NEC

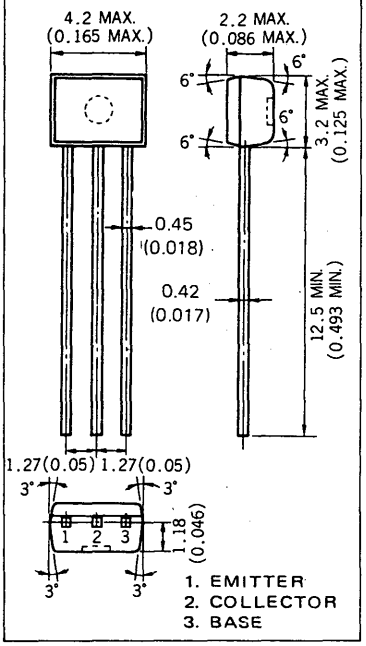
NPN SILICON TRANSISTOR
2SC3731

DESCRIPTION The 2SC3731 is designed for general purpose amplifier and high speed switching applications.

FEATURES

- High Frequency Current Gain.
- High Speed Switching.
- Small Output Capacitance.
- Complementary to the NEC 2SA1458 PNP transistor.

PACKAGE DIMENSIONS
in millimeters (inches)



ABSOLUTE MAXIMUM RATINGS

Maximum Temperatures

- Storage Temperature . . . . . −55 to +150 °C
- Junction Temperature . . . . . 150 °C Maximum

Maximum Power Dissipation (T_a = 25 °C)

- Total Power Dissipation . . . . . 250 mW

Maximum Voltages and Current (T_a = 25 °C)

- V_{CBO} Collector to Base Voltage . . . . . 60 V
- V_{CEO} Collector to Emitter Voltage . . . . . 40 V
- V_{EBO} Emitter to Base Voltage . . . . . 6.0 V
- I_C Collector Current . . . . . 200 mA

ELECTRICAL CHARACTERISTICS (T_a = 25 °C)

SYMBOL	CHARACTERISTIC	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
t_{on}	Turn-on Time			70	ns	See Test Circuit.
t_{stg}	Storage Time		100	200	ns	See Test Circuit.
t_{off}	Turn-off Time			250	ns	See Test Circuit.
f_T	Gain Bandwidth Product	300	510		MHz	V_{CE} = 20 V, I_E = −10 mA, f = 100 MHz
C_{ob}	Output Capacitance		3.0	4.0	pF	V_{CB} = 5.0 V, I_E = 0, f = 1 MHz
h_{FE1}*	DC Current Gain	75	200	300	–	V_{CE} = 1.0 V, I_C = 10 mA
h_{FE2}*	DC Current Gain	25	80		–	V_{CE} = 1.0 V, I_C = 100 mA
$V_{CE(sat)}$*	Collector Saturation Voltage		0.12	0.30	V	I_C = 50 mA, I_B = 5.0 mA
$V_{BE(sat)}$*	Base Saturation Voltage		0.80	0.95	V	I_C = 50 mA, I_B = 5.0 mA
I_{CBO}	Collector Cutoff Current			0.1	μA	V_{CB} = 30 V, I_E = 0
I_{EBO}	Emitter Cutoff Current			0.1	μA	V_{EB} = 3.0 V, I_C = 0

* Pulsed PW ≦ 350 μs, Duty Cycle ≦ 2 %

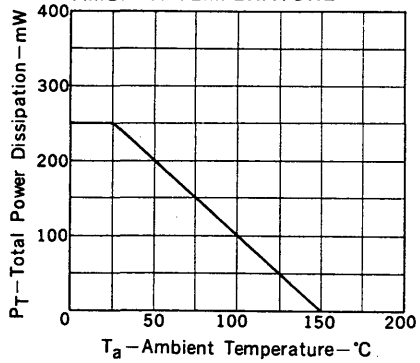
Classification of h_{FE1}

Rank	M	L	K
Range	75 to 150	100 to 200	150 to 300

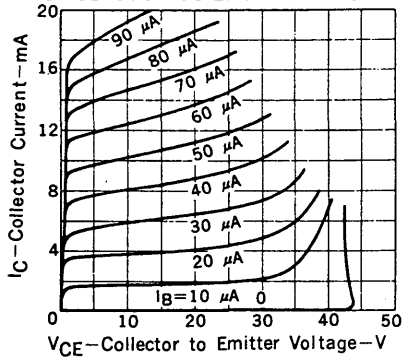
Test Conditions : V_{CE} = 1.0 V, I_C = 10 mA

