M81725FP

HIGH VOLTAGE HIGH SIDE DRIVER

DESCRIPTION

M81725FP is high voltage Power MOSFET and IGBT driver for high side applications.

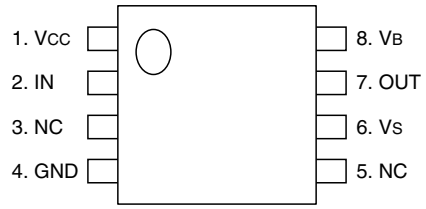
FEATURES

- FLOATING SUPPLY VOLTAGE 600V
- OUTPUT CURRENT ..... ±3A (typ)
- UNDERVOLTAGE LOCKOUT
- INPUT FILTER
- SOP-8 PACKAGE

APPLICATIONS

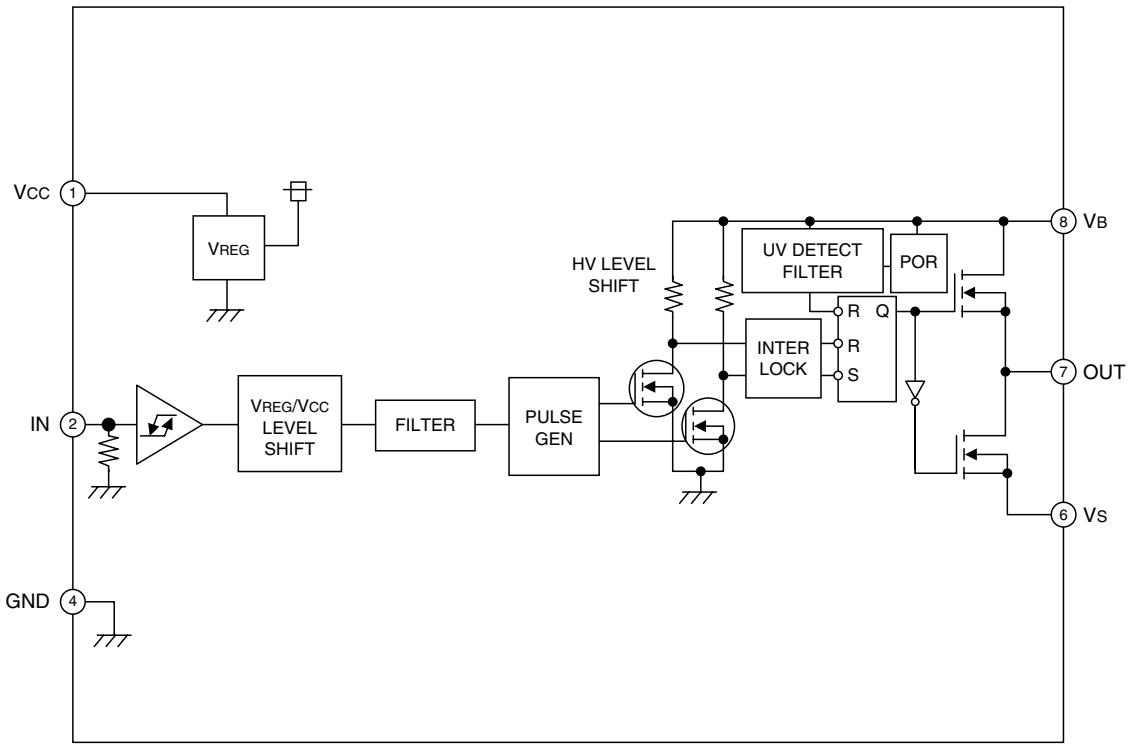
MOSFET and IGBT driver for PDP,HID lamp, refrigerator, air-conditioner, washing machine, AC-servomotor and general purpose.

PIN CONFIGURATION (TOP VIEW)



Outline:8P2S
NC: NO CONNECTION

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_{OUT}	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_{IN}	Logic Input Voltage	IN	–0.5 ~ V_{CC}+0.5	V
Pd	Package Power Dissipation	Ta = 25°C , On Board	0.6	W
Kθ	Linear Derating Factor	Ta > 25°C , On Board	4.8	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
T_L	Solder heat-proof(flow)	For Pb Free	260(10s)	°C

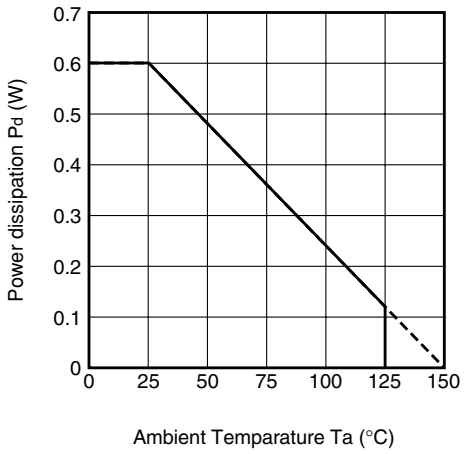
* Please adjust the V_S potential to 500V or less when the junction temperature (Tj) exceeds 125°C.

