



# MMBT3906W

PNP GENERAL PURPOSE SWITCHING TRANSISTOR

**Voltage Range 40 Volts**  
**Power 150 Watts**

## Features

- \* PNP epitaxial silicon, planar design
- \* Collector-emitter voltage  $V_{CE} = -40V$
- \* Collector current  $I_C = -200mA$
- \* Both normal and Pb free product are available :  
Normal : 80~95% Sn, 5~20% Pb  
Pb free: 98.5% Sn above

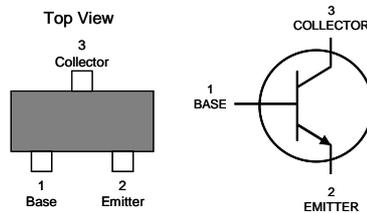
## Mechanical Data

Case: SOT-323, Plastic

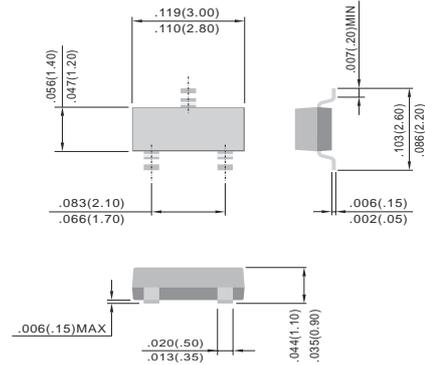
Terminals: Solderable per MIL-STD-202, Method 208

Approx. Weight: 0.0052 gram

Marking: S2A



SOT-23



Dimensions in millimeters

## ABSOLUTE RATINGS

PARAMETER	Symbol	Value	Units
Collector - Emitter Voltage	$V_{CE0}$	-40	V
Collector - Base Voltage	$V_{CB0}$	-40	V
Emitter - Base Voltage	$V_{EB0}$	-5.0	V
Collector Current - Continuous	$I_C$	-200	mA

## THERMAL CHARACTERISTICS

PARAMETER	Symbol	Value	Units
Max Power Dissipation (Note 1)	$P_{TOT}$	150	mW
Thermal Resistance , Junction to Ambient	$R_{\theta JA}$	833	$^{\circ}C/W$
Junction Temperature	$T_J$	-55 to 150	$^{\circ}C$
Storage Temperature	$T_{STG}$	-55 to 150	$^{\circ}C$

**NOTE:**

1. Transistor mounted on FR-5 board 1.0 x 0.75 x 0.062 in.



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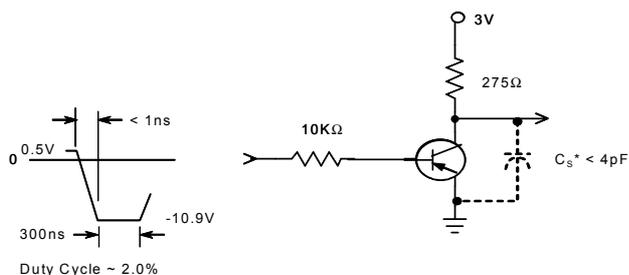
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## ELECTRICAL CHARACTERISTICS

