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Product Group: DD/Fri Mar 24, 2023/PCN-DD-003-2023-REV-0

Additional Schottky Wafer Foundry for Commercial Grade SMA, SMB and SMC Rectifiers

For further information, please contact your regional Vishay office.

CONTACT INFORMATION

Americas

Vishay Semiconductors
150 Motor Parkway, Suite 119,
Hauppauge,
New York United States 11788
Phone: +1 631 300 3816
Fax: +1 631 300 3843
Diodes-Americas@vishay.com

Europe

Vishay Semiconductors
Theresienstrasse 2
-
Heilbronn Germany D-74072
Phone: +49 7131 7498 656 (or 715)
Fax: +49 7131 67 2938
Diodes-Europe@vishay.com

Asia

Vishay Semiconductors
15D, Sun Tong Infoport Plaza
55 Huai Hai West Road,
Shanghai China 200030
Phone: +86 138 1787 2112
Fax: +86 21 5258 7979
Diodes-Asia@vishay.com

Description of Change: In addition to the existing in-house Schottky wafer source, Vishay Diodes Division is introducing a subcontractor Schottky foundry in Tianjin, China for commercial grade SMA, SMB and SMC 20V–60V Schottky rectifiers.

This additional Schottky wafer foundry was already introduced before through PCN-DD-006-2020 and PCN-DD-015-2022. There will be no change in form, fit and function on all involved products.

Classification of Change: Capacity expansion

Expected Influence on Quality/Reliability/Performance: No changes in quality and reliability performance

Part Numbers/Series/Families Affected: Please see materials list on the succeeding page.

Vishay Brand(S): Vishay General Semiconductor

Time Schedule:

Start Shipment Date: Thu Jun 1, 2023

Sample Availability: Available upon request

Product Identification: Wafer source traceability is done through Lot Number.

Qualification Data: Available upon request

This PCN is considered approved, without further notification, unless we receive specific customer concerns before Sat May 27, 2023 or as specified by contract.

Issued By: Eddie Hwang, Product Marketing Director – Schottky Rectifier , Eddie.Hwang@vishay.com



Product Change Notification



Product Group: DD/Fri Mar 24, 2023/PCN-DD-003-2023-REV-0

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B150-E3/5AT	B150-E3/61T	B150-M3/5AT	B150-M3/61T	B160-E3/5AT
B160-E3/61T	B160-M3/5AT	B160-M3/61T	B350A-E3/5AT	B350A-E3/61T
B350A-M3/5AT	B350A-M3/61T	B350B-E3/52T	B350B-E3/5BT	B350B-M3/52T
B350B-M3/5BT	B360A-E3/5AT	B360A-E3/61T	B360A-M3/5AT	B360A-M3/61T
B360B-E3/52T	B360B-E3/5BT	B360B-M3/52T	B360B-M3/5BT	SL12-E3/5AT
SL12-E3/61T	SL12-M3/5AT	SL12-M3/61T	SL13-E3/5AT	SL13-E3/61T
SL13-M3/5AT	SL13-M3/61T	SL42-E3/57T	SL42-E3/9AT	SL42-M3/57T
SL42-M3/9AT	SL43-E3/57T	SL43-E3/9AT	SL43-M3/57T	SL43-M3/9AT
SS15-E3/5AT	SS15-E3/61T	SS15-M3/5AT	SS15-M3/61T	SS16-E3/5AT
SS16-E3/61T	SS16-M3/5AT	SS16-M3/61T	SS25-E3/52T	SS25-E3/5BT
SS25-M3/52T	SS25-M3/5BT	SS25S-E3/5AT	SS25S-E3/61T	SS25S-M3/5AT
SS25S-M3/61T	SS26-7001E3/5BT	SS26-E3/52T	SS26-E3/5BT	SS26-E3C/H
SS26-E3C/I	SS26-M3/52T	SS26-M3/5BT	SS26-M3C/H	SS26-M3C/I
SS26S-E3/5AT	SS26S-E3/61T	SS26S-M3/5AT	SS26S-M3/61T	SS35-E3/57T
SS35-E3/9AT	SS35-M3/57T	SS35-M3/9AT	SS36-E3/57T	SS36-E3/9AT
SS36-M3/57T	SS36-M3/9AT	SSB43L-E3/52T	SSB43L-E3/5BT	SSB43L-E3C/I
SSB43L-M3/52T	SSB43L-M3/5BT	SSC53L-E3/57T	SSC53L-E3/9AT	SSC53L-M3/57T
SSC53L-M3/9AT				

Qual Pack





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1. Background

In addition to the existing in-house Schottky wafer source, Vishay Diodes Division is introducing a subcontractor Schottky foundry in Tianjin, China for commercial grade SMA, SMB and SMC 20V~60V Schottky rectifiers.

This additional Schottky wafer foundry was already introduced before through PCN-DD-006-2020 and PCN-DD-015-2022. There will be no change in form, fit and function on all involved products.

The representative part numbers for this qualification are as following:

Smallest chip/Lowest voltage	Middle chip	Biggest chip	Highest voltage
MSS2P3-M3	BYS10-45-E3	SL44-E3	SS26-E3

Part Numbers / Series/ Families affected: Involved part numbers are listed in below table.

B150-E3/5AT	SL13-M3/5AT	B360B-E3/52T	SSB43L-M3/5BT
B150-E3/61T	SL13-M3/61T	B360B-E3/5BT	SL42-E3/57T
B150-M3/5AT	SS15-E3/5AT	B360B-M3/52T	SL42-E3/9AT
B150-M3/61T	SS15-E3/61T	B360B-M3/5BT	SL42-M3/57T
B160-E3/5AT	SS15-M3/5AT	SS25-E3/52T	SL42-M3/9AT
B160-E3/61T	SS15-M3/61T	SS25-E3/5BT	SL43-E3/57T
B160-M3/5AT	SS16-E3/5AT	SS25-M3/52T	SL43-E3/9AT
B160-M3/61T	SS16-E3/61T	SS25-M3/5BT	SL43-M3/57T
B350A-E3/5AT	SS16-M3/5AT	SS26-7001E3/5BT	SL43-M3/9AT
B350A-E3/61T	SS16-M3/61T	SS26-E3/52T	SS35-E3/57T
B350A-M3/5AT	SS25S-E3/5AT	SS26-E3/5BT	SS35-E3/9AT
B350A-M3/61T	SS25S-E3/61T	SS26-E3C/H	SS35-M3/57T
B360A-E3/5AT	SS25S-M3/5AT	SS26-E3C/I	SS35-M3/9AT
B360A-E3/61T	SS25S-M3/61T	SS26-M3/52T	SS36-E3/57T
B360A-M3/5AT	SS26S-E3/5AT	SS26-M3/5BT	SS36-E3/9AT
B360A-M3/61T	SS26S-E3/61T	SS26-M3C/H	SS36-M3/57T
SL12-E3/5AT	SS26S-M3/5AT	SS26-M3C/I	SS36-M3/9AT
SL12-E3/61T	SS26S-M3/61T	SSB43L-E3/52T	SSC53L-E3/57T
SL12-M3/5AT	B350B-E3/52T	SSB43L-E3/5BT	SSC53L-E3/9AT
SL12-M3/61T	B350B-E3/5BT	SSB43L-E3C/I	SSC53L-M3/57T
SL13-E3/5AT	B350B-M3/52T	SSB43L-M3/52T	SSC53L-M3/9AT
SL13-E3/61T	B350B-M3/5BT		


* Note: Upon this PCN approval, all future these P/Ns will be assembled with either the existing in-house wafer or the foundry wafer.



2. CDC (Certificate of Design Construction)

Item Name	Supplier Response
1. Supplier Part Number/Generic Part Number:	SS26-E3
2. Device Description:	2A, 60V Schottky Rectifier
3. Wafer/Die Fab Location: a. Facility name/plant #: b. Country:	Vishay General Semiconductor Taiwan Ltd. / Subcon. Taiwan/China
4. Assembly Location: a. Facility name/plant #: b. Country:	Vishay General Semiconductor China Co., Ltd. Vishay General Semiconductor Taiwan Ltd., Nanzi Branch China/Taiwan
5. Final Quality Control A (Test) Location: a. Facility name/plant #: b. Country:	Vishay General Semiconductor China Co., Ltd. / Subcon. Vishay General Semiconductor Taiwan Ltd., Nanzi Branch China/Taiwan
6. Wafer/Die: a. Wafer size: b. Die family:	6 inch SKY
7. Die (frontside) Metallization: a. Die metallization material(s):	Ti/Ni/Ag
8. Die Passivation: a. Die passivation material(s):	Oxide
9. Die Overcoat Material (e.g., Polyimide):	N/A
10. Die Prep Backside: a. Die metallization:	Ti/Ni/Ag
11. Die Separation Method:	Blade saw
12. Die Attach: a. Die attach method:	Reflow soldering
13. Package: a. Type of package (e.g., plastic, ceramic, unpackaged): b. JEDEC designation (e.g., MS029, MS034, etc.):	Plastic SMB (DO-214AA)
14. Mold Compound: a. Mold compound type: b. Flammability rating: c. Tg (glass transition temperature) (°C):	Epoxy Compound UL 94 V1 <input type="checkbox"/> UL 94 V0 <input checked="" type="checkbox"/> Min. 150°C
15. Wire Bond: a. Wire bond material:	N/A
16. Leadframe (if applicable): a. Header material: b. Leadframe material: c. Leadframe bonding plating composition: d. External lead plating composition: e. External lead plating thickness (μinch):	Copper Copper None Pure Sn Min. 8μm
17. Thermal Resistance: a. θ_{JA} °C/W (approx): b. θ_{JC} °C/W (approx): c. θ_{JL} junction-to-lead °C/W (approx): d. θ_{JM} junction-to-mounting base °C/W (approx):	75°C/W, 14x14mm copper pad PCB mounted N/A 17°C/W, 14x14mm copper pad PCB mounted N/A
18. Maximum Process Exposure Conditions: a. MSL @ rated SnPb temperature: b. MSL @ rated Pb-free temperature:	<i>* Note: Temperatures are as measured on the center of the plastic package body top surface.</i> <u>1 at 235 °C (SnPb)</u> <u>1 at 260 °C (Pb-free)</u>

3. Product Description

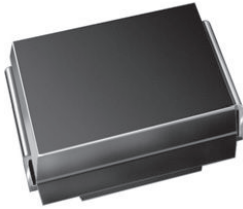
Product Description					
Product:	SS26-E3	Package:	DO-214AA	Issued by:	Larry Zhang
Technology:		Schottky		Date:	02/17/2023
Function Description: 2A, 60V Surface-Mount Schottky Barrier Rectifier					
Fab Taiwan/China		Assembly Factory China/Taiwan		Testing Factory China/Taiwan	
Product:					
Chip			Sub-assembly (Top view)		
					
Finish Product					
					



4. Data Sheet

- please see the next pages
- Visit [ss22.pdf \(vishay.com\)](#) for the latest version

Surface-Mount Schottky Barrier Rectifier


SMB (DO-214AA)

Cathode Anode

LINKS TO ADDITIONAL RESOURCES


[3D Models](#)

PRIMARY CHARACTERISTICS	
$I_{F(AV)}$	2.0 A
V_{RRM}	20 V, 30 V, 40 V, 50 V, 60 V
I_{FSM}	75 A
V_F	0.50 V, 0.70 V
T_J max.	150 °C
Package	SMB (DO-214AA)
Circuit configuration	Single

FEATURES

- Low profile package
- Ideal for automated placement
- Guardring for overvoltage protection
- Low power losses, high efficiency
- Low forward voltage drop
- High surge capability
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- AEC-Q101 qualified available
- Automotive ordering code: base P/NHE3 or P/NHM3
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912


RoHS
 COMPLIANT
 HALOGEN
FREE
 Available

TYPICAL APPLICATIONS

For use in low voltage high frequency inverters, freewheeling, DC/DC converters, and polarity protection applications.

