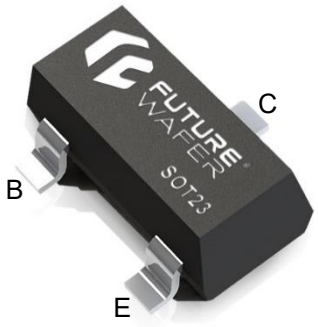
1. Synopsis

1-1. Feature List

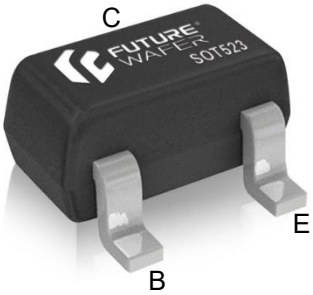
- BV_{CEO}>40V
- I_C=600mA High Collector Current
- Pair of PNP Type: MMBT2907A
- Ideal for Low Power Amplification and Switching



MMBT2222A
SOT23

1-2. Applications

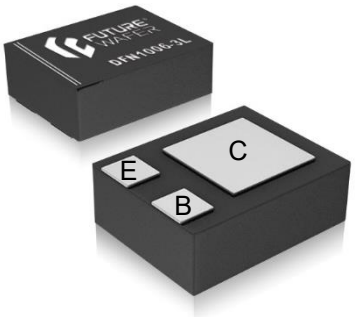
- Current Mirrors
- Differential and Instrumentation Amplifiers
- Comparators



MMBT2222AE
SOT523

1-3. Mechanical Characteristics

- Molded JEDEC Package: SOT23 / SOT523 / DFN1006-3L
- Packing: Tape and Reel
- Flammability rating UL 94V-0
- Halogen Free
- JEDEC MSL Classification: LEVEL 1



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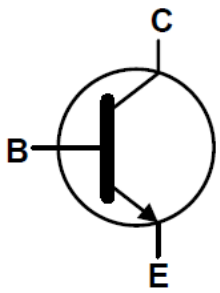


Device Symbol

1-4. Device Characteristics

Absolute Maximum Ratings@25°C Unless Otherwise Specified

Parameter	Symbol	Values	Units
Collector Base Voltage	V_{CBO}	75	Vdc
Collector Emitter Voltage	V_{CEO}	40	
Emitter Base Voltage	V_{EBO}	6.0	
Collector Current-Continuous	I_C	600	mAdc
Collector Current-Peak	I_{CM}	1100	mAdc
Total Power Dissipation	P_{tot}	350	mW
Junction Temperature	T_J	-55 to +150	°C
Storage Temperature Range	T_{STG}		

2. Contents

3. Electrical Property

3-1. Electrical Characteristics

Parameter	Symbol	Condition	Min.	Typ.	Max.	Units
Collector-Emitter Breakdown Voltage	V_{BR-CEO}	I_C = 10mA, I_B = 0	40	-	-	V
Collector-Base Breakdown Voltage	V_{BR-CBO}	I_C = 10uA, I_E = 0	75	-	-	
Emitter-Base Breakdown Voltage	V_{BR-EBO}	I_E = 10uA, I_C = 0	6.0	-	-	
Emitter Base Cutoff Current	I_{EBO}	V_{EB} = 3V	-	-	100	nA
Collector Base Cutoff Current	I_{CBO}	V_{CE} = 60V	-	-	100	

3-2. On Characteristics

Parameter	Symbol	Condition		Min.	Typ.	Max.	Units
DC Current Gain	h_{FE}	Ic = 0.1mA	V_{CE} = 10V	35	-	-	-
		Ic = 1.0mA		50	-	-	-
		Ic = 10mA		75	-	-	-
		Ic = 150mA	V_{CE} = 1.0V	50	-	-	-
		Ic = 150mA	V_{CE} = 10V	100	-	300	-
		Ic = 500mA		40	-	-	-
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	Ic = 150mA	I_B = 15mA	-	-	300	mV
		Ic = 500mA	I_B = 50mA	-	-	1000	
Base-Emitter Saturation Voltage	$V_{BE(sat)}$	Ic = 150mA	I_B = 15mA	0.60	-	1.20	V
		Ic = 500mA	I_B = 50mA	-	-	2.00	

