

# Enhance the Insulation Longevity of Wound Components through Inter-Turn Short Testing

<b>PASS</b>	AERA : PASS +3.7 %	FILE : NONAME
	DIFF : PASS 10.9 %	VOLT : 2.50 kV
	FLUT : PASS 218	PASS : 17
	COMP : PASS	HFLT : PASS 0
	CORO : PASS 7	HARM : PASS

Non-Destructive High Voltage Pulse

High Speed Test 10 times/sec.

BDV

Output Max. 10kV

## Impulse Winding Tester 7750/ 7759



The MICROTTEST 7750 / 7759 Series Impulse Winding Testers provide reliable insulation quality testing for both high and low inductance wound components.

Using non-destructive impulse voltage waveform comparison, the system effectively detects insulation defects in motors, transformers, and BL inductors.

The series supports pulse voltage outputs of 1200V / 5200V / 10000V, and adopts 200MHz high-speed sampling technology to capture subtle partial discharge anomalies with high precision.

It offers six comparison analysis modes — AREA Comparison, DIFF Comparison, CORONA Comparison, FLUTTER Comparison, LAPLACIAN Comparison, and WAVEFORM Comparison Mode — with a testing speed up to 10 times per second.

200V-10000V	<input type="checkbox"/>	$\geq 20\mu\text{H}$
100V-5200V	<input type="checkbox"/>	$\geq 1\mu\text{H}$
10V-1200V	<input type="checkbox"/>	$\geq 0.1\mu\text{H}$

For applications requiring multi-point testing, the 7759 model supports multi-channel measurement, making it an ideal solution for automated production lines of wound components.



High Power Choke



Transformers



Inductor



Motor Stator/ Motor Rotor

# Impulse Winding Tester

7750 Series  
7759

Impulse Voltage  
1200V/5200V/10000V

Safety Tester



• 7750

MICROTEST 7750 Series is an advanced Impulse Winding Tester with a faster color display screen. It provides pulse voltage outputs of 1200V/ 5200V/ 10000V and utilizes high-speed sampling technology at 200MHz/9 bits. It offers various comparison modes such as total area, area difference, corona count, jitter count, second-order differentiation, and waveform comparison. With a testing speed of up to 10 times per second, it is ideal for high-speed production lines.

For testing small components, the optional 7750-1S tester comes with the FX-IM0001 four-wire SMD component testing fixture. It features voltage compensation to minimize voltage errors caused by wiring and equivalent inductance, ensuring accurate quality control for products with small inductance.

## Application

Transformers, Motors, Generators, Automotive Ignition Coils, Relays, Electromagnets, Filters

## Feature

- 200MHz/ 9bits High Impulse Test Sampling Rate
- High Speed Test : 10times/ sec
- Lowest Inductance  $\geq 0.1\mu\text{H}$
- Voltage Compensation Function
- Breakdown Voltage Analysis
- Programmable Impulse voltage
- USB Host: Quick access to test screenshots
- Built-in storage 128 sets testing waveform
- Six waveform analysis modes for detecting inter-layer short circuit defects in wound components.
- Optimal selection for molded inductor measurement: 7750-1F 4-Wire Measurement Technology.



• 7759



• 7750



• 7759



## Standard Interfaces

RS-232

USB Host

SIGNAL I/O

USB Device

LAN

## Specification

Model	7750-5E	7750-5H	7750-5S	7750-1S	7750-1F	7750-10S	7759
Channel	1						8+1 (Note*1)
Impulse Voltage	100V~5200V	100V~5200V	100V~5200V	10V~1200V	10V~1200V	200V~10000V	100V~5200V
Voltage Resolution	1V	1V	1V	0.1V	0.1V	5V	1V
Lowest Inductance	≥16μH	≥4μH	≥1μH	≥0.1μH	≥0.1μH	≥20μH	≥1μH
Pulse Energy	Max. 0.5J	Max. 0.5J	Max. 0.5J	Max. 0.028J	Max. 0.028J	Max. 2J	Max. 0.5J
Impulse Voltage Accuracy	± ( 2% of setting + 10V )			± ( 2% of setting + 5V )	±[2% of setting × (1+1μH / Lx) + 2% of Range]	± ( 2% of setting + 20V )	± ( 2% of setting + 10V )
4-Wire Measurement	-	-	-	-	●	-	-
Pulse Number	Max. 32						
Input Impedance	20MΩ						
Sampling Rate	50MHz/ 9 bit	100MHz/ 9 bit	200MHz/ 9 bit				
Test Time	10 times/ sec						
Waveform Comparison	AREA comparison						
	DIFF comparison						
	CORONA comparison						
	WAVEFORM comparison						
	FLUTTER comparison						
	-	LAPLACIAN comparison					
Breakdown Voltage	-	-	●	●	●	●	●
Measurement Statistics	●						

Note\*1 | Channel 9 of 7759 is the ground terminal and requires no setting.

