To our customers,

## Old Company Name in Catalogs and Other Documents

On April 1st, 2010, NEC Electronics Corporation merged with Renesas Technology Corporation, and Renesas Electronics Corporation took over all the business of both companies. Therefore, although the old company name remains in this document, it is a valid Renesas Electronics document. We appreciate your understanding.

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

# NTC2517

## HIGH SPEED HIGH CURRENT SWITCHING NPN SILICON EPITAXIAL TRANSISTOR

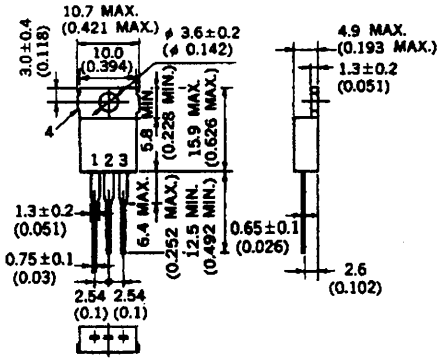
Industrial Use

### 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 | $V_{CEX}$ | 150 | V |
| Collector to Emitter Sustaining Voltage | $V_{CEO(SUS)}$ | 100 | V |
| Collector to Emitter Sustaining Voltage | $V_{CEX(SUS)}$ | 150 | V |
| Emitter to Base Voltage | $V_{EBO}$ | 12 | V |
| Continuous Collector Current | $I_{C(DC)}$ | 5.0 | A |
| Peak Collector Current | $I_{C(pulse)}$* | 10 | A |
| Continuous Base Current | $I_{B(DC)}$ | 2.5 | A |
| Maximum Power Dissipations | | | |
| Total Power Dissipation | $P_{T(Tc = 25\ °C)}$ | 50 | 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 | $R_{th(j-c)}$ | 2.5 | °C/W |
| Junction to Ambient | $R_{th(j-a)}$ | 62.5 | °C/W |

*Pulsed PW ≦ 300 μs, duty cycle ≦ 10 %

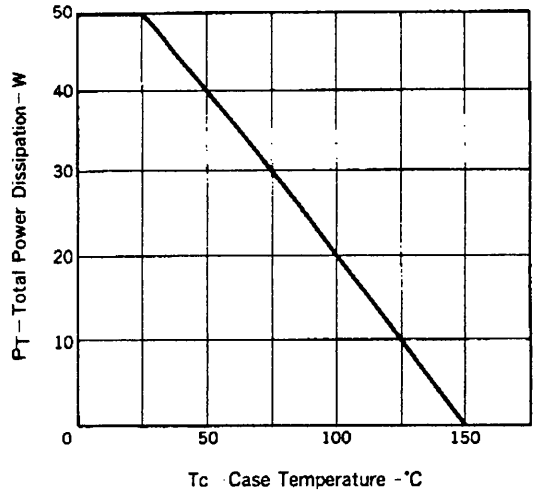
## ELECTRICAL CHARACTERISTICS (Ta = 25 °C unless otherwise noted)

