

HIGH AND LOW SIDE 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
- 5V Schmitt triggered input logic
- Matched propagation delay for both channels
- Logic and power ground +/- 5V offset.
- Lower di/dt gate driver for better noise immunity
- Outputs in phase with inputs (IR2181/IR21814)
- Outputs out of phase with inputs (IR2182/IR21824)

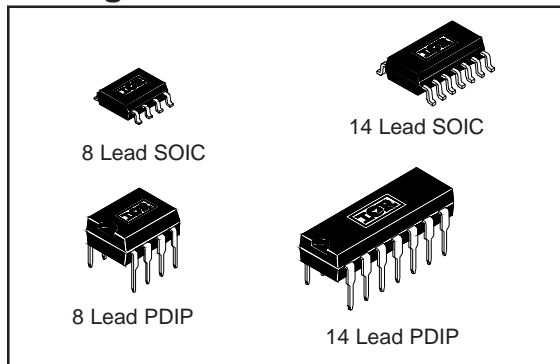
Description

The IR2181/IR21814/IR2182/IR21824 are high voltage, high speed power MOSFET and IGBT drivers 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. 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.

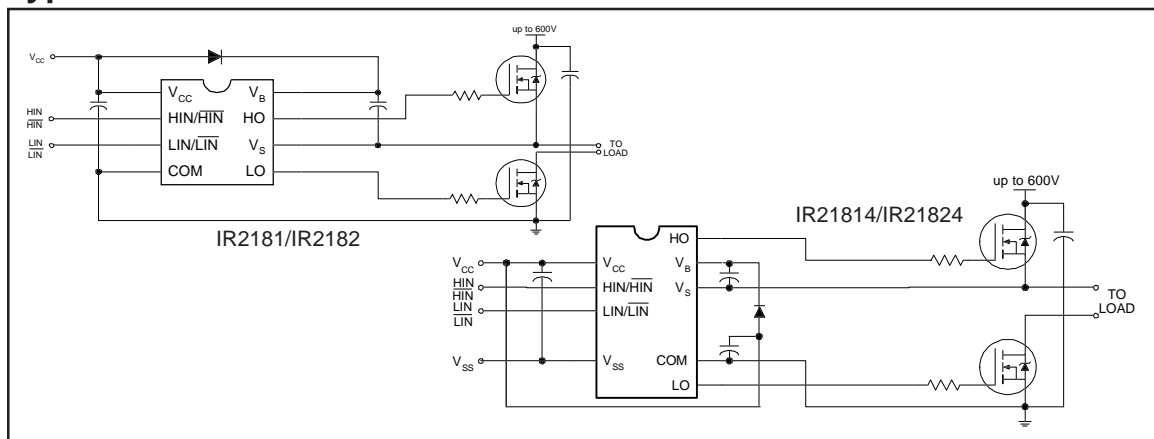
Product Summary

V_{OFFSET}	600V max.
$I_{\text{O}+/-}$	1.7 A / 1.7 A
V_{OUT}	10 - 20V
$t_{\text{on/off}}$ (typ.)	180 ns
Delay matching	50 ns

Packages



Typical Connection



IR2181/IR21814/IR2182/IR21824

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 - IR2181/IR21814) ($\overline{\text{HIN}}$ & $\overline{\text{LIN}}$ - IR2182/IR21824)	V _{SS} - 0.3	V _{CC} + 0.3		
V _{SS}	Logic ground (IR21814/IR21824 only)	V _{CC} - 25	V _{CC} + 0.3		
dV _S /dt	Allowable offset supply voltage transient	—	50	V/ns	
P _D	Package power dissipation @ T _A ≤ +25°C	(8 lead PDIP)	—	1.0	W
		(8 lead SOIC)	—	0.625	
		(14 lead PDIP)	—	1.6	
		(14 lead SOIC)	—	1.0	
R _{thJA}	Thermal resistance, junction to ambient	(8 lead PDIP)	—	125	°C/W
		(8 lead SOIC)	—	200	
		(14 lead PDIP)	—	75	
		(14 lead SOIC)	—	120	
T _J	Junction temperature	—	150	°C	
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
V _B	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 (HIN & LIN - IR2181/IR21814) ($\overline{\text{HIN}}$ & $\overline{\text{LIN}}$ - IR2182/IR21824)	V _{SS}	V _{CC}	
V _{SS}	Logic ground (IR21814/IR21824 only)	-5	5	
T _A	Ambient temperature	-40	125	°C

Note 1: Logic operational for V_S of -5 to +600V. Logic state held for V_S of -5V to -V_{BS}.

