NPN Small Signal Surface Mount Transistor

MMBT2222AM

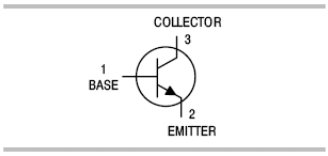
Features

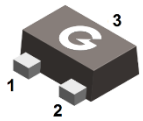
HF

- Epitaxial die construction
- Complementary PNP type available (MMBT2907AM)
- Ultra-small surface mount package

Mechanical Data

- Case: SOT-723
- Molding compound: UL flammability classification rating 94V-0
- Terminals: Tin-plated; solderability per MIL-STD-202, Method 208





SOT-723

Ordering Information

Part Number	Package	Shipping Quantity	Marking Code
MMBT2222AM	SOT-723	10000 pcs / Tape & Reel	1P

Maximum Ratings (@ T_A = 25°C unless otherwise specified)

Parameter	Symbol	Value	Unit
Collector-Base Voltage	V_{CBO}	75	V
Collector-Emitter Voltage	V_{CEO}	40	V
Emitter-Base Voltage	V_{EBO}	6	V
Collector Current (Continuous)	I_C	600	mA
Collector Current - Peak pulse width ≤ 40μs, δ = 0.35	I_{CM}	1.5	A
Continuous Base Current	I_B	0.15	A
Peak Base Current	I_{BM}	0.2	A

Thermal Characteristics

Parameter	Symbol	Value	Unit
Power Dissipation *1	P_D	0.15	W
Thermal Resistance Junction-to-Air *1	$R_{\theta JA}$	833	°C/W
Thermal Resistance Junction-to-Air *2	$R_{\theta JA}$	190	°C/W
Thermal Resistance Junction-to-Case *2	$R_{\theta JC}$	110	°C/W
Thermal Resistance Junction-to-Lead *2	$R_{\theta JL}$	100	°C/W
Ambient Temperature	T_A	-55 ~ +150	°C
Operating Junction Temperature	T_J	-55 ~ +150	°C
Storage Temperature Range	T_{STG}	-55 ~ +150	°C

Electrical Characteristics (@ T_A = 25°C unless otherwise specified)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	I_C = 10μA, I_E = 0	75	-	-	V
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	I_C = 10mA, I_B = 0	40	-	-	V
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	I_E = 10μA, I_C = 0	6	-	-	V
Collector Cut-off Current	I_{CBO}	V_{CB} = 60V, I_E = 0	-	-	10	nA
Collector Cut-off Current	I_{CEX}	V_{CE} = 60V, V_{BE} = 3V	-	-	10	nA
Emitter Cut-off Current	I_{EBO}	V_{EB} = 3V, I_C = 0	-	-	10	nA
DC Current Gain	h_{FE}	V_{CE} = 10V, I_C = 0.1mA	35	-	-	-
		V_{CE} = 10V, I_C = 1mA	50	-	-	-
		V_{CE} = 10V, I_C = 10mA	75	-	-	-
		V_{CE} = 10V, I_C = 150mA	100	-	300	-
		V_{CE} = 10V, I_C = 500mA	40	-	-	-
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	I_C = 500mA, I_B = 50mA	-	-	1	V
		I_C = 150mA, I_B = 15mA	-	-	0.3	V
Base-Emitter Saturation Voltage	$V_{BE(sat)}$	I_C = 500mA, I_B = 50mA	-	-	2	V
		I_C = 150mA, I_B = 15mA	-	0.6	1.2	V
Base-Emitter Voltage	$V_{BE(on)}$	I_C = 200mA, V_{CE} = 10V	-	-	1	V
Transition Frequency	f_T	V_{CE} = 20V, I_C= 20mA f = 100MHz	300	-	-	MHz
Output Capacitance	C_{OBO}	V_{CB} = 10V, I_E = 0 f = 1MHz	-	-	8	pF
Noise Figure	N_F	V_{CE} = 10V, I_C = 100μA R_S = 1.0KΩ, f = 1.0kHz	-	-	4.0	dB
Delay Time	t_d	V_{CC} = 30V, I_C = 150mA $V_{BE(OFF)}$ = -0.5V, I_{B1} = 15mA	-	-	10	ns
Rise Time	t_r		-	-	25	ns
Storang Time	t_s	V_{CC} = 30V, I_C = 150mA I_{B1} = -I_{B2} = 15mA	-	-	225	ns
Fall Time	t_f		-	-	60	ns

Notes:

1. FR−5 = 1.0 * 0.75 * 0.062 in
2. The data tested by surface mounted on a 1 $inch^2$ FR-4 board with 2OZ copper

Ratings and Characteristics Curves (@ T_A = 25°C unless otherwise specified)

