

General Description

SY205205 is a low-capacitance transient voltage suppressor (TVS) designed to provide electrostatic discharge (ESD) protection for data interfaces. With typical capacitance of 25pF, SY205205 is designed to protect against over-voltage and over-current transient events. It complies with IEC61000-4-2 (ESD) ($\pm 30\text{kV}$ air, $\pm 30\text{kV}$ contact discharge), IEC61000-4-5 (surge) (16A, 8/20 μs).

Each SY205205 device can protect one data line.

Features

- Transient Protection for data Lines
 - IEC61000-4-2 (ESD) $\pm 30\text{kV}$ (air) $\pm 30\text{kV}$ (contact)
 - IEC61000-4-5 (surge) 16A (8/20 μs)
- For Operating Voltage of 3.3V and Below
- Package Optimized for data Lines
- Small Package:
DFN1.0 $\times$ 0.6-2/SOD523/DFN0.6 $\times$ 0.3-2
- Protects One Data Line
- Capacitance: 25pF
- Low Leakage Current 0.01 μA @ V_{RWM} (typical)
- Low Clamping Voltage
- Each I/O pin withstands over 1000 ESD strikes for $\pm 8\text{kV}$ contact discharge.

Applications

- Portable Electronics
- Desktops, Servers, and Notebooks
- Mobile Phones
- Digital Camera Ports

Mechanical Characteristics

- Package: DFN1.0 $\times$ 0.6-2/SOD523/DFN0.6 $\times$ 0.3-2
- Marking: Device Code, Date code
- Packaging: Tape and Reel

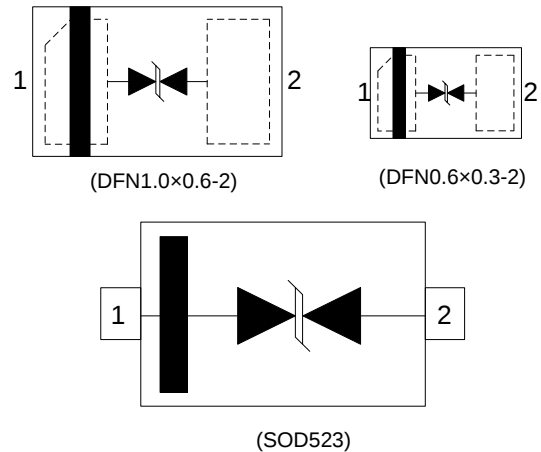
Circuit Diagram



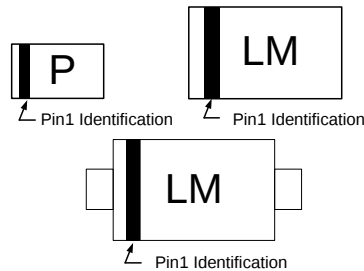
Ordering Information

Part Number	Package Type	Top Mark
SY205205DXC	DFN0.6×0.3-2 RoHS Compliant and Halogen Free	P
SY205205DWC	DFN1.0×0.6-2 RoHS Compliant and Halogen Free	LM
SY205205ANC	SOD523 RoHS Compliant and Halogen Free	LM

Pinout (Top View)



Marking Codes



Note 1: “P”, “L” is device code, fixed.

Note 2: “M” is date code, from 1 to 0, A to Z

Absolute Maximum Rating				
Parameter	Symbol	Min	Max	Unit
Maximum Peak Pulse Current (8/20μs)	I_{PP}		16	A
Maximum Peak Pulse Power (8/20μs)	P_{PK}		155	W
ESD per IEC 61000-4-2 (Air)	V_{ESD}	-30	30	kV
ESD per IEC 61000-4-2 (Contact)				
Operating Temperature	T_{OPT}	-40	+85	°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}		-3.3		3.3	V
Reverse Leakage Current @ V_{RWM}	I_R	$V_R = 3.3\text{V}$		0.01	0.1	μA
Reverse Breakdown Voltage @ I_T	V_{t1}	$I_T = 10\text{mA}$	3.7			V
Clamping Voltage @ I_{PP}	$V_C (1)$	$I_{PP} = 16\text{A}$, $t_p = 10/100\text{ns}$		6		V
Clamping Voltage @ I_{PP}	$V_C (1)$	$I_{PP} = 16\text{A}$, $t_p = 8/20\mu\text{s}$			10	V
Dynamic Resistance	$R_{DYN} (1,2)$	$t_p = 10/100\text{ns}$		0.17		Ω
Parasitic Capacitance	$C_{ESD} (1)$	$V_R = 0\text{V}$, $f = 1\text{MHz}$		25	30	pF

Note 1: The device is not guaranteed to function outside its operating conditions.

