impedance
Analyzer 2097k

technical specifications

General Specifications

power consumption	5 VDC; 400mA
power source	USB port
control interface	USB port
built-in protection	USB interface galvanically isolated (1000 VDC /1min, 3000 VDC /1sec)
weight	0.2 kg
dimensions	32 x 81 x 126 mm (without connectors)
operating condition	-15 to +65 °C / 0 to 150 °F at < 80% humidity, non condensing (extended range on request)
electromagnetic compliance	emitted radiation: EN 55011, class B (stringest class) immunity against discharge: EN 61000-4-2, criterion A (highest immunity) immunity against EM fields: EN 61000-4-3, criterion A (highest immunity)

Probe Port Specifications

terminal type	BNC
output signal amplitude	measurement on: max. 316 mV$_p$ max. 9,6 mA$_p$ measurement off: no signal
probe calibration function	to compensate individual probes against series and parallel R, parallel C, series R, series L

Frequency Characteristics

frequency range	1 kHz to 2097 kHz
frequency sweep stepwidth	1 Hz to 250 kHz
frequency resolution	1 Hz
absolute frequency error	typ. +/- 0,001%

Display Modes

impedance values	versus frequency: IZI (Impedance Magnitude), φ (Phase), R (Resistance), X (Reactance) dual plots: IZI and φ vs.Frequency, R and X vs.Frequency complex plot: X versus R (Nyquist Diagram)
admittance values	versus frequency: IYI (Admittance Magnitude), φ (Phase), G (Conductance), B (Susceptance) dual plots: IYI and φ vs.Frequency, G and B vs.Frequency complex plot: B versus G (Nyquist Diagram)
capacitance	Capacitance vs. Frequency
inductance	Inductance vs. Frequency
scaling options	full-scale automatically or manually settable; linear or logarithmic display option for both axis

Data Storage & Handling

save/load options	- save/load measurement as data - save/load parameter and probe calibration only - save measurement as picture only (bmp, jpg, or png)
printing options	- graph only - full panel
data export options	- text file format(*.txt) - Microsoft Excel file format(*.xls) - MathWorks MatLab file format(*.mat)

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System Requirements

minimum PC/Laptop[†] requirements	- 1 GHz clock rate - 256 MByte RAM - 300 MByte available harddrive space - 1024 x 600 pixels resolution - CD-ROM drive (for installation of user software)
operating system[†]	Microsoft Windows 7 and Windows 10 (other on request)

[†] not included

Measurement Range

version	2097k-33	2097k-330
impedance values	10 mΩ to 100 kΩ	0.1 Ω to 1000 kΩ
admittance values	10 µS to 100 S	1 µS to 10 S
capacitance	1 pF to 10 mF	0.1 pF to 1 mF
inductance	1 nH to 10 H	10 nH to 100 H
phase	+90 to -90 degree; +π/2 to -π/2	+90 to -90 degree; +π/2 to -π/2

Measurement Accuracy   (at 21-24°C / 70-75°F; warm up time 15 min)

version		2097k-33	2097k-330
impedance values	typical full frequency range error (shortened probe):	+/-10 mΩ	+/-100 mΩ
	typical single frequency repetitive error (shortened probe):	+/- 1 mΩ	+/- 10 mΩ
	typical 100 kHz BW error (%), full Z range:	(3mΩ/Z + Z/300kΩ)•100% (Fig.1)	(30mΩ/Z + Z/3MΩ)•100% (Fig.1)
admittance values	typical full frequency range error (open probe):	+/-10 µS	+/-1 µS
	typical single frequency repetitive error (open probe):	+/- 1 µS	+/-0.1 µS
	typical 100 kHz BW error (%), full Y range:	(3µS/Y + Y/300S) •100%	(0.3µS/Y + Y/30S) •100%
phase		see Figure 2	see Figure 2
capacitance		see Figure 3	see Figure 5
inductance		see Figure 4	see Figure 6

Measurement Time

standard operation	approx. 30 msec per frequency step
with noise reduction	approx. 60 msec per frequency step
additional optional delay time	settable from 3 msec to 300 msec / frequency step (for high-Q measurements)

