

±60V AC Switch with Current Fold-Back Protection

Features

- ▶ Up to ±60V input voltage protection
- ▶ Low on resistance – 4.0Ω typical
- ▶ Current fold-back protection
- ▶ No external power supplies needed
- ▶ Simple 3-pin SOT-89 package

Applications

- ▶ Solenoid valve control
- ▶ AC relay control
- ▶ Relay replacement
- ▶ Resettable fuse

General Description

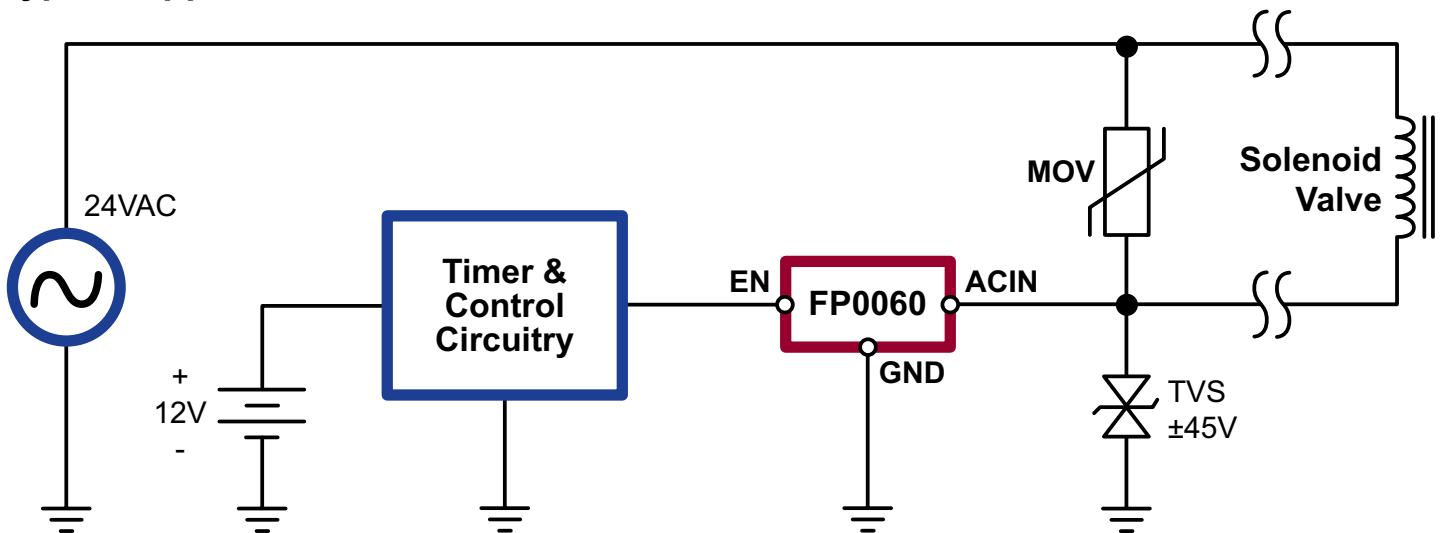
The Supertex FP0060 is a low voltage AC switch with current fold-back protection. It is designed to be used as an AC low side switch.

The FP0060 has a maximum switch resistance of 5.0Ω. The switch can be controlled by an enable pin, EN. The enable pin is designed for 12V CMOS logic input. When EN is low, the switch is open. When EN is high, the switch is closed. In the open state, the device can withstand up to ±60V. This enables users to control 24VAC lines with 12V logic.

The FP0060 has built-in current fold-back. If the load is shorted, the FP0060 will detect a high current condition and will quickly turn-off the switch. The switch will automatically turn back on when the short is removed.

The FP0060 does not have a DC power supply pin. It operates from the EN pin. This allows the device to be packaged in an economical 3-pin SOT-89 package.

Typical Application Circuit



Ordering Information

Part Number	Package	Packing
FP0060N8-G	3-Lead TO-243AA (SOT-89)	2000/Reel

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



Absolute Maximum Ratings

Parameter	Value
V_{AC-IN} , Maximum input voltage	-70V to +70V
Maximum input voltage for EN	+15V
Maximum junction temperature	+125°C
Operating temperature	-40°C to +125°C
Storage temperature range	-65° to +150°C
Power dissipation, $T_A @ 25^\circ\text{C}$	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 TO-243AA (SOT-89)	173°C/W

Pin Configuration



Product Marking

F06YW

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

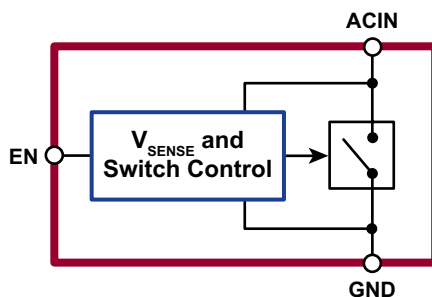
Package may or may not include the following marks: Si or

