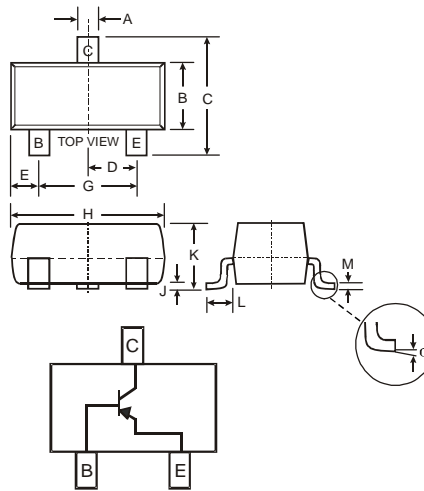


Features

- Epitaxial Planar Die Construction
- Complementary NPN Type Available (MMBT4401)
- Ideal for Medium Power Amplification and Switching
- **Lead, Halogen and Antimony Free, RoHS Compliant "Green" Device (Notes 2 and 3)**

Mechanical Data

- Case: SOT-23
- Case Material: Molded Plastic. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020D
- Terminals: Solderable per MIL-STD-202, Method 208
- Lead Free Plating (Matte Tin Finish annealed over Alloy 42 leadframe)
- Terminal Connections: See Diagram
- Marking Information: See Page 4
- Ordering Information: See Page 4
- Weight: 0.008 grams (approximate)



| SOT-23 | | |
|----------------------|-------|-------|
| Dim | Min | Max |
| A | 0.37 | 0.51 |
| B | 1.20 | 1.40 |
| C | 2.30 | 2.50 |
| D | 0.89 | 1.03 |
| E | 0.45 | 0.60 |
| G | 1.78 | 2.05 |
| H | 2.80 | 3.00 |
| J | 0.013 | 0.10 |
| K | 0.903 | 1.10 |
| L | 0.45 | 0.61 |
| M | 0.085 | 0.180 |
| α | 0° | 8° |
| All Dimensions in mm | | |

Maximum Ratings @ $T_A = 25^\circ\text{C}$ unless otherwise specified

| Characteristic | Symbol | Value | Unit |
|--|-----------------|-------------|---------------------------|
| Collector-Base Voltage | V_{CB0} | -40 | V |
| Collector-Emitter Voltage | V_{CE0} | -40 | V |
| Emitter-Base Voltage | V_{EB0} | -5.0 | V |
| Collector Current - Continuous (Note 1) | I_C | -600 | mA |
| Power Dissipation (Note 1) | P_D | 300 | mW |
| Thermal Resistance, Junction to Ambient (Note 1) | $R_{\theta JA}$ | 417 | $^\circ\text{C}/\text{W}$ |
| Operating and Storage Temperature Range | T_J, T_{STG} | -55 to +150 | $^\circ\text{C}$ |

- Notes:
1. Device mounted on FR-4 PCB, 1 inch x 0.85 inch x 0.062 inch; pad layout as shown on Diodes Inc. suggested pad layout document AP02001, which can be found on our website at <http://www.diodes.com/datasheets/ap02001.pdf>.
 2. No purposefully added lead. Halogen and Antimony Free.
 3. Product manufactured with Data Code V9 (week 33, 2008) and newer are built with Green Molding Compound. Product manufactured prior to Date Code V9 are built with Non-Green Molding Compound and may contain Halogens or Sb_2O_3 Fire Retardants.

