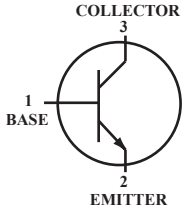
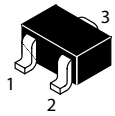
WEITRON

MMBT3904W

General Purpose Transistor
NPN Silicon

Pb 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}	60	Vdc
Emitter-Base VOltage	V_{EBO}	6.0	Vdc
Collector Current-Continuous	I_C	200	mAdc

Thermal Characteristics

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

Device Marking

MMBT3904W=AM

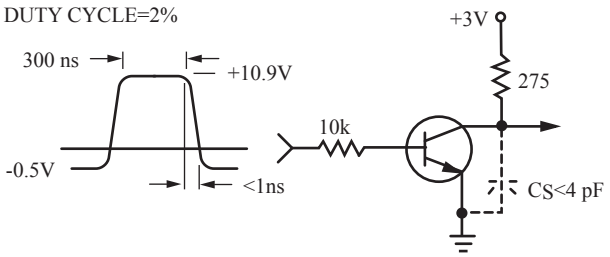
Electrical Characteristics (T_A=25°C Unless Otherwise noted)

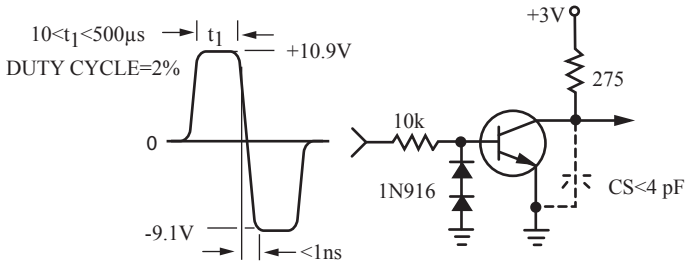
Characteristics	Symbol	Min	Max	Unit
Off Characteristics				
Collector-Emitter Breakdown Voltage(2) (I_C=1.0mAdc.I_B=0)	V(BR)CEO	40	-	Vdc
Collector-Base Breakdown Voltage (I_C=10 μAdc, I_E=0)	V(BR)CBO	60	-	Vdc
Emitter-Base Breakdown Voltage (I_E=10 μAdc, I_C=0)	V(BR)EBO	6.0	-	Vdc
Base Cutoff Current (V_{CE}=30 Vdc, V_{EB} =3.0 Vdc)	I_{BL}	-	50	nAdc
Collector Cutoff Current (V_{CE}=30Vdc, V_{EB}=3.0Vdc)	I_{CEX}	-	50	nAdc

1. Device Mounted FR4 glass epoxy printed circuit board using the minimun recommended footprint.
2. Pulse Test:Pulse Width ≦300uS, Duty Cycle≦2.0%

Electrical Characteristics (T_A=25°C unless otherwise noted) (Countinued)

