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Fault Protection Switch with Current Fold-back

Features

- Up to 100V input voltage protection
- Low on resistance – 4.0Ω typical
- Fast switching speed
- No external supplies needed

Applications

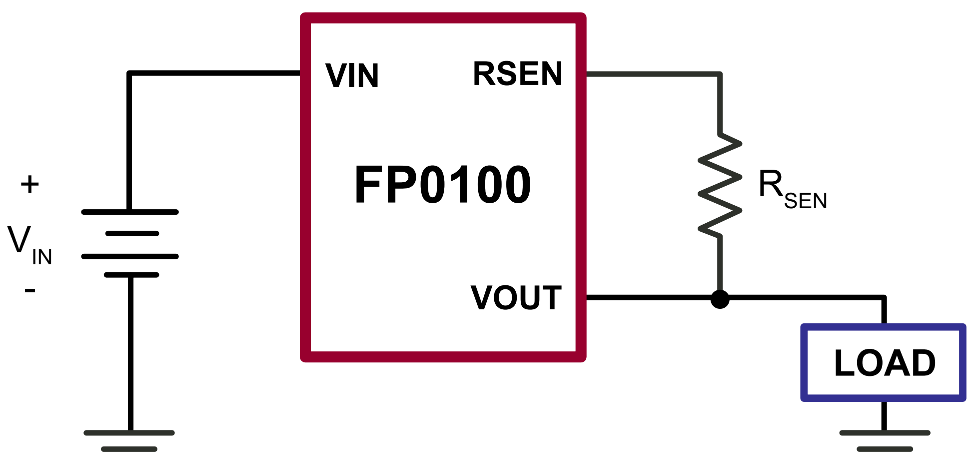
- Power supplies
- Fast resettable fuse
- High side switches
- Data acquisition

General Description

The Supertex FP0100 is a high voltage fault protection switch with current fold-back. It is designed to protect system output power supplies against over-current or short circuit conditions. In protection mode, the FP0100 limits the current to 300µA.

The FP0100 can be considered as a normally closed switch with a typical switch resistance of 4.0Ω. The peak current allowed to pass through the switch can be set by an external resistor across VOUT and RSEN. Once the voltage drop across VIN and VOUT exceeds a nominal value of 3.0V, the input current will fold-back to 300µA. In the off state, the FP0100 can withstand up to 100V. Higher input voltages can be accommodated by using an external depletion-mode MOSFET. Please refer to Figure 4 for more details. The FP0100 is available in a SOT-89 package.

Typical Application Circuit



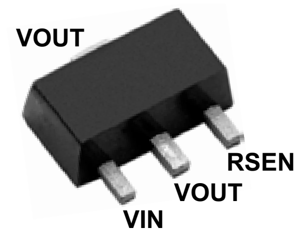
Ordering Information

Part Number	Package	Packing
FP0100N8-G	3-Lead SOT-89	2000/Reel

-G denotes a lead (Pb)-free / RoHS compliant package

ESD Sensitive Device

Pin Configuration



TO-243AA (SOT-89)

Product Marking

F10YW

Y = Code for year sealed
W = Code for week sealed
= "Green" Packaging

Package may or may not include the following marks: Si or

TO-243AA (SOT-89)

Absolute Maximum Ratings

Parameter	Value
V_{IN} - V_{OUT}, differential input voltage range	0 to +110V
Maximum junction temperature	+125°C
Storage temperature range	-65° to +150°C
Power dissipation, T_A@25°C	1.6W[1]

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	θ_{ja}
3-Lead SOT-89	133°C/W

Electrical Characteristics *(T_A = 25°C unless otherwise specified)*

Sym	Parameter	Min	Typ	Max	Units	Conditions
V_{IN} - V_{OUT}	Differential input voltage range	0	-	100	V	V_{OUT} = GND, I_{IN} = 600μA
I_{PEAK}	Peak current	-	260	-	mA	R_{SEN} = 0Ω
		-	20	40	mA	R_{SEN} = 50Ω
		-	10	20	mA	R_{SEN} = 100Ω
I_{OFF}	Off current	-	300	600	μA	V_{IN} - V_{OUT} = 100V, See I-V curve
R_{ON}	On resistance	-	4.0	6.0	Ω	I_{IN} = 20mA, R_{SEN} = 0Ω
V_{TRIP}	$V_{IN - OUT}$ trip point to turn off	-	3.0	-	V	R_{SEN} = 50Ω, I_{IN} = 90% of I_{PEAK} See I-V curve
V_{OFF}	Switch turn off voltage	-	-	4.5	V	I_{OFF} ≤ 600μA
T_J	Operating junction temperature	-40	-	+125	°C	---