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

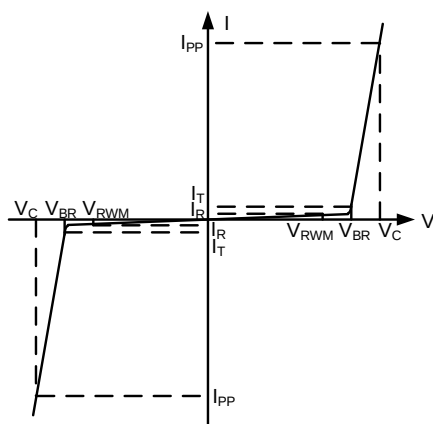
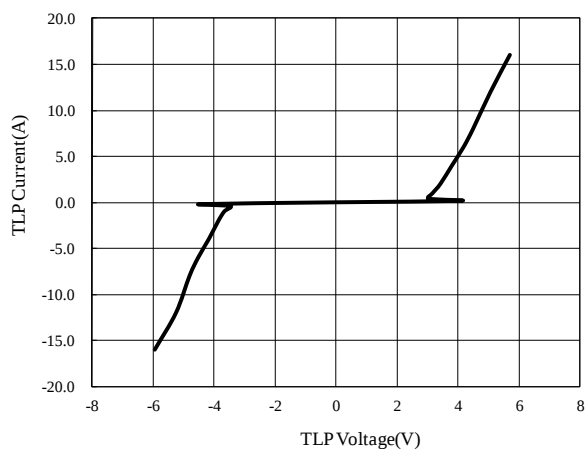


