



SILICON TRANSISTOR

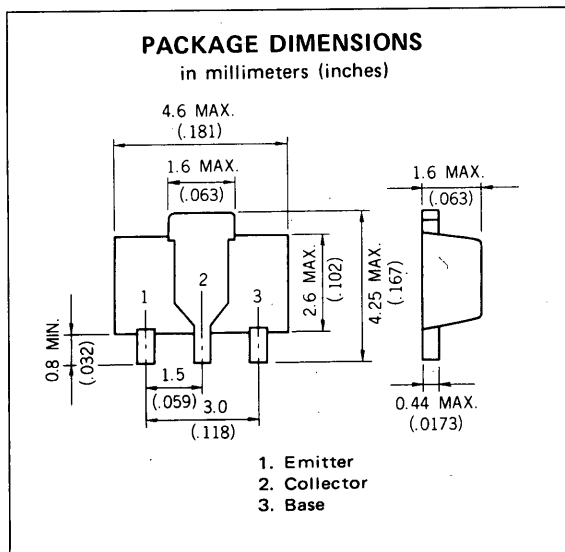
2SD999

NPN SILICON EPITAXIAL TRANSISTOR

POWER MINI MOLD

DESCRIPTION

The 2SD999 is designed for audio frequency power amplifier application, especially in Hybrid Integrated Circuits.



FEATURES

- World Standard Miniature Package
: SOT-89
- Low Collector Saturation Voltage
: $V_{CE(sat)} < 0.4 \text{ V}$ ($I_C = 1.0 \text{ A}$, $I_B = 100 \text{ mA}$)
- Excellent DC Current Gain Linearity
: $h_{FE} = 140 \text{ TYP.}$ ($V_{CE} = 1.0 \text{ V}$, $I_C = 1.0 \text{ A}$)
- Complements to PNP type 2SB798

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

Maximum Voltages and Currents

Collector to Base Voltage	V_{CBO}	30	V
Collector to Emitter Voltage	V_{CEO}	25	V
Emitter to Base Voltage	V_{EBO}	5.0	V
Collector Current (DC)	I_C	1.0	A
Collector Current (Pulse)*	I_C	1.5	A

Maximum Power Dissipation

Total Power Dissipation at 25°C Ambient Temperature**	P_T	2.0	W
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Maximum Temperatures

