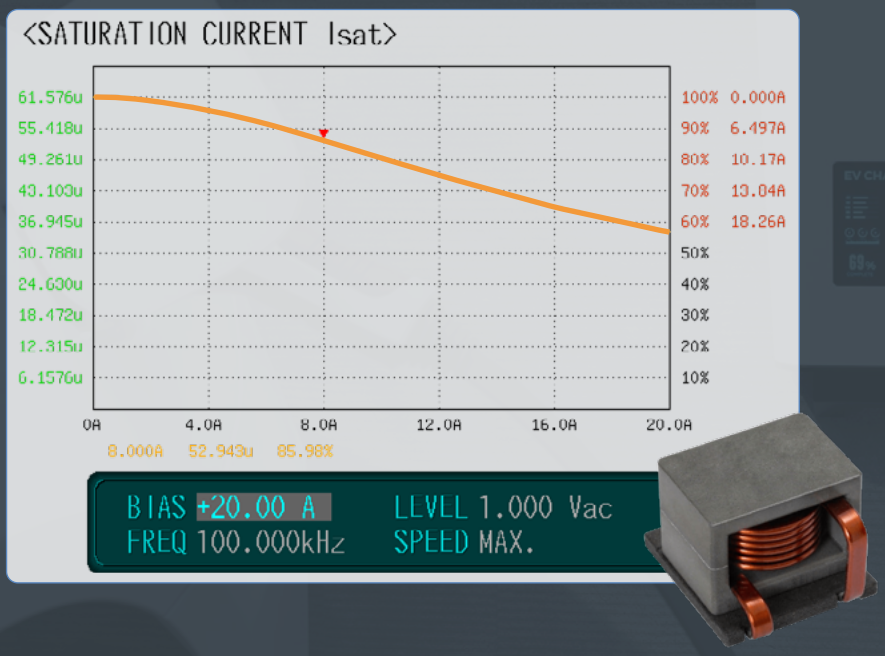
Your Inductance Testing Expert



Isat

Magnetic saturation current curve

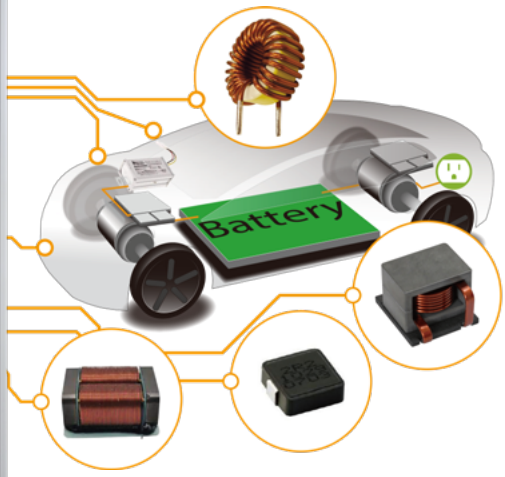
Irms

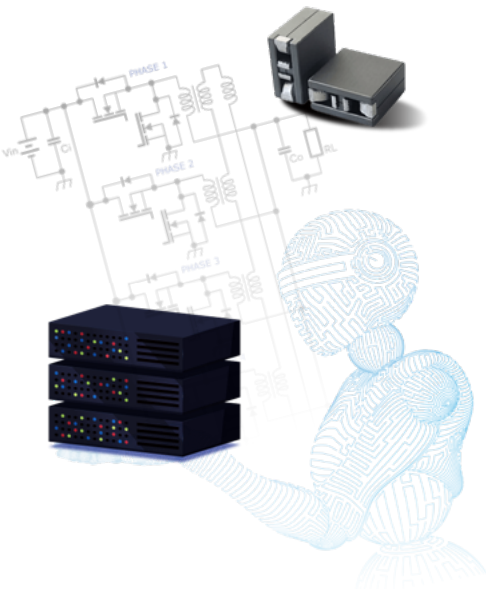
Rated current curve

High Frequency Response 100Hz~10MHz

DC Bias Current Source Test System

Output Max Current up to 640A
Frequency Response up to 10 MHz





The ideal choice for precise verification of magnetic saturation current (Isat) and temperature rise current (Irms) characteristics in inductors, coils, and transformers.Whether in R&D design or production testing, the MICROTEST DC Bias Current Source Test System delivers high-precision current output to measure inductance variations under DC bias conditions. Furthermore, by utilizing the copper temperature coefficient as a foundation for temperature rise analysis, the system employs internal resistance (DCR) measurement technology to evaluate the thermal performance of inductors with greater objectivity and precision.

