

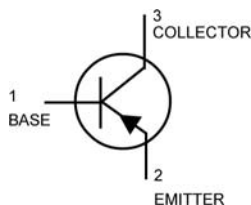
RoHS Compliant Product
A suffix of "-C" specifies halogen & lead-free

FEATURES

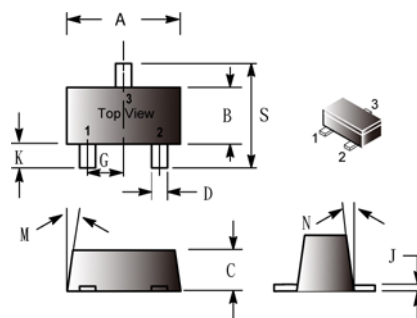
- Simplifies Circuit Design.
- We Declare that the material of product compliance with RoHS requirements.

ORDERING INFORMATION

Device	Marking	Shipping
MMBT3906T	2A	3000/Tape&Reel



SOT-523



REF.	Millimeter		REF.	Millimeter	
	Min.	Max.		Min.	Max.
A	1.50	1.70	K	0.30	0.50
B	0.75	0.95	M	---	10°
C	0.60	0.80	N	---	10°
D	0.23	0.33	S	1.50	1.70
G	0.50BSC				
J	0.10	0.20			

MAXIMUM RATINGS (at T_a = 25°C unless otherwise specified)

PARAMETER	SYMBOL	RATINGS	UNIT
Collector - Emitter Voltage	V _{CEO}	-40	Vdc
Collector - Base Voltage	V _{CB0}	-40	Vdc
Emitter - Base Voltage	V _{EBO}	-5.0	Vdc
Collector Current - Continuous	I _C	-200	mAdc
Total Device Dissipation FR-4 Board ⁽¹⁾ T _A =25°C, Derate above 25°C	P _D	200	mW
		1.6	mW/°C
Thermal Resistance, Junction to Ambient	R _{θJA}	600	°C / W
Total Device Dissipation FR-4 Board ⁽²⁾ T _A =25°C, Derate above 25°C	P _D	300	mW
		2.4	mW/°C
Thermal Resistance, Junction to Ambient	R _{θJA}	400	°C / W
Junction & Storage Temperature	T _J , T _{STG}	-55 ~ 150	°C

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%.

DEVICE MARKING

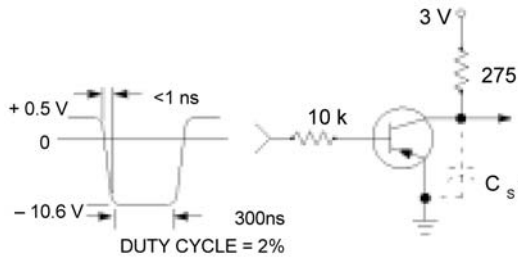
MMBT3906T = 2A

ELECTRICAL CHARACTERISTICS (at $T_a = 25^\circ\text{C}$ unless otherwise specified)