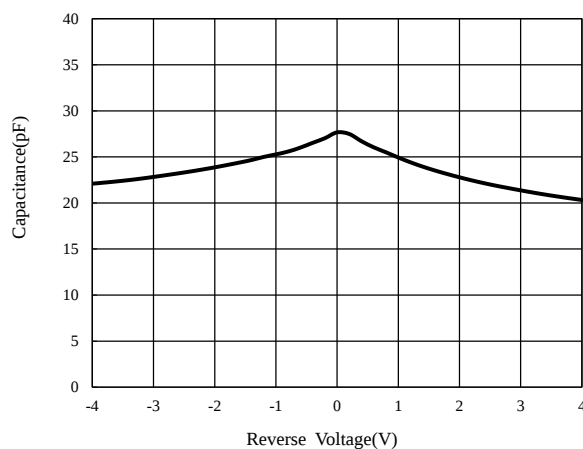
Figure 1. Bi-Directional TVS

Typical Characteristics

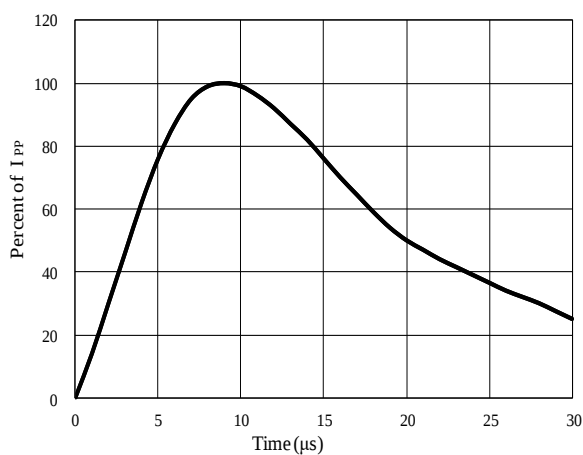
TLP Testing of I/O to I/O



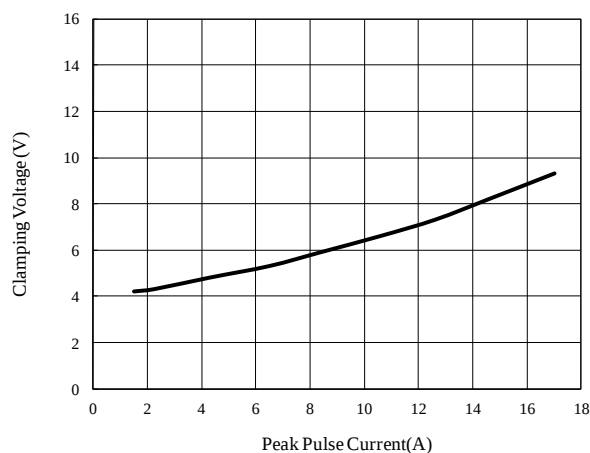
Capacitance vs. Voltage of I/O to I/O



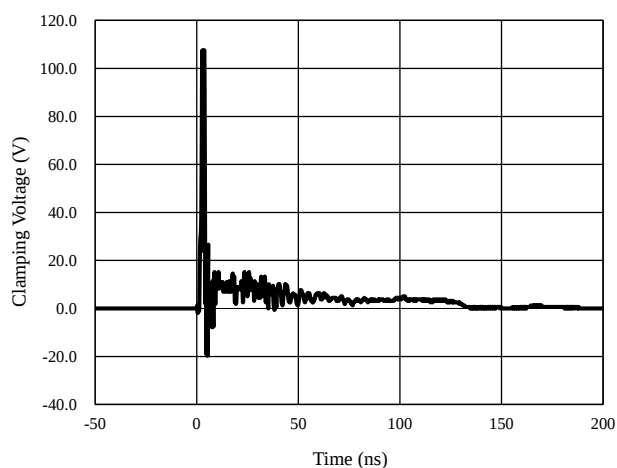
Pulse Waveform



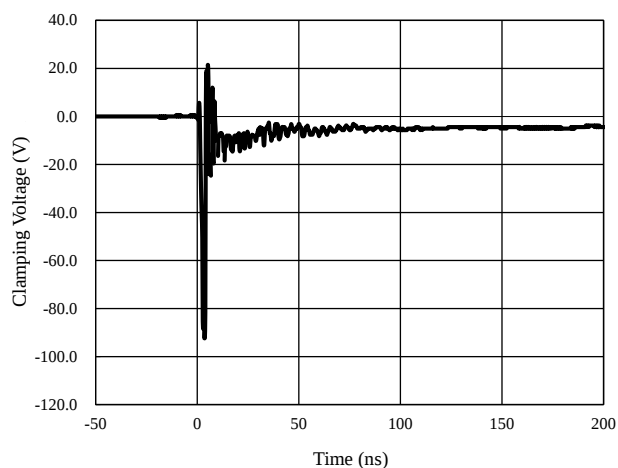
Clamping Voltage vs. Peak Pulse Current (8/20μs)



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 SY205205 protects one bidirectional data line against over-voltage and over-current transient events by clamping it to an acceptable reference.

The SY205205 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 SY205205 should be as short as possible to minimize the parasitic inductance.

