

LCD and Camera EMI Filter Array with ESD Protection

CM1630

Features

- Four, six and eight channels of EMI filtering with integrated ESD protection
- Pi-style EMI filters in a capacitor-resistorcapacitor (C-R-C) network
- ±15kV ESD protection on each channel (IEC 61000-4-2 Level 4, contact discharge)
- ±30kV ESD protection on each channel (HBM)
- Greater than 25dB attenuation (typical) at 1 GHz
- UDFN package with 0.40mm lead pitch:
 - 4-ch. = 8-lead UDFN
 - 6-ch. = 12-lead UDFN
 - 8-ch. = 16-lead UDFN
- Tiny UDFN package size:
 - 8-lead: 1.7mm x 1.35mm x 0.5mm
 - 12-lead: 2.5mm x 1.35mm x 0.5mm
 - 16-lead: 3.3mm x 1.35mm x 0.5mm
- Increased robustness against vertical impacts during manufacturing process
- Lead-free version available

Applications

- · LCD and Camera data lines in mobile handsets
- I/O port protection for mobile handsets, notebook computers, PDAs etc.
- EMI filtering for data ports in cell phones, PDAs or notebook computers.
- Wireless handsets
- Handheld PCs/PDAs
- · LCD and camera modules

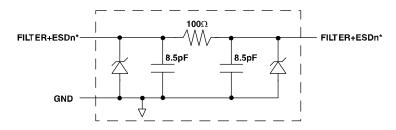
Product Description

The CM1630 is a family of pi-style EMI filter arrays with ESD protection, which integrates four, six and eight filters (C-R-C) in small form factor UDFN 0.40mm pitch packages. The CM1630 component values of 8.5pF-100Ω-8.5pF channel. The CM1630 has a cut-off frequency of 200MHz and can be used in applications with data rates up to 80Mbps. The parts include ESD diodes on every pin, which provide a very high level of protection for sensitive electronic components that may be subjected to electrostatic discharge (ESD). The ESD protection diodes safely dissipate ESD strikes of ±15kV, well beyond the maximum requirement of the IEC61000-4-2 international standard. Using the MIL-STD-883 (Method 3015) specification for Human Body Model (HBM) ESD, the pins are protected for contact discharges at greater than ±30kV.

These devices are particularly well-suited for portable electronics (e.g. wireless handsets, PDAs, notebook computers) because of their small package and easy-to-use pin assignments. In particular, the CM1630 is ideal for EMI filtering and protecting data and control lines for the I/O data ports, LCD display and camera interface in mobile handsets.

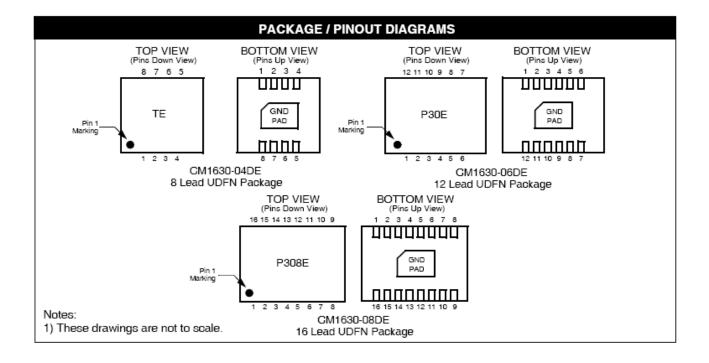
The CM1630 is housed in space-saving, low-profile 8-, 12- and 16-lead UDFN packages with a 0.4mm pitch and is available with lead-free finishing. This new small UDFN package provides up to 42% board space savings vs. the 0.50mm pitch UDFN packages.

Electrical Schematic



* See P ackage/Pinout Dia gram for expanded pin information.

