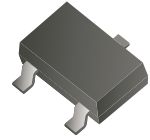


MMBT4401-HF (NPN)

RoHS Device

Halogen Free



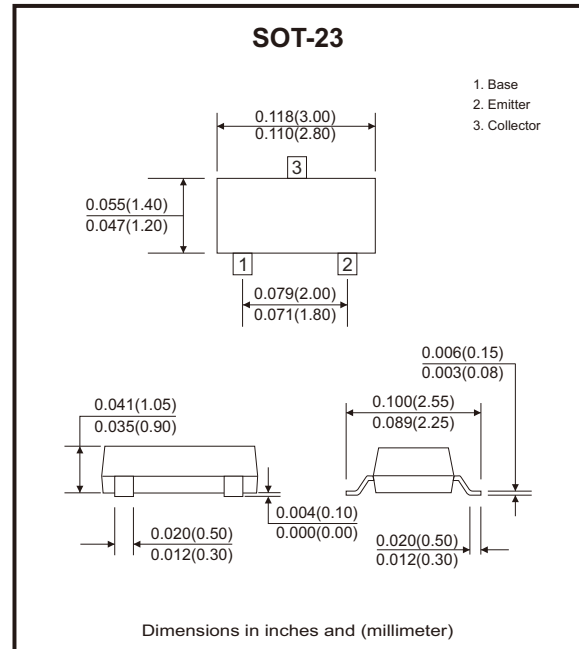
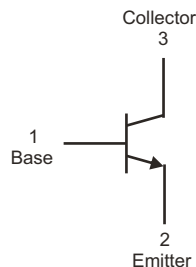
Features

- Power dissipation of 300mW.
- High stability and high reliability.

Mechanical data

- Case: SOT-23, molded plastic.
- Epoxy UL: 94V-0.
- Mounting position: Any.

Circuit Diagram



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

Parameter	Symbol	Value	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	600	mA
Collector power dissipation	P_C	300	mW
Junction temperature	T_J	150	°C
Storage temperature range	T_{STG}	-55 to +150	°C
Thermal resistance from junction to ambient	$R_{\theta JA}$	417	°C/W

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

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Collector-base breakdown voltage	$V_{(BR)CBO}$	$I_C = 100\mu\text{A}, I_E = 0$	60			V
Collector-emitter breakdown voltage	$V_{(BR)CEO}$	$I_C = 1\text{mA}, I_B = 0$	40			V
Emitter-base breakdown voltage	$V_{(BR)EBO}$	$I_E = 100\mu\text{A}, I_C = 0$	6			V
Collector cut-off current	I_{CBO}	$V_{CB} = 50\text{V}, I_E = 0$			100	nA
Collector cut-off current	I_{CEX}	$V_{CE} = 35\text{V}, V_{EB(off)} = 0.4\text{V}$			100	nA
Emitter cut-off current	I_{EBO}	$V_{EB} = 5\text{V}, I_C = 0$			100	nA
DC current gain	h_{FE1}	$V_{CE} = 1\text{V}, I_C = 0.1\text{mA}$	20			
	h_{FE2}	$V_{CE} = 1\text{V}, I_C = 1\text{mA}$	40			
	h_{FE3}	$V_{CE} = 1\text{V}, I_C = 10\text{mA}$	80			
	h_{FE4}	$V_{CE} = 1\text{V}, I_C = 150\text{mA}$	100		300	
	h_{FE5}	$V_{CE} = 1\text{V}, I_C = 500\text{mA}$	40			
Collector-emitter saturation voltage	$V_{CE(sat)}$	$I_C = 150\text{mA}, I_B = 15\text{mA}$			0.40	V
		$I_C = 500\text{mA}, I_B = 50\text{mA}$			0.75	V
Base-emitter saturation voltage	$V_{BE(sat)}$	$I_C = 150\text{mA}, I_B = 15\text{mA}$			0.95	V
		$I_C = 500\text{mA}, I_B = 50\text{mA}$			1.20	V
Transition frequency	f_T	$V_{CE} = 10\text{V}, I_C = 20\text{mA}, f = 100\text{MHz}$	250			MHz
Delay time	t_d	$V_{CC} = 30\text{V}, V_{BE(off)} = -2\text{V}, I_C = 150\text{mA}, I_{B1} = 15\text{mA}$			15	ns
Rise time	t_r				20	ns
Storage time	t_s	$V_{CC} = 30\text{V}, I_C = 150\text{mA}, I_{B1} = I_{B2} = 15\text{mA}$			225	ns
Fall time	t_f				60	ns

