NCP370GEVB

NCP370 Over Voltage Protection Controller with Reverse Charge Control Evaluation Board User's Manual

ON Semiconductor®

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EVAL BOARD USER'S MANUAL

Description

The NCP370 is an overvoltage, overcurrent and reverse control device. Two main modes are available by setting logic pins.

First mode is Direct Mode from Wall Adapter to the system. In this mode the system is both positive and negative overvoltage protected up to +28 V and down to −28 V. The wall adapter is disconnected from the system if the input voltage exceeds the overvoltage (OVLO) or undervoltage (UVLO) thresholds. At powerup, the Vout turns on 30 ms after the Vin exceeds the undervoltage threshold.

The second mode, called the Reverse Mode, allows an external accessory to be powered by the system battery or a boost converter. Here, the external accessory would be connected to the device input (bottom connector of system) and the device battery would be at the device output. In this case, overcurrent protection is activated to prevent accessory faults and battery discharge. Thanks to the NCP370 using an internal NMOS, the system cost and the PCB area of the application board are minimized. The NCP370 provides a negative going flag (FLAG(BAR)) output which alerts the system that a fault has occurred. In addition, the device has ESD protected input (15 kV Air) when bypassed with a 1.0 μF or larger capacitor.

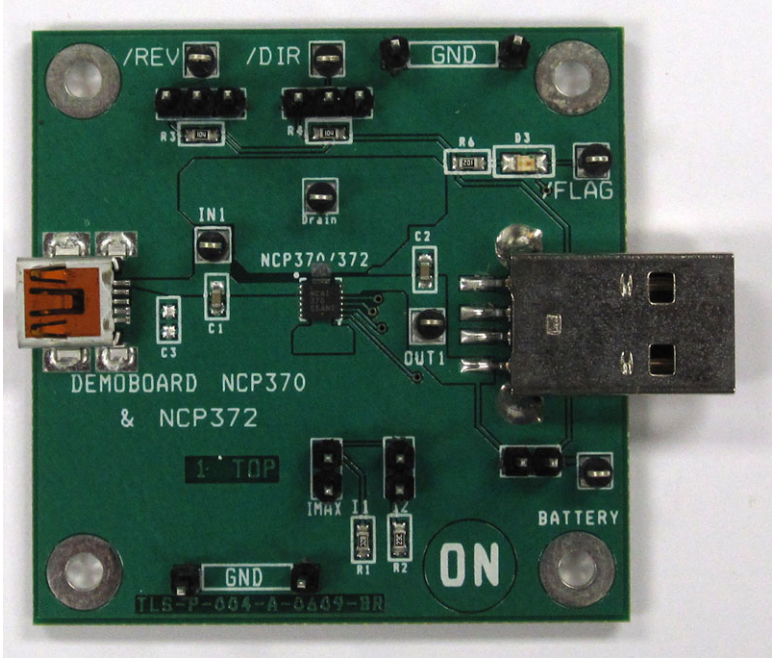


Figure 1. NCP370GEVB Board Picture

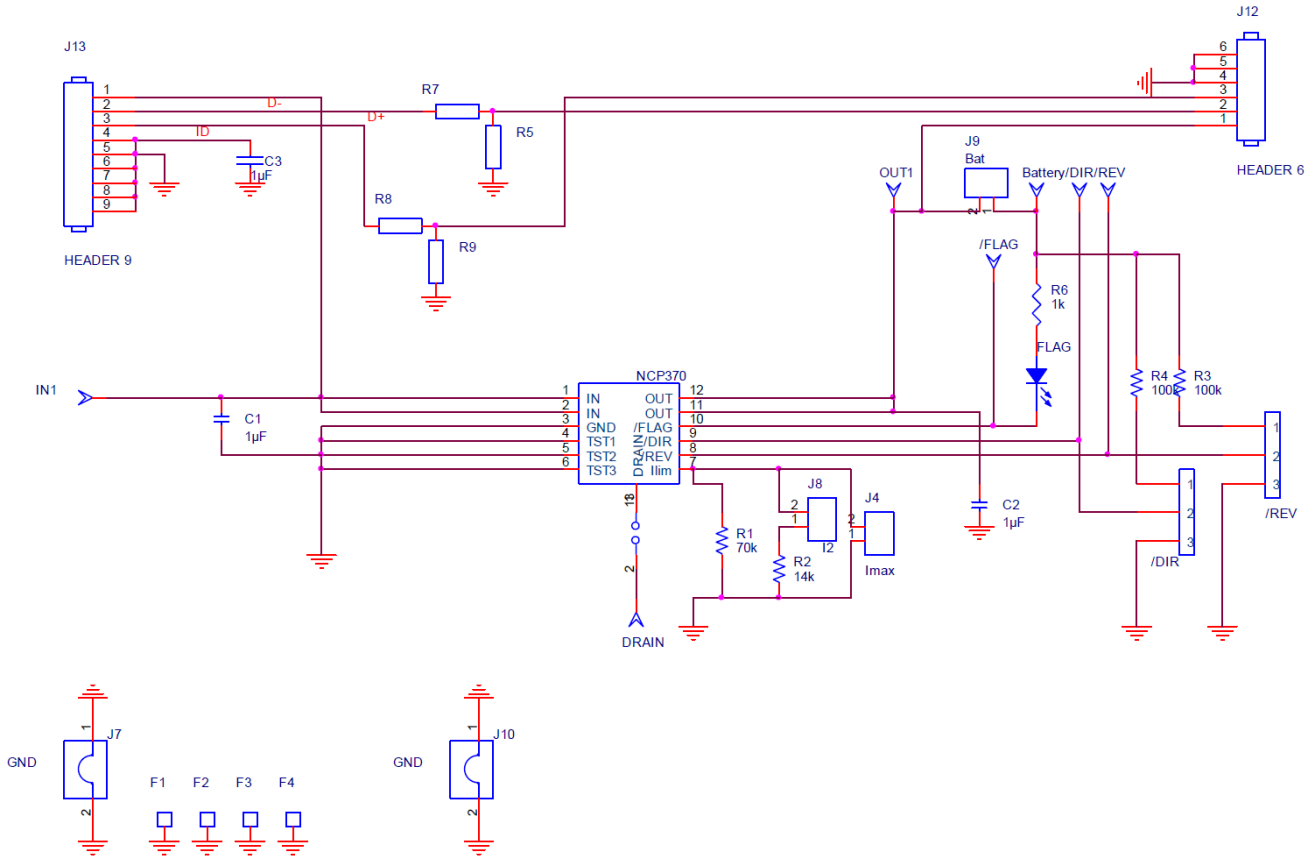


Figure 2. NCP370GEVB Board Schematic

Table 1. BILL OF MATERIALS

Quantity	Designation	Manufacturer	Digi key	Specifications
1	NCP370 LLGA3x3	ON Semiconductor		Over voltage protection
2	C1 (Cin), C2 (Cout)	Murata – GRM188R61E105KA12D	490-3897-1-ND	1 μF 25V X5R CMS0805
1	C3 (ID): not mounted			
13	Test points:IN1, OUT1, BAT-TERY, FLAG, DRAIN, REV, DIR		5001K-ND	Hole diameter: 1.3mm
1	J13 (USB IN)	Molex	WM17116CT-ND	5 pins USB miniB
1	J12. (USB OUT)	Molex	WM17118-ND	4 pins USB A
1	FLAG	rohm	511-1287-ND	Green LED 0805
1	R6	susumu	Rr08p(value)dct-nd	1 kΩ. CMS0603 0.5%
2	R3, R4	susumu	Rr08p(value)dct-nd	100 kΩ. CMS0603 0.5%
Not mounted	R5,R7,R8,R9 (USB data)			
1	R1	susumu	Rr08p(value)bct-nd	69.8k Ω. CMS0603 0.5%
1	R2	susumu	Rr08p(value)bct-nd	16.9k Ω. CMS0603 0.5%
4	GND jumper: J7, J10		WM8083-ND	Jumper Ground 1mm pitch 10.16 mm
1x3	REV		WM8083-ND	SMB R 114 665 PCB Plated Gold
1x3	DIR		WM8083-ND	SMB R 114 665 PCB Plated Gold
1x2	Imax		WM8083-ND	SMB R 114 665 PCB Plated Gold
1x2	I2		WM8083-ND	SMB R 114 665 PCB Plated Gold
1x2	Battery		WM8083-ND	SMB R 114 665 PCB Plated Gold

