

# 9640A Series

The key component in an RF and microwave calibration system

## Technical Data



The Fluke 9640A and 9640A-LPNX RF Reference Sources are designed specifically for RF calibration, featuring a calibration-oriented user interface, precision signal level and attenuation, high signal purity and precision low distortion modulation. This unique combination of features and performance makes them clearly superior to the general purpose signal

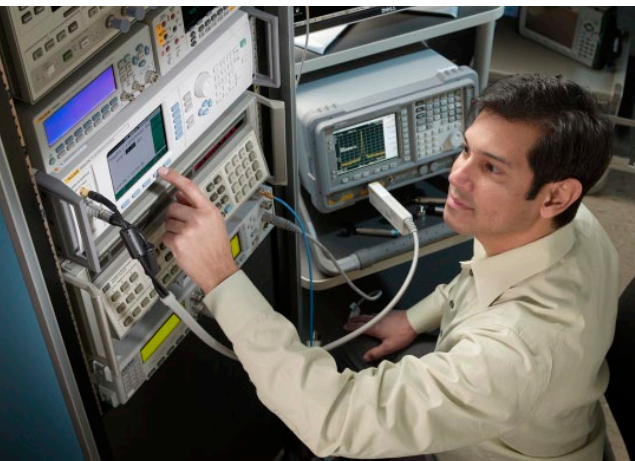
generators that are often used in RF calibration systems, with the 9604A-LPNX low phase noise version providing superior phase noise performance.

The 9640A Series simplifies and speeds up calibration procedures, reduces opportunities for operator errors, and greatly simplifies RF metrology.

As the core of an RF and microwave calibration system, the 9640A Series covers the majority of test points required for calibrating spectrum analyzers of any frequency range.

Used manually or automated with MET/CAL® Plus Calibration Management Software, the 9640A models reduce complexity and calibration times, dramatically improving efficiency and increasing capacity.

Walk-away automation with the 9640A Series performing the majority of tests enables operators to carry out additional value-adding tasks rather than wasting time waiting for frequent system setup changes.



### A cost effective, compact solution for RF and microwave calibration systems

The 9640A Series takes the central role and typically halves the cost of a high capability RF calibration system. Its unique features and performance enable it to replace up to four signal sources (from audio/function generators to RF signal and low phase noise sources), power meters and power sensors, step attenu-

ators, filters, pads, couplers, and also a frequency counter with the 9600FC integrated counter option. For many spectrum analyzer models operating below 4 GHz, only the 9640A Series is required to perform their entire calibration.

The 9640A Series performs more than 80 percent of all the tests required on high performance high frequency spectrum analyzers. For workload with frequency requirements beyond 4 GHz, an existing RF and microwave source can be used alongside

the 9640A Series to address the few remaining higher frequency test points all controlled by MET/CAL software.

The 9640A Series features and performance also make them ideal for calibrating other workload, including RF millivoltmeters, signal level meters, modulation analyzers, receivers and counter/timers.

Reducing the number of instruments in a calibration system brings many benefits. Metrology is simpler with fewer error sources and uncertainty contributions to consider. System support costs are reduced, as there are fewer instruments to calibrate and maintain. A smaller, more compact and robust system is also a practical onsite calibration solution with lower transport costs.

The 9640A models are designed to match or exceed the performance and functionality of the HP3335A and HP8662/3A in calibration systems. With HP3335A GPIB command emulation as standard in both 9640A models and optional HP8662/3A emulation in the 9640A-LPNX, replacing these popular but obsolete and difficult-to-maintain products becomes just a plug-and-play substitution. HP8662/3A GPIB command emulation is installed on the 9640A-LPNX as "try before you buy" temporary license for convenient and thorough compatibility testing.

## 9640A Series designed to simplify RF calibration procedures and RF metrology

The 9640A Series provides unrivalled level and attenuation accuracy, with high signal purity, low harmonic and spurious content. A rugged, precision leveling head delivers the 9640A signals directly to the unit under test, minimizing losses, noise, interference, and mismatch errors, and maintains the integrity of low-level signals—all through a single connection, and eliminating the need for power meters and sensors, step attenuators and filters required when using general purpose signal generators in calibration applications.

This unique “connect once, measure many” capability not only simplifies the calibration process but also greatly reduces the number of measurement error sources and uncertainty contributions.

The standard 9640A and 9640A-LPNX models are supplied with a 50 ohm leveling head and the /75 models have both 50 ohm and 75 ohm leveling heads. The mainframe and heads are calibrated together as a system.

