Agilent 8590L-Series
Portable Spectrum Analyzers
Product Overview

8590L
9 kHz to 1.8 GHz

8592L
9 kHz to 22/26.5 GHz

8594L
9 kHz to 2.9 GHz

Low-Cost General Purpose RF or MW Spectrum Analysis with Frequency Accuracy

Agilent Technologies
Innovating the HP Way
Economical and Reliable Solutions with Frequency Accuracy

When you need a full-featured, frequency-accurate RF or microwave spectrum analyzer to meet your field or factory testing requirements, the Agilent Technologies 8590L-Series gives you the features and options you need to get the job done. Reliable and economical, the 8590L operates from 9 kHz to 1.8 GHz with an amplitude range of –115 dBm to +30 dBm; the 8592L operates from 9 kHz to 22 GHz (26.5 GHz optionally) with preselection starting at 2.75 GHz and an amplitude range of –114 dBm to +30 dBm.

The 8590L-Series now includes the 8594L for reliable and economical performance from 9 kHz to 2.9 GHz with an amplitude range of –112 dBm to +30 dBm.

Frequency Accuracy with Built-In Frequency Counter

With the 8590L and 8594L you get ±7.6 kHz marker count accuracy at 1 GHz. And with the 8592L you get ±165 kHz at 22 GHz. At lower frequencies you achieve even greater accuracy.

Additional Features and Options

Whether you operate the analyzer manually or remotely, more than 200 functions are available. The Agilent 8590L-Series gives you a full set of marker functions including marker delta, marker peak search, and up to four on-screen markers. Time and date functions are useful for unattended operation and for data storage or output labels.

Built-in Measurement Capability

Third-order intercept, percent AM, and “N” dB bandwidth are just a few of the built-in measurements. These measurements are performed at the press of a single softkey. Results are displayed onscreen. And the downloadable program (DLP) capability lets you write your own built-in measurements using the DLP editor and an external keyboard.
Measurement Personalities
Measurement personalities are application-specific DLPs that are loaded into the analyzer through the optional card reader. They provide measurement routines and a user-interface specific to the application. A scalar measurements personality customizes the 8590L with optional built-in 1.8 GHz tracking generator, and a cable TV measurements personality equips the 8590L-Series with one-button RF measurements for CATV service and system monitoring.

Agilent 8590E Series Spectrum Analyzers
If you need higher performance, more features, a wider range of options and upgrade capabilities, or additional application-based measurement personalities than the 8590L-series provides, please contact your local Agilent Technologies sales office for information on the 8590E-series of portable spectrum analyzers.

MIL-T-28800 Conformance
The 8590 series spectrum analyzers conform to the environmental specifications of MIL-T-28800 class 5 to insure reliable and accurate performance in portable environments as well as indoors. Compliance with the MIL-T-28800 standards of vibration, temperature, humidity, and shock provide assurance that the 8590 series will withstand the rigors of field use.

ISO 9000
This product is manufactured in an ISO 9002 registered facility in concurrence with Agilent’s quality commitment.
Specifications
All specifications apply over 0° C to +55° C. The analyzer will meet its specifications after 2 hours of storage at a constant temperature, within the operating temperature range, 30 minutes after the analyzer is turned on, and after CAL FREQ and CAL AMPTD (and for the 8592L CAL YTF) have been run.

### Frequency Specifications

<table>
<thead>
<tr>
<th>Frequency Range</th>
<th>Frequency Range</th>
<th>Band</th>
<th>LO Harmonic = N</th>
</tr>
</thead>
<tbody>
<tr>
<td>8590L 50Ω</td>
<td>9 kHz to 1.8 GHz</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>8592L 75Ω</td>
<td>1 MHz to 1.8 GHz</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>8592L (Opt. 026/027)</td>
<td>9 kHz to 22 GHz</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>8592L (Opt. 026/027)</td>
<td>9 kHz to 26.5 GHz</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>8592L (Opt. 026)</td>
<td>9 kHz to 22 GHz</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>8594L dc coupled</td>
<td>9 kHz to 2.9 GHz</td>
<td>N</td>
<td>1</td>
</tr>
<tr>
<td>8594L ac coupled</td>
<td>100 kHz to 2.9 GHz</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

