

Automotive Grade AUIRS4426S DUAL LOW SIDE DRIVER

Features

- Gate drive supply range from 6 V to 20 V
- CMOS Schmitt-triggered inputs
- Matched propagation delay for both channels
- Outputs out of phase with inputs
- Automotive Qualified[†]
- Leadfree, RoHS compliant

Typical Applications

- Automotive General Purpose Dual Low Side Driver
- Automotive DC-DC converters
- Hybrid Power Train Drives
- Direct Fuel Injection

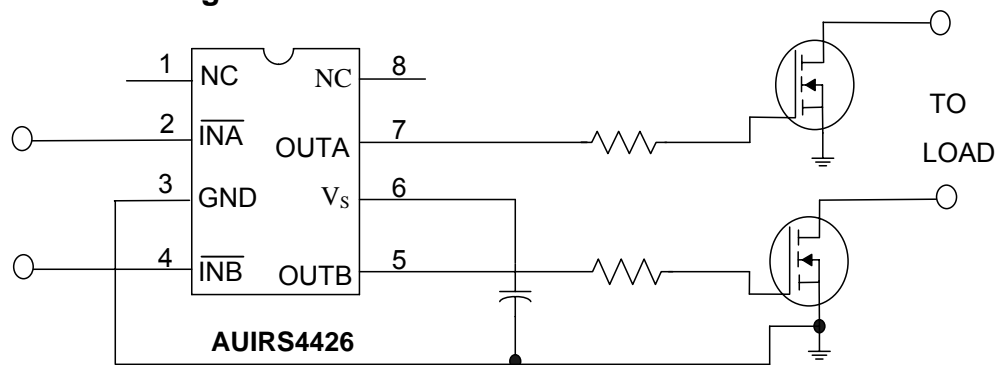
Product Summary

Topology	Dual Low Side Driver
V_{OFFSET}	25V
V_{OUT}	6 V – 20 V
$I_{\text{o+}}$ & $I_{\text{o-}}$ (typical)	2.3 A & 3.3 A
t_{ON} & t_{OFF} (typical)	70 ns & 65 ns

Package



Typical Connection Diagram



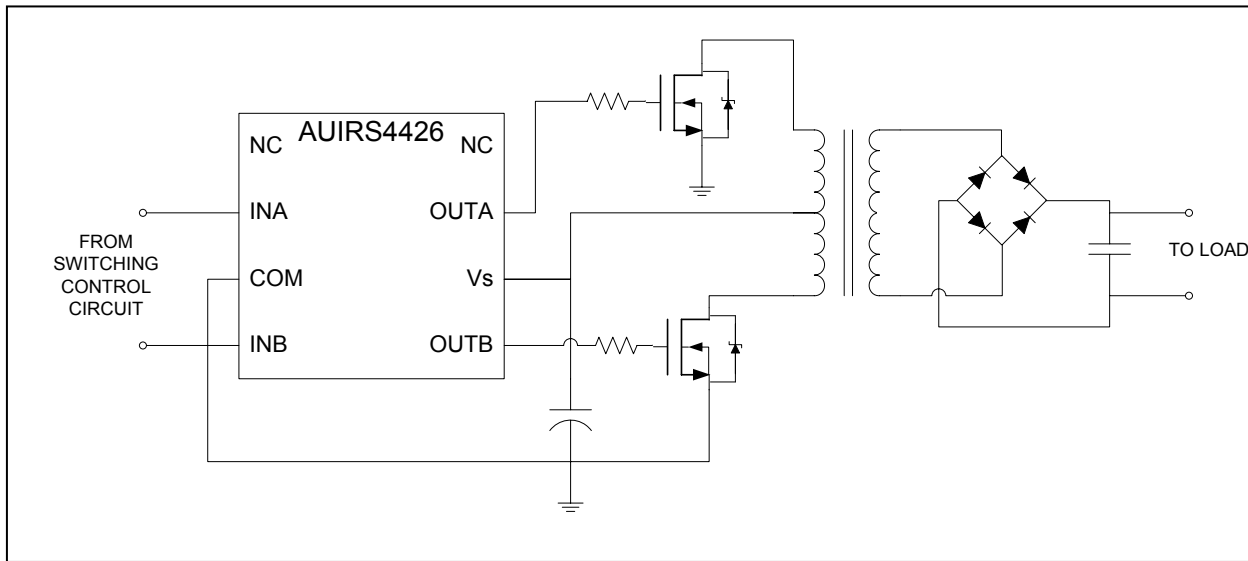
(Please refer to our Application Notes and Design Tips for proper circuit board layout)

Table of Contents	Page
Typical Connection Diagram	1
Description	3
Diagram for push-pull forward DC-DC converter application	3
Qualification Information	4
Absolute Maximum Ratings	5
Recommended Operating Conditions	5
Static Electrical Characteristics	6
Dynamic Electrical Characteristics	6
Functional Block Diagram	7
Input/Output Pin Equivalent Circuit Diagrams	8
Lead Definitions	9
Lead Assignments	9
Input/output Timing Diagram	10
Switching Time Waveform Definitions	10
Advance Configuration	10
Parameter Temperature Trends	11-12
Package Details	13
Tape and Reel Details	14
Part Marking Information	15
Ordering Information	16
Important Notice	17

Description

The AUIRS4426 is a low voltage, high speed power MOSFET and IGBT driver. Proprietary latch immune CMOS technologies enable ruggedized monolithic construction. The logic input is compatible with standard CMOS or LSTTL output. The output drivers feature a high pulse current buffer stage designed for minimum driver cross-conduction. Propagation delays between two channels are matched.

