

BAL99/BAV99/BAW56/BAV70**List**

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BAL99/BAV99/BAW56/BAV70

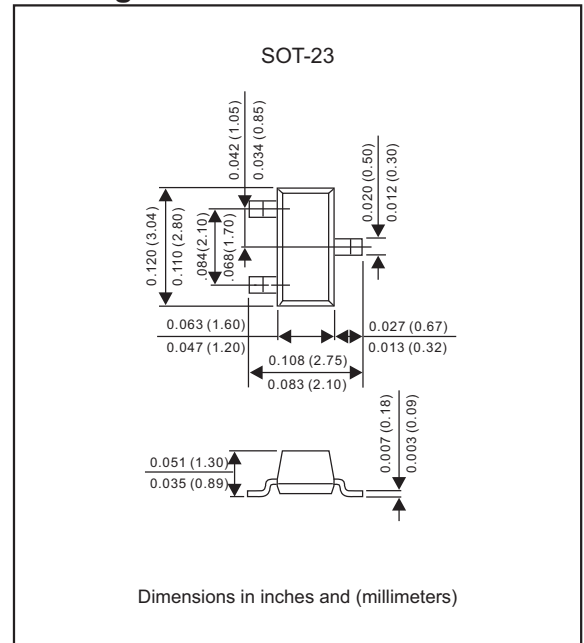
**100~215mA Surface Mount
Switching Diode 70V~75V**

Features

- Fast speed switching
- For general purpose switching application
- High conductance
- Silicon epitaxial planar chip
- Lead-free parts meet RoHS requirements
- Suffix "-H" indicates Halogen-free part, ex. BAL99-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 0.009 gram

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

Parameter	Symbol	BAL99	BAV99	BAW56	BAV70	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	I_{FSM}	2.0	2.0	2.0	2.0	A
@ $t=1.0\mu\text{s}$		1.0	1.0	1.0	1.0	
@ $t=1.0\text{ms}$		0.5	0.5	0.5	0.5	
@ $t=1.0\text{s}$		-	-	-	2.0	
@ $t=8.3\text{ms}$						

Thermal characteristics

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

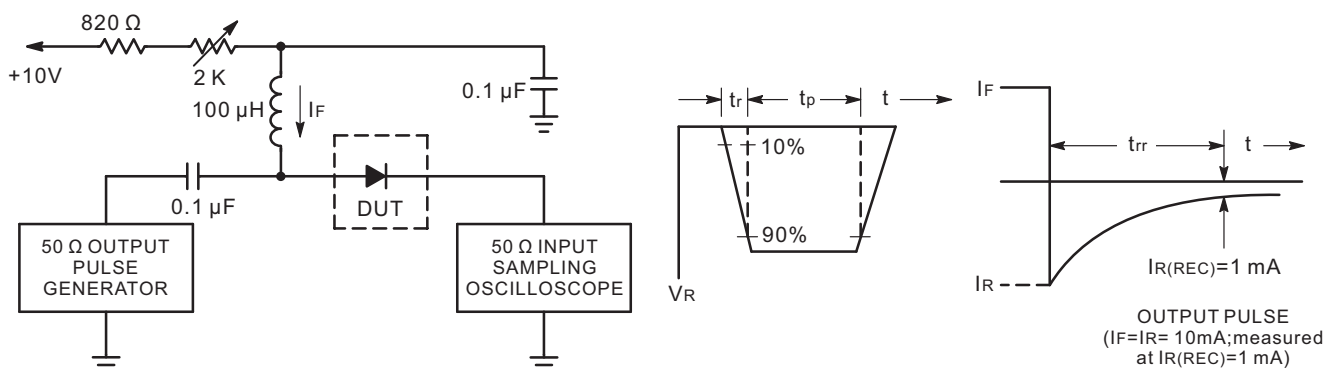
1. FR-5 = 1.0 x 0.75 x 0.062 in.

