LCR Meter

6630 Series

Frequency Range
10Hz~50MHz

MICROTEST
www.microtest.com.tw

The MICROTEST 6630 LCR Meter provides a wide measurement frequency range from 10Hz to 50MHz for characterizing component and material impedance properties. Supported measurement parameters include |Z| (Impedance), |Y| (Admittance), θ (Phase Angle), X (Reactance), R (Series/Parallel Resistance), G (Conductance), B (Susceptance), L (Inductance), D (Dissipation Factor), Q (Quality Factor), DCR (DC Resistance), C (Capacitance), ESR (Equivalent Series Resistance), ε_r (Relative Permittivity), and μ_r (Relative Permeability).
With a measurement speed of up to 3ms, the 6630 is an ideal choice for automated inductor taping and packaging systems. The instrument supports LAN/ USB Host/ USB Device/ RS-232/ GPIB (Optional) interfaces, allowing seamless integration with automated production equipment or PLC-based systems.

Application

Passive Components I Capacitors, Inductors, Resistors, Transformers, Ceramic Resonators, Quartz Crystals

Semiconductor Components I The CV characteristics analysis of varactor diodes, Diodes

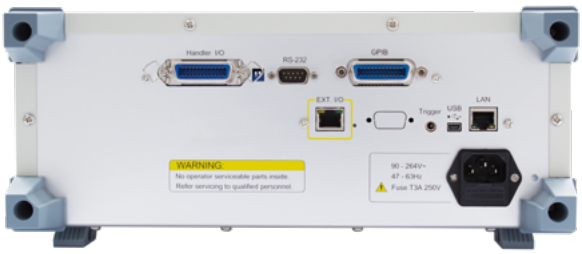
Dielectric materials I dielectric constant measurement for thin-film, solid, and liquid samples

Magnetic materials I permeability characterization

Other Components I Ultrasonic Sensors, Piezoelectric Devices

Features

- Frequency range 10Hz~1M/ 3M/ 5M/ 10M/ 20M/ 30M/ 50MHz
- Basic accuracy ±0.05%
- Ultra-high measuring speed < 3mS(Max)
- Output Impedance 25Ω/ 100Ω
- Automatic Level Control Function (ALC)
- Open circuit/ Short circuit/ Load Correction Function
- Cable Compensation function (0/ 0.5/ 1/ 2m)
- Built-in Permeability-μ_r / Dielectric constant-ε_r
- Meter Mode/ List Mode
- 7-inch color display (showing four parameters simultaneously) with concurrent AC/DC measurement capability
- Access configuration files via USB
- Store test data and capture screenshots of the test screen
- Optional F420006 External Voltage Bias (supports ±2000 V)



CE

Standard Interfaces

RS-232	USB Host	LAN
Handler	USB Device	EXT. I / O

Specification

Model	6630-1	6630-3	6630-5	6630-10	6630-20	6630-30	6630-50
Frequency Range	10Hz~1MHz	10Hz~3MHz	10Hz~5MHz	10Hz~10MHz	10Hz~20MHz	10Hz~30MHz	10Hz~50MHz
Frequency Resolution	6-digits of setting						
Frequency Output Accuracy	±0.01%						
Basic Accuracy	±0.05%						
AC Drive Level	Voltage	10mV~2Vrms(FREQ. ≦ 1MHz), 10mV~1Vrms(FREQ.>1MHz or FREQ. ≦ 1MHz and RO=25Ω)					
	Current	100μA~20mArms(RO=100Ω), 200μA~40mArms(RO=25Ω)					
	Voltage Minimum Resolution	1mV					
	Current Minimum Resolution	10μA					
DC Drive Level	DCR Voltage	1Vdc (40mA max.)					
ALC	ALC ON：6% * Voltage ±2mV ALC OFF：10% * Voltage ±2mV						
Output Impedance	25Ω、100Ω (switchable)						
Test Time (Fastest)	<3mS						
Measurement Parameters and Ranges	|Z|	0.000mΩ~9999.99MΩ					
	R, X	±0.000mΩ~9999.99MΩ					
	|Y|	0.00000μS~999.999kS					
	G, B	±0.00000μS~999.999kS					
	θRAD	±0.00000~3.14159					
	θDEG	±0.000° ~180.000°					
	Cs, Cp	±0.00000pF~9999.99F					
	Ls, Lp	±0.00nH~9999.99kH					
	D	0.00000~9999.99					
	Q	0.00~9999.99					
	Δ	±0.00%~9999.99%					
	Rdc	0.00mΩ~99.9999MΩ					
	ε_r' ε_r''	0~100000					
	μ_r' μ_r''	0~100000					

