

IC Features

- Dimming LED driver controller
- Hysteretic Current Regulation
- Closed-loop LED current dimming control
- Analog/PWM Dimming Input
- Internal High Voltage Regulator
- Internal 15.6V zener clamp diode on Vcc
- Micropower startup (250 μ A)
- Latch immunity and ESD protection

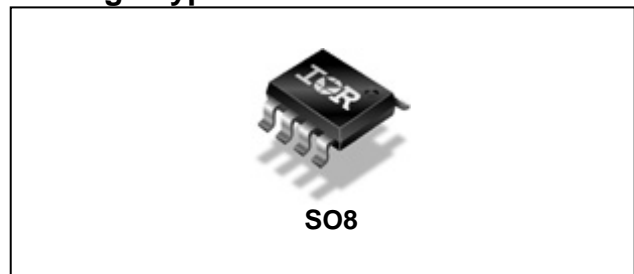
LED Driver System Features

- Single chip dimming solution
- Simple LED current dimming control method
- No external protection circuits required (fully internal)
- Easy to use for fast design cycle time
- Increased manufacturability and reliability

Product Summary

Topology	Buck
V _{OFFSET}	600 V
V _{OUT}	V _{CC}
I _{O+} & I _{O-} (typical)	180mA & 260mA

Package Types



Typical applications

- LED incandescent/CFL replacement lamps
- LED driver module

Typical Connection Diagram

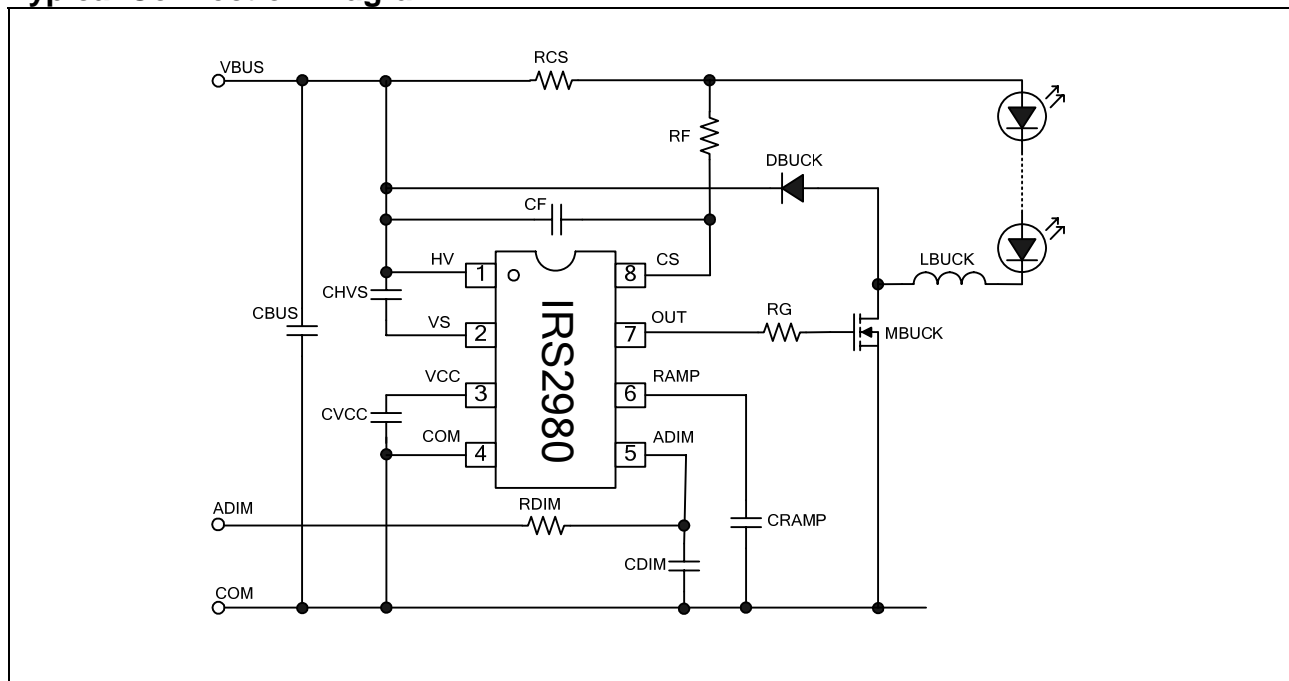
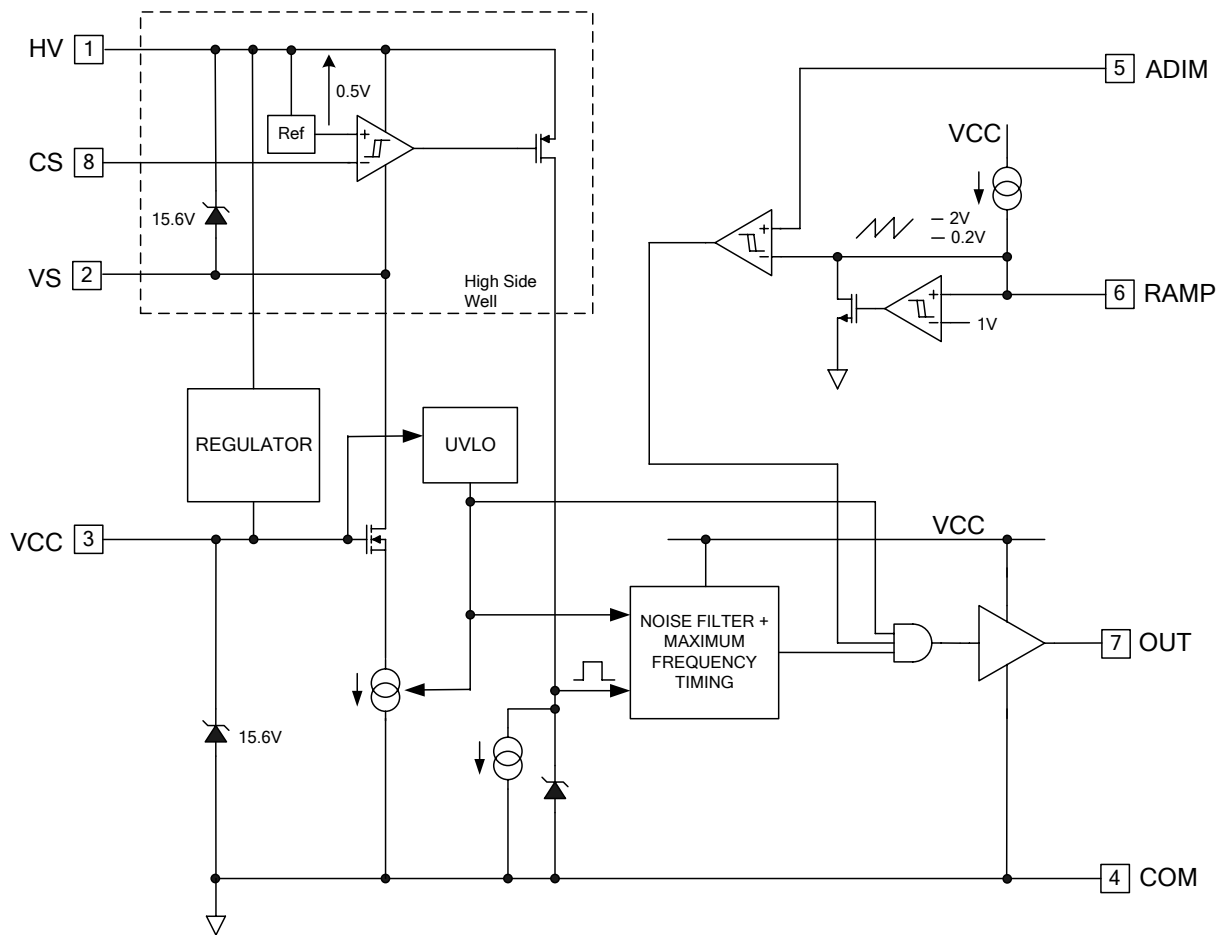


