4-Channel LCD EMI Filter Array plus 4-Channel ESD Protection Array

Features

- Functionally and pin compatible with CMD's CSPEMI607
- Four channels of combined EMI/RFI filtering plus ESD protection
- Four additional channels of ESD-only protection
- Better than 30dB attenuation (typical) at 1 GHz
- ±15kV ESD protection on all channels (IEC 61000-4-2 Level 4, contact discharge)
- ±30kV ESD protection on all channels (HBM)
- Chip Scale Package features extremely low lead inductance for optimum filter and ESD performance
- 15-bump, 2.960mm X 1.330mm footprint Chip Scale Package (CSP)
- Optiguard™ coated for improved reliability
- Lead-free version available

Applications

- LCD data lines in mobile handsets
- EMI filtering and ESD protection for both data and I/O ports
- Mobile Handsets
- Handheld PCs / PDAs
- Notebook Computers

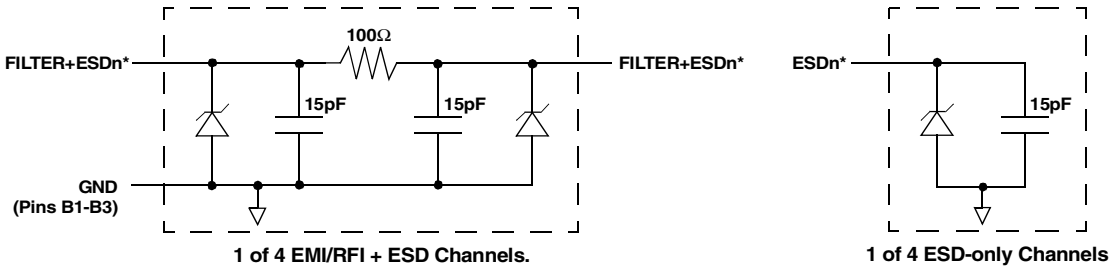
Product Description

The CM1421 is a multichannel array consisting of four low-pass filters with integrated ESD protection and four ESD-only protection channels designed to reduce EMI/RFI emissions on LCD data lines in mobile handsets. The CM1421 has component values of 15pF-100Ω-15pF. These devices include ESD protection 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 diodes connected to the filter ports are designed and characterized to safely dissipate ESD strikes of ±15kV, beyond the maximum requirement of the IEC 61000-4-2 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.

This device is particularly well suited for portable electronics (e.g. wireless handsets, PDAs, notebook computers) because of its small package format and easy-to-use pin assignments. In particular, the CM1421 is ideal for EMI filtering and protecting data lines from ESD for the LCD display in clamshell handsets.

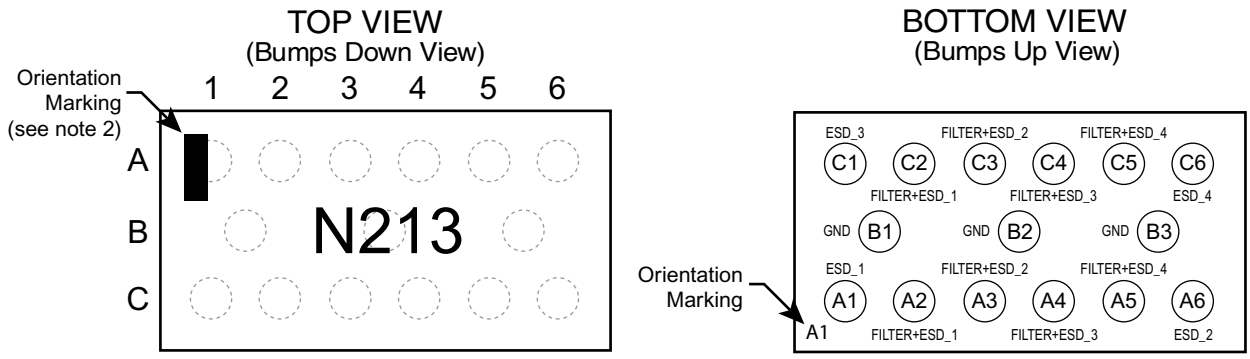
The CM1421 incorporates Optiguard™ coating which results in improved reliability. The CM1421 is available in space-saving, low-profile chip-scale packages with optional lead-free finishing.

