NEC

SILICON TRANSISTOR
2SD1899-Z

NPN SILICON EPITAXIAL TRANSISTOR
MP-3

DESCRIPTION

2SD1899-Z is designed for Audio Frequency Amplifier and Switching, especially in Hybrid Integrated Circuits.

FEATURES

- High h_{FE} h_{FE} = 100 to 400
- Low $V_{CE(sat)}$ $V_{CE(sat)}$ = 0.3 V

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.

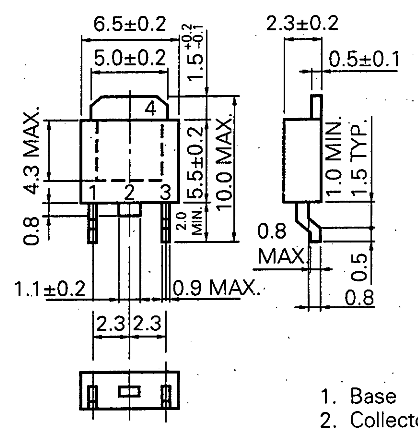
ABSOLUTE MAXIMUM RATINGS (T_a = 25 °C)

Collector to Base Voltage	V_{CBO}	60	V
Collector to Emitter Voltage	V_{CEO}	60	V
Emitter to Base Voltage	V_{EBO}	7.0	V
Collector Current (DC)	I_C	3.0	A
Collector Current (Pulse)	I_C*	5.0	A
Base Current (DC)	I_B	0.5	A
Total Power Dissipation (T_a = 25 °C)	P_{T1}**	2.0	W
Total Power Dissipation (T_c = 25 °C)	P_{T2}	10	W
Junction Temperature	T_j	150	°C
Storage Temperature	T_{stg}	−55 to +150	°C

* PW ≦ 10 ms, Duty Cycle ≦ 50 %

** Mounted on ceramic substrate of 7.5 cm^2 × 0.7 mm

PACKAGE DIMENSIONS
(in millimeters)



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

Document No. TC-1818A
(O.D. No. TC-6082)
Date Published December 1993 M
Printed in Japan

ELECTRICAL CHARACTERISTICS (T_a = 25 °C)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Collector Cutoff Current	I_{CBO}			10	μA	V_{CB} = 60 V, I_E = 0
Emitter Cutoff Current	I_{EBO}			10	μA	V_{EB} = 7.0 V, I_C = 0
DC Current Gain	h_{FE1}*	60				V_{CE} = 2.0 V, I_C = 0.2 A
DC Current Gain	h_{FE2}*	100		400		V_{CE} = 2.0 V, I_C = 0.6 A
DC Current Gain	h_{FE3}*	50				V_{CE} = 2.0 V, I_C = 2.0 A
Collector Saturation Voltage	$V_{CE(sat)}$*		0.14	0.25	V	I_C = 1.5 A, I_B = 0.15 A
Base Saturation Voltage	$V_{BE(sat)}$*		0.93	1.2	V	I_C = 1.5 A, I_B = 0.15 A
Gain Bandwidth Product	f_T		120		MHz	V_{CE} = 5.0 V, I_E = −1.5 A
Output Capacitance	C_{ob}		30		pF	V_{CB} = 10 V, I_E = 0, f = 1.0 MHz
Turn-on Time	t_{on}		0.15	0.5	μs	I_C = 1 A, V_{CC} = 10 V, R_L = 10 Ω I_{B1} = $-I_{B2}$ = 0.1 A
Storage Time	t_{stg}		0.75	2.0	μs	
Fall Time	t_f		0.2	0.5	μs	

