HP 8594E

Attenuator

Limited Availability
Used and in Excellent Condition

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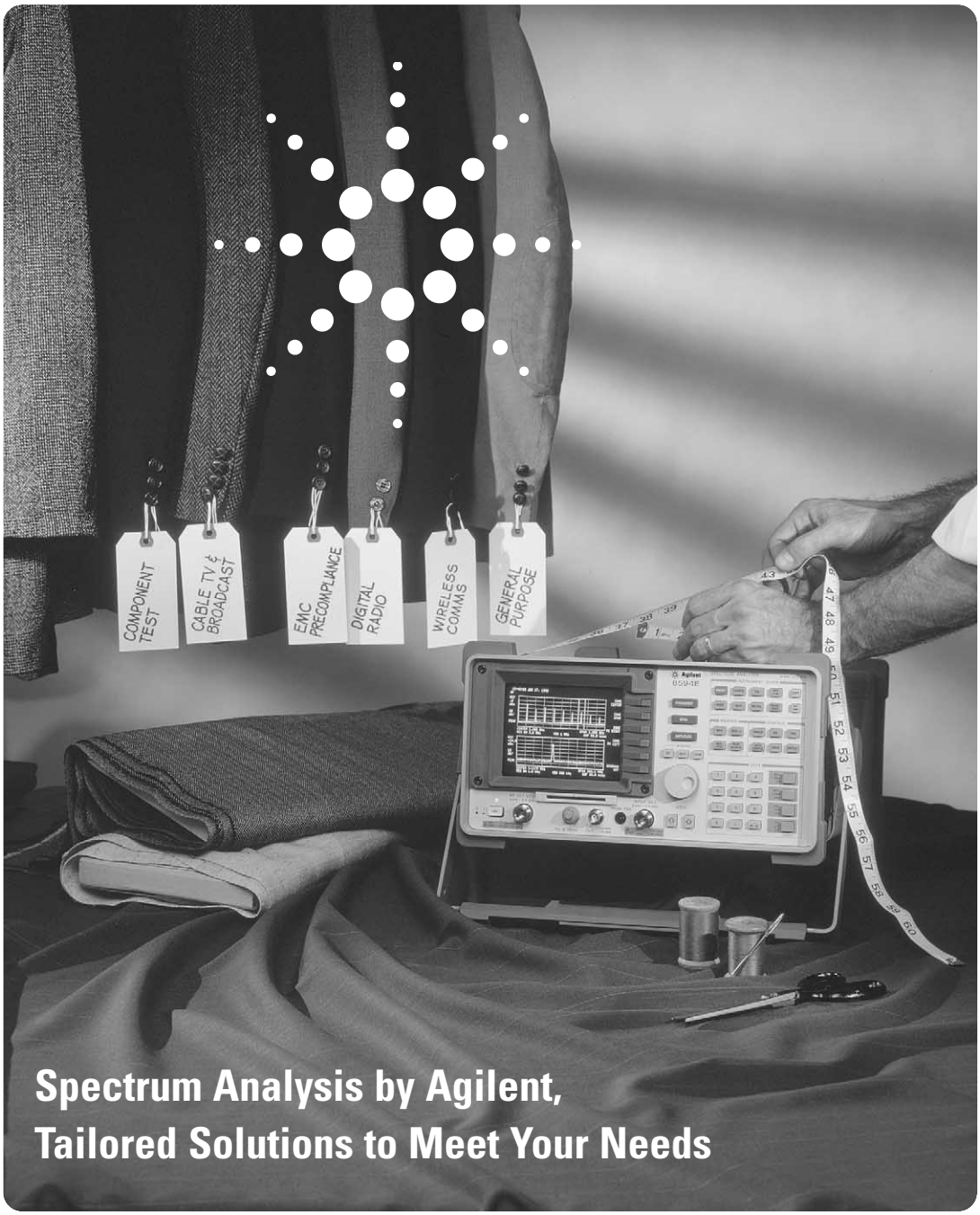
Agilent 8590 E-Series Portable Spectrum Analyzers



Spectrum Analysis by Agilent,
Tailored Solutions to Meet Your Needs

Agilent Technologies
Innovating the HP Way

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Flexible spectrum analysis PLUS...

Optional hardware configurations

...add performance and capability.

Agilent Technologies has designed a series of Spectrum Analyzers that can be configured to your specific measurement needs. With the internal cardcage, circuit-card options can be inserted into any of four internal card slots to increase your measurement capabilities.

And should your needs change, your analyzer can adapt since most options are retrofittable.

