

General Description

The SYS32X24TPD is a single line, unidirectional transient voltage suppressor (TVS) designed to provide electrical overstress (EOS) protection for cell phones and laptops. The SYS32X24TPD offers an operating voltage of 24V, and is designed to protect sensitive semiconductor components from damage or upset due to electrostatic discharge (ESD) and other overcurrent transient events. It complies with IEC 61000-4-2 (ESD), ($\pm 30\text{kV}$ air, $\pm 30\text{kV}$ contact discharge), and IEC 61000-4-5 (surge) 125A (8/20 μs) standards.

The SYS32X24TPD is available in a DFN2.0mm \times 2.0mm-3 pin package.

Features

- Operating Voltage: 24V and Below
- Transient Protection for a Single Line
 - IEC 61000-4-2 (ESD) $\pm 30\text{kV}$ (Air) $\pm 30\text{kV}$ (Contact)
 - IEC 61000-4-5 (Surge) 125A (8/20 μs)
- Protects One Power Line
- Capacitance: 850pF (Typical)
- Low Leakage Current: 1 μA at V_{RWM} (Max)
- Low Clamping Voltage

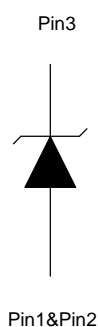
Applications

- Cell Phones and Accessories
- Power Supply Protection
- Power Management
- Portable Instrumentation
- Digital Cameras

Mechanical Characteristics

- DFN2.0 \times 2.0-3 Package
- Marking: Device Code, Date Code
- Packaging: Tape and Reel

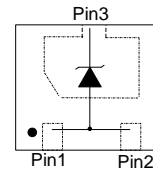
Circuit Diagram



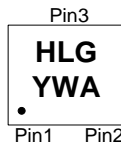
Ordering Information

Pinout (Top View)

Part Number	Package Type	Top Mark
SYS32X24TPD	DFN2.0x2.0-3	HLG YWA



Marking Codes



Notes: "HLG" is the device code, fixed.

"YWA" is the date code.

Pin Descriptions

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

Absolute Maximum Ratings (Note 1)

Parameter	Symbol	Min	Max	Unit
Peak Pulse Power ($t_p=8/20\mu s$)	P_{PK}		5400	W
Peak Pulse Current ($t_p=8/20\mu s$)	I_{pp}		125	A
ESD per IEC 61000-4-2 (Air)	V_{ESD}	-30	30	kV
ESD per IEC 61000-4-2 (Contact)		-30	30	
Operating Temperature	T_{OPT}	-55	+125	$^{\circ}C$
Storage Temperature	T_{STG}	-55	+150	$^{\circ}C$

Electrical Characteristics (IO Referenced to GND, $T_A = 25^{\circ}C$, Note 4)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Nominal Reverse Working Voltage	V_{RWM}				24	V
Reverse Leakage Current at V_{RWM}	I_R	$V_{RWM} = 24V, T_A = 25^{\circ}C$ Pin1 or Pin2 to Pin3			1	μA
Reverse Breakdown Voltage at I_T	V_{BR}	$I_T = 1mA$ Pin1 or Pin2 to Pin3	26		30	V
Forward Voltage at I_F	V_F	$I_F = 10mA$ Pin3 to Pin1 or Pin2			1.2	V
Clamping Voltage at I_{PP} (Note 5)	V_C	$I_{PP} = 100A, t_p = 8/20\mu s$ Pin1&2 to Pin3		40	45	V
Clamping Voltage at I_{PP} (Note 5)	V_C	$I_{PP} = 125A, t_p = 8/20\mu s$ Pin3 to Pin1&2		42	50	V
Clamping Voltage at I_{PP} (Note 5)	V_C	$I_{PP} = 16A,$ $t_p = 10/100ns$		30		V
Dynamic Resistance (Note 2, 5)	R_{DYN}	$t_p = 10/100ns$		0.09		Ω

Parasitic Capacitance(Note 5)	C_{ESD}	$V_R = 0V, f = 1MHz$ Pin3 to Pin1	850	pF
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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 $T_A \cong T_J = 25^\circ C$. 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.

