

IR2122(S)

CURRENT SENSING SINGLE CHANNEL 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
- 3.3V, 5V and 15V input logic compatible
- FAULT lead indicates shutdown has occurred
- Output out of phase with input

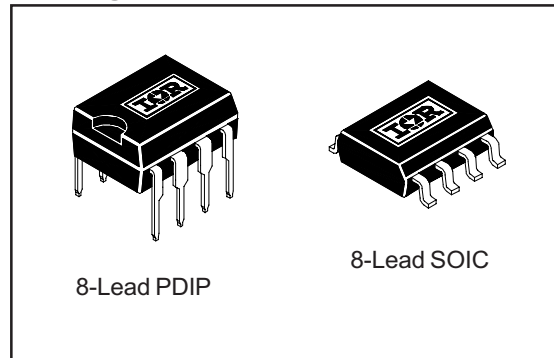
Description

The IR2122(S) is a high voltage, high speed power MOSFET and IGBT driver. Proprietary HVIC and latch immune CMOS technologies enable ruggedized monolithic construction. The logic input is compatible with standard CMOS or LSTTL outputs, down to 3.3V. The protection circuitry detects over-current in the driven power transistor and terminates the gate drive voltage. An open drain FAULT signal is provided to indicate that an over-current shutdown has occurred. The output driver features a high pulse current buffer stage designed for minimum cross-conduction. The floating channel can be used to drive an N-channel power MOSFET or IGBT in the high side or low side configuration which operates up to 600 volts.

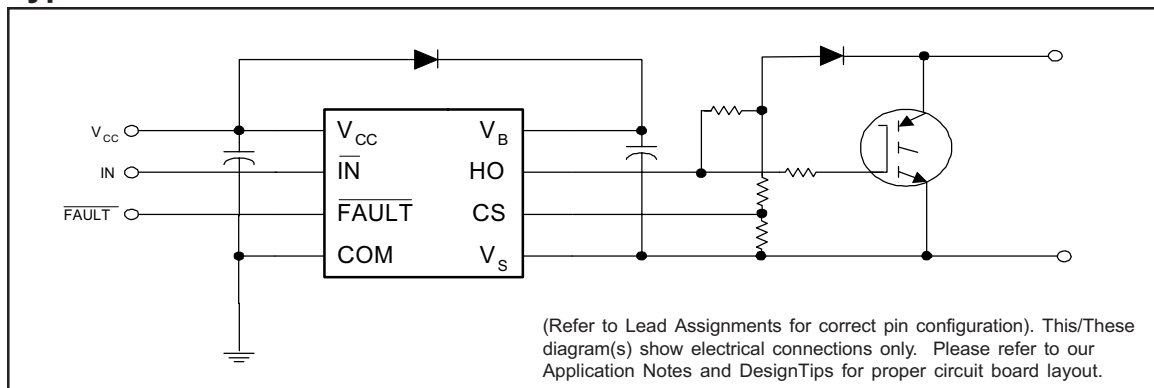
Product Summary

V_{OFFSET}	600V max.
I_{O+/-}	110 mA / 110 mA
V_{OUT}	10 - 20V
V_{CSth}	500 mV
t_{on/off} (typ.)	250 & 200 ns

Packages



Typical Connection



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 Voltage	-0.3	625	V
V _S	High Side Floating 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}	Logic Supply Voltage	-0.3	25	
V _{IN}	Logic Input Voltage	-0.3	V _{CC} + 0.3	
V _{FLT}	FAULT Output Voltage	-0.3	V _{CC} + 0.3	
V _{CS}	Current Sense Voltage	V _S - 0.3	V _B + 0.3	
dV _S /dt	Allowable Offset Supply Voltage Transient	—	50	V/ns
P _D	Package Power Dissipation @ T _A ≤ +25°C (8 Lead DIP)	—	1.0	W
	(8 Lead SOIC)	—	0.625	
R _{THJA}	Thermal Resistance, Junction to Ambient (8 Lead DIP)	—	125	°C/W
	(8 Lead SOIC)	—	200	
T _J	Junction Temperature	—	150	°C
T _S	Storage Temperature	-55	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 offset rating is tested with all supplies biased at 15V differential.

Symbol	Definition	Min.	Max.	Units
V _B	High Side Floating Supply Voltage	V _S + 13	V _S + 20	V
V _S	High Side Floating Offset Voltage	Note 1	600	
V _{HO}	High Side Floating Output Voltage	V _S	V _B	
V _{CC}	Logic Supply Voltage	13	20	
V _{IN}	Logic Input Voltage	0	V _{CC}	
V _{FLT}	FAULT Output Voltage	0	V _{CC}	
V _{CS}	Current Sense Signal Voltage	V _S	V _S + 5	°C
T _A	Ambient Temperature	-40	150	

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, C_L = 1000 pF and T_A = 25°C unless otherwise specified. The dynamic electrical characteristics are measured using the test circuit shown in Figure 3.