Dynamic Electrical Characteristics

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

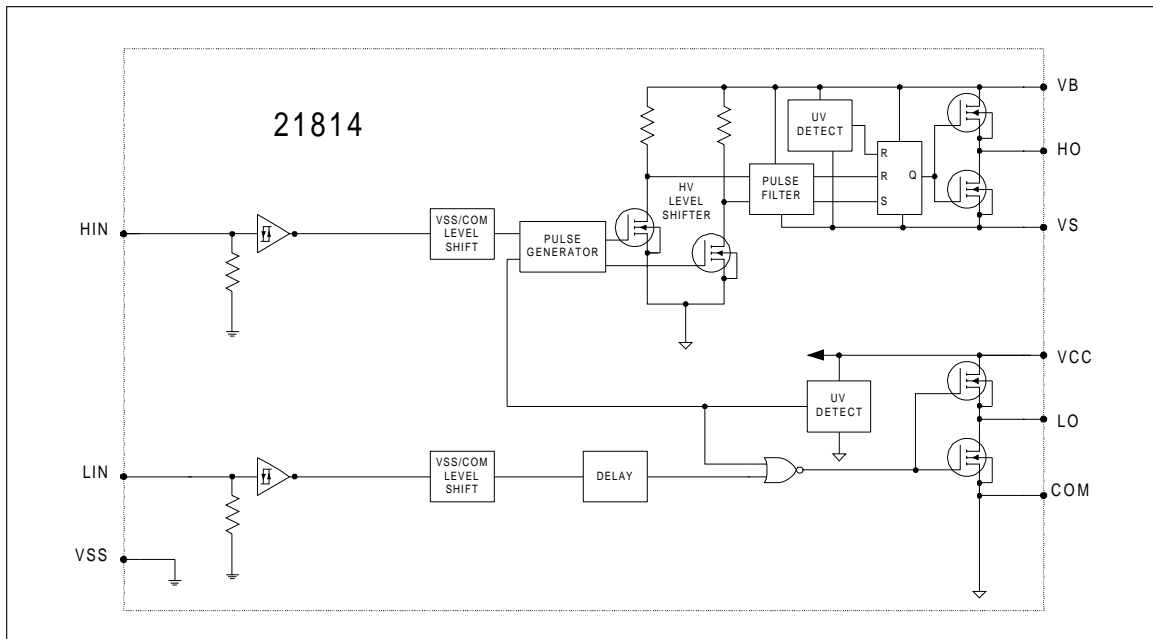
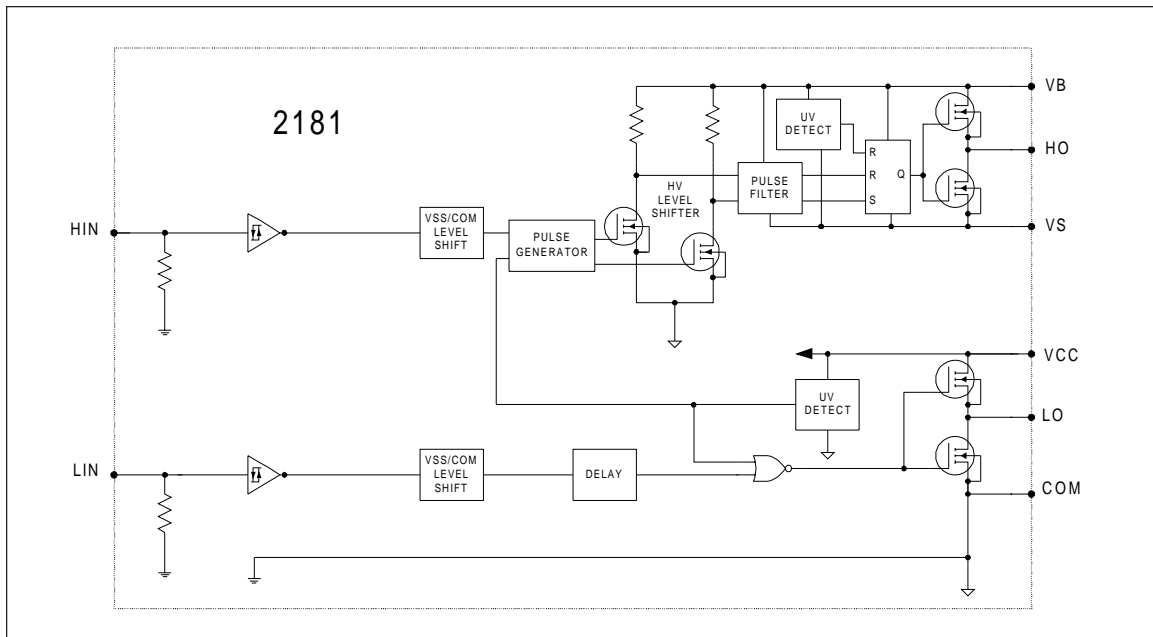
Symbol	Definition	Min.	Typ.	Max.	Units	Test Conditions
t_{on}	Turn-on propagation delay	—	180	270	nsec	$V_S = 0V$
t_{off}	Turn-off propagation delay	—	170	250		$V_S = 0V$ or 600V
MT	Delay matching, HS & LS turn-on/off	—	0	50		
t_r	Turn-on rise time	—	40	60		$V_S = 0V$
t_f	Turn-off fall time	—	20	30		$V_S = 0V$

