

R&S®RT-ZPMMCX Probe User Manual



700 MHz Passive Voltage Probe

R&S®RT-ZPMMCX

1803.1599.02

ROHDE&SCHWARZ



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Declaration of Conformity



The manufacturer declares the product complies with all relevant provisions of the following harmonization legislation:

2014/35/EU	Low Voltage Directive
2014/30/EU	Electromagnetic Compatibility Directive
2011/65/EU	Restriction of Hazardous Substances (RoHS)

Reference of the harmonized standards applied to the above-mentioned harmonization legislation:

IEC 61010	Safety requirements for electrical equipment for measurement, control, and laboratory use Part 1: 2010 General requirements Part 31: 2022 Safety requirements for hand-held and hand-manipulated probe assemblies for electrical test and measurement
IEC 61326	Electrical equipment for measurement, control and laboratory use – EMC requirements Part 1: 2020 General requirements
IEC 63000:2016	Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances
IEC 61000	Electromagnetic compatibility (EMC) Part 4-2: 2008 Testing and measurement techniques – Electrostatic discharge immunity test

WEEE/ RoHS Directives



This electronic product and its accessories are classified within the WEEE/ RoHS category list as monitoring and control equipment (category 9) and is compliant to the following EC Directives.

WEEE Directive 2012/19/EU Waste Electrical and Electronic Equipment

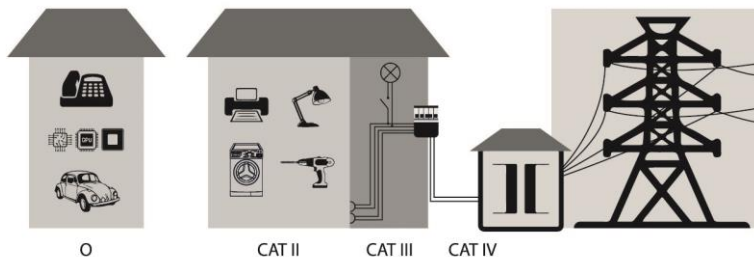
RoHS Directive 2011/65/EU Restriction of the use of certain Hazardous Substances in Electrical and Electronic Equipment

Your help and efforts are required to protect and keep clean our environment. Therefore, return this electronic product at the end of its life either to our Service Department or take care of separate WEEE collection and professional WEEE treatment yourself. Do not dispose as unsorted municipal waste.

IEC Measurement Categories

The probe is not rated for any measurement category. Do not use the probes in circuits with measurement category II, III or IV.

Definitions and Examples:



Overview of measurement categories according to IEC 61010-01

O = No Measurement Category (Other circuits that are not directly connected to mains)

IEC Pollution Degree

- Pollution Degree 1** No POLLUTION or only dry, nonconductive POLLUTION. NOTE: The POLLUTION has no influence.
- Pollution Degree 2** Only- nonconductive POLLUTION. Occasionally, however, temporary conductivity caused by condensation must be accepted.
- Pollution Degree 3** Conductive POLLUTION occurs or dry, non-conductive POLLUTION occurs which becomes conductive due to condensation which is to be expected.

IEC Safety Symbols

The following symbols may appear on the product or in this instruction manual:



Caution, risk of danger. Refer to manual.



Caution, risk of electric shock.



Earth (ground) TERMINAL.

Safety and Handling Information

The overall safety of any measurement setup incorporating this probe is the responsibility of the user.



Prevent personal injury, fire and product damage.

To avoid personal injury and to prevent fire or damage to this product or products connected to it, review and comply with the following safety precautions. Be aware that if you use this probe assembly in a manner not specified the protection this product provides may be impaired. Only qualified personnel should use this probe assembly.



Use only grounded instruments.

Do not connect the MMCX ground contact to a potential other than earth ground. Always make sure the probe and the measurement instrument are grounded properly.



Connect and disconnect properly.

Connect the probe output to the measurement instrument before connecting the probe's MMCX plug input to the MMCX socket test point in the circuit under test.

Disconnect the probe's MMCX input from the de-energized circuit under test before disconnecting the probe from the measurement instrument.



Observe probe and probe accessory ratings.

