M81713FP

HIGH VOLTAGE HALF BRIDGE DRIVER

DESCRIPTION

M81713FP is high voltage Power MOSFET and IGBT module driver for half bridge applications.

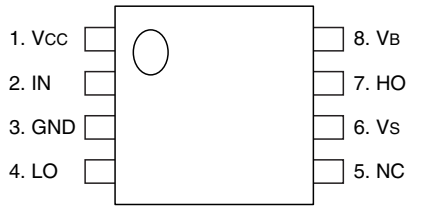
FEATURES

- FLOATING SUPPLY VOLTAGE 600V
- OUTPUT CURRENT ..... ±500mA
- HALF BRIDGE DRIVER
- SINGLE INPUT TYPE
- INTERNALLY SET DEADTIME
- UNDERVOLTAGE LOCKOUT
- SOP-8 PACKAGE

APPLICATIONS

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

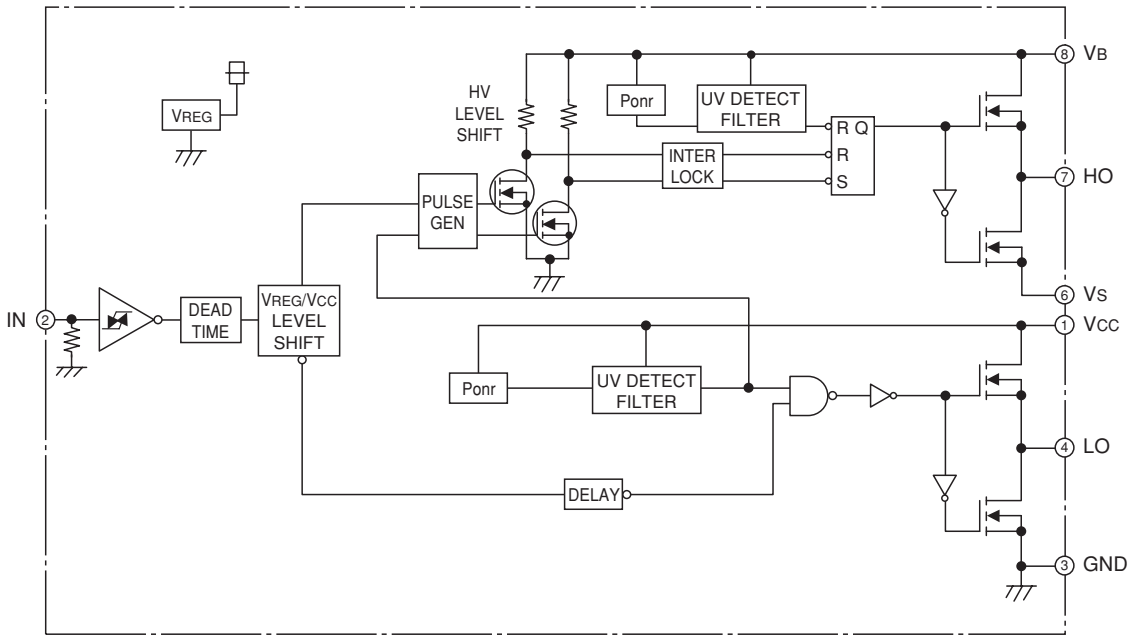
PIN CONFIGURATION (TOP VIEW)



NC:NO CONNECTION

Outline:8P2S

BLOCK DIAGRAM



MITSUBISHI ELECTRIC

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

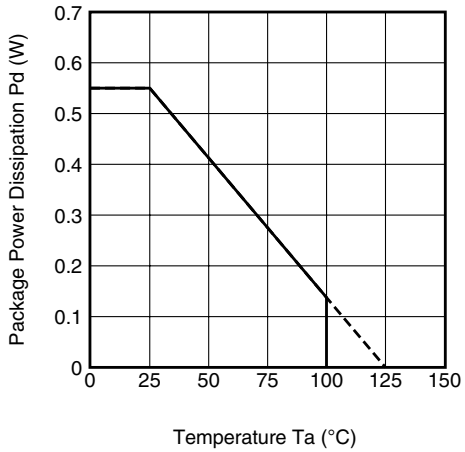
Symbol	Parameter	Test conditions	Ratings	Unit
V_B	High Side Floating Supply Absolute Voltage		–0.5 ~ 624	V
V_S	High Side Floating Supply Offset Voltage		V_B–24 ~ V_B+0.5	V
V_{BS}	High Side Floating Supply Voltage	$V_{BS} = V_B–V_S$	–0.5 ~ 24	V
V_{HO}	High Side Output Voltage		V_S–0.5 ~ V_B+0.5	V
V_{CC}	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		–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	0.55	W
$K\theta$	Linear Derating Factor	Ta > 25°C, On Board	5.5	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		0	—	V_{CC}	V

