Additional In-House Backend Assembly Site for Automotive Grade Rectifiers and TVS Products in SMP Package

For further information, please contact your regional Vishay office.

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Description of Change: To support BCP (Business Continuity Program), Vishay Diodes Division is introducing an additional in-house back-end manufacturing site for Automotive Grade products in SMP package (Case Outline: DO-220AA).
This assembly site is located in Kaohsiung, Taiwan, and already has manufacturing experience in Automotive Grade surface mount packaged products. There is no change in form, fit and function on all involved part numbers.

Classification of Change: Capacity expansion and risk management

Expected Influence on Quality/Reliability/Performance: No change 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 Aug 3, 2023

Sample Availability: Available upon request

Product Identification: The new manufacturing code “K” will be marked next to the date code of device marking as the identification of Additional manufacturing site, for example, “M34K” (M – halogen-free compound, 3 - 2023, 4 – April, K – Kaohsiung, Taiwan).

Qualification Data: Available upon request

This PCN is considered approved, without further notification, unless we receive specific customer concerns before Wed Aug 2, 2023 or as specified by contract.

Issued By: Alessandro Bonaudo, Eddie Hwang, Ivan Chen, Jill Li

AR1PDHM3/84A	AR1PDHM3/85A	AR1PGHM3/84A	AR1PGHM3/85A	AR1PJHM3/84A
AR1PJHM3/85A	AR1PKHM3/84A	AR1PKHM3/85A	AR1PMHM3/84A	AR1PMHM3/85A
AS1PDHM3/84A	AS1PDHM3/85A	AS1PGHM3/84A	AS1PGHM3/85A	AS1PJHM3/84A
AS1PJHM3/85A	AS1PKHM3/84A	AS1PKHM3/85A	AS1PMHM3/84A	AS1PMHM3/85A
AU1PDHM3/84A	AU1PDHM3/85A	AU1PGHM3/84A	AU1PGHM3/85A	AU1PJHM3/84A
AU1PJHM3/85A	AU1PKHM3/84A	AU1PKHM3/85A	AU1PMHM3/84A	AU1PMHM3/85A
ES1PBHM3/84A	ES1PBHM3/85A	ES1PCHM3/84A	ES1PCHM3/85A	ES1PDHM3/84A
ES1PDHM3/85A	ESH1PBHM3/84A	ESH1PBHM3/85A	ESH1PCHM3/84A	ESH1PCHM3/85A
ESH1PD-001HM3/84A	ESH1PDHM3/84A	ESH1PDHM3/85A	ESH2PB-61HM3J/H	ESH2PBHM3/84A
ESH2PBHM3/85A	ESH2PCHM3/84A	ESH2PCHM3/85A	ESH2PDHM3/84A	ESH2PDHM3/85A
RS1PBHM3_A/H	RS1PBHM3_A/I	RS1PDHM3_A/H	RS1PDHM3_A/I	RS1PGHM3_A/H
RS1PGHM3_A/I	RS1PJHM3_A/H	RS1PJHM3_A/I	S1PBHM3/84A	S1PBHM3/85A
S1PDHM3/84A	S1PDHM3/85A	S1PGHM3/84A	S1PGHM3/85A	S1PJHM3J/84A
S1PJHM3/84A	S1PJHM3/85A	S1PKHM3/84A	S1PKHM3/85A	S1PMHM3/84A
S1PMHM3/85A	SE10PBHM3/84A	SE10PBHM3/85A	SE10PDHM3/84A	SE10PDHM3/85A
SE10PGHM3/84A	SE10PGHM3/85A	SE10PJHM3/84A	SE10PJHM3/85A	SE15PBHM3/84A
SE15PBHM3/85A	SE15PDHM3/84A	SE15PDHM3/85A	SE15PGHM3/84A	SE15PGHM3/85A
SE15PJHM3/84A	SE15PJHM3/85A	SE20PBHM3/84A	SE20PBHM3/85A	SE20PDHM3/84A
SE20PDHM3/85A	SE20PGHM3/84A	SE20PGHM3/85A	SE20PJHM3/84A	SE20PJHM3/85A
SS1P3LHM3/84A	SS1P3LHM3/85A	SS1P4LHM3/84A	SS1P4LHM3/85A	SS1P5LHM3/84A
SS1P5LHM3/85A	SS1P6LHM3/84A	SS1P6LHM3/85A	SS2P2HM3/84A	SS2P2HM3/85A
SS2P2LHM3/84A	SS2P2LHM3/85A	SS2P3HM3/84A	SS2P3HM3/85A	SS2P3LHM3/84A
SS2P3LHM3/85A	SS2P4-001HM3/85A	SS2P4HM3/84A	SS2P4HM3/85A	SS2P5HM3/84A
SS2P5HM3/85A	SS2P6HM3/84A	SS2P6HM3/85A	SS2PH10HM3_A/H	SS2PH10HM3_A/I
SS2PH5HM3/84A	SS2PH5HM3/85A	SS2PH6HM3/84A	SS2PH6HM3/85A	SS2PH9HM3J_A/H
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SS3P4HM3J/84A	SS3P4HM3/84A	SS3P4HM3/85A	SS3P5HM3/84A	SS3P5HM3/85A
SS3P6-61HM3J/H	SS3P6HM3J/85A	SS3P6HM3/84A	SS3P6HM3/85A	TPSMP10AHM3_A/H
TPSMP10AHM3_A/I	TPSMP11AHM3_A/H	TPSMP11AHM3_A/I	TPSMP12AHM3_A/H	TPSMP12AHM3_A/I
TPSMP13AHM3_A/H	TPSMP13AHM3_A/I	TPSMP15AHM3_A/H	TPSMP15AHM3_A/I	TPSMP16AHM3_A/H
TPSMP16AHM3_A/I	TPSMP18AHM3_A/H	TPSMP18AHM3_A/I	TPSMP20AHM3_A/H	TPSMP20AHM3_A/I
TPSMP22AHM3_A/H	TPSMP22AHM3_A/I	TPSMP24AHM3_A/H	TPSMP24AHM3_A/I	TPSMP27AHM3J_A/H
TPSMP27AHM3_A/H	TPSMP27AHM3_A/I	TPSMP30AHM3_A/H	TPSMP30AHM3_A/I	TPSMP33AHM3_A/H
TPSMP33AHM3_A/I	TPSMP36AHM3_A/H	TPSMP36AHM3_A/I	TPSMP39AHM3_A/H	TPSMP39AHM3_A/I
TPSMP43AHM3_A/H	TPSMP43AHM3_A/I	TPSMP6.8AHM3_A/H	TPSMP6.8AHM3_A/I	TPSMP7.5AHM3_A/H
TPSMP7.5AHM3_A/I	TPSMP8.2AHM3_A/H	TPSMP8.2AHM3_A/I	TPSMP9.1AHM3_A/H	TPSMP9.1AHM3_A/I
V2P6LHM3/H	V2P6LHM3/I	V2P6XHM3/H	V2P6XHM3/I	V2PL45LHM3/H
V2PL45LHM3/I	V2PL63LHM3/H	V2PL63LHM3/I	V2PM10LHM3/H	V2PM10LHM3/I
V2PM12LHM3/H	V2PM12LHM3/I	V2PM15LHM3/H	V2PM15LHM3/I	V2PM63LHM3/H
V2PM63LHM3/I	V2PM6LHM3/H	V2PM6LHM3/I	V3P6HM3_A/H	V3P6HM3_A/I
V3P6LHM3/H	V3P6LHM3/I	V3PL45HM3/H	V3PL45HM3/I	V3PL63HM3/H
V3PL63HM3/I	V3PM10HM3/H	V3PM10HM3/I	V3PM12HM3/H	V3PM12HM3/I
V3PM15HM3/H	V3PM15HM3/I	V3PM63HM3/H	V3PM63HM3/I	V3PM6HM3/H
V3PM6HM3/I				

VISHAY

Diodes

P P A P

Product:

Customer:

Revision:

Date of Revision:

PPAP No: 2023-000-Kaohsiung

Production Part Approval Process (PPAP)

Vishay Part Number

Customer Part Number

FRONT END Location

Supplier Name	Vishay General Semiconductor Taiwan Ltd.
City	New Taipei
State Zip	23145 Taiwan

BACK END Location

Supplier Name	Vishay General Semiconductor Taiwan, Ltd.
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State Zip	81170 Taiwan
Internet	www.vishay.com

PRODUCTION PART APPROVAL PROCESS

1.
Design Records

Surface Mount Ultrafast Avalanche Rectifiers

eSMP® Series

SMP (DO-220AA)

Cathode ○—|◀|—○ Anode

AUTOMOTIVE GRADE Available

RoHS COMPLIANT

HALOGEN FREE

FEATURES

- Very low profile - typical height of 1.0 mm
- Ideal for automated placement
- Glass passivated pellet chip junction
- Ultrafast recovery times for high frequency
- Low reverse current
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- AEC-Q101 qualified
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

LINKS TO ADDITIONAL RESOURCES

3D Models

PRIMARY CHARACTERISTICS	
$I_{F(AV)}$	1.0 A
V_{RRM}	200 V, 400 V, 600 V, 800 V, 1000 V
I_{FSM}	30 A, 25 A
t_{rr}	75 ns
I_R	1 µA
E_{AS}	20 mJ
V_F at I_F = 1.0 A	1.6 V
T_J max.	175 °C
Package	SMP (DO-220AA)
Circuit configuration	Single

TYPICAL APPLICATIONS

For use in secondary rectification and freewheeling for ultrafast switching speeds of AC/AC and DC/DC converters in high temperature conditions for both consumer and automotive applications.

MECHANICAL DATA

Case: SMP (DO-220AA)
Molding compound meets UL 94 V-0 flammability rating
Base P/N-M3 - halogen-free, RoHS-compliant, and commercial grade
Base P/NHM3 - halogen-free, RoHS-compliant, and automotive grade

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

MAXIMUM RATINGS (T_A = 25 °C unless otherwise noted)

PARAMETER	SYMBOL	AU1PD	AU1PG	AU1PJ	AU1PK	AU1PM	UNIT
Device marking code		AUD	AUG	AUJ	AUK	AUM	
Maximum repetitive peak reverse voltage	V_{RRM}	200	400	600	800	1000	V
Average forward current	$I_{F(AV)}$	1.0					A
Peak forward surge current 10 ms single half sine-wave superimposed on rated load	I_{FSM}	30			25		A
Non-repetitive avalanche energy at I_{AS} = 1.0 A, T_A = 25 °C	E_{AS}	20					mJ
Operating junction and storage temperature range	T_J, T_{STG}	-55 to +175					°C

ELECTRICAL CHARACTERISTICS (T_A = 25 °C unless otherwise noted)									
PARAMETER	**TEST CONDITIONS**		**SYMBOL**	**AU1PD**	**AU1PG**	**AU1PJ**	**AU1PK**	**AU1PM**	**UNIT**
Maximum instantaneous forward voltage	I_F = 1.0 A	T_A = 25 °C	V_F (1)	1.5			1.85		V
		T_A = 125 °C		1.4			1.6		
Maximum reverse current	Rated V_R	T_A = 25 °C	I_R (2)	1.0					µA
		T_A = 125 °C		100					
Maximum reverse recovery time	I_F = 0.5 A, I_R = 1.0 A, I_{rr} = 0.25 A		t_{rr}	75					ns
Typical junction capacitance	4.0 V, 1 MHz		C_J	11			7.5		pF

Notes

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

(2) Pulse test: pulse width ≤ 40 ms

THERMAL CHARACTERISTICS (T_A = 25 °c unless otherwise noted)								
PARAMETER	**SYMBOL**	**AU1PD**	**AU1PG**	**AU1PJ**	**AU1PK**	**AU1PM**	**UNIT**
Typical thermal resistance	$R_{\theta JA}$ (1)	132					°C/W
	$R_{\theta JM}$ (1)	15					

Note

(1) Free air, mounted on recommended copper pad area. Thermal resistance $R_{\theta JA}$ - junction to ambient, $R_{\theta JM}$ - junction to mount at the terminal cathode band

ORDERING INFORMATION (Example)				
PREFERRED P/N	**UNIT WEIGHT (g)**	**PREFERRED PACKAGE CODE**	**BASE QUANTITY**	**DELIVERY MODE**
AU1PJ-M3/84A	0.024	84A	3000	7" diameter plastic tape and reel
AU1PJ-M3/85A	0.024	85A	10 000	13" diameter plastic tape and reel
AU1PJHM3/84A (1)	0.024	84A	3000	7" diameter plastic tape and reel
AU1PJHM3/85A (1)	0.024	85A	10 000	13" diameter plastic tape and reel

Note

(1) AEC-Q101 qualified

RATINGS AND CHARACTERISTICS CURVES (T_A = 25 °c unless otherwise noted)

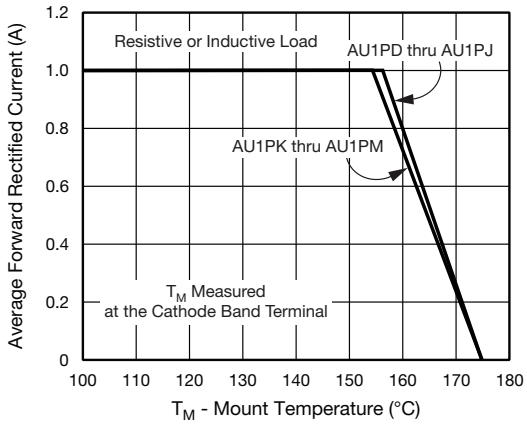


Fig. 1 - Maximum Forward Current Derating Curve

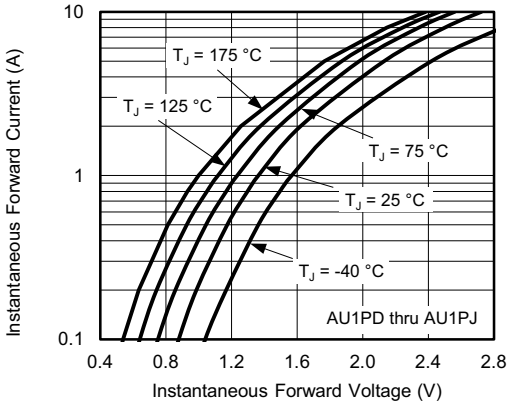


Fig. 4 - Typical Instantaneous Forward Characteristics

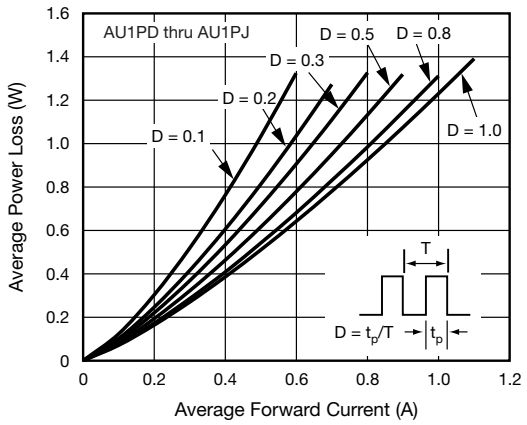


Fig. 2 - Forward Power Loss Characteristics

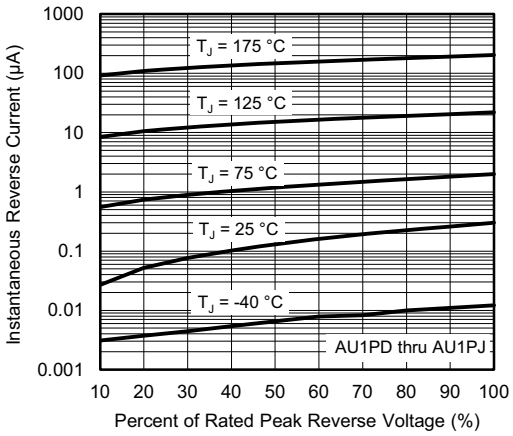


Fig. 5 - Typical Instantaneous Forward Characteristics

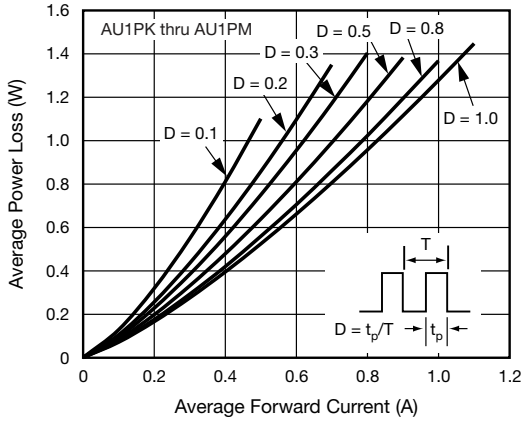


Fig. 3 - Forward Power Loss Characteristics

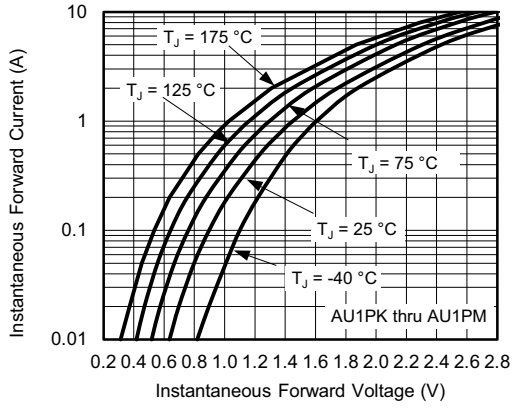


Fig. 6 - Typical Reverse Characteristics

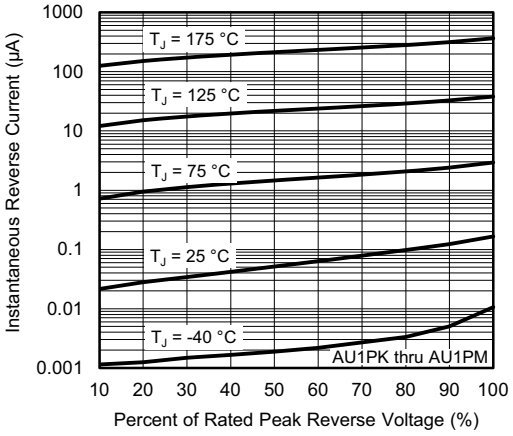


Fig. 7 - Typical Reverse Characteristics

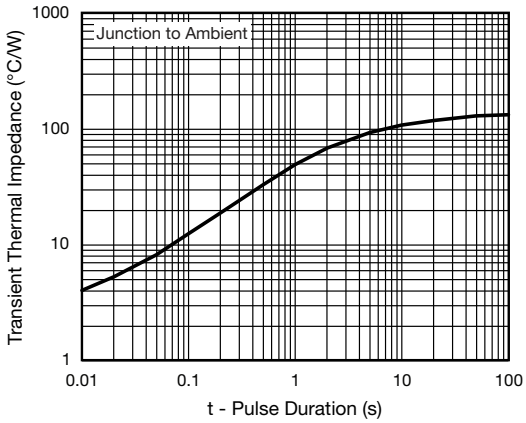


Fig. 9 - Typical Transient Thermal Impedance

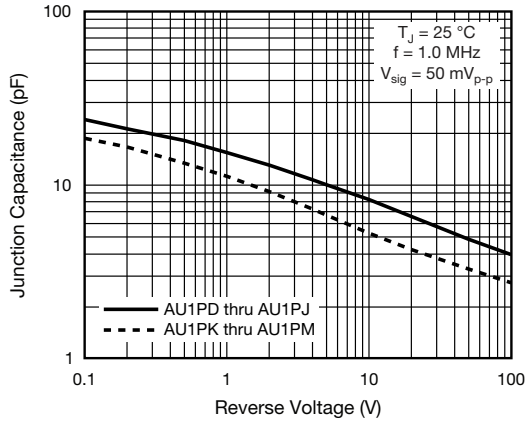
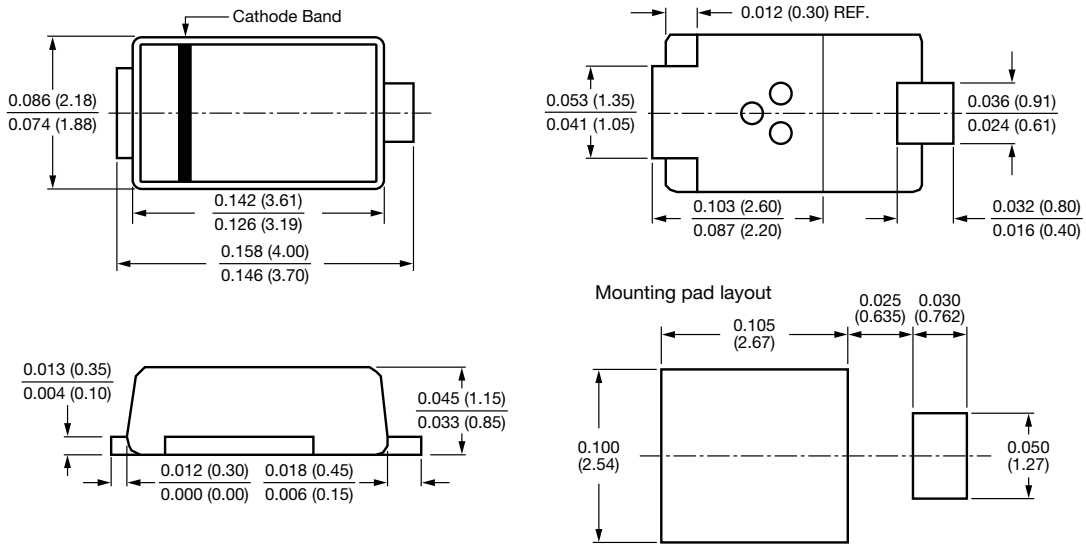


Fig. 8 - Typical Junction Capacitance

PACKAGE OUTLINE DIMENSIONS in inches (millimeters)

SMP (DO-220AA)



SE10PB, SE10PD, SE10PG, SE10PJ

Vishay General Semiconductor

Surface Mount ESD Capability Rectifiers

eSMP® Series

SMP (DO-220AA)

Cathode ○—▶|—○ Anode

FEATURES

- Very low profile - typical height of 1.0 mm
- Ideal for automated placement
- Oxide planar chip junction
- Low forward voltage drop
- Typical I_R less than 0.1 µA
- ESD capability
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- AEC-Q101 qualified
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

AUTOMOTIVE GRADE

RoHS COMPLIANT

HALOGEN FREE

LINKS TO ADDITIONAL RESOURCES

3D Models

PRIMARY CHARACTERISTICS	
$I_{F(AV)}$	1.0 A
V_{RRM}	100 V, 200 V, 400 V, 600 V
I_R	5 µA
V_F at I_F = 1.0 A	0.86 V
T_J max.	175 °C
Package	SMP (DO-220AA)
Circuit configuration	Single

TYPICAL APPLICATIONS

General purpose, power line polarity protection and rail-to-rail protection in consumer, industrial, and automotive applications.

MECHANICAL DATA

Case: SMP (DO-220AA)
Molding compound meets UL 94 V-0 flammability rating
Base P/N-M3 - halogen-free, RoHS-compliant, and commercial grade
Base P/NHM3 - halogen-free, RoHS-compliant, and automotive grade

Terminals: matte tin plated leads, solderable per J-STD-002 and JESD 22-B102
M3 suffix meets JESD 201 class 1A whisker test, HM3 suffix meets JESD 201 class 2 whisker test

MAXIMUM RATINGS (T_A = 25 °C unless otherwise noted)

PARAMETER	SYMBOL	SE10PB	SE10PD	SE10PG	SE10PJ	UNIT
Device marking code		10B	10D	10G	10J	
Max. repetitive peak reverse voltage	V_{RRM}	100	200	400	600	V
Average forward current	$I_{F(AV)}$	1.0				A
Peak forward surge current 10 ms single half sine-wave superimposed on rated load	I_{FSM}	25				A
Operating junction and storage temperature range	T_J, T_{STG}	-55 to +175				°C

ELECTRICAL CHARACTERISTICS (T_A = 25 °C unless otherwise noted)						
PARAMETER	TEST CONDITIONS		SYMBOL	TYP.	MAX.	UNIT
Max. instantaneous forward voltage	I_F = 1.0 A	T_A = 25 °C	V_F (1)	0.960	1.05	V
		T_A = 125 °C		0.860	0.95	
Max. reverse current	Rated V_R	T_A = 25 °C	I_R (2)	-	5.0	μA
		T_A = 125 °C		4.8	50	
Max. reverse recovery time	I_F = 0.5 A, I_R = 1.0 A, I_{rr} = 0.25 A		t_{rr}	780	-	ns
Typical junction capacitance	4.0 V, 1 MHz		C_J	7.0	-	pF

Notes

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

(2) Pulse test: Pulse width ≤ 40 ms

THERMAL CHARACTERISTICS (T_A = 25 °C unless otherwise noted)						
PARAMETER	SYMBOL	SE10PB	SE10PD	SE10PG	SE10PJ	UNIT
Typical thermal resistance	$R_{\theta JA}$ (1)	105				°C/W
	$R_{\theta JL}$ (1)	25				
	$R_{\theta JC}$ (1)	30				

Note

(1) Thermal resistance from junction to ambient and junction to lead mounted on PCB with 5.0 mm x 5.0 mm copper pad areas. $R_{\theta JL}$ is measured at the terminal of cathode band. $R_{\theta JC}$ is measured at the top center of the body.

IMMUNITY TO ELECTRICAL STATIC DISCHARGE TO THE FOLLOWING STANDARDS (T_A = 25 °C unless otherwise noted)					
STANDARD	TEST TYPE	TEST CONDITIONS	SYMBOL	CLASS	VALUE
AEC-Q101-001	Human body model (contact mode)	C = 100 pF, R = 1.5 kΩ	V_C	H3B	> 8 kV
AEC-Q101-002	Machine model (contact mode)	C = 200 pF, R = 0 Ω		M4	> 400 V
JESD22-A114	Human body model (contact mode)	C = 100 pF, R = 1.5 kΩ		3B	> 8 kV
JESD22-A115	Machine model (contact mode)	C = 200 pF, R = 0 Ω		C	> 400 V
IEC 61000-4-2 (2)	Human body model (contact mode)	C = 150 pF, R = 330 Ω		4	> 8 kV
	Human body model (air-discharge mode) (1)	C = 150 pF, R = 330 Ω		4	> 15 kV

Notes

(1) Immunity to IEC 61000-4-2 air discharge mode has a typical performance > 30 kV

(2) System ESD standard

ORDERING INFORMATION (Example)				
PREFERRED P/N	UNIT WEIGHT (g)	PREFERRED PACKAGE CODE	BASE QUANTITY	DELIVERY MODE
SE10PJ-M3/84A	0.024	84A	3000	7" diameter plastic tape and reel
SE10PJ-M3/85A	0.024	85A	10 000	13" diameter plastic tape and reel
SE10PJHM3/84A (1)	0.024	84A	3000	7" diameter plastic tape and reel
SE10PJHM3/85A (1)	0.024	85A	10 000	13" diameter plastic tape and reel

Note

(1) Automotive grade

RATINGS AND CHARACTERISTICS CURVES (T_A = 25 °C unless otherwise noted)

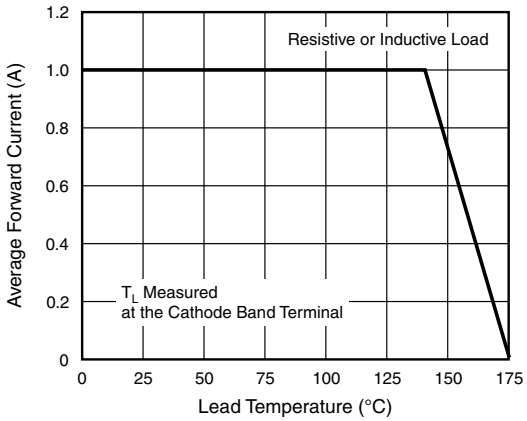


Fig. 1 - Max. Forward Current Derating Curve

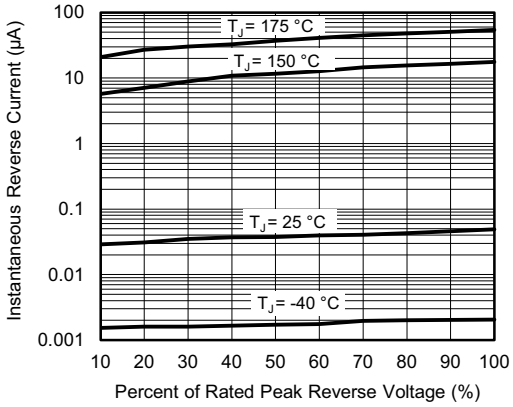


Fig. 4 - Typical Instantaneous Forward Characteristics

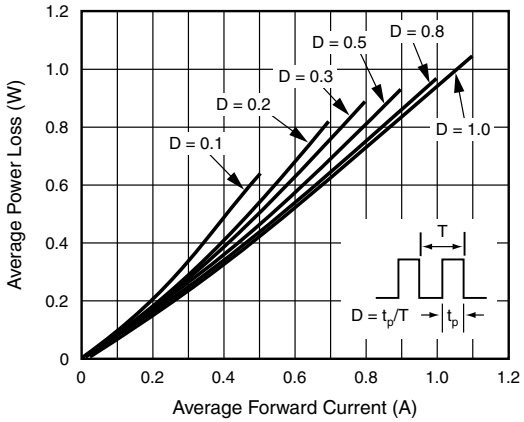


Fig. 2 - Forward Power Loss Characteristics

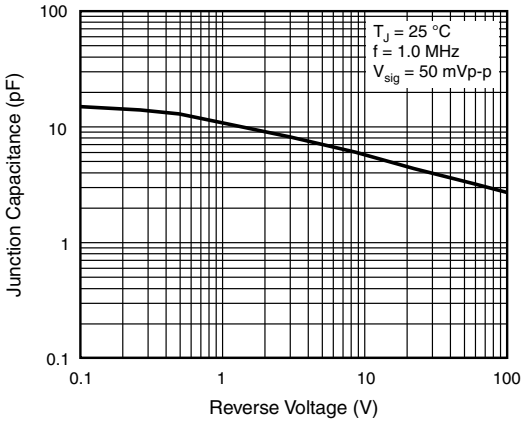


Fig. 5 - Typical Instantaneous Forward Characteristics

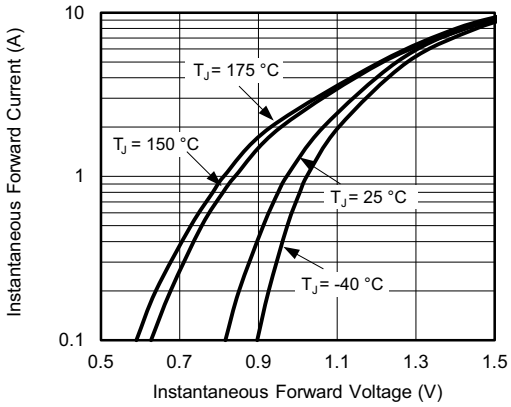
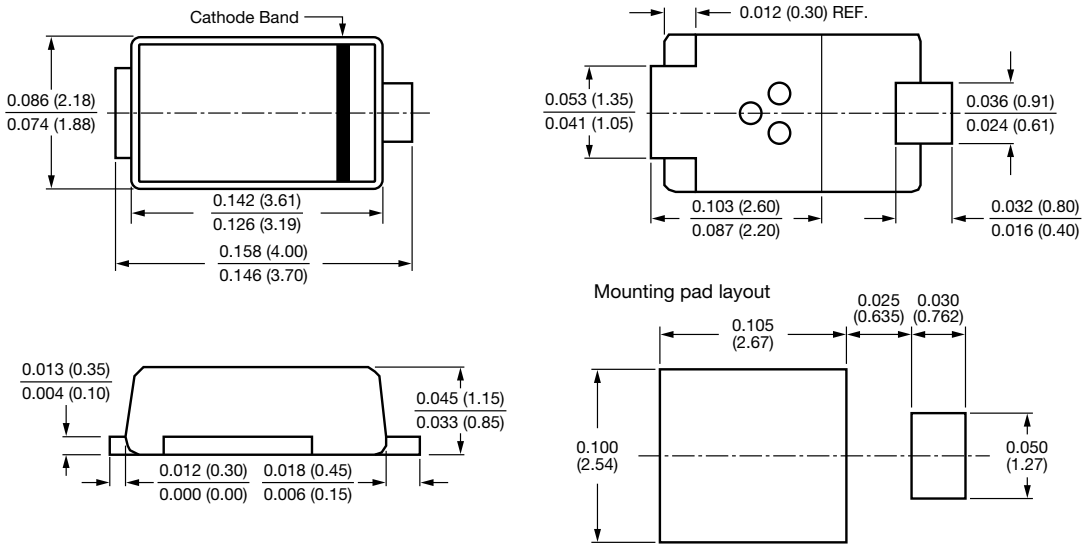


