

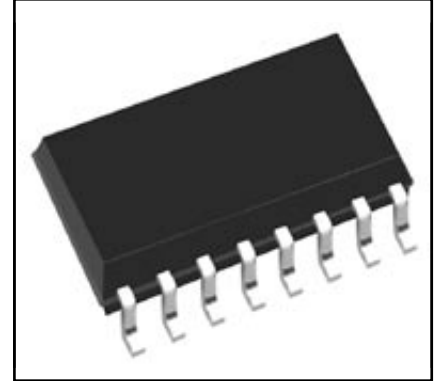
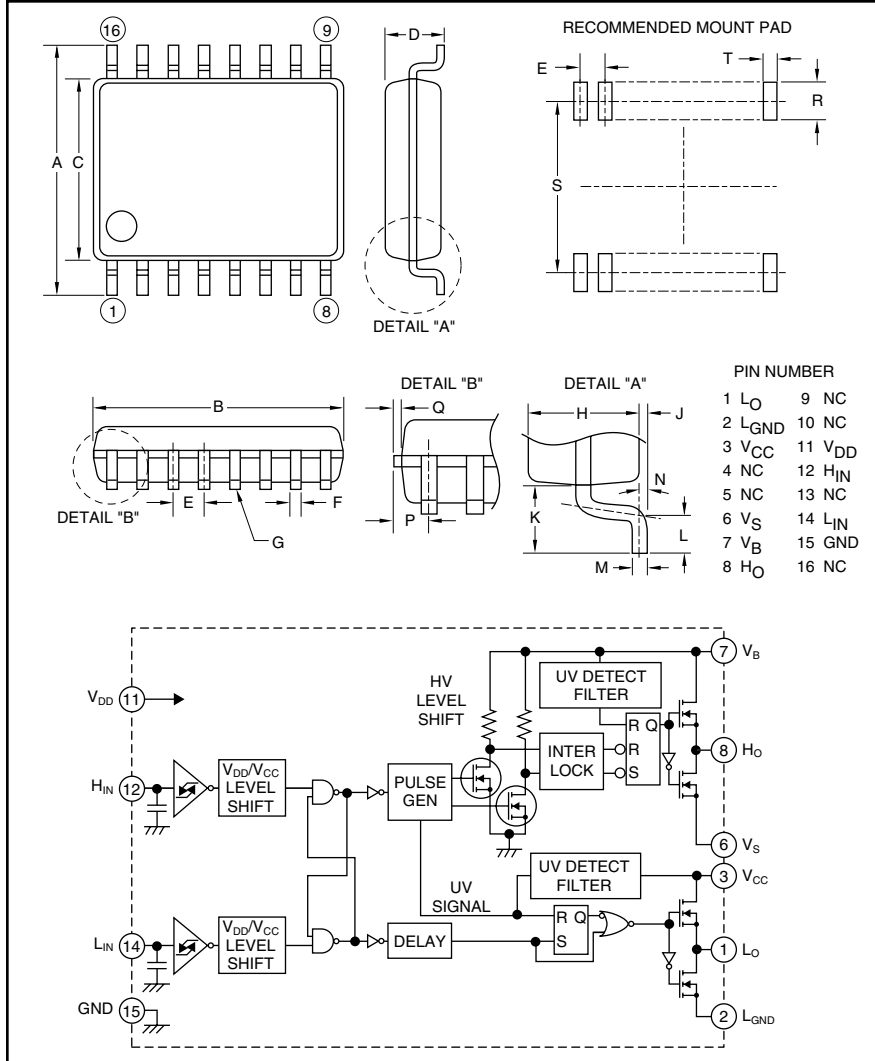


**THE DATASHEET OF  
M81701FP**



### HVIC

High Voltage Integrated Circuit  
600 Volts/±2 Amperes



#### Description:

M81701FP 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:

M81701FP 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



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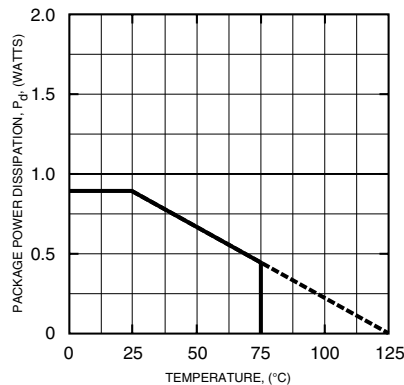
**Absolute Maximum Ratings,  $T_a = 25^\circ\text{C}$  unless otherwise specified**

Characteristics	Symbol	M81701FP	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
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
Low Side Return Offset Voltage	$L_{GND}$		-5	—	5	Volts

**THERMAL DERATING FACTOR CHARACTERISTICS**





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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
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



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FUNCTION TABLE (X: H or L)

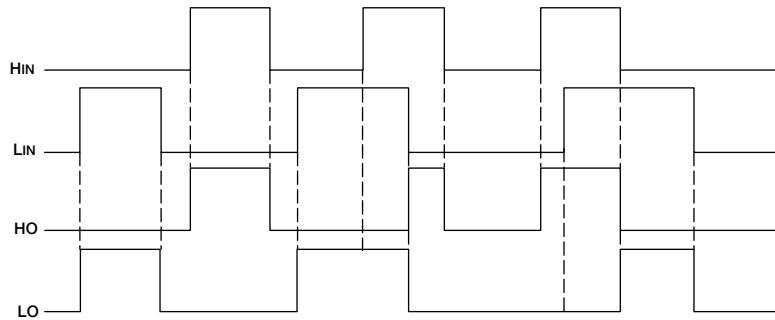
H <sub>IN</sub>	L <sub>IN</sub>	V <sub>BS</sub> UV	V <sub>CC</sub> UV	H <sub>O</sub>	L <sub>O</sub>	Behavioral State
L	L	H	H	L	L	LO = OFF, HO = OFF
L	H	H	H	L	H	LO = ON, HO = OFF
H	L	H	H	H	L	LO = OFF, HO = ON
H	H	H	H	*	*	
X	L	L	H	L	L	LO = OFF, HO = OFF, V <sub>BS</sub> UV tripped
X	H	L	H	L	H	LO = ON,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

Note : "L" state of V<sub>BS</sub> UV and V<sub>CC</sub> UV means that UV trip voltage.  
 \* If both input signals are "H", refer to TIMING DIAGRAM.

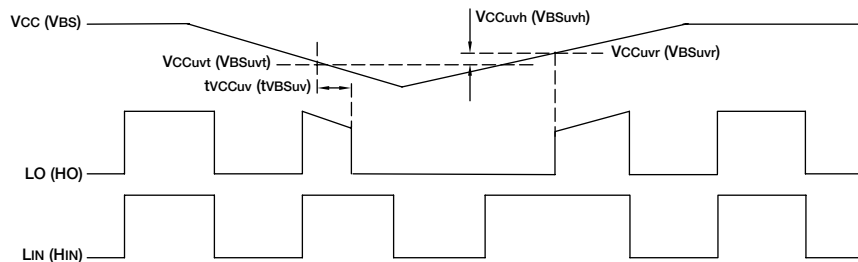
**TIMING DIAGRAM**

**1. Input/Output Timing Diagram**

When input signal (H<sub>IN</sub> or L<sub>IN</sub>) is "H", then output signal (H<sub>O</sub> or L<sub>O</sub>) is "H". In the case of both input signals (H<sub>IN</sub> and L<sub>IN</sub>) are "H", first coming input signal (H<sub>IN</sub> or L<sub>IN</sub>) "H" is only accepted. Corresponding this signal, output signal (H<sub>O</sub> or L<sub>O</sub>) becomes "H". Corresponding the other signal (L<sub>IN</sub> or H<sub>IN</sub>), output signal (L<sub>O</sub> or H<sub>O</sub>) keeps "L".



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



**3. 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 (H<sub>O</sub> or L<sub>O</sub>) may be "H".

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