

FMBTRA102SS-Q1

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FMBTRA102SS-Q1

PNP Silicon Epitaxial Planar Digital Transistor

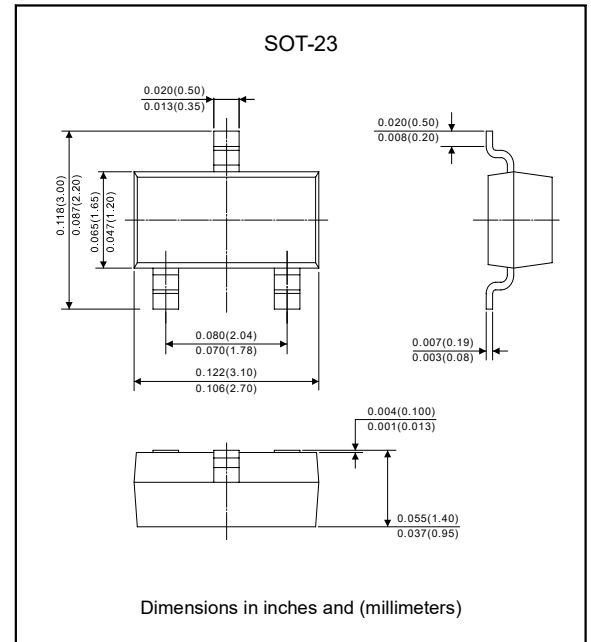
Features

- $R_1 = 10K\Omega$, $R_2 = 10K\Omega$
- With built-in bias resistors.
- Simplify circuit design.
- Reduce a quantity of parts and manufacturing process.
- Lead-free parts meet RoHS requirements.
- Qualified to AEC-Q101 standards for high reliability.
- Suffix "-H" indicates Halogen free parts, ex. FMBTRA102SS-Q1-H.

Mechanical data

- Epoxy: UL94-V0 rated flame retardant.
- Case : Molded plastic, SOT-23.
- Terminals : Solder plated, solder able per MIL-STD-750, Method 2026.
- Mounting Position : Any.

Package outline



Maximum ratings (At $T_A = 25^\circ\text{C}$ unless otherwise noted)

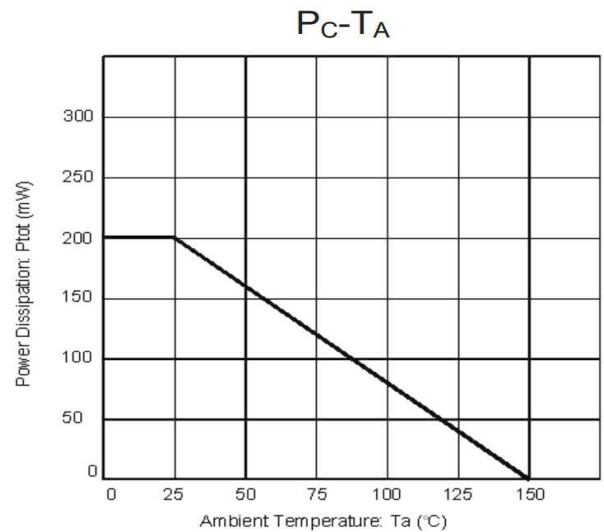
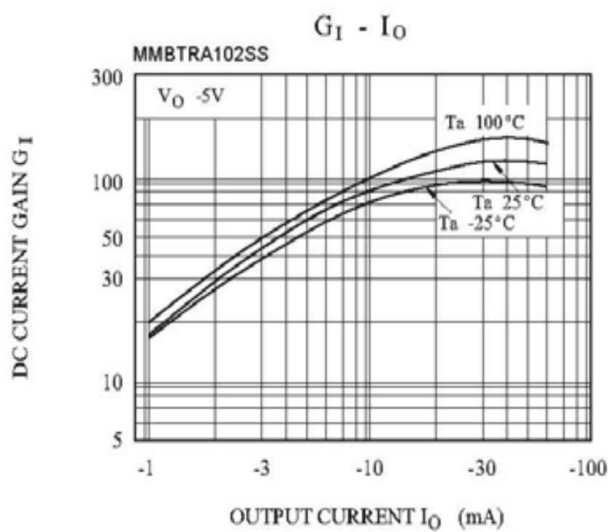
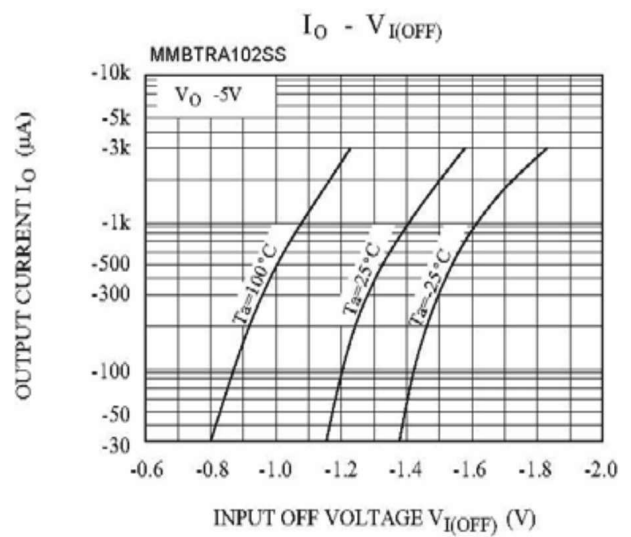
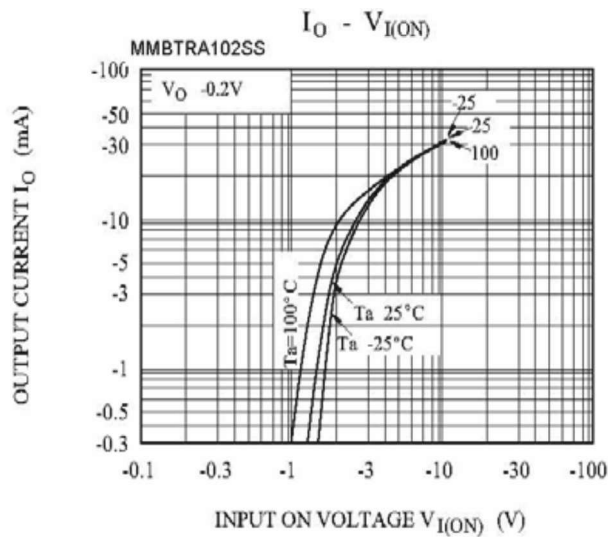
Parameter	Symbol	Value	Unit
Output voltage	$-V_o$	50	V
Input voltage	$-V_i$	30, -10	V
Output current	$-I_o$	100	mA
Total power dissipation	P_{tot}	200	mW
Operating junction temperature	T_J	+150	$^\circ\text{C}$
Storage temperature range	T_{STG}	-55~ +150	$^\circ\text{C}$

