FLUKE®

9640A RF Reference Source

A unique combination of level precision, dynamic range and frequency capability

Preliminary Technical Data

The 9640A Reference Source: designed for RF calibration

Choosing a signal source for calibrating spectrum analyzers, modulation analyzers and other RF measurement equipment can be a frustrating task. You need a source that has accurate attenuation, broad frequency coverage, signal purity, and 50- or 75-Ohm output. But because most signal sources are not designed for calibration, they cannot provide the accuracy and performance you need in these areas, even if you first use additional equipment to characterize the source.

Some newer signal sources include extra "features" that you pay for but do not actually need for calibration. But the features you do need aren't available, at least not in a single instrument. Signal sources that offer a wide frequency range may not meet the required specifications for level or attenuation accuracy. Sources with good level accuracy may not have the frequency range you need. Add the need for a wide dynamic range, and the search becomes almost impossible.

Given all of the problems involved in finding a signal source that can do the job, it is no wonder that many calibration professionals continue to use their old sources for as long as possible. However, as manufacturers stop supporting older instruments, the cost of ownership begins to rise.



The Fluke 9640A Reference Source can help you simplify the RF calibration process. The 9640A calibrates a broad range of RF test equipment:

- Spectrum analyzers
- Modulation meters and analyzers
- RF power meters and sensors
- Measurement receivers
- Frequency counters
- Attenuators
- And more

A unique combination of level accuracy, dynamic range and frequency in a single box

The Fluke 9640A Reference Source features a unique combination of level precision, dynamic range, and frequency capability to calibrate the broadest range of RF measurement workload. The 9640A is designed specifically for metrology applications where the combination of level accuracy and dynamic range is important.

The 9640A replaces the level generator, RF signal generator, power meter and sensors, step attenuators, and function generator commonly used in RF calibration systems. It gives you the signal range and precision you need in a single, easy-to-use instrument. You need fewer pieces of equipment, which simplifies the calibration process and, ultimately, saves time and resources.

For even greater time savings, the 9640A can be automated with MET/CAL® *Plus* Calibration Management Software. MET/CAL *Plus* software has become the de facto industry standard for automating the calibration process and managing cal lab inventory, because it provides a complete, scalable, and affordable solution.

Fluke supports your instrument investment with a range of services, software and training.

Our developers are continuously releasing new MET/CAL procedures to help you cover your workload in the most efficient manner possible. And, of course, we offer a broad range of calibrators and standards to handle a wide portion of your dc/low frequency, temperature and humidity, power, pressure, and process calibration needs.

Only Fluke offers so many solutions, matching your calibration needs, workload and budget with the best tools to do the job. Just what you'd expect from the leading manufacturer of calibration solutions.

A history of innovation

Fluke is no stranger to high frequency calibration. Since its founding in 1948, Fluke has developed many unique technologies, helping calibration professionals to keep the world up and running. These technologies resulted in products including a line of high frequency signal generators and, more recently, a range of oscilloscope calibration solutions to 6 GHz and beyond. Procedures for calibrating RF equipment have been developed for MET/CAL *Plus* software.



Capability and performance in a single, cost-effective solution

Level accuracy and broad frequency coverage in one instrument

Calibration often involves use of several popular signal sources spanning a wide range of frequencies. Some of these signal sources are now obsolete. You would normally need three signal generators, plus a power meter and sensors, to cover the entire frequency range of today's workload with the required accuracy.

The Fluke 9640A is designed to handle the broadest portion of the RF calibration workload, providing frequency coverage from 10 Hz up to 4 GHz. The signals are extraordinarily accurate across the entire frequency range.

Having a single output source reduces the cost of ownership because you have fewer instruments to calibrate and repair. A single instrument is also easier to use manually or automate.

High signal purity maintains level accuracy

The 9640A outputs a pure sinusoidal signal with extremely low harmonic and spurious and phase noise signal content. This ensures that level accuracy is maintained when you make measurements with wideband or narrow band detectors, or when the 9640A is used for intercomparing peak and RMS sensing instruments. You'll avoid differences between the wideband/narrow band and peak/RMS sensors, without requiring additional external filters.

