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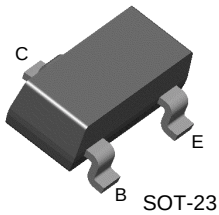
# MMBT5401

## PNP General Purpose Amplifier

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




SOT-23
Mark: 2L

## PNP Epitaxial Silicon Transistor

### Absolute Maximum Ratings* $T_a$=25°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 | °C |

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

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

### Electrical Characteristics $T_a$=25°C unless otherwise noted

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

* Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2.0%

## Thermal Characteristics $T_a$=25°C unless otherwise noted

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

# Typical Characteristics

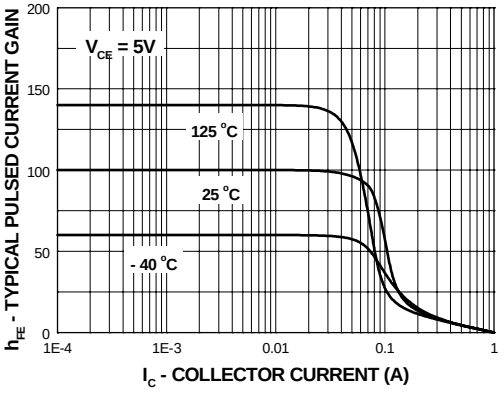



**Figure 1. Typical Pulsed Current Gain vs Collector Current**

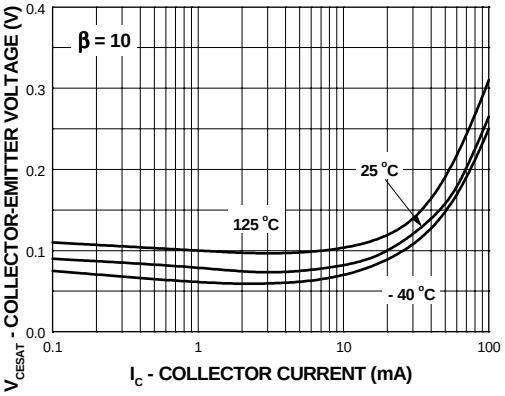



