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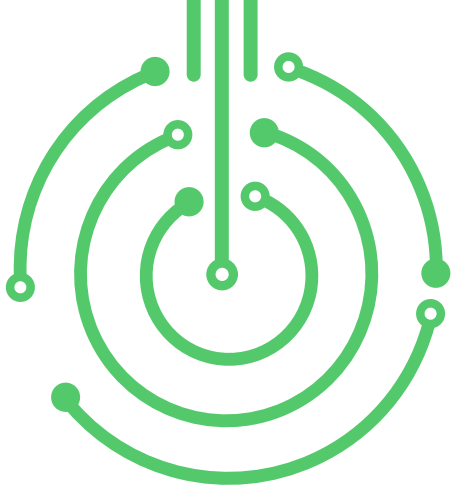


Isolated Undervoltage and Overvoltage Detection Module

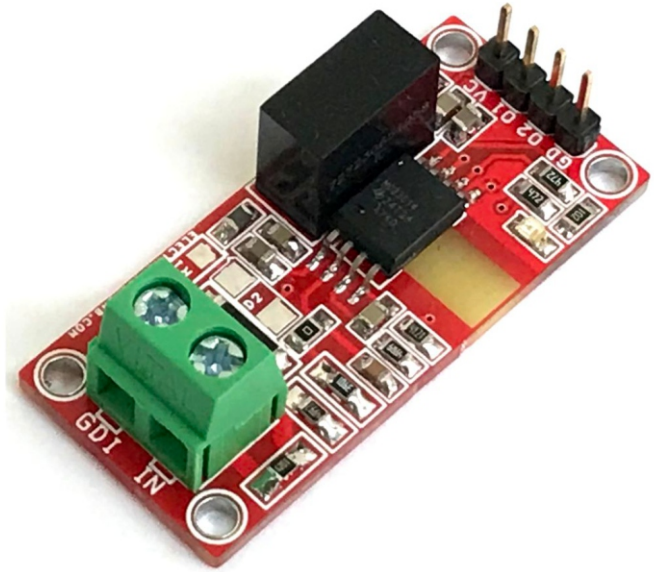
SKU: EL148677

Isolated Undervoltage and Overvoltage Detection Module

This high-speed, isolated Undervoltage and Overvoltage detection project is implemented with a dual isolated window comparator with an adjustable threshold (AMC23C14). This circuit is designed for industrial field-supply applications where the controller side must detect whether the remote module supply voltage is in a valid range.

FEATURES

- Power Supply 5V DC
- Input Signal 24V
- Over Voltage Level 28.8V
- Under Voltage Level 20.4V
- Output 1 and Output 2 Normally High, Low when Over/Under Condition Occurs
- Transient Response Time 390ns
- Trip threshold error: ±1% (max) at 250 mV
- Open-drain outputs with Pull Resistors
- Dual window comparator: – Window comparator 1: ±20-mV to ±300-mV adjustable
- threshold
- Window comparator 2: ±300-mV fixed threshold
- 7000-VPK reinforced isolation per DIN EN IEC 60747-17 (VDE 0884-17)
- 5000-VRMS isolation for 1 minute per Ul1577
- 4X2.5MM Mounting Hole
  PCB Dimensions 42.23X19.05MM



The AMC23C14 has open-drain outputs that are pulled up to VCC, and are driven low when the input voltage exceeds the threshold voltage of each comparator. In these measurements, OUT1 (trace 3) transitions low if Vsupply exceeds 28.8V, and OUT2 transitions low if Vsupply exceeds 20.8V. Component variations and the comparator hysteresis can affect the trip thresholds, but in this case, the trip point is within less than 1% of the desired values. The voltage thresholds vary slightly if Vsupply is rising or falling. The second waveform depicts this with OUT1 triggering at 28.6V instead of 28.8V.

U1 (CRE1S0505SC) is an isolated DC-DC converter that provides 5V to the input side circuitry. The module can be powered from input side power, using R11 1K SMD size 0805 and Zener diode 27V 1W SMD. Do not install U1 in this case, the output side requires separate 2.7V to 5.5V VCC.

