

# PolyZen Devices— Polymer Protected Zener Diode

PolyZen devices are polymer protected precision Zener diode micro-assemblies. They offer resettable protection against multi-watt fault events while exhibiting only 0.7W power dissipation that requires no special heat sinking.

The relatively flat voltage vs. current response of the PolyZen device helps clamp the output voltage, even when input voltage and source currents vary.

An advanced feature of the PolyZen micro-assembly is that its Zener and follow-on electronics are additionally protected by a resistively non-linear, polymer PTC (positive temperature coefficient) layer. This PTC layer is fully integrated into the device, is thermally coupled to the diode, and is electrically in series between  $V_{IN}$  and the diode clamped  $V_{OUT}$ .

This advanced PTC layer responds to either 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 a voltage drop, which helps to protect both the Zener and the follow-on electronics. This integrated PTC effectively increases the diode’s power handling capability.



## Benefits:

- Helps shield downstream electronics from overvoltage and reverse bias
- Trip events shut out overvoltage and reverse bias sources
- Analog nature of trip events minimizes upstream inductive spikes
- Helps reduce design costs with single component placement and minimal heat sinking requirements

## Features:

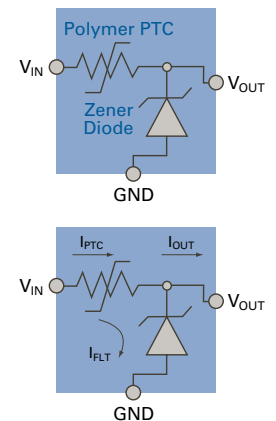
- Overvoltage transient suppression
- Stable  $V_Z$  vs. fault current
- Time delayed, overvoltage trip
- Time delayed, reverse bias trip
- Power handling on the order of 100 watt
- Integrated device construction
- RoHS compliant

## Applications:

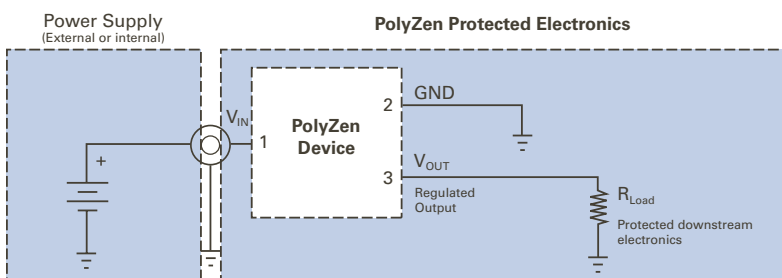
- DC power port protection for systems using barrel jacks for power input
- DC power port protection in portable electronics
- Internal overvoltage and transient suppression
- DC output voltage regulation

## Definition of Terms

$V_Z$	$V_{OUT}$ as measured under a specified diode test current ( $I_{FLT} = I_{ZT}$ )
$I_{ZT}$	Current at which $V_Z$ is measured. $I_{ZT}$ is time limited (typically 100 $\mu$ Sec)
$I_{HOLD}$	Maximum steady state $I_{PTC}$ that will not generate a trip event at the specified temperature. Specification assumes $I_{FLT}$ is sufficiently low so as to prevent the diode from acting as a heat source.
R Typ	Resistance between $V_{IN}$ and $V_{OUT}$ pins during normal operation at room temperature
$R_{1 MAX}$	The maximum resistance between $V_{IN}$ and $V_{OUT}$ pins during normal operation at room temperature, one hour after first trip or after reflow soldering
$I_{FLT}$	Current flowing through the Zener diode
$I_{FLT Max}$	Maximum RMS fault current the diode portion of the device can withstand and remain resettable; testing is conducted at +/- 24V and -16V with no load connected to $V_{OUT}$ .
$V_{INT Max}$	The voltage ( $V_{IN} - V_{OUT}$ ) at which typical qualification devices (98% devices, 95% confidence) survived at least 100 trip cycles and 24 hours trip endurance at the specific voltage and current $I_{PTC}$