Block Diagram

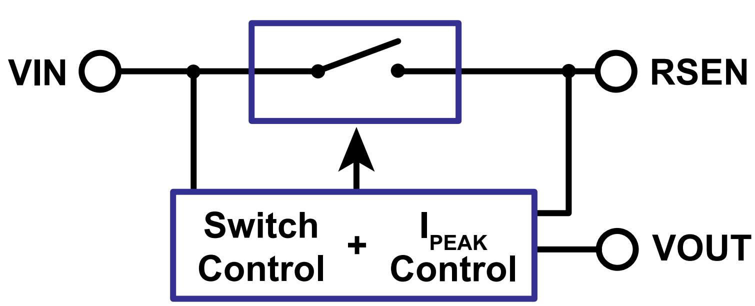


Figure 1. Typical I-V Characteristics

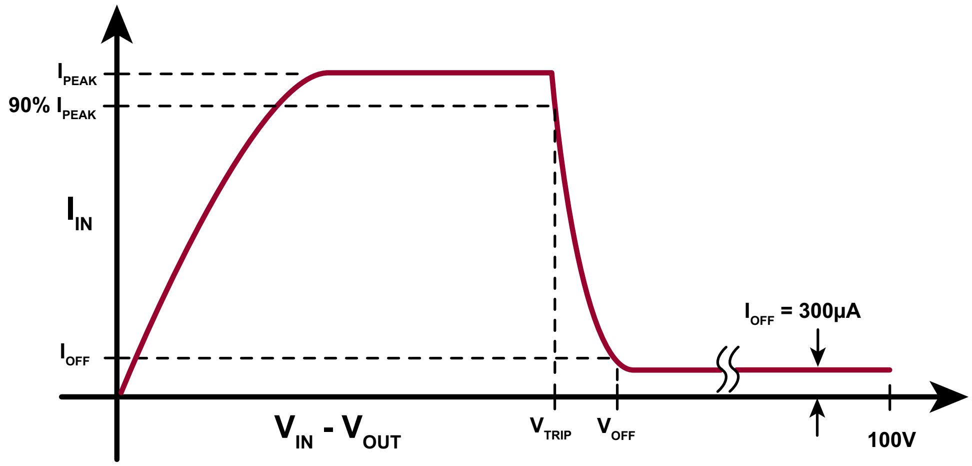
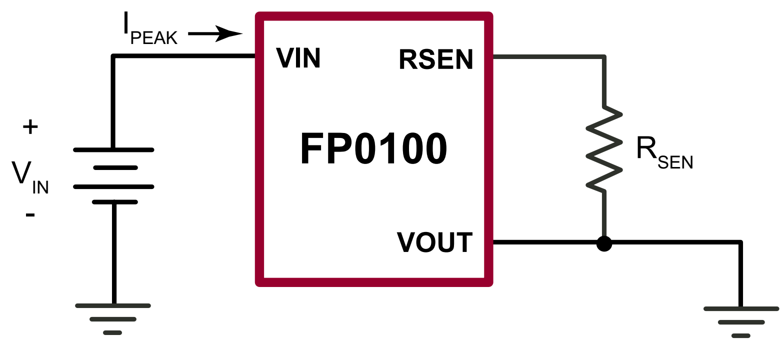


Figure 2. Test Circuit for I_{PEAK} vs R_{SEN}



The input peak current, I_{PEAK}, can be lowered by adding an external resistor across the RSEN and VOUT pins as shown in the test circuit in Figure 2. I_{PEAK} will decrease as the resistor value of R_{SEN} increases. The typical I_{PEAK} vs R_{SEN} characteristic is shown in Figure 3.

