DATA SHEET

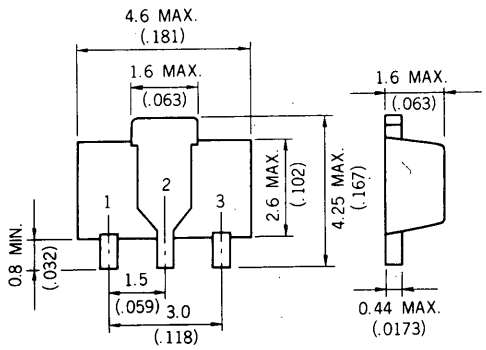
NEC

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.

PACKAGE DIMENSIONS
in millimeters (inches)



1. Emitter
2. Collector
3. Base

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

ABSOLUTE MAXIMUM RATINGS (Ta = 25 °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
Maximum Temperatures			
Junction Temperature	T_j	150	°C
Storage Temperature Range	T_{stg}	−55 to +150	°C

*PW ≦ 10 ms, duty cycle ≦ 50 %
**When mounted on ceramic substrate of 16 cm² x 0.7 mm

ELECTRICAL CHARACTERISTICS (Ta = 25 °C)

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

***Pulsed: PW ≦ 350 μs, duty cycle ≦ 2 %

h_{FE} Classification

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

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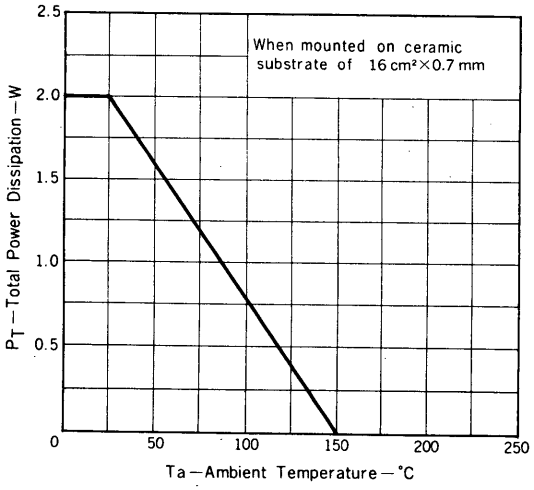
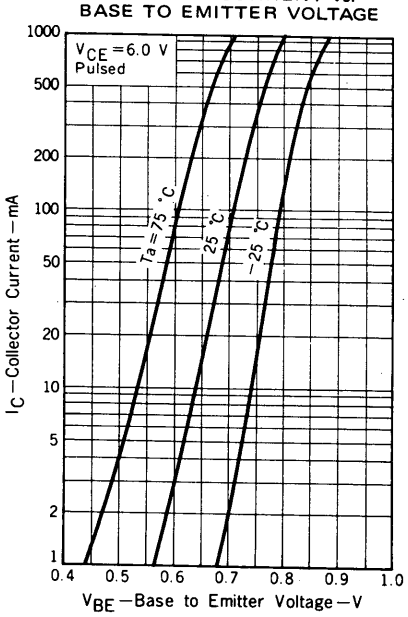
TYPICAL CHARACTERISTICS (Ta = 25 °C)

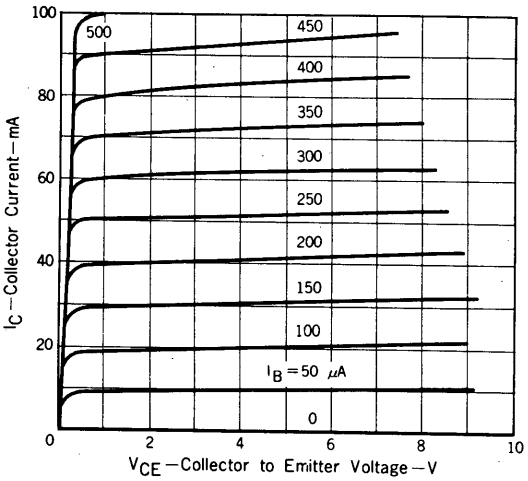
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