DC Bias Current Test System

6632+Series
6632S+Series

Output Current Max. 640A
Frequency Range 100Hz~10MHz

MICROTEST
www.microtest.com.tw

DC Bias Source Testing System combines the Impedance Analyzer 6632 with a DC Bias Source. This system is capable of analyzing the saturation characteristics of inductors, coils, ferrites, and magnetic cores. Additionally, it provides testing for the relative permeability (μ_r) to analyze key properties of magnetic materials.
The system supports magnetic saturation current and temperature rise current scanning analysis, providing research and development engineers with fast and accurate current curve variations. When integrated into a production line, it offers the option of Meter Mode or Multi-Step Mode. Measurement results are displayed numerically, and the system supports PC connectivity for storing test data and conducting report analysis.

Application

Magnetic Components I Power Inductors, Common Mode Inductors, Filter Inductors, PFC Inductors
Magnetic Materials I Ferrite Absorber Materials, Alloy Magnetic Materials

Features

- Maximum Frequency range: 30 MHz (Option 6632+6225/ 6632S+6225)
- Maximum Frequency range: 10 MHz (Option 6632+6223/ 6243/ 6243H)
- Magnetic Saturation Curve (Measurement results visually display inductance drop (%) for clearer analysis)
- Current and frequency graphic scanning analysis
- Temperature-rising scan function can solve the problems of overheating a DUT to burn
- DCR Measurement function
- Long-term consecutive maximum power output
- Built-in Permeability(μ_r) function, enables comprehensive magnetic material analysis.
- Direct Handler interfaces control through Impedance Analyzer
- DC Bias Current Output Max.640A/ 320A/ 120A/ 60A/ 20A

• 6240A/6243/6243H

• 6223/6220/6210

• 6225

CE

Standard Interfaces

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

Specification

DC Bias Model	6225	6210	6223	6220	6243	6240	6243H
Frequency Range	100Hz~30MHz	100Hz~3MHz	100Hz~10MHz	100Hz~3MHz	100Hz~10MHz	100Hz~3MHz	100Hz~10MHz
Output Current Max.	20A	60A	120A	120A	320A	320A	640A
Output Current (unit)	20A	10A	20A	20A	40A	40A	40A
Current Accuracy	0.000A~1.000A 1%+5mA 1.001A~5.000A 2% 5.001A~40.000A 3%						
Power Consumption	320W Max.	320W Max.	320W Max.	320W Max.	640W Max.	640W Max.	640W Max.
Constant Power Output	●	●	●	●	●	●	●
Magnetic Saturation Curve Scanning Analysis	●	●	●	●	●	●	●
Temperature Rise Current Curve Scanning Analysis	●	●	●	●	●	●	●
Frequency Graphic Scanning Analysis	●	●	●	●	●	●	●
DC Resistance	●	●	●	●	●	●	●

Model	Impedance Analyzer 6632/ 6632S Series	
Frequency Range (Hz)	10HZ~1M/ 3M/ 5M/ 10M/ 20M/ 30M/ 50MHz	
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.)
Output Impedance	25Ω、100Ω (Switchable)	
Measurement Parameters	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
Measurement Mode	Meter Mode, List Mode, Sweep Mode, and optional Equivalent Circuit Analysis function (S model)	