TYPICAL CHARACTERISTICS (T_a = 25 °C)

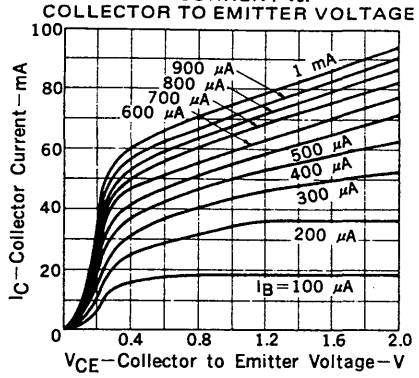
TOTAL POWER DISSIPATION vs. AMBINET TEMPERATURE



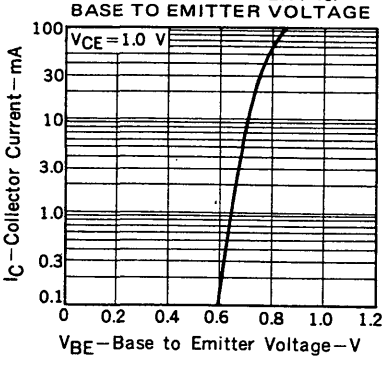
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



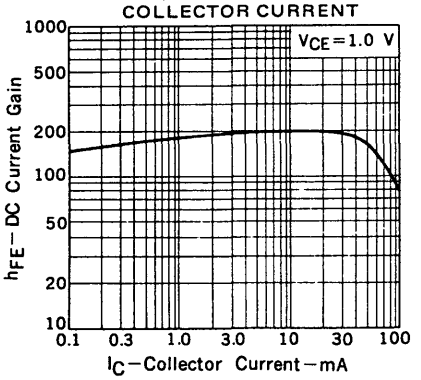
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



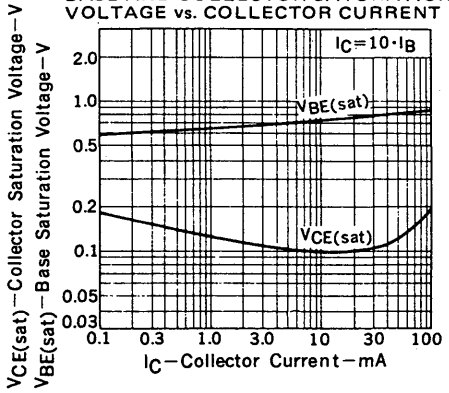
COLLECTOR CURRENT vs. BASE TO EMITTER VOLTAGE



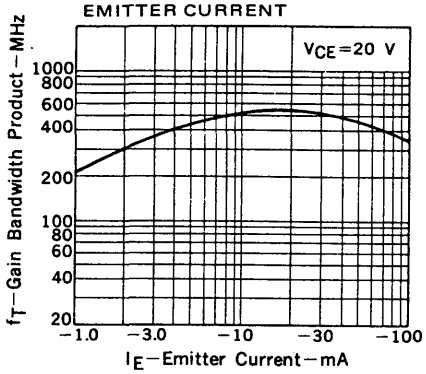
DC CURRENT GAIN vs. COLLECTOR CURRENT



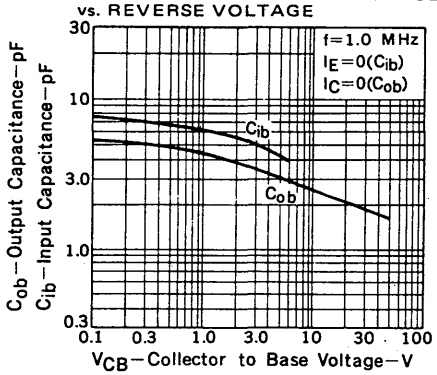
BASE AND COLLECTOR SATURATION VOLTAGE vs. COLLECTOR CURRENT



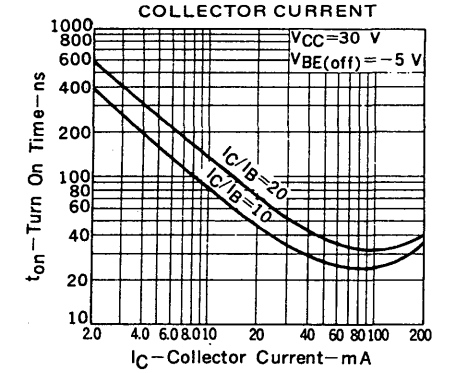
GAIN BANDWIDTH PRODUCT vs. EMITTER CURRENT



