FP0100

Fault Protection Switch with Current Foldback

Features

- Up to ±100V Input Voltage Protection
- 4Ω On-resistance, Typical
- Fast-switching Speed
- No External Supplies Needed
- Available in a SOT-89 package

Applications

- Power Supplies
- Fast Resettable Fuses
- High-side Switches
- Data Acquisition

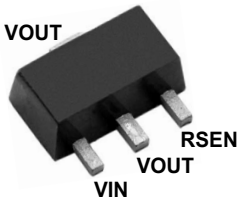
General Description

The FP0100 is a high-voltage Fault protection switch with current foldback. It is designed to protect system output power supplies against Overcurrent and Short-circuit conditions. In Protection mode, the FP0100 limits the current to 300 µA.

The FP0100 can be considered as a normally closed switch with a typical switch resistance of 4Ω. The peak current allowed to pass through the switch can be set by an external resistor across V_{OUT} and R_{SEN}. Once the voltage drop across V_{IN} and V_{OUT} exceeds a nominal value of 3V, the input current will foldback to 300 µA. In the OFF state, the FP0100 can withstand up to 100V. Higher input voltages can be accommodated using an external Depletion-mode MOSFET. Refer to Figure 3-3 for more details.

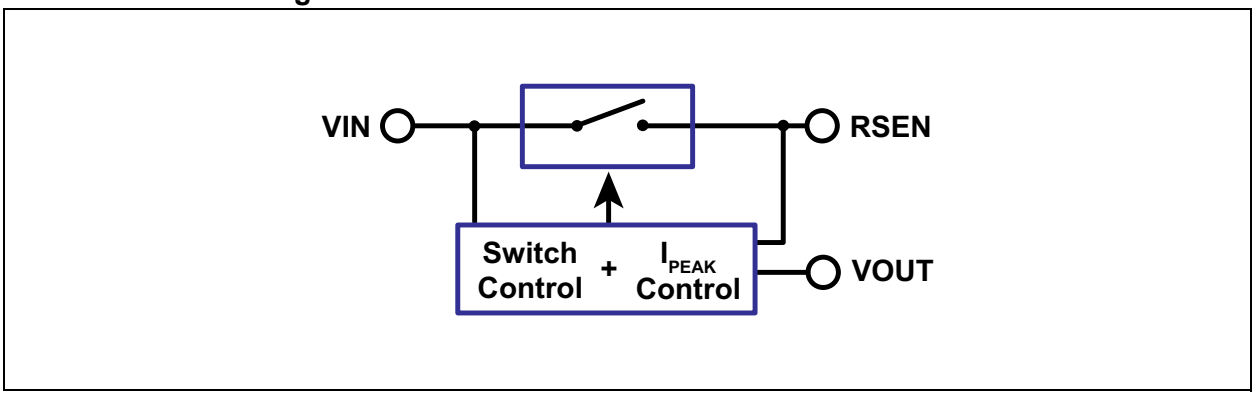
Package Type

3-lead SOT-89
(Top view)

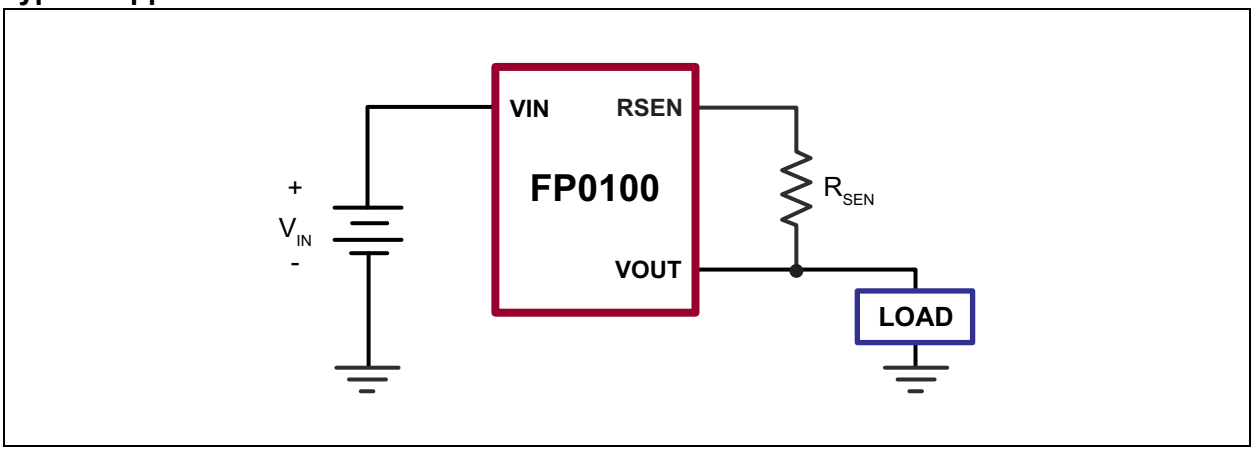


See Table 2-1 for pin information.

