

**IRS210614S**  
**HIGH AND LOW SIDE DRIVER**

**IC Features**

- Floating channel designed for bootstrap operation
- Fully operational to +600 V
- Tolerant to negative transient voltage, dV/dt immune
- Gate drive supply range from 10 V to 20 V
- Undervoltage lockout for both channels
- 3.3 V, 5 V, and 15 V input logic compatible
- Matched propagation delay for both channels
- Logic and power ground +/- 5 V offset
- Lower di/dt gate driver for better noise immunity
- Outputs in phase with inputs
- RoHS compliant

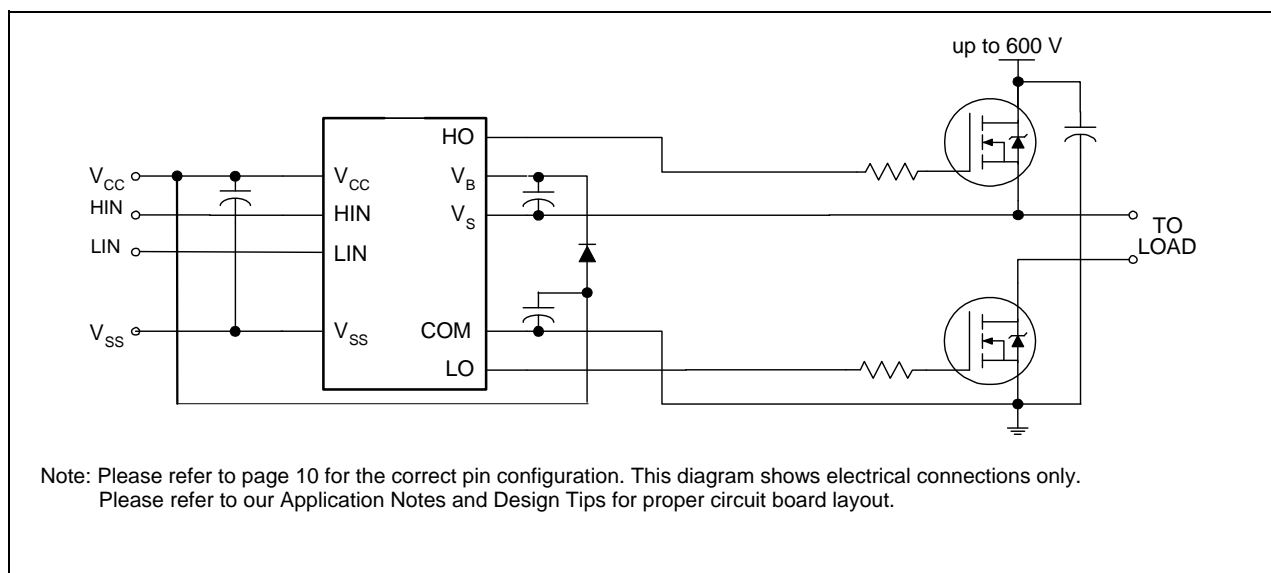
**Product Summary**

Topology	Half-Bridge
V <sub>OFFSET</sub>	600 V
V <sub>OUT</sub>	10 V-20 V
I <sub>O+</sub> & I <sub>O-</sub> (typical)	290 mA & 600 mA
T <sub>on</sub> & t <sub>off</sub> (typical)	165 ns & 165 ns

**Package Types**



**Typical Connection Diagram**



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### **Description**

The IRS21064S 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 3.3 V 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.

**Qualification Information<sup>†</sup>**

<b>Qualification Level</b>		Industrial <sup>††</sup>	
		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>		SOIC14N	MSL2 <sup>†††</sup> (per IPC/JEDEC J-STD-020)
<b>ESD</b>	<b>Machine Model</b>	Class B (per JEDEC standard EIA/JESD22-A115)	
	<b>Human Body Model</b>	Class 2 (per EIA/JEDEC standard JESD22-A114)	
<b>IC Latch-Up Test</b>		Class 1, Level A (per JESD78)	
<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.

**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, all currents are defined positive into any lead. The thermal resistance and power dissipation ratings are measured under board mounted and still air conditions.

