DESCRIPTION

The *SENIS* 3-Axis AC Magnetic Transducer 3DACMT-1 is a compact instrument to measure all 3 components of alternating magnetic fields with very high resolution in a small volume.

It incorporates three groups of mutually orthogonal coils, analog integrators and amplifiers within a small cube and generates 3 high level output signals that are immune to electromagnetic disturbances. The sensing cube is completely non magnetic and therefore does not disturb the external field.

The *SENIS* 3DACMT-1 Transducer is ideally suited to measure and map AC magnetic fields in noisy environments with field resolution better than 1.5µT.

KEY FEATURES

- **Frequency range from 10kHz to 200kHz**
- **Magnetic field resolution better than 1.5µTrms**
- **Small probe volume of about 4 cm^3**
- **Non-invasive: The probe does not modify the measured magnetic field**
- **Highly linear response**
- **High transduction accuracy of ±1%**
- **High phase accuracy: <3° at 85kHz**
- **Excellent angular accuracy <±1°**
- **Negligible cross-talk**
- **Common center of coils for all three axis**
- **Insensitive to electrical fields or capacitive coupling**
- **Analog output**

PRELIMINARY TECHNICAL SPECIFICATIONS

Geometrical	**Value**
Size of sensing cube, A	16mm x 16mm x 16mm ±0.5mm (for all 3 dimensions)
Probe length (sensing cube with holder), L1	240mm
Cable length, L	3m ±10cm
Size electronic box (BxCxD)	150mm x 38mm x 95 mm
Orthogonality of different sensing directions	<1° in all 3 Cartesian directions
Electrical	
Full measurement range	±10mT
Output Signal	Bipolar, single—ended, amplitude from 0V to ±5V
Sensitivity	500mV/mT
Magnetic resolution	Better than 1.5µTrms for all three axis
Magnetic nonlinearity	< 1% for f<100kHz
Measurement bandwidth	10kHz - 200kHz
Phase shift	Better than 3° at 85kHz
Minimum Load Impedance	10kΩ
Output resistance	< 60Ω
Spurious in measurement range	<50µV_{peak} (<100nT RTI)
Current consumption	±45mA @ ±12V