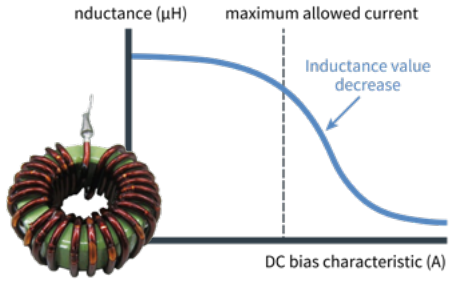
General

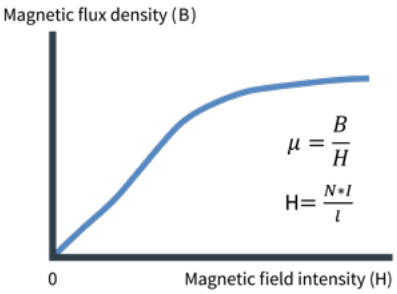
Power Supply	Voltage：88~264Vac
	Frequency：47~63Hz
Power Consumption	300VA (6225/ 6223/ 6220/ 6210)/ 600VA (6240/ 6243/ 6243H)
PC Link Software	●
Interface	RS-232/ Handler
Trigger Test	Auto/ Manual/ RS-232/ Handler/ GPIB (Option OP-663201)
Environment	Temperature：10~40℃, Humidity：20~90%RH
Dimension (W*H*D)	356×147×497mm (6225)/ 337×145×525mm (6223/ 6220/ 6210) 435×145×525mm (6240)/ 435×145×644mm (6243/ 6243H)
Weight	15Kg (6225/ 6223/ 6220/ 6210), 20Kg (6243/ 6240/ 6243H)

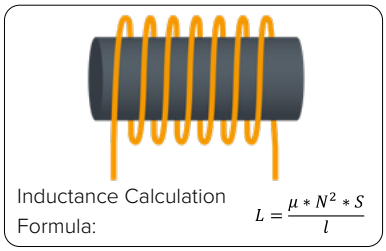
Inductor Specifications – Magnetic Saturation Current & Temperature Rise Current

The Saturation Current (Isat) of an inductor coil

Inductors generally contain a magnetic core, especially power inductors. The core can experience magnetic saturation, as seen in the magnetization curve of the inductor core. When the magnetic field intensity reaches a certain level, the trend of increasing magnetic flux density gradually diminishes. At this point, the inductor reaches saturation, and permeability (μ) significantly decreases, causing a sharp drop in inductance value and a loss of ability to suppress current. Typically, the saturation current is chosen to be 30% lower than the inductance value decrease, and often determined by applying a DC bias to assess the extent of inductance decay concerning saturation current.

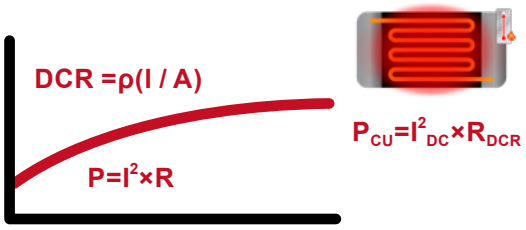






The Temperature Rise Current (Irms) of an inductor

Due to the inherent parasitic DC resistance in the inductor, the internal temperature of the inductor rises with increasing current during operation. Typically, the current at which the self-temperature rise of the inductor does not exceed 20℃ or 40℃ is considered as the temperature rise current. This current is also the rated current for the application of inductor products.



The hazards of exceeding the Isat & Irms range include

When designing circuits, engineers choose the conditions for the inductor such that the maximum instantaneous current does not exceed its saturation current (Isat), and the effective current does not exceed the temperature rise current (Irms).

- If the inductor exceeds the Isat range during circuit design, the decrease in inductance leads to ineffective smoothing of the current, potentially causing more ripple current in the circuit, which can affect other components, particularly the capacitance or IC control
- Irms is defined based on the inductor's own temperature rise and heat generation. Therefore, when the inductor exceeds the Irms range during circuit design, it may become too hot and be damaged

Part No.	OCL (1)-(4)&(2)-(3) (nH) ±15%	Li (1)-(4)&(2)-(3) (nH) Min.	DCR (1)-(4) (mΩ) ±10%	DCR (2)-(3) (mΩ) ±10%	Isat (1)-(4)& (2)-(3) (A) Typ.		Irms(1)-(4) (A)	Irms(2)-(3) (A)
					@25°C	@100°C		
GTLVR126011PV-R10L	105	71.4	0.125	0.37	125.0	106.0	77.0	45.0
GTLVR126011PV-R12L	120	81.6	0.125	0.37	102.0	87.0	77.0	45.0
GTLVR126011PV-R15L	150	102.0	0.125	0.37	84.0	71.0	77.0	45.0
GTLVR126011PV-R17L	170	115.6	0.125	0.37	70.0	60.0	77.0	45.0
GTLVR126011PV-R20L	200	136.0	0.125	0.37	58.0	50.0	77.0	45.0