Characteristics	Symbol	Min	Max	Unit
On Characteristics (2)				
DC Current Gain				
(I_C= 0.1 mAdc, V_{CE}=1.0Vdc)	H_{FE}	40	-	-
(I_C= 1.0 mAdc, V_{CE}= 1.0 Vdc)		70	-	
(I_C= 10 mAdc, V_{CE}= 1.0Vdc)		100	300	
(I_C= 50 mAdc, V_{CE}= 1.0Vdc)		60	-	
(I_C= 100 mAdc, V_{CE}= 1.0Vdc)		30	-	
Collector-Emitter Saturation Voltage (2)				
(I_C= 10 mAdc, I_B= 1.0mAdc)	$V_{CE(sat)}$	-	0.2	Vdc
(I_C= 50 mAdc, I_B= 5.0mAdc)		-	0.3	
Base-Emitter Saturation Voltage (2)				
(I_C= 10 mAdc, I_B= 1.0 mAdc)	$V_{BE(sat)}$	0.65	0.85	Vdc
(I_C= 50 mAdc, I_B= 5.0 mAdc)		-	0.95	
Small-signal Characteristics				
Current-Gain-Bandwidth Product (I_C= 10 mAdc, V_{CE}= 20 Vdc, f=100MHz)	f_T	300	-	MHz
Output Capacitance (V_{CB}= 5.0 Vdc, I_E=0, f=1.0MHz)	C_{obo}	-	4.0	pF
Input Capacitance (V_{EB}= 0.5 Vdc, I_C=0, f=1.0MHz)	C_{ibo}	-	8.0	pF
Input Impedance (V_{CE}= 10 Vdc, I_C=1.0 mAdc, f=1.0 kHz)	h_{ie}	1.0	10	k ohms
Voltage Feeback Radio (V_{CE}= 10Vdc, I_C=1.0 mAdc, f=1.0 kHz)	h_{re}	0.5	8.0	x 10-4
Small-Signal Current Gain (V_{CE}= 10Vdc, I_C=1.0 mAdc, , f=1.0 kHz)	h_{fe}	100	400	-
Output Admittance (V_{CE}= 10Vdc, I_C=1.0 mAdc, f=-1.0kHz)	h_{oe}	1.0	40	µmhos
Noise Figure (V_{CE}= 5.0Vdc, I_C= 100 µAdc, , R_S=1.0k ohms, f=1.0kHz)	NF	-	5.0	dB
Switching Characteristics				
Delay Time	(Vcc= 3.0 Vdc, V_{BE}= -0.5 Vdc	td	-	35	ns
Rise Time	Ic= 10 mAdc, I_{B1}= 1.0 mAdc)	tr	-	35	
Storage Time	(Vcc= 3.0 Vdc,	ts	-	200	ns
Fall Time	Ic= 10 mAdc, I_{B1}=I_{B2}= 1.0 mAdc)	tf	-	50	





