

## Features

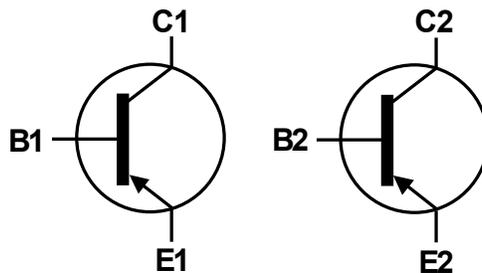
- Epitaxial Planar Die Construction
- Complementary NPN Type Available (MMDT5551)
- Ideal for Medium Power Amplification and Switching
- Ultra-Small Surface Mount Package
- **Totally Lead-Free & Fully RoHS compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

## Mechanical Data

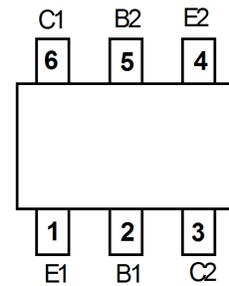
- Case: SOT363
- Case Material: Molded Plastic, "Green" Molding Compound,
- UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish — Matte Tin Finish. Solderable per MIL-STD-202, Method 208
- Weight: 0.006 grams (approximate)



Top View



Device Symbol


 Top View  
Pin-Out

## Ordering Information (Note 4)

Product	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) compliant.
  2. See [http://www.diodes.com/quality/lead\\_free.html](http://www.diodes.com/quality/lead_free.html) 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 <http://www.diodes.com/products/packages.html>.

## Marking Information



K4M = Product Type Marking Code  
 YM = Date Code Marking  
 Y = Year ex: N = 2002  
 M = Month ex: 9 = September

### Date Code Key

Year	2009	2010	2011	2012	2013	2014	2015	2016	2017
Code	W	X	Y	Z	A	B	C	D	E

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

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

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	$V_{CBO}$	-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	$P_D$	200	mW
		320	
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	625	$^\circ\text{C/W}$
		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
<b>OFF CHARACTERISTICS</b>						
Collector-Base Breakdown Voltage	$BV_{CBO}$	-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	$I_{CBO}$	—	—	-50	nA	$V_{CB} = -120\text{V}, I_E = 0$
		—	—	-50	$\mu\text{A}$	$V_{CB} = -120\text{V}, I_E = 0, T_A = +100^\circ\text{C}$
Base-Emitter Cutoff Current	$I_{EBO}$	—	—	-50	nA	$V_{EB} = -5\text{V}, I_C = 0$
<b>ON CHARACTERISTICS (Note 9)</b>						
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		$I_C = -50\text{mA}, I_B = -5.0\text{mA}$
Base-Emitter Saturation Voltage	$V_{BE(sat)}$	—	—	-1.0	V	$I_C = -10\text{mA}, I_B = -1.0\text{mA}$
		—	—	—		$I_C = -50\text{mA}, I_B = -5.0\text{mA}$
<b>SMALL SIGNAL CHARACTERISTICS</b>						
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	—	200	—	$I_C = -1\text{mA}, V_{CE} = -10\text{V}, f = 1.0\text{MHz}$
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:
- For a device mounted on minimum recommended pad layout 1oz weight copper that is on a single-sided FR4 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  $\leq 300\mu\text{s}$ . Duty cycle  $\leq 2\%$ .

