

NPN Type Bipolar Transistor

Features

- Low profile package
- Ideal for automated placement
- Switching Transistor.
- Power Dissipation of 300mW
- High Stability and High Reliability
- RoHS Compliant

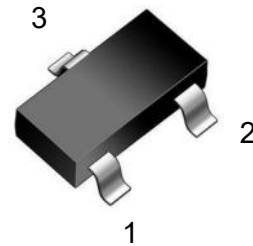
Mechanical Data

- Package: SOT-23
- Lead Finish: Matte Tin
- Case Material: "Green" Molding Compound.
- UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020

Applications

- Amplifying Signal
- Electronic switch
- Oscillating circuit
- Variable Resistance

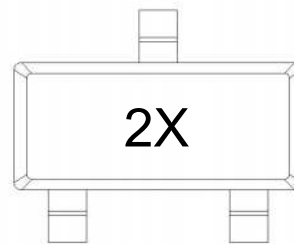
Appearance & Symbol



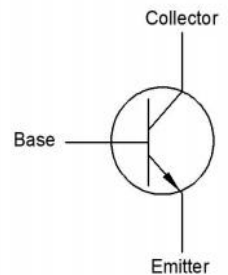
Package: SOT-23

- 1: Base
- 2: Emitter
- 3: Collector

Marking Information



Marking Code: 2X



Absolute Maximum Ratings (T=25°C, RH=45%-75%, unless otherwise noted)

