

### General Description

SY205219DXC is an ultra-low capacitance transient voltage suppressor (TVS) designed to provide electrostatic discharge (ESD) protection for high-speed data interfaces. With a typical capacitance of 0.15pF, SY205219DXC is designed to protect against over-voltage and over-current transient events. It complies with IEC61000-4-2 (ESD) ( $\pm 15\text{kV}$  air,  $\pm 15\text{kV}$  contact discharge), IEC61000-4-5 (surge) (4A, 8/20 $\mu\text{s}$ ).

The combined features of ultra-low capacitance, ultra-small size and high ESD robustness make SY205219DXC ideal for high-speed data ports and high-frequency lines (e.g., HDMI & DVI) applications. The low clamping voltage of the SY205219DXC guarantees minimum stress on the protected IC.

Each SY205219DXC device can protect one high-speed data line. SY205219DXC is available in a small DFN0.6x0.3-2L package.

### Features

- Protects One Data, Control, or Power Line
- Ultra-Low Capacitance: 0.15pF
- Low Leakage Current: 0.01 $\mu\text{A}$  @  $V_{\text{RWM}}$  (Typical)
- Low Clamping Voltage
- For Operating Voltage of 5V and Below
- Transient Protection for High-speed Data Lines
  - IEC61000-4-2(ESD)  $\pm 15\text{kV}$  (Air)  $\pm 15\text{kV}$  (Contact)
  - IEC61000-4-5 (Surge) 4A (8/20 $\mu\text{s}$ )
- Package Optimized for High-Speed Lines
- Ultra-Small Package (0.6mmx0.3mmx0.3mm)
- Each I/O pin can withstand over 1000 ESD strikes for  $\pm 8\text{kV}$  contact discharge.

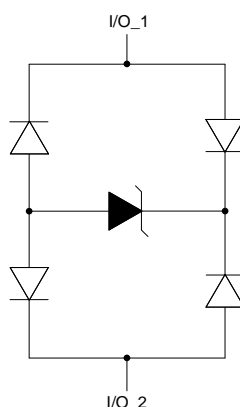
### Applications

- Serial ATA
- PCI Express
- Desktops, Servers, and Notebooks
- MDDI Ports
- USB 2.0, 3.0, and 3.1
- Display Port(DP) and DVI Interfaces
- HDMI 1.3, 1.4, 2.0, and 2.1.

### Mechanical Characteristics

- DFN0.6x0.3-2 package
- Flammability Rating: UL 94V-0
- Marking: Device Code
- Packaging: Tape and Reel

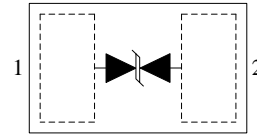
### Circuit Diagram



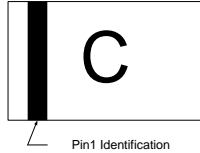
## Ordering Information

Part Number	Package Type	Top Mark
SY205219DXC	DFN0.6x0.3-2 RoHS Compliant and Halogen Free	C

## Pinout (Top View)



## Marking Codes



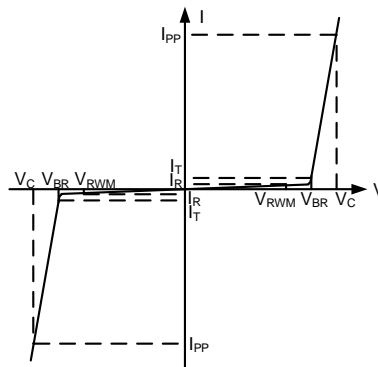
**Note:** "C" is device code, fixed.

