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• This PDF catalog has only typical specifications because there is no space for detailed specifications because there is no space for detailed specifications.

# On-Board Type (DC) EMI Suppression Filters (EMIFIL<sup>®</sup>)





Innovator in Electronics

Murata Manufacturing Co., Ltd.

Cat.No.C31E-18

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- For more details, please refer to our website 'Murata's Approach for EU RoHS' (http://www.murata.com/info/rohs.html).



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 OCapacitor Type NFM18C/21C/3DC/41C 90 ORC Combined Type NFR21G 103
 OCapacitor Array Type NFA31C 94 ORC Combined Array Type NFA31G 107 •LC Combined Monolithic Type NFL18ST/18SP/21S — 95 •For Large Current NFM18P/21P/3DP/41P/55P — 109 •LC Combined Array Type NFA18S/21S — 98 •LC Combined Type for Large Current NFE31P/61P — 115 ●LC Combined Wire Wound Type NFW31S — 101 ●LC Combined Type for Large Current NFE61H — 117

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163

_	
Lead Type EMI Suppression Filters (EMIFIL®)	
Ferrite Beads Inductors Part Numbering	EMIGUARD <sup>®</sup> (EMIFIL <sup>®</sup> with Varistor Function) Part Numbering
•BL01/02/03 141	●VFR3V/VFS6V/VFS9V

\_\_\_\_\_136

Chip Common Mode Choke Coils Part Numbering -

•Monolithic Type DLM11G/2HG — 127

Block Type EMIFIL®

•SMD Type BNX022 -

Ferrite Beads Inductors Part Numbering	EMIGUARD <sup>®</sup> (EMIFIL <sup>®</sup> with Varistor Function) Part
•BL01/02/03 141	●VFR3V/VFS6V/VFS9V
Disc Type EMIFIL <sup>®</sup> Part Numbering	Common Mode Choke Coils Part Numbering
•DS $\Box$ 6/Wide frequency DS $\Box$ 9N/Heavy-duty Type DS $\Box$ 9H — 145	•PLT09H

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3



2

BLM21P

1.5-6A 22-330Ω

1206

BLM31P

1.5-6A 33-600 $\Omega$ 

1806

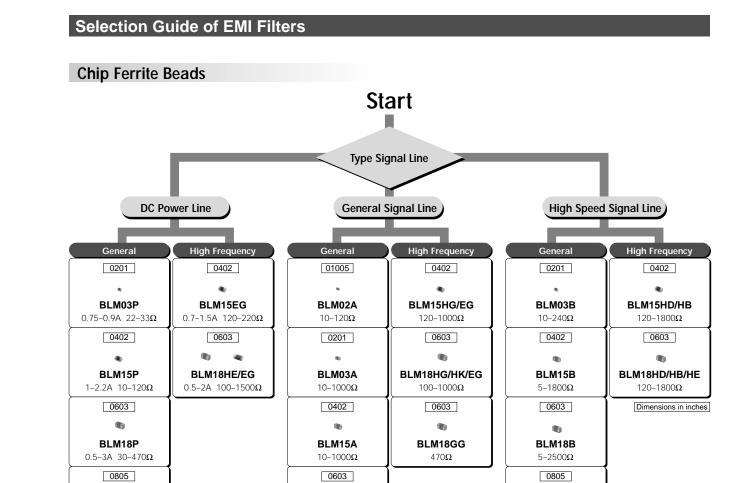
1-6A 60-1000Ω

Low DC Resistance Type
0603

SLM18S

1.5-6A 26-330Ω

BLM41P



BLM18A/T/R

120-1000Ω

0805

.

BLM21A/R

120-1000Ω

Arrays 0804

-

BLA2AA

120–1000**Ω** 

1206

**BLA31A** 30–1000Ω

Impedance is typical value at 100MHz.

BLM21B

5-2700Ω

Arrays

-

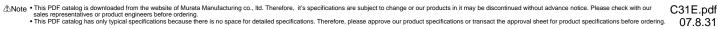
**BLA2AB** 10–1000Ω

1206

144

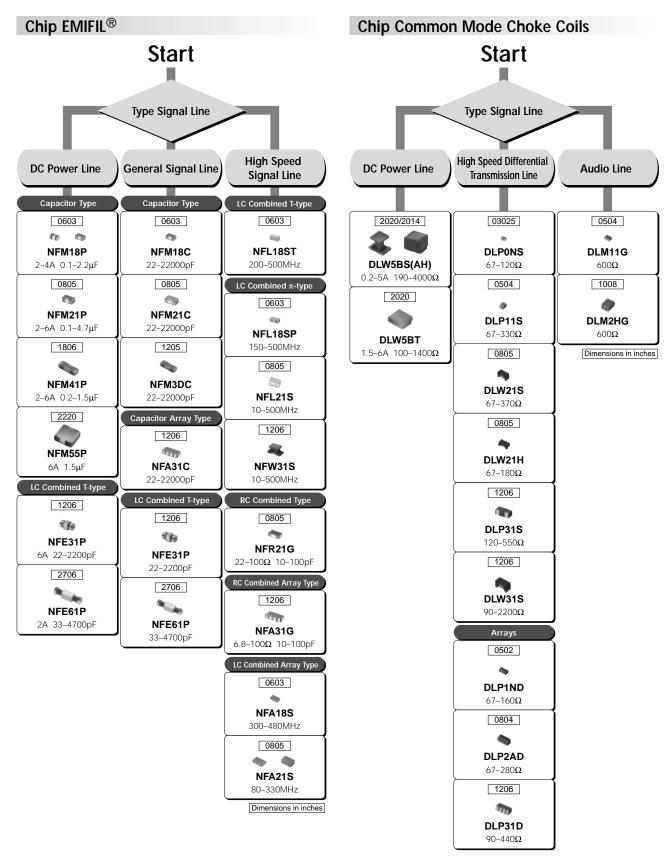
BLA31B

120-1000Ω



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**Selection Guide of EMI Filters** 



Impedance is typical value at 100MHz.



# Product Guide/Effective Frequency Range

### Product Guide

Product Guid	ue		Dime	nsions	Effective Frequency Range
Ту	ype	Series	(mm)	EIA Code	10kHz 100kHz 1MHz 10MHz100MHz 1GHz 10GHz
	or Digital 🔹	BLM18R	1.6 ₩•0.8	0603	
iype ii		BLM21R	2.0 ₩ \$1.25	0805	
S	Standard	BLM02A	0.4	01005	
	•	BLM03A	0.6	0201	
		BLM15A	1.0 = +0.5	0402	
			= •0.5 1.6 ₩ •0.8	0603	
			■ +0.8 1.6 ■ +0.8	0603	-
		BI A2AA	2.0	0805	
	41	(4 circuits array)	2.0 ■ ‡1.0	0804	
	ar Llick	(4 circuits array)	3.2 1.6	1206	
	or High Speed Signals	BLM03B	0.6 • • 0.3	0201	
	10	BLM15B	1.0 ₩•0.5	0402	
	1	BLM18B	1.6 ₩•0.8	0603	
		BLM21B	2.0 ■ \$1.25	0805	
	41	BLA2AB (4 circuits array)	2.0 ■ ‡1.0	0804	
	44	DI AGAD	3.2 1.6	1206	
	or High 😱	BLM03P	0.6	0201	
	٩	BLM15P	1.0 ₩ •0.5	0402	
	16	BLM18P	1.6 ₩•0.8	0603	
		BLM21P	2.0 ₩ \$1.25	0805	
		BLM31P	3.2 \$1.6	1206	
		BLM41P	4.5 \$1.6	1806	
	•	BLM18S (Low DC Resistance Type)	1.6 ₩+0.8	0603	
	For GHz Range		1.0 <b>=</b> +0.5	0402	
N	loise	BLM15HB	1.0 ₩+0.5	0402	
3	Suppression	BLM15HD	1.0 = +0.5	0402	
		BLM15EG	1.0 = +0.5	0402	
	16	BLM18HG	1.6 ■ +0.8	0603	
	10	BLM18HB	1.6 ₩ +0.8	0603	
		BLM18HD	1.6 ₩ +0.8	0603	
	1		1.6 ₩+0.8	0603	
			■ +0.8 1.6 ₩ +0.8	0603	
		BLM18EG	■ +0.8 1.6 ■ +0.8	0603	
		BLM18GG	1.6 ■•0.8	0603	

Continued on the following page.



# Product Guide/Effective Frequency Range

### Continued from the preceding page.

Continued from		51.55		Dime	nsions	Effective Frequency Range
1	Гуре		Series	(mm)	EIA Code	10kHz 100kHz 1MHz 10MHz100MHz 1GHz 10GHz
	Standard Type	0	NFM18C	1.6 ₩•0.8	0603	
ype	Type		NFM21C	2.0 ➡ \$1.25	0805	
			NFM3DC	3.2 11.25	1205	
			NFM41C	4.5 \$1.6	1806	
			NFA31C (4 circuits array)	3.2 ■ 11.6	1206	
	For Signal Lines	ių.	NFL18ST	1.6 ₩ •0.8	0603	
		aigr	NFL18SP	1.6 ₩ •0.8	0603	
			NFL21S	2.0 ₩ 11.25	0805	
		49	NFA18S (4 circuits array)	1.6 <b>■</b> •0.8	0603	
	49	4	NFA21S (4 circuits array)	2.0 ➡ \$1.25	0805	
		4	NFW31S	3.2 11.6	1206	
		•	NFR21G	2.0	0805	
			NFA31G (4 circuits array)	3.2 11.6	1206	
	For High Current	h (h	NFM18P	1.6 ■ •0.8	0603	
		•	NFM21P	2.0 <b>1</b> .25	0805	
		49	NFM3DP	3.2	1205	
			NFM41P	4.5	1806	
	(		NFM55P	5.7	2220	
	T Filter for High Current	1	NFE31P	3.2 11.6	1206	
	J	N. AU	NFE61P(H)	<u>6.8</u> 11.6	2706	
Common Mod Choke Coils	е	39	DLPONS	0.85 • •0.65	03025	
		ø	DLP11S	1.25 ■ ‡1.0	0504	
			DLP31S	3.2 \$1.6	1206	
			DLP1ND	1.5 = \$0.65	0502	
		49	DLP2AD	2.0 ■ ‡1.0	0804	
			DLP31D	3.2 1.6	1206	
			DLM11G	1.25 ■ ‡1.0	0504	
		•	DLM2HG	2.5 \$2.0	1008	
		-	DLW21S	2.0 ■ <b>‡</b> 1.2	0805	
		-	DLW21H	2.0 ■ <b>‡</b> 1.2	0805	
		-	DLW31S	3.2 1.6	1206	
	2		DLW5BS (DLW5AH)	5.0 (3.6)	2020 (2014)	
			DLW5BT	5.0 5.0	2020	

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# Product Guide/Effective Frequency Range

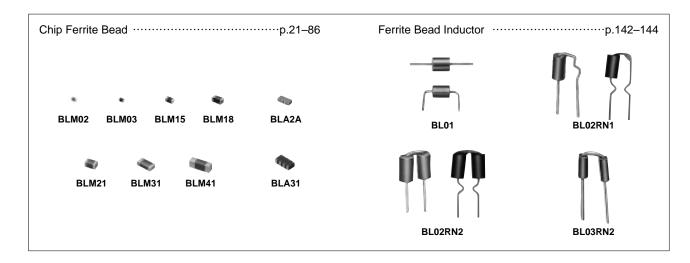
Continued from the preceding page.

Tupo	Series	Dimer	nsions	Effective Frequency Range
Туре	Series	(mm)	EIA Code	10kHz 100kHz 1MHz 10MHz100MHz 1GHz 10GHz
Disc EMIFIL®	BL01/02/03 DSN6/9(H) DSS6/9(H) DST9(H)			
EMIGUARD <sup>®</sup> (EMI Filters with varistor functions)	VFR3V VFS6V/9V			
Block EMIFIL®	BNX022 BNX002/003/005 BNX012/016			
Common Mode Choke Coils	PLT09H			
Microwave Absorbers	EA10/20/21/30			



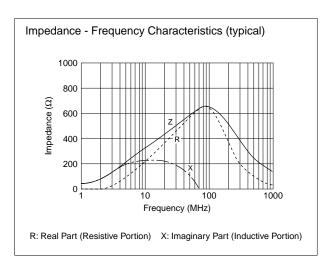
## Outline of EMI Suppression Filters (EMIFIL®) for DC Line

# Chip Ferrite BeadFerrite Bead Inductor



- Chip Ferrite Beads are effective for frequencies ranging from a few MHz to a few GHz. Chip Ferrite Beads are widely used as a low noise countermeasure, as well as a universal noise suppression component.
- Chip Ferrite Beads produce a micro inductance in the low frequency range. At high frequencies, however, the resistive component of the inductor produces the primary impedance. When inserted in series in the noise producing circuit, the resistive impedance of the inductor prevents noise propagation.

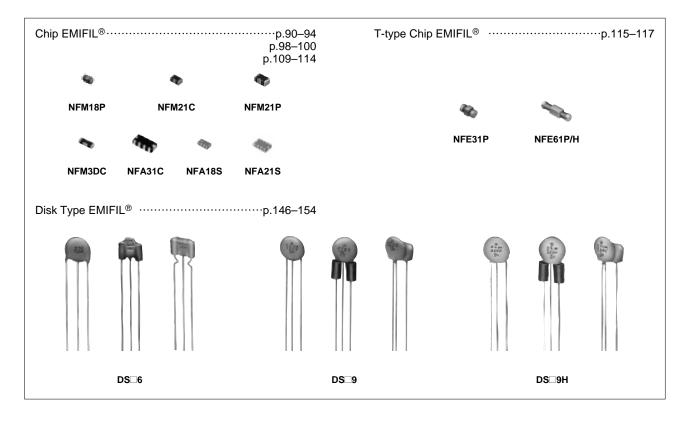
Equivalent Circuit



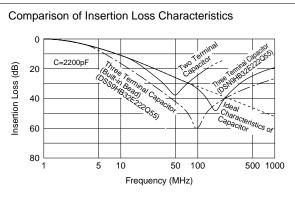


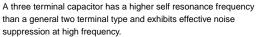
### Outline of EMI Suppression Filters (EMIFIL®) for DC Line

Chip EMIFIL<sup>®</sup>
 T-type Chip EMIFIL<sup>®</sup>
 Disk Type EMIFIL<sup>®</sup>



- This capacitor type EMI suppression filter has a large noise suppression effect at frequencies ranging from a few MHz to hundreds of MHz. This type of filter is used widely as a universal, high performance EMI suppression component.
- The chip EMIFIL<sup>®</sup> incorporates a built-in three terminal capacitor, eliminating the lead wire and thereby increasing the high frequency performance characteristic.
- The T-type chip EMIFIL<sup>®</sup> is a chip EMI suppression filter with a built-in feed-thru capacitor. The use of ferrite beads on input and output terminals minimizes resonance with surrounding circuits.
- Whatever the situation, three terminal construction reduces residual inductance, thereby substantially improving noise suppression at frequencies over 10MHz.



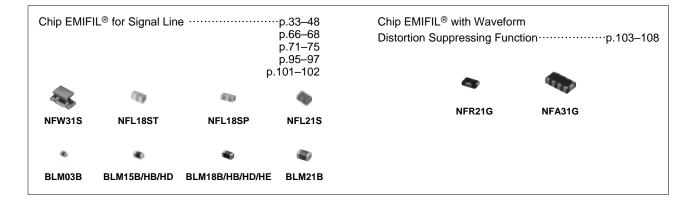




## Outline of EMI Suppression Filters (EMIFIL®) for DC Line

### Chip EMIFIL<sup>®</sup> for Signal Line

Chip EMIFIL<sup>®</sup> with Waveform Distortion Suppressing Function



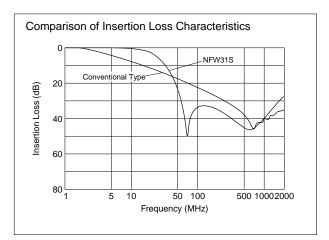
 High-speed signal application EMIFIL<sup>®</sup> are high performance EMI suppression filters which increase the slope of insertion loss frequency characteristic curves (shape factor), thereby improving noise and signal separation. These are used for high speed signal applications in which noise and signal frequency approach the same value.

To avoid the elimination of both the noise and specific signal components, three terminal capacitors and other components are applied.

An NFW31S with a built-in capacitor and an inductor type  $BLM \square B$  are available.

BLM HB/HD has additional performance for suppressing GHz range noise after cut-off frequency.

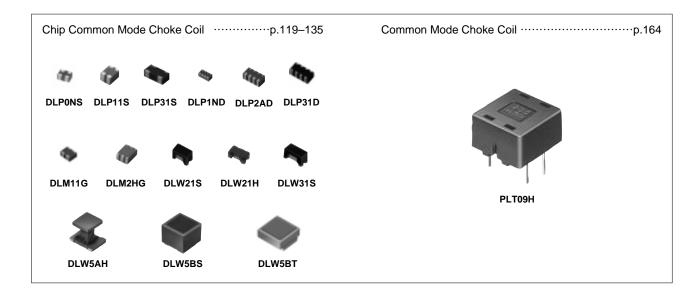
• The EMIFIL<sup>®</sup> with waveform distortion suppressing function suppresses waveform distortion caused by the resonance of digital ICs and surrounding circuits.





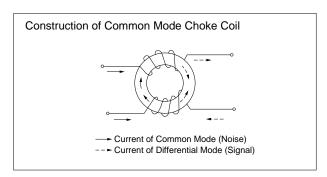
# Outline of EMI Suppression Filters (EMIFIL®) for DC Line

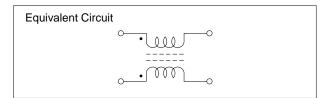
Chip Common Mode Choke CoilCommon Mode Choke Coil

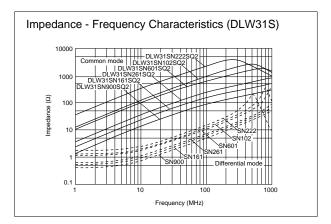


• These choke coils reduce common mode noise, which causes problems on balanced transmission lines, and are effective against common mode noise in the several MHz to several 100MHz frequency range.

They are ideally suited for noise suppression on DC power supply lines and interface cables.



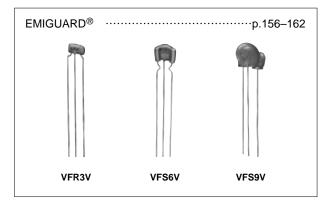




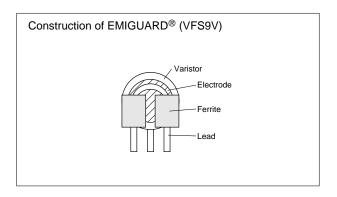


# Outline of EMI Suppression Filters (EMIFIL<sup>®</sup>) for DC Line

#### EMIGUARD<sup>®</sup>



- EMIGUARD<sup>®</sup> eliminates both surge noises and EMI noises due to its dielectric varistor material.
- Effective when high frequency noise and high voltage surge suppression are required, and also in situations when surging starts at extremely high speeds. This type of surging cannot be eliminated with general type varistors.



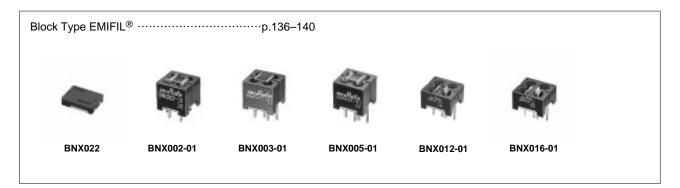
Type of Filter	Surge Absorption Effect of EMIGUARD®
No filter	4kV 500V /div -1kV -1kV -100ns 50ns/div 400ns
Three terminal capacitor is used to suppress the surge.	4kV 500V /div -1kV -100ns 50ns/div 400ns
EMIGUARD <sup>®</sup> is used to suppress the surge. ( <b>VFS6V</b> )	4kV 500V /div -1kV -1kV -100ns 50ns/div 400ns

#### ■Surge Absorption Effect of EMIGUARD<sup>®</sup>

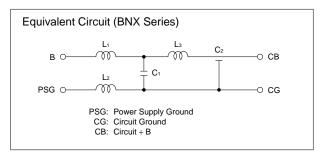


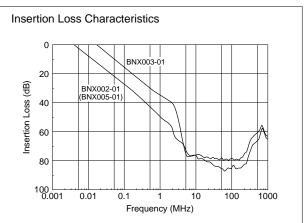
# Outline of EMI Suppression Filters (EMIFIL®) for DC Line

Block Type EMIFIL<sup>®</sup>

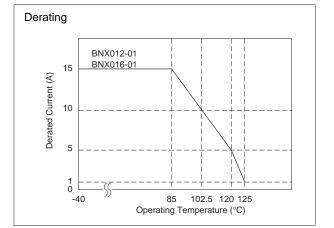


- Block type EMIFIL<sup>®</sup> are resin encased, built-in, high performance EMI suppression filters, which use a feedthru capacitor having excellent high frequency characteristics.
- Used when the noise frequency is high, or when extreme countermeasures are required.
- The high performance EMIFIL<sup>®</sup> BNX series exhibits significant noise suppression effects over a wide frequency band (extending from 100kHz to 1GHz) in DC power lines.





 In operating temperatures exceeding +85°C, derating of current is necessary for BNX010 series. Please apply the derating curve according to the operating temperature.





# On-Board Type (DC) EMI Suppression Filters (EMIFIL®)



# Chip Ferrite Beads Part Numbering

Chip Ferrite Be	eads		
(Part Number)	BL M 18 AG 102		
Product ID			5 Impedance
Product ID			Expressed by t
BL	Chip Ferrite Be	ads	first and secon
			expresses the I
2Туре			6 Electrode
Code	Туре		Expressed by a
Α	Array Type		Ex.) Co
м	Monolithic Ty	ре	S
			A
Oimensions (L	×W)		
Code	Dimensions (L×W)	EIA	Category
02	0.4×0.2mm	01005	Code
03	0.6×0.3mm	0201	N
15	1.0×0.5mm	0402	
18	1.6×0.8mm	0603	8Number of C
2A	2.0×1.0mm	0804	Code
21	2.0×1.25mm	0805	1
31	3.2×1.6mm	1206	4
41	4.5×1.6mm	1806	
•			
Characteristics			
Code *1	Characteristics/	Applications	
AG	for Gener	al Use	BLM02
TG			BLM18
BA			BLM1
BB	for High-speed	Signal Lines	BLM03
BD			BLM03
PD	for Power S	Supplies	BLM1
PG			BLM03
SG	for Power Supplies (Low		BLM18
RK	for Digital I		BLM18
HG	for GHz Band Conservations (		BLM1
EG HB	for GHz Band General Use (L	Low DC Resistance Type)	
HD	 for GHz Band High-s	meed Signal Line	BLM1
HE			DENT
	for Cills Doord Di		

three figures. The unit is in ohm ( $\Omega$ ) at 100MHz. The nd figures are significant digits, and the third figure number of zeros which follow the two figures.

a letter.

Ex.)	Code	Electrode
	S/T	Sn Plating
	Α	Au Plating

Code	Category
N	Standard Type

#### Circuits

Code	Number of Circuits
1	1 Circuit
4	4 Circuits

Code *1	Characteristics/Applications	Series		
AG	for General Use	BLM02/03/15/18/21, BLA2A/31		
TG		BLM18		
BA		BLM15/18		
BB	for High-speed Signal Lines	BLM03/15/18/21, BLA2A		
BD		BLM03/15/18/21, BLA2A/31		
PD	for Dowor Symplico	BLM15		
PG	for Power Supplies	BLM03/15/18/21/31/41		
SG	for Power Supplies (Low DC Resistance Type)	BLM18		
RK	for Digital Interface	BLM18/21		
HG	for GHz Band General Use	BLM15/18		
EG	for GHz Band General Use (Low DC Resistance Type)	BLM13/18		
НВ				
HD	for GHz Band High-speed Signal Line	BLM15/18		
HE				
нк	for GHz Band Digital Interface	BLM18		
GG	for High-GHz Band General Use	DLWIIO		

\*1 Frequency characteristics vary with each code.

Continued on the following page.



Continued from t	he preceding page.	
ickaging		
Code	Packaging	Series
К	Embossed Taping (ø330mm Reel)	DI M04/44/04 *1
L	Embossed Taping (ø180mm Reel)	— BLM31/41/21 *1
В	Bulk	All Series
J	Paper Taping (ø330mm Reel)	BLM03/15/18*3/21*2, BLA2A/31
D	Paper Taping (ø180mm Reel)	BLM02/03/15/18/21 *2, BLA2A/31
С	Bulk Case	BLM15/18

\*1 BLM21BD222SN1/BLM21BD272SN1 only.

\*2 Except BLM21BD222SN1/BLM21BD272SN1

\*3 Except BLM18T



# On-Board Type (DC) EMI Suppression Filters (EMIFIL®)

Chip Ferrite Bead BLM Series

# Essential for Noise Suppression in High Speed Signal Lines and DC Power Lines

The chip ferrite bead BLM series is comprised of ferrite beads in the shape of a chip. This ferrite bead generates a high impedance which at high frequencies mainly consists of a resistance element. BLM series is effective in circuits without stable ground lines because BLM series does not need a connection to ground.

#### Features

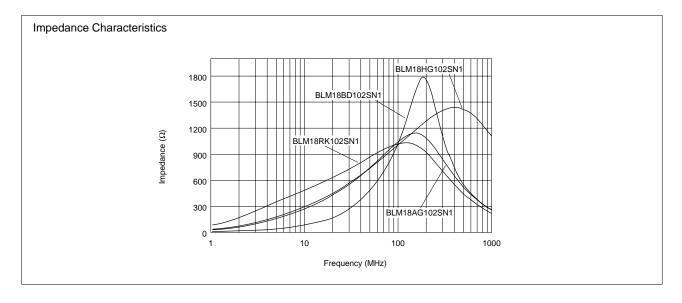
BLM series is comprised of R series (for digital interface), A series (for standard), B series (for high speed signal), P series (for large current), and H/E/G series (for GHz range noise suppression).

- BLM R series For Digital Interface BLM-R series can be used in Digital Interface. Resistance of BLM-R series especially grows in the lower frequency range. Therefore BLM-R series is less effective for digital signal waveform at low frequency range and can suppress the ringing.
- BLM A/T series For General Use BLM-A series generates an impedance from the relatively low frequencies. Therefore BLM-A series is effective in noise suppression in the wide frequency range (30MHz – several hundred MHz).

Chip sizes of 0.6x0.3, 1.0x0.5, 1.6x0.8, 2.0x1.25, 3.2x1.6 and 4.5x1.6mm are cataloged. (BLA series of array type chip ferrite beads is also cataloged.) The nickel barrier structure of the external electrodes provides excellent solder heat resistance.

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- BLM B series For High Speed Signal BLM-B series can minimize attenuation of the signal waveform due to its sharp impedance characteristics. Various impedances are available to match signal frequency.
- BLM P/S series For Large Current BLM-P/S series can be used in high current circuits due to its low DC resistance. It can match power lines to a maximum of 6A DC.
- 5. BLM H/E/G series For GHz Range Noise Suppression BLM H/E/G series has horizontal wire wound structure that minimizes stray capacitance and increases the effective frequency range.





	600	600	600 470	1000 600 470		600 470	600 470	750 600	1000 600	1000						1000 (1.5A)	1000	100
		600						600	600									
		600							600									
			470	470		470	470			600					600 (1.5A)		600	60
								470	470	470			470 (1A)			470 (2A)		47
							420	420										
				1											390 (2A)			39
	240		330	330	240		330	330					330 (1.2A) 330 (1.5A)	330 (1.5A)	( )			33
	2.10	220	220	220	210	220	220	220 200	220	220			220 (1.4A) 220 (2.5A)	220 (2A)			220	22
								200					180 (1.5A)			180 (3A)		
			150	150			150	150										
							140											
120	120	120	120	120	120	120	120	120	120	120		120 (1.3A)	120 (2A) 120 (3A)		120 (3A)		120	12 10
												80 (1.5A)						
					75	75	75	75								75 (3A)		
70	70	70																
							60	60				60 (1.7A)	60 (0.5A)	60 (3A)	50 (0.4)	60 (6A)		
					17	47	47								50 (3A)			
					"'		71				33 (0 75A)		33 (3A)		33 (6A)			
												30 (2.2A)		30 (3A)				
					22	22	22				22 (0.9A)			22 (6A)				
10	10	10			10	10	10					10 (1A)						
						5	5	5										
0402	0603	1005	1608	2012	0603	1005	1608	2012	1608	2012	0603	1005	1608	2012	3216	4516	1005	16
01005	0201	0402	0603	0805	0201	0402	0603	0805	0603	0805	0201	0402	0603	0805	1206	1806	0402	06
-	70 10	70 70 10 10 0402 0603 1005 0201 For 5	70     70     70       10     10     10       0402     0603     1005       01005     0201     0402       For Stance	120         120         120         120           70         70         70         70           10         10         10           0402         0603         1005         1608	120       120       120       120       120         70       70       70       70       10       10         10       10       10       100       1008       2012         1000       0603       1005       1608       2012         1000       0201       0402       0603       0805         For Standard	120       120       120       120       120       120         120       120       120       120       120       120         70       70       70       70       75       75         10       10       70       70       22       10         100       100       1005       1608       2012       0603         1005       0201       0402       0603       0805       0201         For Standard       For Standard	120       120       120       120       120       120       120         70       70       70       70       75       75       75         70       70       70       70       47       47         10       10       10       22       22       10         100       100       1608       2012       0603       1005         1005       0201       0402       0603       0805       0201       0402	120       1	120       120       120       150       150       150       150       140         120       120       120       120       120       120       120       120       120         70       70       70       70       75       75       75       75       75         70       70       70       70       70       70       70       70       70       70       70       75       75       75       75       75       60       60         10	120       120       120       150       150       150       150       150       150       150       120       1	120       120       120       150       150       150       150       150       150       150       120       1	120       120       120       150       150       150       150       150       150       150       120       1	120       120       120       120       150       150       150       150       150       150       150       120       1	120       1	120       120       120       120       150       150       150       150       150       150       150       150       150       150       150       150       150       150       120       1	120       1	120       120       120       150       120	$ \begin{array}{c c c c c c c c c c c c c c c c c c c $

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	Tur	Dert N	Impeda	nce (Ω)	Detect Council (
ize (EIA Code)	) Туре	Part Number	at 100MHz	at 1GHz	Rated Current (mA
		BLM02AG100SN1	10 (Typ.)	-	500
01005	For Standard	BLM02AG700SN1	70±25%	-	250
		BLM02AG121SN1	120±25%	-	200
		BLM03AG100SN1	10 (Typ.)	-	500
		BLM03AG700SN1	70 (Typ.)	-	200
		BLM03AG121SN1	120±25%	-	200
	For Standard	BLM03AG241SN1	240±25%	-	200
		BLM03AG601SN1	600±25%	-	100
		BLM03AG102SN1	1000±25%	-	100
		BLM03BB100SN1	10±25%	-	300
		BLM03BB220SN1	22±25%	-	
0201		BLM03BB470SN1         47±25%		-	200
		BLM03BB750SN1	75±25%	-	
	For High Speed Signal	BLM03BB121SN1	120±25%	-	100
		BLM03BD750SN1	75±25%	-	300
		BLM03BD121SN1	120±25%	-	250
-		BLM03BD241SN1	240±25%	-	200
		BLM03PG220SN1	22±25%	-	900
	For Large Current	BLM03PG330SN1	33±25%	-	750
		BLM15AG100SN1	10 (Typ.)	-	1000
		BLM15AG700SN1	70 (Typ.)	-	1000
		BLM15AG121SN1	120±25%	-	500
		BLM15AG221SN1	220±25%	-	
	For Standard	BLM15AG601SN1	600±25%	-	300
		BLM15AG102SN1	1000±25%	-	200
		BLM15AG601AN1	600±25%	-	300
	-	BLM15AG102AN1	1000±25%	-	200
		BLM15BA050SN1	1000±2070	-	300
	-	BLM15BB050SN1	5±25%	-	500
	-	BLM15BA100SN1		-	300
	-	BLM15BB100SN1	10±25%	-	_
	-	BLM15BA220SN1		-	
	-	BLM15BB220SN1	22±25%	-	
	_	BLM15BA330SN1	33±25%	-	
		BLM15BA470SN1	33±25%	-	200
0402	-	BLM15BB470SN1	47±25%	-	200
0402		BLM15BA750SN1		-	200
	For High Speed Signal (Sharp impedance characteristics)	BLM15BB750SN1	75±25%	-	200
		BLM15BB121SN1	120+25%	-	300
	_	BLM15BB221SN1	120±25% 220±25%		200
	_	BLM15BD750SN1	75±25%		200
	_	BLM15BD121SN1	120±25%		
	-	BLM15BD221SN1	220±25%	-	
	_	BLM15BD471SN1		-	
	–	BLM15BD601SN1	470±25%		
	–	BLM15BD102SN1	600±25%		200
	–	BLM15BD1025N1	1000±25%		100
		BLM15BD1825N1 BLM15PG100SN1	1800±25%		100
	–	BLM15PD300SN1	10 (Typ.)		1000
	For Large Current	BLM15PD600SN1	30±25%		2200*
	For Large Current	BLM15PD800SN1	60±25%	-	1700*
		BLM15PD121SN1	80±25% 120±25%	-	1500*

\* Please see p.56 "Derating of Rated Current".

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ze (EIA Code)		Turno	Part Number	Impeda	ince (Ω)	Rated Current (m	
ze (EIA Coue)		Туре	Part Number	at 100MHz	at 1GHz	Rated Current (in	
		E. Charles I	BLM15HG601SN1	600±25%	1000±40%	300	
		For Standard	BLM15HG102SN1	1000±25%	1400±40%	250	
			BLM15HB121SN1	120±25%	500±40%	300	
			BLM15HB221SN1	220±25%	900±40%	250	
0402	GHz Range	For High Speed	BLM15HD601SN1	600±25%	1400±40%	300	
		Signal	BLM15HD102SN1	1000±25%	2000±40%	250	
			BLM15HD182SN1	1800±25%	2700±40%	200	
		For Standard	BLM15EG121SN1	120±25%	145 (Typ.)	1500*	
		(Low DC Resistance Type)	BLM15EG221SN1	220±25%	270 (Typ.)	700*	
			BLM18AG121SN1	120±25%	-		
			BLM18AG151SN1	150±25%	-		
			BLM18AG221SN1	220±25%	-		
			BLM18AG331SN1	330±25%	-	200	
			BLM18AG471SN1	470±25%	-	-	
	For	Standard	BLM18AG601SN1	600±25%	-	_	
			BLM18AG102SN1	1000±25%	-	100	
		-	BLM18TG121TN1	120±25%	-		
		-	BLM18TG221TN1	220±25%	-	200	
			BLM18TG601TN1	600±25%	-	-	
			BLM18TG102TN1	1000±25%	-	100	
			BLM18BA050SN1	1000_2070	-	500	
			BLM18BB050SN1	5±25%		700	
	-		BLM18BA100SN1		-	100	
			BLM18BB100SN1	10±25%		-	
			BLM18BA220SN1			500	
			BLM18BB220SN1	22±25%		-	
			BLM18BA470SN1		-	300	
			BLM18BB470SN1	47±25%		500	
			BLM18BB600SN1	60±25%	-	200	
			BLM18BA750SN1	00123%	-		
		-	BLM18BB750SN1	75±25%		300	
		-	BLM18BA121SN1		-	200	
0603			BLM18BB121SN1	400+05%	-	_	
		-		120±25%	-	_	
		-	BLM18BD121SN1		-	_	
		n Speed Signal ance characteristics)	BLM18BB141SN1	140±25%	-	_	
	(Sharp impedi		BLM18BB151SN1	150±25%	-		
		-	BLM18BD151SN1		-	200	
		-	BLM18BB221SN1	220±25%	-	_	
		_	BLM18BD221SN1		-	_	
			BLM18BB331SN1	330±25%	-	_	
			BLM18BD331SN1		-	_	
			BLM18BD421SN1	420±25%	-		
			BLM18BB471SN1	470±25%	-	50	
			BLM18BD471SN1		-	200	
			BLM18BD601SN1	600±25%	-	200	
			BLM18BD102SN1	1000±25%	-	100	
			BLM18BD152SN1	1500±25%	-	4	
			BLM18BD182SN1	1800±25%	-	50	
			BLM18BD222SN1	2200±25%	-		
			BLM18BD252SN1	2500±25%	-		
			BLM18RK121SN1	120±25%	-	_	
			BLM18RK221SN1	220±25%	-		
	For Dig	gital Interface	BLM18RK471SN1	470±25%	-	200	
			BLM18RK601SN1	600±25%	-	200	
				00012070		-	

\* Please see p.70 "Derating of Rated Current".

Continued on the following page.  $\square$ 



18

	om the preceding			Impeda	ance (Ω)			
Size (inches)		Туре	Part Number	at 100MHz	at 1GHz	Rated Current (mA)		
			BLM18PG300SN1	30 (Typ.)	-	1000		
			BLM18PG330SN1	33±25%	-	3000*		
			BLM18PG600SN1	60 (Typ.)	-	500		
			BLM18PG121SN1	120±25%	-	2000*		
		For Standard	BLM18PG181SN1	180±25%	-	1500*		
			BLM18PG221SN1	220±25%	-	1400*		
	For Large Current		BLM18PG331SN1	330±25%	-	1200*		
	Current		BLM18PG471SN1	471±25%	-	1000		
			BLM18SG260TN1	26±25%	-	6000*		
		For Standard	BLM18SG700TN1	70±25%	-	4000*		
		(Low DC	BLM18SG121TN1	120±25%	-	3000*		
		Resistance Type)	BLM18SG221TN1	220±25%	-	2500*		
			BLM18SG331TN1	330±25%	-	1500*		
			BLM18HG471SN1	470±25%	600 (Typ.)	000		
		For Standard	BLM18HG601SN1	600±25%	700 (Typ.)	200		
			BLM18HG102SN1	1000±25%	1000 (Typ.)	100		
			BLM18HB121SN1	120±25%	500±40%	200		
			BLM18HB221SN1	220±25%	1100±40%	100		
		For High Speed Signal	BLM18HB331SN1	330±25%	1600±40%	50		
0603			BLM18HD471SN1	470±25%	1000 (Typ.)	400		
			0.	BLM18HD601SN1	600±25%	1200 (Typ.)	100	
				BLM18HD102SN1	1000±25%	1700 (Typ.)	50	
			BLM18HE601SN1	600±25%	600 (Typ.)	800*		
			-		BLM18HE102SN1	1000±25%	1000 (Typ.)	600*
			BLM18HE152SN1	1500±25%	1500 (Typ.)	500*		
	GHz Range		BLM18HK331SN1	330±25%	400±40%	200		
		For Digital	BLM18HK471SN1	470±25%	600±40%	200		
		Interface	BLM18HK601SN1	600±25%	700±40%	100		
			BLM18HK102SN1	1000±25%	1200±40%	50		
			BLM18EG101TN1	100±25%	140 (Typ.)	2000*		
			BLM18EG121SN1	120±25%	145 (Typ.)	2000*		
			BLM18EG221TN1	220 1 25%	300 (Typ.)	1000		
		For Standard	BLM18EG221SN1	220±25%	260 (Typ.)	2000*		
		(Low DC	BLM18EG331TN1	330±25%	450 (Typ.)	500		
		Resistance Type)	BLM18EG391TN1	390±25%	520 (Typ.)	500		
			BLM18EG471SN1	470±25%	550 (Typ.)	500		
			BLM18EG601SN1	600±25%	700 (Typ.)	500		
			BLM18GG471SN1	470±25%	1800±30%	200		

\* Please see p.65, p.75, p.77 "Derating of Rated Current".

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	-		Impeda	nce (Ω)	D.L. LO.
ize (inches)	Туре	Part Number	at 100MHz	at 1GHz	Rated Current (m
		BLM21AG121SN1	120±25%	-	
		BLM21AG151SN1	150±25%	-	
		BLM21AG221SN1	220±25%	-	
	For Standard	BLM21AG331SN1	330±25%	-	200
		BLM21AG471SN1	470±25%	-	_
		BLM21AG601SN1	600±25%	-	_
		BLM21AG102SN1	1000±25%	-	_
		BLM21BB050SN1	5±25%	-	500
		BLM21BB600SN1	60±25%	-	
		BLM21BB750SN1	75±25%	-	
	-	BLM21BB121SN1		-	
		BLM21BD121SN1	120±25%	-	
		BLM21BB151SN1		-	
		BLM21BD151SN1	150±25%	-	
		BLM21BB201SN1	200±25%	-	
		BLM21BB221SN1	20012378	-	
		BLM21BD221SN1	220±25%		_
	For High Speed Signal	BLM21BB331SN1		-	
			330±25%	-	
	(Sharp impedance characteristics)	BLM21BD331SN1	100.070/	-	200
0805	. –	BLM21BD421SN1	420±25%	-	_
		BLM21BB471SN1	470±25%	-	-
		BLM21BD471SN1		-	
		BLM21BD601SN1	600±25%	-	
	-	BLM21BD751SN1	750±25%	-	
		BLM21BD102SN1	1000±25%	-	
		BLM21BD152SN1	1500±25%	-	
		BLM21BD182SN1	1800±25%	-	_
		BLM21BD222SN1	2250 (Тур.)	-	
		BLM21BD222TN1	2200±25%	-	_
		BLM21BD272SN1	2700±25%	-	
		BLM21RK121SN1	120±25%	-	
		BLM21RK221SN1	220±25%	-	
	For Digital Interface	BLM21RK471SN1	470±25%	-	200
		BLM21RK601SN1	600±25%	-	
		BLM21RK102SN1	1000±25%	-	
		BLM21PG220SN1	22±25%	-	6000*
		BLM21PG300SN1	30 (Тур.)	-	2000*
	For Large Current	BLM21PG600SN1	60±25%	-	3000*
		BLM21PG221SN1	220±25%	-	2000*
		BLM21PG331SN1	330±25%	-	1500*
		BLM31PG330SN1	33±25%	-	6000*
		BLM31PG500SN1	50 (Typ.)	-	
1206	For Large Current	BLM31PG121SN1	120±25%	-	3000*
		BLM31PG391SN1	390±25%	-	2000*
		BLM31PG601SN1	600±25%	-	1500*
		BLM41PG600SN1	60 (Typ.)	-	6000*
		BLM41PG750SN1	75 (Typ.)	-	3000*
1806	For Large Current	BLM41PG181SN1	180±25%	-	3000*
		BLM41PG471SN1	470±25%	-	2000*
		BLM41PG102SN1	1000±25%	-	1500*

\* Please see p.65 "Derating of Rated Current".



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# On-Board Type (DC) EMI Suppression Filters (EMIFIL®)



# Chip Ferrite Beads BLM02/03/15/18/21/31/41 Series

#### Features (BLM\_A Series)

The chip ferrite beads BLM series is designed to function nearly as a resistor at noise frequencies, which greatly reduces the possibility of resonance and leaves signal wave forms undistorted. BLM series is effective in circuits without stable

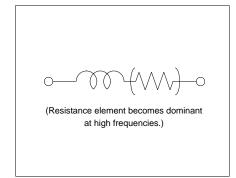
ground lines because BLM series does not need a connection to ground.

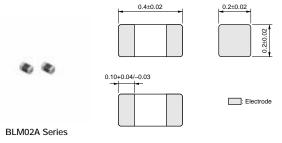
The nickel barrier structure of the external electrodes provides excellent solder heat resistance. BLM\_A series generates an impedance from the relatively low frequencies. Therefore BLM\_A series is effective in noise suppression in a wide frequency range (30MHz to several hundred MHz).

The small size of BLM02A series (0.4x0.2mm) is suitable for noise suppression in small equipment such as PA modules for cellular phones.

