NEC

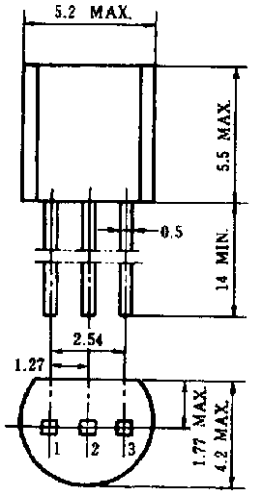
SILICON TRANSISTORS
2SD1616, 2SD1616A

NPN SILICON EPITAXIAL TRANSISTOR
FOR LOW-FREQUENCY POWER AMPLIFIERS AND MID-SPEED SWITCHING

FEATURES

- Low $V_{CE(sat)}$:
  $V_{CE(sat)}$ = 0.15 V TYP. (I_C = 1.0 A, I_B = 50 mA)
- Large P_T in small dimension with versatility
  P_T = 0.75 W, V_{CEO} = 50/60 V, $I_{C(DC)}$ = 1.0 A
- Complementary transistor with the 2SB1116 and 1116A

PACKAGE DRAWING (UNIT: mm)



Electrode Connection
1. Emitter EIAJ : SC-43B
2. Collector JEDEC : TO-92
3. Base IEC : PA33

ABSOLUTE MAXIMUM RATINGS (Ta = 25°C)

Parameter	Symbol	Ratings		Unit
		2SD1616	2SD1616A	
Collector to base voltage	V_{CBO}	60	120	V
Collector to emitter voltage	V_{CEO}	50	60	V
Emitter to base voltage	V_{EBO}	6.0		V
Collector current (DC)	$I_{C(DC)}$	1.0		A
Collector current (pulse)	$I_{C(Pulse)}$*	2.0		A
Total power dissipation	P_T	0.75		W
Junction temperature	T_j	150		°C
Storage temperature	T_{stg}	−55 to +150		°C

* PW ≤ 10 ms, duty cycle ≤ 50%

ELECTRICAL CHARACTERISTICS (Ta = 25°C)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Collector cutoff current	I_{CBO}	V_{CB} = 60 V, I_E = 0			100	nA
Emitter cutoff current	I_{EBO}	V_{EB} = 6.0 V, I_C = 0			100	nA
DC current gain	h_{FE1}**	V_{CE} = 2.0 V, I_C = 100 mA	135		600/400	−
DC current gain	h_{FE2}**	V_{CE} = 2.0 V, I_C = 1.0 A	81			−
DC base voltage	V_{BE}**	V_{CE} = 2.0 V, I_C = 50 mA	600	640	700	mV
Collector saturation voltage	$V_{CE(sat)}$**	I_C = 1.0 A, I_B = 50 mA		0.15	0.3	V
Base saturation voltage	$V_{BE(sat)}$**	I_C = 1.0 A, I_B = 50 mA		0.9	1.2	V
Output capacitance	C_{ob}	V_{CB} = 10 V, I_E = 0, f = 1.0 MHz		19		pF
Gain bandwidth product	f_T	V_{CE} = 2.0 V, I_C = 100 mA	100	160		MHz
Turn-on time	t_{on}	V_{CC} = 10 V, I_C = 100 mA I_{B1} = −I_{B2} = 10 mA $V_{BE(off)}$ = −2 to −3 V		0.07		μs
Storage time	t_{stg}			0.95		μs
Fall time	t_f			0.07		μs

** Pulse test PW ≤ 350 μs, duty cycle ≤ 2% per pulsed

h_{FE1}/h_{FE} CLASSIFICATION L : 135 to 270 K : 200 to 400 U : 300 to 600 (U rank is not available for the 2SD1616A.)

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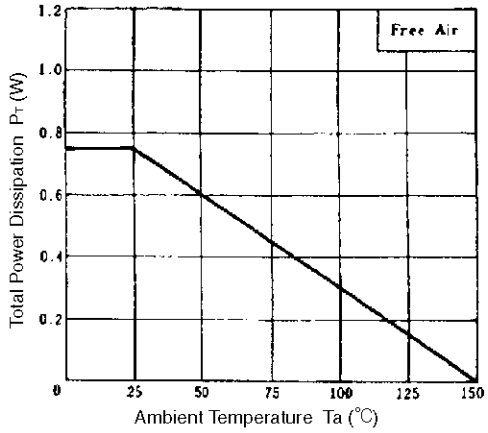
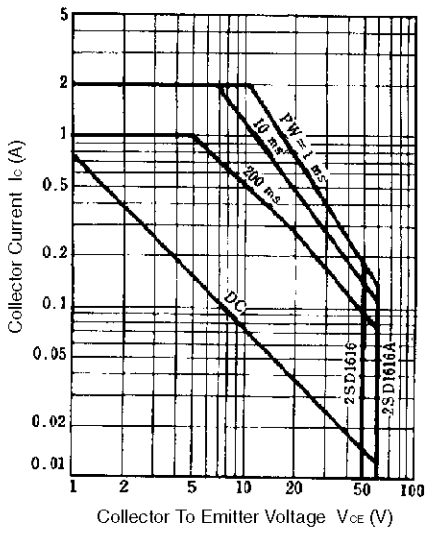
TYPICAL CHARACTERISTICS (Ta = 25°C)

