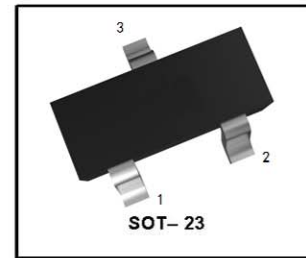
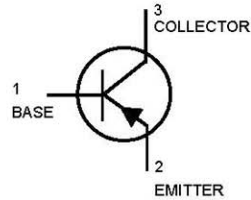


## PNP Silicon



### ● 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– 5 Board(1) $T_A = 25^\circ\text{C}$	$P_D$	225	mW
Derate above $25^\circ\text{C}$		1.8	mW/ $^\circ\text{C}$
Thermal Resistance Junction to Ambient	$R_{\theta JA}$	556	$^\circ\text{C}/\text{W}$
Total Device Dissipation Alumina Substrate, (2) $T_A = 25^\circ\text{C}$	$P_D$	300	mW
Derate above $25^\circ\text{C}$		2.4	mW/ $^\circ\text{C}$
Thermal Resistance Junction to Ambient	$R_{\theta JA}$	417	$^\circ\text{C}/\text{W}$
Junction and Storage Temperature	$T_J, T_{stg}$	–55 to +150	$^\circ\text{C}$

### ● DEVICE MARKING

MMBT3906 = 2A
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### ● ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Min	Max	Unit
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#### OFF CHARACTERISTICS

Collector–Emitter Breakdown Voltage (3) ( $I_C = -1.0\text{ mAdc}, I_B = 0$ )	$V_{(BR)CEO}$	– 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

- FR–5 = 1.0 x 0.75 x 0.062 in.
- Alumina = 0.4 x 0.3 x 0.024 in. 99.5% alumina.
- Pulse Width  $\leq 300\ \mu\text{s}$ ; Duty Cycle  $\leq 2.0\%$ .

● **ELECTRICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$  unless otherwise noted) (Continued)

Characteristic	Symbol	Min	Max	Unit
<b>ON CHARACTERISTICS (2)</b>				
DC Current Gain ( $I_C = -0.1\text{ mAdc}$ , $V_{CE} = -1.0\text{ Vdc}$ )	$h_{FE}$	60	—	—
( $I_C = -1.0\text{ mAdc}$ , $V_{CE} = -1.0\text{ Vdc}$ )		80	—	
( $I_C = -10\text{ mAdc}$ , $V_{CE} = -1.0\text{ Vdc}$ )		100	300	
( $I_C = -50\text{ mAdc}$ , $V_{CE} = -1.0\text{ Vdc}$ )		60	—	
( $I_C = -100\text{ mAdc}$ , $V_{CE} = -1.0\text{ Vdc}$ )		30	—	
Collector–Emitter Saturation Voltage ( $I_C = -10\text{ mAdc}$ , $I_B = -1.0\text{ mAdc}$ )	$V_{CE(sat)}$	—	-0.25	Vdc
( $I_C = -50\text{ mAdc}$ , $I_B = -5.0\text{ mAdc}$ )		—	-0.4	
Base–Emitter Saturation Voltage ( $I_C = -10\text{ mAdc}$ , $I_B = -1.0\text{ mAdc}$ )	$V_{BE(sat)}$	-0.65	-0.85	Vdc
( $I_C = -50\text{ mAdc}$ , $I_B = -5.0\text{ mAdc}$ )		—	-0.95	

