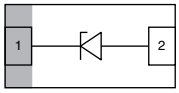
Single-Line Unidirectional ESD-Protection Diode in DFN1006-2A



FEATURES

- Compact DFN1006-2A package
- Low package height < 0.5 mm
- 1-line unidirectional ESD-protection
- AEC-Q101 qualified available
- Working range 14 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 | SPICE 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	
VMMBZ16C1HD1	-	G	3	-08	VMMBZ16C1HD1-G3-08
VMMBZ16C1HD1	H	G	3	-08	VMMBZ16C1HD1HG3-08

PACKAGE DATA

DEVICE NAME	PACKAGE NAME	TYPE CODE	WEIGHT	MOLDING COMPOUND FLAMMABILITY RATING	MOISTURE SENSITIVITY LEVEL	SOLDERING CONDITIONS
VMMBZ16C1HD1	DFN1006-2A	2X	0.83 mg	UL 94 V-0	MSL level 1 (according J-STD-020)	Peak temperature max. 260 °C
VMMBZ33C1HD1	DFN1006-2A	2L	0.83 mg	UL 94 V-0	MSL level 1 (according J-STD-020)	Peak temperature max. 260 °C

ABSOLUTE MAXIMUM RATINGS VMMBZ16C1HD1 (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	tp = 10/1000 µs (1)	I_{PPM}	0.7	A
Peak pulse power	tp = 10/1000 µs (1)	P_{PP}	16	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

Note

(1) Guaranteed by design; tested during device characterization

ABSOLUTE MAXIMUM RATINGS VMMBZ33C1HD1 (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	tp = 10/1000 µs (1)	I_{PPM}	0.3	A
Peak pulse power	tp = 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

Note

(1) Guaranteed by design; tested during device characterization

ELECTRICAL CHARACTERISTICS VMMBZ16C1HD1 (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}	15.2	16	16.8	V
	At I_R = 1 mA; T_J = -40 °C to +150 °C (1)		14.3	-	19.0	V
Reverse clamping voltage	At I_{PP} = I_{PPM} = 4 A, t_p = 8/20 µs	V_C	19	23	27	V
	t_p = 100 ns (TLP); $I_{\_TLP}$ = 16 A (1)	V_{C_TLP}	-	24	-	V
Dynamic resistance	t_p = 100 ns (TLP) (1)	r_{dyn}	-	0.48	-	Ω
Capacitance	At V_R = 0 V; f = 1 MHz	C_D	24.6	29	33.4	pF

Note

(1) Guaranteed by design; tested during device characterization

ELECTRICAL CHARACTERISTICS VMMBZ33C1HD1
(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 = 0.01 µA	V_R	28	-	-	V
Reverse current	At V_R = 28 V	I_R	-	< 0.001	0.01	µA
	At V_R = 28 V; TJ = 150 °C (1)		-	0.1	10	µA
Reverse breakdown voltage	At I_R = 1 mA	V_{BR}	31.3	33	34.7	V
	At I_R = 1 mA; T_J = -40 °C to +150 °C (1)		29	-	39	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}	-	85	-	V
Dynamic resistance	t_p = 100 ns (TLP) (1)	r_{dyn}	-	0.34	-	Ω
Capacitance	At V_R = 0 V; f = 1 MHz	C_D	13.6	16.1	18.6	pF

Note

(1) Guaranteed by design; tested during device characterization

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

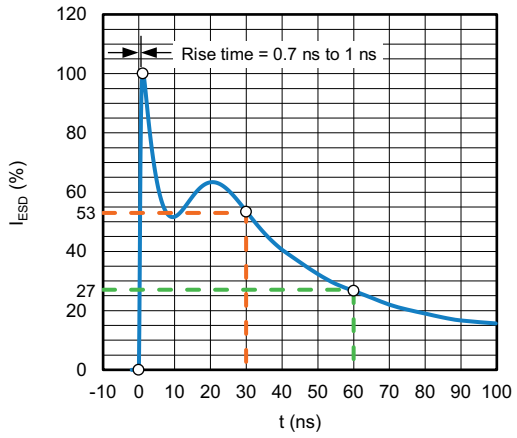


Fig. 1 - ESD Discharge Current Wave Form
According to IEC 61000-4-2 (330 Ω / 150 pF)