Static Electrical Characteristics

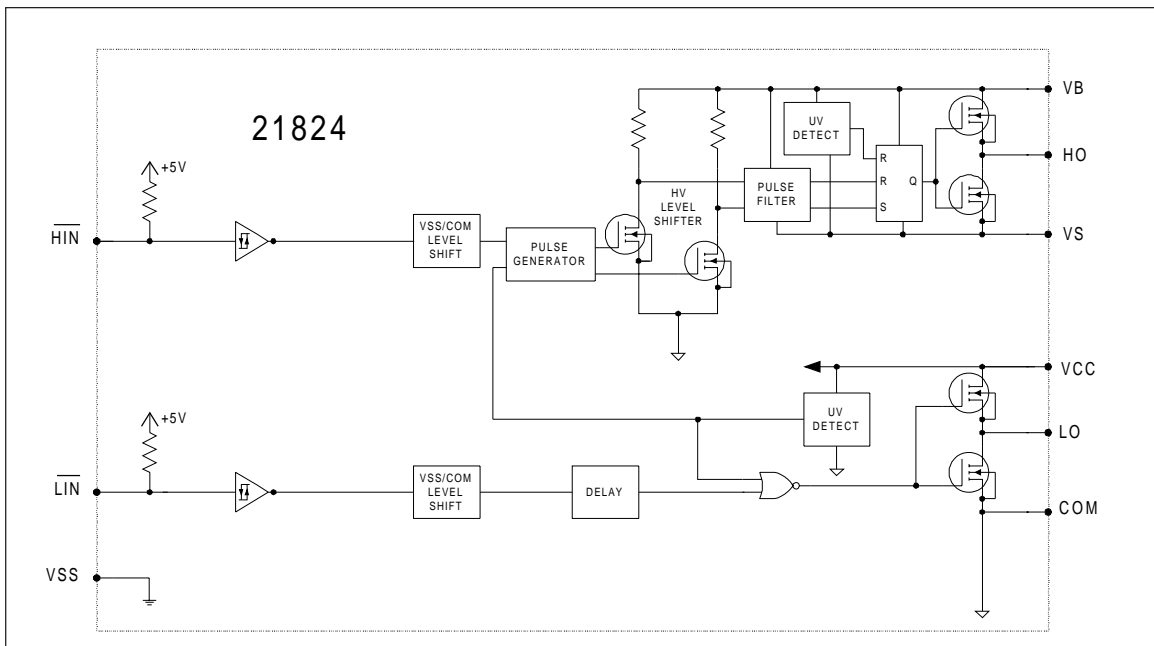
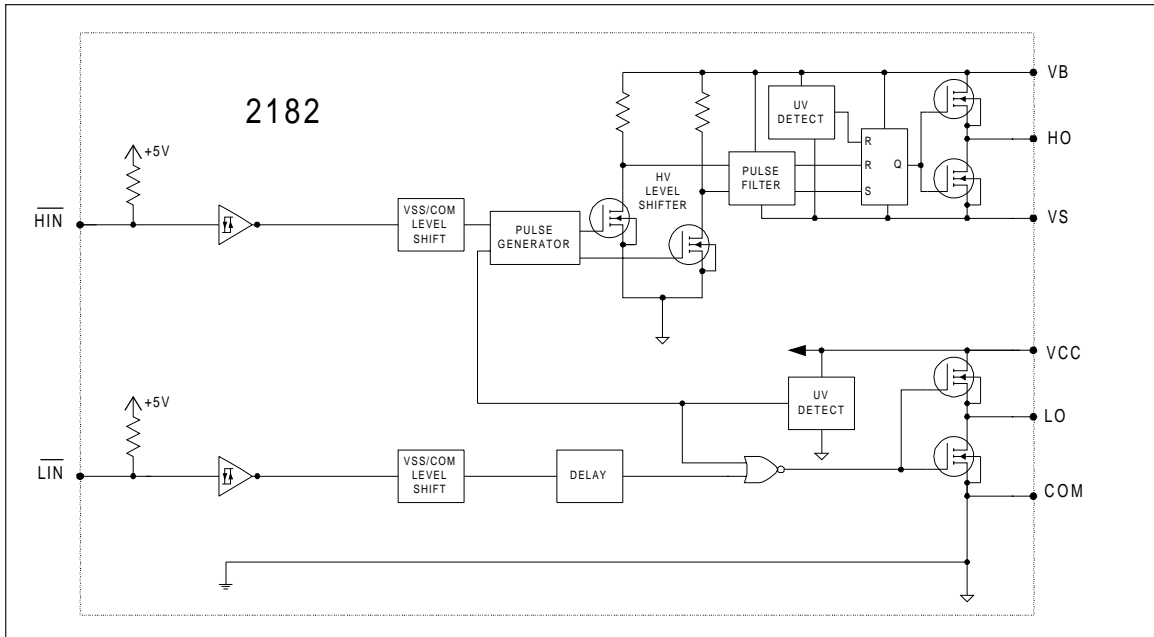
V_{BIAS} (V_{CC} , V_{BS}) = 15V, V_{SS} = COM and T_A = 25°C unless otherwise specified. The V_{IL} , V_{IH} and I_{IN} parameters are referenced to V_{SS}/COM and are applicable to the respective input leads: HIN and LIN (IR2181/IR21814) and HIN and LIN (IR2182/IR21824). The V_O , I_O and R_{on} parameters 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 (IR2181/IR21814) Logic "0" input voltage (IR2182/IR21824)	2.7	—	—	V	$V_{CC} = 10V$ to 20V
V_{IL}	Logic "0" input voltage (IR2181/IR21814) Logic "1" input voltage (IR2182/IR21824)	—	—	0.8		$V_{CC} = 10V$ to 20V
V_{OH}	High level output voltage, $V_{BIAS} - V_O$	—	—	1.2		$I_O = 0A$
V_{OL}	Low level output voltage, V_O	—	—	0.1		$I_O = 0A$
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	50	120	240		$V_{IN} = 0V$ or 5V
I_{IN+}	Logic "1" input bias current	—	20	40		$V_{IN} = 5V$ (IR2181(4)) $V_{IN} = 0V$ (IR2182(4))
I_{IN-}	Logic "0" input bias current	—	—	1.0		$V_{IN} = 0V$ (IR2181(4)) $V_{IN} = 5V$ (IR2182(4))
V_{CCUV+} V_{BSUV+}	V_{CC} and V_{BS} supply undervoltage positive going threshold	8.0	8.9	9.8	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	1.7	2	—	A	$V_O = 0V$, $PW \leq 10 \mu s$
I_{O-}	Output low short circuit pulsed current	1.7	2	—		$V_O = 15V$, $PW \leq 10 \mu s$

