

# NEC

## NPN SILICON TRANSISTORS 2SD1616, 2SD1616A

**DESCRIPTION** The 2SD1616/2SD1616A are designed for use in driver and output stages of AF amplifier, general purpose application.

**FEATURES**

- Low Collector Saturation Voltage.  
 $V_{CE(sat)} = 0.15 \text{ V TYP. (@ } I_C = 1.0 \text{ A, } I_B = 50 \text{ mA)}$
- High Break Down Voltage.  
 $V_{CEO} = 50 \text{ V/60 V (2SD1616/2SD1616A)}$
- High Total Power Dissipation.  $P_T = 0.75 \text{ W (} T_a = 25^\circ \text{C)}$
- Complementary to the NEC 2SB1116/2SB1116A PNP Transistor.

**ABSOLUTE MAXIMUM RATINGS**

Maximum Temperatures

Storage Temperature . . . . .  $-55 \text{ to } +150^\circ \text{C}$

Junction Temperature . . . . .  $150^\circ \text{C Maximum}$

Maximum Power Dissipation ( $T_a = 25^\circ \text{C}$ )

Total Power Dissipation . . . . .  $0.75 \text{ W}$

Maximum Voltages and Currents ( $T_a = 25^\circ \text{C}$ )

2SD1616/2SD1616A

$V_{CBO}$  Collector to Base Voltage . . . . .  $60 \text{ V/120 V}$

$V_{CEO}$  Collector to Emitter Voltage . . . . .  $50 \text{ V/60 V}$

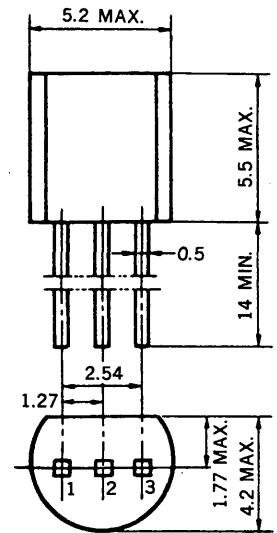
$V_{EBO}$  Emitter to Base Voltage . . . . .  $6.0 \text{ V}$

$I_C$  Collector Current (DC) . . . . .  $1.0 \text{ A}$

$I_C$  Collector Current (pulse)\* . . . . .  $2.0 \text{ A}$

\*PW  $\leq 10 \text{ ms}$ , Duty Cycle  $\leq 50 \%$

**PACKAGE DIMENSIONS**  
in millimeters



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

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

2SD1616/2SD1616A

SYMBOL	CHARACTERISTIC	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
$h_{FE1}^{**}$	DC Current Gain	135		600	—	$V_{CE} = 2.0 \text{ V, } I_C = 100 \text{ mA}$
$h_{FE2}^{**}$	DC Current Gain	81			—	$V_{CE} = 2.0 \text{ V, } I_C = 1.0 \text{ A}$
$f_T$	Gain Bandwidth Product	100	160		MHz	$V_{CE} = 2.0 \text{ V, } I_C = 100 \text{ mA}$
$C_{ob}$	Output Capacitance		19		pF	$V_{CB} = 10 \text{ V, } I_E = 0, f = 1.0 \text{ MHz}$
$I_{CBO}$	Collector Cutoff Current			100	nA	$V_{CB} = 60 \text{ V/120 V, } I_E = 0$
$I_{EBO}$	Emitter Cutoff Current			100	nA	$V_{EB} = 6.0 \text{ V, } I_C = 0$
$V_{BE}^{**}$	Base to Emitter Voltage	600		700	mV	$V_{CE} = 2.0 \text{ V, } I_C = 50 \text{ mA}$
$V_{CE(sat)}^{**}$	Collector Saturation Voltage		0.15	0.3	V	$I_C = 1.0 \text{ A, } I_B = 50 \text{ mA}$
$V_{BE(sat)}^{**}$	Base Saturation Voltage		0.9	1.2	V	$I_C = 1.0 \text{ A, } I_B = 50 \text{ mA}$
$t_{on}$	Turn-On Time		0.07		$\mu\text{s}$	$V_{CC} = 10 \text{ V, } I_C = 100 \text{ mA}$ $I_{B1} = -I_{B2} = 10 \text{ mA}$ $V_{BE(off)} = -2 \text{ to } 3 \text{ V}$
$t_{stg}$	Storage Time		0.95		$\mu\text{s}$	
$t_f$	Fall Time		0.07		$\mu\text{s}$	

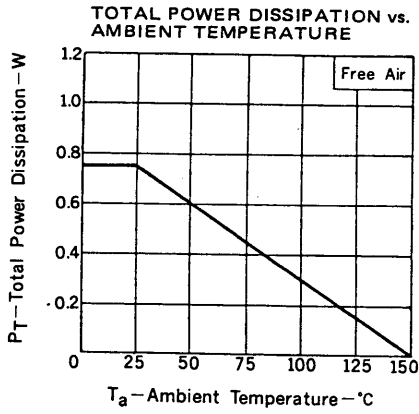
\*\*Pulsed PW  $\leq 350 \mu\text{s}$ , Duty Cycle  $\leq 2 \%$