MECHANICAL DATA

Case: SMB (DO-214AA)

Molding compound meets UL 94 V-0 flammability rating
 Base P/N-E3 - RoHS-compliant, commercial grade
 Base P/N-M3 - halogen-free, RoHS-compliant, commercial grade
 Base P/NHE3_X - RoHS-compliant and AEC-Q101 qualified
 Base P/NHM3_X - halogen-free, RoHS-compliant, and AEC-Q101 qualified
 (“_X” denotes revision code e.g. A, B,)

Terminals: matte tin plated leads, solderable per J-STD-002 and JESD 22-B102
 E3, M3, HE3, and HM3 suffix meets JESD 201 class 2 whisker test

Polarity: color band denotes cathode end

MAXIMUM RATINGS ($T_A = 25\text{ °C}$ unless otherwise noted)								
PARAMETER	SYMBOL	SS22	SS23	SS24	SS25	SS26	UNIT	
Device marking code		S2	S3	S4	S5	S6		
Maximum repetitive peak reverse voltage	V_{RRM}	20	30	40	50	60	V	
Maximum RMS voltage	V_{RMS}	14	21	28	35	42	V	
Maximum DC blocking voltage	V_{DC}	20	30	40	50	60	V	
Max. average forward rectified current at T_L (fig. 1)	$I_{F(AV)}$	2.0						A
Peak forward surge current 8.3 ms single half sine-wave superimposed on rated load	I_{FSM}	75						A
Non-repetitive avalanche energy at $T_A = 25\text{ °C}$, $I_{AS} = 2.0\text{ A}$, $L = 10\text{ mH}$	E_{AS}	20						mJ
Electrostatic discharge capacitor voltage Human body model: $C = 100\text{ pF}$, $R = 1.5\text{ k}\Omega$	V_C	8.0						kV
Voltage rate of change (rated V_R)	dV/dt	10 000						V/ μ s
Operating junction temperature range	T_J	-65 to +150						°C
Storage temperature range	T_{STG}	-65 to +150						°C

**ELECTRICAL CHARACTERISTICS** ($T_A = 25\text{ }^\circ\text{C}$ unless otherwise noted)

PARAMETER	TEST CONDITIONS	SYMBOL	SS22	SS23	SS24	SS25	SS26	UNIT
Maximum instantaneous forward voltage ⁽¹⁾	2.0 A	V_F	0.5			0.7		V
Maximum DC reverse current at rated DC blocking voltage ⁽¹⁾	$T_A = 25\text{ }^\circ\text{C}$	I_R	0.4					mA
	$T_A = 100\text{ }^\circ\text{C}$		10					

Note

⁽¹⁾ Pulse test: 300 μs pulse width, 1 % duty cycle

THERMAL CHARACTERISTICS ($T_A = 25\text{ }^\circ\text{C}$ unless otherwise noted)

PARAMETER	SYMBOL	SS22	SS23	SS24	SS25	SS26	UNIT
Typical thermal resistance ⁽¹⁾	$R_{\theta JA}$	75					$^\circ\text{C/W}$
	$R_{\theta JL}$	17					

Note

⁽¹⁾ PCB mounted with 0.55" x 0.55" (14 mm x 14 mm) copper pad areas

ORDERING INFORMATION (Example)

PREFERRED P/N	UNIT WEIGHT (g)	PREFERRED PACKAGE CODE	BASE QUANTITY	DELIVERY MODE
SS26-E3/52T	0.096	52T	750	7" diameter plastic tape and reel
SS26-E3/5BT	0.096	5BT	3200	13" diameter plastic tape and reel
SS26HE3_A/H ⁽¹⁾	0.096	H	750	7" diameter plastic tape and reel
SS26HE3_A/I ⁽¹⁾	0.096	I	3200	13" diameter plastic tape and reel
SS26-M3/52T	0.096	52T	750	7" diameter plastic tape and reel
SS26-M3/5BT	0.096	5BT	3200	13" diameter plastic tape and reel
SS26HM3_A/H ⁽¹⁾	0.096	H	750	7" diameter plastic tape and reel
SS26HM3_A/I ⁽¹⁾	0.096	I	3200	13" diameter plastic tape and reel

Note

⁽¹⁾ AEC-Q101 qualified

RATINGS AND CHARACTERISTICS CURVES ($T_A = 25\text{ }^\circ\text{C}$ unless otherwise noted)

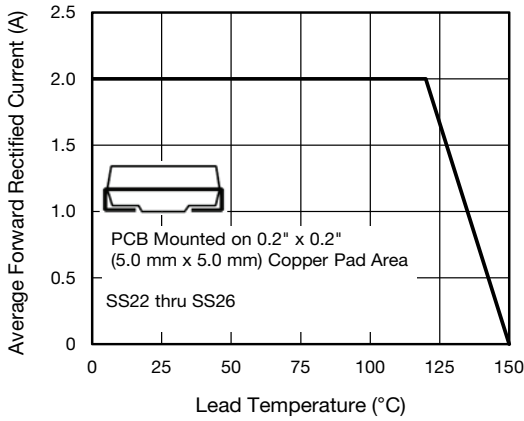


Fig. 1 - Forward Current Derating Curve

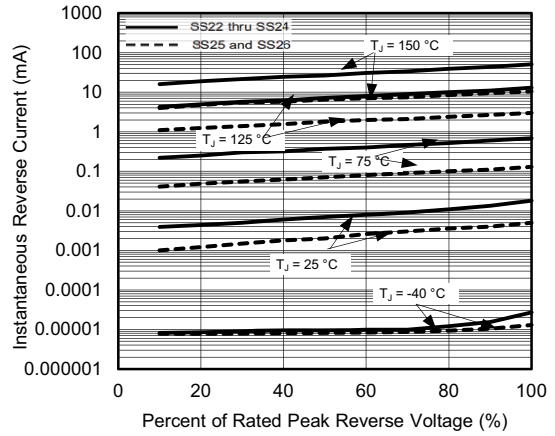


Fig. 4 - Typical Reverse Current Characteristics

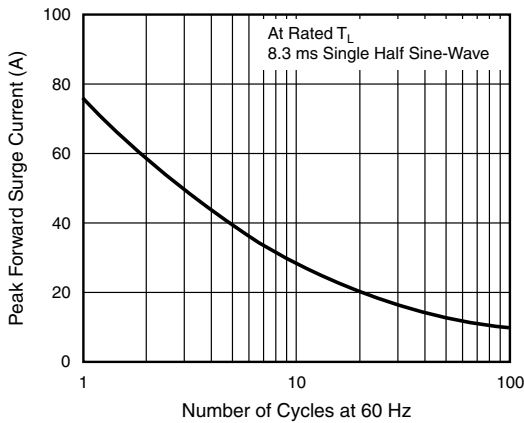


Fig. 2 - Maximum Non-Repetitive Surge Current

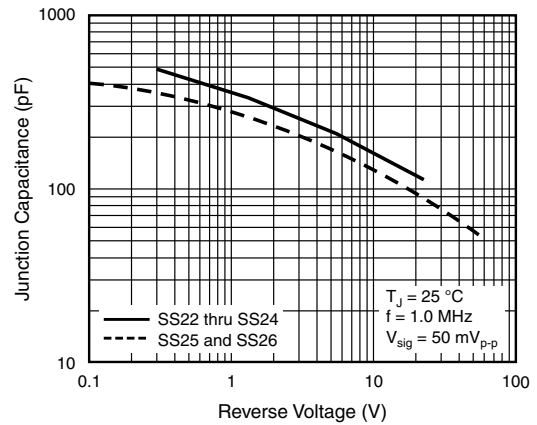


Fig. 5 - Typical Junction Capacitance

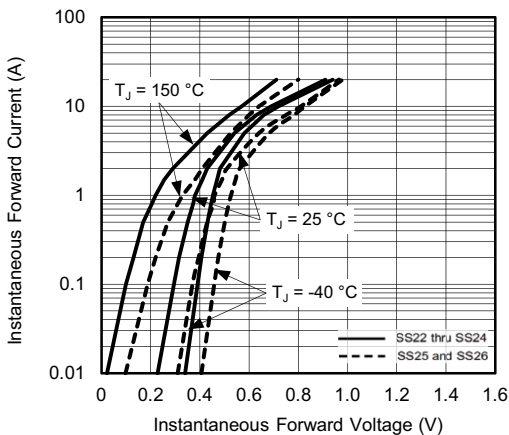
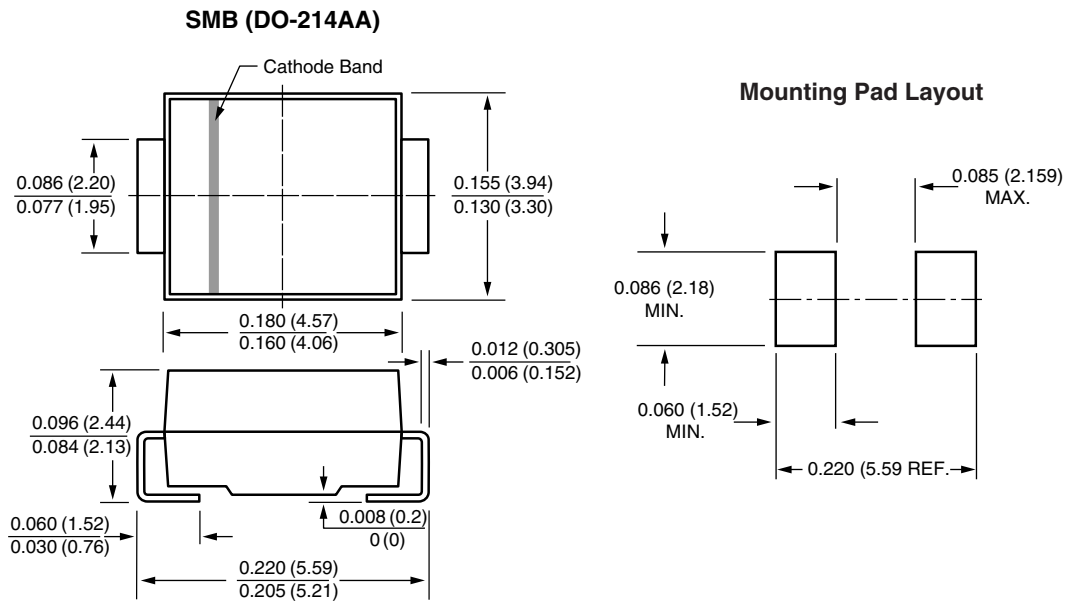


Fig. 3 - Typical Instantaneous Forward Characteristics



PACKAGE OUTLINE DIMENSIONS in inches (millimeters)