3-3. Small Signal Characteristics

Parameter	Symbol	Condition	Min.	Typ.	Max.	Units
Current Gain Bandwidth Product	f_T	$-I_E$ = 20mA, V_{CE} = 20V	300	-	-	MHZ
Collector Output Capacitance	C_{OB}	V_{CB} = 10V, f = 100KHZ	-	-	8.0	pF
Input Capacitance	C_{IBO}	V_{EB} = 0.5V, f = 1.0MHZ	-	-	25.0	
Delay Time	T_d	V_{CC} = 30V, $V_{BE(OFF)}$ = 0.5V, I_C = 150mA, I_{B1} = 15mA	-	-	10	nS
Storage Time	T_{STG}	V_{CC} = 30V, I_C = 150mA, I_{B1} = $-I_{B2}$ = 15mA	-	-	225	
Rise Time	T_r	V_{CC} = 30V, $V_{BE(OFF)}$ = 0.5V, I_C = 150mA, I_{B1} = 15mA	-	-	25	
Fall Time	T_f	V_{CC} = 30V, I_C = 150mA, I_{B1} = $-I_{B2}$ = 15mA	-	-	60	

3-4. Ratings and Characteristics Curve

Fig 1. Typical DC Current Gain vs. Collector Current

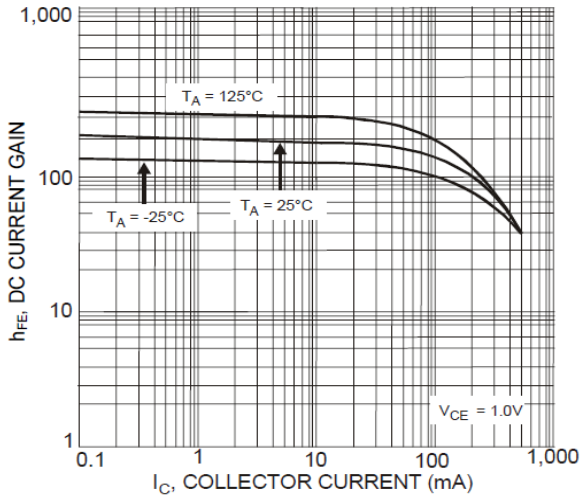


Fig 2. Typical Collector-Emitter Saturation Voltage vs. Collector Current

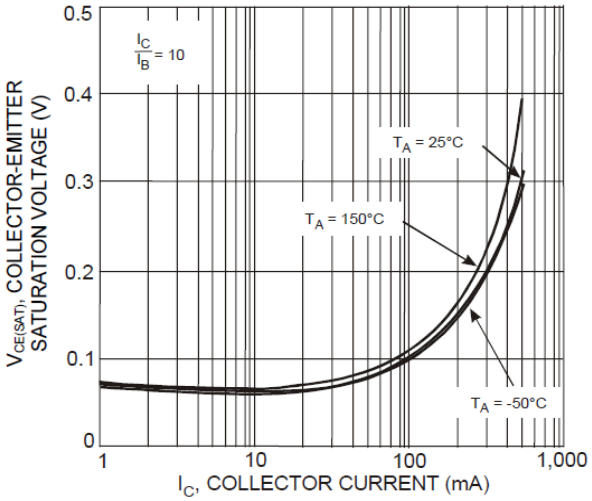


Fig 3. Base-Emitter Turn-On Voltage vs. Collector Current

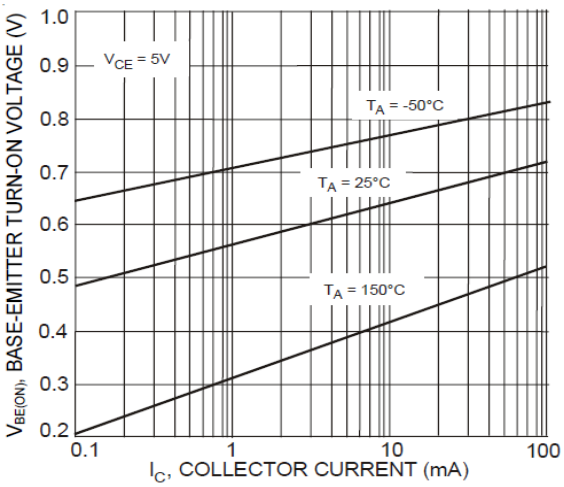


Fig 4. Typical Capacitance Characteristics

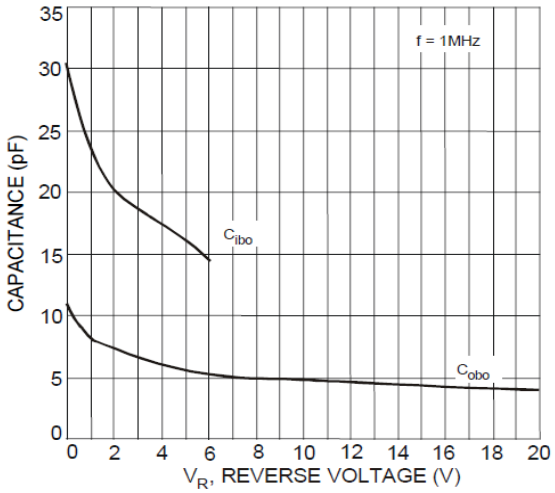


Fig 5. Typical Gain Bandwidth Product vs. Collector Current

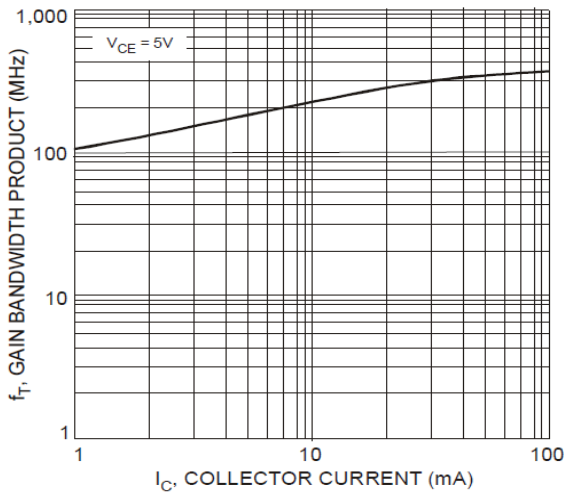
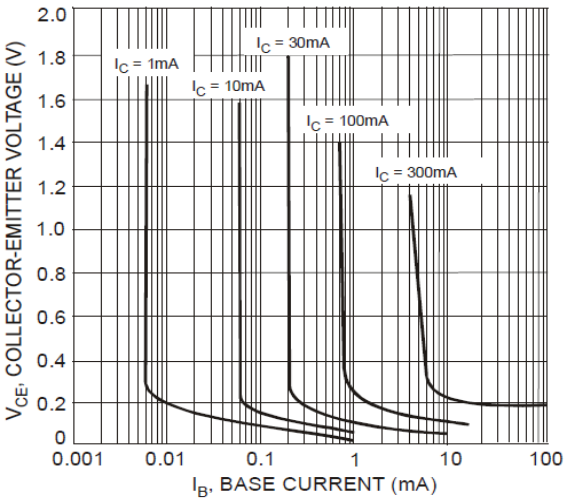
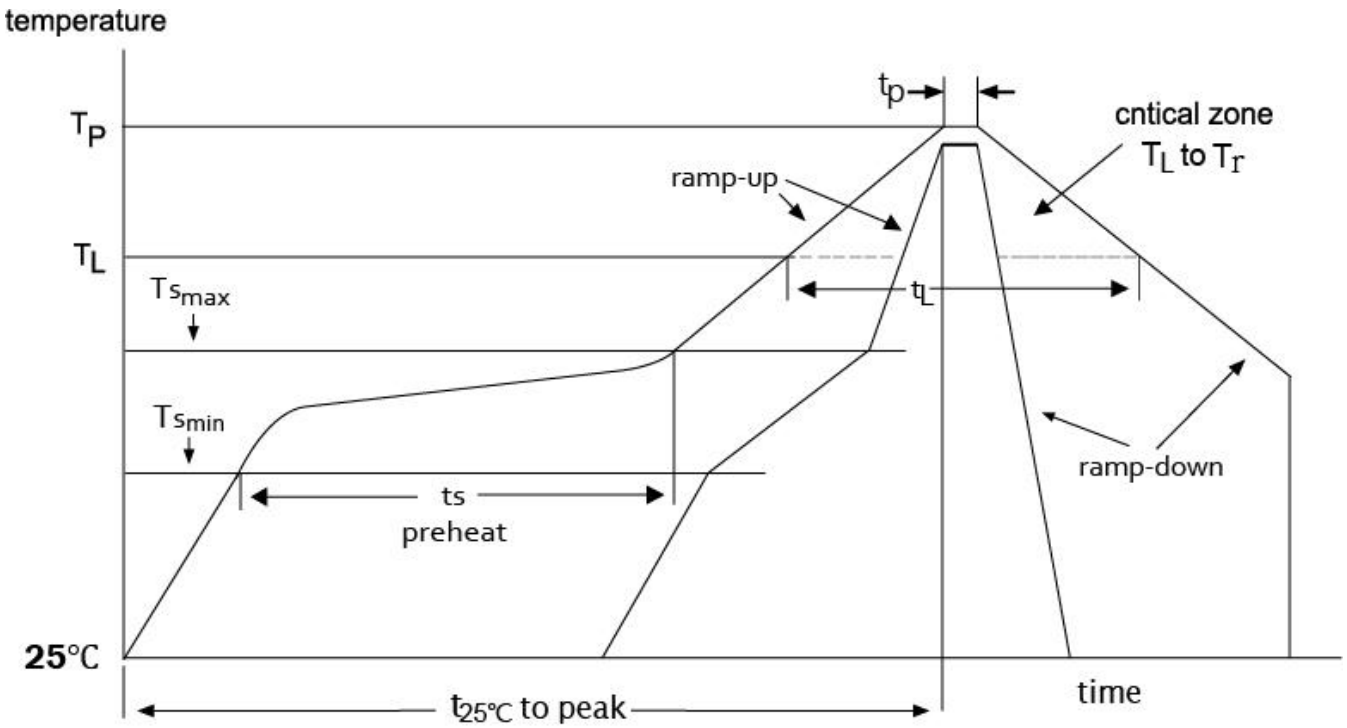


