B-TCA

Test Card Adapter

User Manual

Version: ENU 1302 05 01 — Year: 2025

The product information, specifications, and technical data embodied in this manual represent the technical status at the time of writing and are subject to change without prior notice.

Contents

1 Introduction

1.1 About this document

This document provides information on how to use this product safely, properly and efficiently.

It contains important safety rules for working with this product and gets you familiar with operating this product. Following the instructions in this document will help you to prevent danger, repair costs, and avoid possible down time due to incorrect operation.

This document is to be supplemented by existing national safety standards for accident prevention and environmental protection.

1.2 Symbols and conventions

The following symbols indicate safety instructions for avoiding hazards:

WARNING

Death or severe injury can occur if the appropriate safety instructions are not observed.

CAUTION

Minor or moderate injury may occur if the appropriate safety instructions are not observed.

NOTICE

Equipment damage or loss of data possible

The following symbols and formatting styles are used:

Symbol/format	Description
▶	Instructions that can be carried out in any order
1. 2.	Instructions that have to be carried out in the given order
Text in bold	Text shown on a device, its display or in a software
Text in italics	OMICRON product name

1.3 Fulfilled directives

In the following statement, the device is designated as "product", "equipment", or "apparatus".
The OMICRON Lab contact address can be found on the Support page at the end of this document.

European Union

The equipment adheres to the guidelines of the council of the European Community for meeting the requirements of the member states regarding the following directives:

- RoHS directive

United Kingdom

The equipment adheres to the regulations of the UK government for meeting the requirements regarding the following regulations:

- UK RoHS directive

1.4 Disposal and recycling

This test set (including all accessories) is not intended for household use. After use the test set cannot be disposed of as household waste.

EU countries (incl. European Economic Area)
OMICRON devices are subject to the EU Waste Electrical and Electronic Equipment Directive (WEEE directive). As part of our legal obligations under this legislation, OMICRON offers to take back the device and to ensure that it is disposed of by an authorized recycling agent.

Outside the European Economic Area
For information on the environmental regulations relevant to your country, contact the responsible authorities. Dispose the OMICRON device only in accordance with your local legal requirements.

2 Safety

2.1 Basic safety information

Before operating the device, make sure that you have read this document and fully understood all the instructions.

Only install and operate the device and any accessories according to the instructions in the corresponding user documentation.

Make sure that this document is available on the site where the device is operated, either digitally or in print.

Contact OMICRON Lab Support if you do not understand any of the instructions in this document.

Using the device must comply with all applicable local and national safety standards, regulations and safety-relevant documents.

Improper use may result in damage to persons or property and could invalidate warranty claims.

2.2 Designated use

The purpose of the *B-TCA* is to analyze the frequency response of passive components using the *Bode 100* or *Bode 500* vector network analyzer. The *B-TCA* has been designed specifically for use in laboratory and manufacturing environments.

2.3 Operator qualifications

Only authorized and qualified personnel who are regularly trained in electrical engineering and their specific tasks are permitted to operate the device and any accessories.

Operators must be familiar with the equipment and observe all applicable standards, local regulations, and safety-relevant documents.

Safety during operation is only achieved when all measures and precautions are considered. This includes the safety instructions in the following documents:

- *Bode 100, Bode 500* user manual

Personnel receiving training, instructions, directions, or education on the device must be under constant supervision of an experienced operator while working with the equipment.

2.4 Safe use

► Stay focused on your tasks to ensure safety.

► Visually check the device for damage. If the device or any accessory is damaged, not in technically sound condition, or does not seem to function properly, do not use it. If you are in doubt, contact OMICRON Lab Support.

► Make sure that the test object is isolated from other sources during testing.

Voltage limits

The *B-TCA* is a SELV device (Safety Extra Low Voltage in accordance with IEC 60950), also known as protection class III equipment. If voltages exceeding the limits of 60 V DC or 30 V RMS are applied to any input or output of the device, touchable parts carry hazardous voltages. This could lead to electric shock, painful burn scars and death.

► Connect a maximum of 60 V DC or 30 V RMS to any input or output of the B-TCA.

Work environment

► Only use the device on dry, solid ground.

► Do not operate the device in a condensing environment.

► Do not operate the device under environmental conditions that exceed the temperature and humidity limits listed in the "Technical data" section.

► Make sure that the device and all accessories are dry and clean.

Explosive environment

The *B-TCA* is not designed for explosive environments. Ignition sources inside the device could lead to an explosion in an environment where explosive gas or vapors are present.

► Do not operate the device in the presence of explosive gas or vapors.

Biasing

Capacitors can explode when charged with the wrong voltage. Possible injuries are loss of eyesight, burns or electric shock.

► Do not exceed the voltage ratings of the capacitors.

► Make sure that the polarity of the capacitors is correct.

Inductors can increase the voltage up to dangerous levels when the current flow is interrupted before they are discharged. This can lead to an electrical shock.

► Discharge the capacitors before disconnecting the *B-TCA*.

► Do not charge an inductor above 350 mJ.

Test card PCBs

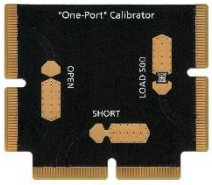
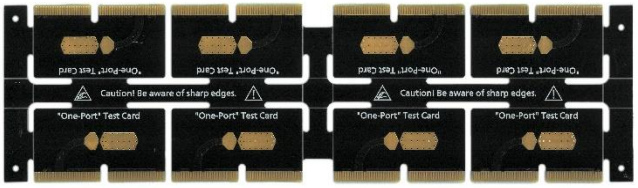
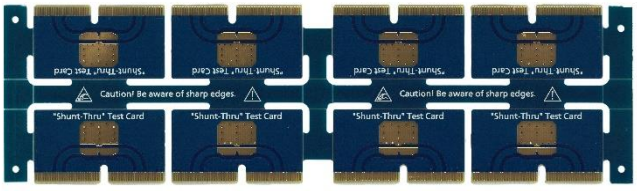
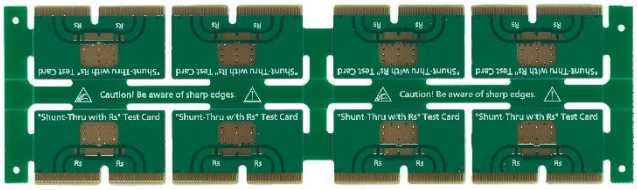
A separated test card PCB can have sharp edges which can cut or prick the skin.

► Wear gloves when breaking off the PCBs.

► Remove any remaining sharp edges from the PCBs.

3 Device Overview

3.1 Scope of delivery

 B-TCA Test Card adapter	 30 cm N-N cables	 50 cm N-BNC cables
 **One-Port** Calibrator	 **One-Port** Test Cards for DUT mounting	
 **Shunt-Thru** Calibrator	 **Shunt-Thru** Test Cards for DUT mounting	
 **Series-Thru** Calibrator	 **Series-Thru** Test Cards for DUT mounting	
 **Shunt-Thru-Rs** Calibrator	 **Shunt-Thru** with Rs Test Cards for DUT mounting	

3.2 B-TCA connectors

B-TCA is a test card interface for Bode 100 and Bode 500. It converts the coaxial connectors to a card-edge interface for simple contacting of PCB-based test objects. B-TCA features the following connectors:

- SOURCE: N-Type connector (intended to connect to OUTPUT of Bode Analyzer).
- CH2: N-Type connector (intended to connect to CH2 of Bode Analyzer).
- Test Card: Edge-card connector to connect test cards or calibrator boards.

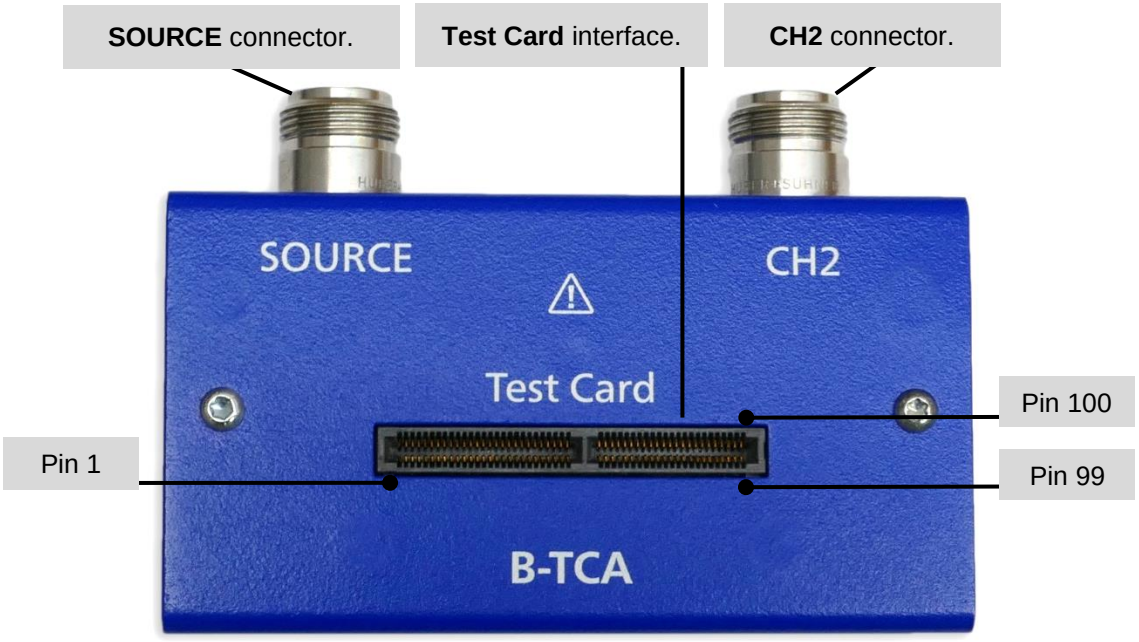


Figure 3-1: *B-TCA* connector description.

3.3 Test Card Interface

The test-card interface is a 100-pin edge-card connector with 0.8 mm pitch. The nominal test-card thickness is 1.57 mm. The following table shows the pin assignment for the interface:

Pin	Use
1 – 6, 15, 25, 75, 85, 95 – 100	Not connected
7 – 14, 16, 18, 20, 22, 24, 26 – 74, 76, 78, 80, 82, 84, 86 – 93	GND
17, 19, 21, 23	CH1 Signal
77, 79, 81, 83	CH2 Signal

4 Application Information

B-TCA supports one-port and two-port measurement methods respectively connection setups. The following measurements can be performed using B-TCA:

- **Impedance** or **S11** reflection via the **One-port** measurement setup
- **Two-port Impedance** measurements (Shunt-Thru, Series-Thru, Shunt-Thru with series resistors)
- **S21** Transmission via a **Two-port** measurement setup

4.1 Overview of Impedance Measurement Methods

B-TCA allows four different impedance measurement methods. The following table lists the four methods indicating the suitability for low or high impedance measurements.

Table 4-1 Impedance Measurement Method Overview

	One-Port	Series-Thru	Shunt-Thru	Shunt-Thru with Rs
Low impedance values	OK	Worst	Best	Better
High impedance values	OK	Best	Worst	Worse
Best suited range	500 mΩ … 10 kΩ	1 kΩ … 1 MΩ	1 mΩ … 100 Ω	Depends on Rs

If **low impedance** values need to be characterized precisely (e.g. ESR of ceramic capacitors), then the **Shunt-Thru** measurement is most suitable. If **high impedance** values need to be measured (e.g. parasitic capacitance), then the **Series-Thru** method is best suitable. The One-Port reflection method is best suited if very low and very high impedance values are not of absolute importance. The “Shunt-Thru with Rs” method is a variation of the Shunt-Thru method where series resistors can be selected to scale the impedance measurement range respectively change the port impedance.

4.2 Card Placement

When placing a test card or a calibrator to the B-TCA Test Card interface, make sure the test card or calibrator board has clean contacts and push the card straight from above by pushing at the center of the test card or calibrator PCB. Make sure the test card or calibrator mates well into the B-TCA interface and avoid tilting the test card or calibrator by more than 2°.

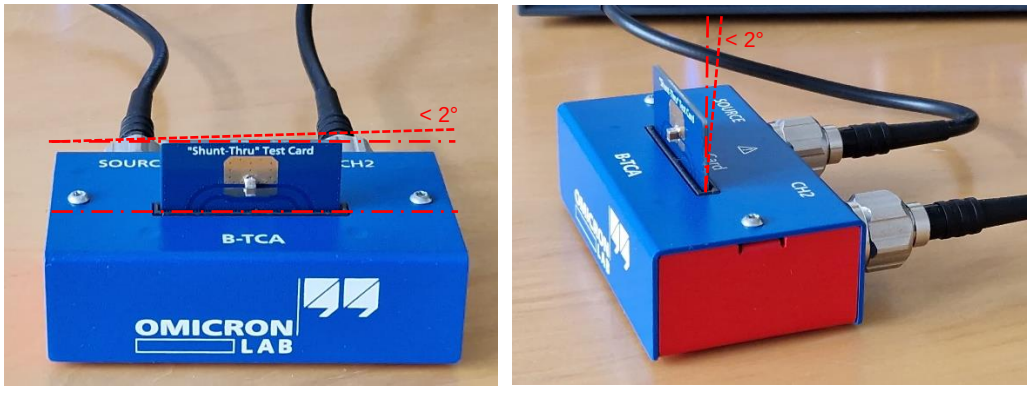


Figure 4-1: Mated “Shunt-Thru” Test Card with soldered DUT (ceramic capacitor).

