

# NUP45V6P5

## ESD Protection Diode Array, Quad, Low Capacitance

This integrated surge protection is designed for applications requiring transient overvoltage protection. It is intended to be used in sensitive equipment such as wireless headsets, PDAs, digital cameras, computers, printers, communication systems, and other applications. The integrated design provides very effective and reliable protection for four separate lines using only one package. This device is ideal for situations where board space is at a premium.

### Features

- ESD Protection: IEC61000-4-2: Level 4
- Four Separate Unidirectional Configurations for Protection
- Low Leakage Current < 1  $\mu$ A @ 3 V
- Small SOT-953 SMT Package
- Low Capacitance
- These are Pb-Free Devices

### Benefits

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

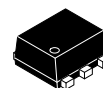
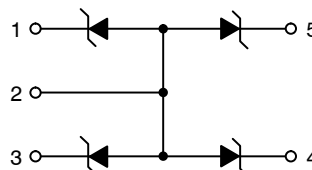
### Typical Applications

- Cellular and Portable Electronics
- Serial and Parallel Ports
- Microprocessor Based Equipment
- Notebooks, Desktops, Servers



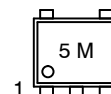
ON Semiconductor®

[www.onsemi.com](http://www.onsemi.com)



SOT-953  
CASE 526AE

### MARKING DIAGRAM



5 = Specific Device Code  
M = Date & Assembly Code

### ORDERING INFORMATION

| Device       | Package              | Shipping†             |
|--------------|----------------------|-----------------------|
| NUP45V6P5T5G | SOT-953<br>(Pb-Free) | 8000 /<br>Tape & Reel |

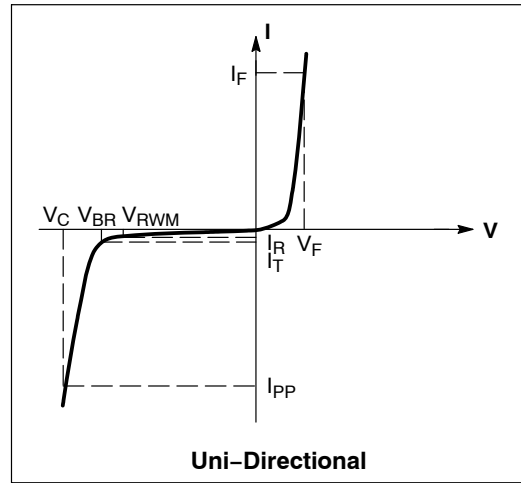
†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specification Brochure, BRD8011/D.

# NUP45V6P5

## ELECTRICAL CHARACTERISTICS

( $T_A = 25^\circ\text{C}$  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                                |
| $\Theta V_{BR}$ | Maximum Temperature Coefficient of $V_{BR}$ |
| $I_F$           | Forward Current                             |
| $V_F$           | Forward Voltage @ $I_F$                     |
| $Z_{ZT}$        | Maximum Zener Impedance @ $I_{ZT}$          |
| $I_{ZK}$        | Reverse Current                             |
| $Z_{ZK}$        | Maximum Zener Impedance @ $I_{ZK}$          |



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

| Characteristic  | Symbol          | Value       | Unit                       |
|---|-----------------|-------------|----------------------------|
| Thermal Resistance Junction-to-Ambient<br>Above $25^\circ\text{C}$ , Derate | $R_{\theta JA}$ | 560         | $^\circ\text{C}/\text{W}$  |
|   |                 | 4.5         | $\text{mW}/^\circ\text{C}$ |
| Maximum Junction Temperature  | $T_{Jmax}$      | 150         | $^\circ\text{C}$           |
| Operating Junction and Storage Temperature Range                            | $T_J T_{stg}$   | -55 to +150 | $^\circ\text{C}$           |
| Lead Solder Temperature (10 seconds duration)                               | $T_L$           | 260         | $^\circ\text{C}$           |
| Human Body Model (HBM)<br>Machine Model (MM)                                | ESD             | 8000        | V                          |
|   |                 | 400         |                            |

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.

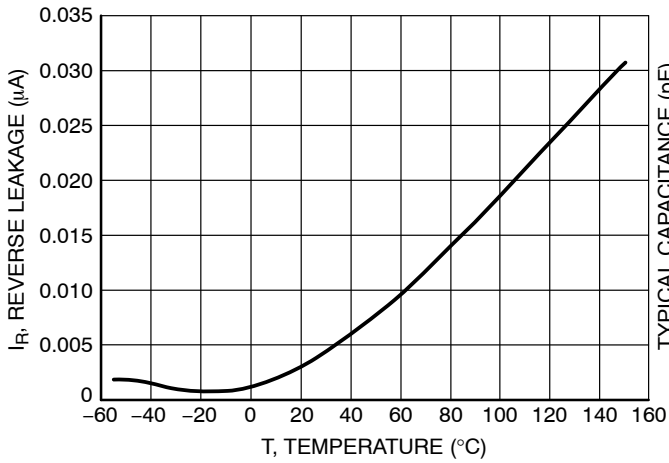
## ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ )