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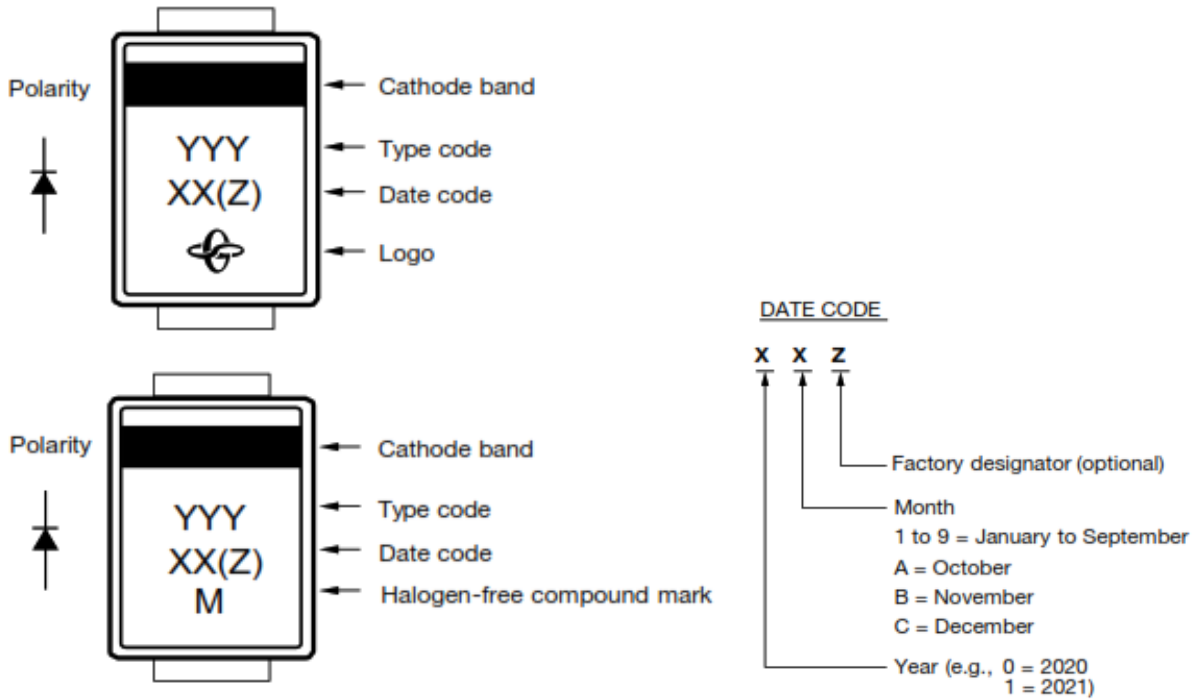
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5. Body Marking

(Visit <https://www.vishay.com/docs/88912/diodesgroupbodymarking.pdf> for the latest marking version)



Notes

- Type code refers to individual datasheet
- Cathode band: marked with one or more lines



6. Back-End Process Flow

Changeover Key		Inspection Key		For Process: Folded SMA(Cell#1), SMB & SMC Flow		Doc. #	
P=Product	A=Automatic	A=Automatic	M=Manual	For Sites: VGSC		FC-055F(T)	
T=Tooling	V=Visual	V=Visual		Prepared By: Tracy Mu		Rev. #	
S=Software	Q=Quality Audit	Q=Quality Audit				2022/11/22	
D=Dunnage	L=Label	L=Label				Vishay GS Part #	
						FSMX Process	
						Customer Part #	
Op-Seq	Symbol Instructions	Changeover	Operation Description	Special Char. Class	Significant Product Characteristics (Outputs)	Special Char. Class	Significant Process Characteristics (Inputs)
OP-049	Lead Frame						
	Solder Paste						
	Die						
	Flux (Only for products with pre-bump dice, for example, it's not required for the BYG series with Non-bump dice)						
	Auto Soldering	DD	Bottom solder area and position		AOI 100% Vision		
OP-515			Post Cleaning				
OP-205/206	Molding compound						
	Transfer molding						
OP-220	Trimming & Forming						
	Forming dimension measurement	DD	Forming dimension		Tool life		
OP-215			Post molding curing				
OP-335	Pure tin solder ball						
	Pure tin barrel plating	DT	PB content in pure-tin plating layer		PB content in pure-tin plating bath		
	Plating solderability test Plating thickness measurement	DD	Plating solderability Plating thickness Aging test		1.Plating current 2.Solution concentration		
OP-350	Rej.		Plating rework				
OP-535 or Subcon (None-automotive)	Carrier Tape						
	Cover Tape						
	Reel						
	Test/Mark/Mechanical/Tape or Sub-con(Only for None automotive)	DD	Elec:IR/BVR/VF/TRR(FER)		Tester accuracy		
OP-550	Tape peeling force test	DD	Tape peeling force		Sealing temperature		
	Final inspection						
GSC-4775			Outgoing quality control (Elec.&Mech.)				
OP-600			Packing				



7. Unit Pack Specifications



Packaging Information

PACKAGING ORDERING CODE		
ANTI-STATIC PACKAGE CODE	PREFERRED PACKAGE CODE	PACKAGING DESCRIPTION
51, A		Bulk
52, 52T	P	SMB (DO-214AA) /SMBG (DO-215AA), 12 mm tape, 7" diameter plastic reel
2D	P	SM5-8A (DO-218AB), 24 mm tape, 13" diameter plastic reel, anode towards sprocket hole
2E, K		SM5-8A (DO-218AB), 24 mm tape, 13" diameter plastic reel, cathode towards sprocket hole
2M, P		Tube packaging for 5KP/6KA type lead formed components
53, B		26 mm horizontal taping and ammo box packaging
54, C	P	52.4 mm horizontal tape, 13" diameter paper reel
5A, 5AT	P	SMA (DO-214AC), 12 mm tape, 13" diameter plastic reel
5B, 5BT	P	SMB (DO-214AA) / SMBG (DO-215AA), 12 mm tape, 13" diameter plastic reel
5CA	P	GF1 (DO-214BA), 12 mm tape, 13" diameter plastic reel
57, 57T	P	SMC (DO-214AB) / SMCG (DO-215AB), 16 mm tape, 7" diameter plastic reel
6A	P	SlimSMA (DO-221AC), 12 mm tape, 7" diameter plastic reel
6B	P	SlimSMA (DO-221AC), 12 mm tape, 13" diameter plastic reel
9A, 9AT	P	SMC (DO-214AB) / SMCG (DO-215AB), 16 mm tape, 13" diameter plastic reel
61, 61T	P	SMA (DO-214AC), 12 mm tape, 7" diameter plastic reel
67A	P	GF1 (DO-214BA), 12 mm tape, 7" diameter plastic reel
72, E	P	Bulk pack for bridge and special axial-leaded formed devices
73, D		52.4 mm horizontal tape and ammo box packaging
77	P	DFS bridge, 16 mm tape, 13" diameter paper reel
80	P	MB-S (TO-269AA) bridge, 12 mm tape, 13" diameter paper reel
81	P	D ² PAK (TO-263AB) 24 mm tape, 13" diameter reinforced hub plastic reel
8W	P	D ² PAK (TO-263AB) (wire bond) 24 mm tape, 13" diameter reinforced hub plastic reel
83	P	GL34 (DO-213AA) 8 mm tape, 13" diameter plastic reel
84A	P	SMP (DO-220AA) 12 mm tape, 7" diameter plastic reel
85A	P	SMP (DO-220AA) 12 mm tape, 13" diameter plastic reel
86A	P	SMPC (TO-277A), 12 mm tape, 7" diameter plastic reel
87A	P	SMPC (TO-277A), 12 mm tape, 13" diameter plastic reel
89A	P	MicroSMP (DO-219AD), 8 mm tape, 7" diameter plastic reel
45, P	P	Anti-static tube packaging for Bridge and Power Pack
4W, P	P	Anti-static tube packaging for wire bond TO-220, ITO-220, TO-262 and TO-263
96	P	GL41 (DO-213AB), 12 mm tape, 7" diameter plastic reel
97	P	GL41 (DO-213AB), 12 mm tape, 13" diameter plastic reel
98	P	GL34 (DO-213AA), 8 mm tape, 7" diameter plastic reel
100, V		MPG06 pseudo radial tape, cathode first out of ammo pack
H	P	Tape in 7" diameter plastic reel
I	P	Tape in 13" diameter plastic reel
TR	P	SMA (DO-214AC), 12 mm tape, 7" diameter plastic reel ⁽¹⁾
TR3	P	SMA (DO-214AC), 12 mm tape, 13" diameter plastic reel ⁽¹⁾

Notes

- "P" and bold letter denotes preferred package code
- A "T" suffix added to the packaging codes for SMA, SMB and SMC products indicates that the patented folded-frame construction is used. This does not apply to TR and TR3 codes or TRANSZORB[®] TVS in SMA and SMB
- ⁽¹⁾ Formerly sold by Vishay Telefunken[®] (Telefunken[®] is a registered trademark of Electro Holding GmbH)



AXIAL-LEADED TAPE AND REEL PACKAGING

TABLE 2 - REEL AND AMMO PACK TAPING SPECIFICATIONS

COMPONENT CASE TYPE	PREFERRED PACKAGE CODE	UNITS PER REEL	COMPONENT PITCH "A" Fig. 1		INSIDE TAPE SPACING "B" Fig. 1		REEL DIMENSION "D" Fig. 2		LEAD BENDING "E" Fig. 1	
			EA.	INCHES	mm	INCHES	mm	INCHES	mm	INCHES
DO-15 (DO-204AC)	54, C	4000	0.200	5.0	2.06	52.4	13.0	330	0.047	1.2
DO-201AD	54, C	1400	0.395	10.0	2.06	52.4	13.0	330	0.047	1.2
DO-41 (DO-204AL)	54, C	5500	0.200	5.0	2.06	52.4	13.0	330	0.047	1.2
DFS Surface-Mount	77	1500	Fig. 8		-	-	13.0	330	Fig. 8	-
GF1 (DO-214BA)	67A, H / 5CA, I	1500 / 6500			-	-	7.0 / 13.0	178 / 330	Fig. 8	-
GL34 (DO-213AA)	98, H / 83, I	2500 / 9000			-	-	7.0 / 13.0	178 / 330	Fig. 8	-
GL41 (DO-213AB)	96, H / 97, I	1500 / 5000			-	-	7.0 / 13.0	178 / 330	Fig. 8	-
GP10E Radial	Fig. 5 and Fig. 6	2500	0.500	12.7	-	-	13.0	330	0.079	2.0
GP10E	54, C	5500	0.200	5.0	2.06	52.4	13.0	330	0.047	1.2
GP20/1.5KE	54, C	1400	0.395	10.0	2.06	52.4	13.0	330	0.047	1.2
MPG06	54, C	5500	0.200	5.0	2.06	52.4	13.0	330	0.047	1.2
P600	54, C	800	0.395	10.0	2.06	52.4	13.0	330	0.047	1.2
SMP (DO-220AA)	84A, H / 85A, I	3000 / 10 000	Fig. 8		-	-	7.0 / 13.0	178 / 330	Fig. 8	-
SMF (DO-219AB)	H / I	3000 / 10 000			-	-	7.0 / 13.0	178 / 300	Fig. 8	-
SMPD (TO-263AC) / SMPA (DO-221BC)	I	2000 / 14 000			-	-	13.0	330	Fig. 8	-
MicroSMP (DO-219AD) / MicroSMF (DO-219AC)	89A / H	4500			-	-	7.0	178	Fig. 8	-
SMPC (TO-277A)	86A, H / 87A, I	1500 / 6500			-	-	7.0 / 13.0	178 / 330	Fig. 8	-
SMA (DO-214AC)	61, 61T, TR, H / 5A, 5AT, TR3, I	1800 / 7500			-	-	7.0 / 13.0	178 / 330	Fig. 8	-
SMB (DO-214AA) / SMBG (DO-215AA)	52, 52T, H / 5B, 5BT, I	750 / 3200			-	-	7.0 / 13.0	178 / 330	Fig. 8	-
SMC (DO-214AB) / SMCG (DO-215AB)	57, 57T, H / 9A, 9AT, I	850 / 3500			-	-	7.0 / 13.0	178 / 330	Fig. 8	-
DO-218AB / AC	2D / I	750			-	-	13.0	330	Fig. 8	-
D ² PAK (TO-263AB)	81, 8W, I	800			-	-	13.0	330	Fig. 8	-
MBS (TO-269AA)	80, I	3000			-	-	13.0	330	Fig. 8	-
SlimSMA (DO-221AC)	6A, H / 6B, I	3500 / 14 000			-	-	7.0 / 13.0	178 / 330	Fig. 8	-
SlimSMAW (DO-221AD)	H, I	3500 / 14 000			-	-	7.0 / 13.0	178 / 330	Fig. 8	-
SlimDPAK (TO-252AE)	I	4500			-	-	13.0	330	Fig. 8	-
FlatPAK 5 x 6	H / I	1500 / 6000			-	-	7.0 / 13.0	178 / 330	Fig. 8	-
MicroSMP (DO-219AD)	I	16 000			-	-	13.0	330	Fig. 8	-
SMPA (DO-221BC)	H	3500			-	-	7.0	178	Fig. 8	-

