

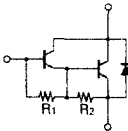
NPN SILICON EPITAXIAL TRANSISTOR  
MP-3

## DESCRIPTION

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

## FEATURES

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



$R_1 \approx 10\ k\Omega$   
 $R_2 \approx 500\ k\Omega$

## QUALITY GRADE

Standard

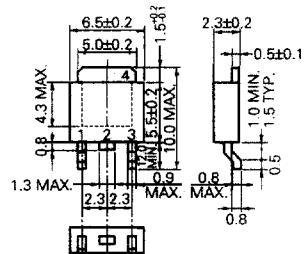
Please refer to "Quality grade on NEC Semiconductor Devices" (Document number IEI-1209) published by NEC Corporation to know the specification of quality grade on the devices and its recommended applications.

ABSOLUTE MAXIMUM RATINGS ( $T_a = 25\ ^\circ\text{C}$ )

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

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

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

PACKAGE DIMENSIONS  
(in millimeters)

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

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

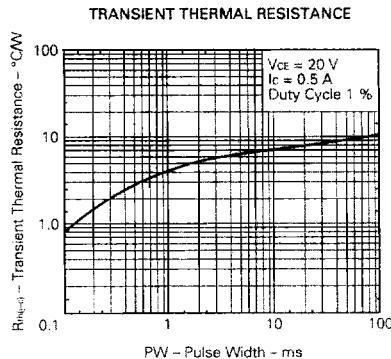
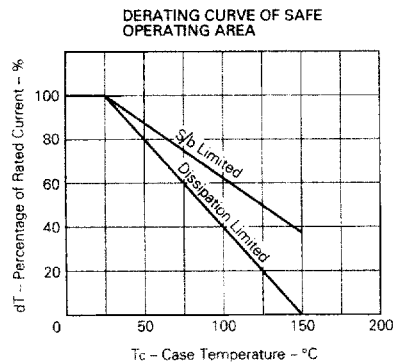
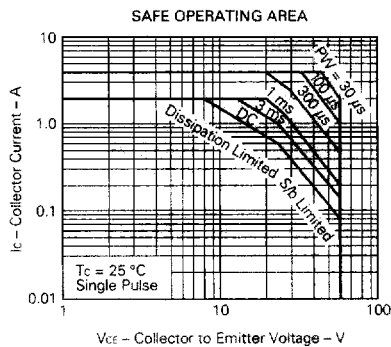
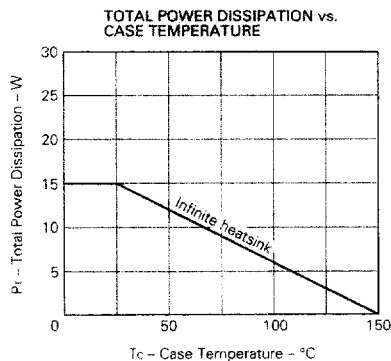
CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Collector Cutoff Current	I <sub>CEO</sub>			10	μA	V <sub>CE</sub> = 60 V, I <sub>c</sub> = 0
Emitter Cutoff Current	I <sub>EB0</sub>			1.0	mA	V <sub>EB</sub> = 5.0 V, I <sub>c</sub> = 0
DC Current Gain	h <sub>FE1</sub> *	1 000				V <sub>CE</sub> = 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 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>r</sub>		1.0		μs	

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

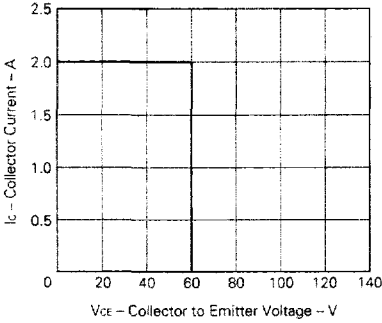
**h<sub>FE</sub> Classification**

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

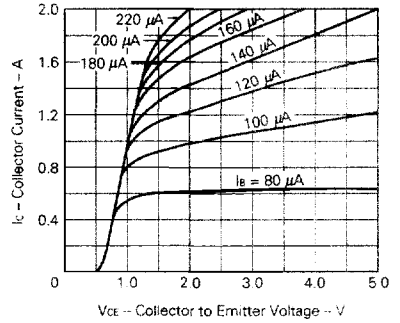
**TYPICAL CHARACTERISTICS (T<sub>a</sub> = 25 °C)**



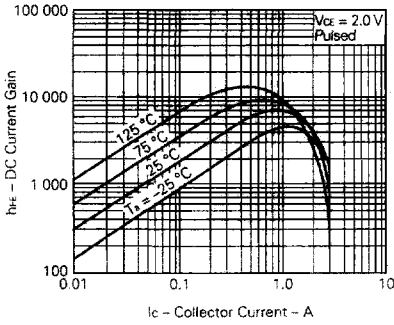
REVERSE BIAS SAFE OPERATING AREA



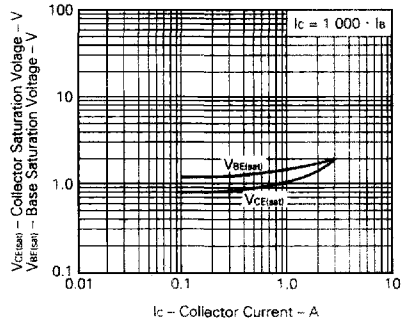
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



DC CURRENT GAIN vs. COLLECTOR CURRENT



BASE AND COLLECTOR SATURATION VOLTAGE vs. COLLECTOR CURRENT



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