1 of 4, 6 or 8 EMI/RFI Filter Channels with Integrated ESD Protection



PIN DESCRIPTIONS										
DEVICE PIN(s)					DEVICE PIN(s)					
-04	-06	-08	NAME	DESCRIPTION		-04 -06 -08		NAME	DESCRIPTION	
1	1	1	FILTER1	Filter + ESD Channel 1		8	12	16	FILTER1	Filter + ESD Channel 1
2	2	2	FILTER2	Filter + ESD Channel 2		7	11	15	FILTER2	Filter + ESD Channel 2
3	3	3	FILTER3	Filter + ESD Channel 3		6	10	14	FILTER3	Filter + ESD Channel 3
4	4	4	FILTER4	Filter + ESD Channel 4		5	9	13	FILTER4	Filter + ESD Channel 4
	5	5	FILTER5	Filter + ESD Channel 5			8	12	FILTER5	Filter + ESD Channel 5
	6	6	FILTER6	Filter + ESD Channel 6			7	11	FILTER6	Filter + ESD Channel 6
		7	FILTER7	Filter + ESD Channel 7		10		FILTER7	Filter + ESD Channel 7	
		8	FILTER8	Filter + ESD Channel 8				9	FILTER8	Filter + ESD Channel 8
0	AND PA	νD	GND	Device Ground						

Ordering Information

PART NUMBERING INFORMATION							
		Lead-free Finish					
Pins	Package	Ordering Part Number ¹ Part Marking					
8	UDFN-8	CM1630-04DE	TE				
12	UDFN-12	CM1630-06DE	P30E				
16	UDFN-16	CM1630-08DE	P308E				

Note 1: Parts are shipped in Tape & Reel form unless otherwise specified.

Specifications

ABSOLUTE MAXIMUM RATINGS							
PARAMETER	RATING	UNITS					
Storage Temperature Range	-65 to +150	°C					
DC Power per Resistor	100	mW					
DC Package Power Rating	500	mW					

STANDARD OPERATING CONDITIONS							
PARAMETER	RATING	UNITS					
Operating Temperature Range	-40 to +85	°C					

	ELECTRICAL OPERATING CHARACTERISTICS (SEE NOTE1)										
SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS					
R	Resistance		80	100	120	Ω					
C _{TOTAL}	Total Channel Capacitance	At 2.5VDC Reverse Bias, 1MHz, 30mVAC	14	17	22	pF					
С	Capacitance C1	At 2.5VDC Reverse Bias, 1MHz, 30mVAC	7	8.5	11	pF					
V _{DIODE}	Standoff Voltage	$I_{\text{DIODE}} = 10 \mu A$		6.0		V					
I _{LEAK}	Diode Leakage Current (reverse bias)	V _{DIODE} =+3.3V		0.1	1.0	μΑ					
V _{SIG}	Signal Clamp Voltage Positive Clamp Negative Clamp	$I_{LOAD} = 10$ mA $I_{LOAD} = -10$ mA	5.6 -0.4	6.8 -0.8		V V					
V _{ESD}	In-system ESD Withstand Voltage a) Human Body Model, MIL-STD-883, Method 3015 b) Contact Discharge per IEC 61000-4-2 Level 4	Note 2	±30 ±15			kV kV					
R _{DYN}	Dynamic Resistance Positive Negative			2.3 0.9		Ω					
f _c	Cut-off Frequency $\mathbf{Z}_{\text{SOURCE}} = 50\Omega, \mathbf{Z}_{\text{LOAD}} = 50\Omega$	Channel R = 100Ω , Channel C = 8.5 pF		200		MHz					
A _{1GHz}	Absolute Attenuation @ 1GHz from 0dB Level	$Z_{\text{SOURCE}} = 50\Omega, Z_{\text{LOAD}} = 50\Omega,$ DC Bias = 0V; Notes 1 and 3		30		dB					
A _{800MHz - 6GHz}	Absolute Attenuation @ 800MHz to 6GHz from 0dB Level	$Z_{\text{SOURCE}} = 50\Omega, Z_{\text{LOAD}} = 50\Omega,$ DC Bias = 0V; Notes 1 and 3		25		dB					

Note 1: T_A =25°C unless otherwise specified. Note 2: ESD applied to input and output pins with respect to GND, one at a time. Note 3: Attenuation / RF curves characterized by a network analyzer using microprobes.