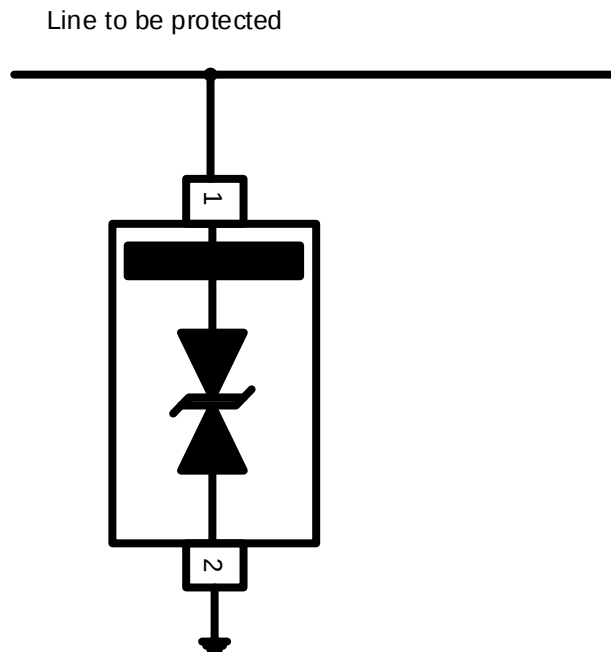


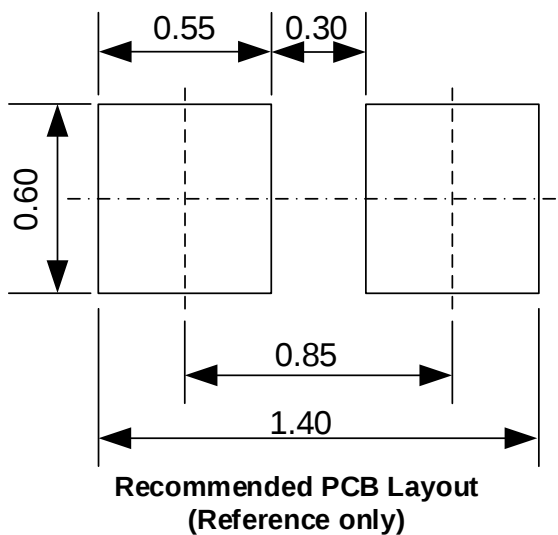
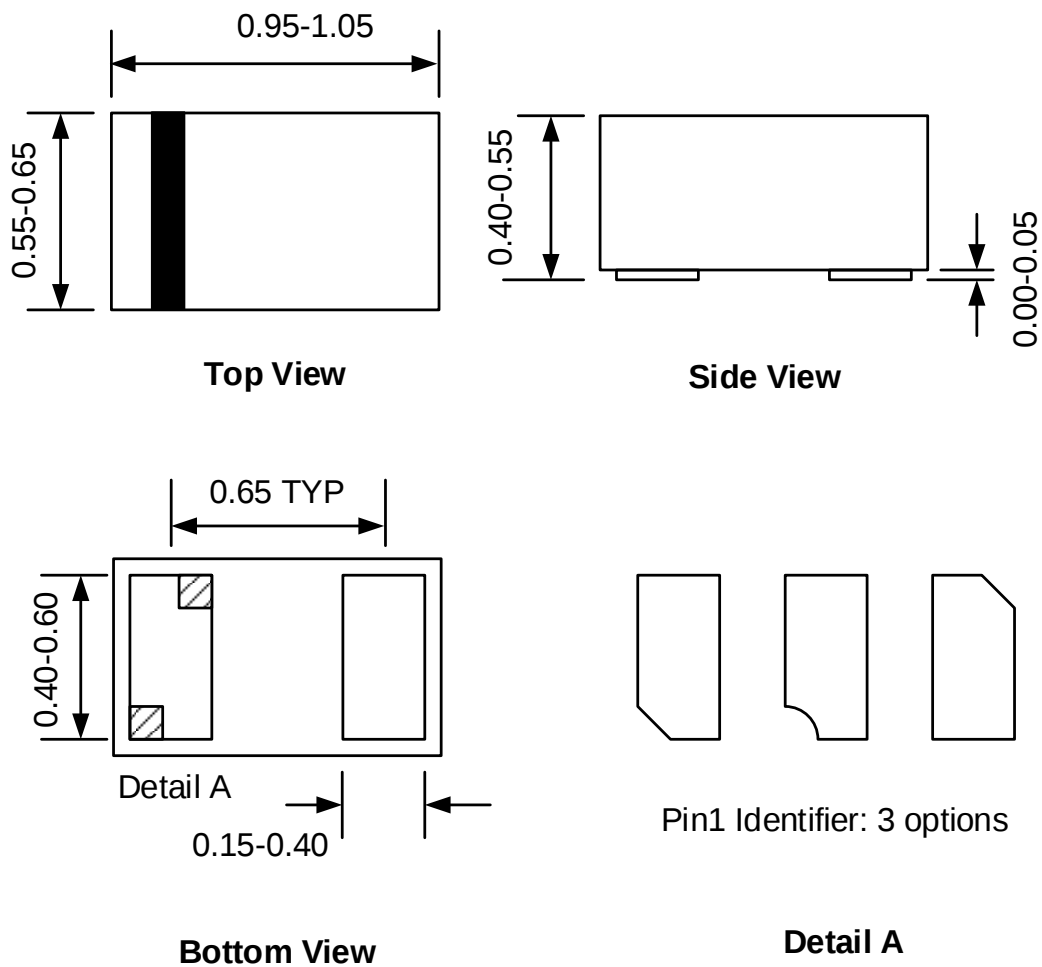
Figure 2. ESD/Surge Protection Circuit

