

MITSUBISHI SEMICONDUCTORS <HVIC>

# M63975FP

IGBT MOSFET DRIVER

## DESCRIPTION

M63975FP is Power MOSFET and IGBT module driver for half bridge applications.

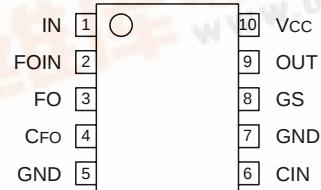
## FEATURES

- SUPPLY VOLTAGE ..... 24V
- OUTPUT CURRENT .....  $\pm 600\text{mA}$
- LOW SIDE DRIVER
- SOP-10
- BUILT-IN SOFT STOP FACILITY

## APPLICATION

MOSFET and IGBT module inverter driver

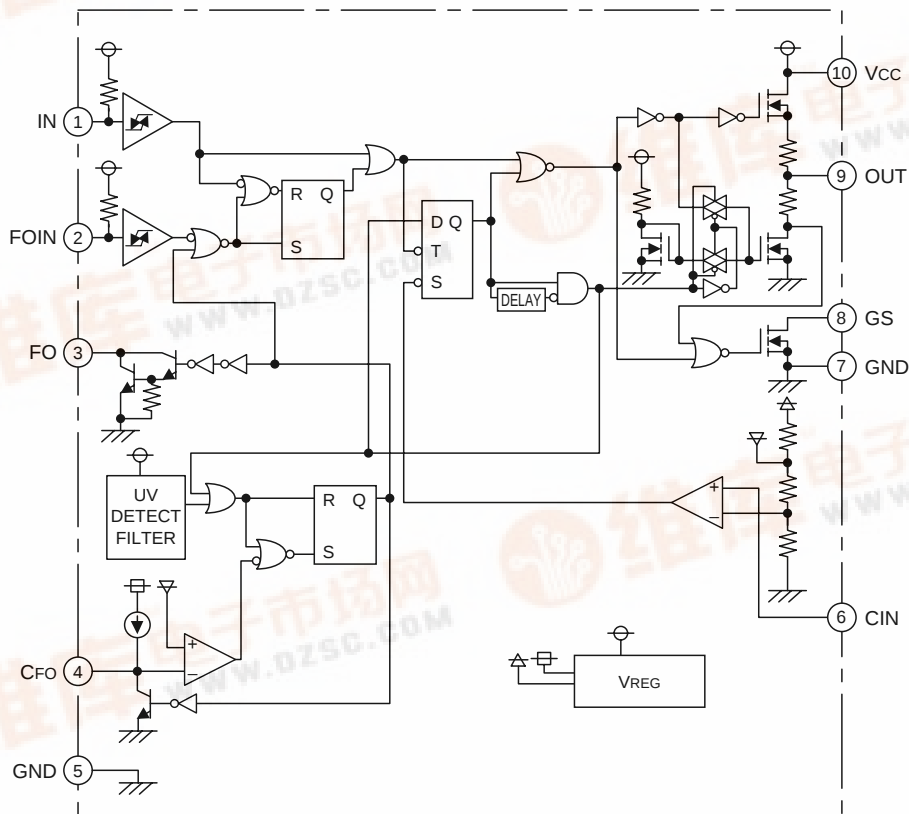
## PIN CONFIGURATION (TOP VIEW)



