LCD and Camera EMI Filter Array with ESD Protection

Features

- Four, six and eight channels of EMI filtering with integrated ESD protection
- 0.5mm pitch, 10-bump, 1.96mm x 1.33mm footprint Chip Scale Package (CM1426-04)
- 0.5mm pitch, 15-bump, 2.96mm x 1.33mm footprint Chip Scale Package (CM1426-06)
- 0.5mm pitch, 20-bump, 3.96mm x 1.33mm footprint Chip Scale Package (CM1426-08)
- Pi-style EMI filters in a capacitor-resistor-capacitor (C-R-C) network
- ±8kV ESD protection on each channel (IEC 61000-4-2 Level 4, contact discharge)
- ±15kV ESD protection on each channel (HBM)
- Greater than 20dB attenuation (typical) at 1 GHz
- Chip Scale Package features extremely low lead inductance for optimum filter and ESD performance
- *Optiguard*™ coated for improved reliability at assembly
- 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

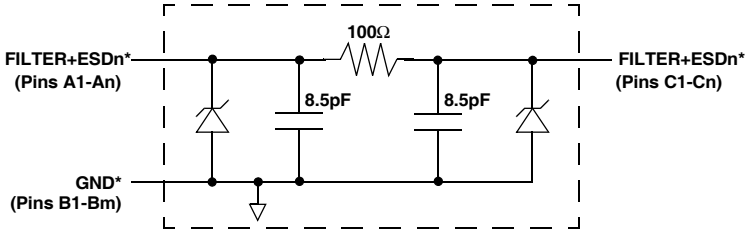
Product Description

The CM1426 is a family of pi-style EMI filter arrays with ESD protection, which integrates four, six and eight filters (C-R-C) in a Chip Scale Package with 0.50mm pad pitch. The CM1426 has component values of 8.5pF-100Ω-8.5pF per channel. The CM1426 has a cut-off frequency of 230MHz and can be used in applications where the data rates are as high as 92Mbps. The parts include avalanche-type 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 ±8kV, 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 ±15kV.

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 CM1426 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 CM1426 incorporates *Optiguard*™ which results in improved reliability at assembly. The CM1426 is available in a space-saving, low-profile Chip Scale Package with optional lead-free finishing.

Electrical Schematic

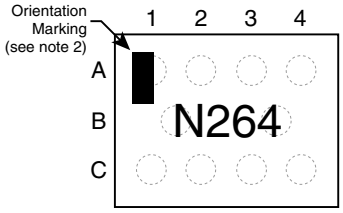


1 of 4, 6 or 8 EMI/RFI + ESD Channels

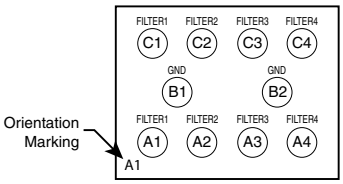
*** See Package/Pinout Diagram for expanded pin information.**

PACKAGE / PINOUT DIAGRAMS

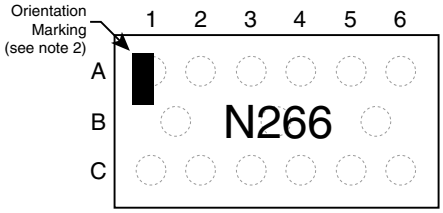
TOP VIEW
(Bumps Down View)

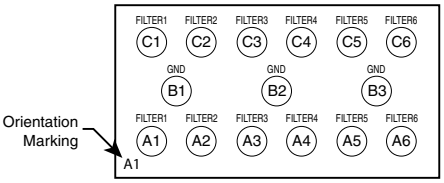


BOTTOM VIEW
(Bumps Up View)

