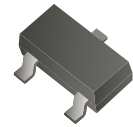
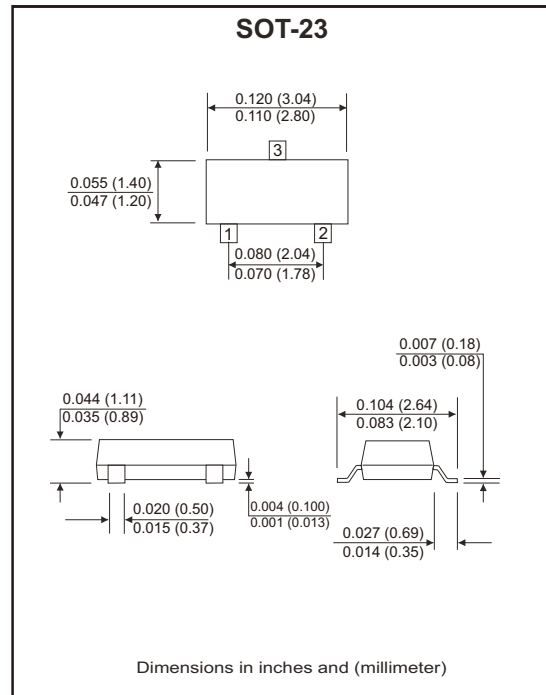
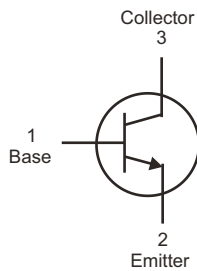


MMBT3904-G (NPN) RoHS Device



Features

- Epitaxial planar die construction
- As complementary type, the PNP transistor MMBT3906-G is recommended



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

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	40	Vdc
Collector-Base Voltage	V_{CBO}	60	Vdc
Emitter-Base Voltage	V_{EBO}	6.0	Vdc
Collector Current-Continuous	I_C	200	mA dc

Thermal Characteristics

Characteristics	Symbol	Max. Value	Unit
Total Device Dissipation FR-5 Board (Note) @ $T_A = 25^\circ\text{C}$	P_D	225	mW
Derate above 25°C		1.8	mW/ $^\circ\text{C}$
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	556	$^\circ\text{C/W}$
Junction and Storage Temperature	T_J, T_{STG}	-55 to +150	$^\circ\text{C}$

Note: FR-5 = 1.0 x 0.75 x 0.062 in.

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

Characteristics	Conditions	Symbol	Min.	Max.	Unit
OFF CHARACTERISTICS					
Collector-Emitter Breakdown Voltage	I _c =1mA , (Note)	V _{(BR)CEO}	40		V
Collector-Base Breakdown Voltage	I _c =10μA	V _{(BR)CBO}	60		V
Emitter-Base Breakdown Voltage	I _E =10μA	V _{(BR)EBO}	6.0		V
Base Cut-off Current	V _{CE} =30V , V _{EB} =3V	I _{BL}		50	nA
Collector Cut-off Current	V _{CE} =30V , V _{EB} =3V	I _{CEX}		50	nA
ON CHARACTERISTICS (Note)					
DC Current Gain	V _{CE} =1V , I _c =0.1mA	h _{FE}	40		
	V _{CE} =1V , I _c =1.0mA		70		
	V _{CE} =1V , I _c =10mA		100	300	
	V _{CE} =1V , I _c =50mA		60		
	V _{CE} =1V , I _c =100mA		30		
Collector-Emitter Saturation Voltage (Note)	I _c =10mA , I _B =1.0mA	V _{CE(sat)}		0.2	V
	I _c =50mA , I _B =5.0mA			0.3	
Base-Emitter Saturation Voltage (Note)	I _c =10mA , I _B =1.0mA	V _{BE(sat)}	0.65	0.85	V
	I _c =50mA , I _B =5mA			0.95	
SMALL-SIGNAL CHARACTERISTICS					
Current - Gain - Bandwidth Product	V _{CE} =20V , I _c =10mA , f=100MHz	f _T	300		MHZ
Output Capacitance	V _{CB} =5.0V , I _E =0 , f=1.0MHz	C _{obo}		4.0	pF
Input Capacitance	V _{BE} =0.5V , I _c =0 , f=1.0MHz	C _{ibo}		8.0	pF
Input Impedancen	V _{CE} =10V , I _c =1.0mA , f=1.0kHz	h _{ie}	1.0	10	kΩ
Voltage Feedback Ratio	V _{CE} =10V , I _c =1.0mA , f=1.0kHz	h _{re}	0.5	8.0	X10 ⁻⁴
Small - Signal Current Gain	V _{CE} =10V , I _c =1.0mA , f=1.0kHz	h _{fe}	100	400	
Output Admittance	V _{CE} =10V , I _c =1.0mA , f=1.0kHz	h _{oe}	1.0	40	μmhos
Noise Figure	V _{CE} =5V , I _c =100μA , f=1.0kHz , R _s =1.0kΩ	NF		5.0	dB
SWITCHING CHARACTERISTICS					
Delay Time	V _{CC} =3.0V , V _{BE} =-0.5V	t _d		35	nS
Rise Time	I _c =10mA , I _{B1} =1.0mA	t _r		35	nS
Storage Time	V _{CC} =3.0V ,	t _s		200	nS
Fall Time	I _c =10mA , I _{B1} =I _{B2} =1.0mA	t _f		50	nS

