

Speakers mounted in conductive enclosures must be tested for electrical connections from either terminal to the enclosure.

Using a bridged amplifier and some modified cables this defect can be detected reliably.

Typical applications are industrial speaker systems used for public address or metal housed multi-media systems.

The opposite case of testing a required connection to any conductive part of the system can be realized using a very similar solution.



CONTENTS:

Hardware 2

How does it work 3

Example..... 4

Further reading 5

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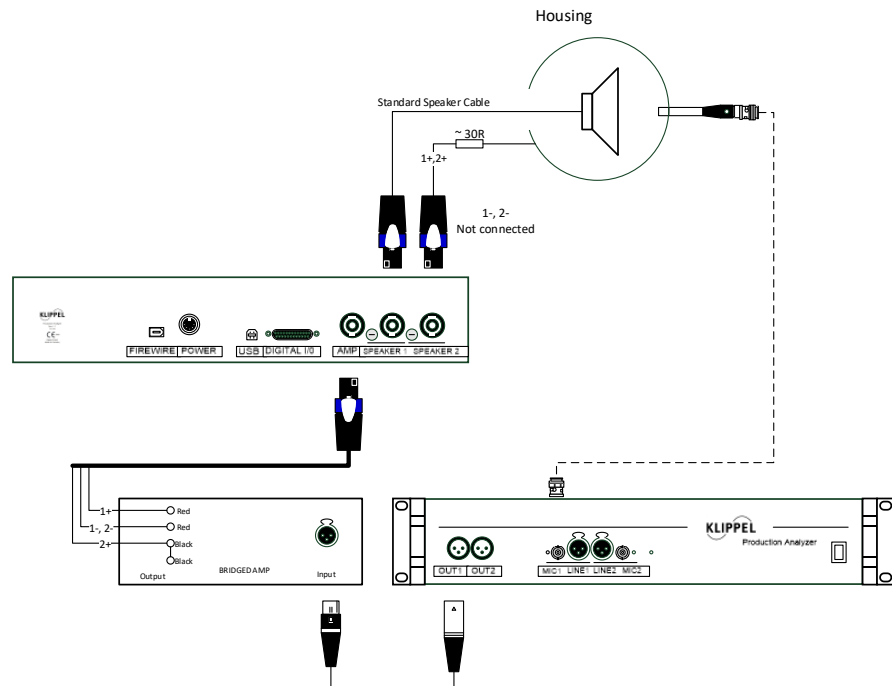


Hardware

Requirements

- Power Amplifier set to bridged mode.
- Additional Speaker cable
- Power Resistor (>30 Ohms)

Schematic



- Power Amplifier must be in bridged mode (both outputs swing with opposite phase)
- Amplifier Cable (with crimped ferrules) required. Connect amplifier cable exactly as depicted.
- For normal speaker testing a standard speaker cable is used.
- For the grounding check, a special speaker cable is used. Only the pair 1+ together with 2+ needs to be connected via a resistor (about 30 Ohms) to the housing of the system.
- The connected microphone is not required for the grounding check, it is part of the normal acoustic check

Extending number of DUTs

A Speakon-Multiplexer can be used to measure up to 4 DUTs in one sequence. For this application, the multiplexer must be operated in **Dual Parallel 1 out of 4** mode:

Channels 1-4 are connected to the drive units under test, BUS A is connected to Speaker1 connector of the PA unit.

Channels 5-8 are connected to the resistance check, BUS B is connected to Speaker2 connector of the PA unit.

How does it work

Resistance check

The grounding check is based on a resistance measurement between the speaker terminals and the housing.

Due to the bridged mode amplifier operation, the default (no short cut to the housing) resistance between either terminal and the housing is very high (>10kOhm)

Speaker 1 channel is used for the normal impedance check and for the acoustic tests as well. Speaker 1 is driven from the bridged amplifier output.

Speaker 2 channel is driven from one non-bridged amplifier channel. One hot output (red output post on most amplifiers) and one ground (normally black output post) is used for driving. The ground posts (black) are internally connected.

Using the 30 Ohms resistor the housing is grounded to the amplifier ground. This resistor is used to limit the current in case of a shortcut to its value.

In case of a shortcut of one terminal of the DUT to the housing, the impedance measured at speaker channel 2 is much lower than the open circuit which is used as pass/fail test.

Detected Defects

The following defects may occur:

- The negative DUT terminal is connected to the housing. The measured impedance in speaker channel 2 is measured close to the value of the used resistor.
- The positive DUT terminal is connected to the housing. The measured impedance in speaker channel 2 is measured close to the value of the used resistor plus the impedance magnitude of the DUT.

