SYT21S05DWC

Ultra-Low Capacitance TVS Protection

Features

- Transient protection for high-speed data lines
  IEC 61000-4-2 (ESD) ±30kV(Air)
  ±30kV(Contact)
  IEC 61000-4-5 (Surge) 4.5A (8/20 μs)
- For 5V and below operating voltage
- Package optimized for high-speed lines
- Ultra-small package: DFN1.0×0.6-2
- Protects one data, control or power line
- Low capacitance: 0.5pF (Typical)
- Low leakage current: 0.01μA @ V_{RWM} (Typical)
- Low clamping voltage
- Each I/O pin can withstand over 1000 ESD strikes for ±8kV contact discharge

Description

SYT21S05DWC is an ultra-low capacitance transient voltage suppressor (TVS) designed to provide electrostatic discharge (ESD) protection for high-speed data interfaces. With typical capacitance of 0.5pF, SYT21S05DWC is designed to protect parasitic-sensitive systems against over-voltage and over-current transient events. It complies with IEC61000-4-2 (ESD) (±30kV air, ±30kV contact discharge), IEC61000-4-5 (Surge) (4.5A, 8/20μs), etc.

Each SYT21S05DWC device can protect one data line. It offers system designers flexibility to protect single data line where space is a premium concern.

Applications

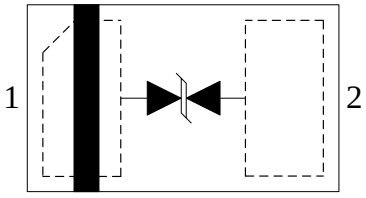
- Serial ATA
- PCI Express
- Desktops, Servers and Notebooks
- MDDI Ports
- USB2.0, 3.0 and 3.1
- Display Ports
- HDMI 1.3, 1.4, 2.0 and 2.1
- Digital Visual Interfaces (DVI)

Mechanical Characteristics

- Package: DFN1.0×0.6-2
- Marking: Device code, date code
- Packaging: Tape and Reel

Circuit Diagram

Pin Configuration



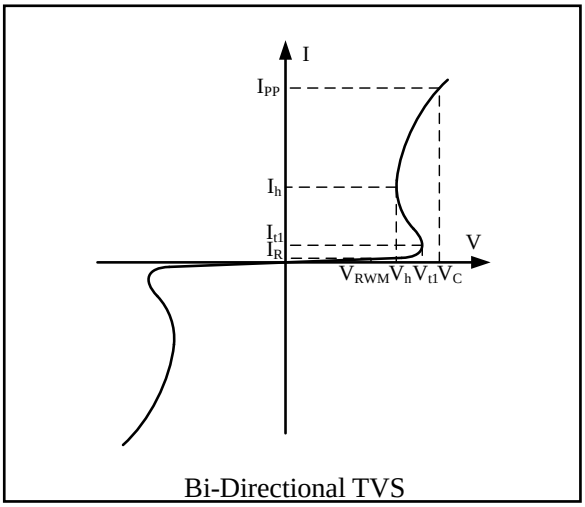
DFN1.0×0.6-2
(Top View)

Absolute Maximum Rating

Symbol	Parameter	Value	Units
V_{ESD}	ESD per IEC 61000-4-2 (Air) ESD per IEC 61000-4-2 (Contact)	±30 ±30	kV
I_{PP}	Peak Pulse Current (8/20μs)	4.5	A
P_{PK}	Peak Pulse Power (8/20μs)	45	W
T_{OPT}	Operating Temperature	-40/+125	°C
T_{STG}	Storage Temperature	-55/+150	°C

Electrical Characteristics (T_A = 25°C)

Symbol	Parameter
V_{RWM}	Nominal Reverse Working Voltage
I_R	Reverse Leakage Current @ V_{RWM}
V_{t1}	Triggering Voltage @ I_{t1}
I_{t1}	Test Current for Triggering Voltage
V_C	Clamping Voltage @ I_{PP}
I_{PP}	Maximum Peak Pulse Current
C_{ESD}	Parasitic Capacitance
V_h	Holding Voltage @ I_h
f	Small Signal Frequency



