Elektronische Bauelemente

MMBT3906FW

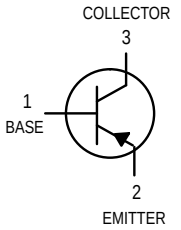
PNP Silicon

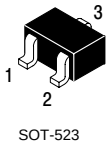
General Purpose Transistor

RoHS Compliant Product

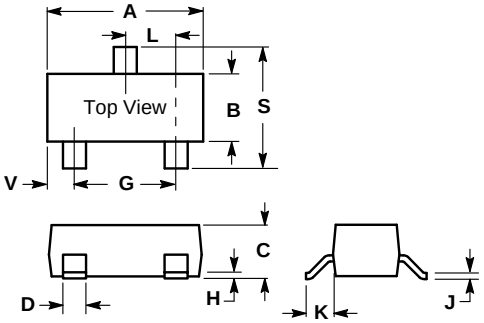
FEATURES

- Epitaxial Planar Die Construction
- Complementary NPN Type Available (MMBT3904FW)
- Ideal for Medium Power Amplification and Switching





SOT-523



SOT-523		
Dim	**Min**	**Max**
A	1.500	1.700
B	0.750	0.850
C	0.700	0.900
D	0.250	0.350
G	0.900	1.100
H	0.000	0.100
J	0.100	0.200
K	0.220	0.500
L	0.400	0.600
S	1.500	1.700
V	0.200	0.400
All Dimension in mm		

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

Characteristic	Symbol	Max	Unit
Total Device Dissipation FR–4 Board(1) T_A = 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) T_A = 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 and Storage Temperature	T_J, T_{stg}	–55 to +150	°C

DEVICE MARKING

MMBT3906FW = 3N, 2A

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector–Emitter Breakdown Voltage(3) (I_C = –1.0 mAdc, I_B = 0)	$V_{(BR)CEO}$	–40	—	Vdc
Collector–Base Breakdown Voltage (I_C = –10 μAdc, I_E = 0)	$V_{(BR)CBO}$	–40	—	Vdc
Emitter–Base Breakdown Voltage (I_E = –10 μAdc, I_C = 0)	$V_{(BR)EBO}$	–5.0	—	Vdc
Base Cutoff Current (V_{CE} = –30 Vdc, V_{EB} = –3.0 Vdc)	I_{BL}	—	–50	nAdc
Collector Cutoff Current (V_{CE} = –30 Vdc, V_{EB} = –3.0 Vdc)	I_{CEX}	—	–50	nAdc

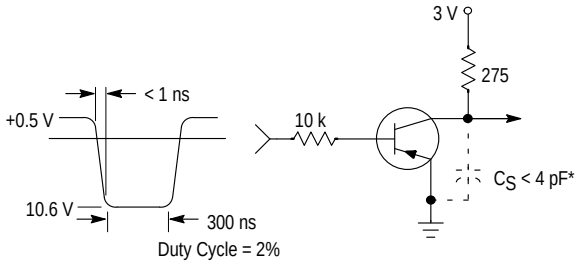
1. FR–4 = Minimum Pad
2. Alumina = 1.0 × 1.0 inchs. 99.5% alumina.

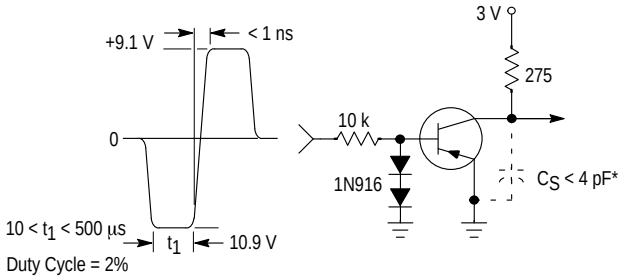
REM : Thermal Clad is a trademark of the Bergquist Company.

