

## 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

$V_{\text{OFFSET}}$	600V max.
$I_{\text{O+/-}}$	60 mA / 130 mA
$V_{\text{OUT}}$	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.

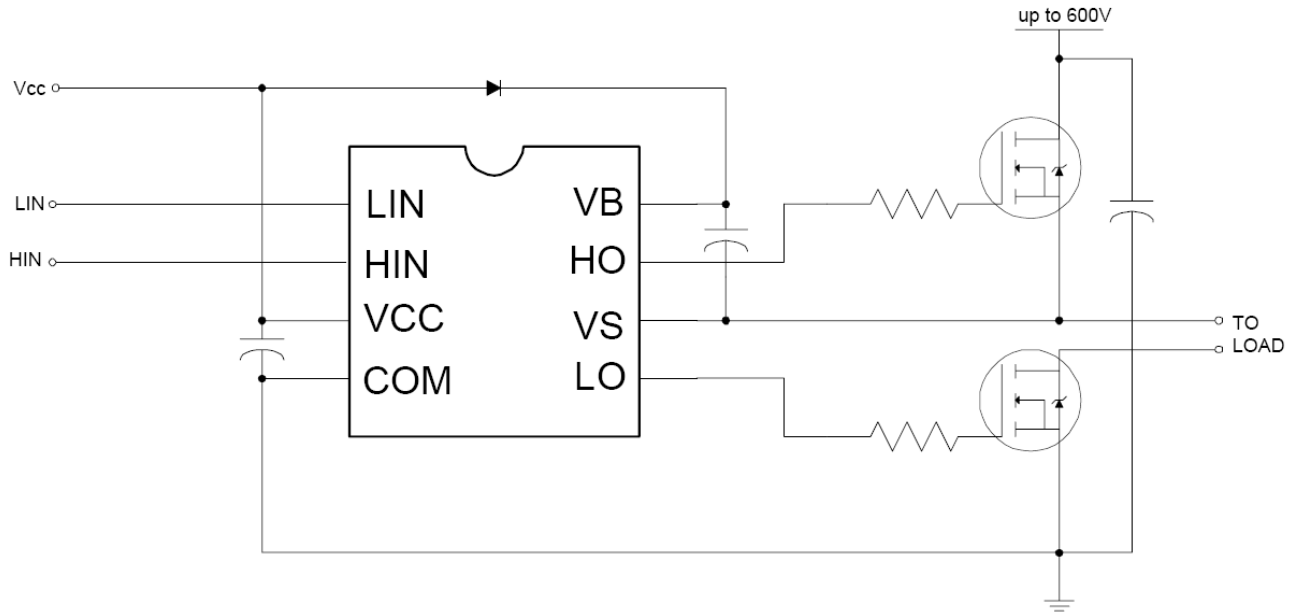
### Package Options



### 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**



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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
$V_B$	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.

