To our customers,

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April 1st, 2010
Renesas Electronics Corporation

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# DATA SHEET

RENESAS

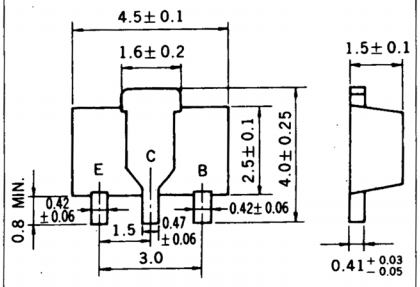
# SILICON TRANSISTOR
# 2SD1950

## NPN SILICON EPITAXIAL TRANSISTOR
## POWER MINI MOLD

### DESCRIPTION

The 2SD1950 is designed for general-purpose applications requiring High DC Current Gain.
This is suitable for all kind of driving or muting.

**PACKAGE DIMENSIONS**
in millimeters




E. Emitter
C. Collector
B. Base

### FEATURES

- High DC Current Gain and good $h_{FE}$ linearity.
  $h_{FE}$ = 800 to 3 200 ($V_{CE}$ = 5.0 V, $I_C$ = 1.0 A)
- Low Collector Saturation Voltage.
  $V_{CE(sat)}$ = 0.18 V TYP. ($I_C$ = 1.0 A, $I_B$ = 10 mA)
- High $V_{EBO}$ : $V_{EBO}$ = 15 V

### ABSOLUTE MAXIMUM RATINGS ($T_A$ = 25 °C)

| | | | |
|---|---|---|---|
| Collector to Base Voltage | $V_{CBO}$ | 30 | V |
| Collector to Emitter Voltage | $V_{CEO}$ | 25 | V |
| Emitter to Base Voltage | $V_{EBO}$ | 15 | V |
| Collector Current (DC) | $I_{C(DC)}$ | 2 | A |
| Collector Current (Pulse)* | $I_{C(Pulse)}$ | 3 | A |
| Total Power Dissipation ** | $P_T$ | 2.0 | W |
| Junction Temperature | $T_j$ | 150 | °C |
| Storage Temperature Range | $T_{stg}$ | −55 to +150 | °C |

* PW ≦ 10 ms, Duty Cycle ≦ 50 %
** When mounted on ceramic substrate of 16 cm² x 0.7 mm

### ELECTRICAL CHARACTERISTICS ($T_A$ = 25 °C)

| CHARACTERISTIC | SYMBOL | MIN. | TYP. | MAX. | UNIT | TEST CONDICTIONS |
|---|---|---|---|---|---|---|
| Collector Cutoff Current | $I_{CBO}$ | | | 100 | nA | $V_{CB}$ = 30 V, $I_E$ = 0 |
| Emitter Cutoff Current | $I_{EBO}$ | | | 100 | nA | $V_{EB}$ = 10 V, $I_C$ = 0 |
| DC Current Gain | $h_{FE1}$*** | 800 | 1500 | 3200 | | $V_{CE}$ = 5.0 V, $I_C$ = 1.0 A |
| DC Current Gain | $h_{FE2}$*** | 400 | | | | $V_{CE}$ = 5.0 V, $I_C$ = 2.0 A |
| Collector Saturation Voltage | $V_{CE(sat)}$*** | | 0.18 | 0.3 | V | $I_C$ = 1.0 A, $I_B$ = 10 mA |
| Base Saturation Voltage | $V_{BE(sat)}$*** | | 0.83 | 1.2 | V | $I_C$ = 1.0 A, $I_B$ = 10 mA |
| Base to Emitter Voltage | $V_{BE}$*** | 600 | 660 | 700 | mV | $V_{CE}$ = 5.0 V, $I_C$ = 300 mA |
| Gain Bandwidth Product | $f_T$ | 150 | 350 | | MHz | $V_{CE}$ = 10 V, $I_E$ = −500 mA |
| Output Capacitance | $C_{ob}$ | | 26 | 35 | pF | $V_{CB}$ = 10 V, $I_E$ = 0, f = 1.0 MHz |

***Pulsed: PW ≦ 350 μs, Duty Cycle ≦ 2 %

$h_{FE}$ Classification

| MARKING | VM | VL | VK |
|---|---|---|---|
| $h_{FE1}$ | 800 to 1600 | 1200 to 2400 | 2000 to 3200 |