Note

- Package codes, 61/5A, 52/5B are matrix-frame constructions for TRANSZORB® TVS in SMA and SMB only

TABLE 3 - COMPONENT AND INSIDE HORIZONTAL TAPE SPACING

COMPONENT BODY DIAMETER	COMPONENTS SPACING A (LEAD TO LEAD)	INSIDE TAPE SPACING "B"	CUMULATIVE PITCH TOLERANCE
0 mm to 5 mm (0.0" to 0.197")	5.0 mm ± 0.5 mm (0.197" ± 0.020")	26 mm + 1.5 mm / - 0.0 mm (1.024" + 0.059" / - 0.0")	Not to exceed 1.5 mm (0.059") over 6 consecutive components
0 mm to 5 mm (0.0" to 0.197")	5.0 mm ± 0.5 mm (0.197" ± 0.020")	52.4 mm + 1.5 mm / - 0.4 mm (2.062" + 0.059" / - 0.016")	
5.01 mm to 10 mm (0.197" to 0.394")	10 mm ± 0.5 mm (0.394" ± 0.020")	52.4 mm + 1.5 mm / - 0.4 mm (2.062" + 0.059" / - 0.016")	



SURFACE MOUNT TAPE AND REEL PACKAGING

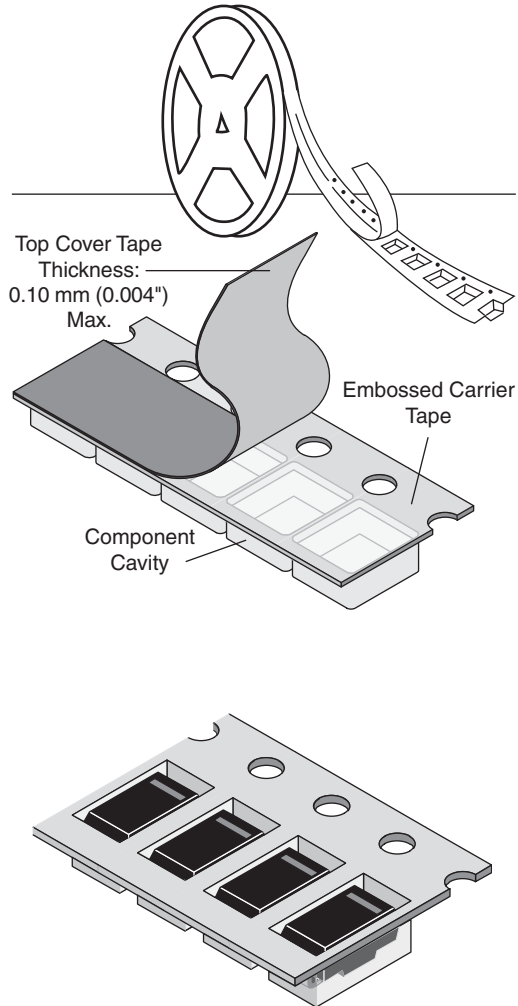


Fig. 5

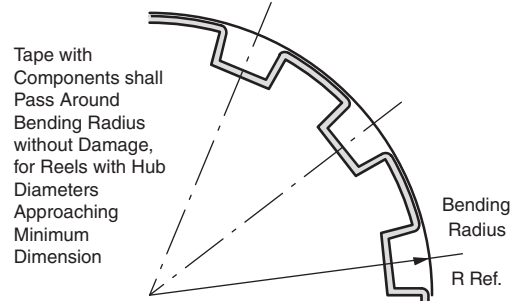


Fig. 6

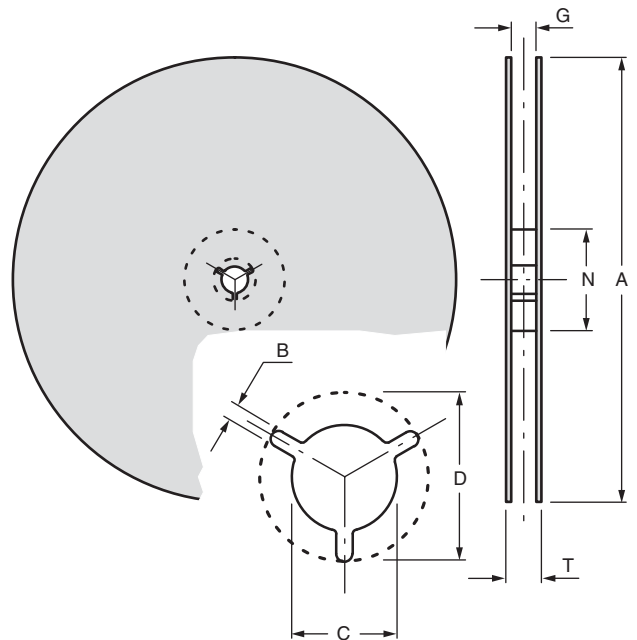


Fig. 7

DIMENSIONS in millimeters (inches)							
TAPE SIZE	A MAX.	B MIN.	C	D MIN.	N MIN.	G MAX.	T MAX.
8 mm (0.315)	330 ± 2.0 (13.0 ± 0.079) 178 ± 2.0 (7.0 ± 0.079)	1.5 (0.059)	13.0 ± 0.20 (0.51 ± 0.008)	20.2 (0.795)	50 (1.97)	9.9 (0.389)	14.4 (0.567)
12 mm (0.472)	330 ± 2.0 (13.0 ± 0.079) 178 ± 2.0 (7.0 ± 0.079)	1.5 (0.059)	13.0 ± 0.20 (0.51 ± 0.008)	20.2 (0.795)	50 (1.97)	14.4 (0.567)	18.4 (0.724)
16 mm (0.630)	330 ± 2.0 (13.0 ± 0.079) 178 ± 2.0 (7.0 ± 0.079)	1.5 (0.059)	13.0 ± 0.20 (0.51 ± 0.008)	20.2 (0.795)	50 (1.97)	18.4 (0.724)	22.4 (0.802)
24 mm (0.945)	330 ± 2.0 (13.0 ± 0.079) 178 ± 2.0 (7.0 ± 0.079)	1.5 (0.059)	13.0 ± 0.20 (0.51 ± 0.008)	20.2 (0.795)	50 (1.97)	26.4 (1.039)	30.4 (1.197)

SURFACE MOUNT TAPE AND REEL PACKAGING

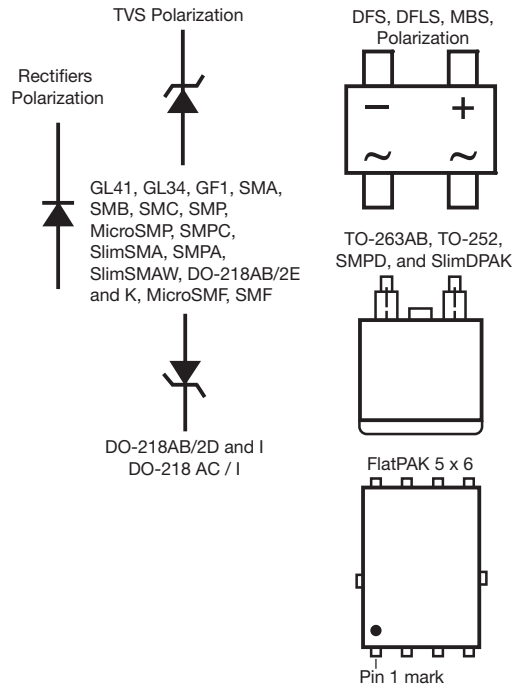
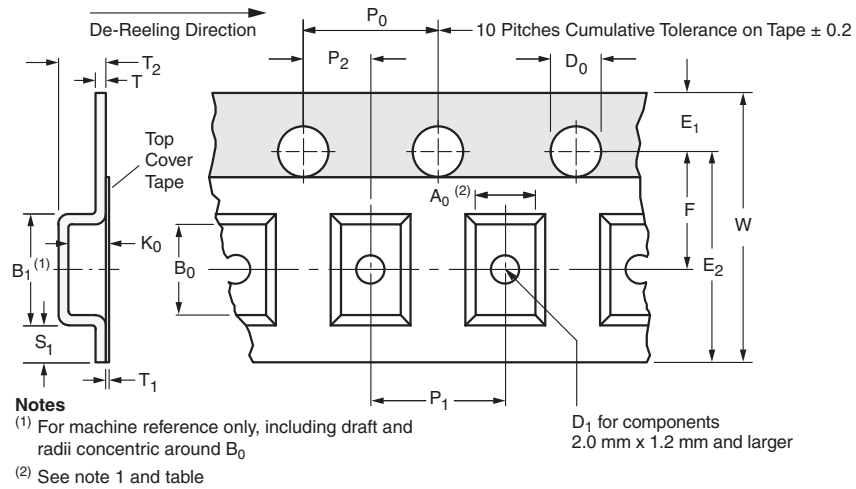


Fig. 8

8 mm, 12 mm, 16 mm, AND 24 mm EMBOSSED TAPE in millimeters (inches)								
TAPE SIZE	D_0	E_1	P_0	P_2	A_0, B_0, K_0	S_1 MIN.	T MAX.	T_1 MAX.
8 mm, 12 mm	1.5 \pm 0.1 (0.059 \pm 0.004)	1.75 \pm 0.1 (0.069 \pm 0.004)	4.0 \pm 0.1 (0.157 \pm 0.004)	2.0 \pm 0.05 (0.079 \pm 0.002)	(1)	0.6 (0.024)	0.600 (0.024)	0.1 (0.004)
16 mm, 24 mm				2.0 \pm 0.1 (0.079 \pm 0.004)				



