Notice for TAIYO YUDEN products

Please read this notice before using the TAIYO YUDEN products.

⚠ REMINDERS

- Product information in this catalog is as of October 2009. All of the contents specified herein are subject to change without notice due to technical improvements, etc. Therefore, please check for the latest information carefully before practical application or usage of the Products.

  Please note that Taiyo Yuden Co., Ltd. shall not be responsible for any defects in products or equipment incorporating such products, which are caused under the conditions other than those specified in this catalog or individual specification.

- Please contact Taiyo Yuden Co., Ltd. for further details of product specifications as the individual specification is available.

- Please conduct validation and verification of products in actual condition of mounting and operating environment before commercial shipment of the equipment.

- All electronic components or functional modules listed in this catalog are developed, designed and intended for use in general electronics equipment.(for AV, office automation, household, office supply, information service, telecommunications, (such as mobile phone or PC) etc.). Before incorporating the components or devices into any equipment in the field such as transportation,(automotive control, train control, ship control), transportation signal, disaster prevention, medical, public information network (telephone exchange, base station) etc. which may have direct influence to harm or injure a human body, please contact Taiyo Yuden Co., Ltd. for more detail in advance.
  Do not incorporate the products into any equipment in fields such as aerospace, aviation, nuclear control, submarine system, military, etc. where higher safety and reliability are especially required.

  In addition, even electronic components or functional modules that are used for the general electronic equipment, if the equipment or the electric circuit require high safety or reliability function or performances, a sufficient reliability evaluation check for safety shall be performed before commercial shipment and moreover, due consideration to install a protective circuit is strongly recommended at customer's design stage.

- The contents of this catalog are applicable to the products which are purchased from our sales offices or distributors (so called "TAIYO YUDEN's official sales channel").
  It is only applicable to the products purchased from any of TAIYO YUDEN's official sales channel.

- Please note that Taiyo Yuden Co., Ltd. shall have no responsibility for any controversies or disputes that may occur in connection with a third party's intellectual property rights and other related rights arising from your usage of products in this catalog. Taiyo Yuden Co., Ltd. grants no license for such rights.

- Caution for export
  Certain items in this catalog may require specific procedures for export according to "Foreign Exchange and Foreign Trade Control Law" of Japan, "U.S. Export Administration Regulations", and other applicable regulations. Should you have any question or inquiry on this matter, please contact our sales staff.
  Should you have any question or inquiry on this matter, please contact our sales staff.

LEADED FERRITE BEADS INDUCTORS

WAVE

FEATURES

- Use of high loss ferrite material.
- Easy mounting on PC boards.
- Available in a wide range of values and configurations to suit most applications.

APPLICATIONS

- Waveform correction of digital signals from digital equipment and absorption of high-frequency noise from data lines.

OPERATING TEMP.

- −25℃～85℃

ORDERING CODE

F B A 0 4 H A 4 5 0 B B ○ ○ ○

❶Type	
FB	Ferrite Beads

❷Configuration	
A	Axial lead
R	Radial lead

❸Core Dimensions (mm)	
03	φ2.5
04	φ3.5
05	5.0
06	6.0
07	7.5

❹Material code	
HA	Refer to impedance curves for material difference
VA	

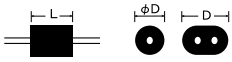
❺Nominal Impedance	
example	
850	85
121	120

Excluding 03Type

❻Lead configuration (mm)			
AB	Straight lead (26mm lead space) / ammo	SA	Straight lead (FBR05 type) / ammo
BB	Straight lead (52mm lead space) / ammo	SB	Straight lead (FBR07 type) / ammo
KD	Formed lead (10mm pitch) / bulk	TB	Straight lead (FBR07 type) / ammo
KE	Formed lead (12.5mm pitch) / bulk	UB	Radial lead formed / ammo
KF	Formed lead / bulk (15.0mm pitch) / bulk	US	Formed lead (crimped) / bulk
NA	Lead (2.5mm pitch)/bulk (FBR)	VB	Dual side lead formed (crimped) / ammo
	Straight lead / bulk (FBA)	VS	Formed lead / bulk
NB	Formed lead (crimped) / bulk		

❼Internal code	
−00	Standard Products

EXTERNAL DIMENSIONS/STANDARD QUANTITY



Type		Configurations: Taping: Straight	Configurations: Taping: Formed	Configurations: Bulk: Straight	Configurations: Bulk: Formed	Dimensions: D	Dimensions: L	Standard Quantity (pcs): Type	Lead Configuration	Bulk	Taped Ammo
FBA	03HA450□-00 03VA450□-00	AB,BB W:26,52 (1.02, 2.05) P:5.0 (0.197)	VB UB P: 12.7 (0.500)	NA	KD,KE,KF F: 10, 12.5, 15 (0.39, 0.492, 0.591) VS US F: 5.0 (0.197)	2.5±0.2 (0.098±0.008)	4.5±0.3 (0.177±0.012)	FBA03	NA, KD, US	1000	–
									KE, KF, VS	500	–
									AB, BB	–	2000
									UB, VB	–	3000
	04HA450□-00 04VA450□-00	AB,BB W:26,52 (1.02,2.05) P:5.0 (0.197)	VB UB P: 12.7 (0.500)	NA	KD,KE,KF F: 10, 12.5, 15 (0.39, 0.492, 0.591) VS US F: 5.0 (0.197)	3.5±0.2 (0.138±0.008)	4.5±0.3 (0.177±0.012)	FBA04	NA, KD, US	1000	–
	04HA600□-00 04VA600□-00	AB,BB W:26,52 (1.02, 2.05) P:5.0 (0.197)	VB P	NA	KD,KE,KF F: 10, 12.5, 15 (0.39, 0.492, 0.591) VS	3.5±0.2 (0.138±0.008)	$6.0^{+0.5}_{-0}$ ($0.236^{+0.020}_{-0}$)		KE, KF, VS	500	–
									AB, BB	–	1000
	04HA900□-00 04VA900□-00	AB,BB W:26,52 (1.02, 2.05) P:5.0 (0.197)	VB P P: 12.7 (0.500)	NA	KE,KF F: 12.5, 15 (0.492, 0.591) VS	3.5±0.2 (0.138±0.008)	9.0±0.5 (0.354±0.020)		UB, VB	–	3000
FBR	05VA121□-00	–	SA P P: 12.7 (0.500)	–	NA F: 2.5 (0.098)	5.0 max. (0.197 max.)	7.5 (0.295)	FBR05	NA	1000	–
									SA	–	2000
	06HA850NA-00 06VA850NA-00	–	–	–	NA F: 2.5 (0.098)	6.0±0.5 (0.236±0.020)	5.0 (0.197)	FBR06	NA	1000	–
	06HA121NA-00 06VA121NA-00						7.0 (0.276)				
	07HA850□-00 07VA850□-00	–	SB,TB P: 12.7 (0.500)	–	NB F: 5.0 (0.197)	7.5±0.5 (0.295±0.020)	5.5 (0.217)	FBR07	NB	1000	–
	07HA121□-00 07VA121□-00						7.5 (0.295)		SB	–	2000

□Please specify the lead configuration code.