### Frequency Reference

- **Aging**: ±2 x 10^-6/year
- **Temperature Stability**: ±5 x 10^-6
- **Initial Achievable Accuracy**: ±0.5 x 10^-4

### Frequency Readout Accuracy

- (Start, Stop, Center, Marker)
  - ± (freq. readout x freq. ref. error^2 + span accuracy + 1% of span + 20% of RBW + 100 Hz x N)

### Marker Frequency Counter Accuracy

- **Span ≤10 MHz x N**
  - ± (marker freq. x freq. ref. error^2 + counter resolution + 100 Hz x N)
- **Span >10 MHz x N**
  - ± (marker freq. x freq. ref. error^2 + counter resolution + 1 kHz x N)

### Counter Resolution

- **Span ≤10 MHz x N**
  - Selectable from 10 Hz to 100 kHz
- **Span >10 MHz x N**
  - Selectable from 100 Hz to 100 kHz

### Frequency Span

- **Range**
  - 8590L: 0 Hz (zero span), 10 kHz to 1.8 GHz
  - 8592L: 0 Hz (zero span), 10 kHz x N to 19.25 GHz
  - 8594L: 0 Hz (zero span), 10 kHz to 2.9 GHz

### Resolution Bandwidth

- **Accuracy**
  - ±2% of span

### Frequency Sweep Time

- **Range**
  - 8590L: 20 ms to 100 s
  - 8592L: ±3%
- **Accuracy**
  - ±10 dB

### Video Bandwidth Range

| 30 Hz to 1 MHz in 1, 3, 10 sequence |

### Stability

- **Noise Sidebands (1 kHz RBW, 30 Hz VBW and sample detector)**
  - >10 kHz offset from CW signal: ≤–90 dBc/Hz + 20 Log N
  - >20 kHz offset from CW signal: ≤–100 dBc/Hz + 20 Log N
  - >30 kHz offset from CW signal: ≤–105 dBc/Hz + 20 Log N
- **System-Related Sidebands**
  - >30 kHz offset from CW signal: ≤–65 dBc + 20 Log N

### Comb Generator Frequency

- **8592L**: 100 MHz fundamental frequency
- **Accuracy**: ±0.007%

### Amplitude Specifications

<table>
<thead>
<tr>
<th>Amplitude Range</th>
<th>Displayed Average Noise Level to +30 dBm</th>
</tr>
</thead>
<tbody>
<tr>
<td>8590L, 8592L, 8594L</td>
<td>Displayed Average Noise Level to +75 dBmV</td>
</tr>
</tbody>
</table>

### Maximum Safe Input Level

- **Average Continuous Power**: +30 dBm (1 W)
- **Peak Pulse Power**: +75 dBmV (0.4 W)
- **8590L (Opt. 001)**
  - +30 dBm (1 W)
  - +75 dBmV (0.4 W)
- **8592L (Opt. 001)**
  - +50 dBm (100 W) for <10 µs pulse width
- **8594L dc**
  - 25 Vdc
- **8590L (Opt. 001)**
  - 100 Vdc
- **8592L**
  - 0 Vdc
- **8594L ac coupled**
  - 50 V

### Gain Compression

- **>10 MHz**
  - ≤0.5 dB (total power at input mixer^3 = –10 dBm)

### Displayed Average Noise Level

- **(Input terminated, 0 dB atten., 30 Hz VBW, 1 kHz RBW, sample detector)**
  - 8590L
    - 400 kHz to 1.5 GHz: ≤–115 dBm
    - 1.5 GHz to 1.8 GHz: ≤–113 dBm
  - 8590L (Opt. 001)
    - 1 MHz to 1.5 GHz: ≤–63 dBmV
    - 1.5 GHz to 1.8 GHz: ≤–61 dBmV
  - 8592L
    - 400 kHz to 2.9 GHz: ≤–112 dBm
    - 2.75 GHz to 6.5 GHz: ≤–114 dBm
    - 6.0 GHz to 12.8 GHz: ≤–102 dBm
    - 12.4 GHz to 19.4 GHz: ≤–98 dBm
    - 19.1 GHz to 22 GHz: ≤–92 dBm
  - 8592L (Opt. 026)
    - 19.1 GHz to 26.5 GHz: ≤–87 dBm
  - 8594L
    - 400 kHz to <5 MHz: ≤–107 dBm
    - 5 MHz to 2.9 GHz: ≤–112 dBm

