

# 500V breakdown voltage Full bridge driver C SPF5103 (Negative drive system)

## Features

- 500V breakdown voltage negative power supply drive system
- Encapsulate IGBT (4pieces) and a control MIC
- Compact type power surface mount package
- Suitable for inverter element for HID ballast unit

## Absolute maximum ratings

| No. | Item                    | Symbol      | Unit | Rating   | Conditions                                  |
|-----|-------------------------|-------------|------|----------|---------------------------------------------|
| 1   | Power Source Voltage    | VM          | V    | 500      | between Power GND and -HV<br>Ta=-40°C~150°C |
| 2   | Input Voltage           | VIN         | V    | 15       | Ta=-40°C~150°C                              |
| 3   | Operating Voltage       | VCC         | V    | 15       | Ta=-40°C~150°C                              |
| 4   | Output Voltage          | VOU         | V    | 500      | Ta=-40°C~150°C                              |
| 5   | Output Current (DC)     | IOUT(DC)    | A    | 7        | Ta=25°C                                     |
| 6   | Output current (pulse)  | IOUT(pulse) | A    | 22       | Ta=125°C, Pulse width = 15 μs               |
| 7   | Total Power Dissipation | PD          | W    | 27.2     | Tc=25°C                                     |
| 8   | Thermal Resistance      | θj-c        | °C/W | 4.6      | Tc=25°C                                     |
| 9   | Operation Temperature   | Topr        | °C   | -40~+105 |                                             |
| 10  | Storage Temperature     | Tstg        | °C   | -40~+150 |                                             |
| 11  | Junction Temperature    | Tj          | °C   | 150      |                                             |