Do not apply any electrical potential to the probe input which exceeds the maximum ratings of the probe, or the accessories connected to it. In case of a combination always the lower rating / measurement category applies to both probe and accessories connected to it.



Keep away from hazardous live circuits.

Avoid open circuitry. Do not touch connections or components when power is present.

Do not operate with suspected failures.

Refer to qualified service personnel.

Indoor use only.

Do not operate in wet or damp environment. Keep the product dry and clean.

Do not operate the product in an explosive atmosphere.



The max. input voltage decreases as the frequency of the applied Sine signal increases (see Voltage Derating curve).

See the relevant section of this manual for further information on maximum input voltage, voltage derating and definitions of relevant IEC Measurement Categories (CAT).

Specifications

Read this Instruction Manual before first use and keep it for future reference.

Do not exceed the specifications. Specifications that are not defined to be guaranteed with (*) are typical and are published as general information to the user. The instrument should have warmed-up for at least 20 minutes and the environmental conditions do not exceed the probe's specified limits. Specifications determined at 23°C.

The probe is not rated for CAT II, III or IV. Observe pollution degree 2.

Electrical Specifications

Model Number	Attenuation Ratio ($\pm 2\%$ at DC)	Bandwidth (-3dB)	Rise time (10%-90%)	Input Impedance
R&S@RT-ZPMMCX	25:1	> 700 MHz	< 570 ps	14.9 M Ω $\pm 1\%$ < 4 pF

Each input accessory is lowering the probe's bandwidth. Please review the "Ordering Information" section for the bandwidth limitations of each accessory.

Model Number	Propagation Delay	Compensation Range	Probe Type	Input Coupling of the Measuring Instrument
R&S@RT-ZPMMCX	< 5 ns	7 pF – 20 pF	passive	1 M Ω

Maximum Rated Input Voltage $\pm 42V$ peak, 30 V rms, ± 60 V DC

Mechanical Specifications

Parameter	Specification
Weight (Probe only)	45g
Length	1.2 m
Probe Input	MMCX (Male)
Output Connector	BNC (Male) ¹

Environmental Specifications

Parameter	Specification	
Temperature Range	Operating	-40 °C to +60 °C
	Non-Operating	-40 °C to +71 °C
Maximum Relative Humidity	Operating	80 % relative humidity for temperatures up to +31 °C, decreasing linearly to 40 % at +45 °C, non-condensing humidity
	Non-Operating	95 % relative humidity for temperatures up to +40 °C
Altitude	Operating	up to 2000 m
	Non-Operating	up to 15000 m

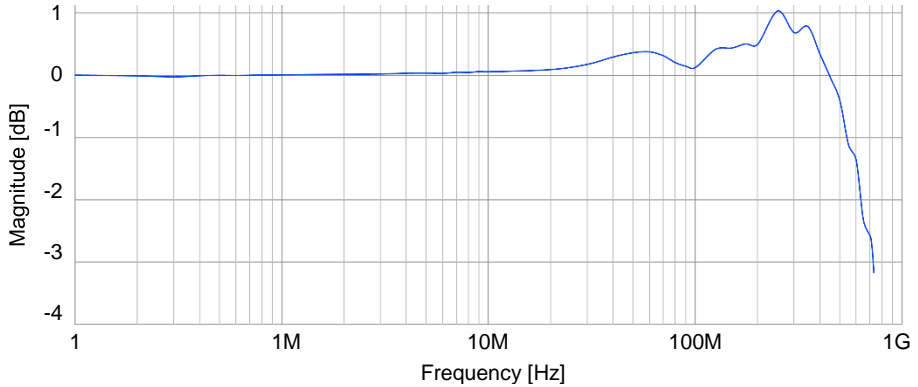
Notes

¹ With automated 25x dividing factor detection with MXO series.

Typical Frequency Response

The frequency response plot shown here is for the probe series without any accessories. Frequency responses with specific accessories are available on request.

