

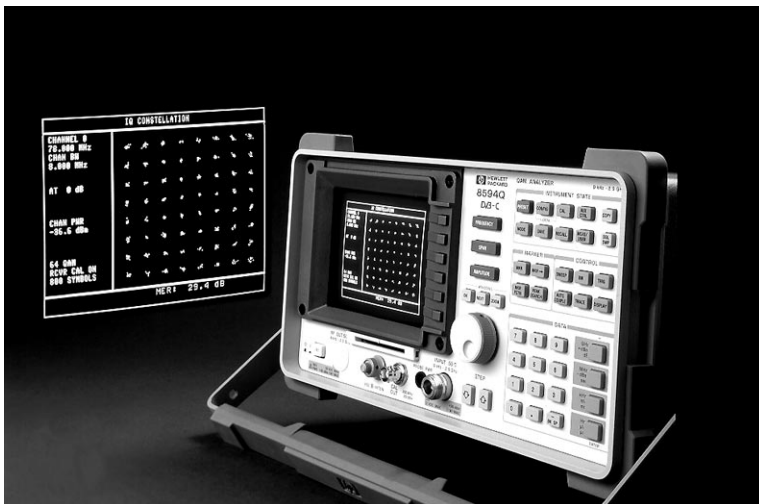
# DVB-C Solutions

## Product Overview

### HP 8594Q QAM Analyzer

#### The first choice for field testing of DVB-C signals on your cable TV system

All cable TV network operators planning the introduction of DVB-C (Digital Video Broadcast via Cable) services have increasing competitive pressure to install these new services—quickly. Aggressive activation schedules require test equipment capable of verifying your quality of service—fast. The HP 8594Q QAM<sup>1</sup> analyzer is a comprehensive and powerful test solution for installation and maintenance test on European DVB-C systems. Supporting 8, 4 and 2 MHz channel bandwidths<sup>2</sup>, the HP 8594Q QAM analyzer makes both qualitative and quantitative measurements on the transmitted QAM signal. It gives engineers the measurement capability required to accurately verify the quality of service delivered to subscribers. All measurements are presented in a user friendly manner so the engineer can focus on the job at hand, not on operating the test equipment.



The HP 8594Q QAM analyzer can help you during:

- Headend equipment installation and maintenance
- System verification
- Field installation and maintenance
- Modulator manufacturing test

The HP 8594Q QAM analyzer demodulates and accurately measures the QAM signals carried through the DVB-C system. It provides new measurement metrics necessary to characterize these signals and troubleshoot problems. The HP 8594Q QAM analyzer's clear user interface and one-button measurement capability will make the transition from analog to digital testing easy for cable TV engineers.

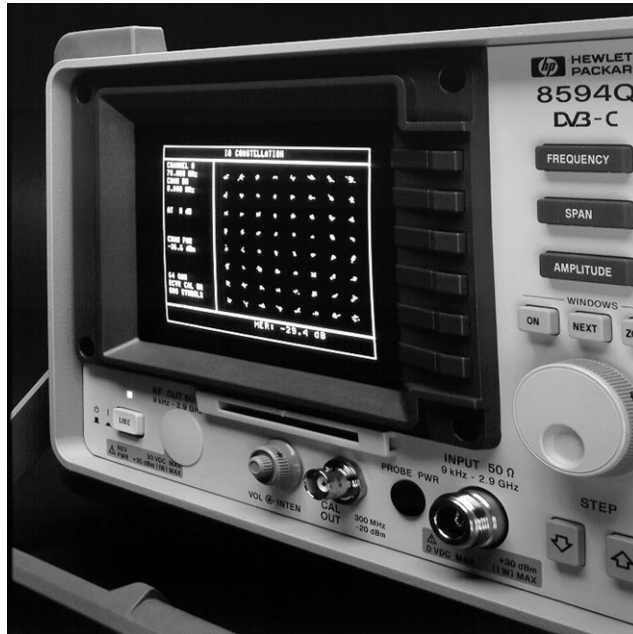
1. QAM - Quadrature Amplitude Modulation. The HP8594Q QAM analyzer supports 16, 64 and 256 state QAM.
2. Option J91 provides RF and modulation analysis on QAM systems using 6 MHz channel bandwidths and using alternate coding standards.