PCB

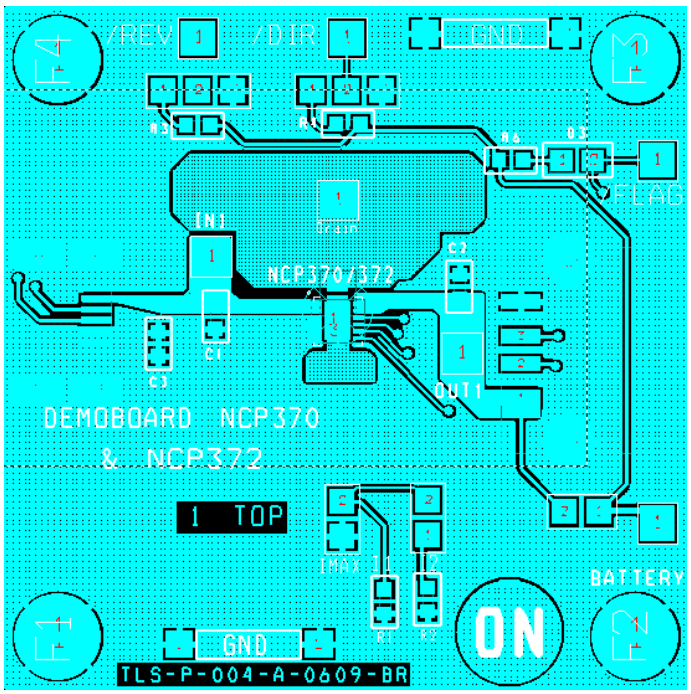


Figure 3. NCP370GEVB Board Layout (Top View)

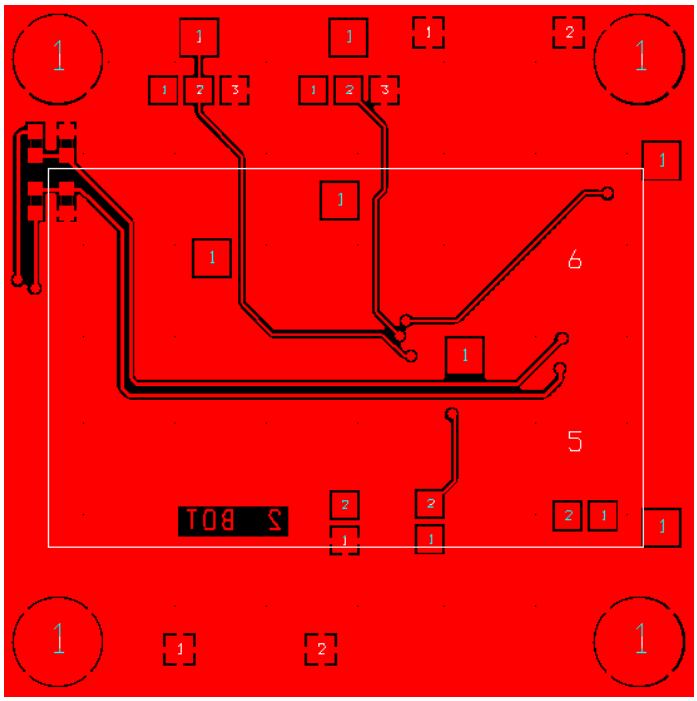
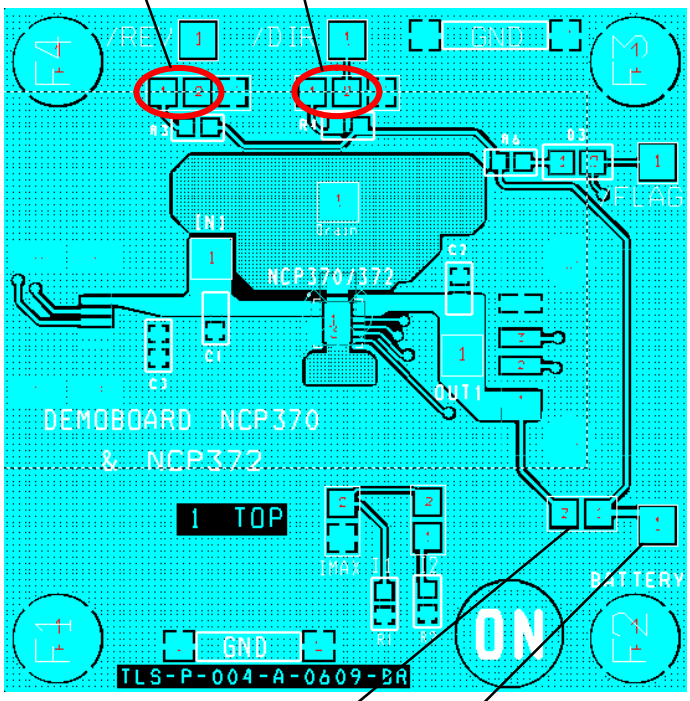


