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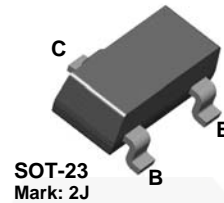


March 2014

MMBT3640 PNP Switching Amplifier

Description

This device is designed for very high-speed saturated switching at collector currents to 100 mA. Sourced from process 65.



Ordering Information

| Part Number | Marking | Package | Packing Method |
|-------------|---------|-----------|----------------|
| MMBT3640 | 2J | SOT-23 3L | Tape and Reel |

Absolute Maximum Ratings^{(1),(2)}

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only. Values are at $T_A = 25^\circ\text{C}$ unless otherwise noted.

| Symbol | Parameter | Value | Unit |
|----------------|--|-------------|------------------|
| V_{CEO} | Collector-Emitter Voltage | -12 | V |
| V_{CBO} | Collector-Base Voltage | -12 | V |
| V_{EBO} | Emitter-Base Voltage | -4 | V |
| I_C | Collector Current - Continuous | -200 | mA |
| T_J, T_{STG} | Junction and Storage Temperature Range | -55 to +150 | $^\circ\text{C}$ |

Notes:

1. These ratings are based on a maximum junction temperature of 150°C .
2. These are steady-state limits. Fairchild Semiconductor should be consulted on applications involving pulsed or low-duty-cycle operations.

Thermal Characteristics⁽³⁾

Values are at $T_A = 25^\circ\text{C}$ unless otherwise noted.

| Symbol | Parameter | Max. | Unit |
|-----------------|---|------|---------------------------|
| P_D | Total Device Dissipation | 225 | mW |
| | Derate Above $T_A = 25^\circ\text{C}$ | 1.8 | mW/ $^\circ\text{C}$ |
| $R_{\theta JA}$ | Thermal Resistance, Junction to Ambient | 556 | $^\circ\text{C}/\text{W}$ |

Note:

3. Device mounted on FR-4 PCB 1.6 inch X 1.6 inch X 0.06 inch.

Electrical Characteristics

Values are at $T_A = 25^\circ\text{C}$ unless otherwise noted.

| Symbol | Parameter | Conditions | Min. | Max. | Unit |
|---------------|---|--|------------------------------------|-------|---------------|
| $V_{(BR)CEO}$ | Collector-Emitter Breakdown Voltage ⁽⁴⁾ | $I_C = -10\text{ mA}, I_B = 0$ | -12 | | V |
| $V_{(BR)CES}$ | Collector-Emitter Breakdown Voltage | $I_C = -100\ \mu\text{A}, V_{BE} = 0$ | -12 | | V |
| $V_{(BR)CBO}$ | Collector-Base Breakdown Voltage | $I_C = -100\ \mu\text{A}, I_E = 0$ | -12 | | V |
| $V_{(BR)EBO}$ | Emitter-Base Breakdown Voltage | $I_E = -100\ \mu\text{A}, I_C = 0$ | -4.0 | | V |
| I_{CES} | Collector Cut-Off Current | $V_{CE} = -6.0\text{ V}, V_{BE} = 0$ | | -0.01 | μA |
| | | $V_{CE} = -6.0\text{ V}, V_{BE} = 0,$ $T_A = 65^\circ\text{C}$ | | -1.00 | |
| I_B | Base Current | $V_{CE} = -6.0\text{ V}, V_{BE} = 0$ | | -10 | nA |
| h_{FE} | DC Current Gain ⁽⁴⁾ | $I_C = -10\text{ mA}, V_{CE} = -0.3\text{ V}$ | 30 | 120 | |
| | | $I_C = -50\text{ mA}, V_{CE} = -1.0\text{ V}$ | 20 | | |
| $V_{CE(sat)}$ | Collector-Emitter Saturation Voltage ⁽⁴⁾ | $I_C = -10\text{ mA}, I_B = -0.5\text{ mA}$ | | -0.30 | V |
| | | $I_C = -10\text{ mA}, I_B = -1.0\text{ mA}$ | | -0.20 | |
| | | $I_C = -50\text{ mA}, I_B = -5.0\text{ mA}$ | | -0.60 | |
| | | $I_C = -10\text{ mA}, I_B = -1.0\text{ mA},$ $T_A = 65^\circ\text{C}$ | | -0.25 | |
| $V_{BE(sat)}$ | Base-Emitter Saturation Voltage ⁽⁴⁾ | $I_C = -10\text{ mA}, I_B = -0.5\text{ mA}$ | -0.75 | -0.95 | V |
| | | $I_C = -10\text{ mA}, I_B = -1.0\text{ mA}$ | -0.80 | -1.00 | |
| | | $I_C = -50\text{ mA}, I_B = -5.0\text{ mA}$ | | -1.50 | |
| f_T | Current Gain - Bandwidth Product | $I_C = -10\text{ mA}, V_{CE} = -5.0\text{ V},$ $f = 100\text{ MHz}$ | 500 | | MHz |
| C_{ob} | Output Capacitance | $V_{CB} = -5.0\text{ V}, I_E = 0,$ $f = 1.0\text{ MHz}$ | | 3.5 | pF |
| C_{ib} | Input Capacitance | $V_{EB} = -0.5\text{ V}, I_C = 0,$ $f = 1.0\text{ MHz}$ | | 3.5 | pF |
| t_d | Delay Time | $V_{CC} = -6\text{ V}, V_{BE(off)} = -1.9\text{ V},$ $I_C = -50\text{ mA}, I_{B1} = -5.0\text{ mA}$ | | 10 | ns |
| t_r | Rise Time | | | 30 | ns |
| t_s | Storage Time | | | 20 | ns |
| t_f | Fall Time | | $I_{B1} = I_{B2} = -5.0\text{ mA}$ | | 12 |
| t_{on} | Turn-On Time | $V_{CC} = -6\text{ V}, V_{BE(off)} = -1.9\text{ V},$ $I_C = -50\text{ mA}, I_{B1} = -5.0\text{ mA}$ | | 25 | ns |
| | | $V_{CC} = -1.5\text{ V}, I_C = -10\text{ mA},$ $I_{B1} = I_{B2} = -0.5\text{ mA}$ | | 60 | |
| t_{off} | Turn-Off Time | $V_{CC} = -6\text{ V}, V_{BE(off)} = -1.9\text{ V},$ $I_C = -50\text{ mA}, I_{B1} = -5.0\text{ mA}$ | | 35 | ns |
| | | $V_{CC} = -1.5\text{ V}, I_C = -10\text{ mA},$ $I_{B1} = I_{B2} = -0.5\text{ mA}$ | | 75 | |