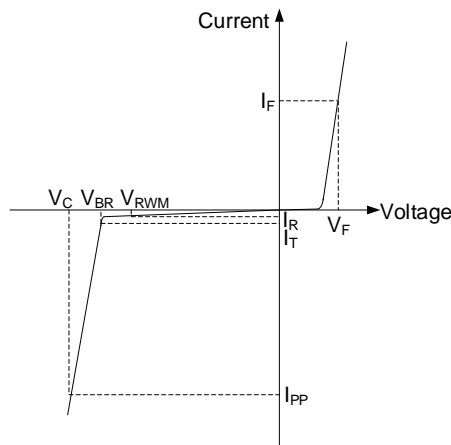
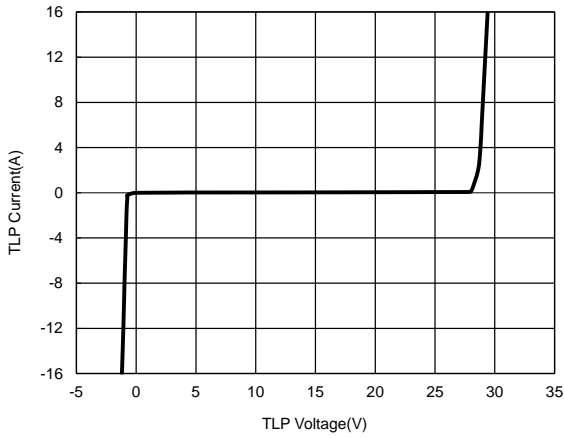