Electrical Schematic



*** See Package/Pinout Diagram for expanded pin information**

PACKAGE / PINOUT DIAGRAMS



CM1421-03
CSP Package

Notes:
1) These drawings are not to scale.
2) Lead-free devices are specified by using a "**+**" character for the top side orientation mark.

PIN DESCRIPTIONS

PIN(s)	NAME	DESCRIPTION
A1	ESD_1	ESD Channel 1
A2	FILTER+ESD_1	Filter + ESD Channel 1
A3	FILTER+ESD_2	Filter + ESD Channel 2
A4	FILTER+ESD_3	Filter + ESD Channel 3
A5	FILTER+ESD_4	Filter + ESD Channel 4
A6	ESD_2	ESD Channel 2
B1-B3	GND	Device Ground
C1	ESD_3	ESD Channel 3
C2	FILTER+ESD_1	Filter + ESD Channel 1
C3	FILTER+ESD_2	Filter + ESD Channel 2
C4	FILTER+ESD_3	Filter + ESD Channel 3
C5	FILTER+ESD_4	Filter + ESD Channel 4
C6	ESD_4	ESD Channel 4

Ordering Information

PART NUMBERING INFORMATION

Pins	Package	Standard Finish		Lead-free Finish	
		Ordering Part Number[1]	Part Marking	Ordering Part Number[1]	Part Marking[2]
15	CSP	CM1421-03CS	N213	CM1421-03CP	N213

Note 1: Parts are shipped in Tape & Reel form unless otherwise specified.
Note 2: Lead-free devices are specified by using a "**+**" character for the top side orientation mark.

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	Capacitance	At 2.5V DC	12	15	18	pF
V_{DIODE}	Diode Standoff Voltage	I_{DIODE}=10µA	5.5			V
I_{LEAK}	Diode Leakage Current (reverse bias)	V_{DIODE}=3.3V		100		nA
V_{SIG}	Signal Voltage Positive Clamp Negative Clamp	I_{LOAD} = 10mA	 5.6 -1.5	 6.8 -0.8	 9.0 -0.4	 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	Notes 2,4 and 5	 ±30 ±15			 kV kV
V_{CL}	Clamping Voltage during ESD Discharge MIL-STD-883 (Method 3015), 8kV Positive Transients Negative Transients	Notes 2,3,4 and 5		 +12 -7		 V V
f_C	Cut-off Frequency Z_{SOURCE}=50Ω, Z_{LOAD}=50Ω	R=100Ω, C=15pF		 120		 MHz

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: Clamping voltage is measured at the opposite side of the EMI filter to the ESD pin. For example, if ESD is applied to Pin A2, then clamping voltage is measured at Pin C2.
Note 4: Unused pins are left open
Note 5: These parameters are guaranteed by design and characterization.

Performance Information

Typical Filter Performance (T_A=25°C, DC Bias=0V, 50 Ohm Environment)

