

## Low Voltage Protection Switch

### Features

- ▶ Up to  $\pm 20\text{V}$  input voltage protection
- ▶ Low on-resistance -  $6.5\Omega$  typical
- ▶ Fast switching speed
- ▶ Effectively, a simple two terminal device
- ▶ No external power supplies needed

### Applications

- ▶ Ethernet system protection
- ▶ Resettable fuse
- ▶ High side switch
- ▶ Data acquisition

### General Description

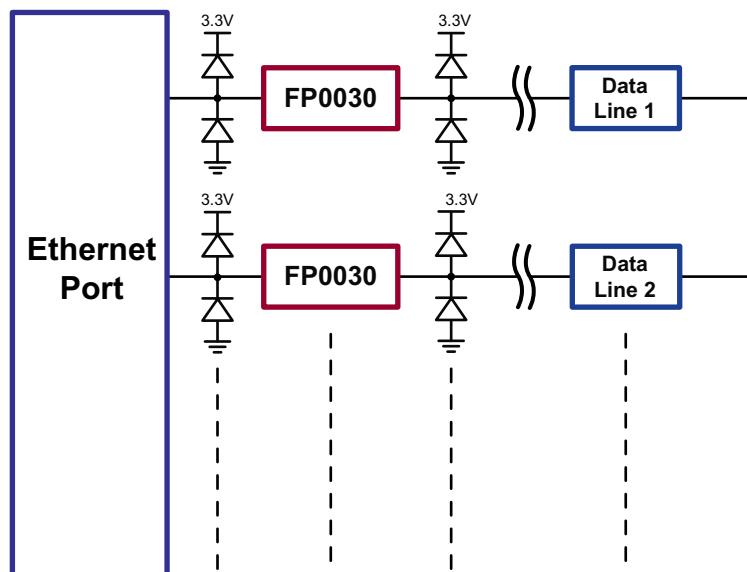
The Supertex FP0030 is a 20V current limiting protection device. It is designed to protect Ethernet systems from high transient voltages.

The FP0030 can be considered as a normally closed switch with a typical switch resistance of  $6.5\Omega$ . The device starts to turn off when the voltage drop across the two terminals exceeds a nominal value of  $\pm 1.5\text{V}$ . In the off state, the FP0030 can withstand up to  $\pm 20\text{V}$  across its terminals. A small amount of current, typical  $800\mu\text{A}$  is allowed to flow through the device.

The FP0030 can also be used as a resettable fuse to protect power lines against output short circuit conditions.

The FP0030 is available in a 3-Lead SOT-23 package.

### Typical Application Circuit



## Ordering Information

Part Number	Package	Packing
FP0030K1-G	3-Lead SOT-23	3000/Reel

-G indicates package is RoHS compliant ('Green')



## Absolute Maximum Ratings

Parameter	Value
V <sub>A-B</sub> , Differential voltage drop	0 to ±22V
Maximum junction temperature	+125°C
Storage temperature range	-65° to +150°C
Power dissipation, T <sub>A</sub> @25°C	360mW <sup>1</sup>

Absolute Maximum Ratings are those values beyond which damage to the device may occur. Functional operation under these conditions is not implied. Continuous operation of the device at the absolute rating level may affect device reliability. All voltages are referenced to device ground.

**Note:**

1. Mounted on FR4 board, 25mm x 25mm x 1.57mm.

## Typical Thermal Resistance

Package	$\theta_{ja}$
3-Lead SOT-23	203°C/W

## Pin Configuration



## Product Marking



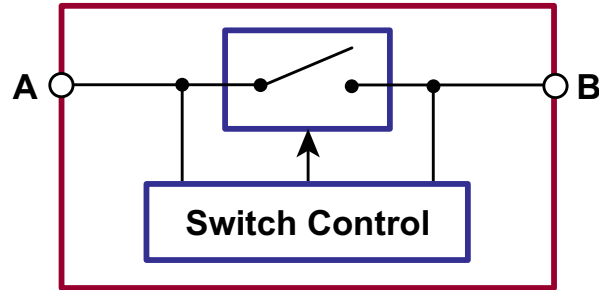
W = Code for week sealed  
 \_\_\_\_\_ = "Green" Packaging