Classification of  $h_{FE1}$

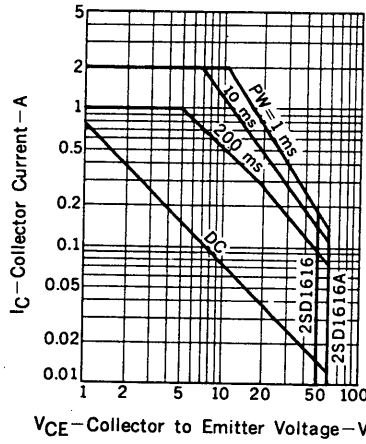
Rank	L	K	U
Range	135 to 270	200 to 400	300 to 600

Test Conditions:  $V_{CE} = 2.0 \text{ V, } I_C = 100 \text{ mA}$

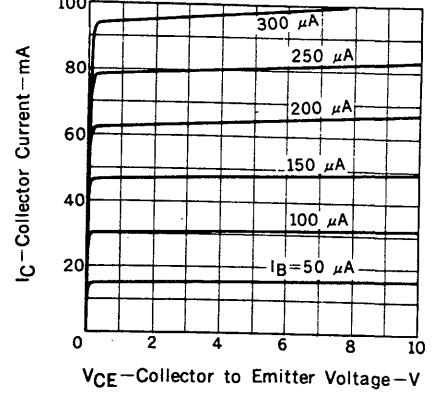
TYPICAL CHARACTERISTICS ( $T_a = 25^\circ\text{C}$ )



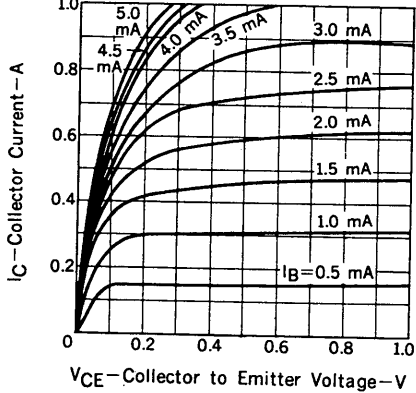
SAFE OPERATING AREAS (TRANSIENT THERMAL RESISTANCE METHOD)



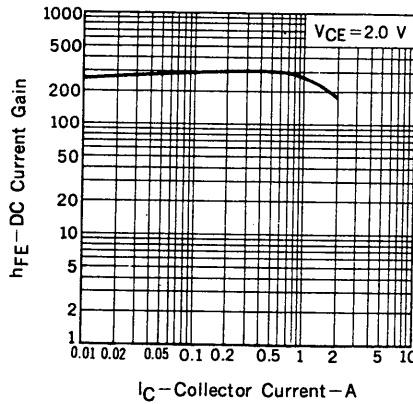
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



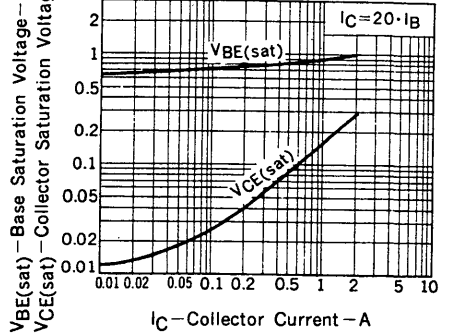
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



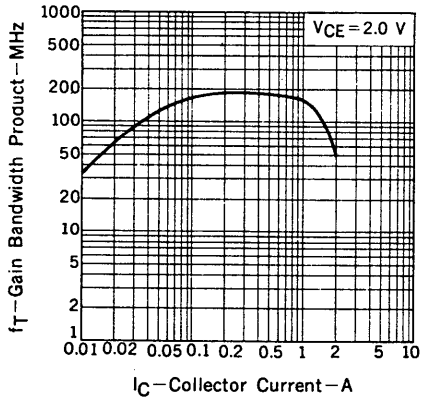
DC CURRENT GAIN vs. COLLECTOR CURRENT



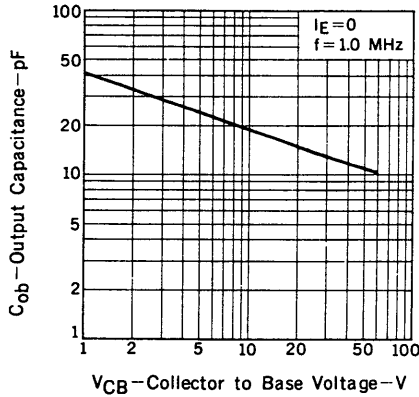
COLLECTOR AND BASE SATURATION VOLTAGE vs. COLLECTOR CURRENT



GAIN BANDWIDTH PRODUCT vs. EMITTER CURRENT



OUTPUT CAPACITANCE vs. COLLECTOR TO BASE VOLTAGE



SWITCHING TIME vs. COLLECTOR CURRENT