TO-243AA (SOT-89) (N8)

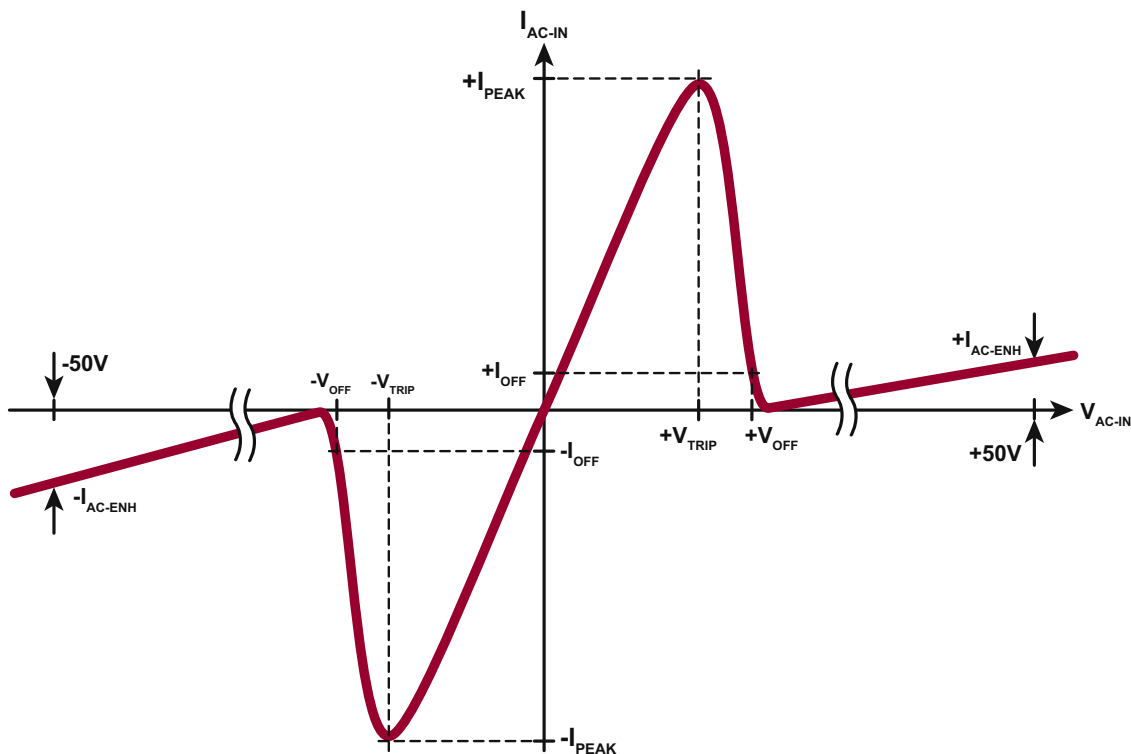
Electrical Characteristics ($T_j = 25^\circ\text{C}$ unless otherwise specified)

Sym	Parameter	Min	Typ	Max	Units	Conditions
V_{AC-IN}	AC_{IN} operating voltage	0	-	±60	V	EN = 0V, $I_{AC-IN} = \pm 8.0\text{mA}$
R_{SW}	AC_{IN} switch on-resistance	-	4.0	5.0	Ω	EN = 12V, $I_{AC-IN} = \pm 200\text{mA}$
V_{TRIP}	V_{AC-IN} to GND trip point to turn-off	-	±3.0	-	V	EN = 12V
V_{OFF}	Switch turn-off voltage	-	±3.1	-	V	EN = 12V, $I_{OFF} = \pm 1.0\text{mA}$
$+I_{AC-ENH}$	Enable high positive leakage current	-	0.8	2.6	mA	EN = 12V, $V_{AC-IN} = +50\text{V}$
$-I_{AC-ENH}$	Enable high negative leakage current	-14	-6.3	-	mA	EN = 12V, $V_{AC-IN} = -50\text{V}$
$+I_{AC-ENL}$	Enable low positive leakage current	-	0.8	2.6	mA	EN = 0V, $V_{AC-IN} = +50\text{V}$
$-I_{AC-ENL}$	Enable low negative leakage current	-2.6	-0.8	-	mA	EN = 0V, $V_{AC-IN} = -50\text{V}$
I_{PEAK}	Peak switching current	-	±1.0	-	A	$V_{AC-IN} = \pm 50\text{V}$
V_{IH}	Enable input logic high	10.8	12	13.2	V	---
V_{IL}	Enable input low low	0	-	1.2	V	---
I_{IH}	Enable input logic high current	-	-	2.5	mA	$V_{AC-IN} = +50\text{V}$
		-	-	7.5	mA	$V_{AC-IN} = -50\text{V}$
I_{IL}	Enable input logic low current	-	-	100	μA	$V_{AC-IN} = +50\text{V}$
		-	-	10	μA	$V_{AC-IN} = -50\text{V}$
T_{ON}	Turn-on time	-	-	30	μs	EN = 0V to 12V
T_{OFF}	Turn-off time	-	-	80	μs	EN = 12V to 0V
T_{SON}	Short circuit turn-on time	-	-	500	ns	EN = 12V, V_{AC-IN} = pulse 0 to 20V with 1.0 Ω to GND

