



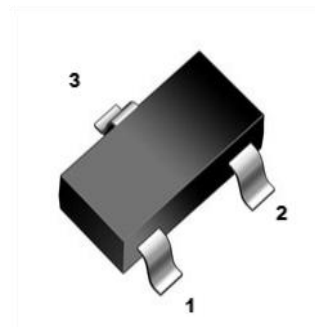
MMBTRA101SS THRU MMBTRA106SS

PNP DIGITAL TRANSISTOR

1. Features

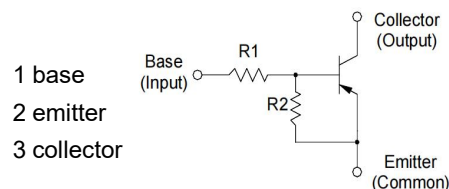
- for switching and interface circuit and drive circuit applications

SOT-23



2. Mechanical Data

- Case:Molded Plastic,SOT-23 .
- Epoxy:UL 94V-0 rate flame retardant.
- Terminals:Plated Leads Solderable per MIL-STD-750,Method-2026.
- Marking:MMBTRA101SS:RK;MMBTRA102SS:RM;MMBTRA103SS:RN
MMBTRA104SS:RP;MMBTRA105SS:RR;MMBTRA106SS:RX
- Mounting Position : Any.



Type	R1 (KΩ)	R2 (KΩ)	Marking Code
MMBTRA101SS	4.7	4.7	RK
MMBTRA102SS	10	10	RM
MMBTRA103SS	22	22	RN
MMBTRA104SS	47	47	RP
MMBTRA105SS	2.2	47	RR
MMBTRA106SS	4.7	47	RX

3. Maximum Ratings

Electrical Characteristics Rating at 25°C ambient temperature unless otherwise specified.

Characteristic	Symbol	Value	Unit
Supply voltage	V_{CC}	-50	V
Input voltage	V_{IN}	-20~+10 -30~+10 -40~+10 -40~+10 -12~+5 -20~+5	V
Output current	I_O	-100	mA
Power dissipation	P_D	200	mW
Junction temperature	T_j	-55~+150	°C
Storage temperature	T_{stg}	-55~+150	°C



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4. Electrical Characteristics ($T_a=25^{\circ}\text{C}$ unless otherwise noted)

Characteristics		Symbol	Condition	Min	TYP	Max	Unit
DC current gain	MMBTRA101SS	G_I	$V_O=-5\text{V}, I_O=-10\text{mA}$	30	-	-	-
	MMBTRA102SS			50	-	-	-
	MMBTRA103SS			70	-	-	-
	MMBTRA104SS			80	-	-	-
	MMBTRA105SS			80	-	-	-
	MMBTRA106SS			80	-	-	-
Output current		$I_{O(\text{off})}$	$V_{CC}=-50\text{V}, V_I=0$	-	-	-0.5	μA
Input current	MMBTRA101SS	I_I	$V_I=-5\text{V}$	-	-	-1.8	mA
	MMBTRA102SS			-	-	-0.88	
	MMBTRA103SS			-	-	-0.36	
	MMBTRA104SS			-	-	-0.18	
	MMBTRA105SS			-	-	-3.6	
	MMBTRA106SS			-	-	-1.8	
Output voltage		$V_{O(\text{on})}$	$I_O/I_I=-10\text{mA}/-0.5\text{mA}$	-	-	-0.3	V
Input voltage	MMBTRA101SS	$V_{I(\text{on})}$	$V_O=-0.3\text{V}, I_O=-20\text{mA}$	-	-	-2	V
	MMBTRA102SS			-	-	-2.4	
	MMBTRA103SS			-	-	-3	
	MMBTRA104SS			-	-	-5	
	MMBTRA105SS			-	-	-1.1	
	MMBTRA106SS			-	-	-1.3	
Input resistance	MMBTRA101SS	R_I	-	3.29	4.7	6.11	K Ω
	MMBTRA102SS			7	10	13	
	MMBTRA103SS			15.4	22	28.6	
	MMBTRA104SS			32.9	47	61.1	
	MMBTRA105SS			1.54	2.2	2.86	
	MMBTRA106SS			3.29	4.7	6.11	
Resistance ratio	MMBTRA101SS	R_2/R_1	-	0.8	1	1.2	-
	MMBTRA102SS			0.8	1	1.2	-
	MMBTRA103SS			0.8	1	1.2	-
	MMBTRA104SS			0.8	1	1.2	-
	MMBTRA105SS			17	21	26	-
	MMBTRA106SS			8	10	12	-
Input voltage	MMBTRA101SS~104SS	$V_{I(\text{off})}$	$V_{CC}=-5\text{V}, I_O=-100\mu\text{A}$	1	-	-	V
	MMBTRA105SS~106SS			0.5	-	-	V
Transition frequency		f_T	$V_O=-10\text{V}, I_O=-5\text{mA}, f=100\text{MHz}$	-	200	-	MHz