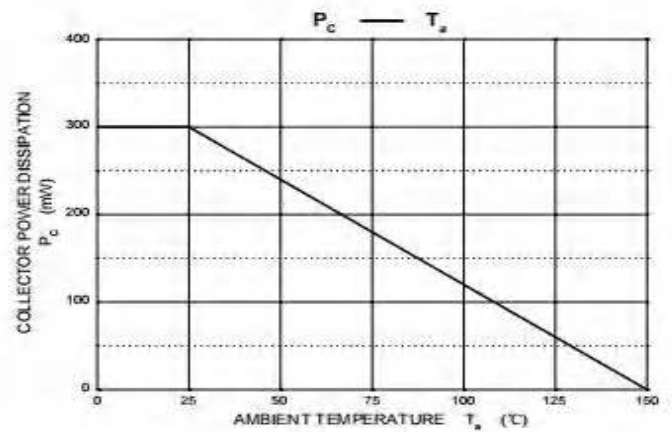
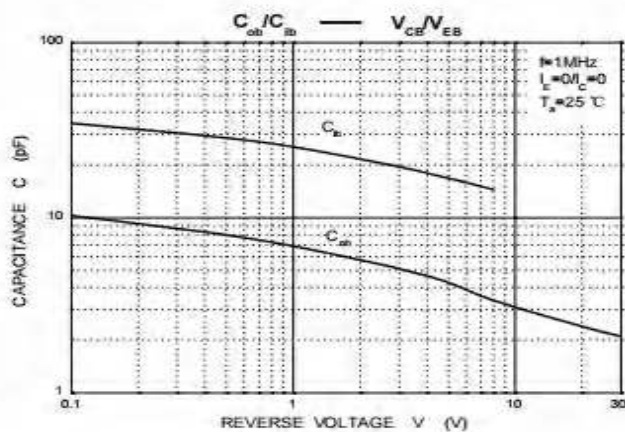
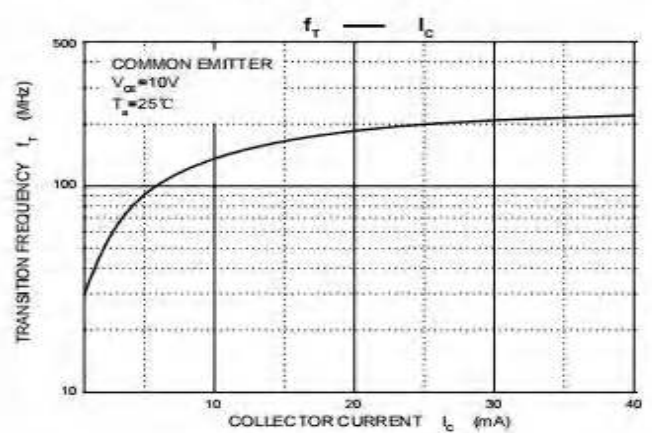
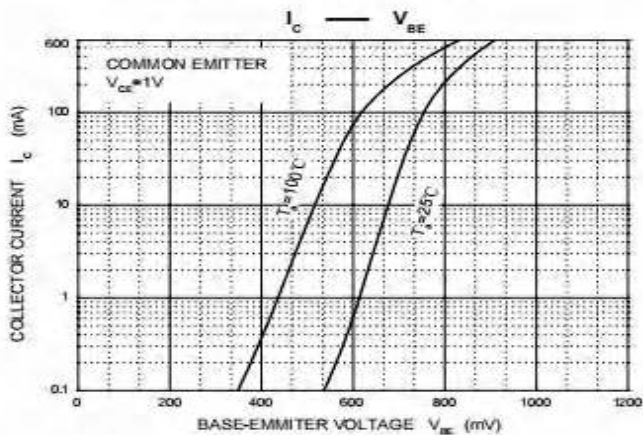
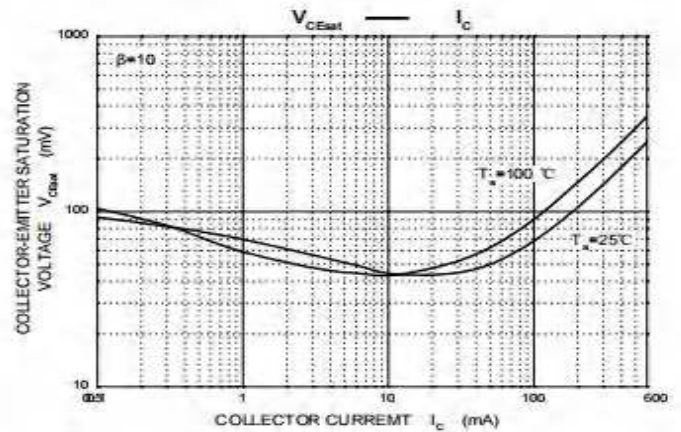
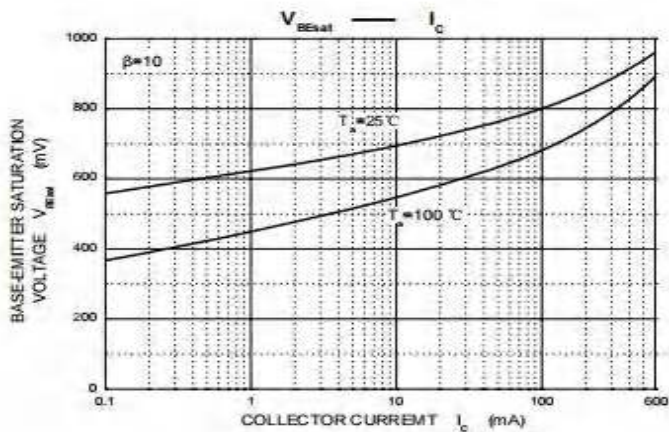
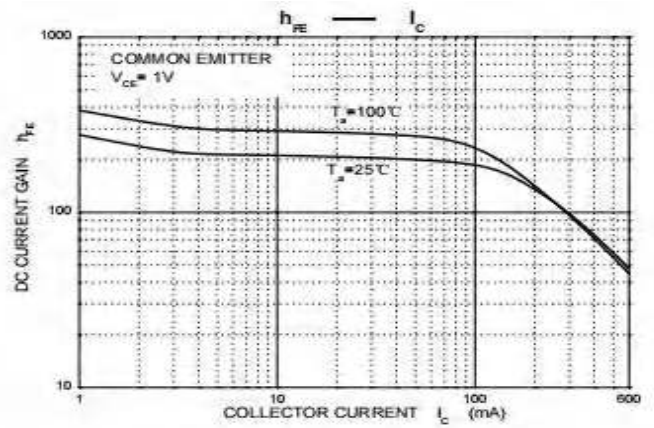
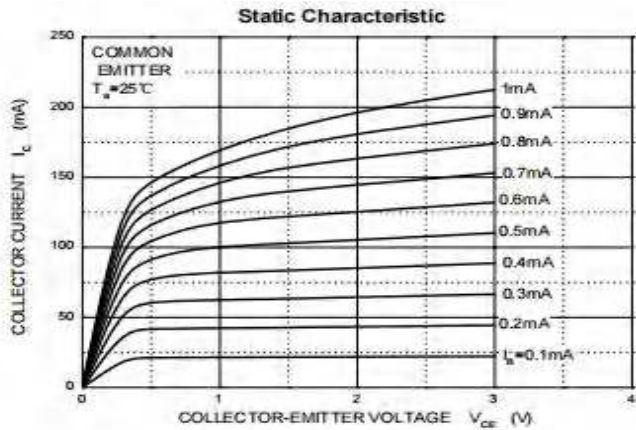
Parameters	Symbol	Value	Unit
Collector-Base Voltage	V_{CBO}	60	V
Collector-Emitter Voltage	V_{CEO}	40	V
Emitter-Base Voltage	V_{EBO}	6	V
Collector Current - Continuous	I_C	600	mA
Collector Power Dissipation	P_C	300	mW
Thermal Resistance From Junction to Ambient	$R_{\theta JA}$	417	°C/W
Junction Temperature	T_J	-55 to +150	°C
Junction and Storage Temperature	T_{STG}	-55 to +150	°C

