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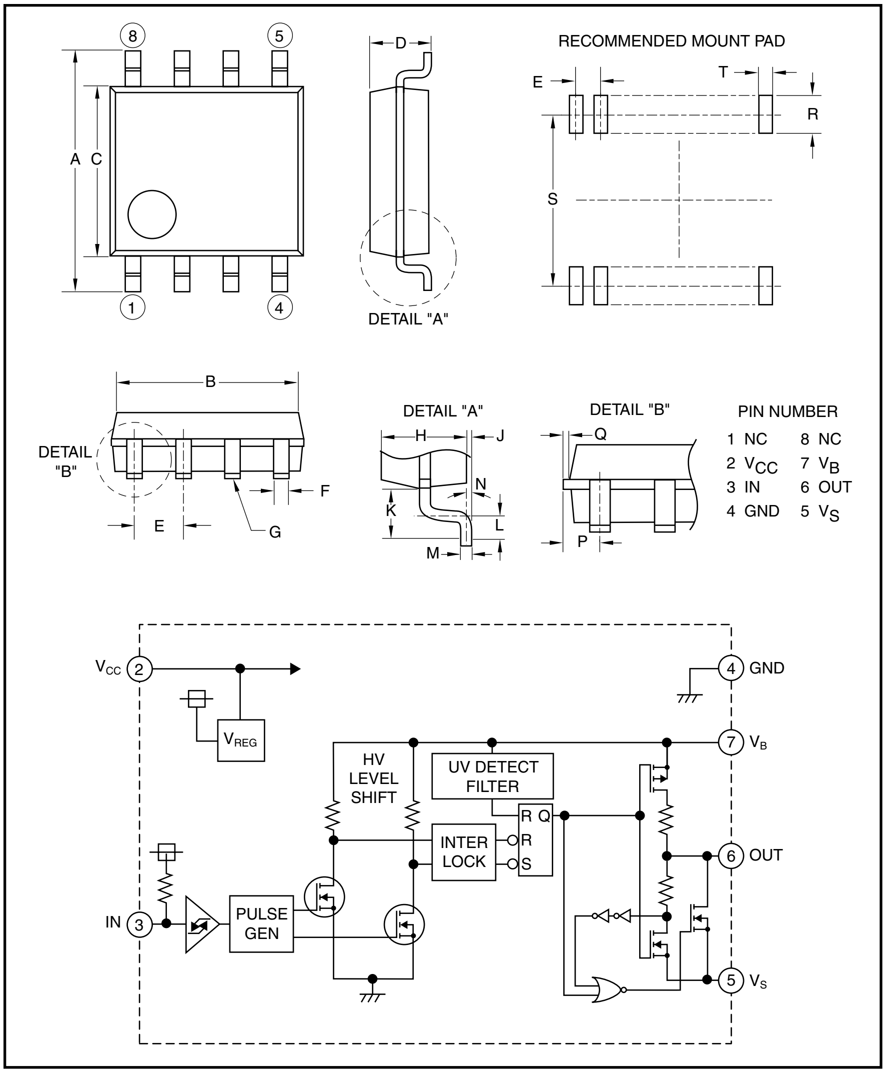
M81705FP

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

HVIC

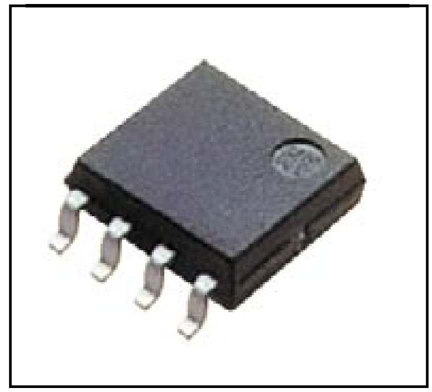
High Voltage Integrated Circuit
600 Volts/+150mA/-125mA



Outline Drawing and Circuit Diagram

Dimensions	Inches	Millimeters
A	0.25	6.5
B	0.21	5.2
C	0.18	4.6
D	0.08	1.9
E	0.05	1.27
F	0.02	0.5
G	0.004	0.1
H	0.06	1.5
J	0.002	0.05

Dimensions	Inches	Millimeters
K	0.04	0.9
L	0.03	0.6
M	0.008	0.2
N	10°	10°
P	0.023	0.595
Q	0.03	0.745
R	0.05	1.27
S	0.23	5.72
T	0.76	0.76



Description:
M81705FP is a high voltage Power MOSFET and IGBT module driver for half-bridge applications.

