AUTOMOTIVE

RoHS

COMPLIANT

HALOGEN FREE

GREEN

(5-2008)



Vishay Semiconductors

2-Line Low Capacitance, Bidirectional and Symmetrical (BiSy) **ESD Protection Diode**





MARKING (example only)



Dot = pin marking X = date code

Y = type code (see table below)

FEATURES

- Small DFN1110-3A
- 2-line ESD protection
- Working range ± 5.5 V
- Low leakage current I_R < 0.05 μA
- Low load capacitance C_D < 0.45 pF
- ESD immunity acc. IEC 61000-4-2 ± 20 kV contact discharge
 - ± 20 kV air discharge
- ESD capability according to AEC-Q101: human body model: class H3B: > 8 kV
- e3 pins side wall plated with tin (Sn)
- AOI capable
- AEC-Q101 qualified available
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912









ORDERING INFORMATION							
	ENVIRONMENTAL AND QUALITY CODE			PACKAGING CODE			
PART NUMBER (EXAMPLE)	AEC-Q101 QUALIFIED	RoHS-COMPLIANT + LEAD (Pb)-FREE TERMINATIONS	TIN PLATED	10K PER 7" REEL (8 mm TAPE) 10K/BOX = MOQ	ORDERING CODE (EXAMPLE)		
	,	GREEN		IUN/BOX = WOQ			
VBUS05M2-HT5	-	G	3	-08	VBUS05M2-HT5-G3-08		
VBUS05M2-HT5	Н	G	3	-08	VBUS05M2-HT5HG3-08		

PACKAGE DATA						
DEVICE NAME	PACKAGE NAME	TYPE CODE	WEIGHT	MOLDING COMPOUND FLAMMABILITY RATING	MOISTURE SENSITIVITY LEVEL	SOLDERING CONDITIONS
VBUS05M2-HT5	DFN1110-3A	М	1.43 mg	UL 94 V-0	MSL level 1 (according J-STD-020)	Peak temperature max. 260 °C

ABSOLUTE MAXIMUM RATINGS						
PARAMETER	TEST CONDITIONS	SYMBOL	VALUE	UNIT		
Peak pulse current	Acc. IEC 61000-4-5; t _P = 8/20 μs; single shot	I _{PPM}	3.4	А		
Peak pulse power	Acc. IEC 61000-4-5; t _P = 8/20 μs; single shot	P _{PP}	60	W		
ESD immunity	Contact discharge acc. IEC 61000-4-2; 10 pulses	V	± 20	kV		
ESD IIIIIIdility	Air discharge acc. IEC 61000-4-2; 10 pulses	V_{ESD}	± 20			
Operating temperature	Junction temperature	TJ	-55 to +150	°C		
Storage temperature		T _{STG}	-55 to +150	°C		



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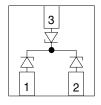
ELECTRICAL CHARACTERISTICS (pin 1 or pin 2 to pin 3; in both directions) (T _{amb} = 25 °C, unless otherwise specified)							
PARAMETER	TEST CONDITIONS/REMARKS	SYMBOL	MIN.	TYP.	MAX.	UNIT	
Protection paths	Number of lines which can be protected	N _{channel}	-	-	2	lines	
Reverse stand-off voltage	Max. reverse working voltage	V_{RWM}	-	-	5.5	V	
Reverse voltage	At I _R = 0.1 μA	V_{R}	5.5	-	-	V	
Reverse current	At V _{RWM} = 5.5 V	I _R	-	< 0.001	0.1	μΑ	
Reverse breakdown voltage	At I _R = 1 mA	V_{BR}	7.5	8.5	9.5	V	
Reverse clamping voltage	At I _{PP} = 1 A	V _C	-	11	13	V	
	At I _{PP} = I _{PPM} = 3.4 A	V _C	-	15	18	V	
Clamping voltage	Transmission line pulse (TLP), $t_p = 100 \text{ ns}$ $I_{TLP} = 8 \text{ A}$	V _{C-TLP}	-	20	-	V	
	Transmission line pulse (TLP), $t_p = 100 \text{ ns}$ $I_{TLP} = 16 \text{ A}$	V _{C-TLP}	-	27	-	V	
Dynamic resistance	Transmission line pulse (TLP), t _p = 100 ns	R_{DYN}	-	1	-	Ω	
Capacitance	At V _R = 0 V; f = 1 MHz	_	-	0.37	0.45	pF	
	At V _R = 3.3 V; f = 1 MHz	- C _D	-	0.37	0.45	pF	