- Figure 1 is the datasheet for a specific inductor.
- Isat
- Irms

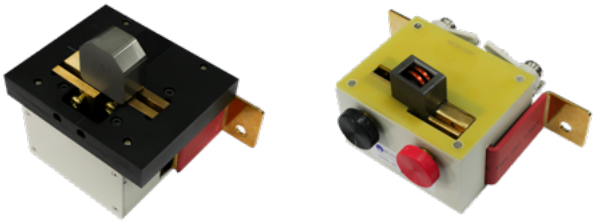
The planning scheme for the MICROTEST DC Bias Current Source Test System

The DC Bias Current Source Test System is equipped with an Impedance Analyzer and the DC Bias Current Source. It can analyze the saturation characteristics of components such as sensors, coils, ferrites, and iron cores. The Impedance Analyzer has a built-in function to measure the relative permeability(μ_r) and verify the saturation current and temperature rise current of magnetic components. The entire system supports both meter and sweep analysis modes, and measurement data can be retrieved via the USB Host interface. Additionally, PC Link software can be optionally purchased for remote control and data collection.

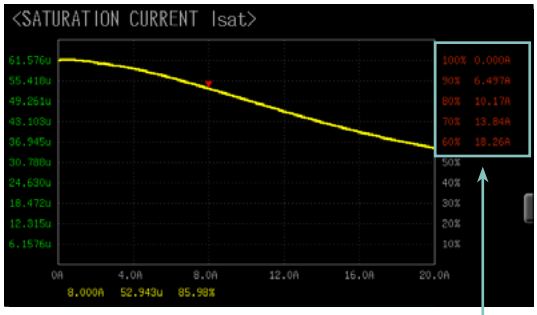
Plan	Rack+PC	Desktop+PC	Desktop
			
LCR Meter/ Impedance Analyzer	●	●	●
DC Bias Current Source	●	●	●
PC Link Software	●	●	/
Test Fixture	DIP(F6210A)  		SMD(FX-DB0001)  
Features	• Easy to manage and maintain • Portable and convenient to move • PC control and data acquisition	• Ideal for R&D or laboratory environments • PC control and data acquisition	• On-board operation

Supports Saturation Current (Isat) scanning analysis, displayed as a % decrease in inductance value

The DC Bias Current Source Test System supports saturation current testing, with a maximum output current of 640A and a frequency response from 100Hz to 10MHz. In Graph Analysis Mode, it enables saturation current scanning, where the X-axis represents the applied bias current and the Y-axis represents the inductance value. The measurement results directly display the percentage decrease in inductance value, providing engineers with a more intuitive way to verify the saturation current of sensors.
(typically when the inductance value decreases by 30%)



High-current flat-wire power inductor measurement
(Custom fixture based on pin configuration)



Inductance Decrease Percentage (%)

Supports analysis of inductance temperature rise current (Irms)

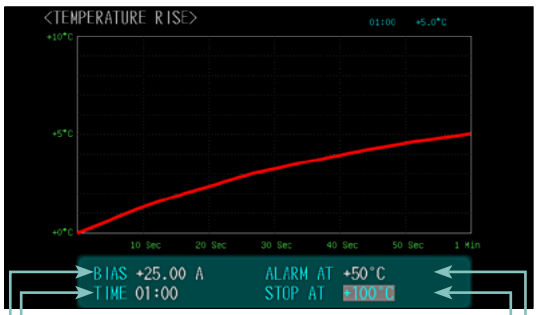
Applying current to the inductor coil, simulating the working current of the inductor for temperature rise characteristic measurement. During measurement, tests are conducted according to known specifications (Irms, temperature rise of the inductance).
Prior to testing, you can set: 1. The amount of current to be applied, 2. The duration of continuous current output, 3. The temperature at which the instrument alerts, 4. The temperature at which the instrument stops outputting current

Utilizing the temperature coefficient of copper as the basis for inductance temperature rise analysis, employing internal resistance measurement techniques for increased objectivity and precision.