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1. N = LO harmonic. N = 1 for 8590L and 8594L
2. Frequency reference error = (aging rate x period of time since adjustment + initial achievable accuracy + temperature stability)
3. Mixer Power Level (dBm) = Input Power (dBm) – Input Attenu. (dB)
### Spurious Responses

#### Second Harmonic Distortion
- 5 MHz to 1.8 GHz (8590L): $<-70$ dBc for $-45$ dBm tone at input mixer$^1$
- 10 MHz to 2.9 GHz (8592L): $<-70$ dBc for $-40$ dBm tone at input mixer$^1$
- $>10$ MHz (8592L): $<-100$ dBc for $-10$ dBm tone at input mixer$^1$

(Or below displayed average noise level)

#### Third Order Intermodulation Distortion
- 5 MHz to 1.8 GHz (8590L): $<-70$ dBc for two $-30$ dBm tones at input mixer$^1$ and $>50$ kHz separation
- 10 MHz to 2.9 GHz (8594L): $<-65$ dBc at $\pm 30$ kHz offset, for $-20$ dBm tone at input mixer$^1$

#### Other Input Related Spurious
- $\leq 1.8$ GHz (8590L): $<-65$ dBc at $\pm 30$ kHz offset, for $-20$ dBm tone at input mixer$^1$
- $\leq 2.9$ GHz (8594L): $<-60$ dBc at $\pm 30$ kHz offset, for $-20$ dBm tone at input mixer$^1$

### Residual Responses
(Reflected terminated and 0 dB attenuation)
- 1 MHz to 1.8 GHz (8590L Opt. 001): $<-38$ dBmV
- 150 kHz to 1.8 GHz (8590L): $<-90$ dBm
- 150 kHz to 1.8 GHz (8592L): $<-90$ dBm

### Display Range

#### Log Scale
- 0 to $-70$ dB from ref. level is calibrated;
- 0.1, 0.2, 0.5 dB/division and 1 to 20 dB/division in 1 dB steps; eight divisions displayed

#### Linear Scale
- Eight divisions

### Marker Readout Resolution
0.05 dB for log scale
0.05% of ref. level for linear scale

### Reference Level
- Range: same as amplitude range
- Resolution: 0.01 dB for log scale 0.12% of ref. level for linear scale
- Accuracy: $\pm 0.3$ dB $\pm -20$ dBm
- 0 dBm to $-59.9$ dBm $\pm (0.3$ dB $+ 0.01$ x dB from $-20$ dBm)

### Frequency Response

#### 8590L
- 9 kHz to 1.8 GHz: $\pm 1.5$ dB $\pm 1.0$ dB
- Absolute$^4$ Relative Flatness$^5$

#### 8592L
- Preselector peaked in band $> 0$
- 9 kHz to 2.9 GHz: $\pm 1.5$ dB $\pm 1.0$ dB
- 2.75 GHz to 6.5 GHz: $\pm 2.0$ dB $\pm 1.5$ dB
- 6.0 GHz to 12.8 GHz: $\pm 2.5$ dB $\pm 2.0$ dB
- 12.4 GHz to 19.4 GHz: $\pm 3.0$ dB $\pm 2.0$ dB
- 19.1 GHz to 22 GHz: $\pm 3.0$ dB $\pm 2.0$ dB
- 19.1 GHz to 26.5 GHz: $\pm 5.0$ dB $\pm 2.0$ dB

### Calibrator Output
- Amplitude: $-20$ dBm $\pm 0.4$ dB
- 8590L Opt. 001: $+28.75$ dBmV $\pm 0.4$ dB

### Resolution Bandwidth

#### Switching Uncertainty
- (Referenced to 3 kHz RBW, at ref. level)
  - 3 kHz to 3 MHz RBW: $\pm 0.4$ dB
  - 1 kHz RBW: $\pm 0.5$ dB

- Linear to Log Switching: $\pm 0.25$ dB at ref. level

#### Display Scale Fidelity
- Log Maximum Cumulative
  - 0 to $-70$ dB from ref. level: $\pm (0.4$ dB $+ 0.01$ x dB from ref. level)
- Log Incremental Accuracy: $\pm 0.4$ dB/4 dB
- Linear Accuracy: $\pm 3\%$ of ref. level

