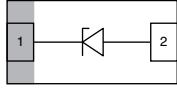




## Single-Line Unidirectional ESD-Protection Diode in DFN1006-2A



### MARKING (example only)



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

### LINKS TO ADDITIONAL RESOURCES



### 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](http://www.vishay.com/doc?99912)



### Soldering Recommendations for DFN Packages:

please see Application Note: [www.vishay.com/doc?86198](http://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



<b>ABSOLUTE MAXIMUM RATINGS</b> VMMBZ16C1HD1 ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)				
PARAMETER	TEST CONDITIONS	SYMBOL	VALUE	UNIT
Peak pulse current	Acc. IEC 61000-4-5, 8/20 $\mu\text{s}$ /single shot	$I_{PPM}$	4	A
Peak pulse power	Acc. IEC 61000-4-5, 8/20 $\mu\text{s}$ /single shot <sup>(1)</sup>	$P_{PP}$	108	W
Peak pulse current	$t_p = 10/1000\text{ }\mu\text{s}$ <sup>(1)</sup>	$I_{PPM}$	0.7	A
Peak pulse power	$t_p = 10/1000\text{ }\mu\text{s}$ <sup>(1)</sup>	$P_{PP}$	16	W
ESD immunity	Contact discharge acc. IEC 61000-4-2; 10 pulses <sup>(1)</sup>	$V_{ESD}$	30	kV
	Air discharge acc. IEC 61000-4-2; 10 pulses <sup>(1)</sup>		30	kV
Operating temperature	Junction temperature	$T_J$	-55 to +150	$^{\circ}\text{C}$
Storage temperature		$T_{stg}$	-55 to +150	$^{\circ}\text{C}$

**Note**<sup>(1)</sup> Guaranteed by design; tested during device characterization

<b>ABSOLUTE MAXIMUM RATINGS</b> VMMBZ33C1HD1 ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)				
PARAMETER	TEST CONDITIONS	SYMBOL	VALUE	UNIT
Peak pulse current	Acc. IEC 61000-4-5, 8/20 $\mu\text{s}$ /single shot	$I_{PPM}$	1.7	A
Peak pulse power	Acc. IEC 61000-4-5, 8/20 $\mu\text{s}$ /single shot <sup>(1)</sup>	$P_{PP}$	100	W
Peak pulse current	$t_p = 10/1000\text{ }\mu\text{s}$ <sup>(1)</sup>	$I_{PPM}$	0.3	A
Peak pulse power	$t_p = 10/1000\text{ }\mu\text{s}$ <sup>(1)</sup>	$P_{PP}$	15	W
ESD immunity	Contact discharge acc. IEC 61000-4-2; 10 pulses <sup>(1)</sup>	$V_{ESD}$	15	kV
	Air discharge acc. IEC 61000-4-2; 10 pulses <sup>(1)</sup>		15	kV
Operating temperature	Junction temperature	$T_J$	-55 to +150	$^{\circ}\text{C}$
Storage temperature		$T_{stg}$	-55 to +150	$^{\circ}\text{C}$

**Note**<sup>(1)</sup> Guaranteed by design; tested during device characterization

<b>ELECTRICAL CHARACTERISTICS</b> VMMBZ16C1HD1 ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , 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 $I_R = 0.01\text{ }\mu\text{A}$	$V_R$	14	-	-	V
Reverse current	At $V_R = 14\text{ V}$	$I_R$	-	< 0.001	0.01	$\mu\text{A}$
	At $V_R = 14\text{ V}$ ; $T_J = 150\text{ }^{\circ}\text{C}$ <sup>(1)</sup>		-	0.06	10	$\mu\text{A}$
Reverse breakdown voltage	At $I_R = 1\text{ mA}$	$V_{BR}$	15.2	16	16.8	V
	At $I_R = 1\text{ mA}$ ; $T_J = -40\text{ }^{\circ}\text{C}$ to $+150\text{ }^{\circ}\text{C}$ <sup>(1)</sup>		14.3	-	19.0	V
Reverse clamping voltage	At $I_{PP} = I_{PPM} = 4\text{ A}$ , $t_p = 8/20\text{ }\mu\text{s}$	$V_C$	19	23	27	V
	$t_p = 100\text{ ns}$ (TLP); $I_{TLP} = 16\text{ A}$ <sup>(1)</sup>	$V_{C\_TLP}$	-	24	-	V
Dynamic resistance	$t_p = 100\text{ ns}$ (TLP) <sup>(1)</sup>	$r_{dyn}$	-	0.48	-	$\Omega$
Capacitance	At $V_R = 0\text{ V}$ ; $f = 1\text{ MHz}$	$C_D$	24.6	29	33.4	pF

