

60V, NPN General-Purpose Transistor

FEATURES

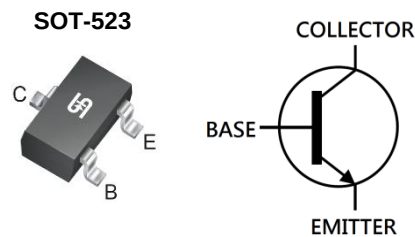
- Complementary PNP Type: MMBT3906T
- Epitaxial Planar Type
- $V_{CEO} > 40V$
- $I_C = 200mA$ Collector Current
- RoHS Compliant
- Halogen-free according to IEC 61249-2-21

KEY PERFORMANCE PARAMETERS

PARAMETER		VALUE	UNIT
V_{CBO}		60	V
V_{CEO}		40	V
I_C		200	mA
$V_{CE(sat)}$	$I_C = 10mA, I_B = 1mA$	0.2	V

APPLICATION

- Consumer electronics
- Low frequency amplifier
- Driver



Notes: MSL 1 (Moisture Sensitivity Level) per J-STD-020

ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ C$ unless otherwise noted)

PARAMETER	SYMBOL	VALUE	UNIT
Collector-Base Voltage	V_{CBO}	60	V
Collector-Emitter Voltage	V_{CEO}	40	V
Emitter-Base Voltage	V_{EBO}	6	V
Collector Current	I_C	200	mA
Power Dissipation	P_D	150	mW
Junction temperature	T_J	-55 to +150	$^\circ C$
Storage temperature	T_{STG}	-55 to +150	$^\circ C$

THERMAL PERFORMANCE

PARAMETER	SYMBOL	TYP	UNIT
Junction-to-ambient thermal resistance	$R_{\theta JA}$	397	$^\circ C/W$

Thermal Performance Note: Units mounted on PCB (10mm x 5mm Cu pad test board)

ELECTRICAL SPECIFICATIONS ($T_A = 25^\circ\text{C}$ unless otherwise noted)

PARAMETER	CONDITIONS	SYMBOL	MIN	TYP	MAX	UNIT
Static ⁽¹⁾						
Collector-Emitter Breakdown Voltage	I _C = 1.0mA, I _B = 0A	V _{(BR)CEO}	40	-	-	V
Collector-Base Breakdown Voltage	I _C = 10μA, I _E = 0A	V _{(BR)CBO}	60	-	-	V
Emitter-Base Breakdown Voltage	I _E = 10μA, I _C = 0A	V _{(BR)EBO}	6	-	-	V
Emitter Cut-Off Current	V _{CB} = 30V, I _E = 0A	I _{CBO}	-	-	50	nA
Collector Cut-Off Current	V _{EB} = 5V, I _E = 0A	I _{EBO}	-	-	50	nA
Collector-Emitter Saturation Voltage	I _C = 10mA, I _B = 1.0mA	V _{CE(sat)}	-	-	0.2	V
	I _C = 50mA, I _B = 5.0mA		-	-	0.3	V
Base-Emitter Saturation Voltage	I _C = 10mA, I _B = 1.0mA	V _{BE(sat)}	0.65	-	0.85	V
	I _C = 50mA, I _B = 5.0mA		-	-	0.95	V
Output Capacitance	V _{CB} = 5.0V, I _E = 0, f = 1MHz	C _{obo}	-	-	4	pF
Input Capacitance	V _{EB} = 0.5V, I _C = 0, f = 1MHz	C _{ibo}	-	-	8	pF
DC Current Gain	I _C = 0.1mA, V _{CE} = 1.0V	h _{FE}	40	-	-	-
	I _C = 1.0mA, V _{CE} = 1.0V		70	-	-	
	I _C = 10mA, V _{CE} = 1.0V		100	-	300	
	I _C = 50mA, V _{CE} = 1.0V		60	-	-	
	I _C = 100mA, V _{CE} = 1.0V		30	-	-	
Dynamic ⁽²⁾						
Transition Frequency	I _C = 10mA, V _{CE} = 20V, f = 100MHz	f _T	300	-	-	MHz
Delay Time	V _{CC} = 3.0V, V _{BE(OFF)} = -0.5V I _C = 10mA, I _{B1} = 1.0mA	t _d	-	-	35	ns
Rise Time		t _r	-	-	35	ns
Storage Time	V _{CC} = 3.0V, I _C = 10mA I _{B1} = I _{B2} = 1.0mA	t _s	-	-	200	ns
Fail Tome		t _f	-	-	50	ns

