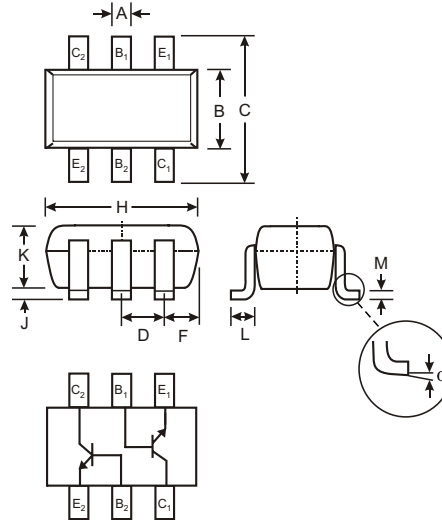


### Features

- Epitaxial Planar Die Construction
- Ideal for Low Power Amplification and Switching
- Ultra-Small Surface Mount Package
- **Available in Lead Free/RoHS Compliant Version (Note 3)**

### 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
- Also Available in Lead Free Plating (Matte Tin Finish annealed over Alloy 42 leadframe). Please see Ordering Information, Note 6, 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
$\alpha$	0°	8°
<b>All Dimensions in mm</b>		

### 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.
  3. No purposefully added lead.

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

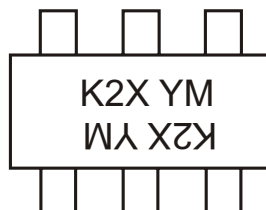
Characteristic	Symbol	Min	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 4)</b>					
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	60	—	V	$I_C = 100\mu\text{A}, I_E = 0$
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	40	—	V	$I_C = 1.0\text{mA}, I_B = 0$
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	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	$V_{CE} = 35\text{V}, V_{EB(OFF)} = 0.4\text{V}$
<b>ON CHARACTERISTICS (Note 4)</b>					
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	$I_C = 150\text{mA}, I_B = 15\text{mA}$ $I_C = 500\text{mA}, I_B = 50\text{mA}$
<b>SMALL SIGNAL CHARACTERISTICS</b>					
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 $\Omega$	$V_{CE} = 10\text{V}, I_C = 1.0\text{mA}, f = 1.0\text{kHz}$
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	$\mu\text{S}$	
Current Gain-Bandwidth Product	$f_T$	250	—	MHz	$V_{CE} = 10\text{V}, I_C = 20\text{mA}, f = 100\text{MHz}$
<b>SWITCHING CHARACTERISTICS</b>					
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 5)

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

- Notes:
- Short duration pulse test used to minimize self-heating effect.
  - For Packaging Details, go to our website at <http://www.diodes.com/datasheets/ap02007.pdf>.
  - For Lead Free/RoHS Compliant Version part number, please add "-F" suffix to the 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

