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Diodes Incorporated for Discrete and Analog Semiconductors

QPAK/PPAP- 2605

Qualification Report

Manufacturer No.: BAV70W-7-F
Revision 0
Date: September 29, 2010
Qualified By: Shanghai Kaihong Electronic Co., Ltd. & Diodes Shanghai Electronic Co., Ltd
Also Applicable To: BAV70W-7-F is Qualified By Similarity to BAV70LP-7-F. The included Certificate of Design and Construction and the Reliability Test Summary are for the BAV70LP-7-F.

AEC-Q101 Hi-Rel YES NO

Prepared By:	<u>Diodes DAL. Document Control</u>	Date	<u>September 29, 2010</u>
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Approved By:	<u>Diodes DAL. QRA Department</u>	Date	<u>September 29, 2010</u>
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DIODES INCORPORATED

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www.diodes.com



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Features

- Fast Switching Speed
- Ultra-Small Surface Mount Package
- For General Purpose Switching Applications
- High Conductance
- **Lead Free/RoHS Compliant (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**
- **"Green" Device (Notes 4 and 5)**

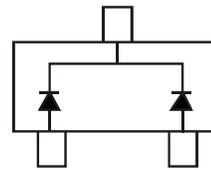
Mechanical Data

- Case: SOT-323
- Case Material: Molded Plastic, "Green" Molding Compound, Note 5. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020D
- Terminals: Solderable per MIL-STD-202, Method 208
- Lead Free Plating (Matte Tin Finish annealed over Alloy 42 leadframe)
- Polarity: See Diagram
- Marking Information: See Page 3
- Ordering Information: See Page 3
- Weight: 0.006 grams (approximate)

SOT-323



TOP VIEW


 TOP VIEW
Internal Schematic

Maximum Ratings @ $T_A = 25^\circ\text{C}$ unless otherwise specified

Characteristic	Symbol	Value	Unit
Non-Repetitive Peak Reverse Voltage	V_{RM}	100	V
Peak Repetitive Reverse Voltage	V_{RRM}	75	V
Working Peak Reverse Voltage	V_{RWM}		
DC Blocking Voltage	V_R		
RMS Reverse Voltage	$V_{R(RMS)}$	53	V
Forward Continuous Current (Note 1)	I_{FM}	300	mA
Average Rectified Output Current (Note 1)	I_O	150	mA
Non-Repetitive Peak Forward Surge Current (Note 1)	I_{FSM}	2.0	A
		1.0	

@ $t = 1.0\mu\text{s}$
 @ $t = 1.0\text{s}$

Thermal Characteristics

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 1)	P_D	200	mW
Thermal Resistance Junction to Ambient Air (Note 1)	$R_{\theta JA}$	625	$^\circ\text{C}/\text{W}$
Operating and Storage Temperature Range	T_J, T_{STG}	-65 to +150	$^\circ\text{C}$

Electrical Characteristics @ $T_A = 25^\circ\text{C}$ unless otherwise specified

Characteristic	Symbol	Min	Max	Unit	Test Condition
Reverse Breakdown Voltage (Note 2)	$V_{(BR)R}$	75	—	V	$I_R = 100\mu\text{A}$
Forward Voltage	V_F	—	0.715 0.855 1.0 1.25	V	$I_F = 1.0\text{mA}$ $I_F = 10\text{mA}$ $I_F = 50\text{mA}$ $I_F = 150\text{mA}$
Reverse Current (Note 2)	I_R	—	2.5 50 30 25	μA μA μA nA	$V_R = 75\text{V}$ $V_R = 75\text{V}, T_J = 150^\circ\text{C}$ $V_R = 25\text{V}, T_J = 150^\circ\text{C}$ $V_R = 20\text{V}$
Total Capacitance	C_T	—	2.0	pF	$V_R = 0, f = 1.0\text{MHz}$
Reverse Recovery Time	t_{rr}	—	4.0	ns	$I_F = I_R = 10\text{mA}$, $I_{rr} = 0.1 \times I_R, R_L = 100\Omega$

- Notes:
1. Device mounted on FR-4 PC board with recommended pad layout, which can be found on our website at <http://www.diodes.com/datasheets/ap02001.pdf>.
 2. Short duration pulse test used to minimize self-heating effect.
 3. No purposefully added lead.
 4. Diodes Inc.'s "Green" policy can be found on our website at http://www.diodes.com/products/lead_free/index.php.
 5. Product manufactured with Date Code 0627 (week 27, 2006) and newer are built with Green Molding Compound. Product manufactured prior to Date Code 0627 are built with Non-Green Molding Compound and may contain Halogens or Sb_2O_3 Fire Retardants.