DIMENSIONS in millimeters (inches)									
CASE TYPE	TAPE SIZE	B ₁ MAX.	D ₁ MIN.	E ₂ MIN.	F	P ₁	R REF.	T ₂ MAX.	W MAX.
GL34 (DO-213AA)	8 (0.315)	4.2 (0.165)	1.0 (0.039)	6.25 (0.246)	3.5 ± 0.05 (0.138 ± 0.002)	4.0 ± 0.10 (0.157 ± 0.004)	20 (0.787)	2.4 (0.094)	8.3 (0.327)
MicroSMP (DO-219AB) / MicroSMF (DO-219AD)		3.28 (0.129)		6.05 (0.238)				1.919 (0.076)	
SMF (DO-219AB)		-						1.8 (0.07)	8.2 (0.322)
GL34 (DO-213AA)	12 (0.472)	8.2 (0.323)	1.5 (0.059)	10.25 (0.404)	5.5 ± 0.05 (0.217 ± 0.002)	8.0 ± 0.10 (0.315 ± 0.004)	25 (0.984)	4.5 (0.177)	12.3 (0.484)
GF1 (DO-214BA)								3.25 (0.128)	
SMA (DO-214AC)								2.64 (0.104)	
SMP (DO-220AA)								1.84 (0.072)	
SMPC (TO-277A)		7.0 (0.276)						1.43 (0.056)	
SMB (DO-214AA) / SMBG (DO-215AA)		8.2 (0.323)						2.77 (0.109)	
SMC (DO-214AB) / SMCG (DO-215AB)	16 (0.630)	12.1 (0.476)	14.25 (0.561)	7.5 ± 0.1 (0.295 ± 0.004)	12.0 ± 0.10 (0.472 ± 0.004)	25 (0.984)	25 (0.984)	2.64 (0.104)	16.3 (0.642)
SlimDPAK (TO-252AE)								2.0 (0.079)	
DFS								3.91 (0.154)	
D ² PAK (TO-263AB) DO-218AB / AC	24 (0.945)	20.1 (0.791)	22.25 (0.876)	11.5 ± 0.1 (0.453 ± 0.004)	16.0 ± 0.10 (0.630 ± 0.004)	25 (0.984)	25 (0.984)	5.31 (0.209)	24.3 (0.957)
SMPD (TO-263AC)								12.0 ± 0.10 (0.472 ± 0.004)	
SlimSMA (DO-221AC) / SMPA (DO-221BC)	12 (0.472)	6.2 (0.244)	10.25 (0.404)	5.5 ± 0.05 (0.217 ± 0.002)	4.0 ± 0.10 (0.157 ± 0.004)	25 (0.984)	25 (0.984)	1.53 (0.060)	12.3 (0.484)
SlimSMAW (DO-221AD)								1.61 (0.063)	
FlatPAK 5 x 6								6.4 (0.252)	

Notes

- (1) A₀, B₀, and K₀ are determined by the maximum dimensions of the component size. The clearance between the component and the cavity must be within 0.05 mm (0.002") min. to 0.5 mm (0.02") max. for 8 mm tape and 12 mm tape, 0.15 mm (0.066") min. to 0.90 mm (0.035") max. for 16 mm tape and 0.15 mm (0.006") min. to 1.0 mm (0.59") max. for 24 mm tape
- (2) All surface mount components are packed in accordance with EIA standard 481-E



8. Electrical Parameters Verification

Type		SS26-E3
IR (uA), <400uA VR=60V Ta=25°C	Min	3.26
	Max	4.48
	Avg.	3.73
	Sigma	0.277
IR (mA), <10mA VR=60V Ta=100°C	Min	0.98
	Max	1.25
	Avg.	1.09
	Sigma	0.071
VF (V), <0.70V IF=2.0A Ta=25°C	Min	0.485
	Max	0.493
	Avg.	0.490
	Sigma	0.002



9. Reliability Qualification Report

Request Part Number		
Package	SMA, SMB, SMC	
FAB	SKY	

Package Qualification:	SMA, SMB, SMC	
Package Process Used	BYS10-45-E3	DO-214AC (SMA)
	SS26-E3	DO-214AA (SMB)
	SL44-E3	DO-214AB (SMC)

FAB Process:	Requested	MSS2P3-M3	SKY
FAB Process Used		BYS10-45-E3	SKY
		SS26-E3	SKY
		SL44-E3	SKY

Test Item & Condition	Duration	MSS2P3-M3	BYS10-45-E3	SS26-E3	SL44-E3
HTRB	Ta / Bias	95°C/ 30V	120°C/ 45V	105°C/ 60V	85°C/ 40V
	168 Hrs	0 / 77	0 / 77	0 / 77	0 / 77
	500 Hrs	0 / 77	0 / 77	0 / 77	0 / 77
	1000 Hrs	0 / 77	0 / 77	0 / 77	0 / 77
ESD Test (CDM)	500V		0 / 10		0 / 10
	1000V		0 / 10		0 / 10
ESD Test (HBM) @ 1500Ohm / 100pF	2KV	0 / 10	0 / 10	0 / 10	0 / 10
	6KV	0 / 10	0 / 10	0 / 10	0 / 10
	8KV	0 / 10	0 / 10	0 / 10	0 / 10
Solder Dip	POST	0 / 30	0 / 30	0 / 30	0 / 30
@ Bake:130°C/24H->Moisture Soak:85°C/85% RH/168H->Pre-heating & 265°C/10sec					
Terminal Strength @ 2.2LB/60sec	POST	0 / 30	0 / 30	0 / 30	0 / 30
Solderability @ 245°C/5sec	POST	0 / 10	0 / 10	0 / 10	0 / 10
Pre-conditioning		0 / 308	0 / 308	0 / 308	0 / 308
@ Bake:125°C/24H->Moisture Soak:85°C/85% RH/168H->Reflow 3 times:TP=260°C					
Temperature Cycling @ -55°C / +150°C / 30min.	168 Cycles	0 / 77	0 / 77	0 / 77	0 / 77
	500 Cycles	0 / 77	0 / 77	0 / 77	0 / 77
	1000 Cycles	0 / 77	0 / 77	0 / 77	0 / 77
UHAST @ 130°C / 85% R.H. / 33.3Psia.	24 Hrs	0 / 77	0 / 77	0 / 77	0 / 77
	48 Hrs	0 / 77	0 / 77	0 / 77	0 / 77
	96 Hrs	0 / 77	0 / 77	0 / 77	0 / 77
IOL @ DTJ=100°C / TON=TOFF=2min.	2520 Cycles	0 / 77	0 / 77	0 / 77	0 / 77
	7500 Cycles	0 / 77	0 / 77	0 / 77	0 / 77
	15000 Cycles	0 / 77	0 / 77	0 / 77	0 / 77
H3TRB @ 85°C/85% R.H./80% VRRM(max 100V)	168 Hrs		0 / 77	0 / 77	0 / 77
	500 Hrs		0 / 77	0 / 77	0 / 77
	1000 Hrs		0 / 77	0 / 77	0 / 77
HAST @ 110°C/85% R.H./80% VRRM(max 42V)/17.7 Psia	44 Hrs	0 / 77			
	132 Hrs	0 / 77			
	264 Hrs	0 / 77			



10. Soldering Profile

Soldering Process

VISHAY DIODES RECOMMENDED SOLDERING PROCESS

Through hole device (THD) and surface mount device (SMD) imply different soldering technologies leading to different constraints.

In THD, the package body is exposed to relatively low temperatures ($< 150\text{ }^{\circ}\text{C}$) because the lead extremities are only dipped in the soldering alloy, whereas in SMD the whole package body is exposed to a very high temperature ($> 240\text{ }^{\circ}\text{C}$) during reflow soldering process.

In addition, molding compounds used for encapsulation absorb moisture from the ambient medium. During rapid heating in solder reflow process; this absorbed moisture can vaporize, generating pressure at lead frame pad/silicon to plastic interfaces in the package, with a risk of package cracking and potential degradation of device reliability.

Wave soldering with SMD packages is not recommended because the thermal shock associated with package body solder dipping may induce internal structural damage to the package (interface delamination) that may affect long term reliability.

SMD package characterizations performed as a standard by Vishay only induce Solder Reflow Resistance assessment.

JEDEC® JESD A111 recommends that wave soldering of SMD packages should be evaluated by the USER, because the stress induced inside the package is very dependant of solder process parameters.

Due to the higher melting point of lead (Pb)-free alloys, the temperature of the solder pot will also increase to improve solderability and shorten contact times. For AgSnCu with melting point of $217\text{ }^{\circ}\text{C}$, the solder pot temperature will be between $250\text{ }^{\circ}\text{C}$ to $270\text{ }^{\circ}\text{C}$ or as high as $260\text{ }^{\circ}\text{C}$ to $280\text{ }^{\circ}\text{C}$ for SnCu.

RECOMMENDED WAVE SOLDERING PROFILE FOR THROUGH HOLE COMPONENTS

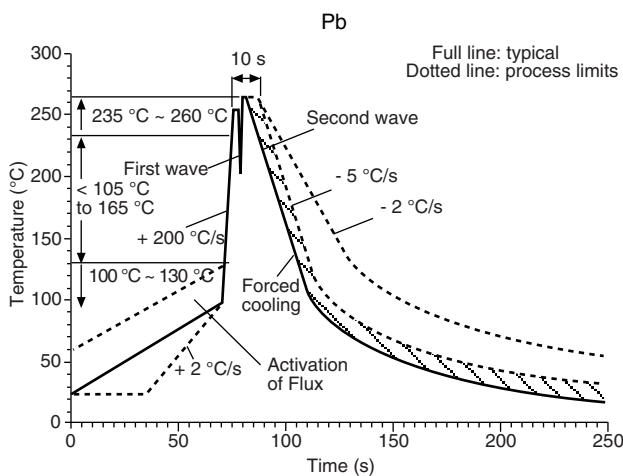
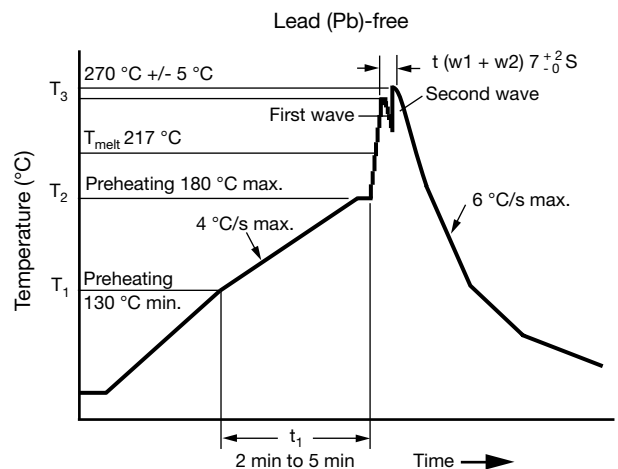


Fig. 1



Notes

- Temperature jump from T_2 to T_3 (w_1): $150\text{ }^{\circ}\text{C}$ max.
- Time from $25\text{ }^{\circ}\text{C}$ to T_3 (wave temp.): 8 min max.