Performance Information

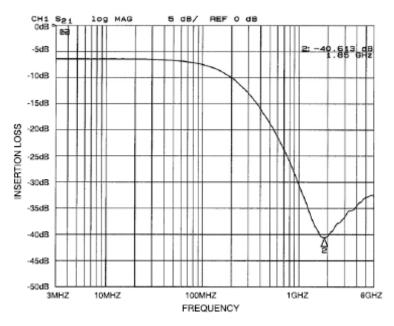


Figure 1. Insertion Loss vs. Frequency (FILTER1 Input to GND, CM1436-04DE)

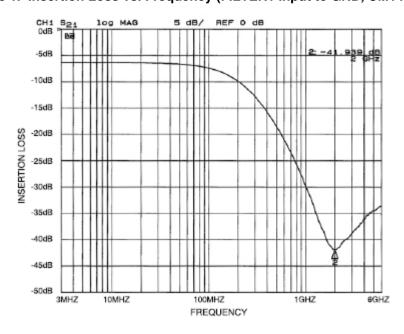


Figure 2. Insertion Loss vs. Frequency (FILTER2 Input to GND, CM1436-04DE)

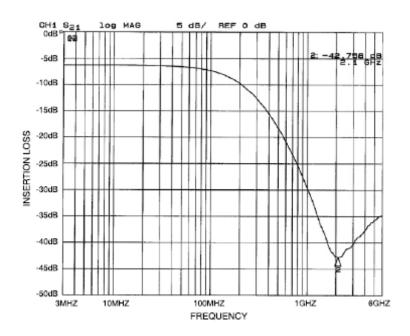


Figure 3. Insertion Loss vs. Frequency (FILTER3 Input to GND, CM1436-04DE)

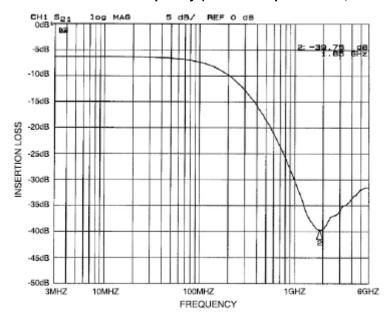


Figure 4. Insertion Loss vs. Frequency (FILTER4 Input to GND, CM1436-04DE)

Performance Information (cont'd)

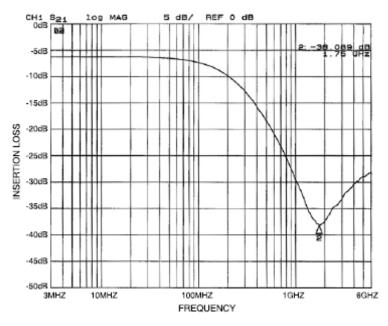


Figure 5. Insertion Loss vs. Frequency (FILTER1 Input to GND, CM1436-06DE)

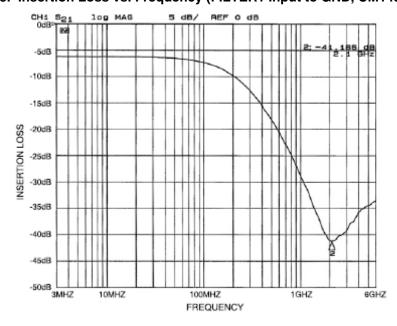


Figure 6. Insertion Loss vs. Frequency (FILTER2 Input to GND, CM1436-06DE)

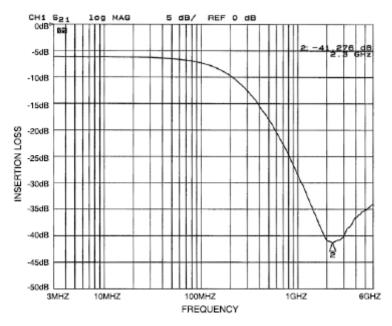


Figure 7. Insertion Loss vs. Frequency (FILTER3 Input to GND, CM1436-06DE)

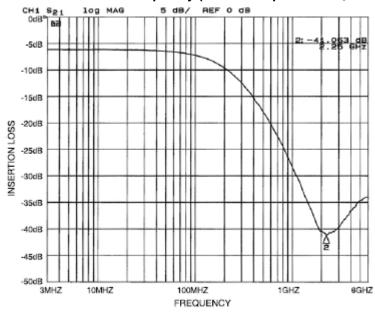


Figure 8. Insertion Loss vs. Frequency (FILTER4 Input to GND, CM1436-06DE)