Features:
- ☐ Floating Supply Voltage
- ☐ Output Current
- ☐ Half-Bridge Driver
- ☐ SOP-8

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

Ordering Information:
M81705FP is a ±150/-125mA, 600 Volt HVIC, High Voltage Integrated Circuit

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

M81705FP
HVIC, High Voltage Integrated Circuit
600 Volts/+150mA/-125mA

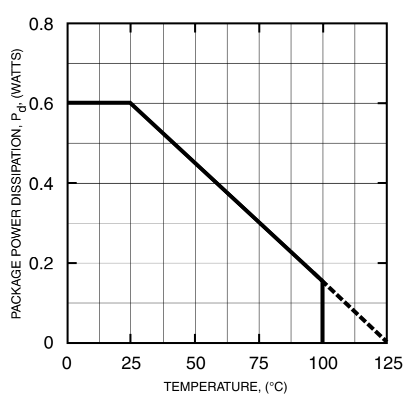
Absolute Maximum Ratings, T_a = 25°C unless otherwise specified

Characteristics	Symbol	M81705FP	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_{OUT}	V_S-0.5 ~ V_B+0.5	Volts
Low Side Fixed Supply Voltage	V_{CC}	-0.5 ~ 24	Volts
Logic Input Voltage	V_{IN}	-0.5 ~ 5.5	Volts
Allowable Offset Supply Voltage Transient	d_{VS}/dt	±50	V/ns
Package Power Dissipation (T_a = 25°C, On Board)	P_d	0.60	Watts
Linear Derating Factor (T_a > 25°C, On Board)	$K\theta$	-6.0	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 ~ 100	°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 +13.5	—	V_S +20	Volts
High Side Floating Supply Offset Voltage	V_S	V_B > 13.5V	-5	—	500	Volts
High Side Floating Supply Voltage	V_{BS}	$V_B = V_B - V_S$	13.5	—	20	Volts
Low Side Fixed Supply Voltage	V_{CC}		13.5	—	20	Volts
Logic Input Voltage	V_{IN}		0	—	5	Volts

THERMAL DERATING FACTOR CHARACTERISTICS



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M81705FP
HVIC, High Voltage Integrated Circuit
600 Volts/+150mA/-125mA

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_{BS} Standby Current	I_{BS}		0.25	0.50	0.75	mA
V_{CC} Standby Current	I_{CC}		0.50	0.75	1.00	mA
High Level Output Voltage	V_{OH}	I_O = 0A	14.9	—	—	Volts
Low Level Output Voltage	V_{OL}	I_O = 0A	—	—	0.1	Volts
High Level Input Threshold Voltage	V_{IH}		2.5	3.0	4.0	Volts
Low Level Input Threshold Voltage	V_{IL}		0.8	1.5	2.0	Volts
High Level Input Bias Current	I_{IH}	V_{IN} = 5V	-50	-20	—	µA
Low Level Input Bias Current	I_{IL}	V_{IN} = 0V	-200	-100	—	µA
V_{BS} Supply UV Reset Voltage	V_{BSuvr}		10.5	11.5	12.5	Volts
V_{BS} Supply UV Hysteresis Voltage	V_{BSuvh}		0.2	0.5	0.8	Volts
V_{BS} Supply UV Filter Time	t_{VBSuv}		—	5	—	µs
Output High Level Short Circuit Pulsed Current	I_{OH}	V_O = 0V, V_{IN} = 0V, P_W < 10µs	—	-125	—	mA
Output Low Level Short Circuit Pulsed Current	I_{OL1}	V_O = 1V, V_{IN} = 5V, P_W < 10µs	—	40	—	mA
Output Low Level Short Circuit Pulsed Current	I_{OL2}	V_O = 15V, V_{IN} = 5V, P_W < 10µs	—	150	—	mA
Output High Level ON Resistance	R_{OH}	I_O = -100mA, R_{OH} = (V_{OH} – V_O)/I_O	—	120	160	Ω
Output Low Level ON Resistance1	R_{OL1}	V_O = 1V, R_{OL1} = V_O /I_O	—	50	60	Ω
Output Low Level ON Resistance2	R_{OL2}	V_O = 5V, R_{OL2} = V_O /I_O	—	100	130	Ω
High Side Turn-On Propagation Delay	t_{dLH}	C_L = 1000pF between OUT – V_S	100	—	500	ns
High Side Turn-Off Propagation Delay	t_{dHL}	C_L = 1000pF between OUT – V_S	100	—	500	ns
High Side Turn-On Rise Time	t_r	C_L = 1000pF between OUT – V_S	—	220	—	ns
High Side Turn-Off Fall Time	t_f	C_L = 1000pF between OUT – VS	—	110	—	ns
R_{OL1}/R_{OL2} Switching Output Voltage	V_{Oth}		1.5	2.5	4.0	Volts

