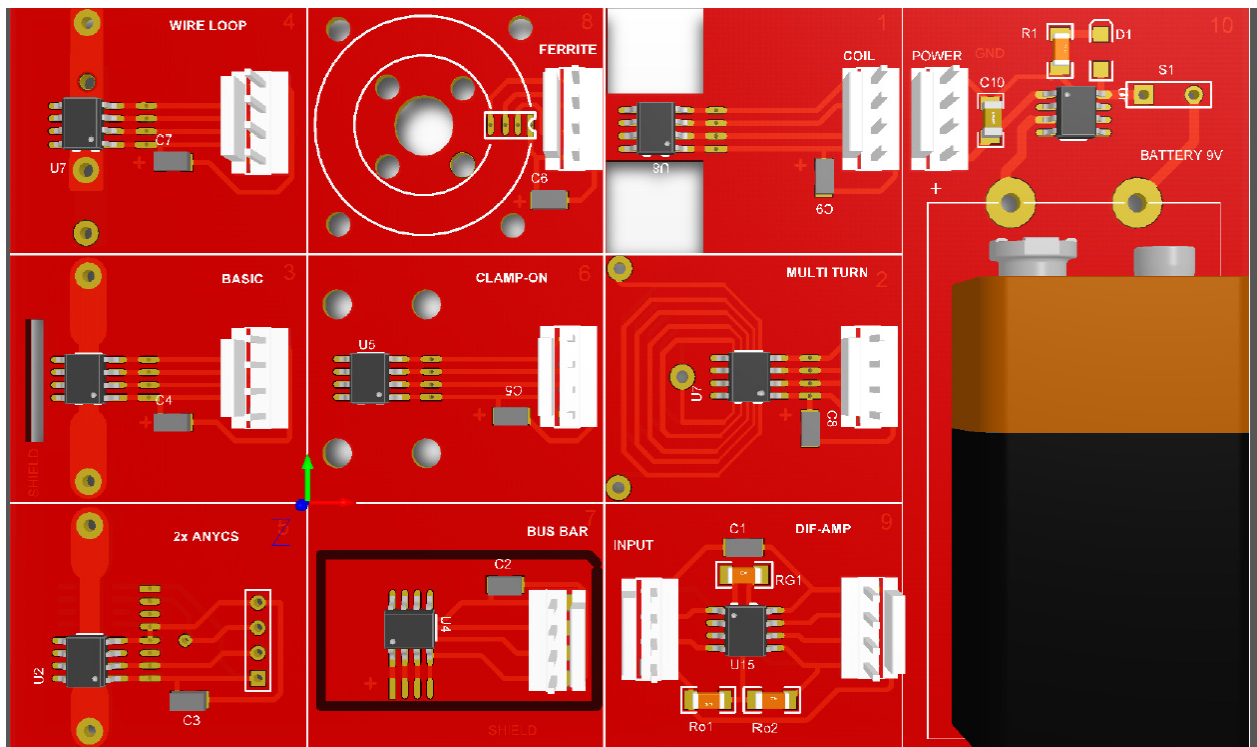


Datasheet: SENIS® Evaluation boards

SENCS1Dx CURRENT SENSOR EVALUATION BOARDS



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3. INTRODUCTION

Current sensor Evaluation Boards (modules) allow a rapid test of SENIS novel integrated current sensor SENC1Dx in various application configurations. With Evaluation Boards AC and DC currents can be measured in the range of 0.1 -100 A and bandwidth DC to 1MHz. Evaluation Boards can also be used for the detection of current spikes that occur in short time intervals, down to a few us.

An Evaluation Board consist of a printed circuit board (PCB) with current carrying tracks and a 9V battery, which supplies the current sensor with a regulated 5V voltage.

The current sensor SENC1Dx measures the magnetic field generated around a current carrying conductor and converts the measured magnetic field to the voltage proportional to the current that needs to be measured.

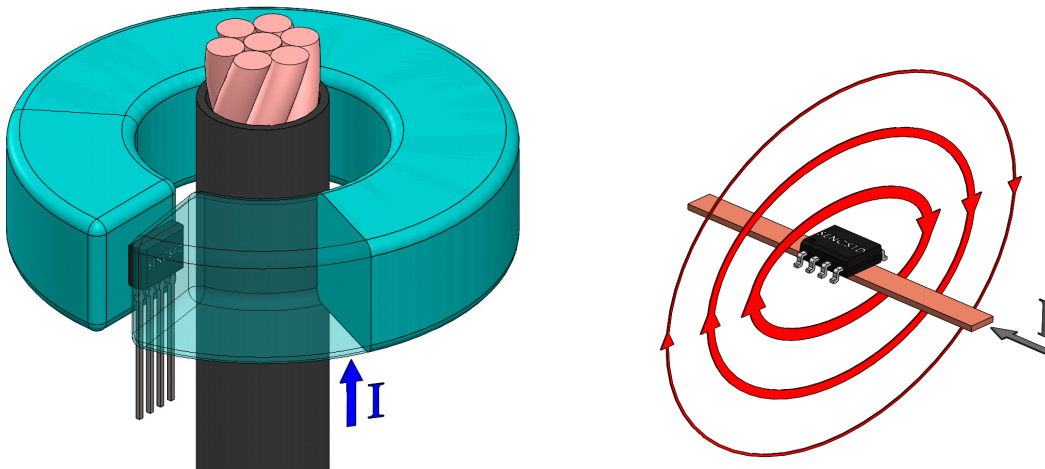


Figure 1: Full scale linear output 2.5V +/-2V proportional to the current flowing through the conductor

SENC1Dx current sensor is included in all Evaluation Boards and can be also delivered as a spare sensor. It is calibrated for **5mT** magnetic field range, with the sensitivity $S=200V/T$ (20mV/Gauss), unless otherwise noted. However, SENIS' SENC1Dx sensor is fully custom programmable and can be calibrated to support up to 1T range.

