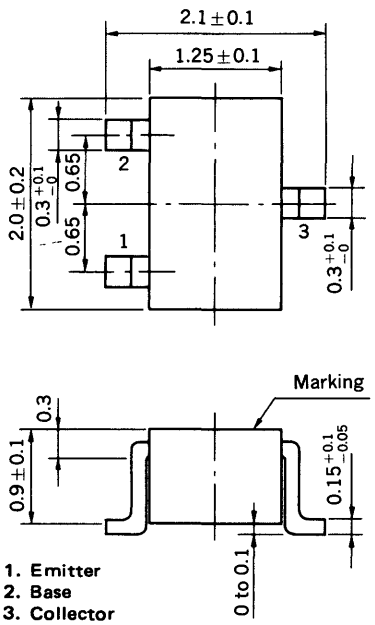
DATA SHEET

NEC
ELECTRON DEVICE

SILICON TRANSISTOR
2SC4178

HIGH FREQUENCY AMPLIFIER
NPN SILICON EPITAXIAL TRANSISTOR

PACKAGE DIMENSIONS
in millimeters



1. Emitter
2. Base
3. Collector

DESCRIPTION

The 2SC4178 is designed for use in small type equipments especially recommended for Hybrid Integrated Circuit and other applications.

FEATURES

- Micro package.
- High gain bandwidth product. f_T = 600 MHz TYP. (I_E = −1.0 mA)
- Low output capacitance. C_{ob} = 1.0 pF TYP. (V_{CB} = 6.0 V)

ABSOLUTE MAXIMUM RATINGS (T_a = 25 °C)

Maximum Voltages and Current			
Collector to Base Voltage	V_{CBO}	30	V
Collector to Emitter Voltage	V_{CEO}	20	V
Emitter to Base Voltage	V_{EBO}	4.0	V
Collector Current	I_C	20	mA
Maximum Power Dissipation			
Total Power Dissipation	P_T	150	mW
Maximum Temperatures			
Storage Temperature	T_{stg}	−55 to +150	°C
Junction Temperature	T_j	150	°C

ELECTRICAL CHARACTERISTICS (T_a = 25 °C)

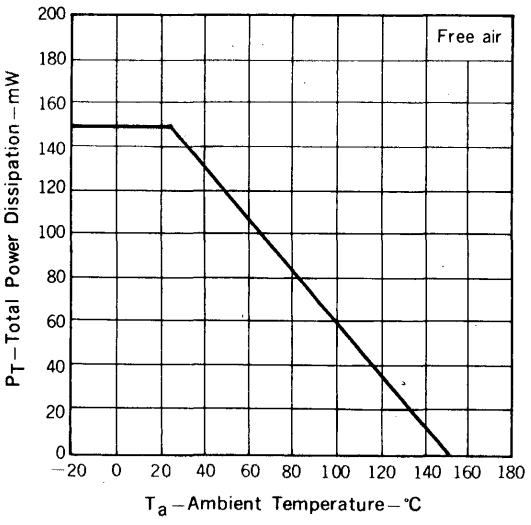
CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Collector Cutoff Current	I_{CBO}			100	nA	V_{CB} = 30 V, I_E = 0
DC Current Gain	h_{FE}	40	90	180		V_{CE} = 6.0 V, I_C = 1.0 mA
Collector Saturation Voltage	$V_{CE(sat)}$		0.1	0.3	V	I_C = 10 mA, I_B = 1.0 mA
Gain Bandwidth Product	f_T	400	600		MHz	V_{CE} = 6.0 V, I_E = −1.0 mA
Output Capacitance	C_{ob}		1.0		pF	V_{CB} = 6.0 V, I_E = 0, f = 1.0 MHz
Collector to Base Time Constant	$C_c \cdot rb'b$		12		ps	V_{CE} = 6.0 V, I_E = −1.0 mA, f = 31.9 MHz
Noise Figure	NF		3.0		dB	V_{CE} = 6.0 V, I_E = −1.0 mA, R_G = 50 Ω, f = 100 MHz See Test Circuit

Classification of h_{FE}

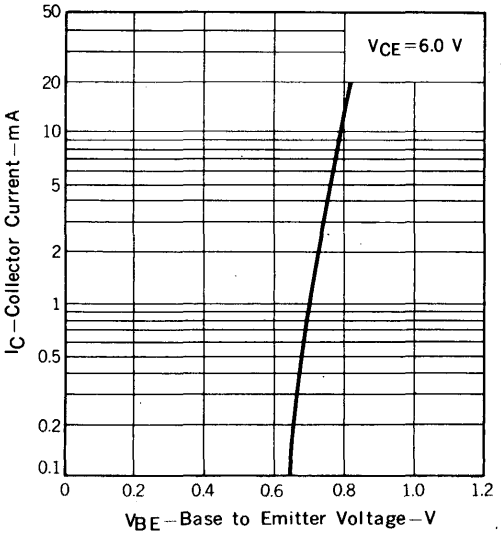
Marking	F12	F13	F14
h_{FE} Range	40 to 80	60 to 120	90 to 180

