ON Semiconductor®

LCD EMI Filter Array with ESD Protection

CM1405

Features

- Eight channels of EMI filtering
- 30kV ESD protection on each channel (IEC 61000-4-2 Level 4, contact discharge)
- 30kV ESD protection on each channel (HBM)
- Better than 35dB of attenuation at 800-2700MHz
- Chip Scale Package features extremely low lead inductance for optimum filter and ESD performance
- 20-bump, 4.000mm x 1.458mm footprint Chip Scale Package
- *OptiGuard*™ coated version available for improved reliability at assembly
- RoHS-compliant, lead-free finishing

Applications

- LCD data lines in mobile handsets
- EMI filtering & ESD protection for high-speed I/O ports
- EMI filtering for high-speed data lines
- Wireless handsets
- Cell phones
- Notebook computers
- PDAs / Handheld PCs

Product Description

California Micro Device's CM1405 is an EMI filter array with ESD protection, which integrates eight Pi-filters (C-R-C). The CM1405 has component values of 25pF-100W-25pF. 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 diodes connected to the filter ports safely dissipate ESD strikes of •30kV, exceeding 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.

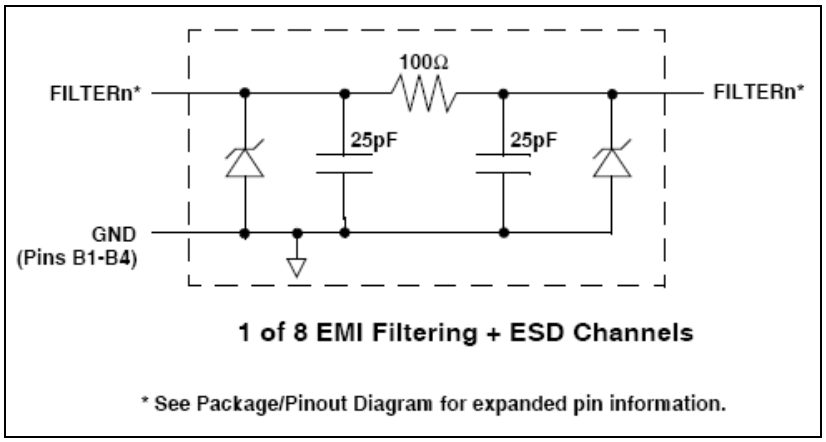
This device is particularly well-suited for portable electronics (e.g. mobile handsets, PDAs, notebook computers) because of its small package and easy-to-use pin assignments. In particular, the CM1405 is ideal for EMI filtering and protecting data lines from ESD for the LCD display in mobile handsets.
The CM1405-03 incorporates *OptiGuard*ä coating which results in improved reliability at assembly and is available in space-saving, low-profile chip-scale packages with RoHS-compliant, lead-free finishing.

The CM1400-03 incorporates *OptiGuard*™ coating which results in improved reliability at assembly. The CM1400-03 is available in a space-saving, low-profile chip scale package with RoHS compliant lead-free finishing.

April 2010 Rev.2

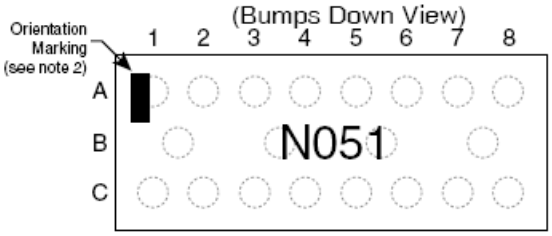
Publication Order Number:
CM1405/D

Block Diagram

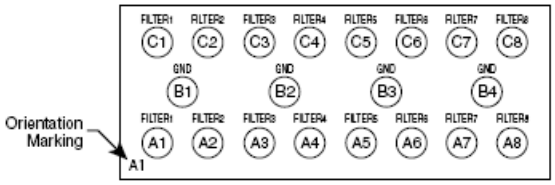


PACKAGE / PINOUT DIAGRAMS

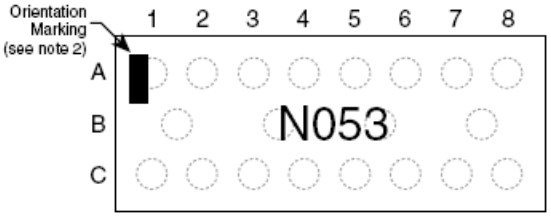
TOP VIEW
(Bumps Down View)

