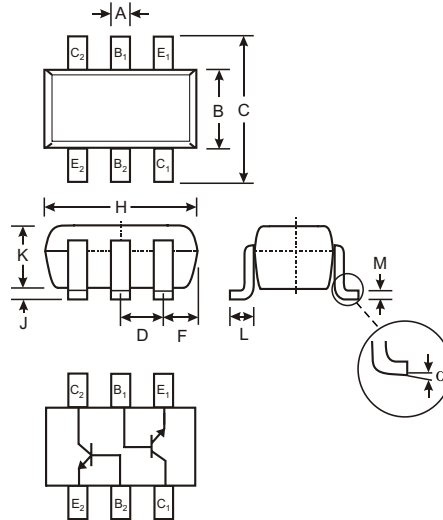


Features

- Epitaxial Planar Die Construction
- Ideal for Low Power Amplification and Switching
- Ultra-Small Surface Mount Package
- Also Available in Lead Free Version

Mechanical Data

- Case: SOT-363, Molded Plastic
- Case material - UL Flammability Rating Classification 94V-0
- Moisture sensitivity: Level 1 per J-STD-020A
- Terminals: Solderable per MIL-STD-202, Method 208
- Also Available in Lead Free Plating (Matte Tin Finish). Please see Ordering Information, Note 5, on Page 2
- Terminal Connections: See Diagram
- Marking (See Page 2): K2X
- Ordering & Date Code Information: See Page 2
- Weight: 0.006 grams (approx.)



| SOT-363 | | |
|----------------------|--------------|------|
| Dim | Min | Max |
| A | 0.10 | 0.30 |
| B | 1.15 | 1.35 |
| C | 2.00 | 2.20 |
| D | 0.65 Nominal | |
| F | 0.30 | 0.40 |
| H | 1.80 | 2.20 |
| J | — | 0.10 |
| K | 0.90 | 1.00 |
| L | 0.25 | 0.40 |
| M | 0.10 | 0.25 |
| 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} | 60 | V |
| Collector-Emitter Voltage | V_{CE0} | 40 | V |
| Emitter-Base Voltage | V_{EB0} | 6.0 | V |
| Collector Current - Continuous (Note 1) | I_C | 600 | mA |
| Power Dissipation (Note 1, 2) | P_d | 200 | mW |
| Thermal Resistance, Junction to Ambient (Note 1) | $R_{\theta JA}$ | 625 | $^\circ\text{C}/\text{W}$ |
| Operating and Storage and 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. Maximum combined dissipation.

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

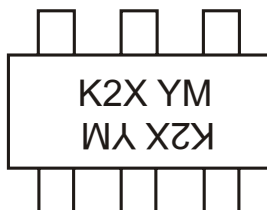
| Characteristic | Symbol | Min | Max | Unit | Test Condition |
|--------------------------------------|---------------|-----------------------------|-------------------------|------------------|---|
| OFF CHARACTERISTICS (Note 3) | | | | | |
| Collector-Base Breakdown Voltage | $V_{(BR)CBO}$ | 60 | — | 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 | $V_{(BR)EBO}$ | 6.0 | — | 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 3) | | | | | |
| DC Current Gain | h_{FE} | 20 40 80 100 40 | — — — 300 — | — | $I_C = 100\mu\text{A}, V_{CE} = 1.0\text{V}$ $I_C = 1.0\text{mA}, V_{CE} = 1.0\text{V}$ $I_C = 10\text{mA}, V_{CE} = 1.0\text{V}$ $I_C = 150\text{mA}, V_{CE} = 1.0\text{V}$ $I_C = 500\text{mA}, V_{CE} = 2.0\text{V}$ |
| 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 1.2 | 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_{cb} | — | 6.5 | pF | $V_{CB} = 5.0\text{V}, f = 1.0\text{MHz}, I_E = 0$ |
| Input Capacitance | C_{eb} | — | 30 | pF | $V_{EB} = 0.5\text{V}, f = 1.0\text{MHz}, I_C = 0$ |
| Input Impedance | h_{ie} | 1.0 | 15 | k Ω | $V_{CE} = 10\text{V}, I_C = 1.0\text{mA}, f = 1.0\text{kHz}$ |
| Voltage Feedback Ratio | h_{re} | 0.1 | 8.0 | $\times 10^{-4}$ | |
| Small Signal Current Gain | h_{fe} | 40 | 500 | — | |
| Output Admittance | h_{oe} | 1.0 | 30 | μS | |
| Current Gain-Bandwidth Product | f_T | 250 | — | 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 | |

Ordering Information (Note 4)

| Device | Packaging | Shipping |
|------------|-----------|------------------|
| MMDT4401-7 | SOT-363 | 3000/Tape & Reel |

- Notes:
3. Short duration pulse test used to minimize self-heating effect.
 4. For Packaging Details, go to our website at <http://www.diodes.com/datasheets/ap02007.pdf>.
 5. For Lead Free version (with Lead Free terminal finish) part number, please add "-F" suffix to part number above.
Example: MMDT4401-7-F.

