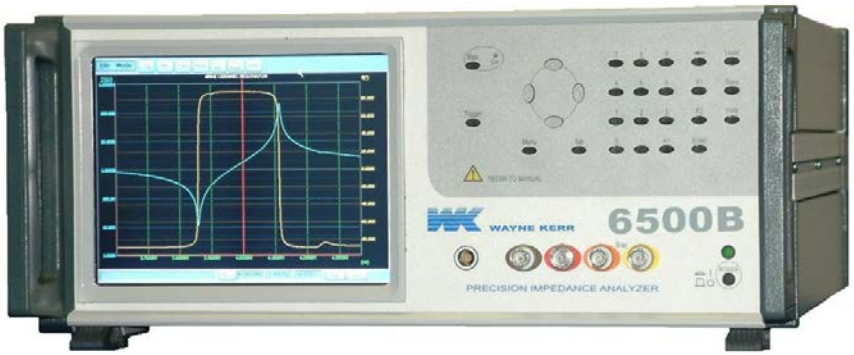
Wayne Kerr Electronics

Technical data sheet

Precision Impedance Analyzers



6505B 5 MHz **6510B 10 MHz**

6515B 15 MHz **6520B 20 MHz**

6530B 30 MHz **6550B 50 MHz**

65120B 120 MHz

- Precise high frequency impedance measurements
- Characterize components to 120 MHz (65120B)
- 0.05% basic measurement accuracy
- Easy to use with large TFT 8.4" touch screen
- Clear graphic displays
- Fully programmable over GPIB or LAN
- Competitively priced
- Equivalent Circuit Analysis function (/E option)
- Calculate Permittivity and Permeability (/K option)
- Test programs in Multi Measurement Mode (/M)
- Polar/Complex Plots (/Y option)
- Unipolar (/D1) and bipolar (/D2) DC Bias options

The 6500B series of Precision Impedance Analyzers provide precise and fast testing of devices at frequencies up to 120 MHz. Basic measurement accuracy is ±0.05% making the instruments the best in their class.

The accuracy and versatility makes these precision instruments the ideal choice for many different tasks and applications including passive component design, dielectric material testing and resonant frequency characterisation.

Engineers need to evaluate component characteristics at high frequencies with very high levels of accuracy. The 65120B 120MHz Precision Impedance Analyzer is therefore ideal for many demanding tasks, combining accuracy and ease of use at an affordable price. If a maximum frequency less than 120MHz is required, other models are available in this range.

AC Measurement parameters

- Impedance (Z)
- Phase Angle (θ)
- Capacitance (C)
- Dissipation Factor (D)
- Inductance (L)
- Quality Factor (Q)
- Resistance (R)
- Reactance (X)
- Conductance (G)
- Susceptance (B)
- Admittance (Y)

High measurement accuracy

Capacitance, inductance and impedance basic accuracy are all an excellent ±0.05%. Dissipation factor accuracy is ±0.0005 and the quality factor accuracy is ±0.05%.

Wayne Kerr Electronics

Technical data sheet

Graphical sweep of components

The 6500B series of Precision Impedance Analyzers are highly accurate high frequency component analyzers with a host of useful features.

Graphical sweep of two measured parameters is available and displayed on the large clear colour display. Swept parameters are frequency, drive level and DC bias (option).

Display formats available include series or parallel equivalent circuit. Polar and Complex plots can also be displayed when the /Y firmware option is installed.

An Equivalent Circuit Analysis function is available as the /E firmware option. This allows modelling and curve fitting to various models of equivalent circuits. 4 types of 3-component model and 1 type of 4-component model can be selected. The instrument will calculate the nearest equivalent circuit parameters for the measurement traces and revise the results for the different models instantly. Alternatively the parameters can be entered by the user and the instrument will plot the resulting frequency characteristics and revise the plot between the various models instantly.

For single frequency measurements a meter mode is available.

Variable drive and bias levels

AC drive levels up to 1V or 20 mA can be selected to evaluate components in realistic operating environments. /D1 DC bias option provides 0 to +40V dc bias voltage and 0 to +100mA dc bias current. /D2 option provides -40V to +40V dc bias voltage.

External control

The GPIB interface is used to control the instrument and read back measured values for applications such as quality control or for archiving purposes.

