International
IOR Rectifier

IR2308(S) & (PbF)

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
- Also available LEAD_FREE

Packages

8-Lead SOIC - IR2308S
Also available
LEAD-FREE (PbF)

8-Lead PDIP
IR2308

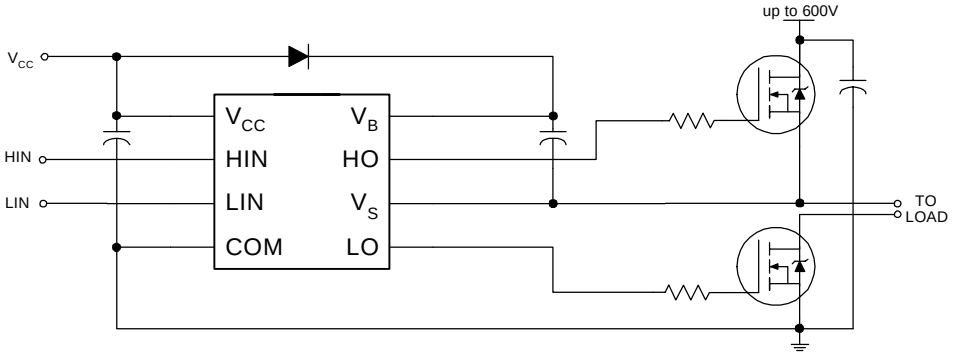
2106//2108//2109/2304/2308 Feature Comparison

Part	Input logic	Cross-conduction prevention logic	Dead-Time	Ground Pins
2106	HIN/LIN	no	none	COM
21064				VSS/COM
2108	HIN/$\overline{\text{LIN}}$	yes	Internal 540ns	COM
21084			Programmable 0.54~5 µs	VSS/COM
2109	IN/$\overline{\text{SD}}$	yes	Internal 540ns	COM
21094			Programmable 0.54~5 µs	VSS/COM
2304	HIN/LIN	yes	Internal 100ns	COM
2308	HIN/LIN	yes	Internal 540ns	COM

Description

The IR2308(S) are high voltage, high speed power MOSFET and IGBT drivers with dependent 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 volts.

Typical Connection



(Refer to Lead Assignments for correct pin configuration). This/These diagram(s) show electrical connections only. Please refer to our Application Notes and DesignTips for proper circuit board layout.

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)		V_{SS} - 0.3	V_{CC} + 0.3	
dV_S/dt	Allowable offset supply voltage transient		—	50	V/ns
P_D	Package power dissipation @ $T_A \leq +25℃$	(8 lead PDIP)	—	1.0	W
		(8 lead SOIC)	—	0.625	
Rth_{JA}	Thermal resistance, junction to ambient	(8 lead PDIP)	—	125	℃/W
		(8 lead SOIC)	—	200	
T_J	Junction temperature		—	150	℃
T_S	Storage temperature		-50	150	
T_L	Lead temperature (soldering, 10 seconds)		—	300	

Recommended Operating Conditions

The Input/Output logic timing diagram is shown in figure 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 15V differential.

Symbol	Definition	Min.	Max.	Units
VB	High side floating supply absolute voltage	V_S + 10	V_S + 20	V
V_S	High side floating supply offset voltage	Note 1	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	COM	V_{CC}	
T_A	Ambient temperature	-40	125	℃

Note 1: Logic operational for V_S of -5 to +600V. Logic state held for V_S of -5V to -V_{BS}. (Please refer to the Design Tip DT97-3 for more details).

Dynamic Electrical Characteristics

V_{BIAS} (V_{CC}, V_{BS}) = 15V, V_{SS} = COM, C_L = 1000 pF, T_A = 25°C, DT = VSS unless otherwise specified.

