

## 4 and 8-Channel ESD Protection Arrays in CSP

### Features

- 4 and 8 channels of ESD protection
- *OptiGuard*<sup>™</sup> coated for improved reliability
- $\pm 15\text{kV}$  ESD protection on each channel (IEC 61000-4-2 Level 4, contact discharge)
- $\pm 30\text{kV}$  ESD protection on each channel (HBM)
- Chip Scale Package features extremely low lead inductance for optimum ESD protection
- 5 bump, 0.960mm X 1.330mm CSP footprint for CM1220-04
- 10 bump, 1.960mm X 1.330mm CSP footprint for CM1220-08
- Lead-free version available

### Applications

- LCD and camera datalines in mobile handsets
- I/O port protection for mobile handsets, notebook computers, PDAs, etc.
- Keypads and buttons
- Wireless handsets
- Handheld PCs/PDAs
- LCD and camera modules

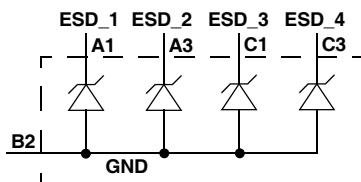
### Product Description

California Micro Devices' CM1220 ESD protection arrays are available in four and eight channel configurations. Each ESD channel features a nominal capacitance of 14pF making these devices ideal for protecting high speed I/O ports and LCD and camera data lines without significantly affecting signal integrity. The CM1220 integrates avalanche-type ESD diodes on every channel, providing a very high level of protection for sensitive electronic components that may be subjected to electrostatic discharge (ESD). These diodes safely dissipate ESD strikes of  $\pm 15\text{kV}$ , 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, these devices protect for contact discharges at greater than  $\pm 30\text{kV}$ .

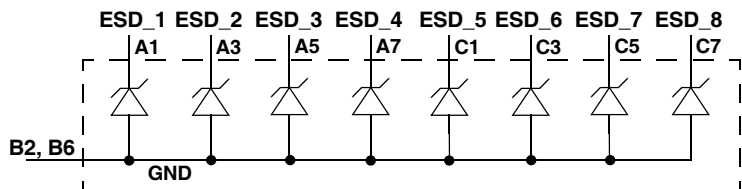
These devices are particularly well-suited for portable electronics (e.g. wireless handsets, PDAs, notebook computers) because of their small package and easy-to-use pin assignments. In particular, the CM1220 is ideal for protecting high speed I/O ports and data and control lines for the LCD display and camera interface in mobile handsets.

These devices incorporate CMD's *OptiGuard*<sup>™</sup> coating for improved reliability at assembly. The CM1220 is available in a space-saving, low-profile Chip Scale Packages with optional lead-free finishing.