Symbol	Definition	Min.	Max.	Units
VB	High-side floating supply absolute voltage	-0.3	625	V
VS	High-side floating supply offset voltage	VB - 25	VB + 0.3	
VHO	High-side floating output voltage	VS - 0.3	VB + 0.3	
VCC	Low-side output voltage	-0.3	25	
VLO	Low-side and logic fixed supply voltage	-0.3	VCC + 0.3	
VIN	Logic input voltage	VS - 0.3	VCC + 0.3	
VSS	Logic ground	VCC - 25	VCC + 0.3	V/ns
$dV_S/dt$	Allowable offset supply voltage transient	---	50	W
PD	Package power dissipation @ $T_A \leq +25\text{ }^\circ\text{C}$	---	1.0	
RthJA	Thermal resistance, junction to ambient	---	120	$^\circ\text{C}/\text{W}$
TJ	Junction temperature	---	150	$^\circ\text{C}$
TS	Storage temperature	-50	150	
TL	Lead temperature (soldering, 10 seconds)	---	300	

**Recommended Operating Conditions**

The input/output logic timing diagram is shown in Fig. 1. For proper operation the device should be used within the recommended conditions. The  $V_S$  and  $V_{SS}$  offset rating are tested with all supplies biased at a 15 V differential..

Symbol	Definition	Min.	Max.	Units
VB	High-side floating supply absolute voltage	$V_S + 10$	$V_S + 20$	V
VS	High-side floating supply offset voltage	Note 1	600	
VHO	High-side floating output voltage	$V_S$	VB	
VCC	Low-side output voltage		10	
VLO	Low-side and logic fixed supply voltage	0	VCC	
VIN	Logic input voltage	$V_{SS}$	VCC	
VSS	Logic ground	-5	5	
TA	Ambient temperature	-40	125	°C

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

**Static Electrical Characteristics**

$V_{BIAS}$  ( $V_{CC}$ ,  $V_{BS}$ ) = 14 V,  $C_T$  = 1 nF and  $T_A$  = 25 °C unless otherwise specified. The  $V_O$  and  $I_O$  parameters are referenced to COM and are applicable to the respective output leads: HO or LO.  $C_{LO1}=C_{LO2}=C_{HO1}=C_{HO2}=1$  nF.

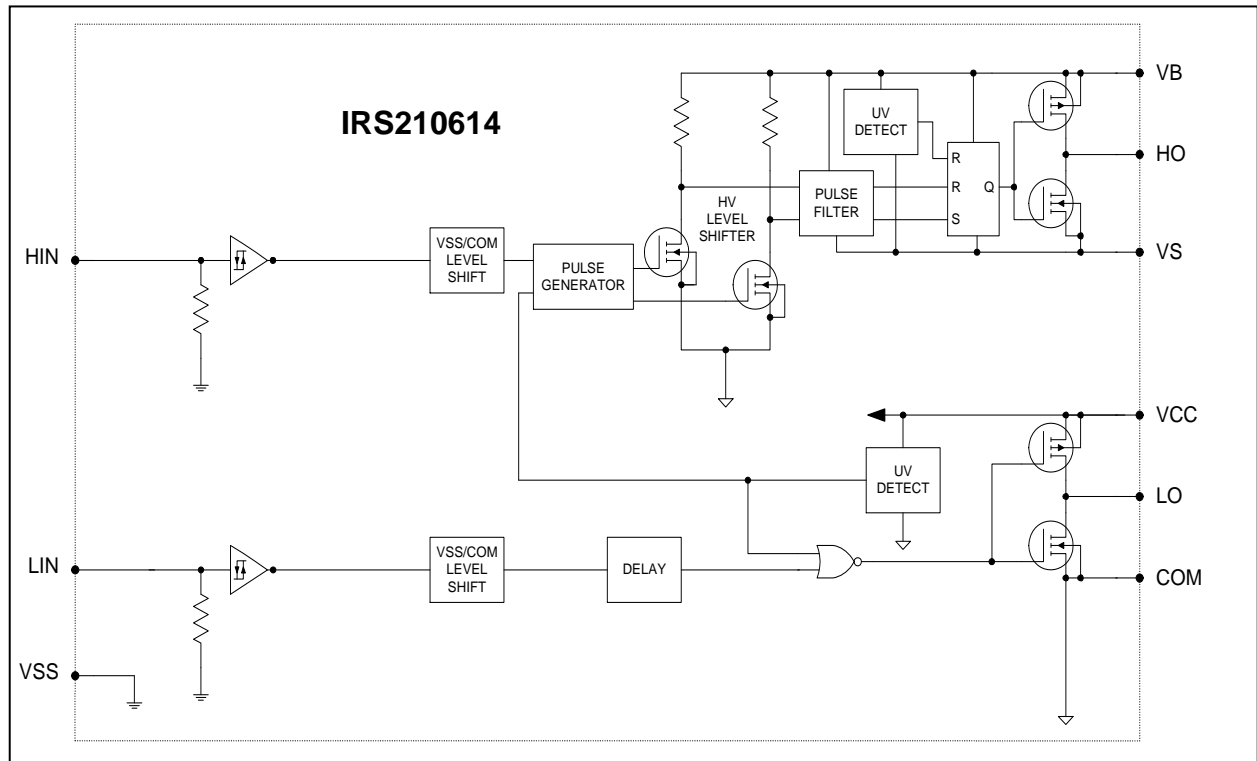
Symbol	Definition	Min	Typ	Max	Units	Test Conditions
<b>Low Voltage Supply Characteristics</b>						
$V_{IH}$	Logic "1" input voltage	2.5	—	—	V	$V_{CC} = 10$ V to 20V
$V_{IL}$	Logic "0" input voltage	—	—	0.8		
$V_{OH}$	High level output voltage, $V_{BIAS} - V_O$	—	0.05	0.2		
$V_{OL}$	Low level output voltage, $V_O$	—	0.02	0.1		
$I_{LK}$	Offset supply leakage current	—	—	50	$\mu$ A	$V_B = V_S = 600$ V
$I_{QBS}$	Quiescent $V_{BS}$ supply current	20	75	130		$V_{IN} = 0$ V or 5V
$I_{QCC}$	Quiescent $V_{CC}$ supply current	60	120	180		
$I_{IN+}$	Logic "1" input bias current $V_{IN} = 5$ V	—	5	20		
$I_{IN-}$	Logic "0" input bias current $V_{IN} = 0$ V	—	—	5	V	
$V_{CCUV+}$ $V_{BSUV}$	$V_{CC}$ and $V_{BS}$ supply undervoltage positive going threshold	8.0	8.9	9.8		
$V_{CCUV-}$ $V_{BSUV-}$	$V_{CC}$ and $V_{BS}$ supply undervoltage negative going threshold	7.4	8.2	9.0		
$V_{CCUVH}$ $V_{BSUVH}$	Hysteresis	0.3	0.7	—	mA	$V_O = 0$ V, $PW \leq 10$ $\mu$ s
$I_{O+}$	Output high short circuit pulsed current	130	290	—		$V_O = 15$ V, $PW \leq 10$ $\mu$ s
$I_{O-}$	Output low short circuit pulsed current	270	600	—		

