

SILICON TRANSISTOR

2SD1164-Z

NPN SILICON EPITAXIAL DARLINGTON TRANSISTOR

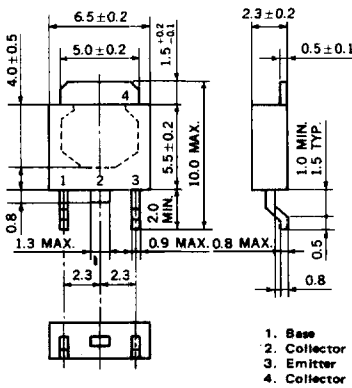
MP-3

DESCRIPTION

2SD1164-Z is designed for Low Frequency Amplifier and Switching, especially in Hybrid Integrated Circuits.

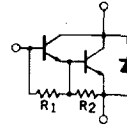
PACKAGE DIMENSIONS

in millimeters



FEATURE

- High h_{FE} : $h_{FE} = 2000$ to 30000



$R_1 \approx 10 \text{ k}\Omega$
 $R_2 \approx 500 \Omega$

ABSOLUTE MAXIMUM RATINGS

Maximum Voltages and Currents ($T_a = 25^\circ\text{C}$)

| | | | |
|------------------------------|-----------|-----|---|
| Collector to Base Voltage | V_{CBO} | 150 | V |
| Collector to Emitter Voltage | V_{CEO} | 60 | V |
| Emitter to Base Voltage | V_{EBO} | 8.0 | V |
| Collector Current (DC) | I_C | 2 | A |
| Collector Current (Pulse)* | I_C | 4 | A |

Maximum Power Dissipation

| | | | |
|--|--|-----|---|
| Total Power Dissipation at 25°C Ambient Temperature** P_T | | 2.0 | W |
|--|--|-----|---|

Maximum Temperatures

| | | | |
|---------------------------|-----------|-------------|------------------|
| Junction Temperature | T_j | 150 | $^\circ\text{C}$ |
| Storage Temperature Range | T_{stg} | -55 to +150 | $^\circ\text{C}$ |

* $PW \leq 10 \text{ ms}$, Duty Cycle $\leq 50 \%$

**When mounted on ceramic substrate of $7.5 \text{ cm}^2 \times 0.7 \text{ mm}$

2SD1164-Z

ELECTRICAL CHARACTERISTICS (T_a = 25 °C)

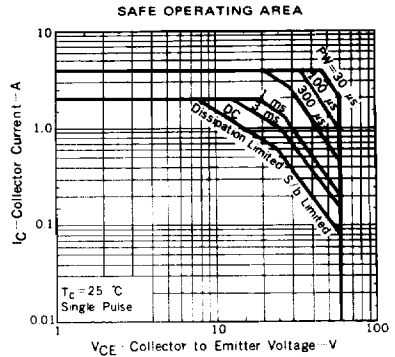
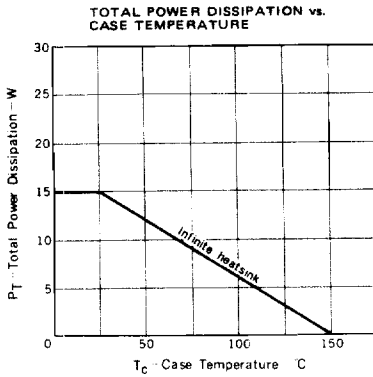
| CHARACTERISTIC | SYMBOL | MIN. | TYP. | MAX. | UNIT | TEST CONDITIONS |
|------------------------------|------------------------|------|------|-------|------|---|
| Collector Cutoff Current | I _{CB0} | | | 10 | μA | V _{CB} = 60 V, I _E = 0 |
| Emitter Cutoff Current | I _{EB0} | | | 1.0 | mA | V _{EB} = 5.0 V, I _C = 0 |
| DC Current Gain | h _{FE1} * | 1000 | | | | V _{CE} = 2.0 V, I _C = 0.5 A |
| DC Current Gain | h _{FE2} * | 2000 | | 30000 | | V _{CE} = 2.0 V, I _C = 1.0 A |
| Collector Saturation Voltage | V _{CE(sat)} * | | | 1.5 | V | I _C = 1.0 A, I _B = 1.0 mA |
| Base Saturation Voltage | V _{BE(sat)} * | | | 2.0 | V | I _C = 1.0 A, I _B = 1.0 mA |
| Turn-on Time | t _{on} | | 0.5 | | μs | I _C = 1.0 A, I _{B1} = -I _{B2} = 1.0 mA |
| Storage Time | t _{stg} | | 1.0 | | μs | V _{CC} ≅ 50 V, R _L = 50 Ω |
| Fall Time | t _f | | 1.0 | | μs | V _{CC} ≅ 50 V, R _L = 50 Ω |