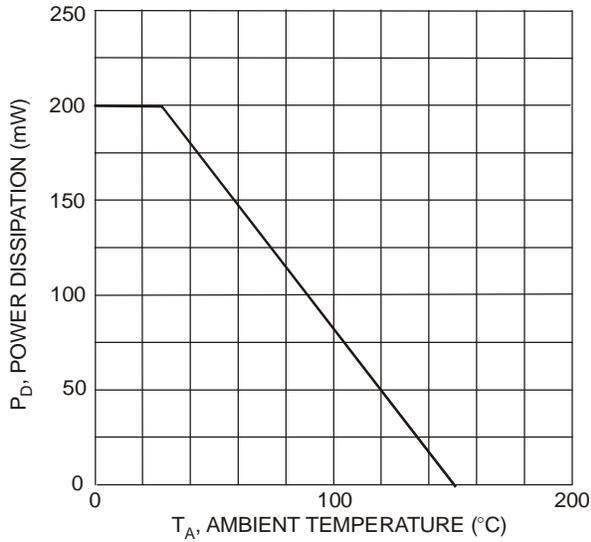


Fig. 1 Power Derating Curve, Total Package

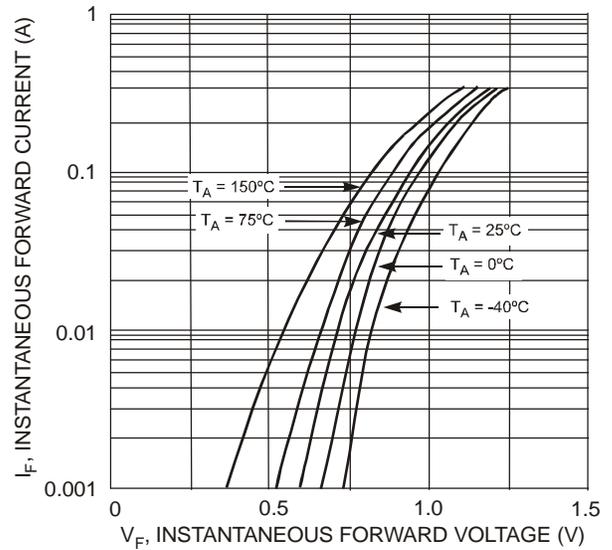


Fig. 2 Typical Forward Characteristics, Per Element

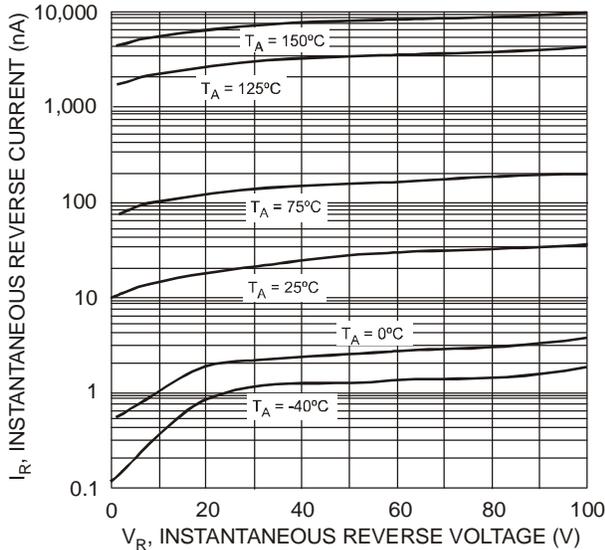


Fig. 3 Typical Reverse Characteristics, Per Element

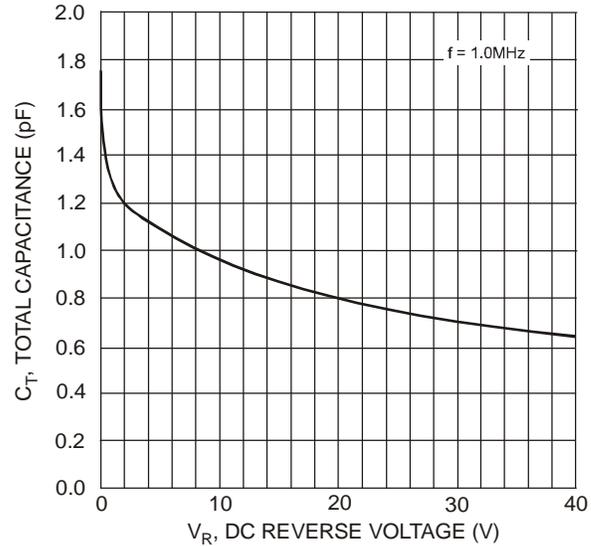


Fig. 4 Total Capacitance vs. Reverse Voltage, Per Element

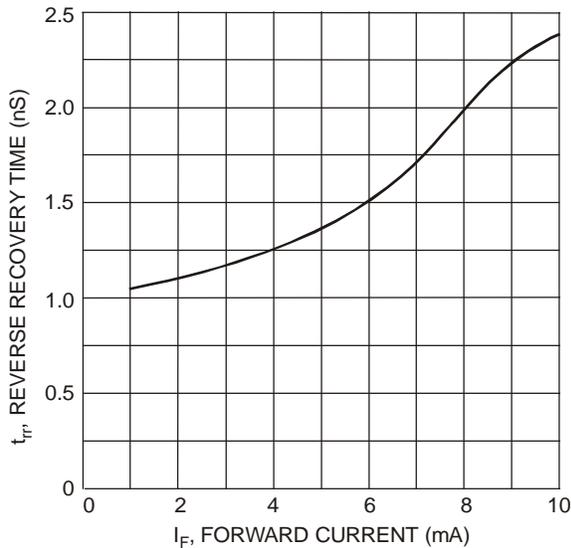


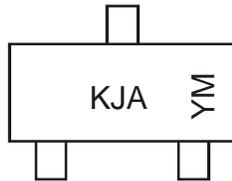
Fig. 5 Reverse Recovery Time vs. Forward Current, Per Element

Ordering Information (Notes 5 & 6)

Part Number	Case	Packaging
BAV70W-7-F	SOT-323	3000/Tape & Reel

