

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

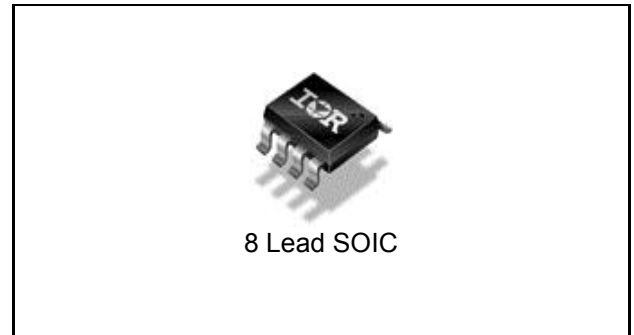
Product Summary

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.

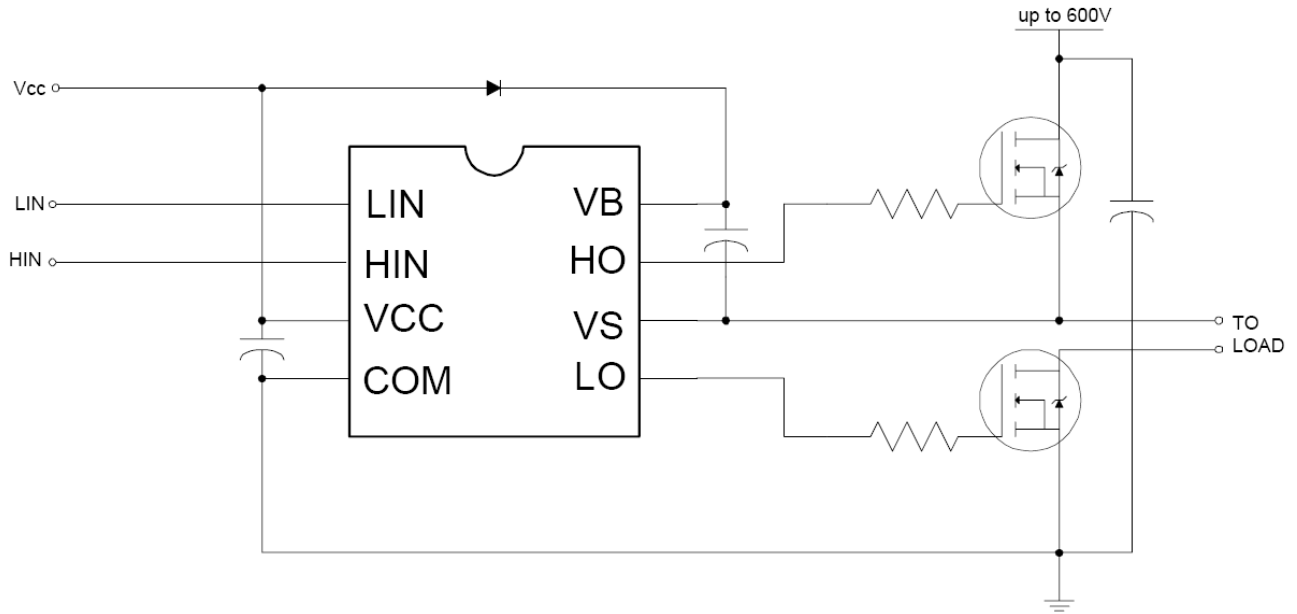
Package Options



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

$V_{BIAS} (V_{CC}, V_{BS}) = 15V$, $CL = 1000 \text{ pF}$ and $T_A = 25^\circ\text{C}$ unless otherwise specified.