### Electrical Schematic

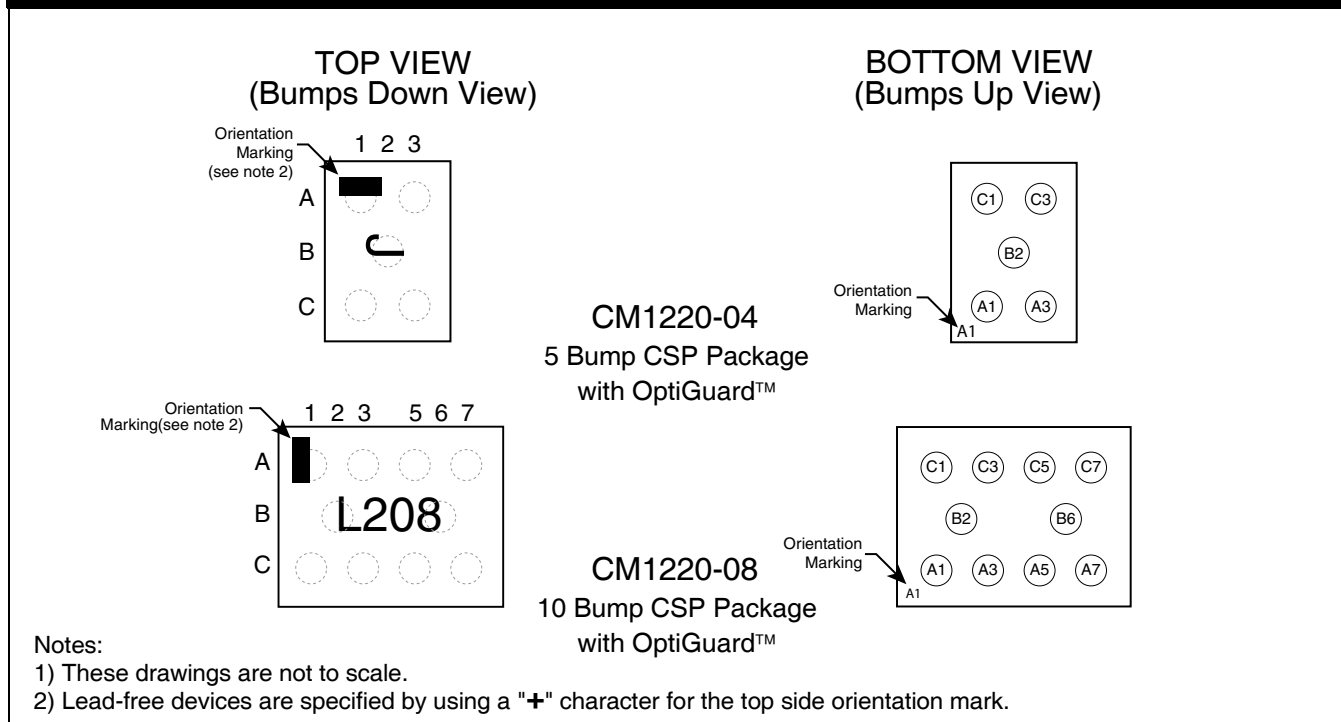


CM1220-04



CM1220-08

**PACKAGE / PINOUT DIAGRAMS**



**PIN DESCRIPTIONS**

CM1220-08		CM1220-04		DESCRIPTION	CM1220-08		CM1220-04		DESCRIPTION
PINS	NAME	PINS	NAME		PINS	NAME	PINS	NAME	
A1	ESD1	A1	ESD1	ESD Channel	C1	ESD5	C1	ESD3	ESD Channel
A3	ESD2	A3	ESD2	ESD Channel	C3	ESD6	C3	ESD4	ESD Channel
A5	ESD3	-	-	ESD Channel	C5	ESD7	-	-	ESD Channel
A7	ESD4	-	-	ESD Channel	C7	ESD8	-	-	ESD Channel
B2	GND	B2	GND	Device Ground	B6	GND	-	-	Device Ground

**Ordering Information**

**PART NUMBERING INFORMATION**

Bumps	Package	Standard Finish		Lead-free Finish <sup>2</sup>	
		Ordering Part Number <sup>1</sup>	Part Marking	Ordering Part Number <sup>1</sup>	Part Marking
5	CSP	CM1220-04CS	J	CM1220-04CP	J
10	CSP	CM1220-08CS	L208	CM1220-08CP	L208

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

### 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
$C_{DIODE}$	Diode (Channel) Capacitance	At 2.5VDC Reverse Bias, 1MHz, 30mVAC	11	14	17	pF
$V_{DIODE}$	Diode Standoff Voltage	$I_{DIODE} = 10\mu A$		6.0		V
$I_{LEAK}$	Diode Leakage Current	$V_{IN} = +3.3V$ (reverse bias voltage)		0.1	1	$\mu A$
$V_{SIG}$	Signal Clamp Voltage Positive Clamp Negative Clamp	$I_{DIODE} = 10mA$	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	Note 2	$\pm 30$ $\pm 15$			kV kV
$R_{DYN}$	Dynamic Resistance Positive Negative			2.3 0.9		$\Omega$ $\Omega$

Note 1:  $T_A = 25^\circ C$  unless otherwise specified.

Note 2: ESD applied to input and output pins with respect to GND, one at a time. Unused pins are left open. These parameters are guaranteed by design and characterization.

## Performance Information

Diode Characteristics (nominal conditions unless specified otherwise)

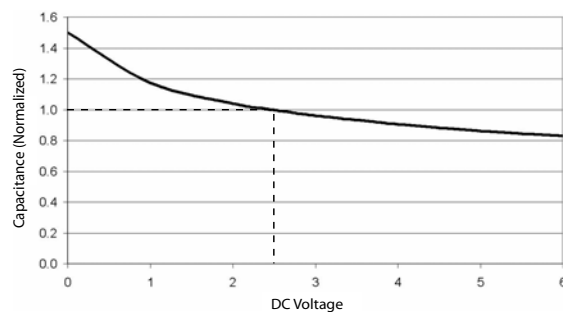


Figure 1. Typical Diode Capacitance VS. Input Voltage (normalized to 2.5VDC)