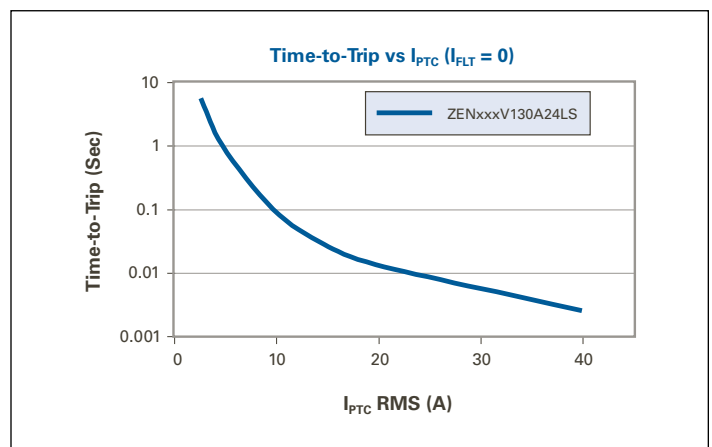
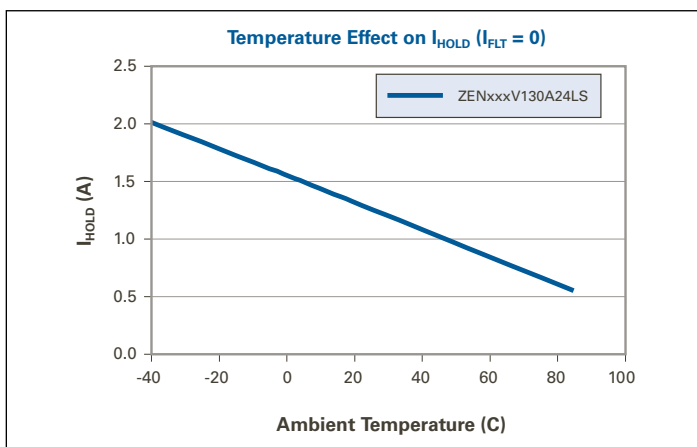
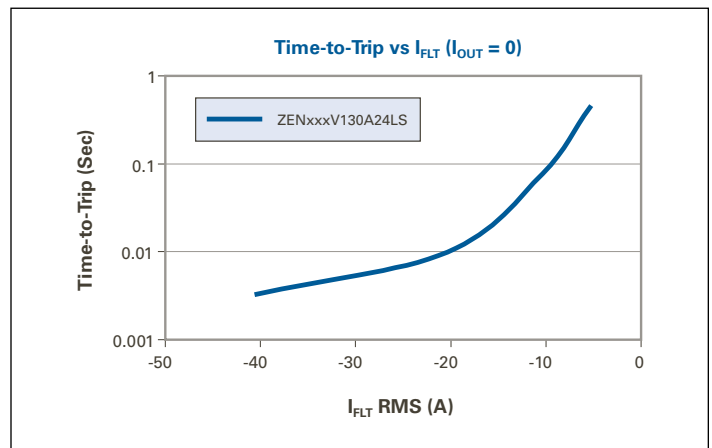
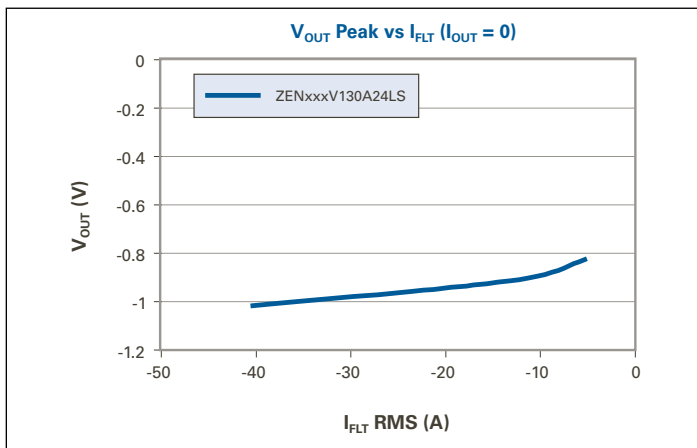
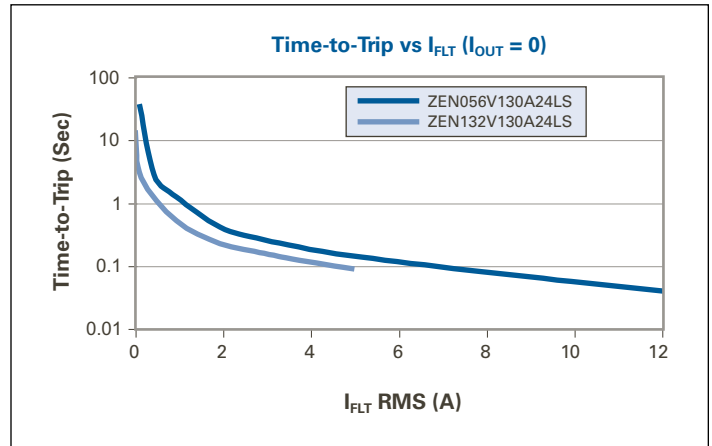
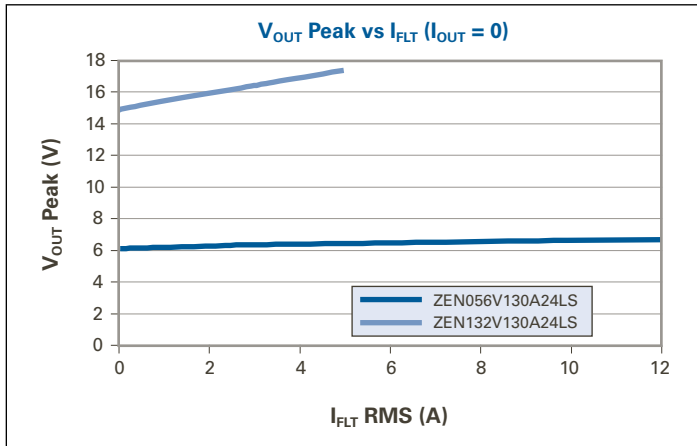
## Typical Application Block Diagram



