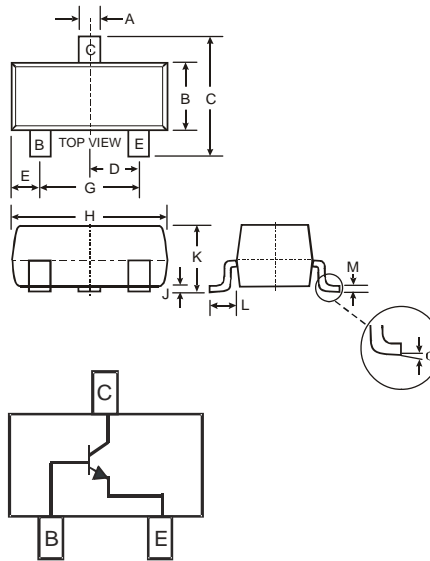


### Features

- Epitaxial Planar Die Construction
- Complementary PNP Type Available (MMBT4403)
- Ideal for Medium Power Amplification and Switching
- **Lead Free/RoHS Compliant (Note 2)**
- **Qualified to AEC-Q101 Standards for High Reliability**

### Mechanical Data

- Case: SOT-23
- Case Material: Molded Plastic. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020C
- Terminal Connections: See Diagram
- Terminals: Solderable per MIL-STD-202, Method 208
- Lead Free Plating (Matte Tin Finish annealed over Alloy 42 leadframe).
- Marking Information: See Page 4
- Ordering Information: See Page 4
- Weight: 0.008 grams (approximate)



SOT-23		
Dim	Min	Max
A	0.37	0.51
B	1.20	1.40
C	2.30	2.50
D	0.89	1.03
E	0.45	0.60
G	1.78	2.05
H	2.80	3.00
J	0.013	0.10
K	0.903	1.10
L	0.45	0.61
M	0.085	0.180
$\alpha$	0°	8°
<b>All Dimensions in mm</b>		

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

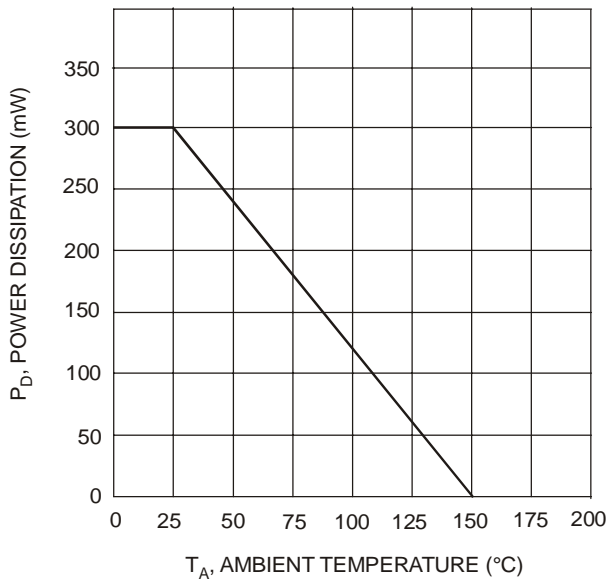
Characteristic	Symbol	Value	Unit
Collector-Base Voltage	$V_{CBO}$	60	V
Collector-Emitter Voltage	$V_{CEO}$	40	V
Emitter-Base Voltage	$V_{EBO}$	6.0	V
Collector Current - Continuous (Note 1)	$I_C$	600	mA
Power Dissipation (Note 1)	$P_d$	300	mW
Thermal Resistance, Junction to Ambient (Note 1)	$R_{\theta JA}$	417	$^\circ\text{C}/\text{W}$
Operating and Storage 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. No purposefully added lead.

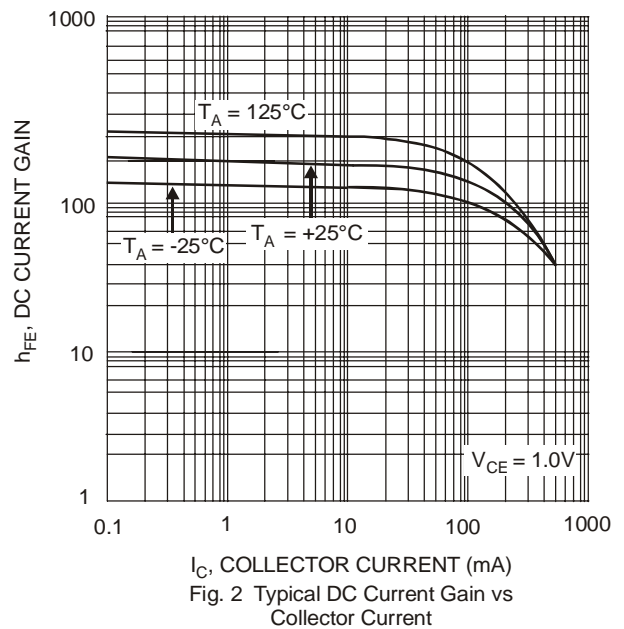
## Electrical Characteristics @T<sub>A</sub> = 25°C unless otherwise specified