Note: 1. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2.0%.

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REV:E

RATING AND CHARACTERISTIC CURVES (MMBT3904-G)

Fig.1 - ON Voltages

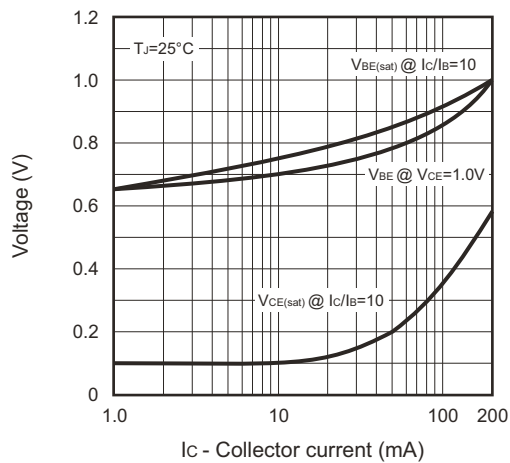


Fig.2 - Temperature Coefficients

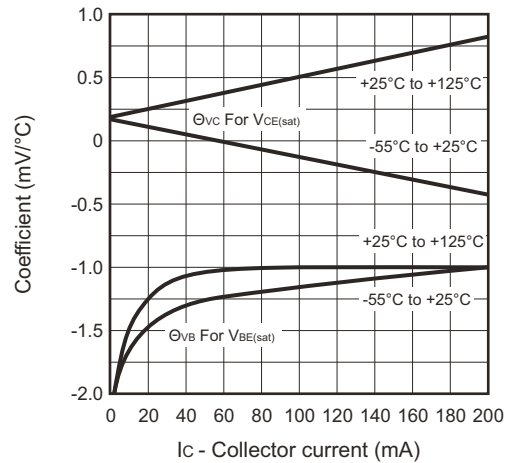


Fig.3 - Turn-On Time

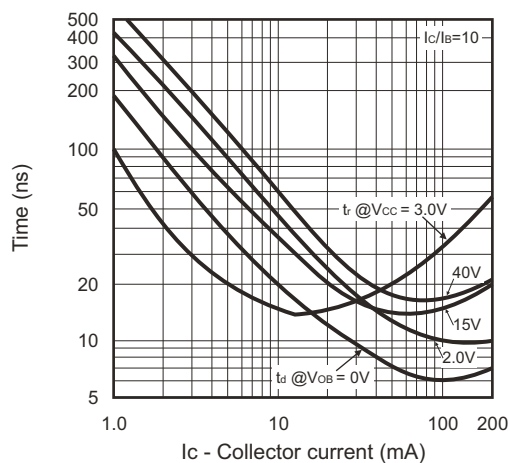


