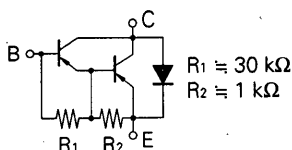


**PNP SILICON EPITAXIAL DARLINGTON TRANSISTOR
MP-3****DESCRIPTION**

2SB963-Z is designed for switching, especially in Hybrid Integrated Circuits.

FEATURES

- High Gain $h_{FE} = 2\,000$ to $3\,000$
- Complement to 2SD1286-Z

**QUALITY GRADE**

Standard

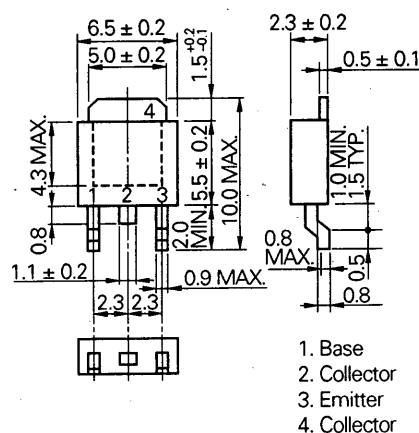
Please refer to "Quality grade on NEC Semiconductor Devices" (Document number IEI-1209) published by NEC Corporation to know the specification of quality grade on the devices and its recommended applications.

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

Collector to Base Voltage	V_{CB0}	-60	V
Collector to Emitter Voltage	V_{CE0}	-60	V
Emitter to Base Voltage	V_{EB0}	-8	V
Collector Current (DC)	$I_{C(DC)}$	∓ 1.0	A
Collector Current (Pulse)*	$I_{C(pulse)}$	∓ 2.0	A
Total Power Dissipation ($T_a = 25\text{ }^\circ\text{C}$)**	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)

ELECTRICAL CHARACTERISTICS ($T_a = 25^\circ\text{C}$)