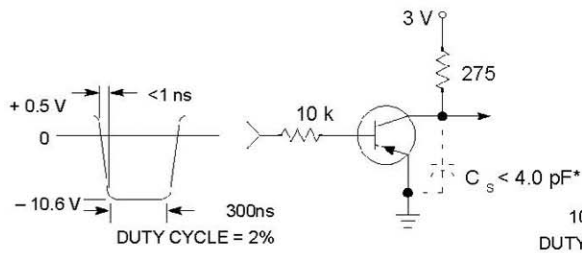
● **SMALL–SIGNAL CHARACTERISTICS**

Current–Gain — Bandwidth Product ( $I_C = -10\text{ mAdc}$ , $V_{CE} = -20\text{ Vdc}$ , $f = 100\text{ MHz}$ )	$f_T$	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 ( $V_{CE} = -10\text{ Vdc}$ , $I_C = -1.0\text{ mAdc}$ , $f = 1.0\text{ kHz}$ )	$h_{ie}$	2.0	12	k $\Omega$
Voltage Feedback Ratio ( $V_{CE} = -10\text{ Vdc}$ , $I_C = -1.0\text{ mAdc}$ , $f = 1.0\text{ kHz}$ )	$h_{re}$	0.1	10	$\times 10^{-4}$
Small–Signal Current Gain ( $V_{CE} = -10\text{ Vdc}$ , $I_C = -1.0\text{ mAdc}$ , $f = 1.0\text{ kHz}$ )	$h_{re}$	100	400	—
Output Admittance ( $V_{CE} = -10\text{ Vdc}$ , $I_C = -1.0\text{ mAdc}$ , $f = 1.0\text{ kHz}$ )	* $h_{oe}$	3.0	60	$\mu\text{mhos}$
Noise Figure ( $V_{CE} = -5.0\text{ Vdc}$ , $I_C = -100\text{ }\mu\text{A}$ , $R_S = 1.0\text{ k}\Omega$ , $f = 1.0\text{ kHz}$ )	NF	—	4.0	dB

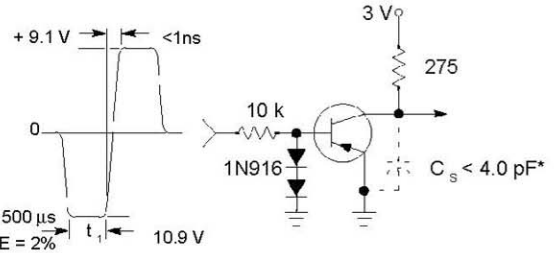
● **SWITCHING CHARACTERISTICS**

Delay Time	( $V_{CC} = -3.0\text{ Vdc}$ , $V_{BE} = 0.5\text{ Vdc}$ ,	$t_d$	—	35	ns
Rise Time	$I_C = -10\text{ mAdc}$ , $I_{B1} = -1.0\text{ mAdc}$ )	$t_d$	—	35	
Storage Time	( $V_{CC} = -3.0\text{ Vdc}$ , $I_C = -10\text{ mAdc}$ ,	$t_s$	—	225	ns
Fall Time	$I_{B1} = I_{B2} = -1.0\text{ mAdc}$ )	$t_f$	—	75	

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



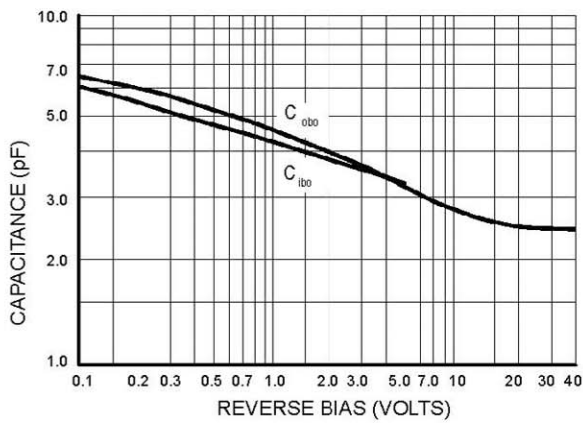
**Figure 1. Delay and Rise Time  
Equivalent Test Circuit**



