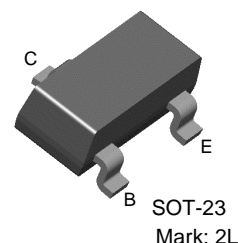


## MMBT5401

### PNP General Purpose Amplifier

- This device is designed as a general purpose amplifier and switch for applications requiring high voltage.



### PNP Epitaxial Silicon Transistor

#### Absolute Maximum Ratings\* $T_a=25^\circ\text{C}$ unless otherwise noted

| Symbol         | Parameter  | Value     | Units            |
|----------------|--|-----------|------------------|
| $V_{CEO}$      | Collector-Emitter Voltage                        | -150      | V                |
| $V_{CBO}$      | Collector-Base Voltage                           | -160      | V                |
| $V_{EBO}$      | Emitter-Base Voltage                             | -5.0      | V                |
| $I_C$          | Collector Current - Continuous                   | -600      | mA               |
| $T_J, T_{STG}$ | Operating and Storage Junction Temperature Range | -55 ~ 150 | $^\circ\text{C}$ |

\* These ratings are limiting values above which the serviceability of any semiconductor device may be impaired.

#### Notes:

- These ratings are based on a maximum junction temperature of 150 degrees C.
- These are steady state limits. The factory should be consulted on applications involving pulsed or low duty cycle operations.

#### Electrical Characteristics $T_a=25^\circ\text{C}$ unless otherwise noted

| Symbol                              | Parameter                             | Test Condition   | Min.           | Max.         | Units               |
|-------------------------------------|---------------------------------------|--|----------------|--------------|---------------------|
| <b>Off Characteristics</b>          |                                       |  |                |              |                     |
| $BV_{CEO}$                          | Collector-Emitter Breakdown Voltage * | $I_C = -1.0\text{mA}, I_B = 0$   | -150           |              | V                   |
| $BV_{CBO}$                          | Collector-Base Breakdown Voltage      | $I_C = -100\mu\text{A}, I_E = 0$   | -160           |              | V                   |
| $BV_{EBO}$                          | Emitter-Base Breakdown Voltage        | $I_E = -10\mu\text{A}, I_C = 0$  | -5.0           |              | V                   |
| $I_{CBO}$                           | Collector Cutoff Current              | $V_{CB} = -120\text{V}, I_E = 0$<br>$V_{CB} = -120\text{V}, I_E = 0, T_a = 100^\circ\text{C}$  |                | -50          | nA<br>$\mu\text{A}$ |
| $I_{EBO}$                           | Emitter Cutoff Current                | $V_{EB} = -3.0\text{V}, I_C = 0$   |                | -50          | nA                  |
| <b>On Characteristics *</b>         |                                       |  |                |              |                     |
| $h_{FE}$                            | DC Current Gain                       | $I_C = -1.0\text{mA}, V_{CE} = -5.0\text{V}$<br>$I_C = -10\text{mA}, V_{CE} = -5.0\text{V}$<br>$I_C = -50\text{mA}, V_{CE} = -5.0\text{V}$ | 50<br>60<br>50 | 240          |                     |
| $V_{CE}(\text{sat})$                | Collector-Emitter Saturation Voltage  | $I_C = -10\text{mA}, I_B = -1.0\text{mA}$<br>$I_C = -50\text{mA}, I_B = -5.0\text{mA}$   |                | -0.2<br>-0.5 | V<br>V              |
| $V_{BE}(\text{sat})$                | Base-Emitter Saturation Voltage       | $I_C = -10\text{mA}, I_B = -1.0\text{mA}$<br>$I_C = -50\text{mA}, I_B = -5.0\text{mA}$   |                | -1.0<br>-1.0 | V<br>V              |
| <b>Small Signal Characteristics</b> |                                       |  |                |              |                     |
| $f_T$                               | Current Gain Bandwidth Product        | $I_C = -10\text{mA}, V_{CE} = -10\text{V},$<br>$f = 100\text{MHz}$   | 100            | 300          | MHz                 |
| $C_{ob}$                            | Output Capacitance                    | $V_{CB} = -10\text{V}, I_E = 0, f = 1\text{MHz}$   |                | 6.0          | pF                  |
| $N_F$                               | Noise Figure                          | $I_C = -250\mu\text{A}, V_{CE} = -5.0\text{V}, R_S = 1.0\text{K}\Omega$<br>$f = 10\text{Hz to } 15.7\text{KHz}$                            |                | 8.0          | dB                  |

