SY205274DWD

Low Capacitance TVS Protection

General Description

The SY205274DWD is a low capacitance uni-directional transient voltage suppressor (TVS) designed to provide electrostatic discharge (ESD) protection for data line interfaces.

With a typical capacitance of 1.5pF, the device is designed to protect parasitic-sensitive systems against overvoltage and overcurrent transient events. It complies with IEC 61000-4-2 (ESD), (±30kV air, ±30kV contact discharge), and IEC 61000-4-5 (surge) (30A, 8/20μs) standards.

Each SY205274DWD device can protect one line. It is available in a compact DFN1.0×0.6-2 package.

Features

- Operating Voltage: 15V and Below
- Transient Protection for Data Lines
  - IEC61000-4-2 (ESD) ±30kV (Air) ±30kV (Contact)
  - IEC61000-4-5 (Surge) 30A (8/20μs)
- Ultra Low Capacitance: 1.5pF (Typical)
- Low Clamping Voltage

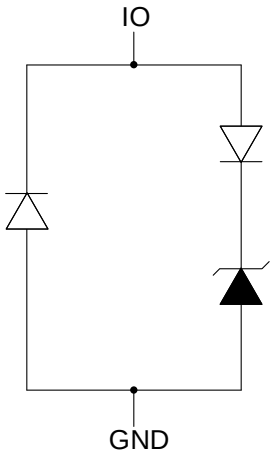
Applications

- Desktops, Servers and Notebooks
- USB2.0
- Type-C CC/SBU Data Lines

Mechanical Characteristics

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

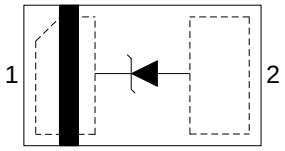
Circuit Diagram



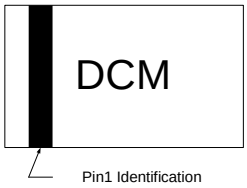
Ordering Information

Part Number	Package Type	Top Mark
SY205274DWD	DFN1.0×0.6-2	DCM

Pinout (Top View)



Marking Codes



Notes: "DC" is device code, fixed.

"M" is date code.

Pin Descriptions

Device Pins	Name	Description
1	Input/Output	IO
2	GND	GND

Absolute Maximum Ratings (Note 1)				
Parameter	**Symbol**	**Min**	**Max**	**Unit**
ESD per IEC 61000-4-2 (Air) ESD per IEC 61000-4-2 (Contact)	V_{ESD}	-30 -30	30 30	kV
Junction Temperature	T_J	-40	+125	°C
Storage Temperature	T_{STG}	-55	+150	°C

Electrical Characteristics (IO referenced to GND, T_A = 25°C, Note 2)						
Parameter	**Symbol**	**Test Condition**	**Min**	**Typ**	**Max**	**Unit**
Nominal Reverse Working Voltage	V_{RWM}		-	-	15	V
Reverse Leakage Current at V_{RWM}	I_R	V_{RWM} = 15V, T_A = 25°C		0.01	0.1	μA
Reverse Triggering Voltage at I_{t1}	V_{tl}	I_{tl}=0.1mA, Pin1 to Pin2	16.5	19	22	V
Forward Voltage	V_f	I_F=1mA, Pin2 to Pin1	0.4		1.2	V
Clamping Voltage at I_{PP} (Note 5)	V_C	I_{PP} = 16A, t_p = 10/100ns		4	6	V
Clamping Voltage at I_{PP} (Note 5)	V_C	I_{PP} = 30A, t_p = 8/20μs		7	9	V
Dynamic Resistance (Note 2, 5)	R_{DYN}	t_p = 10/100ns		0.15		Ω
Parasitic Capacitance (Note 5)	C_{ESD}	V_R = 0V, f = 1MHz	1.2	1.5	2	pF

Note 1: Stresses beyond the "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only. Functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

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

Note 3: The device is not guaranteed to function outside its operating conditions.

Note 4: Unless otherwise stated, limits are 100% production tested under pulsed load conditions such that $T_A \cong T_J = 25°C$. Limits over the operating temperature range (see recommended operating conditions) and relevant voltage range(s) are guaranteed by design, test, or statistical correlation.

Note 5: Guaranteed by design or statistical correlation and not production tested.

