

# ESD8472

## Ultra-Low Capacitance ESD Protection Diodes

### Micro-Packaged Diodes for ESD Protection

The ESD8472 is designed to protect voltage sensitive components that require ultra-low capacitance from ESD and transient voltage events. Excellent clamping capability, low capacitance, high breakdown voltage, high linearity, low leakage, and fast response time make these parts ideal for ESD protection on designs where board space is at a premium. It has industry leading capacitance linearity over voltage making it ideal for RF applications. This capacitance linearity combined with the extremely small package and low insertion loss makes this part well suited for use in antenna line applications for wireless handsets and terminals.

#### Features

- Industry Leading Capacitance Linearity Over Voltage
- Ultra-Low Capacitance: 0.2 pF
- Insertion Loss: 0.030 dBm
- 0201DNS Package: 0.60 mm x 0.30 mm
- Stand-off Voltage: 5.3 V
- Low Leakage: < 1 nA
- Low Dynamic Resistance: < 1  $\Omega$
- 1000 ESD IEC61000-4-2 Strikes  $\pm 8$  kV Contact / Air Discharged
- SZ Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable
- These Devices are Pb-Free, Halogen Free and are RoHS Compliant

#### Typical Applications

- RF Signal ESD Protection
- RF Switching, PA, and Antenna ESD Protection
- Near Field Communications
- USB 2.0, USB 3.0

#### MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ unless otherwise noted)

Rating	Symbol	Value	Unit
IEC 61000-4-2 Level 4 (Contact) (Note 1) IEC 61000-4-2 Level 4 (Air) (Note 1)	ESD	$\pm 20$ $\pm 20$	kV
Maximum Peak Pulse Current IEC 61000-4-5 8/20 $\mu\text{s}$ (Lightning) (Note 2)	$I_{PP}$	3.0	A
Total Power Dissipation (Note 3) @ $T_A = 25^\circ\text{C}$ Thermal Resistance, Junction-to-Ambient	$P_D$ $R_{\theta JA}$	300 400	mW $^\circ\text{C/W}$
Junction and Storage Temperature Range	$T_J, T_{stg}$	-55 to +150	$^\circ\text{C}$
Lead Solder Temperature – Maximum (10 Second Duration)	$T_L$	260	$^\circ\text{C}$

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. Non-repetitive current pulse at  $T_A = 25^\circ\text{C}$ , per IEC61000-4-2 waveform.
2. Non-repetitive current pulse at  $T_A = 25^\circ\text{C}$ , per IEC61000-4-5 waveform.
3. Mounted with recommended minimum pad size, DC board FR-4



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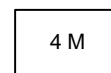


#### MARKING DIAGRAM



X3DFN2  
CASE 152AF

PIN 1



4 = Specific Device Code  
M = Date Code

#### ORDERING INFORMATION

Device	Package	Shipping†
ESD8472MUT5G	X3DFN2 (Pb-Free)	15000 / Tape & Reel
SZESD8472MUT5G	X3DFN2 (Pb-Free)	15000 / Tape & Reel

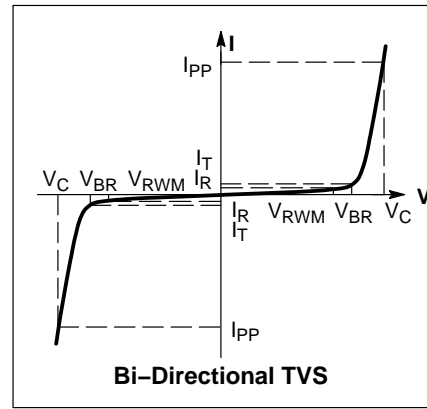
†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

**ELECTRICAL CHARACTERISTICS**

(T<sub>A</sub> = 25°C unless otherwise noted)

Symbol	Parameter
I <sub>PP</sub>	Maximum Reverse Peak Pulse Current
V <sub>C</sub>	Clamping Voltage @ I <sub>PP</sub>
V <sub>RWM</sub>	Working Peak Reverse Voltage
I <sub>R</sub>	Maximum Reverse Leakage Current @ V <sub>RWM</sub>
V <sub>BR</sub>	Breakdown Voltage @ I <sub>T</sub>
I <sub>T</sub>	Test Current

\*See Application Note AND8308/D for detailed explanations of datasheet parameters.

