ON Semiconductor®

LCD and Camera EMI Filter Array with ESD Protection

CM1426

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
- *OptiGuard*™ coated for improved reliability at assembly
- RoHS-compliant, lead-free packaging

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 that provide a very high level of protection for sensitive electronic components against possible ESD strikes. 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.
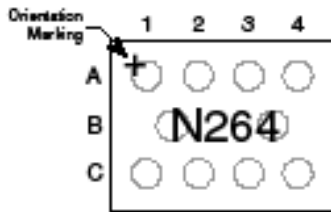
Block Diagram

Electrical Schematic

FILTER+ESDn* (Pins A1-An)

100Ω

8.5pF   8.5pF

FILTER+ESDn* (Pins C1-Cn)

GND* (Pins B1-Bm)
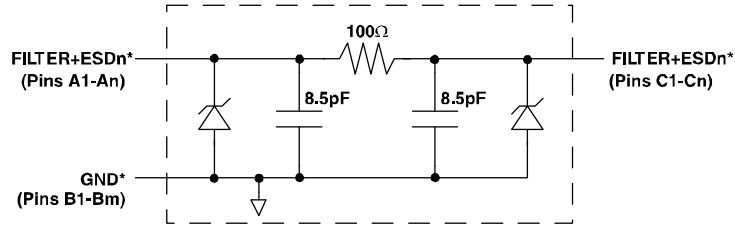
1 of 4, 6 or 8 EMI/RFI + ESD Channels

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

PACKAGE / PINOUT DIAGRAMS
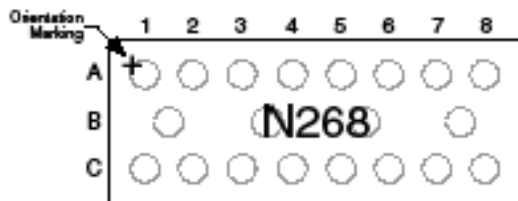
TOP VIEW
(Bumps Down View)

Orientation Marking

1 2 3 4

A
B   N264
C

CM1426-04CP
10 Bump CSP Package

BOTTOM VIEW
(Bumps Up View)

C1 C2 C3 C4
GND   GND
B1   B2
A1 A2 A3 A4

Orientation Marking

Orientation Marking

1 2 3 4 5 6

A
B   N266
C
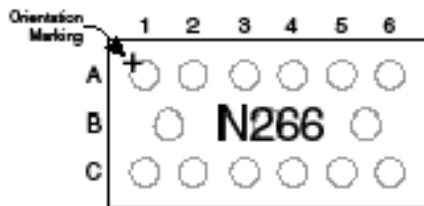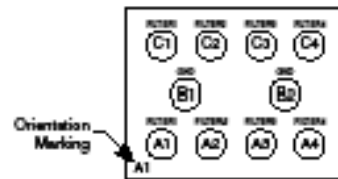
CM1426-06CP
15 Bump CSP Package

C1 C2 C3 C4 C5 C6
GND   GND   GND
B1   B2   B3
A1 A2 A3 A4 A5 A6

Orientation Marking

Orientation Marking

1 2 3 4 5 6 7 8

A
B   N268
C

CM1426-08CP
20 Bump CSP Package

C1 C2 C3 C4 C5 C6 C7 C8
GND   GND   GND   GND
B1   B2   B3   B4
A1 A2 A3 A4 A5 A6 A7 A8

Orientation Marking

Notes:
1) These drawings are not to scale.

CM1426

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			
Bumps	Package	Ordering Part Number[1]	Part Marking
10	CSP	CM1426-04CP	N264
15	CSP	CM1426-06CP	N266
20	CSP	CM1426-08CP	N268

Note 1: Parts are shipped in Tape and 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	℃

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
		Note 2	15
			8
						kV
						kV

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℃ unless otherwise specified.
Note 2: ESD applied to input and output pins with respect to GND, one at a time.

