

General Description

The SY205272DVD 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 0.18pF, the SY205272DVD is designed to protect parasitic-sensitive systems against overvoltage and overcurrent transient events. It complies with IEC 61000-4-2 (ESD), ($\pm 15\text{kV}$ air, $\pm 9\text{kV}$ contact discharge), and IEC 61000-4-5 (surge) (4.5A, 8/20 μs) standards.

Each SY205272DVD device can protect four high-speed data lines. The combined features of ultra-low capacitance, ultra-small size, and high ESD robustness make the SY205272DVD ideal for high-speed data ports and high-frequency lines (e.g., USB 3.x and DVI) applications. The low clamping voltage of the SY205272DVD ensures minimal stress on the protected device.

The SY205272DVD is available in a compact DFN2.5x1.0-10 package.

Features

- Operating Voltage: 3.3V and Below
- Transient Protection for Four High Speed Data Lines
 - IEC61000-4-2 (ESD) $\pm 15\text{kV}$ (Air) $\pm 9\text{kV}$ (Contact)
 - IEC61000-4-5 (Surge) 4.5A (8/20 μs)
- Ultra Low Capacitance: 0.18pF (Typ.)
- Low Clamping Voltage

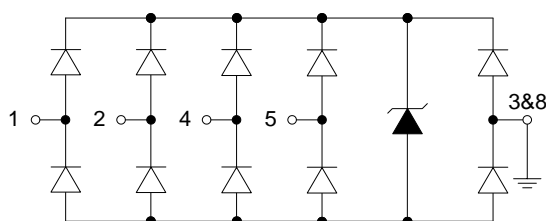
Applications

- USB 2.0 and 3.x
- USB Type-C
- HDMI2.0, HDMI2.1
- V-By-One
- DP1.4, DP2.1

Mechanical Characteristics

- DFN2.5x1.0-10 Package
- Marking: Device Code, Date Code
- Packaging: Tape and Reel

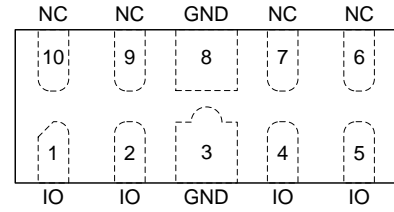
Circuit Diagram



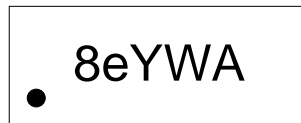
Ordering Information

Pinout (Top View)

Part Number	Package Type	Top Mark
SY205272DVD	DFN2.5x1.0-10	8eYWA



Marking Codes



Note 1: "8e" is the device code, fixed.

Note 2: "YWA" is the date code.

Pin Descriptions

Device Pins	Name	Description
1	Input/Output	IO1
2	Input/Output	IO2
3	Ground	GND
4	Input/Output	IO3
5	Input/Output	IO4

Absolute Maximum Rating				
Parameter	Symbol	Min	Max	Unit
Maximum Peak Pulse Current (8/20 μ s)	I_{PP}		4.5	A
ESD per IEC 61000-4-2 (Air)	V_{ESD}	-15	15	kV
ESD per IEC 61000-4-2 (Contact)		-9	9	
Junction Temperature	T_J	-40	+125	$^{\circ}$ C
Storage Temperature	T_{STG}	-55	+150	$^{\circ}$ C

Electrical Characteristics $T_A = 25^{\circ}$ C						
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Nominal Reverse Working Voltage	V_{RWM}		-3.3		3.3	V
Reverse Leakage Current at V_{RWM}	I_R	$V_{RWM} = 3.3V, T_A = 25^{\circ}$ C		0.01	0.1	μ A
Reverse Triggering Voltage at I_{t1}	V_{t1}	$I_{t1} = 0.1mA$	5.6		10	V
Clamping Voltage at I_{PP}	V_C^1	$I_{PP} = 16A, t_p = 10/100ns$		11		V
Clamping Voltage at I_{PP}	V_C^1	$I_{PP} = 4.5A, t_p = 8/20\mu s$		6	7	V
Dynamic Resistance	$R_{DYN}^{1,2}$	$t_p = 10/100ns$		0.23		Ω
Parasitic Capacitance	C_{ESD}^1	$V_R = 1.65V, f = 1MHz$		0.18	0.22	pF