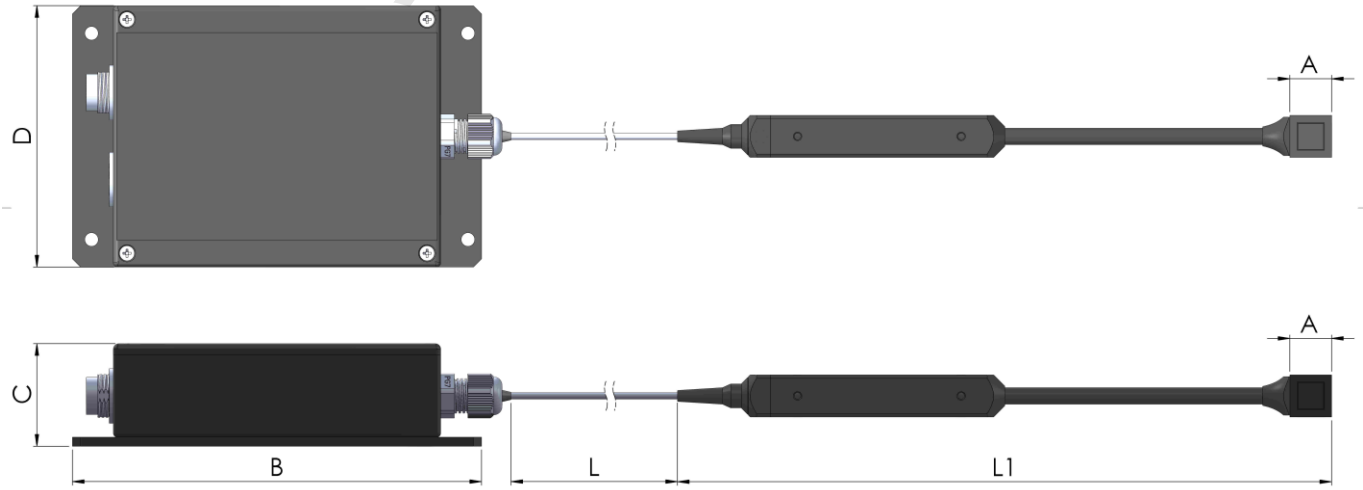


Figure 1. Geometry of the AC Transducer and Probe

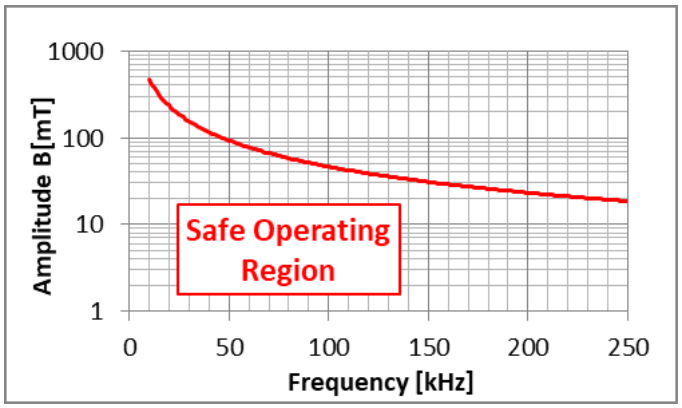


Figure 2a: Safe Operating Region

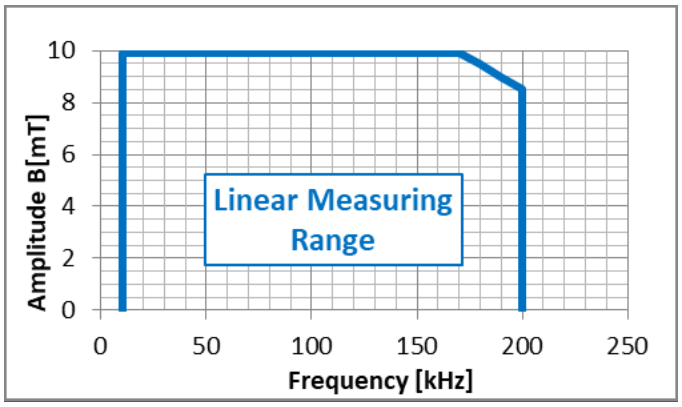


Figure 2b: Linear Measuring Range

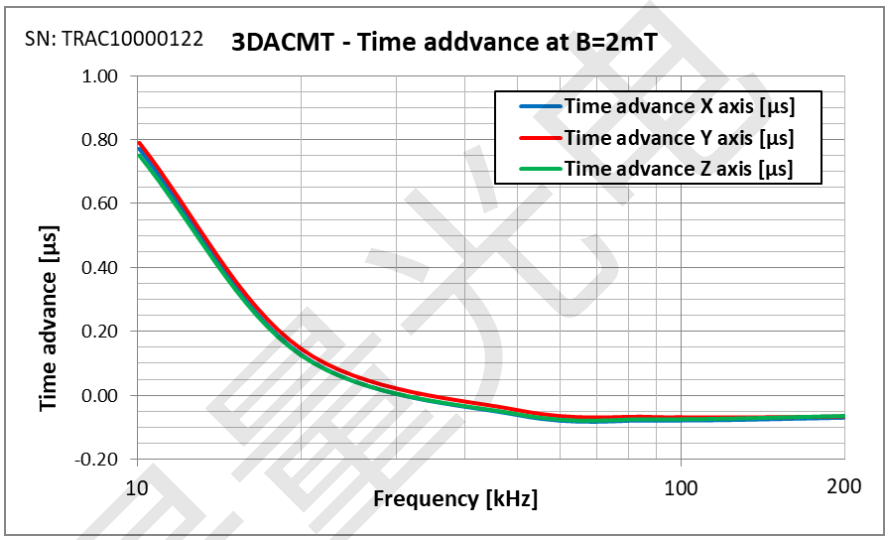


Figure 3: Time advance for all three axes.

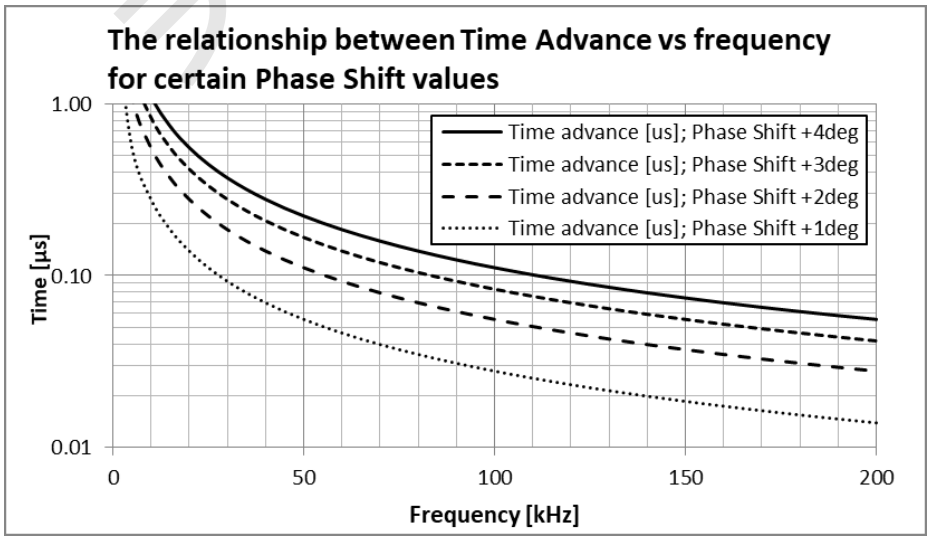


Figure 4: Relationship between Time Advance vs. frequency.

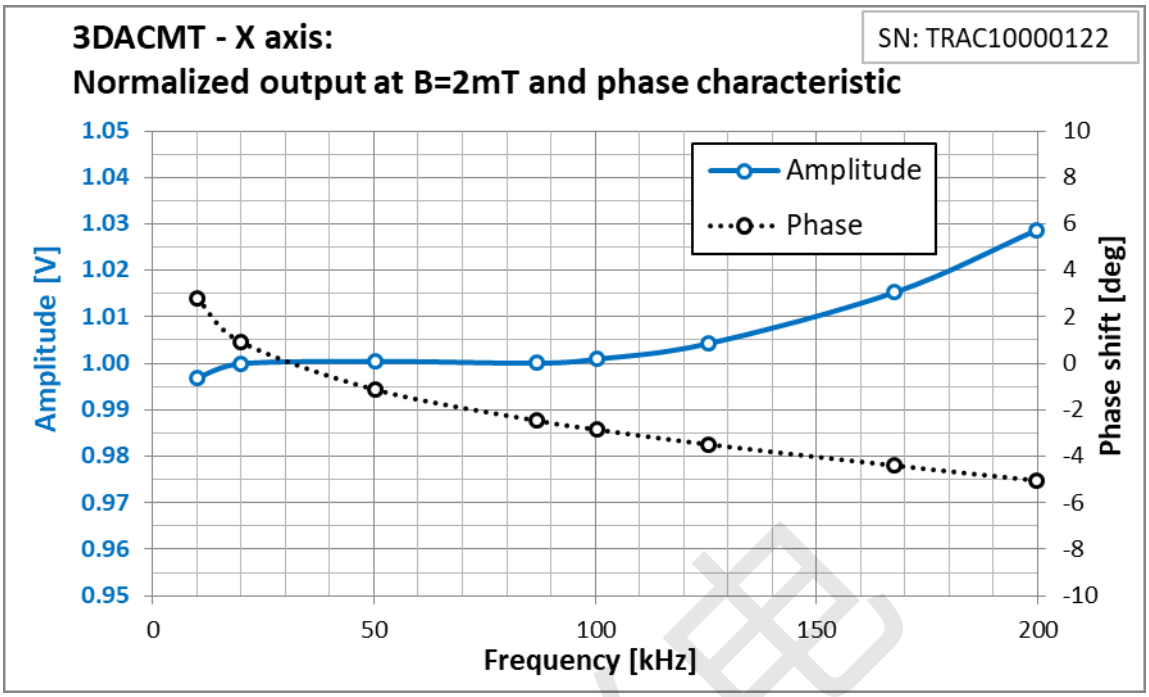


Figure 5: X axis - Normalized Output and Phase Shift.