## 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	$\pm 50\mu\text{m}$
Solder Ball Side Coplanarity	$\pm 20\mu\text{m}$
Maximum Dwell Time Above Liquidous	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

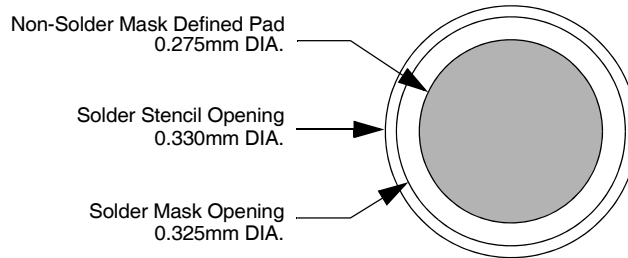


Figure 2. Recommended Non-Solder Mask Defined Pad Illustration

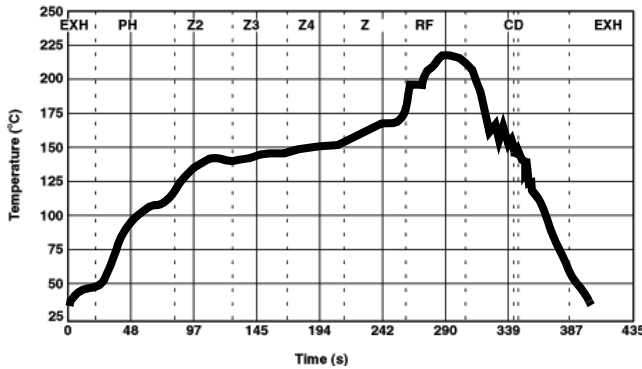


Figure 3. Eutectic (SnPb) Solder Ball Reflow Profile

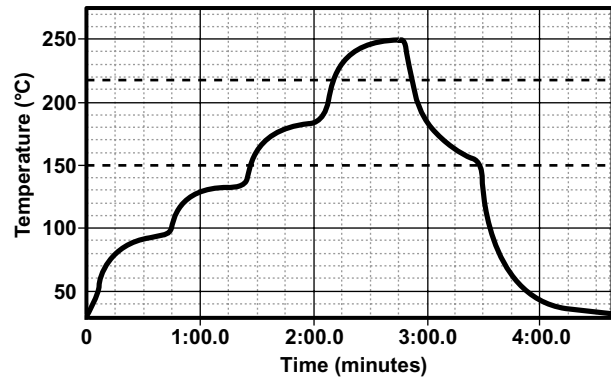


Figure 4. Lead-free (SnAgCu) Solder Ball Reflow Profile

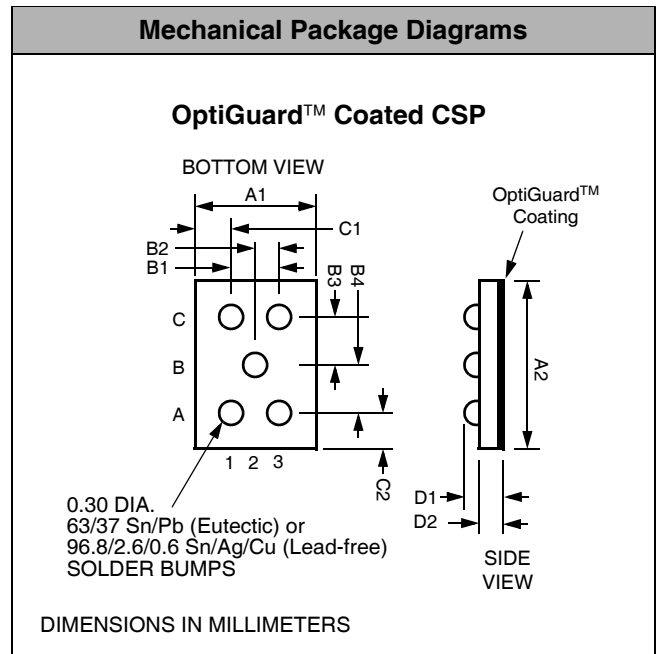
## Mechanical Details

The CM1220 is supplied in custom Chip Scale Packages (CSP) depending on the channel count. Dimensions for these packages are presented in the following pages.

### CM1220-04CS/CP Mechanical Specifications

Mechanical dimensions for the CM1220-04CS/CP are presented below.