\* Pulse Test: Pulse Width  $\leq 300\mu\text{s}$ , Duty Cycle  $\leq 2.0\%$

**Thermal Characteristics**  $T_a=25^\circ\text{C}$  unless otherwise noted

| Symbol          | Parameter                               | Max. | Units                     |
|-----------------|---|------|---------------------------|
| $P_D$           | Total Device Dissipation                | 350  | mW                        |
|                 | Derate above $25^\circ\text{C}$         | 2.8  | mW/ $^\circ\text{C}$      |
| $R_{\theta JA}$ | Thermal Resistance, Junction to Ambient | 357  | $^\circ\text{C}/\text{W}$ |

# Typical Characteristics

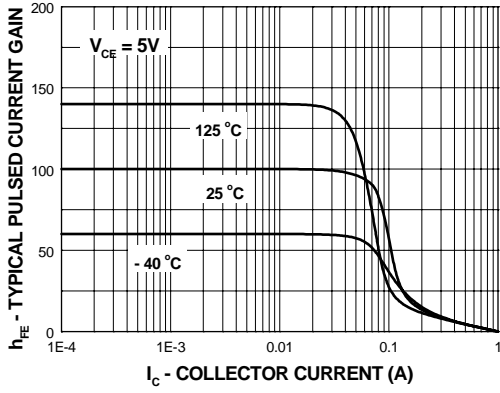


Figure 1. Typical Pulsed Current Gain vs Collector Current

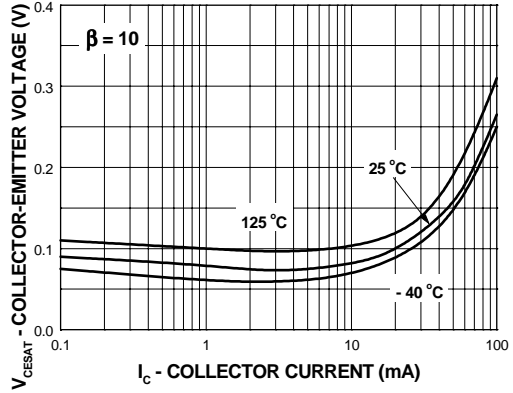


Figure 2. Collector-Emitter Saturation Voltage vs Collector Current

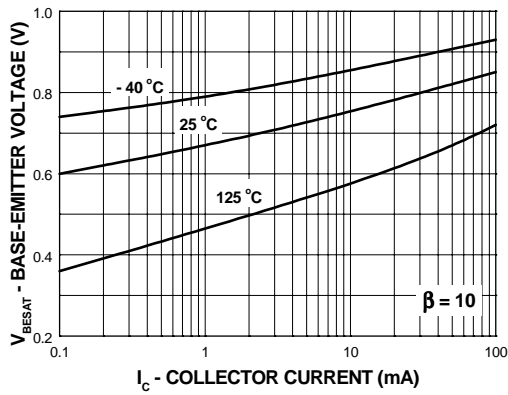


Figure 3. Base-Emitter Saturation Voltage vs Collector Current

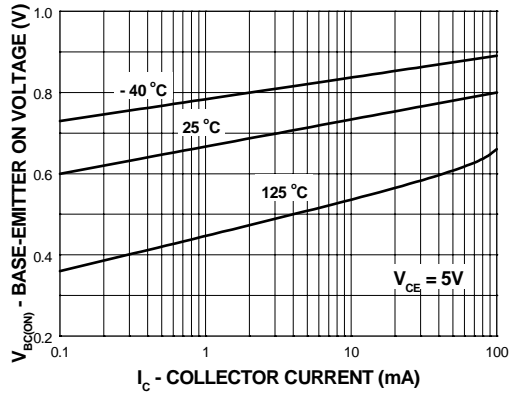


Figure 4. Base-Emitter On Voltage vs Collector Current

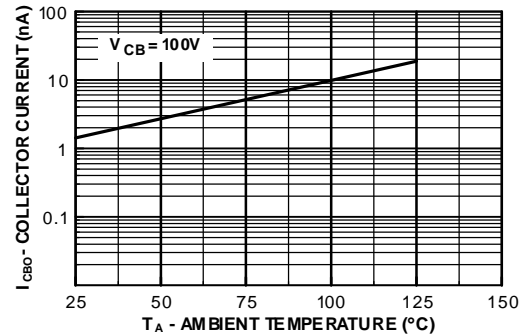


Figure 5. Collector-Cutoff Current vs Ambient Temperature

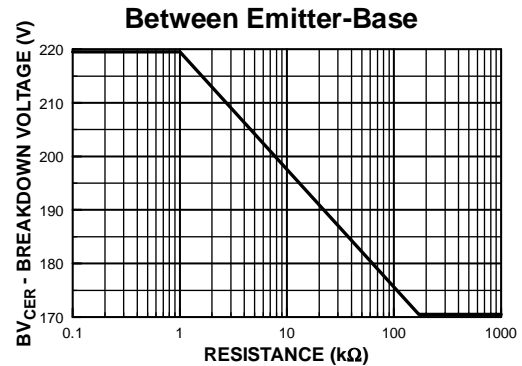


Figure 6. Collector-Emitter Breakdown Voltage with Resistance Between Emitter-Base

