

## Features

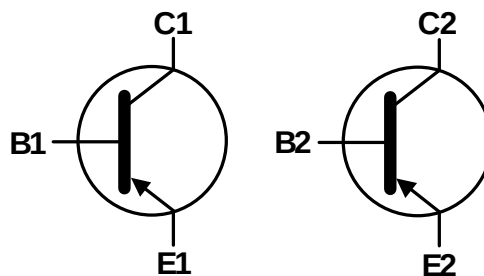
- Epitaxial Planar Die Construction
- Complementary NPN Type Available (MMDT5551)
- Ideal for Medium Power Amplification and Switching
- Ultra-Small Surface Mount Package
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified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

## Mechanical Data

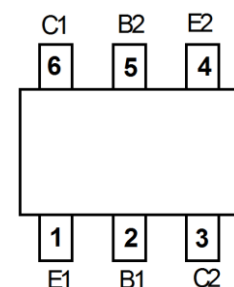
- Case: SOT363
- Case Material: Molded Plastic, "Green" Molding Compound, UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish — Matte Tin Finish. Solderable per MIL-STD-202, Method 208 
- Weight: 0.006 grams (Approximate)



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<sub>A</sub> = +25°C, unless otherwise specified.)

| Characteristic               | Symbol           | Value | Unit |
|------------------------------|------------------|-------|------|
| Collector-Base Voltage       | V <sub>CBO</sub> | -160  | V    |
| Collector-Emitter Voltage    | V <sub>CEO</sub> | -150  | V    |
| Emitter-Base Voltage         | V <sub>EBO</sub> | -6    | V    |
| Continuous Collector Current | I <sub>C</sub>   | -200  | mA   |

**Thermal Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

| Characteristic                          | Symbol                            | Value       | Unit |
|-----------------------------------------|-----------------------------------|-------------|------|
| Power Dissipation                       | P <sub>D</sub>                    | 200         | mW   |
| (Note 5)                                |                                   | 320         |      |
| Thermal Resistance, Junction to Ambient | R <sub>θJA</sub>                  | 625         | °C/W |
| (Notes 6 & 7)                           |                                   | 390         |      |
| Thermal Resistance, Junction to Case    | (Note 8)                          | 140         |      |
| Operating and Storage Temperature Range | T <sub>J</sub> , T <sub>STG</sub> | -55 to +150 | °C   |

**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

| Characteristic                               | Symbol               | Min  | Typ | Max  | Unit | Test Condition                                                                     |
|----------------------------------------------|----------------------|------|-----|------|------|------------------------------------------------------------------------------------|
| OFF CHARACTERISTICS                          |                      |      |     |      |      |                                                                                    |
| Collector-Base Breakdown Voltage             | BV <sub>CBO</sub>    | -160 | —   | —    | V    | I <sub>C</sub> = -100μA, I <sub>E</sub> = 0                                        |
| Collector-Emitter Breakdown Voltage (Note 9) | BV <sub>CEO</sub>    | -150 | —   | —    | V    | I <sub>C</sub> = -1mA, I <sub>B</sub> = 0                                          |
| Emitter-Base Breakdown Voltage               | BV <sub>EBO</sub>    | -6   | —   | —    | V    | I <sub>E</sub> = -100μA, I <sub>C</sub> = 0                                        |
| Collector-Base Cutoff Current                | I <sub>CBO</sub>     | —    | —   | -50  | nA   | V <sub>CB</sub> = -120V, I <sub>E</sub> = 0                                        |
|                                              |                      | —    | —   | -50  | μA   | V <sub>CB</sub> = -120V, I <sub>E</sub> = 0, T <sub>A</sub> = +100°C               |
| Base-Emitter Cutoff Current                  | I <sub>EBO</sub>     | —    | —   | -50  | nA   | V <sub>EB</sub> = -5V, I <sub>C</sub> = 0                                          |
| ON CHARACTERISTICS (Note 9)                  |                      |      |     |      |      |                                                                                    |
| DC Current Gain                              | h <sub>FE</sub>      | 50   | —   | —    | —    | I <sub>C</sub> = -1.0mA, V <sub>CE</sub> = -5.0V                                   |
|                                              |                      | 60   |     | 240  |      | I <sub>C</sub> = -10mA, V <sub>CE</sub> = -5.0V                                    |
|                                              |                      | 50   |     | —    |      | I <sub>C</sub> = -50mA, V <sub>CE</sub> = -5.0V                                    |
| Collector-Emitter Saturation Voltage         | V <sub>CE(SAT)</sub> | —    | —   | -0.2 | V    | I <sub>C</sub> = -10mA, I <sub>B</sub> = -1.0mA                                    |
|                                              |                      |      |     | -0.5 |      | I <sub>C</sub> = -50mA, I <sub>B</sub> = -5.0mA                                    |
| Base-Emitter Saturation Voltage              | V <sub>BE(SAT)</sub> | —    | —   | -1.0 | V    | I <sub>C</sub> = -10mA, I <sub>B</sub> = -1.0mA                                    |
|                                              |                      |      |     |      |      | I <sub>C</sub> = -50mA, I <sub>B</sub> = -5.0mA                                    |
| SMALL SIGNAL CHARACTERISTICS                 |                      |      |     |      |      |                                                                                    |
| Output Capacitance                           | C <sub>obo</sub>     | —    | —   | 6.0  | pF   | V <sub>CB</sub> = -10V, f = 1.0MHz, I <sub>E</sub> = 0                             |
| Small Signal Current Gain                    | h <sub>fe</sub>      | 40   | —   | 260  | —    | I <sub>C</sub> = -1mA, V <sub>CE</sub> = -10V, f = 1.0MHz                          |
| Current Gain-Bandwidth Product               | f <sub>T</sub>       | 100  | —   | 300  | MHz  | I <sub>C</sub> = -10mA, V <sub>CE</sub> = -10V, f = 100MHz                         |
| Noise Figure                                 | NF                   | —    | —   | 8.0  | dB   | V <sub>CE</sub> = -5.0V, I <sub>C</sub> = -200μA, R <sub>S</sub> = 10Ω, f = 1.0kHz |

