


Features

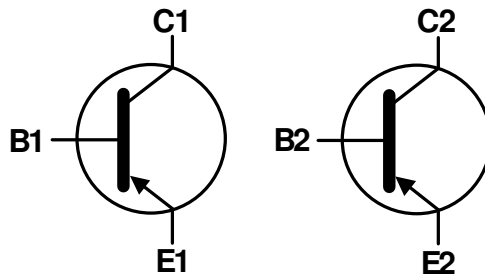
- Epitaxial Planar Die Construction
- Complementary NPN Type Available (MMDT5551)
- Ideal for Medium Power Amplification and Switching
- Ultra-Small Surface Mount Package
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**
- **An Automotive-Compliant Part is Available Under Separate Datasheet ([MMDT5401Q](#))**

Mechanical Data

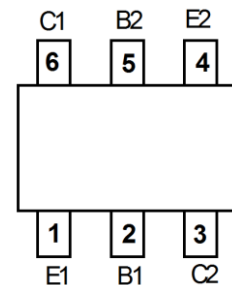
- Case: SOT363
- Case Material: Molded Plastic, "Green" Molding Compound, UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish — Matte Tin Finish. Solderable per MIL-STD-202, Method 208 
- Weight: 0.006 grams (Approximate)



Top View



Device Symbol



Top View
Pin-Out

Ordering Information (Note 4)

| Part Number | Marking | Reel Size (inches) | Tape Width (mm) | Quantity Per Reel |
|--------------|---------|--------------------|-----------------|-------------------|
| MMDT5401-7-F | K4M | 7 | 8 | 3,000 |

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
 2. See <https://www.diodes.com/quality/lead-free/> for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
 3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
 4. For packaging details, go to our website at <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

Marking Information



K4M = Product Type Marking Code
YM = Date Code Marking
Y = Year (ex: F = 2018)
M = Month (ex: 9 = September)

Date Code Key

| Year | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 |
|------|------|------|------|------|------|------|------|------|------|
| Code | E | F | G | H | I | J | K | L | M |

| 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 |

Absolute Maximum Ratings (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

| Characteristic | Symbol | Value | Unit |
|------------------------------|-----------|-------|------|
| Collector-Base Voltage | V_{CB0} | -160 | V |
| Collector-Emitter Voltage | V_{CEO} | -150 | V |
| Emitter-Base Voltage | V_{EBO} | -6 | V |
| Continuous Collector Current | I_C | -200 | mA |

Thermal Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

| Characteristic | Symbol | Value | Unit | |
|---|-----------------|---------------|--------------------|--------------------|
| Power Dissipation | P_D | (Note 5) | 200 | mW |
| | | (Notes 6 & 7) | 320 | |
| Thermal Resistance, Junction to Ambient | $R_{\theta JA}$ | (Note 5) | 625 | $^\circ\text{C/W}$ |
| | | (Notes 6 & 7) | 390 | |
| Thermal Resistance, Junction to Case | $R_{\theta JC}$ | 140 | $^\circ\text{C/W}$ | |
| Operating and Storage Temperature Range | T_J, T_{STG} | -55 to +150 | $^\circ\text{C}$ | |

Electrical Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|--|---------------|------|-----|------|---------------|---|
| OFF CHARACTERISTICS | | | | | | |
| Collector-Base Breakdown Voltage | BV_{CB0} | -160 | — | — | V | $I_C = -100\mu\text{A}, I_E = 0$ |
| Collector-Emitter Breakdown Voltage (Note 9) | BV_{CEO} | -150 | — | — | V | $I_C = -1\text{mA}, I_B = 0$ |
| Emitter-Base Breakdown Voltage | BV_{EBO} | -6 | — | — | V | $I_E = -100\mu\text{A}, I_C = 0$ |
| Collector-Base Cutoff Current | I_{CB0} | — | — | -50 | nA | $V_{CB} = -120\text{V}, I_E = 0$ |
| | | — | — | -50 | μA | $V_{CB} = -120\text{V}, I_E = 0, T_A = +100^\circ\text{C}$ |
| Base-Emitter Cutoff Current | I_{EBO} | — | — | -50 | nA | $V_{EB} = -5\text{V}, I_C = 0$ |
| ON CHARACTERISTICS (Note 9) | | | | | | |
| DC Current Gain | h_{FE} | 50 | — | — | — | $I_C = -1.0\text{mA}, V_{CE} = -5.0\text{V}$ |
| | | 60 | — | 240 | — | $I_C = -10\text{mA}, V_{CE} = -5.0\text{V}$ |
| | | 50 | — | — | — | $I_C = -50\text{mA}, V_{CE} = -5.0\text{V}$ |
| Collector-Emitter Saturation Voltage | $V_{CE(SAT)}$ | — | — | -0.2 | V | $I_C = -10\text{mA}, I_B = -1.0\text{mA}$ |
| | | — | — | -0.5 | V | $I_C = -50\text{mA}, I_B = -5.0\text{mA}$ |
| Base-Emitter Saturation Voltage | $V_{BE(SAT)}$ | — | — | -1.0 | V | $I_C = -10\text{mA}, I_B = -1.0\text{mA}$ |
| | | — | — | -1.0 | V | $I_C = -50\text{mA}, I_B = -5.0\text{mA}$ |
| SMALL SIGNAL CHARACTERISTICS | | | | | | |
| Output Capacitance | C_{obo} | — | — | 6.0 | pF | $V_{CB} = -10\text{V}, f = 1.0\text{MHz}, I_E = 0$ |
| Small Signal Current Gain | h_{fe} | 40 | — | 260 | — | $I_C = -1\text{mA}, V_{CE} = -10\text{V}, f = 1.0\text{MHz}$ |
| Current Gain-Bandwidth Product | f_T | 100 | — | 300 | MHz | $I_C = -10\text{mA}, V_{CE} = -10\text{V}, f = 100\text{MHz}$ |
| Noise Figure | NF | — | — | 8.0 | dB | $V_{CE} = -5.0\text{V}, I_C = -200\mu\text{A}, R_S = 10\Omega, f = 1.0\text{kHz}$ |