Performance Information (cont'd)

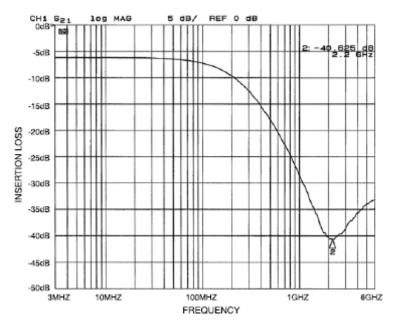


Figure 9. Insertion Loss vs. Frequency (FILTER5 Input to GND, CM1436-06DE)

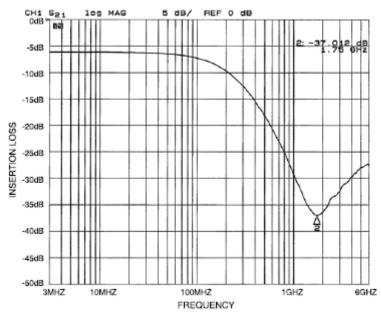


Figure 10. Insertion Loss vs. Frequency (FILTER6 Input to GND, CM1436-06DE)

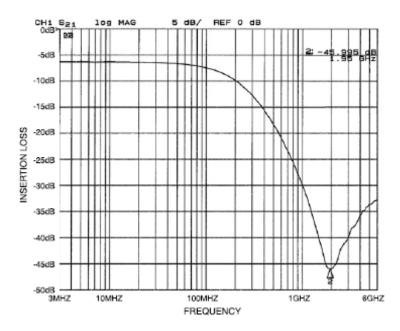


Figure 11. Insertion Loss vs. Frequency (FILTER1 Input to GND, CM1436-08DE)

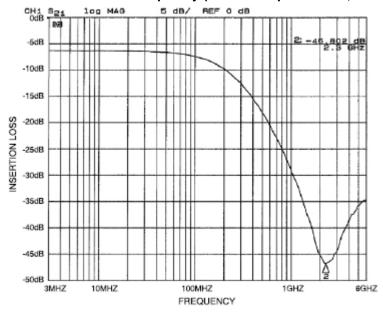


Figure 12. Insertion Loss vs. Frequency (FILTER2 Input to GND, CM1436-08DE)

Performance Information (cont'd)

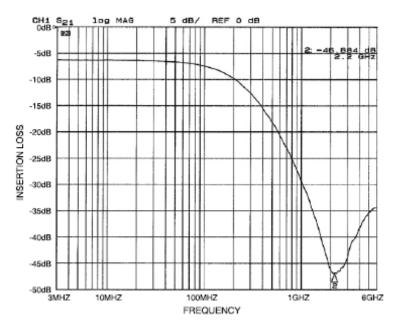


Figure 13. Insertion Loss vs. Frequency (FILTER3 Input to GND, CM1436-08DE)

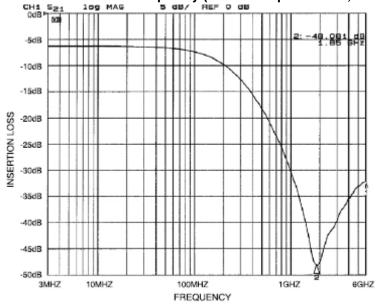


Figure 14. Insertion Loss vs. Frequency (FILTER4 Input to GND, CM1436-08DE)

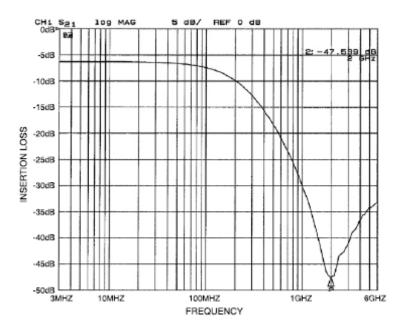


Figure 15. Insertion Loss vs. Frequency (FILTER5 Input to GND, CM1436-08DE)