- Notes:
- 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.
  - Same as Note 5, except the device is mounted 25mm X 25mm 2oz copper.
  - Maximum combined dissipation.
  - Thermal resistance from junction to the top of package.
  - Measured under pulsed conditions. Pulse width ≤ 300μs. Duty cycle ≤ 2%.

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

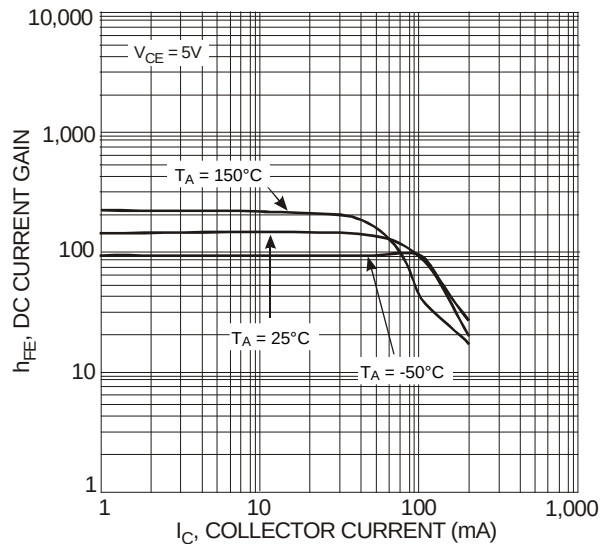


Fig. 1 Typical DC Current Gain vs. Collector Current

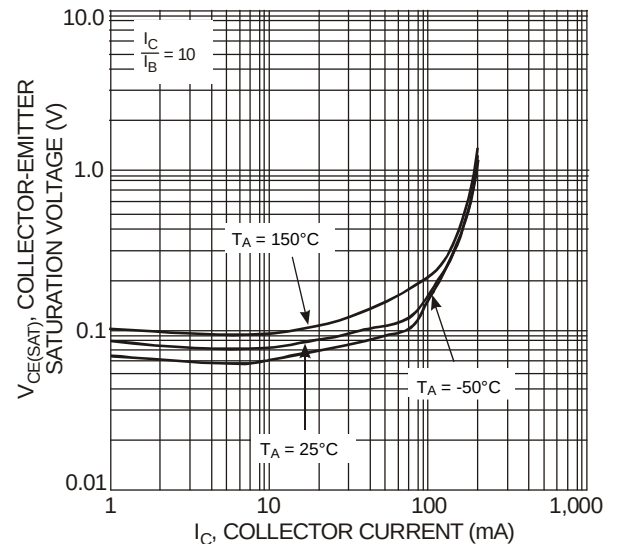


Fig. 2 Typical Collector-Emitter Saturation Voltage vs. Collector Current

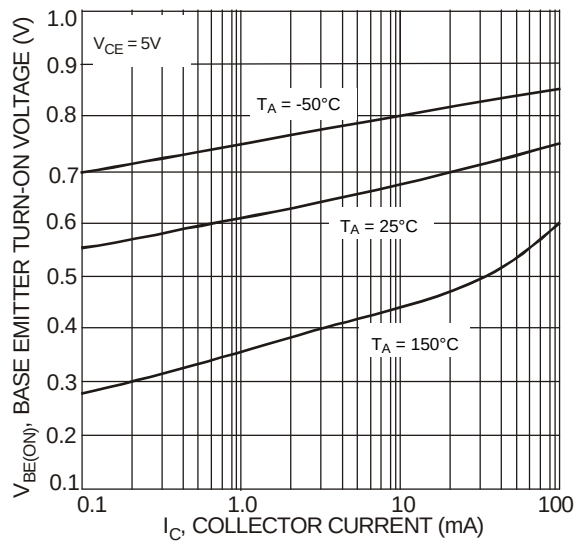


Fig. 3 Typical Base-Emitter Turn-On Voltage vs. Collector Current

