To our customers,

## Old Company Name in Catalogs and Other Documents

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

April 1st, 2010
Renesas Electronics Corporation

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

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RENESAS

# SILICON POWER TRANSISTOR
# NTA1010

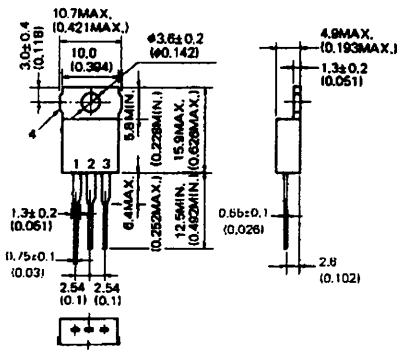
## HIGH SPEED HIGH CURRENT SWITCHING
## PNP SILICON EPITAXIAL TRANSISTOR

Industrial Use

### DESCRIPTION

Suitable for switching regulator, DC-DC converter and ultrasonic appliance applications.

### PACKAGE DIMENSIONS
**in millimeters (inches)**




1. Base (B)
2. Collector (C)
3. Emitter (E)
4. Fin (Collector)

JEDEC: TO-220AB

### FEATURES

- High speed switching.
- Low collector saturation voltage.
- Specified of reverse biased SOA with inductive loads.

### ABSOLUTE MAXIMUM RATINGS

Maximum Voltages and Currents (Ta=25°C)

| | | | |
|---|---|---|---|
| Collector to Emitter Voltage | $V_{CEX}$ | −100 | V |
| Collector to Emitter Sustaining Voltage | $V_{CEO(SUS)}$ | −100 | V |
| Collector to Emitter Sustaining Voltage | $V_{CEX(SUS)}$ | −100 | V |
| Emitter to Base Voltage | $V_{EBO}$ | −7.0 | V |
| Continuous Collector Current | $I_{C(DC)}$ | −7.0 | A |
| Peak Collector Current | $I_{C(pulse)}$* | −15 | A |
| Continuous Base Current | $I_{B(DC)}$ | −3.0 | A |

Maximum Power Dissipations

| | | | |
|---|---|---|---|
| Total Power Dissipation | $P_{T(Tc=25°C)}$ | 65 | W |
| Total Power Dissipation | $P_{T(Tc=100°C)}$ | 26 | W |
| Total Power Dissipation | $P_{T(Ta=25°C)}$ | 2.0 | W |

Maximum Temperatures

| | | | |
|---|---|---|---|
| Junction Temperature | $T_j$ | 150 | °C |
| Storage Temperature | $T_{stg}$ | −55 to +150 | °C |
| Lead Temperature | | | |
| 1/8 inch from case for 10 seconds | $T_L$ | 260 | °C |

Thermal Resistances

| | | | |
|---|---|---|---|
| Junction to Case | $R_{th(j-c)}$ | 1.92 | °C/W |
| Junction to Ambient | $R_{th(j-a)}$ | 62.5 | °C/W |

* Pulsed PW≤300μs, duty cycle≤10%

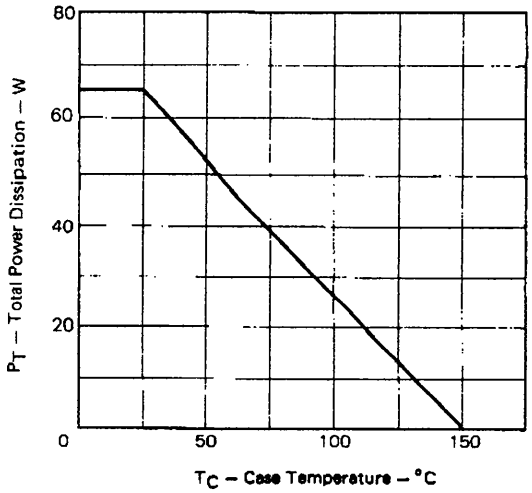
## ELECTRICAL CHARACTERISTICS (Ta=25°C unless otherwise noted.)

