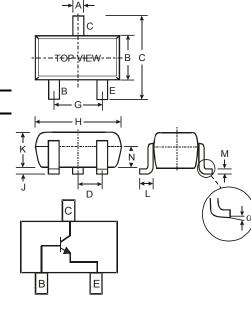


### Features

- Epitaxial Planar Die Construction
- Complementary PNP Type Available (MMBT3906T)
- Ultra-Small Surface Mount Package
- Lead Free/RoHS Compliant (Note 2)
- "Green" Device (Note 3 and 4)

## 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 Information: 1N, See Page 3
- Ordering & Date Code Information: See Page 3
- Weight: 0.002 grams (approximate)



SOT-523									
Dim	Min	Max	Тур						
Α	0.15	0.30	0.22						
в	0.75	0.85	0.80						
С	1.45	1.75	1.60						
D			0.50						
G	0.90	1.10	1.00						
Н	1.50	1.70	1.60						
J	0.00	0.10	0.05						
к	0.60	0.80	0.75						
L	L 0.10 0.30								
М	<b>M</b> 0.10		0.12						
Ν	0.45	0.65	0.50						
α	0°	8°							
Ali D	imens	ions 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	Ic	200	mA
Power Dissipation (Note 1)	Pd	150	mW
Thermal Resistance, Junction to Ambient (Note 1)	$R_{ ext{ heta}JA}$	833	°C/W
Operating and Storage 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

3. Diodes Inc.'s "Green" policy can be found on our website at http://www.diodes.com/products/lead\_free/index.php.

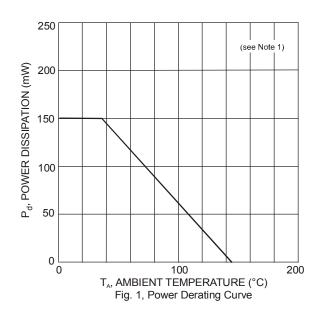
4. Product manufactured with Date Code UO (week 40, 2007) and newer are built with Green Molding Compound. Product manufactured prior to Date Code UO are built with Non-Green Molding Compound and may contain Halogens or Sb2O3 Fire Retardants.

