M81708FP

HIGH VOLTAGE HALF BRIDGE DRIVER

DESCRIPTION

M81708FP is high voltage Power MOSFET and IGBT module driver for half bridge applications.

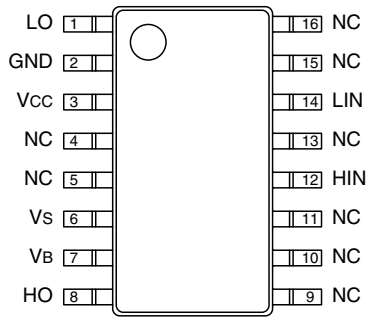
FEATURES

- FLOATING SUPPLY VOLTAGE 600V
- OUTPUT CURRENT ..... +120mA/–250mA
- HALF BRIDGE DRIVER
- UNDERVOLTAGE LOCKOUT
- SOP-16 PACKAGE

APPLICATIONS

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

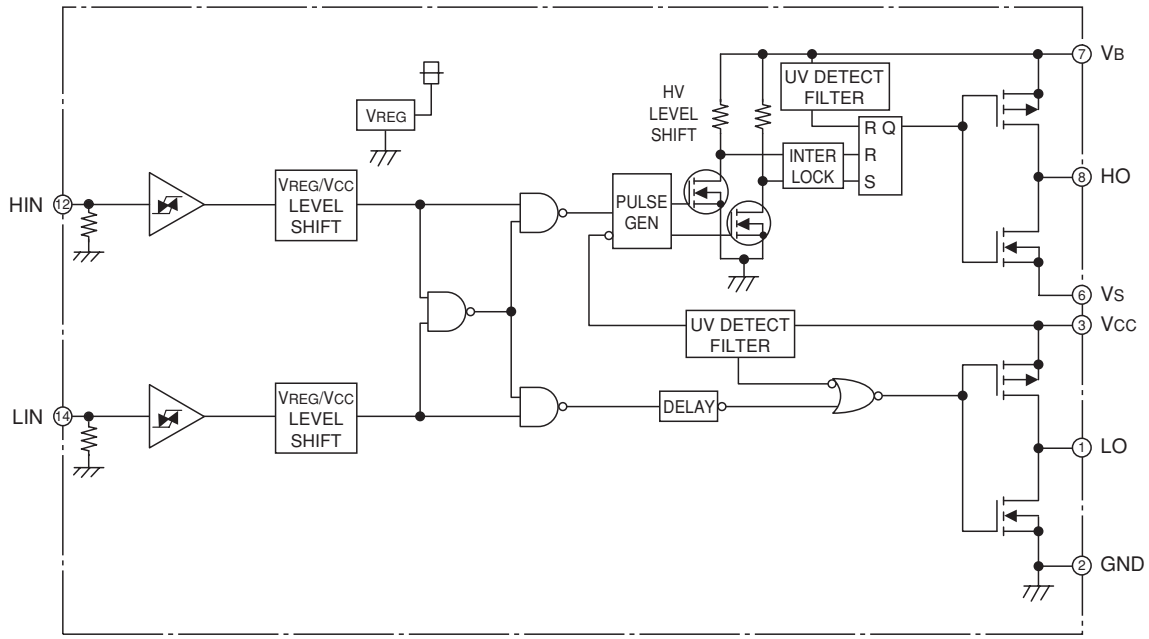
PIN CONFIGURATION (TOP VIEW)



NC:NO CONNECTION

Outline:16P2N

BLOCK DIAGRAM



MITSUBISHI ELECTRIC

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

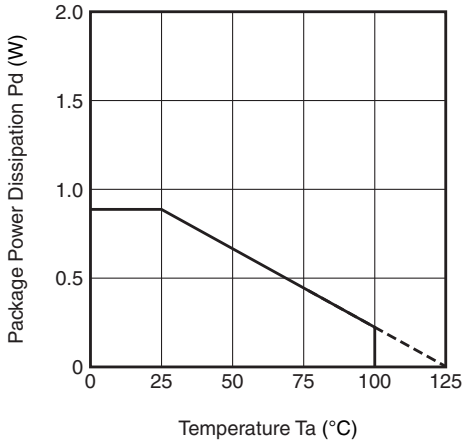
Symbol	Parameter	Test conditions	Ratings	Unit
V_B	High Side Floating Supply Absolute Voltage		–0.5 ~ 624	V
V_S	High Side Floating Supply Offset Voltage		V_B–24 ~ V_B+0.5	V
V_{BS}	High Side Floating Supply Voltage	$V_{BS} = V_B–V_S$	–0.5 ~ 24	V
V_{HO}	High Side Output Voltage		V_S–0.5 ~ V_B+0.5	V
V_{CC}	Low Side Fixed Supply Voltage		–0.5 ~ 24	V
V_{LO}	Low Side Output Voltage		–0.5 ~ V_{CC}+0.5	V
V_{IN}	Logic Input Voltage	HIN, LIN	–0.5 ~ V_{CC}+0.5	V
dVS/dt	Allowable Offset Voltage Transient		±50	V/ns
Pd	Package Power Dissipation	Ta = 25°C, On Board	0.84	W
$K\theta$	Linear Derating Factor	Ta > 25°C, On Board	8.4	mW/°C
Rth(j-c)	Junction-Case Thermal Resistance		50	°C/W
Tj	Junction Temperature		–20 ~ 125	°C
Topr	Operation Temperature		–20 ~ 100	°C
Tstg	Storage Temperature		–40 ~ 125	°C