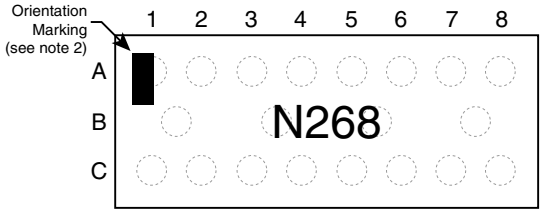


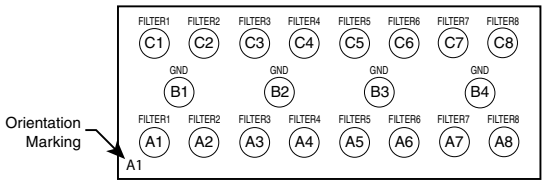
CM1426-04CS/CP
10 Bump CSP Package





CM1426-06CS/CP
15 Bump CSP Package





CM1426-08CS/CP
20 Bump 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		PIN(s)	NAME	DESCRIPTION
A1	FILTER1	Filter + ESD Channel 1		C1	FILTER1	Filter + ESD Channel 1
A2	FILTER2	Filter + ESD Channel 2		C2	FILTER2	Filter + ESD Channel 2
A3	FILTER3	Filter + ESD Channel 3		C3	FILTER3	Filter + ESD Channel 3
A4	FILTER4	Filter + ESD Channel 4		C4	FILTER4	Filter + ESD Channel 4
A5	FILTER5	Filter + ESD Channel 5		C5	FILTER5	Filter + ESD Channel 5
A6	FILTER6	Filter + ESD Channel 6		C6	FILTER6	Filter + ESD Channel 6
A7	FILTER7	Filter + ESD Channel 7		C7	FILTER7	Filter + ESD Channel 7
A8	FILTER8	Filter + ESD Channel 8		C8	FILTER8	Filter + ESD Channel 8
B1-B4	GND	Device Ground				

Ordering Information

PART NUMBERING INFORMATION					
		Standard Finish		Lead-free Finish[2]	
Bumps	Package	Ordering Part Number[1]	Part Marking	Ordering Part Number[1]	Part Marking
10	CSP	CM1426-04CS	N264	CM1426-04CP	N264
15	CSP	CM1426-06CS	N266	CM1426-06CP	N266
20	CSP	CM1426-08CS	N268	CM1426-08CP	N268

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_{TOTAL}	Total Channel Capacitance	At 2.5VDC Reverse Bias, 1MHz, 30mVAC	13.6	17	20.4	pF
C	Capacitance C1	At 2.5VDC Reverse Bias, 1MHz, 30mVAC	6.8	8.5	10.2	pF
V_{DIODE}	Standoff Voltage	I_{DIODE}=10μA		6.0		V
I_{LEAK}	Diode Leakage Current (reverse bias)	V_{DIODE}= 3.3V		0.1	1	μA
V_{SIG}	Signal Clamp Voltage Positive Clamp Negative Clamp	 I_{LOAD} = 10mA 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 and 3	 ±15 ±8			 kV kV

ELECTRICAL OPERATING CHARACTERISTICS (SEE NOTE1)						
R_{DYN}	Dynamic Resistance Positive Negative			 2.3 0.9		 Ω Ω
f_C	Cut-off Frequency Z_{SOURCE}=50Ω, Z_{LOAD}=50Ω	R=100Ω, C=17pF		230		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: These parameters are guaranteed by design and characterization.

Performance Information

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

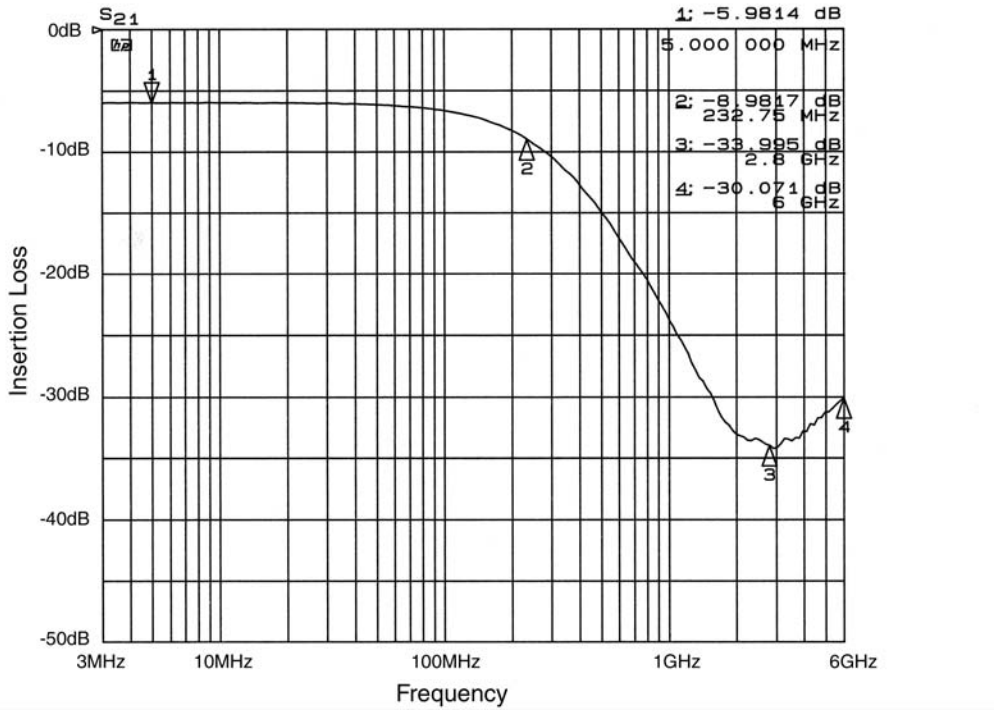


Figure 1. Insertion Loss vs. Frequency (A1-C1 to GND B1)