Typical Characteristics (Continued)

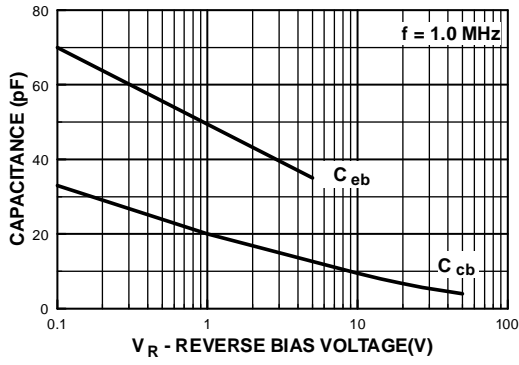


Figure 7. Input and Output Capacitance vs Reverse Voltage

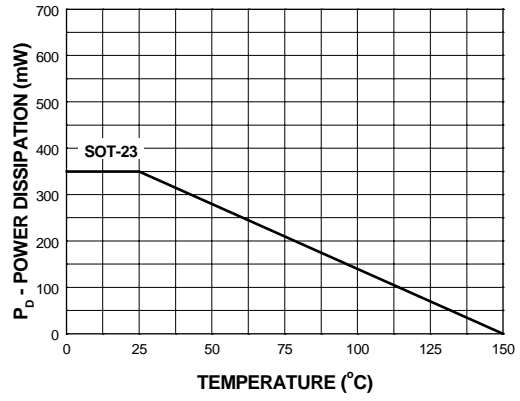
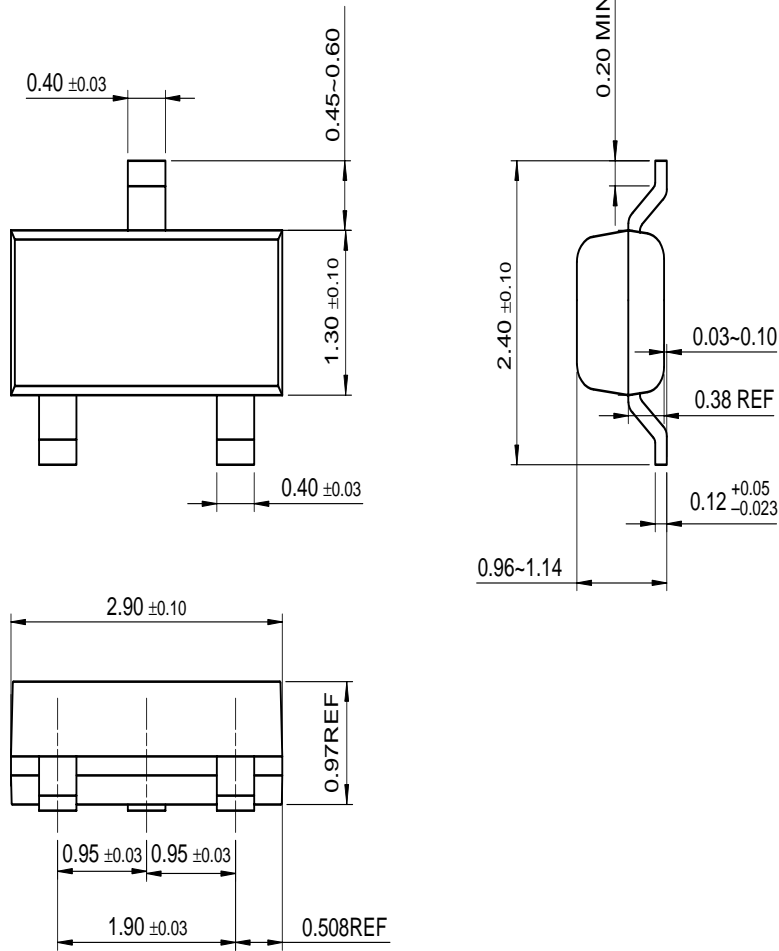


Figure 8. Power Dissipation vs Ambient Temperature

# Package Dimensions

## SOT-23



Dimensions in Millimeters

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| ActiveArray <sup>™</sup>                         | FAST <sub>r</sub> <sup>™</sup>  | LittleFET <sup>™</sup>    | PowerSaver <sup>™</sup>         | SuperSOT <sup>™</sup> -3    |
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