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

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

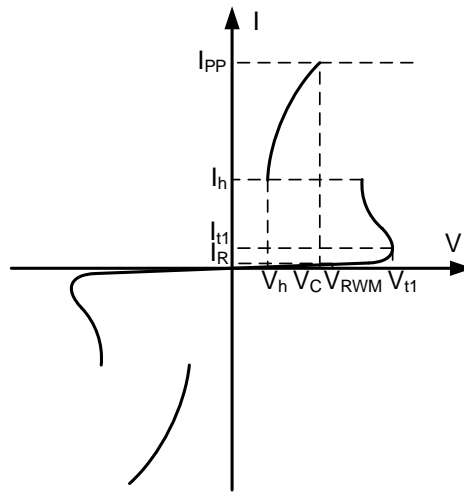
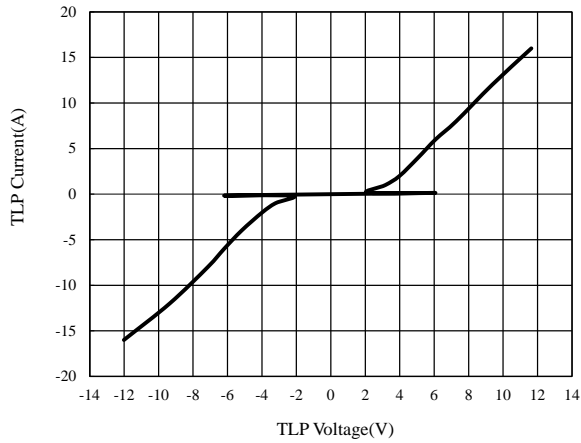


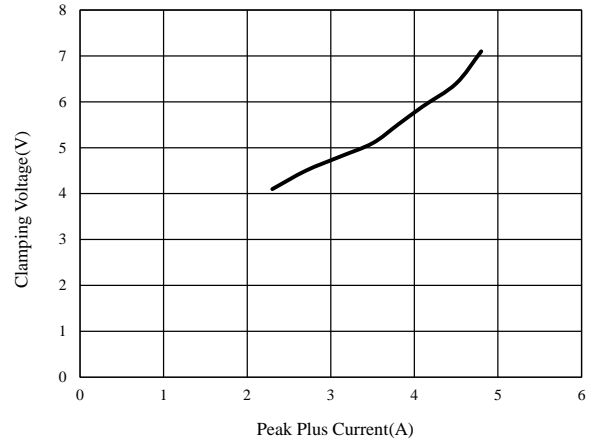
Figure 1. Bi-Directional TVS

Typical Performance Characteristics

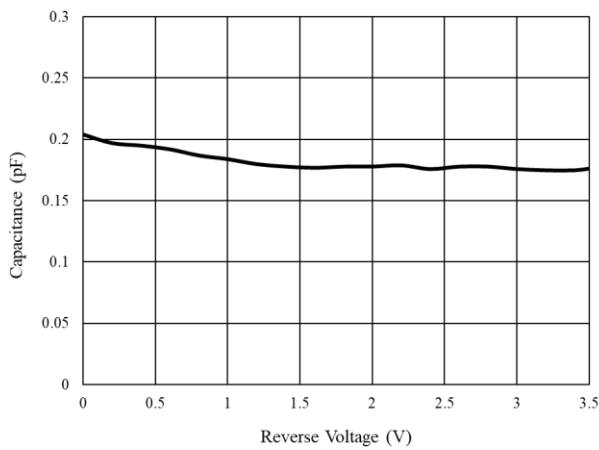
TLP Testing of IO to GND



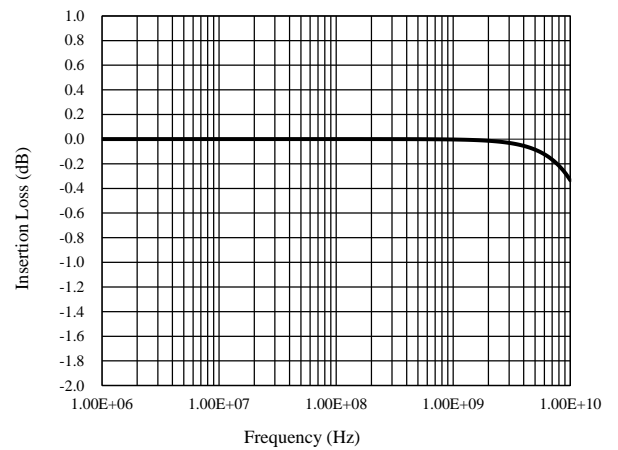
Clamping Voltage vs. Peak Pulse Current (8/20μs)



