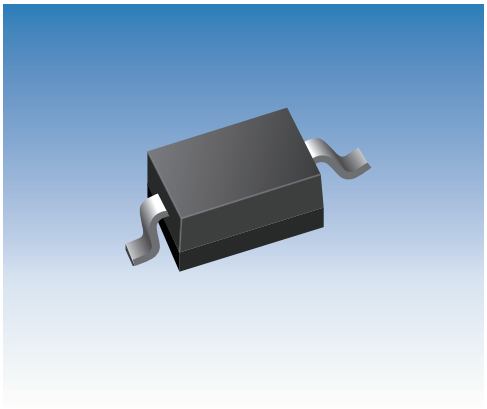


## Features

- 350W peak pulse power (8/20us)
- Protects one data or power line
- Ultra low leakage: nA level
- Stand−off Voltage: 3.3 V ~ 36 V
- Ultra low clamping voltage
- Complies with following standards:
  – IEC 61000-4-2 (ESD) immunity test
  Air discharge: ±30kV
  Contact discharge: ±30kV
  – IEC61000-4-4 (EFT) 40A (5/50ns)
- RoHS Compliant

LEAD-FREE
LEAD-FREE COMPATIBLE COMPONENT

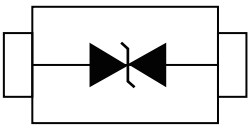
RoHS COMPLIANT

## Applications

- Cell Phone Handsets and Accessories
- Microprocessor based equipment
- Personal Digital Assistants (PDA’ s)
- Notebooks, Desktops, and Servers
- Portable Instrumentation
- Networking and Telecom
- Serial and Parallel Ports.
- Peripherals

## Description

The NVD05xx-xR is a bi-directional TVS diode, utilizing leading monolithic silicon technology to provide fast response time and low ESD clamping voltage, making this device an ideal solution for protecting voltage sensitive high-speed data lines. The NVD05xx-xR has a low capacitance with a typical value at 1pF, and complies with the IEC 61000-4-2 (ESD) standard with ±30kV air and ±30kV contact discharge. It is assembled into a leadfree SOD-323 package. The small size, low capacitance and high ESD surge protection make NVD05xx-xR an ideal choice to protect cell phone, wireless systems, and communication equipment.

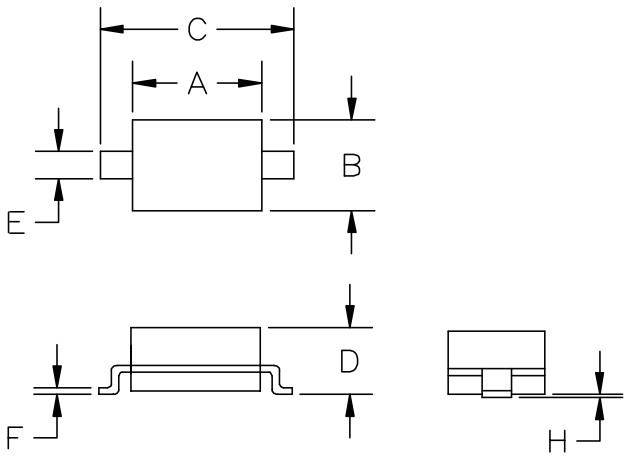


Dimensions & Symbol

## Ordering Information

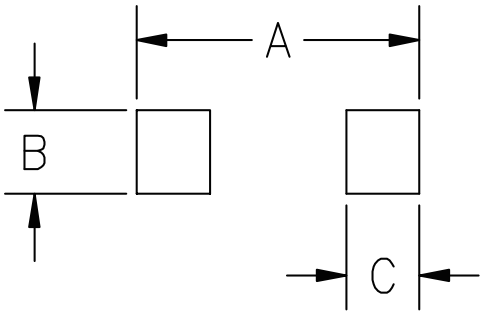
| Part Number | Packaging | Reel Size |
|---|---|---|
| NVD0503-YR | 3000/Tape & Reel | 7 inch |
| NVD0505-XR | 3000/Tape & Reel | 7 inch |
| NVD0512-TR | 3000/Tape & Reel | 7 inch |
| NVD0515-TR | 3000/Tape & Reel | 7 inch |
| NVD0518-RR | 3000/Tape & Reel | 7 inch |
| NVD0524-SR | 3000/Tape & Reel | 7 inch |
| NVD0536-RR | 3000/Tape & Reel | 7 inch |

