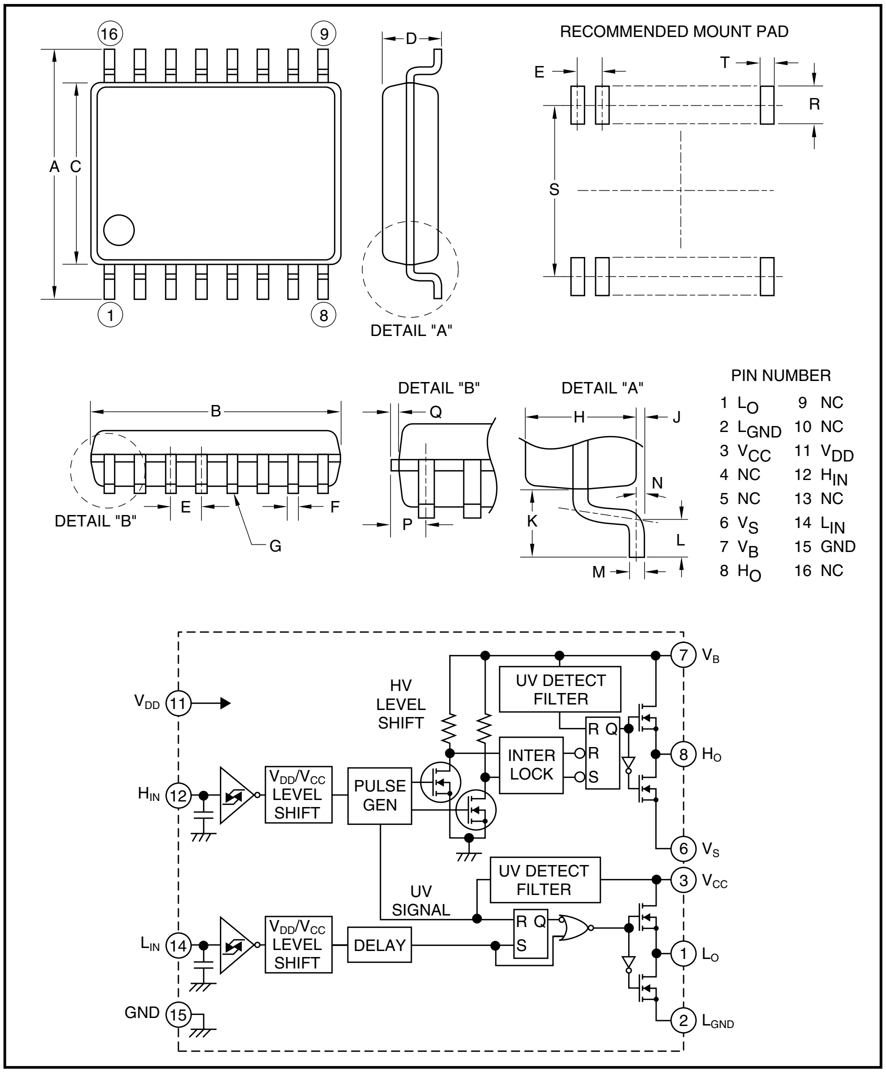
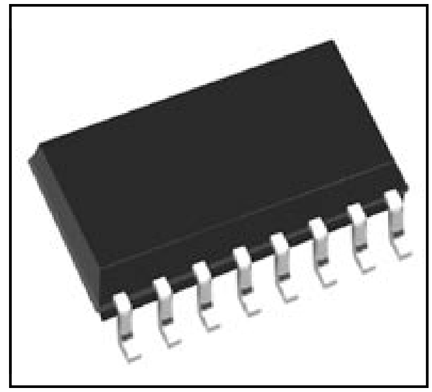
Powerex, Inc., 200 E. Hillis Street, Youngwood, Pennsylvania 15697-1800 (724) 925-7272

HVIC

High Voltage Integrated Circuit
600 Volts/±2 Amperes





Outline Drawing and Circuit Diagram

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

Dimensions	Inches	Millimeters
K	0.05	1.25
L	0.024±0.008	0.6±0.2
M	0.1±0.002	0.2±0.05
N	4°±4°	4°±4°
P	0.03 Max.	0.755 Max.
Q	0.006	0.15
R	0.05 Min.	Min. 1.27
S	0.30	7.62
T	0.029	0.76

Description:

M81703FP is a high voltage Power MOSFET and IGBT module driver for half-bridge applications.