*Pulsed: F_W ≤ 350 μs, Duty Cycle ≤ 2 %

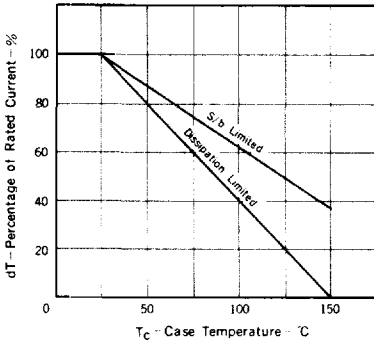
h_{FE} Classification

| MARKING | M | L | K |
|------------------|--------------|---------------|---------------|
| h _{FE2} | 2000 to 5000 | 4000 to 10000 | 8000 to 30000 |

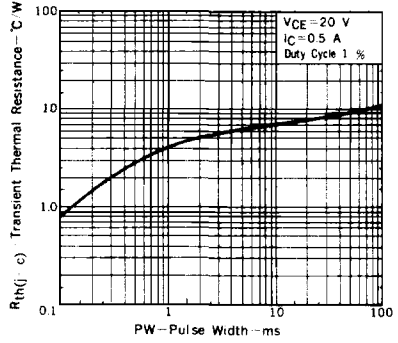
TYPICAL CHARACTERISTICS (T_a = 25 °C)



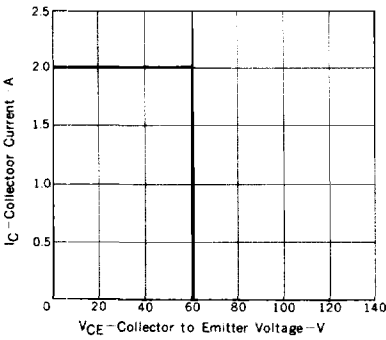
DERATING CURVE OF SAFE OPERATING AREA



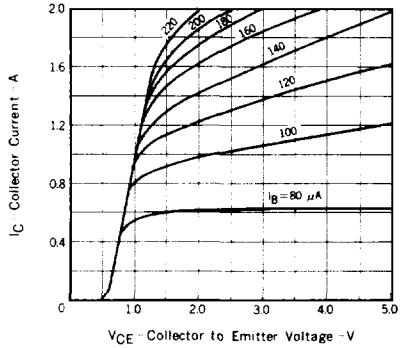
TRANSIENT THERMAL RESISTANCE



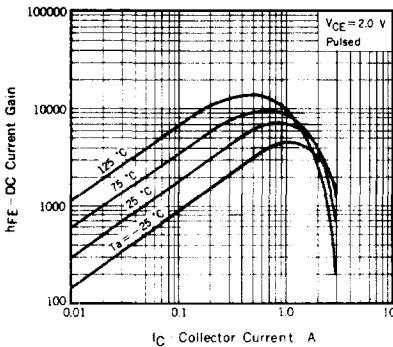
REVERSE BIAS SAFE OPERATING AREA



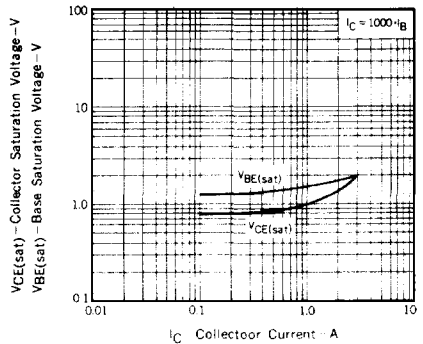
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



DC CURRENT GAIN vs. COLLECTOR CURRENT



BASE AND COLLECTOR SATURATION VOLTAGE vs. COLLECTOR CURRENT



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