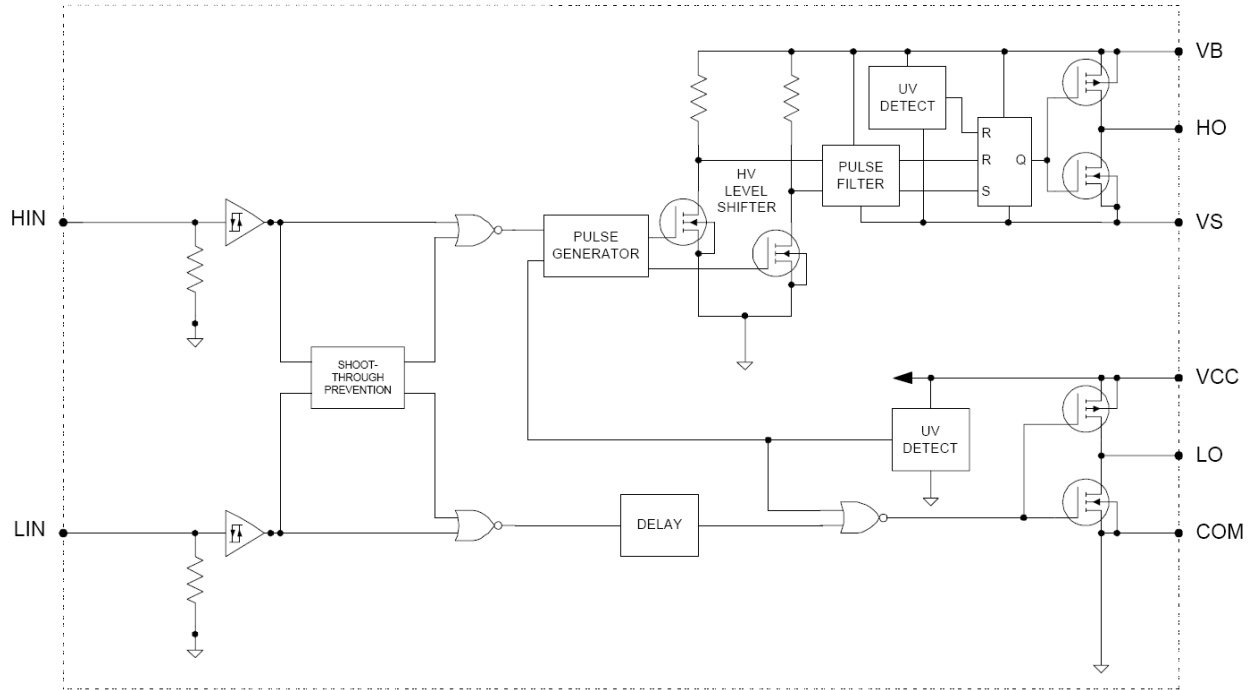
Symbol	Definition	Min.	Typ.	Max.	Units	Test Conditions
$t_{on}$	Turn-on propagation delay	120	220	320	ns	$V_S = 0V$
$t_{off}$	Turn-off propagation delay	130	220	330		$V_S = 0V$ or $600V$
$t_r$	Turn-on rise time	60	200	300		
$t_f$	Turn-off fall time	20	100	170		
DT	Dead time	80	100	190		
MT	Delay matching, 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	$\mu A$	$V_B = V_S = 600V$
$I_{QBS}$	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	—	—		$V_O = 15V$ $PW \leq 10 \mu s$

