

# 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

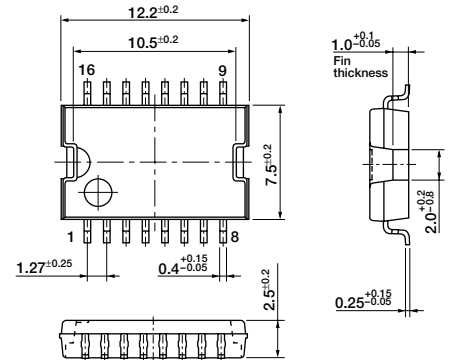
(V<sub>B</sub>=14V, Ta=25°C unless otherwise specified)

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	Ω	
Current sensing resistance	R <sub>sense</sub>			0.21	Ω	I <sub>OUT</sub> =1A
				0.25	Ω	
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	V	I <sub>o</sub> =0.2A, V <sub>CC</sub> =5V
		1.219	1.250	1.281	V	I <sub>o</sub> =0.5A, V <sub>CC</sub> =5V, Ta=-40 to 140°C
		2.925	3.000	3.075	V	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			mA	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>			15	μs	
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, C <sub>1</sub> =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, C <sub>1</sub> =0.033μF
				80	μs	V <sub>B</sub> =11V, V <sub>CC</sub> =5V, I <sub>o</sub> =1.2A, C <sub>1</sub> =0.033μF, Ta=125°C

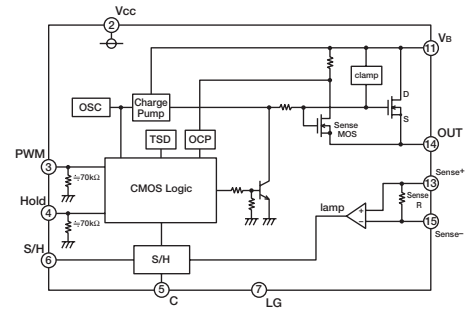
Note:

- \*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 (C<sub>1</sub>). The capacitor C<sub>1</sub> must be of low dielectric absorption and have good bias and leak current characteristics.

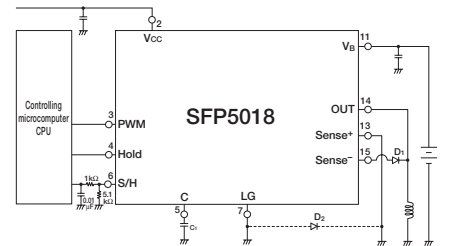
## External Dimensions (unit: mm)



## Block Diagram (for one channel)

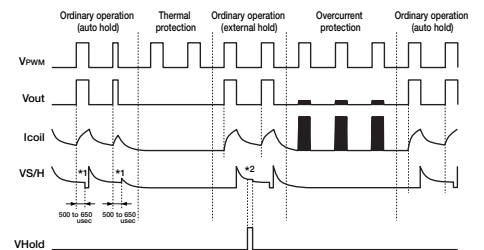


## Standard Connection Diagram



\* Use a Schottky Di for D<sub>2</sub> 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