

Broadcast Television Measurements

Data Sheet



**Broadcast Transmitter Testing with
the Agilent 85724A and 8590E-Series
Spectrum Analyzers**



Agilent Technologies

Innovating the HP Way

RF and Video Measurements . . . at the Touch of a Button

Installing, maintaining, and troubleshooting your broadcast TV systems can be a complex and time-consuming process.

The Agilent Technologies 85724A Broadcast Measurements Personality enhances the Agilent 8590E Series of portable spectrum analyzers, providing customized RF Video measurements for testing broadcast transmitters.

These rugged, portable broadcast spectrum analyzers are ideal for field use, or as a production measurement and troubleshooting tool.

Satisfy Your Customers and Save Time with One-Button Non-Interfering Measurements

Your customers expect a quality service with no interruptions. With the 8590E-Series spectrum analyzers and the Agilent 85724A Broadcast Measurements Personality you can perform nearly all RF plus three key video measurements without interrupting your system. This helps maintain continuous service to your customers and also allows you to make measurements when it is convenient for you.

The one-button tests ensure accurate and repeatable measurements. Results may be printed, plotted, or stored as the screen image on a RAM card.



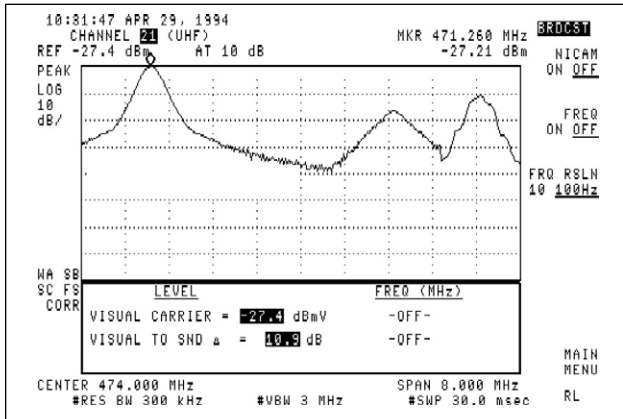
Setting up Your Analyzer is Easy

A simple process quickly configures the analyzer for your particular TV system. User definable parameters include TV standard, default ITS lines, and noise power bandwidths. Once these parameters are set, the analyzer will remember them, even through power down. Once the analyzer is configured, you may tune to channels simply by entering the channel number and band. If you use non-standard channels or want to measure FM radio channels, you can use the frequency tuning mode.

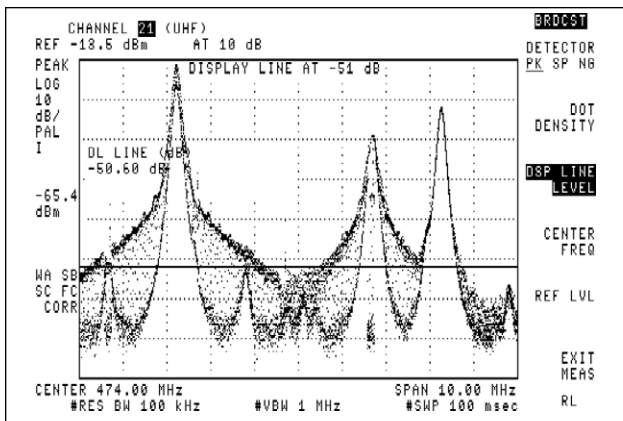
The 85724A supports PAL-I/B/G, NTSC-M and SECAM-D/K.

