

Half-Bridge Driver

Features

- Floating channel designed for bootstrap operation
- Fully operational to +600V
- Tolerant to negative transient voltage
- dV/dt immune
- Gate drive supply range from 10 to 20V
- Under voltage lockout for both channels
- 3.3V, 5V and 15V input logic compatible
- Cross-conduction prevention logic
- Internally set dead-time (100ns)
- Output in phase with input
- Matched propagation delay for both channels
- Lower di/dt gate driver for better noise immunity

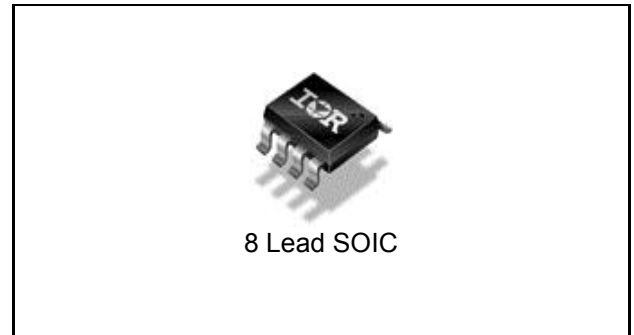
Product Summary

| | |
|--------------------|----------------|
| V_{OFFSET} | 600V max. |
| $I_{O+/-}$ | 60 mA / 130 mA |
| V_{OUT} | 10 – 20V |
| Delay Matching | 50ns |
| Ton/off (typ.) | 220 & 220 ns |
| Internal Dead time | 100 ns |

Description

The IR25601 is a high voltage, high speed power MOSFET and IGBT driver with independent high and low side referenced output channels. Proprietary HVIC and latch immune CMOS technologies enable ruggedized monolithic construction. The logic input is compatible with standard CMOS or LSTTL output, down to 3.3V logic. The output driver features a high pulse current buffer stage designed for minimum driver cross-conduction. The floating channel can be used to drive an N-channel power MOSFET or IGBT in the high side configuration which operates up to 600 volts.

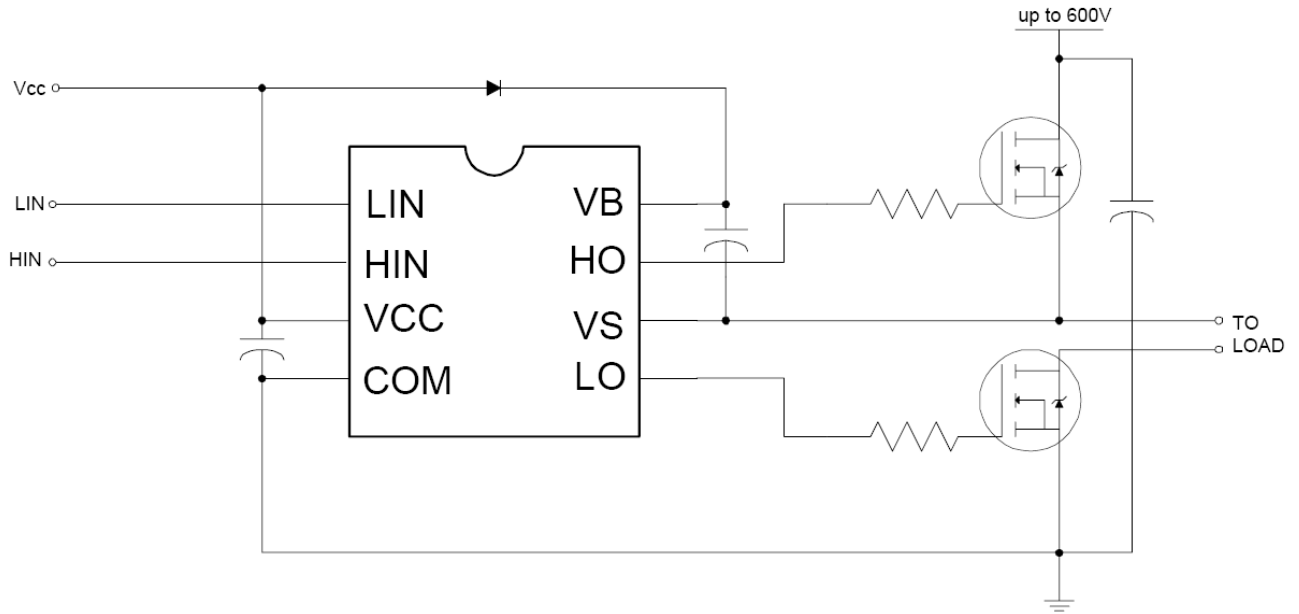
Package Options



Ordering Information

| Base Part Number | Package Type | Standard Pack | | Orderable Part Number |
|------------------|--------------|---------------|----------|-----------------------|
| | | Form | Quantity | |
| IR25601SPBF | SO8N | Tube | 95 | IR25601SPBF |
| IR25601SPBF | SO8N | Tape and Reel | 2500 | IR25601STRPBF |