Functional Block Diagram



IR2181/IR21814/IR2182/IR21824

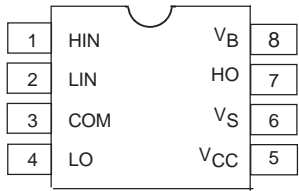
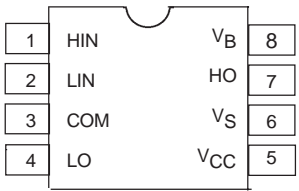


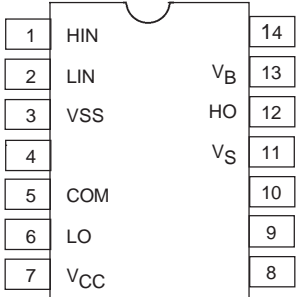
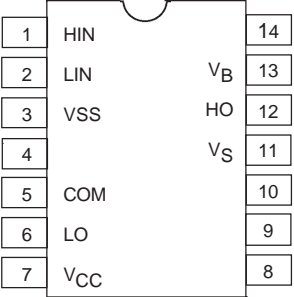
IR2181/IR21814/IR2182/IR21824

Lead Definitions

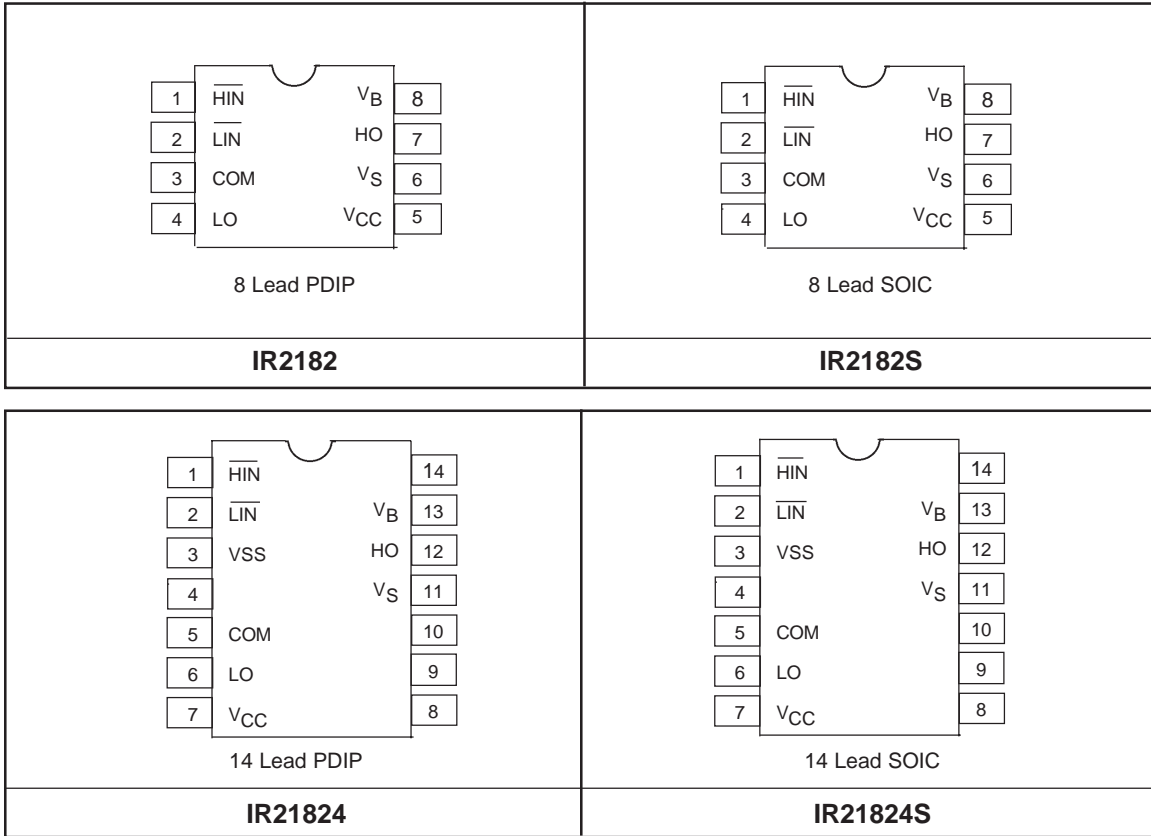
Symbol	Description
HIN	Logic input for high side gate driver output (HO), in phase (IR2181/IR21814)
$\overline{\text{HIN}}$	Logic input for high side gate driver output (HO), out of phase (IR2182/IR21824)
LIN	Logic input for low side gate driver output (LO), in phase (IR2181/IR21814)
$\overline{\text{LIN}}$	Logic input for low side gate driver output (LO), out of phase (IR2182/IR21824)
VSS	Logic Ground (IR21814 and IR21824 only)
V _B	High side floating supply
HO	High side gate drive output
V _S	High side floating supply return
V _{CC}	Low side and logic fixed supply
LO	Low side gate drive output
COM	Low side return