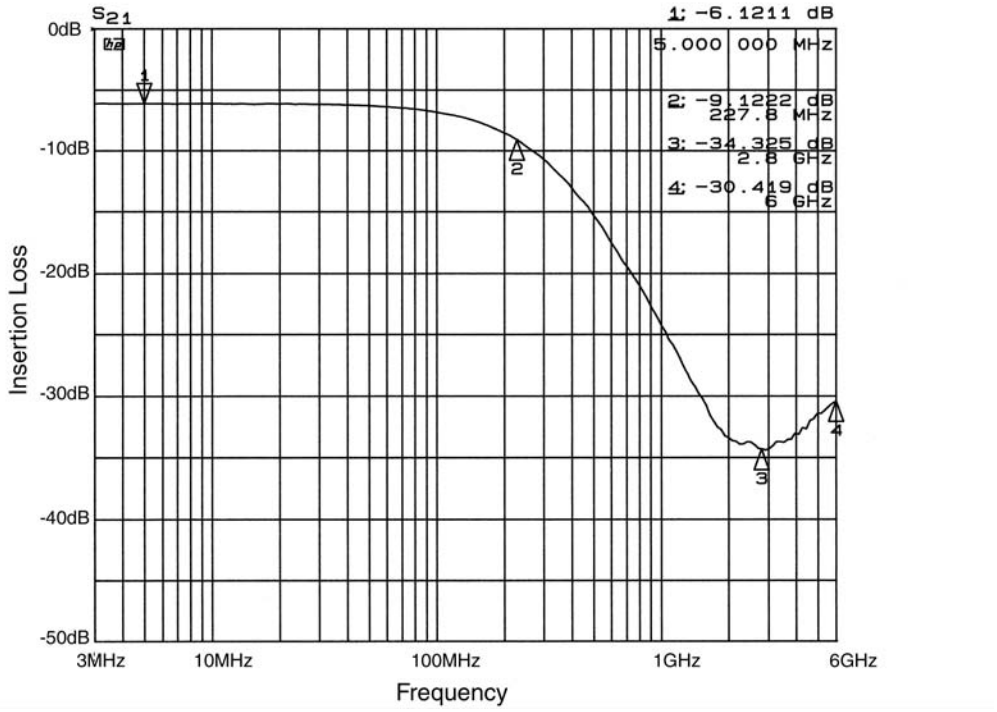


Figure 2. Insertion Loss vs. Frequency (A2-C2 to GND B1)

Performance Information (cont'd)

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

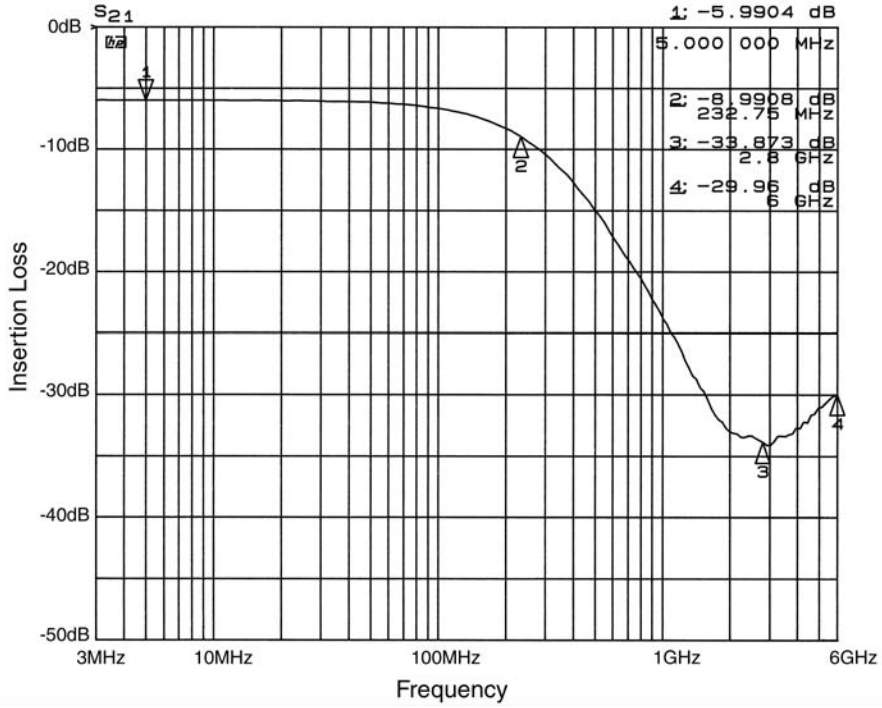


Figure 3. Insertion Loss vs. Frequency (A3-C3 to GND B2)

