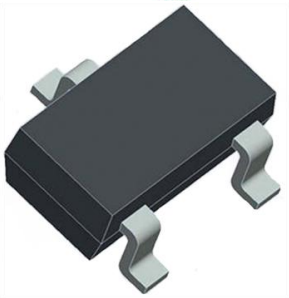
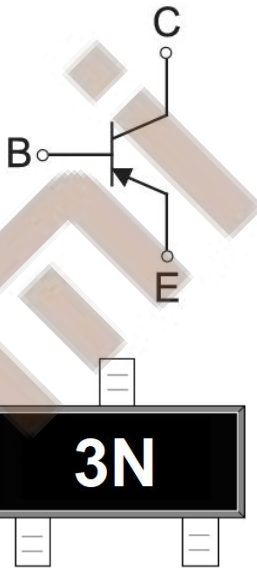
General Description

V_{CEO}	I_C	$V_{CE(sat)}$	f_T	T_{jMax}
-40V	-200mA	-0.4V	250MHz	150℃





Features

- **SOT-523 Package**
- **Epoxy meets UL-94 V-0 flammability rating and halogen free**
- **Moisture Sensitivity Level 3**
- **High temperature soldering guaranteed 260℃/10seconds at terminals**

Package Marking and Ordering Information

Product ID	Package	Marking	Qty(PCS)
MMBT3906T	SOT-523	3N	3000

Absolute Maximum Ratings (Ta=25℃ unless otherwise noted)

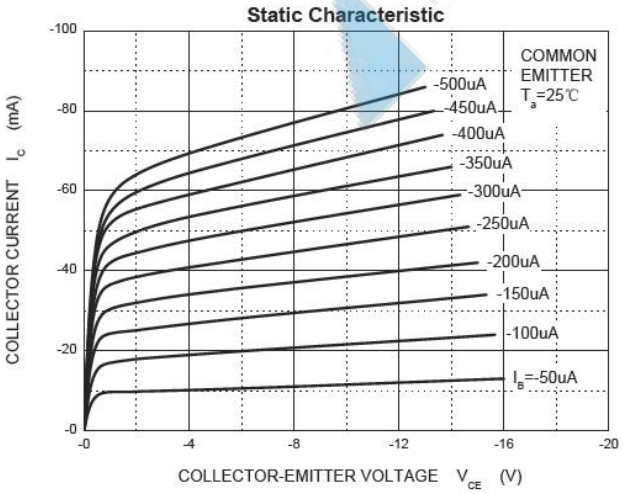
Parameter	Symbols	Value	Units
Collector-Base Voltage	VCBO	-40	V
Collector-Emitter Voltage	VCEO	-40	V
Emitter -Base Voltage	VEBO	-5	V
Collector Current-Continuous	IC	-200	mA
Collector Power Dissipation	PC	150	mW
Junction Temperature	Tj	150	℃
Storage Temperature	Tstg	-55-+150	℃
Thermal resistance From junction to ambient	R θ JA	833	℃/W

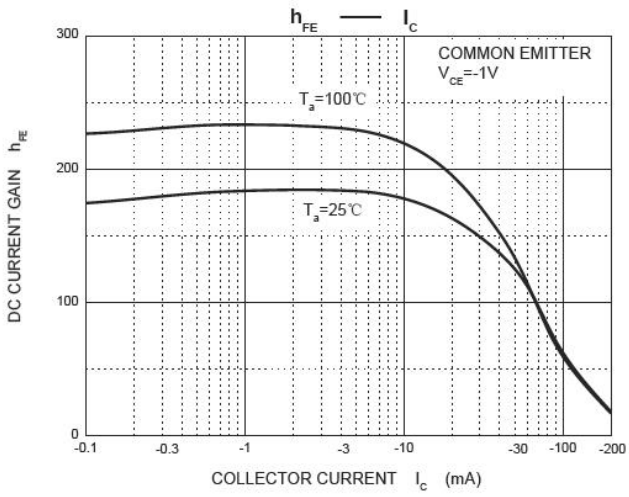
Electrical Characteristics(Ta=25℃ unless otherwise noted)

