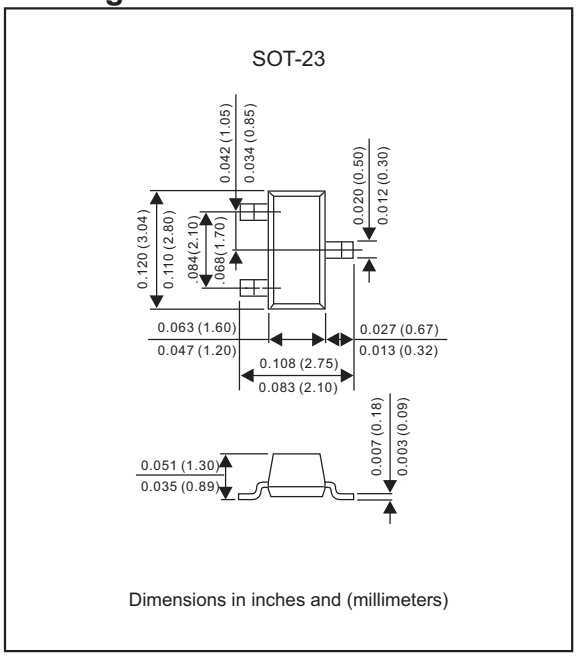
BAL99-Q1/BAV99-Q1/BAW56-Q1/BAV70-Q1

100~215mA Surface Mount Switching Diode 70V~75V

Features

- Fast speed switching
- For general purpose switching application
- High conductance
- Silicon epitaxial planar chip
- Lead-free parts meet RoHS requirements
- Qualified to AEC-Q101 standards for high reliability
- Suffix "-H" indicates Halogen-free part, ex.BAL99-Q1-H

Package outline



Dimensions in inches and (millimeters)

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 0.009 gram

Maximum ratings (AT T_A=25°C unless otherwise noted)

Parameter	Symbol	BAL99-Q1	BAV99-Q1	BAW56-Q1	BAV70-Q1	Unit
Repetitive peak reverse voltage	V_{RRM}	80	85	-		V
Reverse breakdown voltage	V_{RM}	-	-	70		V
Reverse voltage	V_R	70	75	70		V
Forward current	I_F	100	215	200		mA
Repetitive peak forward current	I_{FRM}	450				mA
Peak forward surge current	$I_{FM\ (Surge)}$	500				mA
Non-repetitive peak forward surge current @ t=1.0μs @ t=1.0ms @ t=1.0s @ t=8.3ms	I_{FSM}	 2.0 1.0 0.5 -	 2.0 1.0 0.5 -	 2.0 1.0 0.5 -	 2.0 1.0 0.5 2.0	A

Thermal characteristics

Parameter	Symbol	Limits	Unit
Total device dissipation, FR-5 Board*1, T_A = 25°C	P_D	225	mW
Derate above 25°C		1.8	mW/°C
Thermal resistance junction to ambient	$R_{\theta JA}$	556	°C/W
Total device dissipation, alumina substrate*2, T_A = 25°C	P_D	300	mW
Derate above 25°C		2.4	mW/°C
Thermal resistance junction to ambient	$R_{\theta JA}$	417	°C/W
Operating junction temperature range	T_J	-55 to +150	°C
Storage temperature range	T_{STG}	-55 to +150	°C