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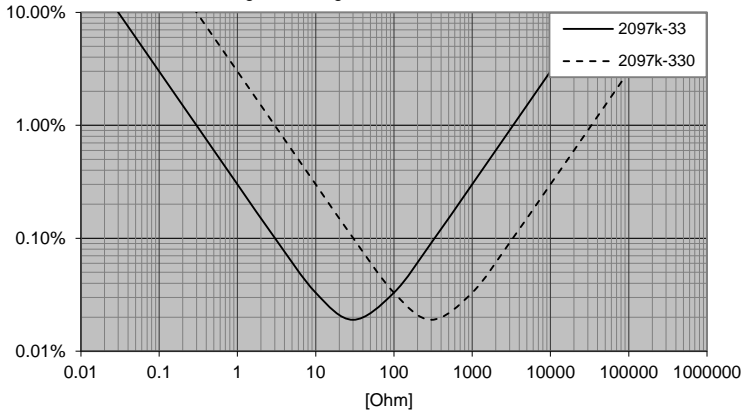
Figure 1: Magnitude Error versus Load
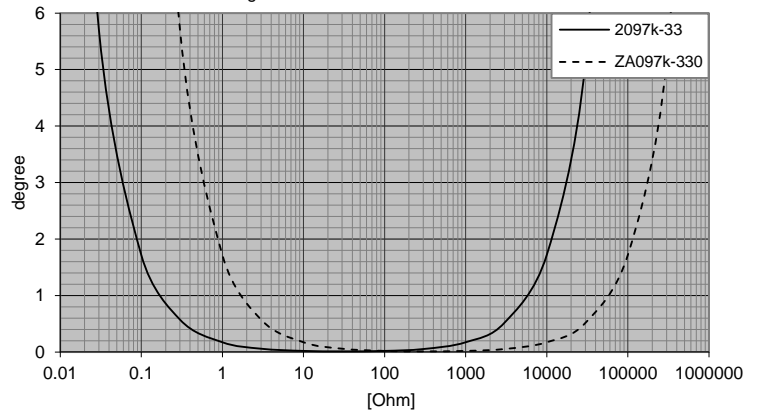

Figure 2: Phase Error versus Load

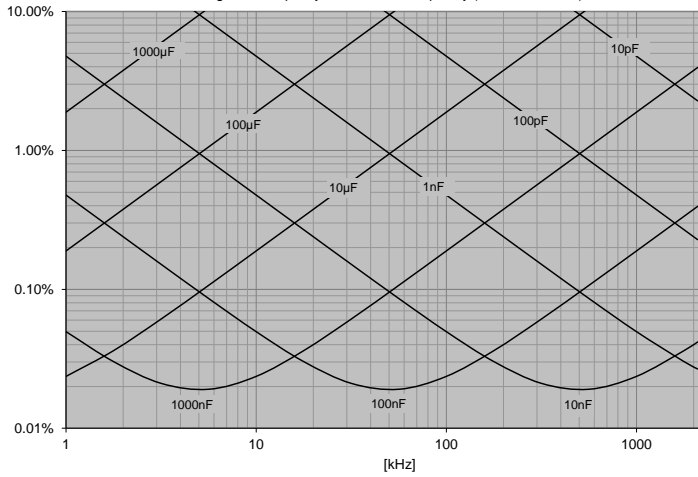Figure 3: Capacity error versus Frequency (Model 2097k-33)

Figure 4: Inductivity error versus Frequency (Model 2097k-33)
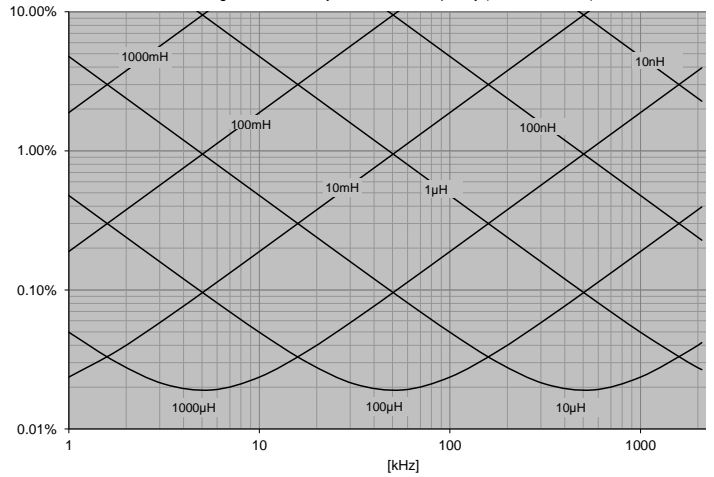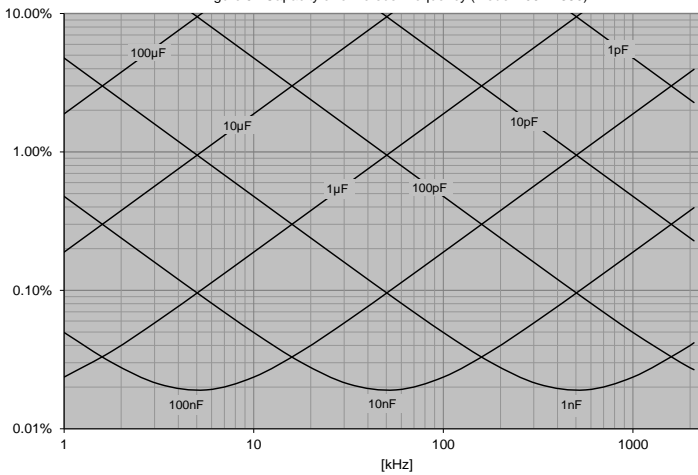

Figure 5: Capacity error versus Frequency (Model 2097k-330)

Figure 6: Inductivity error versus Frequency (Model 2097k-330)