

GSTMMBT3904F

NPN General Purpose Transistor

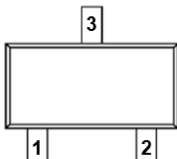
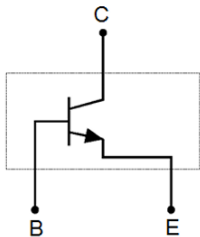
Product Description

This device is designed for general purpose amplifier and switch applications.

Features

- Complementary PNP Type Available (GSTMMBT3906F)
- RoHS Compliant and Halogen Free

Package & Pin Assignment

SOT-23 (TO-236)		Equivalent Circuit
		
Pin	Description	
1	BASE	
2	EMITTER	
3	COLLECTOR	

Ordering and Marking Information

Ordering Information			
Part Number	Package	Marking Code	Quantity/Reel
GSTMMBT3904F	SOT-23	1AM	3,000 PCS
- Product Code: GSTMMBT3904		- Green Level: F for RoHS Compliant and Halogen Free	
Marking Information			
- Product Code: 1AM			

GSTMMBT3904F

Absolute Maximum Ratings (T_A=25°C, unless otherwise specified)

Symbol	Conditions	Typical	Unit
V _{CEO}	Collector-Emitter Voltage	40	V
V _{CBO}	Collector-Base Voltage	60	V
V _{EBO}	Emitter-Base Voltage	6.0	V
I _C	Collector Current - Continuous	200	mA
P _D	Power Dissipation ⁽¹⁾	225	mW
R _{θJA}	Thermal Resistance Junction to Ambient ⁽¹⁾	556	°C/W
T _J	Junction Temperature Range	-55 to +150	°C
T _{STG}	Storage Temperature Range	-55 to +150	°C

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

NOTE1: Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

Electrical Characteristics (T_A=25°C, unless otherwise specified)

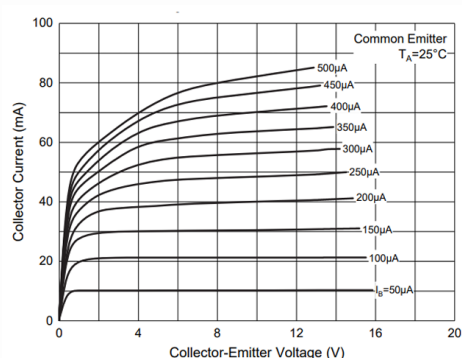
Symbol	Conditions	Min	Max	Unit
V _{(BR)CEO}	Collector-Emitter Breakdown Voltage (I _C =1.0mA, I _B =0mA)	40	-	V
V _{(BR)CBO}	Collector-Base Breakdown Voltage (I _C =10uA, I _E =0mA)	60	-	V
V _{(BR)EBO}	Emitter-Base Breakdown Voltage (I _E =10uA, I _C =0mA)	6.0	-	V
I _{CEX}	Collector Cutoff Current (V _{CE} =30V, V _{EB(off)} =3.0V)	-	50	nA
I _{BL}	Base Cutoff Current (V _{CE} =30V, V _{EB(off)} =3.0V)	-	50	nA
h _{FE}	DC Current Gain (I _C =0.1mA, V _{CE} =1.0V)	40	-	-
	DC Current Gain (I _C =1.0mA, V _{CE} =1.0V)	70	-	-
	DC Current Gain (I _C =10mA, V _{CE} =1.0V)	100	300	-
	DC Current Gain (I _C =50mA, V _{CE} =1.0V)	60	-	-
	DC Current Gain (I _C =100mA, V _{CE} =1.0V)	30	-	-
V _{CE(sat)}	Collector-Emitter Saturation Voltage ⁽²⁾ (I _C =10mA, I _B =1.0mA) (I _C =50mA, I _B =5.0mA)	-	0.2	V
		-	0.3	
V _{BE(sat)}	Base-Emitter Saturation Voltage ⁽²⁾ (I _C =10mA, I _B =1.0mA) (I _C =50mA, I _B =5.0mA)	0.65	0.85	V
		-	0.95	
f _T	Current-Gain-Bandwidth Product (I _C =10mA, V _{CE} =20V, f=100MHz)	300	-	MHz
C _{obo}	Output Capacitance (V _{CB} =5V, I _E =0mA, f=1.0MHz)	-	4.0	pF
C _{ibo}	Input Capacitance (V _{EB} =0.5V, I _C =0mA, f=1.0MHz)	-	8.0	pF
NF	Noise Figure (I _C =100uA, V _{CE} =5V, R _S =1.0kΩ, f=1.0kHz)	-	5.0	dB

Electrical Characteristics (T_A=25°C, unless otherwise specified)

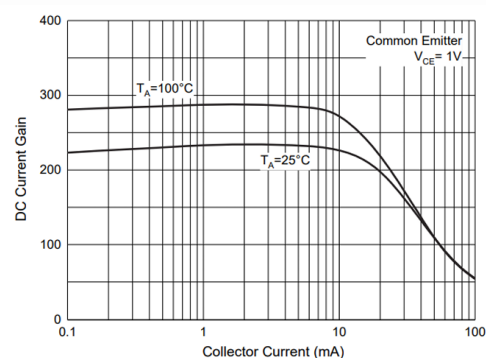
Symbol	Conditions	Min	Max	Unit
t _d	Delay Time (V _{CC} =3.0V, V _{BE(off)} =-0.5V, I _C =10mA, I _{B1} =1.0mA)	-	35	ns
t _r	Rise Time (V _{CC} =3.0V, V _{BE(off)} =-0.5V, I _C =10mA, I _{B1} =1.0mA)	-	35	ns
t _s	Storage Time (V _{CC} =3.0V, I _C =10mA, I _{B1} =I _{B2} =1.0mA)	-	200	ns
t _f	Fall Time (V _{CC} =3.0V, I _C =10mA, I _{B1} =I _{B2} =1.0mA)	-	50	ns

