NUP8011MU

Transient Voltage Suppressors

ESD Protection Diodes with Low Clamping Voltage Array

This integrated transient voltage suppressor device (TVS) is designed for applications requiring transient overvoltage protection. It is intended for use in sensitive equipment such as computers, printers, business machines, communication systems, and other applications. Its integrated design provides very effective and reliable protection for eight separate lines using only one package. These devices are ideal for situations where board space is at a premium.

Features

- Low Clamping Voltage
- UDFN Package, 1.2 x 1.8 mm
- Standoff Voltage: 4.3 V
- Low Leakage Current
- IEC61000−4−2, Level 4 ESD Protection
- Moisture Sensitivity Level 1
- This is a Pb−Free Device

Benefits

- Provides Protection for ESD Industry Standards: IEC 61000, HBM
- Protects the Line Against Transient Voltage Conditions
- Minimize Power Consumption of the System
- Minimize PCB Board Space

Applications

- ESD Protection for Data Lines
- Wireless Phones
- Handheld Products
- Notebook Computers
- LCD Displays

MAXIMUM RATINGS (T_A = 25°C unless otherwise noted)

Characteristic	Symbol	Value	Unit
Steady State Power − 1 Diode (Note 1)	P_D	380	mW
Thermal Resistance, Junction−to−Ambient Above 25°C, Derate	$R_{\theta JA}$	327 3.05	°C/W mW/°C
Maximum Junction Temperature	T_{Jmax}	150	°C
Operating Temperature Range	T_{OP}	−40 to +85	°C
Storage Temperature Range	T_{stg}	−55 to +150	°C
Lead Solder Temperature (10 seconds duration)	T_L	260	°C
IEC 61000−4−2 (ESD) Contact		±8.0	kV
Machine Model − Class C	MM	400	V
Human Body Model − Class 3B	HBM	8.0	kV

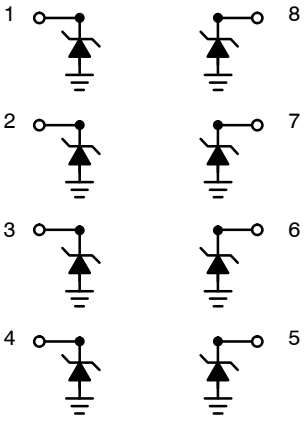
Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

1. Only 1 diode under power. For all 4 diodes under power, P_D will be 25%. Mounted on FR−4 board with min pad.

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

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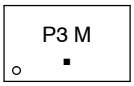


(Top View)



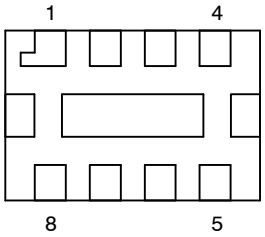
UDFN8
CASE 517AD

MARKING DIAGRAM



P3 = Specific Device Code
M = Month Code
▪ = Pb−Free Package

PIN CONNECTIONS



ORDERING INFORMATION

Device	Package	Shipping
NUP8011MUTAG	UDFN8 (Pb−Free)	3000 / 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.

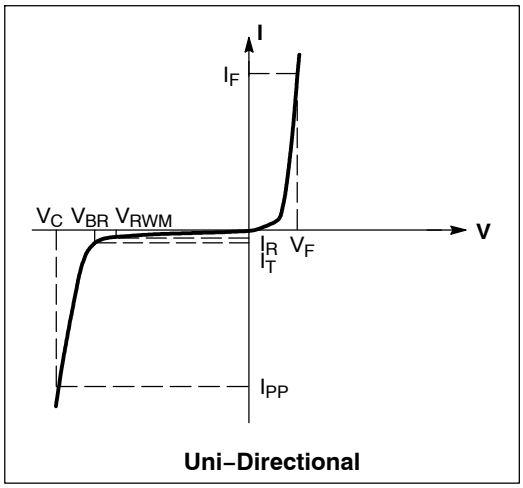
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ELECTRICAL CHARACTERISTICS

(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
I_F	Forward Current
V_F	Forward Voltage @ I_F
P_{pk}	Peak Power Dissipation
C	Capacitance @ V_R = 0 and f = 1.0 MHz