Fig. 3 - Forward Power Loss Characteristics

PACKAGE OUTLINE DIMENSIONS in inches (millimeters)

SMP (DO-220AA)



High Voltage Surface-Mount Schottky Barrier Rectifier

High Barrier Technology for Improved High Temperature Performance

eSMP® Series

SMP (DO-220AA)

Cathode ○—◀—○ Anode

FEATURES

- Very low profile - typical height of 1.0 mm
- Ideal for automated placement
- Low forward voltage drop, low power losses
- High efficiency
- Low thermal resistance
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- AEC-Q101 qualified available
  - Automotive ordering code: base P/NHM3
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

AUTOMOTIVE GRADE Available

RoHS COMPLIANT

HALOGEN FREE

LINKS TO ADDITIONAL RESOURCES

3D Models

PRIMARY CHARACTERISTICS	
$I_{F(AV)}$	2.0 A
V_{RRM}	90 V, 100 V
I_{FSM}	50 A
E_{AS}	11.25 mJ
V_F at I_F = 2.0 A, T_J = 125 °C	0.62 V
I_R max. at rated V_R, T_J = 25 °C	1.0 µA
T_J max.	175 °C
Package	SMP (DO-220AA)
Circuit configuration	Single

TYPICAL APPLICATIONS

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

MECHANICAL DATA

Case: SMP (DO-220AA)
Molding compound meets UL 94 V-0 flammability rating
Base P/N-M3 - halogen-free, RoHS-compliant, and commercial grade
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
M3 suffix meets JESD 201 class 2 whisker test, HM3 suffix meets JESD 201 class 2 whisker test

Polarity: color band denotes the cathode end

MAXIMUM RATINGS (T_A = 25 °C unless otherwise noted)				
PARAMETER	**SYMBOL**	**SS2PH9**	**SS2PH10**	**UNIT**
Device marking code		29	210	
Maximum repetitive peak reverse voltage	V_{RRM}	90	100	V
Maximum average forward rectified current (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}	50		A
Non-repetitive avalanche energy at T_J = 25 °C, I_{AS} = 1.5 A, L = 10 mH	E_{AS}	11.25		mJ
Voltage rate of change (rated V_R)	dV/dt	10 000		V/µs
Operating junction and storage temperature range	T_J, T_{STG}	-55 to +175		°C

ELECTRICAL CHARACTERISTICS (T_A = 25 °C unless otherwise noted)						
PARAMETER	**TEST CONDITIONS**		**SYMBOL**	**TYP.**	**MAX.**	**UNIT**
Maximum instantaneous forward voltage	I_F = 2.0 A	T_J = 25 °C	V_F (1)	0.77	0.80	V
		T_J = 125 °C		0.62	0.66	
Maximum reverse current at rated V_R		T_J = 25 °C	I_R (2)	0.1	1.0	µA
		T_J = 125 °C		60	500	
Typical junction capacitance	4.0 V, 1 MHz		CJ	65	-	pF

Notes

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

(2) Pulse test: Pulse width ≤ 40 ms

THERMAL CHARACTERISTICS (T_A = 25 °C unless otherwise noted)				
PARAMETER	**SYMBOL**	**SS2PH9**	**SS2PH10**	**UNIT**
Typical thermal resistance	$R_{\theta JA}$ (1)	110		°C/W
	$R_{\theta JL}$ (1)	15		
	$R_{\theta JC}$ (1)	25		

Note

(1) Thermal resistance from junction to ambient and junction to lead mounted on PCB with 15 mm x 15 mm copper pad areas. $R_{\theta JC}$ is measured at the top center of the body

ORDERING INFORMATION (Example)				
PREFERRED P/N	**UNIT WEIGHT (g)**	**PREFERRED PACKAGE CODE**	**BASE QUANTITY**	**DELIVERY MODE**
SS2PH9-M3/84A	0.024	84A	3000	7" diameter plastic tape and reel
SS2PH9-M3/85A	0.024	85A	10 000	13" diameter plastic tape and reel
SS2PH9HM3_A/H (1)	0.024	H	3000	7" diameter plastic tape and reel
SS2PH9HM3_A/I (1)	0.024	I	10 000	13" diameter plastic tape and reel

Note

(1) AEC-Q101 qualified

RATINGS AND CHARACTERISTICS CURVES (T_A = 25 °C unless otherwise noted)

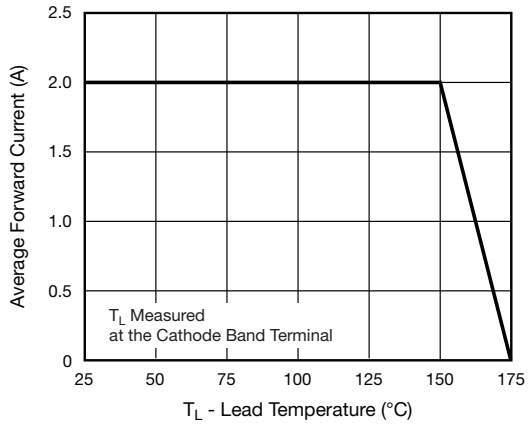


Fig. 1 - Forward Current Derating Curve

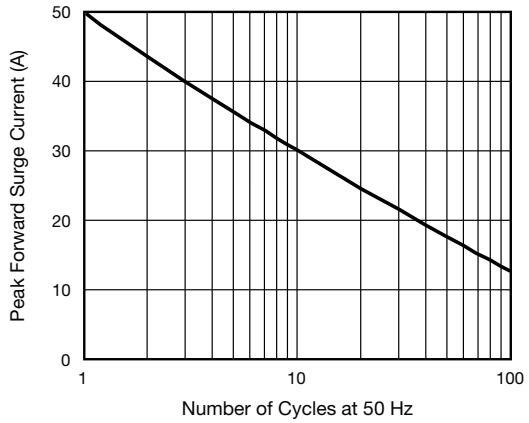


Fig. 2 - Maximum Non-Repetitive Peak Forward Surge Current

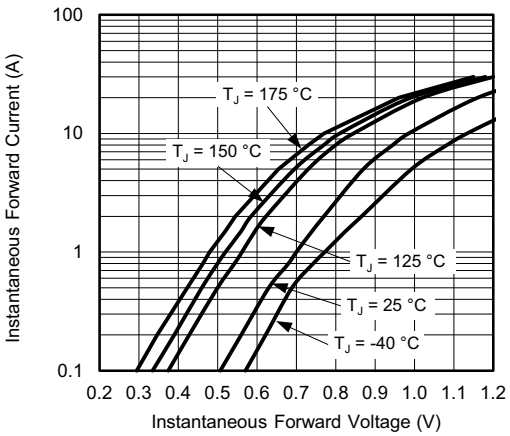


Fig. 3 - Typical Instantaneous Forward Characteristics

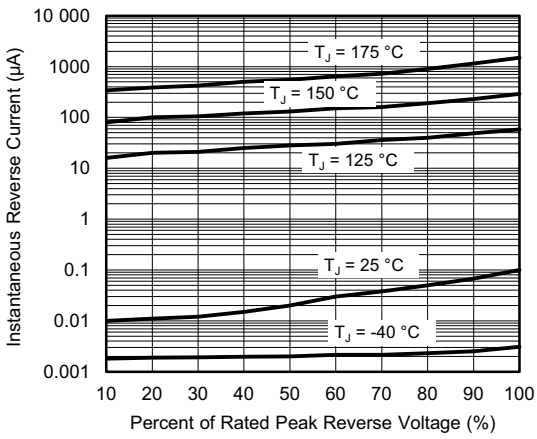


Fig. 4 - Typical Reverse Leakage Characteristics

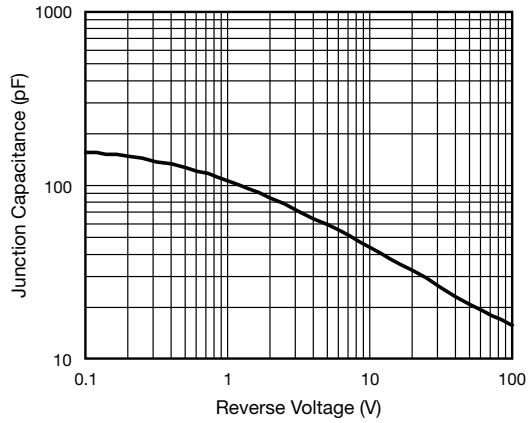


Fig. 5 - Typical Junction Capacitance

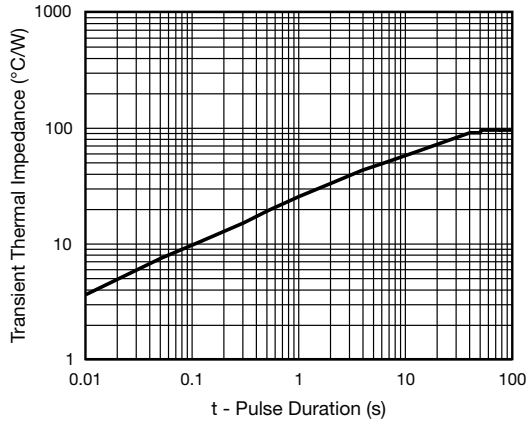
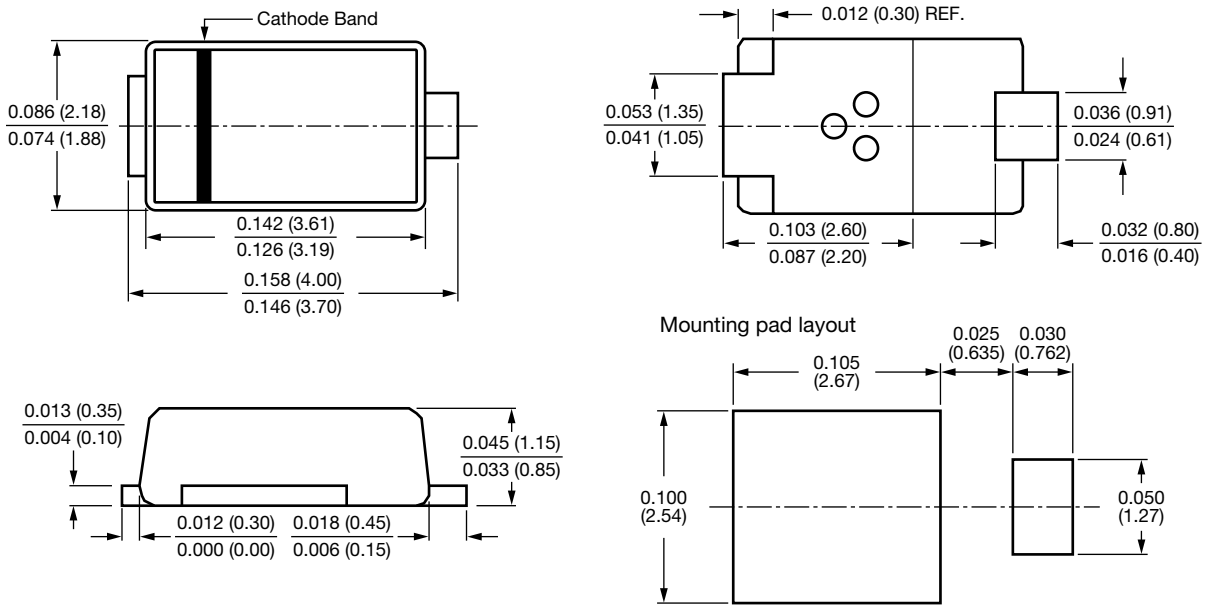


Fig. 6 - Typical Transient Thermal Impedance

PACKAGE OUTLINE DIMENSIONS in inches (millimeters)

SMP (DO-220AA)



TPSMP6.8A thru TPSMP43A

Vishay General Semiconductor

High Power Density Surface Mount PAR® Transient Voltage Suppressors

eSMP® Series

SMP (DO-220AA)

Anode ○—▶|—○ Cathode

LINKS TO ADDITIONAL RESOURCES

3D Models

PRIMARY CHARACTERISTICS	
V_{BR}	6.8 V to 43 V
V_{WM}	5.8 V to 36.8 V
P_{PPM} (for V_{BR} 6.8 V)	250 W
P_{PPM} (for V_{BR} 7.5 V to 12 V)	300 W
P_{PPM} (for V_{BR} 13 V to 43 V)	400 W
P_D	2.5 W
I_{FSM}	40 A
T_J max.	185 °C
Polarity	Unidirectional
Package	SMP (DO-220AA)

FEATURES

AUTOMOTIVE GRADE

RoHS COMPLIANT

HALOGEN FREE

- Junction passivation optimized design passivated anisotropic rectifier technology
- T_J = 185 °C capability suitable for high reliability and automotive requirement
- Very low profile - typical height of 1.0 mm
- Ideal for automated placement
- Unidirection only
- Excellent clamping capability
- Low incremental surge resistance
- Very fast response time
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- AEC-Q101 qualified
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

TYPICAL APPLICATIONS

Protection for ICs, drive transistors, signal lines of sensor units, and electronic units in consumer, computer, industrial, and automotive applications.

MECHANICAL DATA

Case: SMP (DO-220AA)
Molding compound meets UL 94 V-0 flammability rating
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
HM3 suffix meets JESD 201 class 2 whisker test

Polarity: color band denotes cathode end

MAXIMUM RATINGS (T_A = 25 °C, unless otherwise noted)			
PARAMETER	**SYMBOL**	**VALUE**	**UNIT**
Peak power dissipation with a 10/1000 µs waveform (fig. 1 and 3) (1)(2)	P_{PPM}	See table next page	W
Peak power pulse current with a 10/1000 µs waveform (fig. 1) (1)	I_{PPM}	See table next page	A
Power dissipation on infinite heatsink, T_A = 75 °C	P_D	2.5	W
Peak forward surge current 10 ms single half sine-wave superimposed on rated load	I_{FSM}	40	A
Maximum instantaneous forward voltage at 25 A (3)	V_F	2.5	V
Operating junction and storage temperature range	T_J, T_{STG}	-65 to +185	°C

Notes

(1) Non-repetitive current pulse, per fig. 3 and derated above T_A = 25 °C per fig. 2
(2) Mounted on PCB with 5.0 mm x 5.0 mm copper pads attached to each terminal
(3) Pulse test: 300 µs pulse width, 1 % duty cycle

ELECTRICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)										
DEVICE TYPE	DEVICE MARKING CODE	BREAKDOWN VOLTAGE V_{BR} (1) AT I_T (V)		TEST CURRENT I_T (mA)	STAND-OFF VOLTAGE V_{WM} (V)	MAXIMUM REVERSE LEAKAGE AT V_{WM} I_R (µA)	MAXIMUM REVERSE LEAKAGE AT V_{WM} T_J = 150 °C I_D (µA)	MAXIMUM PEAK PULSE SURGE CURRENT I_{PPM} (2) (A)	MAXIMUM CLAMPING VOLTAGE AT I_{PPM} V_C (V)	MAXIMUM TEMPERATURE COEFFICIENT OF V_{BR} (%/°C)
		MIN.	MAX.							
TPSMP6.8A	AEP	6.45	7.14	10.0	5.80	300	1000	23.8	10.5	0.057
TPSMP7.5A	AGP	7.13	7.88	10.0	6.40	150	500	26.5	11.3	0.061
TPSMP8.2A	AKP	7.79	8.61	10.0	7.02	50.0	200	24.8	12.1	0.065
TPSMP9.1A	AMP	8.65	9.55	1.0	7.78	10.0	50.0	22.4	13.4	0.068
TPSMP10A	APP	9.50	10.5	1.0	8.55	5.0	20.0	20.7	14.5	0.073
TPSMP11A	ARP	10.5	11.6	1.0	9.40	2.0	10.0	19.2	15.6	0.075
TPSMP12A	ATP	11.4	12.6	1.0	10.2	1.0	5.0	18.0	16.7	0.078
TPSMP13A	AVP	12.4	13.7	1.0	11.1	1.0	5.0	22.0	18.2	0.081
TPSMP15A	AXP	14.3	15.8	1.0	12.8	1.0	5.0	18.9	21.2	0.084
TPSMP16A	AZP	15.2	16.8	1.0	13.6	1.0	5.0	17.8	22.5	0.086
TPSMP18A	BEP	17.1	18.9	1.0	15.3	1.0	5.0	15.9	25.5	0.088
TPSMP20A	BGP	19.0	21.0	1.0	17.1	1.0	5.0	14.4	27.7	0.090
TPSMP22A	BKP	20.9	23.1	1.0	18.8	1.0	5.0	13.1	30.6	0.092
TPSMP24A	BMP	22.8	25.2	1.0	20.5	1.0	5.0	12.0	33.2	0.094
TPSMP27A	BPP	25.7	28.4	1.0	23.1	1.0	5.0	10.7	37.5	0.096
TPSMP30A	BRP	28.5	31.5	1.0	25.6	1.0	5.0	9.7	41.4	0.097
TPSMP33A	BTP	31.4	34.7	1.0	28.2	1.0	5.0	8.8	45.7	0.098
TPSMP36A	BVP	34.2	37.8	1.0	30.8	1.0	5.0	8.0	49.9	0.099
TPSMP39A	BXP	37.1	41.0	1.0	33.3	1.0	5.0	7.4	53.9	0.100
TPSMP43A	BZP	40.9	45.2	1.0	36.8	1.0	5.0	6.7	59.3	0.101

Notes

(1) V_{BR} measured after I_T applied for 300 µs, I_T = square wave pulse or equivalent

(2) Surge current waveform per fig. 3 and derated per fig. 2

(3) All terms and symbols are consistent with ANSI/IEEE C62.35

ORDERING INFORMATION (Example)				
PREFERRED P/N	UNIT WEIGHT (g)	PREFERRED PACKAGE CODE	BASE QUANTITY	DELIVERY MODE
TPSMP6.8AHM3_A/H (1)	0.024	H	3000	7" diameter plastic tape and reel
TPSMP6.8AHM3_A/I (1)	0.024	I	10 000	13" diameter plastic tape and reel

Note

(1) Automotive grade

RATINGS AND CHARACTERISTICS CURVES (T_A = 25 °C, unless otherwise noted)

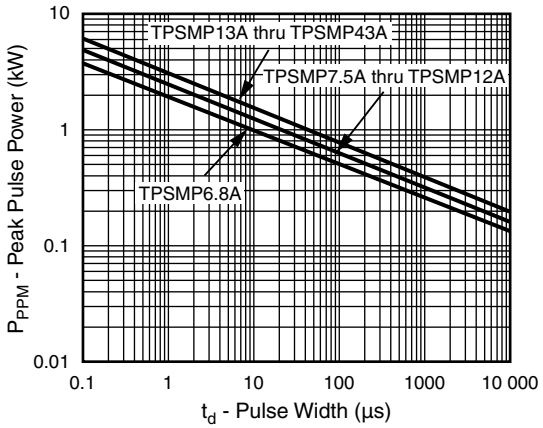


Fig. 1 - Peak Pulse Power Rating Curve

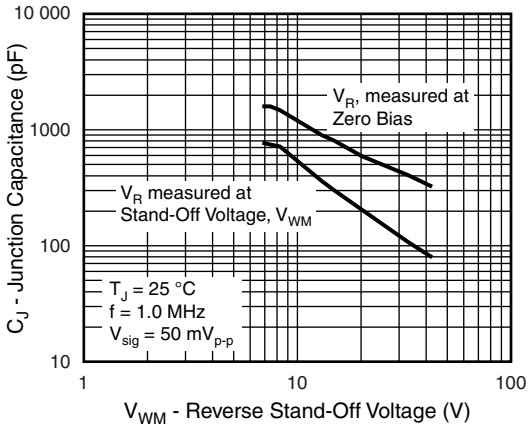


Fig. 4 - Typical Junction Capacitance

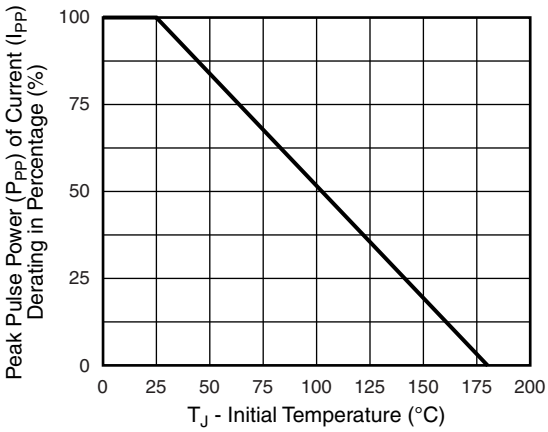


Fig. 2 - Pulse Derating Curve

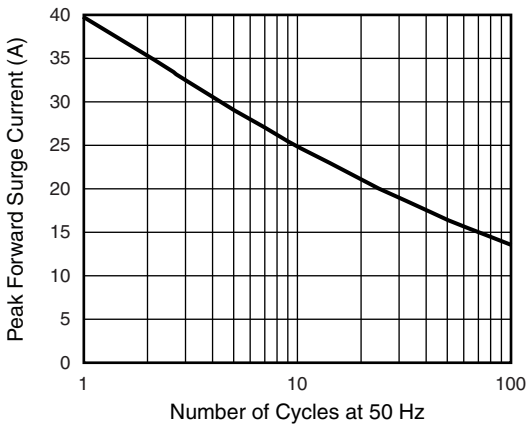


Fig. 5 - Maximum Peak Forward Surge Current

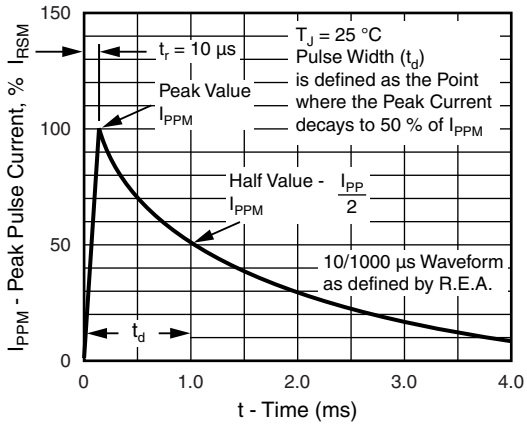


Fig. 3 - Pulse Waveform

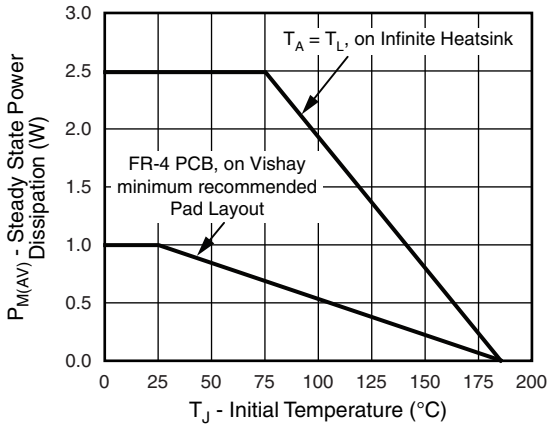
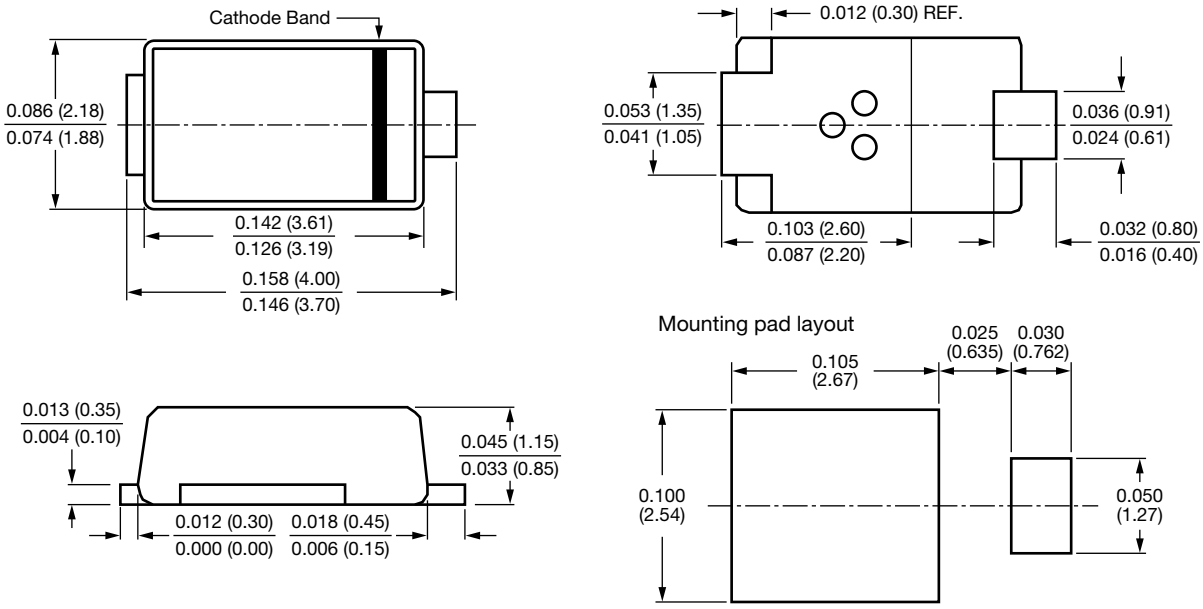


Fig. 6 - Steady State Power Derating Curve

PACKAGE OUTLINE DIMENSIONS in inches (millimeters)

SMP (DO-220AA)



Surface-Mount TMBS® (Trench MOS Barrier Schottky) Rectifier

eSMP® Series

SMP (DO-220AA)

Cathode ○—|◀—○ Anode

FEATURES

- Low profile package
- Trench MOS Schottky technology
- Low power losses, high efficiency
- Low forward voltage drop
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- AEC-Q101 qualified available
  - Automotive ordering code; base P/NHM3
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

AUTOMOTIVE GRADE Available

RoHS COMPLIANT HALOGEN FREE

LINKS TO ADDITIONAL RESOURCES

3D Models

PRIMARY CHARACTERISTICS	
$I_{F(AV)}$	3.0 A
V_{RRM}	45 V
I_{FSM}	80 A
V_F at I_F = 3.0 A	0.37 V
T_J max.	150 °C
Package	SMP (DO-220AA)
Circuit configuration	Single

TYPICAL APPLICATIONS

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

MECHANICAL DATA

Case: SMP (DO-220AA)
Molding compound meets UL 94 V-0 flammability rating
Base P/N-M3 - halogen-free, RoHS-compliant, and commercial grade
Base P/NHM3 - halogen-free, RoHS-compliant, and AEC-Q101 qualified

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

Polarity: color band denotes the cathode end

MAXIMUM RATINGS (T_A = 25 °C unless otherwise noted)			
PARAMETER	**SYMBOL**	**V3PL45**	**UNIT**
Device marking code		3LE	
Maximum repetitive peak reverse voltage	V_{RRM}	45	V
Maximum DC forward current	I_F (1)	3	A
Peak forward surge current 10 ms single half sine-wave superimposed on rated load	I_{FSM}	80	A
Operating junction and storage temperature range	T_J (2)	-40 to +150	°C
Operating junction and storage temperature range	T_{STG}	-55 to +150	°C

Notes

(1) Free air, mounted on recommended copper pad area

(2) The heat generated must be less than the thermal conductivity from junction-to-ambient: $dP_D/dT_J < 1/R_{\theta JA}$

ELECTRICAL CHARACTERISTICS (T_A = 25 °C unless otherwise noted)						
PARAMETER	TEST CONDITIONS		SYMBOL	TYP.	MAX.	UNIT
Instantaneous forward voltage	I_F = 1.5 A	T_A = 25 °C	V_F (1)	0.41	-	V
	I_F = 3 A			0.46	0.54	
	I_F = 1.5 A	T_A = 125 °C		0.31	-	
	I_F = 3 A			0.37	0.46	
Reverse current	V_R = 45 V	T_A = 25 °C	I_R (2)	-	0.45	mA
		T_A = 125 °C		5.0	25.0	
Typical junction capacitance	4.0 V, 1 MHz		C_J	550	-	pF

Notes

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

(2) Pulse test: pulse width ≤ 5 ms

THERMAL CHARACTERISTICS (T_A = 25 °C unless otherwise specified)			
PARAMETER	SYMBOL	V3PL45	UNIT
Typical thermal resistance	$R_{\theta JA}$ (1)	125	°C/W
	$R_{\theta JM}$ (2)	15	

Notes

(1) Free air, mounted on recommended PCB, 1 oz. pad area; thermal resistance $R_{\theta JA}$ - junction-to-ambient

(2) Mounted on 10 mm x 10 mm copper pad area PCB; thermal resistance $R_{\theta JM}$ - junction-to-mount

ORDERING INFORMATION (Example)				
PREFERRED P/N	UNIT WEIGHT (g)	PREFERRED PACKAGE CODE	BASE QUANTITY	DELIVERY MODE
V3PL45-M3/H	0.024	H	3000	7" diameter plastic tape and reel
V3PL45-M3/I	0.024	I	10 000	13" diameter plastic tape and reel
V3PL45HM3/H (1)	0.024	H	3000	7" diameter plastic tape and reel
V3PL45HM3/I (1)	0.024	I	10 000	13" diameter plastic tape and reel

Note

(1) AEC-Q101 qualified

RATINGS AND CHARACTERISTICS CURVES (T_A = 25 °C unless otherwise noted)