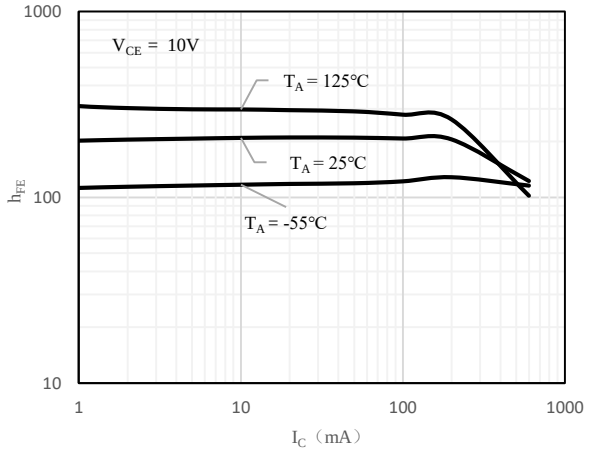


Fig 1 h_{FE} vs. I_C

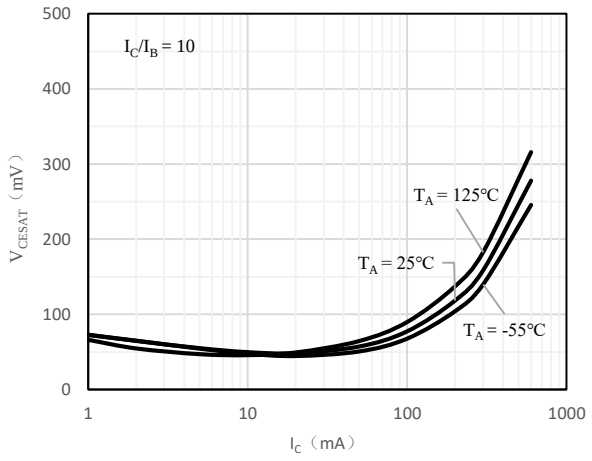


Fig 2 $V_{CE(sat)}$ vs. I_C

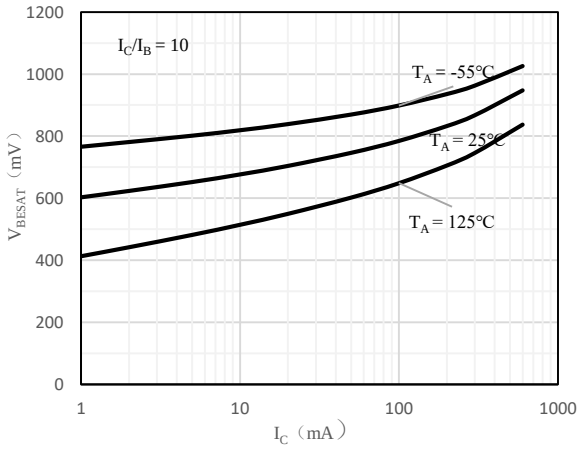


Fig 3 $V_{BE(sat)}$ vs. I_C

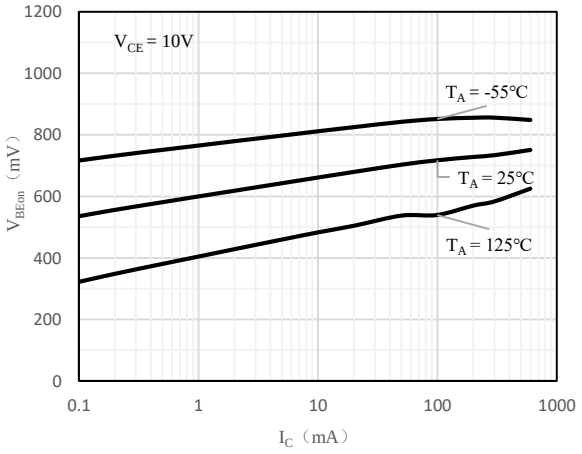


Fig 4 $V_{BE(ON)}$ vs. I_C

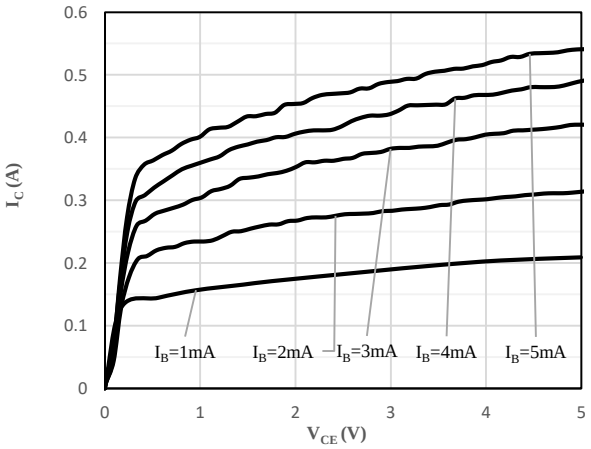


Fig 5 I_C vs. V_{CE}

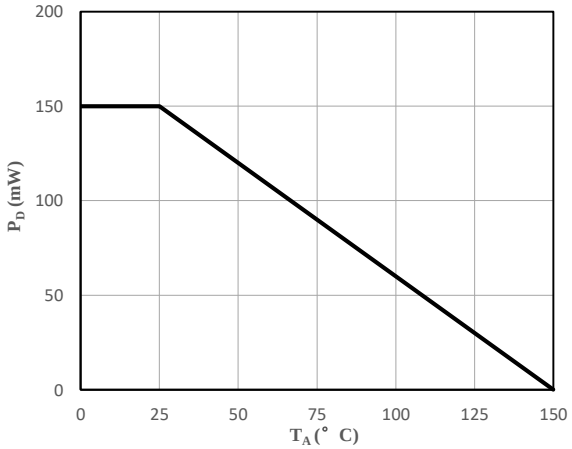


Fig 6 P_D vs. T_A