## *Verify your quality of service*

### **Activate your DVB-C services faster**

To help you activate your DVB-C services faster, test equipment must provide a comprehensive suite of measurements. The ability to analyze the signals on the system in detail will help you to quickly identify and troubleshoot problems. With the new challenge of testing digital signals it is important that your test equipment is easy to use. With the HP 8594Q QAM analyzer's one button measurement capability, engineers will be able to concentrate on getting measurement results, not finding the right menu. The portable, rugged HP 8594Q QAM analyzer is ideal for testing from the headend through the network to the subscriber drop.

This combination of powerful measurements and usability will ease your transition from analog to DVB-C testing.



### **Digital video measurement overview**

The shift from analog to digital technology brings many new measurement challenges. Analog system measurements which would have indicated a high quality of service are no longer appropriate. Where analog signals degrade slowly as impairments become worse, digital signals will provide excellent picture quality then degrade very rapidly upon reaching the threshold. Analyzing these digital signals in detail is crucial to determining the real quality of service being delivered to your customer.

## *Headend to subscriber drop testing*

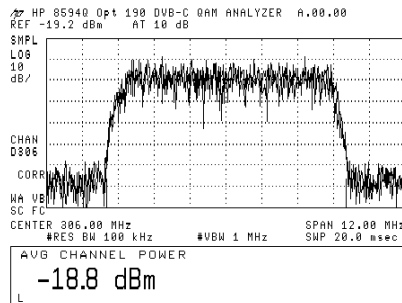
# Comprehensive RF and modulation quality measurements

## Comprehensive measurement capability

To accurately verify your quality of service the following measurements are important:

### Average channel power

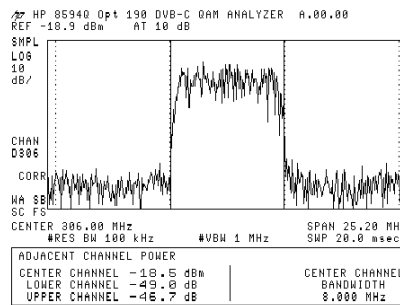
Channel power is the most basic measurement of digital signals on your DVB-C system. The HP 8594Q QAM analyzer gives a real-time display of the average power across the channel being measured. The sensitivity of the HP EM 8594Q QAM analyzer allows measurements throughout the system, from the headend to the low level signals at the subscriber drop.



Average channel power measured on an HP 8594 QAM analyzer

### Adjacent channel power

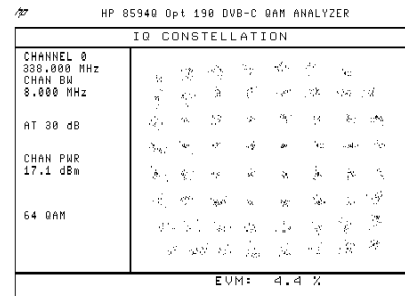
Adjacent channel power provides a measure of how much a transmission is leaking, into the immediately adjacent channels. Measurements are carried out across the transmission channel as well as two adjacent channels. The power level is presented for each channel.



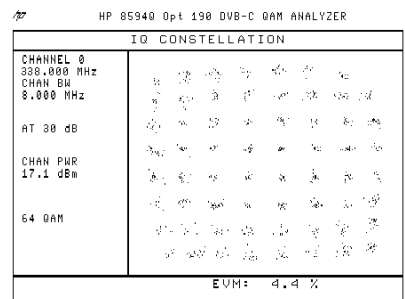
Adjacent channel power measured on an HP 8594 QAM analyzer

### Constellation display

The constellation display gives a graphical view of the demodulated QAM signal. This allows quick identification of impairments such as gain compression or IQ imbalance. The information from the visual appearance of the constellation display can be used to isolate and troubleshoot problems.



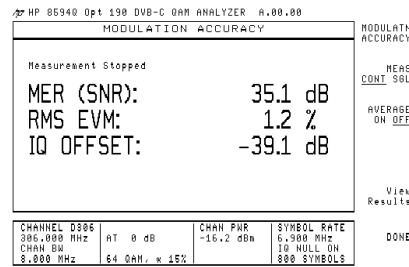
The HP 8594Q QAM analyzer constellation display of a signal with gain compression



The HP 8594Q QAM analyzer constellation display of a signal with IQ imbalance

### MER (modulation error ratio) and EVM (error vector magnitude and origin offset)

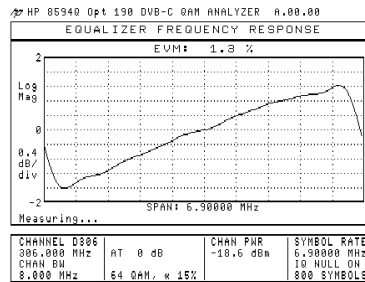
Mer and EVM give a metric measurement of the modulation quality. The measurement results can be displayed in real-time alongside the graphical constellation. Alternatively, ten average, maximum, minimum and standard deviation measurements can be captured and analyzed for trends.



