

# High-side Power Switch ICs [Surface-mount, current monitor output function] **SPF5018**

## Features

- Internal current sense resistor
- High accuracy current monitor output (sample & hold function)
- Built-in overcurrent and thermal protection circuits

## Absolute Maximum Ratings

(Ta=25°C)

Parameter	Symbol	Ratings	Unit	Conditions
Power supply voltage 1	V <sub>B</sub>	0 to 32	V	
Power supply voltage 2	V <sub>CC</sub>	-0.5 to 7.0	V	
Power supply voltage 3	V <sub>B</sub>	0 to 40	V	V <sub>B</sub> terminal, t = 1 min
Current sensing voltage	V <sub>sense</sub> <sup>+</sup>	-0.8 to 6	V	
	V <sub>sense</sub> <sup>-</sup>	V <sub>sense</sub> <sup>+</sup> ± I <sub>o</sub> • R <sub>sense</sub>		
Output terminal voltage	V <sub>OUT</sub>	-2 to 32	V	
Input terminal voltage	V <sub>PWM</sub>	-0.5 to 7.0	V	
	V <sub>Hold</sub>			
Output current	I <sub>OUT</sub>	2.0	A	
Power dissipation	P <sub>D</sub>	2.0	W	Depends on surface-mount board pattern
Storage temperature	T <sub>stg</sub>	-40 to +150	°C	
Channel temperature	T <sub>ch</sub>	150	°C	

## Electrical Characteristics

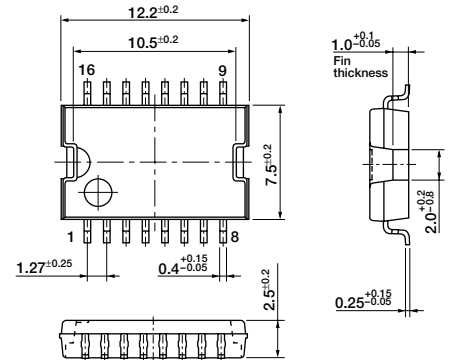
(V<sub>B</sub>=14V, Ta=25°C unless otherwise specified)