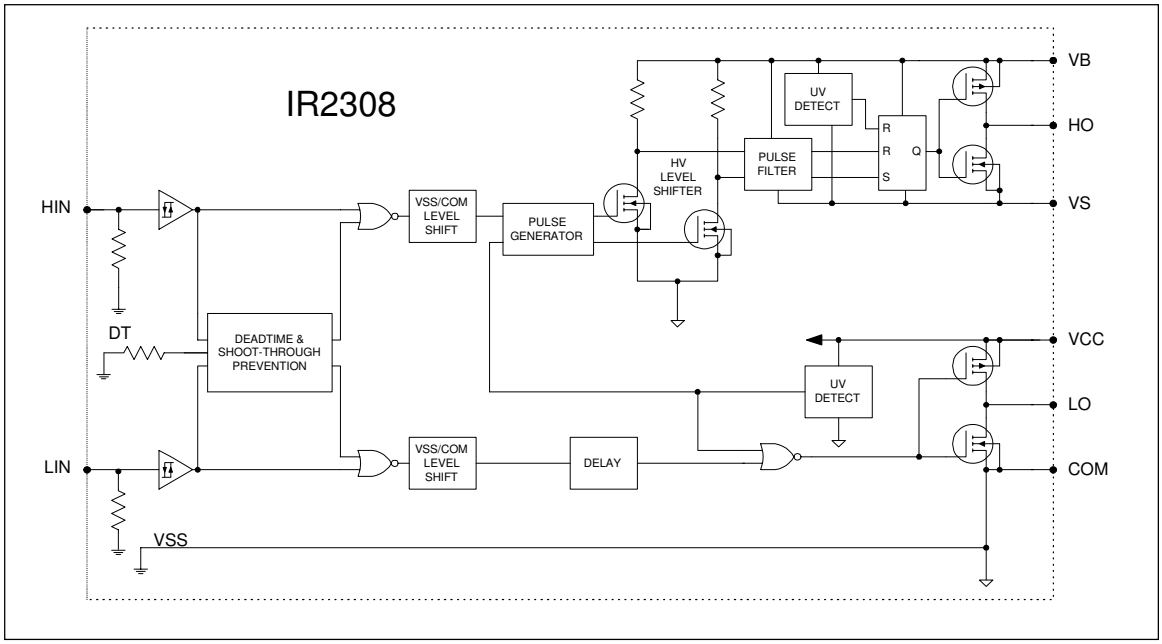
Symbol	Definition	Min.	Typ.	Max.	Units	Test Conditions
t_{on}	Turn-on propagation delay	—	220	300	nsec	V_S = 0V
t_{off}	Turn-off propagation delay	—	200	280		V_S = 0V or 600V
MT	Delay matching $\lvert t_{on} - t_{off} \rvert$	—	0	46		
t_r	Turn-on rise time	—	150	220		V_S = 0V
t_f	Turn-off fall time	—	50	80		V_S = 0V
DT	Deadtime: LO turn-off to HO turn-on(DT_{LO-HO}) & HO turn-off to LO turn-on (DT_{HO-LO})	400	540	680		
MDT	Deadtime matching = $\lvert DT_{LO-HO} - DT_{HO-LO} \rvert$	—	0	60		

Static Electrical Characteristics

V_{BIAS} (V_{CC}, V_{BS}) = 15V, V_{SS} = COM, DT= V_{SS} and T_A = 25°C unless otherwise specified. The V_{IL}, V_{IH} and I_{IN} parameters are referenced to V_{SS}/COM and are applicable to the respective input leads: HIN and LIN. The V_O, I_O and Ron 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 for HIN & LIN	2.9	—	—	V	V_{CC} = 10V to 20V
V_{IL}	Logic “0” input voltage for HIN & LIN	—	—	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	µA	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	0.4	1.0	1.6	mA	V_{IN} = 0V or 5V
I_{IN+}	Logic “1” input bias current	—	5	20	µA	HIN = 5V, LIN = 5V
I_{IN-}	Logic “0” input bias current	—	1	2		HIN = 0V, LIN = 0V
V_{CCUV+} V_{BSUV+}	V_{CC} and V_{BS} supply undervoltage positive going threshold	8.0	8.9	10	V	
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	—		
I_{O+}	Output high short circuit pulsed current	97	200	—	mA	V_O = 0V, PW ≤ 10 µs
I_{O-}	Output low short circuit pulsed current	250	350	—		V_O = 15V, PW ≤ 10 µs

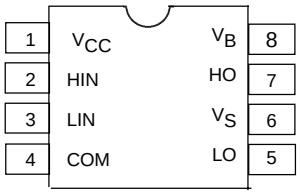
Functional Block Diagram



Lead Definitions

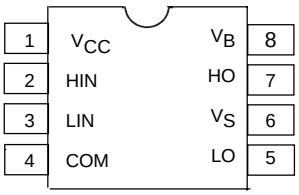
Symbol	Description
HIN	Logic input for high side gate driver output (HO), in phase
LIN	Logic input for low side gate driver output (LO), in phase
V_B	High side floating supply
HO	High side gate driver output
V_S	High side floating supply return
V_{CC}	Low side and logic fixed supply
LO	Low side gate driver output
COM	Low side return

