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Tel: +86-755-8981 8866 Fax: +86-755-8427 6832

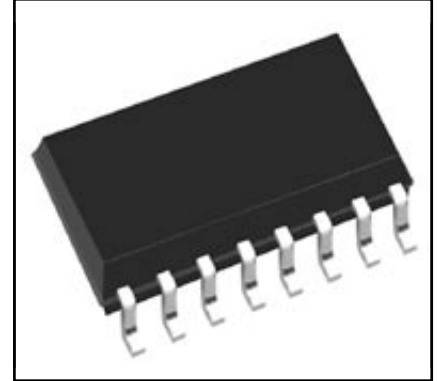
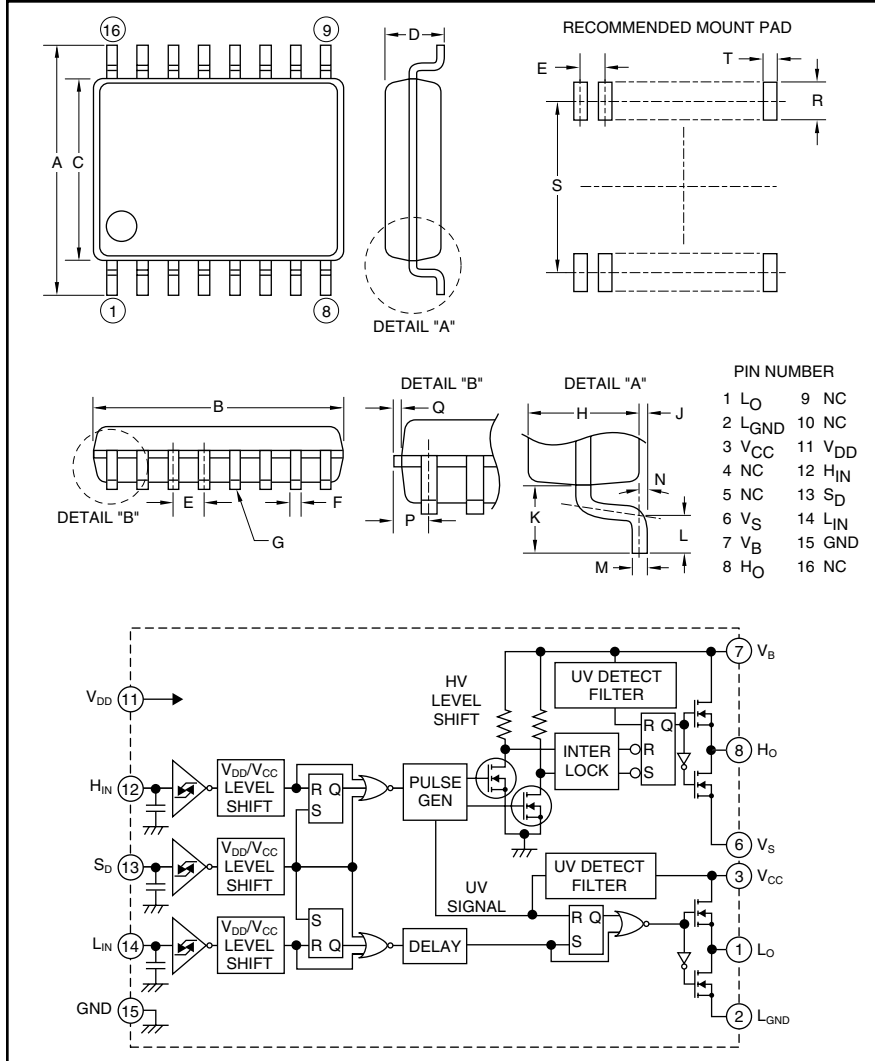
Email & Skype: info@chipsmall.com Web: www.chipsmall.com

Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China



### HVIC

High Voltage Integrated Circuit  
600 Volts/±2 Amperes



#### Description:

M81702FP is a high voltage Power MOSFET and IGBT module driver for half-bridge applications.