Notes: 6. For packaging details, go to our website at <http://www.diodes.com/datasheets/ap02007.pdf>.

Marking Information



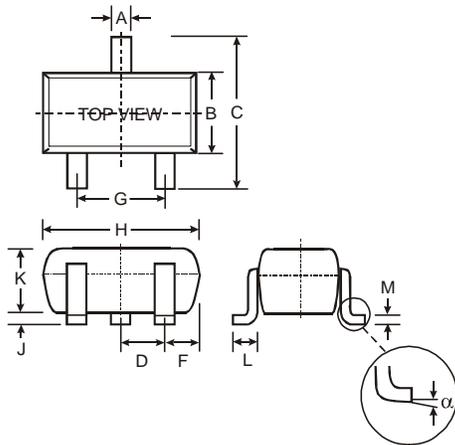
KJA = Product Type Marking Code
 YM = Date Code Marking
 Y = Year ex: N = 2002
 M = Month ex: 9 = September

Date Code Key

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Code	L	M	N	P	R	S	T	U	V	W	X	Y	Z

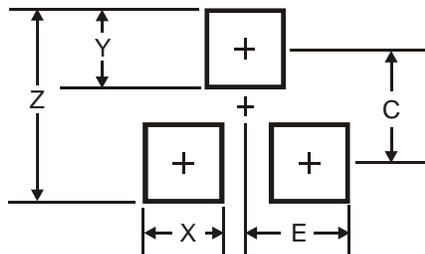
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Code	1	2	3	4	5	6	7	8	9	O	N	D

Package Outline Dimensions



SOT-323		
Dim	Min	Max
A	0.25	0.40
B	1.15	1.35
C	2.00	2.20
D	0.65 Nominal	
F	0.30	0.40
G	1.20	1.40
H	1.80	2.20
J	0.0	0.10
K	0.90	1.00
L	0.25	0.40
M	0.10	0.18
α	0°	8°
All Dimensions in mm		