In following chapters, different available Evaluation Boards are described. Dimension of each board is 50x25 mm

4. EVBCS1Dx-BASIC Evaluation Board

This Evaluation Board is suitable for sensing of the current in pcb traces directly located under the sensor IC for the mid-range current. The electric current is limited by the trace width of 2mm and its copper thickness (35µm).

The PCB configuration increases the current capability by paralleling the top and the bottom traces on the two-sided pcb. It may include a SMD ferrite chip or a shield placed on the backside to improve the sensor's sensitivity and its immunity to the stray field.

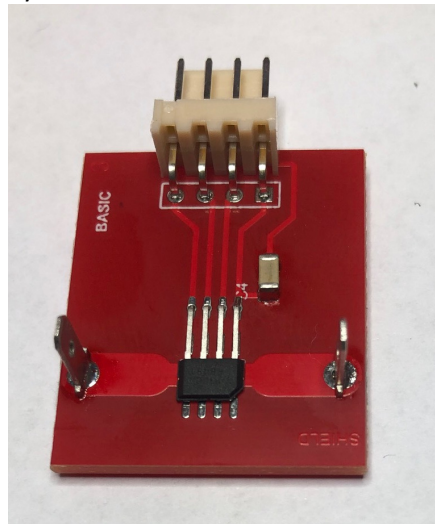
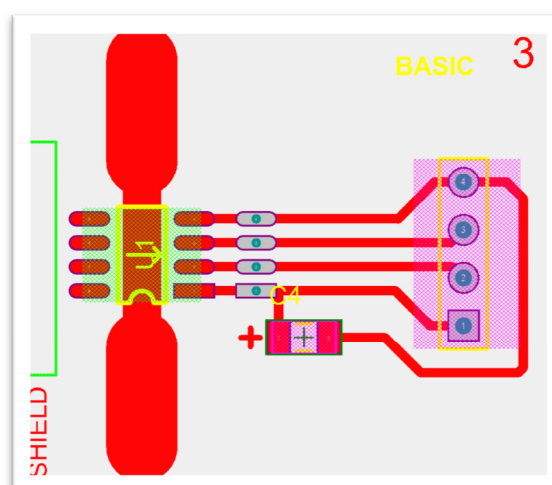
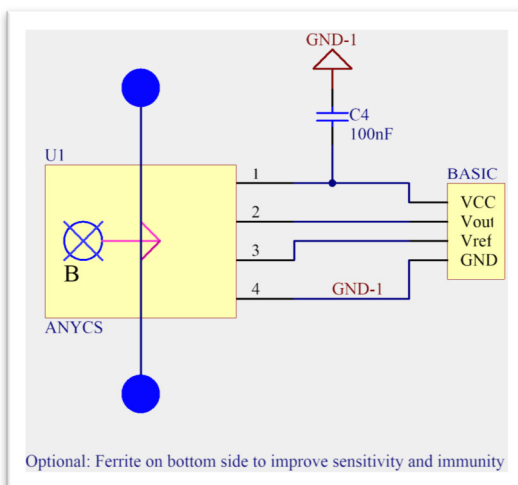


Figure 2: Photo of EVBCS1Dx-BASIC Evaluation Board – Top side

Features

- AC and bidirectional DC primary current
- Mid-range current, less than 4A rms
- Peak current, 40A for the time <1sec
- Sensitivity=50mV/A
- Galvanic isolation between primary conductor and the sensor output



5. EVBCS1Dx-MULTI_TURN Evaluation Board

A coil composed of the current track on the PCB, with 5 loops generates the magnetic field proportional to the measured current. By using a magnetic shield on the backside of the printed circuit board, the sensor can be shielded against external fields and in addition, the sensitivity is slightly increased.

