HP 8542E EMI Receiver
HP 85422E Receiver RF Section
HP 85420E RF Filter Section

Product Overview

9 kHz to 2.9 GHz

The HP 8542E EMI test receiver is designed for conformance testing to industry standards such as CISPR, EN, FCC, VCCI, and VDE.

Just like the HP 8546A EMI test receiver, the HP 8542E is fully CISPR 16 compliant. This includes meeting the strict requirement for ±2 dB absolute amplitude accuracy and correct measurement of the CISPR pulse.

With an upper frequency of 2.9 GHz, the HP 8542E provides extended frequency coverage for:

- Testing the fundamental and first two harmonics of 900 MHz mobile communications devices,
- Performing FCC testing of devices with internally generated frequencies up to 500 MHz,
- Measuring the fundamental of the latest 2.4 GHz wireless communications devices and
- Testing devices, such as microwave ovens, with emissions above 2 GHz.

The HP 8542E includes built-in measurement functions and routines which automate and speed conformance testing. The Measure at Marker function automatically measures the corrected (dBµV/m) peak, quasi peak and average amplitude of a signal with the press of one key. The built-in DOS disk drive allows a measured, internal list of signals to be easily transferred directly to your personal computer.

Measurement Confidence — An HP Tradition

In the EMI business, accurate measurements are essential. That is why measurement confidence is one of the cornerstones of the HP 8542E. We began with a robust design that met or exceeded all the recommendations of CISPR Publication 16. Next, we included RF and IF overload detectors to warn you of any possible overload condition. If overload does occur, built-in auto-ranging readjusts the receiver's IF gain and/or RF attenuation settings to automatically eliminate any overload conditions.

To insure accurate calibration of the receiver, we added features that include:

• A fully automatic calibration routine that completely calibrates the receiver with the touch of a button. All calibration signals are automatically switched internally to both inputs, so you don't have to connect or disconnect any cables on the front panel to perform a calibration.

• A built-in real-time clock that lets you program a time to start the calibration, even if the receiver is unattended. You can schedule the calibration to automatically begin before you arrive at work. The receiver will be fully calibrated and ready to start making measurements, saving you time and making you more productive.

Certificate Of Calibration

Model No/System No: 8542E
Serial No:
Description: EMI Receiver

At the time of manufacture, this certifies that the above product was calibrated in accordance with applicable Hewlett-Packard procedures which are in compliance with relevant clauses of ISO 9001:2

At planned intervals, Hewlett-Packard measurement standards are calibrated by comparision to or measurement against national standards, natural physical constants, consensus standards, or by ratio-type measurements using self-calibrating techniques.

National standards are administered by NIST (National Institute of Standards and Technology) or other recognized national standards laboratories.

At the time of shipment, your instrument met its published operating specifications

The environment is which this instrument was calibrated is maintained within the operating specifications of the instrument and the standards.

Supporting documentation relative to traceability is on file and is available for examination upon request

Calibration Date: 05/14/94

HEWLETT-PACKARD COMPANY

A certificate of calibration, shipped with each receiver.

• A Cal Check key, which you can press before measuring a signal, performs a quick calibration verification to assure that you are making accurate measurements

• A Receiver Calibration Status key which displays the date of the last factory or service center calibration, and the date of the last user calibration. This capability helps you meet the goals of ISO 9000 by documenting the calibration status of your receiver. HP takes great care in building and testing our EMI instrumentation products. We believe ISO 9000 certification of our facilities by recognized third-party registrars complements our long standing objective to provide products and services of the highest quality and the greatest possible value to our customers. This product was manufactured in an ISO 9002 registered facility in concurrence with HP's quality commitment.

Support

HP operates many of its own EMC test facilities, so we understand how important it is to keep your test systems up and running. When you buy an HP 8542E, you get more than just a great EMI receiver - you also get the reliability, service, and support on which HP has built its reputation. With service centers, systems engineers, and customer engineers located worldwide, and the factory expertise to back them up, HP is ready to support you in a way no other company can.