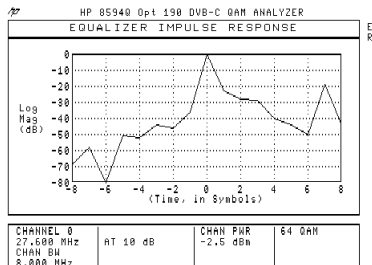
The HP 8594Q QAM analyzer display of MER, EVM and IQ offset

### Built-in equalizer response

The built-in adaptive equalizer in the HP 8594Q QAM analyzer displays both impulse and frequency response. The impulse response allows identification of micro-reflections in the transmission plant while the frequency response shows any tilt across the channel.



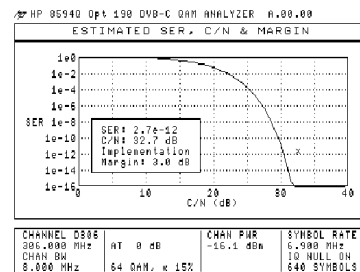
The HP 8594Q QAM analyzer display of the built-in equalizer frequency response



The HP 8594Q QAM analyzer display of the built-in equalizer impulse response

### Estimated SER (symbol error ratio) versus carrier to noise

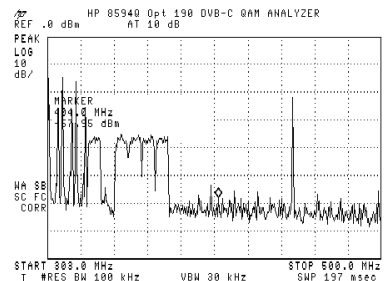
The estimated SER versus carrier-to-noise ratio measurement shows the current operating point of the cable TV system. A calculation is carried out for each measured constellation point to determine its probability of being misinterpreted. This point is then plotted against the current carrier-to-noise ratio. An operating curve can then be traced out by adding an external noise source to decrease the carrier-to-noise ratio.



The HP 8594Q QAM analyzer display of SER versus carrier to noise

### Spectrum analysis

In addition to these specific DVB-C measurements, the HP 8594Q QAM analyzer provides a fully featured 2.9 GHz spectrum analyzer.



The HP 8594Q QAM analyzer showing a sweep of several analog and digital channels

**Full spectrum  
analysis capability**

## Data analysis Option

### Check data integrity

Add Option 195<sup>1</sup> to the HP 8594Q QAM analyzer to verify that the MPEG data has been correctly decoded, and check transport stream content. The option also proves a real-time output (both ASI and parallel), to allow access to the data stream for further comprehensive analysis.

### Reed-Solomon error

Examining the statistics from the forward error correction (FEC) system gives information about the transmission margin of the RF channel. The FEC process adds information to each packet in the transport stream, to enable the correction of transmission errors. The HP 8594Q Option 195 includes a real-time FEC decoder. By monitoring the activity of the FEC decoder, analysis of byte and packet errors is provided. Since this analysis can be made on live data, this is the method recommended for non-intrusive in-service bit error ratio estimation.

| REED-SOLOMON RESULTS |                         |
|----------------------|-------------------------|
| <u>Byte Errors</u>   |                         |
| Count                | 186924                  |
| Ratio                | 4.338E-04               |
| <u>Packet Errors</u> |                         |
| Count                | 72                      |
| Ratio                | 3.408E-05               |
| CHANNEL USER         | TIME: 00d 00h 01m 23s   |
| 729.125 MHz          | RESULTS: [ Cumulative ] |
| 41.25 Mb/s           |                         |
| Measurement Stopped  |                         |

**Reed-Solomon byte and packet error count displayed on an HP 8594Q Option 195 QAM analyzer**

### PID statistics

The program identifier (PID) statistics provide two critical pieces of information about the MPEG transport stream. First, they list the individual data streams which make up the transport stream, along with the data rate associated with each one. An operator can check the video, audio and data content of the stream, and check for "illegal" PIDs. The number of "null" packets (added to bring the overall data rate up to the rate used for the channel) determines how much more information could be added to the stream. Second, they allow identification of any PID which has suffered uncorrectable packet errors during transmission. Packet errors cause glitches or blocking effects on the picture.

