

## 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
- Undervoltage lockout for both channels
- 3.3V, 5V and 15V input logic compatible
- Cross-conduction prevention logic
- Matched propagation delay for both channels
- Outputs in phase with inputs
- Logic and power ground +/-5V offset
- Internal 540ns dead-time
- Lower di/dt gate driver for better noise immunity

### Description

The IR25606 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 drivers feature 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 V.

### Product Summary

$V_{\text{OFFSET}}$	600V max.
$I_{\text{O+/-}}$	200 mA / 350 mA
$V_{\text{OUT}}$	10 – 20V
Ton/off (typ.)	220 & 200 ns

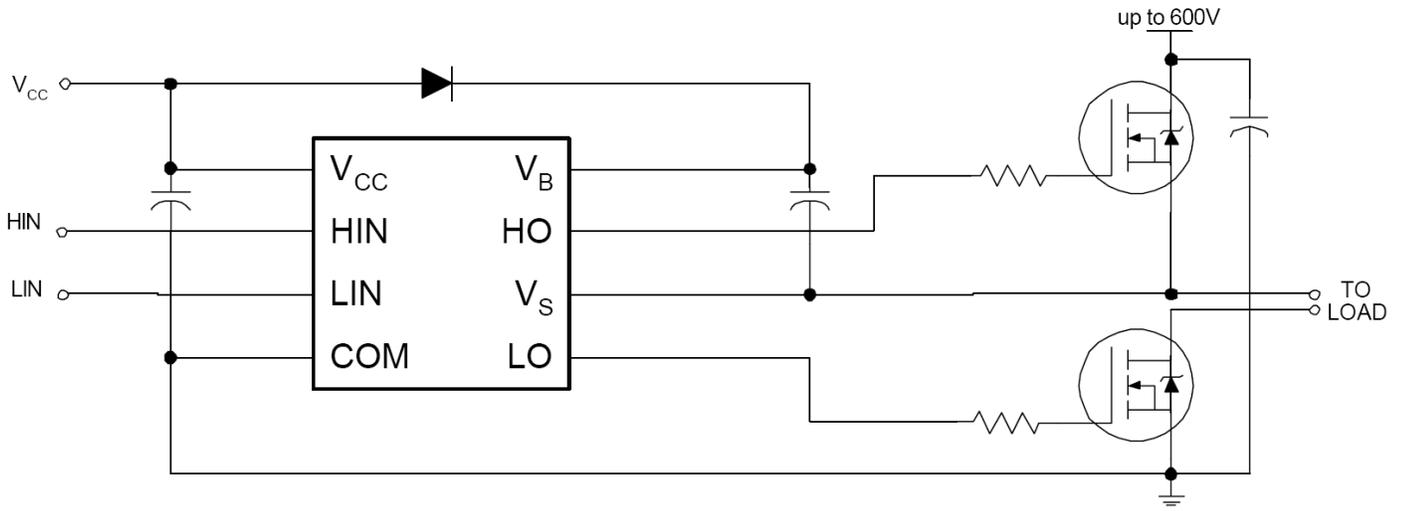
### Package Options



### Ordering Information

Base Part Number	Package Type	Standard Pack		Orderable Part Number
		Form	Quantity	
IR25606SPBF	SO8N	Tube	95	IR25606SPBF
IR25606SPBF	SO8N	Tape and Reel	2500	IR25606STRPBF

**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 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	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 - $V_B$ . (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.

