DATASHEET

Tyco Electronics

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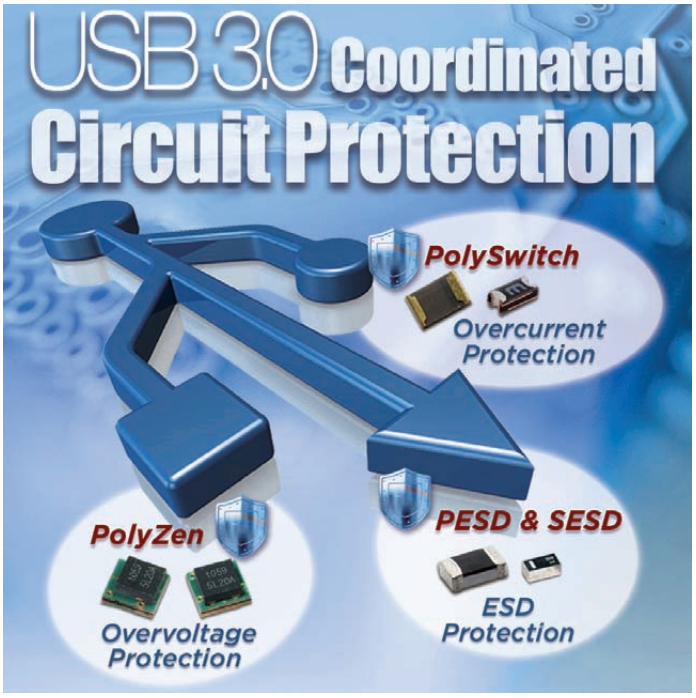
PolyZen Protection Device for USB Applications

Tyco Electronics PolyZen devices are polymer-enhanced, precision Zener diode micro-assemblies. They offer resettable protection against multi-Watt fault events and spare the need for large heavy heat sinks.

A unique feature of the PolyZen micro-assembly is that the Zener diode is thermally coupled to a resistively non-linear, polymer PTC (Positive Temperature Coefficient) layer. This PTC layer is fully integrated into the device, and is electrically in series between V_{IN} and the diode clamped V_{OUT}.

This polymer PTC layer responds to either extended diode heating or overcurrent events by transitioning from a low to high resistance state, also known as "tripping". A tripped PTC will limit current and generate voltage drop. It helps to protect both the Zener diode and the follow-on electronics and effectively increases the diode's power handling capability.

The Zener diode used for voltage clamping in the PolyZen micro-assembly was selected due to its relatively flat voltage vs current response. This helps improve output voltage clamping, even when input voltage is high and diode current is large.



The polymer-enhanced Zener diode helps protect sensitive portable electronics from damage caused by inductive voltage spikes, voltage transients, improper power supplies, and reverse bias conditions. The PolyZen ZEN059V130A24LS device is particularly useful for USB 2.0/3.0 powered devices; typically, it draws only 500µA of operating current in USB suspend mode.

Benefits:

- Stable Zener diode helps shield downstream electronics from overvoltage and reverse bias
- PTC trip events help to protect the Zener diode and extend its power handling capability
- Analog nature of trip events minimizes upstream inductive spikes
- Minimal power dissipation requirements
- Single component placement

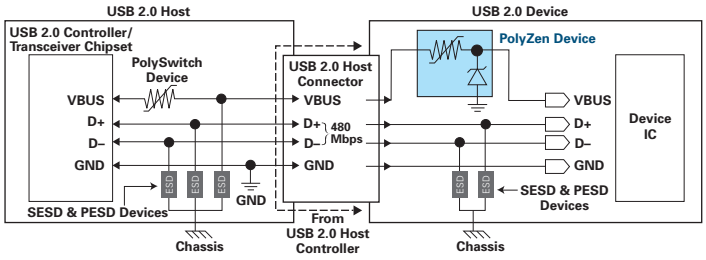
Features:

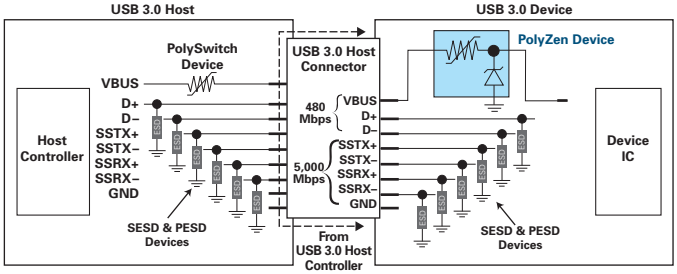
- Meets USB suspend mode current requirement - 500µA (typ) @ 5.0V
- Overvoltage transient suppression
- Stable V_Z vs fault current
- Time delayed, overvoltage trip
- Time delayed, reverse bias trip
- Multi-Watt power handling capability
- Integrated device construction
- RoHS Compliant and Halogen Free

Applications:

- USB 2.0/3.0 powered consumer electronics, external hard disk drives and solid state devices
- DC power port protection in systems using barrel jacks for power input
- DC power port protection in portable electronics and navigation devices
- DC output voltage regulation
- USB 3.0 hubs and adapter cards
- Laptops and desktop PCs