Functional Block Diagram



Typical Application Circuit



1.0 ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings†

Differential Voltage Drop, $V_{IN–OUT}$ ..... 0V to +110V
Maximum Junction Temperature, T_J ..... +125°C
Storage Temperature, T_S ..... –65°C to +150°C
Power Dissipation:
SOT-89 (**Note 1**) 1.6W
ESD Rating (**Note 2**) ..... ESD Sensitive

† Notice: Stresses above those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. This is a stress rating only, and functional operation of the device at those or any other conditions above those indicated in the operational sections of this specification is not intended. Exposure to maximum rating conditions for extended periods may affect device reliability.

Note 1: Mounted on an FR4 board, 25 mm x 25 mm x 1.57 mm

2: Device is ESD sensitive. Handling precautions are recommended.

ELECTRICAL CHARACTERISTICS

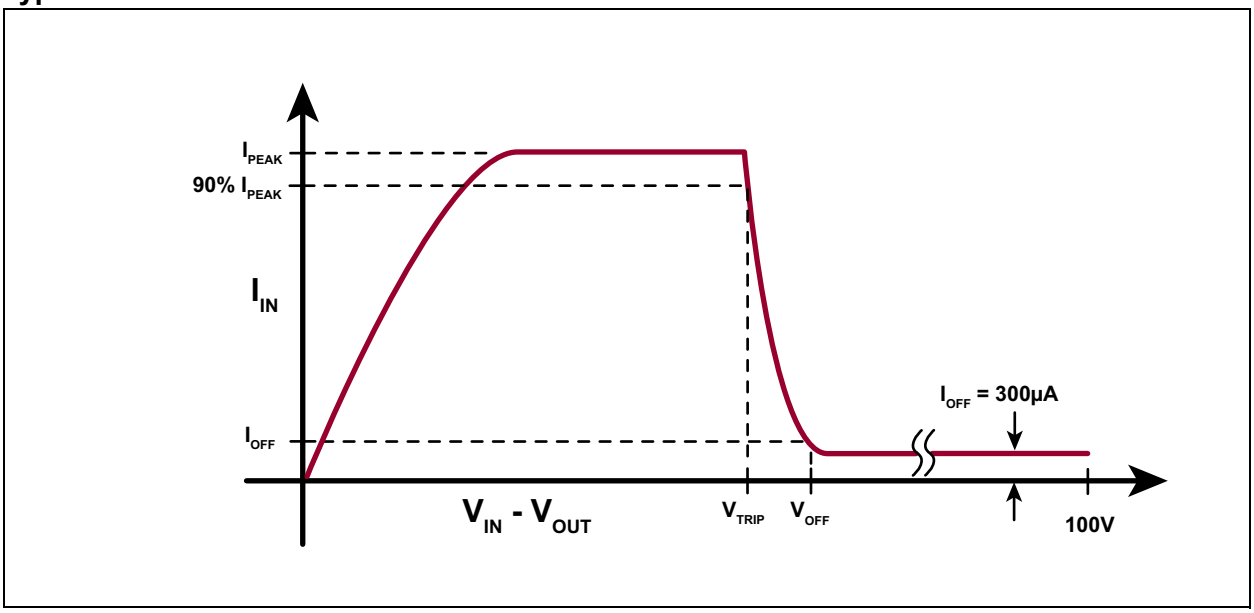
Electrical Specifications: T_J = 25°C unless otherwise specified.