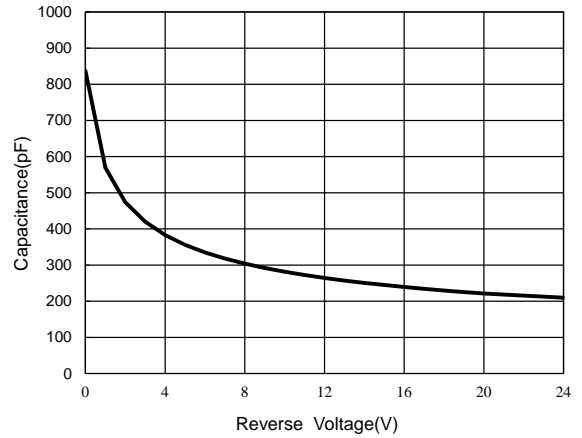
Figure 1. Uni-Directional TVS

Typical Performance Characteristics, IO Referenced to GND

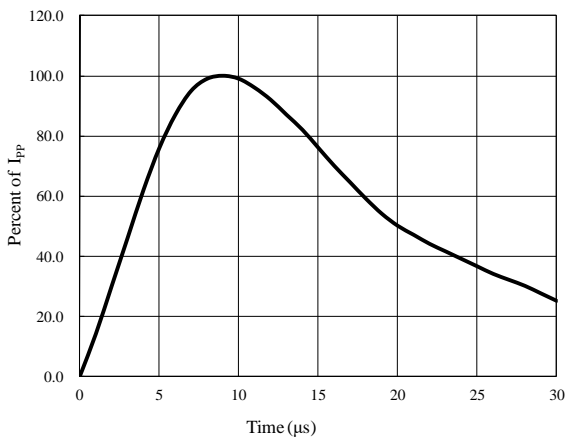
TLP Testing



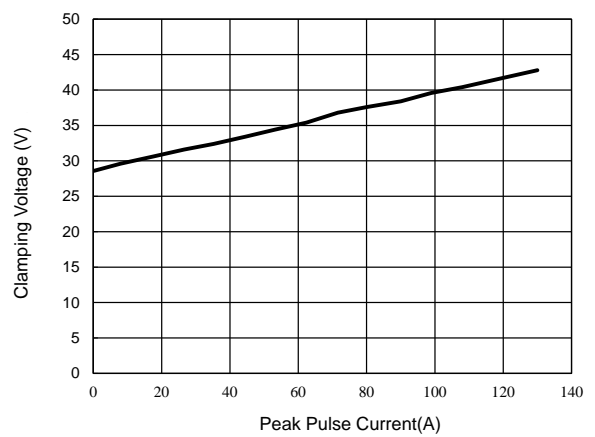
Capacitance vs. Voltage



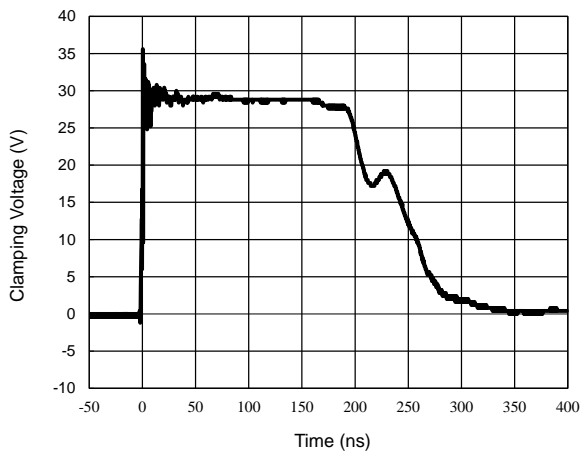
Pulse Waveform



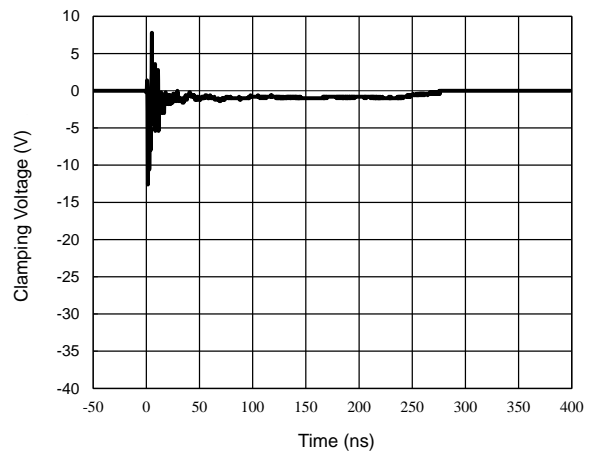
Clamping Voltage vs. Peak Pulse Current



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



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



Application Information

PCB Pin Connections

The SYS32X24TPD can protect one unidirectional line. It offers system designers flexibility to protect a single control or power line.

A single control or power line can be connected directly to pin 3. Pin 1 and pin 2 of the SYS32X24TPD are the negative reference pins, which should connect to the GND. The connection wires should be as short as possible to minimize parasitic inductance.

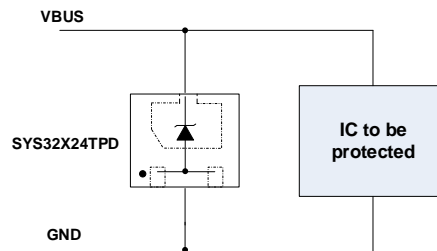


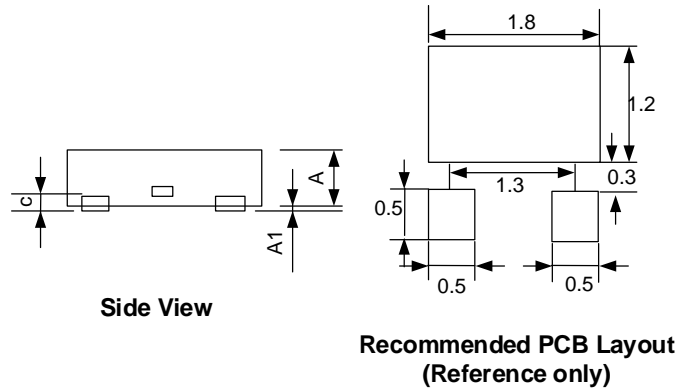
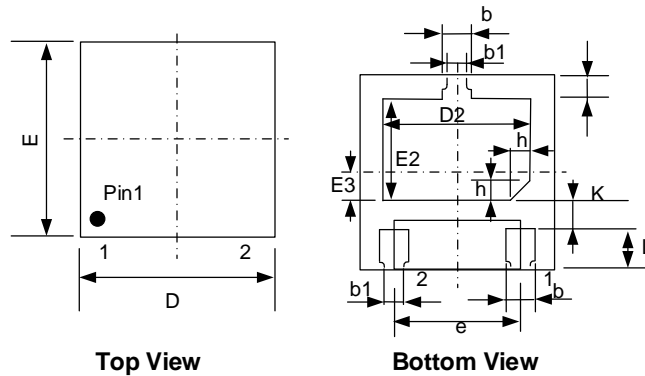
Figure 2. SYS32X24TPD Pin Connections in PCB

PCB Layout Guidelines

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

- The distance between pin 3 and the PCB GND rail path should be as short as possible to reduce the ESD transient return path to the GND.
- Use large vias to connect pins 1/2 and pin 3 to the PCB VCC and GND.
- Place the SYS32X24TPD as close to the connector port as possible to reduce parasitic inductance and restrict ESD coupling into adjacent traces.

