Power Analyzer 7140

Direct input

Frequency | DC, 0.2Hz~100kHz Voltage | 800V Current | 30A

Supports Three Major Graphical Analysis Functions (Trend , Bar Chart, Waveform)

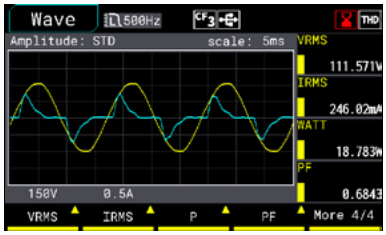
MICROTEST 7140 Power Analyzer not only provides numerical displays but also supports Waveform, Trend and Bar charts. Whether for real-time monitoring or long-term trend analysis, these graphical functions help engineers comprehensively analyze power-related parameters.

Trend Graph for Energy Evolution

As time progresses, energy changes often follow specific trends. The MICROTEST 7140's Trend function helps track long-term trends and short-term fluctuations, providing valuable insights into energy evolution over time.

Harmonic Analysis with Bar Chart

MICROTEST 7140 supports 100-order harmonic analysis and offers the option to display the results in a bar chart. This provides a more intuitive view of the relative strength or proportion of different harmonic components, helping to quickly identify the existing harmonic frequencies.



Waveform Graph for Real-Time Monitoring

The waveform graph function allows for a more intuitive observation of real-time fluctuations in power signals. By analyzing the curves of voltage and current variations, users can quickly detect any anomalies or periodic changes.

±0.05% Ultra High Accuracy, Unveiling Power's Secrets

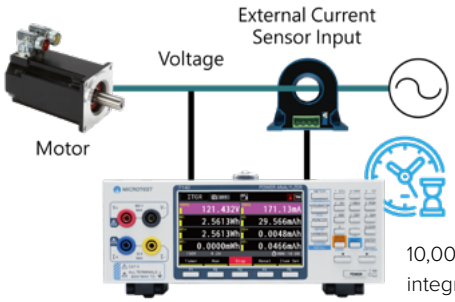
Auto Integration up to 10,000 Hours

with 100th Harmonic Analysis

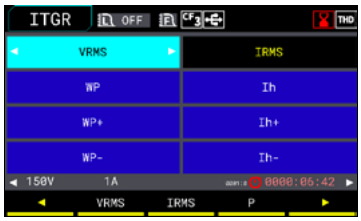
Power Integration Mode

In Power Integration Mode, the MICROTEST 7140/7130 accurately measures current integration (Ah) and energy (Wh) over a time range of up to 10,000 hours. It allows for long-term monitoring of equipment's energy consumption and current demand, making it ideal for durability testing of motors/rotating machinery. The instrument also supports data storage via the standard USB Host communication.

With its independent measurement modules, the instrument can simultaneously perform harmonic analysis and integration in any screen background, enabling real-time evaluation of harmonic effects in the system.

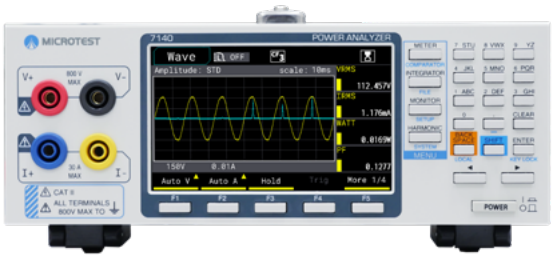


10,000 hours integration



Power Analyzer/ Power Meter

7140
7130



Test Frequency
0.2Hz~100kHz
100th-order Harmonic Analysis

MICROTEST
www.microtest.com.tw

MICROTEST 7140 Power Analyzer is specifically designed for single-phase AC/DC power measurement and analysis. It offers a wide test bandwidth ranging from DC, 0.2Hz to 100kHz and features a high-speed 500kSPS sampling rate. With a basic power measurement accuracy of ±0.05%, the compact unit is equipped with a 4.3" TFT LCD display, providing both numerical and graphical representations for precise power-related parameter measurements.

MICROTEST 7140 supports a rated direct input voltage of 800V and an input current of 30A, along with 100-harmonic analysis capability. Its independent measurement modules allow multiple tests to be executed simultaneously in any screen background. This enables harmonic analysis and integration measurement to be performed simultaneously, ensuring real-time power quality monitoring and comprehensive measurement data acquisition. This significantly enhances testing efficiency, making power analysis more precise and reliable.

For standby power consumption measurement, it supports a minimum 5mA current range and a power resolution of 10µW. The rich graphical display interface includes waveform diagrams, bar charts, and trend graphs. In Meter mode, it can display 4/8/16 sets of parameters simultaneously while monitoring the maximum and minimum values of 4 or 8 parameter sets. Additionally, the comparison mode allows for PASS/FAIL judgments based on predefined upper and lower limits, meeting the measurement requirements of production lines, R&D, and quality control applications.

