

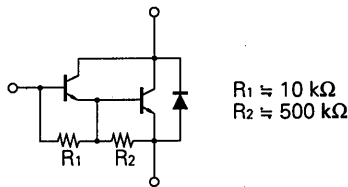
**NPN SILICON EPITAXIAL TRANSISTOR  
MP-3**

**DESCRIPTION**

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

**FEATURES**

- High  $h_{FE} = 2\ 000$  to  $30\ 000$



**QUALITY GRADE**

Standard

Please refer to "Quality grade on NEC Semiconductor Devices" (Document number IEI-1209) published by NEC Corporation to know the specification of quality grade on the devices and its recommended applications.

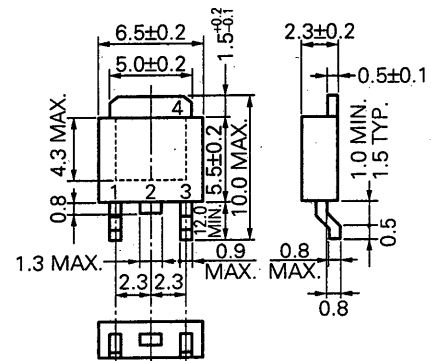
**ABSOLUTE MAXIMUM RATINGS ( $T_a = 25\ ^\circ C$ )**

|  |           |             |            |
|--|-----------|-------------|------------|
| 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          |
| Total Power Dissipation ( $T_a = 25\ ^\circ C$ )** | $P_T$     | 2.0         | W          |
| Junction Temperature                               | $T_j$     | 150         | $^\circ C$ |
| Storage Temperature                                | $T_{stg}$ | -55 to +150 | $^\circ C$ |

