

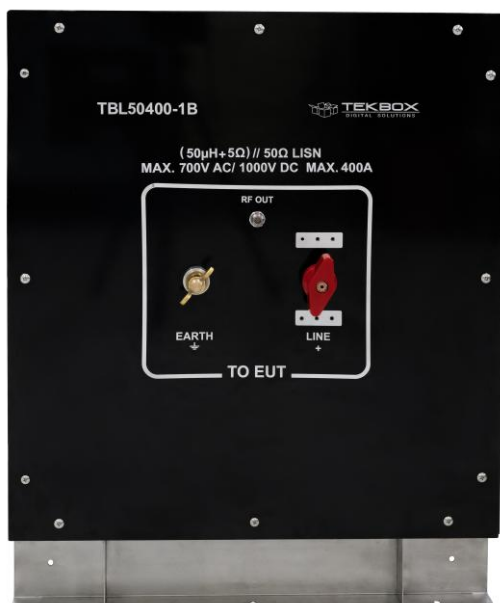
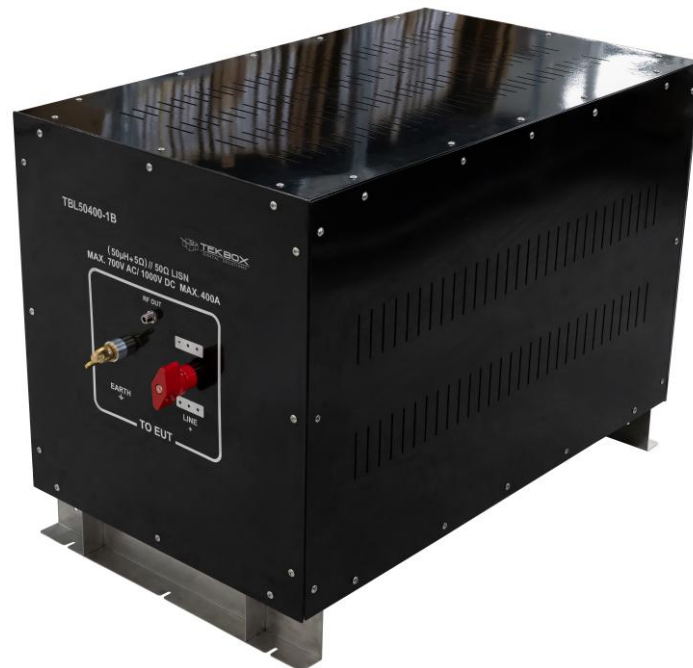
50 μ H Line Impedance Stabilisation Network

1 Introduction

The TBL50400-1B is a single path (50 μ H +5 Ω) // 50 Ω LISN for conducted emission measurements of DC or AC-powered electronic equipment. It is designed according to CISPR 16-1-2 and characterized in the frequency range of 9 kHz to 30 MHz.

Combining two LISN enables conducted emission measurement of DC and single phase supplied EUTs. EUTs with 3 phase supply require three or four pieces of TBL50400-1B, depending on whether the product is supplied in delta or star configuration.

An exposed bottom profile enables convenient ground plane connection. The unit comes equipped with a N-male to N-male RG223 cable.



TBL50400-1B EUT Side



TBL50400-1B Source Side

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2 Specification

LISN type: single path V-AMN, 50 Ω /(50 μ H+5 Ω); 250 μ H pre-filter

Characterized Frequency range: 9 kHz – 30 MHz

DC Resistance: 70 m Ω

Maximum current: 300A continuous with FANS ON ,400A for 30 minutes with FANS ON

Operating voltage range: 0 – 1000V DC; 0 - 700V AC (50/60 Hz)

High pass to suppress residual AC: default jumpered ON; residual AC suppression > 66dB; RF out not terminated

EUT connector: binding post, M16, 4mm center hole, 400A, 1kV, Schützinger POL 3590 / RED

Source connector: binding post, M16, 4mm center hole, 400A, 1kV, Schützinger POL 3590 / RED

Earth: 16mm Earth stud with wing-nut, exposed stainless steel bottom profile with mounting slots

RF connector: N-Female

Dimensions: W x H x L; 660 mm x 820 mm x 1250 mm;

Weight: 150 kg

Fans :

The LISN is equipped with fans to enable continuous operation up to 300 A. The fans are available with either 100 V – 120 V or with 200V – 240 V supply voltage. A C14 connector with integrated switch sits on the rear panel. The LISN can be operated continuously with up to 235 A without fan.

An exposed stainless steel bottom profile enables convenient ground plane connection.

2.1 Conformity

The TBL50400-1B is compliant with CISPR 16-1-2 .

In line with the CISPR 16-1-2 standard compliant design and setup specification, the LISN exhibits high ground leakage currents and non-standard isolation and consequently cannot meet the safety requirements of EN 61010-1.

Furthermore CISPR 16-1-2 specifies high capacitance values for the capacitors from Line / + to Ground. These capacitance values are not commercially available in Y2 rating and are implemented using AC rated capacitors with suitable voltage rating.

In order to prevent the danger of lethal electric shock, the operator is responsible for ensuring protective measures in line with IEC 60364-4-41 and IEC 60364-5-54 and to follow all safety related information of this manual.

2.2 Safety

To ensure safe operations, the user must adhere to all safety-related information in this manual. All metal parts of the housing are connected to the earth pins of the Source and DUT sockets. Before connecting any other conductor to the LISN, connect the Earth brackets to protective Earth.

Protective Earth must not be disconnected from the Earth brackets unless all other wiring has been disconnected first. Special care must be taken to avoid connecting AC - line or VDC+ to the EARTH pin of the SOURCE connector by mistake.

When operating the LISN with alternating current, use an isolation transformer.

While the source connector is under voltage, do not connect or disconnect it.

The TBL50400-1B shall be operated by qualified laboratory staff only.

