ON Semiconductor®

LCD EMI Filter Array with ESD Protection

CM1420-22

Features

- Functionally and pin compatible with CSPEMI606 (CM1420) and CSPEMI608 (CM1422) devices
- *OptiGuard*™ coated for improved reliability at assembly
- Six and eight channels of EMI filtering
- ±15kV ESD protection on each channel (IEC 61000-4-2 Level 4, contact discharge)
- ±30kV ESD protection on each channel (HBM)
- Better than 30dB of attenuation at 1GHz to 3GHz
- 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 (CM1420)
- 20-bump, 4.000mm x 1.458mm footprint Chip Scale Package (CM1422)
- RoHS compliant (lead-free) finishing

Applications

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

Product Description

The CM1420 and CM1422 are EMI filter arrays with ESD protection, which integrate six and eight Pi-filters (C-R-C), respectively. The CM1420/22 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 safely dissipate ESD strikes of ±15kV, well 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 CM1420/22 is ideal for EMI filtering and protecting data lines from ESD for the LCD display in clamshell handsets.

The CM1420 and CM1422 incorporate *OptiGuard*™ coating which results in improved reliability at assembly. The CM1420 and CM1422 are available in space-saving, low-profile chip-scale packages with RoHS compliant lead-free finishing.

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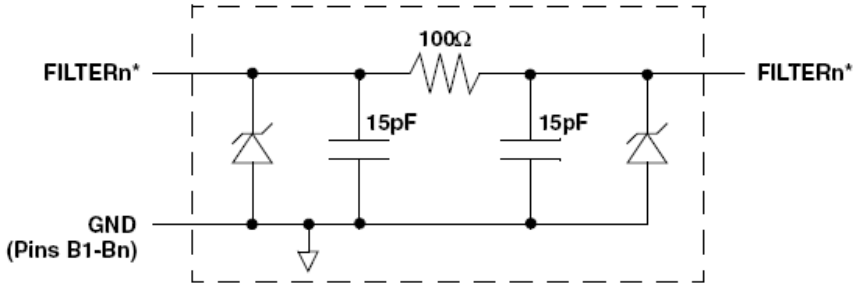
Publication Order Number:
CM1420-22/D