## General

SIGNAL I/O Control	START/ STOP
SIGNAL I/O Output	PASS/ FAIL/ TEST/ READY/ HV ON
Safety Switch	When testing, you need to short-circuit the INTER LOCK on the rear of the instrument to output the test voltage
Built-in Storage	128
Interface	RS-232/ SIGNAL I/O/ USB Host/ USB Device/ LAN/ GPIB (Option OP-775001)
PC Link Software	●
Power Supply	Voltage : 100Vac~240Vac
	Frequency : 47~63Hz
Power Consumption	70VA
Display	7" TFT, Color LCD (800*480)
Environment	Temperature : 0°C~40°C, Humidity : 20~80%RH
Dimension(W*H*D)	430 x 132 x 370 mm(7750)/ 430 x 176 x 370 mm(7759)
Weight	7Kg(7750)/ 11kg(7759)

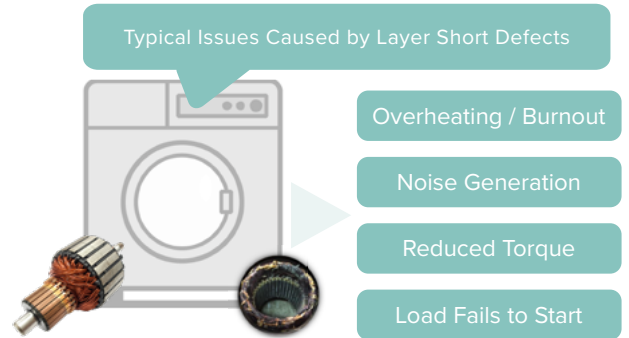
# Functions

## Why Is Layer Short Circuit Testing Essential for Magnetic Components?

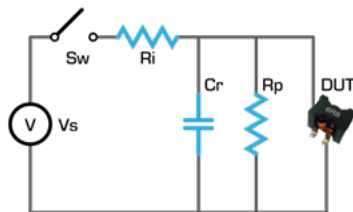
Minor Layer short defects in winding coils are often undetectable at low-voltage test stations. When such semi-finished components are assembled into motors or transformers, functional testing at the final stage may reveal failures (NG), resulting in wasted manufacturing and rework costs.

By integrating an inter-turn short circuit test station into the production line, the insulation quality of enameled wires can be verified using high-voltage pulse testing, ensuring long-term product reliability and preventing motor overheating, burnout, or operation failure.

Layer Short Circuit Test = Lifetime Reliability Test

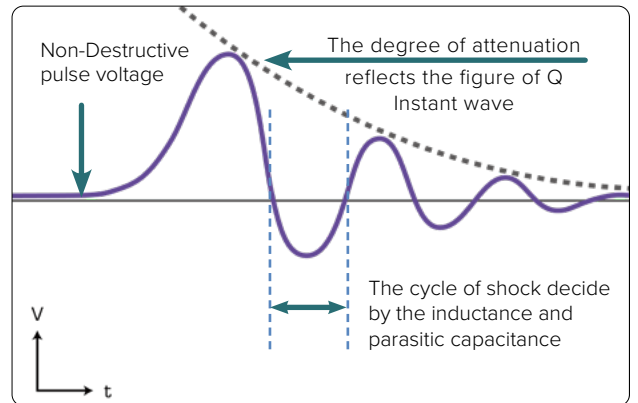


## 7750/ 7759 Technology of Detect Layer Short



<b>Vs</b>	<b>Internal high voltage source</b>
<b>Sw</b>	<b>Internal control switch</b>
<b>Ri</b>	<b>Internal resistor</b>
<b>Cr</b>	<b>Resonant capacitor</b>
<b>Rp</b>	<b>Parallel resistor</b>
<b>DUT</b>	<b>Device under test</b>

- The instrument outputs a high-speed impulse voltage applied across the parallel circuit.
- This generates an L/C resonance between the inductance (L) and capacitance (C).