Table of Contents	Page
Description	3
Block Diagram	3
Qualification Information	4
Absolute Maximum Ratings	5
Recommended Operating Conditions	6
Electrical Characteristics	7
Input/Output Pin Equivalent Circuit Diagram	9
Lead Definitions	10
Lead Assignments	10
PCB Layout Guidelines	11
Package Details	12
Tape and Reel Details	13
Part Marking Information	14
Ordering Information	15

Description

The IRS2980 utilizes International Rectifier's control and high-voltage technologies to realize a simple, high-performance dimming LED driver solution. This solution is based on a hysteretic topology where the high frequency AC output current is controlled by adjusting the oscillator frequency and duty cycle.

Block Diagram



Qualification Information[†]

Qualification Level		Industrial ^{††}
		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-020C)
ESD	Machine Model	Class B (per JEDEC standard JESD22-A115)
	Human Body Model	Class 2 (per EIA/JEDEC standard EIA/JESD22-A114)
IC Latch-Up Test		Class I, Level A (per JESD78)
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.

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
VHV	High Voltage Input	-0.3	450	V
VOUT	Low-Side Output Voltage	-0.3	VCC + 0.3	
VADIM	DIM Input Voltage	-0.3	VCC + 0.3	
VRAMP	RAMP Input Voltage	-0.3	VCC + 0.3	
ICC	Supply Current [†]	---	20	mA
IOMAX	Maximum allowable current at OUT due to external power transistor Miller effect.	-500	500	
PD	Maximum Power Dissipation @ TA ≤ +25°C	---	0.625	W
RθJA	Thermal Resistance, Junction to Ambient	---	128	°C/W
TJ	Junction Temperature	-55	150	°C
TS	Storage Temperature	-55	150	
TL	Lead Temperature (Soldering, 10 seconds)	---	300	

† This IC contains a zener clamp structure between the chip VCC and COM which has a nominal breakdown voltage of 15.6V. This supply pin should not be driven by a DC, low impedance power source greater than the VCLAMP specified in the Electrical Characteristics section.

Recommended Operating Conditions

For proper operation the device should be used within the recommended conditions.

Symbol	Definition	Min.	Max.	Units
VHV	High Voltage Input	0	375	V
VCC	Supply Voltage	VCCUV+ + 0.1V	VCLAMP	
ICC	Supply Current	---	5	mA
VRAMP	VENN Pin Voltage	0	6	V
VADIM	VENN Pin Voltage	0	6	V
VENN	VENN Pin Voltage	0	6	V
TJ	Junction Temperature	-40	125	°C

Electrical Characteristics

VHV=100V, VCC=14V, CVCC=0.1μF, CVF=0.1μF, COUT=1nF, and TA = 25°C unless otherwise specified. The output voltage and current (VO and IO) parameters are referenced to COM and are applicable to OUT.

Symbol	Definition	Min	Typ	Max	Units	Test Conditions
Low Voltage Supply Characteristics						
V _{CLAMP}	V _{CC} Zener Clamp Voltage	14.6	15.6	16.6	V	I _{CC} = 10mA
I _{QCCUV}	Micropower Startup V _{CC} Supply Current	---	250	---	μA	V _{CC} = 6V
High Voltage Regulator Characteristics						
V _{CCREG}	V _{CC} Regulation Voltage	8.9	9.9	10.9	V	I _{CC} = 1mA
I _{REG_MAX}	Maximum Regulator Current	---	3	5	mA	V _{CC} = 0V
V _{HVMIN}	Minimum HV required for regulator†	---	60	---	V	
High Side Voltage Supply Characteristics						
V _{HVS+}	High Side UVLO Positive Threshold	8.3	9.3	10.3	V	
V _{HVS-}	High Side UVLO Negative Threshold	6.3	7.3	8.3		
Control Characteristics						
f _{MAX}	Maximum Output Frequency	---	150	---	kHz	
d _{MAX}	Buck Duty Cycle	---	100	---	%	
V _{CS}	Current Regulation Threshold	0.37	0.49	0.61	V	
V _{CS-HYS}	Current Regulation Hysteresis	---	100	---	mV	
Dimming Charateristics						
I _{RAMP}	RAMP Pin Charging Current	---	15	---	μA	
V _{RAMP+}	RAMP Pin Shutdown Threshold	---	2.0	---		
V _{RAMP-}	RAMP Pin Re-start Threshold	---	0.2	---		
d _{PWM}	Dimming Duty Cycle	0		100	%	