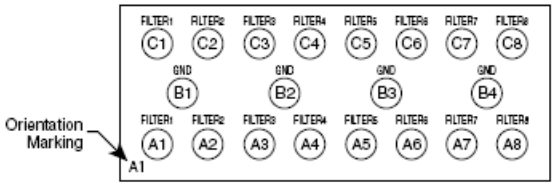


BOTTOM VIEW
(Bumps Up View)



CM1405-01
Chip Scale Package





CM1405-03
Chip Scale 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 Channel 1	C1	FILTER1	Filter Channel 1
A2	FILTER2	Filter Channel 2	C2	FILTER2	Filter Channel 2
A3	FILTER3	Filter Channel 3	C3	FILTER3	Filter Channel 3
A4	FILTER4	Filter Channel 4	C4	FILTER4	Filter Channel 4
A5	FILTER5	Filter Channel 5	C5	FILTER5	Filter Channel 5
A6	FILTER6	Filter Channel 6	C6	FILTER6	Filter Channel 6
A7	FILTER7	Filter Channel 7	C7	FILTER7	Filter Channel 7
A8	FILTER8	Filter Channel 8	C8	FILTER8	Filter Channel 8
B1-B4	GND	Device Ground			

Ordering Information

PART NUMBERING INFORMATION									
		Standard Finish				**Lead-free Finish[2]**			
		No Coating		**Optiguard™ Coated**		**-No Coating**		**Optiguard™ Coated**	
Bumps	**PKG**	**Ordering Part Number[1]**	**Part Marking**	**Ordering Part Number[1]**	**Part Marking**	**Ordering Part Number[1]**	**Part Marking**	**Ordering Part Number[1]**	**Part Marking**
20	CSP	CM1405-01CS	N051	CM1405-03CS	N053	CM1405-01CP	N051	CM1405-03CP	N053

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 NOTE 1)

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
R	Resistance		80	100	120	Ω
C	Capacitance	At 2.5V DC, 1MHz, 30mV AC	20	25	30	pF
V_{DIODE}	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 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	 30 30			 kV kV
R_{DYN}	Dynamic Resistance Positive Negative			 1.5 0.9		 Ω Ω
f_C	Cut-off Frequency Z_{SOURCE}=50Ω, Z_{LOAD}=50Ω	R = 100Ω, C = 25pF		70		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.

Performance Information

Typical Filter Performance (nominal conditions unless specified otherwise, 50 Ohm Environment)

