# MMDT4403

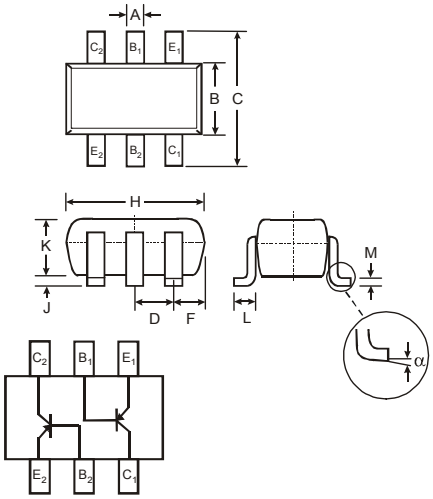
**DUAL PNP SMALL SIGNAL SURFACE MOUNT TRANSISTOR**

## Features

- Epitaxial Planar Die Construction
- Ideal for Low Power Amplification and Switching
- Ultra-Small Surface Mount Package
- **Lead Free/RoHS Compliant (Note 3)**
- **"Green" Device (Note 4 and 5)**

## Mechanical Data

- Case: SOT-363
- Case Material: Molded Plastic. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020C
- 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: K2T – See Page 4
- Ordering & Date Code Information: See Page 4
- Weight: 0.006 grams (approximate)




| 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°C unless otherwise specified

| Characteristic | | Symbol | Value | Unit |
|---|---|---|---|---|
| Collector-Base Voltage | | $V_{CBO}$ | -40 | V |
| Collector-Emitter Voltage | | $V_{CEO}$ | -40 | V |
| Emitter-Base Voltage | | $V_{EBO}$ | -5.0 | 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 | °C/W |
| Operating and Storage Temperature Range | | $T_j$, $T_{STG}$ | -55 to +150 | °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.
3. No purposefully added lead.
4. Diodes Inc.'s "Green" policy can be found on our website at http://www.diodes.com/products/lead_free/index.php.
5. Product manufactured with Date Code UO (week 40, 2007) and newer are built with Green Molding Compound. Product manufactured prior to Date Code UO are built with Non-Green Molding Compound and may contain Halogens or Sb2O3 Fire Retardants.



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## Electrical Characteristics @$T_A$ = 25°C unless otherwise specified

| Characteristic | Symbol | Min | Max | Unit | Test Condition |
|---|---|---|---|---|---|
| **OFF CHARACTERISTICS (Note 6)** | | | | | |
| Collector-Base Breakdown Voltage | $V_{(BR)CBO}$ | -40 | — | V | $I_C$ = -100μA, $I_E$ = 0 |
| Collector-Emitter Breakdown Voltage | $V_{(BR)CEO}$ | -40 | — | V | $I_C$ = -1.0mA, $I_B$ = 0 |
| Emitter-Base Breakdown Voltage | $V_{(BR)EBO}$ | -5.0 | — | V | $I_E$ = -100μA, $I_C$ = 0 |
| Collector Cutoff Current | $I_{CEX}$ | — | -100 | nA | $V_{CE}$ = -35V, $V_{EB(OFF)}$ = -0.4V |
| Base Cutoff Current | $I_{BL}$ | — | -100 | nA | $V_{CE}$ = -35V, $V_{EB(OFF)}$ = -0.4V |
| **ON CHARACTERISTICS (Note 6)** | | | | | |
| DC Current Gain | $h_{FE}$ | 30<br>60<br>100<br>100<br>20 | —<br>—<br>—<br>300<br>— | — | $I_C$ = -100μA, $V_{CE}$ = -1.0V<br>$I_C$ = -1.0mA, $V_{CE}$ = -1.0V<br>$I_C$ = -10mA, $V_{CE}$ = -1.0V<br>$I_C$ = -150mA, $V_{CE}$ = -2.0V<br>$I_C$ = -500mA, $V_{CE}$ = -2.0V |
| Collector-Emitter Saturation Voltage | $V_{CE(SAT)}$ | — | -0.40<br>-0.75 | V | $I_C$ = -150mA, $I_B$ = -15mA<br>$I_C$ = -500mA, $I_B$ = -50mA |
| Base-Emitter Saturation Voltage | $V_{BE(SAT)}$ | -0.75<br>— | -0.95<br>-1.30 | V | $I_C$ = -150mA, $I_B$ = -15mA<br>$I_C$ = -500mA, $I_B$ = -50mA |
| **SMALL SIGNAL CHARACTERISTICS** | | | | | |
| Output Capacitance | $C_{cb}$ | — | 8.5 | pF | $V_{CB}$ = -10V, f = 1.0MHz, $I_E$ = 0 |
| Input Capacitance | $C_{eb}$ | — | 30 | pF | $V_{EB}$ = -0.5V, f = 1.0MHz, $I_C$ = 0 |
| Input Impedance | $h_{ie}$ | 1.5 | 15 | kΩ | $V_{CE}$ = -10V, $I_C$ = -1.0mA, f = 1.0kHz |
| Voltage Feedback Ratio | $h_{re}$ | 0.1 | 8.0 | x $10^{-4}$ | |
| Small Signal Current Gain | $h_{fe}$ | 60 | 500 | — | |
| Output Admittance | $h_{oe}$ | 1.0 | 100 | μS | |
| Current Gain-Bandwidth Product | $f_T$ | 200 | — | MHz | $V_{CE}$ = -10V, $I_C$ = -20mA, f = 100MHz |
| **SWITCHING CHARACTERISTICS** | | | | | |
| Delay Time | $t_d$ | — | 15 | ns | $V_{CC}$ = -30V, $I_C$ = -150mA, $V_{BE(off)}$ = -2.0V, $I_{B1}$ = -15mA |
| Rise Time | $t_r$ | — | 20 | ns | |
| Storage Time | $t_s$ | — | 225 | ns | $V_{CC}$ = -30V, $I_C$ = -150mA, $I_{B1}$ = $I_{B2}$ = -15mA |
| Fall Time | $t_f$ | — | 30 | ns | |

