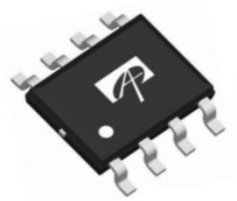
AGD8252B1 / AGD8252B2

High Voltage Half-Bridge Gate Driver IC

General Description

The AGD8252B1 / AGD8252B2 are 600V half-bridge gate driver ICs to control IGBTs and power MOS-transistors in full-bridge and 3-phase inverter systems. Due to specially designed common mode filter, it has an excellent ruggedness on transient voltage variation.



SOP-8L
(Body: 5.0 x 4.0 x 1.5 mm)

Green

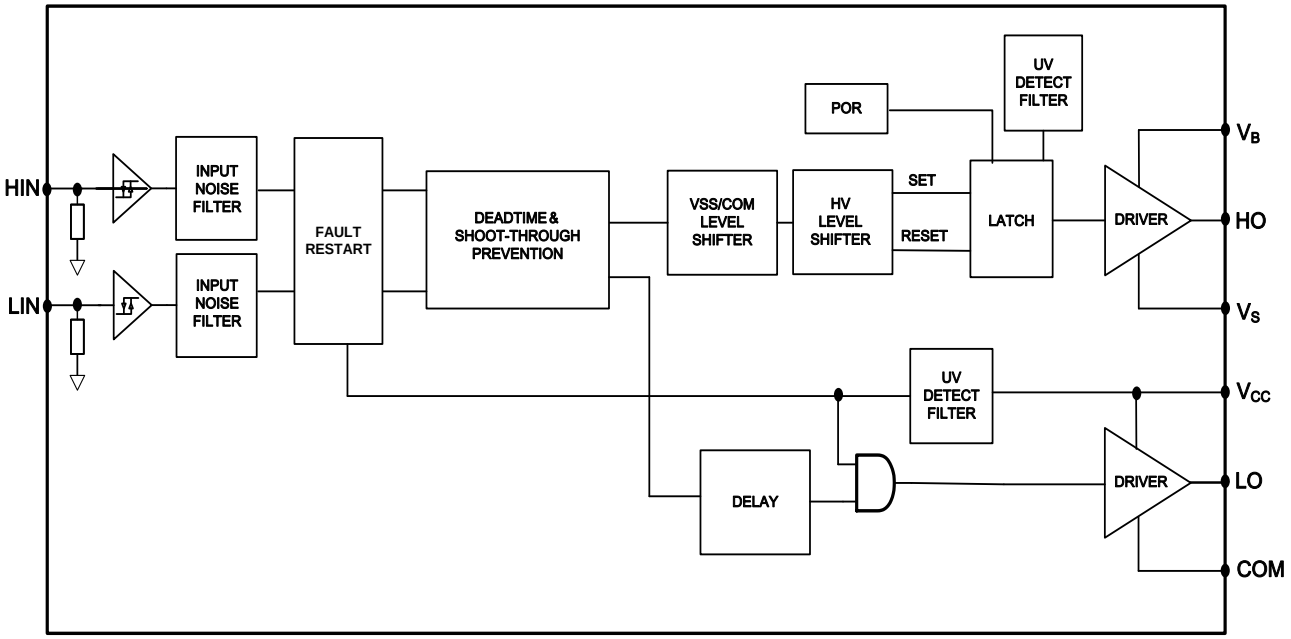
Features

- Maximum blocking voltage +600V
- Output current: +200mA / -350mA (Typ.)
- Matched propagation delay for both channels
- Shoot-through (cross-conduction) protection
- Under-voltage lockout protection (UVLO)
- 3.3V / 5V CMOS and TTL inputs logic compatible
- Input logic: Schmitt trigger receiver circuit (Active high)

Applications

- Motor drives
- Home appliances
- IGBT and power MOS gate drivers for general purpose