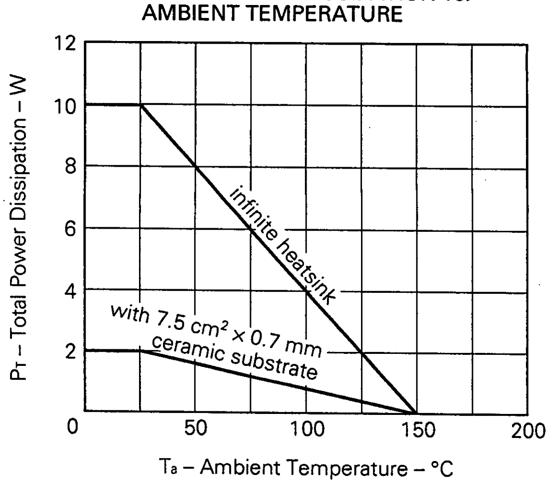
* Pulsed: PW ≦ 350 μs, Duty Cycle ≦ 2 %

h_{FE} Classification

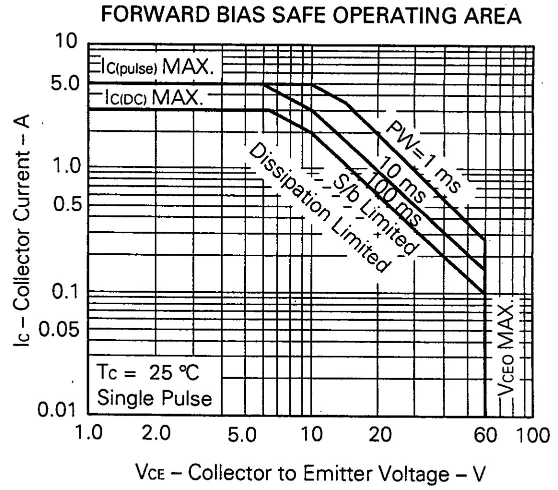
MARKING	M	L	K
h_{FE2}	100 to 200	160 to 320	200 to 400

TYPICAL CHARACTERISTICS (T_a = 25 °C)

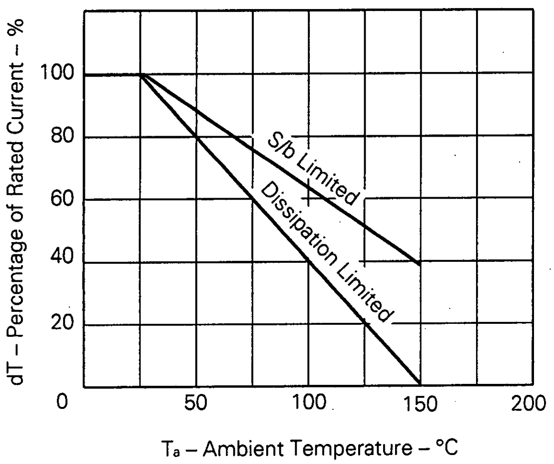
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



