

**MOTOROLA SEMICONDUCTOR TECHNICAL DATA**

T-33-07  
**MPS-U07**

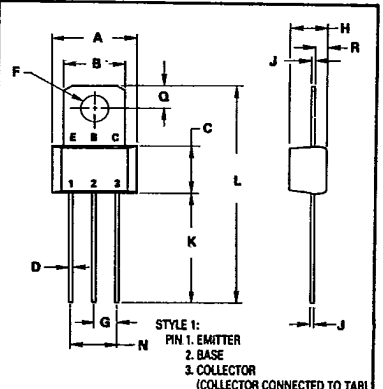
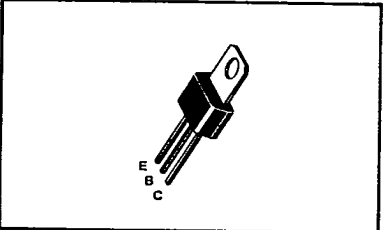
**NOT RECOMMENDED FOR NEW DESIGNS**

**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**



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	6.50	7.24	0.260	0.286
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 $25^\circ\text{C}$	$P_D$	1.0 8.0	Watt mW/ $^\circ\text{C}$
Total Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	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**

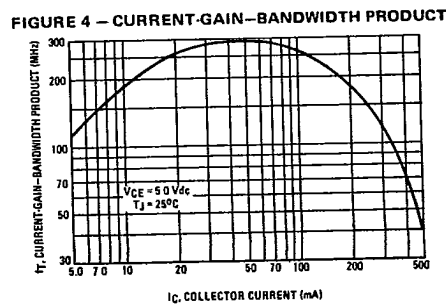
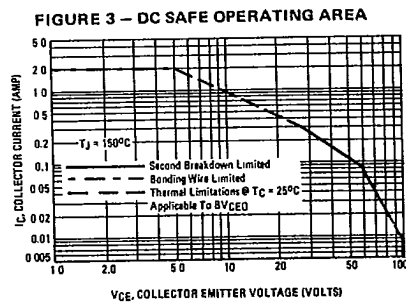
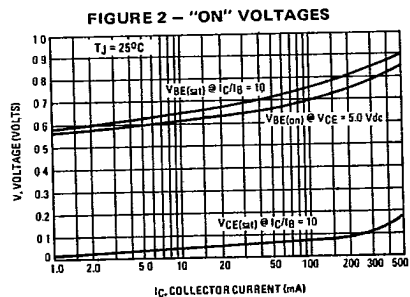
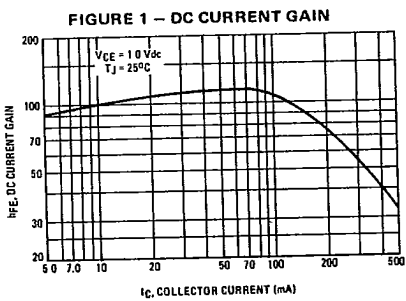
Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	12.5	$^\circ\text{C/W}$
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	125	$^\circ\text{C/W}$

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

Characteristic	Symbol	Min	Typ	Max	Unit
<b>OFF CHARACTERISTICS</b>					
Collector-Emitter Breakdown Voltage (1) ( $I_C = 1.0 \text{ mA}, I_B = 0$ )	$V_{(BR)CEO}$	100	—	—	Vdc
Emitter-Base Breakdown Voltage ( $I_E = 100 \mu\text{A}, I_C = 0$ )	$V_{(BR)EBO}$	4.0	—	—	Vdc
Collector Cutoff Current ( $V_{CB} = 80 \text{ Vdc}, I_E = 0$ )	$I_{CBO}$	—	—	100	nAdc
<b>ON CHARACTERISTICS</b>					
DC Current Gain (1) ( $I_C = 50 \text{ mA}, V_{CE} = 1.0 \text{ Vdc}$ ) ( $I_C = 250 \text{ mA}, V_{CE} = 1.0 \text{ Vdc}$ ) ( $I_C = 500 \text{ mA}, V_{CE} = 1.0 \text{ Vdc}$ )	$h_{FE}$	60 30 —	110 65 33	— — —	—
Collector-Emitter Saturation Voltage (1) ( $I_C = 250 \text{ mA}, I_B = 10 \text{ mA}$ ) ( $I_C = 250 \text{ mA}, I_B = 25 \text{ mA}$ )	$V_{CE(sat)}$	— —	0.18 0.1	0.4 —	Vdc
Base-Emitter On Voltage (1) ( $I_C = 250 \text{ mA}, V_{CE} = 5.0 \text{ Vdc}$ )	$V_{BE(on)}$	—	0.76	1.2	Vdc
<b>SMALL-SIGNAL CHARACTERISTICS</b>					
Current-Gain-Bandwidth Product (1) ( $I_C = 250 \text{ mA}, V_{CE} = 5.0 \text{ Vdc}, f = 100 \text{ MHz}$ )	$f_T$	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  $\leq 2.0\%$ .



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.

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