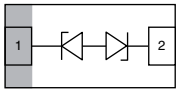
Single-Line Bidirectional ESD-Protection Diode in DFN1006-2B



FEATURES

- Compact DFN1006-2B package
- Low package height < 0.5 mm
- 1-line bidirectional ESD-protection
- AEC-Q101 qualified available
- Working range ±14 V; ±19 V; ± 28 V
- ESD immunity acc. IEC 61000-4-2
  ±15 kV to ±30 kV contact discharge
  ±15 kV to ±30 kV air discharge
- Lead plating: Sn (e3)
  - Soldering can be checked by standard vision inspection
  - AOI = Automated Optical Inspection
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

AUTOMOTIVE GRADE Available

Pb-free

e3

RoHS COMPLIANT

HALOGEN FREE GREEN (5-2008)

MARKING (example only)

Bar = pin 1 marking
X = date code
YY = type code (see table below)

LINKS TO ADDITIONAL RESOURCES

3D Models | Models | Application Notes

Soldering Recommendations for DFN Packages:
please see Application Note: www.vishay.com/doc?86198

ORDERING INFORMATION

PART NUMBER (EXAMPLE)	AEC-Q101 QUALIFIED	ENVIRONMENTAL AND QUALITY CODE			ORDERING CODE (EXAMPLE)
		RoHS COMPLIANT + LEAD (Pb)-FREE TERMINATIONS	TIN PLATED	10K PER 7" REEL (8 mm TAPE)	
		GREEN		MOQ = 10K/BOX	
VMMBZ16C1DD1	-	G	3	-08	VMMBZ16C1DD1-G3-08
VMMBZ16C1DD1	H	G	3	-08	VMMBZ16C1DD1HG3-08

PACKAGE DATA

DEVICE NAME	PACKAGE NAME	TYPE CODE	WEIGHT	MOLDING COMPOUND FLAMMABILITY RATING	MOISTURE SENSITIVITY LEVEL	SOLDERING CONDITIONS
VMMBZ16C1DD1	DFN1006-2B	2Y	0.83 mg	UL 94 V-0	MSL level 1 (according J-STD-020)	Peak temperature max. 260 °C
VMMBZ23C1DD1	DFN1006-2B	3F	0.83 mg	UL 94 V-0	MSL level 1 (according J-STD-020)	Peak temperature max. 260 °C
VMMBZ33C1DD1	DFN1006-2B	2N	0.83 mg	UL 94 V-0	MSL level 1 (according J-STD-020)	Peak temperature max. 260 °C

For technical questions, contact: ESDprotection@vishay.com

THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT www.vishay.com/doc?91000

ABSOLUTE MAXIMUM RATINGS VMMBZ16C1DD1 (T_{amb} = 25 °C, unless otherwise specified)				
PARAMETER	**TEST CONDITIONS**	**SYMBOL**	**VALUE**	**UNIT**
Peak pulse current	Acc. IEC 61000-4-5, 8/20 µs/single shot	I_{PPM}	4	A
Peak pulse power	Acc. IEC 61000-4-5, 8/20 µs/single shot (1)	P_{PP}	108	W
Peak pulse current	t_p = 10/1000 µs (1)	I_{PPM}	0.65	A
Peak pulse power	t_p = 10/1000 µs (1)	P_{PP}	15	W
ESD immunity	Contact discharge acc. IEC 61000-4-2; 10 pulses (1)	V_{ESD}	30	kV
	Air discharge acc. IEC 61000-4-2; 10 pulses (1)		30	kV
Operating temperature	Junction temperature	T_J	-55 to +150	°C
Storage temperature		T_{stg}	-55 to +150	°C