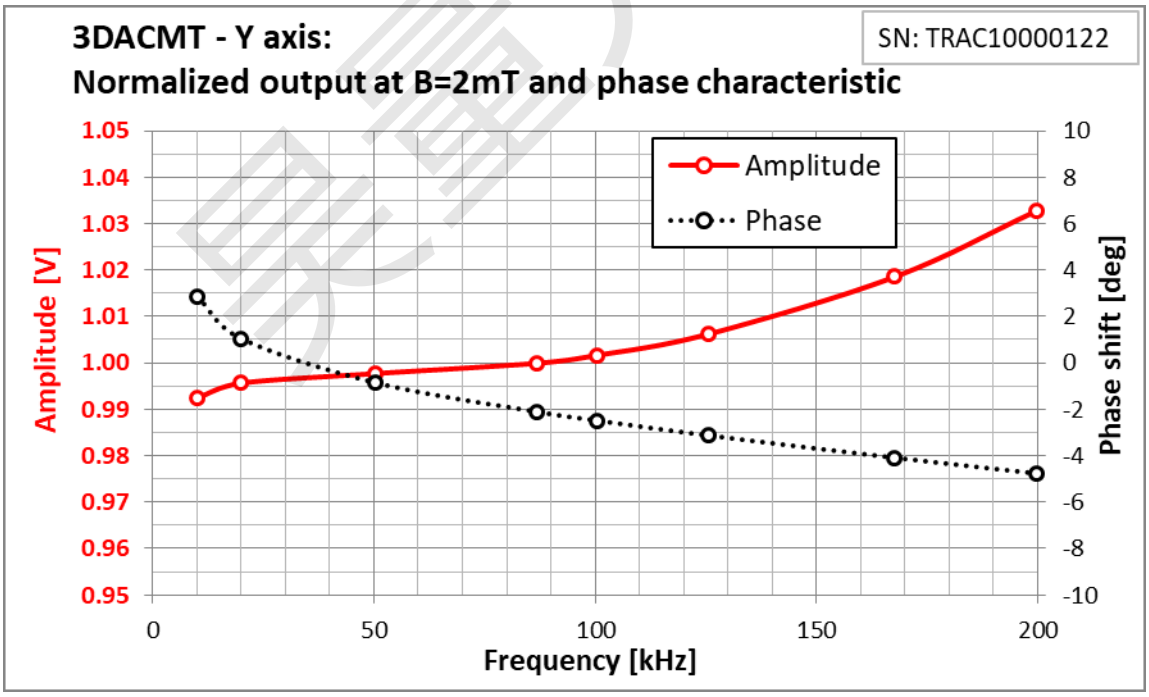


Figure 6: Y axis - Normalized Output and Phase Shift.

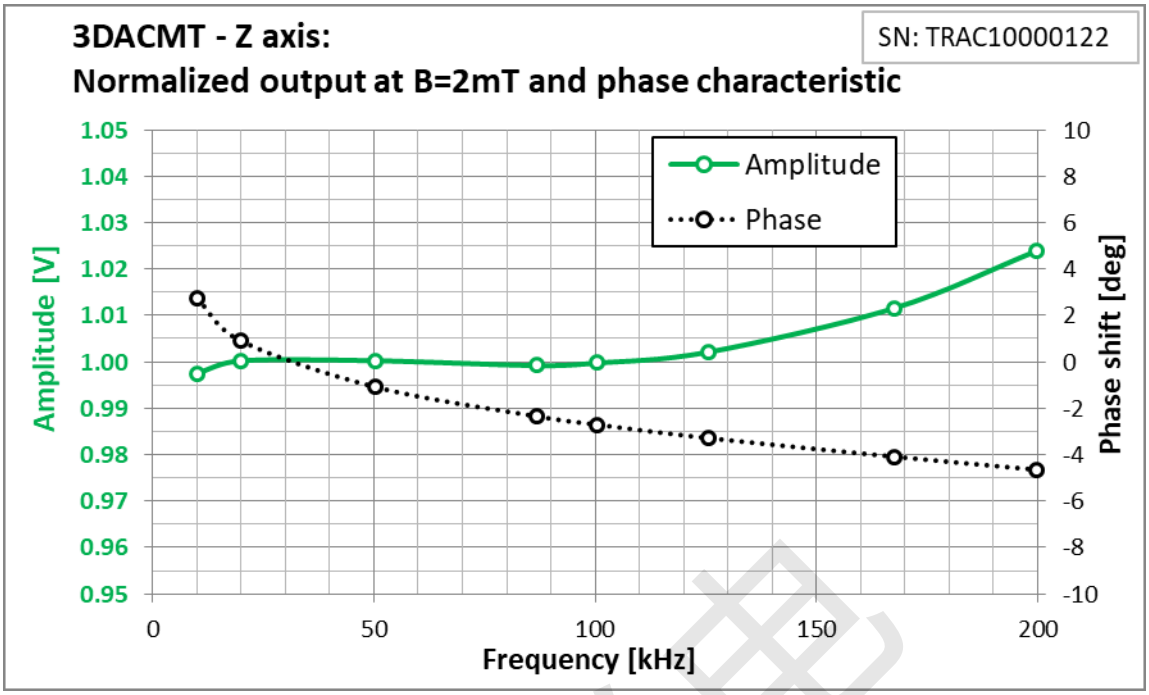


Figure 7: Z axis - Normalized Output and Phase Shift.

