



RF CURRENT MONITORING PROBE

1 Introduction

The TBCP2-30K400 is a snap-on RF current monitoring probe, expanding the Tekbox product range of affordable EMC pre-compliance test equipment.

The probe has a flat response from 30kHz to 400 MHz and is characterized over the frequency range from 10 Hz to 500 MHz. The TBCP2-30K400 is for RF current monitoring applications that need higher sensitivity in the low frequency range, compared to our other current monitoring probe series. The higher sensitivity at low frequencies comes at the cost of a slightly reduced overall trans-impedance.



Picture 1: TBCP2-30K400 RF current monitoring probe

The aperture of the RF current monitoring probe is 32 mm. Its transfer impedance is 3 dB Ohm with a 3dB bandwidth from 30kHz to 400 MHz.

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2 Specification

Characterized frequency range: 10 Hz to 500 MHz
Aperture diameter: 32 mm
Outside diameter: 73 mm
Height: 20 mm
Weight: 320 g
Connector type: N female
Transfer impedance: 3 dB Ohm in the flat region, typ.
3 dB bandwidth: 30 kHz to 400 MHz, typ.
Max. RMS current, DC – 400Hz: 5A
Max. primary current (RF): 3 A
Max. core temperature: 125 °C



3 Transfer impedance

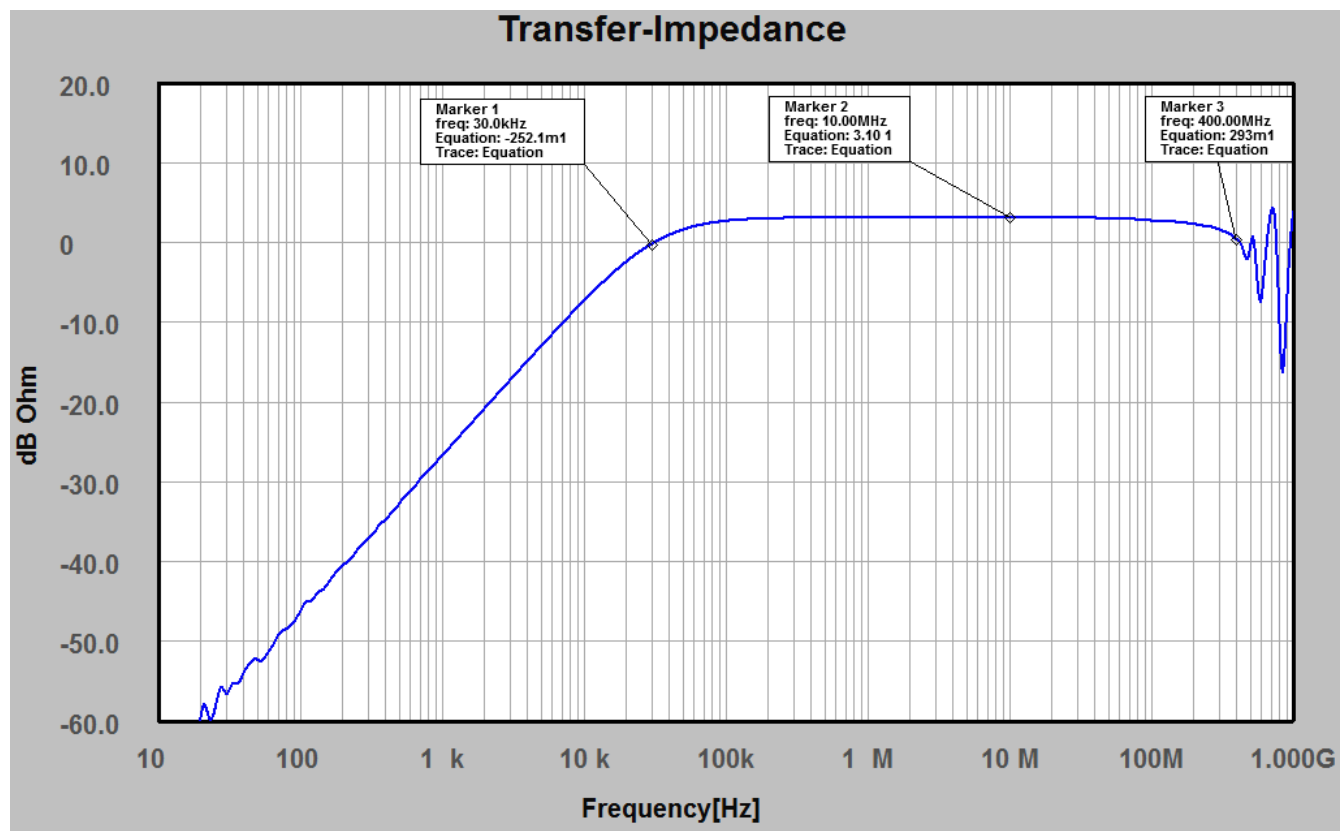


Figure1: typical transfer impedance

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4 Typical transfer impedance table

The table below shows typical transfer impedance data of a TBCP2-30K400 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]
0.00001	-62.61	10	3.1
0.000025	-58.59	25	3.1
0.00005	-52.37	50	2.97
0.000075	-48.81	75	2.87
0.0001	-46.31	100	2.69
0.00025	-38.71	125	2.64
0.0005	-32.82	150	2.52
0.00075	-29.22	175	2.41
0.001	-26.78	200	2.25
0.0025	-18.91	225	2.1
0.005	-13.03	250	1.96
0.0075	-9.68	275	1.79
0.01	-7.38	300	1.56
0.025	-1.15	325	1.24
0.05	1.15	350	1.1
0.075	2.32	375	0.71
0.1	2.64	400	0.29
0.25	3.01	425	-0.11
0.5	3.1	450	-1.35
0.75	3.1	460	-1.93
1	3.12	470	-2.24
2.5	3.11	480	-2.1
5	3.1	490	-1.14
7.5	3.1	500	-0.5

Table1: Transfer impedance: 10 Hz to 500 MHz, typical data



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5 Saturation effects caused by DC and AC supply currents

