

# ESD and Surge Protection Diode

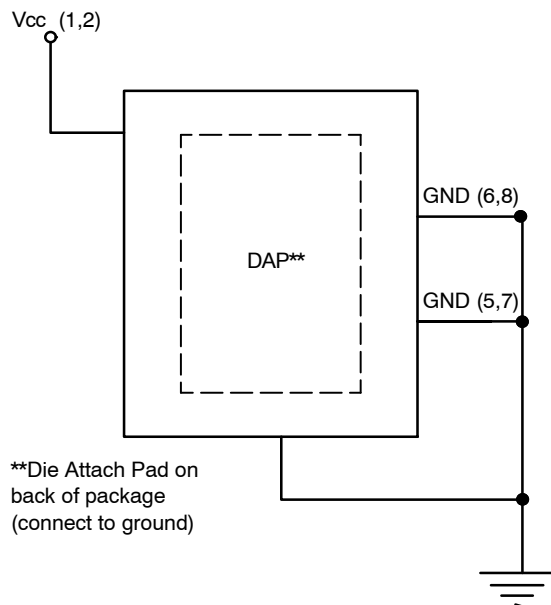
Low Clamping Voltage

## NSPU5201, NSPU5221 Series

### Features

- Unidirectional High Voltage ESD and Surge Protection
- Provides ESD Protection to IEC61000-4-2 Level 4:  $\pm 30$  kV Contact Discharge
- Small Package: 1.8 mm x 2.0 mm
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

### APPLICATION DIAGRAM



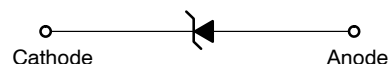
ON Semiconductor®

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UDFN6  
CASE 517CS

### BLOCK DIAGRAM



### MARKING DIAGRAM



XX = Specific Device Code  
M = Date Code  
▪ = Pb-Free Package

### ORDERING INFORMATION

Device	Package	Shipping <sup>†</sup>
NSPU5201MUTBG	UDFN6 (Pb-Free)	3000 / Tape & Reel
NSPU5221MUTBG	UDFN6 (Pb-Free)	3000 / Tape & Reel

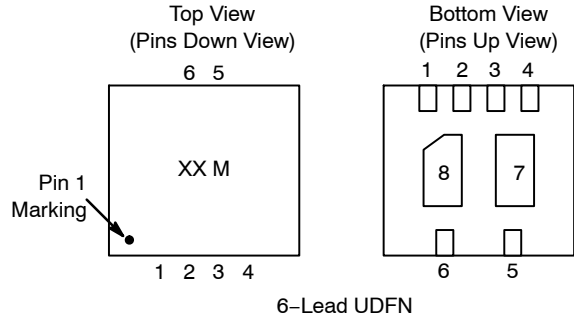
<sup>†</sup>For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specification Brochure, BRD8011/D.

# NSPU5201, NSPU5221 Series

**Table 1. PIN DESCRIPTIONS**

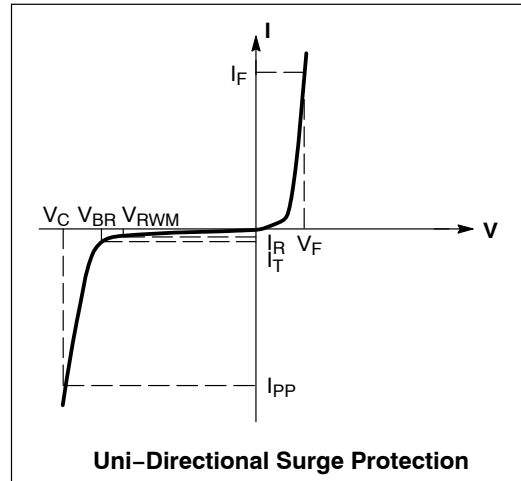
6-Lead, UDFN8 Package		
Pin	Name	Description
1	V <sub>CC</sub>	Cathode
2	V <sub>CC</sub>	Cathode
3	N/C	No Connect
4	N/C	No Connect
5	GND	Anode
6	GND	Anode
7	GND	Anode
8	GND	Anode

## PACKAGE / PINOUT DIAGRAMS



## ELECTRICAL CHARACTERISTICS

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
ΘV <sub>BR</sub>	Maximum Temperature Coefficient of V <sub>BR</sub>
I <sub>F</sub>	Forward Current
V <sub>F</sub>	Forward Voltage @ I <sub>F</sub>



# NSPU5201, NSPU5221 Series

## SPECIFICATIONS

**Table 2. MAXIMUM RATINGS**

Parameter	Rating	Units
Operating Temperature Range	-55 to +125	°C
Storage Temperature Range	-65 to +150	°C

Stresses at or above those listed in Maximum Ratings table may cause permanent damage to the device. This is a stress only rating and operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied. Also, due to variations in test equipment, stresses shown above are averages.