Electrical characteristics (At $T_A = 25^\circ\text{C}$ unless otherwise noted)

Parameter	Conditions	Symbol	Min.	Typ.	Max.	Unit
DC current gain	$-V_o = 5\text{V}$, $-I_o = 10\text{mA}$	G_i	50			
Output cut off current	$-V_o = 50\text{V}$	$-I_{O(OFF)}$			500	nA
Input current	$-V_i = 5\text{V}$	$-I_i$			0.88	mA
Output voltage	$-I_o = 10\text{mA}$, $-I_i = 0.5\text{mA}$	$-V_{O(ON)}$			0.3	V
Input voltage (ON)	$-V_o = 0.2\text{V}$, $-I_o = 5\text{mA}$	$-V_{I(ON)}$			2.4	V
Input voltage (OFF)	$-V_o = 5\text{V}$, $-I_o = 0.1\text{mA}$	$-V_{O(OFF)}$	1.0			V
Transition frequency	$-V_o = 10\text{V}$, $-I_o = 5\text{mA}$	f_T		200		MHz

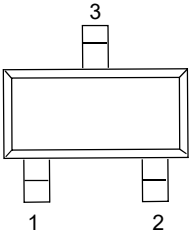
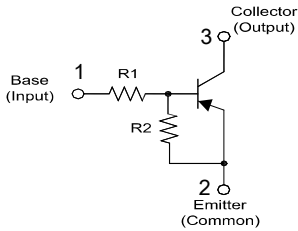
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Rating and Characteristic Curves



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Pinning information

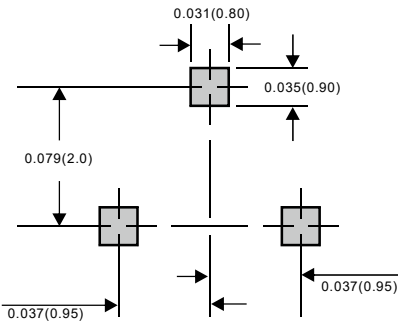
Pin	Simplified outline	Symbol
Pin1 Base Pin2 Emitter Pin3 Collector		

