

IR2127

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
- 5V Schmitt-triggered input logic
- FAULT lead indicates shutdown has occurred
- Output in phase with input

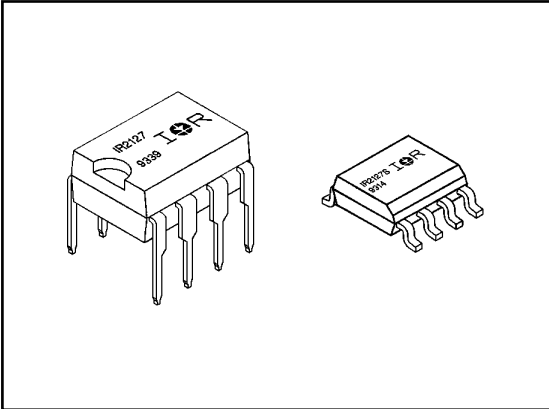
Product Summary

V_{OFFSET}	600V max.
I_{O+/-}	200 mA / 420 mA
V_{OUT}	10 - 20V
V_{CSth}	250 mV
t_{on/off} (typ.)	150 & 100 ns

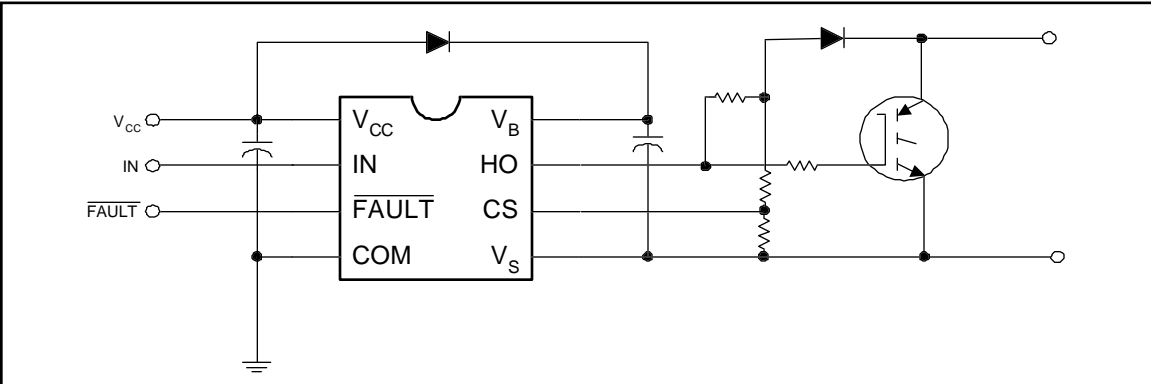
Description

The IR2127 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. 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.

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	Parameter Definition	Value		Units
		Min.	Max.	
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 _{θJA}	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	Parameter Definition	Value		Units
		Min.	Max.	
V _B	High Side Floating Supply Voltage	V _S + 10	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	11.8	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	
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, 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.