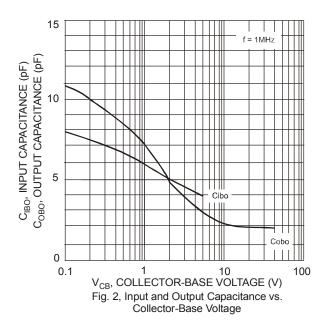


# **Electrical Characteristics** @T<sub>A</sub> = 25°C unless otherwise specified

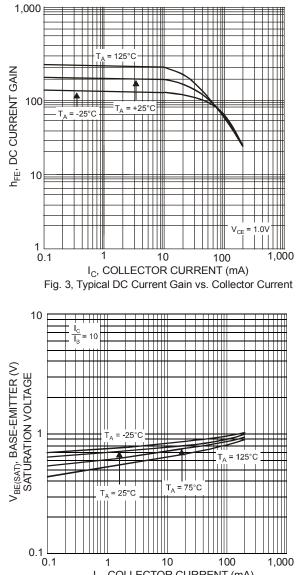
Characteristic	Symbol	Min	Max	Unit	Test Condition			
OFF CHARACTERISTICS (Note 5)					-			
Collector-Base Breakdown Voltage	V <sub>(BR)CBO</sub>	60	_	V	$I_{\rm C} = 10 \mu A, I_{\rm E} = 0$			
Collector-Emitter Breakdown Voltage	V <sub>(BR)CEO</sub>	40	_	V	I <sub>C</sub> = 1.0mA, I <sub>B</sub> = 0			
Emitter-Base Breakdown Voltage	V <sub>(BR)EBO</sub>	6.0	_	V	$I_{E} = 10 \mu A, I_{C} = 0$			
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			
ON CHARACTERISTICS (Note 5)	•				·			
DC Current Gain	h <sub>FE</sub>	40 70 100 60 30	 300 		$I_{C} = 100\mu A, V_{CE} = 1.0V$ $I_{C} = 1.0mA, V_{CE} = 1.0V$ $I_{C} = 10mA, V_{CE} = 1.0V$ $I_{C} = 50mA, V_{CE} = 1.0V$ $I_{C} = 100mA, V_{CE} = 1.0V$			
Collector-Emitter Saturation Voltage	V <sub>CE(SAT)</sub>		0.20 0.30	V	$I_{C}$ = 10mA, $I_{B}$ = 1.0mA $I_{C}$ = 50mA, $I_{B}$ = 5.0mA			
Base-Emitter Saturation Voltage	VBE(SAT)	0.65	0.85 0.95	V	$I_{C}$ = 10mA, $I_{B}$ = 1.0mA $I_{C}$ = 50mA, $I_{B}$ = 5.0mA			
SMALL SIGNAL CHARACTERISTICS								
Output Capacitance	C <sub>obo</sub>	_	4.0	pF	V <sub>CB</sub> = 5.0V, f = 1.0MHz, I <sub>E</sub> = 0			
nput Capacitance	C <sub>ibo</sub>	_	8.0	pF	V <sub>EB</sub> = 0.5V, f = 1.0MHz, I <sub>C</sub> = 0			
nput Impedance	h <sub>ie</sub>	1.0	10	kΩ				
/oltage Feedback Ratio	h <sub>re</sub>	0.5	8.0	x 10 <sup>-4</sup>	V <sub>CE</sub> = 10V, I <sub>C</sub> = 1.0mA,			
Small Signal Current Gain	h <sub>fe</sub>	100	400		f = 1.0kHz			
Dutput Admittance	h <sub>oe</sub>	1.0	40	μS				
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	$V_{CE}$ = 5.0Vdc, I <sub>C</sub> = 100µAdc, R <sub>S</sub> = 1.0KΩ, f = 1.0MHz			
SWITCHING CHARACTERISTICS	•		·	·				
Delay Time	t <sub>d</sub>	_	35	ns	V <sub>CC</sub> = 3.0V, I <sub>C</sub> = 10mA,			
Rise Time	tr		35	ns	V <sub>BE(off)</sub> = - 0.5V, I <sub>B1</sub> = 1.0mA			
Storage Time	ts		200	ns	V <sub>CC</sub> = 3.0V, I <sub>C</sub> = 10mA			
Fall Time	t <sub>f</sub>		50	ns	$I_{B1} = I_{B2} = 1.0 \text{mA}$			

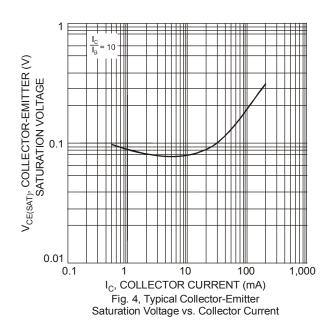
Notes: 5. Short duration pulse test used to minimize self-heating effect.











Ordering	Information	(Note 6)
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Device	Packaging	Shipping
MMBT3904T-7-F	SOT-523	3000/Tape & Reel

Notes: 6. For packaging details, go to our website at http://www.diodes.com/datasheets/ap02007.pdf.

I<sub>C</sub>, COLLECTOR CURRENT (mA) Fig. 5, Typical Base-Emitter Saturation Voltage vs. Collector Current

## **Marking Information**



1N = Product Type Marking Code YM = Date Code Marking Y = Year (ex: N = 2002) M = Month (ex: 9 = September)

Date	Code	Key

Month Code	Jan	Fe	b	Mar	Apr 4	May	Ju	n	Jul	Aug	Sep	Oc	t I	Nov N	Dec
														- 1	_
Code	J	К	L	М	Ν	Р	R	S	Т	U	V	W	Х	Y	Z
Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Date Code Key															



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