

FMPBSS4160-Q1

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FMPBSS4160-Q1

1.0A 60V Transistor NPN Silicon

Features

- Low $V_{CE(sat)}$, high current.
- Qualified to AEC-Q101 standards for high reliability.
- Lead-free parts meet RoHS requirements.
- Suffix "-H" indicates Halogen free parts, ex. FMPBSS4160-Q1-H.

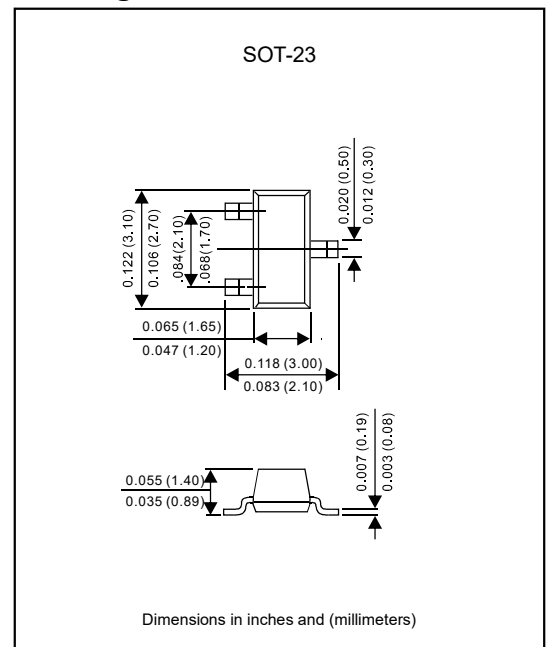
Applications

- General purpose switching and muting.
- LCD back-lighting.
- Supply line switching circuits.

Mechanical data

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

Package outline



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

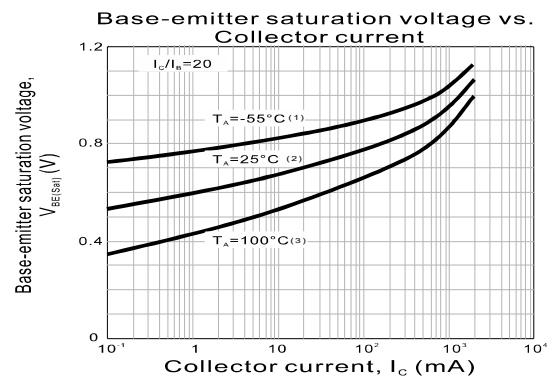
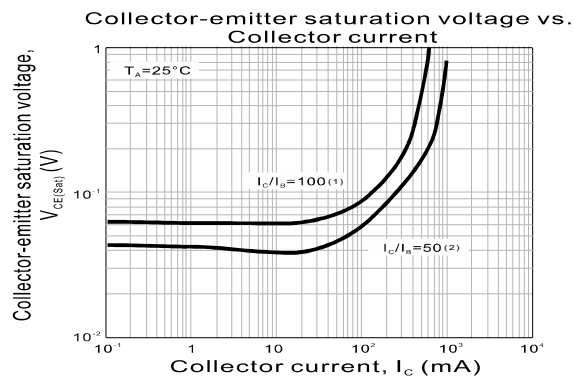
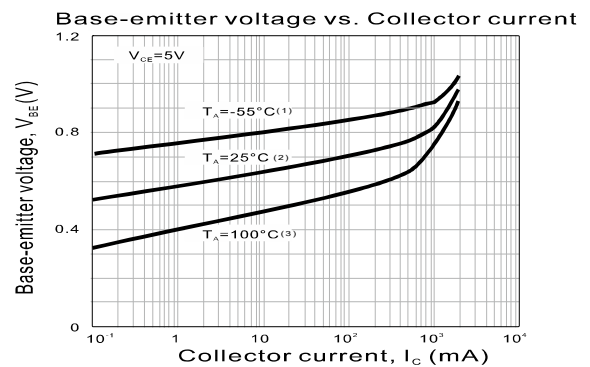
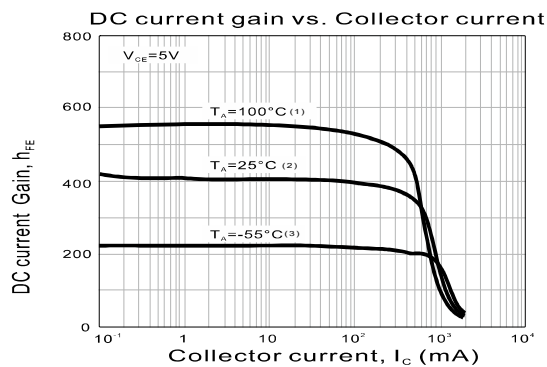
Parameter	Symbol	Ratings	Units
Collector to base voltage	V_{CBO}	80	V
Collector to Emitter Voltage	V_{CEO}	60	V
Emitter to base voltage	V_{EBO}	5	V
Collector current	I_C	1	A
Peak collector current	I_{CM}	2	A
Base current	I_B	0.3	A
Peak base current	I_{BM}	1	A
Collector power dissipation	P_C	400	mW
Junction temperature	T_J	150	$^\circ\text{C}$
Storage temperature range	T_{STG}	-55 to +150	$^\circ\text{C}$