Using a non-destructive impulse voltage, the system performs waveform sampling and comparison. It supports 1200 V / 5200 V / 10000 V pulse voltage outputs, applying the impulse voltage across the winding coil. Without damaging the DUT, an L/C resonant damped oscillation waveform is generated. By utilizing 200MHz high-speed sampling technology, the system compares the waveform of the reference sample and the test piece to accurately identify internal coil or magnetic core insulation defects.

## 7750 / 7759 Layer Short Comparison Method

### Purpose of Layer Short Testing

- The layer short test is a durability and insulation lifetime test for coil windings, used to evaluate the long-term reliability of insulation materials.
- It is a mandatory test item adopted by many motor, transformer, and inductor manufacturers to ensure product quality and reliability.

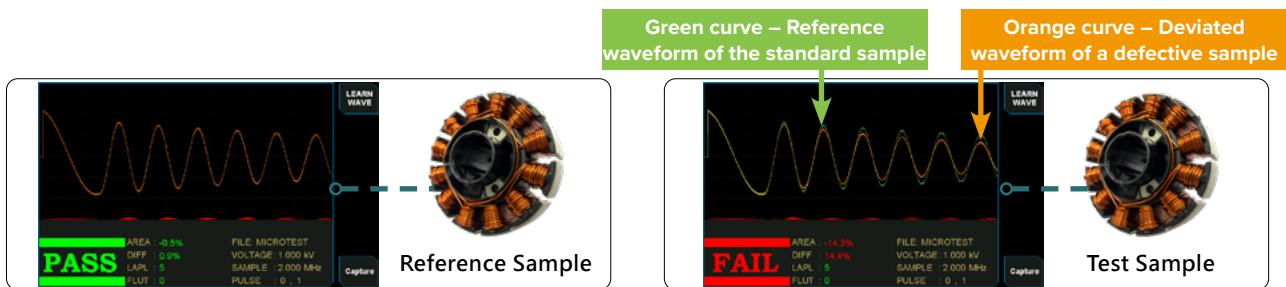
Since the layer short comparison method analyzes the damped oscillation waveform generated by L/C resonance, it detects waveform deviations to identify defective products caused by layer shorts—which may result from insulation aging or poor manufacturing processes, leading to partial or complete shorts between winding layers.

### Preparation Items for Implementing layer Short Testing on Production Lines

- Establish Judgment Criteria for layer Shorts:  
 Create a standard reference waveform suitable for the product batch.  
 Before testing, prepare reference (golden) samples as the comparison baseline.
- Measure and Analyze Waveform Parameters:  
 Measure the waveform of the reference samples.  
 You may average the results from multiple samples and set an acceptable tolerance range to establish a standard waveform profile.

The electrical characteristics of defective products are reflected as altered waveforms when compared with the standard reference.

Differences in inductance, quality factor (Q), turn count (voltage variation), core material characteristics, or inter-turn short defects within the coil can all cause waveform deviations.