Fig. 2

REFLOW FOR SURFACE MOUNTED COMPONENTS

TABLE 1 - CLASSIFICATION REFLOW PROFILE		
PROFILE FEATURE	Sn-Pb EUTECTIC ASSEMBLY	LEAD (Pb)-FREE ASSEMBLY
Preheat and soak		
Temperature min. ($T_{Smin.}$)	100 °C	150 °C
Temperature max. ($T_{Smax.}$)	150 °C	200 °C
Time ($T_{Smin.}$ to $T_{Smax.}$) (t_s)	60 s to 120 s	60 s to 120 s
Average ramp-up rate ($T_{Smax.}$ to T_p)	3 °C/s maximum	
Liquidus temperature (T_L)	183 °C	217 °C
Time to liquidus (t_l)	60 s to 150 s	60 s to 150 s
Peak package temperature (T_p) ⁽¹⁾	See classification temperature in table 2	See classification temperature in table 3
Time (t_p) ⁽²⁾ with 5 °C of the specified classification temperature (T_C)	20 s ⁽²⁾	30 s ⁽²⁾
Average ramp-down rate (T_p to $T_{Smax.}$)	6 °C/s maximum	
Time 25 °C to peak temperature	6 min maximum	8 min maximum

Notes

- (1) Tolerance for peak profile temperature (T_p) is defined as a supplier minimum and user maximum
 (2) Tolerance for time at peak profile temperature (T_p) is defined as a supplier minimum and user maximum

REFLOW PROFILE

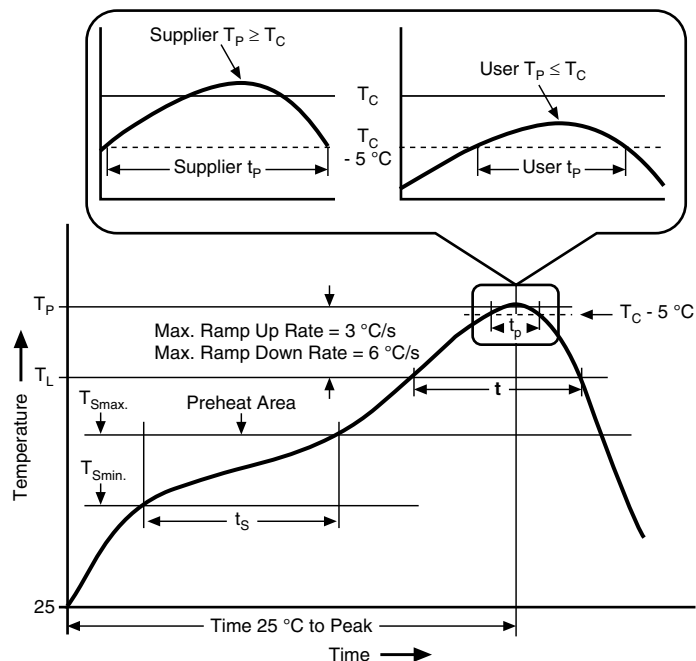


Fig. 3



TABLE 2 - Sn-Pb EUTECTIC PROCESS PACKAGE PEAK REFLOW TEMPERATURES		
PACKAGE THICKNESS	VOLUME mm³ < 350	VOLUME mm³ ≥ 350
< 2.5 mm	235 °C	220 °C
≥ 2.5 mm	220 °C	220 °C

TABLE 3 - LEAD (Pb) - FREE PROCESS PACKAGE CLASSIFICATION REFLOW TEMPERATURES			
PACKAGE THICKNESS	VOLUME mm³ < 350	VOLUME mm³ 350 to 2000	VOLUME mm³ > 2000
< 1.6 mm	260 °C	260 °C	260 °C
1.6 mm to 2.5 mm	260 °C	250 °C	245 °C
≥ 2.5 mm	250 °C	245 °C	245 °C

Tolerance: The device manufacturer / supplier shall assure process compatibility up to and including the stated classification temperature at the rated MSL level.

Notes

- Package volume excludes external terminals (balls, bumps, lands, leads) and/or non-integral heatsinks
- The maximum component temperature reached during reflow depends on package thickness and volume. The use of convection reflow processes reduces the thermal gradients between packages. However, thermal gradients due to differences in thermal mass of SMD packages may still exist
- Recommended soldering process is accordance with IPD / JEDEC® J-STD-020E. Copyright 2014



11. Materials Declaration Report

Part / Product Family Details		Material Declaration Sheet						Date	
		Vishay General Semiconductor - VGSC						22/Aug/22	
Vishay Part Number	RoHS Compliance Status	RoHS Compliance Date Code dd-mm-yyyy	Total product Weight (gm)	Resistance value	3rd Party Lab ICP Test Report Available	Manufacturing Location	Number of Exemption used		
B230LA-(HE)3 to B240A-(HE)3 B330LA-(HE)3 to B360A-(HE)3 B100-E3 to B100-E3 BYS10-xx-E3 BYS11-90-E3 BYS12-90-E3 SS19-(HE)3 SL12-(HE)3 to SL13-(HE)3 SS19A-(HE)3 to SS115A-(HE)3 SS12-(HE)3 to SS15-(HE)3 SS22B-(HE)3 to SS24B-(HE)3 SS25B-(HE)3 to SS25S-(HE)3 SSA23L-(HE)3 to SSA24-(HE)3 SSA33L-(HE)3 to SSA34-(HE)3	YES WITH EXEMPTION	01-12-2004	0.064	N/A	Yes	China	One		
Material Composition									
Homogenous Material Name	Material Classification	Substance Name	CAS number	Weight of Substance (gm)	With respect to Homogenous Material		% with respect to Total Product Weight	RoHS Exemptions Used	
Chip	Electronics (e.g. pc boards, displays)	Silicon and others (business secret)	-	0.00125	%	ppm	1.95		
Lead Frame	Copper (e.g. copper mounts in cable harnesses)	Copper	7440-50-8	0.0224	100.00	1000000	36.32		
Solder 92.5	Other special metals	Lead	7439-92-1	0.00236	92.50	925000	3.69	Exemption No:7(a)	
		Tin	7440-31-5	0.00013	5.00	50000	0.20		
		Silver	7440-22-4	0.00006	2.50	25000	0.10		
Encapsulation	Other dioxomers	Quartz (SiO2)	14808-60-7	0.02472	70.00	700000	38.62		
		Bis(chlorohydrin, o-cresol, formalde polymer	29690-82-2	0.00565	15.00	150000	8.83		
		Phenol-formaldehyde resin	9003-35-1	0.00424	12.00	120000	6.62		
		Antimony oxide (Sb2O3)	1309-64-1	0.00035	1.00	10000	0.55		
		Carbon-Black	1333-86-1	0.00059	0.25	2500	0.14		
Surface finish	Other special metals	Additive & know-how	-	0.00026	0.75	7500	0.41		
		Tin	7440-31-5	0.00163	100.00	1000000	2.55		
<p>EU-RoHS Directive 2015/863/EU - MCV of 0.1% by mass (1000 PPM) in homogeneous material for: Lead (Pb), Mercury, Hexavalent Chromium, Polybrominated Biphenyls (PBB), Polybrominated Diphenyl Ethers (PBDE) and MCV of 0.01% by mass cadmium, Bis(2-ethylhexyl) phthalate (DEHP), Butyl benzyl phthalate (BBP), Dibutyl phthalate (DBP) and Diisobutyl phthalate (DIBP)</p> <p>Exemption Used 7(a) - Lead in high melting temperature type solders (i.e. lead-based alloys containing 85 % by weight or more lead)</p> <p>Note :- (i) All information is based on data received from our vendors & subjected to change without prior notice. (ii) Substance weight are derived from MSDS.</p>									

Part / Product Family Details		Material Declaration Sheet						Date	
		Vishay General Semiconductor - VGSC						22/Aug/22	
Vishay Part Number	RoHS Compliance Status	RoHS Compliance Date Code dd-mm-yyyy	Total product Weight (gm)	Resistance value	3rd Party Lab ICP Test Report Available	Manufacturing Location	Number of Exemption used		
B340LB-E3 B350B-E3 to B360B-E3 SL22-(HE)3 to SL23-(HE)3 SS24B-(HE)3 to SS2410-(HE)3 SS24-(HE)3 to SS26-(HE)3 SS29-(HE)3 to SS210-(HE)3 SSB43L-(HE)3 to SSB44-(HE)3	YES WITH EXEMPTION	01-12-2004	0.093	N/A	Yes	China	One		
Material Composition									
Homogenous Material Name	Material Classification	Substance Name	CAS number	Weight of Substance (gm)	With respect to Homogenous Material		% with respect to Total Product Weight	RoHS Exemptions Used	
Chip	Electronics (e.g. pc boards, displays)	Silicon and others (business secret)	-	0.00269	%	ppm	3.97		
Lead Frame	Copper (e.g. copper mounts in cable harnesses)	Copper	7440-50-8	0.02600	100.00	1000000	38.71		
Solder 92.5	Other special metals	Lead	7439-92-1	0.00115	92.50	925000	3.38	Exemption No:7(a)	
		Tin	7440-31-5	0.00017	5.00	50000	0.18		
		Silver	7440-22-4	0.00009	2.50	25000	0.09		
Encapsulation	Other dioxomers	Quartz (SiO2)	14808-60-7	0.03352	70.00	700000	36.04		
		Bis(chlorohydrin, o-cresol, formalde polymer	29690-82-2	0.00767	15.00	150000	8.25		
		Phenol-formaldehyde resin	9003-35-1	0.00574	12.00	120000	6.18		
		Antimony oxide (Sb2O3)	1309-64-1	0.00048	1.00	10000	0.52		
		Carbon-Black	1333-86-1	0.00012	0.25	2500	0.13		
Surface finish	Other special metals	Additive & know-how	-	0.00036	0.75	7500	0.39		
		Tin	7440-31-5	0.00210	100.00	1000000	2.26		
<p>EU-RoHS Directive 2015/863/EU - MCV of 0.1% by mass (1000 PPM) in homogeneous material for: Lead (Pb), Mercury, Hexavalent Chromium, Polybrominated Biphenyls (PBB), Polybrominated Diphenyl Ethers (PBDE) and MCV of 0.01% by mass cadmium, Bis(2-ethylhexyl) phthalate (DEHP), Butyl benzyl phthalate (BBP), Dibutyl phthalate (DBP) and Diisobutyl phthalate (DIBP)</p> <p>Exemption Used 7(a) - Lead in high melting temperature type solders (i.e. lead-based alloys containing 85 % by weight or more lead)</p> <p>Note :- (i) All information is based on data received from our vendors & subjected to change without prior notice. (ii) Substance weight are derived from MSDS.</p>									



Material Declaration Sheet								Date		
Vishay General Semiconductor - VGSC								22/Aug/22		
Part / Product Family Details										
Vishay Part Number	RoHS Compliance Status	RoHS Compliance Date Code dd-mm-yyyy	Total product Weight (gm)	Resistance value	3rd Party Lab ICP Test Report Available	Manufacturing Location	Number of Exemption used			
SL42-0HE3 to SL44-0HE3 SS3HB-0HE3 to SS3H10-0HE3 SS32-0HE3 to SS36-0HE3 SSC3XL-0HE3 to SSC34-0HE3	YES WITH EXEMPTION	01-12-2004	0.235	N/A	Yes	China	One			
Material Composition										
Homogenous Material Name	Material Classification	Substance Name	CAS number	Weight of Substance (gm)	With respect to Homogenous Material		% with respect to Total Product Weight	RoHS Exemptions Used		
					%	ppm				
Chip	Electronics (e.g. pc boards, displays)	Silicon and others (business secret)	-	0.00592	100.00	1000000	9.52			
Lead Frame	Copper (e.g. copper amounts in cable harnesses)	Copper	7440-50-8	0.07332	100.00	1000000	31.20			
Solder 95.3	Other special metals	Lead	7439-92-1	0.00926	92.50	925000	3.51	Exemption No:7(a)		
		Tin	7440-31-5	0.00045	5.00	50000	0.19			
Encapsulation	Other diuretics	Silver	7440-22-4	0.00072	2.50	25000	0.10			
		Quartz (SiO2)	14808-60-7	0.10115	70.00	700000	13.04			
		Epichlorohydrin, o-cresol, formalde polymer	29690-82-2	0.02313	16.00	160000	9.84			
		Phenol-formaldehyde resin	9003-39-4	0.01124	12.00	120000	7.28			
		Inorganic oxide (SSG-10)	1309-64-4	0.00143	1.00	10000	0.61			
Surface Finish	Other special metals	Carbon-Black	1333-86-4	0.00035	0.25	2500	0.15			
		Phenol, 4,4'-(1-methylethylidene)bis(2,6-dibromo-, polymer w/	40039-93-8	0.00108	0.75	7500	0.46			
		Tin	7440-31-5	0.00135	100.00	1000000	1.00			
<p>EU-RoHS Directive- 2015/863/EU MCV of 0.1% by mass (1000 PPM) in homogeneous material for: Lead (Pb), Mercury, Hexavalent Chromium, Polybrominated Biphenyls (PBB), Polybrominated Diphenyl Ethers (PBDE) and MCV of 0.01% by mass cadmium, Bis(2-ethylhexyl) phthalate (DEHP), Butyl benzyl phthalate (BBP), Dibutyl phthalate (DBP) and Diisobutyl phthalate (DIBP)</p> <p>Exemption Used 7(a) - Lead in high melting temperature type solders (i.e. lead-based alloys containing 85 % by weight or more lead)</p> <p>Note :- (i) All information is based on data received from our vendors & subjected to change without prior notice. (ii) Substance weight are derived from MSDS.</p>										
Build Vishay into your Design				Vishay General Semiconductor - VGSC No. 88 6th Avenue TEDA Tianjin P.R. China ONE OF THE WORLD'S LARGEST MANUFACTURERS OF DISCRETE SEMICONDUCTORS AND PASSIVE COMPONENTS				One of the World's Largest Manufacturers of Discrete Semiconductors and Passive Components		

