1,2 and 3-Channel ESD Arrays in CSP

Features

- 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
- 4 bump, 1.06 x 0.93mm footprint Chip Scale Package (CSP)
- Chip Scale Package features extremely low lead inductance for optimum ESD and filter performance

Applications

- I/O port protection for cellphones, notebook computers, PDAs etc.
- EMI filtering for data ports in cell phones, PDAs or notebook computers.
- Wireless Handsets
- MP3 Players
- Digital Still Cameras
- Handheld PCs / PDAs

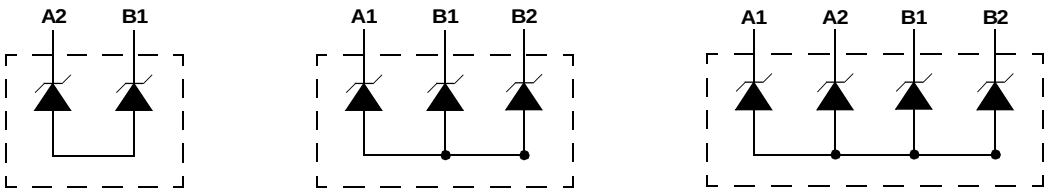
Product Description

The CSPESD301/302/303 is 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 present. 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 protection against contact discharges at greater than ±30kV. The diodes can also provide some EMI filtering, when used in combination with a PCB trace or series resistor.

This device is particularly well suited for portable electronics (e.g. cellular telephones, PDAs, notebook computers) because of its small package format and easy-to-use pin assignments.

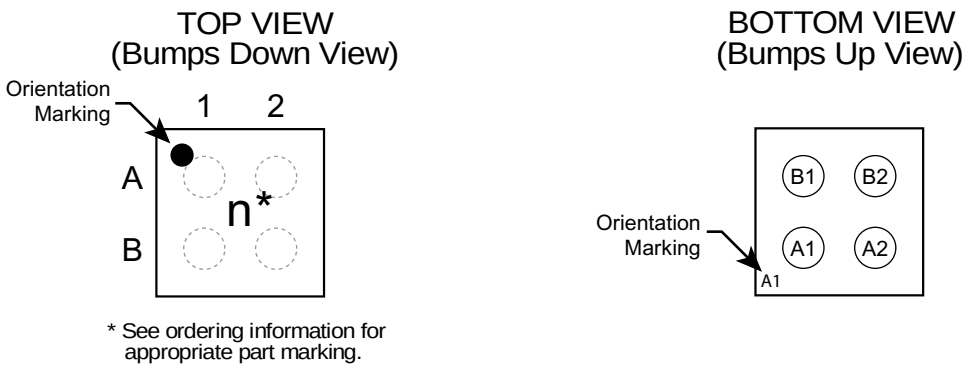
The CSPESD301/2/3 is available in a space-saving, low-profile, chip-scale package, and is fabricated with one of California Micro Devices' semiconductor processes.

Electrical Schematics



CSPEMI301 **CSPEMI302** **CSPEMI303**

PACKAGE / PINOUT DIAGRAMS



* See ordering information for appropriate part marking.

CSPESD301/302/303 4-Bump CSP Package

Notes:
1) These drawings are not to scale.
2) All 4 bumps are always present. Unused bumps are electrically unconnected.

Ordering Information

PART NUMBERING INFORMATION

Pins (Bumps)	Package	Ordering Part Number[1]	Part Marking
4	CSP	CSPESD301	F
4	CSP	CSPESD302	G
4	CSP	CSPESD303	H

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 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_{DIODE}	Diode Stand-off Voltage	I_{DIODE} = ±10µA	±5.9			V
I_{LEAK}	Diode Leakage Current	V_{IN}=3.3V			100	nA
V_{SIG}	Signal 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 Positive Transients Negative Transients	Notes 2, 3 and 4		 +19 -10		 V V
C_{DIODE}	Diode Capacitance	At 0VDC, 1MHz, 30mVAC		30		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.

