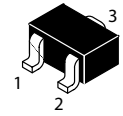
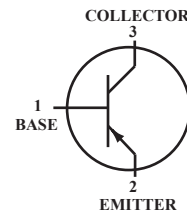


General Purpose Transistor

PNP Silicon

 **Lead(Pb)-Free**


SOT-323(SC-70)

Maximum Ratings

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	-40	Vdc
Collector-Base Voltage	V_{CBO}	-40	Vdc
Emitter-Base Voltage	V_{EBO}	-5.0	Vdc
Collector Current-Continuous	I_C	-200	mAdc

Thermal Characteristics

Characteristics	Symbol	Max	Unit
Total Device Dissipation $T_A=25^\circ\text{C}$	P_D	150	mW
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	833	$^\circ\text{C}/\text{W}$
Junction and Storage, Temperature	T_J, T_{stg}	-55 to +150	$^\circ\text{C}$

Device Marking

MMBT3906W=2A

Electrical Characteristics ($T_A=25^\circ\text{C}$ Unless Otherwise noted)

Characteristics	Symbol	Min	Max	Unit
-----------------	--------	-----	-----	------

Off Characteristics

Collector-Emitter Breakdown Voltage ⁽²⁾ ($I_C=-1.0\text{mAdc}, I_E=0$)	$V_{(BR)CEO}$	-40	-	Vdc
Collector-Base Breakdown Voltage ($I_C=-10\ \mu\text{Adc}, I_E=0$)	$V_{(BR)CBO}$	-40	-	Vdc
Emitter-Base Breakdown Voltage ($I_E=-10\ \mu\text{Adc}, I_C=0$)	$V_{(BR)EBO}$	-5.0	-	Vdc
Base Cutoff Current ($V_{CE}=-30\ \text{Vdc}, V_{EB}=-3.0\ \text{Vdc}$)	I_{BL}	-	-50	nAdc
Collector Cutoff Current ($V_{CE}=-30\ \text{Vdc}, V_{EB}=-3.0\ \text{Vdc}$)	I_{CEX}	-	-50	nAdc

1. Device mounted FR4 glass epoxy printed circuit board suing the minimun recommended footprint.

2. Pulse Test:Pulse Width $\leq 300\ \mu\text{S}$, Duty Cycle $\leq 2.0\%$.

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

Characteristics	Symbol	Min	Max	Unit
-----------------	--------	-----	-----	------

On Characteristics (2)

DC Current Gain ($I_C = -0.1 \text{ mA}$, $V_{CE} = -1.0 \text{ Vdc}$) ($I_C = -1.0 \text{ mA}$, $V_{CE} = -1.0 \text{ Vdc}$) ($I_C = -10 \text{ mA}$, $V_{CE} = -1.0 \text{ Vdc}$) ($I_C = -50 \text{ mA}$, $V_{CE} = -1.0 \text{ Vdc}$) ($I_C = -100 \text{ mA}$, $V_{CE} = -1.0 \text{ Vdc}$)	H_{FE}	60 80 100 60 30	. . 300 . .	-
Collector-Emitter Saturation Voltage (2) ($I_C = -10 \text{ mA}$, $I_B = -1.0 \text{ mA}$) ($I_C = -50 \text{ mA}$, $I_B = -5.0 \text{ mA}$)	$V_{CE(sat)}$. .	-0.25 -0.4	Vdc
Base-Emitter Saturation Voltage (2) ($I_C = -10 \text{ mA}$, $I_B = -1.0 \text{ mA}$) ($I_C = -50 \text{ mA}$, $I_B = -5.0 \text{ mA}$)	$V_{BE(sat)}$	-0.65 .	-0.85 -0.95	Vdc

Small-signal Characteristics

Current-Gain-Bandwidth Product ($I_C = -10 \text{ mA}$, $V_{CE} = -20 \text{ Vdc}$, $f = 100 \text{ MHz}$)	f_T	250	-	MHz
Output Capacitance ($V_{CB} = -5.0 \text{ Vdc}$, $I_E = 0$, $f = 1.0 \text{ MHz}$)	C_{obo}	-	4.5	pF
Input Capacitance ($V_{EB} = -0.5 \text{ Vdc}$, $I_C = 0$, $f = 1.0 \text{ MHz}$)	C_{ibo}	-	10	pF
Input Impedance ($V_{CE} = -10 \text{ Vdc}$, $I_C = -1.0 \text{ mA}$, $f = 1.0 \text{ kHz}$)	h_{ie}	2.0	12	k ohms
Voltage Feedback Ratio ($V_{CE} = -10 \text{ Vdc}$, $I_C = 1.0 \text{ mA}$, $f = 1.0 \text{ kHz}$)	h_{re}	0.1	10	$\times 10^{-4}$
Small-Signal Current Gain ($V_{CE} = -10 \text{ Vdc}$, $I_C = 1.0 \text{ mA}$, $f = 1.0 \text{ kHz}$)	h_{fe}	100	400	.
Output Admittance ($V_{CE} = -10 \text{ Vdc}$, $I_C = 1.0 \text{ mA}$, $f = 1.0 \text{ kHz}$)	h_{oe}	3.0	60	μmhos
Noise Figure ($V_{CE} = -5.0 \text{ Vdc}$, $I_C = -100 \mu\text{A}$, $R_S = 1.0 \text{ k ohms}$, $f = 1.0 \text{ kHz}$)	NF	-	4.0	dB