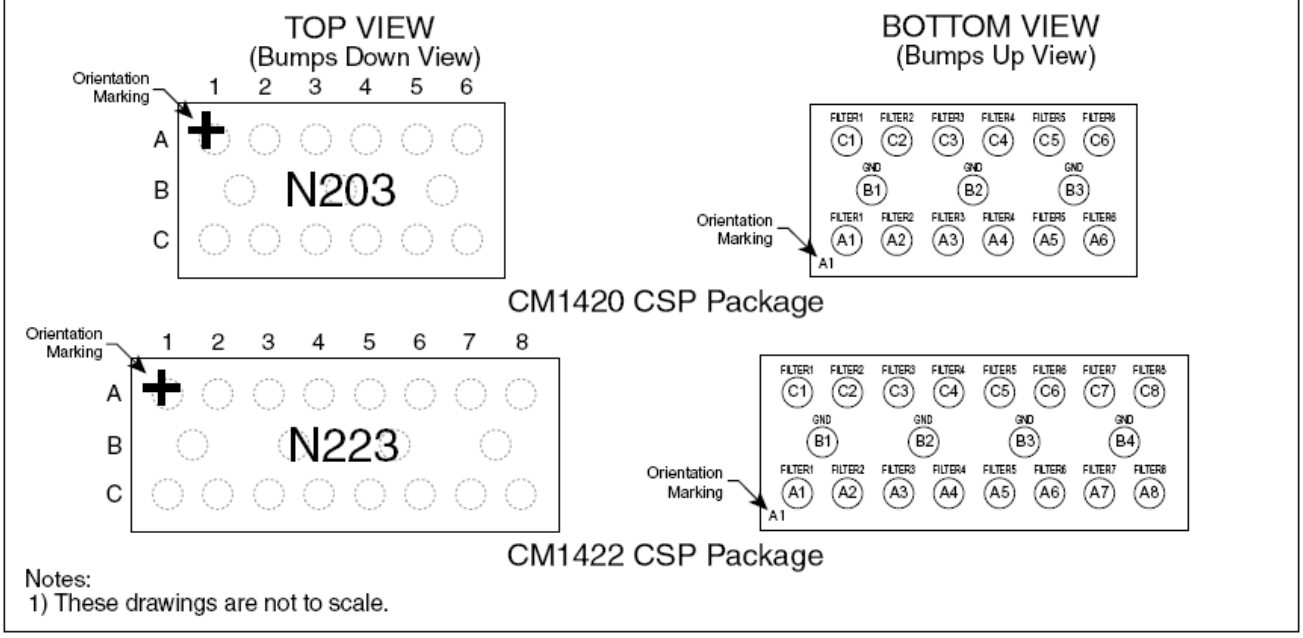
Block Diagram



1 of n EMI Filtering + ESD Channels
(n=6 for CM1420, 8 for CM1422)

* See Package/Pinout Diagram for expanded pin information.

PACKAGE / PINOUT DIAGRAMS



Notes:
1) These drawings are not to scale.

PIN DESCRIPTIONS								
CM1420	**CM1422**	**NAME**	**DESCRIPTION**		**CM1420**	**CM1422**	**NAME**	**DESCRIPTION**
PIN(s)	**PIN(s)**	**NAME**	**DESCRIPTION**		**PIN(s)**	**PIN(s)**	**NAME**	**DESCRIPTION**
A1	A1	FILTER1	Filter Channel 1		C1	C1	FILTER1	Filter Channel 1
A2	A2	FILTER2	Filter Channel 2		C2	C2	FILTER2	Filter Channel 2
A3	A3	FILTER3	Filter Channel 3		C3	C3	FILTER3	Filter Channel 3
A4	A4	FILTER4	Filter Channel 4		C4	C4	FILTER4	Filter Channel 4
A5	A5	FILTER5	Filter Channel 5		C5	C5	FILTER5	Filter Channel 5
A6	A6	FILTER6	Filter Channel 6		C6	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-B3	B1-B4	GND	Device Ground					

Ordering Information

PART NUMBERING INFORMATION			
Bumps	**Package**	**Ordering Part Number[1]**	**Part Marking**
15	CSP	CM1420-03CP	N203
20	CSP	CM1422-03CP	N223

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[1]

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
R	Resistance		80	100	120	Ω
C	Capacitance	At 2.5V DC, 1MHz, 30mV AC	12	15	18	pF
V_{DIODE}	Diode Standoff Voltage	I_{DIODE}=10μA		6.0		V
I_{LEAK}	Diode Leakage Current (reverse bias)	V_{DIODE}= 3.3V		100	200	nA
V_{SIG}	Signal Voltage Positive Clamp Negative Clamp	I_{LOAD} = 10mA; Note 3	 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 ±15			 kV kV
R_{DYN}	Dynamic Resistance Positive Negative			 2.30 0.90		 Ω Ω
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 A1, then clamping voltage is measured at Pin C1.

Performance Information

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

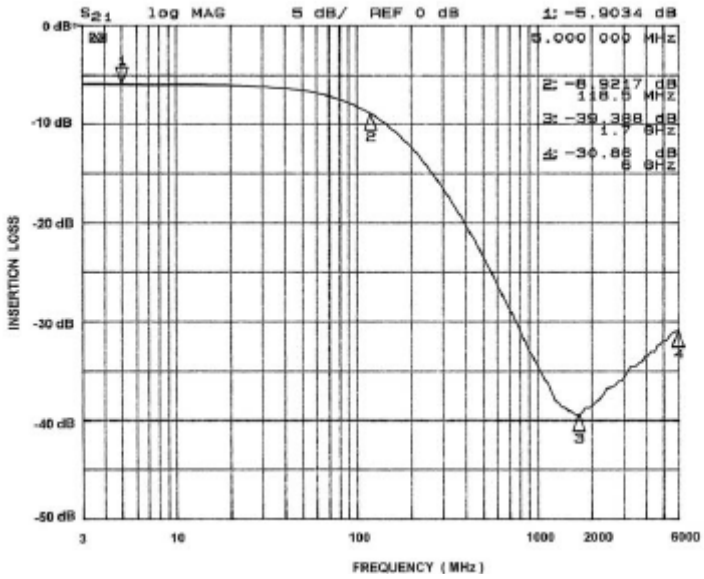


Figure 1. Insertion Loss VS. Frequency (A1-C1 to GND B1)