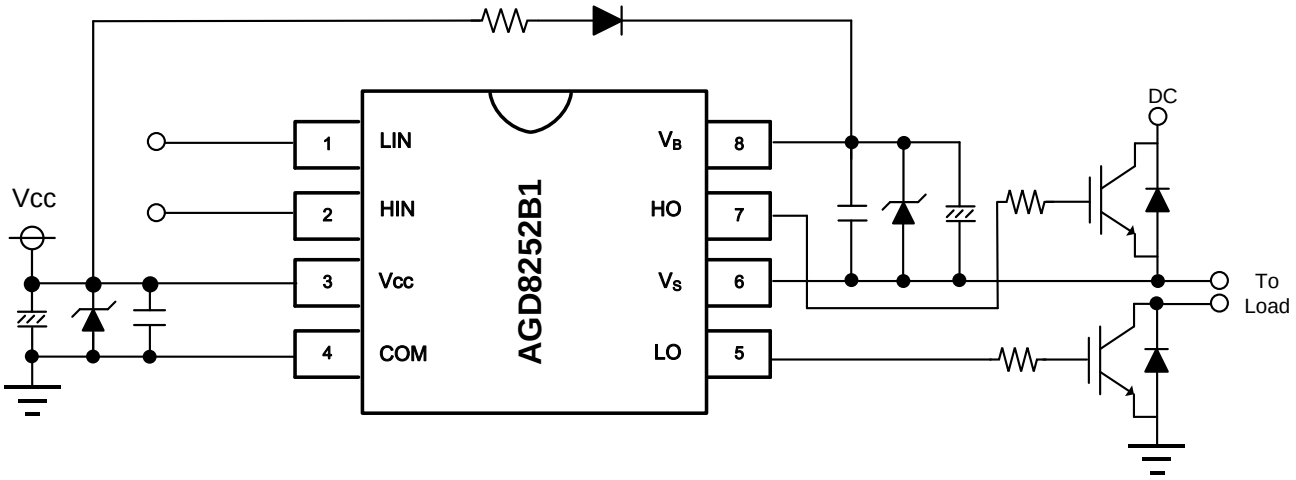
Internal Block Diagram

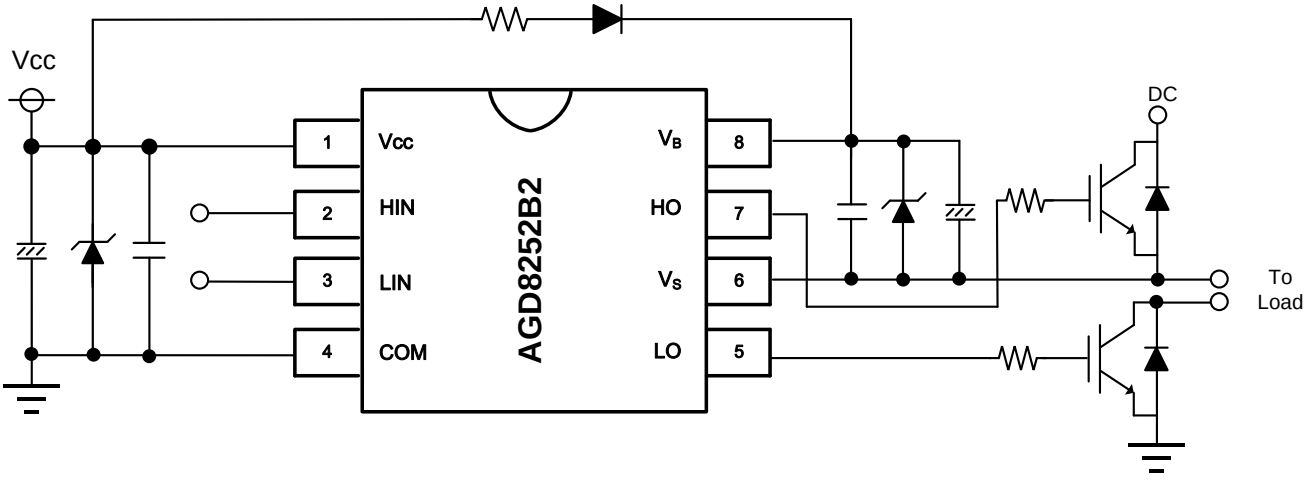


Ordering Information

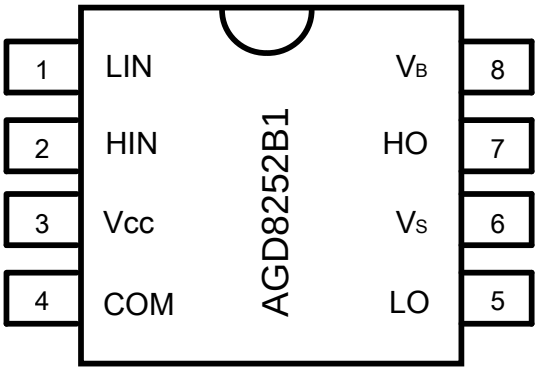
Part Number	Temperature Range	Package
AGD8252B1	-40°C to 125°C	SOP-8L
AGD8252B2	-40°C to 125°C	SOP-8L

