

GSTMMBT3904W

NPN General Purpose Transistor


Product Description

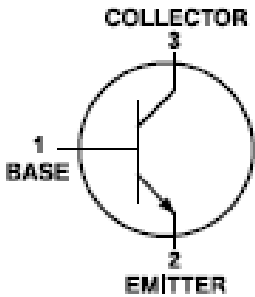
This device is designed as a general purpose amplifier and switch.

Features

- Collector-Emitter Voltage : 40V
- Collector-Base Voltage : 60V
- Collector Current-Continuous : 200mA
- Lead(Pb)-Free

Packages & Pin Assignments

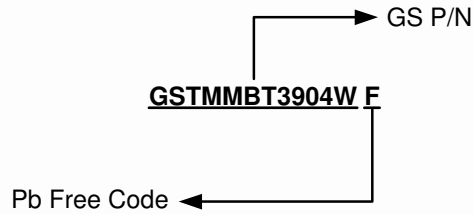
GSTMMBT3904WF(SOT-323)	
	
Pin	Description
1	Base
2	Emitter
3	Collector



Marking Information

P/N	Package	Part Marking
GSTMMBT3904WF	SOT-323	1E

Ordering Information



Part Number	Package	Quantity
GSTMMBT3904WF	SOT-323	3000 PCS

Absolute Maximum Ratings

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

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
$I_{C(DC)}$	Collector Current (DC)	200	mA
P_D	Total Device Dissipation $T_A=25^\circ\text{C}$	200	mW
T_J	Junction Temperature Range	-55 to +150	$^\circ\text{C}$
T_{STG}	Storage Temperature Range	-55 to +150	$^\circ\text{C}$

Electrical Characteristics

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

Symbol	Conditions	Min	Max	Unit
$V_{(BR)CEO}$	Collector-Emitter Breakdown Voltage ($I_C=1.0\text{mA}$, $I_B=0\text{mA}$)	40	-	V
$V_{(BR)CBO}$	Collector-Base Breakdown Voltage ($I_C=10\mu\text{A}$, $I_E=0\text{mA}$)	60	-	V
$V_{(BR)EBO}$	Emitter-Base Breakdown Voltage ($I_E=10\mu\text{A}$, $I_C=0\text{mA}$)	6.0	-	V
I_{CEX}	Collector Cutoff Current ($V_{CE}=30\text{V}$, $V_{EB(off)}=3.0\text{V}$)	-	50	nA
I_{BL}	Base Cutoff Current ($V_{CE}=30\text{V}$, $V_{EB(off)}=3.0\text{V}$)	-	50	nA
h_{FE}	DC Current Gain ($I_C=0.1\text{mA}$, $V_{CE}=1.0\text{V}$)	40	-	-
	DC Current Gain ($I_C=1.0\text{mA}$, $V_{CE}=1.0\text{V}$)	70	-	-
	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 ($I_C=10\text{mA}$, $I_B=1.0\text{mA}$) ($I_C=50\text{mA}$, $I_B=5.0\text{mA}$)	- -	0.2 0.3	V
$V_{BE(sat)}$	Base-Emitter Saturation Voltage ($I_C=10\text{mA}$, $I_B=1.0\text{mA}$) ($I_C=50\text{mA}$, $I_B=5.0\text{mA}$)	0.65 -	0.85 0.95	V
f_T	Current-Gain-Bandwidth Product ($I_C=10\text{mA}$, $V_{CE}=20\text{V}$, $f=100\text{MHz}$)	300	-	MHz
C_{obo}	Output Capacitance ($V_{CB}=5\text{V}$, $I_E=0\text{mA}$, $f=1.0\text{MHz}$)	-	4.0	pF
C_{ibo}	Input Capacitance ($V_{EB}=0.5\text{V}$, $I_C=0\text{mA}$, $f=1.0\text{MHz}$)	-	8.0	pF
h_{ie}	Input Impedance ($I_C=1.0\text{mA}$, $V_{CE}=10\text{V}$, $f=1.0\text{kHz}$)	1.0	10	$\text{K}\Omega$
h_{re}	Voltage Feedback Ratio ($I_C=1.0\text{mA}$, $V_{CE}=10\text{V}$, $f=1.0\text{kHz}$)	0.5	8.0	$\times 10^{-4}$
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 ($I_C=1.0\text{mA}$, $V_{CE}=10\text{V}$, $f=1.0\text{kHz}$)	1.0	40	umhos
NF	Noise Figure ($I_C=100\mu\text{A}$, $V_{CE}=5\text{V}$, $R_S=1.0\text{k}\Omega$, $f=1.0\text{kHz}$)	-	5.0	dB
t_d	Delay Time ($V_{CC}=3.0\text{V}$, $V_{BE(off)}=-0.5\text{V}$, $I_C=10\text{mA}$, $I_{B1}=1.0\text{mA}$)	-	35	ns
t_r	Rise Time ($V_{CC}=3.0\text{V}$, $V_{BE(off)}=-0.5\text{V}$, $I_C=10\text{mA}$, $I_{B1}=1.0\text{mA}$)	-	35	ns
t_s	Storage Time ($V_{CC}=3.0\text{V}$, $I_C=10\text{mA}$, $I_{B1}=I_{B2}=1.0\text{mA}$)	-	200	ns
t_f	Fall Time ($V_{CC}=3.0\text{V}$, $I_C=10\text{mA}$, $I_{B1}=I_{B2}=1.0\text{mA}$)	-	50	ns

