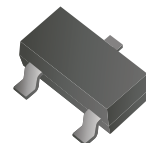


MMBT3904T-HF (NPN)

RoHS Device
Halogen Free



Features

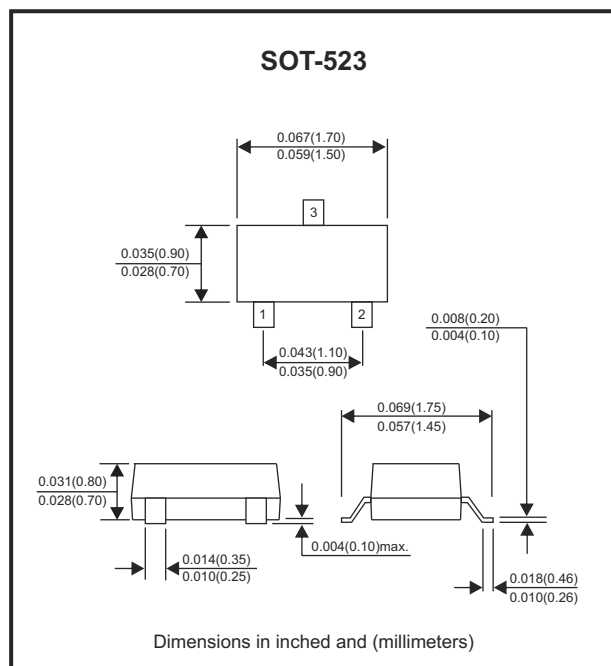
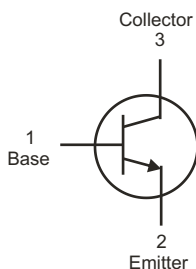
- Small package

Mechanical data

- Case: SOT-523, molded plastic.
- Terminals: Matte tin plated, solderable per MIL-STD-750, method 2026.
- Weight: 0.002 grams(Approx.)

Circuit Diagram

- 1.BASE
- 2.EMITTER
- 3.COLLECTOR



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

Parameter	Conditions	Symbol	Value	Unit
Collector-Base voltage		V _{CBO}	60	V
Collector-Emitter voltage		V _{CEO}	40	V
Emitter-Base voltage		V _{EB0}	6	V
Collector current-continuous		I _c	200	mA
Power dissipation		P _c	150	mW
Thermal resistance	Junction to ambient	R _{θJA}	833	°C/W
Junction temperature		T _J	150	°C
Storage temperature range		T _{stg}	-55~+150	°C

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

Parameter	Symbol	Conditions	Min	Max	Unit
Collector-Base breakdown voltage	$V_{(BR)CBO}$	$I_C = 10\mu\text{A}$, $I_E = 0$	60		V
Collector-Emitter breakdown voltage	$V_{(BR)CEO}$	$I_C = 1\text{mA}$, $I_B = 0$	40		V
Emitter-Base breakdown voltage	$V_{(BR)EBO}$	$I_E = 10\mu\text{A}$, $I_C = 0$	6		V
Collector cut-off current	I_{CEX}	$V_{CE} = 30\text{V}$, $V_{EB(off)} = 3\text{V}$		50	nA
Emitter cut-off current	I_{EBO}	$V_{EB} = 5\text{V}$, $I_C = 0$		100	nA
DC current gain	$h_{FE(1)}$	$V_{CE} = 1\text{V}$, $I_C = 0.1\text{mA}$	40		
	$h_{FE(2)}$	$V_{CE} = 1\text{V}$, $I_C = 1\text{mA}$	70		
	$h_{FE(3)}$	$V_{CE} = 1\text{V}$, $I_C = 10\text{mA}$	100	300	
	$h_{FE(4)}$	$V_{CE} = 1\text{V}$, $I_C = 50\text{mA}$	60		
Collector-Emitter saturation voltage	$V_{CE(sat)1}$	$I_C = 10\text{mA}$, $I_B = 1\text{mA}$		0.2	V
	$V_{CE(sat)2}$	$I_C = 50\text{mA}$, $I_B = 5\text{mA}$		0.3	V
Base-Emitter saturation voltage	$V_{BE(sat)1}$	$I_C = 10\text{mA}$, $I_B = 1\text{mA}$	0.65	0.85	V
	$V_{BE(sat)2}$	$I_C = 50\text{mA}$, $I_B = 5\text{mA}$		0.95	V
Transition frequency	f_T	$V_{CE} = 20\text{V}$, $I_C = 10\text{mA}$, $f = 100\text{MHz}$	300		MHz
Output capacitance	C_{Ob}	$V_{CB} = 5\text{V}$, $I_E = 0$, $f = 1\text{MHz}$		4	pF
Input capacitance	C_{ib}	$V_{EB} = 0.5\text{V}$, $I_C = 0$, $f = 1\text{MHz}$		8	pF
Delay time	t_d	$V_{CC} = 3\text{V}$, $V_{BE(off)} = -0.5\text{V}$		35	nS
Rise time	t_r	$I_C = 10\text{mA}$, $I_{B1} = 1\text{mA}$		35	nS
Storage time	t_s	$V_{CC} = 3\text{V}$, $I_C = 10\text{mA}$		200	nS
Fall time	t_f	$I_{B1} = I_{B2} = 1\text{mA}$		50	nS

