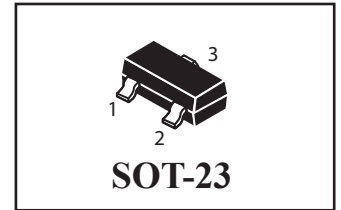
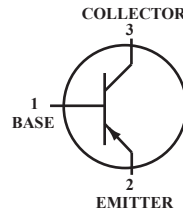


General Purpose Transistor PNP Silicon



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

Characteristics	Symbol	Max	Unit
Total Device Dissipation FR-5 Board ⁽¹⁾ TA=25°C Derate above 25°C	P _D	225	mW
Thermal Resistance, Junction to Ambient	R _{θJA}	556	°C/W
Total Device Dissipation Alumina Substrate, ⁽²⁾ TA=25°C Derate above 25°C	P _D	300	mW
Thermal Resistance, Junction to Ambient	R _{θJA}	417	°C/W
Junction and Storage, Temperature	T _J , T _{stg}	-55 to +150	°C

Device Marking

MMBT3906=2A

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

Characteristics	Symbol	Min	Max	Unit
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Off Characteristics

Collector-Emitter Breakdown Voltage ⁽³⁾ (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}	-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} =-30Vdc, V _{EB} =-3.0Vdc)	I _{CEX}	-	-50	nAdc

1.FR-5=1.0 x 0.75 x 0.062 in.

2.Alumina=0.4 x 0.3 x 0.024 in. 99.5% alumina.

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

Electrical Characteristics ($T_A=25^\circ\text{C}$ unless otherwise noted) (Continued)

Characteristics	Symbol	Min	Max	Unit
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On Characteristics (3)

DC Current Gain ($I_C = -0.1 \text{ mAdc}, V_{CE} = -1.0 \text{ Vdc}$) ($I_C = -1.0 \text{ mAdc}, V_{CE} = -1.0 \text{ Vdc}$) ($I_C = -10 \text{ mAdc}, V_{CE} = -1.0 \text{ Vdc}$) ($I_C = -50 \text{ mAdc}, V_{CE} = -1.0 \text{ Vdc}$) ($I_C = -100 \text{ mAdc}, V_{CE} = -1.0 \text{ Vdc}$)	H_{FE}	60 80 100 60 30	- - 300 - -	-
Collector-Emitter Saturation Voltage (3) ($I_C = -10 \text{ mAdc}, I_B = -1.0 \text{ mAdc}$) ($I_C = -50 \text{ mAdc}, I_B = -5.0 \text{ mAdc}$)	$V_{CE(sat)}$	- -	-0.25 -0.4	Vdc
Base-Emitter Saturation Voltage (3) ($I_C = -10 \text{ mAdc}, I_B = -1.0 \text{ mAdc}$) ($I_C = -50 \text{ mAdc}, I_B = -5.0 \text{ mAdc}$)	$V_{BE(sat)}$	-0.65 -	-0.85 -0.95	Vdc

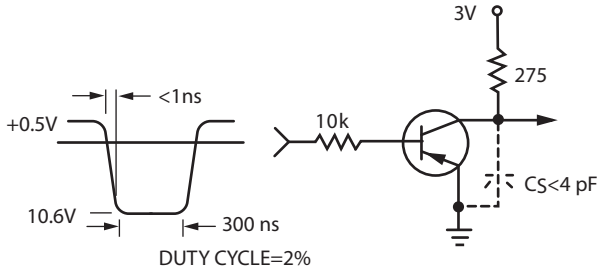
Small-signal Characteristics

Current-Gain-Bandwidth Product (4) ($I_C = -10 \text{ mAdc}, V_{CE} = -20 \text{ Vdc}, f = 100 \text{ MHz}$)	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 ohms
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_{fe}	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	μmhos
Noise Figure ($V_{CE} = -5.0 \text{ Vdc}, I_C = -100 \mu\text{Adc}, R_S = 1.0 \text{ k ohms}, f = 1.0 \text{ kHz}$)	NF	-	4.0	dB