**Note**<sup>(1)</sup> Guaranteed by design; tested during device characterization



ELECTRICAL CHARACTERISTICS VMMBZ33C1HD1						
(T <sub>amb</sub> = 25 °C, unless otherwise specified)						
PARAMETER	TEST CONDITIONS / REMARKS	SYMBOL	MIN.	TYP.	MAX.	UNIT
Protection paths	Number of lines which can be protected	N <sub>channel</sub>	-	-	1	lines
Reverse stand off voltage	Max. reverse working voltage	V <sub>RWM</sub>	-	-	28	V
Reverse voltage	At I <sub>R</sub> = 0.01 μA	V <sub>R</sub>	28	-	-	V
Reverse current	At V <sub>R</sub> = 28 V	I <sub>R</sub>	-	< 0.001	0.01	μA
	At V <sub>R</sub> = 28 V; T <sub>J</sub> = 150 °C <sup>(1)</sup>		-	0.1	10	μA
Reverse breakdown voltage	At I <sub>R</sub> = 1 mA	V <sub>BR</sub>	31.3	33	34.7	V
	At I <sub>R</sub> = 1 mA; T <sub>J</sub> = -40 °C to +150 °C <sup>(1)</sup>		29	-	39	V
Reverse clamping voltage	At I <sub>PP</sub> = I <sub>PPM</sub> = 1.7 A, t <sub>p</sub> = 8/20 μs	V <sub>C</sub>	40	49	59	V
	t <sub>p</sub> = 100 ns (TLP); I <sub>TLP</sub> = 16 A <sup>(1)</sup>	V <sub>C,TLP</sub>	-	85	-	V
Dynamic resistance	t <sub>p</sub> = 100 ns (TLP) <sup>(1)</sup>	r <sub>dyn</sub>	-	0.34	-	Ω
Capacitance	At V <sub>R</sub> = 0 V; f = 1 MHz	C <sub>D</sub>	13.6	16.1	18.6	pF

**Note**

<sup>(1)</sup> Guaranteed by design; tested during device characterization

**TYPICAL CHARACTERISTICS** (T<sub>amb</sub> = 25 °C, unless otherwise specified)

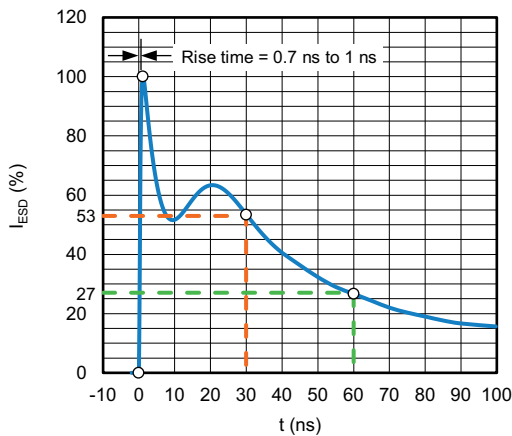


Fig. 1 - ESD Discharge Current Wave Form According to IEC 61000-4-2 (330 Ω / 150 pF)

