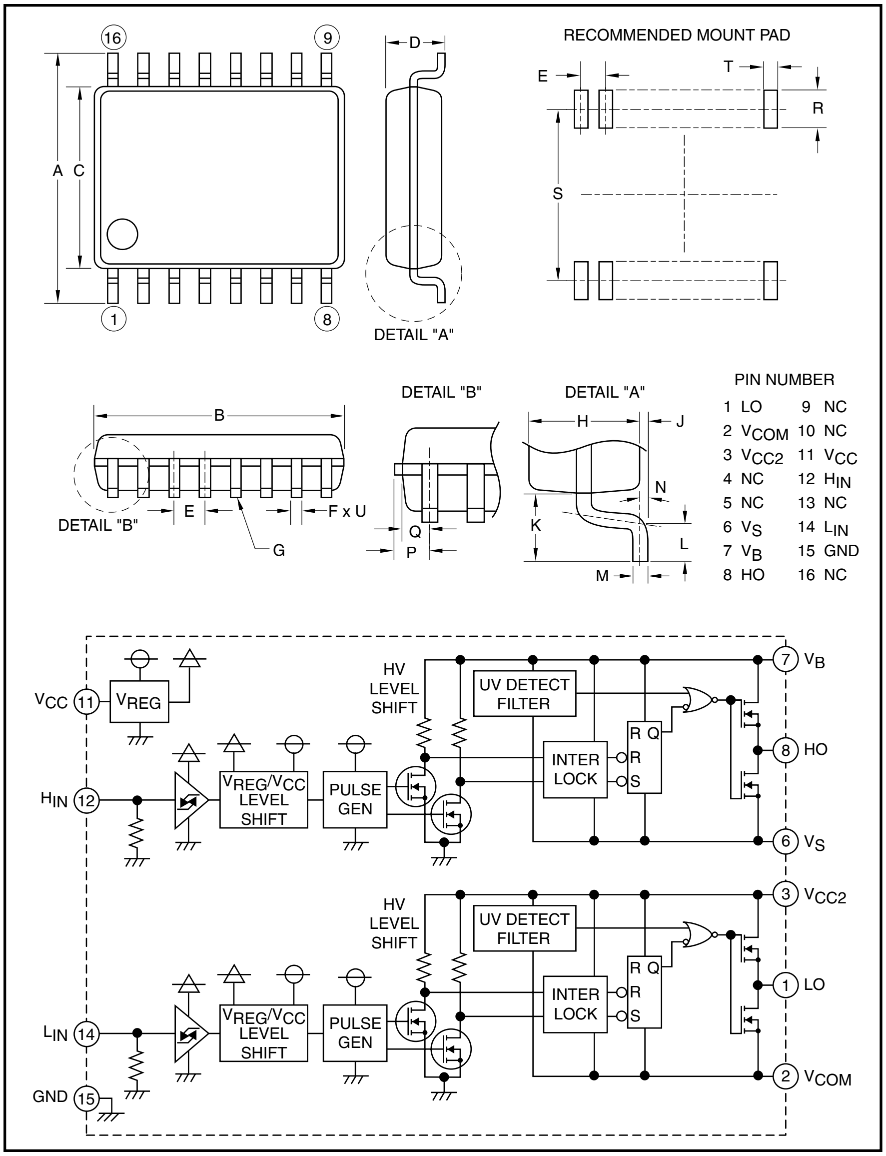
THE DATASHEET OF

M81707FP

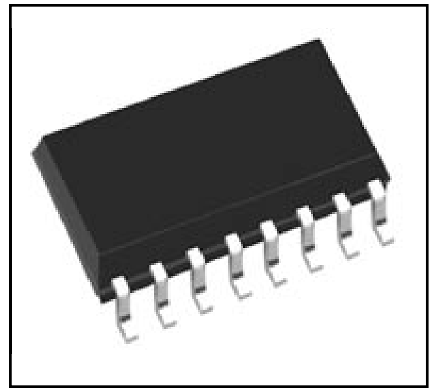
Powerex, Inc., 200 E. Hillis Street, Youngwood, Pennsylvania 15697-1800 (724) 925-7272

HVIC

High Voltage Half-Bridge Driver 600 Volts/±100mA



Outline Drawing and Circuit Diagram



Description:

M81707FP is a high voltage Power MOSFET and IGBT module driver for half-bridge applications.