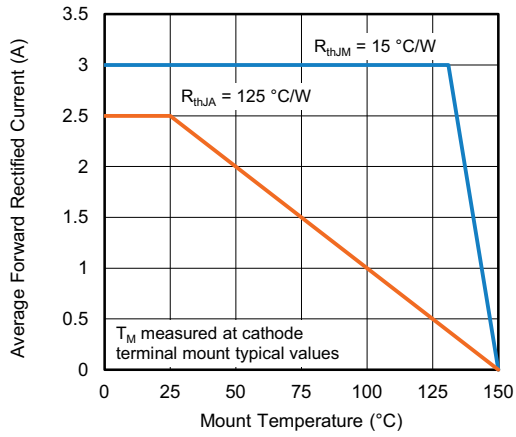


Fig. 1 - Maximum Forward Current Derating Curve

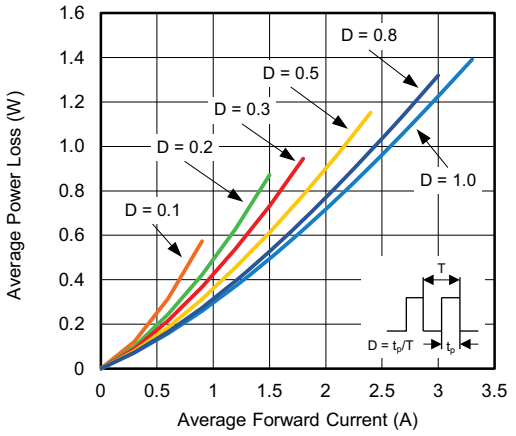


Fig. 2 - Forward Power Loss Characteristics

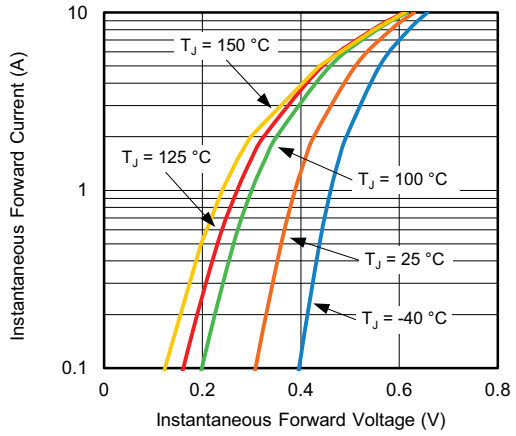


Fig. 3 - Typical Instantaneous Forward Characteristics

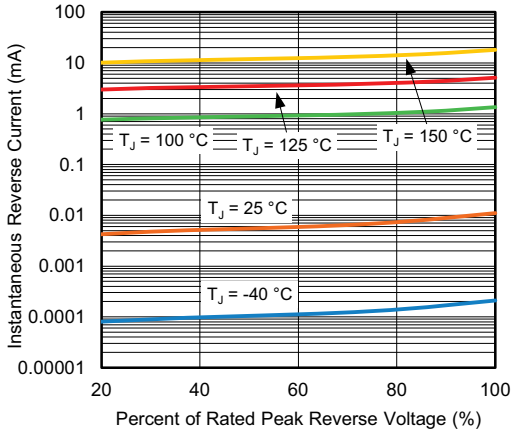


Fig. 4 - Typical Reverse Characteristics

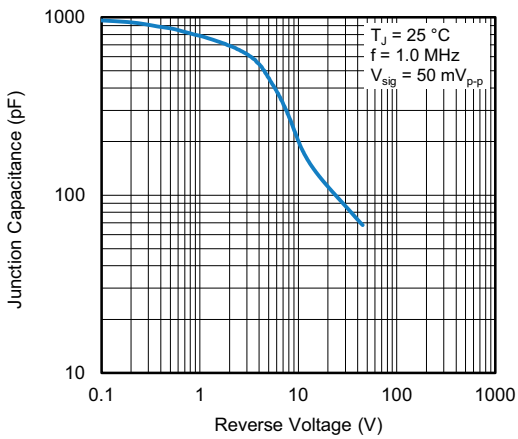


Fig. 5 - Typical Junction Capacitance

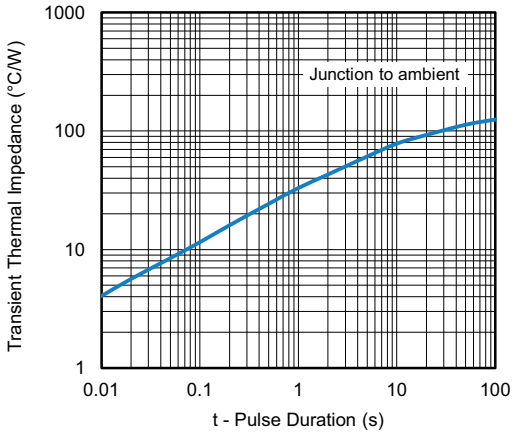
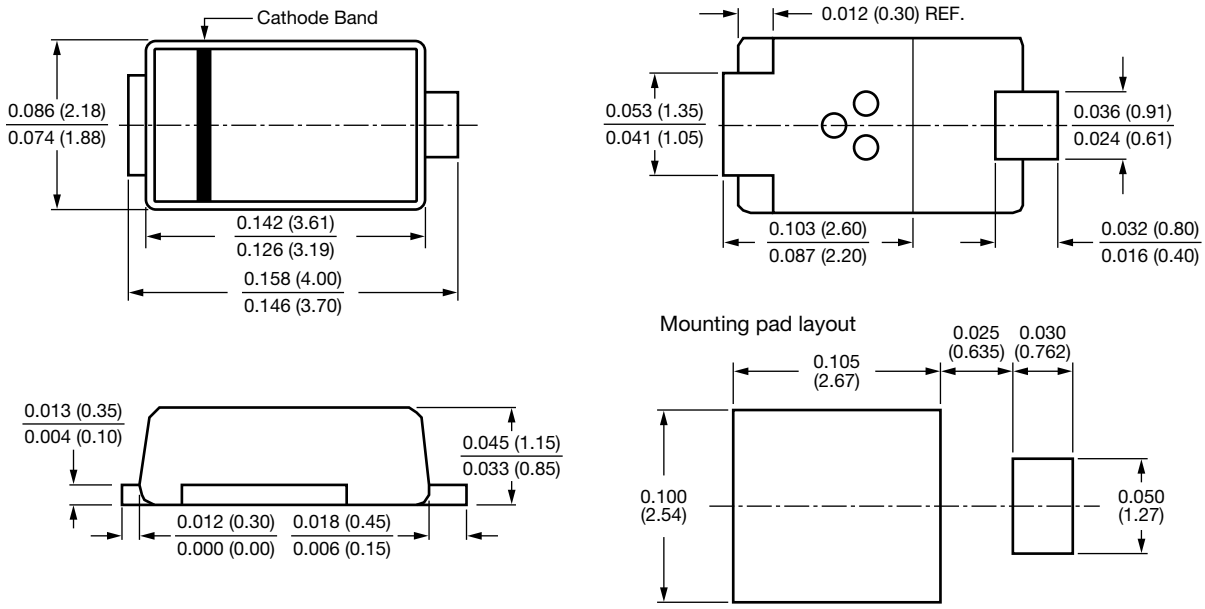


Fig. 6 - Typical Transient Thermal Impedance

PACKAGE OUTLINE DIMENSIONS in inches (millimeters)

SMP (DO-220AA)



Ultrafast Rectifier, 2 A FRED Pt®

eSMP® Series

SMP (DO-220AA)

Cathode ○—▶|—○ Anode

FEATURES

- Very low profile - typical height of 1.0 mm
- Ideal for automated placement
- Low forward voltage drop, low power losses
- Low leakage current
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- For PFC, CRM snubber operation
- AEC-Q101 qualified
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

AUTOMOTIVE GRADE

RoHS COMPLIANT

HALOGEN FREE

LINKS TO ADDITIONAL RESOURCES

3D Models

TYPICAL APPLICATIONS

For use in high frequency, freewheeling, DC/DC converters, PFC, and in snubber industrial and automotive applications.

MECHANICAL DATA

Case: SMP (DO-220AA)

Molding compound meets UL 94 V-0 flammability rating

Terminals: matte tin plated leads, solderable per J-STD-002, meets JESD 201 class 2 whisker test

Polarity: color band denotes cathode end

PRIMARY CHARACTERISTICS	
$I_{F(AV)}$	2 A
V_R	100 V, 200 V
V_F at I_F	0.79 V
I_{FSM}	40 A
t_{rr} (typ.)	23 ns
T_J max.	175 °C
Package	SMP (DO-220AA)
Circuit configuration	Single

ABSOLUTE MAXIMUM RATINGS					
PARAMETER		SYMBOL	TEST CONDITIONS	VALUES	UNITS
Peak repetitive reverse voltage	VS-2ENH01HM3	V_{RRM}		100	V
	VS-2ENH02HM3			200	
Average rectified forward current		$I_{F(AV)}$	T_C = 158 °C	2	A
Non-repetitive peak surge current		I_{FSM}	T_J = 25 °C, 10 ms sine pulse	40	
Operating junction and storage temperatures		T_J, T_{Stg}		-55 to +175	°C

ELECTRICAL SPECIFICATIONS (T_J = 25 °C unless otherwise specified)							
PARAMETER		SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Breakdown voltage, blocking voltage	VS-2ENH01HM3	V_{BR}, V_R	I_R = 100 µA	100	-	-	V
	VS-2ENH02HM3			200	-	-	
Forward voltage		V_F	I_F = 2 A	-	0.94	1.00	
			I_F = 2 A, T_J = 150 °C	-	0.79	0.84	
Reverse leakage current		I_R	V_R = V_R rated	-	-	2	µA
			T_J = 150 °C, V_R = V_R rated	-	-	20	
Junction capacitance		C_T	V_R = 200 V	-	8	-	pF

DYNAMIC RECOVERY CHARACTERISTICS (T_J = 25 °C unless otherwise specified)							
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNITS
Reverse recovery time	t_{rr}	I_F = 1.0 A, dI_F/dt = 100 A/µs, V_R = 30 V		-	23	-	ns
		I_F = 0.5 A, I_R = 1 A, I_{rr} = 0.25 A		-	-	28	
		T_J = 25 °C	I_F = 2 A dI_F/dt = 200 A/µs V_R = 100 V	-	16	-	
		T_J = 125 °C		-	25	-	
Peak recovery current	I_{RRM}	T_J = 25 °C		-	2.0	-	A
		T_J = 125 °C		-	3.1	-	
Reverse recovery charge	Q_{rr}	T_J = 25 °C		-	15	-	nC
		T_J = 125 °C		-	37	-	

THERMAL - MECHANICAL SPECIFICATIONS							
PARAMETER		SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Maximum junction and storage temperature range		T_J, T_{Stg}		-55	-	175	°C
Thermal resistance, junction to mount		R_{thJM}[1]	Infinite heatsink	-	7	9	°C/W
Thermal resistance, junction to ambient		R_{thJA}	PCB footprint 4.8 mm x 4.8 mm	-	107	-	
Approximate weight				0.024			g
Marking device	VS-2ENH01HM3		Case style SMP (DO-220AA)	2H1			
	VS-2ENH02HM3			2H2			

Note

(1) Thermal resistance junction to mount follows JEDEC® 51-14 transient dual interface test method (TDIM)

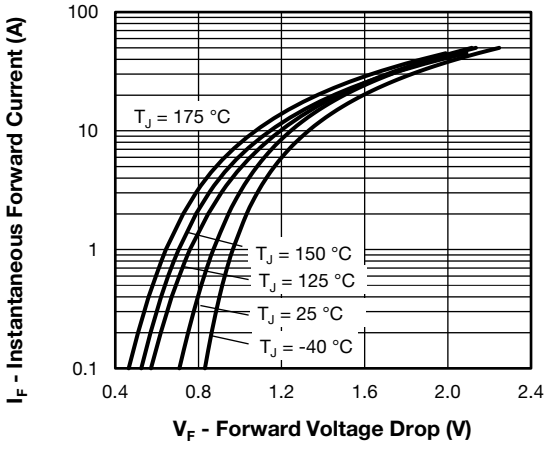


Fig. 1 - Typical Forward Voltage Drop Characteristics

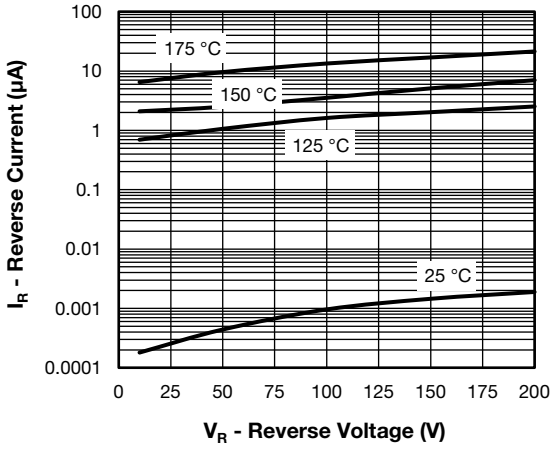


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

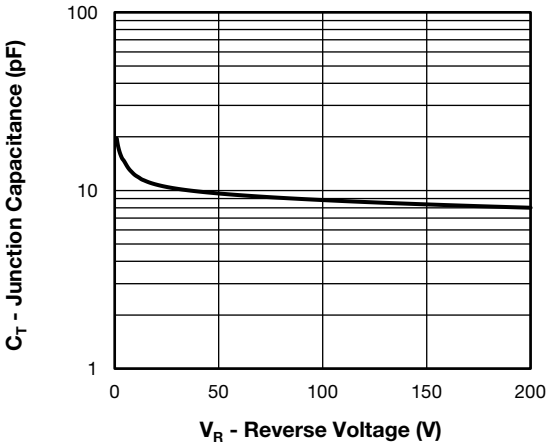


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

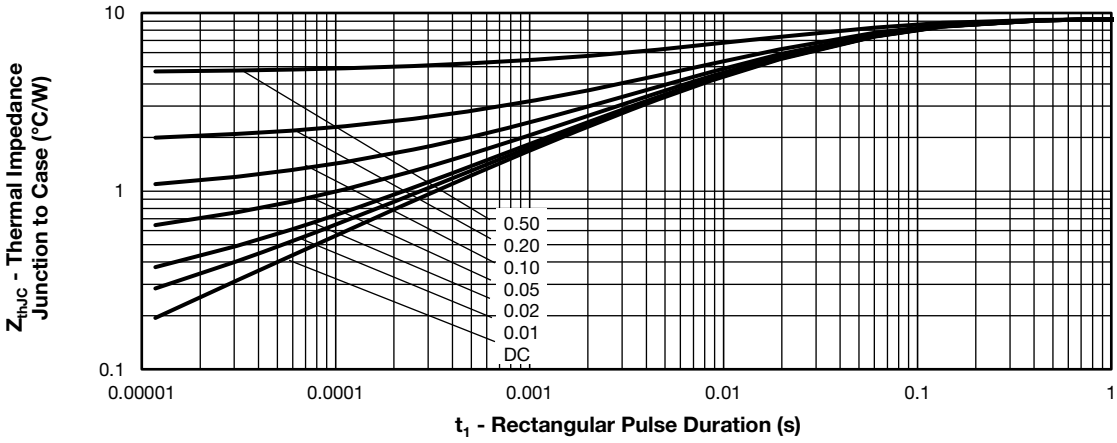


Fig. 4 - Transient Thermal Impedance, Junction to Case

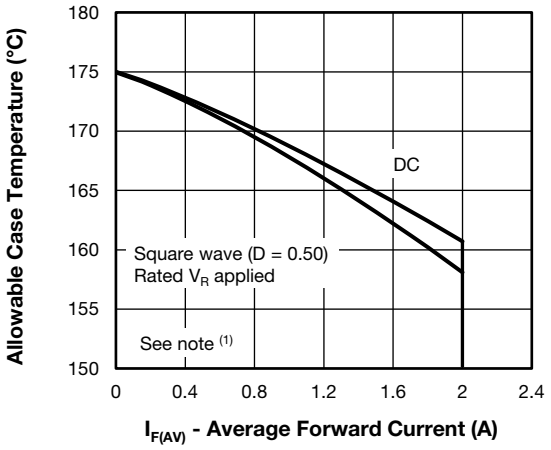


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

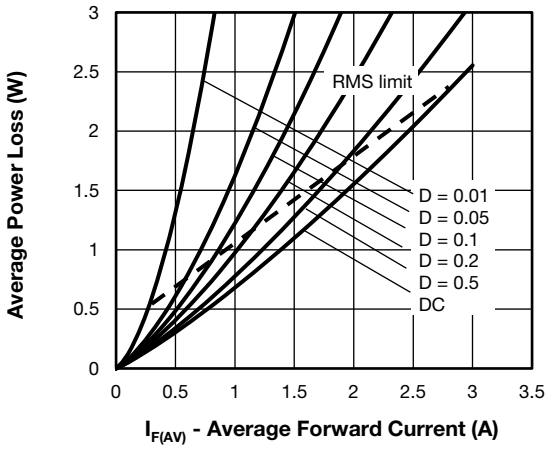


Fig. 6 - Forward Power Loss Characteristics

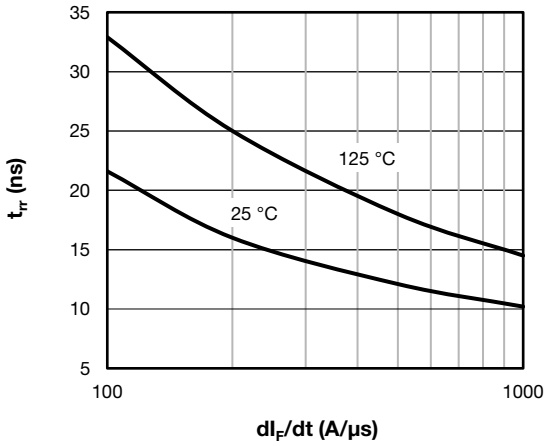


Fig. 7 - Typical Reverse Recovery Time vs. dI_F/dt

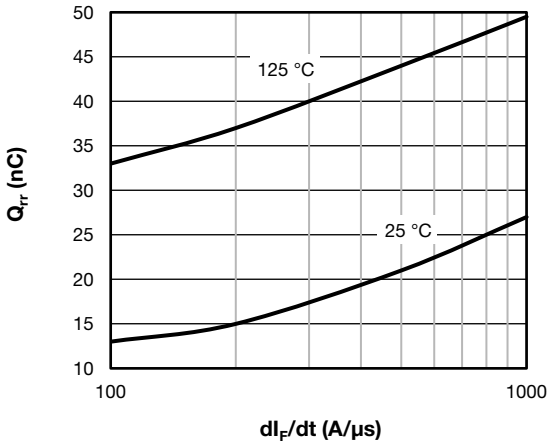
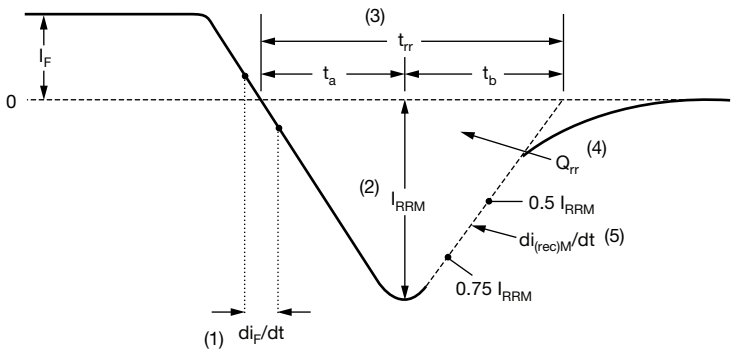


Fig. 8 - Typical Stored Charge vs. dI_F/dt

Note

(1) Formula used: $T_C = T_J - (Pd + Pd_{REV}) \times R_{thJC}$;
Pd = forward power loss = $I_{F(AV)} \times V_{FM}$ at ($I_{F(AV)}$/D) (see fig. 5);
Pd_{REV} = inverse power loss = $V_{R1} \times I_R (1 - D)$; I_R at V_{R1} = rated V_R



(1) di_F/dt - rate of change of current through zero crossing

(2) I_{RRM} - peak reverse recovery current

(3) t_{rr} - reverse recovery time measured from zero crossing point of negative going I_F to point where a line passing through 0.75 I_{RRM} and 0.50 I_{RRM} extrapolated to zero current.

(4) Q_{rr} - area under curve defined by t_{rr} and I_{RRM}

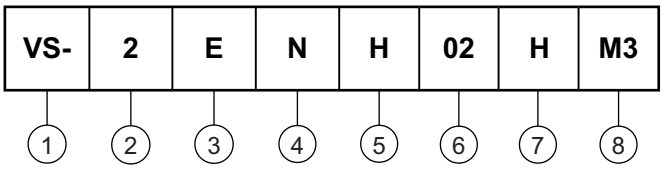
$$Q_{rr} = \frac{t_{rr} \times I_{RRM}}{2}$$

(5) $di_{(rec)M}/dt$ - peak rate of change of current during t_b portion of t_{rr}

Fig. 9 - Reverse Recovery Waveform and Definitions

ORDERING INFORMATION TABLE

Device code



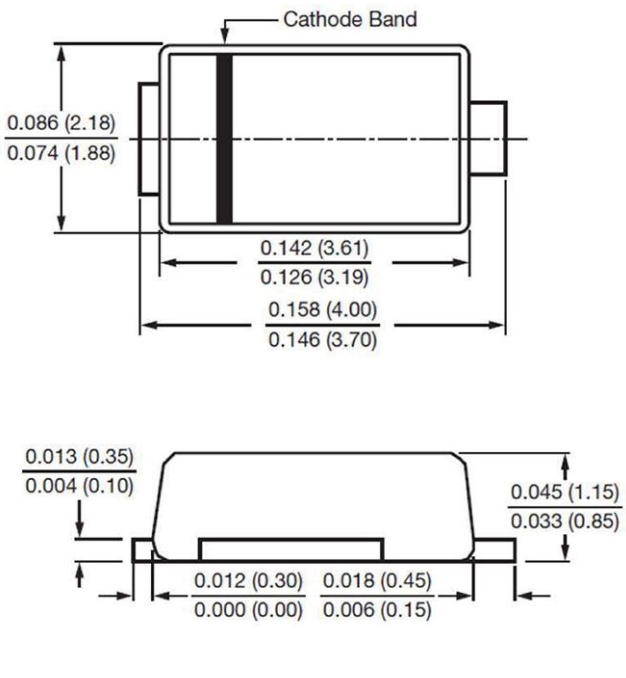
1 - Vishay Semiconductors product
2 - Current rating (2 = 2 A)
3 - Circuit configuration:
E = single diode
4 - N = SMP package
5 - Process type,
H = ultrafast recovery
6 - Voltage code (02 = 200 V)
7 - H = AEC-Q101 qualified
8 - M3 = halogen-free, RoHS-compliant, and terminations lead (Pb)-free

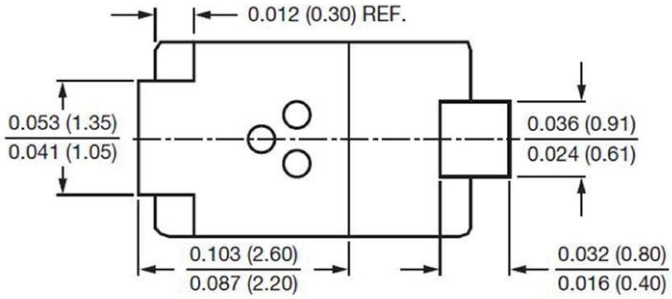
ORDERING INFORMATION (Example)			
PREFERRED P/N	**PREFERRED PACKAGE CODE**	**MINIMUM ORDER QUANTITY**	**PACKAGING DESCRIPTION**
VS-2ENH01HM3/84A	84A	3000	7" diameter plastic tape and reel
VS-2ENH01HM3/85A	85A	10 000	13" diameter plastic tape and reel
VS-2ENH02HM3/84A	84A	3000	7" diameter plastic tape and reel
VS-2ENH02HM3/85A	85A	10 000	13" diameter plastic tape and reel

LINKS TO RELATED DOCUMENTS	
Dimensions	www.vishay.com/doc?96547
Part marking information	www.vishay.com/doc?96574
Packaging information	www.vishay.com/doc?88869
SPICE model	www.vishay.com/doc?96551

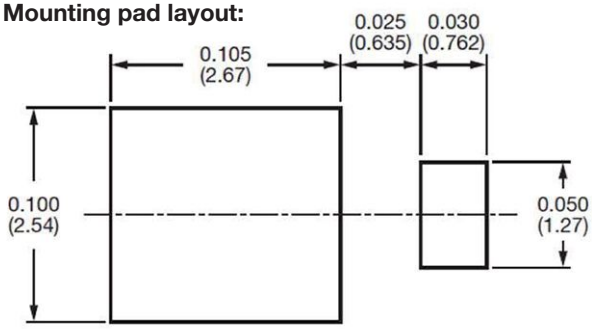
SMP (DO-220AA)

DIMENSIONS in inches (millimeters)





Mounting pad layout:



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^2PAK (TO-263AB) 24 mm tape, 13" diameter reinforced hub plastic reel**
8W	**P**	**D^2PAK (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]**

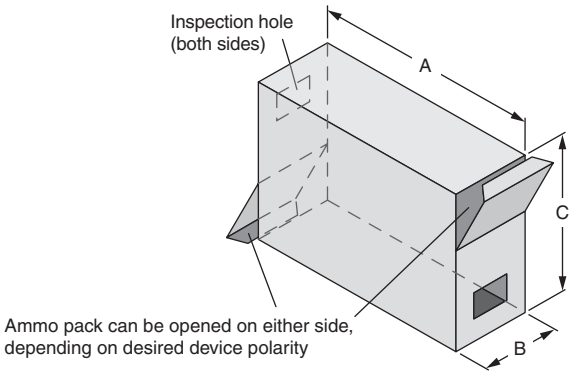
Notes

- "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)

BULK PACKAGING					
CASE TYPES	PREFERRED PACKAGE CODE	PACKAGING	BOX SIZE		QUANTITY
			INCHES	cm	EA.
DF-M, DF-S, DFL-S	45	Anti-static plastic tubes	17.4 length	44.1 length	50
GSIB-5S, PB	45	Anti-static plastic tubes	24.2 length	61.5 length	20
GBU, BU	45	Anti-static plastic tubes	18.5 length	47 length	20
GBL	45	Anti-static plastic tubes	17.5 length	44.5 length	20
TO-220AB / AC, ITO-220AC / AB, TO-262AA	45, 4W	Anti-static plastic tubes	21.0 length	53.7 length	50
TO-247AD	45	Anti-static plastic tubes	20.0 length	50.8 length	30
MBS (TO-269AA)	45	Anti-static plastic tubes	20.3 x 0.41	51.5 x 1.04	100
GBL	51	Anti-static PVC tray	12.5 x 6.1 x 1.0	31.7 x 15.5 x 2.5	400
GBPC12-35W	51	Paper box	12.5 x 12.5 x 1.7	31.7 x 31.7 x 4.3	100
GBPC6	51	Paper box	7.5 x 7.5 x 1.43	19.0 x 19.0 x 3.6	100
KBL	51	Anti-static PVC tray	12.2 x 6.1 x 1.5	30.9 x 15.5 x 3.8	300
GBPC12-35	51	Paper box	12.5 x 12.5 x 1.7	31.7 x 31.7 x 4.3	100
KBU4, 6, 8	51	Anti-static PVC tray	12.2 x 6.1 x 1.5	30.9 x 15.5 x 3.8	250
WOG, 2WOG	51	Plastic bags	-	-	100
GBU / BU	51	Paper tray	13.1 x 6.6 x 1.2	33.2 x 16.8 x 3.0	250

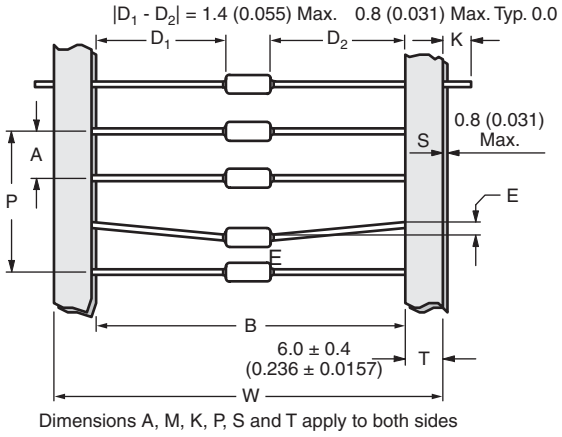
AXIAL-LEADED TAPE AND REEL PACKAGING



All axial-leaded devices are packed in accordance with EIA standard RS-296-E. The diagrams given below refer to these specifications.

TABLE 1 - AMMO PACK PACKAGING

PACKAGING	AVAILABLE PRODUCT OUTLINES	PREFERRED PACKAGE CODE	DIMENSION A	DIMENSION B	DIMENSION C	QUANTITY BOX
26 mm horizontal tape, ammo pack	DO-41(DO-204AL), MPG06 DO-15 (DO-204AC) P300	53, B 53, B 53, B	9.7" (247 mm)	1.7" (44 mm)	3.7" (95 mm)	3.0K 1.5K 0.75K
52 mm horizontal tape, ammo pack	DO-41(DO-204AL), MPG06 DO-15 (DO-204AC) DO-201AD, GP20 P600	73, D 73, D 73, D 73, D	10.0" (255 mm)	3.15" (80 mm)	4.53" (115 mm)	3.0K 2.0K 1.0K 0.3K
Pseudo / radial tape, ammo pack	MPG06	100, V	13.4" (340 mm)	1.8" (47 mm)	7.9" (200 mm)	2.0K



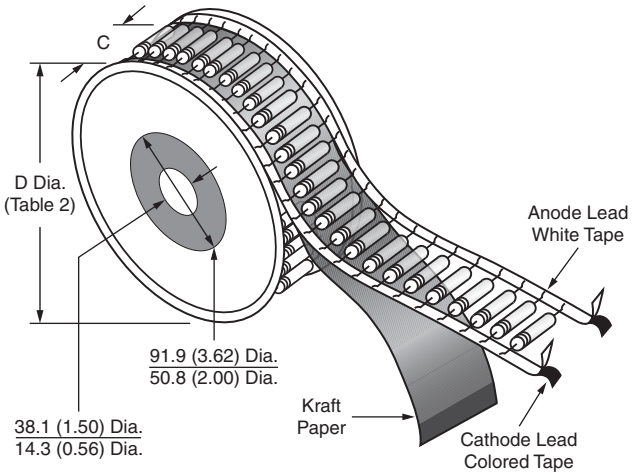
Dimensions A, M, K, P, S and T apply to both sides

Dimensions in millimeters (inches)

Description	Symbol	
Component Pitch	A	2, 3
Inside Tape Spacing	B	2, 3
Lead to Lead Eccentricity	|D1 - D2|	-
Lead Extension	K	-
Lead Bending	E	2
Cumulative Pitch	P	3
Exposed Adhesive	S	-
Tape Width	T	-

All polarized components shall be oriented in the same direction

Fig. 1



The “C” dimension of Fig. 2 is between flanges of the component reel and shall be 1.5 mm (0.059") to 8.00 mm (0.315") greater than the overall taped component width “W” (Fig. 1). Where “W” dimension is 68.2 mm (2.68") max.

Fig. 2

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	mm
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^2PAK (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	-

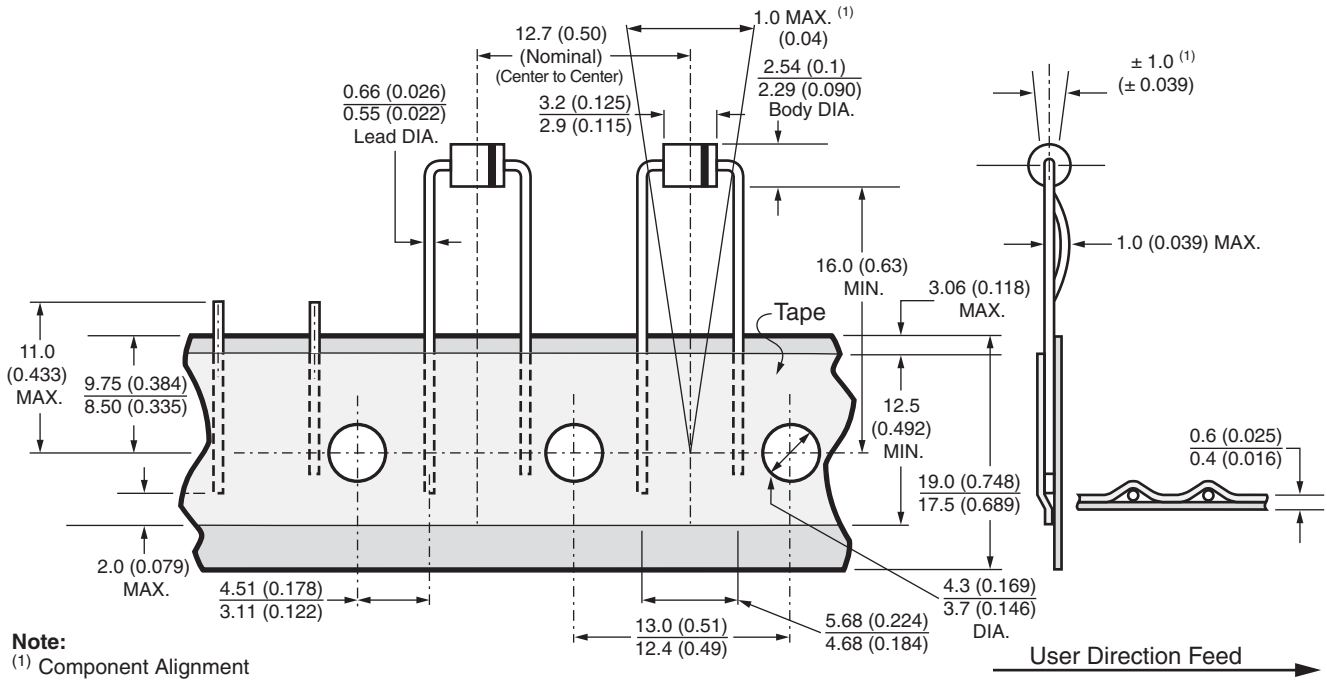
Note

- 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")	

DIMENSIONS in millimeters (inches)



Note:
(1) Component Alignment

Available only for MPG06 Product in Ammo Pack in Accordance with EIA Standard RS-468-A Utilizing 0.61 mm (0.024") Diameter Leads. Maximum Cumulative Pitch Tolerance: 1.0 mm (0.039")/20 Pitch.