*Typical is not specified.

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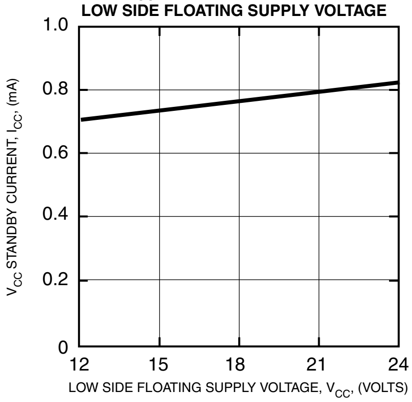
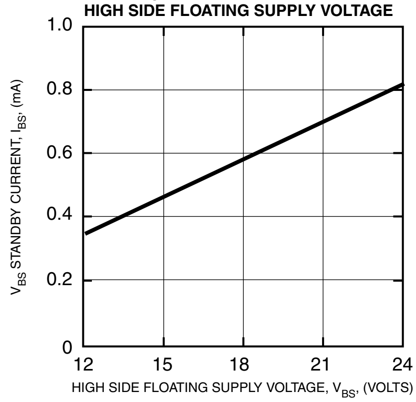
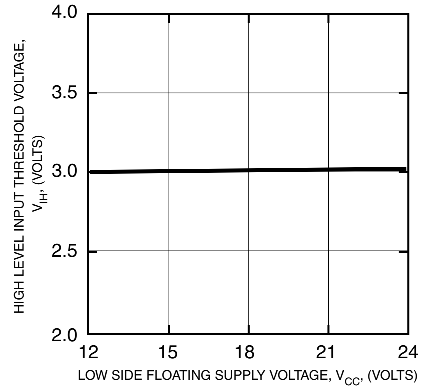
V_{CC} STANDBY CURRENT VS. LOW SIDE FLOATING SUPPLY VOLTAGE