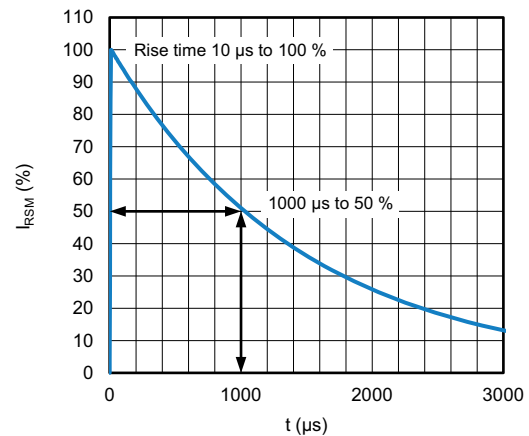


Fig. 3 - 10/1000 μs Peak Pulse Current Wave Form

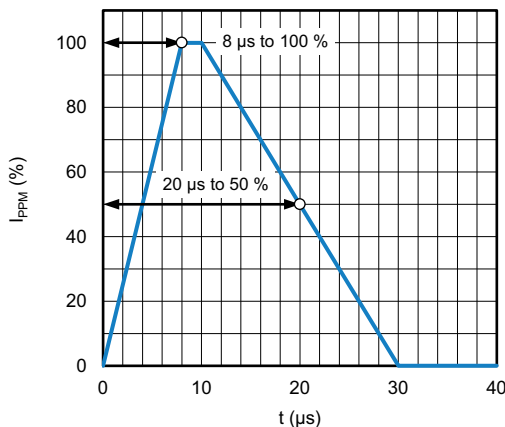


Fig. 2 - 8/20 μs Peak Pulse Current Wave Form According to IEC 61000-4-5

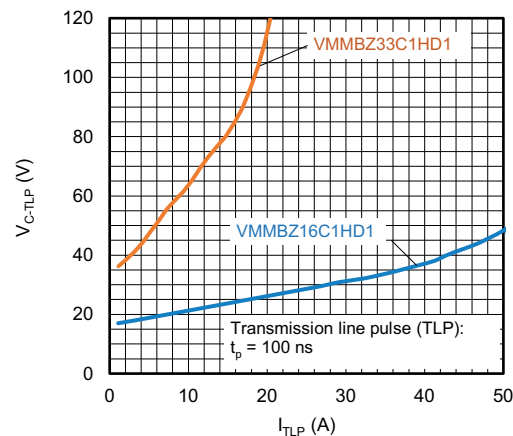


Fig. 4 - Typical Clamping Voltage vs. Peak Pulse Current

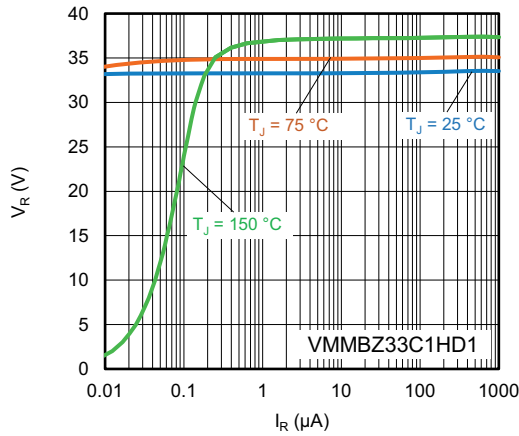


Fig. 5 - Typical Reverse Voltage vs. Reverse Current