5. Rating And Characteristic Curves

Fig. 1 $I_O - V_{I(ON)}$

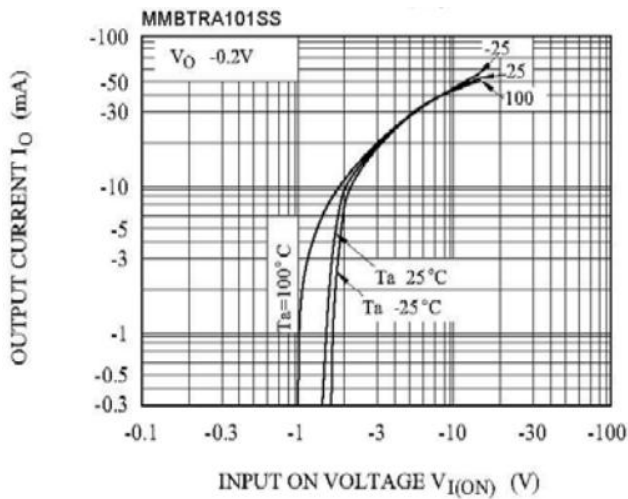


Fig. 2 $I_O - V_{I(ON)}$

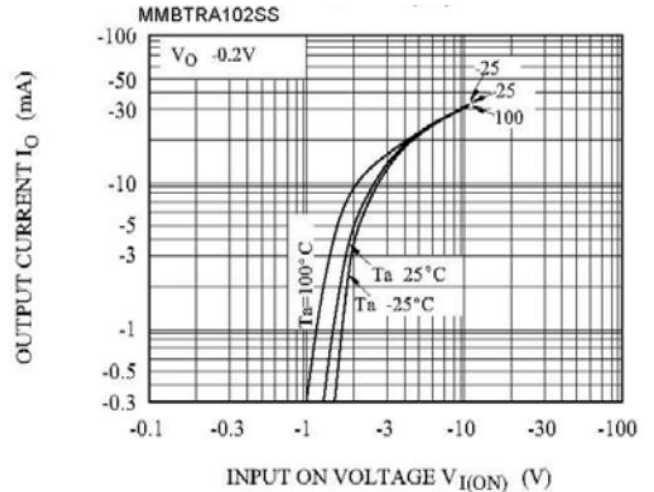


Fig. 3 $I_O - V_{I(ON)}$