These specifications apply to both the HP 8542E EMI receiver and the HP 85422E receiver RF section except where noted. All specifications apply over a 0 to 55° C temperature range unless otherwise stated. The receiver will meet its specifications after two hours of storage at a constant temperature within the operating temperature range, after the receiver has been operating for thirty minutes, and after CAL ALL has been run.

Supplemental characteristics are denoted by “characteristic”, “nominal”, and “approximately”; these constitute nonwarranted functional performance information derived during the design process and are not tested on a continuing basis.

Specifications

Frequency Specifications

Tuning Range

HP 8542E	
Band 1	9 kHz to 50 MHz
Band 2	20 MHz to 2.9 GHz
Bypass	9 kHz to 2.9 GHz
HP 85422E	9 kHz to 2.9 GHz

Frequency Reference

Aging	$<\pm 1 \times 10^{-7}$/year
Settability	$<\pm 1 \times 10^{-8}$
Temperature Stability	$<\pm 1 \times 10^{-8}$

Frequency Readout Accuracy

±(frequency readout x frequency reference error +1% of span + 20% of IF bandwidth + 100 Hz)

Frequency Span Accuracy

Span ≤ 10 MHz	±2% of Span
Span > 10 MHz	±3% of Span

Marker Count Accuracy

Frequency Span ≤ 10 MHz ±(marker frequency x frequency reference error + counter resolution + 100 Hz)
Frequency Spans >10 MHz ±(marker frequency x frequency reference error + counter resolution + 1kHz)

Counter Resolution

Frequency Spans ≤ 10 MHz	Selectable from 10 Hz to 100 kHz
Frequency Spans >10 MHz	Selectable from 100 Hz to 100 kHz

Sweep Time

Range	20 ms. to 100 sec.
Sweep Trigger	Free Run, Single, Line, Video, External

Amplitude Specifications

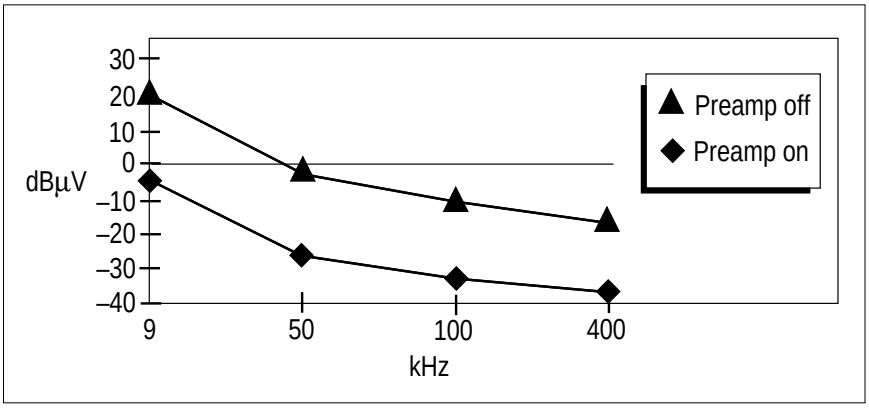
Characteriestic Noise Indication with CISPR Measurement bands (0 dB attenuation, 50Ω input termination)

HP 8542E		**Peak**	**Quasi-Peak**	**Average**
CISPR Band A	9 kHz to 150 kHz (200 Hz Bandwidth)			
Preamp off		15 to –15 dBµV	6 to –25 dBµV	3 to –27 dBµV
Preamp on		2 to –28 dBµV	7 to –29 dBµV	–9 to –31 dBµV
CISPR Band B	150 kHz to 30 MHz (9 kHz Bandwidth)			
Preamp off		–3 dBµV	–11 dBµV	–18 dBµV
Preamp on		–8 dBµV	–15 dBµV	–21 dBµV
CISPR Band C/D	30 MHz to 1 GHz (120 kHz Bandwidth)			
Preamp off		9 dBµV	2 dBµV	–5 dBµV
Preamp on		4 dBµV	–2 dBµV	–10 dBµV

Displayed Average Noise Level (0 dB attenuation, 50Ω input termination, 30 Hz IF BW, 30 Hz Averaging BW)

