TAIWAN SEMICONDUCTOR

MMBT2222A

300mW, NPN Small Signal Transistor

Small Signal Product

SOT-23

Features

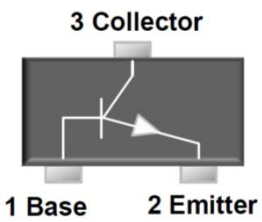
- ◇ Epitaxial planar die construction
- ◇ Surface device type mounting
- ◇ Moisture sensitivity level 1
- ◇ Matte Tin(Sn) lead finish with Nickel(Ni) underplate
- ◇ Pb free version and RoHS compliant
- ◇ Green compound (Halogen free) with suffix "G" on packing code and prefix "G" on date code

Pb-Free

RoHS COMPLIANT

Mechanical Data

- ◇ Case : SOT- 23 small outline plastic package
- ◇ Terminal : Matte tin plated, lead free, solderable per MIL-STD-202, method 208 guaranteed
- ◇ High temperature soldering guaranteed : 260°C/10s
- ◇ Weight : 0.008 grams (approximately)
- ◇ Marking Code : 1P



Maximum Ratings and Electrical Characteristics

Rating at 25°C ambient temperature unless otherwise specified.

Maximum Ratings

Parameter	Symbol	Value	Units
Power Dissipation	P_D	300	mW
Collector-Base Voltage	V_{CBO}	75	V
Collector-Emitter Voltage	V_{CEO}	40	V
Emitter-Base Voltage	V_{EBO}	6	V
Collector Current	I_C	600	mA
Thermal Resistance (Junction to Ambient) (Note 1)	$R_{\theta JA}$	417	°C/W
Junction and Storage Temperature Range	T_J , T_{STG}	-55 to + 150	°C

Notes:1. Valid provided that electrodes are kept at ambient temperature

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

Parameter					Symbol	Min	Max	Units
Collector-Base Breakdown Voltage			I_C= 10μA	I_E= 0	$V_{(BR)CBO}$	75	-	V
Collector-Emitter Breakdown Voltage			I_C= 10mA	I_B= 0	$V_{(BR)CEO}$	40	-	V
Emitter-Base Breakdown Voltage			I_E= 10μA	I_C= 0	$V_{(BR)EBO}$	6	-	V
Collector Cut-off Current			V_{CB}= 60V	I_E= 0	I_{CBO}	-	0.01	μA
Collector Cut-off Current			V_{CE}= 60V	$V_{BE(off)}$= 3.0V	I_{CEX}	-	0.01	μA
Emitter Cut-off Current			V_{EB}= 3.0V	I_C= 0	I_{EBO}	-	0.1	μA
DC Current Gain			V_{CE}= 10V	I_C= 500mA	h_{FE}	40	-	
			V_{CE}= 10V	I_C= 150mA		100	300	
			V_{CE}= 10V	I_C= 10mA		75	-	
			V_{CE}= 10V	I_C= 1mA		50	-	
			V_{CE}= 10V	I_C= 0.1mA		35	-	
Collector-Emitter Saturation Voltag			I_C= 500mA	I_B= 50mA	$V_{CE(sat)}$	-	1.0	V
Base-Emitter Saturation Voltage			I_C= 500mA	I_B= 50mA	$V_{BE(sat)}$	-	2.0	V
Transition Frequency		V_{CE}= 20V	I_C= 20mA	f= 100MHz	f_T	300	-	MHz
Output Capacitance		V_{CB}= 10V	I_E = 0	f= 1.0MHz	C_{obo}	8		pF
Input Capacitance		V_{EB}= 0.5V	I_C = 0	f= 1.0MHz	C_{ibo}	25		pF
Delay Time	V_{CC}=30V	$V_{BE(off)}$= -0.5V	I_C=150mA	I_{B1}=15mA	t_d	-	10	nS
Rise Time	V_{CC}=30V	$V_{BE(off)}$= -0.5V	I_C=150mA	I_{B1}=15mA	t_r	-	25	nS
Storage Time	V_{CC}=30V	I_C=150mA	I_{B1}= -I_{B2}=15mA		t_s	-	225	nS
Fall Time	V_{CC}=30V	I_C=150mA	I_{B1}= -I_{B2}=15mA		t_f	-	60	nS