Lead Assignments



8 Lead PDIP

IR2308



8 Lead SOIC
Also available LEAD-FREE(PbF)

IR2308S

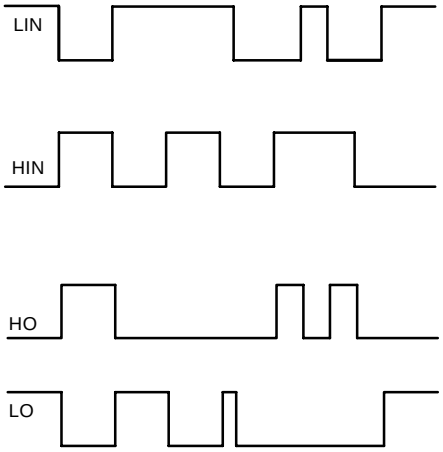


Figure 1. Input/Output Timing Diagram

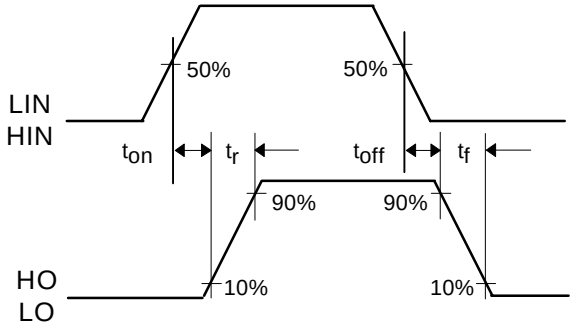


Figure 2. Switching Time Waveform Definitions

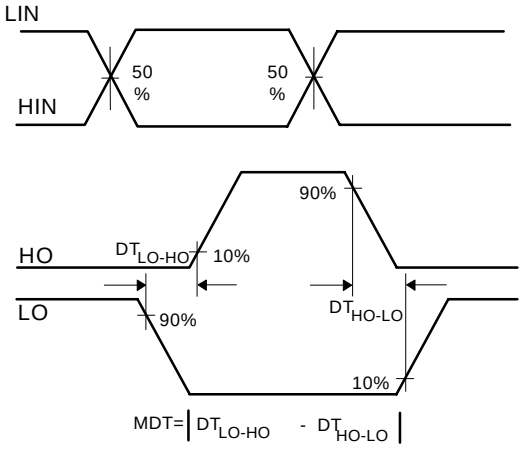
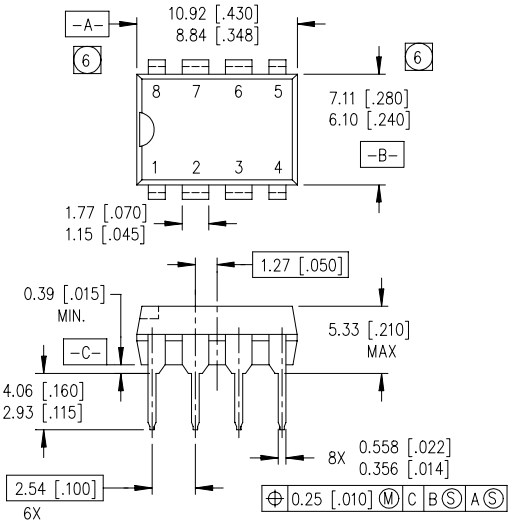
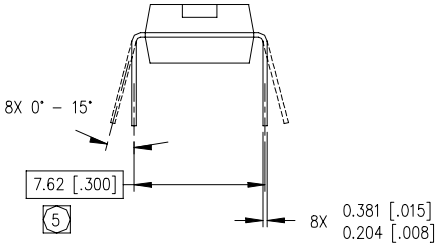