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

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

**PACKAGE DIMENSIONS  
(in millimeters)**



1. Base
2. Collector
3. Emitter
4. Collector

**ELECTRICAL CHARACTERISTICS (T<sub>a</sub> = 25 °C)**

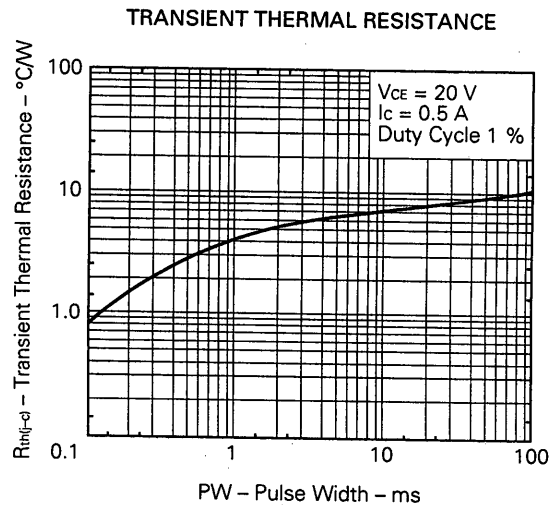
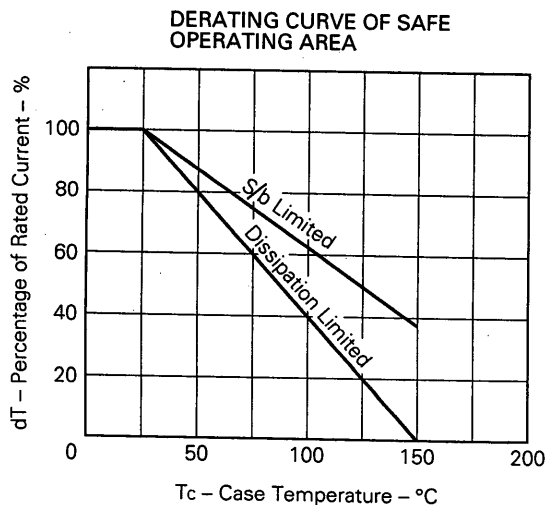
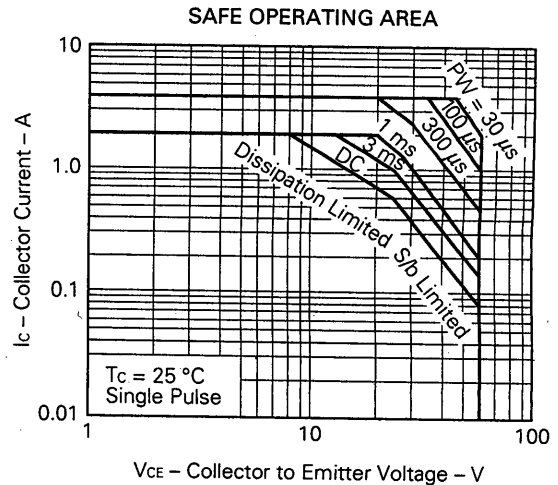
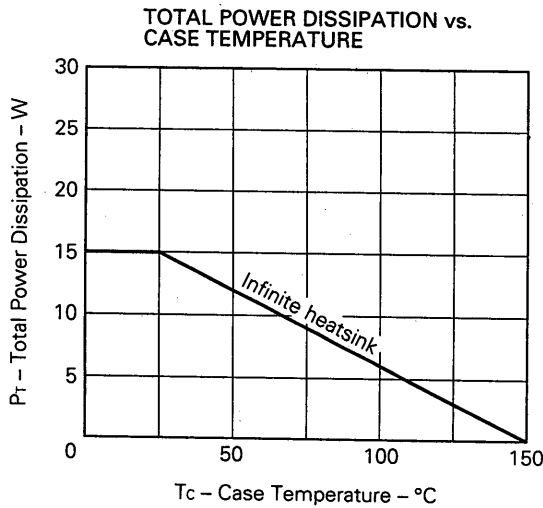
| CHARACTERISTIC               | SYMBOL                 | MIN.  | TYP. | MAX.   | UNIT | TEST CONDITIONS  |
|------------------------------|------------------------|-------|------|--------|------|--|
| Collector Cutoff Current     | I <sub>cBO</sub>       |       |      | 10     | μA   | V <sub>CE</sub> = 60 V, I <sub>E</sub> = 0   |
| Emitter Cutoff Current       | I <sub>EBO</sub>       |       |      | 1.0    | mA   | V <sub>EB</sub> = 5.0 V, I <sub>C</sub> = 0  |
| DC Current Gain              | h <sub>FE1</sub> *     | 1 000 |      |        |      | V <sub>CE</sub> = 2.0 V, I <sub>C</sub> = 0.5 A  |
| DC Current Gain              | h <sub>FE2</sub> *     | 2 000 |      | 30 000 |      | V <sub>CE</sub> = 2.0 V, I <sub>C</sub> = 1.0 A  |
| Collector Saturation Voltage | V <sub>CE(sat)</sub> * |       |      | 1.5    | V    | I <sub>C</sub> = 1.0 A, I <sub>B</sub> = 1.0 mA  |
| Base Saturation Voltage      | V <sub>BE(sat)</sub> * |       |      | 2.0    | V    | I <sub>C</sub> = 1.0 A, I <sub>B</sub> = 1.0 mA  |
| Turn-on Time                 | t <sub>on</sub>        |       | 0.5  |        | μs   | I <sub>C</sub> = 1.0 A, I <sub>B1</sub> = -I <sub>B2</sub> = 1.0 mA<br>V <sub>CC</sub> ≅ 50 V, R <sub>L</sub> = 50 Ω |
| Storage Time                 | t <sub>stg</sub>       |       | 1.0  |        | μs   |  |
| Fall Time                    | t <sub>f</sub>         |       | 1.0  |        | μs   |  |