Bi-Directional TVS

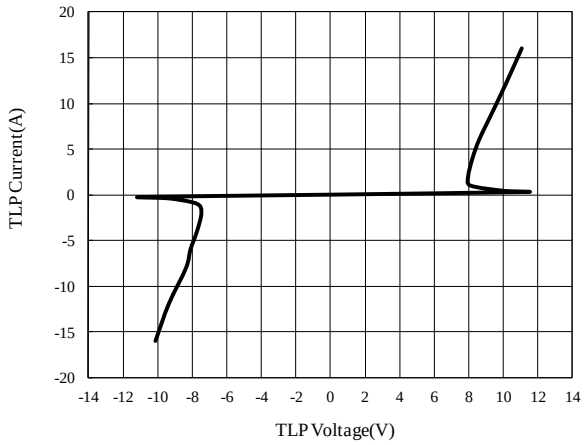
Symbol	Test Condition	Minimum	Typical	Maximum	Units
V_{RWM}				5	V
I_R	V_{RWM} = 5V, T_A = 25°C		0.01	0.1	μA
V_{t1}[1]	I_{t1} = 1μA	5.5			V
V_h	I_h = 10mA	5.5		9.0	V
V_C[1]	I_{PP} = 4.5A, t_p = 8/20μs		10		V
V_C[1]	I_{PP} = 16A, t_p = 10/100ns		11		V
R_{DYN}[1,2]	t_p = 10/100ns		0.25		Ω
C_{ESD}[1]	V_R = 2.5V, f = 1MHz		0.50	0.65	pF

NOTES

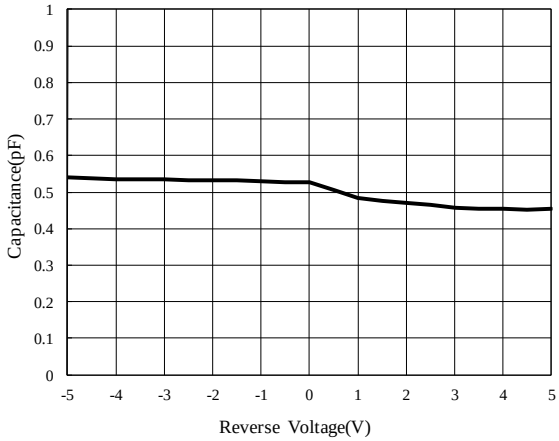
[1]Guaranteed by design and not subject to production test.

[2]R_{DYN} calculated based on I_{PP}=8A to I_{PP}=16A, t_p = 10/100ns.