***Total shunt capacitance of test jig and connectors**

Figure 1. Delay and Rise Time Equivalent Test Circuit

Figure 2. Storage and Fall Time Equivalent Test Circuit

TYPICAL TRANSIENT CHARACTERISTICS

—— T_J=25°C - - - T_J=125°C

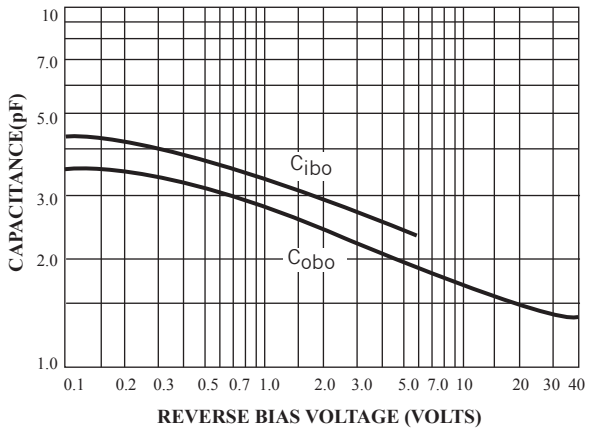


Figure 3. Capacitance

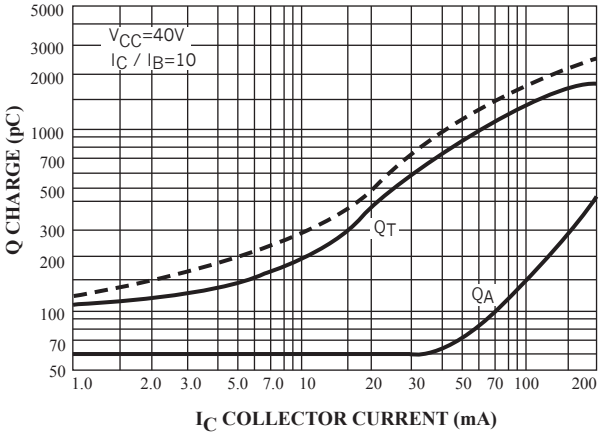


Figure 4. Charge Data

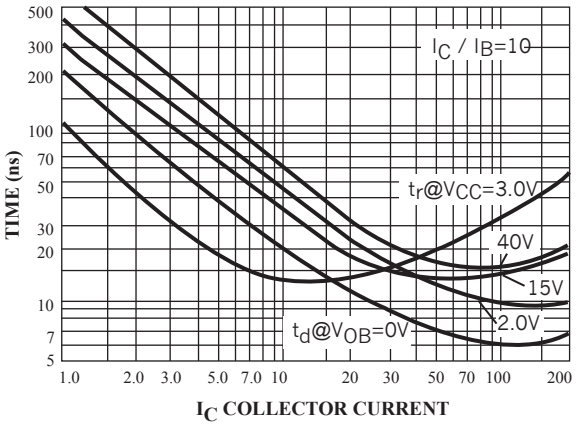


Figure 5.Turn-On Time

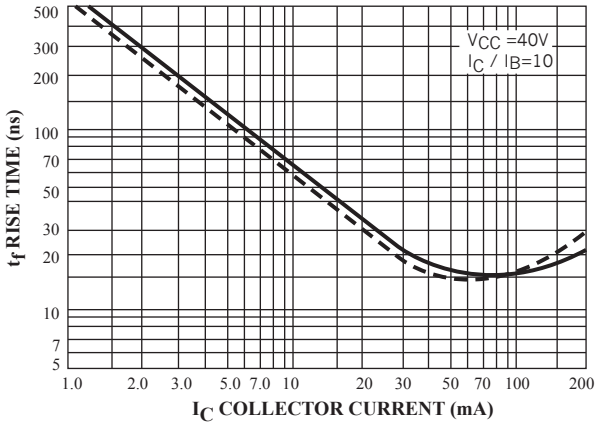


Figure 6. Rise Time