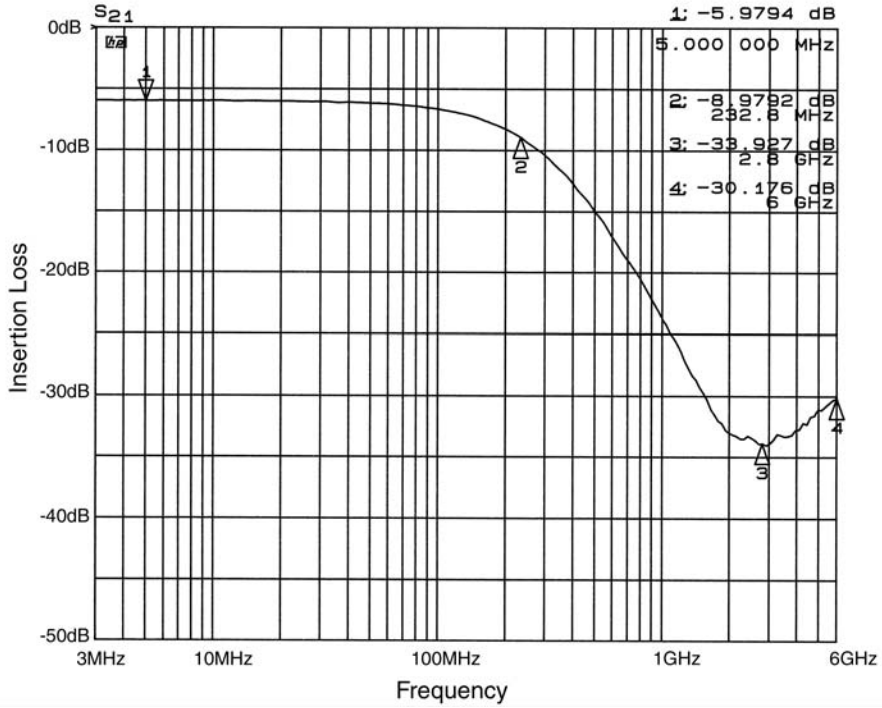


Figure 4. Insertion Loss vs. Frequency (A4-C4 to GND B2)

Performance Information (cont'd)

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

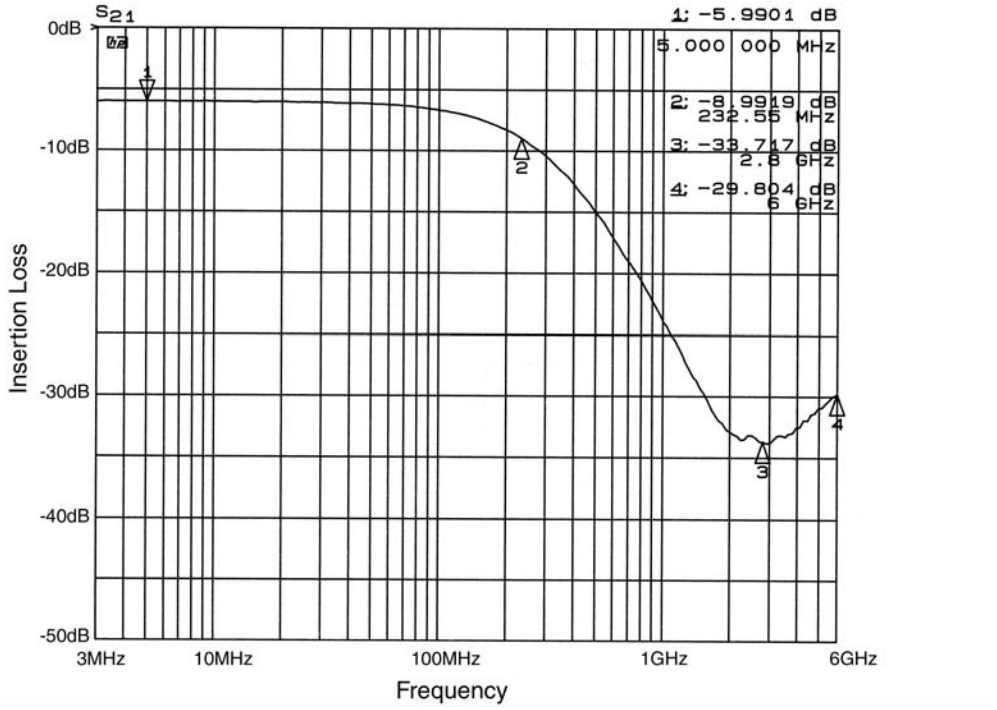


Figure 5. Insertion Loss vs. Frequency (A5-C5 to GND B3)

