1, 2 and 3-Channel ESD Arrays in CSP

Features

- Functionally and pin compatible with CMD's CSPESD301/302/303 family of devices
- OptiGuard™ coated for improved reliability at assembly
- 1, 2 or 3 channels of ESD protection
- ±15kV ESD protection (IEC 61000-4-2, contact discharge)
- ±30kV ESD protection (HBM)
- Supports both AC and DC signal applications
- Low leakage current (<100nA)
- Chip Scale Package features extremely low lead inductance for optimum ESD and filter performance
- 4 bump, 1.06 x 0.93mm footprint Chip Scale Package (CSP)
- Lead-free version available

Applications

- I/O port protection
- EMI filtering for data ports
- Cellphones, notebook computers, PDAs
- Wireless Handsets
- MP3 Players
- Digital Still Cameras
- Handheld PCs

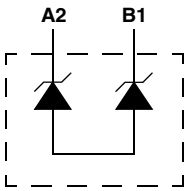
Product Description

The CM1203 comprises a family of 1, 2, and 3-channel ESD protection arrays, which integrate two, three and four identical avalanche-style diodes. It is intended that one of these diodes is connected to GND and the other diodes provide ESD protection for up to 3 lines depending upon the configuration utilized. The back-to-back diode connections provide ESD protection for nodes that have AC signals up to 5.9V peak. These devices provide a very high level of protection for sensitive electronic components that may be subjected to electrostatic discharge (ESD). The diodes are designed and characterized to safely dissipate ESD strikes of ±15kV, well beyond the maximum requirements of the IEC 61000-4-2 international standard. Using the MIL-STD-883 (Method 3015) specification for Human Body Model (HBM) ESD, these devices protect against contact discharges of greater than ±30kV. The diodes also provide some EMI filtering, when used in combination with a PCB trace or series resistor.

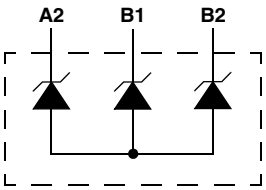
These devices are particularly well-suited for portable electronics (e.g. cellular telephones, PDAs, notebook computers) because of their small package format and easy-to-use pin assignments.

The CM1203 incorporates OptiGuard™ coating which results in improved reliability at assembly. The CM1203 is available in a space-saving, low-profile, chip-scale package with optional lead-free finishing.

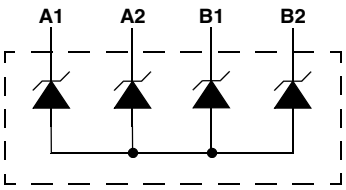
Electrical Schematics



CM1203-01

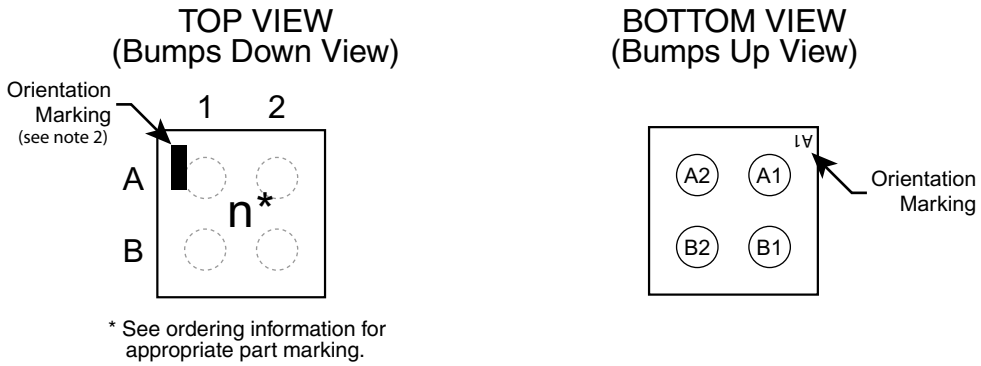


CM1203-02



CM1203-03

PACKAGE / PINOUT DIAGRAMS



* See ordering information for appropriate part marking.

CM1203
4-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.
3) All 4 bumps are always present. Unused bumps are electrically unconnected.

