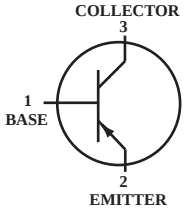
WEITRON

MMBT3906T

General Purpose Transistor
PNP Silicon

Lead(Pb)-Free



SC-89
(SOT-523F)

Maximum Ratings

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

Thermal Characteristics

Characteristics	Symbol	Max	Unit
Total Device Dissipation FR-5 Board (1) TA=25°C Derate above 25°C	P_D	200 1.6	mW mW/°C
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	600	°C/W
Total Device Dissipation Alumina Substrate, (2) TA=25°C Derate above 25°C	P_D	300 2.4	mW mW/°C
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	400	°C/W
Junction Temperature	T_J	-55 to +150	°C
Storage Temperature	T_{stg}	-55 to +150	°C

Device Marking

MMBT3906T = 2A

Electrical Characteristics (T_A=25°C Unless Otherwise noted)

Characteristics	Symbol	Min	Max	Unit
Off Characteristics				
Collector-Emitter Breakdown Voltage(3) (I_C=-1.0mAdc.I_B=0)	$V_{(BR)CEO}$	-40	-	V
Collector-Base Breakdown Voltage (IC=-10 µAdc, IE=0)	$V_{(BR)CBO}$	-40	-	V
Emitter-Base Breakdown Voltage (IE=-10 µAdc, IC=0)	$V_{(BR)EBO}$	-5.0	-	V
Base Cutoff Current (VCE=-30 Vdc, VEB =-3.0 Vdc)	I_{BL}	-	-50	nA
Collector Cutoff Current (VCE=-30Vdc, VEB=-3.0Vdc)	I_{CEX}	-	-50	nA

1. FR-4 Minimum Pad.
2. FR-4 1.0 x 1.0 Inch Pad.
3. Pulse Test : Pulse Width ≤ 300 µS, Duty Cycle ≤ 2.0%.

Electrical Characteristics (T_A=25℃ unless otherwise noted) (Countinued)

Characteristics	Symbol	Min	Max	Unit

On Characteristics (3)

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

Small-signal Characteristics

Current-Gain-Bandwidth Product (4) (I_C= -10 mA , V_{CE}= -20 V , f=100MHz)	f_T	250	-	MHz
Output Capacitance (V_{CB}= -5.0 V, I_E=0, f=1.0MHz)	C_{obo}	-	4.5	pF
Input Capacitance (V_{EB}= -0.5 V, I_C=0, f=1.0MHz)	C_{ibo}	-	10	pF
Input Impedance (V_{CE}= -10V, I_C=-1.0 mA , f=1.0 kHz)	h_{ie}	2.0	12	kΩ
Voltage Feeback Radio (V_{CE}= -10V, I_C=-1.0 mA , f=1.0 kHz)	h_{re}	0.1	10	x 10^{-4}
Small-Signal Current Gain (V_{CE}= -10V, I_C=-1.0 mA , f=1.0 kHz)	h_{fe}	100	400	-
Output Admittance (V_{CE}= -10V, I_C=-1.0 mA , f=1.0kHz)	h_{oe}	3.0	60	μmhos
Noise Figure (V_{CE}= -5.0V, I_C= -100 μA , R_S=1.0kΩ, f=1.0kHz)	NF	-	4.0	dB

Switching Characteristics

Delay Time	(V_{cc}= -3.0 V, V_{BE}= 0.5 V I_c= -10 mA, I_{B1}= -1.0 mA)	td	-	35	ns
Rise Time		tr	-	35	
Storage Time	(V_{cc}= -3.0 V, I_c= -10 mA , I_{B1}=I_{B2}= -1.0 mA)	ts	-	225	ns
Fall Time		tf	-	75	

3.Pulse Test:Pulse Width≦300 μS, Duty Cycle≦2.0%.