General

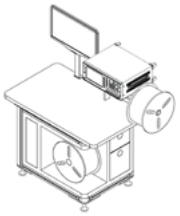
Measurement Mode	Meter Mode, List Mode
Measurement Circuit	Series/ Parallel
Correction	Open Circuit/ Short Circuit/ Load correction
Cable Compensation	0/ 0.5/ 1/ 2m
List Mode	50 groups of Multi-Steps setting (Each group contains up to 15 steps)
BIN	9
Comparator	ABS、ΔABS、Δ%、OFF
Built-in Storage	100 sets LCR Meter setting documents, 50 sets list mode setting documents
USB Host Storage	LCR setting documents, List Mode setting documents, BMP graphics
Trigger Test	Auto/ Manual/ RS-232/ Handler/ GPIB (Option OP-663001)
Interface	RS-232/ Handler/ REMOTE/ LAN/ USB Host/ USB Device/ GPIB (Option OP-663001)
PC Link Software	●
Power Supply	Voltage：100~240Vac
	Frequency：50~60Hz
	Low power consumption:Maximum 30W
Power Consumption	30VA
Display	7"TFT · Color LCD (800*480)
Environment	Temperature：10~40℃, Humidity：20~80%RH
Dimension (W*H*D)	336x147x340 mm
Weight	3Kg

Displays up to four parameters simultaneously

800*400 7-inch Color LCD, capable of simultaneously setting and displaying 4 parameters. Both AC and DC measurements can be performed simultaneously.

The 6630 delivers a measurement speed of <3 ms, meeting the throughput requirements of automated component taping and packaging systems.
It supports RS-232, LAN, GPIB, Handler, EXT. I/O, USB Host, and USB Device interfaces, making it an ideal choice for automated production environments.

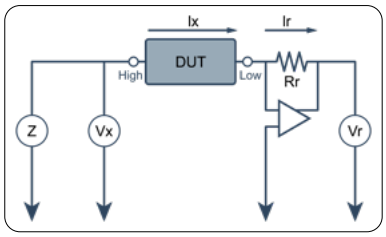
RS-232 LAN GPIB Handler EXT. I/O USB Host USB Device

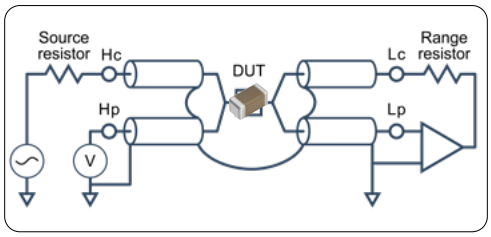


Precision Calibration, Automatic Level Control (ALC), Selectable Output Impedance (25 Ω / 100 Ω)

Adopting automatic balanced bridge measurement technology, supporting two output impedance modes of 25Ω and 100Ω, meets users' matching needs for measurement results with other instruments.

Supporting Automatic Level Control (ALC) function, accurately measuring MLCCs with a capacitance of 1.0uF and above. When ALC is enabled, it automatically corrects the offset level back to the set voltage signal value, ensuring precise measurement of high-capacity MLCCs.





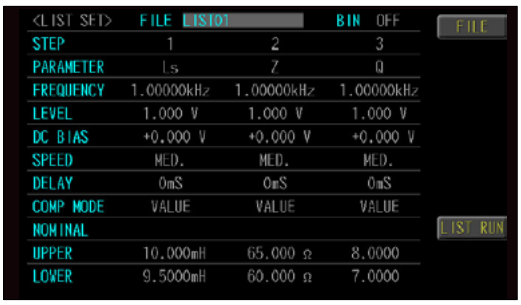
Supports Open, Short, HF Load, and SPOT Load Correction

Calibration procedures—Open, Short, HF Load, and SPOT Load Correction—should be performed prior to measurement to eliminate errors caused by test leads and measurement circuitry.