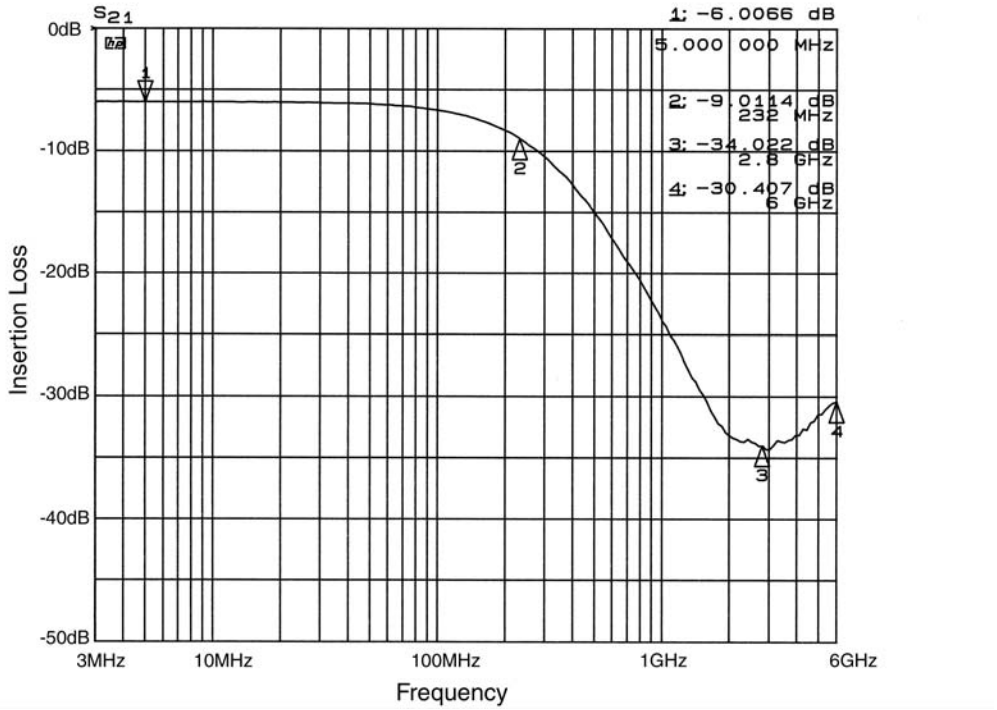


Figure 6. Insertion Loss vs. Frequency (A6-C6 to GND B3)

Performance Information (cont'd)

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

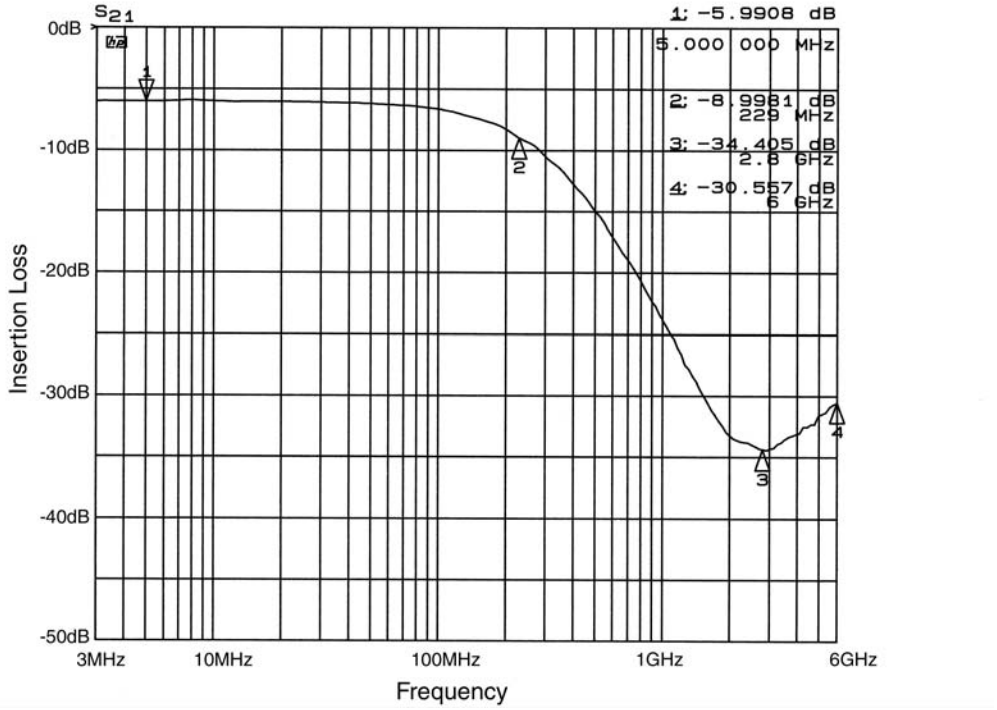


Figure 7. Insertion Loss vs. Frequency (A7-C7 to GND B4)