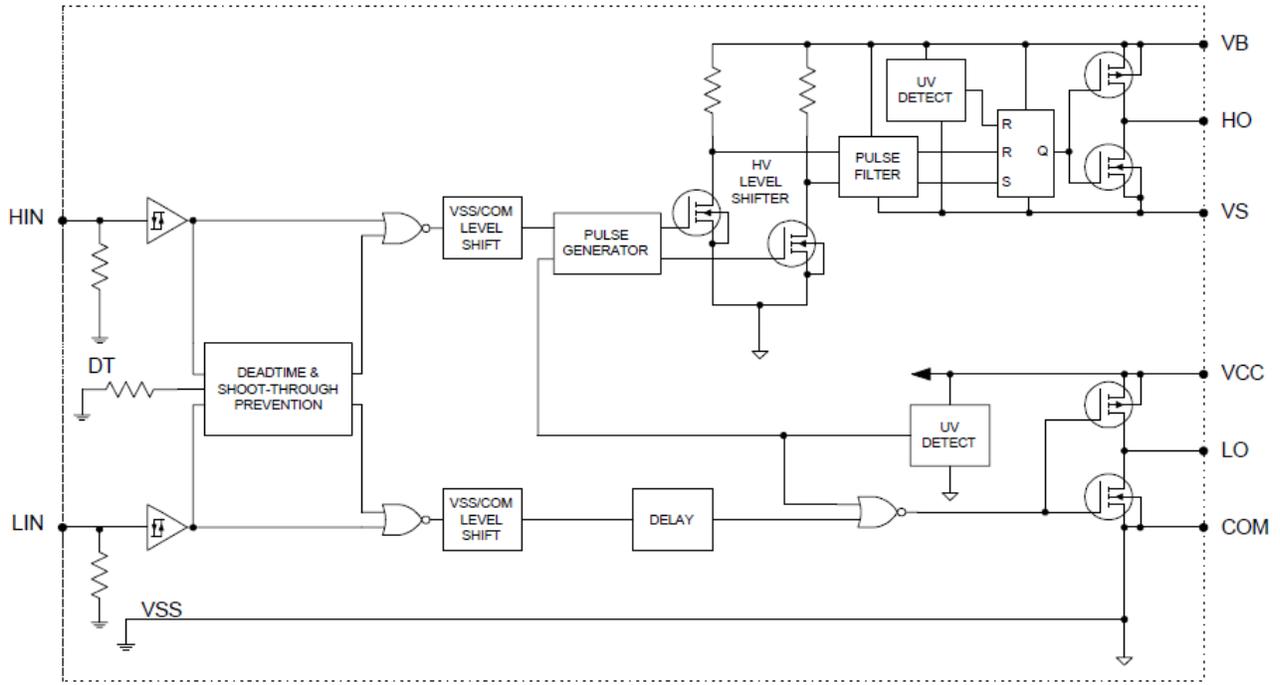
Symbol	Definition	Min.	Typ.	Max.	Units	Test Conditions
$t_{on}$	Turn-on propagation delay	—	220	300	ns	$V_S = 0V$
$t_{off}$	Turn-off propagation delay	—	200	280		$V_S = 0V$ or 600V
$t_r$	Turn-on rise time	—	150	220		$V_S = 0V$
$t_f$	Turn-off fall time	—	50	80		$V_S = 0V$
DT	Deadtime	400	540	680		
MT	Delay matching, HS & LS turn-on/off	—	0	46		

## 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	2.9	—	—	V	$V_{CC} = 10V$ to 20V
$V_{IL}$	Logic "0" input voltage	—	—	0.8		$V_{CC} = 10V$ to 20V
$V_{OH}$	High level output voltage, $V_{BIAS} - V_O$	—	0.8	1.4		$I_O = 20$ mA
$V_{OL}$	Low level output voltage, $V_O$	—	0.3	0.6		$I_O = 20$ mA
$I_{LK}$	Offset supply leakage current	—	—	50	$\mu A$	$V_B = V_S = 600V$
$I_{QBS}$	Quiescent $V_{BS}$ supply current	20	60	150	$\mu A$	$V_{IN} = 0V$ or 5V
$I_{QCC}$	Quiescent $V_{CC}$ supply current	0.4	1.0	1.6	mA	$V_{IN} = 0V$ or 5V
$I_{IN+}$	Logic "1" input bias current	—	5	20	$\mu A$	$V_{IN} = 5V$
$I_{IN-}$	Logic "0" input bias current	—	1	2	$\mu A$	$V_{IN} = 0V$
$V_{CCUV+}$ $V_{BSUV+}$	$V_{CC}$ and $V_{BS}$ supply undervoltage positive going threshold	8	8.9	10	V	
$V_{CCUV-}$ $V_{BSUV-}$	$V_{CC}$ and $V_{BS}$ supply undervoltage negative going threshold	7.4	8.2	9		
$V_{CCUVH}$ $V_{BSUVH}$	Hysteresis	0.3	0.7	—		
$I_{O+}$	Output high short circuit pulsed current	97	200	—	mA	$V_O = 0V$ $PW \leq 10 \mu s$
$I_{O-}$	Output low short circuit pulsed current	250	350	—		$V_O = 15V$ $PW \leq 10 \mu s$

