High Side Switch with Input Overvoltage and Overcurrent Protection

The project here is a 48V protected, high side switch designed to switch a 5A output load from input voltages from 8V to 48V. The circuit helps the user to easily ON/OFF the high current and voltage load with over-voltage lockout and over-current protection. The wide input range and low shutdown current (1µA typical) make it suitable for automotive, industrial, medical instruments, and telecom applications. This board offers a low 50ns (typical) propagation delay, fast switching times (<10ns), and 100% duty cycle operation. The project is based on LTC7000 which is a fast high voltage protected high side N-channel MOSFET driver. An internal charge pump fully enhances an external N-channel MOSFET switch, allowing it to remain on indefinitely. Its powerful gate driver can drive large gate capacitance MOSFETs with very short transition times, ideal for both high-frequency switching and static switch applications.

The circuit operates over an 8V to 48V input supply range. When an external current sense resistor and internal comparator sense that the switch current has exceeded a pre-set level, a fault flag is asserted and the switch is turned off after a period of time set by an external timing capacitor C7. After a cooldown period, it goes back on. The circuit is also configured to act when an overvoltage condition occurs. When voltage rise more than setpoint of 48V it switches off the output and remains off until input is cycled. Resistors R7, R8 are provided to set the overvoltage lockout, R10 sets the overcurrent limit, U2 5V is a regulator, Pin 3 (IMP) of CN3-CN4 provided to enable the output. This pin needs a High-level TTL-5V signal to enable the output, connect this pin to 5V to enable the output. When a fault condition occurs, disconnect the IMP pin from 5V and connect it to GND, pull up this pin to recycle the output.

Note: Note: The project can be set for higher voltage and current, refer to the datasheet to configure the board for higher voltage up to 135V and current up to 10A.

Features

- Supply 8V to 48V DC
- Load Current 5Amps
- Over Voltage threshold 48V
- Easy On/OFF the high voltage and High Current Load
- Overvoltage Lockout
- Over Current Protection
- PCB Dimensions 61.28MM X 43.66 MM



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CN1 VIN 0.47 uF/63 R1 10E 100uF/63/ \langle C1 C2 \oslash 0.47 uF/63V U1 LTC7000 DC IN C3 \bigtriangledown 16 R3 0E C4 1K SNS+ DNF RUN 2 0.005E SNS-VIN R4 100E 3 14 BST VCC R11 R5 TL783 4 13 VCCUV TS C5 0.1uF 2 3 5V **POOL** R6 IN 5 12 ~ FAULT TGUP Q1 100K R7 N051 6 11 U2 FDD86369 TGDN TIMER 10uF/10V C6 INP7 10 IM R12 1uF IMON CN2 R13 B022 INP VOP DNP 82E C10 8 9 G 0.47uF/63 N OVLO ISET 19.1K 8 R10 0.47 uF/63 C8 **R**9 GND GD 5V DNP CN3-CN4 D1 2 3 4 5 OP IP C7 1K GD $\overline{\vee}$ $\dot{-}$



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BOM						
NO.	QNTY.	REF.	DESC.	MANUFACTURER	SUPPLIER	SUPPLIER PART NO
1	1	CN1	2 PIN SCREW TERMINAL 5.08MM PITCH	PHOENIX	DIGIKEY	277-1247-ND
2	1	CN2	2 PIN SCREW TERMINAL 5.08MM PITCH	PHOENIX	DIGIKEY	277-1247-ND
3	1	CN3-CN4	5 PIN HEADER 2.54MM PITCH	WURTH	DIGIKEY	732-5318-ND
4	4	C1,C3,C8,C9	0.47uF/63V SMD SIZE 1206	MURATA/YAGEO	DIGIKEY	399-C1206C474KMREC7210CT-ND
5	1	C2	100uF/63V ELECTROLYTIC	NICHICON	DIGIKEY	493-6185-1-ND
6	2	C4,C7	1KPF/50V SMD SIZE 0805	MURATA/YAGEO	DIGIKEY	
7	1	C5	0.1uF/50V SMD SIZE 0805	MURATA/YAGEO	DIGIKEY	
8	1	C6	1uF/50V SMD SIZE 1206	MURATA/YAGEO	DIGIKEY	
9	3	D1,R9,R11	DNP			
10	1	Q1	FDD86369	ON SEMI	DIGIKEY	FDD86369OSCT-ND
11	1	R1	10E 5% SMD SIZE 1206	MURATA/YAGEO	DIGIKEY	
12	2	R2,R3	0E SMD SIZE 0805	MURATA/YAGEO	DIGIKEY	
13	1	R4	100E 5% SMD SIZE 0805	MURATA/YAGEO	DIGIKEY	
14	1	R5	0.005E 1% SMD SIZE 2512	ROHM	DIGIKEY	RHM.005AUCT-ND
15	1	R6	100K 1% SMD SIZE 0805	MURATA/YAGEO	DIGIKEY	
16	1	R7	750K 1% SMD SIZE 0805	MURATA/YAGEO	DIGIKEY	
17	1	R8	19.1K 1% SMD SIZE 0805	MURATA/YAGEO	DIGIKEY	
18	1	R10	75K 1% SMD SIZE 0805	MURATA/YAGEO	DIGIKEY	
19	1	R12	82E 1% SMD SIZE 0805	MURATA/YAGEO	DIGIKEY	
20	1	R13	270E 1% SMD SIZE 0805	MURATA/YAGEO	DIGIKEY	
21	1	U1	LTC7000	ANALOG DEVICE	DIGIKEY	LTC7000IMSE#PBF-ND
22	1	U2	LT783	TI	DIGIKEY	296-20778-1-ND
23	1	C10	10uF/10V SMD CAPACITOR SIZE 1206	SAMSUNG	DIGIKEY	1276-1137-1-ND