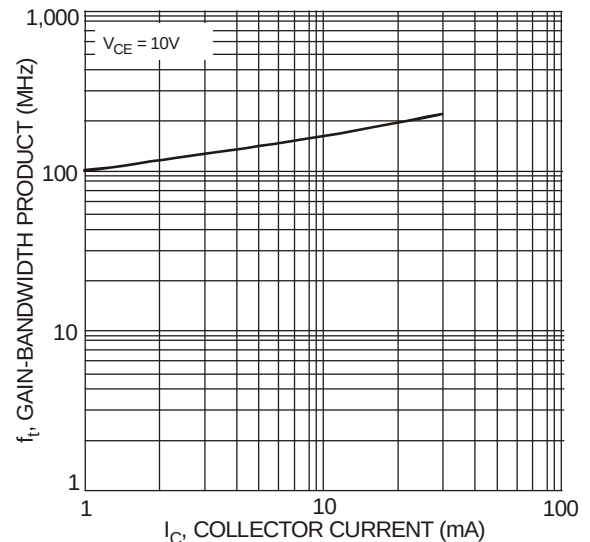
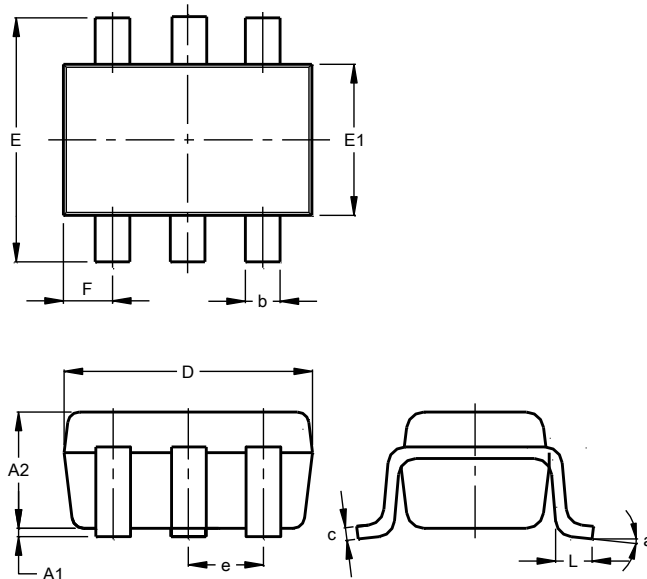


Fig. 4 Typical Gain-Bandwidth Product vs. Collector Current

## Package Outline Dimensions

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

### SOT363

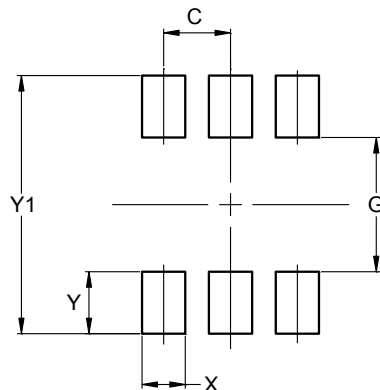


| SOT363               |           |      |       |
|----------------------|-----------|------|-------|
| Dim                  | Min       | Max  | Typ   |
| A1                   | 0.00      | 0.10 | 0.05  |
| A2                   | 0.90      | 1.00 | 0.95  |
| b                    | 0.10      | 0.30 | 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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