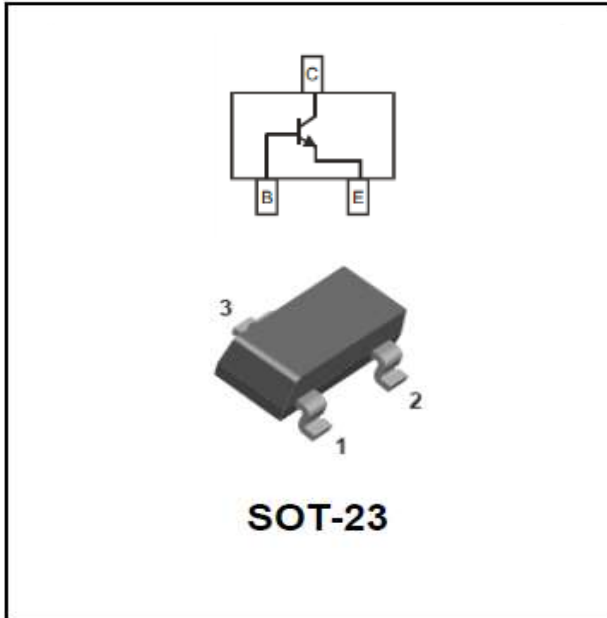




MMBT3904

NPN General Purpose Amplifier



Features

- Epoxy meets UL-94 V-0 flammability rating
- Moisure Sensitivity Level 1
- Marking:1AM

Off Characteristics

Item	Symbol	Unit	Conditions	Value
Collector-Emitter Voltage*	V_{CEO}	V	$I_C=1.0\text{mA}, I_B=0$	40
Collector-Base Voltage	V_{CBO}	V	$I_C=10\mu\text{A}, I_E=0$	60
Emitter-Base Voltage	V_{EBO}	V	$I_E=10\mu\text{A}, I_C=0$	6.0
Collector Current	I_C	mA		200
Collector Cutoff Current	I_{CBO}	nA	$V_{CB}=60\text{Vdc}$	50
Collector Cutoff Current	I_{CEX}	nA	$V_{CE}=30\text{Vdc}$	50
Power Dissipation	P_D	mW		350
Thermal Resistance Junction to Case	R_{thJC}	$^{\circ}\text{C/W}$		185
Thermal Resistance Junction to Ambient	R_{thJA}	$^{\circ}\text{C/W}$		357
Operation Junction Temperature	T_J	$^{\circ}\text{C}$		-30 to +150
Storage Temperature	T_{STG}	$^{\circ}\text{C}$		-30 to +150

*Pulse Width $\leq 300\mu\text{s}$, Duty Cycle $\leq 2.0\%$



MMBT3904

■ On Characteristics

Item	Symbol	Unit	Conditions	Min	Max
DC Current Gain	h_{FE}		$I_C=0.1\text{mA}, V_{CE}=1.0\text{Vdc}$	40	
			$I_C=1.0\text{mA}, V_{CE}=1.0\text{Vdc}$	70	
			$I_C=10\text{mA}, V_{CE}=1.0\text{Vdc}$	100	300
			$I_C=50\text{mA}, V_{CE}=1.0\text{Vdc}$	60	
			$I_C=100\text{mA}, V_{CE}=1.0\text{Vdc}$	30	
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	Vdc	$I_C=10\text{mA}, I_B=1.0\text{mA}$		0.2
			$I_C=50\text{mA}, I_B=5.0\text{mA}$		0.3
Base-Emitter Saturation Voltage	$V_{BE(sat)}$	Vdc	$I_C=10\text{mA}, I_B=1.0\text{mA}$	0.65	0.85
			$I_C=50\text{mA}, I_B=5.0\text{mA}$		0.95

■ Small-signal Characteristics

Item	Symbol	Unit	Conditions	Min	Max
Output Capacitance	C_{obo}	pF	$V_{CB}=5.0\text{Vdc}, f=1.0\text{MHz}, I_E=0$		4
Input Capacitance	C_{ibo}	pF	$V_{EB}=0.5\text{Vdc}, f=1.0\text{MHz}, I_C=0$		8
Current Gain-Bandwidth Product	f_T	MHz	$I_C=10\text{mA}, V_{CE}=20\text{Vdc}, f=100\text{MHz}$	300	
Noise Figure	NF	dB	$V_{CE}=5.0\text{V}, f=10\text{Hz to } 15.7\text{kHz}, I_C=100\mu\text{A}, R_S=1.0\text{k}\Omega$		5

■ Switching Characteristics

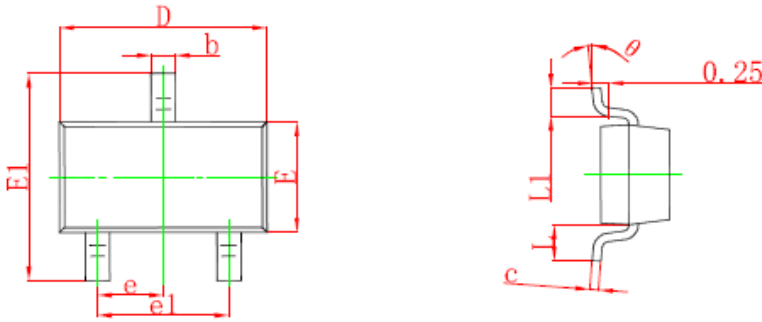
Item	Symbol	Unit	Conditions	Value
Delay Time	t_d	ns	$V_{CC}=3.0\text{Vdc}, V_{BE}=0.5\text{Vdc}, I_C=10\text{mA}, I_{B1}=1.0\text{mA}$	35
Rise Time	t_r	ns		35
Storage Time	t_s	ns	$V_{CC}=3.0\text{Vdc}, I_C=10\text{mA}, I_{B1}=I_{B2}=1.0\text{mA}$	200
Fall Time	t_f	ns		50

■ Ordering Information (Example)

PREFERRED P/N	PACKING CODE	UNIT WEIGHT(g)	MINIMUM PACKAGE(pcs)	INNER BOX QUANTITY(pcs)	OUTER CARTON QUANTITY(pcs)	DELIVERY MODE
MMBT3904	F2	Approximate 0.008	3000	30000	120000	7" reel

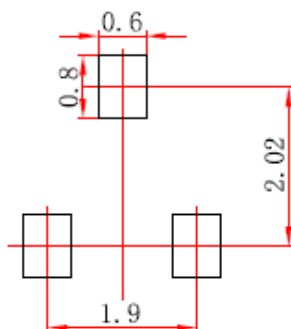
MMBT3904

■SOT-23 Package Outline Dimensions



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.900	1.150	0.035	0.045
A1	0.000	0.100	0.000	0.004
A2	0.900	1.050	0.035	0.041
b	0.300	0.500	0.012	0.020
c	0.080	0.150	0.003	0.006
D	2.800	3.000	0.110	0.118
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.950 TYP		0.037 TYP	
e1	1.800	2.000	0.071	0.079
L	0.550 REF		0.022 REF	
L1	0.300	0.500	0.012	0.020
θ	0°	8°	0°	8°

■SOT-23 Suggested Pad Layout



Note:

1. Controlling dimension: In millimeters.
2. General tolerance: $\pm 0.05\text{mm}$.
3. The pad layout is for reference purposes only.