#### Features:

- Floating Supply Voltage
- Output Current
- Half-Bridge Driver
- SOP-16

#### Applications:

- HID
- PDP
- MOSFET Driver
- IGBT Driver
- Inverter Module Control

#### Ordering Information:

M81702FP is a ±2 Ampere, 600 Volt HVIC, High Voltage Integrated Circuit

#### Outline Drawing and Circuit Diagram

Dimensions	Inches	Millimeters
A	0.31±0.01	7.8±0.3
B	0.41±0.004	10.1±0.1
C	0.21±0.004	5.3±0.1
D	0.12	2.10
E	0.05	1.27
F	0.02±0.002	0.4±0.05
G	0.004	0.1
H	0.07	1.8
J	0.01±0.004	0.1±0.1

Dimensions	Inches	Millimeters
K	0.05	1.25
L	0.024±0.008	0.6±0.2
M	0.1±0.002	0.2±0.05
N	4°±4°	4°±4°
P	0.03 Max.	0.755 Max.
Q	0.006	0.15
R	0.05 Min.	Min. 1.27
S	0.30	7.62
T	0.029	0.76



Powerex, Inc., 200 E. Hillis Street, Youngwood, Pennsylvania 15697-1800 (724) 925-7272

**M81702FP**

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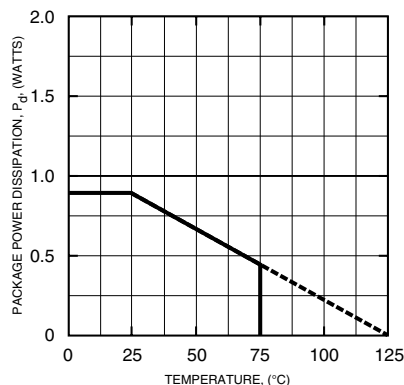
**Absolute Maximum Ratings,  $T_a = 25^\circ\text{C}$  unless otherwise specified**

Characteristics	Symbol	M81702FP	Units
High Side Floating Supply Absolute Voltage	$V_B$	-0.5 ~ 624	Volts
High Side Floating Supply Offset Voltage	$V_S$	-0.5 ~ 600	Volts
High Side Floating Supply Voltage ( $V_{BS} = V_B - V_S$ )	$V_{BS}$	-0.5 ~ 24	Volts
Allowable Offset Supply Voltage Minus Surge ( $P_W < 1\mu\text{s}$ )	$-V_S$	-5	Volts
High Side Output Voltage	$V_{HO}$	$V_S - 0.5 \sim V_B + 0.5$	Volts
Low Side Fixed Supply Voltage	$V_{CC}$	-0.5 ~ 24	Volts
Low Side Output Voltage	$V_{LO}$	-0.5 ~ $V_{CC} + 0.5$	Volts
Logic Supply Voltage	$V_{DD}$	-0.5 ~ 24	Volts
Logic Input Voltage ( $H_{IN}, L_{IN}$ )	$V_{IN}$	-0.5 ~ $V_{DD} + 0.5$	Volts
Shutdown Input Voltage	$S_D$	-0.5 ~ $V_{DD} + 0.5$	Volts
Low Side Return Offset Voltage ( $V_{CC} - L_{GND} < 24\text{V}$ )	$L_{GND}$	-5 ~ $V_{CC} + 0.5$	Volts
Allowable Offset Supply Voltage Transient	$dV_S/dt$	±50	V/ns
Package Power Dissipation ( $T_a = 25^\circ\text{C}$ , On Board)	$P_d$	0.88	Watts
Linear Derating Factor ( $T_a > 25^\circ\text{C}$ , On Board)	$K_\theta$	-8.8	mW/°C
Junction to Case Thermal Resistance	$R_{th(j-c)}$	50	°C/W
Junction Temperature	$T_j$	-20 ~ 125	°C
Operation Temperature	$T_{opr}$	-20 ~ 75	°C
Storage Temperature	$T_{stg}$	-40 ~ 125	°C