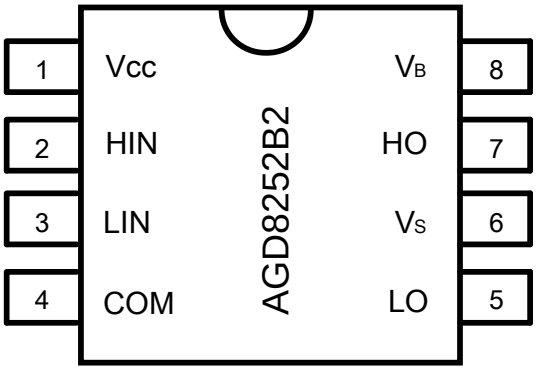
Typical Application Circuit





Pin Configuration





Pin Description

Pin Name	Pin Function
V_{CC}	Low-Side Supply Voltage
HIN	High-Side Logic Input
LIN	Low-Side Logic Input
COM	Power Ground
LO	Low-Side Driver Output
V_S	High-Side Floating Supply Offset Voltage
HO	High-Side Driver Output
V_B	High-Side Floating Supply Voltage

Absolute Maximum Ratings

Absolute maximum ratings indicate sustained limits beyond which damage to the device may occur. All voltage parameters are absolute values referenced to V_{SS}, unless otherwise stated in the table.

Symbol	Parameter	Min.	Max.	Units
V_{CC}	Low-Side Supply Voltage	-0.3	20 (1)	V
V_{IN}	Logic Input Voltage (LIN, HIN)	V_{SS}-0.3	V_{CC}+0.3	
V_B	High-Side Floating Supply Voltage	-0.3	620	
V_S	High-Side Floating Supply Offset Voltage	V_B-20 (1)	V_B+0.3	
V_{HO}	High-Side Driver Output Voltage	V_S-0.3	V_B+0.3	
V_{LO}	Low-Side Driver Output Voltage	COM-0.3	V_{CC}+0.3	
COM	Power Ground	V_{CC}-25	V_{CC}+0.3	
dV_S/dt	Vs Offset Voltage Slew Rate (2)	-	50	V/ns
PW_{HIN}	High-Side Input Pulse Width	500	-	ns
P_D	Package Power Dissipation @ T_A ≤25°C	-	0.75	W
R_{thJA}	Thermal Resistance, Junction to Ambient	-	150	°C/W
T_J	Junction Temperature	-	150	°C
T_S	Storage Temperature	-55	150	
T_L	Solder Reflow Condition (10 seconds)	-	300	
ESD	Human Body Model	2		kV

Notes:

1. An internal 20V zener diode is integrated to clamp each supply voltage.
2. Not subject of production test, verified by characterization.

Recommended Operating Ratings

The device is not guaranteed to operate beyond the Recommended Operating Conditions. All voltage parameters are absolute voltages referenced to V_{SS}, unless otherwise specified. The offset rating is tested with supplies of (V_{CC}-COM) = (V_B-V_S) = 15V.

Symbol	Parameter	Min.	Max.	Units
V_{CC}	Low-Side Supply Voltage	13.2	20	V
V_{IN}	Logic Input Voltage (LIN, HIN)	V_{SS}	V_{SS}+5	
V_B	High-Side Floating Supply Voltage	V_S+13.2	V_S+20	
V_S	High-Side Floating Supply Offset Voltage (3)	COM-6	600	
V_S(t)	Transient High-Side Floating Supply Voltage (4)	-50	600	
V_{HO}	High-Side Driver Output Voltage	V_S	V_B	
V_{LO}	Low-Side Driver Output Voltage	COM	V_{CC}	
COM	Power Ground	-5	5	
T_A	Ambient Temperature	-40	125	°C

Notes:

3. Logic operation for V_S of -6V to 600V. Logic state held for V_S of -6V to -V_{BS}.
4. Operational for transient negative V_S of V_{SS}-50V with a 50ns pulse width, which is guaranteed by design.