- **Open Calibration**
  Perform an open calibration before measuring capacitive components to eliminate the influence of test leads and stray circuit effects.
- **Short Calibration**
  Perform a short calibration before measuring inductive components to remove the effects of test leads and equivalent series capacitance.
- **HF Load Calibration (High-Frequency Load Correction)**
  During high-frequency measurements, parasitic inductance and capacitance from test leads and measurement circuitry can significantly affect results. HF Load Calibration should be performed prior to measurement to improve accuracy.
- **SPOT Load Calibration (Fixed-Frequency Load Correction)**
  At a specific frequency, calibration is performed using known standard capacitors or inductors. Calibration factors are calculated based on the deviation between measured and actual values, compensating for frequency-specific errors and ensuring reliable measurement results.

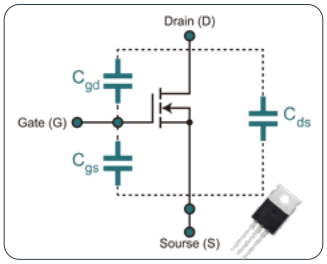
List Mode

50 groups of List Mode setting (Each group contains up to 15 steps).



Support for Semiconductor Capacitance-Voltage Characteristic Testing

The input, output, and reverse transfer of semiconductor power devices are key performance indicators. In the specifications of MOSFETs, there are three sets of parameters (Ciss, Coss, Crss), representing the input capacitance, output capacitance, and reverse transfer capacitance at different voltages. To ensure that MOSFETs can meet design requirements and operate normally, measuring the capacitance-voltage characteristics of MOSFETs is crucial. The 6630 LCR tester can be equipped with a DC bias voltage box and power supply, forming a testing system through PLC or industrial control, to accurately measure the C-V characteristics of power devices.



F420003	F420005	F420001	F420006
±40V	±40V/±100mA	±200V	±2000V
100Hz~1MHz	≤ 30 MHz	100Hz~1MHz	100Hz~1MHz
			

Material Analysis - Dielectric Constant

Many materials in everyday life possess electrical properties related to dielectrics, such as the DC bus capacitors used in new energy vehicles, which require dielectric materials with high dielectric constants. For electric vehicles, the performance of the power battery directly determines the range capability, and the dielectric properties of the battery's electrode materials are key to performance. The relative dielectric constant can be measured using 6630 LCR Meter, which provides an AC excitation signal to the material, while simultaneously monitoring the actual voltage on the material. By measuring the material's dimensions and its capacitance value along with the loss factor D, the material's relative dielectric constant ε_r is obtained.

Monitoring $\varepsilon_r'/\varepsilon_r''$ in Meter Mode

Dielectric constant & Loss Test Solution

6630 LCR Meter is equipped with the following dielectric constant test fixtures.

Solid/ film material selection
FX-0000C7

Liquid material selection
FX-000C20

Built-in ε_r= Cx / C0

- Measure the capacitance C0 of a capacitor when there is a vacuum between its two plates.
- Using the same capacitor and plate spacing, measure the capacitance Cx after introducing a dielectric material between the plates.
- Calculate the relative dielectric constant ε_r using the formula.

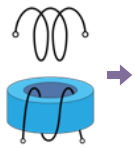
Material Analysis - Permeability Coefficient

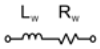
The 6630 LCR Meter uses inductance measurement technology for permeability coefficient testing. The instrument has a built-in formula for permeability coefficient. Optional FX-0000C8 Permeability coefficient test fixture can be equipped, which allows direct measurement of Inductance value (Ls) and Permeability coefficient (μ_r'/μ_r'') on the machine.

Built-in permeability coefficient calculation formula

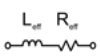
$$\mu_e' = \frac{\ell\, L_{eff}}{\mu_0 N^2 A}$$

$$\mu_e'' = \frac{\ell\, (R_{eff} - Rw)}{\mu_0 N^2\, \omega A}$$





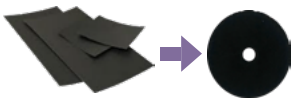
Equivalent Circuit



1.Height of the magnetic material under test
2.Inner diameter of the magnetic material under test
3.outer diameter of the magnetic material under test