Each 9640A instrument is supplied with a comprehensive ISO17025 compliant certificate of calibration with data for all key parameters, including level and attenuation, output VSWR, and phase noise. In addition to providing traceability, RF metrology and

uncertainty analysis become much simpler and faster. Accredited certification is available for both 9640A models and both 50 ohm and 75 ohm heads.

The 9640A Series user interface is designed to simplify common calibration processes for typical items in your workload, such as spectrum analyzers, RF level meters and receivers. Parameter offset, stepping, relative and UUT/DUT error readout 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 simplicity of the calibration oriented user interface also benefits troubleshooting activities if an unexpected result or out-of-tolerance condition is encountered in either manual or automated calibration procedures.



## Use MET/CAL® software for “walk-away” automation

In a typical automated RF calibration process, the operator must frequently intervene to change test setups, thus limiting the benefits that can be realized by the automation. Walk-away automation can increase calibration system capacity by up to 25 percent and will free up 50 percent more operator time for other value-adding tasks rather than waste time waiting for the next system setup change. For example, the manufacturer’s calibration procedure for calibrating the Agilent E4407B 26.5 GHz spectrum analyzer requires 27 different and complex test setups.

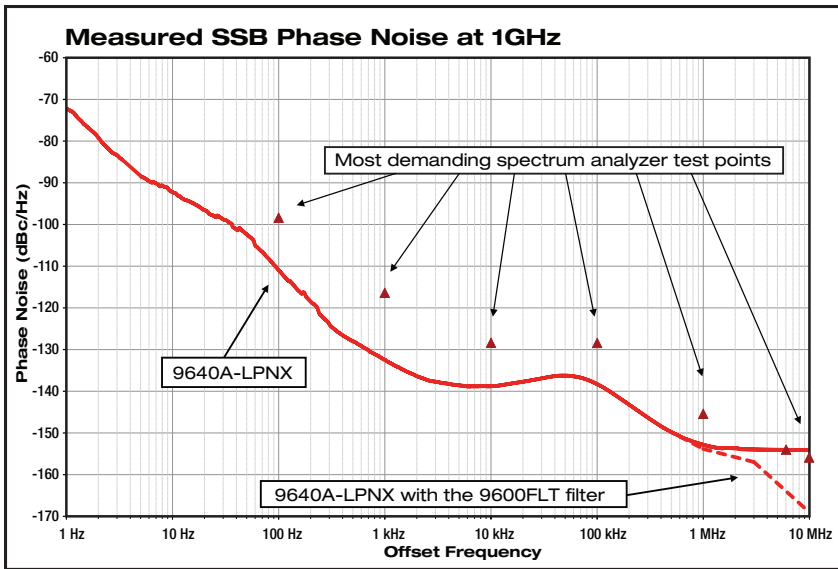
On the other hand, the 9640A Series, used with MET/CAL Plus Calibration Management Software, performs the major core of required tests with a single setup. Only six additional setups are needed to complete the MET/CAL procedure.

MET/CAL procedures created by Fluke for the 9640A models optimize operator time, maximizing the time available for the operator to leave the system running unattended while attending to other work. For example, the E4407B MET/CAL procedure for the 9640A-LPNX allows for a total 90 minutes of “walk-away” time within the total two-hour runtime.

Use MET/CAL software’s Flexible Standards feature to automate the other instruments in your system. This capability allows you to substitute equivalent standards within the procedures, so you aren’t locked into a specific reference model. Flexible Standards support is available for popular microwave synthesizers including the HP8340, HP83630, Agilent E8254 and E8257, and other models from Anritsu and Rohde & Schwarz.

Fluke has developed calibration procedures for many instruments that make up the calibration workload for the 9640A Series, and new procedures are released regularly. A current list of procedures is available on the Fluke web site at [www.fluke.com/mclist](http://www.fluke.com/mclist).





9640A-LPNX with 9600FLT

### Using the 9640A Series to advantage with other automation solutions

The 9640A Series is also integrated easily into existing automated systems and software. The time savings and efficiency gains offered by the 9640A Series can be realized by structuring test sequences to take full advantage of its “connect once, test many” capabilities. Alternatively, the 9640A Series’ HP3335A and HP8662/3A emulation provides a drop-in replacement solution overcoming reliability and support problems with these obsolete products.

### 9640A-LPNX state-of-the art phase noise performance

With reduced phase noise levels at low offset frequencies and specifications from 1 Hz to 10 MHz offsets, the 9640A-LPNX offers exceptional phase noise performance.

With more than ample capability for today’s high performance spectrum analyzer workload, there is performance margin for future workload enhancements. Phase noise data is included in the 9640A Series certificate of calibration. Instead of relying only on the more conservative guaranteed specifications, users have actual performance data for their unit.

