International
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July 25th, 2012

# Automotive Grade AUIRS4427S

## DUAL LOW SIDE DRIVER

### Features

- Gate drive supply range from 6 V to 20 V
- CMOS Schmitt-triggered inputs
- 3.3V and 5V logic compatible
- Two independent gate drivers
- Matched propagation delay for both channels
- Outputs in phase with inputs
- Leadfree, RoHS compliant
- Automotive qualified*

### Typical Applications

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

### Product Summary

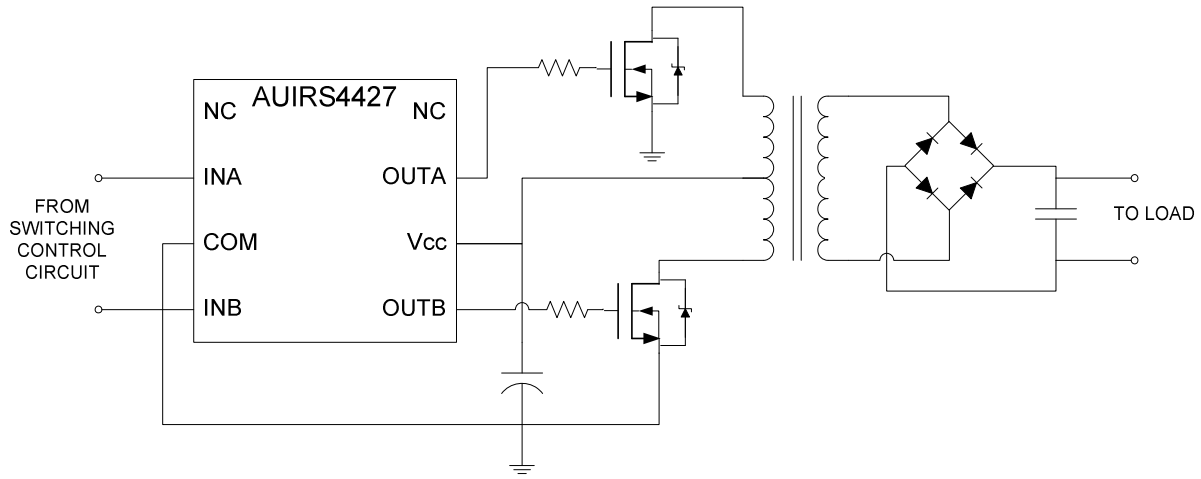
| | |
|---|---|
| Topology | General Driver |
| $V_{OUT}$ | 6V - 20V |
| $I_{o+}$ & $I_{o-}$ (typical) | 2.3A & 3.3A |
| $t_{on}$ & $t_{off}$ (typical) | 50ns & 50ns |

### Package Type



SOIC8N

### Diagram for push-pull forward DC-DC converter application




* Qualification standards can be found on IR's web site www.irf.com

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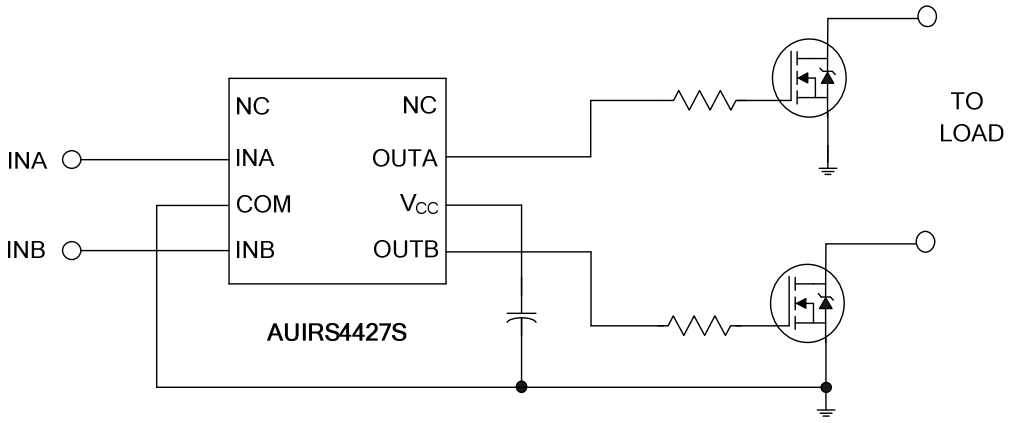
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## Description

The AUIRS4427S 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.