Lead Assignments

 <p>8 Lead PDIP</p> <p>IR2181</p>	 <p>8 Lead SOIC</p> <p>IR2181S</p>
---	---

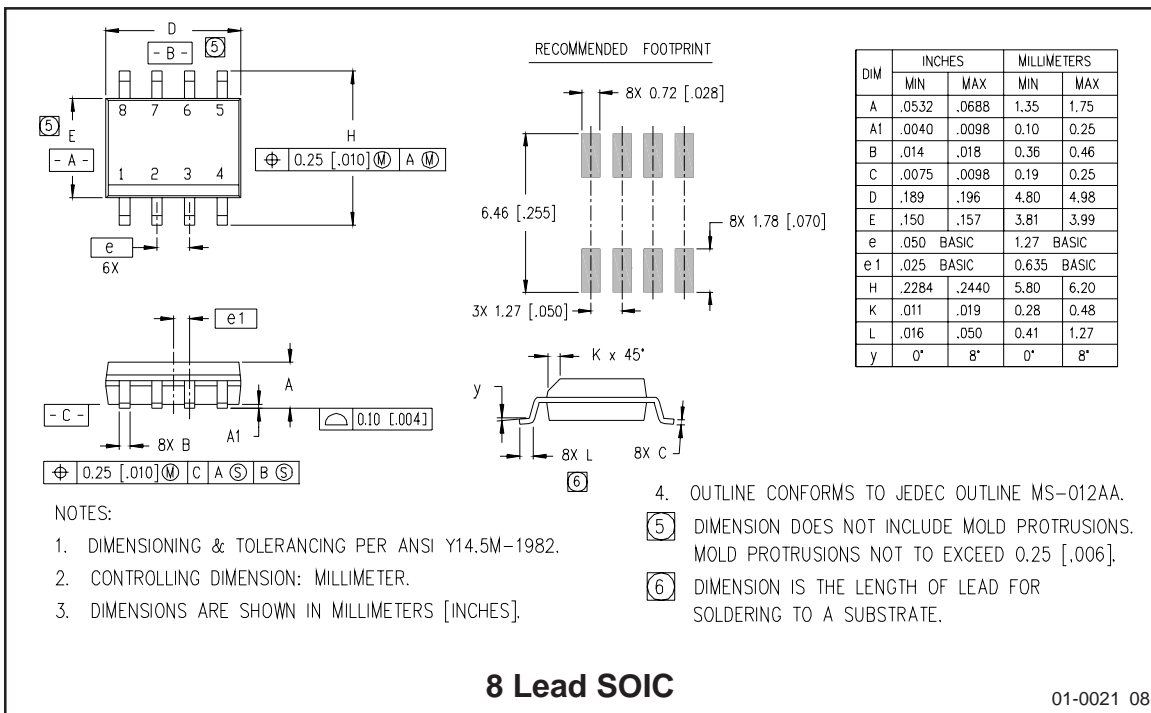
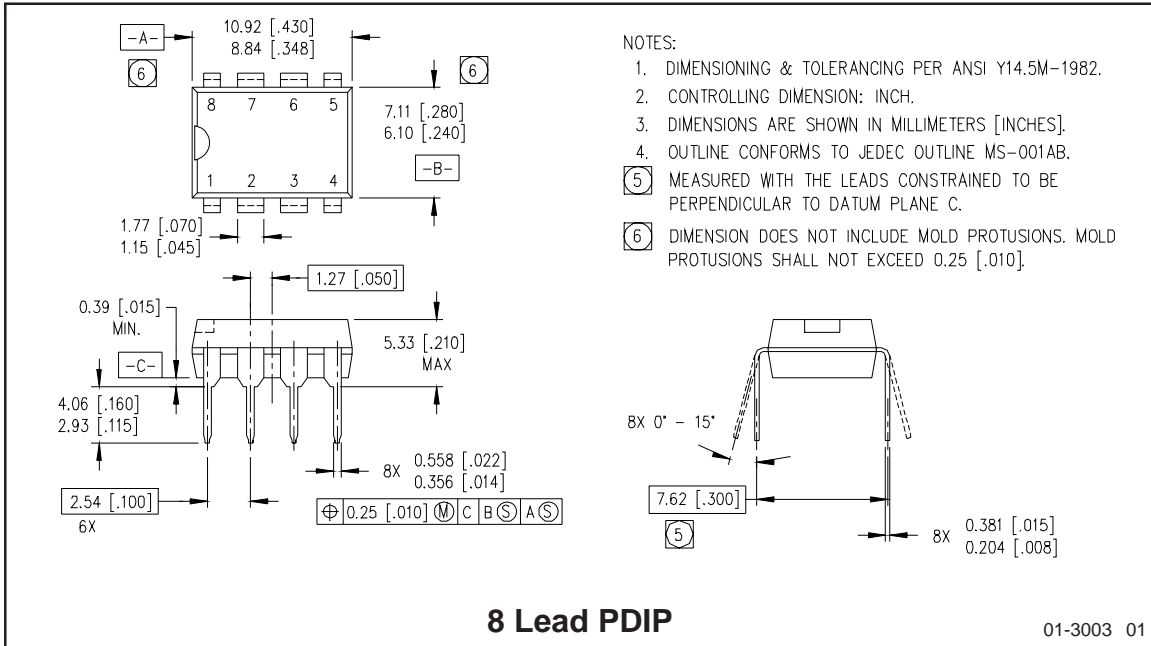
 <p>14 Lead PDIP</p> <p>IR21814</p>	 <p>14 Lead SOIC</p> <p>IR21814S</p>
---	---