Performance Information

Typical Filter Performance (T$_A$=25°C, DC Bias=0V, 50 Ohm Environment)
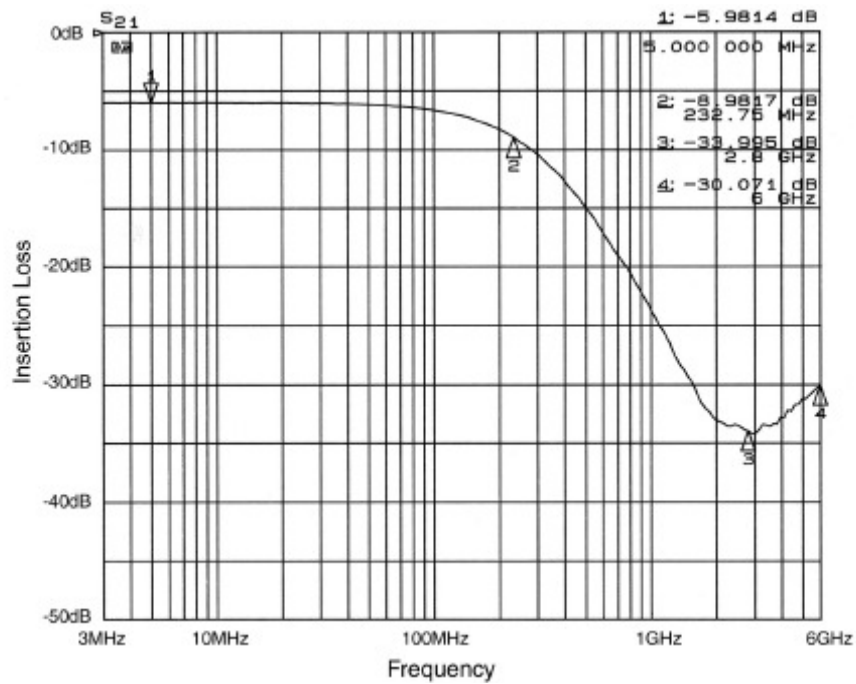
Figure 1. Insertion Loss vs. Frequency (A1-C1 to GND B1)
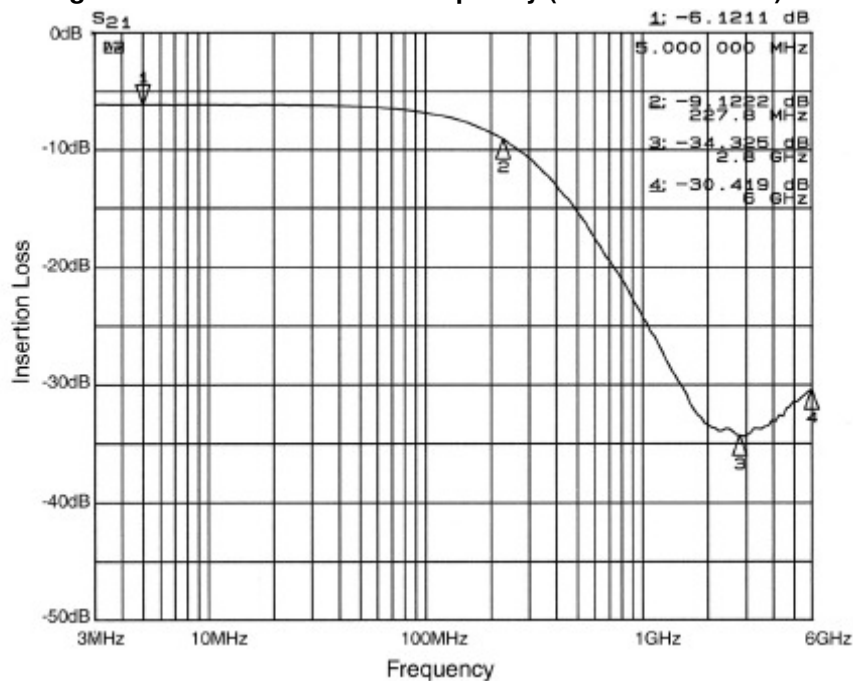
Figure 2. Insertion Loss vs. Frequency (A2-C2 to GND B1)

Performance Information (cont'd)