NC:NO INTERNAL CONNECTION

Outline 10P2N

## BLOCK DIAGRAM



# M63975FP

## IGBT MOSFET DRIVER

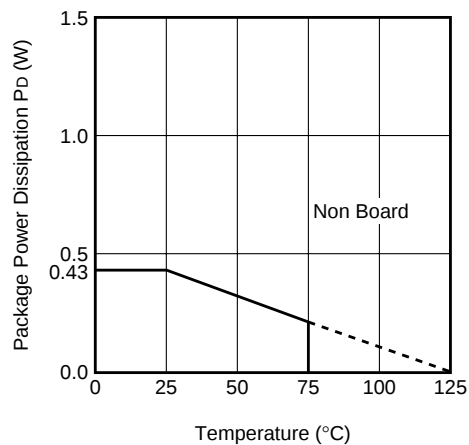
### ABSOLUTE MAXIMUM RATINGS

| Symbol           | Parameter                 | Conditions                       | Ratings                     | Unit  |
|------------------|---------------------------|----------------------------------|-----------------------------|-------|
| V <sub>CC</sub>  | Fixed Supply Voltage      |                                  | −0.5 ~ 24                   | V     |
| V <sub>OUT</sub> | Output Voltage 1          |                                  | −0.5 ~ V <sub>CC</sub> +0.5 | V     |
| I <sub>OUT</sub> | Output Current 1          |                                  | ±600                        | mA    |
| V <sub>GS</sub>  | Output Voltage 2          |                                  | −0.5 ~ V <sub>CC</sub> +0.5 | V     |
| I <sub>GS</sub>  | Output Current 2          |                                  | 375                         | mA    |
| V <sub>IN</sub>  | Input Voltage             |                                  | −0.5 ~ V <sub>CC</sub> +0.5 | V     |
| V <sub>FIN</sub> | FOIN Input Voltage        |                                  | −0.5 ~ V <sub>CC</sub> +0.5 | V     |
| V <sub>CIN</sub> | CIN Input Voltage         |                                  | −0.5 ~ V <sub>CC</sub> +0.5 | V     |
| V <sub>FO</sub>  | FO Output Voltage         |                                  | −0.5 ~ V <sub>CC</sub> +0.5 | V     |
| I <sub>FO</sub>  | FO Output Current         |                                  | 15                          | mA    |
| P <sub>D</sub>   | Package Power Dissipation | T <sub>a</sub> = 25°C, Non Board | 0.43                        | W     |
| K $\theta$       | Linear Derating Factor    | T <sub>a</sub> > 25°C, Non Board | −4.31                       | mW/°C |
| T <sub>j</sub>   | Junction Temperature      |                                  | −20 ~ 125                   | °C    |
| T <sub>opr</sub> | Operation Temperature     |                                  | −20 ~ 75                    | °C    |
| T <sub>stg</sub> | Storage Temperature       |                                  | −40 ~ 125                   | °C    |

### RECOMMENDED OPERATING CONDITIONS

| Symbol          | Parameter            | Test conditions | Limits |      |      | Unit |
|-----------------|----------------------|-----------------|--------|------|------|------|
|                 |                      |                 | Min.   | Typ. | Max. |      |
| V <sub>CC</sub> | Fixed Supply Voltage |                 | 13.5   | —    | 16.5 | V    |
| V <sub>IN</sub> | Input Voltage        |                 | 0      | —    | 5    | V    |

### THERMAL DERATING FACTOR CHARACTERISTIC



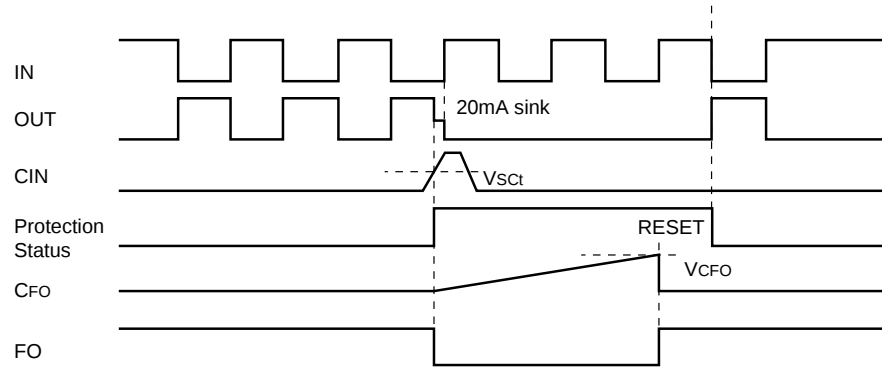
**ELECTRICAL CHARACTERISTICS (Ta=25°C, Vcc=15V, GND=0V unless otherwise specified)**