Switching Characteristics

Delay Time	(Vcc = -3.0 Vdc, VBE = 0.5 Vdc Ic = -10 mA, IB1 = -1.0 mA)	td	-	35	ns
Rise Time		tr	-	35	
Storage Time	(Vcc = -3.0 Vdc, Ic = -10 mA, IB1 = IB2 = -1.0 mA)	ts	-	225	ns
Fall Time		tf	-	75	

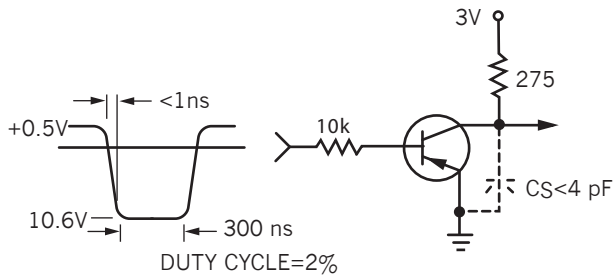


Figure 1. Delay and Rise Time Equivalent Test Circuit

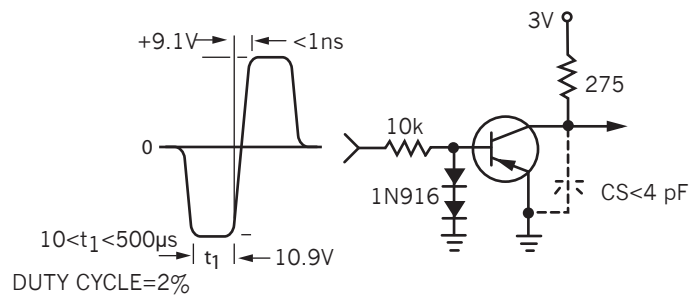


Figure 2. Storage and Fall Time Equivalent Test Circuit

*Total shunt capacitance of test jig and connectors

TYPICAL TRANSIENT CHARACTERISTICS

—— $T_J=25^\circ\text{C}$ - - - - $T_J=125^\circ\text{C}$