Rating and Characteristic Curves (MMBT4401-HF)

Fig.1 - Static Characteristic

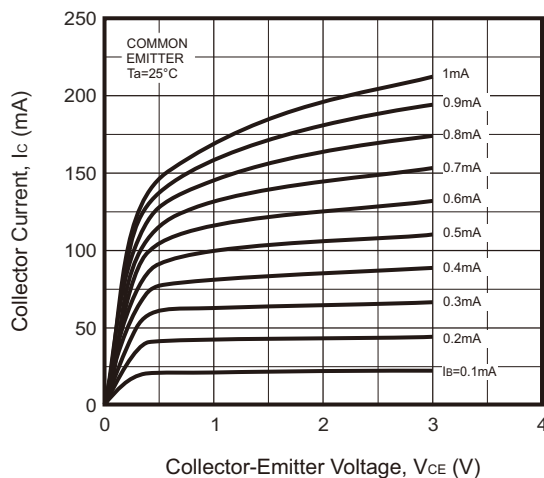
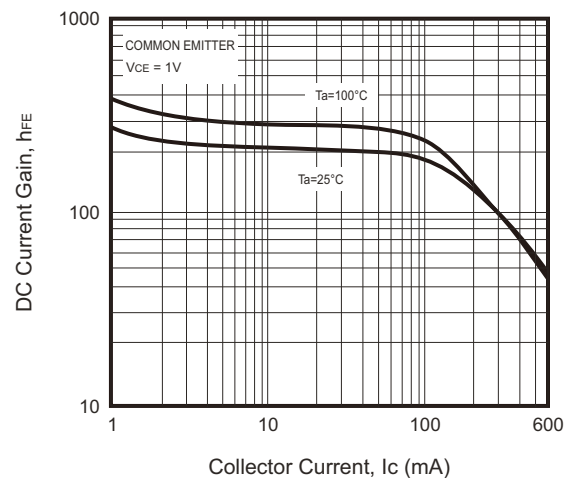


Fig.2 - $h_{FE} - I_C$



Rating and Characteristic Curves (MMBT4401-HF)