Typical Connection Diagram



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_B | High side floating supply absolute voltage | -0.3 | 625 | V |
| V_S | High side floating supply offset voltage | $V_B - 25$ | $V_B + 0.3$ | |
| V_{HO} | High side floating output voltage | $V_S - 0.3$ | $V_B + 0.3$ | |
| V_{CC} | Low side and logic fixed supply voltage | -0.3 | 25 | |
| V_{LO} | Low side output voltage | -0.3 | $V_{CC} + 0.3$ | |
| V_{IN} | Logic input voltage (HIN & LIN) | -0.3 | $V_{CC} + 0.3$ | |
| dVs/dt | Allowable offset supply voltage transient | — | 50 | V/ns |
| P_D | Package power dissipation @ $T_A \leq +25^\circ\text{C}$ | — | 0.625 | W |
| R_{thJA} | Thermal resistance, junction to ambient | — | 200 | $^\circ\text{C/W}$ |
| T_J | Junction temperature | — | 150 | $^\circ\text{C}$ |
| 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. The V_S offset rating is tested with all supplies biased at 15V differential.

| Symbol | Definition | Min. | Max. | Units |
|----------|--|------------|------------|------------------|
| V_B | High side floating supply absolute voltage | $V_S + 10$ | $V_S + 20$ | V |
| V_S | High side floating supply offset voltage | † | 600 | |
| V_{HO} | High side floating output voltage | V_S | V_B | |
| V_{CC} | Low side and logic fixed supply voltage | 10 | 20 | |
| V_{LO} | Low side output voltage | 0 | V_{CC} | |
| V_{IN} | Logic input voltage (HIN, LIN) | 0 | V_{CC} | |
| T_A | Ambient temperature | -40 | 125 | $^\circ\text{C}$ |

† Logic operational for V_S of -5 to +600V. Logic state held for V_S of -5V to -VBS. (Please refer to Design Tip DT97-3 for more details).

Dynamic Electrical Characteristics

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

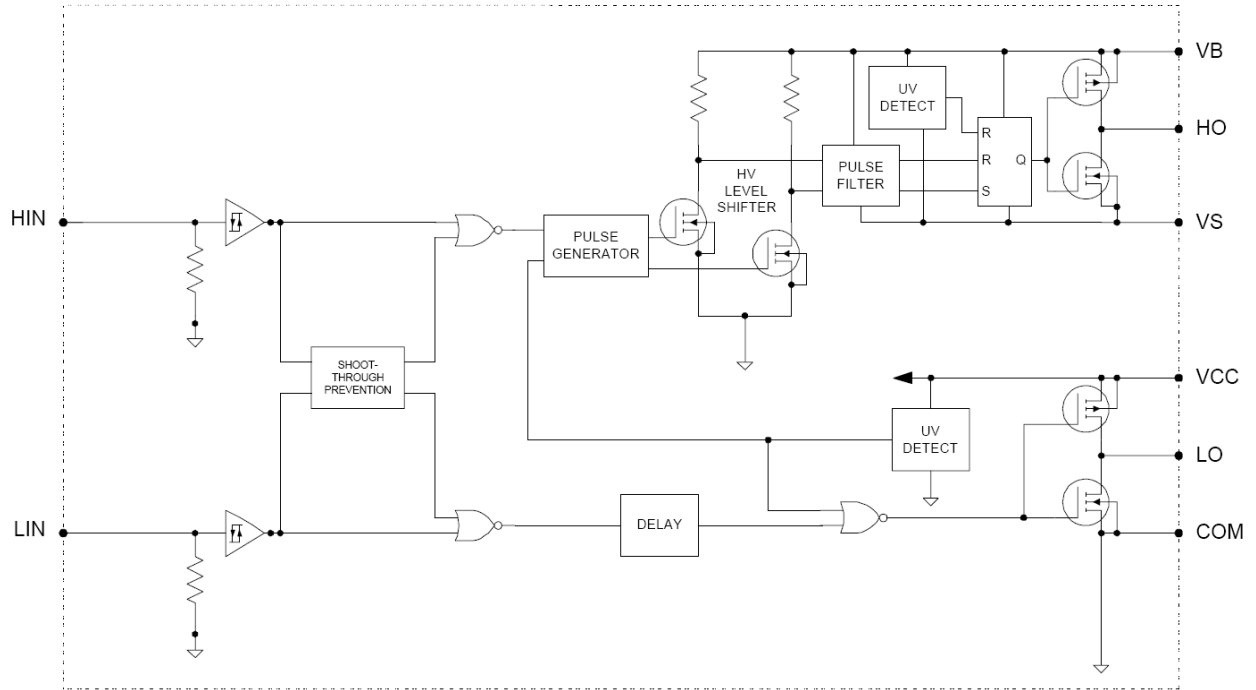
| Symbol | Definition | Min. | Typ. | Max. | Units | Test Conditions |
|-----------|-------------------------------------|------|------|------|-------|--------------------|
| t_{on} | Turn-on propagation delay | 120 | 220 | 320 | ns | $V_S = 0V$ |
| t_{off} | Turn-off propagation delay | 130 | 220 | 330 | | $V_S = 0V$ or 600V |
| t_r | Turn-on rise time | 60 | 200 | 300 | | |
| t_f | Turn-off fall time | 20 | 100 | 170 | | |
| DT | Dead time | 80 | 100 | 190 | | |
| MT | Delay matching, HS & LS turn-on/off | — | — | 50 | | |