Unit : mm (inch)

Note: Lead diameter (φd) shall fall within a range of 0.65mm±0.05mm, FBR05, and FBR07 types however, will have a lead diameter (φd) range of 0.6mm±0.05mm.

* This catalog contains the typical specification only due to the limitation of space. When you consider purchase of our products, please check our specification. For details of each product (characteristics graph, reliability information, precautions for use, and so on), see our Web site (http://www.ty-top.com/) or CD catalogs.

PART NUMBERS

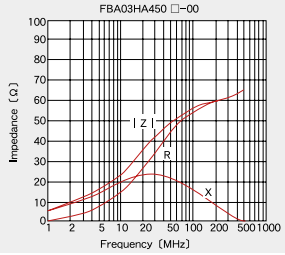
Ordering code		EHS (Environmental Hazardous Substances)	Impedance [Ω] min.	Measuring frequency [MHz]		Rated Current [A] max.	
				Material		Material	
				HA	VA	HA	VA
FBA	03 △ 450 □ −00	RoHS	35.0	50	100	7.0	7.0
	04 △ 450 □ −00	RoHS	45.0	50	100	7.0	7.0
	04 △ 600 □ −00	RoHS	60.0	50	100	7.0	7.0
	04 △ 900 □ −00	RoHS	90.0	50	100	7.0	7.0
FBR	05 VA 121 □ −00	RoHS	120.0	—	100	—	7.0
	06 △ 850 NA −00	RoHS	85.0	50	100	7.0	7.0
	06 △ 121 NA −00	RoHS	120.0	50	100	7.0	7.0
	07 △ 850 □ −00	RoHS	85.0	50	100	7.0	7.0
	07 △ 121 □ −00	RoHS	120.0	50	100	7.0	7.0

△Please specify material codes (HA,VA) and □ lead configuration code.
※DC Resistance : 0.01Ω max., Insulation resistance : 1.0MΩ min.

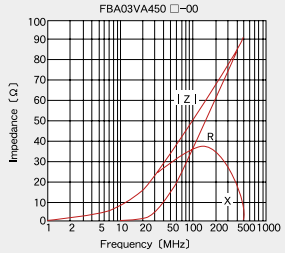
ELECTRICAL CHARACTERISTICS

IMPEDANCE-vs-FREQUENCY CHARACTERISTICS (Measured by HP4191A)

FBA03HA450 □−00



FBA03VA450 □−00



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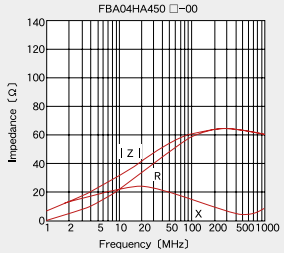

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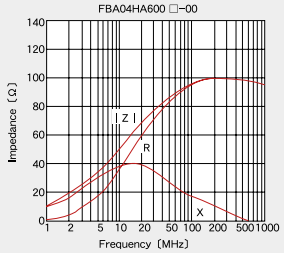
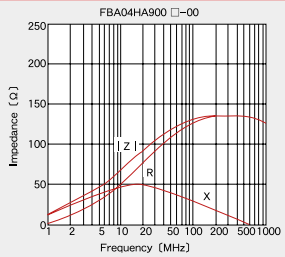
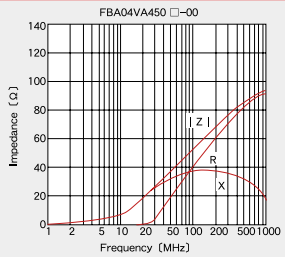


FBA04HA900 □−00



FBA04VA450 □−00



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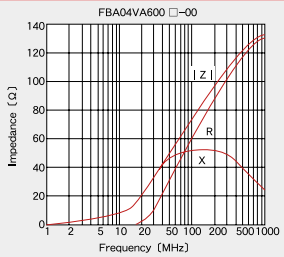
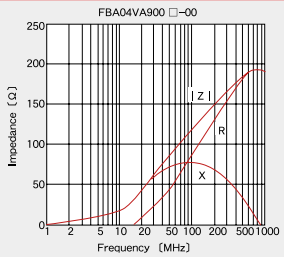
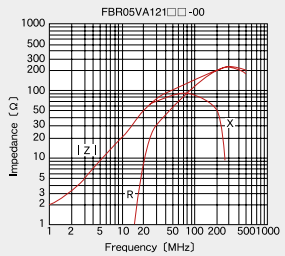


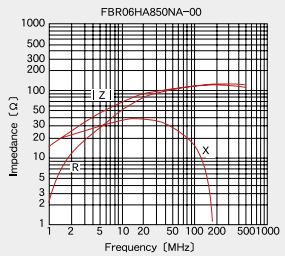
FBA04VA900 □−00



FBR05VA121□□-00



FBR06HA850NA−00



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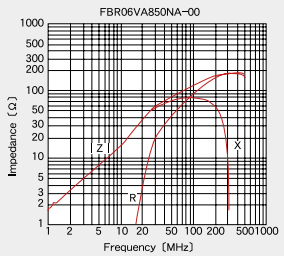

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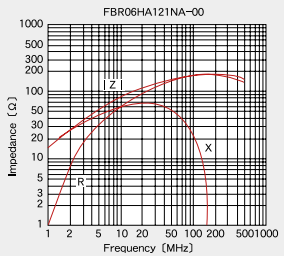
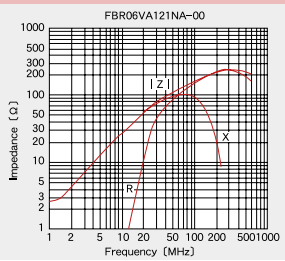


FBR06VA121NA−00



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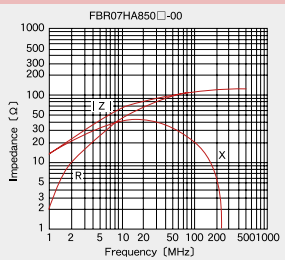

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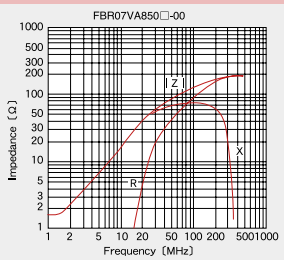

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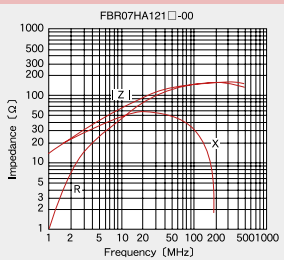

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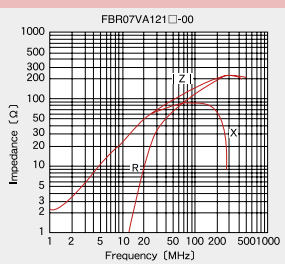

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For details of each product (characteristics graph, reliability information, precautions for use, and so on), see our Web site (http://www.ty-top.com/) or CD catalogs.