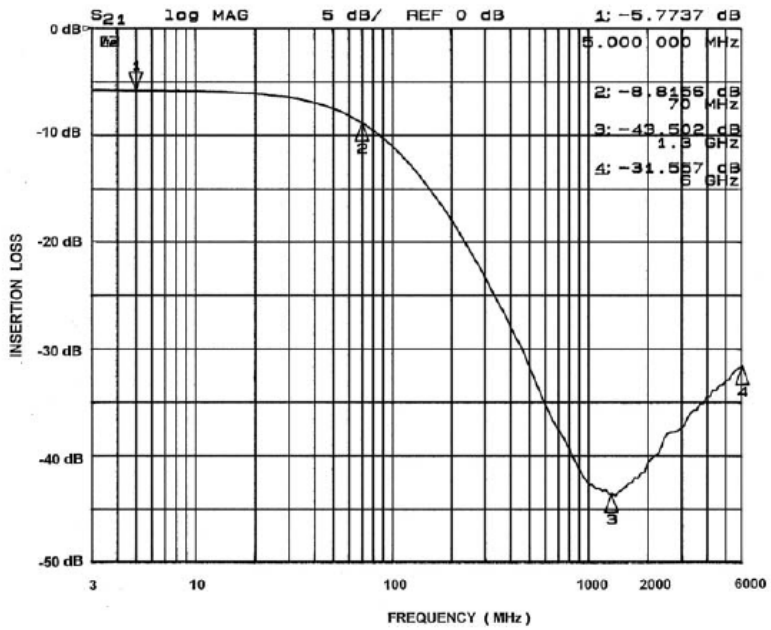


Figure 1. A1-C1 EMI Filter Performance

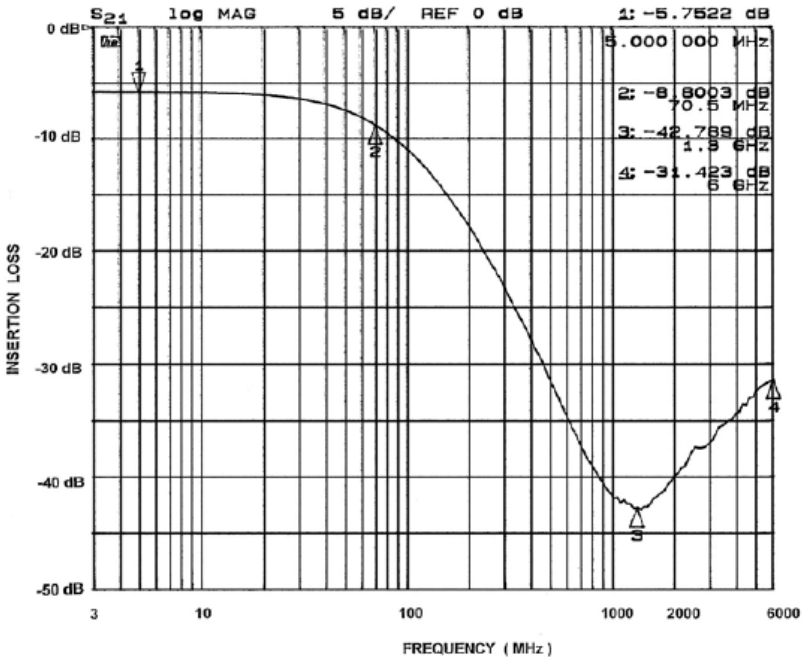


Figure 2. A2-C2 EMI Filter Performance

Performance Information (cont'd)

Typical Filter Performance (nominal conditions unless specified otherwise, 50 Ohm Environment)

