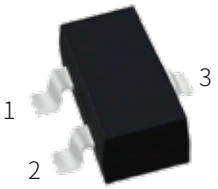
MMBT3904Q

Plastic-Encapsulate Transistor (NPN)

FEATURES

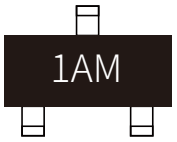
- Low Current, Low Voltage
- Meet AEC-Q101 Requirements



SOT-23

MECHANICAL DATA

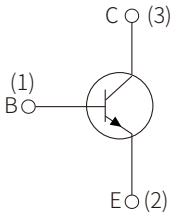
- General Purpose Amplifier And Switching
- Meet The Stringent Requirements of Automotive Applications



Marking

APPROVALS

RoHS	Compliance with 2011/65/EU
HF	Compliance with IEC61249-2-21:2003



Schematic Symbol

MAXIMUM RATINGS (T_A=25°C)

Parameter	Symbol	Value	Unit
Collector to Base Voltage	V_{CBO}	60	V
Collector to Emitter Voltage	V_{CEO}	40	
Emitter to Base Voltage	V_{EBO}	6.0	
Collector Current	I_C	200	mA
Collector Power Dissipation	P_C	200	mW
	*P_C	350	
Junction Temperature	T_J	150	°C
Storage Temperature Range	T_{STG}	-55~+150	°C

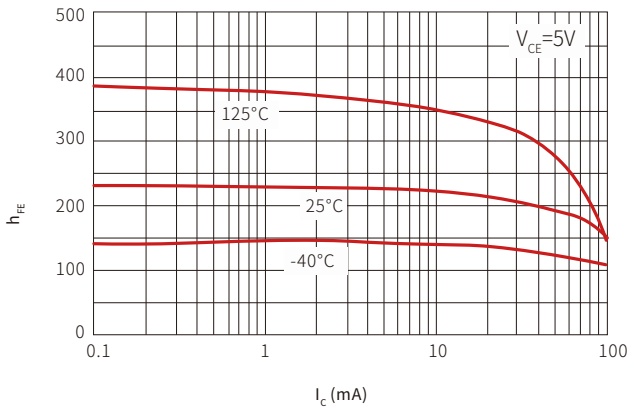
* When mounted on a 7×5×0.6mm ceramic board

ELECTRICAL CHARACTERISTICS (T_A=25°C)

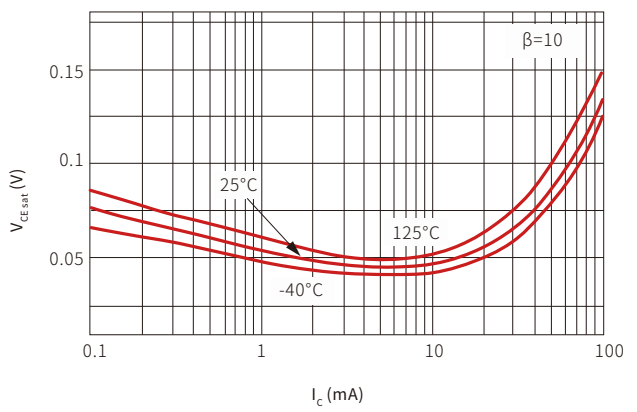
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Collector to Base Breakdown Voltage	V_{CBO}	I_C=10μA,I_E=0	60			V
Collector to Emitter Breakdown Voltage	V_{CEO}	I_C=1.0mA,I_B=0	40			
Emitter to Base Breakdown Voltage	V_{EBO}	I_E=10μA,I_C=0	6.0			
Collector Cut-Off Current	I_{CBO}	V_{CB}= 30V, I_E=0			0.05	μA
Emitter Cut-Off Current	I_{EBO}	V_{EB}=3.0V, I_C=0			0.05	
DC current gain	$h_{FE(1)}$	V_{CE}=1.0V, I_C=10mA	100		300	
	$h_{FE(2)}$	V_{CE}=1.0V, I_C=100mA	30			
	$h_{FE(3)}$	V_{CE}=1.0V, I_C=50mA	60			
	$h_{FE(4)}$	V_{CE}=1.0V, I_C=1.0mA	70			
	$h_{FE(5)}$	V_{CE}=1.0V, I_C=0.1mA	40			
Collector-emitter saturation voltage	$V_{CE(sat)1}$	I_C=10mA, I_B=1.0mA			0.2	V
	$V_{CE(sat)2}$	I_C=50mA, I_B=5.0mA			0.3	
Base-emitter saturation voltage	$V_{BE(sat)1}$	I_C=10mA, I_B=1.0mA	0.65		0.85	
	$V_{BE(sat)2}$	I_C=50mA, I_B=5.0mA			0.95	
Transition frequency	f_T	V_{CE}=20V,I_C=10mA, f=100MHz	300			MHz
Output Capacitance	C_{ob}	V_{CB}=5.0V f=1.0MHz			4.0	pF
Input Capacitance	C_{ib}	V_{EB}=0.5V f=1.0MHz			8.0	pF
Delay time	td	V_{CC}=3.0V, V_{BE}=0.5V I_C=10mA, , I_{B1}=1.0mA			35	nS
Rise Time	tr				35	
Storage time	tstg	V_{CC}=3.0V, I_C=10mA, I_{B1}=-I_{B2}=1.0mA			200	
Fall time	tf				50	