**Electrical Characteristics (Performance ratings @ 25°C unless otherwise specified)**

Part Number	V <sub>z</sub> (V) Typical	I <sub>zt</sub> (A)	I <sub>HOLD</sub> @ 20°C (A)	R Typ (Ω)	R <sub>1</sub> Max (Ω)	V <sub>INT</sub> Max @ 3 A (V)	I <sub>FLT</sub> Max (A)	Typical Power Dissipation (Post Trip) (W)
ZEN056V130A24LS	5.6	0.1	1.3	0.12	0.16	24	+10 / -40	0.7
ZEN065V130A24LS	6.5	0.1	1.3	0.12	0.16	24	TBD / -40	0.7
ZEN098V130A24LS	9.8	0.1	1.3	0.12	0.16	24	TBD / -40	0.7
ZEN132V130A24LS	13.4	0.1	1.3	0.12	0.16	24	+3 / -40	0.7
ZEN164V130A24LS	16.4	0.1	1.3	0.12	0.16	24	TBD / -40	0.7

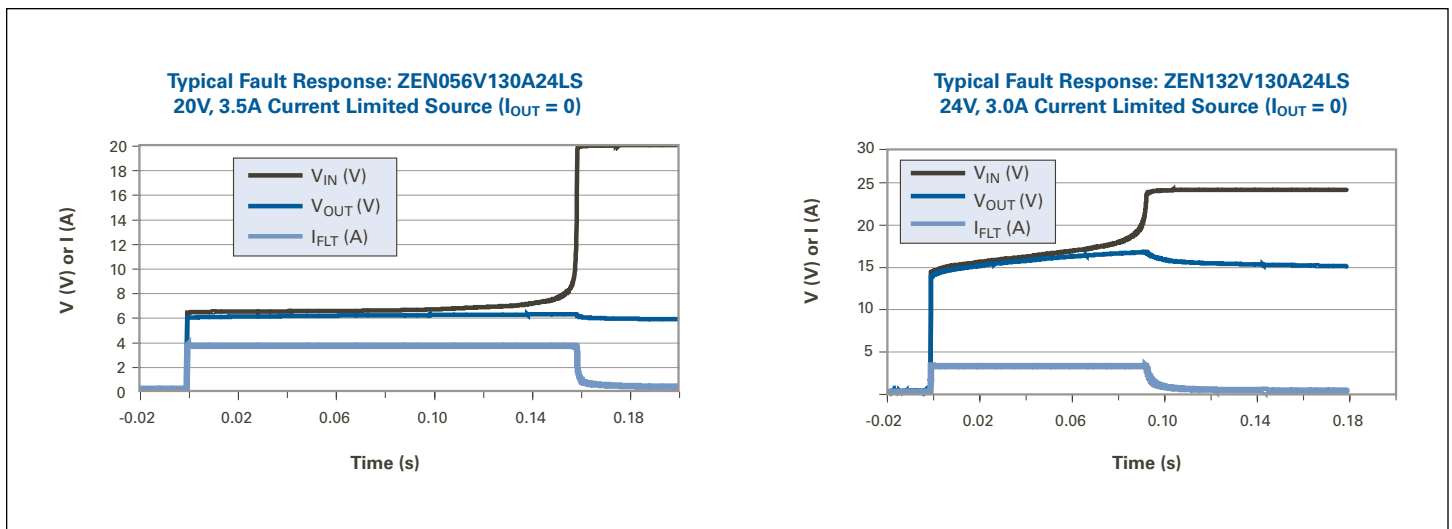
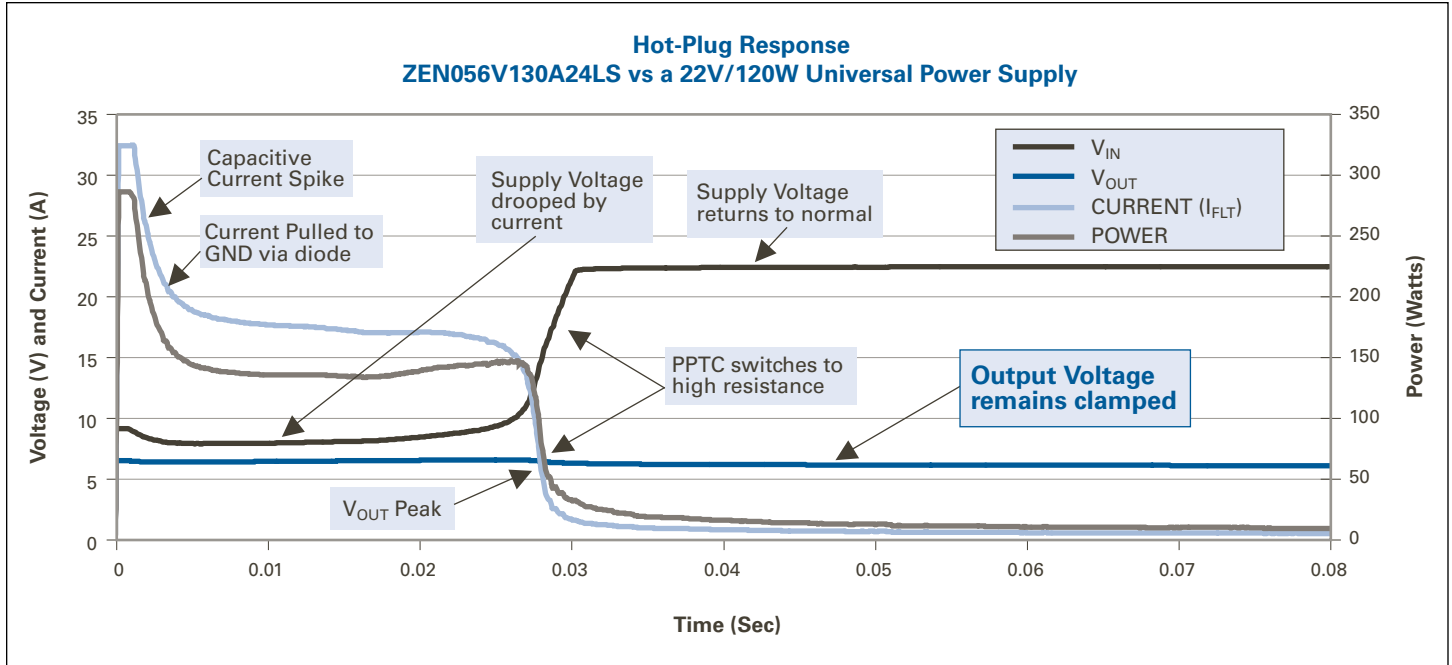
**Typical Performance Curves**