4.3 Performing a “One-Port” Impedance Measurement

The One-Port setup is well suited for a wide range of impedance values. Optimally, the impedance magnitude of the DUT is between 500 mΩ and 10 kΩ. However, also values below 500 mΩ or values above 10 kΩ can be measured. The impedance range is mainly limited by:

- Contact resistance of the signal connection & contact resistance of the ground connection.
- Signal to noise ratio of the vector network analyzer (depends on dynamic range, signal level, attenuator settings and receiver bandwidth setting).

4.3.1 Measurement Setup & DUT Connection

For the One-Port measurement, use the **black** colored test cards as shown below.

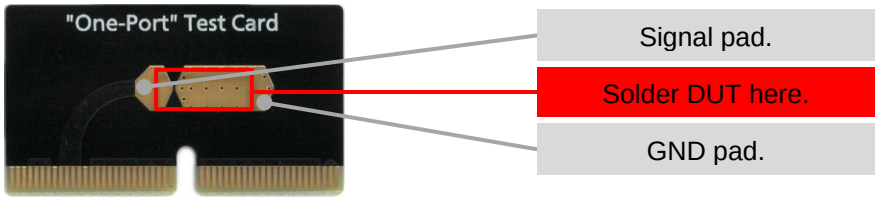


Figure 4-2: “One-Port” Test Card

The DUT is soldered between the signal pad and GND pad. The maximum recommended DUT size is 15 mm from one contact to the other. Make the following connections to complete the setup:

1. Connect the *B-TCA* **SOURCE** connector to the Bode **OUTPUT** connector using the coaxial cable included in the delivery. Use the 30 cm N-N cable in conjunction with the *Bode 500* and the 50 cm N-BNC cable in conjunction with the *Bode 100*.
2. The **CH2** connection is not relevant and can either be connected or left open.

To measure impedance using *Bode 100* or *Bode 500*, start Bode Analyzer Suite, and use the One-Port Impedance Measurement Mode:

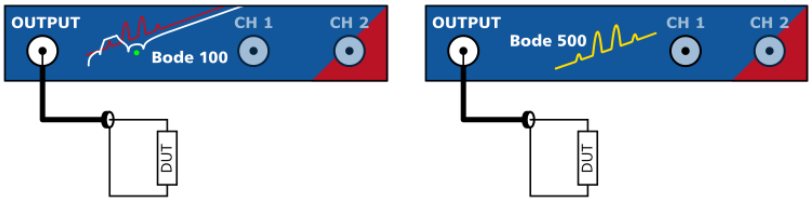


Figure 4-3: One-Port Measurement Mode (*Bode 100* or *Bode 500*)

After selecting the measurement mode, perform Open/Short/Load calibration using the “One-Port” Calibrator.

4.3.2 Calibrating One-Port Measurements

To calibrate a One-Port impedance measurement use the black “One-Port” Calibrator (see Figure 4-4) containing an Open, Short and Load reference element and proceed as follows:

1. Connect the **OPEN** reference side of the “One-Port” Calibrator to the test card interface of *B-TCA*
2. Perform User-Range or Full-Range Impedance calibration and click the Start button for the Open calibration. Wait until the calibration measurement is completed.
3. Set the **Short-Delay Time** in the Impedance Calibration to **0 ps**, connect the **SHORT** reference side

of the “One-Port” Calibrator to the test card interface of *B-TCA* and perform calibration by clicking the Start button for “Short”.

4. Repeat the same for the **LOAD** reference side of the “One-Port” Calibrator by connecting it to the test card interface of *B-TCA* and pressing the Load button to execute the Load calibration.

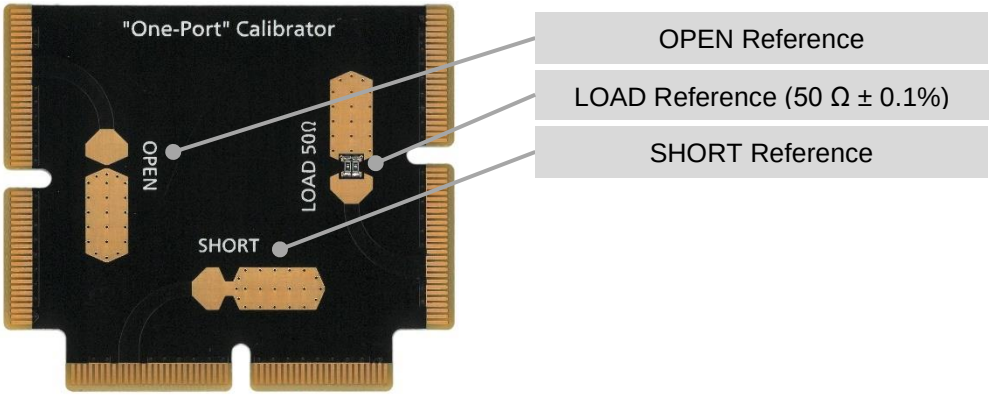


Figure 4-4: “One-Port” Calibrator

After closing the calibration window, the calibration icon should be green, indicating that the calibration is active. You can now place your “One-Port” Test Card with your DUT to the Test Card interface of *B-TCA* to perform a measurement of your DUT.

4.4 Performing a “Series-Thru” Measurement

The Series-Thru setup is suited for higher impedance values. Optimally, the impedance magnitude of the DUT is between 1 kΩ and 1 MΩ. However, also values below 1 kΩ or values above 1 MΩ can be measured. The impedance range is mainly limited by the following factors:

- Low impedance values: The DUT is in series with the 50 Ω termination of the Bode CH2 and the source impedance. Therefore, the sensitivity of the method degrades when the DUT impedance is low.
- High impedance values: Signal to noise ratio of the vector network analyzer usually defines the upper limit. The signal to noise ratio depends on the dynamic range of the analyzer, the signal level, the attenuator settings and the receiver bandwidth setting.

4.4.1 Measurement Setup & DUT Connection

For the Series-Thru measurement, use the **red** colored test cards as shown below.

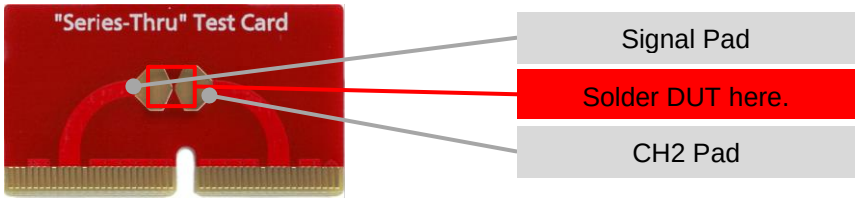


Figure 4-5: “Series-Thru” Test Card

The DUT is soldered between the two pads in the signal line. The maximum recommended DUT size is ≈ 9 mm from one contact to the other.

Make the following connections to complete the setup:

1. Connect the *B-TCA* **SOURCE** connector to the Bode **OUTPUT** connector using the coaxial cable included in the delivery. Use the 30 cm N-N cable in conjunction with the *Bode 500* and the 50 cm N-BNC cable in conjunction with the *Bode 100*.
2. Connect the *B-TCA* **CH2** connector to the Bode **CH2** connector using the coaxial cable included in the delivery. Use the 30 cm N-N cable in conjunction with the *Bode 500* and the 50 cm N-BNC cable in conjunction with the *Bode 100*.

To measure impedance using *Bode 100* or *Bode 500*, start Bode Analyzer Suite, and use the Series-Thru Impedance Measurement Mode:

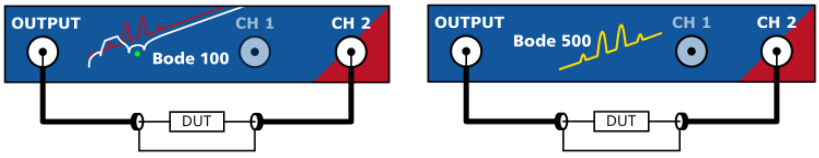


Figure 4-6: Series-Thru Measurement Mode (*Bode 100* or *Bode 500*)

After selecting the measurement mode, perform Open/Short/Load calibration using the “Series-Thru” Calibrator.

4.4.2 Calibrating Series-Thru Measurements

To calibrate a Series-Thru impedance measurement use the red “Series-Thru” Calibrator (see Figure 4-7) containing an Open, Short and Load reference element and proceed as follows:

1. Connect the **OPEN** reference side of the “Series-Thru” Calibrator to the test card interface of *B-TCA*
2. Select User-Range or Full-Range Impedance calibration and click the Start button for the Open calibration. Wait until the calibration measurement is completed.
3. Set the **Short-Delay Time** in the Impedance Calibration to **0 ps**, connect the **SHORT** reference side of the “Series-Thru” Calibrator to the test card interface of *B-TCA* and perform calibration by clicking the Start button for “Short”.
4. Repeat the same for the **LOAD** reference side of the “Series-Thru” Calibrator by connecting it to the test card interface of *B-TCA* and pressing the Load button to execute the Load calibration.

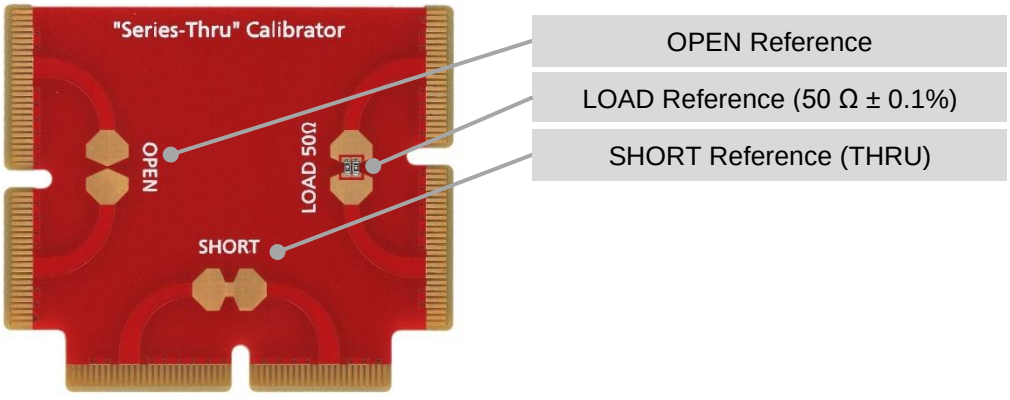


Figure 4-7: “Series-Thru” Calibrator

After closing the calibration window, the calibration icon should be green, indicating that the calibration is active. You can now place your “Series-Thru” Test Card with your DUT to the Test Card interface of *B-TCA* to perform a measurement of your DUT.

Using Thru Calibration Only

The Series-Thru measurement mode would also allow performing only a Thru calibration instead of the Open/Short/Load calibration. If you decide to perform only a Thru calibration, use the **SHORT** element of your Series-Thru calibrator.

It is preferable to choose Open/Short/Load calibration over the simple Thru calibration when using the B-TCA test fixture. Thru calibration can compensate the attenuation and phase shift of the test setup and cabling but it will not remove other errors such as impedance mismatch in the setup.

4.5 Performing a “Shunt-Thru” Measurement

The Shunt-Thru setup is suited for low impedance values. Optimally, the DUT’s impedance magnitude is between 1 mΩ and 100 Ω. However, values below 1 mΩ or values above 100 Ω can be measured when taking care. The impedance range is mainly limited by the following factors:

- Low impedance values: The signal to noise ratio of the vector network analyzer usually defines the lower limit. The signal to noise ratio depends on the dynamic range of the analyzer, the signal level, the attenuator settings and the receiver bandwidth setting.
- High impedance values: The DUT is connected in parallel with the 50 Ω termination of the Bode CH2 and the 50 Ω source impedance. Therefore, the sensitivity of the method degrades when the DUT impedance is high.

4.5.1 Measurement Setup & DUT Connection

For the Shunt-Thru measurement, use the **blue** colored test cards as shown below.

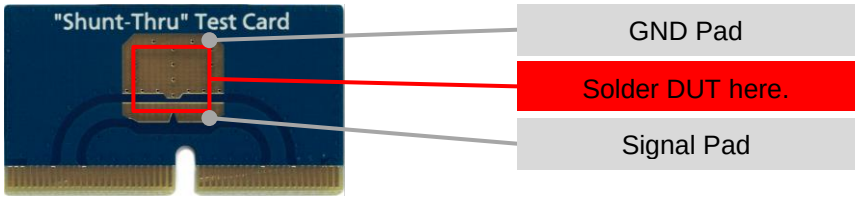


Figure 4-8: “Shunt-Thru” Test Card

The DUT is soldered between the signal line and the ground pad. The maximum recommended DUT size is ≈ 9 mm from one contact to the other and the maximum width is 10 mm.

Make the following connections to complete the setup:

1. Connect the *B-TCA* **SOURCE** connector to the Bode **OUTPUT** connector using the coaxial cable included in the delivery. Use the 30 cm N-N cable in conjunction with the *Bode 500* and the 50 cm N-BNC cable in conjunction with the *Bode 100*.
2. Connect the *B-TCA* **CH2** connector to the Bode **CH2** connector using the coaxial cable included in the delivery. Use the 30 cm N-N cable in conjunction with the *Bode 500* and the 50 cm N-BNC cable in conjunction with the *Bode 100*.

