

ESD NOISE CLIPPING DIODES NNCD5.6LH to NNCD6.8LH

LOW CAPACITANCE TYPE ELECTROSTATIC DISCHARGE NOISE CLIPPING DIODES
(QUARTO TYPE: COMMON ANODE)
5-PIN SUPER SMALL MINI MOLD

This product series is a low capacitance type diode developed for ESD (Electrostatic Discharge) absorption. Based on the IEC1000-4-2 test on electromagnetic interference (EMI), the diode assures an endurance of no less than 8 kV, and capacitance is small with 10 pF between the terminal. This product series is the most suitable for the ESD absorption in the high-speed data communication bus such as USB.

With four elements mounted in the 5-pin super mini mold package, that product can cope with more high density assembling.

FEATURES

- Based on the electrostatic discharge immunity test (IEC1000-4-2), the product assures the minimum endurance of 8 kV.
- Capacitance is small with 10 pF (at $V_R = 0$ V, $f = 1$ MHz) between the terminal. It is excellent in the frequency characteristic.
- With 4 elements mounted (common anode) in the 5-pin super mini mold package, that product can cope with more high density assembling.

APPLICATIONS

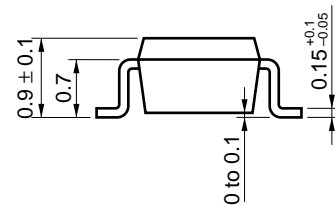
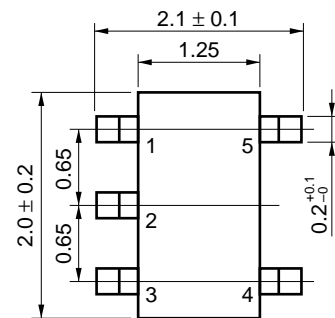
- External interface circuit ESD absorption in the high-speed data communication bus such as USB.

MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$)

| | | | |
|----------------------|-----------|--------------------------------------|---------|
| Power Dissipation | P | 200 mW | (Total) |
| Surge Reverse Power | P_{RSM} | 2W ($t = 10 \mu\text{s}$, 1 pulse) | Fig.5 |
| Junction Temperature | T_j | 150°C | |
| Storage Temperature | T_{stg} | -55°C to +150°C | |

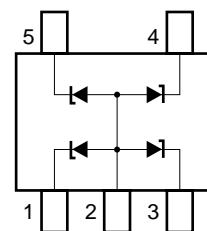
PACKAGE DIMENSIONS

(in millimeters)



(5-pin super mini mold)

PIN CONNECTION



- 1: K1 Cathode 1
- 2: A Anode (Common)
- 3: K2 Cathode 2
- 4: K3 Cathode 3
- 5: K4 Cathode 4

ELECTRICAL CHARACTERISTICS (T_A = 25 °C) (A-K1, A-K2, A-K3, A-K4)

| Type No | Breakdown Voltage ^{Note 1} V _{BR} (V) | | | Dynamic ^{Note 2} Impedance Z _z (Ω) | | Reverse Leakage I _R (μA) | | Capacitance C _i (pF) | | ESD Voltage ^{Note 3} (kV) | |
|-----------|--|------|---------------------|--|---------------------|---|--------------------|------------------------------------|-----------------------------------|---------------------------------------|---|
| | MIN. | MAX. | I _T (mA) | MAX. | I _T (mA) | MAX. | V _R (V) | TYP. | Test Condition | MIN. | Test Condition |
| NNCD5.6LH | 5.3 | 6.3 | 5 | 80 | 5 | 5 | 2.5 | 10 | V _R = 0 V f = 1 MHz | 8 | C = 150 pF R = 330 Ω Contact discharge |
| NNCD6.2LH | 5.7 | 6.7 | 5 | 50 | 5 | 2 | 3.0 | 8 | | 8 | |
| NNCD6.8LH | 6.2 | 7.1 | 5 | 30 | 5 | 2 | 3.5 | 7 | | 8 | |

- Notes**
1. Tested with pulse (40 ms)
 2. Z_z is measured at I_T given a small A.C. signal.
 3. ESD voltage is measured based on the IEC1000-4-2 test on electromagnetic interference (EMI).