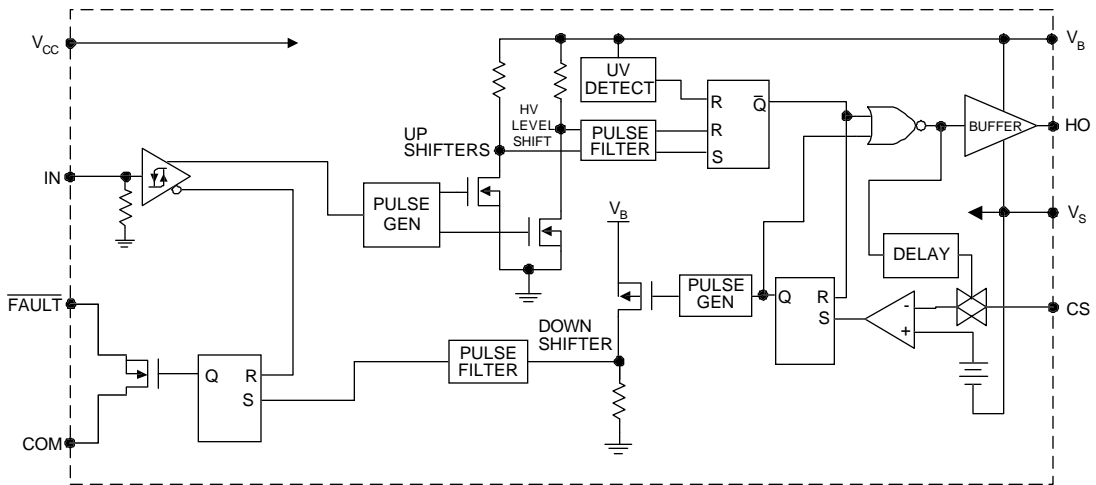
Symbol	Parameter Definition	Value			Units	Test Conditions
		Min.	Typ.	Max.		
t_{on}	Turn-On Propagation Delay	—	150	200	ns	$V_S = 0V$
t_{off}	Turn-Off Propagation Delay	—	100	150		$V_S = 600V$
t_r	Turn-On Rise Time	—	80	120		
t_f	Turn-Off Fall Time	—	40	60		
t_{bl}	Start-Up Blanking Time	500	750	900		
t_{cs}	CS Shutdown Propagation Delay	—	240	360		
t_{flt}	CS to \overline{FAULT} Pull-Up Propagation Delay	—	340	510		

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	Parameter Definition	Value			Units	Test Conditions
		Min.	Typ.	Max.		
V_{IH}	Logic "1" Input Voltage	2.7	—	—	V	$V_{CC} = 10V$ to $20V$
V_{IL}	Logic "0" Input Voltage	—	—	0.8		$V_{CC} = 10V$ to $20V$
V_{CSTH+}	CS Input Positive Going Threshold	180	250	320	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	μA	$V_B = V_S = 600V$
I_{QBS}	Quiescent V_{BS} Supply Current	—	150	300		$V_{IN} = 0V$ 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		$V_{IN} = 5V$
I_{IN-}	Logic "0" Input Bias Current	—	—	1.0		$V_{IN} = 0V$
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	8.8	10.3	11.8	V	
V_{BSUV-}	V_{BS} Supply Undervoltage Negative Going Threshold	7.5	9.0	10.6		
I_{O+}	Output High Short Circuit Pulsed Current	200	250	—	mA	$V_O = 0V$, $V_{IN} = 5V$ $PW \leq 10 \mu s$
I_{O-}	Output Low Short Circuit Pulsed Current	420	500	—		$V_O = 15V$, $V_{IN} = 0V$ $PW \leq 10 \mu s$

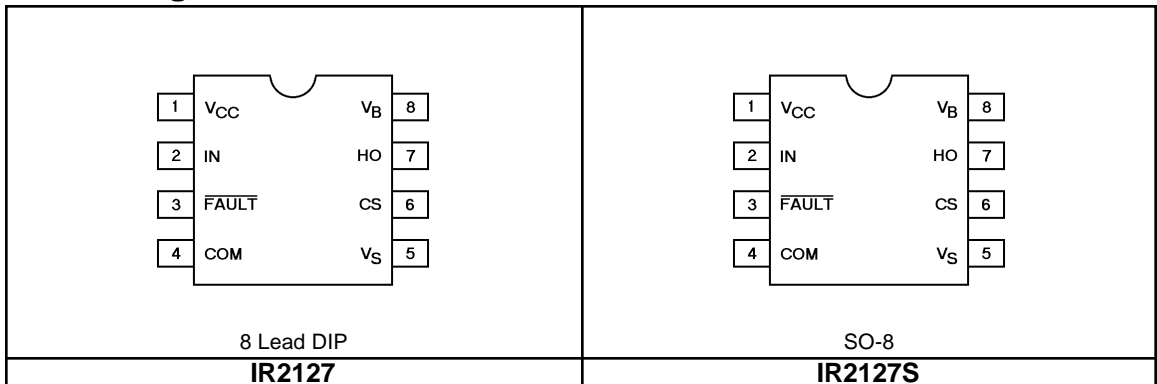
Functional Block Diagram



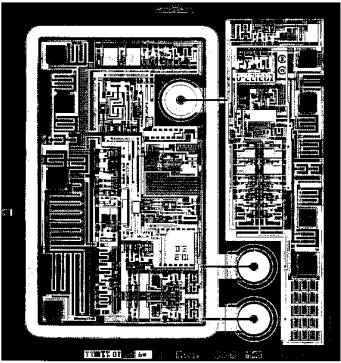
Lead Definitions

Symbol	Description
V_{CC}	Logic and gate drive supply
IN	Logic input for gate driver output (HO), in 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