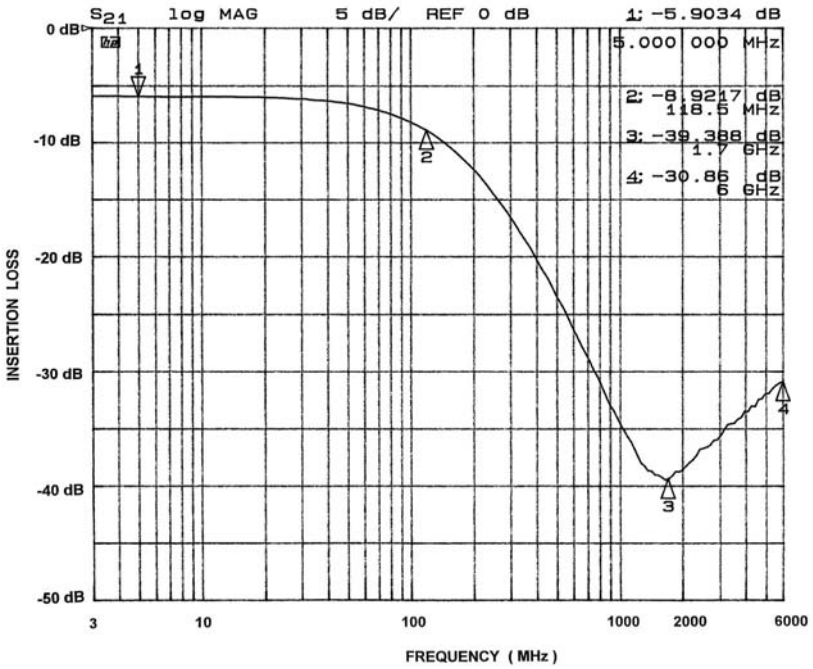


Figure 1. Insertion Loss VS. Frequency (A1-C1 to GND B1)

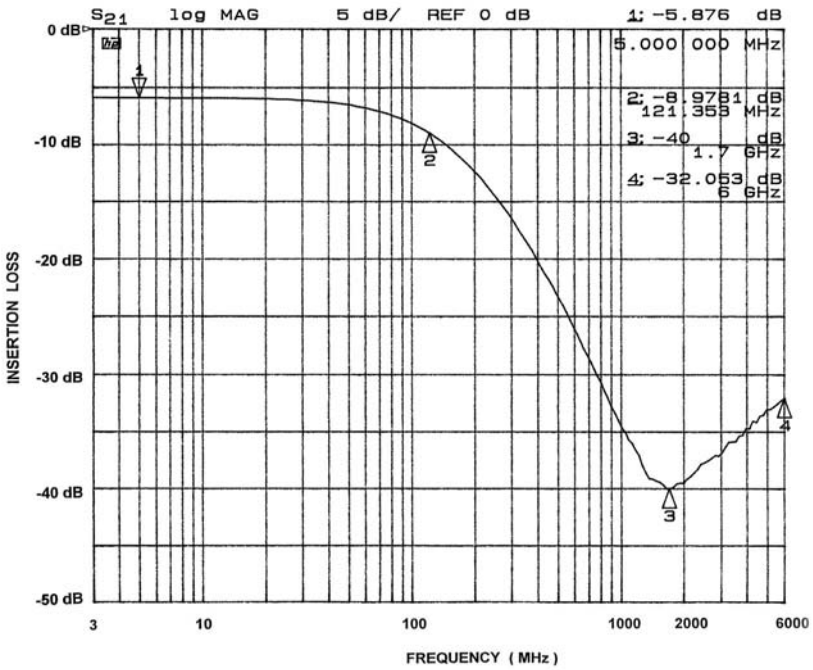


Figure 2. Insertion Loss VS. Frequency (A2-C2 to GND B1)

Performance Information (cont'd)

Typical Filter Performance (T_A=25°C, DC Bias=0V, 50 Ohm Environment)

