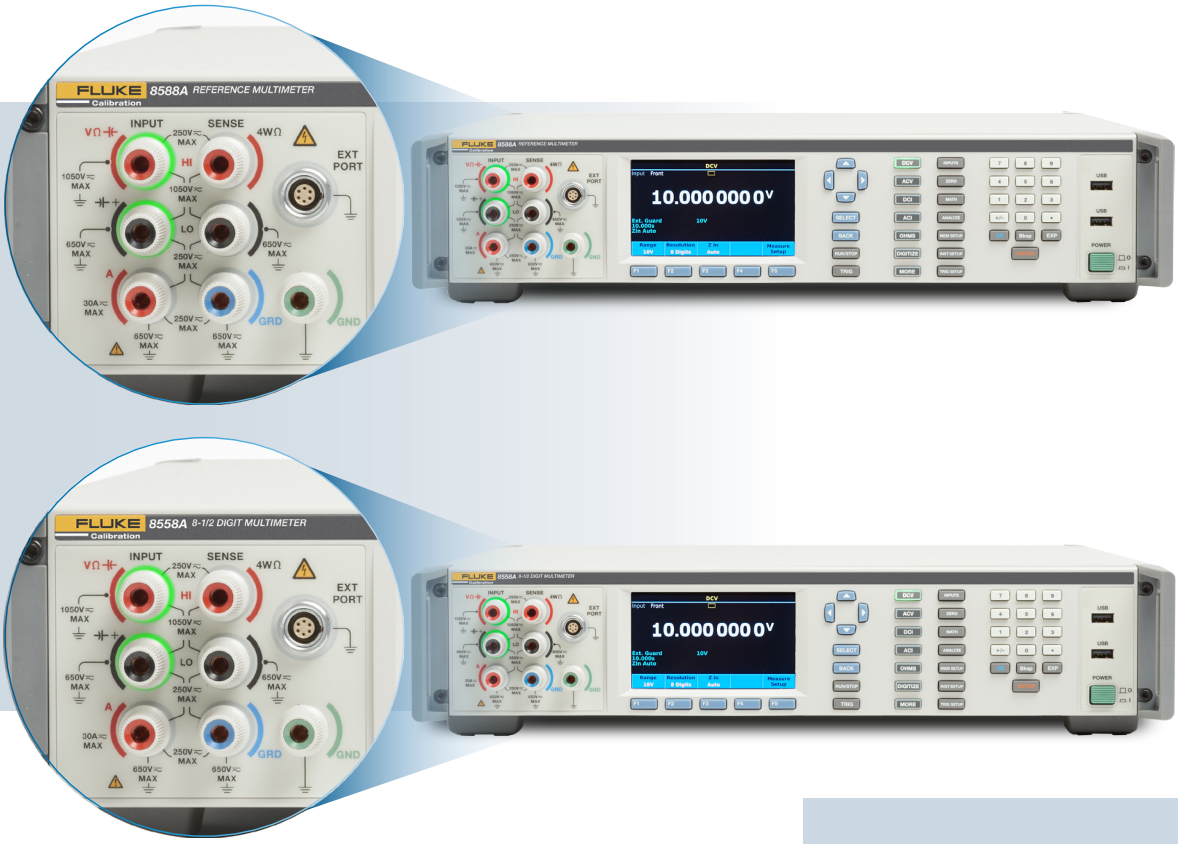
TECHNICAL DATA

8588A Reference Multimeter
8558A 8.5-Digit Multimeter



The 8588A Reference Multimeter is the world's most stable digitizing multimeter. Designed for calibration laboratories, this long-scale high-precision reference multimeter features superior accuracy and long-term stability over a wide measurement range, with an intuitive user interface and a color display.

The 8588A delivers reliable and reproducible measurements with exceptional performance suitable for primary level laboratories. With more than 12 measurement functions, including the new digitize voltage, digitize current, capacitance, RF power, and external shunts for dc and ac current, the 8588A helps you consolidate your lab's cost of test into a single measurement instrument. Its superb analog performance is augmented by Fluke Calibration's new high-speed system design and the industry's fastest direct digitizing capability, enabling significant throughput increase for many automated systems demanding a combination of the highest speed and best accuracy.

8588A: The world's most stable digitizing multimeter

The 8588A is designed for calibration and metrology laboratories that require the highest stability for the most accurate measurements to maintain maximum confidence in traceability.