Advanced Processing Simplifies Measurements

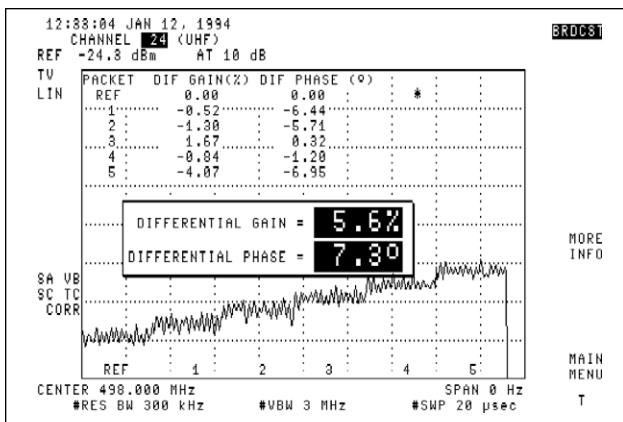
The one-button measurements make normally complex and time-consuming measurements at the press of a key. Measurements such as NICAM carrier power utilizes advanced processing to provide an accurate, repeatable measurement that updates at the end of each sweep to help in system adjustments.



Simultaneous measurement of carrier levels and frequencies



Measurement of in-channel intermodulation using Analog+



Simultaneous differential gain and differential phase video measurements¹

The Agilent 85724A Broadcast TV Measurements Personality provides these dedicated broadcast TV measurements:

RF Measurements

- Automatic tuning of vision, sound, and FM broadcast carriers
- Vision and sound carrier levels and frequencies (including NICAM for PAL-B,G,I)
- Vision to Chrominance Level
- Vision in Sound (AM or FM)
- NICAM Intermodulation (PAL-B,G,I)
- Intermodulation Products
- Three-tone Intermodulation Test
- Spurious Signals
- Depth of Modulation (frame-by-frame)
- Depth of Modulation (ITS line)
- Low Frequency Error (Hum)
- Field Sync Distortion
- FM Deviation
- Carrier to Noise Ratio
- Simultaneous TV picture and sound¹

Video Measurements

- Differential Gain¹
- Differential Phase¹
- Chrominance to Luminance Delay Inequality¹

1. Requires Options 107, E81, or E86.

Quality Spectrum Analyzers

Fit an Analyzer to Your Needs

Offering high quality spectrum analysis with dedicated broadcast TV measurements, the Agilent 8590E-Series portable spectrum analyzers offer the right frequency coverage to meet your needs. You can either order the analyzer and options separately or order one of the following four system bundle options. These system bundles provide complete hardware and software solutions at a reduced cost.

System Bundles	8591E 9 kHz–1.8 GHz		8593,4,5,6E See Note 1	
	E80	E81	E85	E86
Pre-loaded 85724A Broadcast Measurements Personality	✓	✓	✓	✓
AM/FM demod plus TV line trigger	✓	✓	✓	✓
Fast time domain sweeps	✓	✓	✓	✓
Analog+ display mode	✓	✓	✓	✓
Precision Frequency Reference	✓	✓	✓	✓
RS-232 Interface	✓	✓	✓	✓
Rugged carrying case	✓	✓	✓	✓
Built in 20 dB pre-amplifier	✓	✓		
TV Receiver/Video Tester		✓		✓

1. 8594E: 9 kHz–2.9 GHz; 8595E: 9 kHz–6.5 GHz
8596E: 9 kHz–12.9 GHz; 8593E: 9 kHz–22 GHz

Flexibility for the Future

A built-in card cage allows you to configure a variety of circuit-card options that add measurement capability. Circuit-card options are retrofittable, so the options you need are always available. In addition to the system option bundles described above, any 8590E-Series spectrum analyzer may be configured for broadcast TV measurements.

Suitable options include:

Option 301: Fast time domain sweeps, Analog+, TV line triggering, and FM/AM demodulation. (This is required for most broadcast TV measurements.)

Option 107: TV Receiver, Video Tester (including Time Gated Spectrum Analysis)

Hardware versatility is not all it takes to keep up to date with rapidly changing technology. Firmware flexibility is equally important. A Down Loadable Program (DLP) can give you this flexibility. DLPs are stored on a memory card and are downloaded into the analyzer's memory. They can be simple functions that repeat often-used sequences or elaborate tests and calculations, such as the Broadcast TV Measurements personality.

Agilent is continually developing these application-specific programs.