Figure 3. Typical I_{PEAK} vs R_{SEN} Characteristic

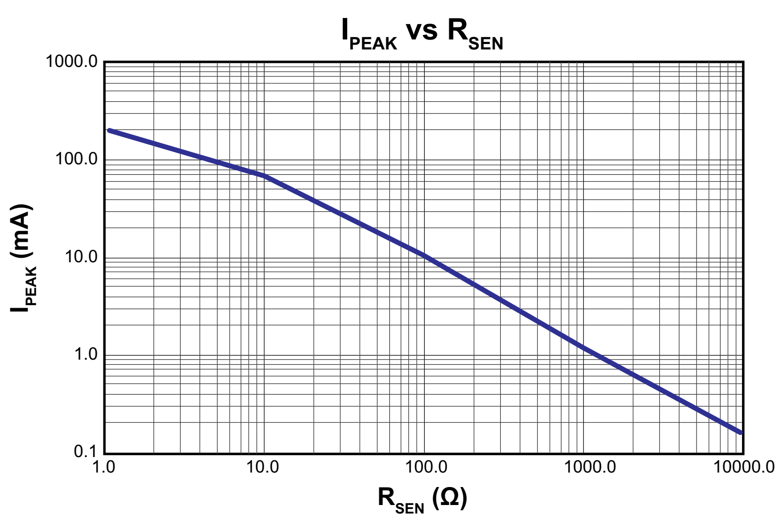


Figure 4. Higher Input Voltage Application

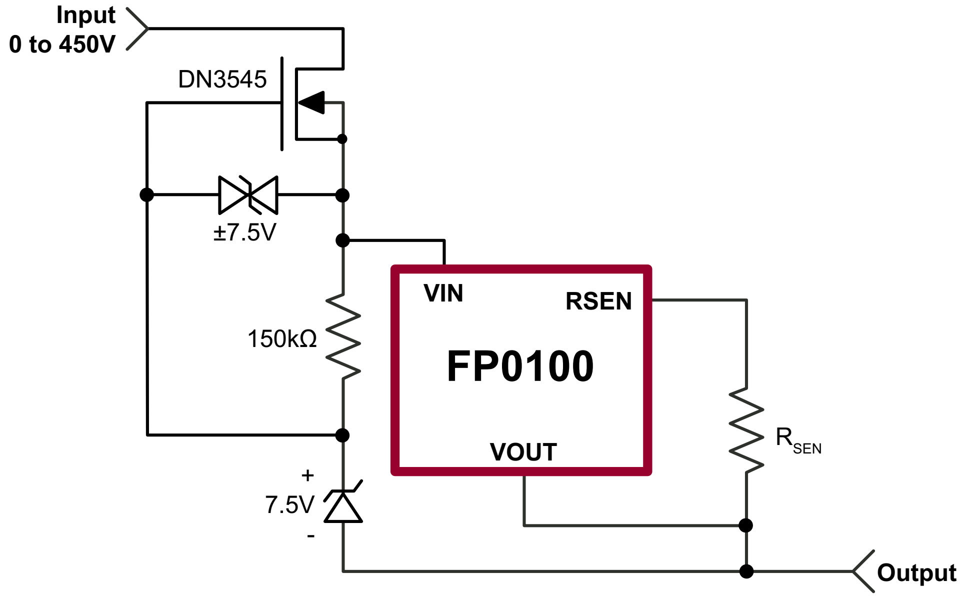
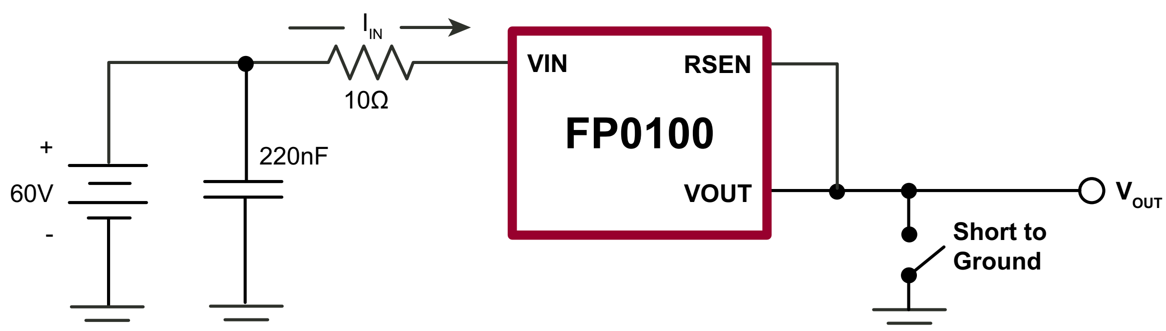
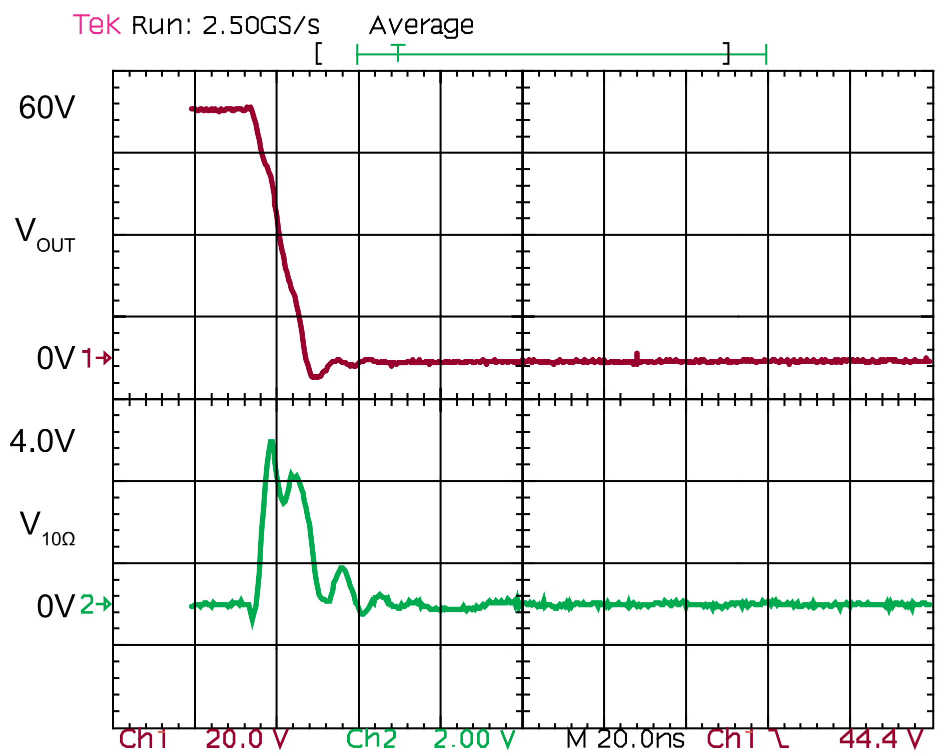


