

Amplifier and switch

ELECTRICAL CHARACTERISTICS

($T_A = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Characteristic and test conditions	Min.	Typ.	Max.	Unit
hFE	DC Current Gain (5)				
	$I_C = 100 \mu\text{A}$ $V_{CE} = 1\text{V}$	20	50		
	$I_C = 5 \text{ mA}$ $V_{CE} = 1\text{V}$	50	85	120	
	$I_C = 150 \text{ mA}$ $V_{CE} = 1\text{V}$	40	80	120	
	$I_C = 500 \text{ mA}$ $V_{CE} = 10\text{V}$	25	55		
VBEsat	Base Saturation Voltage (5)				
	$I_C = 10 \text{ mA}$ $I_B = 1 \text{ mA}$	0.68	0.8		V
	$I_C = 150 \text{ mA}$ $I_B = 15 \text{ mA}$	0.85	1		V
VCEsat	Collector Saturation Voltage (5)				
	$I_C = 10 \text{ mA}$ $I_B = 1 \text{ mA}$	0.05			V
	$I_C = 150 \text{ mA}$ $I_B = 15 \text{ mA}$	0.13	0.25		V
	$I_C = 1 \text{ A}$ $I_B = 0.1 \text{ A}$	0.65	1		V
	Collector Reverse Current				
ICES	$V_{CE} = 50\text{V}$ $V_{EB} = 0$	0.2	20	nA	
	$V_{CE} = 50\text{V}$ $V_{EB} = 0$ (150°C)	0.2	20	μA	
IEBO	Emitter Reverse Current				
	$V_{EB} = 5\text{V}$ $I_C = 0$	0.1	20	nA	
BVCEs	Collector to Emitter Breakdown Voltage				
BVCEO	$I_C = 100 \mu\text{A}$ $V_{EB} = 0$	85			V
	Emitter to Base Breakdown Voltage				
LVCEO	$I_E = 100 \mu\text{A}$ $I_C = 0$	7			V
	Collector to Emitter Sustaining Voltage (4 and 5)				
hfe	$I_C = 30 \text{ mA}$ $I_B = 0$	55			V
	Small Signal Current Gain				
hie	$I_C = 1 \text{ mA}$ $V_{CE} = 5\text{V}$ $f = 1 \text{ kHz}$	80			
	Input Resistance				
hoe	$I_C = 1 \text{ mA}$ $V_{CE} = 5\text{V}$ $f = 1 \text{ kHz}$	2			k Ω
	Output Conductance				
hre	$I_C = 1 \text{ mA}$ $V_{CE} = 5\text{V}$ $f = 1 \text{ kHz}$	8			μmho
	Voltage Feedback Ratio				
hjb	$I_C = 1 \text{ mA}$ $V_{CB} = 5\text{V}$ $f = 1 \text{ kHz}$	2.1			$\times 10^{-4}$
	Input Resistance				
hob	$I_C = 1 \text{ mA}$ $V_{CB} = 5\text{V}$ $f = 1 \text{ kHz}$	27			Ω
	Output Conductance				
hfb	$I_C = 1 \text{ mA}$ $V_{CB} = 5\text{V}$ $f = 1 \text{ kHz}$	0.12			μmho
	Voltage Feedback Ratio				
hfe	$I_C = 1 \text{ mA}$ $V_{CB} = 5\text{V}$ $f = 1 \text{ kHz}$	0.5			$\times 10^{-4}$
	High Freq. Current Gain				
CTE	$I_C = 50 \text{ mA}$ $V_{CE} = 10\text{V}$ $f = 20 \text{ MHz}$	3	4.5		
	Emitter Transition Capacitance				
Cobo	$I_C = 0$ $V_{EB} = 0.5\text{V}$	50	80		pF
	Base-Collector Capacitance				
ton	$I_E = 0$ $V_{CB} = 10\text{V}$	14	25		pF
	Turn On Time (6)				
toff	$I_C = 150 \text{ mA}$ $I_B = 7.5 \text{ mA}$	150	225		ns
	Turn Off Time (6)				
	$I_C = 150 \text{ mA}$ $I_{B1} = 7.5 \text{ mA}$ $I_{B2} = 7.5 \text{ mA}$	350	800		ns

NOTES:

