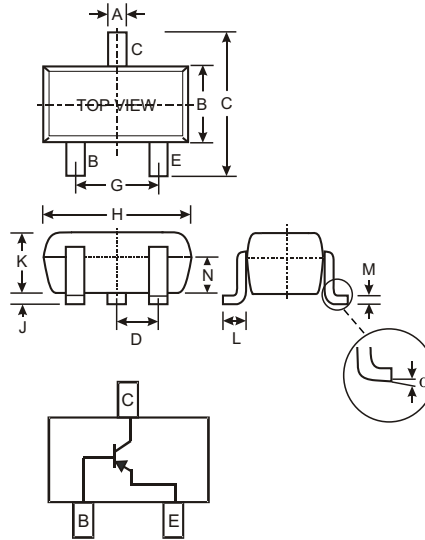


### Features

- Epitaxial Planar Die Construction
- Complementary NPN Type Available (MMBT3904T)
- 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): 3N
- 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>	-40	V
Collector-Emitter Voltage	V <sub>CEO</sub>	-40	V
Emitter-Base Voltage	V <sub>EBO</sub>	-5.0	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:
- 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>.
  - No purposefully added lead.

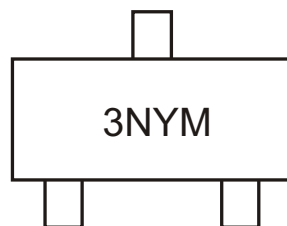
**Electrical Characteristics** @  $T_A = 25\text{ C}$  unless otherwise specified

Characteristic	Symbol	Min	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 3)</b>					
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	-40		V	$I_C = -10\text{ A}, I_E = 0$
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	$I_E = -10\text{ A}, I_C = 0$
Collector Cutoff Current	$I_{CEX}$		-50	nA	$V_{CE} = -30\text{ V}, V_{EB(OFF)} = -3.0\text{ V}$
Base Cutoff Current	$I_{BL}$		-50	nA	$V_{CE} = -30\text{ V}, V_{EB(OFF)} = -3.0\text{ V}$
<b>ON CHARACTERISTICS (Note 3)</b>					
DC Current Gain	$h_{FE}$	60 80 100 60 30	300		$I_C = -100\mu\text{A}, V_{CE} = -1.0\text{ V}$ $I_C = -1.0\text{ mA}, V_{CE} = -1.0\text{ V}$ $I_C = -10\text{ mA}, V_{CE} = -1.0\text{ V}$ $I_C = -50\text{ mA}, V_{CE} = -1.0\text{ V}$ $I_C = -100\text{ mA}, V_{CE} = -1.0\text{ V}$
Collector-Emitter Saturation Voltage	$V_{CE(SAT)}$		-0.25 -0.40	V	$I_C = -10\text{ mA}, I_B = -1.0\text{ mA}$ $I_C = -50\text{ mA}, I_B = -5.0\text{ mA}$
Base-Emitter Saturation Voltage	$V_{BE(SAT)}$	-0.65	-0.85 -0.95	V	$I_C = -10\text{ mA}, I_B = -1.0\text{ mA}$ $I_C = -50\text{ mA}, I_B = -5.0\text{ mA}$
Noise Figure	NF		4.0	dB	$V_{CE} = -5.0\text{ Vdc}, I_C = 100\text{ A}\mu\text{c}$ , $R_S = 1.0\text{ K}, f = 1.0\text{ KHz}$
<b>SMALL SIGNAL CHARACTERISTICS</b>					
Output Capacitance	$C_{obo}$		4.5	pF	$V_{CB} = -5.0\text{ V}, f = 1.0\text{ MHz}, I_E = 0$
Input Capacitance	$C_{ibo}$		10	pF	$V_{EB} = -0.5\text{ V}, f = 1.0\text{ MHz}, I_C = 0$
Input Impedance	$h_{ie}$	2.0	12	k	$V_{CE} = 1.0\text{ V}, I_C = 10\text{ mA},$ $f = 1.0\text{ kHz}$
Voltage Feedback Ratio	$h_{re}$	0.1	10	$\times 10^{-4}$	
Small Signal Current Gain	$h_{fe}$	100	400		
Output Admittance	$h_{oe}$	3.0	60	S	
Current Gain-Bandwidth Product	$f_T$	250		MHz	$V_{CE} = -20\text{ V}, I_C = -10\text{ mA},$ $f = 100\text{ MHz}$
<b>SWITCHING CHARACTERISTICS</b>					
Delay Time	$t_d$		35	ns	$V_{CC} = -3.0\text{ V}, I_C = -10\text{ mA},$ $V_{BE(off)} = 0.5\text{ V}, I_{B1} = -1.0\text{ mA}$
Rise Time	$t_r$		35	ns	
Storage Time	$t_s$		225	ns	$V_{CC} = -3.0\text{ V}, I_C = -10\text{ mA},$ $I_{B1} = I_{B2} = -1.0\text{ mA}$
Fall Time	$t_f$		75	ns	

