

# M81731FP

HIGH VOLTAGE HALF BRIDGE DRIVER

## DESCRIPTION

M81731FP is high voltage Power MOSFET and IGBT module driver for half bridge applications.

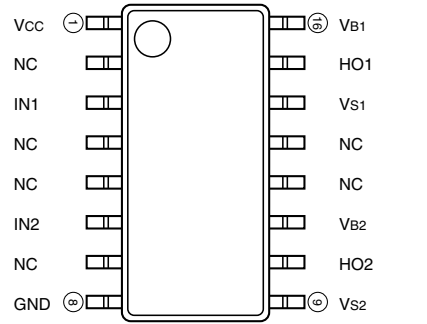
## FEATURES

- FLOATING SUPPLY VOLTAGE ..... 600V
- OUTPUT CURRENT ..... ±3A (typ)
- UNDERVOLTAGE LOCKOUT
- BUILT-IN INPUT NOISE FILTER
- SOP-16 PACKAGE

## APPLICATIONS

MOSFET and IGBT module inverter driver for PDP, HID lamp, refrigerator, air-conditioner, washing machine, AC-servomotor and general purpose.

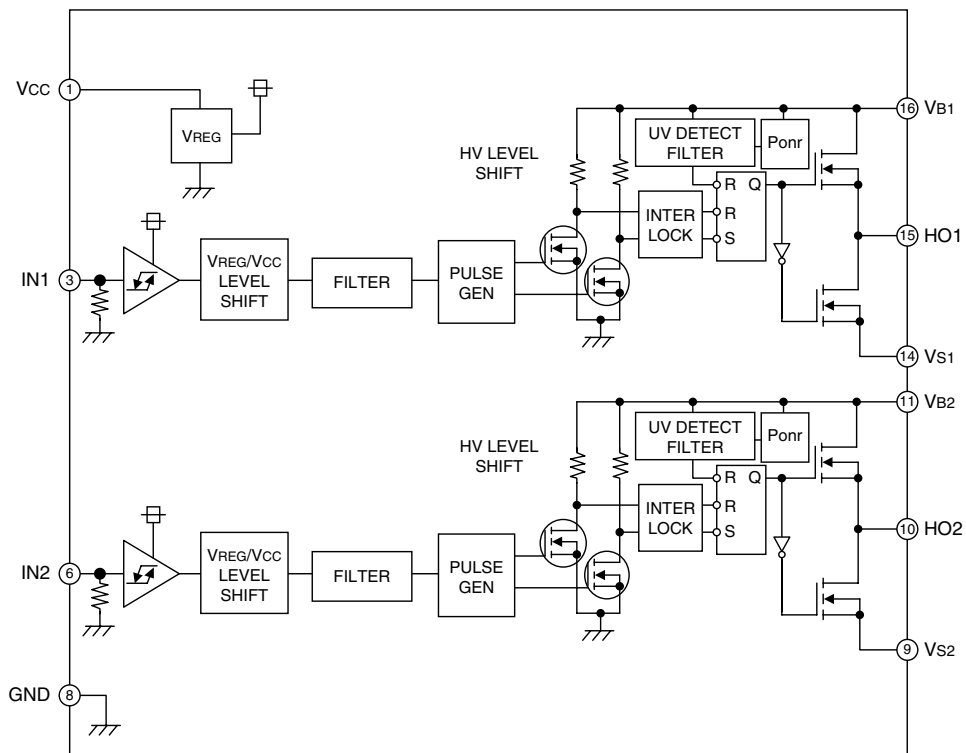
## PIN CONFIGURATION (TOP VIEW)