## Typical Connection Diagram




(Refer to Lead Assignments for correct pin configuration). This/These diagram(s) show electrical connections only. Please refer to our Application Notes and Design Tips for proper circuit board layout.


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## 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℃ (per IPC/JEDEC J-STD-020) |
| **ESD** | Machine Model | Class M3 (+/-200V) (per AEC-Q100-003) | |
| | Human Body Model | Class H3A (+/-4000V) (per AEC-Q100-002) | |
| | Charged Device Model | Class C5 (+/-1000V) (per AEC-Q100-011) | |
| **IC Latch-Up Test** | | Class II, Level B (per AEC-Q100-004) | |
| **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.


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## 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. The thermal resistance and power dissipation ratings are measured under board mounted and still air conditions.

| Symbol | Definition | Min | Max | Units |
|---|---|---|---|---|
| $V_{CC}$ | Fixed supply voltage | -0.3 | 20 | V |
| $V_O$ | Output voltage | -0.3 | $V_{CC}$ + 0.3 | |
| $V_{IN}$ | Logic input voltage | -0.3 | $V_{CC}$ + 0.3 | |
| $P_D$ | Package power dissipation @ TA ≤ 25℃ | — | 0.625 | W |
| $Rth_{JA}$ | Thermal resistance, junction to ambient | — | 200 | ℃/W |
| $T_J$ | Junction temperature | — | 150 | ℃ |
| $T_S$ | 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 voltages referenced to COM unless otherwise stated in the table. The offset rating is tested with supply of $V_{CC}$ = 15V.

| Symbol | Definition | Min | Max | Units |
|---|---|---|---|---|
| $V_{CC}$ | Fixed supply voltage | 6 | 20 | V |
| $V_O$ | Output voltage | 0 | $V_{CC}$ | |
| $V_{IN}$ | Logic input voltage | 0 | $V_{CC}$ | |
| $T_A$ | Ambient temperature | -40 | 125 | ℃ |


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## Static Electrical Characteristics

$V_{CC}$ = 15V, $T_A$ = 25℃ unless otherwise specified. The $V_{IN}$, and $I_{IN}$ parameters are referenced to COM and are applicable to input leads: INA and INB. The $V_O$ and $I_O$ parameters are referenced to COM and are applicable to the output leads: OUTA and OUTB.

| Symbol | Definition | Min | Typ | Max | Units | Test Conditions |
|---|---|---|---|---|---|---|
| $V_{IH}$ | Logic "1" input voltage | 2.5 | — | — | V | |
| $V_{IL}$ | Logic "0" input voltage | — | — | 0.8 | V | |
| $V_{OH}$ | High level output voltage, $V_{BIAS}$ -$V_O$ | — | — | 1.4 | | $I_O$ = 0 mA |
| $V_{OL}$ | Low level output voltage, $V_O$ | — | — | 0.15 | | $I_O$ = 20 mA |
| $I_{IN+}$ | Logic "1" input bias current | — | 5 | 15 | µA | $V_{IN}$ = 5V |
| $I_{IN-}$ | Logic "0" input bias current | -30 | -10 | — | | $V_{IN}$ = 0V |
| $I_{QCC}$ | Quiescent $V_{CC}$ supply current | — | 100 | 200 | | $V_{IN}$ = 0V or 5V |
| $I_{O+}$ | Output high short circuit pulsed current(†) | 1.5 | 2.3 | — | A | $V_O$ = 0V, $V_{IN}$ = 5V PW ≤ 10 µs |
| $I_{O-}$ | Output low short circuit pulsed current(†) | 1.5 | 3.3 | — | | $V_O$ = 15V, $V_{IN}$ = COM PW ≤ 10 µs |