Features:

- ☐ Output Current ±100mA
- ☐ Half-Bridge Driver
- ☐ SOP-16 Package

Applications:

- ☐ HID Ballast
- ☐ PDP
- ☐ MOSFET Driver
- ☐ IGBT Driver
- ☐ Inverter Module Control

Ordering Information:

M81707FP is a ±100mA, 600 Volt HVIC, High Voltage Half-Bridge Driver

Dimensions	Inches	Millimeters
A	0.31±0.01	7.8±0.3
B	0.41±0.004	10.1±0.1
C	0.21±0.004	5.3±0.1
D	0.12	2.10
E	0.05	1.27
F	0.02±0.002	0.4±0.05
G	0.004	0.1
H	0.07	1.8
J	0.01±0.004	0.1±0.1
K	0.05	1.25

Dimensions	Inches	Millimeters
L	0.024±0.008	0.6±0.2
M	0.1±0.002	0.2±0.05
N	8°	8°
P	0.03	0.755
Q	0.023	0.605
R	0.05 Min.	1.27 Min.
S	0.30	7.62
T	0.029	0.76
U	0.098 Dia.	0.25 Dia.

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Absolute Maximum Ratings, T_a = 25°C unless otherwise specified

Characteristics	Symbol	M81707FP	Units
High Side Floating Supply Absolute Voltage	V_B	-0.5 ~ 624	Volts
High Side Floating Supply Offset Voltage	V_S	V_B-24 ~ V_B+0.5	Volts
High Side Floating Supply Voltage ($V_{BS} = V_B - V_S$)	V_{BS}	-0.5 ~ 24	Volts
High Side Output Voltage	V_{HO}	V_S-0.5 ~ V_B+0.5	Volts
Low Side Floating Supply Absolute Voltage	V_{CC2}	-0.5 ~ 624	Volts
Output Standard Voltage	V_{com}	V_{CC2}-24 ~ V_{CC2}+0.5	Volts
Low Side Floating Supply Voltage ($V_{CC2com} = V_{CC2} - V_{com}$)	V_{CC2com}	-0.5 ~ 24	Volts
Low Side Output Voltage	V_{LO}	V_{com}-0.5 ~ V_{CC2}+0.5	Volts
Low Side Fixed Supply Voltage	V_{CC}	-0.5 ~ 24	Volts
Logic Input Voltage (H_{IN}, L_{IN})	V_{IN}	-0.5 ~ V_{CC}+0.5	Volts
Allowable Offset Voltage Transient	dV_S/dt	±50	Volts/ns
Package Power Dissipation (T_a = 25°C, On Board)	P_d	0.89	Watts
Linear Derating Factor (T_a > 25°C, On Board)	$K\theta$	-8.9	mW/°C
Junction to Case Thermal Resistance	$R_{th(j-c)}$	45	°C/W
Junction Temperature	T_j	-40 ~ 125	°C
Operation Temperature	T_{opr}	-40 ~ 100	°C
Storage Temperature	T_{stg}	-55 ~ 125	°C
Solder Heat Resistance (Pb Free)	T_L	255 : 10s, Max. 260	°C

Recommended Operating Conditions

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
High Side Floating Supply Absolute Voltage	V_B		V_S+10	—	V_S+20	Volts
High Side Floating Supply Offset Voltage	V_S	V_B > 10V	-5	—	500	Volts
High Side Floating Supply Voltage	V_{BS}	$V_B = V_B - V_S$	10	—	20	Volts
High Side Output Voltage	V_{HO}		V_S	—	V_B	Volts
Low Side Floating Supply Absolute Voltage	V_{CC2}		V_{com}+10	—	V_{com}+20	Volts
Output Standard Voltage	V_{com}	V_{CC2} > 10V	-5	—	500	Volts
Low Side Floating Supply Voltage	V_{CC2com}	$V_{CC2com} = V_{CC2} - V_{com}$	10	—	20	Volts
Low Side Output Voltage	V_{LO}		V_{com}	—	V_{CC2}	Volts
Low Side Fixed Supply Voltage	V_{CC}		10	—	20	Volts
Logic Input Voltage	V_{IN}	H_{IN}, L_{IN}	0	—	V_{CC}	Volts