Package may or may not include the following marks: Si or SOT-23 (K1)

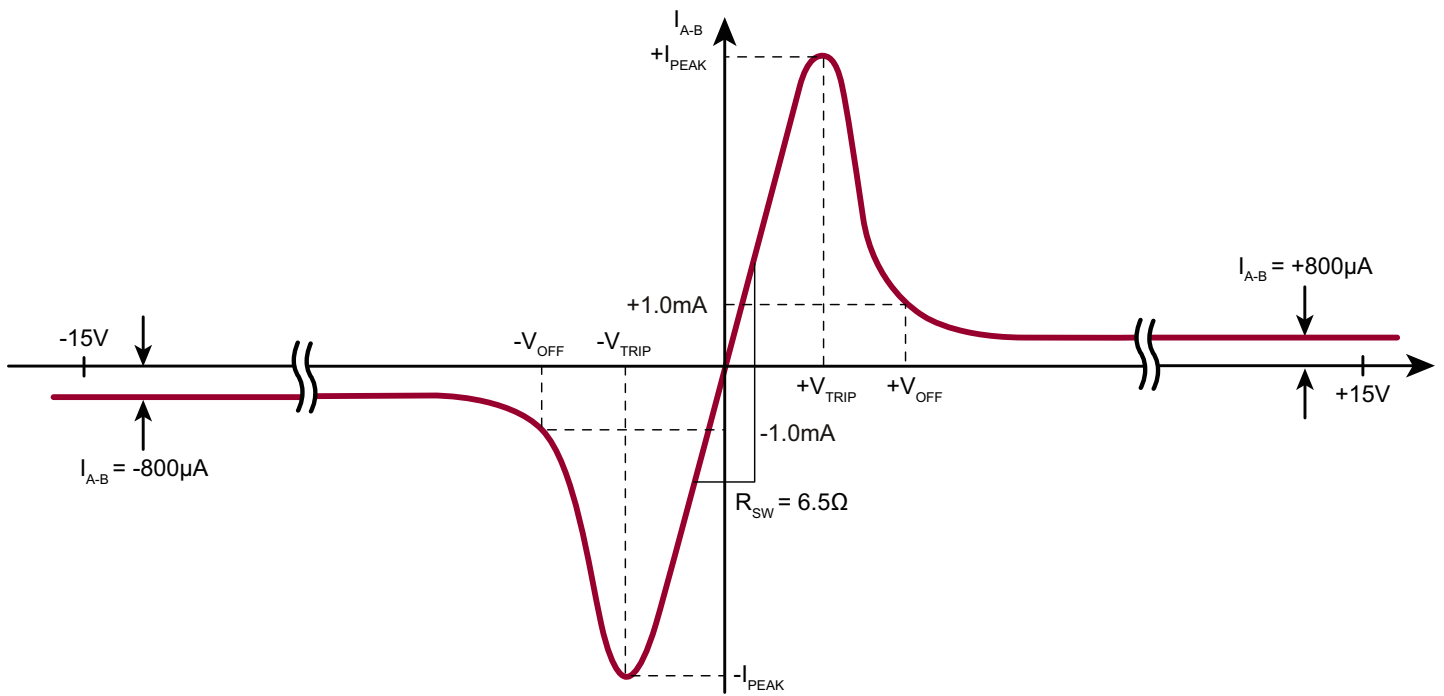
## Electrical Characteristics (T<sub>j</sub> = 25°C unless otherwise specified)