PACKAGING

①Minimum Quantity

● Axial lead (FBA)

Type	Lead Configuration	Standard quantity [pcs]	
		Bulk	Taped Ammo
FBA03	NA, KD, US	1000	—
	KE, KF, VS	500	—
	AB, BB	—	2000
	UB, VB	—	3000
FBA04	NA, KD, US	1000	—
	KE, KF, VS	500	—
	AB, BB	—	1000
	VB, UB	—	3000

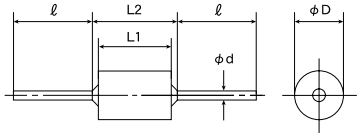
● Radial lead (FBR)

Type	Lead Configuration	Standard quantity [pcs]	
		Bulk	Taped Ammo
FBR05	NA	1000	—
	SA	—	2000
FBR06	NA	1000	—
FBR07	NB	1000	—
	SB	—	2000

②Bulk dimensions

Axial lead (FBA)

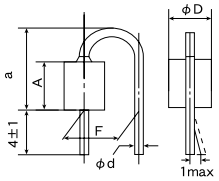
● NA



Type	Dimensions				
	ϕD	L1	L2	ϕd	ℓ
FBA03□450	2.5±0.2 (0.098±0.008)	4.5±0.3 (0.177±0.012)	6.5 max. (0.256 max.)	0.65±0.05 (0.026±0.002)	18 min. (0.709 min.)
FBA04□450	3.5±0.2 (0.138±0.008)	4.5±0.3 (0.177±0.012)	6.5 max. (0.256 max.)		
FBA04□600	3.5±0.2 (0.138±0.008)	$6.0^{+0.5}_{0}$ ($0.236^{+0.020}_{0}$)	8.5 max. (0.335 max.)		
FBA04□900	3.5±0.2 (0.138±0.008)	9.0±0.5 (0.354±0.020)	11.0 max. (0.433 max.)		

Unit : mm (inch)

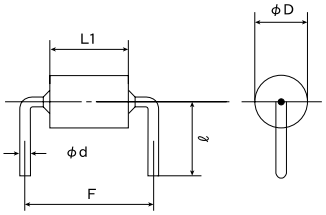
● US



Type	Dimensions				
	ϕD	A	a	F	ϕd
FBA03□450	2.5±0.2 (0.098±0.008)	4.5±0.3 (0.177±0.012)	9.0 max. (0.354 max.)	5.0±1.0 (0.197±0.039)	0.65±0.05 (0.026±0.002)
FBA04□450	3.5±0.2 (0.138±0.008)	4.5±0.3 (0.177±0.012)	9.0 max. (0.354 max.)		

Unit : mm (inch)

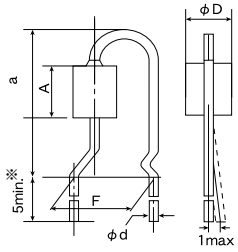
● KD/KE/KF



Type	Lead Symbol	Dimensions				
		ϕD	F	L1	ϕd	ℓ
FBA03□450	KD	2.5±0.2 (0.098±0.008)	10.0±1.0 (0.394±0.040)	4.5±0.3 (0.177±0.012)	0.65±0.05 (0.026±0.020)	7.0±2.0 (0.276±0.079)
FBA04□450		3.5±0.2 (0.138±0.008)	10.0±1.0 (0.394±0.040)	4.5±0.3 (0.177±0.012)		7.5±2.0 (0.295±0.079)
FBA04□600		3.5±0.2 (0.138±0.008)	10.0±1.0 (0.394±0.040)	$6.0^{+0.5}_{0}$ ($0.236^{+0.020}_{0}$)		7.5±2.0 (0.295±0.079)
FBA03□450	KE	2.5±0.2 (0.098±0.008)	12.5±1.0 (0.492±0.004)	4.5±0.3 (0.177±0.012)	0.65±0.05 (0.026±0.020)	7.0±2.0 (0.276±0.079)
FBA04□450		3.5±0.2 (0.138±0.008)	12.5±1.0 (0.492±0.004)	4.5±0.3 (0.177±0.012)		7.5±2.0 (0.295±0.079)
FBA04□600		3.5±0.2 (0.138±0.008)	12.5±1.0 (0.492±0.004)	$6.0^{+0.5}_{0}$ ($0.236^{+0.020}_{0}$)		7.5±2.0 (0.295±0.079)
FBA04□900		3.5±0.2 (0.138±0.008)	12.5±1.0 (0.492±0.004)	9.0±0.5 (0.354±0.020)		7.5±2.0 (0.295±0.079)
FBA03□450	KF	2.5±0.2 (0.098±0.008)	15.0±1.0 (0.591±0.004)	4.5±0.3 (0.177±0.012)	0.65±0.05 (0.026±0.020)	7.0±2.0 (0.276±0.079)
FBA04□450		3.5±0.2 (0.138±0.008)	15.0±1.0 (0.591±0.004)	4.5±0.3 (0.177±0.012)		7.5±2.0 (0.295±0.079)
FBA04□600		3.5±0.2 (0.138±0.008)	15.0±1.0 (0.591±0.004)	$6.0^{+0.5}_{0}$ ($0.236^{+0.020}_{0}$)		7.5±2.0 (0.295±0.079)
FBA04□900		3.5±0.2 (0.138±0.008)	15.0±1.0 (0.591±0.004)	9.0±0.53 (0.354±0.020)		7.5±2.0 (0.295±0.079)

Unit : mm (inch)

● VS



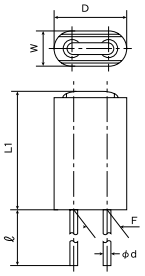
※5±1 for 900 type only

Type	Dimensions				
	ϕD	A	a	F	ϕd
FBA03□450	2.5±0.2 (0.098±0.008)	4.5±0.3 (0.177±0.012)	12.5 max. (0.492 max.)	5.0±1.0 (0.197±0.039)	0.65±0.05 (0.026±0.002)
FBA04□450	3.5±0.2 (0.138±0.008)	4.5±0.3 (0.177±0.012)	12.5 max. (0.492 max.)	5.0±1.0 (0.197±0.039)	0.65±0.05 (0.026±0.002)
FBA04□600	3.5±0.2 (0.138±0.008)	$6.0^{+0.5}_{0}$ ($0.236^{+0.020}_{0}$)	12.5 max. (0.492 max.)	5.0±1.0 (0.197±0.039)	0.65±0.05 (0.026±0.002)
FBA04□900	3.5±0.2 (0.138±0.008)	9.0±0.5 (0.354±0.020)	16.0 max. (0.630 max.)	5.0±1.0 (0.197±0.039)	0.65±0.05 (0.026±0.002)

Unit : mm (inch)

Radial lead (FBR)

● NA



Type	Dimensions					
	D	L1	ϕd	ℓ	W	F
FBR05VA121	5.0 max. (0.197 max.)	9.0 max. (0.354 max.)	0.65±0.05 (0.026±0.002)	10.0^{+3}_{-5} ($0.394^{+0.118}_{-0.197}$)	2.5 max. (0.098 max.)	2.5±1.0 (0.098±0.039)
FBR06□850	6.0±0.5 (0.236±0.020)	7.0 max. (0.276 max.)	0.65±0.05 (0.026±0.002)	10.0^{+3}_{-5} ($0.394^{+0.118}_{-0.197}$)	3.0±0.5 (0.118±0.020)	2.5±1.0 (0.098±0.039)
FBR06□121	6.0±0.5 (0.236±0.020)	9.0 max. (0.354 max.)	0.65±0.05 (0.026±0.002)	10.0^{+3}_{-5} ($0.394^{+0.118}_{-0.197}$)	3.0±0.5 (0.118±0.020)	2.5±1.0 (0.098±0.039)