8558A: The industry's fastest direct 5 mega-samples-per-second digitizing for system automation in labs and manufacturing test environments

The 8558A offers a subset of 8588A functions and features at an extremely competitive accuracy and speed performance.

The 8588A holds the industry's best one-year dc voltage accuracy of 2.7 uV/V at 95 % confidence interval, or 3.5 uV /V at 99 %, and best 24-hour stability of 0.5 uV/V (95 %) or 0.65 uV/V (99 %), enabling it to outperform other long-scale reference multimeters on the market. The 8588A further pushes the speed envelope by producing a stable 8.5 digits reading in a mere one second.

The 8588A platform consists of two models. The 8588A and 8558A both feature a common intuitive user interface with an easy-to-navigate menu structure for all configurations and a set of matching SCPI-compliant commands for automated environments. In addition, both models support a minimum of 100,000 readings per second at 4.5 digits across GPIB, USB or Ethernet.

8588A key features and performance

DC voltage

- 100 mV to 1000 V, (1050 V max)
- 2.02x full scale
- Maximum resolution: 1 nV
- 2.7 µV/V (95 %) 3.5 µV/V (99 %), 1 year
- 0.5 µV/V (95 %) 0.65 µV/V (99 %), 24 hour stability
- 0 to 10 s reading aperture (200 ns resolution)

DC current

- 10 uA to 30 A
- 2.02x full scale
- Maximum resolution: 1 pA
- 6.5 µA/V (95 %), 8.4 µA/V (99 %), 1 year
- 0 to 10 s reading aperture (200 ns resolution)

AC voltage

- 10 mV to 1000 V, 1 Hz to 10 MHz, (1050 Vrms max)
- 2.02x full scale Vpp, 1.2x full scale Vrms
- Maximum resolution: 1 nV
- 60 µV/V (95 %), 77 µV/V (99 %), 1 year

AC current

- 10 uA to 30 A
- 2.02x full scale Vpp, 1 Hz to 100 kHz 1.2x FS Vrms
- Maximum resolution: 1 pA
- 250 µA/V (95 %), 323 µA/V (99 %), 1 year

Resistance

- 1Ω to 10 GΩ (20 GΩ max)
- 2.02x full scale
- Maximum resolution: 10 nΩ
- 7 µΩ/Ω (95 %), 9 µΩ/Ω (99 %), 1 year
- Low current mode, high voltage mode and current-reversal Tru Ohms™

Digitize V

- 100 mV to 1000 V, (1050 V max)
- 2.02x full scale
- Maximum resolution: 18 bits
- 5 mega-samples per second sample rate
- Up to 20 MHz bandwidth

Digitize I

- 10 µA to 30 A
- 2.02x full scale
- Maximum resolution: 18 bits
- 5 mega-samples per second sample rate
- Up to 4 MHz bandwidth

Frequency or period

- Voltage, up to 10 MHz
- Current, up to 100 kHz
- Frequency up to 100 MHz on BNC
- 0.5 µHz/Hz, 1 year

Capacitance

- 1 nF to 100 mF
- 400 µF/F, 1 year

Temperature

- PRT and thermocouple
- 5 mK PRT, 25 mK TC, 1 year

RF power

- Rhode & Schwarz NRP series

DC I and AC I external shunt

- A40B and any other external shunt

Reading speed

- 1 reading /s @ 8.5 digit into memory
- 100,000 readings /s @ 4.5 digit into memory
- Up to 5,000,000 (5 MS/s) readings /s into volatile memory in digitize V and I
- Up to 500,000 readings/s transfer through USB in binary format

Measurement memory

- 15 million readings volitile
- 7.5 million readings volitile with time stamp
- * 16 GB non-volitile

GPIB, USBTMC, Ethernet

- Native SCPI compliant remote commands
- 8508A and 3458A emulation mode
- Fully support MET/CAL™ calibration procedures library in Fluke 8508A emulation
- IVI driver
- USB thumb drive for convenient data transfer in .csv format

Trigger mechanisms

- Manual trigger
- External BNC Trig In and Trig Out
- Internal or level trigger
- Timer trigger
- Epoch trigger
- Line trigger
- BUS trigger