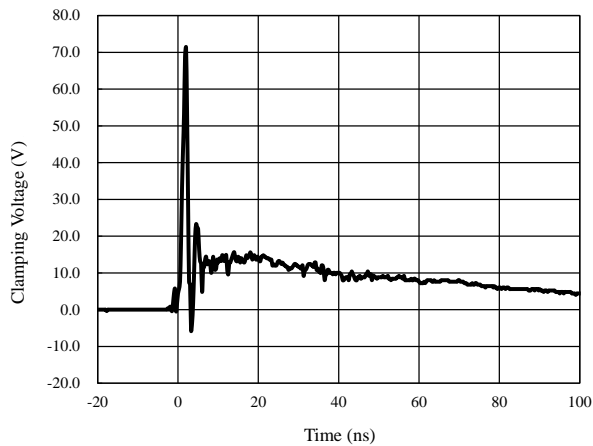
Capacitance vs. Voltage of IO to GND



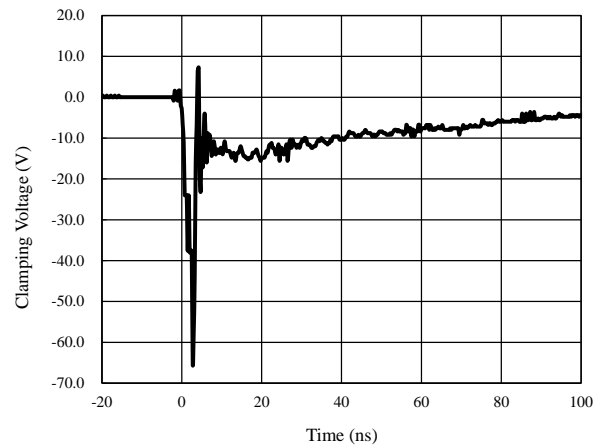
Insertion Loss S21 of IO to GND



ESD Clamping of IO to GND (+8kV Contact per IEC 61000-4-2)



ESD Clamping of IO to GND (-8kV Contact per IEC 61000-4-2)