Absolute Maximum Rating				
Parameter	Symbol	Min	Max	Unit
Maximum Peak Pulse Current (8/20μs)	$I_{PP}$		4	A
Maximum Peak Pulse Power (8/20μs)	$P_{PK}$		55	W
ESD per IEC 61000-4-2 (Air) ESD per IEC 61000-4-2 (Contact)	$V_{ESD}$	-15	15	kV
Operating Temperature	$T_{OPT}$	-40	+125	°C
Storage Temperature	$T_{STG}$	-55	+150	°C

Electrical Characteristics $T_A = 25^\circ\text{C}$						
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Nominal Reverse Working Voltage	$V_{RWM}$				5.5	V
Reverse Leakage Current @ $V_{RWM}$	$I_R$	$V_{RWM} = 5.0\text{V}, T_A = 25^\circ\text{C}$		0.01	0.1	μA
Reverse Breakdown Voltage @ $I_T$	$V_{BR}$	$I_T = 5\text{mA}$	5.5		7.5	V
Clamping Voltage @ $I_{PP}$	$V_C$ (1)	$I_{PP} = 4\text{A}, t_p = 8/20\mu\text{s}$		14		V
Clamping Voltage @ $I_{PP}$	$V_C$ (1)	$I_{PP} = 16\text{A}, t_p = 10/100\text{ns}$		18		V
Dynamic Resistance	$R_{DYN}$ (1,2)	$t_p = 10/100\text{ns}$		0.5		Ω
Parasitic Capacitance	$C_{ESD}$ (1)	$V_R = 0\text{V}, f = 1\text{MHz}$		0.15	0.20	pF

**Note 1:** Guaranteed by design and not subject to production test.

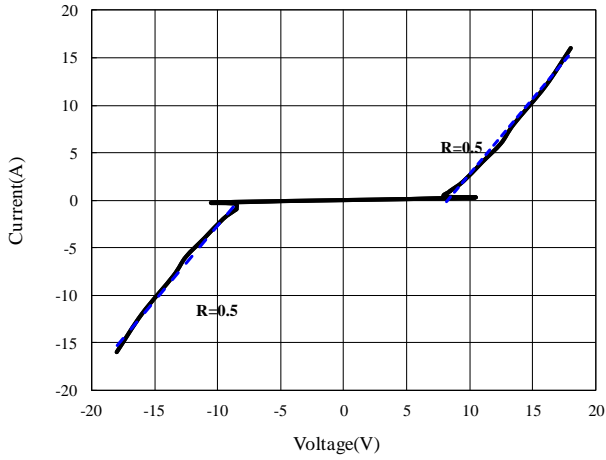
**Note 2:**  $R_{DYN}$  calculated based on  $I_{PP}=8\text{A}$  to  $I_{PP}=16\text{A}$ ,  $t_p = 10/100\text{ns}$ .