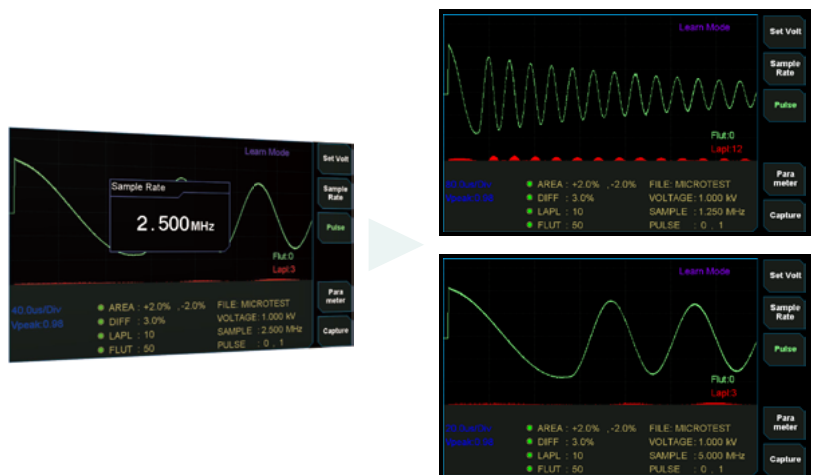


Establish a Reference Waveform for Comparison with DUTs from Production

## 200 MHz / 9-bit High-Speed Sampling for Waveform Comparison — Supports 6 Comparison Modes

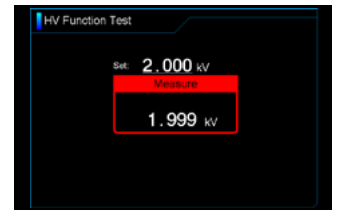
With a sampling rate of up to 200MHz, the system supports six waveform comparison modes. The maximum number of pulses can up to 32

- AREA Comparison Mode
- DIFF Comparison Mode
- CORONA Comparison Mode
- LAPLACIAN Comparison Mode
- WAVEFORM Comparison Mode
- FLUTTER Comparison Mode



## Display of Actual Output Voltage

7750 Support checking output voltage



## Breakdown Voltage Analysis

The MICROTTEST 7750 supports Breakdown Voltage Analysis function, which allows setting:

1. Start voltage
2. End voltage
3. Minimum percentage of voltage rise from the start voltage

In the second-order derivative and corona discharge ratio comparison mode, it determines whether the measured values exceed the set standard value, validating the withstand voltage strength of the tested winding component.

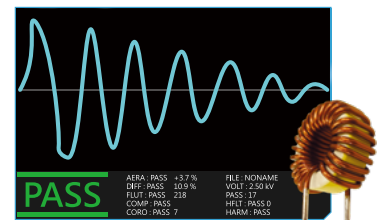


Step voltage: adjustable to 1% of the initial voltage

## Recommended Method for Setting Pulse Voltage

When setting the pulse voltage, the following factors should be considered:

1. Dielectric withstand voltage characteristics of the enameled wire
2. Spacing between each turn
3. Voltage division across each turn
4. Other insulation limitations (such as insulation layers and lamination pressure)



## 4-Wire Measurement Solution for Accurate Testing of Molded Inductors and Low-Inductance Components

During the manufacturing process of molded inductors, conductive materials or magnetic powder may overflow into unintended structures, leading to layer short circuits. In addition, uneven electroplating of conductive materials can create abnormal conductive paths, resulting in layer shorts.

The 7750-1F adopts a 4-wire measurement technique, effectively eliminating discrepancies between the detected voltage and the actual voltage. This enables highly accurate measurement of low-inductance components. Furthermore, through second-order differential computation, the system obtains the maximum discharge energy, allowing effective detection of leakage issues caused by poor solder joints in molded inductors.

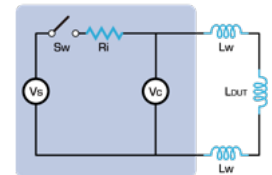
4-wire measurement technique | Model.7750-1F



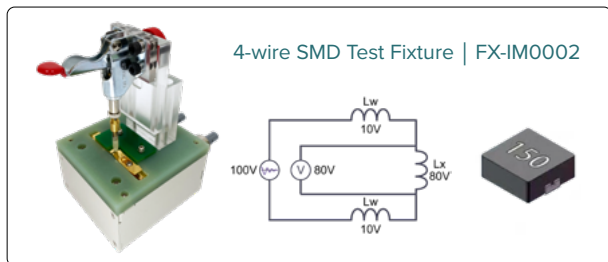
### Voltage Compensation Function

During automated winding inspection, excessive wiring impedance may cause voltage division across the test leads, resulting in the actual output voltage being lower than the preset value. This can lead to missed detection of defective products and raise quality concerns.

The 7750 / 7759 Series supports a Voltage Compensation Function, which enhances detection accuracy and reduces the risk of misjudgment.



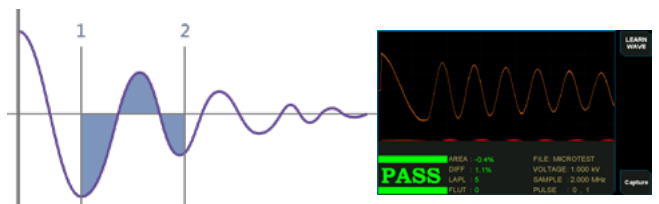
4-wire SMD Test Fixture | FX-IM0002



## 7750 / 7759 Support 6 Analysis and Comparison Modes for Detecting Insulation and Short-Circuit Defects in Wound Components

### AREA Comparison

The waveform area of the test coil within Range 1 to Range 2 is compared against a reference. When an interlayer short occurs, increased energy loss causes a higher resonance damping factor, resulting in reduced resonance amplitude and a smaller total waveform area. This is the most fundamental parameter for detecting interlayer shorts.