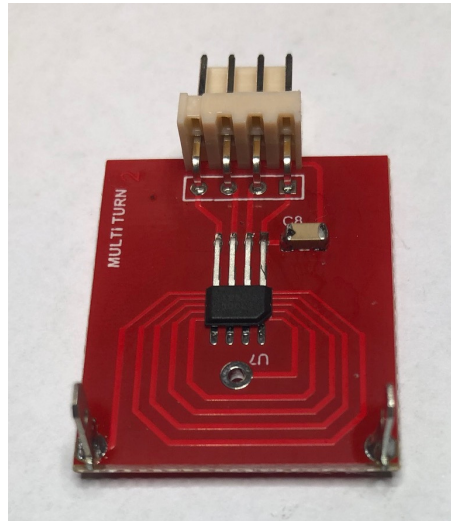
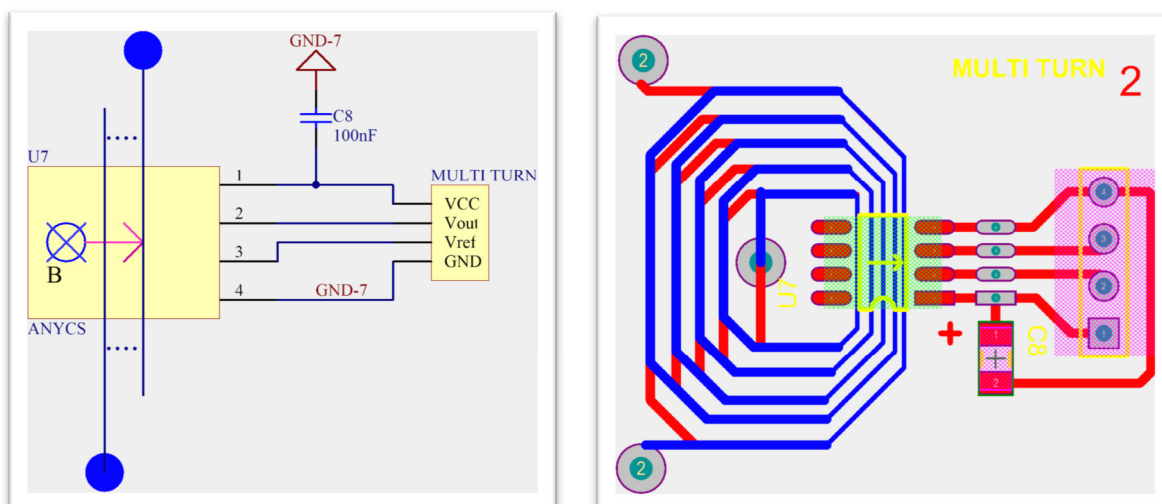


Figure 3: Photo of EVBCS1Dx-MULTI_TURN Evaluation Board – Top side

Features

- Mid-range current, less than 2A rms
- Peak current, 20A for the time <1sec
- Sensitivity=220mV/A \pm 5%



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6. EVBCS1Dx-SINGLE_WIRE_LOOP Evaluation Board

This Evaluation Board is suitable for sensing of current in the PBC traces, located directly under the sensor IC for the mid-range current. Current is limited by the trace width and the copper thickness. It is useful if installing a “through-hole” jumper in an acceptable assembly process.

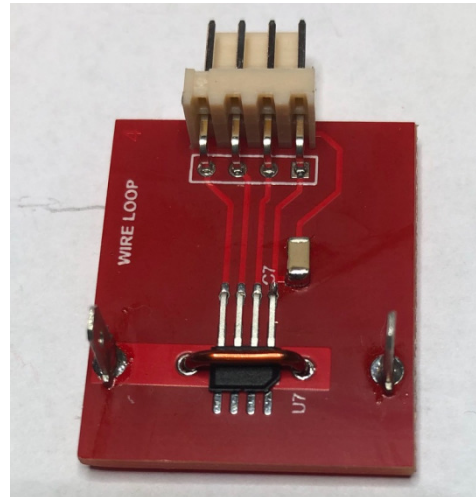
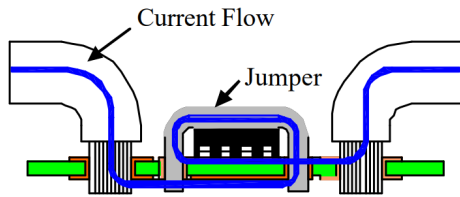
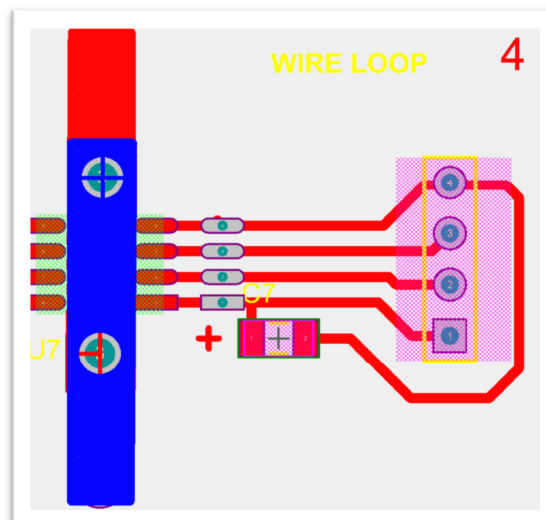
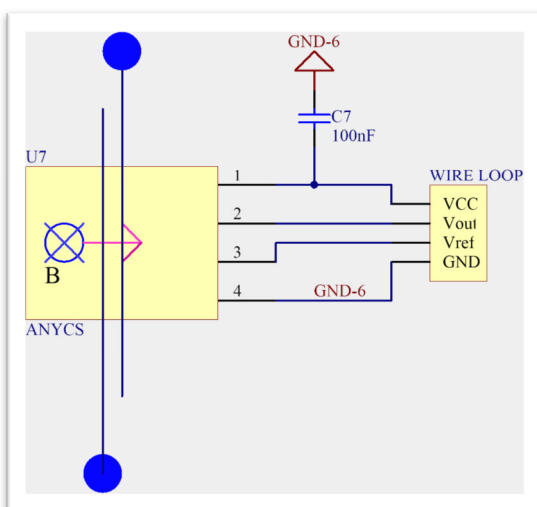


Figure 4: Left side: Current flow under and around sensor increase magnetic flux density in the chip
Right side: Photo of EVBCS1Dx-SINGLE_WIRE_LOOP Evaluation Board – Top side

Features

- Mid-range current, less than 8A rms
- Peak current, 50A for time <1sec
- Sensitivity=80mV/A $\pm 10\%$
- Bidirectional output



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7. EVBCS1Dx-DUAL_SENSOR Evaluation Board

This Evaluation Board is suitable for sensing of the low currents on PCB's. The board contains a sensor on the top and another one, on the other side of board. The common mode magnetic fields are canceled out with this sensor configuration.