Fig 6. Typical Collector Saturation Region



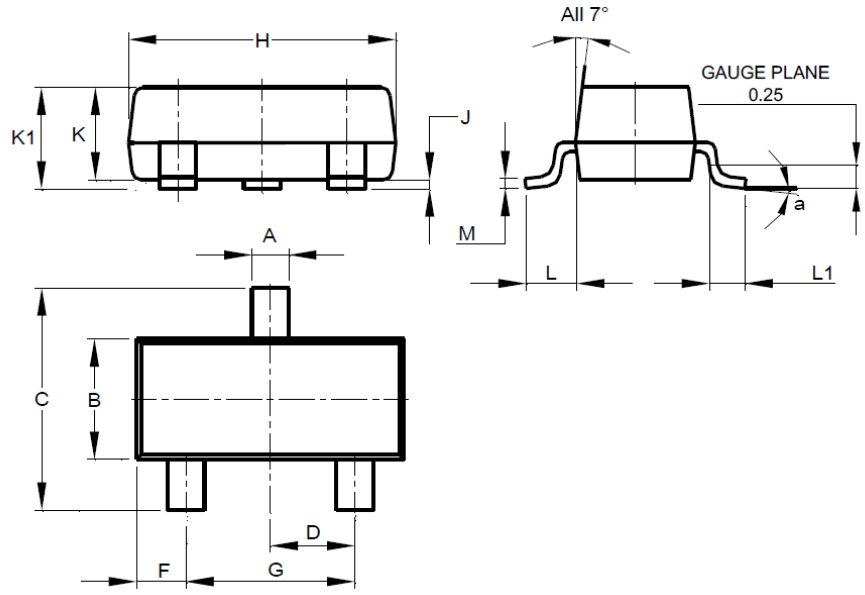
4. Soldering Parameters

Profile Feature	SnPb eutectic assembly	Pb-free assembly
Average ramp-up rate (Tsmax to Tp)	3 °C/s maximum	3 °C/s maximum
Preheat		
Temperature minimum (Tsmin)	100 °C	150 °C
Temperature maximum (Tsmax)	150 °C	200 °C
Time (tsmin to tsmax)	60 s to 120 s	60 s to 180 s
Time maintained above		
Temperature (TL)	183 °C	217 °C
Time (tL)	60 s to 150 s	60 s to 150 s
Peak/classificationtemperature(T)	235 °C	260 °C
Number of allowed reflow cycles	3	3
Time within 5 °C of actual peak temperature (tp)	10 s to 30 s	20 s to 40 s
Ramp-down rate	6 °C/s maximum	6 °C/s maximum
Time 25 °C to peak temperature	6 minutes maximum	8 minutes maximum