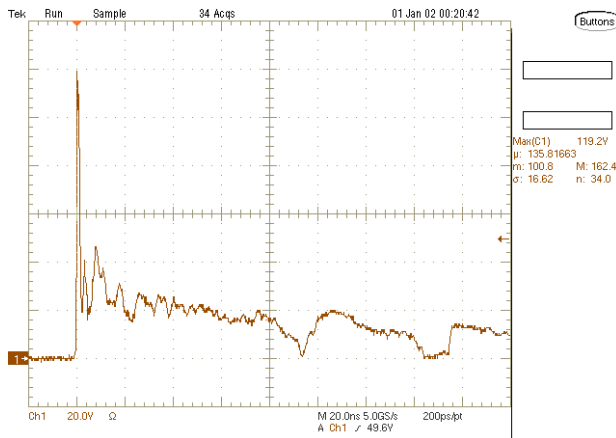


**ELECTRICAL CHARACTERISTICS** (T<sub>A</sub> = 25°C unless otherwise noted)

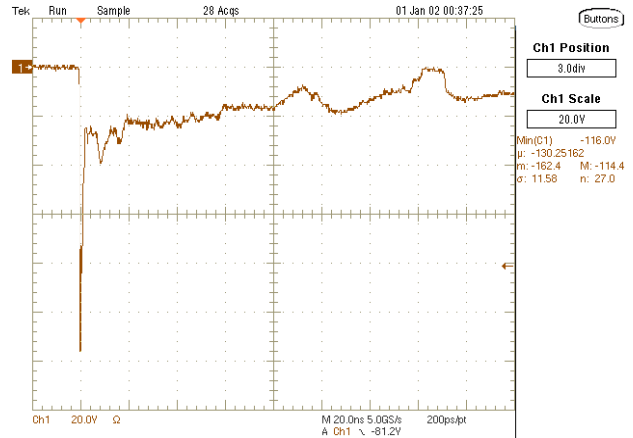
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Reverse Working Voltage	V <sub>RWM</sub>				5.3	V
Breakdown Voltage	V <sub>BR</sub>	I <sub>T</sub> = 1 mA (Note 4)	7.0			V
Reverse Leakage Current	I <sub>R</sub>	V <sub>RWM</sub> = 5.3 V		< 1	50	nA
Clamping Voltage	V <sub>C</sub>	I <sub>PP</sub> = 1 A (Note 5)		11	15	V
Clamping Voltage	V <sub>C</sub>	I <sub>PP</sub> = 3 A (Note 5)		14	20	V
ESD Clamping Voltage	V <sub>C</sub>	Per IEC61000-4-2	See Figures 1 and 2			
Junction Capacitance	C <sub>J</sub>	V <sub>R</sub> = 0 V, f = 1 MHz V <sub>R</sub> = 0 V, f = 1 GHz		0.20 0.15	0.30 0.30	pF
Dynamic Resistance	R <sub>DYN</sub>	TLP Pulse		1		Ω
Insertion Loss		f = 1 MHz f = 8.5 GHz		0.050 0.250		dB

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

- 4. Breakdown voltage is tested from pin 1 to 2 and pin 2 to 1.
- 5. Non-repetitive current pulse at 25°C, per IEC61000-4-5 waveform (Figure 9).