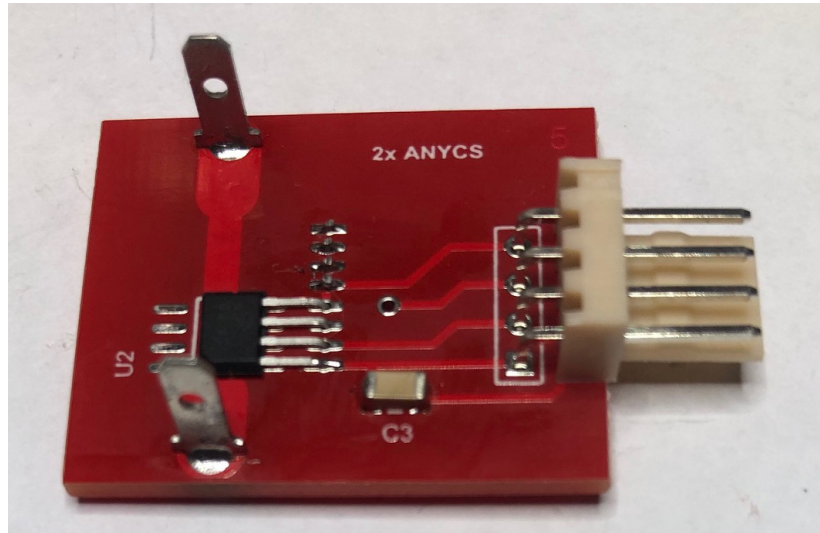
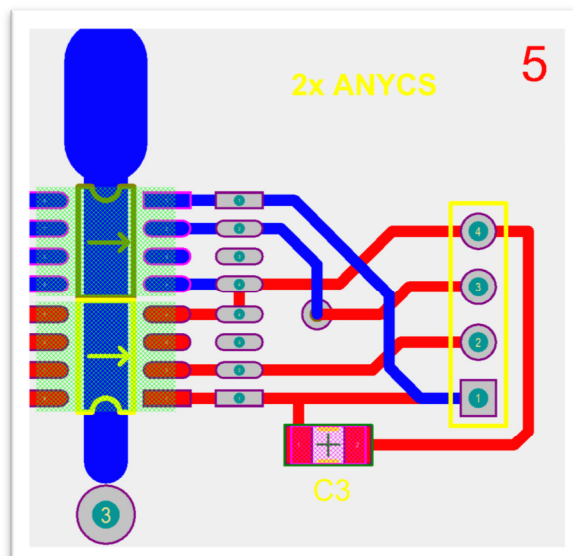
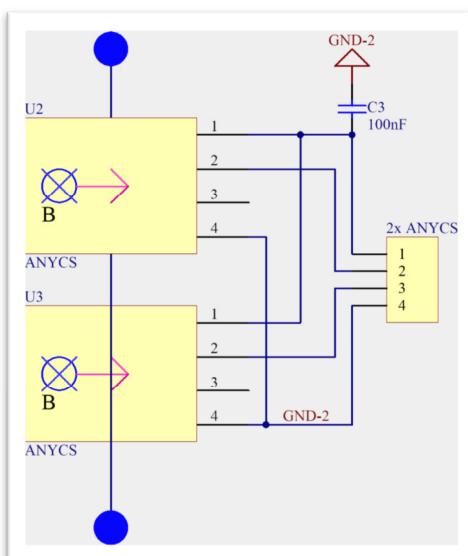


Figure 5: Photo of EVBCS1Dx-DUAL_SENSOR Evaluation Board – Top side

Features

- Low current, less than 4A rms
- Peak current, 50A for time <1sec
- Sensitivity=60mV/A
- Differential output
- High immunity to the stray fields



8. EVBCS1Dx-FERRITE Evaluation Board

This Evaluation Board is suitable for sensing of the high currents through a conductor. The board contains the SENCS1Dx sensor in the air gap of the ferrite core that concentrates the magnetic field generated around the conductor in the air gap.