5. Package Information

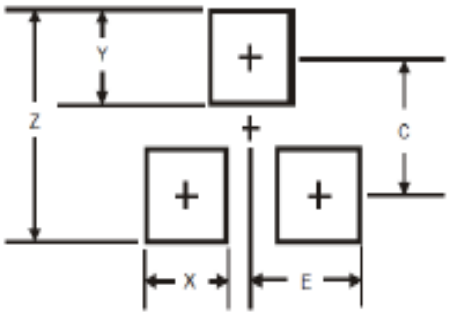
5-1. Dimension-SOT23



SOT23			
Dim	**Min.**	**Max.**	**Typ.**
A	0.37	0.51	0.40
B	1.20	1.40	1.30
C	2.30	2.50	2.40
D	0.89	1.03	0.915
F	0.45	0.60	0.535
G	1.78	2.05	1.83
H	2.80	3.00	2.90
J	0.013	0.10	0.05
K	0.890	1.00	0.975
K1	0.903	1.10	1.025
L	0.45	0.61	0.55
L1	0.25	0.55	0.40
M	0.085	0.150	0.110
a	8°		

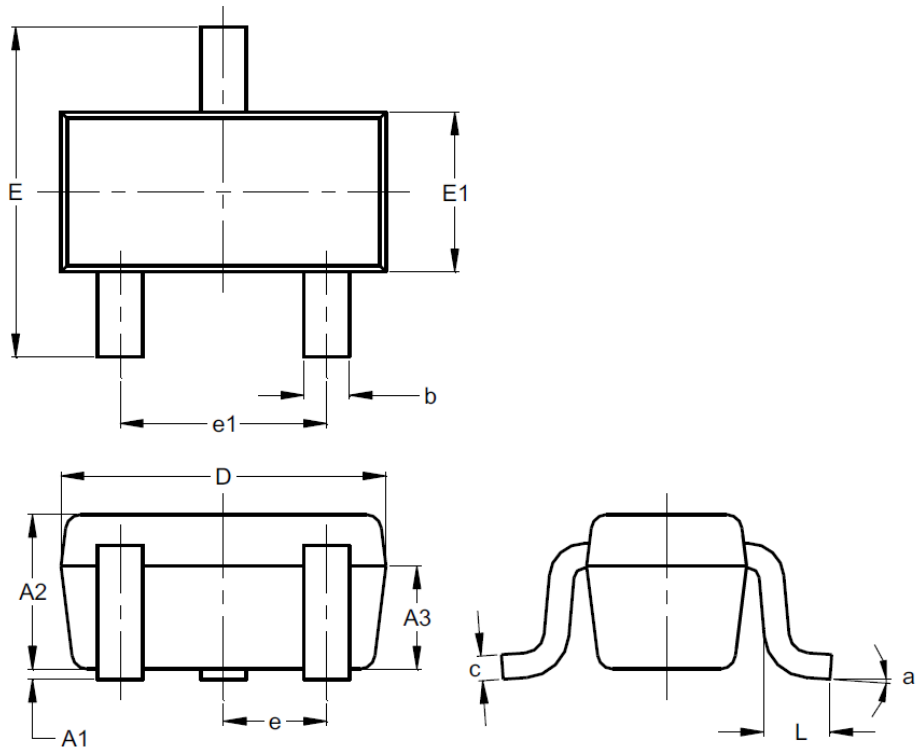
Unit:mm

5-2. PCB Pad Layout Recommendation-SOT23



Dim	Millimeter
Z	2.9
X	0.8
Y	0.9
C	2.0
E	1.35

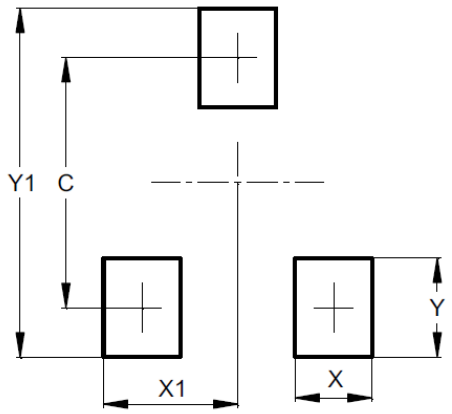
5-3. Dimension-SOT523



SOT523			
Dim	**Min.**	**Max.**	**Typ.**
A1	0.00	0.10	0.05
A2	0.60	0.80	0.75
A3	0.45	0.65	0.50
b	0.15	0.30	0.22
c	0.10	0.20	0.12
D	1.50	1.70	1.60
E	1.45	1.75	1.60
E1	0.75	0.85	0.80
e	0.50 BSC		
e1	0.90	1.10	1.00
L	0.20	0.40	0.33
a	8°		

