M81731FP

HIGH VOLTAGE HALF BRIDGE DRIVER

DESCRIPTION

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

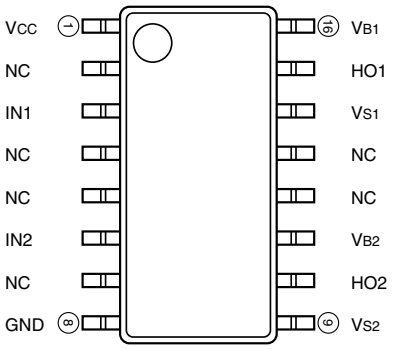
FEATURES

- 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.

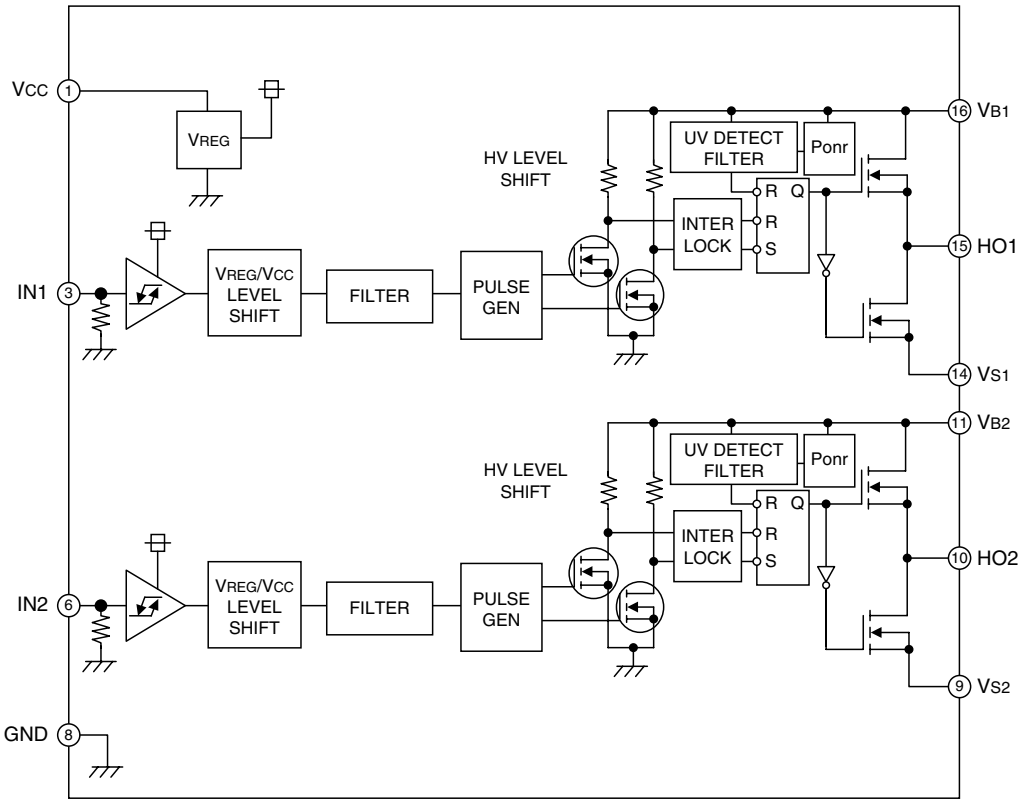
PIN CONFIGURATION (TOP VIEW)



NC:NO CONNECTION

Outline:16P2N

BLOCK DIAGRAM



MITSUBISHI ELECTRIC

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

Symbol	Parameter	Test conditions	Ratings	Unit
V_B	High Side Floating Supply Absolute Voltage	V_{B1} or V_{B2}	–0.5 ~ 624	V
V_S	High Side Floating Supply Offset Voltage	V_{S1} or V_{S2}	V_B–24 ~ V_B+0.5	V
V_{BS}	High Side Floating Supply Voltage	$V_{BS1} = V_{B1}-V_{S1}$ or $V_{BS2} = V_{B2}-V_{S2}$	–0.5 ~ 24	V
V_{OUT}	Output Voltage	HO1 or HO2	V_S–0.5 ~ V_B+0.5	V
V_{CC}	Low Side Fixed Supply Voltage		–0.5 ~ 24	V
V_{IN}	Logic Input Voltage	IN1 or IN2	–0.5 ~ V_{CC}+0.5	V
P_D	Package Power Dissipation	Ta = 25°C, On Board	1.0	W
Kθ	Linear Derating Factor	Ta > 25°C, On Board	8.0	mW/°C
Rth(j-c)	Junction-Case Thermal Resistance		50	°C/W
Tj	Junction Temperature		–20 ~ 150*	°C
Topr	Operation Temperature		–20 ~ 125	°C
Tstg	Storage Temperature		–40 ~ 150	°C
TL	Solder heat-proof (reflow)	Pb Free	255:10s,max 260	°C