### Option Specifications

#### Option 010 and 011 Tracking Generator (Agilent 8590L only)
- Frequency Range
  - (Opt. 010): 100 kHz to 1.8 GHz
  - (Opt. 011): 1 MHz to 1.8 GHz

#### Output Level
- Range
  - (Opt. 010): 0 to $-15$ dBm
  - (Opt. 011): +42.8 to $-27.8$ dBmV

#### Resolution
- Absolute Accuracy
  - (@ 300 MHz, $-10$ dBm): $\pm 1.5$ dB
  - (@ 300 MHz, +38.8 dBmV): $\pm 1.5$ dB

#### Vernier
- Range: 15 dB
- Accuracy: $\pm 1.0$ dB

#### Output Flatness
- $\pm 1.75$ dB

### Spurious Output
- Harmonic Spurs: $<-25$ dBc
- Nonharmonic Spurs: $<-30$ dBc

### Dynamic Range (Characteristics)

#### Dynamic Range$^6$
- TG Feedthrough
  - (Opt. 010): 106 dB
  - (Opt. 011): 100 dB

#### Power Sweep
- Range
  - (Opt. 011): +27.8 dBmV to 42.8 dBmV

#### Resolution
- 0.1 dB

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4. Referenced to 300 MHz CAL OUT
5. Ref. to midpoint between highest and lowest freq. response deviations
6. Maximum output level minus TG feedthrough
### General Specifications
MIL-T-28800: Has been type-tested to the environmental specifications of MIL-T-28800 Class 5.

<table>
<thead>
<tr>
<th>Temperature Range</th>
<th>Operating</th>
<th>0°C to +55°C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Storage</td>
<td>–40°C to +75°C</td>
</tr>
</tbody>
</table>

| EMI Compatibility | Conducted and radiated emission is in compliance with CISPR Pub. 11/1990 Group 1 Class A. |

| Audible Noise | <37.5 dBA pressure and <5.0 Bels power (ISDDP7779) |

| Power Requirements | ON (Line 1) 90 to 132 V rms, 47 to 440 Hz; 195 to 250 V rms, 47 to 66 Hz, Power consumption <500 VA; <180W |
|                   | Standby (Line 0) Power consumption <7 W |

| User Memory      | (nominal) 121 Kbytes non-volatile RAM |
| Data Storage     | (nominal) 50 traces, and 8 state registers internal memory; 24 traces, 32 states memory card (85700A) |

| Dimensions (Nominal) | (No handle, feet, or cover) 183 mm (H) x 325 mm (W) x 427 mm (D) |
|                     | (Overall) 184 mm (H) x 373 mm (W) x 461 mm (D) |

| Weight (Nominal) | 8590L 14.1 kg (31 lb) |
|                 | 8592L 15.9 kg (35 lb) |
|                 | 8594L 15.9 kg (35 lb) |

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### Inputs/Outputs

#### Front Panel Connectors
- **Input**: 50Ω Type N (Opt. 001), 75Ω BNC female (Opt. 026), APC 3.5 mm male (Opt. 027), 50Ω Type N female (Opt. 027), 50Ω BNC, –20 dBm, 300 MHz (100 MHz Comb Out), 100 MHz ±0.007%, SMA (Probe Power +15 Vdc, –12.6 Vdc, and Gnd (150 mA max each))

| Power Requirements | Ext. Ref. In 50Ω BNC, 10 MHz, –2 to +10 dBm |
|                    | Ext. Ref. Output 50Ω BNC, 10 MHz, 0 dBm |
|                    | ALC Input 1 MΩ, (Opt. 010 or 011) –66 dBV to +6 dBV |
|                    | Sweep Output BNC, 0 to +10 V ramp |
|                    | High Sweep In/Out BNC, high TTL = sweep, low TTL = Retrace |
|                    | Aux Video Out 50Ω BNC, 0 to 1 V |
|                    | Aux IF Output 50Ω BNC, –10 to 60 dBm, 21.4 MHz |
|                    | Keyboard (Opt. 041 or 043) 5 pin mini-DIN, compatible with Agilent C1405A and most IBM AT keyboards |
|                    | Ext. Trigger Input BNC, TTL levels, positive edge trigger |
|                    | GPIB and Parallel (Opt.041) 25-Pin subminiature D-shell female for parallel |
|                    | RS-232 and Parallel (Opt.043) BNC, 9-pin subminiature D-Shell female and 25-Pin Subminiature D-Shell female for parallel |
|                    | Aux Interface 9 pin “D” subminiature |
|                    | Monitor Out 50Ω BNC Selectable Format NTSC, 15.75 kHz, 60 Hz PAL, 15.625 kHz, 50 Hz |
**Ordering Information**