Ordering Information

PART NUMBERING INFORMATION

Bumps	Package	Standard Finish		Lead-free Finish[2]	
		Ordering Part Number[1]	Part Marking	Ordering Part Number[1]	Part Marking
4	CSP	CM1203-01CS	P	CM1203-01CP	P
4	CSP	CM1203-02CS	Q	CM1203-02CP	Q
4	CSP	CM1203-03CS	R	CM1203-03CP	R

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 Package Power Rating	200	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
V_{SO}	Diode Stand-off Voltage	I_{DIODE} = ±10µA	±5.9			V
I_{LEAK}	Diode Leakage Current	V_{IN}=3.3V			100	nA
V_{SIG}	Small Signal Clamp Voltage Positive Clamp Negative Clamp	 I_{DIODE} = 10mA I_{DIODE} = -10mA	 6.0 -9.2	 7.6 -7.6	 9.2 -6.0	 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	Notes 2, 3 and 4	 ±30 ±15			 kV kV
V_{CL}	Clamping Voltage during ESD Discharge MIL-STD-883 (Method 3015), 8kV Between adjacent bumps Between diagonal bumps	Notes 2, 3 and 4		 19.5 19.9		 V V
R_D	Dynamic Resistance Between adjacent bumps Between diagonal bumps	Notes 2, 3 and 4		 0.85 1.10		 Ω Ω
C	Capacitance	At 0VDC, 1MHz, 30mVAC		27		pF

Note 1: T_A=25°C unless otherwise specified.

Note 2: ESD applied to input and output pins with respect to another diode, one at a time.

Note 3: Unused pins are left open.

Note 4: These parameters are guaranteed by design and characterization.

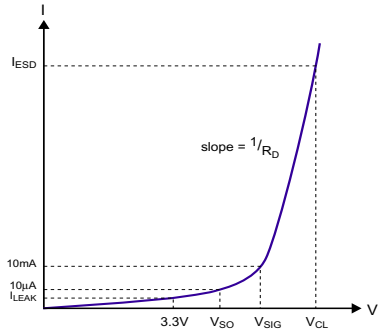


Figure 1. Parameter Legend

Performance Information

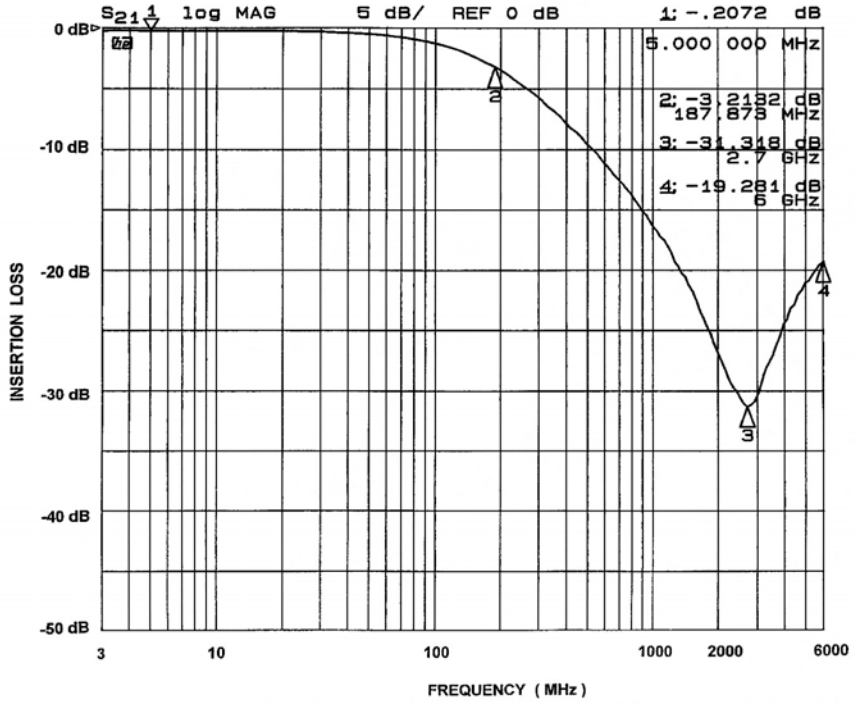


Figure 2. Typical EMI Filter Performance (0VDC, 50 Ohm Environment)

