

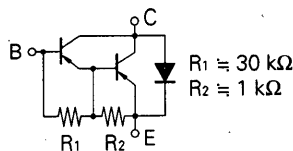
PNP SILICON EPITAXIAL DARLINGTON TRANSISTOR
MP-3

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.

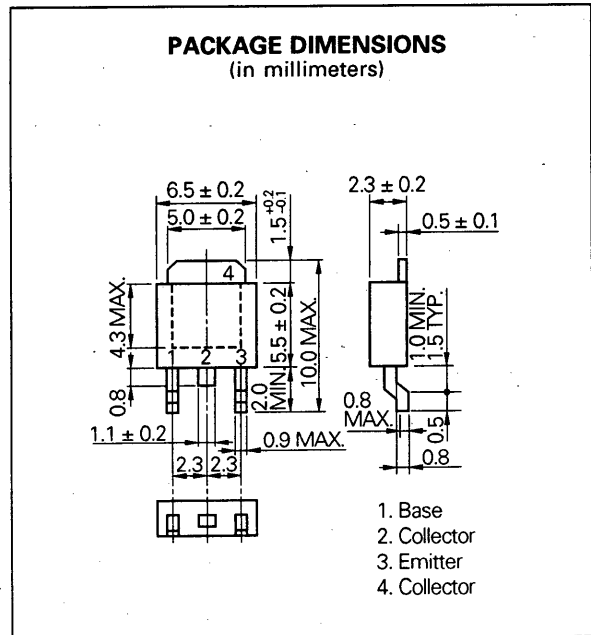
ABSOLUTE MAXIMUM RATINGS ($T_a = 25\ ^\circ\text{C}$)

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

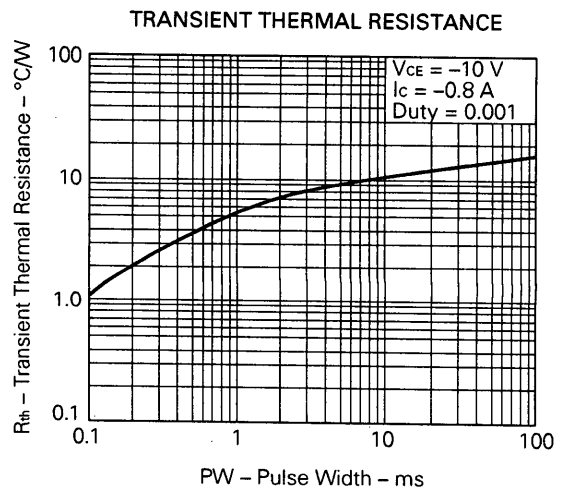
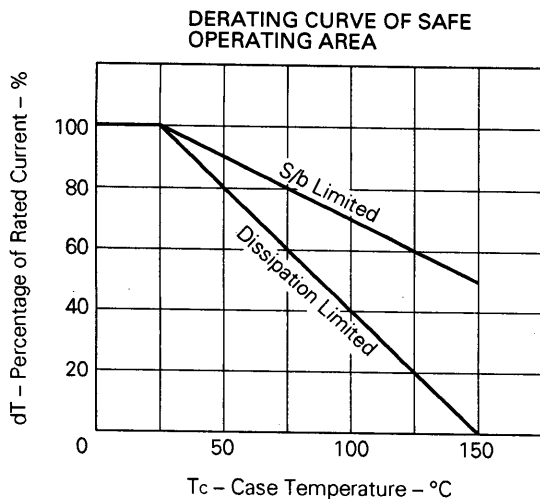
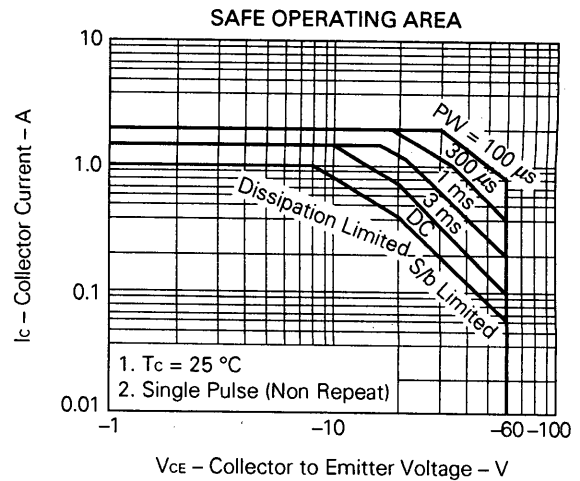
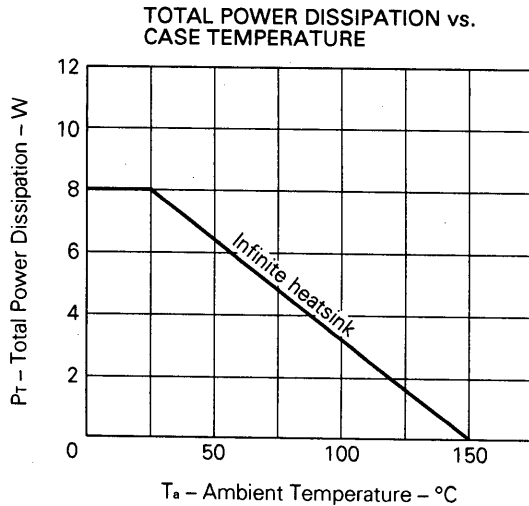
CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Collector Cutoff Current	I _{CB0}			-10	μA	V _{CE} = -60 V, I _E = 0
Emitter Cutoff Current	I _{EB0}			-1.0	μA	V _{EB} = -5.0 V, I _C = 0
DC Current Gain	h _{FE1} ***	1 000				V _{CE} = -2.0 V, I _C = -0.2 A
DC Current Gain	h _{FE2} ***	2 000		30 000		V _{CE} = -2.0 V, I _C = -0.5 A
Collector Saturation Voltage	V _{CE(sat)} ***			-1.5	V	I _C = -0.5 A, I _B = -50 mA
Base Saturation Voltage	V _{BE(sat)} ***			-2.0	V	I _C = -0.5 A, I _B = -50 mA
Turn On Time	t _{on}		0.5		μs	I _C = -0.5 A, R _L = 100 Ω
Storage Time	t _{stg}		1.0		μs	I _{B1} = -I _{B2} = -0.1 mA
Fall Time	t _r		1.0		μs	V _{CC} = -50 V