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REV:B

Electrical Characteristics(T=25°C, RH=45%-75%, unless otherwise noted)

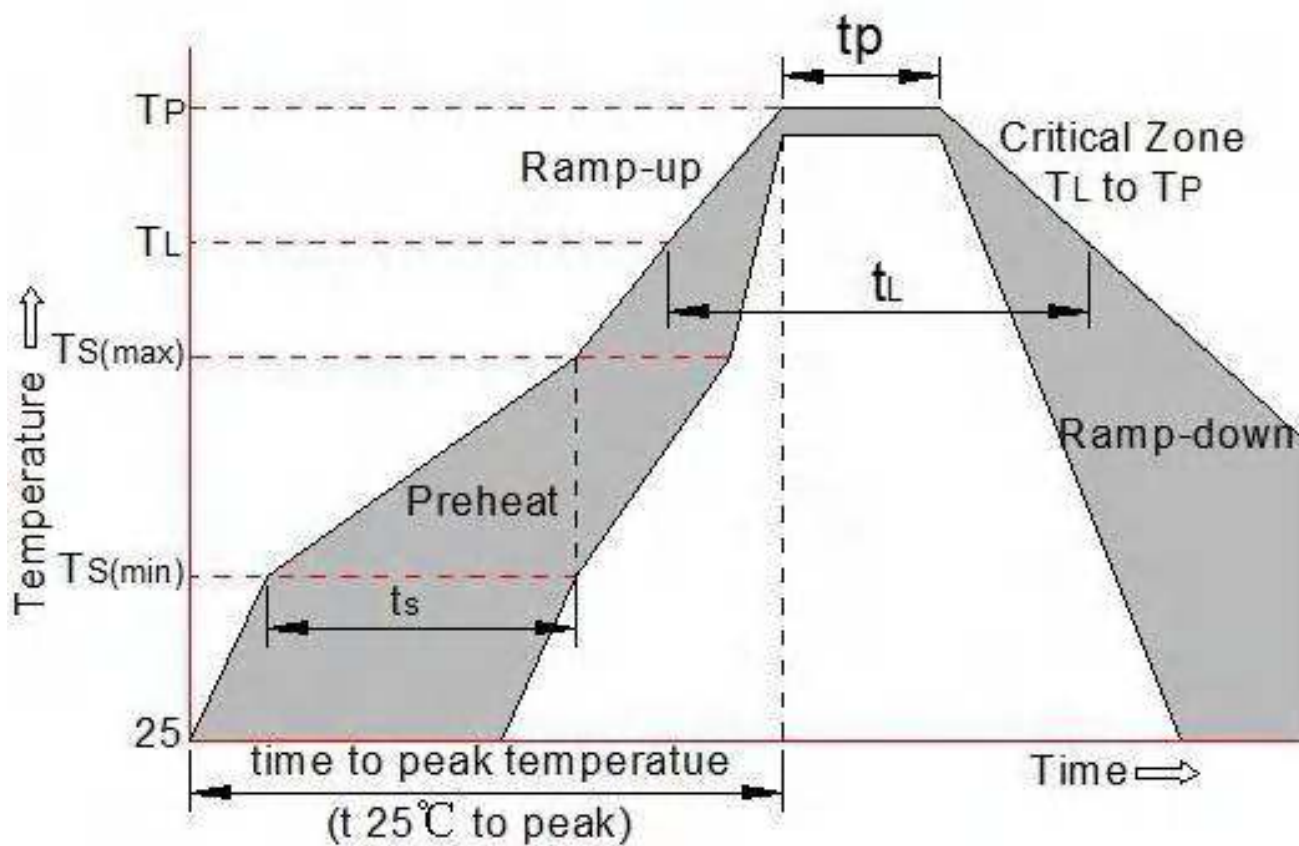
Parameters	Symbol	Test Condition	Min	Max	Unit
Collector-base breakdown voltage	$V_{(BR)CBO}$	$I_C=100\mu A, I_E=0$	60		V
Collector-emitter breakdown voltage	$V_{(BR)CEO}$	$I_C=1mA, I_B=0$	40		V
Emitter-base breakdown voltage	$V_{(BR)EBO}$	$I_E=100\mu A, I_C=0$	6		V
Collector cut-off current	I_{CBO}	$V_{CB}=50V, I_E=0$		100	nA
Collector cut-off current	I_{CEX}	$V_{CE}=35V, V_{EB}=0.4V$		100	nA
Emitter cut-off current	I_{EBO}	$V_{EB}=5V, I_C=0$		100	nA
DC current gain	$h_{FE(1)}$	$V_{CE}=1V, I_C=0.1mA$	20		
	$h_{FE(2)}$	$V_{CE}=1V, I_C=1mA$	40		
	$h_{FE(3)}$	$V_{CE}=1V, I_C=10mA$	80		
	$h_{FE(4)}$	$V_{CE}=1V, I_C=150mA$	100	300	
	$h_{FE(5)}$	$V_{CE}=2V, I_C=500mA$	40		
Collector-emitter saturation voltage	$V_{CE(sat)}$	$I_C=150mA, I_B=15mA$		0.4	V
		$I_C=500mA, I_B=50mA$		0.75	V
Base-emitter saturation voltage	$V_{BE(sat)}$	$I_C=150mA, I_B=15mA$		0.95	V
		$I_C=500mA, I_B=50mA$		1.2	V
Transition frequency	f_T	$V_{CE}=10V, I_C=20mA, f=100MHz$	250		MHz
Delay time	t_d	$V_{CC}=30V, V_{BE(off)}=2V$ $I_C=150mA, I_{B1}=15mA$		15	ns
Rise time	t_r			20	ns
Storage time	t_s	$V_{CC}=30V, I_C=150mA,$ $I_{B1}=I_{B2}=15mA$		225	ns
Fall time	t_f			60	ns

