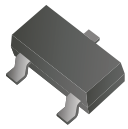
General Purpose Transistor

MMBT3904-HF (NPN)

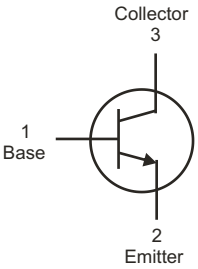
RoHS Device
Halogen Free

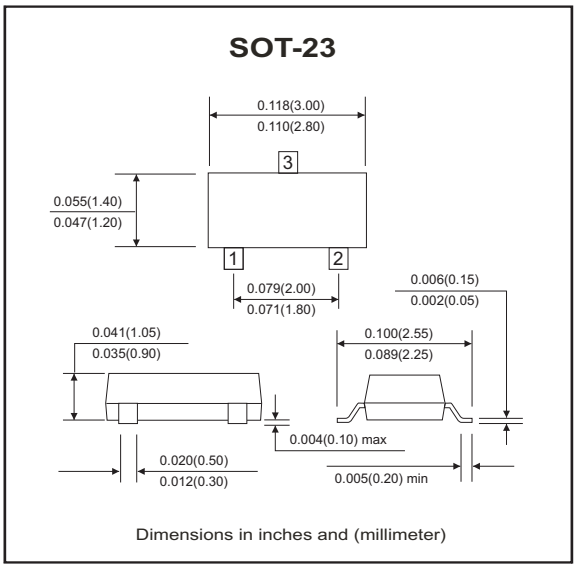


Features

-Epitaxial planar die construction

-As complementary type, the PNP transistor MMBT3904-HF is recommended





Maximum Ratings (at TA=25°C unless otherwise noted)

Parameter	Symbol	Min	Typ	Max	Unit
Collector-Base voltage	V_{CBO}			60	V
Collector-Emitter voltage	V_{CEO}			40	V
Emitter-Base voltage	V_{EBO}			6	V
Collector current-Continuous	I_C			0.2	A
Collector dissipation	P_C			0.2	W
Thermal resistance, junction to ambient	$R_{\theta JA}$			625	°C/W
Storage temperature and junction temperature	T_{STG}, T_J	-55		+150	°C

Electrical Characteristics (at TA=25°C unless otherwise noted)

Parameter	Conditions	Symbol	Min	Max	Unit
Collector-Base breakdown voltage	I_C =100μA , I_E=0	$V_{(BR)CBO}$	60		V
Collector-Emitter breakdown voltage	I_C =1mA , I_B=0	$V_{(BR)CEO}$	40		V
Emitter-Base breakdown voltage	I_E =100μA , I_C=0	$V_{(BR)EBO}$	6		V
Collector cut-off current	V_{CB}=60V , I_E=0	I_{CBO}		0.1	μA
Collector cut-off current	V_{CE}=30V , $V_{BE(off)}$=3V	I_{CEX}		50	nA
Emitter cut-off current	V_{EB}=5V , I_C=0	I_{EBO}		0.1	μA
DC current gain	V_{CE}=1V , I_C=10mA	$h_{FE(1)}$	100	400	
	V_{CE}=1V , I_C=50mA	$h_{FE(2)}$	60		
Collector-Emitter saturation voltage	I_C=50mA , I_B=5mA	V_{CE}(sat)		0.3	V
Base-Emitter saturation voltage	I_C=50mA , I_B=5mA	V_{BE}(sat)		0.95	V
Transition frequency	V_{CE}=20V , I_C=10mA f=100MHz	f_T	300		Mhz
Delay time	V_{CC}=3.0V , V_{BE}=-0.5V	td		35	nS
Rise time	I_C=10mA , I_{B1}=1.0mA	tr		35	nS
Storage time	V_{CC}=3.0V , I_C=10mA	ts		200	nS
Fall time	I_{B1}=I_{B2}=1.0mA	tf		50	nS

RATING AND CHARACTERISTIC CURVES (MMBT3904-HF)