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

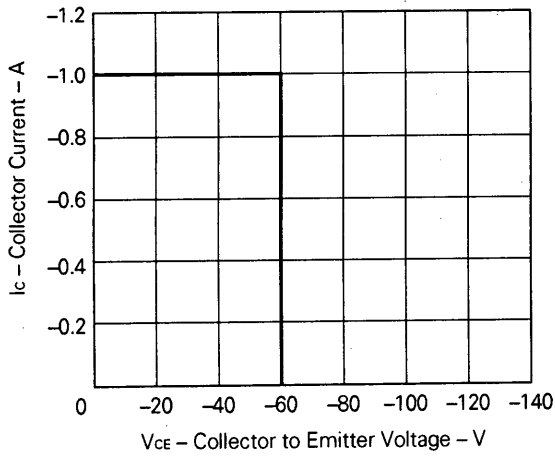
h_{FE} Classification

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

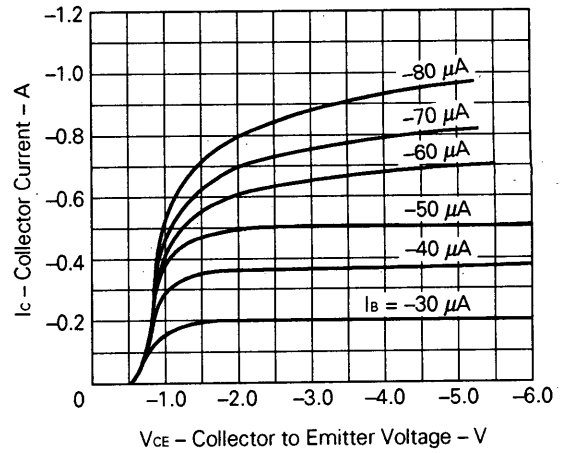
TYPICAL CHARACTERISTICS (T_a = 25 °C)



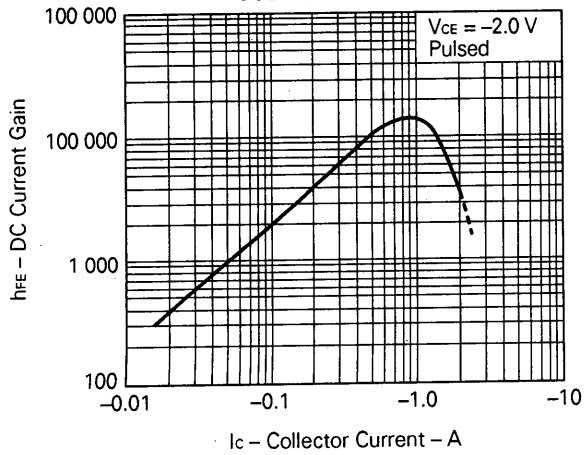
REVERSE BIAS SAFE OPERATING AREA



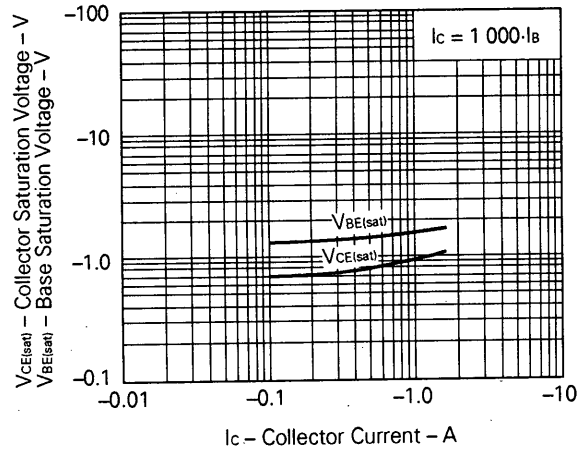
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



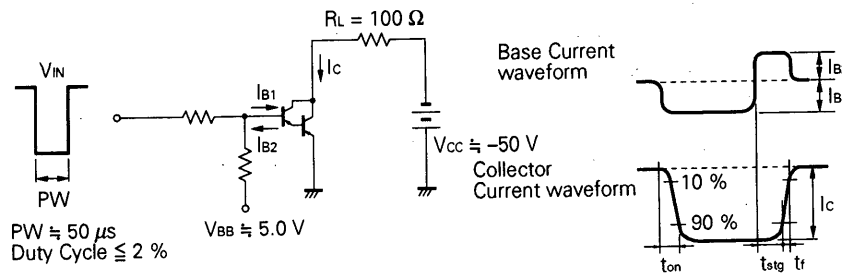
DC CURRENT GAIN vs. COLLECTOR CURRENT



BASE AND COLLECTOR SATURATION VOLTAGE vs. COLLECTOR CURRENT



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



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.

Special: Automotive and Transportation equipment, Traffic control systems, Antidisaster systems, Anticrime systems, etc.