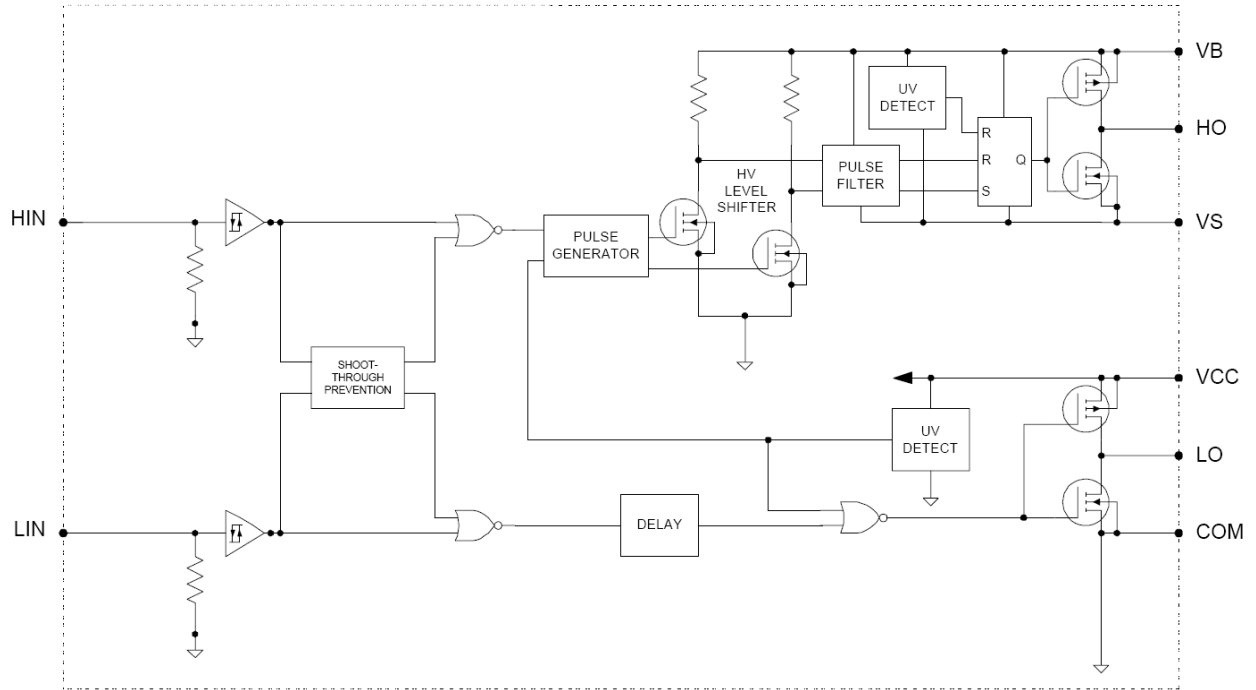
Symbol	Definition	Min.	Typ.	Max.	Units	Test Conditions
t_{on}	Turn-on propagation delay	120	220	320	ns	$V_S = 0V$
t_{off}	Turn-off propagation delay	130	220	330		$V_S = 0V \text{ or } 600V$
t_r	Turn-on rise time	60	200	300		
t_f	Turn-off fall time	20	100	170		
DT	Dead time	80	100	190		
MT	Delay matching,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

Static Electrical Characteristics

$V_{BIAS} (V_{CC}, V_{BS}) = 15V$ and $T_A = 25^\circ\text{C}$ 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		$I_O = 20\text{mA}$
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		$V_{IN} = 0V \text{ or } 5V$
I_{QCC}	Quiescent V_{CC} supply current	50	120	240		$V_{IN} = 0V \text{ or } 5V$
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	$V_O = 0V$ $PW \leq 10 \mu\text{s}$
I_{O-}	Output low short circuit pulsed current	130	—	—		$V_O = 15V$ $PW \leq 10 \mu\text{s}$

