

# Surface-mount 4-circuit Low-side Switch Array SPF5002

## Features

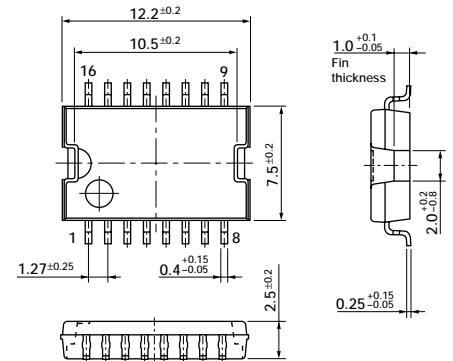
- DMOS 4ch output
- Allows ON/OFF using C-MOS logic level
- Built-in overcurrent, overvoltage and thermal protection circuits

## Absolute Maximum Ratings

(Ta=25°C)

| Parameter                   | Symbol           | Ratings      | Unit | Conditions   |
|-----------------------------|------------------|--------------|------|--------------|
| Power supply voltage        | V <sub>B</sub>   | 40           | V    |              |
| Output terminal voltage     | V <sub>OUT</sub> | 40           | V    |              |
| Input terminal voltage      | V <sub>IN</sub>  | -0.5 to +7.5 | V    |              |
| Output current              | I <sub>O</sub>   | 1            | A    |              |
| Power Dissipation           | P <sub>D</sub>   | 2            | 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>  | 100          | mJ   | Single pulse |

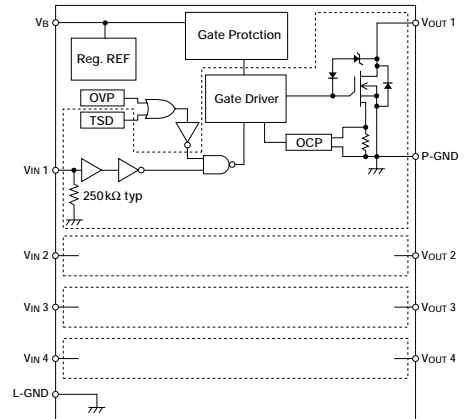
## External Dimensions (unit: mm)



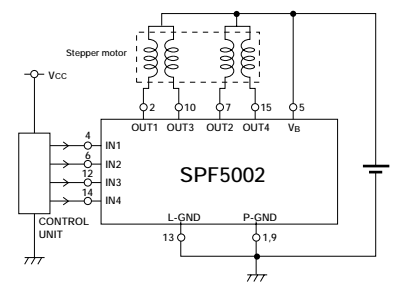
## Electrical Characteristics (V<sub>B</sub>=14V, T<sub>C</sub>=-40 to +125°C unless otherwise specified)

| Parameter                               | Symbol                    | Ratings |     |     | Unit | Conditions                              |
|-----------------------------------------|---------------------------|---------|-----|-----|------|-----------------------------------------|
|                                         |                           | min     | typ | max |      |                                         |
| Power supply voltage                    | V <sub>Bopv</sub>         | 5.5     |     | 32  | V    |                                         |
| Quiescent circuit current               | I <sub>q</sub>            |         | 4   | 6   | mA   | All outputs are OFF                     |
| Input voltage                           | Hi output V <sub>IN</sub> | 3.5     |     | 5.5 | V    | I <sub>O</sub> =1.5A                    |
|                                         | Lo output V <sub>IN</sub> | -0.5    |     | 1.5 | V    |                                         |
| Input current                           | Hi output I <sub>IN</sub> |         |     | 50  | μA   | V <sub>IN</sub> =7V                     |
|                                         | Lo output I <sub>IN</sub> |         |     | 30  | μA   | V <sub>IN</sub> =0V                     |
| Output ON voltage                       | V <sub>DS(on)</sub>       |         |     | 0.4 | V    | I <sub>O</sub> =0.5A                    |
|                                         |                           |         |     | 0.7 | V    | I <sub>O</sub> =1A                      |
| Output ON resistance                    | R <sub>DS(on)</sub>       |         | 0.4 |     | Ω    | Ta=25°C                                 |
|                                         |                           |         | 0.5 |     | Ω    | Ta=25°C, V <sub>B</sub> =5.5V           |
| Output clamp voltage                    | V <sub>OUT(clamp)</sub>   | 41      | 45  | 55  | V    | V <sub>B</sub> =14V, I <sub>O</sub> =1A |
| Output leak current                     | I <sub>OH</sub>           |         |     | 100 | μA   | V <sub>O</sub> =30V                     |
| Forward voltage of output stage diode   | V <sub>F</sub>            |         |     | 1.6 | V    | I <sub>F</sub> =0.5A                    |
| Overvoltage protection starting voltage | V <sub>B(ovp)</sub>       | 32      |     | 40  | V    |                                         |
| Thermal protection starting temperature | T <sub>TSD</sub>          | 151     | 165 |     | °C   |                                         |
| Overcurrent protection starting current | I <sub>S</sub>            | 1.9     |     |     | A    |                                         |
| Output transfer time                    | T <sub>ON</sub>           |         |     | 15  | μS   | R <sub>L</sub> =14Ω, I <sub>O</sub> =1A |
|                                         | T <sub>OFF</sub>          |         |     | 15  | μS   | R <sub>L</sub> =14Ω, I <sub>O</sub> =1A |
| Output rise time                        | T <sub>r</sub>            |         |     | 15  | μS   | R <sub>L</sub> =14Ω, I <sub>O</sub> =1A |
| Output fall time                        | T <sub>f</sub>            |         |     | 15  | μS   | R <sub>L</sub> =14Ω, I <sub>O</sub> =1A |

## Equivalent Circuit Diagram



## Circuit Example

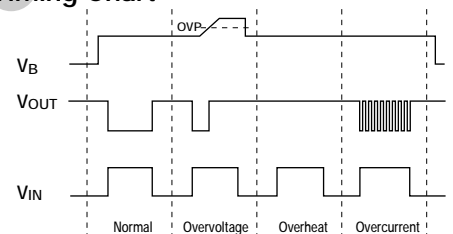


Truth table

| V <sub>IN</sub> | V <sub>O</sub> |
|-----------------|----------------|
| H               | L              |
| L               | H              |

Use L-GND and P-GND being connected.

## Timing Chart



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