Notes: 6. Short duration pulse test used to minimize self-heating effect.

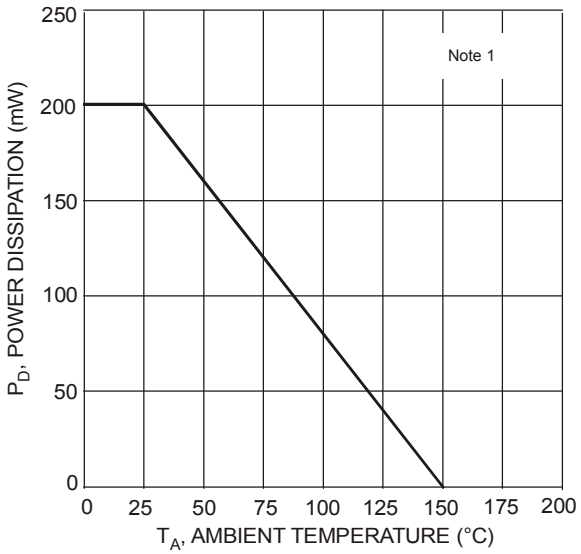


Fig. 1 Max Power Dissipation vs. Ambient Temperature

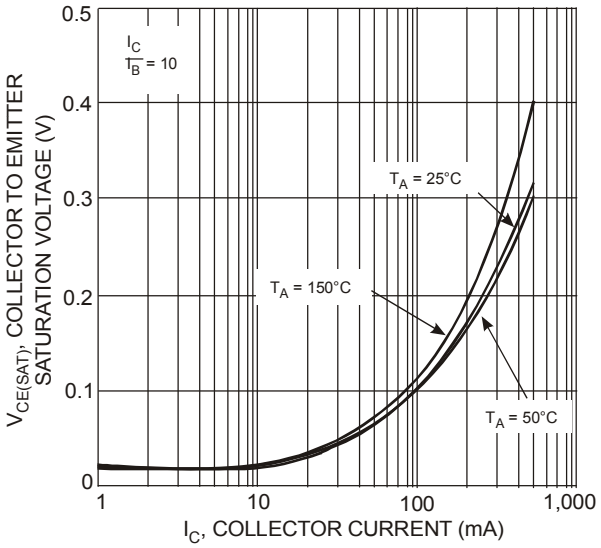


Fig. 2 Collector Emitter Saturation Voltage vs. Collector Current


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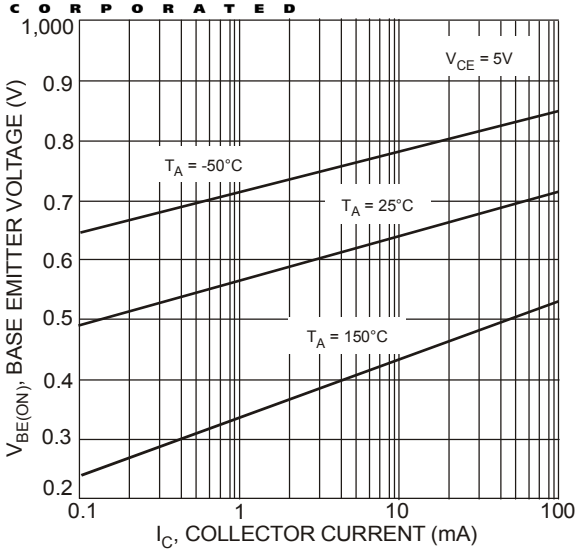