Marking Information



K2X = 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 |
|------|------|------|------|------|------|------|------|------|------|------|------|------|
| Code | J | K | L | M | N | P | R | S | T | U | V | W |

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

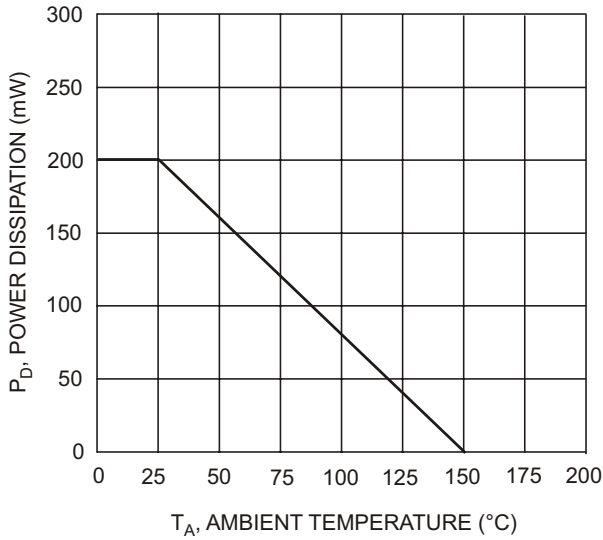


Fig. 1 Max Power Dissipation vs Ambient Temperature

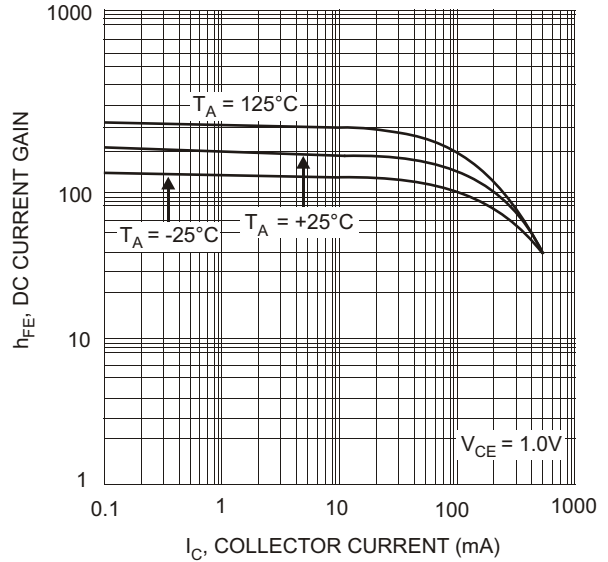


Fig. 2 Typical DC Current Gain vs Collector Current