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

THERMAL DERATING FACTOR CHARACTERISTIC (MAXIMUM RATING)

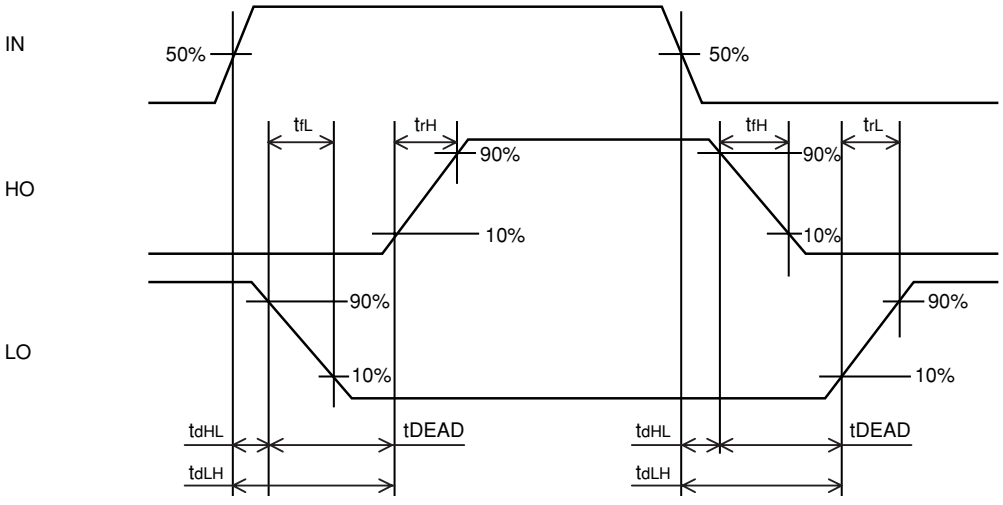


ELECTRICAL CHARACTERISTICS (Ta = 25°C, V_{CC} = V_{BS} (= V_B–V_S) = 15V, unless otherwise specified)

