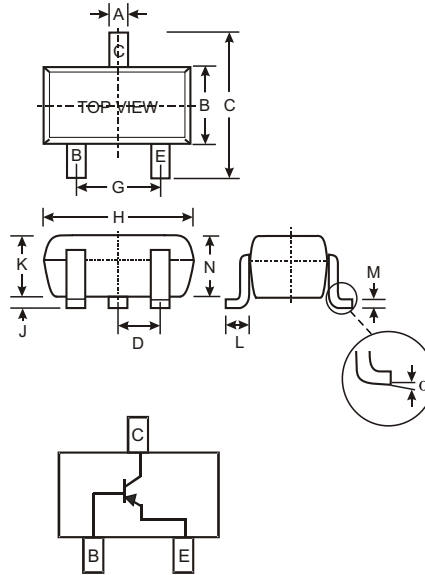


### Features

- Epitaxial Planar Die Construction
- Complementary NPN Type Available (MMBT4401T)
- Ultra-Small Surface Mount Package
- Lead Free/RoHS Compliant (Note 2)**

### Mechanical Data

- Case: SOT-523
- 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 (See Page 2): 2T
- Ordering & Date Code Information: See Page 2
- Weight: 0.002 grams (approx.)



SOT-523			
Dim	Min	Max	Typ
A	0.15	0.30	0.22
B	0.75	0.85	0.80
C	1.45	1.75	1.60
D			0.50
G	0.90	1.10	1.00
H	1.50	1.70	1.60
J	0.00	0.10	0.05
K	0.60	0.80	0.75
L	0.10	0.30	0.22
M	0.10	0.20	0.12
N	0.45	0.65	0.50
	0	8	
All Dimensions in mm			

### Maximum Ratings @ T<sub>A</sub> = 25 °C unless otherwise specified

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V <sub>CB0</sub>	-40	V
Collector-Emitter Voltage	V <sub>CE0</sub>	-40	V
Emitter-Base Voltage	V <sub>EBO</sub>	-5.0	V
Collector Current - Continuous (Note 1)	I <sub>C</sub>	-600	mA
Power Dissipation (Note 1)	P <sub>d</sub>	150	mW
Thermal Resistance, Junction to Ambient (Note 1)	R <sub>JA</sub>	833	C/W
Operating and Storage and Temperature Range	T <sub>j</sub> , T <sub>STG</sub>	-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. No purposefully added lead.

**Electrical Characteristics** @  $T_A = 25\text{ C}$  unless otherwise specified

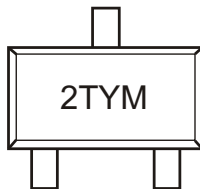
Characteristic	Symbol	Min	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 3)</b>					
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	-40		V	$I_C = -100\text{ A}, I_E = 0$
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	-40		V	$I_C = -1.0\text{mA}, I_B = 0$
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	-5.0		V	$I_E = -100\text{ A}, I_C = 0$
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 3)</b>					
DC Current Gain	$h_{FE}$	30 60 100 100 20	300		$I_C = -100\mu\text{A}, V_{CE} = -1.0\text{V}$ $I_C = -1.0\text{mA}, V_{CE} = -1.0\text{V}$ $I_C = -10\text{mA}, V_{CE} = -1.0\text{V}$ $I_C = -150\text{mA}, V_{CE} = -2.0\text{V}$ $I_C = -500\text{mA}, V_{CE} = -2.0\text{V}$
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 -1.30	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	$C_{cb}$		8.5	pF	$V_{CB} = -10\text{V}, f = 1.0\text{MHz}, I_E = 0$
Input Capacitance	$C_{eb}$		30	pF	$V_{EB} = -0.5\text{V}, f = 1.0\text{MHz}, I_C = 0$
Input Impedance	$h_{ie}$	1.5	15	k	$V_{CE} = -10\text{V}, I_C = -1.0\text{mA}, f = 1.0\text{kHz}$
Voltage Feedback Ratio	$h_{re}$	0.1	8.0	$\times 10^{-4}$	
Small Signal Current Gain	$h_{fe}$	60	500		
Output Admittance	$h_{oe}$	1.0	100	S	
Current Gain-Bandwidth Product	$f_T$	200		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 4)

Device	Packaging	Shipping
MMBT4403T-7-F	SOT-523	3000/Tape & Reel

- Notes: 3. Short duration pulse test used to minimize self-heating effect.  
4. For Packaging Details, go to our website at <http://www.diodes.com/datasheets/ap02007.pdf>.