Static Electrical Characteristics

V_{BIAS} (V_{CC} , V_{BS}) = 15V and T_A = 25°C unless otherwise specified. The V_{IN} , V_{TH} and I_{IN} parameters are referenced to COM. The V_O and I_O parameters are referenced to COM and are applicable to the respective output leads: HO and LO.

| Symbol | Definition | Min. | Typ. | Max. | Units | Test Conditions |
|----------------------------|--|------|------|------|---------|-----------------------------------|
| V_{IH} | Logic "1" input voltage | 2.3 | — | — | V | |
| V_{IL} | Logic "0" input voltage | — | — | 0.8 | | |
| V_{OH} | High level output voltage, $V_{BIAS} - V_O$ | — | — | 2.8 | | $I_O = 20mA$ |
| V_{OL} | Low level output voltage, V_O | — | — | 1.2 | | |
| I_{LK} | Offset supply leakage current | — | — | 50 | μA | $V_B = V_S = 600V$ |
| I_{QBS} | Quiescent V_{BS} supply current | 20 | 60 | 150 | | $V_{IN} = 0V$ or 5V |
| I_{QCC} | Quiescent V_{CC} supply current | 50 | 120 | 240 | | $V_{IN} = 0V$ or 5V |
| I_{IN+} | Logic "1" input bias current | — | 5 | 40 | | $V_{IN} = 5V$ |
| I_{IN-} | Logic "0" input bias current | — | 1.0 | 2.0 | | $V_{IN} = 0V$ |
| V_{CCUV+} V_{BSUV+} | V_{CC} and V_{BS} supply undervoltage positive going threshold | 8 | 8.9 | 9.8 | V | |
| V_{CCUV-} V_{BSUV-} | V_{CC} supply undervoltage negative going threshold | 7.4 | 8.2 | 9 | | |
| V_{CCUVH} V_{BSUVH} | V_{CC} supply undervoltage lockout hysteresis | 0.3 | 0.7 | — | | |
| I_{O+} | Output high short circuit pulsed current | 60 | — | — | mA | $V_O = 0V$ $PW \leq 10 \mu s$ |
| I_{O-} | Output low short circuit pulsed current | 130 | — | — | | $V_O = 15V$ $PW \leq 10 \mu s$ |