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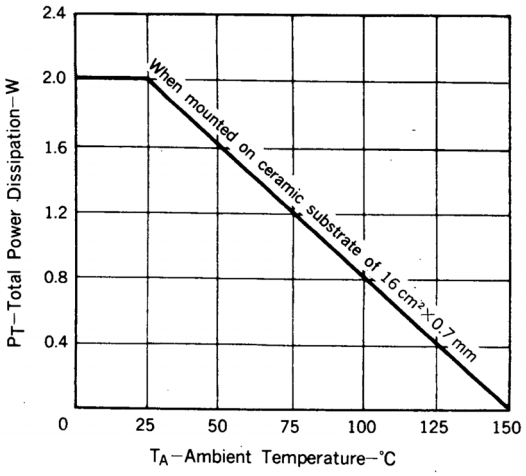
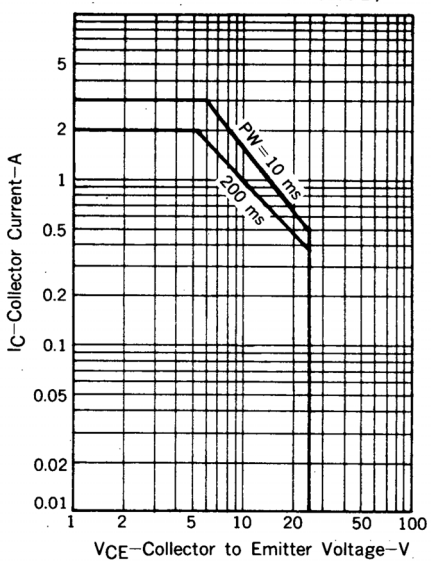
Date Published March 2006 NS CP(K)
Printed in Japan

## TYPICAL CHARACTERISTICS ($T_A$ = 25°C)

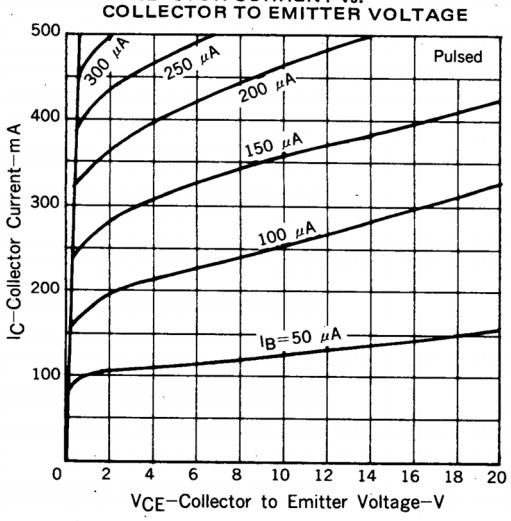
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



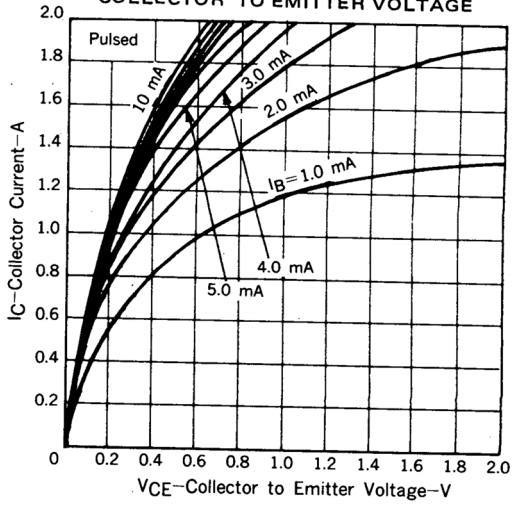

SAFE OPERATING AREAS (TRANSIENT THERMAL RESISTANCE METHOD)