Electrical Characteristics @ $T_A = 25^\circ\text{C}$ unless otherwise specified

| Characteristic | Symbol | Min | Max | Unit | Test Condition |
|--------------------------------------|---------------|------------------------------|-------------------------|------------------|---|
| OFF CHARACTERISTICS (Note 4) | | | | | |
| Collector-Base Breakdown Voltage | $V_{(BR)CBO}$ | -40 | — | V | $I_C = -100\mu\text{A}, I_E = 0$ |
| Collector-Emitter Breakdown Voltage | $V_{(BR)CEO}$ | -40 | — | V | $I_C = -1.0\text{mA}, I_B = 0$ |
| Emitter-Base Breakdown Voltage | $V_{(BR)EBO}$ | -5.0 | — | V | $I_E = -100\mu\text{A}, I_C = 0$ |
| Collector Cutoff Current | I_{CEX} | — | -100 | nA | $V_{CE} = -35\text{V}, V_{EB(OFF)} = -0.4\text{V}$ |
| Base Cutoff Current | I_{BL} | — | -100 | nA | $V_{CE} = -35\text{V}, V_{EB(OFF)} = -0.4\text{V}$ |
| ON CHARACTERISTICS (Note 4) | | | | | |
| DC Current Gain | h_{FE} | 30 60 100 100 20 | — — — 300 — | — | $I_C = -100\mu\text{A}, V_{CE} = -1.0\text{V}$ $I_C = -1.0\text{mA}, V_{CE} = -1.0\text{V}$ $I_C = -10\text{mA}, V_{CE} = -1.0\text{V}$ $I_C = -150\text{mA}, V_{CE} = -2.0\text{V}$ $I_C = -500\text{mA}, V_{CE} = -2.0\text{V}$ |
| Collector-Emitter Saturation Voltage | $V_{CE(SAT)}$ | — | -0.40 -0.75 | V | $I_C = -150\text{mA}, I_B = -15\text{mA}$ $I_C = -500\text{mA}, I_B = -50\text{mA}$ |
| Base-Emitter Saturation Voltage | $V_{BE(SAT)}$ | -0.75 — | -0.95 -1.30 | V | $I_C = -150\text{mA}, I_B = -15\text{mA}$ $I_C = -500\text{mA}, I_B = -50\text{mA}$ |
| SMALL SIGNAL CHARACTERISTICS | | | | | |
| Output Capacitance | C_{obo} | — | 8.5 | pF | $V_{CB} = -10\text{V}, f = 1.0\text{MHz}, I_E = 0$ |
| Input Capacitance | C_{ibo} | — | 30 | pF | $V_{EB} = -0.5\text{V}, f = 1.0\text{MHz}, I_C = 0$ |
| Input Impedance | h_{ie} | 1.5 | 15 | $k\Omega$ | $V_{CE} = -10\text{V}, I_C = -1.0\text{mA}, f = 1.0\text{kHz}$ |
| Voltage Feedback Ratio | h_{re} | 0.1 | 8.0 | $\times 10^{-4}$ | |
| Small Signal Current Gain | h_{fe} | 60 | 500 | — | |
| Output Admittance | h_{oe} | 1.0 | 100 | μS | |
| Current Gain-Bandwidth Product | f_T | 200 | — | MHz | $V_{CE} = -10\text{V}, I_C = -20\text{mA}, f = 100\text{MHz}$ |
| SWITCHING CHARACTERISTICS | | | | | |
| Delay Time | t_d | — | 15 | ns | $V_{CC} = -30\text{V}, I_C = -150\text{mA}, V_{BE(off)} = -2.0\text{V}, I_{B1} = -15\text{mA}$ |
| Rise Time | t_r | — | 20 | ns | |
| Storage Time | t_s | — | 225 | ns | $V_{CC} = -30\text{V}, I_C = -150\text{mA}, I_{B1} = I_{B2} = -15\text{mA}$ |
| Fall Time | t_f | — | 30 | ns | |

Notes: 4. Short duration pulse test used to minimize self-heating effect.