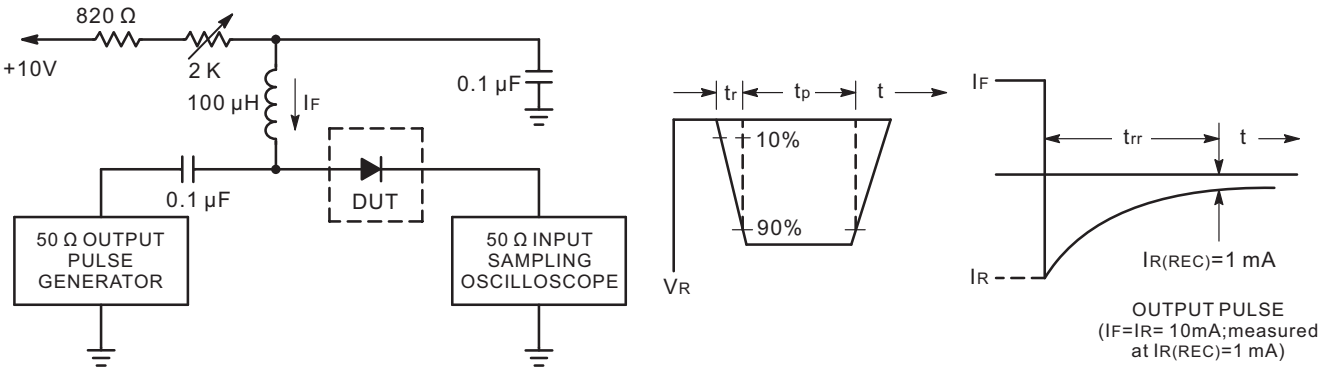
1. FR-5 = 1.0 x 0.75 x 0.062 in.
2. Alumina = 0.4 x 0.3 x 0.024 in. 99.5% alumina.

BAL99-Q1/BAV99-Q1/BAW56-Q1/BAV70-Q1

Electrical characteristics (AT T_A=25°C unless otherwise noted)

Parameter	Symbol	MIN.	MAX.	Unit
Reverse breakdown voltage (I_{BR}=100μA)	V_{BR}	70		V
Reverse voltage leakage current (at V_R = 70V, T_J =25°C) BAL99-Q1/BAV99-Q1/BAW56-Q1/BAV70-Q1 (at V_R = 25V, T_J =150°C) BAL99-Q1/BAV99-Q1/BAW56-Q1 (at V_R = 25V, T_J =150°C) BAV70-Q1 (at V_R = 70V, T_J =150°C) BAL99-Q1/BAV99-Q1/BAW56-Q1 (at V_R = 70V, T_J =150°C) BAV70-Q1	I_R		2.5 30 60 50 100	μA
Diode capacition (V_R = 0V, f = 1.0MHz) BAL99-Q1/BAV70-Q1 BAV99-Q1/BAW56-Q1	C_D		1.5 2.0	pF
Reverse recovery time (I_F = I_R = 10mA,V_R = 5.0V, $I_{R(REC)}$ = 1.0mA, R_L = 100Ω)	t_{rr}		6.0	ns
Forward voltage (at I_F = 1.0mA) (at I_F = 10mA) (at I_F = 50mA) (at I_F = 150mA)	V_F		715 855 1000 1250	mV

Recovery Time Equivalent Test Circuit



Notes : 1. A 2.0 KΩ variable resistor adjusted for a forward current (I_F) of 10 mA
2. Input pulse is adjusted so IR(peak) is equal to 10 mA
3. tp >> trr