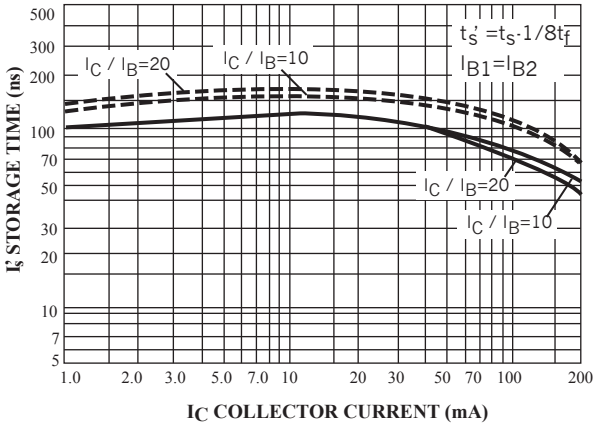


Figure 7. Storage Time

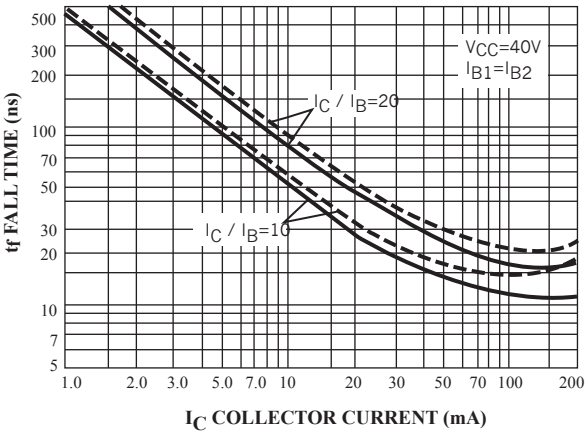


Figure 8. Fall Time

TYPICAL AUDIO SMALL-SIGNAL CHARACTERISTICS NOISE FIGURE VARIATIONS

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

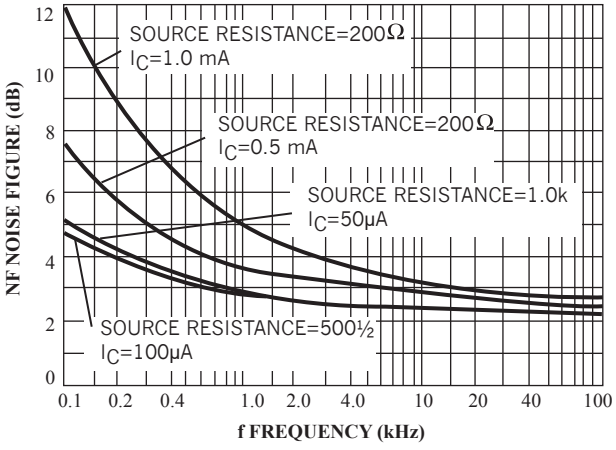


Figure 9.

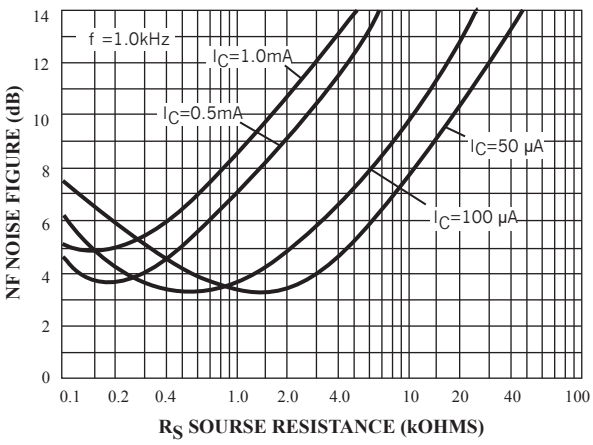


Figure 10.

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

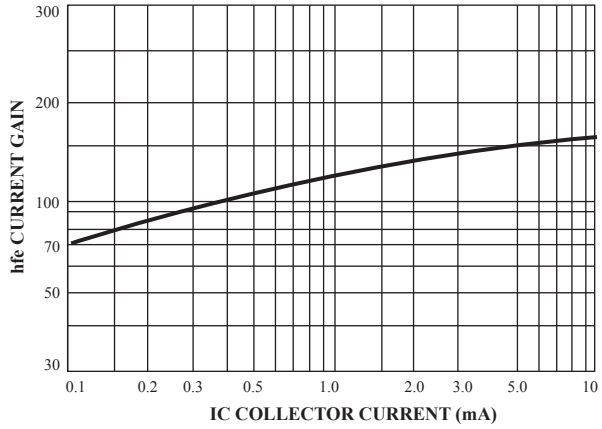
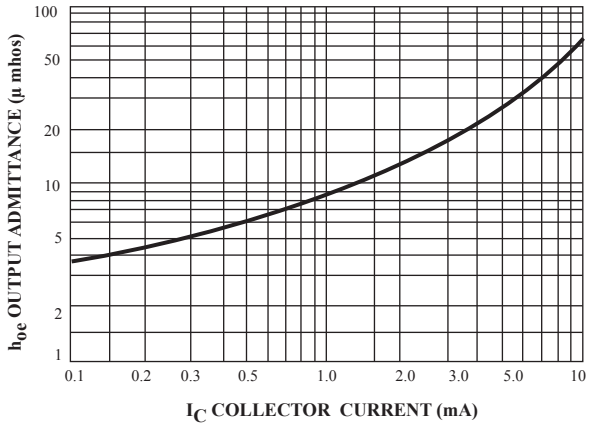