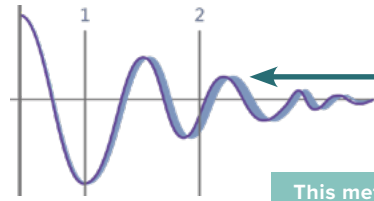


Results are expressed as a percentage (%) to evaluate differences in energy loss

## DIFF Comparison

The area difference is defined as the accumulated point-by-point waveform deviation between the reference sample and the device under test (DUT).

When a turn-to-turn short occurs, the inductance decreases (similar to a shorted secondary winding in a transformer reducing primary inductance), causing changes in oscillation frequency and phase of the resonant waveform. As a result, the area difference varies.

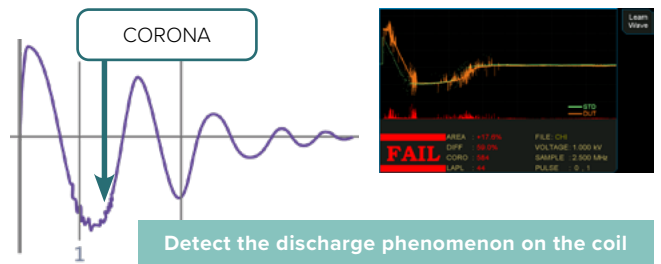


The overlap ratio is calculated by comparing the enclosed area of the DUT waveform with that of the reference waveform.

This method is used to evaluate inductance variation

## CORONA Comparison

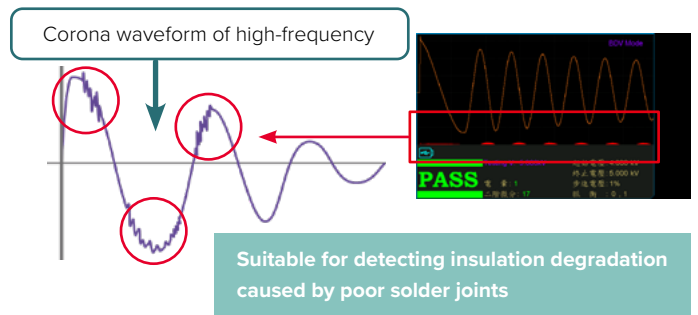
During high-voltage pulse testing, insulation degradation within the winding may cause partial discharge (corona discharge). This phenomenon appears as discharge spikes in the waveform. This function counts the number of corona occurrences and evaluates them based on the degree of deviation.



Detect the discharge phenomenon on the coil

## LAPLACIAN Comparison

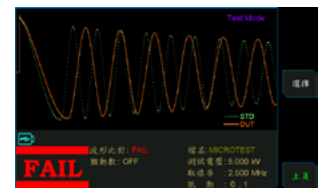
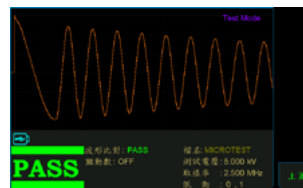
Poor insulation quality can cause discharge under high-voltage stress, leading to rapid changes in the oscillation waveform. This mode uses second-order differential (Laplacian) computation for comparison.



Suitable for detecting insulation degradation caused by poor solder joints

## WAVEFORM Comparison

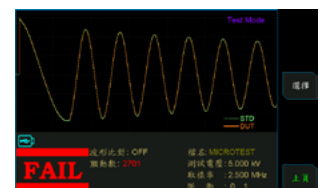
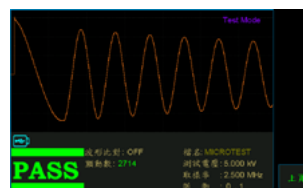
A permissible tolerance band is defined around the reference waveform. This mode simultaneously evaluates resonant amplitude and phase, significantly enhancing the detection capability for turn-to-turn shorts.