- Notes:
5. For a device mounted on minimum recommended pad layout 1oz weight copper that is on a single-sided FR-4 PCB; device is measured under still air conditions whilst operating in a steady-state.
 6. Same as Note 5, except the device is mounted 25mm X 25mm 2oz copper.
 7. Maximum combined dissipation.
 8. Thermal resistance from junction to the top of package.
 9. Measured under pulsed conditions. Pulse width $\leq 300\mu\text{s}$. Duty cycle $\leq 2\%$.

Typical Electrical Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

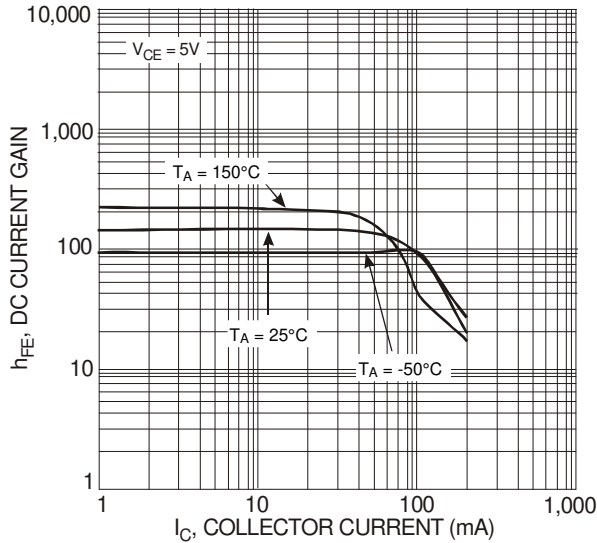


Fig. 1 Typical DC Current Gain vs. Collector Current

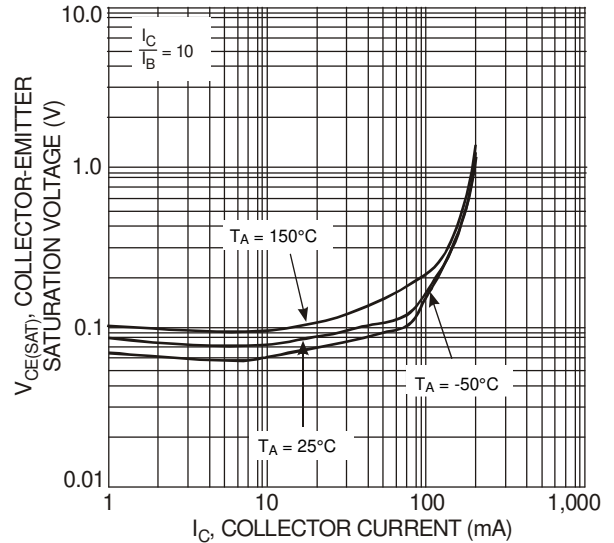


Fig. 2 Typical Collector-Emitter Saturation Voltage vs. Collector Current

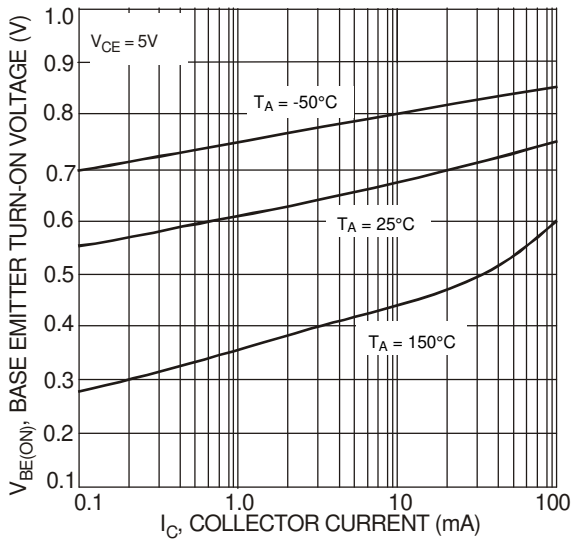


Fig. 3 Typical Base-Emitter Turn-On Voltage vs. Collector Current

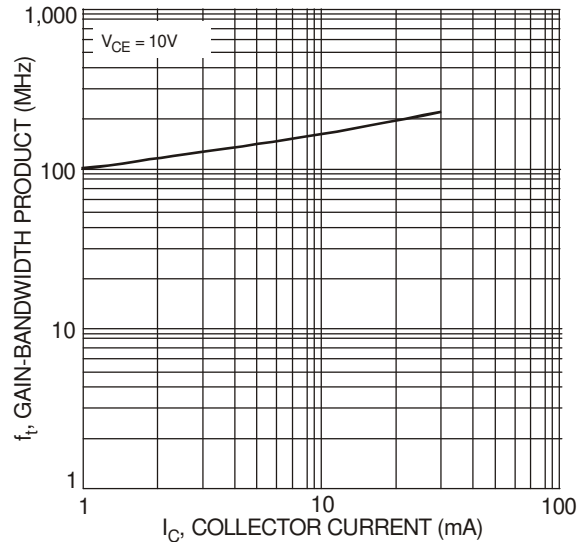
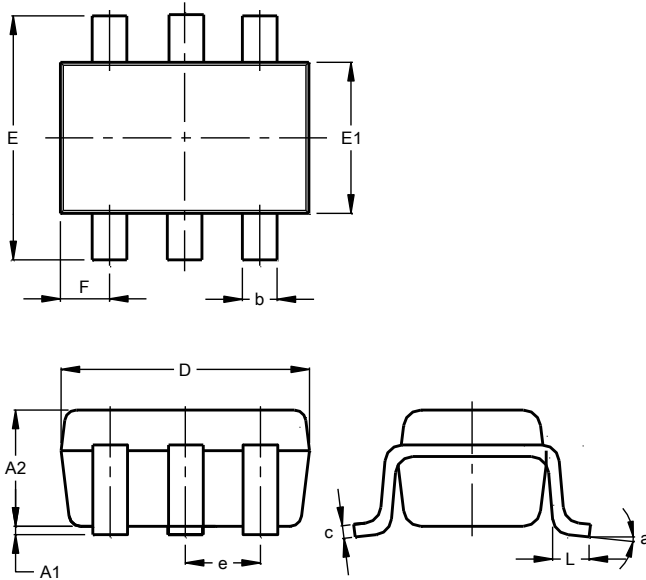


Fig. 4 Typical Gain-Bandwidth Product vs. Collector Current