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Electrical Characteristics

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

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Floating Supply Leakage Current	I_{FS}	V_B = V_S = 600V	—	—	1.0	µA
V_{com} Floating Supply Leakage Current	I_{FScom}	V_{CC2} = V_{com} = 600V	—	—	1.0	µA
V_{BS} Standby Current	I_{BS}	H_{IN} = L_{IN} = 0V	—	0.18	0.4	mA
V_{CC} Standby Current	I_{CC}	H_{IN} = L_{IN} = 0V	—	0.30	0.6	mA
V_{CC2} Standby Current	I_{CC2}	H_{IN} = L_{IN} = 0V	—	0.18	0.4	mA
V_{BS} Standby Current H	I_{BSH}	H_{IN} = 5V	—	0.25	0.5	mA
V_{CC} Standby Current H	I_{CCH}	H_{IN} = 5V	—	0.37	0.75	mA
V_{CC2} Standby Current H	I_{CC2H}	H_{IN} = 5V	—	0.18	0.4	mA
V_{BS} Standby Current L	I_{BSL}	L_{IN} = 5V	—	0.18	0.4	mA
V_{CC} Standby Current L	I_{CCL}	L_{IN} = 5V	—	0.37	0.75	mA
V_{CC2} Standby Current H	I_{CC2L}	L_{IN} = 5V	—	0.25	0.5	mA
High Level Output Voltage	V_{OH}	I_O = 0A, LO, HO	14.9	—	—	Volts
Low Level Output Voltage	V_{OL}	I_O = 0A, LO, HO	—	—	0.1	Volts
High Level Input Threshold Voltage	V_{IH}	H_{IN}, L_{IN}	2.0	3.0	4.0	Volts
Low Level Input Threshold Voltage	V_{IL}	H_{IN}, L_{IN}	0.6	1.5	2.5	Volts
Input Hysteresis Voltage	V_{INh}	V_{INh} = V_{IH} – V_{IL}	1.0	1.5	2.0	Volts
High Level Input Bias Current 5	I_{IH5}	V_{IN} = 5V	—	25	75	µA
High Level Input Bias Current 15	I_{IH15}	V_{IN} = 15V	—	75	150	µA
Low Level Input Bias Current	I_{IL}	V_{IN} = 0V	—	—	1.0	µA
V_{BS} Supply UV Reset Voltage	V_{BSuvr}		7.5	8.6	9.7	Volts
V_{BS} Supply UV Hysteresis Voltage	V_{BSuvh}		0.1	0.4	0.7	Volts
V_{BS} Supply UV Filter Time	tV_{BSuv}		—	7.5	—	µs
V_{CC} Supply UV Reset Voltage	V_{CCuvr}		7.5	8.6	9.7	Volts
V_{CC} Supply UV Hysteresis Voltage	V_{CCuvh}		0.1	0.4	0.7	Volts
V_{CC} Supply UV Filter Time	tV_{CCuv}		—	7.5	—	µs
Output High Level Short Circuit Pulsed Current	I_{OH}	V_O = 0V, V_{IN} = 5V, P_W < 10µs	-60	-100	-140	mA
Output Low Level Short Circuit Pulsed Current	I_{OL}	V_O = 15V, V_{IN} = 0V, P_W < 10µs	60	100	140	mA
Output High Level ON Resistance	R_{OH}	I_O = -20mA, R_{OH} = (V_{OH} – V_O)/I_O	—	35	70	Ω
Output Low Level ON Resistance	R_{OL}	I_O = 20mA, R_{OL} = V_O /I_O	—	50	100	Ω
High Side Turn-On Propagation Delay	$t_{dLH(HO)}$	C_L = 200pF between HO – V_S	85	110	135	ns
High Side Turn-Off Propagation Delay	$t_{dHL(HO)}$	C_L = 200pF between HO – V_S	100	130	160	ns
High Side Turn-On Rise Time	t_{rH}	C_L = 200pF between HO – V_S	15	30	70	ns
High Side Turn-Off Fall Time	t_{fH}	C_L = 200pF between HO – V_S	20	45	90	ns
LowSide Turn-On Propagation Delay	$t_{dLH(LO)}$	C_L = 200pF between LO – GND	85	110	135	ns
Low Side Turn-Off Propagation Delay	$t_{dHL(LO)}$	C_L = 200pF between LO – GND	100	130	160	ns
Low Side Turn-On Rise Time	t_{rL}	C_L = 200pF between LO – GND	15	30	70	ns
Low Side Turn-Off Fall Time	t_{fL}	C_L = 200pF between LO – GND	20	45	90	ns
Delay Matching, High Side and Low Side Turn-On	Δt_{dLH}	$\lvert t_{dLH(HO)} - t_{dLH(LO)} \rvert$	—	—	15	ns
Delay Matching, High Side and Low Side Turn-Off	Δt_{dHL}	$\lvert t_{dHL(HO)} - t_{dHL(LO)} \rvert$	—	—	15	ns
Output Pulse Width	V_{OPW}	V_{IN} : PW = 200ns	200	220	240	ns