Diagram for push-pull forward DC-DC converter application



Qualification Information[†]

Qualification Level		Automotive (per AEC-Q100 ^{††})	
		Comments: This family of ICs has passed an Automotive qualification. IR's Industrial and Consumer qualification level is granted by extension of the higher Automotive level.	
Moisture Sensitivity Level		SOIC8N	MSL3 ^{†††} 260°C (per IPC/JEDEC J-STD-020)
ESD	Machine Model	Class M3 (per AEC-Q100-003)	
	Human Body Model	Class H3A (per AEC-Q100-002)	
	Charged Device Model	Class C5 (per AEC-Q100-011)	
RoHS Compliant		Yes	

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

†† Exceptions to AEC-Q100 requirements are noted in the qualification report.

††† Higher MSL ratings may be available for the specific package types listed here. Please contact your International Rectifier sales representative for further information.

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 GND 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_S	Fixed supply voltage	-0.3	25	V
V_O	Output voltage	-0.3	$V_S + 0.3$	
V_{IN}	Logic input voltage	-0.3	$V_S + 0.3$	
P_D	Package power dissipation @ $T_A \leq 25^\circ\text{C}$	—	0.625	W
R_{thJA}	Thermal resistance, junction to ambient	—	200	°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

The input/output logic timing diagram is shown in Figure 1. For proper operation the device should be used within the recommended conditions. All voltage parameters are absolute voltage referenced to GND.

Symbol	Definition	Min.	Max.	Units
V_S	Fixed supply voltage	6	20	V
V_O	Output voltage	0	V_S	
V_{IN}	Logic input voltage	0	V_S	
T_A	Ambient temperature	-40	125	°C

Static Electrical Characteristics

Unless otherwise noted, these specifications apply for an operating junction temperature range of $-40^{\circ}\text{C} \leq T_j \leq 125^{\circ}\text{C}$ with bias conditions of $V_{\text{BIAS}} (V_S) = 15\text{ V}$, $T_A = 25^{\circ}\text{C}$. The V_{IN} and I_{IN} parameters are referenced to GND and are applicable to input leads: INA and INB. 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_{IH}	Logic "0" input voltage	2.7	—	—	V	
V_{IL}	Logic "1" input voltage	—	—	0.8		
V_{OH}	High level output voltage, $V_{\text{BIAS}} - V_{\text{O}}$	—	—	1.4		
V_{OL}	Low level output voltage, V_{O}	—	—	0.1		
$I_{\text{IN}+}$	Logic "1" input bias current (OUT = HI)	—	5	15	μA	$V_{\text{IN}} = 0\text{ V}$
$I_{\text{IN}-}$	Logic "0" input bias current (OUT = LO)	—	-10	-30		$V_{\text{IN}} = V_S$
I_{QB}	Quiescent V_S supply current	—	100	200		$V_{\text{IN}} = 0\text{ V}$ or V_S
$I_{\text{O}+}$	Output high short circuit pulsed current ^(†)	1.5	2.3	—	A	$V_{\text{O}} = 0\text{ V}$, $V_{\text{IN}} = 0$ $\text{PW} \leq 10\ \mu\text{s}$
$I_{\text{O}-}$	Output high short circuit pulsed current ^(†)	1.5	3.3	—		$V_{\text{O}} = 15\text{ V}$, $V_{\text{IN}} = V_S$ $\text{PW} \leq 10\ \mu\text{s}$