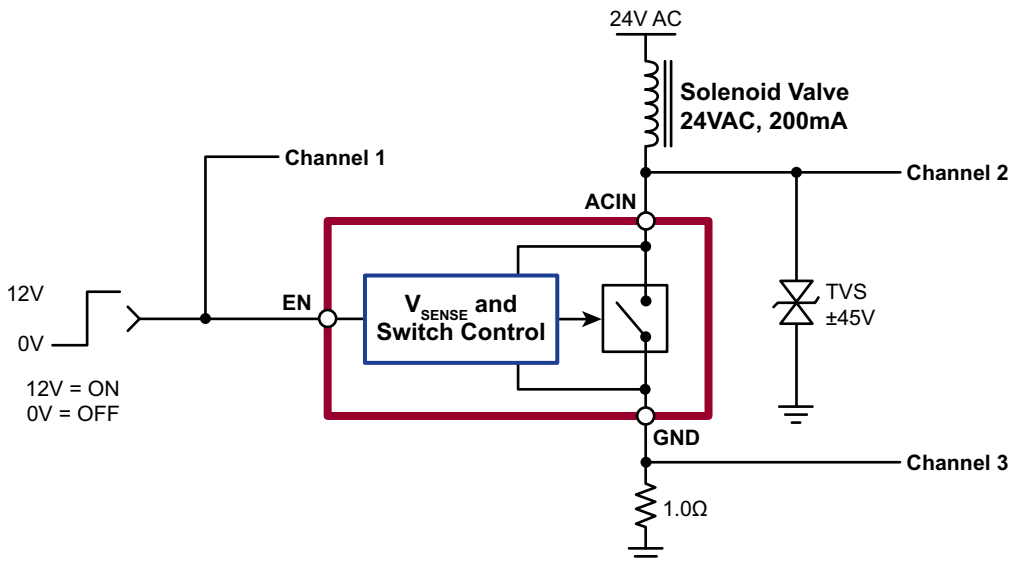
Block Diagram



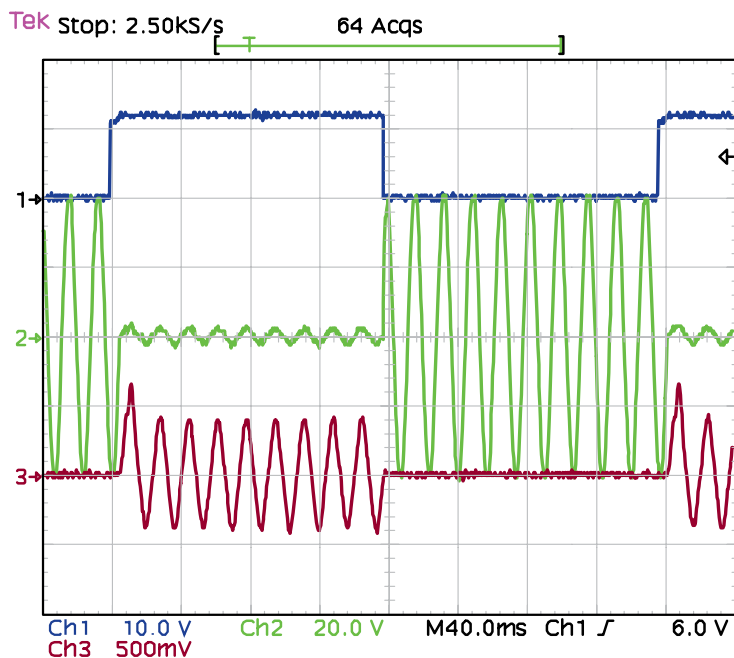
Typical I-V Characteristics (ON-state)