Typical Application Circuit

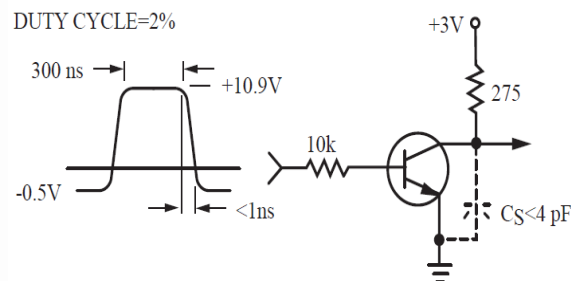


FIG.1 Delay and Rise Time
Equivalent Test Circuit

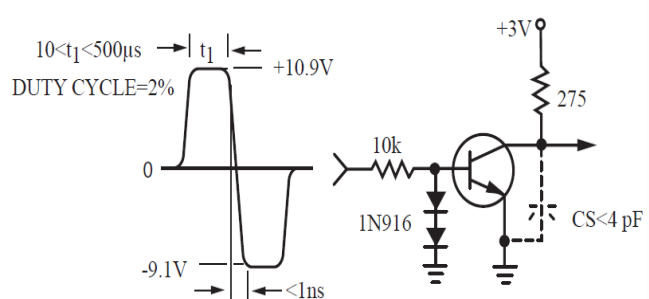


FIG.2 Storage and Fall Time
Equivalent Test Circuit

*Total shunt capacitance of test jig and connectors

Typical Performance Characteristics

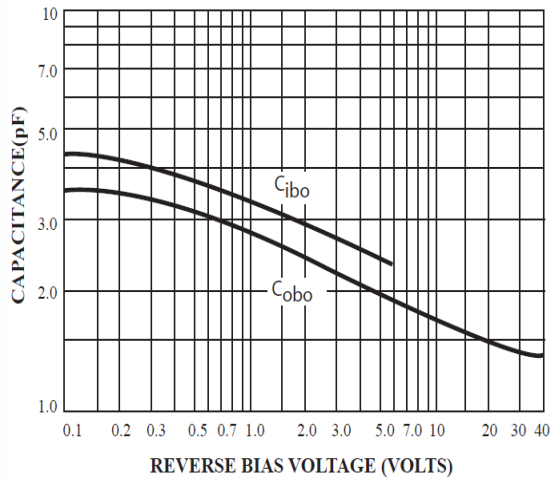


FIG.3 Capacitance