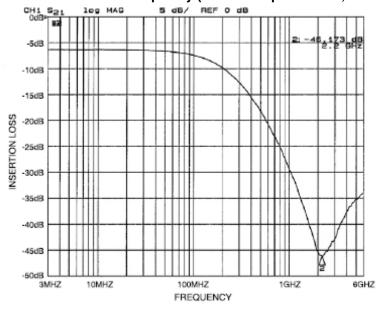


Figure 16. Insertion Loss vs. Frequency (FILTER6 Input to GND, CM1436-08DE)

Performance Information (cont'd)

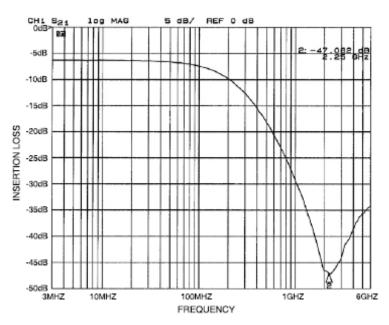


Figure 17. Insertion Loss vs. Frequency (FILTER7 Input to GND, CM1436-08DE)

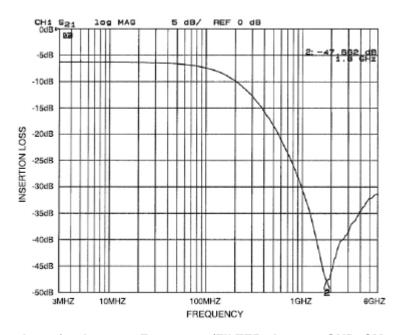


Figure 18. Insertion Loss vs. Frequency (FILTER8 Input to GND, CM1436-08DE)

Typical Diode Capacitance vs. Input Voltage

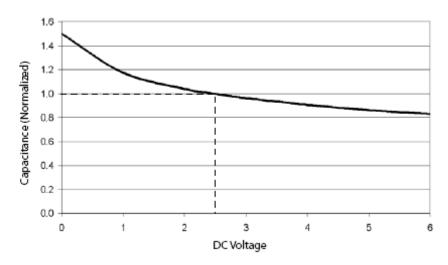


Figure 19. Filter Capacitance vs. Input Voltage (normalized to capacitance at 2.5VDC and 25°C)

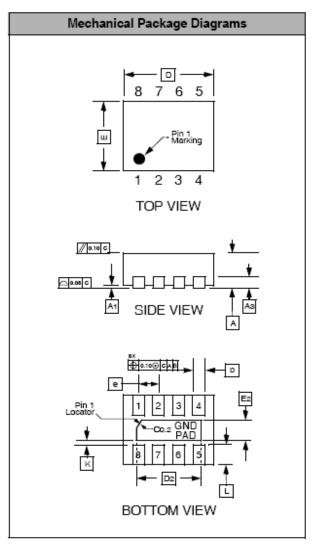
Mechanical Details

UDFN-08 Mechanical Specifications

Dimensions for the CM1630 supplied in a 8-lead, 0.4mm pitch UDFN package are presented below.

PACKAGE DIMENSIONS								
Package	kage UDFN							
JEDEC No.		MO-229C [†]						
Leads				8				
Dim.	IV	lillimete	rs		Inches			
Diiii.	Min	Nom	Max	Min	Nom	Max		
Α	0.45	0.50	0.55	0.018	0.020	0.022		
A1	0.00	0.02	0.05	0.000	0.001	0.002		
А3	C).127 RE	F	O	.005 RE	F		
b	0.15	0.20	0.25	0.006	0.008	0.010		
D	1.60	1.70	1.80	0.063	0.067	0.071		
D2	1.10	1.20	1.30	0.043	0.047	0.051		
E	1.25	1.35	1.45	0.049	0.053	0.057		
E2	0.30	0.40	0.50	0.012	0.016	0.020		
е		0.40 BS	С	0	.016 BS	C		
К	0.20			0.008				
L	0.15	0.25	0.35	0.006	0.010	0.014		
# per tape and reel	ape and							
	Controlling dimension: millimeters							

⁼This package is compliant with JEDEC standard MO-229C with the exception of the "D", "D2", "E", "E2", "K" and "L" dimensions as called out in the table above.