Test Circuit



Waveform: Solenoid not shorted

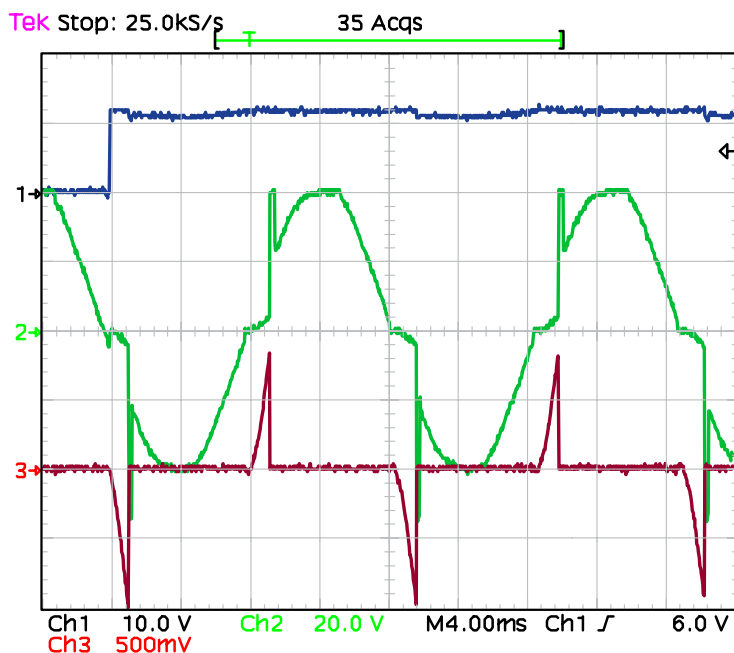


Channel 1: EN signal 0 to 12V logic input turning the solenoid on and off.

Channel 2: Voltage on ACIN pin. When off, the full AC voltage is seen on ACIN. When on, only about 2V drop due to IR drops.

Channel 3: Voltage across a 1.0Ω resistor. Sees the expected pull-in current of 700mA then 400mA peaks.

Waveform: Solenoid shorted



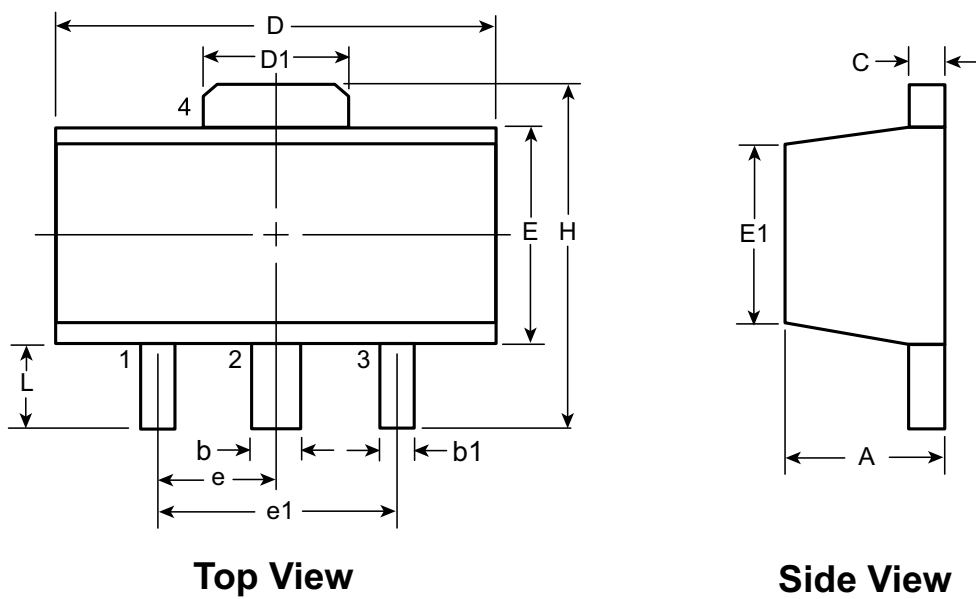
Enable from low to high into a shorted solenoid.

Peak currents of about ±1.0A. See inductive boosting action due to FP0060 turning off.

Pin Description

Pin Name	Description
EN	Enable pin. Logic high turns on the switch.
GND	Ground. Device ground.
ACIN	AC voltage input. Connect to load.

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



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>.)

Supertex inc. does not recommend the use of its products in life support applications, and will not knowingly sell them for use in such applications unless it receives an adequate "product liability indemnification insurance agreement." **Supertex inc.** does not assume responsibility for use of devices described, and limits its liability to the replacement of the devices determined defective due to workmanship. No responsibility is assumed for possible omissions and inaccuracies. Circuitry and specifications are subject to change without notice. For the latest product specifications refer to the **Supertex inc.** (website: <http://www.supertex.com>)