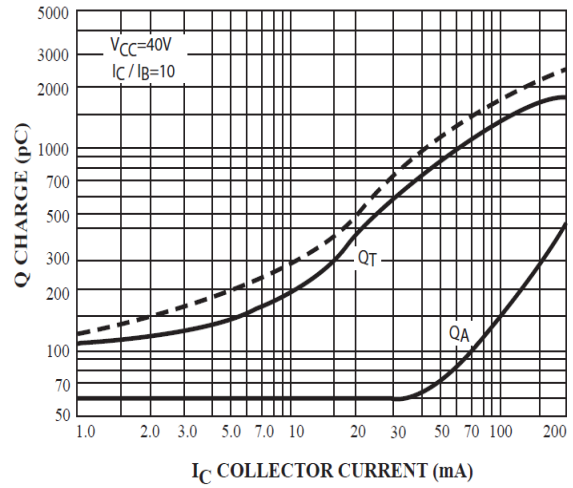


FIG.4 Charge Data

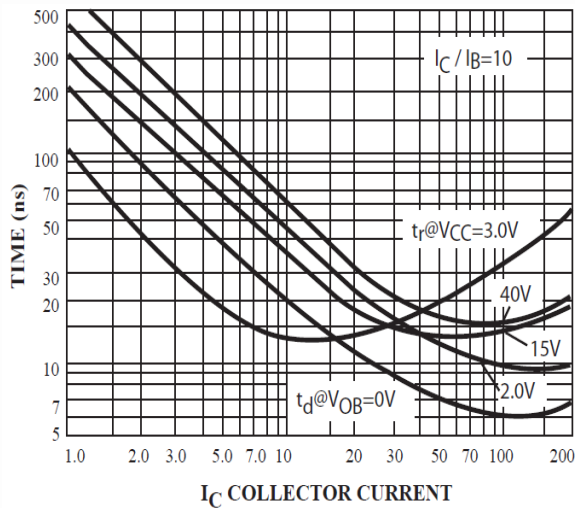


FIG.5 Turn-On Time

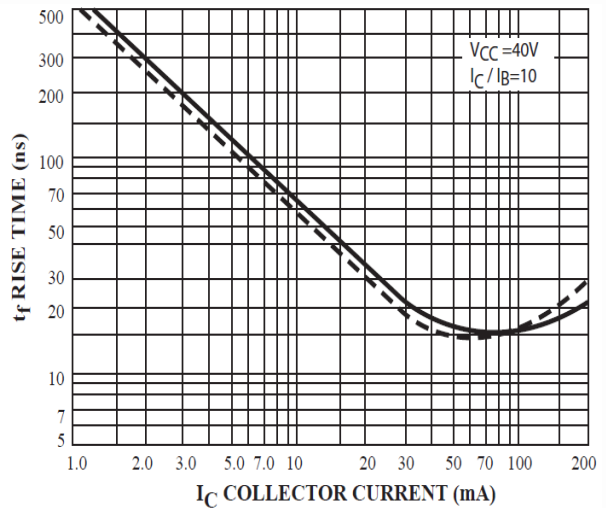


FIG.6 Rise Time

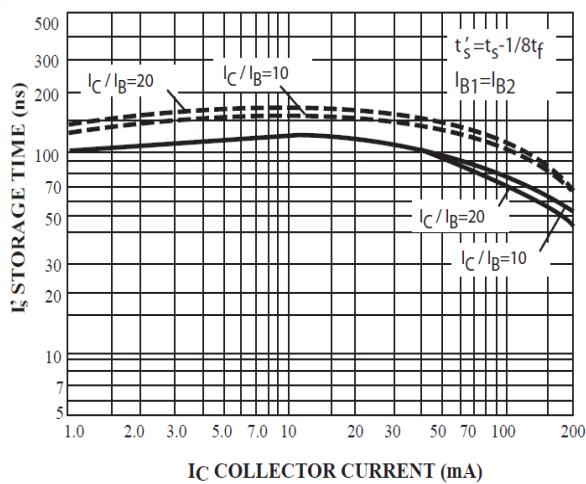


FIG.7 Storage Time

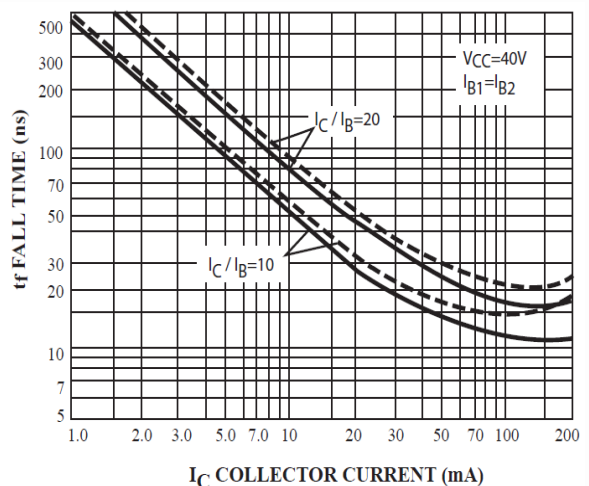


FIG.8 Fall Time

Typical Performance Characteristics (Continue)