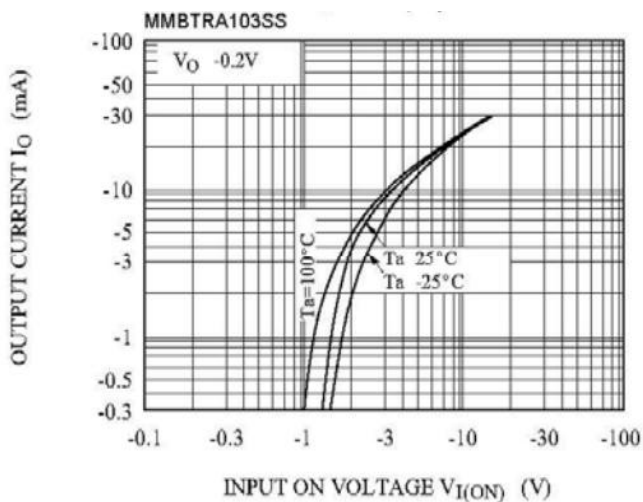


Fig. 4 $I_O - V_{I(ON)}$

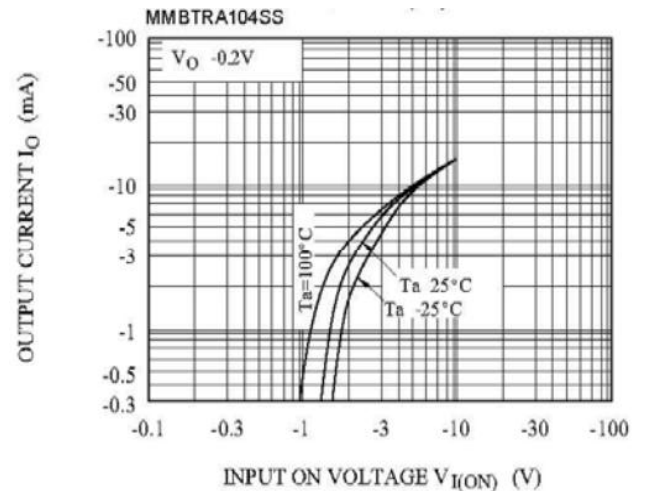


Fig. 5 $I_O - V_{I(ON)}$

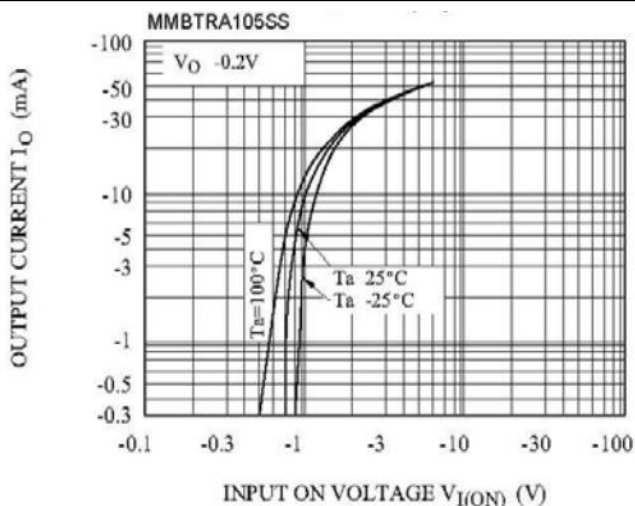
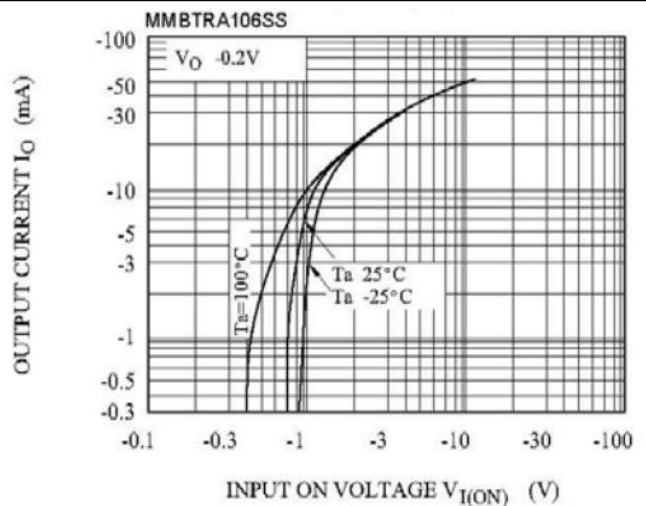