To measure impedance using *Bode 100* or *Bode 500*, start Bode Analyzer Suite, and use the **Shunt-Thru** Impedance Measurement Mode:

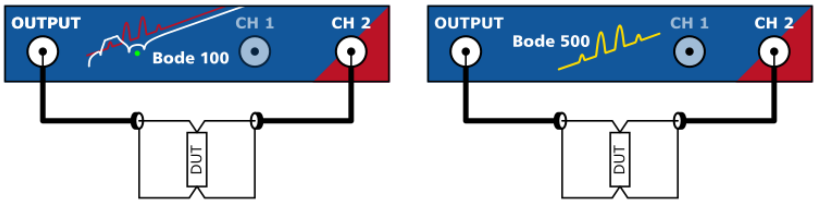


Figure 4-9: Shunt-Thru Measurement Mode (*Bode 100* or *Bode 500*)

After selecting the measurement mode, perform Open/Short/Load calibration using the “Shunt-Thru” Calibrator.

4.5.2 Calibrating a Shunt-Thru Measurement

To calibrate a Shunt-Thru impedance measurement use the blue “Shunt-Thru” Calibrator (see Figure 4-10) containing an Open, Short and Load reference element and proceed as follows:

1. Connect the **OPEN** reference side of the “Shunt-Thru” Calibrator to the test card interface of *B-TCA*
2. Select User-Range or Full-Range Impedance calibration and click the Start button for the Open calibration. Wait until the calibration measurement is completed.
3. Set the **Short-Delay Time** in the Impedance Calibration to **23 ps**, connect the **SHORT** reference side of the “Shunt-Thru” Calibrator to the test card interface of *B-TCA* and perform calibration by clicking the Start button for “Short”.
4. Repeat the same for the **LOAD** reference side of the “Shunt-Thru” Calibrator by connecting it to the test card interface of *B-TCA* and pressing the Load button to execute the Load calibration.

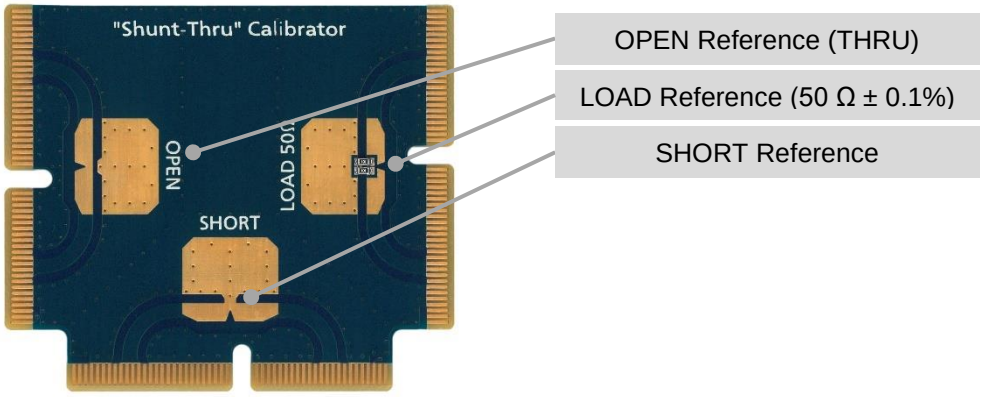


Figure 4-10: “Shunt-Thru” Calibrator

After closing the calibration window, the calibration icon should be green, indicating that the calibration is active. You can now place your “Shunt-Thru” Test Card with your DUT to the Test Card interface of *B-TCA* to perform a measurement of your DUT.

Using Thru Calibration Only

The Shung-Thru measurement mode would also allow performing only a Thru calibration instead of the Open/Short/Load calibration. If you decide to perform only a Thru calibration, use the **OPEN** element of your Shunt-Thru calibrator.

It is preferable to choose Open/Short/Load calibration over the simple Thru calibration when using the B-TCA test fixture. Thru calibration can compensate the attenuation and phase shift of the test setup and cabling but it will not remove other errors such as impedance mismatch in the setup or the ground-loop error in the Shunt-Thru setup which appears specifically at low frequency and low DUT impedance values.

4.6 Performing a “Shunt-Thru with Rs” Measurement

The Shunt-Thru with Rs setup is similarly to the Shunt-Thru measurement setup. Contrary to the basic Shunt-Thru setup, the Shunt-Thru with Rs method allows the user to add series resistors (Rs) to the measurement path. Adding the series resistors in the measurement path virtually increases the port impedance of the vector network analyzer to “Rs + 50 Ω” which has the following impacts:

- It increases the maximum impedance that can be measured in the Shunt-Thru method. On the other hand, it negatively impacts the noise floor respectively the lowest impedance that can be measured.
- It increases the maximum voltage that can be applied at the DUT connection point by lowering the reverse current that flows into the vector network analyzer ports. This can be advantageous when biasing a DUT.

The recommended impedance measurement range depends on the Rs value. Like the Shunt-Thru method, the impedance range is mainly limited by the following factors:

- Low impedance values: If Rs = 0, the method is identical to Shunt-Thru. Larger Rs values have a negative impact on the lowest impedance that can be measured.
- High impedance values: The DUT is connected in parallel with the Rs + 50 Ω termination of the Bode CH2 and the Rs + 50 Ω source impedance. Higher Rs values will increase the maximum impedance that can be measured but will also lower the measurement current, therefore degrading signal / noise ratio.

The following table shows an example of Rs values and their impact on the measurement:

Table 4-2 Impact of Rs Values

Rs	Optimal Impedance Range	Max. DC Voltage at DUT	Max. Power Dissipated in Rs[1]
0 Ω	1 mΩ … 100 Ω	3.3 V	-
200 Ω	5 mΩ … 1125 Ω	16.5 V	0.9 W
450 Ω	10 mΩ … 2250 Ω	33 V	2 W
499 Ω	11 mΩ … 2480 Ω	36 V	2.2 W
950 Ω	20 mΩ … 4500 Ω	60 V (safety limit)	≈ 4 W

When selecting an Rs resistor to protect the Bode Analyzer from DC voltages, make sure the Rs resistor can handle the power dissipated in the Rs resistor. The power can be estimated using the equation $P = \left(\frac{V}{Rs+50\Omega}\right)^2 \cdot Rs$ where P is the power dissipated in the Rs resistor and V is the voltage present at the DUT connection point.

[1] When applying Max. DC Voltage at DUT

4.6.1 Measurement Setup & DUT Connection

For the Shunt-Thru with Rs measurement, use the **green** colored test cards as shown below.

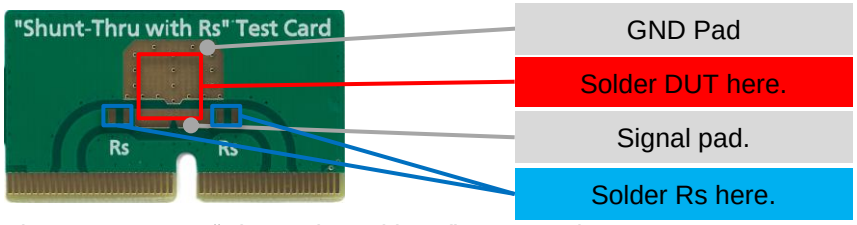


Figure 4-11: “Shunt-Thru with Rs” Test Card

The DUT is soldered between the signal line and the ground pad. The maximum recommended DUT size is ≈ 9 mm x 9 mm. Two Rs resistors must be soldered to the test card to close the measurement path. Rs resistors between 0603 and 1206 can be placed.

Make the following connections to complete the setup:

1. Connect the *B-TCA* **SOURCE** connector to the Bode **OUTPUT** connector using the coaxial cable included in the delivery. Use the 30 cm N-N cable in conjunction with the *Bode 500* and the 50 cm N-BNC cable in conjunction with the *Bode 100*.
2. Connect the *B-TCA* **CH2** connector to the Bode **CH2** connector using the coaxial cable included in the delivery. Use the 30 cm N-N cable in conjunction with the *Bode 500* and the 50 cm N-BNC cable in conjunction with the *Bode 100*.

To measure impedance using *Bode 100* or *Bode 500*, start Bode Analyzer Suite, and use the **Shunt-Thru with Rs** Impedance Measurement Mode:

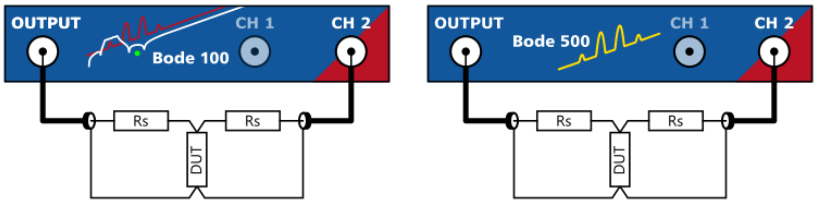


Figure 4-12: Shunt-Thru Measurement Mode (*Bode 100* or *Bode 500*)

After selecting the measurement mode, configure the Rs value in Bode Analyzer Suite and perform Open/Short/Load calibration using the “Shunt-Thru with Rs” Calibrator. Note that you will need to place the same Rs resistor value on the Calibrator and on the Test Cards.

4.6.2 Calibrating a Shunt-Thru with Rs Measurement

To calibrate a Shunt-Thru with Rs impedance measurement use the green “Shunt-Thru with Rs” Calibrator (see Figure 4-13) containing an Open, Short and Load reference element and proceed as follows:

1. Solder the 6 (six) Rs resistors to the corresponding locations as shown in Figure 4-13.
2. If you haven’t done so, configure the correct Rs resistor value in the Impedance/Reflection Measurement Setup or in the Calibration dialog before calibrating.
3. Connect the **OPEN** reference side of the “Shunt-Thru” Calibrator to the test card interface of *B-TCA*
4. Select User-Range or Full-Range Impedance calibration and click the Start button for the Open calibration. Wait until the calibration measurement is completed.
5. Set the **Short-Delay Time** in the Impedance Calibration to **23 ps**, connect the **SHORT** reference

side of the “Shunt-Thru” Calibrator to the test card interface of *B-TCA* and perform calibration by clicking the Start button for “Short”.

6. Repeat the same for the **LOAD** reference side of the “Shunt-Thru” Calibrator by connecting it to the test card interface of *B-TCA* and pressing the Load button to execute the Load calibration.

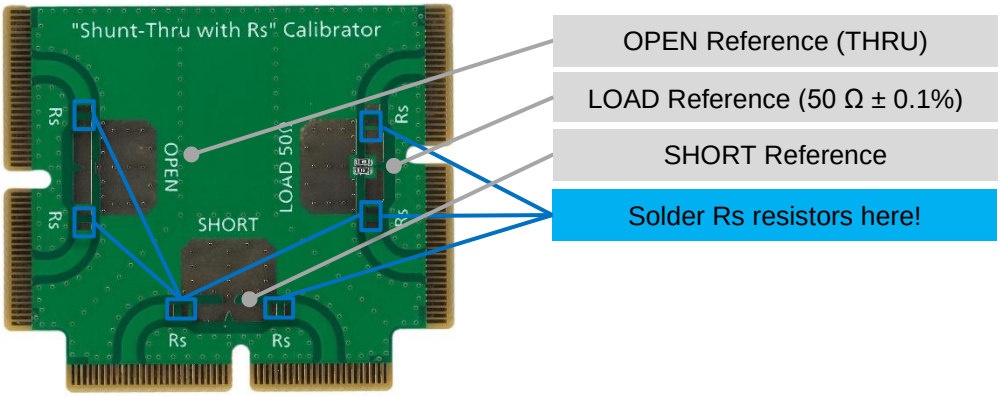


Figure 4-13: “Shunt-Thru with Rs” Calibrator

4.7 Biasing of a DUT

Whilst the *B-TCA* does not have any intended bias connections and does not contain any internal bias-T or other circuitry intended for biasing purposes, it can be practical to use an external bias-T between the Bode analyzer and *B-TCA* to investigate the frequency response of the DUT under voltage charge or current bias conditions.