The importance of low phase noise is often overlooked, or at least not considered beyond the need to do phase noise testing. Yet there are multiple tests where low phase noise is important, including residual FM and spectrum analyzer close-in response. The Fluke 9640A can be used in these tests and others that depend on the instrument's signal purity.

Precision leveling head minimizes mismatch errors

A rugged, precision leveling head delivers the 9640A signals directly to the unit under test, to minimize losses, noise, mismatch errors and to maintain the calibrated integrity of the signal. The head maintains signal precision and noise immunity throughout a 154 dB dynamic range, down to the very lowest levels at –130 dBm.

By integrating signal leveling and attenuation within the leveling head, the 9640A eliminates the need for separate, difficult-to-automate step attenuators, simplifying automation and reducing cost of ownership. It also eliminates the need to use an external power meter and sensors to characterize the output at different levels.

VSWR and mismatch errors are often the dominant source of measurement uncertainty in RF applications. Connecting the leveling head output directly to the load minimizes transmission line length and eliminates any VSWR degradation due to cabling, allowing the full potential of its accuracy specifications to be realized at the load across the entire frequency range.

The 9640A-STD is supplied with a 50 Ω leveling head, while the 9640A-STD/75 comes complete with both 50 Ω and 75 Ω leveling heads.

External frequency reference input and output

The 9640A frequency accuracy is 0.25 ppm and sufficient for most applications. However, if better accuracy is required a selectable external frequency reference input is available on the rear panel of the 9640A. The input allows you to lock the frequency output to an external reference, such as the Fluke 910R Rubidium Standard, for applications where high clock accuracy or use of a common reference frequency is important.

The frequency reference output allows a UUT to be frequency locked to the 9640A internal reference clock. This configuration is often required to reduce frequency offset errors that may occur between the reference source and the UUT.

Internal AM and FM modulation

The 9640A Reference Source's internal modulation capability makes it suitable for applications that require precision modulation to be applied to the output signal, such as modulation analyzer calibration. You don't need additional function generators as a low frequency modulation source—the 9640A delivers it all.

Frequency modulation is available at rates up to 300 kHz for applications such as modulation analyzer testing.

Amplitude modulation is available at depths of up to 99 % and rates up to 200 kHz. This feature also simplifies spectrum analyzer sweep rate tests. Extremely accurate modulating frequency is ideal for measuring a spectrum analyzer's zero-span-mode time-domain display accuracy.

An RF calibration solution that sets new standards for usability

The 9640A front panel is equipped with dedicated function keys, context-sensitive softkeys, and a bright, easy-to-read color display that make it easy to learn and operate. Output levels may be set in terms of power, (watts or dBm), voltage (rms or pkpk) using familiar multipliers or exponent forms. You can move easily between voltage power and dBm units without losing entered values or accuracy.

The user interface is designed to simplify common calibration processes for typical items in your workload, such as spectrum analyzers, RF level meters and receivers. Offset, stepping, relative and error modes allow calibration technicians and metrologists to work quickly, accurately and efficiently, following familiar calibration procedures and making it easy to determine performance and tolerances of units under test.

The support you need, when you need it

When you register MET/CAL *Plus*, you are enrolled automatically in the MET/SUPPORT Silver program for 60 days of free support via telephone, fax, and e-mail—to help get you up and running quickly and easily. But the support doesn't stop there. Enroll in the annual MET/SUPPORT Gold program and receive additional premium support and services to help keep you as productive as possible. In addition to priority support by telephone, fax or e-mail, you get free access to the Fluke library of Warranted Procedures, software updates and upgrades, discounts on training courses, and more. Even if you use only a few of the Gold services, you can easily recover more than the cost of your membership fee.

Fluke also operates global calibration and repair facilities to keep your hardware in top working order. A variety of service programs are available, including the Priority Gold CarePlan, which features priority turnaround on calibration and repairs plus a host of additional features.

If you need to arrange for training for yourself or your staff, Fluke can help there too, with a broad range of classes on metrology principles, lab management, software use, procedure writing, and more.

Fluke's commitment to support provides additional benefits as well, including invitations to software user group meetings and conferences, periodic e-mail bulletins, and a newsletter.