### BLM02A Series (01005 Size)



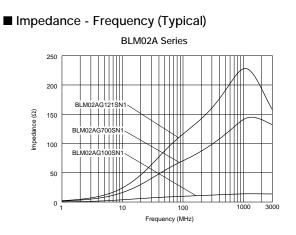




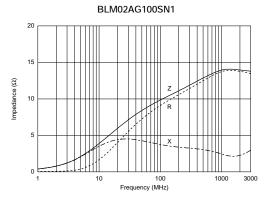
(in mm)

Part Number	Impedance (at 100MHz/20°C) (ohm)	Rated Current (mA)	DC Resistance (max.) (ohm)	Operating Temperature Range (°C)
BLM02AG100SN1	10 (Тур.)	500	0.1	-55 to +125
BLM02AG700SN1	70 ±25%	250	0.5	-55 to +125
BLM02AG121SN1	120 ±25%	200	0.8	-55 to +125

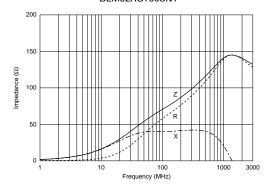


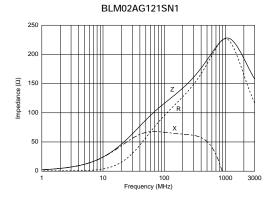


■ Impedance - Frequency Characteristics



BLM02AG700SN1







### BLM03A Series (0201 Size)



0.6±0.03

0.15±0.05

(in mm)

: electrode

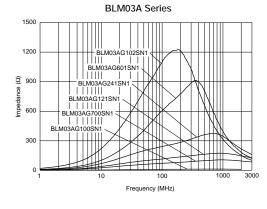
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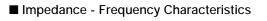
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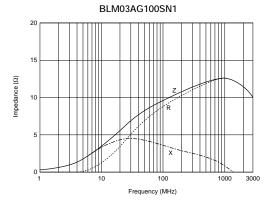
0.3±0.03

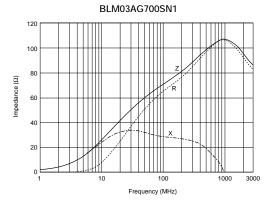
Part Number	Impedance (at 100MHz/20°C) (ohm)	Rated Current (mA)	DC Resistance (max.) (ohm)	Operating Temperature Range (°C)
BLM03AG100SN1	10 (Тур.)	500	0.1	-55 to +125
BLM03AG700SN1	70 (Тур.)	200	0.4	-55 to +125
BLM03AG121SN1	120 ±25%	200	0.5	-55 to +125
BLM03AG241SN1	240 ±25%	200	0.8	-55 to +125
BLM03AG601SN1	600 ±25%	100	1.5	-55 to +125
BLM03AG102SN1	1000 ±25%	100	2.5	-55 to +125

■ Impedance - Frequency (Typical)



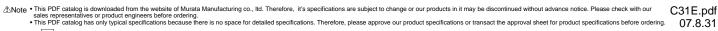




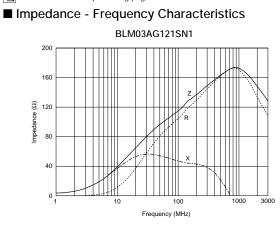


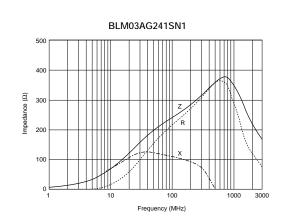
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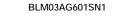


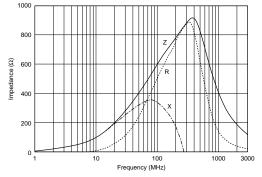


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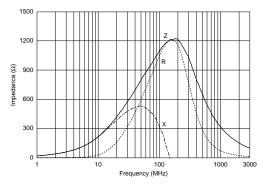


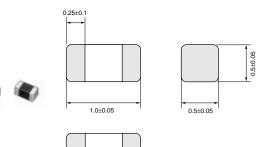




BLM15A Series (0402 Size)

BLM03AG102SN1



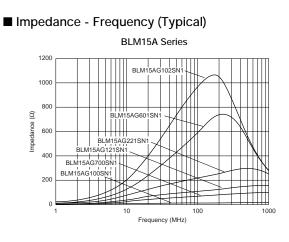


**BLM15A Series** 

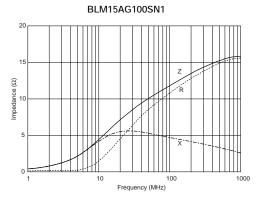
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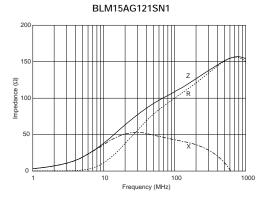
Part Number	Impedance (at 100MHz/20°C) (ohm)	Rated Current (mA)	DC Resistance (max.) (ohm)	Operating Temperature Range (°C)
BLM15AG100SN1	10 (Тур.)	1000	0.05	-55 to +125
BLM15AG700SN1	70 (Тур.)	500	0.15	-55 to +125
BLM15AG121SN1	120 ±25%	500	0.25	-55 to +125
BLM15AG221SN1	220 ±25%	300	0.35	-55 to +125
BLM15AG601SN1	600 ±25%	300	0.6	-55 to +125
BLM15AG102SN1	1000 ±25%	200	1.0	-55 to +125

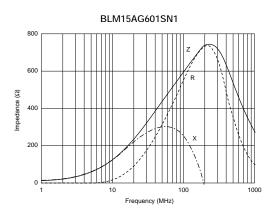




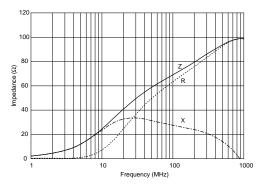
■ Impedance - Frequency Characteristics



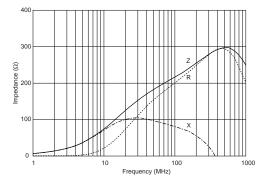


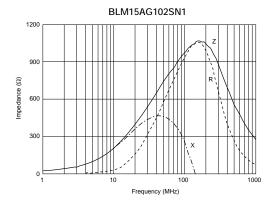


BLM15AG700SN1



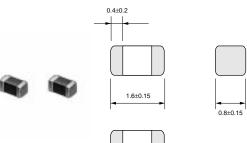
BLM15AG221SN1



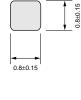




### BLM18A Series (0603 Size)

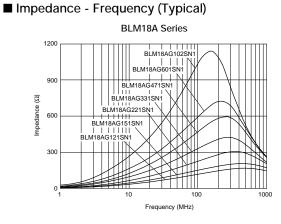




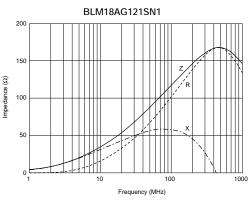


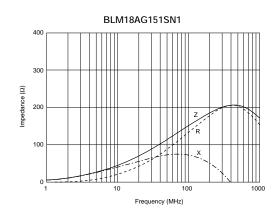
(in mm)

Part Number	Impedance (at 100MHz/20°C) (ohm)	Rated Current (mA)	DC Resistance (max.) (ohm)	Operating Temperature Range (°C)
BLM18AG121SN1	120 ±25%	200	0.20	-55 to +125
BLM18AG151SN1	150 ±25%	200	0.25	-55 to +125
BLM18AG221SN1	220 ±25%	200	0.30	-55 to +125
BLM18AG331SN1	330 ±25%	200	0.45	-55 to +125
BLM18AG471SN1	470 ±25%	200	0.50	-55 to +125
BLM18AG601SN1	600 ±25%	200	0.50	-55 to +125
BLM18AG102SN1	1000 ±25%	100	0.70	-55 to +125

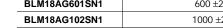


■ Impedance - Frequency Characteristics

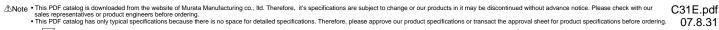




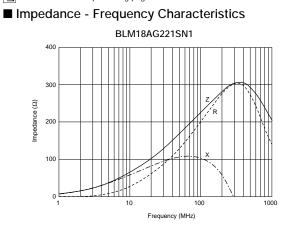
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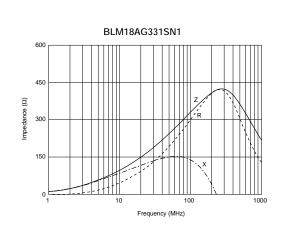


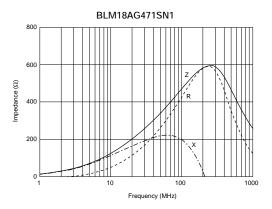


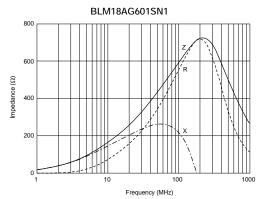


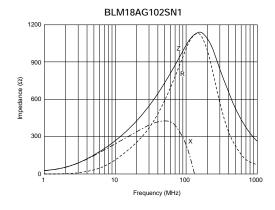
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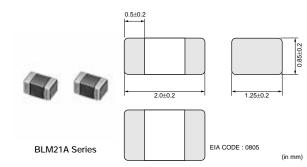




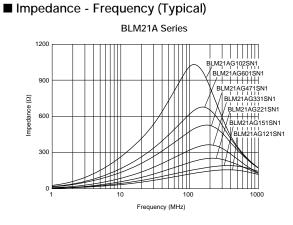


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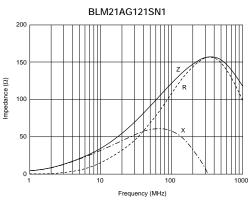
### BLM21A Series (0805 Size)

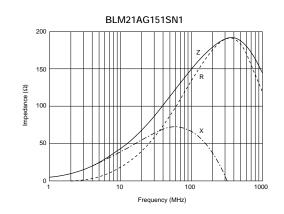


Part Number	Impedance (at 100MHz/20°C) (ohm)	Rated Current (mA)	DC Resistance (max.) (ohm)	Operating Temperature Range (°C)
BLM21AG121SN1	120 ±25%	200	0.15	-55 to +125
BLM21AG151SN1	150 ±25%	200	0.15	-55 to +125
BLM21AG221SN1	220 ±25%	200	0.20	-55 to +125
BLM21AG331SN1	330 ±25%	200	0.25	-55 to +125
BLM21AG471SN1	470 ±25%	200	0.25	-55 to +125
BLM21AG601SN1	600 ±25%	200	0.30	-55 to +125
BLM21AG102SN1	1000 ±25%	200	0.45	-55 to +125



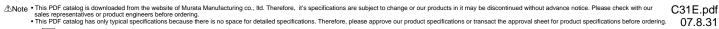
■ Impedance - Frequency Characteristics



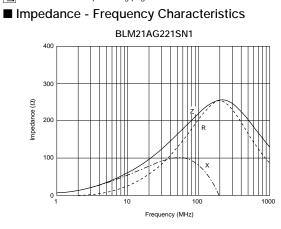


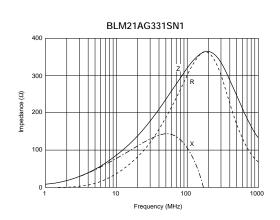
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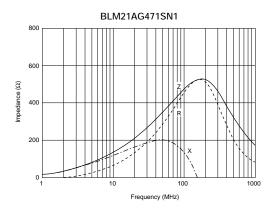


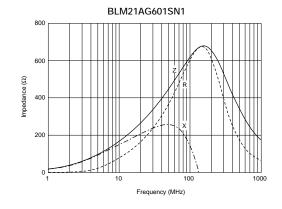


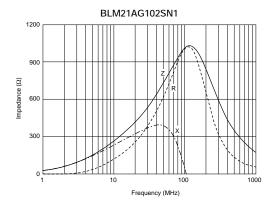
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## BLM15A Series Gold Plating (0402 Size)

#### Features

1

- 1. Au plating for wire bonding mounting
- BLM\_A series generates an impedance from the relatively low frequencies. Therefore BLM\_A series is effective in noise suppression in a wide frequency range (30MHz to several hundred MHz).

#### Applications

- 1. Optical transceiver modules
- 2. Optical pickup modules

BLM15A Series (gold plating) 0.25±0.

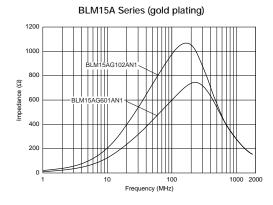
1.0±0.05

0.5±0.05

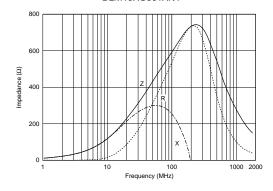
(in mm)

Part Number	Impedance (at 100MHz/20°C) (ohm)	Rated Current (mA)	DC Resistance (max.) (ohm)	Operating Temperature Range (°C)
BLM15AG601AN1	600 ±25%	300	0.6	-55 to +125
BLM15AG102AN1	1000 ±25%	200	1.0	-55 to +125

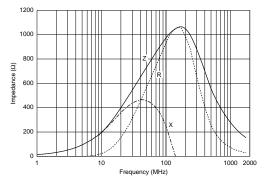
#### ■ Impedance - Frequency (Typical)



■ Impedance - Frequency Characteristics BLM15AG601AN1



BLM15AG102AN1





### BLM18T Series (0603 Size)

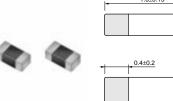
#### Features

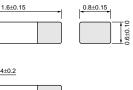
The chip ferrite beads BLM series is designed to function nearly as a resistor at noise frequencies, which greatly reduces the possibility of resonance and leaves signal wave forms undistorted.

BLM series is effective in circuits without stable ground lines because BLM series does not need a connection to ground.

The nickel barrier structure of the external electrodes provides excellent solder heat resistance. BLM\_T series generates an impedance from the relatively low frequencies. Therefore BLM\_T series is effective in noise suppression in a wide frequency range (10MHz to several hundred MHz).

BLM\_T series contributes further to miniaturizing portable equipment.





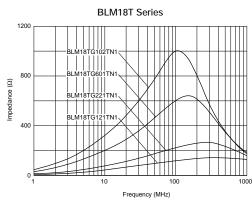
BLM18T Series

(in mm)

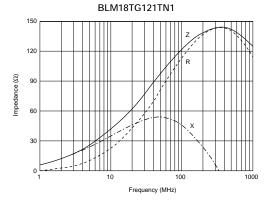
: Electrode

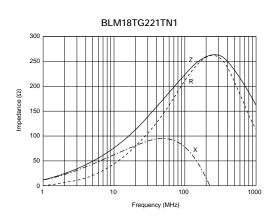
Impedance (at 100MHz/20°C) (ohm)	Rated Current (mA)	DC Resistance (max.) (ohm)	Operating Temperature Range (°C)
120 ±25%	200	0.25	-55 to +125
220 ±25%	200	0.30	-55 to +125
600 ±25%	200	0.45	-55 to +125
1000 ±25%	100	0.60	-55 to +125
	(at 10bMHz/20°C) (ohm) 120 ±25% 220 ±25% 600 ±25%	(at 10bMHz/20°C) (ohm)         Rated current (mA)           120 ±25%         200           220 ±25%         200           600 ±25%         200	(at 10bMHz/20°C) (ohm)         Rated current (mA)         Do Resistance (max.) (ohm)           120 ±25%         200         0.25           220 ±25%         200         0.30           600 ±25%         200         0.45

### ■ Impedance - Frequency (Typical)



# Impedance - Frequency Characteristics



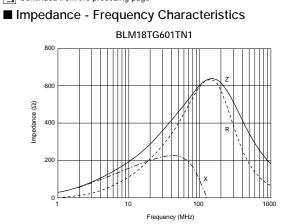


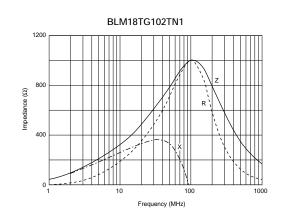
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### ■ Features (BLM\_B Series)

The chip ferrite beads BLM series is designed to function nearly as a resistor at noise frequencies, which greatly reduces the possibility of resonance and leaves signal wave forms undistorted. BLM series is effective in circuits without stable ground lines because BLM series does not need a connection to ground.

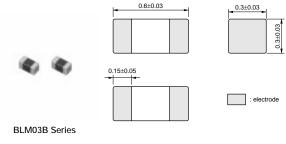
The nickel barrier structure of the external electrodes provides excellent solder heat resistance. BLM\_B series can minimize attenuation of the signal waveform due to its sharp impedance characteristics. Various impedances are available to match signal frequency.

The small size of BLM03B series (0.6x0.3mm) is suitable for advanced high-density mounting, and is followed on a miniaturization of digital equipment, or module of a functional portion.

### BLM03B Series (0201 Size)

### Equivalent Circuit

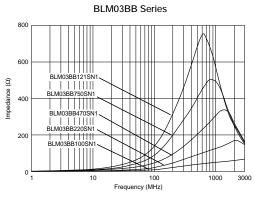
(Resistance element becomes dominant at high frequencies.)

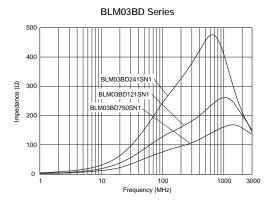


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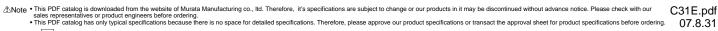
Part Number	Impedance (at 100MHz/20°C) (ohm)	Rated Current (mA)	DC Resistance (max.) (ohm)	Operating Temperature Range (°C)
BLM03BB100SN1	10 ±25%	300	0.4	-55 to +125
BLM03BB220SN1	22 ±25%	200	0.5	-55 to +125
BLM03BB470SN1	47 ±25%	200	0.7	-55 to +125
BLM03BB750SN1	75 ±25%	200	1.0	-55 to +125
BLM03BD750SN1	75 ±25%	300	0.4	-55 to +125
BLM03BB121SN1	120 ±25%	100	1.5	-55 to +125
BLM03BD121SN1	120 ±25%	250	0.5	-55 to +125
BLM03BD241SN1	240 ±25%	200	0.8	-55 to +125



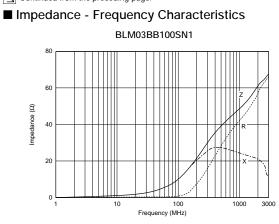


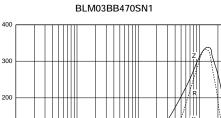


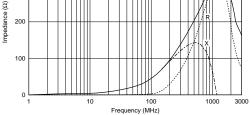


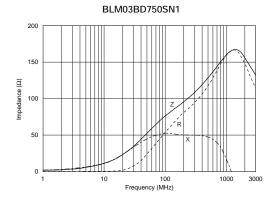


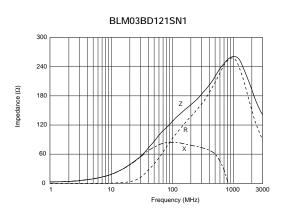
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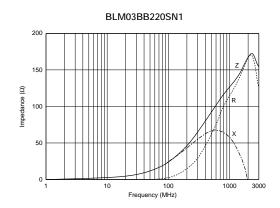




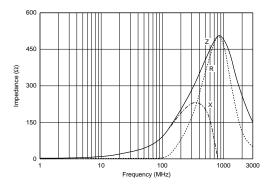




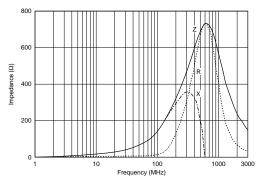




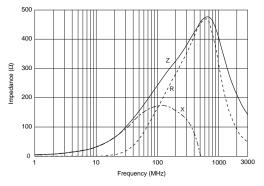
BLM03BB750SN1



BLM03BB121SN1



BLM03BD241SN1

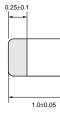




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# BLM15B Series (0402 Size)



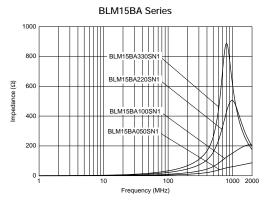


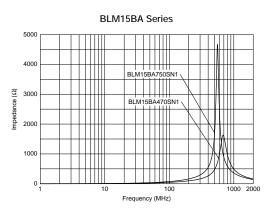


(in mm)

Part Number	Impedance (at 100MHz/20°C) (ohm)	Rated Current (mA)	DC Resistance (max.) (ohm)	Operating Temperature Range (°C)
BLM15BA050SN1	5 ±25%	300	0.10	-55 to +125
BLM15BB050SN1	5 ±25%	500	0.08	-55 to +125
BLM15BA100SN1	10 ±25%	300	0.20	-55 to +125
BLM15BB100SN1	10 ±25%	300	0.10	-55 to +125
BLM15BA220SN1	22 ±25%	300	0.30	-55 to +125
BLM15BB220SN1	22 ±25%	300	0.20	-55 to +125
BLM15BA330SN1	33 ±25%	300	0.40	-55 to +125
BLM15BA470SN1	47 ±25%	200	0.60	-55 to +125
BLM15BB470SN1	47 ±25%	300	0.35	-55 to +125
BLM15BA750SN1	75 ±25%	200	0.80	-55 to +125
BLM15BB750SN1	75 ±25%	300	0.40	-55 to +125
BLM15BD750SN1	75 ±25%	300	0.20	-55 to +125
BLM15BB121SN1	120 ±25%	300	0.55	-55 to +125
BLM15BD121SN1	120 ±25%	300	0.30	-55 to +125
BLM15BB221SN1	220 ±25%	200	0.80	-55 to +125
BLM15BD221SN1	220 ±25%	300	0.40	-55 to +125
BLM15BD471SN1	470 ±25%	200	0.60	-55 to +125
BLM15BD601SN1	600 ±25%	200	0.65	-55 to +125
BLM15BD102SN1	1000 ±25%	200	0.90	-55 to +125
BLM15BD182SN1	1800 ±25%	100	1.40	-55 to +125





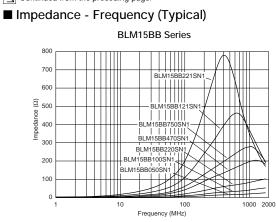


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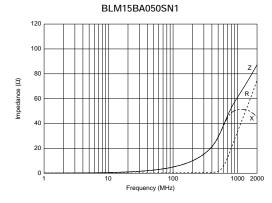


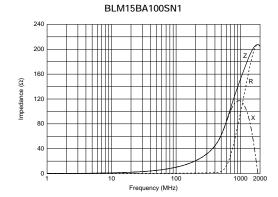


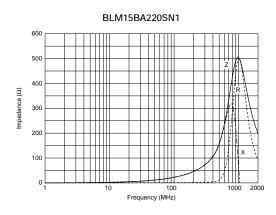


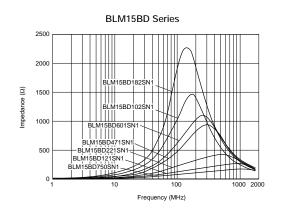


■ Impedance - Frequency Characteristics

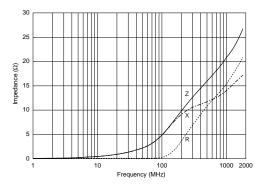




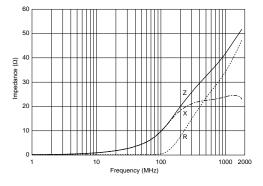




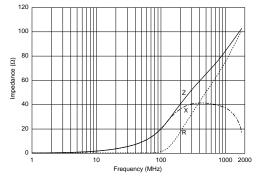
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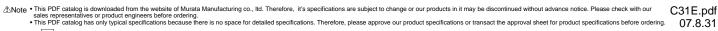
BLM15BB100SN1



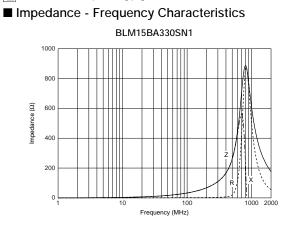
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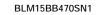


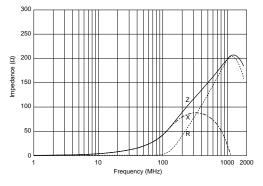


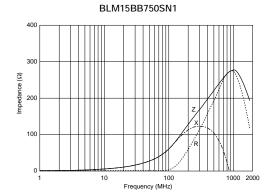


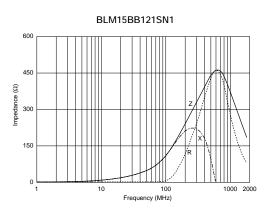


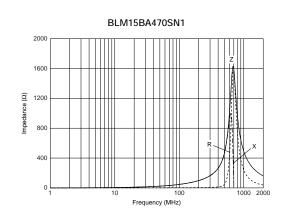




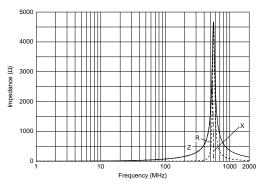


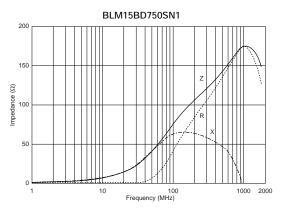


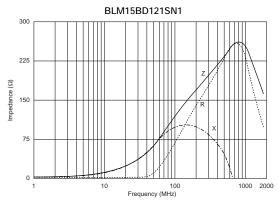




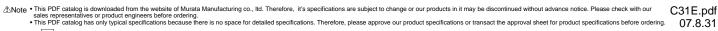
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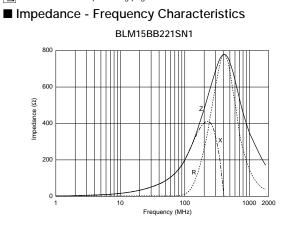


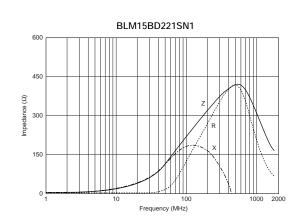


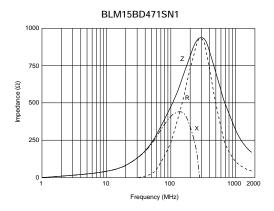


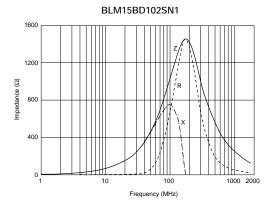


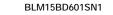


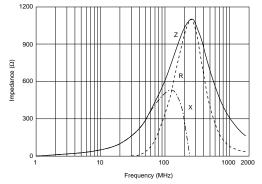




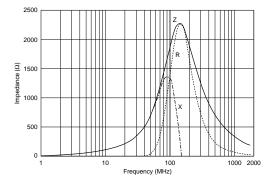








BLM15BD182SN1

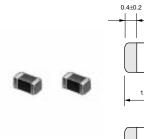


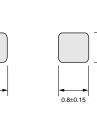


BLM18BA121SN1	120 ±25%	200	0.90	-55 to +125
BLM18BB121SN1	120 ±25%	200	0.50	-55 to +125
BLM18BD121SN1	120 ±25%	200	0.40	-55 to +125
BLM18BB141SN1	140 ±25%	200	0.55	-55 to +125
BLM18BB151SN1	150 ±25%	200	0.55	-55 to +125
BLM18BD151SN1	150 ±25%	200	0.40	-55 to +125
BLM18BB221SN1	220 ±25%	200	0.65	-55 to +125
BLM18BD221SN1	220 ±25%	200	0.45	-55 to +125
BLM18BB331SN1	330 ±25%	200	0.75	-55 to +125
BLM18BD331SN1	330 ±25%	200	0.50	-55 to +125
BLM18BD421SN1	420 ±25%	200	0.55	-55 to +125
BLM18BB471SN1	470 ±25%	50	1.00	-55 to +125
BLM18BD471SN1	470 ±25%	200	0.55	-55 to +125
BLM18BD601SN1	600 ±25%	200	0.65	-55 to +125
BLM18BD102SN1	1000 ±25%	100	0.85	-55 to +125
BLM18BD152SN1	1500 ±25%	50	1.20	-55 to +125
BLM18BD182SN1	1800 ±25%	50	1.50	-55 to +125
BLM18BD222SN1	2200 ±25%	50	1.50	-55 to +125
BLM18BD252SN1	2500 ±25%	50	1.50	-55 to +125

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• This PDF catalog has only typical specifications because there is no space for detailed specifications. Therefore, please approve our product specifications or transact the approval sheet for product specifications before	re ordering.

# BLM18B Series (0603 Size)





1.6±0.15

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0.8±0.15

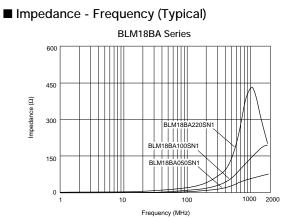
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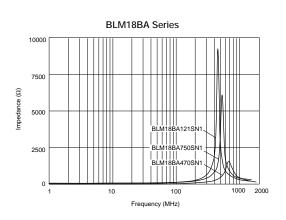
BLM18B Series

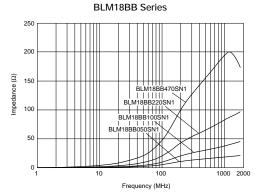
(in mm)

Part Number	Impedance (at 100MHz/20°C) (ohm)	Rated Current (mA)	DC Resistance (max.) (ohm)	Operating Temperature Range (°C)
BLM18BA050SN1	5 ±25%	500	0.20	-55 to +125
BLM18BB050SN1	5 ±25%	700	0.10	-55 to +125
BLM18BA100SN1	10 ±25%	500	0.25	-55 to +125
BLM18BB100SN1	10 ±25%	500	0.15	-55 to +125
BLM18BA220SN1	22 ±25%	500	0.35	-55 to +125
BLM18BB220SN1	22 ±25%	500	0.25	-55 to +125
BLM18BA470SN1	47 ±25%	300	0.55	-55 to +125
BLM18BB470SN1	47 ±25%	500	0.30	-55 to +125
BLM18BB600SN1	60 ±25%	200	0.35	-55 to +125
BLM18BA750SN1	75 ±25%	300	0.70	-55 to +125
BLM18BB750SN1	75 ±25%	200	0.35	-55 to +125
BLM18BA121SN1	120 ±25%	200	0.90	-55 to +125
BLM18BB121SN1	120 ±25%	200	0.50	-55 to +125
BLM18BD121SN1	120 ±25%	200	0.40	-55 to +125
BLM18BB141SN1	140 ±25%	200	0.55	-55 to +125
BLM18BB151SN1	150 ±25%	200	0.55	-55 to +125
BLM18BD151SN1	150 ±25%	200	0.40	-55 to +125
BLM18BB221SN1	220 ±25%	200	0.65	-55 to +125
BLM18BD221SN1	220 ±25%	200	0.45	-55 to +125
BLM18BB331SN1	330 ±25%	200	0.75	-55 to +125
BLM18BD331SN1	330 ±25%	200	0.50	-55 to +125
BLM18BD421SN1	420 ±25%	200	0.55	-55 to +125
BLM18BB471SN1	470 ±25%	50	1.00	-55 to +125
BLM18BD471SN1	470 ±25%	200	0.55	-55 to +125
BLM18BD601SN1	600 ±25%	200	0.65	-55 to +125
BLM18BD102SN1	1000 ±25%	100	0.85	-55 to +125
BLM18BD152SN1	1500 ±25%	50	1.20	-55 to +125
BLM18BD182SN1	1800 ±25%	50	1.50	-55 to +125
BLM18BD222SN1	2200 ±25%	50	1.50	-55 to +125
BLM18BD252SN1	2500 ±25%	50	1.50	-55 to +125

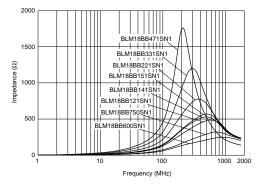


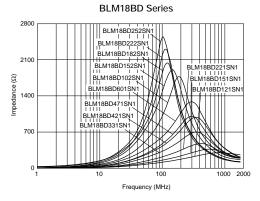


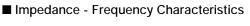


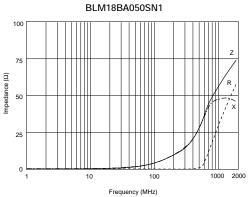


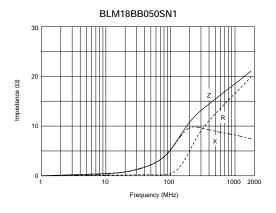
**BLM18BB** Series







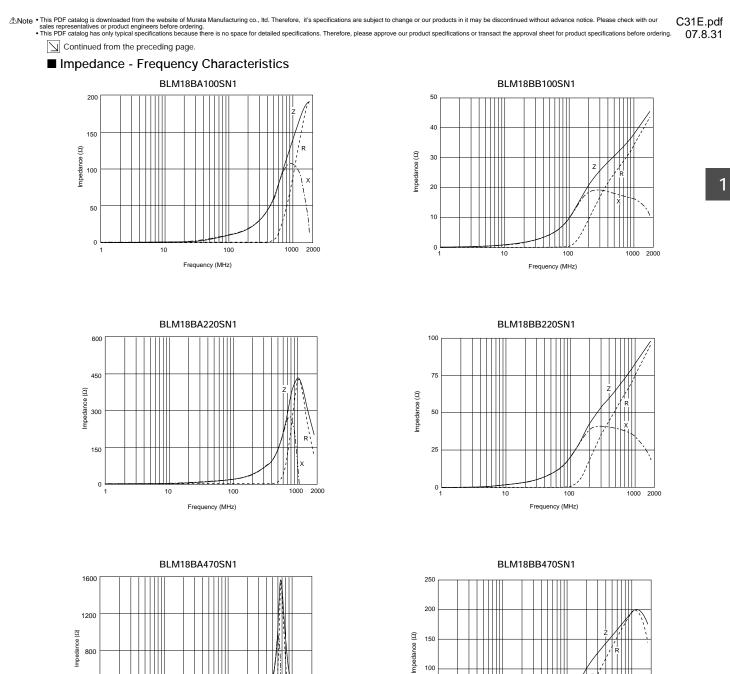


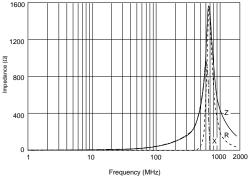


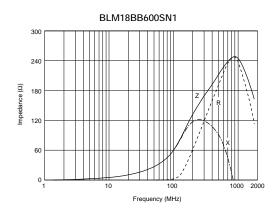
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BLM18BA750SN1

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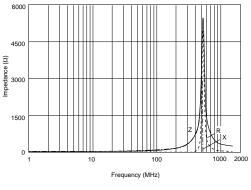
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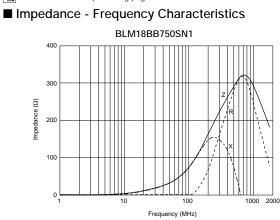
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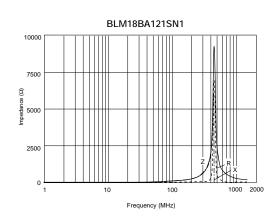
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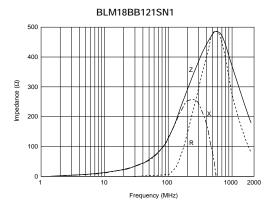


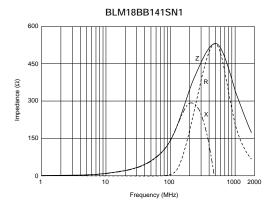
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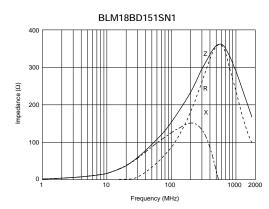


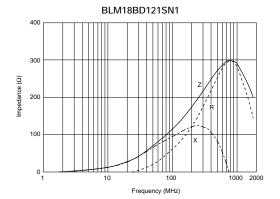


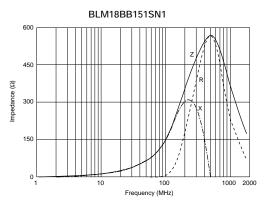


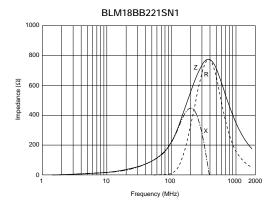




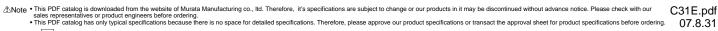




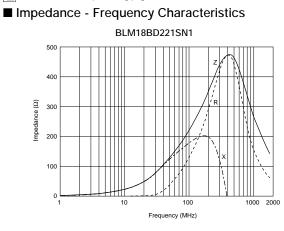


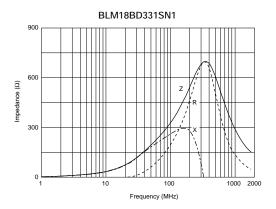


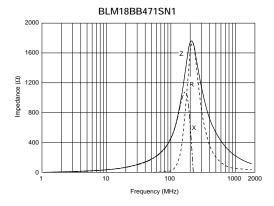


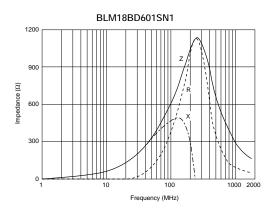


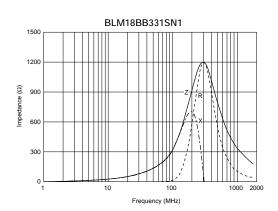


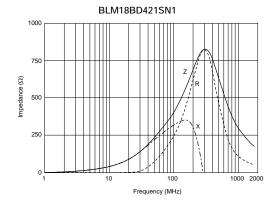


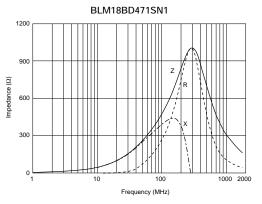


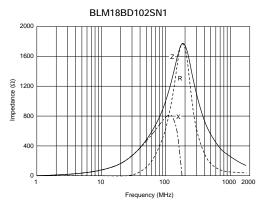




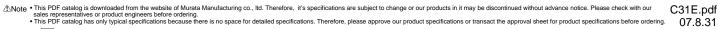


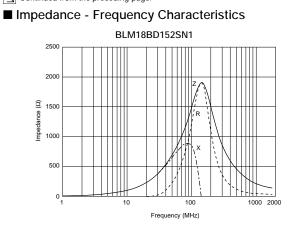


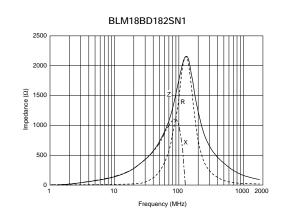


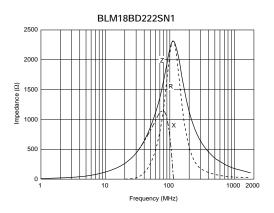


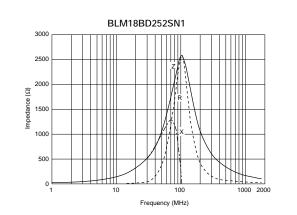






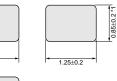








# BLM21B Series (0805 Size)

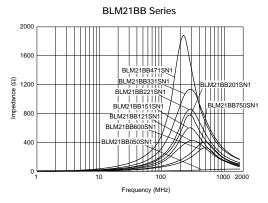


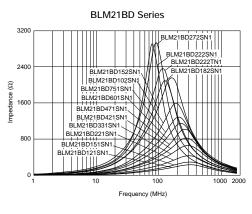
BLM21B Series

\*1 BLM21BD222SN1 / 21BD272SN1 :1.25±0.2 \*2 BLM21BD272SN1: 0.3±0.2 EIA CODE : 0805 in mm

Part Number	Impedance (at 100MHz/20°C) (ohm)	Rated Current (mA)	DC Resistance (max.) (ohm)	Operating Temperature Range (°C)
BLM21BB050SN1	5 ±25%	500	0.07	-55 to +125
BLM21BB600SN1	60 ±25%	200	0.20	-55 to +125
BLM21BB750SN1	75 ±25%	200	0.25	-55 to +125
BLM21BB121SN1	120 ±25%	200	0.25	-55 to +125
BLM21BD121SN1	120 ±25%	200	0.25	-55 to +125
BLM21BB151SN1	150 ±25%	200	0.25	-55 to +125
BLM21BD151SN1	150 ±25%	200	0.25	-55 to +125
BLM21BB201SN1	200 ±25%	200	0.35	-55 to +125
BLM21BB221SN1	220 ±25%	200	0.35	-55 to +125
BLM21BD221SN1	220 ±25%	200	0.25	-55 to +125
BLM21BB331SN1	330 ±25%	200	0.40	-55 to +125
BLM21BD331SN1	330 ±25%	200	0.30	-55 to +125
BLM21BD421SN1	420 ±25%	200	0.30	-55 to +125
BLM21BB471SN1	470 ±25%	200	0.45	-55 to +125
BLM21BD471SN1	470 ±25%	200	0.35	-55 to +125
BLM21BD601SN1	600 ±25%	200	0.35	-55 to +125
BLM21BD751SN1	750 ±25%	200	0.40	-55 to +125
BLM21BD102SN1	1000 ±25%	200	0.40	-55 to +125
BLM21BD152SN1	1500 ±25%	200	0.45	-55 to +125
BLM21BD182SN1	1800 ±25%	200	0.50	-55 to +125
BLM21BD222TN1	2200 ±25%	200	0.60	-55 to +125
BLM21BD222SN1	2250 (Тур.)	200	0.60	-55 to +125
BLM21BD272SN1	2700 ±25%	200	0.80	-55 to +125

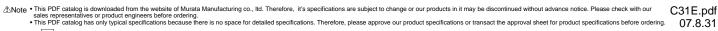
#### ■ Impedance - Frequency (Typical)

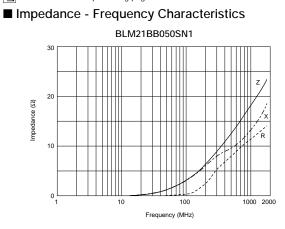


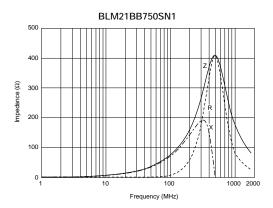


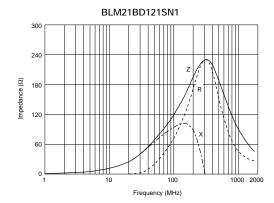
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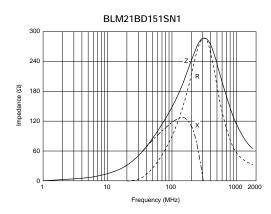


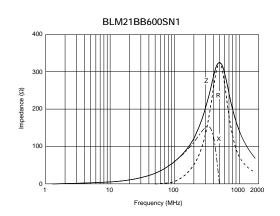




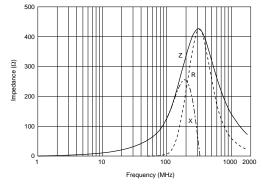




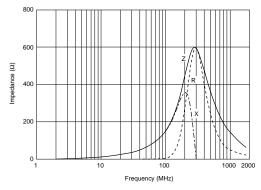




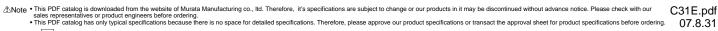
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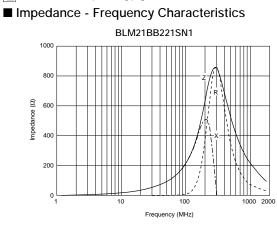
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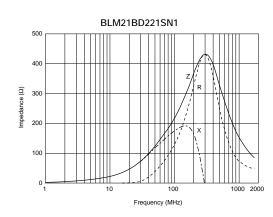


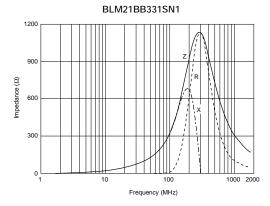


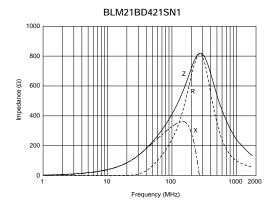


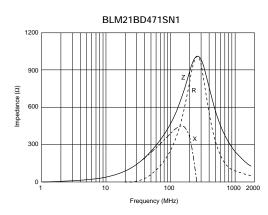


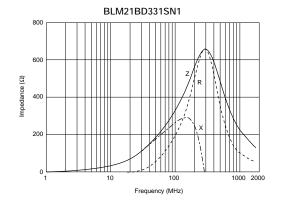




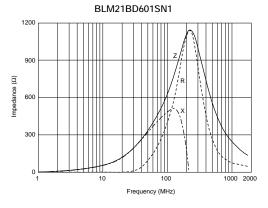








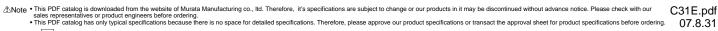
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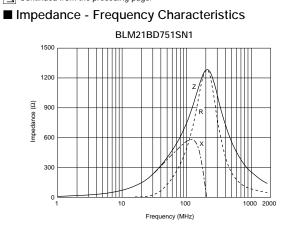


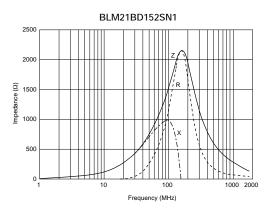
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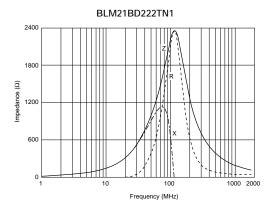


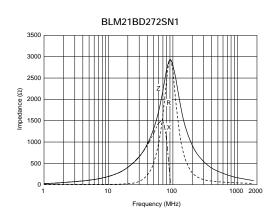
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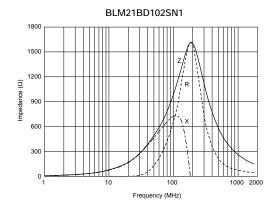


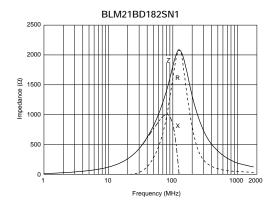


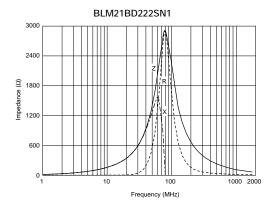












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 • This PDF catalog has only typical specifications because there is no space for detailed specifications. Therefore, please approve our product specifications or transact the approval sheet for product specifications before ordering.
 07.8.31

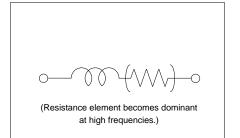
#### Features (BLM\_R Series)

The chip ferrite beads BLM series is designed to function nearly as a resistor at noise frequencies, which greatly reduces the possibility of resonance and leaves signal wave forms undistorted. BLM series is effective in circuits without stable ground lines because BLM series does not need a connection to ground.

The nickel barrier structure of the external electrodes provides excellent solder heat resistance. BLM\_R series can be used in a digital Interface. Resistance of BLM\_R series especially grows in the lower frequency range. Therefore BLM\_R series is less effective for digital signal waveform at low frequency range and can suppress the ringing.

## BLM18R Series (0603 Size)

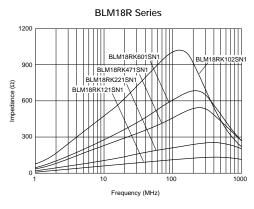
Equivalent Circuit



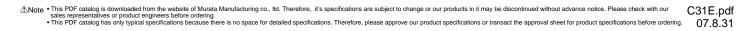
	0.4±0.2	
•	1.6±0.15	0.8±0.15
BLM18R Series		(in mm)

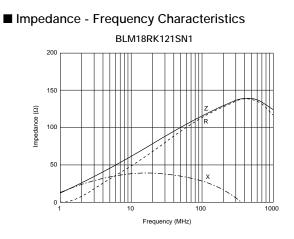
Part Number	Impedance (at 100MHz/20°C) (ohm)	Rated Current (mA)	DC Resistance (max.) (ohm)	Operating Temperature Range (°C)
BLM18RK121SN1	120 ±25%	200	0.25	-55 to +125
BLM18RK221SN1	220 ±25%	200	0.30	-55 to +125
BLM18RK471SN1	470 ±25%	200	0.50	-55 to +125
BLM18RK601SN1	600 ±25%	200	0.60	-55 to +125
BLM18RK102SN1	1000 ±25%	200	0.80	-55 to +125

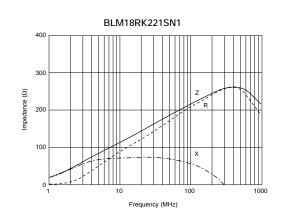
■ Impedance - Frequency (Typical)

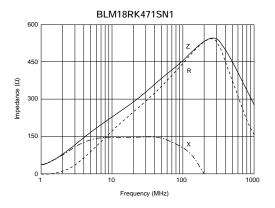


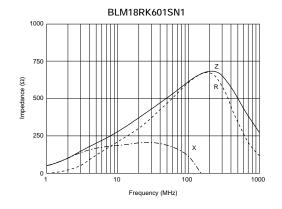


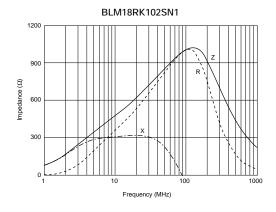






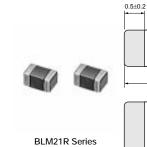


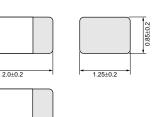






# BLM21R Series (0805 Size)

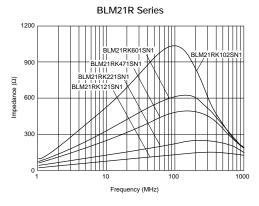




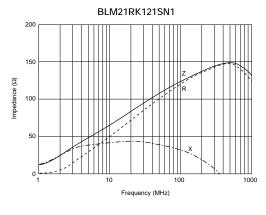
EIA CODE : 0805 (in mm)

Part Number	Impedance (at 100MHz/20°C) (ohm)	Rated Current (mA)	DC Resistance (max.) (ohm)	Operating Temperature Range (°C)
BLM21RK121SN1	120 ±25%	200	0.15	-55 to +125
BLM21RK221SN1	220 ±25%	200	0.20	-55 to +125
BLM21RK471SN1	470 ±25%	200	0.25	-55 to +125
BLM21RK601SN1	600 ±25%	200	0.30	-55 to +125
BLM21RK102SN1	1000 ±25%	200	0.50	-55 to +125

#### ■ Impedance - Frequency (Typical)







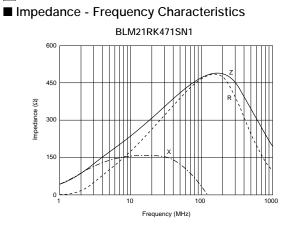
BLM21RK221SN1 300 225 Impedance (Ω) 150 75 х 0 1000 10 100 Frequency (MHz)

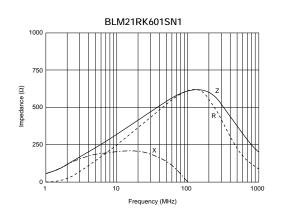
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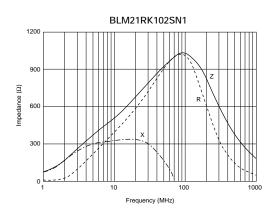


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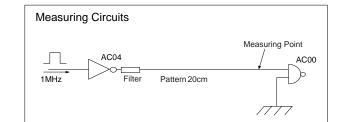


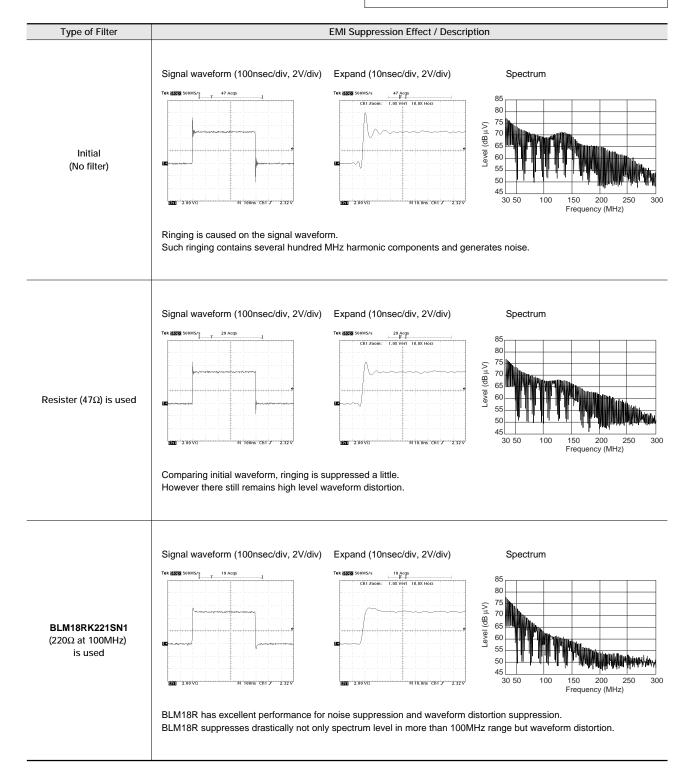




### Noise Suppression Effect of BLM\_R Series

#### ■Waveform Distortion Suppressing Performance of BLM□□R Series







#### Features (BLM\_P Series)

The chip ferrite beads BLM series is designed to function nearly as a resistor at noise frequencies, which greatly reduces the possibility of resonance and leaves signal wave forms undistorted. BLM series is effective in circuits without stable ground lines because BLM series does not need a connection to ground.