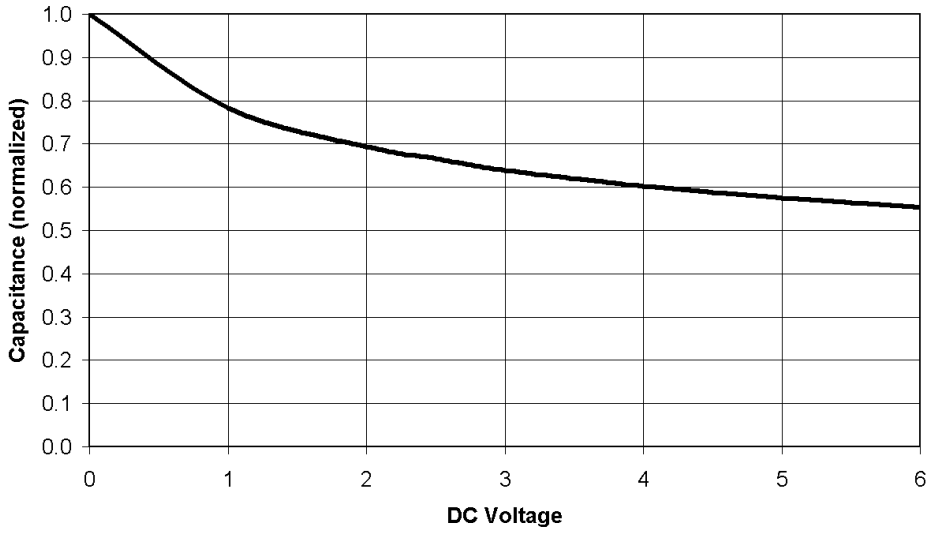


Figure 3. Typical Capacitance vs. Input Voltage (normalized to 0VDC)

Performance Information (cont'd)