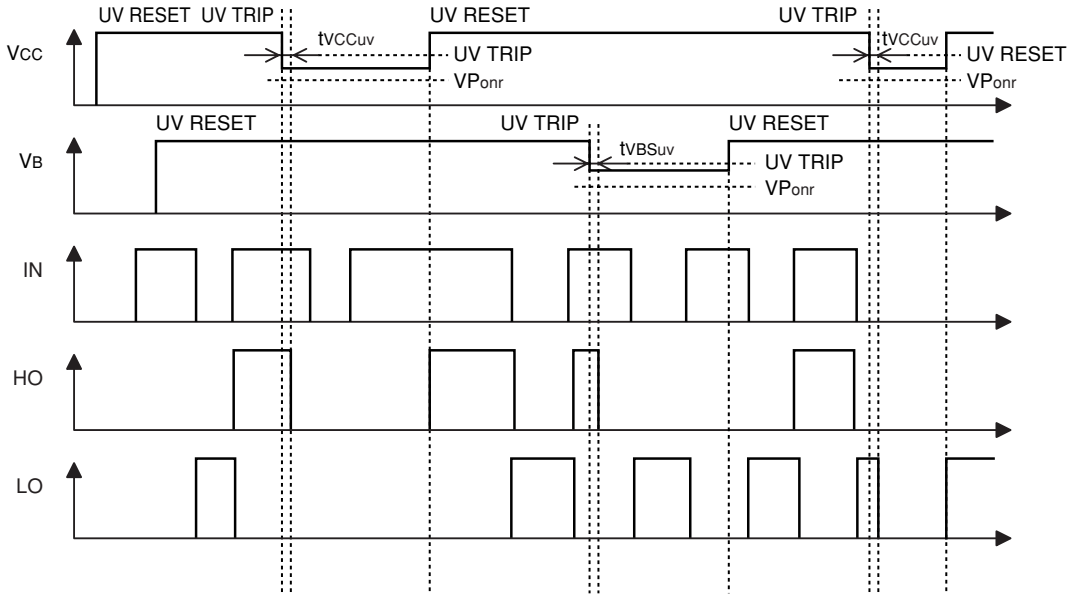
Symbol	Parameter	Test conditions	Limits			Unit
			Min.	Typ.*	Max.	
I_{FS}	Floating Supply Leakage Current	V_B = V_S = 600V	—	—	1.0	μA
I_{BS}	V_{BS} Standby Current	IN = 0V	—	0.2	0.5	mA
I_{CC}	V_{CC} Standby Current	IN = 0V	0.2	0.5	0.75	mA
V_{OH}	High Level Output Voltage	I_O = 0A, LO, HO	13.8	14.4	—	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	—	25	75	μA
I_{IL}	Low Level Input Bias Current	V_{IN} = 0V	—	—	1	μA
V_{BSuvr}	V_{BS} Supply UV Reset Voltage		8.0	8.9	9.8	V
V_{BSuvh}	V_{BS} Supply UV Hysteresis Voltage		0.5	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		0.5	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, PW < 10μs	—	–500	—	mA
I_{OL}	Output Low Level Short Circuit Pulsed Current	V_O = 15V, PW < 10μs	—	500	—	mA
R_{OH}	Output High Level On Resistance	I_O = –200mA, R_{OH} = (V_{OH}–V_O)/I_O	—	30	—	Ω
R_{OL}	Output Low Level On Resistance	I_O = 200mA, R_{OL} = V_O/I_O	—	12	—	Ω
tDEAD	Dead Time LO Turn-Off to HO Turn-On & HO Turn-Off to LO Turn-On	CL = 1000pF between HO-V_S, LO-GND	0.5	—	1.00	μs
VP_{onr}	Power On Reset Voltage		—	—	6	V
$tP_{onr(FIL)}$	Power On Reset Filter Time		300	—	—	ns
t_{dLH}	Turn-On Propagation Delay	CL = 1000pF between HO-V_S, LO-GND	0.6	0.9	1.2	μs
t_{dHL}	Turn-Off Propagation Delay	CL = 1000pF between HO-V_S, LO-GND	0.1	0.15	0.2	μs
t_{rH}	High Side Turn-On Rise Time	CL = 1000pF between HO-V_S	—	75	180	ns
t_{fH}	High Side Turn-Off Fall Time	CL = 1000pF between HO-V_S	—	75	180	ns
t_{rL}	Low Side Turn-On Rise Time	CL = 1000pF between LO-GND	—	75	180	ns
t_{fL}	Low Side Turn-Off Fall Time	CL = 1000pF between LO-GND	—	75	180	ns

* Typ. is not specified.

INPUT/OUTPUT TIMING DIAGRAM



UV SEQUENCE



1.Input/Output Logic:

HO has positive logic with reference to IN. LO has negative logic with reference to IN.