ABSOLUTE MAXIMUM RATINGS VMMBZ23C1DD1 (T_{amb} = 25 °C, unless otherwise specified)				
PARAMETER	**TEST CONDITIONS**	**SYMBOL**	**VALUE**	**UNIT**
Peak pulse current	Acc. IEC 61000-4-5, 8/20 µs/single shot	I_{PPM}	2.5	A
Peak pulse power	Acc. IEC 61000-4-5, 8/20 µs/single shot (1)	P_{PP}	100	W
Peak pulse current	t_p = 10/1000 µs (1)	I_{PPM}	0.44	A
Peak pulse power	t_p = 10/1000 µs (1)	P_{PP}	15	W
ESD immunity	Contact discharge acc. IEC 61000-4-2; 10 pulses (1)	V_{ESD}	22	kV
	Air discharge acc. IEC 61000-4-2; 10 pulses (1)		22	kV
Operating temperature	Junction temperature	T_J	-55 to +150	°C
Storage temperature		T_{stg}	-55 to +150	°C

ABSOLUTE MAXIMUM RATINGS VMMBZ33C1DD1 (T_{amb} = 25 °C, unless otherwise specified)				
PARAMETER	**TEST CONDITIONS**	**SYMBOL**	**VALUE**	**UNIT**
Peak pulse current	Acc. IEC 61000-4-5, 8/20 µs/single shot	I_{PPM}	1.7	A
Peak pulse power	Acc. IEC 61000-4-5, 8/20 µs/single shot (1)	P_{PP}	100	W
Peak pulse current	t_p = 10/1000 µs (1)	I_{PPM}	0.3	A
Peak pulse power	t_p = 10/1000 µs (1)	P_{PP}	15	W
ESD immunity	Contact discharge acc. IEC 61000-4-2; 10 pulses (1)	V_{ESD}	15	kV
	Air discharge acc. IEC 61000-4-2; 10 pulses (1)		15	kV
Operating temperature	Junction temperature	T_J	-55 to +150	°C
Storage temperature		T_{stg}	-55 to +150	°C

For technical questions, contact: ESDprotection@vishay.com
THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT www.vishay.com/doc?91000

ELECTRICAL CHARACTERISTICS VMMBZ16C1DD1
(T_{amb} = 25 °C, unless otherwise specified)

PARAMETER	TEST CONDITIONS / REMARKS	SYMBOL	MIN.	TYP.	MAX.	UNIT
Protection paths	Number of lines which can be protected	$N_{channel}$	-	-	1	lines
Reverse stand off voltage	Max. reverse working voltage	V_{RWM}	-	-	14	V
Reverse voltage	At I_R = 0.01 µA	V_R	14	-	-	V
Reverse current	At V_R = 14 V	I_R	-	< 0.001	0.01	µA
	At V_R = 14 V; T_J = 150 °C (1)		-	0.06	10	µA
Reverse breakdown voltage	At I_R = 1 mA	V_{BR}	16.2	16.7	17.3	V
	At I_R = 1 mA; T_J = -40 °C to +150 °C (1)		15	-	18.7	V
Reverse clamping voltage	At I_{PP} = I_{PPM} = 4 A, t_p = 8/20 µs	V_C	20	23.7	27	V
	t_p = 100 ns (TLP); $I_{\_TLP}$ = 16 A (1)	V_{C_TLP}	-	26	-	V
Dynamic resistance	t_p = 100 ns (TLP) (1)	r_{dyn}	-	0.55	-	Ω
Capacitance	At V_R = 0 V; f = 1 MHz	C_D	12	14.5	17	pF

ELECTRICAL CHARACTERISTICS VMMBZ23C1DD1
(T_{amb} = 25 °C, unless otherwise specified)

PARAMETER	TEST CONDITIONS / REMARKS	SYMBOL	MIN.	TYP.	MAX.	UNIT
Protection paths	Number of lines which can be protected	$N_{channel}$	-	-	1	lines
Reverse stand off voltage	Max. reverse working voltage	V_{RWM}	-	-	19	V
Reverse voltage	At I_R = 0.01 µA	V_R	19	-	-	V
Reverse current	At V_R = 19 V	I_R	-	< 0.001	0.01	µA
	At V_R = 19 V; T_J = 150 °C (1)		-	0.02	10	µA
Reverse breakdown voltage	At I_R = 1 mA	V_{BR}	21	23	25	V
	At I_R = 1 mA; T_J = -40 °C to +150 °C (1)		19.5	-	28	V
Reverse clamping voltage	At I_{PP} = I_{PPM} = 2.5 A, t_p = 8/20 µs	V_C	25	32	40	V
	t_p = 100 ns (TLP); $I_{\_TLP}$ = 16 A (1)	V_{C_TLP}	-	42	-	V
Dynamic resistance	t_p = 100 ns (TLP) (1)	r_{dyn}	-	1.2	-	Ω
Capacitance	At V_R = 0 V; f = 1 MHz	C_D	9	11	13	pF