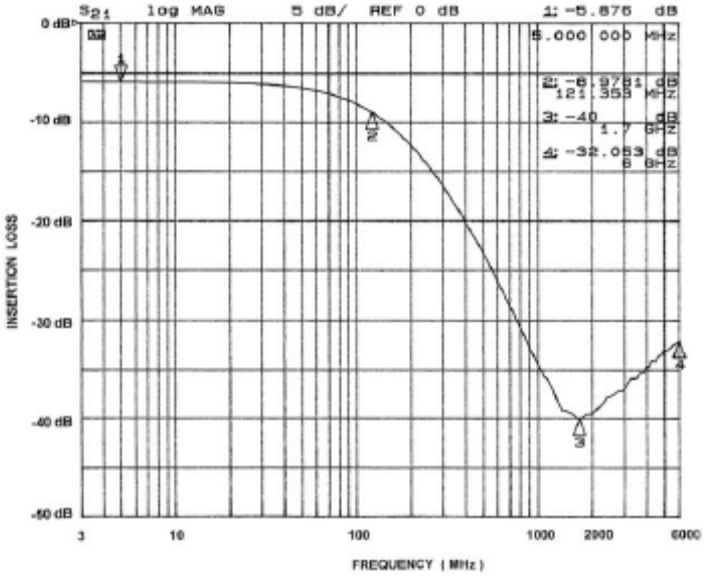


Figure 2. Insertion Loss VS. Frequency (A2-C2 to GND B1)

Performance Information (cont'd)

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

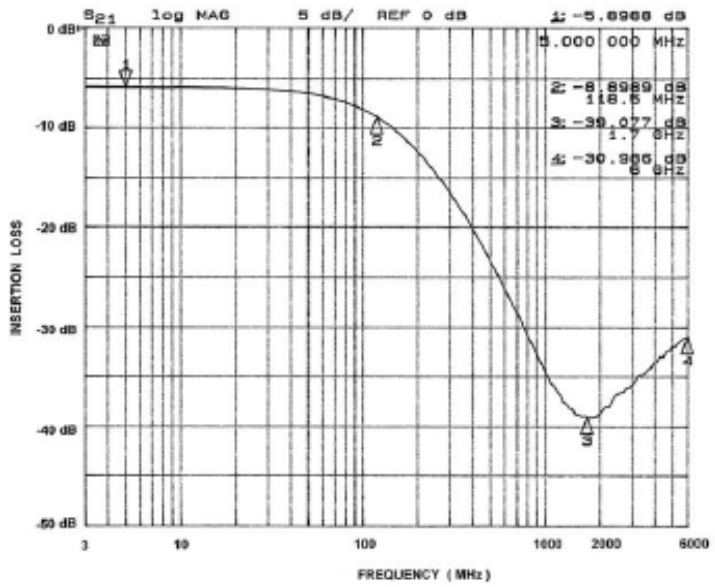


Figure 3. Insertion Loss VS. Frequency (A3-C3 to GND B2)

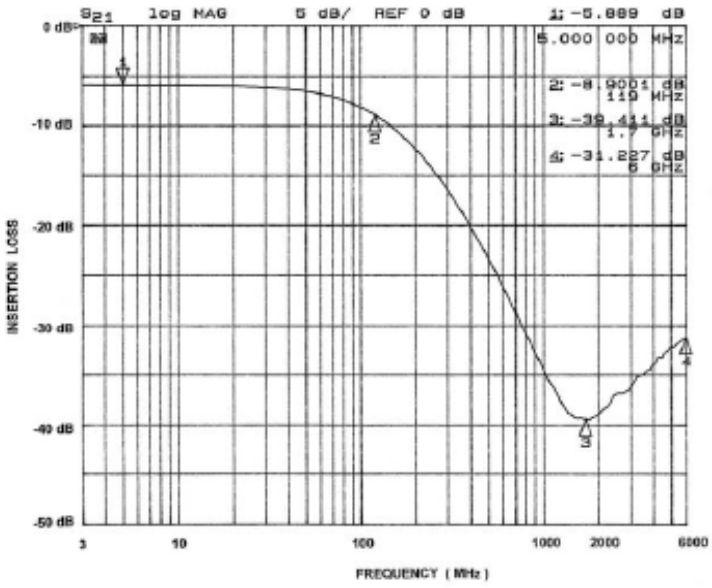


Figure 4. Insertion Loss VS. Frequency (A4-C4 to GND B2)