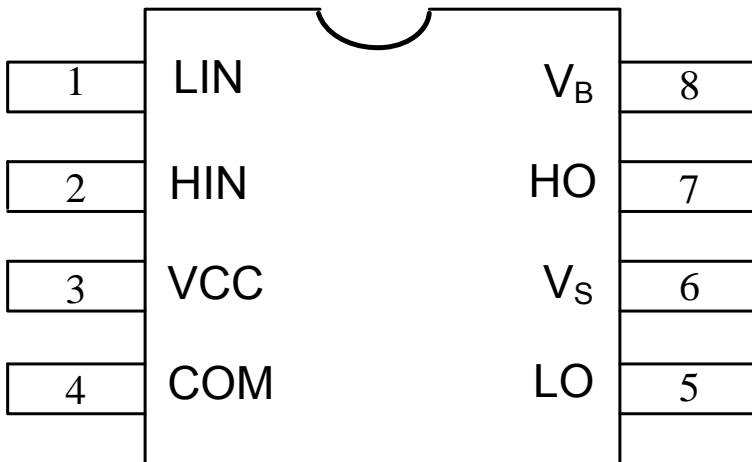
Functional Block Diagram



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

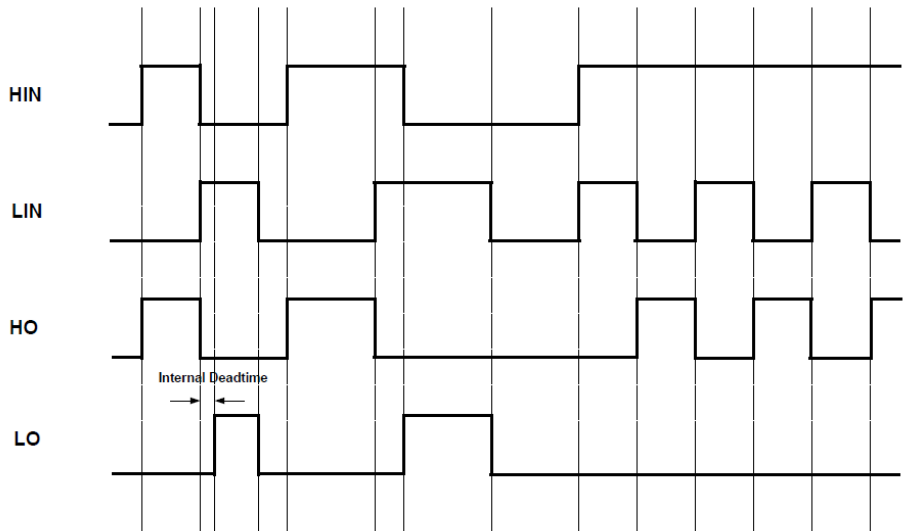


Figure 1. Input/Output Functionality Diagram