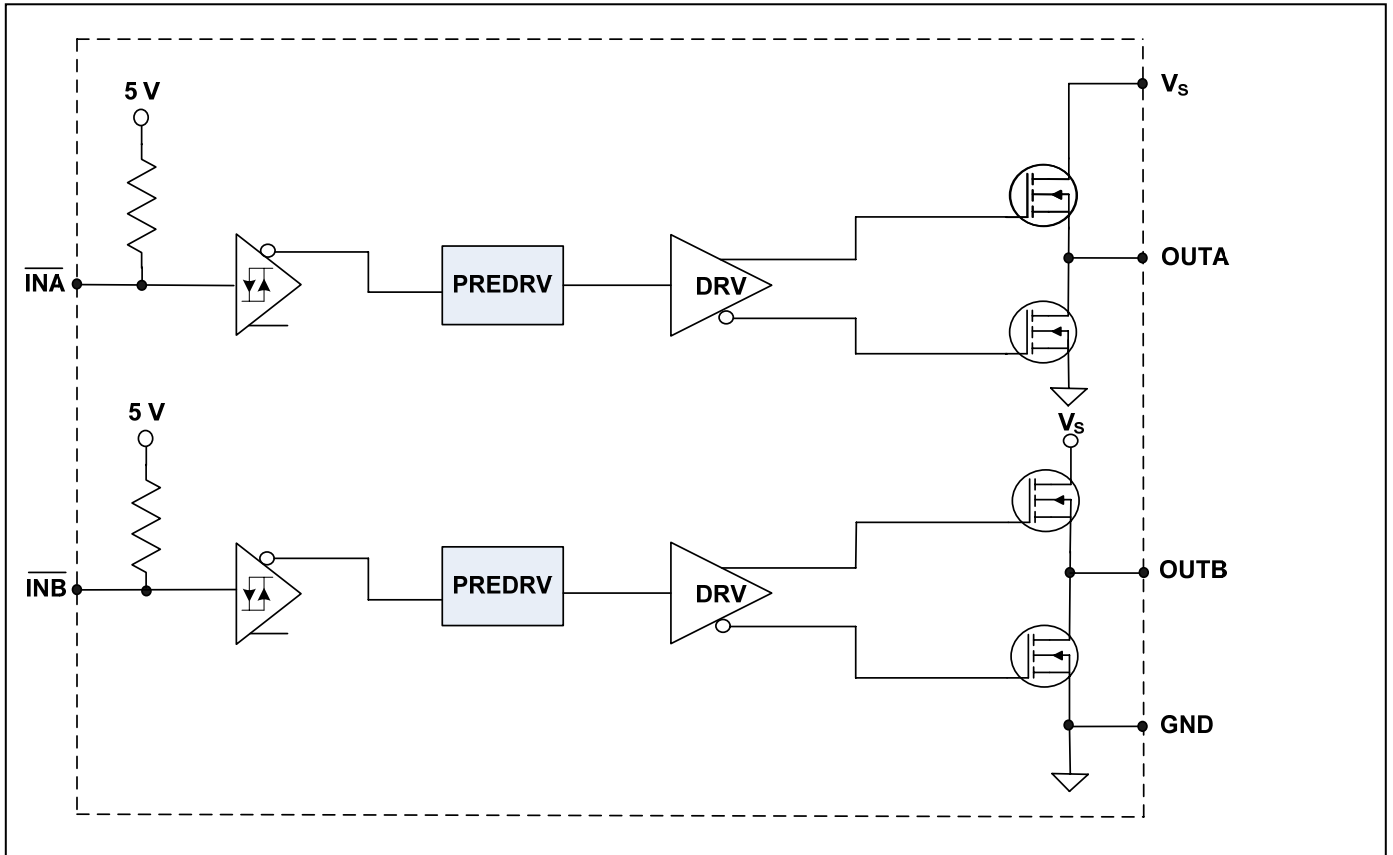
(†) Guaranteed by design

Dynamic Electrical Characteristics

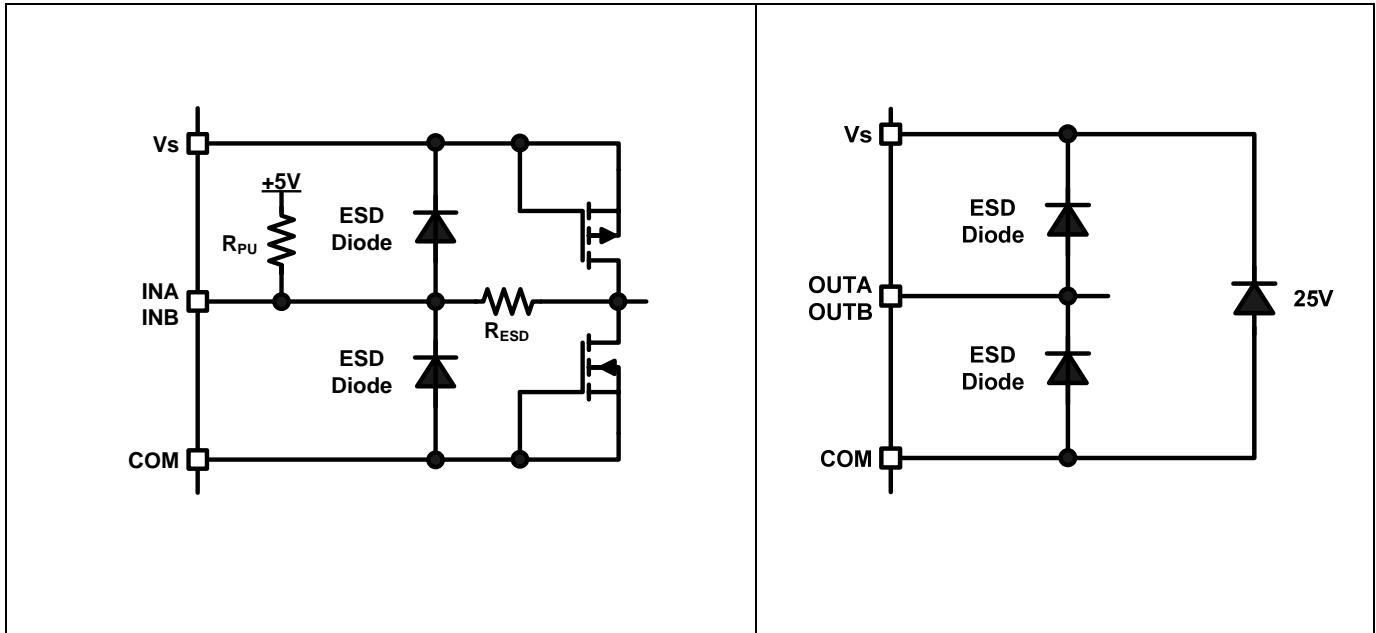
Unless otherwise noted, these specifications apply for an operating junction temperature range of $-40^{\circ}\text{C} \leq T_j \leq 125^{\circ}\text{C}$ with bias conditions of $V_{\text{BIAS}} (V_S) = 15\text{ V}$, $\text{CL} = 1000\text{pF}$, and $T_A = 25^{\circ}\text{C}$. The dynamic electrical characteristics are measured using the test circuit shown in Fig. 3.