Features:

- ☐ Floating Supply Voltage
- ☐ Output Current
- ☐ Half-Bridge Driver
- ☐ SOP-16

Applications:

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

Ordering Information:

M81703FP is a ±2 Ampere, 600 Volt HVIC, High Voltage Integrated Circuit

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M81703FP
HVIC, High Voltage Integrated Circuit
600 Volts/±2 Amperes

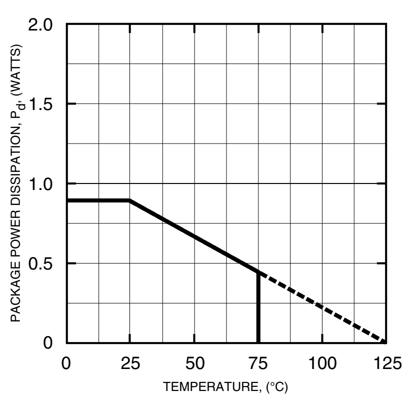
Absolute Maximum Ratings, T_a = 25°C unless otherwise specified

Characteristics	Symbol	M81703FP	Units
High Side Floating Supply Absolute Voltage	V_B	-0.5 ~ 624	Volts
High Side Floating Supply Offset Voltage	V_S	-0.5 ~ 600	Volts
High Side Floating Supply Voltage ($V_{BS} = V_B - V_S$)	V_{BS}	-0.5 ~ 24	Volts
Allowable Offset Supply Voltage Minus Serge (P_W < 1μs)	$-V_S$	-5	Volts
High Side Output Voltage	V_{HO}	V_S – 0.5 ~ V_B + 0.5	Volts
Low Side Fixed Supply Voltage	V_{CC}	-0.5 ~ 24	Volts
Low Side Output Voltage	V_{LO}	-0.5 ~ V_{CC} + 0.5	Volts
Logic Supply Voltage	V_{DD}	-0.5 ~ 24	Volts
Logic Input Voltage (H_{IN}, L_{IN})	V_{IN}	-0.5 ~ V_{DD} + 0.5	Volts
SLow Side Return Offset Voltage ($V_{CC} - L_{GND}$ < 24V)	L_{GND}	-5 ~ V_{CC} + 0.5	Volts
Allowable Offset Supply Voltage Transient	d_{VS}/dt	±50	V/ns
Package Power Dissipation (T_a = 25°C, On Board)	P_d	0.88	Watts
Linear Derating Factor (T_a > 25°C, On Board)	$K\theta$	-8.8	mW/°C
Junction to Case Thermal Resistance	$R_{th(j-c)}$	50	°C/W
Junction Temperature	T_j	-20 ~ 125	°C
Operation Temperature	T_{opr}	-20 ~ 75	°C
Storage Temperature	T_{stg}	-40 ~ 125	°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		0	—	500	Volts
High Side Floating Supply Voltage	V_{BS}	$V_{BS} = V_B - V_S$	10	—	20	Volts
Low Side Fixed Supply Voltage	V_{CC}		10	—	20	Volts
Logic Supply Voltage	V_{DD}		5	—	20	Volts
Logic Input Voltage	V_{IN}	H_{IN}, L_{IN}	0	—	V_{DD}	Volts
Low Side Return Offset Voltage	L_{GND}		-5	—	5	Volts

THERMAL DERATING FACTOR CHARACTERISTICS



Electrical Characteristics

T_a = 25°C, $V_{CC} = V_{BS}$ (= $V_B - V_S$) = V_{DD} = 15V, L_{GND} = 0V unless otherwise specified

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Floating Supply Leakage Current	I_{FS}	$V_B = V_S$ = 600V	—	—	1	μA
V_{BS} Standby Current	I_{BS}		—	0.4	0.7	mA
V_{CC} Standby Current	I_{CC}		—	0.75	1.5	mA
V_{DD} Standby Current	I_{DD}		—	—	10	μA
High Level Output Voltage	V_{OH}	I_O = 0A, L_O, H_O	13.8	14.4	—	Volts
Low Level Output Voltage	V_{OL}	I_O = 0A, L_O, H_O	—	—	0.1	Volts
High Level Input Threshold Voltage	V_{IH15}	H_{IN}, L_{IN}	—	8.4	9.5	Volts
Low Level Input Threshold Voltage	V_{IL15}	H_{IN}, L_{IN}	6.0	6.8	—	Volts
High Level Input Threshold Voltage	V_{IH5}	H_{IN}, L_{IN} (V_{DD} = 5V)	—	3.1	4.1	volts
Low Level Input Threshold Voltage	V_{IL5}	H_{IN}, L_{IN} (V_{DD} = 5V)	1.4	2.4	—	Volts
High Level Input Bias Current	I_{IH}	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}		—	10	—	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}		—	10	—	μs
Output High Level Short Circuit Pulsed Current	I_{OH}	V_O = 0V, V_{IN} = 15V, P_W < 10μs	—	-2.5	—	Amperes
Output Low Level Short Circuit Pulsed Current	I_{OL}	V_O = 15V, V_{IN} = 0V, P_W < 10μs	—	2.5	—	Amperes
Output High Level ON Resistance	R_{OH}	I_O = -200mA, $R_{OH} = (V_{OH} - V_O)/I_O$	—	10	13	Ω
Output Low Level ON Resistance	R_{OL}	I_O = 200mA, $R_{OL} = V_O / I_O$	—	2.5	3	Ω
High Side Turn-On Propagation Delay	$t_{dLH(HO)}$	C_L = 1000pF between $H_O - V_S$	—	—	350	ns
High Side Turn-Off Propagation Delay	$t_{dHL(HO)}$	C_L = 1000pF between $H_O - V_S$	—	—	330	ns
High Side Turn-On Rise Time	t_{rH}	C_L = 1000pF between $H_O - V_S$	—	—	60	ns
High Side Turn-Off Fall Time	t_{fH}	C_L = 1000pF between H_O – VS	—	—	30	ns
Low Side Turn-On Propagation Delay	$t_{dLH(LO)}$	C_L = 1000pf between L_O – GND	—	—	350	ns
Low Side Turn-Off Propagation Delay	$t_{dHL(LO)}$	C_L = 1000pf between L_O – GND	—	—	330	ns
Low Side Turn-On Rise Time	t_{rL}	C_L = 1000pf between L_O – GND	—	—	60	ns
Low Side Turn-Off Rise Time	t_{fL}	C_L = 1000pf between L_O – GND	—	—	30	ns
Delay Matching, High Side and Low Side Turn-On	Δt_{dLH}	$\lvert t_{dLH(HO)} - t_{dLH(LO)} \rvert$	—	—	30	ns
Delay Matching, High Side and Low Side Turn-Off	Δt_{dHL}	$\lvert t_{dHL(HO)} - t_{dHL(LO)} \rvert$	—	—	30	ns
Shutdown Propagation Delay	t_{SD}	C_L = 1000pF between H_O-V_S, C_L = 1000pF between L_O-GND	—	—	350	ns