NC:NO CONNECTION

Outline:16P2N

## BLOCK DIAGRAM



HIGH VOLTAGE HALF BRIDGE DRIVER

**ABSOLUTE MAXIMUM RATINGS (Ta = 25°C unless otherwise specified)**

Symbol	Parameter	Test conditions	Ratings	Unit
V <sub>B</sub>	High Side Floating Supply Absolute Voltage	V <sub>B1</sub> or V <sub>B2</sub>	-0.5 ~ 624	V
V <sub>S</sub>	High Side Floating Supply Offset Voltage	V <sub>S1</sub> or V <sub>S2</sub>	V <sub>B</sub> -24 ~ V <sub>B</sub> +0.5	V
V <sub>BS</sub>	High Side Floating Supply Voltage	V <sub>BS1</sub> = V <sub>B1</sub> -V <sub>S1</sub> or V <sub>BS2</sub> = V <sub>B2</sub> -V <sub>S2</sub>	-0.5 ~ 24	V
V <sub>OUT</sub>	Output Voltage	HO1 or HO2	V <sub>S</sub> -0.5 ~ V <sub>B</sub> +0.5	V
V <sub>CC</sub>	Low Side Fixed Supply Voltage		-0.5 ~ 24	V
V <sub>IN</sub>	Logic Input Voltage	IN1 or IN2	-0.5 ~ V <sub>CC</sub> +0.5	V
P <sub>D</sub>	Package Power Dissipation	Ta = 25°C, On Board	1.0	W
K $\theta$	Linear Derating Factor	Ta > 25°C, On Board	8.0	mW/°C
R <sub>th(j-c)</sub>	Junction-Case Thermal Resistance		50	°C/W
T <sub>J</sub>	Junction Temperature		-20 ~ 150*	°C
T <sub>opr</sub>	Operation Temperature		-20 ~ 125	°C
T <sub>stg</sub>	Storage Temperature		-40 ~ 150	°C
TL	Solder heat-proof (reflow)	Pb Free	255:10s,max 260	°C

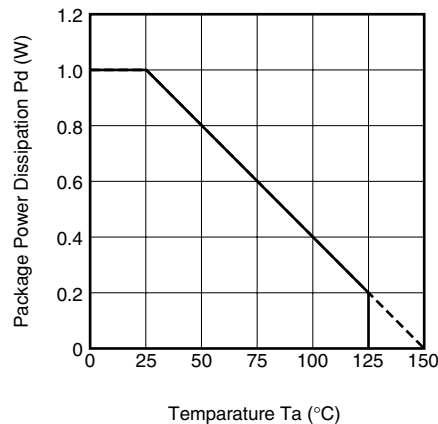
\* Please adjust the V<sub>S</sub> potential to 500V or less when the junction temperature (T<sub>J</sub>) exceeds 125°C.

**RECOMMENDED OPERATING CONDITIONS**

Symbol	Parameter	Test conditions	Limits			Unit
			Min.	Typ.	Max.	
V <sub>B</sub>	High Side Floating Supply Absolute Voltage	V <sub>B1</sub> or V <sub>B2</sub>	V <sub>S</sub> +10	—	V <sub>S</sub> +20	V
V <sub>S</sub>	High Side Floating Supply Offset Voltage	V <sub>S1</sub> (V <sub>B1</sub> >10V) or V <sub>S2</sub> (V <sub>B2</sub> >10V)	-5	—	500	V
V <sub>BS</sub>	High Side Floating Supply Voltage	V <sub>BS1</sub> = V <sub>B1</sub> -V <sub>S1</sub> or V <sub>BS2</sub> = V <sub>B2</sub> -V <sub>S2</sub>	10	—	20	V
V <sub>OUT</sub>	High Side Output Voltage	HO1 or HO2	V <sub>S</sub>	—	V <sub>B</sub>	V
V <sub>CC</sub>	Low Side Fixed Supply Voltage		10	—	20	V
V <sub>IN</sub>	Logic Input Voltage	IN1 or IN2	0	—	7	V

\* For proper operation, the device should be used within the recommended conditions.

