

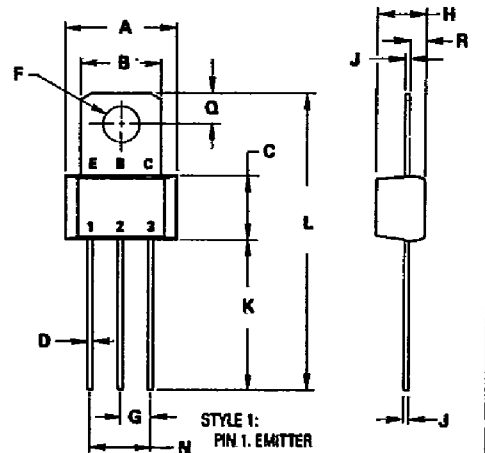
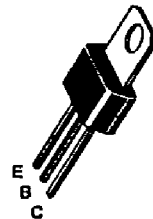
**NOT RECOMMENDED
 FOR NEW DESIGNS**

**NPN SILICON ANNULAR
 AMPLIFIER TRANSISTOR**

... designed for general-purpose, high-voltage amplifier and driver applications.

- High Collector-Emitter Breakdown Voltage –
 $V_{(BR)CEO} = 100 \text{ Vdc (Min) @ } I_C = 1.0 \text{ mAdc}$
- High Power Dissipation – $P_D = 10 \text{ W @ } T_C = 25^\circ\text{C}$
- Complement to PNP MPS-U57

**NPN SILICON
 AMPLIFIER TRANSISTOR**



STYLE 1:
 PIN 1. EMITTER
 2. BASE
 3. COLLECTOR
 (COLLECTOR CONNECTED TO TAB)

NOTE:
 1. LEADS WITHIN 0.15 mm(0.006) TOTAL OF TRUE POSITION AT CASE, AT MAXIMUM MATERIAL CONDITION.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	9.14	9.53	0.360	0.375
B	6.60	7.24	0.260	0.285
C	5.41	5.66	0.213	0.223
D	0.38	0.53	0.015	0.021
F	3.18	3.33	0.125	0.131
G	2.54 BSC		0.100 BSC	
H	3.94	4.19	0.155	0.165
J	0.36	0.41	0.014	0.016
K	11.63	12.70	0.458	0.500
L	24.58	25.53	0.968	1.005
N	5.08 BSC		0.200 BSC	
Q	2.39	2.69	0.094	0.106
R	1.14	1.40	0.045	0.055

CASE 152-02

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	100	Vdc
Collector-Base Voltage	V_{CB}	100	Vdc
Emitter-Base Voltage	V_{EB}	4.0	Vdc
Collector Current – Continuous	I_C	2.0	A dc
Total Power Dissipation @ $T_A = 25^\circ\text{C}$ Derate above 25°C	P_D	1.0 8.0	Watt mW/ $^\circ\text{C}$
Total Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C	P_D	10 80	Watts mW/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	T_J, T_{stg}	-55 to +150	$^\circ\text{C}$

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	12.5	$^\circ\text{C/W}$
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	125	$^\circ\text{C/W}$

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

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector-Emitter Breakdown Voltage (1) ($I_C = 1.0\text{ mAdc}$, $I_B = 0$)	$V_{(BR)CEO}$	100	—	—	Vdc
Emitter-Base Breakdown Voltage ($I_E = 100\ \mu\text{Adc}$, $I_C = 0$)	$V_{(BR)EBO}$	4.0	—	—	Vdc
Collector Cutoff Current ($V_{CB} = 80\text{ Vdc}$, $I_E = 0$)	I_{CBO}	—	—	100	nAdc
ON CHARACTERISTICS					
DC Current Gain (1) ($I_C = 50\text{ mAdc}$, $V_{CE} = 1.0\text{ Vdc}$) ($I_C = 250\text{ mAdc}$, $V_{CE} = 1.0\text{ Vdc}$) ($I_C = 500\text{ mAdc}$, $V_{CE} = 1.0\text{ Vdc}$)	h_{FE}	60 30 —	110 65 33	— — —	—
Collector-Emitter Saturation Voltage (1) ($I_C = 250\text{ mAdc}$, $I_B = 10\text{ mAdc}$) ($I_C = 250\text{ mAdc}$, $I_B = 25\text{ mAdc}$)	$V_{CE(sat)}$	— —	0.18 0.1	0.4 —	Vdc
Base-Emitter On Voltage (1) ($I_C = 250\text{ mAdc}$, $V_{CE} = 5.0\text{ Vdc}$)	$V_{BE(on)}$	—	0.76	1.2	Vdc
SMALL-SIGNAL CHARACTERISTICS					
Current-Gain-Bandwidth Product (1) ($I_C = 250\text{ mAdc}$, $V_{CE} = 5.0\text{ Vdc}$, $f = 100\text{ MHz}$)	f_T	50	150	—	MHz
Output Capacitance ($V_{CB} = 10\text{ Vdc}$, $I_E = 0$, $f = 100\text{ kHz}$)	C_{ob}	—	6.0	12	pF