| CHARACTERISTIC | SYMBOL | MIN. | TYP. | MAX. | UNIT | TEST CONDITIONS |
|---|---|---|---|---|---|---|
| Collector to Emitter Sustaining Voltage | $V_{CEO(SUS)}$ | 100 | | | V | $I_C$ = 3.0 A, $I_B$ = 0.3 A, L = 1 mH |
| | $V_{CEX(SUS)1}$ | 150 | | | V | $I_C$ = 3.0 A, $I_{B1}$ = −$I_{B2}$ = 0.3 A, $V_{BE(OFF)}$ = −5 V, L = 180 μH, Ta = 125 °C *1 |
| | $V_{CEX(SUS)2}$ | 100 | | | V | $I_C$ = 6.0 A, $I_{B1}$ = 0.6 A, $I_{B2}$ = −0.3 A, $V_{BE(OFF)}$ = −5 V, L = 180 μH, Ta = 125 °C *2 |
| Collector Cutoff Current | $I_{CEX1}$ | | | 10 | μA | $V_{CE}$ = 100 V, $V_{BE(OFF)}$ = −1.5 V |
| | $I_{CEX2}$ | | | 1.0 | mA | $V_{CE}$ = 100 V, $V_{BE(OFF)}$ = −1.5 V, Ta = 125 °C |
| | $I_{CER}$ | | | 1.0 | mA | $V_{CE}$ = 100 V, $R_{BE}$ = 51 Ω, Ta = 125 °C |
| Emitter Cutoff Current | $I_{EBO}$ | | | 10 | μA | $V_{EB}$ = 10 V, $I_C$ = 0 |
| Second Breakdown Collector Current | $I_{S/B}$ | 1.5 | | | A | $V_{CE}$ = 20 V, t = 1 s, Tc = 25 °C |
| Second Breakdown Energy | $E_{S/B}$ | 180 | | | μJ | $I_C$ = 3.0 A, $I_{B1}$ = 0.3 A, $V_{BE(OFF)}$ = −5 V, $R_{BB}$ = 50 Ω, L = 40 μH |
| DC Current Gain | $h_{FE1}$ | 40 | | | | $V_{CE}$ = 5.0 V, $I_C$ = 0.2 A *3 |
| | $h_{FE2}$ | 40 | | 200 | | $V_{CE}$ = 5.0 V, $I_C$ = 2.0 A *3 |
| Collector Saturation Voltage | $V_{CE(sat)}$ | | | 0.6 | V | $I_C$ = 3.0 A, $I_B$ = 0.3 A *3 |
| Base Saturation Voltage | $V_{BE(sat)}$ | | | 1.5 | V | |
| Gain Bandwidth Product | $f_T$ | 20 | | | MHz | $V_{CE}$ = 10 V, $I_C$ = 50 mA, f = 3 MHz |
| Output Capacitance | $C_{ob}$ | | | 200 | pF | $V_{CB}$ = 10 V, $I_E$ = 0, f = 1 MHz |
| Turn On Time | $t_{on}$ | | | 0.5 | μs | $I_C$ = 3.0 A, $I_{B1}$ = −$I_{B2}$ = 0.3 A, $V_{BE(OFF)}$ = −5.0 V, $R_L$ = 27 Ω, $V_{CC}$ ≈ 50 V |
| Storage Time | $t_{stg}$ | | | 2.5 | μs | |
| Fall Time | $t_f$ | | | 0.5 | μs | |

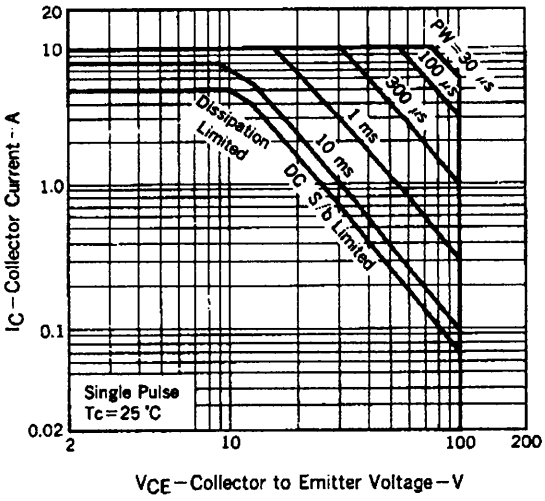
*1 $V_{CE}$ clamped $V_{clamp}$ = 150 V
*2 $V_{CE}$ clamped $V_{clamp}$ = 100 V
*3 Pulsed PW ≦ 350 μs, duty cycle ≦ 2 %