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted) (Continued)

Characteristic	Symbol	Min	Max	Unit
ON CHARACTERISTICS(3)				
DC Current Gain	H_{FE}			—
(I_C = –0.1 mAdc, V_{CE} = –1.0 Vdc)		60	—	
(I_C = –1.0 mAdc, V_{CE} = –1.0 Vdc)		80	—	
(I_C = –10 mAdc, V_{CE} = –1.0 Vdc)		100	300	
(I_C = –50 mAdc, V_{CE} = –1.0 Vdc)		60	—	
(I_C = –100 mAdc, V_{CE} = –1.0 Vdc)		30	—	
Collector–Emitter Saturation Voltage	$V_{CE(sat)}$			Vdc
(I_C = –10 mAdc, I_B = –1.0 mAdc)		—	–0.25	
(I_C = –50 mAdc, I_B = –5.0 mAdc)		—	–0.4	
Base–Emitter Saturation Voltage	$V_{BE(sat)}$			Vdc
(I_C = –10 mAdc, I_B = –1.0 mAdc)		–0.65	–0.85	
(I_C = –50 mAdc, I_B = –5.0 mAdc)		—	–0.95	
SMALL–SIGNAL CHARACTERISTICS				
Current–Gain — Bandwidth Product	f_T			MHz
(I_C = –10 mAdc, V_{CE} = –20 Vdc, f = 100 MHz)		250	—	
Output Capacitance	C_{obo}			pF
(V_{CB} = –5.0 Vdc, I_E = 0, f = 1.0 MHz)		—	4.5	
Input Capacitance	C_{ibo}			pF
(V_{EB} = –0.5 Vdc, I_C = 0, f = 1.0 MHz)		—	10	
Input Impedance	h_{ie}			kΩ
(I_C = –1.0 mAdc, V_{CE} = –10 Vdc, f = 1.0 kHz)		2.0	12	
Voltage Feedback Ratio	h_{re}			X 10^{-4}
(I_C = –1.0 mAdc, V_{CE} = –10 Vdc, f = 1.0 kHz)		0.1	10	
Small–Signal Current Gain	h_{fe}			—
(I_C = –1.0 mAdc, V_{CE} = –10 Vdc, f = 1.0 kHz)		100	400	
Output Admittance	h_{oe}			μmhos
(I_C = –1.0 mAdc, V_{CE} = –10 Vdc, f = 1.0 kHz)		3.0	60	
Noise Figure	NF			dB
(I_C = –100 μAdc, V_{CE} = –5.0 Vdc, R_S = 1.0 kΩ, f = 1.0 kHz)		—	4.0	
SWITCHING CHARACTERISTICS				
Delay Time	(V_{CC} = –3.0 Vdc, V_{BE} = 0.5 Vdc, I_C = –10 mAdc, I_{B1} = –1.0 mAdc)	t_d	—	35	ns
Rise Time		t_r	—	35	
Storage Time	(V_{CC} = –3.0 Vdc, I_C = –10 mAdc, I_{B1} = I_{B2} = –1.0 mAdc)	t_s	—	225	ns
Fall Time		t_f	—	75	

3. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%.