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Test conditions	Limits			Unit
			Min.	Typ.	Max.	
V_B	High Side Floating Supply Absolute Voltage		V_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_{OUT}	High Side Output Voltage		V_S	—	V_B	V
V_{CC}	Low Side Fixed Supply Voltage		10	—	20	V
V_{IN}	Logic Input Voltage	IN	0	—	7	V

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

THERMAL DERATING FACTOR CHARACTERISTIC (ABSOLUTE MAXIMUM RATINGS)

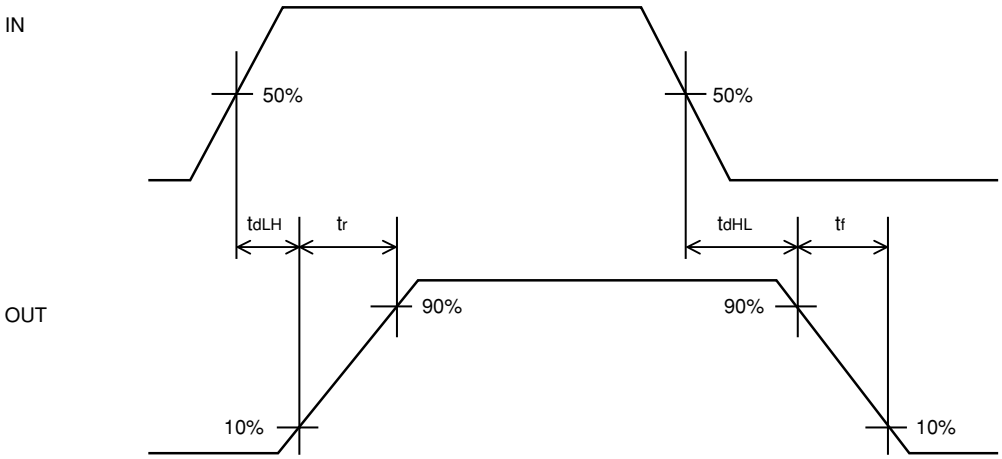


ELECTRICAL CHARACTERISTICS (Ta = 25°C, Vcc=VBS(=VB-VS)=15V, unless otherwise specified)

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}	Vcc standby Current	IN = 0V	0.1	0.3	0.6	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	IN	4.0	—	—	V
V_{IL}	Low Level Input Threshold Voltage	IN	—	—	0.8	V
I_{IH}	High Level Input Bias Current	V_{IN} = 5V	—	17	40	μA
I_{IL}	Low Level Input Bias Current	V_{IN} = 0V	—	0	1	μA
V_{BSuvr}	V_{BS} Supply UV Reset Voltage		8.0	8.9	9.8	V
V_{BSuvt}	V_{BS} Supply UV Trip Voltage		7.4	8.2	9.0	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_{Ponr}	Power-On Reset Voltage		—	—	6.0	V
t_{Ponr}(FIL)	Power-On Reset Filter Time		300	—	—	ns
I_{OH}	Output High Level Short Circuit Pulsed Current	V_O = 0V, V_{IN} = 5V, PWD < 10μs	2.0	3.0	—	A
I_{OL}	Output Low Level Short Circuit Pulsed Current	V_O = 15V, V_{IN} = 0V, PWD < 10μs	2.0	3.0	—	A
R_{OH}	Output High Level On Resistance	I_O = –200mA, R_{OH} = (V_{OH}–V_O)/I_O	—	10	20	Ω
R_{OL}	Output Low Level On Resistance	I_O = 200mA, R_{OL} = V_O/I_O	—	2.5	3.0	Ω
t_{dLH}	Turn-On Propagation Delay	CL = 1000pF between OUT-Vs	—	200	280	ns
t_{dHL}	Turn-Off Propagation Delay	CL = 1000pF between OUT-Vs	—	180	260	ns
t_r	Turn-On Rise Time	CL = 1000pF between OUT-Vs	—	25	45	ns
t_f	Turn-Off Fall Time	CL = 1000pF between OUT-Vs	—	20	35	ns
IN(FIL)	Input Filter Time	CONVEX PULSE : IN	—	100	—	ns
		CONCAVE PULSE : IN	—	100	—	ns