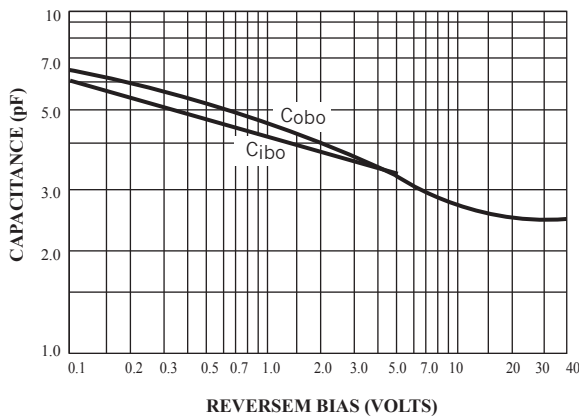


Figure 3. Capacitance

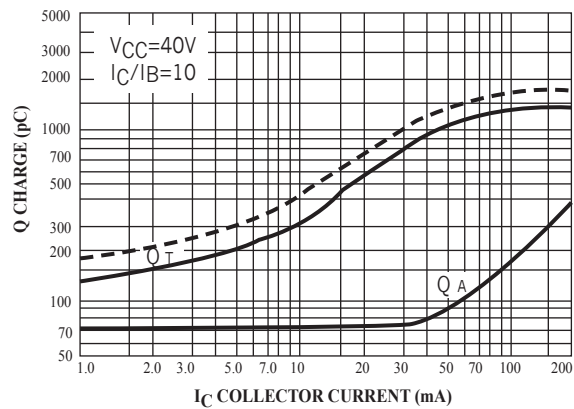


Figure 4. Charge Data

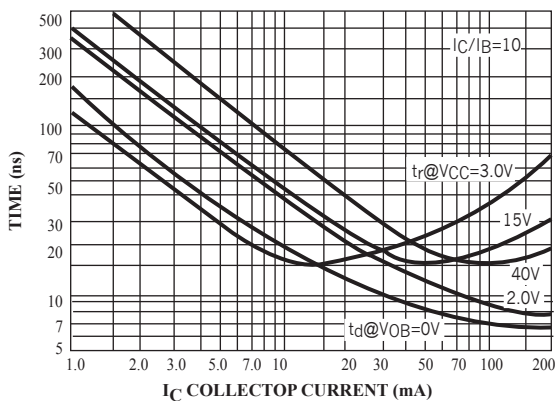


Figure 5. Turn-On Time

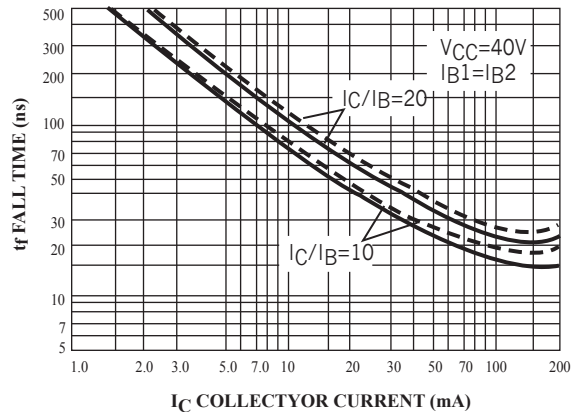


Figure 6. Fall Time

TYPICAL AUDIO SMALL-SIGNAL CHARACTERISTICS NOISE FIGURE VARIATIONS

($V_{CE} = -5.0$ Vdc, $T_A = 25^\circ\text{C}$, Bandwidth= 1.0Hz)

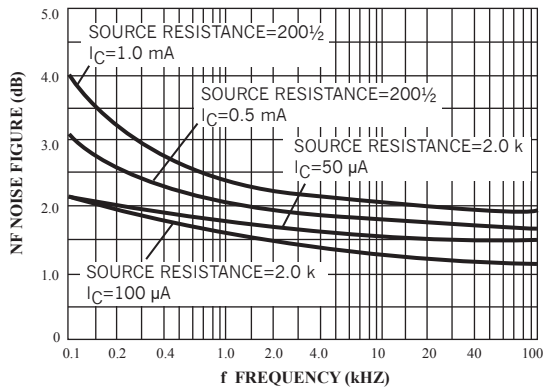


Figure 7.

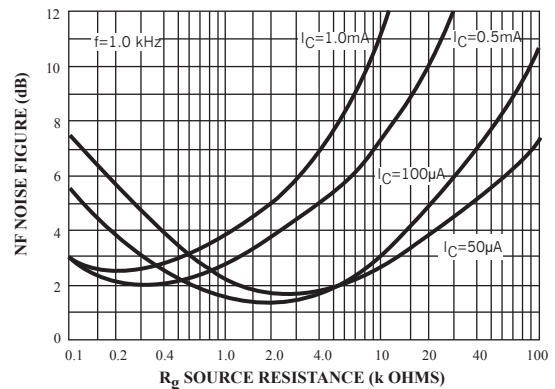


Figure 8.

h PARAMETERS ($V_{CE} = -10$ Vdc, $f = 1.0$ kHz, $T_A = 25^\circ\text{C}$)