RATING AND CHARACTERISTIC CURVES (MMBT3904T-HF)

Fig.1 - Static Characteristic

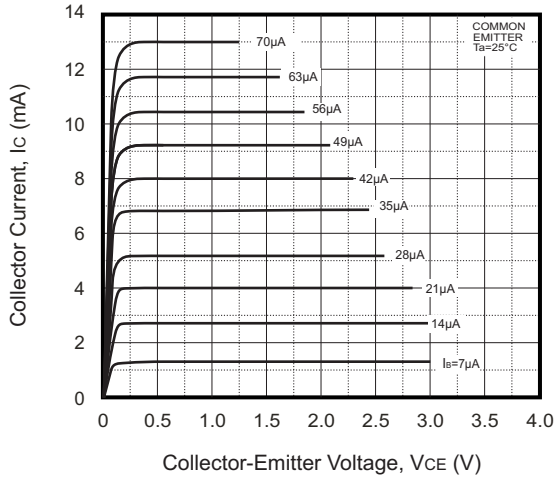


Fig.2 - h_{FE} — I_c

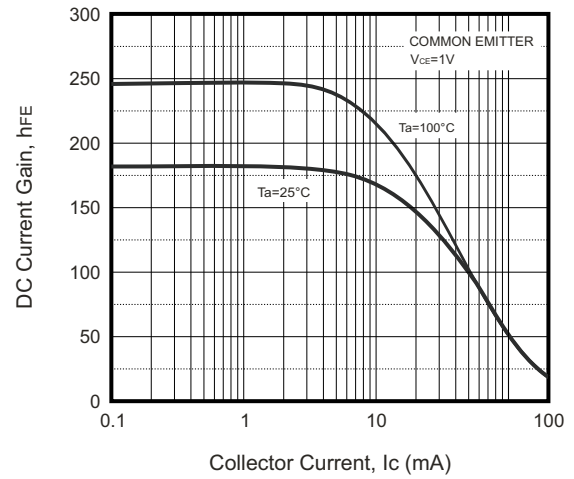


Fig.3 - V_{BEsat} — I_c

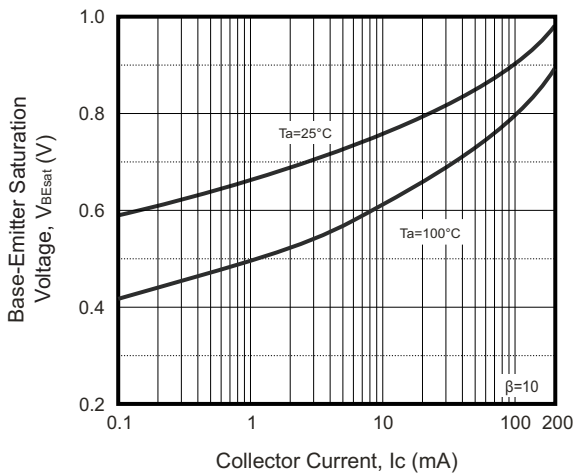


