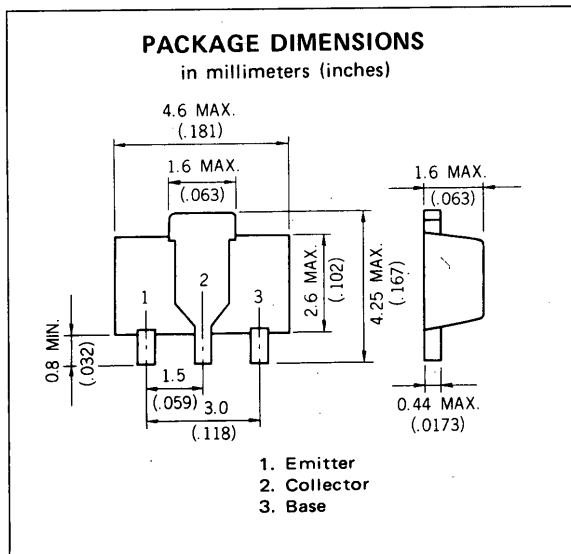


NPN SILICON EPITAXIAL TRANSISTOR  
POWER MINI MOLD

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	$V_{CB0}$	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 $25^\circ \text{C}$ 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 ( $T_a = 25^\circ \text{C}$ )

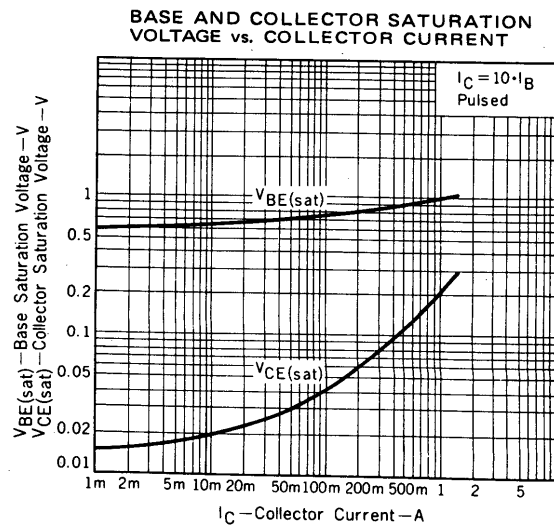
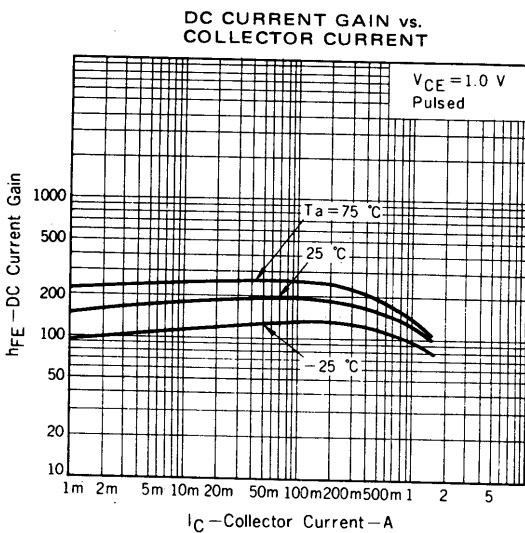
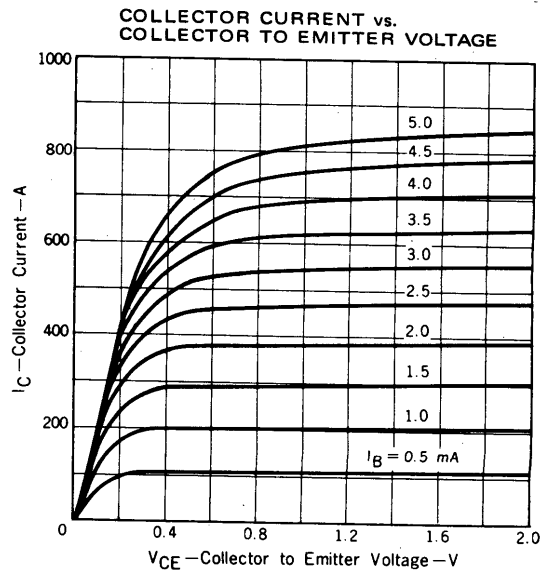
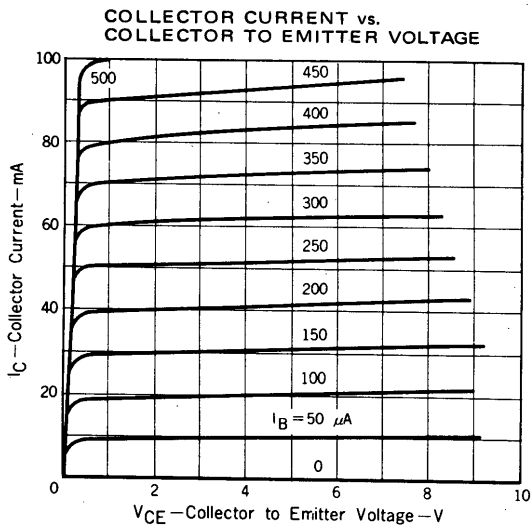
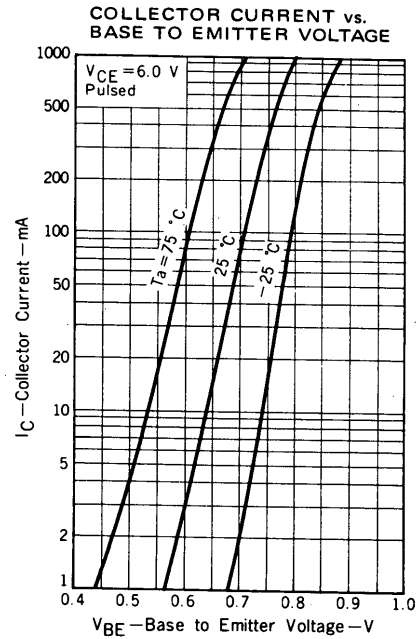
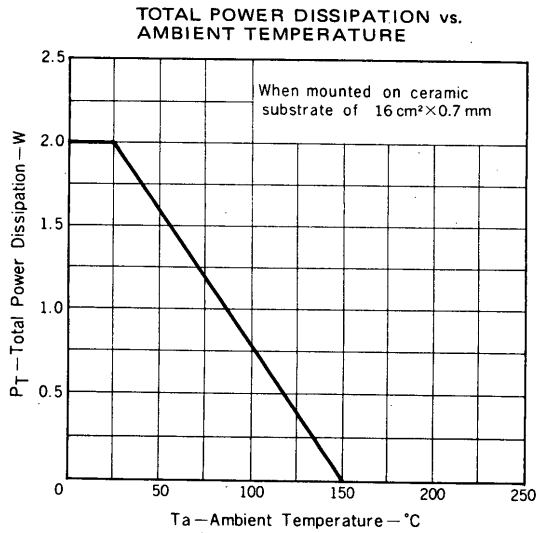
CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Collector Cutoff Current	$I_{CBO}$			100	nA	$V_{CB} = 30 \text{ V}$ , $I_E = 0$
Emitter Cutoff Current	$I_{EBO}$			100	nA	$V_{EB} = 5.0 \text{ V}$ , $I_C = 0$
DC Current Gain	$h_{FE1}$	90	200	400		$V_{CE} = 1.0 \text{ V}$ , $I_C = 100 \text{ mA}$ ***
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  $\leq 2 \%$