(1) Pulse Test: Pulse Width $\leq 300\ \mu\text{s}$, Duty Cycle $\leq 2.0\%$.

FIGURE 1 – DC CURRENT GAIN

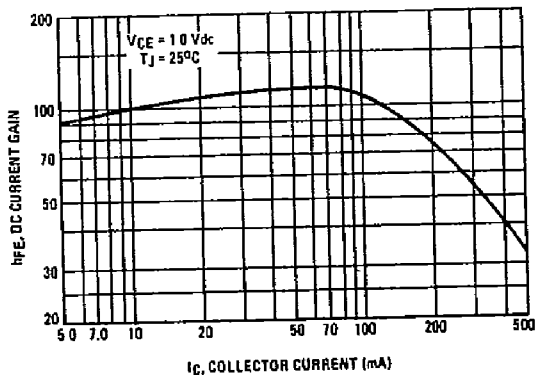


FIGURE 2 – "ON" VOLTAGES

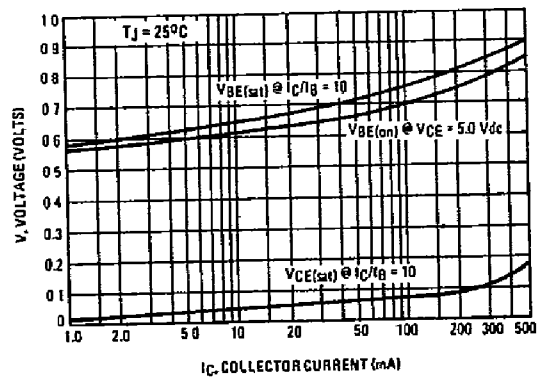


FIGURE 3 – DC SAFE OPERATING AREA

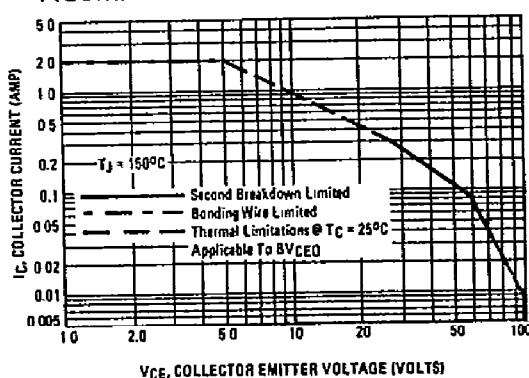
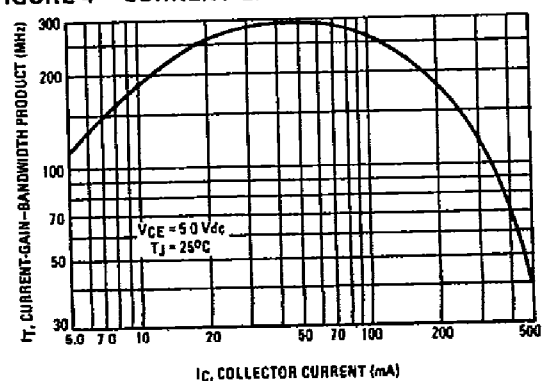


FIGURE 4 – CURRENT-GAIN-BANDWIDTH PRODUCT



There are two limitations on the power handling ability of a transistor: junction temperature and second breakdown. Safe operating area curves indicate $I_C - V_{CE}$ limits of the transistor that must be observed for reliable operation; i.e., the transistor must not be subjected to greater dissipation than the curves indicate.

The data of Figure 3 is based on $T_{J(pk)} = 150^\circ\text{C}$; T_C is variable depending on conditions. At high case temperatures, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by second breakdown.