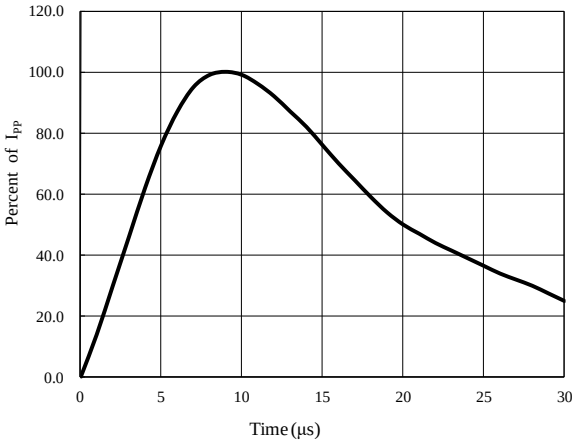
TLP Measurement



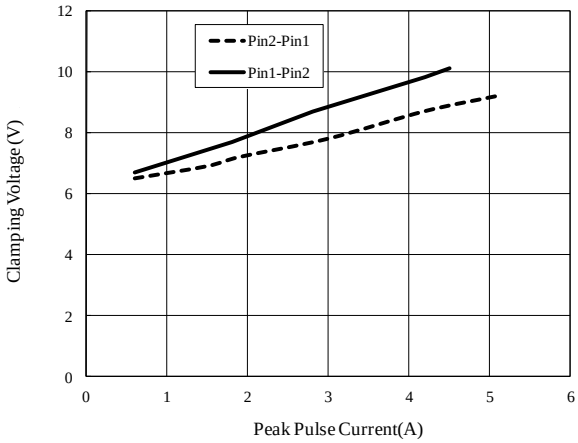
Capacitance vs. Voltage



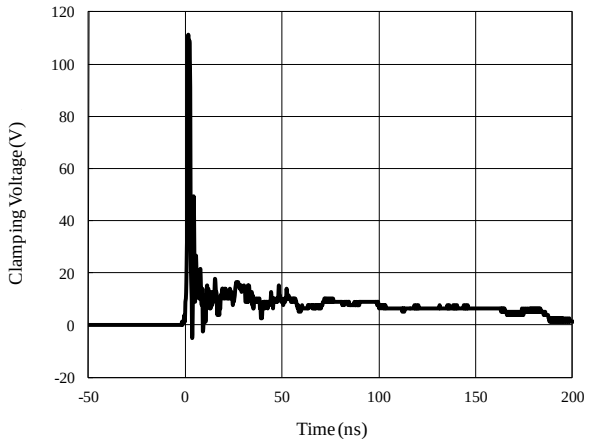
Pulse Waveform



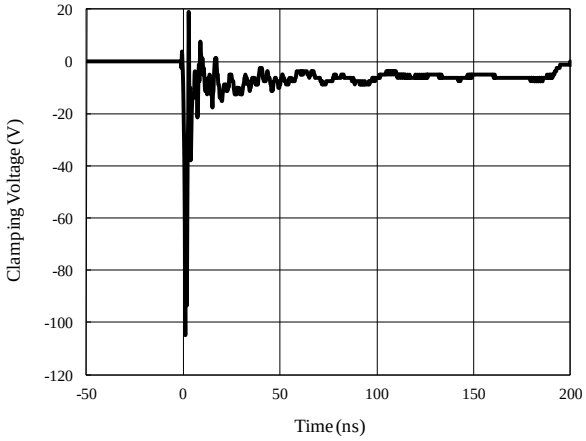
Clamping Voltage vs. Peak Pulse Current



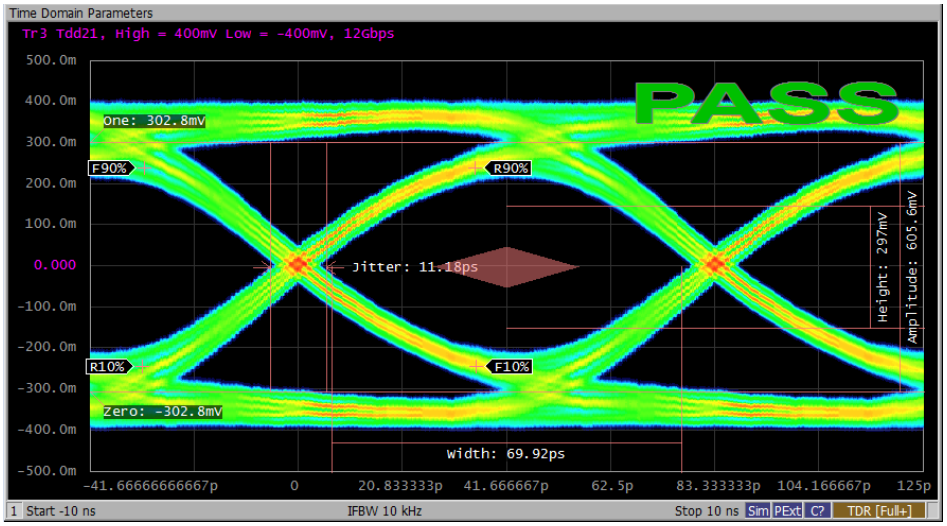
ESD Clamping of I/O_1 to I/O_2 (+8kV Contact per IEC 61000-4-2)



ESD Clamping of I/O_1 to I/O_2 (-8kV Contact per IEC 61000-4-2)