Rating and characteristic curves for each diode

FIG.1-TYPICAL FORWARD CHARACTERISTICS

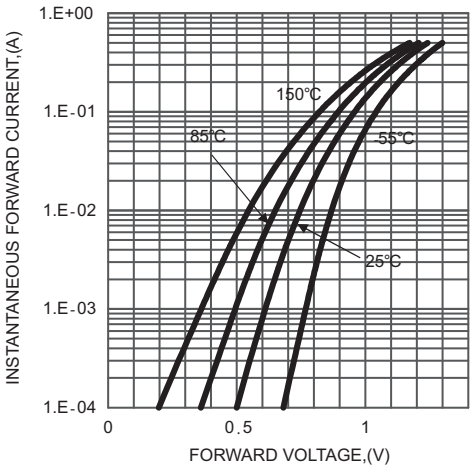


FIG.2 - TYPICAL REVERSE CHARACTERISTICS

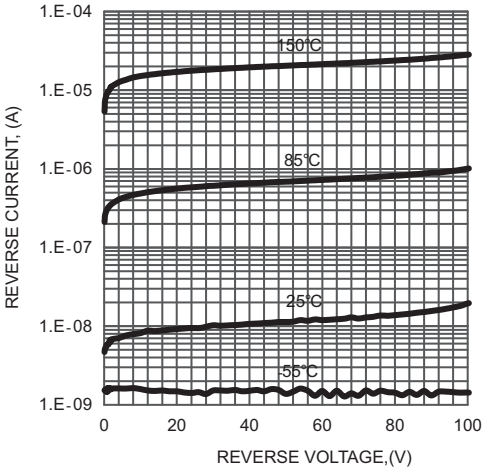


FIG.3a - TYPICAL DIODE CAPACITANCE
BAL99-Q1/BAV70-Q1

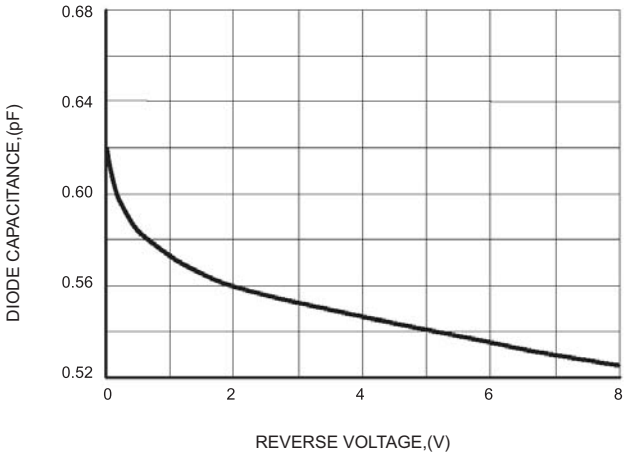
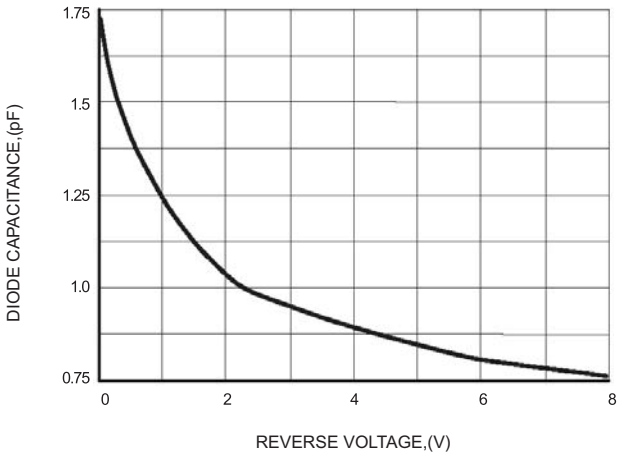
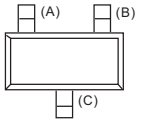
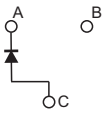
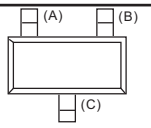
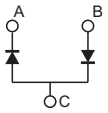
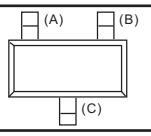
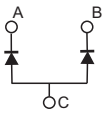
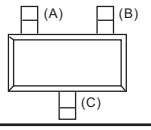
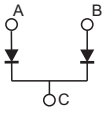


FIG.3b - TYPICAL DIODE CAPACITANCE
BAV99-Q1/BAW56-Q1



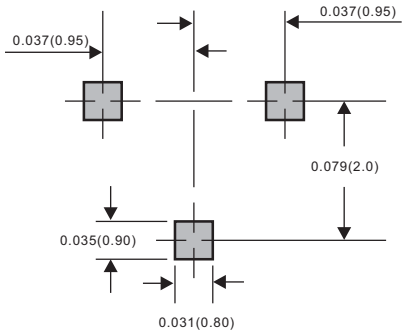
BAL99-Q1/BAV99-Q1/BAW56-Q1/BAV70-Q1

Pinning information

Type number	Marking code	Simplified outline	Symbol
BAL99-Q1	JF		
BAV99-Q1	A7		
BAW56-Q1	A1		
BAV70-Q1	A4		