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RATINGS AND CHARACTERISTIC CURVES

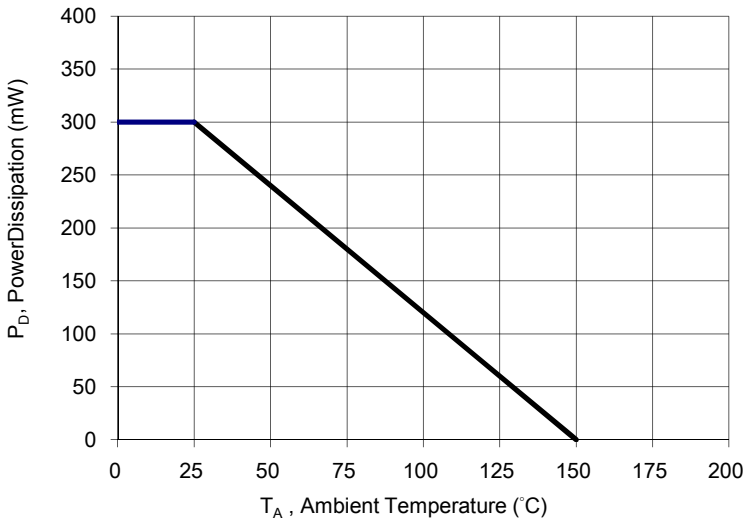

Fig. 1 Max Power Dissipation VS. Ambient Temperature

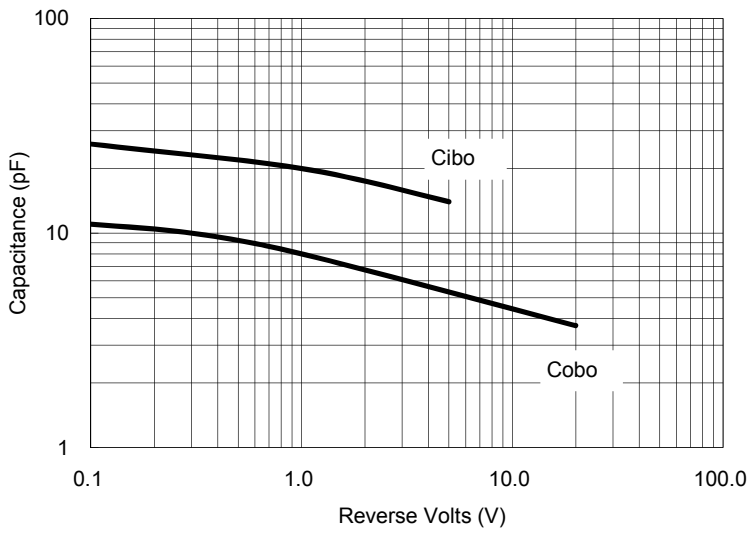

Fig. 2 Typical Capacitanc

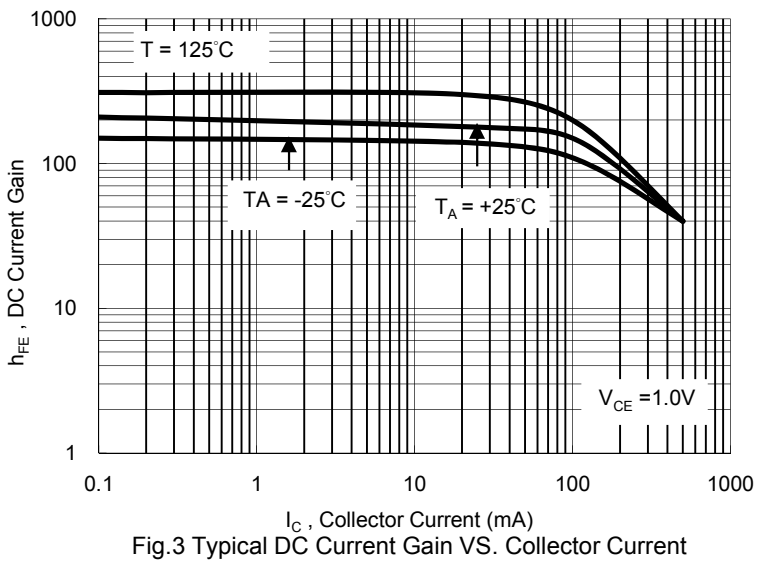

Fig.3 Typical DC Current Gain VS. Collector Current

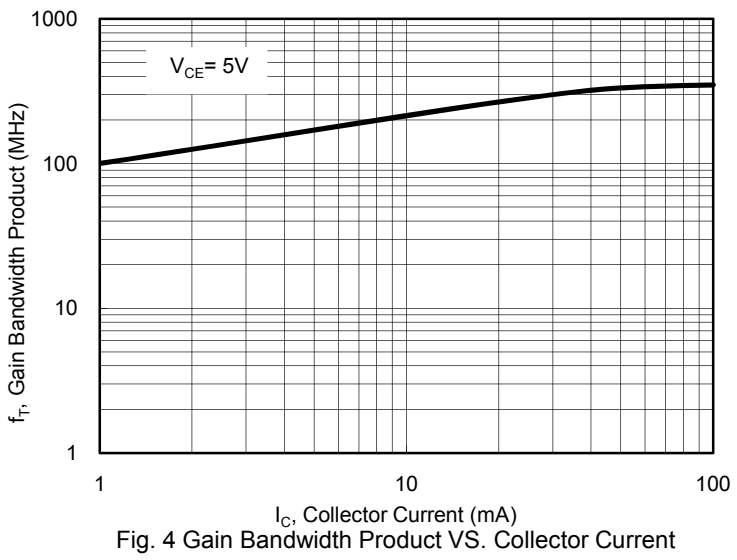