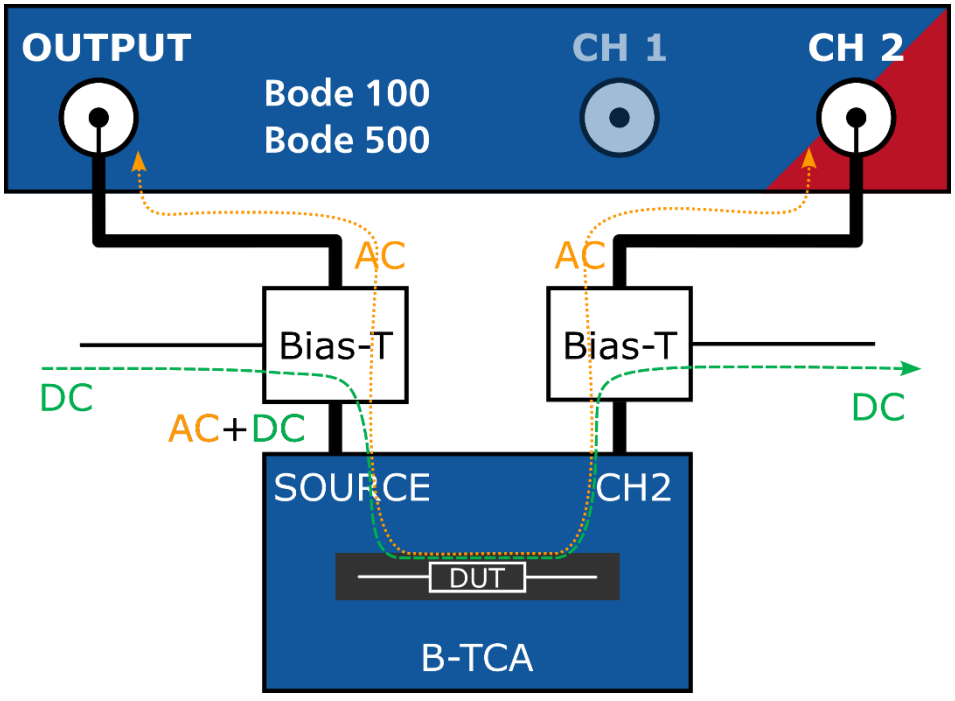


Figure 4-14: Biasing of a DUT using Bias-T

Typically, a Bias-T is composed of an LC filter whereby the inductance represents a conductive (low impedance) path for the DC component but “blocks” the AC component. In situations where no significant bias current is required, a resistive Bias-T can be used instead. Alternatively, DC blockers can be used to protect the Bode instrument from the DC component. The “Shunt-Thru with Rs” method can also be used to increase the resilience of the ports of the Bode instrument.

WARNING

Death due to electric shock.

Hazardous touchable voltages from external sources when biasing components

- ► Only use DC voltage sources below 60 V.
- ► Only use DC sources isolated from mains.
- ► Ensure that energy stored in inductive components stays below 350 mJ.

Special care must be taken to protect the user and instrument from the energy stored in inductors or capacitors. Make sure to discharge capacitors and inductors before connecting and make sure to slowly charge and discharge inductors or capacitors to avoid high voltages or high currents from short-circuit or back-EMF events.

NOTICE

Damage to measurement instrument.

Energy charged in inductors or capacitors can damage the ports of the measurement instrument.

- ► Discharge capacitors before connecting them to the *B-TCA*.
- ► Discharge inductors before connecting or disconnecting them.

4.7.1 Biasing capacitors

To measure the impact of DC charge on the impedance of capacitors, it is required to charge the capacitor under test (DUT) with DC voltage in addition to the AC measurement signal. Make sure you do not exceed the ratings of the capacitor under test and check the polarity of the DC voltage applied. Also, do never exceed the maximum voltage of 60 V when using the *B-TCA*.

WARNING

Loss of eyesight due to splitters from exploding capacitors.

Capacitors can explode when being overcharged or wrongly polarized

- ► Do not charge capacitors above their voltage ratings.
- ► Make sure the capacitor is correctly polarized.

There are several possibilities to measure capacitors with DC bias charge using the *B-TCA* in conjunction with *Bode 100* or *Bode 500*. In low voltage applications where a DC voltage of 3.3 V is not exceeded, no extensive DC blocking is required since the *Bode 100* or *Bode 500* can cope with the reverse power from the DC voltage applied. Note that the ports of Bode represent a 50 Ω impedance, therefore a DC current will flow into the ports.

In cases where the DC voltage of 3.3 V is exceeded, the following list describes some possibilities:

- Use a DC blocker or Bias-T between the ports of Bode and *B-TCA* to protect Bode from DC voltage.
- Use “Shunt-Thru with Rs” to increase the impedance of the ports of Bode and therefore reduce the DC reverse current into the ports of Bode.
- Use two capacitors in a series connection as DUT and charge the center-point between the two capacitors to charge both DUTs whilst the DUT acts as DC blocker itself.

A DC voltage source represents a low AC impedance. Use a large resistor value to increase the impedance of the DC voltage source when charging capacitors. This also helps to reduce inrush currents that can pass through the DUT, DC blocker or Bias-T whilst charging or discharging capacitors.

4.7.2 Biasing inductors

Biasing an inductor under test with a DC current to investigate saturation effects is typically more challenging than biasing capacitors due to the following reasons:

- The separation between AC and DC signals can be more difficult when high DC currents are involved. A simple resistor cannot be used to increase the impedance of the DC source.
- A DC current source usually never represents a high impedance at high frequency due to the presence of output capacitors and the limited control loop bandwidth.
- A Bias-T will work at high frequency but can have limitations at lower frequencies.
- Interrupting the DC current flow can cause high voltages that can damage the instrument or harm the operator. Do never charge inductors with more than 350 mJ to avoid harm.

At high frequencies (MHz), a Bias-T can be a viable solution to increase the AC source impedance of the DC source, making higher-frequency measurements easier than low-frequency measurements.

Often the DC voltage across an inductor from the resistive power loss in the inductor is below 3.3 V which makes the measurement setup simpler since protecting the ports of Bode from DC voltages is not required.

4.8 Cleaning

► Before cleaning the device, make sure that all connections to the *B-TCA* and DUT are disconnected.

► Clean the *B-TCA* with a cloth dampened with isopropanol alcohol.

5 Technical data

Table 5-1 Specifications

Characteristics	Rating
Recommended frequency range	DC to 450 MHz
Signal connector type	N
Maximum voltage	AC: 30 V, DC: 60 V
Maximum current	1 A
Test card connector mating cycles	1000 cycles
Signal-line contact resistance (4 pins)	2 mΩ (typ.) < 1 mΩ repeatability (typ.)
Test card ground contact resistance	< 0.5 mΩ (typ.) < 100 µΩ repeatability (typ.)
SOURCE - Common mode inductance	> 40 µH @ 1 kHz
CH2 – Common mode inductance	> 40 µH @ 1 kHz
SOURCE – CH2 insertion loss	< 0.1 dB (DC…50 MHz) < 0.5 dB (50 MHz … 450 MHz)
SOURCE – CH2 return loss[2] (typ.)	> 35 dB (DC…10 MHz) > 28 dB (10 MHz…200 MHz) > 20 dB (200 MHz…450 MHz)

Table 5-2 Environmental conditions

Characteristic	Rating
Operating temperature	+5 °C … +40 °C / 41 °F … +104 °F
Storage temperature	-35 °C … +60 °C / -31 °F … +140 °F
Relative humidity	20 % … 80 %, non-condensing

Table 5-3 Mechanical data

Characteristic	Rating
Dimensions (with connectors)	100 mm x 70 mm x 33 mm 3.94 in x 2.76 in x 1.3 in
B-TCA weight	0.2 kg / 0.44 lbs

[2] Thru connection from SOURCE to CH2 via “Shunt-Thru Open” or “Series-Thru Short” calibrator whilst CH2 was terminated with 50 Ω.

6 Localized safety instructions

6.1 BG - Указания за безопасност, предназначение и квалификации на оператора

► Винаги спазвайте всички мерки и предпазни мерки за осигуряване на безопасност при използване на B-TCA.

Предназначение: B-TCA е предназначен за анализ на честотната характеристика на пасивни компоненти с помощта на векторния мрежов анализатор Bode 100 или Bode 500 в лабораторни и производствени среди.

Квалификации на операторите:

► Уверете се, че операторите на B-TCA са квалифицирани, опитни и упълномощени.

► Уверете се, че операторите са запознати с всички вътрешни инструкции за безопасност, както и с допълнителни релевантни документи. Винаги прилагайте тази информация по време на тестване.

Ограничения на напрежението: B-TCA е устройство SELV (Безопасно много ниско напрежение съгласно IEC 60950), известно още като оборудване от клас на защита III. Ако на някой вход или изход на устройството се приложат напрежения, надвишаващи границите от 60 V DC или 30 V RMS, докосваемите части носят опасни напрежения. Това може да доведе до електрически удар, болезнени изгаряния и смърт.

► Свържете максимум 60 V DC или 30 V RMS към който и да е вход или изход на B-TCA.

Експлозивна среда: B-TCA не е предназначен за експлозивни среди. Източници на запалване вътре в устройството могат да доведат до експлозия в среда, където има експлозивни газове или пари.

► Не използвайте устройството в присъствието на експлозивни газове или пари.

Поляризация: Кондензаторите могат да експлодират, когато са заредени с неправилно напрежение. Възможни наранявания са загуба на зрение, изгаряния или електрически удар.

► Не превишавайте напрежението на кондензаторите.

► Уверете се, че полярността на кондензаторите е правилна.

Индукторите могат да повишат напрежението до опасни нива, когато токът се прекъсне преди да бъдат разредени. Това може да доведе до електрически удар.

► Разредете кондензаторите преди да изключите B-TCA.

► Не зареждайте индуктор над 350 mJ.

Тестови платки: Отделена тестова платка може да има остри ръбове, които могат да порежат или убодат кожата.

► Носете ръкавици при отделяне на платките.

► Отстранете всички останали остри ръбове от платките.

6.2 CS - Bezpečnostní pokyny, určené použití a kvalifikace operátora

► Vždy dodržujte všechna opatření a preventivní opatření k zajištění bezpečnosti při používání B-TCA.

Určené použití: B-TCA je navržen k analýze frekvenční odezvy pasivních komponentů pomocí vektorového síťového analyzátoru Bode 100 nebo Bode 500 v laboratorním a výrobním prostředí.

Kvalifikace operátora:

► Ujistěte se, že operátoři B-TCA jsou kvalifikovaní, zkušení a autorizovaní.

► Ujistěte se, že operátoři jsou obeznámeni se všemi interními bezpečnostními pokyny a dalšími relevantními dokumenty. Tyto informace vždy aplikujte během testování.

Napěťové limity: B-TCA je zařízení SELV (Safety Extra Low Voltage podle IEC 60950), také známé jako zařízení třídy ochrany III. Pokud jsou na jakýkoli vstup nebo výstup zařízení aplikována napětí přesahující limity 60 V DC nebo 30 V RMS, dotykové části nesou nebezpečná napětí. To může vést k elektrickému šoku, bolestivým popáleninám a smrti.

► Připojte maximálně 60 V DC nebo 30 V RMS na jakýkoli vstup nebo výstup B-TCA.

Výbušné prostředí: B-TCA není navržen pro výbušné prostředí. Potenciální zdroje vznícení uvnitř zařízení mohou vést k explozi v prostředí, kde jsou přítomny výbušné plyny nebo páry.

► Nepoužívejte zařízení v přítomnosti výbušných plynů nebo par.

Předpětí: Kondenzátory mohou explodovat, pokud jsou nabity nesprávným napětím. Možná zranění zahrnují ztrátu zraku, popáleniny nebo elektrický šok.

► Nepřekračujte napěťové hodnoty kondenzátorů.

► Ujistěte se, že polarita kondenzátorů je správná.

Induktory mohou zvýšit napětí na nebezpečné úrovně, pokud je tok proudu přerušen před jejich vybitím. To může vést k elektrickému šoku.

► Vybijte kondenzátory před odpojením B-TCA.

► Nenabíjejte induktor nad 350 mJ.

Testovací karty PCB: Oddělená testovací karta PCB může mít ostré hrany, které mohou řezat nebo píchat kůži.

► Noste rukavice při odlamování PCB.

► Odstraňte všechny zbývající ostré hrany z PCB.

6.3 DA - Sikkerhedsanvisninger, tilsigtet brug og operatørkvalifikationer

► Overhold altid alle foranstaltninger og forholdsregler for at opnå sikkerhed ved brug af B-TCA.

Anvendelsesområde: B-TCA er designet til at analysere frekvensresponsen af passive komponenter ved brug af Bode 100 eller Bode 500 vektornetværksanalysator i laboratorie- og produktionsmiljøer.

Operatørkvalifikationer:

► Sørg for, at operatørerne af B-TCA er kvalificerede, dygtige og autoriserede.

► Sørg for, at operatørerne er opmærksomme på alle interne sikkerhedsinstruktioner samt yderligere relevante dokumenter. Anvend altid denne information under testning.

Spændingsgrænser: B-TCA er en SELV-enhed (Safety Extra Low Voltage i henhold til IEC 60950), også kendt som beskyttelsesklasse III udstyr. Hvis spændinger, der overstiger grænserne på 60 V DC eller 30 V RMS, tilføres enhedens indgange eller udgange, vil berørbare dele bære farlige spændinger. Dette kan føre til elektrisk stød, smertefulde brandsår og død.

► Tilslut maksimalt 60 V DC eller 30 V RMS til en hvilken som helst indgang eller udgang på B-TCA.

Eksplosivt miljø: B-TCA er ikke designet til eksplosive miljøer. Tændkilder inde i enheden kan føre til eksplosion i et miljø, hvor der er eksplosiv gas eller dampe til stede.

► Betjen ikke enheden i nærvær af eksplosiv gas eller dampe.

Biasing: Kondensatorer kan eksplodere, når de oplades med forkert spænding. Mulige skader inkluderer tab af syn, forbrændinger eller elektrisk stød.

► Overskrid ikke kondensatorernes spændingsgrænser.

► Sørg for, at kondensatorernes polaritet er korrekt.

Induktorer kan øge spændingen til farlige niveauer, når strømmen afbrydes, før de er afladet. Dette kan føre til elektrisk stød.

► Aflad kondensatorerne, før du afbryder B-TCA.

► Oplad ikke en induktor over 350 mJ.