Figure 3. Deadtime Waveform Definitions

Case outlines

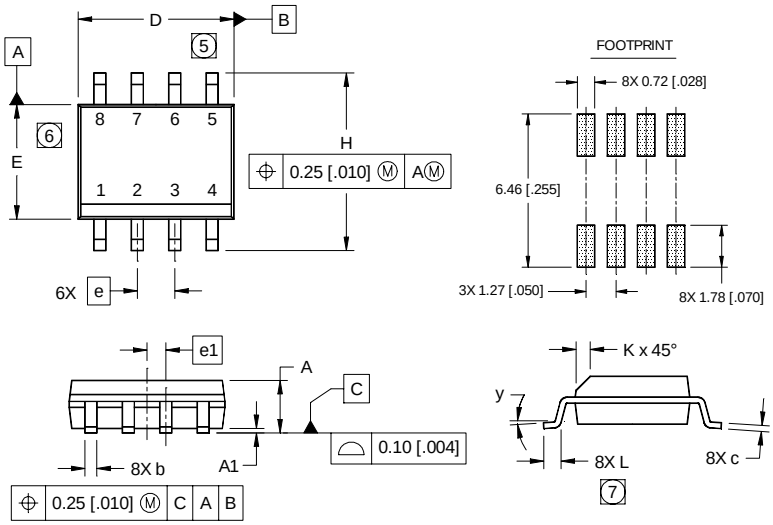


NOTES:
1. DIMENSIONING & TOLERANCING PER ANSI Y14.5M–1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
4. OUTLINE CONFORMS TO JEDEC OUTLINE MS–001AB.
5. MEASURED WITH THE LEADS CONSTRAINED TO BE PERPENDICULAR TO DATUM PLANE C.
6. DIMENSION DOES NOT INCLUDE MOLD PROTUSIONS. MOLD PROTUSIONS SHALL NOT EXCEED 0.25 [.010].



8-Lead PDIP

01-6014
01-3003 01 (MS-001AB)



DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.0532	.0688	1.35	1.75
A1	.0040	.0098	0.10	0.25
b	.013	.020	0.33	0.51
c	.0075	.0098	0.19	0.25
D	.189	.1968	4.80	5.00
E	.1497	.1574	3.80	4.00
e	.050 BASIC		1.27 BASIC	
e 1	.025 BASIC		0.635 BASIC	
H	.2284	.2440	5.80	6.20
K	.0099	.0196	0.25	0.50
L	.016	.050	0.40	1.27
y	0°	8°	0°	8°

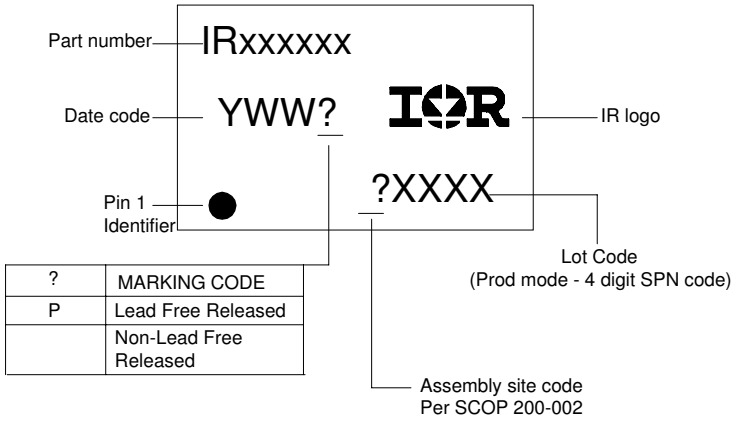
NOTES:
1. DIMENSIONING & TOLERANCING PER ASME Y14.5M-1994.
2. CONTROLLING DIMENSION: MILLIMETER
3. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
4. OUTLINE CONFORMS TO JEDEC OUTLINE MS-012AA.

5. DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS. MOLD PROTRUSIONS NOT TO EXCEED 0.15 [.006].
6. DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS. MOLD PROTRUSIONS NOT TO EXCEED 0.25 [.010].
7. DIMENSION IS THE LENGTH OF LEAD FOR SOLDERING TO A SUBSTRATE.

8-Lead SOIC

01-6027
01-0021 11 (MS-012AA)

LEADFREE PART MARKING INFORMATION



?	MARKING CODE
P	Lead Free Released
	Non-Lead Free Released

ORDER INFORMATION

Basic Part (Non-Lead Free)
8-Lead PDIP IR2308 order IR2308
8-Lead SOIC IR2308S order IR2308S

Leadfree Part
8-Lead PDIP R2308 not available
8-Lead SOIC IR2308S order IR2308SPbF