(†) Guaranteed by design

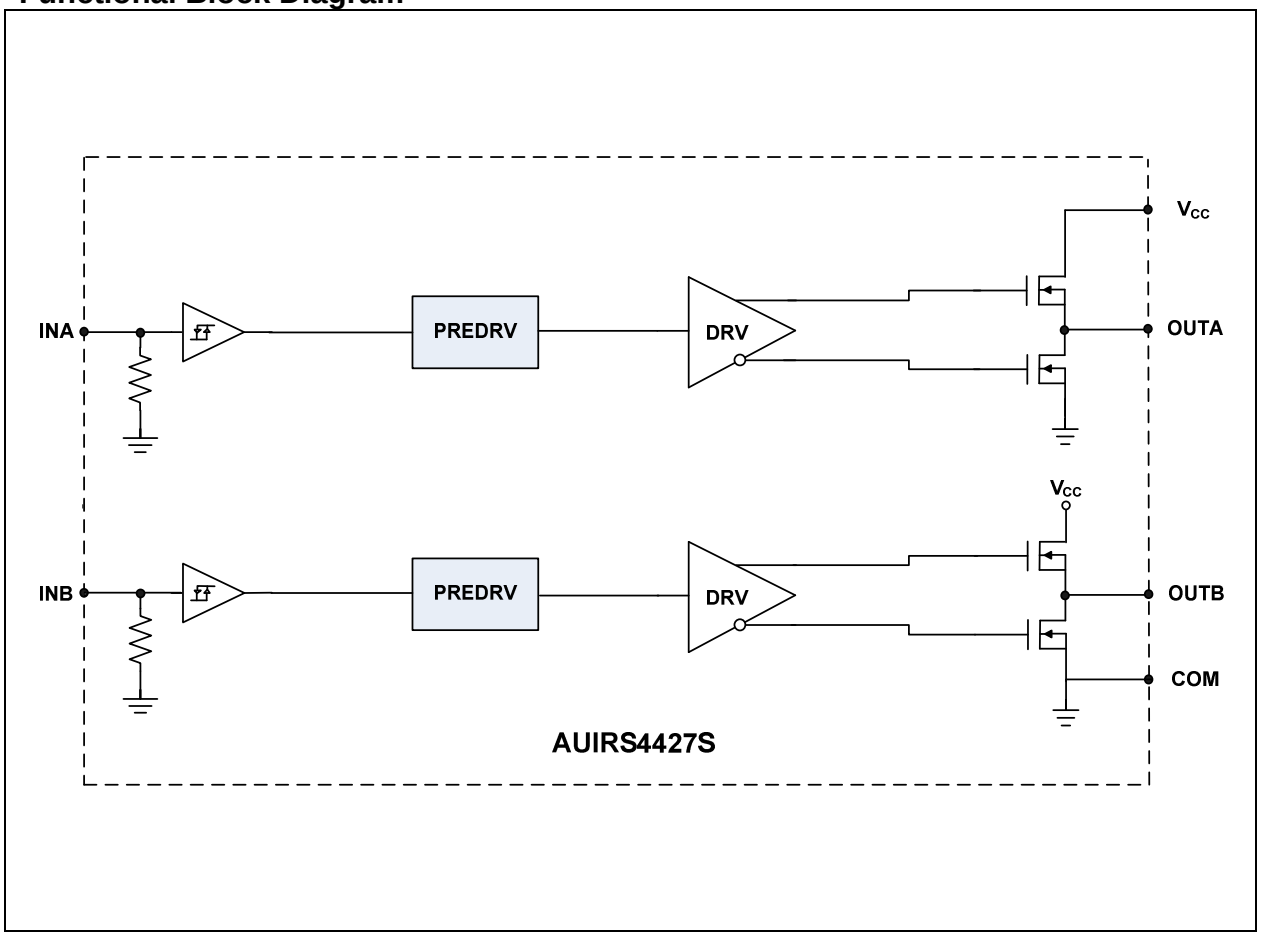
## Dynamic Electrical Characteristics

$V_{CC}$ = 15V, $T_A$ = 25℃, and $C_L$ = 1000pF unless otherwise specified.