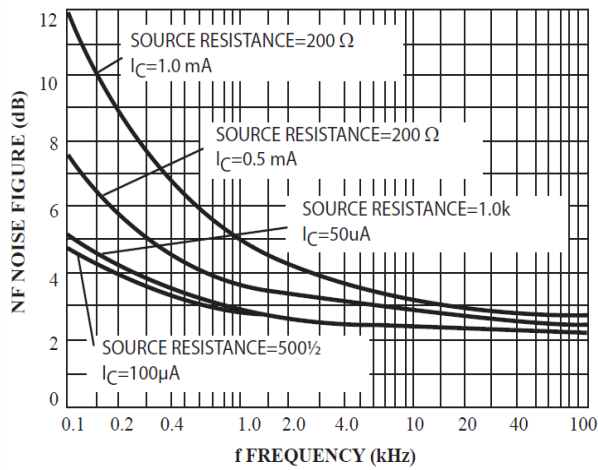


FIG.9

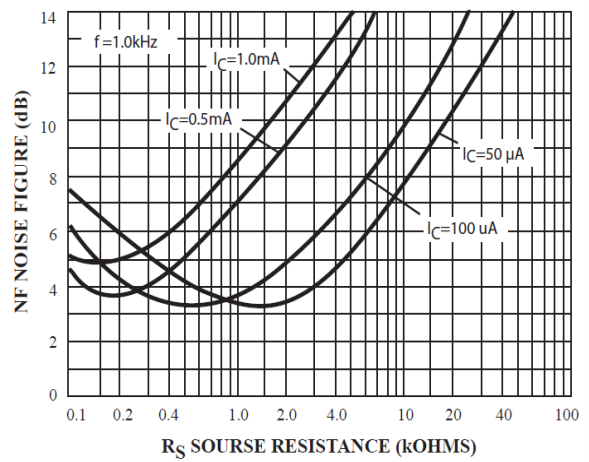


FIG.10

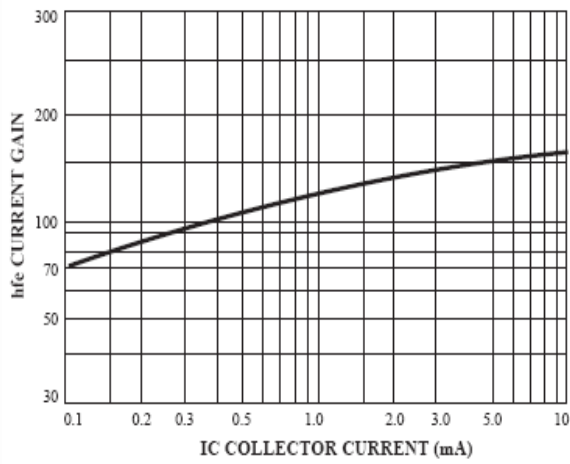


Figure 11. Current Gain

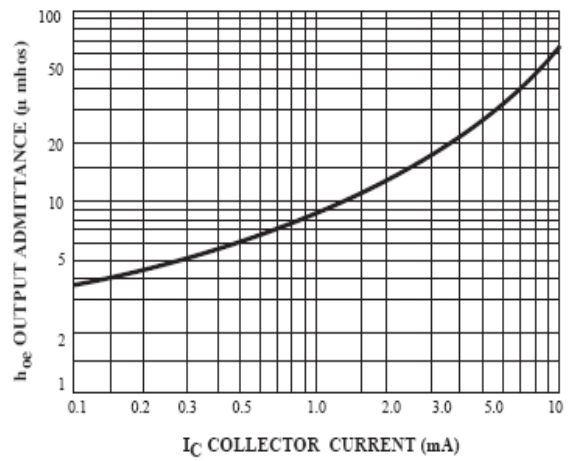


Figure 12. Output Admittance

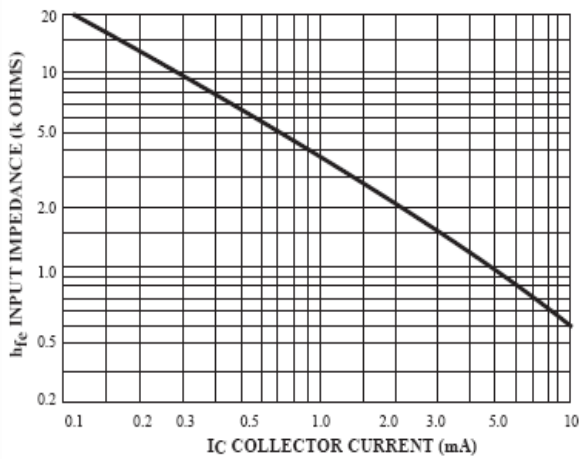


Figure 13. Input Impedance

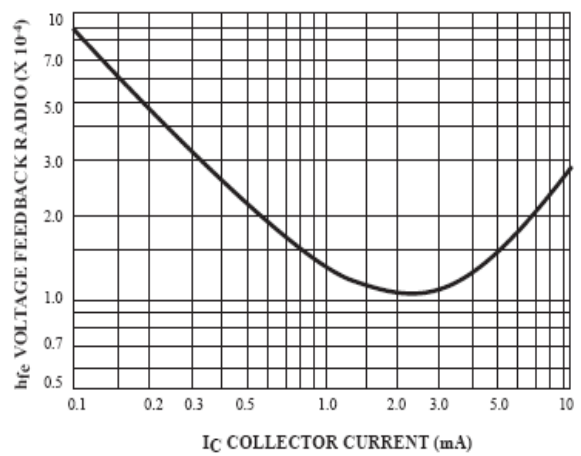


Figure 14. Voltage Feedback Ratio

Typical Performance Characteristics (Continue)