| Device    | Device Marking | Breakdown Voltage $V_{BR}$ @ 1 mA (Volts) |     |     | Leakage Current $I_{RM}$ @ $V_{RM}$ |                             | Typ Capacitance @ 0 V Bias (pF) (Note 1) |     | Typ Capacitance @ 3 V Bias (pF) (Note 1) |      | $V_C$ (V) @ $I_{PP} = 1$ A (Note 2) |
|-----------|----------------|---|-----|-----|-------------------------------------|-----------------------------|--|-----|--|------|-------------------------------------|
|           |                | Min                                       | Nom | Max | $V_{RWM}$                           | $I_{RWM}$ ( $\mu\text{A}$ ) | Typ                                      | Max | Typ                                      | Max  | Max                                 |
| NUP45V6P5 | 5              | 5.3                                       | 5.6 | 5.9 | 3.0                                 | 1.0                         | 13                                       | 17  | 7.0                                      | 11.5 | 10.5                                |

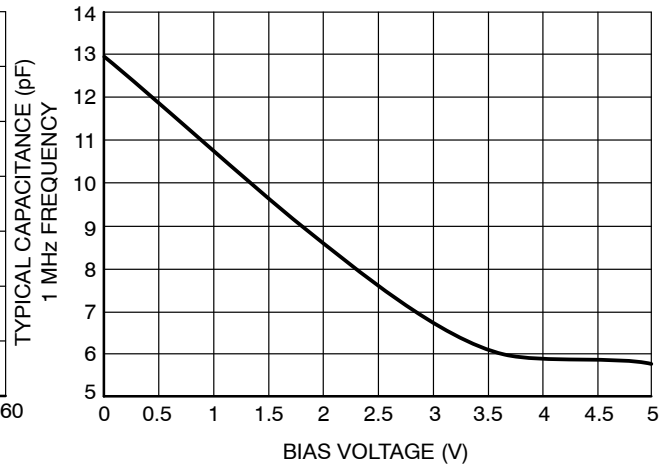
1. Capacitance of one diode at  $f = 1$  MHz,  $T_A = 25^\circ\text{C}$ .
2. Surge current waveform per Figure 3.

# NUP45V6P5

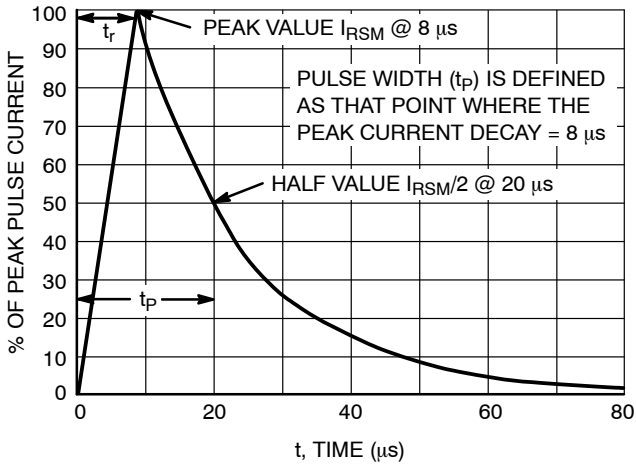
## TYPICAL ELECTRICAL CHARACTERISTICS



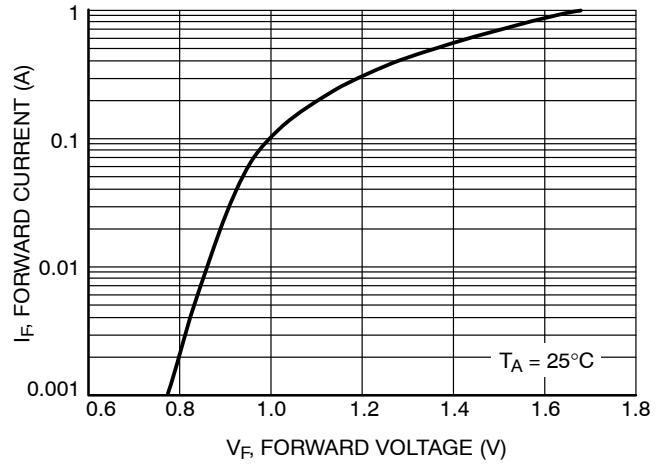
**Figure 1. Reverse Leakage Current versus Temperature**