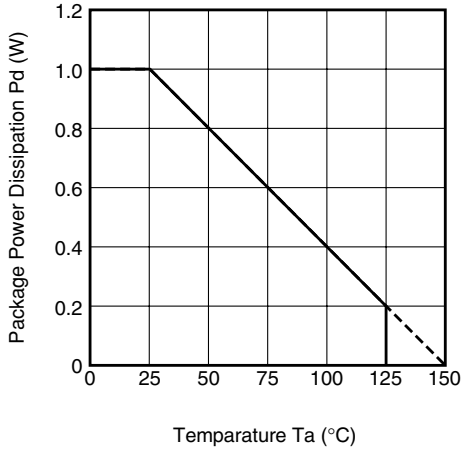
* Please adjust the V_S potentian to 500V or less when the junction temperature (Tj) exceeds 125°C.

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Test conditions	Limits			Unit
			Min.	Typ.	Max.	
V_B	High Side Floating Supply Absolute Voltage	V_{B1} or V_{B2}	V_S+10	—	V_S+20	V
V_S	High Side Floating Supply Offset Voltage	V_{S1} (V_{B1}>10V) or V_{S2} (V_{B2}>10V)	–5	—	500	V
V_{BS}	High Side Floating Supply Voltage	$V_{BS1} = V_{B1}-V_{S1}$ or $V_{BS2} = V_{B2}-V_{S2}$	10	—	20	V
V_{OUT}	High Side Output Voltage	HO1 or HO2	V_S	—	V_B	V
V_{CC}	Low Side Fixed Supply Voltage		10	—	20	V
V_{IN}	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)

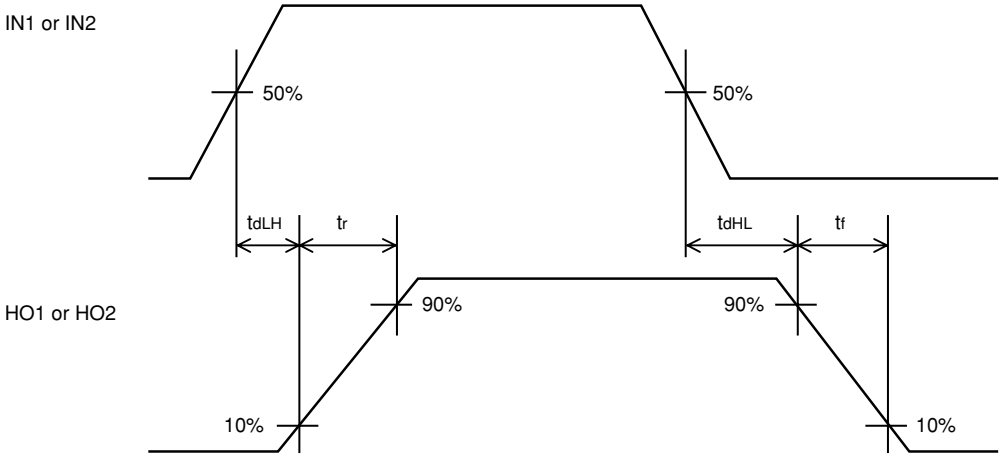


ELECTRICAL CHARACTERISTICS (Ta = 25°C, V_{CC} = V_{BS} (= V_B–V_S) = 15V, unless otherwise specified)