Parameter	Symbol	Ratings			Unit	Conditions
		min	typ	max		
Min. operating power supply voltage	V <sub>B</sub> min	6			V	Minimum operation of OUT terminal.
Operating power supply voltage 1	V <sub>B</sub>	10	14	16	V	*1
Operating power supply voltage 2	V <sub>CC</sub>		5.0		V	*2
Quiescent circuit current 1	I <sub>qvb</sub>			7.2	mA	V <sub>CC</sub> =5V, V <sub>PWM</sub> =0V
Quiescent circuit current 2	I <sub>qvcc</sub>			0.2	mA	V <sub>CC</sub> =5V, V <sub>PWM</sub> =0V
PWM terminal input voltage	V <sub>PWMH</sub>	3.5			V	V <sub>CC</sub> =5V
	V <sub>PWML</sub>			1.5		
PWM terminal input current	I <sub>PWMH</sub>		70	110	μA	V <sub>CC</sub> =5V, V <sub>PWM</sub> =5V, Active H *3
	I <sub>PWML</sub>					
Hold terminal input voltage	V <sub>HoldH</sub>	3.5			V	V <sub>CC</sub> =5V
	V <sub>HoldL</sub>			1.5		
Hold terminal input current	I <sub>HoldH</sub>		70	110	μA	V <sub>CC</sub> =5V, V <sub>PWM</sub> =5V, Active H *3
	I <sub>HoldL</sub>					
Output ON resistance	R <sub>DSon</sub>			0.14	Ω	I <sub>OUT</sub> =1A
				0.21		
Current sensing resistance	R <sub>sense</sub>			0.21	Ω	I <sub>OUT</sub> =1A
				0.25		
Overcurrent protection starting current	I <sub>s</sub>	3.0			A	*4
Thermal shutdown operating temperature	T <sub>tsd</sub>	150			°C	
Operation circuit for current monitor output	I <sub>o</sub>	0.2		1.2	A	*1
Current monitor output voltage	V <sub>SH</sub>			0.2	V	I <sub>o</sub> =0A, V <sub>CC</sub> =5V
		0.488	0.500	0.512		I <sub>o</sub> =0.2A, V <sub>CC</sub> =5V
		1.219	1.250	1.281		I <sub>o</sub> =0.5A, V <sub>CC</sub> =5V, Ta=-40 to 140°C
		2.925	3.000	3.075		I <sub>o</sub> =1.2A, V <sub>CC</sub> =5V, Ta=-40 to 140°C
Current monitor output current	I <sub>SH</sub>			5	mA	I <sub>o</sub> =1A, V <sub>CC</sub> =5V, V <sub>SH</sub> =0V
		-6				I <sub>o</sub> =1A, V <sub>CC</sub> =5V, V <sub>SH</sub> =5V
Output transfer time	t <sub>on</sub>			15	μs	I <sub>o</sub> =0.5A, V <sub>CC</sub> =5V
		t <sub>off</sub>				
Output rise time	t <sub>r</sub>			100	μs	
Output fall time	t <sub>f</sub>			50	μs	
Current monitor output hold time	t <sub>sh</sub>	500		650	μs	
Current monitor output delay time	t <sub>shd</sub>			1	μs	I <sub>o</sub> =0.5A, V <sub>CC</sub> =5V, C1=0.033μF
Hold time after inputting hold	t <sub>shh</sub>			2	μs	
S/H settling time	t <sub>stt</sub>			70	μs	V <sub>B</sub> =11V, V <sub>CC</sub> =5V, I <sub>o</sub> =1.2A, C1=0.033μF
				80		V <sub>B</sub> =11V, V <sub>CC</sub> =5V, I <sub>o</sub> =1.2A, C1=0.033μF, Ta=125°C

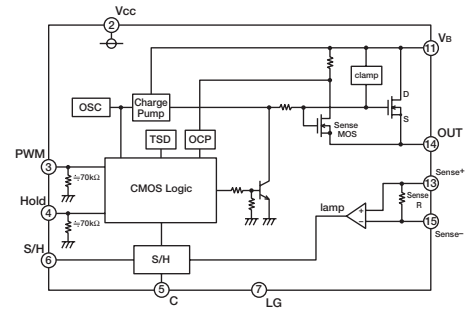
Note:

- \*1: Accuracy warranty range for current monitor output
- \*2: Equivalent errors are not included in current monitor output accuracy.
- \*3: With built-in pull-down resistance (70kΩ typ)
- \*4: Self-excitation and oscillation type
- \*5: Accuracy of current monitor output is affected by the materials of the hold capacitor (C1). The capacitor C1 must be of low dielectric absorption and have good bias and leak current characteristics.

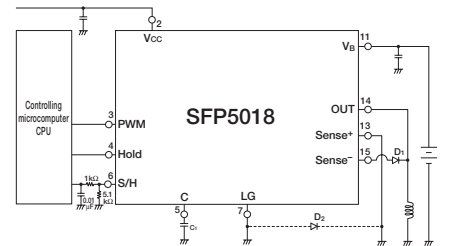
## External Dimensions (unit: mm)



## Block Diagram (for one channel)

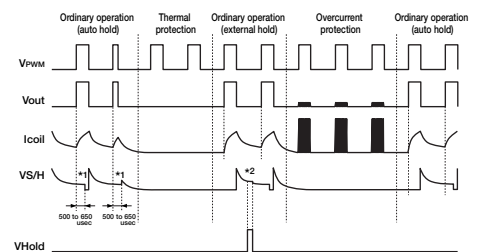


## Standard Connection Diagram



\* Use a Schottky Di for D2 when the Sense\* terminal is lower than the abs. max. rated voltage (-0.5V)

## Timing Chart



Truth table

V <sub>PWM</sub>	L	H
V <sub>OUT</sub>	L	H