Sym	Parameter	Min	Typ	Max	Units	Conditions
BV <sub>A-B</sub>	Differential input voltage range from A to B	±20	-	-	V	I <sub>A-B</sub> = ±2.0mA
R <sub>SW</sub>	Switch ON-resistance from A to B	-	6.5	8.5	Ω	I <sub>A-B</sub> = ±50mA, V <sub>A</sub> or V <sub>B</sub> = 0V
V <sub>TRIP</sub>	V <sub>A-B</sub> trip point to turn off	-	±1.5	-	V	---
V <sub>OFF</sub>	Switch turn off voltage	-	±3.2	-	V	I <sub>A-B</sub> = ±1.0mA
I <sub>A-B(OFF)</sub>	Switch off current	-	±800	±1500	μA	V <sub>A-B</sub> = ±15V
I <sub>PEAK</sub>	Peak switching current	-	±155	-	mA	---
T <sub>OFF</sub>	Turn off time	-	30	60	ns	See Figure 1
T <sub>ON</sub>	Turn on time	-	1.0	2.0	μs	See Figure 2
C <sub>SW(ON)</sub>	Switch ON-capacitance from A to B or B to A	-	32	-	pF	SW = ON
C <sub>SW(OFF)</sub>	Switch OFF-capacitance from A to B or B to A	-	11	-	pF	V <sub>SW</sub> = 10V
T <sub>j</sub>	Operating junction temperature	-40	-	+125	°C	---

Block Diagram



Typical I-V Characteristics



## Functional Description

The Supertex FP0030 can be considered as a normally closed switch controlled by a switch control (please refer to the block diagram). The switch control monitors the voltage drop across terminals A and B. If the voltage difference is greater than  $\pm 1.5V$ , the switch will start to open. Once in the

open state, only a small amount of current, typical  $800\mu A$ , flows through the switch to detect if the high voltage is still present or not. The switch will not close until the voltage across terminal A and B drops below  $\pm 1.5V$ .

## Test Circuits for $T_{ON}$ and $T_{OFF}$

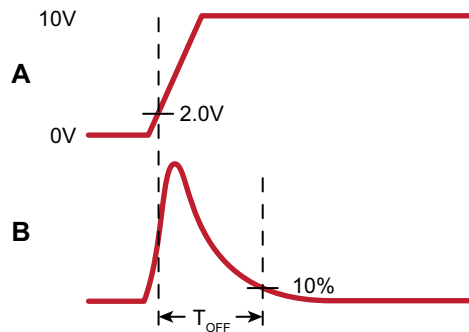
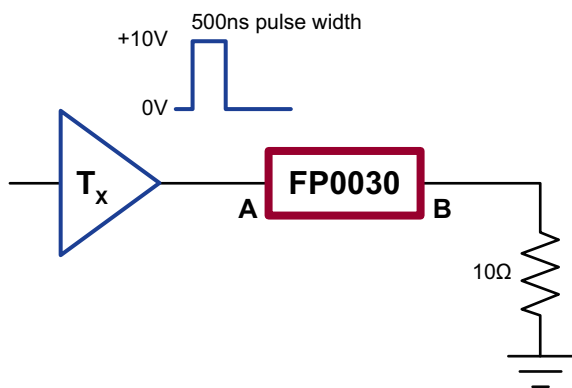


Figure 1:  $T_{OFF}$  Test Circuit

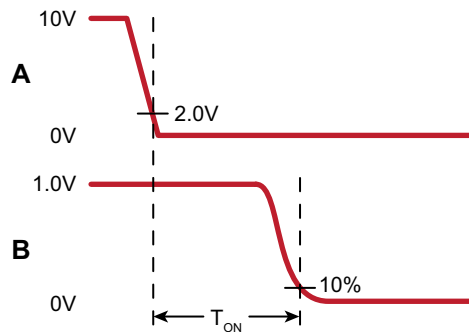
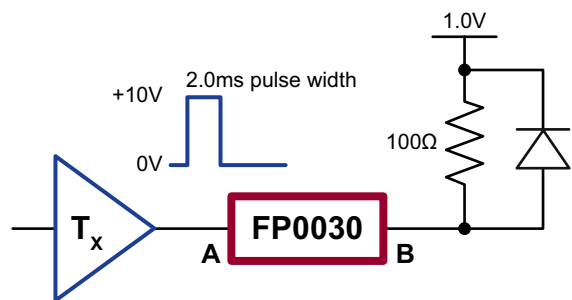