Symbol	Definition	Min	Typ	Max	Units	Test Conditions
Propagation delay characteristics						
t_{d1}	Turn-on propagation delay	—	70	150	ns	Figure 2
t_{d2}	Turn-off propagation delay	—	65	150		
t_{r}	Turn-on rise time	—	15	35		
t_{f}	Turn-off fall time	—	25	50		

Functional Block Diagram: AUIRS4426



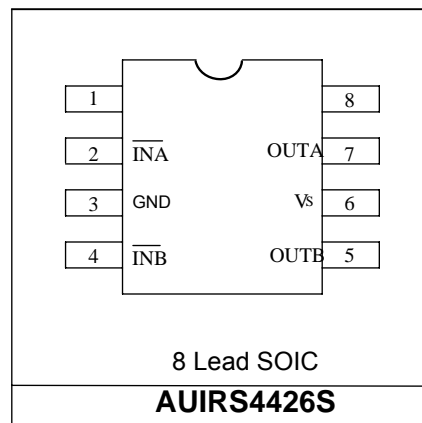
Input/Output Pin Equivalent Circuit Diagrams:



Lead Definitions

Symbol	Description
V_s	Supply voltage
GND	Ground
\overline{INA}	Logic input for gate driver output (OUTA), out of phase
\overline{INB}	Logic input for gate driver output (OUTB), out of phase
OUTA	Gate drive output A
OUTB	Gate drive output B