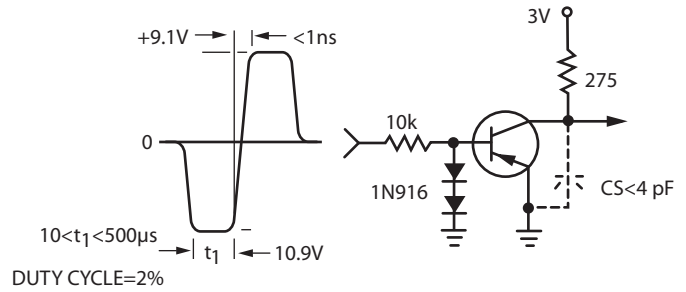
Switching Characteristics

Delay Time	(Vcc = -3.0 Vdc, VBE = 0.5 Vdc Ic = -10 mAdc, IB1 = -1.0 mAdc)	td	-	35	ns
Rise Time		tr	-	35	
Storage Time	(Vcc = -3.0 Vdc, Ic = -10 mAdc, IB1 = IB2 = -1.0 mAdc)	ts	-	225	ns
Fall Time		tf	-	75	

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



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



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

*Total shunt capacitance of test jig and connectors

TYPICAL TRANSIENT CHARACTERISTICS

—— $T_J=25^\circ\text{C}$ - - - - $T_J=125^\circ\text{C}$

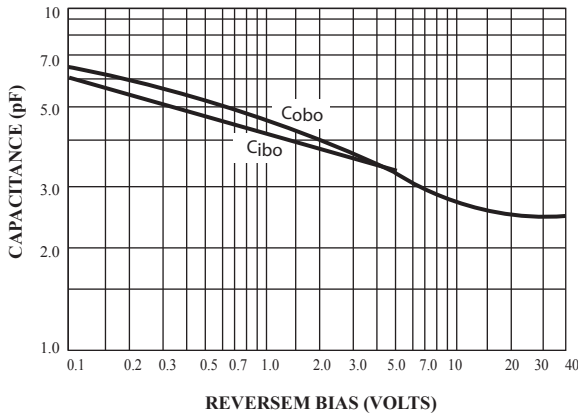


FIG.3 Capacitance

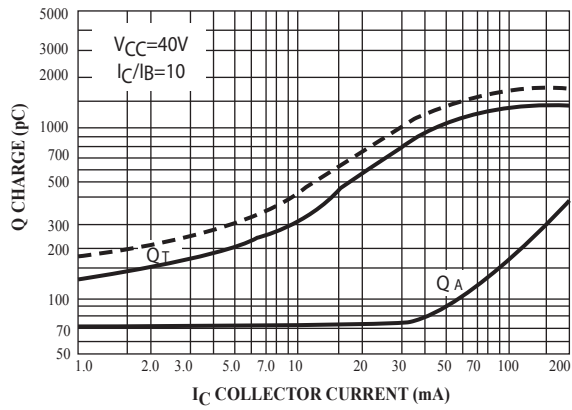


FIG.4 Charge Data

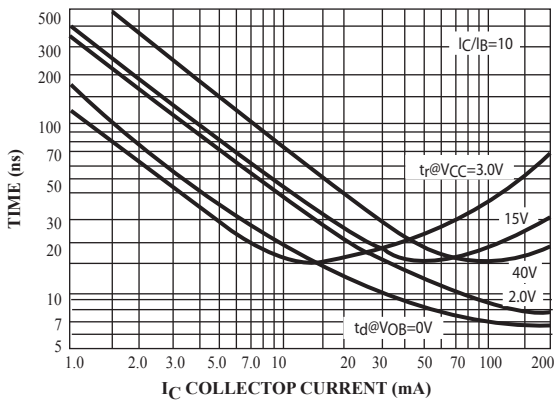


FIG.5 Turn-On Time

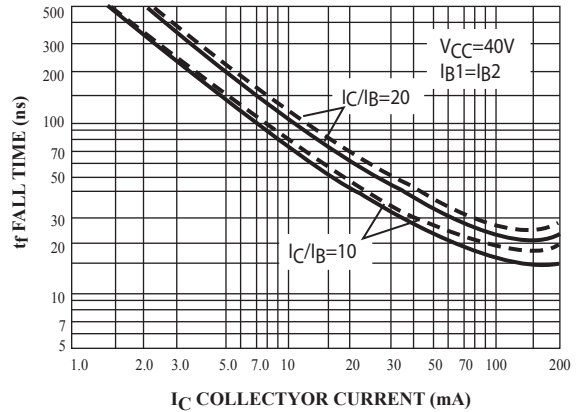


FIG.6 Fall Time

TYPICAL AUDIO SMALL-SIGNAL CHARACTERISTICS NOISE FIGURE VARIATIONS

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

