

## E.S.D NOISE CLIPPING DIODES NNCD3.3E to NNCD12E

### ELECTROSTATIC DISCHARGE NOISE CLIPPING DIODES (200 mW TYPE)

This product series is a diode developed for E.S.D (Electrostatic Discharge) noise protection. Based on the IEC1000-4-2 test on electromagnetic interference (EMI), the diode assures an endurance of no less than 30 kV, thus making itself most suitable for external interface circuit protection.

Type NNCD3.3E to NNCD12E Series are into 3PIN Mini Mold Package having allowable power dissipation of 200 mW.

#### FEATURES

- Based on the electrostatic discharge immunity test (IEC1000-4-2), the product assures the minimum endurance of 30 kV.
- Based on the reference supply of the set, the product achieves a series over a wide range (15 product name lined up).

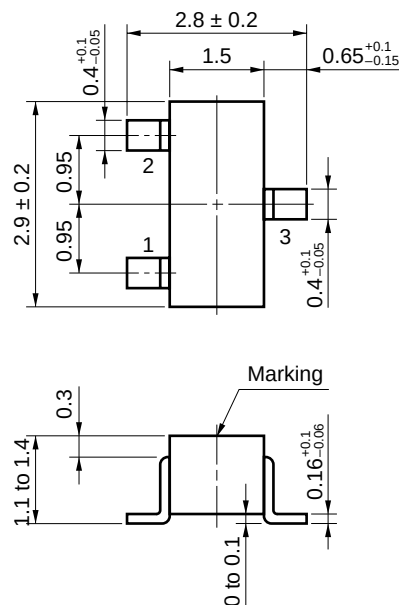
#### APPLICATIONS

- External interface circuit E.S.D protection.
- Circuits for Waveform clipper, Surge absorber.

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

|                      |           |                                                   |        |
|----------------------|-----------|---------------------------------------------------|--------|
| Power Dissipation    | P         | 200 mW                                            |        |
| Surge Reverse Power  | $P_{RSM}$ | 100 W ( $t_T = 10\text{ }\mu\text{s}$ 1 pulse)    | Fig. 6 |
| Junction Temperature | $T_j$     | 150 $^{\circ}\text{C}$                            |        |
| Storage Temperature  | $T_{stg}$ | -55 $^{\circ}\text{C}$ to +150 $^{\circ}\text{C}$ |        |

#### PACKAGE DIMENSIONS (in millimeters)



#### PIN CONNECTION

1. NC
  2. Anode
  3. Cathode
- SC-59 (EIAJ)

ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25 °C)