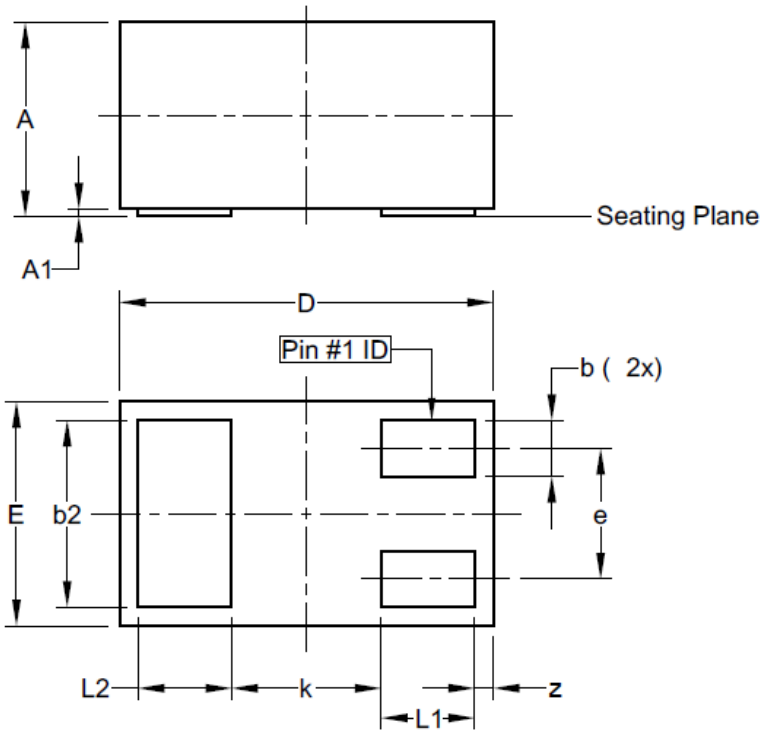
Unit:mm

5-4. PCB Pad Layout Recommendation-SOT523



Dim	**Millimeter**
C	1.29
X	0.40
X1	0.70
Y	0.51
Y1	1.80

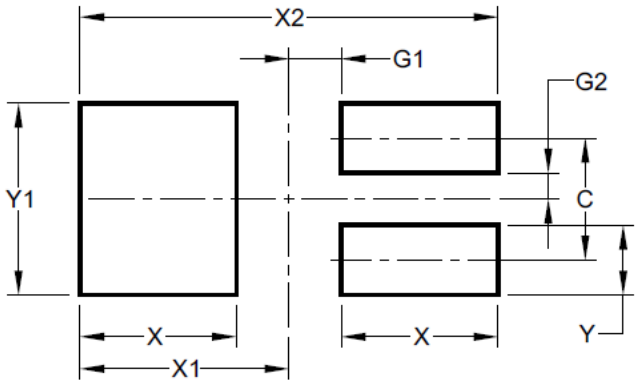
5-5. Dimension-DFN1006-3L



DFN1006-3L		
Dim	**Min.**	**Max.**
A	-	0.40
A1	-	0.05
b	0.10	0.20
b2	0.45	0.55
D	0.95	1.05
E	0.55	0.65
e	0.35(Typ.)	
L1	0.20	0.30
L2	0.20	0.30
k	0.40(Typ.)	
z	0.02	0.08

Unit:mm

5-6. PCB Pad Layout Recommendation-DFN1006-3L



DFN1006-3L	
Dim	**Values**
C	0.35
G1	0.15
G2	0.075
X	0.45
X1	0.6
X2	1.2
Y	0.2
Y1	0.55

Unit:mm

6. Ordering Information

Part Number	Marking Code	Quantity	Component Package	Packaging Option
MMBT2222A	1P	3,000PCS	SOT23	Tape & Reel - 8mm tape / 7"reel
MMBT2222AE	1P	8,000PCS	SOT523	
MMBT2222AS	2AS	10,000PCS	DFN1006-3L	

7. Version

7-1. History

Version	Date	File No.	Recording	Basis
A	15-Jun-2018	F51832L	New Create	Market
B	22-Jul-2018		Update Company Info.	System
2.0	22-Apr-2021		Update Version	System
2.1	25-Aug-2021		Update Version	System

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