

The Optimal Choice for Electronic Component Analysis!



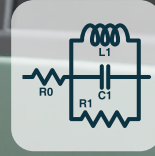
High Frequency



Sweep Mode



High Speed < 3ms



Equivalent Circuit

6632-50S Impedance Analyzer
10Hz~50MHz

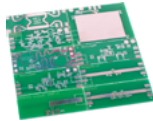


Application



Magnetic material

$$\mu_r'' / \mu_r'$$



Dielectric / ceramics / Electrochemical materials

$$\epsilon_r' / \epsilon_r''$$



Voice coil motor

$$L_s / Q / Q_m / SRF$$

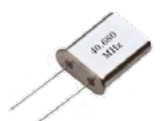


Hearing aids



Piezoelectric element

$$C_s / C_p / D / F_s / F_p / K_p$$



Quartz crystal



Wireless charging

$$L_s / Q / SRF / DCR / R_s$$

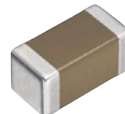


NFC / RFID



Battery

$$C_s / C_p / D$$



MLCC

$$C_s / C_p / D / Q / DC \text{ Bias Voltage}$$



Capacitance



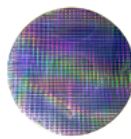
Diode

$$C_s / C_p / D$$



Inductance

$$L_s / L_p / Q / SRF / I_{sat} / I_{rms}$$



Wafer

$$C-V$$



LED Light board

$$Z / C_s / C_p / D$$



MOSFET

$$C_{gd} / C_{gs} / C_{ds}$$

Impedance Analyzer

6632 Series

Frequency Range

10Hz~50MHz



The MICROTTEST 6632/6632S Impedance Analyzer series adopts an automatic balancing bridge measurement architecture, providing a 10 Hz to 50 MHz wide frequency range for measuring impedance characteristics of components and materials. It supports both Meter Mode and Sweep Analysis Mode, allowing measurement results to be displayed in either numeric or graphical form.

An optional Equivalent Circuit Analysis (ECA) function is available for 3-element and 4-element impedance model analysis. The instrument supports LAN / USB Host / USB Device/ RS-232/ GPIB (Optional) communication interfaces and can be integrated with automation systems or programmable logic controllers (PLC).

Application

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

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

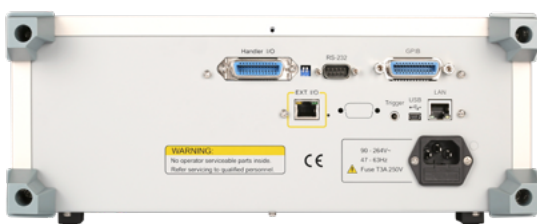
Dielectric materials | dielectric constant measurement for thin-film, solid, and liquid samples

Magnetic materials | permeability characterization

Other Components | Ultrasonic Sensors, Piezoelectric Devices

Features

- Frequency range: 10Hz~1M/ 3M/ 5M/ 10M/ 20M/ 30M/ 50MHz
- Basic accuracy $\pm 0.08\%$ (typical $\pm 0.05\%$)
- Ultra-high measuring speed $< 3\text{ms}$
- Support Equivalent Circuit Analysis function (S Series)
- Output Impedance 25 Ω /100 Ω
- Built-in DC Bias Voltage $\pm 12\text{V}$
- 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
- Supports admittance circle plotting and Kp/Qm measurement for ultrasonic sensors
- Support Meter Mode and List Mode, Sweep Mode
- 7-inch Color LCD (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 $\pm 2000\text{V}$)
- Compatible with the 6243H high-current module for magnetic saturation analysis of high-power components (DC Bias up to 640 A)