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

*PW $\leq 10 \text{ ms}$, duty cycle $\leq 50 \%$

**When mounted on ceramic substrate of $16 \text{ cm}^2 \times 0.7 \text{ mm}$

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

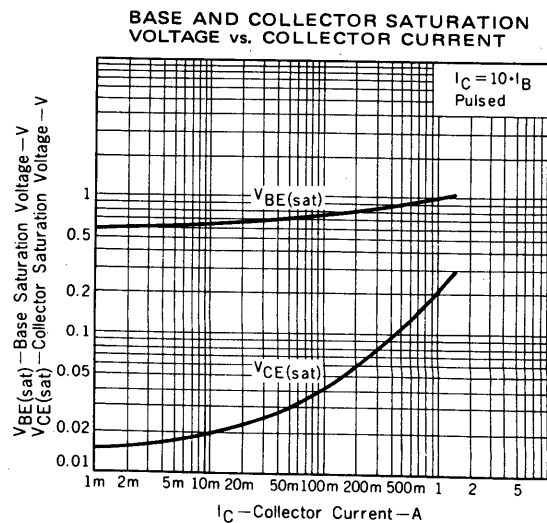
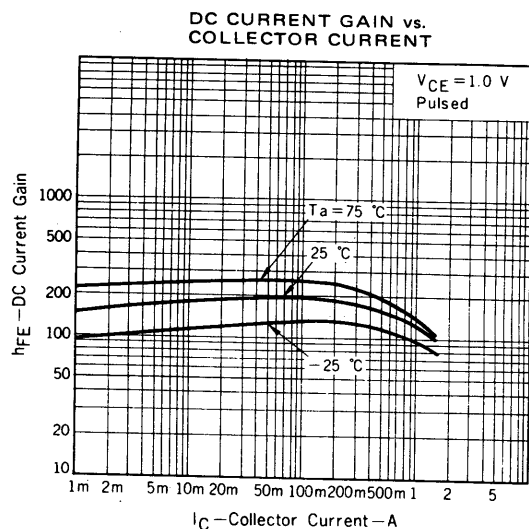
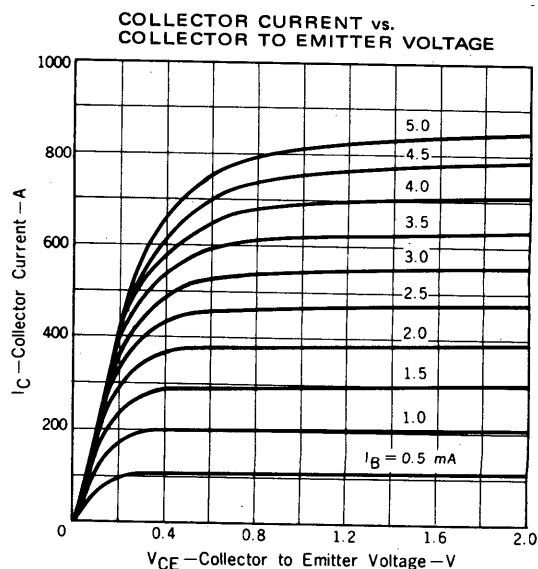
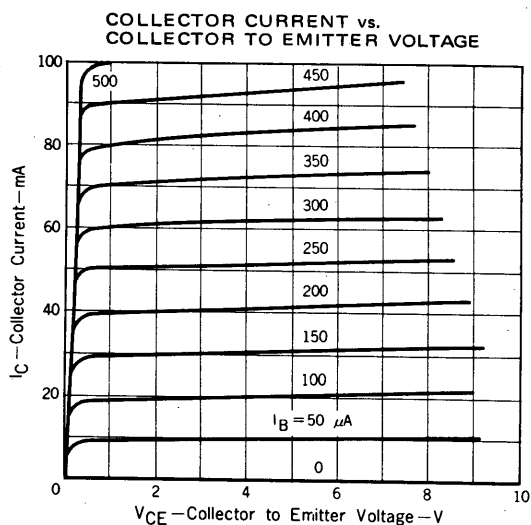
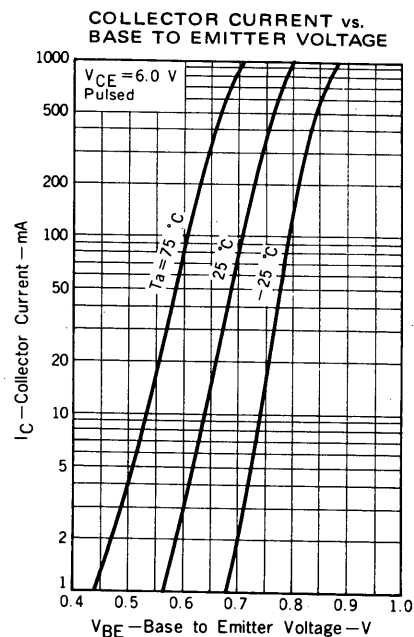
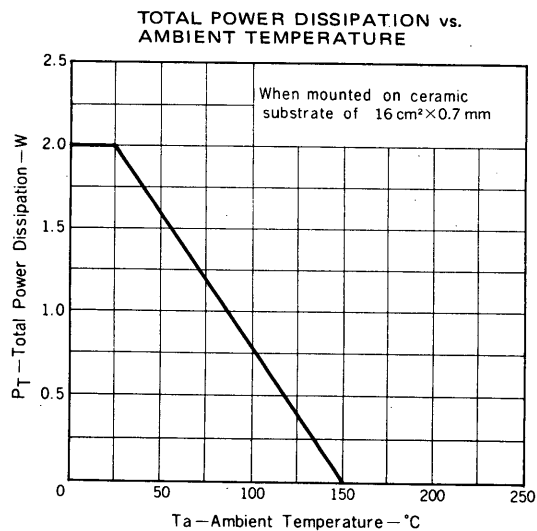
CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Collector Cutoff Current	I_{CBO}			100	nA	$V_{CB} = 30 \text{ V}$, $I_E = 0$
Emitter Cutoff Current	I_{EBO}			100	nA	$V_{EB} = 5.0 \text{ V}$, $I_C = 0$
DC Current Gain	h_{FE1}	90	200	400		$V_{CE} = 1.0 \text{ V}$, $I_C = 100 \text{ mA}$ ***
DC Current Gain	h_{FE2}	50	140			$V_{CE} = 1.0 \text{ V}$, $I_C = 1.0 \text{ A}$ ***
Collector Saturation Voltage	$V_{CE(sat)}$		0.21	0.40	V	$I_C = 1.0 \text{ A}$, $I_B = 0.10 \text{ A}$ ***
Base Saturation Voltage	$V_{BE(sat)}$		1.0	1.2	V	$I_C = 1.0 \text{ A}$, $I_B = 0.10 \text{ A}$ ***
Base to Emitter Voltage	V_{BE}	600	630	700	mV	$V_{CE} = 6.0 \text{ V}$, $I_C = 10 \text{ mA}$ ***
Gain Bandwidth Product	f_T		130		MHz	$V_{CE} = 6.0 \text{ V}$, $I_E = -10 \text{ mA}$
Output Capacitance	C_{ob}		22		pF	$V_{CB} = 6.0 \text{ V}$, $I_E = 0$, $f = 1.0 \text{ MHz}$