2. Alumina = 0.4 x 0.3 x 0.024 in. 99.5% alumina.

BAL99/BAV99/BAW56/BAV70**Electrical characteristics** (AT $T_A=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	MIN.	MAX.	Unit
Reverse breakdown voltage ($I_{BR}=100\mu\text{A}$)	V_{BR}	70		V
Reverse voltage leakage current (at $V_R = 70\text{V}$, $T_J=25^\circ\text{C}$) BAL99/BAV99/BAW56/BAV70 (at $V_R = 25\text{V}$, $T_J=150^\circ\text{C}$) BAL99/BAV99/BAW56 (at $V_R = 25\text{V}$, $T_J=150^\circ\text{C}$) BAV70 (at $V_R = 70\text{V}$, $T_J=150^\circ\text{C}$) BAL99/BAV99/BAW56 (at $V_R = 70\text{V}$, $T_J=150^\circ\text{C}$) BAV70	I_R		2.5 30 60 50 100	μA
Diode capacitance ($V_R = 0\text{V}$, $f = 1.0\text{MHz}$) BAL99/BAV70 BAV99/BAW56	C_D		1.5 2.0	pF
Reverse recovery time ($I_F = I_R = 10\text{mA}$, $V_R = 5.0\text{V}$, $I_{R(REC)} = 1.0\text{mA}$, $R_L = 100\Omega$)	t_{rr}		6.0	ns
Forward voltage (at $I_F = 1.0\text{mA}$) (at $I_F = 10\text{mA}$) (at $I_F = 50\text{mA}$) (at $I_F = 150\text{mA}$)	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 $I_{R(\text{peak})}$ is equal to 10 mA
 3. $t_p \gg t_{rr}$

Rating and characteristic curves for each diode (BAL99/BAV99/BAW56/BAV70)

FIG.1-TYPICAL FORWARD

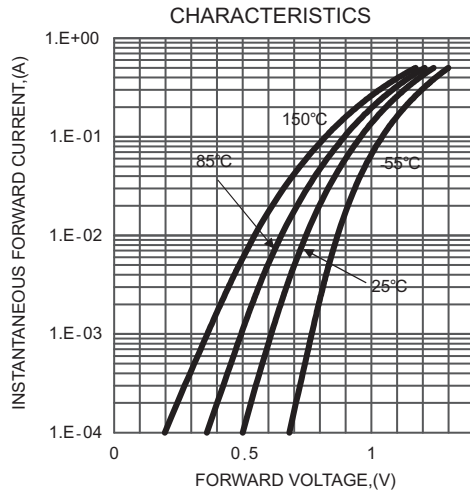


FIG.2 - TYPICAL REVERSE

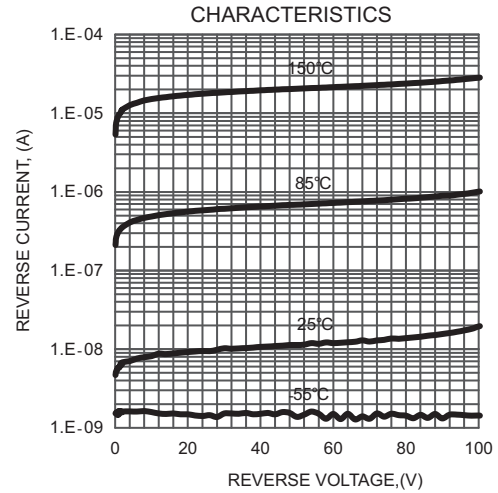


FIG.3a - TYPICAL DIODE CAPACITANCE
BAL99/BAV70

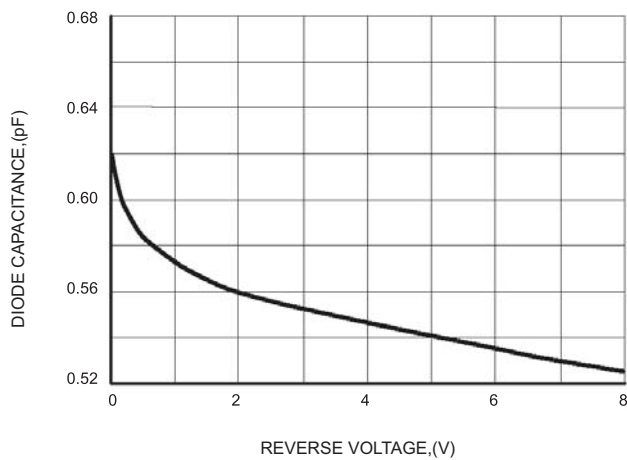
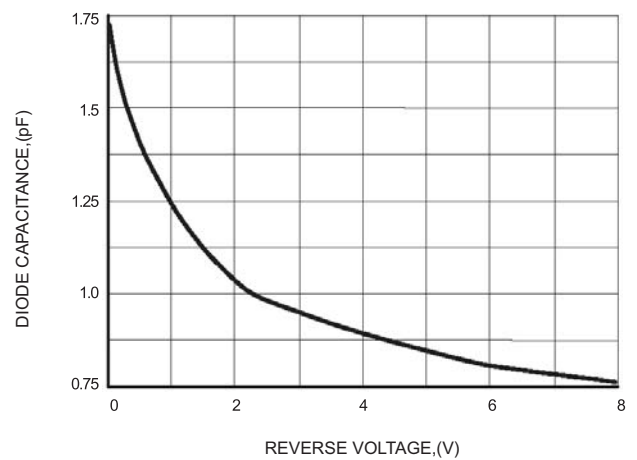
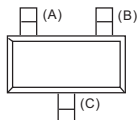
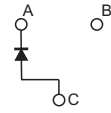
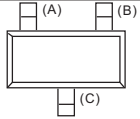
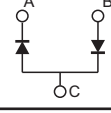
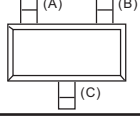
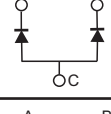
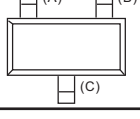
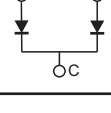