Eye Diagram Measurement for HDMI2.1

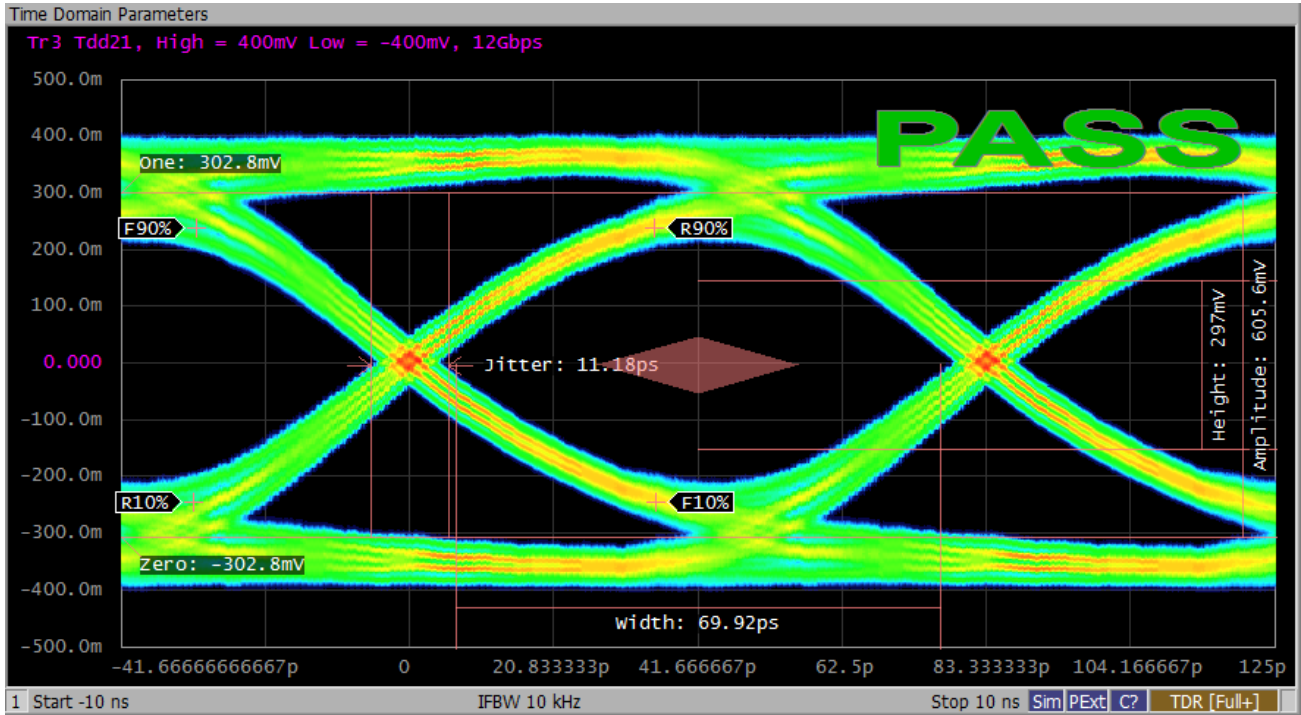


Figure 2. HDMI2.1 Eye Diagram without SY205272DVD
Data Rate 12Gb/s

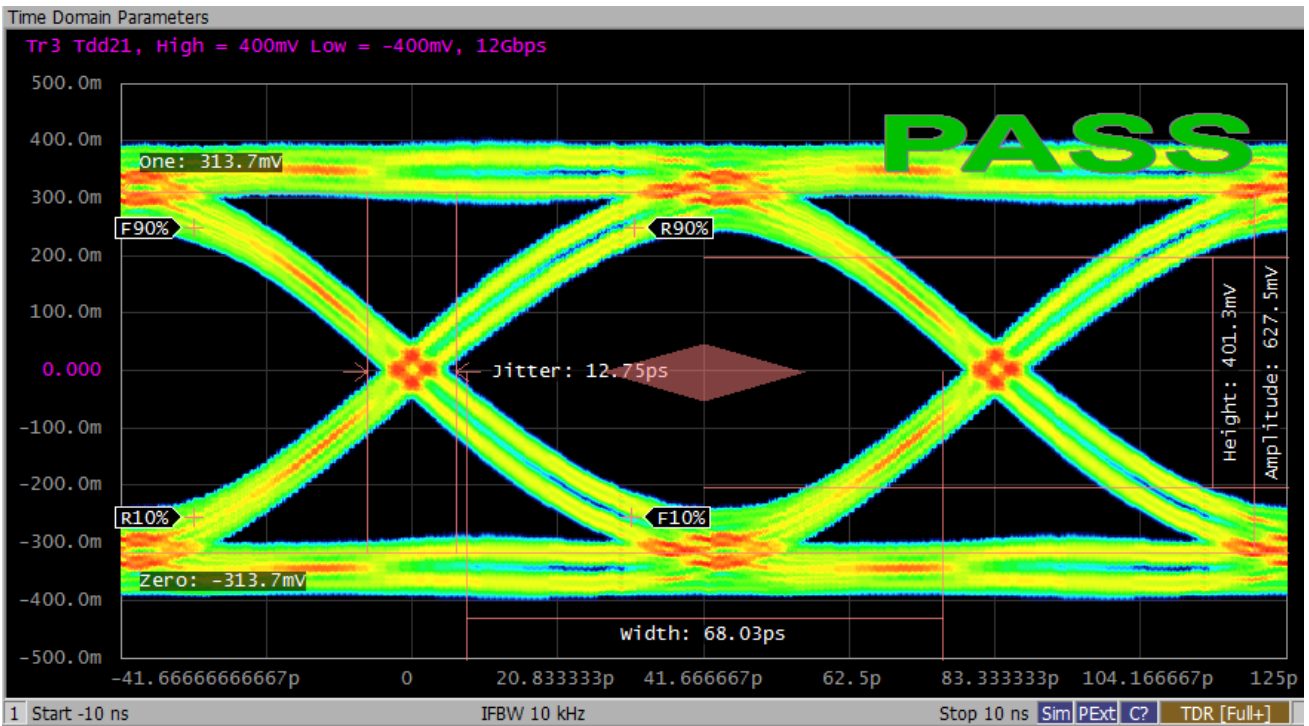


Figure 3. HDMI2.1 Eye Diagram with SY205272DVD
Data Rate 12Gb/s

Application Information

Pin Connections in PCB

The SY205272DVD provides ESD protection for four data lines simultaneously. The pin connections are shown in Figure 4 below.

