

GSTMMBT3906

PNP General Purpose Transistor


Product Description

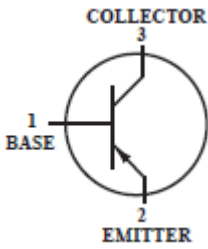
This device is designed as a general purpose amplifier and switch.

Features

- Lead(Pb)-Free

Packages & Pin Assignments

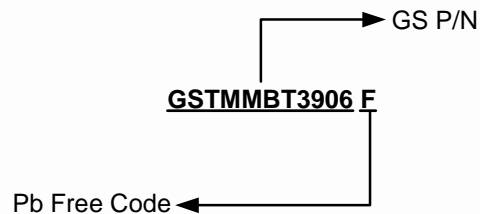
GSTMMBT3906F(SOT-23)	
	
Pin	Description
1	Base
2	Emitter
3	Collector



Marking Information

P/N	Package	Part Marking
GSTMMBT3906F	SOT-23	2A

Ordering Information



Part Number	Package	Quantity
GSTMMBT3906F	SOT-23	3000 PCS

Absolute Maximum Ratings

$T_A=25^\circ\text{C}$

Symbol	Conditions	Value	Unit
V_{CEO}	Collector-Emitter Voltage	-40	V
V_{CBO}	Collector-Base Voltage	-40	V
V_{EBO}	Emitter-Base Voltage	-5.0	V
$I_{C(DC)}$	Collector Current (DC)	-200	mA
P_D	Total Device Dissipation FR-5 Board ⁽¹⁾ $T_A=25^\circ\text{C}$	225	mW
	Derate above 25°C	1.8	mW/ $^\circ\text{C}$
$R_{\theta JA}$	Thermal Resistance Junction to Ambient	556	$^\circ\text{C}/\text{W}$
P_D	Total Device Dissipation Alumina Substrate ⁽²⁾ $T_A=25^\circ\text{C}$	300	mW
	Derate above 25°C	2.4	mW/ $^\circ\text{C}$
$R_{\theta JA}$	Thermal Resistance Junction to Ambient	417	$^\circ\text{C}/\text{W}$
T_J	Junction Temperature Range	-55 to +150	$^\circ\text{C}$
T_{STG}	Storage Temperature Range	-55 to +150	$^\circ\text{C}$

Note 1: FR-5=1.0 x 0.75 x 0.062 in

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

Electrical Characteristics

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

Symbol	Conditions	Min	Max	Unit
$V_{(BR)CEO}$	Collector-Emitter Breakdown Voltage ⁽³⁾ ($I_C=-1.0\text{mA}$, $I_B=0\text{mA}$)	-40	-	V
$V_{(BR)CBO}$	Collector-Base Breakdown Voltage ($I_C=-10\mu\text{A}$, $I_E=0\text{mA}$)	-40	-	V
$V_{(BR)EBO}$	Emitter-Base Breakdown Voltage ($I_E=-10\mu\text{A}$, $I_C=0\text{mA}$)	-5.0	-	V
I_{CEX}	Collector Cutoff Current ($V_{CE}=-30\text{V}$, $V_{EB}=-3.0\text{V}$)	-	-50	nA
I_{BL}	Base Cutoff Current ($V_{CE}=-30\text{V}$, $V_{EB}=-3.0\text{V}$)	-	-50	nA
h_{FE}	DC Current Gain ($I_C=-0.1\text{mA}$, $V_{CE}=-1.0\text{V}$)	60	-	-
	DC Current Gain ($I_C=-1.0\text{mA}$, $V_{CE}=-1.0\text{V}$)	80	-	-
	DC Current Gain ($I_C=-10\text{mA}$, $V_{CE}=-1.0\text{V}$)	100	300	-
	DC Current Gain ($I_C=-50\text{mA}$, $V_{CE}=-1.0\text{V}$)	60	-	-
	DC Current Gain ($I_C=-100\text{mA}$, $V_{CE}=-1.0\text{V}$)	30	-	-

Electrical Characteristics (Continue)