Fig. 4 Gain Bandwidth Product VS. Collector Current

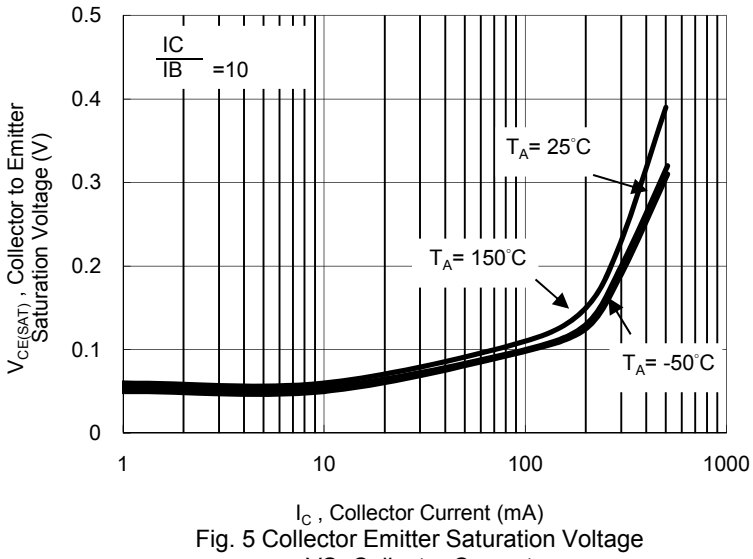

Fig. 5 Collector Emitter Saturation Voltage VS. Collector Current

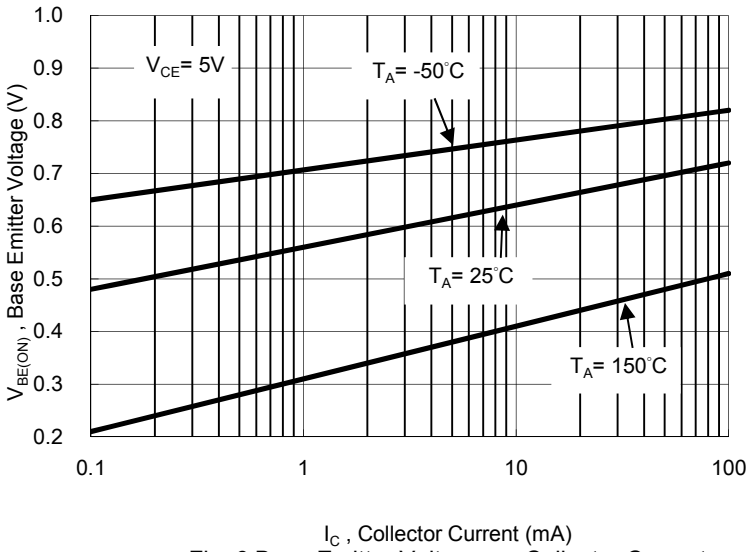

Fig. 6 Base Emitter Voltage vs. Collector Current

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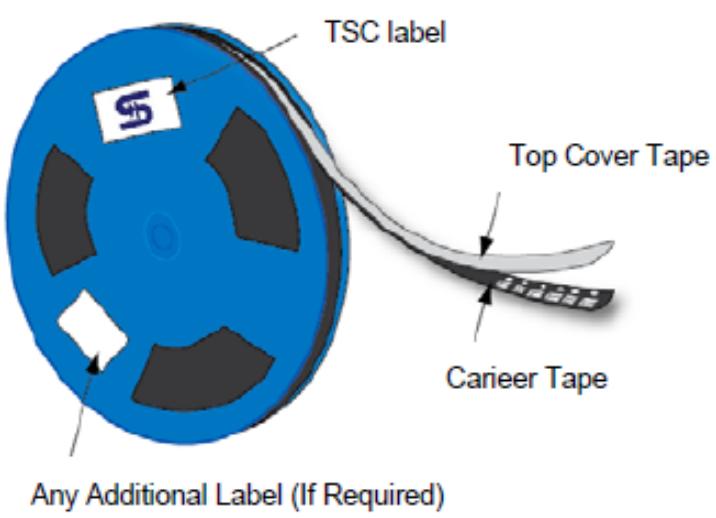