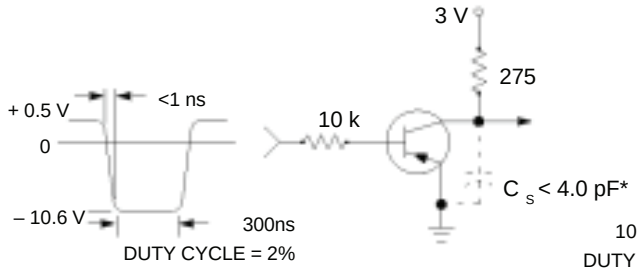
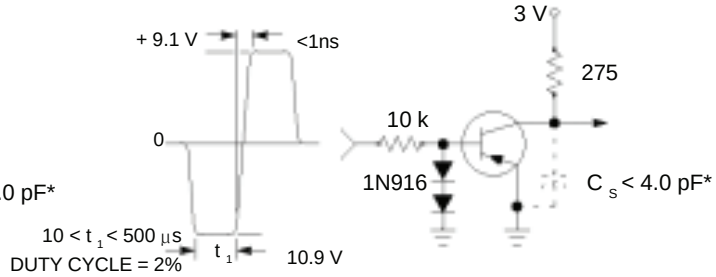


Figure 1. Delay and Rise Time Equivalent Test Circuit



*Total shunt capacitance of test jig and connectors

Figure 2. Storage and Fall Time Equivalent Test Circuit

TYPICAL TRANSIENT CHARACTERISTICS

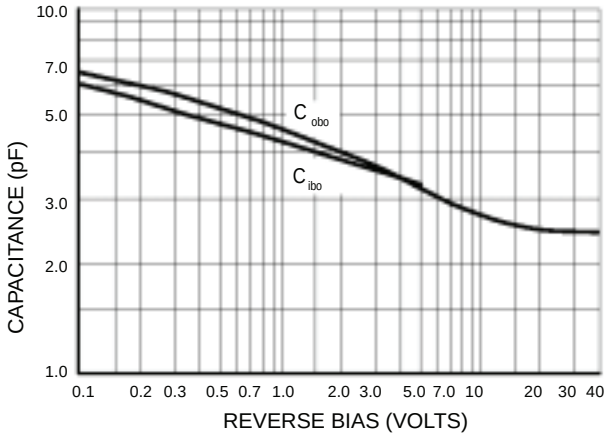


Figure 3. Capacitance

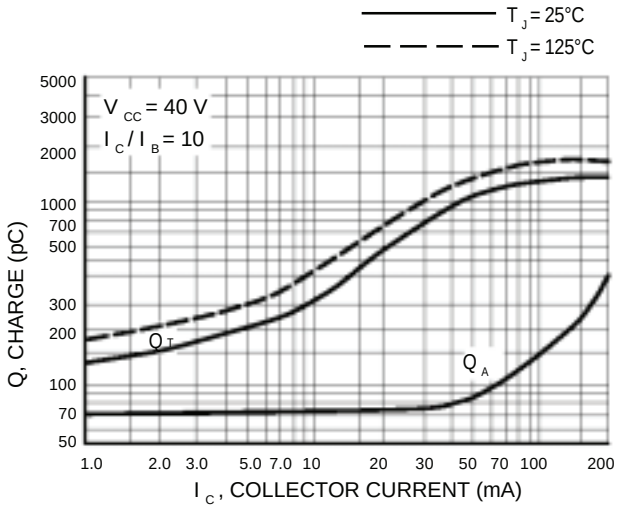


Figure 4. Charge Data