CE and CSA compliant

FLUKE®
Calibration

Specifications

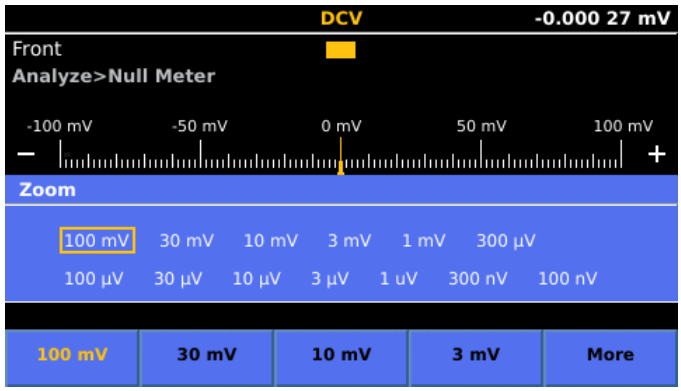
Comparing the 8588A and the 8558A		
Function	**8588A**	**8558A**
DC voltage	100 mV – 1000 V	Same
AC voltage	10 mV – 1000 V, 1 Hz – 10 MHz	Same
Resistance, LoI, HV	1 Ω - 10 GΩ	Same
DC current	10 uA – 30 A	10 uA – 2 A
AC current	10 uA – 30 A, 1 Hz to 100 kHz	10 uA – 2 A, 1 Hz to 100 kHz
Digitize V	100 mV - 1000 V, 5 MSamples/s, up to 20 MHz BW	Same
Digitize I	10 uA - 30 A, 5 MSamples/s, up to 4 MHz BW	10 uA - 2 A, 5 MSamples/s,up to 4 MHz BW
Frequency (V, I, BNC)	1 Hz to 10 MHz, 1 Hz to 100 kHz, 10 Hz to 100 MHz	Same
Temperature	PRT / Thermocouple (ext. CJC)	Same
Capacitance	1 nF – 100 mF	No
RF power	R&S NRP Series	No
Ext. dc current and ac current	A40B current shunt and other shunts	No
Graphical display	Yes	Yes
Visual Connection Management®	Yes	Yes
Programmable front/rear input switching	Yes	Yes
Ratio ohms, voltage, current	Yes	No
External 10 MHz ref clock, 50 Ω/Hi-Z	Yes	Yes
A40B and other shunt asset management	Yes	No
GPIB 488.2, ethernet, USB TMC	Yes	Yes
SCPI command compatibility	Yes	Yes
3458A emulation, 8508A emulation	Yes	Yes
Volatile memory	15 million	Same
Level and other trigger	Yes	Yes
FFT onboard	Yes	No
Reading rates: 5 MS/s into memory, bus: 100 k readings /s at 4.5 digits, 1 rdg/s at 8.5 digits	Yes	Yes

Function			8588A± (µX/X of reading + µX/X of range)		8558A± (µX/X of reading + µX/X of range)	
			95%	99%	95%	99%
DC voltage	10 V	relative	2.7 + 0.05	3.5 + 0.06	4.0 + 0.06	5.2 + 0.08
		absolute	2.8 + 0.05	3.6 + 0.06	4.1 + 0.06	5.3 + 0.08
AC voltage	10 V, 1 kHz	relative	60 + 5	77 + 6.5	80 + 10	103 + 13
		absolute	64 + 5	83 + 6.5	90 + 10	116 + 13
Resistance	10 kΩ	relative	7 + 0.5	9 + 0.	10 + 0.6	13 + 0.7
		absolute	7.2 + 0.5	9.2 + 0.6	10.3 + 0.6	13.3 + 0.7
DC current	1 mA	relative	6.5 + 4	8.4 + 5	9 + 5	12 + 6
		absolute	7.6 + 4	10 + 5	9.8 + 5	13 + 6
AC current	1 mA, 1 kHz	relative	250 + 50	323 + 65	300 + 100	387 + 12
		absolute	260 + 50	335 + 65	310 + 100	400 + 129
Frequency	BNC, 1 kHz	relative	0.5 uHz/Hz	0.5 uHz/Hz	0.5 uHz/Hz	0.5 uHz/Hz
Temperature	PRT 100 Ω,	relative	± 5 mK	± 5 mK	± 5 mK	± 5 mK
Capacitance	1 uF	relative	400 + 100	516 + 129	N/A	N/A
		absolute	406 + 100	523 + 129	N/A	N/A

95 % & 99 % 1 year relative accuracy specification. Fluke Calibration guarantees to specification at 99 % confidence interval k=2.58.