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

Symbol	Conditions	Min	Max	Unit
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage ⁽³⁾ ($I_C=-10\text{mA}$, $I_B=-1.0\text{mA}$) ($I_C=-50\text{mA}$, $I_B=-5.0\text{mA}$)	- -	-0.25 -0.4	V
$V_{BE(sat)}$	Base-Emitter Saturation Voltage ⁽³⁾ ($I_C=-10\text{mA}$, $I_B=-1.0\text{mA}$) ($I_C=-50\text{mA}$, $I_B=-5.0\text{mA}$)	-0.65 -	-0.85 -0.95	V
f_T	Current-Gain-Bandwidth Product ⁽⁴⁾ ($I_C=-10\text{mA}$, $V_{CE}=-20\text{V}$, $f=100\text{MHz}$)	250	-	MHz
C_{obo}	Output Capacitance ($V_{CB}=-5\text{V}$, $I_E=0\text{mA}$, $f=1.0\text{MHz}$)	-	4.5	pF
C_{ibo}	Input Capacitance ($V_{EB}=-0.5\text{V}$, $I_C=0\text{mA}$, $f=1.0\text{MHz}$)	-	10.0	pF
h_{ie}	Input Impedance ($I_C=-1.0\text{mA}$, $V_{CE}=-10\text{V}$, $f=1.0\text{kHz}$)	2.0	12	$\text{K}\Omega$
h_{re}	Voltage Feedback Ratio ($I_C=-1.0\text{mA}$, $V_{CE}=-10\text{V}$, $f=1.0\text{kHz}$)	0.1	10.0	$\times 10^{-4}$
h_{fe}	Small-Signal Current Gain ($I_C=-1.0\text{mA}$, $V_{CE}=-10\text{V}$, $f=1.0\text{kHz}$)	100	400	-
h_{oe}	Output Admittance ($I_C=-1.0\text{mA}$, $V_{CE}=-10\text{V}$, $f=1.0\text{kHz}$)	3.0	60	umhos
NF	Noise Figure ($I_C=-100\mu\text{A}$, $V_{CE}=-5\text{V}$, $R_S=1.0\text{k}\Omega$, $f=1.0\text{kHz}$)	-	4.0	dB
t_d	Delay Time ($V_{CC}=-3.0\text{V}$, $V_{BE}=0.5\text{V}$, $I_C=-10\text{mA}$, $I_{B1}=-1.0\text{mA}$)	-	35	ns
t_r	Rise Time ($V_{CC}=-3.0\text{V}$, $V_{BE}=0.5\text{V}$, $I_C=-10\text{mA}$, $I_{B1}=-1.0\text{mA}$)	-	35	ns
t_s	Storage Time ($V_{CC}=-3.0\text{V}$, $I_C=-10\text{mA}$, $I_{B1}=I_{B2}=-1.0\text{mA}$)	-	225	ns
t_f	Fall Time ($V_{CC}=-3.0\text{V}$, $I_C=-10\text{mA}$, $I_{B1}=I_{B2}=-1.0\text{mA}$)	-	75	ns