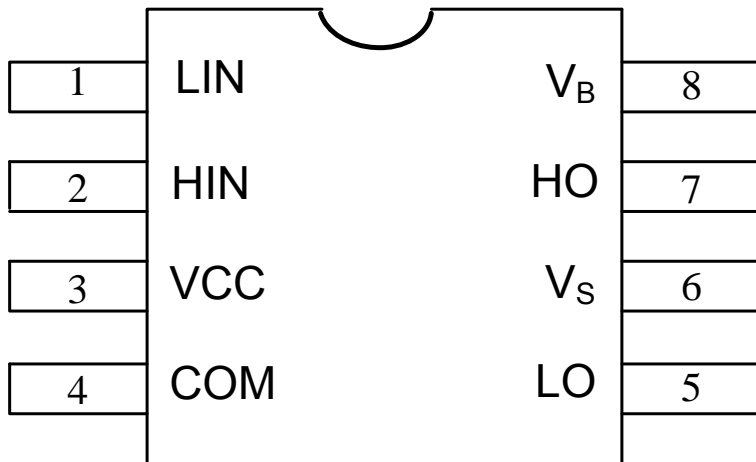
Functional Block Diagram



Lead Definitions

| Symbol | Description |
|-----------------|--|
| HIN | Logic input for high side gate driver output |
| LIN | Logic input for low side gate driver output |
| V _B | High side floating supply |
| HO | High side gate drive output |
| V _S | High side floating supply return |
| V _{CC} | Low side supply voltage |
| LO | Low side gate drive output |
| COM | Low side return |