OVER CURRENT AND SHORT CIRCUIT APPLICATION

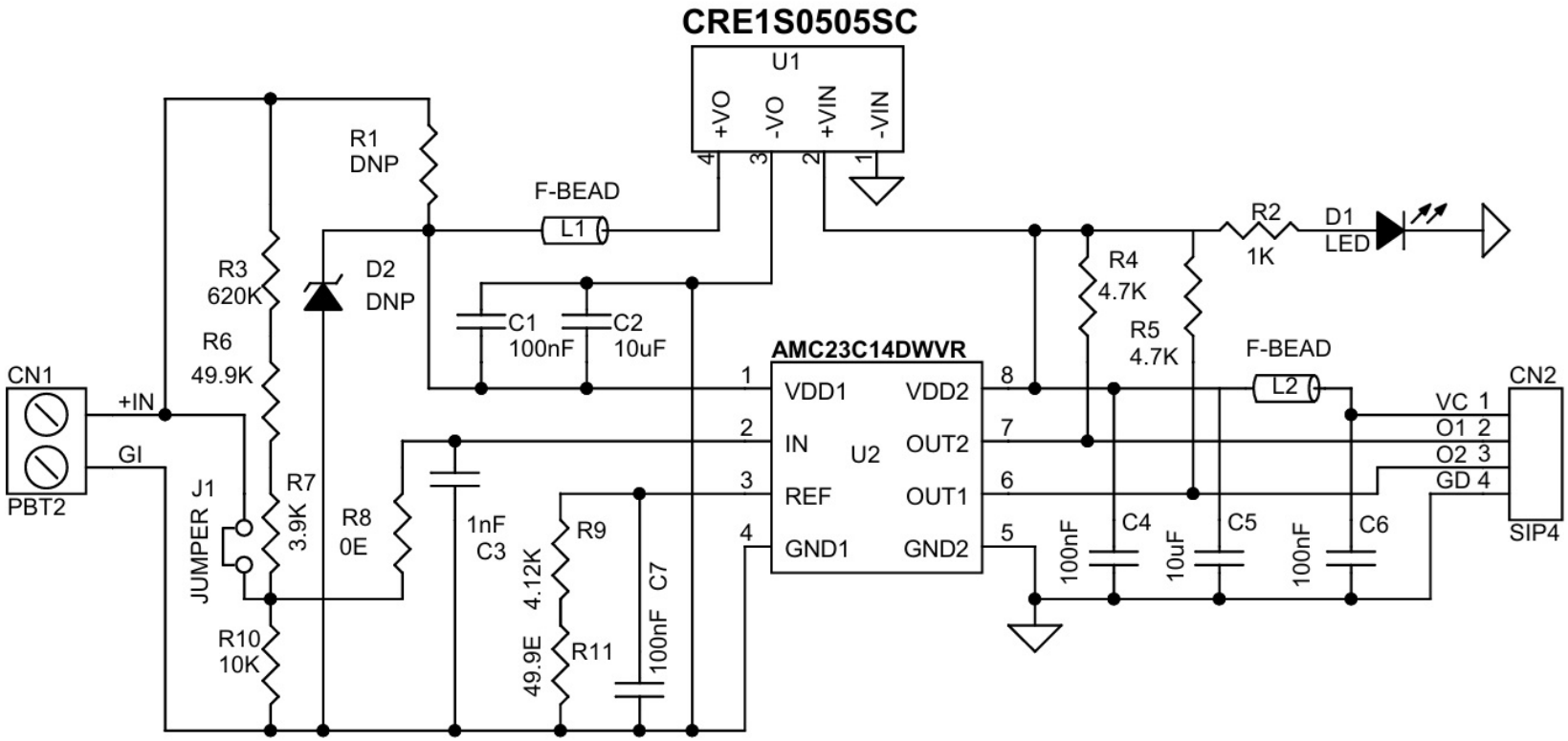
The project is designed for Under/Over voltage detection. However, the project also has provisions to be used for over-current and short-circuit detection. Read the datasheet of the chip for more info. Do not install R3, R6, and R7, Install R10 = 10mOhms SMD size 2512, solder jumper J1 under the PCB. This configuration will help you to detect over current and short circuit across the shunt resistor R10.

The AMC23C14 is a dual, isolated window comparator with a short response time. The open-drain outputs are separated from the input circuitry by an isolation barrier that is highly resistant to magnetic interference. This barrier is certified to provide reinforced galvanic isolation of up to 5 kVRMS according to VDE 0884-17 and UL1577, and supports a working voltage of up to 1 kVPK.

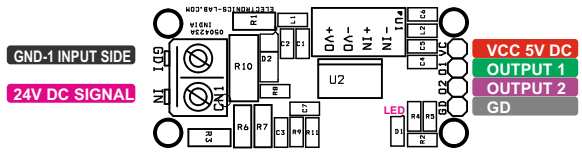
Both comparators have windows that are centred around 0 V, meaning that the comparators trip if the input exceeds the thresholds in a positive or negative direction. One comparator has fixed thresholds of ±300 mV. The second comparator has adjustable thresholds from ±20 mV to ±300 mV through a single external resistor.

The AMC23C14 also supports a positive-comparator only mode. When the voltage on the REF pin is greater than 550 mV, the negative comparators are disabled and only the positive comparators are functional. The reference voltage in this mode can be as high as 2.7 V. This mode is particularly useful for monitoring positive voltage supplies.