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

Note 4: f_T is defined as the frequency at which h_{fe} extrapolates to unity

Typical Application Circuit

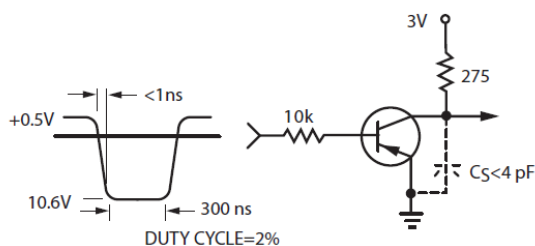


FIG.1 Delay and Rise Time
Equivalent Test Circuit

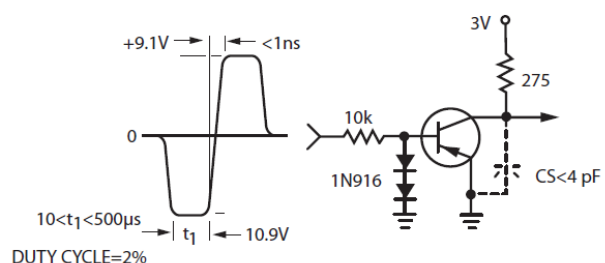


FIG.2 Storage and Fall Time
Equivalent Test Circuit

*Total shunt capacitance of test jig and connectors

Typical Performance Characteristics

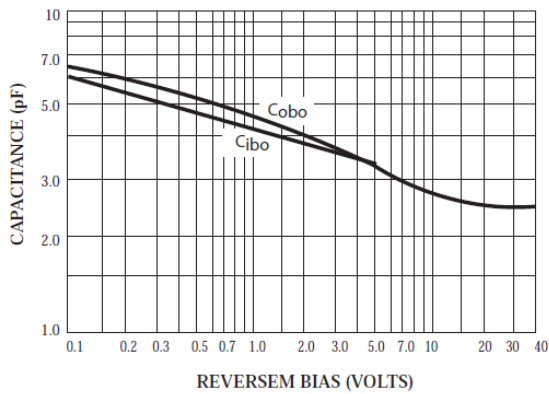


FIG.3 Capacitance

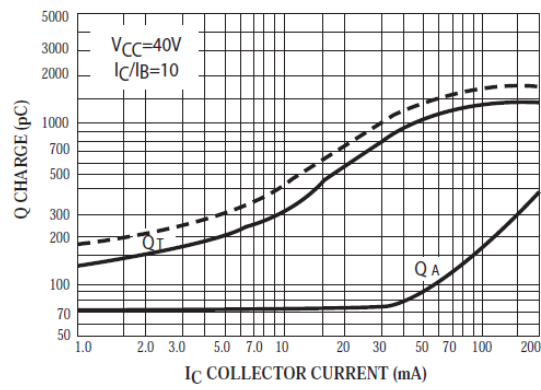


FIG.4 Charge Data

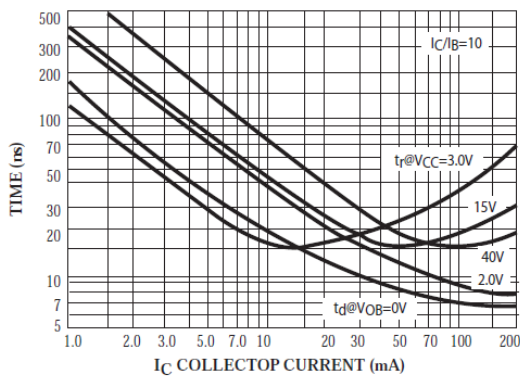


FIG.5 Turn-On Time

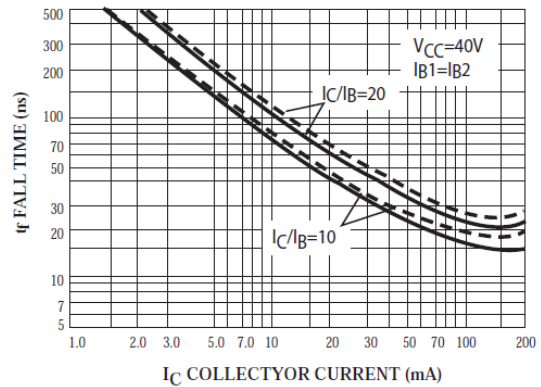


FIG.6 Fall Time

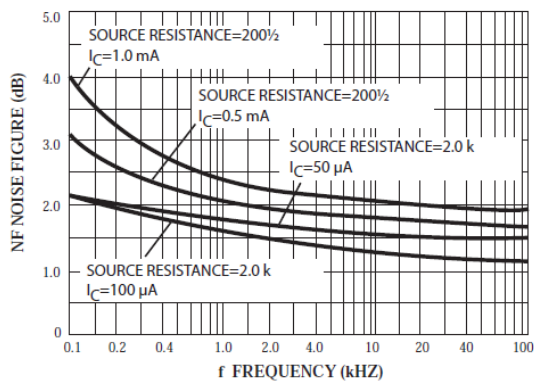


FIG.7

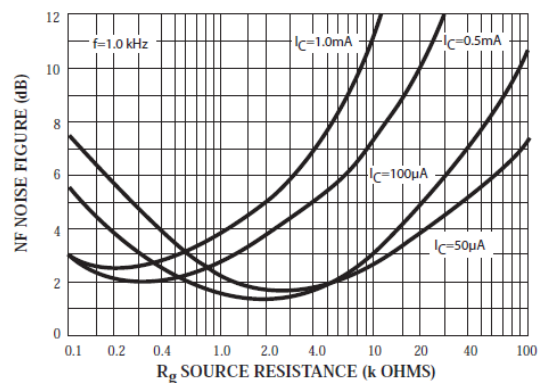


FIG.8

h PARAMETERS (VCE = -10 Vdc, f = 1.0 kHz, TA = 25°C)