RATING AND CHARACTERISTICS CURVES (MMBT4401)

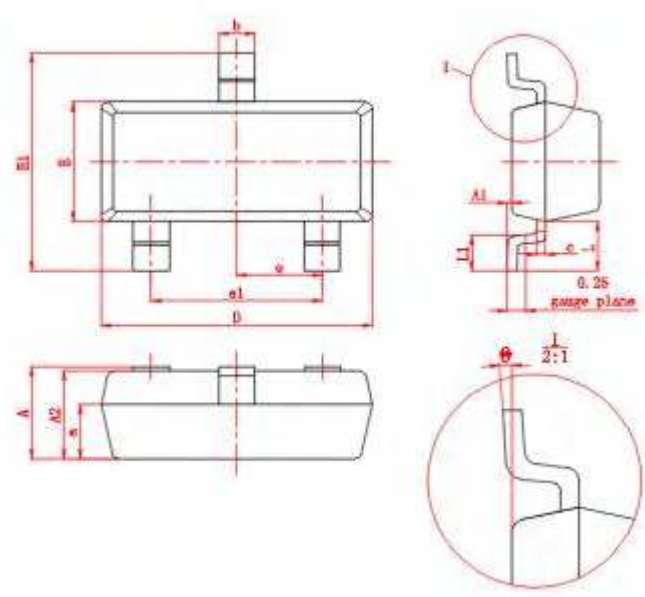


Soldering parameters

Reflow Condition		Pb-Free assembly (see as bellow)
Pre Heat	-Temperature Min ($T_{s(min)}$)	+150°C
	-Temperature Max($T_{s(max)}$)	+200°C
	-Time (Min to Max) (ts)	60-180 secs.
Average ramp up rate (Liquid us Temp (T_L) to peak)		3°C/sec. Max
$T_{s(max)}$ to T_L - Ramp-up Rate		3°C/sec. Max
Reflow	-Temperature(T_L) (Liquid us)	+217°C
	-Temperature(t_L)	60-150 secs.
Peak Temp (T_p)		+260(+0/-5)°C
Time within 5°C of actual Peak Temp (t_p)		30 secs. Max
Ramp-down Rate		6°C/sec. Max
Time 25°C to Peak Temp (T_p)		8 min. Max
Do not exceed		+260°C