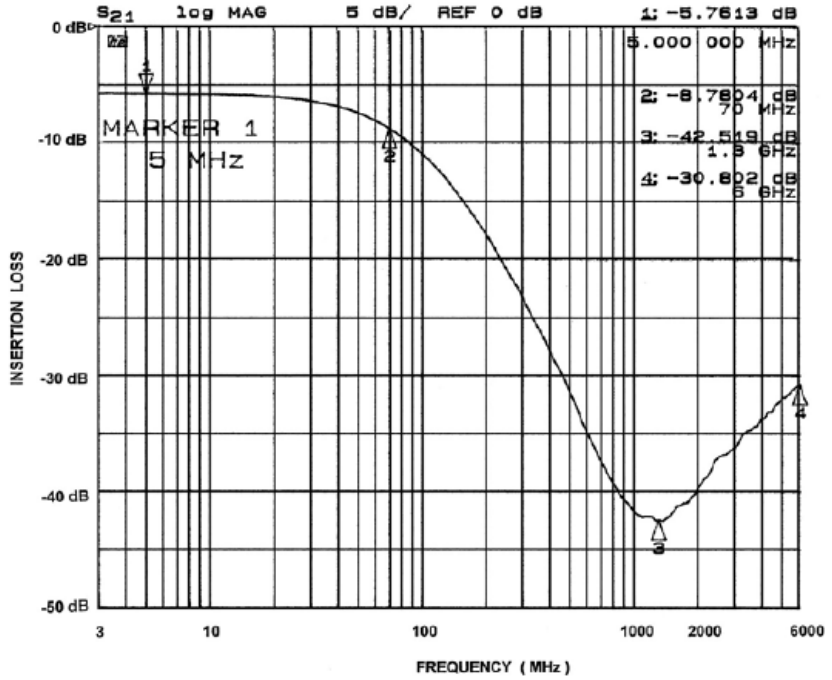


Figure 3. A3-C3 EMI Filter Performance

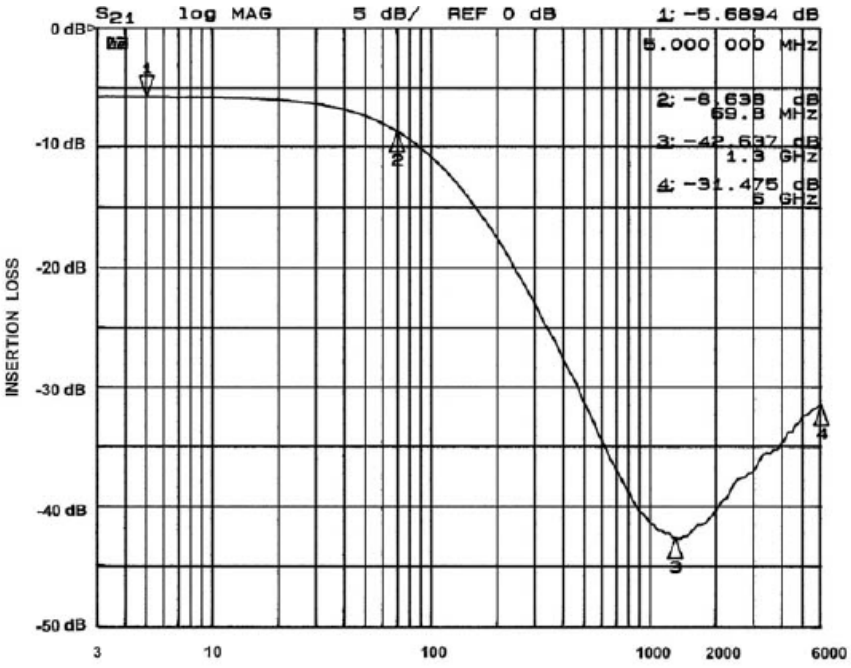


Figure 4. A4-C4 EMI Filter Performance

Performance Information (cont'd)

Typical Filter Performance (nominal conditions unless specified otherwise, 50 Ohm Environment)