Standard Interfaces

RS-232

USB Host

LAN

Handler

USB Device

EXT. I / O

Specification

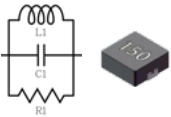

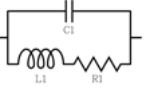



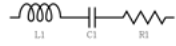

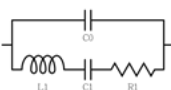

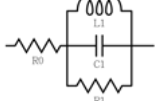

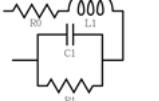

Model (S Series : Support Equivalent Circuit Analysis function)	6632-1	6632-3	6632-5	6632-10	6632-20	6632-30	6632-50
	6632-1S	6632-3S	6632-5S	6632-10S	6632-20S	6632-30S	6632-50S
Frequency Range	10Hz~1MHz	10Hz~3MHz	10Hz~5MHz	10Hz~10MHz	10Hz~20MHz	10Hz~30MHz	10Hz~50MHz
Points of Test Frequency	Programmable						
Frequency Resolution	100mHz, 6-digits of setting						
Frequency Output Accuracy	±0.01%						
Basic Accuracy	±0.08% (typical±0.05%)						
AC Drive Level	Voltage	10mV~2Vrms(FREQ. ≤ 1MHz), 10mV~1Vrms(FREQ.>1MHz or FREQ. ≤ 1MHz and RO=25Ω)					
	Current	100μA~20mA Arms(RO=100Ω), 200μA~40mA Arms(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					
Output DC Bias	DC Bias: 6243H(640A), 6243/ 6240(320A), 6223/ 6220(120A), 6210(60A), 6225(20A)						

General

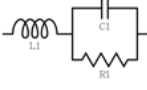

Measurement Mode	Meter Mode, List Mode, Sweep Mode, Equivalent Circuit Analysis (Option S Series)	
Measurement Circuit	Series/ Parallel	
Correction	Open Circuit/ Short Circuit/ Load Correction	
Cable Compensation	0/ 0.5/ 1/ 2m	
List Mode	50 groups of Multi-Steps setting (Each group contains up to 15 steps)	
Built-in DC bias voltage	-12 to +12V, 0.3% ±1.5mV, 100Hz to 50MHz	
BIN	9 (Max)	
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, Sweep screen and test result data	
Trigger Test	Auto/ Manual/ RS-232/ Handler/ GPIB (Option OP-663201)	
Interface	RS-232/ Handler/ LAN/ USB Host/ USB Device/ GPIB (Option OP-663201)	
Optional	PC Link Software	
	MLCC Component Measurement (Option FX-LR0001)	MLCC (Class 2) AC Voltage Level Compensation Test Function
	Output DC Bias Voltage/Current (Option F420005)	0~±40V/ ±100mA
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°C, Humidity : 20~80%RH	
Dimension(W*H*D)	358×148×343mm	
Weight	3.95Kg	

The equivalent circuit modeling analysis (6632S model)

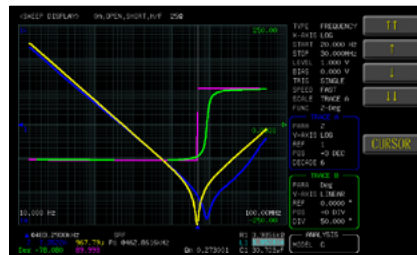
The 6632S model supports analysis of 7 types of equivalent circuits. Through three-component modeling/four-component modeling at different frequency variations, the impedance trajectory curve calculated after equivalent circuit parameter calculation is compared with the scanned curve of the measured device in real measurement. At the same time, by modifying the values of R1/ L1/ C1, changes in impedance(Z) and frequency characteristics can be generated, allowing examination of the degree of deviation of the self-resonant frequency point (SRF). This feature is particularly suitable for process changes or evaluation of materials or processes for device development. Through equivalent circuit model analysis, unexpected differences can be pre-simulated. Simulate real-world performance without physical prototyping.

Through three-component modeling			
<p>Model A</p> <p>High magnetic leakage inductance</p>  	<p>Model B</p> <p>NFC</p>  	<p>Model C</p> <p>High resistance resistor</p>  	<p>Model D</p> <p>Capacitor</p>  
Through four-component modeling			
<p>Model E</p> <p>Piezoelectric element/quartz crystal</p>  	<p>Model F</p> <p>Equivalent series resistance of inductor</p>  	<p>Model G</p> <p>Capacitor</p>  	

Model C

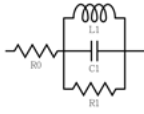




Multilayer Ceramic Capacitor

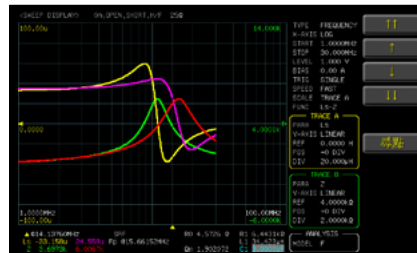


For high-frequency MLCC applications, the 6632 Impedance Analyzer supports Equivalent Circuit Model Analysis (Model C), enabling adjustment of the L1 parameter to evaluate impedance characteristics and SRF behavior.