## TYPICAL CHARACTERISTICS (Ta = 25 °C)

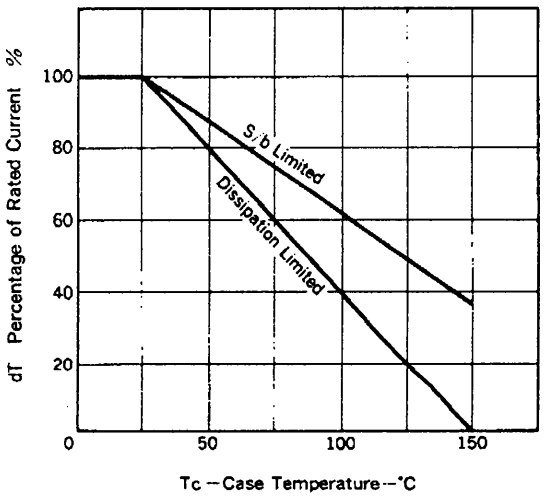
TOTAL POWER DISSIPATION vs. CASE TEMPERATURE



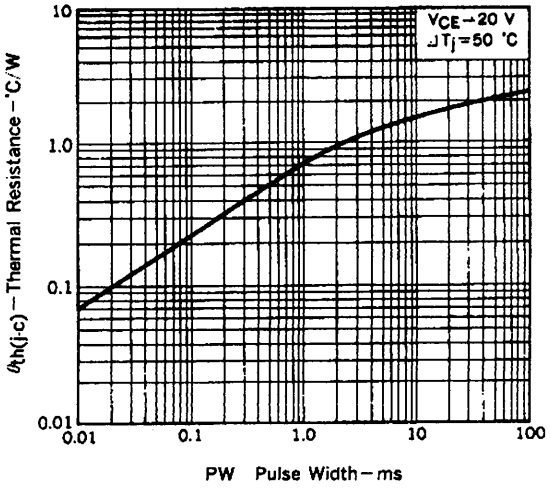

SAFE OPERATING AREAS



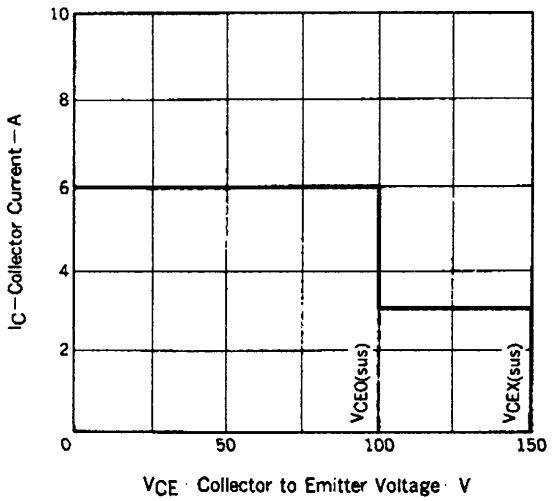

DERATING CURVE OF SAFE OPERATING AREAS



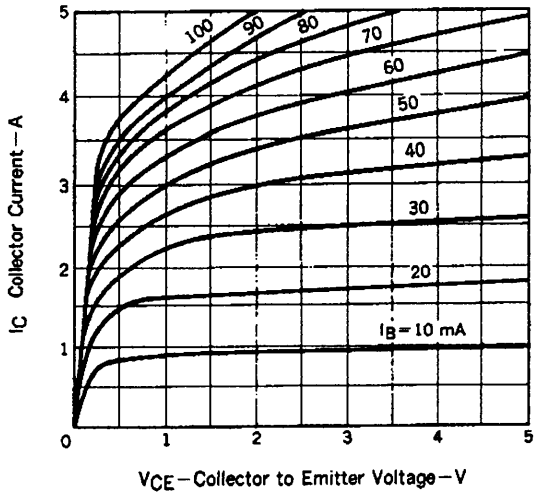

TRANSIENT THERMAL RESISTANCE



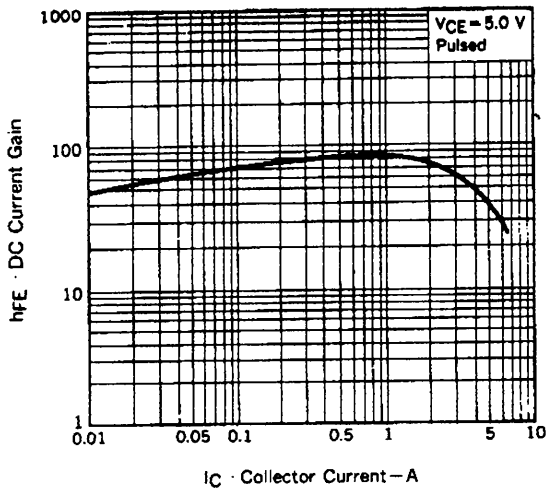

REVERSE BIAS SAFE OPERATING AREAS



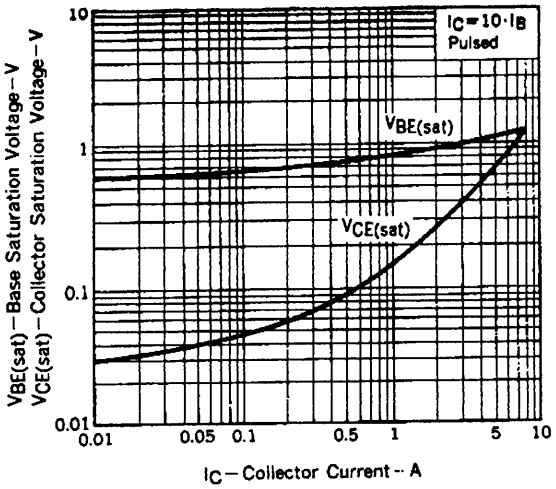

COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



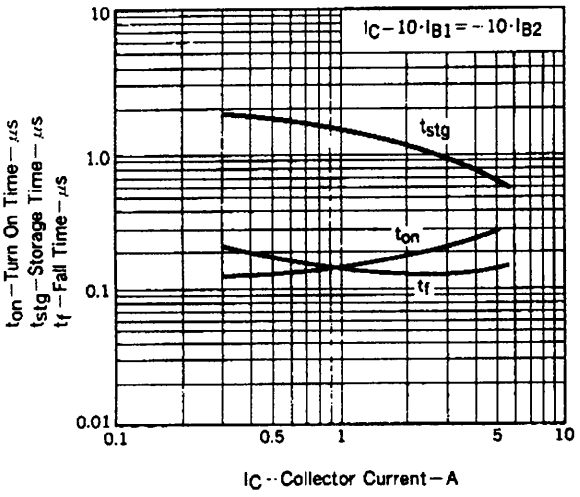
DC CURRENT GAIN vs.
COLLECTOR CURRENT



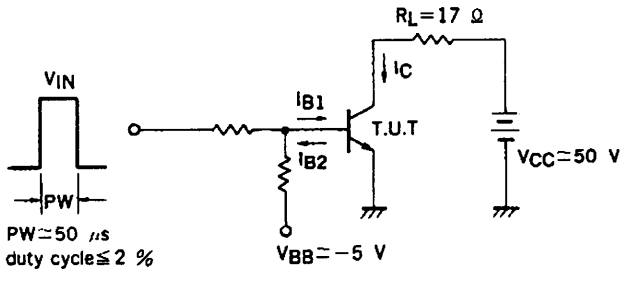

BASE AND COLLECTOR SATURATION
VOLTAGE vs. COLLECTOR CURRENT

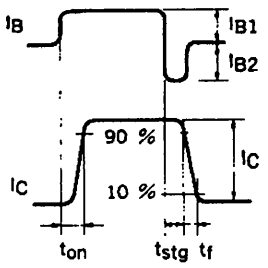



TURN ON TIME, STORAGE TIME AND
FALL TIME vs. COLLECTOR CURRENT




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





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