Features

- High and low side gate driver
- Fully operational up to 200V
- Floating channel designed for bootstrap operation
- 2A source and sink currents
- Extended supply voltage range: 10V to 20V
- CMOS compatible inputs
- CMOS Schmitt-triggered inputs
- Outputs in phase with inputs
- Under Voltage Lock Out function
- Matched propagation delay times
- Automotive Qualified†
- Leadfree, RoHS compliant

Typical Applications

- Mid to low voltage DC-DC Converter for Micro and Mild Hybrid Vehicle
- Multiphase buck boost converters
- Direct Fuel Injection

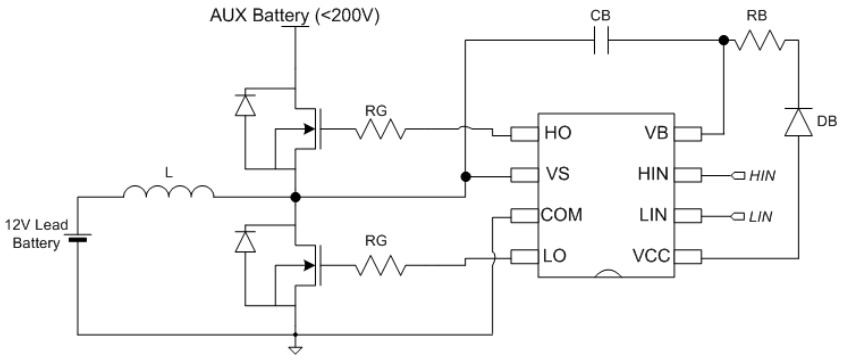
Product Summary

Topology	High & Low Side Driver
$V_{S\text{-}MAX}$	200V
V_{OUT}	10V – 20V
I_{o+} & I_{o-}	2 A
t_{ON} & t_{OFF}	60ns (typ)
Delay matching	20ns (max)

Package

SOIC-8N

Typical Connection Diagram



Orderable Part Number	Package Type	Standard Pack		Note
		Form	Quantity	
AUIRS2012STR	SOIC8-N	Tape & Reel	2500	

Absolute Maximum Ratings

Absolute Maximum Ratings indicate sustained limits beyond which damage to the device may occur. All voltage parameters are absolute voltages referenced to COM lead. Stresses beyond those listed under " Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only; and functional operation of the device at these or any other condition beyond those indicated in the “Recommended Operating Conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability. The thermal resistance and power dissipation ratings are measured under board mounted and still air conditions. Ambient temperature (T_A) is 25°C, unless otherwise specified.

Symbol	Definition	Min.	Max.	Units
V_{CC}	Fixed supply voltage	-0.3	20	V
V_{LO}	Low Side output voltage	-0.3	VCC+0.3	
V_{IN}	Logic input voltage (HIN & LIN)	-0.3	5.0	
V_B	High side floating supply voltage	-0.3	Vs+20	
V_S	High side floating offset voltage	VB-20	200	
V_{HO}	High Side floating output voltage	VS-0.3	VB+0.3	
dV_S/dt	Allowable offset transient	-	50	V/ns
Rth_{JA}	Thermal resistance, junction to ambient	—	100	°C/W
T_J	Junction temperature	—	150	°C
T_S	Storage temperature	-55	150	
T_L	Lead temperature (soldering, 10 seconds)	—	300	

Recommended Operating Conditions

For proper operation the device should be used within the recommended conditions. All voltage parameters are absolute voltage referenced to COM.

Symbol	Definition	Min.	Max.	Units
V_{cc}	Fixed supply voltage	10	20	V
V_{LO}	Low Side output voltage	0	V_{CC}	
V_{IN}	Logic input voltage (HIN & LIN)	COM	5.0	
V_B	High side floating supply voltage	VS+10	VS+20	
V_S	High side floating offset voltage	Note 1	200	
V_{HO}	High Side floating output voltage	VS	VB	
Fsw	Switching frequency**		400	kHz
Rin	Input resistance*	100	5k	Ω
T_A	Ambient Temperature	-40	125	°C

Note 1: Logic operational for VS of -5V to 200V. Logic state held of -5V to –VBS.
* input resistance value to be calculated based on the desired rise time and switching frequency.
** thermal balance to be verified accordingly

Static Electrical Characteristics

Unless otherwise specified, these specifications apply for an operating junction temperature range of -40°C≤Ta≤125°C and power supplies V_{BIAS} (i.e. V_{CC} & V_{BS}) = 15V. The V_{IN}, V_{TH} and I_{IN} parameters are referenced to COM and are applicable to all logic input leads: HIN and LIN. The V_O and I_O parameters are referenced to GND and are applicable to the output leads: OUTA and OUTB.