- According to the temperature coefficient of copper, approximately 3,930 ppm
- The resistance value (RDC_Tr) at temperature Tr can be calculated using the formula
- RDC_Tr= RDC (1+0.00393Tr)
- To simulate the temperature rise measurement of the inductor's working current
- Use the DC resistance (DCR) as the basis for temperature rise calculation.
- For each degree Celsius rise in temperature, the DCR increases by 0.393%.

$$\Delta T = \frac{R_2 - R_1}{R_1} \div 0.0039$$

- Calculate the temperature rise characteristics of the inductor after applying current



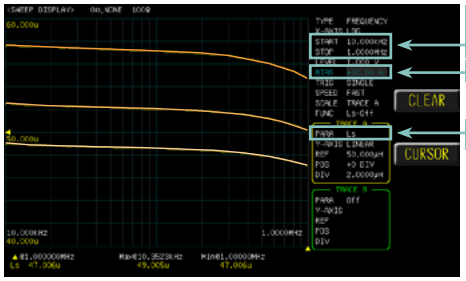
Set applied current

Set the temperature for the alarm

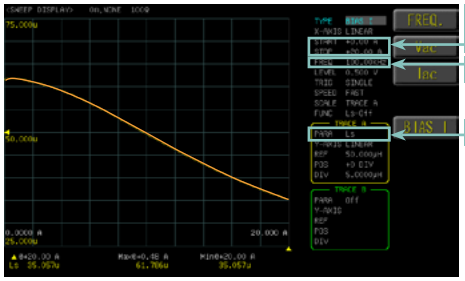
Set the duration of continuous output current

Set the upper temperature limit and stop outputting current

Analyze Magnetic Saturation Characteristics in Sweep Mode – Frequency Sweep / Current Sweep



In Sweep Analysis Mode, you can set the frequency range for inductance measurement and the applied DC bias current to analyze the characteristics of the inductor. For example, you can set the sweep range from 10kHz to 1MHz and apply different DC bias currents (5A/8A/10A). Additionally, you can configure to retain the previous current curve for analyzing the inductance variation under different currents.



In Sweep Analysis Mode, you can set the current range and test frequency for analyzing the characteristics of the inductor. For example, at a test frequency of 100kHz, gradually increase the DC bias current up to 20A and observe the change in inductance value after applying the overlaid current.

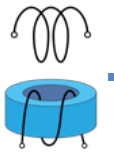
Material Analysis: Magnetic Permeability

Adopts the inductance method measurement technique for relative permeability testing. The instrument incorporates a relative permeability formula. By purchasing the FX-0000C8 Magnetic Conductivity Test Fixture, inductance value (Ls) and relative permeability (μ_r'/μ_r'') can be directly measured on the machine.

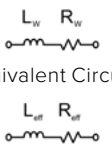
Built-in permeability coefficient calculation formula Equivalent Circuit

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

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



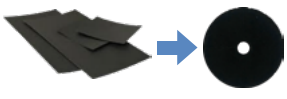
Equivalent Circuit



1. Input the height of the magnetic material
2. Input the inner diameter of the magnetic material
3. Input the outer diameter of the magnetic material

Magnetic Permeability Measurement Solutions

Magnetic Conductivity Test Fixture FX-0000C8

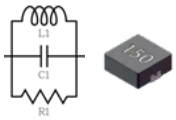
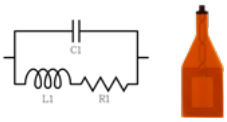
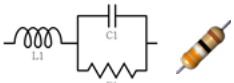
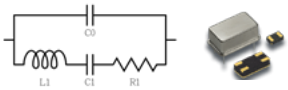
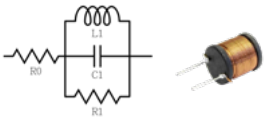
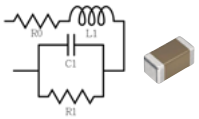


Before measurement, please cut the magnetic material into a ring shape. (The magnetic ring can be placed directly on the fixture)

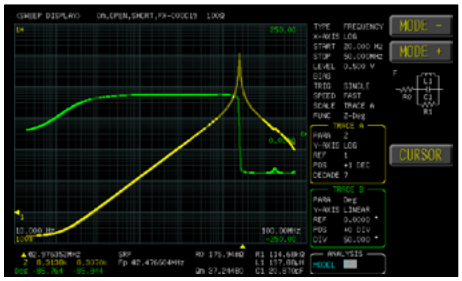
FX-0000C8 Available Dimensions	
Type A	OD 8, ID 3.1, H 3 mm
Type B	OD 20.5, ID 4.8, H 11 mm
Type C	OD 65.5, ID 7.1, H 28 mm