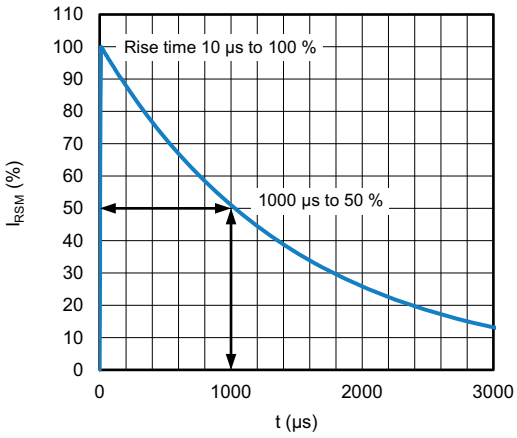


Fig. 3 - 10/1000 µs Peak Pulse Current Wave Form

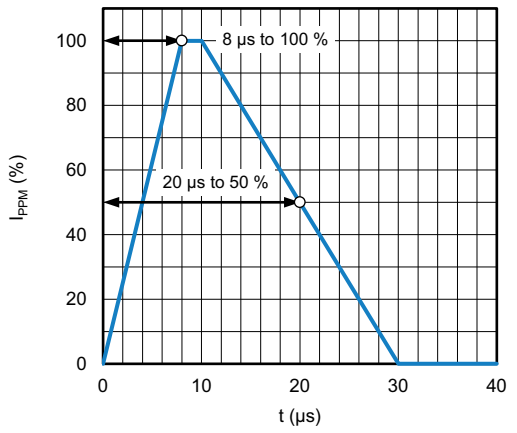


Fig. 2 - 8/20 µs Peak Pulse Current Wave Form
According to IEC 61000-4-5

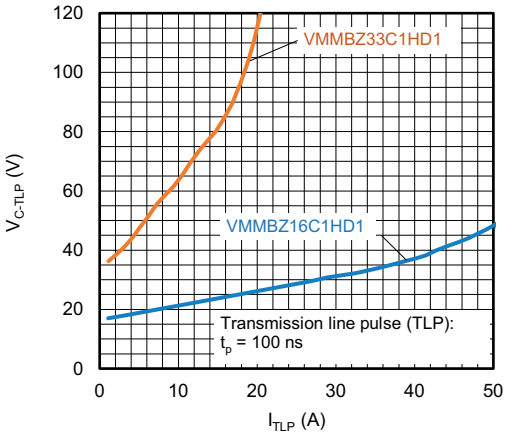


Fig. 4 - Typical Clamping Voltage vs. Peak Pulse Current

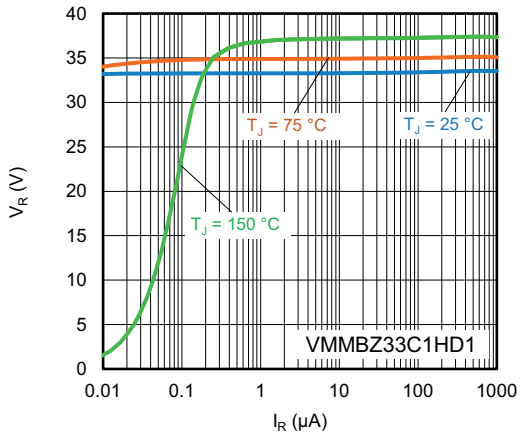


Fig. 5 - Typical Reverse Voltage vs. Reverse Current