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



ELECTRICAL CHARACTERISTICS (T_A = 25°C)

Device	Device Marking	Breakdown Voltage V_{BR} @ 1 mA (V)			Leakage Current I_{RM} @ V_{RM}		Typ Capacitance @ 0 V Bias (pF) (Note 2)		Typ Capacitance @ 3 V Bias (pF) (Note 2)		V_C
		Min	Nom	Max	V_{RWM}	I_{RWM} (μA)	Typ	Max	Typ	Max	Per IEC61000−4−2 (Note 3)
NUP8011MUTAG	P3	6.47	6.8	7.14	4.3	1.0	12	14	6.7	9.5	Figures 1 and 2 (See Below)

2. Capacitance of one diode at f = 1 MHz, V_R = 0 V, T_A = 25°C
3. For test procedure see Figures 3 and 4 and Application Note AND8307/D.

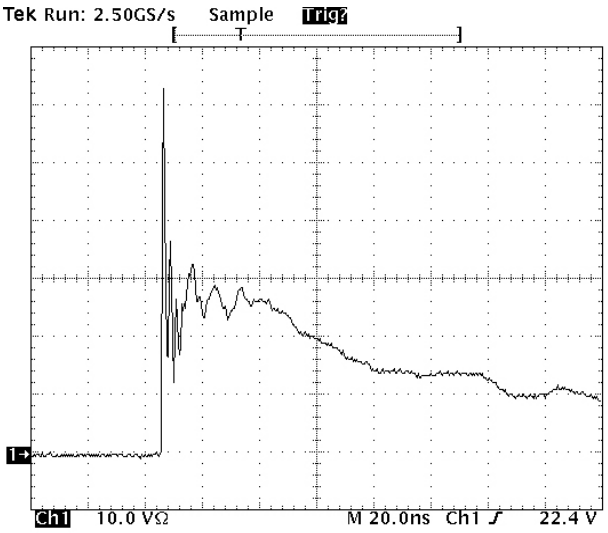


Figure 1. ESD Clamping Voltage Screenshot Positive 8 kV Contact per IEC61000−4−2

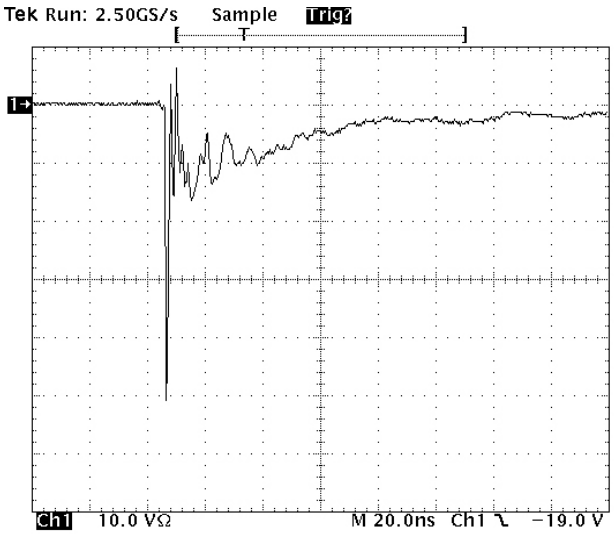


Figure 2. ESD Clamping Voltage Screenshot Negative 8 kV Contact per IEC61000−4−2

IEC 61000−4−2 Spec.