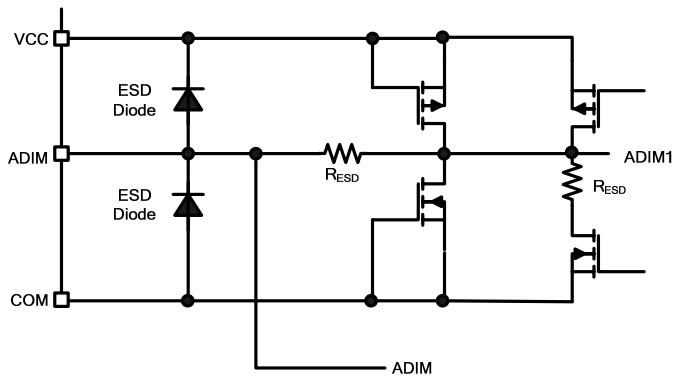
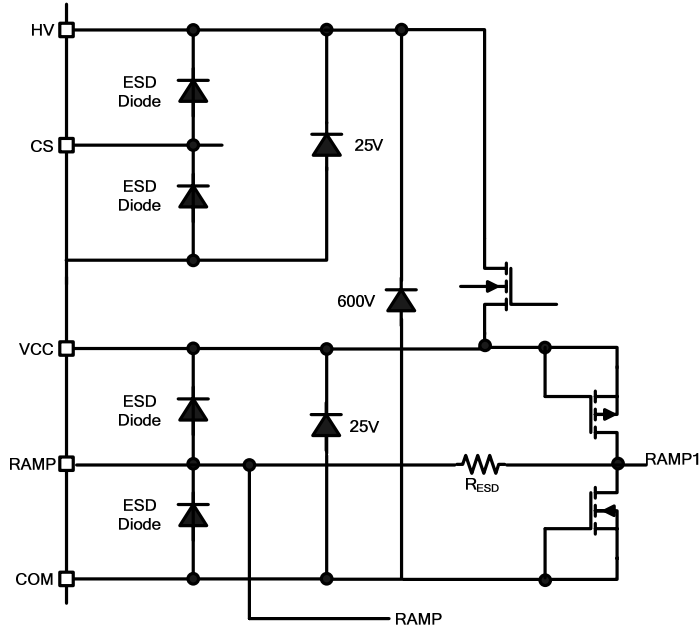
† VCC can be supplied from an alternative source for the IRS2980 to operate with bus voltages below this level.

Electrical Characteristics

VHV=100V, VCC= 14V, CVCC=0.1μF, CVF=0.1μF and TA = 25°C unless otherwise specified. The output voltage and current (VO and IO) parameters are referenced to COM and are applicable to OUT .

Symbol	Definition	Min	Typ	Max	Units	Test Conditions
Gate Driver Output Characteristics (OUT)						
V _{OH}	High-Level Output Voltage	---	VCC	---		I _O = 0A
V _{OL}	Low-Level Output Voltage	---	COM	---		I _O = 0A
V _{OL_UV}	UV-Mode Output Voltage	---	COM	---		I _O = 0A, V _{CC} ≤ V _{CCUV-}
t _r	Output Rise Time	---	120	220	ns	
t _f	Output Fall Time	---	50	80		
I _{O+}	Output source current	---	180	---	mA	
I _{O-}	Output sink current	---	260	---		