Testkort-PCB'er: Et adskilt testkort-PCB kan have skarpe kanter, der kan skære eller stikke huden.

► Brug handsker, når du bryder PCB'erne af.

► Fjern eventuelle resterende skarpe kanter fra PCB'erne.

6.4 DE – Sicherheitshinweise, bestimmungsmäßige Verwendung und Qualifikation des Bedienpersonals

► Alle Maßnahmen und Vorsichtsmaßnahmen zur Gewährleistung der Sicherheit beim Einsatz des B-TCA beachten.

Bestimmungsgemäße Verwendung: Der B-TCA ist dafür ausgelegt, das Frequenzverhalten passiver Komponenten mithilfe des Bode 100 oder Bode 500 Vektor-Netzwerkanalysators in Labor- und Fertigungsumgebungen zu analysieren.

Qualifikationen der Bediener:

► Sicherstellen, dass die Bediener des B-TCA qualifiziert, erfahren und autorisiert sind.

► Sicherstellen, dass die Bediener alle internen Sicherheitsanweisungen sowie zusätzliche relevante Dokumente kennen. Diese Informationen während der Tests stets anwenden.

Spannungsgrenzen: Der B-TCA ist ein SELV-Gerät (Safety Extra Low Voltage gemäß IEC 60950), auch bekannt als Schutzklasse III Gerät. Wenn Spannungen über den Grenzwerten von 60 V DC oder 30 V RMS an einen Eingang oder Ausgang des Geräts angelegt werden, führen berührbare Teile gefährliche Spannungen. Dies könnte zu einem elektrischen Schlag, schmerzhaften Brandnarben und Tod führen.

► Maximal 60 V DC oder 30 V RMS an einen Eingang oder Ausgang des B-TCA anschließen.

Explosionsgefährdete Umgebung: Der B-TCA ist nicht für explosionsgefährdete Umgebungen ausgelegt. Zündquellen im Inneren des Geräts könnten in einer Umgebung, in der explosive Gase oder Dämpfe vorhanden sind, zu einer Explosion führen.

► Das Gerät nicht in Anwesenheit von explosiven Gasen oder Dämpfen betreiben.

Vorspannung: Kondensatoren können explodieren, wenn sie mit der falschen Spannung geladen werden. Mögliche Verletzungen sind Verlust des Augenlichts, Verbrennungen oder elektrischer Schlag.

► Die Spannungsgrenzen der Kondensatoren nicht überschreiten.

► Sicherstellen, dass die Polarität der Kondensatoren korrekt ist.

Induktivitäten können die Spannung auf gefährliche Werte erhöhen, wenn der Stromfluss unterbrochen wird, bevor sie entladen sind. Dies kann zu einem elektrischen Schlag führen.

► Die Kondensatoren vor dem Trennen des B-TCA entladen.

► Eine Induktivität nicht über 350 mJ laden.

Testkarten-PCBs: Eine getrennte Testkarte PCB kann scharfe Kanten haben, die die Haut schneiden oder stechen können.

► Handschuhe tragen, wenn die PCBs abgebrochen werden.

► Alle verbleibenden scharfen Kanten von den PCBs entfernen.

6.5 EL - Οδηγίες ασφαλείας, προβλεπόμενη χρήση και προσόντα χειριστών

► Πάντα να τηρείτε όλα τα μέτρα και τις προφυλάξεις για την επίτευξη ασφάλειας κατά τη χρήση του B-TCA.

Προοριζόμενη χρήση: Το B-TCA έχει σχεδιαστεί για να αναλύει την απόκριση συχνότητας παθητικών εξαρτημάτων χρησιμοποιώντας τον αναλυτή δικτύου Bode 100 ή Bode 500 σε εργαστηριακά και κατασκευαστικά περιβάλλοντα.

Προσόντα χειριστή:

► Βεβαιωθείτε ότι οι χειριστές του B-TCA είναι καταρτισμένοι, έμπειροι και εξουσιοδοτημένοι.

► Βεβαιωθείτε ότι οι χειριστές είναι ενήμεροι για όλες τις εσωτερικές οδηγίες ασφαλείας καθώς και για επιπλέον σχετικά έγγραφα. Πάντα να εφαρμόζετε αυτές τις πληροφορίες κατά τη διάρκεια των δοκιμών.

Όρια τάσης: Το B-TCA είναι μια συσκευή SELV (Safety Extra Low Voltage σύμφωνα με το IEC 60950), γνωστή και ως εξοπλισμός προστασίας κατηγορίας III. Εάν εφαρμοστούν τάσεις που υπερβαίνουν τα όρια των 60 V DC ή 30 V RMS σε οποιαδήποτε είσοδο ή έξοδο

της συσκευής, τα μέρη που μπορούν να αγγιχτούν φέρουν επικίνδυνες τάσεις. Αυτό μπορεί να οδηγήσει σε ηλεκτροπληξία, επώδυνα εγκαύματα και θάνατο.

► Συνδέστε μέγιστο 60 V DC ή 30 V RMS σε οποιαδήποτε είσοδο ή έξοδο του B-TCA.

Εκρηκτικό περιβάλλον: Το B-TCA δεν είναι σχεδιασμένο για εκρηκτικά περιβάλλοντα. Πηγές ανάφλεξης μέσα στη συσκευή μπορεί να οδηγήσουν σε έκρηξη σε περιβάλλον όπου υπάρχουν εκρηκτικά αέρια ή ατμοί.

► Μην λειτουργείτε τη συσκευή παρουσία εκρηκτικών αερίων ή ατμών.

Προκατάληψη: Οι πυκνωτές μπορούν να εκραγούν όταν φορτιστούν με λάθος τάση. Πιθανοί τραυματισμοί είναι απώλεια φωτός ματιού, εγκαύματα ή ηλεκτροπληξία.

► Μην υπερβαίνετε τις τάσεις των πυκνωτών.

► Βεβαιωθείτε ότι η πολικότητα των πυκνωτών είναι σωστή.

Οι επαγωγείς μπορούν να αυξήσουν την τάση σε επικίνδυνα επίπεδα όταν η ροή του ρεύματος διακόπτεται πριν εκφορτιστούν. Αυτό μπορεί να οδηγήσει σε ηλεκτροπληξία.

► Εκφορτίστε τους πυκνωτές πριν αποσυνδέσετε το B-TCA.

► Μην φορτίζετε έναν επαγωγέα πάνω από 350 mJ.

Κάρτες δοκιμής PCBs: Μια διαχωρισμένη κάρτα δοκιμής PCB μπορεί να έχει αιχμηρές άκρες που μπορούν να κόψουν ή να τρυπήσουν το δέρμα.

► Φορέστε γάντια όταν σπάτε τις PCBs.

► Αφαιρέστε τυχόν εναπομείνασες αιχμηρές άκρες από τις PCBs.

6.6 EN – Safety instructions, designated use and operator qualifications

► Always observe all measures and precautions to achieve safety when using the *B-TCA*.

Designated use: The *B-TCA* is designed to analyze the frequency response of passive components using the *Bode 100* or *Bode 500* vector network analyzer in laboratory and manufacturing environments.

Operator qualifications:

► Make sure that the operators of the B-TCA are qualified, skilled, and authorized.

► Make sure that the operators are aware of all internal safety instructions as well as additional relevant documents. Always apply this information during testing.

Voltage limits: The *B-TCA* is a SELV device (Safety Extra Low Voltage in accordance with IEC 60950), also known as protection class III equipment. If voltages exceeding the limits of 60 V DC or 30 V RMS are applied to any input or output of the device, touchable parts carry hazardous voltages. This could lead to electric shock, painful burn scars and death.

► Connect a maximum of 60 V DC or 30 V RMS to any input or output of the B-TCA.

Explosive environment: The *B-TCA* is not designed for explosive environments. Ignition sources inside the device could lead to an explosion in an environment where explosive gas or vapors are present.

► Do not operate the device in the presence of explosive gas or vapours.

Biasing: Capacitors can explode when charged with the wrong voltage. Possible injuries are loss of eyesight, burns or electric shock.

► Do not exceed the voltage ratings of the capacitors.

► Make sure that the polarity of the capacitors is correct.

Inductors can rise the voltage up to dangerous levels when the current flow is interrupted before they are discharged. This can lead to an electric shock.

► Discharge the capacitors before disconnecting the B-TCA.

► Do not charge an inductor above 350 mJ.

Test card PCBs: A separated test card PCB can have sharp edges which can cut or prick the skin

► Wear gloves when breaking apart the PCBs.

► Remove any remaining sharp edges from the PCBs.

6.7 ES - Instrucciones de seguridad, aplicación prevista y cualificaciones de los operadores

► Siempre observe todas las medidas y precauciones para garantizar la seguridad al usar el B-TCA.

Uso designado: El B-TCA está diseñado para analizar la respuesta en frecuencia de componentes pasivos utilizando el analizador de redes vectoriales Bode 100 o Bode 500 en entornos de laboratorio y fabricación.

Calificaciones del operador:

► Asegúrese de que los operadores del B-TCA estén calificados, capacitados y autorizados.

► Asegúrese de que los operadores estén informados de todas las instrucciones de seguridad internas, así como de documentos adicionales relevantes. Utilice siempre esta información durante las pruebas.

Límites de voltaje: El B-TCA es un dispositivo SELV (Seguridad de Voltaje Extra-Bajo, de acuerdo con IEC 60950), también conocido como equipo de clase de protección III. Si se aplican voltajes que superan los límites de 60 V DC o 30 V RMS a cualquier entrada o salida del dispositivo, las partes expuestas quedarán energizadas con voltajes peligrosos. Esto podría provocar una descarga eléctrica, causar dolorosas cicatrices por quemaduras u ocasionar la muerte.

► Conecte un máximo de 60 V DC o 30 V RMS a cualquier entrada o salida del dispositivo B-TCA.

Entorno explosivo: El B-TCA no está diseñado para entornos explosivos. Fuentes de ignición dentro del dispositivo podrían provocar una explosión en un entorno donde haya gases o vapores explosivos.

► No opere el dispositivo en presencia de gases o vapores explosivos.

Polarización: Los capacitores pueden explotar cuando se cargan con el voltaje incorrecto. Las posibles lesiones son pérdida de visión, quemaduras o trauma por descarga eléctrica.
► No exceda las especificaciones de voltaje de los capacitores.
► Asegúrese de que la polaridad de los capacitores sea la correcta.
Los inductores pueden aumentar el voltaje a niveles peligrosos cuando el flujo de corriente se interrumpe antes de que se descarguen. Esto puede provocar una descarga eléctrica.
► Descargue los capacitores antes de desconectar el B-TCA.
► No cargue un inductor por encima de 350 mJ.
Tarjetas de prueba PCB: Una tarjeta de prueba PCB segmentada puede presentar bordes afilados que pueden cortar o perforar la piel.
► Use guantes al segmentar y cortar los PCBs.
► Elimine cualquier borde afilado de los PCBs.

6.8 ET - Ohutusjuhised, kasutusotstarve ja kasutaja kvalifikatsioon

► Järgige alati kõiki meetmeid ja ettevaatusabinõusid, et tagada ohutus B-TCA kasutamisel.
Ettenähtud kasutus: B-TCA on loodud passiivsete komponentide sageduskarakteristiku analüüsimiseks Bode 100 või Bode 500 vektoriaalse võrguanalüsaatori abil labori- ja tootmiskeskkondades.
Operaatori kvalifikatsioonid:
► Veenduge, et B-TCA operaatorid oleksid kvalifitseeritud, oskuslikud ja volitatud.
► Veenduge, et operaatorid oleksid teadlikud kõigist sisemistest ohutusjuhistest ning täiendavatest asjakohastest dokumentidest. Rakendage alati seda teavet testimise ajal.
Pingepiirangud: B-TCA on SELV-seade (Safety Extra Low Voltage vastavalt IEC 60950-le), tuntud ka kui kaitseklass III varustus. Kui seadme mis tahes sisendile või väljundile rakendatakse pingeid, mis ületavad 60 V DC või 30 V RMS piire, kannavad puutuvad osad ohtlikke pingeid. See võib põhjustada elektrilööki, valusaid põletusarme ja surma.
► Ühendage B-TCA mis tahes sisendile või väljundile maksimaalselt 60 V DC või 30 V RMS.
Plahvatusohtlik keskkond: B-TCA ei ole mõeldud plahvatusohtlikeks keskkondadeks. Seadme sees olevad süüteallikad võivad põhjustada plahvatuse keskkonnas, kus esineb plahvatusohtlikke gaase või aure.
► Ärge kasutage seadet plahvatusohtlike gaaside või aurude juuresolekul.
Eelpingestamine: Kondensaatorid võivad valesti pingestamisel plahvatada. Võimalikud vigastused on silmavalguse kaotus, põletused või elektrilöök.
► Ärge ületage kondensaatorite pingereitinguid.
► Veenduge, et kondensaatorite polaarsus oleks õige.
Induktorid võivad tõsta pinge ohtlikule tasemele, kui vool katkestatakse enne nende tühjendamist. See võib põhjustada elektrilööki.
► Tühjendage kondensaatorid enne B-TCA lahtiühendamist.
► Ärge laadige induktorit üle 350 mJ.
Testkaardi PCB-d: Eraldatud testkaardi PCB-l võivad olla teravad servad, mis võivad nahka lõigata või torkida.
► Kandke kindaid PCB-de murdmise ajal.
► Eemaldage PCB-delt kõik järelejäänud teravad servad.