Extensive Parameter Measurement

- **Voltage** (VRMS/ VDC/ V+PK/ V-PK)
- **Current** (IRMS/ IDC/ I+PK/ I-PK)
- **Frequency** (VHZ/ IHZ)
- **Power** (P)
- **Crest Factor** (CFV/ CFI)
- **Power Factor** (PF)
- **Apparent Power** (S)
- **Reactive Power** (Q)
- **Phase Angle** (DEG)
- **Total Harmonic Distortion** (THDV/ THDI/ THDW)
- **Maximum Current Ratio** (MCR)
- **Displacement Power Factor** (DPF)

Application

Household Appliances I Refrigerators, washing machines, air conditioners, microwaves, etc.

Consumer Electronics I Laptops, tablets, servers, mobile phones, etc.

Industrial Equipment I Machinery, power tools, compressors, etc.

Power Equipment I Generators, transformers, inverters, etc.

New Energy Equipment I Solar power systems

Features

- Ultra-High Measurement Accuracy ±0.05%
- High-Speed 500kSPS Sampling Rate
- Rated Direct Input Voltage: 800V / Input Current: 30A
- DC, 0.2Hz~100kHz Voltage/Current Measurement Bandwidth
- 100th-Order Harmonic Analysis (Numerical Display / Bar Graph Analysis)
- 4.3" Color Multifunctional Digital & Graphical LCD Display
- Three Graphical Display Modes (Waveform / Trend / Bar Graph)
- Automatic Integration up to 10,000 Hours with Simultaneous Harmonic Analysis
- Minimum Current Range of 5mA & Power Resolution of 10µW
- Supports Comparison Mode with Upper/Lower Limit PASS/FAIL Judgment
- Automatic Switching Between Low and High Current Measurement Modes (Eliminates Manual Wiring)
- Simultaneous AC+DC Measurement and Display
- Supports External Current Sensor Input (High-Current Testing Solution)

CE

Standard Interfaces

LAN | SIGNAL I/O | USB Device | RS-232 | USB Host

Selection Chart

Power Measurement Solutions	7140 Power Analyzer	7130 Power Meter
Frequency Range	DC, 0.2Hz~100kHz	DC, 0.2Hz~100kHz
Basic Measurement Accuracy	±0.05%	±0.05%
Sampling Rate	500kSPS	500kSPS
Meter Mode	●	●
Harmonic Analysis	100th-order harmonic	50th-order harmonic
Voltage and Current Waveform Display	●	●
Power Trend Graph	●	-
Harmonic Bar Chart	●	-

Specification

Input			
Measurement range	Voltage	Crest factor 3: 15V/ 30V/ 60V/ 150V/ 300V/ 600V Crest factor 6: 7.5V/ 15V/ 30V/ 75V/ 150V/ 300V	
	Current: Direct input	Crest factor 3: 5mA/10mA/20mA/50mA/100mA/200mA/0.5A/1A/2A/5A/10A/20A(Max30A) Crest factor 6: 2.5mA/5mA/10mA/25mA/50mA/100mA/0.25A/0.5A/1A/2.5A/5A/10A	
	Current: External current sensor input	Crest factor 3: 500mV/ 1V/ 2V/ 5V/ 10V	
Input impedance	Voltage	Input resistance:Approx. 1.66MΩ Input capacitance:Approx. 13pF (Parallel with the resistance)	
	Current: Direct input	Crest factor 3: 5mA/10mA/20mA/50mA/100mA/200mA Crest factor 6: 2.5mA/5mA/10mA/25mA/50mA/100mA	Input resistance:Approx. 500mΩ+10mΩ(wire) Input inductance:Approx. 0.1μH
		Crest factor 3: 0.5A/1A/2A/5A/10A/20A Crest factor 6: 0.25A/0.5A/1A/2.5A/5A/10A	Input resistance: Approx. 5mΩ + 3mΩ(wire) Input inductance: Approx. 0.1μH
	Current: External current sensor input	Crest factor 3: 0.5V/1V/2V/5V/10V	Input resistance: Approx. 10kΩ
Continuous maximum allowable input	BNC	Max AC 10V	
	Voltage	Peak value 1131V	
	Current	Crest factor 3: 5mA/10mA/20mA/50mA/100mA/200mA Crest factor 6: 2.5mA/5mA/10mA/25mA/50mA/100mA	Maximum current: 0.9A
		Crest factor 3: 0.5A/1A/2A/5A/10A/20A Crest factor 6: 0.25A/0.5A/1A/2.5A/5A/10A	Maximum current: 30A
Line filter	Select OFF or ON(cutoff frequency at 500Hz/5kHz/100kHz), THD ON(cutoff frequency at 500Hz/ 5kHz)		
Frequency filter	Select OFF or ON(cutoff frequency at 500Hz)		
A/D converter	Simultaneous conversion of voltage and current inputs Resolution: 16bits, Maximum conversion rate: 500kSPS		

