

# NPN SILICON TRANSISTOR

## 2SC1399

**2**

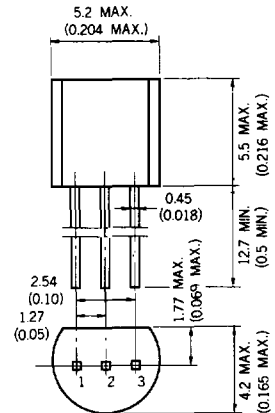
**DESCRIPTION** The 2SC1399 is designed for use in driver stage of AF amplifier, and low speed switching.

- FEATURES**
- High Voltage  
 $V_{CE0}$  : 80 V
  - High  $h_{FE}$  and Excellent  $h_{FE}$  Linearity  
 $h_{FE}$  ( $I_C = 0.5$  mA,  $V_{CE} = 3$  V) : 600 TYP.  
 $h_{FE1}$  (0.1 mA)/ $h_{FE2}$  (1.0 mA) ( $V_{CE} = 3$  V) : 0.92 TYP.

**ABSOLUTE MAXIMUM RATINGS**

- Maximum Temperatures
- Storage Temperature . . . . . -55 to +125 °C
  - Junction Temperature . . . . . +125 °C Maximum
- Maximum Power Dissipation ( $T_a = 25$  °C)
- Total Power Dissipation . . . . . 250 mW
- Maximum Voltages and Currents ( $T_a = 25$  °C)
- $V_{CBO}$  Collector to Base Voltage . . . . . 100 V
  - $V_{CEO}$  Collector to Emitter Voltage . . . . . 80 V
  - $V_{EBO}$  Emitter to Base Voltage . . . . . 5.0 V
  - $I_C$  Collector Current . . . . . 50 mA
  - $I_B$  Base Current . . . . . 10 mA

**PACKAGE DIMENSIONS**  
in millimeters (inches)



- 1. EMITTER EIAJ : SC-43
- 2. COLLECTOR JEDEC : TO-92
- 3. BASE IEC : PA33

**ELECTRICAL CHARACTERISTICS ( $T_a = 25$  °C)**

SYMBOL	CHARACTERISTIC	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
$h_{FE1}$	DC Current Gain	170	560	—	—	$V_{CE} = 3.0$ V, $I_C = 0.1$ mA
$h_{FE2}$	DC Current Gain	225	600	1000	—	$V_{CE} = 3.0$ V, $I_C = 0.5$ mA
NF	Noise Figure	—	—	20	dB	$V_{CE} = 6.0$ V, $I_C = 0.3$ mA, $R_G = 2.0$ k $\Omega$ , $f = 100$ Hz
$f_T$	Gain Bandwidth Product	50	100	—	MHz	$V_{CE} = 6.0$ V, $I_E = -1.0$ mA
$C_{ob}$	Collector to Base Capacitance	—	2.7	5.0	pF	$V_{CB} = 6.0$ V, $I_E = 0$ , $f = 1.0$ MHz
$I_{CBO}$	Collector Cutoff Current	—	—	50	nA	$V_{CB} = 100$ V, $I_E = 0$
$I_{CEO}$	Collector Cutoff Current	—	—	1.0	$\mu$ A	$V_{CE} = 60$ V, $I_B = 0$
$I_{EBO}$	Emitter Cutoff Current	—	—	50	nA	$V_{EB} = 5.0$ V, $I_C = 0$
$V_{CE(sat)}$	Collector Saturation Voltage	—	0.09	0.3	V	$I_C = 50$ mA, $I_B = 5.0$ mA
$V_{BE(sat)}$	Base Saturation Voltage	—	0.81	1.0	V	$I_C = 50$ mA, $I_B = 5.0$ mA

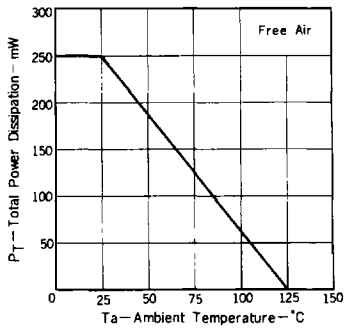
**Classification of  $h_{FE2}$**

Rank	F	E	U
Range	225 - 450	350 - 700	500 - 1000

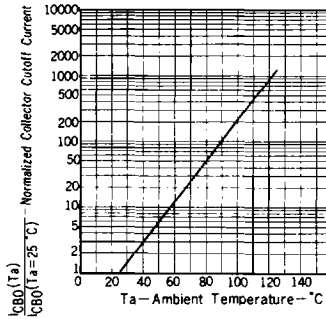
$h_{FE}$  Test Conditions :  $V_{CE} = 3.0$  V,  $I_C = 0.5$  mA

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

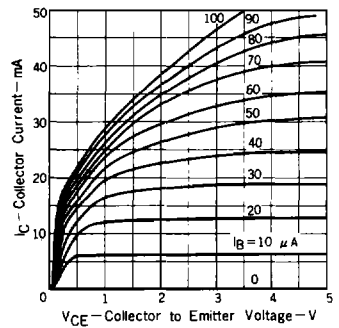
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