Performance Information

Simulated EMI Filter Performance (0 VDC, 50 Ohm Environment)

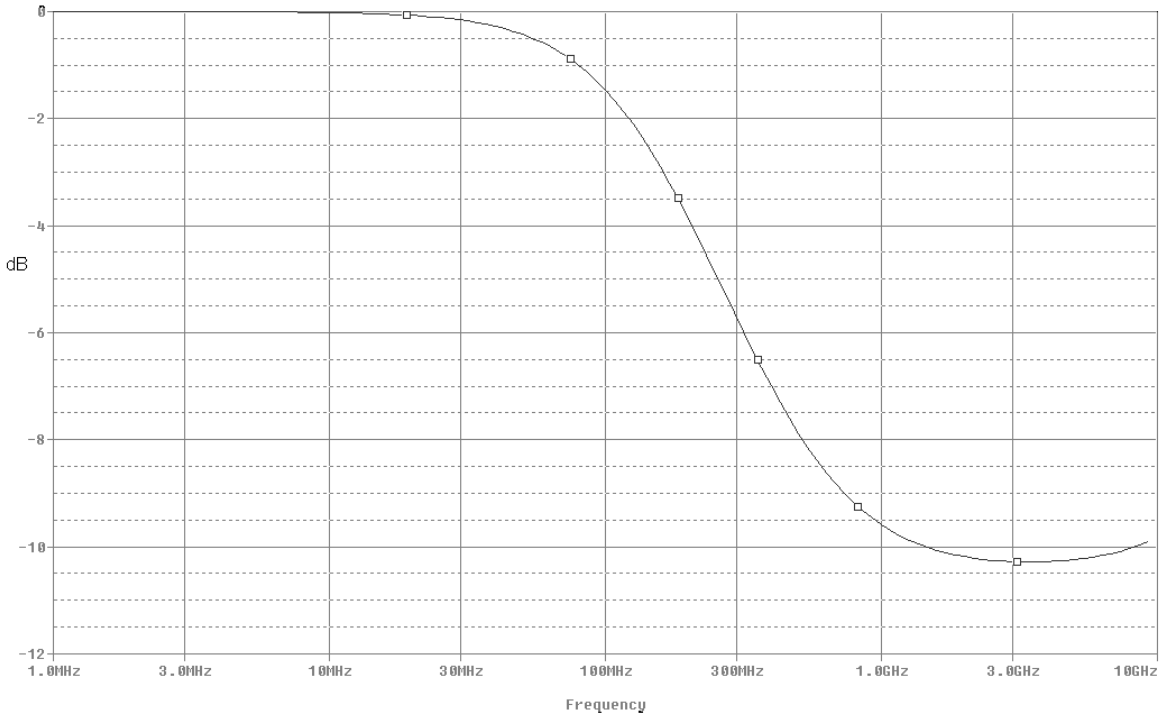


Figure 1. Typical EMI Filter Performance (Simulated)

Diode Capacitance

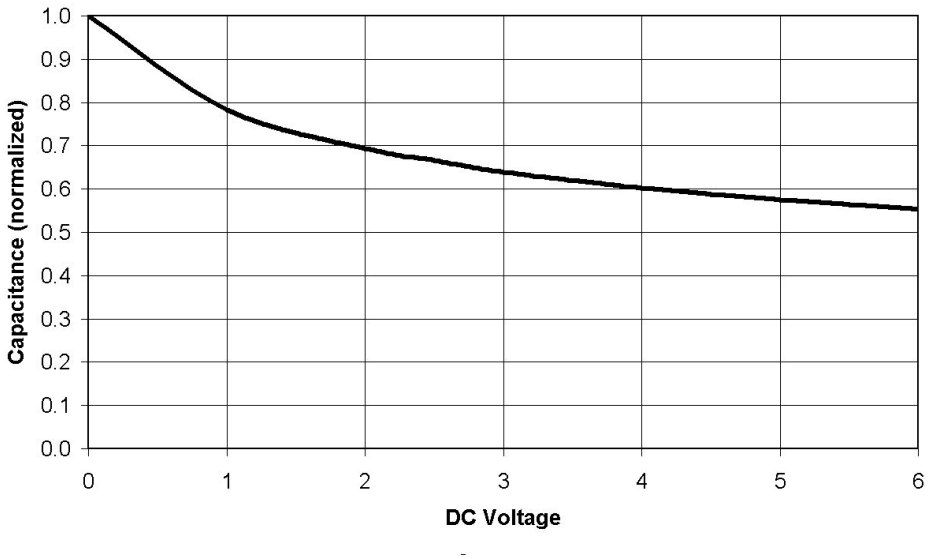


Figure 2. Typical Diode Capacitance VS. Input Voltage (normalized to 0Vdc)

