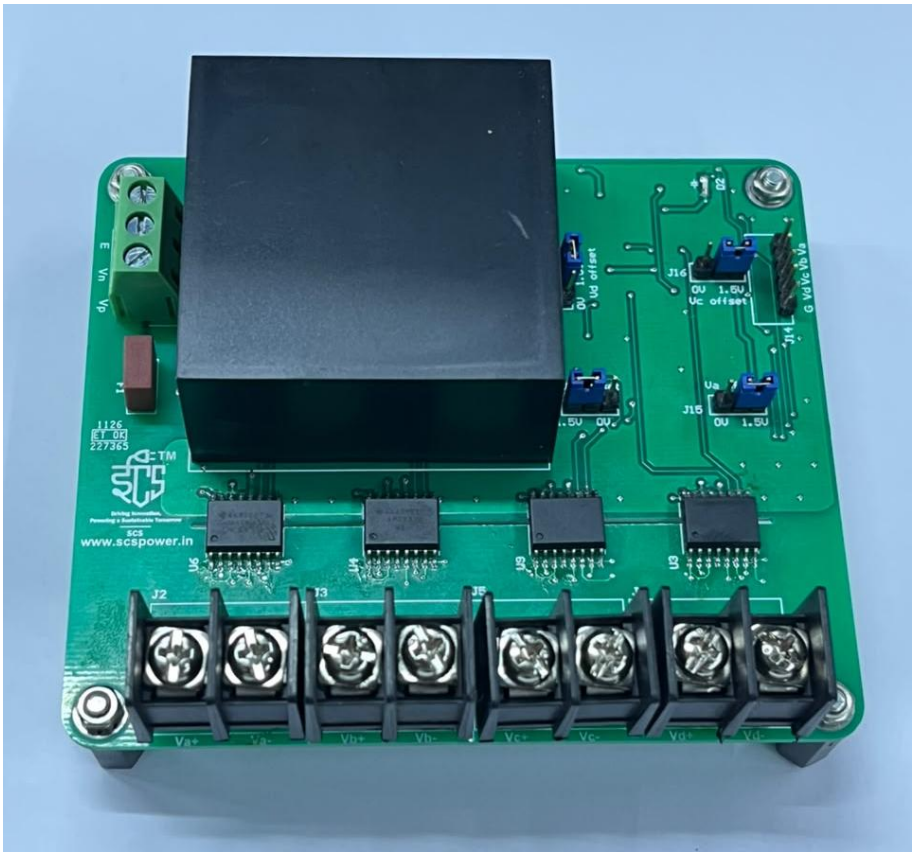
User Manual

SCS04HFVSXXX

(High Frequency Voltage Sensors Board)



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Overview:

- AC/DC universal voltage sensors board.
- On board Auxiliary power supplies.
- Excellent accuracy and linearity.
- Thermal and noise optimized PCB design.
- Voltage sensing accuracy better than ±1%
- Up to four onboard voltage sensors.
- Voltage sensing bandwidth >250 kHz.
- Voltage sensing range maximum up to 1500V available.
- Selectable offset 0V and 1.5V.
- Board can be power up with single phase 85-300Vac power supply.
- LED indication for power on.

Board Protection:

- Over Current
- Over Voltage
- Short Circuit
- As per IEC 61000-4 Standard

Applications:

This board is universal and can be used for any application whether AC or DC voltage sensing and have frequency bandwidth of 250kHZ, some of the targeted applications are,

- Power Converters
- Electrical Drives
- General purpose industry applications
- Laboratory R&D purposes
- Testing purposes

Table 1 : Pinout

Number	Name	Description
1.	V_p	Positive terminal for AC voltage supply
2.	V_n	Negative terminal for AC voltage supply
3.	E	Earth terminal
4.	$V_{a+}, V_{b+}, V_{c+}, V_{d+}, V_{a-}, V_{b-}, V_{c-}, V_{d-}$	terminals for the sensing voltage input
5.	V_a, V_b, V_c, V_d	Sensor output
6.	G	Ground terminal

Offset setting

Each 3-pin header (J15, J16, J17, J18) in the sensing circuit is provided for selecting the required Offset:

- 0V: Install the jumper between the 0V pins.
- 1.5V: Install the jumper between the 1.5V pins.

Table 2 : Sensor Offset Jumper pin Identification

Sr. No.	Indicator	Description
1	J15	For A Voltage sensor
2	J16	For C Voltage sensor
3	J17	For B Voltage sensor
4	J18	For D Voltage sensor

2 Sensor Gain Calculation

2.1 Conversion Formulas

$$\text{Gain} = \frac{V_{IN}}{V_{OUT}}$$

Take three different readings and then average for better accuracy. For better calculation of gain use sensor near to its rated Voltage values.

Use accurate multi-meter for calibrate sensors, use AC range for AC measurements.

To obtain original wave shape in microcontroller/DSP/FPGA/DSPACE:

The voltage outputs are available in voltage form on pins V_a, V_b, V_c, V_d , all referenced to GND. Each output pin has a fixed gain. In the microcontroller, simply multiply the ADC value by the gain in non-offset mode, and in offset mode, subtract 1.5 V from the ADC value first and then apply the gain.