IR2181/IR21814/IR2182/IR21824

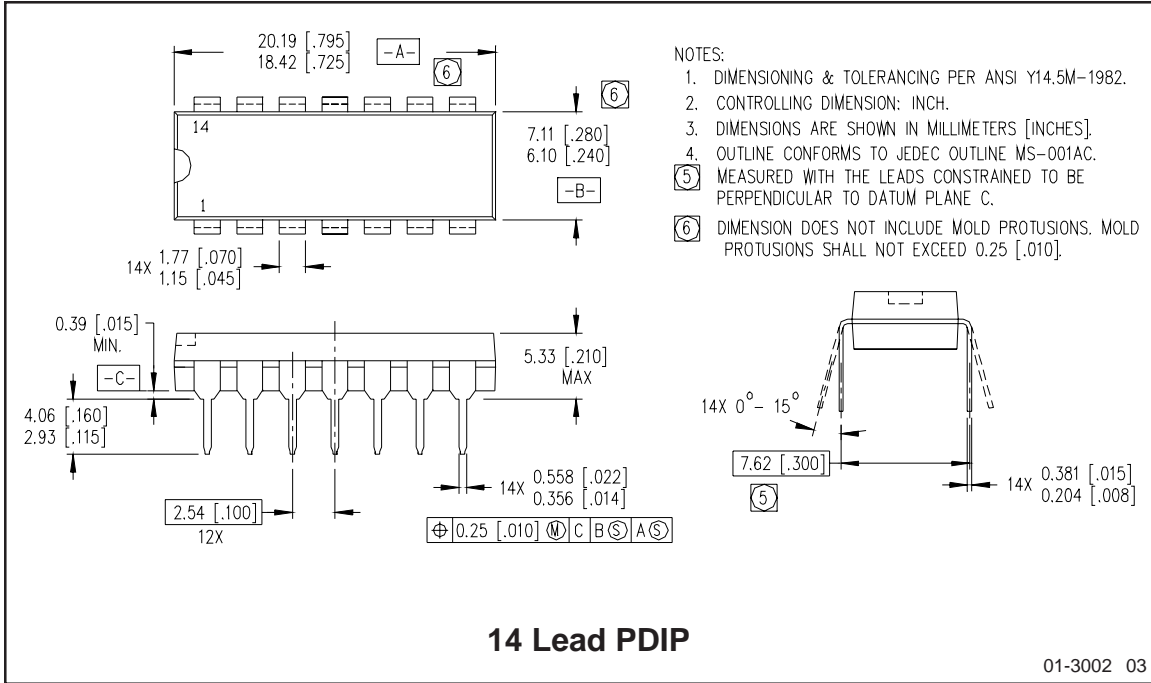


IR2181/IR21814/IR2182/IR21824

International
IR Rectifier

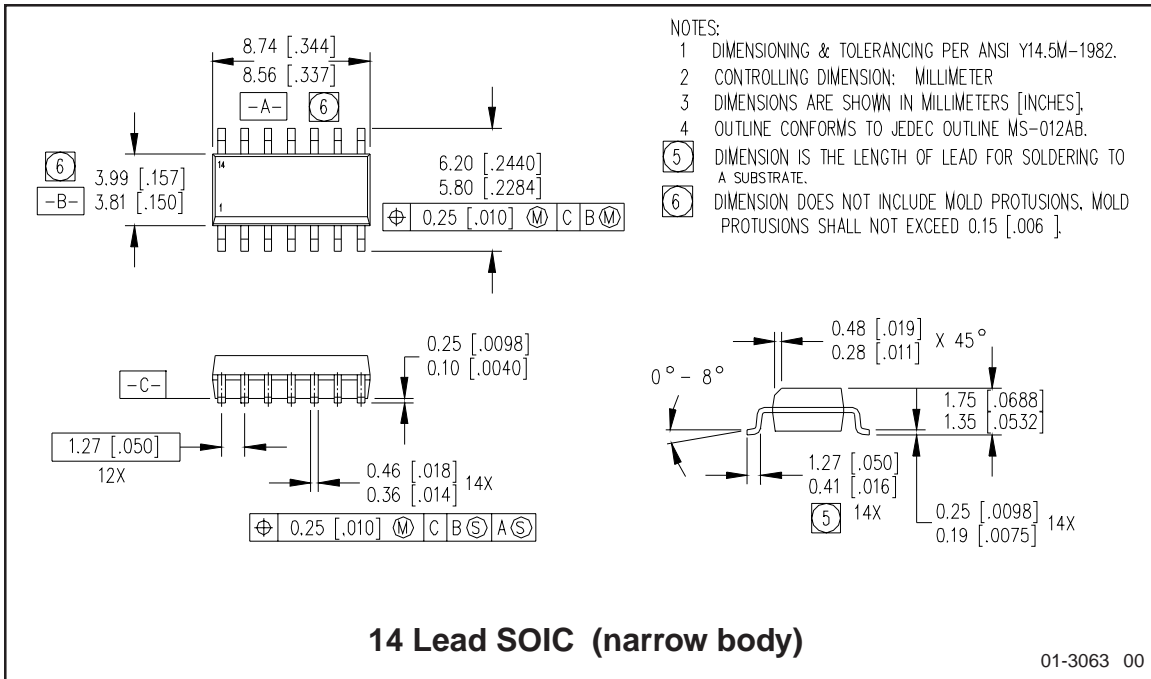


IR2181/IR21814/IR2182/IR21824



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-001AC.
- 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].



NOTES:

1. DIMENSIONING & TOLERANCING PER ANSI Y14.5M-1982.
2. CONTROLLING DIMENSION: MILLIMETER
3. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
4. OUTLINE CONFORMS TO JEDEC OUTLINE MS-012AB.
- ⑤ DIMENSION IS THE LENGTH OF LEAD FOR SOLDERING TO A SUBSTRATE.
- ⑥ DIMENSION DOES NOT INCLUDE MOLD PROTUSIONS. MOLD PROTUSIONS SHALL NOT EXCEED 0.15 [.006].

IR2181/IR21814/IR2182/IR21824

International
IR Rectifier