Optional 8588A Null Detector Option

The 8588A/Null Meter option can be used to replace analog null meters in electrical metrology to measure small voltage differences between two points or to detect a zero current condition where the voltages at two points are the same. These might include comparing and measuring the voltage difference between a standard and a device under test such as in the comparison of two primary level standards or between a primary standard and a secondary calibration standard by interfacing with the instruments directly or with the aid of a voltage divider. The small differences in voltage that are measured by a null detector allow voltages to be adjusted on standards so that there is effectively no voltage difference between two points or two instruments. The ability to zero voltage, or a null condition, is essential for electrical metrology. The 8588A/Null Meter has an intuitive user interface that allows quick or automated collection of measurements. As opposed to analog null meters or other DMMs, the 8588A/Null Meter is far more configurable, allowing flexibility in speed and settling.



Key Feature and specification comparison			
	8588A/Null Meter	8558A	8558A
Bias current	Specified <20pA, typical <5pA	Not specified	Not specified
Balanced resistor network resolution	Typical 0.2 ppm to 0.5 ppm	No	No
Internal 5 Hz LP filter [low noise better than analog null detectors]	Yes	No	No
Selectable ranges for null application	(± 100 nV to ± 100 mV)	No	No
Null measurement responsiveness @ 8.5 digit resolution	<1s	No	No
LF filter selection with DCV function	Yes	No	No

Stability, simplicity and performance by design

The 8588A incorporates exceptional linearity, low noise and stability in the design. This best-in-class long-scale digital reference multimeter guarantees superior 3.5 ppm one-year dc voltage relative accuracy at 99 % confidence level and long-term stability over a wide measurement range and functions.

The 8588A contains the world's most stable voltage references and attenuators custom crafted at Fluke Calibration. These precision components eliminate the need for daily internal self-calibration to compensate for drift when less-precise components are used. Autozeroing also becomes unnecessary because the amplifier offsets are ultra-stable. The 8588A achieves an exceptional 8.5-digit resolution reading in one second, two times shorter than the next best in class, which amounts to considerable productivity improvements.

The 8588A is easy and intuitive to use. It is the ideal lab multimeter for metrologists and calibration laboratory managers who expect and appreciate a straightforward setup that quickly achieves the maximum performance of the instrument.

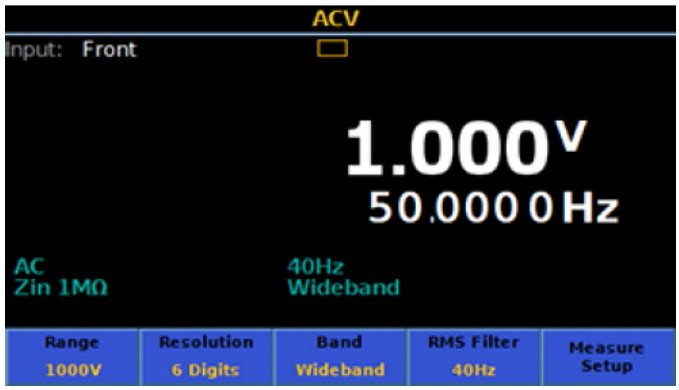
- 3.5 µV/V (99 %), 1 year relative accuracy, dc voltage, without internal self-calibration or auto-adjustments
- 0.65 µV/V (99 %), 24 hour stability, dc voltage
- 9 µΩ/Ω (99 %), 1 year, resistance
- 2.02x full scale stretches lower noise floor to higher signal levels to maximize higher accuracies from the instrument
- 0 ns to 100 s aperture setting allows the industry's widest flexibility to control data capture window

Accuracy, offset and stability provide excellent ac performance

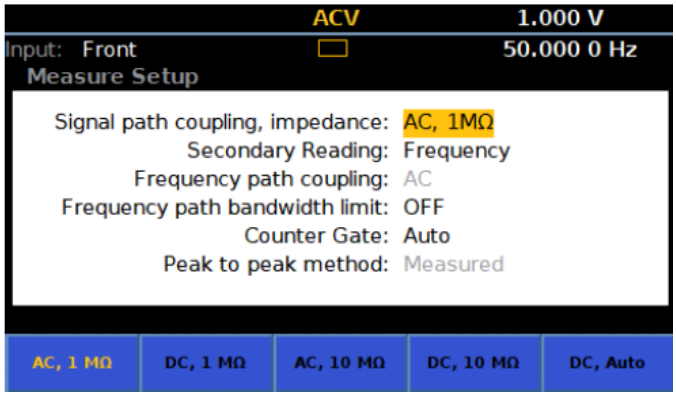
The 8588A provides the most accurate true ac rms measurement available in a Fluke Calibration multimeter.