Static Electrical Characteristics

V_{CC} = V_{BS} = 15V. T_A = 25°C, unless otherwise specified.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
UV_{CC+}	V_{CC} Under-Voltage Positive Going Threshold		10.8	11.9	13.0	V
UV_{CC-}	V_{CC} Under-Voltage Negative Going Threshold		10.3	11.4	12.5	
UV_{CChys}	V_{CC} Under-Voltage Hysteresis		-	0.5	-	
UV_{BS+}	V_{BS} Under-Voltage Positive Going Threshold		10.0	11.0	12.0	
UV_{BS-}	V_{BS} Under-Voltage Negative Going Threshold		9.0	10.0	11.0	
UV_{BShys}	V_{BS} Under-Voltage Hysteresis		-	1.0	-	
I_{LK}	High-Side Floating Supply Leakage Current	V_B=V_S=600V	-	-	50	µA
I_{QBS}	Quiescent V_{BS} Supply Current	V_{IN}=0V (all inputs are in the off state)	-	70	120	µA
I_{QCC}	Quiescent V_{CC} Supply Current		-	0.3	1	mA
V_{OH}	High Level Output Voltage Drop, V_{BIAS}-V_O	I_O=20mA, V_{IN}=5V	-	0.9	1.4	V
V_{OL}	Low Level Output Voltage Drop, V_O	I_O=20mA, V_{IN}=0V	-	0.4	0.6	
I_{O+}	Output High Short Circuit Pulsed Current	V_O=0V, V_{IN}=5V, PW≤10µs	120	200	-	mA
I_{O-}	Output Low Short Circuit Pulsed Current	V_O=15V, V_{IN}=0V, PW≤10µs	250	350	-	
V_{IH}	High Level Input Voltage		2.5	-	-	V
V_{IL}	Low Level Input Voltage		-	-	0.8	
I_{HIN+}	Input Bias Current	V_{HIN}=5V	-	650	850	µA
I_{HIN-}	Input Bias Current	V_{HIN}=0V	-	-	1	
I_{LIN+}	Input Bias Current	V_{LIN}=5V	-	650	850	
I_{LIN-}	Input Bias Current	V_{LIN}=0V	-	-	1	

Dynamic Electrical Characteristics

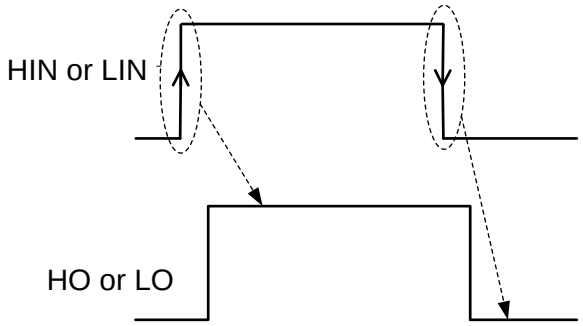
V_{CC} = V_{BS} = 15V, C_L = 1000pF and T_A = 25°C unless otherwise specified.

Symbol	Definition	Conditions	Min.	Typ.	Max.	Units
t_{ON}	Turn-On Propagation Delay	V_{IN}=0V or 5V	400	530	750	ns
t_{OFF}	Turn-Off Propagation Delay		400	530	750	
t_R	Turn-On Rise Time		-	125	190	
t_F	Turn-Off Fall Time		-	50	75	
$t_{IN,FLT}$	Input Filter Time (LIN, HIN) (5)		200	350	510	
DT	Dead Time (6)	V_{IN}=0V or 5V without External Dead Time	190	275	420	
MT	Matching Delay Time (t_{ON}, t_{OFF})	$\lvert t_{ON(HO)} - t_{ON(LO)} \rvert$ or $\lvert t_{OFF(HO)} - t_{OFF(LO)} \rvert$	-	-	50	
PM	Output Pulse Width Matching (7)	Input Pulse Width=10µs	-	-	75	

Notes:

5. The minimum width of the input pulse is recommended to exceed 500ns to ensure the filtering time of the input filter is exceeded.
6. Please refer to 'Dead Time' definition of 'Function Diagram'.
7. PM is defined as |(Input Pulse Width) – (Output Pulse Width)|.