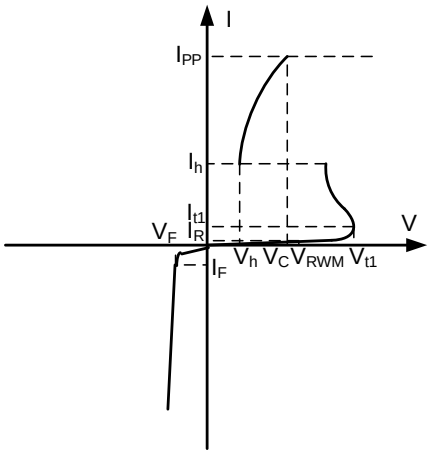
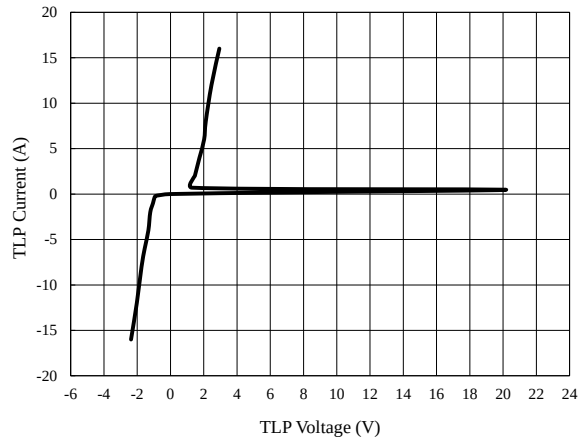


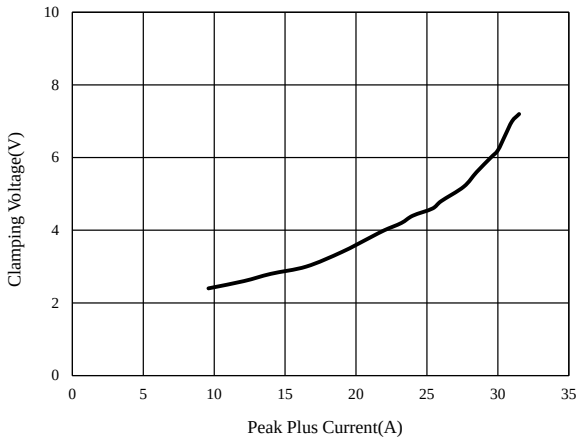
Figure 1. Uni-Directional TVS

Typical Performance Characteristics, IO Referenced to GND

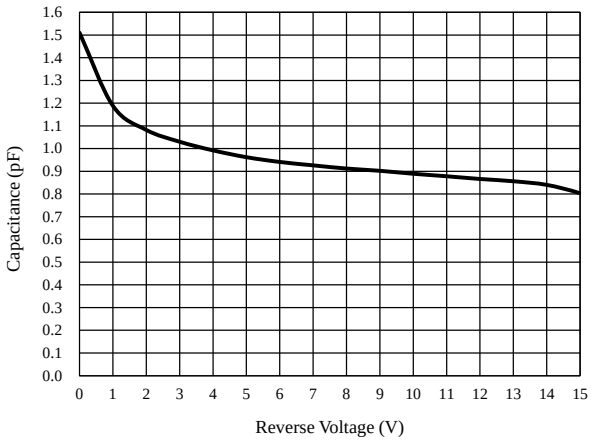
TLP Testing



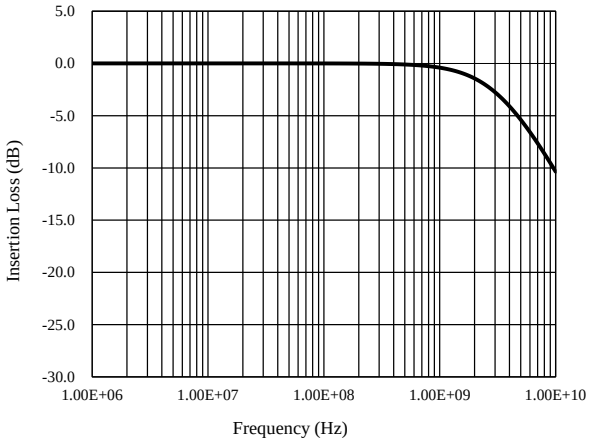
Clamping Voltage vs. Peak Pulse Current (8/20μs)