Fig.4 - V_{CEsat} — I_c

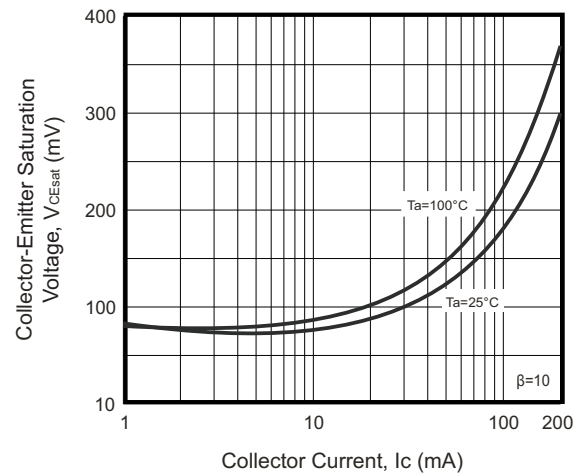


Fig.5 - I_c — V_{BE}

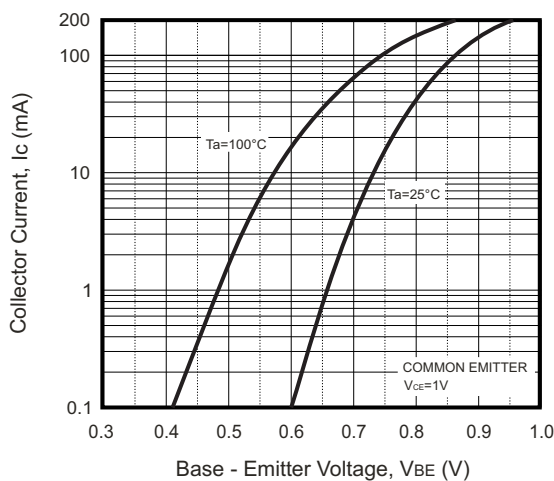
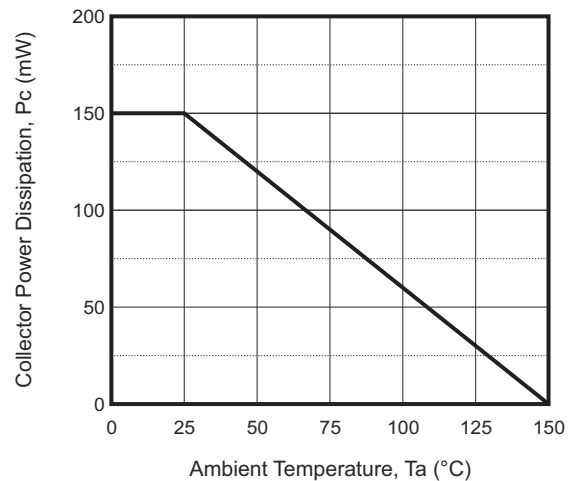
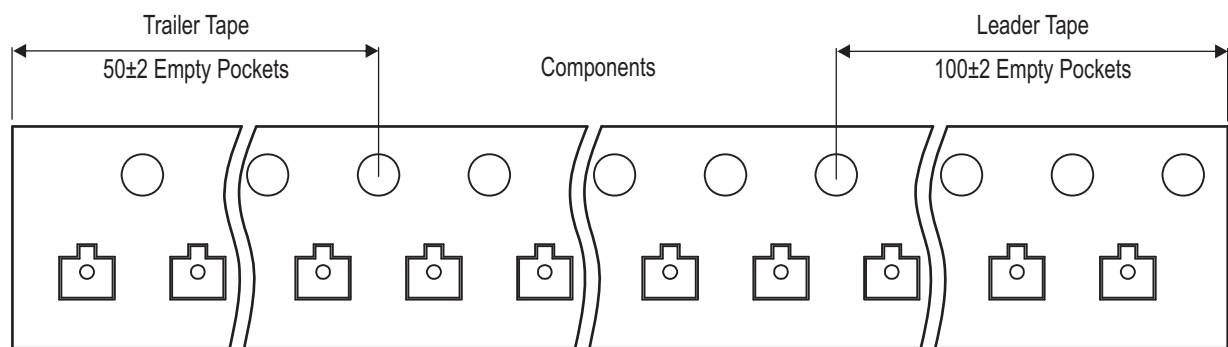
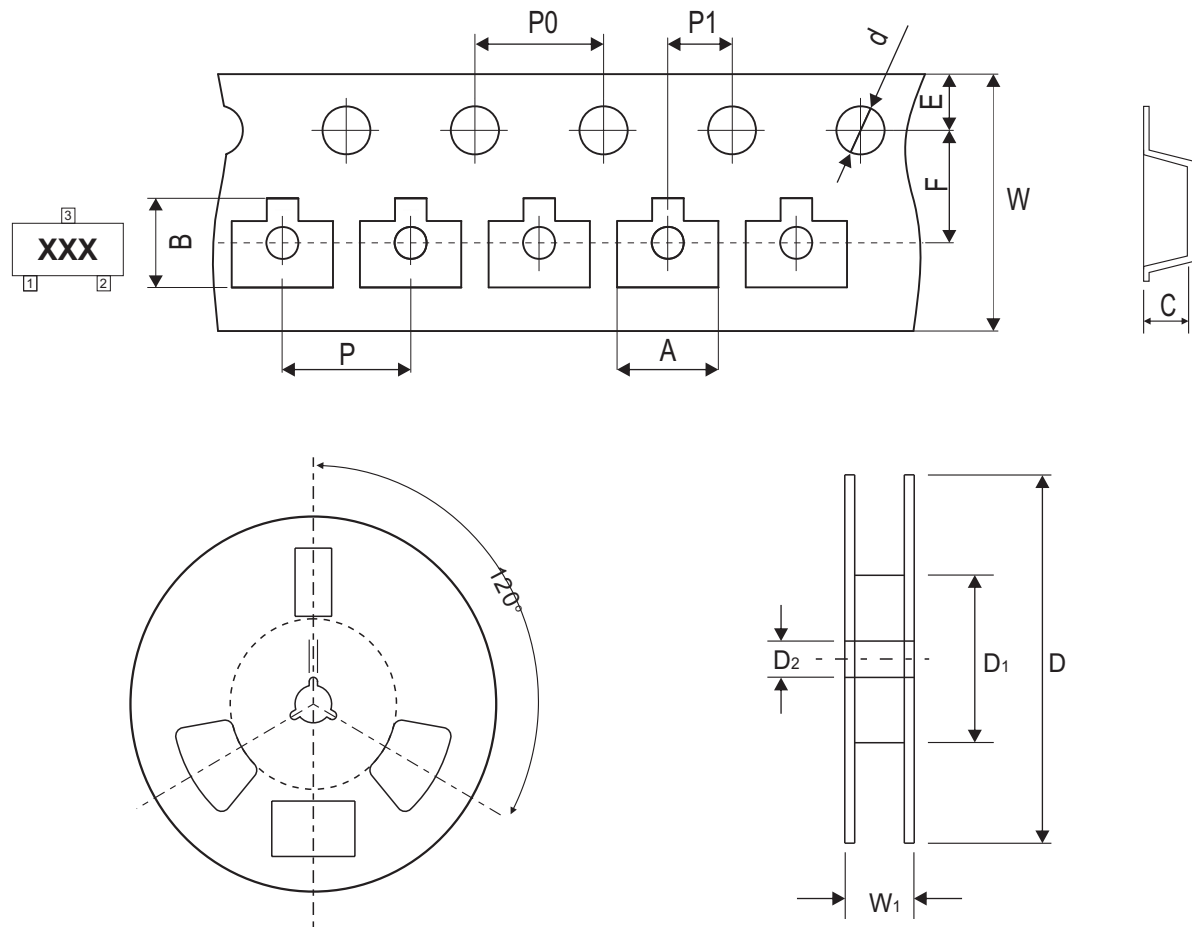