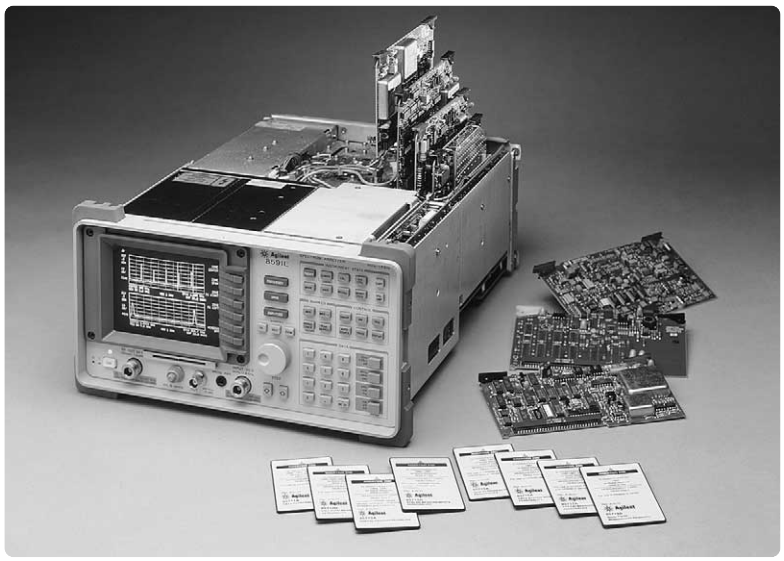
Optional capability:

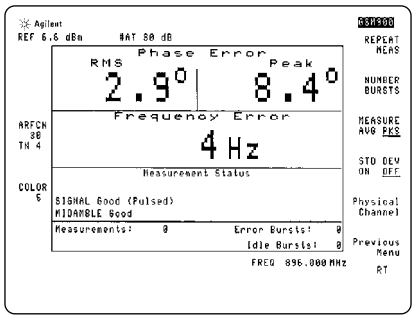
- Separate closely spaced signals and increase sensitivity with narrow resolution bandwidths.
- Measure digital transmitter power, timing, frequency, and modulation with digital demodulators for any of the major cellular and cordless formats.
- Analyze "bursted" signals with time-gated spectrum analysis.
- Assure EMI precompliance with quasi-peak detector.
- Test components for scalar parameters with built-in tracking generators.
- With group delay and amplitude flatness capability, you can do link analysis on…

  - Microwave radios
  - Satellites
  - Cables

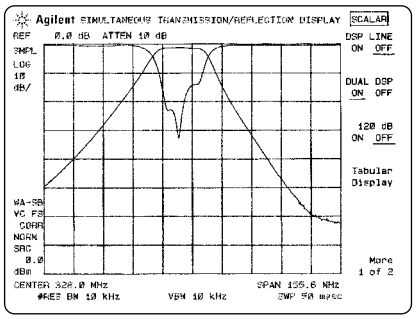
PLUS...

there are over 20 other performance options you can choose from!





Note the modulation quality of a GSM900 signal



Transmission and reflection results for scalar test

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Application software EQUALS ... tailored solutions for you!

Downloadable measurement personalities

…add powerful measurement routines.

For each application, Agilent offers a unique software program (provided on ROM-based memory cards), designed specifically for the 8590 E-series. Downloaded into analyzer memory, each measurement personality provides measurement setups, routines, and results specific to your application, as well as a user interface with terminology directly related to that application!

Choose from a wide selection of measurement personalities:

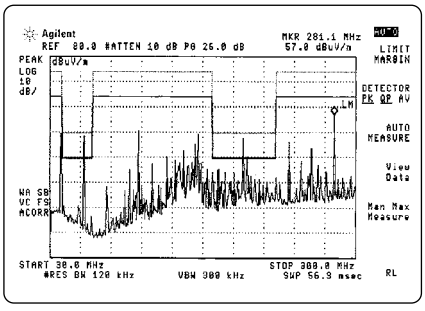
- RF Wireless Communications
- Cable TV
- EMI Precompliance
- Microwave Links
- Noise Figure
- Lightwave
- Broadcast TV
- Digital Radio
- Scalar Analysis
- Customized personalities we create specifically for you!

Benefits include:

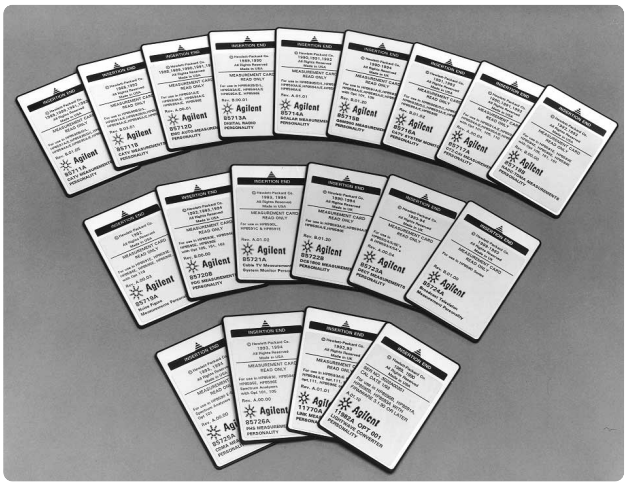
- Ease of use with one-button measurements
- Complex tests are performed simply and quickly
- Improved accuracy and repeatability over manual measurements
- Results are operator independent
- Save coding time with remotely programmable subroutines
- Decreased training time

PLUS...

when you add them all together, you save time and money!



EMI measurement compared to regulatory limits



Internal option cardcage

Customize your analyzer now or in the future with our plug-in, circuit-card options.

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Measurement Power Tailored for Your Success…

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Softkey menus
Operate your analyzer more easily with related softkey functions.

Zoom window (onscreen)
Focus in on critical data quickly and easily.

Sturdy design
Tough and resilient: wherever you have to go, your analyzer will, too.

Internal option cardcage
Customize your analyzer now or in the future with our plug-in, circuit-card options.

Built-in measurements and advanced functions
Allow you to perform complex measurements with one-button ease.

