# **ESD5482**

# **ESD Protection Diode**Micro-Packaged Diodes for ESD Protection

The ESD5482 is designed to protect voltage sensitive components from ESD. Excellent clamping capability, low leakage, and fast response time provide best in class protection on designs that are exposed to ESD. Because of its small size, this part is well suited for use in cellular phones, MP3 players, digital cameras and many other portable applications where board space comes at a premium.



• Low Capacitance 5 pF

• Low Clamping Voltage

• Small Body Outline Dimensions: 0.60 mm x 0.30 mm

Low Body Height: 0.3 mmStand-off Voltage: 3.3 V

• Low Leakage

• Response Time is < 1 ns

• IEC61000-4-2 Level 4 ESD Protection

• IEC61000-4-4 Level 4 EFT Protection

 These Devices are Pb–Free, Halogen Free/BFR Free and are RoHS Compliant

**Mechanical Characteristics MOUNTING POSITION:** Any

QUALIFIED MAX REFLOW TEMPERATURE: 260°C

Device Meets MSL 1 Requirements

#### **MAXIMUM RATINGS**

Rating	Symbol	Value	Unit
IEC 61000-4-2 (ESD) Contact Air		±10 ±10	kV
Total Power Dissipation on FR-5 Board (Note 1) @ T <sub>A</sub> = 25°C Thermal Resistance, Junction-to-Ambient	$P_D$ $R_{ hetaJA}$	300 400	mW °C/W
Junction and Storage Temperature Range	T <sub>J</sub> , T <sub>stg</sub>	-55 to +150	°C
Lead Solder Temperature – Maximum (10 Second Duration)	TL	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.  $FR-5 = 1.0 \times 0.75 \times 0.62$  in.



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DIAGRAM

**MARKING** 

X3DFN2 CASE 152AF PIN 1

J = Specific Device Code (Rotated 90° Clockwise)

#### **ORDERING INFORMATION**

Device	Package	Shipping <sup>†</sup>
ESD5482MUT5G	X3DFN2 (Pb-Free)	10000 / Tape & Reel

<sup>†</sup>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.

See Application Note AND8308/D for further description of survivability specs.

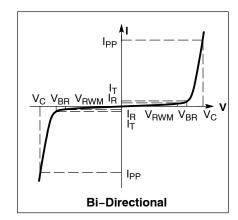
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#### **ELECTRICAL CHARACTERISTICS**

(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		

<sup>\*</sup>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		Тур	Max	Unit
Reverse Working Voltage	$V_{RWM}$				3.3	V
Breakdown Voltage	$V_{BR}$	I <sub>T</sub> = 1 mA (Note 2)	5.0			V
Reverse Leakage Current	I <sub>R</sub>	V <sub>RWM</sub> = 3.3 V		< 1	50	nA
Clamping Voltage	V <sub>C</sub>	I <sub>PP</sub> = 1 A (Note 3)		7.8	9.1	V
ESD Clamping Voltage	V <sub>C</sub>	Per IEC61000-4-2	See Figures 1 and 2			
Junction Capacitance	СЈ	$V_R = 0 \text{ V, } f = 1 \text{ MHz}$ $V_R = 0 \text{ V, } f = 1 \text{ GHz}$		5.0 5.0	7.0 7.0	pF
Dynamic Resistance	R <sub>DYN</sub>	TLP Pulse		0.60		Ω
Insertion Loss		f = 1 MHz f = 8.5 GHz		0.20 0.56		dB

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

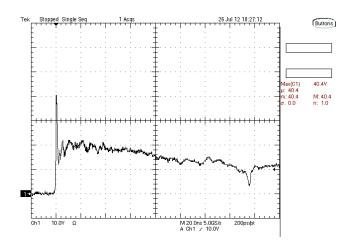


Figure 1. ESD Clamping Voltage Screenshot Positive 8 kV Contact per IEC61000-4-2

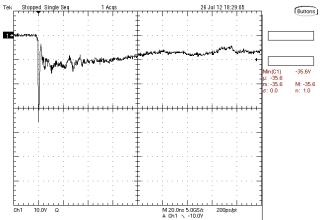
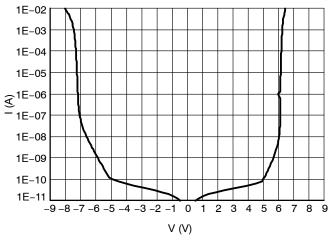


Figure 2. ESD Clamping Voltage Screenshot Negative 8 kV Contact per IEC61000-4-2

#### **ESD5482**

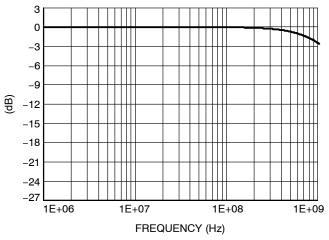
### **TYPICAL CHARACTERISTICS**



5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0 -4 -3 -2 -1 0 1 2 3 VBias (V)