Symbol	Definition	Min	Typ	Max	Units	Test Conditions
V_{IL}	Logic "0" input voltage			0.7	V	VCC=10V-20V
V_{IH}	Logic "1" input voltage	2.5				
V_{OL}	Low Level output voltage			0.1		Io=20mA
V_{OH}	High Level output voltage, V_{BIAS}-Vo			2.45		Io=-20mA
I_{IN+}	Logic "1" input bias current		40	60	µA	VIN=3.3V
I_{IN-}	Logic "0" input bias current			2		VIN=0V
C_{IN}	Equivalent input capacitance (†)		7		pF	
I_{QBS}	Quiescent VBS supply current		100	250	µA	VIN=0V or 3.3V
I_{QCC}	Quiescent VCC supply current		100	250		
I_{LK}	Offset supply leakage current			20		VB=VS=200V
$V_{CCUVHYS}$	Vcc supply undervoltage hysteresis		1		V	
V_{CCUV+}	Vcc supply undervoltage turn on threshold	6	7	8		
V_{CCUV-}	Vcc supply undervoltage turn off threshold	5	6	7		
$V_{BSUVHYS}$	Vcc supply undervoltage hysteresis		1			
V_{BSUV+}	Vcc supply undervoltage turn on threshold	6	7	8		
V_{BSUV-}	Vcc supply undervoltage turn off threshold	5	6	7		
I_{O+}	Output high short circuit pulsed current(†)		2		A	VO=0V, PW=10us, Ta=25C
I_{O-}	Output high short circuit pulsed current(†)		2			VO=15V, PW=10us, Ta=25C

(†) Guaranteed by design

Dynamic Electrical Characteristics

Unless otherwise specified, these specifications apply for an operating junction temperature range of -40°C≤Ta≤125°C and power supplies V_{BIAS} (i.e. V_{CC} & V_{BS})= 15V, CL = 1000pF. Refer to Figure 1 for switching time definition.

Symbol	Definition	Min	Typ	Max	Units	Test Conditions
Propagation delay characteristics						
t_{ON}	Turn-on propagation delay	—	60	120	ns	VS=0V and 200V
t_{OFF}	Turn-off propagation delay	—	60	120		VS=0V and 200V
t_r	Turn-on rise time	—	22	46		
t_f	Turn-off fall time	—	15	35		
DM1	Channel to channel turn on delay matching			20		
DM2	Channel to channel turn off delay matching			20		

Input/Output table

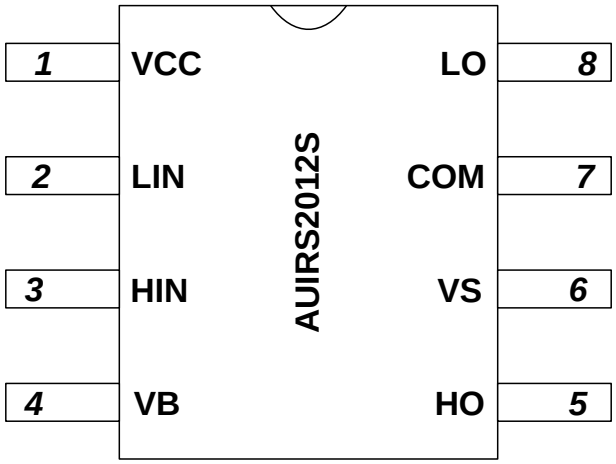
HIN	LIN	HO	LO
L	**L**	**L**	**L**
H	**L**	**H**	**L**
L	**H**	**L**	**H**
H	**H**	**H**	**H**

This table is held true in the voltages ranges defined in the recommended operating conditions section.

