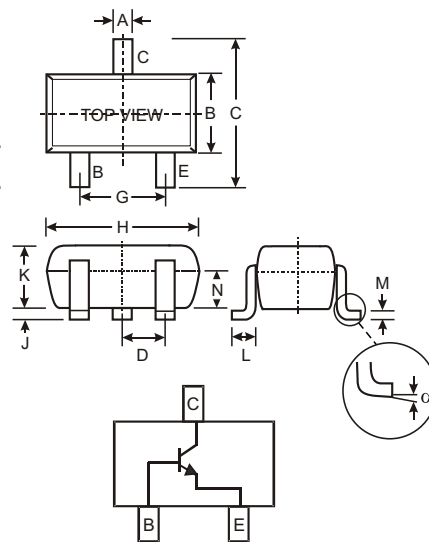


**Features**

- Epitaxial Planar Die Construction
- Complementary PNP Type Available (MMBT3906T)
- 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): 1N
- Ordering & Date Code Information, See Page 2
- Weight: 0.002 grams (approximate)



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>CBO</sub>	60	V
Collector-Emitter Voltage	V <sub>CEO</sub>	40	V
Emitter-Base Voltage	V <sub>EBO</sub>	6.0	V
Collector Current - Continuous	I <sub>C</sub>	200	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<sub>A</sub> = 25 °C unless otherwise specified

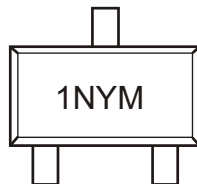
Characteristic	Symbol	Min	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 3)</b>					
Collector-Base Breakdown Voltage	V <sub>(BR)CBO</sub>	60		V	I <sub>C</sub> = 10 A, I <sub>E</sub> = 0
Collector-Emitter Breakdown Voltage	V <sub>(BR)CEO</sub>	40		V	I <sub>C</sub> = 1.0mA, I <sub>B</sub> = 0
Emitter-Base Breakdown Voltage	V <sub>(BR)EBO</sub>	6.0		V	I <sub>E</sub> = 10 A, I <sub>C</sub> = 0
Collector Cutoff Current	I <sub>CEX</sub>		50	nA	V <sub>CE</sub> = 30V, V <sub>EB(OFF)</sub> = 3.0V
Base Cutoff Current	I <sub>BL</sub>		50	nA	V <sub>CE</sub> = 30V, V <sub>EB(OFF)</sub> = 3.0V
<b>ON CHARACTERISTICS (Note 3)</b>					
DC Current Gain	h <sub>FE</sub>	40 70 100 60 30	300		I <sub>C</sub> = 100μA, V <sub>CE</sub> = 1.0V I <sub>C</sub> = 1.0mA, V <sub>CE</sub> = 1.0V I <sub>C</sub> = 10mA, V <sub>CE</sub> = 1.0V I <sub>C</sub> = 50mA, V <sub>CE</sub> = 1.0V I <sub>C</sub> = 100mA, V <sub>CE</sub> = 1.0V
Collector-Emitter Saturation Voltage	V <sub>CE(SAT)</sub>		0.20 0.30	V	I <sub>C</sub> = 10mA, I <sub>B</sub> = 1.0mA I <sub>C</sub> = 50mA, I <sub>B</sub> = 5.0mA
Base- Emitter Saturation Voltage	V <sub>BE(SAT)</sub>	0.65	0.85 0.95	V	I <sub>C</sub> = 10mA, I <sub>B</sub> = 1.0mA I <sub>C</sub> = 50mA, I <sub>B</sub> = 5.0mA
<b>SMALL SIGNAL CHARACTERISTICS</b>					
Output Capacitance	C <sub>obo</sub>		4.0	pF	V <sub>CB</sub> = 5.0V, f = 1.0MHz, I <sub>E</sub> = 0
Input Capacitance	C <sub>ibo</sub>		8.0	pF	V <sub>EB</sub> = 0.5V, f = 1.0MHz, I <sub>C</sub> = 0
Input Impedance	h <sub>ie</sub>	1.0	10	k	V <sub>CE</sub> = 10V, I <sub>C</sub> = 1.0mA, f = 1.0kHz
Voltage Feedback Ratio	h <sub>re</sub>	0.5	8.0	x 10 <sup>-4</sup>	
Small Signal Current Gain	h <sub>fe</sub>	100	400		
Output Admittance	h <sub>oe</sub>	1.0	40	S	
Current Gain-Bandwidth Product	f <sub>T</sub>	300		MHz	V <sub>CE</sub> = 20V, I <sub>C</sub> = 10mA, f = 100MHz
Noise Figure	NF		5.0	dB	V <sub>CE</sub> = 5.0Vdc, I <sub>C</sub> = 100 Adc, R <sub>S</sub> = 1.0K , f = 1.0MHz
<b>SWITCHING CHARACTERISTICS</b>					
Delay Time	t <sub>d</sub>		35	ns	V <sub>CC</sub> = 3.0V, I <sub>C</sub> = 10mA, V <sub>BE(off)</sub> = - 0.5V, I <sub>B1</sub> = 1.0mA
Rise Time	t <sub>r</sub>		35	ns	
Storage Time	t <sub>s</sub>		200	ns	V <sub>CC</sub> = 3.0V, I <sub>C</sub> = 10mA
Fall Time	t <sub>f</sub>		50	ns	I <sub>B1</sub> = I <sub>B2</sub> = 1.0mA