Material Declaration Sheet								Date		
Vishay General Semiconductor - VGSC								22/Aug/22		
Part / Product Family Details										
Vishay Part Number	RoHS Compliance Status	RoHS Compliance Date Code dd-mm-yyyy	Total product Weight (gm)	Resistance value	3rd Party Lab ICP Test Report Available	Manufacturing Location	Number of Exemption used			
B230LA-M3 to B240A-M3 B330LA-M3 to B390A-M3 B123-M3 to B190A-M3 BYS10-xx-M3 BYS11-90-M3 BYS12-90-M3 SL12-M3 to SL13-M3 SS18-M3 to SS1H10-M3 SS12-M3 to SS16-M3 SS22S-M3 to SS24S-M3 SS25S-M3 to SS26S-M3 SSA23L-M3 to SSA24-M3 SSA33L-M3 to SSA34-M3	YES WITH EXEMPTION	01-12-2004	0.064	N/A	Yes	China	One			
Material Composition										
Homogenous Material Name	Material Classification	Substance Name	CAS number	Weight of Substance (gm)	With respect to Homogenous Material		% with respect to Total Product Weight	RoHS Exemptions Used		
					%	ppm				
Chip	Electronics (e.g. pc boards, displays)	Silicon and others (business secret)	-	0.00125	100.00	1000000	1.95			
Lead Frame	Copper (e.g. copper amounts in cable harnesses)	Copper	7440-50-8	0.02324	100.00	1000000	36.32			
Solder 95.3	Other special metals	Lead	7439-92-1	0.00796	92.50	925000	3.69	Exemption No:7(a)		
		Tin	7440-31-5	0.00013	5.00	50000	0.20			
Encapsulation	Other diuretics	Silver	7440-22-4	0.00006	2.50	25000	0.10			
		Silica	69678-96-0	0.02320	80.00	800000	44.00			
		Epoxy Resin	29690-82-2	0.00326	10.00	100000	3.56			
		Phenol Resin	9003-39-4	0.00338	2.50	25000	3.28			
		Carbon-Black	1333-86-4	0.00018	0.50	5000	0.28			
Surface Finish	Other special metals	Tin	7440-31-5	0.00163	100.00	1000000	2.53			
<p>EU-RoHS Directive- 2015/863/EU MCV of 0.1% by mass (1000 PPM) in homogeneous material for: Lead (Pb), Mercury, Hexavalent Chromium, Polybrominated Biphenyls (PBB), Polybrominated Diphenyl Ethers (PBDE) and MCV of 0.01% by mass cadmium, Bis(2-ethylhexyl) phthalate (DEHP), Butyl benzyl phthalate (BBP), Dibutyl phthalate (DBP) and Diisobutyl phthalate (DIBP)</p> <p>Exemption Used 7(a) - Lead in high melting temperature type solders (i.e. lead-based alloys containing 85 % by weight or more lead)</p> <p>Note :- (i) All information is based on data received from our vendors & subjected to change without prior notice. (ii) Substance weight are derived from MSDS.</p>										
Build Vishay into your Design				Vishay General Semiconductor - VGSC No. 88 6th Avenue TEDA Tianjin P.R. China ONE OF THE WORLD'S LARGEST MANUFACTURERS OF DISCRETE SEMICONDUCTORS AND PASSIVE COMPONENTS				One of the World's Largest Manufacturers of Discrete Semiconductors and Passive Components		



Material Declaration Sheet								Date	
Vishay General Semiconductor - VGSC								22/Aug/22	
Part / Product Family Details									
Vishay Part Number	RoHS Compliance Status	RoHS Compliance Date Code dd-mm-yyyy	Total product Weight (gm)	Resistance value	3rd Party Lab ICP Test Report Available	Manufacturing Location	Number of Exemption used		
B340LB-M3 B350B-M3 to B360B-M3 SS22-M3 to SS23-M3 SS24B-M3 to SS24H-M3 SS22-M3 to SS26-M3 SS29-M3 to SS210-M3 SS843L-M3 to SS844-M3	YES WITH EXEMPTION	01-12-2004	0.093	N/A	Yes	China	One		
Material Composition									
Homogenous Material Name	Material Classification	Substance Name	CAS number	Weight of Substance (gm)	With respect to Homogenous Material		% with respect to Total Product Weight	RoHS Exemptions Used	
					%	ppm			
Chip	Electronics (e.g. pc boards, displays)	Silicon and others (business secret)		0.00360	100.00	1000000	3.87		
Lead Frame	Copper (e.g. copper amounts in cable harnesses)	Copper	7440-50-8	0.00600	100.00	1000000	66.71		
Solder 96.5	Other special metals	Lead	7439-92-1	0.00115	92.50	925000	1.26	Exemption No: 7(a)	
		Tin	7440-51-5	0.00017	5.00	50000	0.18		
		Silver	7440-22-1	0.00009	2.50	25000	0.09		
Encapsulation	Other dielectrics	Silica	80870-38-0	0.00334	80.00	800000	11.70		
		Epoxy Resin	99069-92-2	0.00179	10.00	100000	3.13		
Surface Finish	Other special metals	Carbon Black	1333-86-1	0.00024	0.30	5000	0.26		
		Tin	7440-51-5	0.00210	100.00	1000000	2.26		

EU-RoHS Directive- 2015/863/EU MCV of 0.1% by mass (1000 PPM) in homogenous material for: Lead (Pb), Mercury, Hexavalent Chromium, Polybrominated Biphenyls (PBB), Polybrominated Diphenyl Ethers (PBDE) and MCV of 0.01% by mass cadmium, Bis(2-ethylhexyl) phthalate (DEHP), Butyl benzyl phthalate (BBP), Dibutyl phthalate (DBP) and Diisobutyl phthalate (DIBP)

Exemption Used 7(a) - Lead in high melting temperature type solders (i.e. lead-based alloys containing 85% by weight or more lead)

Note :- (i) All information is based on data received from our vendors & subjected to change without prior notice.
(ii) Substance weight are derived from MSDS.

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No. 88 4th Avenue TIGI Tianjin P.R. China
ONE OF THE WORLD'S LARGEST MANUFACTURERS OF DISCRETE SEMICONDUCTORS AND PASSIVE COMPONENTS

One of the World's Largest Manufacturers of Discrete Semiconductors and Passive Components

Material Declaration Sheet								Date	
Vishay General Semiconductor - VGSC								22/Aug/22	
Part / Product Family Details									
Vishay Part Number	RoHS Compliance Status	RoHS Compliance Date Code dd-mm-yyyy	Total product Weight (gm)	Resistance value	3rd Party Lab ICP Test Report Available	Manufacturing Location	Number of Exemption used		
SL42-M3 to SL44-M3 SS319-M3 to SS3110-M3 SS32-M3 to SS36-M3 SSC36L-M3 to SSC34-M3	YES WITH EXEMPTION	01-12-2004	0.235	N/A	Yes	China	One		
Material Composition									
Homogenous Material Name	Material Classification	Substance Name	CAS number	Weight of Substance (gm)	With respect to Homogenous Material		% with respect to Total Product Weight	RoHS Exemptions Used	
					%	ppm			
Chip	Electronics (e.g. pc boards, displays)	Silicon and others (business secret)		0.00222	100.00	1000000	2.50		
Lead Frame	Copper (e.g. copper amounts in cable harnesses)	Copper	7440-50-8	0.07152	100.00	1000000	31.20		
Solder 96.5	Other special metals	Lead	7439-92-1	0.00026	92.50	925000	1.21	Exemption No: 7(a)	
		Tin	7440-51-5	0.00010	5.00	50000	0.19		
		Silver	7440-22-1	0.00002	2.50	25000	0.10		
Encapsulation	Other dielectrics	Silica	80870-38-0	0.11888	80.00	800000	51.18		
		Epoxy Resin	99069-92-2	0.01112	10.00	100000	6.13		
Surface Finish	Other special metals	Carbon Black	1333-86-1	0.00072	0.30	5000	0.31		
		Tin	7440-51-5	0.00025	100.00	1000000	1.20		

EU-RoHS Directive- 2015/863/EU MCV of 0.1% by mass (1000 PPM) in homogenous material for: Lead (Pb), Mercury, Hexavalent Chromium, Polybrominated Biphenyls (PBB), Polybrominated Diphenyl Ethers (PBDE) and MCV of 0.01% by mass cadmium, Bis(2-ethylhexyl) phthalate (DEHP), Butyl benzyl phthalate (BBP), Dibutyl phthalate (DBP) and Diisobutyl phthalate (DIBP)

Exemption Used 7(a) - Lead in high melting temperature type solders (i.e. lead-based alloys containing 85% by weight or more lead)

Note :- (i) All information is based on data received from our vendors & subjected to change without prior notice.
(ii) Substance weight are derived from MSDS.

