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Agilent 8542E and 8546A EMI Test Receivers

Data Sheet



Agilent Technologies 8542E: 9 kHz to 2.9 GHz
- **8542E EMI Receiver**
- **85422E Receiver RF Section**
- **85420E RF Filter Section**

Agilent Technologies 8546A: 9 kHz to 6.5 GHz
- **8546A EMI Receiver**
- **85462A Receiver RF Section**
- **85460A RF Filter Section**

These specifications apply to both EMI receivers (Agilent 8542E and 8546A) and both receiver RF sections (Agilent 85422E and 85462A) except where noted.

Specifications

All specifications apply over 0 °C to +55 °C. The EMI receiver 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 ALL has been run.

Frequency Specifications

Tuning Range

Band 1	9 kHz to 50 MHz
Band 2	20 MHz to 2.9 GHz
Band 3	1 GHz to 6.5 GHz*
Bypass	9 kHz to 2.9 GHz (to 6.5 GHz*)
85422E/85462A	9 kHz to 2.9 GHz (to 6.5 GHz*)

Frequency Readout Accuracy

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

Marker Count Accuracy

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

Frequency Reference

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

Frequency Span Accuracy

	Bands 1 and 2	Band 3 and Bypass
Span ≤ 10 MHz	±2% of span + 10 Hz	±4% of span
Span > 10 MHz	±3% of span	±6% of span
85422E/85462A		
Span ≤ 10 MHz	±2% of span + 10 Hz	
Span > 10 MHz	±3% of span	

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 s
Sweep trigger	free run, single, line, video, external

* For 8546A EMI receiver only

** Frequency reference error = (aging rate x period of time since last adjustment + initial achievable accuracy + temperature stability)

Agilent Technologies

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Amplitude Specifications

Characteristic Noise Indication with CISPR Measurement Bands (0 dB attenuation, 50 Ω input termination)

Band A, 9 to 150 kHz (200 Hz BW)	**Peak**	**Quasi-Peak**	**Average**
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
Band B, 150 kHz to 30 MHz (9 kHz BW)			
Preamp off	–3 dBµV	–11 dBµV	–18 dBµV
Preamp on	–8 dBµV	–15 dBµV	–21 dBµV
Band C, 30 MHz to 1 GHz (120 kHz BW)			
Preamp off	9 dBµV	2 dBµV	–5 dBµV
Preamp on	4 dBµV	–2 dBµV	–10 dBµV

System Amplitude Accuracy

	Band 1	**Band 2**	**Band 3***
	9 kHz to 50 MHz	20 MHz to 2.9 GHz	1 to 6.5 GHz
Specification	± 2 dB	± 2 dB	
Characteristic	±1 dB	±1 dB	± 3 dB

Linear to Log Scale Switching Uncertainty

85422E/85462A ± 0.25 dB at reference level

Display Scale Fidelity

85422E/85462A

Log maximum cumulative	(0 to –66 dB from reference level, 0 to –64 dB for Band 3 only)
3 kHz to 3 MHz IF BW	±(0.3 dB + 0.01 x dB from reference level)
≤ 1 kHz IF BW	±(0.4 dB + 0.01 x dB from reference level)
Log incremental accuracy	±0.4 dB/4 dB
	(0 to –56 dB from reference level; 0 to –54 dB for Band 3 only)
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 ≥ 4 kHz and the signal amplitude is ≤ reference level + 10 dB.)

	Band 1	**Band 2**	**Band 3***
	9 kHz to 50 MHz	20 MHz to 2.9 GHz	1 to 6.5 GHz
200 kHz ≤f_0 <10 MHz	< 0.75 dB	< 0.75 dB	< 0.75 dB
f_0 ≥ 10 MHz	< 0.5 dB	< 0.5 dB	< 0.5 dB

Characteristic 1 dB compression point

8542E/8546A			
(f_0 ≥10 MHz)			
Preamp off	89 dBµV	89 dBµV	102 dBµV
Preamp on	77 dBµV	77 dBµV	77 dBµV
(9 kHz <f_0 <10 MHz)			
Preamp off	85 dBµV		
Preamp on	72 dBµV		
85422E/85462A			
(f_0 >10 MHz)	**(No bands)**		
Preamp off	102 dBµV		
Preamp on	75 dBµV		
(9 kHz ≤f_0 ≤10 MHz)			
Preamp off	95 dBµV		
Preamp on	68 dBµV		

Third Order Intercept Point

	Band 1	**Band 2**	**Band 3***	**Bypass**
f_0 > 200 kHz, signal separation >50 kHz	9 kHz to	20 MHz to	1 to	9 kHz to
8542E/8546A	50 MHz	2.9 GHz	6.5 GHz	2.9 GHz
Preamp off	97 dBµV	97 dBµV	112 dBµV	112 dBµV
Preamp on	85 dBµV	85 dBµV	85 dBµV	85 dBµV
85422E/85462A	**(No Bands)**			
Preamp off	112 dBµV			
Preamp on	85 dBµV			

* For 8546A EMI receiver only

Amplitude Specifications (continued)

Second Harmonic Intercept Point	**Band 1**	**Band 2**	**Band 3***
	9 kHz to	20 MHz to	1 to
8542E/8546A	50 MHz	2.9 GHz	6.5 GHz
100 kHz ≤ f_0 ≤ 1.8 GHz, > 2.9 GHz			
Preamp off	122 dBµV	122 dBµV	134 dBµV
Preamp on	110 dBµV	110 dBµV	100 dBµV
1.8 GHz < f_0 ≤ 2.9 GHz			
Preamp off	105 dBµV		
Preamp on	105 dBµV		
85422E/85462A	**(No bands)**		
f_0 > 200 kHz			
Preamp off	134 dBµV		
Preamp on	100 dBµV		

