Dual Variable - Reluctance Sensor Interface Module, Stepper Motor Based Incremental Rotary Encoder

This project offers a dual−channel low component count interface solution for ground-referenced variable reluctance sensors. Each of the two identical channels interfaces with a variable−reluctance sensor, and continuously compares the sensor output signal to a user−programmable internal reference. An alternating input signal of appropriate amplitude at IN1 or IN2 will result in a rectangular waveform at the corresponding OUT1 and OUT2 terminal, suitable for interface to either standard microprocessors or standard logic families. A diagnostic input, common to both channels, provides a means to test for degradation or loss of the physical connector to both sensors. Each channel of the circuit has independent input bias and clamp circuitry, and independent comparators with Hysteresis voltage generators. Both channels share a common reference generator for normal and diagnostic modes. Basically, the circuit converts the sinewave signal of the sensor into a clean rectangular wave signal.

Input Protection

An active clamp is provided on each input to limit the voltage on the input pin and prevent substrate current injection. The clamp is specified to handle ±12 mA. This puts an upper limit on the amplitude of the sensor output. With resistor value R3 = 22 k, then Therefore, the VRS (pk−pk) IN1 and In2 voltage can be as high as 480 V. The circuit will typically run at a frequency up to 1.8 MHz if the input signal does not activate the positive or negative input clamps. Frequency performance will be lower when the positive or negative clamps are active. Typical performance will be up to a frequency of 680 kHz with the clamps

Note: The project is built using an NCV1124 chip, refer to the datasheet of the chip for further information of internal functions.

Connections:

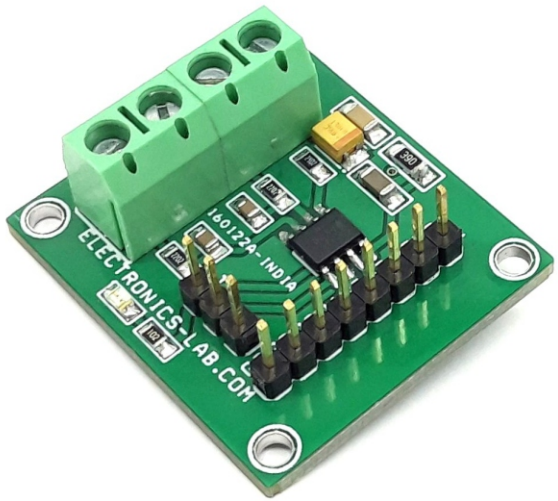
- CN2 and CN3 Sensor 1 and Sensor 2 Interface
- Jumper 1 Diagnostic Mode Selection
- D1 Power LED
- CN1: Pin1 and Pin 2 = VCC, Pin 3 and Pin4 = GND, Pin5 = Output 1, Pin6 = Output 2, Pin 7 and Pin 8 = GND

Stepper Motor based 2 Channel Incremental Encoder Channel a and Channel B Phase Shift Output to detect the direction

Other than a reluctance sensor, the project can help to use a stepper motor as a rotary encoder. Connect the 4 wires of a bipolar stepper motor at input terminal S1, GND, and S2 and GND. The project provides 2 channel rotary encoder output channel A and Channel B, the output is 200 Lines per rotation and both outputs are phase-shifted which can help to detect the direction of the encoder.