Suggested solder pad layout

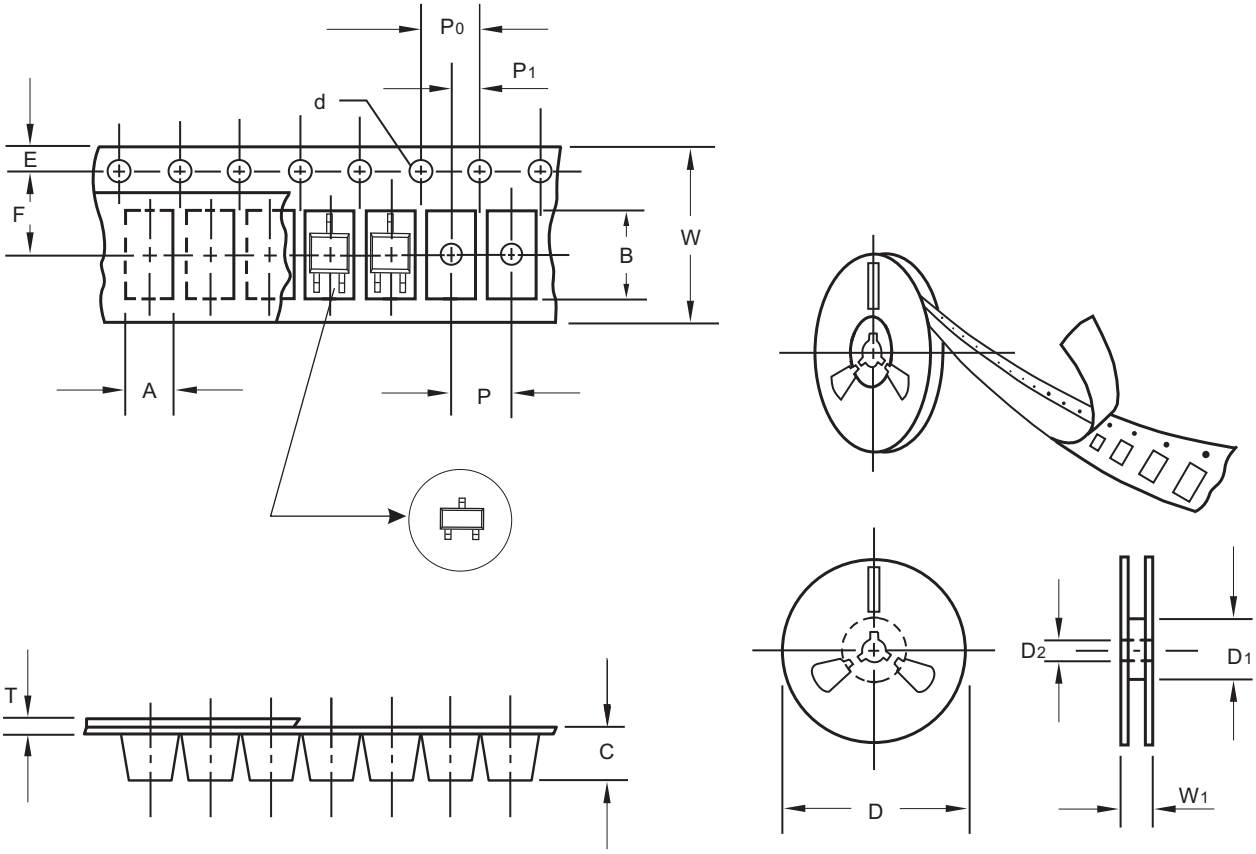
SOT-23



Dimensions in inches and (millimeters)

BAL99-Q1/BAV99-Q1/BAW56-Q1/BAV70-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 accor dance with EIA standar RS-481-A and specifications listed above.