Parameter	Sym.	Min.	Typ.	Max.	Unit	Conditions
Differential Input Voltage Range	$V_{IN}–V_{OUT}$	0	—	100	V	V_{OUT} = GND, I_{IN} = 600 µA
Peak Current	I_{PEAK}	—	260	—	mA	R_{SEN} = 0Ω
		—	20	40	mA	R_{SEN} = 50Ω
		—	10	20	mA	R_{SEN} = 100Ω
Off Current	I_{OFF}	—	300	600	µA	$V_{IN}–V_{OUT}$ = 100V (See **Typical I-V Characteristics**.)
On Resistance	R_{ON}	—	4	6	Ω	I_{IN} = 20 mA, R_{SEN} = 0Ω
V_{IN-OUT} Trip Point to Turn Off	V_{TRIP}	—	3	—	V	R_{SEN} = 50Ω, I_{IN} = 90% of I_{PEAK} (See **Typical I-V Characteristics**.)
Switch Turn-off Voltage	V_{OFF}	—	—	4.5	V	I_{OFF} ≤ 600 µA

TEMPERATURE SPECIFICATIONS

Parameter	Sym.	Min.	Typ.	Max.	Unit	Conditions
TEMPERATURE RANGE						
Operating Junction Temperature	T_J	–40	—	+125	°C	
Storage Temperature	T_S	–65	—	+150	°C	
PACKAGE THERMAL RESISTANCE						
3-lead SOT-89	θ_{JA}	—	133	—	°C/W	

Typical I-V Characteristics



2.0 PIN DESCRIPTION

The details on the pins of FP0100 are listed in Table 2-1. See **Package Type** for the location of pins.

TABLE 2-1: PIN FUNCTION TABLE

Pin Number	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}.

3.0 FUNCTIONAL DESCRIPTION

The input peak current I_{PEAK} can be lowered by adding an external resistor across the R_{SEN} and V_{OUT} pins as shown in the test circuit in Figure 3-1. I_{PEAK} decreases as the resistor value of R_{SEN} increases. The typical I_{PEAK} vs. R_{SEN} characteristic is illustrated in Figure 3-2.

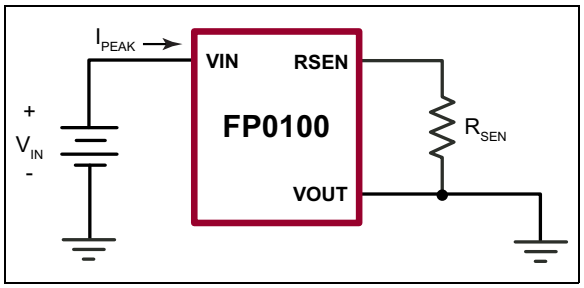


FIGURE 3-1: *Test Circuit for I_{PEAK} vs. R_{SEN}.*

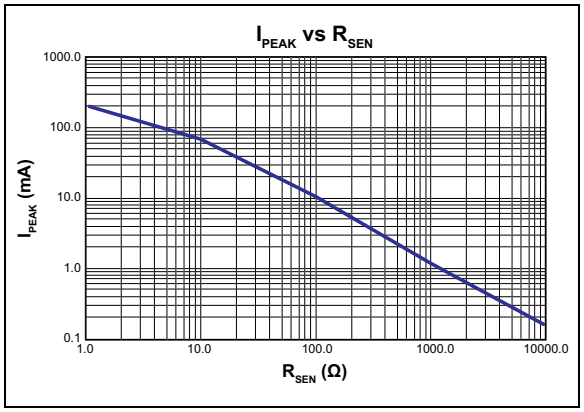


FIGURE 3-2: *Typical I_{PEAK} vs. R_{SEN} Characteristic.*

The FP0100 has a typical response time of less than 30 ns. The short-circuit test setup is demonstrated in Figure 3-4. The output is at 60V prior to a short. A 10Ω resistor is used to measure the current going into the FP0100. A 220 nF ceramic capacitor is added to the input to supply any transient currents that might occur. The waveform is shown in Figure 3-5. 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 400 mA and then decays quickly within 20 ns.