PCB Layout Guidelines

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

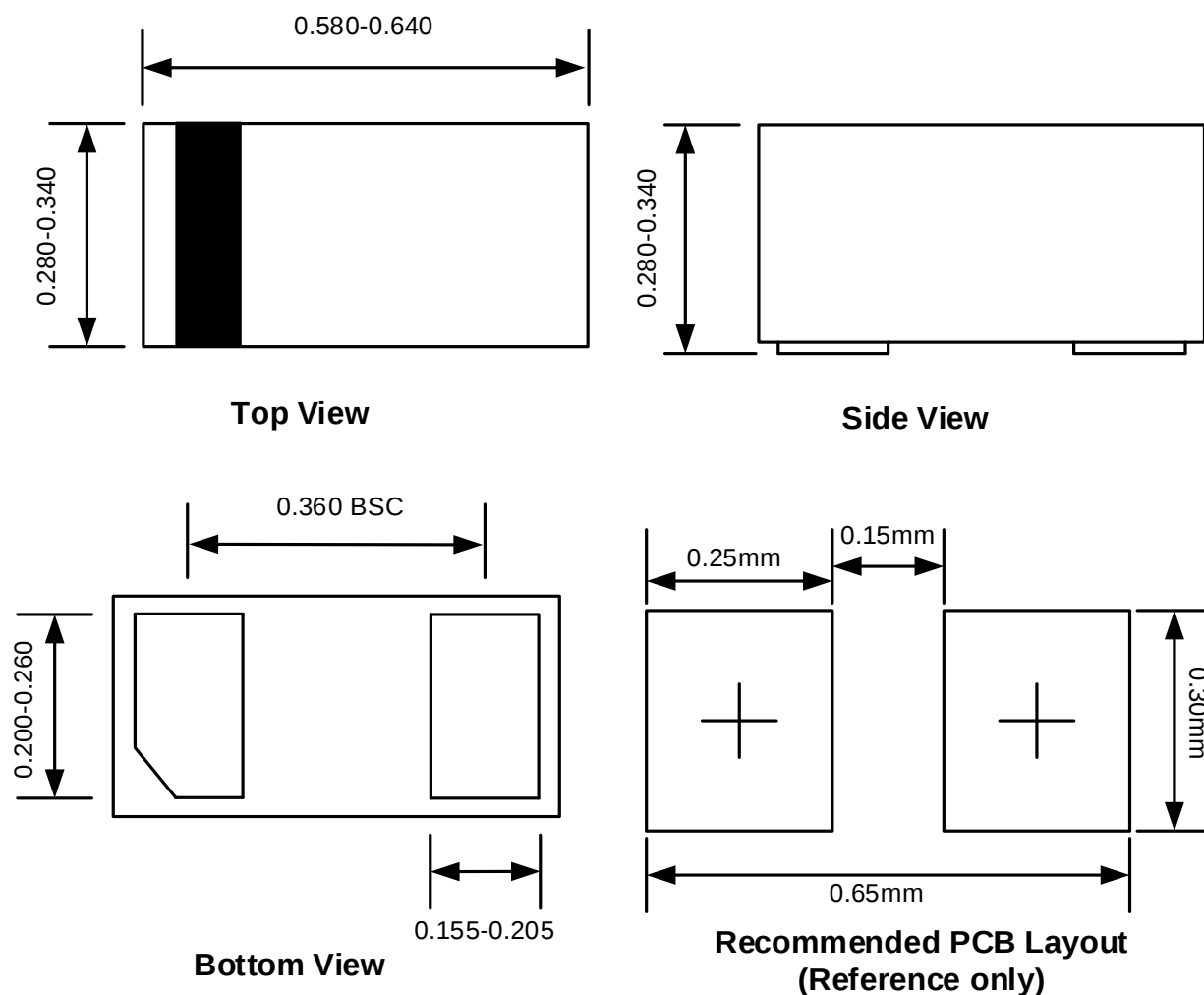
- Place SY205205 as close to the connector or terminal ports as possible.
- Use a large via to connect the SY205205 pin to the ground.
- Avoid running signals near board edges.
- The SY205205 should be placed near the protected line.
- The distance between the SY205205 ground pin and the GND reference path should be as short as possible.