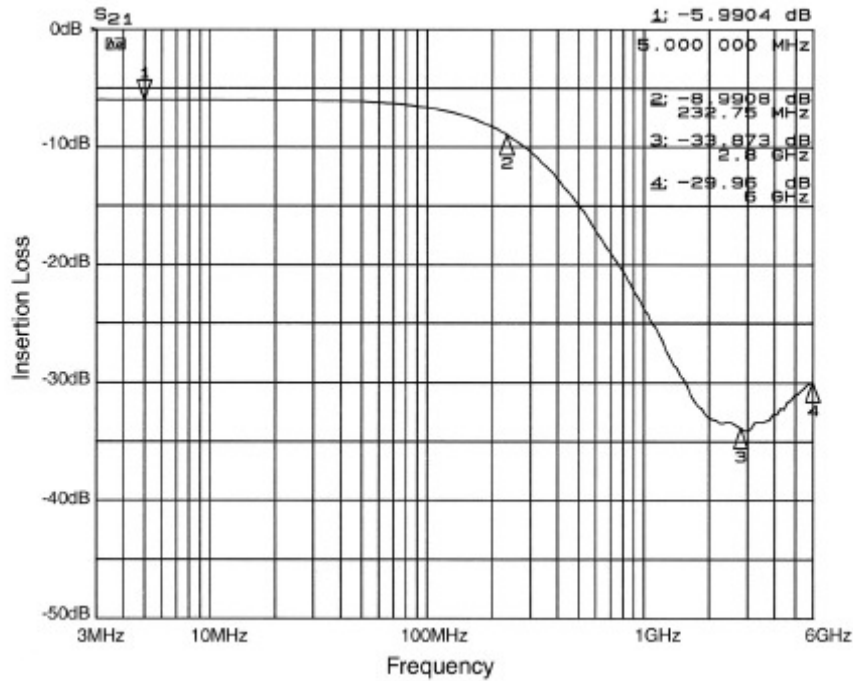**Typical Filter Performance (T$_A$=25°C, DC Bias=0V, 50 Ohm Environment)**