| 188.2885 PID STATISTICS          |                       |               |
|----------------------------------|-----------------------|---------------|
| PID                              | TEI                   | Net Kb/s      |
| 10                               | 0200 00001            | 4066          |
| 9                                | 0212 00000            | 4396          |
| 8                                | 0140 00002            | 4082          |
| 7                                | 000C 00000            | 4066          |
| 6                                | 0078 00002            | 4090          |
| 5                                | 0399 00001            | 4066          |
| 4                                | 025C 00001            | 4066          |
| 3                                | 0208 00001            | 4074          |
| 2                                | 0164 00002            | 6153          |
| 1                                | 0032 00000            | 82            |
| NULL Packet Min. Rate: 1446 Kb/s |                       | Total 38816   |
| NULL Packet Max. Rate: 2397 Kb/s |                       | Averages: Off |
| NULL Packet Mean Rate: 1376 Kb/s |                       |               |
| CHANNEL USER                     | TIME: 00d 00h 02m 57s |               |
| 729.125 MHz                      | RESULTS: Real Time    |               |
| 41.25 Mb/s                       |                       |               |
| Measuring...                     |                       |               |

**The PID statistics of a transport stream displayed on an HP 8594Q Option 195 QAM analyzer**

### Bit error ratio testing

For out-of-service testing of a digital channel, the recommended quality metric is bit error ratio (BER). Typical headend modulators can be set to transmit a standard continuous  $2^{23}-1$  pseudo-random binary sequence (PRBS). The HP 8594Q QAM analyzer data analysis option allows the instrument to function as a BER receiver, providing analysis and display of true bit error ratio measurements during installation of new channels or during system troubleshooting.

| CONTINUOUS PRBS RESULTS |                         |
|-------------------------|-------------------------|
| <u>Bit Errors</u>       |                         |
| Count                   | 14                      |
| Ratio                   | 1.765E-08               |
| CHANNEL 0330            | TIME: 00d 00h 00m 19s   |
| 888.000 MHz             | RESULTS: [ Cumulative ] |
| 41.40 Mb/s              |                         |
| Measuring...            |                         |

**The HP 8594Q Option 195 QAM analyzer makes the key out-of-service test of bit error ratio**

1. Option 195 measurements are specific to the European DVB standard. The option is not compatible with other digital video standards.

## *Solutions from baseband to RF...*

### HP Digital Video Test Solutions

HP provides a comprehensive range of test equipment for DVB-C analysis, generation and MPEG analysis.

### RF Testing

#### HP 8594Q DVB-C QAM Analyzer



- Field testing solution for the European DVB-C standard
- Comprehensive RF and data quality testing
- Test from the headend to the subscriber drop

#### HP 8591C Cable TV Analyzer



- Includes digital carrier power measurement
- In service analog RF and video measurements

### HP 89441A Option AYH Digital Video Modulation Analysis



- Provides highest quality QAM and VSB analysis capabilities
- Measures key modulation metrics
- Ideal for R&D use

### HP CaLan 3010R/H Sweep/Ingress Analyzer



- Return sweep and ingress detection
- Includes digital carrier power measurements
- Identify, troubleshoot and eliminate ingress

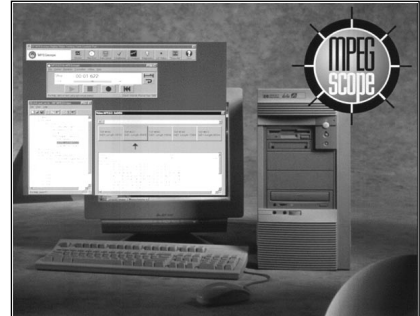
### HP E4441A DVB QAM Coder



- Fully compliant with DVB-C specifications
- Flexible real-time encoding
- Built-in calibrated impairments simplifies receiver characterization

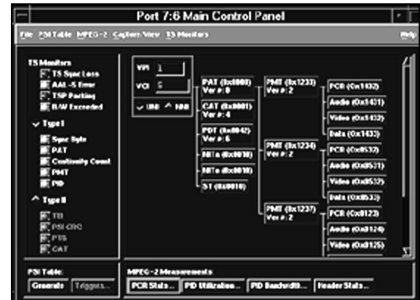
### MPEG Testing

#### E6277A MPEGScope Plus



- Verify or troubleshoot MPEG-2/DVB/ATSC implementations
- Generate and capture MPEG-2 streams up to 60Mb/s
- Live monitoring and analysis of MPEG-2 transport streams
- Complete MPEG-2, DVB and ATSC protocol decode