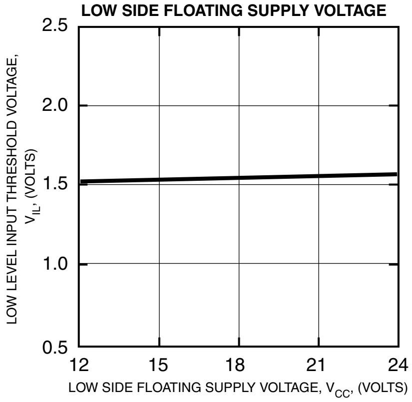
V_{BS} STANDBY CURRENT VS. HIGH SIDE FLOATING SUPPLY VOLTAGE



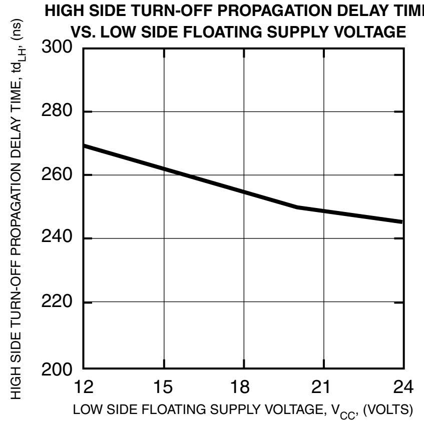
HIGH LEVEL INPUT THRESHOLD VOLTAGE VS. LOW SIDE FLOATING SUPPLY VOLTAGE



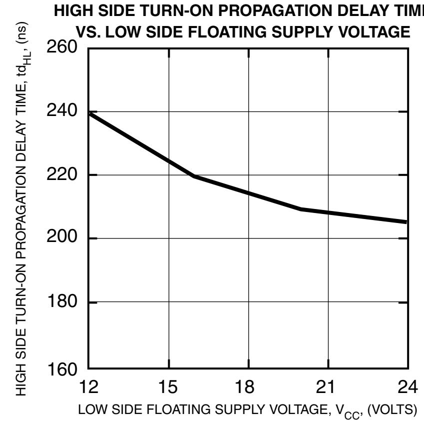
LOW LEVEL INPUT THRESHOLD VOLTAGE VS. LOW SIDE FLOATING SUPPLY VOLTAGE



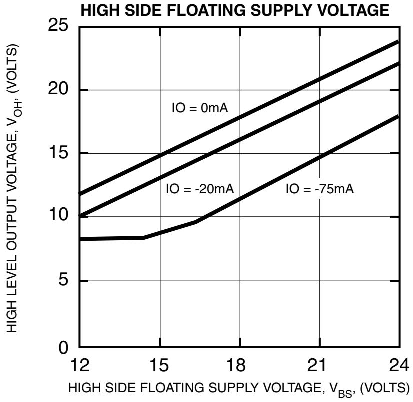
HIGH SIDE TURN-OFF PROPAGATION DELAY TIME VS. LOW SIDE FLOATING SUPPLY VOLTAGE



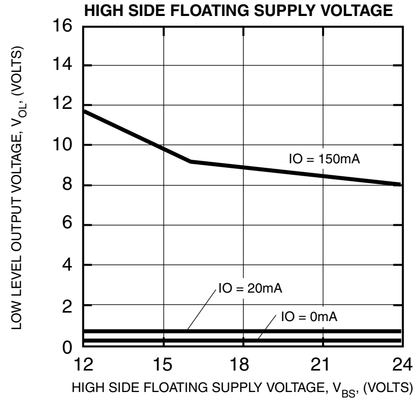
HIGH SIDE TURN-ON PROPAGATION DELAY TIME VS. LOW SIDE FLOATING SUPPLY VOLTAGE



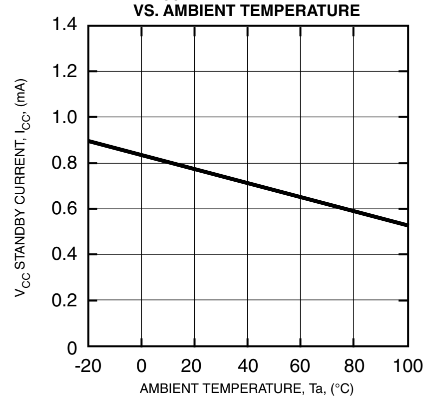
HIGH LEVEL OUTPUT VOLTAGE VS. HIGH SIDE FLOATING SUPPLY VOLTAGE



LOW LEVEL OUTPUT VOLTAGE VS. HIGH SIDE FLOATING SUPPLY VOLTAGE



V_{CC} STANDBY CURRENT VS. AMBIENT TEMPERATURE



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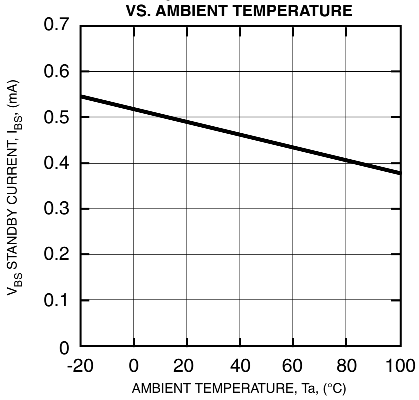
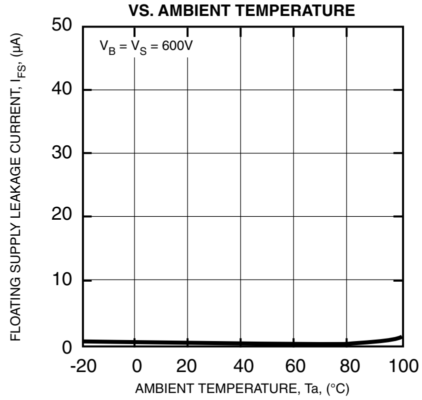
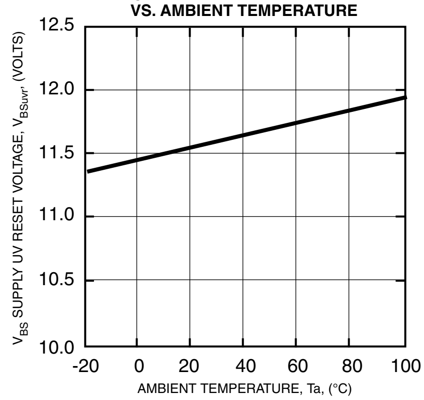
V_{BS} STANDBY CURRENT VS. AMBIENT TEMPERATURE