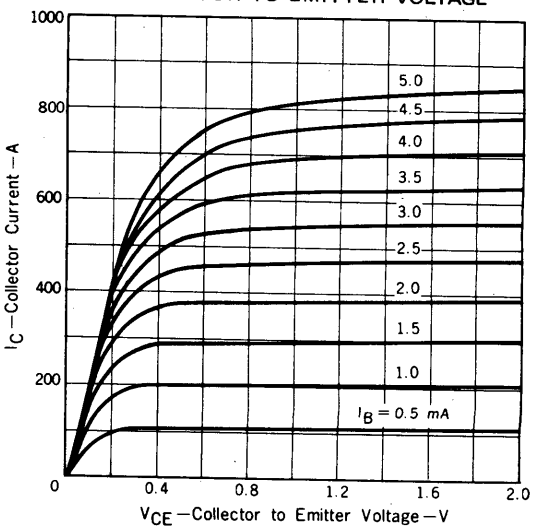
COLLECTOR CURRENT vs. BASE TO EMITTER VOLTAGE



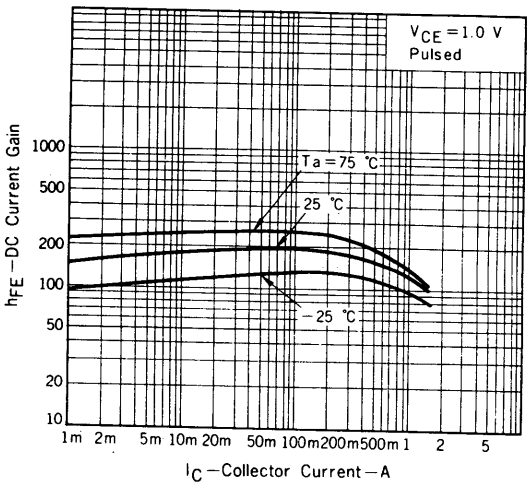
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



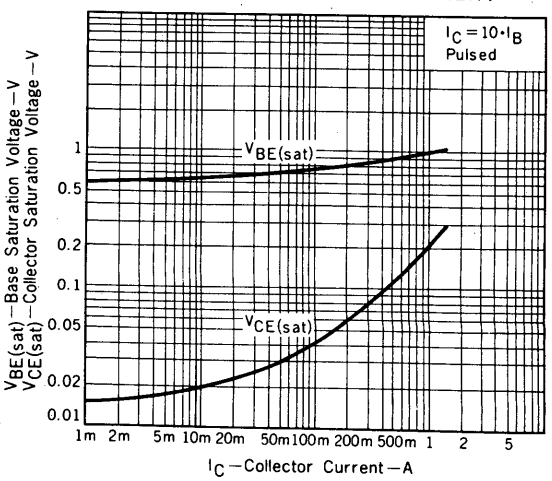
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



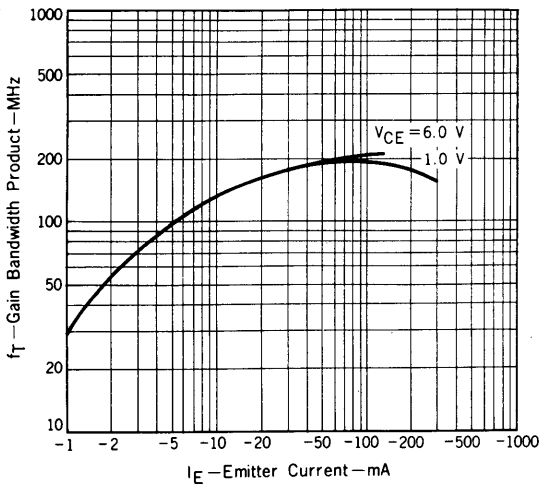
DC CURRENT GAIN vs. COLLECTOR CURRENT



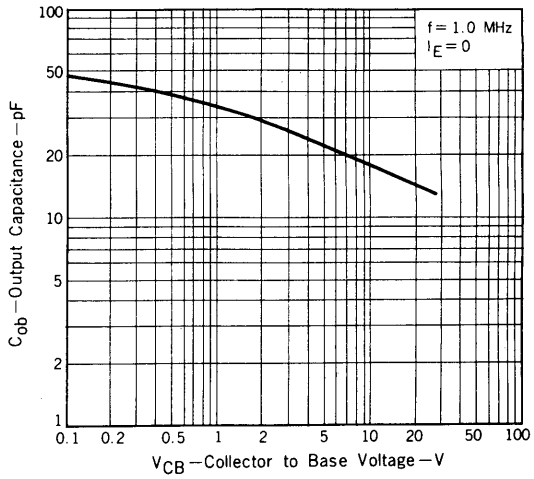
BASE AND COLLECTOR SATURATION VOLTAGE vs. COLLECTOR CURRENT



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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