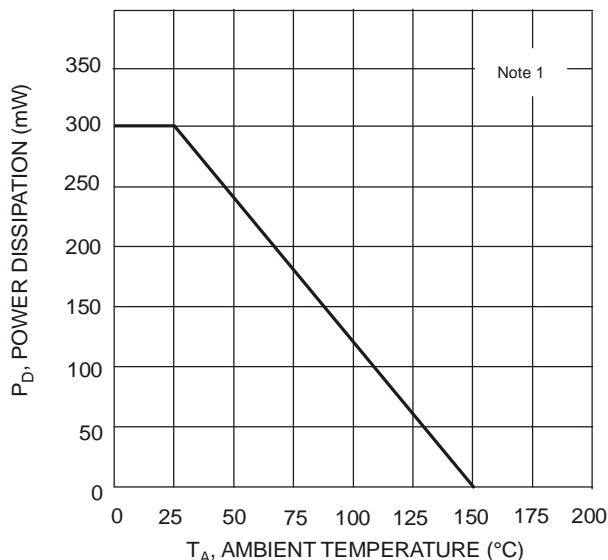


Fig. 1 Maximum Power Dissipation vs. Ambient Temperature

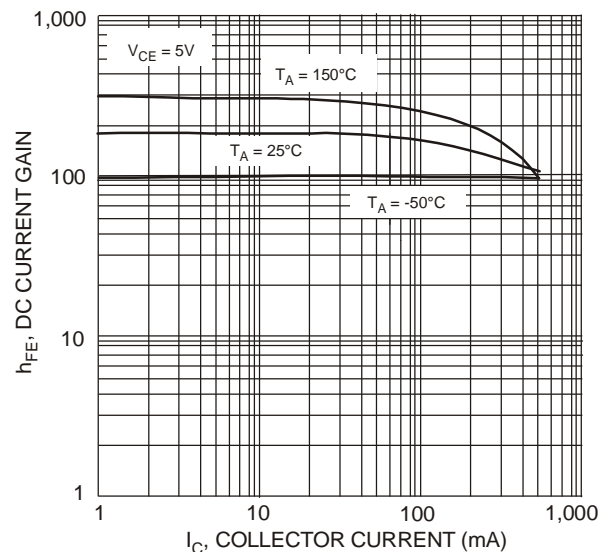


Fig. 2 Typical DC Current Gain vs. Collector Current

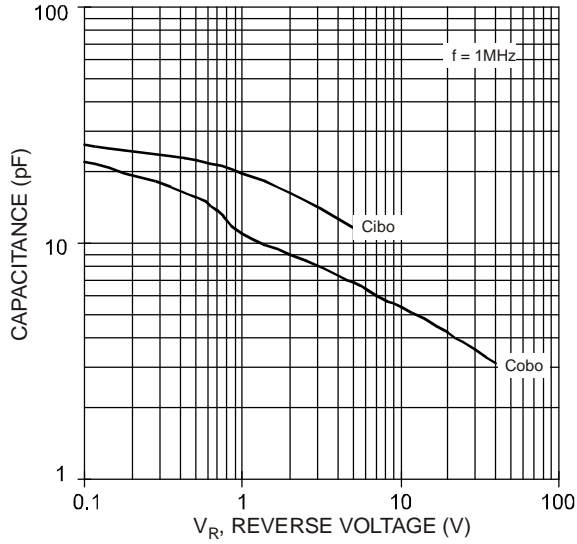


Fig. 3 Typical Capacitance

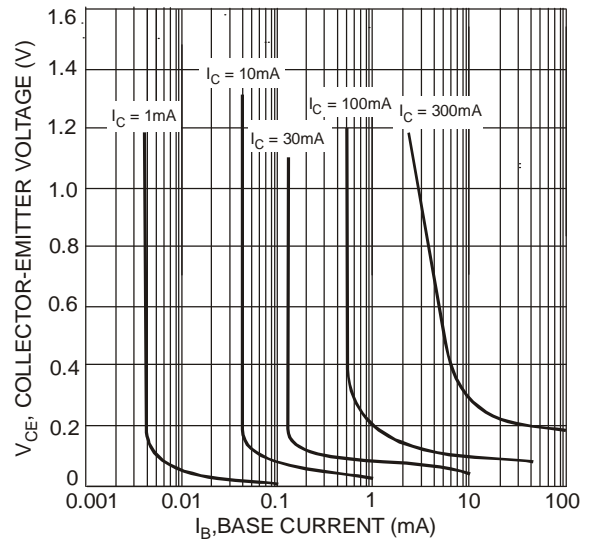


Fig. 4 Typical Collector Saturation Region

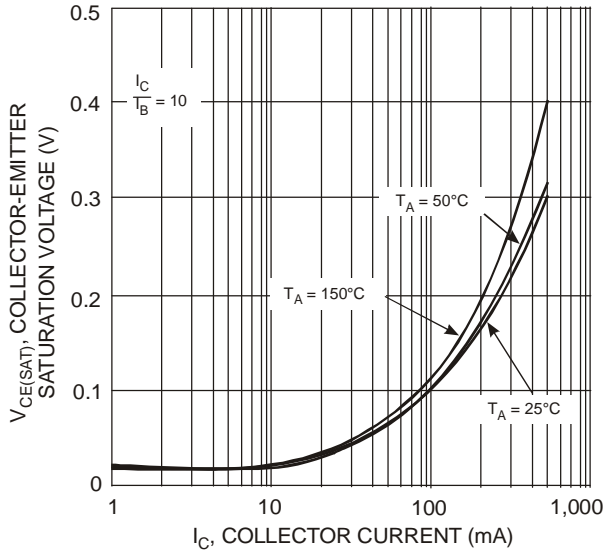


Fig. 5 Typical Collector-Emitter Saturation Voltage vs. Collector Current

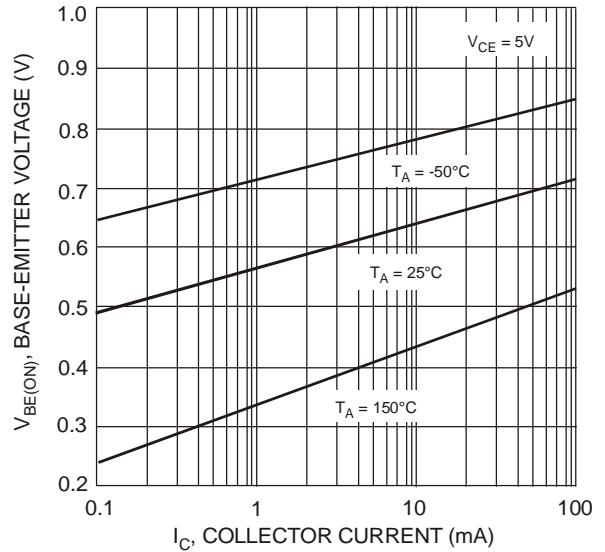


Fig. 6 Typical Base-Emitter Voltage vs. Collector Current

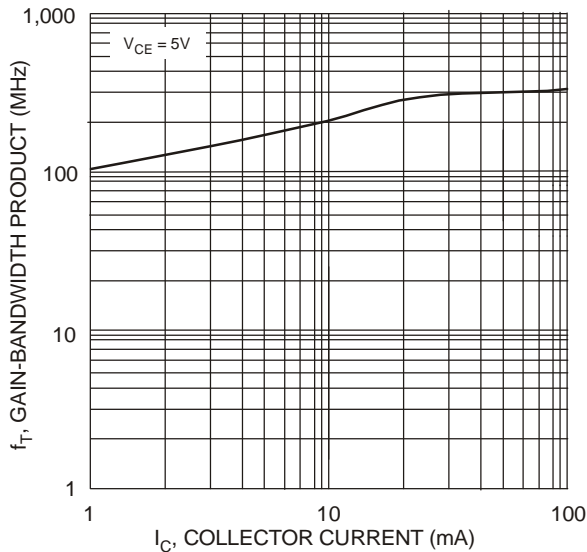


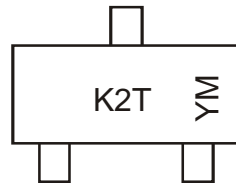
Fig. 7 Typical Gain-Bandwidth Product vs. Collector Current

Ordering Information (Note 5)

| Device | Packaging | Shipping |
|--------------|-----------|------------------|
| MMBT4403-7-F | SOT-23 | 3000/Tape & Reel |

Notes: 5. For packaging details, go to our website at <http://www.diodes.com/datasheets/ap02007.pdf>.

Marking Information



K2T = Product Type Marking Code
 YM = Date Code Marking
 Y = Year ex: N = 2002
 M = Month ex: 9 = September

Date Code Key

| Year | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| Code | J | K | L | M | N | P | R | S | T | U | V | W | X | Y | Z |

| Month | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Code | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | O | N | D |

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