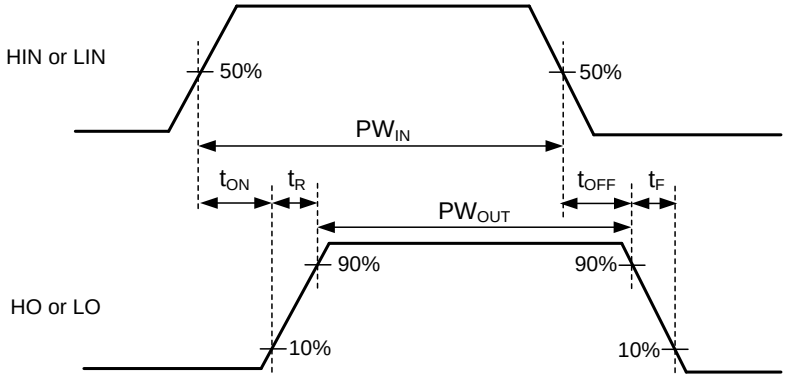
Output Activation



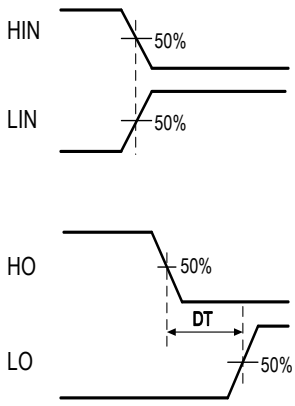
HIN	LIN	HO	LO
H	L	H	L
L	H	L	H

Note: Output signal (HO or LO) is triggered by the edge of input signal.