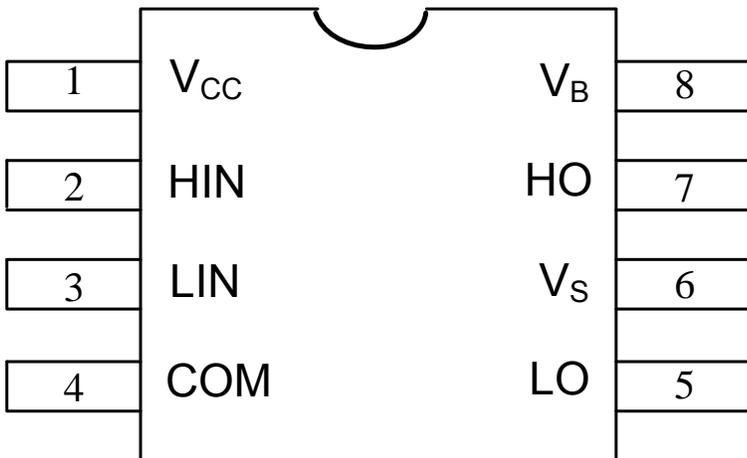
**Functional Block Diagram**



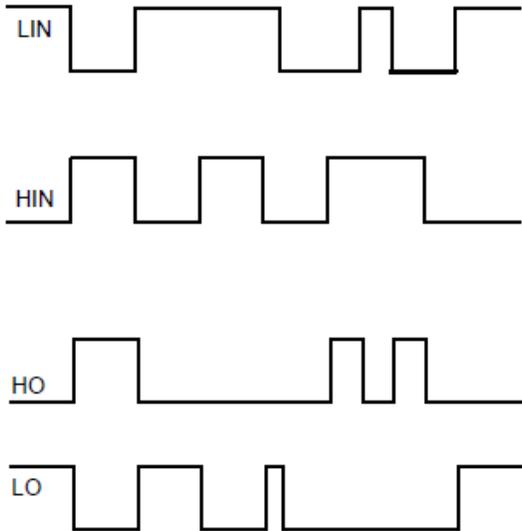
**Lead Definitions**

Symbol	Description
HIN	Logic input for high side gate driver outputs (HO), in phase
LIN	Logic input for low side gate driver outputs (LO), in phase
V <sub>B</sub>	High side floating supply
HO	High side gate drive output
V <sub>S</sub>	High side floating supply return
V <sub>CC</sub>	Low side and logic fixed supply
LO	Low side gate drive output
COM	Low side return

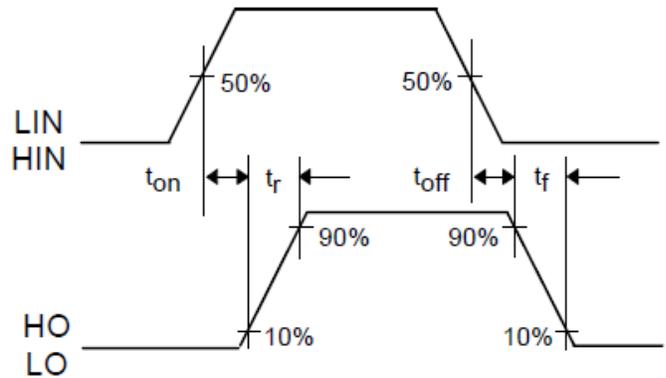
**Lead Assignments**



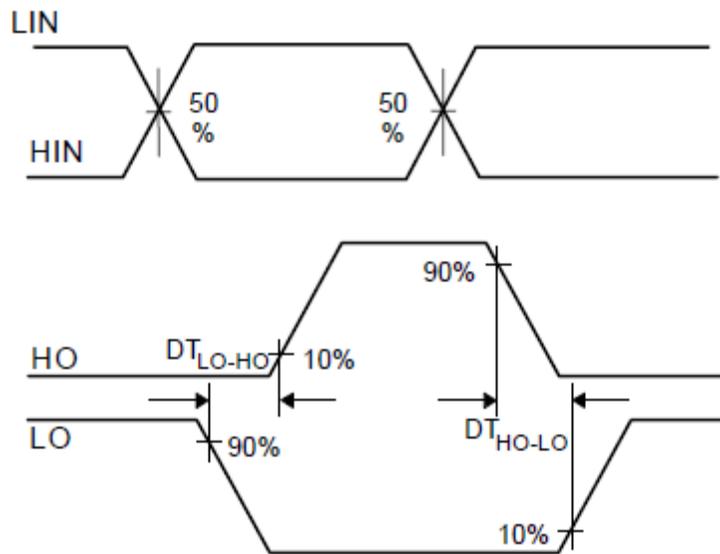
**Application Information and Additional Details**



