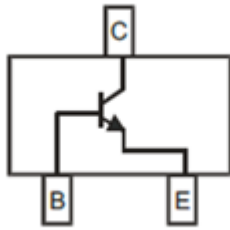


## NPN General Purpose Amplifier



**SOT-23**

### Features

- Epoxy meets UL-94 V-0 flammability rating and halogen free
- Moisture Sensitivity Level 1
- Part no. with suffix "Q" means AEC-Q101 qualified

### Mechanical Data

- Case: SOT-23
- Terminals: Tin plated leads, solderable per J-STD-002 and JESD22-B102
- Marking:



1AM = Product Type Marking Code  
Y = Date Code Marking

Date code (2 years a cycle)

Year	Odd years(eg 2019)											
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Code	J	O	L	C	K	B	P	D	M	E	G	F

Year	Even years(eg 2018)											
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Code	W	N	Y	T	R	H	A	I	U	X	Z	S

### ■ Maximum Ratings (Ta=25°C unless otherwise noted)

Item	Symbol	Unit	Conditions	Value
Collector-Base Voltage	$V_{CBO}$	V		60
Collector-Emitter Voltage	$V_{CEO}$	V		40
Emitter-Base Voltage	$V_{EBO}$	V		6.0
Collector Current -Continuous	$I_C$	mA		200
Total Device Dissipation (*)	$P_D$	mW		300
Thermal Resistance Junction to Ambient (*)	$R_{thJA}$	K/W		357
Junction Temperature	$T_j$	°C		-55 to +150
Storage Temperature	$T_{STG}$	°C		-55 to +150

(\*) Device mounted on FR-4 PCB 1.0 x 1.0 x 0.06 inch.



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## ■ Electrical Characteristics (Ta=25°C unless otherwise noted)

Item	Symbol	Unit	Conditions	Min	Max
Collector-emitter breakdown voltage	$V_{(BR)CEO}$	Vdc	$I_C = 1.0\text{mA}, I_B = 0$	40	
Collector-base breakdown voltage	$V_{(BR)CBO}$	Vdc	$I_C = 10\mu\text{A}, I_E = 0$	60	
Emitter-base breakdown voltage	$V_{(BR)EBO}$	Vdc	$I_E = 10\mu\text{A}, I_C = 0$	6.0	
Collector cut-off current	$I_{CBO}$	nAdc	$V_{CB} = 60\text{Vdc}, I_E = 0$		50
Collector cut-off current	$I_{CEX}$	nAdc	$V_{CE} = 30\text{Vdc}, V_{EB} = 3.0\text{Vdc}$		50
DC current gain	$h_{FE}$		$V_{CE} = 1\text{Vdc}, I_C = 0.1\text{mA}$	40	
	$h_{FE}$		$V_{CE} = 1\text{Vdc}, I_C = 1.0\text{mA}$	70	
	$h_{FE}$		$V_{CE} = 1\text{Vdc}, I_C = 10\text{mA}$	100	300
	$h_{FE}$		$V_{CE} = 1\text{Vdc}, I_C = 50\text{mA}$	60	
	$h_{FE}$		$V_{CE} = 1\text{Vdc}, I_C = 100\text{mA}$	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
Output Capacitance	$C_{obo}$	pF	$V_{CB} = 5.0\text{Vdc}, f = 1.0\text{MHz}, I_E = 0$		4.0
Input Capacitance	$C_{ibo}$	pF	$V_{EB} = 0.5\text{Vdc}, f = 1.0\text{MHz}, I_C = 0$		8.0
Transition frequency	$f_T$	MHz	$V_{CE} = 20\text{V}, I_C = 10\text{mA}, f = 100\text{MHz}$	250	
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
MMBT3904Q	F2	Approximate 0.01	3000	30000	120000	7" reel