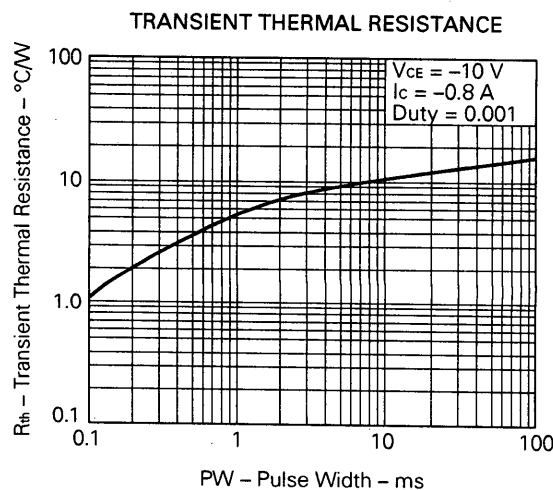
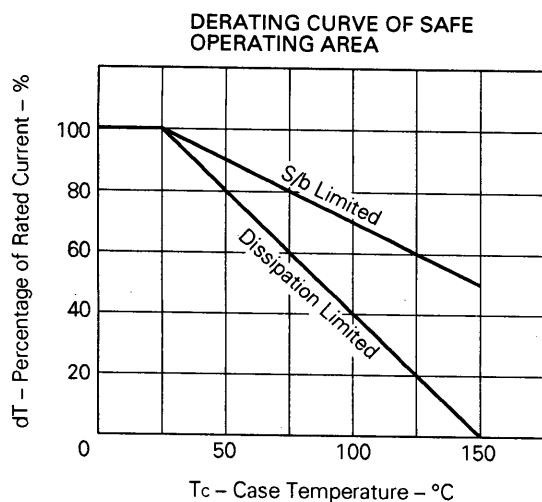
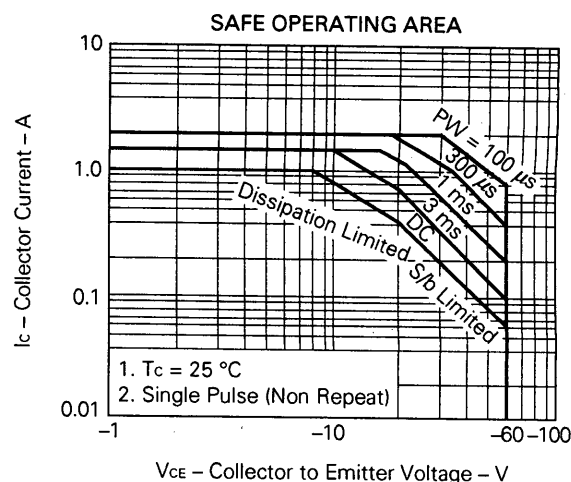
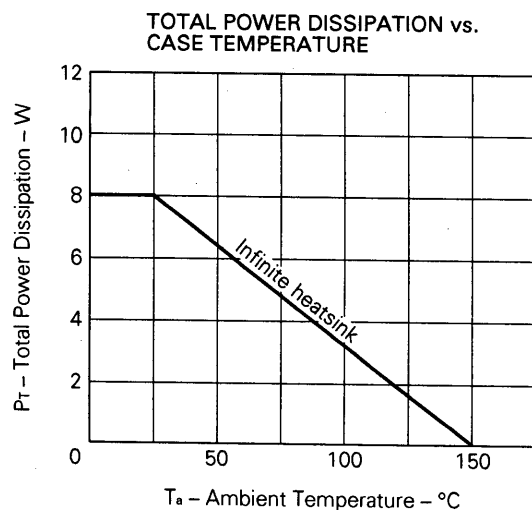
CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Collector Cutoff Current	I_{CBO}			-10	μA	$V_{CB} = -60\text{ V}, I_E = 0$
Emitter Cutoff Current	I_{EBO}			-1.0	μA	$V_{EB} = -5.0\text{ V}, I_C = 0$
DC Current Gain	h_{FE1}^{***}	1 000				$V_{CE} = -2.0\text{ V}, I_C = -0.2\text{ A}$
DC Current Gain	h_{FE2}^{***}	2 000		30 000		$V_{CE} = -2.0\text{ V}, I_C = -0.5\text{ A}$
Collector Saturation Voltage	$V_{CE(sat)}^{***}$			-1.5	V	$I_C = -0.5\text{ A}, I_B = -50\text{ mA}$
Base Saturation Voltage	$V_{BE(sat)}^{***}$			-2.0	V	$I_C = -0.5\text{ A}, I_B = -50\text{ mA}$
Turn On Time	t_{on}		0.5		μs	$I_C = -0.5\text{ A}, R_L = 100\ \Omega$
Storage Time	t_{stg}		1.0		μs	$I_{B1} = -I_{B2} = -0.1\text{ mA}$
Fall Time	t_f		1.0		μs	$V_{CC} = -50\text{ V}$