**Figure 1. Input/Output Timing Diagram**

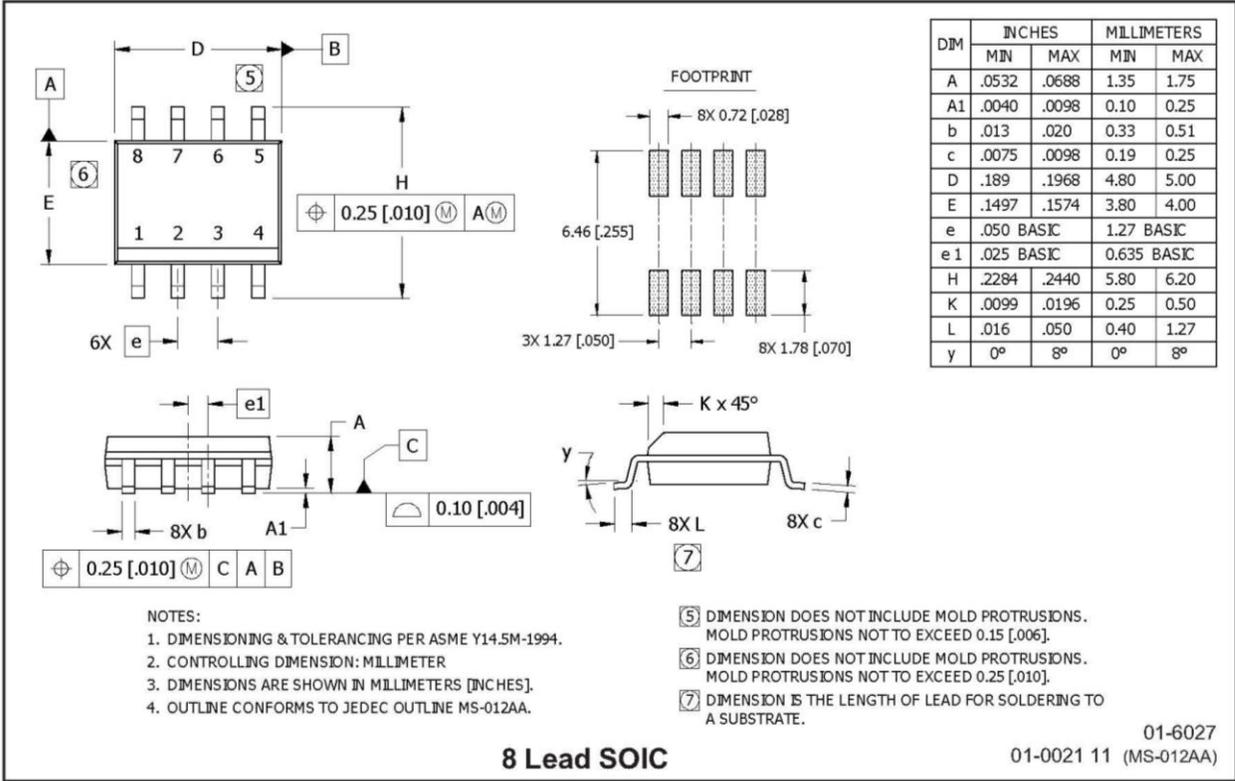


**Figure 2. Switching Time Waveform Definitions**



**Figure 3. Deadtime Waveform Definitions**

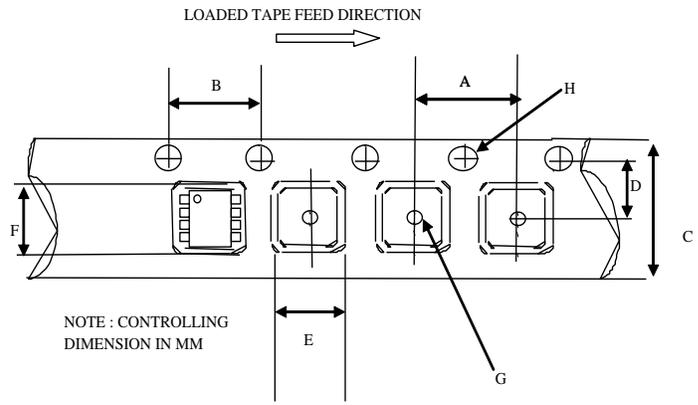
## Package Details



- NOTES:
1. DIMENSIONING & TOLERANCING PER ASME Y14.5M-1994.
  2. CONTROLLING DIMENSION: MILLIMETER
  3. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
  4. OUTLINE CONFORMS TO JEDEC OUTLINE MS-012AA.

