

RF CURRENT MONITORING PROBE

1 Introduction

The TBCP1-200 is a fixed aperture RF current monitoring probe, expanding the Tekbox product range of affordable EMC pre-compliance test equipment. The probe has a 3dB bandwidth of approximately 200 MHz and is characterized and usable over the frequency range from 1kHz to 500 MHz.



Picture 1: TBCP1-200 RF current monitoring probe

The aperture of the RF current monitoring probe is 25 mm. Its transfer impedance is $> 17 \text{ dB}$ Ohm with a 3 dB bandwidth from 40 kHz to 200 MHz.

RF CURRENT MONITORING PROBE

2 Specification

Characterized frequency range: 1 kHz to 500 MHz
Aperture diameter: 25 mm
Outside diameter: 76 mm
Height: 31 mm
Weight: 320 g
Connector type: N female
Transfer impedance: 17 dB Ω in the flat region, typ.
3 dB bandwidth: 40 kHz -200 MHz, typ.
Max. primary current (RF): 3 A
Max. core temperature: 125 °C



3 Typical transfer impedance

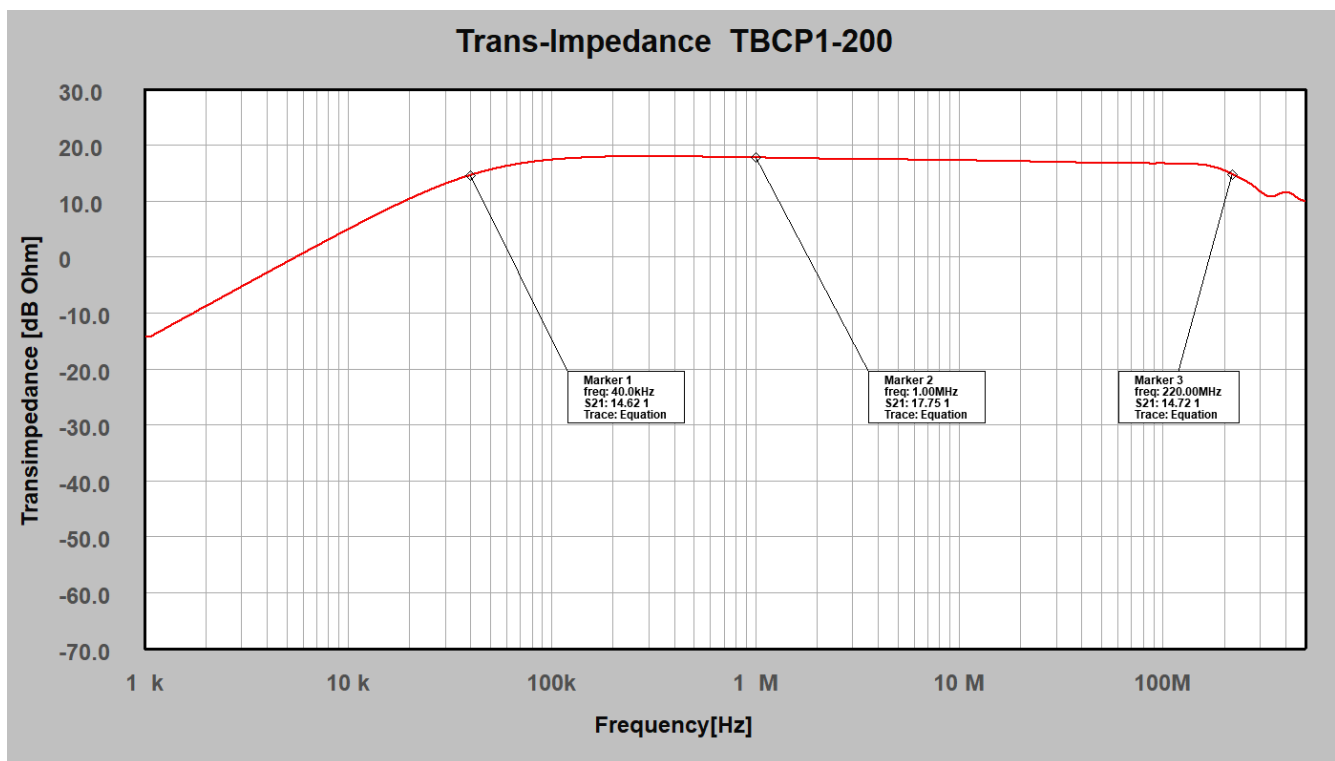


Figure1: Transfer impedance: 1 kHz to 500 MHz, typical data

RF CURRENT MONITORING PROBE

4 Typical transfer impedance table

The table below shows typical transfer impedance data of a TBCP-200 current probe. Each current probe is delivered with its corresponding measurement protocol. This data can be used for the creation of a correction file for EMCview or similar EMC measurement software. The transfer impedance in dBΩ subtracted from the analyzer reading in dBμV gives the corrected reading in dBμA.

Refer to the application notes of EMCview on how to create a current probe correction file.