| Type Number | Breakdown Voltage <sup>Note 1</sup><br>V <sub>BR</sub> (V) |       |                     | Dynamic<br>Impedance <sup>Note 2</sup><br>Z <sub>z</sub> (Ω) |                     | Reverse Leakage<br>I <sub>R</sub> (μA) |                    | Capacitance<br>C <sub>t</sub> (pF) |                                   | E.S.D Voltage<br>(kV) |                                              |
|-------------|------------------------------------------------------------|-------|---------------------|--------------------------------------------------------------|---------------------|----------------------------------------|--------------------|------------------------------------|-----------------------------------|-----------------------|----------------------------------------------|
|             | MIN.                                                       | MAX.  | I <sub>T</sub> (mA) | MAX.                                                         | I <sub>T</sub> (mA) | MAX.                                   | V <sub>R</sub> (V) | TYP.                               | TEST<br>CONDITION                 | MIN.                  | TEST<br>CONDITION                            |
| NNCD3.3E    | 3.10                                                       | 3.50  | 5                   | 130                                                          | 5                   | 20                                     | 1.0                | 220                                | V <sub>R</sub> = 0 V<br>f = 1 MHz | 30                    | C = 150 pF<br>R = 330 Ω<br>(IEC1000<br>-4-2) |
| NNCD3.6E    | 3.40                                                       | 3.80  | 5                   | 130                                                          | 5                   | 10                                     | 1.0                | 210                                |                                   | 30                    |                                              |
| NNCD3.9E    | 3.70                                                       | 4.10  | 5                   | 130                                                          | 5                   | 10                                     | 1.0                | 200                                |                                   | 30                    |                                              |
| NNCD4.3E    | 4.01                                                       | 4.48  | 5                   | 130                                                          | 5                   | 10                                     | 1.0                | 180                                |                                   | 30                    |                                              |
| NNCD4.7E    | 4.42                                                       | 4.90  | 5                   | 130                                                          | 5                   | 10                                     | 1.0                | 170                                |                                   | 30                    |                                              |
| NNCD5.1E    | 4.84                                                       | 5.37  | 5                   | 130                                                          | 5                   | 5                                      | 1.5                | 160                                |                                   | 30                    |                                              |
| NNCD5.6E    | 5.31                                                       | 5.92  | 5                   | 80                                                           | 5                   | 5                                      | 2.5                | 140                                |                                   | 30                    |                                              |
| NNCD6.2E    | 5.86                                                       | 6.53  | 5                   | 50                                                           | 5                   | 2                                      | 3.0                | 120                                |                                   | 30                    |                                              |
| NNCD6.8E    | 6.47                                                       | 7.14  | 5                   | 30                                                           | 5                   | 2                                      | 3.5                | 110                                |                                   | 30                    |                                              |
| NNCD7.5E    | 7.06                                                       | 7.84  | 5                   | 30                                                           | 5                   | 2                                      | 4.0                | 90                                 |                                   | 30                    |                                              |
| NNCD8.2E    | 7.76                                                       | 8.64  | 5                   | 30                                                           | 5                   | 2                                      | 5.0                | 90                                 |                                   | 30                    |                                              |
| NNCD9.1E    | 8.56                                                       | 9.55  | 5                   | 30                                                           | 5                   | 2                                      | 6.0                | 90                                 |                                   | 30                    |                                              |
| NNCD10E     | 9.45                                                       | 10.55 | 5                   | 30                                                           | 5                   | 2                                      | 7.0                | 80                                 |                                   | 30                    |                                              |
| NNCD11E     | 10.44                                                      | 11.56 | 5                   | 30                                                           | 5                   | 2                                      | 8.0                | 70                                 |                                   | 30                    |                                              |
| NNCD12E     | 11.42                                                      | 12.60 | 5                   | 35                                                           | 5                   | 2                                      | 9.0                | 70                                 |                                   | 30                    |                                              |