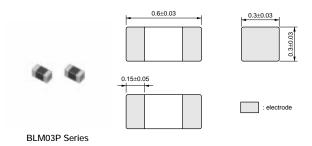
The nickel barrier structure of the external electrodes provides excellent solder heat resistance. BLM\_P series can be used in high current circuits due to its low DC resistance. It can match power lines to a maximum of 6A DC.

The small size of BLM03A series (0.6x0.3mm) is suitable for noise suppression in small equipment such as PA modules for cellular phones.

## BLM03P Series (0201 Size)

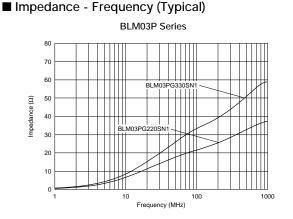
#### Equivalent Circuit

 $\bigcirc$ (Resistance element becomes dominant at high frequencies.)

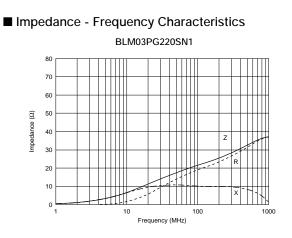


(in mm)

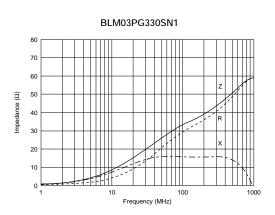
Part Number	Impedance (at 100MHz/20°C) (ohm)	Rated Current (mA)	DC Resistance (max.) (ohm)	Operating Temperature Range (°C)
BLM03PG220SN1	22 ±25%	900	0.065	-55 to +125
BLM03PG330SN1	33 ±25%	750	0.090	-55 to +125

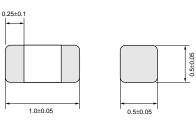






# BLM15P Series (0402 Size)





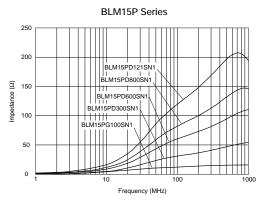
BLM15P Series

(in mm)

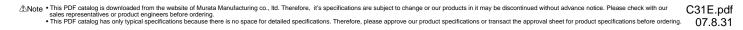
Part Number	Impedance (at 100MHz/20°C) (ohm)	Rated Current (mA)	DC Resistance (max.) (ohm)	Operating Temperature Range (°C)
BLM15PG100SN1	10 (Тур.)	1000	0.05	-55 to +125
BLM15PD300SN1	30 ±25%	2200	0.035	-55 to +125
BLM15PD600SN1	60 ±25%	1700	0.06	-55 to +125
BLM15PD800SN1	80 ±25%	1500	0.07	-55 to +125
BLM15PD121SN1	120 ±25%	1300	0.09	-55 to +125

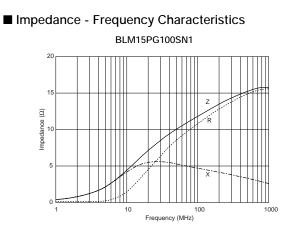
In operating temperature exceeding +85°C, derating of current is necessary for BLM15PD series. Please refer to p.56, "Derating of Rated Current".

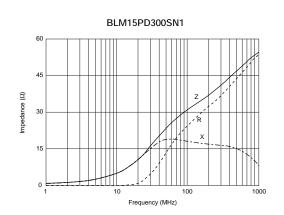
#### ■ Impedance - Frequency (Typical)

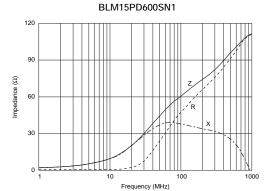




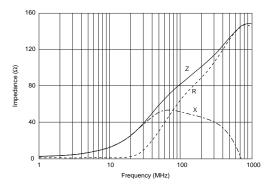


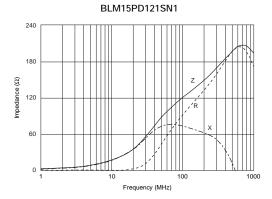






BLM15PD800SN1

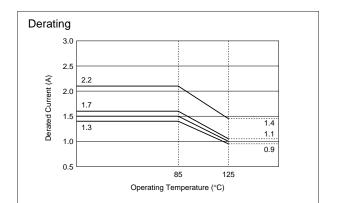




## ■ Notice (Rating)

In operating temperature exceeding +85°C, derating of current is necessary for BLM15PD series.

Please apply the derating curve shown in chart according to the operating temperature.





1000

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Frequency (MHz)

100

Part Number	Impedance (at 100MHz/20°C) (ohm)	Rated Current (mA)	DC Resistance (max.) (ohm)	Operating Temperature Range (°C)
BLM18PG300SN1	30 (Тур.)	1000	0.05	-55 to +125
BLM18PG330SN1	33 ±25%	3000	0.025	-55 to +125
BLM18PG600SN1	60 (Тур.)	500	0.10	-55 to +125
BLM18PG121SN1	120 ±25%	2000	0.05	-55 to +125
BLM18PG181SN1	180 ±25%	1500	0.09	-55 to +125
BLM18PG221SN1	220 ±25%	1400	0.10	-55 to +125
BLM18PG331SN1	330 ±25%	1200	0.15	-55 to +125
BLM18PG471SN1	470 ±25%	1000	0.20	-55 to +125

**BLM18P Series** 

At rated current higher than 1200mA, derating is required.

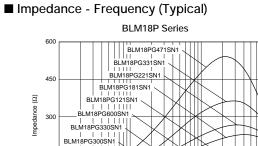
BLM18P Series (0603 Size)

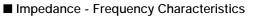
Please refer to p.65, "Derating of Rated Current".

BLM18PG330SN1 BLM18PG300SN1

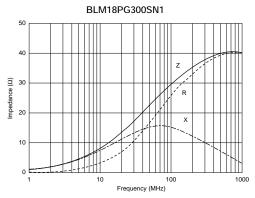
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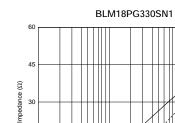
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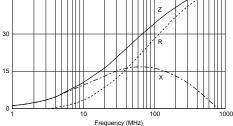


10





0.4±0.2



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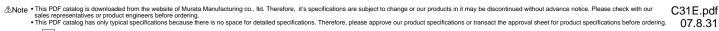
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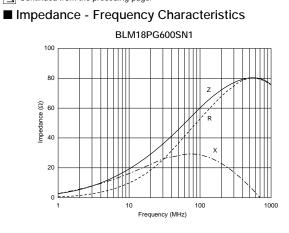
0.8±0.15

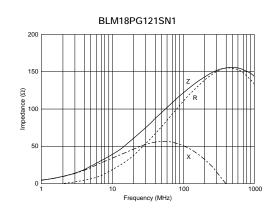
(in mm)

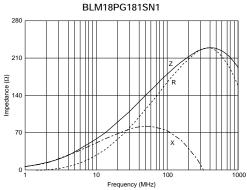
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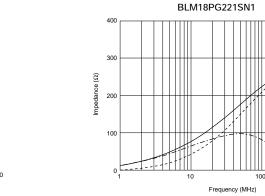
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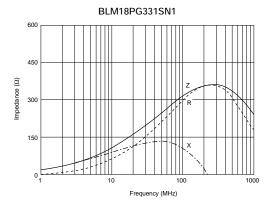








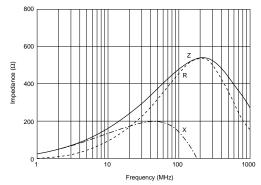






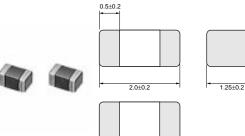
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# BLM21P Series (0805 Size)





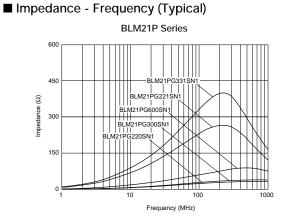
BLM21P Series

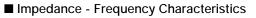
EIA CODE : 0805 (in mm)

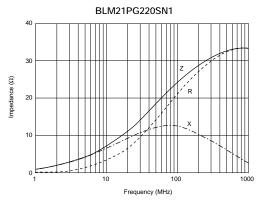
Part Number	Impedance (at 100MHz/20°C) (ohm)	Rated Current (mA)	DC Resistance (max.) (ohm)	Operating Temperature Range (°C)
BLM21PG220SN1	22 ±25%	6000	0.01	-55 to +125
BLM21PG300SN1	30 (Тур.)	3000	0.015	-55 to +125
BLM21PG600SN1	60 ±25%	3000	0.025	-55 to +125
BLM21PG221SN1	220 ±25%	2000	0.050	-55 to +125
BLM21PG331SN1	330 ±25%	1500	0.09	-55 to +125

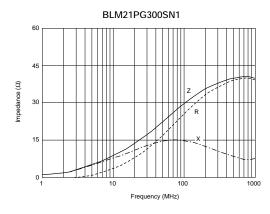
At rated current higher than 1500mA, derating is required.

Please refer to p.65, "Derating of Rated Current".



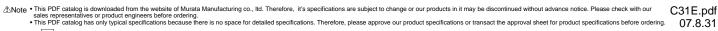


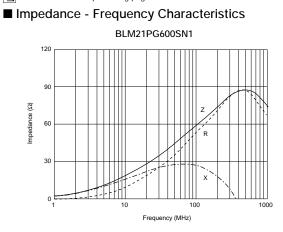


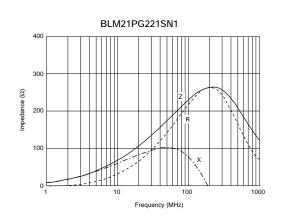


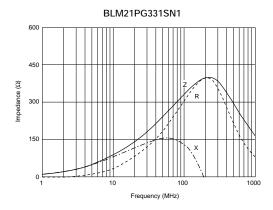
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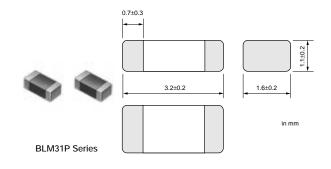








# BLM31P Series (1206 Size)

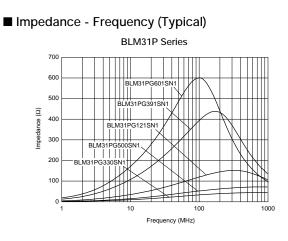


Part Number	Impedance (at 100MHz/20°C) (ohm)	Rated Current (mA)	DC Resistance (max.) (ohm)	Operating Temperature Range (°C)
BLM31PG330SN1	33 ±25%	6000	0.01	-55 to +125
BLM31PG500SN1	50 (Тур.)	3000	0.025	-55 to +125
BLM31PG121SN1	120 ±25%	3000	0.025	-55 to +125
BLM31PG391SN1	390 ±25%	2000	0.05	-55 to +125
BLM31PG601SN1	600 ±25%	1500	0.09	-55 to +125

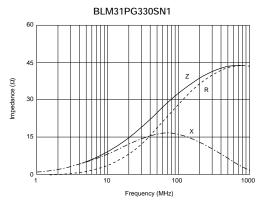
At rated current higher than 1500mA, derating is required.

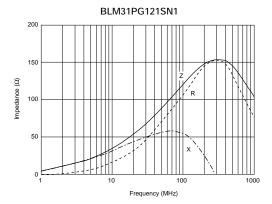
Please refer to p.65, "Derating of Rated Current".

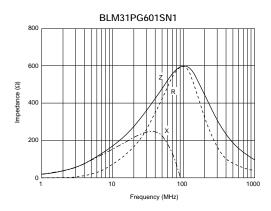


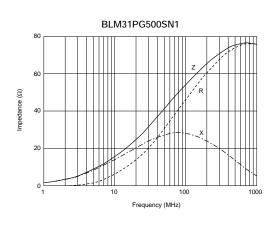


■ Impedance - Frequency Characteristics

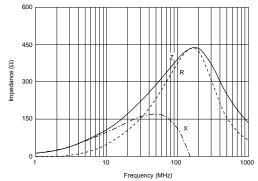








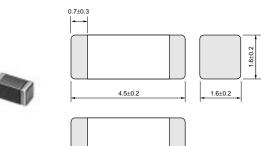
BLM31PG391SN1





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# BLM41P Series (1806 Size)



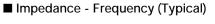
BLM41P Series

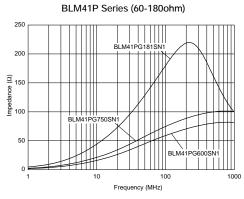
(in mm)

Part Number	Impedance (at 100MHz/20°C) (ohm)	Rated Current (mA)	DC Resistance (max.) (ohm)	Operating Temperature Range (°C)
BLM41PG600SN1	60 (Тур.)	6000	0.01	-55 to +125
BLM41PG750SN1	75 (Тур.)	3000	0.025	-55 to +125
BLM41PG181SN1	180 ±25%	3000	0.025	-55 to +125
BLM41PG471SN1	470 ±25%	2000	0.05	-55 to +125
BLM41PG102SN1	1000 ±25%	1500	0.09	-55 to +125

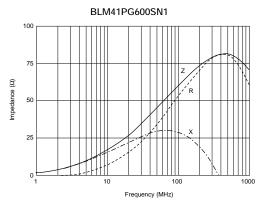
At rated current higher than 1500mA, derating is required.

Please refer to p.65, "Derating of Rated Current".

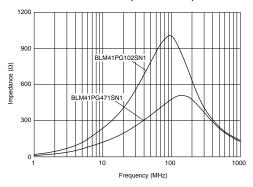


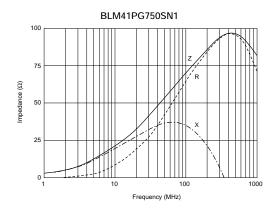


■ Impedance - Frequency Characteristics



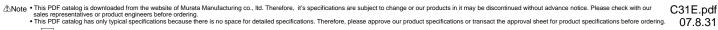
BLM41P Series (470-1000ohm)

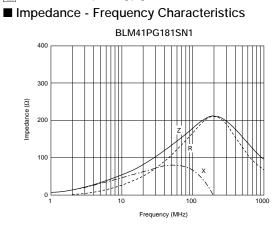


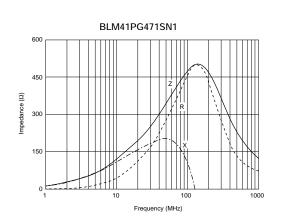


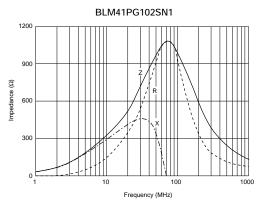
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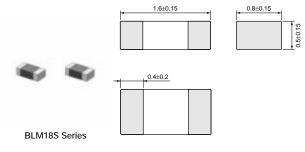


# BLM18S Series (0603 Size)

- Features
- 1. Low DC Resistance/Large Rated Current
- 2. BLM18S series can be used in high current circuits due to its low DC resistance.
  - It can match power lines to a maximum of 6A DC.
- 3. Ni+Sn plating structure of the extenal electrodes provides excellent solder heat resistance.

#### Applications

EMI suppression for DC power line



1

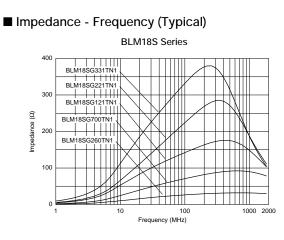
Part Number	Impedance (at 100MHz/20°C) (ohm)	Rated Current (mA)	DC Resistance (max.) (ohm)	Operating Temperature Range (°C)
BLM18SG260TN1	26 ±25%	6000	0.007	-55 to +125
BLM18SG700TN1	70 ±25%	4000	0.020	-55 to +125
BLM18SG121TN1	120 ±25%	3000	0.025	-55 to +125
BLM18SG221TN1	220 ±25%	2500	0.040	-55 to +125
BLM18SG331TN1	330 ±25%	1500	0.070	-55 to +125

At rated current higher than 1500mA, derating is required.

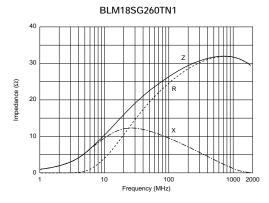
Please refer to p.65, "Derating of Rated Current".

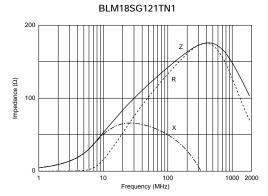
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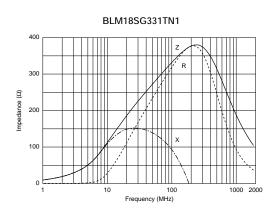




■ Impedance - Frequency Characteristics





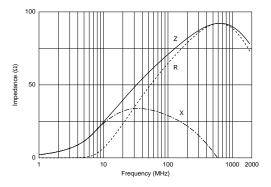


64

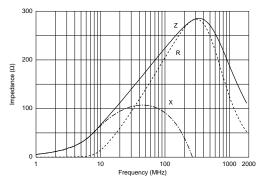
Downloaded from Elcodis.com electronic components distributor



BLM18SG700TN1



BLM18SG221TN1

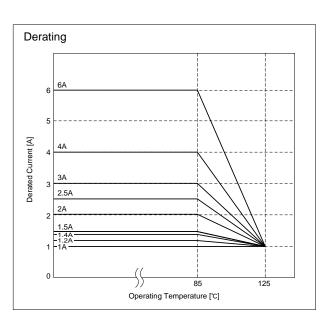


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#### ■ Notice (Rating)

In operating temperatures exceeding +85°C, derating of current is necessary for chip Ferrite Beads for which rated current is 1200mA or over. Please apply the derating curve shown in chart according to the operating temperature.





# On-Board Type (DC) EMI Suppression Filters (EMIFIL®)



# GHz Noise Suppression Chip Ferrite Beads BLM15H/15E/18H/18E/18G Series

1

Excellent high frequency impedance characteristics with 0402 (EIA) size.

- Features (BLM15HG/HD/EG Series)
- 1. Small size: 1.0x0.5mm (0402)
- 2. Suitable for noise suppression in 1GHz or higher frequency
- 3. Low DC Resistance/Large Rated Current (BLM15E)
- 4. No Lead production using Ni+Sn plating in termination

#### Applications

- 1. EMI suppression for Note PC and DSC
- 2. Noise suppression for data line in mobile phone
- 3. Prevention of erroneous operation caused by local oscillation signal in mobile phone
- 4. Optical pickup modules

#### ■ Features (BLM15HB Series)

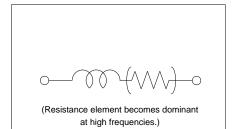
- 1. Small size: 1.0x0.5mm
- Suitable for noise suppression in 1GHz or higher frequency
- 3. No Lead production using Ni+Sn plating in termination

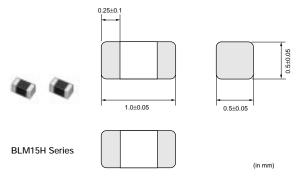
#### Applications

- 1. EMI suppression for Note PC and DSC
- 2. Noise suppression for data line in mobile phone
- 3. Noise suppression for USB interface line in mobile phone
- 4. Prevention of erroneous operation caused by local oscillation signal in mobile phone

# BLM15H Series (0402 Size)

#### Equivalent Circuit





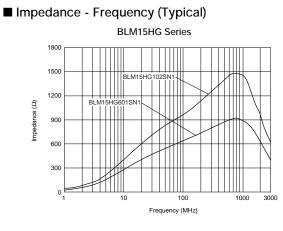
Part Number	Impedance (at 100MHz/20°C) (ohm)	Impedance (at 1GHz/20°C) (ohm)	Rated Current (mA)	DC Resistance (max.) (ohm)	Operating Temperature Range (°C)
BLM15HG601SN1	600 ±25%	1000 ±40%	300	0.7	-55 to +125
BLM15HG102SN1	1000 ±25%	1400 ±40%	250	1.1	-55 to +125
BLM15HB121SN1	120 ±25%	500 ±40%	300	0.7	-55 to +125

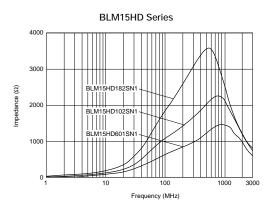


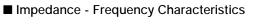
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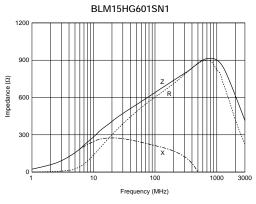
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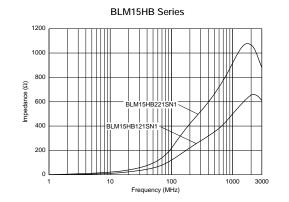
Part Number	Impedance (at 100MHz/20°C) (ohm)	Impedance (at 1GHz/20°C) (ohm)	Rated Current (mA)	DC Resistance (max.) (ohm)	Operating Temperature Range (°C)
BLM15HB221SN1	220 ±25%	900 ±40%	250	1.0	-55 to +125
BLM15HD601SN1	600 ±25%	1400 ±40%	300	0.85	-55 to +125
BLM15HD102SN1	1000 ±25%	2000 ±40%	250	1.25	-55 to +125
BLM15HD182SN1	1800 ±25%	2700 ±40%	200	2.2	-55 to +125

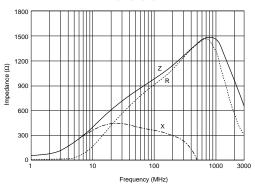








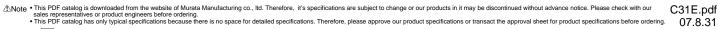


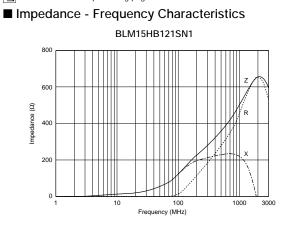


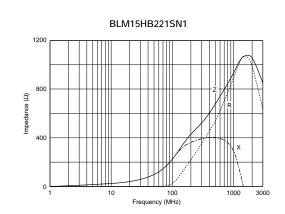
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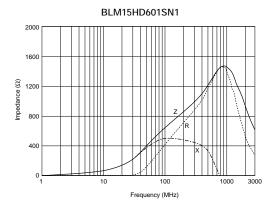
# BLM15HG102SN1



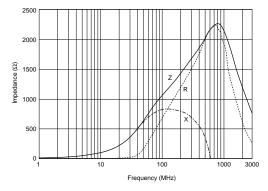


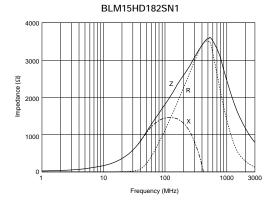














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# BLM15E Series (0402 Size)

BLM15E	Sorios	

0.25±0.1

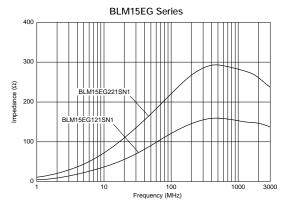
1.0±0.05

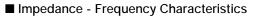
(in	mm

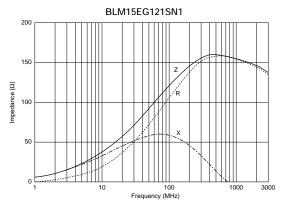
Part Number	Impedance (at 100MHz/20°C) (ohm)	Impedance (at 1GHz/20°C) (ohm)	Rated Current (mA)	DC Resistance (max.) (ohm)	Operating Temperature Range (°C)
BLM15EG121SN1	120 ±25%	145 (Typ.)	1500	0.095	-55 to +125
BLM15EG221SN1	220 ±25%	270 (Тур.)	700	0.28	-55 to +125

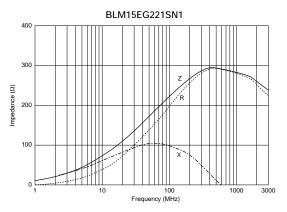
In operating temperature exceeding +85°C, derating of current is necessary for BLM15E series. Please refer to p.70, "Derating of Rated Current".

#### ■ Impedance - Frequency (Typical)









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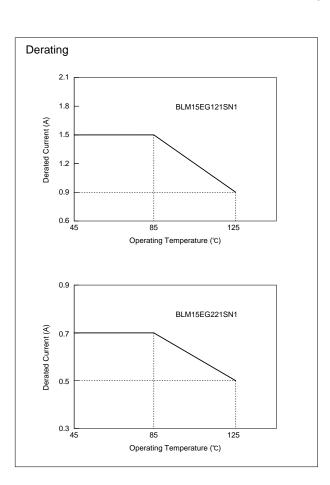
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#### ■ Notice (Rating)

In operating temperature exceeding +85°C, derating of current is necessary for BLM15E series.

Please apply the derating curve shown in chart according to the operating temperature.





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BLM18H/BLM18E series has a modified internal electrode structure, that minimizes stray capacitance and increases the effective frequency range.

## Features (BLM18H series)

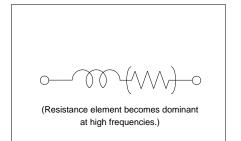
- BLM18H series realizes high impedance at 1GHz and is suitable for noise suppression from 500MHz to GHz range. The impedance value of HG/HD-type is about three times as large as that of A/B-type at 1GHz, though the impedance characteristic of HG/HD-type is similar to A/B-type at 100MHz or less.
- HG-type is effective in noise suppression in wide frequency range (several MHz to several GHz).
   HB/HD-type for high-speed signal line provides a sharper roll-off after the cut-off frequency.
   HK-type for digital interface and HE-type for optical pickup modules is effective in suppressing the ringing because resistance especially grows in the lower frequency.
- 3. The magnetic shielded structure minimizes crosstalk.

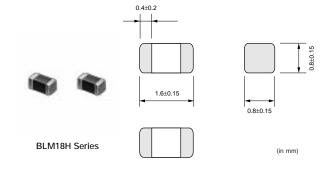
## ■ Features (BLM18E series)

- 1. Low DC Resistance and a large Rated Current are suitable for noise suppression of the driver circuit.
- 2. Excellent direct current characteristics
- 3. Thin type (t=0.5mm) is suitable for small and low profile equipment such as DSC, cellular phones.

## BLM18H Series (0603 Size)

## Equivalent Circuit





Part Number	Impedance (at 100MHz/20°C) (ohm)	Impedance (at 1GHz/20°C) (ohm)	Rated Current (mA)	DC Resistance (max.) (ohm)	Operating Temperature Range (°C)
BLM18HG471SN1	470 ±25%	600 (Тур.)	200	0.85	-55 to +125
BLM18HG601SN1	600 ±25%	700 (Тур.)	200	1.00	-55 to +125
BLM18HG102SN1	1000 ±25%	1000 (Тур.)	100	1.60	-55 to +125
BLM18HB121SN1	120 ±25%	500 ±40%	200	0.50	-55 to +125
BLM18HB221SN1	220 ±25%	1100 ±40%	100	0.80	-55 to +125
BLM18HB331SN1	330 ±25%	1600 ±40%	50	1.20	-55 to +125
BLM18HD471SN1	470 ±25%	1000 (Тур.)	100	1.20	-55 to +125
BLM18HD601SN1	600 ±25%	1200 (Тур.)	100	1.50	-55 to +125
BLM18HD102SN1	1000 ±25%	1700 (Тур.)	50	1.80	-55 to +125
BLM18HE601SN1	600 ±25%	600 (Тур.)	800	0.25	-55 to +125
BLM18HE102SN1	1000 ±25%	1000 (Тур.)	600	0.35	-55 to +125
BLM18HE152SN1	1500 ±25%	1500 (Тур.)	500	0.50	-55 to +125
BLM18HK331SN1	330 ±25%	400 ±40%	200	0.50	-55 to +125
BLM18HK471SN1	470 ±25%	600 ±40%	200	0.70	-55 to +125

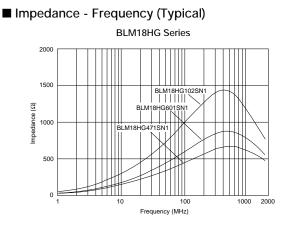


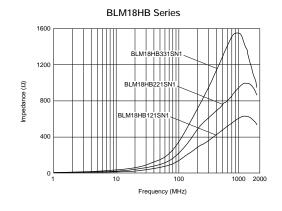
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Part Number	Impedance (at 100MHz/20°C) (ohm)	Impedance (at 1GHz/20°C) (ohm)	Rated Current (mA)	DC Resistance (max.) (ohm)	Operating Temperature Range (°C)
BLM18HK601SN1	600 ±25%	700 ±40%	100	0.90	-55 to +125
BLM18HK102SN1	1000 ±25%	1200 ±40%	50	1.50	-55 to +125

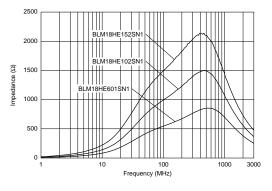
In operating temperature exceeding +85°C, derating of current is necessary for BLM18HE series. Please refer to p.75, "Derating of Rated Current".

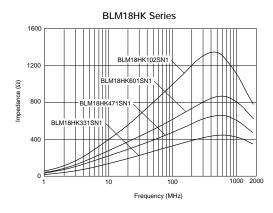




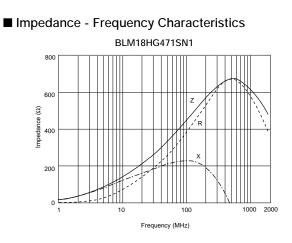
BLM18HD Series

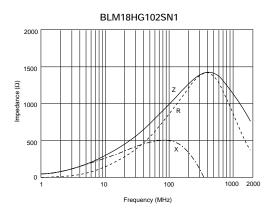
BLM18HE Series

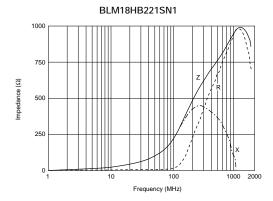


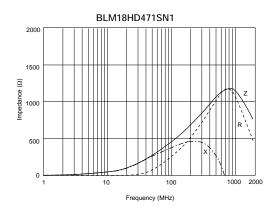


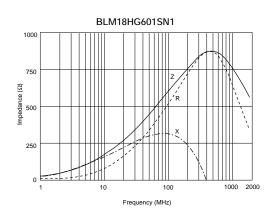




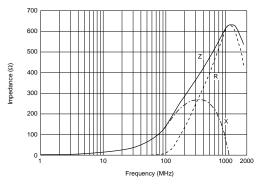




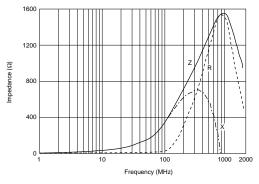




BLM18HB121SN1

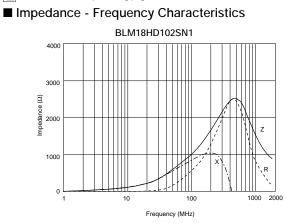


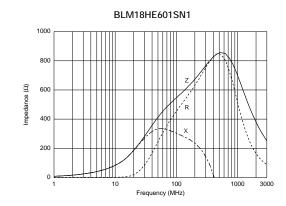
BLM18HB331SN1









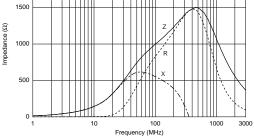


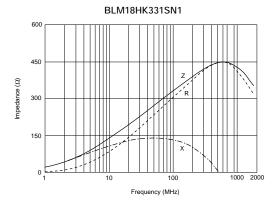


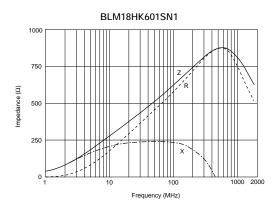
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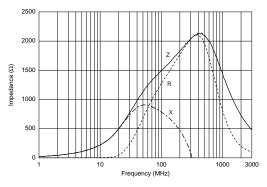






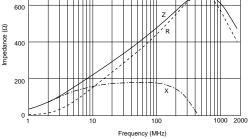






BLM18HK471SN1

800



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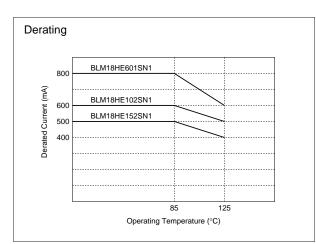
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## Notice (Rating)

In operating temperature exceeding +85°C, derating of

current is necessary for BLM18HE series.

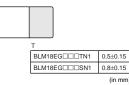
Please apply the derating curve shown in chart according to the operating temperature.



## BLM18E Series (0603 Size)







**BLM18E Series** 

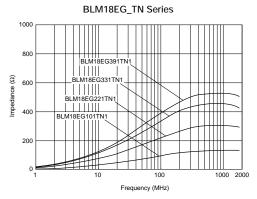
0.8±0.15 (in mm)

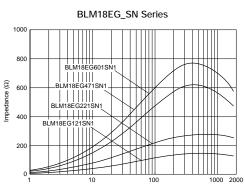
Impedance (at 1GHz/20°C) Operating Temperature Range Impedance (at 100MHz/20°C) Rated Current DC Resistance (max.) Part Number (mA) (ohm) (ohm) (ohm) (°C) BLM18EG101TN1 100 ±25% 140 (Typ.) 2000 0.045 -55 to +125 BLM18EG121SN1 120 ±25% 2000 0.04 -55 to +125 145 (Typ.) BLM18EG221SN1 220 ±25% 260 (Typ.) 2000 0.05 -55 to +125 BLM18EG221TN1 220 ±25% 300 (Typ.) 1000 0.15 -55 to +125 BLM18EG331TN1 330 ±25% 450 (Typ.) 500 0.21 -55 to +125 BLM18EG391TN1 390 ±25% 520 (Typ.) 500 0.3 -55 to +125 BLM18EG471SN1 470 ±25% 500 0.21 -55 to +125 550 (Typ.) BLM18EG601SN1 600 ±25% 700 (Typ.) 500 0.35 -55 to +125

At rated current 2000mA, derating is required.

Please refer to p.77, "Derating of Rated Current".

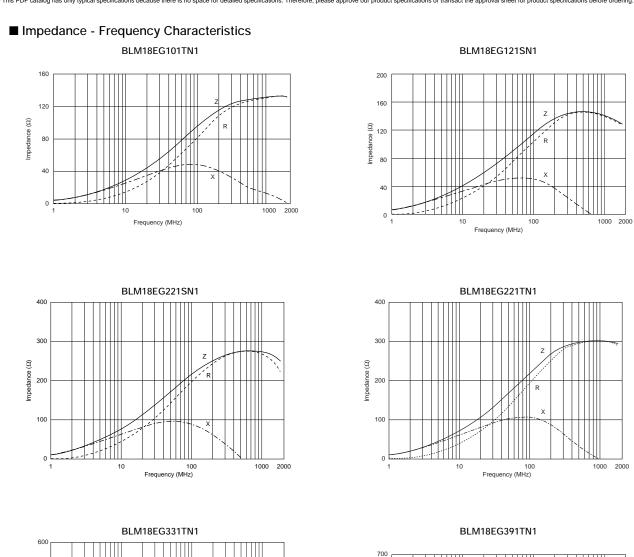
## ■ Impedance - Frequency (Typical)





Frequency (MHz)





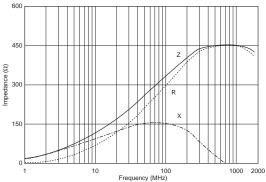
560

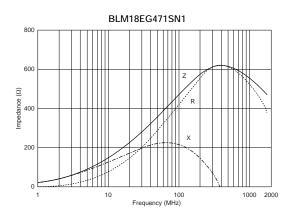
(U) 420 280

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Frequency (MHz)

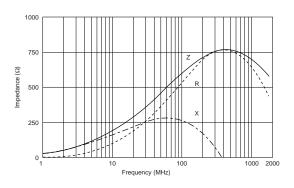
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R

100

1000 2000





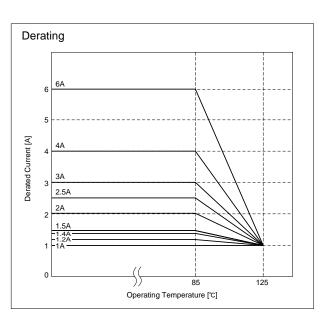
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## ■ Notice (Rating)

In operating temperatures exceeding +85°C, derating of current is necessary for chip Ferrite Beads for which rated current is 1200mA or over. Please apply the derating curve shown in chart according to the operating temperature.



## BLM18G Series (0603 Size)

Chip ferrite beads for high frequency noise suppression over a wide frequency range.

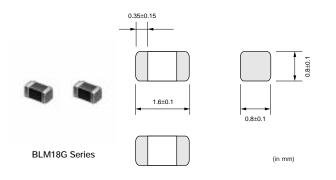
## Features

- 1. High impedance characteristic in 1GHz or higher frequency
- 2. High impedance characteristic over a wide frequency band range of 100MHz to 6GHz
- 3. Small decrease in impedance during current loading, resulting in small impedance fluctuation during equipment operation.
- 4. Reflow soldering only

## Applications

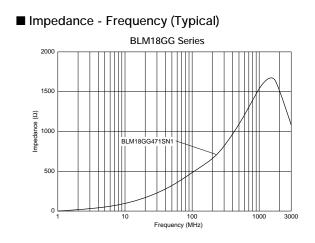
- Noise suppression for PCs with high-speed CPU and high-speed bus, and for interface lines of peripheral equipment.
- High harmonic noise suppression for digital equipment with several hundred MHz or higher clock speeds.
- 3. Prevention of erroneous operation caused by local oscillation signals in mobile phone and W-LAN module (ensuring self-immunity).
- 4. Bias Tee modules in optical transceivers

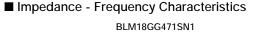
Part Number	Impedance (at 100MHz/20°C) (ohm)	Impedance (at 1GHz/20°C) (ohm)	Rated Current (mA)	DC Resistance (max.) (ohm)	Operating Temperature Range (°C)
BLM18GG471SN1	470 ±25%	1800 ±30%	200	1.30	-55 to +125

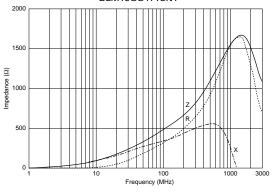




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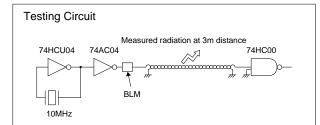


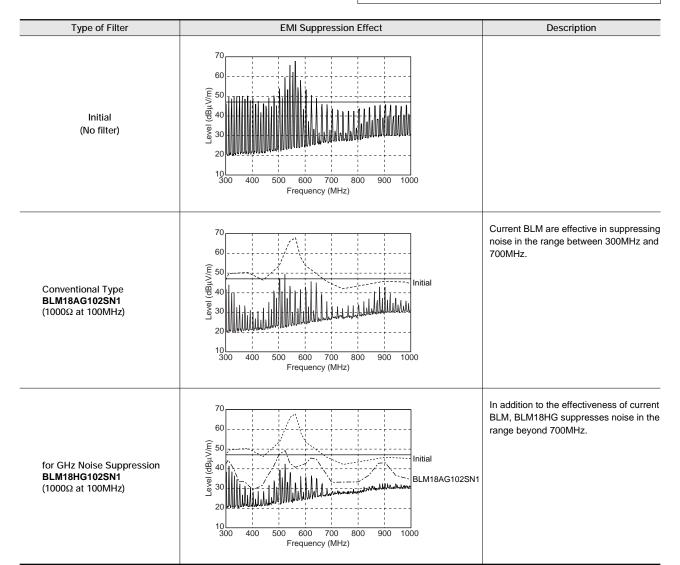




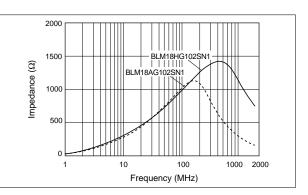
## **Noise Suppression Effect**

## ■Noise Suppression in UHF Range





Comparison between BLM18HG102SN1 and BLM18AG102SN1 (Current Item)







# On-Board Type (DC) EMI Suppression Filters (EMIFIL®)



# Chip Ferrite Beads Arrays BLA2AA/2AB/31A/31B Series

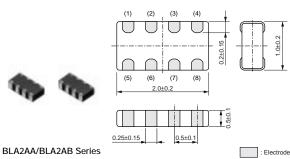
## **BLA2AA/BLA2AB Series**

## Features

- 1. BLA2AA/2AB series has 4 circuits in 2.0x1.0mm body with 0.5mm pitch.
- 2. Provides attenuation across a broad frequency range. Two types of impedance characteristics are available, one is for general signal line and the other is for high speed signal line.
- 3. Original inner electrode structure enables extra low crosstalk.
- 4. The nickel barrier structure of the external electrodes provides excellent solder heat resistance.

## Applications

Notebook size PCs, PDAs and other compact size digital equipment



(in mm)

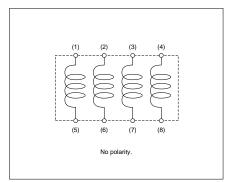
Part Number	Impedance (at 100MHz/20°C) (ohm)	Rated Current (mA)	DC Resistance (max.) (ohm)	Operating Temperature Range (°C)
BLA2AAG121SN4	120 ±25%	100	0.50	-55 to +125
BLA2AAG221SN4	220 ±25%	50	0.70	-55 to +125
BLA2AAG601SN4	600 ±25%	50	1.10	-55 to +125
BLA2AAG102SN4	1000 ±25%	50	1.30	-55 to +125
BLA2ABB100SN4	10 ±25%	200	0.1	-55 to +125
BLA2ABB220SN4	22 ±25%	200	0.2	-55 to +125
BLA2ABB470SN4	47 ±25%	200	0.35	-55 to +125
BLA2ABB121SN4	120 ±25%	50	0.60	-55 to +125
BLA2ABB221SN4	220 ±25%	50	0.90	-55 to +125
BLA2ABD750SN4	75 ±25%	200	0.20	-55 to +125
BLA2ABD121SN4	120 ±25%	200	0.35	-55 to +125
BLA2ABD221SN4	220 ±25%	100	0.40	-55 to +125
BLA2ABD471SN4	470 ±25%	100	0.65	-55 to +125
BLA2ABD601SN4	600 ±25%	100	0.80	-55 to +125
BLA2ABD102SN4	1000 ±25%	50	1.00	-55 to +125

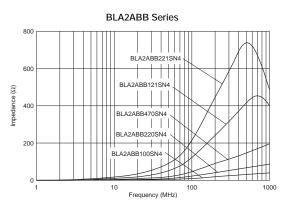
Number of Circuits: 4

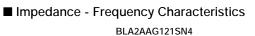


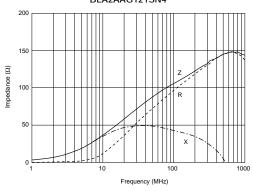
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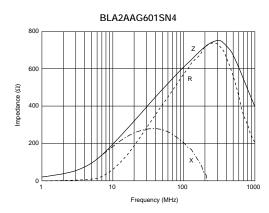
## Equivalent Circuit







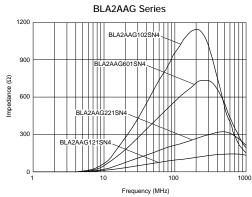


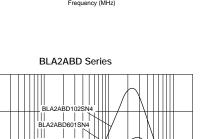


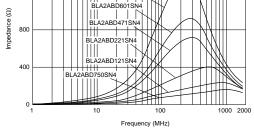


1600

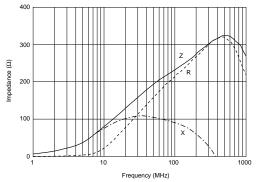
1200







BLA2AAG221SN4

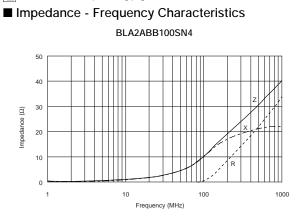


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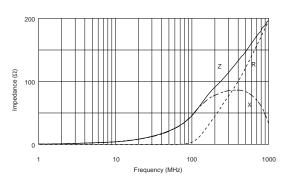
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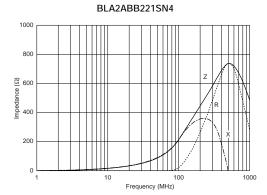


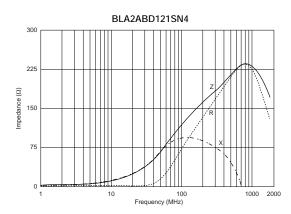
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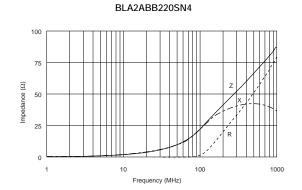




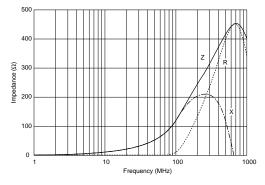




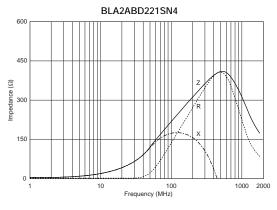




BLA2ABB121SN4



BLA2BD750SN4





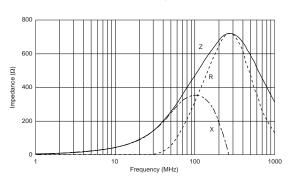
Impedance ( $\Omega$ )

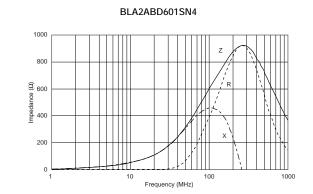
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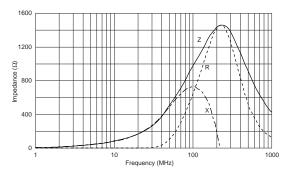
## BLA2ABD471SN4





1

BLA2ABD102SN4





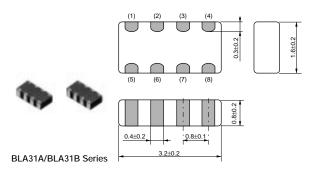
## BLA31A/BLA31B Series

The miniaturization of electronic equipment requires high performance EMI filters which enable high density mounting. BLA31A/B series consists of 4 circuits of ferrite beads.