Four parallel data lines, from the internal device to the IO port connector, can be connected directly to the four IO pins of the SY205272DVD. Pin 3 and Pin 8 of the SY205272DVD are GND pins and should be connected to the PCB ground. The connection wires should be as short as possible to minimize parasitic inductance.

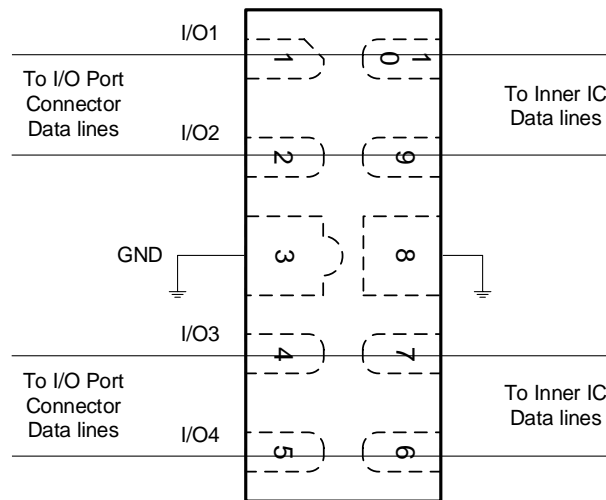


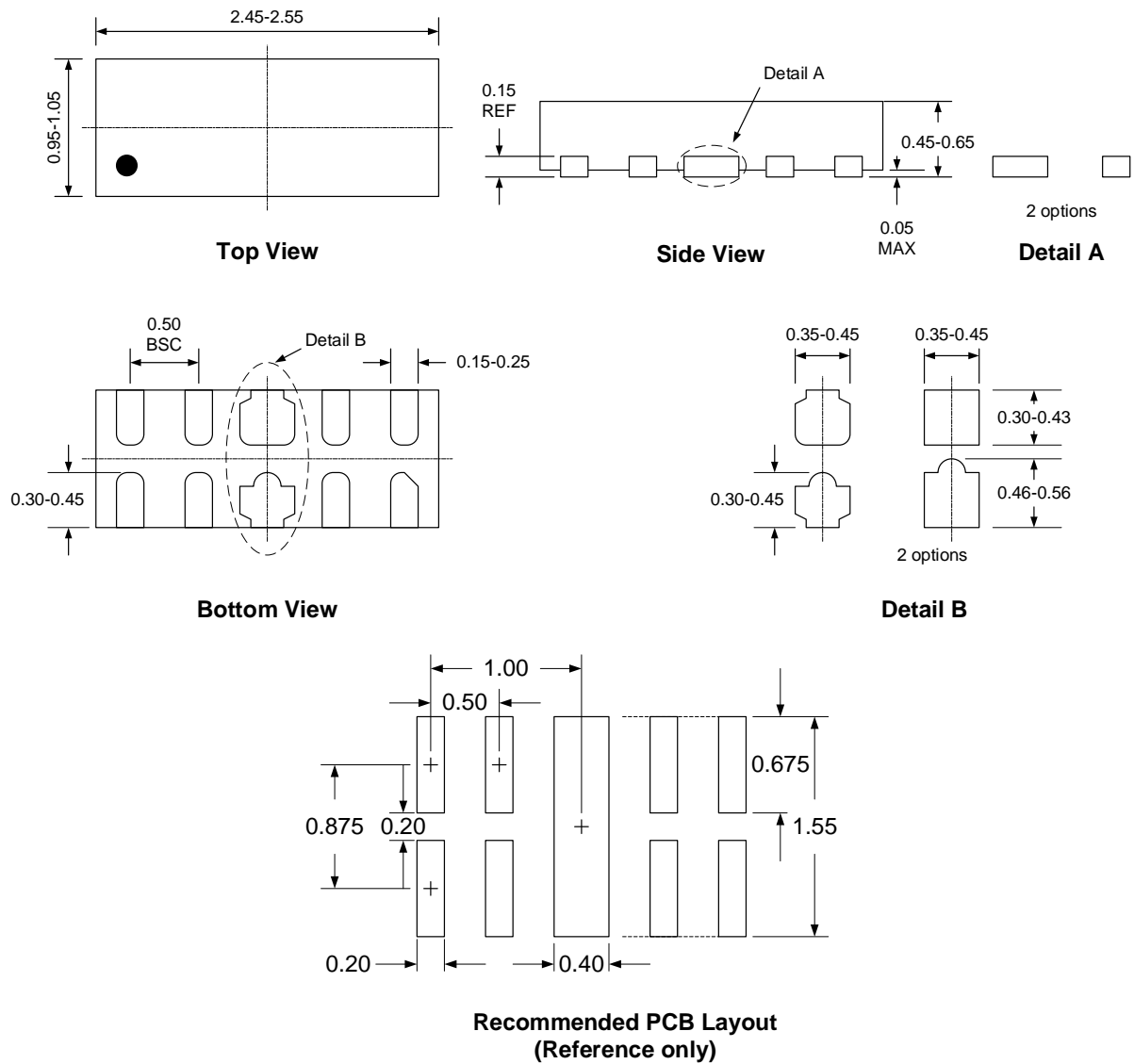
Figure 4. SY205272DVD Pin Connections in PCB