**THERMAL DERATING FACTOR CHARACTERISTIC (MAXIMUM RATING)**



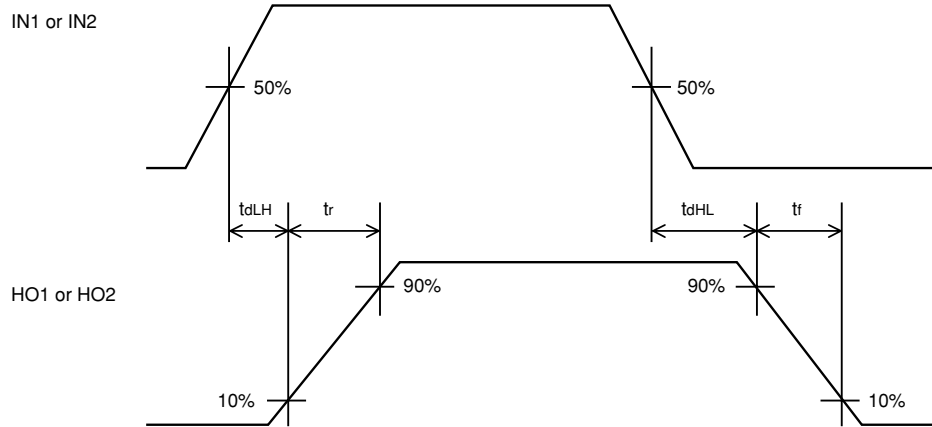
HIGH VOLTAGE HALF BRIDGE DRIVER

ELECTRICAL CHARACTERISTICS (Ta = 25°C, Vcc = Vbs (= Vb-Vs) = 15V, unless otherwise specified)

Symbol	Parameter	Test conditions	Limits			Unit
			Min.	Typ.*	Max.	
IFS1	Floating Supply Leakage Current1	VB1 = VS1 = 600V	—	—	1.0	μA
IFS2	Floating Supply Leakage Current2	VB2 = VS2 = 600V	—	—	1.0	μA
IBS1	VBS1 Standby Current	IN1 = 0V	—	0.2	0.5	mA
IBS2	VBS2 Standby Current	IN2 = 0V	—	0.2	0.5	mA
ICC	Vcc Standby Current	IN1 = IN2 = 0V	—	0.3	0.6	mA
VOH	High Level Output Voltage	Io = 0A, HO1, HO2	13.8	14.4	—	V
VOL	Low Level Output Voltage	Io = 0A, HO1, HO2	—	—	0.1	V
VIH	High Level Input Threshold Voltage	IN1, IN2	4.0	—	—	V
VIL	Low Level Input Threshold Voltage	IN1, IN2	—	—	0.8	V
IiH	High Level Input Bias Current	VIN = 5V, IN1, IN2	—	17	40	μA
IiL	Low Level Input Bias Current	VIN = 0V, IN1, IN2	—	—	2	μA
VBSuvr	VBS Supply UV Reset Voltage	VBS1, VBS2	8.0	8.9	9.8	V
VBSuvh	VBS Supply UV Hysteresis Voltage	VBS1, VBS2	0.3	0.7	—	V
tVBSuv	VBS Supply UV Filter Time	VBS1, VBS2	—	7.5	—	μs
VPonr	Power-On Reset Voltage	VBS1, VBS2	—	—	6.0	V
tPonr(FIL)	Power-On Reset Filter Time	VBS1, VBS2	300	—	—	ns
IOH	Output High Level Short Circuit Pulsed Current	Vo = 0V, VIN = 5V, PWD < 10μs, HO1, HO2	2.0	3.0	—	A
IOL	Output Low Level Short Circuit Pulsed Current	Vo = 15V, VIN = 0V, PWD < 10μs, HO1, HO2	2.0	3.0	—	A
ROH	Output High Level On Resistance	Io = 200mA, ROH = (VOH-Vo) / Io HO1, HO2	—	10	20	Ω
ROL	Output Low Level On Resistance	Io = 200mA, RoL = Vo / Io HO1, HO2	—	2.5	3.0	Ω
tdLH	Turn-On Propagation Delay	CL = 1000pF between HO1-Vs1 or HO2-Vs2	—	200	280	ns
tdHL	Turn-Off Propagation Delay	CL = 1000pF between HO1-Vs1 or HO2-Vs2	—	170	260	ns
tr	Turn-On Rise Time	CL = 1000pF between HO1-Vs1 or HO2-Vs2	—	25	45	ns
tf	Turn-Off Fall Time	CL = 1000pF between HO1-Vs1 or HO2-Vs2	—	20	35	ns
ΔtdLH	Delay Matching, High Side and Low Side Turn-On	tdLH (HO1) -tdLH (HO2)	—	—	30	ns
ΔtdHL	Delay Matching, High Side and Low Side Turn-Off	tdHL (HO1) -tdHL (HO2)	—	—	30	ns
IN(FIL)	Input Filter Time	CONVEX PULSE : IN1, IN2	—	90	—	ns
		CONCAVE PULSE : IN1, IN2	—	90	—	ns