TYPICAL CHARACTERISTICS

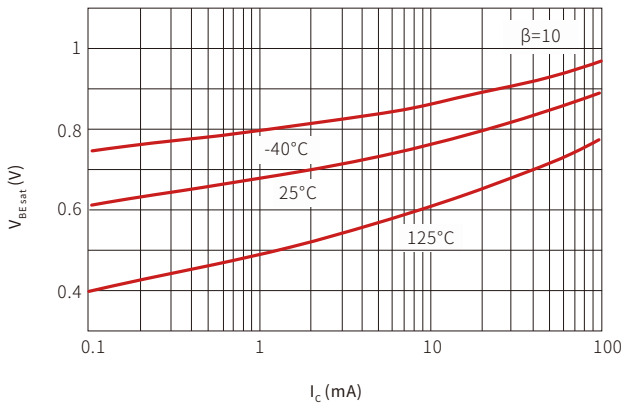
h_{FE} ——— I_C



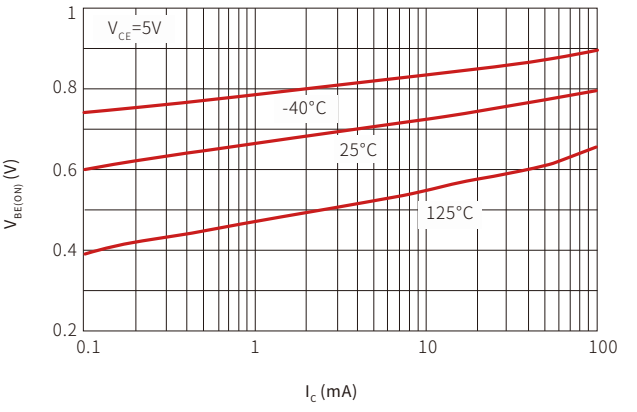
$V_{CE\ sat}$ ——— I_C



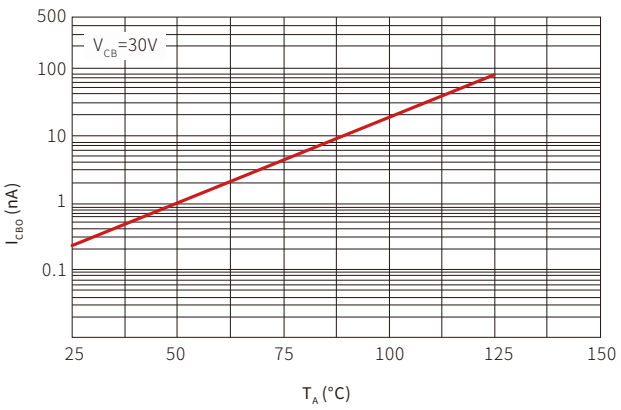
$V_{BE\ sat}$ ——— I_C



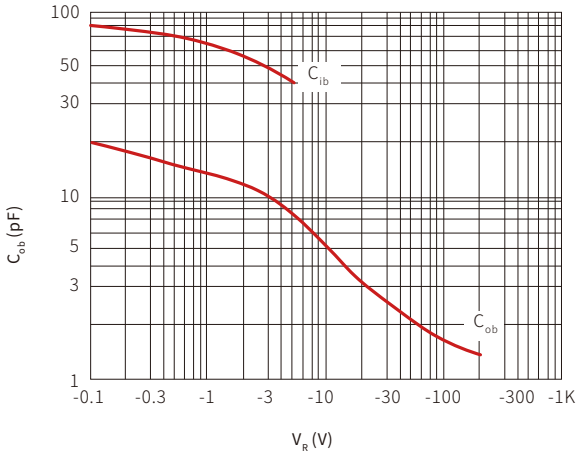
$V_{BE(ON)}$ ——— I_C



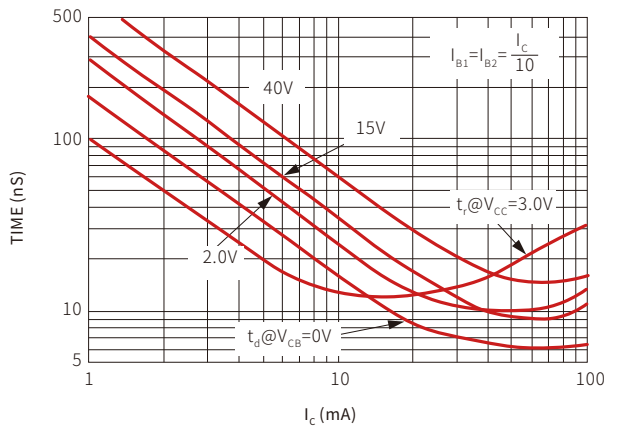
I_{CBO} ——— T_A



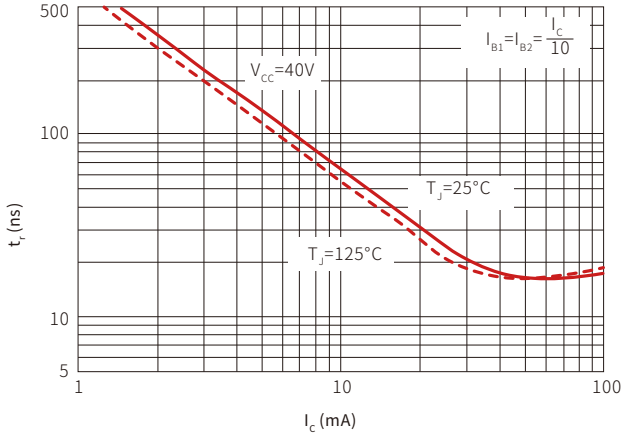
C_{ob} ——— V_R



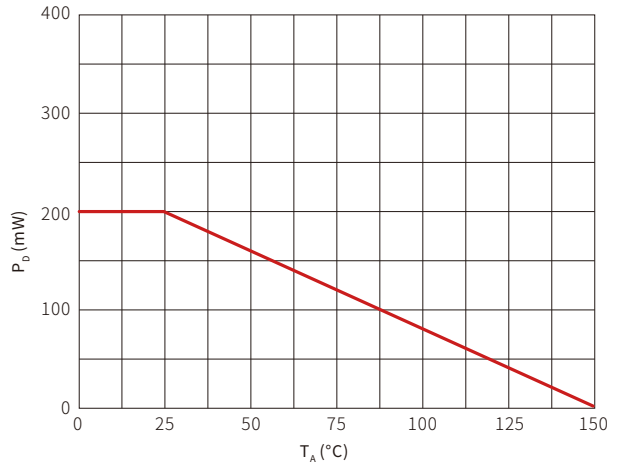
TIME ——— I_C



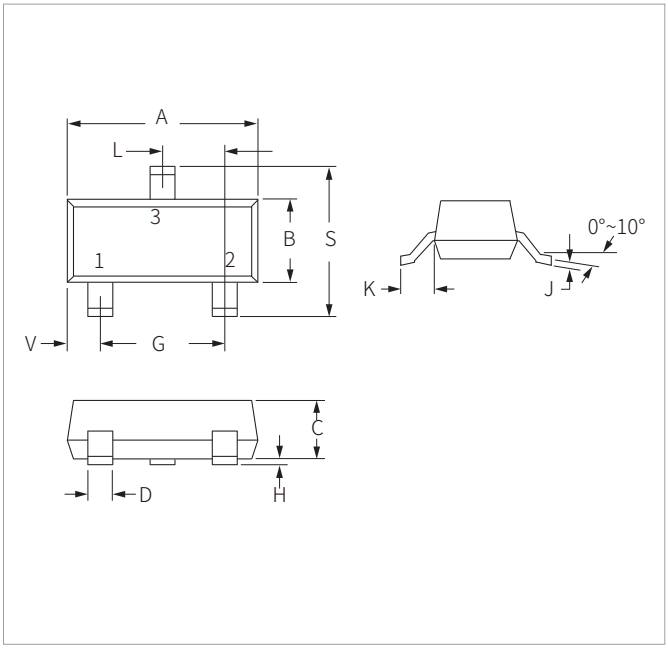
t_r ——— I_C



P_D ——— T_A

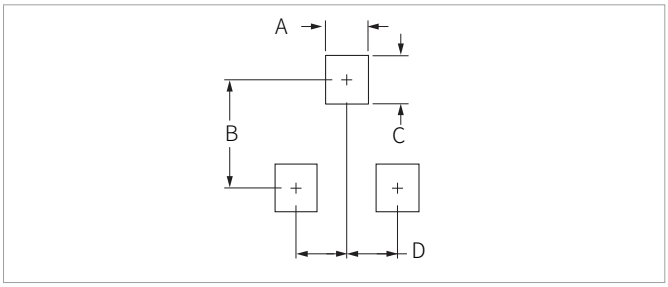


SOT-23 PACKAGE INFORMATION



Ref.	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	2.80	3.05	0.110	0.120
B	1.20	1.40	0.047	0.055
C	0.90	1.15	0.035	0.045
D	0.37	0.50	0.015	0.020
G	1.75	2.05	0.069	0.081
H	0.01	0.100	0.001	0.004
J	0.085	0.180	0.003	0.007
K	0.35	0.69	0.014	0.029
L	0.89	1.02	0.035	0.040
S	2.10	2.65	0.083	0.104
V	0.45	0.60	0.018	0.024

RECOMMENDED PAD LAYOUT DIMENSIONS



Ref.	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	0.71	0.97	0.028	0.038
B	1.88	2.13	0.074	0.084
C	0.71	0.97	0.028	0.038
D	0.81	1.07	0.032	0.042

ORDERING INFORMATION

Part Number	Component Package	QTY/Reel	Reel Size
MMBT3904Q	SOT-23	3000PCS	7”

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