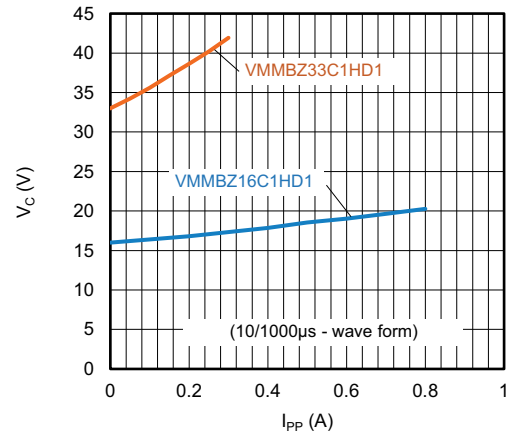


Fig. 8 - Typical Peak Clamping Voltage vs. Peak Pulse Current

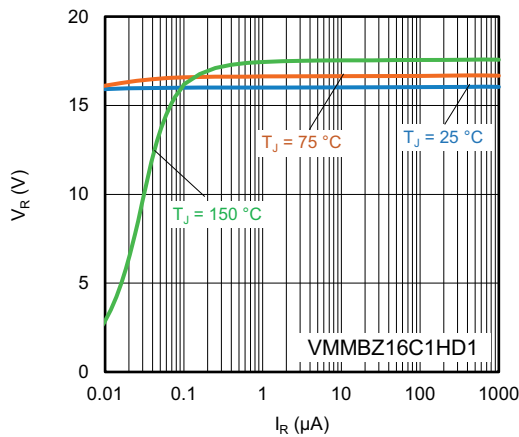


Fig. 6 - Typical Reverse Voltage vs. Reverse Current

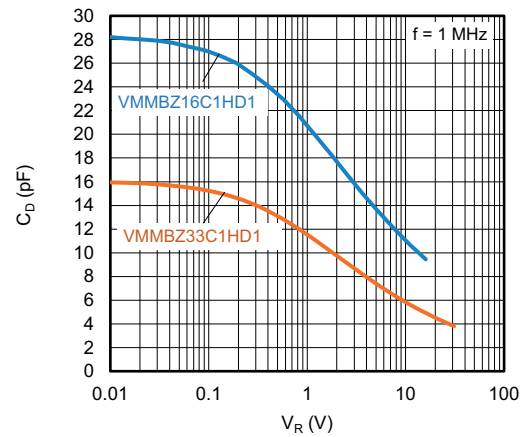


Fig. 9 - Typical Capacitance vs. Reverse Voltage

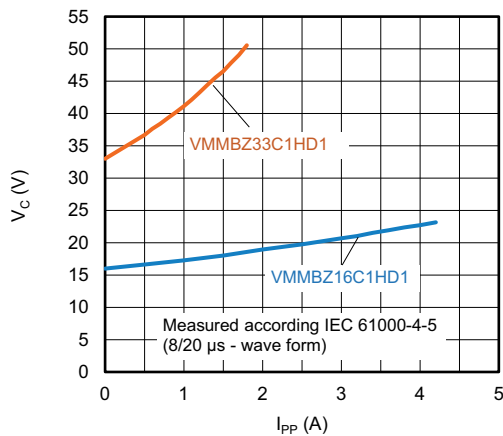
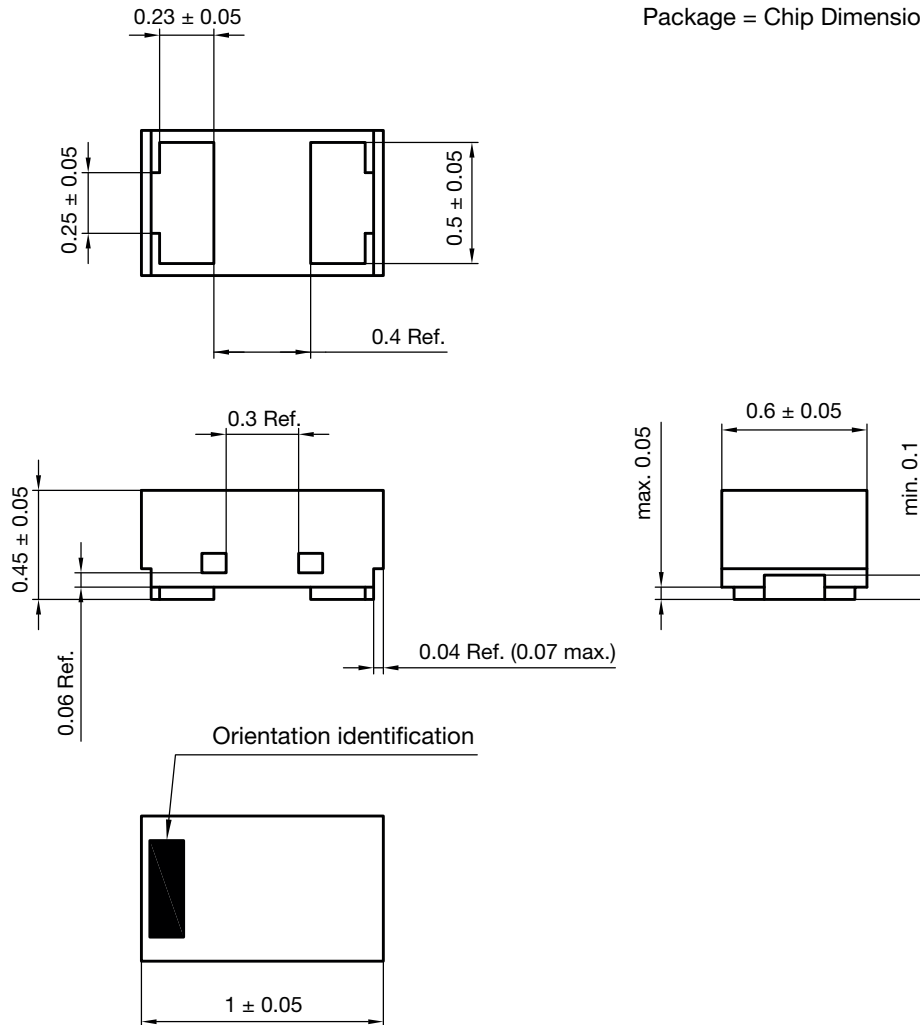