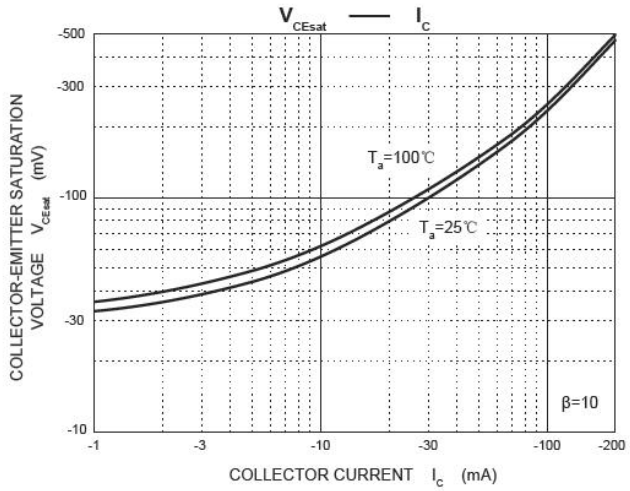
Parameter	Symbol	Conditions	Min.	Max.	Unit
Collector-base breakdown voltage	V(BR)CBO	IC=-10uA, IE=0	-40		V
Collector-emitter breakdown voltage	V(BR)CEO	IC=-1mA, IB=0	-40		V
Emitter-base breakdown voltage	V(BR)EBO	IE=-10uA, IC=0	-5		V
Collector cut-off current	ICBO	VCB=-40V, IE=0		-100	nA
Emitter cut-off current	IEBO	VEB=-5V, IC=0		-100	nA
Collector cut-off current	ICEX	VCE=-30V, VEB(off)=-3V		-50	nA
DC current gain	hFE(1)	VCE=-1V, IC=-0.1mA	60		
	hFE(2)	VCE=-1V, IC=-1mA	80		
	hFE(3)	VCE=-1V, IC=-10mA	100	300	
	hFE(4)	VCE=-1V, IC=-50mA	60		
	hFE(5)	VCE=-2V, IC=-100mA	30		
Collector-emitter saturation voltage	VCE(sat)	IC=-10mA, IB=-1mA		-0.25	V
		IC=-50mA, IB=-5mA		-0.40	V
Base -emitter saturation voltage	VBE(sat)	IC=-10mA, IB=-1mA	-0.65	-0.85	V
		IC=-50mA, IB=-5mA		-0.95	V
Transition frequency	fT	VCE=-20V, IC=-10mA,f=100MHz	250		MHz
Collector output capacitance	Cob	VCB=-5V, IE=0, f=1MHz		4.5	pF
Input capacitance	Cib	VEB=-5V, IE=0, f=1MHz		10	pF
Noise figure	NF	VCE=-5V, IC=-0.1mA		4	dB
Delay time	td	VCC=-3V, VBE(off)=-0.5V, IC=-10mA, IB1=-1mA		35	nS
Rise time	tr			35	nS
Storage time	ts	VCC=-3V, IC=-10mA, IB1=IB2=-1mA		225	nS
Fall time	tf			75	nS

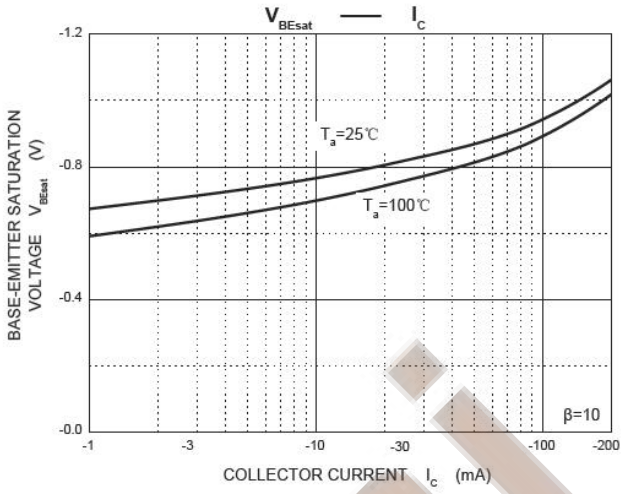
*Pulse test: pulse width≤300us,duty cycle≤2.0%