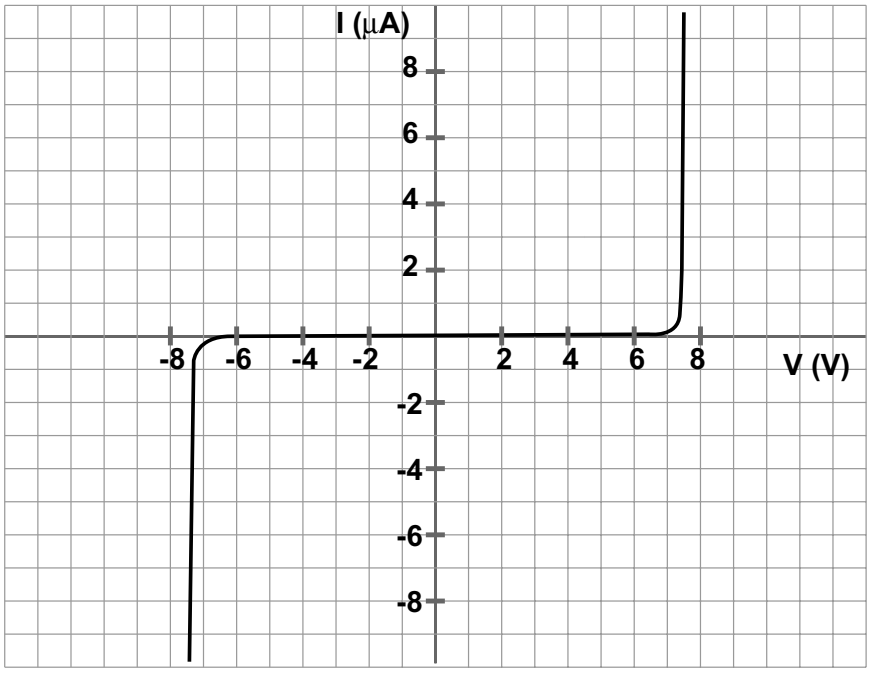


Figure 4. Low Current I-V Curve

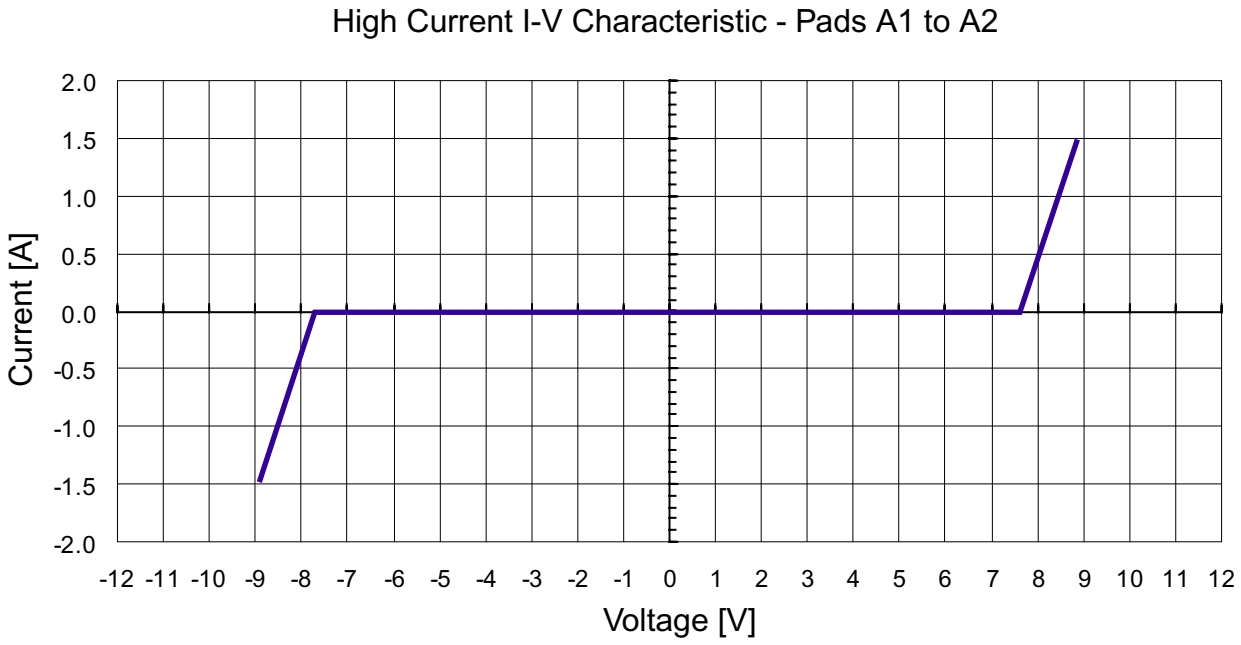


Figure 5. High Current I-V Curve

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	60 seconds
Soldering Maximum Temperature	260°C