Lead Assignments



Application Information and Additional Details

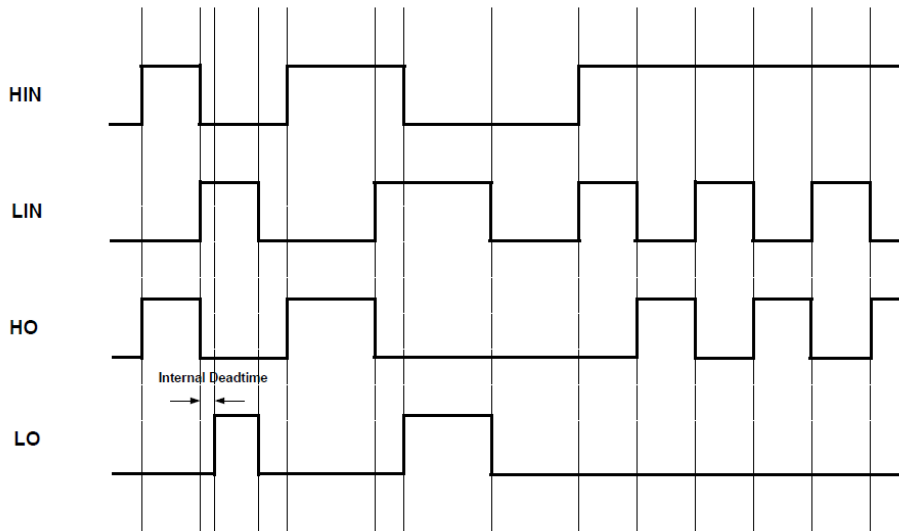


Figure 1. Input/Output Functionality Diagram

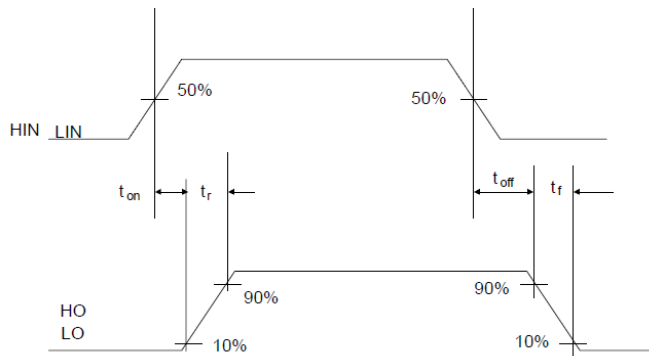


Figure 2. Switching Time Waveforms

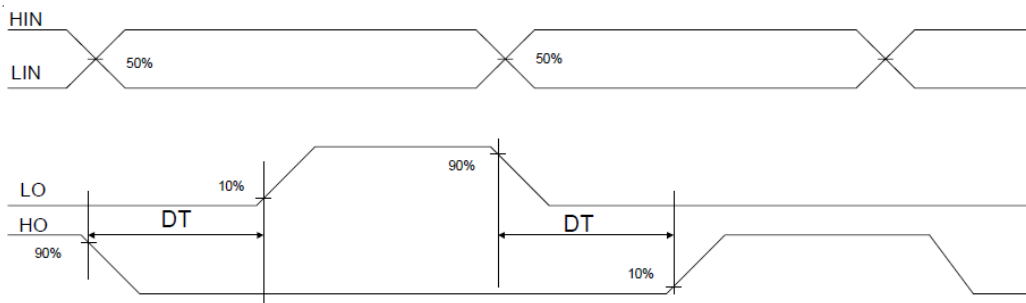
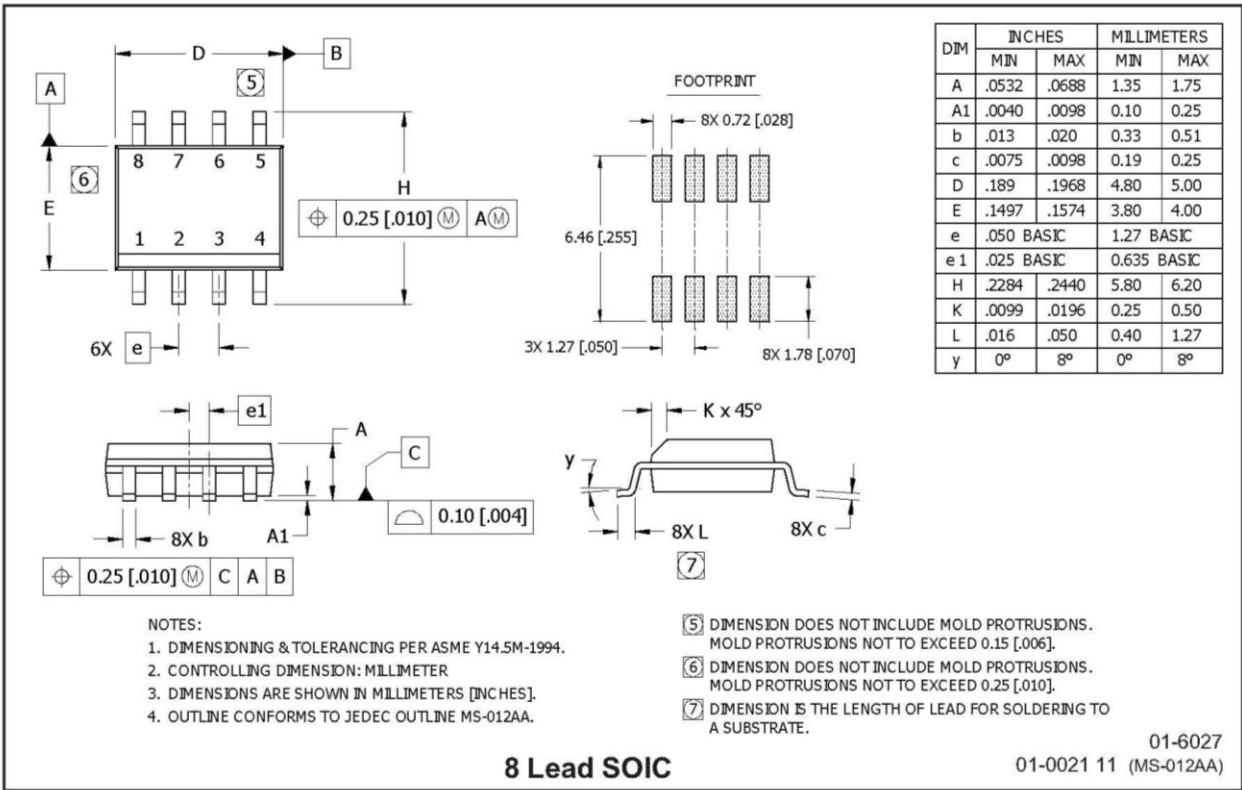
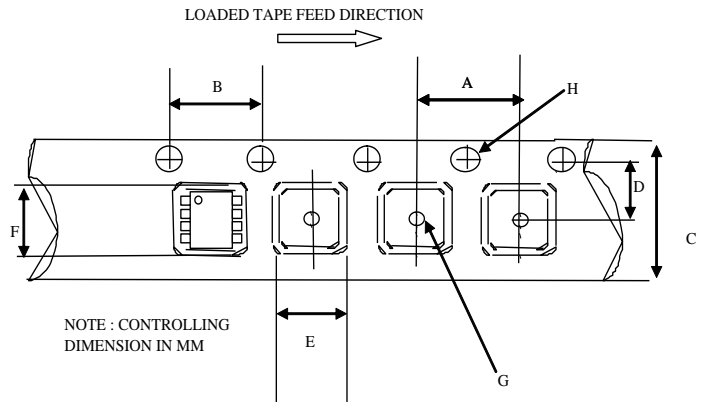