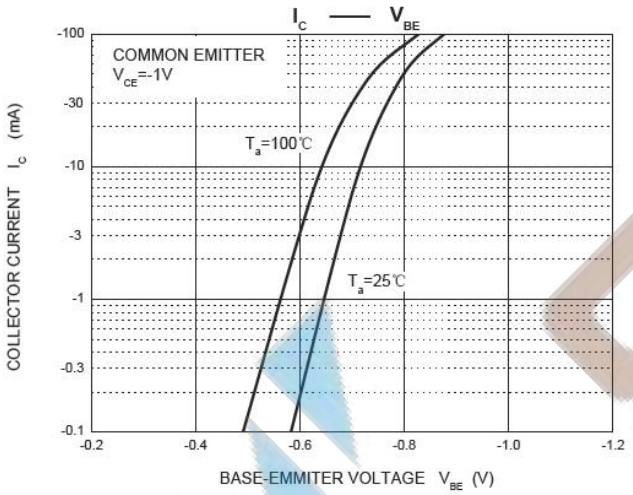
Typical characteristics

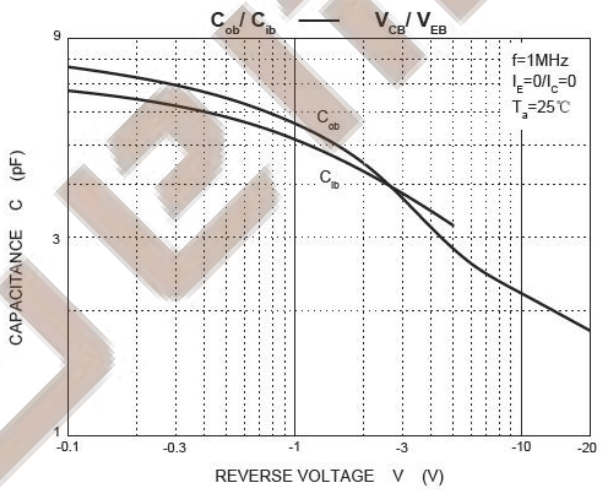


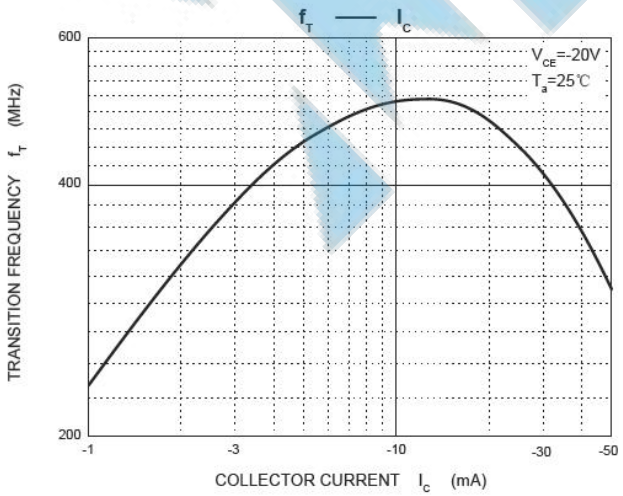


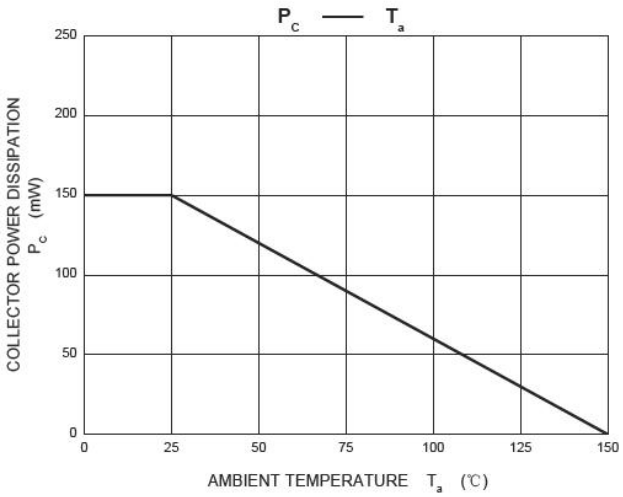

V_{CEsat} — I_C
COLLECTOR-EMITTER SATURATION VOLTAGE V_{CEsat} (mV)
-500
-300
-100
-30
-10
T_a=100℃
T_a=25℃
β=10
-1
-3
-10
-30
-100
-200
COLLECTOR CURRENT I_C (mA)