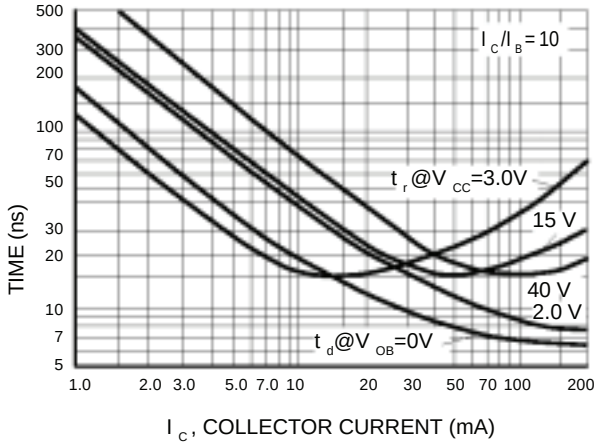


Figure 5. Turn–On Time

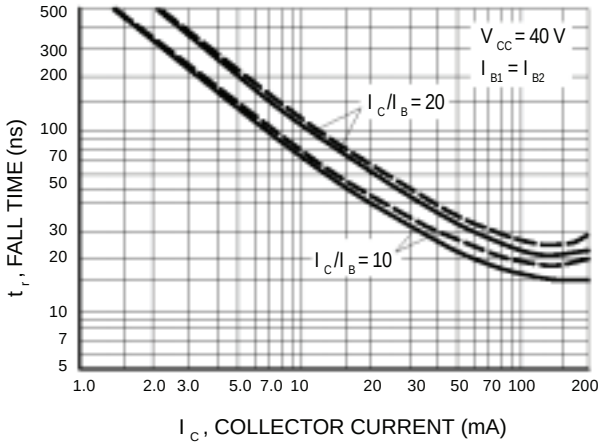


Figure 6. Fall Time

TYPICAL AUDIO SMALL–SIGNAL CHARACTERISTICS NOISE FIGURE VARIATIONS

(V_{CE} = – 5.0 Vdc, T_A = 25°C, Bandwidth = 1.0 Hz)

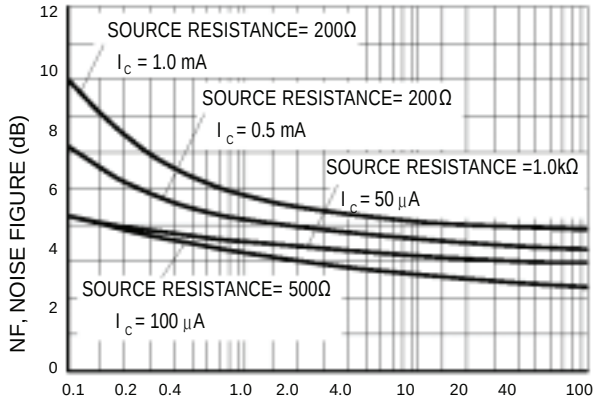


Figure 7. Noise Figure

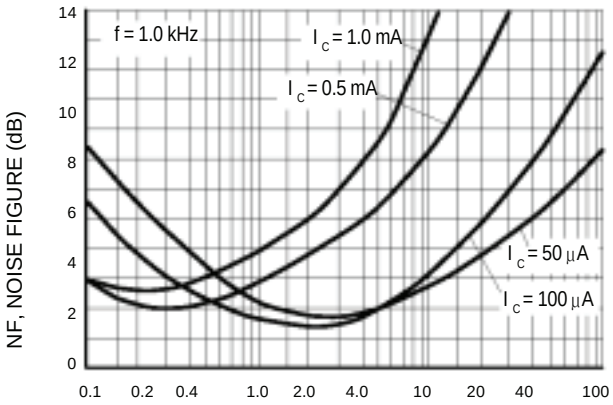


Figure 8. Noise Figure

h PARAMETERS

(V_{CE} = 10 Vdc, f = 1.0 kHz, T_A = 25°C)