Voltage and Current Accuracy			
Voltage and Current Accuracy	Accuracy	DC	DC Accuracy ±0.05% reading ± 0.05% of range
		0.2Hz f < 45Hz	±(0.1% of reading + 0.1% of range)
		45Hz f 66Hz	±(0.05% of reading + 0.05% of range)
		66Hz < f 1kHz	(0.1% of reading + 0.1 % of range)
		1kHz < f 10kHz	±([{0.07×(f)}% of reading] + 0.3% of range)
		10kHz < f 100kHz	±(0.4 % of reading + 0.4 % of range)±[{0.04×(f–10)}% of reading]
	Frequency range	Data update interval	Measurement Frequency Range
		0.05s	40Hz ~ 100kHz
		0.1s	20Hz ~ 100kHz
		0.2s	10Hz ~ 100kHz
		0.25s	8Hz ~ 100kHz
		0.5s	5Hz ~ 100kHz
		1s	2Hz ~ 100kHz
		2s	1.5Hz ~ 100kHz
		5s	0.5Hz ~ 100kHz
		10s~60mins	0.2Hz ~ 100kHz

Active Power Accuracy			
Active Power Accuracy	Requirements	Same as the conditions for voltage and current. Power factor: 1	
	Accuracy	DC	±(0.05% reading ± 0.05% of range)

Active Power Accuracy	Accuracy	0.1Hz f< 45Hz	±(0.2% of reading + 0.2% of range)
		45Hz f 66Hz	±(0.05% of reading + 0.05% of range)
		66Hz <f 1kHz	±(0.1% of reading + 0.1 % of range)
		1kHz <f 10kHz	±(0.1% of reading + 0.2% of range)± [{0.06×(f)}% of reading]
		10kHz < f 100kHz	±(0.4 % of reading + 0.4 % of range)±[{0.07×(f–10)}% of reading]

Voltage, Current, and Active Power Measurements		
Voltage, Current, and Active Power Measurements	Measurement	Digital sampling method
	Crest factor	3 or 6
	Wiring system	Single-phase, two-wire (1P2W)
	Range select	Select manual or auto ranging
	Display mode switching	RMS, VOLTAGE MEAN, DC
	Measurement synchronization source	Select voltage, current, or the entire period of the data update interval for the signal used to achieve synchronization during measurement
	Line filter	Select OFF or ON (cutoff frequency at 500Hz, 5kHz, 100kHz)
	Peak measurement	Measures the peak (max, min) value of voltage, current, or power from the instantaneous voltage, instantaneous current, or instantaneous power that is sampled

Integration	
Mode	Manual integration mode
Timer	Automatically stop integration by setting a timer Selectable range: 0h00m00s ~ 9999h59m59s(0h00m00s, automatically sets to manual integration mode)
Count overflow	WP: 999999MWh/-99999MWh, q: 999999MAh/-99999MAh
Accuracy	±(Power accuracy (or current accuracy) + 0.05% of reading) (fixed range) *In auto-range mode, measurement is not performed during range switching. The first measurement after switching and the non-measurement period are included in calculations
Range setting	Auto range or fixed range for Integration is available. *Refer to the "Voltage, Current, and Power Measurement" section for range switching.
Valid Frequency Ranges for Integration	Active power: DC to 100 kHz Current: DC to 100 kHz
Timer accuracy	±0.02%

Harmonic		
Measured item	1~100 {Voltage, Current, Power, Voltage Ratio, Current Ratio, Power Ratio, Voltage Phase Angle, Current Phase Angle}, and all measurement items when THD is not enabled	
Method	PLL synchronization method with Discrete Fourier Transform for harmonic analysis	
Frequency range	Fundamental frequency of the PLL source is in the range of 20Hz ~ 480Hz	
PLL source	Select voltage or current of each input element	
DFT data length	4096	
Accuracy	20Hz f < 45Hz	±(0.2% of reading + 0.2% of range)
	45Hz f 66Hz	±(0.05% of reading + 0.05% of range)
	66Hz < f 1kHz	±(0.1% of reading + 0.1 % of range)
	1kHz < f 10kHz	±(0.1% of reading + 0.2% of range)± [{0.06×(f)}% of reading]
	10kHz < f 48kHz	±(0.4 % of reading + 0.4 % of range)±[{0.07×(f–10)}% of reading]

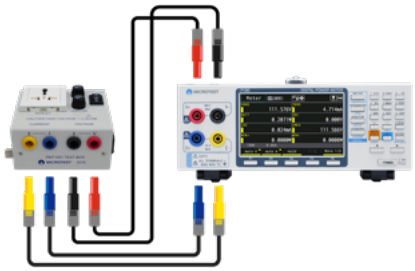
External Current Sensor Input	
Measurement range	Crest factor 3: 0.5V/ 1V/ 2V/ 5V/ 10V