Fig. 3 - Pseudo Radial

RADIAL TAPE PACKAGING

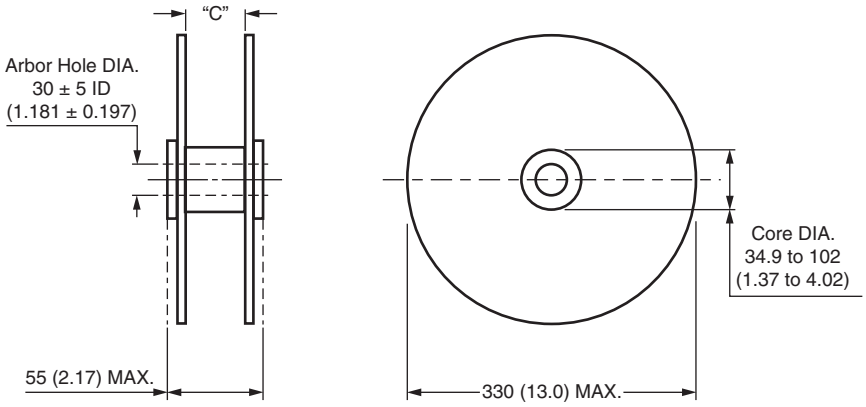


Fig. 4 - Reel Dimensions

Notes

- "C" dimension between the reel flanges shall be governed by the overall width of the taped components and shall be 1.5 mm (0.057") to 8.0 mm (0.315") greater than the overall width
- All leaded devices are packaged in accordance with EIA standard RS-468-A specification and are available on reel or in fan fold box (ammo pack)
- All dimensions are in millimeters and (inches)

SURFACE MOUNT TAPE AND REEL PACKAGING

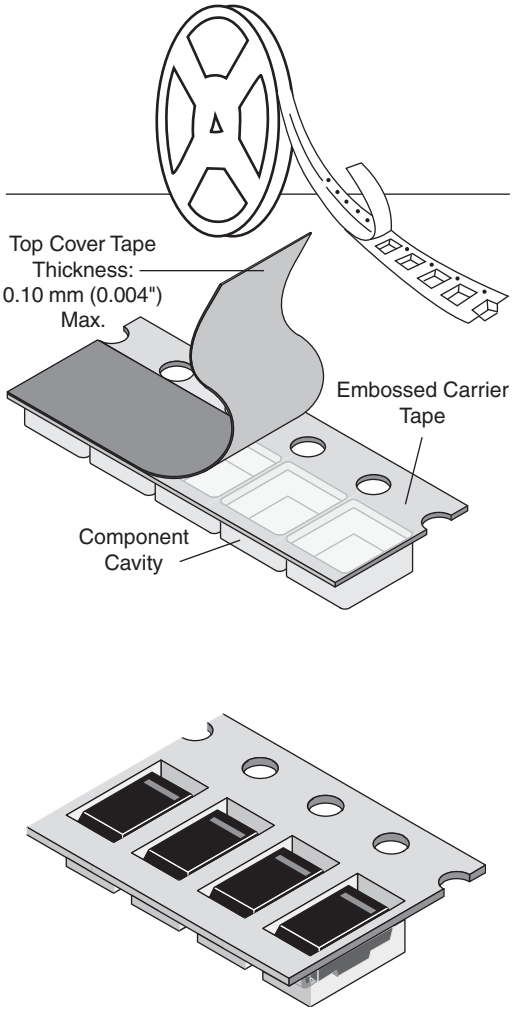


Fig. 5

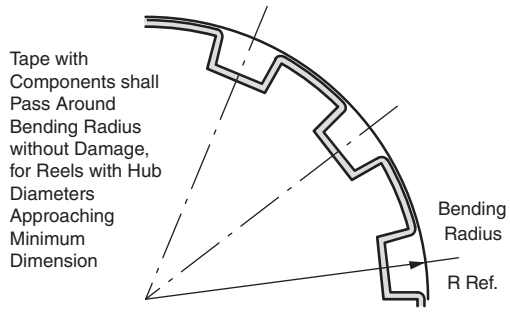


Fig. 6

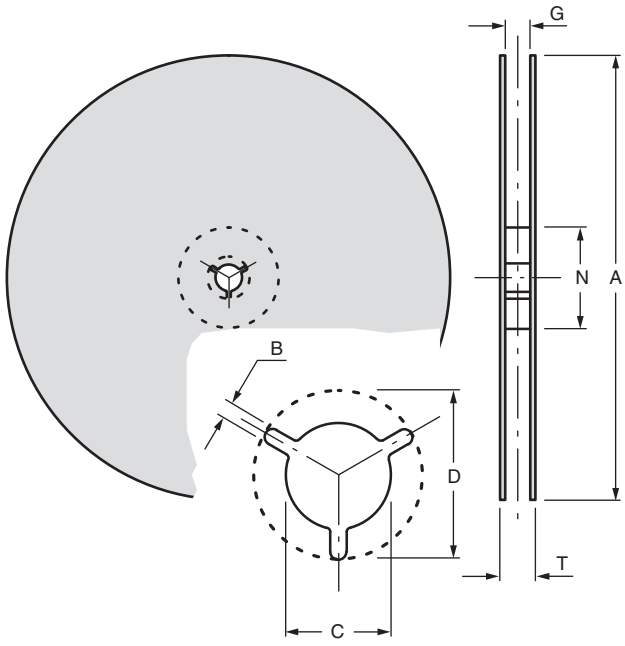
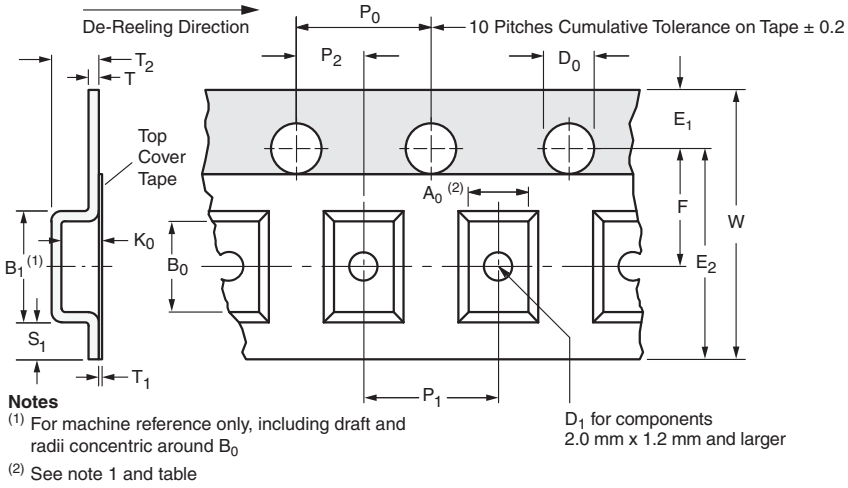


Fig. 7

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



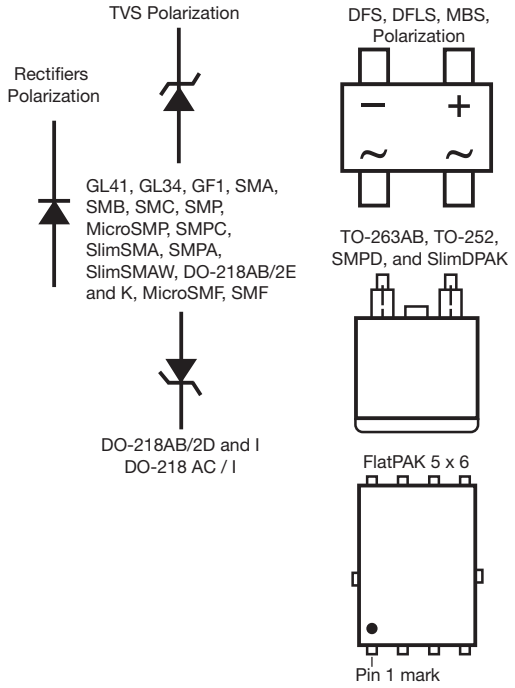


Fig. 8

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 ± 0.1 (0.059 ± 0.004)	1.75 ± 0.1 (0.069 ± 0.004)	4.0 ± 0.1 (0.157 ± 0.004)	2.0 ± 0.05 (0.079 ± 0.002)	(1)	0.6 (0.024)	0.600 (0.024)	0.1 (0.004)
16 mm, 24 mm				2.0 ± 0.1 (0.079 ± 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)		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)				8.0 ± 0.10 (0.315 ± 0.004)		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)			2.64 (0.104)	16.3 (0.642)
SlimDPAK (TO-252AE)								2.0 (0.079)	
DFS						12.0 ± 0.10 (0.472 ± 0.004)		3.91 (0.154)	
D^2PAK (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)		5.31 (0.209)	24.3 (0.957)
SMPD (TO-263AC)						12.0 ± 0.10 (0.472 ± 0.004)		2.35 (0.093)	
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)		1.53 (0.060)	12.3 (0.484)
SlimSMAW (DO-221AD)								1.61 (0.063)	
FlatPAK 5 x 6		6.4 (0.252)				8.0 ± 0.10 (0.315 ± 0.004)		1.20 ± 0.10 (0.047 ± 0.004)	

Notes

(1) A_0, B_0, and K_0 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

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VISHAY

CERTIFICATION OF DESIGN, CONSTRUCTION AND QUALIFICATION

In reference to AEC Q-101 Rev E

Item Name	Supplier Response
1. User's Part Number:	
2. Supplier Part Number/Generic Part Number:	TPSMP6.8AHM3_A
3. Device Description:	TVS
4. Wafer/Die Fab Location & Process ID:	
a. Facility name/plant #:	Vishay General Semiconductor Taiwan Ltd.
b. Street address:	233,Baoqiao Road, New Taipei Xindian, Taiwan
c. Country:	Taiwan
5. Wafer Probe Location:	
a. Facility name/plant #:	Vishay General Semiconductor China Co., Ltd. Vishay General Semiconductor Taiwan Ltd. Vishay General Semiconductor Taiwan Ltd., Nanzi Branch
b. Street address:	No. 88, 6th Avenue, TEDA, Tianjin, China 233,Baoqiao Road, New Taipei Xindian, Taiwan
c. Country:	No.40 Zhongyang Rd., Nanzi Dist. Kaohsiung City 81170, Taiwan China/Taiwan
6. Assembly Location & Process ID:	
a. Facility name/plant #:	Vishay General Semiconductor China Co., Ltd. Vishay General Semiconductor Taiwan Ltd. .Nanzi Branch
b. Street address:	No. 88, 6th Avenue, TEDA, Tianjin, China No.40 Zhongyang Rd., Nanzi Dist. Kaohsiung City 81170, Taiwan
c. Country:	China/Taiwan
7. Final Quality Control A (Test) Location:	
a. Facility name/plant #:	Vishay General Semiconductor China Co., Ltd. Vishay General Semiconductor Taiwan Ltd. .Nanzi Branch
b. Street address:	No. 88, 6th Avenue, TEDA, Tianjin, China No.40 Zhongyang Rd., Nanzi Dist. Kaohsiung City 81170, Taiwan
c. Country:	China/ Taiwan
8. Wafer/Die:	
a. Wafer size:	6 inch
b. Die family:	TVS
c. Die mask set revision & name:	6S50 / Mx2
9. Wafer/Die Technology Description:	
a. Wafer/Die process technology:	TVS
b. Gate oxide thickness (MOSFETs only):	N/A
c. Number of mask steps:	2
10. Die Dimensions:	
a. Die width:	50mil
b. Die length:	50mil
c. Die thickness (finished):	10mil
11. Die (frontside) Metallization:	
a. Die metallization material(s):	Ni/Au
b. Number of layers:	2
c. Thickness (per layer):	Typ. 1.1um
d. % of alloys (if present):	N/A
12. Die Passivation:	
a. Number of passivation layers:	1
b. Die passivation material(s):	Oxide
c. Thickness(es) & tolerances:	> 4000A
13. Die Overcoat Material (e.g., Polyimide):	N/A
14. Die Prep Backside:	
a. Die prep method:	Confidential
b. Die metallization:	Ni/Au
c. Thickness(es) & tolerances:	Typ. 1.1um
15. Die Separation Method:	Blade saw
a. Kerf width (mm):	<0.05
b. Kerf depth (if not 100% saw):	N/A
c. Saw method:	Single ☑ Dual ☐
16. Die Attach:	
a. Die attach material ID:	92.5Pb/2.5Ag/5Sn
b. Die attach method:	Reflow soldering
c. Die placement diagram:	See attached ☑ Not available ☐
17. Package:	
a. Type of package (e.g., plastic, ceramic, unpackaged):	Plastic
b. JEDEC designation (e.g., MS029, MS034, etc.):	SMP(DO-220AA)
18. Mold Compound:	
a. Mold compound supplier & ID:	Confidential
b. Mold compound type:	Halogen-free Epoxy Compound
c. Flammability rating:	UL 94 V1 ☐ UL 94 V0 ☑
d. Fire Retardant type/composition:	Confidential
e. Tg (glass transition temperature)(°C):	Typ. 135 °C
f. CTE (above & below Tg)(ppm/°C):	CTE1 (below Tg) < 16 CTE2 (above Tg) < 46
19. Wire Bond:	
a. Wire bond material:	N/A
b. Wire bond diameter (mils):	N/A
c. Type of wire bond at die:	N/A
d. Type of wire bond at leadframe:	N/A
e. Number of bonds over active area:	N/A
20. Leadframe (if applicable):	
a. Header material:	Copper
b. Header width (mils):	Confidential
c. Header length (mils):	Confidential
d. Header plating composition:	None
e. Header plating thickness (µinch):	N/A
f. Leadframe material:	Copper
g. Leadframe bonding plating composition:	None
h. Leadframe bonding plating thickness (µinch):	N/A
i. External lead plating composition:	Pure Sn
j. External lead plating thickness (µinch):	Min. 8um
21. Thermal Resistance:	
a. θ_{JA} °C/W (approx):	N/A
b. θ_{JC} °C/W (approx):	N/A
c. θ_{JL} junction-to-lead °C/W (approx):	N/A
d. θ_{JM} junction-to-mounting base °C/W (approx):	N/A
22. Maximum Process Exposure Conditions:	** Note: Temperatures are as measured on the center of the plastic package body top surface.*
a. MSL @ rated SnPb temperature:	1 at 235 °C (SnPb)
b. MSL @ rated Pb-free temperature:	1 at 260 °C (Pb-free)
Attachments: Requirements:	Requirements:
Die Photo ☑	1. A separate Certification of Design, Construction & Qualification must be submitted for each part number, wafer fab, and assembly location.
Package Outline Drawing ☐	
Die Cross-Section Photo/Drawing ☐	
Wire Bonding Diagram ☐	2. Design, Construction & Qualification shall be signed by the responsible individual at the supplier who can verify the above information is accurate and complete. Type name and sign below.
Die Placement Diagram ☑	
Completed by: Yan Zhang Date: 4/24/2023	Certified by: Date:
Typed or Printed: Yan Zhang Signatue: Yan Zhang Title: VGSC Product engineer	Typed or Printed: Signatue: Title:

VISHAY

CERTIFICATION OF DESIGN, CONSTRUCTION AND QUALIFICATION

In reference to AEC Q-101 Rev E

Item Name	Supplier Response
1. User's Part Number:	
2. Supplier Part Number/Generic Part Number:	SE10PJHM3
3. Device Description:	STD
4. Wafer/Die Fab Location & Process ID:	
a. Facility name/plant #:	Vishay General Semiconductor Taiwan Ltd.
b. Street address:	233,Baoqiao Road, New Taipei Xindian, Taiwan
c. Country:	Taiwan
5. Wafer Probe Location:	
a. Facility name/plant #:	Vishay General Semiconductor China Co., Ltd. Vishay General Semiconductor Taiwan Ltd. Vishay General Semiconductor Taiwan Ltd., Nanzi Branch
b. Street address:	No. 88, 6th Avenue, TEDA, Tianjin, China 233,Baoqiao Road, New Taipei Xindian, Taiwan No.40 Zhongyang Rd., Nanzi Dist. Kaohsiung City 81170, Taiwan
c. Country:	China/Taiwan
6. Assembly Location & Process ID:	
a. Facility name/plant #:	Vishay General Semiconductor China Co., Ltd. Vishay General Semiconductor Taiwan Ltd. ,Nanzi Branch
b. Street address:	No. 88, 6th Avenue, TEDA, Tianjin, China No.40 Zhongyang Rd., Nanzi Dist. Kaohsiung City 81170, Taiwan
c. Country:	China/Taiwan
7. Final Quality Control A (Test) Location:	
a. Facility name/plant #:	Vishay General Semiconductor China Co., Ltd. Vishay General Semiconductor Taiwan Ltd. ,Nanzi Branch
b. Street address:	No. 88, 6th Avenue, TEDA, Tianjin, China No.40 Zhongyang Rd., Nanzi Dist. Kaohsiung City 81170, Taiwan
c. Country:	China/ Taiwan
8. Wafer/Die:	
a. Wafer size:	4 inch
b. Die family:	STD
c. Die mask set revision & name:	4S40/Mx2
9. Wafer/Die Technology Description:	
a. Wafer/Die process technology:	STD
b. Gate oxide thickness (MOSFETs only):	N/A
c. Number of mask steps:	2
10. Die Dimensions:	
a. Die width:	40mil
b. Die length:	40mil
c. Die thickness (finished):	9.5mil
11. Die (frontside) Metallization:	
a. Die metallization material(s):	Ni/Au
b. Number of layers:	2
c. Thickness (per layer):	Typ. 1.1um
d. % of alloys (if present):	N/A
12. Die Passivation:	
a. Number of passivation layers:	2
b. Die passivation material(s):	Oxide
c. Thickness(es) & tolerances:	> 4000A
13. Die Overcoat Material (e.g., Polyimide):	N/A
14. Die Prep Backside:	
a. Die prep method:	Confidential
b. Die metallization:	Ni/Au
c. Thickness(es) & tolerances:	Typ. 1.1um
15. Die Separation Method:	Blade saw
a. Kerf width (mm):	<0.05
b. Kerf depth (if not 100% saw):	N/A
c. Saw method:	Single ☑ Dual ☐
16. Die Attach:	
a. Die attach material ID:	92.5Pb/2.5Ag/5Sn
b. Die attach method:	Reflow soldering
c. Die placement diagram:	See attached ☑ Not available ☐
17. Package:	
a. Type of package (e.g., plastic, ceramic, unpackaged):	Plastic
b. JEDEC designation (e.g., MS029, MS034, etc.):	SMP (DO-220AA)
18. Mold Compound:	
a. Mold compound supplier & ID:	Confidential
b. Mold compound type:	Halogen-free Epoxy Compound
c. Flammability rating:	UL 94 V1 ☐ UL 94 V0 ☑
d. Fire Retardant type/composition:	Confidential
e. Tg (glass transition temperature)(°C):	Typ. 135°C
f. CTE (above & below Tg)(ppm/°C):	CTE1 (below Tg) < 16 CTE2 (above Tg) < 46
19. Wire Bond:	
a. Wire bond material:	N/A
b. Wire bond diameter (mils):	N/A
c. Type of wire bond at die:	N/A
d. Type of wire bond at leadframe:	N/A
e. Number of bonds over active area:	N/A
20. Leadframe (if applicable):	
a. Header material:	Copper
b. Header width (mils):	Confidential
c. Header length (mils):	Confidential
d. Header plating composition:	None
e. Header plating thickness (µinch):	N/A
f. Leadframe material:	Copper
g. Leadframe bonding plating composition:	None
h. Leadframe bonding plating thickness (µinch):	N/A
i. External lead plating composition:	Pure Sn
j. External lead plating thickness (µinch):	Min. 8um
21. Thermal Resistance:	
a. θ_{JA} °C/W (approx):	105°C/W
b. θ_{JC} °C/W (approx):	30°C/W
c. θ_{JL} junction-to-lead °C/W (approx):	25°C/W
d. θ_{JM} junction-to-mounting base °C/W (approx):	N/A
22. Maximum Process Exposure Conditions:	* *Note: Temperatures are as measured on the center of the plastic package body top surface.*
a. MSL @ rated SnPb temperature:	1 at 235 °C (SnPb)
b. MSL @ rated Pb-free temperature:	1 at 260 °C (Pb-free)
Attachments: Requirements:	Requirements:
Die Photo ☑	1. A separate Certification of Design, Construction & Qualification must be submitted for each part number, wafer fab, and assembly location.
Package Outline Drawing ☐	
Die Cross-Section Photo/Drawing ☐	
Wire Bonding Diagram ☐	2. Design, Construction & Qualification shall be signed by the responsible individual at the supplier who can verify the above information is accurate and complete. Type name and sign below.
Die Placement Diagram ☑	
Completed by: Yan Zhang Date: 4/24/2023	Certified by: Date:
Typed or Printed: Yan Zhang Signatue: Yan Zhang Title: VGSC Product engineer	Typed or Printed: Signatue: Title:

VISHAY

CERTIFICATION OF DESIGN, CONSTRUCTION AND QUALIFICATION

In reference to AEC Q-101 Rev.E

Item Name	Supplier Response
1. User's Part Number:	
2. Supplier Part Number/Generic Part Number:	V3PL45HM3
3. Device Description:	SKY
4. Wafer/Die Fab Location & Process ID:	
a. Facility name/plant #:	Vishay General Semiconductor Taiwan Ltd.
b. Street address:	233,Baoqiao Road, New Taipei Xindian, Taiwan
c. Country:	Taiwan
5. Wafer Probe Location:	
a. Facility name/plant #:	Vishay General Semiconductor China Co., Ltd. Vishay General Semiconductor Taiwan Ltd. Vishay General Semiconductor Taiwan Ltd., Nanzi Branch
b. Street address:	No. 88, 6th Avenue, TEDA, Tianjin, China 233,Baoqiao Road, New Taipei Xindian, Taiwan No.40 Zhongyang Rd., Nanzi Dist. Kaohsiung City 81170, Taiwan
c. Country:	China/Taiwan
6. Assembly Location & Process ID:	
a. Facility name/plant #:	Vishay General Semiconductor China Co., Ltd. Vishay General Semiconductor Taiwan Ltd. ,Nanzi Branch
b. Street address:	No. 88, 6th Avenue, TEDA, Tianjin, China No.40 Zhongyang Rd., Nanzi Dist. Kaohsiung City 81170, Taiwan
c. Country:	China/Taiwan
7. Final Quality Control A (Test) Location:	
a. Facility name/plant #:	Vishay General Semiconductor China Co., Ltd. Vishay General Semiconductor Taiwan Ltd. ,Nanzi Branch
b. Street address:	No. 88, 6th Avenue, TEDA, Tianjin, China No.40 Zhongyang Rd., Nanzi Dist. Kaohsiung City 81170, Taiwan
c. Country:	China/ Taiwan
8. Wafer/Die:	
a. Wafer size:	6 inch
b. Die family:	SKY
c. Die mask set revision & name:	6S50/Mx4
9. Wafer/Die Technology Description:	
a. Wafer/Die process technology:	STD
b. Gate oxide thickness (MOSFETs only):	SKY
c. Number of mask steps:	4
10. Die Dimensions:	
a. Die width:	50mil
b. Die length:	50mil
c. Die thickness (finished):	10mil
11. Die (frontside) Metallization:	
a. Die metallization material(s):	Ti/Al/Ni/Ag;
b. Number of layers:	4
c. Thickness (per layer):	Typ. 5.38 um
d. % of alloys (if present):	N/A
12. Die Passivation:	
a. Number of passivation layers:	4
b. Die passivation material(s):	Oxide
c. Thickness(es) & tolerances:	> 4000A
13. Die Overcoat Material (e.g., Polyimide):	N/A
14. Die Prep Backside:	
a. Die prep method:	Confidential
b. Die metallization:	Ti/Ni/Ag
c. Thickness(es) & tolerances:	Typ. 3.3um
15. Die Separation Method:	Blade saw
a. Kerf width (mm):	<0.05
b. Kerf depth (if not 100% saw):	N/A
c. Saw method:	Single ☑ Dual ☐
16. Die Attach:	
a. Die attach material ID:	92.5Pb/2.5Ag/5Sn
b. Die attach method:	Reflow soldering
c. Die placement diagram:	See attached ☑ Not available ☐
17. Package:	
a. Type of package (e.g., plastic, ceramic, unpackaged):	Plastic
b. JEDEC designation (e.g., MS029, MS034, etc.):	SMP (DO-220AA)
18. Mold Compound:	
a. Mold compound supplier & ID:	Confidential
b. Mold compound type:	Halogen-free Epoxy Compound
c. Flammability rating:	UL 94 V1 ☐ UL 94 V0 ☑
d. Fire Retardant type/composition:	Confidential
e. Tg (glass transition temperature)(°C):	Typ. 135°C
f. CTE (above & below Tg)(ppm/°C):	CTE1 (below Tg) < 16 CTE2 (above Tg) < 46
19. Wire Bond:	
a. Wire bond material:	N/A
b. Wire bond diameter (mils):	N/A
c. Type of wire bond at die:	N/A
d. Type of wire bond at leadframe:	N/A
e. Number of bonds over active area:	N/A
20. Leadframe (if applicable):	
a. Header material:	Copper
b. Header width (mils):	Confidential
c. Header length (mils):	Confidential
d. Header plating composition:	None
e. Header plating thickness (µinch):	N/A
f. Leadframe material:	Copper
g. Leadframe bonding plating composition:	None
h. Leadframe bonding plating thickness (µinch):	N/A
i. External lead plating composition:	Pure Sn
j. External lead plating thickness (µinch):	Min. 8um
21. Thermal Resistance:	
a. θ_{JA} °C/W (approx):	125°C/W
b. θ_{JC} °C/W (approx):	N/A
c. θ_{JL} junction-to-lead °C/W (approx):	N/A
d. θ_{JM} junction-to-mounting base °C/W (approx):	15°C/W
22. Maximum Process Exposure Conditions:	** Note: Temperatures are as measured on the center of the plastic package body top surface.*
a. MSL @ rated SnPb temperature:	1 at 235 °C (SnPb)
b. MSL @ rated Pb-free temperature:	1 at 260 °C (Pb-free)
Attachments: Requirements: Die Photo ☑ Package Outline Drawing ☐ Die Cross-Section Photo/Drawing ☐ Wire Bonding Diagram ☐ Die Placement Diagram ☑	Requirements: 1. A separate Certification of Design, Construction & Qualification must be submitted for each part number, wafer fab, and assembly location. 2. Design, Construction & Qualification shall be signed by the responsible individual at the supplier who can verify the above information is accurate and complete. Type name and sign below.
Completed by: Yan Zhang Date: 2/24/2023	Certified by: Date:
Typed or Printed: Yan Zhang Signatue: Yan Zhang Title: VGSC Product engineer	Typed or Printed: Signatue: Title:

CERTIFICATION OF DESIGN, CONSTRUCTION AND QUALIFICATION

In reference to AEC Q-101 Rev.E

Item Name	Supplier Response
1. User's Part Number:	
2. Supplier Part Number/Generic Part Number:	SS2PH10HM3_A
3. Device Description:	SKY
4. Wafer/Die Fab Location & Process ID:	
a. Facility name/plant #:	Vishay General Semiconductor Taiwan Ltd.
b. Street address:	233,Baoqiao Road, New Taipei Xindian, Taiwan
c. Country:	Taiwan
5. Wafer Probe Location:	
a. Facility name/plant #:	Vishay General Semiconductor China Co., Ltd. Vishay General Semiconductor Taiwan Ltd. Vishay General Semiconductor Taiwan Ltd., Nanzi Branch
b. Street address:	No. 88, 6th Avenue, TEDA, Tianjin, China 233,Baoqiao Road, New Taipei Xindian, Taiwan No.40 Zhongyang Rd., Nanzi Dist. Kaohsiung City 81170, Taiwan
c. Country:	China/Taiwan
6. Assembly Location & Process ID:	
a. Facility name/plant #:	Vishay General Semiconductor China Co., Ltd. Vishay General Semiconductor Taiwan Ltd. ,Nanzi Branch
b. Street address:	No. 88, 6th Avenue, TEDA, Tianjin, China No.40 Zhongyang Rd., Nanzi Dist. Kaohsiung City 81170, Taiwan
c. Country:	China/Taiwan
7. Final Quality Control A (Test) Location:	
a. Facility name/plant #:	Vishay General Semiconductor China Co., Ltd. Vishay General Semiconductor Taiwan Ltd. ,Nanzi Branch
b. Street address:	No. 88, 6th Avenue, TEDA, Tianjin, China No.40 Zhongyang Rd., Nanzi Dist. Kaohsiung City 81170, Taiwan
c. Country:	China/ Taiwan
8. Wafer/Die:	
a. Wafer size:	6 inch
b. Die family:	SKY
c. Die mask set revision & name:	6S50 / Mx3
9. Wafer/Die Technology Description:	
a. Wafer/Die process technology:	SKY
b. Gate oxide thickness (MOSFETs only):	N/A
c. Number of mask steps:	3
10. Die Dimensions:	
a. Die width:	50mil
b. Die length:	50mil
c. Die thickness (finished):	10mil
11. Die (frontside) Metallization:	
a. Die metallization material(s):	Ti/Ni/Ag
b. Number of layers:	3
c. Thickness (per layer):	Typ. 5.38 um
d. % of alloys (if present):	N/A
12. Die Passivation:	
a. Number of passivation layers:	1
b. Die passivation material(s):	Oxide
c. Thickness(es) & tolerances:	> 4000A
13. Die Overcoat Material (e.g., Polyimide):	Polyimide
14. Die Prep Backside:	
a. Die prep method:	Confidential
b. Die metallization:	Ti/Ni/Ag
c. Thickness(es) & tolerances:	Typ. 3.3um
15. Die Separation Method:	Blade saw
a. Kerf width (mm):	<0.05
b. Kerf depth (if not 100% saw):	N/A
c. Saw method:	Single ☑ Dual ☐
16. Die Attach:	
a. Die attach material ID:	92.5Pb5Sn2.5Ag
b. Die attach method:	Reflow soldering
c. Die placement diagram:	See attached ☑ Not available ☐
17. Package:	
a. Type of package (e.g., plastic, ceramic, unpackaged):	Plastic
b. JEDEC designation (e.g., MS029, MS034, etc.):	SMP(DO-220AA)
18. Mold Compound:	
a. Mold compound supplier & ID:	Confidential
b. Mold compound type:	Halogen-free Epoxy Compound
c. Flammability rating:	UL 94 V1 ☐ UL 94 V0 ☑
d. Fire Retardant type/composition:	Confidential
e. Tg (glass transition temperature)(°C):	Typ. 135°C
f. CTE (above & below Tg)(ppm/°C):	CTE1 (below Tg) < 16 CTE2 (above Tg) < 46
19. Wire Bond:	
a. Wire bond material:	N/A
b. Wire bond diameter (mils):	N/A
c. Type of wire bond at die:	N/A
d. Type of wire bond at leadframe:	N/A
e. Number of bonds over active area:	N/A
20. Leadframe (if applicable):	
a. Header material:	Copper
b. Header width (mils):	Confidential
c. Header length (mils):	Confidential
d. Header plating composition:	None
e. Header plating thickness (µinch):	N/A
f. Leadframe material:	Copper
g. Leadframe bonding plating composition:	None
h. Leadframe bonding plating thickness (µinch):	N/A
i. External lead plating composition:	Pure Sn
j. External lead plating thickness (µinch):	Min. 8um
21. Thermal Resistance:	
a. θ_{JA} °C/W (approx):	110°C/W
b. θ_{JC} °C/W (approx):	25°C/W
c. θ_{JL} junction-to-lead °C/W (approx):	15°C/W
d. θ_{JM} junction-to-mounting base °C/W (approx):	N/A
22. Maximum Process Exposure Conditions:	* *Note: Temperatures are as measured on the center of the plastic package body top surface.*
a. MSL @ rated SnPb temperature:	1 at 235 °C (SnPb)
b. MSL @ rated Pb-free temperature:	1 at 260 °C (Pb-free)
Attachments: Requirements: Die Photo ☑ Package Outline Drawing ☐ Die Cross-Section Photo/Drawing ☐ Wire Bonding Diagram ☐ Die Placement Diagram ☑	Requirements: Die Photo 1. A separate Certification of Design, Construction & Qualification must be submitted for each part number, wafer fab, and assembly location. 2. Design, Construction & Qualification shall be signed by the responsible individual at the supplier who can verify the above information is accurate and complete. Type name and sign below.
Completed by: Yan Zhang Date: 4/24/2023	Certified by: Date:
Typed or Printed: Yan Zhang Signatue: Yan Zhang Title: VGSC Product engineer	Typed or Printed: Signatue: Title:

VISHAY

CERTIFICATION OF DESIGN, CONSTRUCTION AND QUALIFICATION

In reference to AEC Q-101 Rev.E

Item Name	Supplier Response
1. User's Part Number:	
2. Supplier Part Number/Generic Part Number:	VS-2ENH02HM3
3. Device Description:	FRED
4. Wafer/Die Fab Location & Process ID:	
a. Facility name/plant #:	Vishay Semiconductor Italiana spa
b. Street address:	Via Liguria, 49 - 10071 BORGARO TORINESE (TURIN)
c. Country:	ITALY
5. Wafer Probe Location:	
a. Facility name/plant #:	Vishay Semiconductor Italiana spa
b. Street address:	Via Liguria, 49 - 10071 BORGARO TORINESE (TURIN)
c. Country:	ITALY
6. Assembly Location & Process ID:	
a. Facility name/plant #:	Vishay General Semiconductor China Co., Ltd. Vishay General Semiconductor Taiwan Ltd. ,Nanzi Branch
b. Street address:	No. 88, 6th Avenue, TEDA, Tianjin, China No.40 Zhongyang Rd., Nanzi Dist. Kaohsiung City 81170, Taiwan
c. Country:	China/Taiwan
7. Final Quality Control A (Test) Location:	
a. Facility name/plant #:	Vishay General Semiconductor China Co., Ltd. Vishay General Semiconductor Taiwan Ltd. ,Nanzi Branch
b. Street address:	No. 88, 6th Avenue, TEDA, Tianjin, China No.40 Zhongyang Rd., Nanzi Dist. Kaohsiung City 81170, Taiwan
c. Country:	China/ Taiwan
8. Wafer/Die:	
a. Wafer size:	6 inch
b. Die family:	FRED
c. Die mask set revision & name:	F5353200_6pol_xx
9. Wafer/Die Technology Description:	
a. Wafer/Die process technology:	FRED
b. Gate oxide thickness (MOSFETs only):	N/A
c. Number of mask steps:	5
10. Die Dimensions:	
a. Die width:	40 mil
b. Die length:	40 mil
c. Die thickness (finished):	10 mil
11. Die (frontside) Metallization:	
a. Die metallization material(s):	Al/Ti/Ni/Ag
b. Number of layers:	4
c. Thickness (per layer):	Typ. 4.2um
d. % of alloys (if present):	N/A
12. Die Passivation:	
a. Number of passivation layers:	1
b. Die passivation material(s):	Oxide
c. Thickness(es) & tolerances:	Typ. 1.4um
13. Die Overcoat Material (e.g., Polyimide):	Polyimide
14. Die Prep Backside:	
a. Die prep method:	Confidential
b. Die metallization:	Ti/Ni/Ag
c. Thickness(es) & tolerances:	Typ. 0.6um
15. Die Separation Method:	Blade saw
a. Kerf width (mm):	<0.05
b. Kerf depth (if not 100% saw):	N/A
c. Saw method:	Single ☑ Dual ☐
16. Die Attach:	
a. Die attach material ID:	92.5Pb/2.5Ag/5Sn
b. Die attach method:	Reflow soldering
c. Die placement diagram:	See attached ☑ Not available ☐
17. Package:	
a. Type of package (e.g., plastic, ceramic, unpackaged):	Plastic
b. JEDEC designation (e.g., MS029, MS034, etc.):	SMP(DO-220AA)
18. Mold Compound:	
a. Mold compound supplier & ID:	Confidential
b. Mold compound type:	Halogen-free Epoxy Compound
c. Flammability rating:	UL 94 V1 ☐ UL 94 V0 ☑
d. Fire Retardant type/composition:	Confidential
e. Tg (glass transition temperature)(°C):	Typ. 135°C
f. CTE (above & below Tg)(ppm/°C):	CTE1 (below Tg) < 16 CTE2 (above Tg) < 46
19. Wire Bond:	
a. Wire bond material:	N/A
b. Wire bond diameter (mils):	N/A
c. Type of wire bond at die:	N/A
d. Type of wire bond at leadframe:	N/A
e. Number of bonds over active area:	N/A
20. Leadframe (if applicable):	
a. Header material:	Copper
b. Header width (mils):	Confidential
c. Header length (mils):	Confidential
d. Header plating composition:	None
e. Header plating thickness (µinch):	Confidential
f. Leadframe material:	Copper
g. Leadframe bonding plating composition:	None
h. Leadframe bonding plating thickness (µinch):	Confidential
i. External lead plating composition:	Pure Sn
j. External lead plating thickness (µinch):	Min. 8um
21. Thermal Resistance:	
a. θ_{JA} °C/W (approx):	107°C/W Typ.
b. θ_{JC} °C/W (approx):	N/A
c. θ_{JL} junction-to-lead °C/W (approx):	N/A
d. θ_{JM} junction-to-mounting base °C/W (approx):	9°C/W Max.
22. Maximum Process Exposure Conditions:	** Note: Temperatures are as measured on the center of the plastic package body top surface.*
a. MSL @ rated SnPb temperature:	1 at 235 °C (SnPb)
b. MSL @ rated Pb-free temperature:	1 at 260 °C (Pb-free)
Attachments: Requirements: Die Photo ☑ Package Outline Drawing ☐ Die Cross-Section Photo/Drawing ☐ Wire Bonding Diagram ☐ Die Placement Diagram ☑	Requirements: 1. A separate Certification of Design, Construction & Qualification must be submitted for each part number, wafer fab, and assembly location. 2. Design, Construction & Qualification shall be signed by the responsible individual at the supplier who can verify the above information is accurate and complete. Type name and sign below.
Completed by: Yan Zhang Date: 4/24/2023	Certified by: Date:
Typed or Printed: Yan Zhang Signatue: Yan Zhang Title: VGSC Product engineer	Typed or Printed: Signature: Title: Quality Mgr

VISHAY

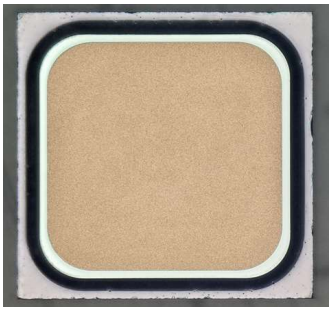
CERTIFICATION OF DESIGN, CONSTRUCTION AND QUALIFICATION

In reference to AEC Q-101 Rev E

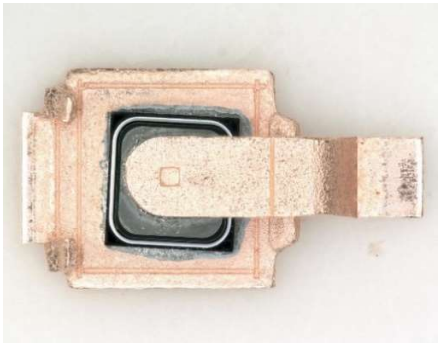
Item Name	Supplier Response
1. User's Part Number:	
2. Supplier Part Number/Generic Part Number:	AU1PMHM3
3. Device Description:	FER
4. Wafer/Die Fab Location & Process ID:	
a. Facility name/plant #:	Vishay General Semiconductor Taiwan Ltd.
b. Street address:	233,Baoqiao Road, New Taipei Xindian, Taiwan
c. Country:	Taiwan
5. Wafer Probe Location:	
a. Facility name/plant #:	Vishay General Semiconductor China Co., Ltd. Vishay General Semiconductor Taiwan Ltd. Vishay General Semiconductor Taiwan Ltd., Nanzi Branch
b. Street address:	No. 88, 6th Avenue, TEDA, Tianjin, China 233,Baoqiao Road, New Taipei Xindian, Taiwan
c. Country:	No.40 Zhongyang Rd., Nanzi Dist. Kaohsiung City 81170, Taiwan China/Taiwan
6. Assembly Location & Process ID:	
a. Facility name/plant #:	Vishay General Semiconductor China Co., Ltd. Vishay General Semiconductor Taiwan Ltd. ,Nanzi Branch
b. Street address:	No. 88, 6th Avenue, TEDA, Tianjin, China No.40 Zhongyang Rd., Nanzi Dist. Kaohsiung City 81170, Taiwan
c. Country:	China/Taiwan
7. Final Quality Control A (Test) Location:	
a. Facility name/plant #:	Vishay General Semiconductor China Co., Ltd. Vishay General Semiconductor Taiwan Ltd. ,Nanzi Branch
b. Street address:	No. 88, 6th Avenue, TEDA, Tianjin, China No.40 Zhongyang Rd., Nanzi Dist. Kaohsiung City 81170, Taiwan
c. Country:	China/ Taiwan
8. Wafer/Die:	
a. Wafer size:	4 inch
b. Die family:	FER
c. Die mask set revision & name:	4S50 / Mx3
9. Wafer/Die Technology Description:	
a. Wafer/Die process technology:	FER
b. Gate oxide thickness (MOSFETs only):	N/A
c. Number of mask steps:	3
10. Die Dimensions:	
a. Die width:	50mil
b. Die length:	50mil
c. Die thickness (finished):	9.5mil
11. Die (frontside) Metallization:	
a. Die metallization material(s):	Ni/Au
b. Number of layers:	2
c. Thickness (per layer):	Typ. 1.1um
d. % of alloys (if present):	N/A
12. Die Passivation:	
a. Number of passivation layers:	1
b. Die passivation material(s):	Glass
c. Thickness(es) & tolerances:	>1mil
13. Die Overcoat Material (e.g., Polyimide):	N/A
14. Die Prep Backside:	
a. Die prep method:	Confidential
b. Die metallization:	Ni/Au
c. Thickness(es) & tolerances:	Typ. 1.1um
15. Die Separation Method:	Blade saw
a. Kerf width (mm):	<0.05
b. Kerf depth (if not 100% saw):	N/A
c. Saw method:	Single ☑ Dual ☐
16. Die Attach:	
a. Die attach material ID:	92.5Pb/2.5Ag/5Sn
b. Die attach method:	Reflow soldering
c. Die placement diagram:	See attached ☑ Not available ☐
17. Package:	
a. Type of package (e.g., plastic, ceramic, unpackaged):	Plastic
b. JEDEC designation (e.g., MS029, MS034, etc.):	SMP (DO-220AA)
18. Mold Compound:	
a. Mold compound supplier & ID:	Confidential
b. Mold compound type:	Halogen-free Epoxy Compound
c. Flammability rating:	UL 94 V1 ☐ UL 94 V0 ☑
d. Fire Retardant type/composition:	Confidential
e. Tg (glass transition temperature)(°C):	Typ. 135°C
f. CTE (above & below Tg)(ppm/°C):	CTE1 (below Tg) < 16 CTE2 (above Tg) < 46
19. Wire Bond:	
a. Wire bond material:	N/A
b. Wire bond diameter (mils):	N/A
c. Type of wire bond at die:	N/A
d. Type of wire bond at leadframe:	N/A
e. Number of bonds over active area:	N/A
20. Leadframe (if applicable):	
a. Header material:	Copper
b. Header width (mils):	Confidential
c. Header length (mils):	Confidential
d. Header plating composition:	None
e. Header plating thickness (µinch):	N/A
f. Leadframe material:	Copper
g. Leadframe bonding plating composition:	None
h. Leadframe bonding plating thickness (µinch):	N/A
i. External lead plating composition:	Pure Sn
j. External lead plating thickness (µinch):	Min. 8um
21. Thermal Resistance:	
a. θ_{JA} °C/W (approx):	132°C/W
b. θ_{JC} °C/W (approx):	N/A
c. θ_{JL} junction-to-lead °C/W (approx):	N/A
d. θ_{JM} junction-to-mounting base °C/W (approx):	15°C/W
22. Maximum Process Exposure Conditions:	** Note: Temperatures are as measured on the center of the plastic package body top surface.*
a. MSL @ rated SnPb temperature:	1 at 235 °C (SnPb)
b. MSL @ rated Pb-free temperature:	1 at 260 °C (Pb-free)
Attachments: Requirements:	Requirements:
Die Photo ☑	Die Photo 1. A separate Certification of Design, Construction & Qualification must be submitted for each part number, wafer fab, and assembly location.
Package Outline Drawing ☐	
Die Cross-Section Photo/Drawing ☐	
Wire Bonding Diagram ☐	2. Design, Construction & Qualification shall be signed by the responsible individual at the supplier who can verify the above information is accurate and complete. Type name and sign below.
Die Placement Diagram ☑	
Completed by: Yan Zhang Date: 4/24/2023	Certified by: Date:
Typed or Printed: Yan Zhang Signatue: Yan Zhang Title: VGSC Product engineer	Typed or Printed: Signatue: Title:

PRODUCT DESCRIPTION			
Product : TPSMP6.8AHM3_A	Package : SMP(DO-220AA)		Issued by: Yan Zhang
Cust. P/N:	Technology : TVS		Date: 4/24/2023
Functional Description : Surface Mount Automotive Transient Voltage Suppressor			
Fab factory Taiwan	Assembly factory China/Taiwan	Testing factory China/Taiwan	

Chip

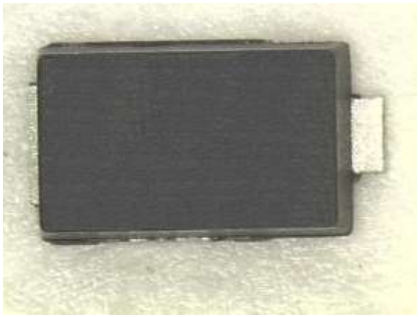


Sub-assembly (Top View)



Sub-assembly (Side View)

Finish Goods

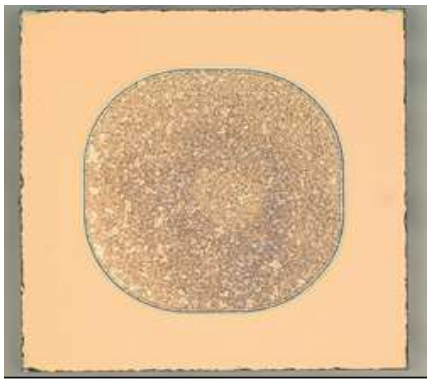


PRODUCT DESCRIPTION

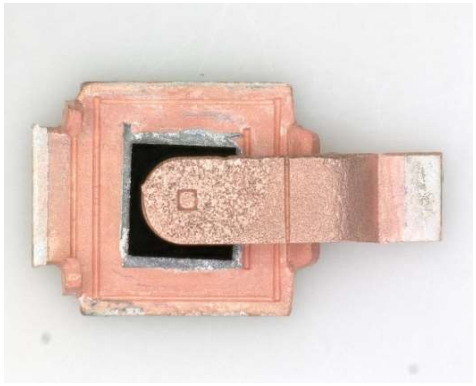
Product : SE10PJHM3	Package : SMP(DO-220AA)	Issued by Yan Zhang
Cust. P/N:	Technology : STD	Date : 4/24/2023
Functional Description : 1A/600V Surface Mount ESD Capability Rectifiers		

Fab factory	Assembly factory	Testing factory
Taiwan	China/Taiwan	China/Taiwan

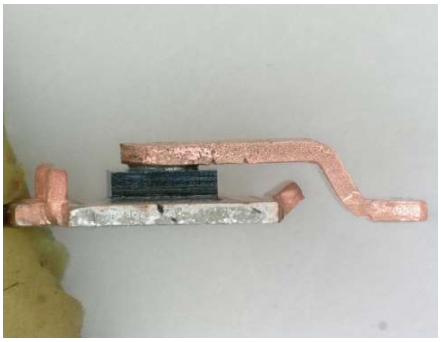
Chip :



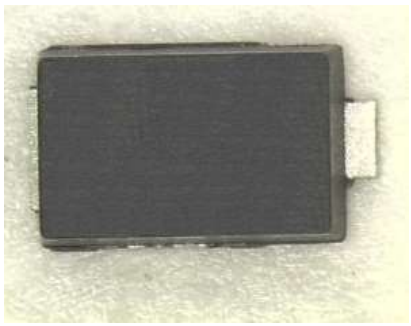
Sub-assembly(Top View)



Sub-assembly(Side View)

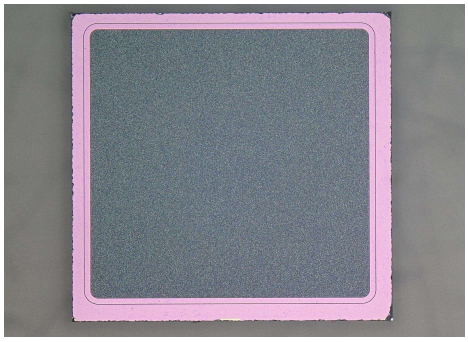


Finish Goods

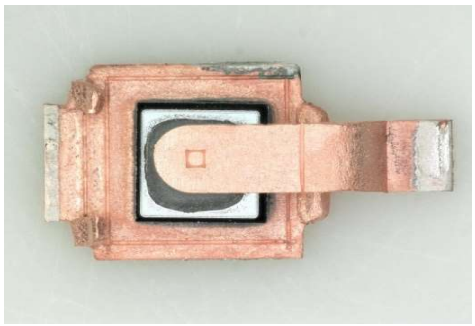


PRODUCT DESCRIPTION			
Product : V3PL45HM3	Package : SMP(DO-220AA)	Issued by Yan Zhang	
Cust. P/N:	Technology : SKY	Date : 4/24/2022	
Functional Description : 3A/45V Surface Mount Trench MOS Barrier Schottky Rectifier			
Fab Taiwan	Assembly factory China/Taiwan	Testing factory China/Taiwan	

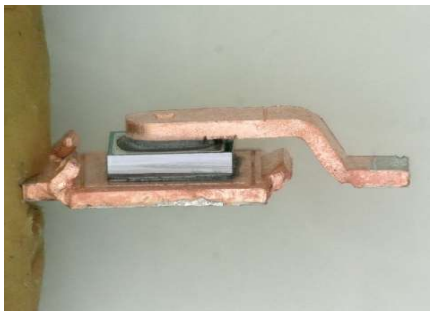
Chip :



Sub-assembly(Top View)



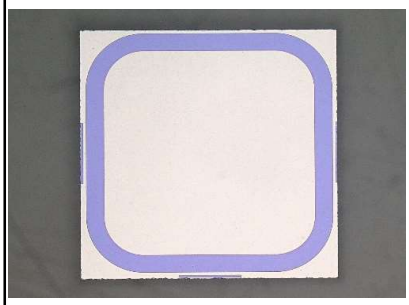
Sub-assembly(Side View)



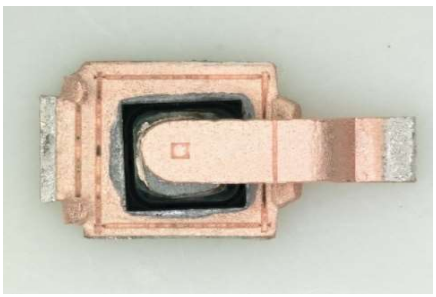
Finish Goods

PRODUCT DESCRIPTION			
Product : SS2PH10HM3_A	Package : SMP(DO-220AA)		Issued by Yan Zhang
Cust. P/N:	Technology : SKY		Date 4/24/2023
Functional Description: 2A/100V High Voltage Surface Mount Schottky Barrier Rectifier			
Fab factory Taiwan	Assembly factory China/Taiwan	Testing factory China/Taiwan	

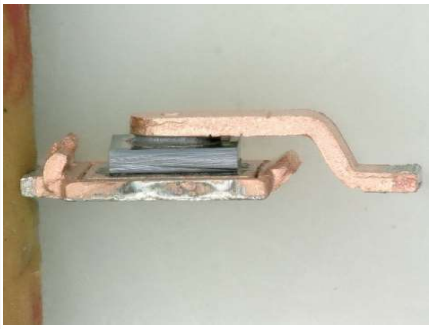
Chip



Sub-assembly (Top view)



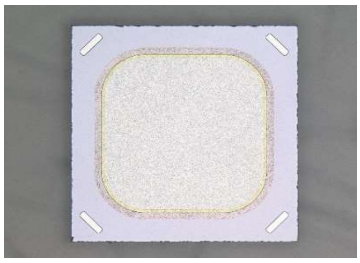
Sub-assembly (Side view)



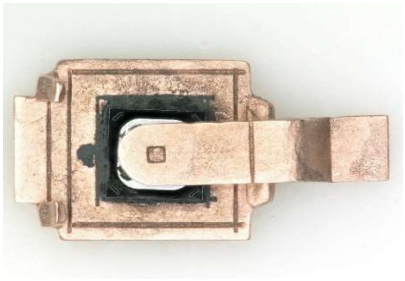
Finish Goods

PRODUCT DESCRIPTION			
Product : VS-2ENH02HM3	Package : SMP(DO-220AA)		Issued by Yan Zhang
Cust. P/N:	Technology : FRED		Date 4/24/2023
Functional Description: 2A/200V Surface Mount Hyperfast Fred			
Fab factory Taiwan	Assembly factory China/Taiwan	Testing factory China/Taiwan	

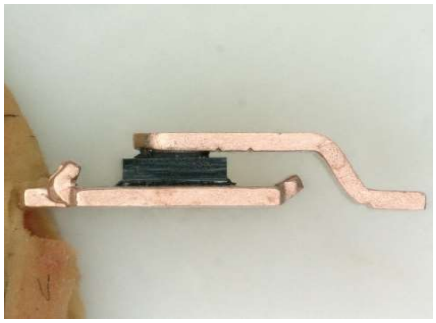
Chip



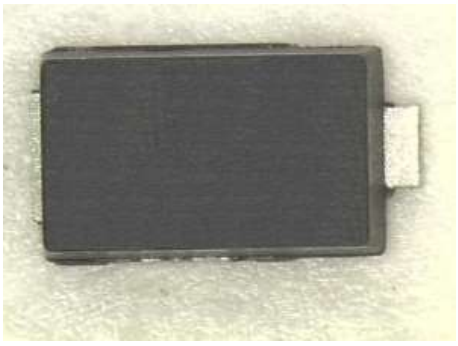
Sub-assembly (Top view)



Sub-assembly (Side view)



Finish Goods

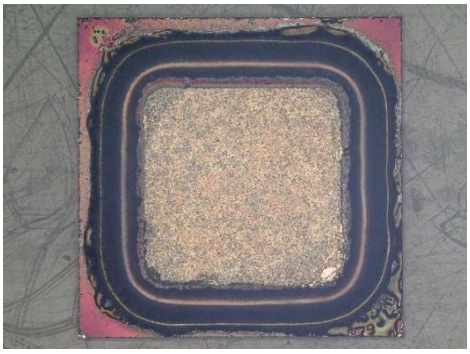


PRODUCT DESCRIPTION

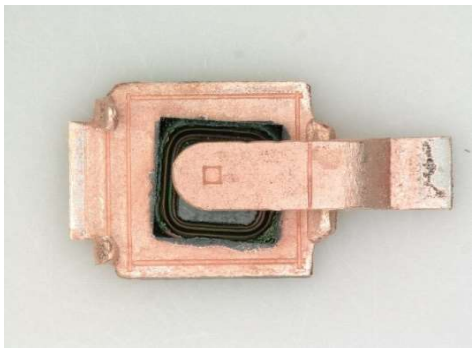
Product : AU1PMHM3	Package : SMP (DO-220AA)	Issued by: Yan Zhang
Cust. P/N:	Technology : FER	Date : 4/24/2023
Functional Description : 1.0A/1000V Surface Mount Ultrafast Avalanche Rectifiers		

Fab factory	Assembly factory	Testing factory	
Taiwan	China/Taiwan	China/Taiwan	

Chip :

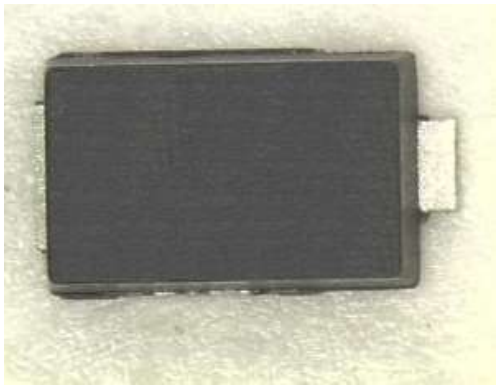


Sub-assembly(Top View)



Sub-assembly(Side View)

Finish Goods



PRODUCTION PART APPROVAL PROCESS

2.
Engineering Change Document

PRODUCTION PART APPROVAL PROCESS

3.
Customer Engineering Approval

Customer Engineering Approval is not applicable for this part

PRODUCTION PART APPROVAL PROCESS

4.
Design FMEA

Vishay General Semiconductor

*POTENTIAL FAILURE MODE AND EFFECTS ANALYSIS (**DESIGN FMEA**)*

Process: SMP
Product: SMP

FMEA Number: 077-SMP
Part Number: ALL
Core Team: SMP project team

Item / Function		Requirement	Potential Failure Mode	Potential Effect(s) of Failure	Severity	Classification	Potential Cause(s)/ Mechanism(s) of Failure	Current Design: Controls Prevention	Current Design: Occurrence	Current Design: Controls Detection	Current Design: Detection
Lead frame	Environmental friendly	Meet product design environment regulation & customer special request	Banned element over limit	Regulatory non-compliance	9	DT	Restricted materials are hazardous for people health and environment.	Designed per material standard G020 & GS-4315	2	Material test by a 3rd party laboratory	2
	Electric conduction	Electrical conductivity equal or better than existing product or industrial performance	Electrical conductivity worse than existing product or industrial performance	High VF	7		LF high resistance	Benchmarking with existing products	2	Prototype electrical tests	3
							LF contamination	AEC-Q101	2	Prototype electrical tests	3
	Thermal conduction	Good thermal conductive	Worse Thermal conductivity	High thermal resistance	8		LF worse thermal conductivity	AEC-Q101 & Benchmark with SMPC	2	Thermal resistance, HTRB & TC	3
	Thermal Expansion	CTE match with the Si Die	Die damage	Short or Hi-IR	8		CTE far away from the Si die material selected	Error-proofing with post molding cure and stress Simulation	2	Real sample stress test (TC)	3
		CTE match with the MCP	Delamination between MCP and LF	Hi-IR	7		CTE far away from the MCP material selected	Error-proofing with post molding cure and stress Simulation	2	Delamination check by cross-section	5
	Wetting with solder paste	Solderable with solder paste	Poor soldering strength	High VF	7		LF contamination	AEC-Q101	2	Shear test	4
	Carrying die	Pad size can carry maximum chip size	Die is out of pad	High IR or short	8		Bottom pad too small	Fail-safe design based on assembly machine capability	2	Die position check	3
							Improper die position on bottom pad	Fail-safe design based on assembly machine capability	2	Die position check	3
							Improper solder volume on bottom pad	Transfer pin design review	2	Solder weight check, pull test	5
		Finger size can carry minimum chip size	Finger is out of die active area	High IR or short	8		Finger size is too big to touch die passivation	Fail-safe design based on assembly machine capability	2	Finger dimension check	3
							Finger downset/ stage is small	Assembly structure simulation &design review	2	IQC check, COC report	3
							Finger mis-alignment	Fail-safe design based on assembly machine capability	2	Finger mis-alignment check	3
	Adhesion with molding compound	Adhesion with molding compound	Delamination between MCP and LF	High IR or short	8		LF contamination	J-STD-020D.1	2	C-SAM check, Cross-section	3
	High withstand voltage	External isolation voltage between cathode and anode is higher than 4KV based on breakdown voltage of air	External air electric breakdown between anode & cathode	Short for high voltage product	8		Creepage distance is too small to sustain high voltage	Structure and isolation voltage simulation	2	Cross-section check	3
		Internal isolation voltage between cathode and anode is higher than 4KV based on breakdown voltage of MCP	Internal MCP electric breakdown between anode & cathode	Short for high voltage product	8		Distance between cathode and anode internally is too thin to sustain high voltage	Structure and isolation voltage simulation	2	Cross-section check	3
		Isolation voltage between internal and external is higher than 4KV based on breakdown voltage of MCP	MCP electric breakdown between internal & external	Short for high voltage product	8		Distance between body top surface and finger top surface is too thin to sustain high voltage	Structure and isolation voltage simulation	2	Cross-section check	3
				Short for high voltage product	8		Distance between body bottom surface and LF bottom surface is too thin to sustain high voltage	Structure and isolation voltage simulation	2	Cross-section check	3
				Short for high voltage product	8		Distance between body side surface and pad side edge is too thin to sustain high voltage	Structure and isolation voltage simulation	2	Cross-section check	3
				Short for high voltage product	8		Lead frame/ chip/ finger tilt	Structure and isolation voltage simulation	2	Cross-section check	3
				Short for high voltage product	8		Distance between top finger edge and die edge (B distance) is too thin to sustain high voltage	Structure and isolation voltage simulation	3	Cross-section check	3
	PCB compatibility	PCB compatible with recommended PCB	Device can not mount on the recommended PCB	Poor wetting	7		Improper solder pad dimension	Structure simulation & Benchmarking with competitors	2	Solderability test & SD	5
							Lead stand off or coplanarity	-	2	Stand-off dimension check	5
							Lead poor strength	J-STD-002 & JESD22-B102	2	Terminal strength	4
	Surge capability	Soldering area fit with die top active area	The soldering area not fit with die top active area	High VF	7		Finger soldering area is too small to sustain target forward surge current	Fail-safe design based on assembly machine capability	2	Dimension check for finger position & Forward surge test	3
	Environmental friendly	Meet product design environment regulation & customer special request	Banned element over limit	Regulatory non-compliance	9	DT	Restricted materials are hazardous for people health and environment.	Designed per material standard G020 & GS-4315	2	Material test by a 3rd party laboratory	2