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2.3 Warning

Spectrum Analyzer / Measurement Receiver protection:

The TBL50400-1B LISN does not contain any protective elements in the RF path. Use an external attenuator and/or limiter, if your EUT may produce harmful transients or high RF noise levels, in order to protect the spectrum analyser / measurement receiver input. If using without transient limiter and testing AC supplied products, it is highly recommended to protect the input of the connected analyzer with Tekbox highpass filters or to insert the internal highpass jumper.

Safety:

Operating an AC LISN involves dealing with potentially lethal voltages and high ground leakage currents. The LISN shall only be operated by qualified staff.



Read this manual carefully and be sure to understand the operation of the LISN. Make sure that the conducted noise pre – compliance test equipment is set up correctly and that the necessary earth connections are reliably bonded to avoid the risk of lethal electric shocks. The ground brackets must be securely connected to the protective earth conductor available on site, before making any other electrical connection. This connection must not be separated, until the mains supply is disconnected from the LISN setup.

When connecting the LISN to AC mains voltage, always use an isolation transformer.

Take precautions, such as validating the signal amplitude at the RF output prior to connecting a spectrum analyzer or using attenuators and/or limiters to prevent damage to your test receiver or spectrum analyzer.

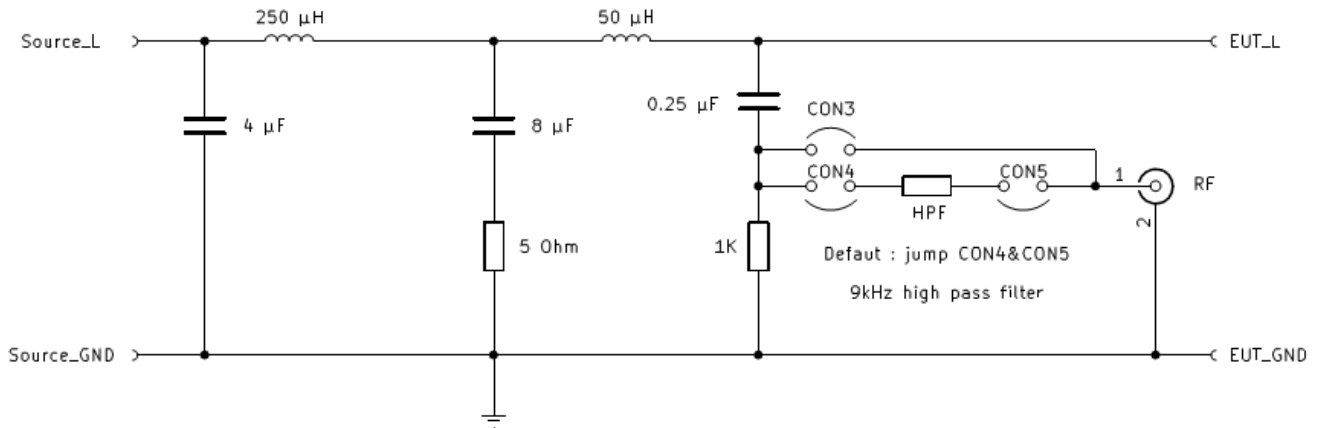
Do not carry out any modifications or manipulations of the TBL50400-1B.

Avoid touching the housing, when operating the LISN at maximum current over extended time. The housing temperature may rise up to 45°C. Turn off the EUT after measurements to avoid unnecessary dissipation.

The LISN housing is connected to the negative / ground SOURCE and EUT pin of the terminal block and the ground of the RF connector. Inadvertently connecting the positive voltage to the ground pin will expose you to the risk of electric shock. The maximum source voltage rating with respect to component ratings is 250V.

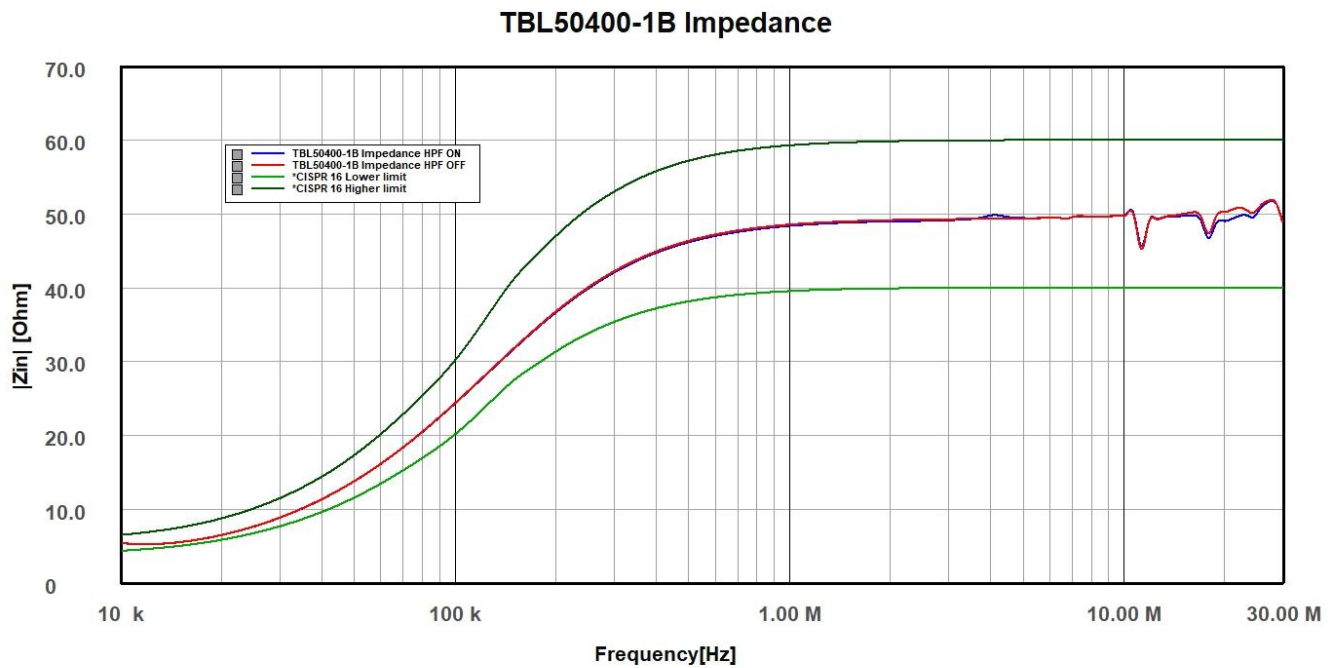
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3 Principle schematic