Fig. 3 Base-Emitter Voltage vs. Collector Current

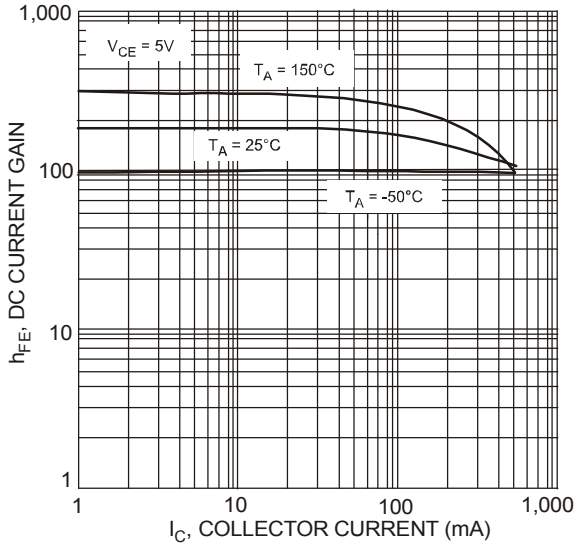



Fig. 4 DC Current Gain vs. Collector Current

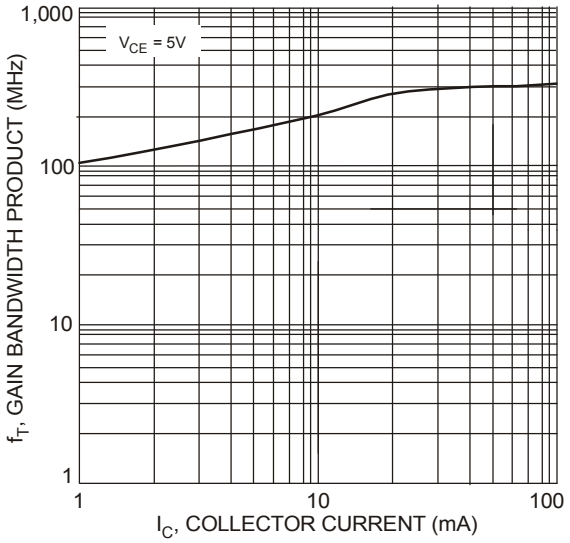



Fig. 5 Gain Bandwidth Product vs. Collector Current

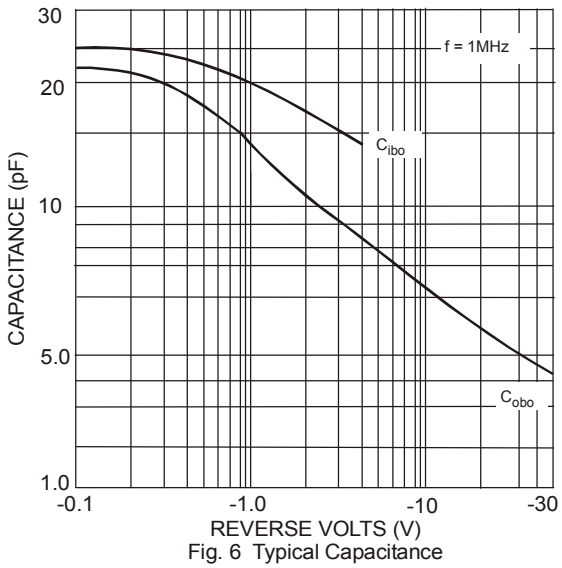



Fig. 6 Typical Capacitance

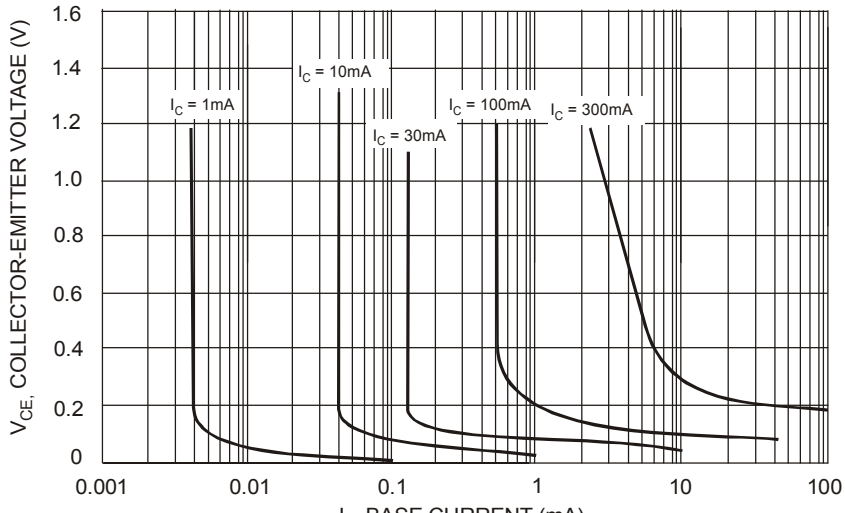



Fig. 7 Typical Collector Saturation Region



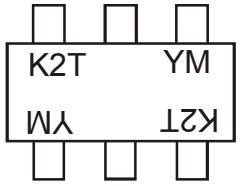
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## Ordering Information (Note 7)

| Device | Packaging | Shipping |
|---|---|---|
| MMDT4403-7-F | SOT-363 | 3000/Tape & Reel |

Notes: 7. 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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