Typical USB 2.0/3.0 Application Block Diagram



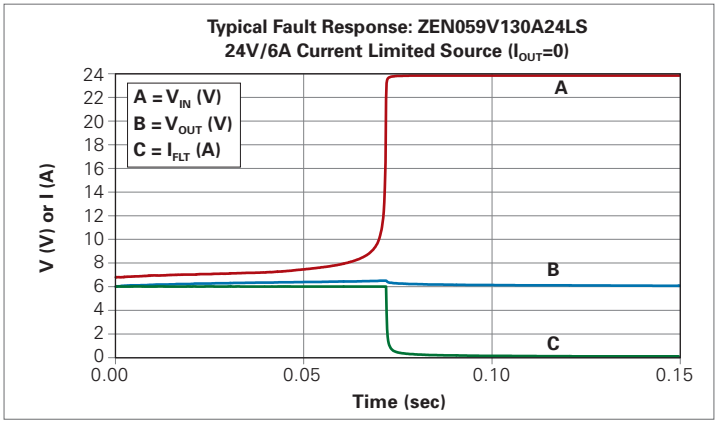


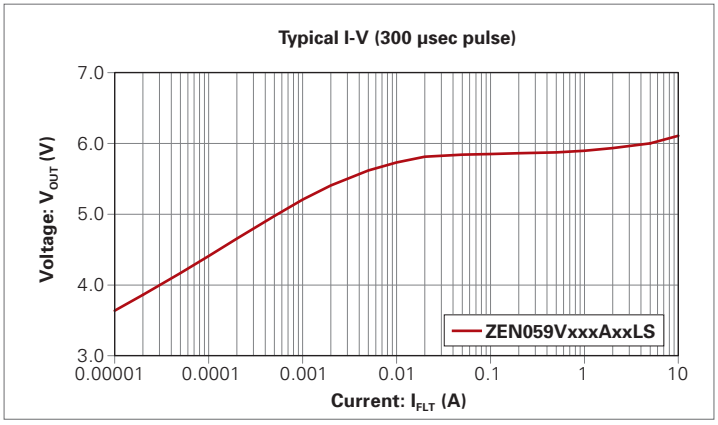
Electrical Characteristics for ZEN059V130A24LS

V_Z[1] (V)			I_{Zt}[1] (A)	I_{HOLD} @ 20°C (A)	Operating[2] Current		R_{Typ} (Ω)	R_{1Max} (Ω)	$V_{INT\ MAX}$ (V)		$I_{FLT\ MAX}$		Tripped Power Dissipation Max	
Min.	Typ.	Max.			Test Voltage	Max Current (mA)			$V_{INT\ MAX}$ (V)	Test Current (A)	$I_{FLT\ MAX}$ (A)	Test Voltage (V)	Value (W)	Test Voltage (V)
5.8	5.9	6.0	0.1	1.3	5.0	0.65	0.12	0.15	24	3	+6 -40	+24 -16	1.0	24

(1) I_{Zt} is the current at which V_Z is measured.
(2) Typical operating current is 500µA @ 5.0V which meets USB suspend mode requirement.

Typical Characteristic



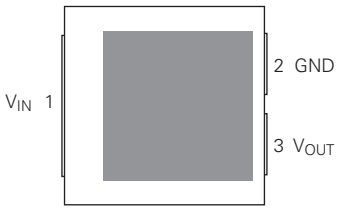


Configuration Information

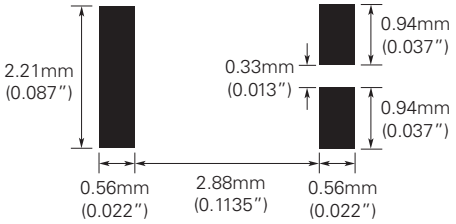
Pin Description

Pin Number	Pin Name	Pin Function
1	V_{IN}	V_{IN} = Protected input to Zener diode
2	GND	GND = Ground
3	V_{OUT}	V_{OUT} = Zener regulated voltage output

Pin Configuration (Top View)

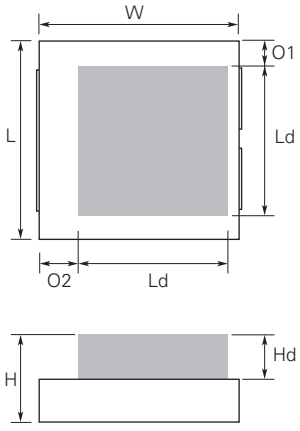


Recommended Pad Dimensions



Mechanical Dimensions

		Min	Typical	Max
Length	**L**	3.85 mm (0.152")	4 mm (0.16")	4.15 mm (0.163")
Width	**W**	3.85 mm (0.152")	4 mm (0.16")	4.15 mm (0.163")
Height	**H**	1.4mm (0.055")	1.7 mm (0.067")	2.0 mm (0.081")
Length Diode	**Ld**	-	3.0 mm (0.118")	-
Height Diode	**Hd**	-	1.0 mm (0.039")	-
Offset	**O1**	-	0.6 mm (0.024")	-
Offset	**O2**	-	0.7 mm (0.028")	-



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