**Recommended Operating Conditions**

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
High Side Floating Supply Absolute Voltage	$V_B$		$V_S + 10$	—	$V_S + 20$	Volts
High Side Floating Supply Offset Voltage	$V_S$		0	—	500	Volts
High Side Floating Supply Voltage	$V_{BS}$	$V_{BS} = V_B - V_S$	10	—	20	Volts
Low Side Fixed Supply Voltage	$V_{CC}$		10	—	20	Volts
Logic Supply Voltage	$V_{DD}$		5	—	20	Volts
Logic Input Voltage	$V_{IN}$	$H_{IN}, L_{IN}$	0	—	$V_{DD}$	Volts
Shutdown Input Voltage	$S_D$		0	—	$V_{DD}$	Volts
Low Side Return Offset Voltage	$L_{GND}$		-5	—	5	Volts

**THERMAL DERATING FACTOR CHARACTERISTICS**



**M81702FP**

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**Electrical Characteristics**

**T<sub>a</sub> = 25°C, V<sub>CC</sub> = V<sub>BS</sub> (= V<sub>B</sub> - V<sub>S</sub>) = V<sub>DD</sub> = 15V, L<sub>GND</sub> = 0V unless otherwise specified**

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Floating Supply Leakage Current	I <sub>FS</sub>	V <sub>B</sub> = V <sub>S</sub> = 600V	—	—	1	μA
V <sub>BS</sub> Standby Current	I <sub>BS</sub>		—	0.4	0.7	mA
V <sub>CC</sub> Standby Current	I <sub>CC</sub>		—	0.75	1.5	mA
V <sub>DD</sub> Standby Current	I <sub>DD</sub>		—	—	10	μA
High Level Output Voltage	V <sub>OH</sub>	I <sub>O</sub> = 0A, L <sub>O</sub> , H <sub>O</sub>	13.8	14.4	—	Volts
Low Level Output Voltage	V <sub>OL</sub>	I <sub>O</sub> = 0A, L <sub>O</sub> , H <sub>O</sub>	—	—	0.1	Volts
High Level Input Threshold Voltage	V <sub>IH15</sub>	H <sub>IN</sub> , L <sub>IN</sub>	—	8.4	9.5	Volts
Low Level Input Threshold Voltage	V <sub>IL15</sub>	H <sub>IN</sub> , L <sub>IN</sub>	6.0	6.8	—	Volts
High Level Input Threshold Voltage	V <sub>IH5</sub>	H <sub>IN</sub> , L <sub>IN</sub> (V <sub>DD</sub> = 5V)	—	3.1	4.1	volts
Low Level Input Threshold Voltage	V <sub>IL5</sub>	H <sub>IN</sub> , L <sub>IN</sub> (V <sub>DD</sub> = 5V)	1.4	2.4	—	Volts
Shutdown High Level Input Threshold Voltage	V <sub>ISDH15</sub>	S <sub>D</sub>	—	8.4	9.5	Volts
Shutdown Low Level Input Threshold Voltage	V <sub>ISDL15</sub>	S <sub>D</sub>	6.0	6.8	—	Volts
Shutdown High Level Input Threshold Voltage	V <sub>ISDH5</sub>	S <sub>D</sub> (V <sub>DD</sub> = 5V)	—	3.1	4.1	Volts
Shutdown Low Level Input Threshold Voltage	V <sub>ISDL5</sub>	S <sub>D</sub> (V <sub>DD</sub> = 5V)	1.4	2.4	—	Volts
High Level Input Bias Current	I <sub>IH</sub>	V <sub>IN</sub> = 15V	—	75	150	μA
Low Level Input Bias Current	I <sub>IL</sub>	V <sub>IN</sub> = 0V	—	—	1.0	μA