TYPICAL CHARACTERISTICS (T_A = 25°C)

Figure 1. P - T_A RATING

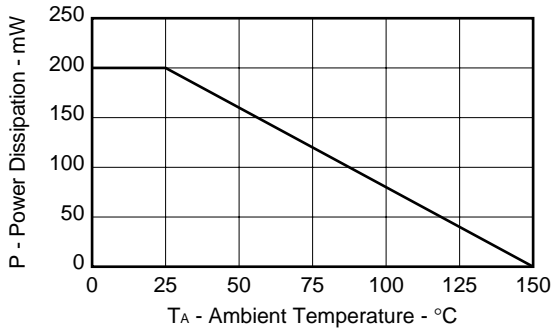


Figure 2. I_T - V_{BR} CHARACTERISTICS
(A - K1, A - K2, A - K3, A - K4)

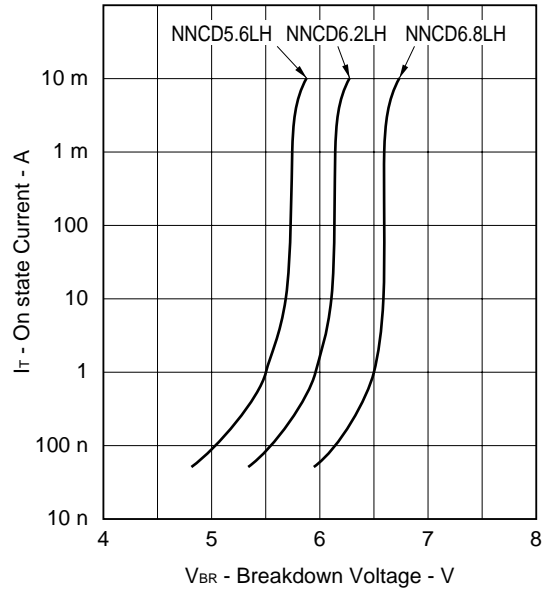