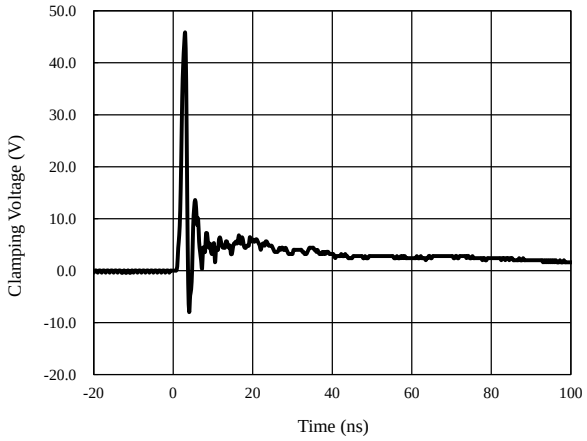
Capacitance vs. Voltage



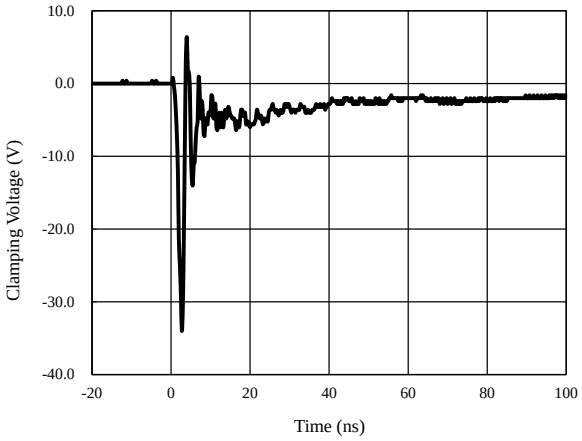
Insertion Loss S21



ESD Clamping
(+8kV Contact per IEC 61000-4-2)



ESD Clamping
(-8kV Contact per IEC 61000-4-2)



Application Information

PCB Pin Connections

The SY205274DWD provides ESD and surge protection for USB Type-C CC/SBU lines. Figure 2 shows the typical application for the USB Type-C CC/SBU. An SY205274DWD device can protect one data line by connecting pin 1 to the data line and pin 2 to the ground. The device has a low clamping voltage of 4V at a TLP current of 16A, offering excellent ESD protection performance. Additionally, the surge IPP is 30A, with a surge clamping voltage of only 7V. It provides surge protection levels higher than 60V, ensuring robust surge protection performance.

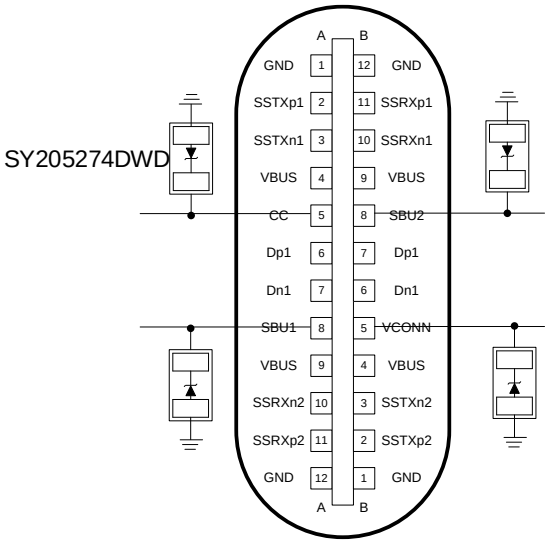


Figure 2. SY205274DWD Application for CC/SBU ESD and Surge Protection

PCB Layout Guidelines

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

- The SY205274DWD GND pin to the PCB GND rail path should be as short as possible to reduce the ESD transient return path to GND.
- The vias connecting the SY205274DWD GND pins to the PCB GND should be wide.
- Place SY205274DWD as close to the connector port as possible to reduce parasitic inductance and restrict ESD coupling into adjacent traces.
- Avoid running critical signals near board edges.

