

Low-side Switch ICs [Surface-mount 4-circuits with Output Monitor] **SPF5012**

Features

- Output monitor circuit (DIAG)
- DMOS 4ch output
- Allows ON/OFF using C-MOS logic level
- Built-in overcurrent, overvoltage and thermal protection circuits

Absolute Maximum Ratings

(Ta=25°C)

Parameter	Symbol	Ratings	Unit	Conditions
Power supply voltage 1	V _B	40	V	
Power supply voltage 2	V _{CC}	7.5	V	
Output voltage	V _O	40 (DC)	V	*1
Logic input voltage	V _{IN}	-0.5 to +7.5	V	
Output current	I _O	Self Limited	A	
Diag output voltage	V _{DIAG}	0 to V _{CC}	V	
Power Dissipation	P _D	2.8 to 5	W	*2
Storage temperature	T _{stg}	-40 to +150	°C	
Channel temperature	T _{ch}	150	°C	
Output avalanche capability	E _{AV}	100	mJ	Single pulse

*1. At the clamping operation, refer to the section of V_{OUT (clamp)} in electrical characteristics

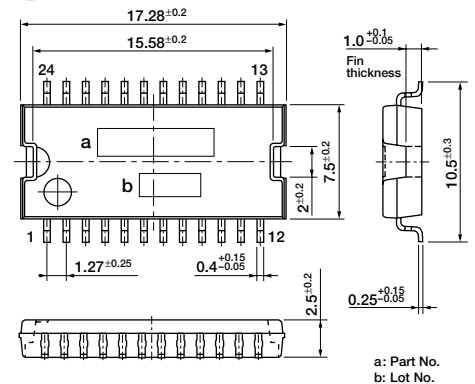
*2. Changes by the pattern of mounted substrate

Electrical Characteristics

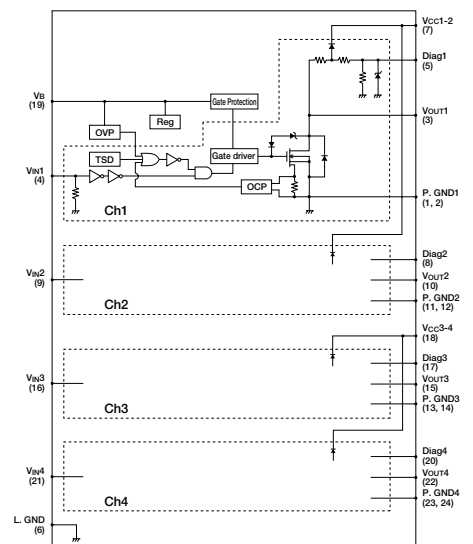
(V_B=14V, Ta=25°C unless otherwise specified)

Parameter	Symbol	Ratings			Unit	Conditions
		min	typ	max		
Operating power supply voltage 1	V _{B (opr)}	5.5		40	V	
Operating power supply voltage 2	V _{CC (opr)}	4.5		5.5	V	
Quiescent circuit current	I _q		4	6	mA	V _B =14V, V _{IN} =0V
Operating circuit current	I _d		8	12	mA	V _B =14V, V _{IN} =5V
Input voltage	Hi output	V _{IN}	3.5	5.5	V	V _B =14V, V _O =1A
	Lo output	V _{IN}	-0.5	1.5	V	V _B =14V
Input current	Hi output	I _{IN}		50	μA	V _B =14V, V _{IN} =5V
	Lo output	I _{IN}		-30	μA	V _B =14V, I _O 1A
Output ON resistance	R _{DS (ON)}			0.3	Ω	V _B =14V, I _O =1A, Ta=125°C
				0.2	Ω	V _B =14V, I _O =1A, Ta=25°C
Output clamp voltage	V _{OUT (clamp)}	45	50	55	V	V _B =14V, I _O =1A
Output leak current	I _{OH}			2.8	mA	V _B =14V, V _{CC} =5V, V _{IN} =0V, V _O =40V, Ta=25°C
				900	μA	V _B =14V, V _{CC} =5V, V _{IN} =0V, V _O =14V, Ta=25°C
Forward voltage of output stage diode	V _F			1.6	V	I _F =1A
Overvoltage protection starting voltage	V _{B (ovp)}	25		40	V	
Overvoltage protection hysteresis voltage	V _{B (ovp+hyss)}		8		V	
Thermal shutdown operating temperature	T _{TSD}	151	165		°C	V _B =14V
Overcurrent protection operating current	I _S	6			A	V _B =14V, Ta=-40°C
		6			A	V _B =14V, Ta=25°C
		5			A	V _B =14V, Ta=125°C
Output transfer time	T _{ON}			12	μs	V _B =14V, R _L =14Ω, I _O =1A
	T _{OFF}			8	μs	
Output rise time	T _r			5	μs	
Output fall time	T _f			10	μs	
Output-diag voltage ratio	r _a (DIAG)	0.195	0.2	0.205		V _B =14V, V _O =1 to 14V, R _{diag} =500kΩ
Diag output clamping voltage	V _{DIAG (clamp)}			4.85	V	V _B =14V, V _{CC} =5V, V _O =40V

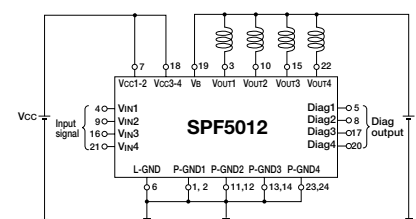
External Dimensions (unit: mm)



Equivalent Circuit Diagram



Circuit Example

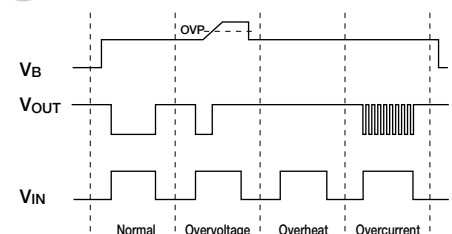


Truth table

V _{IN}	V _O
H	L
L	H

Short L-GND and P-GND in a pattern near the product.

Timing Chart



* Self-excited frequency is used in the overcurrent protection.