The equivalent circuit modeling analysis (6632S+ Series)

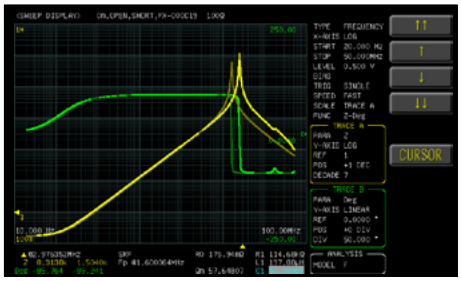
The 6632S+ Series supports analysis of 7 types of equivalent circuits. Through three-component modeling/ four-component modeling at different frequency variations, the impedance trajectory curve calculated after equivalent circuit parameter calculation is compared with the scanned curve of the measured 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			
Model A	Model B	Model C	Model D
High magnetic leakage inductance 	NFC 	High resistance resistor 	Capacitor 
Through four-component modeling			
Model E	Model F	Model G	
Piezoelectric element/quartz crystal 	Equivalent series resistance of inductor 	Capacitor 	

Quantifying Invisible Parasitic Effects into Designable, Predictable Parameters



Select the Model.F four-component configuration



C1 parameter can be adjusted

Model.F

(L) Represents the equivalent inductance of the Tx or Rx coil, reflecting coil geometry, turn count, and magnetic material configuration, and is a key parameter determining coupling strength and power transfer capability in wireless charging.

(R1) Coil series resistance; from wire, skin, and proximity effects; affects Q and efficiency.

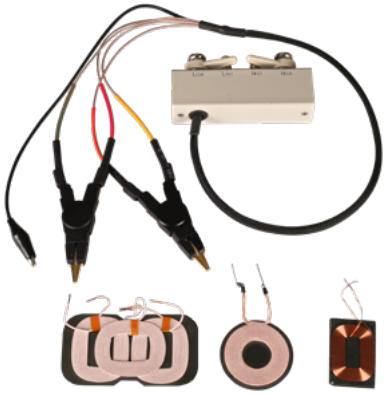
(R0) Parallel loss resistance; models core, eddy, and structural losses; affects impedance, phase, and damping near resonance.

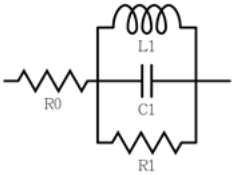
When C1 increases, the SRF shifts lower, affecting the wireless charging frequency band, reducing efficiency and making system tuning difficult.

In wireless charging coil design, the self-resonant frequency (SRF) is a critical pain point that often leads to unstable efficiency, difficult tuning, and poor production consistency—primarily driven by hard-to-quantify parasitic capacitance. Small variations in winding spacing, layer structure, magnetic materials, or shielding can increase parasitic capacitance, shifting SRF downward into the operating band and causing efficiency loss, higher power dissipation, and control-loop instability. By using the 6632 impedance analyzer with equivalent circuit Model F (four-element configuration), engineers can adjust the C1 parameter to accurately correlate parasitic capacitance and rapidly identify SRF shifts.

Wireless Power Transfer

Transmitter (Tx) / Receiver (Rx) Coil



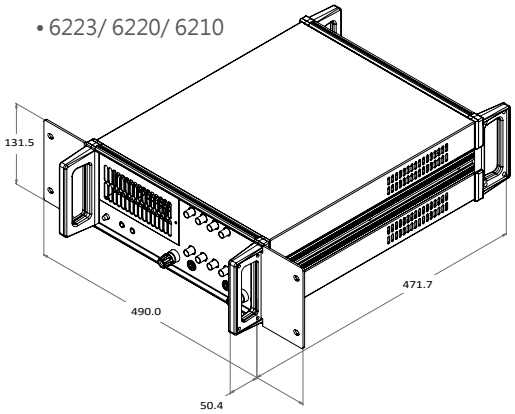


Model.F

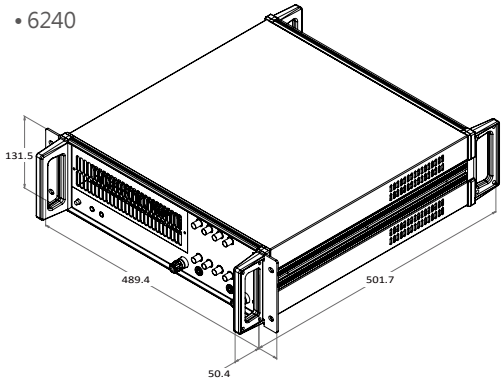
Automatic Chassis Dimension

• Dimension (mm)