8590L RF Spectrum Analyzer (9 kHz to 1.8 GHz)
8592L Microwave Spectrum Analyzer (9 kHz to 22/26.5 GHz)
8594L RF Spectrum Analyzer (9 kHz to 2.9 GHz)

**Options**

001 75Ω Input Impedance (8590L only)
003 Memory Card Reader
010 Tracking Generator (100 kHz to 1.8 GHz, 8590L only)
011 75Ω Tracking Generator (1 MHz to 1.8 GHz, 8590L only)
041 GPIB Interface and Parallel Printer Interface
043 RS-232 Interface and Parallel Printer Interface
026 26.5 GHz Frequency Extension, APC connector (8592L only)
027 26.5 GHz Frequency Extension, Type N Connector (8592L only)
040 Front Panel Protective Cover with Storage
042 Protective Soft Carrying Case/Back Pack
711 50/75Ω Matching Pad with 100V DC Block
908 Rack Mount without Handles
909 Rack Mount with Handles
910 Additional Users, Quick Reference, and Calibration Guides
915 Component Level Information and Service Guide
8ZE Refurbished Spectrum Analyzer (as available)
UK6 Commercial Cal. Certificate
W30 Two Additional Years Return-to-Agilent Service
W32 Two Additional Years Return-to-Agilent Calibration
W50 Four Additional Years Return-to-Agilent Service
W52 Four Additional Years Return-to-Agilent Calibration
008 8590 Customer Service Training

**Application Measurement Personalities/Cards**

85714A Scalar Measurements Personality (8590L only)
85721A Cable TV Measurements Personality (8590L only)
85921B Cable TV Data Management PC Software
85700A 32 kByte Blank Ram Card
85702A 128 kByte Blank Ram Card
85704A 256 kByte Blank Ram Card
85705A 512 kByte Blank Ram Card

**Connectivity**

C1405B Keyboard
C2655A HP DeskJet 340 Portable Printer
C2642D HP DeskJet 400 Monochrome/Color Printer
C4562A HP DeskJet 690C Color Printer
C4565A HP DeskJet 870C Color Printer
ITEL-45CHVUC GPIB/Parallel (Centronics) Converter (U.S. and Canada)
ITEL-45CHVEC GPIB/Parallel (Centronics) Converter (International)
C2950A Parallel printer cable (2 meter)
E4444A BenchLink Spectrum Analyzer PC Software
10833A GPIB cable (1 meter)
24542U RS-232 cable (3 meter, 9 pin F to 9 pin F) (for serial 9 pin PC connection to analyzer)
24542G RS-232 cable (3 meter, 25 pin M to 9 pin F) (for serial 25 pin PC or printer connection to analyzer)
24542M RS-232 cable (3 meter, 25 pin M to 9 pin F) (for serial 25 pin modem connection to analyzer)

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8. Requires Option 003 Memory Card Reader
9. Requires 85721A Cable TV System Monitor Personality
10. Requires Option 041 or 043 Interface
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Our Promise
“Our Promise” means your Agilent test and measurement equipment will meet its advertised performance and functionality. When you are choosing new equipment, we will help you with product information, including realistic performance specifications and practical recommendations from experienced test engineers. When you use Agilent equipment, we can verify that it works properly, help with product operation, and provide basic measurement assistance for the use of specified capabilities, at no extra cost upon request. Many self-help tools are available.

Your Advantage
“Your Advantage” means that Agilent offers a wide range of additional expert test and measurement services, which you can purchase according to your unique technical and business needs. Solve problems efficiently and gain a competitive edge by contracting with us for calibration, extra-cost upgrades, out-of-warranty repairs, and on-site education and training, as well as design, system integration, project management, and other professional services. Experienced Agilent engineers and technicians worldwide can help you maximize your productivity, optimize the return on investment of your Agilent instruments and systems, and obtain dependable measurement accuracy for the life of those products.

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