DESCRIPTION

The AG2186 is a high-voltage, high-speed high-side and low-side gate driver designed to drive power MOSFETs and IGBTs. It features two independent input-to-output drive channels and integrates high-side and low-side under-voltage lockout (UVLO) and over-voltage clamping protection circuits.

The AG2186 provides high-current pulsed gate-drive capability with a peak output current of up to 4 A. The logic inputs are compatible with CMOS and LSTTL logic outputs down to 3.3 V. The high-side floating channel supports operating voltages of up to 700 V, making the AG2186 suitable for driving high-voltage N-channel power MOSFETs and IGBTs in high-side and low-side configurations.

The AG2186 is available in SOP8 package.

APPLICATIONS

- Motor Control
- Air Conditioners and Washing Machines
- General-Purpose Inverters
- Microinverter Drivers

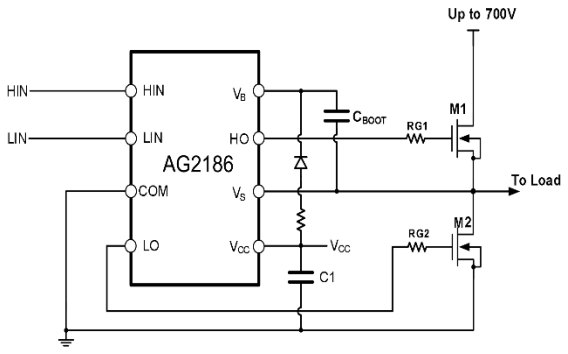
ORDERING INFORMATION

Package Type	Part Number	
SOP8 SPQ: 4,000pcs/Reel	M8	AG2186M8R
		AG2186M8VR
Note	R: Tape & Reel V: Halogen free Package	
AiT provides all RoHS products		

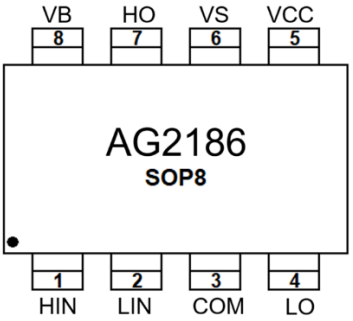
FEATURES

- Bootstrap-powered floating channel
- High-side floating voltage up to 700 V
- Logic input compatible with 3.3 V, 5 V, and 15 V logic levels
- ±50 V/ns dV/dt immunity
- V_S negative transient voltage tolerance down to −9 V
- Gate-drive supply voltage range: 10V to 20V
- High-side and low-side under-voltage lockout
  - UVLO rising threshold: 8.9 V
  - UVLO falling threshold: 8.2 V
- Propagation delay:
  - Turn-on delay (t_{ON}): 130 ns
  - Turn-off delay (t_{OFF}): 130 ns
- High-side and low-side propagation delay matching
- High-current gate-drive capability:
  - Source current: 4.0 A
  - Sink current: 4.0 A

TYPICAL APPLICATION



PIN DESCIPTION



SOP8, M8

Top View

PIN#	Symbol	Function
1	HIN	High side signal input
2	LIN	Low side signal input
3	COM	ground
4	LO	Low side output
5	VCC	Power supply
6	VS	High side floating ground
7	HO	Hight side output
8	VB	High side floating supply

ABSOLUTE MAXIMUM RATINGS

T_A = 25°C, unless otherwise specified.

V_B, High-Side Floating Supply Voltage		-0.3V ~ 725V
V_S, High-Side Floating Reference Voltage		V_B-25V ~ V_B+0.3V
V_{HO}, High-Side Output Voltage		V_S-0.3V ~ V_B+0.3V
V_{CC}, Low-Side Supply Voltage		-0.3V ~ 25V
V_{LO}, Low-Side Output Voltage		-0.3V ~ V_{CC}+0.3V
V_{IN}, Logic Input Voltage (HIN,LIN)		-0.3V ~ V_{CC}+0.3V
P_D, Power dissipation		0.625W
ESD Discharge	Human Body Model (HBM)	1.5KV
	Machine Model (MM)	500V
$R_{\theta JA}$, Package dissipation rating SOP8		200℃/W
T_{STG}, Storage Temperature Range		-55℃ ~ +150℃
T_L, Lead Temperature (Soldering, 10 seconds)		300℃