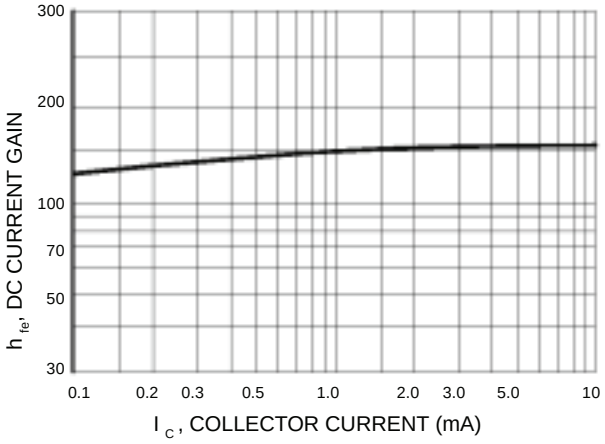


Figure 9. Current Gain

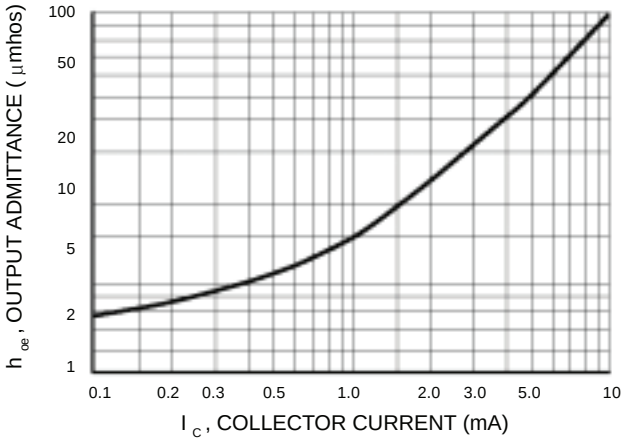


Figure 10. Output Admittance

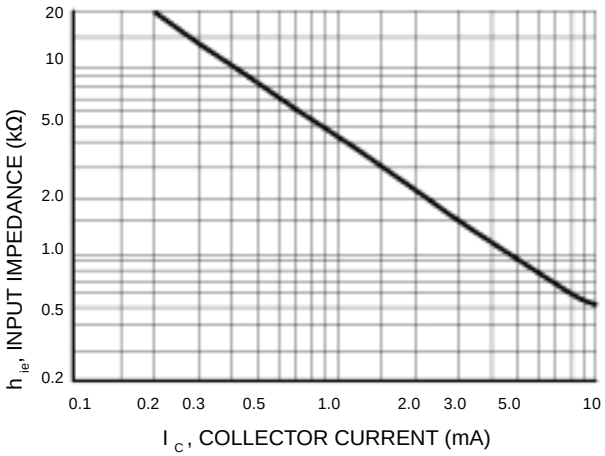


Figure 11. Input Impedance

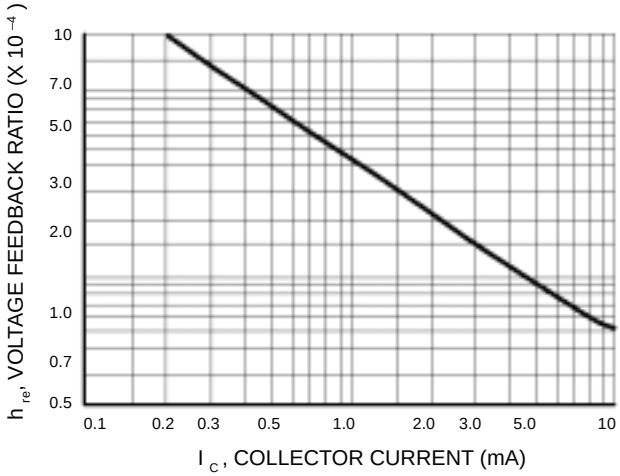


Figure 12. Voltage Feedback Ratio