I/O and parallel printer port
Execute remote programs over GPIB or RS-232 and print test results using the parallel printer interface.

Wide frequency ranges
Choose from 9 kHz to 1.8 GHz, 2.9 GHz, 6.5 GHz, 12.8 GHz, 22 GHz, or 26.5 GHz.

Card reader
Store data on 128 Kbyte memory cards... and download measurement personalities.

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Features and options summary

Features and options	Descriptions
Functions	
Zoom window	Zoom in on any portion of display; in a split-screen format, both the original and zoomed display are shown.
Multiple marker	Displays up to four markers onscreen.
Marker table	Displays a table of up to four marker frequency and amplitude values.
Peaks table	Displays a table of up to ten signal peaks sorted by amplitude or frequency.
Peak zoom	Automatically centers and spans down on largest signal onscreen.
Analog+ display	Offers digital implementation of an analog display; includes markers and printer output.
Frequency counter	Built-in, marker-based frequency counter.
Time/date	Displays time and date onscreen; provides for unattended operation.
One-button measurements	
Adjacent channel power	Measures the adjacent channel power ratio in dB of the upper and lower adjacent channels.
Channel power	Measures the total power in a specified bandwidth.
Occupied bandwidth	Measures the 99.99% to 1% power bandwidth of a spectrum.
Third-order intercept	Calculates the TOI of a distortion product.
Percent AM	Calculates the percent AM from the measured sidebands and fundamental.
N dB points	Measures the -1 to -80 dB bandwidth of the largest signal onscreen.
Advanced functions	
FFT measurements	Provides an alternative method to examine amplitude modulation
Gated measurements	Provides time-gated spectrum analysis for bursted signals.
DLP editor	Allows creation and editing of simple DLPs.[1]
Limit-line editor	Allows time and frequency limit lines with pass/fail messages.
Additional capabilities	
Card reader	Allows storage of data to memory cards and downloading of measurement personalities.
Measurement personality	Use any of the fifteen application-specific measurement personalities on memory cards.
Downloadable program	Alters analyzer capability with custom software.
Display storage	Stores entire display (including onscreen text) to a memory card.
Trace/state storage	Stores over 50 traces and states internally.
External keyboard	Controls analyzer, labels traces, and serves as input device for DLP1 editor.
Internal option cardcage	Expands analyzer capabilities with up to four circuit-card options.
NTSC, PAL, SECAM monitor output	Provides a composite video out for use with external monitors and VCRs.
Selected options	
Narrow resolution bandwidths	Adds 30-Hz, 100-Hz, 200 Hz (EMI), and 300-Hz resolution bandwidths.
AM/FM demodulator	Demodulates AM and FM; outputs to internal speaker/earphone jack.
Quasi-peak detector	Allows automatic and manual quasi-peak EMC measurements.
TV Sync trigger	Triggers on any video line in NTSC, PAL or SECAM formats.
Fast time sweeps	Sweeps as fast as 2 microseconds per division in zero span.
Precision frequency reference	Provides improved frequency accuracy and stability.
Tracking generator	Built-In TGs up to 2.9 GHz for scalar and EMC measurements.
Time-gated spectrum analysis	Obtains spectral information on signals in the frequency domain that are separated in the time domain.
TV display	Displays TV picture for NTSC, PAL and SECAM formats.
GPIB or RS-232 and parallel interface	Provides connection for remote control and printer output.
DSP, fast ADC and digital demodulator	Adds modulation accuracy measurements for digital wireless communications.
Noise figure	Provides swept noise figure and gain capability.

[1] Downloadable programs

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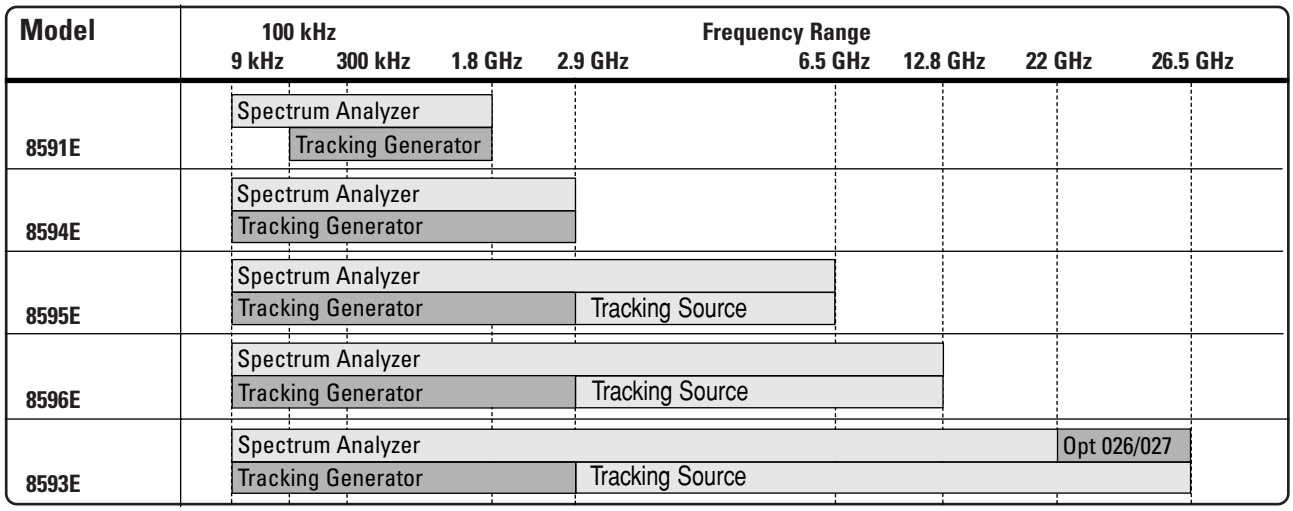
Performance summary