**Marking Information**



2T = Product Type Marking Code  
YM = Date Code Marking  
Y = Year (ex: N = 2002)  
M = Month (ex: 9 = September)

Date Code Key

Year	2002	2003	2004	2005	2006	2007	2008	2009
Code	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

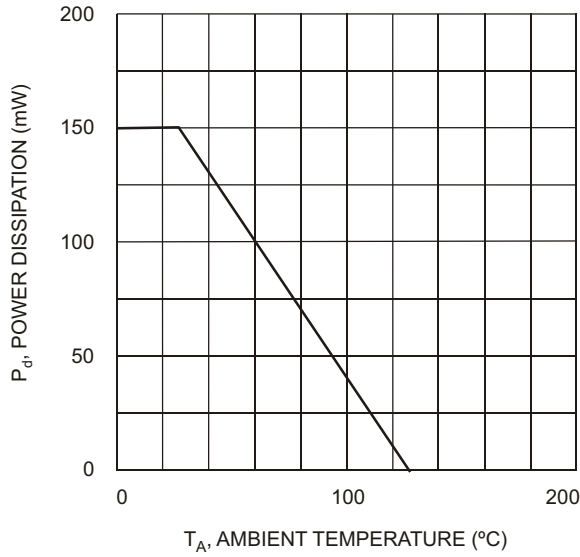


Fig. 1 Power Derating Curve, Total Package

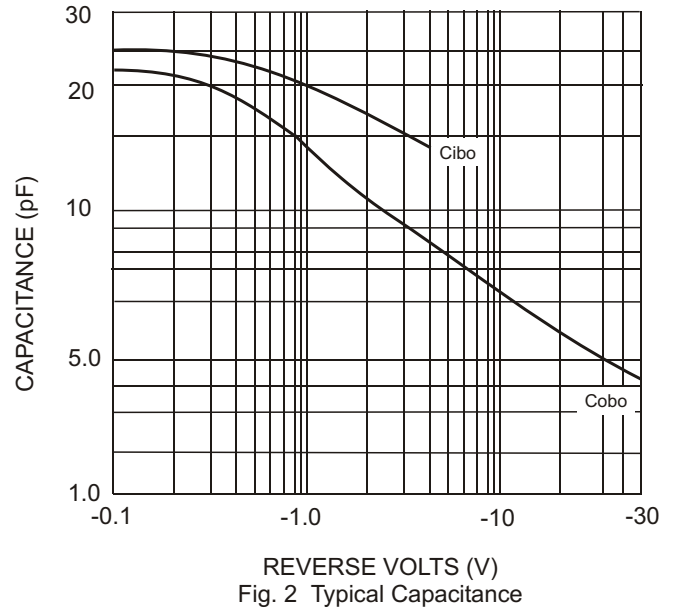


Fig. 2 Typical Capacitance

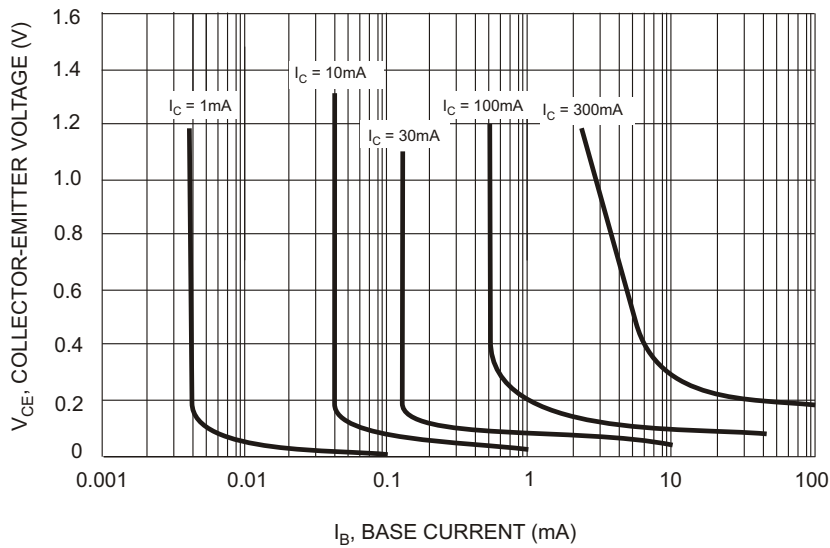