**Notes** 1. Tested with pulse (40 ms)

2. Z<sub>z</sub> is measured at I<sub>T</sub> give a small A.C. signal.

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

Fig. 1 POWER DISSIPATION vs. AMBIENT TEMPERATURE

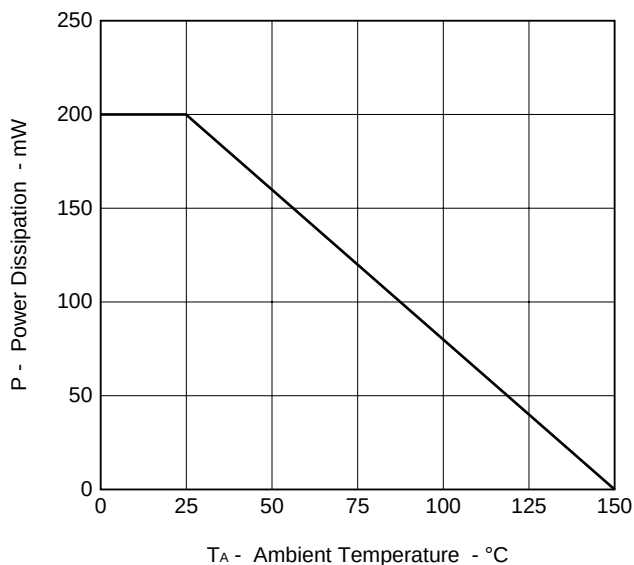


Fig. 2  $I_T$  -  $V_{BR}$  CHARACTERISTICS

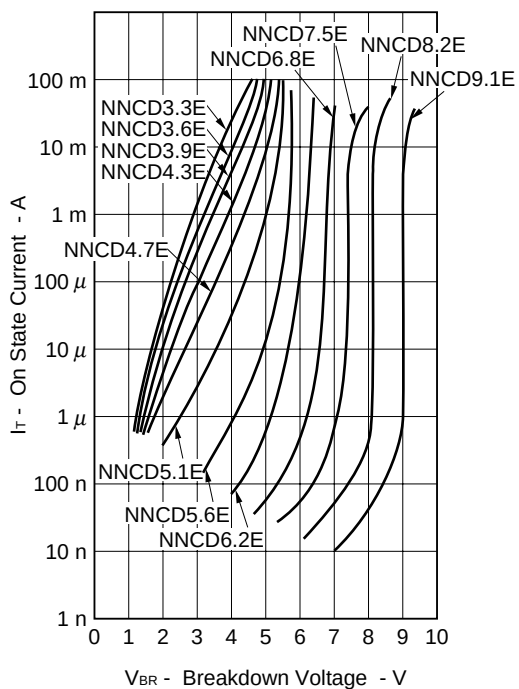


Fig. 3  $I_T$  -  $V_{BR}$  CHARACTERISTICS

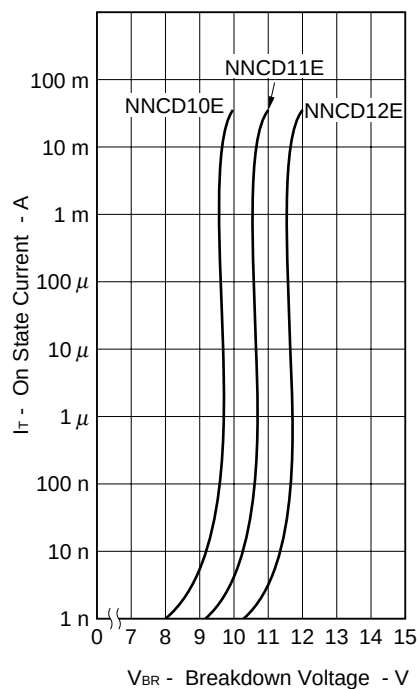


Fig. 4  $Z_z - I_T$  CHARACTERISTICS

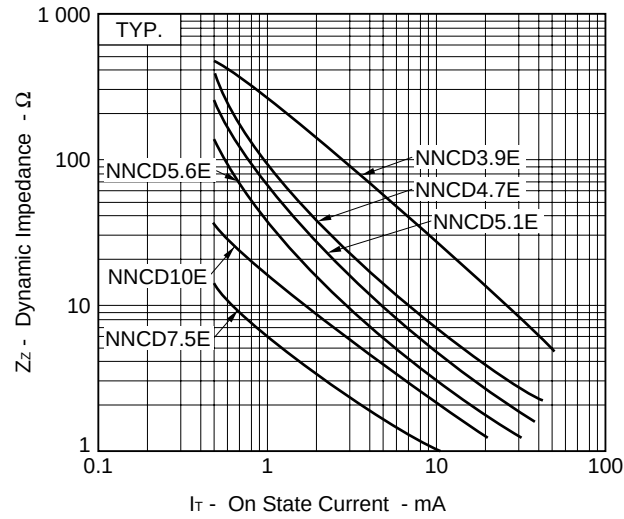


Fig. 5 TRANSIENT THERMAL IMPEDANCE