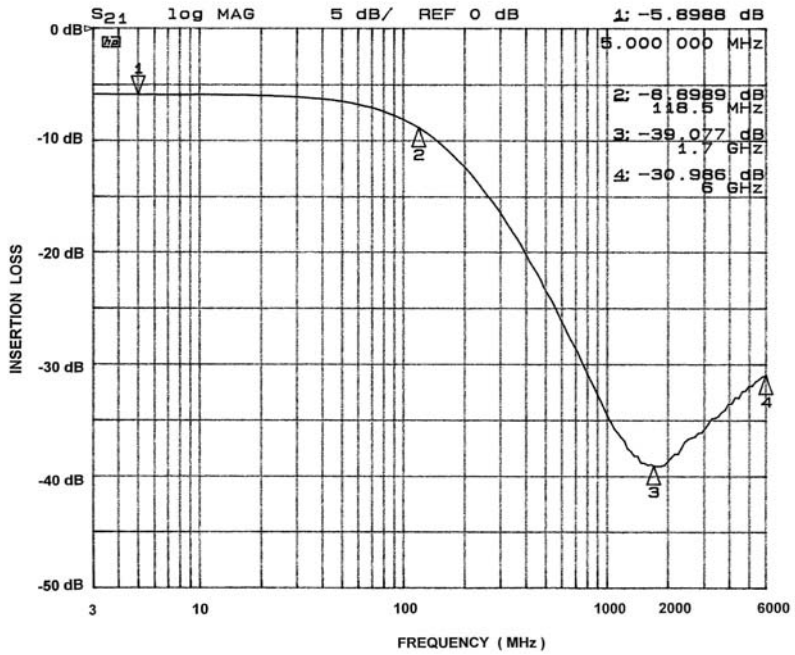


Figure 3. Insertion Loss VS. Frequency (A3-C3 to GND B2)

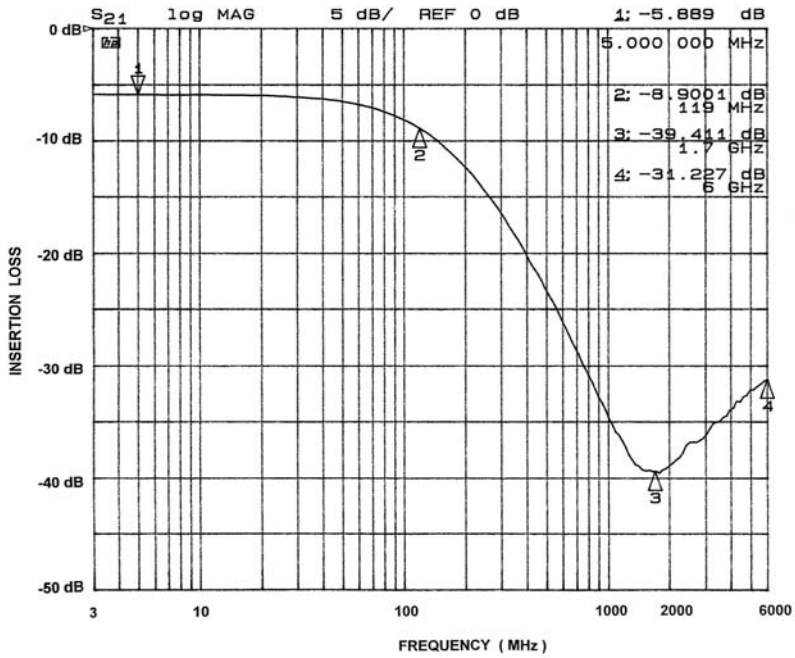


Figure 4. Insertion Loss VS. Frequency (A4-C4 to GND B2)

Performance Information (cont'd)