Notes:

1. Pulse test: $\leq 380\mu\text{s}$, duty cycle $\leq 2\%$
2. For DESIGN AID ONLY, not subject to production testing

ORDERING INFORMATION

ORDERING CODE	PACKAGE	PACKING
MMBT3904T RSG	SOT-523	3,000 / 7" Tape & Reel

CHARACTERISTICS CURVES

($T_A = 25^\circ\text{C}$ unless otherwise noted)

Fig.1 Collector-Emitter Saturation Voltage vs. Collector Current

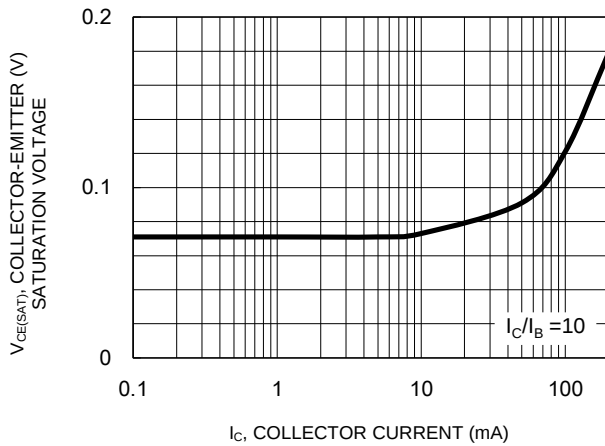