With a 5 mega-samples-per-second sampling analog-to-digital converter and an extraordinarily stable dc analog path, the 8588A achieves remarkable ac rms measurement performance that is ten times faster, two times less noisy, and more sensitive for low level signals than other instruments in this class. It utilizes digital rms calculations to maintain full resolution of a wide dynamic range of digitized signals.

Rapid digital filters are more effective than their analog equivalents for faster settling. The digital filters eliminate the dielectric absorption on analog filters, commonly associated with residual slow-tail characteristics. The digital filters effectively shorten settling time to within 6 cycles of the filter frequency and less than 1 ppm of



AC voltage measurement



AC voltage measurement settings

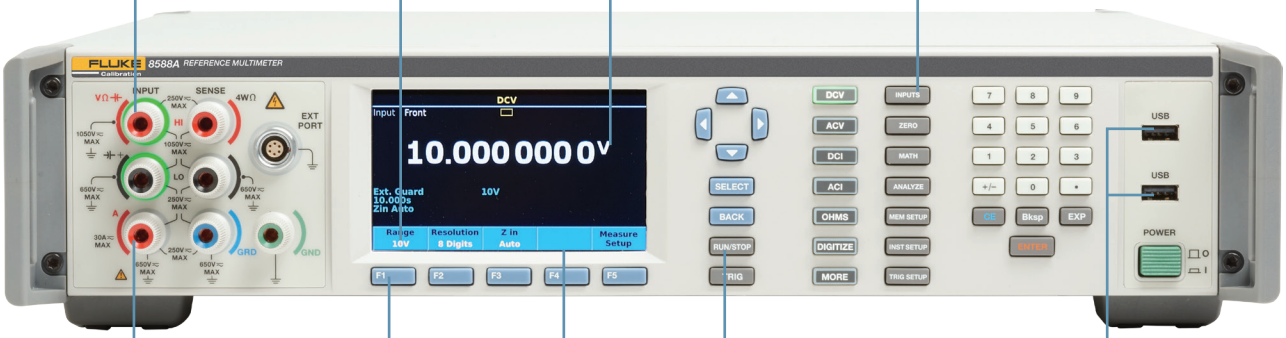
FLUKE®
Calibration

Visual Connection Management™ terminals
Active terminals light up, guiding the user to make the correct connections.

Easy-to-access configurations
Range, aperture, input impedance,RMS filter and other measurementconfigurations are readily viewable.

Large, bright full color display
The intuitive user interface and flat menu structure makes it easy to access configurations and view trend plots, waveforms, FFT, histogram and statistics.

Programmable front/rear electronic switch
Eliminates manual operation and allows immediate ratio results through a single remote command.



Soft menu keys
Adapt to the active function, so the menu structure is intuitive and easy to learn.

Run/Stop trigger
Toggles the continuous, or free run, measurement state.

30 A terminal
Enables industry's widest current measurement range through a single terminal.

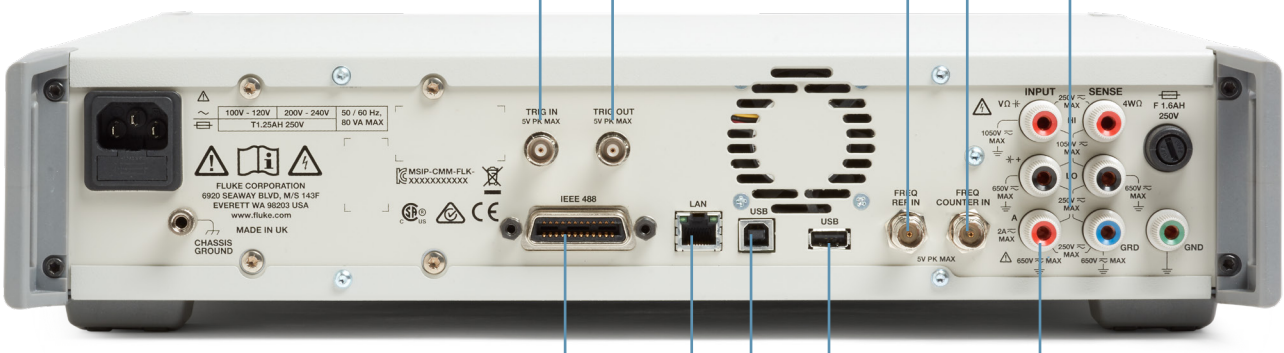
Multi-language selection
Choice of English, Chinese, French, Japanese, Korean, Russian and Spanish.