Picture 1: principle schematic

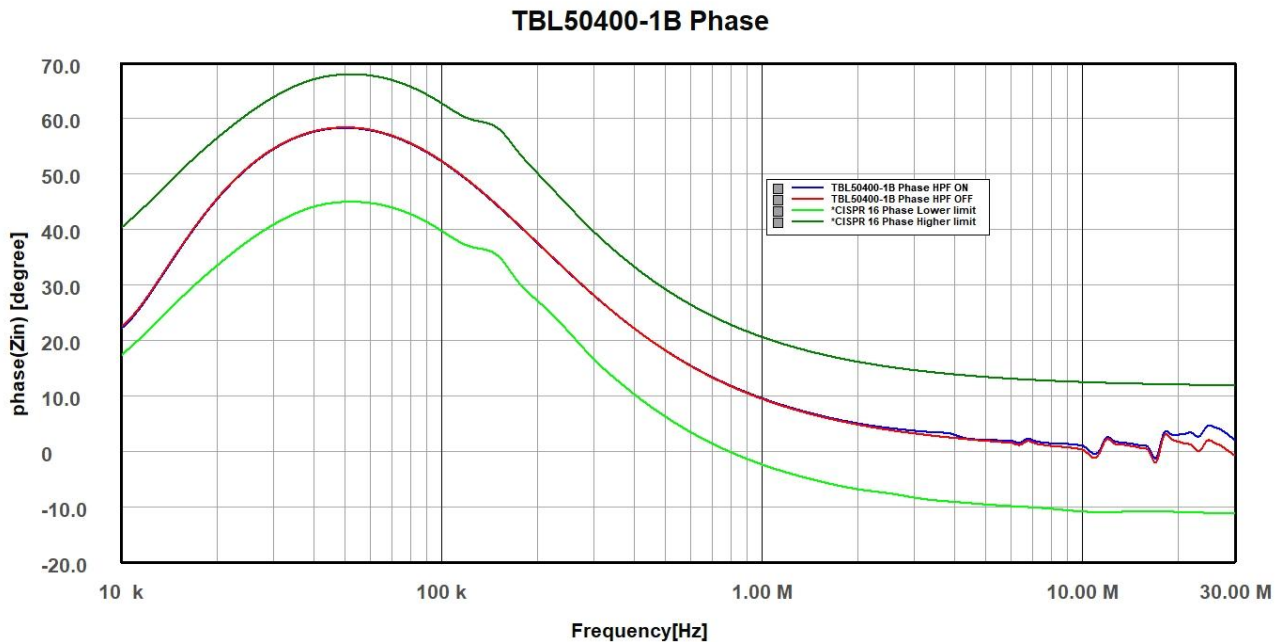
4 Impedance



Picture 2: LISN impedance, (50 μ H + 5 Ω) // 50 Ω , CISPR 16

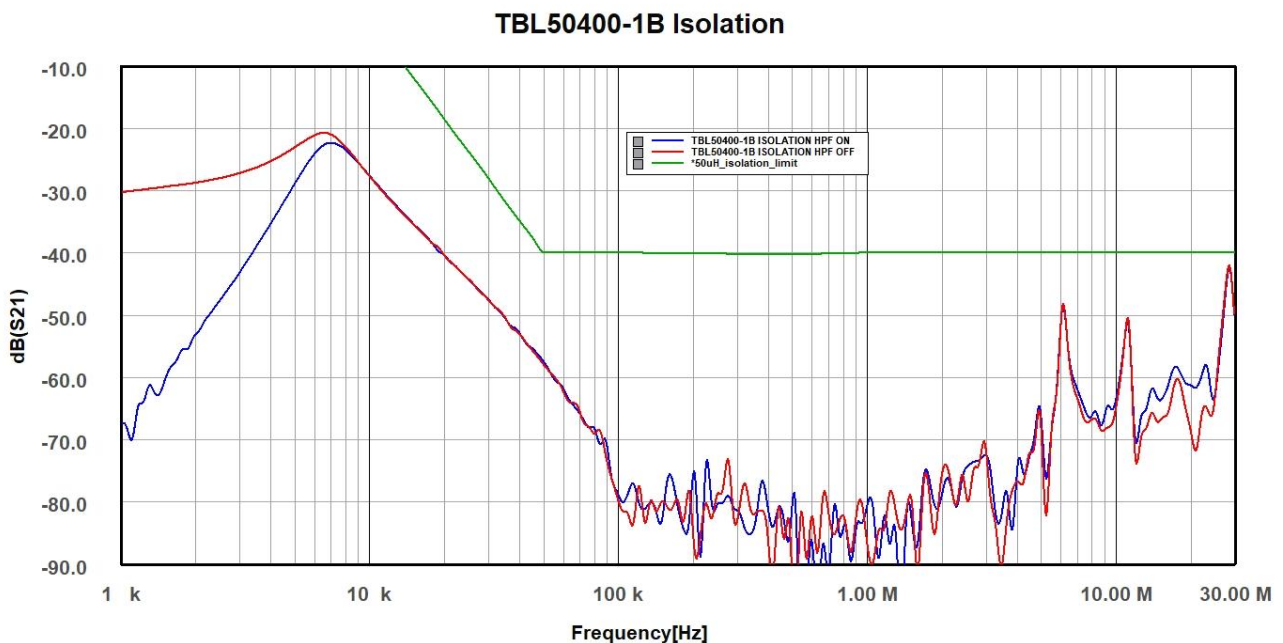
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5 Phase