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

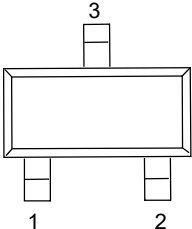
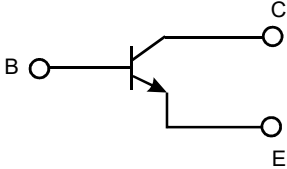
Parameter	Conditions	Symbol	Min.	Typ.	Max.	Unit
Collector-base cut off current	$V_{CB} = 60\text{V}, I_E = 0\text{A}$	I_{CBO}			0.1	μA
	$V_{CB} = 60\text{V}, I_E = 0\text{A}, T_J=150^\circ\text{C}$				50	
Collector-emitter cut off current	$V_{CE} = 60\text{V}, V_{BE} = 0\text{V}$	I_{CEO}			0.1	μA
Emitter-base cut off current	$V_{EB} = 5\text{V}, I_C = 0\text{A}$	I_{EBO}			0.1	μA
Collector-emitter saturation voltage	$I_C = 100\text{mA}, I_B = 1.0\text{mA}$	$V_{CE(sat)(1)}$		90	110	mV
	$I_C = 500\text{mA}, I_B = 50\text{mA}$	$V_{CE(sat)(2)}$		110	140	
	$I_C = 1\text{A}, I_B = 100\text{mA}$	$V_{CE(sat)(3)}$		200	250	
Base-emitter voltage	$V_{CE} = 5\text{V}, I_C = 1\text{A}$	V_{BE}		0.82	0.9	V
Base-emitter saturation voltage	$I_C = 1\text{A}, I_B = 50\text{mA}$	$V_{BE(sat)}$		0.95	1.1	V
DC current gain	$V_{CE}=5\text{V}, I_C=500\text{mA}$	$h_{FE(1)}$	200	350		
	$V_{CE}=5\text{V}, I_C=1\text{mA}$	$h_{FE(2)}$	250	400		
	$V_{CE}=5\text{V}, I_C=1\text{A}$	$h_{FE(3)}$	100	150		
Transition Frequency	$V_{CE}=10\text{V}, I_C=50\text{mA}, f=100\text{MHz}$	f_T	150	220		MHz
Output capacitance	$V_{CB}=10\text{V}, I_E=0\text{A}, f=1.0\text{MHz}$	C_C		5.5	10	pF

Rating and characteristic curves



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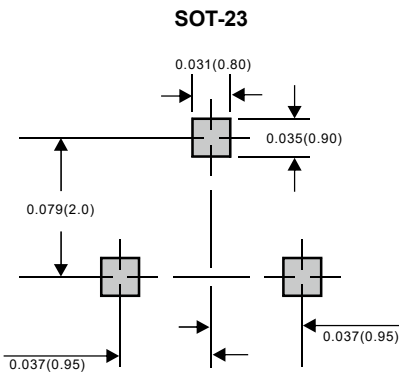
Pinning information

