CSPESD304

4-Channel ESD Array in CSP

ON Semiconductor®

http://onsemi.com

WLCSP5
CASE 567AY

Product Description

The CSPESD304 is a quad ESD transient voltage suppression diode array. Each diode provides 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 ±15 kV, exceeding 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 device provides protection for contact discharges to greater than ±30 kV.

The CSPESD304 is particularly well−suited for portable electronics (e.g., cellular telephones, PDAs, notebook computers) because of its small package and low weight.

The CSPESD304 is available in a space−saving, low−profile Chip Scale Package with lead−free finishing.

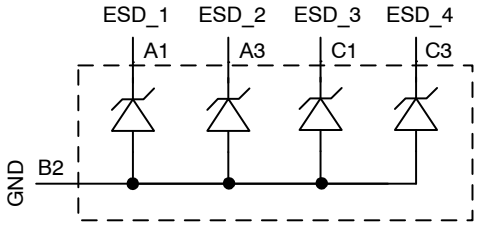
Features

- Four Channels of ESD Protection
- ±15 kV ESD Protection on each Channel (IEC 61000−4−2 Level 4, Contact Discharge)
- ±30 kV ESD Protection on each Channel (HBM)
- Chip Scale Package Features Extremely Low Lead Inductance for Optimum ESD Protection
- 5−Bump, 0.960 mm x 1.330 mm Footprint Chip Scale Package (CSP)
- These Devices are Pb−Free and are RoHS Compliant

Applications

- ESD Protection for Sensitive Electronic Equipment
- I/O Port and Keypad and Button Circuitry Protection for Portable Devices
- Can be Used for EMI Filtering when Combined with External Series Resistance
- Wireless Handsets
- Handheld PCs / PDAs
- MP3 Players
- Digital Camcorders
- Notebooks
- Desktop PCs

ELECTRICAL SCHEMATIC



MARKING DIAGRAM

E = CSPESD304

ORDERING INFORMATION

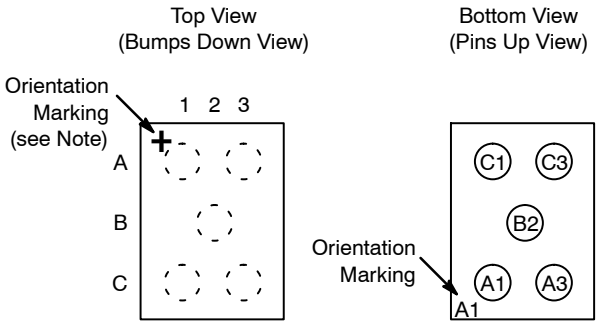
Device	Package	Shipping†
CSPESD304	CSP−5 (Pb−Free)	3500/Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specification Brochure, BRD8011/D.

Table 1. PIN DESCRIPTIONS

5−bump CSP Package		
Pin	**Name**	**Description**
A1	ESD_1	ESD Channel 1
A3	ESD_2	ESD Channel 2
B2	GND	Device Ground
C1	ESD_3	ESD Channel 3
C3	ESD_4	ESD Channel 4

PACKAGE / PINOUT DIAGRAMS



CSPESD304
CSP Package

Note: Lead−free devices are specified by using a "+" character for the top side orientation mark.

SPECIFICATIONS

Table 2. ABSOLUTE MAXIMUM RATINGS

Parameter	Rating	Units
Storage Temperature Range	−65 to +150	°C
DC Package Power Rating	200	mW

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

Table 3. STANDARD OPERATING CONDITIONS

Parameter	Rating	Units
Operating Temperature Range	−40 to +85	°C

Table 4. ELECTRICAL OPERATING CHARACTERISTICS (Note 1)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
V_{DIODE}	Diode Reverse Breakdown Voltage	I_{DIODE} = 10 μA	5.5			V
I_{LEAK}	Diode Leakage Current	V_{IN} = 3.3 V, T_A = 25°C			100	nA
V_{SIG}	Signal Voltage Positive Clamp Negative Clamp	I_{DIODE} = 10 mA	 5.6 −0.4	 6.8 −0.8	 9.0 −1.5	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
V_{CL}	Clamping Voltage during ESD Discharge MIL−STD−883 (Method 3015), 8 kV Positive Transients Negative Transients	(Note 2)		 +15 −8		V
C_{DIODE}	Diode Capacitance	At 2.5 VDC Reverse Bias, 1 MHz, 30 mVAC	22	27	32	pF

1. T_A = −40 to +85°C unless otherwise specified.
2. ESD applied to input and output pins with respect to GND, one at a time.