## Package Mechanical Data




| SYM | DIMENSIONS | | | |
|---|---|---|---|---|
| | MILLIMETERS | | INCHES | |
| | MIN | MAX | MIN | MAX |
| A | 1.50 | 1.80 | 0.060 | 0.071 |
| B | 1.20 | 1.40 | 0.045 | 0.054 |
| C | 2.30 | 2.70 | 0.090 | 0.107 |
| D | - | 1.10 | - | 0.043 |
| E | 0.30 | 0.40 | 0.012 | 0.016 |
| F | 0.10 | 0.25 | 0.004 | 0.010 |
| H | - | 0.10 | - | 0.004 |

## Suggested Land Pattern




| SYM | DIMENSIONS | |
|---|---|---|
| | MILLIMETERS | INCHES |
| A | 3.15 | 0.120 |
| B | 0.80 | 0.031 |
| C | 0.80 | 0.031 |

## TAbsolute Maximum Ratings

($T_A$=25°C, RH=45%-75%, unless otherwise noted)

| NVD0503-YR | | | |
|---|---|---|---|
| **Parameter** | **Symbol** | **Value** | **Unit** |
| Peak Pulse Power (8/20μs) | Ppk | 350 | W |
| Peak Pulse Current (8/20μs) | Ipp | 20 | A |
| ESD per IEC 61000−4−2 (Air)<br>ESD per IEC 61000−4−2 (Contact) | VESD | ±30<br>±30 | kV |
| Operating Temperature Range | TJ | −55 to +125 | °C |
| Storage Temperature Range | Tstg | −55 to +150 | °C |

| NVD0505-XR | | | |
|---|---|---|---|
| **Parameter** | **Symbol** | **Value** | **Unit** |
| Peak Pulse Power (8/20μs) | Ppk | 350 | W |
| Peak Pulse Current (8/20μs) | Ipp | 17 | A |
| ESD per IEC 61000−4−2 (Air)<br>ESD per IEC 61000−4−2 (Contact) | VESD | ±30<br>±30 | kV |
| Operating Temperature Range | TJ | −55 to +125 | °C |
| Storage Temperature Range | Tstg | −55 to +150 | °C |

| NVD0512-TR | | | |
|---|---|---|---|
| **Parameter** | **Symbol** | **Value** | **Unit** |
| Peak Pulse Power (8/20μs) | Ppk | 350 | W |
| Peak Pulse Current (8/20μs) | Ipp | 11 | A |
| ESD per IEC 61000−4−2 (Air)<br>ESD per IEC 61000−4−2 (Contact) | VESD | ±30<br>±30 | kV |
| Operating Temperature Range | TJ | −55 to +125 | °C |
| Storage Temperature Range | Tstg | −55 to +150 | °C |

| NVD0515-TR | | | |
|---|---|---|---|
| **Parameter** | **Symbol** | **Value** | **Unit** |
| Peak Pulse Power (8/20μs) | Ppk | 350 | W |
| Peak Pulse Current (8/20μs) | Ipp | 10 | A |
| ESD per IEC 61000−4−2 (Air)<br>ESD per IEC 61000−4−2 (Contact) | VESD | ±30<br>±30 | kV |
| Operating Temperature Range | TJ | −55 to +125 | °C |
| Storage Temperature Range | Tstg | −55 to +150 | °C |

| NVD0518-RR | | | |
|---|---|---|---|
| **Parameter** | **Symbol** | **Value** | **Unit** |
| Peak Pulse Power (8/20μs) | Ppk | 350 | W |
| Peak Pulse Current (8/20μs) | Ipp | 8 | A |
| ESD per IEC 61000−4−2 (Air)<br>ESD per IEC 61000−4−2 (Contact) | VESD | ±30<br>±30 | kV |
| Operating Temperature Range | TJ | −55 to +125 | °C |
| Storage Temperature Range | Tstg | −55 to +150 | °C |

| NVD0524-SR | | | |
|---|---|---|---|
| **Parameter** | **Symbol** | **Value** | **Unit** |
| Peak Pulse Power (8/20μs) | Ppk | 350 | W |
| Peak Pulse Current (8/20μs) | Ipp | 7 | A |
| ESD per IEC 61000−4−2 (Air)<br>ESD per IEC 61000−4−2 (Contact) | VESD | ±30<br>±30 | kV |
| Operating Temperature Range | TJ | −55 to +125 | °C |
| Storage Temperature Range | Tstg | −55 to +150 | °C |

| NVD0536-RR | | | |
|---|---|---|---|
| **Parameter** | **Symbol** | **Value** | **Unit** |
| Peak Pulse Power (8/20μs) | Ppk | 350 | W |
| Peak Pulse Current (8/20μs) | Ipp | 5 | A |
| ESD per IEC 61000−4−2 (Air)<br>ESD per IEC 61000−4−2 (Contact) | VESD | ±30<br>±30 | kV |
| Operating Temperature Range | TJ | −55 to +125 | °C |
| Storage Temperature Range | Tstg | −55 to +150 | °C |

