

BAT54-Q1 / BAT54A-Q1 / BAT54C-Q1 BAT54S-Q1

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BAT54-Q1 / BAT54A-Q1 / BAT54C-Q1 BAT54S-Q1

200mA Surface Mount Small Signal Schottky Diodes 30V

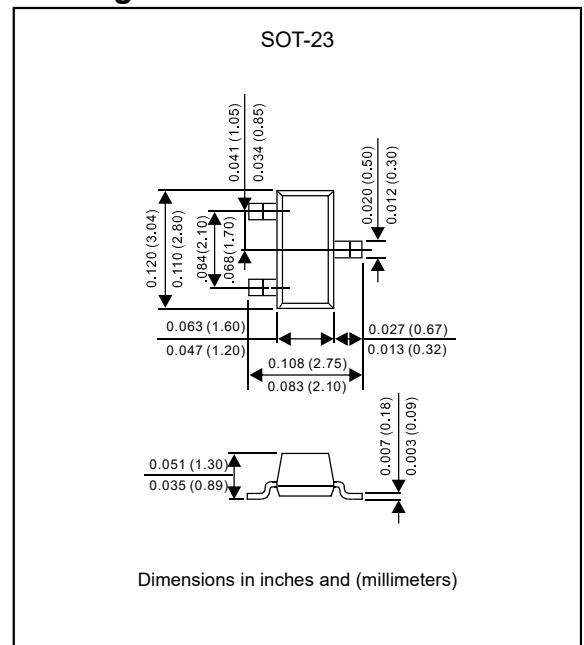
Features

- Low current rectification and high speed switching
- Small surface mount type
- Up to 200mA current capability
- Low forward voltage drop
- Silicon epitaxial planar chip, metal silicon junction
- High speed ($t_{rr} < 5 \text{ ns}$)
- Lead-free parts meet RoHS requirements
- Qualified to AEC-Q101 standards for high reliability
- Suffix "-H" indicates Halogen-free part, ex. BAT54-Q1-H

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
- Weight : Approximated 0.008 gram

Package outline



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

Parameter	Conditions	Symbol	MIN.	TYP.	MAX.	Unit
Repetitive peak reverse voltage		V_{RRM}			30	V
Reverse voltage		V_R			30	V
Total device dissipation	FR-5 Board, (Note 1) $T_A=25^\circ\text{C}$ Derate above 25°C	P_D			200 2.0	mW mW/ $^\circ\text{C}$
Repetitive peak forward current		I_{FRM}			300	mA
Non-repetitive peak forward current	$t_p < 1\text{s}$	I_{FSM}			600	mA
Forward current		I_F			200	mA
Thermal resistance	Junction to ambient Junction to case	$R_{\theta JA}$ $R_{\theta JC}$			500 350	$^\circ\text{C}/\text{W}$ $^\circ\text{C}/\text{W}$
Operating junction temperature range		T_J	-55		+125	$^\circ\text{C}$
Storage temperature range		T_{STG}	-55		+125	$^\circ\text{C}$

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

Parameter	Conditions	Symbol	MIN.	TYP.	MAX.	Unit
Forward voltage	$I_F=0.1\text{mA}$	V_F		0.220	0.240	V
	$I_F=1\text{mA}$			0.290	0.320	V
	$I_F=10\text{mA}$			0.350	0.400	V
	$I_F=30\text{mA}$			0.410	0.500	V
	$I_F=100\text{mA}$			0.520	1.000	V
Reverse leakage current	$V_R=25\text{V}$	I_R		0.5	2.0	μA
Diode capacitance	$V_R=1.0\text{V}$, $f=1.0\text{MHz}$	C_T			10.0	pF
Reverse recovery time	$I_F=I_R=10\text{mA}$, $I_{R(REC)}=1.0\text{mA}$	t_{rr}			5.0	ns