NOTE2: Pulse Test: Pulse Width ≤ 300 us, Duty Cycle ≤ 2.0%

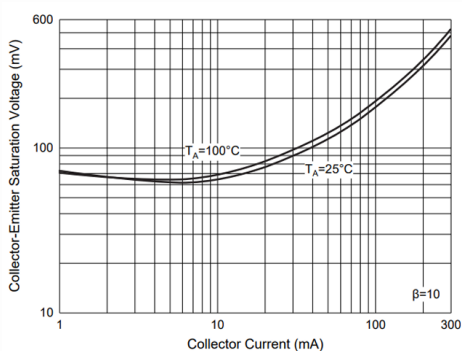
Typical Performance Characteristics (T_A=25°C, unless otherwise specified)



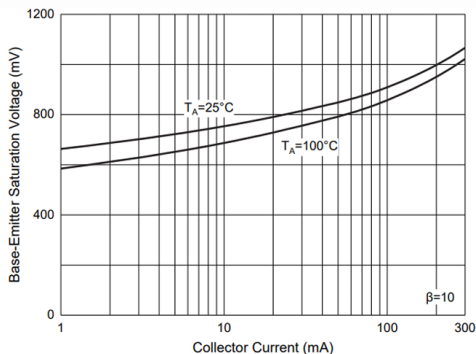
Static Characteristics



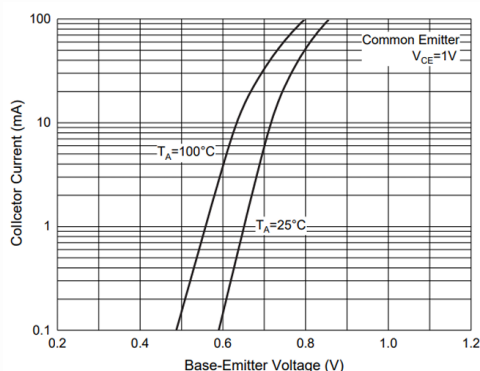
DC Current Gain Characteristics



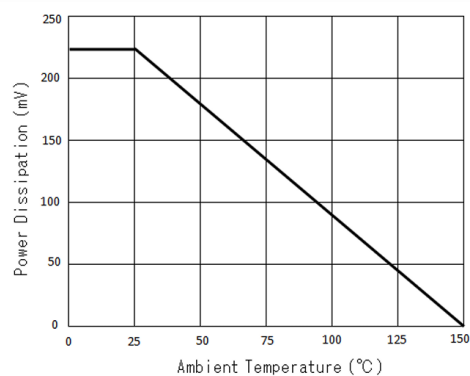
Collector-Emitter Saturation Voltage Characteristics



Base-Emitter Saturation Voltage Characteristics



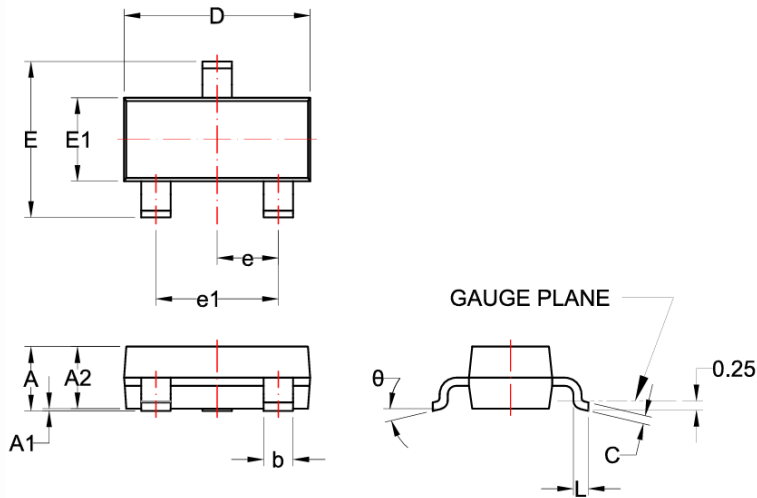
Base-Emitter Voltage Characteristics



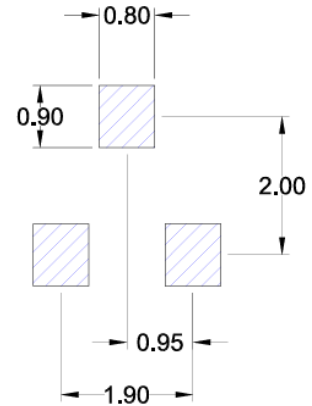
Collector Power Derating Curve

SOT-23 (TO-236)

Package Dimension



Recommended Land Pattern



Dimensions





Symbol	Millimeters		Inches	
	Min	Max	Min	Max
A	0.75	1.17	0.030	0.046
A1	0.01	0.15	0.000	0.006
A2	0.70	1.02	0.028	0.040
b	0.30	0.50	0.012	0.020
c	0.08	0.20	0.003	0.008
D	2.80	3.04	0.110	0.120
E	2.10	2.64	0.083	0.104
E1	1.20	1.40	0.047	0.055
e	0.95 BSC		0.037 BSC	
e1	1.90 BSC		0.075 BSC	
L	0.30	0.60	0.012	0.024
θ	0°	8°	0°	8°



NOTE3: DIMENSION D DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS.

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