Fig.3 - V_{BEsat} — I_c

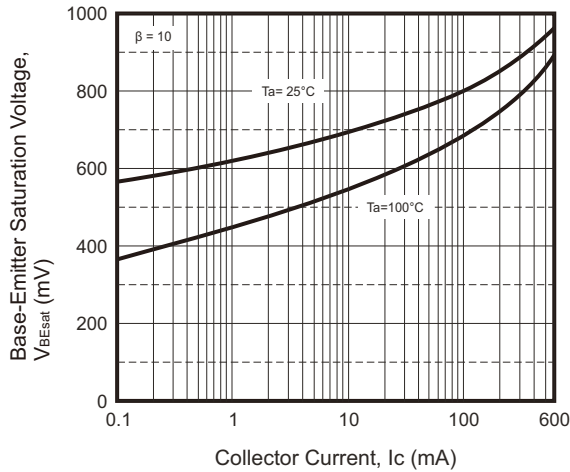


Fig.4 - V_{CEsat} — I_c

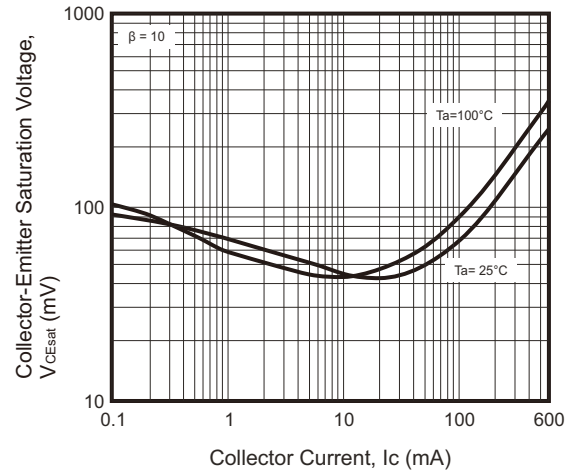


Fig.5 - I_c — V_{BE}

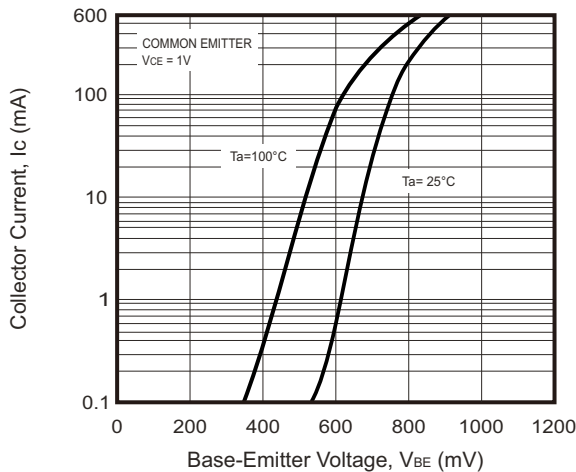


Fig.6 - f_T — I_c

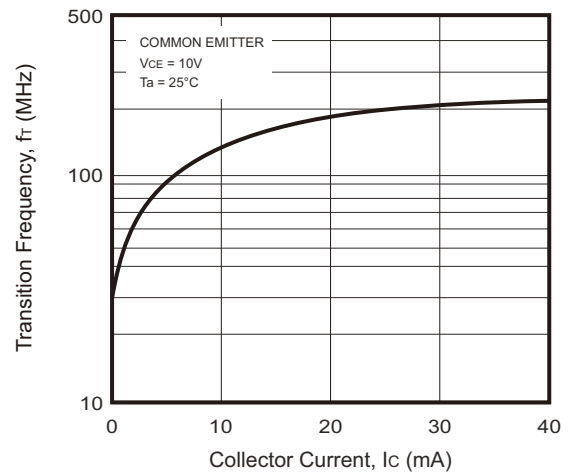


Fig.7 - C_{ob}/C_{ib} — V_{CB}/V_{EB}

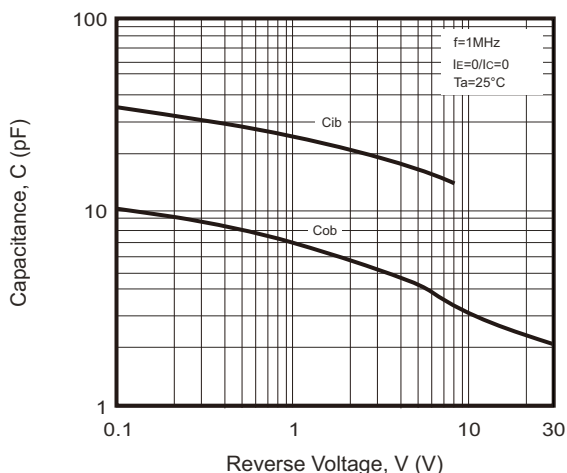
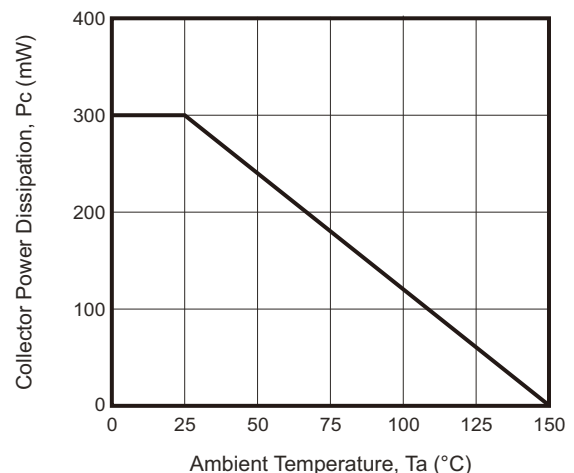
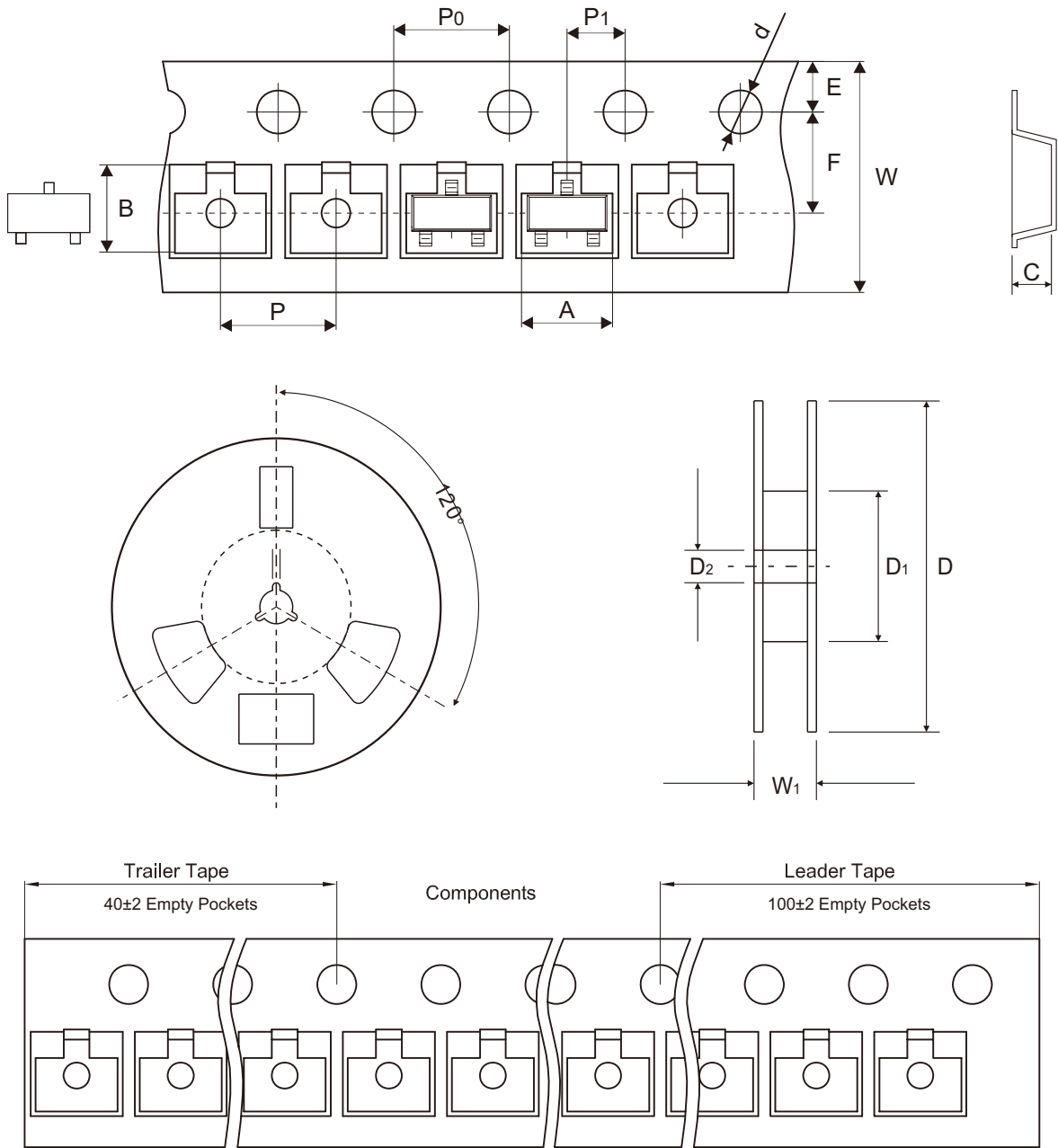