| Symbol | Parameter                               | Test conditions                         | Limits |       |       | Unit |
|--------|-----------------------------------------|-----------------------------------------|--------|-------|-------|------|
|        |                                         |                                         | Min.   | Typ.* | Max.  |      |
| ICC    | Vcc Standby Current                     | VIN=VCC                                 | 1.0    | 2.0   | 3.5   | mA   |
| VIH    | High Level Input Threshold Voltage      | VIL: Low Level Input Threshold Voltage  | 2.5    | 3.0   | 4.0   | V    |
| VINH   | Input Hysteresis Voltage                | VINH=VIH-VIL                            | 0.5    | 1.6   | 3.2   | V    |
| IiH    | High Level Input Bias Current           | VIN=VCC                                 | -0.1   | —     | —     | μA   |
| IiL    | Low Level Input Bias Current            | VIN=0V                                  | 50     | 100   | 200   | μA   |
| VCCuvr | Vcc Supply UV Reset Voltage             | VCCut: Vcc Supply UV Trip Voltage       | 11.2   | 12.0  | 12.8  | V    |
| VCCuvh | Vcc Supply UV Hysteresis Voltage        | VCCuvh=VCCuvr-VCCut                     | —      | 0.5   | —     | V    |
| tVCCuv | Vcc Supply UV Filter Time               |                                         | —      | 10.0  | —     | μs   |
| VFIH   | FOIN High Level Input Threshold Voltage | VFIL: Low Level Input Threshold Voltage | 2.5    | 3.0   | 4.0   | V    |
| VFIh   | FOIN Input Hysteresis Voltage           | VFIh=VFIH-VFIL                          | 0.5    | 1.6   | 3.2   | V    |
| IFIH   | FOIN High Level Input Bias Current      | VFIN=VCC                                | -0.1   | —     | —     | μA   |
| IFIL   | FOIN Low Level Input Bias Current       | VFIN=0V                                 | 50     | 100   | 200   | μA   |
| VCIN   | CIN Input Threshold Voltage             |                                         | 0.40   | 0.50  | 0.60  | V    |
| tCIN   | CIN Propagation Delay                   |                                         | —      | 0.5   | 0.8   | μs   |
| VCFH   | CFO Threshold Voltage                   |                                         | 2.6    | 3.0   | 3.4   | V    |
| ICFO   | CFO Source Current                      | VCFO=0V                                 | -40.0  | -25.0 | -15.0 | μA   |
| Ifo    | FO Leak Current                         | VFO=VCC                                 | —      | —     | 1.0   | μA   |
| VFO    | FO Output Saturation Voltage            | Ifo=15mA                                | 0.7    | 1.2   | 2.0   | V    |
| VOH    | High Level Output Voltage               | Io=0mA                                  | 13.3   | 14.0  | —     | V    |
| VOL    | Low Level Output Voltage                | Io=0mA                                  | —      | —     | 0.1   | V    |
| ROH    | Output High Level On Resistance         | Io=-200mA, ROH=(VOH-Vo)/Io              | 26.3   | 35.7  | 71.4  | Ω    |
| ROL    | Output Low Level On Resistance          | Io=200mA, ROH=Vo/Io                     | 13.0   | 19.0  | 28    | Ω    |
| tdLH   | Turn-On Propagation Delay               | OUT-GND                                 | —      | 300   | 900   | ns   |
| tdHL   | Turn-Off Propagation Delay              | OUT-GND                                 | —      | 300   | 900   | ns   |
| VoTh   | GSOUT Threshold Voltage                 |                                         | 1.5    | 2.5   | 3.8   | V    |
| VGS    | GS Output Saturation Voltage            | IGS=100mA                               | 0.7    | 1.6   | 2.5   | V    |
| ISO    | OUT Soft Cut-Off Sink Current           | VCIN=1V, Vo=VCC                         | —      | 20    | —     | mA   |
| tSO    | OUT Soft Cut-Off Delay                  |                                         | 2.0    | 5.5   | 9.0   | μs   |

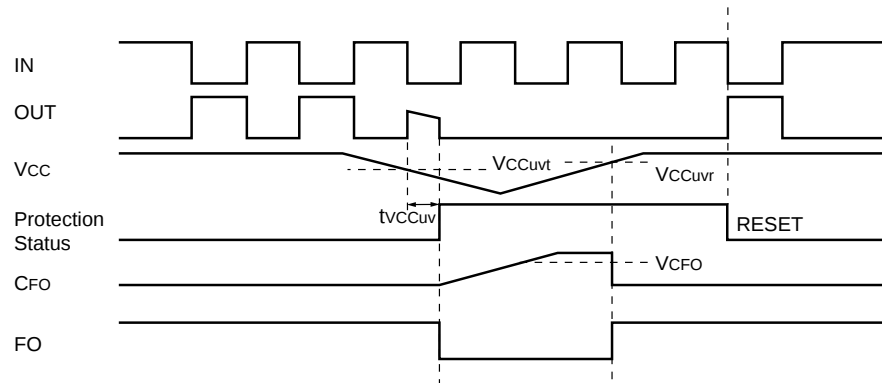
\* Typ. is not specified.

**TIMING DIAGRAM**

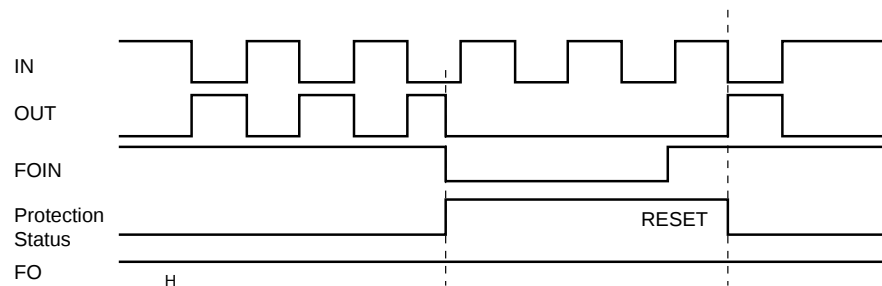
1. SC



2. UV



3. FOIN



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PACKAGE OUTLINE