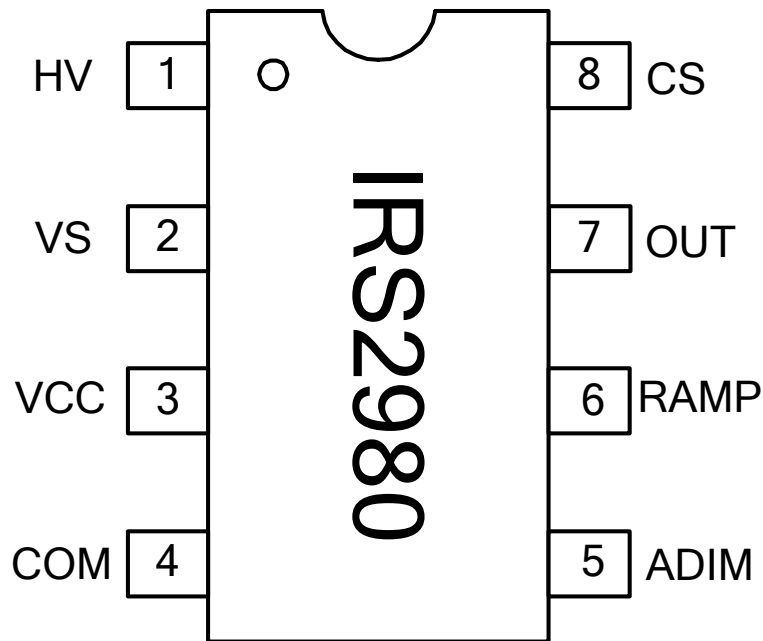
I/O Pin Equivalent Circuit Diagrams



Lead Definitions

Pin #	Symbol	Description
1	HV	High Voltage Bus
2	VS	High Side Floating Supply Return
3	VCC	VCC Supply
4	COM	Ground / Common
5	ADIM	Linear / Analog Dimming Input
6	RAMP	Ramp Waveform for Analog Dimming
7	OUT	Gate Drive Output
8	CS	Load Current Sense

Lead Assignments



Application Information and Additional Details

PCB Layout Guidelines

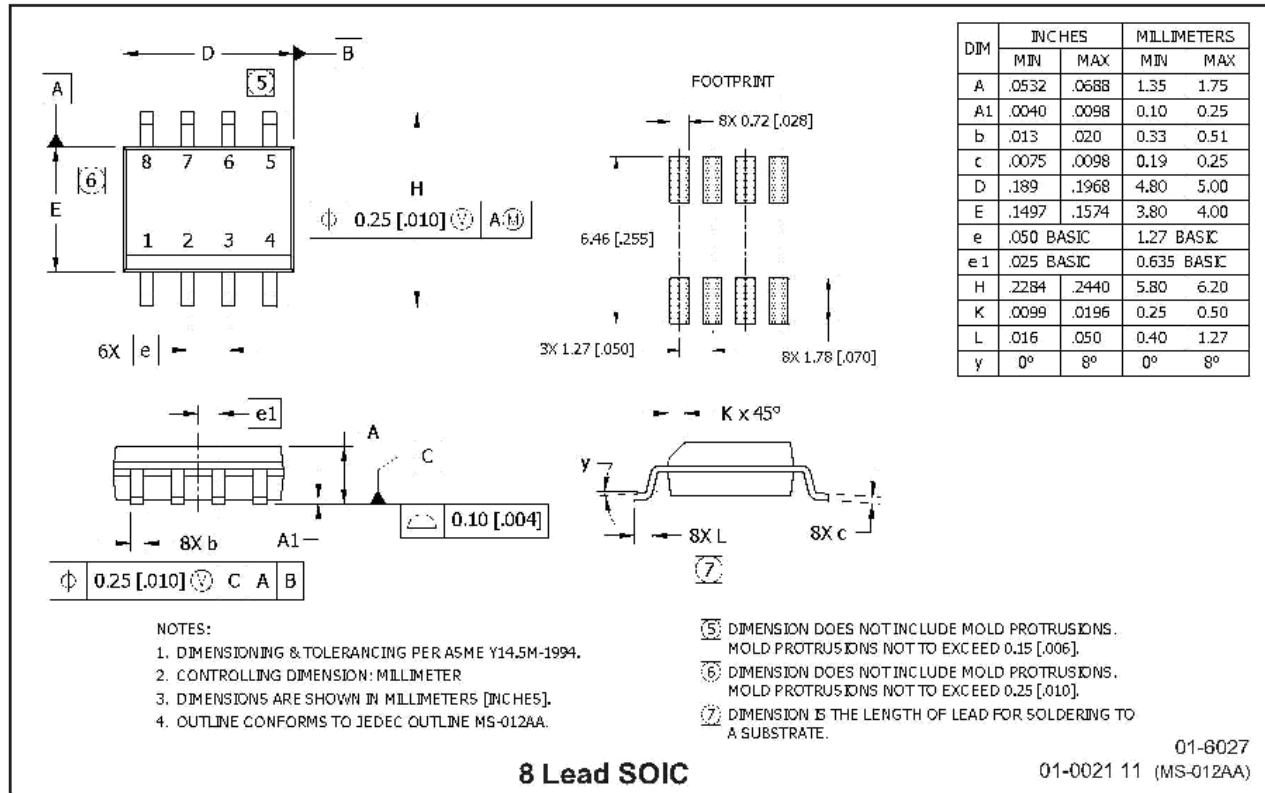
Proper care should be taken when laying out a PCB board to minimize noise effects due to high-frequency switching and to ensure proper functionality of the IRS2980.