Lead Assignments



Application Information and Additional Details

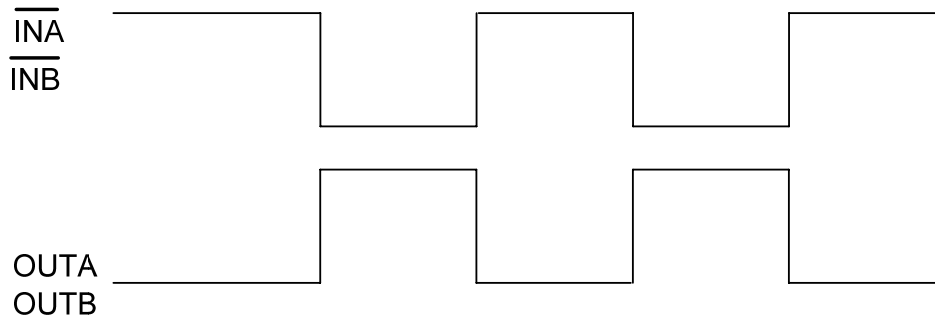


Figure 1: Input/output Timing Diagram

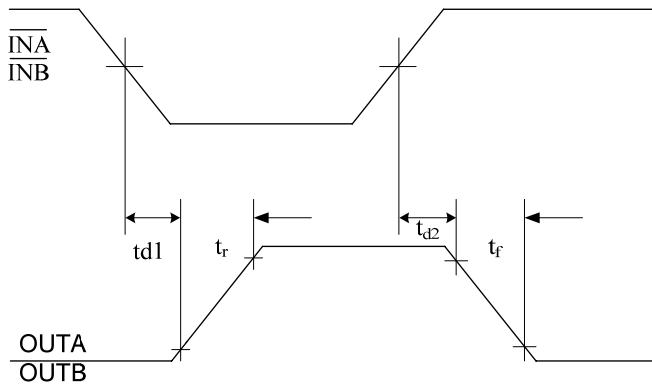


Figure 2: Switching Time Waveform Definitions

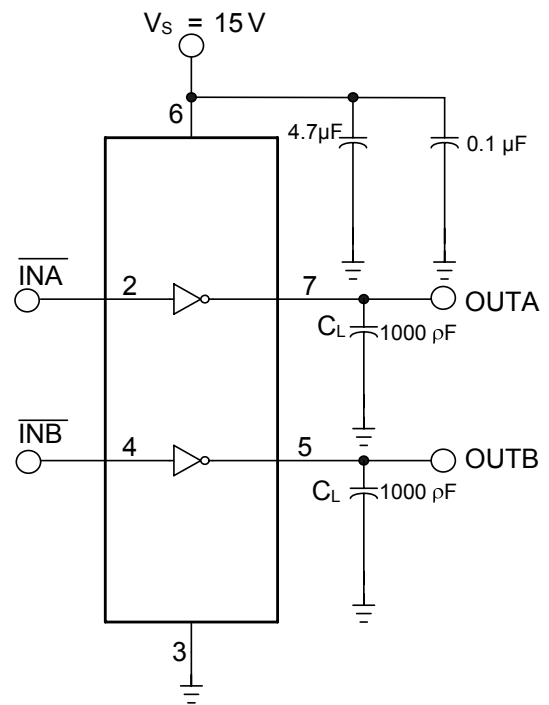


Figure 3: Advance Configuration

Parameter Trends vs. Temperature

Figures illustrated in this chapter provide information on the experimental performance of the AUIRS4426S HVIC. The line plotted in each figure is generated from actual lab data. A large number of individual samples were tested at three temperatures (-40 °C, 25 °C, and 125 °C) with supply voltage of 15V in order to generate the experimental curve. The line consists of three data points (one data point at each of the tested temperatures) that have been connected together to illustrate the understood trend. The individual data points on the Typ. curve were determined by calculating the averaged experimental value of the parameter (for a given temperature).