Figure 3. IV Characteristics

Figure 4. CV Characteristics



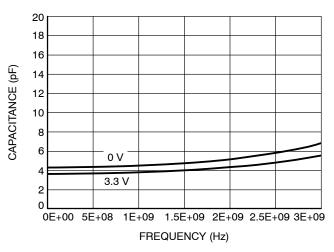
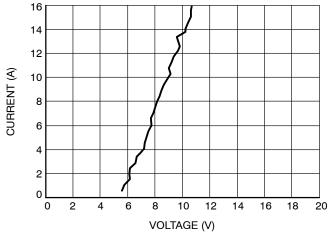


Figure 5. RF Insertion Loss

Figure 6. Capacitance over Frequency



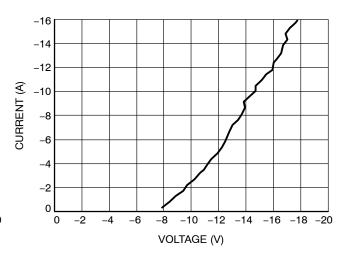


Figure 7. Positive TLP I-V Curve

Figure 8. Negative TLP I-V Curve

### IEC 61000-4-2 Spec.

Level	Test Volt- age (kV)	First Peak Current (A)	Current at 30 ns (A)	Current at 60 ns (A)
1	2	7.5	4	2
2	4	15	8	4
3	6	22.5	12	6
4	8	30	16	8

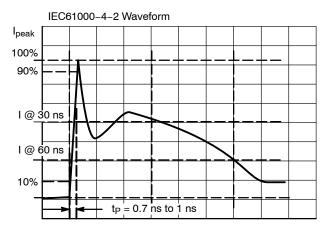


Figure 9. IEC61000-4-2 Spec

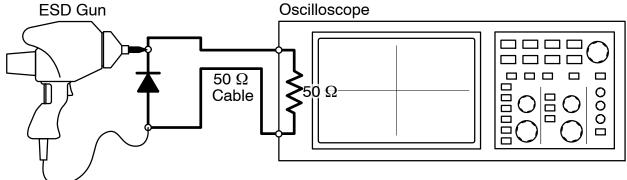


Figure 10. Diagram of ESD Test Setup

The following is taken from Application Note AND8308/D – Interpretation of Datasheet Parameters for ESD Devices.

#### **ESD Voltage Clamping**

For sensitive circuit elements it is important to limit the voltage that an IC will be exposed to during an ESD event to as low a voltage as possible. The ESD clamping voltage is the voltage drop across the ESD protection diode during an ESD event per the IEC61000-4-2 waveform. Since the IEC61000-4-2 was written as a pass/fail spec for larger

systems such as cell phones or laptop computers it is not clearly defined in the spec how to specify a clamping voltage at the device level. ON Semiconductor has developed a way to examine the entire voltage waveform across the ESD protection diode over the time domain of an ESD pulse in the form of an oscilloscope screenshot, which can be found on the datasheets for all ESD protection diodes. For more information on how ON Semiconductor creates these screenshots and how to interpret them please refer to AND8307/D.

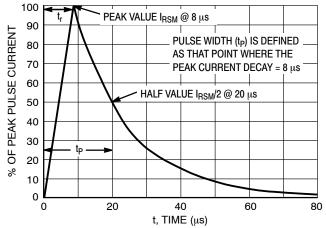


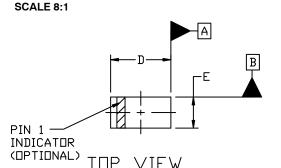
Figure 11. 8 X 20 µs Pulse Waveform

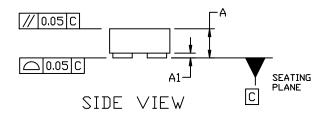


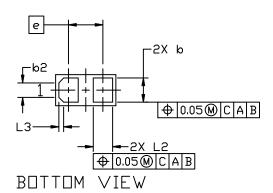
# X3DFN2, 0.62x0.32, 0.355P, (0201)

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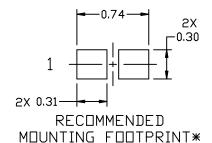




#### NOTES:

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

	MILLIMETERS		
DIM	MIN.	N□M.	MAX.
Α	0.25	0.29	0.33
A1	0.00		0.05
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
е	0.355 BSC		
L2	0.17	0.20	0.23
L3	0.050 REF		



For additional information on our Pb-Free strategy and soldering details, please download the DN Semiconductor Soldering and Mounting Techniques Reference Manual, SDLDERRM/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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