Powerful Yet Portable

Advanced firmware provides tracemath, limit-line testing, Fast Fourier Transforms, and storage for up to 50 traces and states. Adjustable markers let you select any signal; its amplitude and frequency are automatically measured and displayed. Zero span markers display amplitude and time or inverse-time information.

Use the built-in clock-calendar to time and date stamp your active CRT traces. Traces can be stored on memory cards or in the internal memory of the analyzer.

Local oscillator output options are available for compatibility with sideband adapters.

Sturdy and reliable, each analyzer is slightly larger than the size of a briefcase, weighs 16 kg, and has a tilt-bail handle.

Additional Features

- *GPIB (IEEE-488) programmability (option)*
- *RS-232 programmability (option)*
- *Parallel Printer port (option)*
- *Direct printer and plotter dump*
- *Direct keyboard access for titling traces and immediate remote command execution (option)*
- *Agilent service, support, and documentation*

Characteristics

The following information describes the characteristics for the Agilent 85724A Broadcast Measurements Personality (revision B.00.00 or later). These characteristics are to give an indication of the performance of the measurements in the 85724A. The measurements are listed individually along with the appropriate characteristics.

Channel Selection

Tune Configurations:

- CCIR VHF, S, and UHF
- M & B (Netherlands)
- FCC-AIR PRC Bands

Also channels tunable by vision carrier frequency using F NRM mode. User can define span (6 MHz <span <12 MHz). F CTR mode may also be used to select other carriers such as FM channels. User can also define span.

Formats Available

- PAL: I, B, G, D
- NTSC: M
- SECAM: D, K

Carrier Level

Measurement of peak vision carrier level and peak vision to FM sound carrier ratio. NICAM ratio available for PAL systems.

- Range: -50 dBm to +23 dBm
- Absolute Accuracy: ± 2.0 dB
- NICAM Accuracy: ± 2.0 dB

Chroma Level

Measurement of peak vision carrier level and peak vision to chroma ratio.

- Range: -50 dBm to +23 dBm
- Absolute Accuracy: ± 2.0 dB for C/N >40 dB
- Relative Accuracy: ± 1.0 dB for C/N >40 dB

Vision in Sound

Measurement of peak-to-peak amplitude modulation on the FM modulated carrier.

- Accuracy: $\pm 2.0\%$ for stable FM sound carrier and C/N >40 dB

Three Tone Test

Measurement of vision-chroma-FM sound intermodulation when a test generator with three CW tones is inserted to emulate the carriers in a channel.

- Relative Accuracy: ± 1.0 dB for C/N >40 dB and intermod >10 dB above the analyzer noise floor

Spurious Signals

Measurement of +(2 x vision to sound carrier spacing) and -(vision to sound carrier spacing) spurious on a channel.

- Relative Accuracy: ± 2.0 dB for peak detection, no averaging, ANALOG+ off, MIN HOLD off

Modulation Depth (Frame)

Measurement of modulation depth across eight successive frames.

- Range: 50 to 93%
- Accuracy: $\pm 2.0\%$ for C/N >40 dB

Modulation Depth (Line)

Measurement of blanking level, residual carrier, and modulation depth on a single ITS line.

- Range: 50 to 93%
- Accuracy: $\pm 2.0\%$ for C/N >40 dB

Low Frequency Error

Measurement of low frequency amplitude modulation (AM) on the vision carrier.

- Range: 0.5 to 10.0%
- Accuracy: $\pm 1.0\%$

Field Sync Distortion

Measurement of level distortion during field coggle and also end-to-end of the field sync.

- Range: 0.5 to 10.0%
- Accuracy: $\pm 2.0\%$ for C/N >40 dB

Carrier to Noise

Measurement of vision carrier to noise ratio normalized to user specified noise power bandwidth (default 4.75 MHz).

- Range: >60 dB for input >-9.0 dBm and total power at mixer <-8.0 dBm
- Accuracy: <1.25 dB for measured noise >10 dB above the noise floor and adjusted <-60 dB from the reference level

Characteristics, continued

Intermod Check

Digital emulation of analog display for checking in-channel intermodulation with user definable spec. bar.