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	0.150mm
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 (183°C)	60 seconds
Soldering Maximum Temperature	240°C

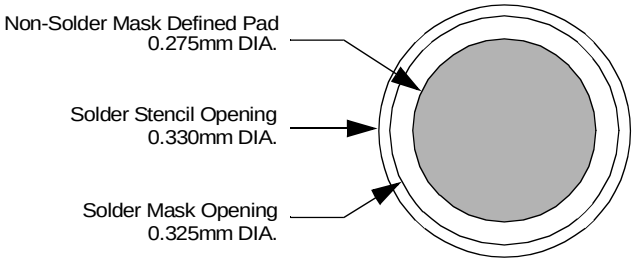


Figure 3. Recommended Non-Solder Mask Defined Pad Illustration

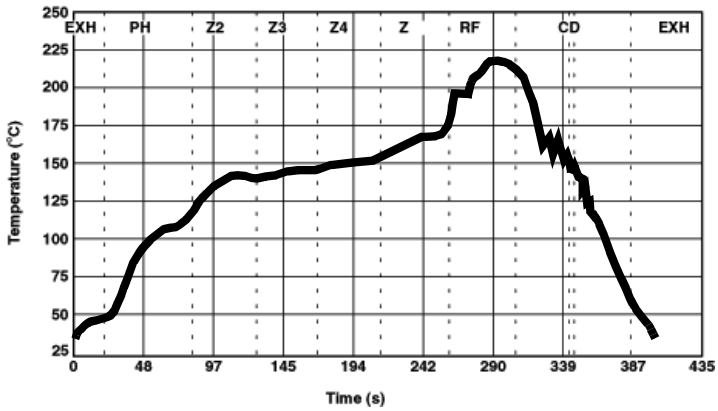


Figure 4. Solder Reflow Profile

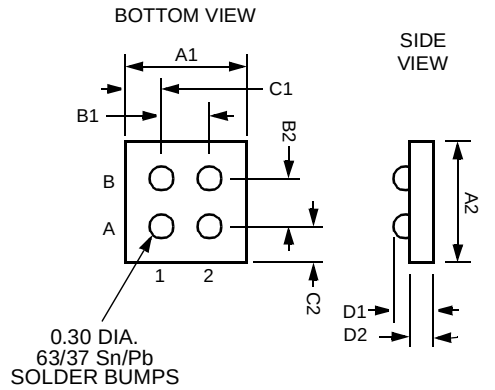
Mechanical Details

CSP Mechanical Specifications

CSPESD301/302/303 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	0.561	0.605	0.649	0.0221	0.0238	0.0255
D2	0.355	0.380	0.405	0.0140	0.0150	0.0159
# per tape and reel	3500 pieces					
Controlling dimension: millimeters						

Mechanical Package Diagrams



Package Dimensions for CSPESD301/302/303 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
CSPESD301 CSPESD302 CSPESD303	1.33 X 0.96 X 0.6	1.14 X 1.01 X 0.70	8mm	178mm (7")	3500	4mm	4mm

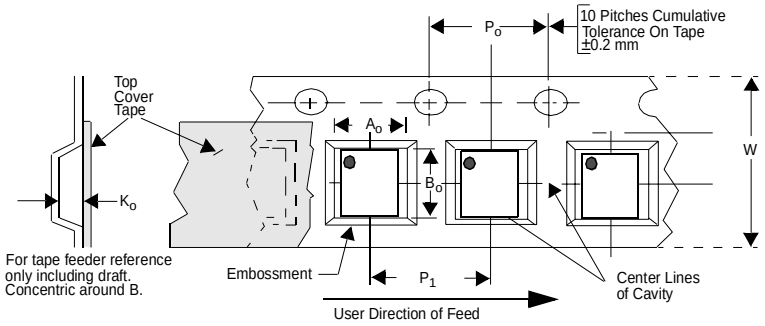


Figure 5. Tape and Reel Mechanical Data