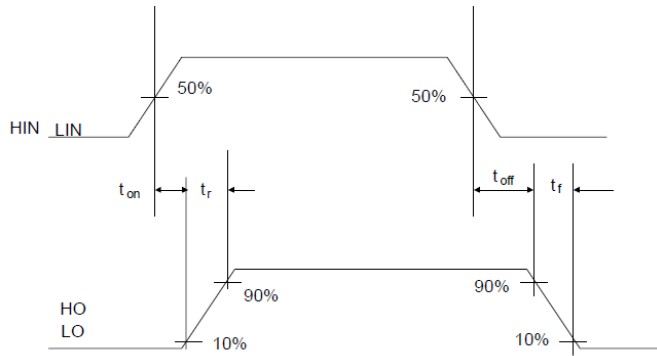


Figure 2. Switching Time Waveforms

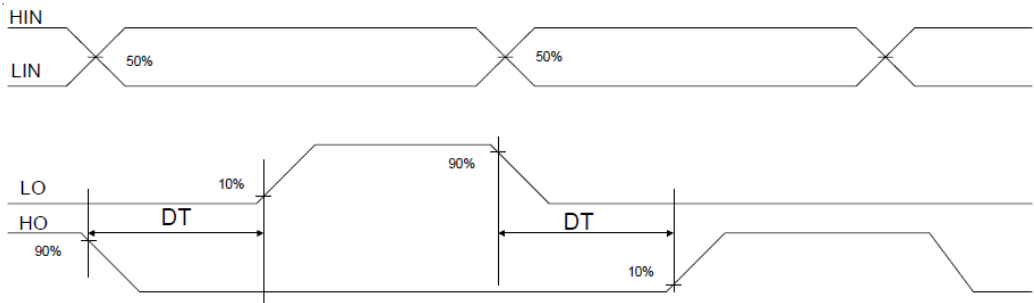
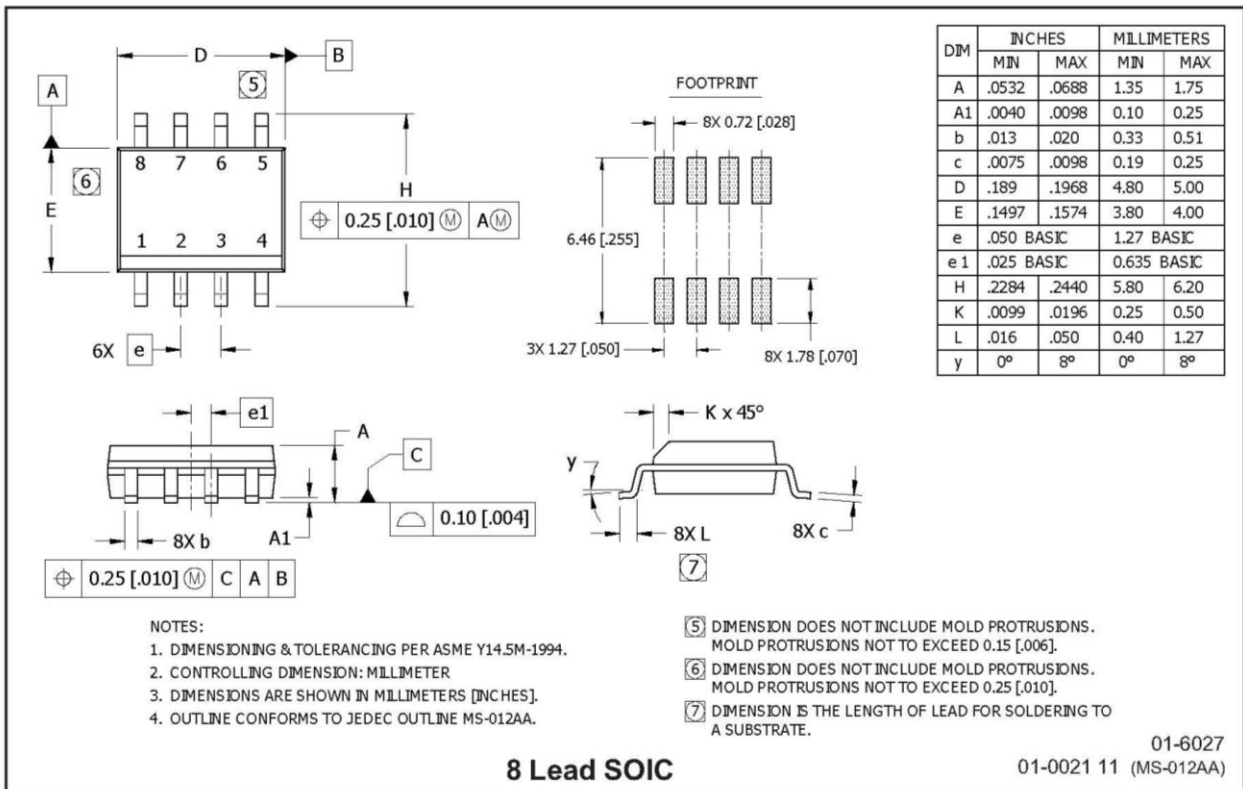
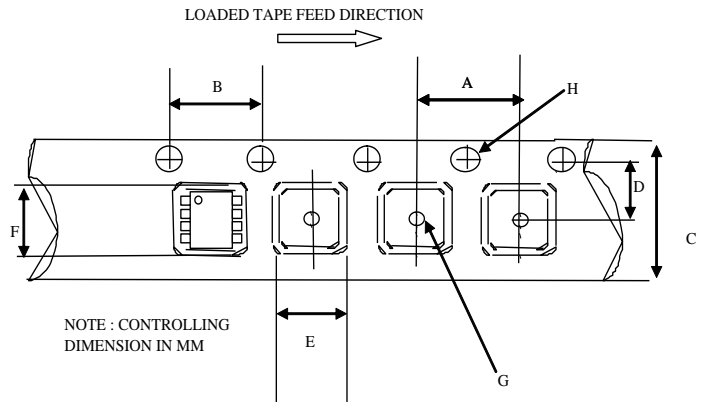