Marking

Type Number	Marking Code
FMBTRA102SS-Q1	2BT

Suggested solder pad layout

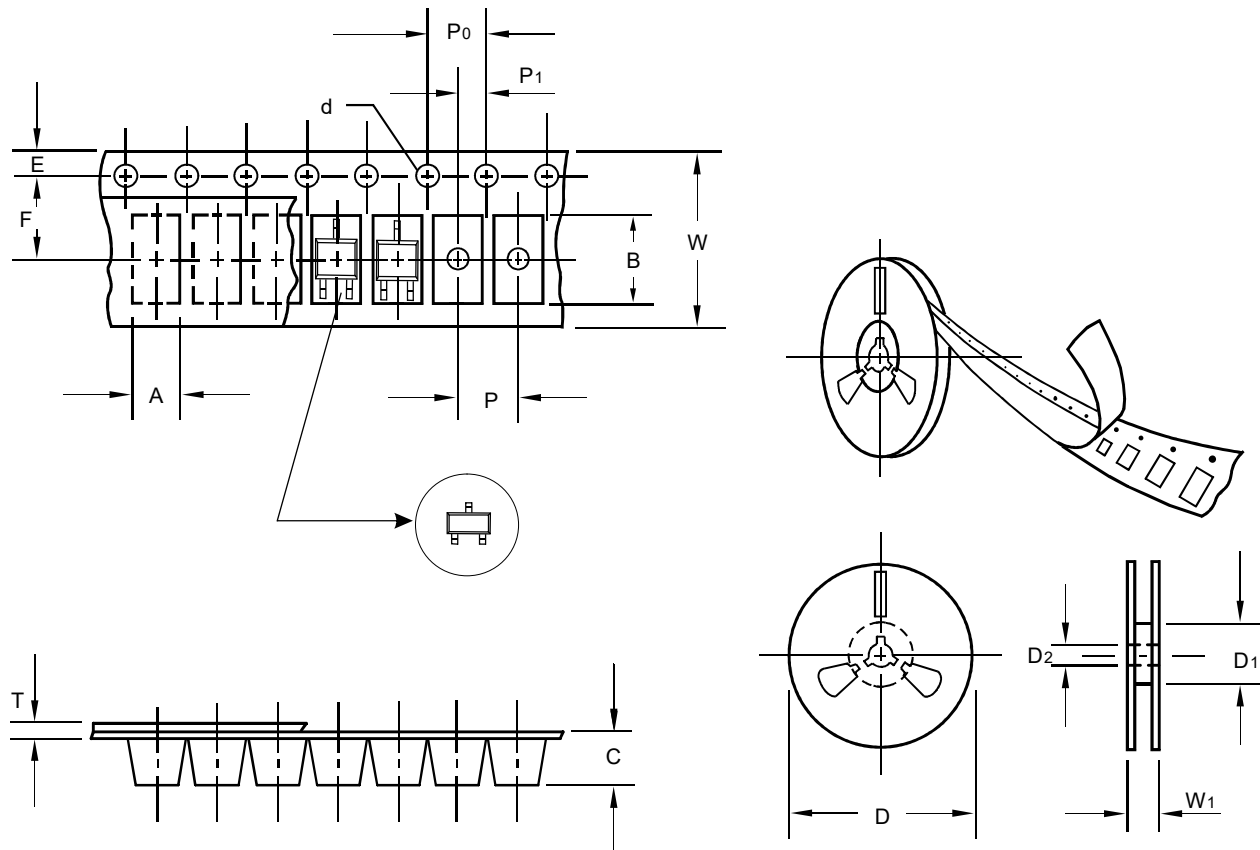
SOT-23



Dimensions in inches and (millimeters)

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Packing information



unit:mm

Item	Symbol	Tolerance	SOT-23
Carrier width	A	0.1	3.15
Carrier length	B	0.1	2.77
Carrier depth	C	0.1	1.22
Sprocket hole	d	0.1	1.50
13" Reel outside diameter	D	2.0	-
13" Reel inner diameter	D1	min	-
7" Reel outside diameter	D	2.0	178.00
7" Reel inner diameter	D1	min	55.00
Feed hole diameter	D2	0.5	13.00
Sprocket hole position	E	0.1	1.75
Punch hole position	F	0.1	3.50
Punch hole pitch	P	0.1	4.00
Sprocket hole pitch	P0	0.1	4.00
Embossment center	P1	0.1	2.00
Overall tape thickness	T	0.1	0.23
Tape width	W	0.3	8.00
Reel width	W1	1.0	12.0

Note: Devices are packed in accordance with EIA standard RS-481-A and specifications listed above.