| Symbol | Definition | Min | Typ | Max | Units | Test Conditions |
|---|---|---|---|---|---|---|
| $t_{on}$ | Turn-on propagation delay | — | 50 | 95 | ns | Figure 2 |
| $t_{off}$ | Turn-off propagation delay | — | 50 | 95 | | |
| $t_r$ | Turn-on rise time | — | 25 | 55 | | |
| $t_f$ | Turn-off fall time | — | 25 | 55 | | |


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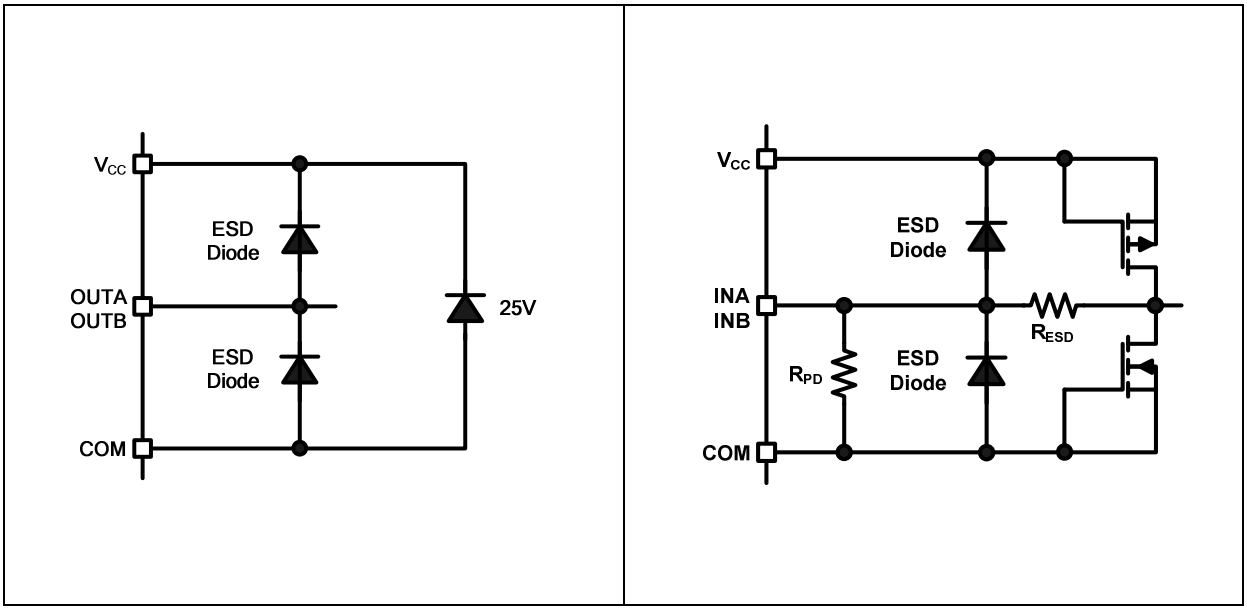
## Functional Block Diagram





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**Input/Output Pin Equivalent Circuit Diagrams**