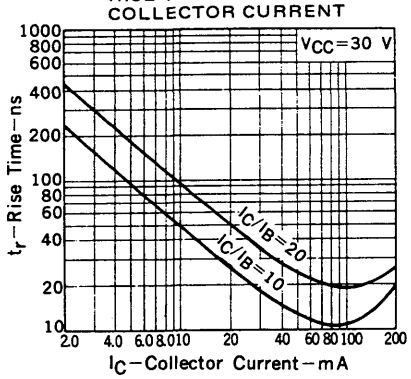
INPUT AND OUTPUT CAPACITANCE vs. REVERSE VOLTAGE



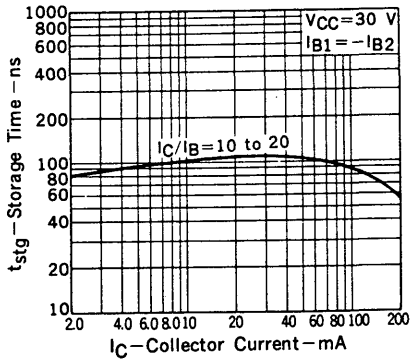
TURN ON TIME vs. COLLECTOR CURRENT



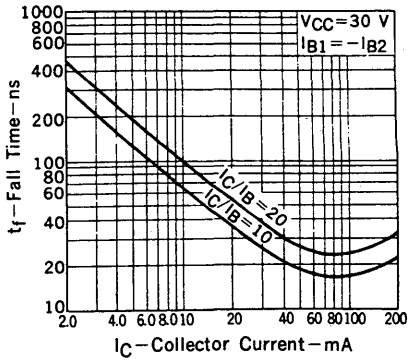
RISE TIME vs. COLLECTOR CURRENT



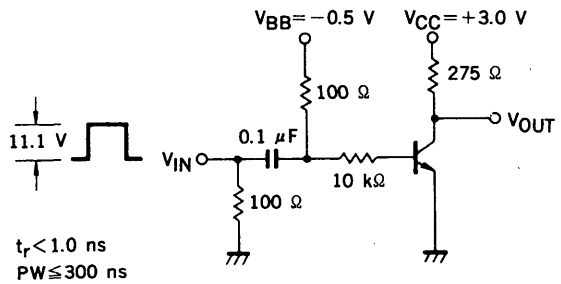
STORAGE TIME vs. COLLECTOR CURRENT



FALL TIME vs. COLLECTOR CURRENT

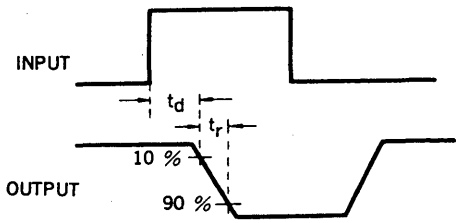


SWITCHING TIME TEST CIRCUIT

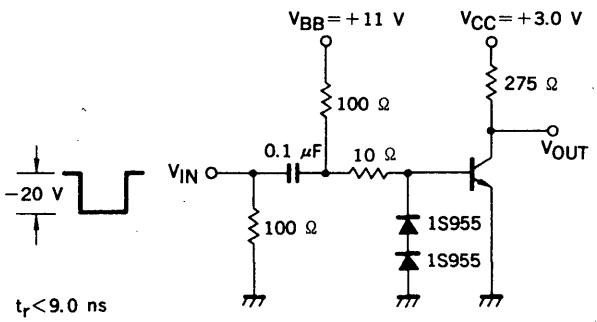


t_r<1.0 ns
PW≦300 ns
Duty Cycle=2 %

t_{on} SWITCHING

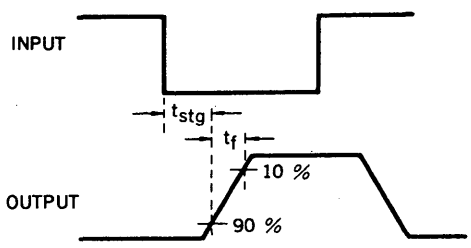


$t_{on}=t_d+t_r$



t_r<9.0 ns
PW≦300 ns
Duty Cycle=2 %

t_{off} SWITCHING



$t_{off}=t_{stg}+t_f$