### ELECTRICAL CHARACTERISTICS

Device Name	Device Marking	V <sub>RWM</sub> (V) Max	I <sub>R</sub> @ V <sub>RWM</sub> (μA) Max	Breakdown Voltage				I <sub>PP</sub> (A) (8 x 20 μs)	V <sub>C</sub> @ I <sub>PP</sub> (8 x 20 μs)	
				V <sub>BR</sub> V			@ I <sub>T</sub> (mA)	Min	V <sub>C</sub> (V) Max	I <sub>PP</sub> (A)
				Min	Nom	Max				
NSPU5201	AZ	20	1	21.7	22.7	23.7	1	140	31.5	110
NSPU5221	A2	20	1	24	25	26	1	120	33	100
		22	2						35	120

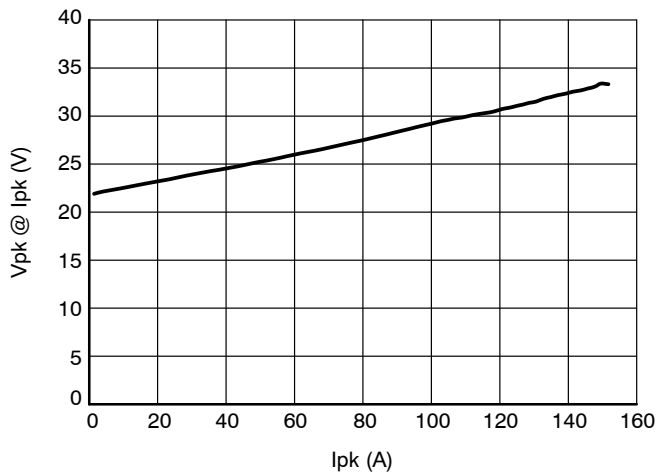
Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

### ELECTRICAL CHARACTERISTICS (NSPU5221)

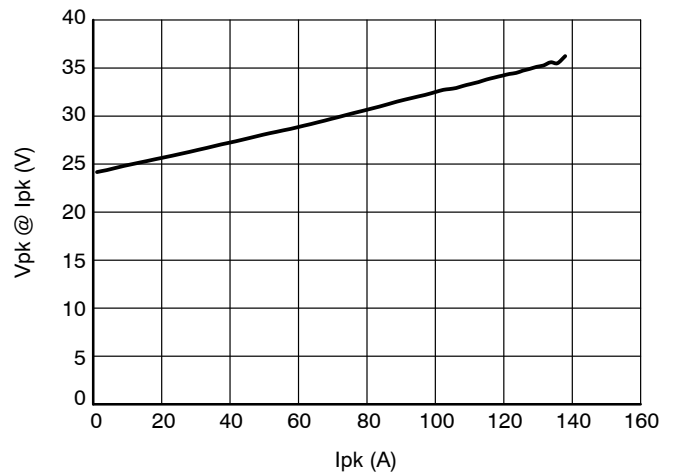
	Description	Min	Typ	Max	Unit
V <sub>CLAMP</sub> Clamp Voltage	24 A IEC61000-4-5 Surge (8/20 μs) from IO to GND, V <sub>IN</sub> = 0 V before surge, 25°C		26.8	28.5	V
	40 A IEC61000-4-5 Surge (8/20 μs) from IO to GND, V <sub>IN</sub> = 0 V before surge, 25°C		28.3	30	V
	35 A IEC61000-4-5 Surge (8/20 μs) from IO to GND, V <sub>IN</sub> = V <sub>RWM</sub> before surge, T <sub>A</sub> = 125°C		29.4	31	V