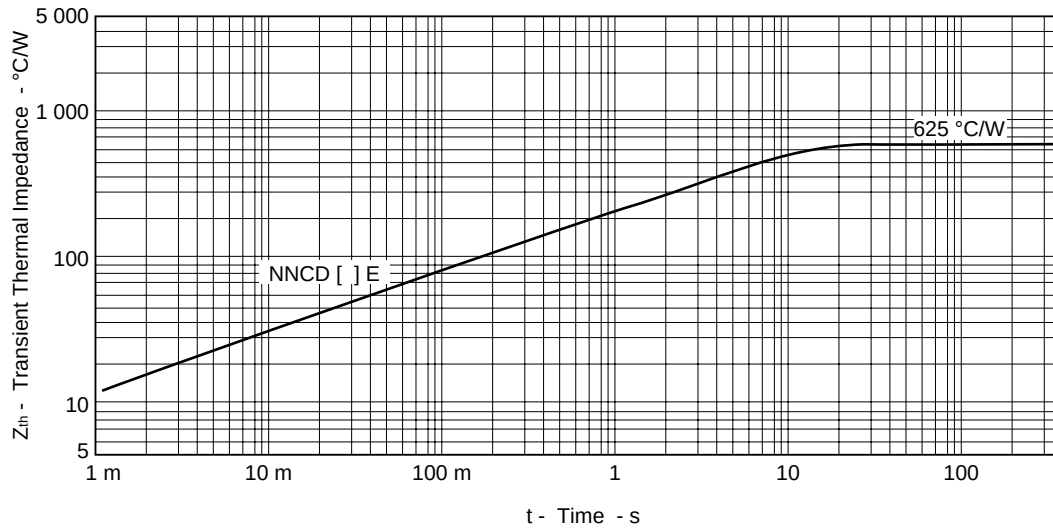
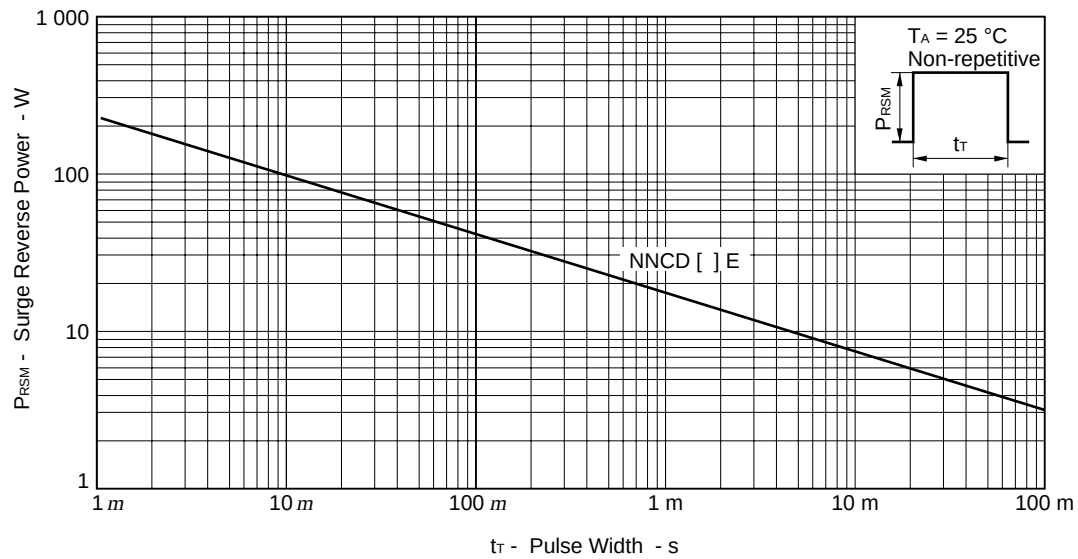
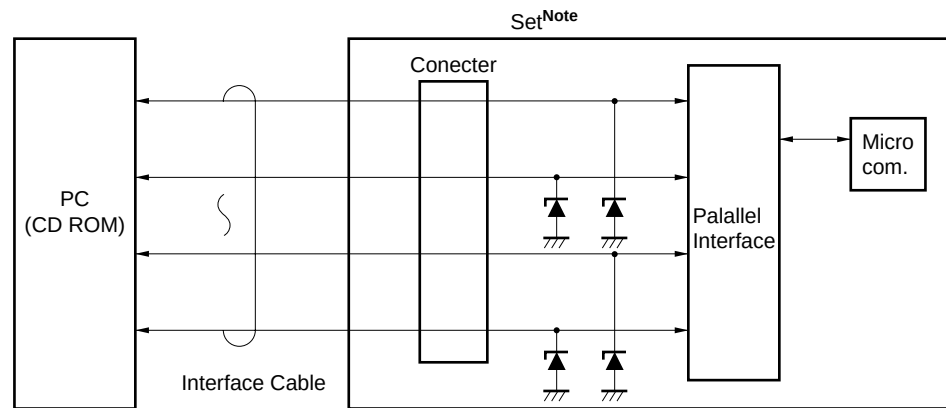


Fig. 6 SURGE REVERSE POWER RATING



Sample Application Circuits



**Note** Set  
Printer, P.D.C, T.V Game etc

**REFERENCE**

| Document Name                                               | 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      |
| Guide to quality assurance for semiconductor device         | MEI-1202     |

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Anti-radioactive design is not implemented in this product.