HP 8542E

$f_0 \leq 400$ kHz

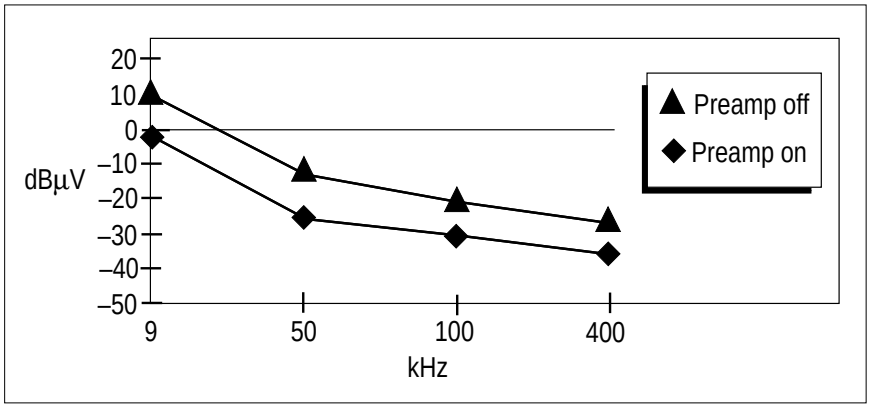


$f_0 > 400$ kHz

	Band 1 9 kHz to 50 MHz	**Band 2** 20 MHz to 2.9 GHz
Preamp off	–31 dBµV	–31 dBµV
Preamp on	–39 dBµV	–39 dBµV

HP 85422E

$f_0 \leq 400$ kHz



$f_0 > 400$ kHz

Preamp off	–18 dBµV
Preamp on	–39 dBµV

Amplitude Specificationa (continued)

Absolute Amplitude Accuracy
HP 8542E only

	Band 1 9 kHz to 50 MHz	Band 2 20 MHz to 2.9 GHz
specification	± 2 dB	± 2 dB
characteristic	± 1 dB	± 1 dB

Linear to Log Scale Switching Uncertainty
HP 85422E ± 0.25 dB

Display Scale Fidelity
HP 85422E
Log Scale
Cumulative Uncertainty (0 to–66 dB from Reference Level)
3 kHz to 3 MHz IF BW ±(0.3 dB + 0.01 x dB from Ref. Level)
30 Hz to 1 kHz IF BW ±(0.4 dB + 0.01 x dB from Ref. Level)
Incremental Uncertainty (0 to –56 dB from Reference Level) ± 0.4 dB/4dB

Linear Scale ± 3% of Reference Level

Gain Compression (Specification is derived from measured distortion with a total power at the input mixer of –10 dBm. If the IF BW ≤ 300 Hz, this applies only if signal separation 3 4 kHz and signal amplitude is ≤ Ref. Level + 10 dB.)

f_0 < 10 MHz < 0.75 dB
f_0 ≥ 10 MHz < 0.5 dB

Characteristic 1dB Compression Point (Characteristics apply for f_0 > 10 MHz)

HP 8542E	Band 1 9 kHz to 50 MHz	Band 2 20 MHz to 2.9 GHz
Preamp off	89 dBµV	89 dBµV
Preamp on	77 dBµV	77 dBµV

HP 85422E
Preamp off 102 dBµV
Preamp on 75 dBµV

Third Order Intercept Point
f_0 > 200 kHz, Signal separation > 50 kHz

HP 8542E	Band 1 9 kHz to 50 MHz	Band 2 20 MHz to 2.9 GHz
Preamp off	97 dBµV	97 dBµV
Preamp on	85 dBµV	85 dBµV

HP 85422E
Preamp off 112 dBµV
Preamp on 85 dBµV

Second Harmonic Intercept Point

HP 8542E	Band 1 9 kHz to 50 MHz	Band 2 20 MHz to 2.9 GHz
f_0 ≤ 1 GHz, ≥1.5 GHz		
Preamp off	122 dBµV	122 dBµV
Preamp on	110 dBµV	110 dBµV
1 GHz < f_0 < 1.5 GHz		
Preamp off		117 dBµV
Preamp on		107 dBµV