BLA31A/B is suitable for EMI suppression in smaller digital equipment.

## Features

- 1. BLA31A/B has 4 circuits in 3.2x1.6mm body with 0.8mm pitch.
- Provides attenuation across a broad frequency range. Two types of impedance are available which meet general signal line and high speed signal line.
- 3. Original inner electrode structure enables extra low crosstalk.
- 4. The nickel barrier structure of the external electrodes provides excellent solder heat resistance. Both flow and reflow soldering methods can be employed.

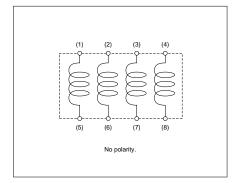


(in mm)

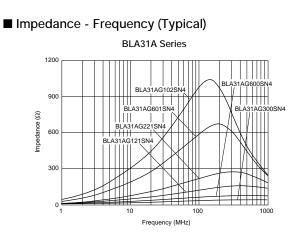
Part Number	Impedance (at 100MHz/20°C) (ohm)	Rated Current (mA)	DC Resistance (max.) (ohm)	Operating Temperature Range (°C)
BLA31AG300SN4	30 ±25%	200	0.10	-55 to +125
BLA31AG600SN4	60 ±25%	200	0.15	-55 to +125
BLA31AG121SN4	120 ±25%	150	0.20	-55 to +125
BLA31AG221SN4	220 ±25%	150	0.25	-55 to +125
BLA31AG601SN4	600 ±25%	100	0.35	-55 to +125
BLA31AG102SN4	1000 ±25%	50	0.45	-55 to +125
BLA31BD121SN4	120 ±25%	150	0.30	-55 to +125
BLA31BD221SN4	220 ±25%	150	0.35	-55 to +125
BLA31BD471SN4	470 ±25%	100	0.40	-55 to +125
BLA31BD601SN4	600 ±25%	100	0.45	-55 to +125
BLA31BD102SN4	1000 ±25%	50	0.55	-55 to +125

Number of Circuits: 4

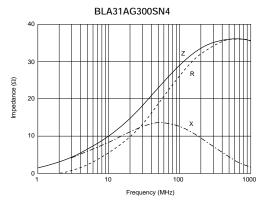
## Equivalent Circuit

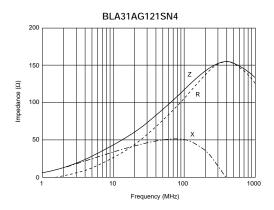


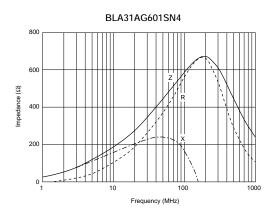


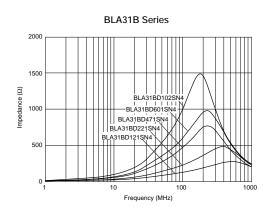


■ Impedance - Frequency Characteristics



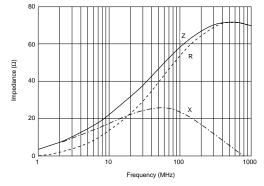




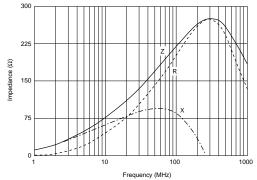


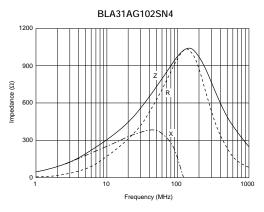
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BLA31AG600SN4

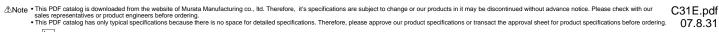


BLA31AG221SN4

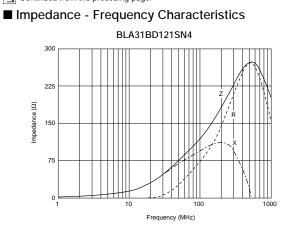


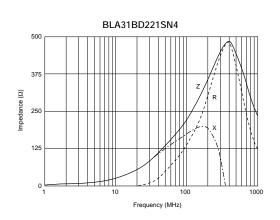


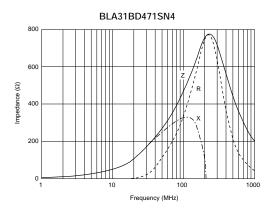


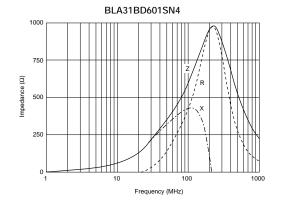


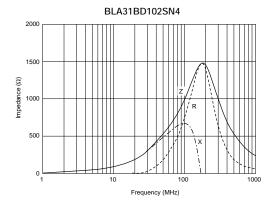
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# On-Board Type (DC) EMI Suppression Filters (EMIFIL®)



# Chip EMIFIL<sup>®</sup> Part Numbering

Chip EMIFIL <sup>®</sup> Capacitor Type/Capacitor Array Type			
(Part Number)	NF M 3D CC 102 R 1H 3 L <b>0 0 6 6 6 0 6</b>		
Product ID			
Product ID			
NF	Chip EMIFIL <sup>®</sup>		
Structure			
Code	Structure		
м	Capacitor Type		
Α	Capacitor Array Type		
③Dimensions (L>	< W)		

#### Code Dimensions (L×W) EIA 18 1.6×0.8mm 0603 21 2.0×1.25mm 0805 3D 3.2×1.25mm 1205 31 1206 3.2×1.6mm 41 4.5×1.6mm 1806 55 5.7×5.0mm 2220

#### 4 Features

Code Features	
CC Capacitor Type for Signal Lines	
PC	Capacitor Type for Large Current
PS	High Loss Type for Large Current

#### 6 Capacitance

Expressed by three figures. The unit is in pico-farad (pF). The first and second figures are significant digits, and the third figure expresses the number of zeros which follow the two figures.

#### Packaging

• usituging			
Code	Packaging	Series	
L	Embossed Taping (ø180mm Reel)	NFM3D/NFM41/NFM55	
В	Bulk	All series	
D	Paper Taping (ø180mm Reel)	NFM18/NFM21/NFA□□CC	

#### 6Characteristics

Code	Capacitance Change (Temperature Characteristics)
В	±10%
F	+30/-80%
R	±15%
U	-750 ±120ppm/°C
S	+350 to -1000ppm/°C

## Rated Voltage

Code	Rated Voltage
Code	Kaled Voltage
0J	6.3V
1A	10V
1C	16V
1E	25V
1H	50V
2A	100V

#### BElectrode/Others (NFM Series)

Code	Electrode	Series
3	Sn Plating	NFM (Except NFM55)
4	Solder Coating	NFM55

#### 8 Number of Circuits (NFA CC Series)

-	· ·
Code	Number of Circuits
4	4 Circuits

2



Chip EMIFIL <sup>®</sup> LC Combined Ty	ре
---	----

(Part Number)

Product ID

Product ID NF

**1 2 8 2 8 6** 

#### 2 Structure

L Monolithic, LC Combin	
	ed Type
W Winding, LC Combine	ed Type
E Block, LC Combined	I Туре

NF L 18 ST 107 X 1C 3 L

Chip EMIFIL®

0 8 9

#### 3 Dimensions (LXW)

Code	Dimensions (L×W)	EIA
18	1.6×0.8mm	0603
21	2.0×1.25mm	0805
31	3.2×1.6mm	1206
61	6.8×1.6mm	2606

### 4 Features

Code	Features
SP	$\pi$ Circuit for Signal Lines
ST	T Circuit for Signal Lines
PT	T Circuit for Large Current
HT	T Circuit for Heavy-duty

#### GCut-off Frequency (NFL/NFW Series)

Expressed by three figures. The unit is in hertz (Hz). The first and second figures are significant digits, and the third figure expresses the number of zeros which follow the two figures.

#### Gapacitance (NFE Series)

Expressed by three figures. The unit is in pico-farad (pF). The first and second figures are significant digits, and the third figure expresses the number of zeros which follow the two figures.

#### Packaging

<b>C</b> 11 13 3			
Code	Packaging	Series	
к	Embossed Taping (ø330mm Reel)	NFW31/NFE	
L	Embossed Taping (ø180mm Reel)	NFW31/NFE	
В	Bulk	NFL18/NFL21/NFE	
D	Paper Taping (ø180mm Reel)	NFL18/NFL21	

#### Ocharacteristics (NFL/NFW Series)

Code	Characteristics
x	Cut-off Frequency

#### **6**Characteristics (NFE Series)

Code	Capacitance Change (Temperature Characteristics)
В	±10%
С	±20%, ±22%
D	+20/-30%, +22/-33%
E	+20/-55%, +22/-56%
F	+30/-80%, +22/-82%
R	±15%
U	-750 ±120ppm/ <sup>-</sup> C
Z	Other

## Rated Voltage

Code	Rated Voltage
1A	10V
1C	16V
1E	25V
1H	50V
2A	100V

#### 8Electrode

Code	Electrode	Series
3/7	Sn Plating	NFL
4	Lead Free Solder Coating	NFW
9	Others	NFE





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	NF   A   21   SL	207 X 1A 4 5	L
(Part Number)	$\begin{array}{c} 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 $	56789	 @
Product ID			6 Features
Product ID			Code
NF	Chip EN	/IIFIL <sup>®</sup>	X
2 Structure			V
Code	Struc	ture	Rated Volta
Α	Array -	Гуре	Code
			1A
3Dimensions (L) Code	×w) Dimensions (L×W)	EIA	8Number of
18	1.6×0.8mm	0603	Code
21	2.0×1.25mm	0805	4
Features			Optimization Biology (Sector Sector Secto
Code	Featu		Code
SL	L Circuit for S	Signal Lines	<u>5</u> 8
	mber of zeros which follov	-	/pe
Chip EMIFIL <sup>®</sup>   Part Number)		-	B L ype Capacitanc Expressed by
Chip EMIFIL®   Part Number) DProduct ID	RC Combined Type/R	C Combined Array Ty 470 470 2 L 5 6 6 6 3	B L /pe ©Capacitanc Expressed by and second fi
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Chip EMIFIL®   Part Number) Product ID Product ID NF Structure Code R A Dimensions (L) Code 21 31	RC Combined Type/R NF R 21 GD 0 0 0 0 Chip EN Chip EN Struc RC Combined KW) Dimensions (L×W) 2.0×1.25mm	C Combined Array Ty 470 470 2 L 5 6 0 6 AIFIL® ture ned Type Array Type EIA 0805	B L L Vpe GCapacitance Expressed by and second fi expresses the GResistance Expressed by The first and a figure express figures. If ther letter "R". In t Code
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Chip EMIFIL <sup>®</sup>   Part Number) Product ID Product ID NF Structure Code R A Dimensions (L) Code 21 31 9 Features Code GD	RC Combined Type/R NF R 21 GD 0 0 0 0 0 Chip EM Chip	C Combined Array Ty 470 470 2 L 9 9 9 9 9 AIFIL® ture ned Type Array Type D EIA 0805 1206 ures e for Signal Lines	B L L Capacitance Expressed by and second fi expresses the GResistance Expressed by The first and s figure express figures. If ther letter "R". In t PElectrode/C Code 2 Number of Code
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Code	Features
х	Expressed by a latter
v	Expressed by a letter

#### je

Code	Rated Voltage
1A	10V

## ircuits

Code	Number of Circuits
4	4 Circuits

## (T)

Code	Dimensions (T)			
5	0.5mm			
8	0.85mm			

Code	Packaging
В	Bulk
L	Embossed Taping (ø180mm Reel)

three figures. The unit is in pico-farad (pF). The first gures are significant digits, and the third figure number of zeros which follow the two figures.

three-digit alphanumerics. The unit is in ohm  $(\Omega)$ . econd figures are significant digits, and the third es the number of zeros which follow the two is a decimal point, it is expressed by the capital nis case, all figures are significant digits.

#### thers (NFR Series)

Code	Electrode
2	Sn Plating

#### Circuits (NFA GD Series)

Code	Number of Circuits			
4	4 Circuits			

# Series



On-Board Type (DC) EMI Suppression Filters (EMIFIL®)



# Chip EMIFIL<sup>®</sup> Capacitor Type NFM18C/21C/3DC/41C Series

## NFM18C Series

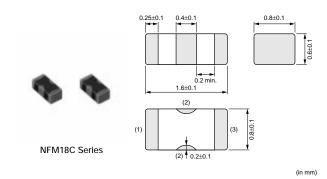
NFM18C series is a 1.6x0.8mm EMI suppression filter for signal lines which have a three terminal structure using Murata's multilayer technology.

## Features

- 1. Ultra small size in 1.6x0.8x0.6mm enables high density mounting.
- Three terminal structure with low residual inductance (ESL)\* characteristics achieves large insertion loss characteristics even in high frequency area.
- 3. NFM18C series covers capacitance range from 22 to 22,000pF.
- \* Not exceeding one-tenth of monolithic ceramic capacitors (two terminals).

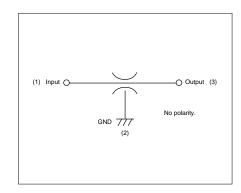
### Applications

- 1. EMI suppression of circuit for insertion loss in quantity
- 2. Noise suppression up to GHz

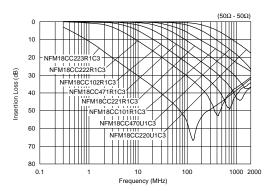


Part Number	Capacitance (pF)	Rated Voltage (Vdc)	Rated Current (mA)	Insulation Resistance (min.) (M ohm)	Operating Temperature Range (°C)
NFM18CC220U1C3	22 +20%,-20%	16	400	1000	-55 to +125
NFM18CC470U1C3	47 +20%,-20%	16	400	1000	-55 to +125
NFM18CC101R1C3	100 +20%,-20%	16	500	1000	-55 to +125
NFM18CC221R1C3	220 +20%,-20%	16	500	1000	-55 to +125
NFM18CC471R1C3	470 +20%,-20%	16	500	1000	-55 to +125
NFM18CC102R1C3	1000 +20%,-20%	16	600	1000	-55 to +125
NFM18CC222R1C3	2200 +20%,-20%	16	700	1000	-55 to +125
NFM18CC223R1C3	22000 +20%,-20%	16	1000	1000	-55 to +125

## Equivalent Circuit



## Insertion Loss Characteristics





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## NFM21C Series

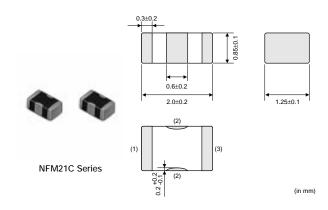
The chip "EMIFIL" NFM21C series is a chip type three terminal EMI suppression filter. It can reduce residual inductance to an extremely low level making it excellent for noise suppression at high frequencies.

## Features

- 1. Small and low profile of 2.0x1.25x0.85mm enables high density mounting.
- 2. Three terminal structure enables high performance in high frequency range.
- 3. Uses original electrode structure which realizes excellent solderability.
- An electrostatic capacitance range of 22 to 22,000pF enables suppression of noise at specific frequencies.

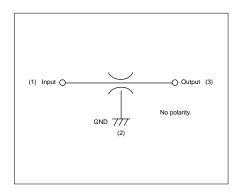
## Applications

- 1. PCs and peripherals which emit high amount of noise
- Compact size equipment such as PDAs, PC cards and mobile telecommunications equipment
- 3. Severe EMI suppression and high impedance circuits such as digital circuits

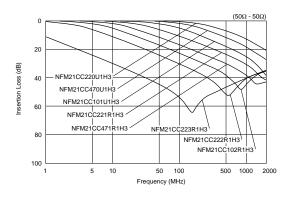


Part Number	Capacitance (pF)	Rated Voltage (Vdc)	Rated Current (mA)	Insulation Resistance (min.) (M ohm)	Operating Temperature Range (°C)
NFM21CC220U1H3	22 +20%,-20%	50	700	1000	-55 to +125
NFM21CC470U1H3	47 +20%,-20%	50	700	1000	-55 to +125
NFM21CC101U1H3	100 +20%,-20%	50	700	1000	-55 to +125
NFM21CC221R1H3	220 +20%,-20%	50	700	1000	-55 to +125
NFM21CC471R1H3	470 +20%,-20%	50	1000	1000	-55 to +125
NFM21CC102R1H3	1000 +20%,-20%	50	1000	1000	-55 to +125
NFM21CC222R1H3	2200 +20%,-20%	50	1000	1000	-55 to +125
NFM21CC223R1H3	22000 +20%,-20%	50	2000	1000	-55 to +125

## Equivalent Circuit



## Insertion Loss Characteristics





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## NFM3DC Series

The chip "EMIFIL" NFM3DC series is a chip type three terminal EMI suppression filter. It can reduce residual inductance to an extremely low level making it excellent for noise suppression at high frequencies.

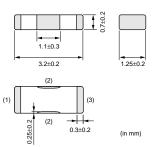
## Features

An electrostatic capacitance range of 22 to 22,000pF enables suppression of noise at specific frequencies.

## Applications

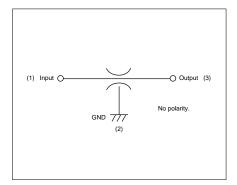
High noise radiation and high impedance circuits such as digital circuits



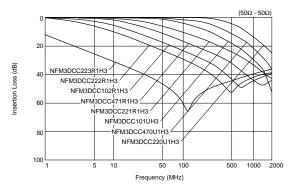


Part Number	Capacitance (pF)	Rated Voltage (Vdc)	Rated Current (mA)	Insulation Resistance (min.) (M ohm)	Operating Temperature Range (°C)
NFM3DCC220U1H3	22 +50%,-20%	50	300	1000	-55 to +125
NFM3DCC470U1H3	47 +50%,-20%	50	300	1000	-55 to +125
NFM3DCC101U1H3	100 +50%,-20%	50	300	1000	-55 to +125
NFM3DCC221R1H3	220 +50%,-20%	50	300	1000	-55 to +125
NFM3DCC471R1H3	470 +50%,-20%	50	300	1000	-55 to +125
NFM3DCC102R1H3	1000 +50%,-20%	50	300	1000	-55 to +125
NFM3DCC222R1H3	2200 +50%,-20%	50	300	1000	-55 to +125
NFM3DCC223R1H3	22000 +50%,-20%	50	300	1000	-55 to +125

## Equivalent Circuit



## ■ Insertion Loss Characteristics





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## NFM41C Series

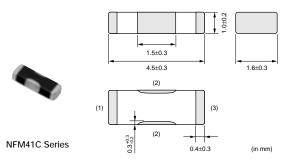
The chip "EMIFIL" NFM41C series is a chip type three terminal EMI suppression filter. It can reduce residual inductance to an extremely low level making it excellent for noise suppression at high frequencies.

## Features

An electrostatic capacitance range of 22 to 22,000pF enables suppression of noise at specific frequencies.

## Applications

High noise radiation and high impedance circuits such as digital circuits

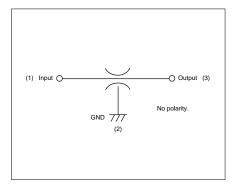


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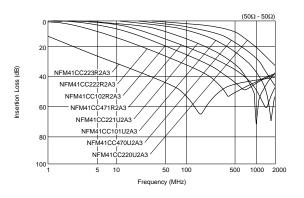
2

Part Number	Capacitance (pF)	Rated Voltage (Vdc)	Rated Current (mA)	Insulation Resistance (min.) (M ohm)	Operating Temperature Range (°C)
NFM41CC220U2A3	22 +50%,-20%	100	300	10000	-55 to +125
NFM41CC470U2A3	47 +50%,-20%	100	300	10000	-55 to +125
NFM41CC101U2A3	100 +50%,-20%	100	300	10000	-55 to +125
NFM41CC221U2A3	220 +50%,-20%	100	300	10000	-55 to +125
NFM41CC471R2A3	470 +50%,-20%	100	300	10000	-55 to +125
NFM41CC102R2A3	1000 +50%,-20%	100	300	10000	-55 to +125
NFM41CC222R2A3	2200 +50%,-20%	100	300	10000	-55 to +125
NFM41CC223R2A3	22000 +50%,-20%	100	300	10000	-55 to +125

## Equivalent Circuit



### Insertion Loss Characteristics





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# On-Board Type (DC) EMI Suppression Filters (EMIFIL®)



# Chip EMIFIL<sup>®</sup> Capacitor Array Type NFA31C Series

NFA31C series is a chip EMI suppression filter for surface mount applications using Murata's ceramic processing technology and filter design technology. The series is well suited for EMI suppression in digital I/O lines of varied electronic equipment such as notebook size PCs.

## Features

2

- 1. High density mounting can be realized because of 4 circuits in one package with 0.8mm pitch.
- 2. Suitable for high frequency noise suppression because of low residual inductance of three terminal structure.
- 3. Excellent EMI suppression can be realized because of two terminal simple GNDs for 4 circuits.
- 4. 22 to 22,000pF lineups can be used depending on noise frequency.

## Applications

- 1.
- 2.
- 3.

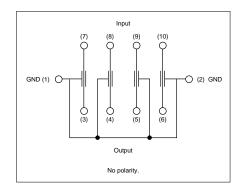
<ol> <li>Personal computers and peripherals</li> <li>Telephones, PPCs, communications equipment</li> <li>Digital TVs, DVDs</li> </ol>								
Part Number	Capacitance (pF)	Rated Voltage (Vdc)	Rated Current (mA)	Insulation Resistance (min.) (M ohm)	Operating Temperature Range (°C)			
NFA31CC220S1E4	22 +20%,-20%	25	200	1000	-40 to +85			
NFA31CC470S1E4	47 +20%,-20%	25	200	1000	-40 to +85			
NFA31CC101S1E4	100 +20%,-20%	25	200	1000	-40 to +85			
NFA31CC221S1E4	220 +20%,-20%	25	200	1000	-40 to +85			
NFA31CC471R1E4	470 +20%,-20%	25	200	1000	-40 to +85			
NFA31CC102R1E4	<b>NFA31CC102R1E4</b> 1000 + 20%, -20% 25 200 1000 -40 to +85							
NFA31CC222R1E4	2200 +20%,-20%	25	200	1000	-40 to +85			

200

16

NFA31CC223R1C4 Number of Circuits: 4

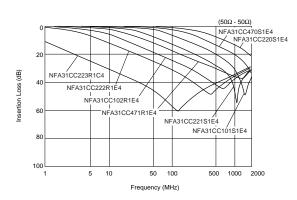
## Equivalent Circuit



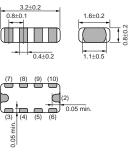
22000 +20%,-20%

## Insertion Loss Characteristics

1000







-40 to +85

NFA31C Series

(in mm)

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On-Board Type (DC) EMI Suppression Filters (EMIFIL<sup>®</sup>)



# Chip EMIFIL<sup>®</sup> LC Combined Monolithic Type NFL18ST/18SP/21S Series

## **NFL18ST Series**

NFL18ST series is an EMI suppression filter for high speed signal lines, achieving T-type structure in 1.6x0.8mm size with Murata's multilayer technology.

## Features

- 1. Ultra-small size in 1.6x0.8x0.8mm
- 2. Steep insertion loss characteristics realize excellent noise suppression and prevent distortion of signal waveform.
- 3. By minimizing stray capacitance of inductor, achieves high performance in noise suppression in high frequency range.
- 4. Three different values of cut-off frequency are available, ranging from 200MHz up to 500MHz.
- 5. Since all side electrode structures are the same, it is no polarity.

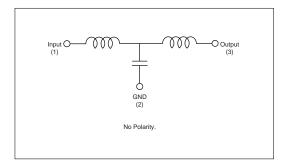
## Applications

Noise suppression for video signal lines (RGB lines) and high speed clock lines

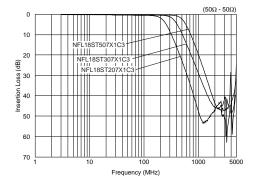
Part Number	Cut-off Frequency (MHz)	Capacitance (pF)	Inductance (nH)	Rated Voltage (Vdc)	Rated Current (mA)	Insulation Resistance (M ohm)	Operating Temperature Range (°C)
NFL18ST207X1C3	200	25 +20%,-20%	110 +20%,-20%	16	150	1000	-55 to 125
NFL18ST307X1C3	300	18 +20%,-20%	62 +20%,-20%	16	200	1000	-55 to 125
NFL18ST507X1C3	500	10 +20%,-20%	43 +20%,-20%	16	200	1000	-55 to 125

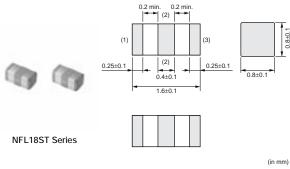
Number of Circuits: 1

## Equivalent Circuit



## Insertion Loss Characteristics







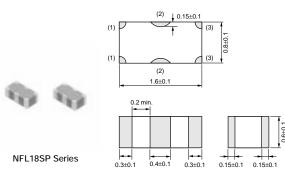
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## NFL18SP Series

The chip "EMIFIL" NFL18SP series is an EMI Suppression filter for high speed signal lines, achieving pi-type structure in 0603 size with Murata's multilayer technology.

## Features

- 1. Ultra-small size in 1.6x0.8x0.6 mm
- 2. Achieves high performance in noise suppression over wide frequency range
- Steep insertion loss characteristics realize excellent noise suppression and prevent distortion of signal waveform.
- 4. Line up 4 items of cut-off frequency range from 150 to 500MHz



(in mm)

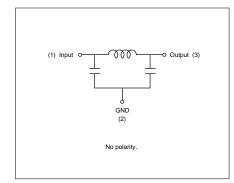
## Applications

EMI suppression for digital signal line such as RGB and high speed clock lines

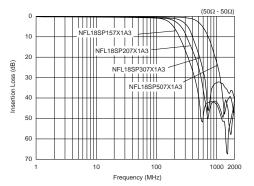
Part Number	Cut-off Frequency (MHz)	Capacitance (pF)	Inductance (nH)	Rated Voltage (Vdc)	Rated Current (mA)	Insulation Resistance (M ohm)	Operating Temperature Range (°C)
NFL18SP157X1A3	150	34 +20%,-20%	100 +20%,-20%	10	100	1000	-55 to 125
NFL18SP207X1A3	200	24 +20%,-20%	80 +20%,-20%	10	100	1000	-55 to 125
NFL18SP307X1A3	300	19 +20%,-20%	60 +20%,-20%	10	100	1000	-55 to 125
NFL18SP507X1A3	500	11 +20%,-20%	38 +20%,-20%	10	100	1000	-55 to 125

Number of Circuits: 1

## Equivalent Circuit



## ■ Insertion Loss Characteristics





## NFL21S Series

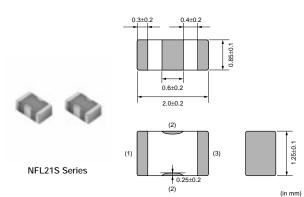
The chip "EMIFIL" NFL21S series is a high performance EMI suppression filter in 2.0x1.25mm size for high speed signal lines by using Murata's processing technology.

## Features

- 1. Suppresses noise with little attenuation of the signal itself due to its steep filtering characteristics.
- 2. Murata's original internal structure design enables excellent noise suppression up to high frequencies.
- 3. Available in ten different values of cut-off frequency ranging from 10MHz up to 500MHz.

## Applications

Suppression of high magnitude radiated noise generated by high speed digital circuits such as clock and RGB



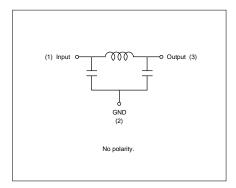
2

Part Number	Cut-off Frequency (MHz)	Capacitance (pF)	Inductance (nH)	Rated Voltage (Vdc)	Rated Current (mA)	Insulation Resistance (M ohm)	Operating Temperature Range (°C)
NFL21SP106X1C3	10	670 +20%,-20%	680 +20%,-20%	16	100	1000	-55 to 125
NFL21SP206X1C7	20	240 +20%,-20%	700 +20%,-20%	16	100	1000	-55 to 125
NFL21SP506X1C3	50	84 +20%,-20%	305 +20%,-20%	16	150	1000	-55 to 125
NFL21SP706X1C3	70	76 +20%,-20%	185 +20%,-20%	16	150	1000	-55 to 125
NFL21SP107X1C3	100	44 +20%,-20%	135 +20%,-20%	16	200	1000	-55 to 125
NFL21SP157X1C3	150	28 +20%,-20%	128 +20%,-20%	16	200	1000	-55 to 125
NFL21SP207X1C3	200	22 +20%,-20%	72 +20%,-20%	16	250	1000	-55 to 125
NFL21SP307X1C3	300	19 +10%,-10%	45 +10%,-10%	16	300	1000	-55 to 125
NFL21SP407X1C3	400	16 +10%,-10%	34 +10%,-10%	16	300	1000	-55 to 125
NFL21SP507X1C3	500	12 +10%,-10%	31 +10%,-10%	16	300	1000	-55 to 125

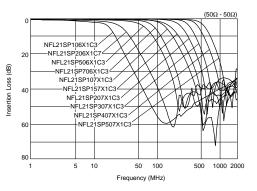
Number of Circuits: 1

## Equivalent Circuit

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## Insertion Loss Characteristics





On-Board Type (DC) EMI Suppression Filters (EMIFIL®)



# Chip EMIFIL<sup>®</sup> LC Combined Array Type NFA18S/21S Series

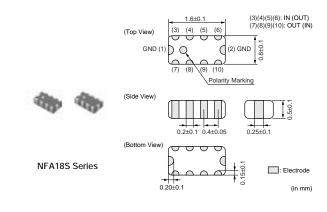
## **NFA18S Series**

## Feautures

- 1. Steep insertion loss characteristics
- 2. Suitable for noise suppression in 800MHz or higher frequency
- 3. Size: 1.6x0.8mm (EIA code: 0603 size)
- 4. 4 circuits in one package

### Applications

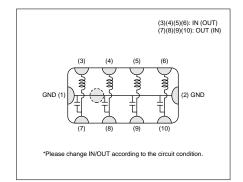
Noise suppression for LCD line, camera's module line



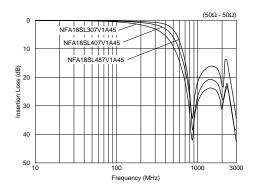
Part Number	Cut-off Frequency (MHz)	Insertion Loss at Cut-off Frequency (dB)	Insertion Loss at 800MHz (min.) (dB)	Insertion Loss at 900MHz (min.) (dB)	Insulation Resistance (min.) (M ohm)	Rated Voltage (Vdc)	Rated Current (mA)	Withstand Voltage (Vdc)
NFA18SL307V1A45	300	6 max	20	20	1000	10	100	30
NFA18SL407V1A45	400	6 max	18	18	1000	10	100	30
NFA18SL487V1A45	480	6 max	15	15	1000	10	100	30

Operating Temperature Range: -55°C to +125°C Number of Circuits: 4

## Equivalent Circuit



## Insertion Loss Characteristics





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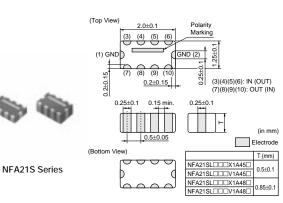
## NFA21S Series

#### Features

- 1. Steep insertion loss characteristics
- 2. Suitable for noise suppression in 800MHz or
- higher frequency
- 3. Size: 2.0x1.25mm
- 4. 4 circuits in one package

## Applications

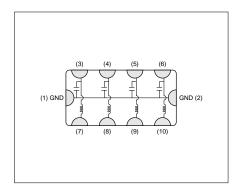
Noise suppression for LCD line



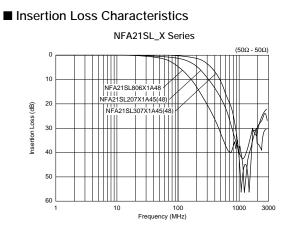
Part Number	Cut-off Frequency (MHz)	Insertion Loss at Cut-off Frequency (dB)	Insertion Loss at 500MHz (min.) (dB)	Insertion Loss at 800MHz (min.) (dB)	Insertion Loss at 900MHz (min.) (dB)	Insertion Loss at 1000MHz (min.) (dB)	Insulation Resistance (min.) (M ohm)	Rated Voltage (Vdc)	Rated Current (mA)	Withstand Voltage (Vdc)
NFA21SL806X1A48	80	2 to 7	25	-	-	25	1000	10	20	30
NFA21SL207X1A45	200	2 to 7	13	25	-	25	1000	10	100	30
NFA21SL207X1A48	200	2 to 7	13	25	-	25	1000	10	100	30
NFA21SL307X1A45	300	2 to 7	7	20	-	25	1000	10	100	30
NFA21SL307X1A48	300	2 to 7	7	20	-	25	1000	10	100	30
NFA21SL287V1A45	280	6 max	-	25	25	-	1000	10	100	30
NFA21SL287V1A48	280	6 max	-	25	25	-	1000	10	100	30
NFA21SL317V1A45	310	6 max	-	20	20	-	1000	10	100	30
NFA21SL317V1A48	310	6 max	-	20	20	-	1000	10	100	30
NFA21SL337V1A45	330	6 max	-	15	15	-	1000	10	100	30
NFA21SL337V1A48	330	6 max	-	20	20	-	1000	10	100	30

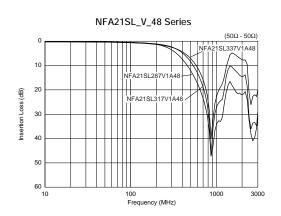
Operating Temperature Range: -55°C to +125°C Number of Circuits: 4

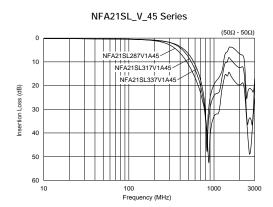
## Equivalent Circuit













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On-Board Type (DC) EMI Suppression Filters (EMIFIL<sup>®</sup>)



# Chip EMIFIL<sup>®</sup> LC Combined Wire Wound Type NFW31S Series

The signal line chip EMI filter NFW31S series consists of high performance EMI suppression filters. They are designed for noise suppression in high speed signal digital circuits in which the signal harmonics are prone to becoming noise sources. These filters achieve a 100dB/dec. (typ.) damping characteristic with Murata's innovative circuit design. This makes these chips effective in applications where the signal and noise frequencies are close to each other.

## Features

- 1. Suppresses signal noise with little or no attenuation of the signal itself.
- 2. Murata's original internal structure design enables excellent noise suppression up to high frequencies (40dB at 1GHz typ.).
- 3. NFW31S series is available in 9 different values of cut-off frequency ranging from 10MHz up to 500MHz.



NFW31S Series



2.3±0.2

 $\nabla$ 

3.2±0.3

0.65±0.2

(3)

0.7±0.3

 (1): Input electrode
 (2): Ground electrode
 (3): Output electrode \*No polarity

1.6±0.2



2

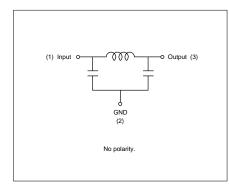
(in mm

I.8±0.2

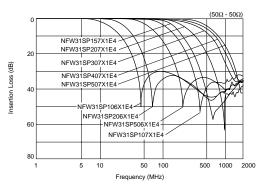
Part Number	Nominal Cut-off Freq. (MHz)	Attenuation at 10MHz (dB)	Attenuation at 20MHz (dB)	Attenuation at 50MHz (dB)	Attenuation at 100MHz (dB)	Attenuation at 150MHz (dB)	Attenuation at 200MHz (dB)	Attenuation at 300MHz (dB)	Attenuation at 400MHz (dB)	Attenuation at 500MHz (dB)	Attenuation at 1000MHz (dB)
NFW31SP106X1E4	10	6 max.	5 min.	25 min.	25 min.	-	25 min.	-	-	30 min.	30 min.
NFW31SP206X1E4	20	-	6 max.	5 min.	25 min.	-	25 min.	-	-	30 min.	30 min.
NFW31SP506X1E4	50	-	-	6 max.	10 min.	-	30 min.	-	-	30 min.	30 min.
NFW31SP107X1E4	100	-	-	-	6 max.	-	5 min.	-	-	20 min.	30 min.
NFW31SP157X1E4	150	-	-	-	-	6 max.	-	10 min.	20 min	30 min.	30 min.
NFW31SP207X1E4	200	-	-	-	-	-	6 max.	-	-	10 min.	30 min.
NFW31SP307X1E4	300	-	-	-	-	-	-	6 max.	-	5 min.	15 min.
NFW31SP407X1E4	400	-	-	-	-	-	-	-	6 max.	-	10 min.
NFW31SP507X1E4	500	-	-	-	-	-	-	-	-	6 max.	10 min.

Rated Current: 200mA Rated Voltage: 25Vdc Operating Temperature Range: -40°C to 85°C

## Equivalent Circuit



## Insertion Loss Characteristics

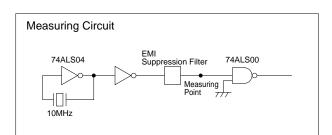


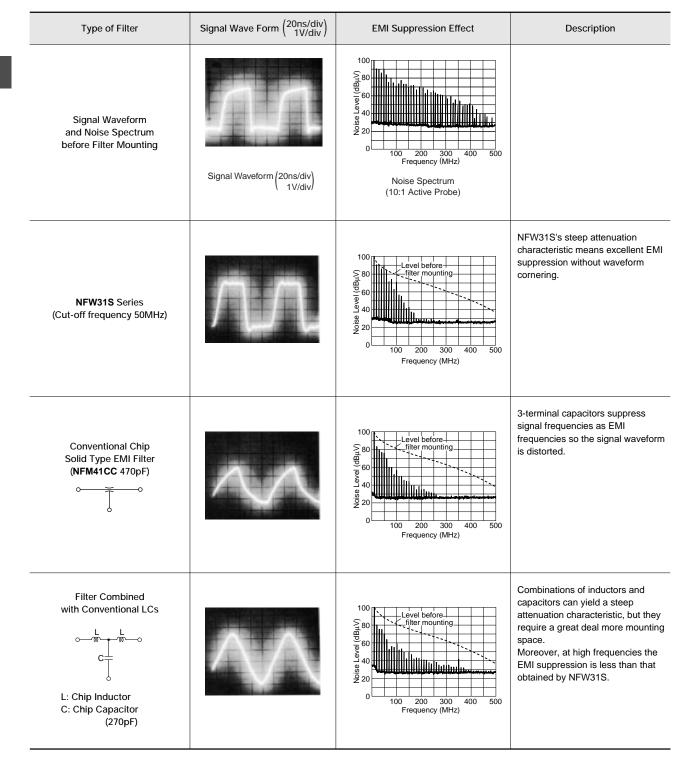


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## Noise Suppression Effect of NFW31S Series

## Example of EMI Suppression in an Actual Circuit







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On-Board Type (DC) EMI Suppression Filters (EMIFIL®)



# Chip EMIFIL<sup>®</sup> RC Combined Type NFR21G Series

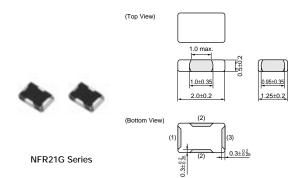
NFR21G series is comprised of high performance EMI suppression filters which can suppress distortion of waveform. Various items are to be used, considering circuit impedance and noise condition.

## Features

- 1. Murata's original inner design realizes small and low profile of 2.0x1.25x0.5mm.
- Distributed constant circuit realizes smooth change of impedance which prevents reflection of signal and distortion of wave shape.
- NFR21G series is effective in a line where ground is not stable, because the resistance element in the filter absorbs noise and returns it to ground line.
- 4. NFR21G series has no polarity so it can be used in dual direction transport lines.
- NFR21G series has various lineups of resistance (22 to 100 ohm) and capacitance (10 to 100pF).

## Applications

Interface lines and clock lines where signals tend to be distorted



(in mm)

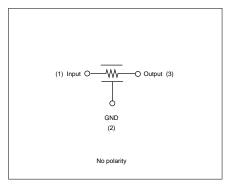
Part Number	Capacitance (pF)	Resistance (ohm)	Rated Current (mA)	Rated Voltage (Vdc)	Insulation Resistance (M ohm)	Operating Temperature Range (°C)
NFR21GD1002202	10 +20%,-20%	22 +30%,-30%	50	50	1000	-40 to 85
NFR21GD1004702	10 +20%,-20%	47 +30%,-30%	35	50	1000	-40 to 85
NFR21GD4702202	47 +20%,-20%	22 +30%,-30%	50	50	1000	-40 to 85
NFR21GD4704702	47 +20%,-20%	47 +30%,-30%	35	50	1000	-40 to 85
NFR21GD4706802	47 +20%,-20%	68 +30%,-30%	30	50	1000	-40 to 85
NFR21GD4701012	47 +20%,-20%	100 +30%,-30%	25	50	1000	-40 to 85
NFR21GD1012202	100 +20%,-20%	22 +30%,-30%	50	50	1000	-40 to 85
NFR21GD1014702	100 +20%,-20%	47 +30%,-30%	35	50	1000	-40 to 85
NFR21GD1016802	100 +20%,-20%	68 +30%,-30%	30	50	1000	-40 to 85
NFR21GD1011012	100 +20%,-20%	100 +30%,-30%	25	50	1000	-40 to 85

Number of Circuits: 1

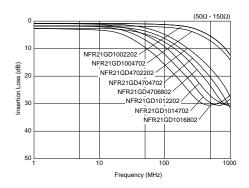


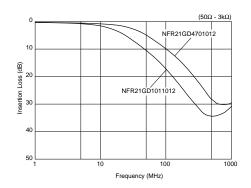
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## Equivalent Circuit



## ■ Insertion Loss Characteristics



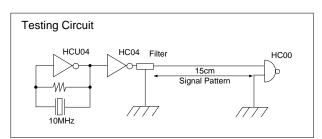




## Noise Suppression Effect of NFR21G Series

## ■Effect of Noise Suppression by NFR21G

NFR21G is effective even if ground line is not stable enough due to its distributed constant circuit structure.



### With Stable Ground Line

Type of Filter	EMI Suppression Effect	Description
Noise Level without Filter	60 9 40 9 40 9 40 9 40 9 40 9 40 9 40 9 40 9 40 9 40 9 40 9 40 9 40 9 40 9 40 9 40 9 40 9 40 10 40 10 40 10 40 10 40 10 40 10 40 10 10 10 10 10 10 10 10 10 1	Filter Signal line Ground pattern Thru-hole (connection ground pattern with ground plane) Whole surface (back side) ground plane
Filter Mounting Condition Standard Type Chip EMIFIL <sup>®</sup> (100pF)	60 9 9 9 9 9 9 9 9 9 9 9 9 9	The standard type chip EMIFIL <sup>®</sup> is effective on stable ground lines.
Filter Mounting Condition NFR21GD4701012	60 9 9 9 9 9 9 9 9 9 9 9 9 9	NFR21G has some advantages to standard type EMIFIL <sup>®</sup> on stable ground lines.

## With Poor Ground Line

Type of Filter	EMI Suppression Effect	Description
Noise Level without Filter	€ 50 9 40 9 40 9 20 10 30 84 138 192 246 300 Frequency (MHz)	Filter Signal line Ground pattern Without ground plane
Filter Mounting Condition Standard Type Chip EMIFIL <sup>®</sup> (100pF)	60 9 9 9 0 9 0 0 0 0 0 0 0 0 0 0 0 0 0	The standard type EMIFIL <sup>®</sup> loses efficiency on poor ground lines.
Filter Mounting Condition NFR21GD4701012	$\begin{array}{c} 60\\ \hline \\ 9\\ \hline 9\\ \hline \\ 9\\ \hline $	NFR21G is effective even on poor ground lines because of its distributed constant circuit structure and unique system to limit rush current.



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## Noise Suppression Effect of NFR21G Series

Waveform Distortion Supp by NFR21G	Testing Circuit	Filter AC04 Measuring Point
Type of Filter	EMI Suppression Effect	Description
Initial Waveform (no filter)	Voltage Waveform         Image: state	Resonance between the internal capacitance of the IC and the inductance of the print pattern causes waveform overshooting and undershooting.
When Ordinary Capacitor Filter is Used	Voltage Waveform         Image: state	Ordinary capacitor filters have no waveform distortion suppressing capability, and they cannot suppress disturbances in the waveforms.
NFR21G	Voltage Waveform $ \begin{array}{c} \hline                                    $	The waveform distortion suppressing function of NFR21G minimizes disturbances of waveforms.



On-Board Type (DC) EMI Suppression Filters (EMIFIL®)

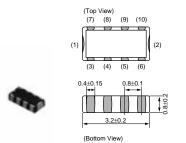
# muRata

## Chip EMIFIL<sup>®</sup> RC Combined Array Type NFA31G Series

NFA31G series is a high performance EMI suppression filter array with a 4-circuit noise filter in 3.2x1.6mm size. NFA31G realizes high density mounting.

### Features

- 1. NFA31G is a 4-circuit noise filter in 3.2x1.6mm size with 0.8mm pitch. High density mounting is available.
- 2. Three terminal structure enables excellent high frequency performance.
- Distributed constant circuit realizes smooth change of impedance which prevents reflection of signal and distortion of wave shape.
- NFA31G series is effective in lines where ground is not stable, because the resistance element in the filter absorbs noise and returns it to ground line.