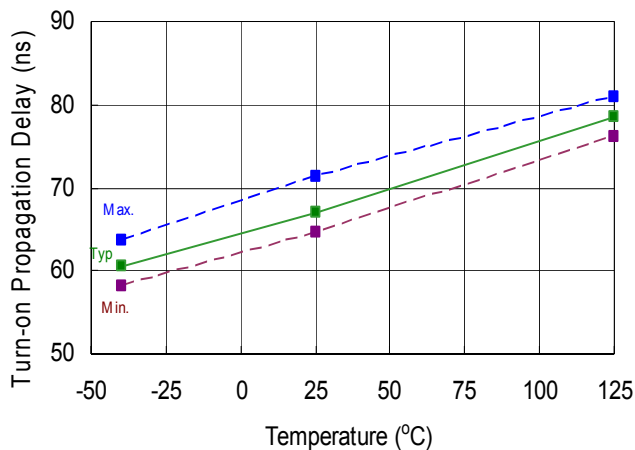


Figure 4. Turn-On Propagation Delay vs. Temperature

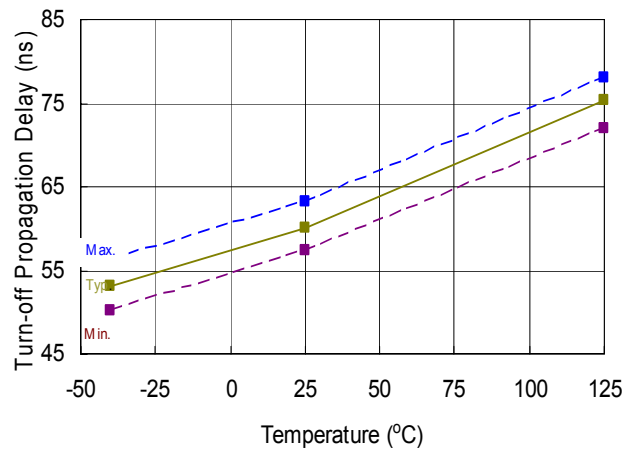


Figure 5. Turn-Off Propagation Delay vs. Temperature

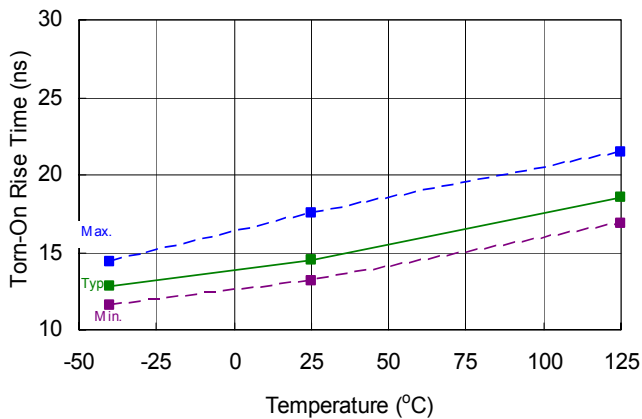


Figure 6. Turn-On Rise Time vs. Temperature

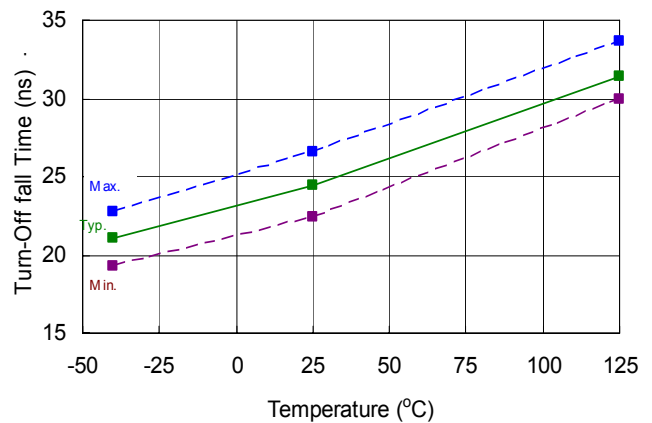


Figure 7. Turn-Off Fall Time vs. Temperature

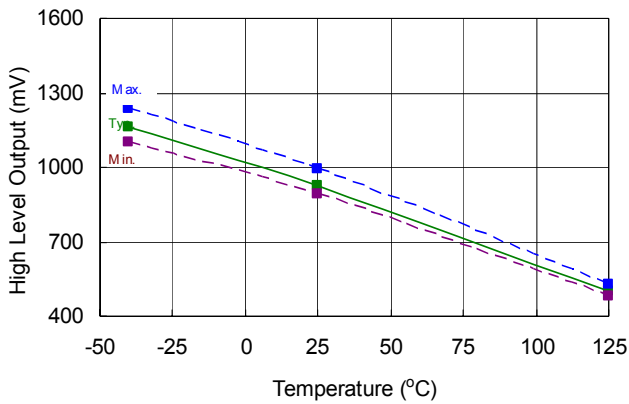


Figure 8. High Level Output Voltage vs. Temperature