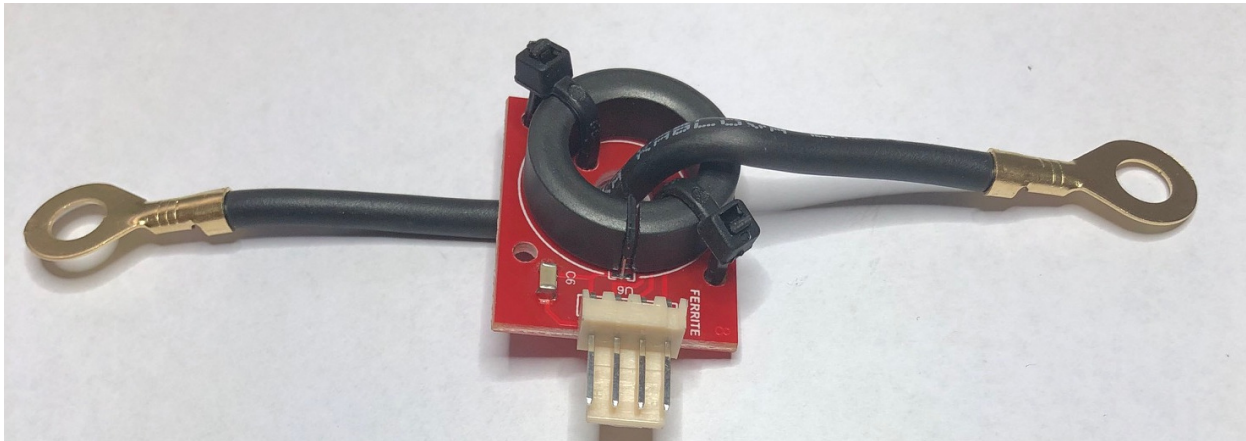
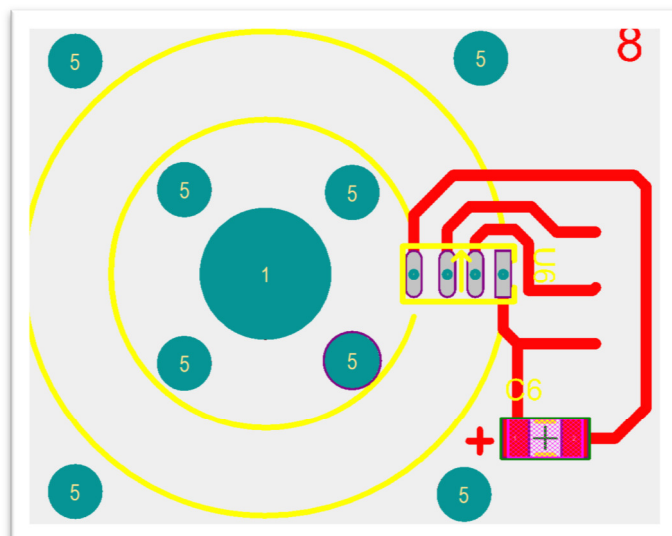
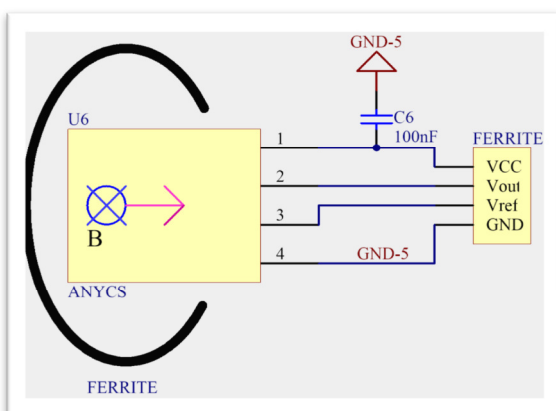


Figure 6: Photo of EVBCS1Dx-FERRITE Evaluation Board – Top side

Feature

- High current, less than 20A rms
- Peak current, 100A for time <1sec
- Sensor programmed for 10mT range, Sensitivity=100V/T
- Sensitivity=150mV/A $\pm 10\%$
- Differential output



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9. EVBCS1Dx-CLAMP_ON Evaluation Board

This Evaluation Board is suitable for sensing currents in the wires (conductors). The sensitivity is dependent on the diameter of the wire and the thickness of the insulation. Any wire size can be used in this application. This configuration provides secure wire attachments.

By using two boards mounted on opposite sides of the conductor in a differential mode, the signal-to-noise (S/N) ratio can be significantly increased.