#### HP E6271A MPEGScope ATM Test Application



- Comprehensive MPEG-2 testing for the HP E4200B/4210B Broadband Series Test System - the ATM industry standard tester
- Real-time MPEG-2 transport stream analysis for ATM systems
- Implements key measurements including PCR jitter
- Supports most ATM standard interfaces from DS1 to OC-3DVB-C channel bandwidths

*...and back again*

## HP 8594Q QAM Analyzer Specifications

This section contains specifications and characteristics for the HP 8594Q QAM Analyzer. The distinction between specifications and characteristics is described as follows.

**Specifications** describe warranted performance over the temperature range 0° C to +55° C (unless otherwise noted). The analyzer will meet its specifications under the following conditions: 0° C to +50° C with Option 015 or Option 016 operating/carrying case; the instrument is within the one year calibration cycle; two hours of storage at a constant temperature within the operating temperature range; thirty minutes after the analyzer is turned on; after the CAL frequency, and CAL amplitude routines have been run.

**Characteristics** provide useful, but nonwarranted information about the functions and performance of the analyzer. Characteristics are specifically identified. Typical performance, where listed, is not warranted, but indicates performance that most units will exhibit. Nominal value indicates the expected, but not warranted, value of the parameter.

### Spectrum Analyzer Specifications

When used as a spectrum analyzer, the HP 8594Q QAM analyzer conforms to all specifications described in the HP 8590E-Series Portable Spectrum Analyzers, Technical Specifications. Literature number 5963-6909E.

### Specifications for DVB measurement capability

|  |  |                  |                   |
|--|--|------------------|-------------------|
| <b>DVB-C channel bandwidths</b>  | 8 MHz, 4 MHz and 2 MHz                       |                  |                   |
| <b>Supported symbol rates (Characteristics)</b><br>(also see Option J91) |  |                  |                   |
| <b>Channel Bandwidth</b>   | <b>8 MHz</b>                                 | <b>4 MHz</b>     | <b>2 MHz</b>      |
| <b>Symbol Rate</b>   | 6.9 MSymbol/s                                | 3.45 MSymbol/s   | 1.725 MSymbol/s   |
|  | 6.89 MSymbol/s                               | 3.445 MSymbol/s  | 1.72 MSymbol/s    |
|  | 6.875 MSymbol/s                              | 3.4375 MSymbol/s | 1.71875 MSymbol/s |
|  | 6.872 MSymbol/s                              | 3.436 MSymbol/s  | 1.718 MSymbol/s   |
| <b>Channel selection standard tuning ranges</b>                          |  |                  |                   |
|  | DVB-C D channel 31 - 41, 330 - 445           |                  |                   |
|  | CCIR VHF S channels 21 - 41                  |                  |                   |
|  | CCIR UHF U channels 21 - 69                  |                  |                   |
| <b>User defined channel tuning</b>                                       | 10 MHz - 2.9 GHz                             |                  |                   |
|  | 10 MHz - 1 GHz (with internal pre-amplifier) |                  |                   |
| <b>Testing at the headend</b>  |  |                  |                   |
| <b>Conditions</b>  | Single input signal                          |                  |                   |
| <b>Average power measurement</b>   |  |                  |                   |
| Minimum average power at input without preamp                            | <b>8 MHz</b>                                 | <b>4 MHz</b>     | <b>2 MHz</b>      |
|  | -60 dBm                                      | -63 dBm          | -66 dBm           |
|  | -62 dBm typical                              | -65 dBm typical  | -68 dBm typical   |
| with preamp <sup>1</sup>   | -81 dBm                                      | -84 dBm          | -87 dBm           |
|  | -83 dBm typical                              | -87 dBm typical  | -90 dBm typical   |
| <b>Average power accuracy</b>  | ± 2.8 dB, ± 1 dB typical                     |                  |                   |

1. Gain error of internal pre-amp not included.

## HP 8594Q QAM Analyzer Specifications continued

|                         |                   |                   |
|-------------------------|-------------------|-------------------|
| <b>Residual EVM/MER</b> | <b><u>EVM</u></b> | <b><u>MER</u></b> |
|                         | 1.47 %            | 33 dB             |
|                         | 1.16 % typical    | 35 dB typical     |