| CHARACTERISTIC | SYMBOL | MIN. | TYP. | MAX. | UNIT | TEST CONDITIONS |
|---|---|---|---|---|---|---|
| Collector to Emitter Sustaining Voltage | $V_{CEO(SUS)}$ | −100 | | | V | $I_C$=−5.0A, $I_B$=−0.5A, L=100μH |
| | $V_{CEX(SUS)1}$ | −100 | | | V | $I_C$=−5.0A, $I_{B1}$=−$I_{B2}$=−0.5A, $V_{BE(OFF)}$ =5V, L=180μH, Ta=125°C *1 |
| | $V_{CEX(SUS)2}$ | −100 | | | V | $I_C$=−10A, $I_{B1}$=−1.0A, $I_{B2}$=0.5A, $V_{BE(OFF)}$=5V, L=180μH, *2 Ta=125°C |
| Collector Cutoff Current | $I_{CEX1}$ | | | −10 | μA | $V_{CE}$=−100V, $V_{BE(OFF)}$=1.5V |
| | $I_{CEX2}$ | | | −1.0 | mA | $V_{CE}$=−100V, $V_{BE(OFF)}$=1.5V, Ta=125°C |
| | $I_{CER}$ | | | −1.0 | mA | $V_{CE}$=−100V, $R_{BE}$=100Ω, Ta=125°C |
| Emitter Cutoff Current | $I_{EBO}$ | | | −10 | μA | $V_{EB}$=−5.0V, $I_C$=0 |
| Second Breakdown Collector Current | $I_{S/B}$ | −2.0 | | | A | $V_{CE}$=−20V, t=1sec Tc=25°C |
| Second Breakdown Energy | $E_{S/B}$ | 125 | | | μJ | $I_C$=−5A, $I_{B1}$=−0.5A, $V_{BE(OFF)}$ =5V, $R_{BB}$=50Ω, L=10μH |
| DC Current Gain | $h_{FE1}$ | 40 | | | | $V_{CE}$=−5.0V, $I_C$=−3.0A, *3 |
| | $h_{FE2}$ | 20 | | | | $V_{CE}$=−5.0V, $I_C$=−5.0A *3 |
| Collector Saturation Voltage | $V_{CE(sat)}$ | | | −0.6 | V | $I_C$=−5.0A, $I_B$=−0.5A *3 |
| Base Saturation Voltage | $V_{BE(sat)}$ | | | −1.5 | V | |
| Gain Bandwidth Product | $f_T$ | 20 | | | MHz | $V_{CE}$=−10V, $I_C$=−0.2A, f=3MHz |
| Output Capacitance | Cob | | | 250 | pF | $V_{CB}$=−10V, $I_E$=0, f=1MHz |
| Turn On Time | ton | | | 0.5 | μs | $I_C$=−5.0A, $I_{B1}$=−$I_{B2}$=−0.5A $V_{BE(OFF)}$=5V, $R_L$=10Ω, Vcc≈−50V |
| Storage Time | tstg | | | 1.5 | μs | |
| Fall Time | $t_f$ | | | 0.3 | μs | |

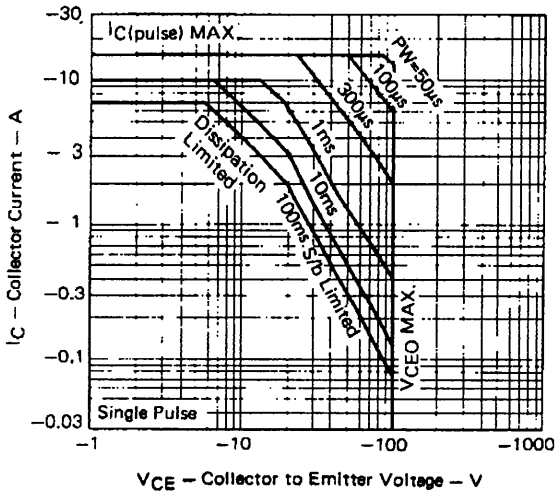
*1 $V_{CE}$ clamped Vclamp = −100V
*2 $V_{CE}$ clamped Vclamp = −100V
*3 Pulsed PW ≤ 350μs, duty cycle ≤ 2%