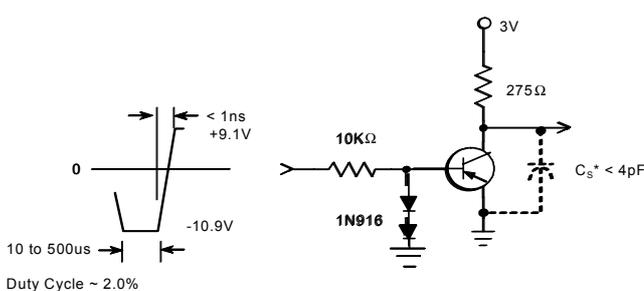
PARAMETER	Symbol	Test Condition	MIN.	TYP.	MAX.	Units
Collector - Emitter Breakdown Voltage	$V_{(BR)CEO}$	$I_C = -1.0\text{mA}, I_B = 0$	-40	-	-	V
Collector - Base Breakdown Voltage	$V_{(BR)CBO}$	$I_C = -10\mu\text{A}, I_E = 0$	-40	-	-	V
Emitter - Base Breakdown Voltage	$V_{(BR)EBO}$	$I_E = -10\mu\text{A}, I_C = 0$	-5.0	-	-	V
Base Cutoff Current	$I_{BL}$	$V_{CE} = -30\text{V}, V_{EB} = -3.0\text{V}$			-50	nA
Collector Cutoff Current	$I_{cEX}$	$V_{CE} = -30\text{V}, V_{EB} = -3.0\text{V}$			-50	nA
DC Current Gain (Note 2)	$h_{FE}$	$I_C = -0.1\text{mA}, V_{CE} = -1.0\text{V}$ $I_C = -1.0\text{mA}, V_{CE} = -1.0\text{V}$ $I_C = -10\text{mA}, V_{CE} = -1.0\text{V}$ $I_C = -50\text{mA}, V_{CE} = -1.0\text{V}$ $I_C = -100\text{mA}, V_{CE} = -1.0\text{V}$	60 80 100 60 30	- - - - -	- - 300 - -	-
Collector - Emitter Saturation Voltage (Note 2)	$V_{CE(SAT)}$	$I_C = -10\text{mA}, I_B = -1.0\text{mA}$ $I_C = -50\text{mA}, I_B = -5.0\text{mA}$	-	-	-0.25 -0.4	V
Base - Emitter Saturation Voltage (Note 2)	$V_{BE(SAT)}$	$I_C = -10\text{mA}, I_B = -1.0\text{mA}$ $I_C = -50\text{mA}, I_B = -5.0\text{mA}$	-0.65 -	- -	-0.85 -0.95	V
Collector - Base Capacitance	$C_{CBO}$	$V_{CB} = -5\text{V}, I_E = 0, f = 1\text{MHz}$	-	-	45	pF
Emitter - Base Capacitance	$C_{EBO}$	$V_{CB} = -0.5\text{V}, I_C = 0, f = 1\text{MHz}$	-	-	10	pF
Delay Time	$t_d$	$V_{CC} = -3\text{V}, V_{BE} = -0.5\text{V}, I_C = -10\text{mA}, I_B = -1.0\text{mA}$	-	-	35	ns
Rise Time	$t_r$	$V_{CC} = -3\text{V}, V_{BE} = -0.5\text{V}, I_C = -10\text{mA}, I_B = -1.0\text{mA}$	-	-	35	ns
Storage Time	$t_s$	$V_{CC} = -3\text{V}, I_C = -10\text{mA}, I_{B1} = I_{B2} = -1.0\text{mA}$	-	-	225	ns
Fall Time	$t_f$	$V_{CC} = -3\text{V}, I_C = -10\text{mA}, I_{B1} = I_{B2} = -1.0\text{mA}$	-	-	75	ns

Note 2: Pulse Test: Pulse Width < 300 us, Duty Cycle < 2.0%.

## SWITCHING TIME EQUIVALENT TEST CIRCUITS



Delay and Rise Time Equivalent Test Circuit



Storage and Fall Time Equivalent Test Circuit



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## ELECTRICAL CHARACTERISTICS CURVE