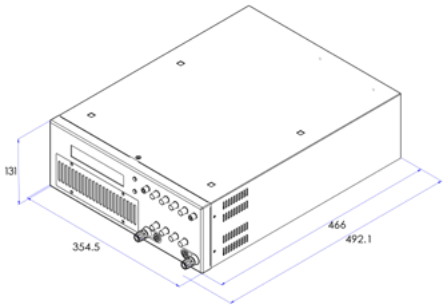
• 6223/ 6220/ 6210



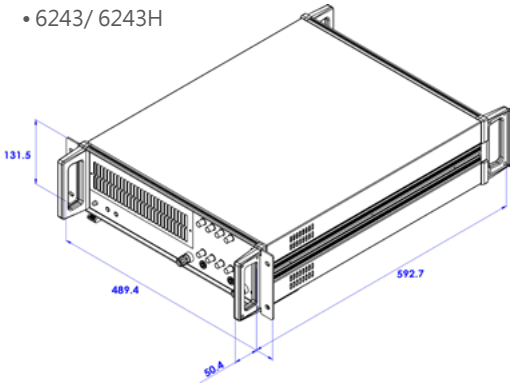
• 6240



• 6225



• 6243/ 6243H



Ordering Information

DC Bias Series	Standard	Optional
• 6632+6225 (Frequency Range 100Hz~30MHz/ Max.20A) • 6632+6210 (Frequency Range 100Hz~3MHz/ Max.60A) • 6632+6223 (Frequency Range 100Hz~10MHz/ Max.120A) • 6632+6220 (Frequency Range 100Hz~3MHz/ Max.120A) • 6632+6243 (Frequency Range 100Hz~10MHz/ Max.320A) • 6632+6240 (Frequency Range 100Hz~1MHz/ Max.320A) • 6632+6243H (Frequency Range 100Hz~10MHz/ Max.640A) S Series- Support Equivalent Circuit Analysis • 6632S+6225 (Frequency Range 100Hz~30MHz/ Max.20A) • 6632S+6210 (Frequency Range 100Hz~3MHz/ Max.60A) • 6632S+6223 (Frequency Range 100Hz~10MHz/ Max.120A) • 6632S+6220 (Frequency Range 100Hz~3MHz/ Max.120A) • 6632S+6243 (Frequency Range 100Hz~10MHz/ Max.320A) • 6632S+6240 (Frequency Range 100Hz~1MHz/ Max.320A) • 6632+6243H (Frequency Range 100Hz~10MHz/ Max.640A)	• TL-DB0001 Ground Wire (6cm) • TL-000008 LAN Cable (40cm) • AX-000001 Fuse (5A/250V) (Note*1) • Power Cord	• FX-DB0001 4-wire SMD Test Fixture (120A/10MHz) • F6210A 4-wire DIP Test Fixture (100A/10MHz) • F6240 4-wire DIP Test Fixture (320A/10MHz) • TL-DB0002 BNC TO BNC Cable Up to 120A(Length selectable according to rack configuration) • AX-DB0001 Connect Plate-Black(L 16.7cm/W 2cm) | Model. 6210/6220/6223 • AX-DB0002 Connect Plate-Red(L 16.7cm/W 2cm) | Model. 6210/6220/6223 • AX-DB0003 Connect Plate-Black(L 25.7cm/W 2cm) | Model. 6210/6220/6223 • AX-DB0004 Connect Plate-Red(L 25.7cm/W 2cm) | Model. 6210/6220/6223 Up to 320A(Length selectable according to rack configuration) • AX-DB0005 Connect Plate-Red(L 16.7cm/W 2.6cm) | Model. 6240/6243 • AX-DB0006 Connect Plate-Black(L 16.7cm/W 2.6cm) | Model. 6240/6243 • AX-DB0007 Connect Plate-Black(L 25.7cm/W 2.6cm) | Model. 6240/6243 • AX-DB0008 Connect Plate-Red(L 25.7cm/W 2.6cm) | Model. 6240/6243 Up to 640A(Length selectable according to rack configuration) • AX-DB0009 Connect Plate-Black(L 16.7cm/W 3cm) | Model. 6243 • AX-DB0010 Connect Plate-Red(L 16.7cm/W 3cm) | Model. 6243 • AX-DB0011 Connect Plate-Black(L 25.7cm/W 3cm) | Model. 6243H • AX-DB0012 Connect Plate-Red(L 25.7cm/W 3cm) | Model. 6243H • AX-DB0013 Connect Plate-Black(L 60cm/W 3.5cm) | For rack connection when paralleled up to 640A • AX-DB0014 Connect Plate-Red(L 60cm/W 3.5cm) | For rack connection when paralleled up to 640A • TL-000003 RS-232 Cable (180cm) • OP-663201 GPIB Interface • PC Link Software