## Ordering Information (Note 4)

Device	Packaging	Shipping
MMBT3904T-7-F	SOT-523	3000/Tape & Reel

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

## Marking Information



1N = 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	2010	2011	2012
Code	N	P	R	S	T	U	V	W	X	Y	Z

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

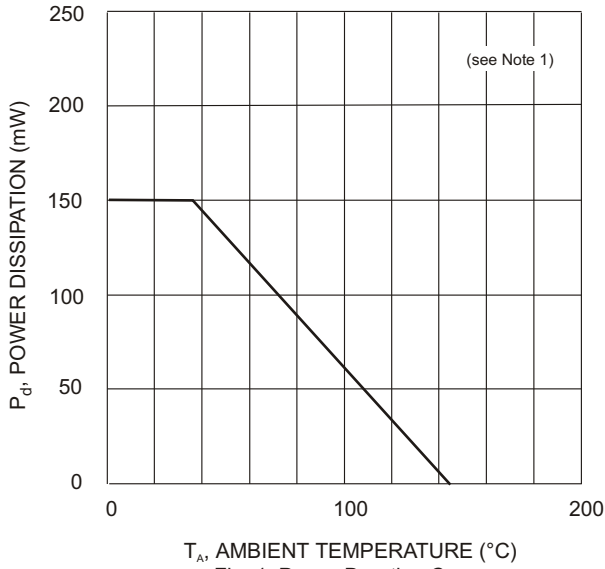


Fig. 1, Power Derating Curve

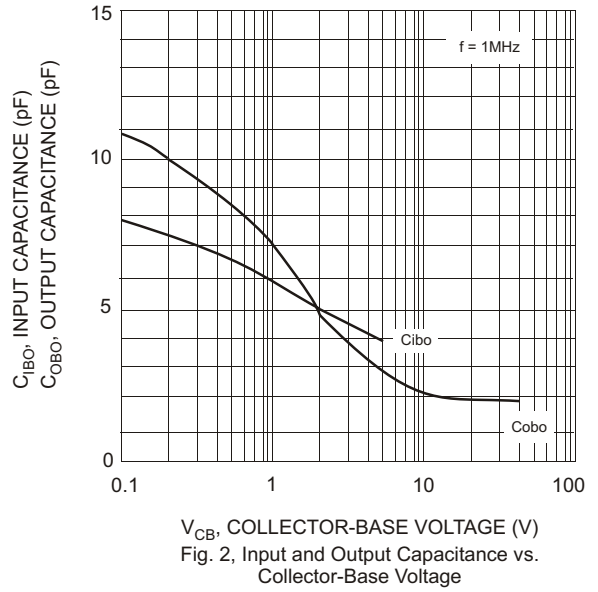