HP 85422E
Preamp off 134 dBµV
Preamp on 100 dBµV

Other Input Related Spurious –65 dBc (f_0 > 10 MHz)

Residual Responses (0 dB attenuation, 50Ω Input termination, Preamp on)
HP 8542E
9 to 30 kHz <–2 dBµV
30 kHz to 2.9 GHz <–10 dBµV

HP 85422E
9 kHz to 150 kHz < 2 dBµV
150 kHz to 2.9 GHz < –8 dBµV

IF and Display Specifications

IF Bandwidths

Measurement (6 dB)	200 Hz, 9 kHz, 120 kHz (conform to CISPR Publication 16)
Diagnostic (3 dB)	30 Hz to 3 MHz in 1-3-10 steps, and 5 MHz

Averaging Bandwidths 30 Hz to 3 MHz in 1-3-10 steps. Post-detection single pole low-pass filters
1, 3, and 10 Hz digital filters with anti-aliasing

Demodulation AM and FM

Detectors

Measurement	Peak, Quasi-Peak and Average. Quasi-Peak time constants conform with CISPR Publication 16.
Overload	
HP 8542E	Broadband RF (band 1 and 2 only) and IF
HP 85422E	IF

Inputs and Outputs

Front Panel Inputs

HP 8542E	
Input 1	9 kHz to 50 MHz, Type N female
Input 2	9 kHz to 2.9 GHz, Type N female
HP 85422E	9 kHz to 2.9 GHz, Type N female

Preamplification

HP 8542E	
Bands 1 and 2	12 dB
BYPASS	27 dB
HP 85422E	27 dB

Maximum Safe Input Level

HP 8542E		
DC Voltage		0 V
Average Power		137 dBµV (30 dBm)
Peak Pulse Power		
	Input 1	2000W peak for 10 µsec, > 20 dB input attenuation
	Input 2	100W peak for 10 µsec, 1% duty cycle, 30 dB input attenuation
HP 85422E		
DC Voltage		0 V (DC coupled) 50 V (AC coupled)
Average Power		137 dBµV (30 dBm)
Peak Pulse Power		100W peak for 10 µsec, 1% duty cycle, 30 dB input attenuation

Input VSWR

HP 8542E Bands 1, 2, and 3		
0 dB input attenuation		2 : 1
10 dB input attenuation	≤1.5 GHz	1.2 : 1
	>1.5 GHz	1.6 : 1

Input Attenuation

HP 8542E	
Input Attenuator	0 to 50 dB in 10 dB steps
Linearity test attenuator	4 dB
HP 85422E	
Input Attenuator	0 to 70 dB in 10 dB steps

Inputs and Outputs (continued)

Input Filter Bandwidths

HP 85420E (all 3 dB bandwidths are characteristics)

9 to 74 kHz	fixed
74 to 198 kHz	fixed
198 to 525 kHz	fixed
525 to 1025 kHz	fixed
1 to 2 MHz	fixed
2 to 6 MHz	tunable (20% 3 dB bandwidth)
6 to 17 MHz	tunable (10% 3 dB bandwidth)
17 to 29 MHz	tunable (7% 3 dB bandwidth)
29 to 52 MHz	tunable (8% 3 dB bandwidth)
52 to 98 MHz	tunable (6% 3 dB bandwidth)
98 to 152 MHz	tunable (6% 3 dB bandwidth)
152 to 216 MHz	tunable (6% 3 dB bandwidth)
216 to 330 MHz	tunable (5% 3 dB bandwidth)
330 to 500 MHz	tunable (5% 3 dB bandwidth)
.5 to 1 GHz	tunable (4% 3 dB bandwidth)
1 to 2.9 GHz	fixed