Even with the best low phase noise signal generators, filters are commonly used during spectrum analyzer phase noise calibration tests, reducing noise levels at wide (high) offset frequencies to improve test margins. The 9600FLT 1 GHz bandpass filter accessory is purpose-designed for high performance spectrum analyzer wide-offset phase noise testing and connects easily to 9640A models in either benchtop or rack-mounted applications.

### General purpose applications

There are many applications in R&D, manufacturing test and ATE needing better performance than a general purpose signal generator. If wide frequency coverage, frequency resolution, low harmonics and spurious content, signal level and attenuation accuracy, or dynamic range are critical parameters the 9640A Series is the ideal solution, with the 9640A-LPNX model for applications requiring frequency resolution, low phase noise and jitter. Replacement of HP3335A and HP8662/3A level and signal generators in automated systems is made easy by the 9640A Series GPIB emulation of these aging obsolete products.

### What’s new?

#### New features included in the 9640A Series:

- **9640A-LPNX model improved phase noise**  
Reduced close-in phase noise and specifications to 1 Hz offsets.
- **Improved level accuracy and attenuation**  
Specifications for better test uncertainty ratios against the most demanding workloads.
- **Optional integrated 50 MHz frequency counter**  
Reducing the number of instruments needed in an RF calibration system in the lab or onsite for UUT frequency reference testing.
- **Extended leveled sine frequency setting resolution**  
An enhanced mode with 10 uHz resolution at all frequencies, giving a maximum display and setting resolution of 4.023 999 999 999 GHz.
- **Leveled sine minimum output frequency of 1 mHz**  
Replacing a function generator in many multipurpose calibration systems, enhancing the 9640A Series versatility.
- **External phase modulation**  
Also with 1 MHz bandwidth for phase and frequency modulation.
- **Narrow range-locked sweep**  
Enhanced resolution frequency sweep with new phase and amplitude continuous, range locked, narrow channel sweep.

#### New accessory:

- **9600FLT 1 GHz wide offset phase noise filter**  
Bandpass filter reducing high offset frequency noise levels for spectrum analyzer calibration 1 GHz phase noise tests.



## Summary specifications

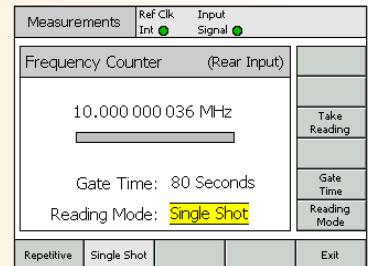
| Key specifications summary (Refer to the extended specifications for full and detailed specifications). |  |  |
|---|--|--|
|   | Frequency specifications   | Level specifications (50 Ω output, see extended specifications for 75 Ω)   |
| Range   | 1 mHz to 4 GHz   | -130 to +24 dBm to 125 MHz, 14 dBm at 4 GHz (leveled)  |
| Resolution  | 10 uHz   | 0.001 dB   |
| Accuracy  | 0.05 ppm + 5 uHz   | <b>Down to -48 dBm</b><br>0.03 dB to 100 kHz, 0.05 dB to 128 MHz, 0.3 dB at 4 GHz<br><b>10 MHz to 128 MHz</b><br>0.05 dB to -48 dBm, 0.1 dB to -84 dBm, 0.7 dB at -130 dBm |
| Attenuation   |  | 0.02 dB to 55 dB, 0.15 dB at 110 dB  |
| VSWR  |  | ≤500 MHz: ≤1.1, ≤1 GHz: 1.2, ≤3 GHz: 1.3, ≤4 GHz: 1.4  |
| Harmonics and spurious  | -60 dBc harmonics, -70 dBc spurious to 1 GHz   |  |
| Phase noise at 1 GHz  | <b>9640A:</b> -122 dBc/Hz, typical, at 10 kHz offset<br><b>9640A-LPNX:</b> -138 dBc/Hz, typical, at 5 kHz to 100 kHz offset                          |  |
| Modulation  | AM, FM, PM, internal and external. Frequency pull and external leveling.   |  |
| Frequency sweep   | 1 mHz to 4 GHz. Linear or Logarithmic. Stop-Start or Center-Span, Sawtooth and Triangle  |  |
| Frequency counter   | Optional internal 50 MHz frequency counter, 1 mHz (0.1 ppb) resolution at 10 MHz   |  |
| Temperature   | <b>Operating:</b> 0 °C to 50 °C, 23 °C ± 5 °C for specified performance<br><b>Storage:</b> -20 °C to +70 °C  |  |
| Standard interfaces   | IEEE488.2 (GPIB)   |  |
| GPIB command emulation  | <b>9640A, 9640A-LPNX:</b> HP3335<br><b>9640A-LPNX + Opt 8662/8663 GPIB:</b> HP3335, HP8662A, HP8663A   |  |
| Dimensions (HxWxD)  | 146 mm x 433 mm x and 533 mm (5.8 in x 17.0 in x 21.0 in)<br>Industry-standard 19 in (483 mm) rack mounting when fitted with Y9600 rack mounting kit |  |
| Weight  | 18 kg, (40 lbs)  |  |