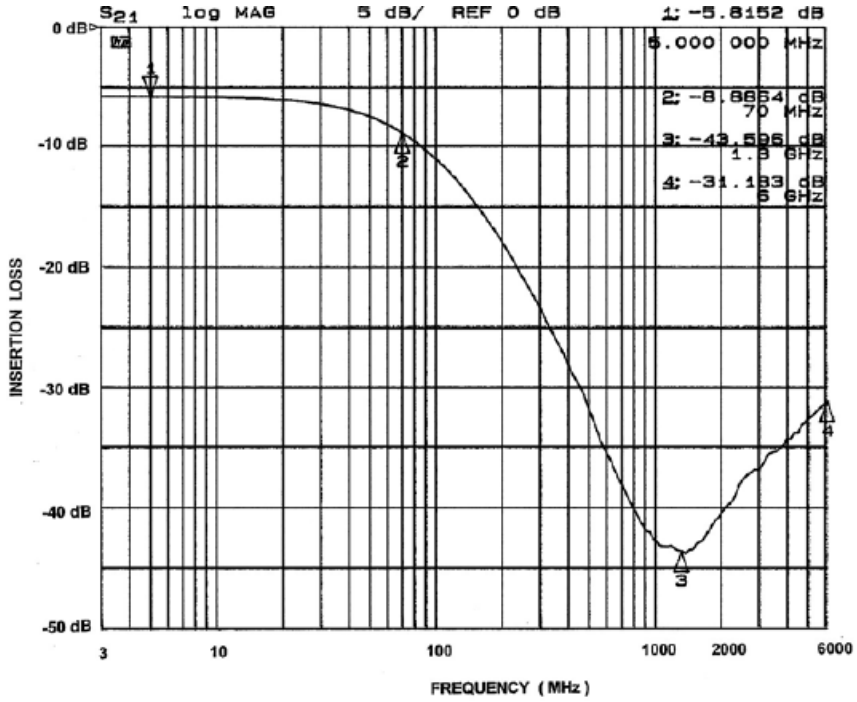


Figure 5. A5-C5 EMI Filter Performance

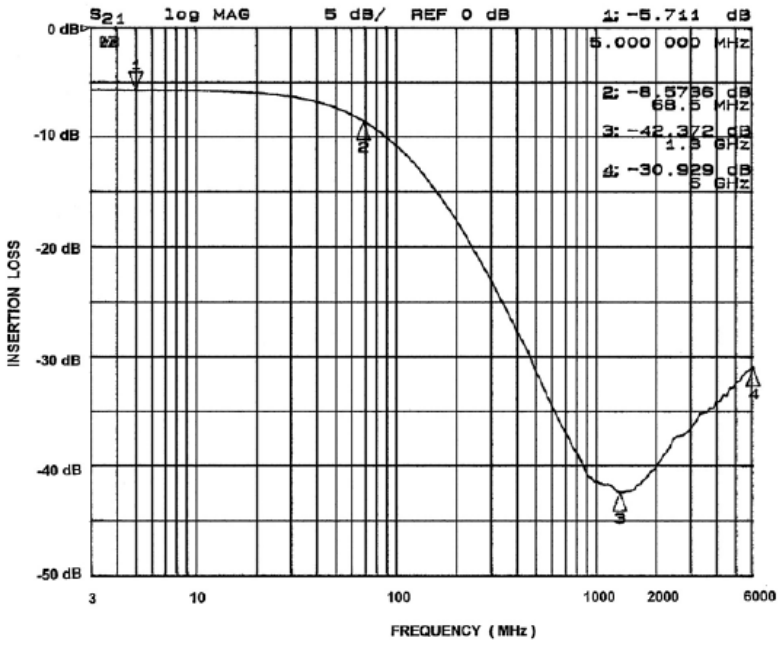


Figure 6. A6-C6 EMI Filter Performance

Performance Information (cont'd)

Typical Filter Performance (nominal conditions unless specified otherwise, 50 Ohm Environment)

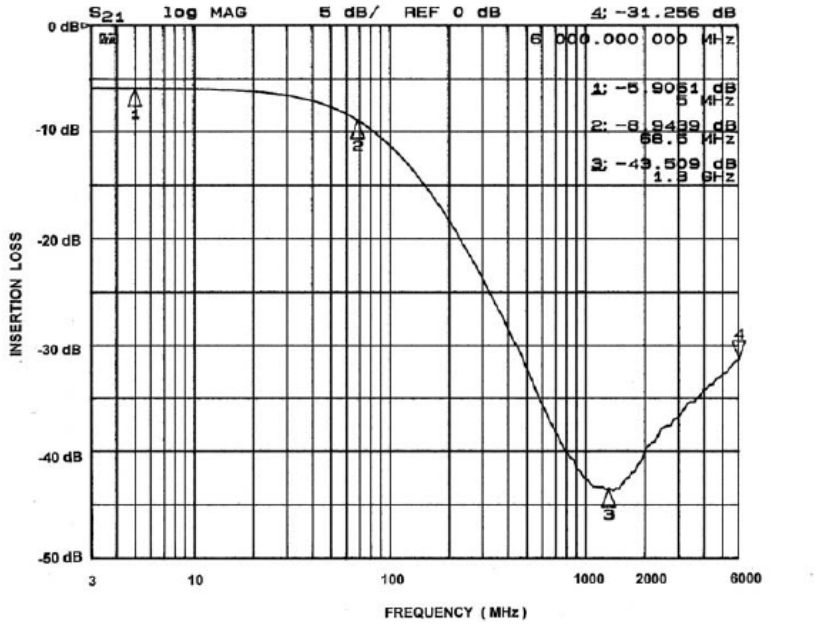


Figure 7. A7-C7 EMI Filter Performance

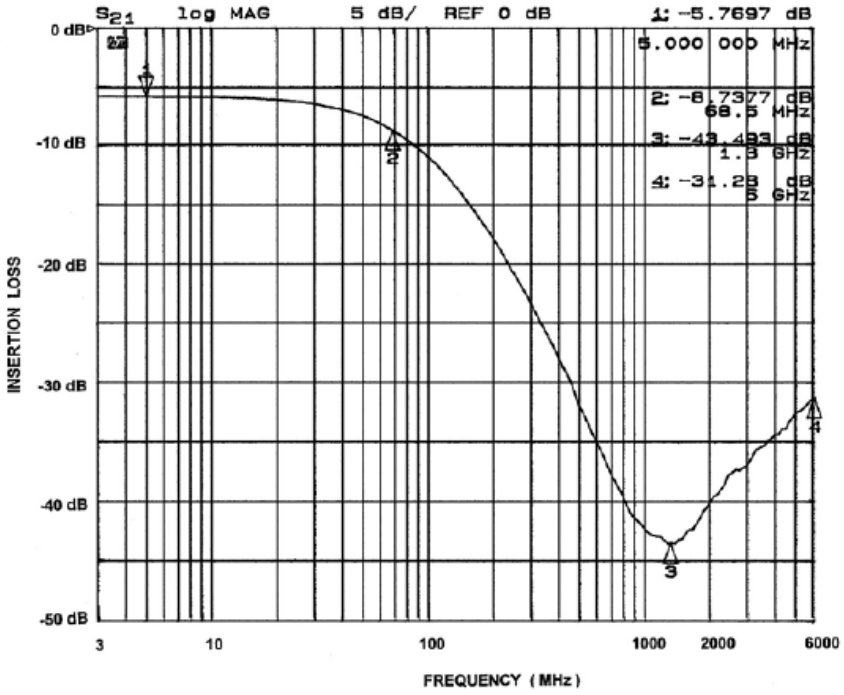


Figure 8. A8-C8 EMI Filter Performance

Performance Information (cont'd)

