

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 _B	0 to 32	V	
Power supply voltage 2	V _{CC}	-0.5 to 7.0	V	
Power supply voltage 3	V _B	0 to 40	V	V _B terminal, t = 1 min
Current sensing voltage	V _{sense} ⁺	-0.8 to 6	V	
	V _{sense} ⁻	V _{sense} ⁺ ± I _o • R _{sense}		
Output terminal voltage	V _{OUT}	-2 to 32	V	
Input terminal voltage	V _{PWM}	-0.5 to 7.0	V	
	V _{Hold}			
Output current	I _{OUT}	2.0	A	
Power dissipation	P _D	2.0	W	Depends on surface-mount board pattern
Storage temperature	T _{stg}	-40 to +150	°C	
Channel temperature	T _{ch}	150	°C	

Electrical Characteristics

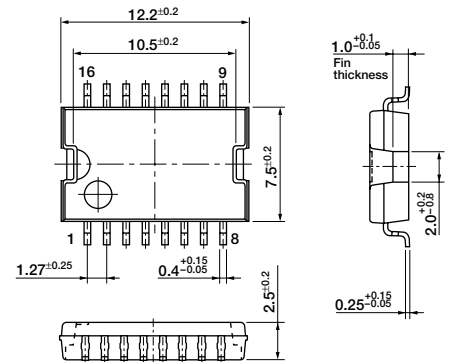
(V_B=14V, Ta=25°C unless otherwise specified)

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

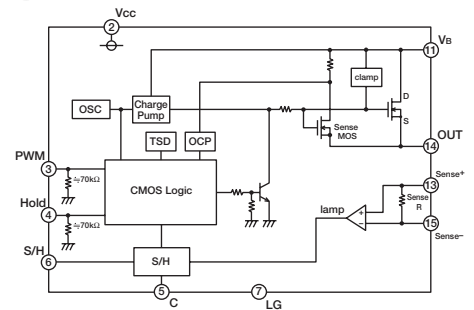
Note:

- *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.

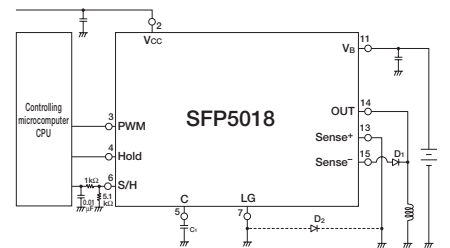
External Dimensions (unit: mm)



Block Diagram (for one channel)

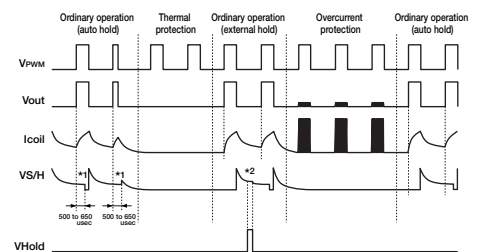


Standard Connection Diagram



* 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 _{PWM}	L	H
V _{OUT}	L	H