**Dynamic Electrical Characteristics**

$V_{BIAS}$  ( $V_{CC}$ ,  $V_{BS}$ ) = 15 V,  $V_{SS} = COM$ ,  $C_L = 1000$  pF,  $T_A = 25$  °C.

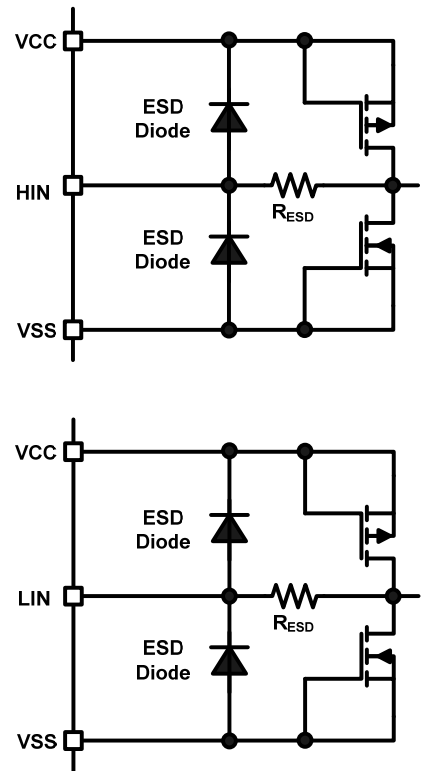
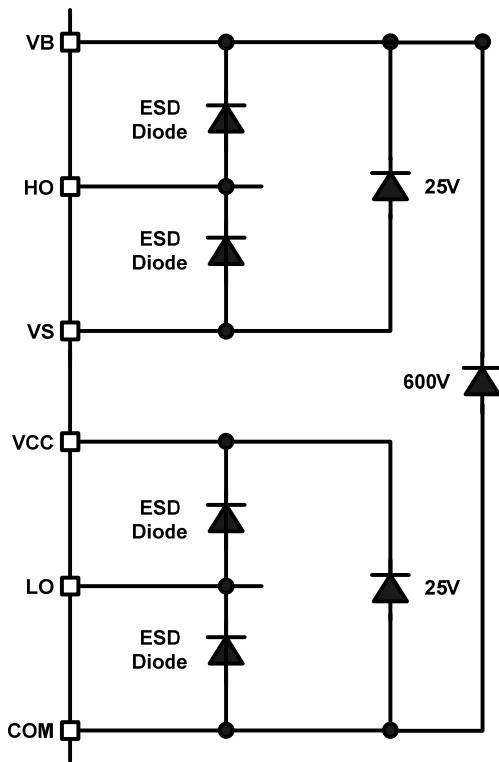
Symbol	Component	Min.	Typ.	Max.	Units	Test Conditions
$t_{on}$	Turn-on propagation delay	---	165	230	ns	$V_S = 0$ V
$t_{off}$	Turn-off propagation delay	---	165	230		$V_S = 0$ V or 600 V
MT	Delay matching, HS & LS turn-on/off	---	0	30		$V_S = 0$ V
$t_r$	Turn-on rise time	---	100	220		
$t_f$	Turn-off fall time	---	35	80		