Picture 3: LISN phase, (50 μ H + 5 Ω) // 50 Ω CISPR 16

6 Isolation



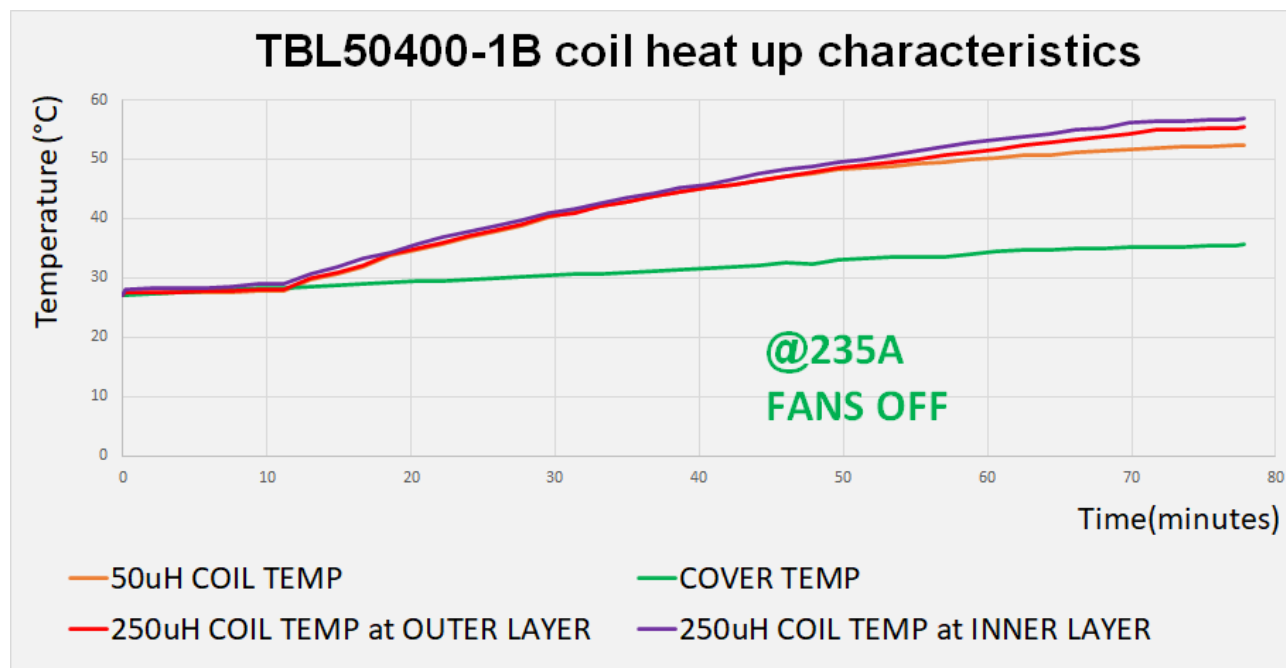
Picture 4: LISN Isolation, Source to RF out, (50 μ H + 5 Ω) // 50 Ω CISPR 16

The isolation is measured between SOURCE terminal and RF port, with the EUT port terminated with 50 Ohm.

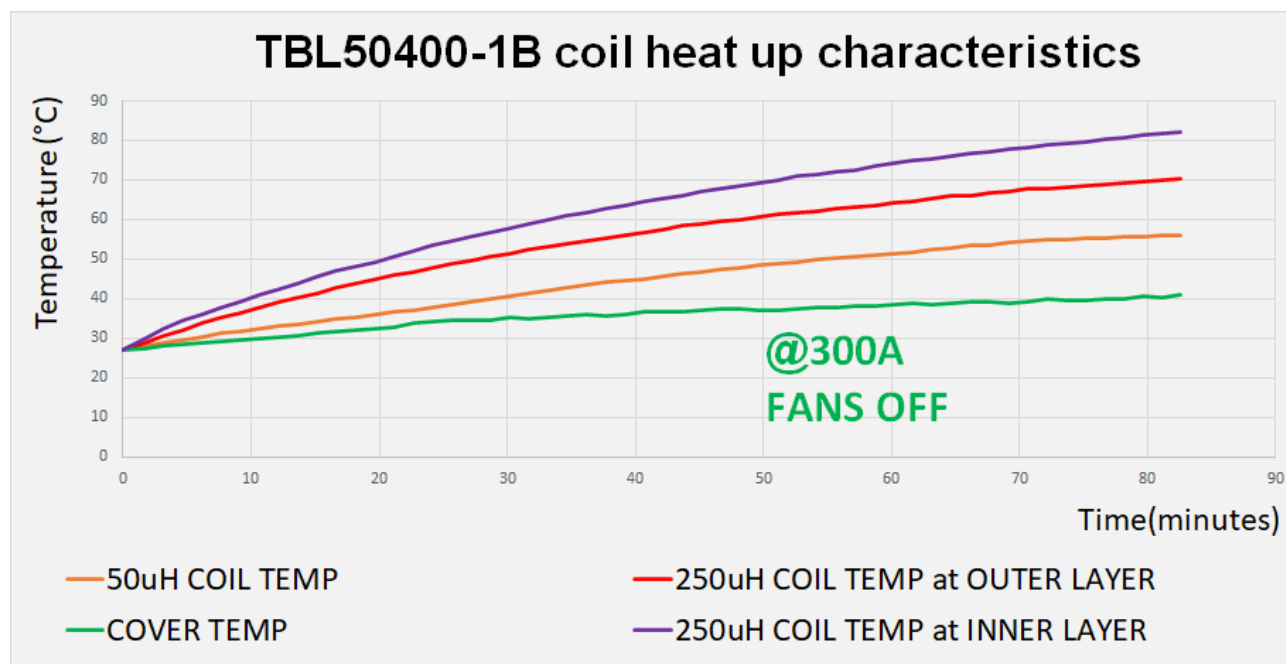
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7 Thermal characteristics

Note: ensure that the cables connected to EUT and source port have sufficient cross-section to avoid overheating the wing terminals.