Dimensions for 8-Lead, 0.4mm pitch UDFN package

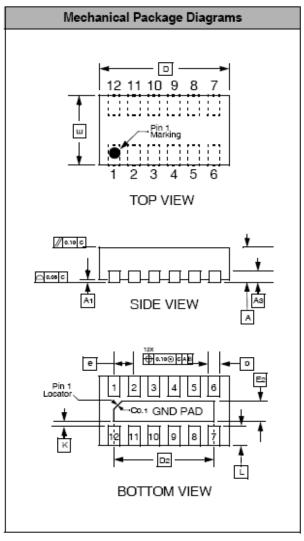
Mechanical Details (cont'd)

UDFN-12 Mechanical Specifications

Dimensions for the CM1630 suplied in a 12-lead, 0.4mm pitch UDFN package are presented below.

PACKAGE DIMENSIONS								
Package	udfn UDFN							
JEDEC No.	MO-229C [†]							
Leads			1	12				
Dim.	IV	lillimete	rs		Inches			
Diiii.	Min	Nom	Max	Min	Nom	Max		
Α	0.45	0.50	0.55	0.018	0.020	0.022		
A1	0.00	0.02	0.05	0.000	0.001	0.002		
А3	C).127 RE	F	O	.005 RE	F		
b	0.15	0.20	0.25	0.006	0.008	0.010		
D	2.40	2.50	2.60	0.094	0.098	0.102		
D2	1.90	2.00	2.10	0.075	0.079	0.083		
E	1.25	1.35	1.45	0.049	0.053	0.057		
E2	0.30	0.40	0.50	0.012	0.016	0.020		
е	(0.40 BS	С	0	.016 BS	C		
К	0.20			0.008				
L	0.15	0.25	0.35	0.006	0.010	0.014		
# per tape and reel	and							
	Controlling dimension: millimeters							

This package is compliant with JEDEC standard MO-229C with the exception of the "D", "D2", "E", "E2", "K" and "L" dimensions as called out in the table above.



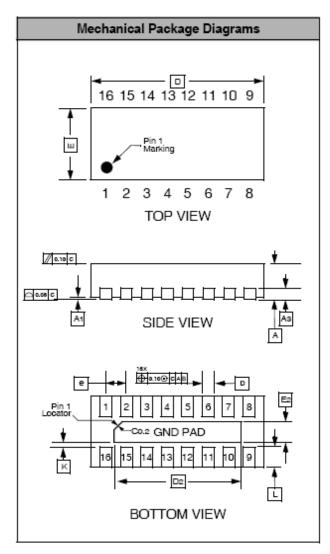
Dimensions for 12-Lead, 0.4mm pitch UDFN package

Mechanical Details (cont'd)

UDFN-16 Mechanical Specifications

Dimensions for the CM1630 supplied in a 16-lead, 0.4mm pitch UDFN package are presented below.

PACKAGE DIMENSIONS							
Package	age UDFN						
JEDEC No.	MO-229C [†]						
Leads			1	16			
Dim.	IV	lillimete	rs		Inches		
Diiii.	Min	Nom	Max	Min	Nom	Max	
Α	0.45	0.50	0.55	0.018	0.020	0.022	
A1	0.00	0.02	0.05	0.000	0.001	0.002	
А3	C).127 RE	F	O	.005 RE	F	
b	0.15	0.20	0.25	0.006	0.008	0.010	
D	3.20	3.30	3.40	0.126	0.130	0.134	
D2	2.70	2.80	2.90	0.106	0.110	0.114	
E	1.25	1.35	1.45	0.049	0.053	0.057	
E2	0.30	0.40	0.50	0.012	0.016	0.020	
е	(0.40 BS	С	0	.016 BS	C	
К	0.20			0.008			
L	0.15	0.25	0.35	0.006	0.010	0.014	
# per tape and reel	e and						
	Controlling dimension: millimeters						



Dimensions for 16-Lead, 0.4mm pitch UDFN package

[†]This package is compliant with JEDEC standard MO-229C with the exception of the "D", "D2", "E", "E2", "K" and "L" dimensions as called out in the table above.



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