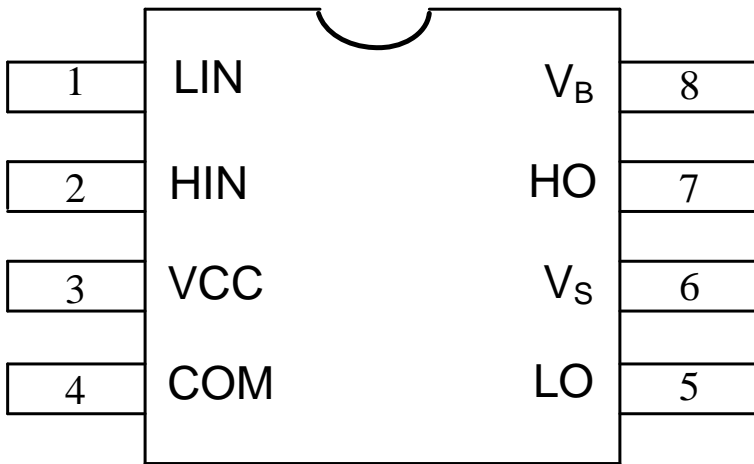
**Functional Block Diagram**



**Lead Definitions**

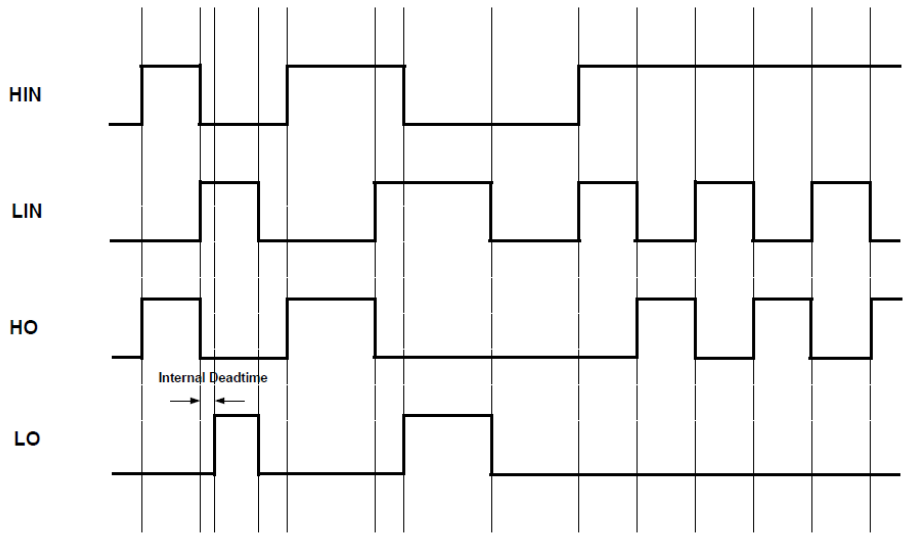
Symbol	Description
HIN	Logic input for high side gate driver output
LIN	Logic input for low side gate driver output
V <sub>B</sub>	High side floating supply
HO	High side gate drive output
V <sub>S</sub>	High side floating supply return
V <sub>CC</sub>	Low side supply voltage
LO	Low side gate drive output
COM	Low side return

**Lead Assignments**

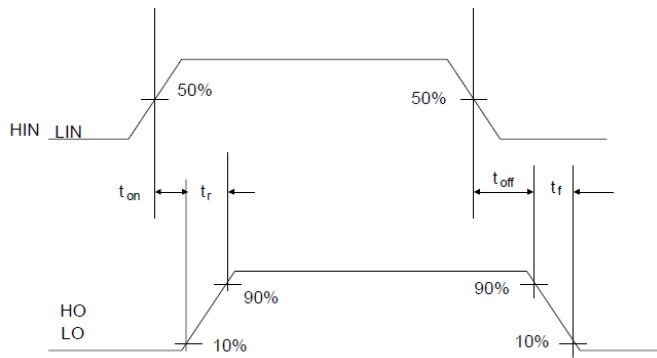


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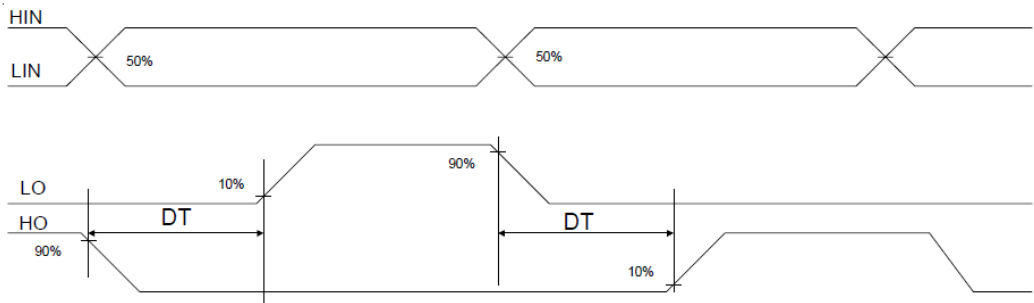
**Advance Information**