Typical Frequency Response – R&S®RT-ZPMMCX – normalized

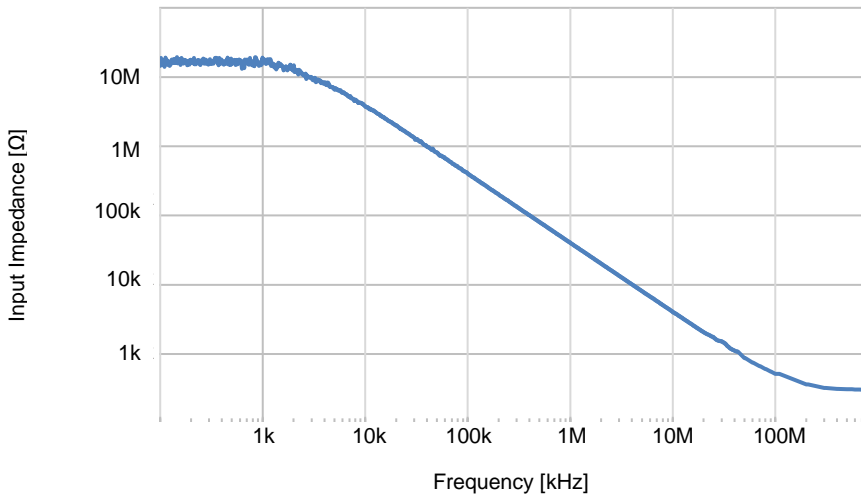


Typical Input Impedance



The input impedance of the probe decreases as the frequency of the applied signal increases.

Typical Differential Input Impedance – R&S®RT-ZPMMCX (full bandwidth)

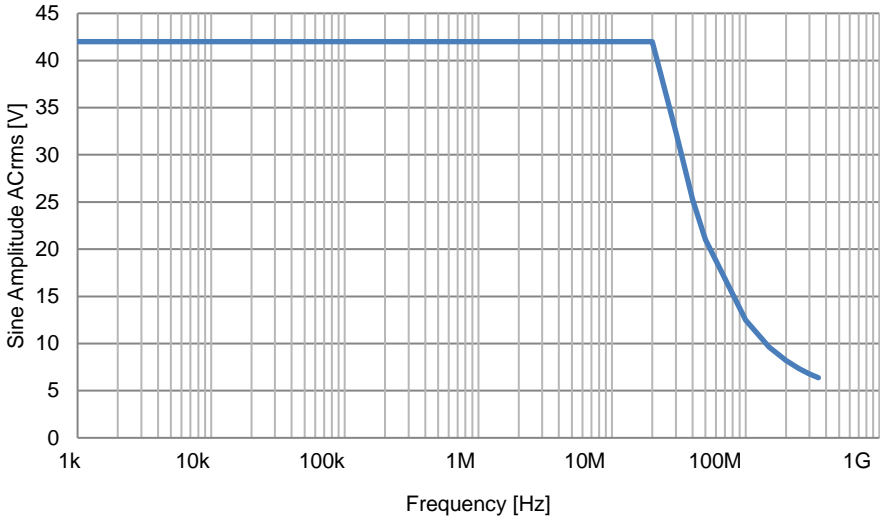


Typical Voltage Derating



Note that the maximum input voltage rating of the probe decreases as the frequency of the applied signal increases.

Typical Voltage Derating – R&S®RT-ZPMMCX
No Measurement Category



Adjustment Procedures

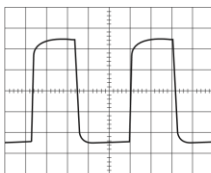
The passive probe R&S®RT-ZPMMCX can be adjusted for low frequency (LF) compensation and for high frequency (HF) compensation.



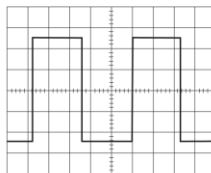
The trimmers are sensitive components. Too much mechanical pressure during adjustment might damage the trimmers.