An Ethernet interface similarly allows the instrument to be controlled and to send out data, allowing it to be integrated into many test environments.

Wide range of interfaces

An external monitor or projector may be connected to the instrument's VGA output. The ability to provide a large screen display of measurement results is invaluable in production environments or for teaching and training.

Instrument control from both a keyboard and mouse is available. Any keyboard or mouse, with either a PS/2 or USB interface, can simply be connected to provide an alternative method of instrument control and operation.

Data storage and retrieval

All measurement and setup data can be stored using the Ethernet interface or a USB memory (supplied as standard).

Setup Data

Up to 20 instrument setups may be locally stored for each mode. Additional setups can be stored to the USB memory stick which is supplied with each unit as standard.

Bin handling option

/B1 option (non-isolated 5V) or /B2 option (isolated 24V) signals are available through a 25-way D-type connector. 10 bins can be set using absolute or percentage limits.

Printer outputs

Hard copy printouts can be obtained using an HP-PCL compatible graphics printer. A networked HP-PCL compatible printer may also be used via the Ethernet connection.

Component connections

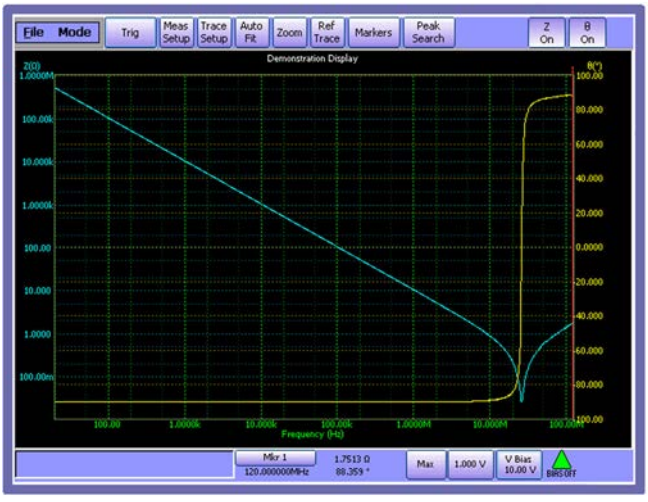
Four front panel BNC connectors permit three or four terminal connections with the screens at ground potential.

The 1J1011 Component Fixture, supplied as standard, ensures optimum performance when measuring a wide range of leaded components and devices.

1J1012 (2-terminal), 1J1014 (4-terminal) and 1J1024 (2-terminal small body DUT) SMD Fixtures allow connection to surface mount devices.

Protection against charged capacitors

High precision measuring instruments can be damaged by All the models in the range incorporate protection against charged capacitors.



Simultaneous plot of impedance and phase displayed against frequency on a clear colour display

Technical specifications

Measurement parameters

Any two of the following parameters can be measured and displayed at the same time:

AC functions

Impedance (Z)	Phase Angle (θ)
Capacitance (C)	Dissipation Factor (D)
Inductance (L)	Quality Factor (Q)
Resistance (R)	Reactance (X)
Conductance (G)	Susceptance (B)
Admittance (Y)	

Display format

Series or parallel equivalent circuit – all parameters

3 and 4-element models (/E option)

Test conditions

Frequency range

6505B 20 Hz to 5 MHz
6510B 20 Hz to 10 MHz
6515B 20 Hz to 15 MHz
6520B 20 Hz to 20 MHz
6530B 20 Hz to 30 MHz
6550B 20 Hz to 50 MHz
65120B 20 Hz to 120 MHz
Frequency step size: 1 mHz
Accuracy of set frequency ±0.005%

AC drive level

10mV to 1Vrms*
200µA to 20mArms*

*Varies with frequency

Signal source impedance: 50Ω nominal

DC bias

D1 option

0 to +100 mAdc bias current; 0 to +40 V dc bias voltage

D2 option

-40 V to +40 V dc bias voltage

Binning (optional)

10 bins with absolute and percentage limits.
25 way D-type interface connector.

Option /B1 (non-isolated)

Common 0 V. Bin outputs 0 to 5 V(nominal) with >10 mA current sink capability.

Option /B2 (isolated)

Common 24 V input. Outputs 0 to 24 V with >10 mA current source capability.