Front Panel Outputs

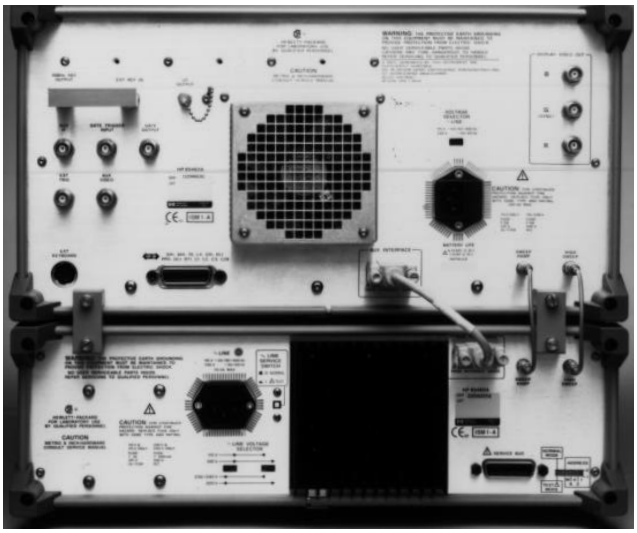
Tracking Generator	Type N female, 50Ω nominal
Probe Power	+ 15 VDC ±7% at 150 mA max. –12.6 VDC ±10% at 150 mA max.
Earphone Jack	1/8 inch monaural jack

HP 85422E only

Calibrator Signal	Type N female, 300 MHz, –20 dBm
External ALC	Negative detector

Rear Panel Inputs and Outputs

10 MHz REF OUTPUT	BNC female, 50Ω
output amplitude	> 0 dBm
EXT REF IN	BNC female
frequency	10 MHz
input amplitude range	–2 to 10 dBm
AUX IF OUT	BNC female, 50Ω
frequency	21.4 MHz
amplitude range	–10 to–60 dBm
AUX VIDEO OUT	BNC female
amplitude range	0 to 1 V



Inputs and Outputs (continued)

EXT KEYBOARD	Interface compatible with HP C1405A option ABA keyboard and most IBM/AT non auto-switching keyboards.
EXT TRIG INPUT	BNC female
trigger level	Positive edge initiates sweep in EXT TRIG mode (TTL)
LO OUTPUT	SMA female, 50Ω
frequency range	3.0 to 6.8214 GHz
HI-SWEEP IN/OUT	
input/output (HP 85422E)	SMA female, high = sweep, low = retrace (TTL)
output (HP 85420E)	SMA female, high = sweep, low = retrace (TTL)
SWEEP INPUT /OUTPUT	
output (HP 85422E)	SMA female, 0 to 10 V
input (HP 85420E)	SMA female, 0 to 10 V
REMOTE INTERFACE	
HP 85422E standard	HP-IB
Option 023	RS-232
HP 85420E	HP-IB compatible service port (for service use by qualified repair personnel only)
MONITOR OUTPUT	R, G, B (Composite video on G) 25 kHz horizontal rate 60 Hz vertical rate
HP 85422E only	
AUX INTERFACE	9-pin subminiature “D”

Tracking Generator Specifications

Output Frequency Range		9 kHz to 2.9 GHz
Output Power Level		
Range		–1 to –66 dBm
Resolution		0.1 dB
Absolute Accuracy	85422E	± 0.75 dB
(–20 dBm at 300 MHz, 25° ± 10° C)	8542E	± 0.75 dB (characteristic)

General Specifications

Storage Media Internal 3.5 inch disk drive
1.44 MByte DOS and LIF format

Temperature Range

Operating	0 to 55°C
Storage media	4 to 45°C
Storage	–20 to 65° C

EMI Compatibility Measurement characteristics are in compliance with CISPR Publication 16.
Radiated and conducted emissions are in compliance with CISPR Publication 11/1990 Group 1 Class A.
Receiver is compliant with CISPR Publication 16 at 3V/m

Power Requirements

	Voltage	**Power consumption**
HP 8542E	90 to 132 V_{rms}, 47 to 440 Hz 198 to 264 V_{rms}, 47 to 66 Hz	On < 615 VA; < 265 W Off < 5 W
HP 85422E	90 to 132 V_{rms}, 47 to 440 Hz 198 to 264 V_{rms}, 47 to 66 Hz	On < 500 VA; < 180 W Off < 5 W
HP 85420E	90 to 132 V_{rms}, 47 to 440 Hz 198 to 264 V_{rms}, 47 to 66 Hz	On < 115 VA; < 85 W Off 0 W