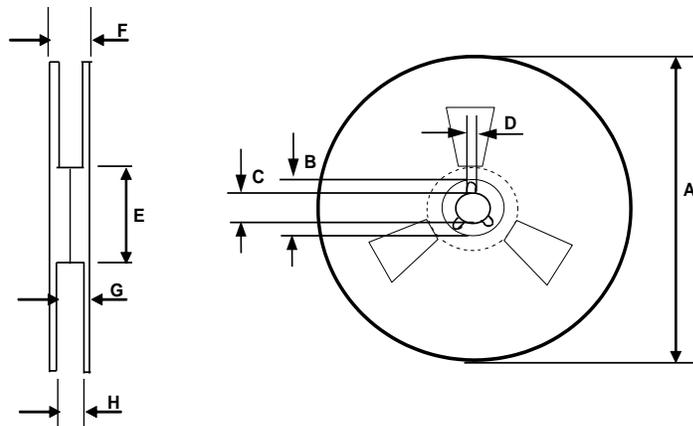
5. DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS. MOLD PROTRUSIONS NOT TO EXCEED 0.15 [0.006].
6. DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS. MOLD PROTRUSIONS NOT TO EXCEED 0.25 [0.010].
7. DIMENSION IS THE LENGTH OF LEAD FOR SOLDERING TO A SUBSTRATE.

## Tape and Reel Details



CARRIER TAPE DIMENSION FOR 8SOICN

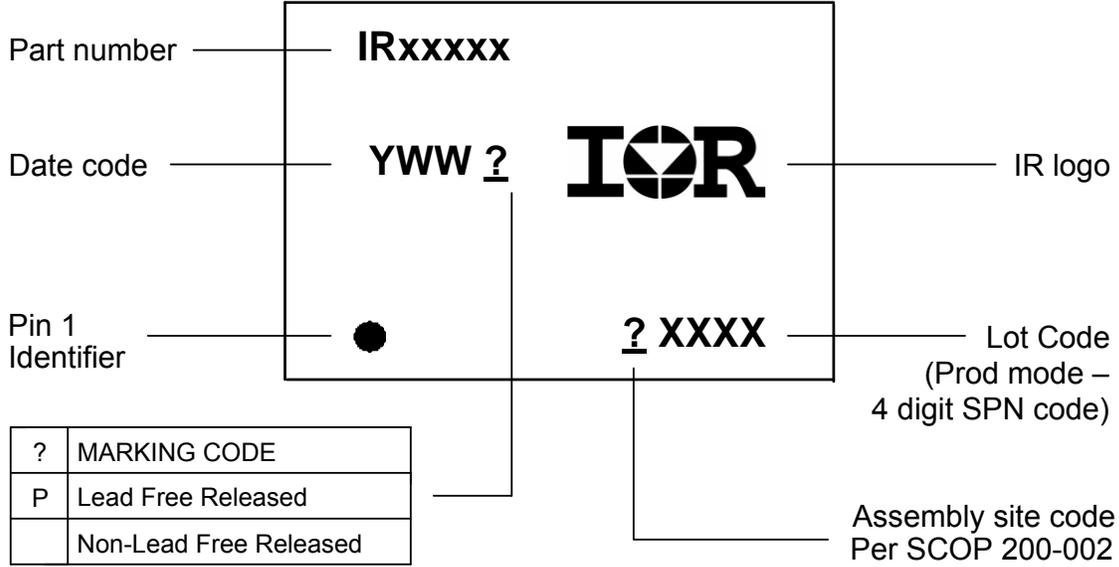
Code	Metric		Imperial	
	Min	Max	Min	Max
A	7.90	8.10	0.311	0.318
B	3.90	4.10	0.153	0.161
C	11.70	12.30	0.46	0.484
D	5.45	5.55	0.214	0.218
E	6.30	6.50	0.248	0.255
F	5.10	5.30	0.200	0.208
G	1.50	n/a	0.059	n/a
H	1.50	1.60	0.059	0.062



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<sup>†</sup>**

<b>Qualification Level</b>	Industrial <sup>††</sup> (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.
<b>Moisture Sensitivity Level</b>	MSL2 <sup>†††</sup> (per IPC/JEDEC J-STD-020)
<b>RoHS Compliant</b>	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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