FUNCTION TABLE (X: H or L)

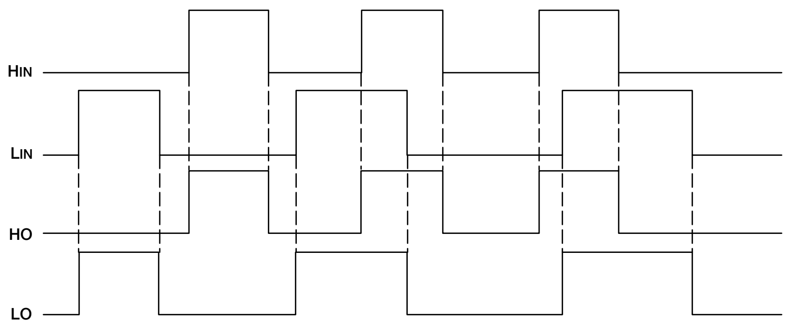
H_{IN}	L_{IN}	V_{BS} UV	V_{CC} UV	HO	LO	Behavioral State
L	L	H	H	L	L	LO = OFF, HO = OFF
L	H	H	H	L	H	LO = ON, HO = OFF
H	L	H	H	H	L	LO = OFF, HO = ON
H	H	H	H	H	H	LO = ON, HO = ON
X	L	L	H	L	L	LO = OFF, HO = OFF, V_{BS} UV tripped
X	H	L	H	L	H	LO = ON, HO = OFF, V_{BS} UV tripped
L	X	H	L	L	L	LO = OFF, HO = OFF, V_{CC} UV tripped
H	X	H	L	L	L	LO = OFF, HO = OFF, V_{CC} UV tripped

Note : "L" state of V_{BS} UV and V_{CC} UV means that UV trip voltage.

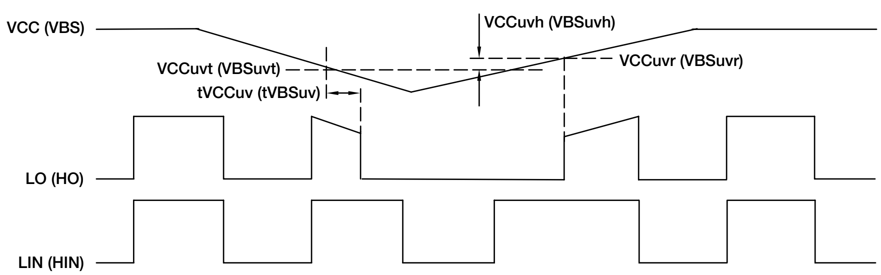
TIMING DIAGRAM

1. Input/Output Timing Diagram

   When input signal (H_{IN} or L_{IN}) is "H", then output signal (HO or LO) is "H".
   Both input signals (H_{IN} and L_{IN}) are "H", then output signal (HO or LO) becomes "H".



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



3. Allowable Supply Voltage Transient

   Allowable high side floating supply voltage (V_{BS}) transient or low side fixed supply voltage (V_{CC}) transient are below 50V/µs.
   In case V_{BS} or V_{CC} are started more than 50V/µs, output signal (HO or LO) may be "H".