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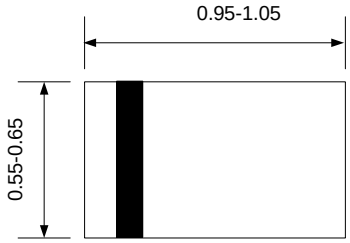
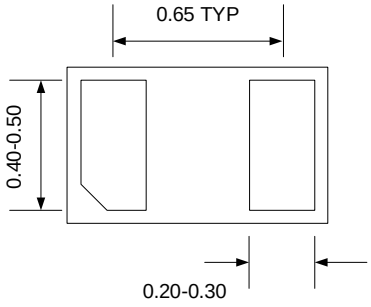
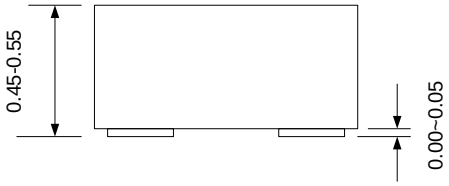
DFN1.0×0.6-2 Package Outline



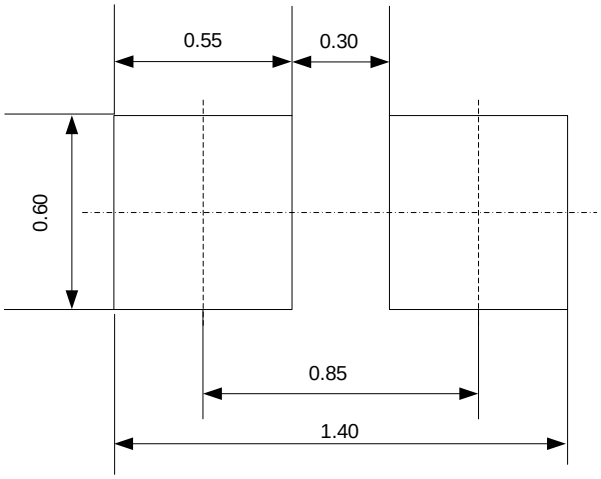
Top View



Bottom View



Side View

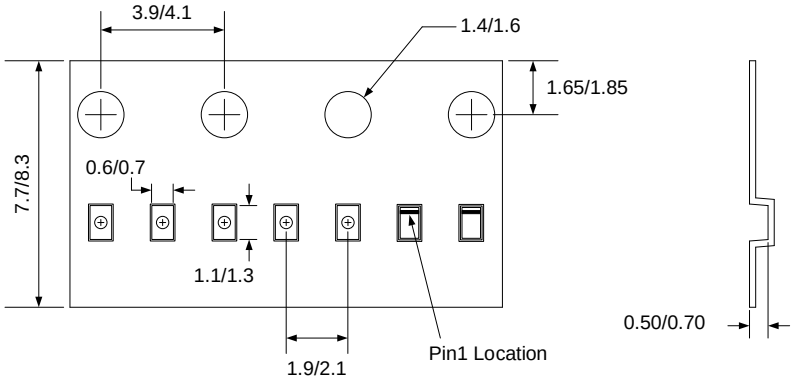


Recommended PCB Layout
(Reference only)

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

Tape and Reel Information

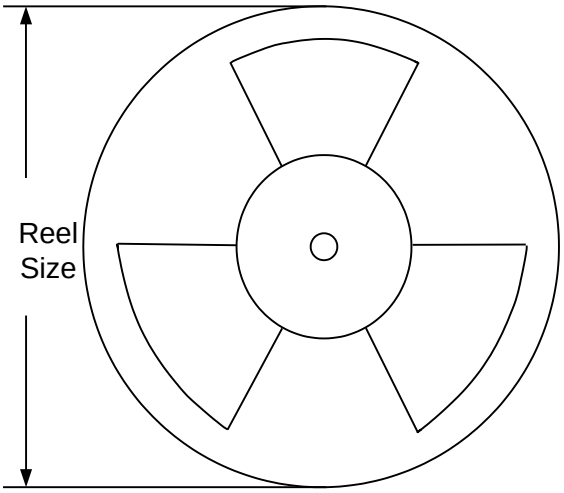
Tape Dimensions and Pin 1 Orientation



Dimensions In mm

Feeding direction

Reel Dimensions



Package Type	Tape Width (mm)	Pocket Pitch(mm)	Reel Size (Inch)	Qty per Reel (pcs)
DFN1.0×0.6-2	8	2	7"	10000

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
1.0	Aug.05, 2024	Initial Release	

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