**Figure 2. Collector-Emitter Saturation Voltage vs Collector Current**

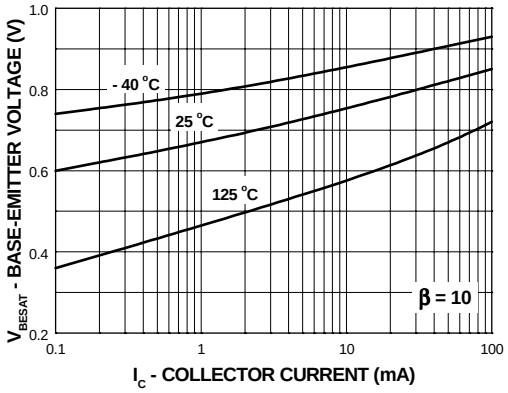



**Figure 3. Base-Emitter Saturation Voltage vs Collector Current**

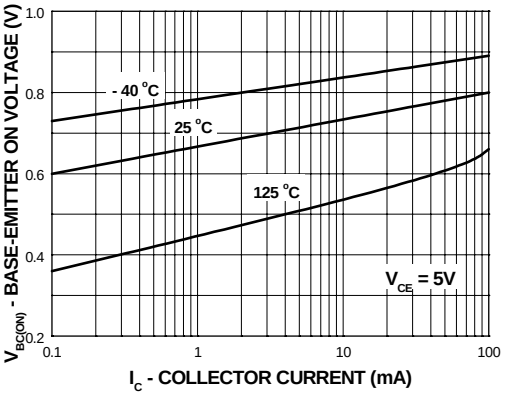



**Figure 4. Base-Emitter On Voltage vs Collector Current**

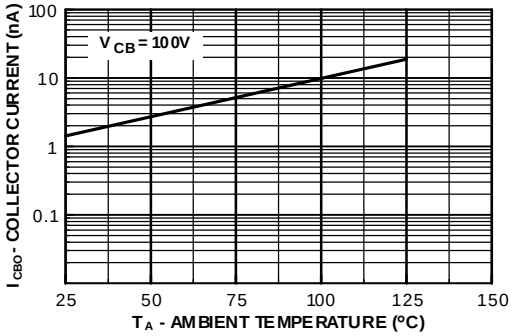



**Figure 5. Collector-Cutoff Current vs Ambient Temperature**

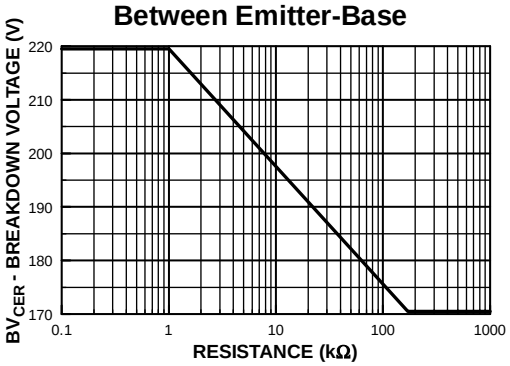



**Figure 6. Collector-Emitter Breakdown Voltage with Resistance Between Emitter-Base**

## Typical Characteristics (Continued)

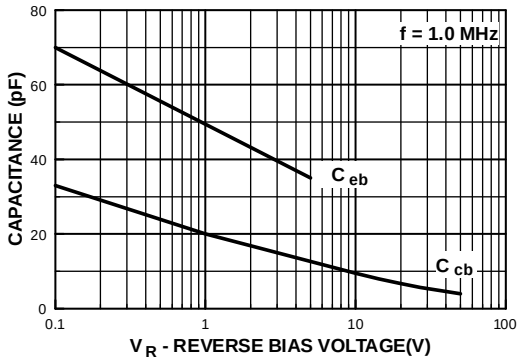



**Figure 7. Input and Output Capacitance vs Reverse Voltage**

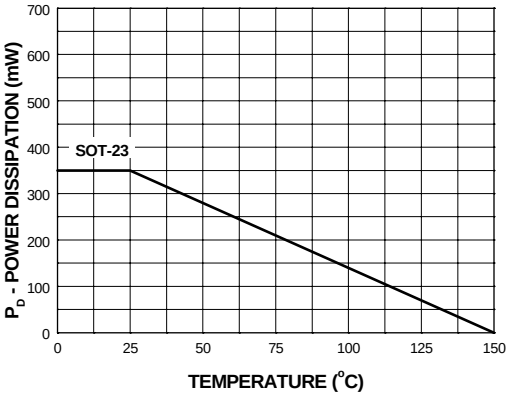
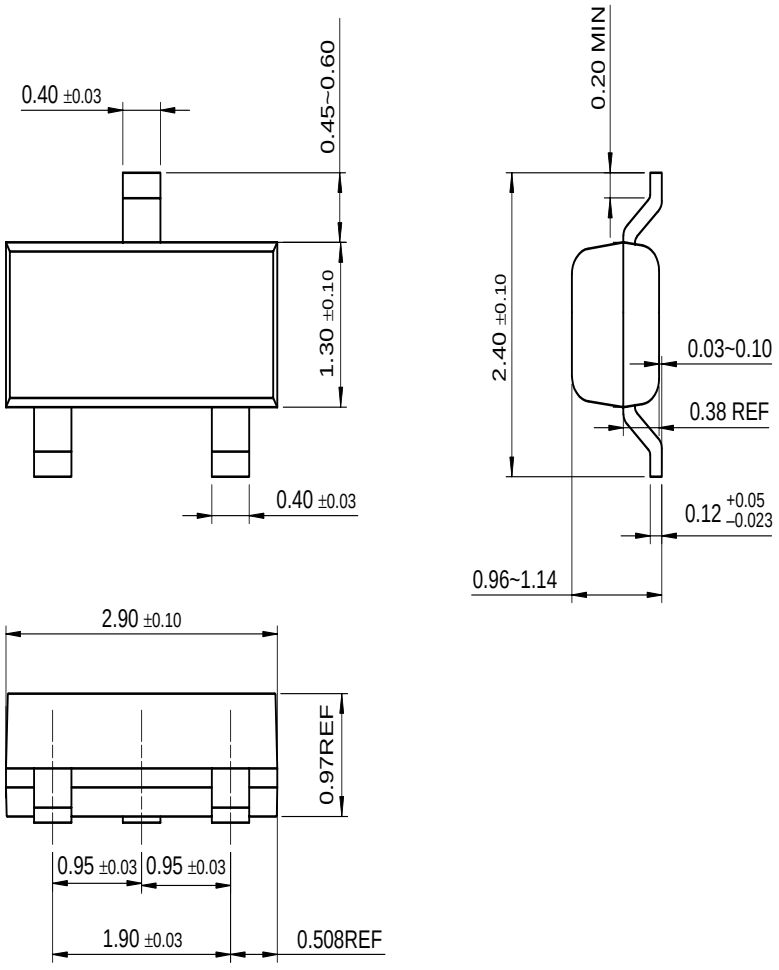



**Figure 8. Power Dissipation vs Ambient Temperature**

## Package Dimensions

SOT-23




Dimensions in Millimeters

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