

NPN SILICON EPITAXIAL TRANSISTOR
MP-3

DESCRIPTION

2SC2946(1) is designed for High Speed Switching, especially in Hybrid Integrated Circuits.

FEATURES

- High Voltage $V_{CE0} = 200$ V
- High Speed $t_f < 1 \mu s$

QUALITY GRADE

Standard

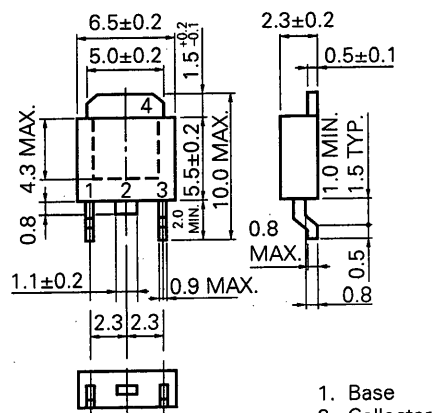
Please refer to "Quality grade on NEC Semiconductor Devices" (Document number IEI-1209) published by NEC Corporation to know the specification of quality grade on the devices and its recommended applications.

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

Collector to Base Voltage	V_{CBO}	330	V
Collector to Emitter Voltage	V_{CEO}	200	V
Emitter to Base Voltage	V_{EBO}	7	V
Collector Current (DC)	I_c	2	A
Collector Current (Pulse)*	I_c	4	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	$^\circ\text{C}$

* $PW \leq 10$ ms, Duty Cycle ≤ 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_a = 25 °C)

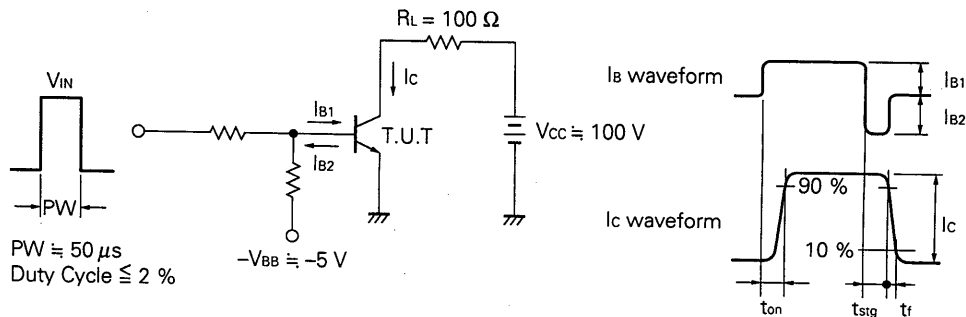
CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Collector Cutoff Current	I _{CB0}			10	μA	V _{CB} = 250 V, I _E = 0
Emitter Cutoff Current	I _{EB0}			1.0	μA	V _{EB} = 5.0 V, I _C = 0
DC Current Gain	h _{FE1} *	20	60	160		V _{CE} = 5.0 V, I _C = 100 mA
DC Current Gain	h _{FE2} *	15				V _{CE} = 5.0 V, I _C = 1.0 A
Collector Saturation Voltage	V _{CE(sat)} *			1.0	V	I _C = 1.0 A, I _B = 0.1 A
Base Saturation Voltage	V _{BE(sat)} *			1.5	V	I _C = 1.0 A, I _B = 0.1 A
Turn-on Time	t _{on}			1.0	μs	See Test Circuit
Storage Time	t _{stg}			2.0	μs	
Fall Time	t _f			1.0	μs	

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

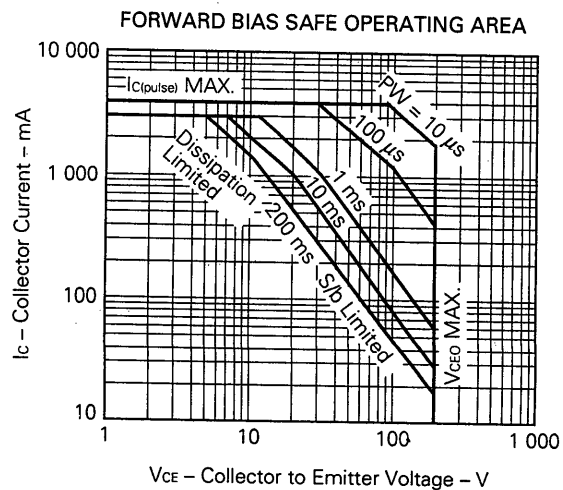
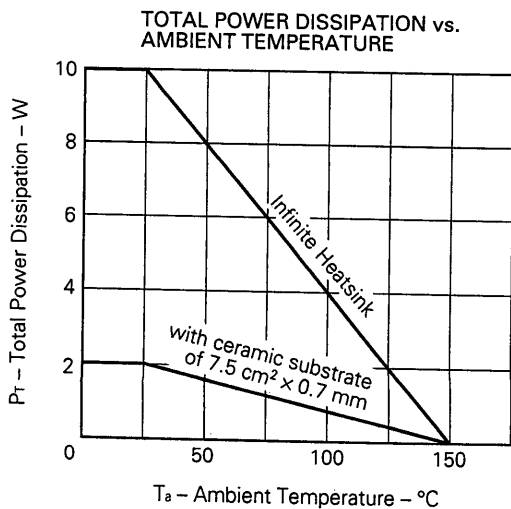
h_{FE} Classification