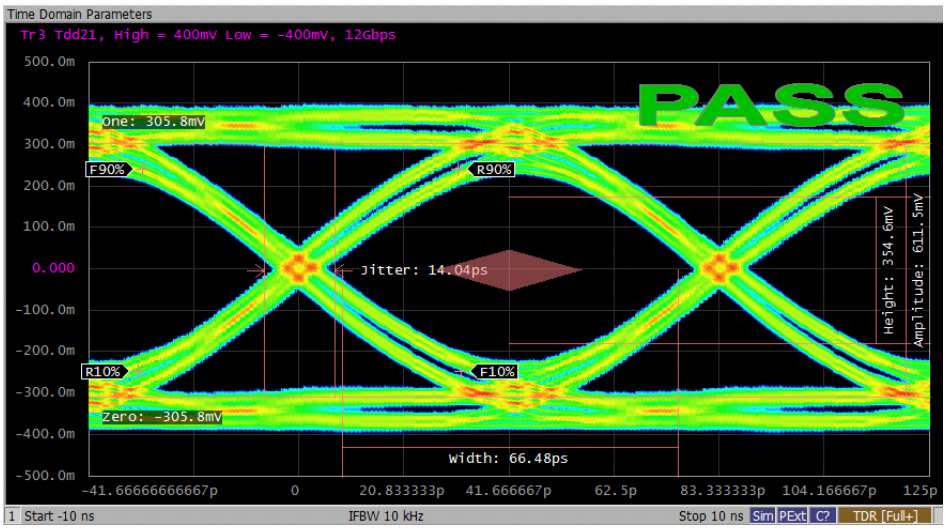


Eye Diagram Measurement for HDMI2.1



Data rate 12Gb/s

HDMI2.1 Eye Diagram without SYT21S05DWC

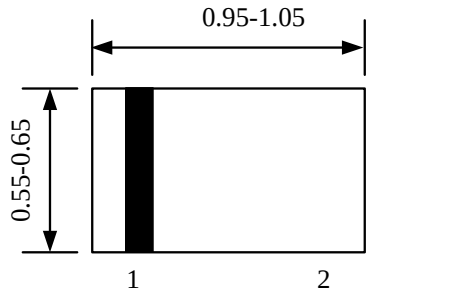


Data rate 12Gb/s

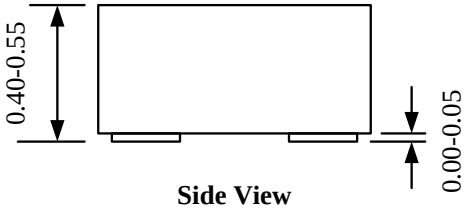
HDMI2.1 Eye Diagram with SYT21S05DWC

Package Outline

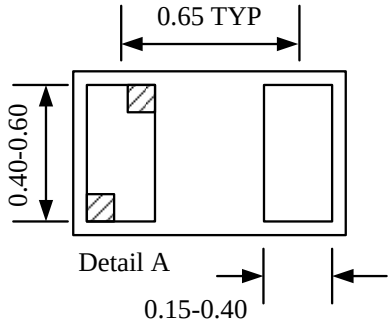
- DFN1.0×0.6-2 Package



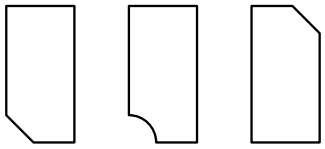
Top View



Side View



Bottom View

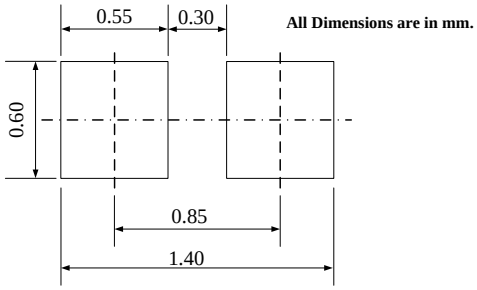


Pin1 Identifier: 3 options

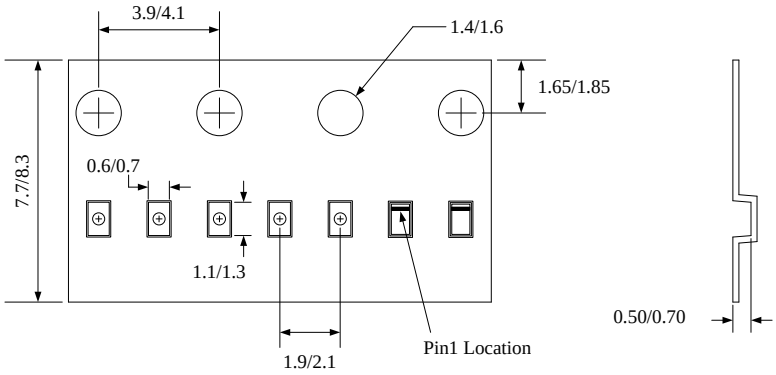
Detail A

Notes: All dimension in mm and exclude mold flash & metal burr.

PCB Layout Pattern

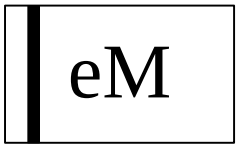


Tape and Reel Specification



Package types	Tape width (mm)	Pocket pitch(mm)	Reel size (Inch)	Qty per reel (pcs)
DFN1.0×0.6-2	8	2	7"	10000

Marking Codes



Note:
(1) “e” is device code, fixed.
(2) “M” is date code.

Ordering Information

Part Number	Working Voltage	Quantity Per Reel	Reel Size
SYT21S05DWC	5V	10,000	7 Inch

Revision History

The revision history provided is for informational purposes only and is believed to be accurate; however, not warrantied. Please make sure that you have the latest revision.

Revision Number	Revision Date	Description	Pages changed
0.9	Jun.02, 2021	Initial Release	
1.0	Jun.02, 2022	Production Release	

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