DFN2.0x2.0-3 Package Outline



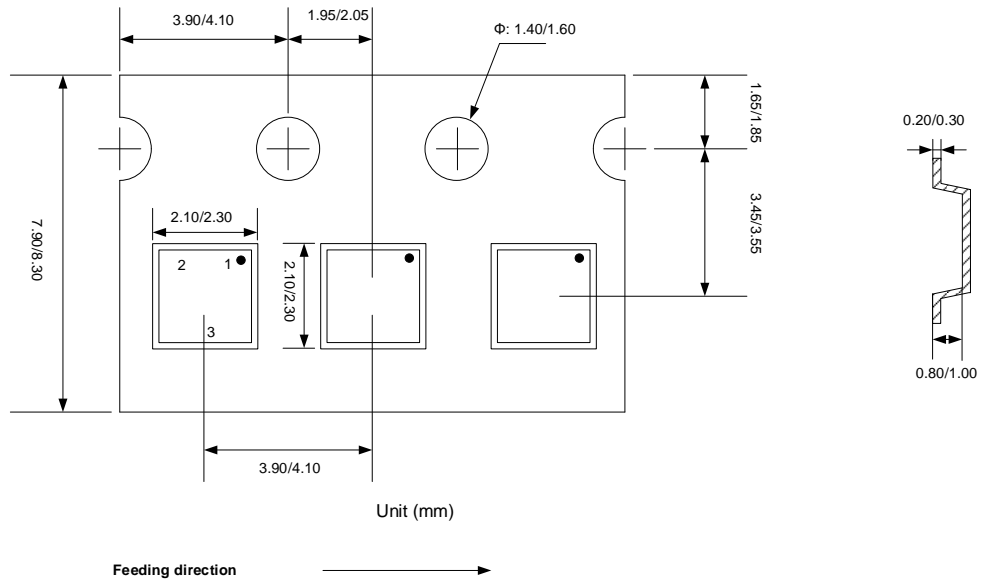
Package Dimensions

Symbol	Dimensions in Millimeters		
	MIN	NOM	MAX
A	0.50	0.55	0.60
A1	0.00	0.02	0.05
b	0.25	0.30	0.35
b1	0.20 REF		
c	0.152 REF		
D	1.90	2.00	2.10
D2	1.40	1.50	1.60
e	1.30BSC		
E	1.90	2.00	2.10
E2	0.95	1.05	1.15
E3	0.20	0.30	0.40
L	0.35	0.40	0.45
L1	0.20	0.25	0.30
h	0.20 REF		
K	0.20	0.30	0.40

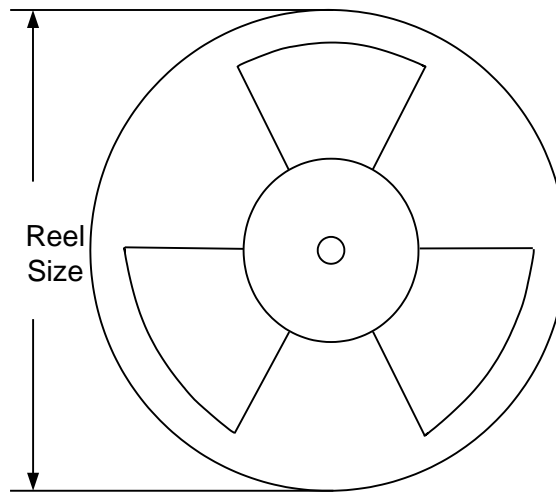
Note: All dimensions are in millimeters and exclude mold flash and metal burr.

Tape and Reel Information

Tape Dimensions and Pin 1 Orientation



Reel Dimensions



Package Type	Tape Width (mm)	Pocket Pitch(mm)	Reel Size (Inch)	Qty per Reel (pcs)
DFN2x2-3	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	Feb.26, 2025	Initial Release	

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