Note 1: FR-5 = 1.0 x 0.75 x 0.062 in

Rating and characteristic curves for each diode

FIG.1-TYPICAL FORWARD CHARACTERISTICS

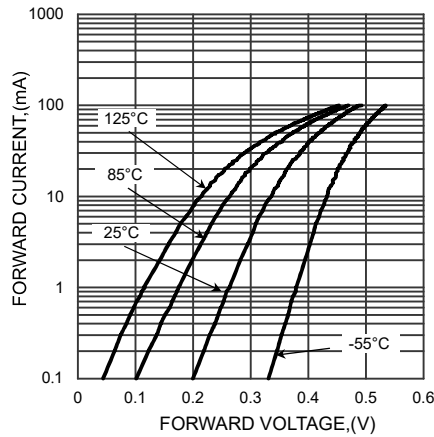


FIG.2 - TYPICAL LEAKAGE CURRENT CHARACTERISTICS

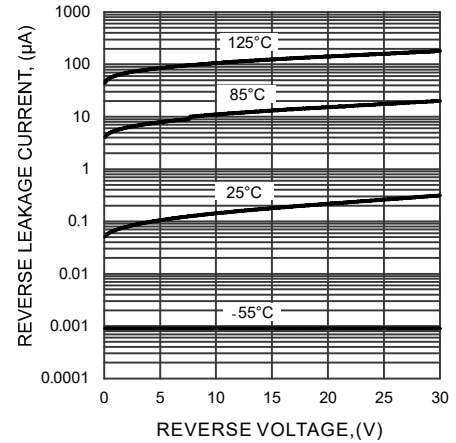
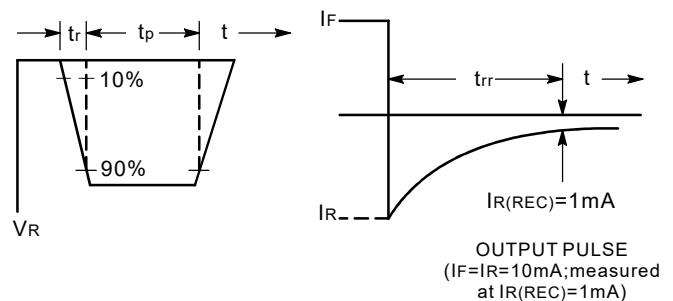
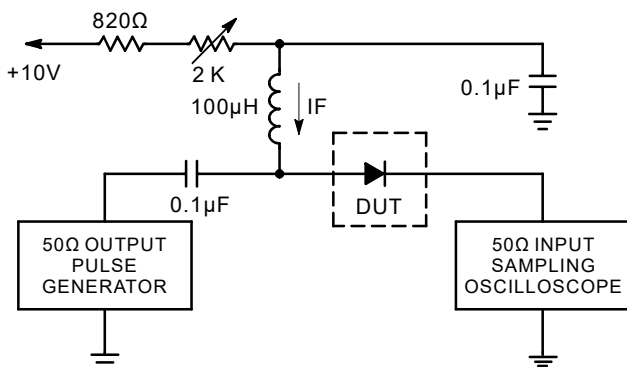
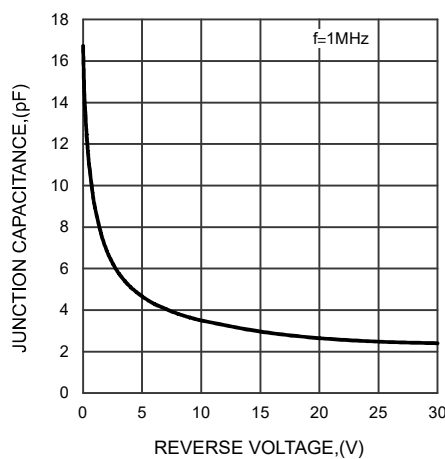


FIG.3-TYPICAL JUNCTION CAPACITANCE

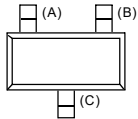
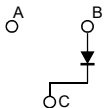
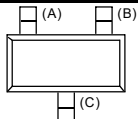
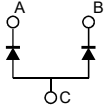
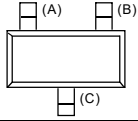
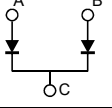
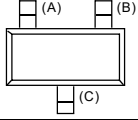
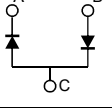


Notes1: A 2.0KΩ variable resistor adjusted for a forward Current (I_F) of 10mA.
2: Input pulse is adjusted so $I_R(\text{peak})$ is equal to 10 mA.
3: $t_p \gg t_{rr}$.