DFN1.0×0.6-2 Package Outline



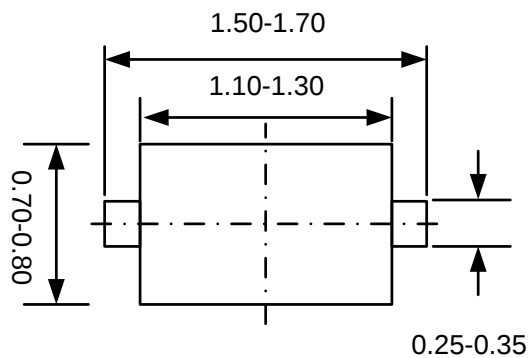
Note: All dimensions are in millimeters and exclude mold flash and metal burr.

DFN0.6×0.3-2 Package Outline

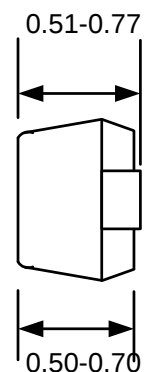


Note: All dimensions are in millimeters and exclude mold flash and metal burr.

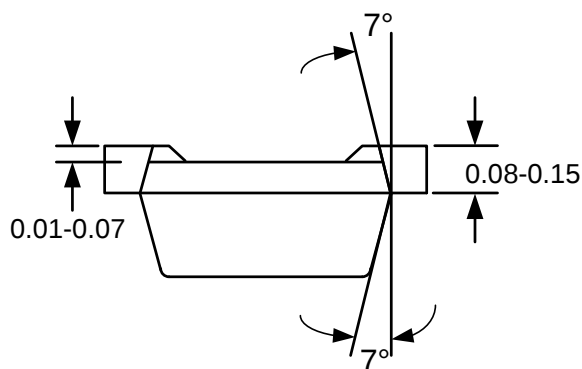
SOD 523 Package Outline



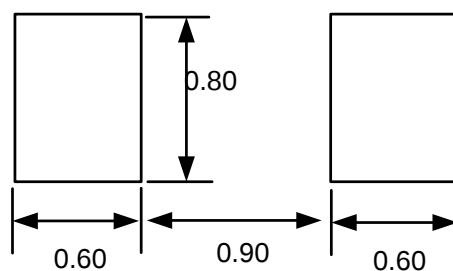
Top View



Side View



Side View

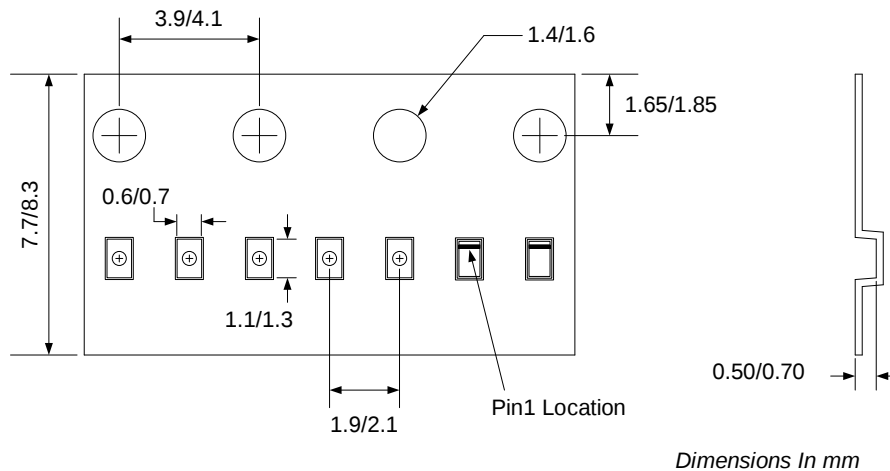


**Recommended PCB Layout
(Reference only)**

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

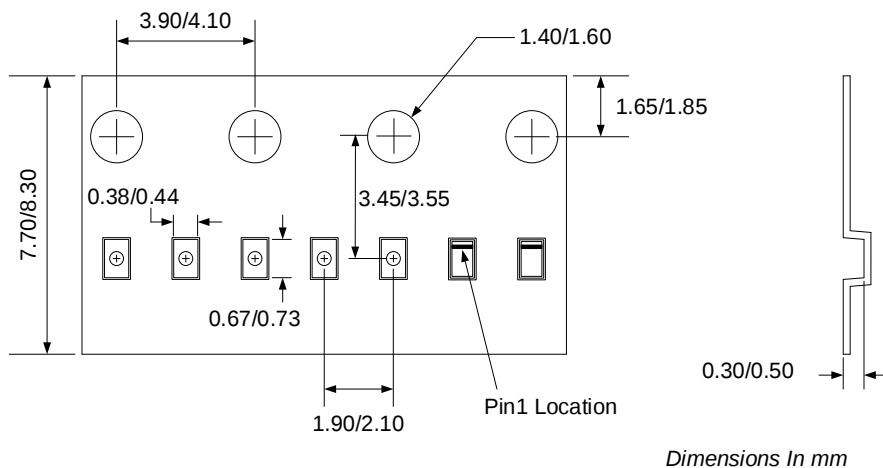
Tape and Reel Specification