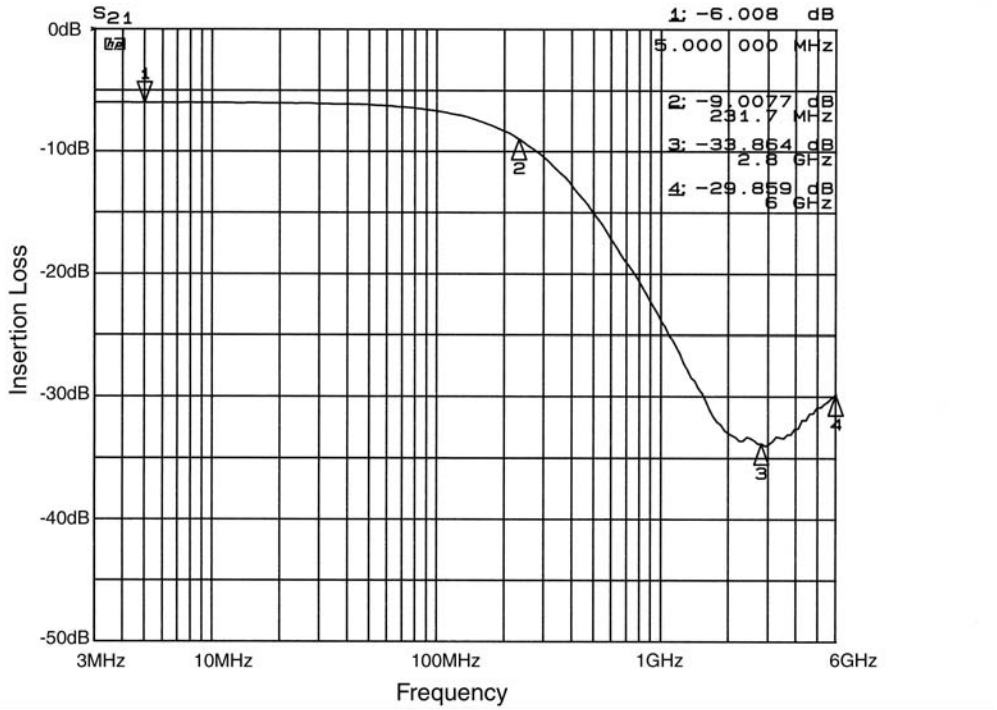


Figure 8. Insertion Loss vs. Frequency (A8-C8 to GND B4)

Performance Information (cont'd)

Typical Diode Capacitance vs. Input Voltage

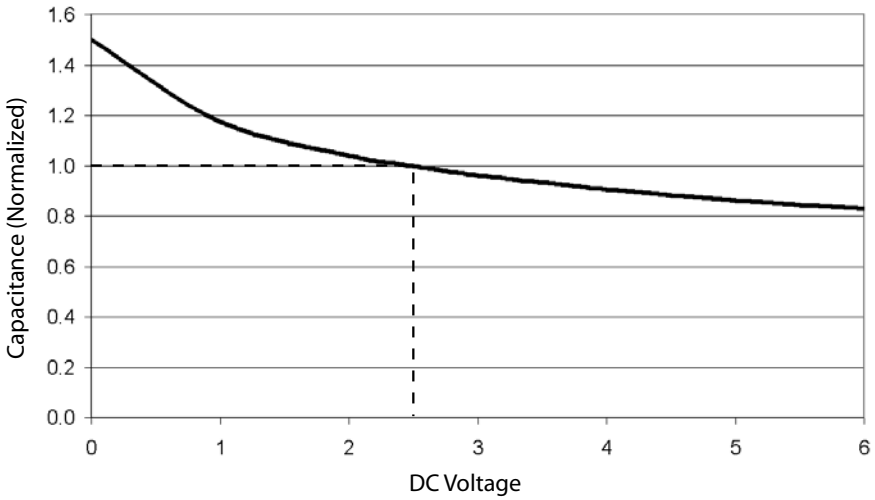


Figure 9. Filter Capacitance vs. Input Voltage over Temperature (normalized to capacitance at 2.5VDC and 25°C)

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 (183°C)	60 seconds
Maximum Soldering Temperature for Eutectic Devices using a Eutectic Solder Paste	240°C
Maximum Soldering Temperature for Lead-free Devices using a Lead-free Solder Paste	260°C