Figure 3. Internal Deadtime Timing

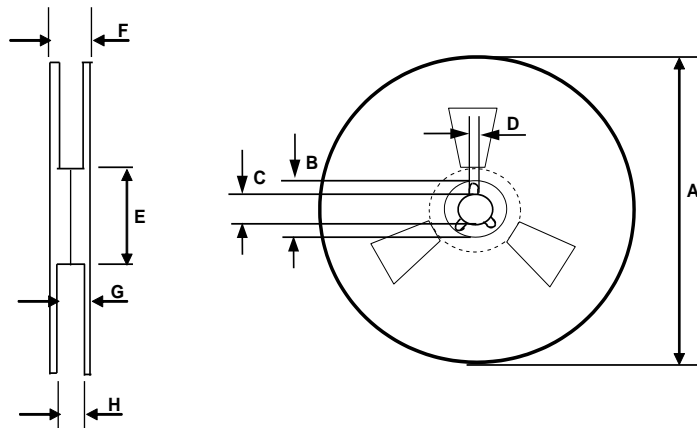
Package Details


Tape and Reel Details



CARRIER TAPE DIMENSION FOR 8SOICN

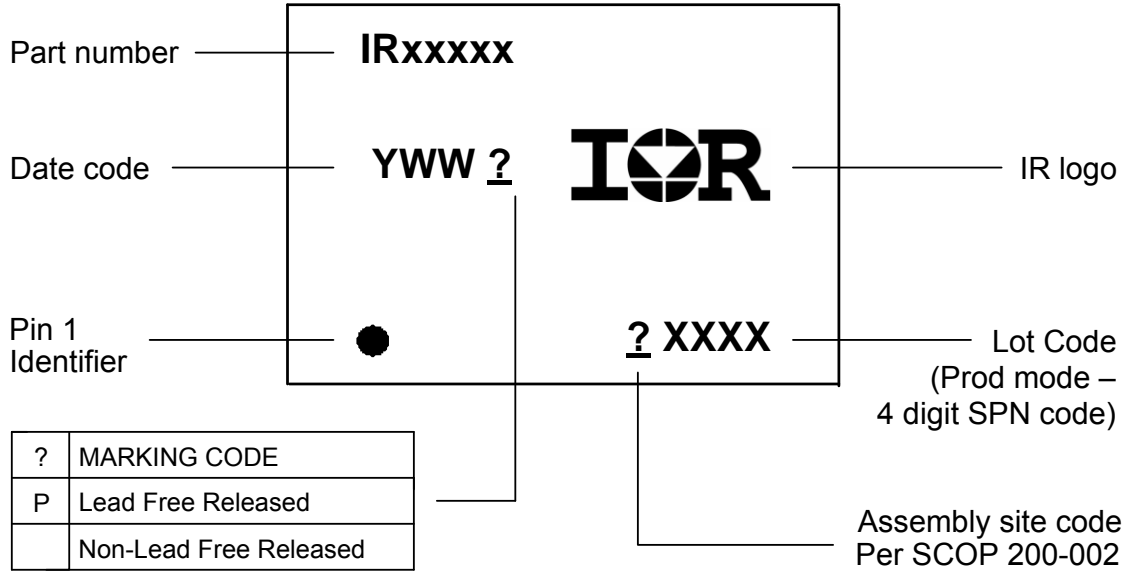
Code	Metric		Imperial	
	Min	Max	Min	Max
A	7.90	8.10	0.311	0.318
B	3.90	4.10	0.153	0.161
C	11.70	12.30	0.46	0.484
D	5.45	5.55	0.214	0.218
E	6.30	6.50	0.248	0.255
F	5.10	5.30	0.200	0.208
G	1.50	n/a	0.059	n/a
H	1.50	1.60	0.059	0.062



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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