TYPICAL STATIC CHARACTERISTICS

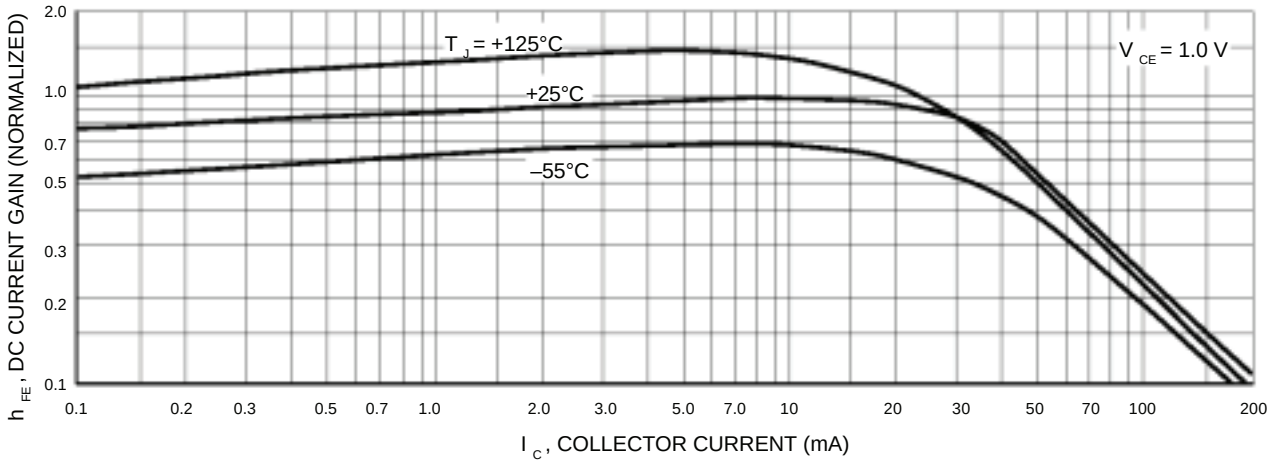


Figure 13. DC Current Gain

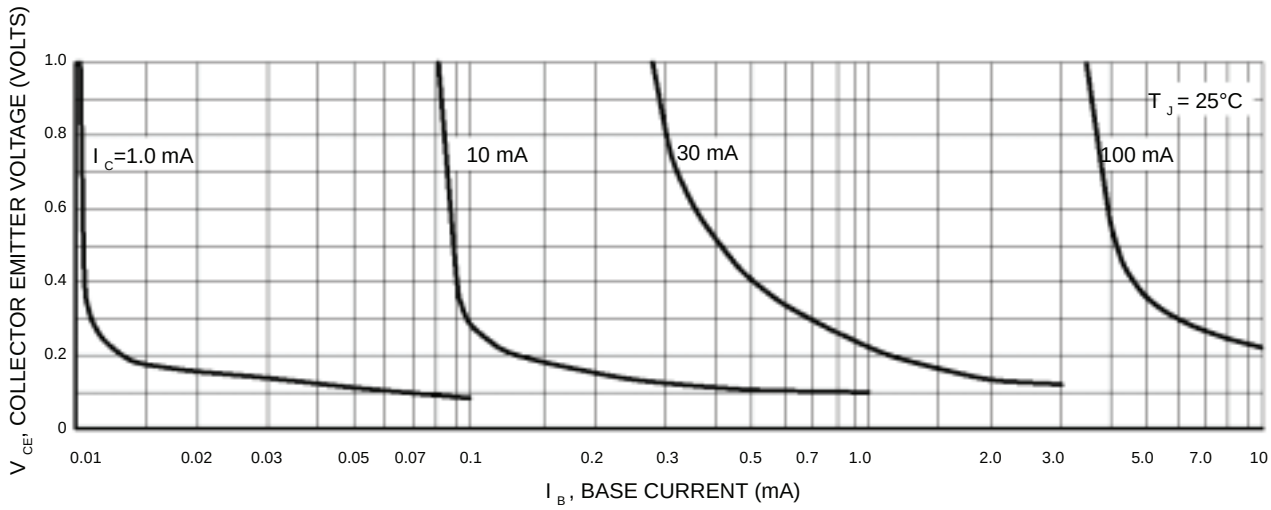


Figure 14. Collector Saturation Region

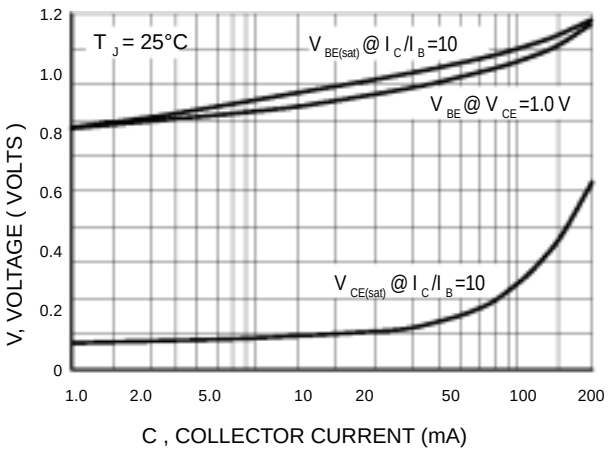


Figure 15. "ON" Voltages

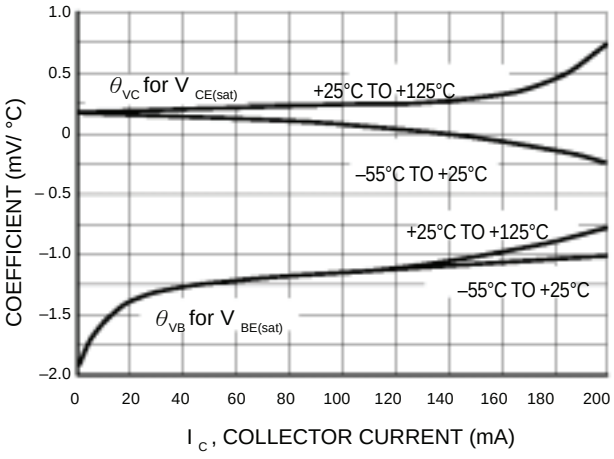