V_{BEsat} — I_C
BASE-EMITTER SATURATION VOLTAGE V_{BEsat} (V)
-1.2
-0.8
-0.4
-0.0
T_a=25℃
T_a=100℃
β=10
-1
-3
-10
-30
-100
-200
COLLECTOR CURRENT I_C (mA)


I_C — V_{BE}
COMMON EMITTER
V_{CE}=-1V
COLLECTOR CURRENT I_C (mA)
-100
-30
-10
-3
-1
-0.3
-0.1
T_a=100℃
T_a=25℃
-0.2
-0.4
-0.6
-0.8
-1.0
-1.2
BASE-EMMITER VOLTAGE V_{BE} (V)

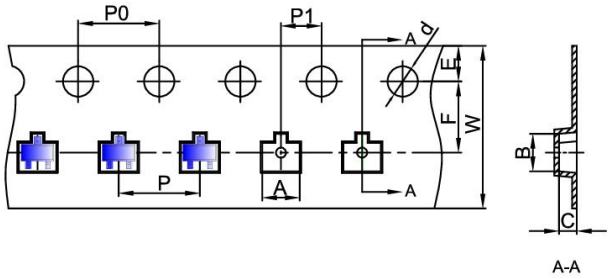

C_{ob} / C_{ib} — V_{CB} / V_{EB}
f=1MHz
I_E=0/I_C=0
T_a=25℃
C_{ob}
C_{ib}
CAPACITANCE C (pF)
9
3
1
-0.1
-0.3
-1
-3
-10
-20
REVERSE VOLTAGE V (V)


f_T — I_C
V_{CE}=-20V
T_a=25℃
TRANSITION FREQUENCY f_T (MHz)
600
400
200
-1
-3
-10
-30
-50
COLLECTOR CURRENT I_C (mA)

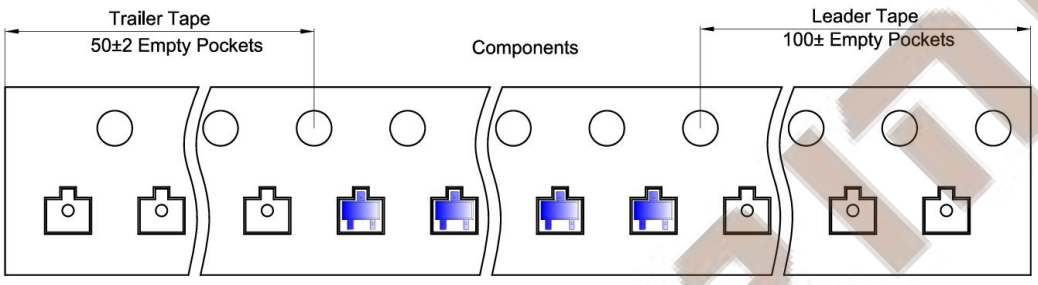

P_C — T_a
COLLECTOR POWER DISSIPATION P_C (mW)
250
200
150
100
50
0
0
25
50
75
100
125
150
AMBIENT TEMPERATURE T_a (℃)