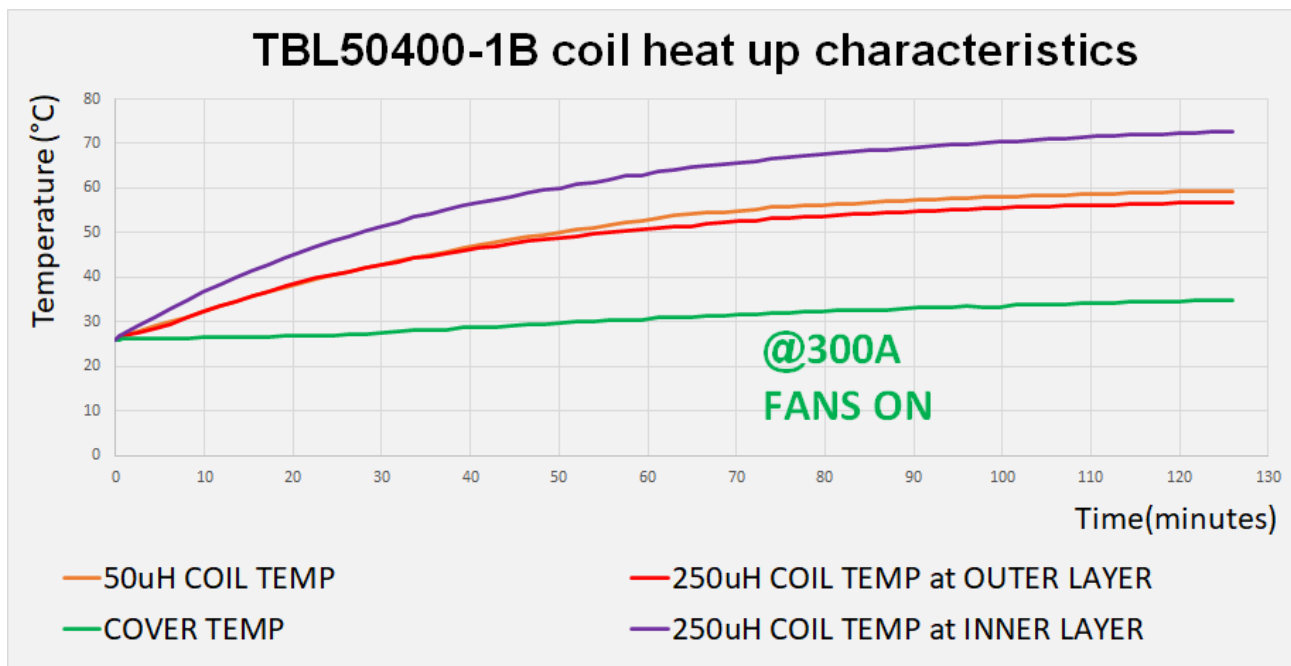


Picture 5: Coil and housing temperature at 235A ,fans OFF

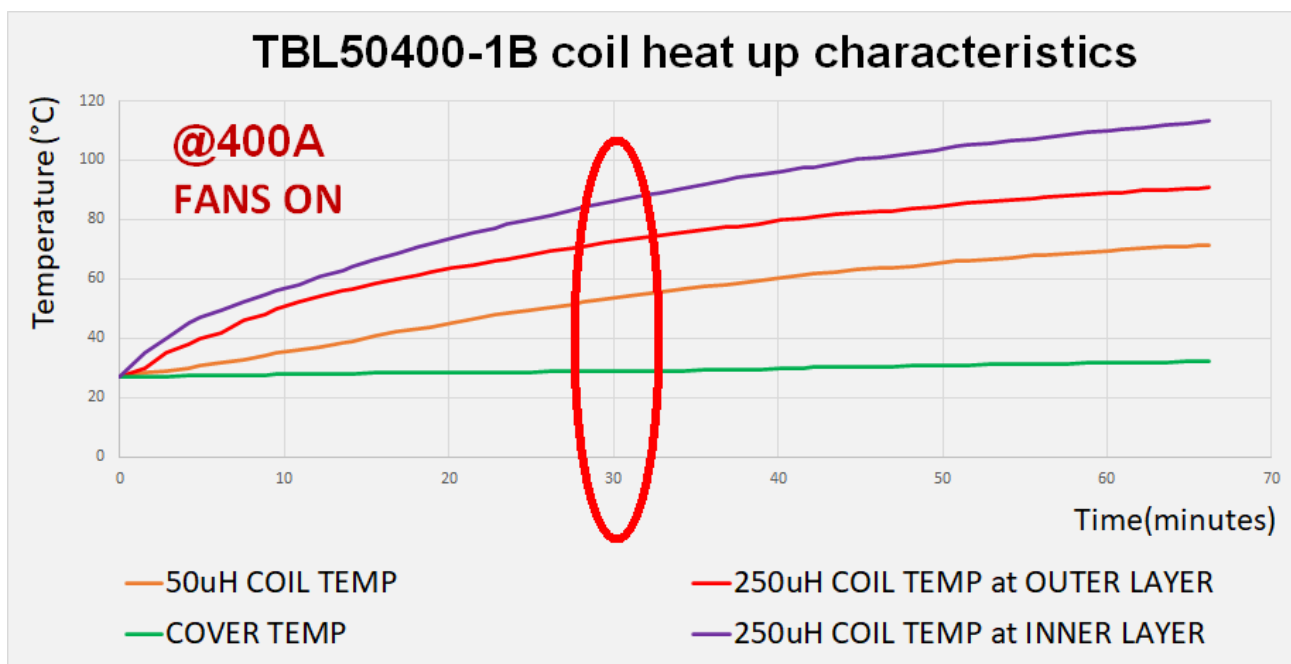


Picture 6: Coil and housing temperature at 300A ,fans OFF

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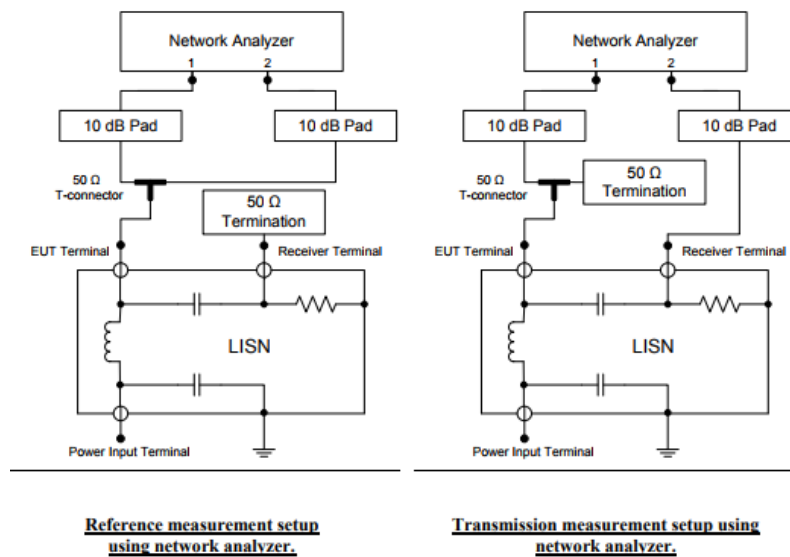
Picture 7: Coil and housing temperature at 300A ,fans ON



Picture 8: Coil and housing temperature at 400A ,fans ON

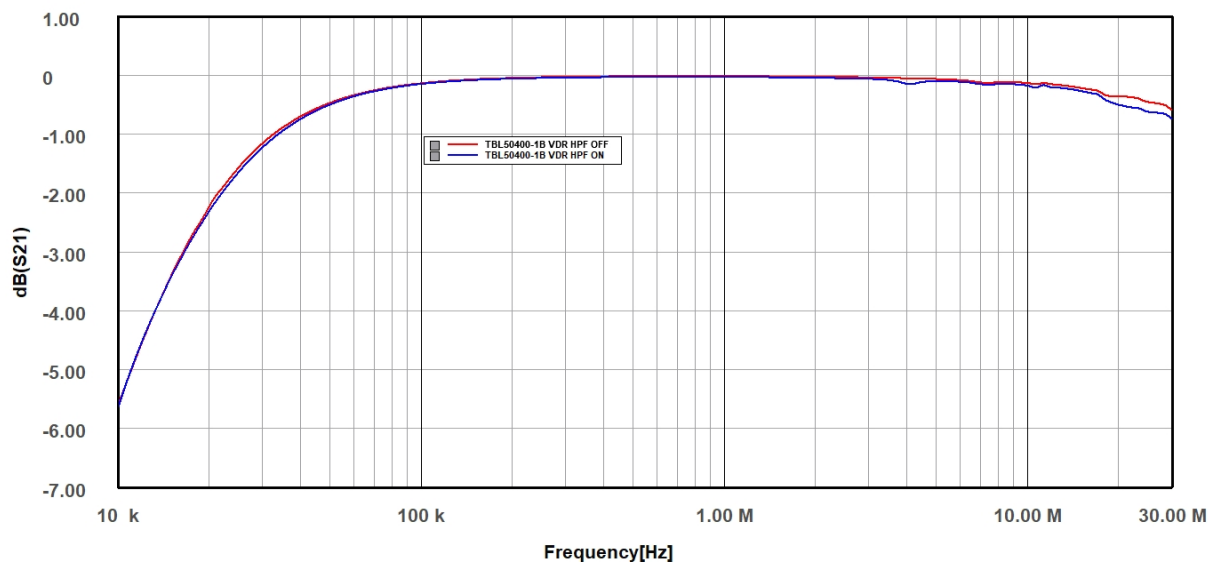
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8 Calibration data according to CISPR 16 -1-2 Annex A8



Picture 9: Calibration set up according to CISPR 16-1-2 Annex A.8.

TBL50400-1B Voltage Division Factor



Picture 10: Voltage division ratio EUT terminals to RF connector

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Frequency [MHz]	VDR EUT port to RF port [dB], HPF OFF	VDR EUT port to RF port [dB], HPF ON	Frequency [MHz]	VDR EUT port to RF port [dB], HPF OFF	VDR EUT port to RF port [dB], HPF ON
0.009	-6.31	-6.48	7	-0.13	-0.16
0.01	-5.62	-5.66	8	-0.13	-0.16
0.015	-3.41	-3.43	9	-0.13	-0.16
0.02	-2.24	-2.32	10	-0.14	-0.18
0.025	-1.58	-1.66	11	-0.15	-0.19
0.05	-0.48	-0.51	12	-0.16	-0.22
0.075	-0.23	-0.25	13	-0.18	-0.22
0.1	-0.15	-0.16	14	-0.20	-0.25
0.125	-0.10	-0.11	15	-0.22	-0.28