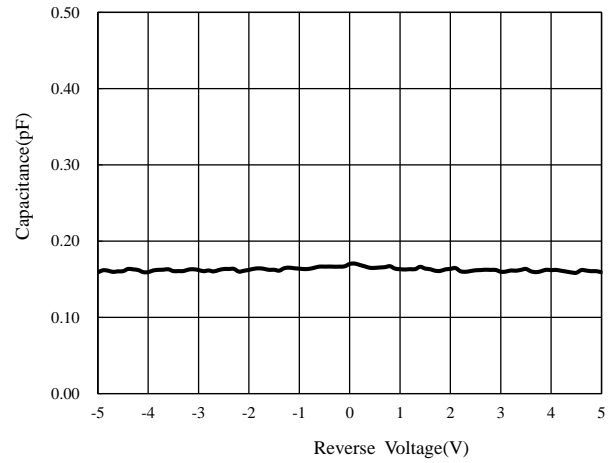
**Figure 1. Bi-directional TVS**

## Typical Characteristics

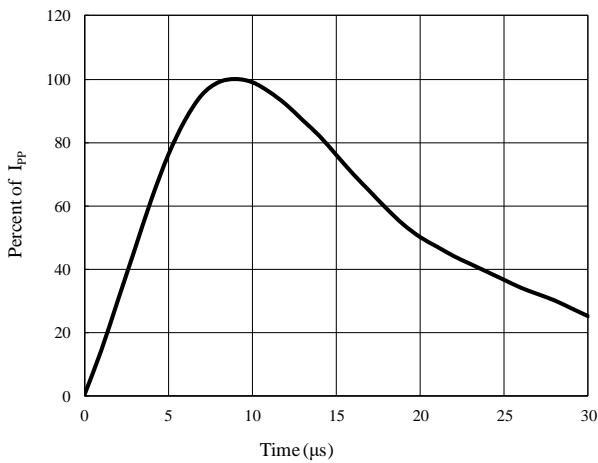
### TLP Testing of I/O to I/O



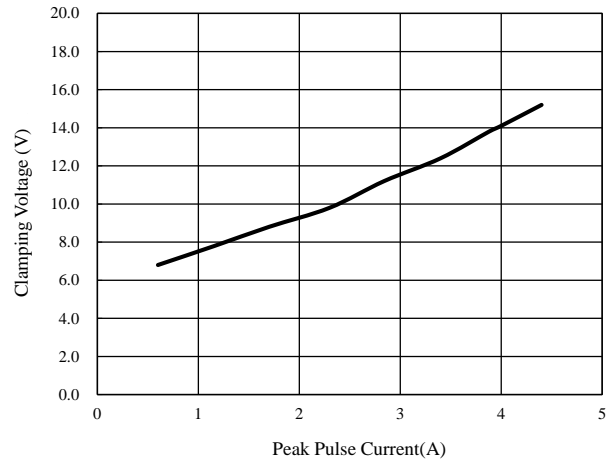
### Capacitance vs. Reverse Voltage



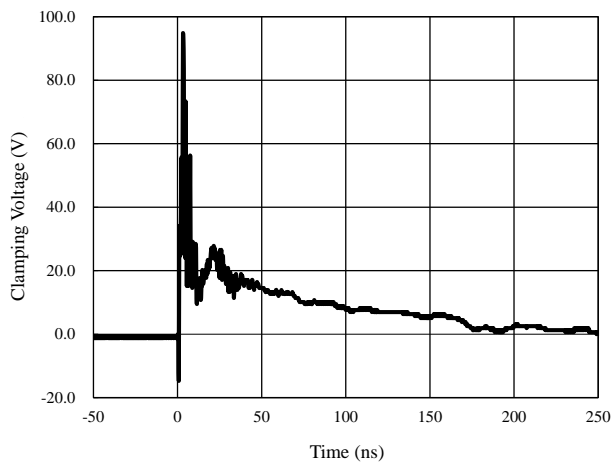
### 8/20µs Pulse Waveform



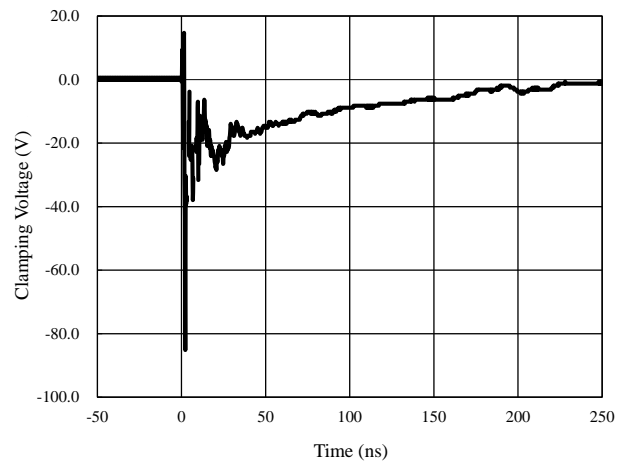
### Clamping Voltage vs. Peak Pulse Current (8/20µs)



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



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



## Application Information

The SY205219DXC protects one bidirectional data line against over-voltage and over-current transient events by clamping it to an acceptable reference.

The SY205219DXC pin connections are shown in Figure 2. The protected line is connected at Pin1 while Pin2 is connected to GND, which should connect to a ground plane on the board. All path lengths connected to pins of SY205219DXC should be as short as possible to minimize the parasitic inductance.