Unit : mm (inch)

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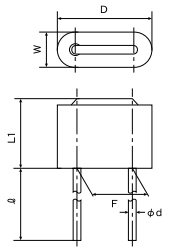
● NB

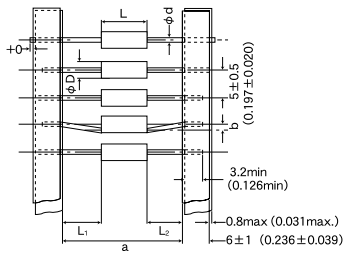


Type	Dimensions					
	D	L1	ϕd	ℓ	W	F
FBR07□850	7.5±0.5 (0.295±0.020)	7.0 max. (0.276 max.)	0.6±0.05 (0.024±0.002)	5.0^{+1}_{-2} ($0.197^{+0.039}_{-0.079}$)	2.5 max. (0.098 max.)	$5.0^{+1}_{-0.5}$ ($0.197^{+0.039}_{-0.020}$)
FBR07□121	7.5±0.5 (0.295±0.020)	9.0 max. (0.354 max.)	0.6±0.05 (0.024±0.002)	5.0^{+1}_{-2} ($0.197^{+0.039}_{-0.079}$)	2.5 max. (0.098 max.)	$5.0^{+1}_{-0.5}$ ($0.197^{+0.039}_{-0.020}$)

Unit : mm (inch)

③Taping Dimensions

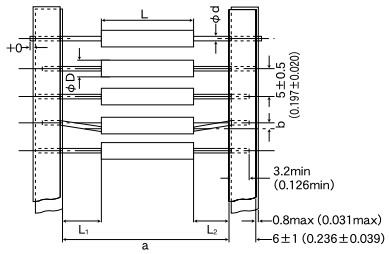
● AB (a:26mm) (1.02inch lead space)



Type	Dimensions						Minimum insertion pitch
	ϕD	L	a	b	|L1-L2|	ϕd	
FBA03	2.5±0.2 (0.098±0.008)	4.5±0.3 (0.177±0.012)	$26.0^{+1.5}_{0}$ ($1.02^{+0.059}_{0}$)	0.8max (0.031max)	1.0 max (0.039 max)	0.65±0.05 (0.026±0.002)	10.0 (0.394)
FBA04	3.5±0.2 (0.138±0.008)	4.5±0.3 (0.177±0.012)	$26.0^{+1.5}_{0}$ ($1.02^{+0.059}_{0}$)	0.8max (0.031max)	1.0 max (0.039 max)	0.65±0.05 (0.026±0.002)	10.0 (0.394)

Unit : mm (inch)

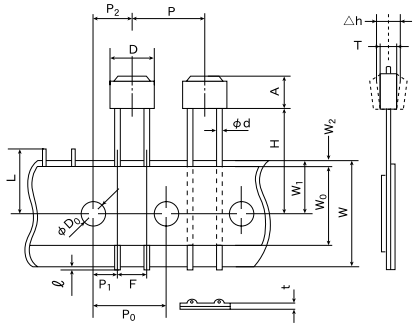
● B□ (a:52mm) (2.05inches lead space)



Type	Dimensions						Minimum insertion pitch
	ϕD	L	a	b	|L1-L2|	ϕd	
FBA03	2.5±0.2 (0.098±0.008)	4.5±0.3 (0.177±0.012)	52.0^{+2}_{-1} ($2.05^{+0.079}_{-0.039}$)	1.2 max (0.047 max)	1.0 max (0.039 max)	0.65±0.05 (0.026±0.002)	10.0 (0.394)
FBA04	3.5±0.2 (0.138±0.008)	4.5±0.3 (0.177±0.012)	52.0^{+2}_{-1} ($2.05^{+0.079}_{-0.039}$)	1.2 max (0.047max)	1.0 max (0.039 max)	0.65±0.05 (0.026±0.002)	10.0 (0.394)

Unit : mm (inch)

● SA (F:2.5mm pitch) (0.098 inches)

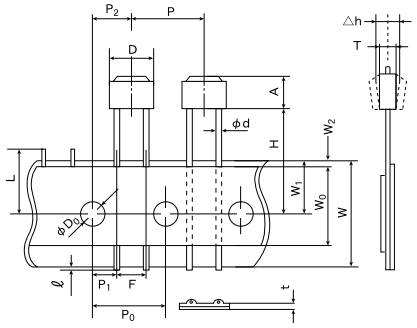


Type	Symbol	Dimensions	Symbol	Dimensions
FBR05	A	121: 9.0 max. (0.354 max.)	W	$18.0^{+1.0}_{-0.5}$ ($0.709^{+0.039}_{-0.020}$)
	T	2.5 max. (0.098 max.)	W_0	12.5 min. (0.492 min.)
	D	5.0 max. (0.197 max.)	W_1	$9.0^{+0.75}_{-0.5}$ ($0.354^{+0.039}_{-0.020}$)
	H	$18.0^{+2.0}_{-0}$ ($0.709^{+0.079}_{-0}$)	W_2	3.0 max. ※2 (0.118 max.)
	P	12.7±1.0 (0.500±0.039)	ℓ	1.0 max. (0.039 max.)
	P_0	12.7±0.3 ※1 (0.500±0.039)	ϕD_0	4.0±0.3 (0.157±0.012)
	P_1	5.1±0.7 (0.201±0.028)	ϕd	0.65±0.05 (0.026±0.002)
	P_2	6.35±1.3 (0.250±0.051)	L	11.0 max. (0.433 max.)
	F	$2.5^{+1.0}_{-0.5}$ ($0.098^{+0.039}_{-0.020}$)	t	0.7±0.2 (0.028±0.008)
	△h	0.0±2.0 (0.0±0.079)		

Unit : mm(inch)

※1 Accumulated error for 20 pitches is ±2mm.
※2 Bonding tape must not protrude from the base tape.

● SB/TB (F:5mm pitch) (0.197 inches)



Type	Symbol	Dimensions	Symbol	Dimensions
FBR07	A	121: 9.0 max. (0.354 max.) 850: 7.0 max. (0.276 max.)	△h	0.0±2.0 (0.0±0.079)
			W	$18.0^{+1.0}_{-0.5}$ ($0.709^{+0.039}_{-0.020}$)
	T	2.5 max. (0.098 max.)	W_0	12.5 min. (0.492 min.)
	D	7.5±0.5 (0.925±0.020)	W_1	$9.0^{+0.75}_{-0.5}$ ($0.354^{+0.039}_{-0.020}$)
	H	SB: $18.0^{+2.0}_{-0}$ ($0.709^{+0.079}_{-0}$) TB: 16.0±0.5 (0.630±0.020)	W_2	3.0 max. ※2 (0.118 max.)
			ℓ	1.0 max. (0.039 max.)
	P	12.7±1.0 (0.500±0.039)	ϕD_0	4.0±0.3 (0.157±0.012)
	P_0	12.7±0.3 ※1 (0.500±0.012)	ϕd	0.65±0.05 (0.02±0.002)
	P_1	3.85±0.8 (0.152±0.028)	L	11.0 max. (0.433 max.)
	P_2	6.35±1.3 (0.250±0.051)	t	0.7±0.2 (0.028±0.008)
	F	$5.0^{+1.0}_{-0.5}$ ($0.197^{+0.039}_{-0.020}$)		

Unit : mm(inch)

※1 Accumulated error for 20 pitches is ±2mm.
※2 Bonding tape must not protrude from the base tape.