Model F

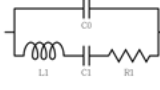




Flat Power Inductor

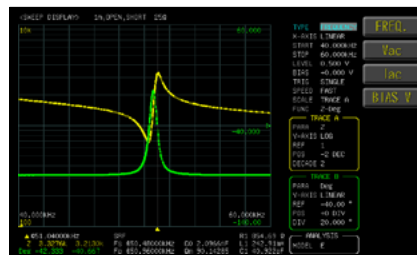


In high-frequency flat inductors, parasitic capacitance directly affects impedance and high-frequency response. The 6632 Impedance Analyzer (Model.F) allows adjustment of C1 to observe real-time changes in magnitude, phase, and resonance.

Model E

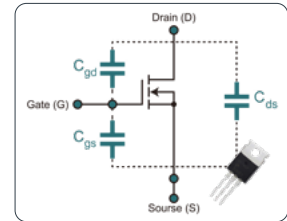
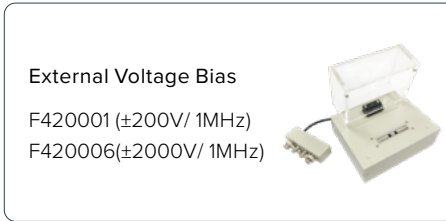
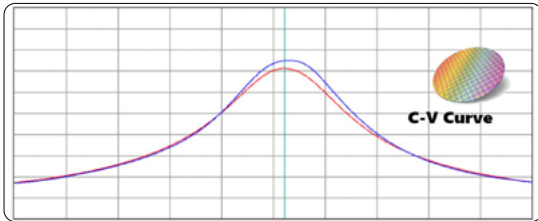
Piezoelectric element



6632 Impedance Analyzer supports Equivalent Circuit Analysis of piezoelectric components, enabling precise fitting of the component's equivalent parameters and observation of its series resonant frequency (Fs) and parallel resonant frequency (Fp). By analyzing impedance magnitude and phase curves, engineers can evaluate the high-frequency response and resonance characteristics of piezoelectric components under various driving conditions, aiding in component selection and the design of reliable piezoelectric circuits.

Evaluation of DC bias voltage characteristics with semiconductor wafer or ceramic multilayer capacitors

Impedance Analyzer 6632, paired with the external DC bias box (F420006), offers a measurement frequency range of 10Hz~50MHz and supports high voltages up to $\pm 2000V$. By precisely obtaining the MOSFET C-V curves under different V_{ds} bias conditions, engineers can directly evaluate the impact of parasitic capacitances on switching losses, as well as the contribution of C_{oss} and C_{rss} to high-speed dv/dt , di/dt , and EMI performance.



Apply DC Bias Voltage to Measure MOSFET Parasitic Capacitance



Perform C-V Curve Scanning via PC Software

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 6632 Impedance Analyzer provides users with accurate measurement of MLCC DC bias characteristics, featuring built-in $\pm 12V$ DC Bias voltage, and an optional external $\pm 40V$ DC Bias voltage box F420005.