Vishay General Semiconductor

*POTENTIAL FAILURE MODE AND EFFECTS ANALYSIS (**DESIGN FMEA**)*

Process: SMP
Product: SMP

FMEA Number: 077-SMP
Part Number: ALL
Core Team: SMP project team

Item	Function	Requirement	Potential Failure Mode	Potential Effect(s) of Failure	Severity	Classification	Potential Cause(s)/ Mechanism(s) of Failure	Current Design: Controls Prevention	Current Design: Occurrence	Current Design: Controls Detection	Current Design: Detection
Chip /Die	Top soldering area size for finger soldering	Soldering area fit with finger soldering area	Finger over/touch die passivation	High IR	7		Top soldering area too small	Fail-safe design based on assembly machine capability	2	Design review	3
							Improper die position	Fail-safe design based on assembly machine capability	2	Die position check & elec test	3
							Improper finger position	Fail-safe design based on assembly machine capability	2	Die position check & elec test	3
							Pre-bump volume or position out of control	Dicing pre-bump stencil spec	2	Dicing pre-bump weight & height check	3
	Wetting with solder paste	Solderable with solder paste	Poor soldering strength	High VF	7		Die metallization contamination	AEC-Q101	3	DV electrical tests	3
	Adhesion with MCP	Die surface adhesion with MCP	Delamination between MCP and die	High IR	7		Die passivation low adhesion	J-STD-020D.1	2	C-SAM &PCT	3
	Electrical function	Refer chip DFMEA	Refer chip DFMEA	Refer chip DFMEA		DD	Refer chip DFMEA	Refer chip DFMEA		Refer chip DFMEA	
	Electrical conductivity	Maximum chip is within bottom pad after soldering	Chip out of bottom pad after soldering	High IR	7		Chip size too big	Fail-safe design based on assembly machine capability	2	Dimension check for die position	3
		Die thickness matches with inner structure	Non-wetting or Solder joint open at die top	Elec. Open	8		Too thin chip thickness	Assembly structure simulation & stress simulation	2	Design review	3
			Finger tilt	IPE	7		Too thick chip thickness	Assembly structure simulation & benchmark	2	Cross-section check	3
			Non-wetting	High VF or Open	8		Insufficient solder of pre-bump	Pre-bump stencil design review	3	Soldering height check, pull test	3
							Improper reflow temperature	Solder paste spec & drawing	2	Reflow temperature DOE and void check	3
	High withstand voltage	Isolation voltage is higher than 4KV for high voltage product	Chip electric breakdown under high voltage	Short for high voltage product	8		Die passivation contamination	AEC-Q101	2	HTRB, H3TRB, IOL	3
							Die passivation aging	AEC-Q101	2	IOL & DPA after reliability tests	5
							No enough Isolation distance/E-field on termination	Refer chip DFMEA		Refer chip DFMEA	
							Out of SOA(Safety operation area)	Specification on datasheet	3	Thermal resistance, HTRB	3
							Low breakdown capability of die edge termination		3	Design review & validation testing	3
Solder paste	Environmental friendly	Meet product design environment regulation & customer special request	Banned element over limit	Regulatory non-compliance	9	DT	Restricted materials are hazardous for people health and environment.	Designed per material standard G020 & GS-4315	2	Material test by a 3rd party laboratory	2
	Wetting with finger, lead frame and Si die	Solderable with LF, finger and chip metallization	Solder joint poor wetting	High VF	7		Solder paste aging	Solder paste storage standard	2	IOL, DPA after reliability tests	5
							Insufficient flux	Benchmarking with existing products	3	DV electrical tests	3
							Solder dispense volume not match die size	Design rule	3	Solder volume DOE, Prototype electrical tests	3
							Improper solder placement	Design rule	3	Solder position check, pull test, TC	3
							Improper reflow temperature	Solder paste spec & drawing	2	Reflow temperature check	3
							Poor soldering hardness	J-STD-002 & JESD22-B102	2	Full qual test & Terminal strength	5
							Poor soldering elongation	J-STD-002 & JESD22-B102	2	Full qual test & Terminal strength	5
		Few solder void	Much solder void	Reliability	6		Improper reflow temperature	Solder paste spec & drawing	2	Reflow temperature DOE and void check	3
							LF contamination	AEC-Q101	2	Electrical test	3
	Electrical conductivity	Electrical conductivity equal or better than existing product or industrial performance	Electrical conductivity worse than existing product or industrial performance	High VF or Open	7		High resistance of solder paste	Benchmarking with existing products	2	Prototype elec. Test	3
			Electric breakdown	High IR	7		Much flux residue after reflow	Error-proofing with flux cleaning	2	Prototype elec. Test	3
	Thermal conduction	CTE match with the Si Die	Solder joint crack	High VF/DVF	7		CTE mismatch from SI die or LF	AEC-Q101 & Benchmarking with existing products	2	TC, IOL	3
	High withstand voltage	Isolation voltage is higher than 4KV for high voltage product	High voltage breakdown	Short for high voltage product	7		Solder paste aging	Solder paste storage standard	2	DPA after reliability tests	5
							Improper solder volume	Pin design review	2	Solder weight check	3
							Improper solder placement	Pin design review	2	Solder position check, pull test, TC	3
							Improper reflow temperature	Reflow temperature DOE	3	Reflow temperature check	3
	Environmental friendly	Meet product design environment regulation & customer special request	Banned element over limit	Regulatory non-compliance	9	DT	Restricted materials are hazardous for people health and environment.	Designed per material standard G020 & GS-4315	2	Material test by a 3rd party laboratory	2

Vishay General Semiconductor

*POTENTIAL FAILURE MODE AND EFFECTS ANALYSIS (**DESIGN FMEA**)*

Process: SMP
Product: SMP

FMEA Number: 077-SMP
Part Number: ALL
Core Team: SMP project team

Item / Function		Requirement	Potential Failure Mode	Potential Effect(s) of Failure	Severity	Classification	Potential Cause(s)/ Mechanism(s) of Failure	Current Design: Controls Prevention	Occurrence	Current Design: Controls Detection	Detection
Molding compound	Thermal Expansion	CTE match with Die	Die chipping or crack	Short or Hi-IR	8		High thermal stress caused by temperature variation	AEC-Q101 & Benchmark with existing products	2	DV real sample electrical test	3
		CTE match with LF	Delamination between MCP and LF	Hi-IR	7		Poor CTE material selected	AEC-Q101 & Benchmark with existing products	2	DV Delamination check	5
	Protect internal component from moisture	Moisture proof	Moisture penetration	High IR	7		MCP high moisture absorption	LF V-groove or half stamping design	3	PCT (or U-HAST) & H3TRB test	3
	Mold ability	Mold body integrity	Incomplete mold or void	Cosmetic failure	4		MCP shorter spiral flow	Mold flow simulation	2	Mechanical check	3
							Filler shape	AEC-Q101	2	Cross-section check	3
							MCP contamination	Mold chase clean standard	2	Mechanical check	3
	Electrical insulation	Isolation voltage is higher than 4KV based on MCP thickness in structure	MCP electric breakdown or MCP carbonization	High IR or short	8		MCP proof voltage is too low to sustain high voltage	AEC-Q101	2	Design review	3
							MCP aging	AEC-Q101	2	DPA after reliability tests	5
							MCP high temperature	Stress simulation check	2	Thermal resistance test	3
							MCP high moisture absorption	LF V-groove or half stamping design	3	PCT (or U-HAST) & H3TRB test	3
							Partial discharge of EMC	AEC-Q101	2	HTRB	3
							Partial discharge due to contamination	AEC-Q101	3	HTRB	3
	Adhesion with LF, finger and die	Adhesion interface adhesion between LF, finger and die	Delamination between MCP and LF, MCP and finger or MCP and die	Short for high voltage product	8		MCP low viscosity or adhesion strength	J-STD-020D.1	2	Cross-section check	3
							MCP aging	AEC-Q101	2	DPA after reliability tests	5
							MCP high temperature	Stress simulation check	2	Thermal resistance test	3
							High stress due to reflow	Cure condition DOE	2	Cure condition check	3
							MCP low CTE	AEC-Q101	2	Cross-section check	3
	Protect chip from mechanical shock	Mold body not break	Body crack or chipping	Cosmetic failure	4		MCP low flexural modules /strength	Benchmark with existing product	2	Validation testing	3
	Protect internal structure and support	High mechanical strength	Incomplete mold or mold void	Cosmetic failure	4		MCP shorter spiral flow	Mold flow simulation	2	Prototype sample visual check	3
							Filler low uniformity	Package structure simulation	2	Cross-section check	3
							Filler size is too large	Package structure simulation	2	Cross-section check	3
	For easy handling while doing SMT	Marker on MCP can be identified	Marker on MCP can not be identified	Application failure	7		MCP low tensile strength	Benchmark with existing product	2	Visual check on laser marker	3
Plating coat	Environmental friendly	Meet product design environment regulation & customer special request	Banned element over limit	Regulatory non-compliance	9	DT	Restricted materials are hazardous for people health and environment.	Designed per material standard G020 & GS-4315	2	Material test by a 3rd party laboratory	2
	Solderable with PCB	Device can be soldered on PCB	Solder joint poor wetting	Poor soldering strength	7	DD	Too thin plating thickness	J-STD-002 & JESD22-B102	2	Solderability test	5
							Lead contamination	J-STD-002 & JESD22-B102	2	Solderability test	5

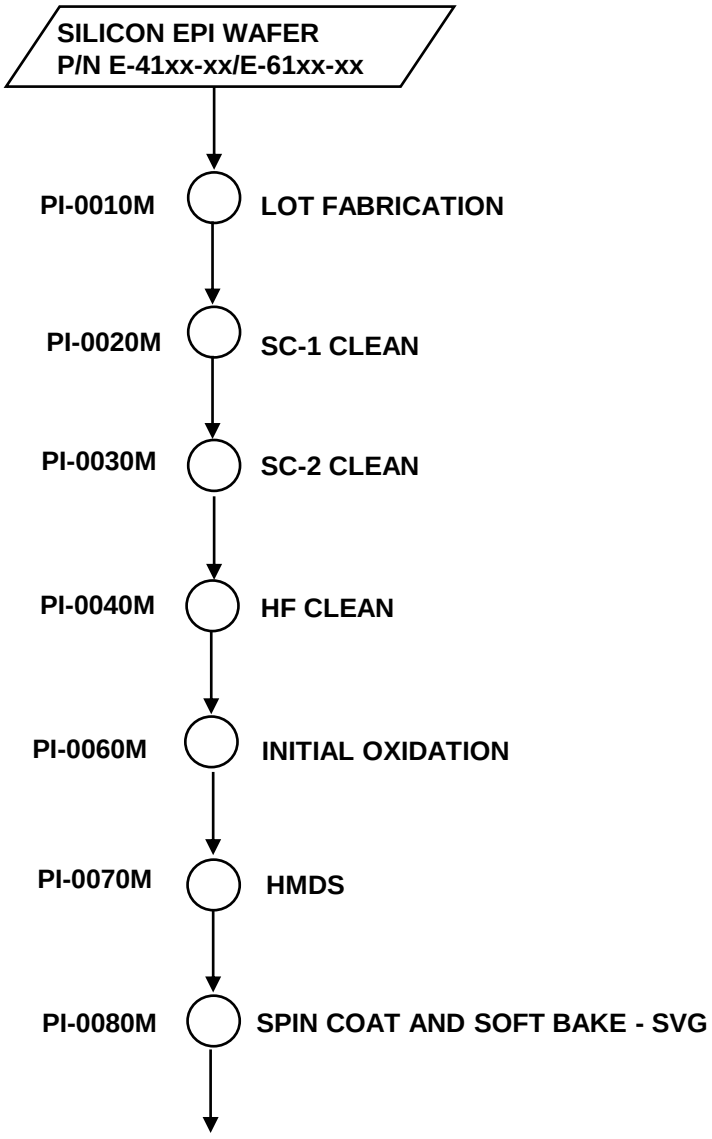
1. Note of CLASS : "Special Characteristic"; <DD> Not Relating Safety or Legal; <DT> Safety or Legal Consideration

PRODUCTION PART APPROVAL PROCESS

5.
Process Flow Diagrams

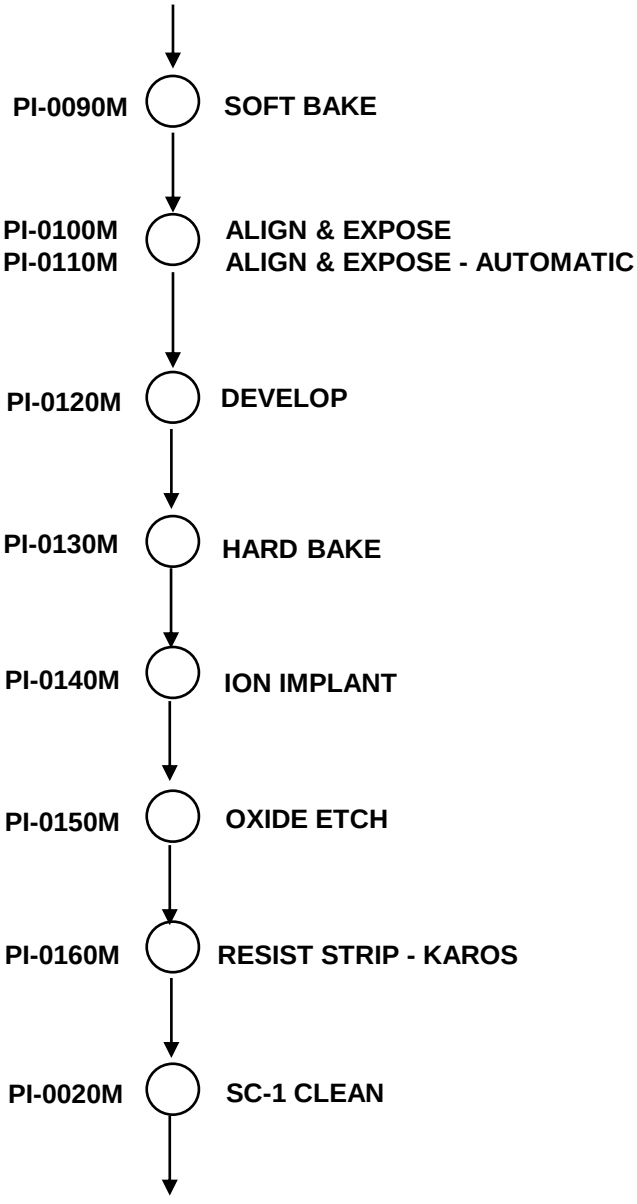
PROCESS SPECIFICATION
VISHAY GENERAL SEMICONDUCTOR TAIWAN LIMITED

DEVICE	OPERATION	NO. FC-002-1
SCHOTTKY WAFER FAB. (TiNiAg)	FLOW CHART	REVISION 5 (11/18/22')
		SHEET 1 OF 7



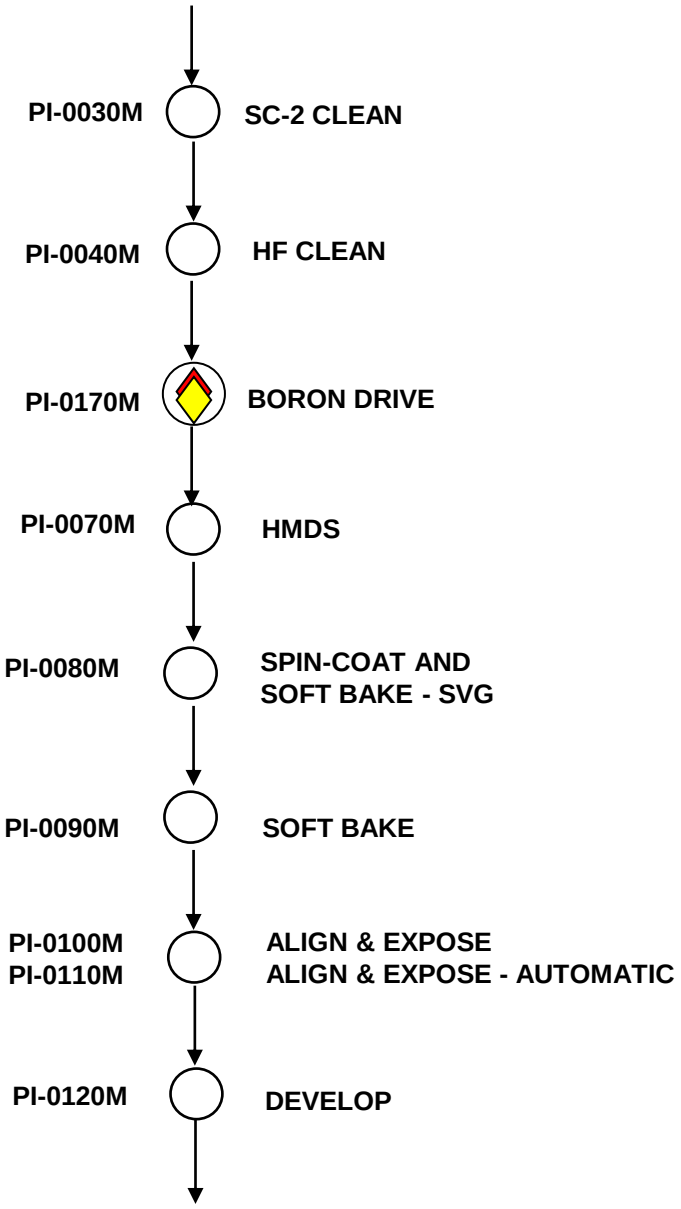
PROCESS SPECIFICATION
VISHAY GENERAL SEMICONDUCTOR TAIWAN LIMITED

DEVICE	OPERATION	NO. FC-002-1
SCHOTTKY WAFER FAB. (TiNiAg)	FLOW CHART	REVISION 5 (11/18/22')
		SHEET 2 OF 7



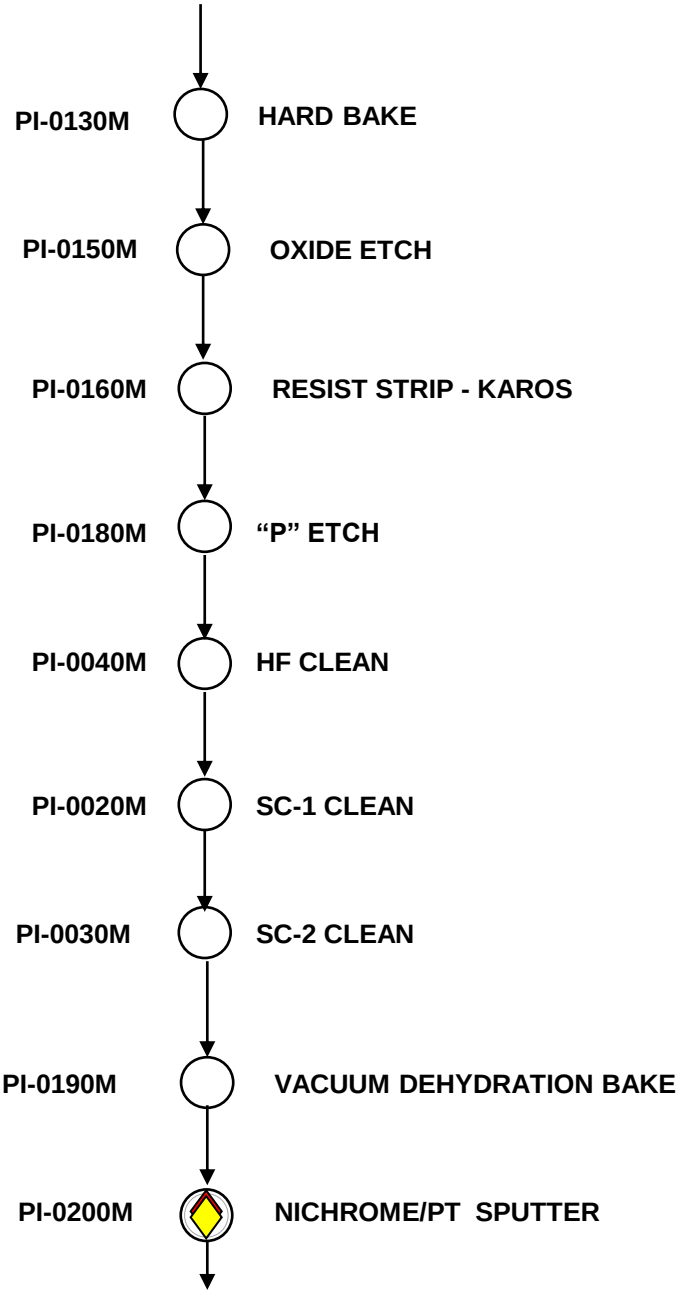
PROCESS SPECIFICATION
VISHAY GENERAL SEMICONDUCTOR TAIWAN LIMITED

DEVICE	OPERATION	NO. FC-002-1
SCHOTTKY WAFER FAB. (TiNiAg)	FLOW CHART	REVISION 5 (11/18/22')
		SHEET 3 OF 7



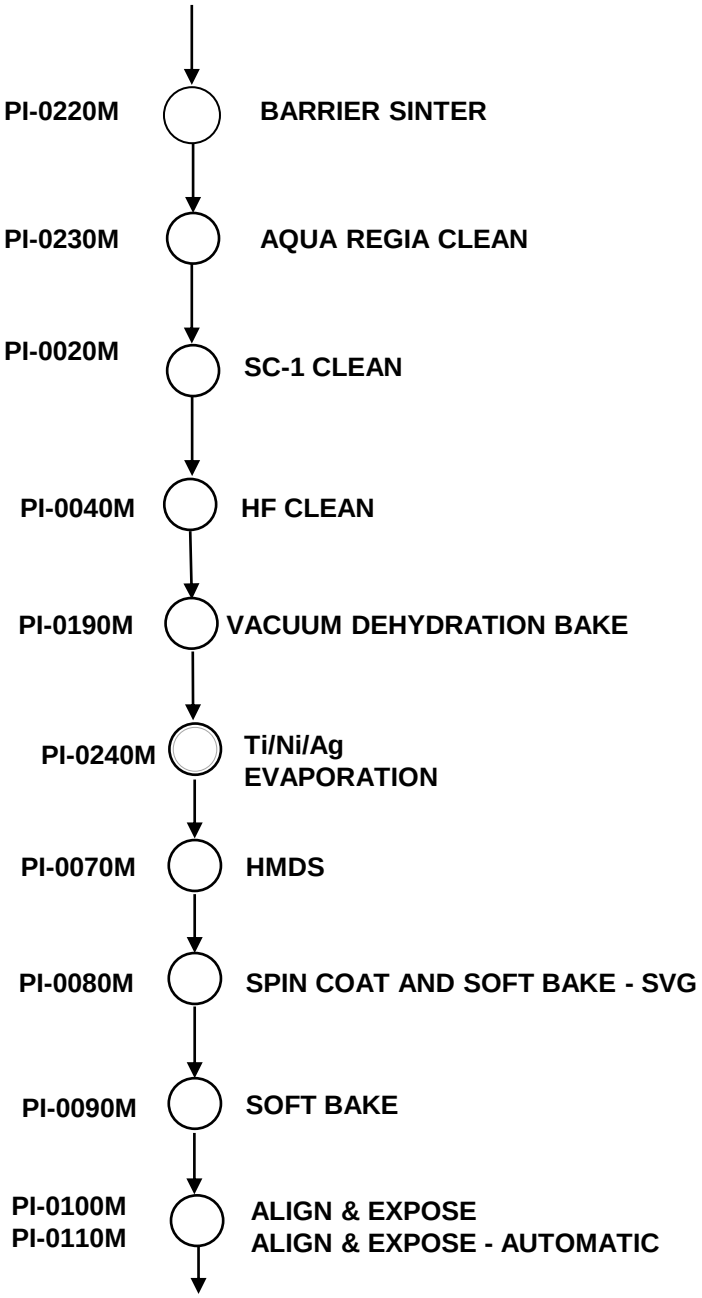
PROCESS SPECIFICATION
VISHAY GENERAL SEMICONDUCTOR TAIWAN LIMITED

DEVICE	OPERATION	NO. FC-002-1
SCHOTTKY WAFER FAB. (TiNiAg)	FLOW CHART	REVISION 5 (11/18/22')
		SHEET 4 OF 7



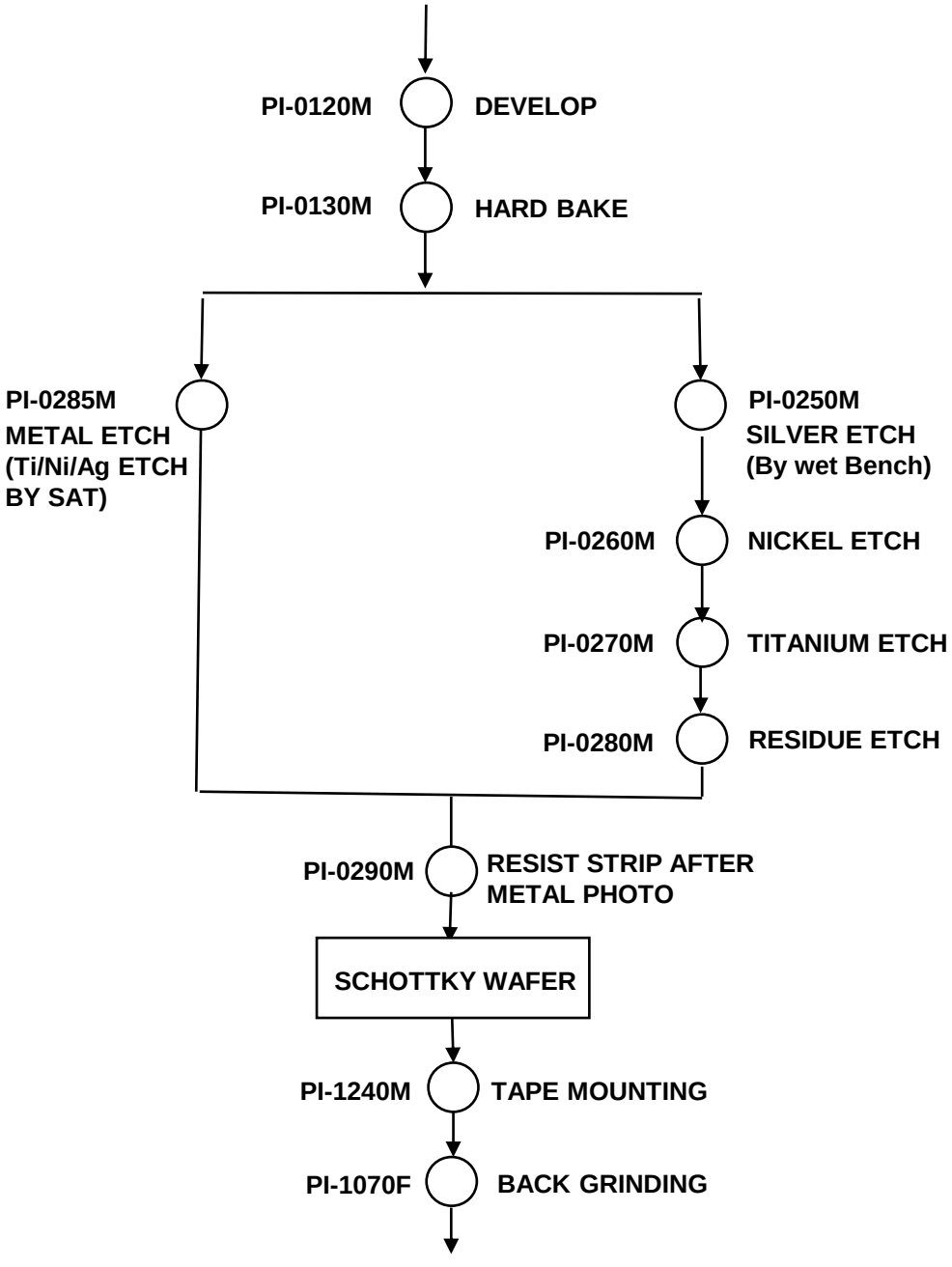
PROCESS SPECIFICATION
VISHAY GENERAL SEMICONDUCTOR TAIWAN LIMITED

DEVICE	OPERATION	NO. FC-002-1
SCHOTTKY WAFER FAB. (TiNiAg)	FLOW CHART	REVISION 5 (11/18/22')
		SHEET 5 OF 7



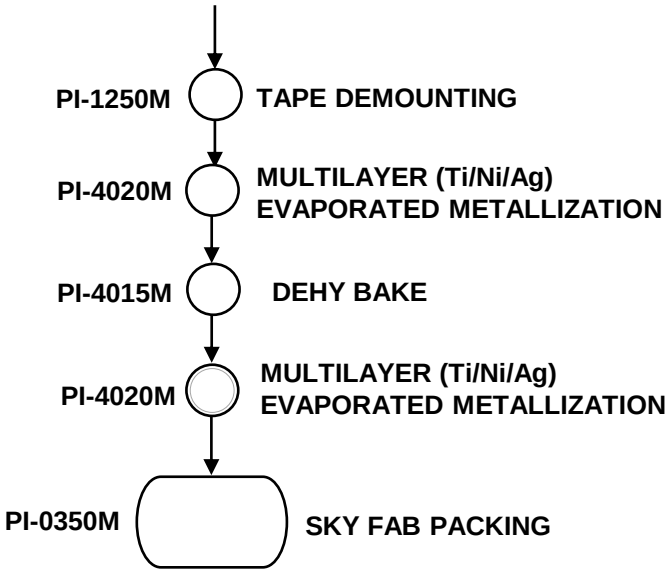
PROCESS SPECIFICATION
VISHAY GENERAL SEMICONDUCTOR TAIWAN LIMITED

DEVICE	OPERATION	NO. FC-002-1
SCHOTTKY WAFER FAB. (TiNiAg)	FLOW CHART	REVISION 5 (11/18/22')
		SHEET 6 OF 7

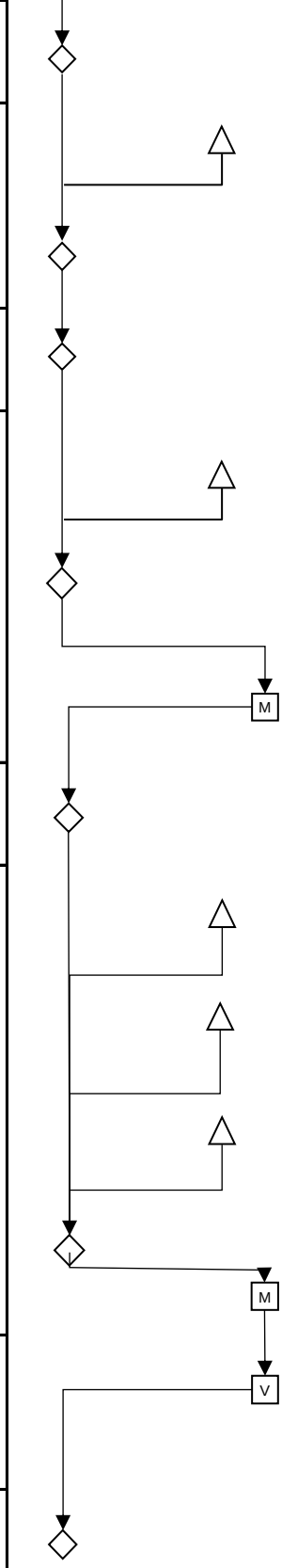


PROCESS SPECIFICATION
VISHAY GENERAL SEMICONDUCTOR TAIWAN LIMITED

DEVICE	OPERATION	NO. FC-002-1
SCHOTTKY WAFER FAB. (TiNiAg)	FLOW CHART	REVISION 5 (11/18/22')
		SHEET 7 OF 7



*Note: Rework allowed.