Reflects mean residual EVM/MER of 50 individual measurements  
 All measurements using 800 symbols  
 Typical value is at 20-30° C (room) temperature

|   |  |
|---|--|
| <b>Minimum power input for EVM/MER measurements</b> | -55 dBm (Using internal pre-amplifier) |
|---|--|

### Testing at the subscriber drop

|                   |  |
|-------------------|--|
| <b>Conditions</b> | Multiple input signals<br>Total incident power at 50 ohm <+17 dBm <sup>1</sup><br>Without external pad |
|-------------------|--|

### Average power measurement

|   |                     |                     |                     |
|---|---------------------|---------------------|---------------------|
| Minimum average power at input without preamp | <b><u>8 MHz</u></b> | <b><u>4 MHz</u></b> | <b><u>2 MHz</u></b> |
|   | -40 dBm             | -43 dBm             | -46 dBm             |
|   | -42 dBm typical     | -45 dBm typical     | -48 dBm typical     |
| with preamp <sup>2</sup>                      | -41 dBm             | -44 dBm             | -47 dBm             |
|   | -43 dBm typical     | -47 dBm typical     | -50 dBm typical     |

|                               |                         |
|-------------------------------|-------------------------|
| <b>Average power accuracy</b> | ± 2.8 dB, ±1 dB typical |
|-------------------------------|-------------------------|

|  |                   |                   |
|--|-------------------|-------------------|
| <b>Residual EVM/MER</b>                      | <b><u>EVM</u></b> | <b><u>MER</u></b> |
| (For total incident power at input <+20 dBm) | 2.07 %            | 30 dB             |
|  | 1.74 % dB typical | 31.5 dB typical   |

Reflects mean residual EVM/MER of 50 individual measurements  
 All measurements using 800 symbols  
 Typical value is at 20 - 30° C (room) temperature

|   |  |
|---|--|
| <b>Minimum power input for EVM/MER measurements</b> | -55 dBm (Using internal pre-amplifier) |
|---|--|

## Characteristics

### Demodulator Characteristics

|                                       |   |
|---------------------------------------|---|
| Supported digital demodulation format | 16, 64, 256 Quadrature Amplitude Modulation |
| Nyquist Filter Alpha                  | 0.15 time DFE/FFE Adaptive Equalizer        |

|                          |                                      |
|--------------------------|--------------------------------------|
| <b>ACP dynamic range</b> | 58 dB without internal pre-amplifier |
|--------------------------|--------------------------------------|

|   |  |
|---|--|
| <b>Maximum total incident input power</b> | + 30 dBm without internal pre-amplifier<br>+ 5 dBm with internal pre-amplifier |
|---|--|

### Pre-amp typical specifications

|                          |                                |
|--------------------------|--------------------------------|
| Maximum safe input level | -5 dBm (average or peak power) |
| Gain                     | +23 dB ±3 dB                   |
| Frequency range          | 1 MHz to 1 GHz                 |
| Flatness                 | ±0.5 dB                        |
| Noise figure             | 4 dB maximum                   |
| TOI                      | +14 dBm                        |

1. Improved performance may be possible by pre-filtering the analyzer input using a tunable Bandpass filter with approximately 10 MHz 3 dB bandwidth.
2. Gain error of internal pre-amp not included.



## HP 8594Q QAM Analyzer Specifications continued

### Front and rear panel interfaces

#### Front Panel

|                    |  |
|--------------------|--|
| RF Input           | 50 ohms Type-N                         |
| Calibration Output | 50 ohms BNC, -20 dBm, 300 MHz          |
| Probe Power        | +15Vdc, -12.6 Vdc, and Gnd 150 mA each |

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#### Rear Panel

|                                   |   |
|-----------------------------------|---|
| Keyboard (Standard or Option 043) | 5-Pin mini-DIN, compatible with HP C1405B and most IBM/AT keyboards                                       |
| External Trigger Input            | BNC, TTL levels, positive edge trigger  |
| HP-IB and Parallel                | SH1, AH1, T6, L4, ST1, RL1, PPO, DC1, C1 C2, C3, & C28 and 25 Pin subminiature D-shell female or parallel |
| RS-232 and Parallel (Option 043)  | 9-Pin subminiature D-shell female and 25 Pin subminiature D-shell female for parallel                     |
| External Ref Input                | 50 ohms BNC, 10 MHz, -2 to +10 dBm  |
| 10 MHz Ref Output                 | 50 ohms BNC, 10 MHz, 0 dBm  |
| Monitor Out                       | 50 ohms BNC, Selectable format NTSC, 15.75 kHz, 60 Hz PAL, 15.625 kHz, 50 Hz                              |