6.9 FI - Turvallisuusohjeet, käyttötarkoitus ja käyttäjän pätevyys

► Noudata aina kaikkia toimenpiteitä ja varotoimia turvallisuuden saavuttamiseksi B-TCA:n käytön aikana.
Käyttötarkoitus: B-TCA on suunniteltu analysoimaan passiivisten komponenttien taajuusvasteita Bode 100 tai Bode 500 vektoriverkkoanalysaattorin avulla laboratorio- ja valmistusympäristöissä.
Käyttäjän pätevyys:
► Varmista, että B-TCA:n käyttäjät ovat päteviä, taitavia ja valtuutettuja.
► Varmista, että käyttäjät ovat tietoisia kaikista sisäisistä turvallisuusohjeista sekä muista asiaankuuluvista asiakirjoista. Sovella näitä tietoja aina testauksen aikana.
Jänniterajat: B-TCA on SELV-laite (Safety Extra Low Voltage IEC 60950:n mukaisesti), joka tunnetaan myös suojausluokan III laitteena. Jos laitteen mihin tahansa tulo- tai lähtöön kytketään jännitteitä, jotka ylittävät 60 V DC tai 30 V RMS rajat, kosketeltavat osat kantavat vaarallisia jännitteitä. Tämä voi johtaa sähköiskuun, kivuliaisiin palovammoihin ja kuolemaan.
► Kytke enintään 60 V DC tai 30 V RMS mihin tahansa B-TCA:n tulo- tai lähtöön.
Räjähdysvaarallinen ympäristö: B-TCA ei ole suunniteltu räjähdysvaarallisiin ympäristöihin. Laitteen sisäiset syttymislähteet voivat johtaa räjähdykseen ympäristössä, jossa on räjähdysherkkää kaasua tai höyryjä.
► Älä käytä laitetta räjähdysherkän kaasun tai höyryjen läsnä ollessa.
Esijännitys: Kondensaattorit voivat räjähtää, jos ne ladataan väärällä jännitteellä. Mahdollisia vammoja ovat silmävauriot, palovammat tai sähköisku.
► Älä ylitä kondensaattoreiden jännitearvoja.
► Varmista, että kondensaattoreiden napaisuus on oikea.
Induktorit voivat nostaa jännitteen vaaralliselle tasolle, kun virran kulku keskeytyy ennen niiden purkamista. Tämä voi johtaa sähköiskuun.
► Purkaa kondensaattorit ennen B-TCA:n irrottamista.
► Älä lataa induktoria yli 350 mJ.
Testikortti-PCB:t: Erottunut testikortti-PCB voi olla teräväreunainen, mikä voi leikata tai pistää ihoa.
► Käytä hanskoja PCB:iden irrottamisen yhteydessä.
► Poista kaikki jäljelle jääneet terävät reunat PCB:istä.

6.10 FR - Consignes de sécurité, utilisation prévue et qualifications des opérateurs

► Toujours observer toutes les mesures et précautions pour garantir la sécurité lors de l'utilisation du B-TCA.

Utilisation désignée : Le B-TCA est conçu pour analyser la réponse en fréquence des composants passifs en utilisant l'analyseur de réseau vectoriel Bode 100 ou Bode 500 dans des environnements de laboratoire et de fabrication.

Qualifications des opérateurs :

► Assurez-vous que les opérateurs du B-TCA sont qualifiés, compétents et autorisés.

► Assurez-vous que les opérateurs sont informés de toutes les instructions de sécurité internes ainsi que des documents supplémentaires pertinents. Appliquez toujours ces informations lors des tests.

Limites de tension : Le B-TCA est un appareil SELV (Safety Extra Low Voltage conformément à la norme IEC 60950), également connu sous le nom d'équipement de classe de protection III. Si des tensions dépassant les limites de 60 V DC ou 30 V RMS sont appliquées à une entrée ou une sortie de l'appareil, les parties accessibles peuvent transporter des tensions dangereuses. Cela pourrait entraîner un choc électrique, des brûlures douloureuses et la mort.

► Connectez un maximum de 60 V DC ou 30 V RMS à toute entrée ou sortie du B-TCA.

Environnement explosif : Le B-TCA n'est pas conçu pour des environnements explosifs. Des sources d'ignition à l'intérieur de l'appareil pourraient provoquer une explosion dans un environnement où des gaz ou vapeurs explosifs sont présents.

► Ne pas utiliser l'appareil en présence de gaz ou vapeurs explosifs.

Polarisation : Les condensateurs peuvent exploser lorsqu'ils sont chargés avec une mauvaise tension. Les blessures possibles incluent la perte de la vue, des brûlures ou un choc électrique.

► Ne dépassez pas les valeurs de tension des condensateurs.

► Assurez-vous que la polarité des condensateurs est correcte.

Les inducteurs peuvent augmenter la tension à des niveaux dangereux lorsque le flux de courant est interrompu avant qu'ils ne soient déchargés. Cela peut entraîner un choc électrique.

► Déchargez les condensateurs avant de déconnecter le B-TCA.

► Ne chargez pas un inducteur au-delà de 350 mJ.

Cartes de test PCB : Une carte de test PCB séparée peut avoir des bords tranchants qui peuvent couper ou piquer la peau.

► Portez des gants lors de la séparation des PCBs.

► Enlevez tous les bords tranchants restants des PCBs.

6.11 HR - Sigurnosne upute, predviđena namjena i kvalifikacije rukovatelja

► Uvijek se pridržavajte svih mjera i opreza kako biste postigli sigurnost pri korištenju B-TCA.

Namjena: B-TCA je dizajniran za analizu frekvencijskog odziva pasivnih komponenti koristeći Bode 100 ili Bode 500 vektorski mrežni analizator u laboratorijskim i proizvodnim okruženjima.

Kvalifikacije operatera:

► Osigurajte da su operateri B-TCA kvalificirani, vješti i ovlašteni.

► Osigurajte da su operateri upoznati sa svim internim sigurnosnim uputama kao i dodatnim relevantnim dokumentima. Uvijek primjenjujte ove informacije tijekom testiranja.

Ograničenja napona: B-TCA je SELV uređaj (Sigurnosni ekstra niski napon u skladu s IEC 60950), također poznat kao oprema zaštitne klase III. Ako se na bilo koji ulaz ili izlaz uređaja primijene naponi koji prelaze granice od 60 V DC ili 30 V RMS, dodirni dijelovi nose opasne napone. To može dovesti do električnog udara, bolnih opeklina i smrti.

► Spojite maksimalno 60 V DC ili 30 V RMS na bilo koji ulaz ili izlaz B-TCA.

Eksplozivno okruženje: B-TCA nije dizajniran za eksplozivna okruženja. Izvori paljenja unutar uređaja mogu dovesti do eksplozije u okruženju gdje su prisutni eksplozivni plinovi ili pare.

► Ne koristite uređaj u prisutnosti eksplozivnih plinova ili para.

Podešavanje prednapona: Kondenzatori mogu eksplodirati kada se napune pogrešnim naponom. Moguće ozljede uključuju gubitak vida, opekline ili električni udar.

► Ne prekoračujte naponske vrijednosti kondenzatora.

► Osigurajte da je polaritet kondenzatora ispravan.

Induktori mogu povećati napon do opasnih razina kada se protok struje prekine prije nego što se isprazne. To može dovesti do električnog udara.

► Ispraznite kondenzatore prije odspajanja B-TCA.

► Ne punite induktor iznad 350 mJ.

Testne kartice PCB-a: Odvojena testna kartica PCB-a može imati oštre rubove koji mogu porezati ili ubosti kožu.

► Nosite rukavice prilikom razdvajanja PCB-a.

► Uklonite sve preostale oštre rubove s PCB-a.

6.12 HU - Biztonsági utasítások, rendeltetésszerű használat és kezelői szakképesítési követelmények

► A B-TCA használata során mindig tartsa be minden vonatkozó biztonsági intézkedést és óvintézkedést a biztonságos üzemeltetés érdekében.

Rendeltetésszerű használat: A B-TCA arra lett tervezve, hogy passzív alkatrészek frekvencia-válaszát elemezze a Bode 100 vagy Bode 500 vektorhálózat-analizátor segítségével laboratóriumi és gyártási környezetben.

Kezelői képesítések:

► Győződjön meg arról, hogy a B-TCA kezelői képzettek, szakképzettek és rendelkeznek a szükséges jogosultsággal.

► Győződjön meg arról, hogy a kezelők tisztában vannak minden belső biztonsági utasítással, valamint további releváns dokumentumokkal. Mindig alkalmazza ezeket az információkat a tesztelés során.

Feszültséghatárok: A B-TCA egy SELV készülék (Biztonsági Extra Alacsony Feszültség az IEC 60950 szerint), más néven III. érintésvédelmi osztályú berendezés. Ha bármely bemenetre vagy kimenetre a készüléken 60 V DC vagy 30 V RMS határértéket meghaladó feszültséget alkalmaznak, az érinthető részek veszélyes feszültség alá kerülhetnek. Ez áramütéshez, súlyos égési sebekhez és akár halálhoz is vezethetnek.

► A B-TCA bármely bemenetére vagy kimenetére legfeljebb 60 V DC vagy 30 V RMS feszültséget csatlakoztasson.

Robbanásveszélyes környezet: A B-TCA nem alkalmas robbanásveszélyes környezetben való használatra. A készülék belsejében lévő gyújtóforrások robbanást okozhatnak olyan környezetben, ahol robbanásveszélyes gáz vagy gőz van jelen.

► Ne használja a készüléket robbanásveszélyes gáz vagy gőz jelenlétében.

Előfeszítés (bias): A kondenzátorok felrobbanhatnak, ha nem megfelelő feszültséggel töltik őket. Lehetséges sérülések: látásvesztés, égési sérülések vagy áramütést.

► Ne lépje túl a kondenzátorok feszültségtűréseit.

► Győződjön meg arról, hogy a kondenzátorok polaritása helyes.

Az induktorok veszélyes szintre emelhetik a feszültséget, ha a bennük folyó áram megszakad, mielőtt kisülnének. Ez áramütéshez vezethet.

► Süsse ki a kondenzátorokat, mielőtt leválasztja a B-TCA-t.

► Ne töltsön fel egy induktivitást 350 mJ nagyobb energiaszintre.

Tesztkártya NYÁK-ok: Egy leválasztott tesztkártya NYÁK élei élesek lehetnek, amelyek megvághatják vagy megszúrhatják a bőrt.

► Viseljen kesztyűt a NYÁK-ok szétválasztásakor.

► Távolítsa el a NYÁK-okon megmaradt éles széleket.

6.13 IT - Istruzioni di sicurezza, utilizzo previsto e qualifiche degli operatori

► Osservare sempre tutte le misure e precauzioni per garantire la sicurezza durante l'uso del B-TCA.

Uso designato: Il B-TCA è progettato per analizzare la risposta in frequenza dei componenti passivi utilizzando l'analizzatore di rete vettoriale Bode 100 o Bode 500 in ambienti di laboratorio e produzione.

Qualifiche dell'operatore:

► Assicurarsi che gli operatori del B-TCA siano qualificati, competenti e autorizzati.

► Assicurarsi che gli operatori siano a conoscenza di tutte le istruzioni di sicurezza interne e dei documenti aggiuntivi pertinenti. Applicare sempre queste informazioni durante i test.

Limiti di tensione: Il B-TCA è un dispositivo SELV (Safety Extra Low Voltage in conformità con IEC 60950), noto anche come apparecchiatura di classe di protezione III. Se vengono applicate tensioni superiori ai limiti di 60 V DC o 30 V RMS a qualsiasi ingresso o uscita del dispositivo, le parti toccabili sono sogette a tensioni pericolose. Questo potrebbe portare a scosse elettriche, dolorose cicatrici da ustione e morte.

► Collegare un massimo di 60 V DC o 30 V RMS a qualsiasi ingresso o uscita del B-TCA.

Ambiente esplosivo: Il B-TCA non è progettato per essere usato in presenza di gas o vapori esplosivi. Scintille all'interno del dispositivo potrebbero portare a esplosioni in un ambiente dove sono presenti gas o vapori esplosivi.

► Non utilizzare il dispositivo in presenza di gas o vapori esplosivi.

Polarizzazione: I condensatori possono esplodere se caricati con la tensione sbagliata. Possibili lesioni includono perdita della vista, ustioni o scosse elettriche.

► Non superare le tensioni nominali dei condensatori.

► Assicurarsi che la polarità dei condensatori sia corretta.

Gli induttori possono aumentare la tensione fino a livelli pericolosi quando il flusso di corrente viene interrotto prima che siano scaricati. Questo può portare a scosse elettriche.

► Scaricare i condensatori prima di scollegare il B-TCA.

► Non caricare un induttore oltre 350 mJ.

Schede di test PCB: Una scheda di test PCB separata può avere bordi taglienti che possono tagliare o pungere la pelle.

► Indossare guanti quando si separano le PCB.

► Rimuovere eventuali bordi taglienti rimanenti dalle PCB.

