

Low-side Switch ICs [Surface-mount 4-circuits]

SPF5009 (under development)

Features

- DMOS 4ch output
- Allows ON/OFF using C-MOS logic level
- Built-in over current and thermal protection circuit and diagnostic function to detect open load
- Built-in output status signals (over current, over heat and open load)

Absolute Maximum Ratings

(Ta=25°C)

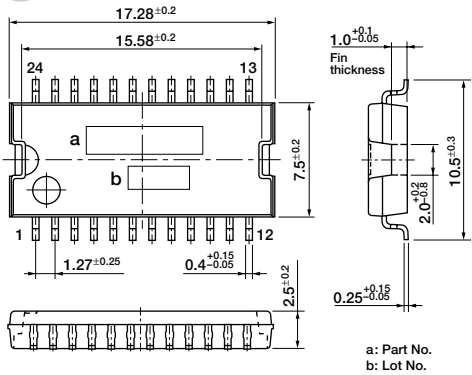
| Parameter                       | Symbol                     | Ratings                                  | Unit | Conditions   |
|---------------------------------|----------------------------|------------------------------------------|------|--------------|
| Power supply voltage            | V <sub>B</sub>             | 40                                       | V    |              |
| Output terminal voltage (DC)    | V <sub>OUT</sub>           | 50                                       | V    |              |
| Output terminal voltage (pulse) | V <sub>OUT</sub>           | Output clamping (max 70V)                | V    |              |
| Output current (DC)             | I <sub>OUT</sub>           | ±2.9                                     | A    |              |
| Output current (pulse)          | I <sub>OUT</sub>           | Over current protection starting current | A    |              |
| Input terminal voltage          | V <sub>IN (SEL, B/U)</sub> | -0.5 to +6.5                             | V    |              |
| Diag output source current      | V <sub>DIAG</sub>          | 6.5                                      | V    |              |
| Diag output voltage             | I <sub>DIAG</sub>          | 5                                        | mA   |              |
| Power Dissipation               | P <sub>D</sub>             | 2.8                                      | W    |              |
| Storage temperature             | T <sub>stg</sub>           | -40 to +150                              | °C   |              |
| Channel temperature             | T <sub>ch</sub>            | 150                                      | °C   |              |
| Output avalanche capability     | E <sub>AV</sub>            | 80                                       | mJ   | Single pulse |

Electrical Characteristics

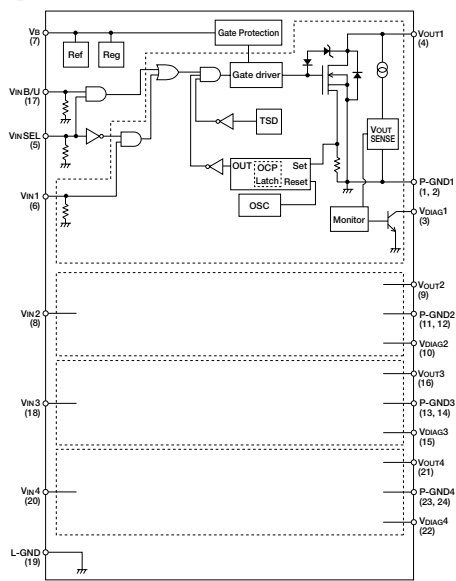
(V<sub>B</sub>=14V, Ta= 25°C unless otherwise specified)

