

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 _B | 35 | V | |
| Input terminal voltage | V _{IN} | -0.3 to 7 | V | |
| Input terminal current | I _{IN} | 5 | mA | |
| DG terminal voltage | V _{DG} | -0.3 to 7 | V | |
| DG terminal current | I _{DG} | 5 | mA | |
| Drain to source voltage | V _{DS} | V _B -45 | V | |
| Output current | I _O | 1.8 | A | |
| Power dissipation | P _D | 2.7 | W | Ta=25°C, all circuit operating |
| Source to drain Di forward current | I _F | 0.8 | A | |
| Channel temperature | T _{ch} | 150 | °C | |
| Operating temperature | T _{OP} | -40 to +105 | °C | |
| Storage temperature | T _{stg} | -40 to +150 | °C | |

Electrical Characteristics

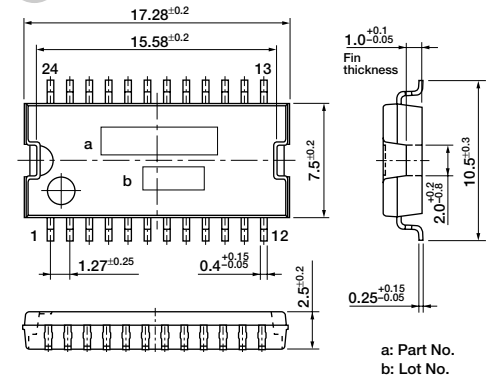
(V_B=14V, Ta=25°C unless otherwise specified)

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

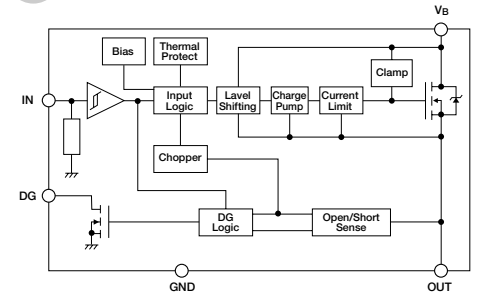
Recommended Operating Conditions (for one channel)

| Parameter | Ratings | | Unit |
|----------------------|---------|-----|------|
| | min | max | |
| Power supply voltage | 5.5 | 16 | V |
| V _{IH} | 4 | 5.5 | V |
| V _{IL} | -0.3 | 0.9 | V |
| I _O | | 1 | A |
| R _{IN} | 10 | 20 | kΩ |
| R _{DG} | 10 | 20 | kΩ |

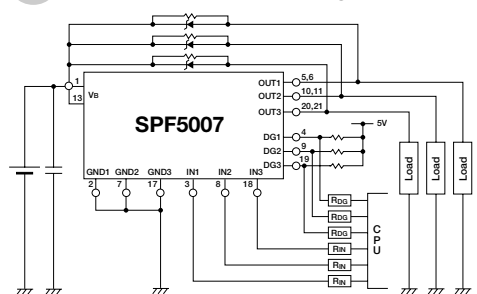
External Dimensions (unit: mm)



Block Diagram (for one channel)

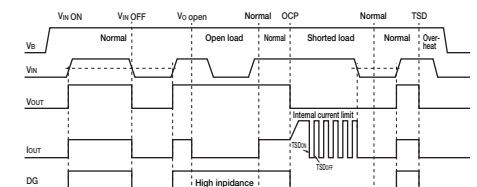


Standard Connection Diagram



- * R_{IN} and R_{DG} are needed to protect CPU and SPF5007 in case of reverse connection of V_B terminal.
- * Make V_B of 1Pin and 13Pin short from the fin to be plated by solder.

Timing Chart



| Mode | V _{IN} | DG | V _O |
|--------------|-----------------|----|----------------|
| Normal | H | H | H |
| | L | L | L |
| Open load | H | H | H |
| | L | L | L |
| Shorted load | H | L | L (Limiting) |
| | L | L | L |
| Overheat | H | L | L |
| | L | L | L |