- These ratings are limiting values above which the serviceability of any individual semiconductor device may be impaired.
- These are steady state limits. The factory should be consulted on applications involving pulsed or low duty cycle operations.
- These ratings give a maximum junction temperature of 200°C and junction-to-case thermal resistance of 35°C/W (derating factor of $28.6 \text{ mW}/^\circ\text{C}$); junction-to-ambient thermal resistance of 219°C/W (derating factor of $4.57 \text{ mW}/^\circ\text{C}$).
- These ratings refer to a high-current point where collector-to-emitter voltage is lowest. For more information send for SGS-AR 5.
- Measured under pulse conditions: pulse length = 300 μsec ; duty cycle = 1%.
- See switching circuit for exact values of I_C , I_{B1} and I_{B2} .

The BFY 56A is an NPN silicon planar epitaxial transistor designed primarily for amplifier and switching applications over a wide range of voltage and current. This device features a useful beta range from 100 μA to 500 mA and low saturation voltage permitting switching operation at 1 ampere. High collector-to-emitter voltage allows operation to 55 volts.

ABSOLUTE MAXIMUM RATINGS (1)

($T_A = 25^\circ\text{C}$ unless otherwise noted)

Voltagess

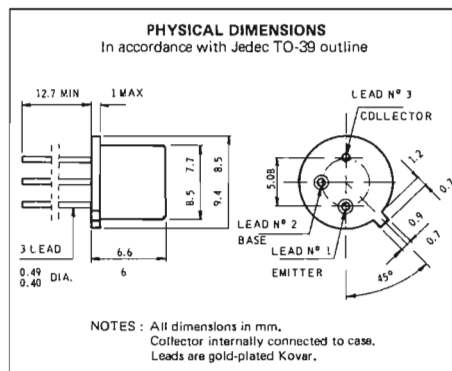
Collector to Emitter (4)	V_{CEO}	55 V
Collector to Emitter	V_{CES}	85 V
Emitter to Base	V_{EBO}	7 V

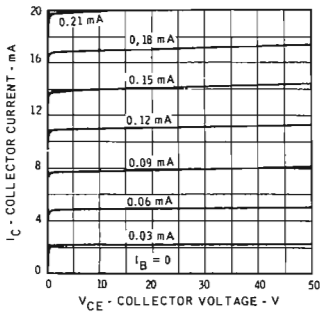
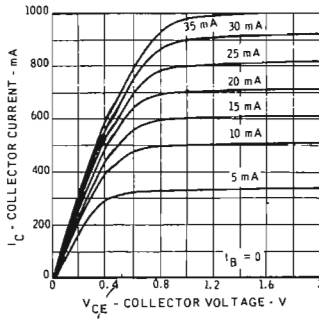
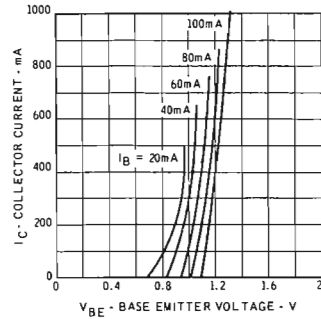
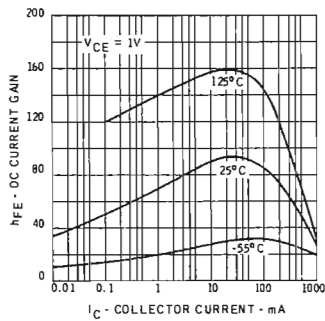
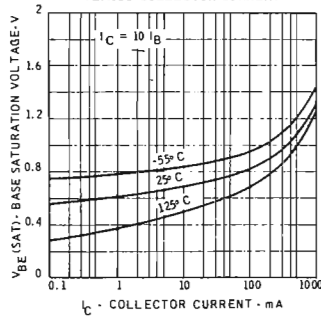
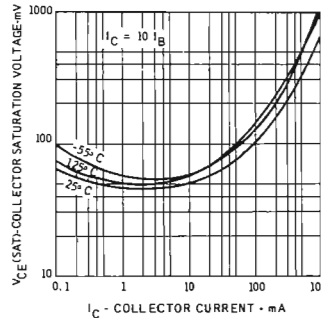
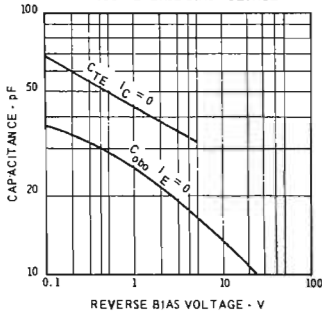
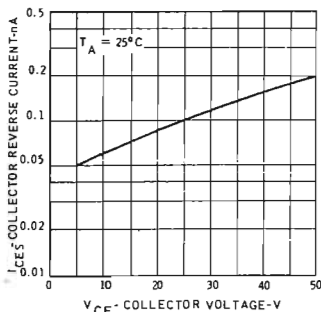
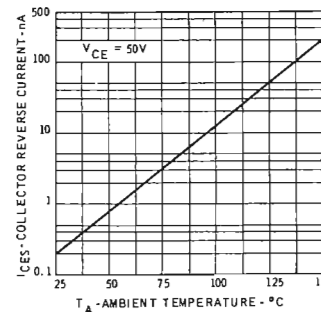
Temperatures