APPLICATION NOTE

The VBUS05M2-HT5 is a two-line ESD protection device with a bidirectional and symmetrical (BiSy) breakdown and clamping performance made for application with a voltage working range up to ± 5.5 V. The high ESD immunity and a very low capacitance makes it usable for high frequency applications like USB2.0, USB3.0, or HDMI.

With the VBUS05M2-HT5 two high speed data lines can be protected against transient voltage signals like ESD (electro static discharge). Connected to the data line (pin 1 and pin 2) and to ground (pin 3) negative transients will be clamped close above the 5.5 V working range.

SCHEMATIC DIAGRAM



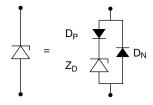


Fig. A

The simplified schematic diagram in Fig. A shows three identical Z-diodes with the cathode on pin 1, 2, or 3 and common anodes. In reality each Z-diode consist of one Z-diode for the adjustment of the breakdown voltage, and two low capacitance switching diodes which provide the low capacitance. Positive transients will be clamped through the switching diode D_P and the Z-diode Z_D while negative transients will be clamped through the switching diode D_N .



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

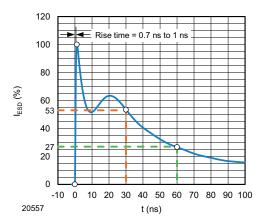


Fig. 1 - ESD Discharge Current Wave Form acc. IEC 61000-4-2 (330 Ω /150 pF)

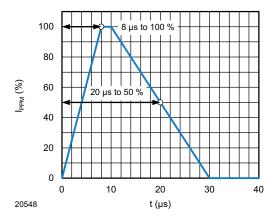


Fig. 2 - 8/20 µs Peak Pulse Current Wave Form acc. IEC 61000-4-5

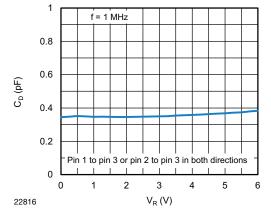


Fig. 3 - Typical Capacitance vs. Reverse Voltage

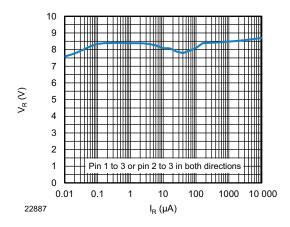


Fig. 4 - Typical Reverse Voltage vs. Reverse Current

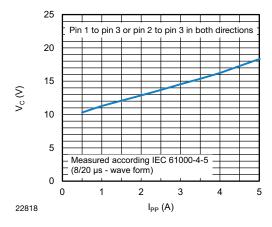


Fig. 5 - Typical Peak Clamping Voltage vs. Peak Pulse Current

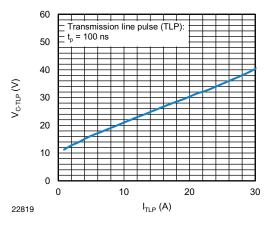
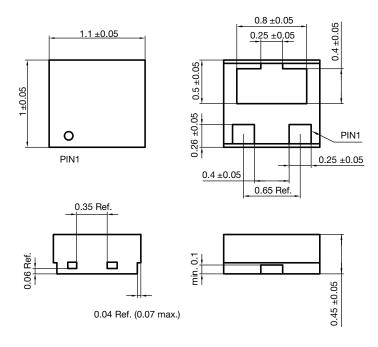
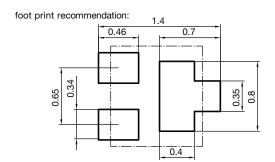


Fig. 6 - Typical Peak Forward Voltage vs. Forward Current

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PACKAGE DIMENSIONS in millimeters (inches)





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Created - Date: 04-Apr-2019



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