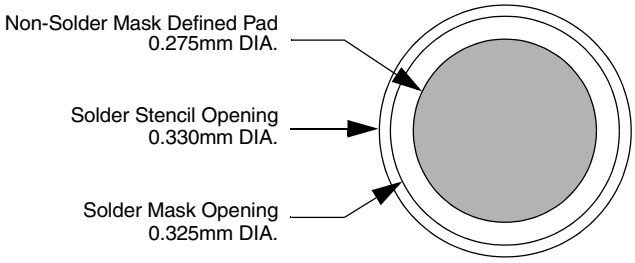


Figure 6. Recommended Non-Solder Mask Defined Pad Illustration

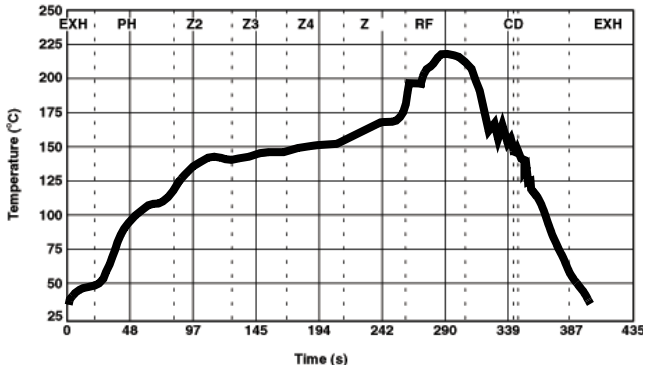


Figure 7. Eutectic (SnPb) Solder Ball Reflow Profile

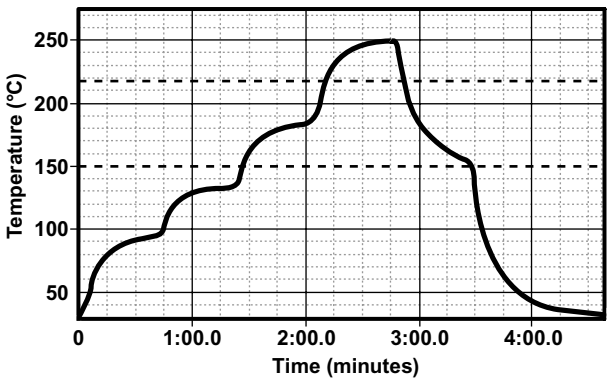


Figure 8. Lead-free (SnAgCu) Solder Ball Reflow Profile

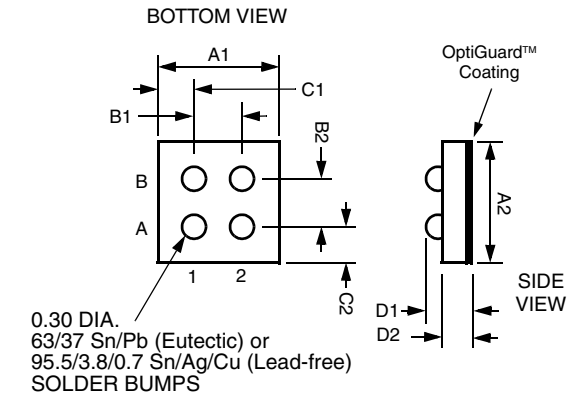
Mechanical Details

CSP Mechanical Specifications

CM1203 devices are packaged in a custom Chip Scale Package (CSP). Dimensions are shown below. For complete information on CSP packaging, see the California Micro Devices CSP Package Information document.

PACKAGE DIMENSIONS						
Package	Custom CSP					
Bumps	4					
Dim	**Millimeters**			**Inches**		
	Min	**Nom**	**Max**	**Min**	**Nom**	**Max**
A1	0.881	0.925	0.971	0.0347	0.0365	0.0382
A2	1.015	1.060	1.105	0.0400	0.0417	0.0435
B1	0.495	0.500	0.505	0.0195	0.0197	0.0199
B2	0.495	0.500	0.505	0.0195	0.0197	0.0199
C1	0.163	0.213	0.263	0.0064	0.0084	0.0104
C2	0.230	0.280	0.330	0.0091	0.0110	0.0130
D1	0.600	0.670	0.739	0.0236	0.0264	0.0291
D2	0.394	0.445	0.495	0.0155	0.0175	0.0195
# per tape and reel	3500 pieces					
Controlling dimension: millimeters						

Mechanical Package Diagrams



Package Dimensions for CM1203 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
CM1203	1.06 X 0.93 X 0.670	1.14 X 1.00 X 0.70	8mm	178mm (7")	3500	4mm	4mm

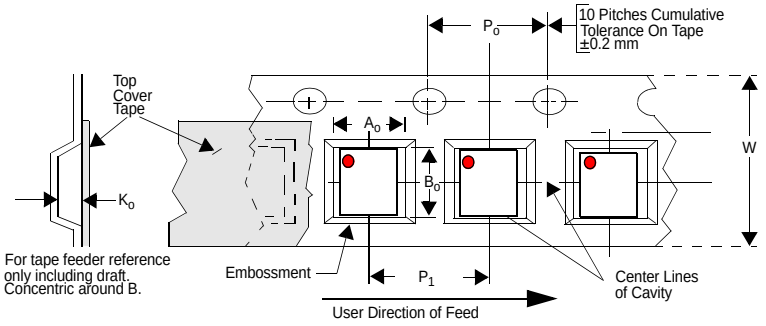


Figure 9. Tape and Reel Mechanical Data