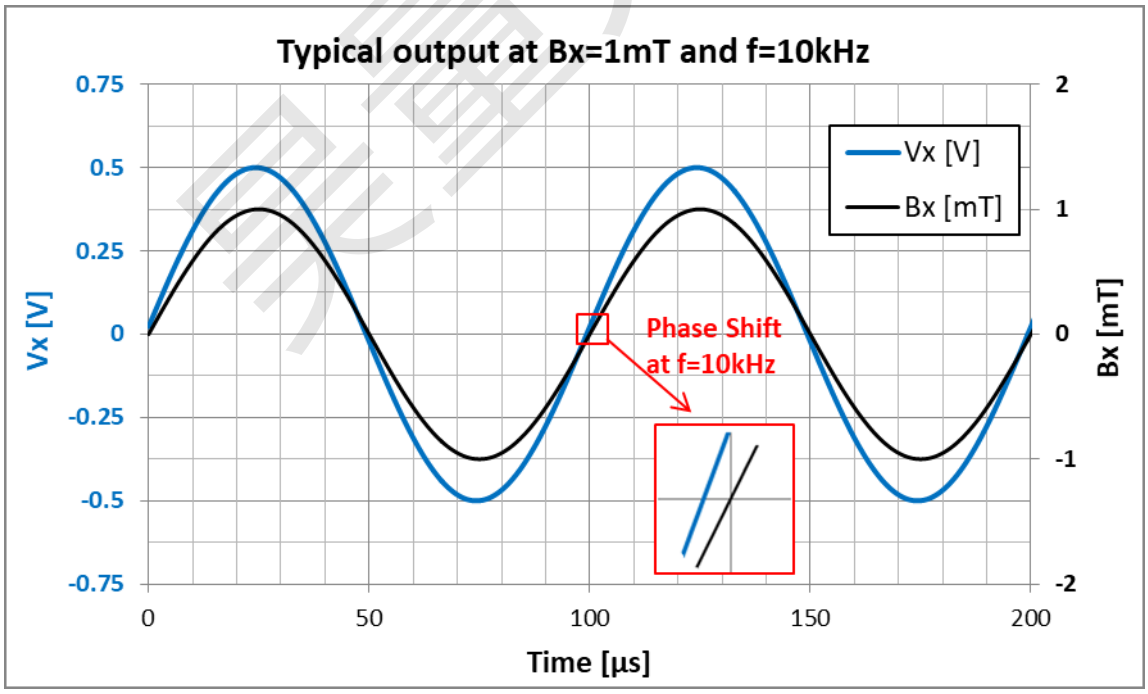


Figure 8: Typical output at B=1mT and f=10kHz

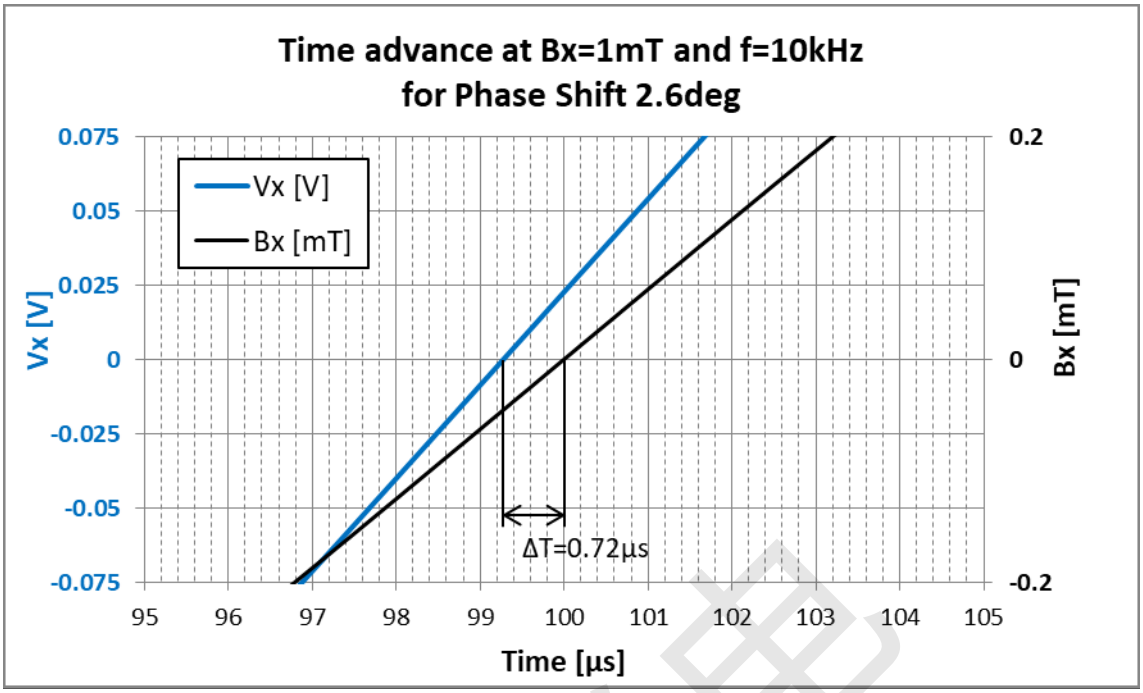


Figure 9: Time advance at zero-crossing for Bx=1mT and f=10kHz and Phase Shift 2.6 deg