Schematic


CRE1S0505SC
U1
+VO
-VO
+VIN
-VIN
R1
DNP
F-BEAD
L1
R3
620K
D2
DNP
C1
100nF
C2
10uF
R6
49.9K
CN1
+IN
GI
PBT2
J1
JUMPER
R7
3.9K
R8
0E
1nF
C3
R9
4.12K
R10
10K
49.9E
R11
100nF
C7
AMC23C14DWVR
U2
VDD1
VDD2
IN
OUT2
REF
OUT1
GND1
GND2
R4
4.7K
R5
4.7K
R2
1K
D1
LED
F-BEAD
L2
C4
100nF
C5
10uF
C6
100nF
CN2
VC 1
O1 2
O2 3
GD 4
SIP4

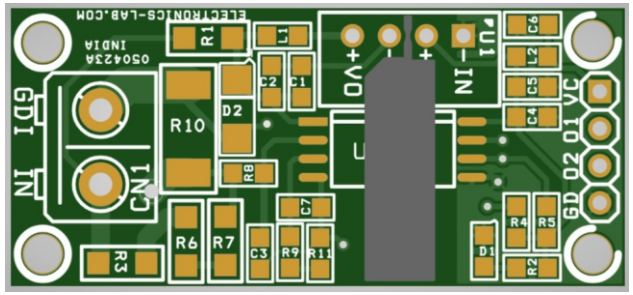
Connections

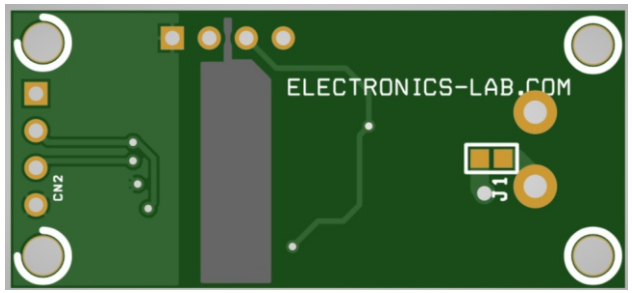


Connections

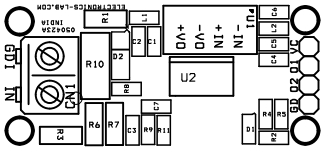
- CN1: Pin 1 Input Detection Power 24V DC, Pin 2 = GND
- CN2: Pin 1 = VCC 5V DC, Pin 2 = Output 1, Pin 3 = Output 2, Pin 4 = GND
- D1: Power LED

PCB

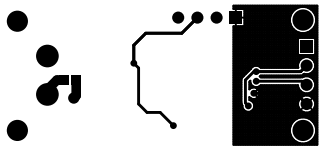




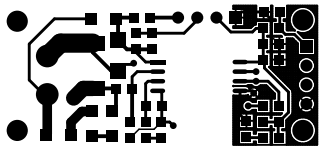
PCB GERBER FILES AVAILABLE



SILK SCREEN TOP



BOTTOM LAYER



TOP LAYER

PCB DIMENSIONS 42.23X19.05MM

Parts List

BOM						
NO.	QNTY.	REF.	DESC	MANUFACTURER	SUPPLIER	SUPPLIER PART NO
1	1	CN1	2 PIN SCREW TERMINAL PITCH 5.08MM	PHOENIX	DIGIKEY	277-1247-ND
2	1	CN2	4 PIN MALE HEADER PITCH 2.54MM	WURTH	DIGIKEY	732-5317-ND
3	4	C1,C4,C6,C7	100nF/50V CERAMIC SMD SIZE 0805	YAGEO/MURATA	DIGIKEY	
4	2	C2,C5	10uF/16V CERAMIC SMD SIZE 0805	YAGEO/MURATA	DIGIKEY	
5	1	C3	1nF/50V CERAMIC SMD SIZE 0805	YAGEO/MURATA	DIGIKEY	
6	1	D1	LED SMD SIZE 0805	OSRAM	DIGIKEY	475-1278-1-ND
7	2	R1,D2	DNP			
8	1	J1	JUMPER-PCB SOLDER			
9	2	L1,L2	F-BEAD 600 Ohms @ 100 MHz, 1.5A 100mOhm	LAIRD	DIGIKEY	240-2390-1-ND
10	1	R2	1K 1% SMD SIZE 0805	YAGEO/MURATA	DIGIKEY	
11	1	R3	620K 1% SMD SIZE 1206	YAGEO/MURATA	DIGIKEY	
12	2	R4,R5	4.7K 5% SMD SIZE 0805	YAGEO/MURATA	DIGIKEY	
13	1	R6	49.9K 1% SMD SIZE 0805	YAGEO/MURATA	DIGIKEY	
14	1	R7	3.9K 1% SMD SIzE 1206	YAGEO/MURATA	DIGIKEY	
15	1	R8	0E SMD SIZE 0805	YAGEO/MURATA	DIGIKEY	
16	1	R9	4.12K 1% SMD SIZE 0805	YAGEO/MURATA	DIGIKEY	
17	1	R10	10K 1% SMD SIZE 2512	YAGEO/MURATA	DIGIKEY	
18	1	R11	49.9E 1% SMD SIZE 0805	YAGEO/MURATA	DIGIKEY	
19	1	U1	CRE1S0505SC ISOLATED DC-DC CONVERTER 5V IN, 5V OUTPUT	MURATA	DIGIKEY	811-3196-ND
20	1	U2	AMC23C14DWVR	TI	DIGIKEY	296-AMC23C14DWVRCT-ND

Notes

APP

Android App

DOWNLOAD

Android App launched in 2017 and has 100k+ downloads - rated with 4.5 stars.

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