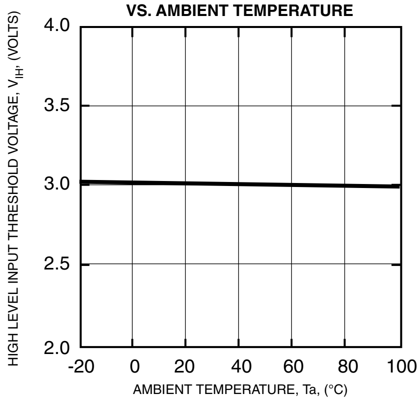
FLOATING SUPPLY LEAKAGE CURRENT VS. AMBIENT TEMPERATURE



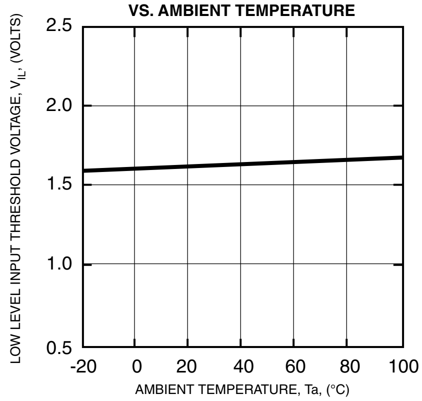
V_{BS} SUPPLY UV RESET VOLTAGE VS. AMBIENT TEMPERATURE



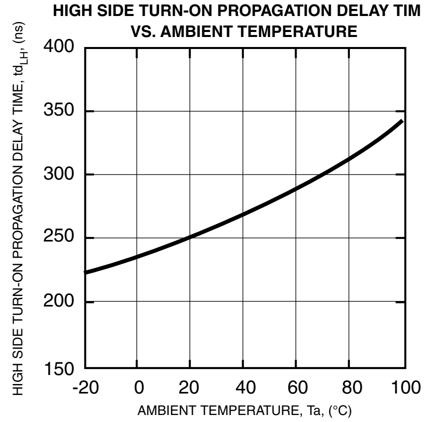
HIGH LEVEL INPUT THRESHOLD VOLTAGE VS. AMBIENT TEMPERATURE



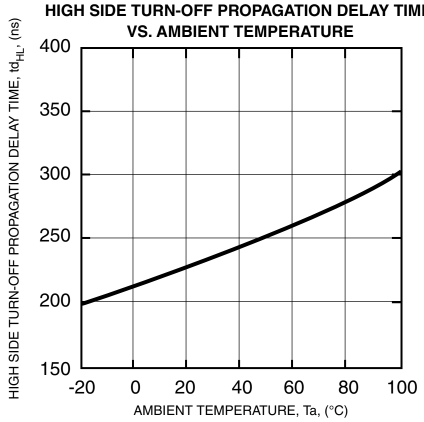
LOW LEVEL INPUT THRESHOLD VOLTAGE VS. AMBIENT TEMPERATURE



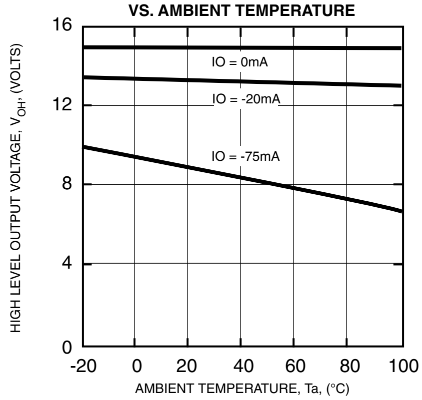
HIGH SIDE TURN-ON PROPAGATION DELAY TIM VS. AMBIENT TEMPERATURE



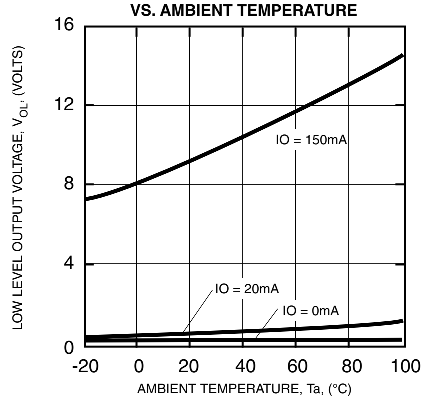
HIGH SIDE TURN-OFF PROPAGATION DELAY TIME VS. AMBIENT TEMPERATURE



HIGH LEVEL OUTPUT VOLTAGE VS. AMBIENT TEMPERATURE



LOW LEVEL OUTPUT VOLTAGE VS. AMBIENT TEMPERATURE



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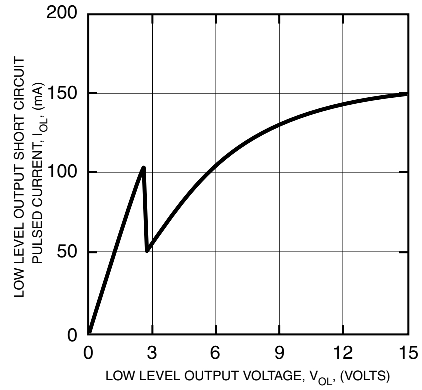
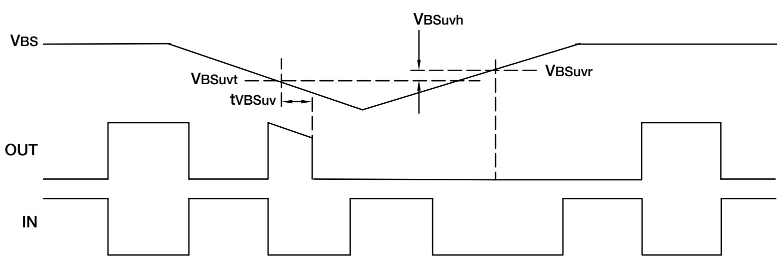
LOW LEVEL OUTPUT SHORT CIRCUIT PULSED CURRENT VS. LOW LEVEL OUTPUT VOLTAGE (R_{OL1}/R_{OL2} SWITCHING OUTPUT VOLTAGE)



TIMING DIAGRAM

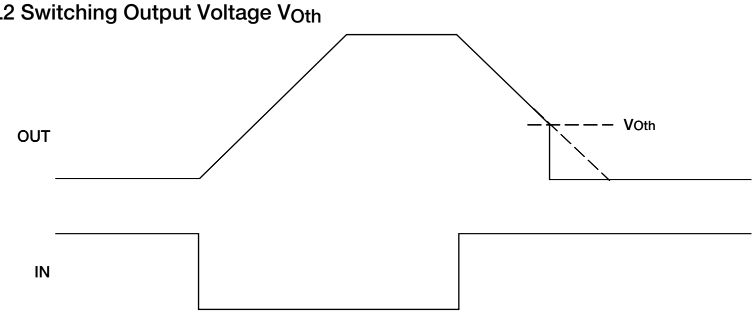
1. Input/Output Timing Diagram
   When input signal "L", then output signal is "H".

2. V_{BS} Supply Under Voltage Lockout Timing Diagram
   When V_{BS} supply voltage keeps lower UV trip voltage ($V_{BSuvt} = V_{BSuvr} - V_{BSuvh}$) for V_{BS} supply UV filter time, output signal becomes "L". And then, V_{BS} supply voltage is higher UV reset voltage, output signal keeps "L" until next input signal is "L".



3. Allowable Supply Voltage Transient
   Firstly, supply V_{CC} with voltage. Secondly, supply V_{BS} with voltage. In the case of shutting off supply voltage, shut off V_{BS} Supply Voltage firstly. Secondly, shut off V_{CC} Supply Voltage.
   In case V_{BS} or V_{CC} is started too fast, output signal may be "H".

4. ROL1 / ROL2 Switching Output Voltage V_{Oth}



As shown by the solid line of the timing chart, the output on-resistance drops at "V_{Oth}" level when the output is in the "L" state (output level falls). Below the "V_{Oth}" level, the output level falls more steeply.