USB ports
Download data quickly and easily to a flash drive.

Trig in/Trig out
Precise triggering maximizes synchronization in system automation.

Freq Counter
Enables 100 MHz frequency counter measurement at 0.5 uHz/z.

Rear panel input terminals
Mirrors front panel input terminals for connection compatibility and allows for front/rear scan measurement.



IEEE 488, LAN USB interfaces
Standard remote interface for straightforward system integration.

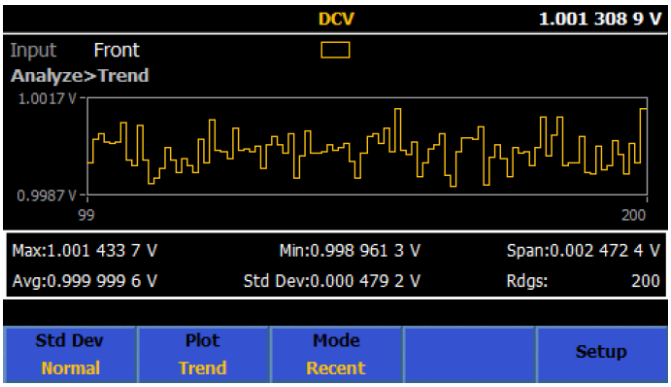
USB port
Download data quickly and easily to a flash drive

2 A terminal

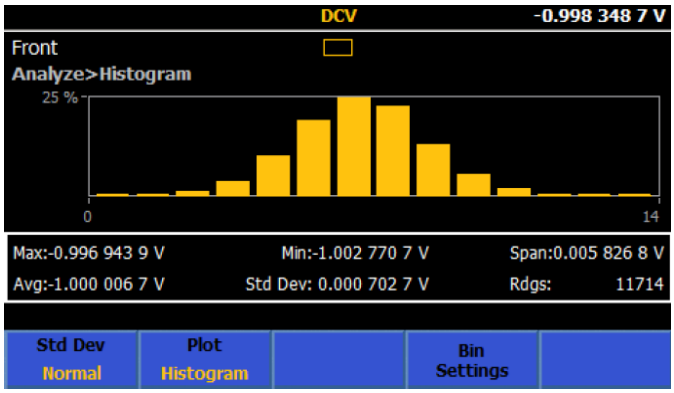
the fully settled value. This is up to 10 times faster than other long-scale precision digital multimeters at low frequencies.

Low noise is achieved from averaging the collected high-resolution digitized data and the inherently stable signal path. De-coupling low level signal sensitivity from temperature drift enables the 8588A to make high accuracy low-level ac measurements. Therefore, temperature drift, offsets, and long-term instability typically associated with an analog rms converter are eliminated.

- 77 µV/V (99 %), 1 year relative accuracy, for the most accurate ac voltage measurement
- 323 µA/A (99 %), 1 year relative accuracy, ac current
- 15 ms settling time at 1 kHz ac filter accomplishes 10x faster ac voltage measurement
- 2.02x full scale Vpp, 1.2x full scale Vrms
- Up to 30 A for peak ac current greatly extends ac current measurement range



Trend plot



Analyze: Histogram

Usability designed for metrologists by metrologists

The 8588A is the ideal lab multimeter. It streamlines the measurement process while eliminating misunderstandings, with an easy-to-access user interface in English, Chinese, French, German, Japanese, Korean, Russian and Spanish. An intuitive graphical display lets you easily visualize trends, histograms, complex waveforms, and statistics and perform routine metrology tasks quickly. You can perform both real-time and post-capture analysis for short-term and long-term stability, identifying and quantifying drifts, run-around noise and uncertainty analysis without the need for an external computer or software. You can also quickly visualize post-processed frequency domain signals of fundamental and harmonic amplitude and phase content.

Some popular system multimeters have complex menu structures and unintuitive commands, while others lack any user interface, presenting barriers to training and operation. By contrast, the 8588A/8558A feature an easy-to-access configuration menu that makes it easy to train new users.

The front panel features many new usability improvements. Visual Connection Management™ output terminals light up to show which terminals are active, guiding the user to make the correct connections. The handles are over-molded for comfort and easy transport.