Fig. 6 $I_O - V_{I(ON)}$





5. Rating And Characteristic Curves

Fig. 7 $I_O - V_{I(OFF)}$

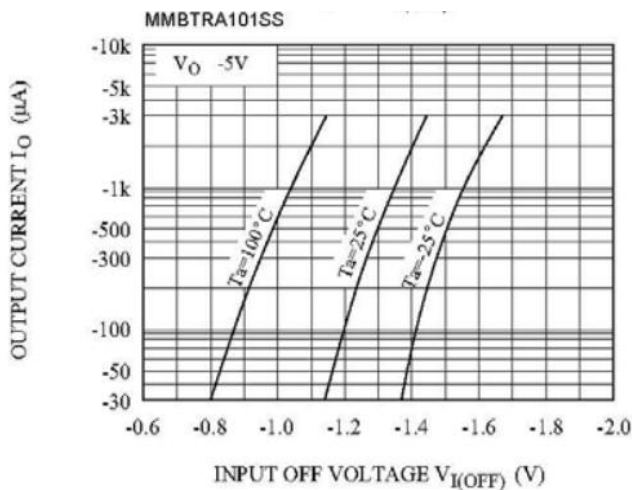


Fig. 8 $I_O - V_{I(OFF)}$

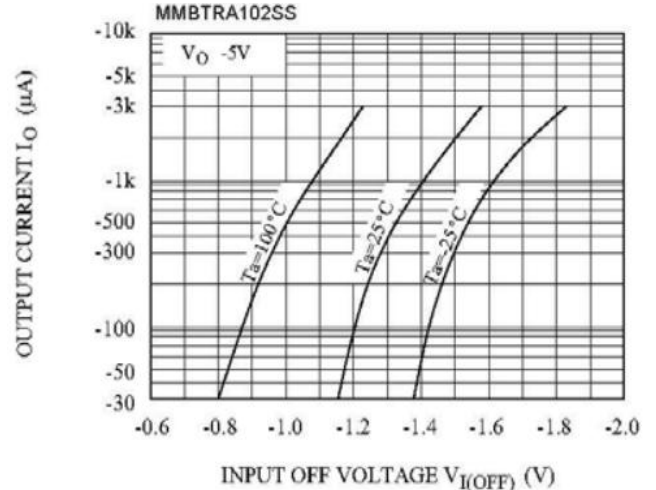


Fig. 9 $I_O - V_{I(OFF)}$

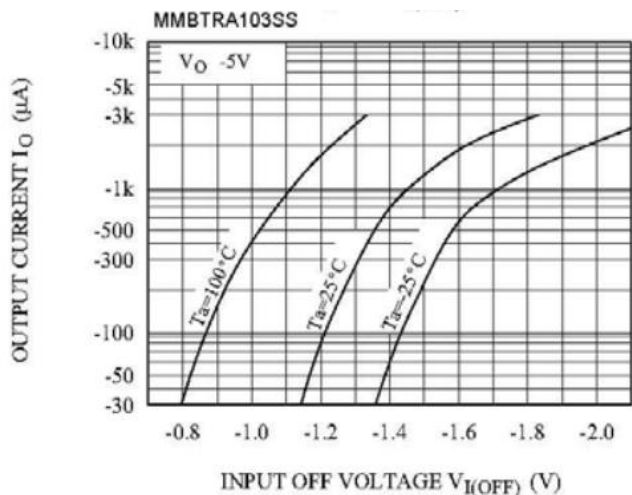


Fig. 10 $I_O - V_{I(OFF)}$

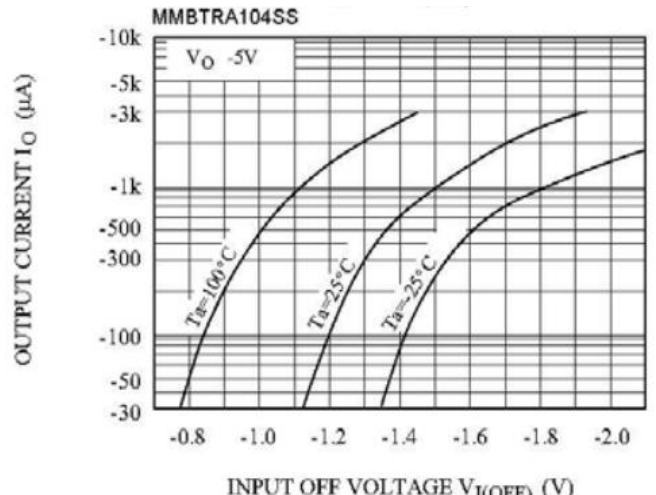


Fig. 11 $I_O - V_{I(OFF)}$

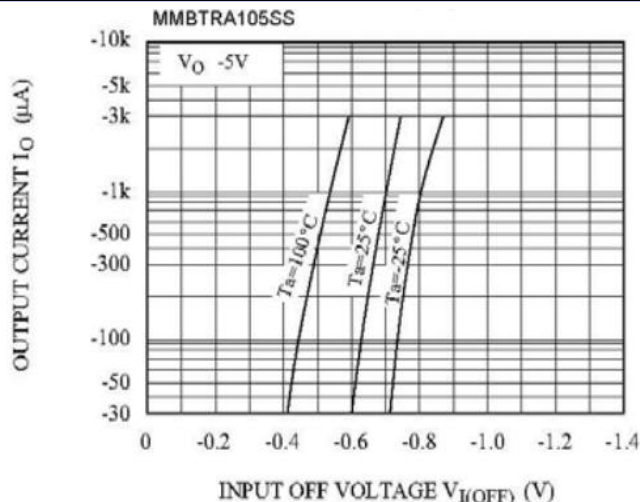
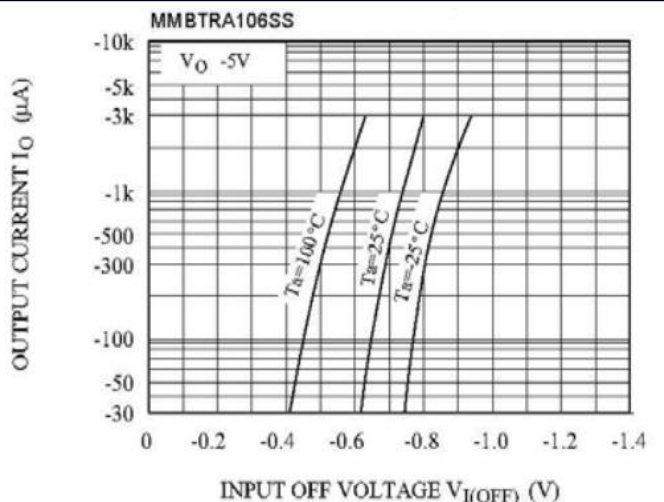