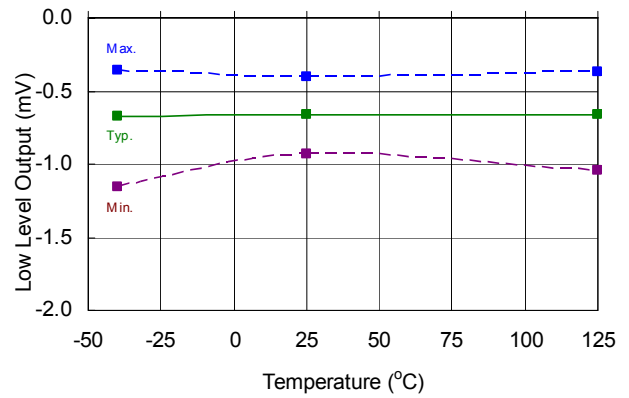


Figure 9. Low Level Output Voltage vs. Temperature

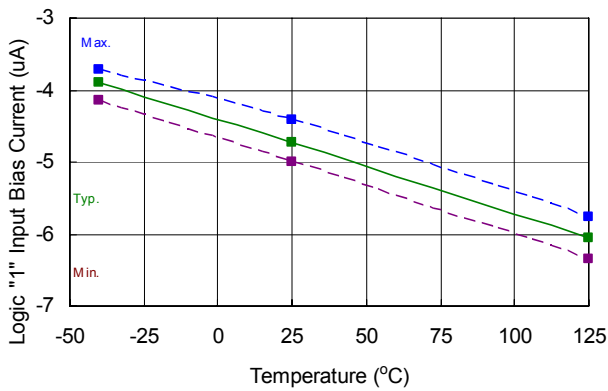


Figure 10. Logic "1" Input Bias Current vs. Temperature

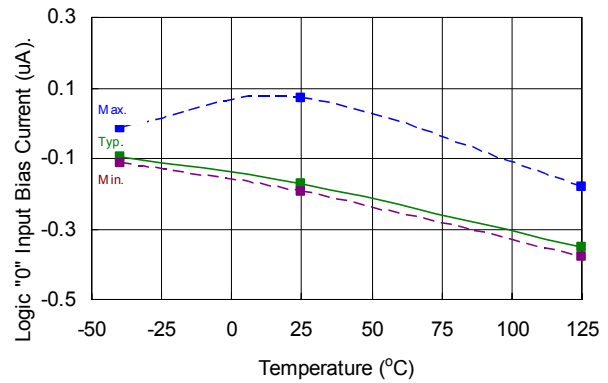


Figure 11. Logic "0" Input Bias Current vs. Temperature

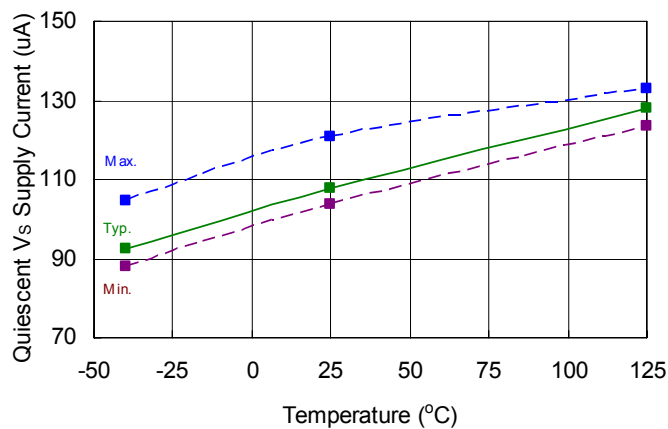
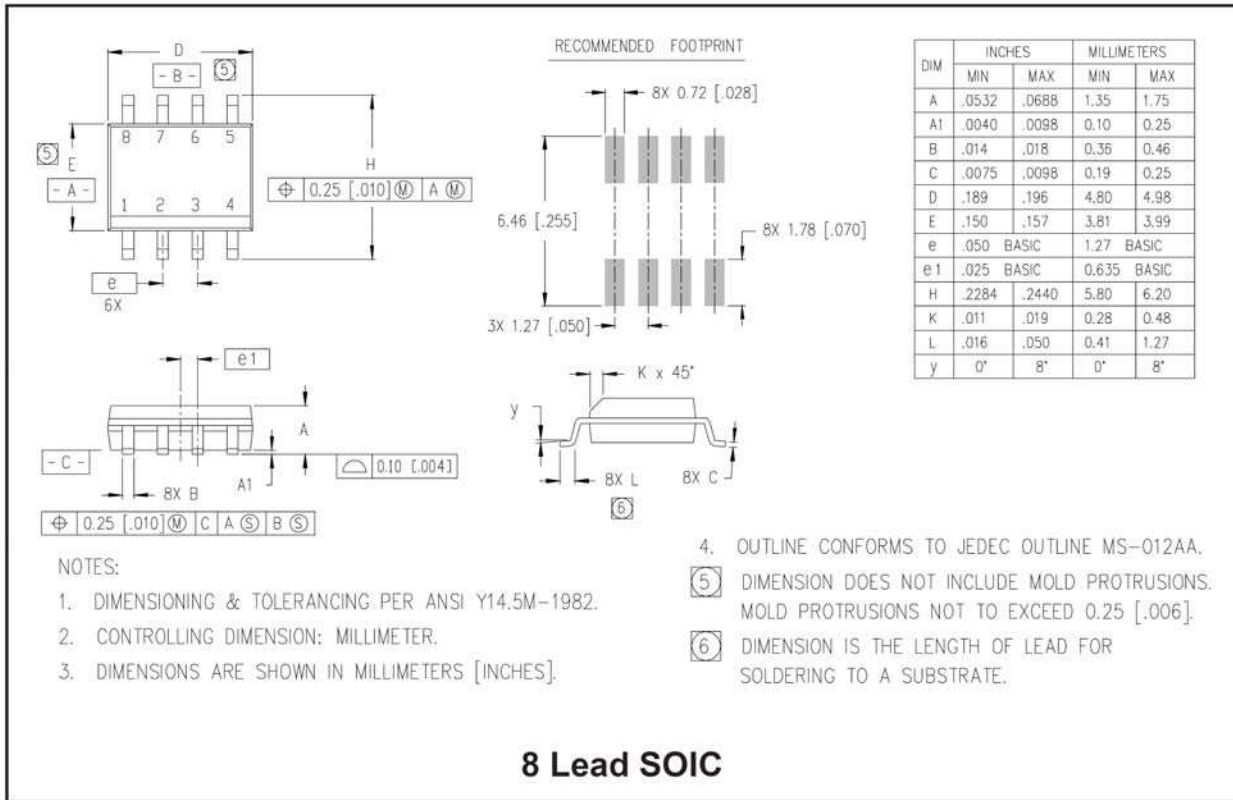
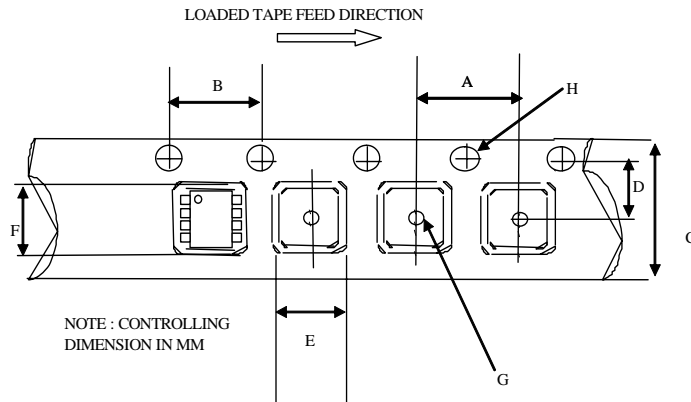