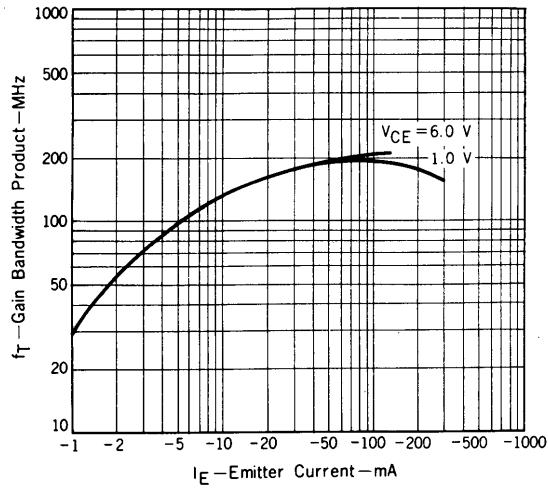
$h_{FE}$  Classification

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

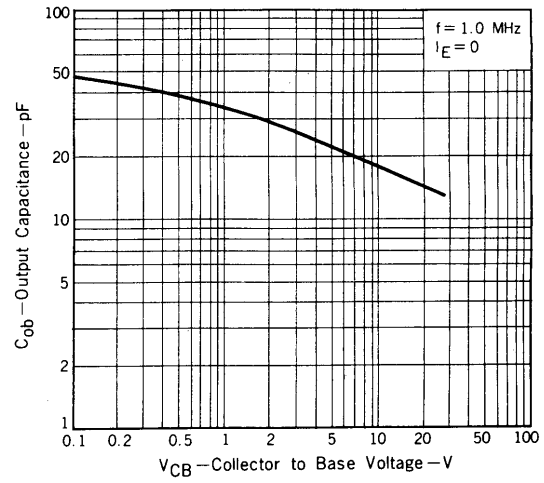
TYPICAL CHARACTERISTICS ( $T_a = 25^\circ\text{C}$ )



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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