0.05 r



NFA31G Series

(in mm)

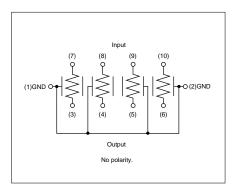
0.05 min

2

Part Number	Capacitance (pF)	Resistance (ohm)	Rated Current (mA)	Rated Voltage (Vdc)	Insulation Resistance (M ohm)	Operating Temperature Range (°C)
NFA31GD1006R84	10 +20%,-20%	6.8 +40%,-40%	50	6	1000	-40 to 85
NFA31GD1004704	10 +20%,-20%	47 +30%,-30%	20	6	1000	-40 to 85
NFA31GD1001014	10 +20%,-20%	100 +30%,-30%	15	6	1000	-40 to 85
NFA31GD4706R84	47 +20%,-20%	6.8 +40%,-40%	50	6	1000	-40 to 85
NFA31GD4703304	47 +20%,-20%	33 +30%,-30%	20	6	1000	-40 to 85
NFA31GD4704704	47 +20%,-20%	47 +30%,-30%	20	6	1000	-40 to 85
NFA31GD4701014	47 +20%,-20%	100 +30%,-30%	15	6	1000	-40 to 85
NFA31GD1016R84	100 +20%,-20%	6.8 +40%,-40%	50	6	1000	-40 to 85
NFA31GD1014704	100 +20%,-20%	47 +30%,-30%	20	6	1000	-40 to 85
NFA31GD1011014	100 +20%,-20%	100 +30%,-30%	15	6	1000	-40 to 85

Number of Circuits: 4

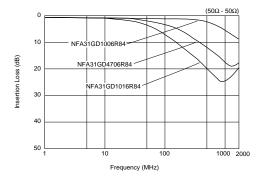
## Equivalent Circuit

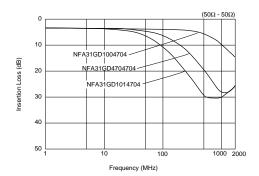


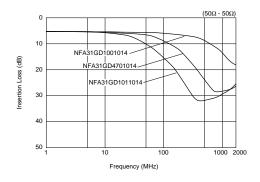


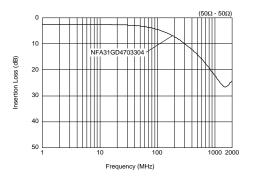
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### ■ Insertion Loss Characteristics











On-Board Type (DC) EMI Suppression Filters (EMIFIL®)



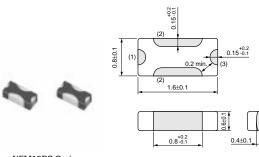
## Chip EMIFIL<sup>®</sup> for Large Current NFM18P/21P/3DP/41P/55P Series

## **NFM18PS Series**

- Features
- 1. Excellent noise suppression characteristics in high frequency band.
- 2. Rated current of 2A is achieved in small size of 1.6x0.8mm.
- 3. Suitable for noise suppression in IC power line.

### Applications

For IC power lines of digital equipment such as DVDs, DSCs, Mobile Phones, Digital TVs

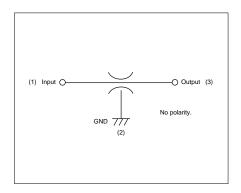


NFM18PS Series

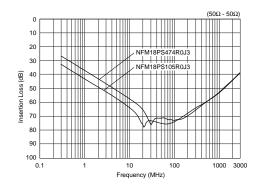
: Electrode

Part Number	Capacitance (µF)	Rated Voltage (Vdc)	Rated Current (A)	Insulation Resistance (min.) (M ohm)	Operating Temperature Range (°C)
NFM18PS474R0J3	0.47 +20%,-20%	6.3	2	1000	-55 to +125
NFM18PS105R0J3	1.0 +20%,-20%	6.3	2	500	-55 to +105

## Equivalent Circuit



## Insertion Loss Characteristics





## **NFM18PC Series**

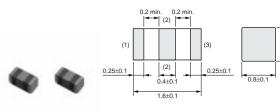
NFM18PC series is a high performance EMI suppression filter in 1.6x0.8mm size for high-speed IC power supply lines by using Murata processing technology.

### Features

- 1. Ultra-small size in 1.6x0.8mm
- 2. Three terminal structure with low residual (ESL)\* and large capacitance 2.2 micro F (max.) realize large insertion loss characteristics over wide frequency range.
- 3. Large rated current 4A max. is suitable for noise suppression of circuits which require large current.
- 4. NFM18PC series has line up of capacitance 0.1 to 2.2 micro F.
- \* Not exceeding one-tenth of monolithic ceramic capacitors (two terminal).

### Applications

- 1. Noise suppression for large capacitance circuits such as high speed IC power lines
- 2. Control change of voltage for high speed IC

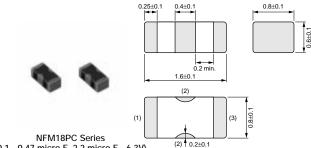


NFM18PC Series (1 micro F, 2.2 micro F - 10V)



(in mm)

0.8±0.1

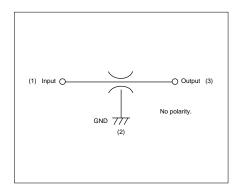


(0.1 - 0.47 micro F, 2.2 micro F - 6.3V)

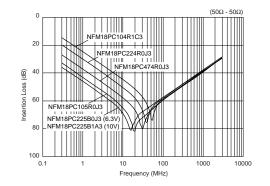
(in mm)

Part Number	Capacitance (µF)	Rated Voltage (Vdc)	Rated Current (A)	Insulation Resistance (min.) (M ohm)	Operating Temperature Range (°C)
NFM18PC104R1C3	0.1 +20%,-20%	16	2	1000	-55 to +125
NFM18PC224R0J3	0.22 +20%,-20%	6.3	2	1000	-55 to +125
NFM18PC474R0J3	0.47 +20%,-20%	6.3	2	1000	-55 to +125
NFM18PC105R0J3	1.0 +20%,-20%	6.3	2	500	-55 to +105
NFM18PC225B0J3	2.2 +20%,-20%	6.3	2	200	-40 to +85
NFM18PC225B1A3	2.2 +20%,-20%	10	4	200	-40 to +85

## Equivalent Circuit



## Insertion Loss Characteristics





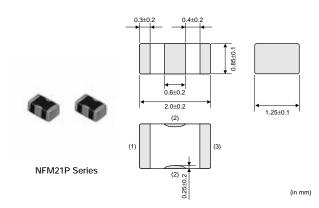
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## NFM21P Series

NFM21P is a three terminal structure component. This product can be applied to large current DC power lines. NFM21P is suitable for noise suppression of DC power lines where relatively large current operates.

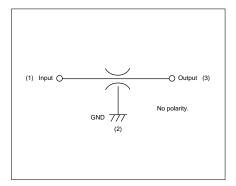
### Features

- 1. The rated current of 6A max. is suitable for IC's individual power lines.
- 2. Small dimension enables higher density packaging. NFM21P is much smaller size (2.0x1.25x0.85mm).
- 3. Murata's original internal electrode structure design realizes excellent EMI suppression effects from low frequency to high frequency.

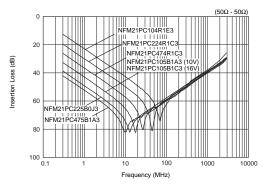


Part Number	Capacitance (μF)	Rated Voltage (Vdc)	Rated Current (A)	Insulation Resistance (min.) (M ohm)	Operating Temperature Range (°C)
NFM21PC104R1E3	0.1 +20%,-20%	25	2	1000	-55 to +125
NFM21PC224R1C3	0.22 +20%,-20%	16	2	1000	-55 to +125
NFM21PC474R1C3	0.47 +20%,-20%	16	2	1000	-55 to +125
NFM21PC105B1A3	1.0 +20%,-20%	10	4	500	-40 to +85
NFM21PC105B1C3	1.0 +20%,-20%	16	4	500	-40 to +85
NFM21PC225B0J3	2.2 +20%,-20%	6.3	4	200	-40 to +85
NFM21PC475B1A3	4.7 +20%,-20%	10	6	100	-40 to +85

## Equivalent Circuit



### ■ Insertion Loss Characteristics





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## NFM3DP Series

The chip "EMIFIL" NFM3DP is a chip type three terminal capacitor with high rated current of 2A. This series is suited for noise suppression in DC power supply lines of digital instruments.

## Features

- 1. Large rated current (2A) is suitable for application in DC power lines.
- 2. Small size (3.2x1.25mm) and low profile (0.7mm max.)

## Applications

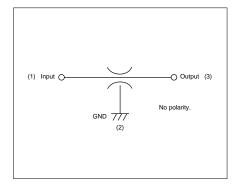
2

- 1. Personal computers, word processors and peripherals
- 2. Telephones, PPCs, communication equipment, etc.
- 3. Digital TVs, DVDs
- 4. Telecommunications equipment

Part Number	Capacitance (µF)	Rated Voltage (Vdc)	Rated Current (A)	Insulation Resistance (min.) (M ohm)	Operating Temperature Range (°C)
NFM3DPC223R1H3	0.022 +20%,-20%	50	2	1000	-55 to +125

In operating temperatures exceeding +85°C, derating of current is necessary.

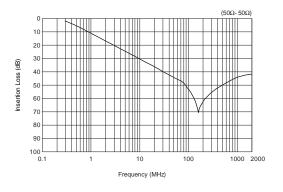
### Equivalent Circuit

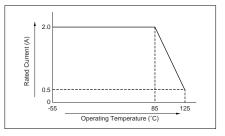


## ■ Notice (Rating)

When NFM3DP series is used in operating temperatures exceeding +85°C, derating of current is necessary. Please apply the derating curve shown in chart according to the operating temperature.

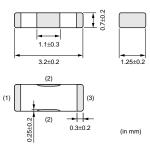
## Insertion Loss Characteristics







NFM3DP Series





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## NFM41P Series

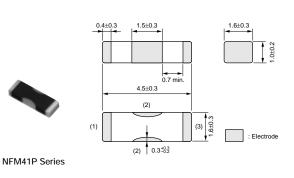
The chip "EMIFIL" NFM41P series consists of three terminal structure. These components are able to be applied to large current DC power lines. NFM41P series are suitable in noise suppression in DC lines where relatively large currents operate.

## Features

- 1. Large rated current 6A (max.) is suitable for the application in DC power lines.
- 2. High electrostatic capacitance and remarkable high frequency performance are effective for immunity against surge noise and pulse noise.

## Applications

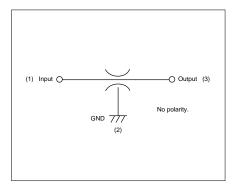
- 1. Personal computers, word processors and peripherals
- 2. Telephones, PPCs, communication equipment, etc.
- 3. Digital TVs, DVDs
- 4. Telecommunications equipment



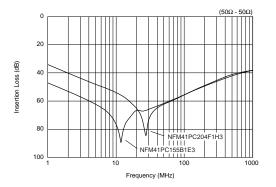
(in mm)

Part Number	Capacitance (μF)	Rated Voltage (Vdc)	Rated Current (A)	Insulation Resistance (min.) (M ohm)	Operating Temperature Range (°C)
NFM41PC204F1H3	0.2 +80%,-20%	50	2	1000	-55 to +85
NFM41PC155B1E3	1.5 +20%,-20%	25	6	300	-55 to +85

## Equivalent Circuit



## Insertion Loss Characteristics





Anote
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## NFM55P Series

The chip solid "EMIFIL" NFM55P is a chip type three terminal capacitor with high rated current of 6A. This series is suited for noise suppression in DC power lines where high rated current and large capacitance is required.

## Features

2

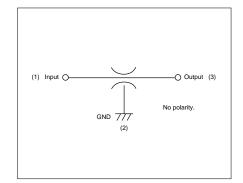
- Large rated current (6A) and low voltage drop due to a small DC resistance (0.01 ohm) are suitable for the application in DC power line.
- 2. High electrostatic capacitance and remarkable high frequency performance are effective for the immunity against the surge noise and the pulse noise.
- 3. Only reflow soldering should be applied.

## Applications

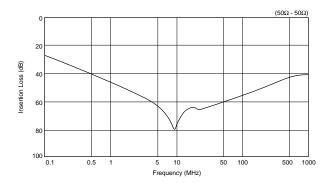
- 1. Personal computers, word processors and peripherals
- 2. Telephones, PPCs, communication equipment, etc.
- 3. Digital TVs, DVDs
- 4. Telecommunications equipment

Part Number	Capacitance (μF)	Rated Voltage (Vdc)	Rated Current (A)	Insulation Resistance (min.) (M ohm)	Operating Temperature Range (°C)
NFM55PC155F1H4	1.5 +80%,-20%	50	6	100	-55 to +85

## Equivalent Circuit



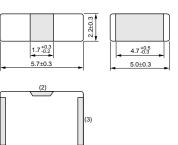
## Insertion Loss Characteristics





(1)

(2)



NFM55P Series

(in mm)

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On-Board Type (DC) EMI Suppression Filters (EMIFIL<sup>®</sup>)



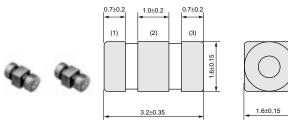
## Chip EMIFIL<sup>®</sup> LC Combined Type for Large Current NFE31P/61P Series

## NFE31P Series

The chip "EMIFIL" NFE31P is a small size T-type circuit EMI suppression filter.

### Features

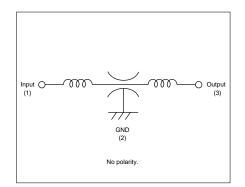
- 1. Its large rated current of 6A and low voltage drop due to small DC resistance are suitable for DC power line use.
- 2. The feedthrough capacitor realizes excellent high frequency characteristics.
- 3. The structure incorporates built-in ferrite beads which minimize resonance with surrounding circuits.
- 4. 22 to 2,200pF lineups can be used in signal lines.



2

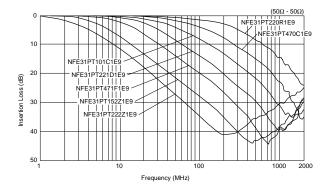
Part Number	Capacitance (pF)	Rated Voltage (Vdc)	Rated Current (A)	Insulation Resistance (min.) (M ohm)	Operating Temperature Range (°C)
NFE31PT220R1E9	22 +30%,-30%	25	6	1000	-40 to +85
NFE31PT470C1E9	47 +50%,-20%	25	6	1000	-40 to +85
NFE31PT101C1E9	100 +80%,-20%	25	6	1000	-40 to +85
NFE31PT221D1E9	220 +50%,-20%	25	6	1000	-40 to +85
NFE31PT471F1E9	470 +50%,-20%	25	6	1000	-40 to +85
NFE31PT152Z1E9	1500 +50%,-20%	25	6	1000	-40 to +85
NFE31PT222Z1E9	2200 +50%,-50%	25	6	1000	-40 to +85

## Equivalent Circuit



## Insertion Loss Characteristics

NFE31P Series



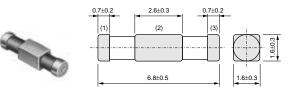


## NFE61P Series

The chip "EMIFIL" NFE61P is a T-type circuit EMI suppression filter.

### Features

- 1. Its large rated current of 2A and low voltage drop due to small DC resistance are suitable for DC power line use.
- 2. The feedthrough capacitor realizes excellent high frequency characteristics.
- The structure incorporates built-in ferrite beads which minimize resonance with surrounding circuits.
- 4. 33 to 4,700pF lineups can be used in signal lines.

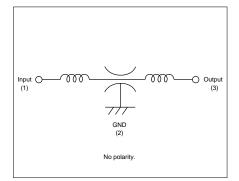


NFE61P Series

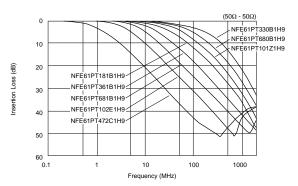
(in mm)

Part Number	Capacitance (pF)	Rated Voltage (Vdc)	Rated Current (A)	Insulation Resistance (min.) (M ohm)	Operating Temperature Range (°C)
NFE61PT330B1H9	33 +30%,-30%	50	2	1000	-25 to +85
NFE61PT680B1H9	68 +30%,-30%	50	2	1000	-25 to +85
NFE61PT101Z1H9	100 +30%,-30%	50	2	1000	-25 to +85
NFE61PT181B1H9	180 +30%,-30%	50	2	1000	-25 to +85
NFE61PT361B1H9	360 +20%,-20%	50	2	1000	-25 to +85
NFE61PT681B1H9	680 +30%,-30%	50	2	1000	-25 to +85
NFE61PT102E1H9	1000 +80%,-20%	50	2	1000	-25 to +85
NFE61PT472C1H9	4700 +80%,-20%	50	2	1000	-25 to +85

### Equivalent Circuit



### ■ Insertion Loss Characteristics





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On-Board Type (DC) EMI Suppression Filters (EMIFIL®)

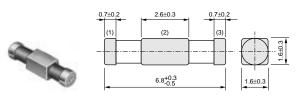


# Chip EMIFIL<sup>®</sup> LC Combined Type for Large Current NFE61H Series

The T-type chip EMI Filter NFE61H series consists of a feedthrough capacitor and ferrite beads. Extending the operating conditions of NFE61P, NFE61H series can be used in an application set under severe operating conditions.

### Features

- 1. These filters have an extended operating temperature range of -55 to +125 degrees C.
- Its large rated current of 2A and low voltage drop due to small DC resistance are suitable for DC power line use.
- The feedthrough capacitor realizes excellent high frequency characteristics.
- 4. The structure incorporates built-in ferrite beads which minimize resonance with surrounding circuits.
- 5. 33 to 3,300pF lineups can be used in signal lines.

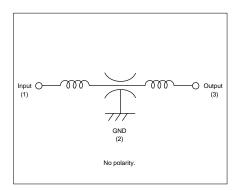


NFE61H Series

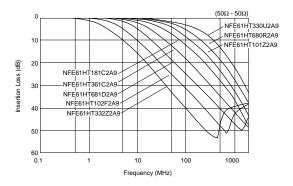
(in mm)

Part Number	Capacitance (pF)	Rated Voltage (Vdc)	Rated Current (A)	Insulation Resistance (min.) (M ohm)	Operating Temperature Range (°C)
NFE61HT330U2A9	33 +30%,-30%	100	2	1000	-55 to +125
NFE61HT680R2A9	68 +30%,-30%	100	2	1000	-55 to +125
NFE61HT101Z2A9	100 +30%,-30%	100	2	1000	-55 to +125
NFE61HT181C2A9	180 +30%,-30%	100	2	1000	-55 to +125
NFE61HT361C2A9	360 +20%,-20%	100	2	1000	-55 to +125
NFE61HT681D2A9	680 +30%,-30%	100	2	1000	-55 to +125
NFE61HT102F2A9	1000 +80%,-20%	100	2	1000	-55 to +125
NFE61HT332Z2A9	3300 +80%,-20%	100	2	1000	-55 to +125

Equivalent Circuit



### Insertion Loss Characteristics





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On-Board Type (DC) EMI Suppression Filters (EMIFIL®)



## Chip Common Mode Choke Coils Part Numbering

Chip Common Mode Choke Coils

DL W 21 S N 371 S Q 2 L

Chip Common Mode Choke Coils

Product ID

(Part Number)

#### Product ID

DL

#### 2Structure

Code	Structure
w	Winding Type
м	Monolithic Type
Р	Film Type

#### 3 Dimensions (LXW)

Code	Dimensions (L×W)	EIA
0N	0.85×0.65mm	03025
1N	1.5×0.65mm	0502
11	1.25×1.0mm	0504
21	2.0×1.2mm	0805
31	3.2×1.6mm	1206
2A	2.0×1.0mm	0804
2H	2.5×2.0mm	1008
5A	5.0×3.6mm	2014
5B	5.0×5.0mm	2020

#### 4 Туре

Code	Туре
S	Magnetically Shielded One Circuit Type
D	Magnetically Shielded Two Circuit Type
н	Open Magnetic One Circuit Type
G	Magnetically Monolithic Type (sectional winding)
т	Magnetically Shielded One Circuit Low Profile Type

#### 6Category

•••••	
Code	Category
N/R	Standard Type

### 6Impedance

Typical impedance at 100MHz is expressed by three figures. The unit is in ohm ( $\Omega$ ). The first and second figures are significant digits, and the third figure expresses the number of zeros which follow the two figures.

#### Circuit

Code	Circuit					
S						
М	Expressed by a letter.					
Н						

#### 8Features

-	
Code	Features
L	
Q	Expressed by a letter.
Z	

#### One of Signal Lines

Code	Number of Signal Lines					
2	Two Lines					
3	Three Lines					
4	Four Lines					

#### Packaging

Code	Packaging	Series
к	Embossed Taping (ø330mm Reel)	DLW5AH/DLW5BS/DLW5BT
L	Embossed Taping (ø180mm Reel)	All Series
В	Bulk	All Series



On-Board Type (DC) EMI Suppression Filters (EMIFIL®)



0.27±0.7

## Chip Common Mode Choke Coils Film Type DLP0NS/11S/31S Series

## **DLP0NS Series**

### Features

- 1. Small size and tight dimensional tolerance Size: 0.85x0.65x0.45mm Tolerance: +-0.05mm
- 2. Useful impedance line-up from 67 ohm to 120 ohm
- 3. DLPONS series enables noise suppression for differential signal line without distortion in high-speed signal transmission due to its line impedance matching

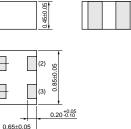
## Applications

Common mode noise suppression of high speed differential signal lines for USB 2.0, IEEE1394, LVDS

1. Note PCs

- 2. Cellular phones
- 3. Digital Still Cameras, Digital Video Cameras





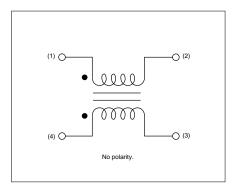
**DLPONS Series** 

: Electrode (in mm)

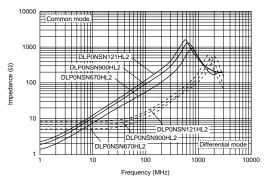
Part Number	Common Mode Impedance (at 100MHz, 20°C) (ohm)	Rated Current (mA)	Rated Voltage (Vdc)	Insulation Resistance (min.) (M ohm)	Withstand Voltage (Vdc)	DC Resistance (ohm)
DLP0NSN670HL2	67 ±20%	110	5	100	12.5	2.4 ±25%
DLP0NSN900HL2	90 ±20%	100	5	100	12.5	3.0 ±25%
DLP0NSN121HL2	120 ±20%	90	5	100	12.5	3.8 ±25%

Operating Temperature Range: -40°C to 85°C

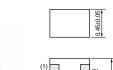
## Equivalent Circuit



## ■ Impedance - Frequency



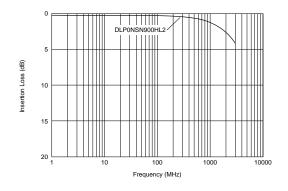
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### Transmission Characteristics (Typical)



## **DLP11S Series**

### Features

- 1. Small size and tight dimensional tolerance Size: 1.25x1.0x0.82mm Tolerance: +-0.1mm
- 2. Useful impedance line-up from 67 ohm to 330 ohm
- DLP11S series enables noise suppression for differential signal line without distortion in high-speed signal transmission due to its high coupling
- 4. DLP11SN\_HL2 series match with line impedance

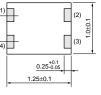
### Applications

Common mode noise suppression of high speed differential signal lines for USB, IEEE1394, LVDS

- 1. Note PCs, PDAs
- 2. Cellular phones
- 3. Digital Still Cameras, Digital Video Cameras







(in mm)

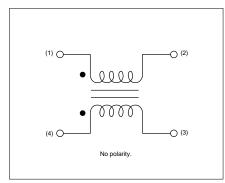
Part Number	Common Mode Impedance (at 100MHz, 20°C) (ohm)	Rated Current (mA)	Rated Voltage (Vdc)	Insulation Resistance (min.) (M ohm)	Withstand Voltage (Vdc)	DC Resistance (ohm)
DLP11SN670SL2	67 ±20%	180	5	100	12.5	1.3 ±25%
DLP11SN900HL2	90 ±20%	150	5	100	12.5	1.5 ±25%
DLP11SN121SL2	120 ±20%	140	5	100	12.5	2.0 ±25%
DLP11SN161SL2	160 ±20%	120	5	100	12.5	2.7 ±25%
DLP11SN201HL2	200 ±20%	110	5	100	12.5	3.1 ±25%
DLP11SN241HL2	240 ±20%	100	5	100	12.5	3.5 ±25%
DLP11SN281HL2	280 ±20%	90	5	100	12.5	4.2 ±25%
DLP11SN331HL2	330 ±20%	80	5	100	12.5	4.9 ±25%

Operating Temperature Range: -40°C to 85°C

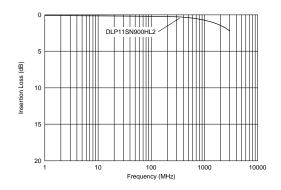


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### Equivalent Circuit



■ Transmission Characteristics (Typical)



## **DLP31S Series**

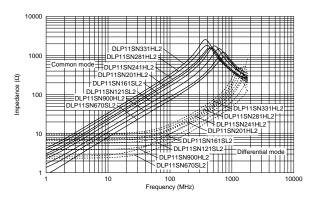
DLP31S series is chip common mode choke coil that realizes high impedance in a small size with ferrite material technology and film processing technology. DLP31S series has excellent performance at high frequency range. It is suitable for differential signal line application.

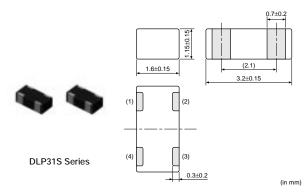
## Features

- 1. Small size, low profile, SMD. 3.2x1.6x1.15mm (Tolerance: +-0.15mm)
- 2. High common mode impedance (550 ohm at 100MHz typ.) in small size
- DLP31S suppresses high frequency noise that was unable to be suppressed with existing common mode choke coils. Suitable for differential signal lines like USB, because DLP31S does not provide distortion to high speed signal transmission due to its high coupling (coupling coefficient: 0.98 min.)

### Applications

- 1. USB lines of PCs, peripheral equipment
- 2. LVDS lines of Note-PCs, LCDs
- 3. USB lines of digital AV equipment such as digital cameras





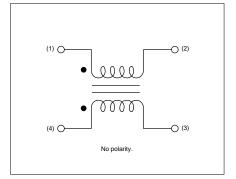


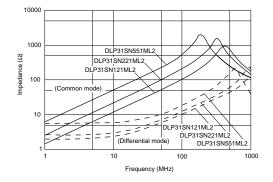
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Part Number	Common Mode Impedance (at 100MHz, 20°C) (ohm)	Rated Current (mA)	Rated Voltage (Vdc)	Insulation Resistance (min.) (M ohm)	Withstand Voltage (Vdc)	DC Resistance (ohm)
DLP31SN121ML2	120 ±20%	100	16	100	40	2.0 max.
DLP31SN221ML2	220 ±20%	100	16	100	40	2.5 max.
DLP31SN551ML2	550 ±20%	100	16	100	40	3.6 max.

Operating Temperature Range: -40°C to 85°C

## Equivalent Circuit







On-Board Type (DC) EMI Suppression Filters (EMIFIL®)



## Chip Common Mode Choke Coils Arrays Film Type DLP1ND/2AD/31D Series

## **DLP1ND Series**

### Features

- 1. 2 components are included in 1.5x0.65mm size
- 2. Low profile: typ. 0.45mm
- 3. High common mode impedance characteristics (max. 160ohm, at 100MHz)
- DLP1ND can suppress common mode noise without damage to signal wave.
- 5. DLP1ND match with line impedance.

## Applications

Common mode noise suppression of high speed differential signal lines for USB, IEEE1394, LVDS, DVI, HDMI

- 1. Main board of personal computers, Note PCs
- 2. Printers, Scanners
- 3. LCD monitors
- 4. Game equipment
- 5. PC peripheral equipment

	0.2±0.1 0.4±0.1	
	(1) (2) (3) (4) (1) (2) (3) (4) (7) (9) (5) (6) (7) (8) (5) (5) (6) (7) (8) (5) (5) (6) (7) (8)	0.45±0.05

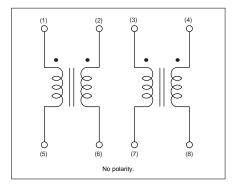
**DLP1ND Series** 

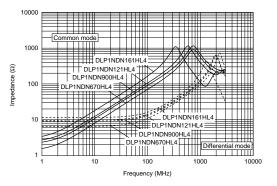
(in mm)

Part Number	Common Mode Impedance (at 100MHz, 20°C) (ohm)	Rated Current (mA)	Rated Voltage (Vdc)	Insulation Resistance (min.) (M ohm)	Withstand Voltage (Vdc)	DC Resistance (ohm)
DLP1NDN670HL4	67 ±20%	80	5	100	12.5	3.0 ±25%
DLP1NDN900HL4	90 ±20%	70	5	100	12.5	4.2 ±25%
DLP1NDN121HL4	120 ±20%	60	5	100	12.5	5.0 ±25%
DLP1NDN161HL4	160 ±20%	60	5	100	12.5	5.6 ±25%

Operating Temperature Range: -40°C to 85°C

## Equivalent Circuit







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## **DLP2AD Series**

### Features

- 1. 2 components are included in 2.0x1.0mm size
- 2. Low profile: typ. 0.82mm
- 3. High common mode impedance characteristics (max. 280 ohm, at 100MHz)
- 4. DLP2AD can suppress common mode noise without damage to signal wave.
- 5. DLP2AD match with line impedance.

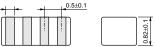
## Applications

Common mode noise suppression of high speed differential signal lines for USB, IEEE1394 LVDS, DVI, HDMI

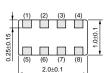
- 1. Main board of personal computers, Note PCs
- 2. Printers, Scanners
- 3. LCD monitors
- 4. Game equipment
- 5. PC peripheral equipment



0.25±0.1







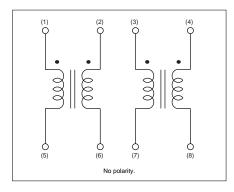
DLP2AD Series

(in mm)

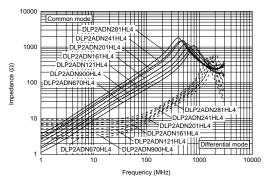
Part Number	Common Mode Impedance (at 100MHz, 20°C) (ohm)	Rated Current (mA)	Rated Voltage (Vdc)	Insulation Resistance (min.) (M ohm)	Withstand Voltage (Vdc)	DC Resistance (ohm)
DLP2ADN670HL4	67 ±20%	140	5	100	12.5	1.3 ±25%
DLP2ADN900HL4	90 ±20%	130	5	100	12.5	1.7 ±25%
DLP2ADN121HL4	120 ±20%	120	5	100	12.5	2.0 ±25%
DLP2ADN161HL4	160 ±20%	100	5	100	12.5	2.5 ±25%
DLP2ADN201HL4	200 ±20%	90	5	100	12.5	3.2 ±25%
DLP2ADN241HL4	240 ±20%	80	5	100	12.5	3.8 ±25%
DLP2ADN281HL4	280 ±20%	80	5	100	12.5	4.6 ±25%

Operating Temperature Range: -40°C to 85°C

## Equivalent Circuit



## ■ Impedance - Frequency

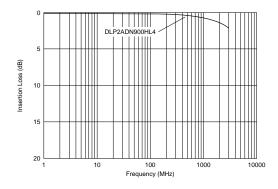


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### Transmission Characteristics (Typical)



## **DLP31D Series**

DLP31D series is chip common mode choke coil array which realizes high coupling and high impedance in a small size with ferrite material technology and thin film processing technology.

### Features

- 1. 2 components are included in 3.2x1.6mm
- 2. Thin type 1.15mm
- 3. High common mode Impedance characteristics (max. 440 ohm, at 100MHz)
- 4. DLP31D can suppress common mode noise without damage to signal wave.

### Applications

Common mode noise suppression of high speed differential signal lines for USB, IEEE1394, LVDS

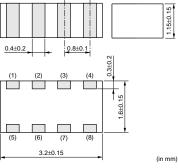
- 1. Main board of personal computers, note PCs
- 2. Printers, Scanners
- 3. LCD monitors
- 4. Game equipment
- 5. PC peripheral equipment

Part Number	Common Mode Impedance (at 100MHz, 20°C) (ohm)	Rated Current (mA)	Rated Voltage (Vdc)	Insulation Resistance (min.) (M ohm)	Withstand Voltage (Vdc)	DC Resistance (ohm)
DLP31DN900ML4	90 ±20%	160	10	100	25	1.1 max.
DLP31DN131ML4	130 ±20%	120	10	100	25	1.6 max.
DLP31DN201ML4	200 ±20%	100	10	100	25	2.2 max.
DLP31DN321ML4	320 ±20%	80	10	100	25	3.5 max.
DLP31DN441ML4	440 ±20%	70	10	100	25	4.3 max.

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**DLP31D Series** 

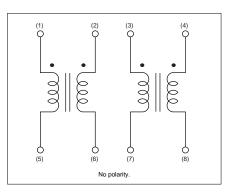


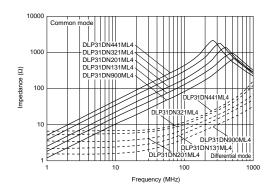
	Temperature		



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### Equivalent Circuit







On-Board Type (DC) EMI Suppression Filters (EMIFIL®)



## Chip Common Mode Choke Coils Monolithic Type DLM11G/2HG Series

## **DLM11G Series**

Small size chip common mode choke coil. Suitable for noise suppression at audio line for mobile phone.

## Features

- 1. Small size: 1.25x1.0x0.5mm
- 2. Noise suppression for personal mobile equipment
- 3. Enables suppression of both differential mode and common mode noise.

Common mode impedance:

600 ohm at 100MHz (typ.)

Differential mode impedance:

1200 ohm at 100MHz (typ.)

4. Available for high density mounting (Narrow pitch)

## Applications

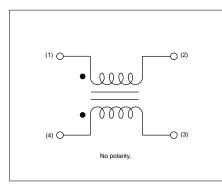
- 1. Audio line for mobile phones
- (Microphones, Speakers, Headphones)
- 2. Handsets
- 3. Personal mobile equipment

(PDAs, Digital still cameras, MD players)

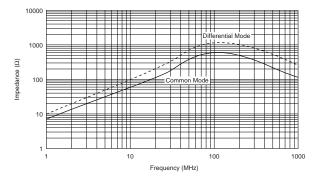
Part Number	Common Mode Impedance (at 100MHz, 20°C) (ohm)	Rated Current (mA)	Rated Voltage (Vdc)	Insulation Resistance (min.) (M ohm)	Withstand Voltage (Vdc)	DC Resistance (ohm)
DLM11GN601SZ2	600 ±25%	100	5	100	25	0.8 max.

Operating Temperature Range: -40°C to 85°C

## Equivalent Circuit



## ■ Impedance - Frequency

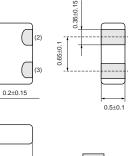




**DLM11G Series** 

1.25±0.15

1.0±0.15







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## **DLM2HG Series**

DLM2HG Series is a high quality noise suppression filter for headphone lines of high quality digital music equipment.

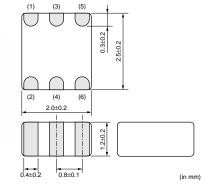
### Features

- 1. Low distortion in audio signal, low crosstalk
- 2. Effective in noise suppression both of common mode and of differential mode
- 3. Small size, low profile, SMD 2.5x2.0x1.2mm

### Applications

- 1. Headphone lines of digital music equipment such as DVDs, MD players
- 2. Headphone lines of Note-PCs, PDAs

DLM2HG Series

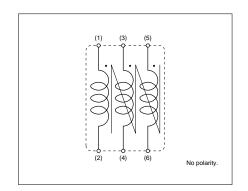


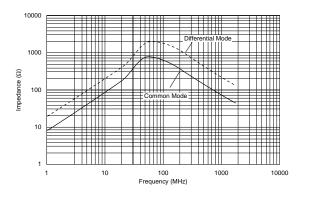
Part Number	Common Mode Impedance (at 100MHz, 20°C) (ohm)	Rated Current (mA)	Rated Voltage (Vdc)	Insulation Resistance (min.) (M ohm)	Withstand Voltage (Vdc)	DC Resistance (ohm)
DLM2HGN601SZ3	600 ±25%	100	16	100	100	0.40 max.

Operating Temperature Range: -40°C to 85°C

## Equivalent Circuit

3







# On-Board Type (DC) EMI Suppression Filters (EMIFIL<sup>®</sup>)



## Chip Common Mode Choke Coils Wire Wound Type DLW21S/21H/31S Series

## **DLW21S Series**

- Features (DLW21S SQ Series)
- 1. DLW21S series realizes small size and low profile. 2.0x1.2x1.2mm
- 2. High common mode impedance at high frequency effects excellent noise suppression performance.
- 3. Various common mode impedance items of 67 to 370 ohm can be used, considering noise level and signal frequency.
- 4. DLW21S series enables noise suppression for differential signal line without distortion in high speed signal transmission due to its high coupling.
- 5. Small dimension enables higher density packaging.

## Applications

- 1. USB lines of PC, Peripheral equipment
- 2. LVDS lines of Note-PCs, LCDs
- 3. USB lines of Small digital AV equipment such as digital cameras

## Features (DLW21S\_HQ Series)

- 1. Small size: 2.0x1.2x1.2mm
- 2. Common mode impedance items of 67, 90 and 120 ohm, and they can be used for various differential signallines and DLW21SN\_HQ series match with line impedance of 100 ohm line.
- 3. DLW21SN(R)\_HQ series can suppress noise for the high-speed differential signal lines which are used in digital AV interfaces, such as HDMI and DVI, without damage to the signal wave.
- 4. In case of using electro static protection device with DLW21SR HQ series match with line impedance of 100 ohm line.

## Applications

Common mode noise suppression of high speed differential signal lines for HDMI, DVI, USB2.0, IEEE1394, LVDS.

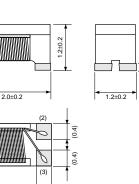
- 1. DVD Recorders
- 2. LCD TVs, LCD monitors
- 3. PCs

DLW21SR HQ Series is suitable for receiver side of HDMI interface line.

Part Number	Common Mode Impedance (at 100MHz, 20°C) (ohm)	Rated Current (mA)	Rated Voltage (Vdc)	Insulation Resistance (min.) (M ohm)	Withstand Voltage (Vdc)	DC Resistance (ohm)
DLW21SN670SQ2	67 ±25%	400	50	10	125	0.25 max.
DLW21SN900SQ2	90 ±25%	330	50	10	125	0.35 max.
DLW21SN121SQ2	120 ±25%	370	50	10	125	0.30 max.



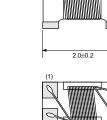
DLW21S SQ Series



(0.45

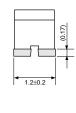


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DLW21S\_HQ Series

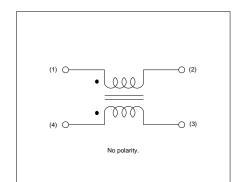
(in mm)

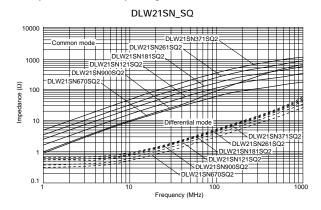
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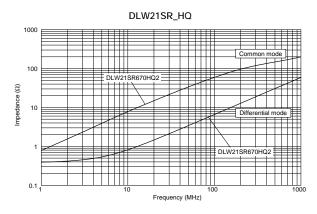
Part Number	Common Mode Impedance (at 100MHz, 20°C) (ohm)	Rated Current (mA)	Rated Voltage (Vdc)	Insulation Resistance (min.) (M ohm)	Withstand Voltage (Vdc)	DC Resistance (ohm)
DLW21SN181SQ2	180 ±25%	330	50	10	125	0.35 max.
DLW21SN261SQ2	260 ±25%	300	50	10	125	0.40 max.
DLW21SN371SQ2	370 ±25%	280	50	10	125	0.45 max.
DLW21SN670HQ2	67 ±25%	320	20	10	50	0.31 max.
DLW21SN900HQ2	90 ±25%	280	20	10	50	0.41 max.
DLW21SN121HQ2	120 ±25%	280	20	10	50	0.41 max.
DLW21SR670HQ2	67 ±25%	400	20	10	50	0.25 max.

Operating Temperature Range: -40°C to 85°C

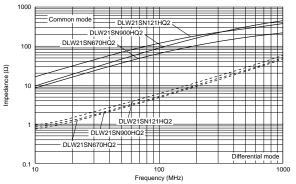
## Equivalent Circuit



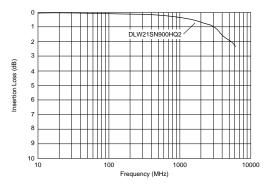




DLW21SN\_HQ



■ Transmission Characteristics (Typical)





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## **DLW21H Series**

## Features

- 1. Small size and low profile (2.0x1.2x0.9mm). Excellent noise suppression for sets of small and thin size.
- 2. High common mode impedance at high frequency effects excellent noise suppression performance.
- 3. Various common mode impedance from 67 to 180 ohm can be used, selected depending on noise level and signal frequency.
- 4. Suitable for differential signal line like USB2.0, IEEE1394 and LVDS, because DLW21H does not provide distortion to high speed signal transmission due to its high coupling. (USB2.0: DLW21HN900SQ2)
- 5. Small dimension enables higher density mounting

## Applications

Part Numbe

Common mode noise suppression of signal lines in high speed and high density digital equipment such as PCs and peripherals and telecommunications equipment.

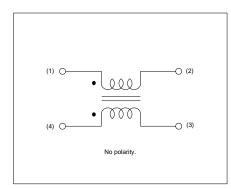
DLW21H Series

Insulation Resistance Withstand Voltage DC Resistance Common Mode Impedance Rated Current Rated Voltage

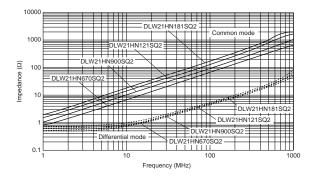
T art Number	(at 1000012, 20 0) (ohm)	(mA)	(Vdc)	(M ohm)	(Vdc)	(ohm)
DLW21HN670SQ2	67 ±25%	330	50	10	125	0.35 max.
DLW21HN900SQ2	90 ±25%	330	50	10	125	0.35 max.
DLW21HN121SQ2	120 ±25%	280	50	10	125	0.45 max.
DLW21HN181SQ2	180 ±25%	250	50	10	125	0.50 max.

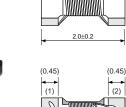
Operating Temperature Range: -40°C to 85°C

## Equivalent Circuit

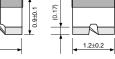


## ■ Impedance - Frequency





(4)







(in mm)





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## **DLW31S Series**

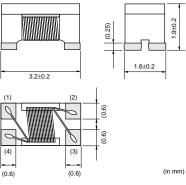
### Features

- 1. DLW31S realizes small size and low profile. 3.2x1.6x1.9mm.
- 2. High common mode impedance at high frequency effects excellent noise suppression performance.
- Various common mode impedance items of 90 to 2200 ohm can be used, considering noise level and signal frequency.
- 4. DLW31S series enables noise suppression for differential signal lines without distortion in high speed signal transmission due to its high coupling.
- 5. Small dimension enables higher density packaging.

### Applications

- 1. USB lines of PCs, Peripheral equipment
- 2. LVDS lines of Note-PCs, LCDs

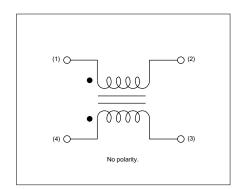


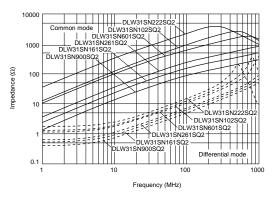


Part Number	Common Mode Impedance (at 100MHz, 20°C) (ohm)	Rated Current (mA)	Rated Voltage (Vdc)	Insulation Resistance (min.) (M ohm)	Withstand Voltage (Vdc)	DC Resistance (ohm)
DLW31SN900SQ2	90 ±25%	370	50	10	125	0.3 max.
DLW31SN161SQ2	160 ±25%	340	50	10	125	0.4 max.
DLW31SN261SQ2	260 ±25%	310	50	10	125	0.5 max.
DLW31SN601SQ2	600 ±25%	260	50	10	125	0.8 max.
DLW31SN102SQ2	1000 ±25%	230	50	10	125	1.0 max.
DLW31SN222SQ2	2200 ±25%	200	50	10	125	1.2 max.

Operating Temperature Range: -40°C to 85°C

## Equivalent Circuit







# On-Board Type (DC) EMI Suppression Filters (EMIFIL®)



## Chip Common Mode Choke Coils Wire Wound Type for Large Current DLW5AH/5BS/5BT Series

## **DLW5AH/5BS Series**

DLW5AH/5BS series is a high performance wound type chip common mode choke coil.

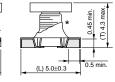
## Features

- 1. High impedance (max. of 4000ohm at 100MHz: DLW5AH) enables great noise suppression.
- 2. Large rated current (max. of 5A) is suitable for power line use.
- DLW5AH/BS series does not damage high speed signal due to high coupling common mode choke coil structure.
- 4. Automatic mounting can be applied.

### Applications

- 1. DC power lines in AC adapters of Portable equipment
- 2. DC power lines of DC-DC converters, battery chargers



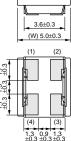


 Starting position of wiring should be covered with resin.

in mm

3





(W) 3.6±0.3

1.3 0.9 1.3

(2)

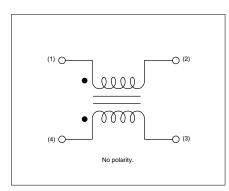
L) 5.0±0.3

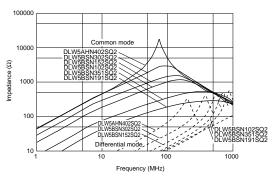
in mm

Part Number	Common Mode Impedance (at 100MHz, 20°C) (ohm)	Rated Current (mA)	Rated Voltage (Vdc)	Insulation Resistance (min.) (M ohm)	Withstand Voltage (Vdc)	DC Resistance (ohm)
DLW5AHN402SQ2	4000 (Тур.)	200	50	10	125	3.0 max.
DLW5BSN191SQ2	190 (Тур.)	5000	50	10	125	0.02 max.
DLW5BSN351SQ2	350 (Тур.)	2000	50	10	125	0.04 max.
DLW5BSN102SQ2	1000 (Тур.)	1500	50	10	125	0.06 max.
DLW5BSN152SQ2	1500 (Тур.)	1000	50	10	125	0.1 max.
DLW5BSN302SQ2	3000 (Тур.)	500	50	10	125	0.3 max.

Operating Temperature Range: -25°C to 85°C

## Equivalent Circuit







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Continued from the preceding page.

## Derating of Rated Current

#### DLW5BSN191 DLW5BSN191SQ2 Temperature Derating 4 75 Rated Current (A) 4.5 10 20 30 40 50 60 70 t 80 90 100 75°C 85°C Operating Temperature (°C)

## **DLW5BT Series**

Low profile (h=2.5mm) chip common mode choke coil. Suitable for noise suppression at DC power lines.