Permeability Coefficient Testing Solution

6630 LCR Meter optional equipped with FX-000C8 Permeability coefficient test fixture.

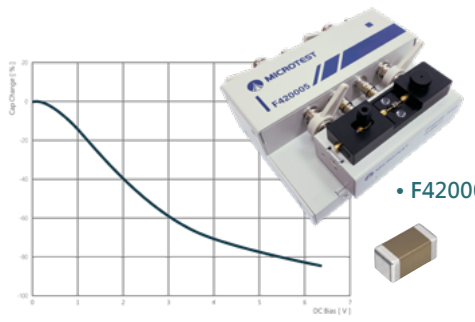


Before measurement, please cut the magnetic material into a ring shape (the magnetic ring can be directly placed on the fixture)

FX-0000C8 is available in the following sizes
Type A | OD 8, ID 3.1, H 3 mm
Type B | OD 20.5, ID 4.8, H 11 mm
Type C | OD 65.5, ID 7.1, H 28 mm

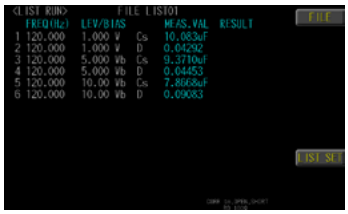
MLCC DC Bias Characteristic Test Solution

When designing circuits, it is necessary to choose MLCCs that can maintain a stable capacitance value within the operating voltage range, because the polarization phenomenon in the ceramic material of MLCCs becomes more pronounced at high voltages, leading to changes in the dielectric constant and affecting the capacitance value. As the applied DC Bias voltage increases, the capacitance value of the MLCC decreases. The 6630 LCR tester, equipped with an external ±40V DC Bias voltage box F420005, accurately measures the DC Bias characteristics of MLCCs.



MLCC DC Bias Voltage Test Solution

- 6632 Impedance Analyzer (Built-in DC Bias voltage ±12V)
- External DC bias voltage box ±40V (F420005)
- SMD component test fixture (FX-000C12)



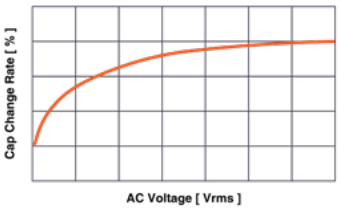
List Mode:
Measuring the change in capacitance with different DC bias voltages applied

No DC Bias voltage applied

Applying a 40V DC Bias voltage, the capacitance value decreases to 86.11nF

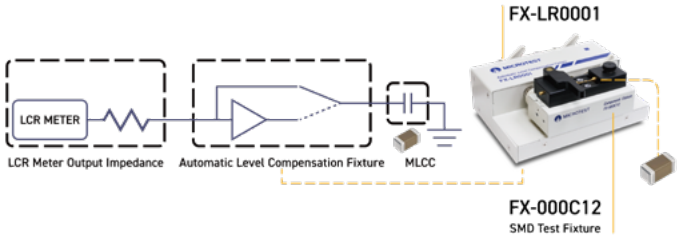
AC Signal Level Enhancement Solution for Accurate MLCC

The regulations (JIS C 5101-1-1998) stipulate standards for test signals. When measuring MLCC capacitance, the LCR Meter must enable the Automatic Level Control (ALC) function. This function introduces a stable level circuit into the test circuit to automatically correct any level offset back to the user-set voltage signal value.



ALC ON

The figure below shows the measured MLCC capacitance value. Without enabling the ALC function, the measured capacitance value (7.85uF) is lower than the standard value. By using an External AC Voltage Level Compensation Box (FX-LR0001), the measured capacitance value under stable level signals is closer to the standard value (9.09uF).

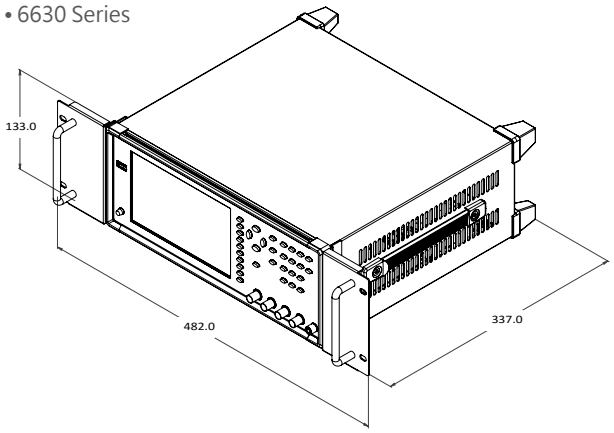


External AC Voltage Level Compensation Box (FX-LR0001)	
Frequency Range	100Hz~100kHz
Voltage compensation (ALC ON)	0.1Vrms~1Vrms
Current compensation (ALC ON)	0.15A

