

# SILICON TRANSISTOR

## 2SD1899-Z

### NPN SILICON EPITAXIAL TRANSISTOR

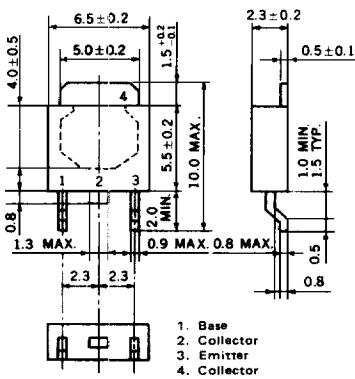
#### MP-3

#### DESCRIPTION

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

#### PACKAGE DIMENSIONS

in millimeters



#### FEATURE

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

#### ABSOLUTE MAXIMUM RATINGS

Maximum Voltages and Currents ( $T_a = 25^\circ\text{C}$ )

Collector to Base Voltage	$V_{CBO}$	60	V
Collector to Emitter Voltage	$V_{CEO}$	60	V
Emitter to Base Voltage	$V_{EBO}$	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

#### Maximum Power Dissipations

Total Power Dissipation			
at $25^\circ\text{C}$ Ambient Temperature	$P_T^{**}$	1.0	W
Total Power Dissipation	$P_T^{***}$	10	W

#### Maximum Temperatures

Junction Temperature	$T_j$	150	$^\circ\text{C}$
Storage Temperature Range	$T_{stg}$	-55 to +150	$^\circ\text{C}$

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

\*\* Mounted on ceramic substrate of  $2.5\text{ cm}^2 \times 0.7\text{ mm}$

\*\*\*  $T_C = 25^\circ\text{C}$

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

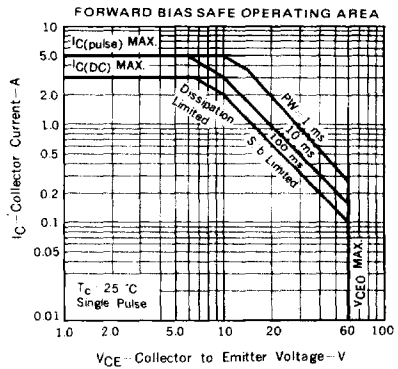
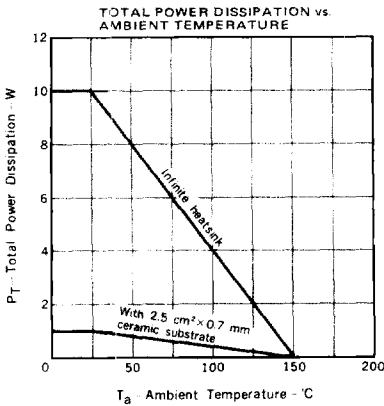
CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Collector Cutoff Current	I <sub>CBO</sub>			10	μA	V <sub>CB</sub> = 60 V, I <sub>E</sub> = 0
Emitter Cutoff Current	I <sub>EBO</sub>			10	μA	V <sub>EB</sub> = 7.0 V, I <sub>C</sub> = 0
DC Current Gain	h <sub>FE1</sub> *	60				V <sub>CE</sub> = 2.0 V, I <sub>C</sub> = 0.2 A
DC Current Gain	h <sub>FE2</sub> *	100		400		V <sub>CE</sub> = 2.0 V, I <sub>C</sub> = 0.6 A
DC Current Gain	h <sub>FE3</sub> *	50				V <sub>CE</sub> = 2.0 V, I <sub>C</sub> = 2.0 A
Collector Saturation Voltage	V <sub>CE(sat)</sub> *		0.14	0.25	V	I <sub>C</sub> = 1.5 A, I <sub>B</sub> = 0.15 A
Base Saturation Voltage	V <sub>BE(sat)</sub> *		0.93	1.2	V	I <sub>C</sub> = 1.5 A, I <sub>B</sub> = 0.15 A
Gain Bandwidth Product	f <sub>T</sub>		120		MHz	V <sub>CE</sub> = 5.0 V, I <sub>E</sub> = -1.5 A
Output Capacitance	C <sub>ob</sub>		30		pF	V <sub>CB</sub> = 10 V, I <sub>E</sub> = 0, f = 1.0 MHz
Turn-on Time	t <sub>on</sub>		0.15	0.5	μs	I <sub>C</sub> = 1 A, V <sub>CC</sub> = 10 V, R <sub>L</sub> = 10 Ω  I <sub>B1</sub> = -I <sub>B2</sub> = 0.1 A
Storage Time	t <sub>stg</sub>		0.75	2.0	μs	
Fall Time	t <sub>f</sub>		0.2	0.5	μs	

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

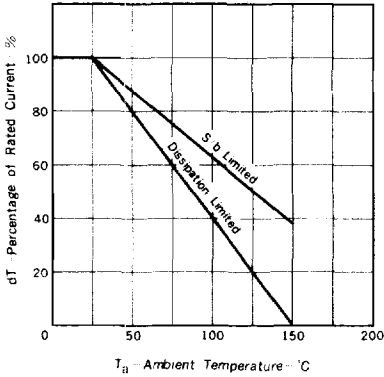
h<sub>FE</sub> Classification

MARKING	M	L	K
h <sub>FE2</sub>	100 to 200	160 to 320	200 to 400

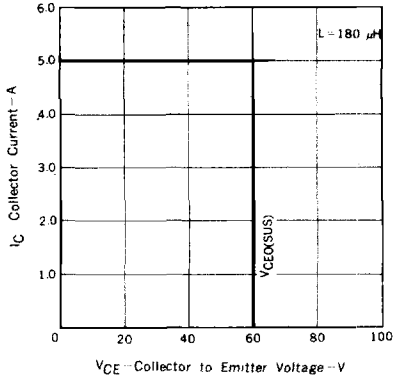
TYPICAL CHARACTERISTICS (T<sub>a</sub> = 25 °C)



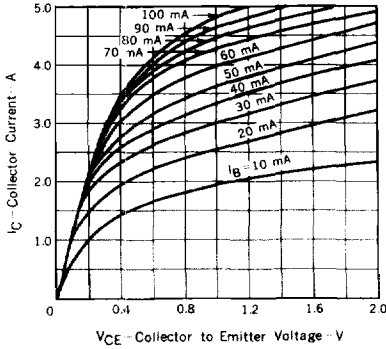
DERATING CURVE OF SAFE OPERATING AREA



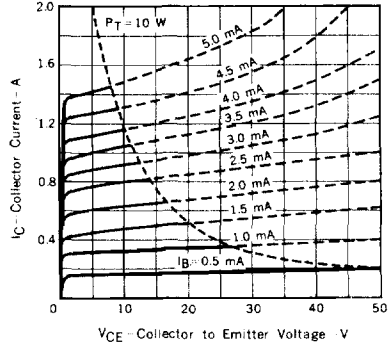
REVERSE BIAS SAFE OPERATING AREA



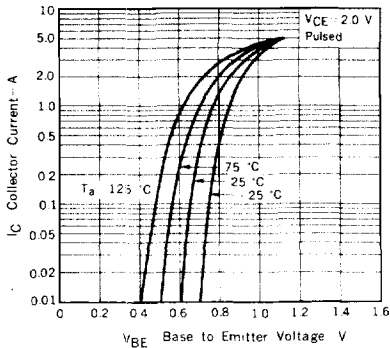
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



COLLECTOR CURRENT vs. BASE TO EMITTER VOLTAGE



DC CURRENT GAIN vs. COLLECTOR CURRENT