**Ordering Information** (Note 4)

Device	Packaging	Shipping
MMBT3906T-7-F	SOT-523	3000/Tape & Reel

- Note: 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**


3N = 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

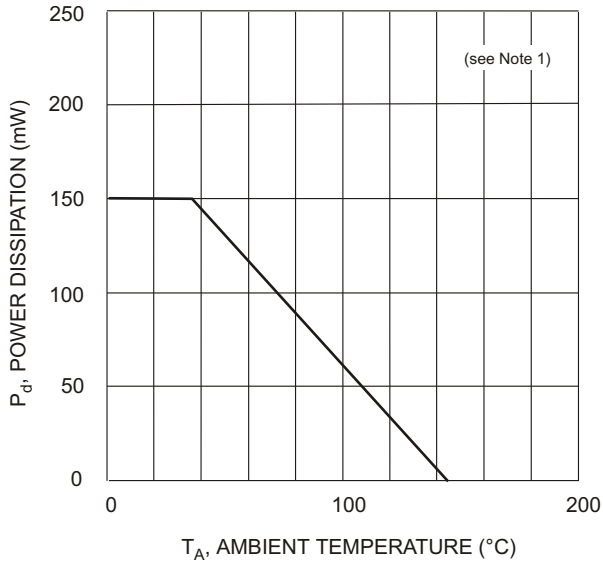


Fig. 1, Power Derating Curve

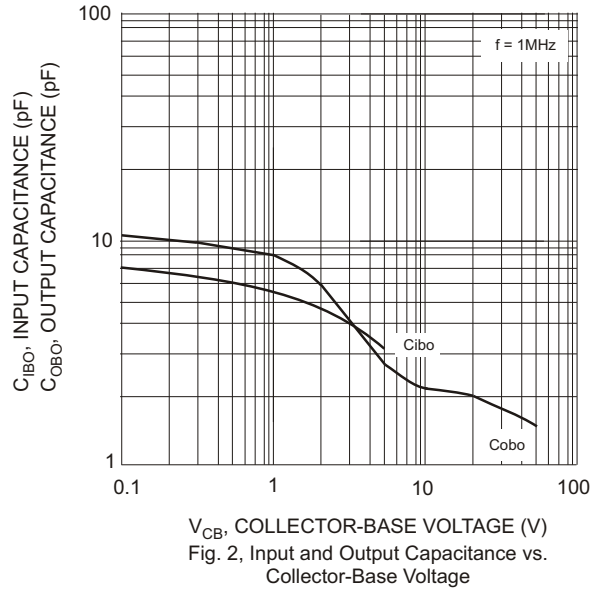


Fig. 2, Input and Output Capacitance vs. Collector-Base Voltage

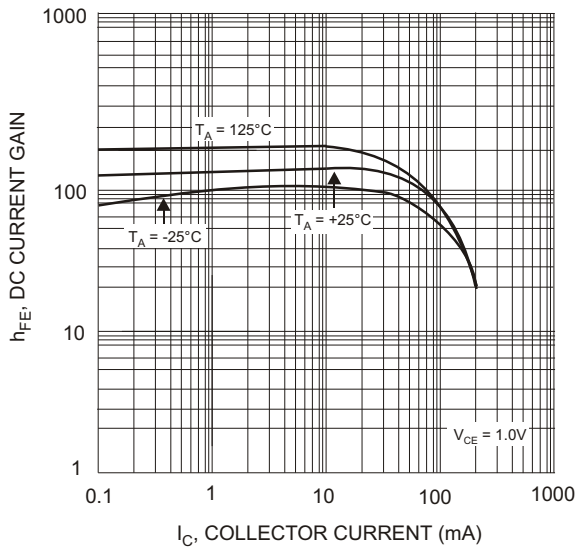


Fig. 3, Typical DC Current Gain vs. Collector Current

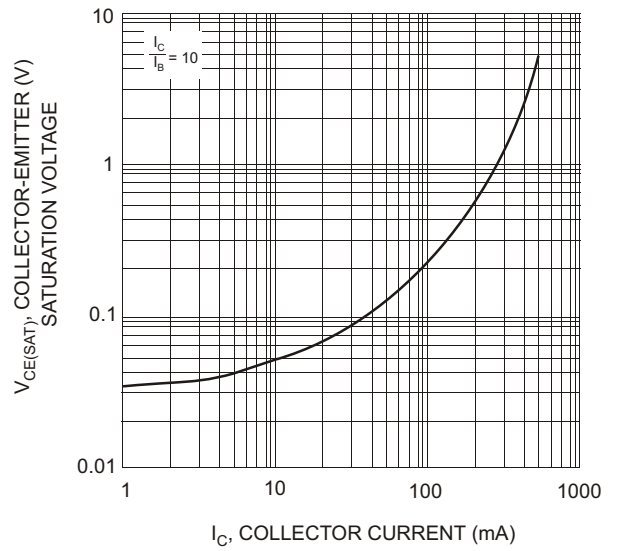


Fig. 4, Typical Collector-Emitter Saturation Voltage vs. Collector Current

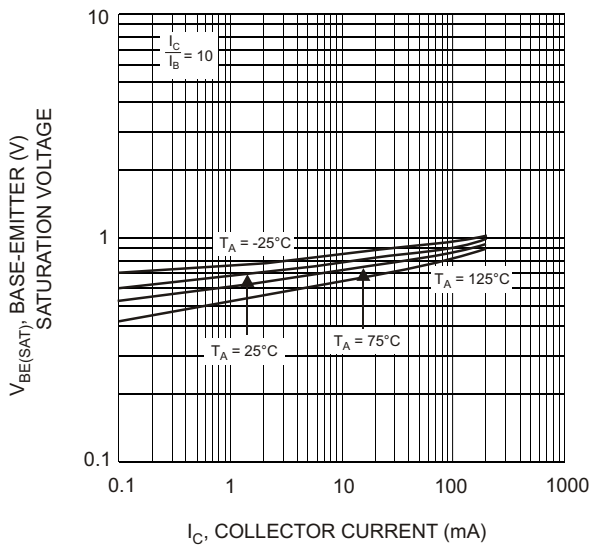


Fig. 5, Typical Base-Emitter Saturation Voltage vs. Collector Current

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