ELECTRICAL CHARACTERISTICS VMMBZ33C1DD1
(T_{amb} = 25 °C, unless otherwise specified)

PARAMETER	TEST CONDITIONS / REMARKS	SYMBOL	MIN.	TYP.	MAX.	UNIT
Protection paths	Number of lines which can be protected	$N_{channel}$	-	-	1	lines
Reverse stand off voltage	Max. reverse working voltage	V_{RWM}	-	-	28	V
Reverse voltage	At I_R = 0.1 µA	V_R	28	-	-	V
Reverse current	At V_R = 28 V	I_R	-	< 0.001	0.01	µA
	At V_R = 28 V; T_J = 150 °C (1)		-	0.1	10	µA
Reverse breakdown voltage	At I_R = 1 mA	V_{BR}	32.7	33.7	34.8	V
	At I_R = 1 mA; T_J = -40 °C to +150 °C (1)		30	-	39.7	V
Reverse clamping voltage	At I_{PP} = I_{PPM} = 1.7 A, t_p = 8/20 µs	V_C	40	49	59	V
	t_p = 100 ns (TLP); $I_{\_TLP}$ = 16 A (1)	V_{C_TLP}	-	88	-	V
Dynamic resistance	t_p = 100 ns (TLP) (1)	r_{dyn}	-	3.3	-	Ω
Capacitance	At V_R = 0 V; f = 1 MHz	C_D	6	8	10	pF

Note

(1) Guaranteed by design. Tested during device characterization

For technical questions, contact: ESDprotection@vishay.com
THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT www.vishay.com/doc?91000

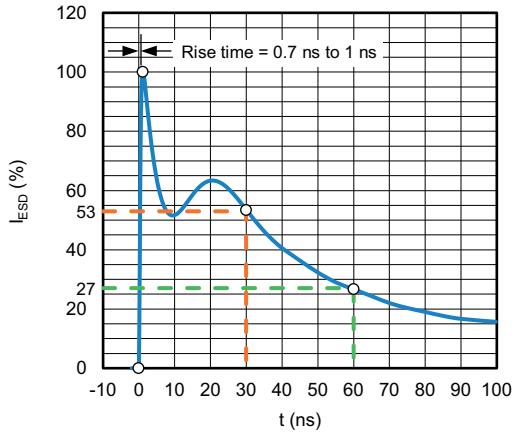


Fig. 1 - ESD Discharge Current Wave Form Acc. IEC 61000-4-2 (330 Ω / 150 pF)