**Functional Block Diagram**





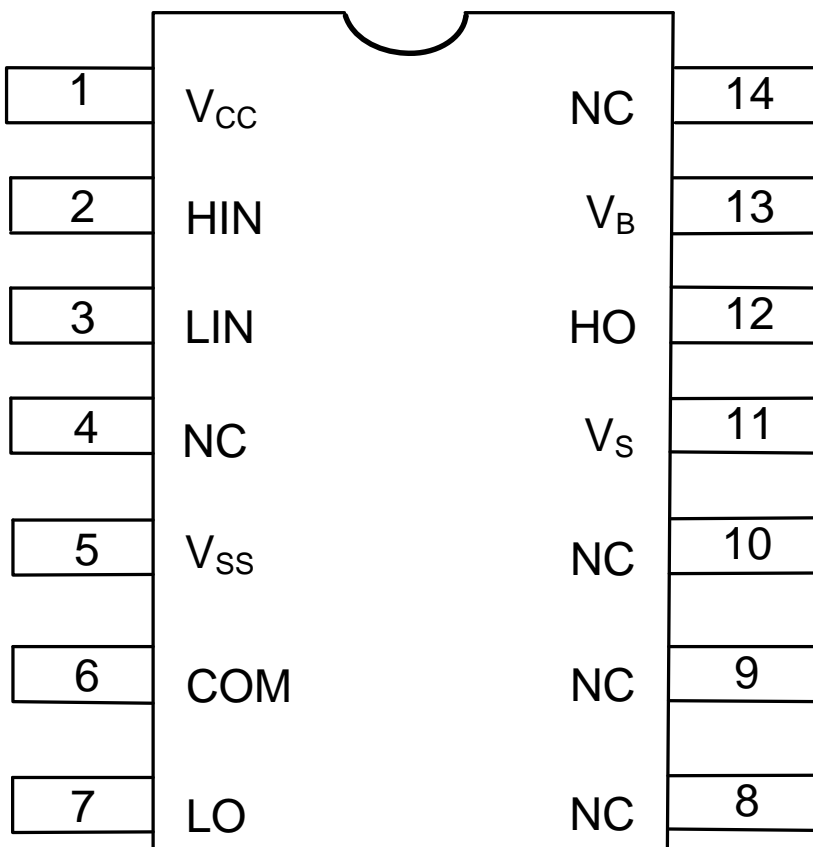
### I/O Pin Equivalent Circuit Diagrams



**Lead Definitions**

Pin#	Symbol	Description
1	V <sub>CC</sub>	Low-side and logic fixed supply
2	HIN	Logic input for high-side gate driver output (HO), in phase
3	LIN	Logic input for low-side gate driver output (LO), in phase
4	NC	No Connect
5	V <sub>SS</sub>	Logic ground
6	COM	Low-side return
7	LO	Low-side drive output
8	NC	No Connect
9	NC	No Connect
10	NC	No Connect
11	V <sub>S</sub>	High-side floating supply return
12	HO	High-side gate drive output
13	V <sub>B</sub>	High-side floating supply
14	NC	No Connect