2.Logic During UV (V_{CC}, V_{BS}) Error

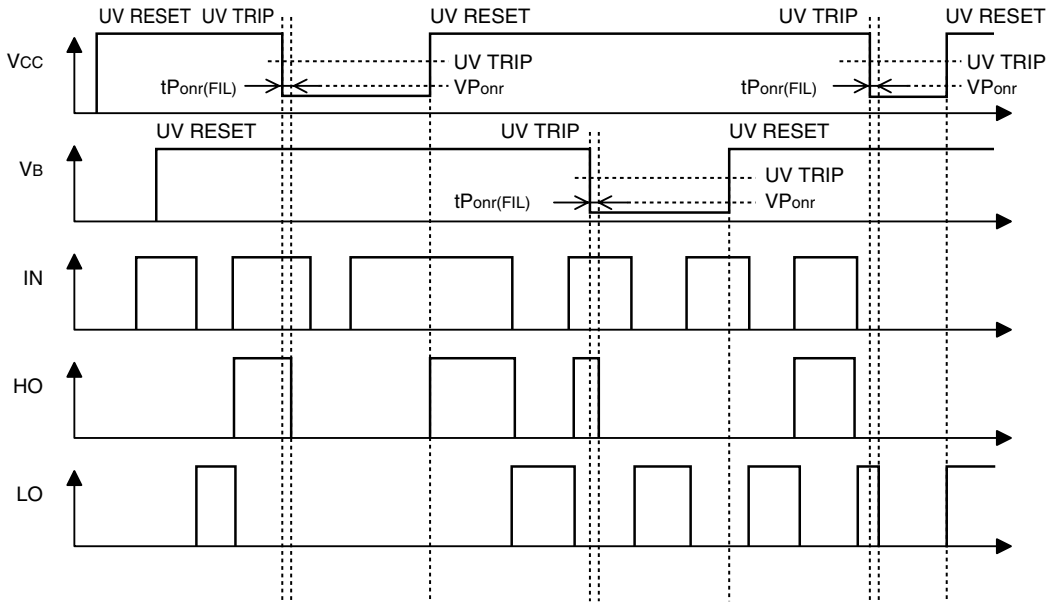
Error Signal	HO	LO
UV error (V_{CC})	HO outputs "L" Level as long as UV error for V_{CC} is detected. HO responds to IN if V_{CC} exceeds V_{CC} UV reset level.	LO is locked at "L" level as long as UV error for V_{CC} is detected. After V_{CC} exceeds V_{CC} UV reset level, the lock for LO is removed and responds to IN signal.
UV error (V_{BS})	HO is locked at "L" level as long as UV error for V_{BS} is detected. After V_{BS} exceeds V_{BS} UV reset level, the lock for HO is removed following an "L" state of the IN signal, and then HO responds to the input.	LO is independent of V_{BS} to respond to IN.

* IF UV error for V_{CC} is detected when HO is in "H" level and the falling speed of V_{CC} is exceeds 0.03V/μs, the off signal for HO might not be transmitted from low side to high side and then HO stays "H".

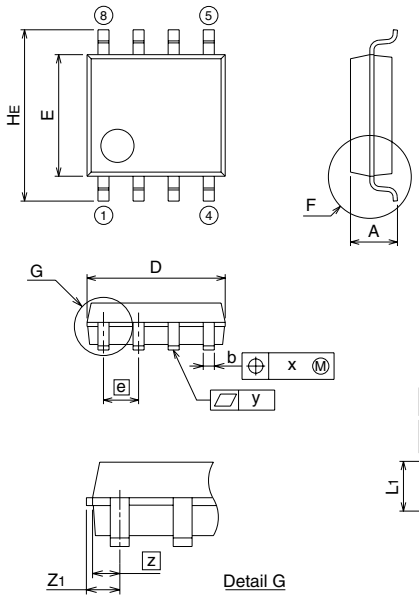
3.Allowable Supply Voltage Transient

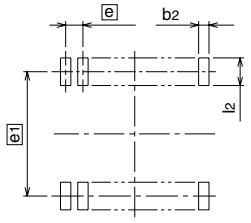
It is recommended that supplying V_{CC} firstly and supplying V_{BS} secondly. In the case of shutting off supply voltage, it is recommended to shut off V_{BS} firstly and to shut off V_{CC} secondly. At the time of starting V_{CC} and V_{BS}, power supply should be increased slowly (below 50V/μs). If it is increased rapidly, output signal (HO or LO) may be "H".

Ponr (Power On Reset) SEQUENCE



PACKAGE OUTLINE





Recommended Mount Pad

Symbol	Dimension in Millimeters		
	Min	Nom	Max
A	–	–	1.9
A1	0.05	–	–
A2	–	1.5	–
b	0.35	0.4	0.5
c	0.13	0.15	0.2
D	4.8	5.0	5.2
E	4.2	4.4	4.6
e	–	1.27	–
HE	5.9	6.2	6.5
L	0.2	0.4	0.6
L1	–	0.9	–
Z	–	0.595	–
Z1	–	–	0.745
x	–	–	0.25
y	–	–	0.1
θ	0°	–	10°
b2	–	0.76	–
e1	–	5.72	–
l2	1.27	–	–