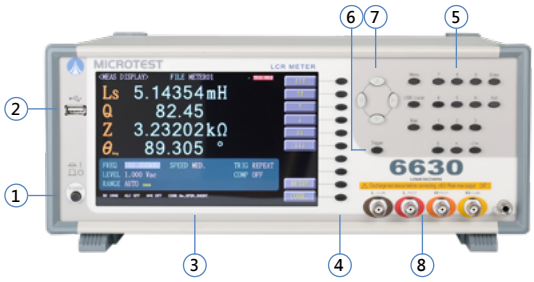
Automatic Chassis Dimension

• Dimension (mm)

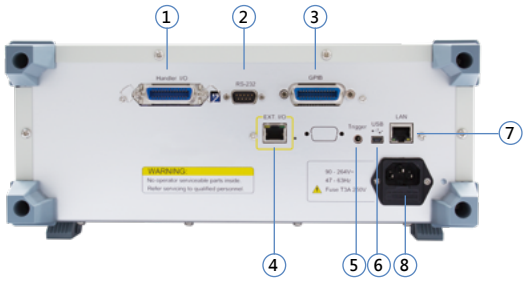
• 6630 Series



Appearance



1. Power switch
2. USB
3. LCD Screen
4. Function
5. Setup/ Number key
6. Trigger
7. Direction
8. BNC terminal



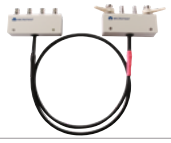
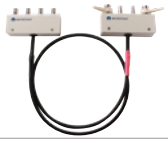
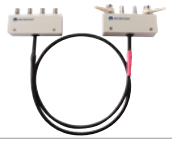
1. Handler
2. RS232
3. GPIB (Optional)
4. EXT. I/O
5. Trigger
6. USB
7. LAN
8. Power jack/ Fuse block

Ordering Information

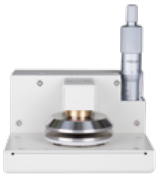
6630 LCR Meter	Standard	Optional
• 6630-1 (Frequency Range 10Hz~1MHz) • 6630-3 (Frequency Range 10Hz~3MHz) • 6630-5 (Frequency Range 10Hz~5MHz) • 6630-10 (Frequency Range 10Hz~10MHz) • 6630-20 (Frequency Range 10Hz~20MHz) • 6630-30 (Frequency Range 10Hz~30MHz) • 6630-50 (Frequency Range 10Hz~50MHz)	• FX-000C19 DIP Test Fixture • Power Cord	• F423906A Kelvin Clip Leads (100cm) • F423906B Kelvin Clip Leads (50cm) • F663001A BNC Test Leads (50cm) • F663001B BNC Test Leads (100cm) • F663001C BNC Test Leads (200cm) • F420001 External Voltage Bias (±200V/1MHz) • F420003 External Voltage Bias (±40V/1MHz) • F420005 External Voltage/ Current Bias (±40V/100mA) • F420006 External Voltage Bias (±2000V/1MHz) • FX-0000C6 DIP Test Fixture • FX-0000C7 Dielectric Material • FX-0000C8 Magnetic Material Test Fixture • FX-0000C9 Material Testing Fixture • FX-000C10 Bottom Electrode SMD Test Fixture • FX-000C11 SMD Tweezers Test Leads • FX-000C12 SMD Test Fixture • FX-000C20 Liquid Dielectric Material Test Fixture • FX-LR0001 Automatic Level Compensation Fixture • FX-0000C4 DIP Test Fixture • TL-000003 RS-232 Cable (180cm) • TL-000007 USB Cable (180cm I Type-A TO Type-B) • OP-663001 GPIB Interface • PC Link Software

Fixture & Accessories

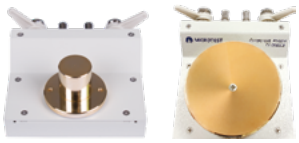
	FX-000C19 DIP Test Fixture	F423906A Kelvin Clip Leads (100cm)	F423906B Kelvin Clip Leads (50cm)
			