## Features

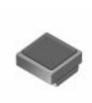
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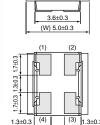
- 1. Low profile (h=2.5mm)
- 2. Small size (5.0x5.0mm) and high rated current (1.5 to 6A)
- 3. High common mode Impedance (max. 1400 ohm, at 100MHz)

### Applications

Noise suppression for power line

- 1. Power line equipment -DC-DC converters -Battery chargers
- 2. Portable equipment
  - -PDAs (Personal Digital Assistants) -Note PCs -Printers





0.9±0.3



**DLW5BT Series** 



	Part Number	Common Mode Impedance (at 100MHz, 20°C) (ohm)	Rated Current (mA)	Rated Voltage (Vdc)	Insulation Resistance (min.) (M ohm)	Withstand Voltage (Vdc)	DC Resistance (ohm)
DL	W5BTN101SQ2	100 (Тур.)	6000	50	10	125	0.009 ±40%
DL	W5BTN251SQ2	250 (Тур.)	5000	50	10	125	0.014 ±40%
DL	W5BTN501SQ2	500 (Тур.)	4000	50	10	125	0.019 ±40%
DL	W5BTN102SQ2	1000 (Тур.)	2000	50	10	125	0.024 ±40%
DL	W5BTN142SQ2	1400 (Тур.)	1500	50	10	125	0.040 ±40%

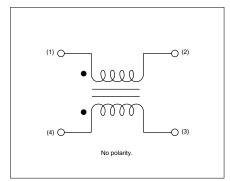
Operating Temperature Range: -25°C to 85°C



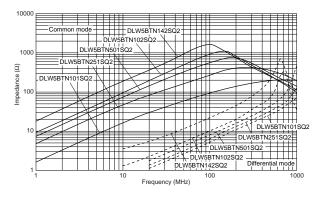


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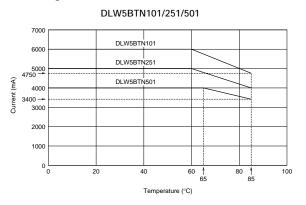
### Equivalent Circuit



### ■ Impedance - Frequency



## Derating of Rated Current





# On-Board Type (DC) EMI Suppression Filters (EMIFIL®)



## Block Type EMIFIL<sup>®</sup> BNX Series

## SMD Type

BNX022 series is SMD type high performance and provides excellent noise suppression on DC power lines.

### Features

- 1. Large rated current (10A) and Low DC Resistance. (0.43m ohm - Typ.)
- High insertion loss characteristic over a wide frequency range of 1MHz to 1GHz.
- 3. Mounting area and volume is reduced.
- 4. Effective for impulse noise such as electrostatic discharge or spike noise.

### Applications

4

- 1. Displays (PDP/LCD-TV)
- 2. Digital AV equipment
- 3. Amusement equipment
- 4. PC peripheral equipment
- Industry equipment, measurement equipment, power supplies

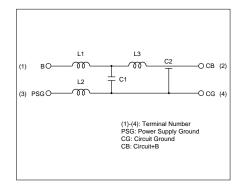
Part Number	Rated Voltage (Vdc)	Withstand Voltage (Vdc)	Rated Current (A)	Insulation Resistance (min.) (M ohm)	Insertion Loss
BNX022-01	50	125	10	500	1MHz to 1GHz:35dB min. (20 to 25 degrees C line impedance=50 ohm)

Operating Temperature Range: -40°C to 125°C

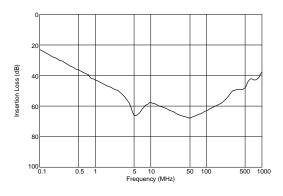
In operating temperatures exceeding +85°C, derating of current is necessary.

Please refer to p.137, "Derating of Rated Current".

## Equivalent Circuit



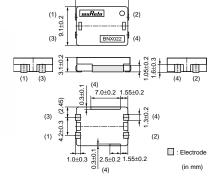
## Insertion Loss Characteristics



Continued on the following page.



BNX022



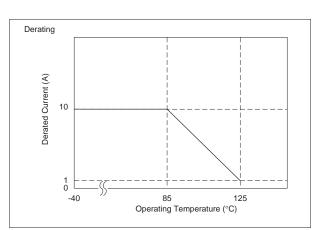
12.1±0.2

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Continued from the preceding page.

## Derating of Rated Current

In operating temperatures exceeding +85°C, derating of current is necessary for BNX022 series. Please apply the derating curve shown in chart according to the operating temperature.



## Lead Type

The block type "EMIFIL" BNX series incorporates through-type capacitor, monolithic chip capacitors and bead. The BNX is high performance for use in DC power circuits.

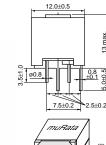
### Features

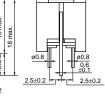
- 1. The filter enables obtaining high insertion loss in wide frequency ranges from 0.5MHz to 1GHz.
- 2. Effective for impulse noise such as electrostatic discharge or spike noise.
- 3. There are no connection routes in the current circuits, thus ensuring highly reliable performance.

### Applications

- 1. Displays (PDP/LCD-TV)
- 2. Digital AV equipment
- 3. Amusement equipment
- 4. PC peripheral equipment
- 5. Industry equipment







11.0±0.5

BNX002/003



2.5±0.2 2.5±0.2

PSG: Power supply ground CG: Load circuit ground CB: Load circuit + Bias

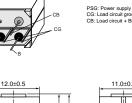
11.0±0.5

BNX005

(in mm)

Part Number	Rated Voltage (Vdc)	Withstand Voltage (Vdc)	Rated Current (A)	Insulation Resistance (min.) (M ohm)	Insertion Loss	
BNX002-01	50	125	10	100	1MHz to 1GHz:40dB min. (20 to 25 degrees C line impedance=50 ohm)	
BNX003-01	150	375	10	100	5MHz to 1GHz:40dB min. (20 to 25 degrees C line impedance=50 ohm)	
BNX005-01	50	125	15	100	1MHz to 1GHz:40dB min. (20 to 25 degrees C line impedance=50 ohm)	

Operating Temperature Range: -30°C to 85°C



13.5 max

2 5+0 2

7.5±0.2

max.

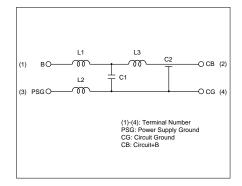


(in mm)

4

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### Equivalent Circuit



## Lead Type Low Profile

The block type "EMIFIL" BNX010 series is high performance and BNX series provide excellent noise suppression on DC power lines.

### Features

 High insertion loss characteristic over a wide frequency band range.
 1MHz to 1GHz: 40dB min (BNX012)

100kHz to 1GHz: 40dB min (BNX016)

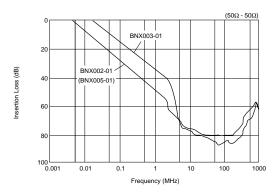
- 2. Large rated current (15A) and Low Rdc (0.8m ohm-typ.)
- 3. Low profile (height: 8.0mm except lead terminal)
- 4. Effective for impulse noise such as electrostatic discharge or spike noise.

### Applications

4

- 1. Displays (PDP/LCD-TV)
- 2. Digital AV equipment
- 3. Amusement equipment
- 4. PC peripheral equipment
- 5. Industry equipment

### ■ Insertion Loss Characteristics



12.0±0.2

**muRata** BNX\*\*\* 00

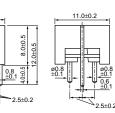
7.5±0.2

muRata

2±0.5

\*\*\* : 012/016

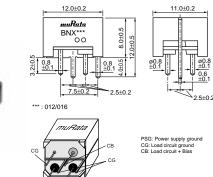






BNX016

PSG: Power supply ground B CG: Load circuit ground CB: Load circuit + Bias



(in mm)

(in mm)

Part Number	Rated Voltage (Vdc)	Withstand Voltage (Vdc)	Rated Current (A)	Insulation Resistance (min.) (M ohm)	Insertion Loss	
BNX012-01	50	125	15	500	1MHz to 1GHz:40dB min. (20 to 25 degrees C line impedance=50 ohm)	
BNX016-01	25	62.5	15	50	100kHz to 1GHz:40dB min. (20 to 25 degrees C line impedance=50 ohm)	

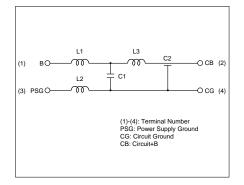
Operating Temperature Range: -40°C to 125°C

In operating temperatures exceeding +85°C, derating of current is necessary. Please refer to p.139, "Derating of Rated Current".

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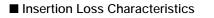
### Equivalent Circuit

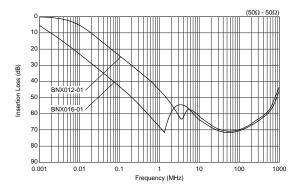


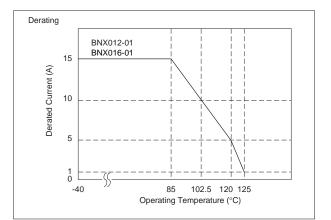
## Notice

### Rating

In operating temperatures exceeding +85°C, derating of current is necessary for BNX010 series. Please apply the derating curve shown in chart according to the operating temperature.

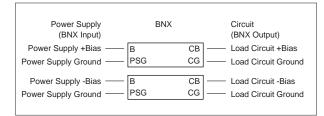






## • Connecting ± power line

In case of using  $\pm$  power line, please connect to each terminal as shown.

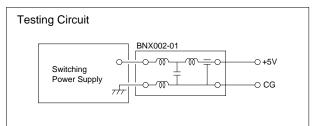




## Noise Suppression Effect of BNX Series

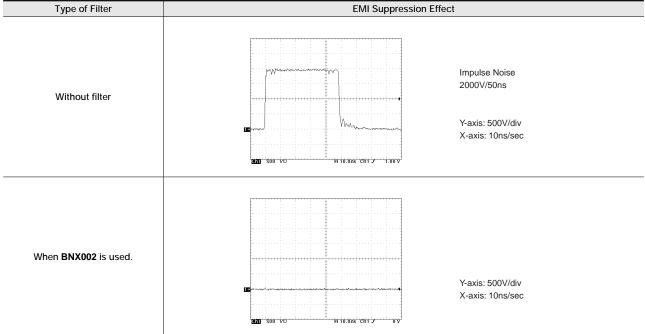
## Suppression of DC Side

Ripple of the Switching Power Supply



Type of Filter	EMI Suppression Effect	Description
When <b>BNX002</b> is not used	+5.0V → 50µs/div 0.2V/div	High frequency noise, max. 0.5V, can be seen.
When <b>BNX002</b> is used	+5.0V → 50µs/div 0.2V/div	Noise can be almost suppressed by BNX002.

## ■Example of Impulse Noise Suppression





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# On-Board Type (DC) EMI Suppression Filters (EMIFIL®)



## Ferrite Beads Inductors Part Numbering

art Number)		2 B 7 8			
Product ID		0			
Product ID					
BL	Ferrite Beads Inductor	s			
Series					
Code	Series				
01	Beads ø3.6				
02	Beads ø3.4				
03	Beads ø2.3 max.				
Beads Core Ma					
Code	Beads Core Material				
Code RN	Beads Core Material Standard Type				
	Standard Type				
RN	Standard Type				
RN	Standard Type				
RN Numbers of Bea Code	Standard Type ads Core Numbers of Beads Co				
RN Numbers of Bea Code 1	Standard Type ads Core Numbers of Beads Co 1				
RN Numbers of Bea Code 1 2	Standard Type ads Core Numbers of Beads Co 1				
RN Numbers of Bea Code 1 2 Lead Type	Standard Type ads Core Numbers of Beads Co 1 2	re			
RN Numbers of Bea Code 1 2 Lead Type Code	Standard Type Standard Type Lead Type	re Series			

Radial Straight and Wave Formed Leads Type

Radial Incrimp Type

**BL02** 

BL02

Lead Length, Space				
Code	Lead Length, Space	Series		
Α	Bulk, Axial Type, 3.7mm			
D	Bulk, Axial Type, 45.0mm	<b>D</b> 1 04		
E	Taping Axial Type, 26.0mm	BL01		
F	Taping, Axial Type, 52.0mm			
J	Bulk, Radial Type, 5.0mm			
м	Bulk, Radial Type, 10.0mm			
N	Taping, Radial Type, 16.5mm	BL02/BL03		
Р	Taping, Radial Type, 18.5mm			
Q	Taping, Radial Type, 20.0mm			

#### Lead Diameter

Code	Lead Diameter
1	ø0.60mm
2	ø0.65mm

### 8Packaging

Code	Packaging	Series
Α	Ammo Pack	BL01/BL02/BL03
В	Bulk	All Series
J	Paper Reel (ø320mm)	BL01

## 5

R2

R3



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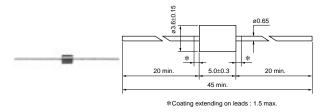
# On-Board Type (DC) EMI Suppression Filters (EMIFIL®)

# muRata

## Ferrite Beads Inductors BL01/02/03 Series

## Features

BL01/02/03 series are ferrite beads with lead wires to produce a high frequency loss for suppression of noise. Simple construction and easy-to-use, effective for low impedance circuits such as power supplies and grounds. Effective also for preventing overshoot and undershoot of digital signal in clocks or the like, and suppressing the higher harmonic wave. Suitable for prevention of abnormal oscillation at high frequency amplifying circuit.



max.

7.5

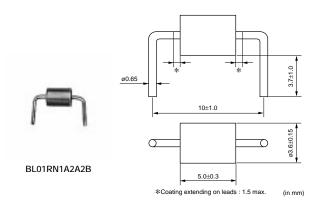
10.0±1.0

7.5 max.

10.0±1.0

BL01RN1A1D2B





8.0 max

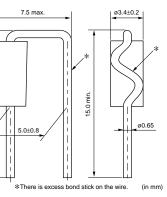
5.0+0.8

\*There is excess bond stick on the wire

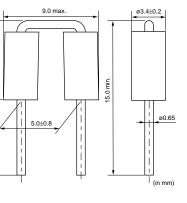
12.0 max.

5.0±1.0

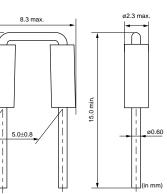
BL02RN1R2M2B



BL02RN2R1M2B

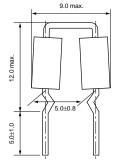


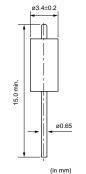






BL02RN1R3J2B





ø3.4±0.2

ø0.65

(in mm)

15.0 min.

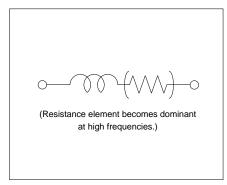


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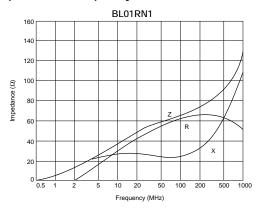
Part Number	Rated Current (A)	Operating Temperature Range (°C)		
BL01RN1A1D2B	7	-40 to +85		
BL01RN1A1E1A	6	-40 to +85		
BL01RN1A1F1J	6	-40 to +85		
BL01RN1A2A2B	7	-40 to +85		
BL02RN1R2M2B	7	-40 to +85		
BL02RN1R2N1A	6	-40 to +85		
BL02RN1R2P1A	6	-40 to +85		
BL02RN1R2Q1A	6	-40 to +85		
BL02RN1R3J2B	7	-40 to +85		
BL02RN1R3N1A	6	-40 to +85		
BL02RN2R1M2B	7	-40 to +85		
BL02RN2R1N1A	6	-40 to +85		
BL02RN2R1P1A	6	-40 to +85		
BL02RN2R1Q1A	6	-40 to +85		
BL02RN2R3J2B	7	-40 to +85		
BL02RN2R3N1A	6	-40 to +85		
BL03RN2R1M1B	6	-40 to +85		
BL03RN2R1N1A	6	-40 to +85		
BL03RN2R1P1A	6	-40 to +85		
BL03RN2R1Q1A	6	-40 to +85		

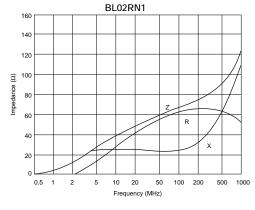
Please refer to p.186, "Ferrite Beads Inductors Packaging" for Dimensions of Part Numbers except 'B' for the last code.

# Equivalent Circuit



# ■ Impedance - Frequency Characteristics





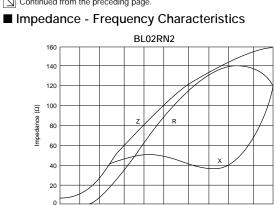
Continued on the following page.



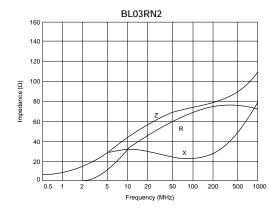
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Continued from the preceding page.

0.5



Frequency (MHz)





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On-Board Type (DC) EMI Suppression Filters (EMIFIL®)



# Disc Type EMIFIL<sup>®</sup> Part Numbering

Disc Type EMI	FIL®		
(Part Number)	DS S 9 H B3 2E 271 Q55 B <b>0 0 6 6 6 7 6 9</b>		
Product ID			
Product ID			
DS	Three-terminals Capacitor		
2 Structure			
Code	Structure		
N	No Ferrite Beads Type		
S	Built-in Ferrite Beads Type		
т	with Ferrite Beads Type		

#### Style

Code	Style		
6	Diameter 8.0mm max.		
9	Diameter 12.0mm max.		

#### Category

Code	Category
N	for General Use
н	for Heavy-duty

#### **5**Temperature Characteristics

· ·	
Code	Capacitance Change
B3/P3	±10% (Temperature Range: -25°C to +85°C)
C5	±22% (Temperature Range: -25°C to +85°C)
Т3	+20/-30% (Temperature Range: -25°C to +85°C)
E5	+22/-56% (Temperature Range: -25°C to +85°C)
F3	+30/-80% (Temperature Range: -25°C to +85°C)
Z8	+30/-85% (Temperature Range: -10°C to +60°C)

#### 6 Rated Voltage

Code	Rated Voltage
1C	16V
1H	50V
2A	100V
2E	250V

#### Capacitance

Expressed by three figures. The unit is in pico-farad (pF). The first and second figures are significant digits, and the third figure expresses the number of zeros which follow the two figures.

#### 8Lead Type/9Packaging

Code	Lead Type	Lead Length* (in mm)	Packaging	Series	
Q55B		25.0 min.	Bulk	All series	
Q50B		4.0±0.5		DST9N/H	
Q52B	Straight	6.0±1.0		DST9N	
Q54B		4.0±0.5		DONGNION DOCCINON DOCOLI	
Q56B		6.0±1.0		DSN6N/9N, DSS6N/9N, DSS9H	
T41B	Inorima	4.0±0.5		DOCN	
T51B	Incrimp	25.0 min.		DSS6N	
Q91J		20.0±1.0			
Q92J		16.5±1.0	Paper Reel (ø320mm)	DSS9N/H	
Q93J	Straight	18.5±1.0			
Q91A	Straight	20.0±1.0		DS□6N, DSN9N/H	
Q92A		16.5±1.0		All paring except DSSON/L	
Q93A		18.5±1.0	Ammo Pack	All series except DSS9N/H	
U21A	Incrimp	16.5±1.0	]	DSS6N	
U31A	Incrimp	18.5±1.0		0300	

\*Lead Distance between Reference and Bottom Planes except Bulk.



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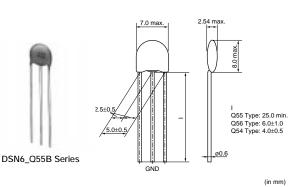
On-Board Type (DC) EMI Suppression Filters (EMIFIL®)

# muRata

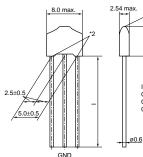
# Disc Type EMIFIL<sup>®</sup> DSN6/DSS6 Series

# Features

DS\_6 is a compact, high performance lead type EMI suppression filter which can be mounted 2.54mm pitch. Its three terminal structure enables precise high frequency performance.





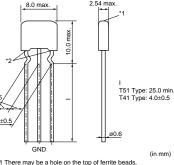


\*1 There may be a hole on the top of ferrite beads, which causes no characteristics deterioration.
\*2 Bottom of the ferrite beads may not be level with each other.

I Q55 Type: 25.0 min. Q56 Type: 6.0±1.0 Q54 Type: 4.0±0.5

(in mm)





\*1 There may be a hole on the top of ferrite beads, which causes no characteristics deterioration. \*2 Bottom of the ferrite beads may not be level with each other.

# Straight Type

DSN6	Series

Part Number	Capacitance (pF)	Rated Voltage (Vdc)	Rated Current (A)	Operating Temperature Range (°C)
DSN6NC51H220	22 +20%,-20%	50	6	-25 to +85
DSN6NC51H330	33 +20%,-20%	50	6	-25 to +85
DSN6NC51H470	47 +20%,-20%	50	6	-25 to +85
DSN6NC51H101	100 +20%,-20%	50	6	-25 to +85
DSN6NC51H271	270 +20%,-20%	50	6	-25 to +85
DSN6NC51H102	1000 +20%,-20%	50	6	-25 to +85
DSN6NC51H222	2200 +20%,-20%	50	6	-25 to +85
DSN6NZ81H103	10000 +80%,-20%	50	6	-25 to +85

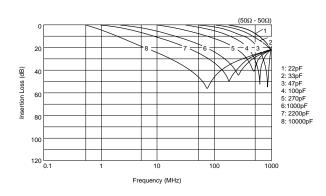
Please refer to Part Numbering for Type and Length of Lead.



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# Equivalent Circuit

# C -0 GND No polarity.



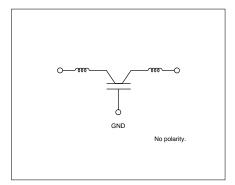
■ Insertion Loss Characteristics

# Built-in Ferrite Beads DSS6 Series Straight Type

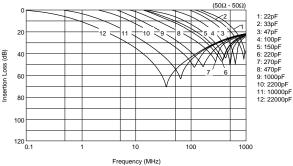
Part Number	Capacitance (pF)	Rated Voltage (Vdc)	Rated Current (A)	Operating Temperature Range (°C)
DSS6NC52A220	22 +20%,-20%	100	6	-25 to +85
DSS6NC52A330	33 +20%,-20%	100	6	-25 to +85
DSS6NC52A470	47 +20%,-20%	100	6	-25 to +85
DSS6NC52A101	100 +20%,-20%	100	6	-25 to +85
DSS6NC52A151	150 +20%,-20%	100	6	-25 to +85
DSS6NC52A221	220 +20%,-20%	100	6	-25 to +85
DSS6NC52A271	270 +20%,-20%	100	6	-25 to +85
DSS6NC52A471	470 +20%,-20%	100	6	-25 to +85
DSS6NC52A102	1000 +20%,-20%	100	6	-25 to +85
DSS6NE52A222	2200 +80%,-20%	100	6	-25 to +85
DSS6NZ82A103	10000 +30%,-30%	100	6	-25 to +85
DSS6NF31C223	22000 +80%,-20%	16	6	-25 to +85

Please refer to Part Numbering for Type and Length of Lead.

# Equivalent Circuit



# ■ Insertion Loss Characteristics





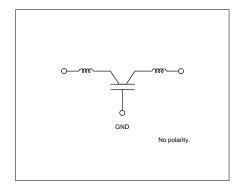
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# Built-in Ferrite Beads DSS6 Series Incrimp Type

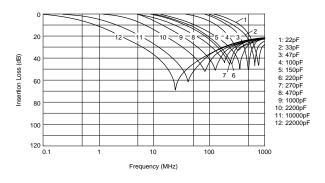
Part Number	Capacitance (pF)	Rated Voltage (Vdc)	Rated Current (A)	Operating Temperature Range (°C)
DSS6NC52A220	22 +20%,-20%	100	6	-25 to +85
DSS6NC52A330	33 +20%,-20%	100	6	-25 to +85
DSS6NC52A470	47 +20%,-20%	100	6	-25 to +85
DSS6NC52A101	100 +20%,-20%	100	6	-25 to +85
DSS6NC52A151	150 +20%,-20%	100	6	-25 to +85
DSS6NC52A221	220 +20%,-20%	100	6	-25 to +85
DSS6NC52A271	270 +20%,-20%	100	6	-25 to +85
DSS6NC52A471	470 +20%,-20%	100	6	-25 to +85
DSS6NC52A102	1000 +20%,-20%	100	6	-25 to +85
DSS6NE52A222	2200 +80%,-20%	100	6	-25 to +85
DSS6NZ82A103	10000 +30%,-30%	100	6	-25 to +85
DSS6NF31C223	22000 +80%,-20%	16	6	-25 to +85

Please refer to Part Numbering for Type and Length of Lead.

# Equivalent Circuit



# ■ Insertion Loss Characteristics





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On-Board Type (DC) EMI Suppression Filters (EMIFIL®)



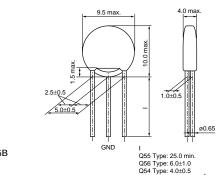
# Disc Type EMIFIL<sup>®</sup> Broad Type DSN9/DSS9/DST9 Series

# Features

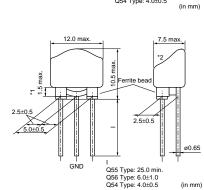
DS\_9 is a basic type EMI suppression filter which can obtain high insertion loss in a wide frequency range. Its three terminal structure enables precise high frequency performance. DSS9NP32A222/DSS9NT31H223 are low distortion types for audio circuits.

#### Supplement

Diameter of lead is 0.6mm for taping type. Taping type is three terminal in-line arrangement.



DSN9N\_Q55B



DSS9N\_Q55B

\*1 Coating extending on leads does not exceed the tangent line. Exposed electrode, if any, is covered by solder, etc.
\*2 There should not be the exposure of the ferrite bead if a hole

is in top of filter, the ferrite bead should not be exposed.



DST9N\_Q55B

9.5 max. 4.0 max 9.5 max. 9.5 max

(in mm)

ø0.65



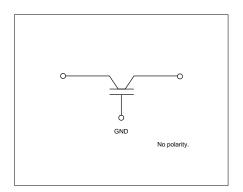
# **DSN9 Series**

Part Number	Capacitance (pF)	Rated Voltage (Vdc)	Rated Current (A)	Operating Temperature Range (°C)
DSN9NC52A271	270 +20%,-20%	100	7	-25 to +85
DSN9NC52A222	2200 +20%,-20%	100	7	-25 to +85
DSN9NC51H223	22000 +50%,-20%	50	7	-25 to +85
DSN9NC51C104	100000 +20%,-20%	16	7	-25 to +85

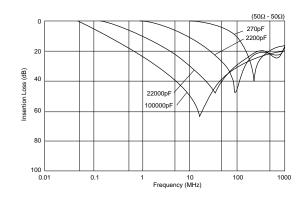
Rated current is 6A for taping type and its lead diameter is phi 0.6mm.

Please refer to Part Numbering for Type and Length of Lead.

# Equivalent Circuit



# Insertion Loss Characteristics

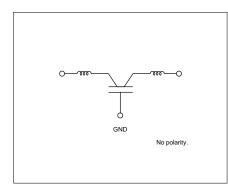


# **Built-in Ferrite Beads DSS9 Series**

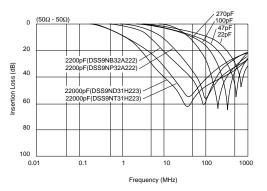
Part Number	Capacitance (pF)	Rated Voltage (Vdc)	Rated Current (A)	Operating Temperature Range (°C)
DSS9NC52A220	22 +20%,-20%	100	7	-25 to +85
DSS9NC52A470	47 +20%,-20%	100	7	-25 to +85
DSS9NC52A101	100 +20%,-20%	100	7	-25 to +85
DSS9NC52A271	270 +20%,-20%	100	7	-25 to +85
DSS9NC52A222	2200 +20%,-20%	100	7	-25 to +85
DSS9NP32A222	2200 +20%,-20%	100	7	-25 to +85
DSS9NC51H223	22000 +50%,-20%	50	7	-25 to +85
DSS9NT31H223	22000 +50%,-20%	50	7	-25 to +85

Rated current is 6A for taping type and its lead diameter is phi 0.6mm. DSS9NP32A222/DSS9NT31H223 are low distortion types for audio IF circuits. Please refer to Part Numbering for Type and Length of Lead.

# Equivalent Circuit



# ■ Insertion Loss Characteristics





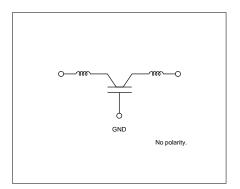
# With Ferrite Beads DST9 Series

Part Number	Capacitance (pF)	Rated Voltage (Vdc)	Rated Current (A)	Operating Temperature Range (°C)
DST9NC52A271	270 +20%,-20%	100	7	-25 to +85
DST9NC52A222	2200 +20%,-20%	100	7	-25 to +85
DST9NC51H223	22000 +50%,-20%	50	7	-25 to +85

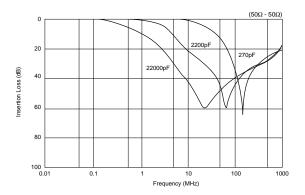
Rated current is 6A for taping type and its lead diameter is phi 0.6mm.

Please refer to Part Numbering for Type and Length of Lead.

# Equivalent Circuit



# Insertion Loss Characteristics





On-Board Type (DC) EMI Suppression Filters (EMIFIL®)



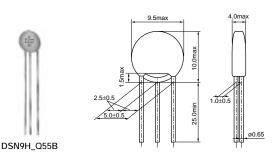
# Disc Type EMIFIL<sup>®</sup> Heavy-duty Type DSN9H/DSS9H/DST9H Series

## Features

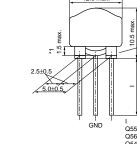
DS\_9H is a basic type EMI suppression filter which can obtain high insertion loss in a wide frequency range. Its three terminal structure enables nice high frequency performance. High rated voltage of 250Vdc and wide operating temperature range from -40 degrees C to 105 degrees C are suitable for high reliability circuits.

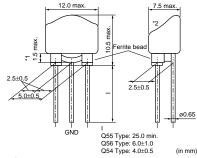
#### Supplement

Diameter of lead is 0.6mm for taping type. Taping type is three terminal in-line arrangement.



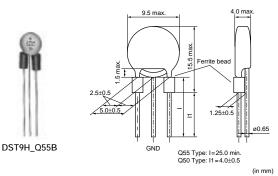
(in mm)





DSS9H\_Q55B

\*1 Coating extending on leads does not exceed the tangent line. Exposed electrode, if any, is covered by solder, etc. \*2 There should not be the exposure of the ferrite bead if a hole is in top of filter, the ferrite bead should not be exposed.



**DSN9H Series** 

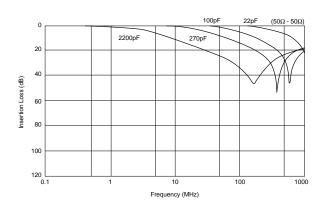
Part Number	Part Number Capacitance (pF)		Rated Current (A)	Operating Temperature Range (°C)
DSN9HB32E220	22 +20%,-20%	250	6	-40 to +105
DSN9HB32E101	100 +20%,-20%	250	6	-40 to +105
DSN9HB32E271	270 +20%,-20%	250	6	-40 to +105
DSN9HB32E222	2200 +20%,-20%	250	6	-40 to +105

Please refer to Part Numbering for Type and Length of Lead.



# Equivalent Circuit

# O GND No polarity.



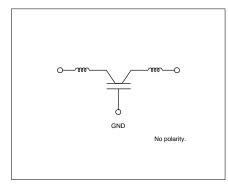
■ Insertion Loss Characteristics

# Built-in Ferrite Beads DSS9H Series

Part Number	Capacitance (pF)	Rated Voltage (Vdc)	Rated Current (A)	Operating Temperature Range (°C)
DSS9HB32E220	22 +20%,-20%	250	6	-40 to +105
DSS9HB32E101	100 +20%,-20%	250	6	-40 to +105
DSS9HB32E271	270 +20%,-20%	250	6	-40 to +105
DSS9HB32E222	2200 +20%,-20%	250	6	-40 to +105

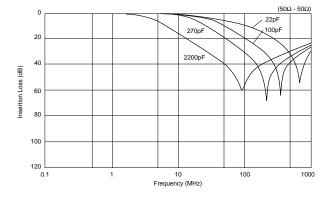
Please refer to Part Numbering for Type and Length of Lead.

# Equivalent Circuit



# With Ferrite Beads DST9H Series

# Insertion Loss Characteristics



Part Number	Capacitance (pF)	Rated Voltage (Vdc)	Rated Current (A)	Operating Temperature Range (°C)
DST9HB32E220	22 +20%,-20%	250	6	-40 to +105
DST9HB32E101	100 +20%,-20%	250	6	-40 to +105
DST9HB32E271	270 +20%,-20%	250	6	-40 to +105
DST9HB32E222	2200 +20%,-20%	250	6	-40 to +105

Please refer to Part Numbering for Type and Length of Lead.

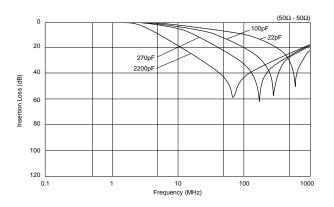


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# Equivalent Circuit

# GND No polarity.

#### ■ Insertion Loss Characteristics





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# On-Board Type (DC) EMI Suppression Filters (EMIFIL®)



# Lead Type EMIGUARD<sup>®</sup> (EMIFIL<sup>®</sup> with Varistor Function) Part Numbering

t Number)	VF S 6 V D8 1E 221 T51 B <b>0 2 6 0 6 7 8 9</b>
duct ID	
Product ID	
VF	EMIGUARD <sup>®</sup> Lead Type
ructure Code	Structure
S	Built-in Ferrite Beads Type
S R	Built-in Ferrite Beads Type with Resistance
R	
-	

Size is expressed by a figure

4 Features	
Code	Features
v	with Varistor Function

**5**Temperature Characteristics

Code	Capacitance Change			
D8 +20/-30% (Temperature Range: -40°C to +10				
D3	+20/-30% (Temperature Range: -25°C to +85°C)			

#### 6Rated Voltage

Code	Rated Voltage
1E	25V
1B	12V

#### Capacitance

Expressed by three figures. The unit is in pico-farad (pF). The first and second figures are significant digits, and the third figure expresses the number of zeros which follow the two figures.

#### 8Lead Type/9Packaging

6

9

Code	Lead Type	Lead Length* Packaging		Series	
T51B	- Incrimp	25.0mm min.	Bulk	VFR3/VFS6	
U31A	Псппр	18.5+/-1.0mm	Ammo Pack	VFR3/VF30	
Q55B		25.0mm min.	Bulk		
Q91J	- Straight	20.0+/-1.0mm		VFS9	
Q92J	Suaign	16.5+/-1.0mm	Paper Reel (ø320mm)	VF39	
Q93J		18.5+/-1.0mm			

\*Lead Distance between Reference and Bottom Planes except Bulk.



# On-Board Type (DC) EMI Suppression Filters (EMIFIL®)



# Lead Type EMIGUARD<sup>®</sup> (EMIFIL<sup>®</sup> with Varistor Function) VFR3V/VFS6V/VFS9V Series

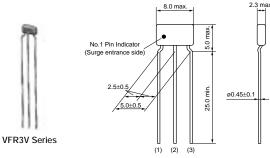
# for Semiconductor Protection VFR3V Series

# Features

VFR3V series is designed for ESD surge protection of IC. It efficiently absorbs ESD surges rushed into IC's I/O terminal.

# Applications

Elimination of noise and protection of semiconductors in office equipment, including computers and peripheral equipment, copy machines, and communication terminals.

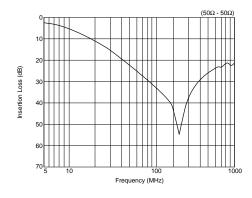


(in mm)

Part Number	Rated Voltage (Vdc)	Varistor Voltage (Vdc)	Capacitance (pF)	Rated Current (mA)	Peak Pulse Current (A)	Operating Temperature Range (°C)
VFR3VD31E131	25	50 +20%,-20%	130 +20%,-20%	20	30	-25 to 85

Please refer to Part Numbering for Type and Length of Lead.

# Insertion Loss Characteristics





# for Signal-Line VFS6V Series

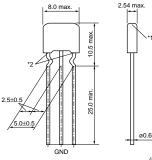
## Features

VFS6V series is designed for surge protection of signal line. It protects electric circuit from surges such as static electricity and suppresses EMI noise. Built-in ferrite bead gives excellent EMI suppression.

# Applications

Elimination of noise and protection of electric circuits in office equipment, including computers and peripheral equipment, copy machines, and communication terminals.



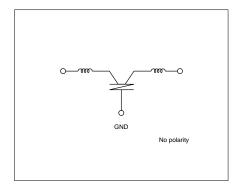


(in mm) \*1 There may be a hole on the top of ferrite beads, which causes no characteristics deterioration. \*2 Bottom of the ferrite beads may not be level with each other.

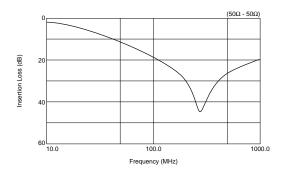
Part Number	Rated Voltage (Vdc)	Varistor Voltage (Vdc)	Capacitance (pF)	Rated Current (A)	Peak Pulse Current (A)	Operating Temperature Range (°C)
VFS6VD81E221	25	50 +20%,-20%	220 +20%,-20%	6	100	-40 to 105

Please refer to Part Numbering for Type and Length of Lead.

# Equivalent Circuit



# Insertion Loss Characteristics





# for Large-Current VFS9V Series

## Features

VFS9V series is designed for surge protection of the power supply. It protects electric circuits from surge such as static electricity and suppresses EMI noise. Its large capacitance value enables high insertion loss for EMI noise.

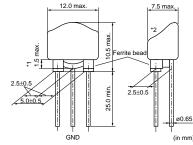
#### Applications

For circuit protection and noise suppression in electronics equipment such as computers and DC motors, and in electronics systems installed in cars such as car audio equipment and engine controllers.

## Supplement

Diameter of lead is 0.6mm for taping type. Taping type is three terminal in-line arrangement.





\*1 Coating extending on leads does not exceed the tangent line. Exposed electrode, if any, is covered by solder, etc. \*2 If there is a hole in the top of the filter, the ferrite bead should not be exposed.

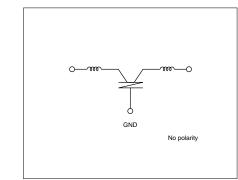
Part Number	Rated Voltage (Vdc)	Varistor Voltage Capacitance (Vdc) (pF)		Rated Current (A)	Operating Temperature Range (°C)
VFS9VD31B223	12	22 +20%,-20%	22000 +50%,-20%	7	-40 to 100

Rated current is 7A for bulk type and 6A for taping type.

Rated current of taping type is 6A because diameter of lead is 0.6mm and its lead layout is in-line type.

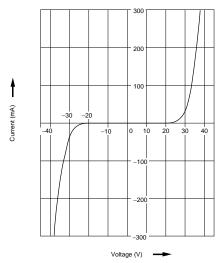
Please refer to Part Numbering for Type and Length of Lead.

## Equivalent Circuit

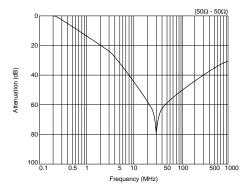


# 5

■ Voltage - Current Characteristics



#### Insertion Loss Characteristics





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# **Noise Suppression Effect of VFR/VFS Series**

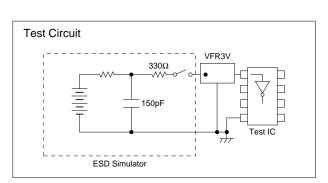
# ■Example of IC Protection (VFR3V)

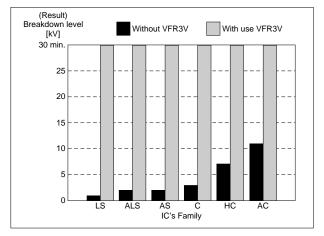
Testing Method

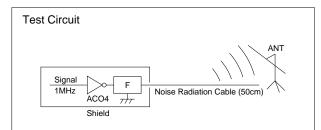
1. Put ESD surge to IC (7404 family) input terminal with ESD simulator based on IEC 801-2.

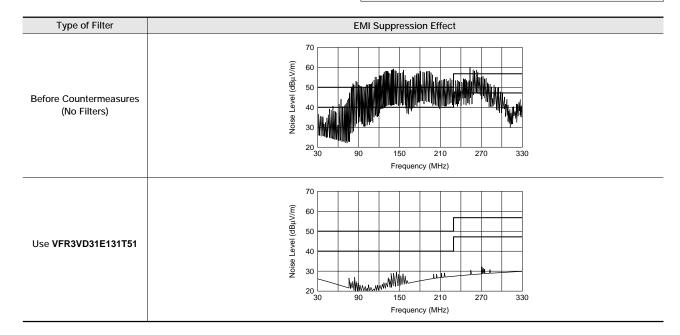
- 2. Check IC's operation.
- If IC's operation is normal, increase ESD voltage in 1kV steps.
- 4. Continue above steps 1 to 3 till IC's operation becomes abnormal.
- Result

Varistor VFR3V can protect IC from ESD.









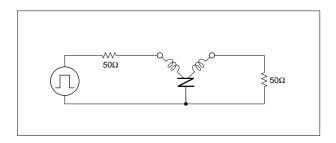


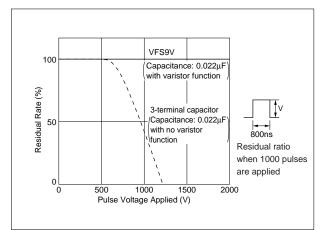
# Noise Suppression Effect of VFR/VFS Series

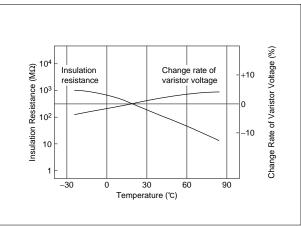
# ■Features (VFS9V)

Items	Test methods	Rated values		
Overload	1.4 times the varistor voltage (V1) is applied for 5 minutes at room temperature.			
Surge Test (1)	At room temperature. Surges are applied are $10^5$ times every 2 seconds. Then after 1 or 2 hours, the sample is measured.	Items Specifications		
	0.80	Rated Capacitance Change         Within±15%           Insulation Resistance         500kΩ min.		
Surge Test (2)	At room temperature. Capacitor "C" is charged with 70V, then discharged to apply the voltage to the sample. Tested once	Rated of Change in Varistor Voltage V1* Within±15%		
	(resuming JASO A-1). C=110mF	Voltage Rate 1.30 max.		
High Temperature Load	At a temperature of 85±3℃, the varistor voltage V1 is continuously applied to the sample for 1000 to 1024 hours. Then it is left at room temperature, for 4 to 24 hours before measuring.	*V1: Voltage when 1mA is applied		

■Pulse-Voltage Breakdown Characteristic (VFS9V) VFS9V EMIGUARD<sup>®</sup> use a self healing varistor- capacitor, so that it can be used under a 500 to 600V surge which would break conventional disk type EMI filters. As shown in figure below EMIGUARD<sup>®</sup> withstands 2000V impulses applied 1000 times.







Temperature Characteristics of Varistor Voltage - Insulation Resistance (VFS9V)

Continued on the following page.



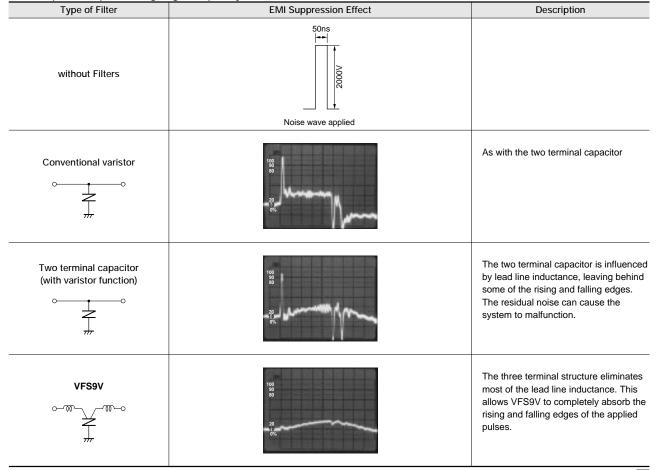
# Noise Suppression Effect of VFR/VFS Series

# Continued from the preceding page.

Type of Filter	EMI Suppression Effect	Description
without EMIGUARD®	100 90 80 20 1056	Waveform when EMIGUARD <sup>®</sup> is no used. (Surge from a noise simulator)
with EMIGUARD®	1 : 200V/div : 10ns/div 90 80	Waveform after the noise passed through EMIGUARD <sup>®</sup> . Little noise is recorded.

# Comparative Data (VFS9V)

1. Absorption of quick-rising, high-frequency noise (10ns/div, 100V/div)



Continued on the following page.

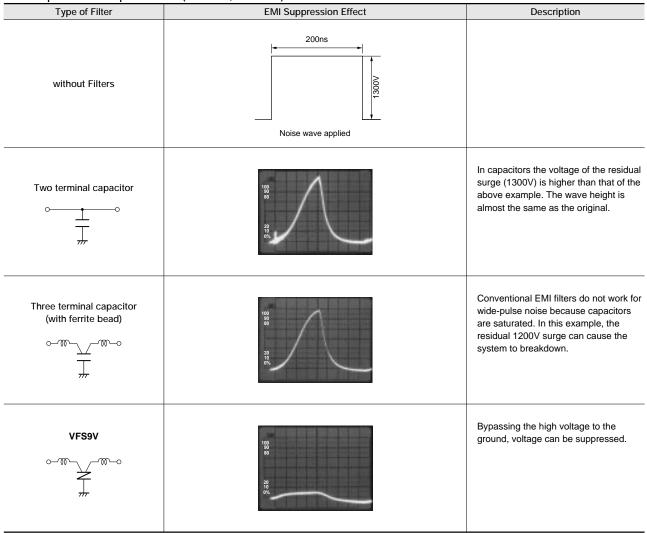


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# Noise Suppression Effect of VFR/VFS Series

Continued from the preceding page.

2. Absorption of wide-pulse noise (50ns/div, 200V/div)





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On-Board Type (DC) EMI Suppression Filters (EMIFIL®)



# Common Mode Choke Coils Part Numbering

Part Number)	PL T 09H N 200 3R0 P 1 B			
Product ID		<b>5</b> Inductance		
Product ID			gures. The unit is micro-henry ( $\mu$ H). The f	
PL	Common Mode Choke Coils	<ul> <li>and second figures are significant digits, and the third figures</li> <li>expresses the number of zeros which follow the two figures</li> </ul>		
Туре		6Rated Current		
Code	Туре		igit alphanumerics. The unit is in ampere	
т	DC Туре	<ul> <li>(A). A decimal point is expressed by the capital letter "F</li> <li>case, all figures are significant digits.</li> </ul>		
Applications		Winding Mode	5 5	
Code	Applications	Code	Winding Mode	
09H	for DC Line High-frequency Type	P	Aligned Winding Type	
Features		8Lead Dimensions		
reatures		Code	Lead Dimensions	
Code	Features	Code		
	Features General Use	1	5mm	
Code N			5mm	
Code			5mm Series	



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On-Board Type (DC) EMI Suppression Filters (EMIFIL®)



# Common Mode Choke Coils (for DC Line) PLT09H Series

PLT09H series is a common mode choke coil for DC lines. It is effective against the common mode noise that can cause radiative noise in power supply lines and interface lines. The additional normal mode inductance enables high suppression effect to radiation noise.

#### Features

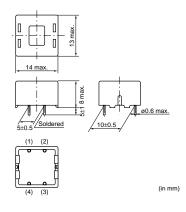
- 1. This is a wide frequency range type, applicable in applications ranging from a few MHz to several 100MHz.
- 2. It features a low-profile design.