DFN1.0×0.6-2 Taping Orientation



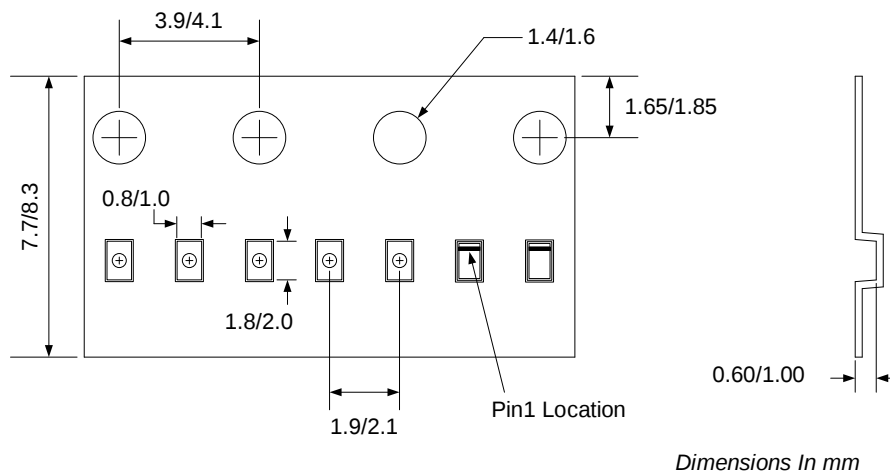
Feeding direction →

DFN0.6×0.3-2 Taping Orientation



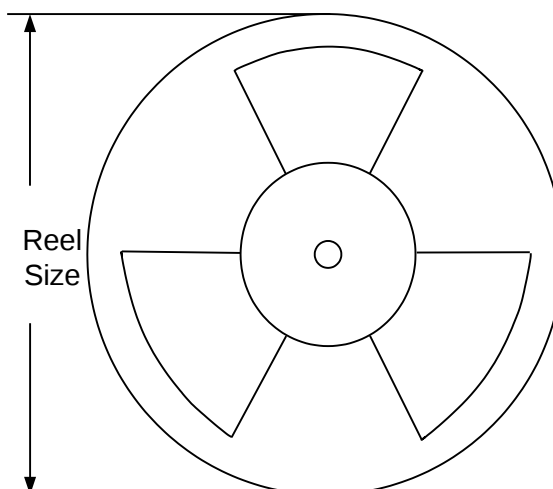
Feeding direction →

SOD523 Taping Orientation



Feeding direction →

Carrier Tape & Reel Specification for Packages



Package Types	Tape Width (mm)	Pocket Pitch(mm)	Reel Size (Inch)	Qty per Reel (pcs)
DFN1.0×0.6-2	8	2	7"	10000
DFN0.6×0.3-2	8	2	7"	10000
SOD523	8	2	7"	8000

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	08/29/2019	Initial Release	
1.0	08/29/2020	Production Release	
1.0A	11/8/2023	V _{ti} min changed from 3.4V to 3.7V	2

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