Fig.4 - Rise Time

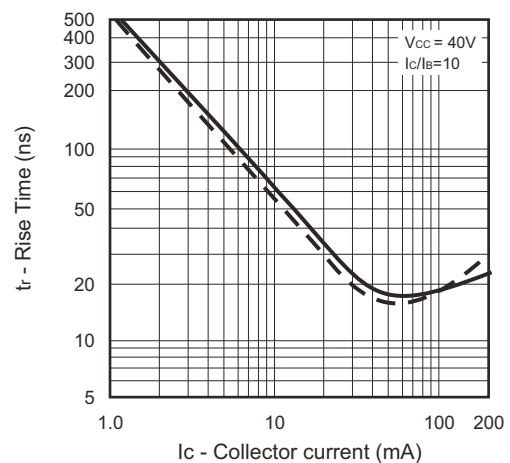


Fig.5 - Collector Saturation Region

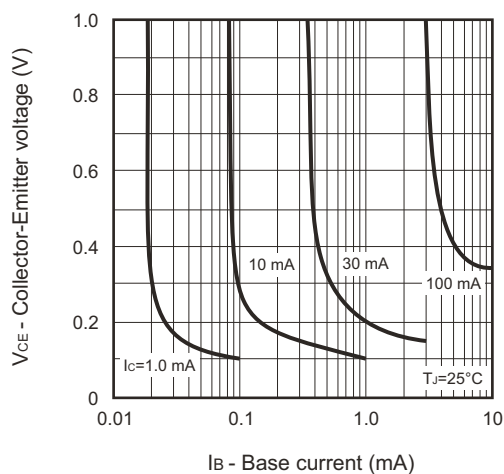
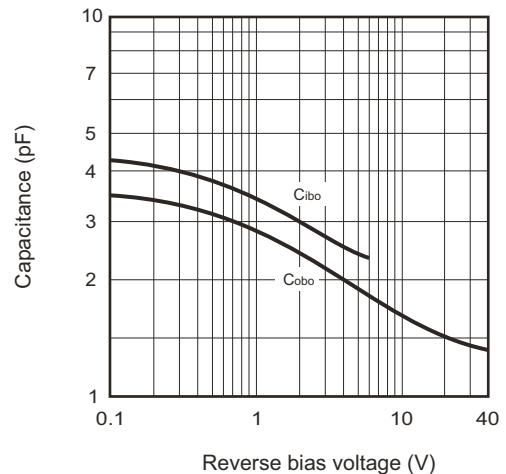


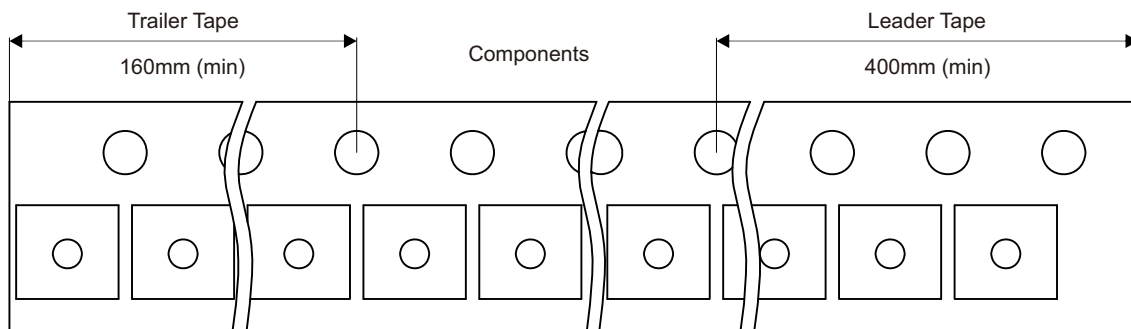
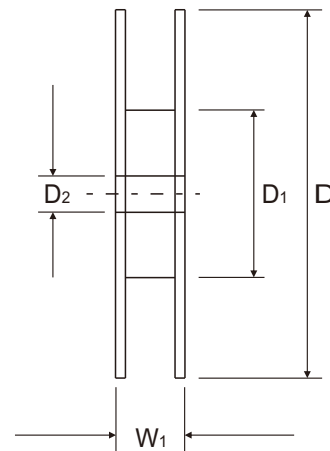
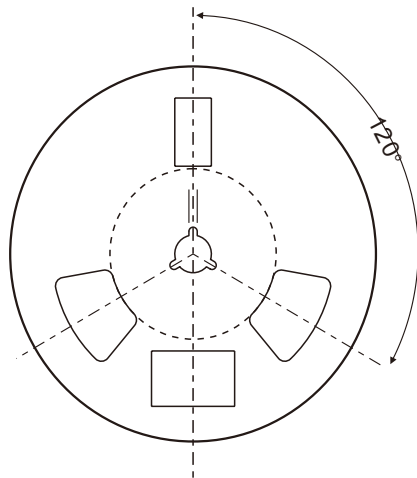
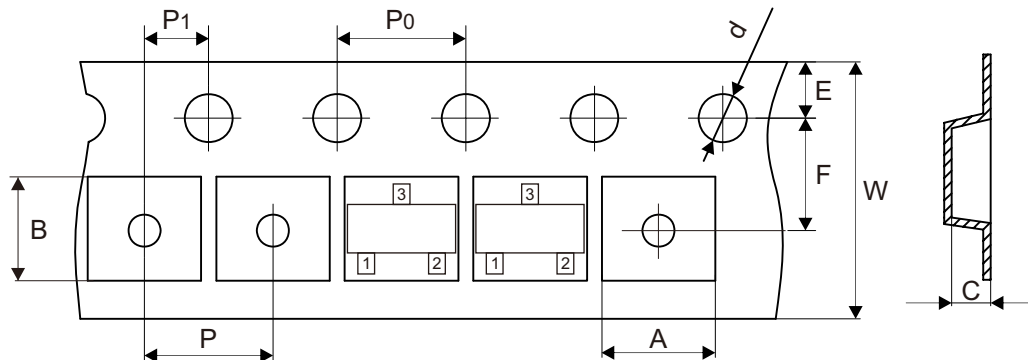
Fig.6 - Capacitance