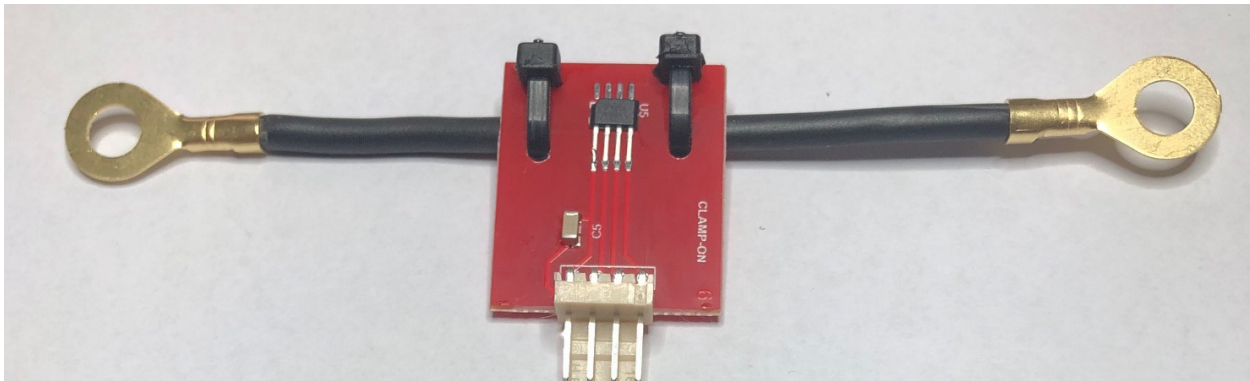
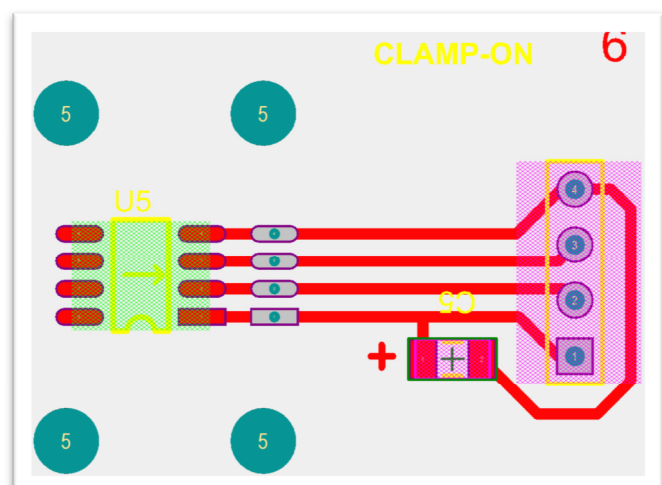
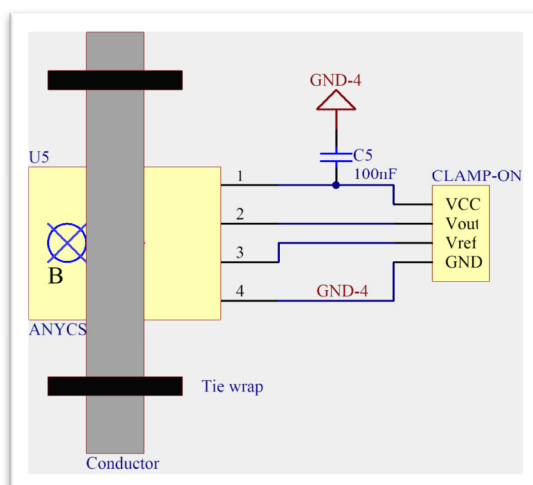


Figure 7: Photo of EVBCS1Dx-CLAMP_ON Evaluation Board – Top side

Features

- Measures AC or bi-directional DC currents in an external conductor
- No limit in current, external wire sensing
- Sensor programmed for 10mT range
- Sensitivity=6mV/A
- High Voltage Isolation configuration



10. EVBCS1Dx-BUS_BAR Evaluation Board

This Evaluation Board is suitable for sensing current in bus bars and flat conductors. The sensitivity depends on the width and the thickness of the conductor. Increasing the width and thickness decreases the sensitivity. Some approx. examples are listed below:

Width x Thickness [mm]	Sensitivity [mV/A]	Full scale current [A]
15x6	5	330
20x4	3	375
30x6	2.5	500
40x4	2	615

In order to increase the current range, the distance between the sensor and current conductor can be simply increased; or the sensor should be programmed for a higher range, up to 1T.

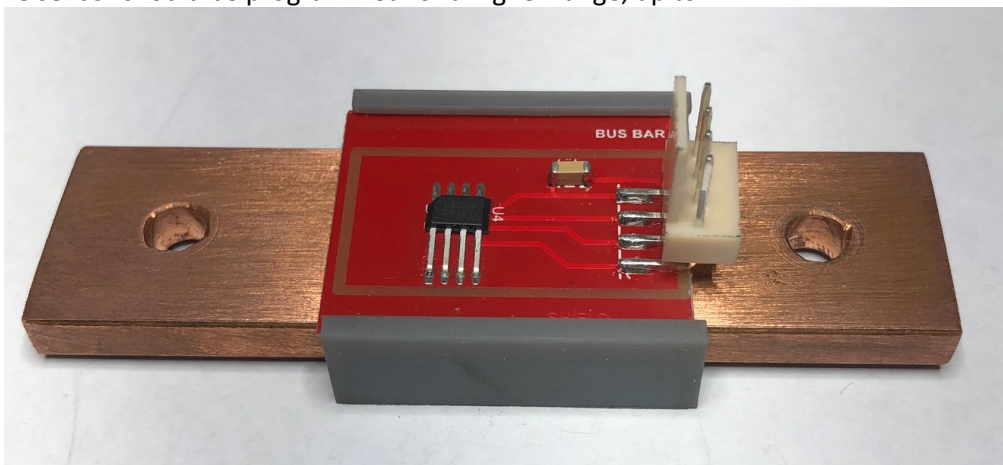
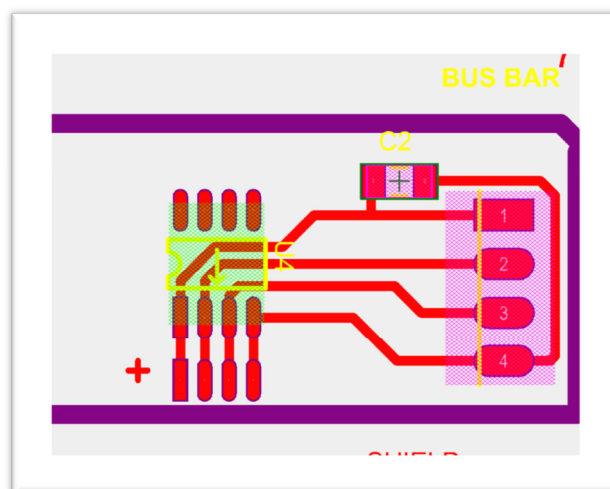
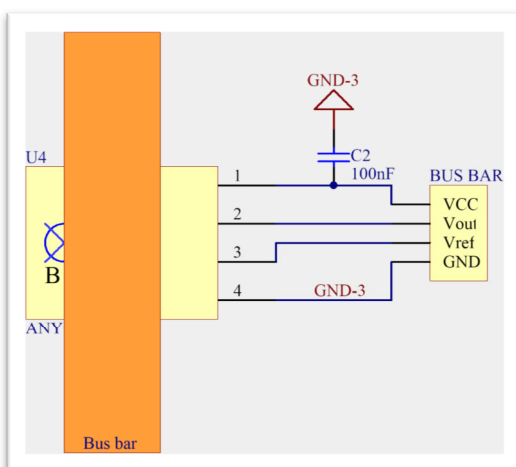