#### Applications

- 1. Noise suppression of SW power supply, DC-DC converter
- 2. DC power lines in AC adapter of Portable equipment



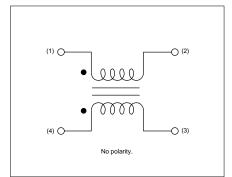
PLT09H Series



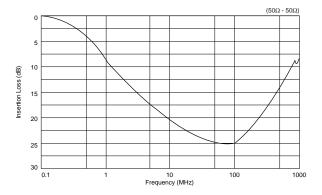
Part Number	Common Mode Inductance (min.) (μΗ)	Rated Current (A)	Rated Voltage (Vdc)	Withstand Voltage (Vdc)
PLT09HN2003R0P1	20	3	50	125

Operating Temperature Range: -40°C to 85°C

#### Equivalent Circuit



## Insertion Loss Characteristics





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# On-Board Type (DC) EMI Suppression Filters (EMIFIL®)



# Microwave Absorbers Part Numbering

art Number)	EA         1026         A         160         M         200         200           ①         ②         ③         ④         ⑤         ④         ⑦         ⑦         ⑦         ⑦         0 <th0< th="">         0</th0<>
Product ID	
Product ID	
EA	Microwave Absorber

Code	Sheet Type	
10□□	Iron carbonyl type (UL certified type/non Halogen type)	
2070 Metal Flake Powder (non Halogen typ		
2100	Metal Flake Powder (UL certified type)	
3008	Magnetic material (UL certified type/non Halogen type)	

#### 3Adhesive Tape Type

Code	Adhesive Tape Type		
Α	Standard tape type (non Halogen type)		
В	Thin Adhesive tape type (non Halogen type		
L	No tape type		
U	UL certified type (non Halogen type)		

Sheet Thickness

Expressed by 3 digits including the second decimal place in mm.

Ex.)	Code	Sheet Thickness		
	020	0.20mm		

#### **5**Unit of Dimension

One capital lettler expresses Unit of Dimension (6) and Dimensions Length (7).

Code	Unit of Dimension
Μ	in mm (Standard)
С	in cm (Standard)

Standard shape is a rectangle.

Please contact us for other shapes.

#### 6 Dimension (Length)

Expressed by 3 digits including the first decimal place.

#### Dimension (Width)

Expressed by 3 digits including the first decimal place.

Ex.)	Code	Dimension (Length $ imes$ Width)		
	M300150	30.0×15.0 mm		
	C150100	15.0×10.0 cm		



# On-Board Type (DC) EMI Suppression Filters (EMIFIL®)



# Microwave Absorbers EA10/20/21/30 Series

# **EA10 Series**

When inquiring, please contact us with size code, refering to "Part Numbering".

# Features

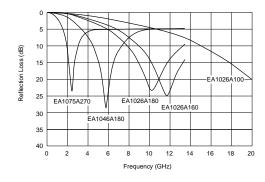
- 1. Excellent elasticity and durability with silicon rubber
- Suitable for prevention of abnormal oscillation in high frequency modules, suppression of spurious spectra and prevention of interference between circuits
- 3. Holds easily in equipment with adhesive tape



EA10 Series

Part Number	Applicable Frequency (Typ.)	Thickness (Typ.) (mm)	Flame Resistance	Halogen	Operating Temperature Range
EA1026A100	20.0GHz	1.0	UL94V-0	Halogen Free	-40 to +80°C
EA1026A160	11.5GHz	1.6	UL94V-0	Halogen Free	-40 to +80°C
EA1026A180	10.0GHz	1.8	UL94V-0	Halogen Free	-40 to +80°C
EA1046A180	5.8GHz	1.8	UL94V-0	Halogen Free	-40 to +80°C
EA1075A270	2.5GHz	2.7	UL94V-0	Halogen Free	-40 to +80°C

# Reflection Loss





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# EA20/21 Series

When inquiring, please contact us with size code, refering to "Part Numbering".

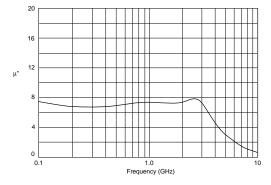
- Features
- 1. Magnetically-shielded high-micro and high-loss characteristics can suppress noise in a wide frequency band for digital equipment.
- 2. Thin (0.2mm-1.0mm) and flexible sheet makes easy handling in assembly process.
- 3. Holds easily in equipment with adhesive tape
- 4. EA20xx series: Non Halogen type EA21xx series: UL94V-0 certified material is used.



EA20/21 Series

Part Number	Applicable Frequency (Typ.)	Thickness (Typ.) (mm)	Flame Resistance	Halogen	Operating Temperature Range
EA2070A020	0.1 to 3.0GHz	0.20	-	Halogen Free	-40 to +120°C
EA2070A050	0.1 to 3.0GHz	0.50	-	Halogen Free	-40 to +120°C
EA2070A100	0.1 to 3.0GHz	1.00	-	Halogen Free	-40 to +120°C
EA2070B005	0.1 to 3.0GHz	0.05	-	Halogen Free	-40 to +120°C
EA2070B010	0.1 to 3.0GHz	0.10	-	Halogen Free	-40 to +120°C
EA2070B013	0.1 to 3.0GHz	0.13	-	Halogen Free	-40 to +120°C
EA2070B020	0.1 to 3.0GHz	0.20	-	Halogen Free	-40 to +120°C
EA2070B050	0.1 to 3.0GHz	0.50	-	Halogen Free	-40 to +120°C
EA2100A020	0.1 to 3.0GHz	0.20	UL94V-0	-	-40 to +120°C
EA2100A050	0.1 to 3.0GHz	0.50	UL94V-0	-	-40 to +120°C
EA2100A100	0.1 to 3.0GHz	1.00	UL94V-0	-	-40 to +120°C
EA2100B020	0.1 to 3.0GHz	0.20	UL94V-0	-	-40 to +120°C
EA2100B050	0.1 to 3.0GHz	0.50	UL94V-0	-	-40 to +120°C
EA2100B100	0.1 to 3.0GHz	1.00	UL94V-0	-	-40 to +120°C

# Magnetic Permeability - Reluctance (Typical)





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# EA30 Series

When inquiring, please contact us with size code, refering to "Part Numbering".

## Features

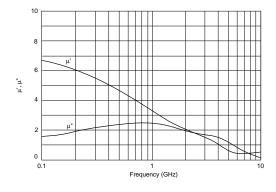
- 1. EMC Absorber magnetically shields and suppresses noise of digital equipment.
- 2. Flexible sheet, easy handling in assembly process.
- 3. Holds easily in equipment with adhesive tape.
- 4. Halogen free and UL94V-0 certified material are used.



EA30 Series

Part Number	Applicable Frequency (Typ.)	Thickness (Typ.) (mm)	Flame Resistance	Halogen	Operating Temperature Range
EA3008U025	0.1 to 3.0GHz	0.25	UL94V-0	Halogen Free	-40 to +120°C
EA3008U035	0.1 to 3.0GHz	0.35	UL94V-0	Halogen Free	-40 to +120°C
EA3008U050	0.1 to 3.0GHz	0.50	UL94V-0	Halogen Free	-40 to +120°C
EA3008U100	0.1 to 3.0GHz	1.00	UL94V-0	Halogen Free	-40 to +120°C
EA3008U250	0.1 to 3.0GHz	2.50	UL94V-0	Halogen Free	-40 to +120°C

# ■ Magnetic Permeability - Reluctance (Typical)





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# Chip EMIFIL<sup>®</sup> (Caution/Notice

## ■ ①Caution (Rating)

Do not use products beyond the rated current and rated voltage as this may create excessive heat and deteriorate the insulation resistance.

## ■ ①Caution (Soldering and Mounting)

1. Self-heating

Please provide special attention when mounting chip "EMIFIL" (BLM\_P/S, NFM\_P) series in close proximity to other products that radiate heat.

The heat generated by other products may deteriorate the insulation resistance and cause excessive heat in this component.

2. Mounting Direction

Mount Chip Common Mode Choke Coils in right direction. Wrong direction, which is 90 degrees rotated from right direction, causes not only open or short circuit but also flames or other serious trouble.

#### Notice (Storage and Operating Conditions) <Operating Environment>

Do not use products in a chemical atmosphere such as chlorine gas, acid or sulfide gas.

<Storage and Handling requirements>

1. Storage Period

BLM (except BLM15E/15H series) /BLA/NFM55/DLP31S/ DLM11G/DLM2HG series should be used within 6 months, the other series should be used within 12 months.

Solderability should be checked if this period is exceeded.

## Notice (Soldering and Mounting)

1. Washing

Failure and degradation of a product are caused by the washing method. When you wash in conditions that are not in mounting information, please contact Murata engineering.

2. Soldering

Reliability decreases with improper soldering methods. Please solder by the standard soldering conditions shown in mounting information.

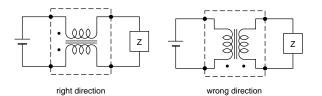
# ■ Notice (Handling)

1. Resin coating

Using resin for coating/molding products may affect the products performance. So please pay careful attention in selecting resin.

Prior to use, please make the reliability

evaluation with the product mounted in your application set.



#### 2. Storage Conditions

- (1) Storage temperature: -10 to 40 degrees C Relative humidity: 30 to 70% Avoid sudden changes in temperature and humidity.
- (2) Do not store products in a chemical atmosphere such as chlorine gas, acid or sulfide gas.

3. Other

Noise suppression levels resulting from Murata's EMI suppression filters "EMIFIL" may vary, depending on the circuits and ICs used, type of noise, mounting pattern, lead wire length, mounting location, and other operating conditions. Be sure to check and confirm in advance the noise suppression effect of each filter, in actual circuits, etc. before applying the filter in a commercial-purpose equipment design.

#### 2. Caution for use (DLW Series)

When you hold products with a tweezer, please hold by the sides. Sharp materials, such as a pair of tweezers, should not touch the winding portion to prevent breaking the wire. Mechanical shock should not be applied to the products mounted on the board to prevent breaking the core.



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# Lead Type EMIFIL<sup>®</sup> **Caution/Notice**

## ■ ①Caution (Rating)

Do not use products beyond the rated current and rated voltage as this may create excessive heat and deteriorate the insulation resistance.

■ ①Caution (Soldering and Mounting) Mounting holes should be designed as specified in these specifications. Other designs than shown in these specifications may cause cracks in ceramics which may lead to smoking or firing.

# ■ Notice (Storage and Operating Conditions)

- <Operating Environment>
- 1. Do not use products in a chemical atmosphere such as chlorine gas, acid or sulfide gas.
- Do not use products near water, oil or organic solvents. Avoid environment where dust or dirt may adhere to product.

# <Concerning "EMIGUARD">

VFR3V series is designed only to absorb electrostatic surges. Do not use this product to absorb large energy surges such as lighting or switching related surges. <Storage and Handling Requirements>

1. Storage Period

Used the products within 12 months after delivery. Solderability should be checked if this period is exceeded.

# Notice (Soldering and Mounting)

1. Washing

Failure and degradation of a product are caused by the washing method. When you wash in conditions that are not in mounting information, please contact Murata engineering.

2. Soldering

Reliability decreases with improper soldering methods. Please solder by the standard soldering conditions shown in mounting information.

#### 2. Storage Conditions

- (1) Storage temperature: -10 to 40 degrees C Relative humidity: 30 to 70% Avoid sudden changes in temperature and humidity.
- (2) Do not store products in a chemical atmosphere such as chlorine gas, acid or sulfide gas.
- (3) When restoring taping type (BL01RN1A1F1J), please attach the Spacer between flanges of reel. The Spacer is corrugated paper which is attached when shipping.

3. Other

Noise suppression levels resulting from Murata's EMI suppression filters "EMIFIL" may vary, depending on the circuits and ICs used, type of noise, mounting pattern, lead wire length, mounting location, and other operating conditions. Be sure to check and confirm in advance the noise suppression effect of each filter, in actual circuits, etc. before applying the filter in a commercial-purpose equipment design.

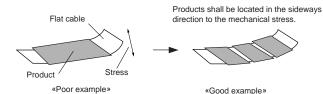


# **Microwave Absorbers Notice**

# Notice (Storage and Operating Conditions) Adhesive Tape Stress

This product is designed for using the adhesive tape to hold itself to the object.

And please avoid causing mechanical stress by bending or variation of the object.



## 2. Cleaning

Avoid cleaning product.

3. Handling of the product

Adhesive tape must be clean to maintain the quality of tape. And please wipe off any dirt, dust and any kind of oil from the surface of the object before use.

- 4. Storage Conditions
- (1) Storage period

Products which were inspected in Murata over 6 months ago should be examined and used. This can be confirmed with inspection No. marked on the container. Adhesiveness should be checked if this period is exceeded.

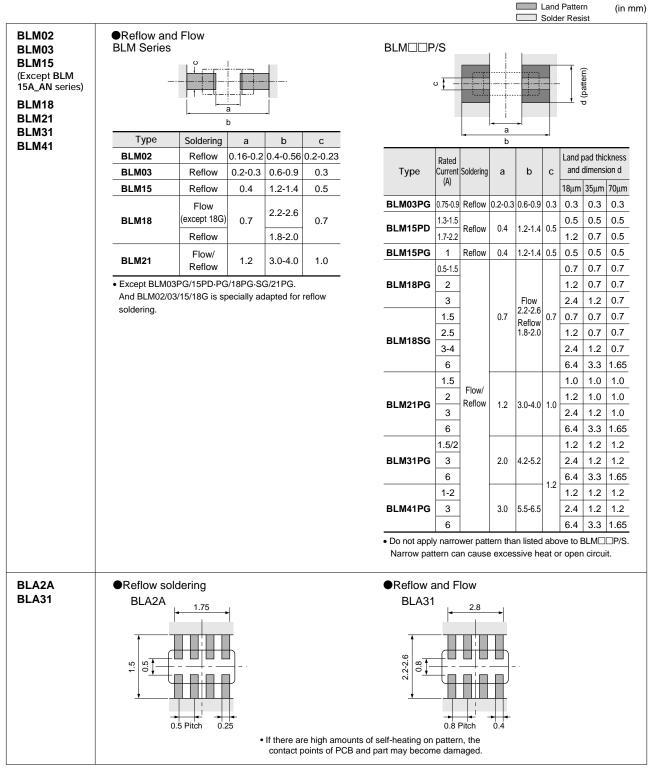
- (2) Storage conditions
  - Products should be stored in the warehouse on the following conditions.
    - Temperature: -10 to 40°C
    - Humidity: 30 to 70% relative humidity
    - No rapid change on temperature and humidity
  - Products should be stored in the warehouse without heat shock, vibration, direct sunlight and so on.



#### 1. Standard Land Pattern Dimensions

NF series suppress noise by conducting the high-frequency noise element to ground. Therefore, to obtain maximum performance from these filters, the ground pattern should be made as large as possible during the PCB design stage. As shown below, one side of the PCB is used for chip mounting, and the other is used for grounding.

Small diameter feedthrough holes are then used to connect the grounds on each side of the PCB. This reduces the high-frequency impedance of the grounding and maximizes the filter's performance.



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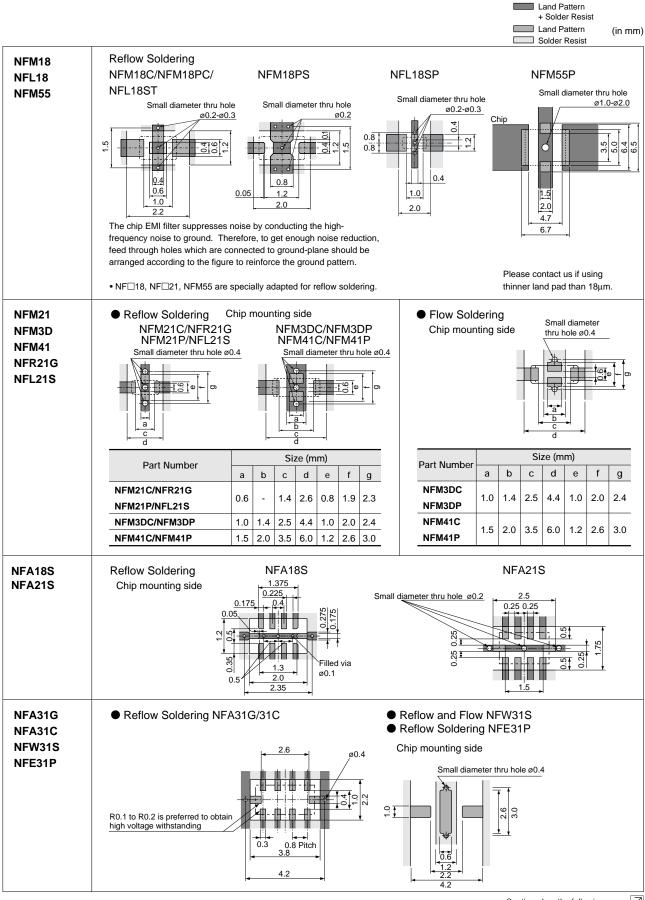
Land Pattern + Solder Resist



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EMIFIL<sup>®</sup> (Soldering and Mounting)

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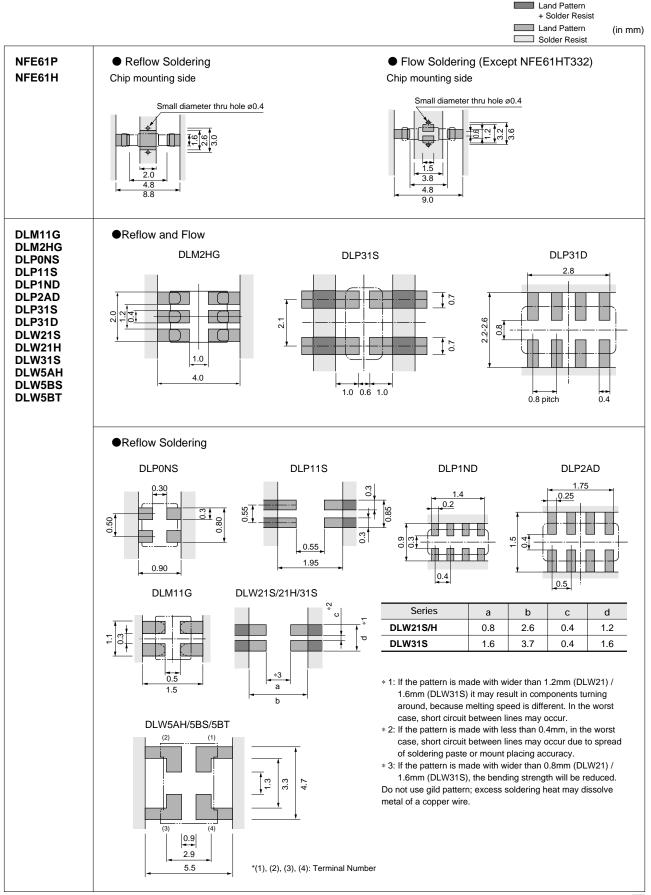




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# EMIFIL<sup>®</sup> (Soldering and Mounting)

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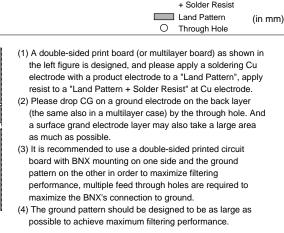
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Land Pattern

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DNIV022		
BNX022	• • •	0
	12.5 10.2 9.9 9.6 B	•
	28 28 23 28 23 20 20 20 20 20 20 20 20 20 20 20 20 20	
		•
		•
	0 5.8 5.8 10.3 13.7 1 13.7 1 17.5	



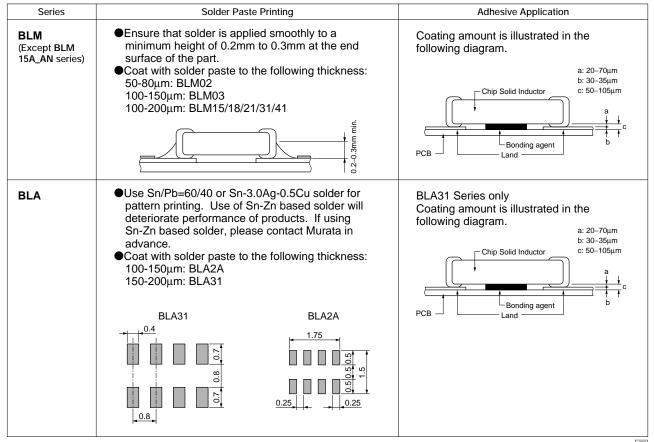
 Solder Paste Printing and Adhesive Application When reflow soldering the chip EMI suppression filter, the printing must be conducted in accordance with the following cream solder printing conditions.

If too much solder is applied, the chip will be prone to damage by mechanical and thermal stress from the PCB and may crack.

Standard land dimensions should be used for resist and copper foil patterns.

When flow soldering the EMI suppression filter, apply the adhesive in accordance with the following conditions. If too much adhesive is applied, then it may overflow into the land or termination areas and yield poor solderability. In contrast, if insufficient adhesive is applied, or if the adhesive is not sufficiently hardened, then the chip may become detached during flow soldering process.

(in mm)



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(in mm) Series Solder Paste Printing Adhesive Application NFM ●Use Sn/Pb=60/40 or Sn-3.0Ag-0.5Cu solder for Apply 0.1mg for NFM41C/41P and NFR 0.06mg for NFM3D of bonding agent at pattern printing. Use of Sn-Zn based solder will NFL each chip. Do not cover electrodes. deteriorate performance of products. If using NFM series with Sn-Zn based solder, please contact Murata in advance. •Coat with solder paste to the following thickness: 100-150µm: NFM18/21/3D, NFR, NFL 150-200µm: NFM55P 100-200µm: NFM41 Bonding agent Coating position of NFM18C/18PC NFL18SP NFM21C/21P bonding agent NFR21G/NFL21S NFL18ST 4.10 ----0, 0.4 0.4 1.0 1.0 2.0 NFM18PS 0.8 0.05 NFM55P 2.0 NFM3DC/3DP NFM41C/41P 0 0 0 0 1.5 1.0 \_1.5 4.7 6.7 NFA ●Use Sn/Pb=60/40 or Sn-3.0Ag-0.5Cu solder for pattern printing. Coat with solder paste to the following thickness: 100-200µm: NFA31G/31C 100-150µm: NFA18S/21S NFA31G/31C NFA21S 0.6 1.5 2.6 0.5 Π 0.4 75 - - -- - - -0.25 0.8 pitch 0.25 0.3 0.25 NFA18S 1.375 0.175 0.225 0.4 52 0.05 ●Use Sn/Pb=60/40 or Sn-3.0Ag-0.5Cu solder for NFW31S NFW31S Series pattern printing. NFE31P Apply 0.2mg of bonding agent at each chip. Coat with solder paste to the following thickness: 150-200µm <del>,</del> 0.6 2.6 0.6 Bonding agent Coating positon of bonding agent 2.2 4.2

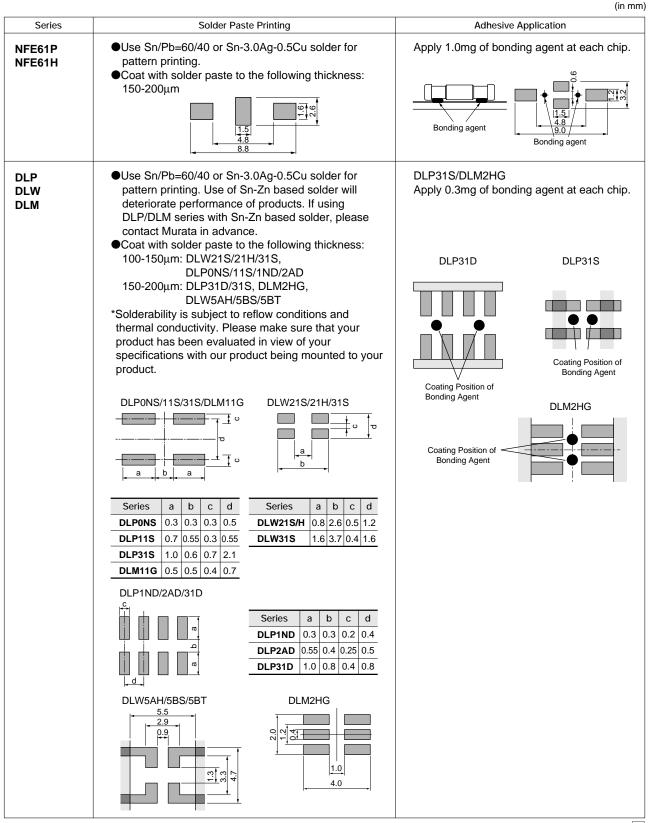
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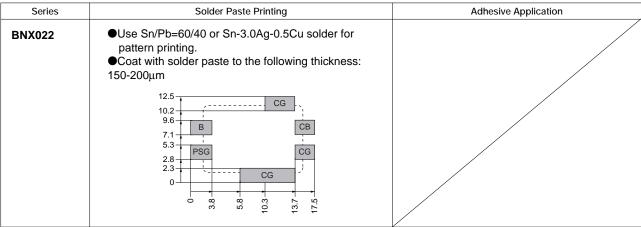
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- 3. Standard Soldering Conditions
- (1) Soldering Methods

Use flow and reflow soldering methods only.

Use standard soldering conditions when soldering chip EMI suppression filters.

In cases where several different parts are soldered, each having different soldering conditions, use those conditions requiring the least heat and minimum time.

#### Solder: H60A H63A solder (JIS Z 3238)

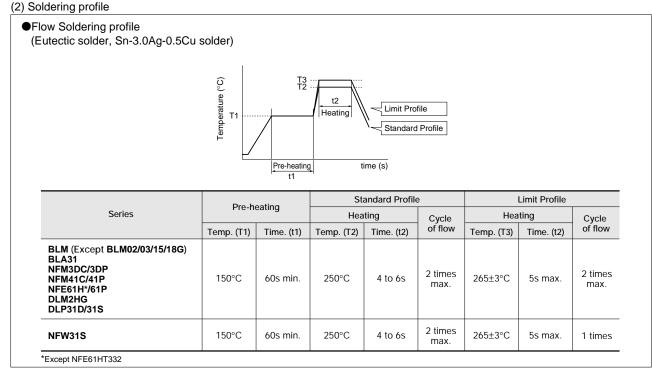
In case of lead-free solder, use Sn-3.0Ag-0.5Cu solder. Use of Sn-Zn based solder will deteriorate performance of products.

If using BLA/NFM/DLP/DLM series with Sn-Zn based solder, please contact Murata in advance.

## Flux:

- Use Rosin-based flux. In case of DLW21/31 series, use Rosin-based flux with converting chlorine content of 0.06 to 0.1wt%. In case of using RA type solder, products should be cleaned completely with no residual flux.
- Do not use strong acidic flux (with chlorine content exceeding 0.20wt%)
- Do not use water-soluble flux.

For additional mounting methods, please contact Murata.



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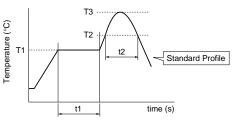


# EMIFIL<sup>®</sup> (Soldering and Mounting)

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eflow Soldering profile oldering profile for Lead-free	Solder (Sn- G) 180 Tember Tember Tember Tember Tember Tember Tember Tember Tember Tember Tember Tember Tember	3.0Ag-0.5C	T2 T1 eating $t1$ t2	T4	Profile ard Profile			
Standard Profile					Limit Profile			
Series	Heating		Peak temperature Cycle	Heating		Peak temperature	Cycle	
	Temp. (T1)	Time. (t1)	(T2)	of reflow	Temp. (T3)	Time. (t2)	(T4)	of reflow
BLM, BLA NFA, NFE NFL, NFM (Except NFM55P) NFR, DLM DLP DLW21/31	220°C min.	30 to 60s	245±3°C	2 times max.	230°C min.	60s max.	260°C/10s	2 times max.
DLW5A/5B	220°C min.	30 to 60s	250±3°C	2 times max.	230°C min.	60s max.	260°C/10s	2 times max.
NFW31S, NFM55P	220°C min.	30 to 60s	245±3°C	2 times max.	230°C min.	60s max.	260°C/10s	1 times
BNX022	220°C min.	30 to 60s	250±3°C	2 times max.	230°C min.	60s max.	260°C/10s	2 times max.

②Soldering profile for Eutectic solder (Limit profile: refer to ①)



	Drah		Standard Profile				
Series	Pre-n	eating	Hea	ting	Peak	Cycle of reflow	
	Temp. (T1)	Time. (t1)	Temp. (T2)	Time. (t2)	temperature (T3)		
BLM, BLA NFA, NFE NFL, NFM NFR, NFW DLM, DLP DLW, BNX022	150°C	60s min.	183°C min.	60s max.	230°C	2 times max.	

(3) Reworking with Solder Iron

The following conditions must be strictly followed when using a soldering iron.

Pre-heating: 150°C 60s min.\*1

\*1 NFM55P: 100°C/60s+200°C/60s

Soldering iron power output: 30W max.

Temperature of soldering iron tip / Soldering time: 350°C max./3s max.\*2

\*2 NFE31PT152Z1E9: 280°C max./10s max.

BNX022: 450°C max./5s max./2 times

Do not allow the tip of the soldering iron to directly contact the chip.

For additional methods of reworking with a soldering iron, please contact Murata engineering.



# EMIFIL<sup>®</sup> (Soldering and Mounting)

Continued from the preceding page.

4. Cleaning

Following conditions should be observed when cleaning chip EMI filter.

- (1) Cleaning Temperature: 60°C max. (40°C max. for alcohol type cleaner)
- (2) Ultrasonic

Output: 20W/liter max. Duration: 5 minutes max. Frequency: 28 to 40kHz

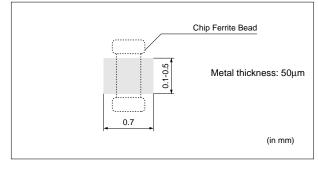
(3) Cleaning agent

The following list of cleaning agents have been tested on the individual components. Evaluation of final assembly should be completed prior to production.

5. Mounting of BLM15A\_AN Series BLM15A\_AN is series for wire bonding mounting.

#### (1) Die bonding mounting

(a) Dimension of standard metal mask



Do not clean DLW21S/31S/5AH/5BS/BNX022 series. Before cleaning, please contact Murata engineering.

- (a) Alcohol cleaning agent Isopropyl alcohol (IPA)(b) Aqueous cleaning agent
- Pine Alpha ST-100S
- (4) Ensure that flux residue is completely removed. Component should be thoroughly dried after aqueous agent has been removed with deionized water.
- (5) Some products may become slightly whitened. However, product performance or usage is not affected. For additional cleaning methods, please contact Murata engineering.
- (b) Die bonding agent
- Use adhesive for die bonding for which the curing temperature is 200°C or less.

#### (c) Notice

- Use a flat surface of substrate for bonding mounting.
   Slant mounting of product may affect the wire bonding.
- Adhesive for die bonding may affect the mounting reliability in wire bonding.
   Make sure of the mounting reliability with the adhesive to be used in advance.



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# Lead Type EMIFIL<sup>®</sup> (Soldering and Mounting)

#### 1. Mounting Hole

Mounting holes should be designed as specified below.

Part number	Bulk type (in mm)	Taping type (in mm)
DSN6 DSS6 VFR3V VFS6V	2.5±0.2	
DSN9 DSN9H	2.5±0.2	ø1.0-3
DST9 DST9H	<u>ø0.8-3</u> <u>2.5±0.2</u> <u>2.5±0.2</u>	<u>2.5±0.2</u> <u>2.5±0.2</u>
DSS9 DSS9H VFS9V	<u>2.5±0.2</u>	_
BNX00□/01□	Component Side	TERMINAL LAYOUT (Bottom figure)
	$(PSG) \qquad (CG) \qquad$	CG PSG B PSG B CG PSG CG PSG: Power supply ground CG: Load circuit ground CB: Load circuit + Bias



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# Lead Type EMIFIL<sup>®</sup> (Soldering and Mounting)

Continued from the preceding page.

2. Using The Block Type EMIFIL<sup>®</sup> Effectively

(1) How to use effectively

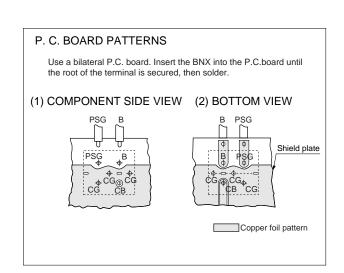
This product effectively prevents undesired radiation and external noise from going out / entering the circuit by grounding the high frequency components which cause noise problems. Therefore, grounding conditions may affect the performance of the filter and attention should be paid to the following for effective use.

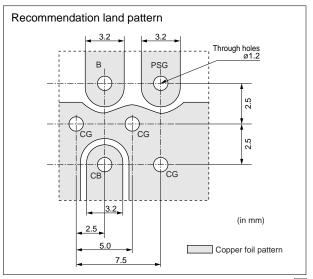
- (a) Design maximized grounding area in the P.C. board, and grounding pattern for all the grounding terminals of the product to be connected. (Please follow the specified recommendations.)
- (b) Minimize the distance between ground of the P.C.
   board and the ground plate of the product.
   (Recommended unsing the through hole connection between grounding area both of component side and bottom side.)
- (c) Insert the terminals into the holes on P.C. board completely.
- (d) Don't connect PSG terminal with CG terminal directly. (See the item 1. Terminal Layout)

#### (2) Self-heating

Though this product has a large rated current, localized selfheating may be caused depending on soldering conditions. To avoid this, attention should be paid to the following:

- (a) Use P.C. board with our recommendation on hole diameter / land pattern dimensions, mentioned in the right hand drawing, especially for 4 terminals which pass current.
- (b) Solder the terminals to the P.C. board with soldercover area at least 90%. Otherwise, excess self-heating at connection between terminals and P.C. board may lead to smoke and / or fire of the product even when operating at rated current.
- (c) After installing this product in your product, please make sure the self-heating is within the rated current recommended.







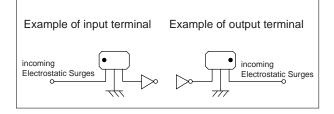
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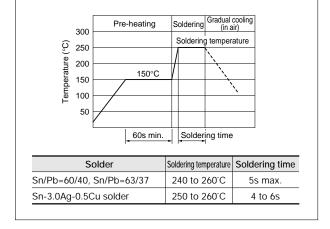
## Lead Type EMIFIL<sup>®</sup> (Soldering and Mounting)

Continued from the preceding page.

3. Using EMIGUARD® effectively

- Terminal (with mark) should be properly connected to the line of incoming electrostatic surge. (There is polarity.) Otherwise, no effect in ESD suppression can be expected (VFR3V).
- (2) Products should be used at rated voltage or less and rated current or less.
- (3) Products should not be applied for the absorption of surges which have large energy (ex. induced lightning surges, switching surges) because it is designed for the absorption of electrostatic surges (VFR3V).
- Electrostatic test should be done on the following conditions (VFR3V).
  - n [ C / R V<sup>2</sup> ]<sup>2</sup> < 8.0 ×10<sup>5</sup>
    - n: Times applied
    - C: Charging Capacitance (pF)
    - V: Testing Voltage (kV)
    - R: Charging Resistance ( $\Omega$ )
- 4. Soldering
- (1) Solder: H60A, H63A solder (JIS Z 3238) In case of lead-free solder, use Sn-3.0Ag-0.5Cu solder.
- (2) Use Rosin-based flux. Do not use strong acidic flux with halide content exceeding 0.2wt% (chlorine conversion value).
- (3) Products and the leads should not be subjected to any mechanical stress during the soldering process, or while subjected to the equivalent high temperatures.
- (4) Standard flow soldering profile





5. Cleaning Conditions

Do not clean VFR3V, PLT09H and VFS6V series. Clean other parts in the following conditions.

- Cleaning temperature should be limited to 60°C max. (40°C max for alcohol type cleaner).
- (2) Ultrasonic cleaning should comply with the following conditions, avoiding the resonance phenomenon at the mounted products and P.C.B. Power: 20 W / I max. Frequency: 28 to 40kHz

Time: 5 min. max.

- (3) Cleaner(a) Alcohol type cleaner
  - Isopropyl alcohol (IPA)

- (b) Aqueous agent (PLT series cannot be cleaned) PINE ALPHA ST-100S
- (4) There should be no residual flux or residual cleaner left after cleaning.

In the case of using aqueous agent, products should be dried completely after rinsing with de-ionized water in order to remove the cleaner.

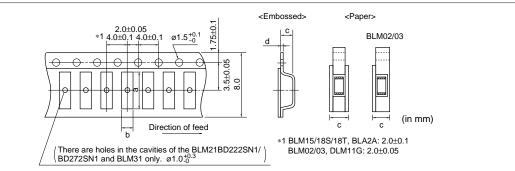
- (5) The surface of products may become dirty after cleaning, but there is no deterioration on mechanical, electrical characteristics and reliability.
- (6) Other cleaning: Please contact us.



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# Chip EMIFIL<sup>®</sup> Packaging

#### Minimum Quantity and Dimensions of 8mm Width Paper / Embossed Tape



		Cavity	Size (in mm)	)	Minimum Qty. (pcs.)				
Part Number		-		1		nm reel		nm reel	Bulk
	а	b	С	d		Embossed Tape	Paper Tape	Embossed Tape	
BLM02	0.45	0.25	0.40 max.	-	20000	-	-	-	100
BLM03	0.70	0.40	0.55 max.	-	15000	-	50000	-	1000
BLM15	1.15	0.65	0.8 max.	-	10000	-	50000	-	1000
BLM18	1.85	1.05	1.1 max.	-	4000	-	10000	-	1000
BLM18EG_TN	1.85	1.05	0.85 max.		4000		10000		1000
BLM18EG_SN	1.05	1.05	1.1 max.	-	4000	-	10000	-	1000
BLM18S	1.85	1.05	0.90 max.	-	10000	-	30000	-	100
BLM18T	1.85	1.05	0.90 max.	-	10000	-	-	-	1000
BLM21	2.25	1.45	1.1 max.	-	4000	-	10000	-	1000
BLM31	3.5	1.9	1.3	0.2	-	3000	-	10000	1000
BLM21BD222SN1/272SN1	2.25	1.45	1.3	0.2	-	3000	-	10000	1000
BLA2A	2.2	1.2	0.8 max.	-	10000	-	50000	-	1000
BLA31	3.4	1.8	1.1 max.	-	4000	-	10000	-	1000
NFM18C/ NFM18PC (Except 105R/225B1A)/ NFM18PS	1.85	1.05	0.9 max.	-	4000	-	-	-	500
NFM18PC105R/225B1A	1		1.1 max.	-	4000	-	-	-	500
NFL18SP			0.9 max.						
NFL18ST	1.85	1.05	1.1 max.	-	4000	-	-	-	1000
NFL21SP	2.3	1.55	1.1 max.						
NFM21	2.3	1.55	1.1 max.	-	4000	-	-	-	500
NFM3DC/3DP	3.4	1.4	0.85	0.2	-	4000	-	-	500
NFA18S	1.8	1.0	0.7	0.25	-	4000	-	-	1000
NFA21SL_45	2.30	1.55	0.7	0.25	-	4000	-	-	1000
NFA21SL 48	2.25	1.45	1.05	0.25	-	4000	-	-	1000
NFA31G/31C	3.5	2.0	1.1 max.	-	4000	-	-	-	100
NFE31P	3.6	1.8	1.85	0.2	-	2000	-	8000	500
NFR21G	2.3	1.55	0.7	0.25	-	4000	-	-	500
NFW31S	3.6	1.9	2.0	0.2	-	2000	-	7500	-
DLM11G	1.45	1.2	0.8 max.	-	10000		-	-	1000
DLM2HG	2.75	2.25	1.3	0.25	-	3000	-	-	1000
DLPONS	0.95	0.75	0.55	0.25	-	5000	-	-	500
DLP11S	1.4	1.2	0.98	0.25		3000	-	-	500
DLP1ND	1.7	0.84	0.57	0.25		5000			500
DLP2AD	2.2	1.2	0.98	0.25	-	3000		-	500
DLP31D/31S	3.5	1.2	1.3	0.25	-	3000	-	-	500
DLP31D/315 DLW21S	3.5 2.25							-	
	-	1.45	1.4	0.3	-	2000	-		500
DLW21H	2.3	1.55	1.1	0.25	-	3000	-	-	500
DLW31S	3.6	2.0	2.1	0.3	-	2000	-	-	500

Please contact us for BLM15/18 in bulk case.



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Chip EMIFIL<sup>®</sup> Packaging

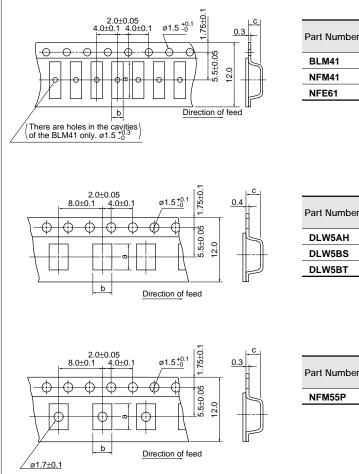
Minimum Qty. (pcs.)

Bulk

ø180mm reel ø330mm reel

Continued from the preceding page.

#### Minimum Quantity and Dimensions of 12mm Width Embossed Tape



BLM41	4.8	1.9	1.75	2500	8000	1000
NFM41	4.8	1.8	1.1	4000	-	500
NFE61	7.2	1.9	1.75	2500	8000	500

Cavity Size

b

а

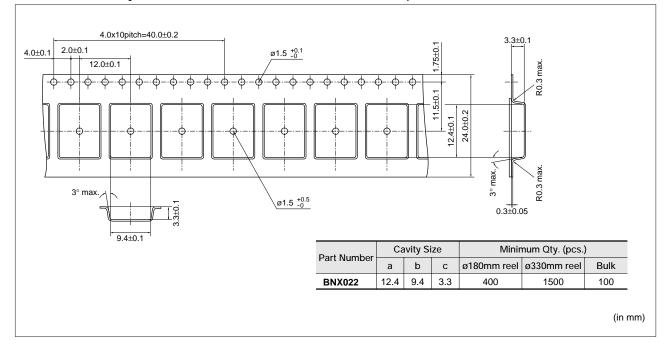
С

Part Number	Cavity Size			Minimum Qty. (pcs.)			
Part Number	а	b	с	ø180mm reel	ø330mm reel	Bulk	
DLW5AH	5.4	4.1	4.4	400	1500	100	
DLW5BS	5.5	5.4	4.7	400	1500	100	
DLW5BT	5.5	5.4	2.7	700	2500	100	

Part Number	Cavity Size Minin			num Qty. (pcs.)	)	
Part Number	а	b	С	ø180mm reel	ø330mm reel	Bulk
NFM55P	6.0	5.3	2.5	500	-	100

(in mm)

#### ■ Minimum Quantity and Dimensions of 24mm Width Embossed Tape



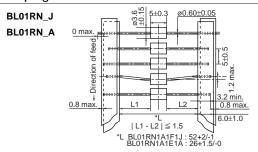


# Ferrite Beads Inductors Packaging

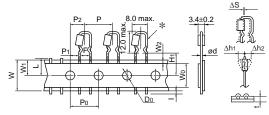
#### Minimum Quantity (Pcs.)

Series	Bulk	Ammo Pack	ø320mm Paper reel
BL01RN	500	1000	2000
BL02RN	500	1500	—
BL03RN	1000	2000	—

#### Taping Dimensions

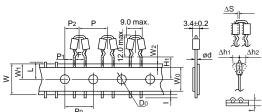


#### BL02RN1R3N1A

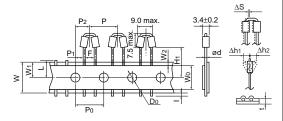


\*There is an excess bond stick on the wire.

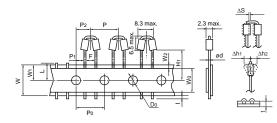
#### BL02RN2R3N1A



#### BL02RN2R1□1A



#### BL03RN2R1□1A



Description	Symbol	Dimension (mm)		Remarks
Pitch of component	Р	12.7		Product inclination $\Delta S$ determines tolerance
Pitch of sprocket hole	P0	12.7±0.2		
Lead spacing	F	5.0 <sup>+0.8</sup> -0.2		
Hole center to lead	P1	3.85±0.7		
Hole center to component center	P2	6.35±1.3		Tape deviation in feeding direction
Offset of bead	ΔS	±1.0		Include the offset caused by lead bend
Carrier tape width	W	18.0±0.5		
Position of sprocket hole	W1	9.0 <sup>+0</sup> <sub>-0.5</sub>		Tape with deviation
		Lead Length Number : N	16.5±0.5	BL02, BL03
Lead length between sprocket	H1	Lead Length Number : Q	20.0±0.5	BL02RN1R2/2R1, BL03
hole and forming position		Lead Length Number : P	18.5±0.5	BL02, BL03
Protruding length	I	+0.5 to -1.0		
Diameter of sprocket hole	Do	ø4.0±0.1		
Lead Diameter	ød	ø0.60		
Total tape thickness	t	0.7±0.2		Including bonding tape thickness
Deviation across tape, Deviation across tape rear	$\Delta$ h1, $\Delta$ h2	1.0 max.		
Cutting position of failure	L	11.0 +0		
Hold down tape width	Wo	12.0±0.5		
Hold down tape position	W2	1.5±1.5		



# Disc Type EMIFIL<sup>®</sup> and EMIGUARD<sup>®</sup> Packaging

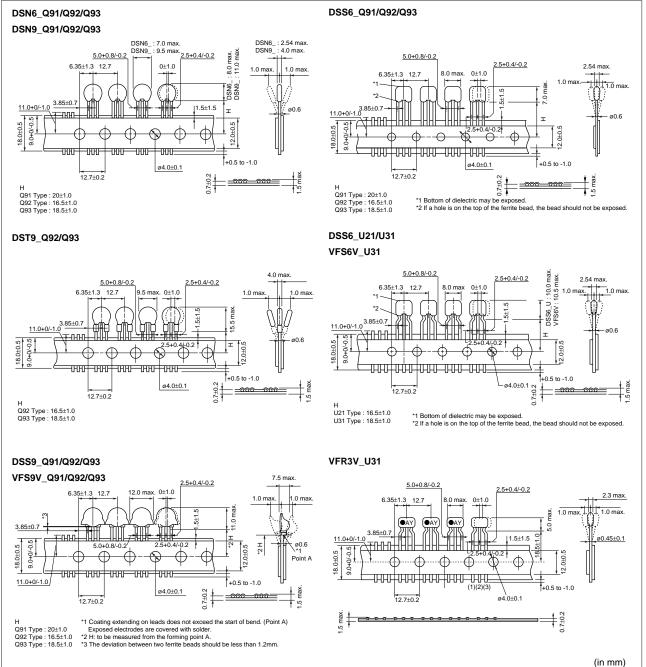
#### Minimum Quantity

	Minimum Order	Quantity (order in	sets only) (Pcs.)
Part Number	Ammo Pack	ø320mm Paper reel	Bulk (Bag)
VFR3V Series	2000	—	250
DSD6/VFS6V Series	2000	—	250 Q55/T51 500 Q54/Q56/T41
DSN9/9H Series	2000	—	250 <b>Q55</b> 500 <b>Q54/Q56</b>
DST9 Series	1000	—	200 <b>Q55</b> 250 <b>Q50/Q52</b>
DSS9 Series	_	800	200 <b>Q55</b> 500 <b>Q54/Q56</b>
VFS9V Series	_	800	200

#### Lead Type Code

Lead Ty	Less diaments (U)	
Straight Type	Incrimp Type	Lead length (H)
Q91	-	20.0±1.0mm
Q92	U21	16.5±1.0mm
Q93	U31	18.5±1.0mm

#### Taping Dimensions





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# Chip EMI Suppression Filter Design Kits





#### EKEMBL03B (Chip Ferrite Beads 0201 Size)

No.	Part Number	Quantity (pcs.)	Impedance typ. (at 100MHz, 20 degrees C)	Rated Current (mA)	DC Resistance (Ω) max.
1	BLM02AG100SN1	10	10Ω (Тур.)	500	0.1
2	BLM02AG700SN1	10	70Ω±25%	250	0.5
3	BLM02AG121SN1	10	120Ω±25%	200	0.8
4	BLM03AG100SN1	10	10Ω (Тур.)	500	0.1
5	BLM03AG700SN1	10	70Ω (Тур.)	200	0.4
6	BLM03AG121SN1	10	120Ω±25%	200	0.5
7	BLM03AG241SN1	10	240Ω±25%	200	0.8
8	BLM03AG601SN1	10	600Ω±25%	100	1.5
9	BLM03BB100SN1	10	10Ω±25%	300	0.4
10	BLM03BB220SN1	10	22Ω±25%	200	0.5
11	BLM03BB470SN1	10	47 <u>Ω</u> ±25%	200	0.7
12	BLM03BB750SN1	10	75Ω±25%	200	1.0
13	BLM03BB121SN1	10	120Ω±25%	100	1.5
14	BLM03BD750SN1	10	75Ω±25%	300	0.4
15	BLM03BD121SN1	10	120Ω±25%	250	0.5
16	BLM03BD241SN1	10	240Ω±25%	200	0.8
17	BLM03PG220SN1	10	22Ω±25%	900	0.065
18	BLM03PG330SN1	10	33Ω±25%	750	0.090

#### EKEMBL15H (Chip Ferrite Beads 0402 Size)

No.	Part Number	Quantity (pcs.)	Impedance typ. (at 100MHz, 20 degrees C)	Rated Current (mA)	DC Resistance (Ω) max.
1	BLM15AG100SN1	10	10Ω (Тур.)	1000	0.05
2	BLM15AG700SN1	10	70Ω (Тур.)	500	0.15
3	BLM15AG121SN1	10	120Ω±25%	500	0.25
4	BLM15AG221SN1	10	220Ω±25%	300	0.35
5	BLM15AG601SN1	10	600Ω±25%	300	0.60
6	BLM15AG102SN1	10	1000Ω±25%	200	1.00
7	BLM15BA050SN1	10	5Ω±25%	300	0.10
8	BLM15BA100SN1	10	10Ω±25%	300	0.20
9	BLM15BA220SN1	10	22Ω±25%	300	0.30
10	BLM15BA330SN1	10	33Ω±25%	300	0.40
11	BLM15BA470SN1	10	47 <u>Ω±</u> 25%	200	0.60
12	BLM15BA750SN1	10	75Ω±25%	200	0.80
13	BLM15BB050SN1	10	5Ω±25%	500	0.08
14	BLM15BB100SN1	10	10Ω±25%	300	0.10
15	BLM15BB220SN1	10	22Ω±25%	300	0.20
16	BLM15BB470SN1	10	47Ω±25%	300	0.35
17	BLM15BB750SN1	10	75Ω±25%	300	0.40



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# Chip EMI Suppression Filter Design Kits

Continued from the preceding page.