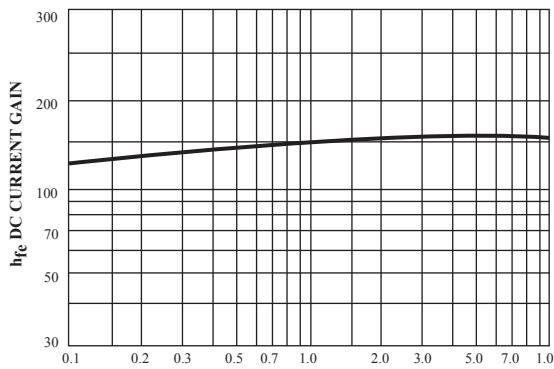


Figure 9. Current Gain

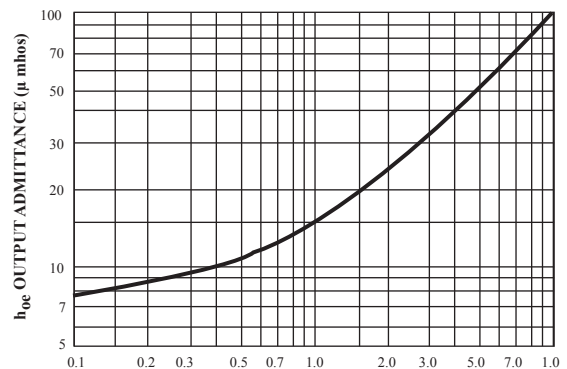


Figure 10. Input Impedance

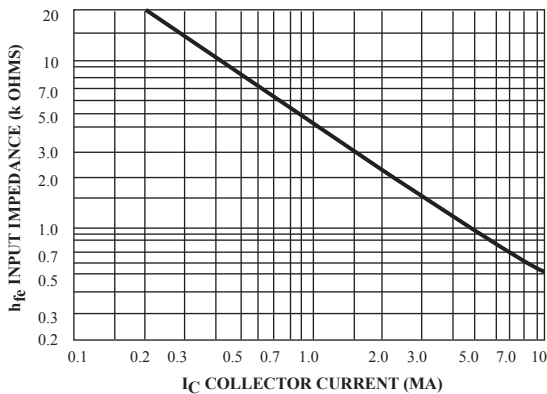


Figure .11 Input Impedance

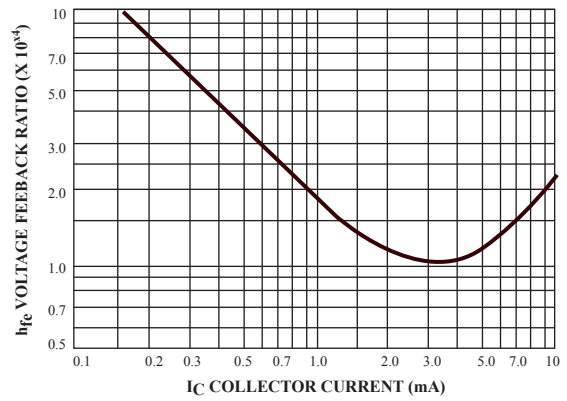


Figure 12. Votage Feedback Ratio

TYPICAL STATIC CHARACTERISTICS

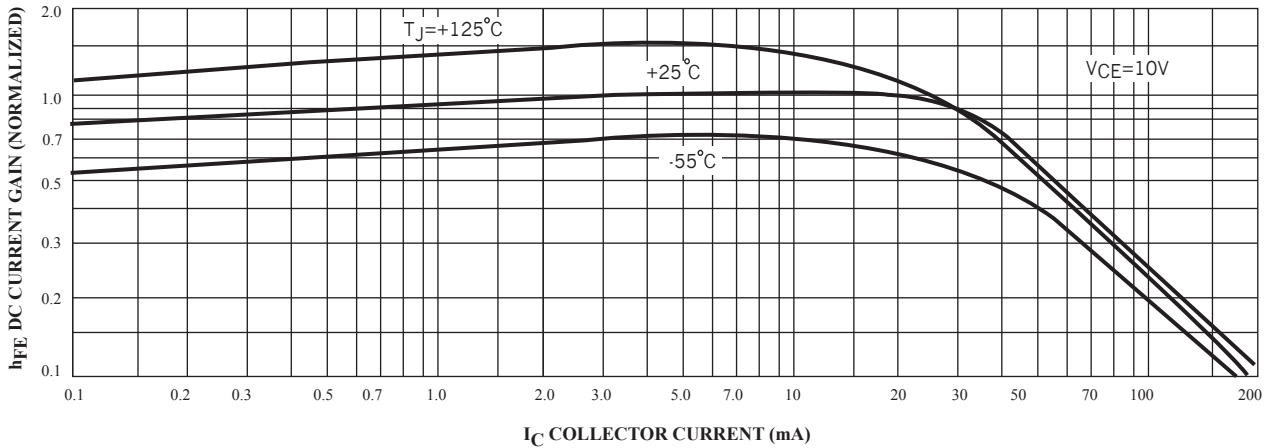


Figure 13. DC Current Gain

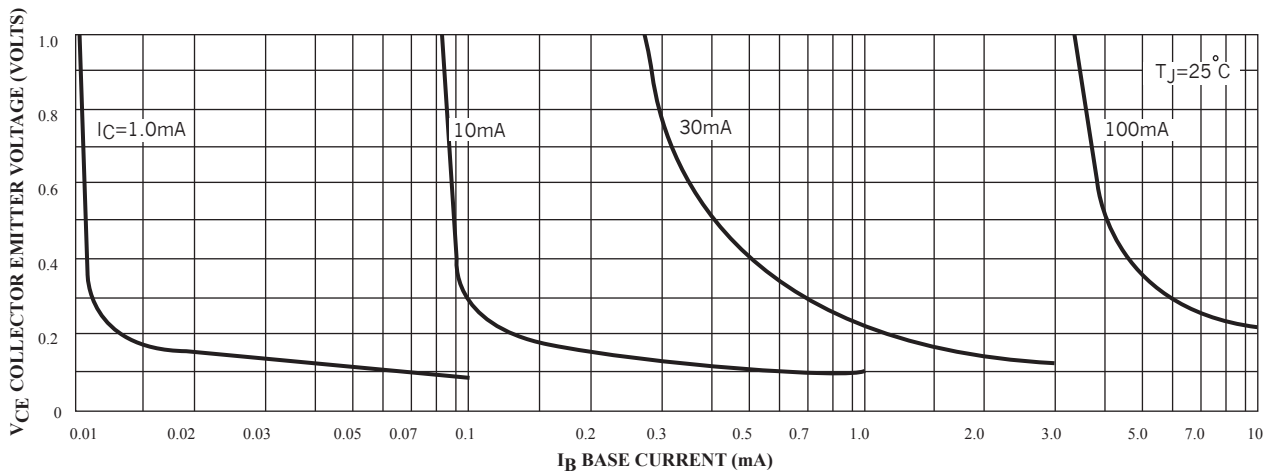