General	
Supply voltage	100VAC~240VAC, 50~60 Hz
Power consumption	30VA MAX
Display	4.3"TFT, 800*480
Remote Control Input/Output Signal	USB, RS-232, ETHERNET 10/100M
Memory	USB disk, Embed flash
Operating environment	Temperature: 13°C to 40°C Humidity: < 80%RH
Weight	2.9kg
Dimensions	214x115x300mm

Functions

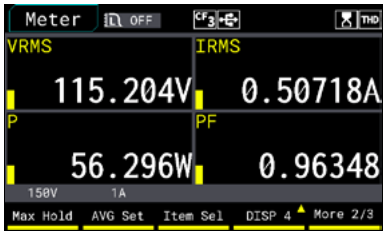
Front-Facing Voltage/Current Input Terminals for Easy Connection

The voltage/current measurement input terminals adopt a front-facing design, enabling quick and convenient connection with the F71201 fixture box. The F71201 connection cables can be directly connected to the 7140 Power Analyzer, allowing DUTs (such as AC plugs) to be plugged into the fixture box for plug-and-play functionality, eliminating the hassle of manual wiring.

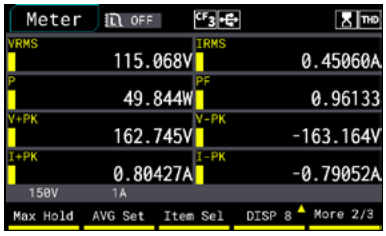


In Meter Mode, up to 4/8/16 sets of parameters can be displayed at once.

MICROTEST 7140/7130 features a 4.3"TFT LCD display with 5-digit measurement readout. In Meter mode, it can simultaneously show 4/8/16 sets of parameters. It offers ultra-high precision for voltage, current, and power measurements, achieving an accuracy of ±0.05% of the reading ±0.05% of the range.



4-Parameter Display

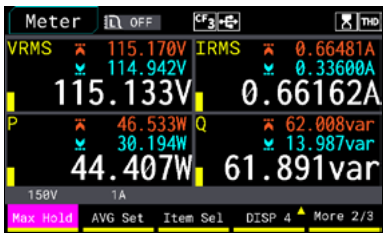


8-Parameter Display

16-Parameter Display

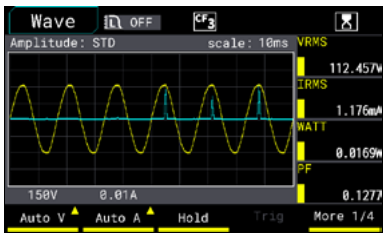
Simultaneous Monitoring of Maximum and Minimum Values for 4/8 Parameters, with Built-in Oscilloscope Function

MICROTEST 7140/7130 is capable of simultaneously monitoring 4 or 8 parameters, displaying their maximum and minimum values. This helps engineers efficiently track fluctuations and variations in power-related parameters. Additionally, it supports graphical display and features a simple oscilloscope function to observe voltage and current waveforms. With its USB Host storage interface, users can directly capture waveform screenshots and record values without the need for an external oscilloscope.



Simultaneous Display of 4 Parameters

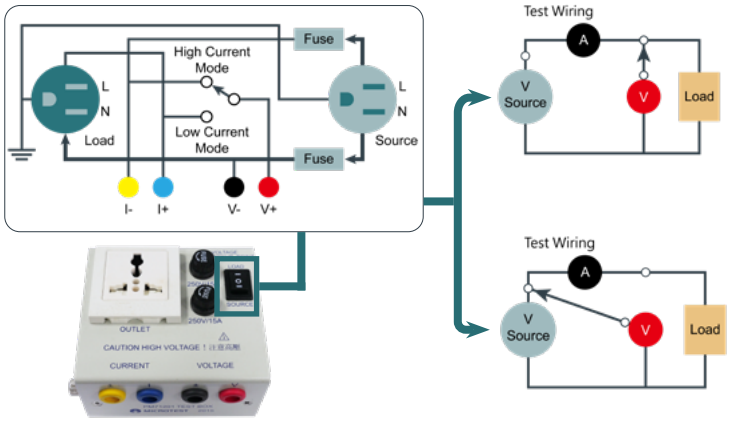
Simultaneous Display of 8 Parameters



Waveform Display of Voltage and Current

Support Switching Between High and Low Current Measurement Modes – Eliminating Manual Wiring

Most power measurement instruments cannot automatically adjust wiring to compensate for the internal resistance of current and voltage meters, which affects power consumption measurements. Engineers typically need to use the correct wiring method (U-I / I-U wiring) to ensure precise standby power measurement.
The MICROTEST 7140/7130 supports manual switching between high and low current measurement modes (when used with the F71201 test fixture and for currents below 15A), eliminating the need for manual rewiring and improving measurement efficiency.

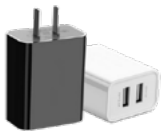


High-Current Mode

When measuring high-current products, the F71201 test fixture allows switching to high-current mode. The voltage measurement point is directly connected to the DUT (Device Under Test) to prevent voltage drop in the wiring loop, ensuring accurate power measurement without underestimation caused by high-current load conditions.