PERFORMANCE INFORMATION

Diode Characteristics (nominal conditions unless specified otherwise)

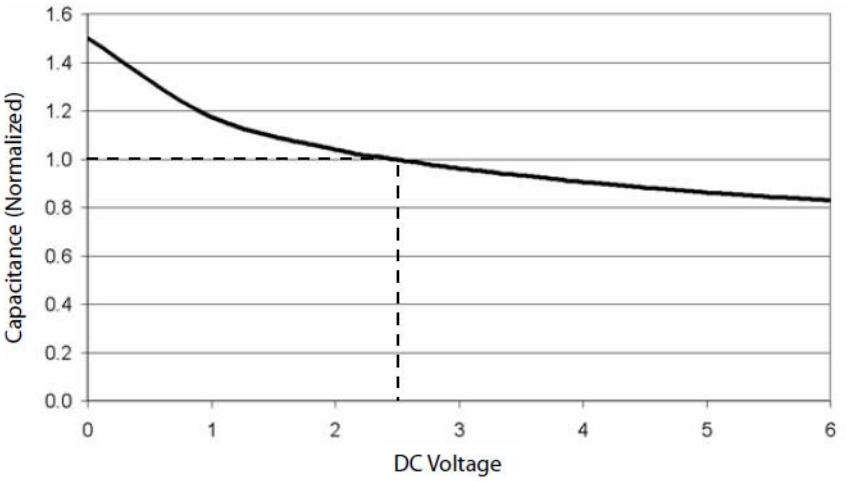


Figure 1. Typical Diode Capacitance vs. Input Voltage (normalized to 2.5 VDC)

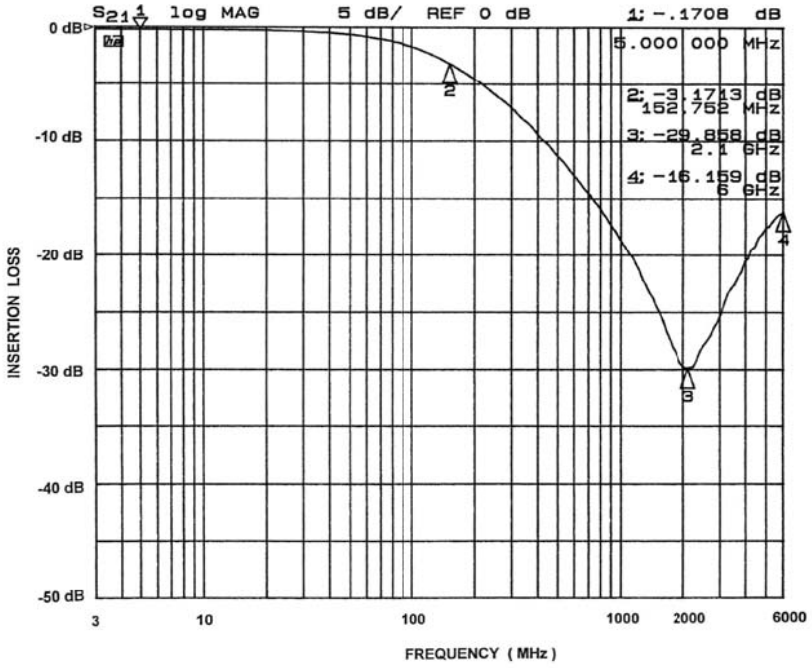


Figure 2. Frequency Response (single channel vs. GND, in 50 Ω system)

APPLICATION INFORMATION

Parameter	Value
Pad Size on PCB	0.240 mm
Pad Shape	Round
Pad Definition	Non−Solder Mask defined pads
Solder Mask Opening	0.290 mm Round
Solder Stencil Thickness	0.125 mm − 0.150 mm
Solder Stencil Aperture Opening (laser cut, 5% tapered walls)	0.300 mm 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	±50 μm
Solder Ball Side Coplanarity	±20 μm
Maximum Dwell Time Above Liquidous	60 seconds
Maximum Soldering Temperature for Lead−free Devices using a Lead−free Solder Paste	260°C