USB host ports are placed both on the front and rear of the instrument. Use the ports to export data to external memory devices or simplify firmware updates. For remote communication with a PC, choose from Ethernet, GPIB or USBTMC connectors on the rear panel.

The 8558A/8558A provide full emulation of the Fluke 8508A Reference Multimeter and command compatibility of the Keysight 3458A Digital Multimeter via SCPI commands, making it an ideal replacement for these older instruments.

- Graphical display that enables instantaneous visualization of trend plot, statistical analysis, histogram and FFT.
- GPIB, USBTMC, Ethernet allows industry standard selection of remote interface.
- USB thumb drive enables quick and easy data transfer to PC in .csv format.
- SCPI compliant commands with 8508A and 3458A emulation mode simplifies and accelerates system upgrade process to 8588A/8558A
- Programmable front/rear input switching with scan measurement allows ratio, difference and deviation measurements between front and rear terminals in dc voltage and resistance, functions with state-of-the-art linearity, noise performance, superb transfer uncertainties.
- Capacitance and RF power meter readout from Rohde & Schwarz NRP Series expands the utility of 8588A in calibrating multi-product calibrators for improved productivity in calibration labs.

Accurate data, delivered amazingly fast

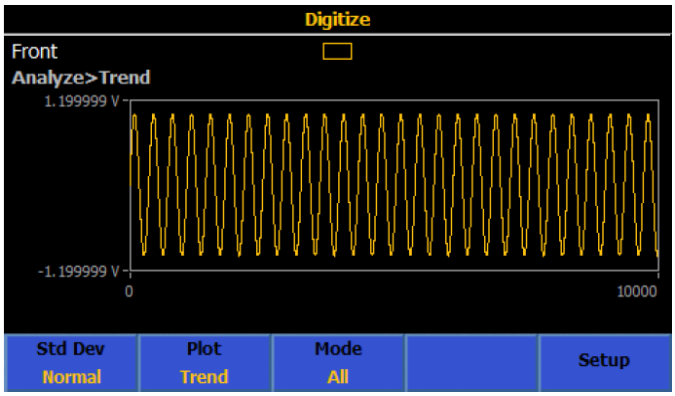
Shorter test time on the 8588A/8558A high-speed digital platform enables you to increase throughput, improve yield and realize a greater return on your investment. The 8588A/8558A digitizes to memory at 200 nanoseconds per reading and delivers 4.5 digit data to a PC via USB, Ethernet and GPIB at 100,000 readings per second. Fast, high resolution data capture gives you the quantity and quality of information you need to make timely, correct decisions affecting system throughput and efficiency.

- 0 ns to 100 s aperture setting allows industry's widest flexibility to control data capture window
- Reading speed: 1 reading /s @ 8.5 digits to 100,000 reading /s @ 4.5 digits
- Data transfer from memory to PC: up to 500,000 readings /s in binary format through USB, up to 200,000 through Ethernet and GPIB

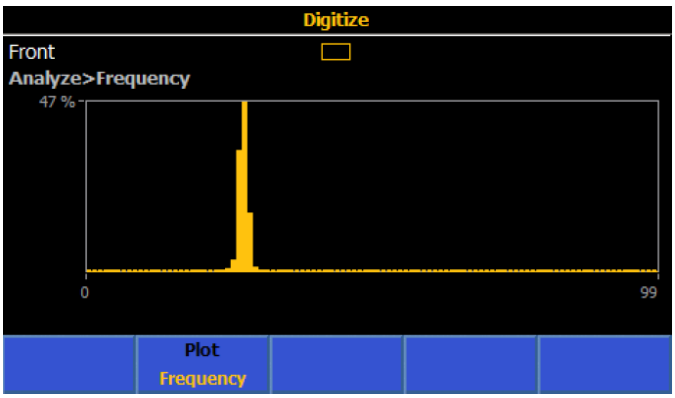
Debug and perfect your device under test

The 8588A/8558A features a 5 mega-sample digitizing rate with up to 20 MHz analog bandwidth, making it the first and only instrument on the market that can characterize extremely low level transient signals at 18-bit resolution. This capability makes it easier to debug designs, uncover anomalies and perfect your devices under test for use in real life environments.