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Test conditions	Limits			Unit
			Min.	Typ.	Max.	
V_B	High Side Floating Supply Absolute Voltage		V_S+10	—	V_S+20	V
V_S	High Side Floating Supply Offset Voltage	V_B > 10V	–5	—	500	V
V_{BS}	High Side Floating Supply Voltage	$V_{BS} = V_B–V_S$	10	—	20	V
V_{HO}	High Side Output Voltage		V_S	—	V_B	V
V_{CC}	Low Side Fixed Supply Voltage		10	—	20	V
V_{LO}	Low Side Output Voltage		0	—	V_{CC}	V
V_{IN}	Logic Input Voltage	HIN, LIN	0	—	V_{CC}	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_{FS}	Floating Supply Leakage Current	V_B = V_S = 600V	—	—	1.0	μA
I_{BS}	V_{BS} Standby Current	HIN = LIN = 0V	—	0.2	0.5	mA
I_{CC}	V_{CC} Standby Current	HIN = LIN = 0V	0.2	0.5	1.0	mA
V_{OH}	High Level Output Voltage	I_O = 0A, LO, HO	14.9	—	—	V
V_{OL}	Low Level Output Voltage	I_O = 0A, LO, HO	—	—	0.1	V
V_{IH}	High Level Input Threshold Voltage	HIN, LIN	2.1	3.0	4.0	V
V_{IL}	Low Level Input Threshold Voltage	HIN, LIN	0.6	1.5	2.0	V
I_{IH}	High Level Input Bias Current	V_{IN} = 5V	—	5	20	μA
I_{IL}	Low Level Input Bias Current	V_{IN} = 0V	—	—	2	μA
V_{BSuvr}	V_{BS} Supply UV Reset Voltage		8.0	8.9	9.8	V
V_{BSuvh}	V_{BS} Supply UV Hysteresis Voltage		0.3	0.7	—	V
t_{VBSuv}	V_{BS} Supply UV Filter Time		—	7.5	—	μs
V_{CCuvr}	V_{CC} Supply UV Reset Voltage		8.0	8.9	9.8	V
V_{CCuvh}	V_{CC} Supply UV Hysteresis Voltage		0.3	0.7	—	V
t_{VCCuv}	V_{CC} Supply UV Filter Time		—	7.5	—	μs
I_{OH}	Output High Level Short Circuit Pulsed Current	V_O = 0V, V_{IN} = 5V, PW < 10μs	120	200	—	mA
I_{OL}	Output Low Level Short Circuit Pulsed Current	V_O = 15V, V_{IN} = 0V, PW < 10μs	250	350	—	mA
R_{OH}	Output High Level On Resistance	I_O = –20mA, R_{OH} = (V_{OH}–V_O)/I_O	—	35	70	Ω
R_{OL}	Output Low Level On Resistance	I_O = 20mA, R_{OL} = V_O/I_O	—	15	30	Ω
$t_{dLH(HO)}$	High Side Turn-On Propagation Delay	CL = 1000pF between HO-V_S	105	140	175	ns
$t_{dHL(HO)}$	High Side Turn-Off Propagation Delay	CL = 1000pF between HO-V_S	95	130	165	ns
t_{rH}	High Side Turn-On Rise Time	CL = 1000pF between HO-V_S	—	100	220	ns
t_{fH}	High Side Turn-Off Fall Time	CL = 1000pF between HO-V_S	—	50	80	ns
$t_{dLH(LO)}$	Low Side Turn-On Propagation Delay	CL = 1000pF between LO-GND	105	140	175	ns
$t_{dHL(LO)}$	Low Side Turn-Off Propagation Delay	CL = 1000pF between LO-GND	95	130	165	ns
t_{rL}	Low Side Turn-On Rise Time	CL = 1000pF between LO-GND	—	100	220	ns
t_{fL}	Low Side Turn-Off Fall Time	CL = 1000pF between LO-GND	—	50	80	ns
Δt_{dLH}	Delay Matching, High Side and Low Side Turn-On	$\lvert t_{dLH(HO)} - t_{dLH(LO)} \rvert$	—	—	30	ns
Δt_{dHL}	Delay Matching, High Side and Low Side Turn-Off	$\lvert t_{dHL(HO)} - t_{dHL(LO)} \rvert$	—	—	30	ns

* Typ. is not specified.