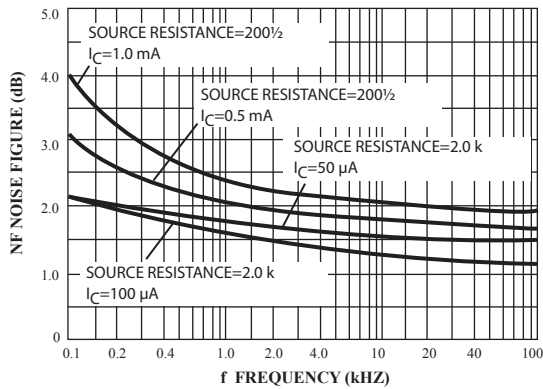


FIG.7

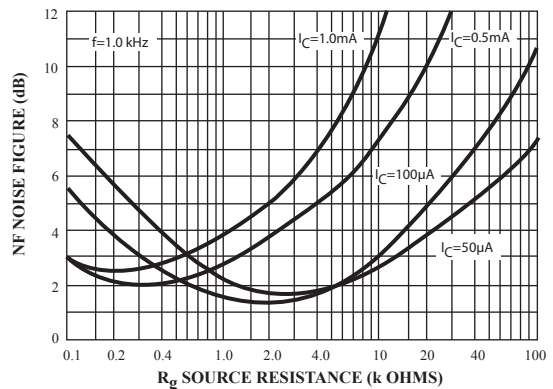


FIG.8

h PARAMETERS

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

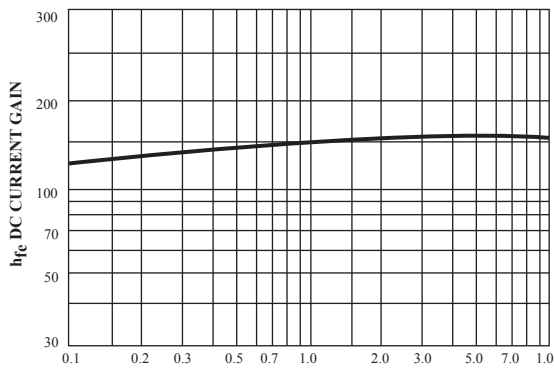


FIG.9 Current Gain

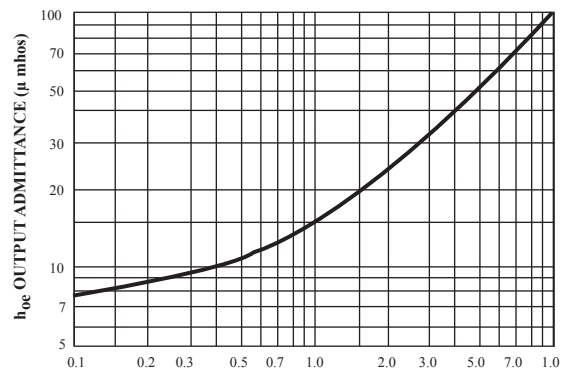


FIG.10 Input Impedance

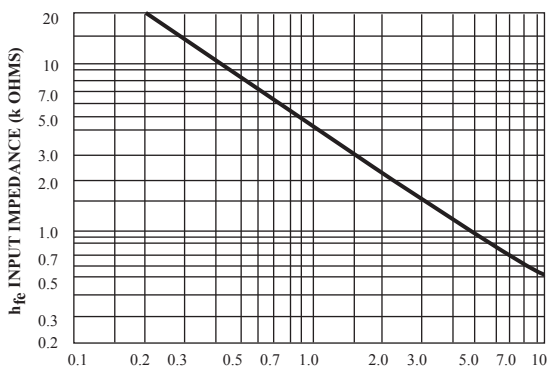


FIG.11 Input Impedance

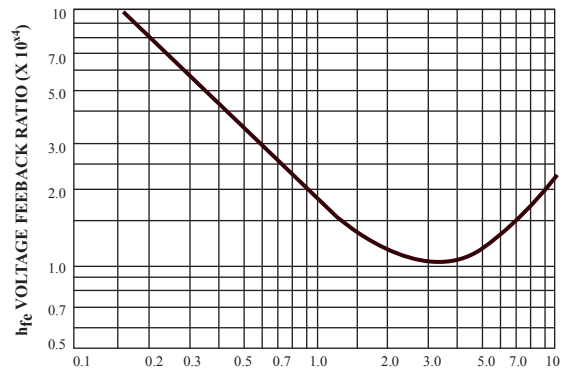


FIG.12 Votage Feabck Ratio

TYPICAL STATIC CHARACTERISTICS

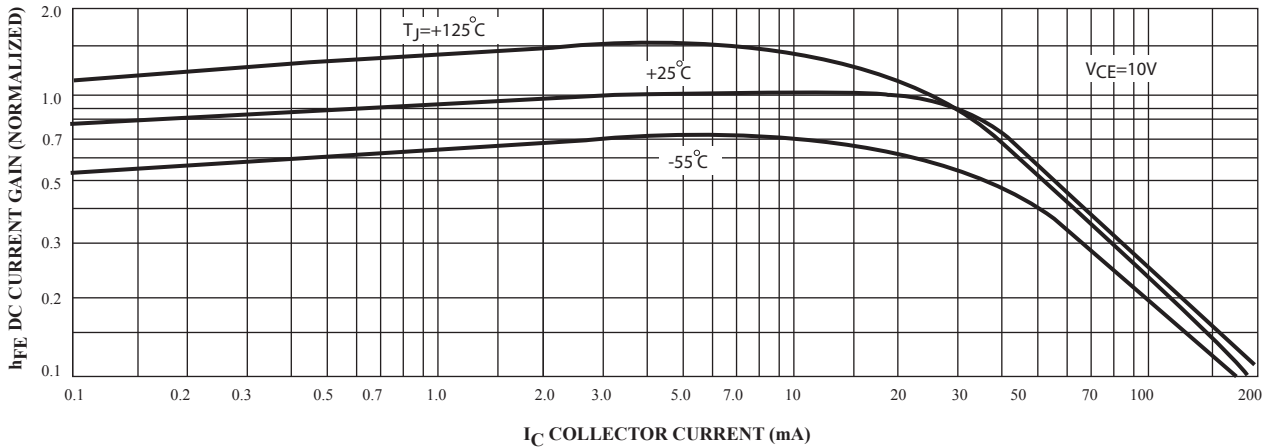