Fig. 7 - Typical Peak Clamping Voltage vs. Peak Pulse Current

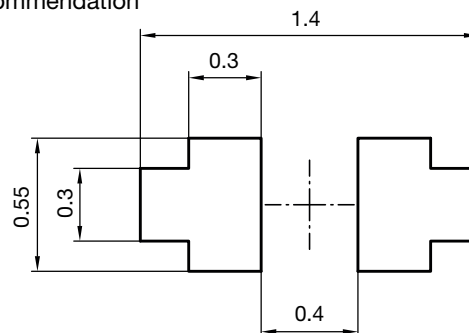


## PACKAGE DIMENSIONS in millimeters (Inches): DFN1006-2A

Package = Chip Dimension in mm



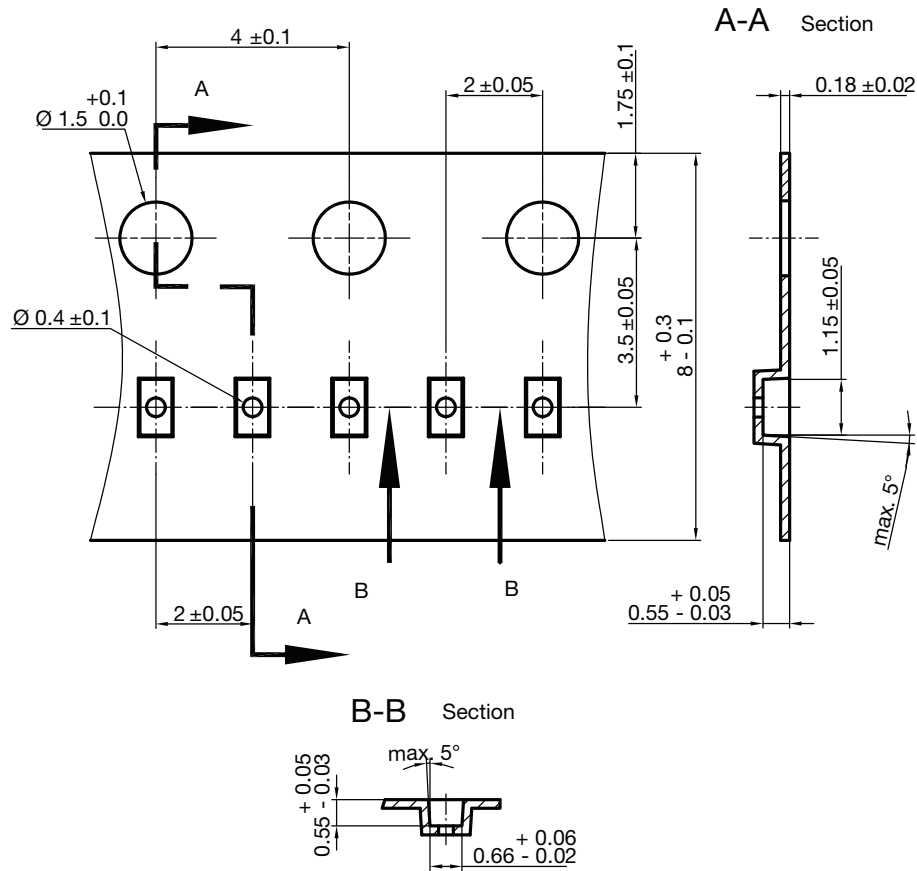
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Document no.: S8-V-3906.04-059 (4)  
Created - Date: 11-Jul-2018  
Rev.5 - Date: 17-Sep-2021

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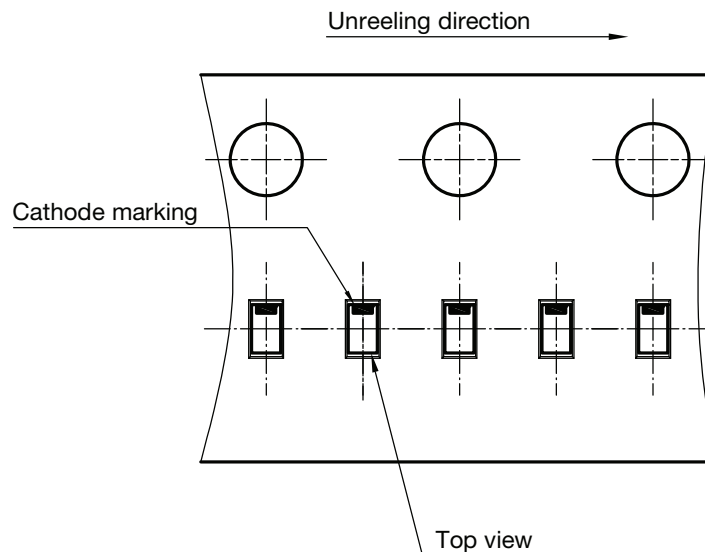
## CARRIER TAPE DFN1006-2A



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

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

## ORIENTATION IN CARRIER TAPE DFN1006-2A



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



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