

To our customers,

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## Old Company Name in Catalogs and Other Documents

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Renesas Electronics website: <http://www.renesas.com>

April 1<sup>st</sup>, 2010  
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (<http://www.renesas.com>)

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Not recommended  
for new design

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# INCND5.6LH 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  $V_R = 0\text{ V}$ ,  $f = 1\text{ MHz}$ ) 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**

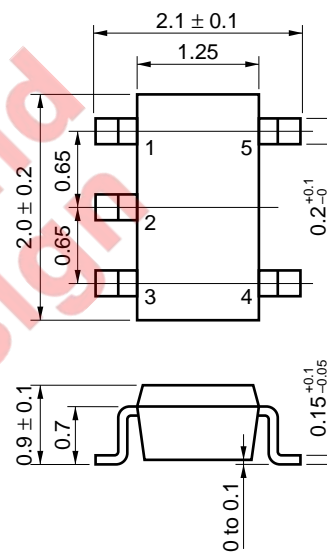
- External interface circuit ESD absorption in the high-speed data communication bus such as USB.

**MAXIMUM RATINGS (T<sub>A</sub> = 25°C)**

Power Dissipation	P	200 mW	(Total)
Surge Reverse Power	P <sub>RSM</sub>	2W (t = 10 μs, 1 pulse)	Fig.5
Junction Temperature	T <sub>j</sub>	150°C	
Storage Temperature	T <sub>stg</sub>	-55°C to +150°C	

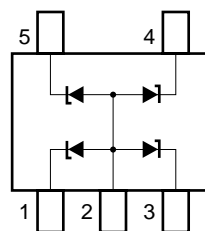
**PACKAGE DIMENSIONS**

(in millimeters)



(5-pin super mini mold)

**PIN CONNECTION**



- 1: K1 Cathode 1
- 2: A Anode (Common)
- 3: K2 Cathode 2
- 4: K3 Cathode3
- 5: K4 Cathode4

**ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25 °C) (A-K1, A-K2, A-K3, A-K4)**

Type No	Breakdown Voltage <sup>Note 1</sup> V <sub>BR</sub> (V)			Dynamic <sup>Note 2</sup> Impedance Z <sub>z</sub> (Ω)		Reverse Leakage I <sub>R</sub> (μA)		Capacitance C <sub>i</sub> (pF)		ESD Voltage <sup>Note 3</sup> (kV)	
	MIN.	MAX.	I <sub>T</sub> (mA)	MAX.	I <sub>T</sub> (mA)	MAX.	V <sub>R</sub> (V)	TYP.	Test Condition	MIN.	Test Condition
NNCD5.6LH	5.3	6.3	5	80	5	5	2.5	10	V <sub>R</sub> = 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<sub>z</sub> is measured at I<sub>T</sub> given a small A.C. signal.
  3. ESD voltage is measured based on the IEC1000-4-2 test on electromagnetic interference (EMI).

Not recommend for new design

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

Figure 1. P -  $T_A$  RATING

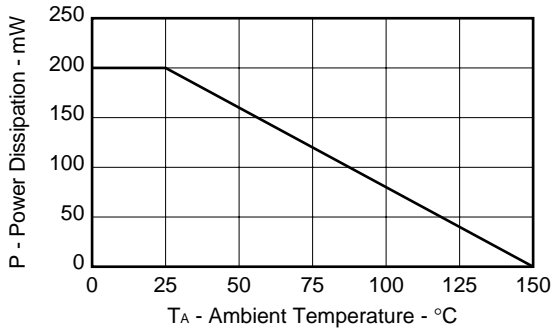


Figure 2.  $I_T$  -  $V_{BR}$  CHARACTERISTICS  
(A - K1, A - K2, A - K3, A - K4)