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

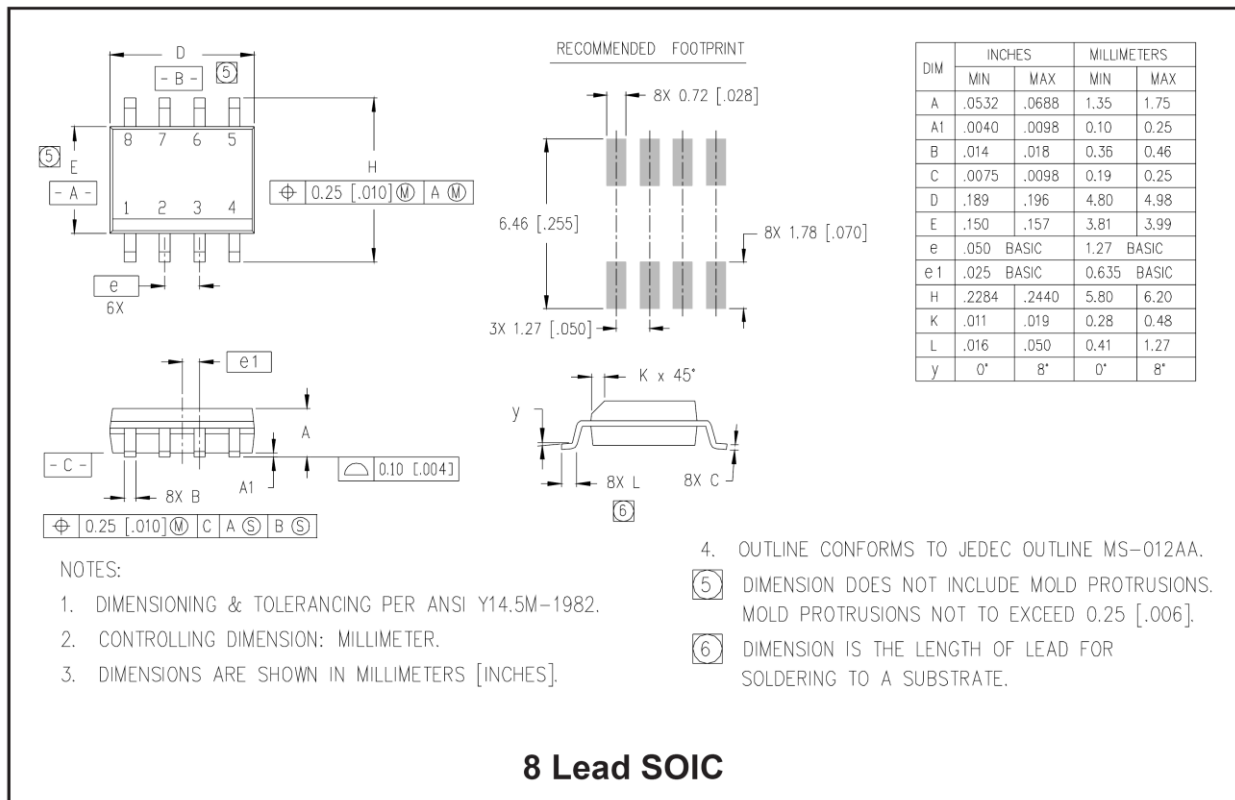


**Figure 2. Switching Time Waveforms**



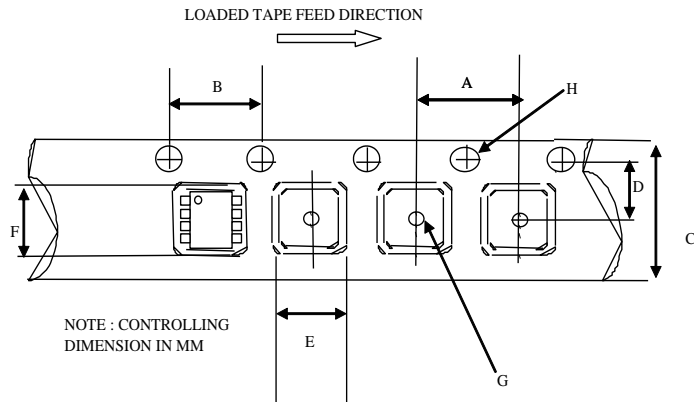
**Figure 3. Internal Deadtime Timing**

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**Package Details**


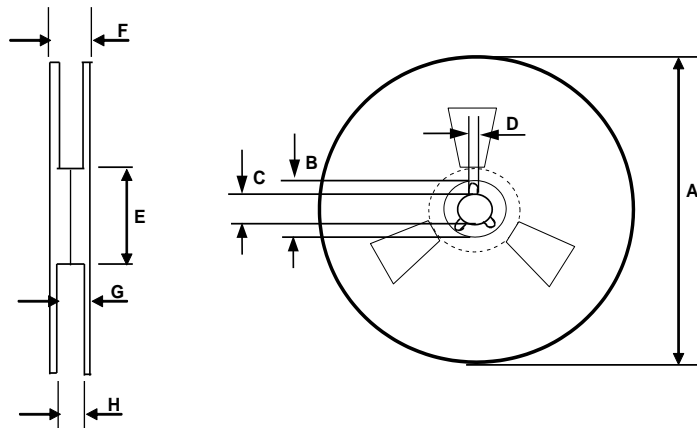


## Tape and Reel Details



CARRIER TAPE DIMENSION FOR 8SOICN

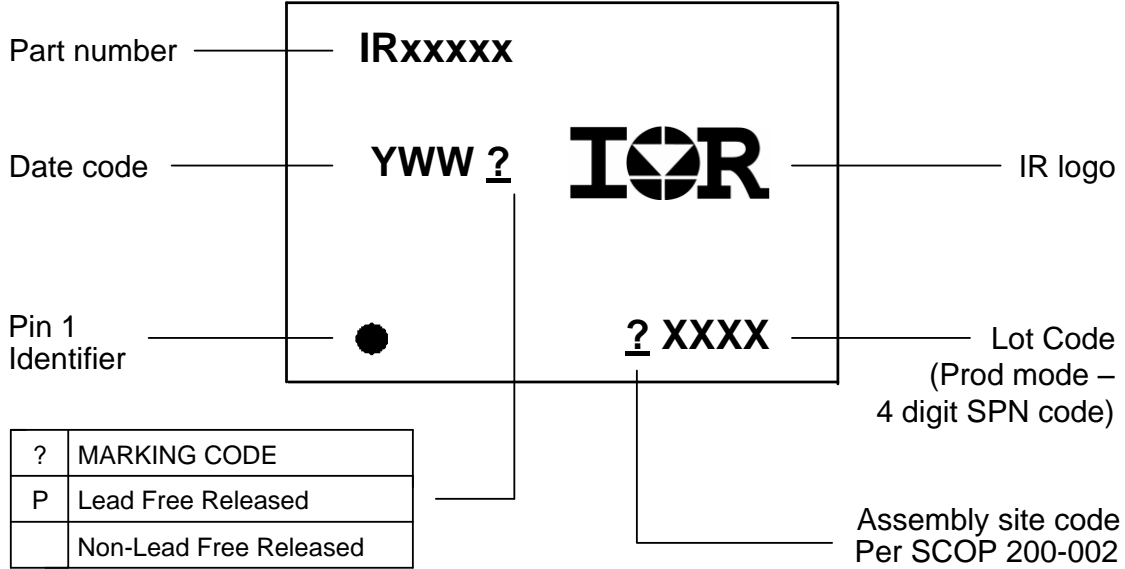
Code	Metric		Imperial	
	Min	Max	Min	Max
A	7.90	8.10	0.311	0.318
B	3.90	4.10	0.153	0.161
C	11.70	12.30	0.46	0.484
D	5.45	5.55	0.214	0.218
E	6.30	6.50	0.248	0.255
F	5.10	5.30	0.200	0.208
G	1.50	n/a	0.059	n/a
H	1.50	1.60	0.059	0.062



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<sup>†</sup>**

<b>Qualification Level</b>	Industrial <sup>††</sup> (per JEDEC JESD 47E)
	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-020C)
<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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