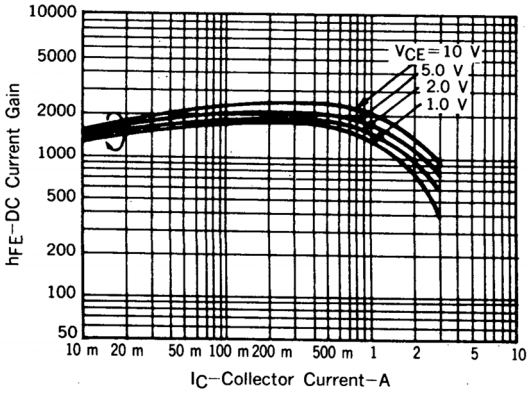

COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



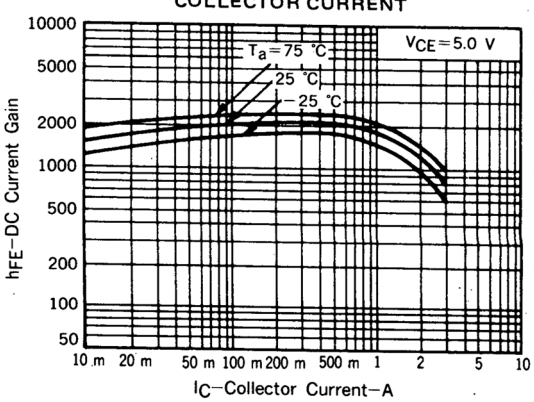

COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



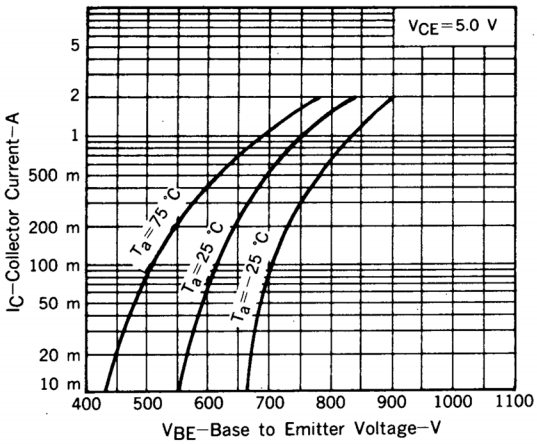

DC CURRENT vs. COLLECTOR CURRENT



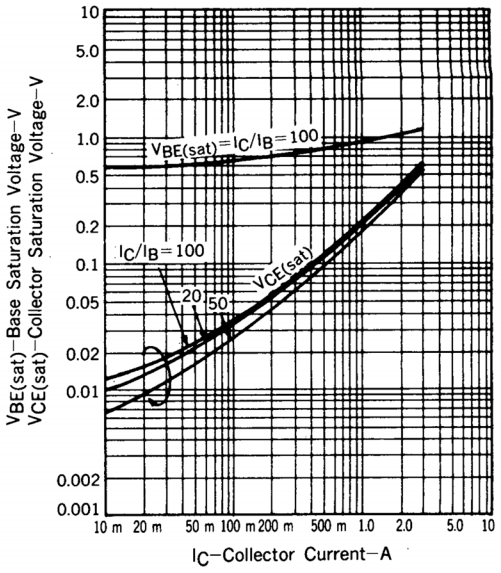

DC CURRENT GAIN vs. COLLECTOR CURRENT



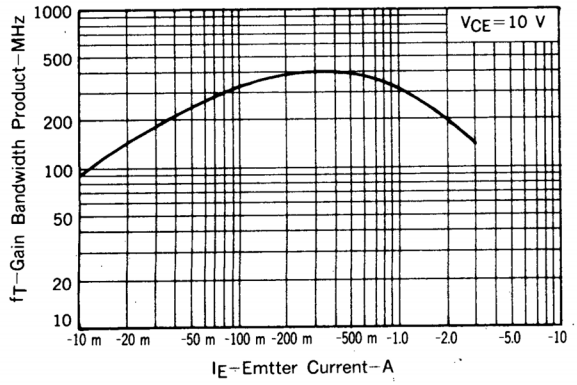
COLLECTOR CURRENT vs.
BASE TO EMITTER VOLTAGE



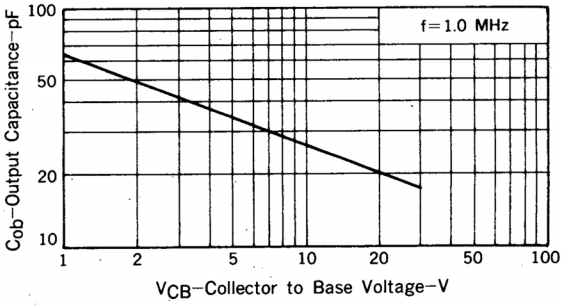

COLLECTOR AND BASE SATURATION
VOLTAGE vs. COLLECTOR CURRENT




GAIN BANDWIDTH PRODUCT vs.
EMITTER CURRENT




OUTPUT CAPACITANCE vs.
COLLECTOR TO BASE VOLTAGE



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