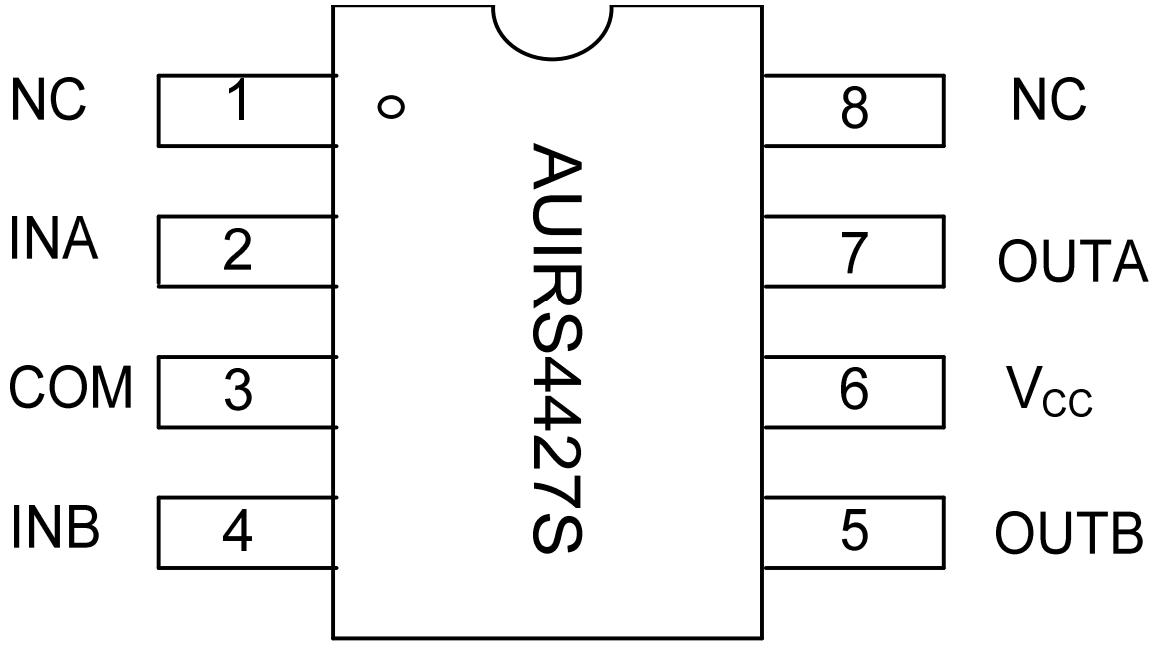


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### Lead Definitions

| PIN | Symbol | Description |
|---|---|---|
| 1 | NC | No connection |
| 2 | INA | Logic input for gate driver output (OUTA), in phase |
| 3 | COM | Ground |
| 4 | INB | Logic input for gate driver output (OUTB), in phase |
| 5 | OUTB | Gate drive output B |
| 6 | $V_{CC}$ | Supply voltage |
| 7 | OUTA | Gate drive output A |
| 8 | NC | No connection |

### Lead Assignments





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## Application Information and Additional Details