Specification summary

Specification[1]	8591E	8594E	8595E	8596E	8593E
Frequency accuracy[2, 3, 4]	±210 Hz	±210 Hz	±210 Hz	±1.2 kHz	±1.2 kHz
Resolution bandwidth range[4]	30 Hz to 3 MHz (10 Hz Nominal)	30 Hz to 3 MHz (10 Hz Nominal)	30 Hz to 3 MHz (10 Hz Nominal)	30 Hz to 3 MHz	30 Hz to 3 MHz
Average noise level (30 Hz-RBW)[4]	–130 dBm	–127 dBm	–127 dBm	–127 dBm	–129 dBm
Optimum dynamic range (2nd/3rd Order)[4]	77 dB/90 dB	78 dB/88 dB	77 dB/86 dB	102 dB/80 dB	103 dB/81 dB
Relative frequency response	±1.0 dB	±1.0 dB	±1.5 dB	±2.0 dB	±2.0 dB
Calibrated display range	70 dB	70 dB	70 dB	70 dB	70 dB
Amplitude range[4]	–130 dBm to +30 dBm	–127 dBm to +30 dBm	–127 dBm to +30 dBm	–127 dBm to +30 dBm	–129 dBm to +30 dBm
Phase noise (30 kHz Offset, 1 GHz)	–105 dBc/Hz	–105 dBc/Hz	–105 dBc/Hz	–105 dBc/Hz	–105 dBc/Hz

[1] **Data shown here is for comparison purposes only. Consult technical data sheet for more complete specifications.**
[2] **Accuracy includes 1-year aging. Settability and temperature drift not included.**
[3] **CF = 1 GHz except 8596E and 8593E @ CF = 10 GHz.**
[4] **Includes optional performance.**

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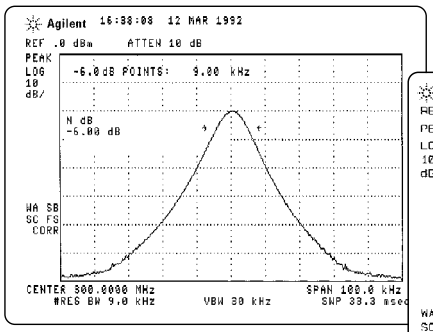
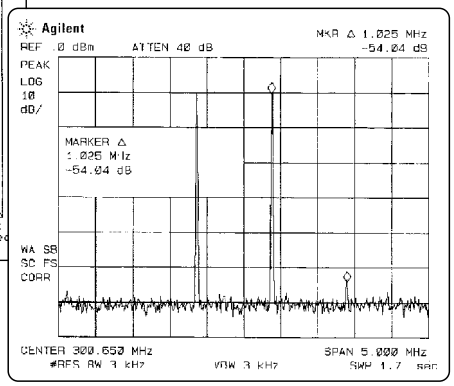
Built-in one-button measurement routines

…save time, setup and training!

- Adjacent channel power (ACP)
- Occupied bandwidth power
- Third-order intercept
- Percent AM
- Signal bandwidth
- Channel power



Measure –1 to –80 dB bandwidths on signals.

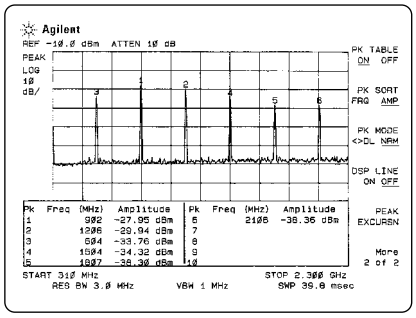


Just one button calculates T.O.I. distortion products!

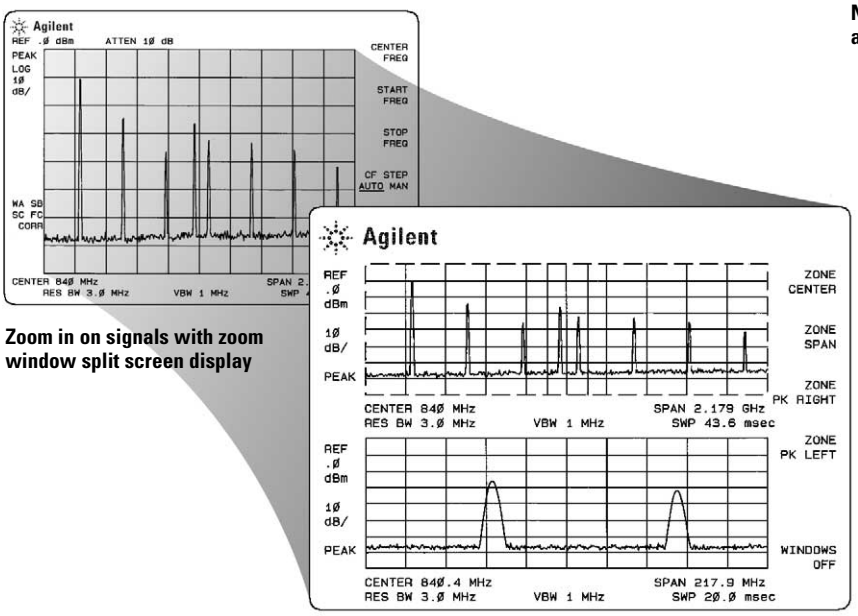
Built-in functions

…reduce analysis and troubleshooting time!