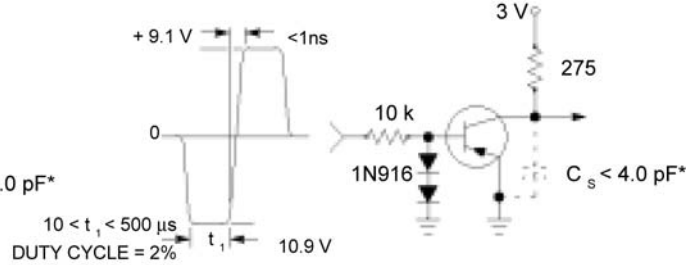
CHARACTERISTIC	SYMBOL	MIN.	MAX.	UNIT	TEST CONDITIONS
Off Characteristics					
Collector-Emitter Breakdown Voltage ⁽³⁾	$V_{(BR)CEO}$	-40	-	Vdc	$I_C = -1.0 \text{ mAdc}, I_B = 0$
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	-40	-	Vdc	$I_C = -10 \mu\text{Adc}, I_E = 0$
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	-5.0	-	Vdc	$I_E = -10 \mu\text{Adc}, I_C = 0$
Collector Cut-Off Current	I_{BL}	-	-50	nAdc	$V_{CE} = -30 \text{ Vdc}, V_{EB} = -3.0 \text{ Vdc}$
Emitter Cut-Off Current	I_{CEX}	-	-50	nAdc	$V_{CE} = -30 \text{ Vdc}, V_{BE} = -3.0 \text{ Vdc}$
On Characteristics⁽³⁾					
DC Current Gain ⁽¹⁾	h_{FE}	60	-	-	$I_C = -0.1 \text{ mAdc}, V_{CE} = -1.0 \text{ Vdc}$
		80	-		$I_C = -1.0 \text{ mAdc}, V_{CE} = -1.0 \text{ Vdc}$
		100	300		$I_C = -10 \text{ mAdc}, V_{CE} = -1.0 \text{ Vdc}$
		60	-		$I_C = -50 \text{ mAdc}, V_{CE} = -1.0 \text{ Vdc}$
		30	-		$I_C = -100 \text{ mAdc}, V_{CE} = -1.0 \text{ Vdc}$
Collector-Emitter Saturation Voltage ⁽³⁾	$V_{CE(sat)}$	-	-0.25	Vdc	$I_C = -10 \text{ mAdc}, I_B = -1.0 \text{ mAdc}$
		-	-0.4		$I_C = -50 \text{ mAdc}, I_B = -5.0 \text{ mAdc}$
Base-Emitter Saturation Voltage ⁽³⁾	$V_{BE(sat)}$	-0.65	-0.85	Vdc	$I_C = -10 \text{ mAdc}, I_B = -1.0 \text{ mAdc}$
		-	-0.95		$I_C = -50 \text{ mAdc}, I_B = -5.0 \text{ mAdc}$
Small-Signal Characteristics					
Curren-Gain-Bandwidth Product	f_T	250	-	MHz	$V_{CE} = -20 \text{ Vdc}, I_C = -10 \text{ mAdc}, f = 100 \text{ MHz}$
Output Capacitance	C_{obo}	-	4.5	pF	$V_{CB} = -5.0 \text{ Vdc}, I_E = 0, f = 1.0 \text{ MHz}$
Input Capacitance	C_{ibo}	-	10	pF	$V_{BE} = -0.5 \text{ Vdc}, I_E = 0, f = 1.0 \text{ MHz}$
Input Impedancen	h_{ie}	2.0	12	pF	$V_{CE} = -10 \text{ Vdc}, I_C = -1.0 \text{ mAdc}, f = 1.0 \text{ kHz}$
Voltage Feedback Ratio	h_{re}	0.1	10	$\times 10^{-4}$	$V_{CE} = -10 \text{ Vdc}, I_C = -1.0 \text{ mAdc}, f = 1.0 \text{ kHz}$
Small-Signal Current Gain	h_{fe}	100	400	-	$V_{CE} = -10 \text{ Vdc}, I_C = -1.0 \text{ mAdc}, f = 1.0 \text{ kHz}$
Output Admittance	$*h_{oe}$	3.0	60	μmhos	$V_{CE} = -10 \text{ Vdc}, I_C = -1.0 \text{ mAdc}, f = 1.0 \text{ kHz}$
Noise Figure	NF	-	4.0	dB	$V_{CE} = -5.0 \text{ Vdc}, I_C = -100 \mu\text{Adc}, R_S = 1.0 \text{ k}\Omega, f = 1.0 \text{ kHz}$
Switching Characteristics					
Delay Time	T_d	-	35	nS	$V_{CC} = -3.0 \text{ Vdc}, V_{BE} = 0.5 \text{ Vdc}, I_C = -10 \text{ mAdc}, I_{B1} = -1.0 \text{ mAdc}$
Rise Time	T_r	-	35	nS	
Storage Time	T_S	-	225	nS	$V_{CC} = -3.0 \text{ Vdc}, I_C = -10 \text{ mAdc}, I_{B1} = I_{B2} = -1.0 \text{ mAdc}$
Fall Time	T_F	-	75	nS	