\* Typ. is not specified.

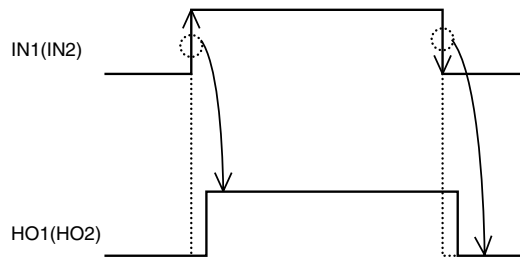
TIMING REQUIREMENT



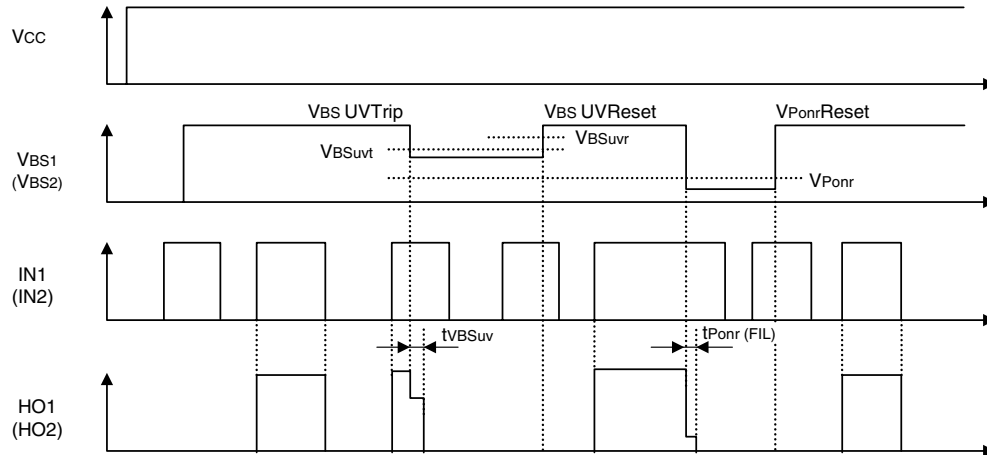
FUNCTION TABLE

IN1	IN2	VBS1 UV	VBS2 UV	HO1	HO2	Behavioral state
H→L	H→L	H	H	L	L	HO1=HO2=Low
H→L	L→H	H	H	L	H	HO2=High
L→H	H→L	H	H	H	L	HO1=High
L→H	L→H	H	H	H	H	HO1=HO2=High
X	H→L	L	H	L	L	HO1=Low, VBS1 UV tripped
X	L→H	L	H	L	H	HO2=High, VBS1 UV tripped
H→L	X	H	L	L	L	HO2=Low, VBS2 UV tripped
L→H	X	H	L	H	L	HO1=High, VBS2 UV tripped

Note1 : "L" state of VBS1 UV, VBS2 UV means that UV trip voltage.  
 When input signal(IN1 and IN2) is "H" at the same time, then output signal (Both HO1 and HO2) is "H".  
 2 : X : L→H or H→L.  
 3 : Output signal (HO1, HO2) is triggered by the edge of input signal.