LF Compensation

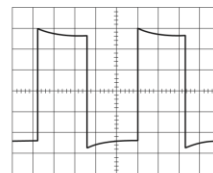
When the probe is connected to the oscilloscope input the first time, the probe's cable capacitance needs to be matched to the oscilloscope input capacitance. This matching assures good amplitude accuracy from DC to the probe's bandwidth.



undercompensated



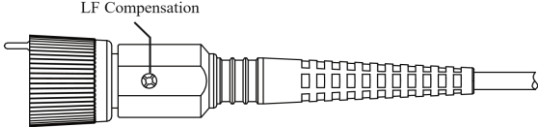
optimum



overcompensated

A poorly compensated probe clearly influences the overall system performance (probe + scope) and causes measurement errors resulting in inaccurate readings and distorted waveforms.

LF compensation is performed by connecting the probe to the CAL – output on the oscilloscope front panel and adjusting the LF compensation trimmer to optimum square wave response. For clarification see the following figures.



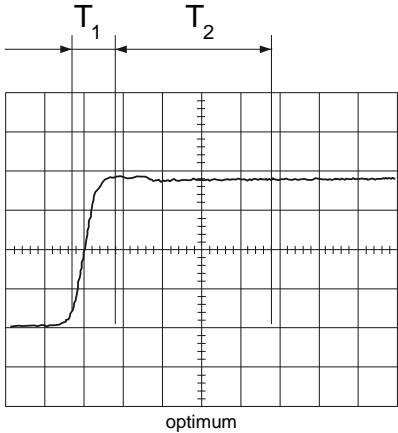
HF Compensation

Overshoot doesn't necessarily need to be adjusted when connecting the probe to your oscilloscope for the first time.

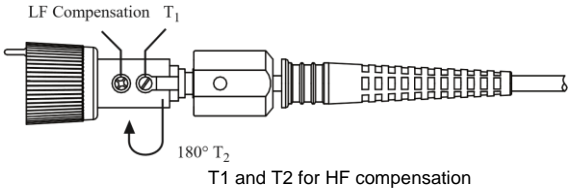
We recommend to use the following equipment for proper HF compensation:

Rectangular waveform generator with a rise time faster than 700 ps, 50 Ω feed through and probe BNC adapter. If you do not have the appropriate equipment, we are pleased to help you. Simply send a message to our service department.

HF adjustment is performed by connecting the probe to the rectangular wave generator.



Adjust trimmers (T_1 and T_2) for optimum square wave response.



Cleaning

To clean the exterior of the probe, use a soft cloth moistened with either distilled water or isopropyl alcohol. Before use allow the probe to dry completely.

MMCX Handling Information

When using MMCX connectors, insert the probe's MMCX plug straight into the mating socket until a "click" sound occurs to indicate a proper connection between the plug and socket.



When removing the probe's MMCX input from the MMCX socket, make sure the circuit under test is de-energized.

Then grasp the probe's MMCX connector and pull straight out, taking care not to wiggle the connector side-to-side to prevent excessive stresses on the socket and its connection to the DUT.

Scope of Delivery

1x R&S®RT-ZPMMCX Probe



1x Adaptor MMCX to Y-Lead 2x 0.025" (0.635mm) socket, -40°C to +125°C



1x Pico Hook™ red, for use with R&S®RT-ZAMXSQ



1x Pico Hook™ black, for use with R&S®RT-ZAMXSQ



1x Instruction Manual

n/a

1x Trimmer tool

n/a



The accessories for this probe series have been safety tested.
Do not use any other accessories or power supplies than what is recommended.

Optional Accessories

Note that any additional accessory degrades the probe's performance. Always observe the Maximum Input Voltage of the probe's input. Do not use any other accessories.

R&S®RT-ZAMXSQ (1803.1647.02)

5x MMCX to Y-Lead 2x 0.025" (0.635mm) socket
-40°C to +125°C (One adaptor included in scope of delivery)



R&S®RT-ZAMXPAD (1803.1653.02)

3x MMCX solder-in cable adapter HT, 50Ω RF micro coax
to flex solder-in pad, -40°C to +155°C



R&S®RT-ZAMXHTS (1803.1660.02)

2x MMCX solder-in cable adapter HT, MMCX socket with
50Ω RF micro coax cable and open end, -40°C to +155°C



R&S®RT-ZAMXUFL (1803.1676.02)

2x MMCX cable adapter, MMCX socket with 50Ω RF micro
coax cable to UF.L socket, -40°C to +125°C



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