## TYPICAL CHARACTERISTICS (Ta=25°C)

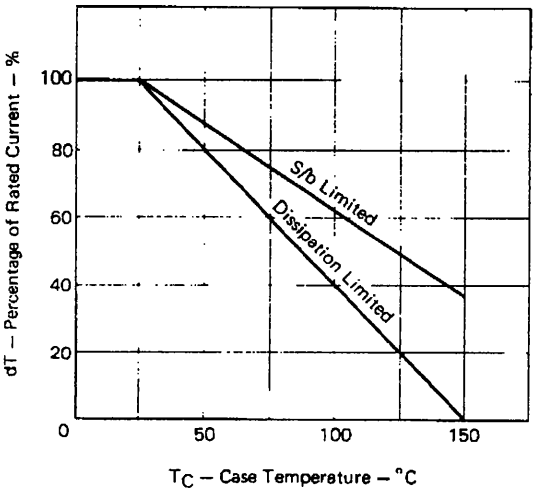
**TOTAL POWER DISSIPATION vs. CASE TEMPERATURE**



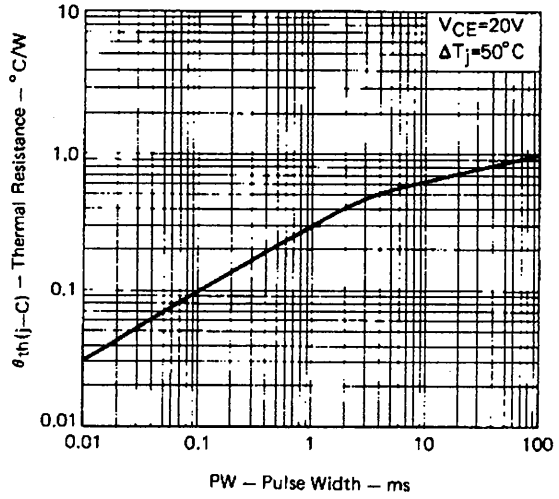

**SAFE OPERATING AREA**



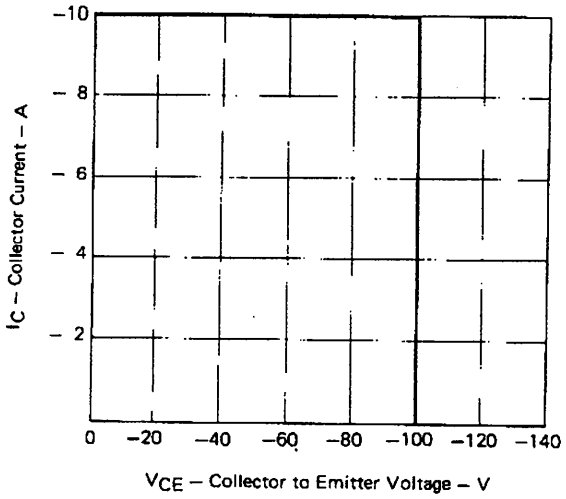

**DERATING CURVE OF SAFE OPERATING AREAS**



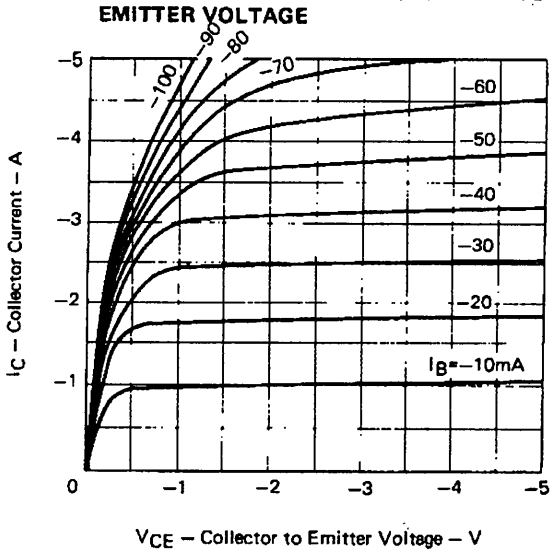

**TRANSIENT THERMAL RESISTANCE**



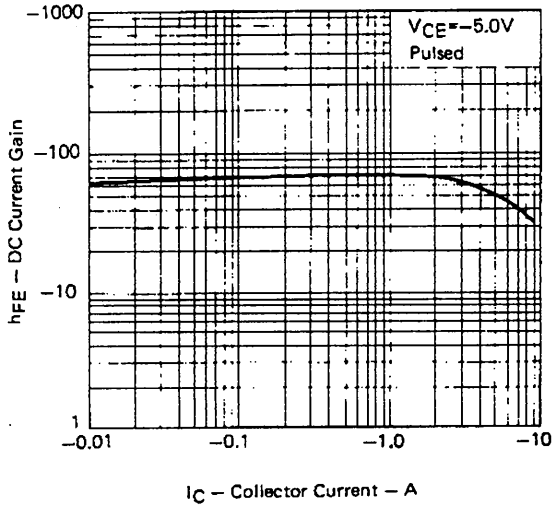

**REVERSE BIAS SAFE OPERATING AREAS**



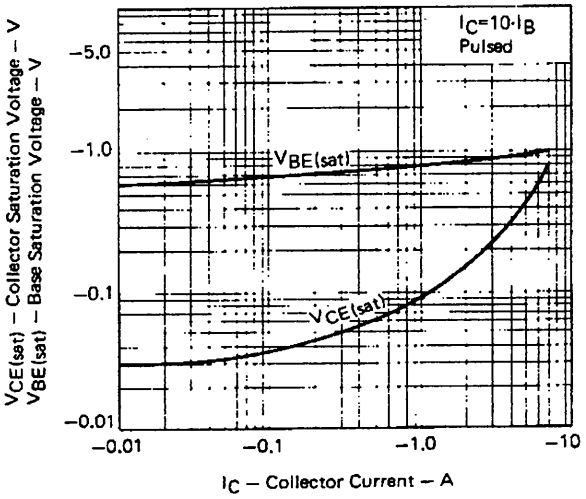

**COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE**



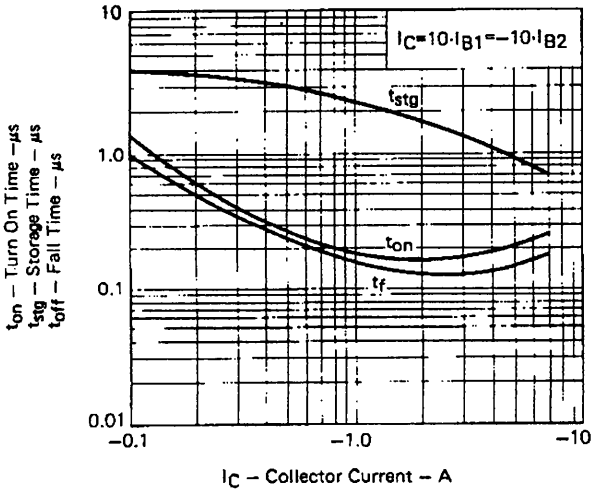