Fig. 3 Typical Collector Saturation Region

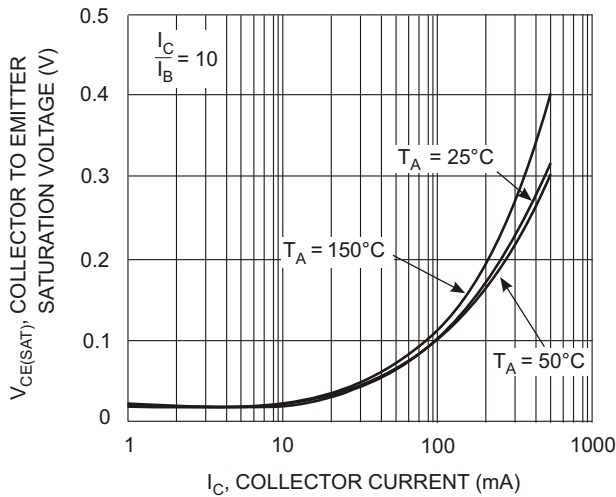


Fig. 4 Collector Emitter Saturation Voltage vs. Collector Current

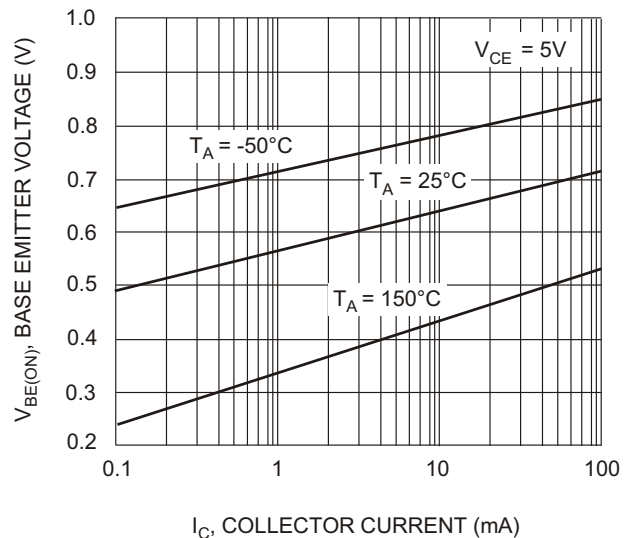


Fig. 5 Base-Emitter Voltage vs. Collector Current

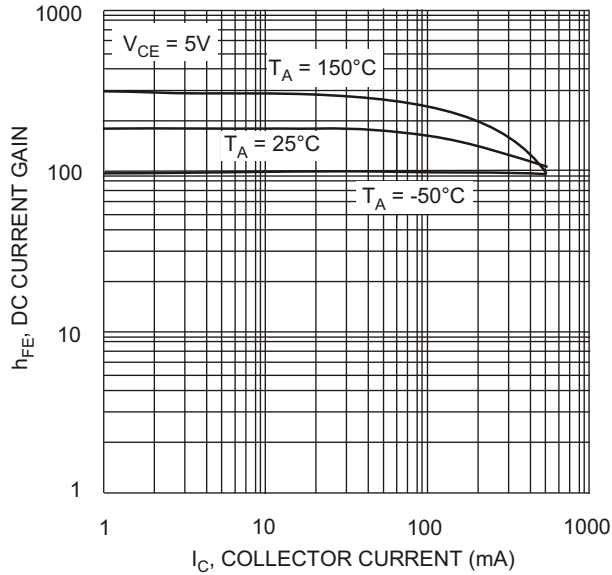


Fig. 6 DC Current Gain vs. Collector Current

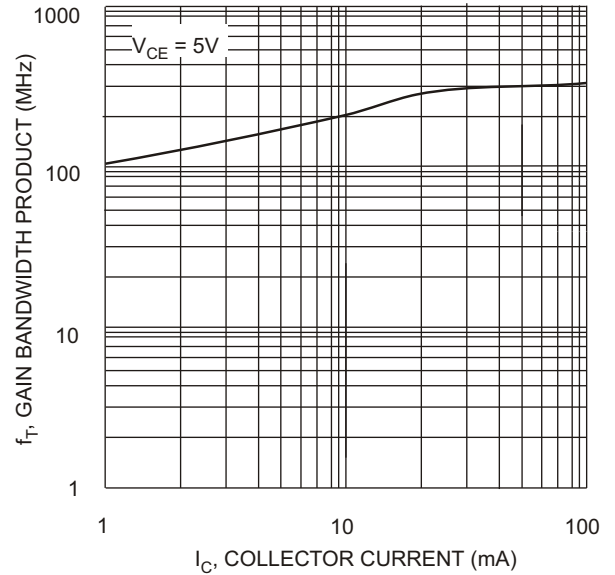


Fig. 7 Gain Bandwidth Product vs. Collector Current

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