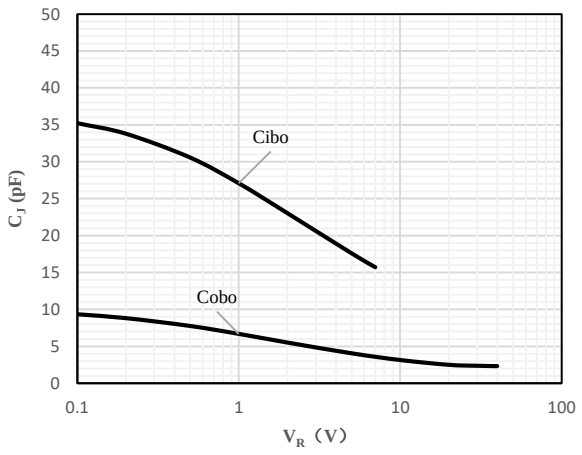
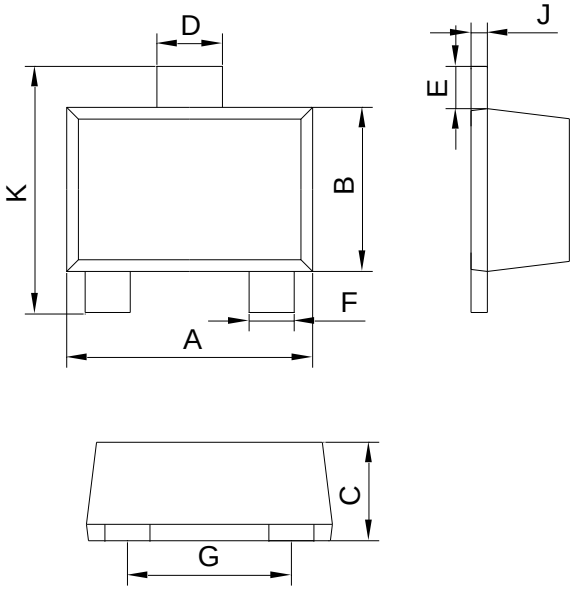


Fig 7 C_J vs. V_R

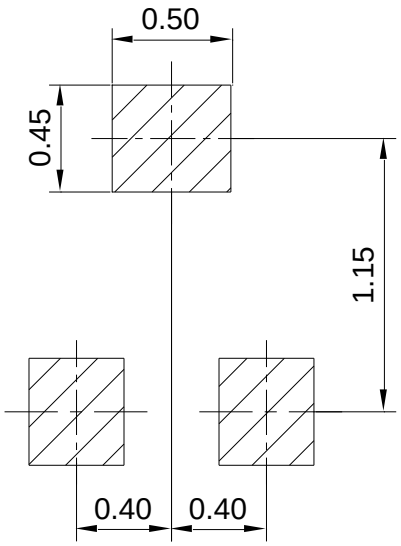
Package Outline Dimensions (Unit: mm)



SOT-723		
Dimension	**Min.**	**Max.**
A	1.10	1.30
B	0.70	0.90
C	0.40	0.54
D	0.22	0.42
E	0.10	0.30
F	0.12	0.32
G	0.70	0.90
J	0.08	0.15
K	1.10	1.30

Mounting PAD Layout (Unit: mm)

SOT-723



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