TYPICAL CHARACTERISTICS (T_a = 25 °C unless otherwise noted)

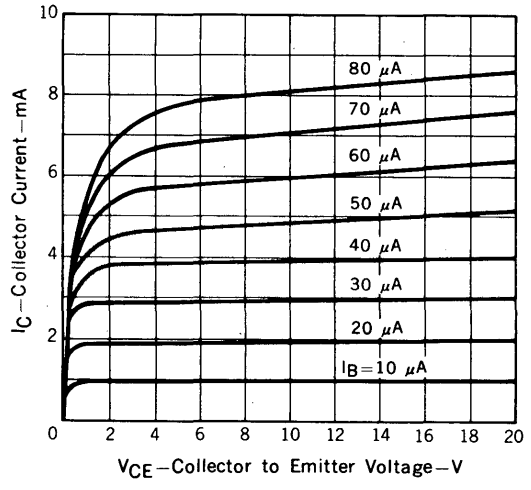
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



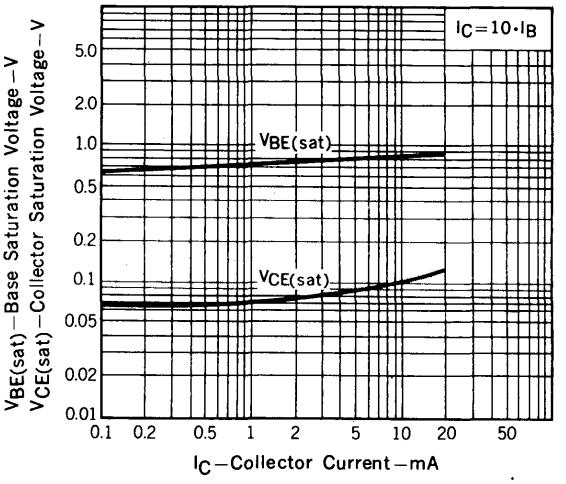
COLLECTOR CURRENT vs. BASE TO EMITTER VOLTAGE



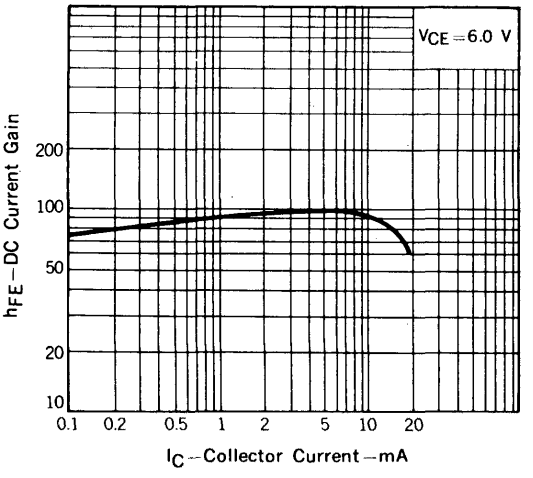
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