Fig.2 Base-Emitter Saturation Voltage vs. Collector Current

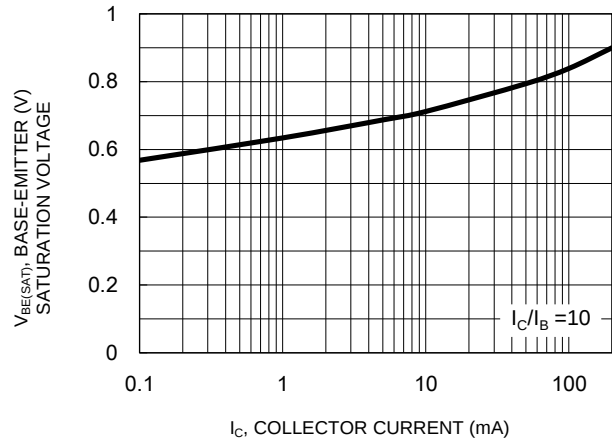


Fig.3 DC Current Gain vs. Collector Current

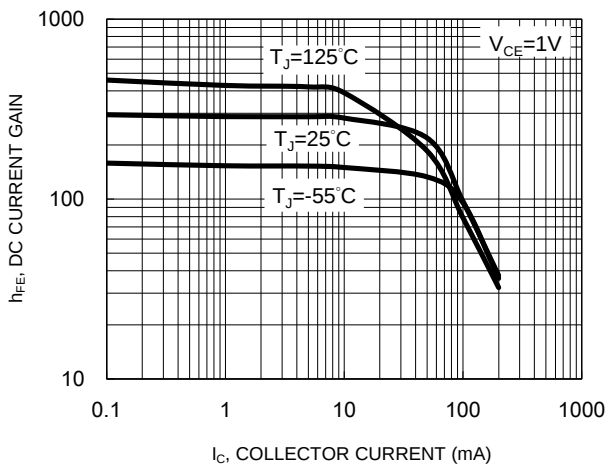


Fig.4 Input and Output Capacitance vs. Bias Voltage

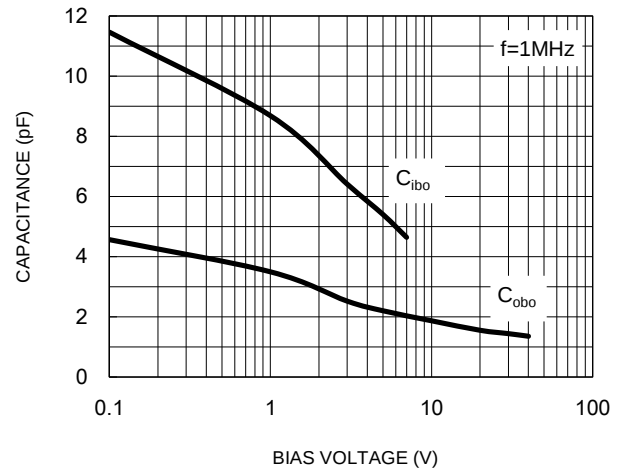
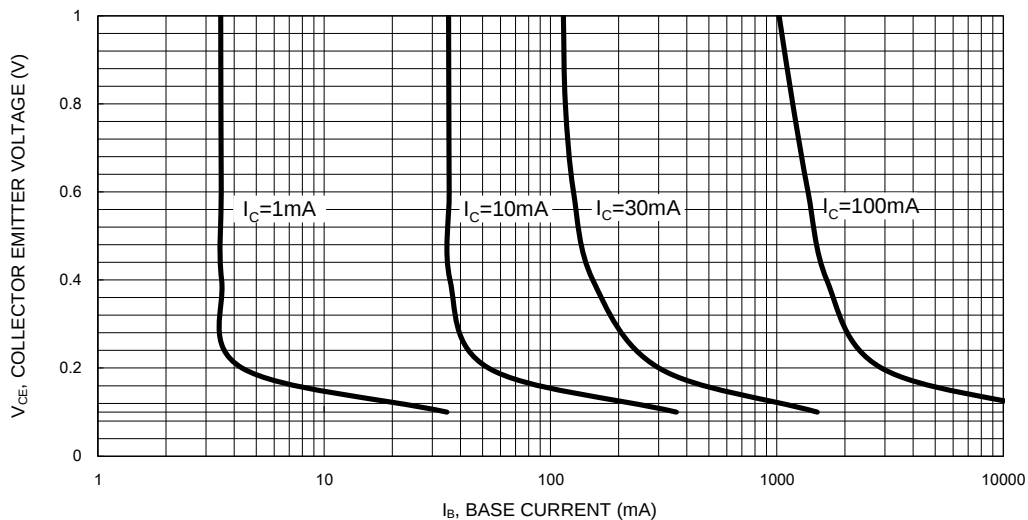
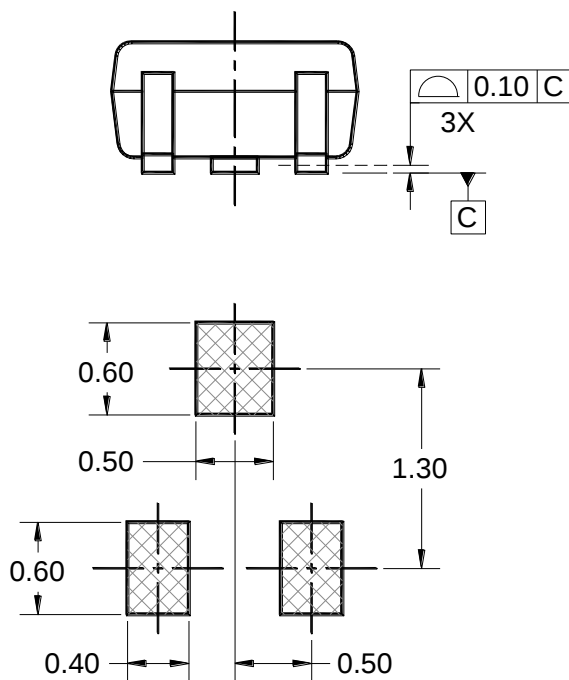
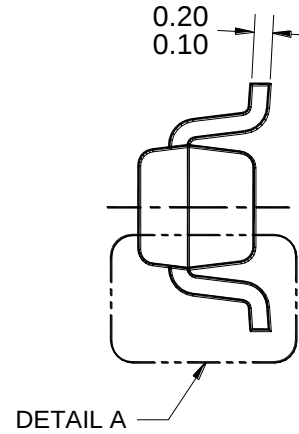
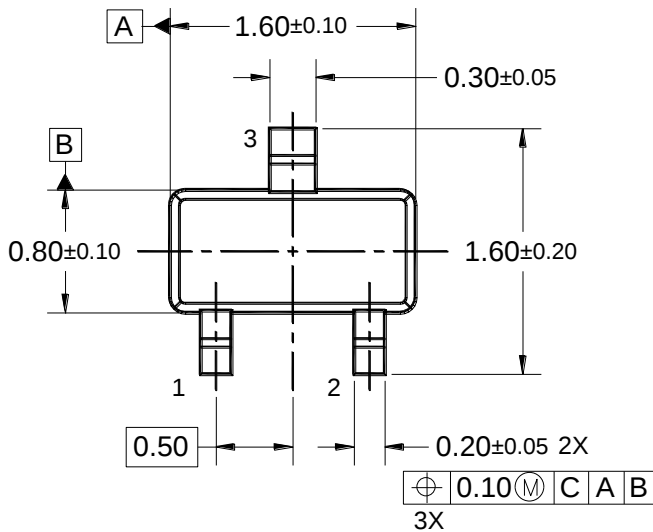