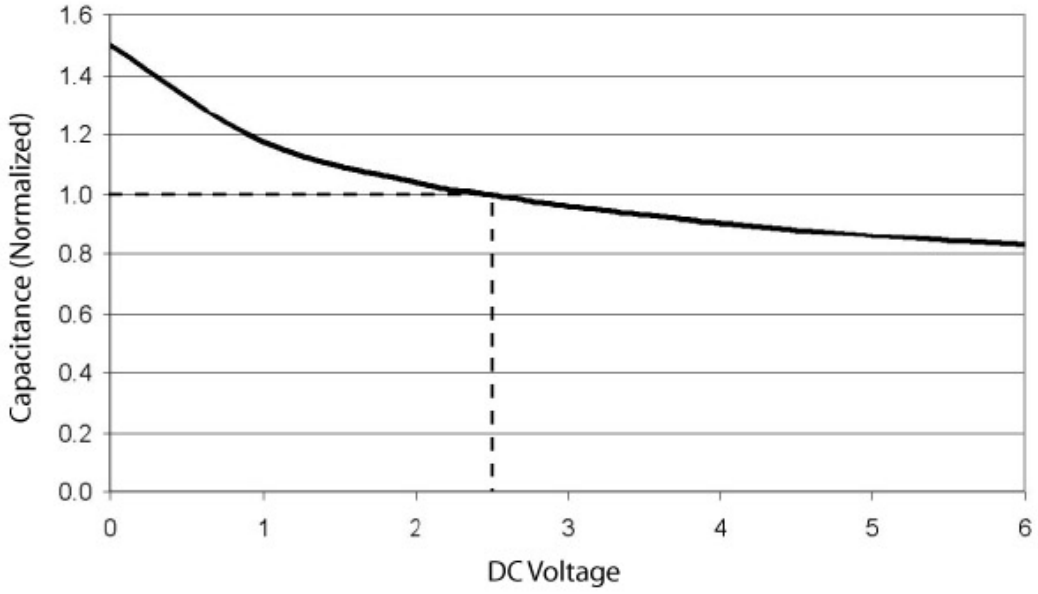


Figure 9. Filter Capacitance vs. Input Voltage over Temperature (normalized to capacitance at 2.5VDC and 25°C)

Figure 9.

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	±50μm
Solder Ball Side Coplanarity	±20μm
Maximum Dwell Time Above Liquidous	60 seconds
Maximum Soldering Temperature for Lead-free Devices using a Lead-free Solder Paste	260°C

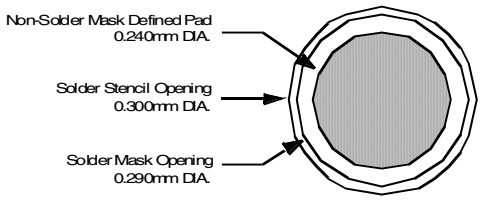


Figure 8. Recommended Non-Solder Mask Defined Pad Illustration

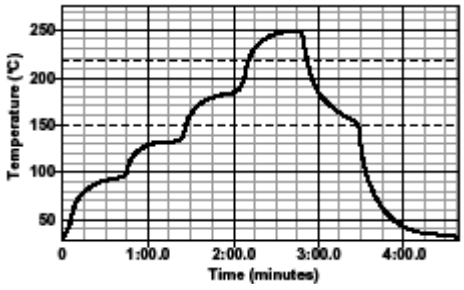


Figure 9. Lead-free (SnAgCu) Solder Ball Reflow Profile

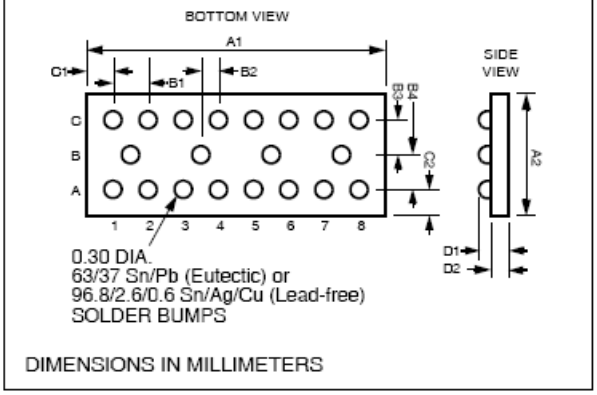
Mechanical Details

CM1405-01 Mechanical Specifications

The package dimensions for the CM1405-01 are presented below.