## FLUTTER Comparison

When turn-to-turn discharge occurs in a winding, the waveform exhibits flutter or jitter.

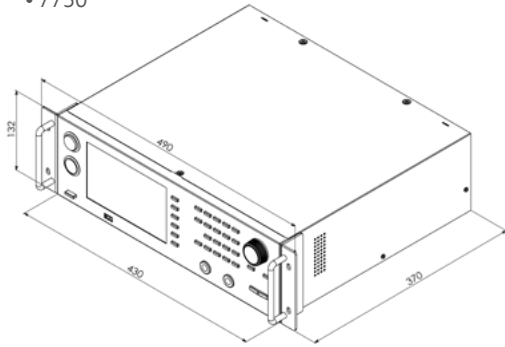
This mode quantifies the degree of waveform fluctuation and performs comparison based on numerical values.



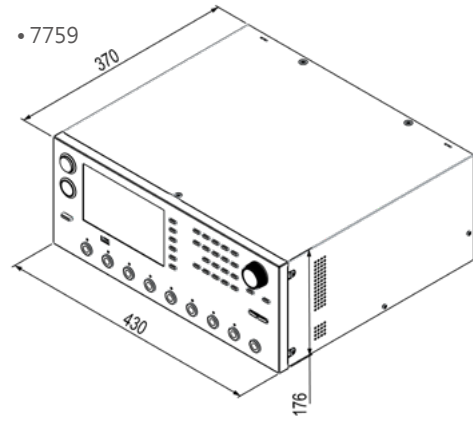
## Automatic Chassis Dimension

• Dimension (mm)

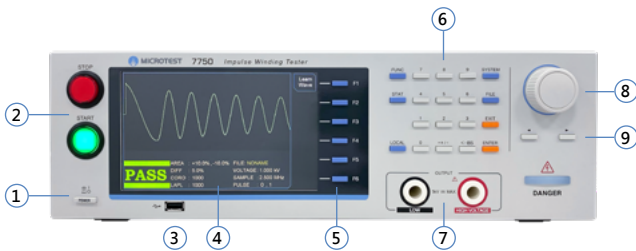
• 7750



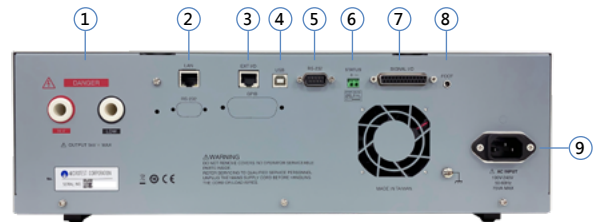
• 7759



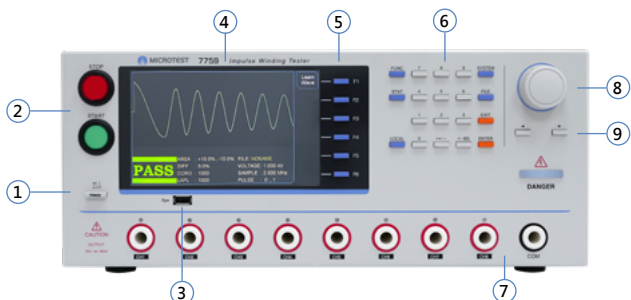
## Appearance



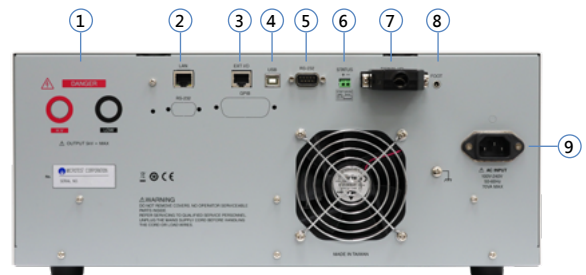
- |                 |                     |
|-----------------|---------------------|
| 1. Power Switch | 6. Number/ Menu key |
| 2. START/STOP   | 7. Voltage Output   |
| 3. USB Host     | 8. Knob             |
| 4. LCD Screen   | 9. Direction        |
| 5. Function     |                     |



- |                   |                |
|-------------------|----------------|
| 1. Voltage Output | 6. STATUS      |
| 2. LAN            | 7. SIGNAL I/O  |
| 3. EXT. I/O       | 8. Foot Switch |
| 4. USB            | 9. AC INPUT    |
| 5. RS232          |                |