Performance Information (cont'd)

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

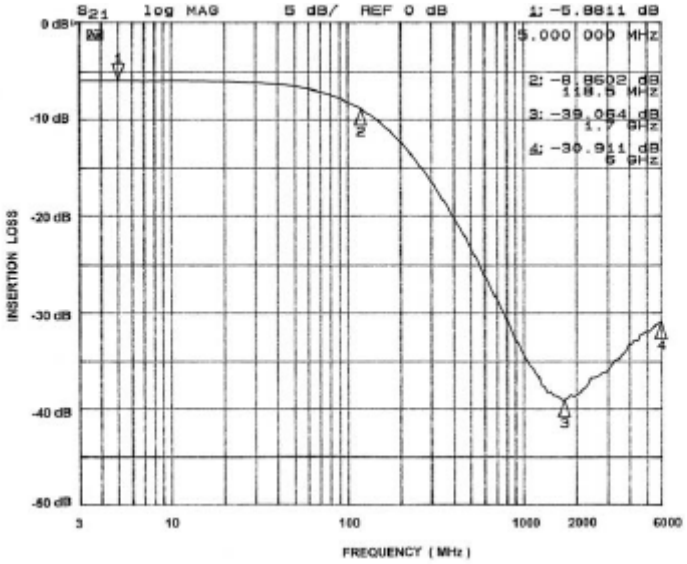


Figure 5. Insertion Loss VS. Frequency (A5-C5 to GND B3)

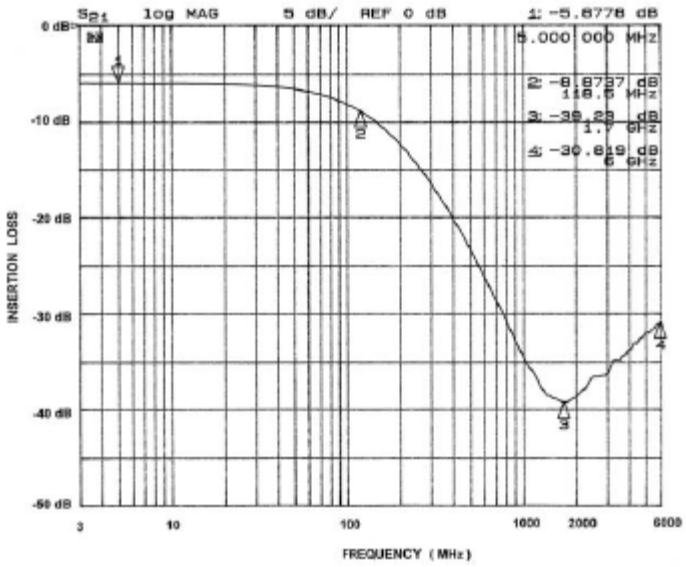


Figure 6. Insertion Loss VS. Frequency (A6-C6 to GND B3)

Performance Information (cont'd)

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

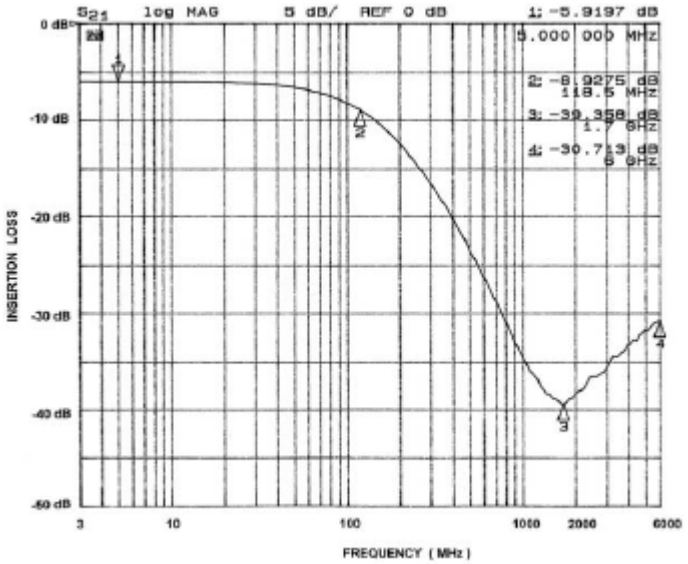


Figure 7. Insertion Loss VS. Frequency (A7-C7 to GND B4, CM1422 Only)