### DC CURRENT GAIN vs. COLLECTOR CURRENT



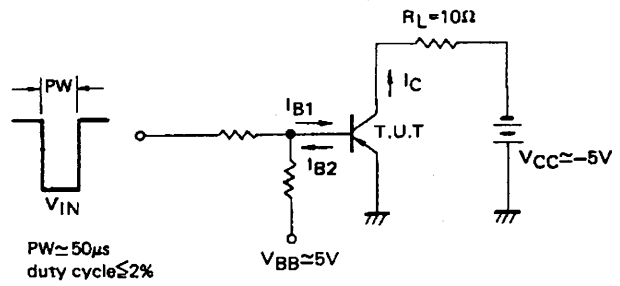

### BASE AND COLLECTOR SATURATION VOLTAGE vs. COLLECTOR CURRENT

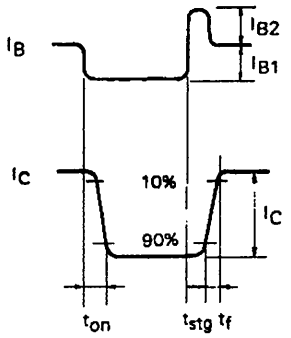



### TURN ON TIME, STORAGE AND FALL TIME vs. COLLECTOR CURRENT




## SWITCHING TIME ($t_{on}$, $t_{stg}$, $t_f$) TEST CIRCUIT





**Nippon Electric Co.,Ltd.**

NEC Building, 33-1, Shiba Gochome, Minato-ku, Tokyo 108, Japan
Tel.: Tokyo 454—1111
Telex Address: NECTOK A J22686
Cable Address: MICROPHONE TOKYO



TC-1288
JUNE-29 79K
Printed in Japan