Recovery Time Equivalent Test Circuit

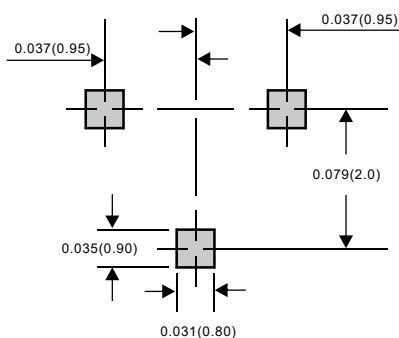
BAT54-Q1 / BAT54A-Q1 / BAT54C-Q1 BAT54S-Q1

Pinning information

Type number	Marking code	Simplified outline	Symbol
BAT54-Q1	KL1		
BAT54A-Q1	KL2		
BAT54C-Q1	KL3		
BAT54S-Q1	KL4		

Suggested solder pad layout

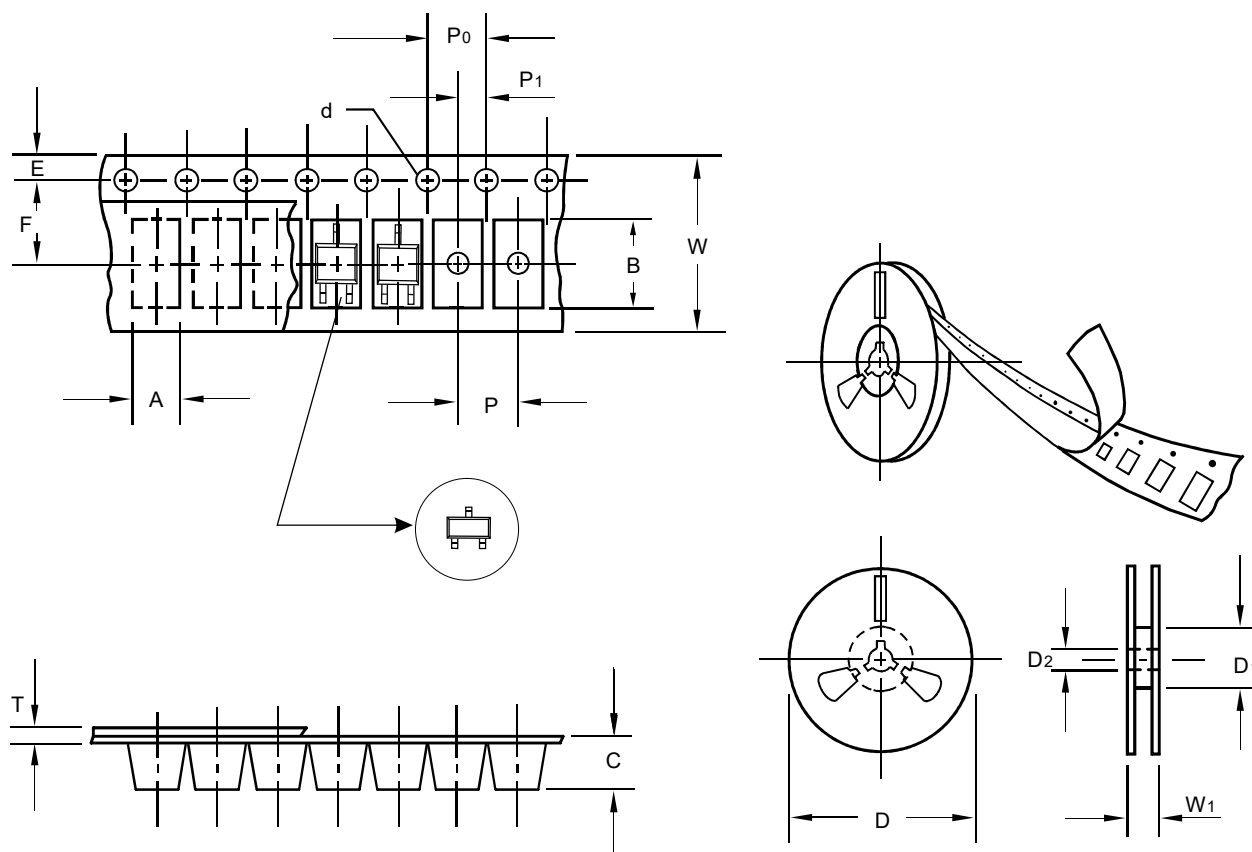
SOT-23



Dimensions in inches and (millimeters)