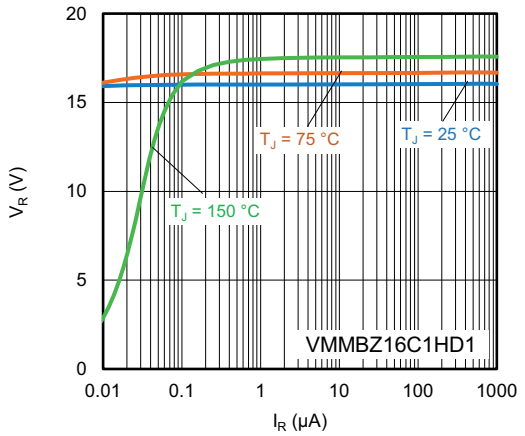


Fig. 6 - Typical Reverse Voltage vs. Reverse Current

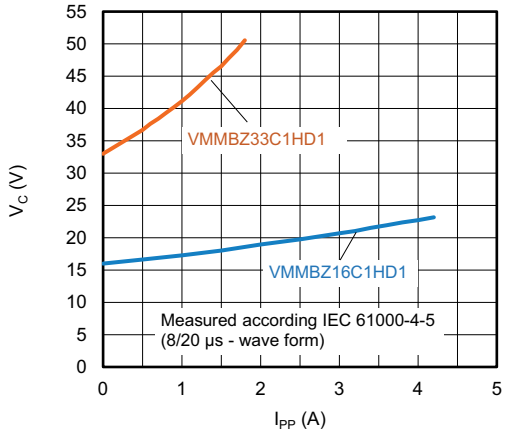


Fig. 7 - Typical Peak Clamping Voltage vs. Peak Pulse Current

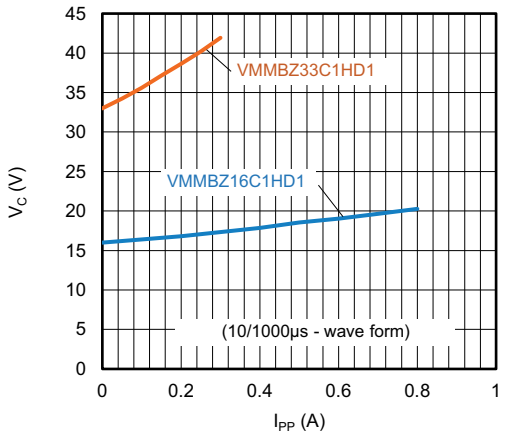


Fig. 8 - Typical Peak Clamping Voltage vs. Peak Pulse Current

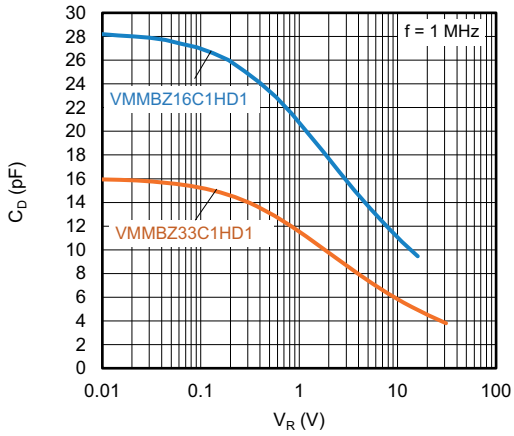
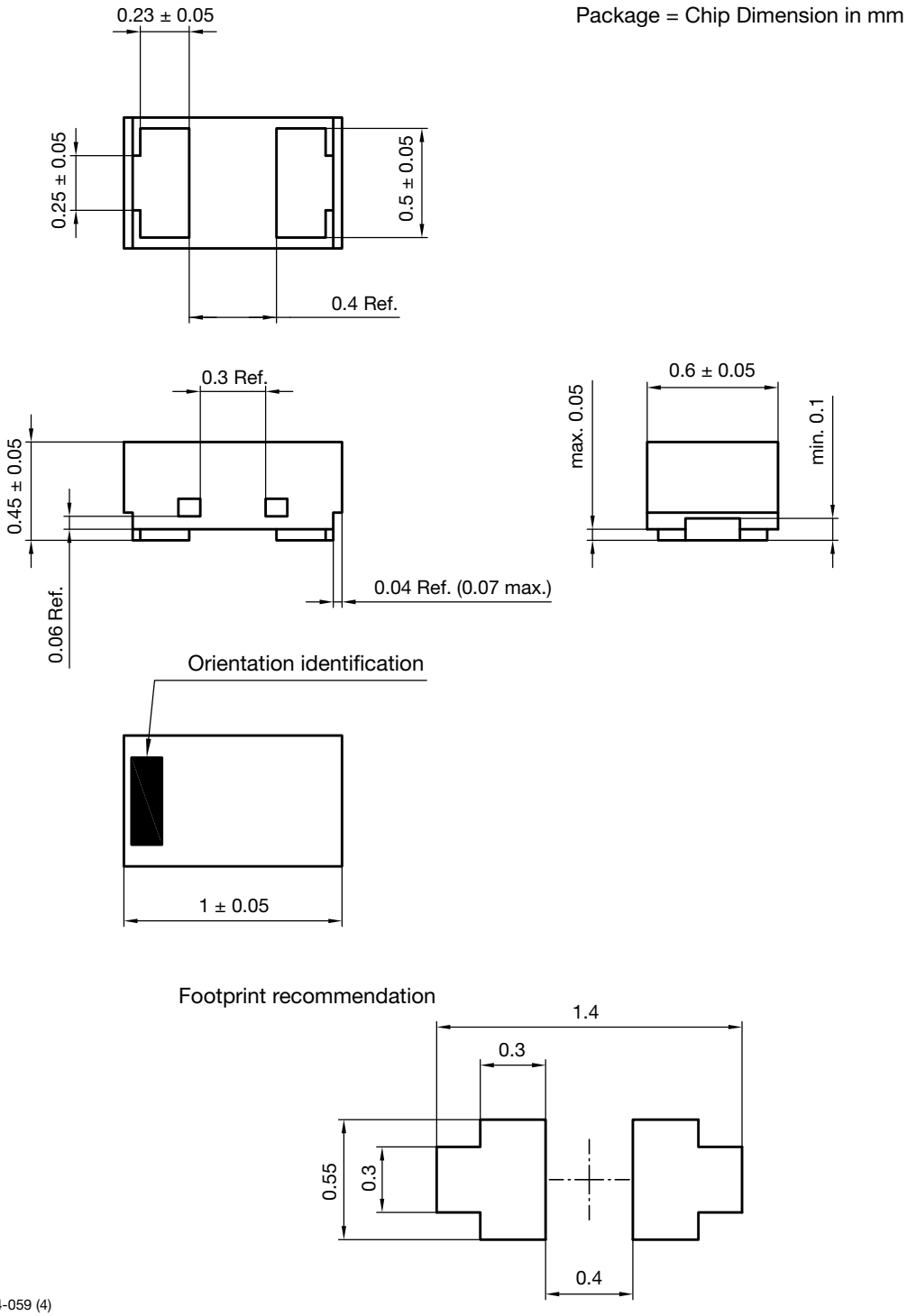