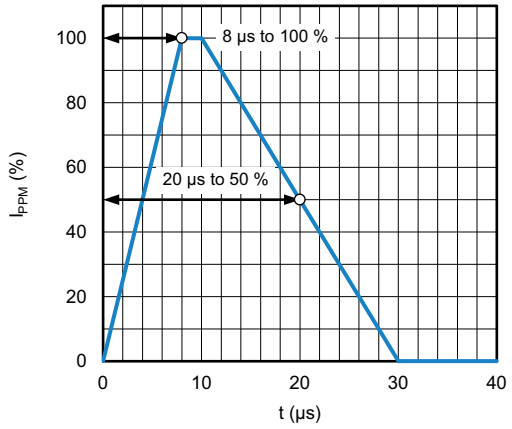


Fig. 2 - 8/20 µs Peak Pulse Current Wave Form Acc. IEC 61000-4-5

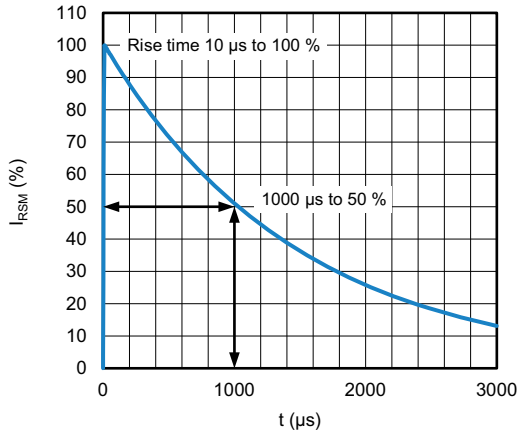


Fig. 3 - 10/1000 µs Peak Pulse Current Wave Form

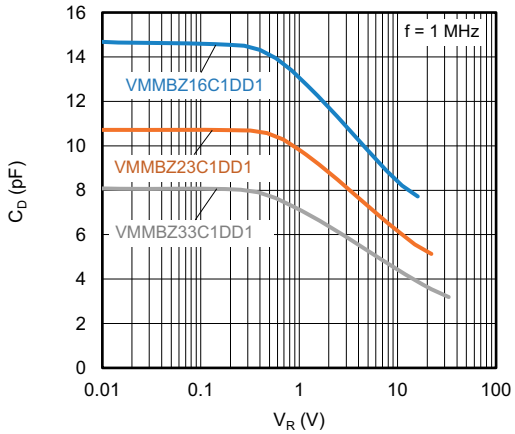


Fig. 4 - Typical Capacitance vs. Reverse Voltage

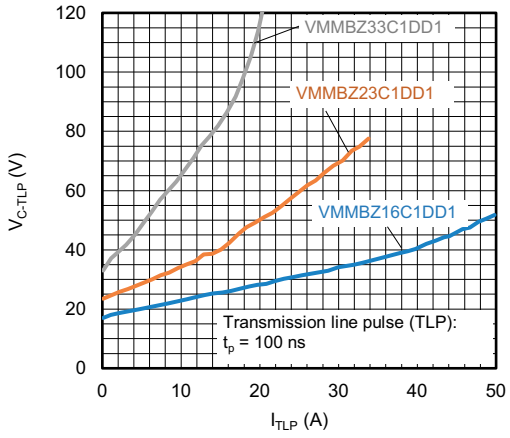


Fig. 5 - Typical Clamping Voltage vs. Peak Pulse Current

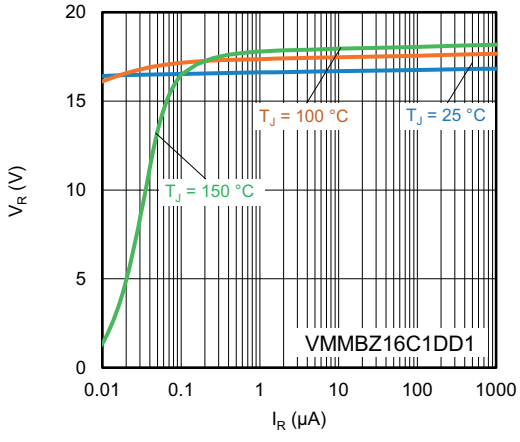


Fig. 6 - Typical Reverse Voltage vs. Reverse Current

For technical questions, contact: ESDprotection@vishay.com
THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT www.vishay.com/doc?91000

