

# High-side Power Switch ICs [With Diagnostic Function, Surface-mount 3-circuits] **SPF5007**

## Features

- Built-in diagnostic function to detect short and open circuiting of loads and output status signals
- DMOS 3ch output
- Allows ON/OFF using C-MOS logic level
- Built-in overcurrent and thermal protection circuits

## Absolute Maximum Ratings

(Ta=25°C)

Parameter	Symbol	Ratings	Unit	Conditions
Power supply voltage	V <sub>B</sub>	35	V	
Input terminal voltage	V <sub>IN</sub>	-0.3 to 7	V	
Input terminal current	I <sub>IN</sub>	5	mA	
DG terminal voltage	V <sub>DG</sub>	-0.3 to 7	V	
DG terminal current	I <sub>DG</sub>	5	mA	
Drain to source voltage	V <sub>DS</sub>	V <sub>B</sub> -45	V	
Output current	I <sub>O</sub>	1.8	A	
Power dissipation	P <sub>D</sub>	2.7	W	Ta=25°C, all circuit operating
Source to drain Di forward current	I <sub>F</sub>	0.8	A	
Channel temperature	T <sub>ch</sub>	150	°C	
Operating temperature	T <sub>OP</sub>	-40 to +105	°C	
Storage temperature	T <sub>stg</sub>	-40 to +150	°C	

## Electrical Characteristics

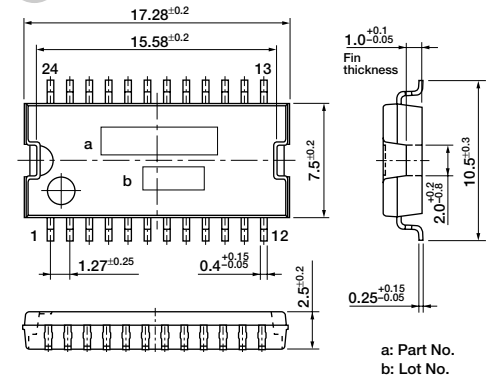
(V<sub>B</sub>=14V, Ta=25°C unless otherwise specified)

Parameter	Symbol	Ratings			Unit	Conditions	
		min	typ	max			
Operating power supply voltage	V <sub>B (opr)</sub>	5.5		35	V		
Quiescent circuit current	I <sub>q</sub>			1	mA	V <sub>IN</sub> =0V, V <sub>OUT</sub> =0V	
Output ON resistance	R <sub>DS (ON)</sub>			200	mΩ	I <sub>O</sub> =1A	
				350	mΩ	I <sub>O</sub> =1A, Ta=80°C	
Output leak current	I <sub>O, leak</sub>		50	100	μA	V <sub>OUT</sub> =0V	
Input threshold voltage	Output ON	V <sub>IHth</sub>	1.4	2.0	3.0	V	Ta=-40 to +105°C
	Output OFF	V <sub>ILth</sub>	1.0	1.8		V	Ta=-40 to +105°C
Input current	Output ON	I <sub>IH</sub>		70	200	μA	V <sub>IN</sub> =5V
	Output OFF	I <sub>IL</sub>			12	μA	V <sub>IN</sub> =0V
Overcurrent protection starting current	I <sub>s</sub>	1.9	3		A	V <sub>OUT</sub> =V <sub>O</sub> -1.5V	
Internal current limit	I <sub>Lim</sub>		5		A	V <sub>OUT</sub> =0V	
Thermal shutdown operating temperature	T <sub>TSD</sub>	155	165		°C		
Load open detection threshold voltage	V <sub>open</sub>	1.5	3	4.5	V		
Output transfer time	T <sub>ON</sub>		70	140	μs	R <sub>L</sub> =14Ω, V <sub>OUT</sub> =V <sub>B</sub> -5V	
	T <sub>OFF</sub>		35	90	μs	R <sub>L</sub> =14Ω, V <sub>B</sub> +10%	
DG leak current	I <sub>DG</sub>			20	μA	V <sub>DG</sub> =5.5V	
Low level DG output voltage	V <sub>DGL</sub>		0.15	0.5	V	I <sub>DG</sub> =1.6mA	
DG output transfer time	T <sub>PLH</sub>		70	140	μs		
	T <sub>PHL</sub>		45	120	μs		

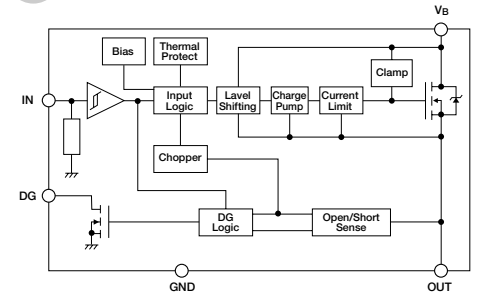
## Recommended Operating Conditions (for one channel)

Parameter	Ratings		Unit
	min	max	
Power supply voltage	5.5	16	V
V <sub>IH</sub>	4	5.5	V
V <sub>IL</sub>	-0.3	0.9	V
I <sub>O</sub>		1	A
R <sub>IN</sub>	10	20	kΩ
R <sub>DG</sub>	10	20	kΩ

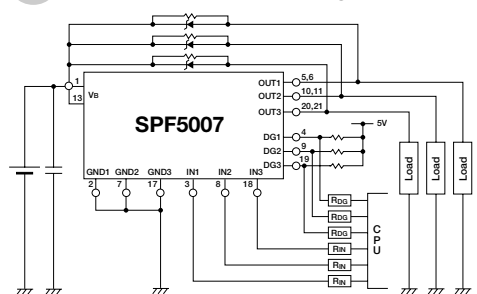
## External Dimensions (unit: mm)



## Block Diagram (for one channel)

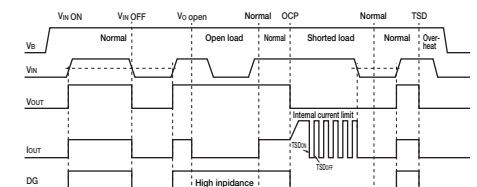


## Standard Connection Diagram



- \* R<sub>IN</sub> and R<sub>DG</sub> are needed to protect CPU and SPF5007 in case of reverse connection of V<sub>B</sub> terminal.
- \* Make V<sub>B</sub> of 1Pin and 13Pin short from the fin to be plated by solder.

## Timing Chart



Mode	V <sub>IN</sub>	DG	V <sub>O</sub>
Normal	H	H	H
	L	L	L
Open load	H	H	H
	L	H	H
Shorted load	H	L	L (Limiting)
	L	L	L
Overheat	H	L	L
	L	L	L