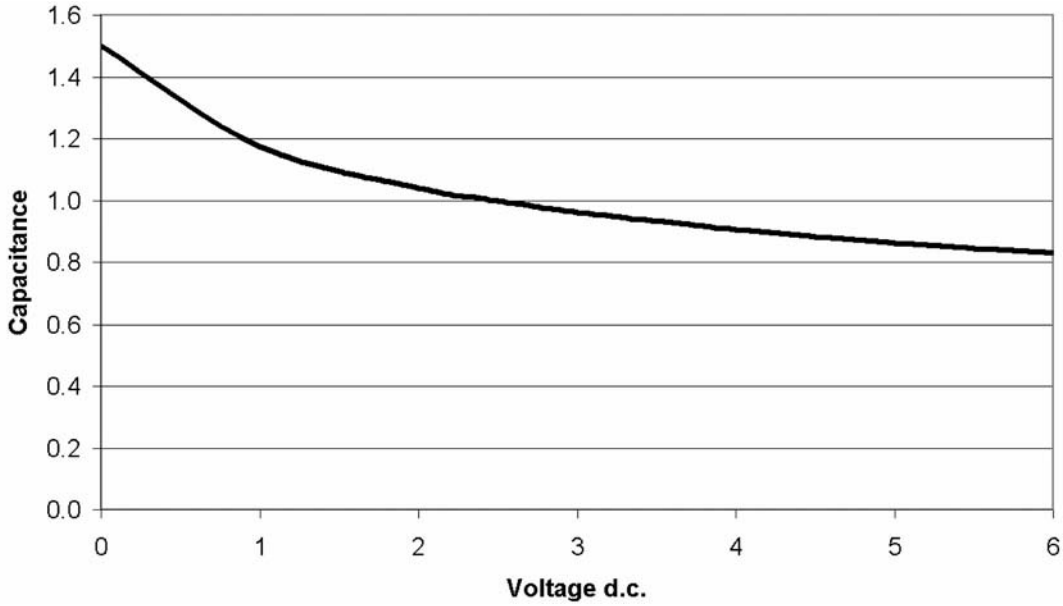


Figure 5. Filter Capacitance vs. Input Voltage over Temperature (normalized to capacitance at 2.5VDC and 25°C)

Application Information

Refer to Application Note AP-217, "The Chip Scale Package", for a detailed description of Chip Scale Packages offered by California Micro Devices.

PRINTED CIRCUIT BOARD RECOMMENDATIONS	
PARAMETER	**VALUE**
Pad Size on PCB	0.275mm
Pad Shape	Round
Pad Definition	Non-Solder Mask defined pads
Solder Mask Opening	0.325mm Round
Solder Stencil Thickness	0.125mm - 0.150mm
Solder Stencil Aperture Opening (laser cut, 5% tapered walls)	0.330mm Round
Solder Flux Ratio	50/50 by volume
Solder Paste Type	No Clean
Pad Protective Finish	OSP (Entek Cu Plus 106A)
Tolerance — Edge To Corner Ball	±50µm
Solder Ball Side Coplanarity	±20µm
Maximum Dwell Time Above Liquidous	60 seconds
Soldering Maximum Temperature	260°C