# NSPU5201, NSPU5221 Series

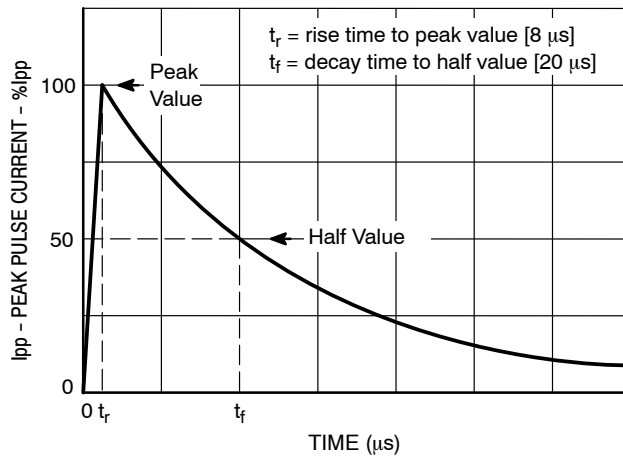
## TYPICAL CHARACTERISTICS



**Figure 1. NSPU5201 Positive Clamping Voltage vs. Peak Pulse Current ( $t_p = 8/20 \mu s$ )**



**Figure 2. NSPU5221 Positive Clamping Voltage vs. Peak Pulse Current ( $t_p = 8/20 \mu s$ )**



**Figure 3. IEC61000-4-5 8/20 μs Pulse Waveform**

# MECHANICAL CASE OUTLINE

## PACKAGE DIMENSIONS

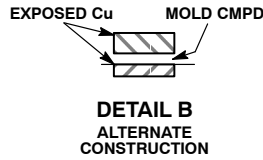
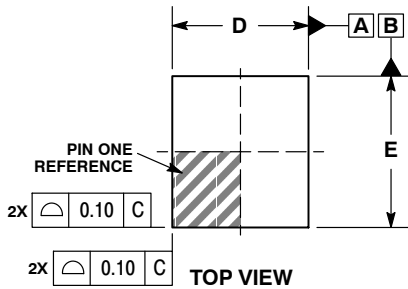
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SCALE 4:1

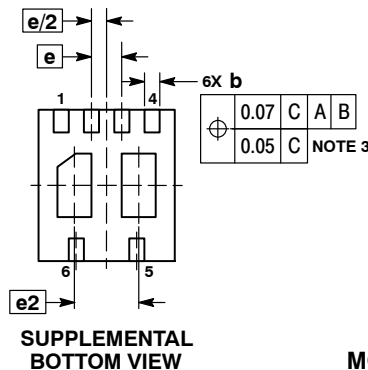
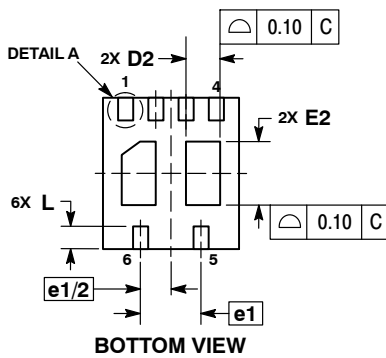
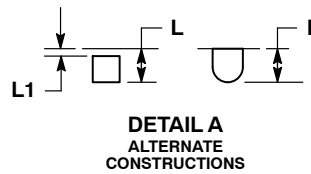
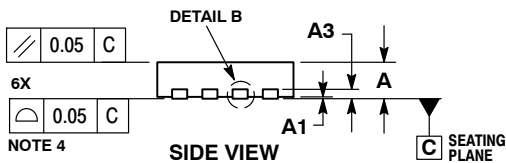
### UDFN6, 1.8x2, 0.4P CASE 517CS ISSUE 0

DATE 30 APR 2013



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

DIM	MILLIMETERS	
	MIN	MAX
A	0.45	0.55
A1	0.00	0.05
A3	0.125 REF	
b	0.15	0.25
D	1.80 BSC	
D2	0.35	0.55
E	2.00 BSC	
E2	0.74	0.94
e	0.40 BSC	
e1	0.80 BSC	
e2	0.95 BSC	
L	0.20	0.40
L1	---	0.15



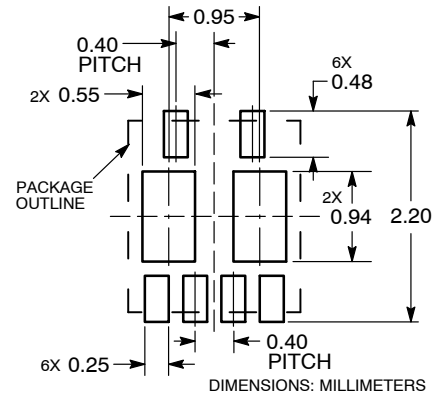
### GENERIC MARKING DIAGRAM\*



XX = 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.

### 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.

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