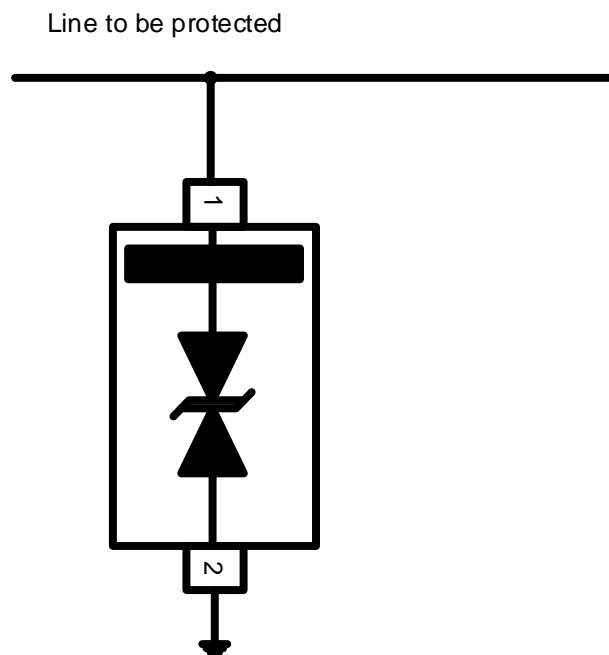


Figure 2. ESD/Surge Protection Circuit

## PCB Layout Guidelines

For optimum ESD protection and circuit performance, the following circuit board guidelines are recommended:

- Place SY205219DXC as close to the connector or terminal ports as possible.
- Use a large via to connect the SY205219DXC pin to the ground.
- Avoid running signals near board edges.
- The SY205219DXC should be placed near the protected line.
- The distance between the SY205219DXC ground pin and the GND reference path should be as short as possible.