Fig. 12 $I_O - V_{I(OFF)}$





5. Rating And Characteristic Curves

Fig. 13 $G_I - I_O$

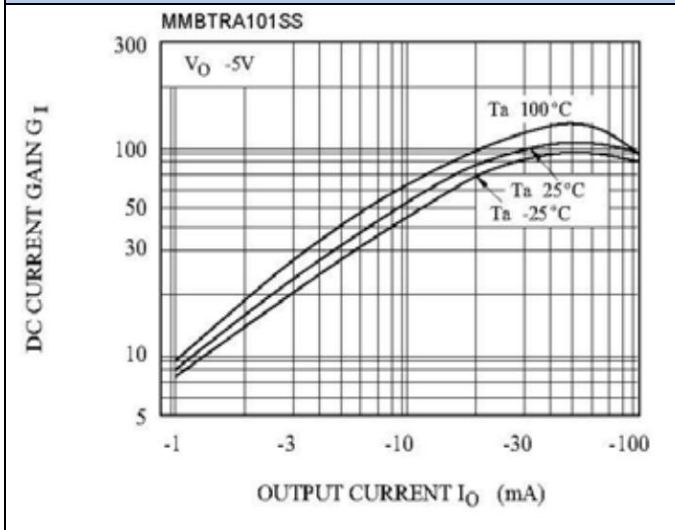


Fig. 14 $G_I - I_O$

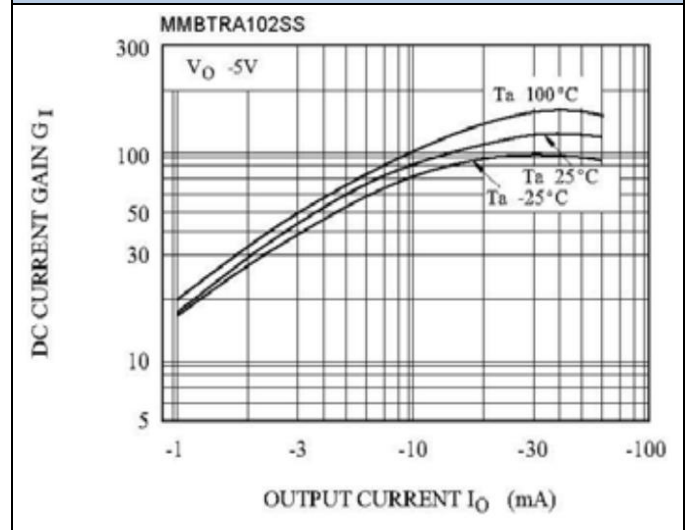


Fig. 15 $G_I - I_O$