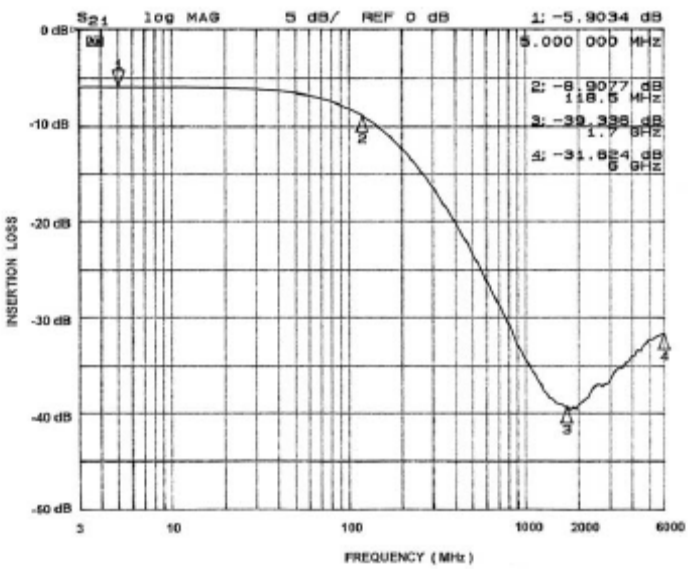


Figure 8. Insertion Loss VS. Frequency (A8-C8 to GND B4, CM1422 Only)

Performance Information (cont'd)

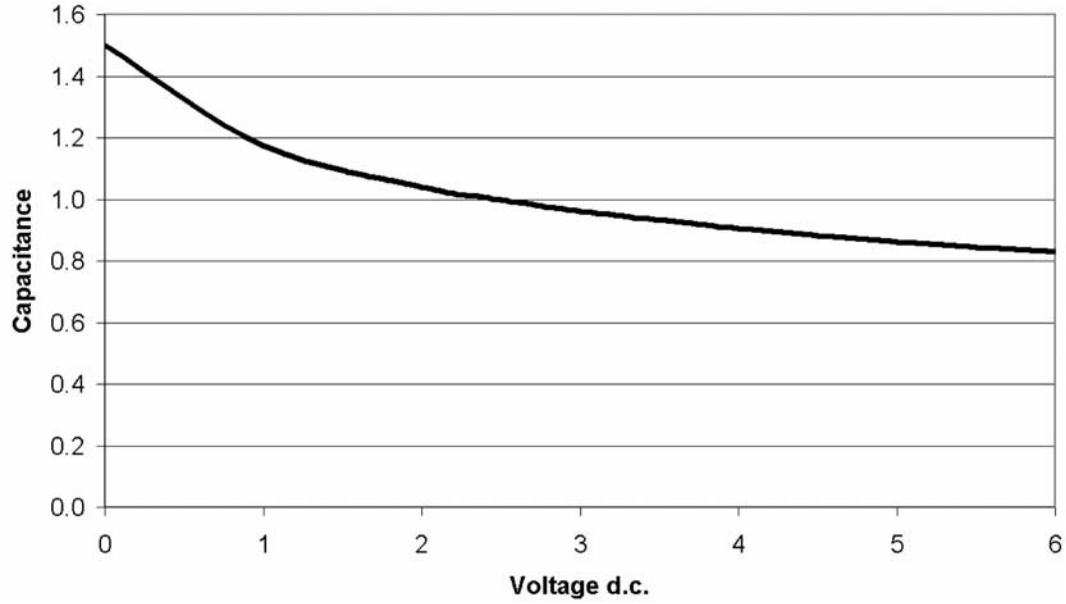


Figure 9. Filter Capacitance vs. Input Voltage over Temperature (normalized to capacitance at 2.5VDC and 25°C)

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	±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