Fig.1 Typical pulsed current gain V.S. Collector current

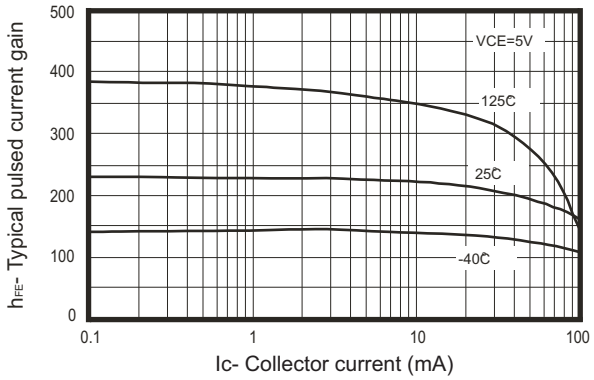


Fig.2 Collector-Emitter saturation voltage V.S. Collector current

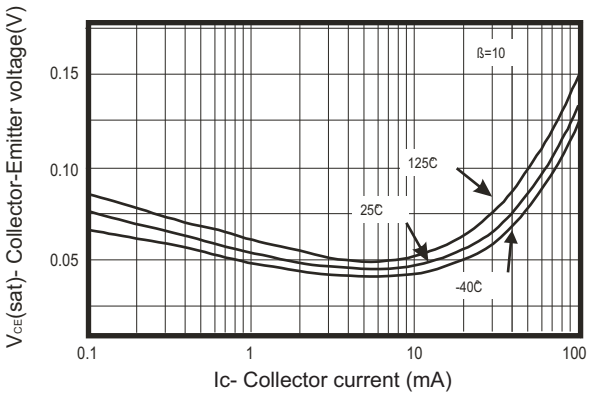


Fig.3 Base-Emitter saturatioin voltage V.S. Collector current

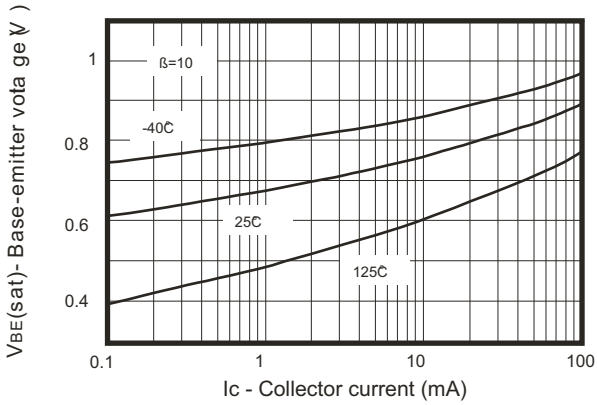


Fig.4 Base-Emitter ON voltage V.S. Collector current

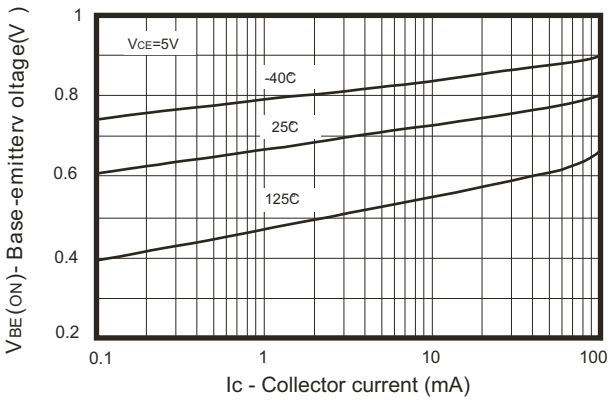


Fig.5 Collector-cutoff current V.S. Ambient temperature

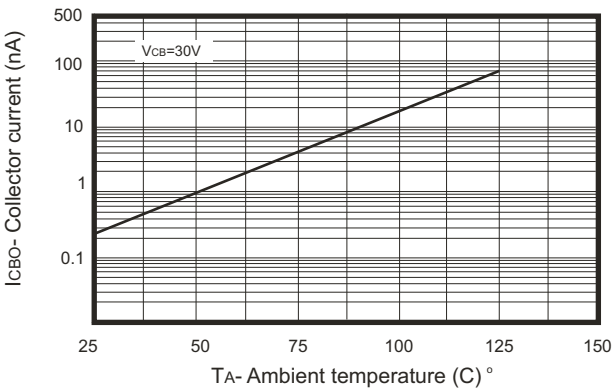
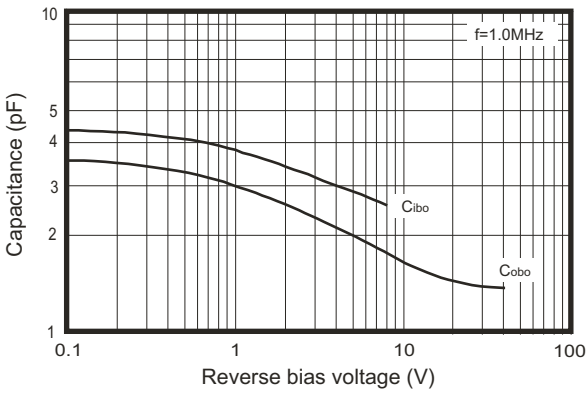
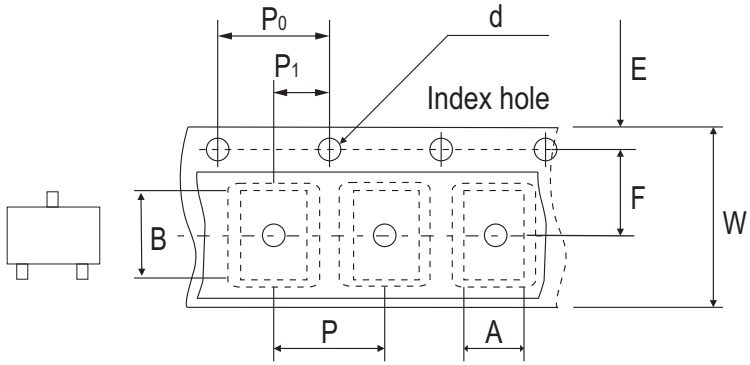
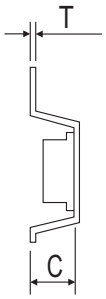