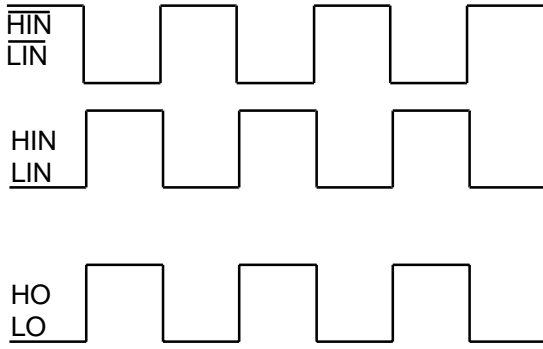


Figure 1. Input/Output Timing Diagram

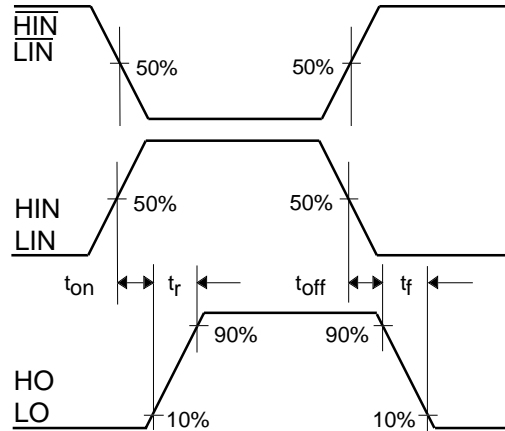


Figure 2. Switching Time Waveform Definitions

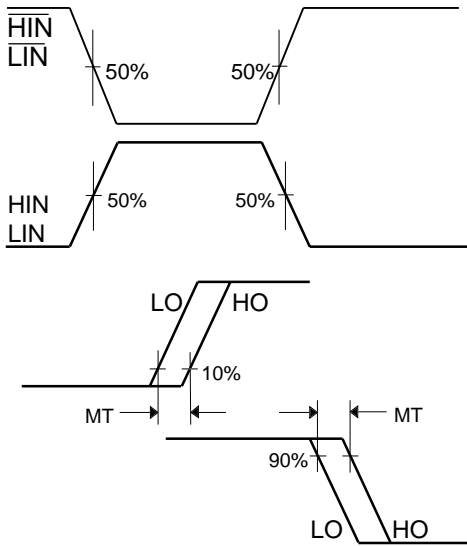


Figure 3. Delay Matching Waveform Definitions

International
IR Rectifier

WORLD HEADQUARTERS: 233 Kansas St., El Segundo, California 90245 Tel: (310) 322 3331

IR GREAT BRITAIN: Hurst Green, Oxted, Surrey RH8 9BB, UK Tel: ++ 44 1883 732020

IR JAPAN: K&H Bldg., 2F, 30-4 Nishi-Ikebukuro 3-Chome, Toshima-Ku, Tokyo, Japan 171-0021 Tel: 8133 983 0086

IR HONG KONG: Unit 308, #F, New East Ocean Centre, No. 9 Science Museum Road, Tsimshatsui East, Kowloon, Hong

Kong Tel: (852) 2803-7380

<http://www.irf.com/>

Data and specifications subject to change without notice. 7/5/99