FIG.3b - TYPICAL DIODE CAPACITANCE
BAV99/BAW56

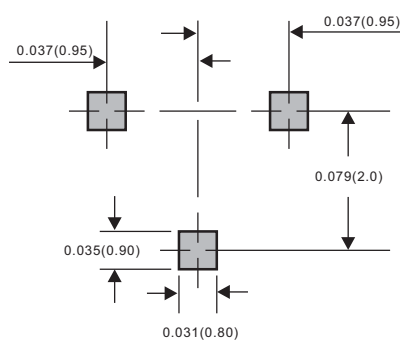


BAL99/BAV99/BAW56/BAV70**Pinning information**

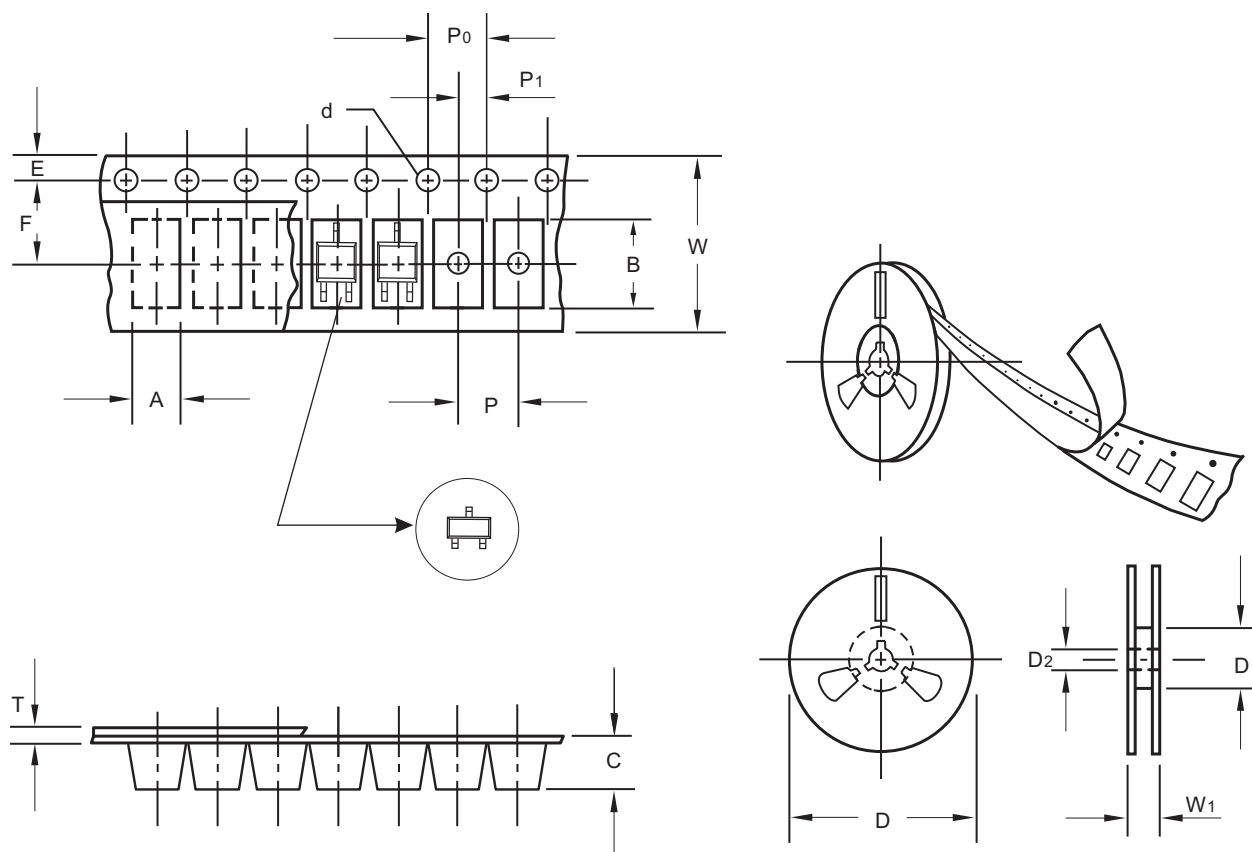
Type number	Marking code	Simplified outline	Symbol
BAL99	L4, A6, JF		
BAV99	JG, A7		
BAW56	JC, A1		
BAV70	JA, A4		