6.14 JA - 安全指示、指定された使用目的、オペレーターの資格

► B-TCAを使用する際は、常に安全を確保するためのすべての措置と予防策を遵守してください。

指定された使用目的: B-TCAは、ラボや製造環境でBode 100またはBode 500ベクトルネットワークアナライザを使用して受動部品の周波数応答を分析するために設計されています。

オペレーターの資格:

► B-TCAのオペレーターが資格を持ち、熟練し、認可されていることを確認してください。

► オペレーターがすべての内部安全指示および関連する追加文書を理解していることを確認してください。テスト中は常にこの情報を適用してください。

電圧制限: B-TCAはSELVデバイス（IEC 60950に準拠した安全超低電圧）、保護クラスIII機器として知られています。60 V DCまたは30 V RMSを超える電圧がデバイスの入力または出力に適用されると、触れる部分に危険な電圧が発生します。これにより、電気ショック、痛みを伴う火傷、死亡につながる可能性があります。

► B-TCAの入力または出力に最大60 V DCまたは30 V RMSを接続してください。

爆発性環境: B-TCAは爆発性環境用に設計されていません。デバイス内部の発火源が、爆発性ガスや蒸気が存在する環境で爆発を引き起こす可能性があります。

► 爆発性ガスや蒸気が存在する環境でデバイスを操作しないでください。

バイアス: コンデンサは誤った電圧で充電されると爆発する可能性があります。可能な怪我には、視力の喪失、火傷、電気ショックがあります。

► コンデンサの電圧定格を超えないでください。

► コンデンサの極性が正しいことを確認してください。

インダクタは、放電前に電流が遮断されると、電圧を危険なレベルまで上昇させる可能性があります。これにより電気ショックが発生する可能性があります。

► B-TCAを切断する前にコンデンサを放電してください。

► インダクタを350 mJ以上充電しないでください。

テストカードPCB: 分離されたテストカードPCBには鋭いエッジがあり、皮膚を切ったり刺したりする可能性があります。

► PCBを分解する際は手袋を着用してください。

► PCBから残っている鋭いエッジを取り除いてください。

6.15 LT - Saugos nurodymai, numatytasis naudojimas ir operatoriaus kvalifikacijos

► Visada laikykitės visų priemonių ir atsargumo priemonių, kad užtikrintumėte saugumą naudojant B-TCA.

Numatytas naudojimas: B-TCA yra skirtas pasyviųjų komponentų dažnio atsako analizei naudojant Bode 100 arba Bode 500 vektorinius tinklo analizatorius laboratorijos ir gamybos aplinkoje.

Operatorių kvalifikacija:

► Įsitikinkite, kad B-TCA operatoriai yra kvalifikuoti, įgudę ir įgalioti.

► Įsitikinkite, kad operatoriai žino visas vidines saugos instrukcijas bei papildomus svarbius dokumentus. Visada taikykite šią informaciją bandymų metu.

Įtampos ribos: B-TCA yra SELV įrenginys (Saugos ypač žemos įtampos įrenginys pagal IEC 60950), taip pat žinomas kaip III apsaugos klasės įranga. Jei bet kuriam įrenginio įėjimui ar išėjimui taikoma įtampa viršija 60 V DC arba 30 V RMS ribas, liečiamos dalys gali turėti pavojingą įtampą. Tai gali sukelti elektros smūgį, skausmingus nudegimus ir mirtį.

► Prijunkite ne daugiau kaip 60 V DC arba 30 V RMS prie bet kurio B-TCA įėjimo ar išėjimo.

Sprogstamoji aplinka: B-TCA nėra skirtas sprogstamoms aplinkoms. Uždegimo šaltiniai įrenginio viduje gali sukelti sprogimą aplinkoje, kurioje yra sprogstamųjų dujų ar garų.

► Neeksploatuokite įrenginio esant sprogstamoms dujoms ar garams.

Įtampa: Kondensatoriai gali sprogti, jei jie įkraunami netinkama įtampa. Galimos traumos yra akių šviesos praradimas, nudegimai ar elektros smūgis.

► Neviršykite kondensatorių įtampos reitingų.

► Įsitikinkite, kad kondensatorių poliariškumas yra teisingas.

Induktoriai gali padidinti įtampą iki pavojingo lygio, kai srovės tekėjimas nutraukiamas prieš juos iškraunant. Tai gali sukelti elektros smūgį.

► Iškraukite kondensatorius prieš atjungdami B-TCA.

► Neįkraukite induktoriaus virš 350 mJ.

Testo kortelės PCB: Atskirta testo kortelė PCB gali turėti aštrius kraštus, kurie gali įpjauti ar pradurti odą.

► Dėvėkite pirštines, kai atskiriate PCB.

► Pašalinkite visus likusius aštrius PCB kraštus.

6.16 LV - Drošības instrukcijas, paredzētā izmantošana un operatora kvalifikācija

► Vienmēr ievērojiet visus pasākumus un piesardzības pasākumus, lai nodrošinātu drošību, lietojot B-TCA.

Paredzētā lietošana: B-TCA ir paredzēts pasīvo komponentu frekvences reakcijas analīzei, izmantojot Bode 100 vai Bode 500 vektoru tīkla analizatoru laboratorijas un ražošanas vidē.

Operatora kvalifikācija:

► Pārliecinieties, ka B-TCA operatori ir kvalificēti, prasmīgi un pilnvaroti.

► Pārliecinieties, ka operatori ir informēti par visām iekšējām drošības instrukcijām, kā arī papildu attiecīgiem dokumentiem. Vienmēr izmantojiet šo informāciju testēšanas laikā.

Sprieguma ierobežojumi: B-TCA ir SELV ierīce (drošības īpaši zems spriegums saskaņā ar IEC 60950), pazīstama arī kā aizsardzības klases III aprīkojums. Ja ierīces jebkuram ieejas vai izejas pieslēgumam tiek pielietots spriegums, kas pārsniedz 60 V DC vai 30 V RMS, pieskaramās daļas var saturēt bīstamu spriegumu. Tas var izraisīt elektrisko triecienu, sāpīgas apdeguma rētas un nāvi.

► Pieslēdziet maksimāli 60 V DC vai 30 V RMS jebkuram B-TCA ieejas vai izejas pieslēgumam.

Sprādzienbīstama vide: B-TCA nav paredzēts sprādzienbīstamai videi. Aizdegšanās avoti ierīces iekšpusē var izraisīt sprādzienu vidē, kurā ir sprādzienbīstamas gāzes vai tvaiki.

► Neizmantojiet ierīci sprādzienbīstamu gāzu vai tvaiku klātbūtnē.

Polarizācija: Kondensatori var eksplodēt, ja tiek uzlādēti ar nepareizu spriegumu. Iespējamie ievainojumi ir acu gaismas zudums, apdegumi vai elektriskais trieciens.

► Nepārsniedziet kondensatoru sprieguma vērtības.

► Pārliecinieties, ka kondensatoru polaritāte ir pareiza.

Induktori var paaugstināt spriegumu līdz bīstamam līmenim, ja strāvas plūsma tiek pārtraukta pirms to izlādēšanas. Tas var izraisīt elektrisko triecienu.

► Izlādējiet kondensatorus pirms B-TCA atvienošanas.

► Neuzlādējiet induktoru virs 350 mJ.

Testa kartes PCB: Atsevišķa testa kartes PCB var būt ar asām malām, kas var sagriezt vai sadurt ādu.

► Valkājiet cimdus, kad izjaucat PCB.

► Noņemiet visas atlikušās asas malas no PCB.

6.17 NL - Veiligheidsinstructies, beoogd gebruik en kwalificaties van de bediener

► Neem altijd alle maatregelen en voorzorgsmaatregelen in acht om veiligheid te garanderen bij het gebruik van de B-TCA.

Aangewezen gebruik: De B-TCA is ontworpen om de frequentierespons van passieve componenten te analyseren met behulp van de Bode 100 of Bode 500 vector netwerk analyzer in laboratorium- en productieomgevingen.

Operator kwalificaties:

► Zorg ervoor dat de operators van de B-TCA gekwalificeerd, vaardig en bevoegd zijn.

► Zorg ervoor dat de operators op de hoogte zijn van alle interne veiligheidsinstructies en aanvullende relevante documenten. Pas deze informatie altijd toe tijdens het testen.

Spanningslimieten: De B-TCA is een SELV-apparaat (Safety Extra Low Voltage volgens IEC 60950), ook bekend als beschermingsklasse III apparatuur. Als spanningen die de limieten van 60 V DC of 30 V RMS overschrijden op een ingang of uitgang van het apparaat worden toegepast, dragen aanraakbare delen gevaarlijke spanningen. Dit kan leiden tot elektrische schokken, pijnlijke brandwonden en de dood.

► Sluit maximaal 60 V DC of 30 V RMS aan op een ingang of uitgang van de B-TCA.

Explosieve omgeving: De B-TCA is niet ontworpen voor explosieve omgevingen. Ontstekingsbronnen binnen het apparaat kunnen leiden tot explosie in een omgeving waar explosief gas of dampen aanwezig zijn.

► Gebruik het apparaat niet in de aanwezigheid van explosief gas of dampen.

Polarisatie: Condensatoren kunnen exploderen wanneer ze met de verkeerde spanning worden geladen. Mogelijke verwondingen zijn verlies van gezichtsvermogen, brandwonden of elektrische schokken.

► Overschrijd de spanningswaarden van de condensatoren niet.

► Zorg ervoor dat de polariteit van de condensatoren correct is.

Inductoren kunnen de spanning tot gevaarlijke niveaus verhogen wanneer de stroom wordt onderbroken voordat ze zijn ontladen. Dit kan leiden tot een elektrische schok.

► Ontlaad de condensatoren voordat u de B-TCA loskoppelt.

► Laad een inductor niet boven 350 mJ.

Testkaart printplaten: Een gescheiden testkaart printplaat kan scherpe randen hebben die de huid kunnen snijden of prikken.

► Draag handschoenen bij het uit elkaar halen van de printplaten.

► Verwijder eventuele resterende scherpe randen van de printplaten.

6.18 PL - Instrukcje bezpieczeństwa, przeznaczenie i kwalifikacje operatora

► Zawsze przestrzegaj wszystkich środków i zasad ostrożności, aby zapewnić bezpieczeństwo podczas korzystania z B-TCA.

Przeznaczenie: B-TCA jest przeznaczony do analizy odpowiedzi częstotliwościowej komponentów pasywnych przy użyciu wektorowego analizatora obwodów Bode 100 lub Bode 500 w środowiskach laboratoryjnych i produkcyjnych.

Kwalifikacje operatora:

► Upewnij się, że operatorzy B-TCA są wykwalifikowani, posiadają odpowiednie umiejętności i uprawnienia.

► Upewnij się, że operatorzy są świadomi wszystkich wewnętrznych instrukcji bezpieczeństwa oraz dodatkowych istotnych dokumentów. Zawsze stosuj te informacje podczas testowania.

Limity napięcia: B-TCA jest urządzeniem SELV (Bezpieczne Niskie Napięcie zgodnie z normą IEC 60950), znanym również jako sprzęt klasy ochrony III. Jeśli napięcia powyżej 60 V DC lub 30 V RMS zostaną podłączone do jakiegokolwiek wejścia lub wyjścia urządzenia, dotykalne części mogą przenosić niebezpieczne napięcia. Może to prowadzić do porażenia prądem, bolesnych oparzeń i śmierci.

► Maksymalne dopuszczalne napięcie dla wejść lub wyjść B-TCA to 60 V DC lub 30 V RMS.

Środowisko wybuchowe: B-TCA nie jest przeznaczony do środowisk wybuchowych. Źródła zapłonu wewnątrz urządzenia mogą prowadzić do eksplozji w środowisku, gdzie obecne są wybuchowe gazy lub opary.

► Nie używaj urządzenia w obecności wybuchowych gazów lub oparów.
Polaryzacja: Kondensatory mogą eksplodować, gdy są naładowane niewłaściwym napięciem. Możliwe obrażenia to utrata wzroku, oparzenia lub porażenie prądem.
► Nie przekraczaj wartości napięcia kondensatorów.
► Upewnij się, że polaryzacja kondensatorów jest prawidłowa.
Elementy indukcyjne mogą podnieść napięcie do niebezpiecznych poziomów, gdy przepływ prądu zostanie przerwany przed ich rozładowaniem. Może to prowadzić do porażenia prądem.
► Rozładuj kondensatory przed odłączeniem B-TCA.
► Nie ładuj elementów indukcyjnych powyżej 350 mJ.
Płytki testowe PCB: Oddzielona płytka testowa PCB może mieć ostre krawędzie, które mogą przeciąć lub ukłuć skórę.
► Noś rękawice podczas rozdzielania płytek PCB.
► Usuń wszelkie pozostałe ostre krawędzie z płytek PCB.