* 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

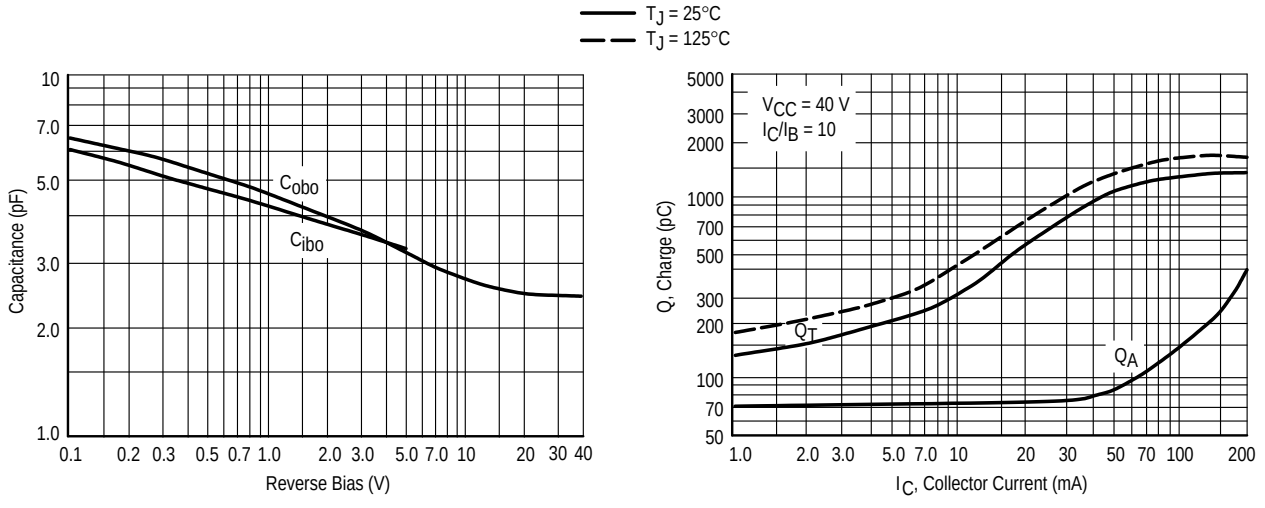


Figure 3. Capacitance

Figure 4. Charge Data

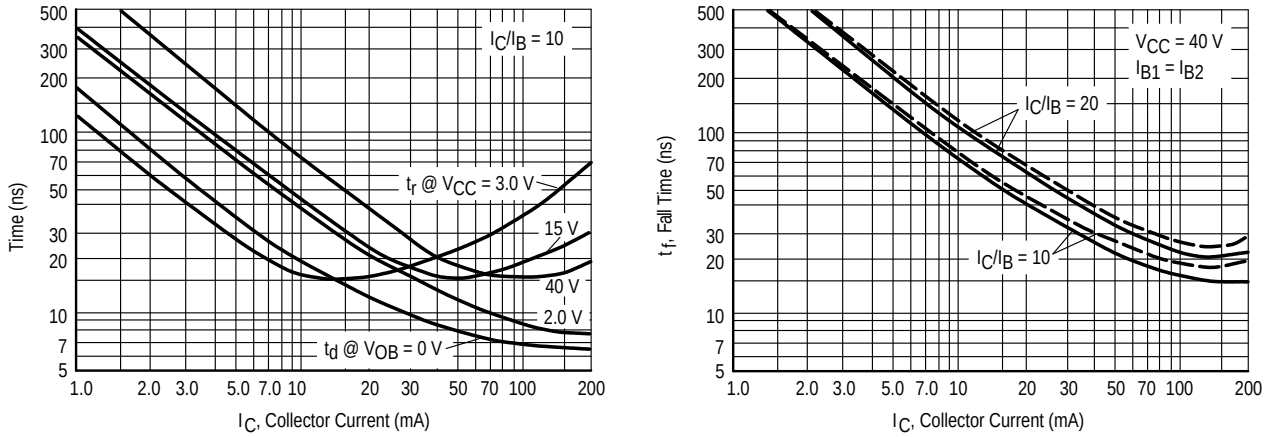


Figure 5. Turn – On Time

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)

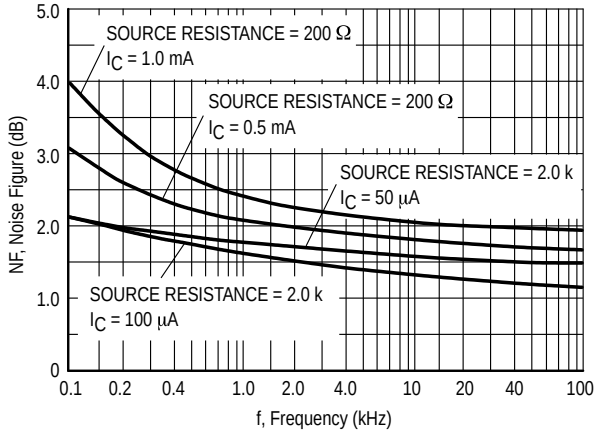


Figure 7.

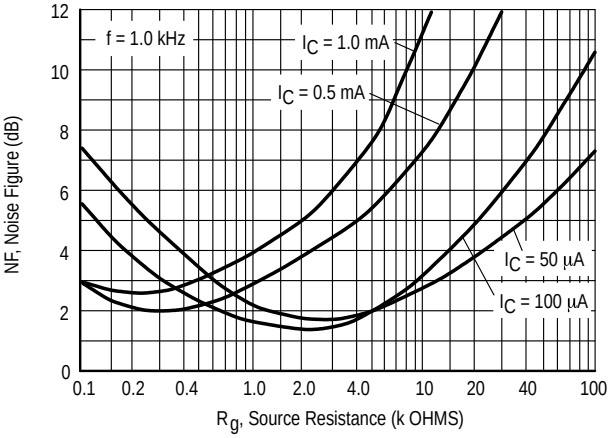


Figure 8.