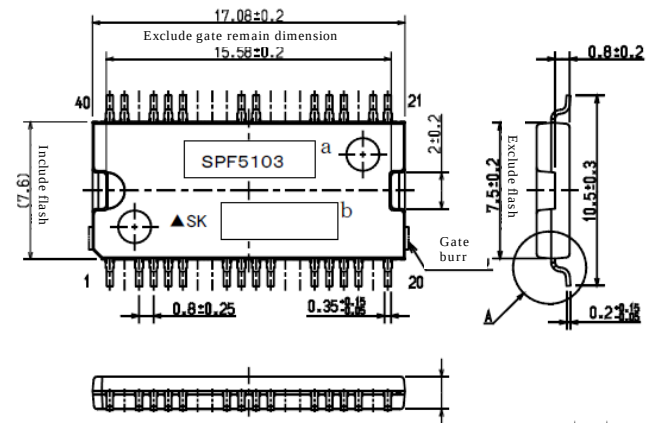
## Electrical characteristics

| No. | Item                                | Symbol             | Unit    | Value     |      |           | Conditions                                                 |
|-----|-------------------------------------|--------------------|---------|-----------|------|-----------|------------------------------------------------------------|
|     |                                     |                    |         | Min.      | Typ. | Max.      |                                                            |
| 1   | IGBT Output Breakdown Voltage       | BVOUT              | V       | 570       |      |           | IOUT=100 μA, Ta=25°C<br>IOUT=100 μA, Ta=-40~150°C          |
| 2   | IGBT Output Leakage Current         | IOUT(off)          | μA      |           |      | 100       | VOU=500V, Ta=25°C<br>VOU=500V, Ta=-40~150°C                |
| 3   | IGBT Output On-State Voltage        | VOUT(on)           | V       | 1.0       | 1.2  | 1.8       | IOUT=0.4A, VIN=10V<br>IOUT=2.0A, VIN=10V                   |
| 4   | Quiescent Circuit Current           | Icc1               | mA      |           |      | 3.0       | Vcc=10V, VM=VIN=0V, Ta=25°C                                |
|     |                                     |                    |         |           |      | 4.5       | Vcc=9~15V, VM=VIN=0V, Ta=-40~125°C                         |
|     |                                     | Icc2               | mA      |           |      | 4.0       | Vcc=10V, VM=450V, VIN=0V, Ta=25°C                          |
| 5   | Operating Circuit Current           |                    |         |           |      | 7.0       | Vcc=9~15V, VM=450V, VIN=0V, Ta=-40~125°C                   |
|     |                                     | Icc3               | mA      |           |      | 4.0       | Vcc=10V, VM=450V, VIN1(=VIN2)=10V, Ta=25°C                 |
|     |                                     |                    |         |           |      | 7.0       | Vcc=10V, VM=450V, VIN1(=VIN2)=10V, Ta=-40~125°C            |
| 6   | Input Threshold Voltage             | V <sub>IH</sub>    | V       | 0.8 · Vcc |      |           | Vcc=9~15V                                                  |
|     |                                     | V <sub>IL</sub>    | V       |           |      | 0.2 · Vcc |                                                            |
| 7   | Delay time                          | High side          | td(on)  |           | 2.0  | 2.3       | VM=85V, I <sub>c</sub> =0.41A                              |
|     |                                     |                    | td(off) |           | 2.4  | 2.8       | V <sub>CE</sub> =10V                                       |
|     |                                     |                    | Δtd     |           | 1.0  | 1.4       | V <sub>IN</sub> =10V(Out Stage=ON)                         |
|     |                                     | Low side           | td(on)  |           | 1.6  | 2.1       | V <sub>IN</sub> =0V(Out Stage=OFF)                         |
|     |                                     |                    | td(off) |           |      |           | Δtd=H/S td(off) - L/S td(on)                               |
|     |                                     |                    | Δtd     |           |      | 3.0       | or L/S td(off) - H/S td(on)                                |
| 8   | UVLO Voltage                        | V <sub>UVLO+</sub> | V       | 5.7       | 6.2  | 6.7       |                                                            |
| 9   | UVLO start voltage Hysteresis width | ΔV <sub>UVLO</sub> | V       | 0.1       | 0.2  | 0.4       | ΔV <sub>UVLO</sub> =V <sub>UVLO+</sub> -V <sub>UVLO-</sub> |
| 10  | Operating Voltage                   | VCC                | V       | 9         |      | 15        | Ta=-40~+105°C                                              |

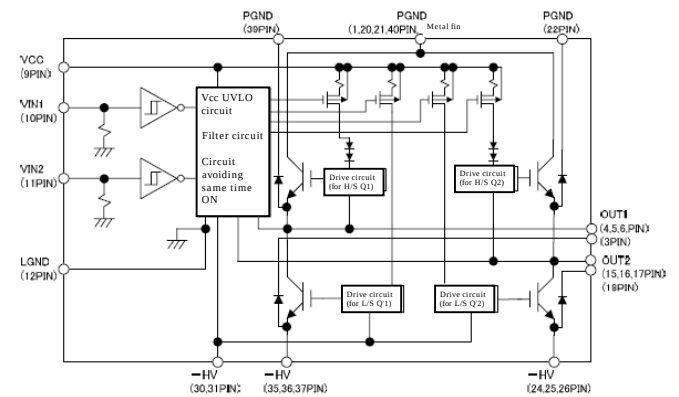
## Recommended operation

| No. | Item                   | Symbol | Unit | Value |      |      | Conditions                         |
|-----|------------------------|--------|------|-------|------|------|------------------------------------|
|     |                        |        |      | Min.  | Typ. | Max. |                                    |
| 1   | Stable operation dV/dt | dV/dt  | V/μs |       |      | 30   | Ta=-40~150°C<br>Vcc=9~15V, VM=400V |
| 2   | Recommended dead time  | td     | μs   | 3     |      |      | Ta=-40~150°C                       |

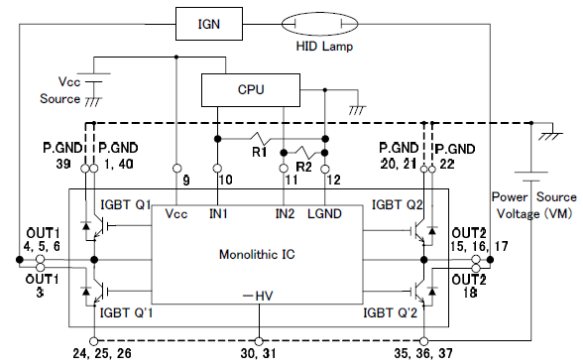
## Package



## Circuit block diagram



## Typical connection diagram



## Timing chart