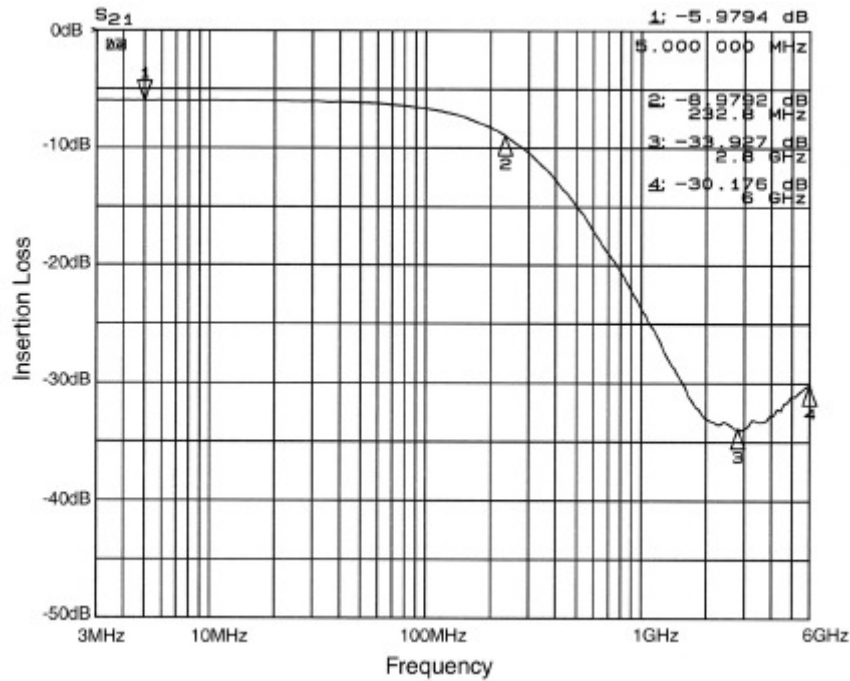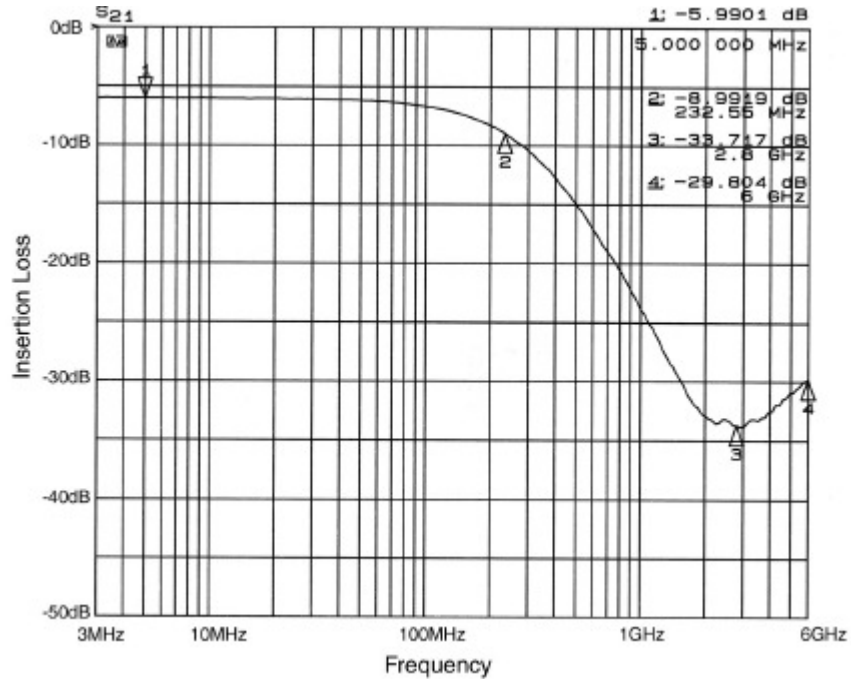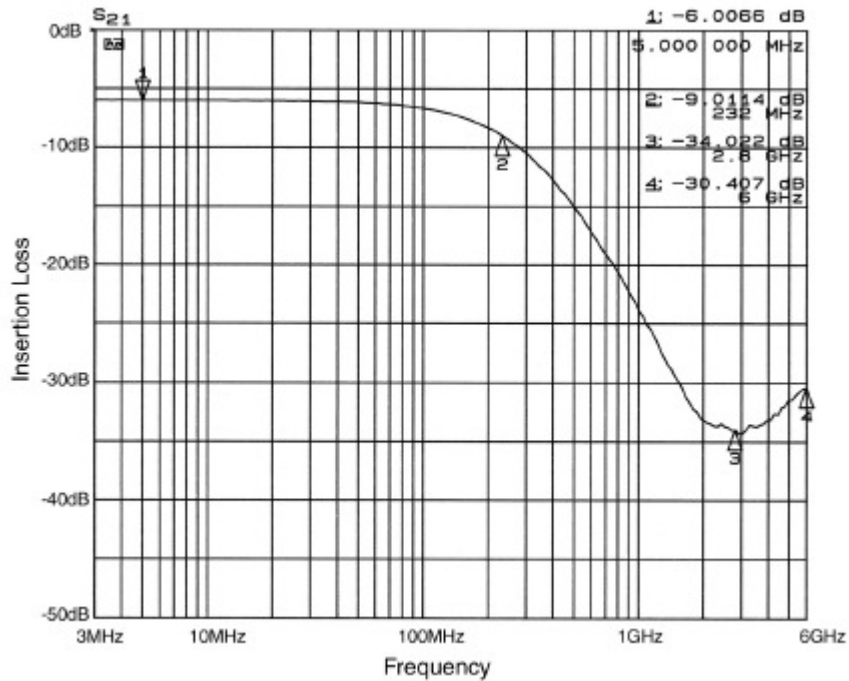