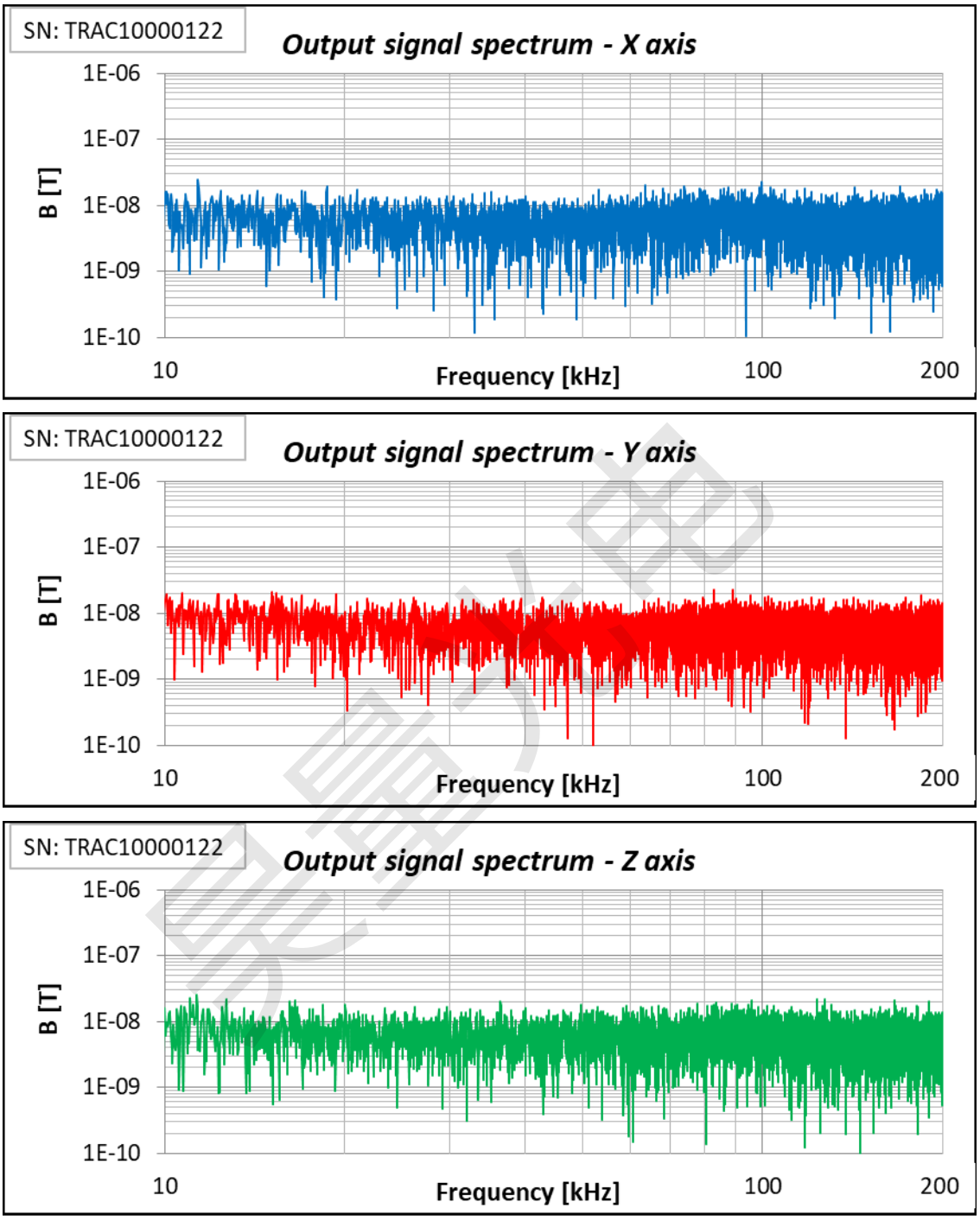


Figure 10: Spectrum of the output signals at B=0T.