Fig. 2, Input and Output Capacitance vs. Collector-Base Voltage

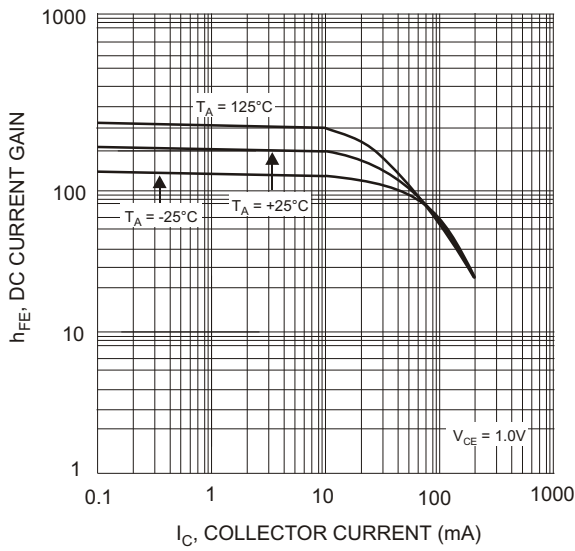


Fig. 3, Typical DC Current Gain vs. Collector Current

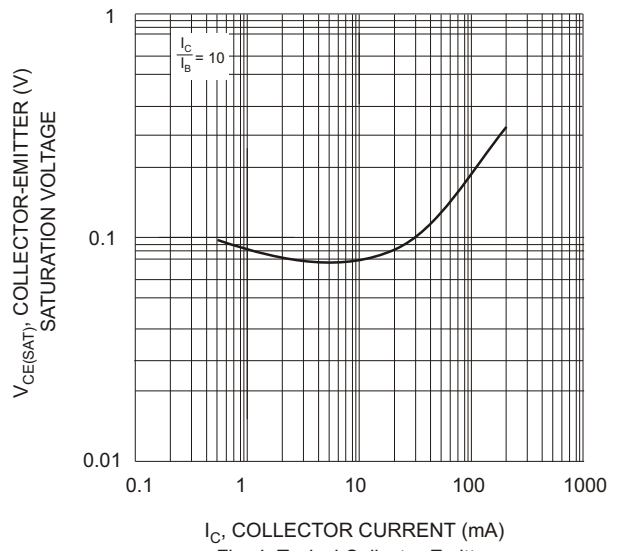


Fig. 4, Typical Collector-Emitter Saturation Voltage vs. Collector Current

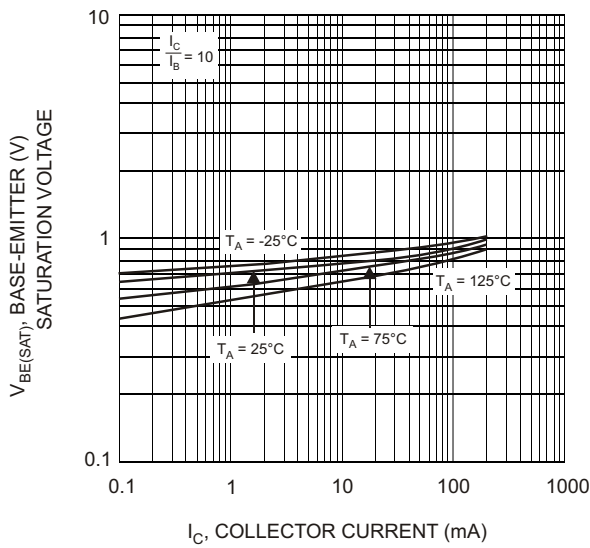


Fig. 5, Typical Base-Emitter Saturation Voltage vs. Collector Current

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