V <sub>BS</sub> Supply UV Reset Voltage	V <sub>BSuvr</sub>		7.5	8.6	9.7	Volts
V <sub>BS</sub> Supply UV Hysteresis Voltage	V <sub>BSuvh</sub>		0.1	0.4	0.7	Volts
V <sub>BS</sub> Supply UV Filter Time	t <sub>VBSuv</sub>		—	10	—	μs
V <sub>CC</sub> Supply UV Reset Voltage	V <sub>CCuvr</sub>		7.5	8.6	9.7	Volts
V <sub>CC</sub> Supply UV Hysteresis Voltage	V <sub>CCuvh</sub>		0.1	0.4	0.7	Volts
V <sub>CC</sub> Supply UV Filter Time	t <sub>VCCuv</sub>		—	10	—	μs
Output High Level Short Circuit Pulsed Current	I <sub>OH</sub>	V <sub>O</sub> = 0V, V <sub>IN</sub> = 15V, P <sub>W</sub> < 10μs	—	-2.5	—	Amperes
Output Low Level Short Circuit Pulsed Current	I <sub>OL</sub>	V <sub>O</sub> = 15V, V <sub>IN</sub> = 0V, P <sub>W</sub> < 10μs	—	2.5	—	Amperes
Output High Level ON Resistance	R <sub>OH</sub>	I <sub>O</sub> = -200mA, R <sub>OH</sub> = (V <sub>OH</sub> - V <sub>O</sub> )/I <sub>O</sub>	—	10	13	Ω
Output Low Level ON Resistance	R <sub>OL</sub>	I <sub>O</sub> = 200mA, R <sub>OL</sub> = V <sub>O</sub> /I <sub>O</sub>	—	2.5	3	Ω
High Side Turn-On Propagation Delay	t <sub>dLH(HO)</sub>	C <sub>L</sub> = 1000pF between H <sub>O</sub> - V <sub>S</sub>	—	—	350	ns
High Side Turn-Off Propagation Delay	t <sub>dHL(HO)</sub>	C <sub>L</sub> = 1000pF between H <sub>O</sub> - V <sub>S</sub>	—	—	330	ns
High Side Turn-On Rise Time	t <sub>rH</sub>	C <sub>L</sub> = 1000pF between H <sub>O</sub> - V <sub>S</sub>	—	—	60	ns
High Side Turn-Off Fall Time	t <sub>fH</sub>	C <sub>L</sub> = 1000pF between H <sub>O</sub> - V <sub>S</sub>	—	—	30	ns
Low Side Turn-On Propagation Delay	t <sub>dLH(LO)</sub>	C <sub>L</sub> = 1000pf between L <sub>O</sub> - GND	—	—	350	ns
Low Side Turn-Off Propagation Delay	t <sub>dHL(LO)</sub>	C <sub>L</sub> = 1000pf between L <sub>O</sub> - GND	—	—	330	ns
Low Side Turn-On Rise Time	t <sub>rL</sub>	C <sub>L</sub> = 1000pf between L <sub>O</sub> - GND	—	—	60	ns
Low Side Turn-Off Rise Time	t <sub>fL</sub>	C <sub>L</sub> = 1000pf between L <sub>O</sub> - GND	—	—	30	ns
Delay Matching, High Side and Low Side Turn-On	Δt <sub>dLH</sub>	t <sub>dLH(HO)</sub> - t <sub>dLH(LO)</sub>	—	—	30	ns
Delay Matching, High Side and Low Side Turn-Off	Δt <sub>dHL</sub>	t <sub>dHL(HO)</sub> - t <sub>dHL(LO)</sub>	—	—	30	ns
Shutdown Propagation Delay	t <sub>SD</sub>	C <sub>L</sub> = 1000pF between H <sub>O</sub> -V <sub>S</sub> , C <sub>L</sub> = 1000pF between L <sub>O</sub> -GND	—	—	350	ns

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**FUNCTION TABLE (X: H or L)**