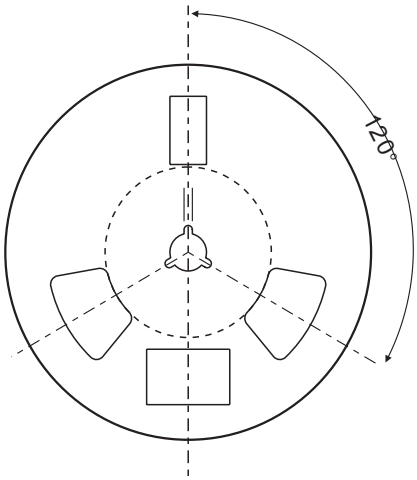
Fig.6 Capacitance V.S. Reverse bias voltage

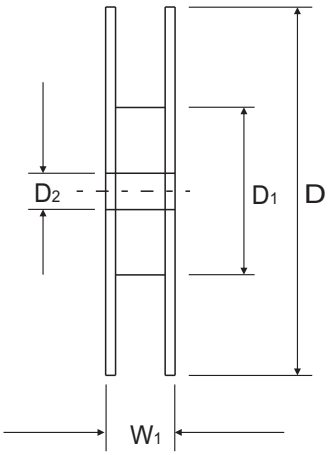


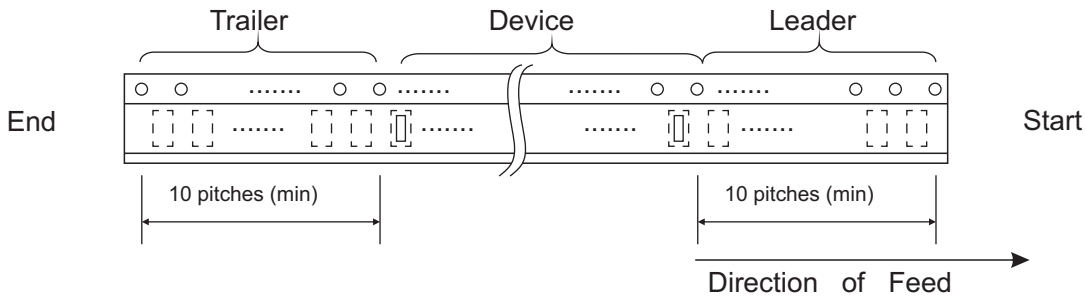
Reel Taping Specification









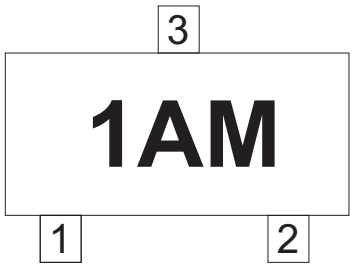


	SYMBOL	A	B	C	d	D	D_1	D_2
SOT-23	(mm)	3.10 ± 0.10	2.85 ± 0.10	1.40 ± 0.10	1.55 ± 0.10	178 ± 1	50.0 MIN.	13.0 ± 0.20
	(inch)	0.122 ± 0.004	0.112 ± 0.004	0.055 ± 0.004	0.061 ± 0.004	7.008 ± 0.04	1.969 MIN.	0.512 ± 0.008

	SYMBOL	E	F	P	P_0	P_1	W	W_1
SOT-23	(mm)	1.75 ± 0.10	3.50 ± 0.05	4.00 ± 0.10	4.00 ± 0.10	2.00 ± 0.05	8.00 ± 0.30	14.4 MAX.
	(inch)	0.069 ± 0.004	0.138 ± 0.002	0.157 ± 0.004	0.157 ± 0.004	0.079 ± 0.004	0.315 ± 0.008	0.567 MAX.

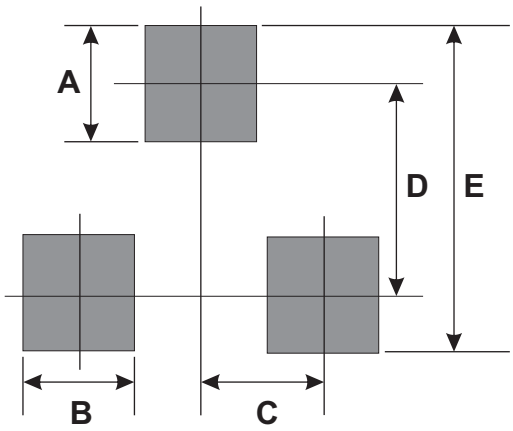
Marking Code

Park Number	Marking Code
MMBT3904-HF	1AM



Suggested PAD Layout

SIZE	SOT-23	
	(mm)	(inch)
A	0.80	0.031
B	0.95	0.037
C	0.95	0.037
D	2.02	0.080
E	3.03	0.120



Standard Packaging

Case Type	Qty per Reel	Reel Size
	(Pcs)	(inch)
SOT-23	3000	7