FUNCTION TABLE (X: H or L)

HIN	LIN	VBS UV	VCC UV	HO	LO	Behavioral state
L	L	H	H	L	L	LO = HO = Low
L	H	H	H	L	H	LO = High
H	L	H	H	H	L	HO = High
H	H	H	H	L	L	LO = HO = Low
X	L	L	H	L	L	HO = Low, VBS UV tripped
X	H	L	H	L	H	LO = High, VBS UV tripped
L	X	H	L	L	L	LO = Low, VCC UV tripped
H	X	H	L	L	L	HO = LO = Low, VCC UV tripped

Note : "L" state of VBS UV, VCC UV means that UV trip voltage.

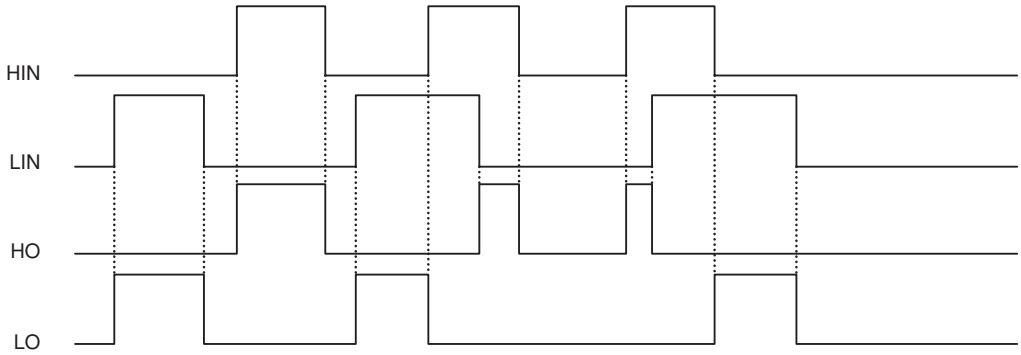
In the case of both input signals (HIN and LIN) are "H", output signals (HO and LO) become "L".

TIMING DIAGRAM

1.Input/Output Timing Diagram

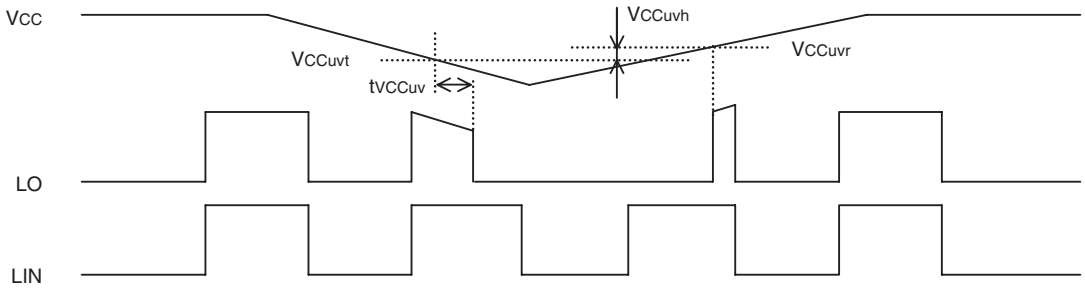
HIGH ACTIVE (When input signal (HIN or LIN) is "H", then output signal (HO or LO) is "H".)

In the case of both input signals (HIN and LIN) are "H", output signals (HO and LO) become "L".