**Figure 1. ESD Clamping Voltage Screenshot Positive 8 kV Contact per IEC61000-4-2**



**Figure 2. ESD Clamping Voltage Screenshot Negative 8 kV Contact per IEC61000-4-2**

# ESD8472

## TYPICAL CHARACTERISTICS

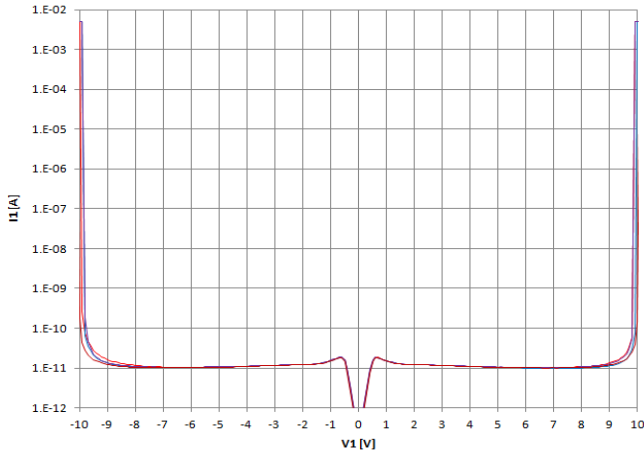


Figure 3. IV Characteristics

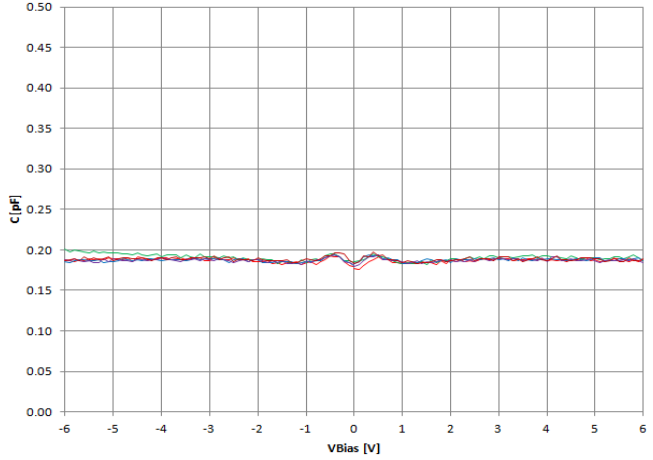


Figure 4. CV Characteristics

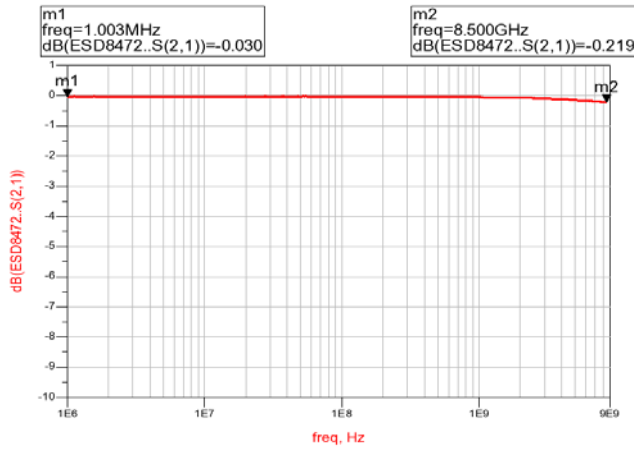


Figure 5. RF Insertion Loss

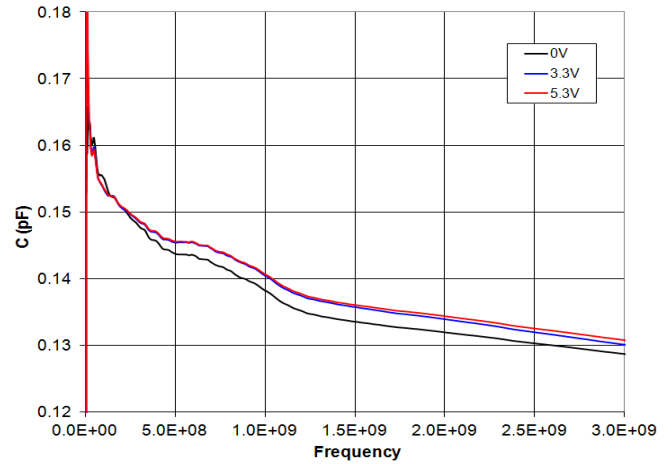


Figure 6. Capacitance over Frequency

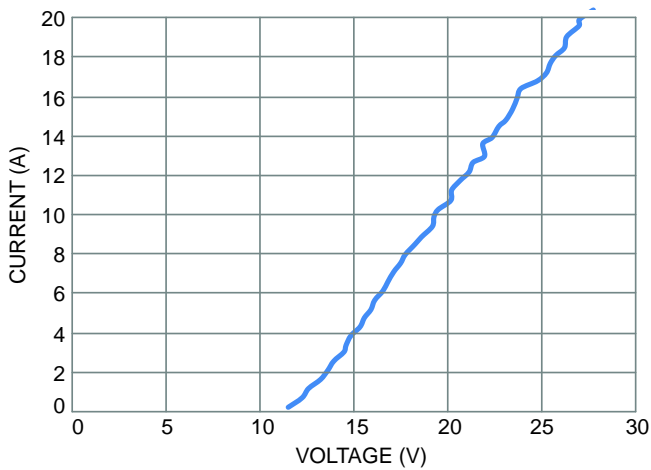


Figure 7. Positive TLP I-V Curve

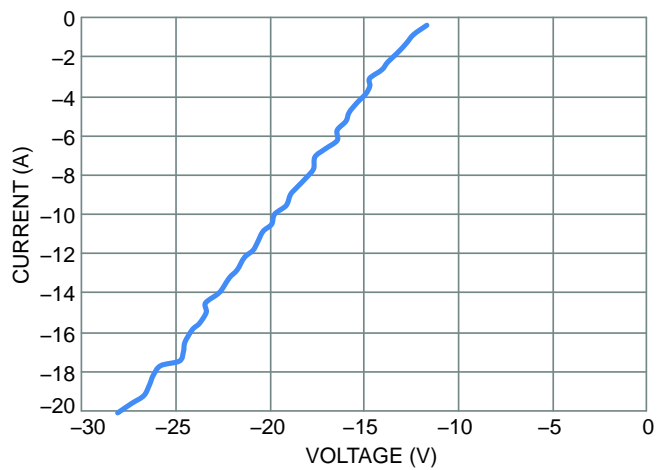


Figure 8. Negative TLP I-V Curve

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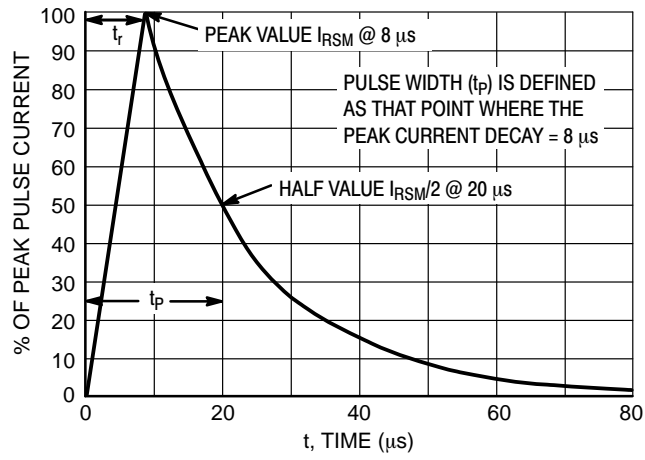
