

CSPESD304

4-Channel ESD Array in CSP

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



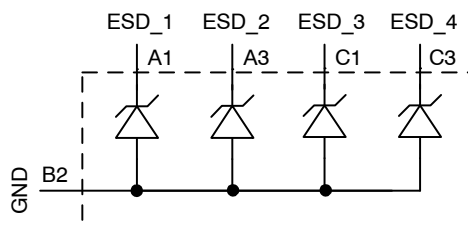
ON Semiconductor®

<http://onsemi.com>

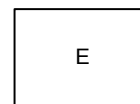


**WLCSP5
CASE 567AY**

ELECTRICAL SCHEMATIC



MARKING DIAGRAM



E = CSPESD304

ORDERING INFORMATION

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

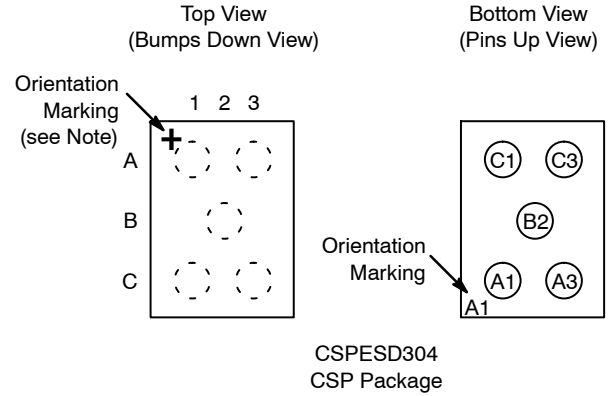
[†]For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specification Brochure, BRD8011/D.

CSPESED304

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



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	$I_{DIODE} = 10 \mu A$	5.5			V
I_{LEAK}	Diode Leakage Current	$V_{IN} = 3.3 V, T_A = 25^\circ C$			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

- $T_A = -40$ to $+85^\circ C$ unless otherwise specified.
- ESD applied to input and output pins with respect to GND, one at a time.

PERFORMANCE INFORMATION

Diode Characteristics (nominal conditions unless specified otherwise)

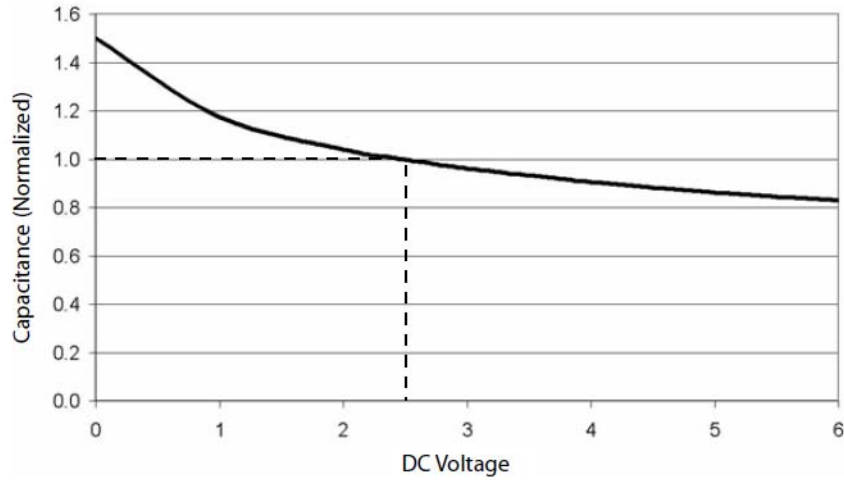


Figure 1. Typical Diode Capacitance vs. Input Voltage (normalized to 2.5 VDC)

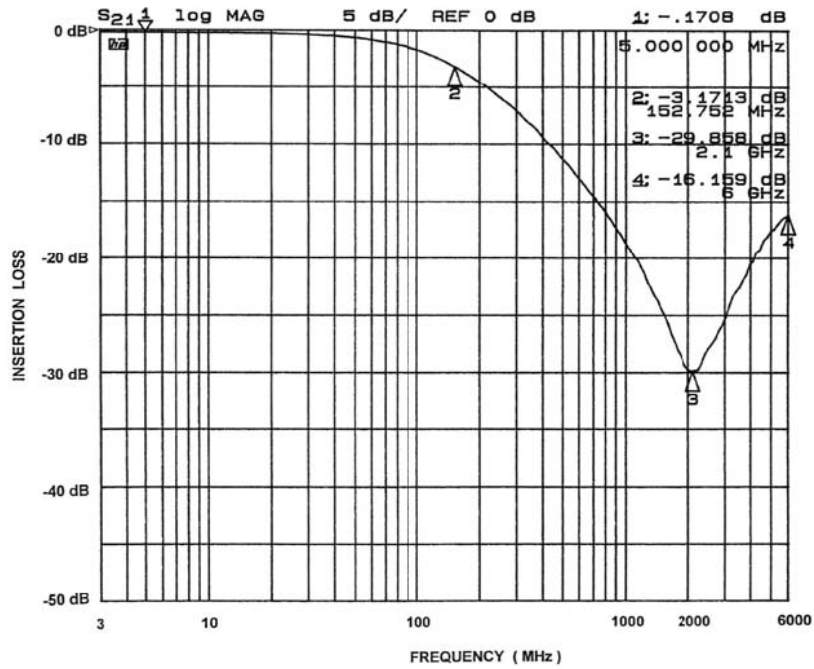


Figure 2. Frequency Response (single channel vs. GND, in 50 Ω system)