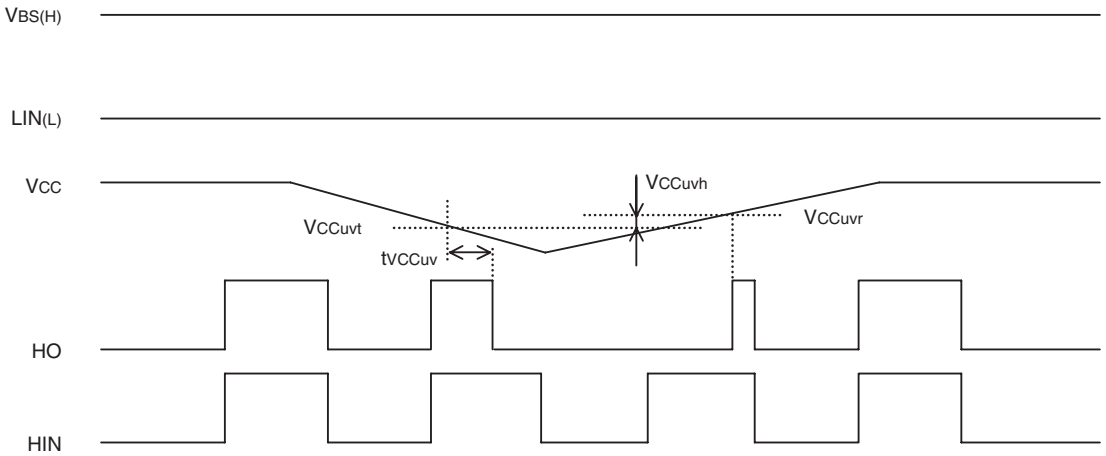


2.V_{CC} (V_{BS}) Supply Under Voltage Lockout Timing Diagram

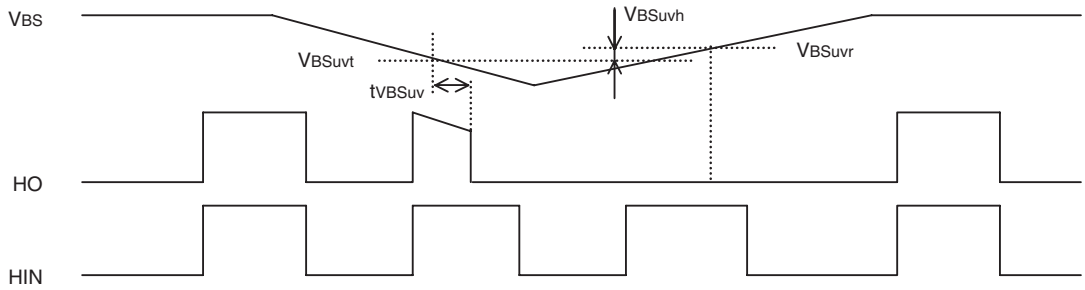
When V_{CC} Supply Voltage keeps lower UV Trip Voltage ($V_{CCuvt} = V_{CCuvr} - V_{CCuvh}$) for V_{CC} Supply UV Filter Time, output signal becomes “L”. And then, when V_{CC} Supply Voltage is higher than UV Reset Voltage, output signal LO becomes “H”.



When V_{CC} Supply Voltage keeps lower UV Trip Voltage ($V_{CCuvt} = V_{CCuvr} - V_{CCuvh}$) for V_{CC} Supply UV Filter Time, output signal becomes “L”. And then, when V_{CC} Supply Voltage is higher than UV Reset Voltage, input signal (LIN) is L; output signal HO becomes “H”.



When V_{BS} Supply Voltage keeps lower UV Trip Voltage ($V_{BSuvt} = V_{BSuvr} - V_{BSuvh}$) for V_{BS} Supply UV Filter Time, output signal becomes “L”. And then, V_{BS} Supply Voltage is higher than UV Reset Voltage, output signal HO keeps “L” until next input signal HIN is “H”.



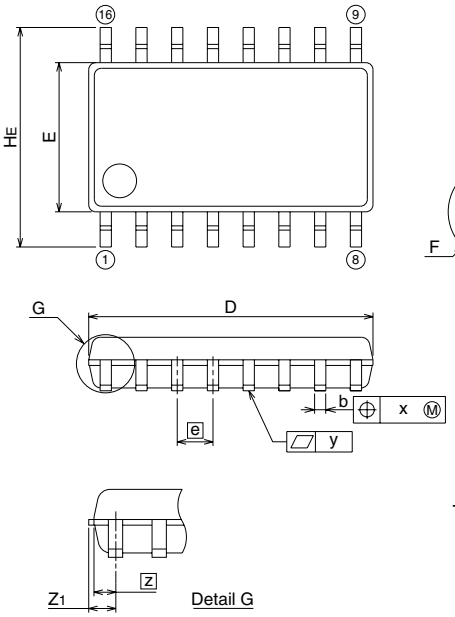
3.Allowable Supply Voltage Transient

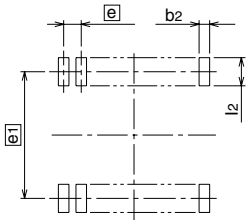
It is recommended that supplying V_{CC} firstly and supplying V_{BS} secondly. In the case of shutting off supply voltage, shutting off V_{BS} firstly and shutting off V_{CC} secondly. At the time of starting V_{CC} and V_{BS}, power supply should be increased slowly. If it is increased rapidly, output signal (HO or LO) may be “H”.

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
A_1	0	0.1	0.2
A_2	–	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	–
H_E	7.5	7.8	8.1
L	0.4	0.6	0.8
L_1	–	1.25	–
Z	–	0.605	–
Z_1	–	–	0.755
x	–	–	0.25
y	–	–	0.1
θ	0°	–	8°
b_2	–	0.76	–
e1	–	7.62	–
l_2	1.27	–	–