Ordering information (Detail, example)

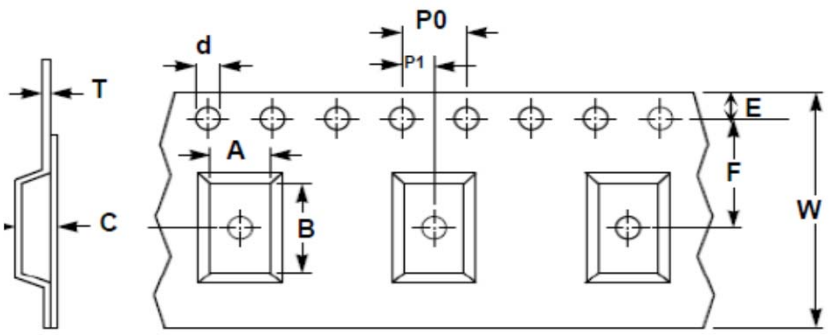
Part No.	Package	Packing	Packing code	Packing code (Green)	Marking	Manufacture code
MMBT2222A	SOT-23	3K / 7" Reel	RF	RFG	1P	(Note)
MMBT2222A	SOT-23	3K / 7" Reel	RF	RFG	1P	

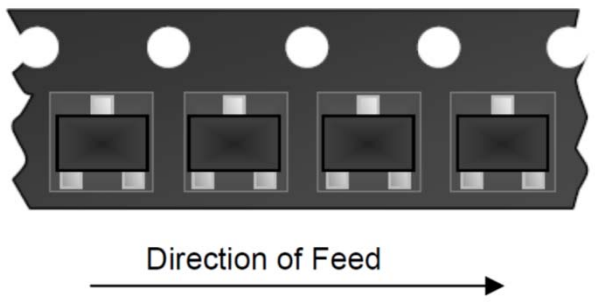
Note : Manufacture special control, if empty means no special control requirement.