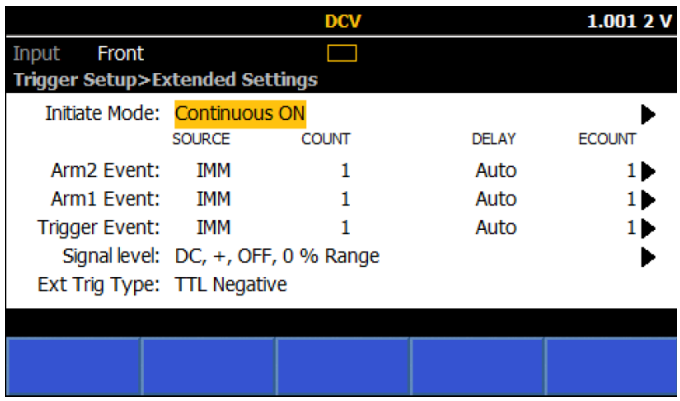
- Voltage sensitivity to hundreds of nV and current sensitivity to hundreds of pA allows you uncover ultra-low level transient signals
- Up to 20 MHz bandwidth for voltage and 4 MHz for current retains high bandwidth content of the signal measured
- 18-bit SAR analog-to-digital converter that achieves 5 mega-samples per second
- 5 mega-samples per second sample rate, into buffer, for capturing complex, fast changing waveforms
- 15 million readings memory allows large amount of data storage eliminating the immediate need to transfer data to a PC
- Graphical waveform display enables real-time visualization of complex waveforms, increased productivity with faster access to results and answers



Trend Plot



Analyze: FFT



Trigger System

Fast, reliable and accurate system compatibility

Inserting a new instrument into a tightly synchronized system can create overhead and incompatibility. The 8588A/8558A's digital platform includes common connectivity interfaces plus precise triggering that lets it digitize and transfer data to anywhere in the system for analysis, with minimal effort and the highest reliability.

- GPIB, USBTMC, Ethernet allows industry standard selection of remote interface
- USB thumb drive enable quick and easy data transfer to PC in .csv format
- SCPI compliant commands with 8508A and 3458A emulation mode simplifies and accelerates system upgrade process to 8588A/8558A
- Fully supports MET/CAL calibration procedures library that commands the Fluke 8508A
- IVI Driver for industry standard control of DMM on 8588A/8558A
- Trigger Mechanisms: External BNC Trigger Trig In and Trig Out, Internal or level trigger, Timer trigger, Epoch trigger, Line trigger, Bus Trigger
- Less than 100 ns trigger latency with external BNC trigger for digitize voltage and current

The MET/CAL™ Calibration Management Software advantage

Both 8588A and 8558A work with Fluke Calibration MET/CAL™ Calibration Software. With native MET/CAL support or using 8508A emulation mode, you can increase throughput up to four times that of traditional manual and multi-product methods while ensuring calibrations are performed consistently every time. This powerful software documents calibration procedures, processes and results for ease in complying with ISO 17025 and similar quality standards.

Support and services when you need them

Fluke Calibration offers testing, repair and calibration services to meet your needs quickly and at a fair cost while maintaining the high level of quality that you expect. Our electrical calibration laboratories are accredited for conformance to ISO Guide 17025 and we maintain global calibration and repair facilities.

Get peace of mind and uptime with a Gold CarePlan service package

The 8588A/8558A multimeters come with a standard one-year factory warranty. You can enhance warranty protection with a Priority Gold Instrument CarePlan service package.

A Priority Gold Instrument CarePlan includes an expedited annual calibration to reduce downtime by a week and extended warranty to help ensure the best long-term performance from your instruments. Choose from one-year, three-year or five-year CarePlans. (Note: Priority shipping times vary by country. Contact your local Fluke Calibration sales representative for details.)

Ordering information

Models	Description
8588A/Null Meter	Reference Multimeter with Null Detector option
8588A	Reference Multimeter
8558A	8.5 Digit Multimeter
Standard accessories	**Description**
8588A-LEAD KIT-OSP	General purpose probe kit & pouch with 2x 4-way shorting PCB
Optional accesories	**Description**
Y8588	Rack mount kit (2U – 3.5 in)
Y8588S	Slide rack mount kit
8588A/CASE	Transit case
8588A-LEAD	Comprehensive measurement lead kit
8588A-SHORT	4-way shorting PCB
8588A-LEAD/ THERMAL	Low thermal lead cable, 1.5 m two core screened low thermal cable with 6 mm gold plated copper spade terminals
8588A-7000K	Cal kit with 1 gohm standard and connecting leads
96000SNS	R&S power sensor

Fluke Calibration. *Precision, performance, confidence.™*

Electrical | RF | Temperature | Humidity | Pressure | Flow | Software

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