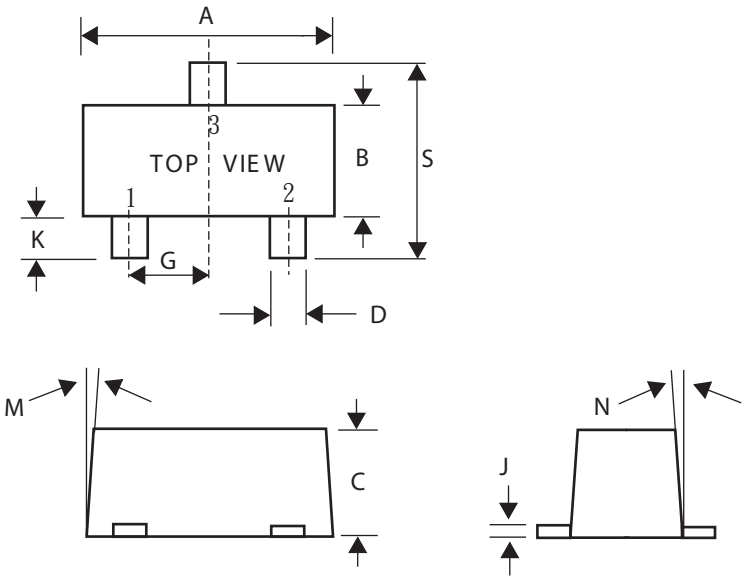


Figure 16. Temperature Coefficients

SC-89 Package Outline Dimensions

Unit:mm



SC-89			
Dim	**Min**	**Nom**	**Max**
A	1.50	1.60	1.70
B	0.75	0.85	0.95
C	0.60	0.70	0.80
D	0.23	0.28	0.33
G		0.50BSC	
J	0.10	0.15	0.20
K	0.30	0.40	0.50
M	---	---	10°
N	---	---	10°
S	1.50	1.60	1.70