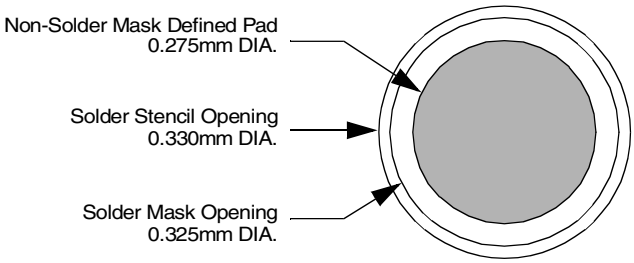


Figure 6. Recommended Non-Solder Mask Defined Pad Illustration

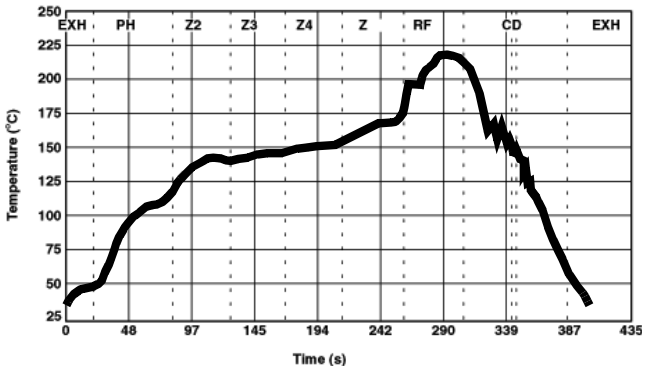


Figure 7. Eutectic (SnPb) Solder Ball Reflow Profile

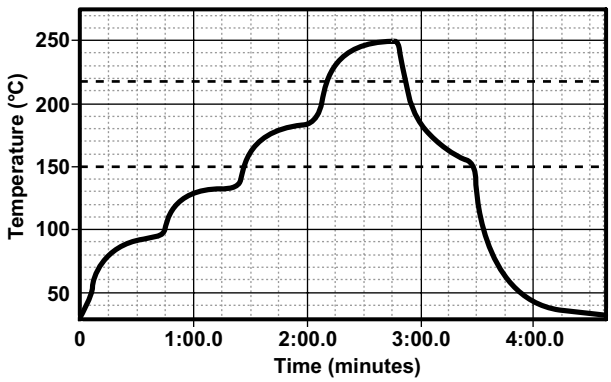


Figure 8. Lead-free (SnAgCu) Solder Ball Reflow Profile

Mechanical Details

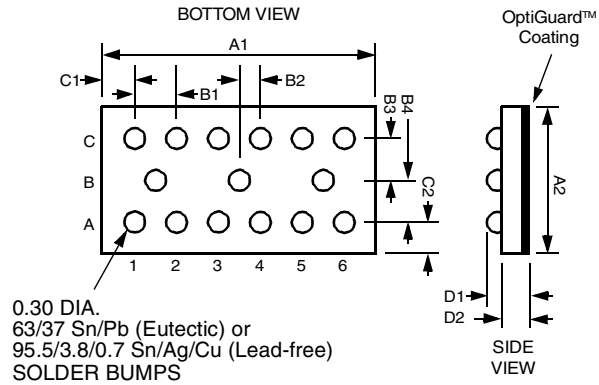
CSP Mechanical Specifications

CM1421 devices are packaged in a custom Chip Scale Package (CSP). Dimensions are presented below. For complete information on CSP packaging, see the California Micro Devices CSP Package Information document.

PACKAGE DIMENSIONS

Package		Custom CSP				
Bumps		15				
Dim	Millimeters			Inches		
	Min	Nom	Max	Min	Nom	Max
A1	2.915	2.960	3.005	0.1148	0.1165	0.1183
A2	1.285	1.330	1.375	0.0506	0.0524	0.0541
B1	0.495	0.500	0.505	0.0195	0.0197	0.0199
B2	0.245	0.250	0.255	0.0096	0.0098	0.0100
B3	0.430	0.435	0.440	0.0169	0.0171	0.0173
B4	0.430	0.435	0.440	0.0169	0.0171	0.0173
C1	0.180	0.230	0.280	0.0071	0.0091	0.0110
C2	0.180	0.230	0.280	0.0071	0.0091	0.0110
D1	0.600	0.670	0.739	0.0236	0.0264	0.0291
D2	0.394	0.445	0.495	0.0155	0.0175	0.0195
# per tape and reel	3500 pieces					
Controlling dimension: millimeters						

Mechanical Package Diagrams



Package Dimensions for CM1421 Chip Scale Package

CSP Tape and Reel Specifications

PART NUMBER	CHIP SIZE (mm)	POCKET SIZE (mm) B_0 X A_0 X K_0	TAPE WIDTH W	REEL DIAMETER	QTY PER REEL	P_0	P_1
CM1421	2.96 X 1.33 X 0.6	3.10 X 1.45 X 0.74	8mm	178mm (7")	3500	4mm	4mm

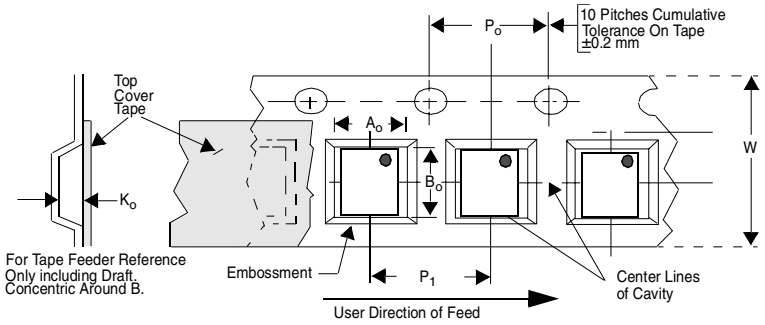


Figure 9. Tape and Reel Mechanical Data