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REV:E

Reel Taping Specification



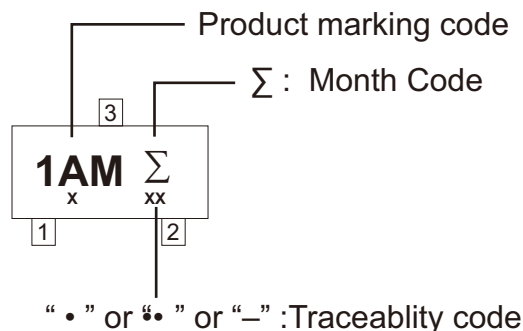
SOT-23	SYMBOL	A	B	C	d	D	D ₁	D ₂
	(mm)	3.10 ± 0.10	2.85 ± 0.10	1.40 ± 0.10	1.55 ± 0.10	178 ± 1	50.0 MIN.	13.0 ± 0.20
	(inch)	0.122 ± 0.004	0.112 ± 0.004	0.055 ± 0.004	0.061 ± 0.004	7.008 ± 0.04	1.969 MIN.	0.512 ± 0.008

SOT-23	SYMBOL	E	F	P	P ₀	P ₁	W	W ₁
	(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.

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Marking Code

Part Number	Marking Code	
MMBT3904-G	1AM	1AM Σ



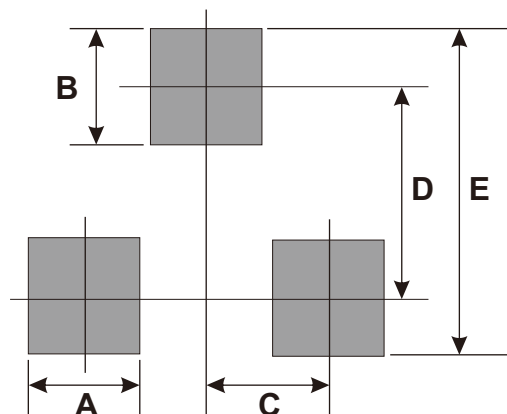
Month Code:

Month	Odd Year (per A.D.)	Even Year (per A.D.)
Jan	1	E
Feb	2	F
Wer	3	H
Apr	4	J
May	5	K
Jun	6	L

Month	Odd Year (per A.D.)	Even Year (per A.D.)
Jul	7	N
Aug	8	P
Sep	9	U
Oct	T	X
Nov	V	Y
Dec	C	Z

Suggested PAD Layout

SIZE	SOT-23	
	(mm)	(inch)
A	0.80	0.031
B	0.90	0.035
C	0.95	0.037
D	2.00	0.079
E	2.90	0.114



Standard Packaging

Case Type	REEL PACK	
	REEL (pcs)	Reel Size (inch)
SOT-23	3,000	7

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REV:E