H <sub>IN</sub>	L <sub>IN</sub>	V <sub>BS</sub> UV	V <sub>CC</sub> UV	HO	LO	SD	Behavioral State
L	L	H	H	L	L	L	LO = OFF, HO = OFF
L	H	H	H	L	H	L	LO = ON, HO = OFF
H	L	H	H	H	L	L	LO = OFF, HO = ON
H	H	H	H	H	H	L	LO = ON, HO = ON
X	L	L	H	L	L	L	LO = OFF, HO = OFF, V <sub>BS</sub> UV tripped
X	H	L	H	L	H	L	LO = ON, HO = OFF, V <sub>BS</sub> UV tripped
L	X	H	L	L	L	L	LO = OFF, HO = OFF, V <sub>CC</sub> UV tripped
H	X	H	L	L	L	L	LO = OFF, HO = OFF, V <sub>CC</sub> UV tripped
X	X	H	H	L	L	H	LO = OFF, HO = OFF, SD = ON

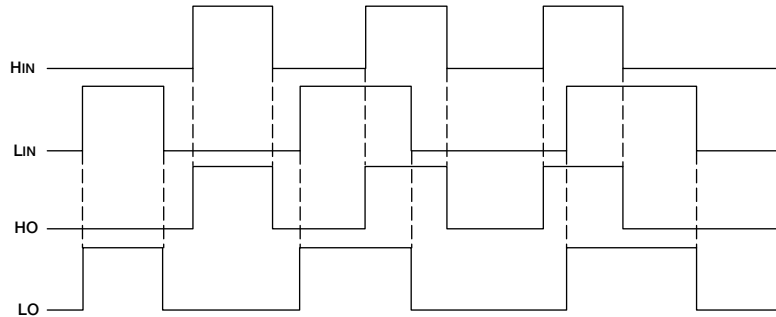
Note : "L" state of V<sub>BS</sub> UV and V<sub>CC</sub> UV means that UV trip voltage.

**TIMING DIAGRAM**

**1. Input/Output Timing Diagram**

When input signal (H<sub>IN</sub> or L<sub>IN</sub>) is "H", then output signal (HO or LO) is "H".

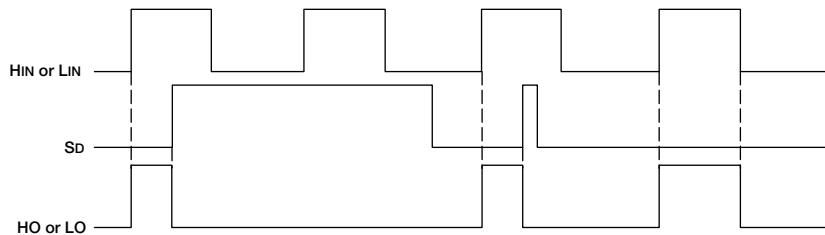
Both input signals (H<sub>IN</sub> and L<sub>IN</sub>) are "H", then output signal (HO or LO) becomes "H".



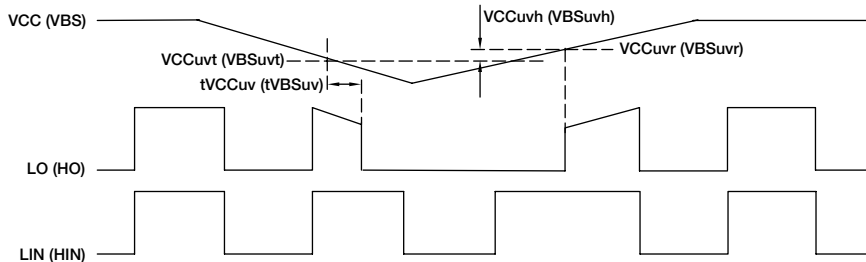
**2. Shutdown Input Timing Diagram**

When shutdown input signal (SD) is "H", then output signals (HO and LO) are "L".

Output signals (HO and LO) keep "L" by shutdown input signal (SD) is "L" until next input signal (H<sub>IN</sub> or L<sub>IN</sub>) is "H".



**3. V<sub>CC</sub> (V<sub>BS</sub>) Supply Under Voltage Lockout Timing Diagram**



**4. Allowable Supply Voltage Transient**

Allowable high side floating supply voltage (V<sub>BS</sub>) transient or low side fixed supply voltage (V<sub>CC</sub>) transient are below 50V/μs. In case V<sub>BS</sub> or V<sub>CC</sub> are started more than 50V/μs, output signal (HO or LO) may be "H".