• F420005

MLCC DC Bias Voltage Test Solution

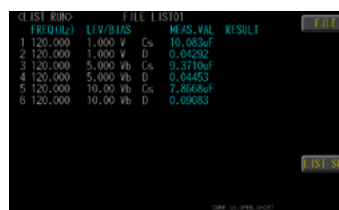
- 6632 Impedance Analyzer (Built-in DC Bias voltage $\pm 12V$)
- External DC bias voltage box $\pm 40V$ (F420005)
- SMD component test fixture (FX-000C12)



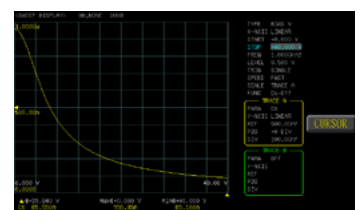
No DC Bias voltage applied



Applying a 40V DC Bias voltage, the capacitance value decreases to 86.1nF



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

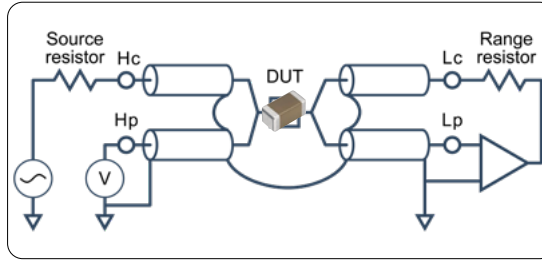
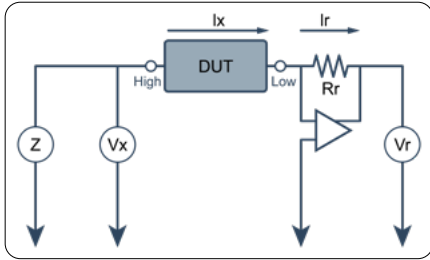


Graph Scanning Mode:
curve showing the gradual decrease in capacitance value

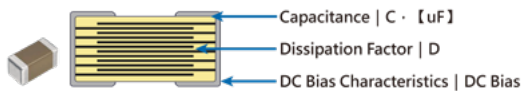
Precision Calibration, Automatic Level Control (ALC), Selectable Output Impedance (25 Ω / 100 Ω)

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.

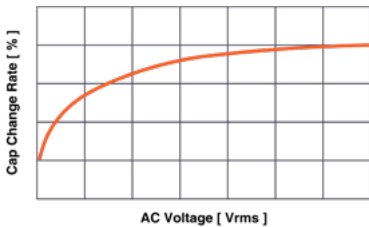
Supporting Automatic Level Control (ALC) function, accurately measuring MLCCs with a capacitance of 1.0uF and above. When ALC is enabled, it automatically corrects the offset level back to the set voltage signal value, ensuring precise measurement of high-capacity MLCCs.



AC Signal Level Enhancement Solution for Accurate MLCC

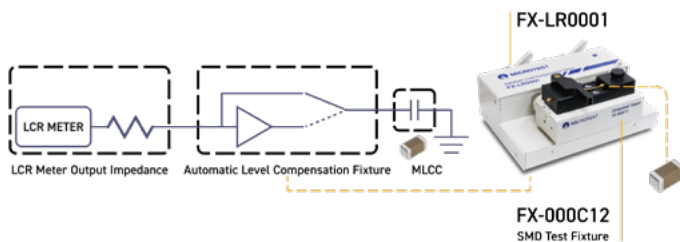


The regulations (JIS C 5101-1-1998) stipulate standards for test signals. When measuring MLCC capacitance, the LCR Meter must enable the Automatic Level Control (ALC) function. This function introduces a stable level circuit into the test circuit to automatically correct any level offset back to the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

Material Analysis - Dielectric Constant

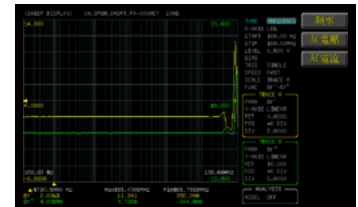
Many materials in everyday life possess electrical properties related to dielectrics, such as the DC bus capacitors used in new energy vehicles, which require dielectric materials with high dielectric constants. For electric vehicles, the performance of the power battery directly determines the range capability, and the dielectric properties of the battery's electrode materials are key to performance. The relative dielectric constant can be measured using 6632 Impedance Analyzer, 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.

Built-in $\epsilon_r = C_x / C_0$

- Measure the capacitance C_0 of a capacitor when there is a vacuum between its two plates.
- Using the same capacitor and plate spacing, measure the capacitance C_x after introducing a dielectric material between the plates.
- Calculate the relative dielectric constant ϵ_r using the formula.