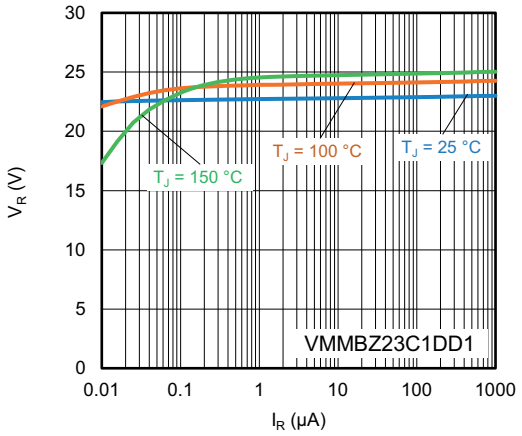


Fig. 7 - Typical Reverse Voltage vs. Reverse Current

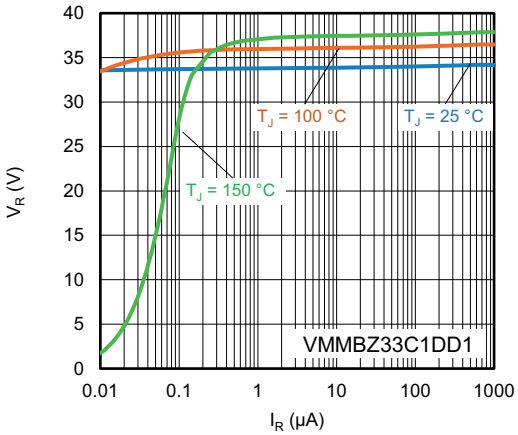


Fig. 10 - Typical Reverse Voltage vs. Reverse Current

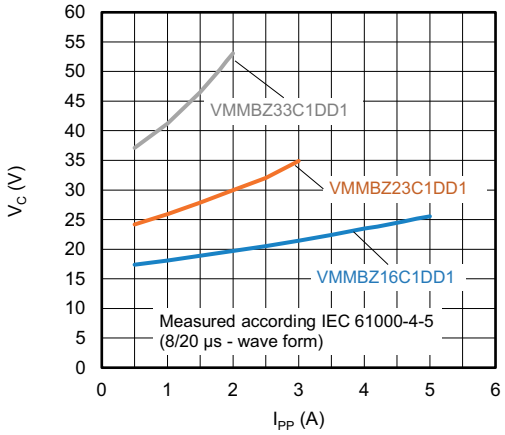


Fig. 8 - Typical Peak Clamping Voltage vs. Peak Pulse Current