KHOI#020			Degreasing		
KHOI#030			Molding compound		
			Transfer molding		
KHOI#050			Post Molding Cure		
KHOP-340			Pure tin solder ball		
			Pure tin strip plating	**DT**	PB content layer
			Plating solderability test Plating thickness measurement	**DD**	Plating sold Plating thicl Aging test
KHOI#100			Trimming	**DD**	Trimming d
KHOI#090 or Subcon (None-automotive)			Carrier Tape		
			Cover Tape		
			Reel		
			Test/Mark/Mechanical/Tape or Sub-con(Only for None automotive)	**DD**	Elec:IR/BVI
			Tape peeling force test	**DD**	Tape peelir
GS-4775			Outgoing quality control (Elec.&Mech.)		
L-006			Packing		

PRODUCTION PART APPROVAL PROCESS

6.
Process FMEA

					Installation alignment
					Installation scrapper ali

			Solder paster preparation	Fill the solder paste into the groove of solder track	Correct sold storage con

					No extra pa contaminati tray
			Solder paste pick & place	Pick & Place solder paste to Lead frame	Place solde lead frame correct sold and solder

					Installation alignment
			Dice preparation	Fill the dice into the cavity of shake loader	Dice shelf li spec.
					Correct dice
					Suitable dic shake loade

	Pre-heating	Pre heating	Dice adhersion to bottom lead frame	Correct tem achieve adh

			Flux preparation	Fill the flux into the groove of track	Flux shelf li spec.
					Suitable flu flux tray
					Uniform flux
			Flux pick & place	Pick & Place Flux to Lead frame	Pick up pro volume on s
					Place flux t position of L

		Folding	Make top finger folding 180 degree for soldering with dice in next step	Correct fold folding perf

					Correct sold position
			Reflow	Finish wetting and joint formed between dice and copper LF	Normal sold structure to normal wett

	Unloading	Unloading	Lead frame tranfer into magazine	LF into the position of

GSK-7311 Attachment 1

Note:

1. In general,if S*O>=40 , need to take corrective action; also to reduce ranking, should follow the order of: Seve
2. Remark: Machine power off by accident, at the beginning of machine recovery to mass production, keep the s
3. ☆ Means alternative solution
4. ★ Means error proofing in prevention

		EPOXY COMPOUND GEL TIME CHECK	CHECK COMPOUND GEL TIME	COMPOUND GEL MEET SPEC
		EPOXY COMPOUND GEL TIME CHECK	CHECK COMPOUND GEL TIME	COMPOUND GEL MEET SPEC
		EPOXY COMPOUND UNFREEZING TIME CHECK	CHECK COMPOUND UNFREEZING TIME	COMPOUND TRANSFER/STOR TEMPERATURE/U EZING TIME MEE SPEC
		EPOXY COMPOUND UNFREEZING TIME CHECK	CHECK COMPOUND UNFREEZING TIME	COMPOUND TRANSFER/STOR TEMPERATURE/U EZING TIME MEE SPEC
		LOADING MAGAZINE INTO MACHINE	MAGAZINE LOADING	LOADING MAGAZ WITHOUT DAMAG
	AUTO-LOADING	AUTO-LOADING LEAD FRAME ON THE PRE-HEATING BLOCK	LOADING LEAD FRAME	LOADING LEADFI WITHOUT DAMAG
		AUTO-LOADING LEAD FRAME ON THE PRE-HEATING BLOCK	LOADING LEAD FRAME	LEAD FRAME DIMENSION MEE DRAWING SEPC
		AUTO-LOADING LEAD FRAME ON THE PRE-HEATING BLOCK	LOADING LEAD FRAME	LEAD FRAME THICKNESS MEE DRAWING SEPC
		AUTO-LOADING LEAD FRAME ON THE PRE-HEATING BLOCK	LOADING LEAD FRAME	LEAD FRAME DIMENSION MEE DRAWING SPEC
		AUTO PRE-HEATING LEAD FRAME	LEAD FRAME PRE-HEATING	LEAD FRAME CORRECT PRE-HEATING
		AUTO-LOADING EPOXY COMPOUND	COMPOUND LOADING IN CAVITY	LOADING COMPO QTY MEET SPEC
		AUTO-LOADING EPOXY COMPOUND	COMPOUND LOADING IN CAVITY	LOADING COMPO QTY MEET SPEC
		AUTO PRE-HEATING EPOXY COMPOUND	COMPOUND PRE-HEATING	COMPOUND COR PRE-HEATING
		AUTO PRE-HEATING EPOXY COMPOUND	COMPOUND PRE-HEATING	COMPOUND COR PRE-HEATING
	AUTO-MOLDING	AUTO-CLAMPING MOLD CHASE	CLAMPING MOLD CHASE	MOLD CHASE WI LIFETIME
			CLAMPING MOLD CHASE	MOLD CHASE WI LIFETIME
			CLAMPING MOLD CHASE	MOLD CHASE WI CLEANING LIFE
			CLAMPING MOLD CHASE	LEAD FRAME WI LOCATION PIN
			CLAMPING MOLD CHASE	CLAMPING CHAS REMAINED
			CLAMPING MOLD CHASE	MOLD CHASE WI LIFETIME
			CLAMPING MOLD CHASE	MOLD CHASE RELEASING COMPLETELY

			COMPOUND	ADHESION CORR
		AUTO-CURING EPOXY COMPOUND IN THE CAVITY	COMPOUND CURING	CURING CORREC
		AUTO-OPENING MOLD CHASE	MOLD CHASE OPENING	OPENING CORRE
			MOLD CHASE OPENING	OPENING CORRE
			MOLD CHASE OPENING	NO NEGATIVE EF TO THE COMPON AND STRUCTURE
	AUTO-DERUNNER	AUTO-DERUNNER COMPOUND	REMOVE RUNNER COMPOUND	RUNNER REMOV
			REMOVE RUNNER COMPOUND	RUNNER REMOV
			REMOVE RUNNER COMPOUND	RUNNER REMOV
	AUTO-UNLOADING	AUTO-UNLOADING INTO MAGAZINE	LEAD FRAME UNLOADING	UNLOADING INTO MAGAZINE
		LEAD FRAME TAKE OUT FROM MAGAZINE	TAKE OUT LEAD FRAME	UNLOADING LEA FRAME
		VISUAL INSPECTION	INSPECT MOLDING LEAD FRAME	MECHANICAL ME SPEC
POST MOLDING CURE (KHOI-050)	LOADING LEAD FRAME	LEAD FRAME LOADING INTO BOX	LOADING LEAD FRAME INTO OVEN	CORRECT HANDI FOR EACH TRAV LOT
	OVEN CURING	START CURING	CURING TIME CORRECT	CURING TIME 4-5
			CURING TEMPERATURE CORRECT	CURING TEMPERATURE $170^{O}C$~$180^{O}C$
	UNLOADING LEAD FRAME	UNLOADING LEAD FRAME INTO BOX	UNLOADING LEAD FRAME INTO OVEN	CURING TIME 4-5
				CURING TEMPERATURE $170^{O}C$~$180^{O}C$
DE-GATE & DE-JUNK(KHOI-030)	LEAD FRAME LOADING	LEAD FRAME PICK AND PLACE	PICK UP THE LEAD FRAME AND PUT ON THE TRACK	PUT LEAD FRAME THE RIGHT DIREC LEAD FRAME NO DEFORM, LOAD U IN GOOD CONDIT
	DE-GATE, DE-JUNK	DE-GATE, DE-JUNK	REMOVE THE MOLDING GATE, REMOVE THE MOLDING FLASH	REMOVE THE MOLDING GATE FLASH COMPLET NO COSMETIC FAILURE

	DEVICES UNLOADING	TAKE DEVICES OUT OF FINISHED GOODS BOX	TAKE DEVICES OUT OF FINISHED GOODS BOX	TAKE DEVICES O FINISHED GOODS COMPLETELY

GSK-7311 Attachment 1

Note:

1. In general,if S*O>=40 , need to take corrective action; also to reduce ranking, should follow the order of: Severity, c
2. Remark: Machine power off by accident, at the beginning of machine recovery to mass production, keep the same
3. ☆ Means alternative solution
4. ★ Means error proofing in prevention

TEST/MARK/TEST/TAPE TEST DEVICE, MARKING, TAPING (KHOI-090)	TESTING		
		LOCATION AND ROTATION	LOCATE AND RATATE DEVICE
		TEST DEVICE	TEST DEVICE FOLLOW TESTING PROGRAM
		LOADING DEVICE TO LASER DISK	PUT DEVICE INTO LASER TABLE
		LASER MARKING	LASER MARKING ON BODY SURFACE

GSK 4775	DEVICE, TAPE AND REEL INSPECTION		
		PUT TAPE INTO REEL	REELING AFTER INSPECTION

GSK-7311 Attachment 1

Note:

1. In general,if S*O>=40 , need to take corrective action; also to reduce ranking, should follow the orde
2. Remark: Machine power off by accident, at the beginning of machine recovery to mass production, k
3. ☆ Means alternative solution
4. ★ Means error proofing in prevention

Note:

1. In general,i

2. The Rev. be

3. Remark: Ma

4. ☆ Means a

5. ★ Means e

PRODUCTION PART APPROVAL PROCESS

7.
Control Plan

				Check
Dispense solder paste on die pad	Dispensing Device KVA-06	P	Solder paste on the bottom pad	
		P		Pin box
		P		AOI pro
		P		AOI val
		P	SOLDER WEIGHT MEASUREMENT- BOTTOM SOLDER PASTE	
		p		Check a.Clear b.Instal
Pick&place dice	Shake loader and pick-up device KVA-06	P	Dice position on the bottom pad	

			PE*		Measu
			P		Check
			P		Check
			P	Pull test	
			P(IPQC)	Soldering height measurement	
			P(IPQC)	Dice position measurement	
			P	Die missing	
				Double Die	
				Reverse die	
				Finger tilt	
				Dice chip out	
				Dice misalignment	
				Incomplete folding	
				L/F deformation	
				Locator hole deformation	
				solder ball	
				Solder necking	
				Solder overhang	
				Finger missing	
				Finger miss center	
				Dice on hook	

				Body flash	
				Imcomplete filled	
				Body crack	
				Body roughness/contamination	
			P	Body hole or void	
				Body burr/Gate burr	
				Body misalignment	
				Body scratch	
				Body lack of corner	
				Delamination between body and lead	
				Lead miss/ broken	
				L/F damage/ Pinch on lead frame/	
					Air pres
KHOI-050	Post Molding Cure	Oven KOV-01	P		Cure pr Actual
KHOI-100	Trimming	Trimming KFR-11	P(IPQC)	Anode lead length	
				Device length	
				Lead coplanarity	
				Stand off	
			P	Mechanical inspection	
				Internal part exposure	
				Body broken/crack	
				Body chip	
				Miss/broken lead	
				Pinch on lead	
				Delamination between body & lead	
				Lead burr residue or contamination	
				Lead copper exposure	
KHOI-090	Test/Marking/Tape	Tester/Laser/Taping KJH-10	P		★Teste ★Binni Test pr
				VF	
				IR	
				VR	
				ZZK/ZZT/SURGE/VC	
				DVF	
				TRR	
			P		Markin

			P	code on label, cover tape misalignment, wrong empty of taping leader and tailer, label illegible, label position wrong, tape open, wrong reel direction, empty pocket over spec., packing material brocken and cover tape overlapping	
			P	Marking defects -Illegible marking -No marking -Poor plating -Body crack -Miss device -Reverse reeling -Mix type -Tape open	

Remark:

1. Abnormal status of control chart:

1.1 Some control point over control limit(UCL&LCL)

1.2 seven points in a row on one side of average.

2. Abnormal criteria:

2.1 Assembly/molding/plating/trimming: for every statior

3. Any abnormal must inform related engineers through

4. Device Defects Album refer SOP#005

5. Remark: Machine power off by accident, at the beginning of machine recovery to mass production, keep the same control method, c

6. After machine pm, check machine setting and devices as routine start check, Machine recover from process parameters change by

7.★Means error proofing in prevention

					CHEM
				FLASH OR RESIN ON LEAD	
				LEAD FRAME DAMAGE DEFORMING	
				LEAD CU EXPOSURE	
				LEAD DISCOLOR	
			IPQC	SOLDERABILITY TEST	
				AGING TEST	
				PURE-TIN PLATING THICKNESS	
					PRE&P CONC
					PLATI
			PE		PB CO
				PB CONTENT IN PURE-TIN PLATING LAYER	
			P		ANNEA CURR

AFTER MACHINE PM, CHECK MACHINE SETTING AND DEVICES AS ROUTINE START CHECK

PRODUCTION PART APPROVAL PROCESS

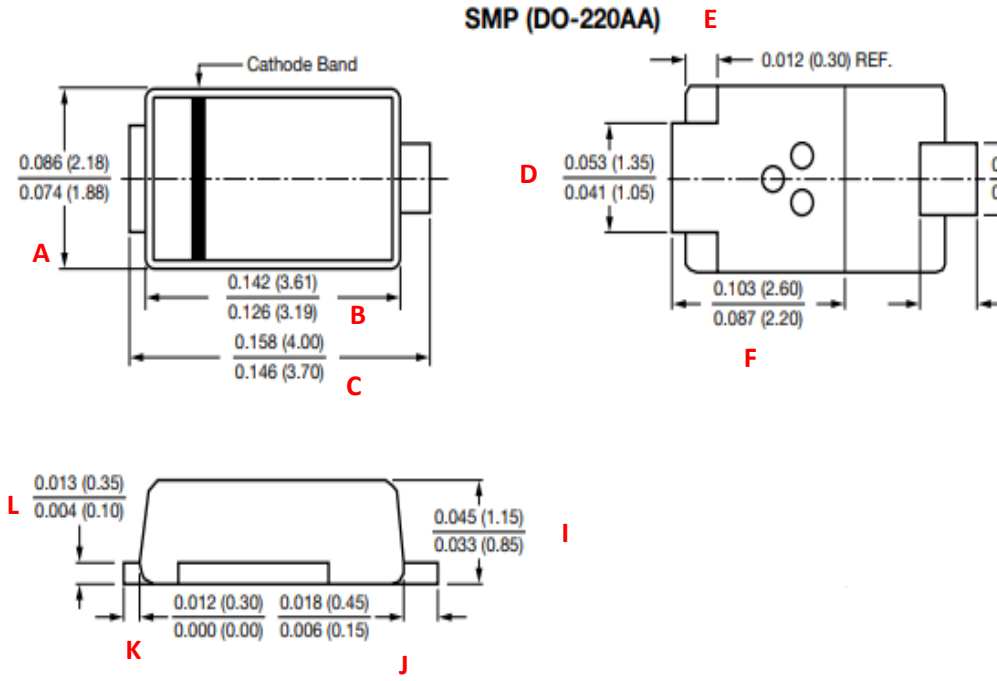
8.
Measurement System Analysis Studies

	EA Sorting (EA-04)	VF	variables	TK-188ZDP	2022/8/10	5.83%
		VR	variables	TK-188ZDP		6.78%
		IR	variables	TK-188ZDP		6.07%
	EA Sorting (EA-08)	VF	variables	TK-188ZDP	2022/8/10	2.41%
		VR	variables	TK-188ZDP		4.19%
		IR	variables	TK-188ZDP		3.07%
	EA Sorting (EA-10)	VF	variables	TK-188ZDP	2022/8/10	1.95%
		VR	variables	TK-188ZDP		2.62%
		IR	variables	TK-188ZDP		3.20%
Dicing	EA Sorting (EA-05)	VF	variables	TK-188DSV	2022/8/10	8.23%
		VR	variables	TK-188DSV		6.18%
		IR	variables	TK-188DSV		6.80%
		TRR	variables	TK-188DSV		4.64%
	EA Sorting (EA-06)	VF	variables	TK-188DSV	2022/8/10	7.06%
		VR	variables	TK-188DSV		5.51%
		IR	variables	TK-188DSV		0.91%
		TRR	variables	TK-188DSV		3.94%
	EA Sorting (EA-07)	VF	variables	TK-188DSV	2022/8/10	4.02%
		VR	variables	TK-188DSV		5.39%
		IR	variables	TK-188DSV		1.27%
		TRR	variables	TK-188DSV		4.35%
	EA Sorting (EA-09)	VF	variables	TK-188DSV	2022/8/10	4.43%
		VR	variables	TK-188DSV		5.07%
		IR	variables	TK-188DSV		0.89%
		TRR	variables	TK-188DSV		3.95%
	Wafer reflow	Height	variables	HM-02	2022/10/26	2.27%
	Wafer Cutting	Width	variables	OM-01	2022/10/26	1.32%
	Screen	Weight	variables	WB-01	2022/10/26	3.45%
Assembly	Soldering	solder joint	variables	SP-01	2022/10/22	6.70%
		Height	variables	HM-01	2022/11/4	3.16%
		Weight	variables	WB-07	2022/11/4	0.57%
	TMTT	Pull test	variables	PF-02	2022/4/8	6.79%
	Trim/Form	Dimension X	variables	PM-01	2022/8/25	0.43%
		Dimension Y	variables	PM-01		0.27%
		Dimension Projector-Angle	variables	PM-01		1.17%
	Forming	Dimension	variables	OM-08	2022/10/12	5.20%
	Plating	Thickness	variables	KXR-02	2022/7/1	6.03%
	TMTT	TEST1	variables	VF	2022/8/1	6.18%
			variables	IR		8.90%
		TEST2	variables	VF		0.39%
			variables	VR		0.96%
			variables	IF		0.55%
		TEST3	variables	VL		1.73%
		TEST4	variables	TRR		7.50%
		TEST5	variables	IR		0.68%
		TEST6	variables	VF		1.29%
			variables	DVF		4.98%
		TEST6	variables	VF		1.73%
			variables	IR		2.90%

PRODUCTION PART APPROVAL PROCESS

9.
Dimensional Results

10	0.0815	0.1335	0.1500	0.0502	0.0118	0.0975	0.0202	0.0314	0.
11	0.0820	0.1345	0.1505	0.0492	0.0111	0.0969	0.0209	0.0316	0.
12	0.0825	0.1335	0.1515	0.0497	0.0117	0.0956	0.0209	0.0319	0.
13	0.0815	0.1355	0.1500	0.0496	0.0129	0.0970	0.0204	0.0305	0.
14	0.0820	0.1345	0.1510	0.0501	0.0122	0.0959	0.0218	0.0315	0.
15	0.0825	0.1345	0.1505	0.0498	0.0115	0.0970	0.0209	0.0319	0.
16	0.0815	0.1350	0.1505	0.0506	0.0119	0.0976	0.0202	0.0327	0.
17	0.0815	0.1350	0.1505	0.0493	0.0108	0.0984	0.0209	0.0305	0.
18	0.0810	0.1360	0.1505	0.0492	0.0123	0.0977	0.0207	0.0312	0.
19	0.0815	0.1345	0.1500	0.0501	0.0111	0.0972	0.0212	0.0322	0.
20	0.0825	0.1345	0.1510	0.0505	0.0126	0.0969	0.0223	0.0322	0.
21	0.0830	0.1350	0.1505	0.0497	0.0110	0.0962	0.0208	0.0327	0.
22	0.0820	0.1340	0.1510	0.0496	0.0109	0.0976	0.0202	0.0312	0.
23	0.0825	0.1350	0.1515	0.0497	0.0101	0.0971	0.0222	0.0322	0.
24	0.0820	0.1340	0.1500	0.0505	0.0125	0.0959	0.0204	0.0314	0.
25	0.0825	0.1345	0.1510	0.0503	0.0108	0.0983	0.0223	0.0317	0.
26	0.0820	0.1355	0.1510	0.0502	0.0127	0.0961	0.0224	0.0317	0.
27	0.0825	0.1350	0.1515	0.0495	0.0109	0.0974	0.0221	0.0327	0.
28	0.0825	0.1355	0.1500	0.0499	0.0129	0.0970	0.0208	0.0302	0.
29	0.0820	0.1335	0.1510	0.0507	0.0122	0.0991	0.0215	0.0311	0.
30	0.0820	0.1345	0.1500	0.0498	0.0102	0.0972	0.0216	0.0302	0.



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PRODUCTION PART APPROVAL PROCESS

10.
Material, Performance Test Results

Environmental Test Summary

Request Part Number		xxxHM3		
	Package	DO-220AA	Ni/Au ; Ti/Ni/Ag	92.5Pb/5Sn/2.5Ag
	FAB	STD, PAR, FER,SKY,TVS,FRED		

Package Qualification:	DO-220AA		
Metalization	Ni/Au ; xx/Ag		
Die attach	92.5PB / 5SN / 2.5Ag		
Package Process Used	TPSMP6.8AHM3_A	DO-220AA	Ni/Au
	AU1PM-M3	DO-220AA	Ni/Au
	SE10PJHM3	DO-220AA	Ni/Au
	SS2PH10HM3_A	DO-220AA	Ti/Ni/Ag
	VS-2ENH02HM3	DO-220AA	Al/Ti/Ni/Ag
	V3PL45HM3	DO-220AA	Ti/Al/Ni/Ag

FAB Process:	Requested	PAR, FER,STD,SKY,FRED,TMBS,	
FAB Process Used	TPSMP6.8AHM3_A	PAR	
	AU1PM-M3	FER	
	SE10PJHM3	STD	
	SS2PH10HM3_A	SKY	
	VS-2ENH02HM3	FRED	
	V3PL45HM3	TMBS	

Test Item & Condition	**Duration**	TPSMP6.8AHM3_A	AU1PMHM3	SE10PJHM3	SS2PH10HM3_A	VS-2ENH02HM3	V3PL45HM3
HTRB	Ta / Bias	175°C / 5.8V	110°C / 1000V	160°C / 600V	150°C / 100V	150°C / 200V	110°C / 45V
	168 Hrs	0 / 77	0 / 77	0 / 77	0 / 77	0 / 77	0 / 77
	500 Hrs	0 / 77	0 / 77	0 / 77	0 / 77	0 / 77	0 / 77
	1000 Hrs	0 / 77	0 / 77	0 / 77	0 / 77	0 / 77	0 / 77
ESD(HBM)	2KV	0 / 10	0 / 10	0 / 10	0 / 10	0 / 10	0 / 10
@ 100pF / 1500 Ω	6KV	0 / 10	0 / 10	0 / 10	0 / 10		0 / 10
	8KV	0 / 10	0 / 10	0 / 10	0 / 10		0 / 10
ESD(CDM)	500V	0 / 10	0 / 10	0 / 10	0 / 10	0 / 10	0 / 10
	1000V	0 / 10	0 / 10	0 / 10	0 / 10	0 / 10	0 / 10
Solder Dip	Post	0 / 30	0 / 30	0 / 30	0 / 30	0 / 30	0 / 30
@Bake:130°C/24H→Moisture Soak:85°C/85%RH/168H→265°C/10sec							
Solderability @245°C/5sec	Post	0 / 10	0 / 10	0 / 10	0 / 10	0 / 10	0 / 10
Terminal Strength @2.2LB/60sec	Post	0 / 30	0 / 30	0 / 30	0 / 30	0 / 30	0 / 30
Pre-conditioning		0 / 231	0 / 308	0 / 308	0 / 308	0 / 308	0 / 308
@Bake:125°C/24H → Moisture Soak:85°C/85%RH/168H→ Reflow 3 times:TP=260℃							
Temperature Cycling	168 Cycs	0 / 77	0 / 77	0 / 77	0 / 77	0 / 77	0 / 77
@-55°C / +150°C / 30min.	500 Cycs	0 / 77	0 / 77	0 / 77	0 / 77	0 / 77	0 / 77
	1000 Cycs	0 / 77	0 / 77	0 / 77	0 / 77	0 / 77	0 / 77
UHAST	24Hrs	0 / 77	0 / 77	0 / 77	0 / 77	0 / 77	0 / 77
@Ta= 130°C / 85%RH / 33.3Psia	48 Hrs	0 / 77	0 / 77	0 / 77	0 / 77	0 / 77	0 / 77
	96 Hrs	0 / 77	0 / 77	0 / 77	0 / 77	0 / 77	0 / 77
IOL	2520 Cycs		0 / 77	0 / 77	0 / 77	0 / 77	0 / 77
@DTj=100°C / Ton=Toff=2min	7500 Cycs		0 / 77	0 / 77	0 / 77	0 / 77	0 / 77
	15000 Cycs		0 / 77	0 / 77	0 / 77	0 / 77	0 / 77
H3TRB	168 Hrs					0 / 77	
@85°C /85%RH/ 80%Vr (max 100V)	500 Hrs					0 / 77	
	1000 Hrs					0 / 77	
HAST	44 Hrs		0 / 77				0 / 77
@110°C / 85%R.H. / 80%VR (max42V)/17.7Psia	132 Hrs		0 / 77				0 / 77
	264 Hrs		0 / 77				0 / 77
HAST	16 Hrs	0 / 77		0 / 77	0 / 77		
@130°C / 85%R.H. / 80%VR (max42V)/33.3Psia	48 Hrs	0 / 77		0 / 77	0 / 77		
	96 Hrs	0 / 77		0 / 77	0 / 77		

Production Part Approval-

Parametric Verification Summary

PART NUMBER	**CUSTOMER P/N**	S.S.
TPSMP6.8AHM3_A		25 EA per lot

TEST	UNIT	CONDITION.	Spec LSL	Spec USL	Lot#	Temp.(℃)	MIN	Max.	AVG.	Std. Dev.	Cpk
IR	uA	@5.8V	-	-	1	-40°C	39.3	115.6	72.2	23.5	-
IR	uA	@5.8V	-	300	1	25°C	51.2	146.5	91.5	28.9	2.41
IR	uA	@5.8V	-	-	1	85°C	72.7	200.8	124.7	38.2	-
IR	uA	@5.8V	-	-	1	100°C	80.8	222.2	137.8	41.7	-
IR	uA	@5.8V	-	-	1	125°C	97.7	264.8	163.6	48.8	-
IR	uA	@5.8V	-	1000	1	150°C	118.4	317.4	194.9	57.4	4.68
IR	uA	@5.8V	-	-	1	185°C	153.8	402.0	246.6	71.2	-
VBR	V	@10mA	6.45	7.14	1	25°C	6.75	6.92	6.85	0.043	-
VF	V	@25A	-	2.5	1	25°C	1.084	1.102	1.091	0.004	108.68
VC	V	@23.8A	-	10.5	1	25°C	7.850	8.210	8.026	0.107	7.70
IR	uA	@5.8V	-	-	2	-40°C	11.0	90.7	50.9	26.5	-
IR	uA	@5.8V	-	300	2	25°C	18.7	118.6	71.5	34.2	2.23
IR	uA	@5.8V	-	-	2	85°C	29.0	153.5	98.5	45.3	-
IR	uA	@5.8V	-	-	2	100°C	31.2	172.1	112.6	50.7	-
IR	uA	@5.8V	-	-	2	125°C	44.6	205.9	139.9	56.3	-
IR	uA	@5.8V	-	1000	2	150°C	59.2	251.1	174.1	66.9	4.12
IR	uA	@5.8V	-	-	2	185°C	88.6	335.2	239.8	86.2	-
VBR	V	@10mA	6.45	7.14	2	25°C	6.930	7.020	6.972	0.026	-
VF	V	@25A	-	2.5	2	25°C	1.096	1.183	1.122	0.020	23.44
VC	V	@23.8A	-	10.5	2	25°C	8.290	8.750	8.432	0.106	6.50
IR	uA	@5.8V	-	-	3	-40°C	11.4	82.7	56.3	23.5	-
IR	uA	@5.8V	-	300	3	25°C	15.8	100.3	71.5	28.5	2.67
IR	uA	@5.8V	-	-	3	85°C	24.7	143.0	105.1	38.7	-
IR	uA	@5.8V	-	-	3	100°C	28.3	160.6	118.7	42.6	-
IR	uA	@5.8V	-	-	3	125°C	35.7	194.0	145.6	49.8	-
IR	uA	@5.8V	-	1000	3	150°C	45.8	238.5	181.0	59.1	4.62
IR	uA	@5.8V	-	-	3	185°C	66.2	324.9	251.0	76.7	-
VBR	V	@10mA	6.45	7.14	3	25°C	6.870	6.960	6.924	0.028	-
VF	V	@25A	-	2.5	3	25°C	1.105	1.162	1.119	0.012	38.15
VC	V	@23.8A	-	10.5	3	25°C	8.140	8.540	8.350	0.116	6.20

Production Part Approval-

Parametric Verification Summary

PART NUMBER	**CUSTOMER P/N**	S.S.
SE10PJHM3		25 EA per lot

TEST	UNIT	CONDITION.	Spec LSL	Spec USL	Lot#	Temp.(℃)	MIN	Max.	AVG.	Std. Dev.	Cpk
IR	nA	@600V	-	-	1	-40°C	0.900	2.400	1.148	0.282	-
IR	uA	@600V	-	5.0	1	25°C	0.017	0.026	0.020	0.002	773.12
IR	uA	@600V	-	-	1	85°C	0.662	0.898	0.735	0.050	-
IR	uA	@600V	-	-	1	100°C	1.478	1.972	1.640	0.104	-
IR	uA	@600V	-	50	1	125°C	5.465	6.973	5.976	0.323	45.42
IR	uA	@600V	-	-	1	150°C	17.570	22.040	19.235	0.961	-
IR	uA	@600V	-	-	1	175°C	35.970	50.330	42.477	3.112	-
VF	V	@1A	-	-	1	-40°C	1.007	1.015	1.011	0.002	-
VF	V	@1A	-	1.05	1	25°C	0.944	0.950	0.947	0.001	25.20
VF	V	@1A	-	-	1	85°C	0.878	0.883	0.881	0.001	-
VF	V	@1A	-	-	1	100°C	0.861	0.867	0.865	0.002	-
VF	V	@1A	-	0.95	1	125°C	0.834	0.840	0.837	0.002	24.63
VF	V	@1A	-	-	1	150°C	0.807	0.815	0.811	0.002	-
VF	V	@1A	-	-	1	175°C	0.786	0.796	0.792	0.002	-
TRR	ns	@RG1	-	TYP.=780	1	25°C	728.0	832.0	781.2	22.5	-
CJ	PF	@4V,1MHz	-	TYP.=7.0	1	25°C	7.36	8.02	7.63	0.18	-
IR	nA	@600V	-	-	2	-40°C	0.800	1.100	0.956	0.108	-
IR	uA	@600V	-	5.0	2	25°C	0.015	0.022	0.018	0.002	944.30
IR	uA	@600V	-	-	2	85°C	0.588	0.769	0.635	0.040	-
IR	uA	@600V	-	-	2	100°C	1.240	1.625	1.355	0.085	-
IR	uA	@600V	-	50	2	125°C	4.309	5.597	4.730	0.300	50.33
IR	uA	@600V	-	-	2	150°C	15.220	19.260	16.614	0.923	-
IR	uA	@600V	-	-	2	175°C	40.410	51.640	45.076	2.863	-
VF	V	@1A	-	-	2	-40°C	1.018	1.025	1.020	0.002	-
VF	V	@1A	-	1.05	2	25°C	0.947	0.953	0.950	0.001	24.26
VF	V	@1A	-	-	2	85°C	0.881	0.887	0.885	0.002	-
VF	V	@1A	-	-	2	100°C	0.867	0.872	0.870	0.001	-
VF	V	@1A	-	0.95	2	125°C	0.840	0.847	0.844	0.002	20.00
VF	V	@1A	-	-	2	150°C	0.811	0.819	0.815	0.002	-
VF	V	@1A	-	-	2	175°C	0.787	0.795	0.792	0.002	-
TRR	ns	@RG1	-	TYP.=780	2	25°C	741.0	867.0	820.0	33.3	-
CJ	PF	@4V,1MHz	-	TYP.=7.0	2	25°C	7.49	7.98	7.79	0.10	-
IR	nA	@600V	-	-	3	-40°C	0.800	4.700	1.144	0.760	-
IR	uA	@600V	-	5.0	3	25°C	0.015	0.026	0.018	0.003	550.22
IR	uA	@600V	-	-	3	85°C	0.599	0.806	0.644	0.047	-
IR	uA	@600V	-	-	3	100°C	1.321	1.719	1.402	0.087	-
IR	uA	@600V	-	50	3	125°C	4.709	5.866	4.953	0.245	61.18
IR	uA	@600V	-	-	3	150°C	15.900	19.220	16.843	0.678	-
IR	uA	@600V	-	-	3	175°C	44.090	53.400	47.195	2.085	-
VF	V	@1A	-	-	3	-40°C	1.017	1.023	1.020	0.002	-
VF	V	@1A	-	1.05	3	25°C	0.946	0.952	0.949	0.001	22.70
VF	V	@1A	-	-	3	85°C	0.879	0.887	0.884	0.002	-
VF	V	@1A	-	-	3	100°C	0.864	0.871	0.868	0.002	-
VF	V	@1A	-	0.95	3	125°C	0.836	0.846	0.842	0.002	17.39
VF	V	@1A	-	-	3	150°C	0.809	0.816	0.814	0.002	-
VF	V	@1A	-	-	3	175°C	0.782	0.793	0.789	0.002	-
TRR	ns	@RG1	-	TYP.=780	3	25°C	725.00	866.00	812	37	-
CJ	PF	@4V,1MHz	-	TYP.=7.0	3	25°C	7.53	8.11	7.80	0.18	-