h PARAMETERS

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

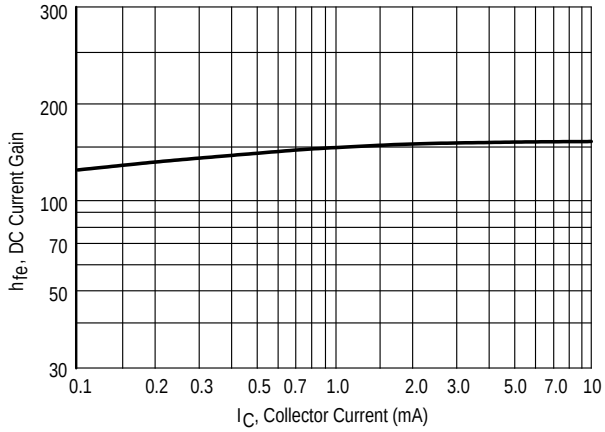


Figure 9. Current Gain

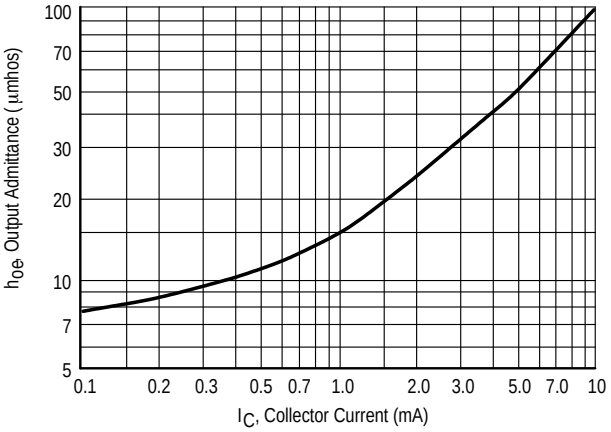


Figure 10. Output Admittance

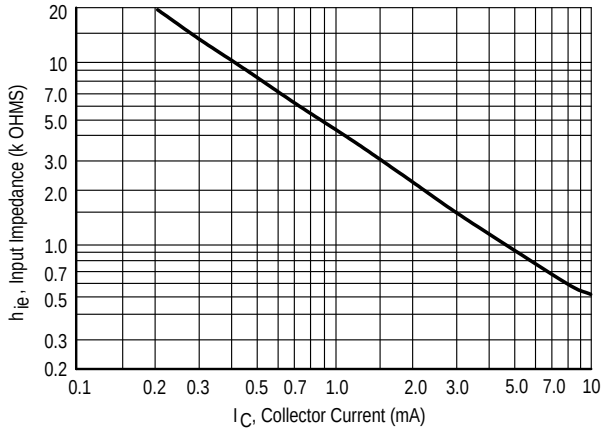


Figure 11. Input Impedance

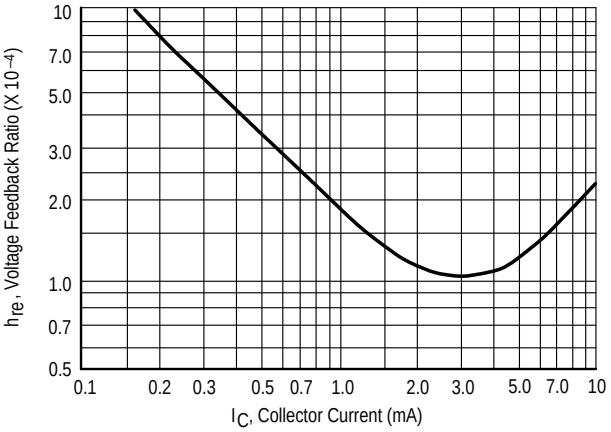


Figure 12. Voltage Feedback Ratio