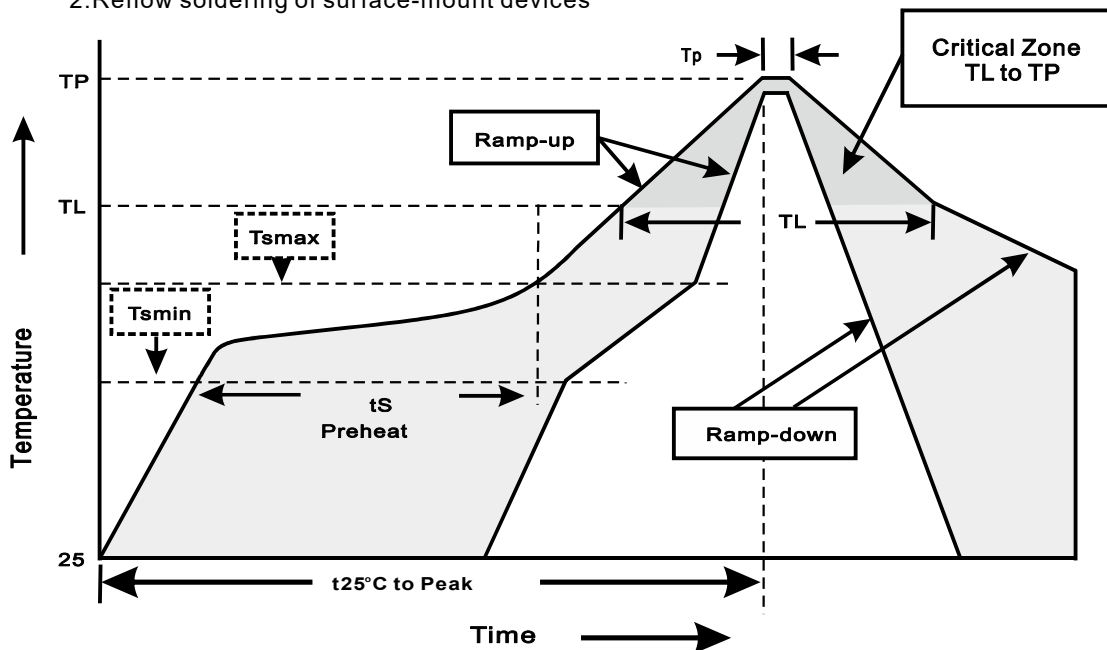
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Reel packing

PACKAGE	REEL SIZE	REEL (pcs)	COMPONENT SPACING (m/m)	BOX (pcs)	INNER BOX (m/m)	REEL DIA, (m/m)	CARTON SIZE (m/m)	CARTON (pcs)	APPROX. GROSS WEIGHT (kg)
SOT-23	7"	3,000	4.0	30,000	183*123*183	178	382*257*387	240,000	11.6

Suggested thermal profiles for soldering processes

- 1.Storage environment: Temperature=5°C~40°C Humidity=55%±25%
- 2.Reflow soldering of surface-mount devices



3.Reflow soldering

Profile Feature	Soldering Condition
Average ramp-up rate(T _L to T _P)	<3°C/sec
Preheat -Temperature Min(T _{smmin}) -Temperature Max(T _{smmax}) -Time(min to max)(t _s)	150°C 200°C 60~120sec
T _{smmax} to T _L -Ramp-upRate	<3°C/sec
Time maintained above: -Temperature(T _L) -Time(t _L)	217°C 60~260sec
Peak Temperature(T _P)	255°C-0/+5°C
Time within 5°C of actual Peak Temperature(t _P)	10~30sec
Ramp-down Rate	<6°C/sec
Time 25°C to Peak Temperature	<6minutes

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High reliability test capabilities

Item Test	Conditions	Reference
1. MSL Preconditioning	24hr bake@125°C+168hrs@85°C /85%RH+3xIR@260°C+1flux immersion+alcohol+DI H2O rinse	JESD22-A113
2. Intermittent Operating Life	Ta=25°C, $\Delta T_j \geq 100^\circ\text{C}$ On/Off=2min Test Duration:1000hrs	MIL-STD-750E METHOD 1037
3. High Temperature Reverse Bias	VCE=80%B _{VCE0} (T _J max=150°C)Test Duration:1000hrs	JESD22-A108
4. High Temperature Storage Life	Ta=125°C Test Duration:1000hrs	JESD22 A-103
5. Temperature Cycle	-55°C(15min) to 150°C(15min)Test Cycles: 1000cycles	JESD22 A-104
6. Autoclave	P=2atm Ta=121°C RH=100% Test Duration:96hrs	JESD22 A-102
7. Solderability	245±5°C for 5sec	J-STD-002
8. Moisture Resistance	Ta=85°C/85% Relative humidity Test Duration:1000hrs	MIL-STD-750E METHOD 1021.2
9. Resistance To Solder Heat	260±5°C for 10sec	JESD22 B-106
10. High Temperature High Humidity Reverse Bias	Ta=85°C, 85%RH, VCE=80%B _{VCE0} Test Duration:1000hrs	JESD22-A101