Figure 3. Internal Deadtime Timing

Package Details

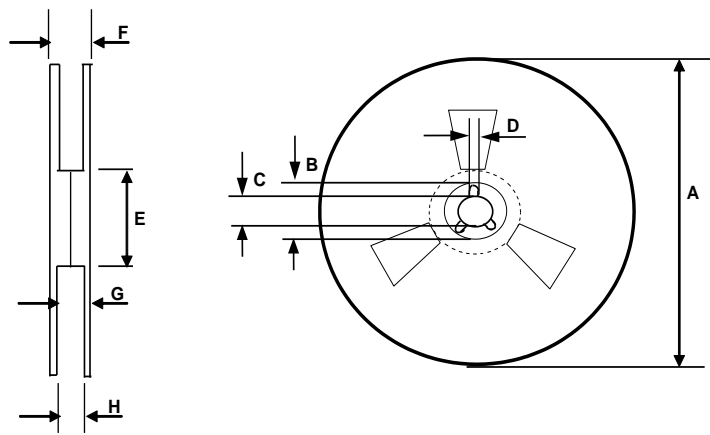


Tape and Reel Details



CARRIER TAPE DIMENSION FOR 8SOICN

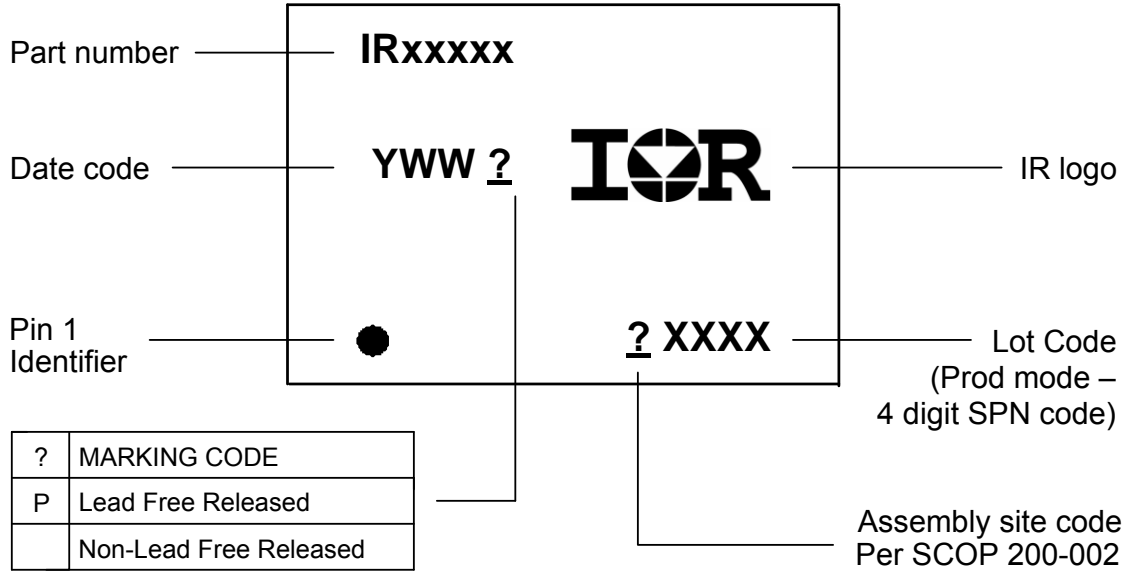
| Code | Metric | | Imperial | |
|------|--------|-------|----------|-------|
| | Min | Max | Min | Max |
| A | 7.90 | 8.10 | 0.311 | 0.318 |
| B | 3.90 | 4.10 | 0.153 | 0.161 |
| C | 11.70 | 12.30 | 0.46 | 0.484 |
| D | 5.45 | 5.55 | 0.214 | 0.218 |
| E | 6.30 | 6.50 | 0.248 | 0.255 |
| F | 5.10 | 5.30 | 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



Qualification Information[†]

| | |
|-----------------------------------|---|
| Qualification Level | Industrial ^{††} (per JEDEC JESD 47) |
| | Comments: This family of ICs has passed JEDEC's Industrial qualification. IR's Consumer qualification level is granted by extension of the higher Industrial level. |
| Moisture Sensitivity Level | MSL2 ^{†††} (per IPC/JEDEC J-STD-020) |
| RoHS Compliant | Yes |

- † Qualification standards can be found at International Rectifier's web site <http://www.irf.com/>
- †† Higher qualification ratings may be available should the user have such requirements. Please contact your International Rectifier sales representative for further information.
- ††† 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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