Figure 3. C_t - V_R CHARACTERISTICS

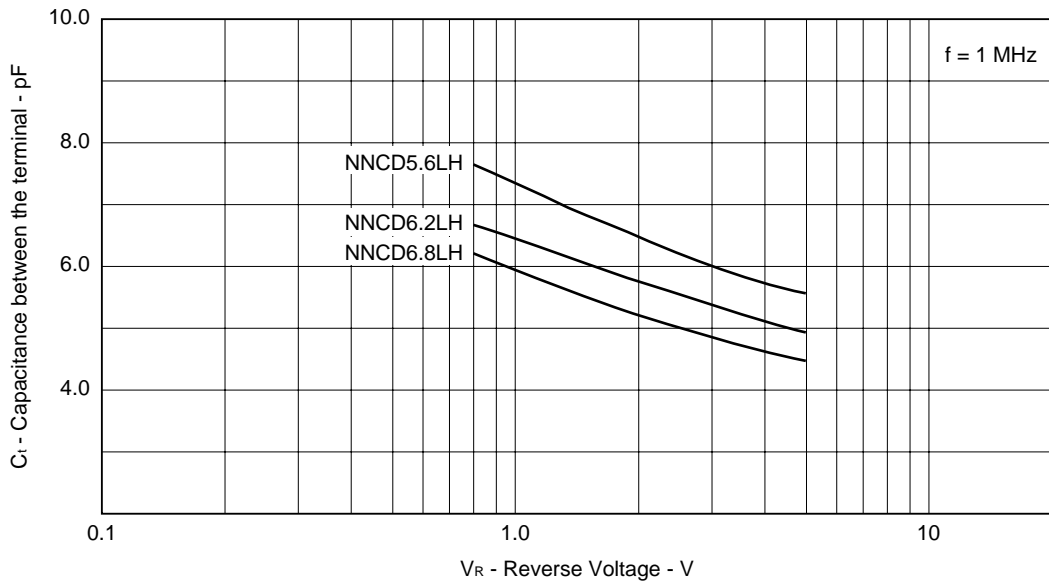


Figure 4. TRANSIENT THERMAL IMPEDANCE

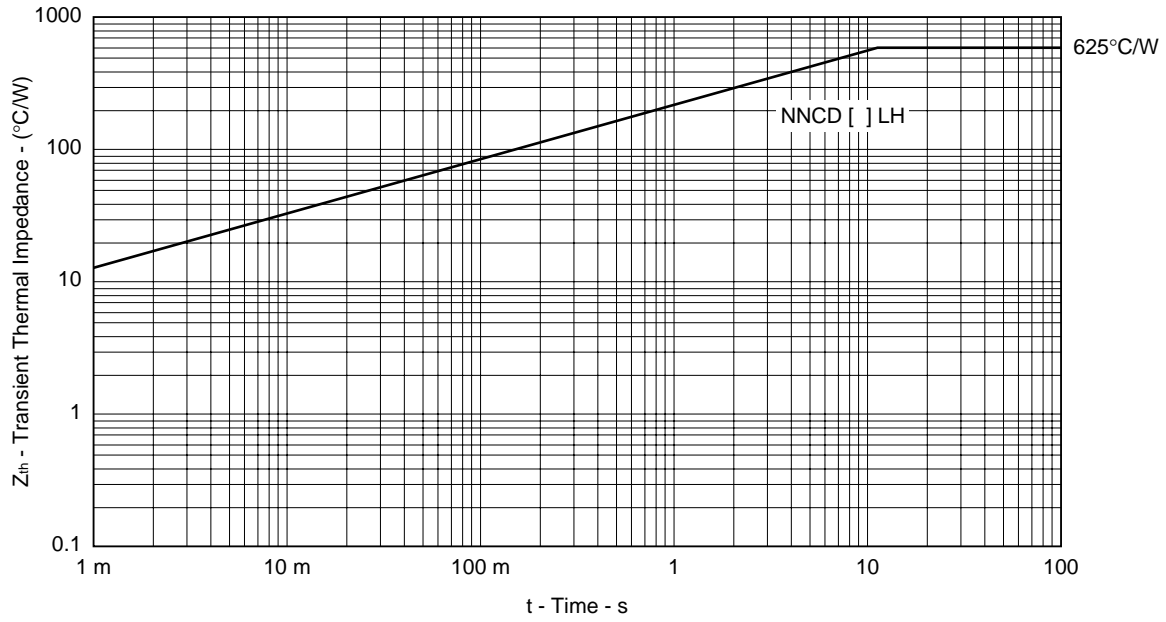
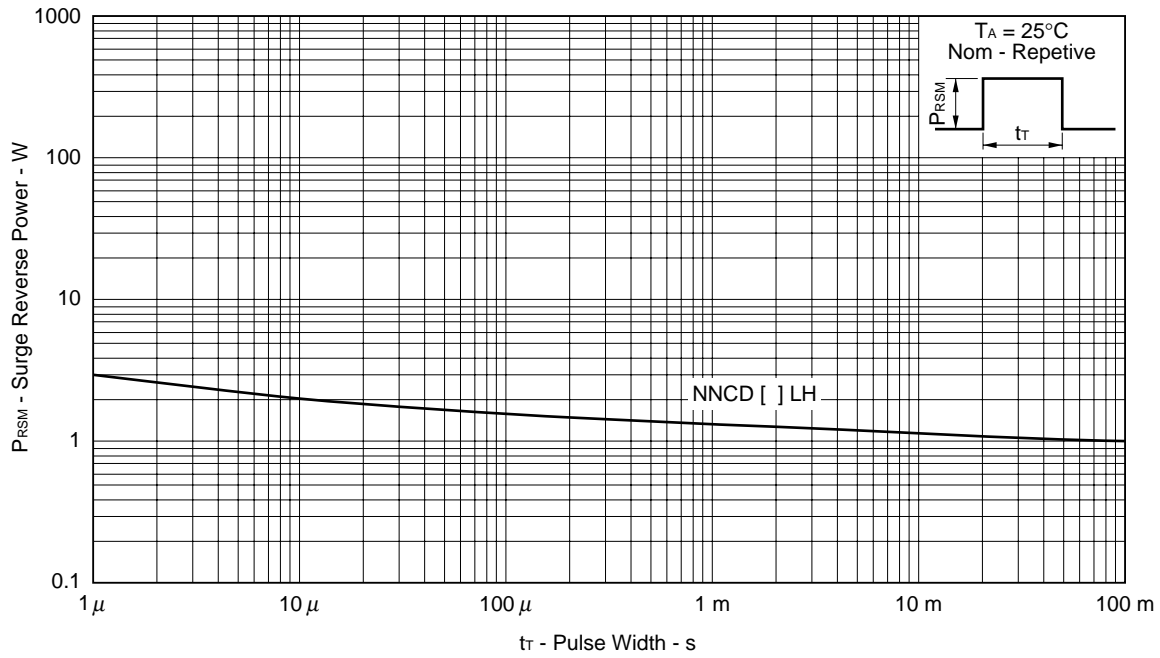