TYPICAL STATIC CHARACTERISTICS

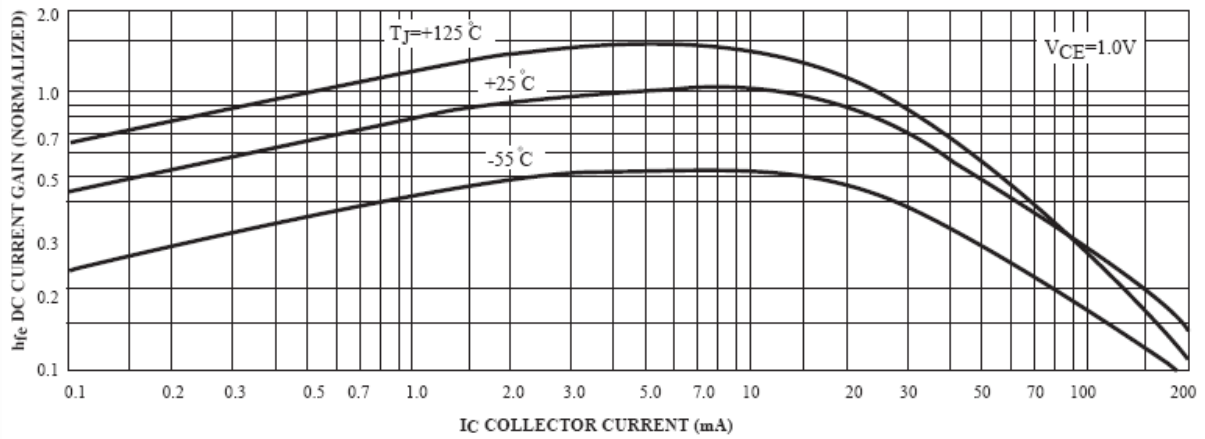


Figure 15. DC Current Gain

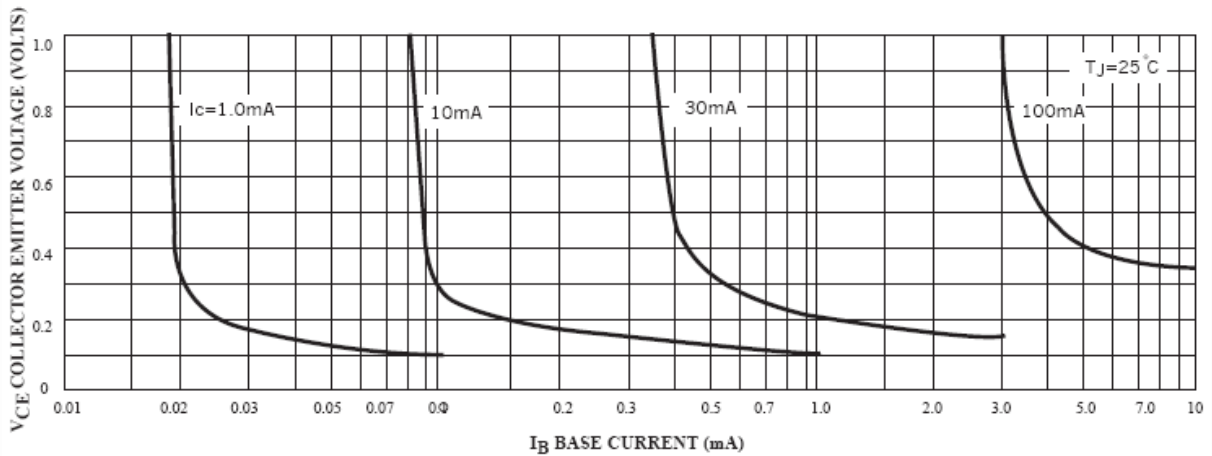


Figure 16. Collector Saturation Region

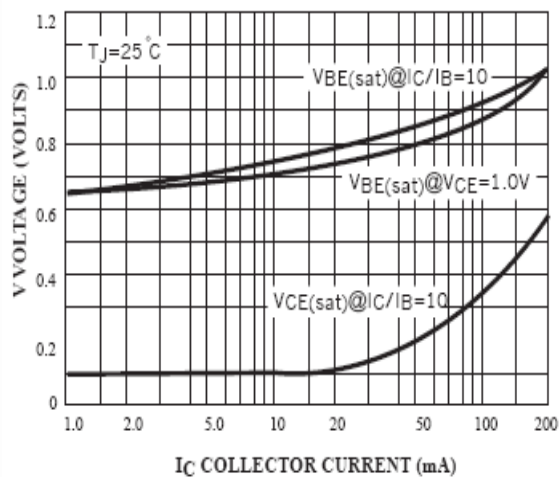


Figure 17. "ON" Voltage

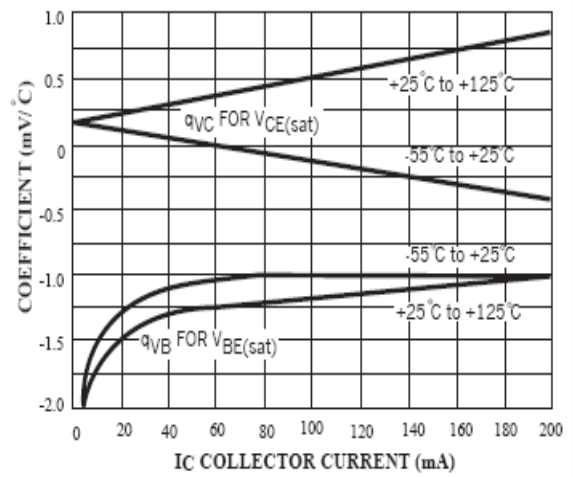
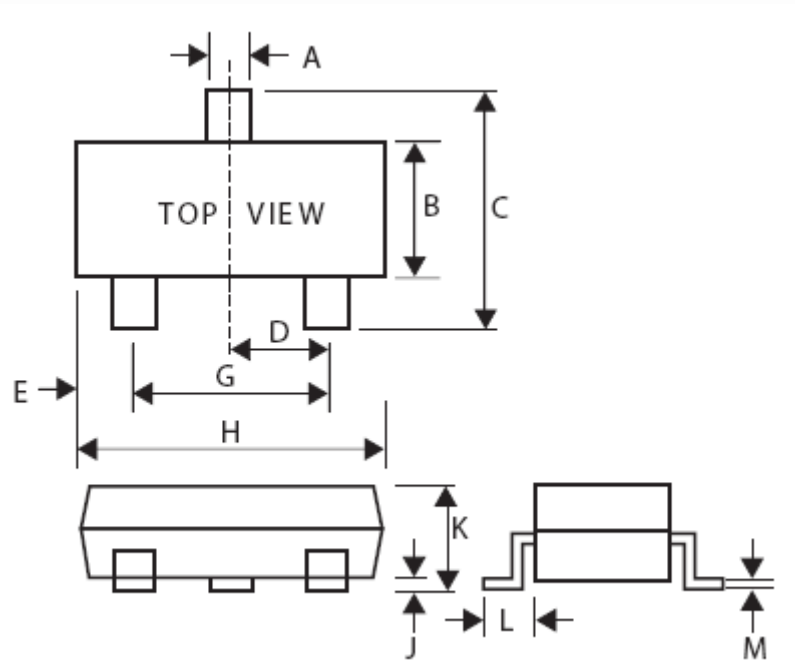


Figure 18. Temperature Coefficients

Package Dimension

SOT-323









Dimensions				
Symbol	Millimeters		Inches	
	Min	Max	Min	Max
A	0.30	0.40	0.012	0.016
B	1.15	1.35	0.045	0.053
C	2.00	2.40	0.079	0.094
D	-	0.65	-	0.026
E	0.30	0.40	0.012	0.016
G	1.20	1.40	0.047	0.055
H	1.80	2.20	0.071	0.087
J	0.00	0.10	0.000	0.004
K	0.80	1.00	0.032	0.039
L	0.42	0.53	0.017	0.021
M	0.10	0.25	0.004	0.010

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