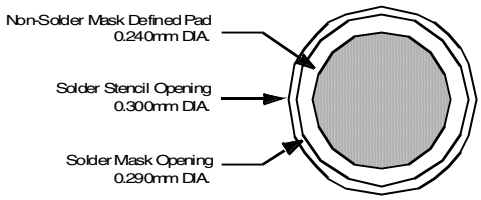


Figure 5. Recommended Non-Solder Mask Defined Pad Illustration

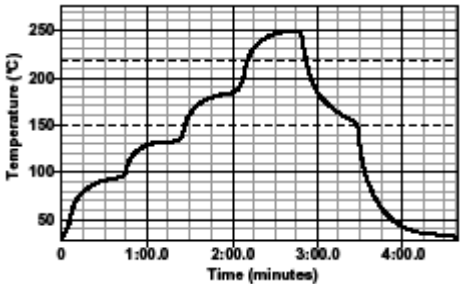


Figure 6. Lead-free (SnAgCu) Solder Ball Reflow Profile

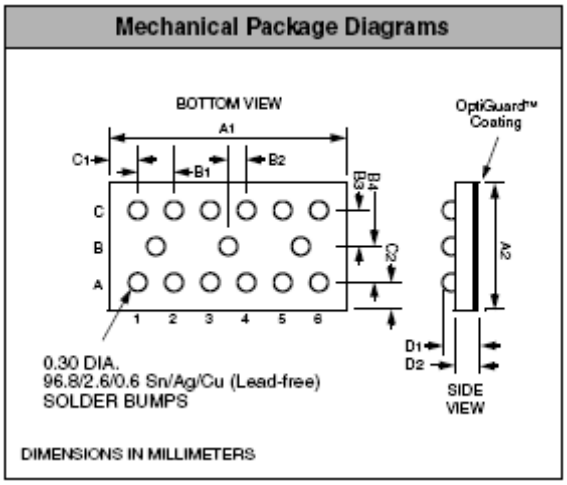
Mechanical Details

The CM1420/22 is offered in 15-bump and 20-bump custom Chip Scale Packages (CSP). Dimensions for each of these devices are presented in the following pages.

CM1420 Mechanical Specifications

The package dimensions for the CM1420 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	0.0091	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						



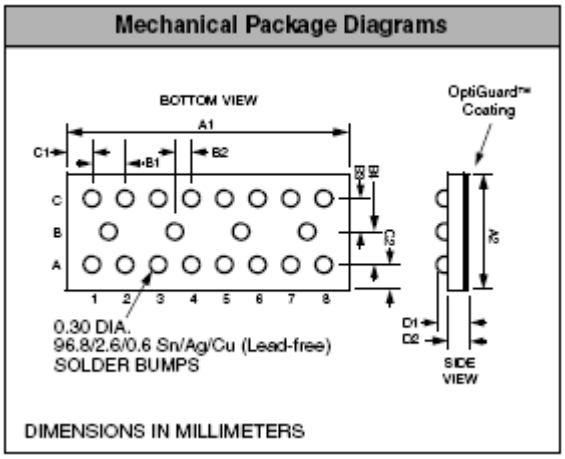
Package Dimensions for CM1420 Chip Scale Package

Mechanical Details (cont'd)

CM1422 Mechanical Specifications

The package dimensions for the CM1422 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 CM1422 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
CM1420	2.96 X 1.33 X 0.644	3.10 X 1.45 X 0.74	8mm	178mm (7")	3500	4mm	4mm
CM1422	4.00 X 1.46 X 0.644	4.11 X 1.57 X 0.76	8mm	178mm (7")	3500	4mm	4mm

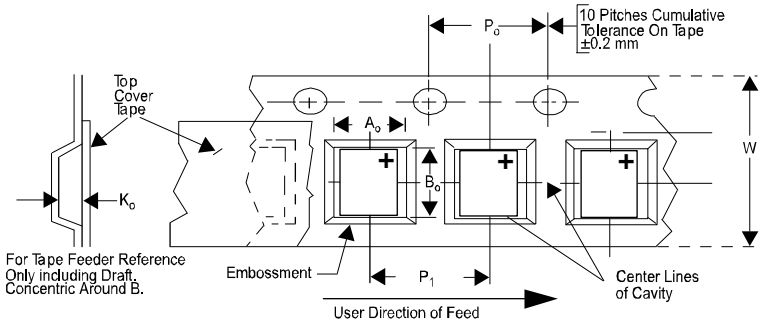


Figure 12. Tape and Reel Mechanical Data

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
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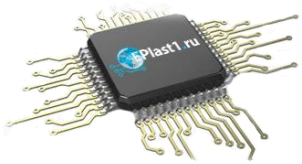

Как с нами связаться

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