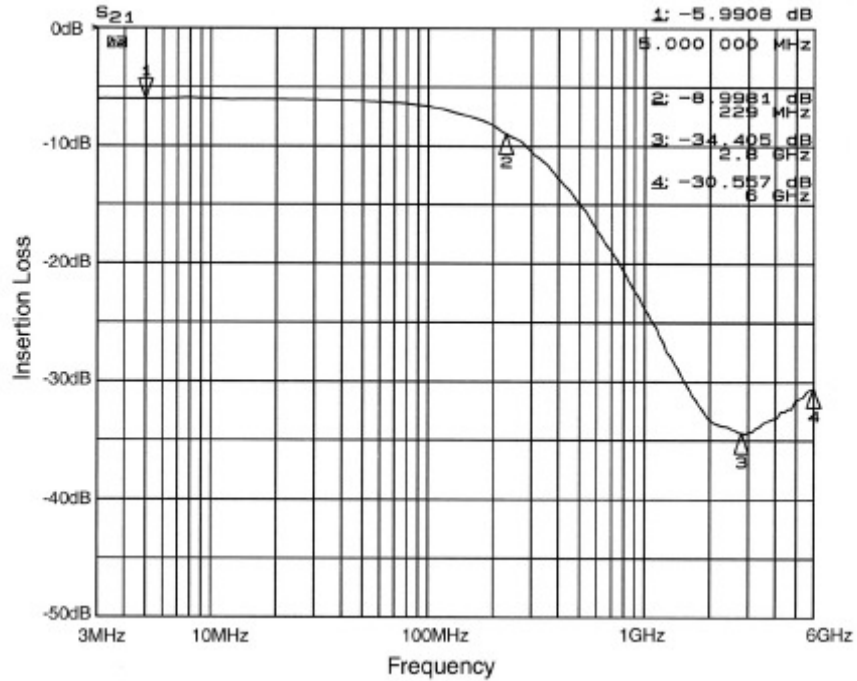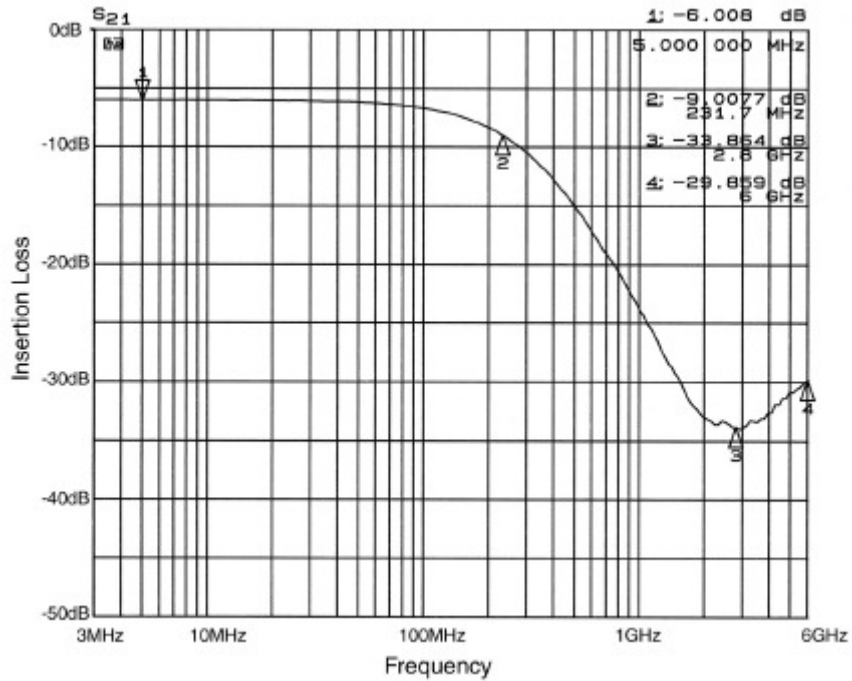**Figure 3. Insertion Loss vs. Frequency (A3-C3 to GND B2)**