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

CHARACTERISTIC CURVES



**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

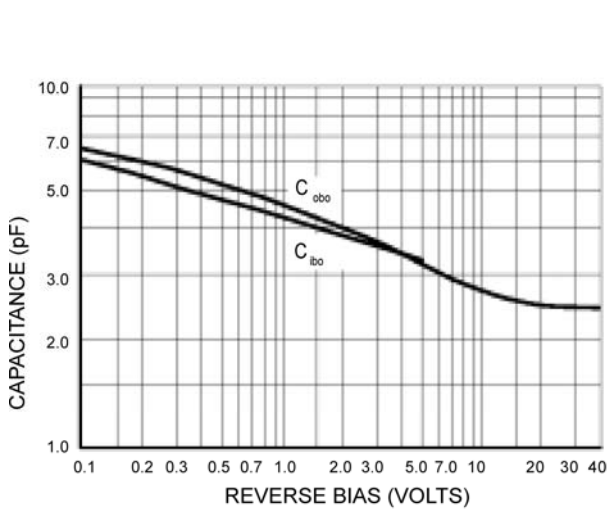


Figure 3. Capacitance

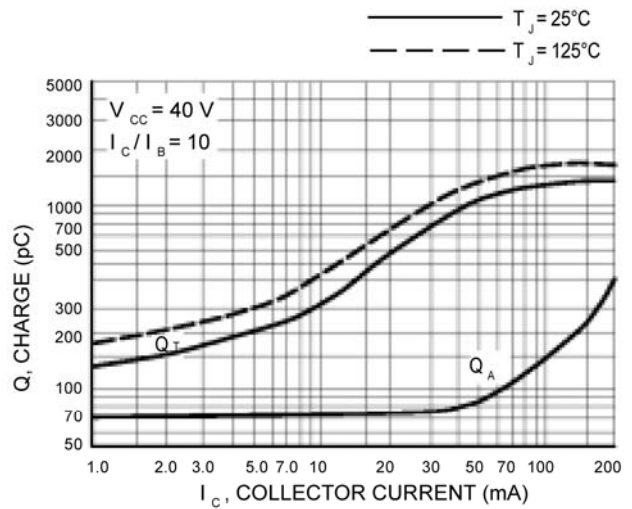


Figure 4. Charge Data

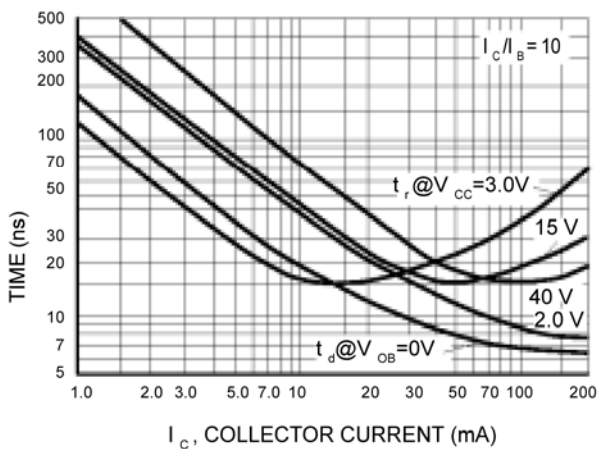


Figure 5. Turn-On Time

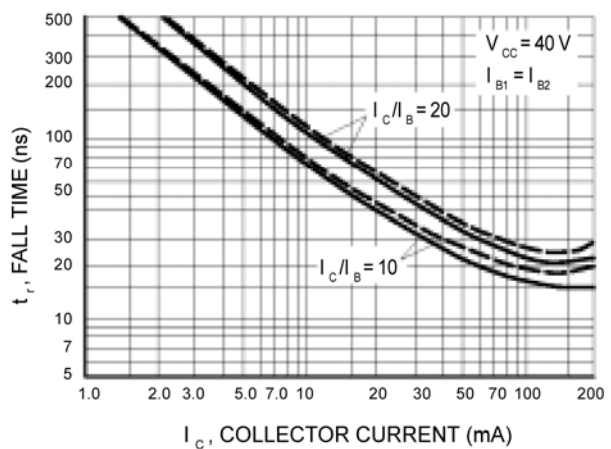


Figure 6. Fall Time

CHARACTERISTIC CURVES

**TYPICAL AUDIO SMALL-SIGNAL CHARACTERISTICS
NOISE FIGURE VARIATIONS**

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