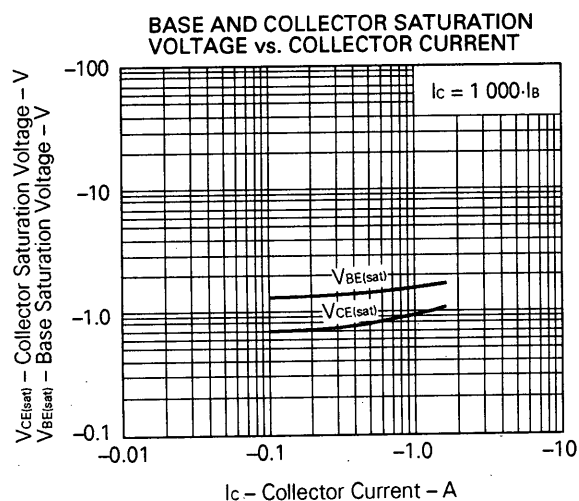
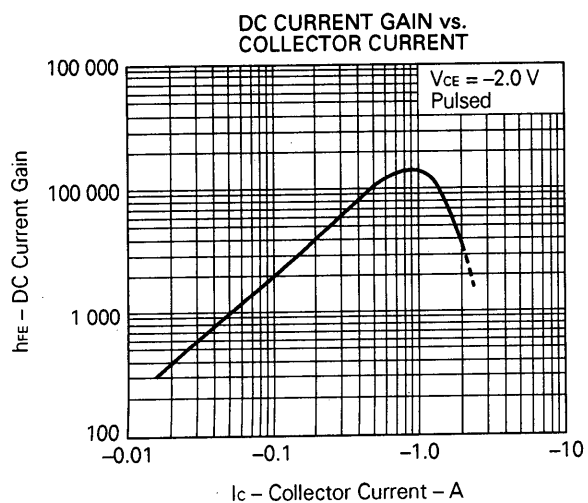
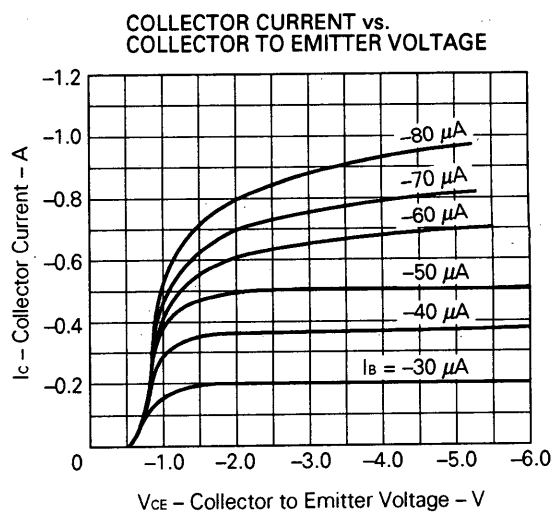
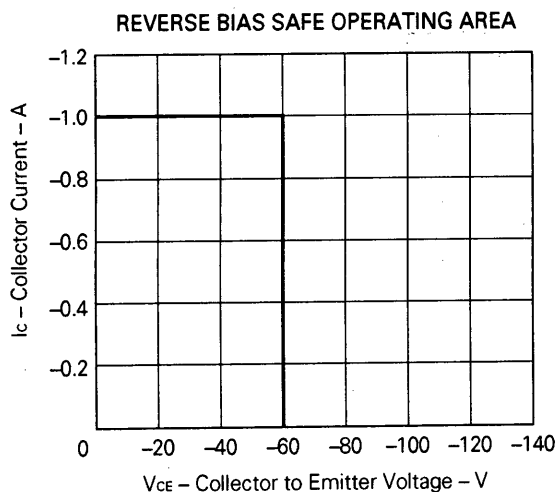
*** Pulsed: $PW \leq 350\ \mu\text{s}$, Duty Cycle $\leq 2\%$

h_{FE} Classification

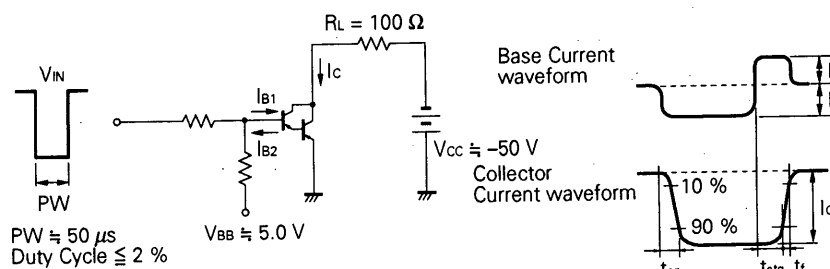
MARKING	M	L	K
h_{FE2}	2 000 to 5 000	4 000 to 10 000	8 000 to 30 000

TYPICAL CHARACTERISTICS ($T_a = 25^\circ\text{C}$)





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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