Note*1 | DC Bias Current Source 6210, 6220, 6223, and 6225 are equipped with a 5A Fuse (AX-000001)

Fixture & Accessories

TL-DB0001
Ground Wire

Applicable Models	DC Bias Series
Accessory Description	6cm

TL-000008
LAN Cable

Applicable Models	DC Bias Series
Accessory Description	40cm

AX-000001
Fuse

Applicable Models	6210/ 6220/ 6223/6225
Accessory Description	5A/250V

FX-DB0001
4-wire SMD Test Fixture

Frequency	100Hz~10MHz
Max. Voltage/ Current	120A
Applicable Models	DC Bias Series
DUT Size	2.5 x 2.0mm ~ 7.4 x 5.1mm

F6210A
4-wire DIP Test Fixture

Frequency	DC~10MHz
Max. Voltage/ Current	100A
Applicable Models	DC Bias Series

F6240
4-wire DIP Test Fixture

Frequency	DC~10MHz
Max. Voltage/ Current	320A
Applicable Models	DC Bias Series

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

Frequency	≤ 30 MHz
Max. Voltage/ Current	DC ±40V
Accessory Description	DC ±100mA
Applicable Models	6632/ 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/ 6630

TL-DB0002
BNC+BNC Cable

Applicable Models	DC Bias Series
Accessory Description	80mm

TL-000003
RS-232 Cable (180cm)

Applicable Models	DC Bias Series
Accessory Description	180cm

AX-DB0001
Connect Plate-Black

AX-DB0002
Connect Plate-Red

Applicable Models	6210/ 6220/ 6223	6210/ 6220/ 6223
Accessory Description	Length 16.7cm I Width 2cm	Length 16.7cm I Width 2cm

AX-DB0005
Connect Plate-Red

AX-DB0006
Connect Plate-Black

Applicable Models	6240/ 6243	6240/ 6243
Accessory Description	Length 16.7cm I Width 2.6cm	Length 16.7cm I Width 2.6cm

AX-DB0003
Connect Plate-Black

AX-DB0004
Connect Plate-Red

Applicable Models	6210/ 6220/ 6223	6210/ 6220/ 6223
Accessory Description	Length 25.7cm I Width 2cm	Length 25.7cm I Width 2cm

AX-DB0007
Connect Plate-Black

AX-DB0008
Connect Plate-Red

Applicable models	6240/ 6243	6240/ 6243
Accessory Description	Length 25.7cm I Width 2.6cm	Length 25.7cm I Width 2.6cm

AX-DB0009
Connect Plate-Black

AX-DB0010
Connect Plate-Red

AX-DB0011
Connect Plate-Black

Applicable Models	6243	6243	6243H
Accessory Description	Length 16.7cm I Width 3cm	Length 16.7cm I Width 3cm	Length 25.7cm I Width 3cm

AX-DB0012
Connect Plate-Red

AX-DB0013
Connect Plate-Black

AX-DB0014
Connect Plate-Red

Applicable Models	6243H	6243H	6243H
Accessory Description	Length 25.7cm I Width 3cm	Length 60cm I Width 3.5cm	Length 60cm I Width 3.5cm