Figure 5. Short Circuit Test Performance



The FP0100 has a typical response time of less than 30ns. The short circuit test set-up is shown in Figure 5. The output is at 60V prior to a short. A 10Ω resistor is used to measure the current going into the FP0100. A 220nF ceramic capacitor is added on the input to supply any transient currents that might occur. The waveform is shown in Figure 6. Channel 1 is the output voltage which is discharged to 0V. Channel 2 is the voltage across the 10Ω resistor. The input current peaks to 400mA then decays quickly within 20ns.

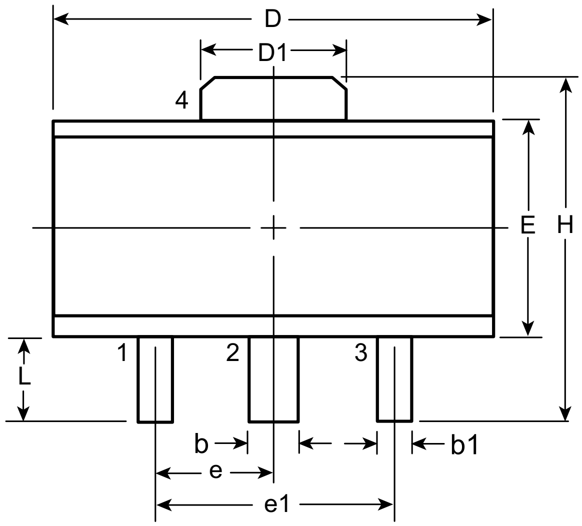
Figure 6. Typical Short Circuit Waveforms



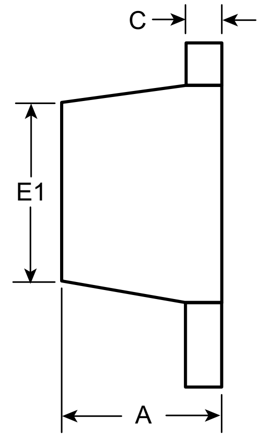
Pin Description

Pin #	Pin Name	Description
1	VIN	Input voltage
2, 4	VOUT	Output voltage
3	RSEN	Current sense for I_{PEAK} control. Connects to an external resistor across the RSEN and VOUT pins to set the I_{PEAK}.

3-Lead TO-243AA (SOT-89) Package Outline (N8)



Top View



Side View

Symbol		A	b	b1	C	D	D1	E	E1	e	e1	H	L
Dimensions (mm)	MIN	1.40	0.44	0.36	0.35	4.40	1.62	2.29	2.00†	1.50 BSC	3.00 BSC	3.94	0.73†
	NOM	-	-	-	-	-	-	-	-			-	-
	MAX	1.60	0.56	0.48	0.44	4.60	1.83	2.60	2.29			4.25	1.20

JEDEC Registration TO-243, Variation AA, Issue C, July 1986.
† This dimension differs from the JEDEC drawing
***Drawings not to scale**.*
***Supertex Doc. #:** DSPD-3TO243AAN8, Version F111010.*

(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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