Example

Sequence

Control Task:

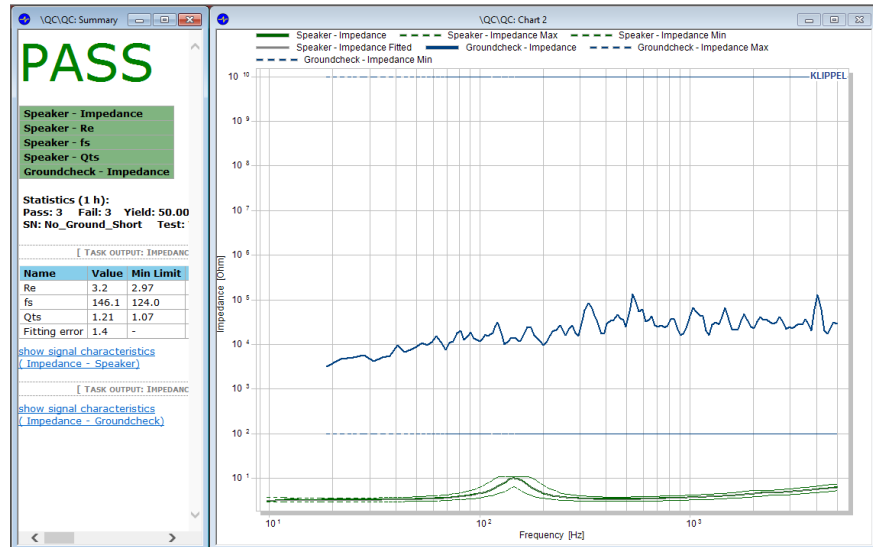
- Output Routing must be defined by task

2 impedance tasks are used:

- One task for the normal impedance check (Speaker 1)
 - Stimulus: bandwidth, level and time: identical to DUT test
 - Routing: Speaker 2
 - Measurements: Impedance only
 - Display: Choose different color for Impedance curve
 - Limits: Impedance: Absolute Calculation Mode
Min: [$* \{Resistor\ value + 2 * peak\ value\ of\ DUT\ impedance\ curve\}$]
Max: [$* 10e10$]

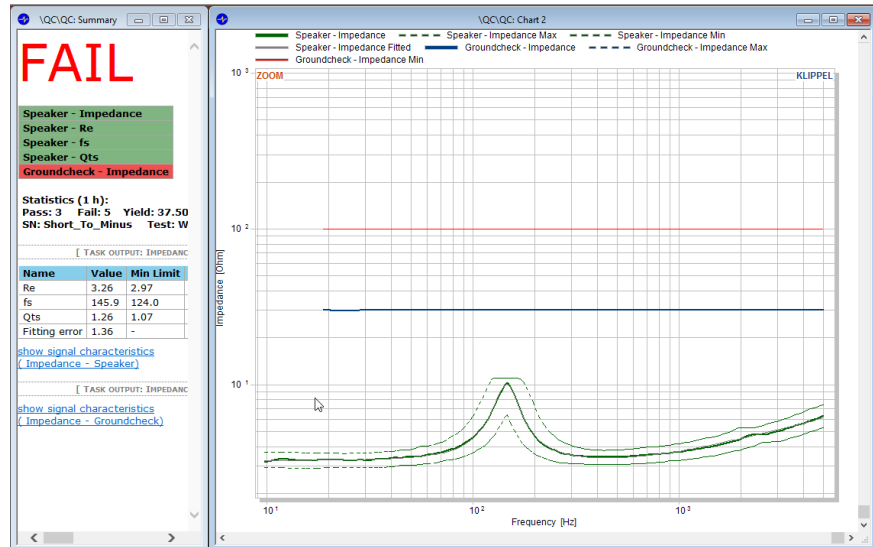
Results

No ground connection

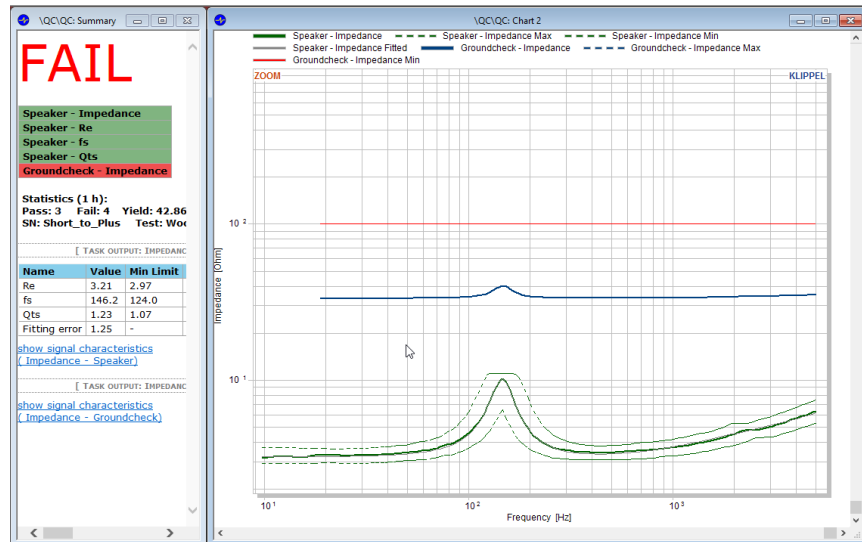


Results

Ground connection to negative terminal



Results
Ground connection to positive terminal



Further reading

QC User Manual

More information about

- Impedance measurement
- Routing

Available as pdf from QC-Start / Help / PDF-Help

Cable Production Guide

More information about

- Wiring speaker and amplifier cables

Available as pdf from QC-Start / Help / PDF-Help / Sales and Support Information

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