Low-Current Mode

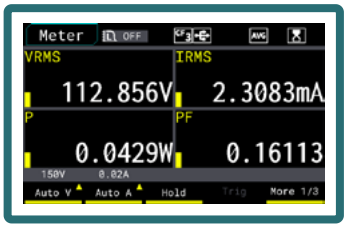
When measuring low standby power products, switching to small current mode bypass the 7140/7130 voltage input internal resistance of 1.66MΩ, ensuring that the measured power approaches 0W. This feature is particularly useful for standby power evaluation, providing high accuracy in ultra-low power measurements.



Example: Measuring Standby Power Consumption of a Charger in No-Load Condition

When testing the standby power consumption of a charger, the power generated is very small due to the extremely low current value. To ensure accurate measurement of the charger's low standby power consumption, it is essential to use the correct wiring method and appropriate current range. This ensures precision in detecting such a minimal power draw.

High-Current Mode



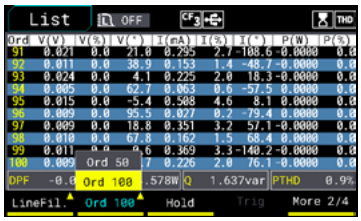
Low-Current Mode

By manually switching to Low-Current Measurement Mode through the F71201 test fixture, the power consumed by the 1.66MΩ voltage input internal resistance is automatically deducted; the system also automatically switches range to the low current range for testing. Accurately measuring the standby power consumption of the charger as 0.0429W, which is much closer to the actual value.

Up to 100-Order Harmonic Analysis with Odd and Even Harmonics Display

MICROTEST 7140 Power Analyzer meets the harmonic measurement requirements of IEC61000-4-7 standards, supporting harmonic analysis up to 100 orders. The measurement results can be displayed as either numerical values or bar charts, allowing for precise analysis of key harmonic parameters such as voltage, current, power, voltage distortion percentage, power distortion percentage, voltage phase angle, and current phase angle.

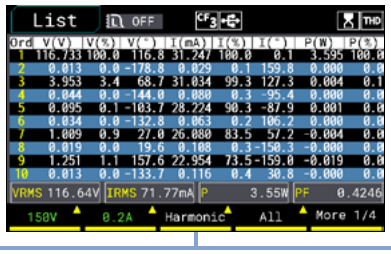
The instrument uses independent measurement modules, allowing engineers to simultaneously perform harmonic analysis and integration, enabling real-time monitoring and analysis.



Model	7140	7130
Harmonic Analysis	100th Harmonic (100th Harmonic Order)	50th Harmonic (50th Harmonic Order)

In harmonic analysis mode, engineers can choose to display "odd-order harmonics" or "even-order harmonics." Focusing on odd-order harmonics helps quickly identify issues such as nonlinear loads or voltage distortion, allowing for precise pinpointing of factors affecting power quality. Filtering even-order harmonics is effective for diagnosing potential risks such as load imbalance or equipment aging, simplifying data analysis and enabling engineers to quickly get to the root of the issue.

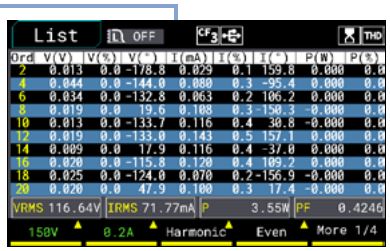
Numeric Mode



Displaying Odd-Order Harmonic Analysis

Harmonics at Odd Multiples of the Rated Frequency (Fundamental Frequency)

Evaluating the Impact of Non-Linear Loads on the System

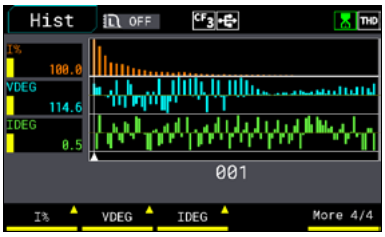


Even Harmonic Analysis Display

Harmonics with Even Multiples of the Rated Frequency (Even-Order Harmonics)

Identifying Potential Asymmetry or Specific Equipment Issues

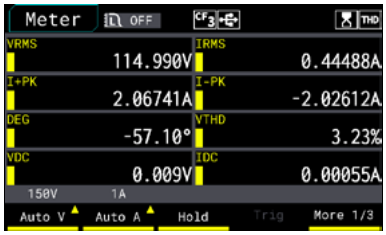
Graphical Mode



Viewing Voltage, Current, and Power Harmonics Analysis Using a Bar Graph

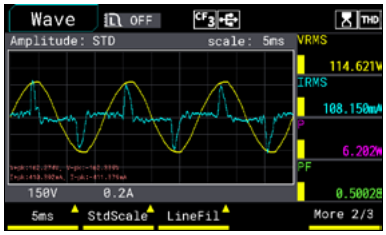
Effective Analysis of AC Power Parameters with DC Characteristics in Voltage/Current

Due to grid fluctuations, the waveform of AC power may not always be a perfect sine wave. When measuring AC parameters, the MICROTEST 7140/7130 can simultaneously display the DC component within the AC voltage and current data. This provides a more comprehensive view of power quality, assisting engineers in optimizing and analyzing power supply designs.