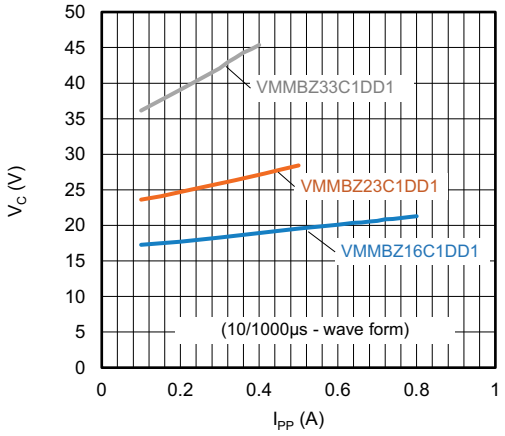
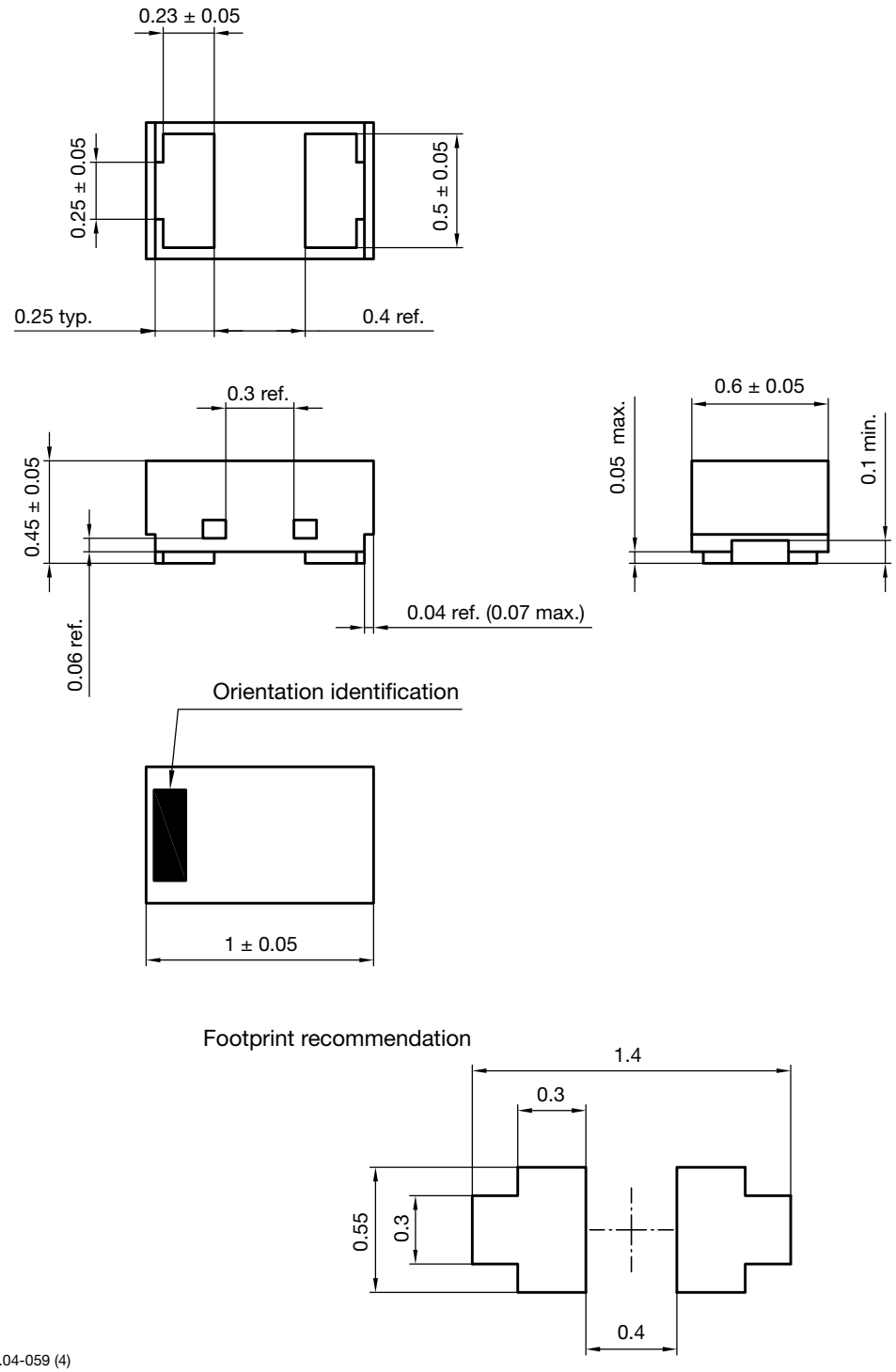


Fig. 9 - Typical Peak Clamping Voltage vs. Peak Pulse Current

For technical questions, contact: ESDprotection@vishay.com
THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT www.vishay.com/doc?91000