Fig.8 - P_C — T_a



Reel Taping Specification

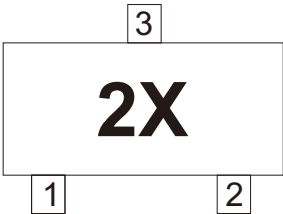


SOT-23	SYMBOL	A	B	C	d	D	D1	D2
	(mm)	3.15 ± 0.10	2.77 ± 0.10	1.22 ± 0.10	1.50 ± 0.10	178.00 ± 2.00	54.40 ± 1.00	13.00 ± 1.00
	(inch)	0.124 ± 0.004	0.109 ± 0.004	0.048 ± 0.004	0.059 ± 0.004	7.008 ± 0.079	2.142 ± 0.039	0.512 ± 0.039

SOT-23	SYMBOL	E	F	P	P0	P1	W	W1
	(mm)	1.75 ± 0.10	3.50 ± 0.10	4.00 ± 0.10	4.00 ± 0.10	2.00 ± 0.10	8.00 ± 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 ± 0.004	0.484 ± 0.039

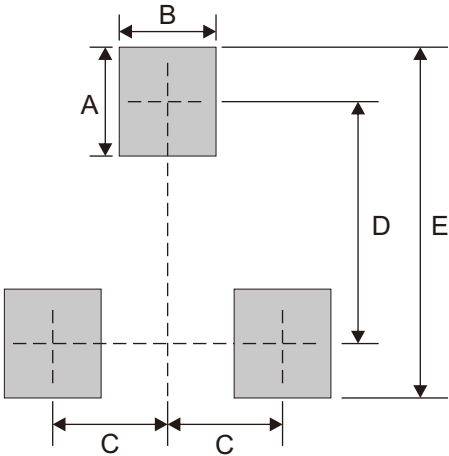
Marking Code

Part Number	Marking Code
MMBT4401-HF	2X



Suggested PAD Layout

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



Note: 1. The pad layout is for reference purposes only.

Standard Packaging

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