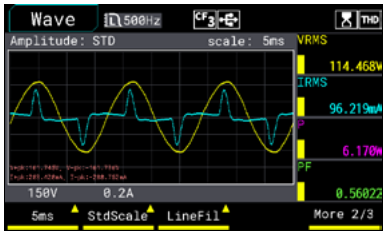


Circuit and Frequency Filtering Function

With the MICROTEST 7140/7130 supporting filtering functions, unwanted frequencies in the signal can be filtered out during measurement, leaving only the signals within the target frequency range. This results in cleaner waveforms and more precise measurements of important power-related parameters in power systems.



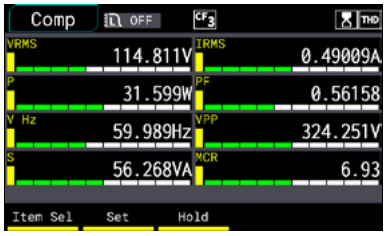
Before Filtering



After Filtering (500Hz)

Automatic PASS/FAIL Judgment

MICROTEST 7140/7130 supports Comparison Mode, allowing users to set upper and lower limit values. This feature is ideal for production line testing, where it can automatically perform PASS/FAIL judgment for multiple parameters, such as voltage, current, and power, based on the defined limit values.



PASS-Displayed in green

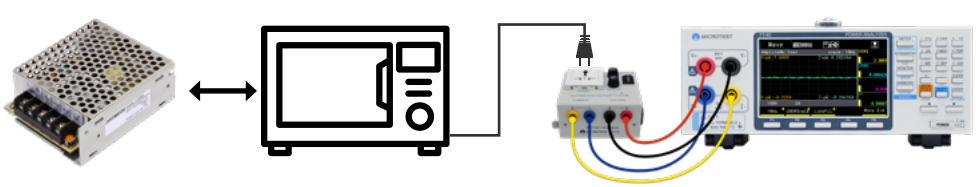
FAIL-Displayed in red

Filter Function for Accurate Switching Waveform and High-Frequency Interference Control

Switched-Mode Power Supplies (SMPS) regulate energy output through high-frequency switching, significantly improving power conversion efficiency. However, this power delivery method generates high-frequency current spikes—commonly referred to as switching noise—at the output. These signals are often accompanied by high-frequency noise and harmonic components, which can further lead to electromagnetic interference (EMI) issues.

Most power analyzers incorporate high-frequency filters to smooth waveform signals, but typically only support harmonic measurements up to the 50th–100th order. This limits the observable frequency range to approximately 5–6 kHz—far below the typical switching frequencies in SMPS applications, which often range from tens of kilohertz to several megahertz. As a result, the analyzer may fail to capture the true high-frequency characteristics of switching components. Furthermore, high-frequency noise and harmonic content may be inadvertently filtered out during measurement, leading to signal distortion and inaccurate analysis results.

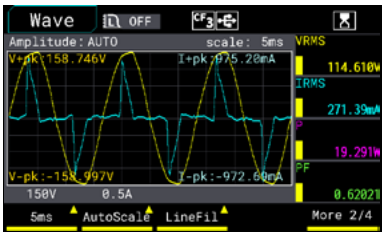
Switching Power Supply, SMPS



Microwave with SMPS design

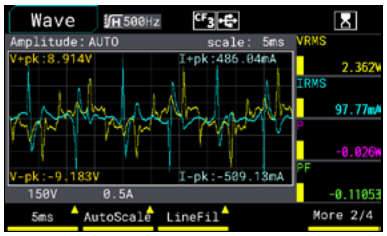
- High-Pass Filter (HPF)
- Low-Pass Filter (LPF)
- Band-Pass Filter (BPF)

MICROTEST 7140 features adjustable filtering technology, allowing engineers to select High-pass, Low-pass, or Band-pass filters according to their application needs. This enables precise isolation of target frequency bands for accurate analysis of switching current and voltage characteristics. By providing more authentic waveforms and current measurements, the MICROTEST 7140 helps engineers comprehensively identify potential interference sources in power supply designs, enhancing the stability and reliability of power systems.