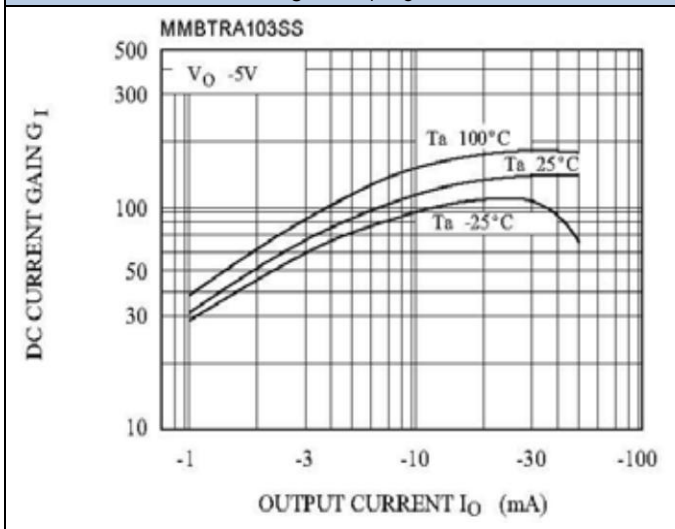


Fig. 16 $G_I - I_O$

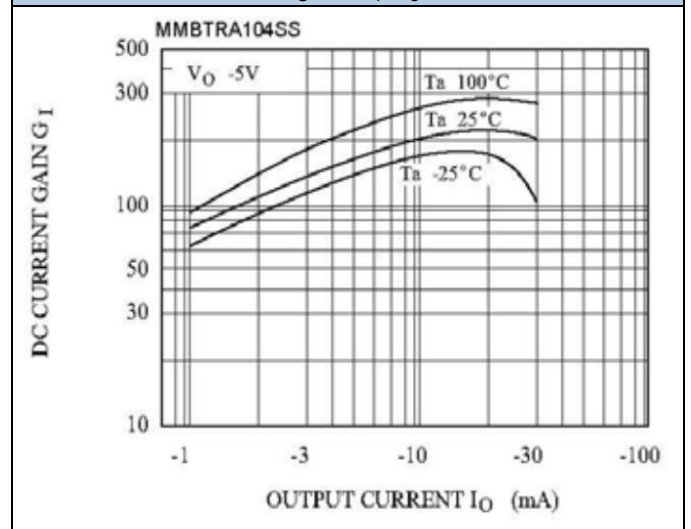


Fig. 17 $G_I - I_O$

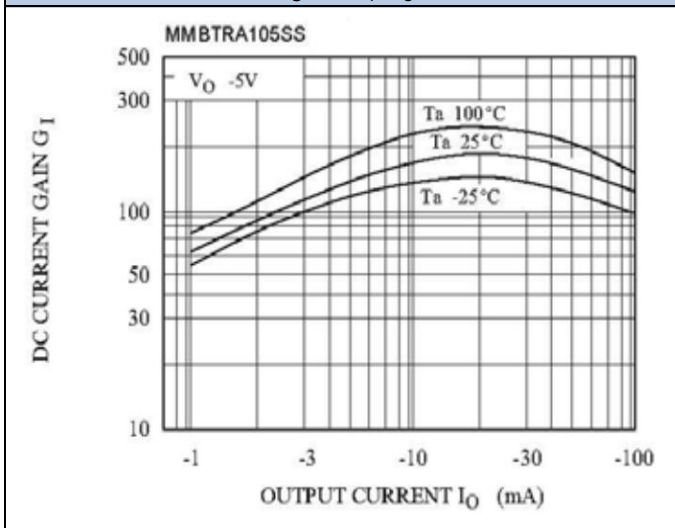
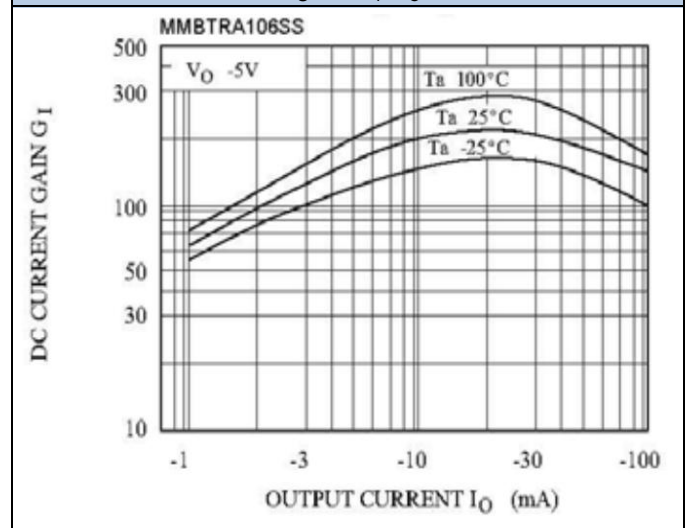