The current feedback input CS for the IRS2980 is sensitive to switching noise therefore a small filter comprising RF and CF is recommended to obtain clean switching. CF should be located close to the IC pins with the trace from HV to RCS and the traces from RCS to CS through RF kept as short as possible. The 0V load return power ground should be connected to the IC COM pin and at a single point to prevent any ground loops.

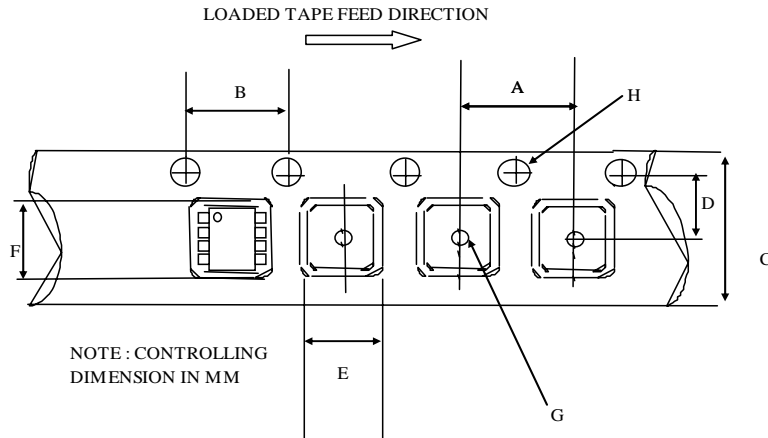
In general, the following guidelines should be followed during PCB board layout:

- 1) Place the VCC supply decoupling capacitor (CVCC) as close as possible to the VCC and COM pins.
- 2) Place the high side decoupling capacitor (CVF) as close as possible to the HV and VS pins.
- 3) If the IRS2980 is being used in non-dimming mode connect the ADIM pin to VCC. If it is being used in dim mode place a capacitor CDIM from the ADIM pin to COM and keep the capacitor as close to the IC as possible with the shortest possible traces.
- 4) If the IRS2980 is being used in non-dimming mode the RAMP pin can be connected to COM. If it is being used in dimming mode CRAMP should be located close to the IC with the shortest possible traces to the RAMP pin and COM.
- 5) Connect IC COM to power GND at one connection only. Do NOT route power GND through the programming components or IC COM.
- 6) A resistor (RG) between the gate driver output and the gate of the power MOSFETs is recommended.