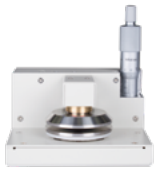
Monitoring ϵ_r/ϵ_r'' in Meter Mode



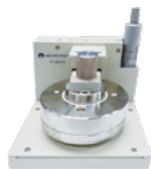
Scanning ϵ_r'/ϵ_r'' curves with frequency variation for analysis

Dielectric constant & Loss Test Solution

6632 Impedance Analyzer is equipped with the following dielectric constant test fixtures.



Solid/ film material selection
FX-0000C7



Liquid material selection
FX-000C20

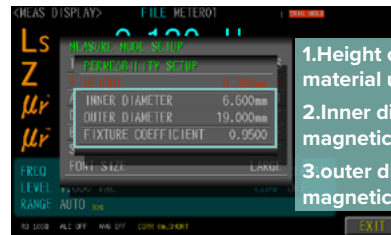
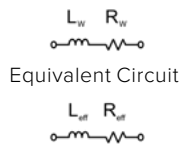
Material Analysis - Permeability Coefficient

The 6632 Impedance Analyzer 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

$$\mu'_e = \frac{\ell L_{eff}}{\mu_0 N^2 A}$$

$$\mu''_e = \frac{\ell (R_{eff} - R_w)}{\mu_0 N^2 \omega A}$$



- 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

6632 Impedance Analyzer 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-000C8 is available in the following sizes

Type A | OD 8, ID 3.1, H 3 mm

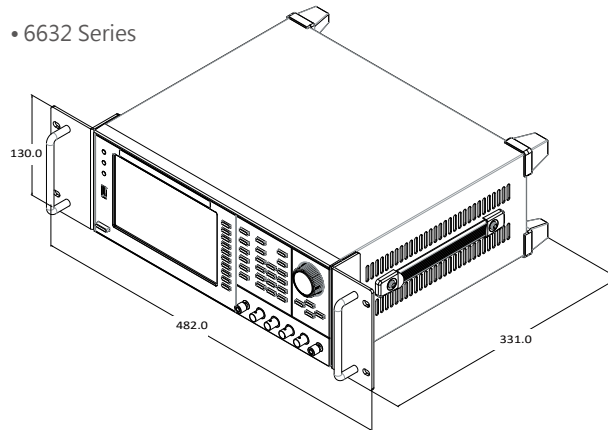
Type B | OD 20.5, ID 4.8, H 11 mm

Type C | OD 65.5, ID 7.1, H 28 mm

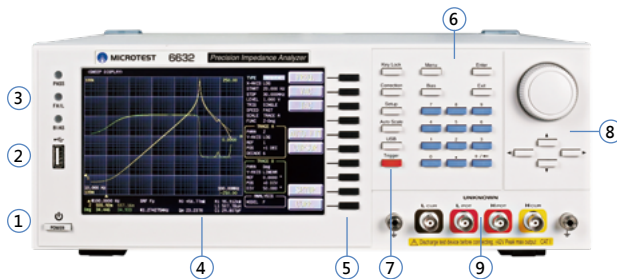
Automatic Chassis Dimension

• Dimension (mm)

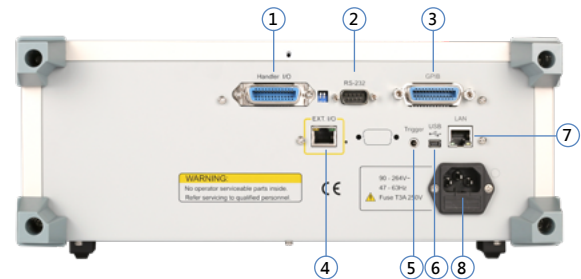
• 6632 Series



Appearance



- | | |
|---------------------|-------------------------|
| 1. Power switch | 6. setup and number key |
| 2. USB | 7. Trigger |
| 3. PASS/ FAIL/ BIAS | 8. Direction |
| 4. LCD Screen | 9. BNC terminal |
| 5. Function | |