- |                 |                     |
|-----------------|---------------------|
| 1. Power Switch | 6. Number/ Menu key |
| 2. START/STOP   | 7. Voltage Output   |
| 3. USB Host     | 8. Knob             |
| 4. LCD Screen   | 9. Direction        |
| 5. Function     |                     |



- |                   |                |
|-------------------|----------------|
| 1. Voltage Output | 6. STATUS      |
| 2. LAN            | 7. SIGNAL I/O  |
| 3. EXT. I/O       | 8. Foot Switch |
| 4. USB            | 9. AC INPUT    |
| 5. RS232          |                |

## Ordering Information

Impulse Winding Tester Series	Standard	Optional
<ul style="list-style-type: none"> <li>7750-5E(Impulse Voltage100V~5200V   Ls≥16μH)</li> <li>7750-5H(Impulse Voltage100V~5200V   Ls≥4μH)</li> <li>7750-5S(Impulse Voltage100V~5200V   Ls≥1μH)</li> <li>7750-1S(Impulse Voltage10V~1200V   Ls≥0.1μH)</li> <li>7750-1F(Impulse Voltage10V~1200V   Ls≥0.1μH, 4-wire)</li> <li>7750-10S(Impulse Voltage200V~10000V   Ls≥20μH)</li> <li>7759(Impulse Voltage100V~5200V   8+1 Channel)</li> </ul>	<p>7750 Series</p> <ul style="list-style-type: none"> <li>TL-IM0004 4-wire Clips-HV Test Cable (70cm)   Model.7750-1F</li> <li>TL-IM0002 Alligator Clips-HV Test Cable-Red (100cm)</li> <li>TL-IM0003 Alligator Clips-HV Test Cable-Black (100cm)</li> <li>AX-IM0001 I/O Connector (D-Sub)</li> <li>Power Cord</li> </ul> <p>7759</p> <ul style="list-style-type: none"> <li>TL-IM0002 Alligator Clips-HV Test Cable-Red (100cm)</li> <li>TL-IM0003 Alligator Clips-HV Test Cable-Black (100cm)</li> <li>AX-IM0001 I/O Connector (D-Sub)</li> <li>Power Cord</li> </ul>	<ul style="list-style-type: none"> <li>FX-IM0001 2-wire SMD Test Fixture</li> <li>FX-IM0002 4-wire SMD Test Fixture   Model.7750-1F</li> <li>F760001 D-Sub Foot Switch (15 PIN)</li> <li>TL-000015 D-Sub Cable-15M TO 15F (200cm)</li> <li>TL-000003 RS-232 Cable (180cm)</li> <li>TL-000007 USB Cable (180cm   Type-A TO Type-B)</li> <li>OP-775001 GPIB Interface</li> <li>PC Link Software</li> </ul>

# Fixture & Accessories

## FX-IM0001

2-wire SMD Test Fixture



## FX-IM0002

4-wire SMD Test Fixture



## TL-IM0002

Alligator Clips-HV Test Cable-Red



Applicable Models	7750	7750-1F	7750
Accessory Description	2-wire test fixture	4-wire test fixture	HV 20kV   100cm

## TL-IM0003

Alligator Clips-HV Test Cable-Black



## AX-IM0001

I/O connector (D-Sub)



## TL-IM0001

Alligator Clips-2 Terminal HV-Red/Black



Applicable Models	7750	7750	7700/ 7710/ 7703/ 7713
Accessory Description	HV 20kV   100cm	SIGNAL I/O plug	HV 20kV   50cm

**TL-000002**

Banana Plug-HV Test Cable-Red



**F760001**

D-Sub foot switch



**TL-000015**

D-Sub Cable



Applicable Models	7720	7750/ 7700/ 7710/ 7720/ 7703/ 7713	7750/ 7700/ 7710/ 7720/ 7703/ 7713
Accessory Description	HV 20kV   60cm	15 PIN	15M TO 15F   200cm

**TL-000003**

RS-232 Cable



**TL-000007**

USB Cable



Applicable Models	7750/ 7700/ 7710/ 7720/ 7703/ 7713	7750
Accessory Description	180cm	Type-A to Type-B I 180cm

**TL-IM0004**

4-wire Clips-HV Test Cable

Applicable Models	7750-1F
Accessory Description	70cm