Figure 4. NCP370GEVB Board Layout (Bottom View)

CONNECTING PROCESS

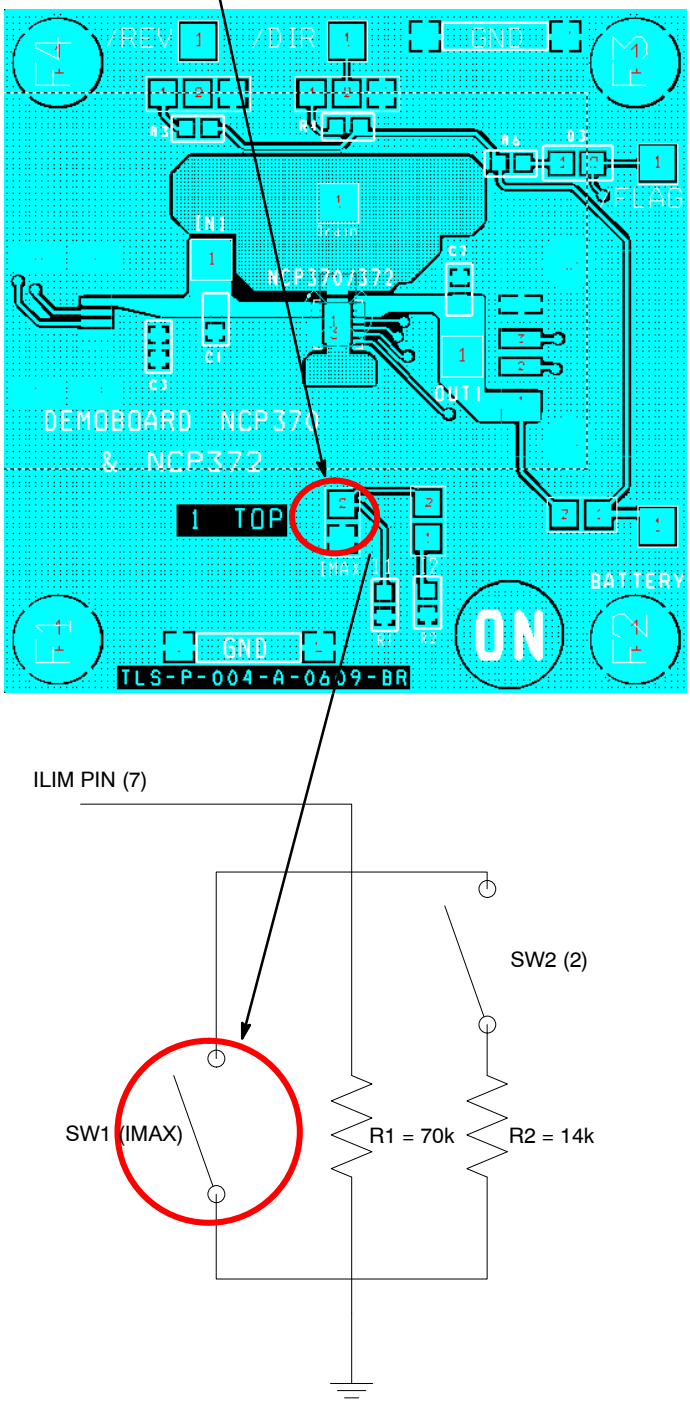
1. Place /REV strap and /DIR strap on left side (“1” logic) (connected to Vbat, through pull up resistor)