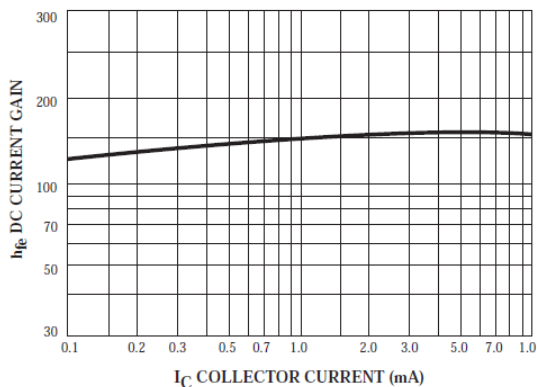


FIG.9 Current Gain

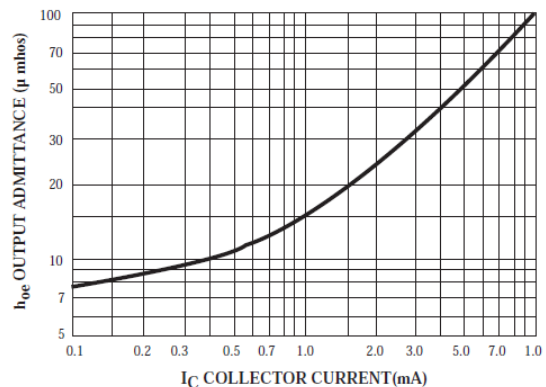


FIG.10 Input Impedance

Typical Performance Characteristics (Continue)