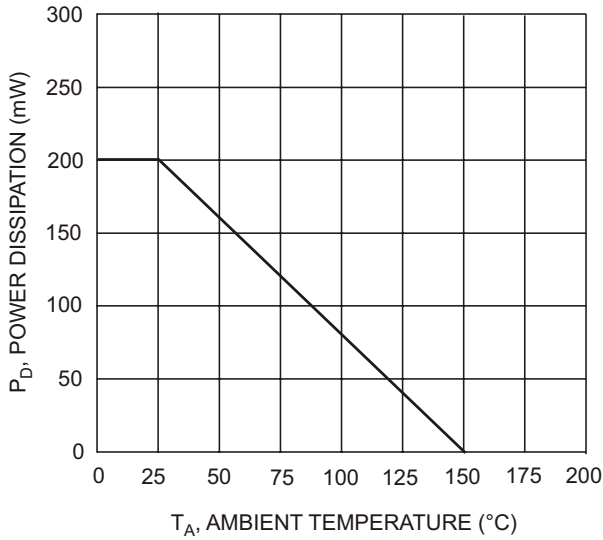


Fig. 1 Max Power Dissipation vs Ambient Temperature

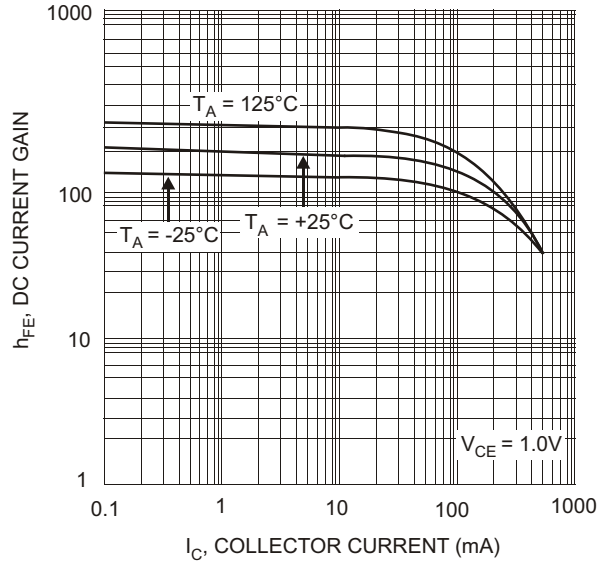


Fig. 2 Typical DC Current Gain vs Collector Current

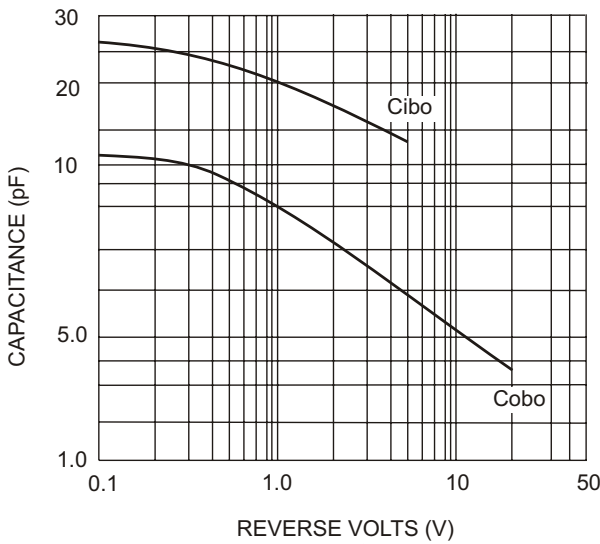


Fig. 3 Typical Capacitance

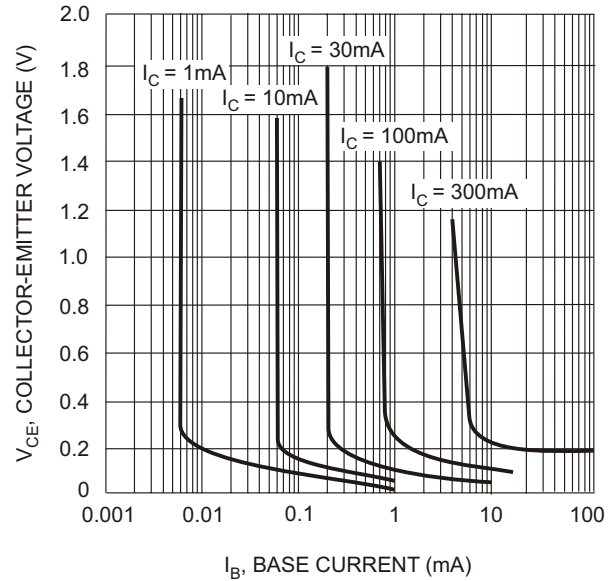


Fig. 4 Typical Collector Saturation Region

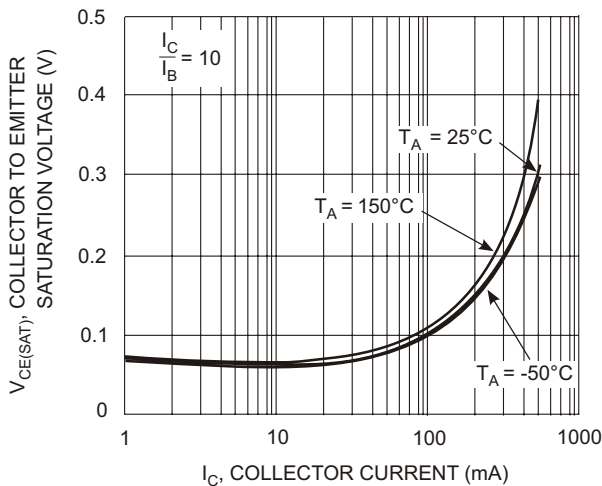


Fig. 5 Collector Emitter Saturation Voltage vs. Collector Current

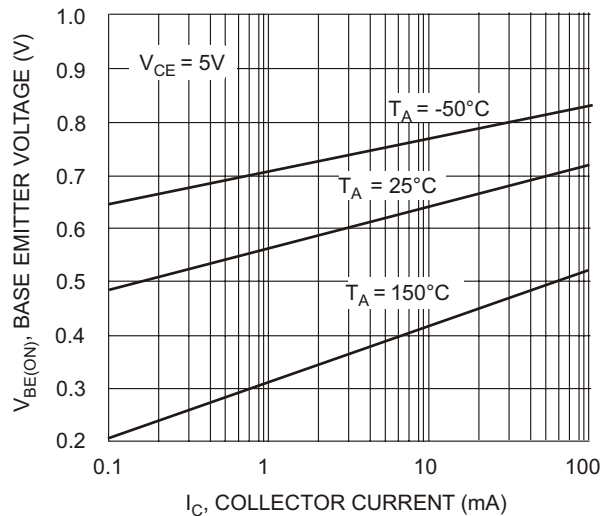


Fig. 6 Base Emitter Voltage vs. Collector Current

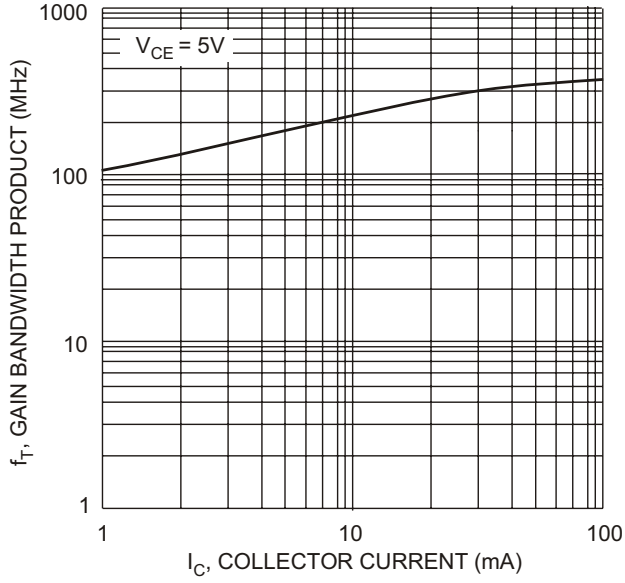


Fig. 7 Gain Bandwidth Product vs. Collector Current