Device Information

Process & Design Rule		HVDCMOS 4.0 μ m
Transistor Count		206
Die Size		77 X 85 X 26 (mil)
Die Outline		
Thickness of Gate Oxide		800Å
Connections	Material	Poly Silicon
	First Layer	Width Spacing Thickness
Second Layer	Material	Al - Si (Si: 1.0% \pm 0.1%)
	Width Spacing Thickness	6 μ m 7 μ m 20,000Å
	Contact Hole Dimension	8 μ m X 8 μ m
Insulation Layer	Material	PSG (SiO ₂)
	Thickness	1.5 μ m
Passivation	Material	PSG (SiO ₂)
	Thickness	1.5 μ m
Method of Saw		Full Cut
Method of Die Bond		Ablebond 84 - 1
Wire Bond	Method	Thermo Sonic
	Material	Au (1.0 mil / 1.3 mil)
Leadframe	Material	Cu
	Die Area	Ag
	Lead Plating	Pb : Sn (37 : 63)
Package	Types	8 Lead PDIP / SO-8
	Materials	EME6300 / MP150 / MP190
Remarks:		

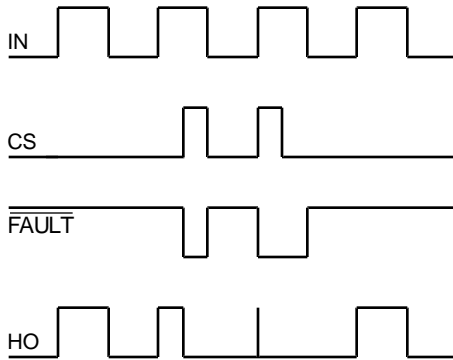


Figure 1. Input/Output Timing Diagram

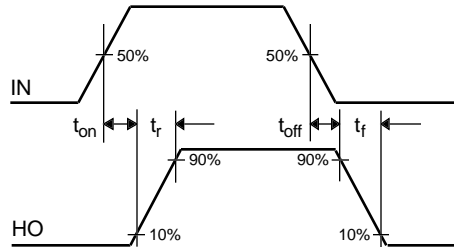


Figure 2. Switching Time Waveform Definition

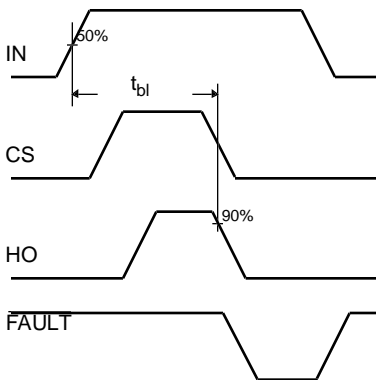


Figure 3. Start-up Blanking Time Waveform Definitions

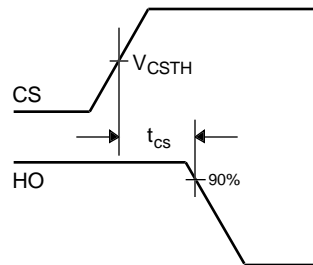


Figure 4. CS Shutdown Waveform Definitions

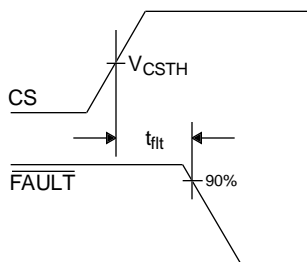


Figure 5. CS to $\overline{\text{FAULT}}$ Waveform Definitions