## General Characteristics

Operating Temperature Range	-40° to +85°C	
Storage Temperature	-40° to +85°C	
ESD Withstand	15KV	Human Body Model
Diode Capacitance	4200pF	Typical @ 1MHz, 1V RMS
Construction	RoHS compliant	

## Basic Operation Examples

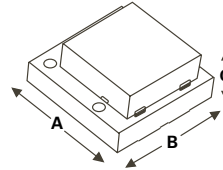


## Packaging and Marking Information

Part Number	Bag Quantity	Tape & Reel Quantity	Standard Package
ZENxxxVyyyAzzLS	-	3,000	15,000

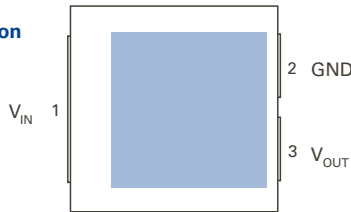
## Mechanical Dimensions

	A		B		C	
	Min	Max	Min	Max	Min	Max
mm	—	4.2	—	4.2	—	2.1
inch	—	(0.17)	—	(0.17)	—	(0.083)

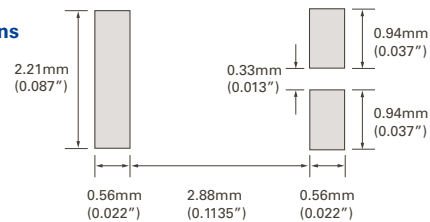


## Configuration Information

### Pin Configuration (Top View)

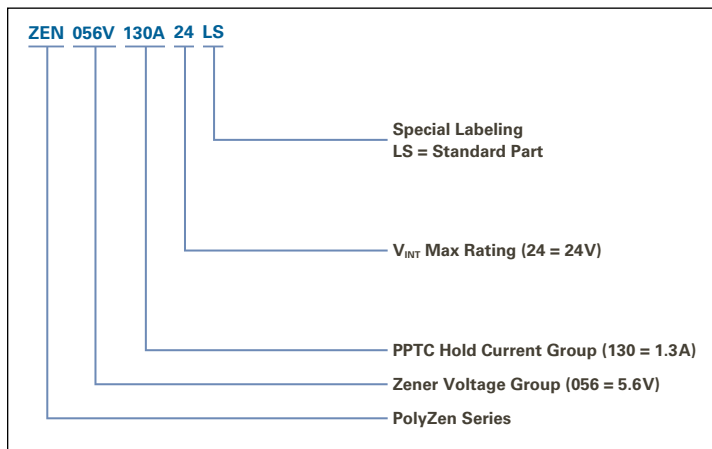


### Pad Dimensions



Pin Number	Pin Name	Pin Function
1	V <sub>IN</sub>	V <sub>IN</sub> = Protected input to Zener diode
2	GND	GND = Ground
3	V <sub>OUT</sub>	V <sub>OUT</sub> = Zener regulated voltage output

## Part Numbering System



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