Stresses above may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions beyond those indicated in the Electrical Characteristics are not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

RECOMMENDED OPERATING CONDITION

Parameter	Symbol	Conditions	Min.	Max.	Unit
High-Side Floating Supply Voltage	V_B	-	V_S+10	V_S+20	V
High-Side Floating Reference Voltage	V_S		-9	700	
High-Side Output Voltage	V_{HO}		VS	VB	
Low-Side Output Voltage	V_{LO}		0	V_{CC}	
Low-Side Supply Voltage	V_{CC}		10	20	
Logic Input Voltage (HIN,LIN)	V_{IN}	-	0	V_{CC}	
Environment Temperature	T_A	-	-40	125	℃

ELECTRICAL CHARACTERISTICS

V_{CC}=V_B=15V, C_L=1nF, T_A=25℃, unless otherwise specified

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Dynamics Characteristics						
Turn-On Propagation Delay	t_{ON}	V_S=0	130	-	250	ns
Turn-Off Propagation Delay	t_{OFF}	V_S=0, or 700V	130	-	250	
Turn-On Rise Time	t_R	V_S=0	15	-	20	
Turn-Off Fall Time	t_F		10	-	15	
Propagation Delay Matching (t_{ON}, t_{OFF})	MT		-	-	50	
Static Characteristics						
V_{CC} UVLO Rising Threshold	V_{CCUV+}	-	8	8.9	9.8	
V_{CC} UVLO Falling Threshold	V_{CCUV-}	-	7.4	8.2	9.0	
V_{CC} UVLO Hysteresis	$V_{CCUVHYS}$		-	0.7	-	
V_{BS} UVLO Rising Threshold	V_{BSUV+}		8	8.9	9.8	
V_{BS} UVLO Falling Threshold	V_{BSUV-}		7.4	8.2	9.0	
V_{BS} UVLO Hysteresis	$V_{BSUVHYS}$		-	0.7	-	
High-Side Floating Supply Leakage Current	I_{LK}		-	-	50	
V_{BS} Quiescent Current	I_{QBS}		-	50	100	
V_{CC} Quiescent Current	I_{QCC}		-	150	240	
High-Level Input Threshold Voltage	V_{IH}		2.5	-	-	
Low-Level Input Threshold Voltage	V_{IL}		-	-	0.8	
Supply-to-Output High-Level Voltage Difference	V_{OH}		-	-	1.4	
Output Low-Level-to-Ground Voltage Difference	V_{OL}		-	-	0.1	
Logic “1” Input Bias Current	I_{IN+}		-	25	60	
Logic “0” Input Bias Current	I_{IN-}	-	-	-	2	
High-Level Output Short-Circuit Pulsed Current	I_{O+}	-	3.0	4.0		
Low-Level Output Short-Circuit Pulsed Current	I_{O-}	-	3.0	4.0		
Propagation delay matching	T_{MATCH}		-5	-	5	ns