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	$\pm 50\ \mu\text{m}$
Solder Ball Side Coplanarity	$\pm 20\ \mu\text{m}$
Maximum Dwell Time Above Liquidous	60 seconds
Maximum Soldering Temperature for Lead-free Devices using a Lead-free Solder Paste	260°C

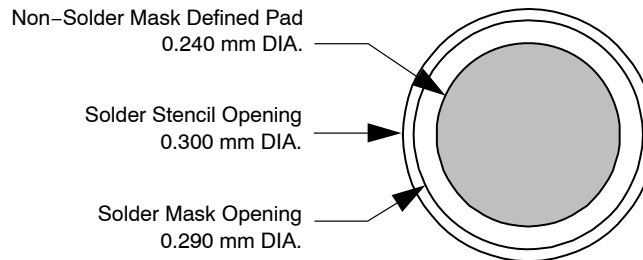


Figure 3. Recommended Non-Solder Mask Defined Pad Illustration

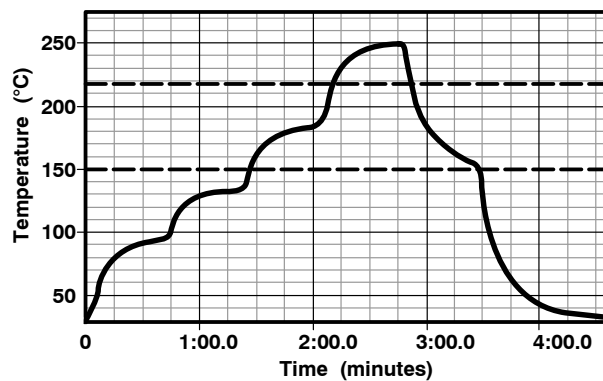
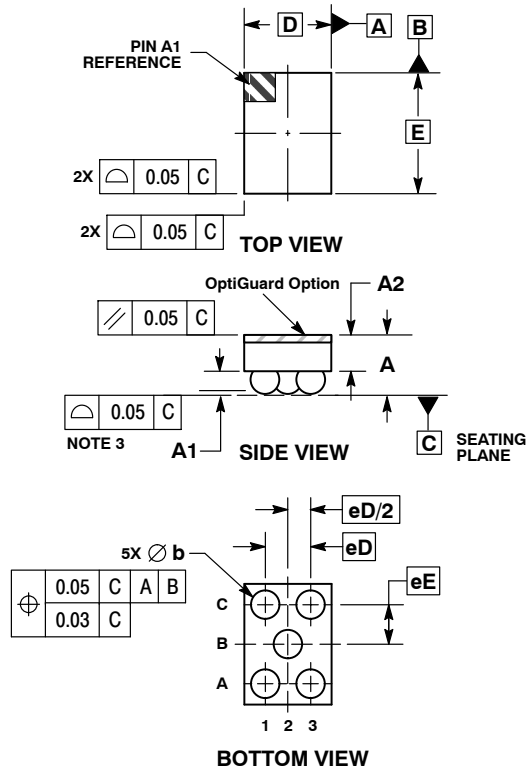


Figure 4. Lead-free (SnAgCu) Solder Ball Reflow Profile

CSPESD304

PACKAGE DIMENSIONS

WLCSP5, 0.96x1.33
CASE 567AY-01
ISSUE 0

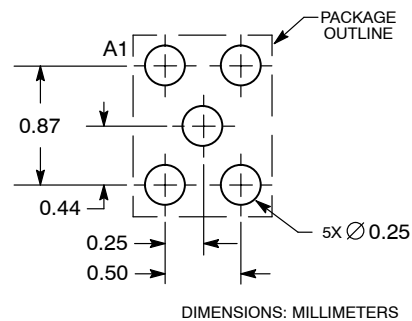


NOTES:

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*



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

ON Semiconductor and are registered trademarks of Semiconductor Components Industries, LLC (SCILLC). SCILLC reserves the right to make changes without further notice to any products herein. SCILLC makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does SCILLC assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. "Typical" parameters which may be provided in SCILLC data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. SCILLC does not convey any license under its patent rights nor the rights of others. SCILLC products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the SCILLC product could create a situation where personal injury or death may occur. Should Buyer purchase or use SCILLC products for any such unintended or unauthorized application, Buyer shall indemnify and hold SCILLC and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that SCILLC was negligent regarding the design or manufacture of the part. SCILLC is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

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
Email: orderlit@onsemi.com

N. American Technical Support: 800-282-9855 Toll Free
USA/Canada
Europe, Middle East and Africa Technical Support:
Phone: 421 33 790 2910
Japan Customer Focus Center
Phone: 81-3-5773-3850

ON Semiconductor Website: www.onsemi.com

Order Literature: <http://www.onsemi.com/orderlit>

For additional information, please contact your local Sales Representative