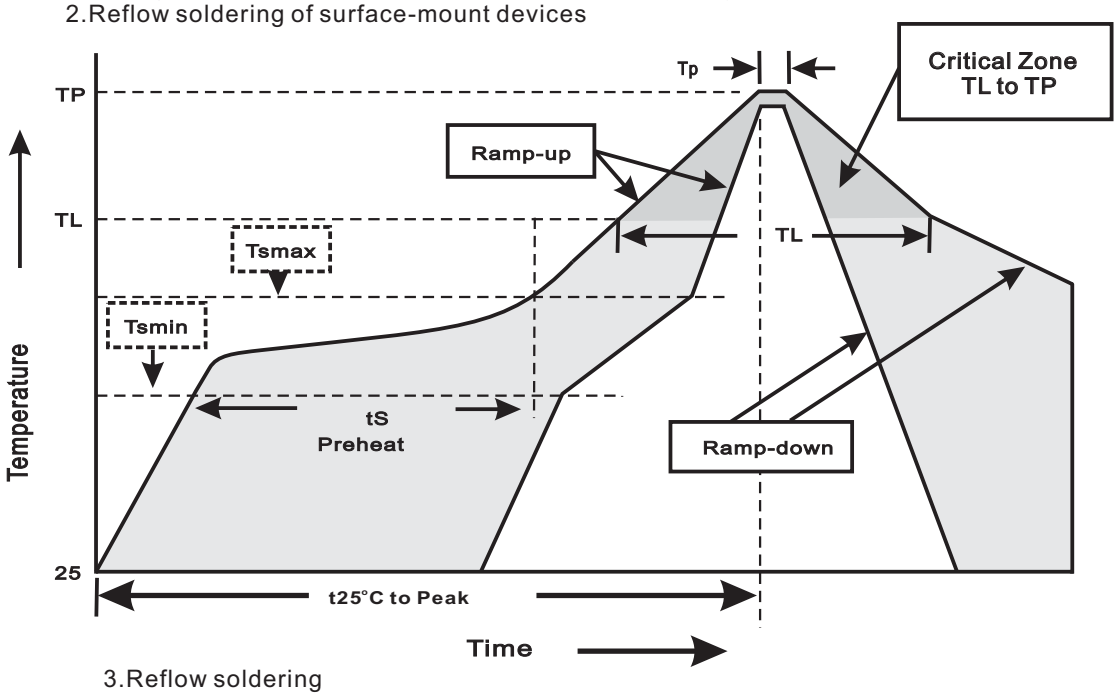
BAL99-Q1/BAV99-Q1/BAW56-Q1/BAV70-Q1

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(Tsmin) -Temperature Max(Tsmax) -Time(min to max)(t_s)	 150°C 200°C 60~120sec
Tsmax 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

BAL99-Q1/BAV99-Q1/BAW56-Q1/BAV70-Q1

High reliability test capabilities

Item Test	Conditions	Reference
1. MSL Preconditioning	24hr bake@125℃+168hrs@85℃ /85%RH+3xIR@260℃+1flux immersion+alcohol+DI H2O rinse	JESD22-A113
2. Operation Life	Ta=25℃,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=125℃ Test Duration:1000hrs	JESD22 A-103
5. Temperature Cycle	-55℃(15min) to 150℃(15min)Test Cycles:1000cycles	JESD22 A-104
6. Autoclave	P=2atm Ta=121℃ RH=100% Test Duration:96hrs	JESD22 A-102
7. Intermittent Operational Life	Ta=25℃,On/Io Max. 2min, Off/2min, Test Cycles:15000cycles	MIL-STD-750E METHOD 1037
8. Solderability	245±5℃ for 5sec	J-STD-002
9. Moisture Resistance	Ta=85℃/85% Relative humidity Test Duration:1000hrs	MIL-STD-750E METHOD 1021.2
10. Resistance To Solder Heat	260±5℃ for 10sec	JESD22 B-106
11. High Temperature High Humidity Reverse Bias	Ta=85℃, 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