TIMING DIAGRAM



1. Input/Output Timing

HIGH ACTIVE (When input signal is "H", then output signal is "H".)

2. Vbs Supply Under Voltage Lockout

If Vbs supply voltage drops below UV trip voltage ( $V_{BSUVtrip}$ ) for Vbs supply UV filter time, output signal is shut down. As soon as Vbs supply voltage rises over UV reset voltage, output signal HO becomes "H" at following "H" edge of input signal.

Note: If the VBS drops below  $V_{PON}$ , the filter time will become  $t_{POR}$  (FIL) instead of  $t_{VBSuv}$ .

3. Allowable Supply Voltage Transient

It is recommended to supply Vcc firstly and supply Vbs1(Vbs2) secondly. When shutting off supply voltage, please shut off Vbs1(Vbs2) firstly and shut off Vcc secondly. When applying Vcc and Vbs1(Vbs2), power supply should be applied slowly. If it rises rapidly, output signal (HO or LO) may be malfunction.

Note: If Vcc is below its recommended value: 10V, output may not response input signals.

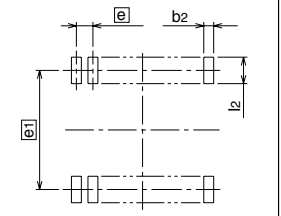
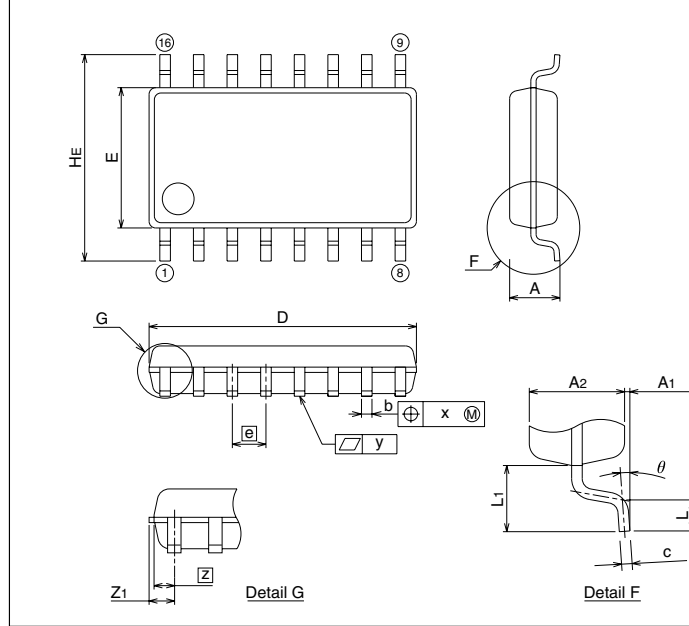
Please take enough evaluation in the case of power supply shut down and power supply applying after its shut-down.

PACKAGE OUTLINE

16P2N-A

EIAJ Package Code	JEDEC Code	Weight(g)	Lead Material
SOP16-P-300-1.27		0.2	Cu Alloy

Plastic 16pin 300mil SOP



Recommended Mount Pad

Symbol	Dimension in Millimeters		
	Min	Nom	Max
A			2.1
A1	0	0.1	0.2
A2		1.8	
b	0.35	0.4	0.5
c	0.18	0.2	0.25
D	10.0	10.1	10.2
E	5.2	5.3	5.4
e		1.27	
HE	7.5	7.8	8.1
L	0.4	0.6	0.8
L1		1.25	
Z		0.605	
Z1			0.755
x			0.25
y			0.1
θ	0°		8°
b2		0.76	
e1		7.62	
l2	1.27		