0.15	-0.08	-0.09	16	-0.25	-0.31
0.175	-0.06	-0.07	17	-0.27	-0.33
0.2	-0.05	-0.07	18	-0.34	-0.42
0.3	-0.03	-0.05	19	-0.36	-0.47
0.4	-0.03	-0.04	20	-0.37	-0.51
0.5	-0.02	-0.04	21	-0.37	-0.53
0.6	-0.02	-0.04	22	-0.38	-0.55
0.7	-0.02	-0.04	23	-0.40	-0.56
0.8	-0.02	-0.04	24	-0.43	-0.60
0.9	-0.02	-0.04	25	-0.46	-0.63
1	-0.02	-0.04	26	-0.48	-0.64
2	-0.03	-0.05	27	-0.49	-0.65
3	-0.04	-0.07	28	-0.50	-0.66
4	-0.06	-0.15	29	-0.54	-0.69
5	-0.07	-0.11	30	-0.61	-0.76
6	-0.09	-0.12			

Table 1 - LISN calibration data, voltage division ratio

8.1 High pass

If the spectrum analyzer or measurement receiver input impedance at 50 / 60 / 400 Hz is not 50 Ohm but high, residual AC voltage suppression at the LISN RF output is low. Moreover, high amplitude sub-harmonics at low frequencies may also cause receiver overload, nonlinear distortions or even damage. It is highly recommended to protect the analyzer / receiver input with an external filter/attenuator/transient limiter such as the TBFL1 or similar. External attenuators may also be necessary, depending on the behaviour of the EUT. The TBL50400-1B also contains a simple, 2nd order high pass filter for residual AC voltage suppression, which can be activated by setting an internal jumper, if needed.