| Parameter                                            | Symbol                   | Ratings |     |      | Unit | Conditions                                                   |
|------------------------------------------------------|--------------------------|---------|-----|------|------|--------------------------------------------------------------|
|                                                      |                          | min     | typ | max  |      |                                                              |
| Power supply voltage                                 | V <sub>B (opr)</sub>     | 5.5     |     | 40   | V    |                                                              |
| Quiescent circuit current                            | I <sub>q</sub>           |         | 9   | 12   | mA   | V <sub>B</sub> =14V, V <sub>IN</sub> =0V                     |
| Operating circuit current                            | I <sub>d</sub>           |         | 12  | 15   | mA   | V <sub>B</sub> =14V, V <sub>IN</sub> =5V (all inputs)        |
| Input voltage<br>(1 to 4, SEL, B/U)                  | V <sub>IN (H)</sub>      | 3.5     |     | 6.5  | V    | V <sub>B</sub> =14V, V <sub>O</sub> =1A                      |
|                                                      | V <sub>IN (L)</sub>      | -0.5    |     | 1.5  | V    | V <sub>B</sub> =14V                                          |
| Input current (single circuit)<br>(1 to 4, SEL, B/U) | I <sub>IN (H)</sub>      |         |     | 200  | μA   | V <sub>B</sub> =14V, V <sub>IN</sub> =5V                     |
|                                                      | I <sub>IN (L)</sub>      |         |     | 30   | μA   | V <sub>B</sub> =14V, V <sub>IN</sub> =0V                     |
| Output ON resistance                                 | R <sub>DS (ON)</sub>     |         |     | 0.18 | Ω    | V <sub>B</sub> =14V, I <sub>O</sub> =1A                      |
| Output clamp voltage                                 | V <sub>OUT (clamp)</sub> | 60      | 65  | 70   | V    | V <sub>B</sub> =14V, I <sub>O</sub> =1A                      |
| Output leak current                                  | I <sub>OH</sub>          |         |     | 50   | μA   | V <sub>B</sub> =14V, V <sub>O</sub> =50V                     |
| Forward voltage of output stage diode                | V <sub>F</sub>           |         |     | 1.5  | V    | I <sub>F</sub> =1A                                           |
| Output moniter threshold voltage                     | V <sub>thM</sub>         |         |     | 2    | V    | V <sub>B</sub> =14V                                          |
| DIAG output voltage                                  | V <sub>DIAG (H)</sub>    | 6.4     |     | 6.5  | V    | V <sub>B</sub> =14V, V <sub>DIAG</sub> =6.5V                 |
|                                                      | V <sub>DIAG (L)</sub>    |         |     | 0.5  | V    | V <sub>B</sub> =14V, I <sub>DIAG</sub> =5mA                  |
| DIAG output leak current                             | I <sub>DH</sub>          |         |     | 10   | μA   | V <sub>B</sub> =14V, V <sub>DIAG</sub> =6.5V                 |
| Thermal shutdown operating temperature               | T <sub>TSD</sub>         | 151     | 165 |      | °C   | V <sub>B</sub> =14V                                          |
| Overcurrent protection starting current              | I <sub>S</sub>           | 3.0     |     |      | A    | V <sub>B</sub> =14V                                          |
| Output transfer time                                 | T <sub>ON</sub>          |         |     | 12   | μs   | V <sub>B</sub> =14V, R <sub>L</sub> =14Ω, I <sub>O</sub> =1A |
|                                                      | T <sub>OFF</sub>         |         |     | 8    | μs   | V <sub>B</sub> =14V, R <sub>L</sub> =14Ω, I <sub>O</sub> =1A |
| Output rise time                                     | T <sub>r</sub>           |         |     | 5    | μs   | V <sub>B</sub> =14V, R <sub>L</sub> =14Ω, I <sub>O</sub> =1A |
| Output fall time                                     | T <sub>f</sub>           |         |     | 10   | μs   | V <sub>B</sub> =14V, R <sub>L</sub> =14Ω, I <sub>O</sub> =1A |
| DIAG output transfer time                            | t <sub>DON</sub>         |         |     | 12   | μs   | V <sub>B</sub> =14V, R <sub>L</sub> =14Ω, I <sub>O</sub> =1A |
|                                                      | t <sub>DOFF</sub>        |         |     | 8    | μs   | V <sub>B</sub> =14V, R <sub>L</sub> =14Ω, I <sub>O</sub> =1A |

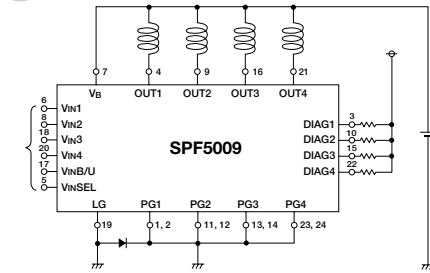
External Dimensions (unit: mm)



Equivalent Circuit Diagram



Circuit Example



Timing Chart