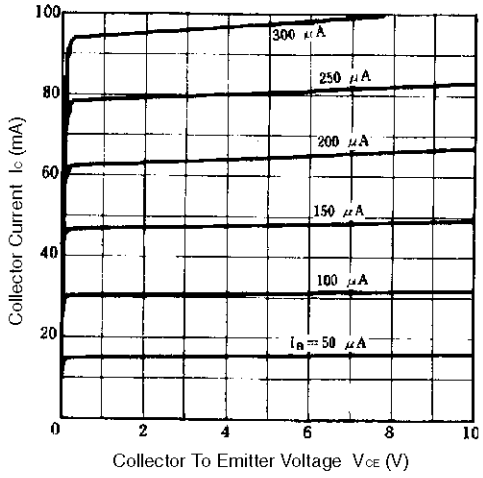
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



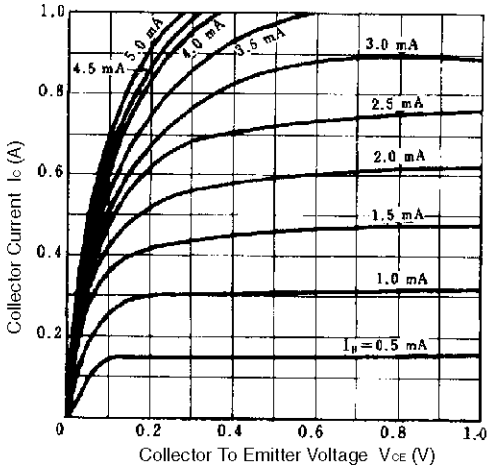
SAFE OPERATING AREAS (TRANSIENT THERMAL RESISTANCE METHOD)



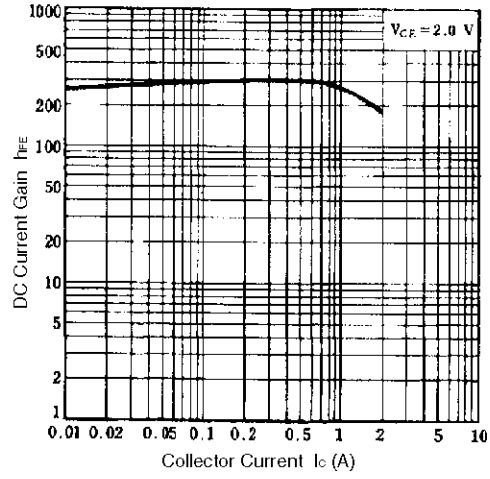
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



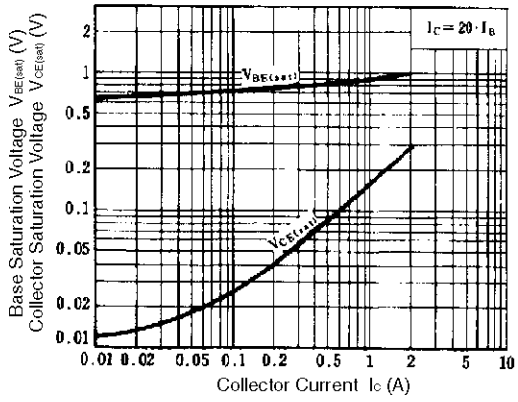
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



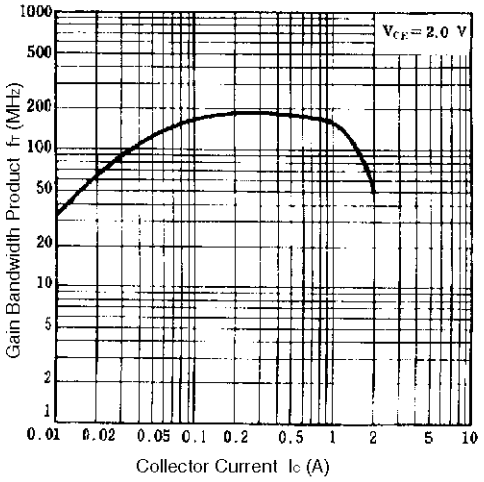
DC CURRENT GAIN vs. COLLECTOR CURRENT



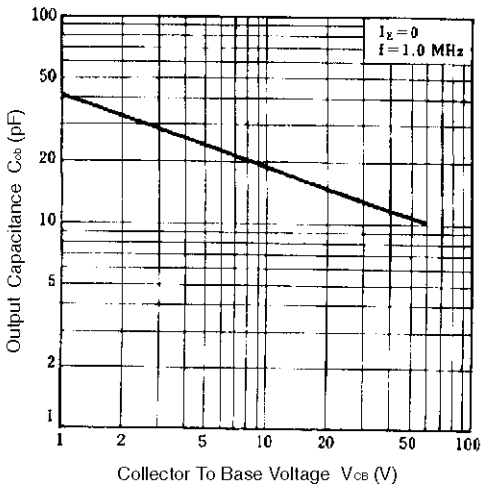
COLLECTOR AND BASE SATURATION VOLTAGE vs. COLLECTOR CURRENT



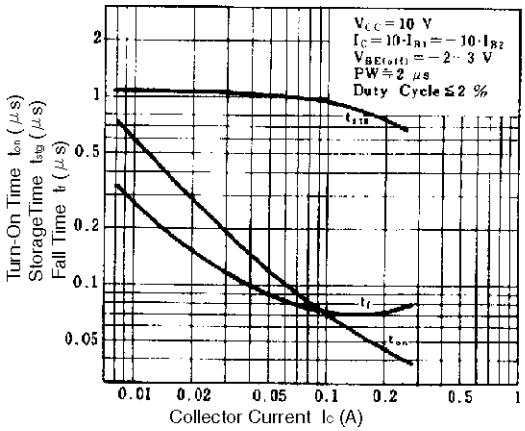
GAIN BANDWIDTH PRODUCT vs.
EMITTER CURRENT



OUTPUT CAPACITANCE vs.
COLLECTOR TO BASE VOLTAGE



SWITCHING TIME vs.
COLLECTOR CURRENT



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