Symbol	Parameter	Test conditions	Limits			Unit
			Min.	Typ.*	Max.	
I_{FS1}	Floating Supply Leakage Current1	V_{B1} = V_{S1} = 600V	—	—	1.0	μA
I_{FS2}	Floating Supply Leakage Current2	V_{B2} = V_{S2} = 600V	—	—	1.0	μA
I_{BS1}	V_{BS1} Standby Current	IN1 = 0V	—	0.2	0.5	mA
I_{BS2}	V_{BS2} Standby Current	IN2 = 0V	—	0.2	0.5	mA
I_{CC}	V_{CC} Standby Current	IN1 = IN2 = 0V	—	0.3	0.6	mA
V_{OH}	High Level Output Voltage	I_O = 0A, HO1, HO2	13.8	14.4	—	V
V_{OL}	Low Level Output Voltage	I_O = 0A, HO1, HO2	—	—	0.1	V
V_{IH}	High Level Input Threshold Voltage	IN1, IN2	4.0	—	—	V
V_{IL}	Low Level Input Threshold Voltage	IN1, IN2	—	—	0.8	V
I_{IH}	High Level Input Bias Current	V_{IN} = 5V, IN1, IN2	—	17	40	μA
I_{IL}	Low Level Input Bias Current	V_{IN} = 0V, IN1, IN2	—	—	2	μA
V_{BSuvr}	V_{BS} Supply UV Reset Voltage	V_{BS1}, V_{BS2}	8.0	8.9	9.8	V
V_{BSuvh}	V_{BS} Supply UV Hysteresis Voltage	V_{BS1}, V_{BS2}	0.3	0.7	—	V
tV_{BSuv}	V_{BS} Supply UV Filter Time	V_{BS1}, V_{BS2}	—	7.5	—	μs
V_{Ponr}	Power-On Reset Voltage	V_{BS1}, V_{BS2}	—	—	6.0	V
$t_{Ponr(FIL)}$	Power-On Reset Filter TIme	V_{BS1}, V_{BS2}	300	—	—	ns
I_{OH}	Output High Level Short Circuit Pulsed Current	V_O = 0V, V_{IN} = 5V, PWD <10μs, HO1, HO2	2.0	3.0	—	A
I_{OL}	Output Low Level Short Circuit Pulsed Current	V_O = 15V, V_{IN} = 0V, PWD < 10μs, HO1, HO2	2.0	3.0	—	A
R_{OH}	Output High Level On Resistance	I_O = -200mA, R_{OH} = (V_{OH}-Vo) /I_O HO1, HO2	—	10	20	Ω
R_{OL}	Output Low Level On Resistance	I_O = 200mA, R_{OL} = V_O / I_O HO1, HO2	—	2.5	3.0	Ω
t_{dLH}	Turn-On Propagation Delay	CL = 1000pF between HO1-V_{S1} or HO2-V_{S2}	—	200	280	ns
t_{dHL}	Turn-Off Propagation Delay	CL = 1000pF between HO1-V_{S1} or HO2-V_{S2}	—	170	260	ns
t_r	Turn-On Rise Time	CL = 1000pF between HO1-V_{S1} or HO2-V_{S2}	—	25	45	ns
t_f	Turn-Off Fall Time	CL = 1000pF between HO1-V_{S1} or HO2-V_{S2}	—	20	35	ns
Δt_{dLH}	Delay Matching, High Side and Low Side Turn-On	|tdLH (HO1) -tdLH (HO2)	—	—	30	ns
Δt_{dHL}	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.