Package Outline Dimensions

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

SOT363

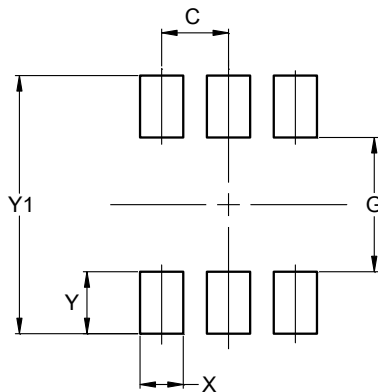


| SOT363 | | | |
|-----------------------------|-----------|------|-------|
| Dim | Min | Max | Typ |
| A1 | 0.00 | 0.10 | 0.05 |
| A2 | 0.90 | 1.00 | 0.95 |
| b | 0.10 | 0.30 | 0.25 |
| c | 0.10 | 0.22 | 0.11 |
| D | 1.80 | 2.20 | 2.15 |
| E | 2.00 | 2.20 | 2.10 |
| E1 | 1.15 | 1.35 | 1.30 |
| e | 0.650 BSC | | |
| F | 0.40 | 0.45 | 0.425 |
| L | 0.25 | 0.40 | 0.30 |
| a | 0° | 8° | -- |
| All Dimensions in mm | | | |

Suggested Pad Layout

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

SOT363



| Dimensions | Value (in mm) |
|------------|---------------|
| C | 0.650 |
| G | 1.300 |
| X | 0.420 |
| Y | 0.600 |
| Y1 | 2.500 |

Note: For high voltage applications, the appropriate industry sector guidelines should be considered with regards to creepage and clearance distances between device Terminals and PCB tracking.

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