## Electrical Characteristics ($T_A$=25℃)

| NVD0503-YR | | | | | | |
|---|---|---|---|---|---|---|
| Parameter | Test Condition | Symbol | Min | Typ | Max | Unit |
| Reverse Working Voltage | - | $V_{RWM}$ | - | - | 3.3 | V |
| Breakdown Voltage | IT = 1mA | $V_{BR}$ | 4.0 | - | - | V |
| Reverse Leakage Current | $V_{RWM}$ = 3.3V | $I_R$ | - | - | 40 | uA |
| Clamping Voltage | $I_{PP}$ = 1A (8 x 20uS pulse) | $V_C$ | - | 7 | - | V |
| Clamping Voltage | $I_{PP}$ = 20A (8 x 20uS pulse) | $V_C$ | - | - | 19 | V |
| Junction Capacitance | VR = 0V, f = 1MHz | $C_J$ | - | 450 | - | pF |

| NVD0505-XR | | | | | | |
|---|---|---|---|---|---|---|
| Parameter | Test Condition | Symbol | Min | Typ | Max | Unit |
| Reverse Working Voltage | - | $V_{RWM}$ | - | - | 5 | V |
| Breakdown Voltage | IT = 1mA | $V_{BR}$ | 6.2 | - | - | V |
| Reverse Leakage Current | $V_{RWM}$ = 5V | $I_R$ | - | - | 10 | uA |
| Clamping Voltage | $I_{PP}$ = 1A (8 x 20uS pulse) | $V_C$ | - | 9.8 | - | V |
| Clamping Voltage | $I_{PP}$ = 17A (8 x 20uS pulse) | $V_C$ | - | - | 21 | V |
| Junction Capacitance | VR = 0V, f = 1MHz | $C_J$ | - | 200 | - | pF |

| NVD0512-TR | | | | | | |
|---|---|---|---|---|---|---|
| Parameter | Test Condition | Symbol | Min | Typ | Max | Unit |
| Reverse Working Voltage | - | $V_{RWM}$ | - | - | 12 | V |
| Breakdown Voltage | IT = 1mA | $V_{BR}$ | 13.3 | - | - | V |
| Reverse Leakage Current | $V_{RWM}$ = 12V | $I_R$ | - | - | 1 | uA |
| Clamping Voltage | $I_{PP}$ = 1A (8 x 20uS pulse) | $V_C$ | - | 19 | - | V |
| Clamping Voltage | $I_{PP}$ = 11A (8 x 20uS pulse) | $V_C$ | - | - | 32 | V |
| Junction Capacitance | VR = 0V, f = 1MHz | $C_J$ | - | 75 | - | pF |

| NVD0515-TR | | | | | | |
|---|---|---|---|---|---|---|
| Parameter | Test Condition | Symbol | Min | Typ | Max | Unit |
| Reverse Working Voltage | - | $V_{RWM}$ | - | - | 15 | V |
| Breakdown Voltage | IT = 1mA | $V_{BR}$ | 16.7 | - | - | V |
| Reverse Leakage Current | $V_{RWM}$ = 15V | $I_R$ | - | - | 1 | uA |
| Clamping Voltage | $I_{PP}$ = 1A (8 x 20uS pulse) | $V_C$ | - | 24 | - | V |
| Clamping Voltage | $I_{PP}$ = 10A (8 x 20uS pulse) | $V_C$ | - | - | 38 | V |
| Junction Capacitance | VR = 0V, f = 1MHz | $C_J$ | - | 68 | - | F |

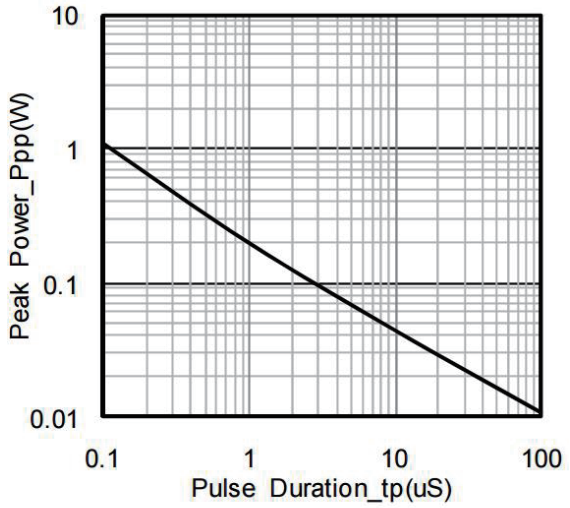
| NVD0518-RR | | | | | | |
|---|---|---|---|---|---|---|
| **Parameter** | **Test Condition** | **Symbol** | **Min** | **Typ** | **Max** | **Unit** |
| Reverse Working Voltage | - | $V_{RWM}$ | - | - | 18 | V |
| Breakdown Voltage | IT = 1mA | $V_{BR}$ | 19 | - | - | V |
| Reverse Leakage Current | $V_{RWM}$ = 18V | $I_R$ | - | - | 1 | uA |
| Clamping Voltage | $I_{PP}$ = 1A (8 x 20uS pulse) | $V_C$ | - | 32 | - | V |
| Clamping Voltage | $I_{PP}$ = 8A (8 x 20uS pulse) | $V_C$ | - | 45 | - | V |
| Junction Capacitance | VR = 0V, f = 1MHz | $C_J$ | - | 60 | - | pF |