**Lead Assignments**



**Waveform definitions**

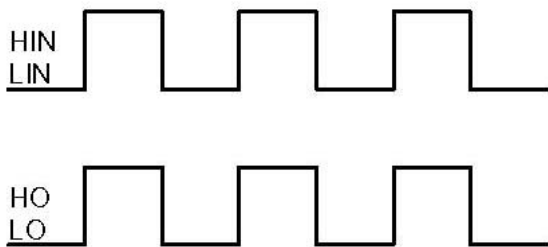


Figure 1. Input/Output Timing Diagram

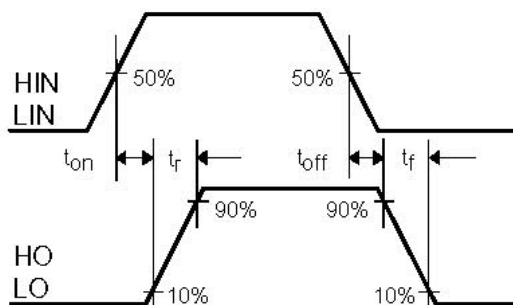


Figure 2. Switching Time Waveform Definitions

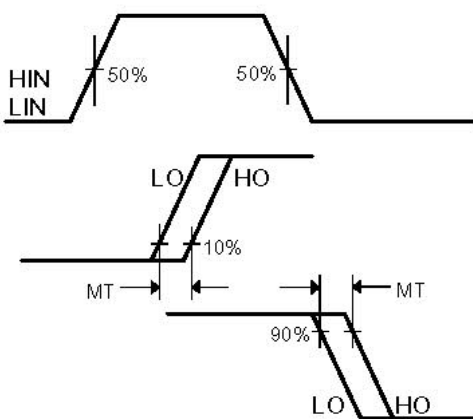
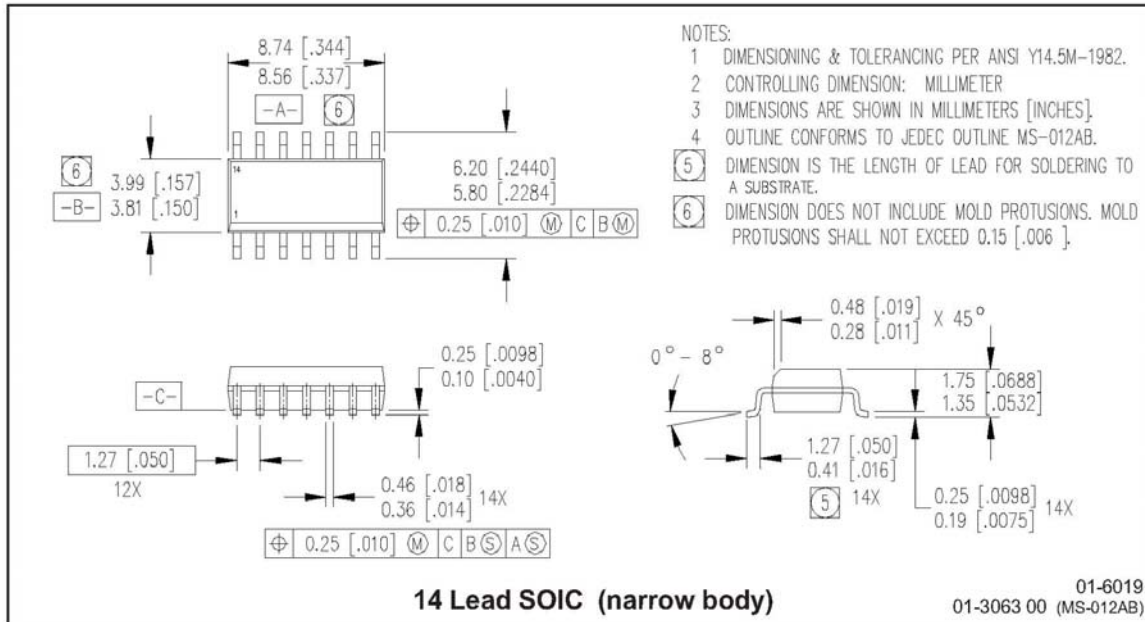
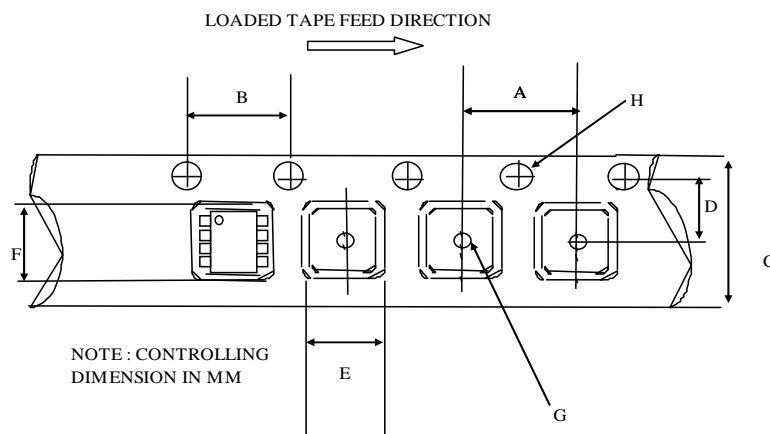