- Zoom window split screen display allows you to zoom in on signals while viewing the broad spectrum.
- Limit lines speed signal comparisons to user defined frequency and amplitude limits …complete with pass/fail messages!
- Fast-Fourier-Transform (FFT) allows quick analysis of the AM components on the signal of interest.
- Time-gated spectrum analysis obtains spectral details of burst-modulated signals.
- Quickly list the top 10 signal sorted by frequency or amplitude.
- And more



Now you can immediately identify amplitude and frequency of top 10 peaks ... automatically!



Zoom in on signals with zoom window split screen display

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Automation and remote control

…provide faster measurements through programmability!

You can program your analyzer to perform repetitive tasks — and that saves measurement time and money! Use over 200 fully documented programming commands to develop programs that specifically meet your needs, or, call upon expert application engineers — available worldwide — to write programs for you.

Here's what programming can do for you:

- Automate routine measurement tasks
- Increase testing throughput
- Reduce complex measurements and calculate results
- Improve measurement quality, accuracy, and repeatability

Two types of programs can be used to control the 8590 E-series spectrum analyzers:

1. **Remote programs** can be developed for controlling your spectrum analyzer from your computer when connected to either the GPIB or RS-232 interface of the analyzer; or,
2. **Downloadable programs** (DLPs) can be developed to locally control your spectrum analyzer. These programs, downloaded into your analyzer's internal memory, provide customized measurement routines assigned to analyzer softkeys.

Reliability, service, and worldwide support network

…provide solutions that lower your cost of ownership!

All 8590 E-series spectrum analyzers…

- Are manufactured in an ISO 9001 registered facility to exacting standards… and come with optional calibration certificates traceable to national standards; and
- Comply with U.S. military MIL-T-28800 class 5 environmental standards ... and that means reliable, accurate performance in portable applications; and
- Contain built-in self-tests and calibration routines to ensure measurement integrity; and
- Are delivered with the most thorough user, calibration and service documentation in the industry and with complete calibration and service available at 27 Agilent locations worldwide.

Agilent's technical professionals…

- Are a phone call away to provide technical application assistance;
- Are available to provide local user training; and,
- Are available to provide factory service training to support your internal calibration and service needs.

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Manufacturing, field and more

General purpose spectrum analysis

This easy-to-use tool provides a broad range of testing capability across a wide variety of applications. You can display relationships between power, frequency, and time with over 200 built-in measurement functions!

Research and development

Shorten your development time by equipping your engineering team with the analysis tools they need to optimize their designs.

- Speed-up design trouble-shooting with built-in, one-button measurement routines. For example, Third-Order-Intercept, Adjacent Channel Power or one of Agilent's measurement personalities.
- Use the 8590-series analyzers with EEsof's MDS Modeling and Simulation Software to verify breadboard performance, as compared to circuit simulations.
- Minimize costs associated with buying additional instruments and adding bench space by leveraging the 8590 E-series scalar and noise figure capabilities.

Manufacturing

Enhance your production line throughput with analyzers designed for measurement speed in automated test systems and for ease-of-use in individually operated test stations.

- Reduce test costs and increase throughput, accuracy, and repeatability with built-in routines.
  Perform "go/no-go" testing with features like limit lines and easily interpreted PASS/FAIL messages.
- Automate your testing to improve throughput and accuracy by programming your analyzer to perform repetitive measurement tasks.
- Execute programs from the analyzer's memory or your PC.
- Save money on future equipment purchases when production line requirements change by retrofitting new capabilities into your 8590 E-series.

Application specific literature	Literature Number
8590 C/E/L and EM Series Configuration Guide	5963-6858E
8590L and 8592L Product Overview	5962-7275E
8590 E-series Technical Specifications	5963-6909E

Note:
For lowest cost, general purpose RF/MW spectrum analysis, see the 8590 L-series. Contact your Agilent representative for more information.

Field service, installation and signal surveillance

Take the power and flexibility of the 8590 E-series with you wherever you need on-site analysis.

- Carry less equipment with you into the field by equipping your analyzer with optional, multi-performance capabilities, such as group delay or on-screen TV picture.
- Store test results in the field on compact, rugged, solid state memory cards with automatic time/date stamps.
- Record screen data with VCR for long term signal monitoring; limit lines provide signal activity alerts.
- Field accessories include an external battery pack CRT sun shield, protective front cover, operating/carrying case, nylon backpack, and transit case.

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Digital RF wireless communications

Customize your transmitter testing

For the design, manufacturing, installation, or service of digital RF wireless communications equipment, the 8590 E-series spectrum analyzer with measurement personality is the tool you need.