Characteristic	Symbol	Min	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 3)</b>					
Collector-Base Breakdown Voltage	V <sub>(BR)CBO</sub>	60	—	V	I <sub>C</sub> = 100μA, I <sub>E</sub> = 0
Collector-Emitter Breakdown Voltage	V <sub>(BR)CEO</sub>	40	—	V	I <sub>C</sub> = 1.0mA, I <sub>B</sub> = 0
Emitter-Base Breakdown Voltage	V <sub>(BR)EBO</sub>	6.0	—	V	I <sub>E</sub> = 100μA, I <sub>C</sub> = 0
Collector Cutoff Current	I <sub>CEX</sub>	—	100	nA	V <sub>CE</sub> = 35V, V <sub>EB(OFF)</sub> = 0.4V
Base Cutoff Current	I <sub>BL</sub>	—	100	nA	V <sub>CE</sub> = 35V, V <sub>EB(OFF)</sub> = 0.4V
<b>ON CHARACTERISTICS (Note 3)</b>					
DC Current Gain	h <sub>FE</sub>	20	—	—	I <sub>C</sub> = 100μA, V <sub>CE</sub> = 1.0V
		40	—		
		80	—		
		100	300		
		40	—		
Collector-Emitter Saturation Voltage	V <sub>CE(SAT)</sub>	—	0.40 0.75	V	I <sub>C</sub> = 150mA, I <sub>B</sub> = 15mA I <sub>C</sub> = 500mA, I <sub>B</sub> = 50mA
Base-Emitter Saturation Voltage	V <sub>BE(SAT)</sub>	0.75	0.95 1.2	V	I <sub>C</sub> = 150mA, I <sub>B</sub> = 15mA I <sub>C</sub> = 500mA, I <sub>B</sub> = 50mA
<b>SMALL SIGNAL CHARACTERISTICS</b>					
Output Capacitance	C <sub>cb</sub>	—	6.5	pF	V <sub>CB</sub> = 5.0V, f = 1.0MHz, I <sub>E</sub> = 0
Input Capacitance	C <sub>eb</sub>	—	30	pF	V <sub>EB</sub> = 0.5V, f = 1.0MHz, I <sub>C</sub> = 0
Input Impedance	h <sub>ie</sub>	1.0	15	kΩ	V <sub>CE</sub> = 10V, I <sub>C</sub> = 1.0mA, f = 1.0kHz
Voltage Feedback Ratio	h <sub>re</sub>	0.1	8.0	x 10 <sup>-4</sup>	
Small Signal Current Gain	h <sub>fe</sub>	40	500	—	
Output Admittance	h <sub>oe</sub>	1.0	30	μS	
Current Gain-Bandwidth Product	f <sub>T</sub>	250	—	MHz	V <sub>CE</sub> = 10V, I <sub>C</sub> = 20mA, f = 100MHz
<b>SWITCHING CHARACTERISTICS</b>					
Delay Time	t <sub>d</sub>	—	15	ns	V <sub>CC</sub> = 30V, I <sub>C</sub> = 150mA, V <sub>BE(off)</sub> = 2.0V, I <sub>B1</sub> = 15mA
Rise Time	t <sub>r</sub>	—	20	ns	V <sub>CC</sub> = 30V, I <sub>C</sub> = 150mA, I <sub>B1</sub> = I <sub>B2</sub> = 15mA
Storage Time	t <sub>s</sub>	—	225	ns	
Fall Time	t <sub>f</sub>	—	30	ns	