Frequency	DC~50MHz	DC~1MHz	DC~1MHz
Max. Voltage/ Current	±42V	±42V	±42V
DUT Size	-	Max. 6mm	Max. 6mm
Applicable Models	6632/ 6621/ 6630/ 6363~6367	6632/ 6621/ 6630/ 6363~6367	6632/ 6621/ 6630/ 6363~6367

	F663001A BNC Test Leads (50cm)	F663001B BNC Test Leads (100cm)	F663001C BNC Test Leads (200cm)
			
Frequency	DC~20M	DC~10M	DC~5MHz
Max. Voltage/ Current	±200V	±200V	±200V
DUT Size	-	-	-
Applicable Models	6632/ 6621/ 6630/ 6363~6367	6632/ 6621/ 6630/ 6363~6367	6632/ 6621/ 6630/ 6363~6367

	F420001 External Voltage Bias (±200V/1MHz)	F420003 External Voltage Bias (±40V/1MHz)	F420005 External Voltage/Current Bias (±40V/100mA)
			
Frequency	100Hz~1MHz	100Hz~1MHz	≤ 30 MHz
Max. Voltage/ Current	±200V	±40V	DC ±40V
Accessory Description	-	-	DC ±100mA
Applicable Models	6632/ 6621/ 6630/ 6363~6367	6632/ 6621/ 6630/ 6363~6367	6632/ 6621/ 6630

	F420006 External Voltage Bias (±2000V/1MHz)	FX-0000C6 DIP Test Fixture	FX-0000C7 Dielectric Material
			
Frequency	100Hz~1MHz	DC~30MHz	≤30MHz
Max. Voltage/ Current	±2000V	±42V	±42V
DUT Size	-	-	≤10mm (Electrode Diameter：38mm、5mm)
Applicable Models	6632/ 6621/ 6630/ 6363~6367	6632/ 6621/ 6630/ 6363~6367	6632/ 6621/ 6630

FX-0000C8
Magnetic Material Test Fixture



FX-0000C9
Material Testing Fixture

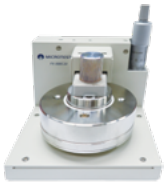
FX-000C10
Bottom Electrode SMD Test Fixture

Frequency	≤30MHz	DC~30MHz	DC~30MHz
Max. Voltage/ Current	±42V	±42V	±42V
DUT Size	Type A：OD 8, ID 3.1, H 3mm Type B：OD 20.5, ID 4.8, H 11mm Type C：OD 65.5, ID 7.1, H 28mm	≤10mm	≤9x9x5mm
Applicable Models	6632/ 6621/ 6630	6632/ 6621/ 6630/ 6363~6367	6632/ 6621/ 6630/ 6363~6367

FX-000C11
SMD Tweezers Test Leads

FX-000C12
SMD Test Fixture

FX-000C20
Liquid Dielectric Material Test Fixture



Frequency	DC~10MHz	DC~30MHz	DC~30MHz
Max. Voltage/ Current	±42V	±42V	±42V
DUT Size	≤10mm	≤7mm	Electrode Diameter：38mm Gap of electrodes：0.3/0.5/1/2/3/5mm
Applicable Models	6632/ 6621/ 6630/ 6363~6367	6632/ 6621/ 6630/ 6363~6367	6632/ 6621/ 6630

FX-LR0001
Automatic Level Compensation Fixture

Frequency	100Hz~100kHz
Output Impedance	10 Ω (ON), 25 Ω/ 100 Ω (OFF)
Output Voltage Sweeping	AC 0.1 ~ 1V rms (ALC ON)
Max. Output Current	0.15A
Applicable Models	6632/ 6621/ 6630

FX-0000C4
DIP Test Fixture

Frequency	DC~1MHz
Max. Voltage/ Current	±42V
DUT Size	Max. 64mm
Applicable Models	6632/ 6621/ 6630/ 6363~6367

TL-000003
RS-232 Cable

TL-000007
USB Cable

Applicable Models	6632/ 6621/ 6630/ 6363~6367	6632/ 6621/ 6630
Accessory Description	180cm	Type-A TO Type-B I 180cm