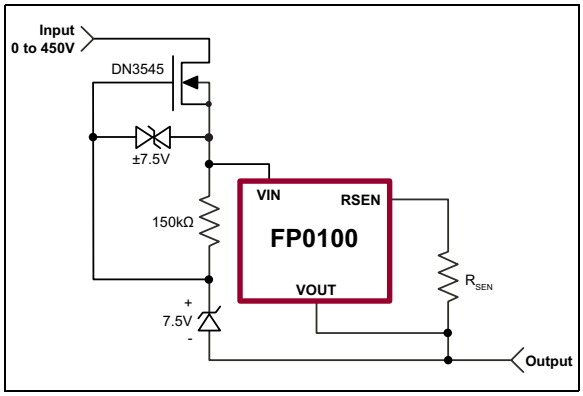


FIGURE 3-3: *Higher Input Voltage Application.*

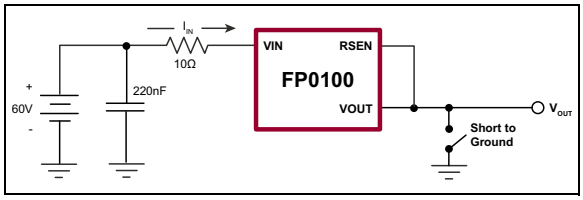


FIGURE 3-4: *Short-circuit Test Performance.*

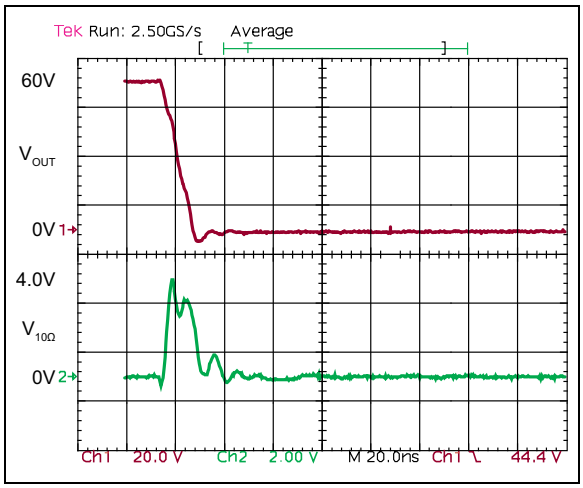
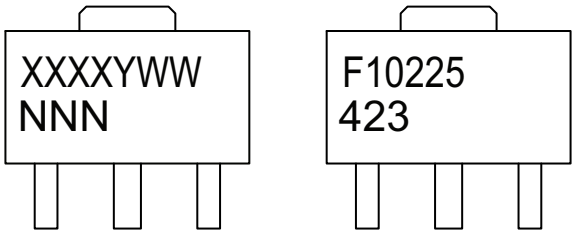


FIGURE 3-5: *Typical Short-circuit Waveforms.*

4.0 PACKAGING INFORMATION

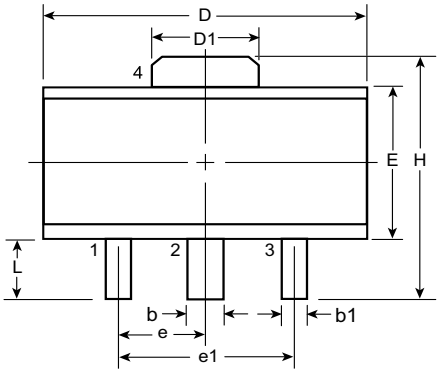
4.1 Package Marking Information

3-lead SOT-89 Example

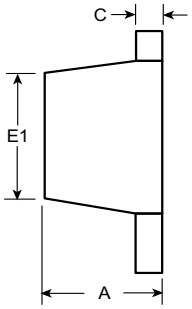


Legend:	XX...X	Product Code or Customer-specific information
	Y	Year code (last digit of calendar year)
	YY	Year code (last 2 digits of calendar year)
	WW	Week code (week of January 1 is week ‘01’)
	NNN	Alphanumeric traceability code
	(e3)	Pb-free JEDEC® designator for Matte Tin (Sn)
	*	This package is Pb-free. The Pb-free JEDEC designator ((e3)) can be found on the outer packaging for this package.
Note:	In the event the full Microchip part number cannot be marked on one line, it will be carried over to the next line, thus limiting the number of available characters for product code or customer-specific information. Package may or not include the corporate logo.	

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



Top View



Side View

Note: For the most current package drawings, see the Microchip Packaging Specification at www.microchip.com/packaging.

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.

NOTES:

APPENDIX A: REVISION HISTORY

Revision A (September 2022)

- Converted Supertex Doc# DSFP-FP0100 to Microchip DS20005814A
- Changed the package marking format
- Changed the 3-lead TO-243AA (SOT-89) package marking to 3-lead SOT-89 to align packaging specifications with the actual BQM
- Made minor text changes throughout the document

PRODUCT IDENTIFICATION SYSTEM

To order or obtain information, e.g., on pricing or delivery, contact your local Microchip representative or sales office.

PART NO.	XX	-	X	-	X
Device	Package Options		Environmental		Media Type

Device:	FP0100	=	Fault Protection Switch with Current Foldback
Package:	N8	=	3-lead SOT-89
Environmental:	G	=	Lead (Pb)-free/RoHS-compliant Package
Media Type:	(blank)	=	2000/Reel for an N8 Package

Example:

a) FP0100N8-G: Fault Protection Switch with Current Foldback, 3-lead SOT-89, 2000/Reel

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ISBN: 978-1-6683-1330-5

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