Suggested Pad Layout



Dimensions	Value (in mm)
Z	2.8
X	0.7
Y	0.9
C	1.9
E	1.0

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CERTIFICATE OF DESIGN AND CONSTRUCTION

Assembly and Test Site	DIODES INC	Glass transition temperature (T_g)	135°C
DIC P/N	BAV70LP-7	Lead material type	SLP1006P2(C7025HH)
Package Type	DFN1006-3	Lead Material manufacturer	ASM/MHT
DIE P/N	5DS21MQ	Lead plating/ coating	Pb free
Die line or process	Planar process technology	Lead frame material type	C7025HH
Wafer Diameter	5 inch	Header plating (Die land area)	NiPdAu
Wafer Fab Site(s)	Phenitec	Max junction temperature(T_j)	150°C
ID method (multiple sites)	N/A	Max thermal resistance junction to case (θ_{JC})	N/A
Assembly Locations(s)	Shanghai Kaihong Electronic Co., Ltd. Diodes Shanghai Co.,Ltd	Max thermal resistance junction to ambient (θ_{JA})*	N/A
Test Locations(s)	Diodes Shanghai Co.,Ltd	Front metal type (Top layer)	Al
Die attach Method / Material	Epoxy(QMI519)	Front metal thickness (Top layer)	N/A
Bond wire material & dia.	Gold wire/0.8mil	Back metal type (All layers)	AuAs
Bond type (at top side of the die)	Thermo-Ultrasonic	Back metal thickness (all Layers)	N/A
Bond type (at leadframe)	Epoxy	Die conforming coating	Classified information
No. of bonds over active area	1	Die size (width x length x thickness) in mm	0.390 x 0.390 x0.138
Package material type	EME-G770HCD	Die passivation thickness range	Not specified
Package material manufacturer	Sumitomo	No. of mask steps	6

*Show conditions (i.e. pad size, board material, copper thickness, etc.

Attachments:

- 1) Die Photo
- 2) Package outline drawing
- 3) Die cross-section drawing
- 4) Wire bond & die placement diagram
- 5) Test circuits, bias levels and conditions

Requirements:

A separate Certificate of Design, Construction and Qualification shall be submitted for each P/N and assembly location. Document shall be signed by a responsible individual at the supplier who can verify that all of the above information is correct. Type name and sign.

Completed by		Date	Certified by	Date
Typed/Printed	Hill Chen	September 16, 2010	Phil Mao	September 16, 2010
Signature				
Title	Wafer Engineer		Wafer section Mgr	