Figure 11. Current Gain



Fiugure 12. Output Admittance

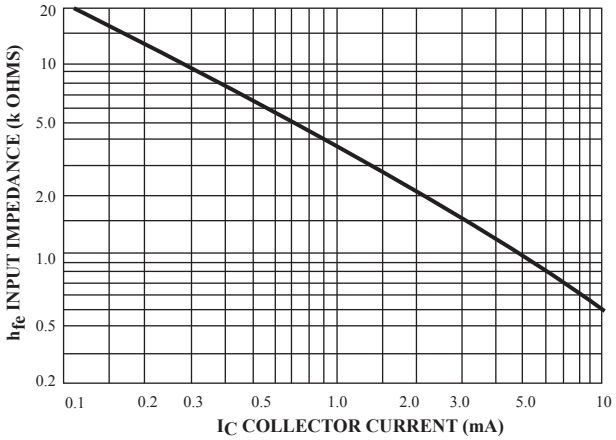


Figure 13. Input Impedance

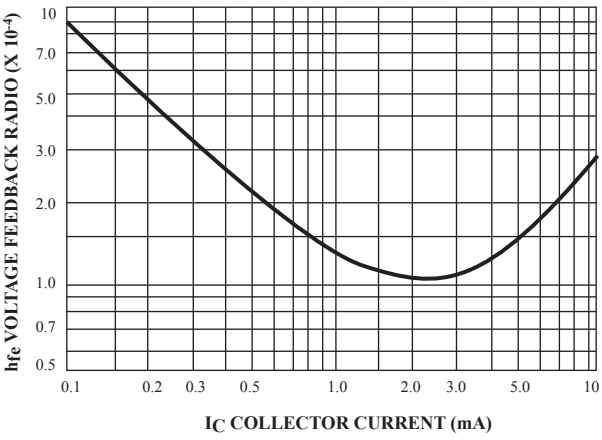


Figure 14. Voltage Feedback Radio

TYPICAL STATIC CHARACTERISTICS

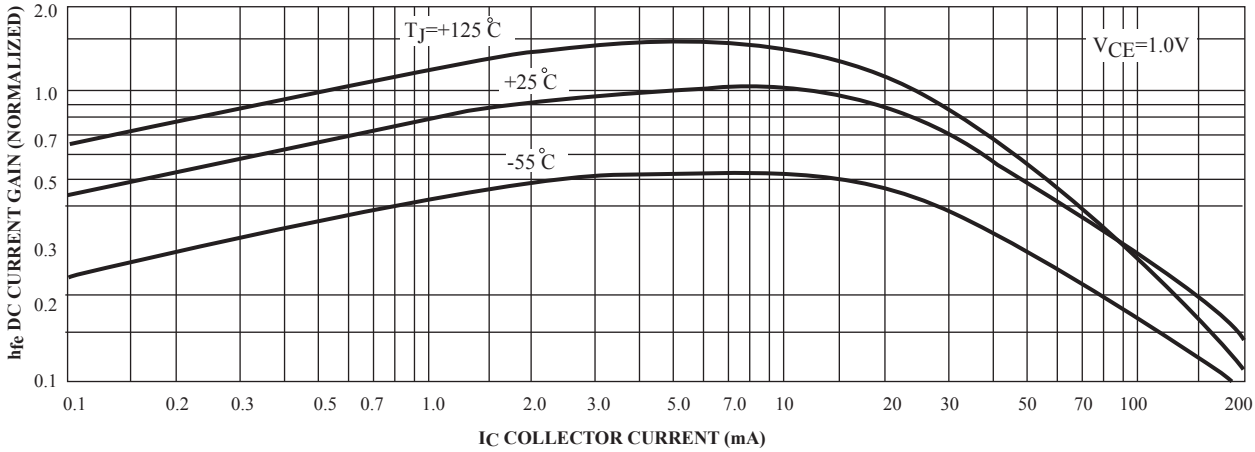


Figure 15. DC Current Gain