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

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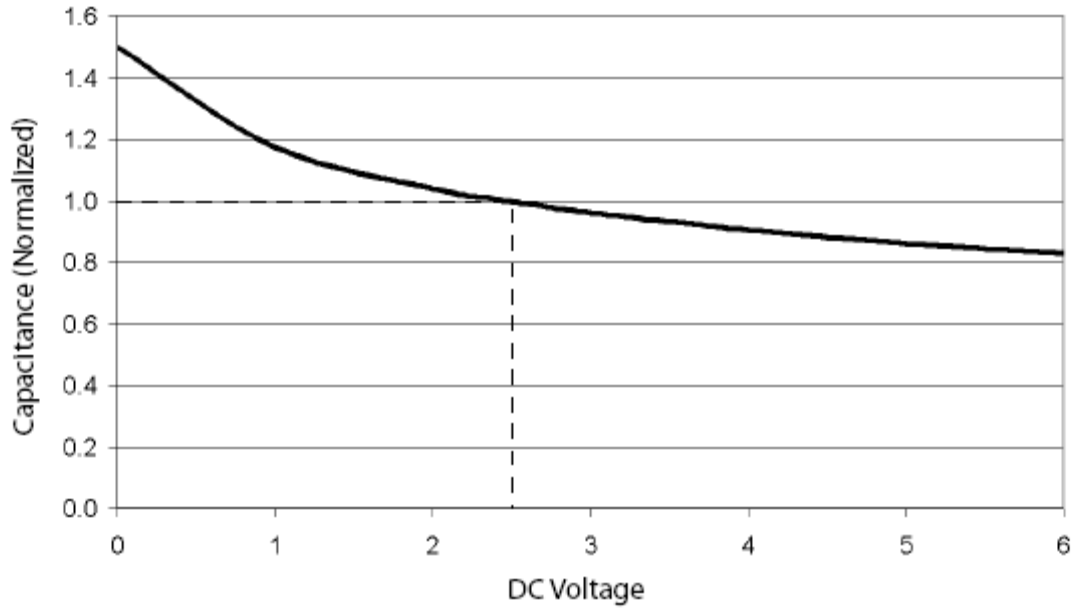
Figure 9. Filter Capacitance vs. Input Voltage over Temperature
(normalized to capacitance at 2.5VDC and 25°C)

Application Information

PARAMETER	VALUE
Pad Size on PCB	0.240mm
Pad Shape	Round
Pad Definition	Non-Solder Mask defined pads
Solder Mask Opening	0.290mm Round
Solder Stencil Thickness	0.125mm - 0.150mm
Solder Stencil Aperture Opening (laser cut, 5% tapered walls)	0.300mm 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	$\pm$50μm
Solder Ball Side Coplanarity	$\pm$20μm
Maximum Dwell Time Above Liquidous	60 seconds
Maximum Soldering Temperature for Lead-free Devices using a Lead-free Solder Paste	260°C
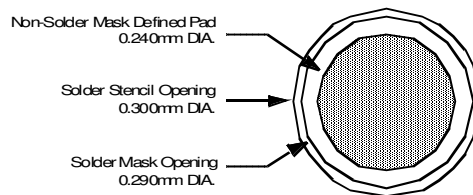
Figure 5. Recommended Non-Solder Mask Defined Pad Illustration
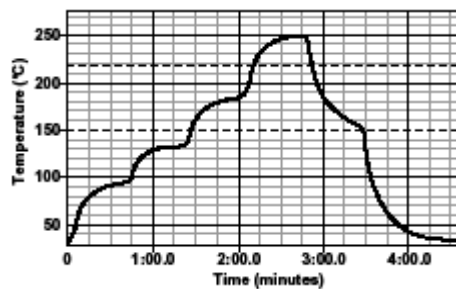
Figure 6. Lead-free (SnAgCu) Solder Ball Reflow Profile
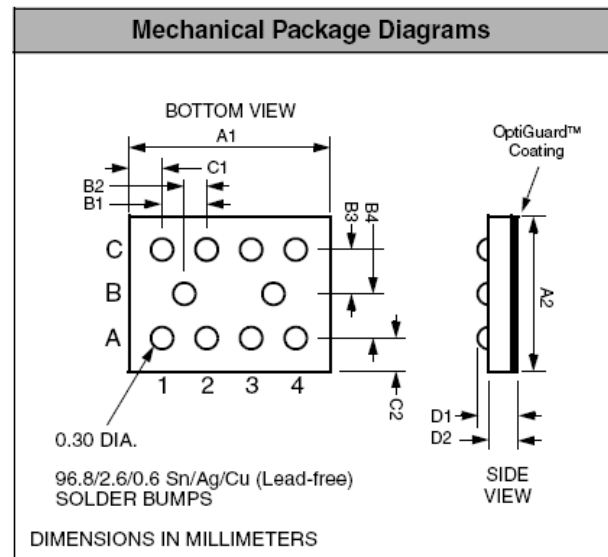
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Mechanical Details