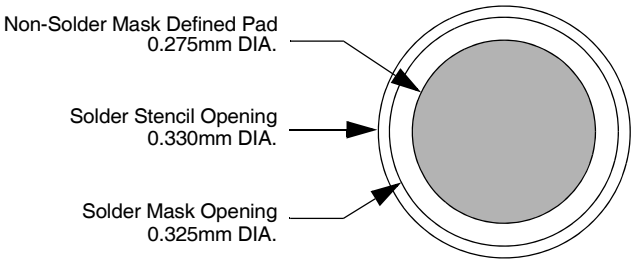


Figure 10. Recommended Non-Solder Mask Defined Pad Illustration

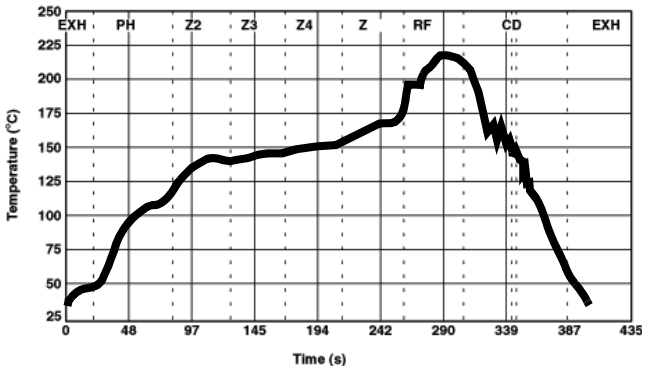


Figure 11. Eutectic (SnPb) Solder Ball Reflow Profile

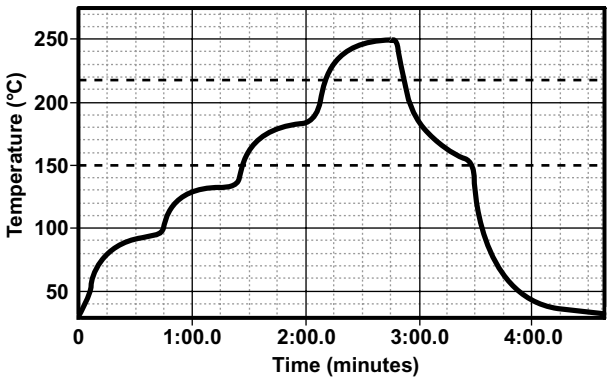


Figure 12. Lead-free (SnAgCu) Solder Ball Reflow Profile

Mechanical Details

CSP Mechanical Specifications

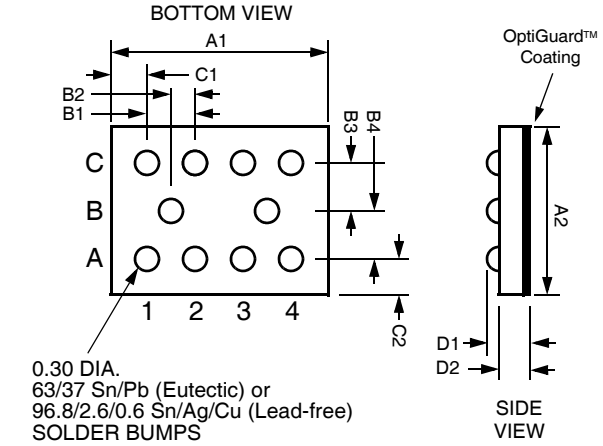
CM1426 devices are supplied in custom Chip Scale Packages (CSP). Dimensions are presented below. For complete information on CSP packaging, see the California Micro Devices CSP Package Information document.

CM1426-04 Mechanical Specifications

The package dimensions for the CM1426-04 are presented below.

PACKAGE DIMENSIONS						
Package	Custom CSP					
Bumps	10					
Dim	**Millimeters**			**Inches**		
	Min	**Nom**	**Max**	**Min**	**Nom**	**Max**
A1	1.915	1.960	2.005	0.0754	0.0772	0.0789
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	0.091	0.0110
D1	0.575	0.644	0.714	0.0226	0.0254	0.0281
D2	0.368	0.419	0.470	0.0145	0.0165	0.0185
# per tape and reel	3500 pieces					
Controlling dimension: millimeters						

Mechanical Package Diagrams



Package Dimensions for CM1426-04
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
CM1426-04	1.96 x 1.33 x 0.644	2.08 x 1.45 x 0.71	8mm	178mm (7")	3500	4mm	4mm