FIG.13 DC Current Gain

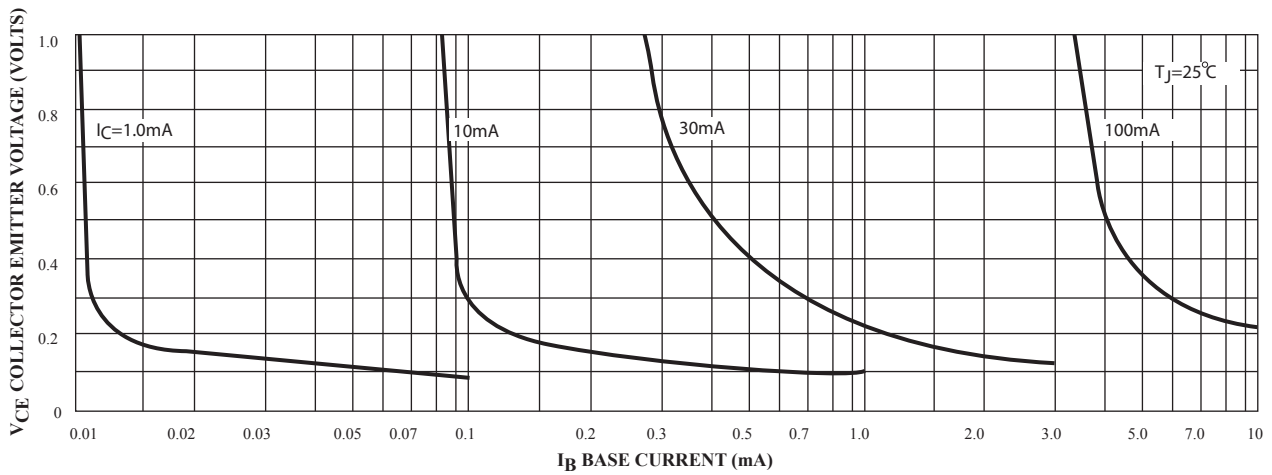


FIG.14 Collector Saturation Region

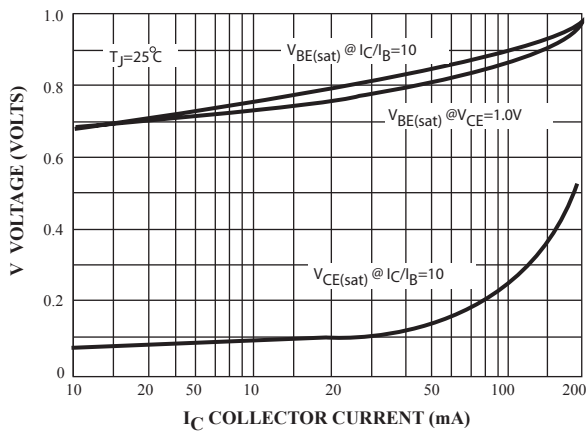


FIG.15 "ON" Voltages

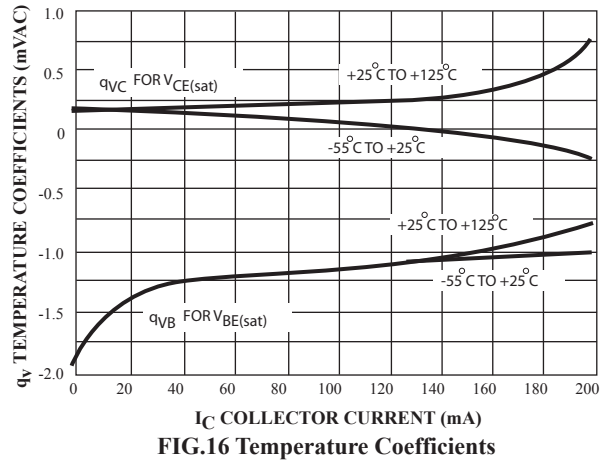
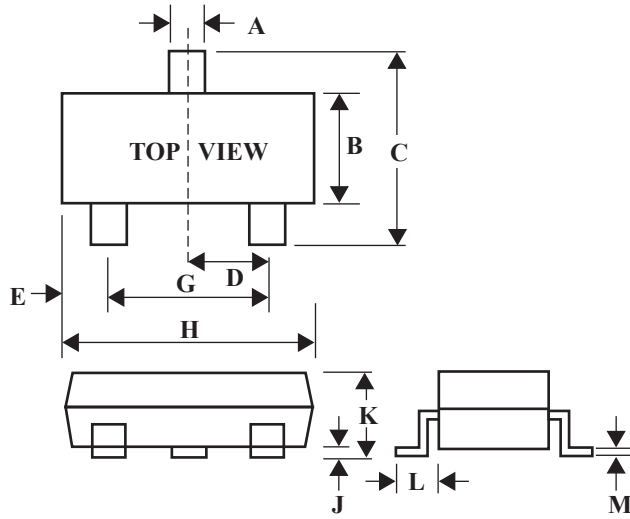


FIG.16 Temperature Coefficients

SOT-23 Package Outline Dimensions

Unit:mm



Dim	Min	Max
A	0.35	0.51
B	1.19	1.40
C	2.10	3.00
D	0.85	1.05
E	0.46	1.00
G	1.70	2.10
H	2.70	3.10
J	0.01	0.13
K	0.89	1.10
L	0.30	0.61
M	0.076	0.25