Frequency [MHz]	Transfer impedance [dBΩ]	Frequency [MHz]	Transfer impedance [dBΩ]
0.001	-14,27	150	16,51
0.0025	-6,91	175	16,10
0.005	-0,94	200	15,40
0.0075	2,51	225	14,53
0.01	4,91	250	13,66
0.025	11,90	275	12,75
0.05	15,59	300	11,65
0.075	16,83	325	10,88
0.1	17,36	350	10,82
0.25	17,96	375	11,26
0.5	17,90	400	11,51
0.75	17,82	410	11,49
1	17,75	420	11,37
2.5	17,50	430	11,18
5	17,39	440	10,94
7.5	17,31	450	10,68
10	17,25	460	10,43
25	16,99	470	10,23
50	16,78	480	10,10
75	16,69	490	10,03
100	16,70	500	9,97
125	16,66		

Table1: Transfer impedance: 1 kHz to 500 MHz, typical data

RF CURRENT MONITORING PROBE

5 Saturation effects caused by DC and AC supply currents

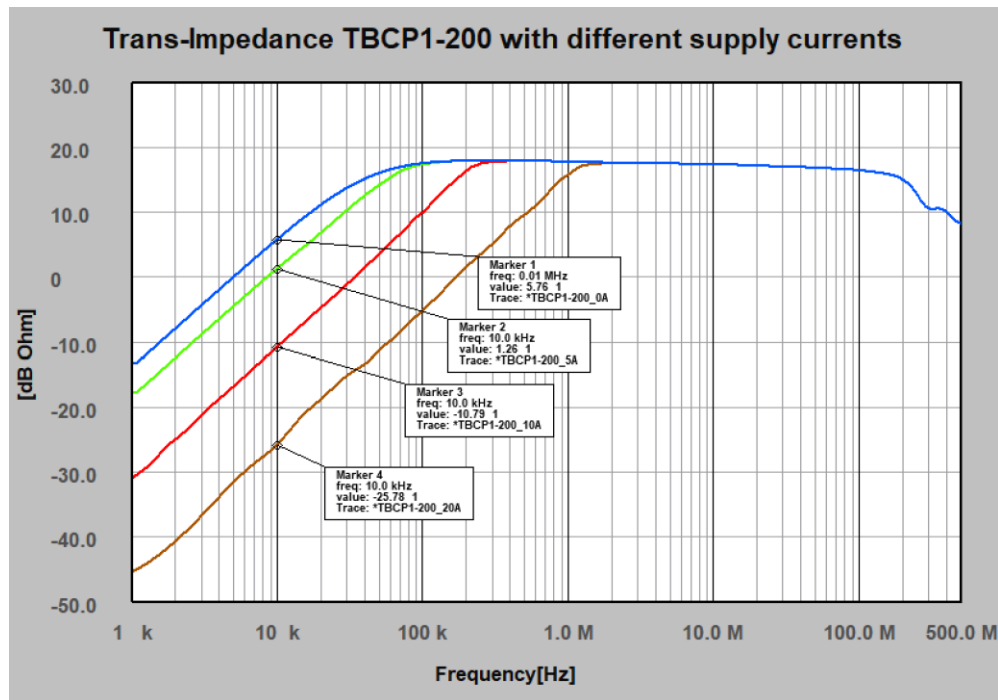


Figure 2: Transfer impedance for estimating the saturation effects at different currents with low frequencies

Most EMC standards specify limits for common mode currents.

Forward and return supply current pass through the probe aperture, the magnetic fields cancel each other out and saturation is not a concern.

A few automotive manufacturer-specific standards and MIL-STD-461 require testing on individual supply lines. Furthermore, differential mode measurements magnetize cores at double the supply current.

DC and AC supply currents up to 5A effect the TBCP1-200 at frequencies below 100 kHz. Increasing the current up to 20A shifts the sloped area of the trans-impedance curve towards 1 MHz.

RF CURRENT MONITORING PROBE

6 Accessory

Tekbox supplies a calibration fixture corresponding with the TBCP1 current probe series:



Picture 2: TBCP1-CAL RF current probe calibration fixture

7 Warning

RF current monitoring probes are primarily used for common mode disturbance measurements, where forward and return current pass the aperture in opposite directions and the magnetic field cancels out. When doing differential mode measurements or just passing a single current carrying wire through the aperture, EUTs with high inrush currents may cause a voltage transient, that might damage the receiver or analyzer frontend. Protect your equipment using attenuators, limiters, or disconnect the RF-input, while powering ON/OFF the EUT.

8 Ordering Information

Part Number	Description
TBCP1-200	Fixed aperture RF current monitoring probe, wooden box, calibration protocol 1kHz – 500 MHz
TBCP1-CAL	Calibration fixture for the TBCP1 series

9 History

Version	Date	Author	Changes
V 1.0	5.05.2019	Mayerhofer	Creation of the document
V 1.1	28.1.2021	Mayerhofer	Chapter 5 added
V 1.2	26.3.2024	Mayerhofer	Extended data to 1kHz – 500 MHz
V 1.3	12.7.2025	Mayerhofer	Chapter 6 added
V 1.4	8.7.2026	Mayerhofer	Chapter 5 added

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