Symbol	Definition	Min.	Typ.	Max.	Units	Test Conditions
t_{on}	Turn-On Propagation Delay	—	250	—	ns	$V_S = 0V$
t_{off}	Turn-Off Propagation Delay	—	200	—		$V_S = 600V$
t_r	Turn-On Rise Time	—	250	—		$C_L = 1000$ pF
t_f	Turn-Off Fall Time	—	250	—		$C_L = 1000$ pF
t_{bl}	Start-Up Blanking Time	500	900	—		
t_{cs}	CS Shutdown Propagation Delay	—	350	—		
t_{fit}	CS to \overline{FAULT} Pull-Up Propagation Delay	—	450	—		

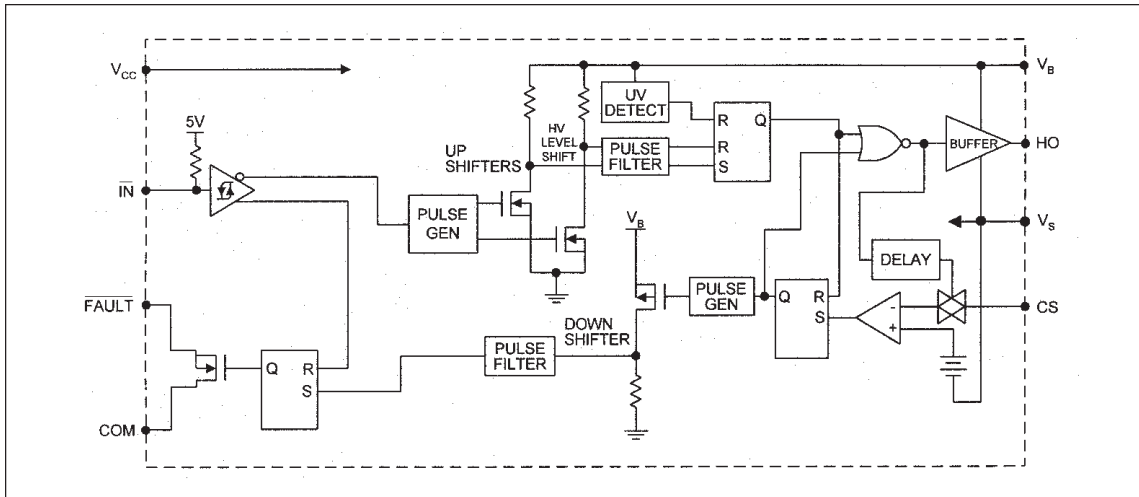
Static Electrical Characteristics

V_{BIAS} (V_{CC} , V_{BS}) = 15V and T_A = 25°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 V_S .

Symbol	Definition	Min.	Typ.	Max.	Units	Test Conditions
V_{IH}	Logic "0" Input Voltage (OUT = LO)	3.0	—	—	V	$V_{CC} = 10V$ to 20V
V_{IL}	Logic "1" Input Voltage (OUT = HI)	—	—	0.8		$V_{CC} = 10V$ to 20V
V_{CSTH+}	CS Input Positive Going Threshold	350	500	650	mV	$V_{CC} = 10V$ to 20V
V_{OH}	High Level Output Voltage, $V_{BIAS} - V_O$	—	—	100		$I_O = 0A$
V_{OL}	Low Level Output Voltage, V_O	—	—	100		$I_O = 0A$
I_{LK}	Offset Supply Leakage Current	—	—	50		$V_B = V_S = 600V$
I_{QBS}	Quiescent V_{BS} Supply Current	—	150	350	μA	$V_{IN} = 0V$ or 5V
I_{QCC}	Quiescent V_{CC} Supply Current	—	60	120		$V_{IN} = 0V$ or 5V
I_{IN+}	Logic "1" Input Bias Current	—	7.0	15		$V_{IN} = 0V$
I_{IN-}	Logic "0" Input Bias Current	—	—	1.0		$V_{IN} = 5V$
I_{CS+}	"High" CS Bias Current	—	—	1.0		$V_{CS} = 3V$
I_{CS-}	"High" CS Bias Current	—	—	1.0		$V_{CS} = 0V$
V_{BSUV+}	V_{BS} Supply Undervoltage Positive Going Threshold	10.0	11.4	13.0	V	
V_{BSUV-}	V_{BS} Supply Undervoltage Negative Going Threshold	9.5	10.4	12.5		
I_{O+}	Output High Short Circuit Pulsed Current	110	130	—	mA	$V_O = 0V$, $V_{IN} = 0V$ $PW \leq 10$ μs
I_{O-}	Output Low Short Circuit Pulsed Current	110	130	—		$V_O = 15V$, $V_{IN} = 5V$ $PW \leq 10$ μs