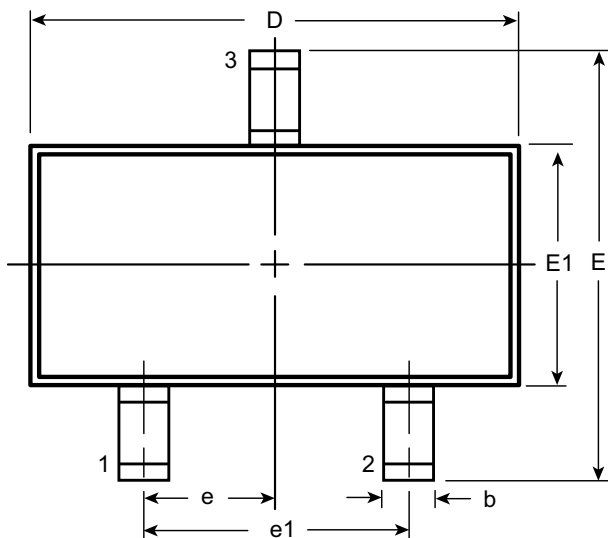
Figure 2:  $T_{ON}$  Test Circuit

## Pin Description

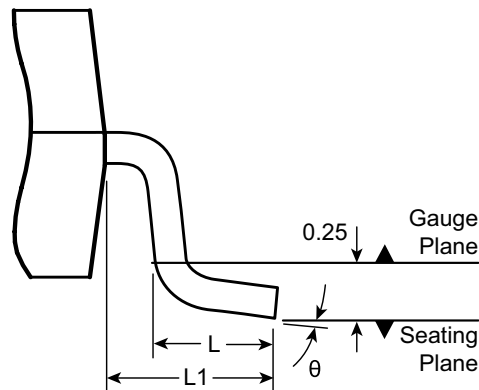
Pin Name	Description
A	Switch terminal A
SUB	Internally connect to the back of the die. Leave floating. <b>DO NOT GROUND!</b>
B	Switch terminal B

### 3-Lead TO-236AB (SOT-23) Package Outline (K1)

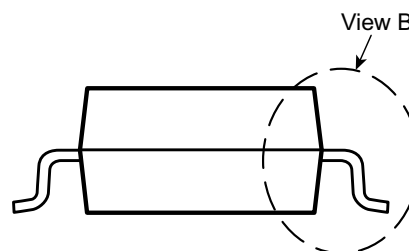
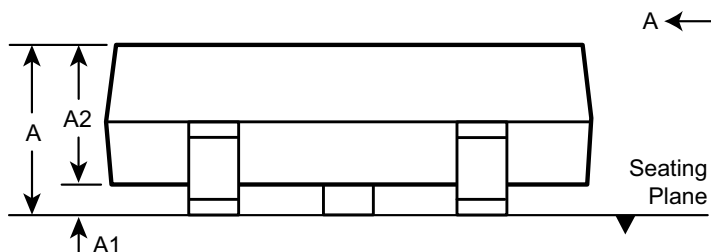
2.90x1.30mm body, 1.12mm height (max), 1.90mm pitch



**Top View**



**View B**



Symbol	A	A1	A2	b	D	E	E1	e	e1	L	L1	$\theta$	
Dimension (mm)	MIN	0.89	0.01	0.88	0.30	2.80	2.10	1.20	0.95 BSC	1.90 BSC	0.20 <sup>†</sup> 0.50 0.60	0.54 REF	0°
	NOM	-	-	0.95	-	2.90	-	1.30					-
	MAX	1.12	0.10	1.02	0.50	3.04	2.64	1.40					8°

JEDEC Registration TO-236, Variation AB, Issue H, Jan. 1999.

<sup>†</sup> This dimension differs from the JEDEC drawing.

Drawings not to scale.

Supertex Doc.#: DSPD-3TO236ABK1, Version C041309.

(The package drawing(s) in this data sheet may not reflect the most current specifications. For the latest package outline information go to <http://www.supertex.com/packaging.html>.)

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Тел: +7 (812) 336 43 04 (многоканальный)

Email: [org@lifeelectronics.ru](mailto:org@lifeelectronics.ru)