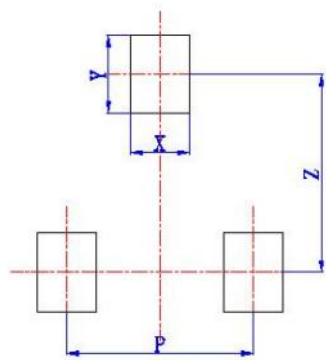


Package mechanical data



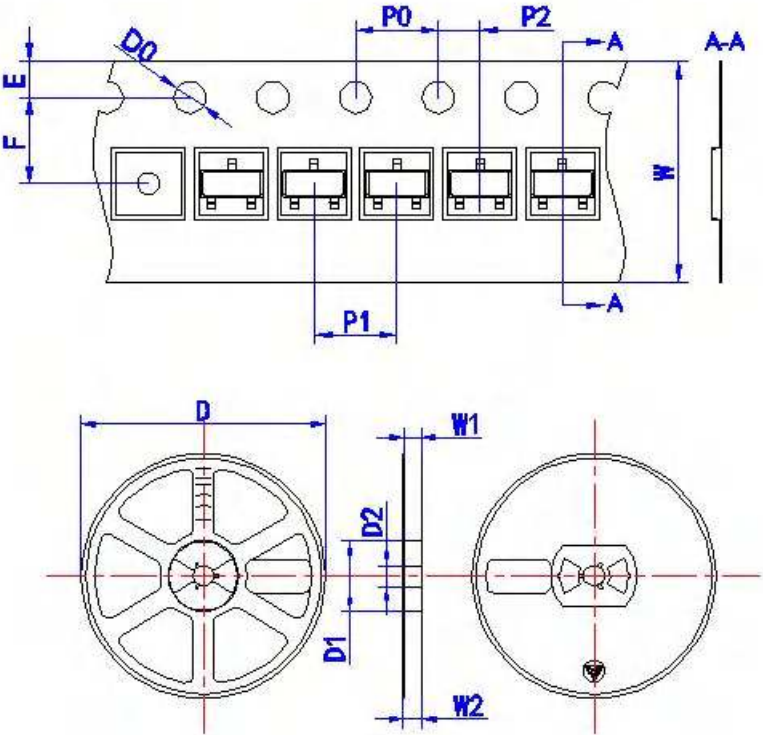
Symbol	Dimension in Millimeters	
	Min	Max
A	0.9	1.15
A1	0	0.1
A2	0.9	1.05
a	(0.6)	
D	2.8	3.0
E	1.2	1.4
E1	2.25	2.55
e	(0.95)	
e1	1.8	2.0
b	0.3	0.5
c	0.08	0.15
L	(0.55)	
L1	0.3	0.5
θ	0°	8°

Suggested Land Pattern



Symbol	Dimension in Millimeters
	Typ
X	(0.6)
Y	(0.8)
Z	(2.02)
P	(1.9)

Tape & reel specification



Symbol	Dimension in Millimeters
Tape	
D0	1.50+0.10/-0.00
E	1.75±0.10
F	3.50±0.10
P0	4.00±0.10
P1	4.00±0.10
P2	2.00±0.10
W	8.00+0.3/-0.1
Reel	
D	178.0±2.00
D1	54.40±1.00
D2	13.00±1.00
W1	9.50±1.00
W2	12.30±1.00

REEL PACK

PACKAGE	PACKING CODE	REEL (EA)	COMPONENT SPACE(mm)	TAPE SPACE (mm)	REEL DIA (mm)	CARTON SIZE (mm)	EA PER CARTON	GROSS WEIGHT(Kg)
SOT-23/-3L	-T	3,000	---	---	178	438*438*220	180,000	7.93

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