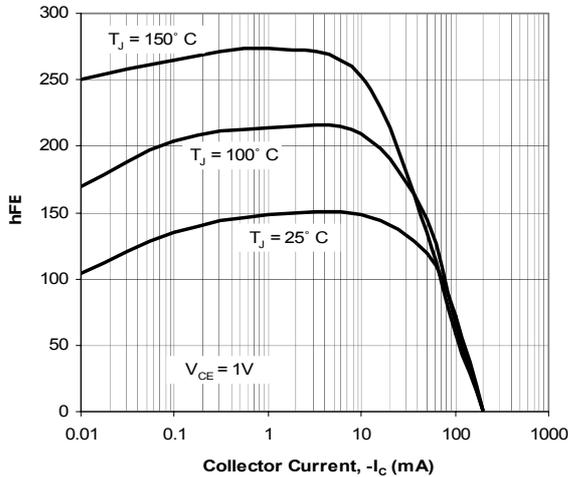


Fig. 1. Typical  $h_{FE}$  vs. Collector Current

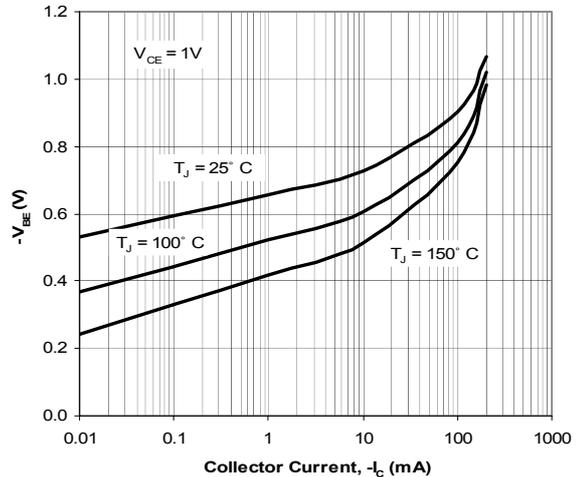


Fig. 2. Typical  $V_{BE}$  vs. Collector Current

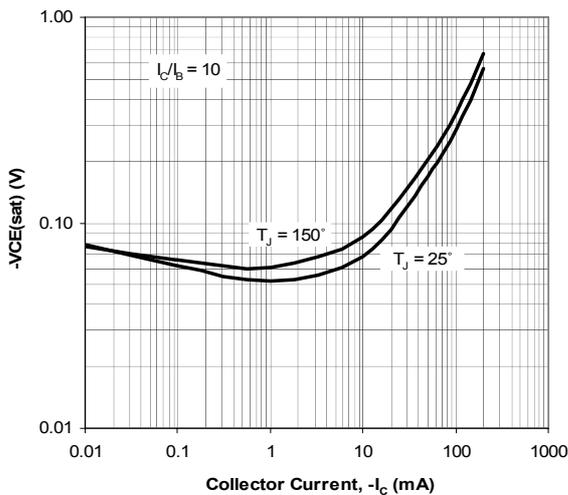


Fig. 3. Typical  $V_{CE(sat)}$  vs. Collector Current

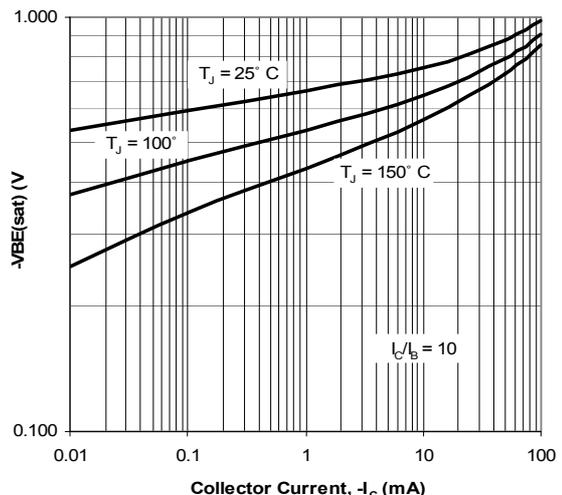


Fig. 4. Typical  $V_{BE(sat)}$  vs. Collector Current

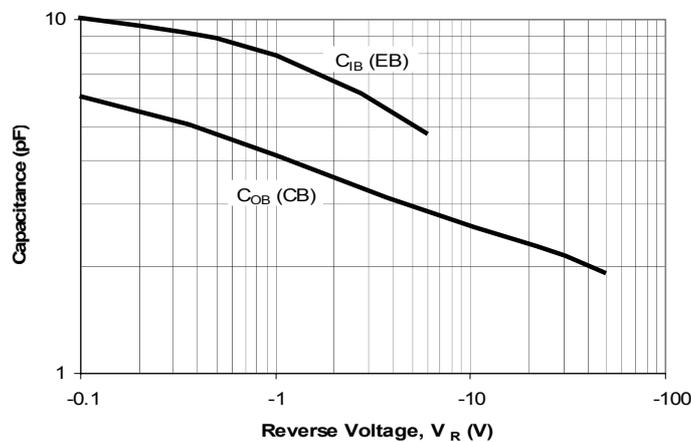


Fig. 5. Typical Capacitances vs. Reverse Voltage

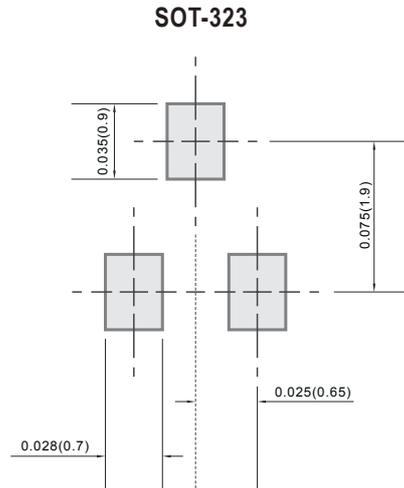


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## Mounting Pad Layout



Dimensions in millimeters

## Order Information

Packing information

T/R - 12K per 13" plastic Reel

T/R - 3.0K per 7" plastic Reel

## Legal Statement

### \* Important Notice

This information is intended to unambiguously characterize the product in order to facilitate the customer's evaluation of the device in the application. The information will help the customer's technical experts determine that the device is compatible and interchangeable with similar devices made by other vendors. The information in this data sheet is believed to be reliable and accurate. The specifications and information herein are subject to change without notice. New products and improvements in products and product characterization are constantly in process. Therefore, the factory should be consulted for the most recent information and for any special characteristics not described or specified.

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