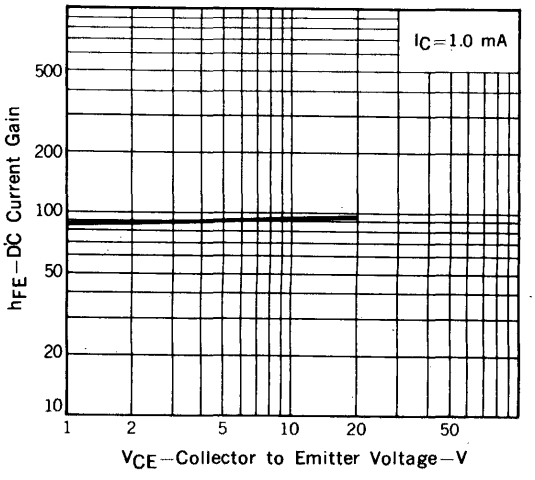
COLLECTOR AND BASE SATURATION VOLTAGE vs. COLLECTOR CURRENT



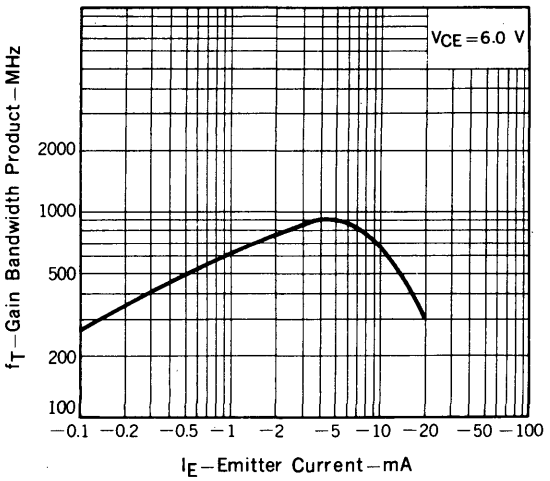
DC CURRENT GAIN vs. COLLECTOR CURRENT



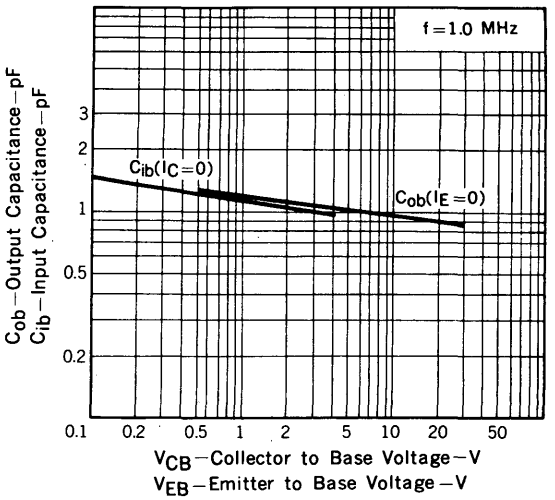
DC CURRENT GAIN vs. COLLECTOR TO EMITTER VOLTAGE



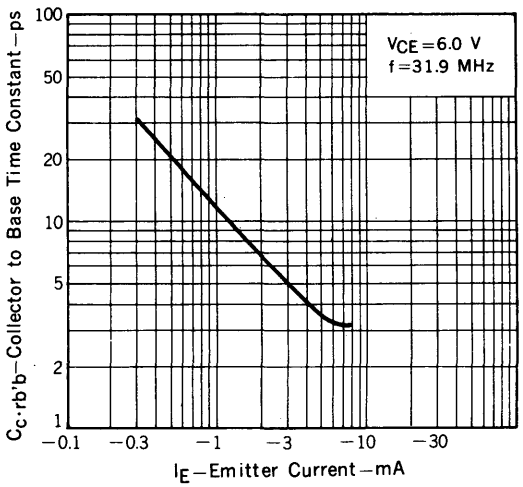
GAIN BANDWIDTH PRODUCT vs. EMITTER CURRENT



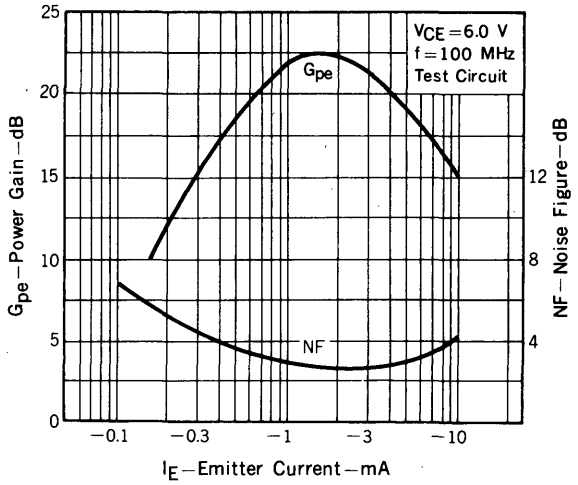
INPUT CAPACITANCE vs. EMITTER TO BASE VOLTAGE, OUTPUT CAPACITANCE vs. COLLECTOR TO BASE VOLTAGE



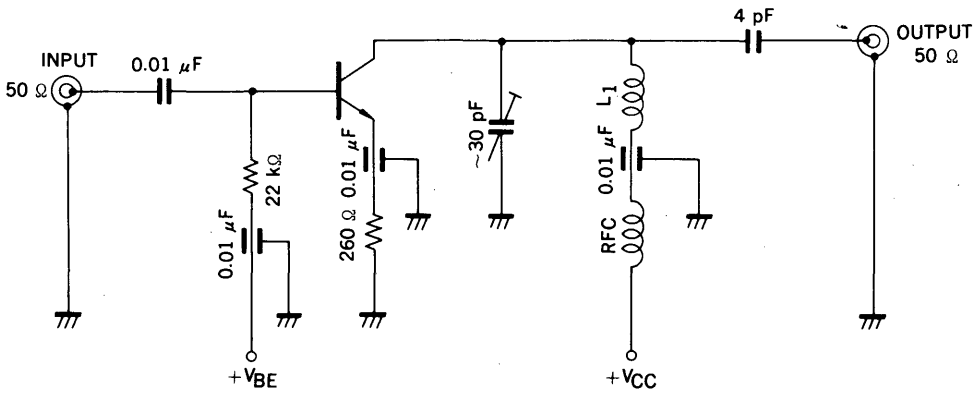
COLLECTOR TO BASE TIME CONSTANT vs. EMITTER CURRENT



POWER GAIN, NOISE FIGURE vs. EMITTER CURRENT



100 MHz G_{pe}, NF TEST CIRCUIT



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