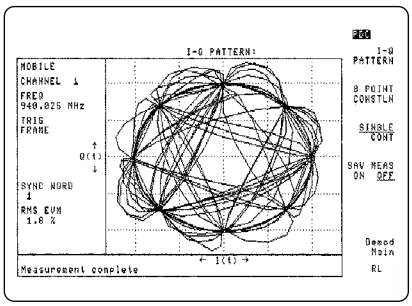
Quick, easy, one-button transmitter measurements

- Customized transmitter tests based on industry standards for GSM, DCS1800, NADC-TDMA, CDMA, PDC, DECT, CT2-CAI, and PHS
- Fast, easy, one-button transmitter measurement personalities automatically set the analyzer controls to perform measurement calculations for:

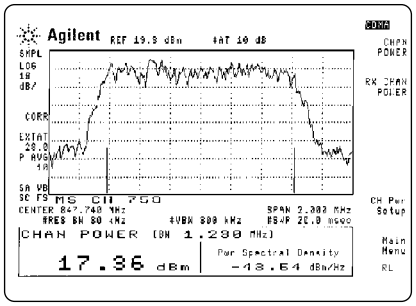
  - channel power
  - adjacent channel power
  - occupied bandwidth
  - burst power versus time
  - modulation quality
  - spurious emissions

Additional features make your measurement easier

- Automatic tuning by channel number
- Pass/Fail messages
- Continuous measurement mode for real-time equipment adjustments and troubleshooting
- Results displayed in numeric waveform and graphic formats
- Immediate, on-screen help provided with the CDMA solution
- Adjustable test limits



IQ diagram of a NADC-TDMA signal



Channel power of a CDMA signal

And it's programmable

All of the customized transmitter measurements are programmable. Each is executed with a single command so production test development time is decreased and test throughput is increased.

Application specific literature

Format	Measurement Personality	Literature Number
GSM, DCS1800	85715B, 85722B	5966-3803E
NADC-TDMA	85718B	5962-6217E
PDC	85720C	5963-9971E
DECT	85723A	5091-7761E
CDMA	85725B	5963-9969E
PHS	85726B	5964-0110E

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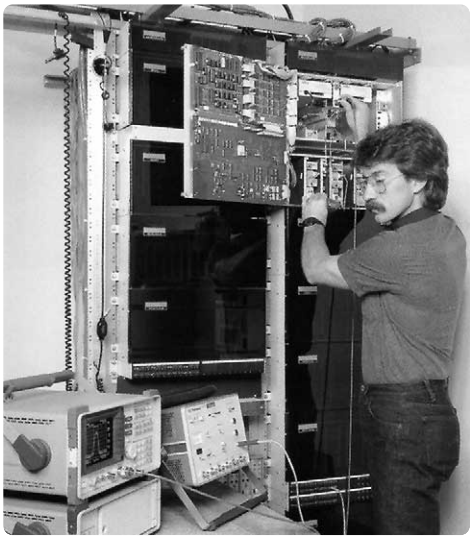
Digital radio

The measurements you need in one convenient package

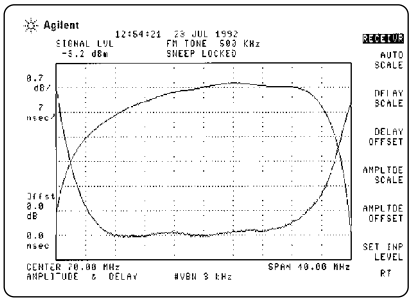
When it comes to installing and maintaining a microwave radio system, you can select the test solution that exactly meets your needs. Choose from personalities, options and system configurations created specifically for those who install and maintain microwave radios of all types—from routine maintenance of low capacity links to installation and commissioning of high capacity systems.



Digital radio measurements

- For low-capacity system maintenance, the 85713A Digital Radio Measurements Personality adds mask comparison, mean-power-level, frequency response and transient measurement capabilities to the standard Spectrum Analyzer. The personality includes standard FCC, UK and FRG agency masks, as well as the ability to create custom masks.
- For higher capacity systems, group delay and amplitude flatness measurements may be required. The 11770A Link Measurements Personality, in conjunction with Option 111 in the Spectrum Analyzer, uses the analyzer and its tracking generator as receiver and transmitter respectively. Two independent analyzers can be used for end-to-end and frequency translation measurements over the entire frequency range of the generator output and analyzer input.
- The 11758V Digital Radio Test system provides comprehensive measurement capability for installation and maintenance of high capacity systems. The system is based on a specially-configured 8593E Spectrum Analyzer and the 11758B Multipath Fading Simulator. Available options include:
  - group delay
  - a microwave source for antenna return loss measurements
  - a fully configured system for microwave satellite system group delay measurements based on a synthesized sweeper.

  Factory integrated special configurations are available.



Amplitude and group delay response for adjusting transmission networks

Application specific literature	Literature Number
Tools for Digital Microwave Radio Installation & Maintenance (AN 355-1)	5962-9920E
11758V Digital Radio Test System Data Sheet	5091-4651E
11770A Link Measurements Personality Data Sheet	5091-4652E

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Cable TV

Your portable, single box tester for both RF and video measurements

Save time in cable TV manufacturing and maintenance with fast one-button measurement routines. Agilent Technologies offers two solutions for the cable TV industry; the 8590 E-series spectrum analyzer with the 85721B cable TV measurement personality for manufacturers, or the CaLan 8591C cable TV analyzer for cable TV operators. The CaLan 8591C includes many 8590 E-series analyzer options specifically for cable TV testing!

