

MOTOROLA SEMICONDUCTOR
TECHNICAL DATA

T-33-17
MPS-U57

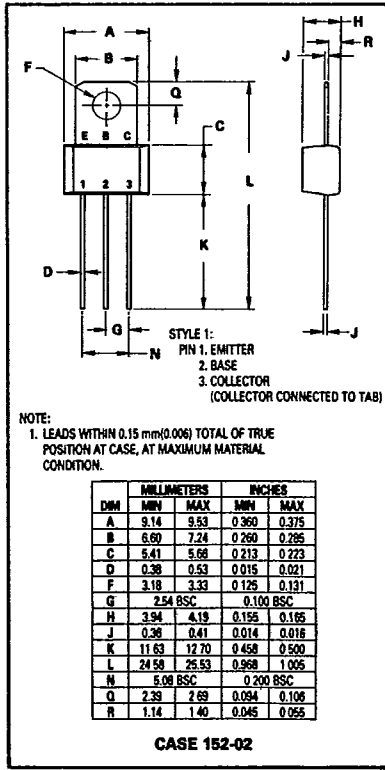
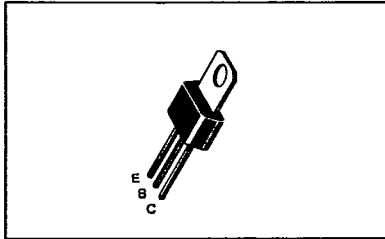
NOT RECOMMENDED FOR NEW DESIGNS

PNP 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 NPN MPS-U07

AMPLIFIER TRANSISTOR
PNP SILICON



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 | Adc |
| 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 | $^\circ\text{C/W}$ |

T-33-17

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 ($I_C = 100 \mu\text{Adc}, I_E = 0$) | $V_{(BR)EBO}$ | 4.0 | — | — | Vdc |
| Collector Cutoff Current ($V_{CB} = 40 \text{ Vdc}, I_E = 0$) | I_{CBO} | — | — | 100 | nAdc |

ON CHARACTERISTICS (1)

| | | | | | |
|--|---------------|---------------|-----------------|-------------|-----|
| DC Current Gain ($I_C = 50 \text{ mAdc}, V_{CE} = 1.0 \text{ Vdc}$) ($I_C = 250 \text{ mAdc}, V_{CE} = 1.0 \text{ Vdc}$) ($I_C = 500 \text{ mAdc}, V_{CE} = 1.0 \text{ Vdc}$) | h_{FE} | 60 30 — | 140 65 30 | — — — | — |
| Collector-Emitter Saturation Voltage ($I_C = 250 \text{ mAdc}, I_B = 10 \text{ mAdc}$) ($I_C = 250 \text{ mAdc}, I_B = 25 \text{ mAdc}$) | $V_{CE(sat)}$ | — — | 0.24 0.15 | 0.5 — | Vdc |
| Base-Emitter On Voltage ($I_C = 250 \text{ mAdc}, V_{CE} = 5.0 \text{ Vdc}$) | $V_{BE(on)}$ | — | 0.78 | 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 | 100 | — | MHz |
| Output Capacitance ($V_{CB} = 10 \text{ Vdc}, I_E = 0, f = 100 \text{ kHz}$) | C_{ob} | — | 10 | 15 | pF |

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

FIGURE 1 - DC CURRENT GAIN

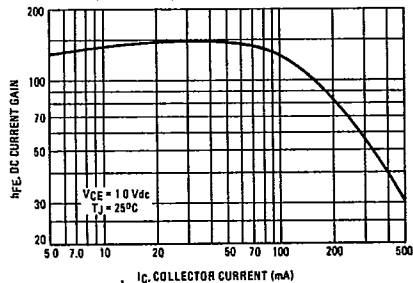


FIGURE 2 - "ON" VOLTAGES

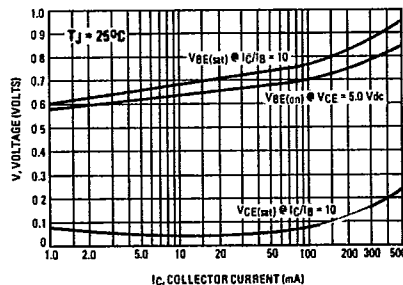


FIGURE 3 - DC SAFE OPERATING AREA

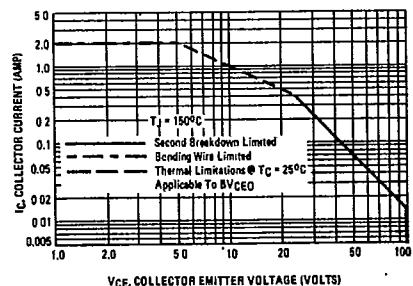
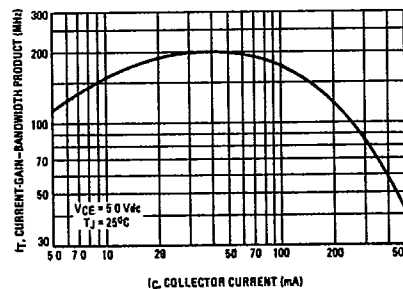


FIGURE 4 - CURRENT-GAIN-BANDWIDTH PRODUCT



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.

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