Note:

4. Pulse test: pulse width $\leq 300\ \mu\text{s}$, duty cycle $\leq 2.0\%$.

Physical Dimensions

SOT-23

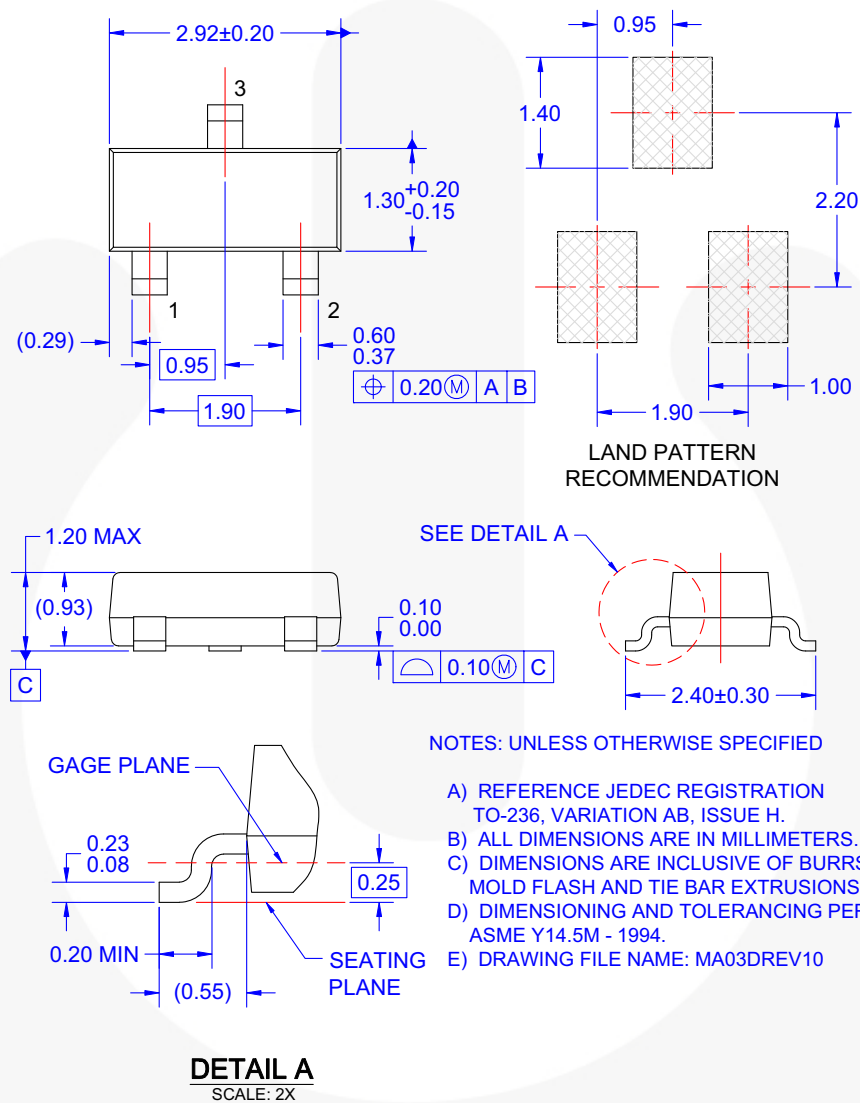


Figure1. 3-LEAD, SOT23, JEDEC TO-236, LOW PROFILE (ACTIVE)

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