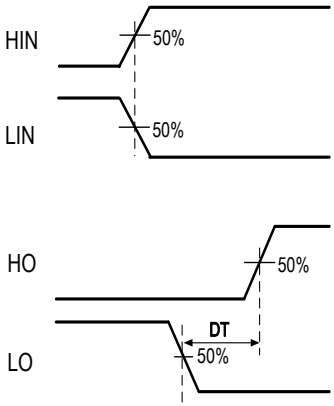
Input / Output Timing Diagram



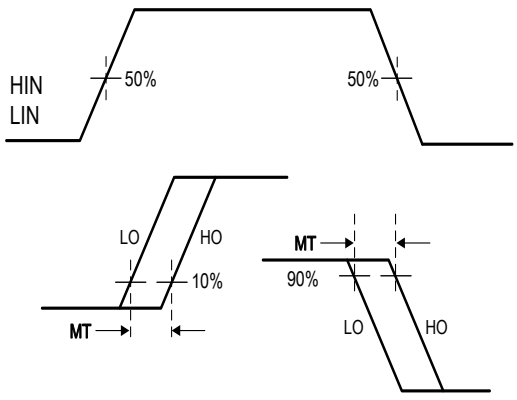
Dead Time Activation



<HIN off and LIN on>



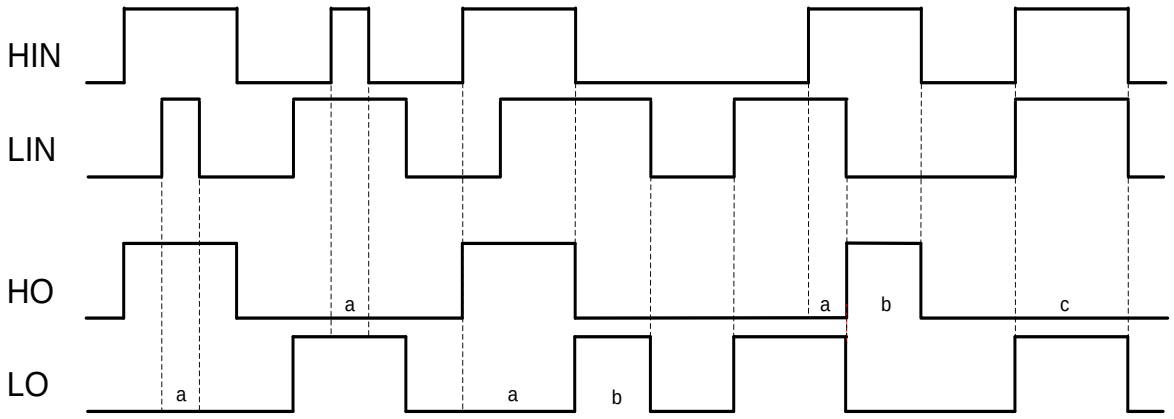
<HIN on and LIN off>



<Delay Matching Waveform Definition>

Function Timing Diagram

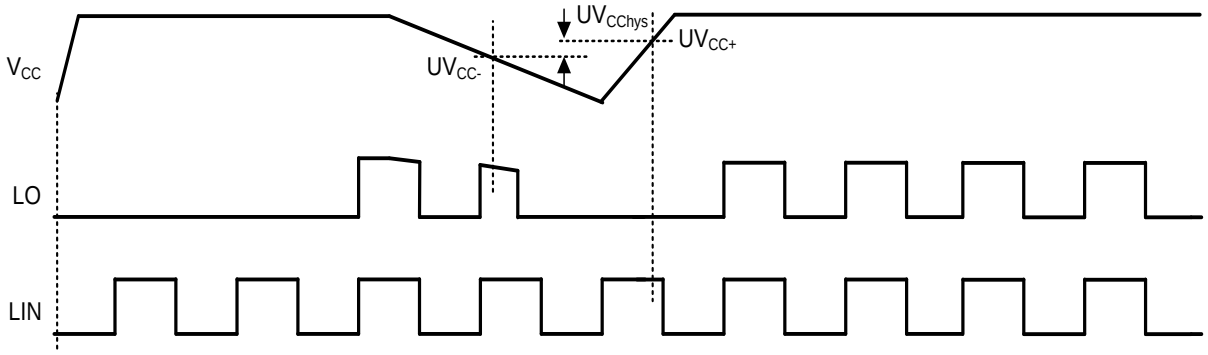
A. Shoot-Through (Cross-Conduction) Protection Logic Timing Diagram



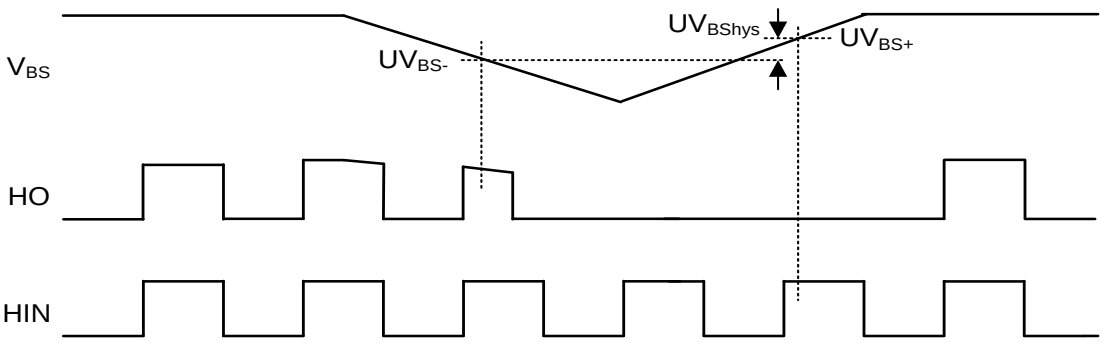
Notes:

a. When one output (high or low side) is turned on, the other side turn-on input is ignored.
b. If both outputs are changed simultaneously, the turn-on activation is done by the internal dead time of 275ns typ. (For more information, please refer to below 'Dead Time' section.)
c. When high-side (HIN) and low-side (LIN) have turn-on inputs at the same time, low-side (LIN) has the priority.