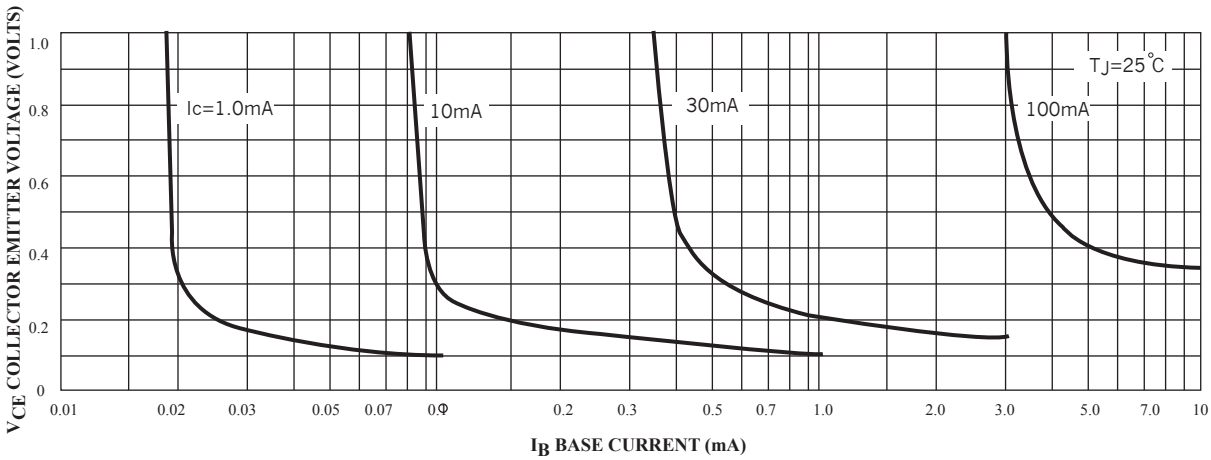


Figure 16. Collector Saturation Ragion

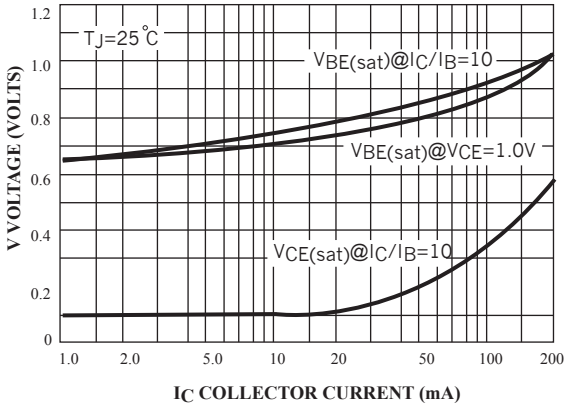


Figure 17. "ON" Voltage

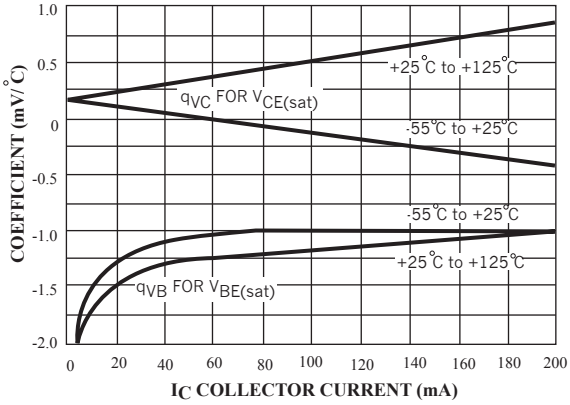
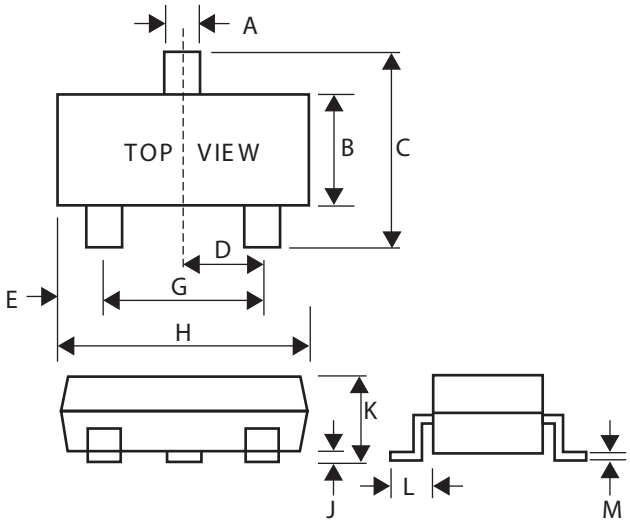


Figure 18. Temperature Coefficients

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