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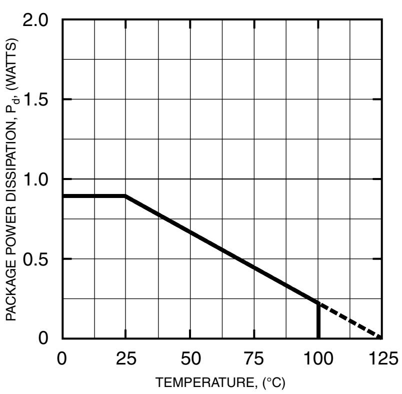
THERMAL DERATING FACTOR CHARACTERISTICS



FUNCTION TABLE (X : HORL)

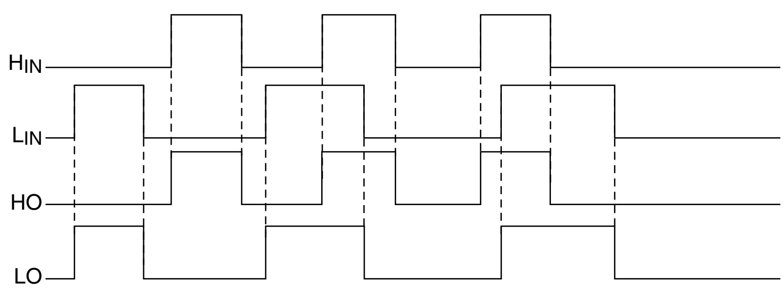
H_{IN}	L_{IN}	V_{BS} U_V	V_{CC2COM} U_V	HO	LO	Behavorial State
L	L	H	H	L	L	LO = HO = Low
L	H	H	H	L	H	LO = High
H	L	H	H	H	L	HO = High
H	H	H	H	H	H	LO = HO = High
X	L	L	H	L	L	HO = Low, V_{BS} U_V Tripped
X	H	L	H	L	H	LO = High, V_{BS} U_V Tripped
L	X	H	L	L	L	LO = Low, V_{CC2COM} U_V Tripped
H	X	H	L	H	L	HO = High, V_{CC2COM} U_V Tripped

NOTE: "L" state of V_{BS} U_V, V_{CC2COM} U_V means that U_V trip voltage.
In the case of both input signals (H_{IN} and L_{IN}) are "H", output signals (HO and LO) become "H".

TIMING DIAGRAM

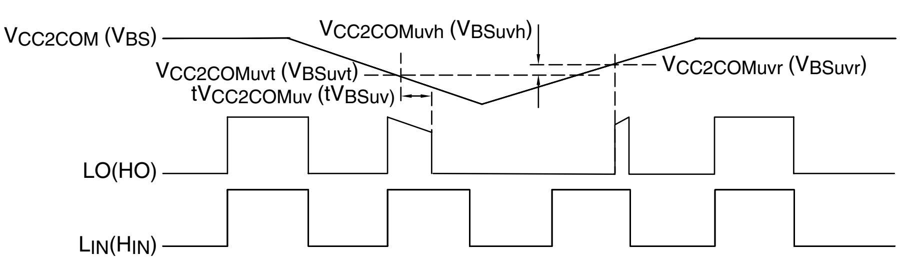
1. Input/Output Timing Diagram

   HIGH ACTIVE – When input signal (H_{IN} or L_{IN}) is "H", then output signal (HO or LO) is "H". In the case of both input signals (H_{IN} and L_{IN}) are "H", then output signals (HO and LO) become "H".



2. V_{CC2COM}(V_{BS}) Supply Under Voltage Lockout Timing Diagram

   When V_{CC2COM} supply voltage keeps lower U_V trip voltage ($V_{CC2COMuvt} = V_{CC2COMuvr} – V_{CC2COMuvh}$) for V_{CC2COM} supply U_V filter time, output signal becomes "L". And then, when V_{CC2COM} supply voltage is higher than U_V reset voltage, output signal becomes normal.



Consideration – Allowable Supply Voltage Transient

It is recommended supplying V_{CC} first, V_{CC2COM} second and V_{BS} last. In the case of shutting off supply voltage, shut off V_{BS} supply voltage first. Second, shut off V_{CC2COM} supply voltage, and last, shut off V_{CC} supply voltage.

At the time of starting V_{CC2COM} and V_{BS}, power supply should be increased slowly. If it is increased rapidly, output signal (HO and LO) may be "H".