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Preliminary Specifications

Frequency range	10 Hz to 4 GHz
Frequency resolution	< 100 MHz: 0.001 Hz , > 100 MHz: 11 digits
Frequency accuracy	± (0.04 ppm + 0.08 mHz)
Frequency sweep	10 Hz to 4 GHz, linear or logarithmic, 0.1 Hz resolution
External reference input	1 MHz to 20 MHz at 1 MHz steps ± 30 ppm
Frequency reference output	1 MHz or 10 MHz, user selectable
Amplitude range	Into 50 Ω –130 dBm to +24 dBm (0.2 µV to 10 V pk-pk) > 125 MHz: +20 dBm > 1.4 GHz: +14 dBm Into 75 Ω –136 dBm to +18 dBm > 125 MHz: +14 dBm > 1.4 GHz to 2 GHz: +8 dBm
Amplitude resolution	0.001 dB
Absolute level accuracy into 50 Ω	100 kHz: +24 to –48 dBm ± 0.05 dB –48 to –60 dBm ± 0.2 dB –60 to –70 dBm ± 0.5 dB –70 to –100 dBm ± 1.5 dB 100 MHz: +24 to –17 dBm ± 0.05 dB –17 to –70 dBm ± 0.2 dB –70 to –100 dBm ± 0.2 dB –100 to –130 dBm ± 0.5 dB 4 GHz: +14 to –48 dBm ± 0.5 dB, –48 to –80 dBm ± 1.0 dB
Output impedance	50 Ω with precision N-series male connector to MIL-C-39012 (Optional 75 Ω leveling head available)
VSWR	≤ 125 MHz: ≤ 1.1, > 125 MHz: ≤ 1.2
Spectral purity	Harmonics ≤ 60 dBc. Spurious ≤ 75 dBc, > 3 kHz offset
Phase noise	500 MHz to 1 GHz: 10 kHz offset –114 dBc/Hz, 1 MHz offset –132 dBc/Hz
Internal modulation	AM: sinusoidal and triangular waveform. FM: sinusoidal only
AM rate	20 Hz to 220 kHz, Fm ≤ 1 % Fc. Accuracy: 0.25 ppm ± 1.2 mHz
AM depth	Range: 0.1 % to 99 %. Accuracy: 3 % setting, typical
AM THD	≤ 1 % (–40 dBc), typical
FM rate	20 Hz to 300 kHz. Accuracy: 0.25 ppm ± 1.2 mHz
FM deviation	10 Hz to 750 kHz or 0.12 % Fc. Accuracy 3 %, typical
FM THD	≤ 1 % (–40 dBc), Frate ≤ 10 kHz, typical
Temperature	Operating: 0 °C to 50 °C. Specified Performance: 5 °C to 40 °C, Tcal ± 5 °C. Storage: –20 °C to +60 °C
Calibration interval	All specifications apply to a 1 year calibration interval at a nominal factory Tcal calibration temperature of 23 °C.
Standard interfaces	IEEE488.2 (GPIB)
Dimensions (WxHxD)	433 x 146 x 533 mm (17.0 x 5.8 x 21.0 in) Mounts within industry-standard 483 mm (19 in) rack-mount frames when fitted with Y9600 rack mounting kit
Weight	18 kg (40 lbs)

Ordering Information

(not available to order until April 2006)

Models	**Description**
9640A-STD	4 GHz RF Reference Source including 50 Ω output
9640A-STD/75	4 GHz RF Reference Source w/50 Ω and 75 Ω output
Options and Accessories	
9600CASE	Rugged Transit Case
Y9600	Rack Mount Kit (Slides)
96XXCONN	Adapter/Torque Kit

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Fluke Corporation
PO Box 9090, Everett, WA USA 98206

Fluke Europe B.V.
PO Box 1186, 5602 BD
Eindhoven, The Netherlands

For more information call:
In the U.S.A. (800) 443-5853 or
Fax (425) 446-5116
In Europe/M-East/Africa +31 (0) 40 2675 200 or
Fax +31 (0) 40 2675 222
In Canada (800) 36-FLUKE or
Fax (905) 890-6866
From other countries +1 (425) 446-5500 or
Fax +1 (425) 446-5116
Web access: http://www.fluke.com

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