Features and options include:

- Dedicated Cable TV measurements which provide one-button, non-interfering RF and video tests.
- Automated compliance testing to FCC regulations and world-wide standards.
- System tests for installation, maintenance, troubleshooting and performance monitoring.
- Five frequency ranges, 1.8 GHz to 22/26.5 GHz (8590 E-series).
- 75-ohm input that matches analyzer to trunk cable or other 75-ohm environments.
- Flexible hardware and software architecture for easy upgrading.
- 75-ohm pre-amp for low-level carrier-to-noise measurements.
- Dual interfaces; a parallel printer port with either an GPIB or RS-232 port.
- Television picture capability to verify subscriber complaints and remedies.

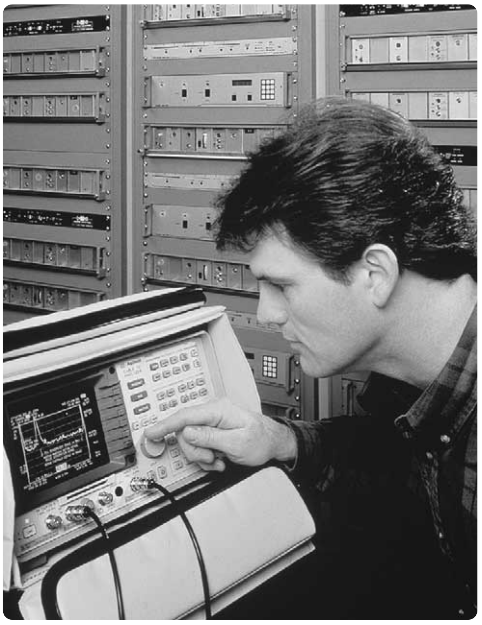
With your analyzer, you can determine…

RF measurements:

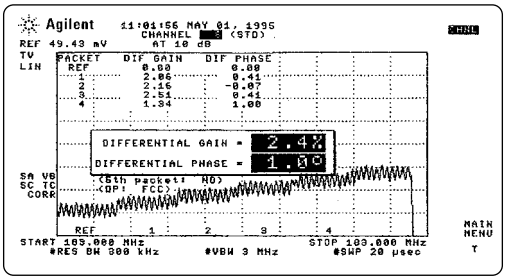
- Automatic tuning to cable TV and broadcast carriers.
- Visual and aural carrier levels and frequencies
- System channel survey
- Depth of modulation
- Crossmodulation
- Aural and FM broadcast carrier deviation
- Carrier-to-noise ratio
- In-channel frequency response
- Hum and low frequency disturbances
- System frequency response
- Distortion (CSO/CTB)

Video measurements:

- Differential gain
- Differential phase
- Chrominance-to-luminance delay inequality



Add the Agilent CaLan 85921B FCC report generator for moving test data from your analyzer to your PC and providing FCC proof-of-performance reports!



Differential gain and phase video measurements made to world wide standards.

Application specific literature	Literature Number
Broadband Test Equipment Brochure	5966-0355E
CaLan 8591C (includes 85721A) Product Overview	5964-0244E
CaLan 8591C Technical Specifications	5964-0243E

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EMC precompliance

Avoid costly EMC compliance delays

The 8590 E-series spectrum analyzer and 85712D EMC measurement personality, options and accessories give you EMC precompliance and diagnostic capabilities. For dedicated EMI users, Agilent recommends the 8590EM series EMC analyzers.

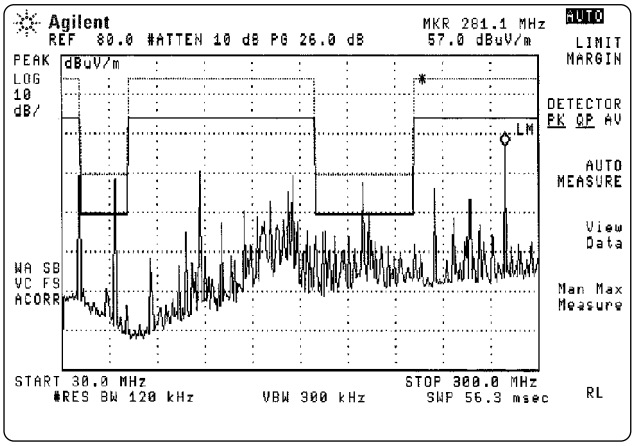
The design cycle

There's no better time than early in the design cycle to solve EMC problems—problems that could prove very costly to correct, even to the point of delaying a new product's introduction — problems you can identify and analyze at the push of a button with 8590 E-series spectrum analyzers.

- Use your 8590 E-series analyzer with the EMC measurement personality (85712D), antennas and accessories to search for radiated emissions.
- Measure conducted emissions with the LISN and accessories.
- Using the close-field probe set (11945A Option E51), pinpoint emissions, make design changes and compare the results.

Selected features and options include:

- Automated, one-button EMC precompliance measurements.
- Fast setup of all EMC measurement system parameters from a range of setup libraries.
- Measure the quasi-peak, average and peak levels of up to 20 signals automatically.
- Enhanced measurement accuracy with built-in transducer amplitude corrections.
- Built-in tracking generator for shielding effectiveness and immunity testing.
- System diagnostic tools to quickly isolate, classify and record EMC design problem spots.
- A complete line of EMC transducers and accessories to perform EMI measurements to meet your needs.