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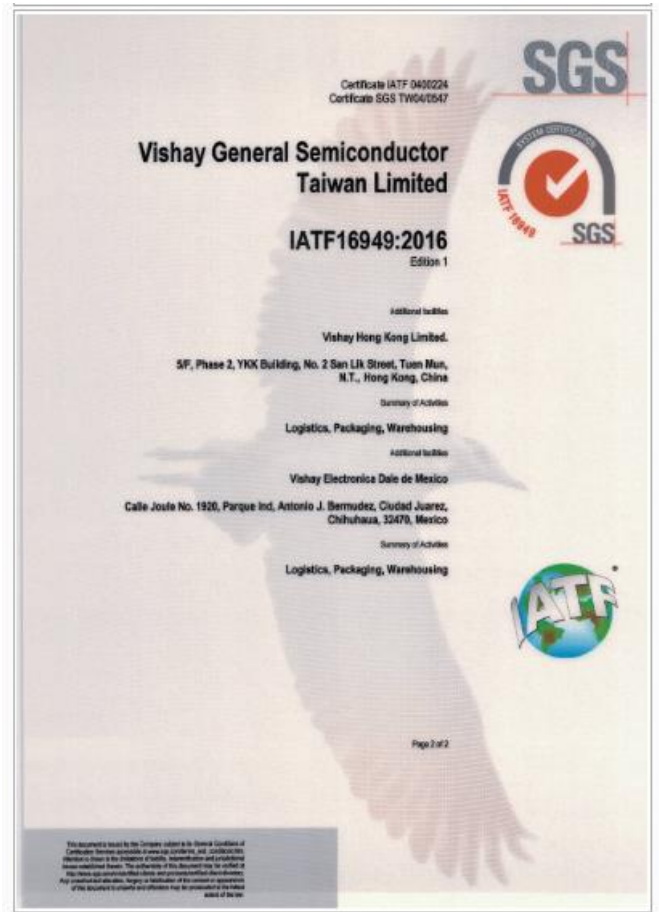
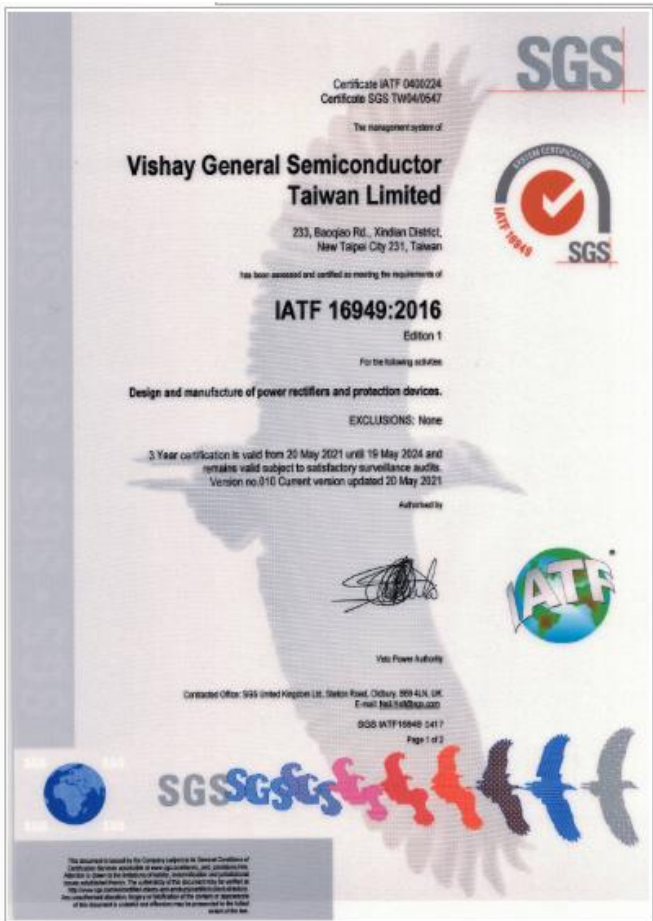
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ONE OF THE WORLD'S LARGEST MANUFACTURERS OF DISCRETE SEMICONDUCTORS AND PASSIVE COMPONENTS

One of the World's Largest Manufacturers of Discrete Semiconductors and Passive Components



12. Certificates

Locations		Country	City	Certificates			
Front-End	Vishay Taiwan	Taiwan	Taipei	IATF16949	ISO9001	ISO14001	ISO45001
Front-End	Subcon	China	Tianjin	IATF16949	ISO9001	ISO14001	ISO45001
Back-End	Vishay Tianjin	China	Tianjin	IATF16949	ISO9001	ISO14001	ISO45001
Back-End	Vishay Kaohsiung	Taiwan	Kaohsiung	IATF16949	ISO9001	ISO14001	ISO45001



DNV·GL

MANAGEMENT SYSTEM CERTIFICATE

Certificate No.: 132648-2013-AQ-80C-IATF Valid until: 12 May 2021 - 08 May 2023
 IATF Certificate No.: 0398042

This is to certify that the management system of

Vishay General Semiconductor (China) Co., Ltd.

No. 88, 6th Avenue, TEDA, Tianjin, P.R. China and, if applicable, the remote support locations as mentioned in the Appendix accompanying this Certificate

has been found to conform to quality management system standard:
IATF 16949:2016

This certificate is valid for the following Scope:
DESIGN AND MANUFACTURE OF POWER RECTIFIERS AND PROTECTION DEVICES

Place and date:
 Katy, TX, 12 May 2021

For the issuing office:
 DNV GL - Business Assurance
 1400 Bayville Drive, Katy, TX 77449-5164 USA

Sherif Hekbar
 Management Representative

Lack of fulfillment of conditions as set out in the Certification Agreement may render this Certificate invalid.
 03/2020/001-001-01 - Business Assurance, 1400 Bayville Drive, Katy, TX 77449, Tel: 281-490-1200, www.dnvgl.com

Page 1 of 2

DNV·GL

Certificate No.: 132648-2013-AQ-80C-IATF
 IATF Certificate No.: 0398042
 Place and date: Katy, TX, 12 May 2021

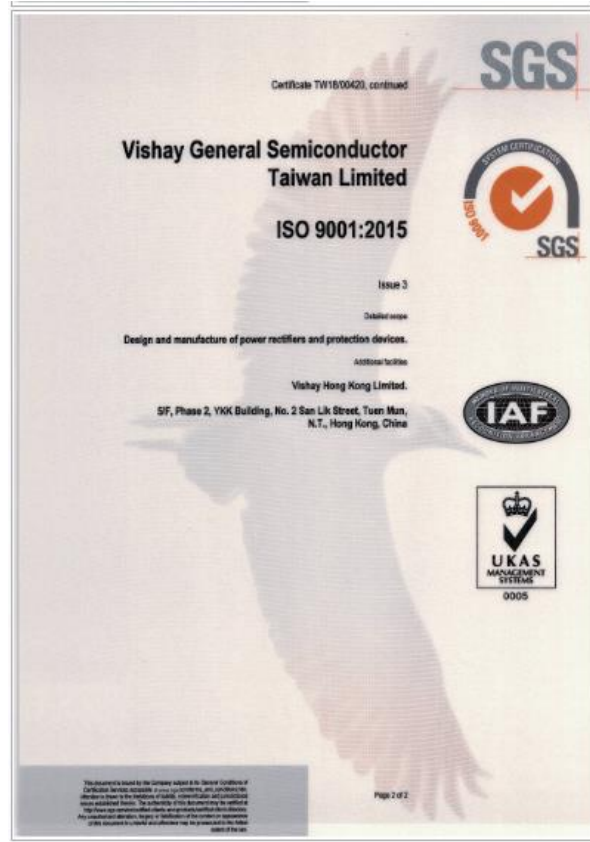
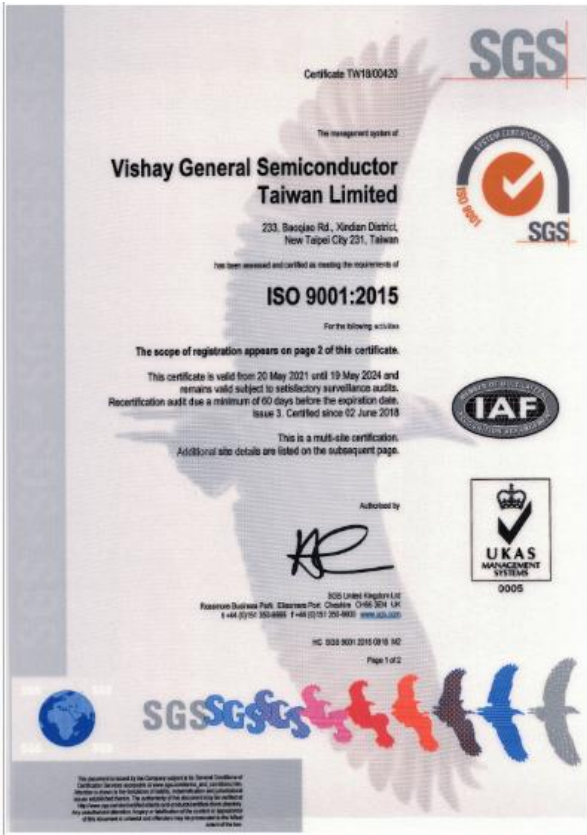
Appendix to Certificate

Vishay General Semiconductor (China) Co., Ltd.
 Remote Support Locations included in the certification are as follows:

Name	Address	RSL Activities	Certification Body
Vishay Hong Kong Limited	5/F, Phase 2, YKK Building, No.2 San Lik Street, Tuen Mun, N.T., Hong Kong	Logistic, Packaging, Warehousing	SGS
Vishay General Semiconductor Taiwan Limited	No. 233 Fao Chiao Road, Hsin Tien District, New Taipei City, Taiwan	Marketing, Product Design	SGS
Vishay SA	139 Boulevard de la Madeleine, 09003, Nice Cedex 1, France	Contract Review, Customer Service	BVC
Vishay Semiconductor Italiana SPA	VIA LIGURIA49-10071 BORGARO TORINESE (TO)	Product Design	CISQ
Vishay Semiconductor (Austria) Ges.m.b.H	Telefunkamstrasse 5, 4840 Vöcklabruck, Austria	Product Design	TUV SUD
Vishay Juarez Regional Warehouse	Calle Joule No. 1920, Parque Ind, Antonio J. Bermudez, Ciudad Juarez, Chihuahua, Mexico	Distribution, Logistic, Packing, Warehousing	BSI
VISHAY INTERTECHNOLO GY ASIA PTE. LTD.	37A TAMPINES STREET 02 #07-01 SG-528886 SINGAPORE	Customer Service	SIRIM QAS

Lack of fulfillment of conditions as set out in the Certification Agreement may render this Certificate invalid.
 03/2020/001-001-01 - Business Assurance, 1400 Bayville Drive, Katy, TX 77449, Tel: 281-490-1200, www.dnvgl.com

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CERTIFICATE

The Certification Body
of TÜV SÜD Management Service GmbH
certifies that

Tianjin Huanxin Technology Development Co., Ltd.
No.12-B East Haitai Road, Huayuan Industrial Park
Tianjin City, P.R. China
Post Code: 300384

Unified social credit code: 91120116675967105W

has established and applies
a Quality Management System for

**Design, Manufacture, Sales and Service of
Silicon Semiconductor Device.**

An audit was performed, Order No. 748332450.
Proof has been furnished that the requirements
according to

ISO 9001:2015

are fulfilled.

The certificate is valid from 2021-03-30 until 2024-03-29.
The certified organization shall undergo and pass
the regular surveillance audit to maintain the validity of this certificate.
Certificate Registration No.: 12 100 59630 TMS.

Information about this certificate can be inquired at the official website
of Certification and Accreditation Administration of the People's Republic of China (www.cnca.gov.cn).

Head of Certification Body
Munich, 2021-04-06

TÜV SÜD Management Service GmbH • Zertifizierungsstelle • Riederstrasse 57 • 80329 München • Germany
www.tuv-sud.de/certificate-validity-check

CERTIFICATE

The Certification Body
of TÜV SÜD Management Service GmbH
certifies that

Tianjin Huanxin Technology Development Co., Ltd.
No.12-B East Haitai Road, Huayuan Industrial Park
Tianjin City, P.R. China
Post Code: 300384

has established and applies
a Quality Management System for

**Design and Manufacture of Silicon Semiconductor Device
(with Product Design as per Chapter 8.3).**

An audit was performed and has furnished proof
that the requirements according to

**IATF 16949
First Edition 2016-10-01**

are fulfilled.

Issue date: 2021-03-30
Expiry date: 2024-03-29

Certificate Registration No.: 12 111 59630 TMS
IATF Certificate No.: 0392066

Part of the certificate is an appendix.

Head of Certification Body
Munich, 2022-02-11

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Appendix of Certificate Registration No.:
12 111 59630 TMS
IATF Certificate No.: 0392066

Tianjin Huanxin Technology Development Co., Ltd.
No.12-B East Haitai Road, Huayuan Industrial Park
Tianjin City, P.R. China
Post Code: 300384

The site is supported by the following remote locations:

Address	Supporting functions
Tianjin Huanxin Electronic Technology Co., Ltd. No.12-A2 East Haitai Road, Huayuan Industrial Park Tianjin City, P.R. China Post Code: 300384	Purchasing, Supplier management

Head of Certification Body
Munich, 2022-02-11

Page 2 of 2

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13. Revision History

Rev#	Date	Revision history
1	2023/03/20	Convert to new QualPack format

--End of Report--