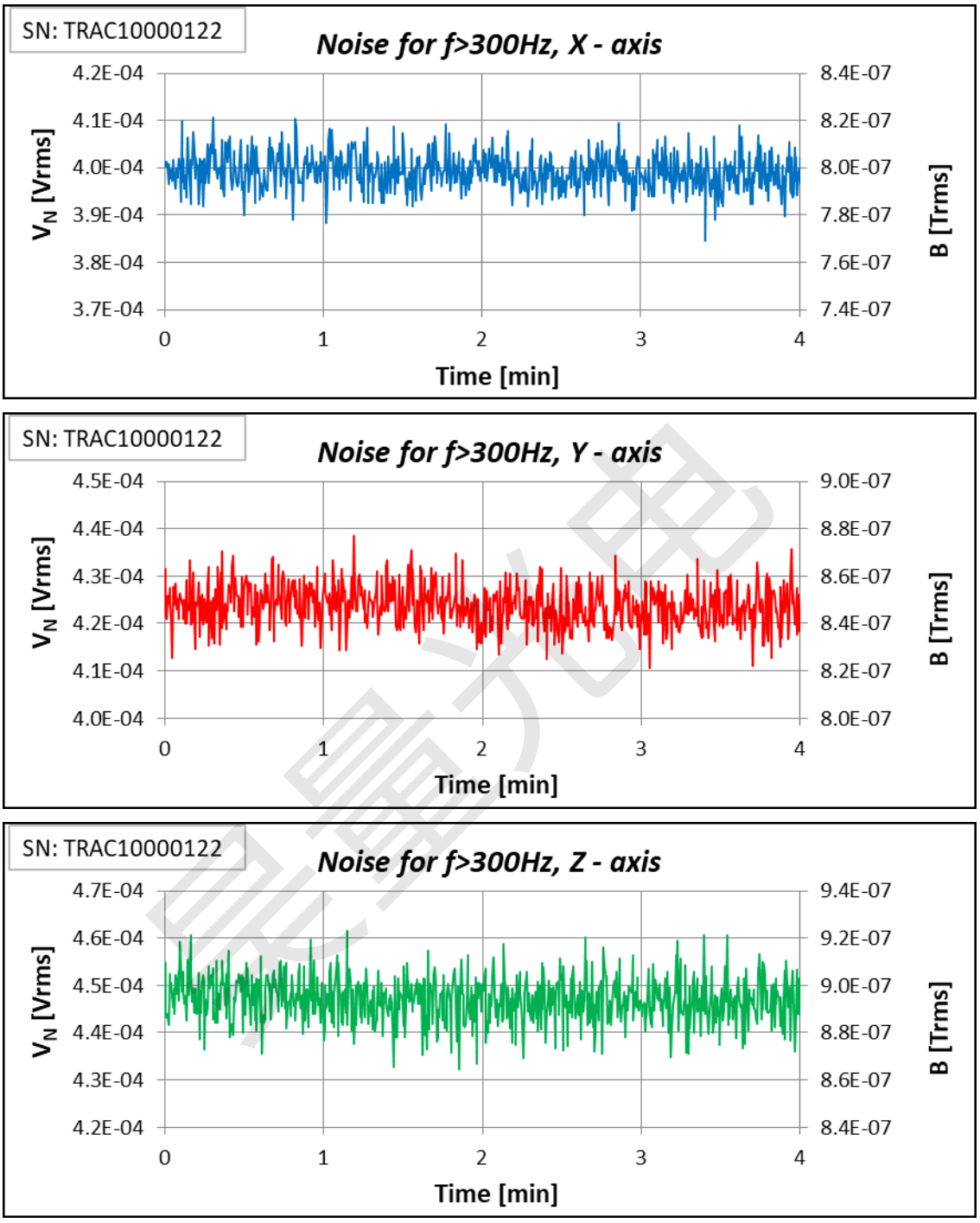


Figure 11: Typical Noise for f>300Hz, rms Value.

Figure 12: Photo of 3D AC Magnetic Field Transducer.

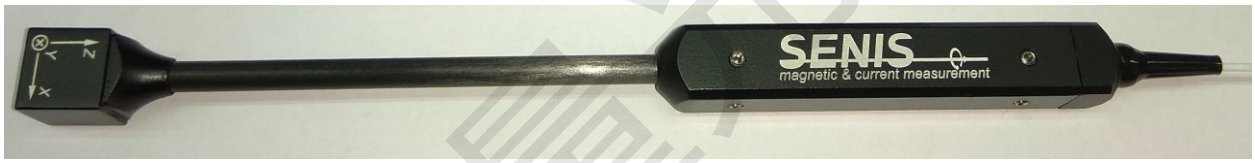
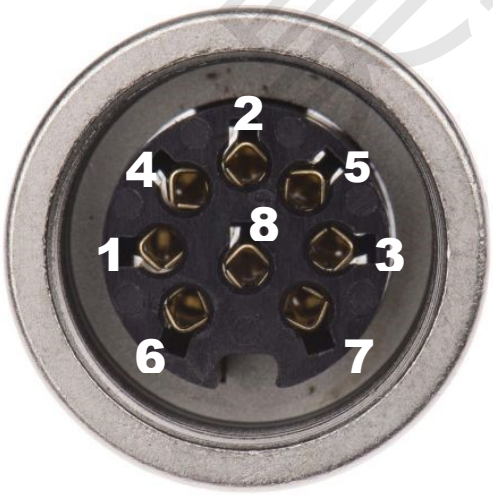


Figure 13: Probe photo.



Pin No.	Output signal
1	Not used
2	**Z axis**
3	Not used
4	**Y axis**
5	**X axis**
6	Not used
7	Not used
8	**GND (Common)**

Figure 14: Output signal connector KVF 81 (matching with cable SV81 connector - pin out, front view

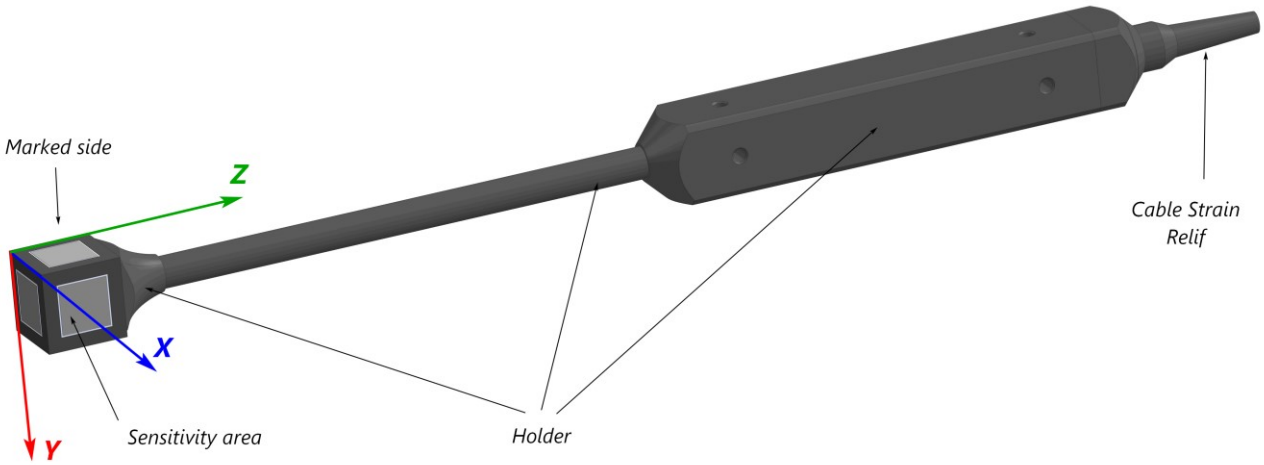


Figure 15: Probe – drawing.

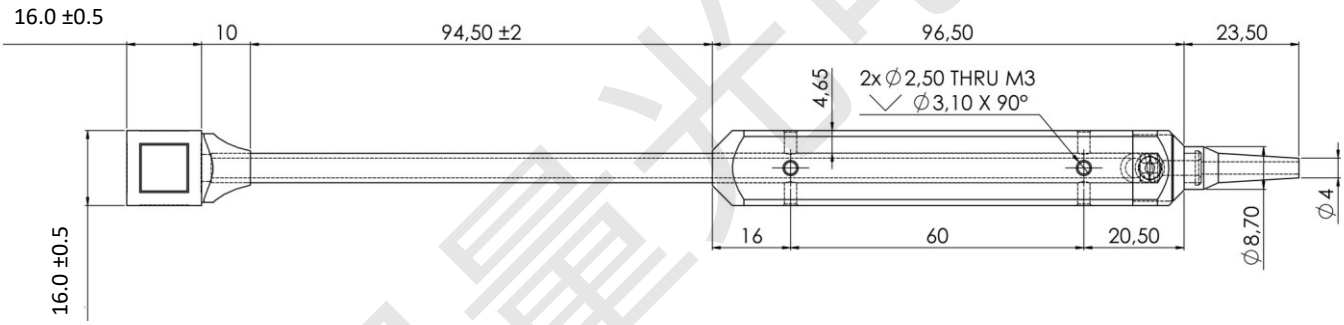


Figure 16: Probe – dimensions (all dimensions are in mm).