## Ordering Information

| Models  | Description   |
|---|---|
| 9640A-STD   | 4 GHz RF Reference Source including 50 Ω leveling head and HP 3335A GPIB command emulation                                |
| 9640A-STD/75  | 4 GHz RF Reference Source including 50 Ω and 75 Ω leveling head and HP 3335A GPIB command emulation                       |
| 9640A-LPNX  | 4 GHz RF Reference Source with low phase noise, including 50 Ω leveling head and HP 3335A GPIB command emulation          |
| 9640A-LPNX/75   | 4 GHz RF Reference Source with low phase noise, including 50 Ω and 75 Ω leveling head and HP 3335A GPIB command emulation |
| <b>Options</b>  |   |
| 8662/8663 GPIB*   | 8662 & 8663 Emulation (not available for 9640A-STD)   |
| 9600FC*   | Integrated 50 MHz Frequency Counter   |
| *Options are License Key enabled, also available as user-installable upgrades. Contact your local Fluke sales office for information.   |   |
| <b>Accessories</b>  |   |
| 9600FLT   | 1 GHz Wide Offset Phase Noise Filter  |
| Y9600   | Rack Mount Kit (slides)   |
| 9600CASE  | Rugged Transit Case   |
| 9600CONN  | Adaptor/Torque Kit  |
| <b>Upgrades</b>   |   |
| 9640A-STD->9640A-LPNX   | Upgrade 9640A-STD to 9640A-LPNX   |
| 9640A-LPN->9640A-LPNX   | Upgrade 9640A-LPN to 9640A-LPNX   |
| 9640A/75UPG   | Upgrade any 9640A to 75 Ohm head  |
| <b>Software</b>   |   |
| MET/CAL-L   | License disk for MET/CAL  |
| MET/BASE-7  | Calibration Software Database System  |
| For full details of available MET/CAL software products, requirements and upgrades; contact your local Fluke sales office.  |   |
| <b>CarePlans</b>  |   |
| GCP9640A-STD*   | One-year Gold CarePlan. Careplan with standard calibration  |
| G3P9640A-STD*   | Three-year Gold CarePlan. Careplan with annual standard calibration   |
| G5P9640A-STD*   | Five-year Gold CarePlan. Careplan with annual standard calibration  |
| *Gold CarePlans are available for the 9640A-LPNX and 9640A/75 models in one-year, three-year or five-year plans with accredited or standard calibration. Contact your local Fluke sales office for information. |   |



9600FLT: 1 GHz Wide Offset Phase Noise Filter



Optional 9600FC Integrated 50 MHz Frequency Counter



9600CONN: Adaptor/Torque Kit

**Visit Fluke online for more information**

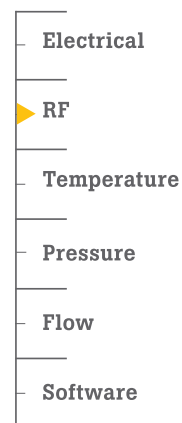
Go to [www.fluke.com](http://www.fluke.com) for detailed 9640A product and application information, including links to these publications:

- A Guide to Calibrating Your Spectrum Analyzer
- Signal Sources Required for Spectrum Analyzer Calibration
- Detailed product specifications
- List of current MET/CAL procedures
- 9640A and 9640A-LPNX users manual and calibration verification procedures

## Total solutions in calibration

Fluke Calibration provides the broadest range of calibrators and standards, software, service, support and training in electrical, temperature, pressure, RF and flow calibration.

Visit [www.fluke.com/FlukeCal](http://www.fluke.com/FlukeCal) for more information about Fluke Calibration solutions.

**Fluke Calibration.**

*Precision, performance, confidence.™*

**Fluke Corporation**

PO Box 9090, Everett, WA 98206 U.S.A.

**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>

©2010 Fluke Corporation.  
Specifications subject to change without notice.  
Printed in U.S.A. 10/2010 3833096B D-EN-N

**Modification of this document is not permitted without  
written permission from Fluke Corporation.**

Pub-ID: 11651-eng