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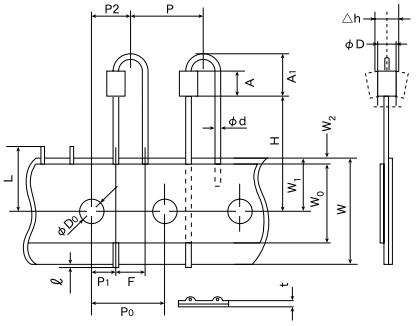
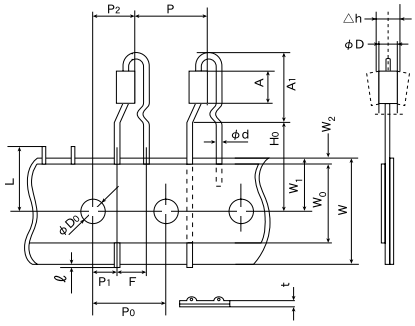


Type	Symbol	Dimensions	Symbol	Dimensions
FBA03□450 FBA04□450	A	4.5±0.3 (0.177±0.012)	△h	0.0±2.0 (0.0±0.079)
	A_1	9.0 max. (0.354 max.)	W	$18.0^{+1.0}_{-0.5}$ $(0.709^{+0.039}_{-0.020})$
	ϕD	03: 2.7 max. (0.106 max.) 04: 3.7 max. (0.146 max.)	W_0	12.5 min. (0.492 min.)
			W_1	$9.0^{+0.75}_{-0.5}$ $(0.354^{+0.039}_{-0.020})$
	H	$20.0^{+0.5}_{-1.0}$ $(0.787^{+0.020}_{-0.039})$	W_2	3.0 max. ※2 (0.118 max.)
	P	12.7±1.0 (0.500±0.039)	ℓ	1.0 max. (0.039 max.)
	P_0	12.7±0.3 ※1 (0.500±0.012)	ϕD_0	4.0±0.3 (0.157±0.012)
	P_1	3.85±0.8 (0.152±0.032)	ϕd	0.65±0.05 (0.026±0.002)
	P_2	6.35±1.3 (0.250±0.051)	L	11.0 max. (0.433 max.)
	F	5.0±1.0 (0.197±0.039)	t	0.7±0.2 (0.028±0.008)

※1 Accumulated error for 20 pitches is ±2mm. Unit : mm (inch)
※2 Bonding tape must not protrude from the base tape.

VB



Type	Symbol	Dimensions	Symbol	Dimensions
FBA03□450 FBA04□450 FBA04□600 FBA04□900	A	450: 4.5±0.3 (0.177±0.012) 600: $6.0^{+0.5}_{0}$ $(0.236^{+0.020}_{0})$ 900: 9.0±0.5 (0.354±0.020)	F	5.0±1.0 (0.197±0.039)
			△h	0.0±2.0 (0.0±0.079)
			W	$18.0^{+1.0}_{-0.5}$ $(0.709^{+0.039}_{-0.020})$
	A_1	450: 12.5 max. 600: (0.492 max.) 900: 16.0 max. (0.630 max.)	W_0	12.5 min. (0.492 min.)
			W_1	$9.0^{+0.75}_{-0.5}$ $(0.354^{+0.039}_{-0.020})$
	ϕD	3.7 max. (0.146 max.)	W_2	3.0 max. ※2 (0.118 max.)
	H_0	16.0±0.5 (0.650±0.020)	ℓ	1.0 max. (0.039 max.)
	P	12.7±1.0 (0.500±0.039)	ϕD_0	4.0±0.3 (0.157±0.012)
	P_0	12.7±0.3 ※1 (0.500±0.012)	ϕd	0.65±0.05 (0.026±0.002)
	P_1	3.85±0.8 (0.152±0.032)	L	11.0 max. (0.433 max.)
	P_2	6.35±1.3 (0.250±0.051)	t	0.7±0.2 (0.028±0.008)

※1 Accumulated error for 20 pitches is ±2mm. Unit : mm (inch)
※2 Bonding tape must not protrude from the base tape.

RELIABILITY DATA

1. Operating temperature Range	
LA Type	−25～+105℃
CAL45 Type	
LHL□□□	
FBA/FBR	−25～+85℃
FL05□ Type	−25～+105℃
FL06BT Type	

【Test Method and Remarks】
LA・CA・FL : Including self-generated heat
LHL□□□ : Including self-generated heat

2. Storage temperature Range	
LA Type	−40～+85℃
CAL45 Type	
LHL□□□	
FBA/FBR	
FL05□ Type	
FL06BT Type	

3. Rated current	
LA Type	Within the specified tolerance
CAL45 Type	
LHL□□□	
FBA/FBR	
FL05□ Type	
FL06BT Type	

【Test Method and Remarks】
LA, CA : The maximum DC value having inductance within 10% and temperature incease within 40℃ (LA:20℃) by the application of DC bias.
LHL□□□ : The maximum DC value having inductance decrease within 10% (LHLC08, LHLC10：within 30%) and temperature increase within the following specified temperature by the application of DC bias.
Reference temperature : 25℃ (LHL08, LHL10, LHL13)
: 30℃ (LHL16, LHLP□□)
: 40℃ (LHLC08, LHLC10)
FB : No disconnection or appearance abnormality by continuous current application for 30 min. Change after the application shall be within ±20% of the initial value. This is not guaranteed for electrial characteristics during current application.
FL : The maximum DC value having temperature rise within specified value.