TYPICAL PERFORMANCE CHARACTERISTICS

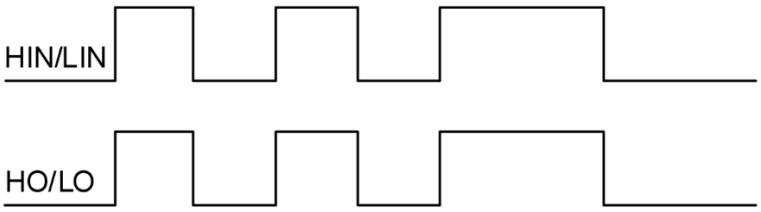


Fig 1. Input and Output Timing Waveforms

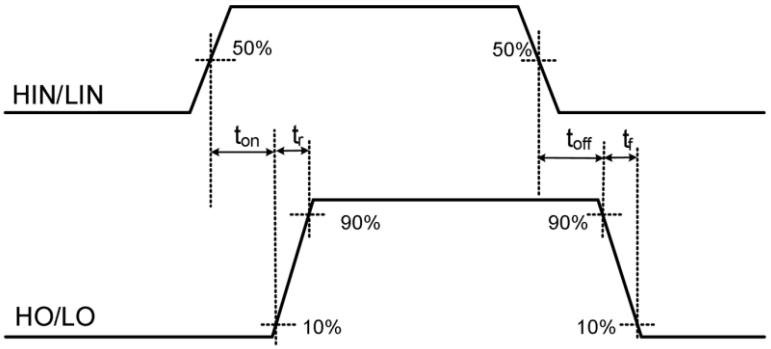


Fig 2. Propagation Delay Timing Definitions

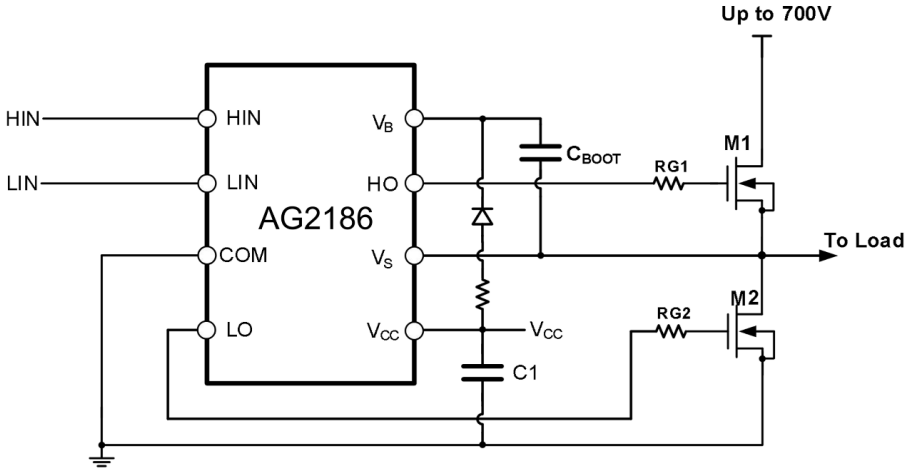
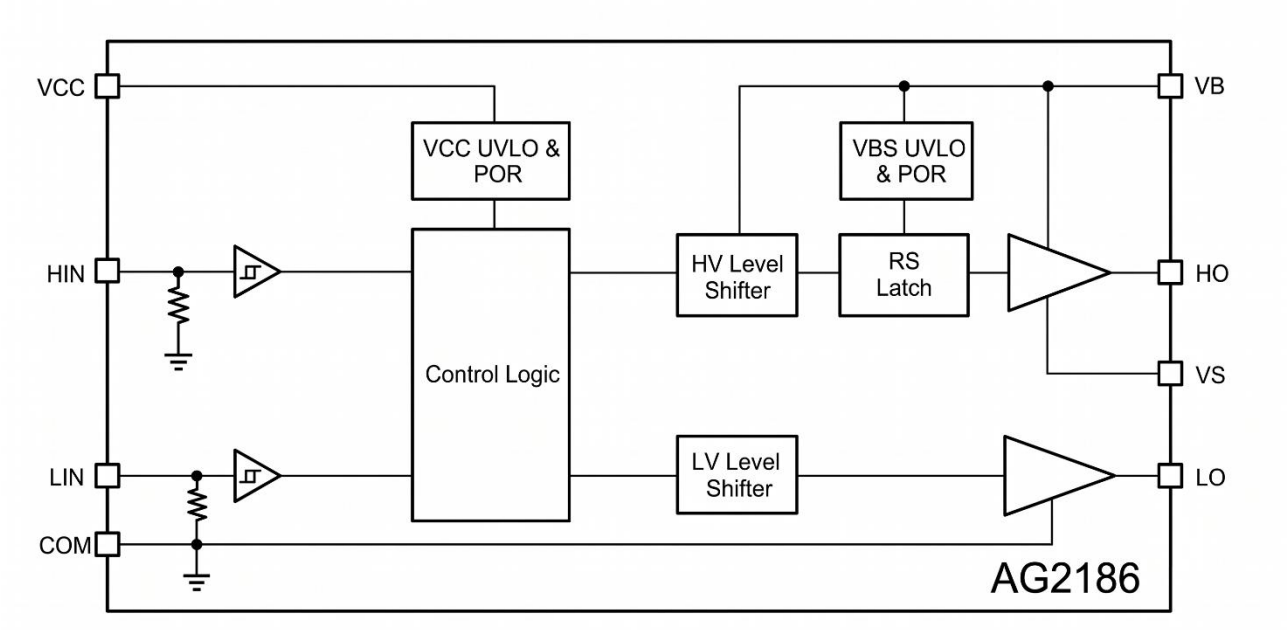