Figure 12. Quiescent V_S Supply Current vs. Temperature

Package Details: SOIC8

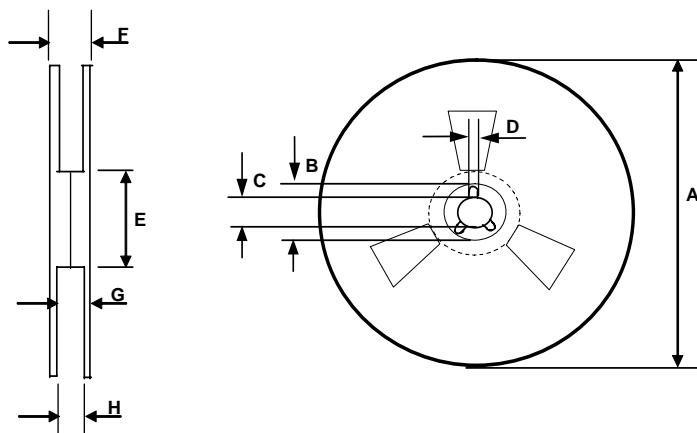


Tape and Reel Details: SOIC8



CARRIER TAPE DIMENSION FOR 8SOICN

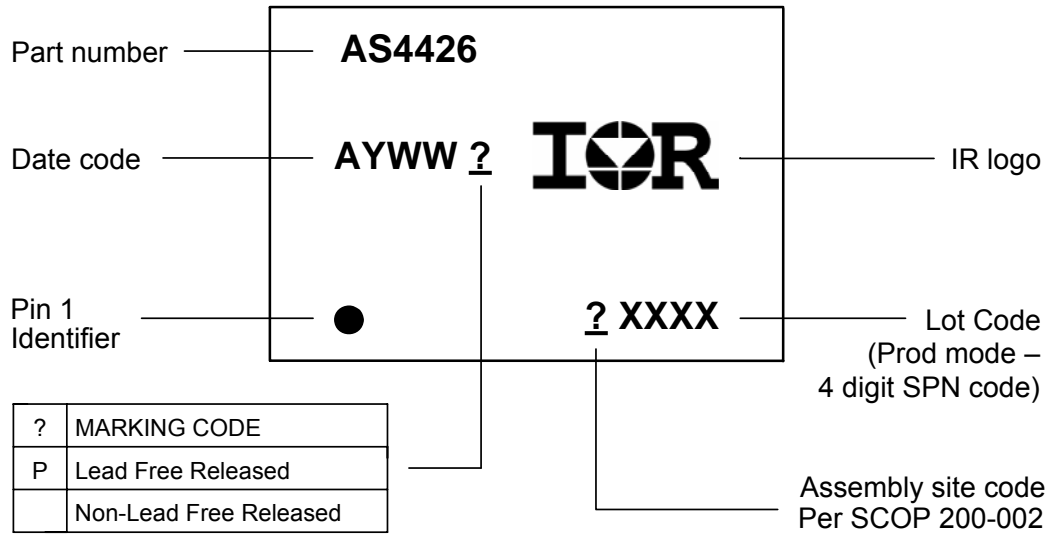
Code	Metric		Imperial	
	Min	Max	Min	Max
A	7.90	8.10	0.311	0.318
B	3.90	4.10	0.153	0.161
C	11.70	12.30	0.46	0.484
D	5.45	5.55	0.214	0.218
E	6.30	6.50	0.248	0.255
F	5.10	5.30	0.200	0.208
G	1.50	n/a	0.059	n/a
H	1.50	1.60	0.059	0.062



REEL DIMENSIONS FOR 8SOICN

Code	Metric		Imperial	
	Min	Max	Min	Max
A	329.60	330.25	12.976	13.001
B	20.95	21.45	0.824	0.844
C	12.80	13.20	0.503	0.519
D	1.95	2.45	0.767	0.096
E	98.00	102.00	3.858	4.015
F	n/a	18.40	n/a	0.724
G	14.50	17.10	0.570	0.673
H	12.40	14.40	0.488	0.566

Part Marking Information



Ordering Information

Base Part Number	Package Type	Standard Pack		Complete Part Number
		Form	Quantity	
AUIRS4426	SOIC8	Tube/Bulk	95	AUIRS4426S
		Tape and Reel	2500	AUIRS4426STR

IMPORTANT NOTICE

Unless specifically designated for the automotive market, International Rectifier Corporation and its subsidiaries (IR) reserve the right to make corrections, modifications, enhancements, improvements, and other changes to its products and services at any time and to discontinue any product or services without notice. Part numbers designated with the "AU" prefix follow automotive industry and / or customer specific requirements with regards to product discontinuance and process change notification. All products are sold subject to IR's terms and conditions of sale supplied at the time of order acknowledgment.

IR warrants performance of its hardware products to the specifications applicable at the time of sale in accordance with IR's standard warranty. Testing and other quality control techniques are used to the extent IR deems necessary to support this warranty. Except where mandated by government requirements, testing of all parameters of each product is not necessarily performed.

IR assumes no liability for applications assistance or customer product design. Customers are responsible for their products and applications using IR components. To minimize the risks with customer products and applications, customers should provide adequate design and operating safeguards.

Reproduction of IR information in IR data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. Reproduction of this information with alterations is an unfair and deceptive business practice. IR is not responsible or liable for such altered documentation. Information of third parties may be subject to additional restrictions.

Resale of IR products or serviced with statements different from or beyond the parameters stated by IR for that product or service voids all express and any implied warranties for the associated IR product or service and is an unfair and deceptive business practice. IR is not responsible or liable for any such statements.

IR products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or in other applications intended to support or sustain life, or in any other application in which the failure of the IR product could create a situation where personal injury or death may occur. Should Buyer purchase or use IR products for any such unintended or unauthorized application, Buyer shall indemnify and hold International Rectifier and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that IR was negligent regarding the design or manufacture of the product.

IR products are neither designed nor intended for use in military/aerospace applications or environments unless the IR products are specifically designated by IR as military-grade or "enhanced plastic." Only products designated by IR as military-grade meet military specifications. Buyers acknowledge and agree that any such use of IR products which IR has not designated as military-grade is solely at the Buyer's risk, and that they are solely responsible for compliance with all legal and regulatory requirements in connection with such use.

IR products are neither designed nor intended for use in automotive applications or environments unless the specific IR products are designated by IR as compliant with ISO/TS 16949 requirements and bear a part number including the designation "AU". Buyers acknowledge and agree that, if they use any non-designated products in automotive applications, IR will not be responsible for any failure to meet such requirements.

For technical support, please contact IR's Technical Assistance Center

<http://www.irf.com/technical-info/>

WORLD HEADQUARTERS:

233 Kansas St., El Segundo, California 90245
Tel: (310) 252-7105