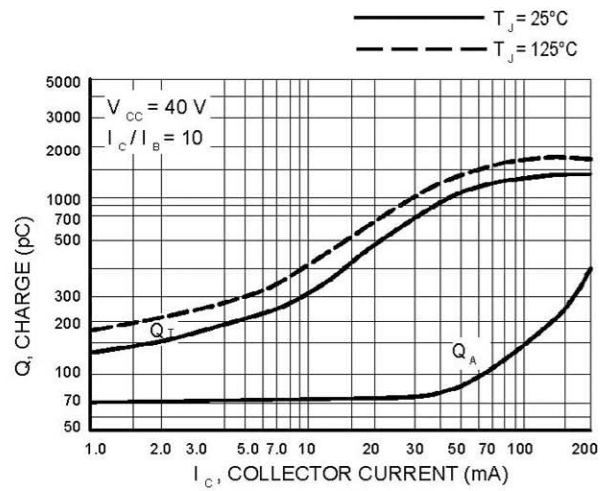
**Figure 2. Storage and Fall Time  
Equivalent Test Circuit**

\*Total shunt capacitance of test jig and connectors

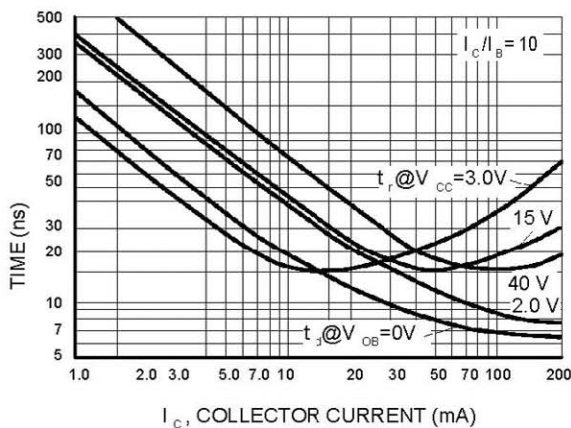
## TYPICAL TRANSIENT CHARACTERISTICS



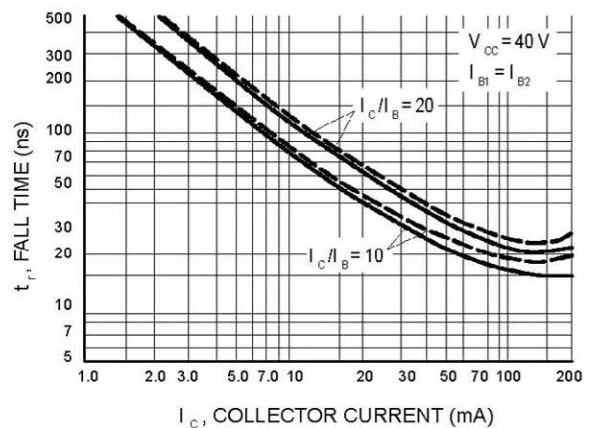
**Figure 3. Capacitance**



**Figure 4. Charge Data**



**Figure 5. Turn-On Time**



**Figure 6. Fall Time**

## TYPICAL AUDIO SMALL-SIGNAL CHARACTERISTICS NOISE FIGURE VARIATIONS

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