Reliability Test Summary

FACTORY:		PART NUMBER :BAV70LP SWB0816038 CUSTOMER:				
LABORATORY (If Different):		PART DESCRIPTION: Qualification for 5DS21M,EME-G770HCD,0.8mil gold ,QMI519				
DW-008 (AEC Q101) Test#	Test Description	Test Conditions	#Lots	#To Test	Results	REMARKS
7.3.2 (1)	PRE- AND POST- STRESS ELECTRICAL TEST (TEST)	Per Spec				
7.3.3 (2)	PRECONDITIONING (PC)	JSED22 A-113 N/A for Axial	1	385	0/385	
7.3.5.1 (3)	EXTERNAL VISUAL (EV)	MIL-STD-750 METHOD 2071	1	500	0/500	
7.3.5.2 (4)	PARAMETRIC VERIFICATION (PV)	Per Data Sheet Ta1=-55°C, Ta2=25°C, Ta3=85°C, Ta4=150°C Characteristic BVDSS@VGS=0V, ID=250uA Characteristic IDSS@VDS=30V, VGS=0V Characteristic IGSS@VGS=±20V, VDS=0V Characteristic IGSS@VGS=±25V, VDS=0V Characteristic VGS(th)@VDS=VGS, ID=250uA Characteristic RDSON@VGS=10V, ID=5.8A Characteristic RDSON@VGS=4.5V, ID=4.2A Characteristic yFS@VDS=5V, ID=4.2A Characteristic VSD@VGS=0V, IS=2.0A	1 of 3	25		
	Lot #2		2 of 3	25		
	Lot #3		3 of 3	25		
7.3.5.3	FORWARD SURGE	MIL-750D, Method 4066	1	45		
7.3.5.4 (5)	HIGH TEMP. REVERSE BIAS (HTRB)	T=150°C Vr=60V, PER JESD22 A-108	1	77		
	Pretest		1	77	0/77	
	@ 500 Hours	T=150°C Vr=60V, PER JESD22 A-108	1	77	0/77	
	Final 1000 Hours	T=150°C Vr=60V, PER JESD22 A-108	1	77	0/77	
(6)	HIGH TEMP GATE BIAS (HTGB)	MIL-750D, Method 4066	1	77		
7.3.5.5 (7)	TEMPERATURE CYCLING (TC)	T=-65°C-150°C, PER JESD22 A-104	1	77		
	Pretest		1	77	0/77	
	@ 500Cycles	T=-65°C-150°C, PER JESD22 A-104	1	77	0/77	
	Final 1000 Cycles	T=-65°C-150°C, PER JESD22 A-104	1	77	0/77	
7.3.5.6 (8)	AUTOCLAVE (AC)	T=121°C 15PSIG 100%RH	1	77	0/77	
7.3.5.7 (9)	H ³ TRB	T=85°C RH=85% Vr=60V	1	77		
	Pretest		1	77	0/77	
	@ 500Hours	T=85°C RH=85% Vr=60V	1	77	0/77	
	Final 1000 Hours	T=85°C RH=85% Vr=60V	1	77	0/77	
7.3.5.8 (10)	INTERMITTENTOPERATING LIFE (IOL)	I _f =150mA, PER MIL-STD-750 METHOD 1037	1	77		2 min on/off
	Pretest	MIL-STD-750 METHOD 1037	1	77	0/77	
	Midpoint	MIL-STD-750 METHOD 1037	1	77	0/77	
	After	MIL-STD-750 METHOD 1037	1	77	0/77	
(10a)	POWER AND TEMP. CYCLE (PTC)	JESD22 A-105, Per Table AEC-Q101, p11	1	77		
(Optional)	Pretest	JESD22 A-105, Per Table AEC-Q101, p11	1	77		
	Midpoint	JESD22 A-105, Per Table AEC-Q101, p11	1	77		
	After	JESD22 A-105, Per Table AEC-Q101, p11	1	77		
7.3.5.9 (11)	ESD CHARACTERIZATION (ESD)	PER AEC-Q101-001 & -002	1	60		
7.3.5.10 (12)	D.P.A. (DPA)	AEC Q101-004 SEC. 4	1	6		
7.3.5.11 (13)	PHYSICAL DIMENSION (PD)	PER JESD22 B-100	1	25	0/25	
7.3.5.12 (14)	TERMINAL STRENGTH (TS)	MIL-STD-750, Method 2036	1	30		
7.3.5.13 (15)	RESISTANCE TO SOLVENTS (RTS)	JESD22 B-107	1	30		
(16)	CONSTANT ACCELERATION (CA)	N/A, not hermetically sealed device.	N/A	N/A		
(17)	VIBRATION VARIABLE FREQUENCY (VVF)	N/A, not hermetically sealed device.	N/A	N/A		
7.3.5.14 (20)	RESISTANCE TO SOLDER HEAT (RSH)	JESD22 B-106	1	30	0/30	260°C @30S
7.3.5.15 (21)	SOLDERABILITY (SD)	J-STD-002	1	10	0/10	245°C @5S
7.3.5.16 (22)	THERMAL RESISTANCE (TR)	JESD 24-3, 24-4, 24-6 as appropriate	1	10		
7.3.5.17 (23)	WIRE BOND STRENGTH (WBS)	MIL-STD-750 METHOD 2037	1	25	0/25	
7.3.5.18 (24)	BOND SHEAR (BS)	AEC-Q101-003	1	25	0/25	
7.3.5.19 (25)	DIE SHEAR (DS)	MIL-STD-750 METHOD 2017	1	25	0/25	
Summary:	The lot passed pre-con and 1000hrs full hi-rel test.					
Submitted by:	Joan Yu 02/05/09	Approved by:	Susan Ding 02/05/09			