# ESD Protection Diode

## Ultra−Low Capacitance Micro−Packaged Diodes for ESD Protection

# ESD8472

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
- Small Footprint: 0.62 mm x 0.32 mm
- Stand−off Voltage: 5.3 V
- Low Leakage: < 1 nA
- Low Dynamic Resistance: < 1 Ω
- 1000 ESD IEC61000−4−2 Strikes ±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°C unless otherwise noted)

| Rating | Symbol | Value | Unit |
|---|---|---|---|
| IEC 61000−4−2 Level 4 (Contact) (Note 1)<br>IEC 61000−4−2 Level 4 (Air) (Note 1) | ESD | ±20<br>±20 | kV |
| Maximum Peak Pulse Current<br>IEC 61000−4−5 8/20 μs (Lightning) (Note 2) | $I_{PP}$ | 2.4 | A |
| Total Power Dissipation (Note 3) @ $T_A$ = 25°C<br>Thermal Resistance, Junction−to−Ambient | $P_D$<br>$R_{\theta JA}$ | 300<br>400 | mW<br>°C/W |
| Junction and Storage Temperature Range | $T_J$, $T_{stg}$ | −55 to +150 | °C |
| Lead Solder Temperature − Maximum (10 Second Duration) | $T_L$ | 260 | °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°C, per IEC61000−4−2 waveform.
2. Non−repetitive current pulse at $T_A$ = 25°C, per IEC61000−4−5 waveform.
3. Mounted with recommended minimum pad size, DC board FR−4

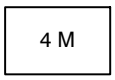




**X3DFN2**
**CASE 152AF**

**MARKING DIAGRAM**

PIN 1




4 = Specific Device Code
M = Date Code

**ORDERING INFORMATION**

| Device | Package | Shipping† |
|---|---|---|
| ESD8472MUT5G | X3DFN2 (Pb−Free) | 10000 / 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.

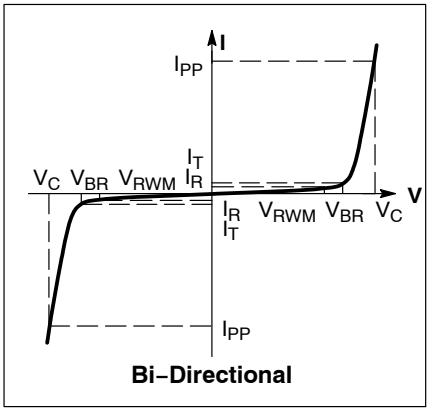
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## ELECTRICAL CHARACTERISTICS

($T_A$ = 25°C unless otherwise noted)

| Symbol | Parameter |
|---|---|
| $I_{PP}$ | Maximum Reverse Peak Pulse Current |
| $V_C$ | Clamping Voltage @ $I_{PP}$ |
| $V_{RWM}$ | Working Peak Reverse Voltage |
| $I_R$ | Maximum Reverse Leakage Current @ $V_{RWM}$ |
| $V_{BR}$ | Breakdown Voltage @ $I_T$ |
| $I_T$ | Test Current |

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




## ELECTRICAL CHARACTERISTICS ($T_A$ = 25°C unless otherwise noted)

| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| Reverse Working Voltage | $V_{RWM}$ | | | | 5.3 | V |
| Breakdown Voltage | $V_{BR}$ | $I_T$ = 1 mA (Note 4) | 7.0 | | 12 | V |
| Reverse Leakage Current | $I_R$ | $V_{RWM}$ = 5.3 V | | < 1 | 50 | nA |
| Clamping Voltage | $V_C$ | $I_{PP}$ = 1 A (Note 5) | | 11 | 15 | V |
| Clamping Voltage | $V_C$ | $I_{PP}$ = 2.4 A (Note 5) | | 15 | 17.8 | V |
| ESD Clamping Voltage | $V_C$ | Per IEC61000−4−2 | See Figures 1 and 2 | | | |
| Junction Capacitance | $C_J$ | $V_R$ = 0 V, f = 1 MHz<br>$V_R$ = 0 V, f = 1 GHz | | 0.20<br>0.15 | 0.30<br>0.30 | pF |
| Dynamic Resistance | $R_{DYN}$ | TLP Pulse | | 1 | | Ω |
| Insertion Loss | | f = 1 MHz<br>f = 8.5 GHz | | 0.050<br>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).