Dimensions

HP 8542E	
Width	457 mm (18 inches)
Height	365 mm (14 3/8 inches)
Depth	645 mm (25 3/8 inches)
Weight	49 kg (108 lb)
HP 85422E	
Width	457 mm (18 inches)
Height	235 mm (9 1/4 inches)
Depth	645 mm (25 3/8 inches)
Weight	28.1 kg (62 lb)
HP 85420E	
Width	457 mm (18 inches)
Height	146 mm (5 3/4 inches)
Depth	645 mm (25 3/8 inches)
Weight	20.9 kg (46 lb)

Ordering Information

HP 8542E	EMI Receiver
HP 85422E	Receiver RF Section
HP 85420E	RF Filter Section
Option 0B1	Add extra manual set
Option 1CM	Rack mount kit
Option 023	Substitutes RS-232 for HP-IB interface
Option W30	Three-year return-to-HP service
HP 8546A	6.5 GHz EMI Test Receiver data sheet, literature number 5091-8314E

Accessories

HP 92203J	HP-IB-to-Centronics Adapter (Includes a 110-120V, 60 Hz AC adapter and NEMA (U.S.) style power cord)
HP 92203K	HP-IB-to-Centronics Adapter. No AC adapter included. (Order HP 82241A AC adapter with appropriate option: ABB - Europe ABG - Australia ABJ - Japan ABU - United Kingdom)
HP C1405A	101-key, enhanced PC keyboard
85460-20036	Replacement semi-rigid cable for front panel
8120-8154	Replacement flexible cable for rear panel (for high sweep or sweep ramp)
8120-6337	Replacement Auxilliary bus cable

Supported Printers

(Note: Printers with HP-IB interfaces can be connected directly to a standard HP 8542E or 85422E. Printers with parallel (Centronics) interfaces require the use of an HP-IB-to-Centronics adapter. Printers with RS-232 interfaces can be connected directly to an HP 8542E or 85422E if Option 023 is installed.)

HP ThinkJet
HP QuietJet
HP PaintJet
HP DeskJet
HP DeskJet 500
HP DeskJet 500C
HP DeskJet 550C
HP LaserJet
HP LaserJet II
HP LaserJet III
HP LaserJet 4
Epson MX-80

HEWLETT® PACKARD

For more information on Hewlett-Packard Test & Measurement products, applications or services please call your local Hewlett-Packard sales offices.
A current listing is available via Web through AccessHP at http://www.hp.com.
If you do not have access to the internet please contact one of the HP centers listed below and they will direct you to your nearest HP representative.

United States:
Hewlett-Packard Company
Test and Measurement Organization
5301 Stevens Creek Blvd.
Bldg. 51L-SC
Santa Clara, CA 95052-8059
1 800 452 4844

Canada:
Hewlett-Packard Canada Ltd.
5150 Spectrum Way
Mississauga, Ontario L4W 5G1
(905) 206 4725

Europe:
Hewlett-Packard
European Marketing Centre
P.O. Box 999
1180 AZ Amstelveen
The Netherlands

Japan:
Yokogawa-Hewlett-Packard Ltd.
Measurement Assistance Center
9-1, Takakura-Cho, Hachioji-Shi,
Tokyo 192, Japan
(81) 426 48 3860

Latin America:
Hewlett-Packard
Latin American Region Headquarters
5200 Blue Lagoon Drive, 9th Floor
Miami, Florida 33126, U.S.A.
(305) 267 4245/4220

Australia/New Zealand:
Hewlett-Packard Australia Ltd.
31-41 Joseph Street
Blackburn, Victoria 3130, Australia
131 347 Ext. 2902

Asia Pacific:
Hewlett-Packard Asia Pacific Ltd.
17-21/F Shell Tower, Time Square,
1 Matheson Street, Causeway Bay,
Hong Kong
(852) 2599 7070

Printed in U.S.A. 5/94
5963-0081E