**DVB Parallel interface (Option 195)** 25-Pin subminiature D-shell female. Compliant with DVB-PI specification, 188 or 204 byte mode user-selectable

**DVB ASI serial interface (Option 195)** 75 ohms BNC. Compliant with DVB-ASI specification, 188 or 204-byte mode, user-selectable

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#### Data measurements (Option 195)

(Option 195 measurements are specific to the European DVB standard. The option is not compatible with other digital video standards)

#### PID statistics measurement

|   |                      |
|---|----------------------|
| Maximum number of PID's analyzed simultaneously | 64                   |
| Transport stream net data rate accuracy         | 1% without averaging |
| PID net data rate accuracy                      | 1% without averaging |
| Transport stream gross data rate accuracy       | 1% without averaging |

#### Multiplex overview measurement

|   |                      |
|---|----------------------|
| Maximum number of PIDs detected in transport stream | 5000                 |
| Maximum number of PIDs analyzed simultaneously      | 10                   |
| Transport stream net data rate accuracy             | 1% without averaging |
| PID net data rate accuracy                          | 1% without averaging |
| Transport stream gross data rate accuracy           | 1% without averaging |

#### Reed-Solomon error statistics measurement

|                       |                           |
|-----------------------|---------------------------|
| Measurement displays: | Byte error count          |
|                       | Byte error ratio          |
|                       | Packet error count        |
|                       | Packet error ratio        |
|                       | Estimated bit error ratio |

#### Bit error ratio measurement

|                             |   |
|-----------------------------|---|
| Measurement stimulus types: | 2 <sup>23</sup> -1 continuous PRBS  |
|                             | Sync (47hex, no inversion) + 203-byte 2 <sup>23</sup> -1 PRBS*                                  |
|                             | R-S encoded packet with payload of 187 bytes of 2 <sup>23</sup> -1 PRBS*                        |
|                             | R-S encoded packet with user-definable PID and payload of 184 bytes of 2 <sup>23</sup> -1 PRBS* |
|                             | R-S encoded packet with null PID value and payload of 184 bytes of 0000                         |
|                             | *Note: PRBS sequence paused during header and Reed-Solomon bytes                                |

## HP 8594Q QAM Analyzer Specifications continued

### 6 MHz Channel Operation (Option J91)

#### Characteristics

|                               |   |
|-------------------------------|---|
| <b>Channel Bandwidth</b>      | 6 MHz   |
| <b>Supported Symbol Rates</b> | 5.056941, 5.360537, 5.274 Msymbols/s                        |
| <b>Nyquist Filter Alpha</b>   | 0.12 to 0.18 DFE/FFE, automatically selected by symbol rate |

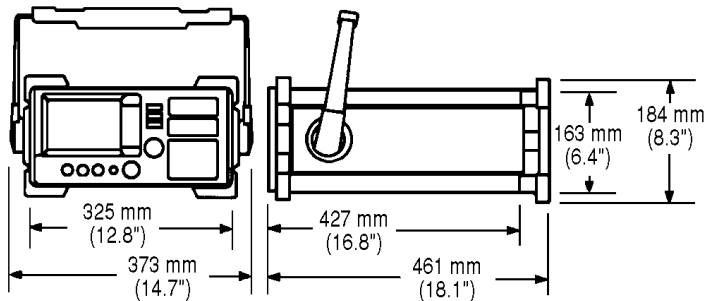
|                               |  |
|-------------------------------|--|
| <b>Channel Selection</b>      | Standard, HRC, IRC, Air channel plans of EIA Interim |
| <b>Standard tuning ranges</b> | Standard IS-6  |

|                                    |  |
|------------------------------------|--|
| <b>User-defined channel tuning</b> | 10 MHz - 2.9 GHz                             |
|                                    | 10 MHz - 1 GHz (with internal pre-amplifier) |

#### Dimensions

|                                |                                      |
|--------------------------------|--------------------------------------|
| Without handle, feet, or cover | 163 mm (H) x 325 mm (W) x 427 mm (D) |
| Overall                        | 184 mm (H) x 373 mm (W) X 461 mm (D) |

|               |                 |
|---------------|-----------------|
| <b>Weight</b> |                 |
| Net           | 16.4 kg (36 lb) |
| Shipping      | 19.1 kg (42 lb) |