Figure 8: Photo of EVBCS1Dx-BUS_BAR Evaluation Board – Top side

Features

- High current in Bus Bar and Flat conductor
- Sensitivity=4mV/A
- Bi-directional output
- Differential output



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11. EVBCS1Dx-COIL Evaluation Board

This Evaluation Board is suitable for low currents (**10 mA to 1A rms**) and high voltage applications. Sensitivity depends on the number of turns of the wire in the coil (approx. 30mV/amp turn)

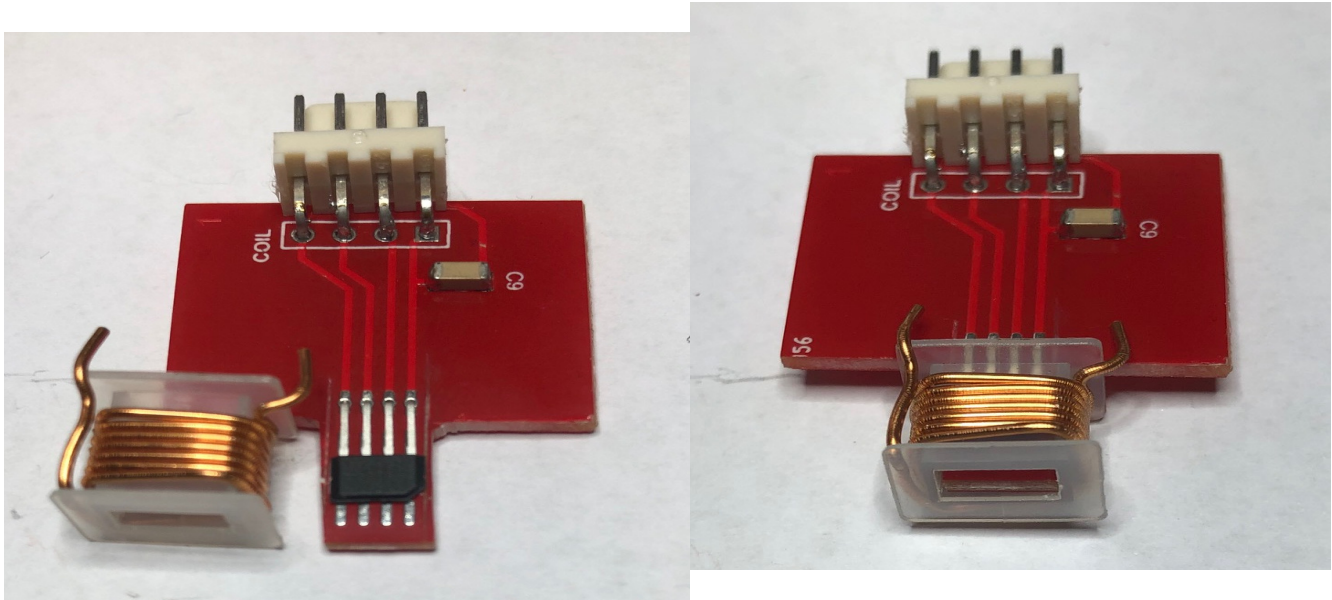
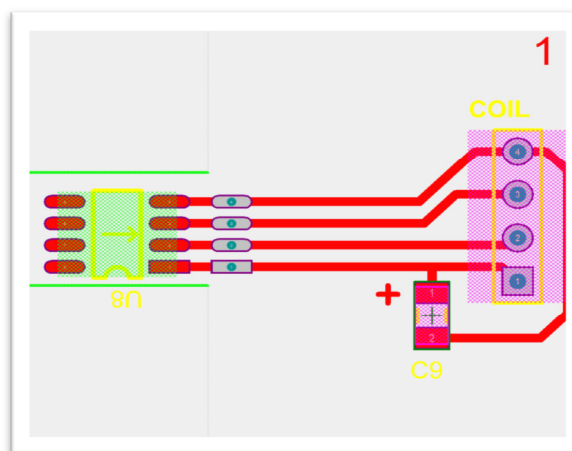
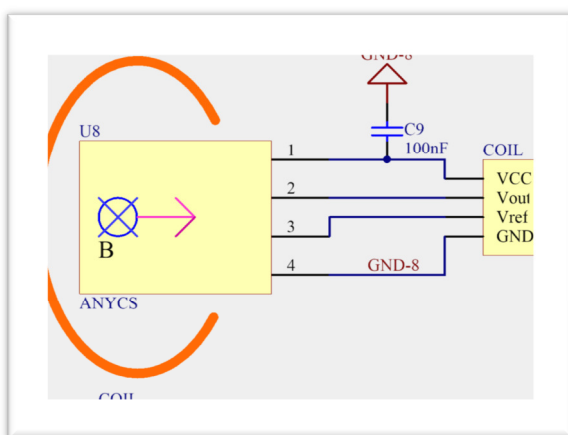