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

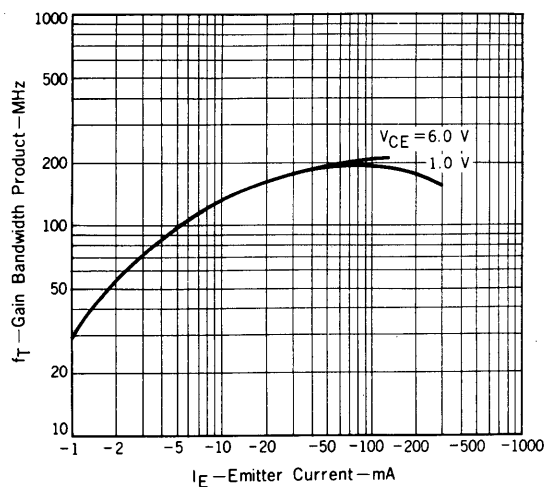
h_{FE} Classification

MARKING	CM	CL	CK
h_{FE1}	90 - 180	135 - 270	200 - 400

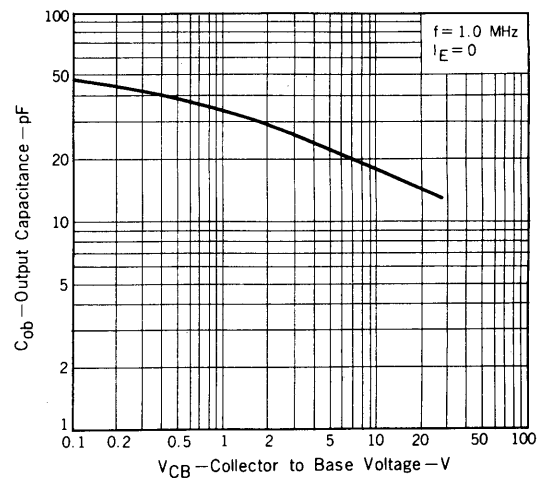
TYPICAL CHARACTERISTICS ($T_a = 25^\circ\text{C}$)



GAIN BANDWIDTH PRODUCT vs.
EMITTER CURRENT



OUTPUT CAPACITANCE vs.
COLLECTOR TO BASE VOLTAGE



REFERENCE

Document Name	Document No.
NEC semiconductor device reliability/quality control system.	TEI-1202
Quality grade on NEC semiconductor devices.	IEI-1209
Semiconductor device mounting technology manual.	IEI-1207
Semiconductor device package manual.	IEI-1213
Guide to quality assurance for semiconductor devices.	MEI-1202
Semiconductor selection guide.	MF-1134

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