MARKING	N	M	L	K
h _{FE1}	20 to 50	30 to 70	50 to 100	80 to 160

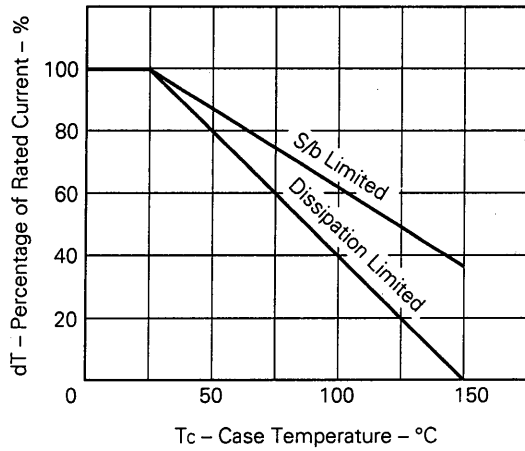
SWITCHING TIME (t_{on}, t_{stg}, t_f) TEST CIRCUIT



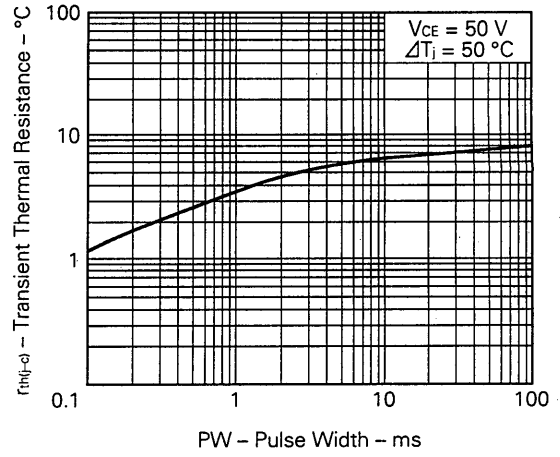
TYPICAL CHARACTERISTICS (T_a = 25 °C)



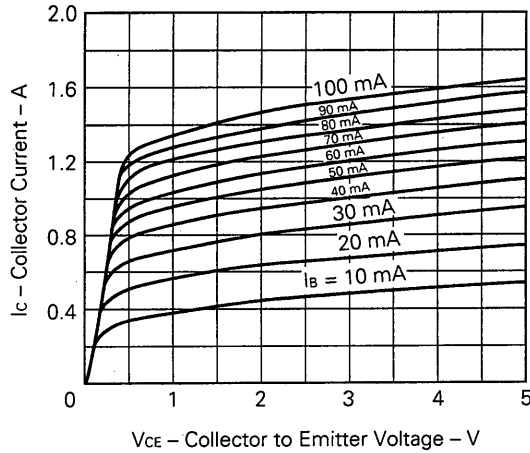
DERATING CURVE OF SAFE OPERATING AREA



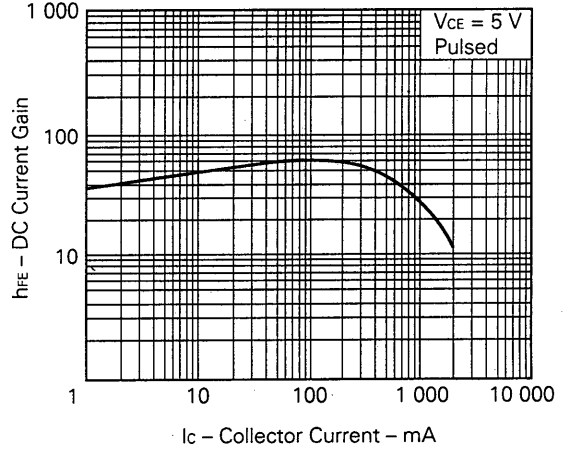
TRANSIENT THERMAL RESISTANCE



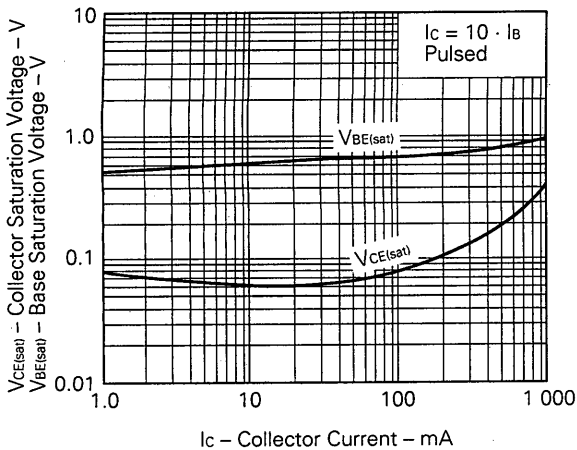
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



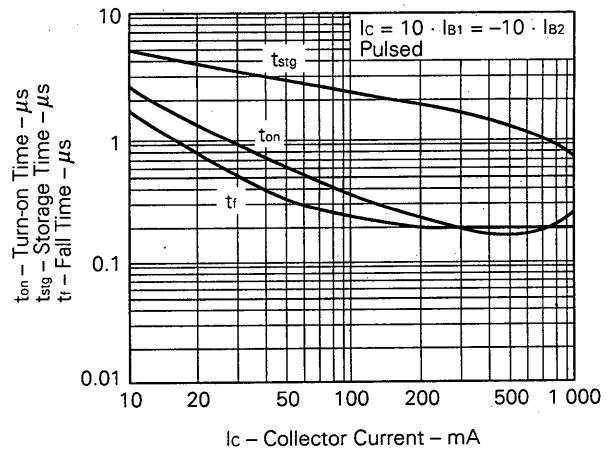
DC CURRENT GAIN vs. COLLECTOR CURRENT



BASE AND COLLECTOR SATURATION VOLTAGE vs. COLLECTOR CURRENT



TURN ON TIME, STORAGE TIME AND FALL TIME vs. COLLECTOR CURRENT



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.