Fig. 9 - Typical Capacitance vs. Reverse Voltage

PACKAGE DIMENSIONS in millimeters (Inches): **DFN1006-2A**



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Rev.5 - Date: 17-Sep-2021

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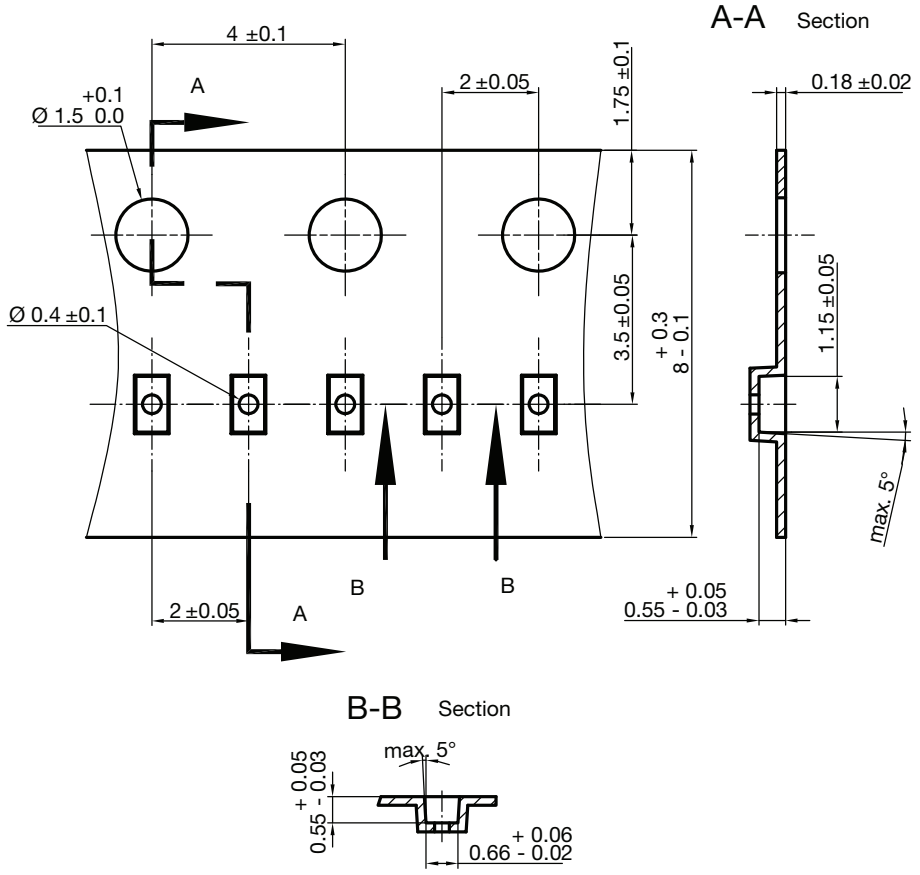
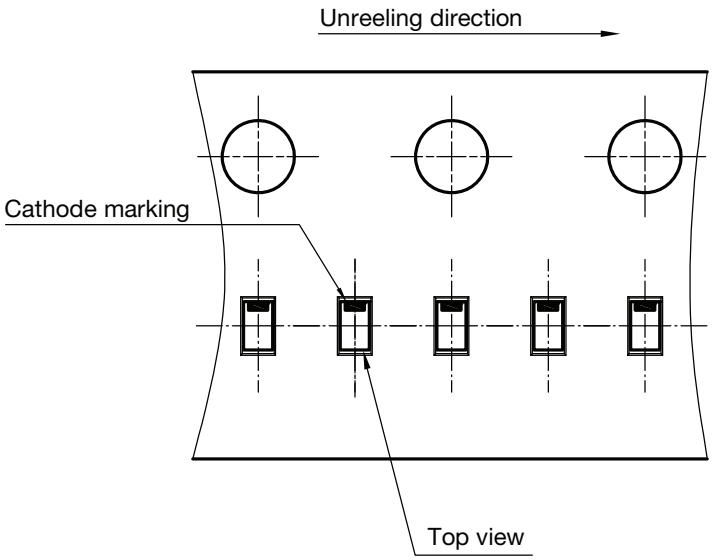
CARRIER TAPE DFN1006-2A



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 DFN1006-2A



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

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