Package Information

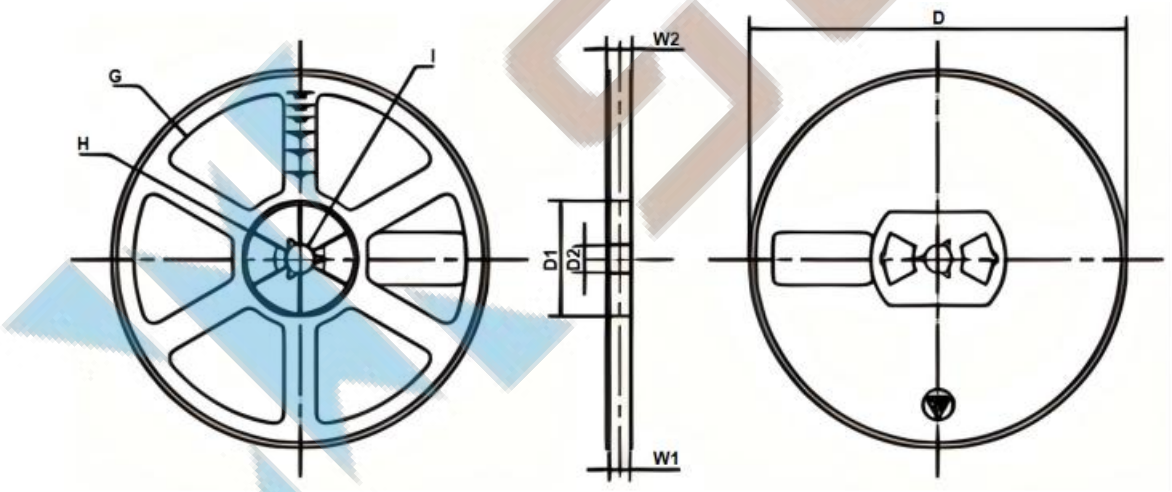
Carrier Dimension(mm)



Dimensions are in millimeter										
Pkg Type	A	B	C	d	E	F	P0	P	P1	W
SOT-523	1.85	1.85	0.875	Ø1.50	1.75	3.50	4.00	4.00	2.00	8.00



Reel Dimension(mm)



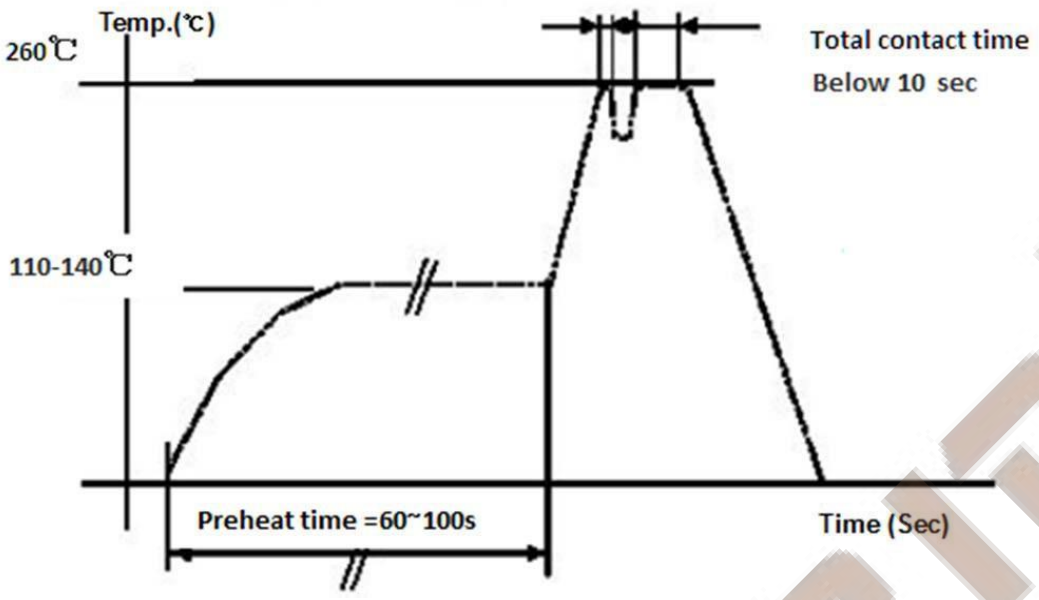
Reel Option	D	D1	D2	G	H	I	W1	W2
7"Dia	Φ178.00	54.40	13.00	R78.00	R25.60	R6.50	9.50	12.30
Tolerance	±2	±1	±1	±1	±1	±1	±1	±1