50 Hz suppression without high pass jumpered: 23 dB @ RF output terminated with High Z

400 Hz suppression without high pass jumpered: 9.4 dB @ RF output terminated with High Z

50 Hz suppression with high pass jumpered: 74 dB @ RF output terminated with High Z

400 Hz suppression with high pass jumpered: 66 dB @ RF output terminated with High Z

According to CISPR 16, the TBL50400-1B LISN has an 8 μ F capacitor to ground. In AC applications, the capacitor draws a significant amount of reactive current, which would trip the mains ground fault switch. Hence, the TBL50400-1B must be supplied through an isolation transformer.

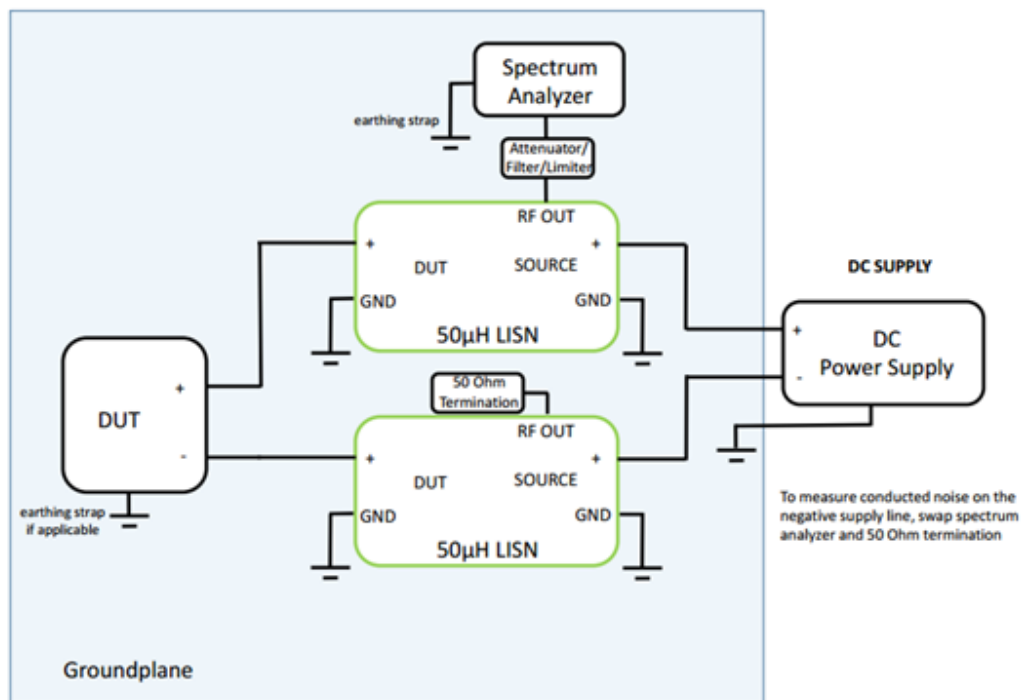
Separate measurement of differential and common mode noise can be carried out using two TBL50400-1B in combination with the Tekbox LISN Mate TBLM2.

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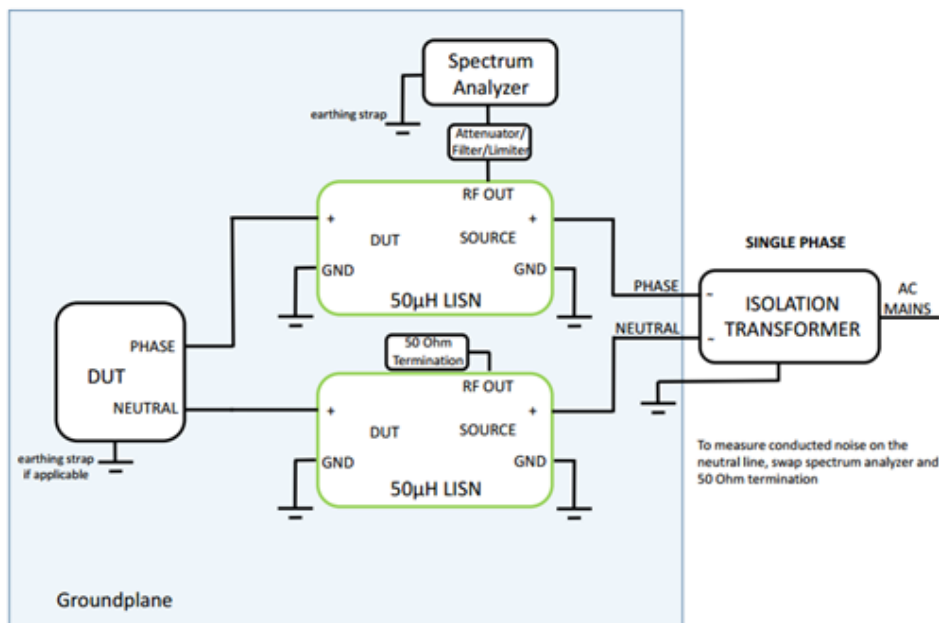
8.2 Jumpers

By default, the LISN is jumpered with the 9kHz high pass filter enabled: CON4 & CON5