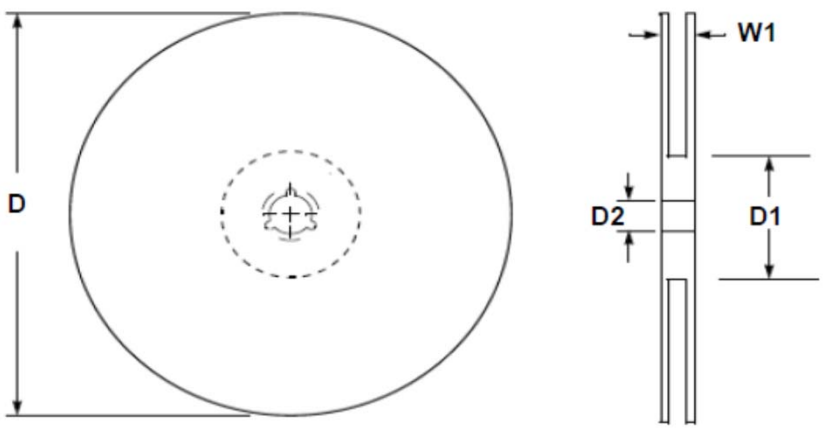
Tape & Reel specification



Item	Symbol	Dimension
Carrier width	A	3.15 ±0.10
Carrier length	B	2.77 ±0.10
Carrier depth	C	1.22 ±0.10
Sprocket hole	d	1.50 ± 0.10
Reel outside diameter	D	178 ± 1
Reel inner diameter	D1	55 Min
Feed hole width	D2	13.0 ± 0.20
Sprocket hole position	E	1.75 ±0.10
Punch hole position	F	3.50 ±0.05
Sprocket hole pitch	P0	4.00 ±0.10
Embossment center	P1	2.00 ±0.05
Overall tape thickness	T	0.229 ±0.013
Tape width	W	8.10 ±0.20
Reel width	W1	12.30 ±0.20







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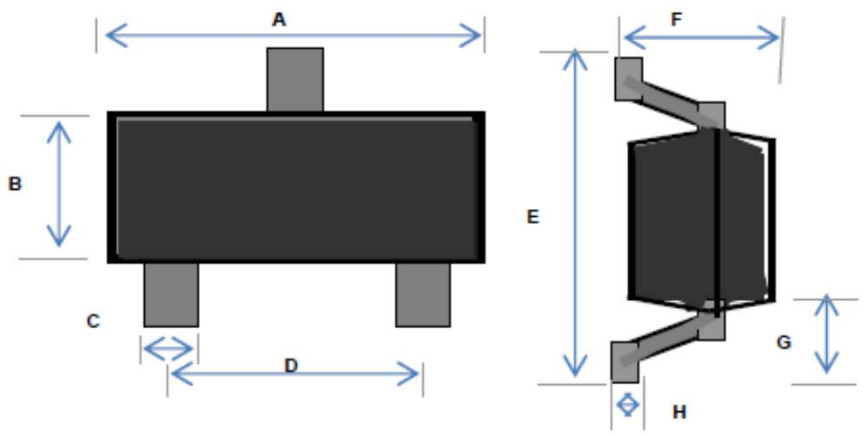
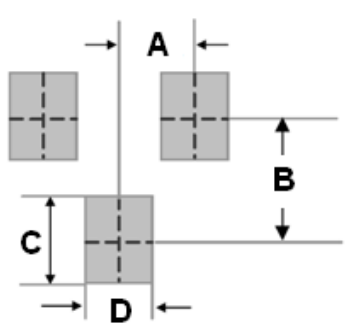
Dimensions



DIM.	Unit(mm)		Unit(inch)	
	Min	Max	Min	Max
A	2.70	3.10	0.106	0.122
B	1.10	1.50	0.043	0.059
C	0.30	0.51	0.012	0.020
D	1.78	2.04	0.070	0.080
E	2.10	2.64	0.083	0.104
F	0.89	1.30	0.035	0.051
G	0.550 REF		0.022 REF	
H	0.1 REF		0.004 REF	

Suggested PAD Layout



DIM.	Unit(mm)	Unit(inch)
	Typ.	Typ.
A	0.95	0.037
B	2.0	0.079
C	0.9	0.035
D	0.8	0.031