2. Let Battery strap opened.

3. Connect a Battery or power supply (4.2 V) on Battery test point (min 2 A capability).

4. Connect strap on lim.



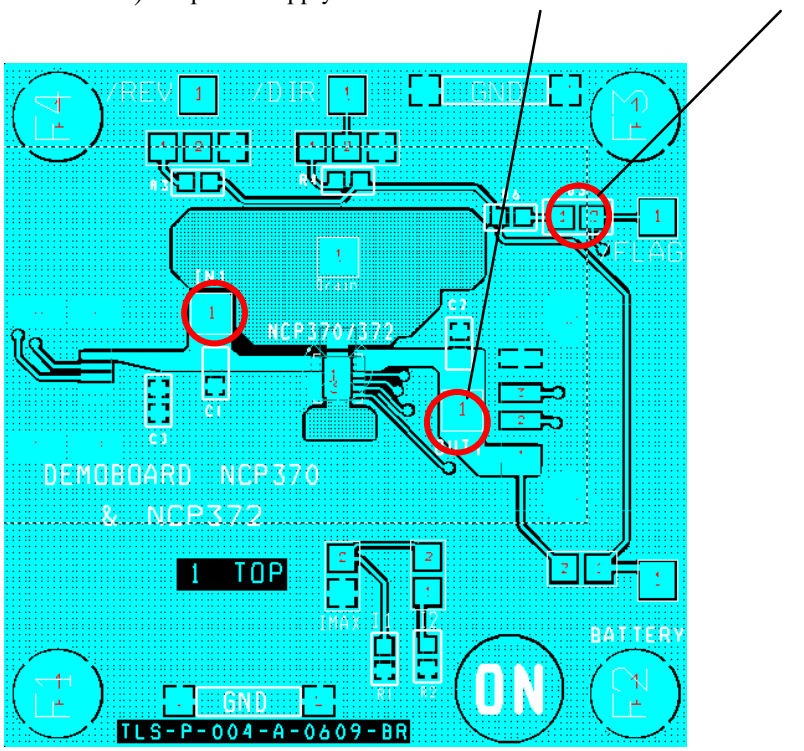
5. Select I limit threshold with pull down resistors connected on pin 7:

SW1	SW2	IOCP
0	0	500 mA
0	1	1 A
1	0	1.5 A
1	1	1.5 A

R1 = 70K
R2 = 14K

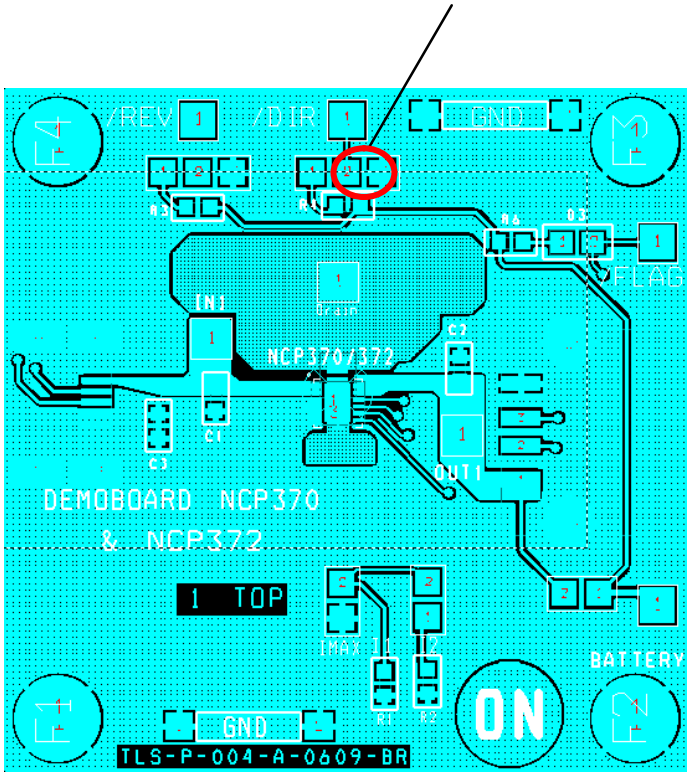
Disable Mode:

6. Connect 10 V capability Vin Supply on IN1 test point.
a.) Set power supply to 5 V ⇒ Check Vout = 0 V and LED = off

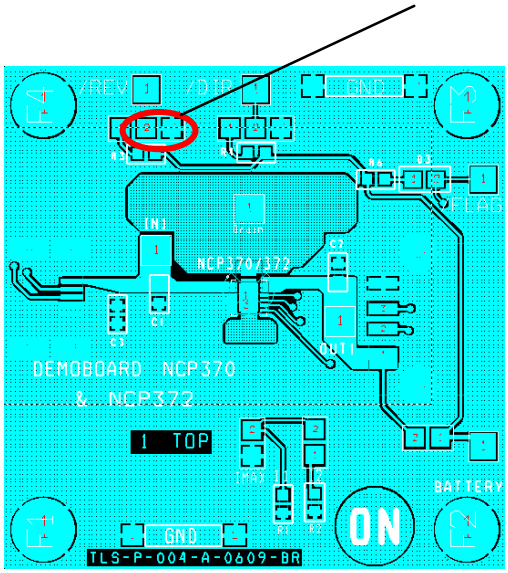


Direct Mode:

7. Switch /DIR from left to right, 1 logic level to 0 logic level



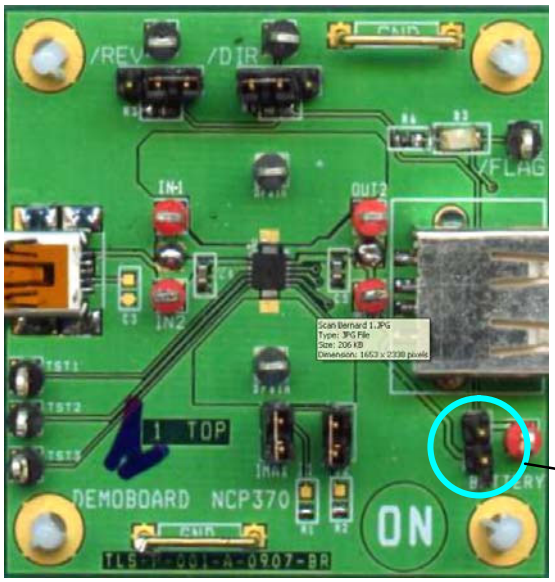
8. Check Vout = 5 V and Flag LED is still off
9. Set Vin = 7 V
10. Check Flag LED = on, and Vout is 0 V.
11. Switch /REV from left to right, 1 logic level to 0 logic level



12. Check Flag LED = off, and Vout = Vin = 7 V.
    Disconnect Vin Supply.

Reverse Mode:

13. Connect Set /DIR = 1, /REV = 1
    Disconnect Vin Power Supply from IN test points.
    Connect accessory on IN1 or IN2 test points.



Put strap to connect Battery to Vout

14. Set /DIR = 1, /REV = 0: Vout = Vin

If I accessory < I limit then Vin = Vout − Rdson x I

If I accessory > I limit then Vin = 0 (Current regulation)

Power off.

15. Set /DIR = 1, /REV = 1
16. Disconnect accessory
17. Disconnect Battery

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