Level	Test Voltage (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

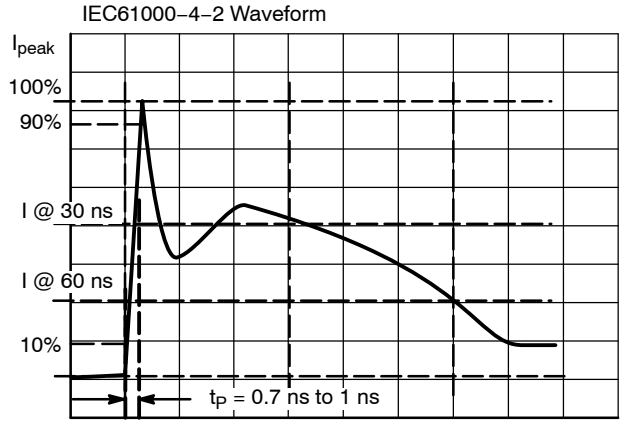


Figure 3. IEC61000−4−2 Spec

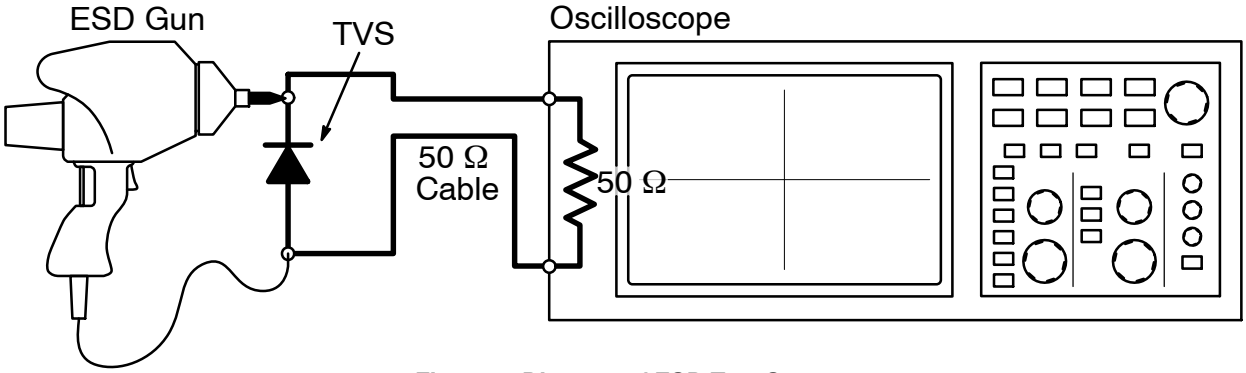


Figure 4. Diagram of ESD Test Setup

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.