PCB Layout Guidelines

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

1. The path from the SY205272DVD GND pin to the PCB GND rail should be as short as possible to reduce the ESD transient return path to GND.
2. Use large vias to connect the SY205272DVD GND pins to the PCB GND.
3. Place the SY205272DVD as close to the connector port as possible to reduce parasitic inductance and restrict ESD coupling into adjacent traces.
4. Avoid running critical signals near board edges.

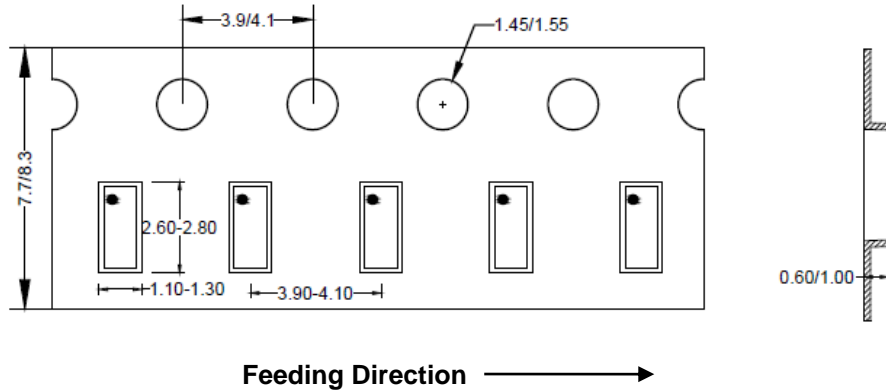
DFN2.5x1.0-10 Package Outline



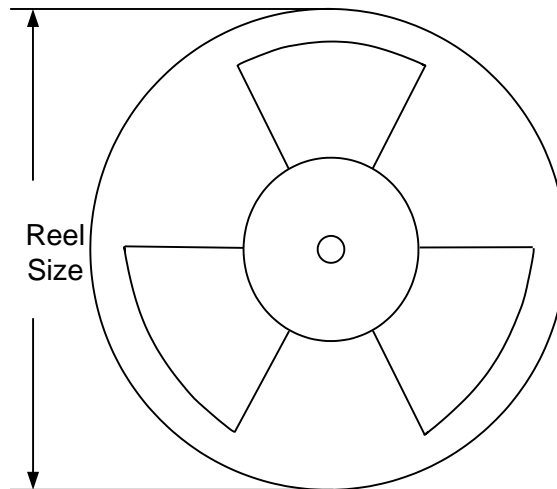
Note: All dimensions are in millimeters and exclude mold flash and metal burr.

Tape and Reel Information

Taping Dimensions and Pin 1 Orientation



Reel Dimensions



Package Type	Tape Width (mm)	Pocket Pitch (mm)	Reel Size (Inch)	Qty per Reel (pcs)
DFN2.5x1.0-10	8	4	7"	3000



Revision History

The revision history provided is for informational purposes 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
1.0	May 27, 2024	Initial Release	

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