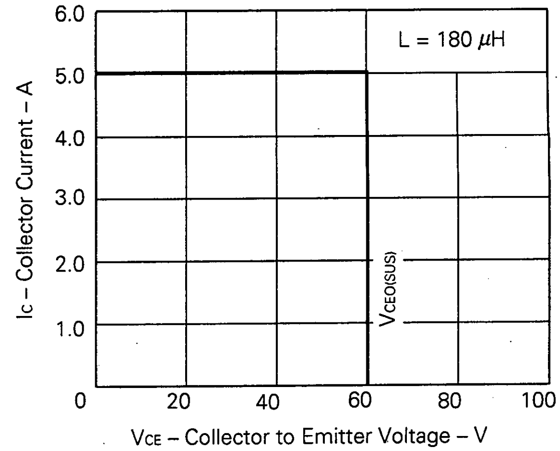
FORWARD BIAS SAFE OPERATING AREA



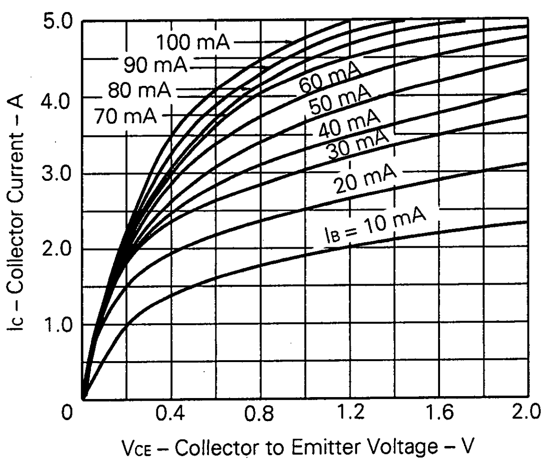
DERATING CURVE OF SAFE OPERATING AREA



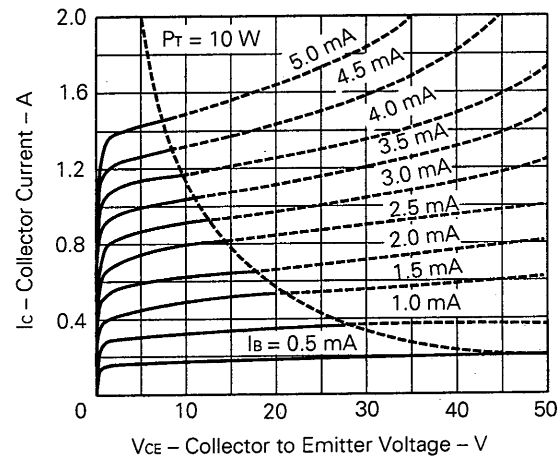
REVERSE BIAS SAFE OPERATING AREA



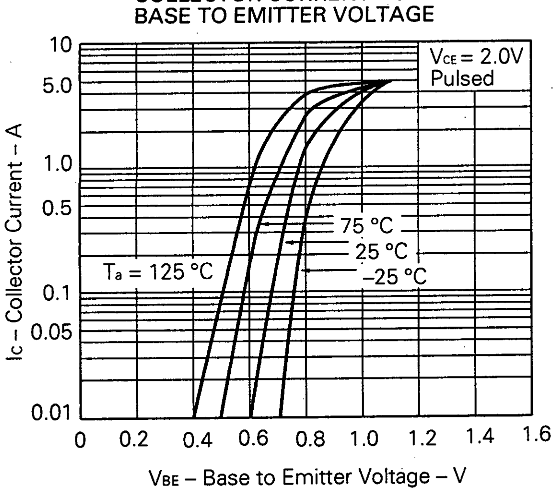
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



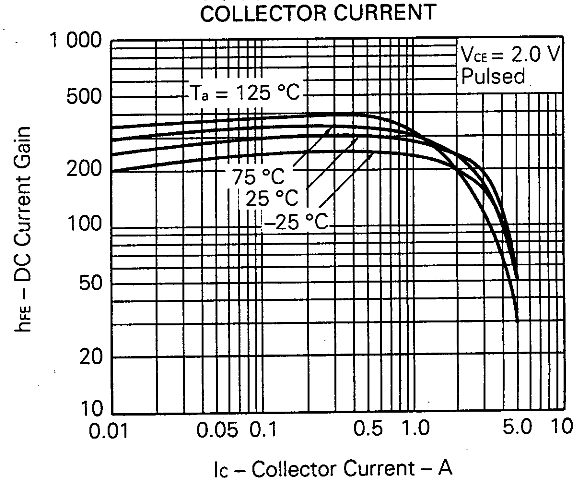
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE

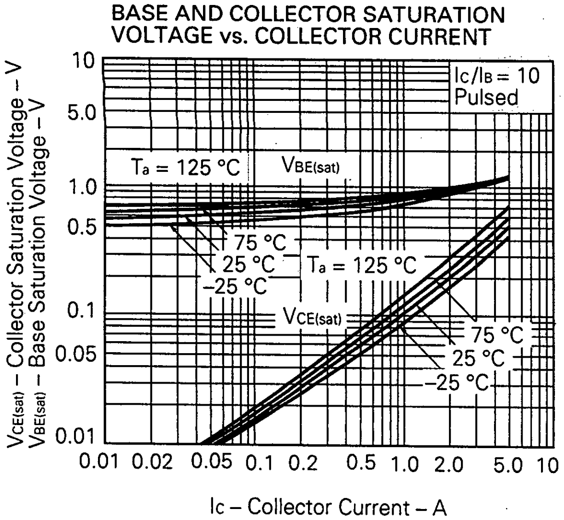


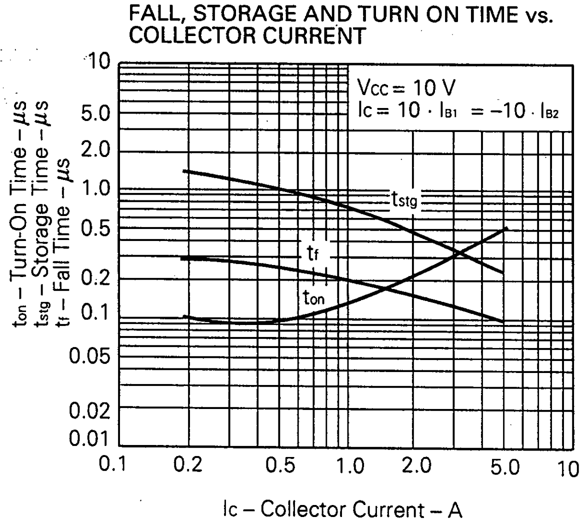
COLLECTOR CURRENT vs. BASE TO EMITTER VOLTAGE

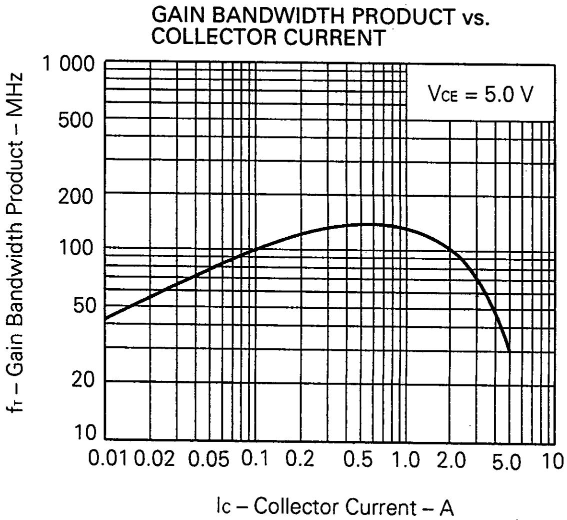


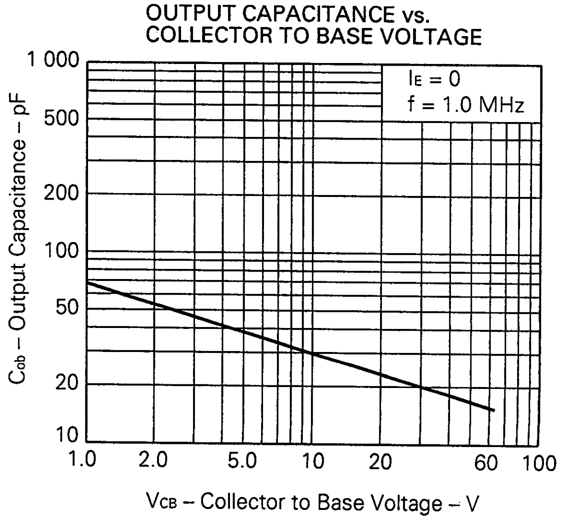
DC CURRENT GAIN vs. COLLECTOR CURRENT




BASE AND COLLECTOR SATURATION VOLTAGE vs. COLLECTOR CURRENT
Ic/IB = 10
Pulsed
Ta = 125 °C
VBE(sat)
75 °C
25 °C
−25 °C
Ta = 125 °C
VCE(sat)
75 °C
25 °C
−25 °C
VCE(sat) – Collector Saturation Voltage – V
VBE(sat) – Base Saturation Voltage – V
Ic – Collector Current – A


FALL, STORAGE AND TURN ON TIME vs. COLLECTOR CURRENT
Vcc = 10 V
Ic = 10 · IB1 = −10 · IB2
tstg
tf
ton
ton – Turn-On Time – μs
tstg – Storage Time – μs
tf – Fall Time – μs
Ic – Collector Current – A


GAIN BANDWIDTH PRODUCT vs. COLLECTOR CURRENT
VCE = 5.0 V
fT – Gain Bandwidth Product – MHz
Ic – Collector Current – A


OUTPUT CAPACITANCE vs. COLLECTOR TO BASE VOLTAGE
IE = 0
f = 1.0 MHz
Cob – Output Capacitance – pF
VCB – Collector to Base Voltage – V

[MEMO]

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