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

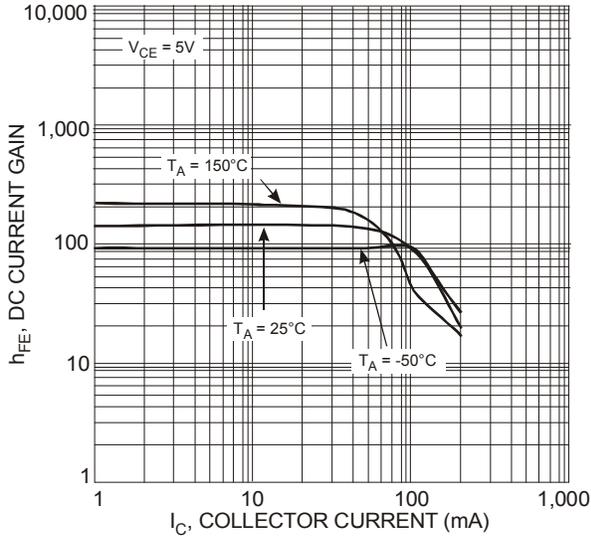


Fig. 1 Typical DC Current Gain vs. Collector Current

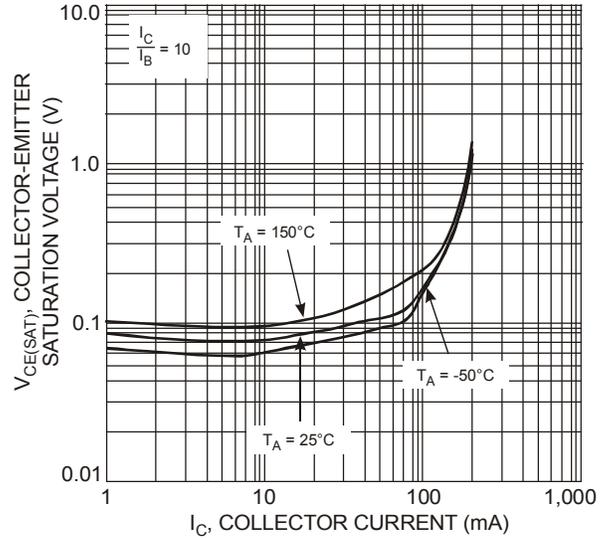


Fig. 2 Typical Collector-Emitter Saturation Voltage vs. Collector Current

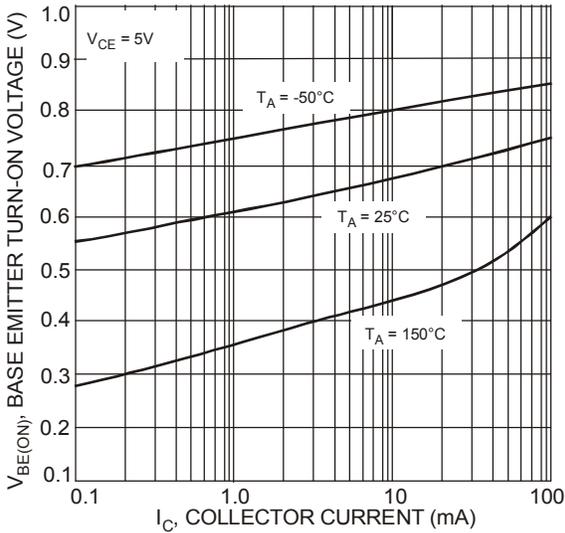


Fig. 3 Typical Base-Emitter Turn-On Voltage vs. Collector Current

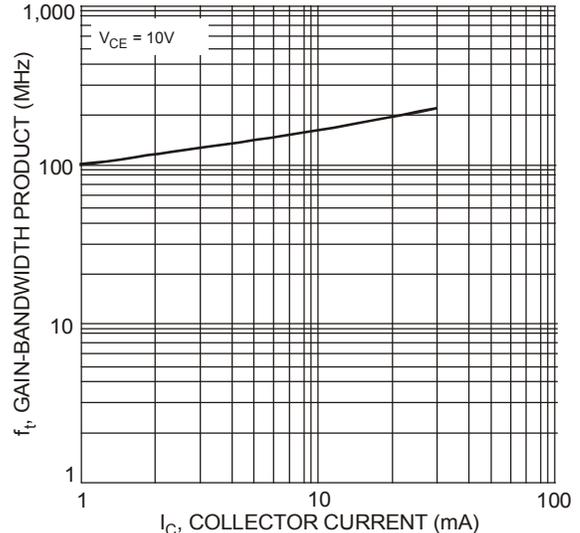
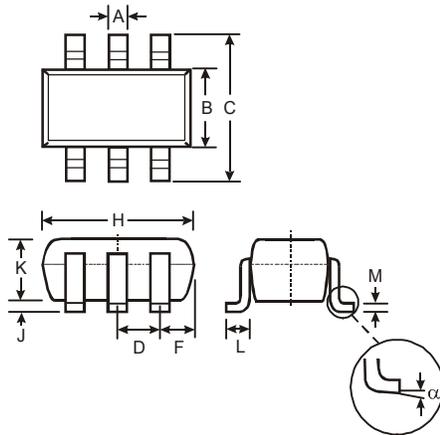


Fig. 4 Typical Gain-Bandwidth Product vs Collector Current

## Package Outline Dimensions

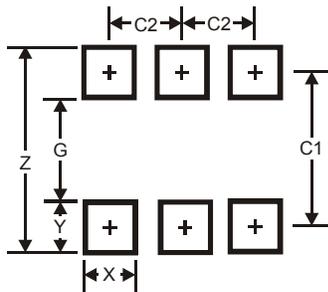
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



SOT363			
Dim	Min	Max	Typ
A	0.10	0.30	0.25
B	1.15	1.35	1.30
C	2.00	2.20	2.10
D	0.65 Typ		
F	0.40	0.45	0.425
H	1.80	2.20	2.15
J	0	0.10	0.05
K	0.90	1.00	1.00
L	0.25	0.40	0.30
M	0.10	0.22	0.11
α	0°	8°	-
<b>All Dimensions in mm</b>			

## Suggested Pad Layout

Please see AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> for the latest version.



Dimensions	Value (in mm)
Z	2.5
G	1.3
X	0.42
Y	0.6
C1	1.9
C2	0.65

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