PACKAGE DIMENSIONS in millimeters (inches): **DFN1006-2B**

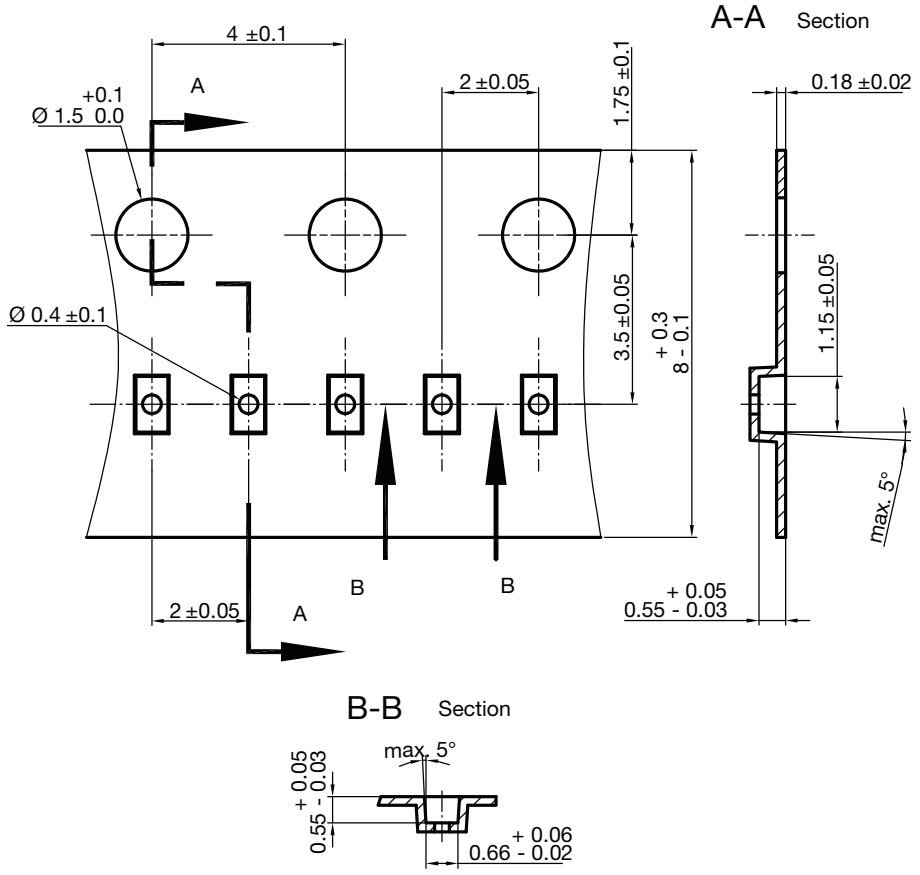


Document no.: S8-V-3906.04-059 (4)
Created - Date: 11-Jul-2018
Rev.6 - Date: 12-Nov-2024

23191

For technical questions, contact: ESDprotection@vishay.com
THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT www.vishay.com/doc?91000

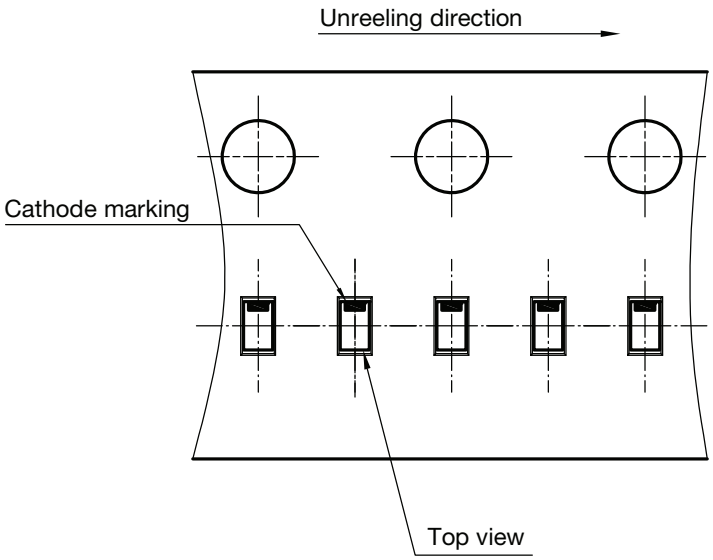
CARRIER TAPE DFN1006-2B



S8-V-3906.04-063 (4)
created 28.10.2019

surface resistance: 10^5 - 10^{11} $\frac{\text{OHMS}}{\text{SQ}}$
Cummulative tolerances of 10 sprocket holes is ± 0.2 mm

ORIENTATION IN CARRIER TAPE DFN1006-2B



S8-V-3906.04-064 (4)
created 28.10.2019

For technical questions, contact: ESDprotection@vishay.com
THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT www.vishay.com/doc?91000

Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, “Vishay”), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and / or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Hyperlinks included in this datasheet may direct users to third-party websites. These links are provided as a convenience and for informational purposes only. Inclusion of these hyperlinks does not constitute an endorsement or an approval by Vishay of any of the products, services or opinions of the corporation, organization or individual associated with the third-party website. Vishay disclaims any and all liability and bears no responsibility for the accuracy, legality or content of the third-party website or for that of subsequent links.

Vishay products are not designed for use in life-saving or life-sustaining applications or any application in which the failure of the Vishay product could result in personal injury or death unless specifically qualified in writing by Vishay. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.

© 2026 VISHAY INTERTECHNOLOGY, INC. ALL RIGHTS RESERVED

THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT www.vishay.com/doc?91000