| NVD0524-SR | | | | | | |
|---|---|---|---|---|---|---|
| **Parameter** | **Test Condition** | **Symbol** | **Min** | **Typ** | **Max** | **Unit** |
| Reverse Working Voltage | - | $V_{RWM}$ | - | - | 24 | V |
| Breakdown Voltage | IT = 1mA | $V_{BR}$ | 26.7 | - | - | V |
| Reverse Leakage Current | $V_{RWM}$ = 24V | $I_R$ | - | - | 1 | uA |
| Clamping Voltage | $I_{PP}$ = 1A (8 x 20uS pulse) | $V_C$ | - | 43 | - | V |
| Clamping Voltage | $I_{PP}$ = 7A (8 x 20uS pulse) | $V_C$ | - | 52 | - | V |
| Junction Capacitance | VR = 0V, f = 1MHz | $C_J$ | - | 57 | - | pF |

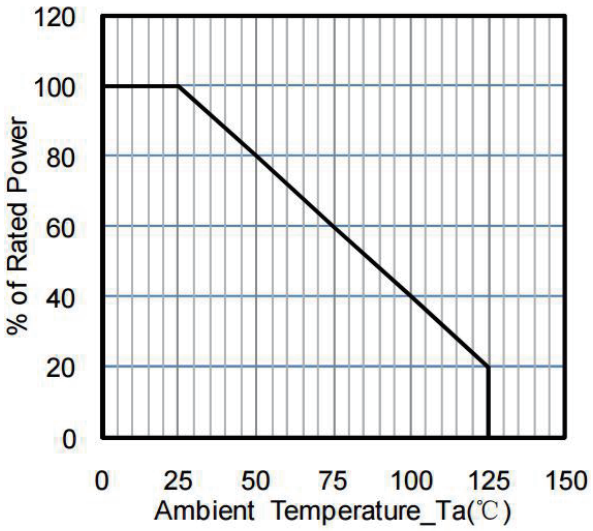
| NVD0536-RR | | | | | | |
|---|---|---|---|---|---|---|
| **Parameter** | **Test Condition** | **Symbol** | **Min** | **Typ** | **Max** | **Unit** |
| Reverse Working Voltage | - | $V_{RWM}$ | - | - | 36 | V |
| Breakdown Voltage | IT = 1mA | $V_{BR}$ | 40 | - | - | V |
| Reverse Leakage Current | $V_{RWM}$ = 36V | $I_R$ | - | - | 1 | uA |
| Clamping Voltage | $I_{PP}$ = 1A (8 x 20uS pulse) | $V_C$ | - | 63 | - | V |
| Clamping Voltage | $I_{PP}$ = 5A (8 x 20uS pulse) | $V_C$ | - | - | 80 | V |
| Junction Capacitance | VR = 0V, f = 1MHz | $C_J$ | - | 35 | - | pF |

## Typical Performance Characteristics

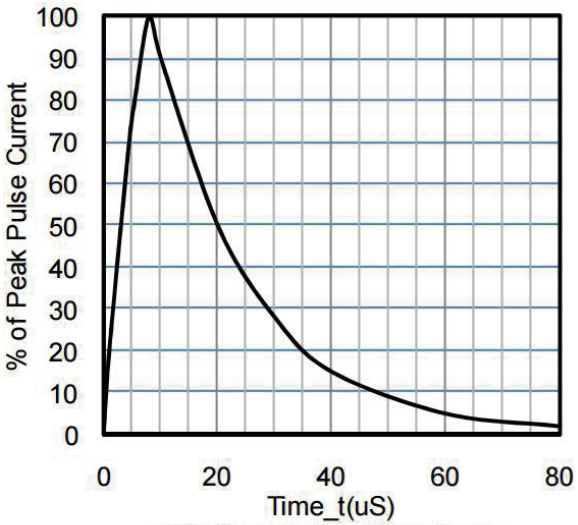
($T_A$=25℃ unless otherwise Specified.)




**Peak Pulse Power vs. Pulse Time**




**Power Derating Curve**




**8 X 20uS Pulse Waveform**

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