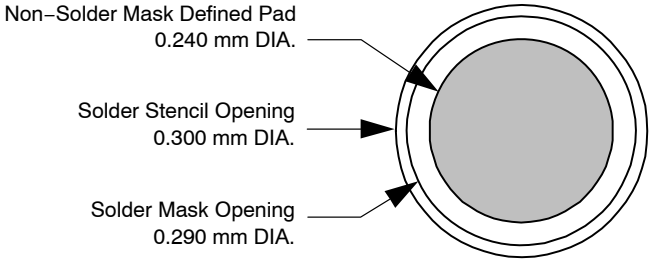


Figure 3. Recommended Non−Solder Mask Defined Pad Illustration

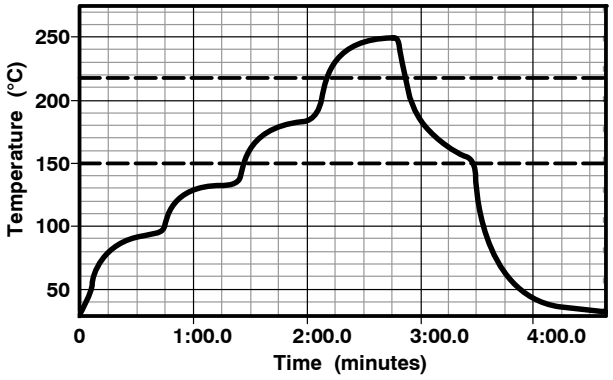
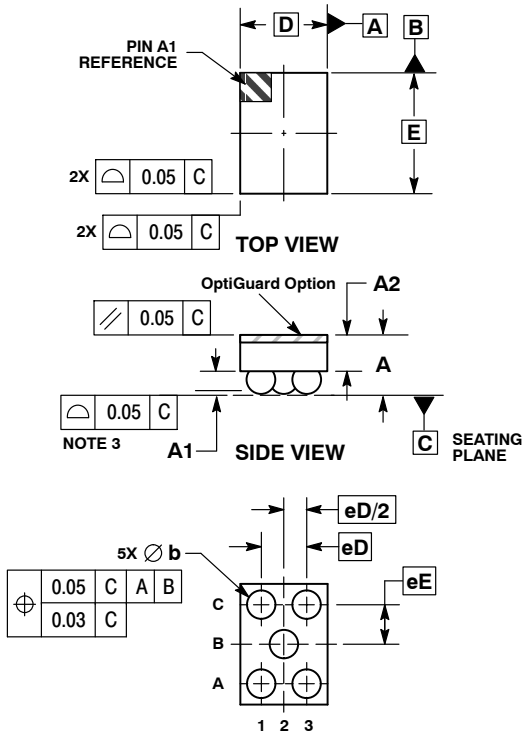


Figure 4. Lead−free (SnAgCu) Solder Ball Reflow Profile

CSPESD304

PACKAGE DIMENSIONS

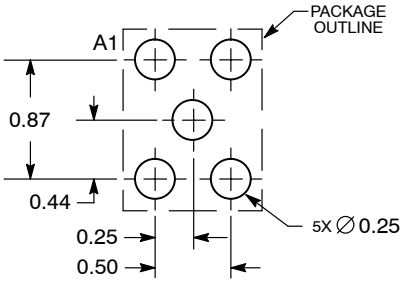
WLCSP5, 0.96x1.33
CASE 567AY−01
ISSUE O



NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. COPLANARITY APPLIES TO SPHERICAL CROWNS OF SOLDER BALLS.

DIM	MILLIMETERS MIN	MAX
A	0.56	0.72
A1	0.21	0.27
A2	0.40 REF	
b	0.29	0.35
D	0.96 BSC	
E	1.33 BSC	
eD	0.50 BSC	
eE	0.435 BSC	

RECOMMENDED SOLDERING FOOTPRINT*



DIMENSIONS: MILLIMETERS

*For additional information on our Pb−Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Literature Distribution Center for ON Semiconductor
P.O. Box 5163, Denver, Colorado 80217 USA
Phone: 303−675−2175 or 800−344−3860 Toll Free USA/Canada
Fax: 303−675−2176 or 800−344−3867 Toll Free USA/Canada
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Order Literature: http://www.onsemi.com/orderlit

For additional information, please contact your local Sales Representative

CSPESD304/D