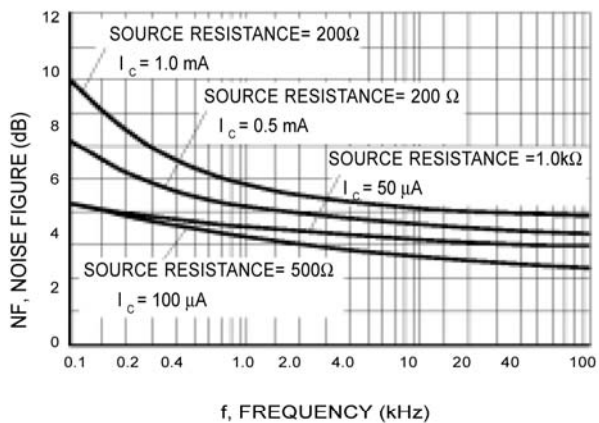


Figure 7. Noise Figure

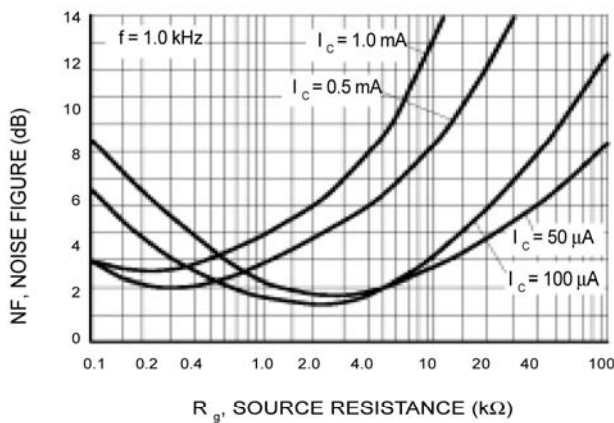


Figure 8. Noise Figure

h PARAMETERS

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

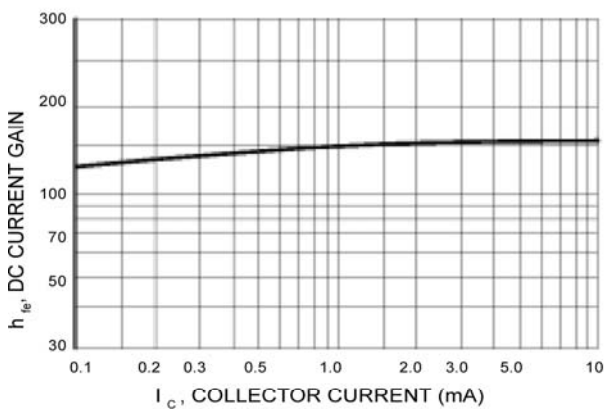


Figure 9. Current Gain

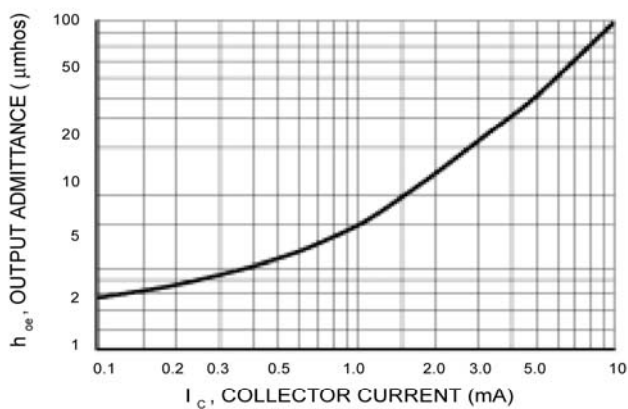


Figure 10. Output Admittance

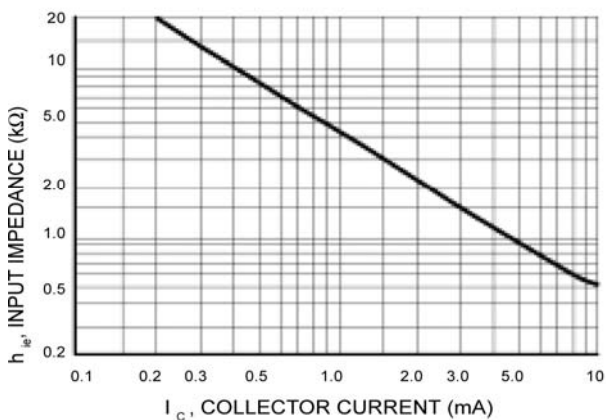


Figure 11. Input Impedance

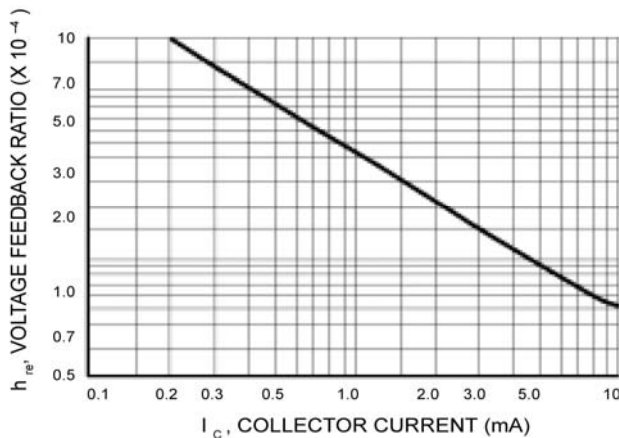


Figure 12. Voltage Feedback Ratio

CHARACTERISTIC CURVES

TYPICAL STATIC CHARACTERISTICS