Table 3 : Sample AC Current Gain Calculation At V_{ao}

Input rms voltage(V)	Output rms voltage(V)	Gain
80	0.254	314.96
100	0.306	326.79
120	0.362	331.49
140	0.420	333.33
150	0.446	336.32
	Average Gain	328.58

Gain Calculation Examples

Example 1 –

Given:

- Input Voltage (V_{in}): 80 V
- Measured Output Voltage (V_{out}): 0.254V

Gain:

$$\text{Gain} = \frac{V_{IN}}{V_{OUT}}$$

$$\text{Gain} = \frac{80}{0.254} = 314.96$$

3. Experimental Validation

3.1 Setup

A SIGLENT SDS824 oscilloscope and FLUKE 15B+ Digital multimeter was used to monitor the output voltage and input current. The overall experimental setup is shown below.

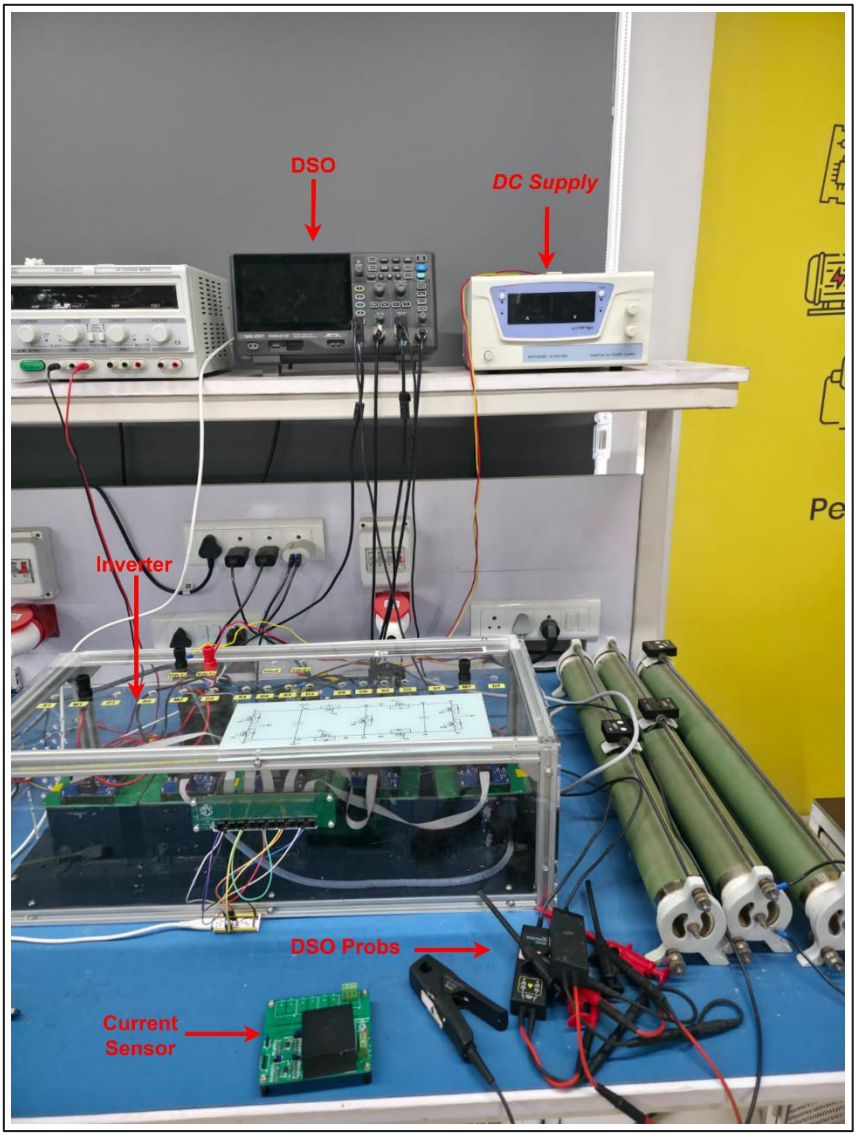

Figure 1 : Experimental setup

3.2 Experimental Results

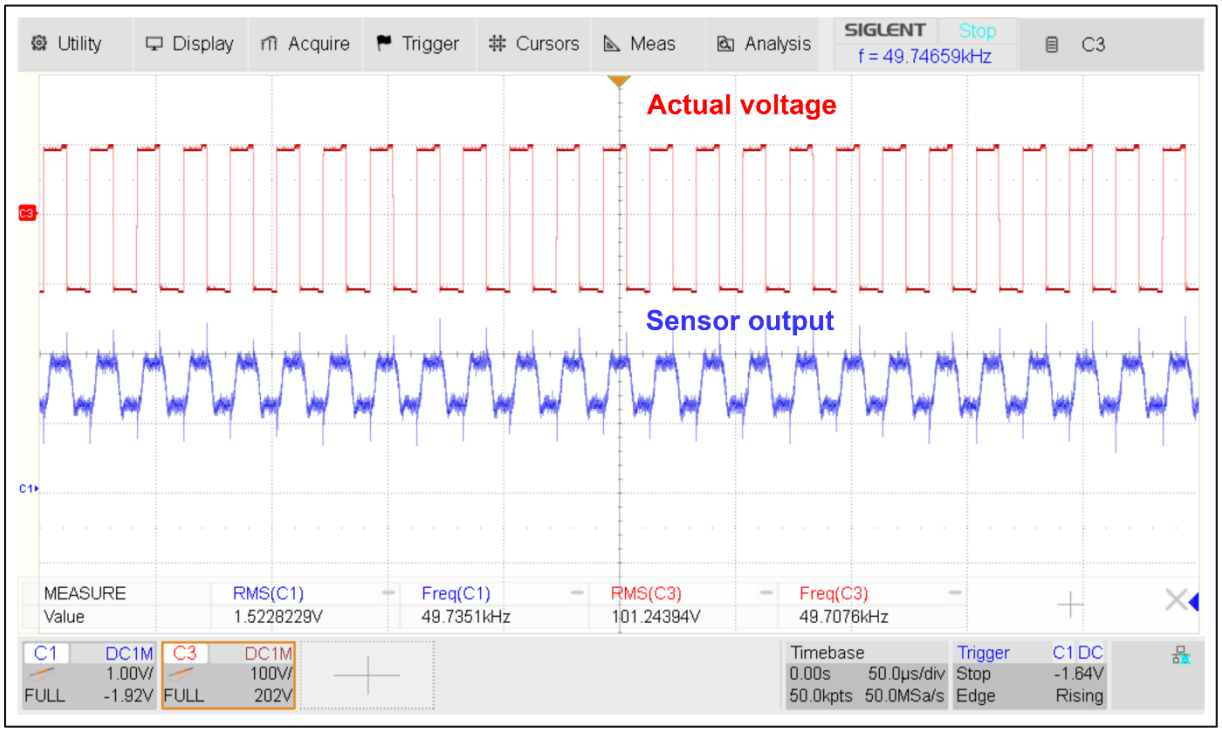

Figure 2 : Results with 50kHz current with offset

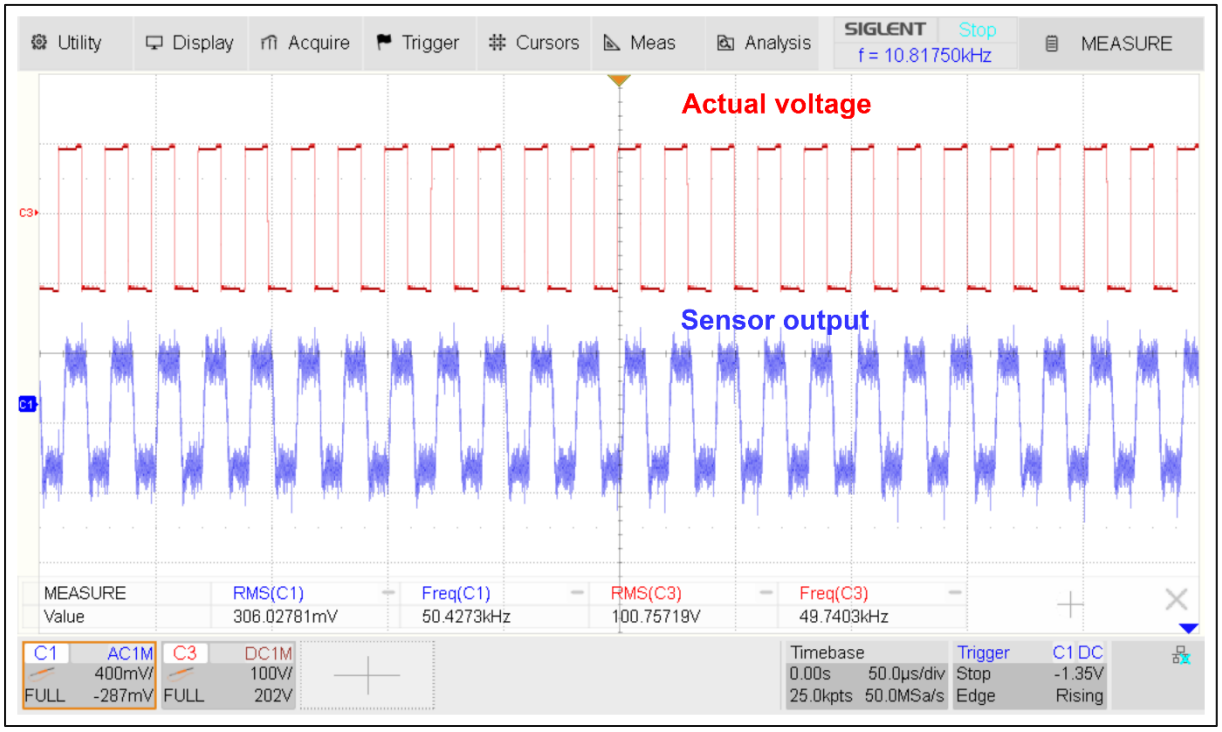

Figure 3 : Results with 50kHz current without offset