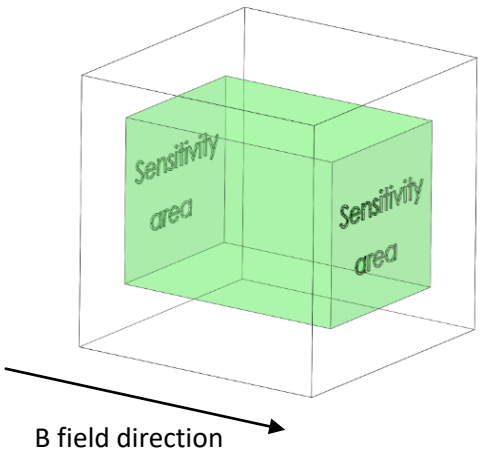


Figure 17: Sensitivity area position for one axis

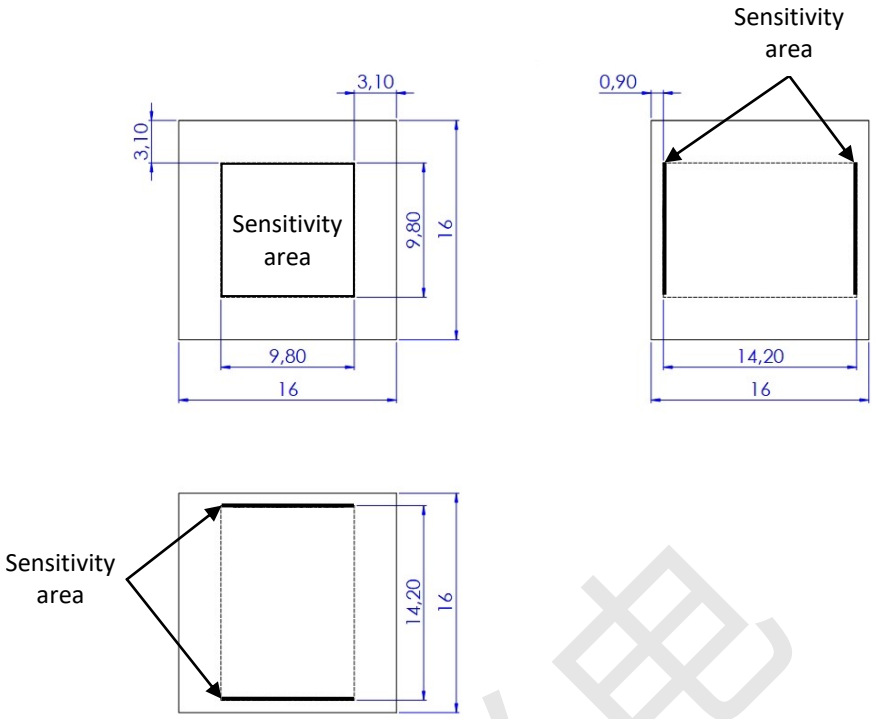
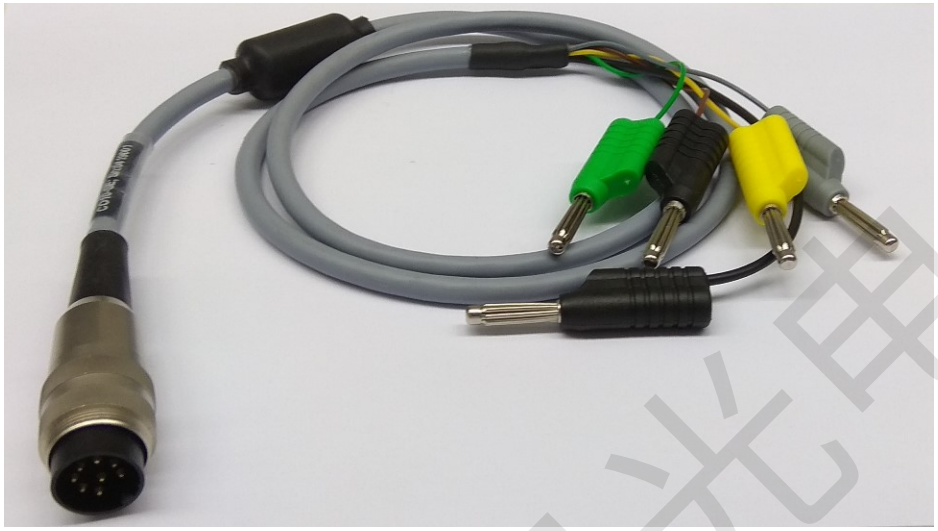


Figure 18: Sensitivity area dimensions and position (all dimensions area in mm).

Appendix A

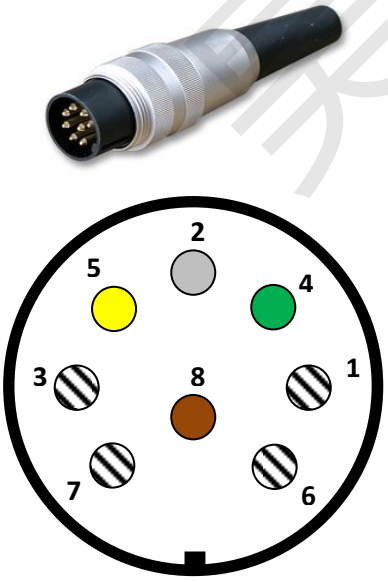
Output Signals Cable CO10-SE

All output signals should be measured between the desired output (X, Y or Z axis) and GND.