Fig.6 - P_c — T_a



Reel Taping Specification

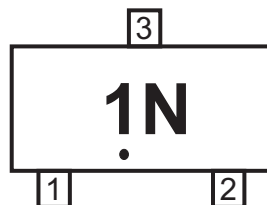


SOT-523	SYMBOL	A	B	C	d	D	D ₁	D ₂
	(mm)	1.85 ± 0.05	1.85 ± 0.05	0.875 ± 0.05	1.50 ± 0.10	178.00 ± 2.00	54.40 ± 1.00	13.00 ± 1.00
	(inch)	0.073 ± 0.002	0.073 ± 0.002	0.034 ± 0.002	0.059 ± 0.004	7.008 ± 0.079	2.142 ± 0.039	0.512 ± 0.039

SOT-523	SYMBOL	E	F	P	P ₀	P ₁	W	W ₁
	(mm)	1.75 ± 0.10	3.50 ± 0.10	4.00 ± 0.10	4.00 ± 0.10	2.00 ± 0.10	8.00 + 0.30 / - 0.10	12.30 ± 1.00
	(inch)	0.069 ± 0.004	0.138 ± 0.004	0.157 ± 0.004	0.157 ± 0.004	0.079 ± 0.004	0.315 + 0.012 / - 0.004	0.484 ± 0.039

Marking Code

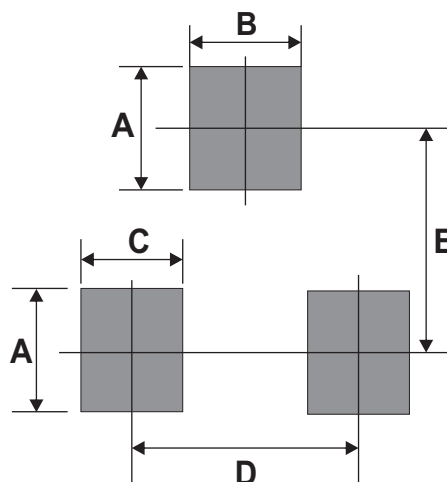
Part Number	Marking Code
MMBT3904T-HF	1N



Solid dot “.” = Halogen Free

Suggested PAD Layout

SIZE	SOT-523	
	(mm)	(inch)
A	0.60	0.024
B	0.50	0.020
C	0.40	0.016
D	1.00	0.039
E	1.24	0.049



Standard Packaging

Case Type	REEL PACK	
	REEL (pcs)	Reel Size (inch)
SOT-523	3,000	7