TYPICAL STATIC CHARACTERISTICS

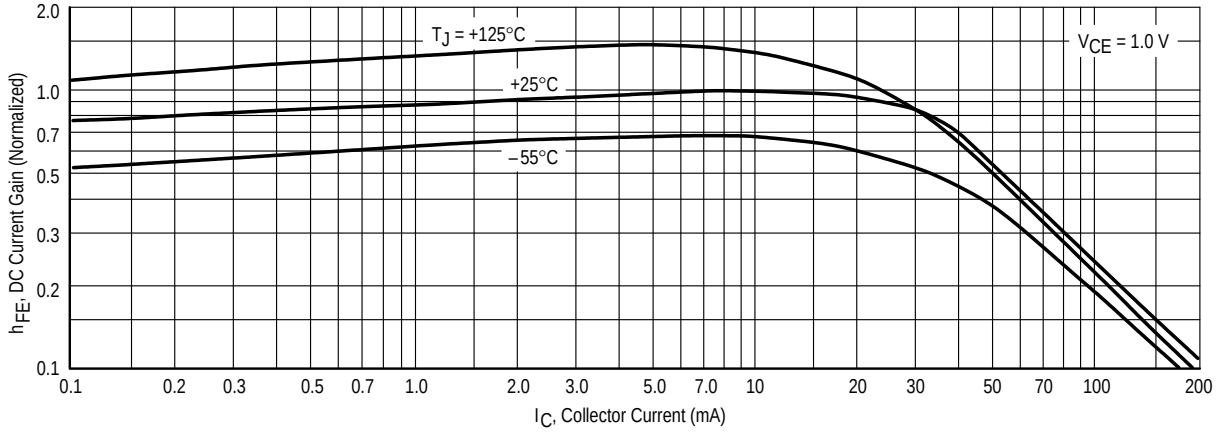


Figure 13. DC Current Gain

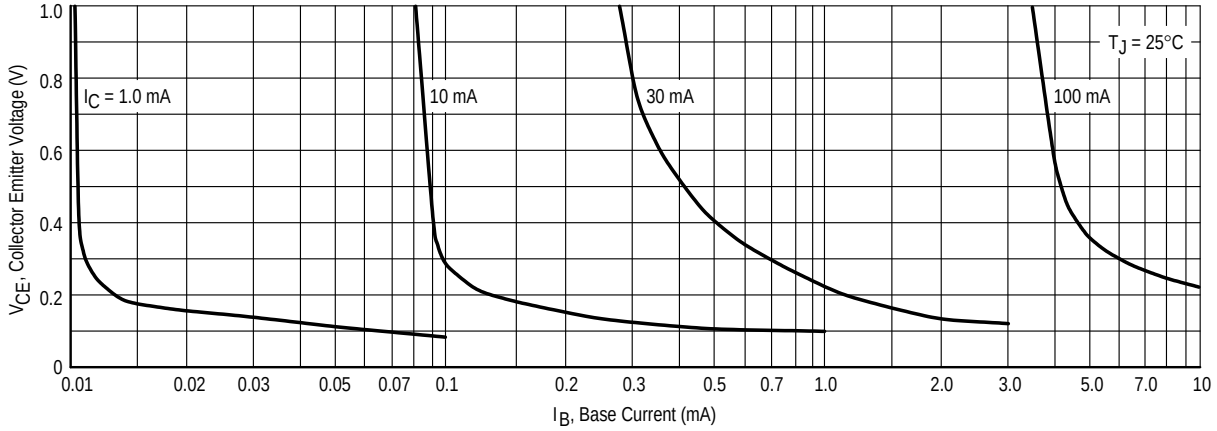


Figure 14. Collector Saturation Region

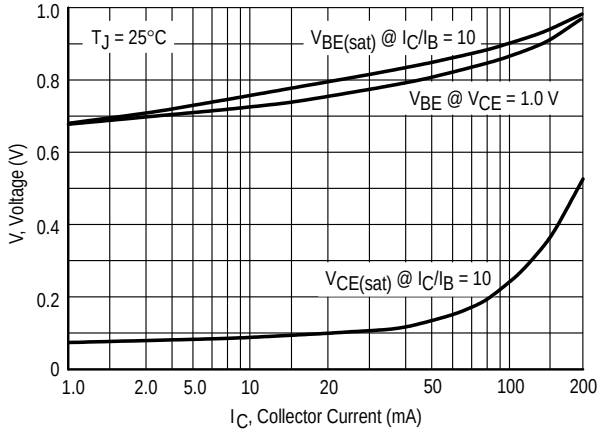


Figure 15. "ON" Voltages

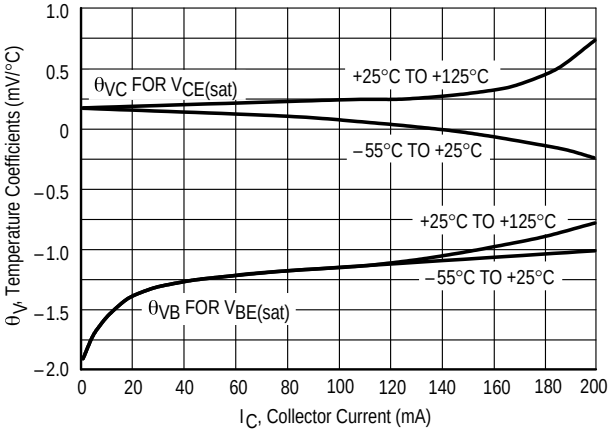


Figure 16. Temperature Coefficients