Wire Color	Output Signals
Yellow	X axis
Green	Y axis
Gray	Z axis
Brown	GND
Black	Cable Shield

Figure a1: Output Signals Cable CO10-SE



Pin no.	Output signal	Wire color
1	Not Used	
2	Z axis	grey
3	Not Used	
4	Y axis	green
5	X axis	yellow
6	Not Used	
7	Not Used	
8	GND	brown

Figure a2: Cable Connector pins layout – connection side view.

Appendix B

Relations between Power Supply AC lines, Common and +/- voltage rails

Connection between Power Supply S12-5 and 3DACMT-1 is given of Figure b1.

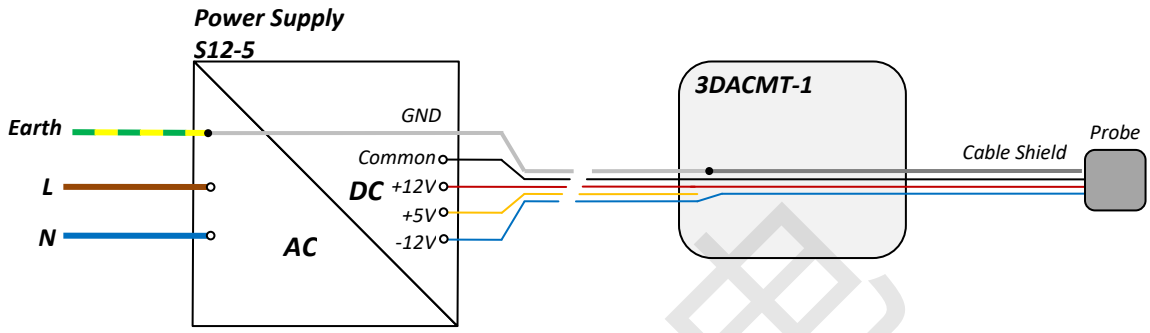


Figure b1.

On Figure a2 is given shield connection of Power Supply S12-5.

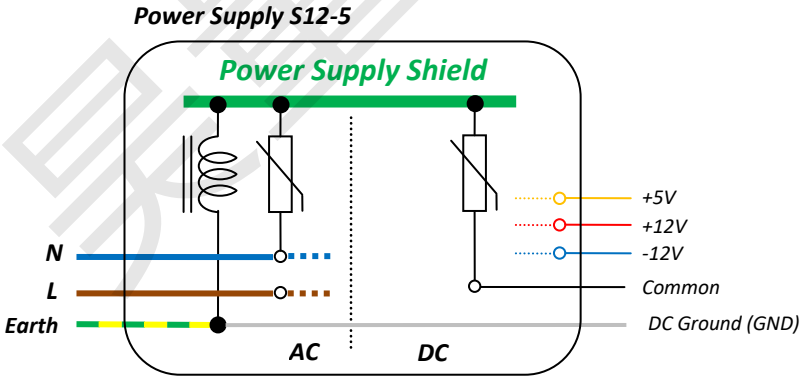


Figure b2.

Appendix C

3DACMT-1 calibration Set-up

Calibration Set-up is given of Figure b1.

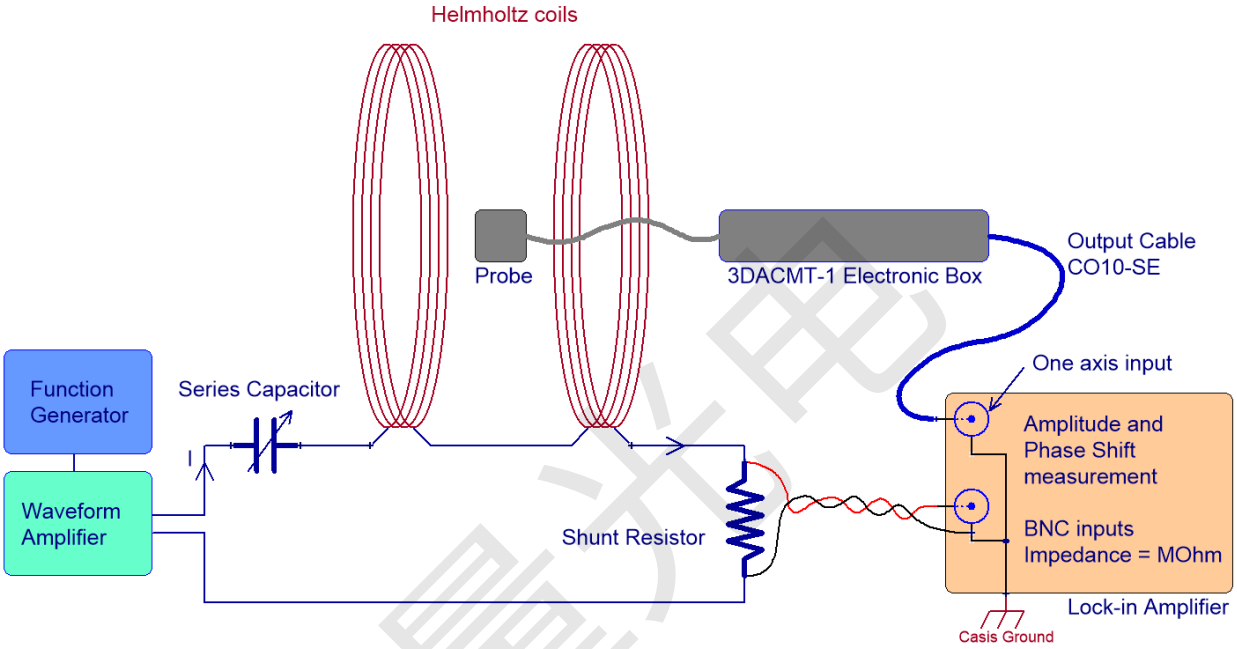


Figure c1.