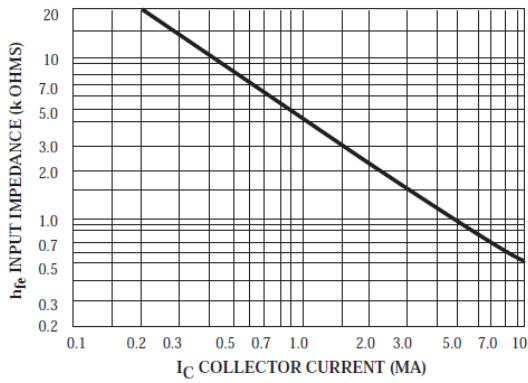


FIG.11 Input Impedance

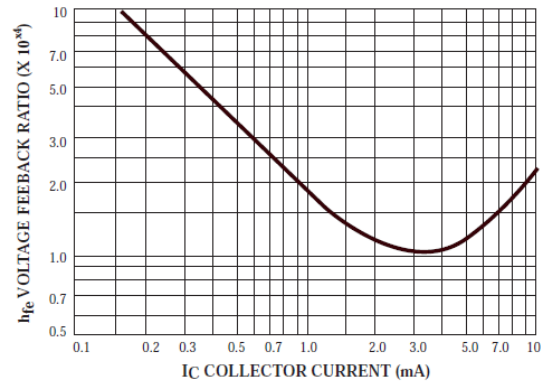


FIG.12 Voltage Feedback Ratio

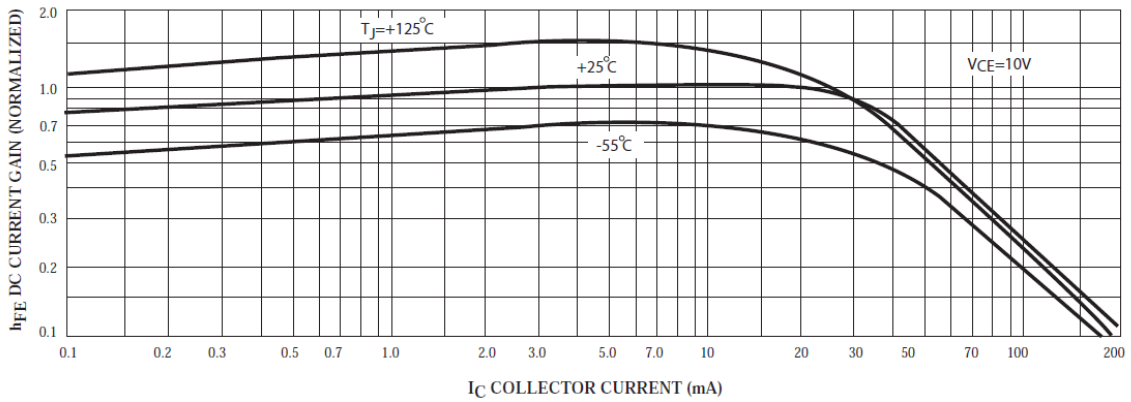


FIG.13 DC Current Gain

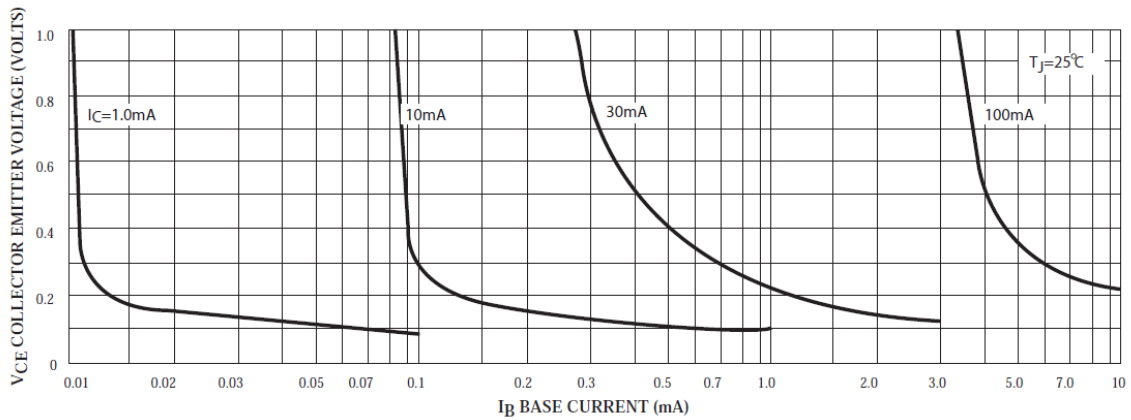


FIG.14 Collector Saturation Region

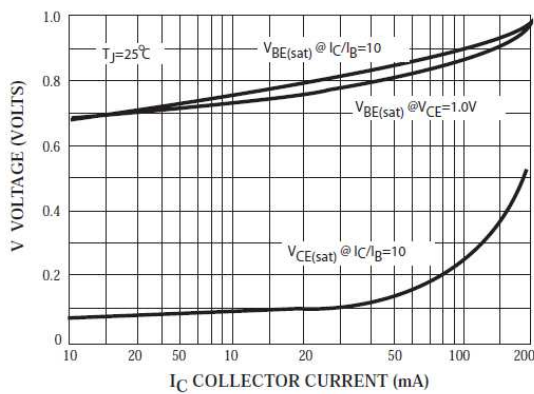


FIG.15 "ON" Voltages

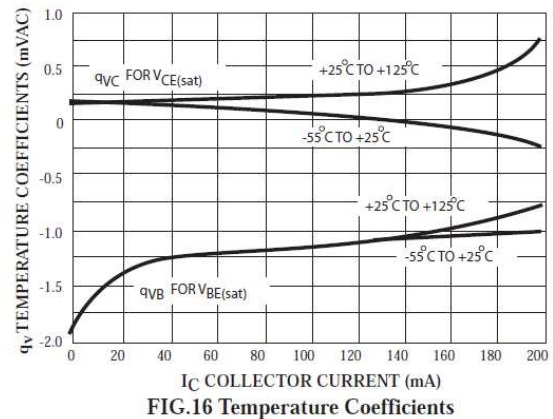
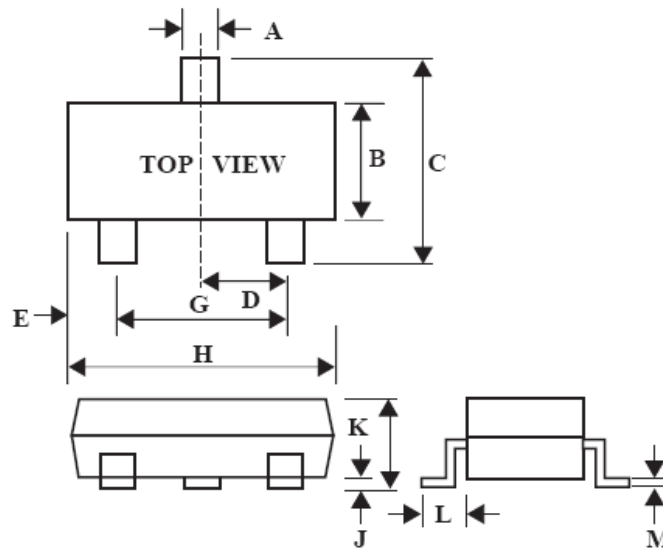


FIG.16 Temperature Coefficients

Package Dimension

SOT-23











Dimensions				
Symbol	Millimeters		Inches	
	Min	Max	Min	Max
A	0.35	0.51	0.014	0.020
B	1.19	1.40	0.047	0.055
C	2.10	3.00	0.083	0.118
D	0.85	1.05	0.033	0.041
E	0.46	1.00	0.018	0.039
G	1.70	2.10	0.067	0.083
H	2.70	3.10	0.106	0.122
J	0.01	0.13	0.000	0.005
K	0.89	1.10	0.035	0.043
L	0.30	0.61	0.011	0.024
M	0.076	0.25	0.002	0.010



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