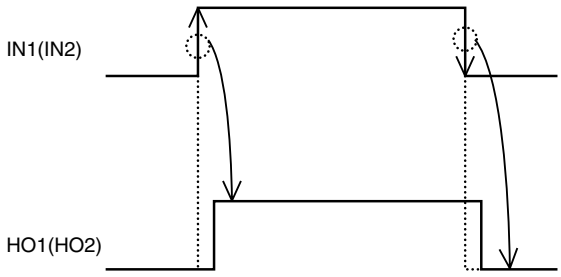
TIMING REQUIREMENT



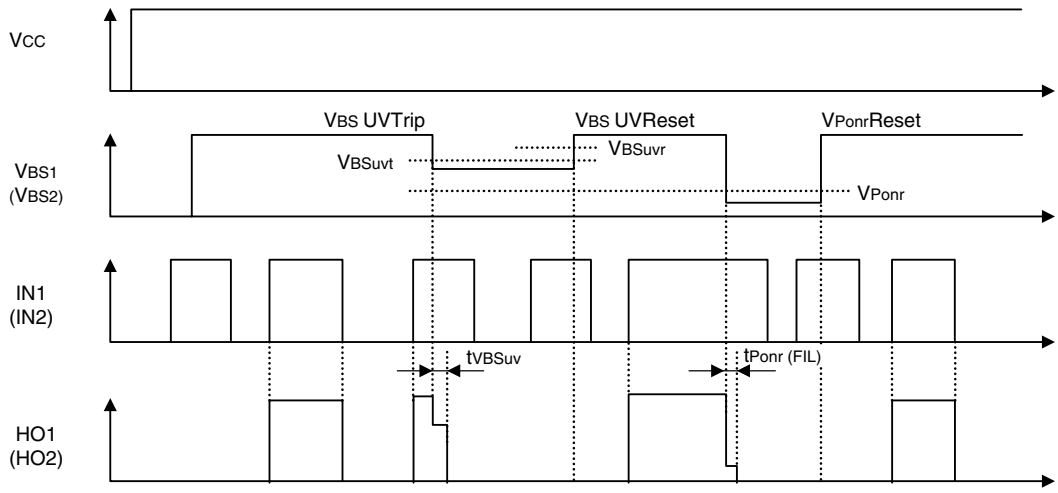
FUNCTION TABLE

IN1	IN2	V_{BS1} UV	V_{BS2} 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, V_{BS1} UV tripped
X	L→H	L	H	L	H	HO2=High, V_{BS1} UV tripped
H→L	X	H	L	L	L	HO2=Low, V_{BS2} UV tripped
L→H	X	H	L	H	L	HO1=High, V_{BS2} UV tripped

Note1 : "L" state of V_{BS1} UV, V_{BS2} 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 (VBSuvt) 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 VPON, the filter time will become tPOR (FIL) instead of tVBSuv.

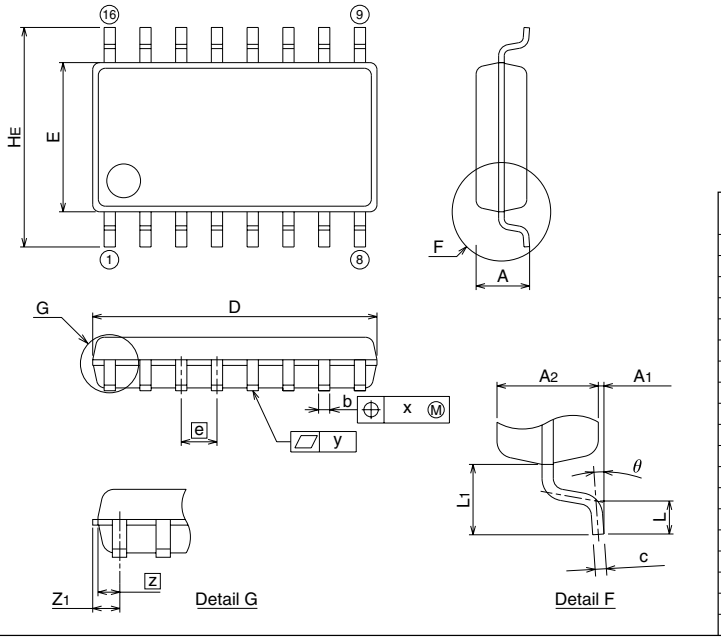
3. Allowable Supply Voltage Transient
   It is recommended to supply VCC firstly and supply VBS1(VBS2) secondly. When shutting off supply voltage, please shut off VBS1(VBS2) firstly and shut off VCC secondly. When applying VCC and VBS1(VBS2), power supply should be applied slowly. If it rises rapidly, output signal (HO or LO) may be malfunction.

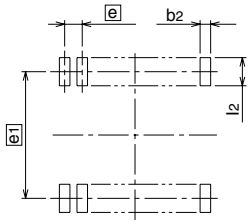
Note: If VCC is below its recommended value: 10V, output may not response input signals.
Please take enough evaluation in the case of power supply shut down and power supply applying after its shut-down.

PACKAGE OUTLINE

16P2N-A — **Plastic 16pin 300mil SOP**

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





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		