Figure 9: Photo of EVBCS1Dx-COIL Evaluation Board

Features

- Sensor programmed for 10mT range
- Sensitivity=160mV/A
- Bi-directional output

Schematic and PCB

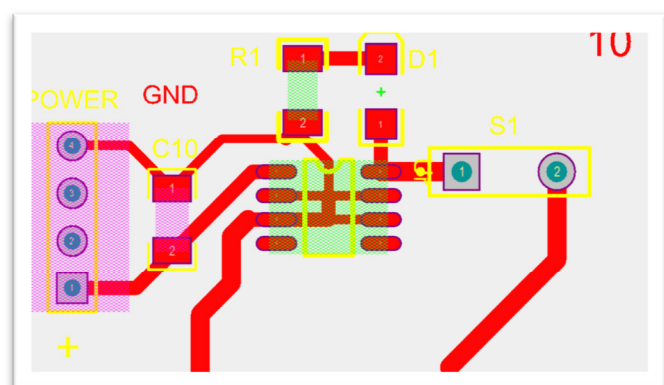
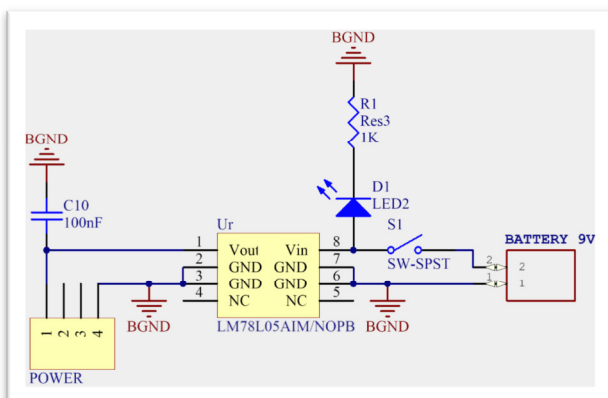


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12. EVBCS1Dx-POWER Module



Figure 10: Photo of POWER Module



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13. EVBCS1Dx-KIT COMPLETE SET OF EVALUATION BOARDS

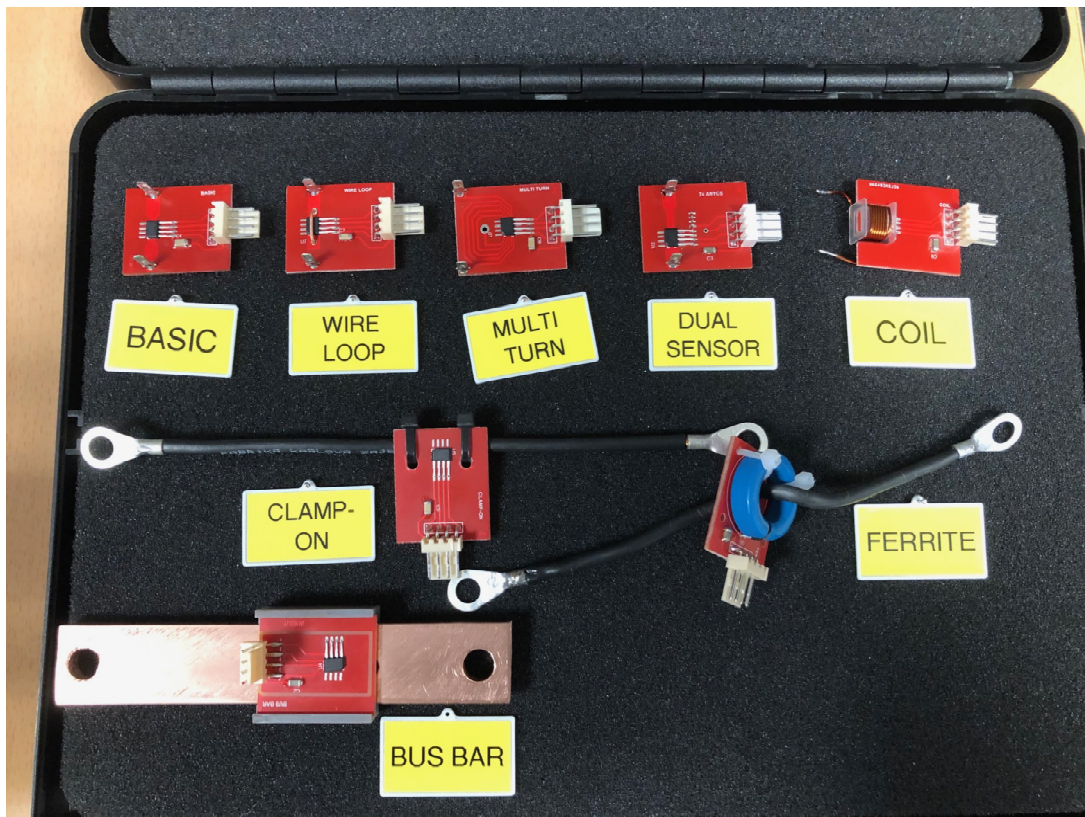


Figure 11: EVBCS1Dx-KIT Complete set of evaluation boards (Evaluation Boards can be ordered separately, or as the complete set)