Pin	Simplified outline	Symbol
Pin 1 Base Pin 2 Emitter Pin 3 Collector		

Marking and h_{FE} range

Type number	Marking code	DC current gain range (h_{FE})
FMPBSS4160-Q1	HU5	>200

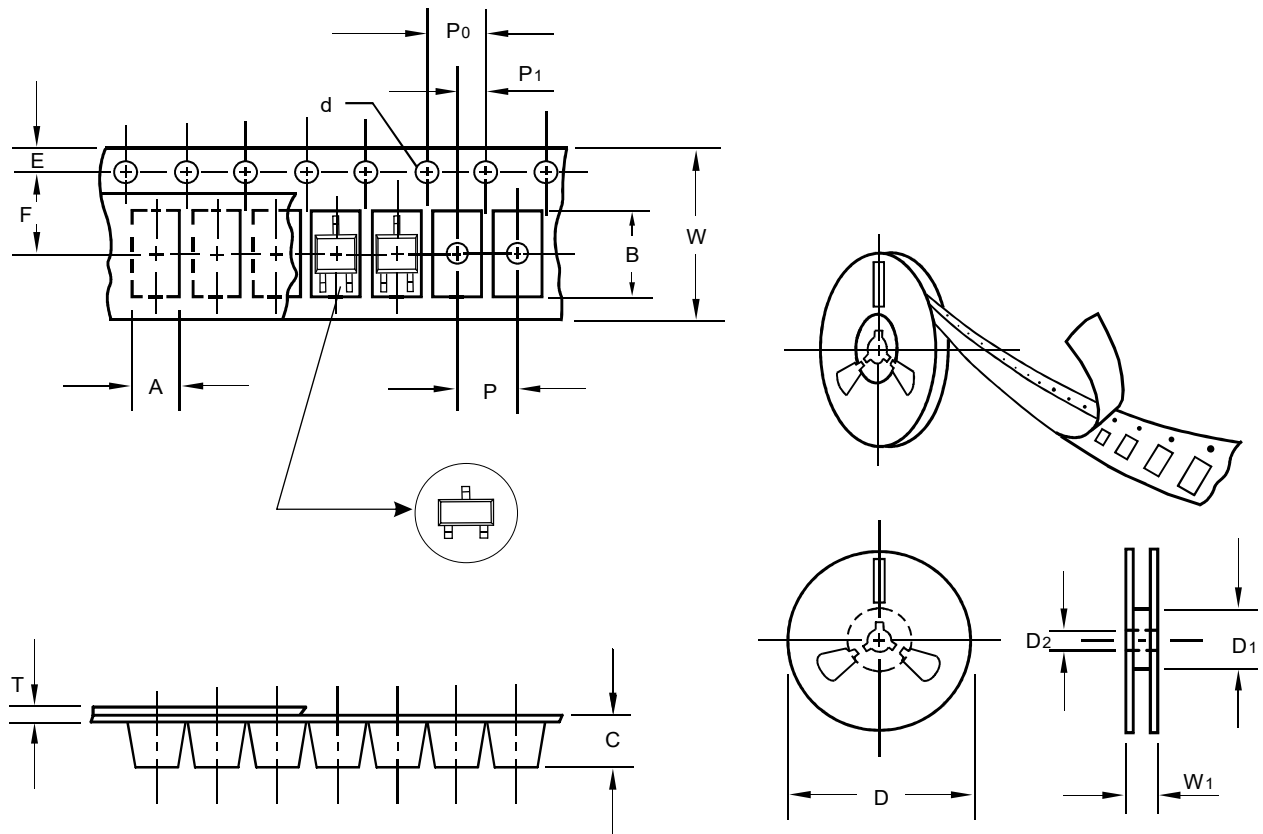
Suggested solder pad layout



Dimensions in inches and (millimeters)

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Packing information



unit:mm

Item	Symbol	Tolerance	SOT-23
Carrier width	A	0.3	3.30
Carrier length	B	0.3	3.20
Carrier depth	C	0.3	1.50
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	54.40
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.

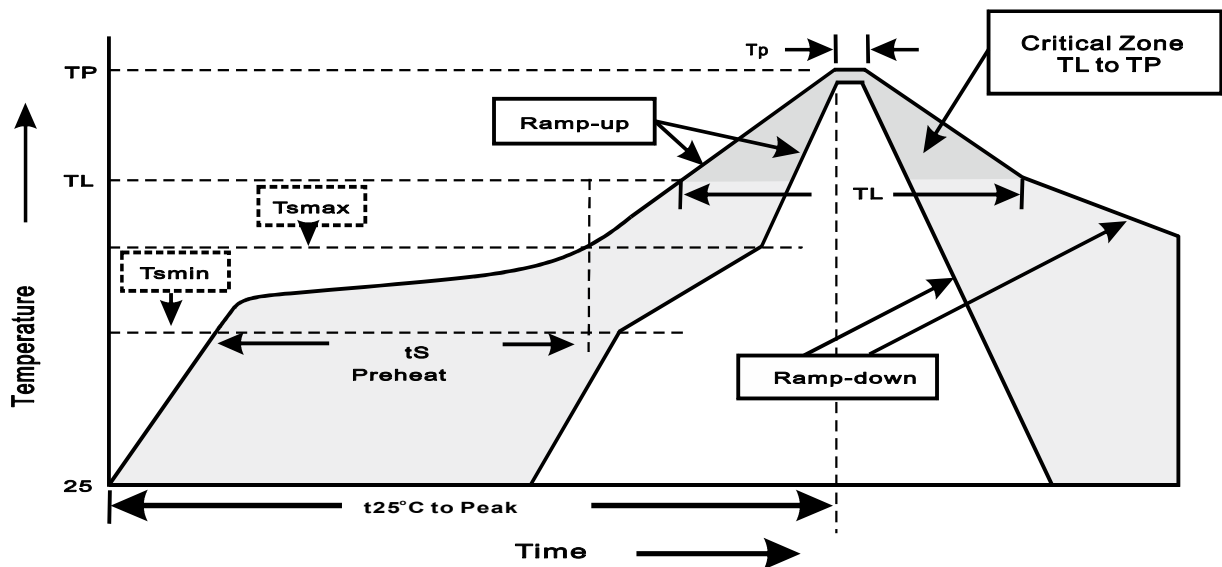
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Reel packing

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)
SOT-23	7"	3,000	4.0	30,000	183*123*183	178	382*257*387	240,000

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 _{smin}) -Temperature Max(T _{smax}) -Time(min to max)(t _s)	150°C 200°C 60~120sec
T _{smax} 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%BVCEO (Tj=Tj max.)Test Duration:1000hrs	JESD22-A108
4. High Temperature Storage Life	Ta=150°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		MIL-STD-750E METHOD 1021.2
9. Resistance To Solder Heat	Ta=85°C/85%Relative humidity Test Duration:1000hrs	JESD22 B-106
10. High Temperature High Humidity Reverse Bias	260±5°C for 10sec	JESD22-A101
	Ta=85°C, 85%RH, VCE=80%BVCEO Test Duration: 1000hrs	