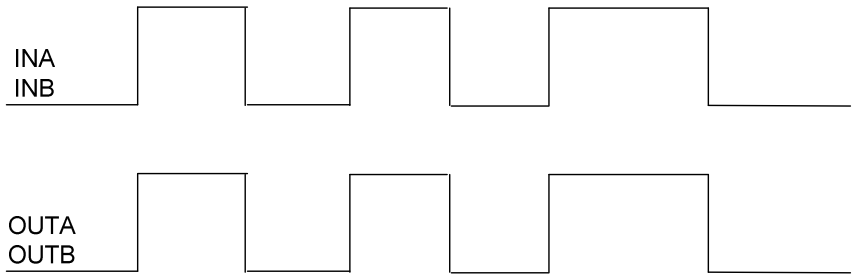



**Figure 1: Input/output Timing Diagram**

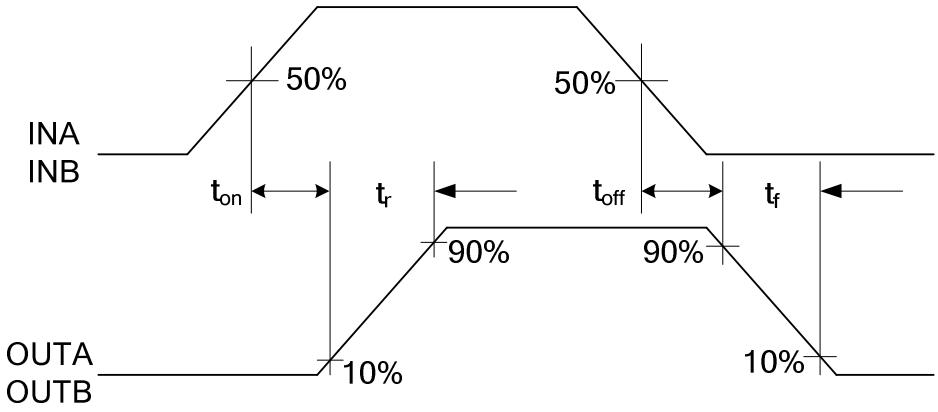



**Figure 2: Switching Time Waveform Definitions**


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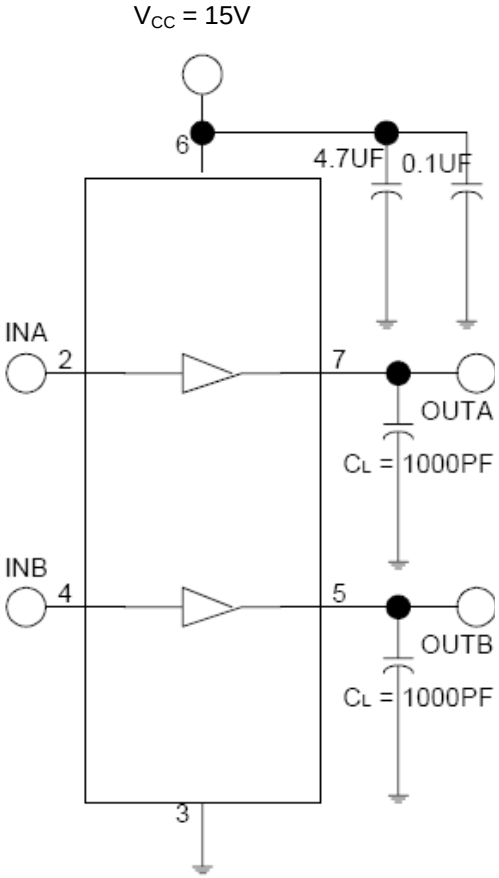
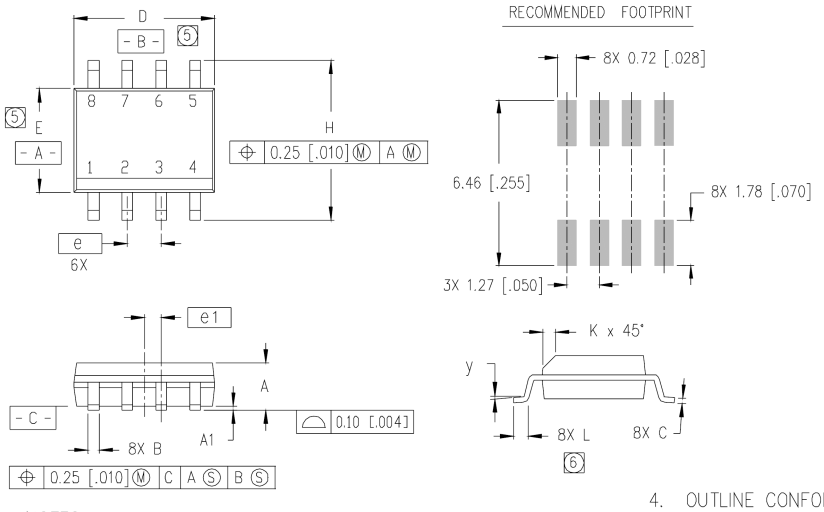



**Figure 3: Switching Time Test Circuit**


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## Package Details, SOIC8N




| 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.

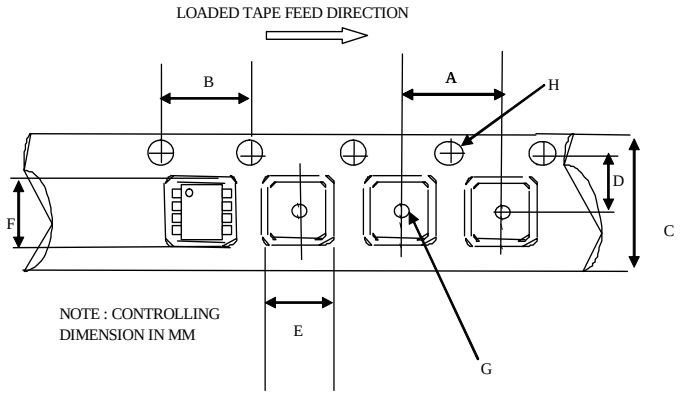
(5) DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS. MOLD PROTRUSIONS NOT TO EXCEED 0.25 [.006].