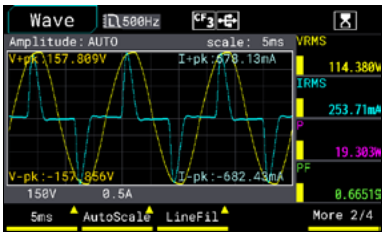
Filter Off

Raw Waveform Display



High-Pass Filter (HPF)

Removes fundamental frequency, focusing on transient spikes



Low-Pass Filter (LPF)

Dedicated filtering for DC and fundamental frequency components

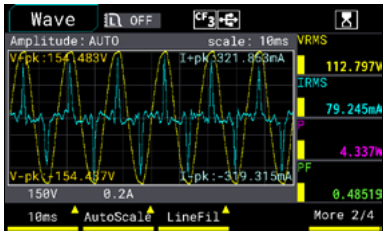
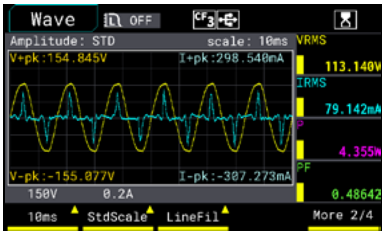
Adjustable Filter Function | High-Pass / Low-Pass / Band-Pass Filter

Engineers can select the appropriate frequency range based on actual test requirements to analyze power parameters within the target frequency band

Filter Mode	Harmonic Analysis On/Off	
	OFF	ON
High-Pass Filter (HPF)	Selectable Settings: 500Hz/ 5kHz/ 100kHz	Selectable Settings: 500Hz/ 5kHz
Low-Pass Filter (LPF)	Selectable Settings: 500Hz/ 5kHz/ 100kHz	Selectable Settings: 500Hz/ 5kHz
Band-Pass Filter (BPF)	Center Frequency：40~100kHz Passband Range：±1%~±20%	Center Frequency：40~25 kHz Passband Range：±1%~±20%

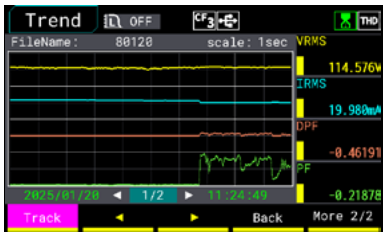
Supports Custom Display Scaling (UserScale)

Engineer can configure custom display ratios for current and voltage, enabling an oscilloscope-like interface for intuitive and flexible waveform observation.

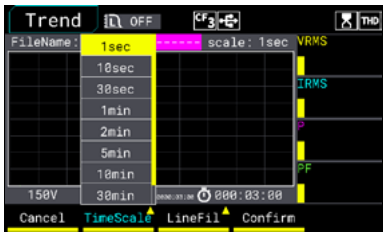
Waveform Display Settings		
AutoScale	Standard	UserScale
		
The system automatically scales the waveform to fill the entire display area, enabling quick and comprehensive signal overview.	Under the standard scaling display, the waveform occupies approximately half of the screen, making it easy for quick viewing.	Users can manually set the current and voltage scaling to flexibly adjust waveform display.

Moving the Timeline for More Flexible Trend Analysis, Quickly Focusing on Specific Moments or Sections

MICROTEST 7140 Power Analyzer supports trend chart analysis, allowing for a more intuitive view of how power parameters change over time through the timeline. This feature enables engineers to quickly and accurately pinpoint data variations at specific moments.

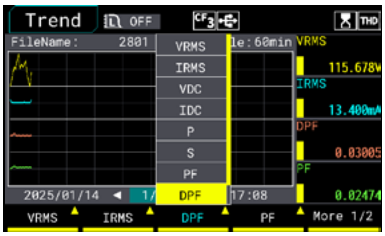


- Transient Division
- Trend Prediction and Diagnosis
- Efficiency and Performance Verification
- Comparative Analysis
- Data Logging and Reporting



Configurable Time Range

Sec	Min
1/ 10/ 30	1/ 2/ 5/ 10/ 30/ 60

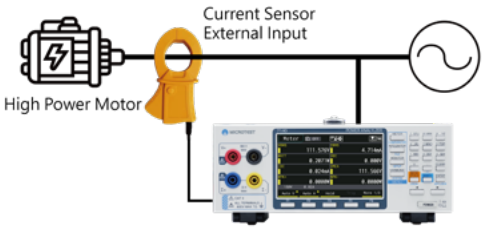


Configurable Output Parameters (Up to 4 Sets at a Time)