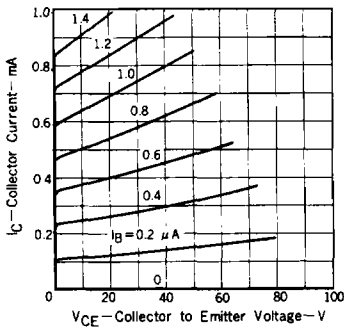
NORMALIZED COLLECTOR CUTOFF CURRENT vs. AMBIENT TEMPERATURE



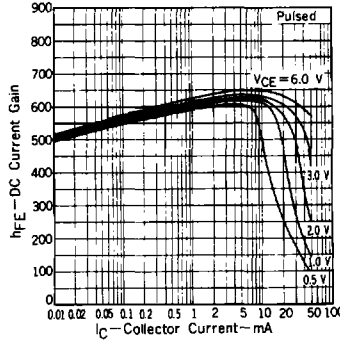
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



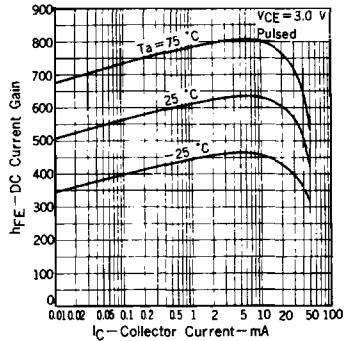
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



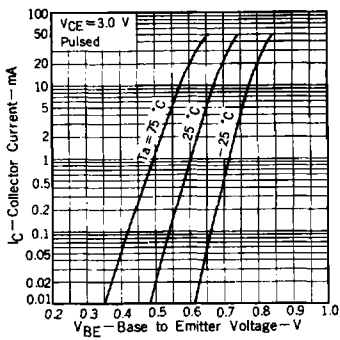
DC CURRENT GAIN vs. COLLECTOR CURRENT



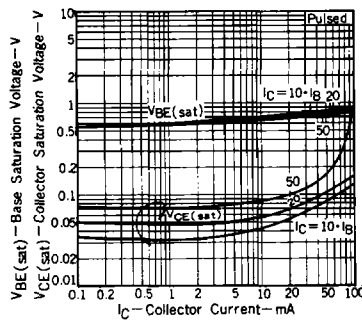
DC CURRENT GAIN vs. COLLECTOR CURRENT



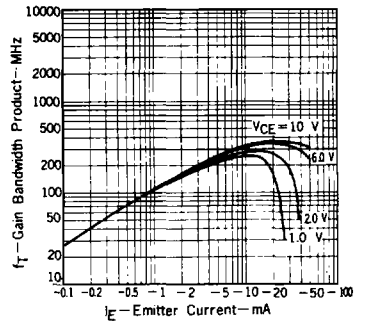
COLLECTOR CURRENT vs. BASE TO EMITTER VOLTAGE



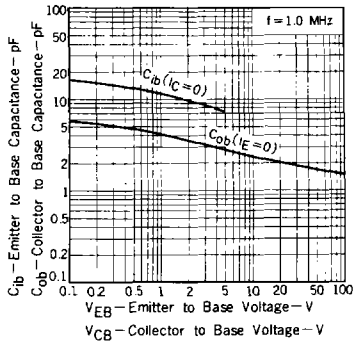
COLLECTOR AND BASE SATURATION VOLTAGE vs. COLLECTOR CURRENT



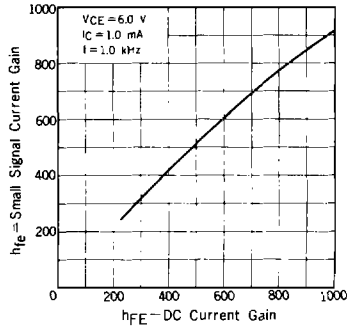
GAIN BANDWIDTH PRODUCT vs. EMITTER CURRENT



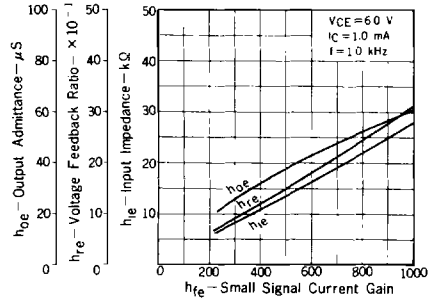
COLLECTOR TO BASE AND  
EMITTER TO BASE CAPACITANCE  
vs. REVERSE VOLTAGE



SMALL SIGNAL CURRENT GAIN  
vs. DC CURRENT GAIN

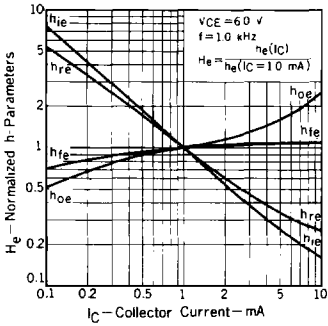


INPUT IMPEDANCE, VOLTAGE  
FEEDBACK RATIO AND OUTPUT  
ADMITTANCE vs. SMALL SIGNAL  
CURRENT GAIN



2

NORMALIZED h-PARAMETERS  
vs. COLLECTOR CURRENT



NORMALIZED h-PARAMETERS  
vs. COLLECTOR TO EMITTER  
VOLTAGE