Storage Temperature	T_{STG}	-55°C to 200°C
Operating Junction Temperature	T_J	200°C
Lead Temperature (Soldering, 10 sec. time limit).	T_L	260°C

Power (2-3)

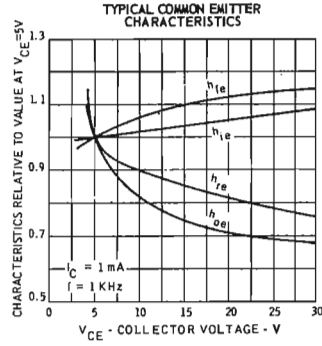
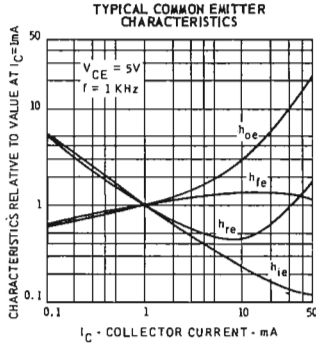
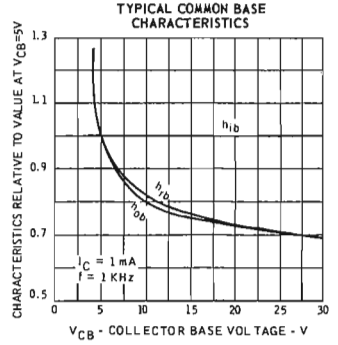
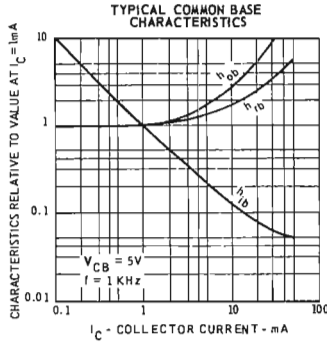
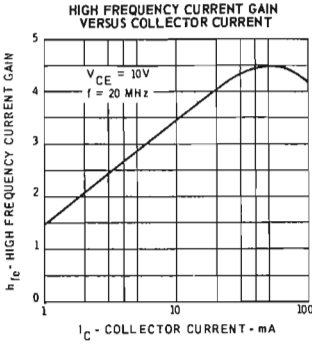
Dissipation at 25°C Case Temperature	P_D	5 W
Dissipation at 25°C Ambient Temperature	P_D	0.8 W



TYPICAL ELECTRICAL CHARACTERISTICS (25°C free air temperature unless otherwise noted)**COLLECTOR CHARACTERISTICS*****COLLECTOR CHARACTERISTICS*****BASE CHARACTERISTICS*****DC PULSE CURRENT GAIN
VERSUS COLLECTOR CURRENT****BASE SATURATION VOLTAGE
VERSUS COLLECTOR CURRENT****COLLECTOR SATURATION VOLTAGE
VERSUS COLLECTOR CURRENT****INPUT AND OUTPUT CAPACITANCES
VERSUS REVERSE BIAS VOLTAGE****COLLECTOR REVERSE CURRENT
VERSUS REVERSE BIAS VOLTAGE****COLLECTOR REVERSE CURRENT
VERSUS AMBIENT TEMPERATURE**

* Single family characteristics on Transistor Curve Tracer.

TYPICAL ELECTRICAL CHARACTERISTICS (25°C free air temperature unless otherwise noted)



SWITCHING CIRCUIT