TYPICAL ELECTRICAL CHARACTERISTICS

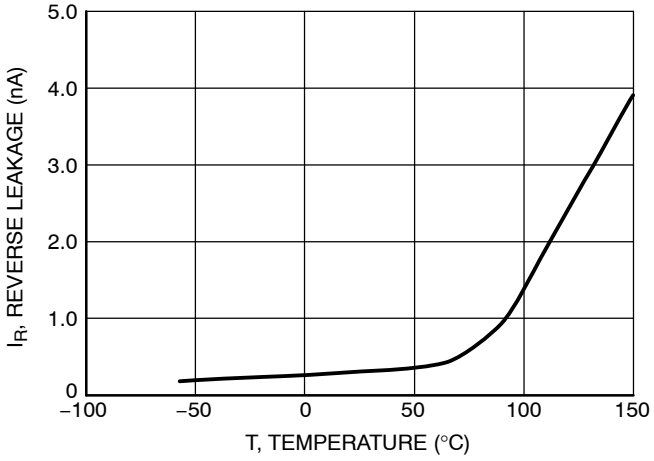


Figure 5. Reverse Leakage versus Temperature

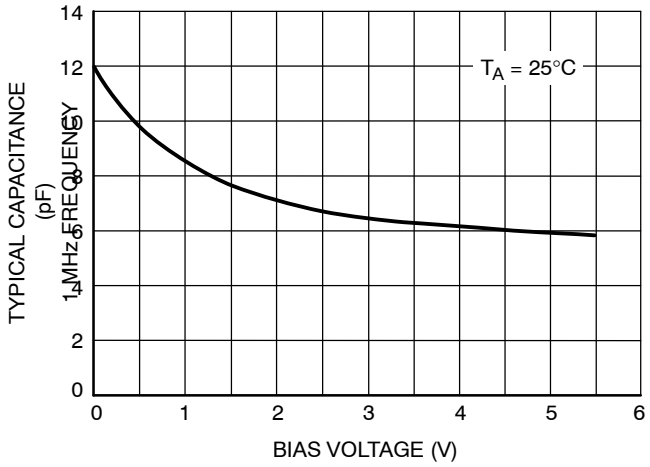


Figure 6. Capacitance

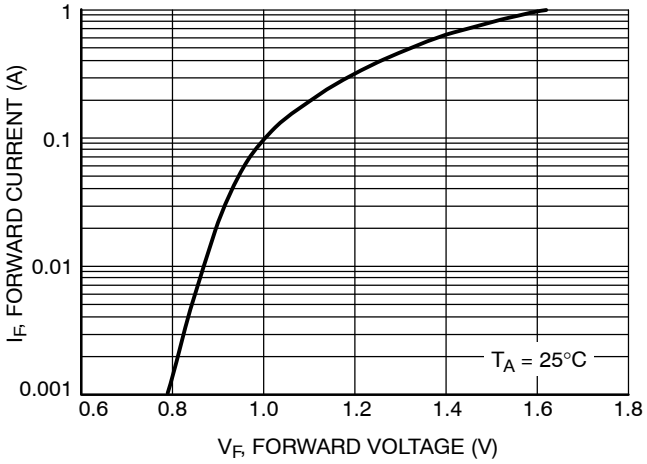
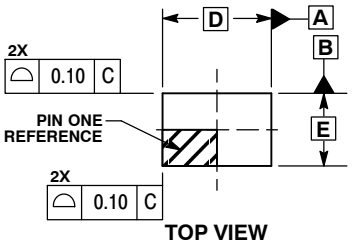


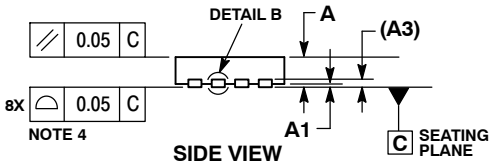
Figure 7. Forward Voltage

PACKAGE DIMENSIONS

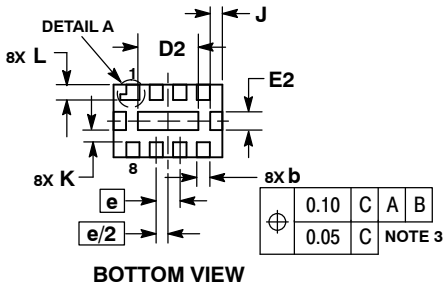
UDFN8, 1.8x1.2, 0.4P
CASE 517AD−01
ISSUE C



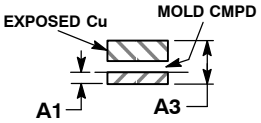
TOP VIEW



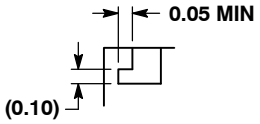
SIDE VIEW



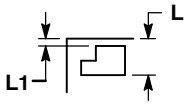
BOTTOM VIEW



DETAIL B
ALTERNATE CONSTRUCTIONS



DETAIL A

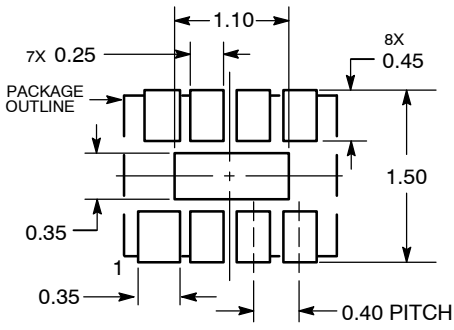


DETAIL A
OPTIONAL CONSTRUCTION

NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSION b APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.15 AND 0.30 mm FROM TERMINAL.
4. COPLANARITY APPLIES TO THE EXPOSED PAD AS WELL AS THE TERMINALS.

	MILLIMETERS	
DIM	MIN	MAX
A	0.45	0.55
A1	0.00	0.05
A3	0.13 REF	
b	0.15	0.25
D	1.80 BSC	
E	1.20 BSC	
e	0.40 BSC	
D2	0.90	1.10
E2	0.20	0.30
J	0.19 REF	
K	0.20	−−−
L	0.20	0.30
L1	−−−	0.10

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.

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