Application specific literature	Literature Number
8590EM Series EMC Analyzers and Precompliance Systems	5964-6091E
EMC Accessories Catalog	5966-1188E

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Component test

Save time and money by combining functionality in a single package!

By using the measurement personalities and selected internal options, you're not forced to purchase multiple instruments —now you can combine the functions of a spectrum analyzer, noise figure meter, and scalar network analyzer.

A single, compact package…

Now with one analyzer, you can measure devices for:

- Noise characteristics
- Transmission and reflection
- Power and frequency
- Distortion
- Spurious responses

Noise figure and gain measurements…

An 85719A noise figure measurements personality and the optional noise figure circuit card added to an 8590 C/E series analyzer with noise source and preamplifier will provide you:

- Simultaneous swept noise figure and gain — up to 2.9 GHz
- Menu driven interface
- Single point pass/fail limit testing
- Narrow band and frequency conversion device capabilities
- Marker readout of N.F. and gain anywhere on the sweep

Scalar analysis measurements ...

An 85714A scalar measurements personality, an RF bridge, and optional 1.8/2.9 GHz built-in tracking generator added to an 8590 C/E/L series analyzer will provide you:

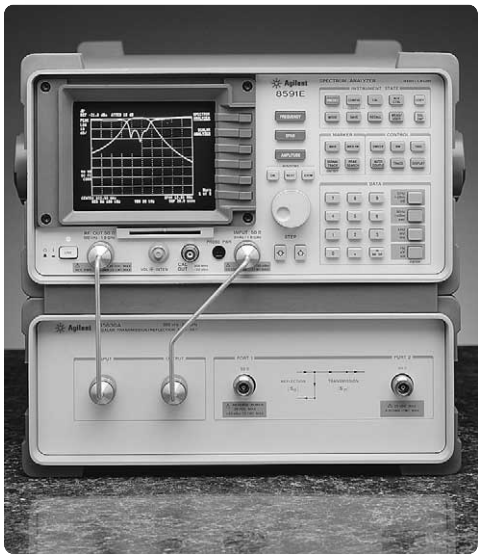
- Transmission and reflection
- Guided calibration
- Pass/fail limit line testing
- 120 dB display

…and one-button measurements of:

- Bandwidths
- Q factor
- Shape factor
- Insertion loss/gain

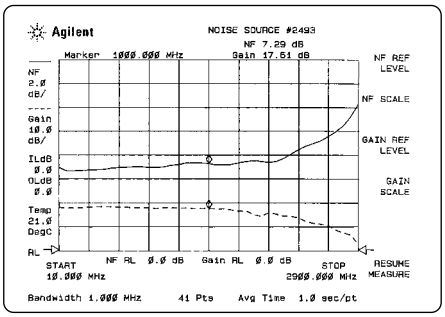
…with marker readout of:

- Power and frequency
- Return loss
- VSWR
- Reflection/Transmission coefficients



…add the 5630A scalar test set for:

- Simultaneous transmission/ reflection
- Built-in RF bridges
- Ease of set-up and use



Measure swept noise figure and gain of an amplifier

Application specific literature	Literature Number
Scalar Network Analysis with 8590 E-series	5091-1338E
86205A and 86207A RF Bridges	5091-3117E
85719A Noise Figure Measurements	5091-4800E
Maximizing Accuracy in Noise Figure Measurements (Product Note: 85719A-1)	5091-4801E

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Ordering information

Spectrum analyzers

8591E RF Spectrum Analyzer	**(9 kHz to 1.8 GHz)**
8594E RF Spectrum Analyzer	**(9 kHz to 2.9 GHz)**
8595E RF Spectrum Analyzer	**(9 kHz to 6.5 GHz)**
8596E MW Spectrum Analyzer	**(9 kHz to 12.8 GHz)**
8593E MW Spectrum Analyzer	**(9 kHz to 22/26.5 GHz)**

Options, measurement personalities, and accessories

For complete ordering and compatibility information on available options, retrofit kits, and measurement personalities, please see the 8590 C/E/L and EM Series Configuration Guide, Literature Number 5963-6858E.

Literature reference index

	Literature Number
General purpose information	
8590L and 8592L Product Overview	5962-7275E
8590 E-Series Technical Specifications	5963-6909E
8590 C/E/L and EM Series Configuration Guide	5963-6858E
Product feature briefs	
Analog+ Display	5091-4054E
Transmitter Power Measurements (ACP, OBW)	5091-4055E
Zoom Window	5091-4051E
Measuring AM with FFT	5091-4049E
Time-Gated Spectrum Analysis	5091-4053E
Editing Keyboard	5091-4048E
Marker and Peaks Table	5091-4050E
Third Order Intermodulation, N dB Bandwidth and Percent AM	5091-4052E
Product notes	
Time-Gated Spectrum Analysis (8590-2)	5952-3685
Analog+ Display	5091-2364E
Maximizing Accuracy in Noise Figure Measurements (85719A-1)	5091-4801E
Application notes	
Spectrum Analysis Basics (150)	5952-0292
Amplitude and Frequency Modulation (150-1)	5954-9130

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