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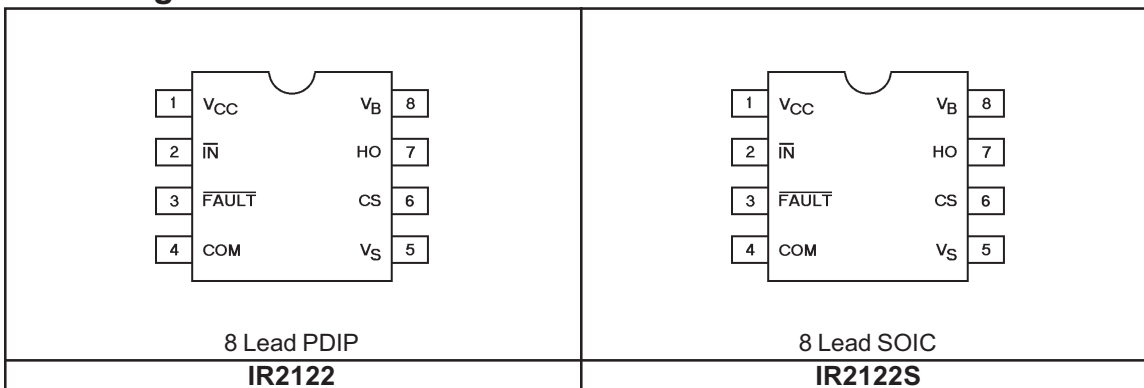
Functional Block Diagram



Lead Definitions

Symbol	Description
V_{CC}	Logic and gate drive supply
\overline{IN}	Logic input for gate driver output (HO), out of phase with HO
\overline{FAULT}	Indicates over-current shutdown has occurred, negative logic
COM	Logic ground
V_B	High side floating supply
HO	High side gate drive output
V_S	High side floating supply return
CS	Current sense input to current sense comparator

Lead Assignments



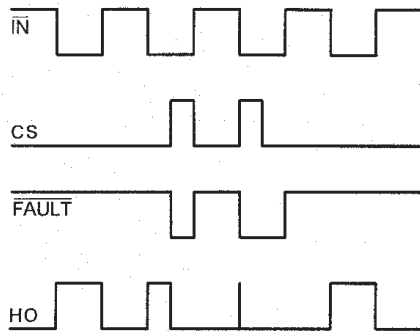


Figure 1. Input/Output Timing Diagram

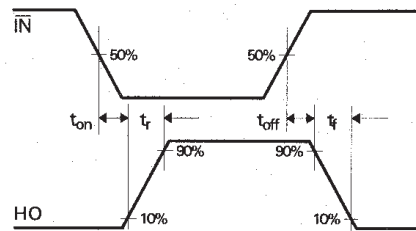


Figure 2. Switching Time Waveform Definition

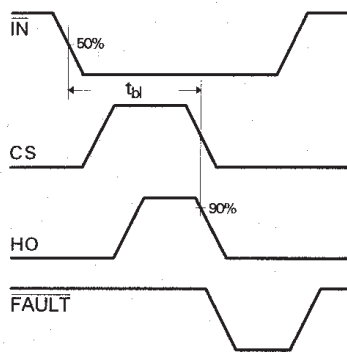


Figure 3. Start-up Blanking Time Waveform Definitions

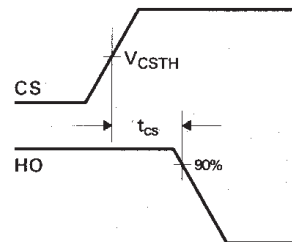


Figure 4. CS Shutdown Waveform Definitions

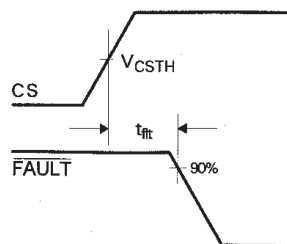


Figure 5. CS to $\overline{\text{FAULT}}$ Waveform Definitions

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Case outlines

8-Lead PDIP

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

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 SOIC

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

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	
e1	.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 PROTUSIONS. MOLD PROTUSIONS NOT TO EXCEED 0.15 [.006].
- ⑥ DIMENSION DOES NOT INCLUDE MOLD PROTUSIONS. MOLD PROTUSIONS NOT TO EXCEED 0.25 [.010].
- ⑦ DIMENSION IS THE LENGTH OF LEAD FOR SOLDERING TO A SUBSTRATE.

IR WORLD HEADQUARTERS: 233 Kansas St., El Segundo, California 90245 Tel: (310) 252-7105
Data and specifications subject to change without notice. 2/2/2005