(6) DIMENSION IS THE LENGTH OF LEAD FOR SOLDERING TO A SUBSTRATE.

**8 Lead SOIC**

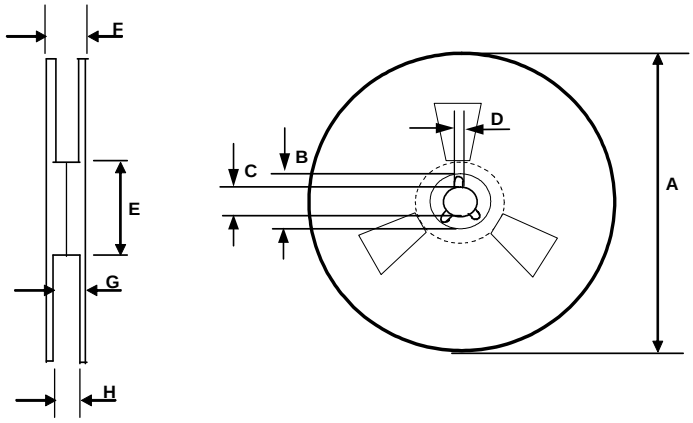

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## Package details: SOIC8N, Tape and Reel




CARRIER TAPE DIMENSION FOR 8SOICN

| | Metric | | Imperial | |
|---|---|---|---|---|
| Code | 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 |

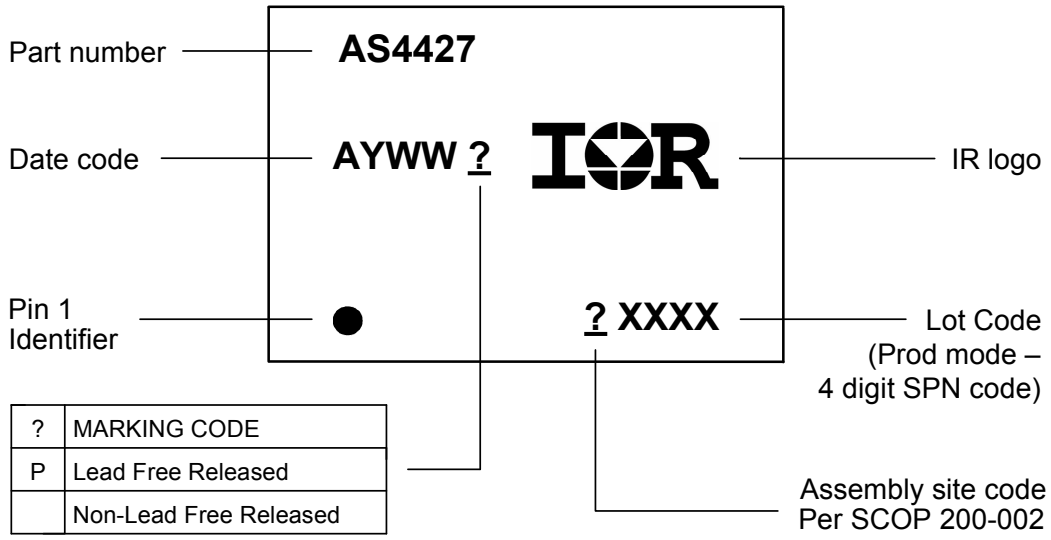



REEL DIMENSIONS FOR 8SOICN

| | Metric | | Imperial | |
|---|---|---|---|---|
| Code | 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 |


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**Part Marking Information**




| | |
|---|---|
| ? | MARKING CODE |
| P | Lead Free Released |
| | Non-Lead Free Released |


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## Ordering Information

| Base Part Number | Package Type | Standard Pack | | Complete Part Number |
|---|---|---|---|---|
| | | Form | Quantity | |
| AUIRS4427S | SOIC8N | Tube/Bulk | 95 | AUIRS4427S |
| | | Tape and Reel | 2500 | AUIRS4427STR |


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