4. Impedance	
LA Type	
CAL45 Type	
LHL□□□	
FBA/FBR	Within the specified tolerance
FL05□ Type	
FL06BT Type	Refer to individual specification

【Test Method and Remarks】
FB : Measuring equipment : Impedance analyzer (HP4191A) or its equivalent
Measuring frequency : Specified frequency
FL06BT : Measuring equipment : 4291A (HP) or its equivalent
Measuring frequency : Specified frequency

5. Inductance	
LA Type	Within the specified tolerance
CAL45 Type	
LHL□□□	
FBA/FBR	
FL05□ Type	Within the specified tolerance
FL06BT Type	

【Test Method and Remarks】
LA, CA : Measuring equipment : LCR meter (HP4285A + HP42851A or its equivalent)
Measuring frequency : Specified frequency
LHL□□□ : Measuring equipment : LCR meter (HP4285A+HP42851A or its equivalent)
LCR meter (HP4263A) or its equivalent (at 1KHz)
Measuring frequency : Specified frequency
FL05R□ : Measuring equipment : HP4262A or its equivalent
Measuring frequency : 1kHz

6. Q	
LA Type	Within the specified tolerance
CAL45 Type	
LHL□□□	
FBA/FBR	
FL05□ Type	
FL06BT Type	

【Test Method and Remarks】
LA : Measuring equipment : LCR meter (HP4285A + HP42851A or its equivalent)
Measuring frequency : Specified frequency
LHL□□□ (except LHLP) : Measuring equipment : LCR meter (HP4285A+HP42851A or its equivalent)
LCR meter (HP4263A) or its equivalent (at 1kHz)
Measuring frequency : Specified frequency

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RELIABILITY DATA

7. DC Resisitance	
LA Type	Within the specified tolerance
CAL45 Type	
LHL□□□	
FBA/FBR	
FL05□ Type	
FL06BT Type	

【Test Method and Remarks】
LA, CA : Measuring equipment : low ohmmeter (A&D AD5812 or its equivalent)
LHL□□□・FB・FL : Measuring equipment : DC ohmmeter

8. Self resonance frequency	
LA Type	Within the specified tolerance
CAL45 Type	
LHL□□□	
FBA/FBR	
FL05□ Type	
FL06BT Type	

【Test Method and Remarks】
LA : Measuring equipment : Network analyzer (Anritsu MS620J or its equivalent)
LHL□□□ (except LHLP) : Measuring equipment : (HP4191A, 4192A) its equivalent

9. Temperature characteristic	
LA Type	△L/L : Within ±5%
CAL45 Type	
LHL□□□	△L/L : Within ±7% (except LHLP16 : Within ±20%)
FBA/FBR	
FL05□ Type	
FL06BT Type	

【Test Method and Remarks】
LA : Change of maximum inductance deviation in step 1 to 5

Step	Temperature (℃)
1	20
2	−25 (Minimum operating temperature)
3	20 (Standard temperature)
4	+85 (Maximum operating temperature)
5	20

LHL□□□ : Change of maximum inductance deviation in step 1 to 5
Temperature at step 1 : 20℃
Temperature at step 2 : Minimum operating temperature
Temperature at step 3 : 20℃ (Standard temperature)
Temperature at step 4 : Maximum operating temperature
Temperature at step 5 : 20℃

10. Terminal strength : tensile force	
LA Type	No abnormality such as cut lead, or looseness.
CAL45 Type	
LHL□□□	
FBA/FBR	No abnormality such as cut lead, or looseness.
FL05□ Type	No abnormality such as cut lead, or looseness.
FL06BT Type	

【Test Method and Remarks】
LA : Apply the stated tensile force progressively in the direction to draw terminal.

force (N)	duration (s)
25	5

CA : Apply the stated tensile force progressively in the direction to draw terminal.

force (N)	duration (s)
10	10

LHL□□□ : Apply the stated tensile force progressively in the direction to draw terminal.

Nominal wire diameter tensile φd (mm)	force (N)	duration (s)
0.3＜φd≦0.5	5	30±5
0.5＜φd≦0.8	10	
0.8＜φd≦1.2	25	

FBA/FBR : A bead shall be fixed and static loaded 20±1N (2.0±0.1 kgf) in axial direction of lead wire in 10±1 seconds.
FL05R□ : Fix the component in the direction to draw terminal,and gradually apply the tensile force of 4.9N.

11. Over current	
LA Type	No emission of smoke no firing.
CAL45 Type	
LHL□□□	There shall be no scorch or short of wire. LHLC08,LHLC10 : There shall be no firing.
FBA/FBR	
FL05□ Type	
FL06BT Type	

【Test Method and Remarks】
LHL□□□/LA・CAL45 Type : Measuring current : Rated current×2
Duration : 5 min.
Number of measuring : one time

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RELIABILITY DATA

12. Terminal strength : bending	
LA Type	No abnormality such as cut lead, or looseness.
CAL45 Type	
LHL□□□	
FBA/FBR	
FL05□ Type	
FL06BT Type	

【Test Method and Remarks】

LA, CA : Suspend a mass at the end the terminal, incline the body though angel of 90 and return it to initial position. This operation is done over a period of 2-3 sec. Then second bend in the opposite direction shall be made.
Number of bends : Two times.

Nominal wire diameter tensile φd (mm)	Bending force (N)	Mass reference weight (kg)
0.5＜φd≦0.8	5	0.50

LH・FB : **Suspend a mass at the end the terminal, incline the body though angel of 90 and return it to initial position. This operation is done over a period of 2-3 sec. Then** second bend in the opposite direction shall be made.
Number of bends : Two times.

Nominal wire diameter tensile φd (mm)	Bending force (N)	Mass reference weight (kg)
0.3＜φd≦0.5	2.5	0.25
0.5＜φd≦0.8	5	0.5
0.8＜φd≦1.2	10	1.0

13. Insulation resisitance : between the terminals and body	
LA Type	
CAL45 Type	
LHL□□□	100MΩ min.
FBA/FBR	
FL05□ Type	
FL06BT Type	

【Test Method and Remarks】
LHL□□□ : Applied voltage : 500 VDC
Duration : 60 sec.

14. Insulation resistance : between terminals and core	
LA Type	
CAL45 Type	
LHL□□□	
FBA/FBR	1MΩ min. (Other than materail code MA)
FL05□ Type	
FL06BT Type	

【Test Method and Remarks】
FBA・FBR : Applied voltage : 100 VDC
Duration : 60±5 sec.

15. Withstanding : between the terminals and body	
LA Type	
CAL45 Type	
LHL□□□	No abnormality such as insulation damage
FBA/FBR	
FL05□ Type	
FL06BT Type	

【Test Method and Remarks】
LHL□□□ : Accoding to JIS C5102. 7. 1. 3 (C)
Metal global method
Applied voltage : 500 VDC
Duration : 60 sec.

16. DC bias characteristic	
LA Type	△L/L : Within −10%
CAL45 Type	
LHL□□□	
FBA/FBR	
FL05□ Type	
FL06BT Type	

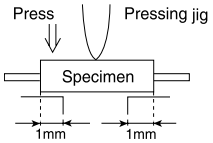
【Test Method and Remarks】
LA, CA : Measure inductance with appliation of rated current using LCR meter to compare it with the initial value.

17. Body strength	
LA Type	No abnormality as damage.
CAL45 Type	
LHL□□□	
FBA/FBR	No abnormality such as cracks on body.
FL05□ Type	
FL06BT Type	

【Test Method and Remarks】
LA : Applied force : 30N
Duration : 10 sec.
Speed : Shall attain to specified force in 2 sec.

CAL45 : Applied force : 50N
Duration : 10 sec.
Speed : Shall attain to specified force in 2 sec.

FBA : Applied force : 50±3N
Duration : 30±1 sec.