Output Parameters
VRMS/ IRMS/ VDC/ IDC/ PF/ DPF/ P/ S

Current Sensor Input

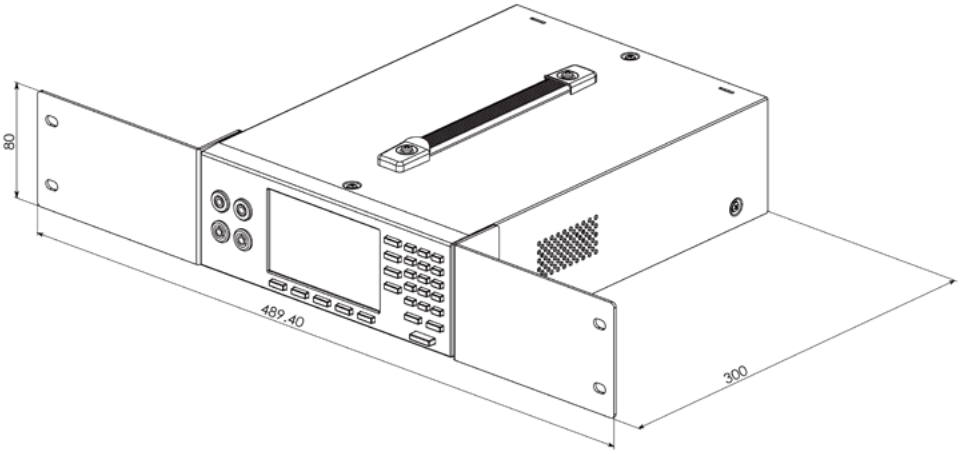
MICROTEST 7140/7130 provides a maximum input of 800V and 30A. For current measurement needs exceeding 30A, voltage input-type current clamps or current sensors can be purchased for testing.



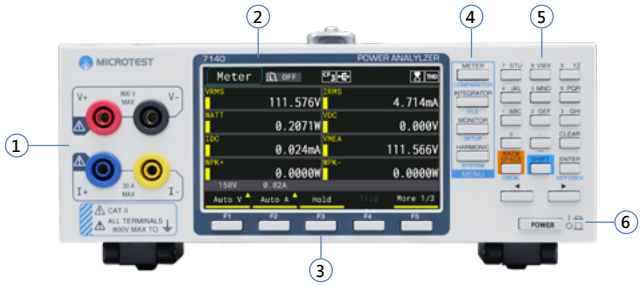
High Current Measurement Solution	
Clamp-on Transformer	Current Sensor
	
AC 100A/ 1V	AC 500A/ 4V
Bandwidth 5kHz	Bandwidth 50kHz

Automatic Chassis Dimension

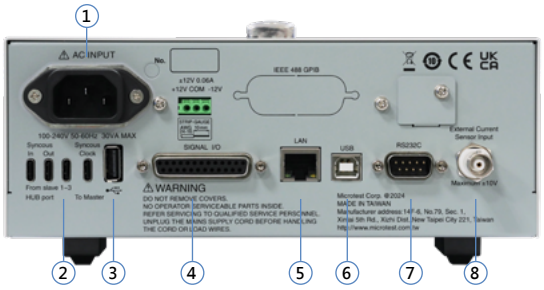
• Dimension (mm)



Appearance



1. Voltage/Current Input Terminal
2. LCD screen
3. Function keys
4. Menu Keys
5. Numeric Keys
6. Power Switch



1. Power jack
2. TYPE-C Syncous
3. USB Host
4. SIGNAL I/O
5. LAN
6. USB Device
7. RS232
8. External Current

Ordering Information

7140/7130	Standard	Optional
• 7140 Power Analyzer (100th-order harmonic) • 7130 Power Meter (50th-order harmonic)	• TL-PM0001 Test Cable-Red (100cm) • TL-PM0002 Test Cable-Black (100cm) • TL-PM0003 Test Cable-Blue (100cm) • TL-PM0004 Test Cable-Yellow (100cm) • Power Cord	• F71201 Test Box • TL-000006 Ethernet Cable (150cm) • TL-000007 USB Cable (180cm I Type-A TO Type-B) • AX-PM0001 Test Probe-Red • AX-PM0002 Test Probe-Black • AX-PM0003 Alligator Clips-Yellow • AX-PM0004 Alligator Clips-Blue • TL-000014 D-Sub Cable-25M TO 25M (180cm) • Grove Hall Sensor (AC 500A/ 4V) • Current Transformer (AC 100A/ 1V)

Fixture & Accessories

	F71201 Test Box	TL-000006 Ethernet Cable	TL-000007 USB Cable
			
Applicable models	7140/ 7130	7140/ 7130	7140/ 7130
Accessory Description	Test Box	150cm	Type-A TO Type-B I 180cm

	TL-PM0001 Test Cable	TL-PM0002 Test Cable	TL-PM0003 Test Cable
			
Applicable models	7140/ 7130	7140/ 7130	7140/ 7130
Accessory Description	Red I 100cm	Black I 100cm	Blue I 100cm

	TL-PM0004 Test Cable	AX-PM0001 Test Probe	AX-PM0002 Test Probe
			
Applicable models	7140/ 7130	7140/ 7130	7140/ 7130
Accessory Description	Yellow I 100cm	Red	Black

	TL-000014 D-Sub Cable	AX-PM0003 Alligator Clips	AX-PM0004 Alligator Clips
			
Applicable models	7140/ 7130	7140/ 7130	7140/ 7130
Accessory Description	180cm I 25M TO 25M	Yellow	Blue

	Grove Hall Sensor	Current Transformer
		
Applicable models	7140/ 7130	7140/ 7130
Accessory Description	AC 500A/ 4V	AC 100A/ 1V