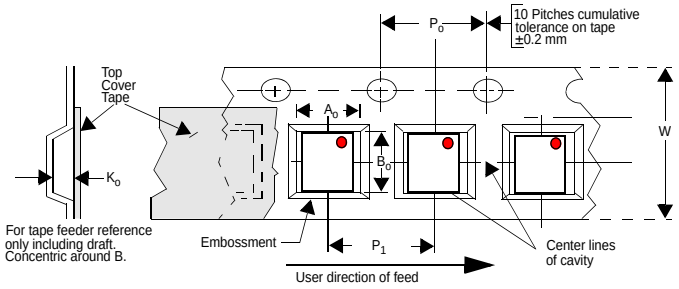


Figure 13. Tape and Reel Mechanical Data

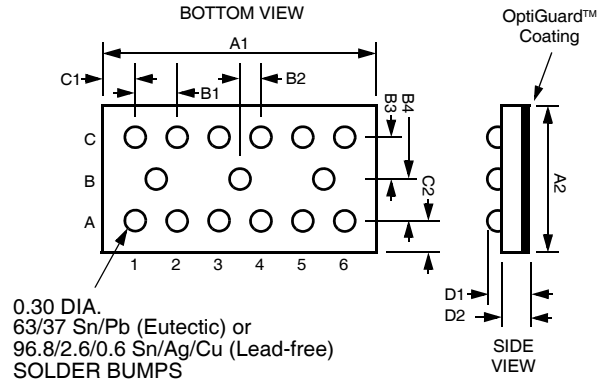
Mechanical Details (cont'd)

CM1426-06 Mechanical Specifications

The package dimensions for the CM1426-06 are presented below.

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	0.091	0.0110
D1	0.575	0.644	0.714	0.0226	0.0254	0.0281
D2	0.368	0.419	0.470	0.0145	0.0165	0.0185
# per tape and reel	3500 pieces					
Controlling dimension: millimeters						

Mechanical Package Diagrams



Package Dimensions for CM1426-06 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
CM1426-06	2.96 x 1.33 x 0.644	3.10 x 1.45 x 0.74	8mm	178mm (7")	3500	4mm	4mm

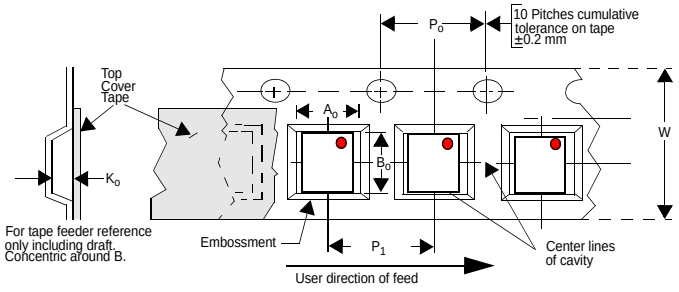


Figure 14. Tape and Reel Mechanical Data

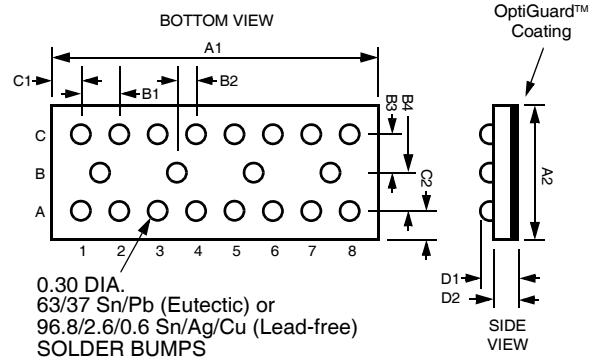
Mechanical Details (cont'd)

CM1426-08 Mechanical Specifications

The package dimensions for the CM1426-08 are presented below.

PACKAGE DIMENSIONS						
Package	Custom CSP					
Bumps	20					
Dim	**Millimeters**			**Inches**		
	Min	**Nom**	**Max**	**Min**	**Nom**	**Max**
A1	3.915	3.960	4.005	0.1541	0.1559	0.1577
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	0.091	0.0110
D1	0.575	0.644	0.714	0.0226	0.0254	0.0281
D2	0.368	0.419	0.470	0.0145	0.0165	0.0185
# per tape and reel	3500 pieces					
Controlling dimension: millimeters						

Mechanical Package Diagrams



DIMENSIONS IN MILLIMETERS

Package Dimensions for CM1426-08 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
CM1426-08	3.96 x 1.33 x 0.644	4.11 x 1.57 x 0.76	8mm	178mm (7")	3500	4mm	4mm

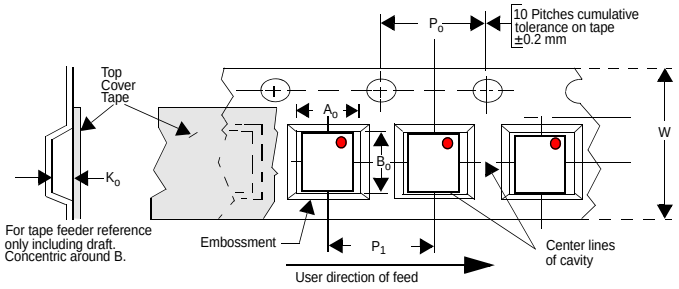


Figure 15. Tape and Reel Mechanical Data