Package Specifications

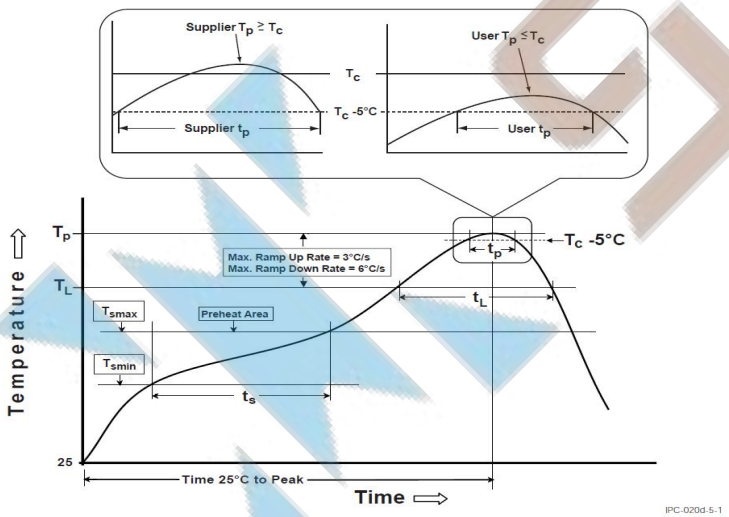
Package	Reel Size	Reel DIA. (mm)	Q'TY/Reel (Kpcs)	Box Size (mm)	QTY/Box (Kpcs)	Carton Size (mm)	Q'TY/Carton (Kpcs)
SOT523	7'	178	3	210*208*203	45	440*400*230	180

Recommended Soldering Profile for Rectifier Diodes (Pb Free)

a) Wave Soldering Profile



b) Reflow Soldering Profile (Pb Free Application), refer to IPC/JEDEC J-STD-020

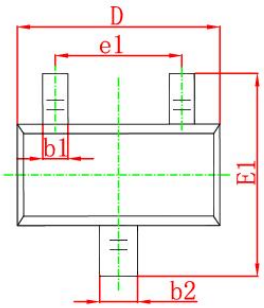


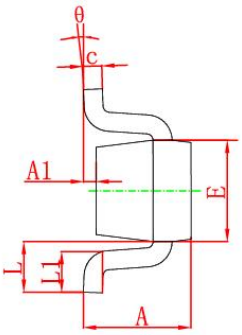
Preheat/Soak Temperature Min (Tsmin) Temperature Max (Tsmax) Time (ts) from (Tsmin to Tsmax)	50 °C 200 °C 60-120 seconds
Melting Point of Solder (Sn Ag Cu)	217℃
Ramp-up Rate to 217℃(Melting Point of Solder)	3℃/sec
Time at Temp.>217℃ (Melting Point of Solder)	60~150 Sec
Peak Temperature	255±5℃
Time within 5℃below Peak Temp.	20~40 Sec
Cooling Rate	6℃/sec (max)
Time from 25℃ to Peak Temp.	8min (max)

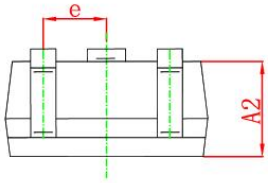
c) Manual Soldering

When using an electric soldering iron for manual soldering, it is recommended that the temperature does not exceed 300°C and the soldering time is less than 10 seconds.

Package Mechanical Data

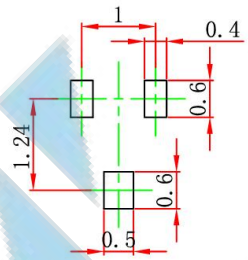






Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.700	0.900	0.028	0.035
A1	0.000	0.100	0.000	0.004
A2	0.700	0.800	0.028	0.031
b1	0.150	0.250	0.006	0.010
b2	0.250	0.350	0.010	0.014
c	0.100	0.200	0.004	0.008
D	1.500	1.700	0.059	0.067
E	0.700	0.900	0.028	0.035
E1	1.450	1.750	0.057	0.069
e	0.500 TYP.		0.020 TYP.	
e1	0.900	1.100	0.035	0.043
L	0.400 REF.		0.016 REF.	
L1	0.260	0.460	0.010	0.018
θ	0°	8°	0°	8°

Suggested Pad Layout



Note:
1.Controlling dimension:in millimeters.
2.General tolerance:±0.05mm.
3.The pad layout is for reference purposes only.

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