### Eye Diagram Measurement for HDMI2.1

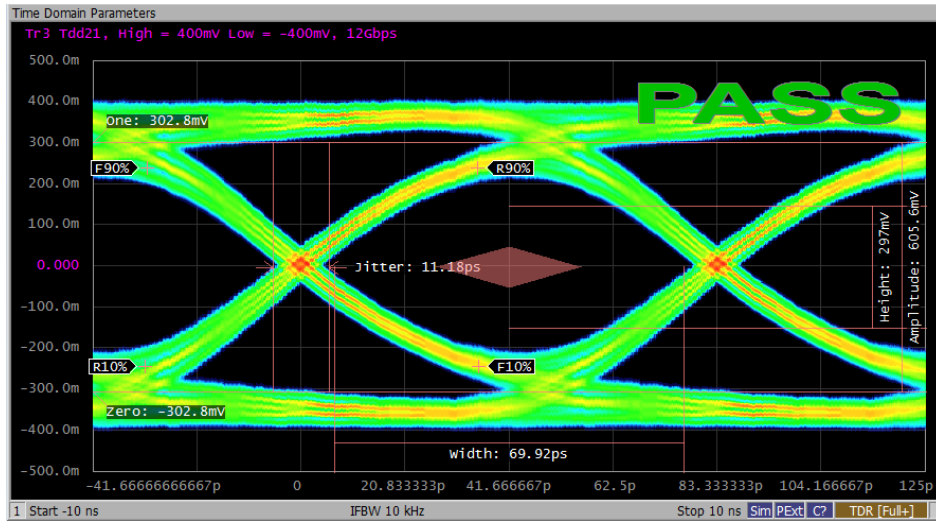


Figure 3. Data Rate 12Gb/s  
HDMI2.1 Eye Diagram without SY205219DXC

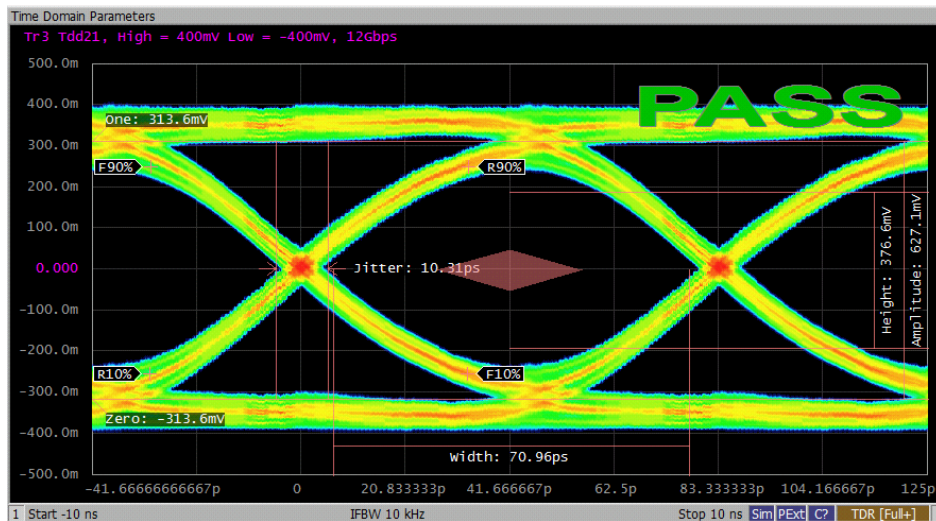
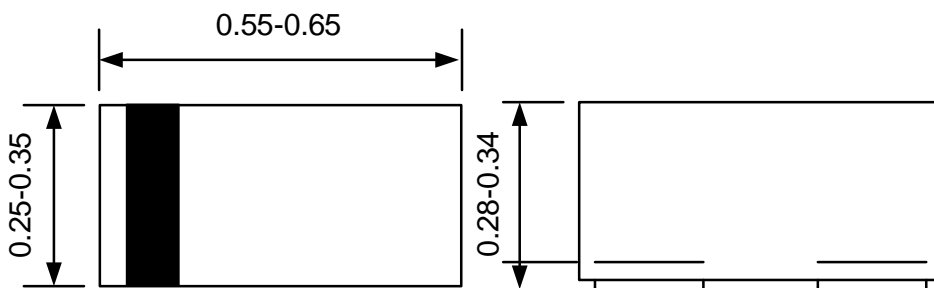


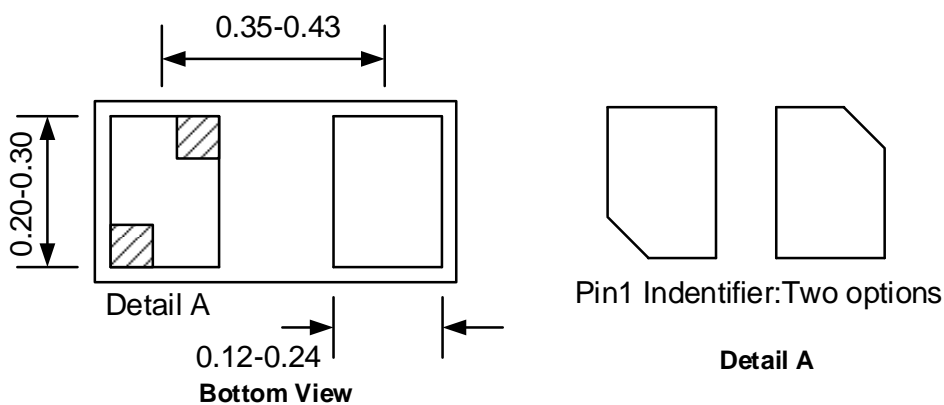
Figure 4. Data Rate 12Gb/s  
HDMI2.1 Eye Diagram with SY205219DXC

## DFN0.6x0.3-2 Package Outline



Top View

Side View

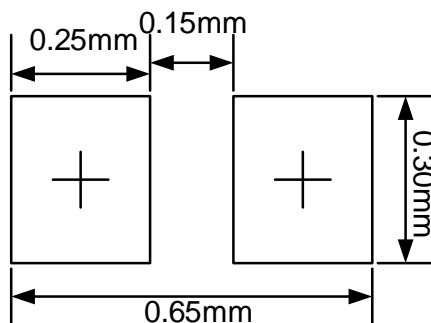


Detail A

Pin1 Identifier: Two options

Detail A

Bottom View



Recommended PCB Layout  
(Reference only)

**Note:** All dimensions are in millimeters and exclude mold flash and metal burr.





**Revision History**

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

Revision Number	Revision Date	Description	Pages changed
0.9	08/15/2019	Initial Release	
1.0	08/15/2020	Production Release	

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