Production Part Approval-

Parametric Verification Summary

PART NUMBER			**CUSTOMER P/N**				S.S.				
V3PL45HM3							25 EA per lot				
TEST	UNIT	CONDITION.	Spec LSL	Spec USL	Lot#	Temp.(℃)	MIN	Max.	AVG.	Std. Dev.	Cpk
IR	uA	@45V	-	-	1	-40°C	0.052	2.905	0.454	0.594	-
IR	mA	@45V	-	0.45	1	25°C	0.007	0.030	0.012	0.005	31.91
IR	mA	@45V	-	-	1	85°C	0.337	0.573	0.451	0.074	-
IR	mA	@45V	-	-	1	100°C	0.951	1.472	1.201	0.159	-
IR	mA	@45V	-	25	1	125°C	3.041	4.801	3.907	0.543	12.95
IR	mA	@45V	-	-	1	150°C	10.510	15.770	13.076	1.671	-
VF1	V	@1.5A	-	-	1	-40°C	0.443	0.476	0.470	0.007	-
VF1	V	@1.5A	-	TYP=0.41	1	25°C	0.391	0.410	0.405	0.004	-
VF1	V	@1.5A	-	-	1	85°C	0.336	0.348	0.343	0.003	-
VF1	V	@1.5A	-	-	1	100°C	0.320	0.329	0.325	0.003	-
VF1	V	@1.5A	-	TYP=0.31	1	125°C	0.295	0.305	0.300	0.003	-
VF1	V	@1.5A	-	-	1	150°C	0.268	0.278	0.273	0.003	-
VF2	V	@3.0A	-	-	1	-40°C	0.489	0.511	0.506	0.005	-
VF2	V	@3.0A	-	0.54	1	25°C	0.441	0.453	0.449	0.003	8.97
VF2	V	@3.0A	-	-	1	85°C	0.391	0.403	0.397	0.003	-
VF2	V	@3.0A	-	-	1	100°C	0.376	0.387	0.381	0.003	-
VF2	V	@3.0A	-	0.46	1	125°C	0.355	0.368	0.361	0.004	9.08
VF2	V	@3.0A	-	-	1	150°C	0.333	0.345	0.339	0.004	-
CJ	PF	@4V,1MHz	-	TYP.=550	1	25°C	511.1	588.8	544.3	24.6	-
IR	uA	@45V	-	-	2	-40°C	0.022	5.111	0.650	1.117	-
IR	mA	@45V	-	0.45	2	25°C	0.005	0.017	0.010	0.004	41.61
IR	mA	@45V	-	-	2	85°C	0.324	0.591	0.459	0.080	-
IR	mA	@45V	-	-	2	100°C	0.815	1.418	1.116	0.179	-
IR	mA	@45V	-	25	2	125°C	3.020	4.980	4.006	0.578	12.10
IR	mA	@45V	-	-	2	150°C	10.000	16.090	13.056	1.816	-
VF1	V	@1.5A	-	-	2	-40°C	0.466	0.496	0.477	0.007	-
VF1	V	@1.5A	-	TYP=0.41	2	25°C	0.406	0.416	0.410	0.003	-
VF1	V	@1.5A	-	-	2	85°C	0.342	0.353	0.346	0.003	-
VF1	V	@1.5A	-	-	2	100°C	0.324	0.336	0.329	0.003	-
VF1	V	@1.5A	-	TYP=0.31	2	125°C	0.298	0.310	0.303	0.004	-
VF1	V	@1.5A	-	-	2	150°C	0.271	0.283	0.276	0.003	-
VF2	V	@3.0A	-	-	2	-40°C	0.505	0.520	0.512	0.004	-
VF2	V	@3.0A	-	0.54	2	25°C	0.448	0.462	0.454	0.004	7.52
VF2	V	@3.0A	-	-	2	85°C	0.394	0.409	0.400	0.004	-
VF2	V	@3.0A	-	-	2	100°C	0.379	0.394	0.386	0.004	-
VF2	V	@3.0A	-	0.46	2	125°C	0.352	0.373	0.364	0.005	6.39
VF2	V	@3.0A	-	-	2	150°C	0.336	0.352	0.342	0.005	-
CJ	PF	@4V,1MHz	-	TYP.=550	2	25°C	511.3	572.9	537.7	18.9	-
IR	uA	@45V	-	-	3	-40°C	0.040	13.450	1.505	3.125	-
IR	mA	@45V	-	0.45	3	25°C	0.004	0.022	0.009	0.004	35.67
IR	mA	@45V	-	-	3	85°C	0.338	0.615	0.486	0.084	-
IR	mA	@45V	-	-	3	100°C	0.804	1.385	1.123	0.184	-
IR	mA	@45V	-	25	3	125°C	2.990	4.980	4.048	0.594	11.75
IR	mA	@45V	-	-	3	150°C	9.520	15.660	12.779	1.815	-
VF1	V	@1.5A	-	-	3	-40°C	0.467	0.488	0.474	0.004	-
VF1	V	@1.5A	-	TYP=0.41	3	25°C	0.407	0.417	0.412	0.003	-
VF1	V	@1.5A	-	-	3	85°C	0.340	0.352	0.345	0.004	-
VF1	V	@1.5A	-	-	3	100°C	0.323	0.335	0.329	0.004	-
VF1	V	@1.5A	-	TYP=0.31	3	125°C	0.297	0.309	0.303	0.004	-
VF1	V	@1.5A	-	-	3	150°C	0.270	0.284	0.277	0.004	-
VF2	V	@3.0A	-	-	3	-40°C	0.502	0.517	0.509	0.004	-
VF2	V	@3.0A	-	0.54	3	25°C	0.449	0.462	0.455	0.004	6.62
VF2	V	@3.0A	-	-	3	85°C	0.392	0.408	0.399	0.005	-
VF2	V	@3.0A	-	-	3	100°C	0.379	0.395	0.386	0.005	-
VF2	V	@3.0A	-	0.46	3	125°C	0.356	0.372	0.364	0.005	6.65
VF2	V	@3.0A	-	-	3	150°C	0.335	0.352	0.343	0.005	-
CJ	PF	@4V,1MHz	-	TYP.=550	3	25°C	513.8	573.6	536.6	17.4	-

Production Part Approval-

Parametric Verification Summary

PART NUMBER	**CUSTOMER P/N**	S.S.
SS2PH10HM3_A		25 EA per lot

TEST	UNIT	CONDITION.	Spec LSL	Spec USL	Lot#	Temp.(℃)	MIN	Max.	AVG.	Std. Dev.	Cpk
IR	nA	@100V	-	-	1	-40°C	1.600	3.600	2.016	0.387	-
IR	uA	@100V	-	1.0	1	25°C	0.032	0.045	0.038	0.004	90.10
IR	uA	@100V	-	-	1	85°C	2.624	3.515	3.140	0.250	-
IR	uA	@100V	-	-	1	100°C	10.250	11.850	11.192	0.330	-
IR	uA	@100V	-	500	1	125°C	50.180	55.830	53.707	1.489	99.91
IR	uA	@100V	-	-	1	150°C	173.900	206.100	191.860	9.107	-
IR	uA	@100V	-	-	1	175°C	739.500	883.000	818.368	41.464	-
VF	V	@2A	-	-	1	-40°C	0.848	0.857	0.853	0.002	-
VF	V	@2A	-	0.80	1	25°C	0.762	0.767	0.764	0.002	7.88
VF	V	@2A	-	-	1	85°C	0.674	0.681	0.678	0.002	-
VF	V	@2A	-	-	1	100°C	0.648	0.653	0.650	0.002	-
VF	V	@2A	-	0.66	1	125°C	0.611	0.616	0.614	0.002	8.99
VF	V	@2A	-	-	1	150°C	0.578	0.584	0.581	0.002	-
VF	V	@2A	-	-	1	175°C	0.537	0.545	0.541	0.002	-
CJ	PF	@4V,1MHz	-	TYP.=65	1	25°C	69.18	71.17	70.36	0.59	-
IR	nA	@100V	-	-	2	-40°C	1.400	3.200	1.616	0.359	-
IR	uA	@100V	-	1.0	2	25°C	0.030	0.041	0.034	0.002	132.24
IR	uA	@100V	-	-	2	85°C	2.641	3.613	3.150	0.268	-
IR	uA	@100V	-	-	2	100°C	9.01	10.89	9.87	0.43	-
IR	uA	@100V	-	500	2	125°C	44.85	54.69	49.23	2.23	67.49
IR	uA	@100V	-	-	2	150°C	197.80	238.40	215.26	9.16	-
IR	uA	@100V	-	-	2	175°C	748.20	900.10	810.18	34.77	-
VF	V	@2A	-	-	2	-40°C	0.861	0.872	0.866	0.003	-
VF	V	@2A	-	0.80	2	25°C	0.770	0.778	0.774	0.002	3.82
VF	V	@2A	-	-	2	85°C	0.682	0.692	0.686	0.003	-
VF	V	@2A	-	-	2	100°C	0.659	0.666	0.661	0.002	-
VF	V	@2A	-	0.66	2	125°C	0.621	0.629	0.624	0.002	5.95
VF	V	@2A	-	-	2	150°C	0.582	0.589	0.585	0.002	-
VF	V	@2A	-	-	2	175°C	0.545	0.553	0.548	0.002	-
CJ	PF	@4V,1MHz	-	TYP.=65	2	25°C	68.830	70.780	69.854	0.550	-
IR	nA	@100V	-	-	3	-40°C	1.300	2.400	1.544	0.222	-
IR	uA	@100V	-	1.0	3	25°C	0.027	0.039	0.032	0.003	110.51
IR	uA	@100V	-	-	3	85°C	3.126	3.733	3.419	0.176	-
IR	uA	@100V	-	-	3	100°C	8.264	9.906	9.023	0.531	-
IR	uA	@100V	-	500	3	125°C	39.910	48.700	44.188	2.745	55.36
IR	uA	@100V	-	-	3	150°C	140.300	185.600	163.484	13.168	-
IR	uA	@100V	-	-	3	175°C	624.900	787.100	706.952	46.366	-
VF	V	@2A	-	-	3	-40°C	0.858	0.871	0.864	0.004	-
VF	V	@2A	-	0.80	3	25°C	0.769	0.780	0.774	0.003	2.85
VF	V	@2A	-	-	3	85°C	0.679	0.689	0.683	0.003	-
VF	V	@2A	-	-	3	100°C	0.659	0.669	0.663	0.003	-
VF	V	@2A	-	0.66	3	125°C	0.622	0.629	0.625	0.002	5.82
VF	V	@2A	-	-	3	150°C	0.588	0.596	0.592	0.002	-
VF	V	@2A	-	-	3	175°C	0.548	0.555	0.551	0.002	-
CJ	PF	@4V,1MHz	-	TYP.=65	3	25°C	69.760	71.410	70.420	0.372	-

Production Part Approval-

Parametric Verification Summary

PART NUMBER	CUSTOMER P/N	S.S.
VS-2ENH02HM3		25 EA per lot

TEST	UNIT	CONDITION.	Spec LSL	Spec USL	Lot#	Temp.(℃)	MIN	Max.	AVG.	Std. Dev.	Cpk
IR	nA	@200V	-	-	1	-40°C	5.000	10.000	6.200	1.528	-
IR	uA	@200V	-	2.0	1	25°C	0.003	0.009	0.005	0.002	411.94
IR	uA	@200V	-	-	1	85°C	0.018	0.030	0.023	0.003	-
IR	uA	@200V	-	-	1	100°C	0.060	0.086	0.070	0.007	-
IR	uA	@200V	-	-	1	125°C	0.370	0.498	0.415	0.036	-
IR	uA	@200V	-	20.0	1	150°C	1.993	2.65	2.221	0.186	31.85
IR	uA	@200V	-	-	1	175°C	9.220	11.930	10.224	0.787	-
VF	V	@2A	-	-	1	-40°C	0.976	0.996	0.984	0.006	-
VF	V	@2A	-	1.00	1	25°C	0.909	0.924	0.915	0.005	5.97
VF	V	@2A	-	-	1	85°C	0.827	0.840	0.833	0.004	-
VF	V	@2A	-	-	1	100°C	0.807	0.819	0.812	0.004	-
VF	V	@2A	-	-	1	125°C	0.774	0.784	0.778	0.003	-
VF	V	@2A	-	0.84	1	150°C	0.740	0.750	0.744	0.003	11.82
VF	V	@2A	-	-	1	175°C	0.706	0.715	0.710	0.002	-
VBR	V	@100uA	200.0	-	1	25°C	246.8	253.0	250.0	1.437	-
TRR	ns	@RG1	-	28.0	1	25°C	8.000	12.000	9.480	0.823	7.50
CJ	PF	@ 200V		TYP=8PF	1	25°C	10.820	11.500	11.138	0.173	-
IR	nA	@200V	-	-	2	-40°C	5.000	11.000	7.200	2.398	-
IR	uA	@200V	-	2.0	2	25°C	0.003	0.006	0.005	0.001	640.86
IR	uA	@200V	-	-	2	85°C	0.023	0.056	0.035	0.010	-
IR	uA	@200V	-	-	2	100°C	0.079	0.157	0.106	0.026	-
IR	uA	@200V	-	-	2	125°C	0.451	0.774	0.577	0.113	-
IR	uA	@200V	-	20.0	2	150°C	2.401	3.62	2.919	0.441	12.91
IR	uA	@200V	-	-	2	175°C	10.970	15.350	12.882	1.577	-
VF	V	@2A	-	-	2	-40°C	0.985	1.011	0.999	0.008	-
VF	V	@2A	-	1.00	2	25°C	0.916	0.946	0.931	0.009	2.64
VF	V	@2A	-	-	2	85°C	0.835	0.857	0.846	0.007	-
VF	V	@2A	-	-	2	100°C	0.814	0.835	0.825	0.007	-
VF	V	@2A	-	-	2	125°C	0.780	0.798	0.789	0.006	-
VF	V	@2A	-	0.84	2	150°C	0.745	0.760	0.753	0.005	6.09
VF	V	@2A	-	-	2	175°C	0.711	0.723	0.717	0.004	-
VBR	V	@100uA	200.0	-	2	25°C	248.900	253.7	251.2	1.348	-
TRR	ns	@RG1	-	28.0	2	25°C	7.000	10.000	8.400	0.764	8.55
CJ	PF	@ 200V		TYP=8PF	2	25°C	10.720	11.490	10.964	0.164	-
IR	nA	@200V	-	-	3	-40°C	0.006	1.100	0.897	0.273	-
IR	uA	@200V	-	2.0	3	25°C	0.001	0.013	0.007	0.004	187.60
IR	uA	@200V	-	-	3	85°C	0.015	0.041	0.023	0.007	-
IR	uA	@200V	-	-	3	100°C	0.058	0.129	0.080	0.019	-
IR	uA	@200V	-	-	3	125°C	0.273	0.547	0.383	0.072	-
IR	uA	@200V	-	20.0	3	150°C	1.457	2.57	1.977	0.291	20.66
IR	uA	@200V	-	-	3	175°C	7.170	11.150	9.123	1.036	-
VF	V	@2A	-	-	3	-40°C	0.980	1.013	0.998	0.009	-
VF	V	@2A	-	1.00	3	25°C	0.908	0.934	0.920	0.009	3.12
VF	V	@2A	-	-	3	85°C	0.828	0.856	0.844	0.008	-
VF	V	@2A	-	-	3	100°C	0.807	0.831	0.820	0.007	-
VF	V	@2A	-	-	3	125°C	0.773	0.797	0.788	0.007	-
VF	V	@2A	-	0.84	3	150°C	0.739	0.761	0.752	0.006	5.13
VF	V	@2A	-	-	3	175°C	0.705	0.725	0.716	0.005	-
VBR	V	@100uA	200.0	-	3	25°C	249.8	256.3	254.2	1.651	-
TRR	ns	@RG1	-	28.0	3	25°C	6.000	10.000	7.440	1.083	6.33
CJ	PF	@ 200V		TYP=8PF	3	25°C	5.940	10.960	6.420	1.150	-

Production Part Approval-

Parametric Verification Summary

PART NUMBER			**CUSTOMER P/N**				S.S.				
AU1PMHM3							25 EA per lot				
TEST	UNIT	CONDITION.	Spec LSL	Spec USL	Lot#	Temp.(℃)	MIN	Max.	AVG.	Std. Dev.	Cpk
IR	uA	@1000V	-	-	1	-40°C	0.006	0.018	0.010	0.003	-
IR	uA	@1000V	-	1.0	1	25°C	0.110	0.147	0.130	0.011	26.53
IR	uA	@1000V	-	-	1	85°C	4.100	13.480	8.196	2.290	-
IR	uA	@1000V	-	-	1	100°C	9.42	28.81	18.20	4.65	-
IR	uA	@1000V	-	100	1	125°C	28.01	48.09	36.83	6.17	3.41
IR	uA	@1000V	-	-	1	150°C	112.2	473.1	271.9	93.24	-
IR	uA	@1000V	-	-	1	175°C	168.3	757.0	425.4	149.49	-
VF	V	@1A	-	-	1	-40°C	1.352	1.570	1.446	0.067	-
VF	V	@1A	-	1.85	1	25°C	1.269	1.483	1.373	0.057	2.80
VF	V	@1A	-	-	1	85°C	1.124	1.277	1.193	0.046	-
VF	V	@1A	-	-	1	100°C	1.096	1.240	1.162	0.042	-
VF	V	@1A	-	1.6	1	125°C	1.069	1.201	1.138	0.036	4.34
VF	V	@1A	-	-	1	150°C	0.999	1.113	1.052	0.034	-
VF	V	@1A	-	-	1	175°C	0.936	1.043	0.989	0.032	-
TRR	ns	@RG1	-	75	1	25°C	68.00	71.00	68.92	0.86	2.35
CJ	PF	@4V,1MHz	-	TYP.=7.5	1	25°C	7.070	9.010	8.074	0.461	-
IR	uA	@1000V	-	-	2	-40°C	0.007	0.015	0.011	0.002	-
IR	uA	@1000V	-	1.0	2	25°C	0.121	0.217	0.167	0.029	9.71
IR	uA	@1000V	-	-	2	85°C	4.327	8.291	6.439	1.322	-
IR	uA	@1000V	-	-	2	100°C	9.380	18.40	14.19	2.984	-
IR	uA	@1000V	-	100	2	125°C	31.86	58.66	47.21	9.322	1.89
IR	uA	@1000V	-	-	2	150°C	100.5	235.6	170.2	47.4	-
IR	uA	@1000V	-	-	2	175°C	293.2	740.1	507.4	149.2	-
VF	V	@1A	-	-	2	-40°C	1.352	1.781	1.448	0.083	-
VF	V	@1A	-	1.85	2	25°C	1.258	1.403	1.329	0.040	4.36
VF	V	@1A	-	-	2	85°C	1.134	1.240	1.186	0.030	-
VF	V	@1A	-	-	2	100°C	1.105	1.205	1.155	0.028	-
VF	V	@1A	-	1.6	2	125°C	1.057	1.148	1.104	0.026	6.48
VF	V	@1A	-	-	2	150°C	1.006	1.088	1.050	0.023	-
VF	V	@1A	-	-	2	175°C	0.953	1.026	0.995	0.020	-
TRR	ns	@RG1	-	75	2	25°C	68.00	71.00	68.80	1.04	1.99
CJ	PF	@4V,1MHz	-	TYP.=7.5	2	25°C	6.760	8.490	7.458	0.428	-
IR	uA	@1000V	-	-	3	-40°C	0.007	0.014	0.011	0.002	-
IR	uA	@1000V	-	1.0	3	25°C	0.083	0.151	0.111	0.019	15.80
IR	uA	@1000V	-	-	3	85°C	3.580	5.920	4.519	0.640	-
IR	uA	@1000V	-	-	3	100°C	8.060	13.220	10.188	1.439	-
IR	uA	@1000V	-	100	3	125°C	28.41	46.10	36.11	5.151	4.14
IR	uA	@1000V	-	-	3	150°C	94.2	160.1	123.2	19.18	-
IR	uA	@1000V	-	-	3	175°C	275.0	476.8	364.2	58.10	-
VF	V	@1A	-	-	3	-40°C	1.357	1.478	1.418	0.037	-
VF	V	@1A	-	1.85	3	25°C	1.261	1.373	1.317	0.033	5.33
VF	V	@1A	-	-	3	85°C	1.132	1.219	1.175	0.025	-
VF	V	@1A	-	-	3	100°C	1.103	1.187	1.144	0.024	-
VF	V	@1A	-	1.6	3	125°C	1.055	1.132	1.093	0.021	7.90
VF	V	@1A	-	-	3	150°C	1.005	1.077	1.041	0.019	-
VF	V	@1A	-	-	3	175°C	0.952	1.020	0.986	0.017	-
TRR	ns	@RG1	-	75	3	25°C	67.00	72.00	68.96	1.06	1.90
CJ	PF	@4V,1MHz	-	TYP.=7.5	3	25°C	7.040	8.340	7.668	0.316	-

PRODUCTION PART APPROVAL PROCESS

11.
Initial Process Study

	Input from chart			22Q4	Unit
Description	**MSMX**	**Machine**	**Item**		
Trimmming Dimension	SMP	KFR-11	Lead length 24	2.46	Cpk
			Lead length 152	6.70	Cpk
Peeling force	SMP	KJH-10	Tape A	7.23	Cpk
Plating thickness	SMP	KPL-01	Thickness	4.79	Cpk

PRODUCTION PART APPROVAL PROCESS

12.
Qualified Laboratory Documentation

Vishay Diodes

Subject: Laboratory Accreditation and Scope of Accreditation

To Whom it May Concern:

Vishay Diodes is a IATF16949 certified manufacturer for discrete semiconductor components for Automotive industry. as such all locations internally are considered suitably and accredited to perform the following:

1. Qualifications, inspections & Reliability testing per:

AEC requirements	JEITA	EIA
JEDEC	MIL-STD	
IEC	IPC	

2. Qualifications, inspections & Reliability testing scope include but not limited to:

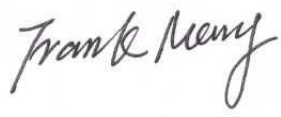
JEDEC STD: Pre-conditioning/ HAST/ H3TRB/ UHAST/ Autoclave/ TC/ RSH/ Thermal Resistance/ Solderability/ HTS/ LTS/ Resistance to Solvents
MIL-STD: IOL/ HTRB/ SSOP(EOL)/ Terminal Strength
AEC STD: DPA/ Whisker Growth Evaluation/ ESD

3. Qualified Laboratories:

VGS Taipei	VGS Tianjin	VGS Kaohsiung
VSI Turin	VMX Xi'an	VSIL Mumbai
VSA Voecklabruck	VSS Shanghai	VHU Budapest

If you have any questions, please contact Vishay Diodes Reliability Manager.

Sincerely,



Frank Meng,
Sr. Manager
Vishay Diodes Reliability

PRODUCTION PART APPROVAL PROCESS

13.
Appearance Approval Report

This section is not applicable

PRODUCTION PART APPROVAL PROCESS

14.
Sample Product

This section is not applicable

PRODUCTION PART APPROVAL PROCESS

15.
Master Sample

This section is not applicable

PRODUCTION PART APPROVAL PROCESS

16.
Checking Aids

This section is not applicable

PRODUCTION PART APPROVAL PROCESS

17.
Records of Compliance with Customer-Specific Requirements

Certificate IATF 0470202
Certificate TW23/00000165
The management system of

Vishay General Semiconductor Taiwan Ltd. Nanzi Branch

40 Zhongyang Rd., Nanzi Dist., Kaohsiung City 81170, Taiwan

has been assessed and certified as meeting the requirements of

IATF 16949:2016
Edition 1

For the following Scope
Design and Manufacture of power rectifiers and protection devices.

EXCLUSIONS : None

3 Year certification is valid from 08 March 2023 until 07 March 2026 and remains valid subject to satisfactory surveillance audits.

Version no. 1. Current version updated 08 March 2023

Hank Yang

Authorised by
Hank Yang
Veto Power Authority

Contracted Office : SGS United Kingdom Ltd, Station Road, Oldbury, B69 4LN, UK.
Email : Neil.Hall@sgs.com

Certificate IATF 0470202
Certificate TW23/00000165

Vishay General Semiconductor Taiwan Ltd. Nanzi Branch

IATF 16949:2016

Edition 1

Additional facilities

Support Function

Vishay General Semiconductor Taiwan Limited.

233, Baoqiao Rd., Xindian District, New Taipei City 231, Taiwan

Summary of Activities

Marketing, Product design, Process design

Support Function

Vishay General Semiconductor (China) Co., Ltd.

No.88 6th Avenue, TEDA, Tianjin, P.R. China

Summary of Activities

Product design, Process design

Support Function

VISHAY INTERTECHNOLOGY ASIA PTE. LTD.

37A Tampines Street 92, #07-01, Singapore, 528886

Summary of Activities

Contract review, Customer Service

Support Function

Vishay Electronica Dale de Mexico S.A. de C.V. Facility Bermudez II

Calle Joule No. 1920, Parque Ind, Antonio J. Bermudez, Ciudad Juarez, Chihuhaua, 32170, Mexico

Summary of Activities

Distribution, Logistics, Packaging, Warehousing

Certificate TW22/00000198

The management system of

Vishay General Semiconductor Taiwan Ltd. Nanzi Branch

No. 40, Zhongyang Rd., Nanzi Dist., Kaohsiung City 81170, Taiwan

has been assessed and certified as meeting the requirements of

ISO 14001:2015

For the following activities
Design and Manufacture of power rectifiers and protection devices.

This certificate is valid from 19 May 2022 until 19 May 2025 and remains valid subject to satisfactory surveillance audits.
Issue 1. Certified since 19 May 2022.

Authorised by

SGS United Kingdom Ltd
Rossmore Business Park, Ellesmere Port, Cheshire, CH65 3EN, UK
t +44 (0)151 350-6666 - www.sgs.com

Certificate TW22/00000199

The management system of

Vishay General Semiconductor Taiwan Ltd. Nanzi Branch

No. 40, Zhongyang Rd., Nanzi Dist., Kaohsiung City 81170, Taiwan

has been assessed and certified as meeting the requirements of

ISO 45001:2018

For the following activities
Design and Manufacture of power rectifiers and protection devices.

This certificate is valid from 19 May 2022 until 19 May 2025 and remains valid subject to satisfactory surveillance audits.
Issue 1. Certified since 19 May 2022.

Authorised by

SGS Taiwan Ltd.
No. 136-1, Wu Kung Road, New Taipei Industrial Park, Wu Ku District, New Taipei City 24803, Taiwan
t +886 (0)2 2299 3939 - www.sgs.com.tw

Management System Certification MS001

PRODUCTION PART APPROVAL PROCESS

18.
Part Submission Warrant

VISHAY

Part Submission Warrant

Part Name _____ Cust. Part No. _____

Shown on Drawing No. _____ Org. Part No. _____

Engineering Change Level _____ Dated _____

Additional Engineering Changes _____ Dated _____

Safety and/or Government Regulation ☐ Yes ☑ No Purchase Order No. _____ Weight: approx. 0.024g

Checking Aid No. _____ Checking Aid Engineering Change Level _____ Dated _____

ORGANIZATION MANUFACTURING INFORMATION

Vishay General Semiconductor Taiwan Ltd. Nanzi Branch
Organization Name & Supplier/Vendor Code

No. 40, Zhongyang Rd., Nanzi Dist.,
Street Address

Kaohsiung (City) 811 (Postal Code) Taiwan (Country)

CUSTOMER SUBMITTAL INFORMATION

_____
Customer Name/Division

_____
Buyer/Buyer Code

_____
Application

MATERIALS REPORTING

Has customer-required Substances of Concern information been reported? ☑ Yes ☐ No ☐ n/a

Submitted by IMDS format: _____

Vishay PPAP # _____

Are polymeric parts identified with appropriate ISO marking codes? ☐ Yes ☐ No ☑ n/a

REASON FOR SUBMISSION (Check at least one)

☐ Initial Submission
☐ Engineering Change(s)
☐ Tooling: Transfer, Replacement, Refurbishment, or additional
☐ Correction of Discrepancy
☐ Tooling Inactive > than 1 year
☐ Change to Optional Construction or Material
☐ Supplier or Material Source Change
☐ Change in Part Processing
☑ Parts Produced at Additional Location
☑ Other - please specify below

REQUESTED SUBMISSION LEVEL (Check one)

☐ Level 1 - Warrant only (and for designated appearance items, an Appearance Approval Report) submitted to customer.
☐ Level 2 - Warrant with product samples and limited supporting data submitted to customer.
☑ Level 3 - Warrant with product samples and complete supporting data submitted to customer.
☐ Level 4 - Warrant and other requirements as defined by customer.
☐ Level 5 - Warrant with product samples and complete supporting data reviewed at organization's manufacturing location.

SUBMISSION RESULTS

The results for ☑ dimensional measurements ☑ material and functional tests ☐ appearance criteria ☑ statistical process package

These results meet all drawing and specification requirements: ☑ Yes ☐ No (If "NO" - Explanation Required)

Mold / Cavity / Production Process N/A

DECLARATION

I affirm that the samples represented by this warrant are representative of our parts which were made by a process that meets all Production Part Approval Process Manual 4th Edition Requirements. I further affirm that these samples were produced at the production rate of 50k / 8 hours.

I also certify that documented evidence of such compliance is on file and available for review. I have noted any deviations from the declaration below.

EXPLANATION/COMMENTS: _____

Is each Customer Tool properly tagged and numbered? ☐ Yes ☐ No ☑ n/a

Organization Authorized Signature Charles Cheng Date 26-Apr-23

Print Name _____ Phone No. +886-7-2626208 Fax No. _____

Title VGSK QA manager E-mail Charles.Cheng@vishay.com

FOR CUSTOMER USE ONLY (IF APPLICABLE)

Part Warrant Disposition: ☐ Approved ☐ Rejected ☐ Other _____

Customer Signature _____ Date _____

Print Name _____ Customer Tracking Number (optional) _____