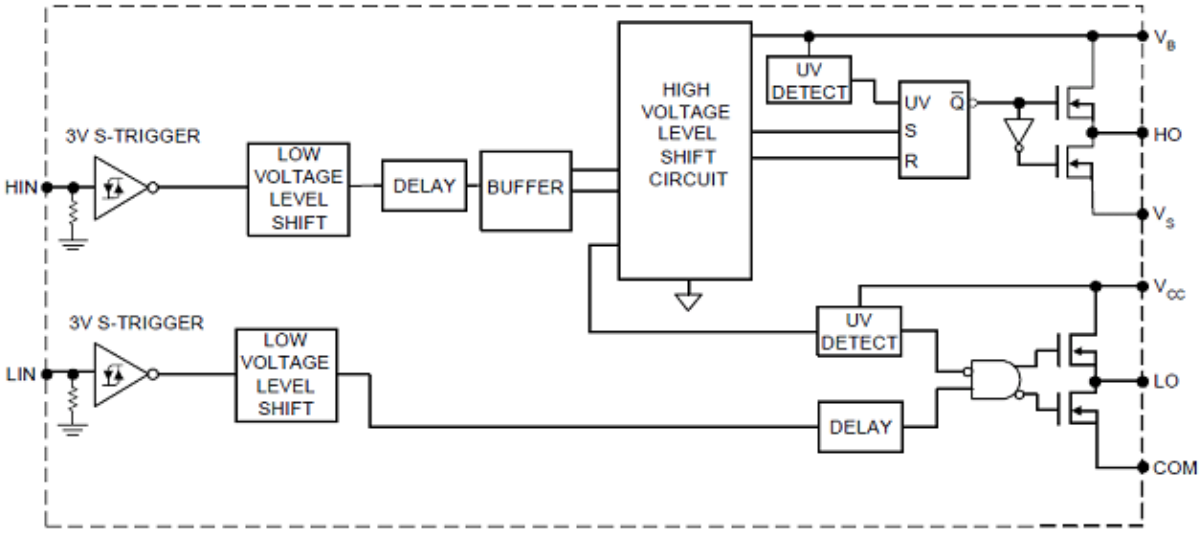
Lead Definitions

PIN	Symbol	Description
1	VCC	Supply voltage
2	LIN	Logic input for low side gate driver – in phase with LO
3	HIN	Logic input for high side gate driver – in phase with HO
4	VB	High side floating supply
5	HO	High side gate drive output
6	VS	High side floating supply reference
7	COM	Low side reference
8	LO	Low side gate drive output

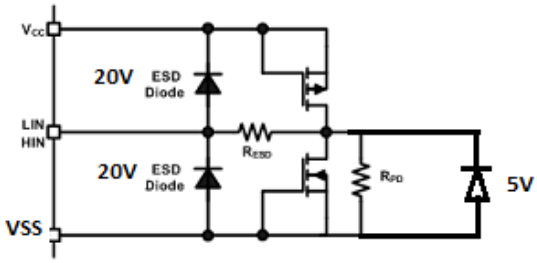
Lead Assignment

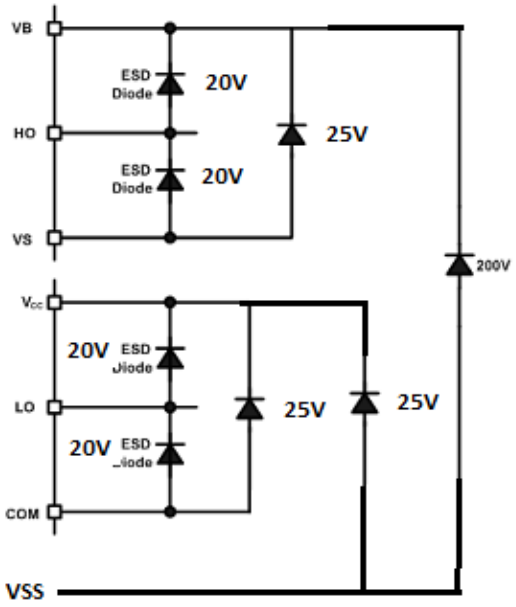


Functional Block Diagram:

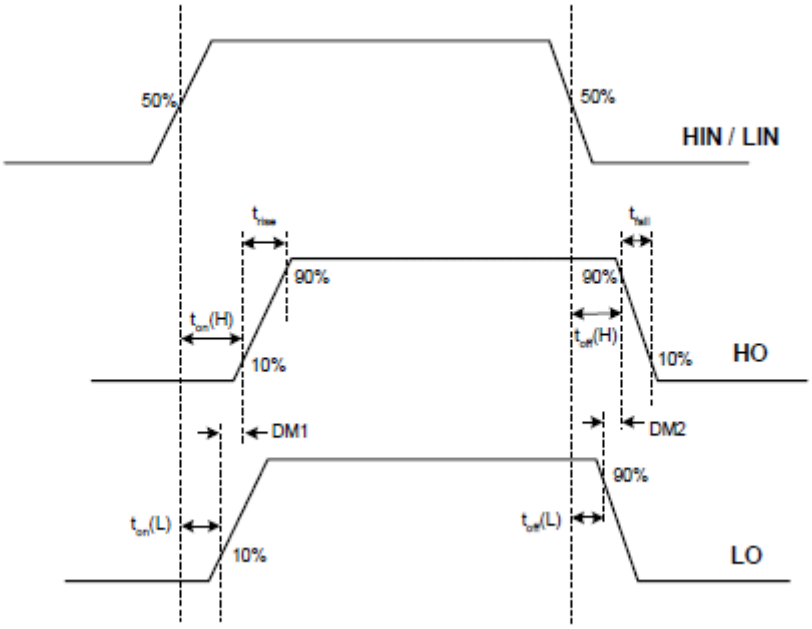


Input/Output/Enable Pin Equivalent Circuit Diagrams

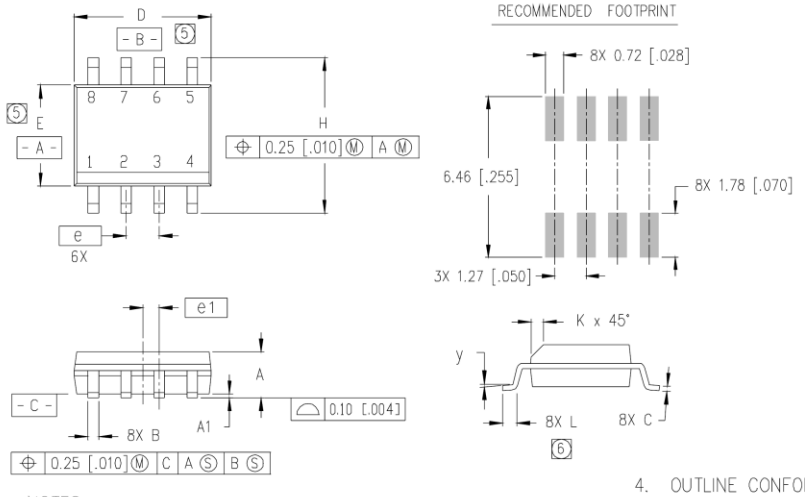




Timing waveforms



Package Information



DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.0532	.0688	1.35	1.75
A1	.0040	.0098	0.10	0.25
B	.014	.018	0.36	0.46
C	.0075	.0098	0.19	0.25
D	.189	.196	4.80	4.98
E	.150	.157	3.81	3.99
e	.050 BASIC		1.27 BASIC	
e1	.025 BASIC		0.635 BASIC	
H	.2284	.2440	5.80	6.20
K	.011	.019	0.28	0.48
L	.016	.050	0.41	1.27
y	0°	8°	0°	8°