Fig.5 Collector Saturation Region



PACKAGE OUTLINE DIMENSIONS

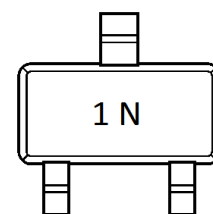
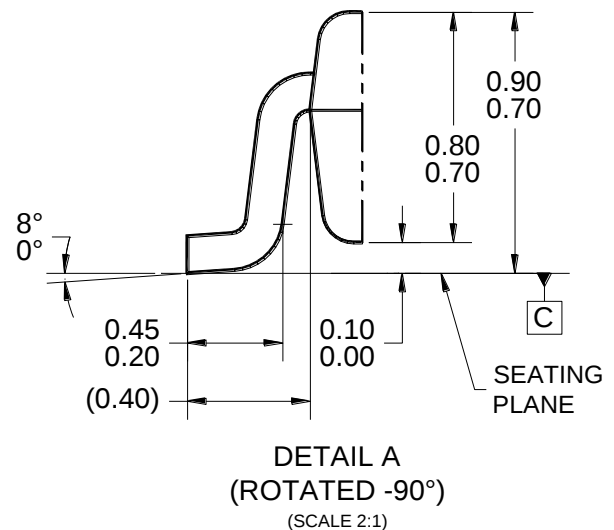
SOT-523



SUGGESTED PAD LAYOUT

NOTES: UNLESS OTHERWISE SPECIFIED

1. ALL DIMENSIONS ARE IN MILLIMETERS.
2. DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994.
3. PACKAGE OUTLINE REFERENCE: EIAJ ED-7500A, SC-75.
4. MOLDED PLASTIC BODY DIMENSIONS DO NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS.
5. DWG NO. REF: HQ2SD07-SOT523-029 REV A.



MARKING DIAGRAM

1N = MARKING CODE

Notice

Specifications of the products displayed herein are subject to change without notice. TSC or anyone on its behalf assumes no responsibility or liability for any errors or inaccuracies.

Purchasers are solely responsible for the choice, selection, and use of TSC products and TSC assumes no liability for application assistance or the design of Purchasers' products.

Information contained herein is intended to provide a product description only. No license, express or implied, to any intellectual property rights is granted by this document. Except as provided in TSC's terms and conditions of sale for such products, TSC assumes no liability whatsoever, and disclaims any express or implied warranty, relating to sale and/or use of TSC products including liability or warranties relating to fitness for a particular purpose, merchantability, or infringement of any patent, copyright, or other intellectual property right.

The products shown herein are not designed for use in medical, life-saving, or life-sustaining applications. Customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify TSC for any damages resulting from such improper use or sale.