6.19 PT - Instruções de segurança, uso designado e qualificações do operador

► Sempre observe todas as medidas e precauções para garantir a segurança ao usar o B-TCA.
Uso designado: O B-TCA é projetado para analisar a resposta de frequência de componentes passivos usando o analisador de rede vetorial Bode 100 ou Bode 500 em ambientes de laboratório e fabricação.
Qualificações do operador:
► Certifique-se de que os operadores do B-TCA sejam qualificados, habilidosos e autorizados.
► Certifique-se de que os operadores estejam cientes de todas as instruções internas de segurança, bem como de documentos adicionais relevantes. Sempre aplique essas informações durante os testes.
Limites de tensão: O B-TCA é um dispositivo SELV (Tensão Extra Baixa de Segurança de acordo com a IEC 60950), também conhecido como equipamento de classe de proteção III. Se tensões superiores aos limites de 60 V DC ou 30 V RMS forem aplicadas a qualquer entrada ou saída do dispositivo, partes tocáveis podem carregar tensões perigosas. Isso pode levar a choque elétrico, cicatrizes de queimaduras dolorosas e morte.
► Conecte um máximo de 60 V DC ou 30 V RMS a qualquer entrada ou saída do B-TCA.
Ambiente explosivo: O B-TCA não é projetado para ambientes explosivos. Fontes de ignição dentro do dispositivo podem levar a explosão em um ambiente onde gases ou vapores explosivos estejam presentes.
► Não opere o dispositivo na presença de gases ou vapores explosivos.
Polarização: Capacitores podem explodir quando carregados com a tensão errada. Possíveis lesões incluem perda de visão, queimaduras ou choque elétrico.
► Não exceda as classificações de tensão dos capacitores.
► Certifique-se de que a polaridade dos capacitores esteja correta.
Indutores podem elevar a tensão a níveis perigosos quando o fluxo de corrente é interrompido antes de serem descarregados. Isso pode levar a um choque elétrico.
► Descarregue os capacitores antes de desconectar o B-TCA.
► Não carregue um indutor acima de 350 mJ.
PCBs de cartão de teste: Um PCB de cartão de teste separado pode ter bordas afiadas que podem cortar ou perfurar a pele.
► Use luvas ao separar os PCBs.
► Remova quaisquer bordas afiadas restantes dos PCBs.

6.20 RO - Instrucțiuni de siguranță, destinația de utilizare și calificările operatorului

► Respectați întotdeauna toate măsurile și precauțiile pentru a asigura siguranța atunci când utilizați B-TCA.
Utilizare desemnată: B-TCA este conceput pentru a analiza răspunsul în frecvență al componentelor pasive folosind analizorul de rețea vectorial Bode 100 sau Bode 500 în medii de laborator și de producție.
Calificări ale operatorului:
► Asigurați-vă că operatorii B-TCA sunt calificați, competenți și autorizați.
► Asigurați-vă că operatorii sunt conștienți de toate instrucțiunile interne de siguranță, precum și de documentele suplimentare relevante. Aplicați întotdeauna aceste informații în timpul testării.
Limite de tensiune: B-TCA este un dispozitiv SELV (Safety Extra Low Voltage conform IEC 60950), cunoscut și ca echipament de protecție clasa III. Dacă tensiuni care depășesc limitele de 60 V DC sau 30 V RMS sunt aplicate la orice intrare sau ieșire a dispozitivului, părțile accesibile pot transporta tensiuni periculoase. Acest lucru poate duce la șoc electric, cicatrici dureroase de arsuri și moarte.
► Conectați un maxim de 60 V DC sau 30 V RMS la orice intrare sau ieșire a B-TCA.
Mediu exploziv: B-TCA nu este conceput pentru medii explozive. Sursele de aprindere din interiorul dispozitivului pot duce la explozie într-un mediu în care sunt prezente gaze sau vapori explozivi.
► Nu operați dispozitivul în prezența gazelor sau vaporilor explozivi.
Polarizare: Condensatoarele pot exploda când sunt încărcate cu tensiunea greșită. Posibilele leziuni includ pierderea vederii, arsuri sau șoc electric.
► Nu depășiți valorile de tensiune ale condensatoarelor.
► Asigurați-vă că polaritatea condensatoarelor este corectă.
Inductoarele pot crește tensiunea la niveluri periculoase când fluxul de curent este întrerupt înainte de a fi descărcate. Acest lucru poate duce la șoc electric.

► Descărcați condensatoarele înainte de a deconecta B-TCA.
► Nu încărcați un inductor peste 350 mJ.

Plăci de testare PCB: O placă de testare PCB separată poate avea margini ascuțite care pot tăia sau înțepa pielea.
► Purtați mănuși când separați plăcile PCB.
► Îndepărtați orice margini ascuțite rămase de pe plăcile PCB.

6.21 SK - Bezpečnostné pokyny, určené použitie a kvalifikácia obsluhy

► Vždy dodržiavajte všetky opatrenia a preventívne opatrenia na dosiahnutie bezpečnosti pri používaní B-TCA.

Určené použitie: B-TCA je navrhnuté na analýzu frekvenčnej odozvy pasívnych komponentov pomocou vektorového analyzátora siete Bode 100 alebo Bode 500 v laboratórnom a výrobnom prostredí.

Kvalifikácia operátora:
► Uistite sa, že operátori B-TCA sú kvalifikovaní, zruční a oprávnení.
► Uistite sa, že operátori sú oboznámení so všetkými internými bezpečnostnými pokynmi, ako aj s ďalšími relevantnými dokumentmi. Vždy aplikujte tieto informácie počas testovania.

Limity napätia: B-TCA je zariadenie SELV (Safety Extra Low Voltage v súlade s IEC 60950), tiež známe ako zariadenie triedy ochrany III. Ak sa na akýkoľvek vstup alebo výstup zariadenia použijú napätia presahujúce limity 60 V DC alebo 30 V RMS, dotykové časti nesú nebezpečné napätia. To môže viesť k elektrickému šoku, bolestivým popáleninám a smrti.
► Pripojte maximálne 60 V DC alebo 30 V RMS na akýkoľvek vstup alebo výstup B-TCA.

Výbušné prostredie: B-TCA nie je navrhnuté pre výbušné prostredia. Zdroje zapálenia vo vnútri zariadenia môžu viesť k výbuchu v prostredí, kde sú prítomné výbušné plyny alebo pary.
► Nepoužívajte zariadenie v prítomnosti výbušných plynov alebo pár.

Predpätie: Kondenzátory môžu explodovať, ak sú nabité nesprávnym napätím. Možné zranenia zahŕňajú stratu zraku, popáleniny alebo elektrický šok.
► Neprekračujte napäťové hodnoty kondenzátorov.
► Uistite sa, že polarita kondenzátorov je správna.

Induktory môžu zvýšiť napätie na nebezpečné úrovne, keď je prúd prerušený pred ich vybitím. To môže viesť k elektrickému šoku.
► Vybiť kondenzátory pred odpojením B-TCA.
► Nenabíjajte induktor nad 350 mJ.

Testovacie karty PCB: Oddelená testovacia karta PCB môže mať ostré hrany, ktoré môžu porezať alebo pichnúť kožu.
► Noste rukavice pri rozdeľovaní PCB.
► Odstráňte všetky zostávajúce ostré hrany z PCB.

6.22 SL - Varnostna navodila, predvidena uporaba in kvalifikacije upravljavca

► Vedno upoštevajte vse previdnostne ukrepe za zagotavljanje varnosti pri uporabi B-TCA.

Namenska uporaba: B-TCA je zasnovan za analizo frekvenčnega odziva pasivnih komponent z uporabo vektorskega analizatorja vezij Bode 100 ali Bode 500 v laboratorijskih in proizvodnih okoljih.

Kvalifikacije operaterja:
► Poskrbite, da so operaterji za rokovanje s B-TCA kvalificirani, usposobljeni in pooblaščeni.
► Poskrbite, da so operaterji seznanjeni z vsemi notranjimi varnostnimi navodili ter dodatnimi pomembnimi dokumenti. Vedno uporabite te informacije med testiranjem.

Napetostne meje: B-TCA je naprava SELV (varnostna zelo nizka napetost v skladu s standardom IEC 60950), znana tudi kot oprema razreda zaščite III. Če se na katerikoli vhod ali izhod naprave pritisnejo napetosti, ki presegajo mejo enosmerne napetosti 60 V DC ali izmenične napetosti 30 V RMS, so lahko dotikljivi deli izpostavljeni nevarno visoki napetosti. To lahko povzroči električni udar, boleče opekline in smrt.
► Na katerikoli vhod ali izhod B-TCA lahko priključite enosmerno napetost do 60 V DC ali izmenično napetost do 30 V RMS.

Eksplozivno okolje: B-TCA ni zasnovan za eksplozivna okolja. Viri vžiga znotraj naprave lahko povzročijo eksplozijo v okolju, kjer so prisotni eksplozivni plini ali hlapi.
► Naprave ne uporabljajte v prisotnosti eksplozivnih plinov ali hlapov.

Prednapetost: Kondenzatorji lahko eksplodirajo, če so napolnjeni z napačno napetostjo. Možne poškodbe so izguba vida, opekline ali električni udar.
► Ne prekoračite nazivnih napetostnih vrednosti kondenzatorjev.
► Poskrbite, da je polariteta kondenzatorjev pravilna.

Tuljave lahko dvignejo napetost na nevarne ravni, ko se tok prekine, preden se izpraznijo. To lahko povzroči električni udar.
► Izpraznite kondenzatorje, preden odklopite B-TCA.
► Ne napolnite tuljav nad 350 mJ.

Testne kartice na tiskanem vezju: Ločena testna kartica na tiskanem vezju lahko ima ostre robove, ki lahko porežejo ali se zapičijo v kožo.
► Nosite rokavice pri ločevanju tiskanih vezij.
► Odstranite vse preostale ostre robove s tiskanih vezij.

6.23 SV - Säkerhetsinstruktioner, avsedd användning och användarkvalifikationer

► Följ alltid alla åtgärder och försiktighetsåtgärder för att uppnå säkerhet vid användning av B-TCA.
Avsedd användning: B-TCA är utformad för att analysera frekvensresponsen hos passiva komponenter med hjälp av Bode 100 eller Bode 500 vektornätverksanalysator i laboratorie- och tillverkningsmiljöer.
Operatörskvalifikationer:
► Se till att operatörerna av B-TCA är kvalificerade, skickliga och auktoriserade.
► Se till att operatörerna är medvetna om alla interna säkerhetsinstruktioner samt ytterligare relevanta dokument. Använd alltid denna information under testning.
Spänningsgränser: B-TCA är en SELV-enhet (Safety Extra Low Voltage i enlighet med IEC 60950), även känd som utrustning i skyddsklass III. Om spänningar som överstiger gränserna på 60 V DC eller 30 V RMS appliceras på någon ingång eller utgång av enheten, bär berörbara delar farliga spänningar. Detta kan leda till elektrisk stöt, smärtsamma brännskador och död.
► Anslut maximalt 60 V DC eller 30 V RMS till någon ingång eller utgång av B-TCA.
Explosiv miljö: B-TCA är inte utformad för explosiva miljöer. Tändkällor inne i enheten kan leda till explosion i en miljö där explosiv gas eller ångor finns.
► Använd inte enheten i närvaro av explosiv gas eller ångor.
Förspänning: Kondensatorer kan explodera när de laddas med fel spänning. Möjliga skador är förlust av syn, brännskador eller elektrisk stöt.
► Överskrid inte kondensatorernas spänningsgränser.
► Se till att kondensatorernas polaritet är korrekt.
Induktorer kan höja spänningen till farliga nivåer när strömflödet avbryts innan de är urladdade. Detta kan leda till elektrisk stöt.
► Ladda ur kondensatorerna innan du kopplar bort B-TCA.
► Ladda inte en induktor över 350 mJ.
Testkort-PCB: Ett separerat testkort-PCB kan ha vassa kanter som kan skära eller sticka huden.
► Använd handskar när du bryter isär PCB:erna.
► Ta bort eventuella kvarvarande vassa kanter från PCB:erna.

6.24 ZH - 安全说明、指定用途和操作员资格

► 在使用B-TCA时，始终遵循所有措施和预防措施以确保安全。

指定用途：B-TCA旨在使用Bode 100或Bode 500矢量网络分析仪在实验室和制造环境中分析无源元件的频率响应。

操作员资格：

► 确保B-TCA的操作员具备资格、技能和授权。

► 确保操作员了解所有内部安全说明以及其他相关文件。在测试过程中始终应用这些信息。

电压限制：B-TCA是一种SELV设备（根据IEC 60950的安全超低电压），也称为保护等级III设备。如果对设备的任何输入或输出施加超过60 V DC或30 V RMS的电压，可触摸部件将带有危险电压。这可能导致电击、痛苦的烧伤和死亡。

► 连接到B-TCA的任何输入或输出的最大电压为60 V DC或30 V RMS。

爆炸环境：B-TCA不适用于爆炸性环境。设备内部的点火源可能在存在爆炸性气体或蒸汽的环境中导致爆炸。

► 不要在存在爆炸性气体或蒸汽的情况下操作设备。

偏置：电容器在充电错误电压时可能会爆炸。可能的伤害包括失明、烧伤或电击。

► 不要超过电容器的电压额定值。

► 确保电容器的极性正确。

当电流流动在电感器放电前被中断时，电感器可能会使电压升高到危险水平。这可能导致电击。

► 如果需要连接B-TCA，请先将电容器放电。

► 不要给电感器充电超过350 mJ。

测试卡PCB：分离的测试卡PCB可能有锋利的边缘，可能会割伤或刺伤皮肤。

► 在拆分PCB时佩戴手套。

► 去除PCB上的任何剩余锋利边缘。

7 Technical support

When you are working with our products we want to provide you with the greatest possible benefits. If you need any support, we are here to assist you!

Technical Support - Get Support

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