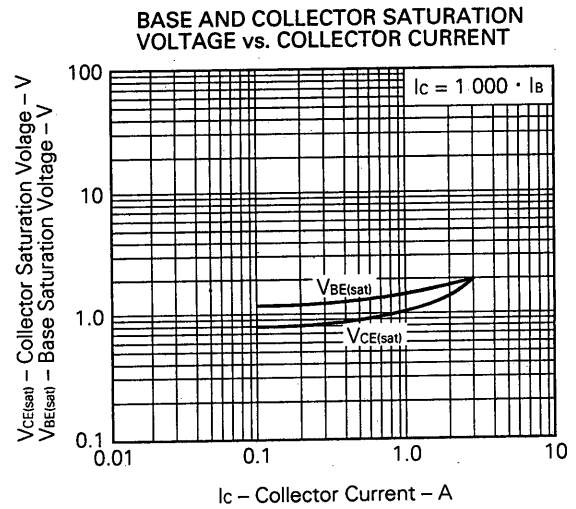
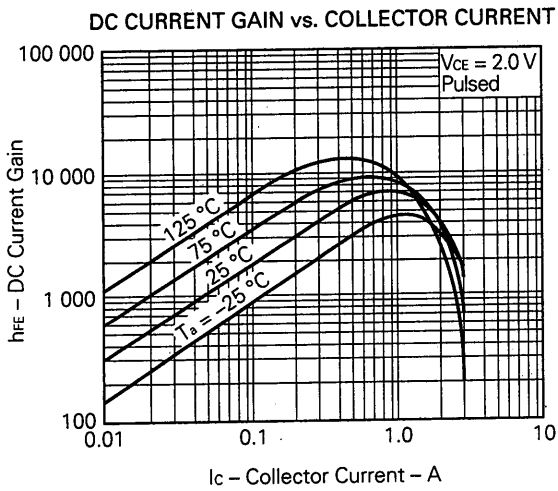
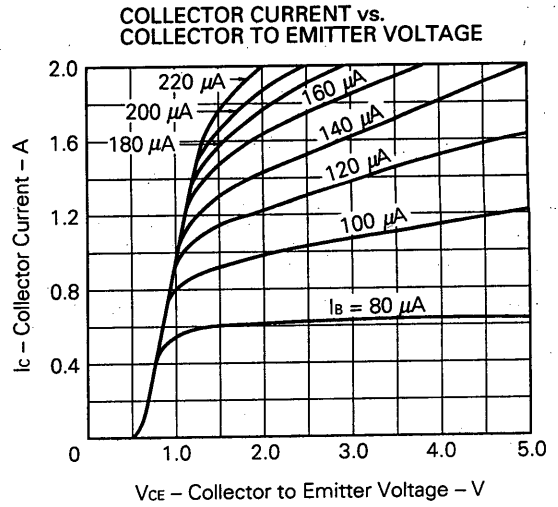
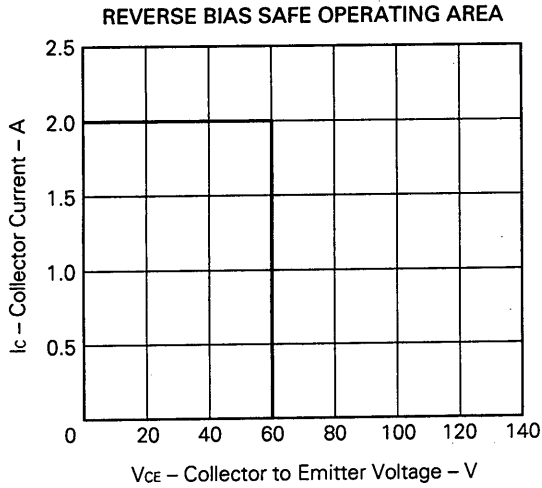
\*Pulsed: PW ≤ 350 μs, Duty Cycle ≤ 2 %

**h<sub>FE</sub> Classification**

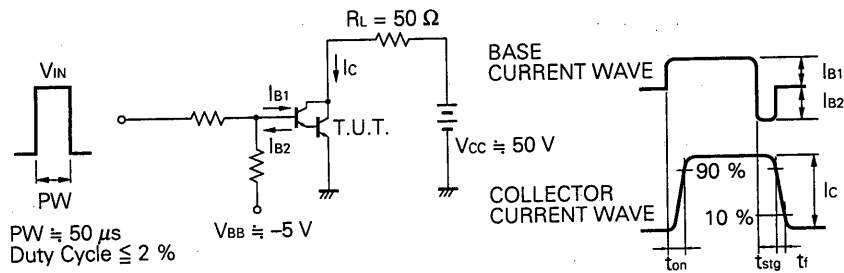
| MARKING          | M              | L               | K               |
|------------------|----------------|-----------------|-----------------|
| h <sub>FE2</sub> | 2 000 to 5 000 | 4 000 to 10 000 | 8 000 to 30 000 |

**TYPICAL CHARACTERISTICS (T<sub>a</sub> = 25 °C)**





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



**Reference**

| Application note name  | No.      |
|--|----------|
| Quality control of NEC semiconductors devices.               | TEI-1202 |
| Quality control guide of semiconductors devices.             | MEI-1202 |
| Assembly manual of semiconductors devices.                   | IEI-1207 |
| Design of Push-Pull Type Switching Regulators (Basic)        | TEB-1002 |
| Design of Push-Pull Type Switching Regulators (Applications) | TEB-1003 |
| Optimum Base Drive Conditions of Switching Power Transistors | TEB-1014 |

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Application examples recommended by NEC Corporation.

Standard: Computer, Office equipment, Communication equipment, Test and Measurement equipment, Machine tools, Industrial robots, Audio and Visual equipment, Other consumer products, etc.

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