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

Package dimensions 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						

Package Dimensions for CM1426-04 Chip Scale Package

CSP Tape and Reel Specifications

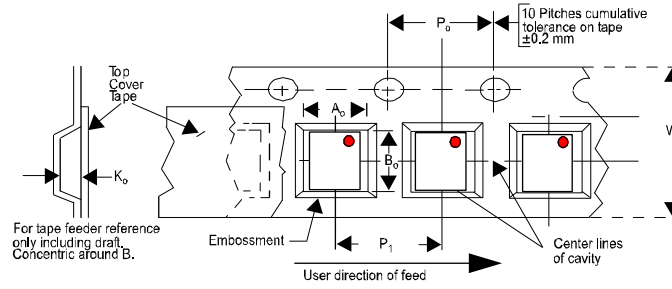| PART NUMBER	CHIP SIZE (mm)	POCKET SIZE (mm) B_0 X A_0 X K_0	TAPE WIDTH W	REEL DIAMETER	QTY PER REEL	P_0	P_1
CM1426-04	1.96 x 1.33 x 0.644	2.08 x 1.45 x 0.71	8mm	178mm (7")	3500	4mm	4mm

Figure 12. Tape and Reel Mechanical Data
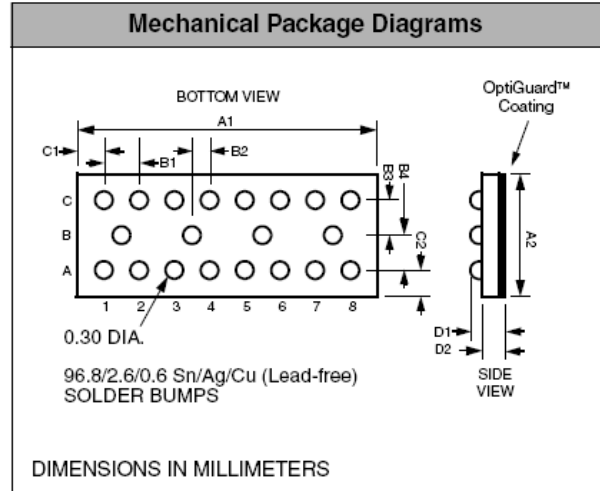
Mechanical Details (cont'd)

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						

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
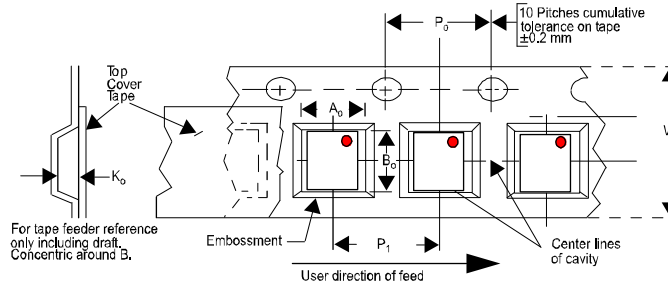
Figure 13. Tape and Reel Mechanical Data

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						

**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
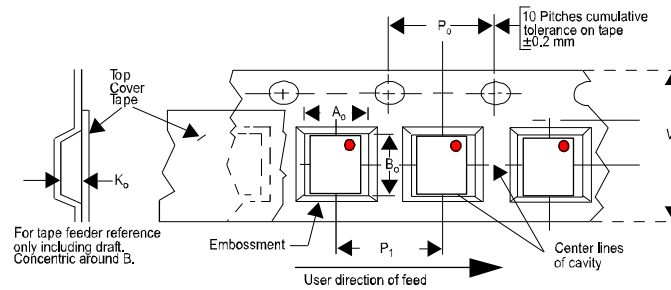
Figure 14. Tape and Reel Mechanical Data

CM1426