

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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M81707FP

HVIC, High Voltage Half-Bridge Driver

600 Volts/±100mA

Absolute Maximum Ratings, $T_a = 25^\circ\text{C}$ 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	$V_B - 24 \sim V_B + 0.5$	Volts
High Side Floating Supply Voltage ($V_{BS} = V_B - V_S$)	V_{BS}	-0.5 ~ 24	Volts
High Side Output Voltage	V_{HO}	$V_S - 0.5 \sim V_B + 0.5$	Volts
Low Side Floating Supply Absolute Voltage	V_{CC2}	-0.5 ~ 624	Volts
Output Standard Voltage	V_{com}	$V_{CC2} - 24 \sim V_{CC2} + 0.5$	Volts
Low Side Floating Supply Voltage ($V_{CC2com} = V_{CC2} - V_{com}$)	V_{CC2com}	-0.5 ~ 24	Volts
Low Side Output Voltage	V_{LO}	$V_{com} - 0.5 \sim V_{CC2} + 0.5$	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 ($T_a = 25^\circ\text{C}$, On Board)	P_d	0.89	Watts
Linear Derating Factor ($T_a > 25^\circ\text{C}$, On Board)	K_θ	-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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600 Volts/±100mA

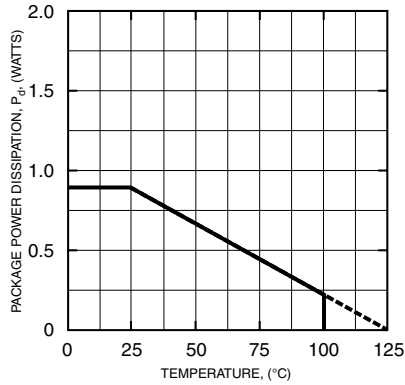
Electrical Characteristics

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 _{CCCL}	L _{IN} = 5V	—	0.37	0.75	mA
V _{CC2} Standby Current L	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	t _{VBsuv}		—	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	t _{VCCuv}		—	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}	t _{dLH(HO)} - t _{dLH(LO)}	—	—	15	ns
Delay Matching, High Side and Low Side Turn-Off	Δt _{dHL}	t _{dHL(HO)} - t _{dHL(LO)}	—	—	15	ns
Output Pulse Width	V _{OPW}	V _{IN} : P _W = 200ns	200	220	240	ns

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THERMAL DERATING FACTOR CHARACTERISTICS



FUNCTION TABLE (X : HORL)

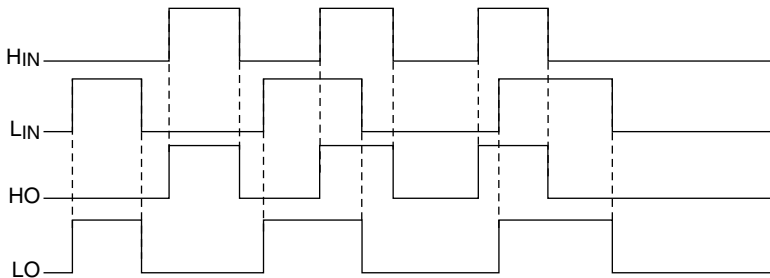
H _{IN}	L _{IN}	V _{BS} U _V	V _{CC2COM} U _V	HO	LO	Behavioral State
L	L	H	H	L	L	LO = HO = Low
L	H	H	H	L	H	LO = High
H	L	H	H	H	L	HO = High
H	H	H	H	H	H	LO = HO = High
X	L	L	H	L	L	HO = Low, V _{BS} U _V Tripped
X	H	L	H	L	H	LO = High, V _{BS} U _V Tripped
L	X	H	L	L	L	LO = Low, V _{CC2COM} U _V Tripped
H	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

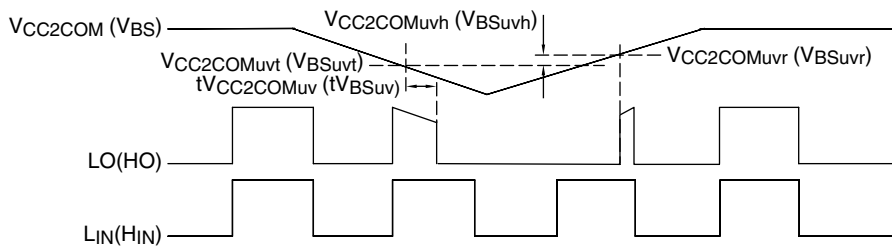
1. Input/Output Timing Diagram

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_{CC2COM}uvt = V_{CC2COM}uvr – V_{CC2COM}uvh) 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".