Fig 3. Typical application circuit

BLOCK DIAGRAM



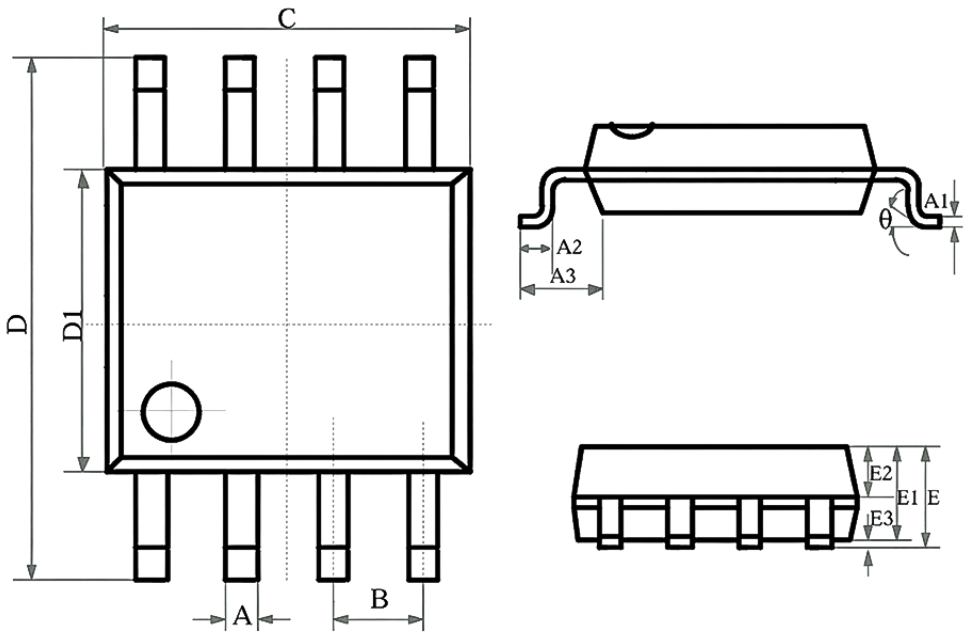
Layout and connection guidelines

The AG2186 incorporates fast reacting input circuits, shortage propagation delays, and powerful output stages capable of delivering current peaks over 4A to facilitate voltage transition times The following layout and connection guidelines are strongly recommended:

- Keep high current output and power ground paths separate logic and enable input signals and signal ground paths. This is especially critical when dealing with TTL-level logic thresholds at driver inputs and enable pins.
- If the inputs to a channel are not externally connected, the internal pull-down resistor indicated on block diagrams command a low output. In noisy environments, it may be necessary to tie inputs of an unused channel to VDD or GND using short traces to prevent noise from causing spurious output switching.
- Many high-speed power circuits can be susceptible to noise injected from their own output or other external sources, possibly causing output re-triggering. These effects can be obvious if the circuit is tested in breadboarding or non-optimal circuit layouts with long input, enable, or output leads. For best results, make connections to all pins as short and direct as possible.
- The AG2186 is compatible with many other industry standard drivers. In single input parts with enable pins, there is an internal pull-down resistor tied to GND to enable the driver by default, this should be considered in the PCB layout.
- The turn on and turn off current paths should be minimized, The Fig 3, Typical Application Circuit shows the pulsed gate drive current path when the gate driver is supplying gate charge to turn the MOSFET on.. .To reach the high peak currents possible, the resistance and inductance in the path should be minimized. The localized bypass capacitor acts to contain the high peak current pulses within this driver MOSFET circuit, preventing them from disturbing the sensitive analog circuitry in the PWM controller.

PACKAGE INFORMATION

Dimension in SOP8 (Unit: mm)



Symbol	Min.	Max.
A	0.39-	0.480
A1	0.210	0.280
A2	0.500	0.800
A3	1.050 BSC.	
B	1.270 BSC.	
C	4.700	5.100
D	5.800	6.200
D1	3.700	4.100
E	-	1.750
E1	1.300	1.500
E2	0.600	0.700
E3	0.100	0.225
θ	0°	8°

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