Mode of operation

Analysis Mode (Graphical Sweep)

Allows graphical sweep of any two measurement parameters

Swept parameters: frequency, drive level or DC bias

Materials Test (/K option)

Calculates Complex Relative Permittivity, ε*r when using 1020 Material Test Fixture and Complex Permeability, µ*

Setup Data

Up to 20 instrument setups can be locally stored for each mode. Additional setups can be stored on USB memory.

Equivalent Circuit Analysis (/E option)

4 types of 3-component model and 1 type of 4-component model.

Polar/Complex Plots (/Y option)

Polar Plots:
1. Z (Impedance & Angle)
2. Y (Admittance & Angle)

Complex Plots:
1. Rs/Xs (Series Resistance against Series Reactance)
2. Gp/Bp (Parallel Conductance against Parallel Susceptance)
3. Z′/Z″ (Real Impedance against Imaginary Impedance)

Measurement connections

Four front panel BNC connectors in 4-terminal pair configuration permits three or four terminal connections with the screens at ground potential.

Measurement accuracy

Dissipation factor

±0.0005 $(1+D^2)$*

Quality factor

±0.05 %(Q+1/Q)*

Capacitance / Inductance / Impedance

±0.05%*

*Varies with frequency, drive level and measured impedance

General

Power Supply

Input voltage 90 VAC to 264 VAC (Autoranging)

Mains frequency

47 Hz to 63 Hz

Display

8.4″ VGA (640 x 480) colour TFT with touch screen

Wayne Kerr Electronics

Technical data sheet

Local Printer
HP-PCL compatible graphics printing
Centronics / parallel printer port, Epson compatible text / ticket printing

Network Printer
HP-PCL compatible graphics printing

GPIB interface
External instrument control. 24 pin IEEE 488 connector

Remote trigger
Rear panel BNC with internal pull-up, operates on logic low or contact closure

USB interface
Two Universal Serial Bus Interfaces
USB 1.1 compliant

VGA interface
15-way D-type connector to drive an external monitor in addition to the instrument display

LAN interface
10/100-BASE-TX Ethernet controller. RJ45 connector

Keyboard interface
Standard USB or PS/2 keyboard port. Instrument front panel remains active with keyboard plugged in

Mouse interface
Standard USB or PS/2 mouse port. Touch screen remains enabled when the mouse is connected.

Bin handler (option)
/B1 option (non-isolated 5V) or /B2 option (isolated 24V).
25-way D-type connector

Environmental conditions
This equipment is intended for indoor use only in a non-explosive and non-corrosive atmosphere

Temperature range
Storage -20°C to 60°C
Operating 0°C to 40°C
Full Accuracy 18°C to 28°C

Relative humidity
Up to 80% non-condensing

Altitude
Up to 2000 m

Installation category
II in accordance with IEC664

Safety
Complies with the requirements of EN61010-1

EMC
Complies with EN61326 for emissions and immunity

Mechanical
Height 190 mm (7.5″) Depth 525 mm (20.5″)
Width 440 mm (17.37″) Weight 14.5 kg (32 lb)

Order codes

Description	Order code
6505B	**1J6505B**
5 MHz Precision Impedance Analyzer	
6510B	**1J6510B**
10 MHz Precision Impedance Analyzer	
6515B	**1J6515B**
15 MHz Precision Impedance Analyzer	
6520B	**1J6520B**
20 MHz Precision Impedance Analyzer	
6530B	**1J6530B**
30 MHz Precision Impedance Analyzer	
6550B	**1J6550B**
50 MHz Precision Impedance Analyzer	
65120B	**1J65120B**
120 MHz Precision Impedance Analyzer with any two firmware options and either /D1 or /D2 option as standard	

All models supplied with:-
User manual AC power cable
2-terminal component fixture (1J1011) USB memory

Hardware Options

Description	Order code
Bin handler (non-isolated)	/B1
Bin handler (isolated 24V)	/B2
DC Bias (0 to +40V, 0 to +100mA)	/D1
DC Bias (-40V to +40V)	/D2

Firmware Options

Description	Order code
Equivalent Circuit Analysis	/E
Material Test	/K
Multi-Measurement Mode	/M
Polar Complex Plots	/Y