Fig. 18 $G_I - I_O$

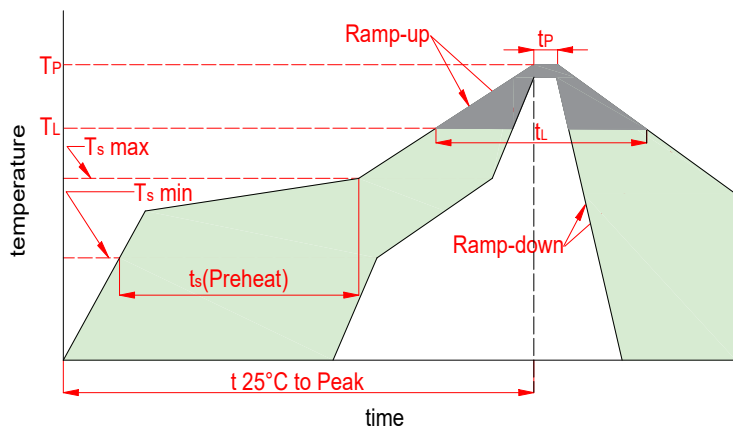




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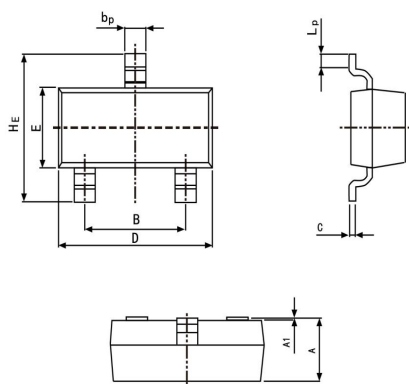
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6. Soldering Parameters



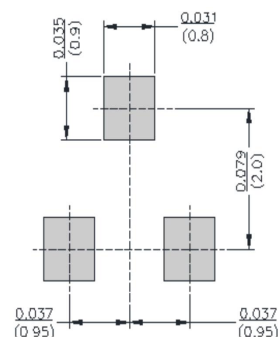
Reflow Condition		Lead-free
Pre Heat	Temp. min(T_s (min))	150°C
	Temp. max(T_s (min))	200°C
	Time(min to max)(t_s)	60~120s
Aver. ramp up rate(Liquidus Temp.)(T_L)to peak		3°C/s max
T_s (max) to T_L -Ramp-up Rate		3°C/s max
Reflow	Temp.(T_L)(Liquidus)	217°C
	Temp.(t_L)(Liquidus)	60~150s
Peak Temp.(T_P)		260 ^{+0/-5} °C
Time within actual peak Temp.(t_p)		30s max
Ramp-down Rate		6°C/s max
Time 25°C to peak Tempe.(T_p)		8 minutes max
Do not exceed		260°C

7. Dimensions

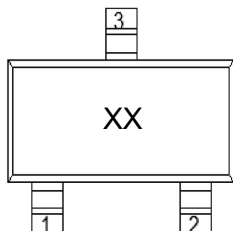


Dimensions	Inches		Millimeters	
	Min	Max	Min	Max
A	0.035	0.045	0.90	1.15
B	0.070	0.081	1.78	2.05
bp	0.012	0.020	0.30	0.51
C	0.003	0.007	0.08	0.18
D	0.110	0.118	2.80	3.00
E	0.047	0.055	1.20	1.40
HE	0.087	0.110	2.20	2.80
A1	0.000	0.004	0.00	0.10
LP	0.008	0.020	0.20	0.50

Mounting PAD Layout



8. Part Marking System



9. Package Information

Package	Part Number	Marking Code	Tape Width(mm)	Quantity(pcs)
SOT-23	MMBTRA101SS	RK	8	3000
SOT-23	MMBTRA102SS	RM	8	3000
SOT-23	MMBTRA103SS	RN	8	3000
SOT-23	MMBTRA104SS	RP	8	3000
SOT-23	MMBTRA105SS	RR	8	3000
SOT-23	MMBTRA106SS	RX	8	3000



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