Package Details

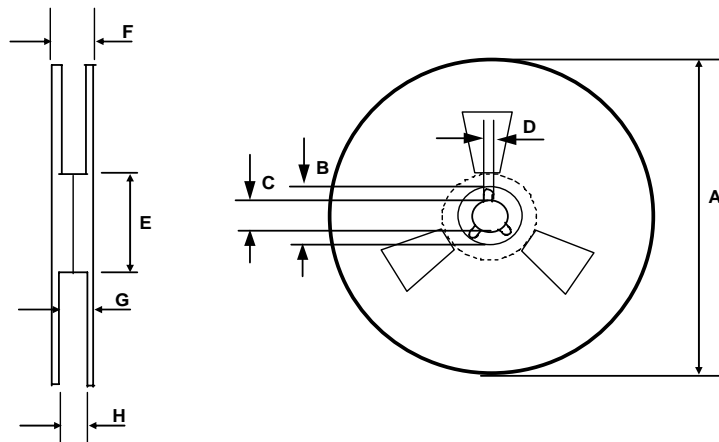


Tape and Reel Details



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

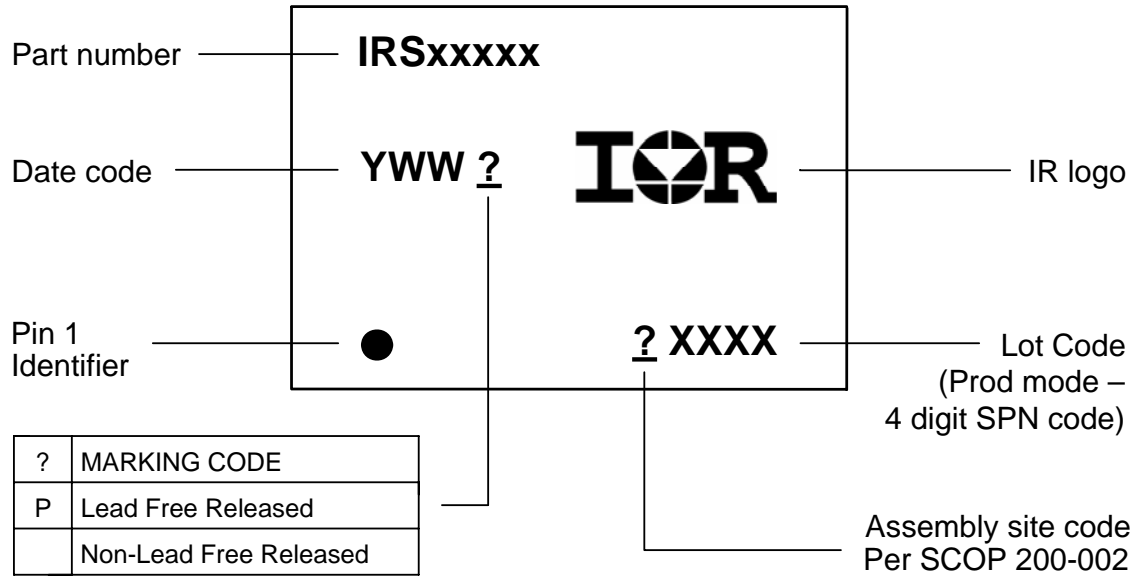


REEL DIMENSIONS FOR 8SOICN

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





Ordering Information

Base Part Number	Package Type	Standard Pack		Complete Part Number
		Form	Quantity	
IRS2980	SOIC8N	Tube/Bulk	95	IRS2980SPBF
		Tape and Reel	2500	IRS2980STRPBF

The information provided in this document is believed to be accurate and reliable. However, International Rectifier assumes no responsibility for the consequences of the use of this information. International Rectifier assumes no responsibility for any infringement of patents or of other rights of third parties which may result from the use of this information. No license is granted by implication or otherwise under any patent or patent rights of International Rectifier. The specifications mentioned in this document are subject to change without notice. This document supersedes and replaces all information previously supplied.

For technical support, please contact IR's Technical Assistance Center
<http://www.irf.com/technical-info/>

WORLD HEADQUARTERS:
233 Kansas St., El Segundo, California 90245
Tel: (310) 252-7105