Suggested solder pad layout

SOT-23



Dimensions in inches and (millimeters)

BAL99/BAV99/BAW56/BAV70**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	62.00
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	11.40

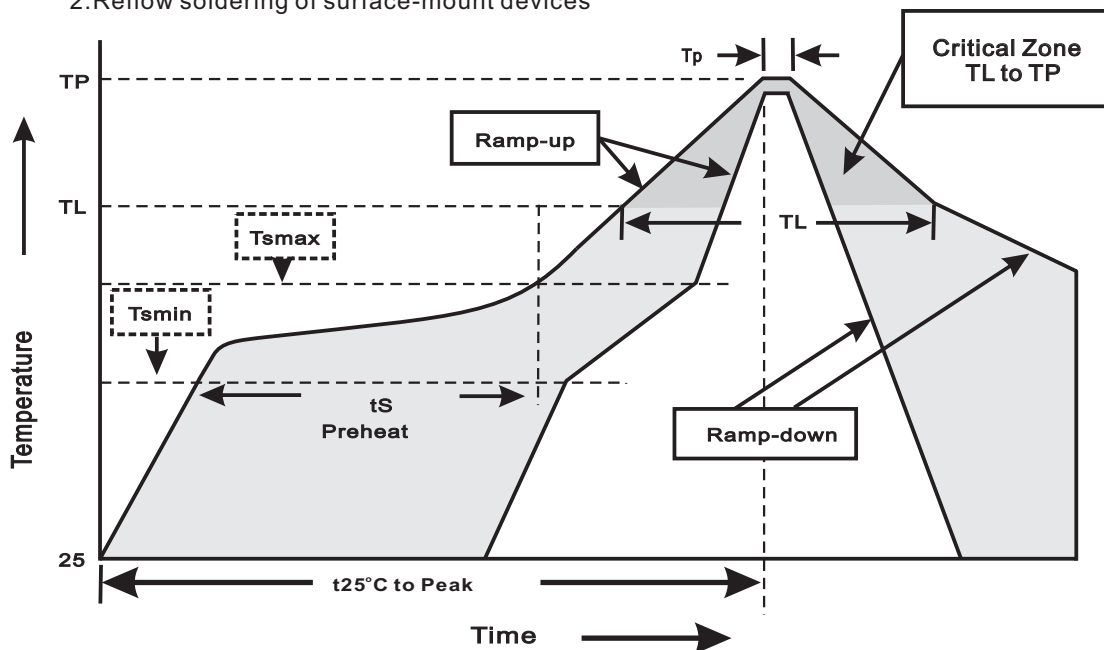
Note: Devices are packed in accordance with EIA standard RS-481-A and specifications listed above.

BAL99/BAV99/BAW56/BAV70**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

BAL99/BAV99/BAW56/BAV70**High reliability test capabilities**

Item Test	Conditions	Reference
1. Solder Resistance	at $260 \pm 5^\circ\text{C}$ for 10 ± 2 sec.	MIL-STD-750D METHOD-2031
2. Solderability	at $245 \pm 5^\circ\text{C}$ for 5 sec.	MIL-STD-202F METHOD-208
3. High Temperature Reverse Bias	$V_R = 80\%$ rate at $T_J = 150^\circ\text{C}$ for 168 hrs.	MIL-STD-750D METHOD-1038
4. Forward Operation Life	Rated average rectifier current at $T_A = 25^\circ\text{C}$ for 500hrs.	MIL-STD-750D METHOD-1027
5. Intermittent Operation Life	$T_A = 25^\circ\text{C}$, $I_F = I_O$ On state: power on for 5 min. off state: power off for 5 min. on and off for 500 cycles.	MIL-STD-750D METHOD-1036
6. Pressure Cooker	$15P_{SIG}$ at $T_A = 121^\circ\text{C}$ for 4 hrs.	JESD22-A102
7. Temperature Cycling	-55°C to $+125^\circ\text{C}$ dwelled for 30 min. and transferred for 5min. total 10 cycles.	MIL-STD-750D METHOD-1051
8. Forward Surge	Non-repetitive peak forward surge current	MIL-STD-750D METHOD-4066-2
9. Humidity	at $T_A = 85^\circ\text{C}$, RH=85% for 1000hrs.	MIL-STD-750D METHOD-1021
10. High Temperature Storage Life	at 175°C for 1000 hrs.	MIL-STD-750D METHOD-1031