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RELIABILITY DATA

18. Resisitance to vibration	
LA Type	△L/L : Within ±5%　Q : 30min
CAL45 Type	△L/L : Within ±5%
LHL□□□	Appearance : No abnomality　△L/L : Within ±5%　Q change : Within ±30% (LHLP : only △L/L)
FBA/FBR	Appearance : No abnomality　Impedance change : Within ±20%
FL05□ Type	
FL06BT Type	

【Test Method and Remarks】

LA, CA : Directions : 2 hrs each in X, Y and Z directions total : 6hrs.
Frequency range : 10 to 55 to 10Hz (1min.)
Amplitude : 1.5mm
Mounting method : Soldering onto printed board.
Recovery : At least 1hr of recovery under the standard condition after the test, followed by the measurement within 2hrs.

LHL□□□・FB : Directions : 2 hrs each in X, Y and Z directions total : 6hrs.
Frequency range : 10 to 55 to 10Hz (1min.)
Amplitude : 1.5mm (But don't exceed acceleration 196m/s^2 (two power))
Mounting method : Soldering onto printed board.

19. Resistance to shock	
LA Type	No significant abnormality in appearance
CAL45 Type	
LHL□□□	
FBA/FBR	
FL05□ Type	
FL06BT Type	

【Test Method and Remarks】

LA, CA : Drop test
Impact material : concrete or vinyl tile
Height : 1m
Total number of drops : 10 times

20. Solderability	
LA Type	At least 75% of terminal electrode is covered by new solder.
CAL45 Type	
LHL□□□	At least 75% of terminal electrode is covered by new solder.
FBA/FBR	At least 90% of terminal electrode is covered by new solder.
FL05□ Type	At least 75% of terminal electrode is covered by new solder.
FL06BT Type	

【Test Method and Remarks】

LA, CA : Solder temperature : 230±5℃
Duration : 2±0.5 sec.

LHL□□□ : Solder temperature : 235±5℃
Duration : 2±0.5 sec.
Immersion depth : Up to 1.5mm from bottom of case.

FB : Solder temperature : 230±5℃
Duration : 3±1 sec.
Immersion depth : Up to 1.5mm from terminal root.

FL05R□ : Solder temperature : 230±5℃
Duration : 2±0.5 sec.
Immersion depth : Up to 2 to 2.5mm from terminal root.

FL06BT : Solder temperature : 230±5℃
Duration : 3±1 sec.
Immersion depth : Up to 0.5 to 1.0mm from terminal root.

21. Resisitance to soldering heat		
LA Type	No significant abnormality in appearance	
CAL45 Type	△L/L : Within ±5%	
LHL□□□	No significant abnormality in appearance	Inductance change : Within ±5%　Q change : Within ±30%(LHLP : only △L/L)
FBA/FBR	No significant abnormality in appearance	Impedance change : Within ±20%
FL05□ Type	Refer to individual specification	
FL06BT Type	No significant abnormality in appearance	Impedance change : Within ±20%

【Test Method and Remarks】

LA, CA : Solder temperature : (CA) 270±5℃, (LA) 260±5℃
Duration : 5±0.5 sec.　One time
Immersed conditions : Inserted into substrate with t=1.6mm
Recovery : At least 1hr of recovery under the standard condition after the test, followed by the measurement within 2hrs.

LHL□□□ : Solder bath method : Solder temperature : 260±5℃
Duration : 10±1 sec.
Up to 1.5mm from bottom of case.
Manual soldering : Solder temperature : 350±10℃ (At the tip of soldering iron)
Duration : 5±1 sec.
Up to 1.5mm from bottom of case.
Caution : No excessive pressing shall be applied to terminald.
Recovery : 4 to 24hrs of recovery under the standard condition after the test.

FB : Solder bath method : Condition 1 : Solder temperature : 260±5℃
Duration : 10±1 sec.
Immersion depth : Up to 1.5mm from terminal root.
Condition 2 : Solder temperature : 350±5℃
Duration : 3±1 sec.
Immersion depth : Up to 1.5mm from terminal root.
Recovery : 3hrs of recovery under the standard condition after the test.

FL : Solder condition : 260±5℃　10±1 sec.
Immersion depth : Up to 0.5 to 1.0mm from terminal root.
Recovery : 3hrs of recovery under the standard condition after the test.

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RELIABILITY DATA

22. Resisitance to solvent	
LA Type	Please avoid the ultrasonic cleaning of this product.
CAL45 Type	
LHL□□□	
FBA/FBR	No significant abnormality in appearance　　Impedance change : Within ±20%
FL05□ Type	
FL06BT Type	

【Test Method and Remarks】
FB : Solvent temperature : 20～25℃
Duration : 30±5 sec.
Solvent type : Acetone, trichloroethylene
Recovery : 3hrs of recovery under the standard condition after the test.

23. Thermal shock	
LA Type	△L/L : Within ±10%　Q : 30min
CAL45 Type	△L/L : Within ±10%
LHL□□□	Appearance : No abnormality　Inductance change : Within ±10%　Q change : Within ±30% (LHLP : only △L/L)
FBA/FBR	Appearance : No abnormality　Impedance change : Within ±20%
FL05□ Type	Refer to individual specification
FL06BT Type	Appearance : No abnormality　Impedance change : Within ±20%

【Test Method and Remarks】
LA, CA : Conditions for 1cycle

Step	Temperature (℃)	Duration (min.)
1	-25^{+0}_{-3}	30±3
2	Room temperature	Within 3
3	$+85^{+2}_{-0}$	30±3
4	Room temperature	Within 3

Number of cycles : 5 cycles
Recovery : At least 1hr of recovery under the standard condition after the removal from test chamber, followed by the measurement within 2hrs.

LHL□□□・FB : Accoding to JIS C0025
Conditions for 1 cycle

Step	Temperature (℃)	Duration (min.)
1	Minimum operating temperature$^{+0}_{-3}$	30±3
2	Room temperature	Within 3
3	Minimum operating temperature$^{+2}_{-0}$	30±3
4	Room temperature	Within 3

Number of cycles : 10 cycles〔LHL□□□〕
: 5 cycles (FBA, FBR)
Recovery : 4 to 24hrs of recovery under the standard condition after the removal from the test chamber.〔LHL□□□〕
: 3hrs of recovery under the standard condition after the removal from the test chamber. (FBA, FBR)

FL : Accoding to JIS C0025
Conditions for 1 cycle

Step	Temperature (℃)	Duration (min.)
1	-25^{+0}_{-3}	30±3
2	Room temperature	Within 3
3	$+85^{+2}_{-0}$	30±3
4	Room temperature	Within 3

Number of cycles : 10 cycles
Recovery : 1 to 2hrs of recovery under the standard condition after the removal from the test chamber.

24. Damp heat	
LA Type	△L/L : Within ±10%　Q : 30min
CAL45 Type	△L/L : Within ±10%
LHL□□□	
FBA/FBR	Appearance : No abnormality　Impedance change : Within ±20%
FL05□ Type	
FL06BT Type	

【Test Method and Remarks】
LA, CA : Temperature : 40±2℃
Humidity : 90～95%RH
Duration : 1000 hrs
Recovery : At least 1hr of recovery under the standard removal from test chamber, followed by the measurement within 2hrs.

FB : Temperature : 60±2℃
Humidity : 90～95%RH
Duration : 1000 hrs
Recovery : 1 to 2hrs of recovery under the standard condition after the removal from the test chamber.