PACKAGE DIMENSIONS						
Package	Custom CSP					
Bumps	5					
Dim	Millimeters			Inches		
	Min	Nom	Max	Min	Nom	Max
A1	0.915	0.960	1.005	0.0360	0.0378	0.0396
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 CM1220-04CS/CP Chip Scale Package

### CSP Tape and Reel Specifications

PART NUMBER	CHIP SIZE (mm)	POCKET SIZE (mm) B <sub>0</sub> X A <sub>0</sub> X K <sub>0</sub>	TAPE WIDTH W	REEL DIAMETER	QTY PER REEL	P <sub>0</sub>	P <sub>1</sub>
CM1220-04	1.33 X 0.96 X 0.644	1.42 X 1.07 X 0.740	8mm	178mm (7")	3500	4mm	4mm

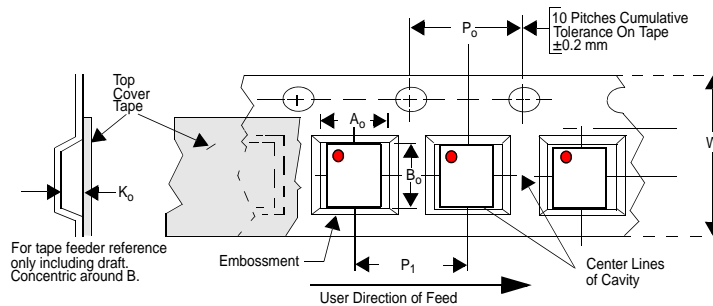


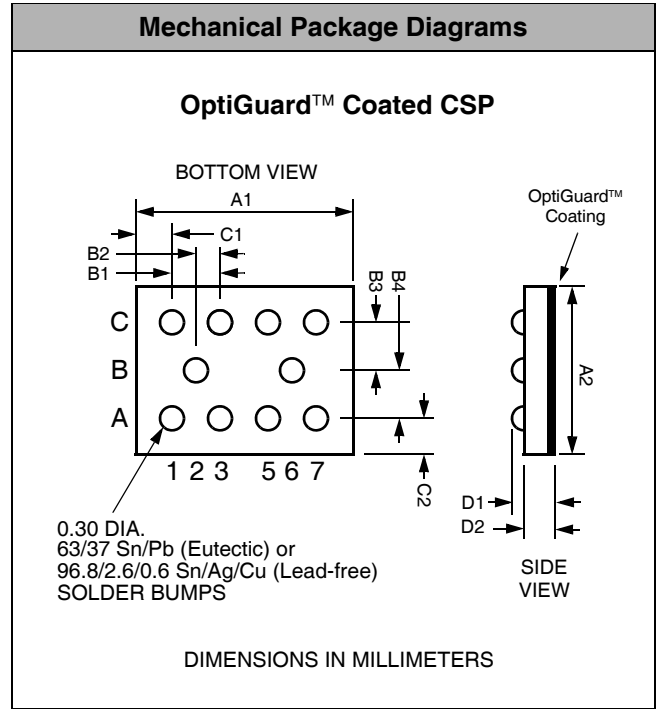
Figure 5. Tape and Reel Mechanical Data

## Mechanical Details (cont'd)

### CM1220-08CS/CP Mechanical Specifications

Mechanical dimensions for the CM1220-08CS/CP 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	0.0091	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 CM1220-08CS/CP  
Chip Scale Package

### CSP Tape and Reel Specifications

PART NUMBER	CHIP SIZE (mm)	POCKET SIZE (mm) B <sub>0</sub> X A <sub>0</sub> X K <sub>0</sub>	TAPE WIDTH W	REEL DIAMETER	QTY PER REEL	P <sub>0</sub>	P <sub>1</sub>
CM1220-08	1.96 X 1.33 X 0.644	2.08 X 1.45 X 0.740	8mm	178mm (7")	3500	4mm	4mm

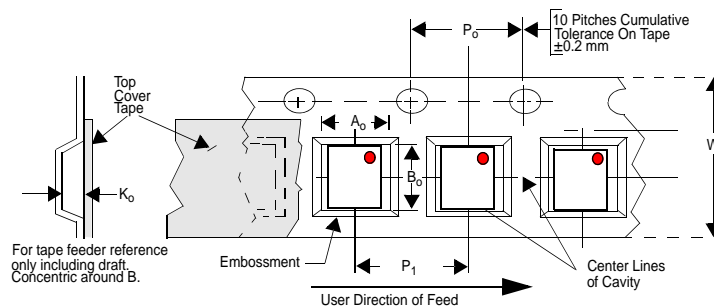


Figure 6. Tape and Reel Mechanical Data