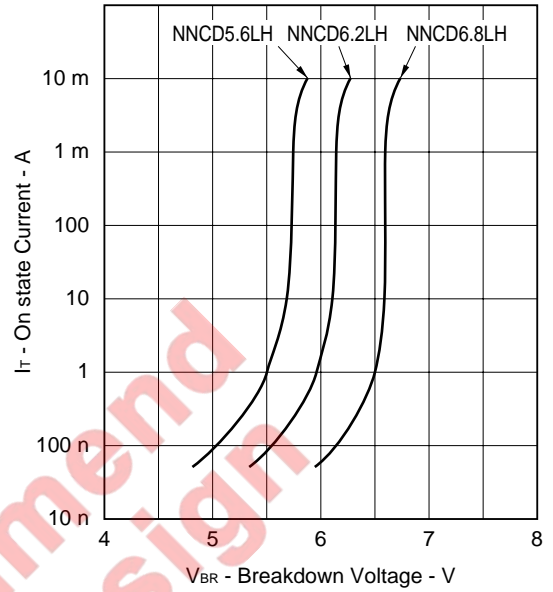


Figure 3.  $C_t$  -  $V_R$  CHARACTERISTICS

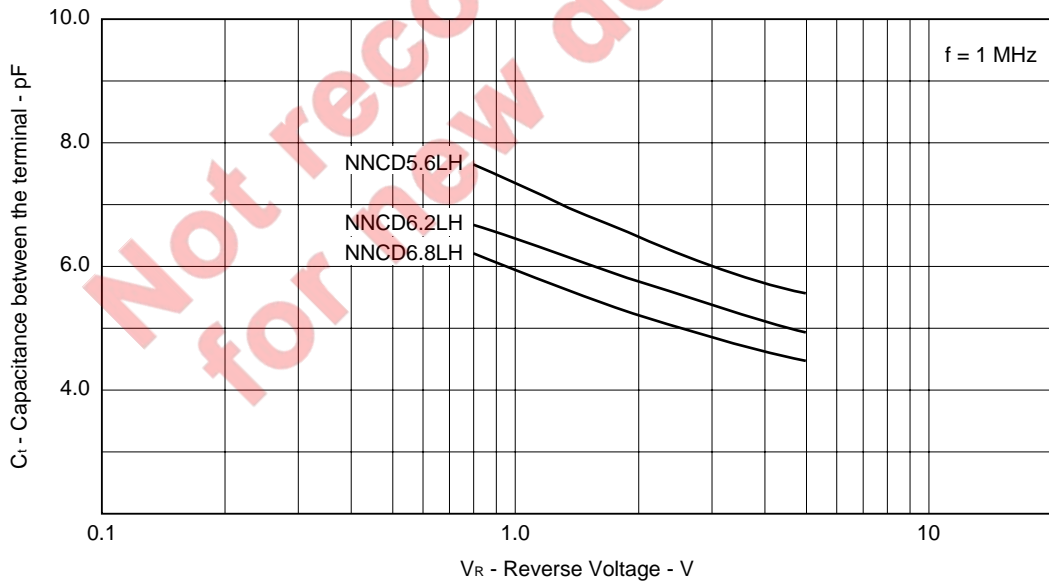


Figure 4. TRANSIENT THERMAL IMPEDANCE

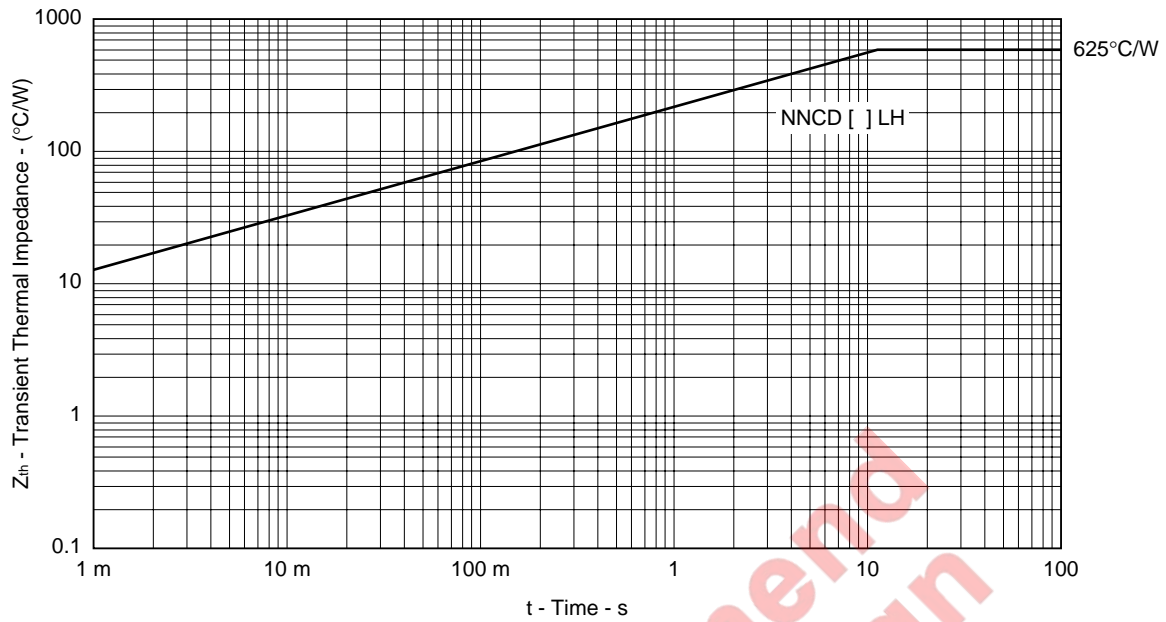
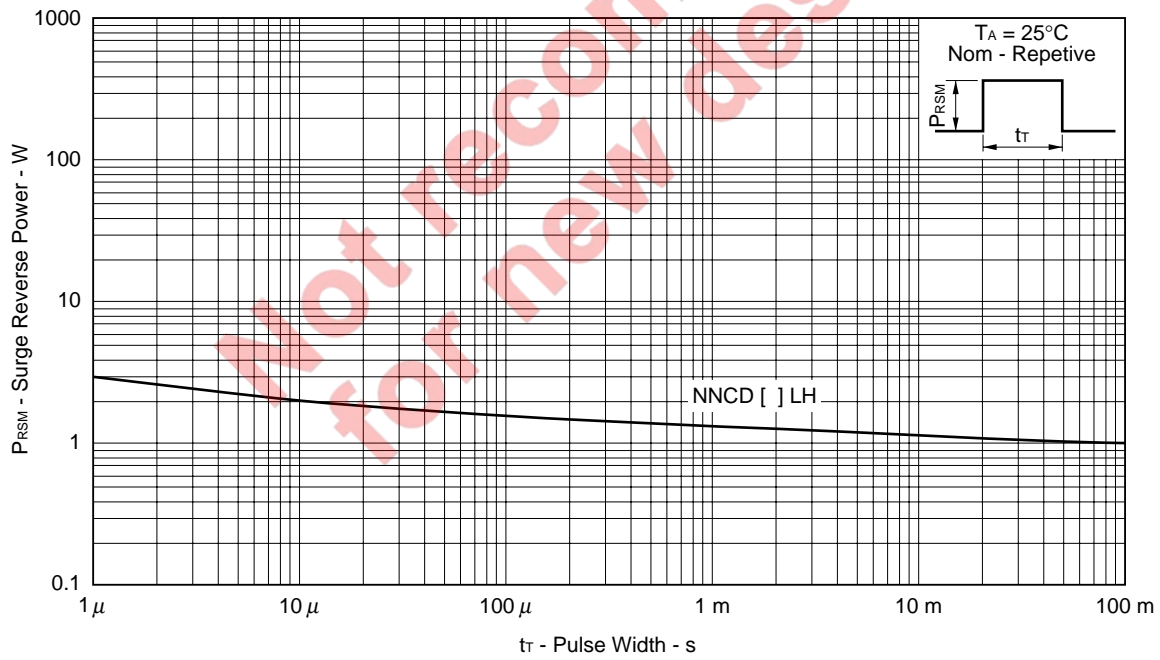


Figure 5. SURGE REVERSE POWER RATING



**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

**Not recommend  
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[MEMO]

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[MEMO]

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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)

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Anti-radioactive design is not implemented in this product.