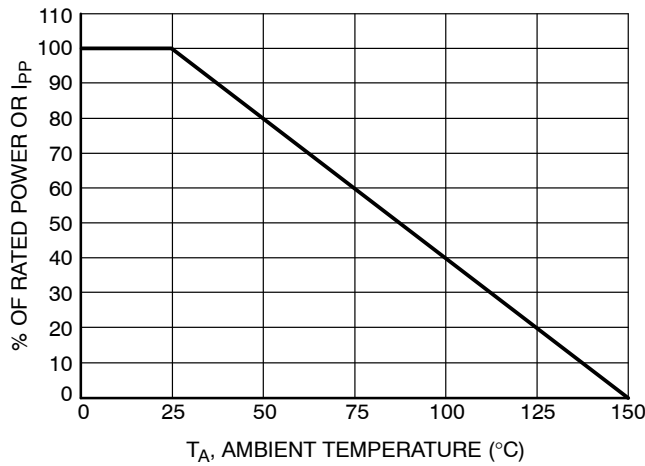
**Figure 2. Capacitance**



**Figure 3. 8 × 20 µs Pulse Waveform**



**Figure 4. Forward Voltage**



**Figure 5. Power Derating Curve**

# MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS

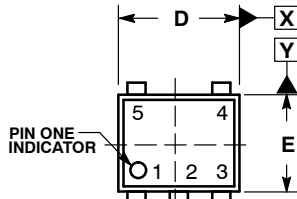
ON Semiconductor®



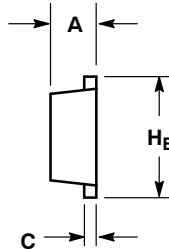
SCALE 4:1

**SOT-953**  
CASE 527AE  
ISSUE E

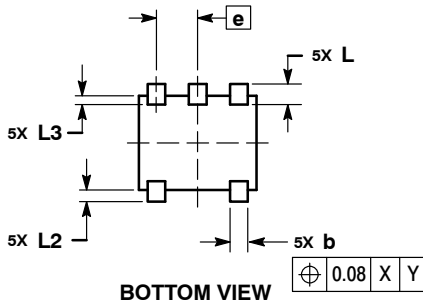
DATE 02 AUG 2011



TOP VIEW

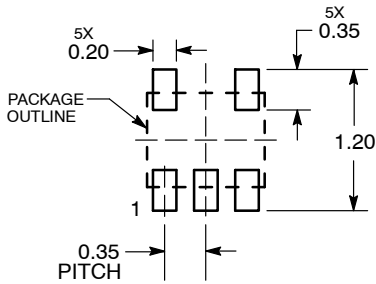


SIDE VIEW



BOTTOM VIEW

**SOLDERING FOOTPRINT\***



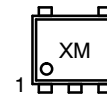
DIMENSIONS: MILLIMETERS

NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF THE BASE MATERIAL.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

| DIM            | MILLIMETERS |      |      |
|----------------|-------------|------|------|
|                | MIN         | NOM  | MAX  |
| A              | 0.34        | 0.37 | 0.40 |
| b              | 0.10        | 0.15 | 0.20 |
| C              | 0.07        | 0.12 | 0.17 |
| D              | 0.95        | 1.00 | 1.05 |
| E              | 0.75        | 0.80 | 0.85 |
| e              | 0.35 BSC    |      |      |
| H <sub>E</sub> | 0.95        | 1.00 | 1.05 |
| L              | 0.175 REF   |      |      |
| L2             | 0.05        | 0.10 | 0.15 |
| L3             | ---         | ---  | 0.15 |

**GENERIC MARKING DIAGRAM\***



X = Specific Device Code  
M = Month 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.

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

|                         |                    |  |
|-------------------------|--------------------|--|
| <b>DOCUMENT NUMBER:</b> | <b>98AON26457D</b> | Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red. |
| <b>DESCRIPTION:</b>     | <b>SOT-953</b>     | <b>PAGE 1 OF 1</b>   |

ON Semiconductor and are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. ON Semiconductor does not convey any license under its patent rights nor the rights of others.

**onsemi**, **Onsemi**, and other names, marks, and brands are registered and/or common law trademarks of Semiconductor Components Industries, LLC dba "**onsemi**" or its affiliates and/or subsidiaries in the United States and/or other countries. **onsemi** owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of **onsemi**'s product/patent coverage may be accessed at [www.onsemi.com/site/pdf/Patent-Marking.pdf](http://www.onsemi.com/site/pdf/Patent-Marking.pdf). **onsemi** reserves the right to make changes at any time to any products or information herein, without notice. The information herein is provided "as-is" and **onsemi** makes no warranty, representation or guarantee regarding the accuracy of the information, product features, availability, functionality, or suitability of its products for any particular purpose, nor does **onsemi** assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using **onsemi** products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by **onsemi**. "Typical" parameters which may be provided in **onsemi** data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. **onsemi** does not convey any license under any of its intellectual property rights nor the rights of others. **onsemi** products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use **onsemi** products for any such unintended or unauthorized application, Buyer shall indemnify and hold **onsemi** and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that **onsemi** was negligent regarding the design or manufacture of the part. **onsemi** is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

## PUBLICATION ORDERING INFORMATION

### LITERATURE FULFILLMENT:

Email Requests to: [orderlit@onsemi.com](mailto:orderlit@onsemi.com)

**onsemi Website:** [www.onsemi.com](http://www.onsemi.com)

### TECHNICAL SUPPORT

**North American Technical Support:**

Voice Mail: 1 800-282-9855 Toll Free USA/Canada

Phone: 011 421 33 790 2910

**Europe, Middle East and Africa Technical Support:**

Phone: 00421 33 790 2910

For additional information, please contact your local Sales Representative