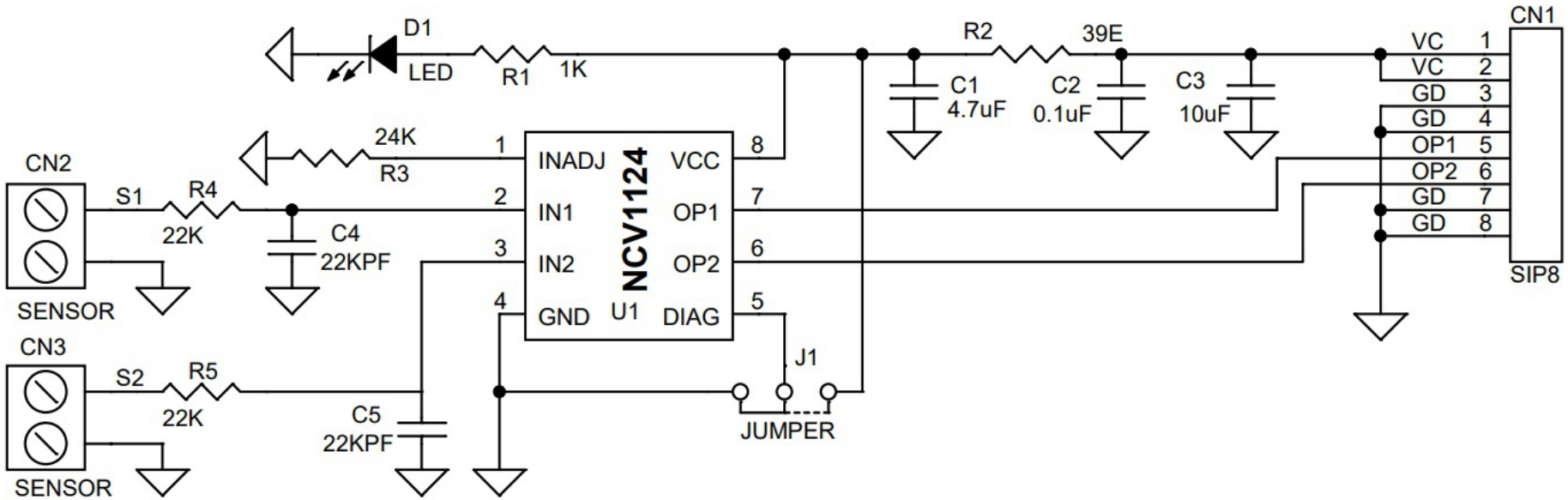
Applications

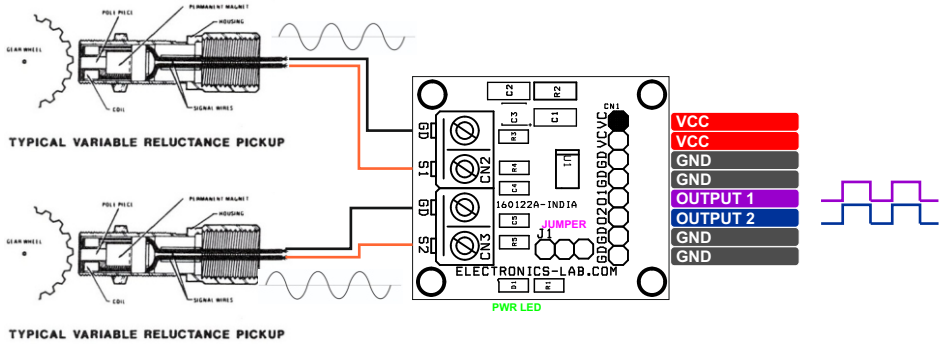
- Anti−Skid Braking and Traction Control
- Vehicle Stability Control
- Drive Belt Slippage Detection
- Crankshaft/Camshaft Position Sensing



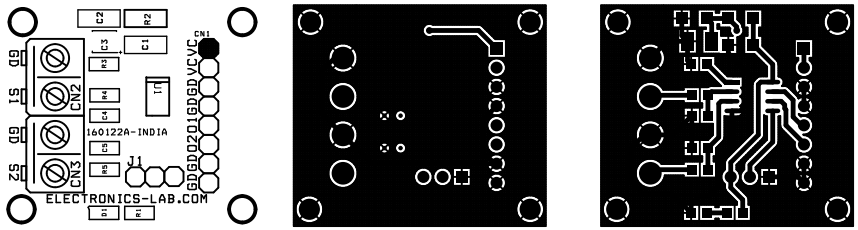
Features

- Power Supply 5V DC +/-10%
- Two Independent Channels TTL Output
- Internal Hysteresis
- Input Threshold +/- 160mV
- Input Signal Sensitivity 250mV to 250V Peak to Peak
- Built–In Diagnostic Mode – Jumper Selection
- Site and Control for Automotive Applications
- Direct Reluctance Sensor Interface – Screw Terminal Connectors
- Power LED
- Screw Terminals for Sensor Interface
- Header Connector for Power Supply and Output
- 4X 2.5MM Mounting Holes
- PCB Dimensions 33.97 x 29.85mm





BOM						
NO.	QNTY.	REF.	DESC.	MANUFACTURER	SUPPLIER	SUPPLIER PART NO
1	1	CN1	8 PIN MALE HEADER PITCH 2.54MM	WURTH	DIGIKEY	732-5321-ND
2	2	CN2,CN3	2 PIN SCREW TERMINAL PITCH 5.08MM	WURTH	DIGIKEY	277-1247-ND
3	1	C1	4.7uF/25V SMD SIZE 1206	YAGEO/MURATA	DIGIKEY	
4	1	C2	0.1uF/50V SMD SIZE 0805	YAGEO/MURATA	DIGIKEY	
5	1	C3	10uF/25V SMD SIZE 1210	YAGEO/MURATA	DIGIKEY	
6	2	C4,C5	22KPF/50V SMD SIZE 0805	YAGEO/MURATA	DIGIKEY	
7	1	D1	LED RED SMD SIZE 0805	LITE ON INC	DIGIKEY	160-1427-1-ND
8	1	J1	JUMPER/2 PIN MALE HEADER 2.54MM	WURTH	DIGIKEY	732-5315-ND
9	1	R1	1K 5% SMD SIZE 0805	YAGEO/MURATA	DIGIKEY	
10	1	R2	39E 5% SMD SIZE 1206	YAGEO/MURATA	DIGIKEY	
11	1	R3	24K 1% SMD SIZE 0805	YAGEO/MURATA	DIGIKEY	
12	2	R4,R5	22K 5% SMD SIZE 08095	YAGEO/MURATA	DIGIKEY	
13	1	U1	NCV1124 SOIC8	ON SEMI	DIGIKEY	NCV1124DR2GOSCT-ND
14	1	J1-S	JUMPER SHUNT	SULLIN CONECT	DIGIKEY	S9001-ND



SILK SCREEN TOP BOTTOM LAYER TOP LAYER

PCB DIMENSIONS 33.97MM X 29.85MM