No.	Part Number	Quantity (pcs.)	Impedance typ. (at 100MHz, 20 degrees C)	Rated Current (mA)	DC Resistance (Ω) max.
18	BLM15BB121SN1	10	120Ω±25%	300	0.55
19	BLM15BB221SN1	10	220Ω±25%	200	0.80
20	BLM15BD750SN1	10	75Ω±25%	300	0.20
21	BLM15BD121SN1	10	120Ω±25%	300	0.30
22	BLM15BD221SN1	10	220Ω±25%	300	0.40
23	BLM15BD471SN1	10	470 <u>Ω</u> ±25%	200	0.60
24	BLM15BD601SN1	10	600Ω±25%	200	0.65
25	BLM15BD102SN1	10	1000Ω±25%	200	0.90
26	BLM15BD182SN1	10	1800Ω±25%	100	1.40
27	BLM15HD601SN1	10	600Ω±25%	300	0.85
28	BLM15HD102SN1	10	1000Ω±25%	250	1.25
29	BLM15HD182SN1	10	1800Ω±25%	200	2.20
30	BLM15HG601SN1	10	600Ω±25%	300	0.70
31	BLM15HG102SN1	10	1000Ω±25%	250	1.10
32	BLM15HB121SN1	10	120Ω±25%	300	0.70
33	BLM15HB221SN1	10	220Ω±25%	250	1.00
34	BLM15EG121SN1	10	120Ω±25%	1500	0.095
35	BLM15EG221SN1	10	220Ω±25%	700	0.28
36	BLM15PG100SN1	10	10Ω (Typ.)	1000	0.05
37	BLM15PD300SN1	10	30Ω±25%	2200	0.035
38	BLM15PD600SN1	10	60Ω±25%	1700	0.06
39	BLM15PD800SN1	10	80Ω±25%	1500	0.07
40	BLM15PD121SN1	10	120Ω±25%	1300	0.09

#### ●EKEMBL18E (Chip Ferrite Beads 0603 Size/ for Large-current P Type)

No.	Part Number	Quantity (pcs.)	Impedance typ. (at 100MHz, 20 degrees C)	Rated Current (mA)	DC Resistance (Ω) max.
1	BLM18AG121SN1	10	120Ω±25%	200	0.20
2	BLM18AG221SN1	10	220Ω±25%	200	0.30
3	BLM18AG601SN1	10	600Ω±25%	200	0.50
4	BLM18AG102SN1	10	1000Ω±25%	100	0.70
5	BLM18BA050SN1	10	5 <b>Ω</b> ±25%	500	0.20
6	BLM18BA100SN1	10	10Ω±25%	500	0.25
7	BLM18BA470SN1	10	47 <u>Ω</u> ±25%	300	0.55
8	BLM18BA750SN1	10	75Ω±25%	300	0.70
9	BLM18BA121SN1	10	120Ω±25%	200	0.90
10	BLM18BB050SN1	10	5 <b>Ω</b> ±25%	700	0.10
11	BLM18BB100SN1	10	10Ω±25%	500	0.15
12	BLM18BB470SN1	10	47 <u>Ω</u> ±25%	500	0.30
13	BLM18BB750SN1	10	75Ω±25%	200	0.35
14	BLM18BB121SN1	10	120Ω±25%	200	0.50
15	BLM18BB221SN1	10	220Ω±25%	200	0.65
16	BLM18BB471SN1	10	470 <u>Ω±</u> 25%	50	1.00
17	BLM18BD121SN1	10	120Ω±25%	200	0.40
18	BLM18BD221SN1	10	220Ω±25%	200	0.45
19	BLM18BD471SN1	10	470Ω±25%	200	0.55
20	BLM18BD601SN1	10	600Ω±25%	200	0.65
21	BLM18BD102SN1	10	1000Ω±25%	100	0.85
22	BLM18BD182SN1	10	1800Ω±25%	50	1.50
23	BLM18BD252SN1	10	2500Ω±25%	50	1.50
24	BLM18HG471SN1	10	470Ω±25%	200	0.85
25	BLM18HG601SN1	10	600Ω±25%	200	1.00

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# Chip EMI Suppression Filter Design Kits

Continued from the preceding page.

No.	Part Number	Quantity (pcs.)	Impedance typ. (at 100MHz, 20 degrees C)	Rated Current (mA)	DC Resistance (Ω) max.	
26	BLM18HG102SN1	10	1000Ω±25%	100	1.60	
27	BLM18HD471SN1	10	470Ω±25%	100	1.20	
28	BLM18HD601SN1	10	600Ω±25%	100	1.50	
29	BLM18HD102SN1	10	1000Ω±25%	50	1.80	
30	BLM18HE601SN1	10	600Ω±25%	800	0.25	
31	BLM18HE102SN1	10	1000Ω±25%	600	0.35	
32	BLM18HE152SN1	10	1500Ω±25%	500	0.50	
33	BLM18HK471SN1	10	470Ω±25%	200	0.70	
34	BLM18HK601SN1	10	600Ω±25%	100	0.90	
35	BLM18HK102SN1	10	1000Ω±25%	50	1.50	
36	BLM18PG330SN1	10	33Ω±25%	3000	0.025	
37	BLM18PG181SN1	10	180Ω±25%	1500	0.09	
38	BLM18PG221SN1	10	220Ω±25%	1400	0.10	
39	BLM18PG331SN1	10	330Ω±25%	1200	0.15	
40	BLM18PG471SN1	10	470Ω±25%	1000	0.20	
41	BLM18SG260TN1	10	26Ω±25%	6000 0.007		
42	BLM18SG700TN1	10	70Ω±25%	4000	0.020	
43	BLM18SG121TN1	10	120Ω±25%	3000	0.025	
44	BLM18SG221TN1	10	220Ω±25%	2500	0.040	
45	BLM18SG331TN1	10	330Ω±25%	1500	0.070	
46	BLM31PG391SN1	10	390Ω (Typ.)	2000	0.05	
47	BLM31PG601SN1	10	600Ω (Тур.)	1500	0.09	
48	BLM41PG181SN1	10	180Ω (Тур.)	3000	0.025	
49	BLM41PG471SN1	10	470Ω (Typ.)	2000	0.05	
50	BLM41PG102SN1	10	1000Ω (Тур.)	1500	0.09	
51	BLM18RK121SN1	10	120Ω±25%	200	0.25	
52	BLM18RK471SN1	10	470Ω±25%	200	0.5	
53	BLM18RK601SN1	10	600Ω±25%	200	0.6	
54	BLM18RK102SN1	10	1000Ω±25%	200	0.8	
55	BLM18EG121SN1	10	120Ω±25%	2000	0.04	
56	BLM18EG221SN1	10	220Ω±25%	1000	0.15	
57	BLM18EG471SN1	10	470Ω±25%	500	0.21	
58	BLM18EG601SN1	10	600Ω±25%	500	0.35	

#### EKEMBL21C (Chip Ferrite Beads 0805 Size)

No.	Part Number	Quantity (pcs.)	Impedance typ. (at 100MHz, 20 degrees C)	Rated Current (mA)	DC Resistance (Ω) max.
1	BLM21AG121SN1	10	120Ω±25%	200	0.15
2	BLM21AG221SN1	10	220Ω±25%	200	0.20
3	BLM21AG471SN1	10	470Ω±25%	200	0.25
4	BLM21AG601SN1	10	600Ω±25%	200	0.30
5	BLM21AG102SN1	10	1000Ω±25%	200	0.45
6	BLM21BB600SN1	10	60Ω±25%	200	0.20
7	BLM21BB750SN1	10	75Ω±25%	200	0.25
8	BLM21BB121SN1	10	120Ω±25%	200	0.25
9	BLM21BB221SN1	10	220Ω±25%	200	0.35
10	BLM21BB471SN1	10	470Ω±25%	200	0.45
11	BLM21BD121SN1	10	120Ω±25%	200	0.25
12	BLM21BD221SN1	10	220Ω±25%	200	0.25
13	BLM21BD471SN1	10	470 <u>Ω±</u> 25%	200	0.35
14	BLM21BD601SN1	10	600Ω±25%	200	0.35
15	BLM21BD102SN1	10	1000Ω±25%	200	0.40



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# Chip EMI Suppression Filter Design Kits

Continued from the preceding page.

No.	Part Number	Quantity (pcs.)	Impedance typ. (at 100MHz, 20 degrees C)	Rated Current (mA)	DC Resistance (Ω) max.
16	BLM21BD182SN1	10	1800Ω±25%	200	0.50
17	BLM21BD222SN1	10	2250Ω (Typ.)	200	0.60
18	BLM21BD222TN1	10	2200Ω±25%	200	0.60
19	BLM21BD272SN1	10	2700Ω±25%	200	0.80

#### ●EKEMNFMCB (Chip EMIFIL<sup>®</sup> Capacitor Type for Signal Lines)

No.	Part Number	Quantity (pcs.)	Capacitance	Rated Voltage (Vdc)	Rated Current (mA)	Insulation Resistance (MΩ min.)
1	NFM18CC220U1C3	10	22pF±20%	16	400	1000
2	NFM18CC470U1C3	10	47pF±20%	16	400	1000
3	NFM18CC101R1C3	10	100pF±20%	16	500	1000
4	NFM18CC221R1C3	10	220pF±20%	16	500	1000
5	NFM18CC471R1C3	10	470pF±20%	16	500	1000
6	NFM18CC102R1C3	10	1000pF±20%	16	600	1000
7	NFM18CC222R1C3	10	2200pF±20%	16	700	1000
8	NFM18CC223R1C3	10	22000pF±20%	16	1000	1000
9	NFM21CC220U1H3	10	22pF±20%	50	700	1000
10	NFM21CC470U1H3	10	47pF±20%	50	700	1000
11	NFM21CC101U1H3	10	100pF±20%	50	700	1000
12	NFM21CC221R1H3	10	220pF±20%	50	700	1000
13	NFM21CC471R1H3	10	470pF±20%	50	1000	1000
14	NFM21CC102R1H3	10	1000pF±20%	50	1000	1000
15	NFM21CC222R1H3	10	2200pF±20%	50	1000	1000
16	NFM21CC223R1H3	10	22000pF±20%	50	2000	1000

#### ●EKEMFA31D (Chip EMIFIL<sup>®</sup> Capacitor Array Type/ RC Combined Array Type)

No.	Part Number	Quantity (pcs.)	Capacitance	Rated Voltage (Vdc)	Rated Current (mA)	Insulation Resistance (MΩ min.)
1	NFA31CC220S1E4	10	22pF±20%	25	200	1000
2	NFA31CC470S1E4	10	47pF±20%	25	200	1000
3	NFA31CC101S1E4	10	100pF±20%	25	200	1000
4	NFA31CC221S1E4	10	220pF±20%	25	200	1000
5	NFA31CC471R1E4	10	470pF±20%	25	200	1000
6	NFA31CC102R1E4	10	1000pF±20%	25	200	1000
7	NFA31CC222R1E4	10	2200pF±20%	25	200	1000
8	NFA31CC223R1C4	10	22000pF±20%	16	200	1000
9	NFA31GD1006R84	10	10pF±20%	6	50	1000
10	NFA31GD1004704	10	10pF±20%	6	20	1000
11	NFA31GD1001014	10	10pF±20%	6	15	1000
12	NFA31GD4706R84	10	47pF±20%	6	50	1000
13	NFA31GD4703304	10	47pF±20%	6	20	1000
14	NFA31GD4704704	10	47pF±20%	6	20	1000
15	NFA31GD4701014	10	47pF±20%	6	15	1000
16	NFA31GD1016R84	10	100pF±20%	6	50	1000
17	NFA31GD1014704	10	100pF±20%	6	20	1000
18	NFA31GD1011014	10	100pF±20%	6	15	1000



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# Chip EMI Suppression Filter Design Kits

Continued from the preceding page.

#### ●EKEMFL18E (Chip EMIFIL<sup>®</sup> LC Combined Type)

No.	Part Number	Quantity (pcs.)	Cut-off Frequency	Rated Voltage (Vdc)	Rated Current (mA)	Insulation Resistance (MΩ min.)	DC Resistance (Ω) max.
1	NFL18ST207X1C3	10	200MHz	16	150	1000	3.5
2	NFL18ST307X1C3	10	300MHz	16	200	1000	1.8
3	NFL18ST507X1C3	10	500MHz	16	200	1000	1.5
4	NFL18SP157X1A3	10	150MHz	10	100	1000	3.0
5	NFL18SP207X1A3	10	200MHz	10	100	1000	3.0
6	NFL18SP307X1A3	10	300MHz	10	100	1000	3.0
7	NFL18SP507X1A3	10	500MHz	10	100	1000	2.0
8	NFL21SP106X1C3	10	10MHz	16	100	1000	8.5
9	NFL21SP206X1C7	10	20MHz	16	100	1000	8.5
10	NFL21SP506X1C3	10	50MHz	16	150	1000	3.5
11	NFL21SP706X1C3	10	70MHz	16	150	1000	3.0
12	NFL21SP107X1C3	10	100MHz	16	200	1000	2.0
13	NFL21SP157X1C3	10	150MHz	16	200	1000	2.0
14	NFL21SP207X1C3	10	200MHz	16	250	1000	1.5
15	NFL21SP307X1C3	10	300MHz	16	300	1000	1.2
16	NFL21SP407X1C3	10	400MHz	16	300	1000	1.2
17	NFL21SP507X1C3	10	500MHz	16	300	1000	1.2

No.	Part Number	Quantity Cut-off					A	tenuatio	n (dB mi	n.)				Rated	Rated
NO.	Part Number	(pcs.)	(pcs.) Frequency	10MHz	20MHz	50MHz	100MHz	150MHz	200MHz	300MHz	400MHz	500MHz	1GHz	Current Vo	Voltage
18	NFW31SP106X1E4	10	10MHz	6dB max.	5	25	25	-	25	-	-	30	30	200mA	25V
19	NFW31SP206X1E4	10	20MHz	-	6dB max.	5	25	-	25	-	-	30	30	200mA	25V
20	NFW31SP506X1E4	10	50MHz	-	-	6dB max.	10	-	30	-	-	30	30	200mA	25V
21	NFW31SP107X1E4	10	100MHz	-	-	-	6dB max.	-	5	-	-	20	30	200mA	25V
22	NFW31SP157X1E4	10	150MHz	-	-	-	-	6dB max.	-	10	20	30	30	200mA	25V
23	NFW31SP207X1E4	10	200MHz	-	-	-	-	-	6dB max.	-	-	10	30	200mA	25V
24	NFW31SP307X1E4	10	300MHz	-	-	-	-	-	-	6dB max.	-	5	15	200mA	25V
25	NFW31SP407X1E4	10	400MHz	-	-	-	-	-	-	-	6dB max.	-	10	200mA	25V
26	NFW31SP507X1E4	10	500MHz	-	-	-	-	-	-	-	-	6dB max.	10	200mA	25V

#### ●EKEMFA20C (Chip EMIFIL<sup>®</sup> LC Combined Array Type)

No.	Part Number	Quantity (pcs.)	Cut-off Frequency	Rated Voltage (Vdc)	Rated Current (mA)	Insulation Resistance (M $\Omega$ min.)
1	NFA18SL307V1A45	10	300MHz	10	100	1000
2	NFA18SL407V1A45	10	400MHz	10	100	1000
3	NFA18SL487V1A45	10	480MHz	10	100	1000
4	NFA21SL806X1A48	10	80MHz	10	20	1000
5	NFA21SL207X1A45	10	200MHz	10	100	1000
6	NFA21SL207X1A48	10	200MHz	10	100	1000
7	NFA21SL307X1A45	10	300MHz	10	100	1000
8	NFA21SL307X1A48	10	300MHz	10	100	1000
9	NFA21SL287V1A45	10	280MHz	10	100	1000
10	NFA21SL287V1A48	10	280MHz	10	100	1000
11	NFA21SL317V1A45	10	310MHz	10	100	1000
12	NFA21SL317V1A48	10	310MHz	10	100	1000
13	NFA21SL337V1A45	10	330MHz	10	100	1000
14	NFA21SL337V1A48	10	330MHz	10	100	1000

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# Chip EMI Suppression Filter Design Kits

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#### ●EKEMNFMPG (Chip EMIFIL<sup>®</sup> for Large Current)

No.	Part Number	Quantity (pcs.)	Capacitance	Rated Voltage (Vdc)	Rated Current (A)	Insulation Resistance (MΩ min.)
1	NFM18PC104R1C3	10	0.1µF±20%	16	2	1000
2	NFM18PC224R0J3	10	0.22µF±20%	6.3	2	1000
3	NFM18PC474R0J3	10	0.47µF±20%	6.3 2		1000
4	NFM18PC105R0J3	10	1µF±20%	6.3	2	500
5	NFM18PC225B0J3	10	2.2µF±20%	6.3	2	200
6	NFM18PC225B1A3	10	2.2µF±20%	10	4	200
7	NFM18PS474R0J3	10	0.47µF±20%	6.3	2	1000
8	NFM18PS105R0J3	10	1µF±20%	6.3	2	500
9	NFM21PC104R1E3	10	0.1µF±20%	25	2	1000
10	NFM21PC224R1C3	10	0.22µF±20%	16	2	1000
11	NFM21PC474R1C3	10	0.47µF±20%	16	2	1000
12	NFM21PC105B1A3	10	1µF±20%	10	4	500
13	NFM21PC105B1C3	10	1µF±20%	16	4	500
14	NFM21PC225B0J3	10	2.2µF±20%	6.3	4	200
15	NFM21PC475B1A3	10	4.7μF±20%	10	6	100
16	NFE31PT152Z1E9	10	1500pF +50/-20%	25	6	1000
17	NFE31PT222Z1E9	10	2200pF±50%	25	6	1000
18	NFE61PT102E1H9	10	1000pF +80/-20%	50	2	1000
19	NFE61PT472C1H9	10	4700pF +80/-20%	50	2	1000
20	NFM41PC204F1H3	10	0.2µF +80/-20%	50	2	1000
21	NFM41PC155B1E3	10	1.5μF±20%	25	6	300

#### EKEMDL21G (Chip Common Mode Choke Coils)

No.	Part Number	Part Number Quantity Common Mode Impedance (pcs.) (at 100MHz, 20 degrees C)		Rated Voltage (Vdc)	Rated Current (mA)	Insulation Resistance (MΩ min.)
1	DLW21HN670SQ2	10	67Ω±25%	50	330	10
2	DLW21HN900SQ2	10	90Ω±25%	50	330	10
3	DLW21HN121SQ2	10	120Ω±25%	50	280	10
4	DLW21HN181SQ2	10	180Ω±25%	50	250	10
5	DLW21SN670SQ2	10	67Ω±25%	50	400	10
6	DLW21SN900SQ2	10	90Ω±25%	50	330	10
7	DLW21SN121SQ2	10	120Ω±25%	50	370	10
8	DLW21SN181SQ2	10	180Ω±25%	50	330	10
9	DLW21SN261SQ2	10	260Ω±25%	50	300	10
10	DLW21SN371SQ2	10	370Ω±25%	50	280	10
11	DLW31SN601SQ2	10	600Ω±25%	50	260	10
12	DLW31SN102SQ2	10	1000Ω±25%	50	230	10
13	DLW31SN222SQ2	10	2200Ω±25%	50	200	10
14	DLP0NSN670HL2	10	67Ω±20%	5	110	100
15	DLP0NSN900HL2	10	90Ω±20%	5	100	100
16	DLP0NSN121HL2	10	120Ω±20%	5	90	100
17	DLP11SN670SL2	10	67Ω±20%	5	180	100
18	DLP11SN121SL2	10	120Ω±20%	5	140	100
19	DLP11SN161SL2	10	160Ω±20%	5	120	100
20	DLP11SN900HL2	10	90Ω±20%	5	150	100
21	DLP11SN201HL2	10	200Ω±20%	5	110	100
22	DLP11SN241HL2	10	240Ω±20%	5	100	100
23	DLP11SN281HL2	10	280Ω±20%	5	90	100
24	DLP11SN331HL2	10	330Ω±20%	5	80	100
25	DLP1NDN670HL4	10	67Ω±20%	5	80	100





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# Chip EMI Suppression Filter Design Kits

#### Continued from the preceding page.

No.	No. Part Number		Common Mode Impedance (at 100MHz, 20 degrees C)	Rated Voltage (Vdc)	Rated Current (mA)	Insulation Resistance (MΩ min.)
26	DLP1NDN900HL4	10	90Ω±20%	5	70	100
27	DLP1NDN121HL4	10	120Ω±20%	5	60	100
28	28 <b>DLP1NDN161HL4</b> 10 160Ω±20%		160Ω±20%	5	60	100
29	DLP2ADN670HL4	10	67Ω±20%	5	140	100
30	DLP2ADN900HL4	10	90Ω±20%	5	130	100
31	DLP2ADN121HL4	10	120 <u>Ω±</u> 20%	5	120	100
32	DLP2ADN161HL4	10	160 <u>Ω±</u> 20%	5	100	100
33	DLP2ADN201HL4	10	200Ω±20%	5	90	100
34	DLP2ADN241HL4	10	240 <u>Ω±</u> 20%	5	80	100
35	DLP2ADN281HL4	10	280Ω±20%	5	80	100
36	DLP31DN321ML4	10	320Ω±20%	10	80	100
37	DLP31DN441ML4	10	440Ω±20%	10	70	100

#### EKEMDCC5A (Chip Common Mode Choke Coils for DC Power Line)

No.	Part Number	Quantity (pcs.)	Common Mode Impedance (at 100MHz, 20 degrees C)	Rated Voltage (Vdc)	Rated Current (mA)	Insulation Resistance (MΩ min.)
1	DLW5AHN402SQ2	5	4000Ω (Typ.)	50	200	10
2	DLW5BSN191SQ2	5	190Ω (Typ.)	50	5000	10
3	DLW5BSN351SQ2	5	350Ω (Тур.)	50	2000	10
4	DLW5BSN102SQ2	5	5 1000Ω (Typ.)		1500	10
5	DLW5BSN152SQ2	5	1500Ω (Typ.)	50	1000	10
6	DLW5BSN302SQ2	<b>V302SQ2</b> 5 3000Ω (Typ.)		50	500	10
7	DLW5BTN101SQ2	5	100Ω (Тур.)	50	6000	10
8	DLW5BTN251SQ2	5	250Ω (Тур.)	50	5000	10
9	DLW5BTN501SQ2	5	500 <b>Ω</b> (Typ.)	50	4000	10
10	DLW5BTN102SQ2	5	1000Ω (Тур.)	50	2000	10
11	DLW5BTN142SQ2	5	1400Ω (Тур.)	50	1500	10

No.	Part Number	Quantity (pcs.)	Insertion Loss	Rated Voltage (Vdc)	Rated Current (A)	Insulation Resistance (MΩ min.)
12	BNX022-01	5	1MHz to 1GHz: 35dB min.	50	10	500



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# **Outlines of Major Noise Regulation Standards**

#### 1. EMI Regulations

Eq	Countries	Information Regulation	Japan	USA	Europe
	Generic Standard	CISPR61000-6-3 (Residential, Commercial and Light Industry) IEC61000-6-4 (Industrial)			EN50081-1 (Residential, Commercial and Light Industry) EN50081-2 (Industrial)
	ITE: Information Technology Equipment Printers, Personal computers Word processors, Displays	CISPR 22	VCCI *1	FCC Part 15 Subpart B	EN55022
	ISM equipment, Microwaves	CISPR 11	*1	FCC Part 18	EN55011
Emission	Igniter (Automobiles, Motorboats)	CISPR 12	JASO	FCC Part 15 Subpart B	Automotive Directive
Emis	TVs, Radios, Audios, VTRs	CISPR 13	*1	FCC Part 15 Subpart B	EN55013
	Household electrical equipment Portable tools	CISPR 14	*1		EN55014
	Fluorescent Lamps, Luminaries	CISPR 15	*1	FCC Part 18	EN55015
	Transceivers	ITU-T	Radio Act ARIB (Voluntary Regulation)	FCC Part 15 Subpart C FCC Part 22	ETS300 Series
	(Reference) Power Supplies Higher Harmonics	IEC61000-3	Industrial Voluntary Regulation		EN61000-3
	Basic Standard	IEC61000-4	JIS C 61000-4		EN61000-4 Series
Immunity	Generic Standard	IEC61000-6-1 (Residential, Commercial and Light Industry) IEC61000-6-2 (Industrial)	JIS C 61000-6-1 (Residential, Commercial and Light Industry) JIS C 61000-6-2 (Industrial)		EN50082-1 (Residential, Commercial and Light Industry) EN50082-2 (Industrial)
	Industrial Process Measurement and Control Equipment				
	Radios, TVs	CISPR 20	Industrial Voluntary Action		EN55020
-	ITE: Information Technology Equipment	CISPR 24			EN55024

\*1 Electrical Appliance and Material Safety Law

There are EMI regulations in each country to meet EMI noise levels emitted from digital equipment. In the countries which regulate EMI, equipment which does not satisfy regulations is not allowed to be sold.

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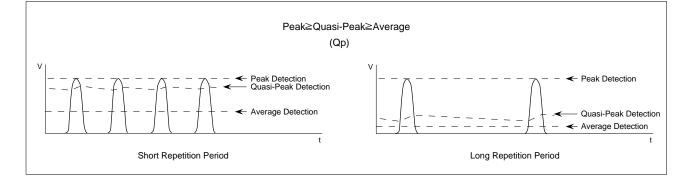
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# **Outlines of Major Noise Regulation Standards**

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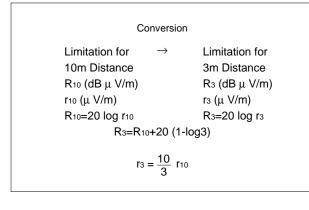
#### 2. Measurement Point and Noise Detection

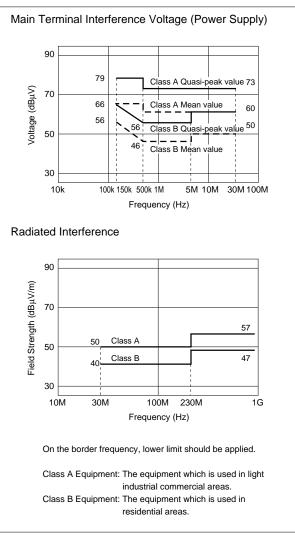
Regulation	Measuring Item	Polarization and Measuring Point	Frequency (Hz)	Detection	Measuring Devices
CISPR 22/	Radiated Interference	Horizontal Pol. Vertical Pol.	30M to 1GHz	Quasi-Peak Detection	Antenna
EN55022	Main Interference Voltage	AC Main Ports	150k to 30MHz	Quasi-Peak Detection Mean Detection	Artificial Main Network
VCCI	Radiated Interference	Horizontal Pol. Vertical Pol.	30M to 1GHz	Quasi-Peak Detection	Dipole Antenna
VCCI	Main Interference Voltage	AC Main Ports	150k to 30MHz	Quasi-Peak Detection Mean Detection	Artificial Main Network
FCC Part 15	Radiated Interference	Horizontal Pol. Vertical Pol.	30M to 40GHz	Quasi-Peak Detection Mean Detection	Antenna
FUC Part 15	Main Interference Voltage	AC Main Ports	150k to 30MHz	Quasi-Peak Detection	Artificial Main Network



#### 3. Limits of CISPR 22/EN55022

 CISPR 22 recommends measurement at 10m distance.
 However, other distance is acceptable if the limitation is converted according to the following calculation.
 Limitation shown left is converted to limitation for 3m distance.







# **Outlines of Major Noise Regulation Standards**

- Continued from the preceding page
- (2) Scope of CISPR 22 Regulation This regulation applies to information technology equipment (ITE) which is defined as:
  - (a) Equipment that receives data from external signal sources;
  - (b) Equipment that processes received data;
  - (c) Equipment that outputs data; and
  - (d) Equipment that has less than 600V rated voltage in power supply.

- 4. Limits of VCCI Voluntary Regulation
- (1) VCCI recommends measurement at 10m distance; 3m or 30m distance measurements are also allowed.
- (2) Scope of VCCI Voluntary Regulation This regulation applies to information technology

equipment (same as CISPR Pub.22), but the application is excluded on the following equipment:

- · Equipment for which other regulations already exist (e.g., household electrical appliances, radio and TV receivers)
- In station equipment principal purpose of which is electrical communication
- · Industrial plant control system for which information processing is a secondary system function
- · Industrial, commercial and medical testing and measuring systems for which data processing is a secondary system function
- Information equipment for which CISPR is conducting further deliberation

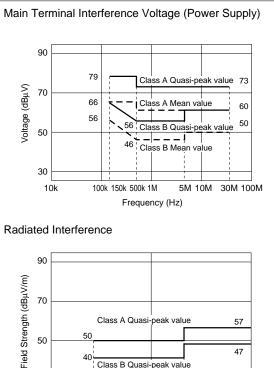
VCCI is the acronym of Voluntary Control Council for Interference by Data Processing Equipment and Electronic Office Machines.

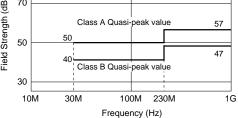
VCCI is organized by the following organizations:

- · Japan Electronics and Information Technology Industries Association (JEITA)
- · Japan Business Machine and Information System Industries Association (JBMIA)
- Communication and Information Network Association of Japan (CIAJ)

#### **CISPR** Regulations

CISPR 10 Organization, Regulations and Procedures of CISPR
CISPR 11 Industrial, Scientific and Medical (ISM) Radio-Frequency
Equipment
CISPR 12 Vehicles, Motor Boats and Spark-Ignited Engine driven
CISPR 13 Sound and Television Receivers
CISPR 14 Household Electrical Appliances, Portable Tools and Similar
Electrical Apparatus
CISPR 15 Fluorescent Lamps and luminaries
CISPR 16 Radio Interference Measuring Apparatus and Measurement
Methods
CISPR 17 Passive Radio Interference Filters and Suppression
Components
CISPR 18 Power Transmission Cables and High Voltage equipment
CISPR 19 Microwave Ovens for Frequencies above 1GHz
CISPR 20 Immunity of Sound and TV Broadcast Receivers
and Associated Equipment
CISPR 21 Interference to Mobile Radio Communications in the Presence
of Impulsive Noise
CISPR 22 Information Technology Equipment
CISPR 23 Industrial Scientific and Medical (ISM) Equipment
CISPR 24 Immunity Regulation of Information Technology Equipment
CISPR 25 Receiver used onboard vehicles, boats, and on devices





On the border frequency, lower limit should be applied.

Class B ITE: Equipment that is designed to be used at home. Class A ITE: Equipment that does not meet interference limits of class B equipment, but satisfies interference limits of class A equipment.



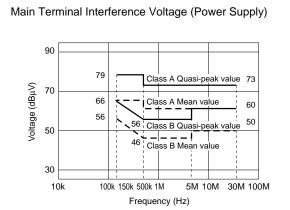
# **Outlines of Major Noise Regulation Standards**

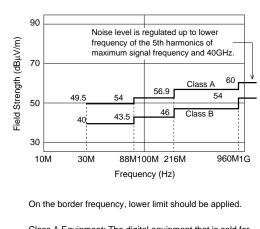
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- 5. Limits of FCC Part 15 Subpart B
- Class A recommended to be measured with 10m distance. Class B recommended to be measured with 3m distance.
- (2) The FCC Part 15 regulation controls radiated interference by establishing quasi-peak and mean value limits for frequencies ranging from 30MHz to 40GHz (or maximum frequency's fifth harmonic, whichever is lower). For AC main ports, the FCC Part 15 regulation controls main terminal interference voltage by establishing quasipeak value limits for frequencies ranging from 450kHz to 30MHz.

#### Measurement Frequency Range for Radiated Interference

Maximum Frequency the Equipment Internally Generates, Uses or Operates or Synchronizes (MHz)	Upper End of Measurement Frequency Range (MHz)	
Less than 1.705	30	
1.705 to 108	1000	
108 to 500	2000	
500 to 1000	5000	
Over 1000	Maximum Frequency's Fifth Harmonic or 40GHz, Whichever is Lower	





**Radiated Interference** 

Class A Equipment: The digital equipment that is sold for commercial, industrial and office use. Class B Equipment: The digital equipment that is sold to be used in residential areas.

(3) There is no regulation on power interference.

FUUF	regulations
Part 1	Procedures
Part 2	Frequency Division and Radio Wave Treaty Issues and
	General Rules
Part 15	Radio Wave Equipment
	<ul> <li>Intentionally electromagnetic radiation equipment</li> </ul>
	<ul> <li>Non-intentionally electromagnetic radiation equipment</li> </ul>
	<ul> <li>Incidentally electromagnetic radiation equipment</li> </ul>
Part 18	Industrial, Scientific and Medical Equipment
Part 22	Public Mobile Wireless Operations
Part 68	Connecting Terminal Equipment to Telephone Circuit Network

Part 76 Cable Television

ECC Regulations

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## **Outlines of Major Noise Regulation Standards**

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6. Immunity Regulations in the European Union All electric/electronic equipment cannot be sold in Europe without CE marking. To use CE marking, they must satisfy related EC directives such as EMC directives. For Information Technology Equipment, in EMC directive, emission regulations are integrated, and immunity regulations are applied. Although these immunity regulations are prepared by CENELEC, almost all contents are same as standards issued by IEC or CISPR.

 All products which are sold in EU must satisfy EC directives which contain immunity regulations.

 Principal EC Directive

 EMC Directive
 89/336/EEC

 Low-Voltage Electrical
 73/23/EEC

 Products Directive
 89/392/EEC

#### 7. Immunity Regulations in Japan

Equipment	Association		
TV, Radio, Audio	IFITA (Japan Flootranics and Information Technology)		
ITE	JEITA (Japan Electronics and Information Technology)		
Office Machine	JBMIA (Japan Business Machine and Information System Industries Association)		
Mi	CIAJ (Communication and Information Network Association of Japan) ARIB (Association of Radio Industries and Business)		
Machine To Builders	JMTBA (Japan Machine Tool Builders' Association)		
Industrial Measuring Control Equipment	JEMIMA (Japan Electric Measuring Instruments Manufacturers' Association)		
Industrial Robot	JARA (Japan Robot Association)		

The table on the right shows the preparation situation of JIS for EMC. At this moment, the immunity standards by JIS do not have a legal force like the Electrical Application and Material Safety Law/VCCI.

Classification	Information Regulation	JIS
Terms	ISO60050-161 (IEV terms 161)	JIS C 0161
Basic Standards	IEC61000-4- 2 IEC61000-4- 3 IEC61000-4- 4 IEC61000-4- 5 IEC61000-4- 6 IEC61000-4- 7 IEC61000-4- 7 IEC61000-4- 8 IEC61000-4-11 IEC61000-4-14 IEC61000-4-17	JIS C 61000-4-2 JIS C 61000-4-3 JIS C 61000-4-4 JIS C 61000-4-5 JIS C 61000-4-5 JIS C 61000-4-7 JIS C 61000-4-7 JIS C 61000-4-11 JIS C 61000-4-14 JIS C 61000-4-17
Generic Standards	IEC61000-6-1 IEC61000-6-2	JIS C 61000-6-1 JIS C 61000-6-2



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### Principle of Noise Suppression by DC EMIFIL®

#### 1. Function of DC EMI Suppression Filters

DC EMI suppression filters absorb and eliminate high frequency noise which may produce electromagnetic interference in PC board circuits.

These filters are used in secondary circuits, and are small in size and light in weight, which further enhances their excellent noise suppression functions.

Chip and adhesive type filters can be mounted on PC boards automatically.

These filters are effective in the suppression of radiation noise in computers, peripheral equipment, and digital circuit application equipment (including various types of microcomputer application equipment), and function to suppress noise in audio/visual equipment, which uses digital memory chips and DSP.

These filters are also effective for improving the noise immunity of equipment used in noisy environments (such as electronic equipment for automobiles).

#### 2. Noise Filter Suppression Principles

Generally, noise problems occur when the noise source and electronic equipment sensitive to the influence of noise are located in close proximity to one another. In such situations, as shown in Figure at right, noise is conducted through a conductor, which produces an inductive field around the noise source.

To overcome such noise problems, it is preferable to reduce the amount of noise generated by the noise source or improve the noise resistance of adjacent equipment.

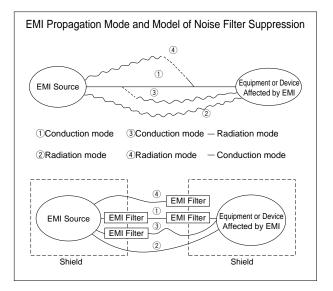
In order to satisfy equipment performance specifications and eliminate noise effectively at the same time, however, it is customary to reduce the amount of noise generated by the noise source, if it can't be eliminated altogether.

3. Configuration of EMI Suppression Filters (DC)

DC EMI suppression filters are used to suppress noise produced by conductors. Noise radiation can be suppressed, if it is eliminated with a filter in advance. Generally, such noise suppression is achieved with DC EMI suppression filters, according to the capacitive and inductive frequency characteristics of the respective conductors in the circuit.

Filters of this kind can be roughly divided into those:

- (1) employing a capacitor,
- (2) employing an inductor,
- (3) employing a capacitor and inductor combination.



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## Principle of Noise Suppression by DC EMIFIL®

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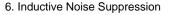
#### 4. Capacitive Noise Suppression

When a capacitor is connected (bypass capacitor) to ground from a noisy signal line or power line, the circuit impedance decreases as the frequency increases. Since noise is a high frequency phenomenon, it flows to ground if a capacitor has been connected to ground, thereby making it possible to eliminate noise. (See Fig.) EMI suppression filters employing a capacitor in this way are used to eliminate this type of noise.

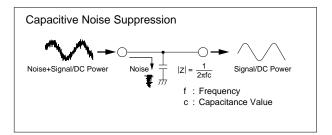
5. High frequency Capacitor Characteristics Used for EMI Suppression Filters

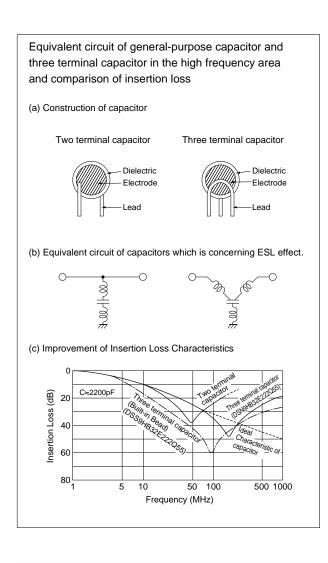
Even general-purpose capacitors can be used for noise suppression. However, since noise has an extremely high frequency range, general-purpose capacitors may not function as effective bypass capacitors, due to the large residual inductance built into the capacitor.

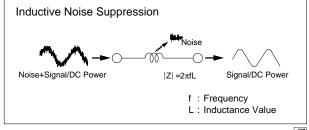
All the capacitors used in Murata's EMI suppression filters employ a three terminal structure or thru-type structure, which functions effectively even at high frequencies, thereby minimizing the influence of residual inductance. Consequently, an effective filter circuit can be formed even at frequencies exceeding 1GHz. (Refer to Fig.)



When an inductor is inserted in series in a noise producing circuit (See Fig.), its impedance increases with frequency. In this configuration it is possible to attenuate and eliminate noise components (high frequency components). The Murata EMI suppression filter functions in this way.







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# Principle of Noise Suppression by DC EMIFIL®

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#### 7. Characteristics of Inductors Used

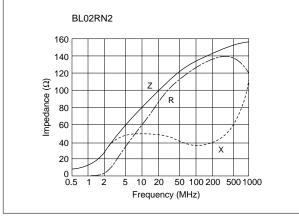
in EMI Suppression Filters

General-purpose inductors also function to suppress noise when configured in series with a noise producing circuit. However, when general-purpose inductors are used, resonance may result in peripheral circuits, signal wave forms may become distorted, and satisfactory impedance may not be obtained at noise frequencies (due to insufficient high frequency impedance characteristics).

The inductors used for Murata's EMI suppression filters are designed to function nearly as a resistor at noise frequencies, which greatly reduces the possibility of resonance and leaves signal wave forms undistorted. And since sufficient impedance is obtained for frequencies ranging to hundreds of MHz, these specifically designed inductors operate effectively to suppress high-frequency noise. (See Fig.) Equivalent Circuit

(Resistance element becomes dominant at high frequency.)

Example of impedance frequency characteristics of inductor type  $\mathsf{EMIFIL}^{\textcircled{\sc 0}}$ 



8. Capacitive-Inductive EMI Suppression Filters If capacitive and inductive suppression characteristics are combined, it is possible to configure a much higher performance filter. In signal circuit applications where this combination is applied, noise suppression effects which have little influence on the signal wave form become

This type of filter is also effective in the suppression of high-speed signal circuit noise. When used in DC power circuits, capacitive-inductive filters prevent resonance from occurring in peripheral circuits, thus making it possible to achieve significant noise suppression under normal service conditions.

9. Other EMI Suppression Filters

possible.

In addition to the capacitive-inductive filter, Murata also has an EMI suppression filter (EMIGUARD<sup>®</sup>) combining a capacitor with a varistor, useful for surge absorption; and a common mode choke coil effective, for common mode noise suppression.

Murata also has a range of built-in filter connectors which greatly reduce filter mounting space requirements.

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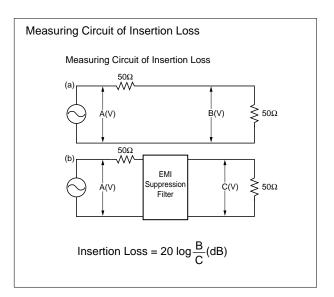
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# Principle of Noise Suppression by DC EMIFIL®

Continued from the preceding page.

10. Expressing EMI Suppression Filter Effects EMI Suppression Filter effects are expressed in terms of the insertion loss measured in the circuit, normally specified in MIL-STD 220A. As shown in the  $50\Omega$ impedance circuit in the Figure at right, insertion loss is represented by the logarithmic ratio of the circuit output voltage with and without a filter in the circuit, which is multiplied by 20 and expressed in dB.

Therefore, an insertion loss of 20dB indicates an output voltage ratio (B/C) of 1/10, and an insertion loss of 40dB indicates an output voltage ratio (B/C) of 1/100.







Select circuit.

(Select a new simulation circuit from File menu.)

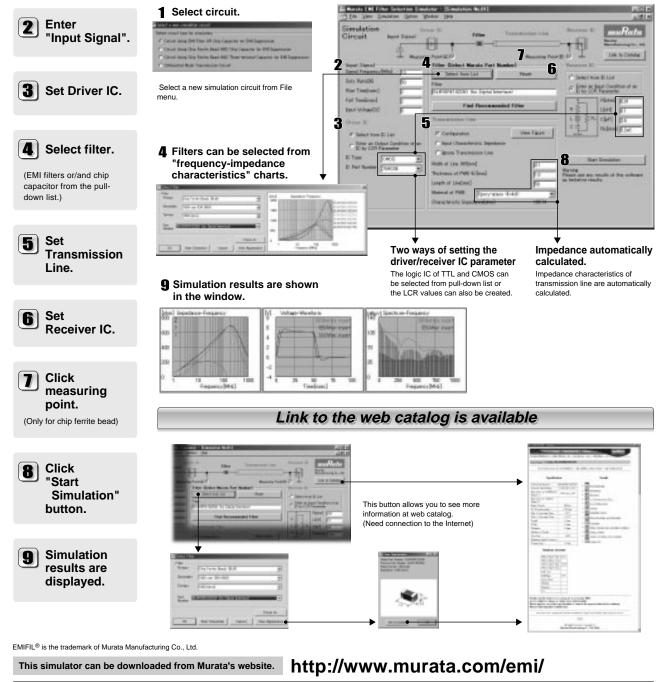
1)



# Murata EMI Filter Selection Simulator Ver. 3.4.0

• Simulation results with various charts are quickly displayed on your PC.

- Results can be displayed in standard format or user defined scaling.
- Simulates various types of circuits such as Differential Mode Transmission, ceramic capacitor, EMIFIL<sup>®</sup>, three terminal capacitor and chip ferrite beads.
- Provides a simulation function that selects best suited Chip EMIFIL<sup>®</sup>.





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(5) Medical equipment

- (2) Aerospace equipment (4) Power plant equipment
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