* Typ. is not specified

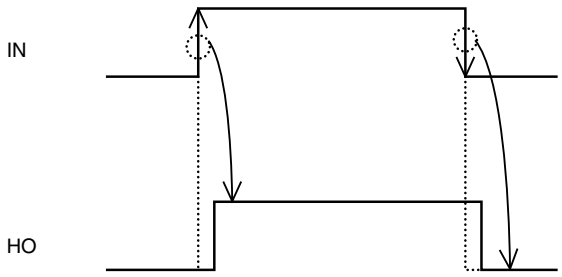
TIMING REQUIREMENT



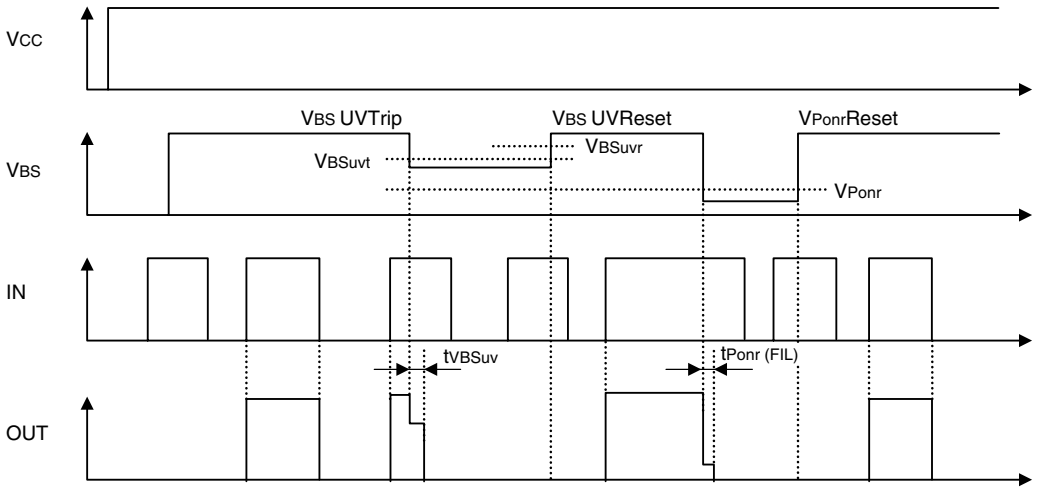
FUNCTION TABLE

IN	V_{BS} UV	OUT	Behavioral state
H→L	H	L	OUT = Low
L→H	H	H	OUT = High
X	L	L	OUT = Low, V_{BS} UV tripped

Note1 : "L" state of V_{BS} UV, Vcc UV means that UV trip voltage.
2 : X (IN) : L→H or H→L.
3 : Output signal (HO) is triggered by the edge of input signal.



Operation sequence Diagram



1. Input/Output Timing
   HIGH ACTIVE (When input signal is “H”, then output signal is “H”.)

2. V_{BS} Supply Under Voltage Lockout

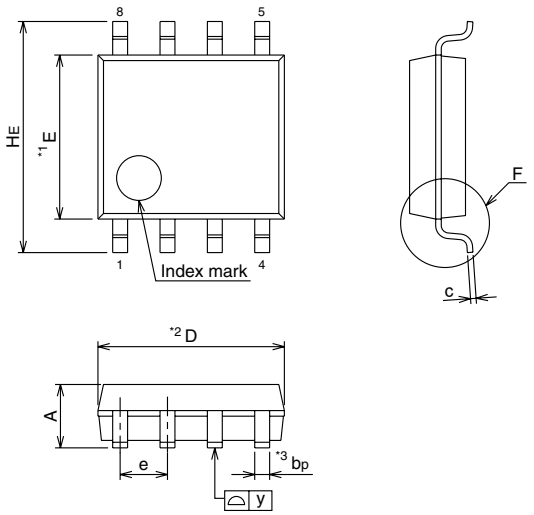
   If V_{BS} supply voltage drops below UV trip voltage (V_{BSuvt}) for V_{BS} supply UV filter time, output signal is shut down. As soon as V_{BS} supply voltage rises over UV reset voltage, output signal HO becomes “H” at following “H” edge of input signal.

Note: If the V_{BS} drops below V_{PON}, the filter time will become tPOR (FIL) instead of tV_{BSuv}.

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

Note: If V_{CC} 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



NOTE)
1. DIMENSIONS "*1" AND "*2" DO NOT INCLUDE MOLD FLASH.
2. DIMENSION "*3" DOES NOT INCLUDE TRIM OFFSET.

Reference Symbol	Dimension in Millimeters		
	Min	Nom	Max
D	4.8	5.0	5.2
E	4.2	4.4	4.6
A_2	–	1.5	–
A_1	0.05	–	–
A	–	–	1.9
b_p	0.35	0.4	0.5
c	0.13	0.15	0.2
θ	0°	–	10°
H_E	5.9	6.2	6.5
e	1.12	1.27	1.42
y	–	–	0.1
L	0.2	0.4	0.6