#### General Specification

|                               |  |
|-------------------------------|--|
| <b>Temperature range</b>      | Operating 0° C to +55° C<br>Storage -40° C to +75° C   |
| <b>EMI compatibility</b>      | Conducted and radiated interference CISPR Pub. 11 and Messemphaenger Postverfuegung 526/527/79   |
| <b>Audible noise</b>          | <37.5 dBa pressure and <5.0 Bels power (ISODP7779)   |
| <b>Power requirements</b>     |  |
| ON (Line 1)                   | 90 to 132 V rms, 47 to 440 Hz, 195 to 250 V rms, 47 to 66 Hz<br>Power consumption <500 VA; <180W |
| Standby (Line 0)              | Power consumption <7 W   |
| <b>User program memory</b>    | 289 Kbytes non-volatile RAM  |
| <b>Data storage (nominal)</b> | Internal 24 traces or 32 states  |

## Ordering Information

### HP 8594Q QAM Analyzer

|                                |  |
|--------------------------------|--|
| <b>Option 190</b> <sup>1</sup> | DVB-C RF and modulation quality measurements<br>(includes DVB-C measurement software, precision frequency reference, HP-IB/parallel interface) |
| <b>Option J91</b> <sup>2</sup> | 6 MHz channel operation<br>(includes RF and modulation quality measurement software, precision frequency reference, HP-IB/parallel interface)  |
| <b>Option 195</b> <sup>3</sup> | Data measurements  |
| <b>Option 016</b>              | Soft yellow operating/carrying case  |
| <b>Option 040</b>              | Front panel protective cover w/storage   |
| <b>Option 042</b>              | Protective soft carrying case  |
| <b>Option 043</b>              | Replace HP-IB/parallel interface with RS232/parallel interface   |
| <b>Option 908</b>              | Rack mount kit without handles   |
| <b>Option 909</b>              | Rack mount with handles  |
| <b>Option 910</b>              | Additional manual set  |

### Related test equipment

#### HP E4441A DVB QAM Coder

#### HP E443xA Series digital signal generators

#### HP 89441A 2.65 GHz vector signal analyzer

|                   |  |
|-------------------|--|
| <b>Option AYA</b> | Vector modulation analysis               |
| <b>Option AYH</b> | Digital video modulation analysis        |
| <b>Option UFG</b> | 4 Mbytes extended RAM and additional I/O |

#### HP 8591C Cable TV Analyzer, 1.8-GHz, 75-ohm input

(includes digital carrier power measurement)

#### HP CaLan 3010R/H Sweep/Ingress Analyzer

(includes digital carrier power measurement)

#### HP E6277A MPEGScope DVB Plus

### Recommended HP accessories

#### HP 85702A 128K RAM card

#### HP 85704A 256K RAM card

#### HP 85705A 512K RAM card

#### HP 85901A Portable AC power source

#### HP 24542U RS-232 9-pin cable (analyzer to PC)

#### HP 24542G RS-232 9-pin to 25-pin cable (analyzer to PC)

#### HP C2950A Parallel 36-pin to 25-pin cable (analyzer to printer)

#### HP 10833A HP-IB (GP-IB) cable (1 m)

1. Required option for standard operation
2. Required option for 6 MHz channel operation; not compatible with option 190
3. Option 195 measurements are specific to the European DVB standard. The option is not compatible with other digital video standards



**For further information on the HP 8594Q QAM analyzer the following literature may be ordered:**

- 5965-3210E** HP 8594Q QAM Analyzer photo card
- 5965-4991E** HP 8594Q QAM Analyzer product note

Visit the interactive demo page on the WorldWideWeb at [http://www.hp.com/info/HP8594Q\\_demo](http://www.hp.com/info/HP8594Q_demo)

**For further information on associated test equipment the following literature may be ordered:**

- 5965-4722E** HP E4441A DVB QAM Coder product information
- 5964-0244E** HP Calan 8591C Cable TV Analyzer
- 5965-1108E** HP CaLan 3010R/H Sweep/Ingress Analyzer
- 5964-3403E** HP 89440A Option AYH Vector Signal Analyzer product information
- 5965-8194E** MPEGScope DVB Plus product information

**For more information about Hewlett-Packard test and measurement products, applications, services, and for a current sales office listing, visit our web site, <http://www.hp.com/go/tmdir>. You can also contact one of the following centers and ask for a test and measurement sales representative.**

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