Figure 14. Collector Saturation Region

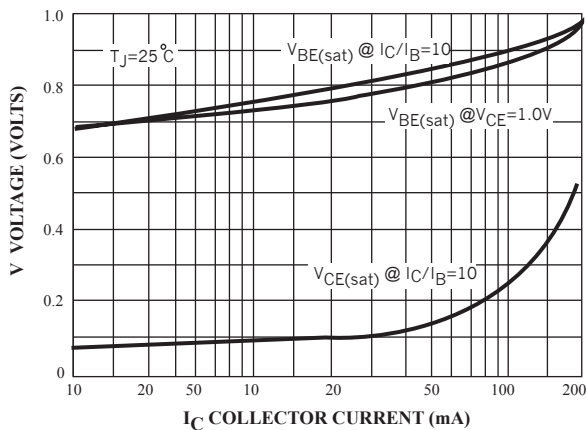


Figure 15. "ON" Voltages

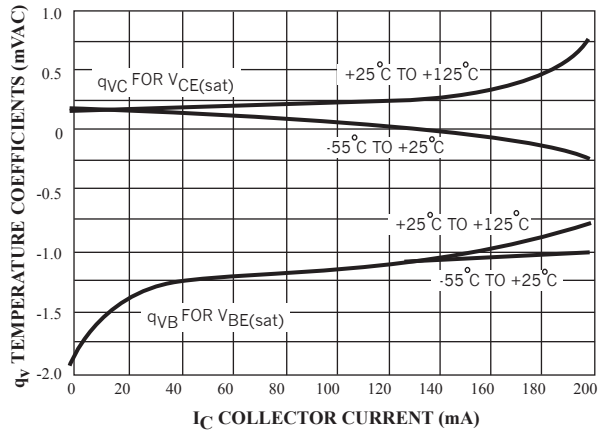
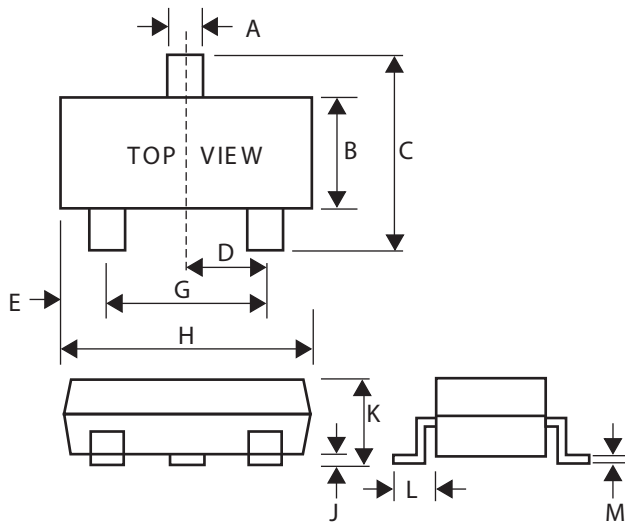


Figure 16. Temperature Coefficients

SOT-323 Outline Demensions

Unit:mm



SOT-323		
Dim	Min	Max
A	0.30	0.40
B	1.15	1.35
C	2.00	2.40
D	-	0.65
E	0.30	0.40
G	1.20	1.40
H	1.80	2.20
J	0.00	0.10
K	0.80	1.00
L	0.42	0.53
M	0.10	0.25