Figure 5. SURGE REVERSE POWER RATING



REFERENCE

| Document | Document No. |
|---|--------------|
| NEC semiconductor device reliability/quality control system | C11745E |
| NEC semiconductor device reliability/quality control system | MEI - 1201 |
| Quality grade on NEC semiconductor device | C11531E |
| Semiconductor device mounting technology manual | C10535E |

[MEMO]

[MEMO]

No part of this document may be copied or reproduced in any form or by any means without the prior written consent of NEC Corporation. NEC Corporation assumes no responsibility for any errors which may appear in this document.

NEC Corporation does not assume any liability for infringement of patents, copyrights or other intellectual property rights of third parties by or arising from use of a device described herein or any other liability arising from use of such device. No license, either express, implied or otherwise, is granted under any patents, copyrights or other intellectual property rights of NEC Corporation or others.

While NEC Corporation has been making continuous effort to enhance the reliability of its semiconductor devices, the possibility of defects cannot be eliminated entirely. To minimize risks of damage or injury to persons or property arising from a defect in an NEC semiconductor device, customers must incorporate sufficient safety measures in its design, such as redundancy, fire-containment, and anti-failure features.

NEC devices are classified into the following three quality grades:

"Standard", "Special", and "Specific". The Specific quality grade applies only to devices developed based on a customer designated "quality assurance program" for a specific application. The recommended applications of a device depend on its quality grade, as indicated below. Customers must check the quality grade of each device before using it in a particular application.

Standard: Computers, office equipment, communications equipment, test and measurement equipment, audio and visual equipment, home electronic appliances, machine tools, personal electronic equipment and industrial robots

Special: Transportation equipment (automobiles, trains, ships, etc.), traffic control systems, anti-disaster systems, anti-crime systems, safety equipment and medical equipment (not specifically designed for life support)

Specific: Aircrafts, aerospace equipment, submersible repeaters, nuclear reactor control systems, life support systems or medical equipment for life support, etc.

The quality grade of NEC devices is "Standard" unless otherwise specified in NEC's Data Sheets or Data Books. If customers intend to use NEC devices for applications other than those specified for Standard quality grade, they should contact an NEC sales representative in advance.

Anti-radioactive design is not implemented in this product.