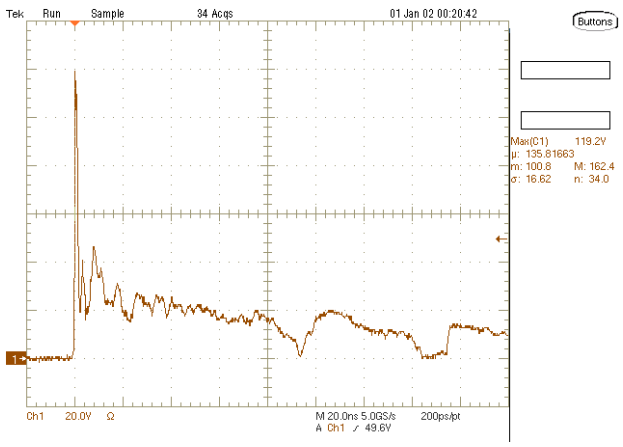



**Figure 1. ESD Clamping Voltage Screenshot Positive 8 kV Contact per IEC61000−4−2**

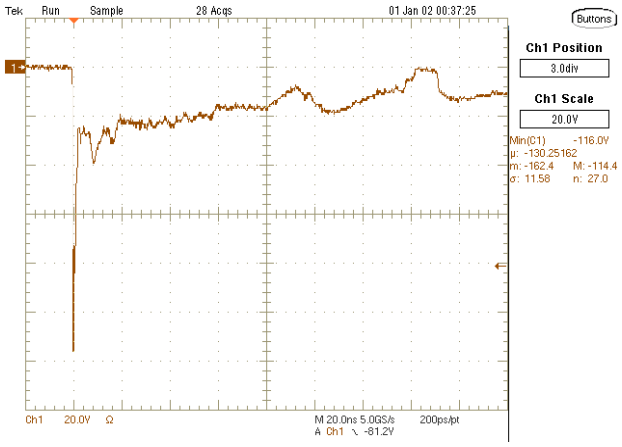



**Figure 2. ESD Clamping Voltage Screenshot Negative 8 kV Contact per IEC61000−4−2**

## TYPICAL CHARACTERISTICS

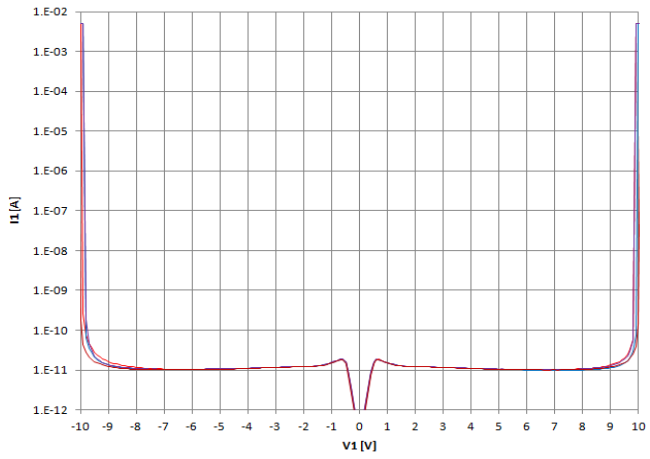



Figure 3. IV Characteristics

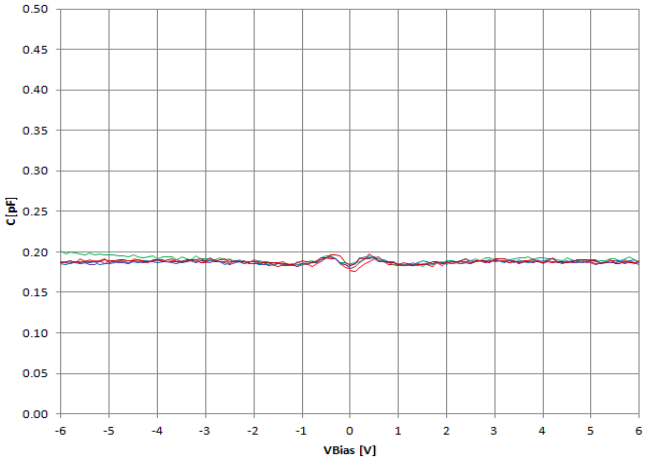



Figure 4. CV Characteristics

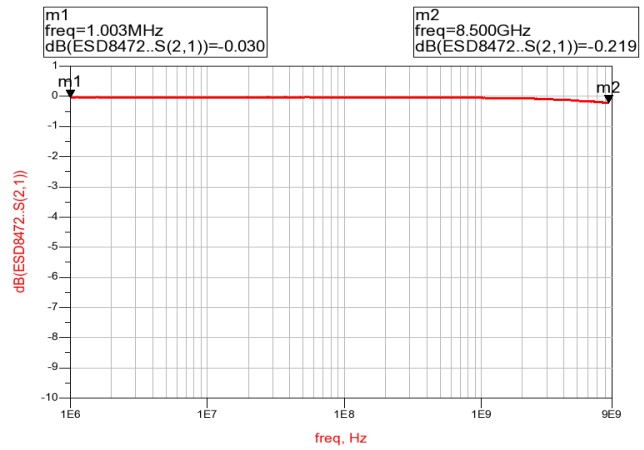



Figure 5. RF Insertion Loss

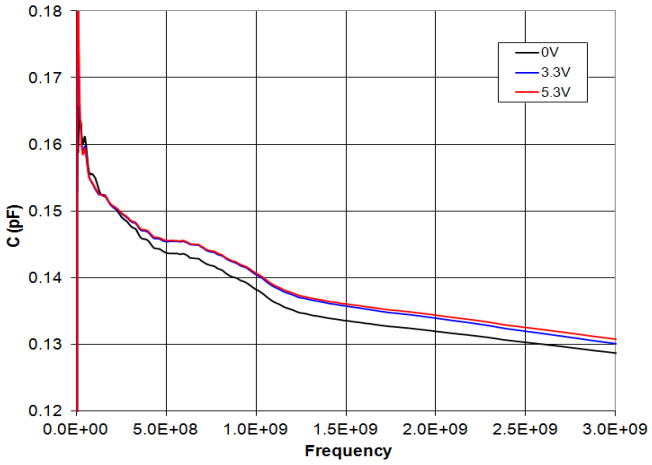



Figure 6. Capacitance over Frequency

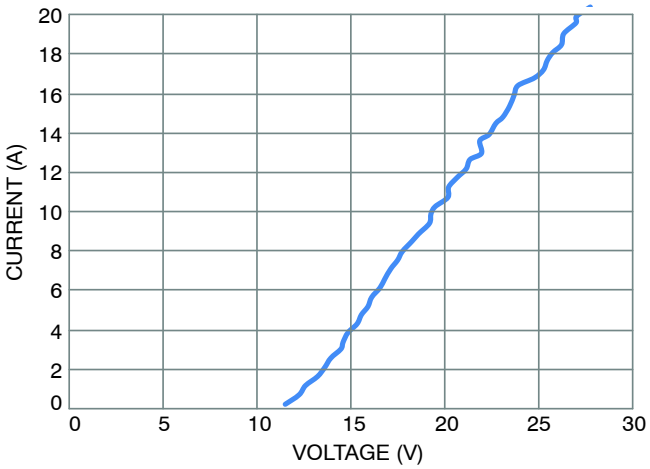



Figure 7. Positive TLP I−V Curve