## ■ Characteristics (Typical)

Fig.1 - Static Characteristic

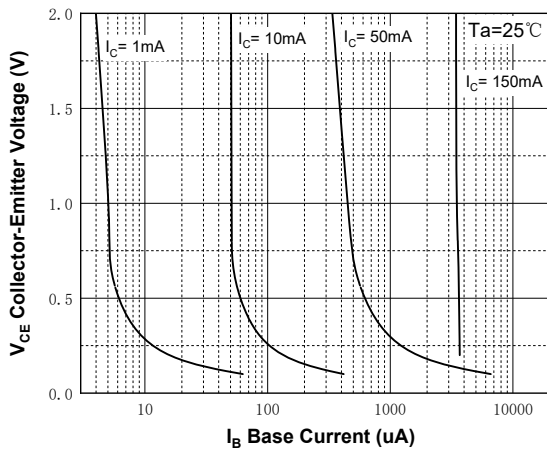


Fig.2 - DC Current Gain

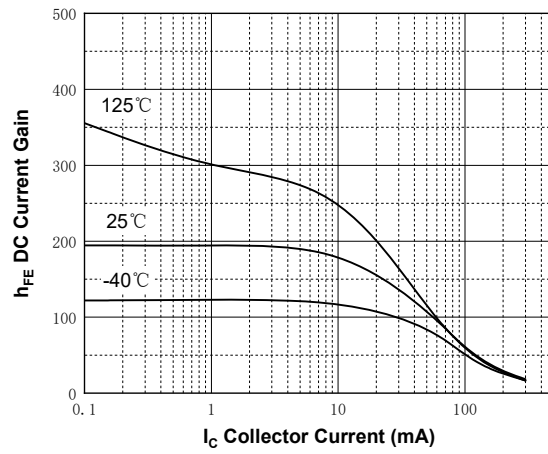


Fig.3 - Collector-Emitter Saturation Voltage

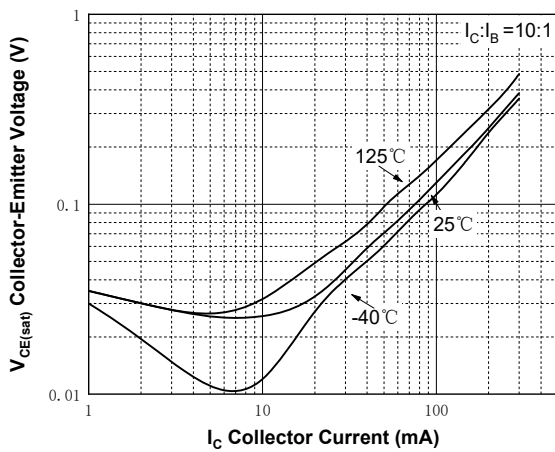


Fig.4 - Base-Emitter Saturation Voltage

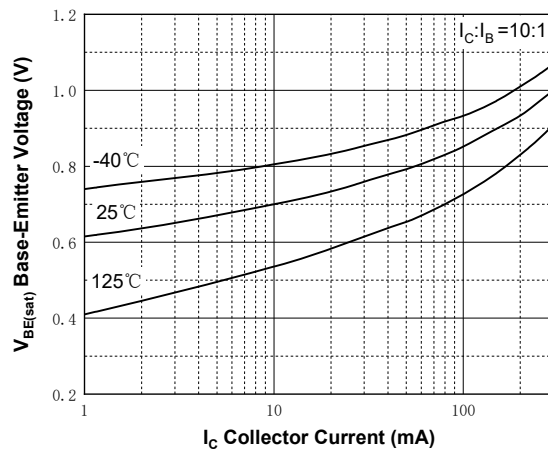
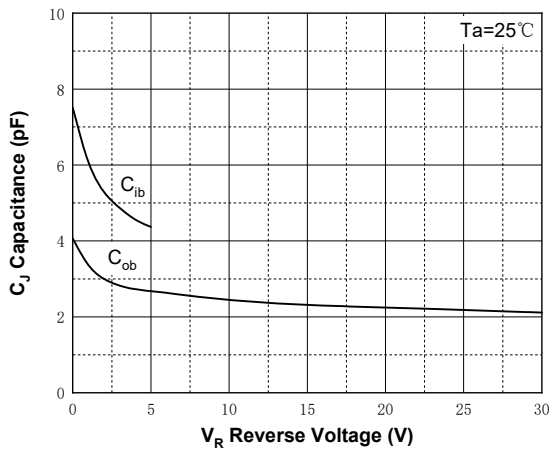


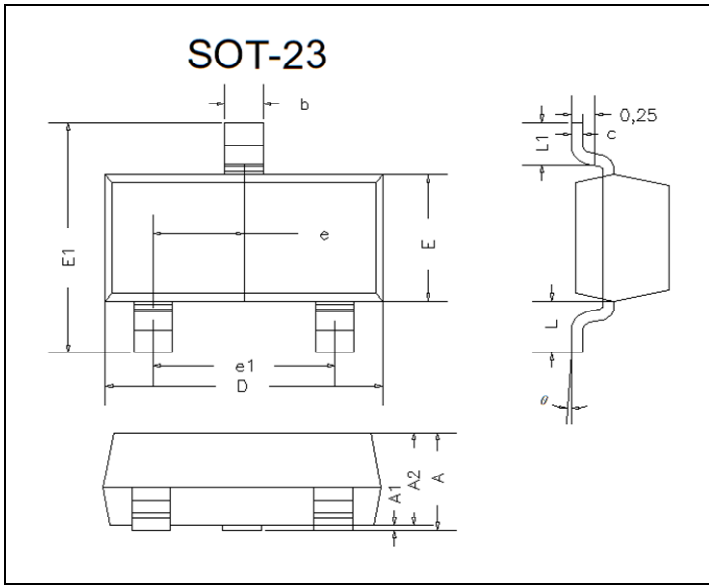
Fig.5 - Capacitance





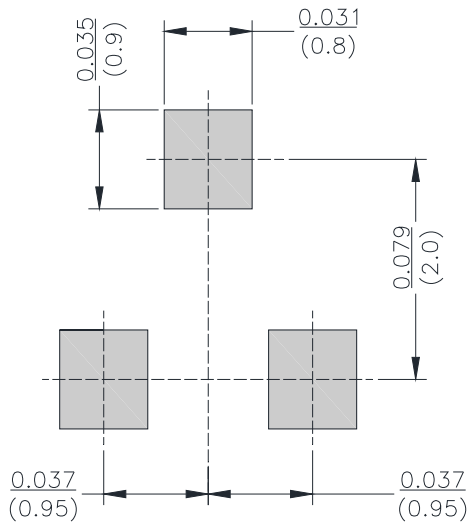
# MMBT3904Q

## ■ SOT-23 Package Outline Dimensions



DIM	INCHES		MM		NOTE
	MIN	MAX	MIN	MAX	
A	0.035	0.045	0.90	1.15	
A1	0.000	0.004	0.00	0.10	
A2	0.035	0.041	0.90	1.05	
b	0.012	0.020	0.30	0.50	
c	0.004	0.008	0.10	0.20	
D	0.110	0.118	2.80	3.00	
E	0.047	0.055	1.20	1.40	
E1	0.089	0.100	2.25	2.55	
e	0.370TYP		0.95TYP		
e1	0.071	0.079	1.80	2.00	
L	0.220REF		0.55REF		
L1	0.012	0.020	0.30	0.50	
θ	0°	8°	0°	8°	

## ■ SOT-23 Suggested Pad Layout



Unit:  $\frac{\text{inch}}{\text{mm}}$



## MMBT3904Q

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