8.3 General Wiring Variants

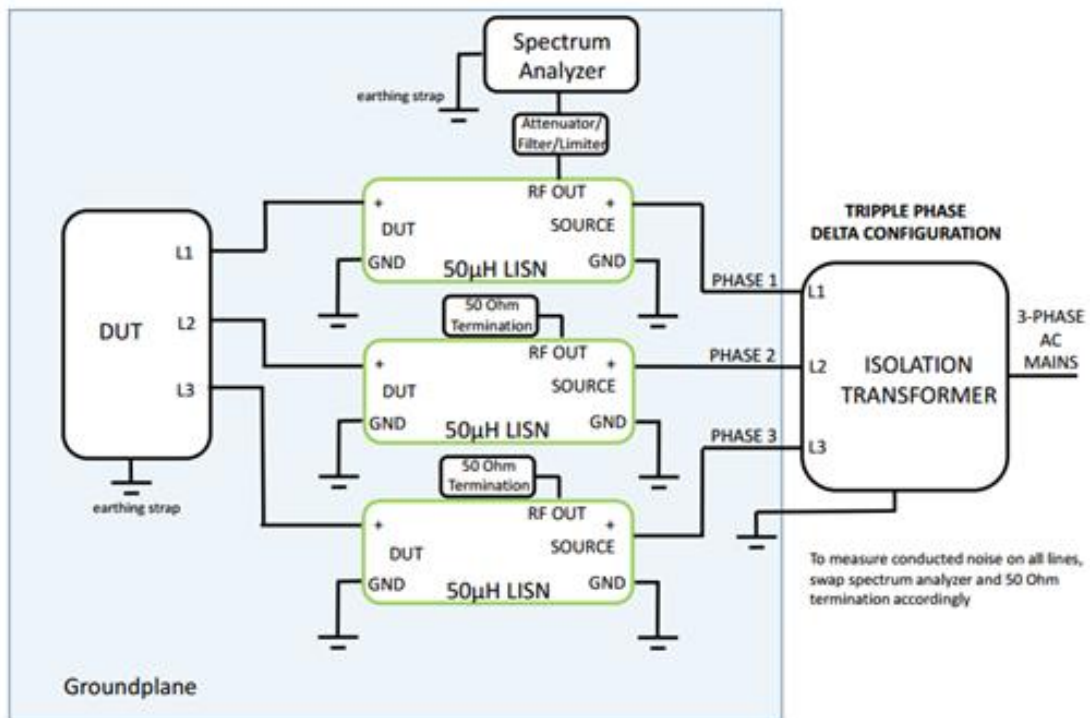


Picture 11: Measurement set up for DC supplied equipment

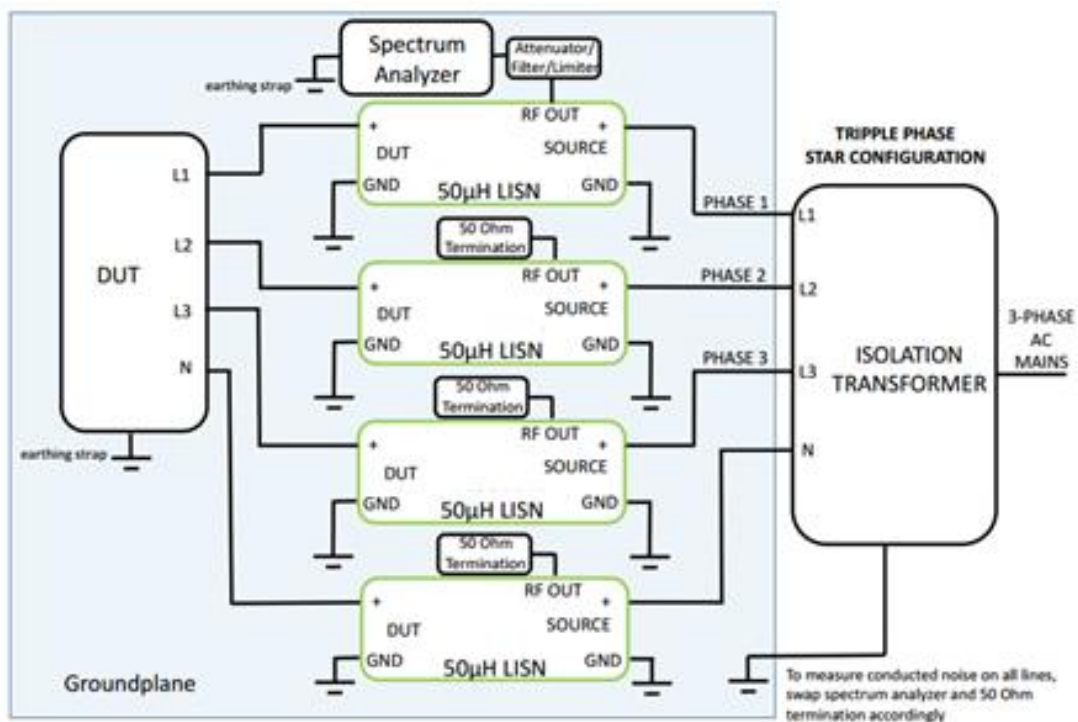


Picture 12: Measurement set up for single phase AC supplied equipment

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Picture 13: Measurement set up for triple phase AC supplied equipment in Delta configuration



Picture 14: Measurement set up for triple phase AC supplied equipment in Star configuration

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9 Ordering Information

Part Number	Description
TBL50400-1B-230	50 μ H LISN, 1 pc. 75 cm N-male to N-male RG223 cable; 220V-240V fan supply voltage
TBL50400-1B-110	50 μ H LISN, 1 pc. 75 cm N-male to N-male RG223 cable; 100V-120V fan supply voltage

Accessories

Part Number	Description
TBL50400-1B-CAL	2 pieces calibration adapters SMA-female

10 History

Version	Date	Author	Changes
V1.0	29.07.2026	Mayerhofer	Creation of the document

Table 2 – History