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RELIABILITY DATA

25. Loading under damp heat			
LA Type	△L/L : Within ±10%　Q : ±30min		
CAL45 Type	△L/L : Within ±10%		
LHL□□□	Appearance : No abnormality	Imductance change : Within ±10%	Q change : Within ±30% (LHLP : only △L/L)
FBA/FBR			
FL05□ Type	Refer to individual specification		
FL06BT Type	Appearance : No abnormality	Impedance change : Within ±20%	

【Test Method and Remarks】

LA, CA : Temperature : 40±2℃
Humidity : 90～95%RH
Duration : 1000 hrs
Applied current : Rated current
Recovery : At least 1hr of recovery under the standard removal from test chamber, followed by the measurement within 2hrs.

LHL□□□ : Temperature : 40±2℃
Humidity : 90～95%RH
Duration : 1000±24 hrs
Applied current : Rated current
Recovery : 1 to 2hrs of recovery under the standard condition after the removal from the test chamber.

FL : Temperature : 60±3℃
Humidity : 90～95%RH
Duration : 500 (+12, −0) hrs
Applied current : Rated current
Recovery : 1 to 2hrs of recovery under the standard condition after the removal from the test chamber.

26. Loading at high temperature			
LA Type	△L/L : Within ±10%　Q : ±30min		
CAL45 Type	△L/L : Within ±10%		
LHL□□□			
FBA/FBR			
FL05□ Type			
FL06BT Type			

【Test Method and Remarks】

LA, CA : Temperature : 85±2℃
Duration : 1000 hrs
Applied current : Rated current
Recovery : At least 1hr of recovery under the standard removal from test chamber, followed by the measurement within 2hrs.

27. Low temperature life test			
LA Type	△L/L : Within ±10%　Q : ±30min		
CAL45 Type	△L/L : Within ±10%		
LHL□□□	Appearance : No abnormality	Inductance change : Within ±10%	Q change : Within ±30% (LHLP : only △L/L)
FBA/FBR			
FL05□ Type	Refer to individual specification		
FL06BT Type	Appearance : No abnormality	Impedance change : Within ±20%	

【Test Method and Remarks】

LA, CA : Temperature : −25±2℃
Duration : 1000 hrs
Recovery : At least 1hr of recovery under the standard removal from test chamber, followed by the measurement within 2hrs.

LHL□□□ : Temperature : −40±3℃
Duration : 1000±24 hrs
Recovery : 1 to 2hrs of recovery under the standard condition after the removal from the test chamber.

FL : Temperature : −40±3℃
Duration : 500 (+12, −0) hrs
Recovery : 1 to 2hrs of recovery under the standard condition after the removal from the test chamber.

28. High temperature life test			
LA Type			
CAL45 Type			
LHL□□□	Appearance : No abnormality	Inductance change : Within ±10%	Q change : Within ±30% (LHLP : only △L/L)
FBA/FBR			
FL05□ Type	Refer to individual specification		
FL06BT Type	Appearance : No abnormality	Impedance change : Within ±20%	

【Test Method and Remarks】

LHL□□□ : Temperature : 105±3℃
Duration : 1000±24 hrs
Recovery : 1 to 2hrs of recovery under the standard condition after the removal from the test chamber.

FL : Temperature : 85±3℃
Duration : 500 (+12, −0) hrs
Recovery : 1 to 2hrs of recovery under the standard condition after the removal from the test chamber.

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PRECAUTIONS

CAL Type, LH Type, FB Type, FL Type, LA Type

1. Circuit Design	
Precautions	◆Operating environment 1. The products described in this specification are intended for use in general electronic equipment,(office supply equipment, telecommunications systems, measuring equipment, and household equipment). They are not intended for use in mission-critical equipment or systems requiring special quality and high reliability (traffic systems, safety equipment, aerospace systems, nuclear control systems and medical equipment including life-support systems,) where product failure might result in loss of life, injury or damage. For such uses, contact TAIYO YUDEN Sales Department in advance.

2. PCB Design	
Precautions	◆Design 1. Please design insertion pitches of a base in the pitches that fitted a terminal interval.
Technical consider-ations	◆Design 1. When Inductors are mounted onto a PC board, hole dimensions on the board should match the lead pitch of the component, if not, it will cause breakage of the terminals or cracking of terminal roots covered with resin as excess stress travels through the terminal legs.

3. Considerations for automatic placement	
Precautions	◆Adjustment of mounting machine 1. Excessive impact load should not be imposed on the products when mounting onto the PC boards. 2. Mounting and soldering conditions should be checked beforehand.
Technical consider-ations	◆Adjustment of mounting machine 1. When installing products, care should be taken not to apply distortion stress as it may deform the products.

4. Soldering	
Precautions	◆Wave soldering 1. Please refer to the specifications in the catalog for a wave soldering. 2. Do not immerse the entire Inductors in the flux during the soldering operation. ◆Lead free soldering 1. When using products with lead free soldering, we request to use them after confirming of adhesion, temperature of resistance to soldering heat, soldering etc sufficiently. Recommended conditions for using a soldering iron: ・Put the soldering iron on the land-pattern. ・Soldering iron's temperature - Below 350℃ ・Duration - 3 seconds or less ・The soldering iron should not directly touch the inductor. ◆Reflow soldering 1. As for reflow soldering, please contact our sales staff.
Technical consider-ations	◆Lead free soldering 1. If products are used beyond the range of the recommended conditions, heat stresses may deform the products, and consequently degrade the reliability of the products.

5. Cleaning	
Precautions	◆Cleaning conditions 1. CAL type, LH type, LA Type Please do not do cleaning by a supersonic wave.
Technical consider-ations	◆Cleaning conditions 1. CAL type, LH type, LA Type If washing by supersonic waves, supersonic waves may deform products.

6. Handling	
Precautions	◆Handling 1. Keep the inductors away from all magnets and magnetic objects. ◆Mechanical considerations 1. Please do not give the inductors any excessive mechanical shocks. 2. LH type If inductors are dropped onto the floor or a hard surface they should not be used. ◆Packing 1. Please do not give the inductors any excessive mechanical shocks. In loading, please pay attention to handling indication mentioned in a packing box (a loading direction / number of maximum loading / fragile item).
Technical consider-ations	◆Handling 1. There is a case that a characteristic varies with magnetic influence. ◆Mechanical considerations 1. There is a case to be damaged by a mechanical shock. 2. LH type There is a case to be broken by a fall. ◆Packing 1. There is a case that a lead route turns by a fall or an excessive shock.

7. Storage conditions	
Precautions	◆Storage 1. To maintain the solderability of terminal electrodes and to keep the packing material in good condition, temperature and humidity in the storage area should be controlled. Recommended conditions ・Ambient temperature 0～40℃ ・Humidity Below 70% RH The ambient temperature must be kept below 30℃. Even under ideal storage conditions, solderability of products electrodes may decrease as time passes. For this reason, inductors should be used within one year from the time of delivery. In case of storage over 6 months, solderability shall be checked before actual usage.
Technical consider-ations	◆Storage 1. Under a high temperature and humidity environment, problems such as reduced solderability caused by oxidation of terminal electrodes and deterioration of taping/packaging materials may take place.

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