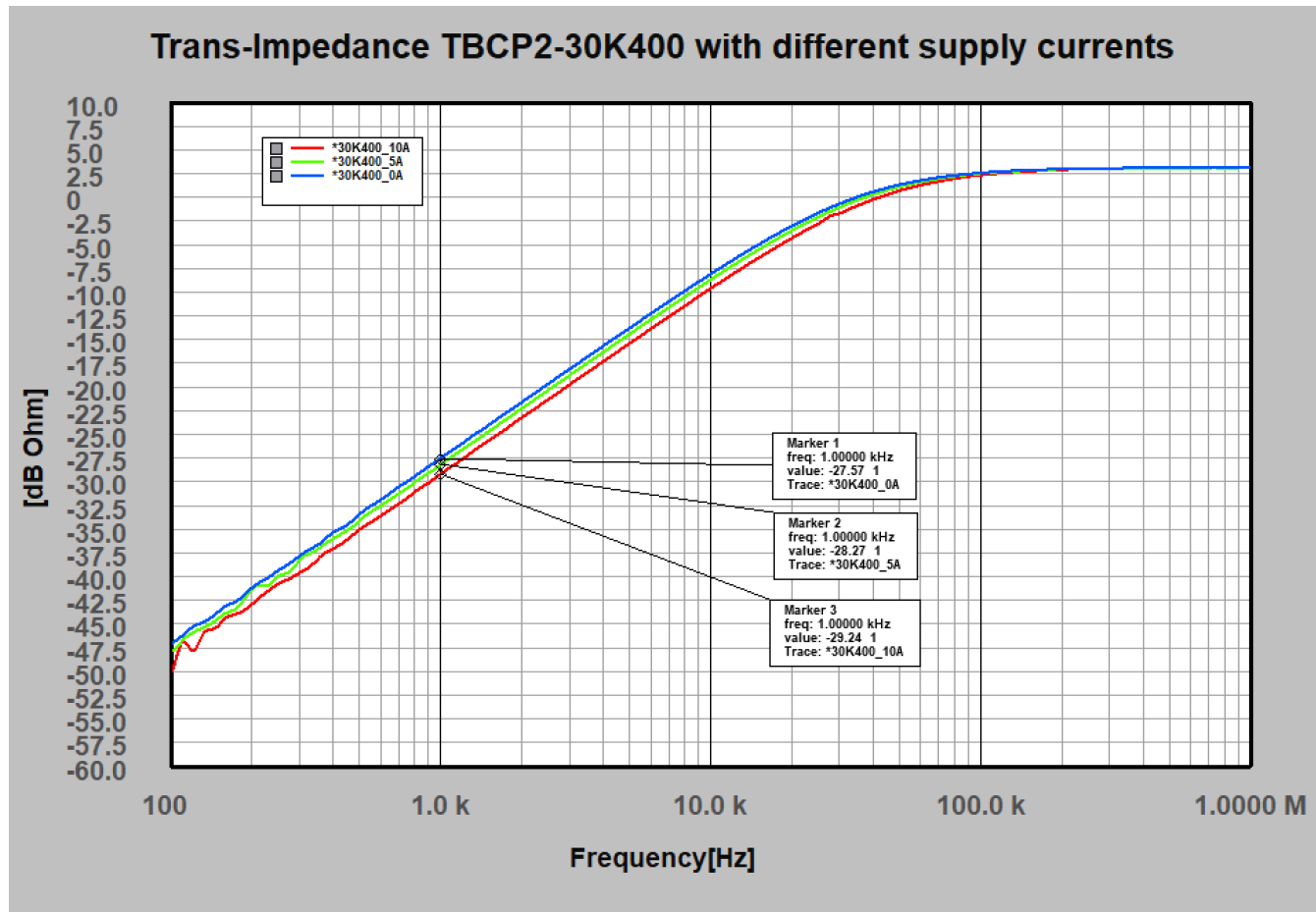


Figure 2: Transfer impedance for estimating the saturation effects at different currents with low frequencies

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.

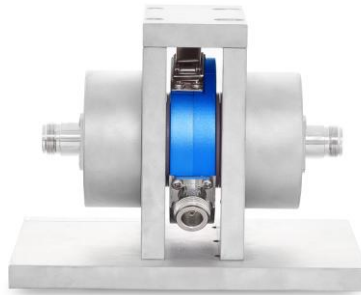
A few automotive manufacturer-specific standards and MIL-STD-461 require testing on individual supply lines. Furthermore, differential mode measurements magnetize cores at double the supply current.

DC and AC supply currents up to 5A have only minor effects on the trans-impedance of the TBCP2-30K400. A supply current of 10A causes a 2dB reduction of the transimpedance of the TBCP2-30K400 at frequencies below 100kHz.

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6 Accessory

Tekbox supplies a calibrator suitable for the TBCP2-30K400 current probe:



Picture 2: TBCP2-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
TBCP2-30K400	Snap on RF current monitoring probe, wooden box, calibration protocol 10 Hz – 500 MHz
TBCP2-CAL	Calibration fixture for TBCP2-30K400 current probe

9 History

Version	Date	Author	Changes
V 1.0	20.10.2021	Mayerhofer	Creation of the preliminary document
V 1.1	6.5.2022	Mayerhofer	Typo correction
V 1.2	26.3.2024	Mayerhofer	Typo correction
V 1.3	12.7.2025	Mayerhofer	Chapter 6 added
V 1.4	6.3.2026	Mayerhofer	Chapter 5 added, chapter 2 updated

TekBox Digital Solutions Vietnam Pte. Ltd.

www.tekbox.com

Factory 4, F4, Lot I-3B-1, Saigon Hi-Tech Park, Tan Phu Ward, District 9, Ho Chi Minh City, Vietnam