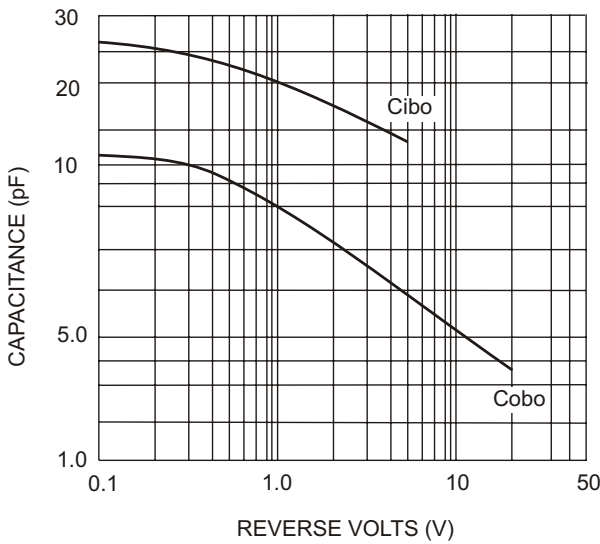


Fig. 3 Typical Capacitance

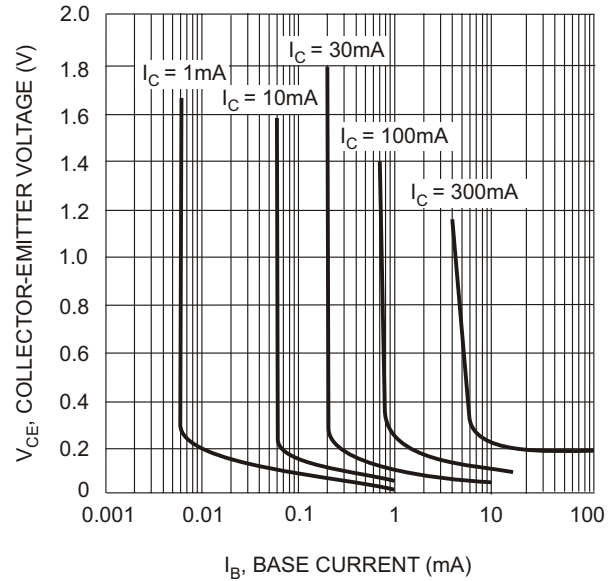


Fig. 4 Typical Collector Saturation Region

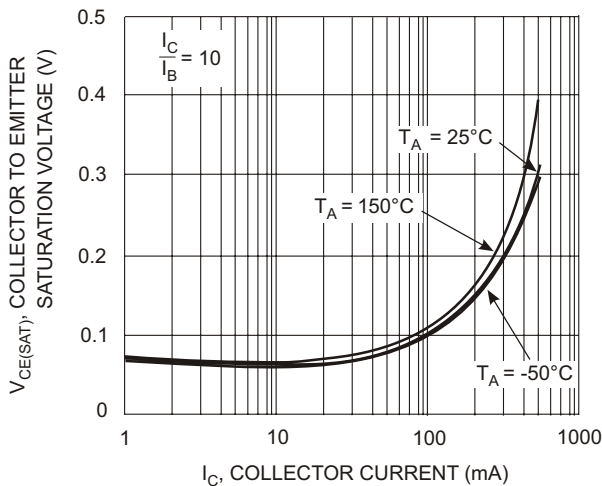


Fig. 5 Collector Emitter Saturation Voltage vs. Collector Current

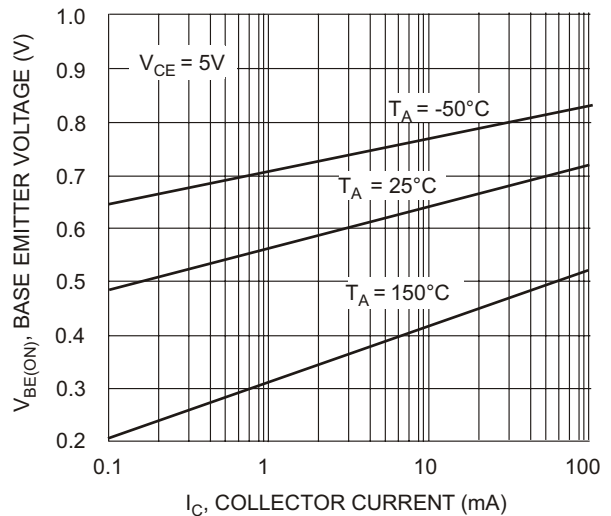


Fig. 6 Base Emitter Voltage vs. Collector Current

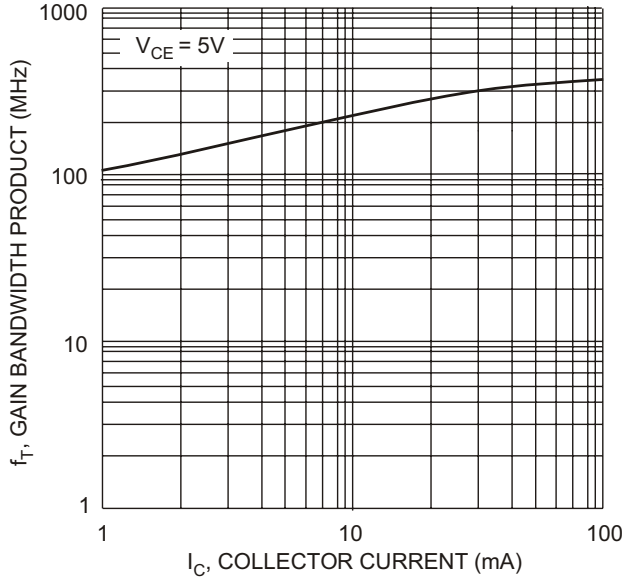


Fig. 7 Gain Bandwidth Product vs. Collector Current