Dynamic range: 70 dB usable to 80 dB

Spec. Bar range: -1 to -79 dB from vision carrier peak

NICAM Intermodulation

Measurement of vision, FM sound, and NICAM sound carrier intermodulation measured on a quiet or noise TV line (a TV line with no video modulation present).

Range: -1 to -60 dB for C/N >60 dB (-1 to -50 dB for C/N >50 dB). Level displayed is relative to the mean level of the quiet or noise line. Default line is 6.

FM Deviation

Measurement of the peak to peak FM deviation of the FM sound carrier or FM radio channel.

Range: ± 1 kHz to ± 100 kHz (with audio modulation)

Accuracy: $\pm 2.0\%$ for deviation >20 kHz on stable FM carrier. Typical performance is $\pm 1.0\%$ for 25 kHz < deviation <75 kHz and C/N >50 dB

H80/81 Setup

Function to allow Option H80/81 (TV Picture view) set-up by a single key press.

Listen On

Function to display vision and sound carriers in the frequency domain while demodulating the audio on the sound carrier.

Output: Speaker with volume control

Demodulation Type: FM

Demodulation Time: 3 secs

Sweep Refresh Rate: 75 ms

Differential Gain

Measurement of differential gain linearity.

Accuracy: $\pm 6\%$ (requires TV receiver, video tester option hardware)

Differential Phase

Measurement of differential phase linearity.

Accuracy: $\pm 4^\circ$ (requires TV receiver, video tester option hardware)

Chrominance to Luminance Delay Inequality

Measurement of delay between chrominance and luminance components of the program video.

Accuracy: ± 45 ns (requires TV receiver, video tester option hardware)

Notes:

1. All C/N (Carrier to Noise) levels quoted are normalized to a 4.75 MHz noise power bandwidth.
2. These characteristics assume an Agilent 8591E with Options 101,102, and H80 (Option 301 is a combination of Options 101 and 102).

Ordering Information

85724A Broadcast TV Measurements Personality

Recommended Configuration

8591E, 8593E, 8594E, 8595E, or 8596E

Portable Spectrum Analyzer

Option E80¹ RF Measurements Option Bundle
(8591E only)

Option E81¹ RF/Video Measurements Option Bundle
(8591E only)

Option E85¹ RF/Microwave Measurements Option Bundle (not available on the 8591E)

Option E86¹ Video/RF/Microwave Measurements Option Bundle (not available on the 8591E)

Option 023 RS-232 Interface

Option 301 Fast time domain sweeps, TV trigger and AM/FM demod, ANALOG+ display

Option 107 TV Receiver/Video Tester

Option H80² PAL/SECAM Picture Display

Option H81² NTSC Picture Display

Other Related Options

Option 010 Built-in tracking generator

Option 040 Precision frequency reference

Option 021 GPIB (IEE-488) Interface

Option 024 Parallel Interface (Centronics)—print only

Option 130 Narrow resolution bandwidths (30 Hz to 300 Hz)

Option H02 LO output for sideband adapter compatibility (8591E without Option 010)

Option H38 LO output for sideband adapter compatibility (8591E with Option 010)

Option 009 LO output (8593,4,5,6E)

Recommended Accessories

85702A Additional 128K RAM card

C2121A Deskjet 550C RS-232 Printer (requires Option 023)

13242-60011 RS-232 Printer cable

C2621A Deskjet 310 Portable Printer (requires Option 024)

85901A Portable AC power source

1. 85724A included in option bundle.

2. Not compatible with Option 107, E81, or E86.

Agilent Technologies' Test and Measurement Support, Services, and Assistance

Agilent Technologies aims to maximize the value you receive, while minimizing your risk and problems. We strive to ensure that you get the test and measurement capabilities you paid for and obtain the support you need. Our extensive support resources and services can help you choose the right Agilent products for your applications and apply them successfully. Every instrument and system we sell has a global warranty. Support is available for at least five years beyond the production life of the product. Two concepts underlie Agilent's overall support policy: "Our Promise" and "Your Advantage."

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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