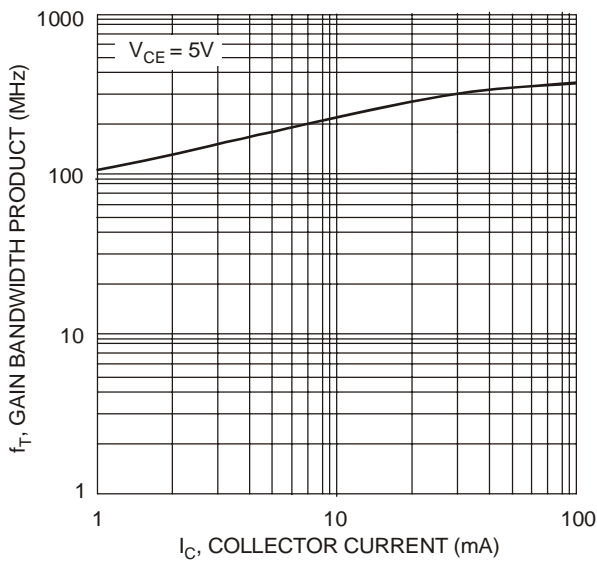
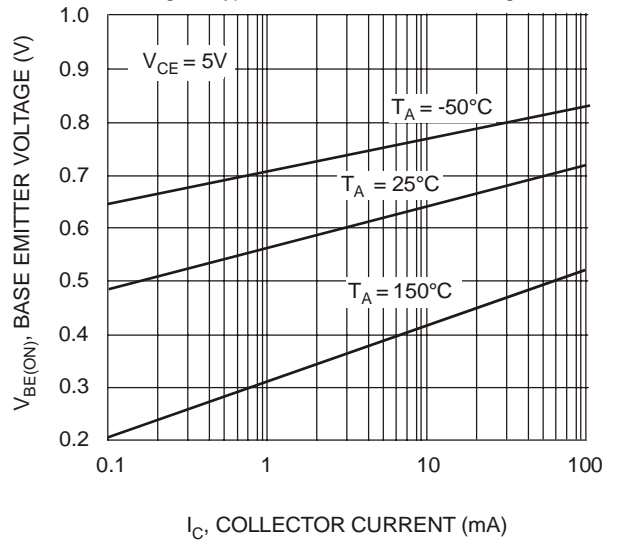
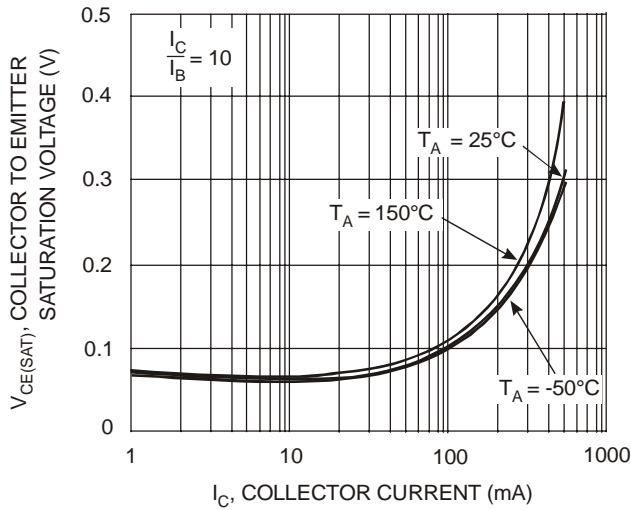
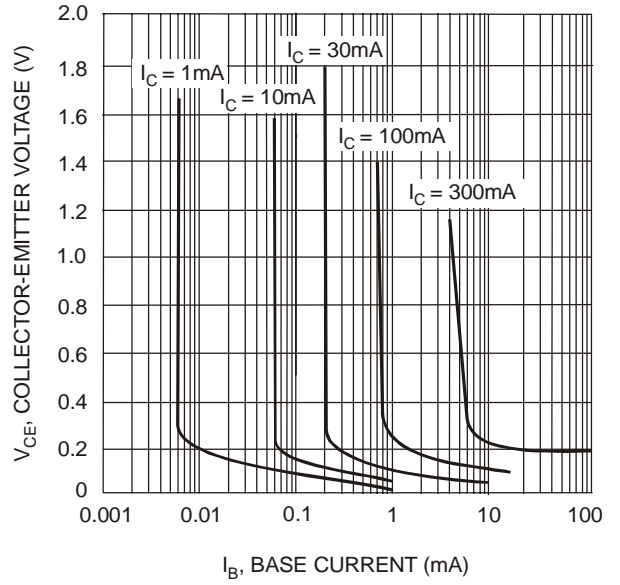
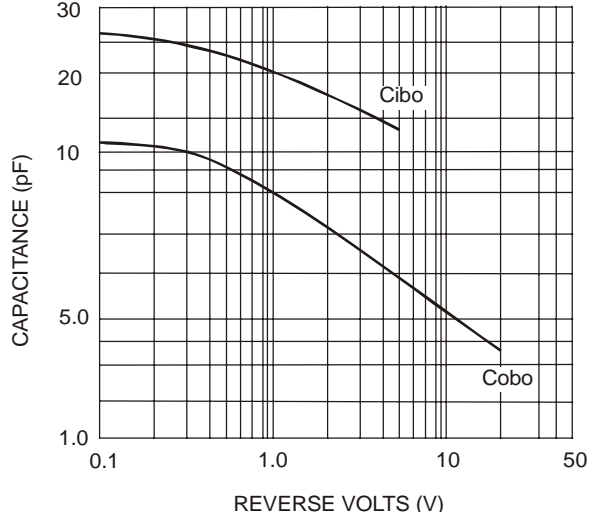
Notes: 3. Short duration pulse test used to minimize self-heating effect.



T<sub>A</sub>, AMBIENT TEMPERATURE (°C)  
Fig. 1 Max Power Dissipation vs Ambient Temperature



I<sub>C</sub>, COLLECTOR CURRENT (mA)  
Fig. 2 Typical DC Current Gain vs Collector Current

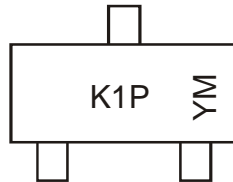


## Ordering Information (Note 4)

Device	Packaging	Shipping
MMBT4401-7-F	SOT-23	3000/Tape & Reel

Notes: 4. For Packaging Details, go to our website at <http://www.diodes.com/datasheets/ap02007.pdf>.

## 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	2010	2011	2012
Code	J	K	L	M	N	P	R	S	T	U	V	W	X	Y	Z

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

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