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

Ordering Information

6632 Impedance Analyzer	Standard	Optional
<ul style="list-style-type: none"> 6632-1(Frequency Range 10Hz~1MHz) 6632-3(Frequency Range 10Hz~3MHz) 6632-5(Frequency Range 10Hz~5MHz) 6632-10(Frequency Range 10Hz~10MHz) 6632-20(Frequency Range 10Hz~20MHz) 6632-30(Frequency Range 10Hz~30MHz) 6632-50(Frequency Range 10Hz~50MHz) <p>S Series-Support Equivalent Circuit Analysis function</p> <ul style="list-style-type: none"> 6632-1S(Frequency Range 10Hz~1MHz) 6632-3S(Frequency Range 10Hz~3MHz) 6632-5S(Frequency Range 10Hz~5MHz) 6632-10S(Frequency Range 10Hz~10MHz) 6632-20S(Frequency Range 10Hz~20MHz) 6632-30S(Frequency Range 10Hz~30MHz) 6632-50S(Frequency Range 10Hz~50MHz) 	<ul style="list-style-type: none"> FX-000C19 DIP Test Fixture Power Cord 	<ul style="list-style-type: none"> F423906A Kelvin Clip Leads (100cm) F423906B Kelvin Clip Leads (200cm) F663001A BNC Test Leads (50cm) F663001B BNC Test Leads (100cm) F663001C BNC Test Leads (200cm) F420001 External Voltage Bias ($\pm 200V/1MHz$) F420003 External Voltage Bias ($\pm 40V/1MHz$) F420005 External Voltage/ Current Bias ($\pm 40V/100mA$) F420006 External Voltage Bias ($\pm 2000V/1MHz$) 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-663201 GPIB Interface PC Link Software

Fixture & Accessories

FX-000C19
DIP Test Fixture



F423906A
Kelvin Clip Leads (100cm)

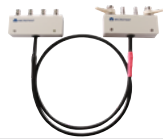


F423906B
Kelvin Clip Leads (50cm)



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)

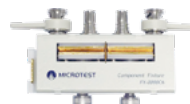


F420005 External Voltage/Current Bias (±40V/100mA)

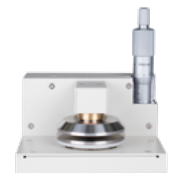


Frequency	100Hz~1MHz	100Hz~1MHz	≤ 30 MHz
Max. Voltage/ Current	±200V	±40V	DC ±40V
Accessory Description	-	-	DC ±100mA
Applicable Models	6632/ 6621/ 6630/ 6363~6367	6632/ 6621/ 6630/ 6363~6367	6632/ 6621/ 6630

F420006 External Voltage Bias (±2000V/1MHz) **FX-0000C6** DIP Test Fixture

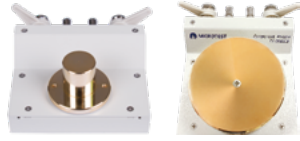


FX-0000C7 Dielectric Material

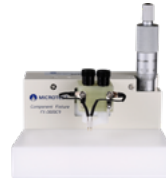


Frequency	100Hz~1MHz	DC~30MHz	≤30MHz
Max. Voltage/ Current	±2000V	±42V	±42V
DUT Size	-	-	≤10mm (Electrode Diameter : 38mm · 5mm)
Applicable Models	6632/ 6621/ 6630/ 6363~6367	6632/ 6621/ 6630/ 6363~6367	6632/ 6621/ 6630

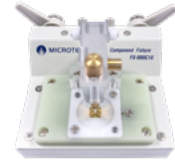
FX-0000C8
Magnetic Material Test Fixture



FX-0000C9
Material Testing Fixture



FX-0000C10
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

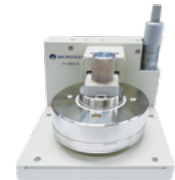
FX-000C11
SMD Tweezers Test Leads



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



FX-0000C4
DIP Test Fixture



Frequency	100Hz~100kHz	Frequency	DC~1MHz
Output Impedance	10 Ω (ON), 25 Ω/ 100 Ω (OFF)	Max. Voltage/ Current	±42V
Output Voltage Sweeping	AC 0.1 ~ 1V rms (ALC ON)	DUT Size	Max. 64mm
Max. Output Current	0.15A	Applicable Models	6632/ 6621/ 6630/ 6363~6367
Applicable Models	6632/ 6621/ 6630		

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 180cm