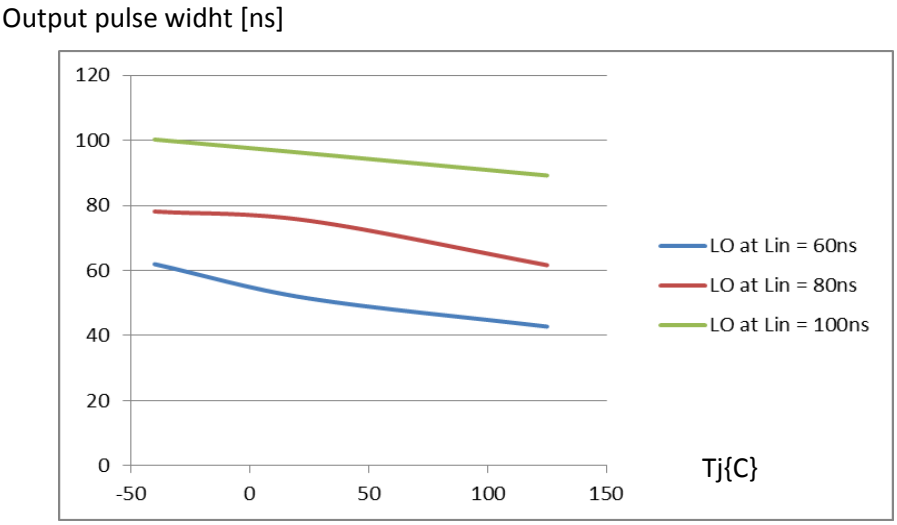
NOTES:

1. DIMENSIONING & TOLERANCING PER ANSI Y14.5M-1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
4. OUTLINE CONFORMS TO JEDEC OUTLINE MS-012AA.
5. DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS. MOLD PROTRUSIONS NOT TO EXCEED 0.25 [.006].
6. DIMENSION IS THE LENGTH OF LEAD FOR SOLDERING TO A SUBSTRATE.

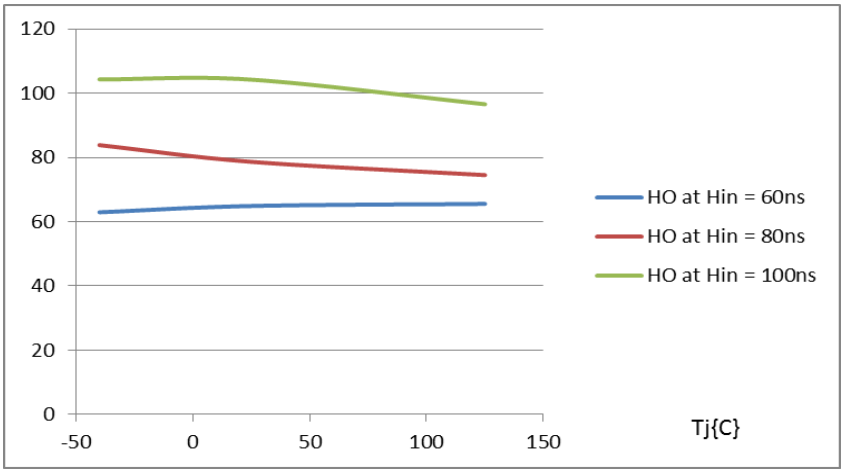
8 Lead SOIC

Application Information

When using the AUIRS2012S, some precautions have to be taken when very short Hin/Lin pulses are applied.
In the following figures, the typical output pulse versus input pulse width distortion is shown, for both HO and LO and for three different input pulse widths.
As an example, applying a 60nsec Lin results in a 60nsec LO only at very low temperatures. At far as Tj increases LO width decreases to a bit more than 40nsec when Tj = Tjmax.
Different is the case when Hin short pulse is applied. Because of the effect of the internal level shifter, the HO pulse width is more stable with temperature.



LO Output pulse width vs Input pulse width and Tj



HO Output pulse width vs Input pulse width and Tj

Qualification Information

Qualification Level		Automotive (per AEC-Q100)	
		Comments: This part number passed Automotive qualification. IR's Industrial and Consumer qualification level is granted by extension of the higher Automotive level.	
Moisture Sensitivity Level		SOIC8-N	MSL3,260C (per IPC/JEDEC J-STD-020)
ESD	Machine Model	Class M2 (150V) (per AEC-Q100-003)	
	Human Body Model	Class H2 (2500V) (AEC-Q100-002)	
	Charged Device Model	Class C4 (875V) (per AEC-Q100-011) AEC-Q101-005	
IC Latch-UP Test		Class II, Level A (per AEC-Q100-004)	
RoHS Compliant		Yes	

† Qualification standards can be found at International Rectifier web site: http://www.irf.com

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