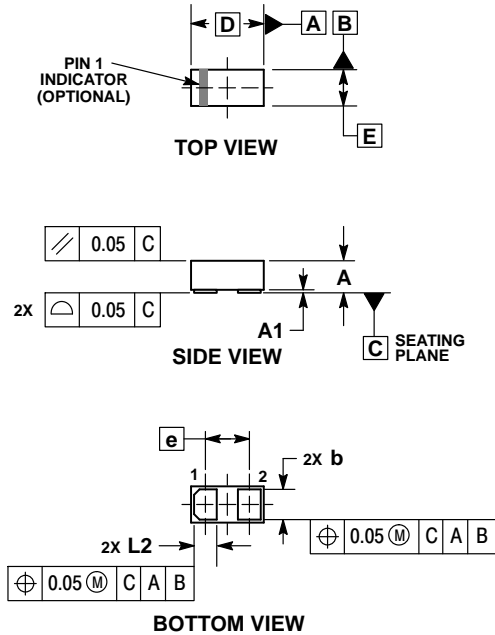


Figure 9. IEC 61000-4-5 8/20 μs Pulse Waveform

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## PACKAGE DIMENSIONS

**X3DFN2, 0.62x0.32, 0.355P, (0201)**  
**CASE 152AF**  
**ISSUE A**

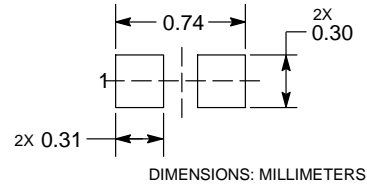


**NOTES:**

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.

MILLIMETERS		
DIM	MIN	MAX
A	0.25	0.33
A1	—	0.05
b	0.22	0.28
D	0.58	0.66
E	0.28	0.36
e	0.355 BSC	
L2	0.17	0.23

**RECOMMENDED MOUNTING FOOTPRINT\***



See Application Note AND8398/D for more mounting details  
 \*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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