Figure 3. Delay Matching Waveform Definitions

**Package Details: SO14N**

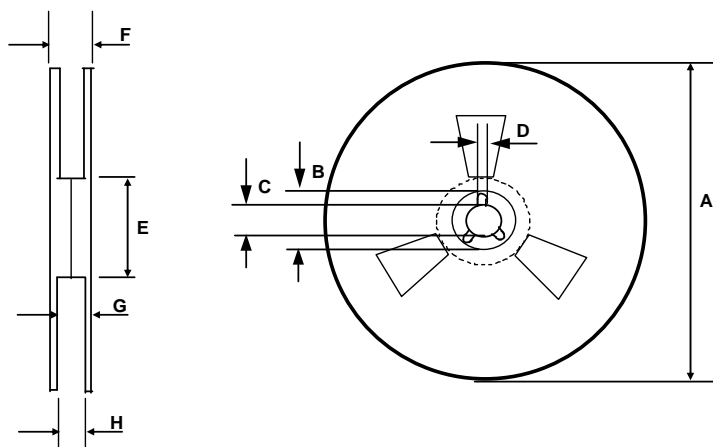


**Package Details: SOIC14N, Tape and Reel**



CARRIER TAPE DIMENSION FOR 14SOICN

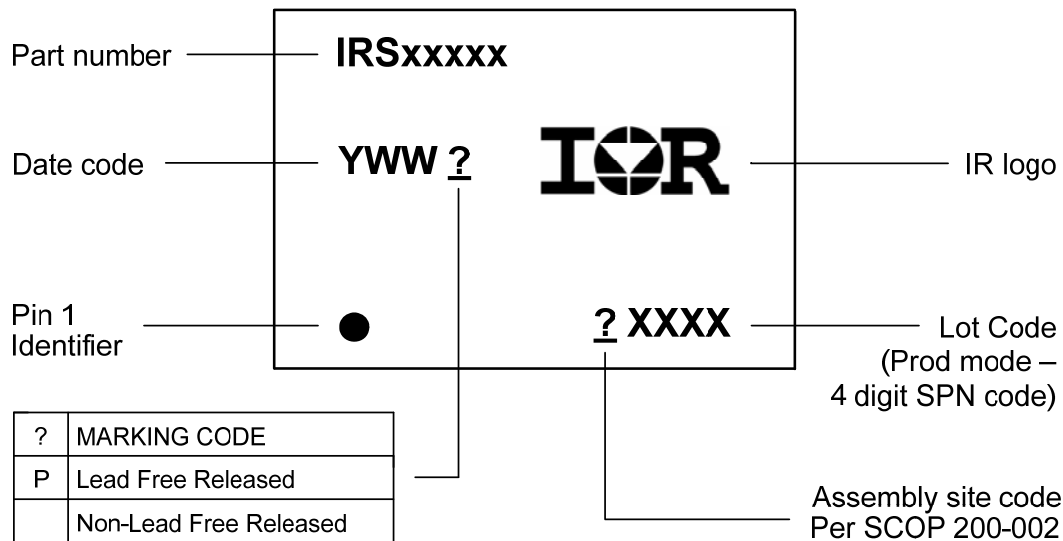
Code	Metric		Imperial	
	Min	Max	Min	Max
A	7.90	8.10	0.311	0.318
B	3.90	4.10	0.153	0.161
C	15.70	16.30	0.618	0.641
D	7.40	7.60	0.291	0.299
E	6.40	6.60	0.252	0.260
F	9.40	9.60	0.370	0.378
G	1.50	n/a	0.059	n/a
H	1.50	1.60	0.059	0.062



REEL DIMENSIONS FOR 14SOICN

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	22.40	n/a	0.881
G	18.50	21.10	0.728	0.830
H	16.40	18.40	0.645	0.724

**Part Marking Information**



**Ordering Information**

Base Part Number	Package Type	Standard Pack		Complete Part Number
		Form	Quantity	
IRS210614S	SOIC14N	Tube/Bulk	55	IRS210614SPBF
		Tape and Reel	2500	IRS210614STRPBF

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