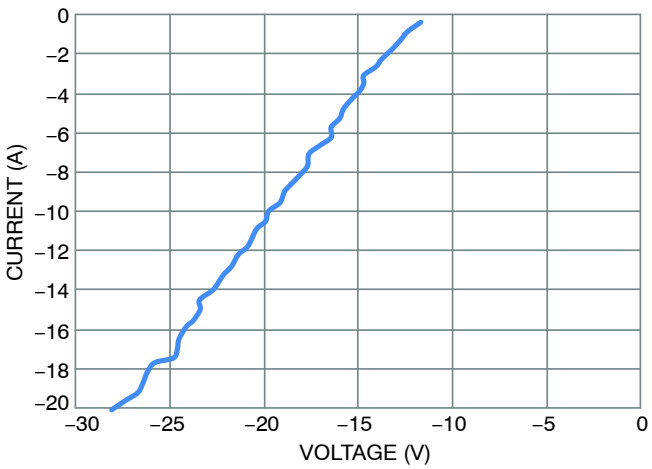



Figure 8. Negative TLP I−V Curve

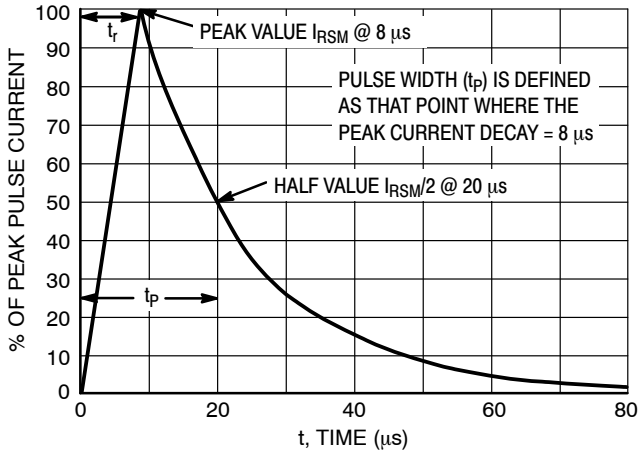
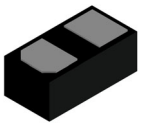
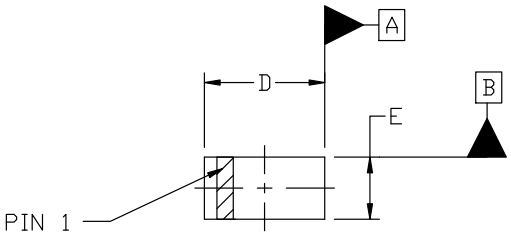



**Figure 9. IEC 61000−4−5 8/20 μs Pulse Waveform**

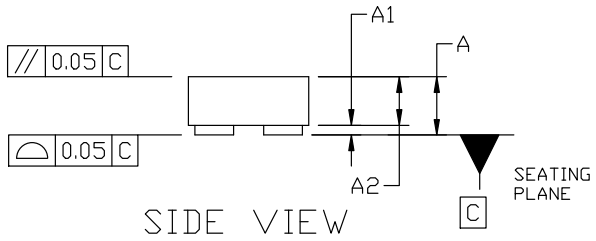


**X3DFN2 0.62x0.32x0.24, 0.35P**
CASE 152AF
ISSUE C

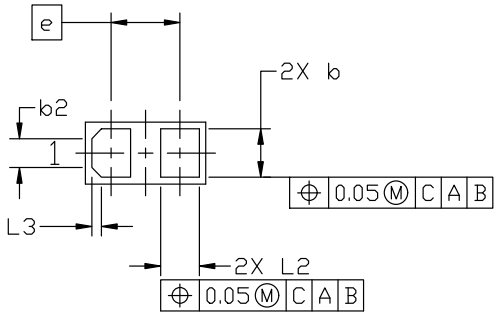
DATE 08 AUG 2023




TOP VIEW



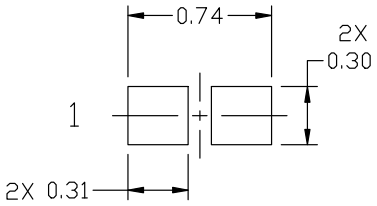

SIDE VIEW




BOTTOM VIEW

NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS
3. 0201

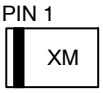
| | MILLIMETERS | | |
|---|---|---|---|
| DIM | MIN. | NOM. | MAX. |
| A | 0.25 | 0.29 | 0.33 |
| A1 | 0.00 | --- | 0.05 |
| A2 | 0.14 | 0.24 | 0.34 |
| b | 0.22 | 0.25 | 0.28 |
| b2 | 0.150 REF | | |
| D | 0.58 | 0.62 | 0.66 |
| E | 0.28 | 0.32 | 0.36 |
| e | 0.355 BSC | | |
| L2 | 0.17 | 0.20 | 0.23 |
| L3 | 0.050 REF | | |




RECOMMENDED
MOUNTING 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.

**GENERIC**
**MARKING DIAGRAM***




X = Specific Device Code
M = Date Code

*This information is generic. Please refer to device data sheet for actual part marking. Pb−Free indicator, “G” or microdot “▪”, may or may not be present. Some products may not follow the Generic Marking.

| | | |
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