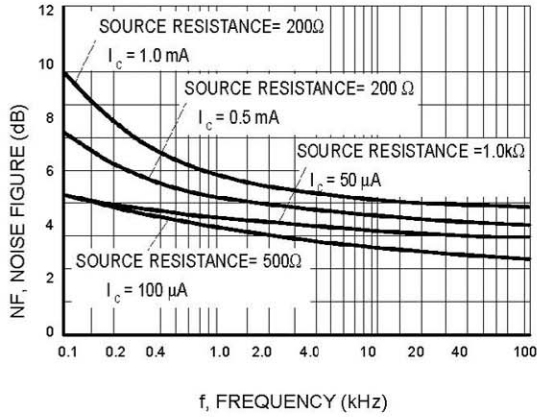


Figure 7. Noise Figure

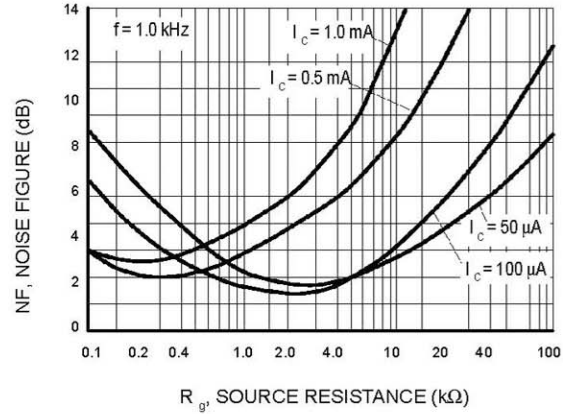


Figure 8. Noise Figure

## h PARAMETERS

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

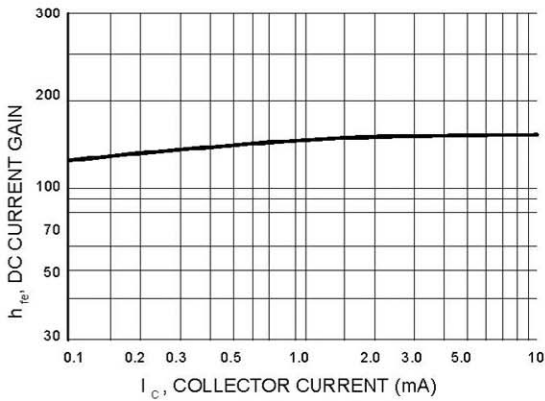


Figure 9. Current Gain

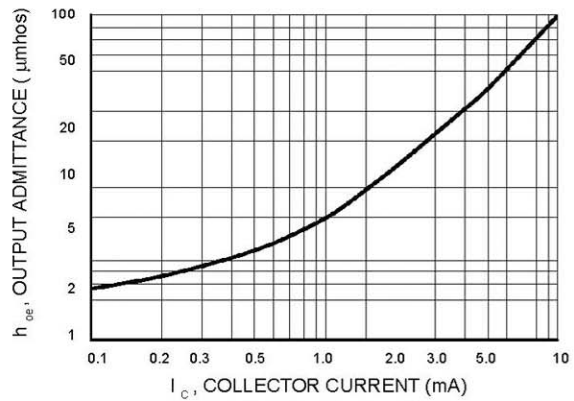


Figure 10. Output Admittance

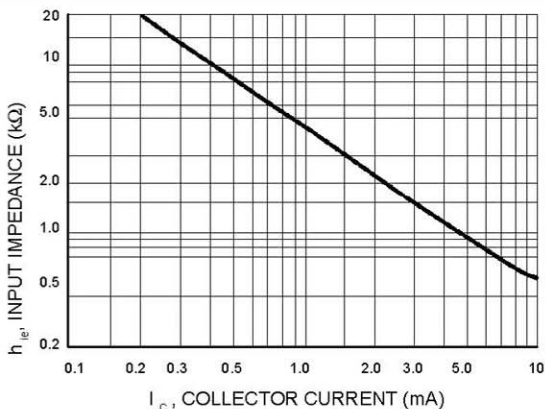


Figure 11. Input Impedance

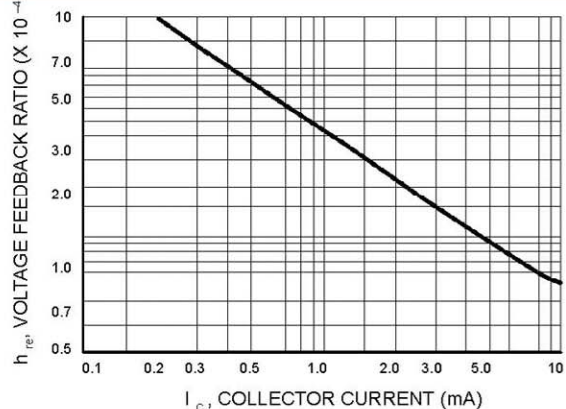


Figure 12. Voltage Feedback Ratio

## TYPICAL STATIC CHARACTERISTICS