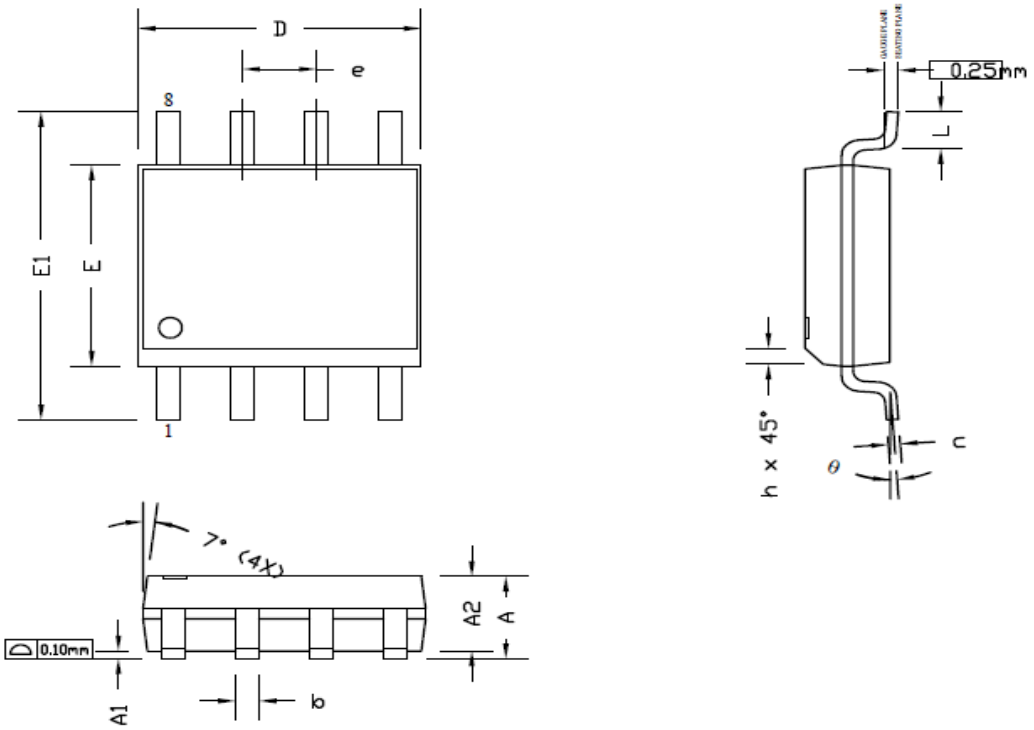
B. V_{CC} Supply Under-Voltage (UV) Lockout Timing Diagram



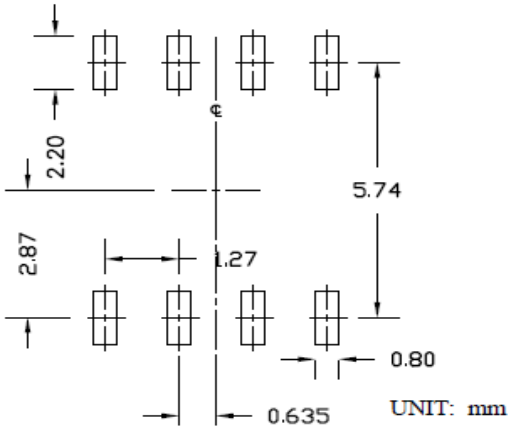
C. V_{BS} Supply Under-Voltage (UV) Lockout Timing Diagram



Package Dimensions, SOP-8L



RECOMMENDED LAND PATTERN



SYMBOLS	DIMENSIONS IN MILLIMETERS			DIMENSIONS IN INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	1.35	1.65	1.75	0.053	0.065	0.069
A1	0.10	0.15	0.25	0.004	0.006	0.010
A2	1.25	1.50	1.65	0.049	0.059	0.065
b	0.31	0.41	0.51	0.012	0.016	0.020
c	0.17	0.20	0.25	0.007	0.008	0.010
D	4.80	4.90	5.00	0.189	0.193	0.197
E	3.80	3.90	4.00	0.150	0.154	0.157
e	1.27 BSC			0.050 BSC		
E1	5.80	6.00	6.20	0.228	0.236	0.244
h	0.25	0.30	0.50	0.010	0.012	0.020
L	0.40	0.69	1.27	0.016	0.027	0.050
θ	0°	4°	8°	0°	4°	8°

NOTE
1. ALL DIMENSIONS ARE IN MILLMETERS.
2. DIMENSIONS ARE INCLUSIVE OF PLATING.
3. PACKAGE BODY SIZES EXCLUDE MOLD FLASH AND GATE BURRS.
   MOLD FLASH AT THE NON-LEAD SIDES SHOULD BE LESS THAN 6 MILS EACH.
4. DIMENSION L IS MEASURED IN GAUGE PLANE.
5. CONTROLLING DIMENSION IS MILLIMETER.
   CONVERTED INCH DIMENSIONS ARE NOT NECESSARILY EXACT.

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