PACKAGE DIMENSIONS						
Package	Custom CSP					
Bumps	20					
Dim	**Millimeters**			**Inches**		
	Min	**Nom**	**Max**	**Min**	**Nom**	**Max**
A1	3.955	4.000	4.045	0.1557	0.1575	0.1593
A2	1.413	1.458	1.503	0.0556	0.0574	0.0592
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	0.200	0.250	0.300	0.0079	0.0098	0.0118
C2	0.244	0.294	0.344	0.0096	0.0116	0.0135
D1	0.562	0.606	0.650	0.0221	0.0239	0.0256
D2	0.356	0.381	0.406	0.0140	0.0150	0.0160
# per tape and reel	3500 pieces					
Controlling dimension: millimeters						

Mechanical Package Diagrams



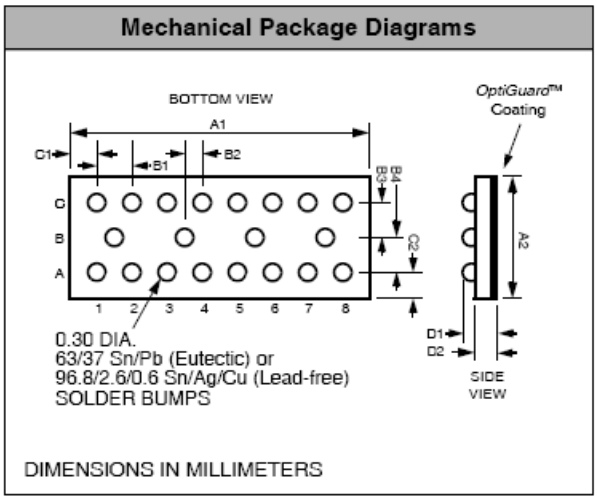
Package Dimensions for CM1405-01 Chip Scale Package

Mechanical Details (cont'd)

CM1405-03 Mechanical Specifications

The package dimensions for the CM1405-03 are presented below.

PACKAGE DIMENSIONS						
Package	Custom CSP					
Bumps	20					
Dim	**Millimeters**			**Inches**		
	Min	**Nom**	**Max**	**Min**	**Nom**	**Max**
A1	3.955	4.000	4.045	0.1557	0.1575	0.1593
A2	1.413	1.458	1.503	0.0556	0.0574	0.0592
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	0.200	0.250	0.300	0.0079	0.0098	0.0118
C2	0.244	0.294	0.344	0.0096	0.0116	0.0135
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
CM1405-03 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
CM1405-01	4.00 X 1.46 X 0.606	4.11 X 1.57 X 0.76	12mm	330mm (13")	3500	4mm	4mm
CM1405-03	4.00 X 1.46 X 0.644	4.11 X 1.57 X 0.76	12mm	330mm (13")	3500	4mm	4mm

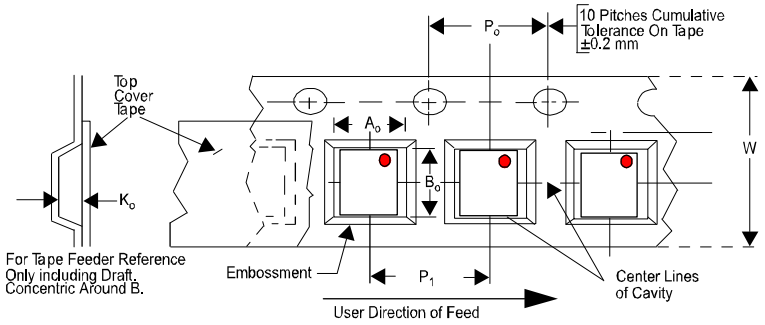


Figure 13. Tape and Reel Mechanical Data

PUBLICATION ORDERING INFORMATION

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