BAT54-Q1 / BAT54A-Q1 / BAT54C-Q1 BAT54S-Q1

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	D ₁	min	-
7" Reel outside diameter	D	2.0	178.00
7" Reel inner diameter	D ₁	min	62.00
Feed hole diameter	D ₂	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	P ₀	0.1	4.00
Embossment center	P ₁	0.1	2.00
Overall tape thickness	T	0.1	0.23
Tape width	W	0.3	8.00
Reel width	W ₁	1.0	11.40

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

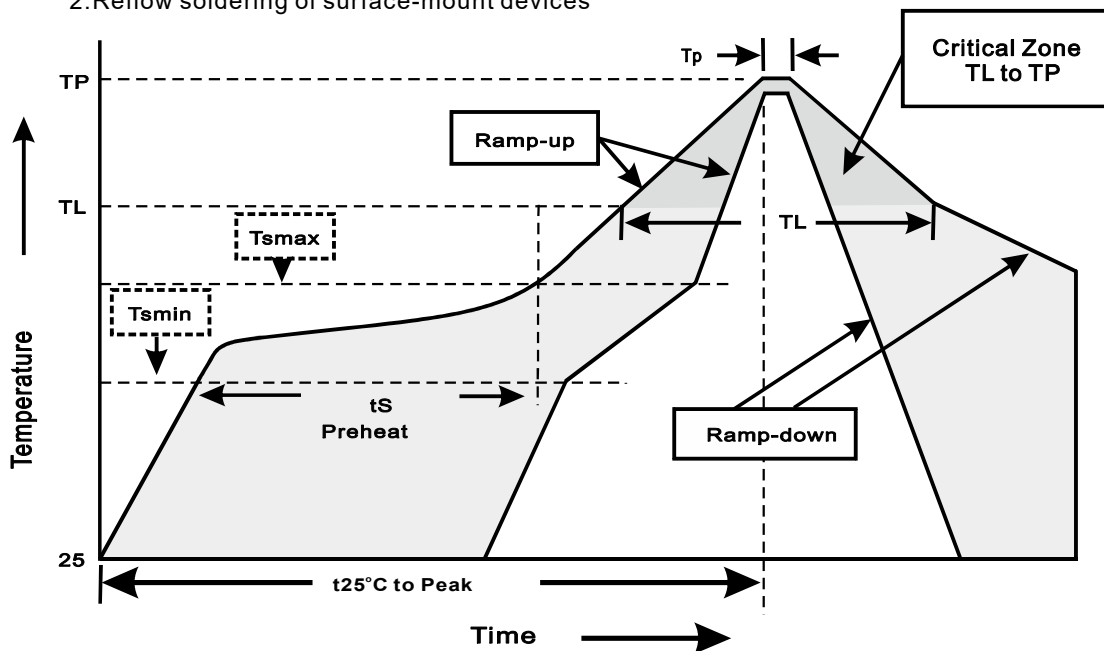
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Reel packing

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. Operation Life	Ta=25°C, Rated Current (Io=Io max.) Test Duration: 1000hrs	MIL-STD-750E METHOD 1027.3
3. High Temperature Reverse Bias	80% Rated VR (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. Intermittent Operational Life	Ta=25°C, On/Io=Io max. 2min, Off/2min, Test Cycles: 15000cycles	MIL-STD-750E METHOD 1037
8. Solderability	245±5°C for 5sec	J-STD-002
9. Moisture Resistance	Ta=85°C/85% Relative humidity Test Duration: 1000hrs	MIL-STD-750E METHOD 1021.2
10. Resistance To Solder Heat	260±5°C for 10sec	JESD22 B-106
11. High Temperature High Humidity Reverse Bias	Ta=85°C, 85%RH, with device reverse biased at 80% of rated breakdown voltage up to a maximum of 100V or limit of chamber Test Duration: 1000hrs	JESD22-A101