Other Input Related Spurious –65 dBc (Band 1, Band 2, and Band 3*)

Residual Responses (0 dB attenuation, 50 Ω input termination, preamp on)

8542E/8546A

< 30 kHz	< –2 dBµV
> 30 kHz	< –10 dBµV

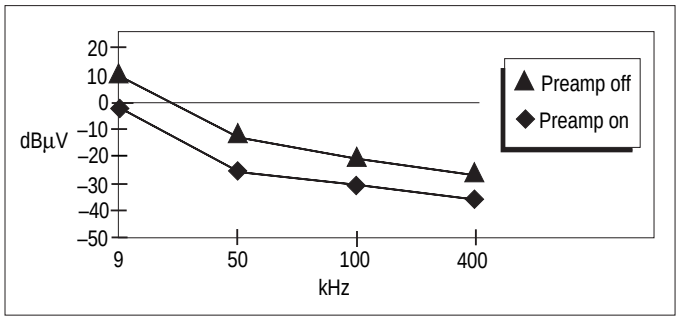
85422E/85462A

9 to 150 kHz	< +2 dBµV
150 kHz to 2.9 (or 6.5 GHz*)	< –8 dBµV

Displayed Average Noise Level (input terminated, 0 dB attenuation, 50 Ω input termination, 30 Hz IF BW, sample detection 30 Hz averaging BW)

8542E/8546A

f_0 ≤ 400 kHz

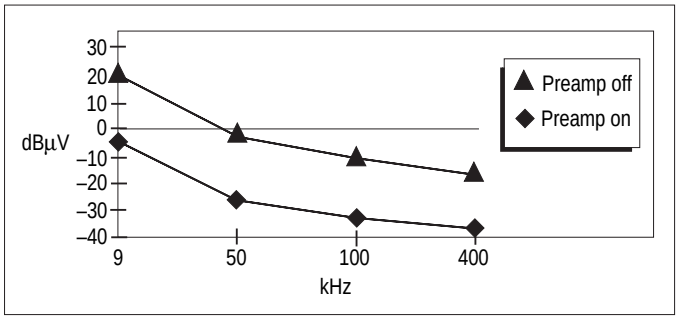


f_0 > 400 kHz

	Band 1	**Band 2**	**Band 3***
	9 kHz to	20 MHz to	1 to
	50 MHz	2.9 GHz	6.5 GHz
Preamp off	≤–31 dBµV	≤ –31 dBµV	≤ –16 dBµV
Preamp on	≤–39 dBµV	≤–39 dBµV	≤–37 dBµV

85422E/85462A

f_0 ≤ 400 kHz



f_0 > 400 kHz

Preamp off	≤–18 dBµV
Preamp on	≤–39 dBµV

* For 8546A EMI receiver only

IF and Display Specifications

IF Bandwidths

Measurement (6 dB)	200 Hz, 9 kHz, 120 kHz (conforms to CISPR Publication 16)
Bandwidth accuracy	1 MHz, 6 dB BW ± 10%
Diagnostic (3 dB)	30 Hz to 300 kHz in 1-3-10 steps (± 20% characteristic), also 3 MHz and 5 MHz

Demodulation

AM and FM

Averaging Bandwidths

30 Hz to 1 MHz in 1-3-10 steps (± 30% characteristic) and 3 MHz. Post-detection single pole low-pass filters. 1, 3 and 10 Hz digital filters with anti-aliasing

Detectors

Measurement	Peak, Quasi-Peak and Average Quasi-Peak time constants conform with CISPR Publication 16
Overload	
8542E/8546A	Broadband RF (Bands 1 and 2 only) and IF
85422E/85462A	IF

Inputs and Outputs Specifications

Front Panel Inputs

8542E/8546A	
Low frequency	Type-N female, 50 Ω nominal
High frequency	Type-N female, 50 Ω nominal
85422E/85462A	Type-N female, 50 Ω nominal

Maximum Safe Input Level

8542E/8546A	
dc voltage	0 V
Average continuous power	
9 kHz to 2.9 GHz	137 dBµV (30 dBm)
1 GHz to 6.5 GHz*	137 dBµV (30 dBm) with ≥ 10 dB input attenuation
Peak pulsed power	
Band 1 (9 kHz to 50 MHz)	2 kW peak for 10 µs, > 20 dB input attenuation
Band 2 (20 MHz to 2.9 GHz)	100 W peak for < 10 µs, <1% duty cycle and > 30 dB input attenuation
85422E/85462A	
dc voltage	0 V (dc coupled), 50 V (ac coupled)
Average continuous power	
9 kHz to 2.9 GHz	137 dBµV (30 dBm)
2.9 GHz to 6.5 GHz*	137 dBµV (30 dBm) with 10 dB input attenuation
Peak pulsed power	50 dBm (100 W) for 10 µs pulse width and 1% duty (Preamp off) cycle, input attenuation ≥ 30 dB

Input Attenuation

8542E/8546A	
Input attenuator	0 to 50 dB in 10 dB steps
Linearity test attenuator	4 dB
85422E/85462A	
Input attenuator	0 to 70 dB in 10 dB steps

Input Filter Bandwidths (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)
0.5 to 1 GHz	tunable (4% 3 dB bandwidth)
1 to 2.9 GHz	fixed
2.9 to 6.5 GHz*	fixed

Preamplification

8542E/8546A	
Bands 1 and 2	12 dB
Band 3* and BYPASS	27 dB ± 4 dB
85422E/85462A	27 dB ± 1.5 dB ≤ 500 MHz, ± 4 dB > 500 MHz

Input VSWR

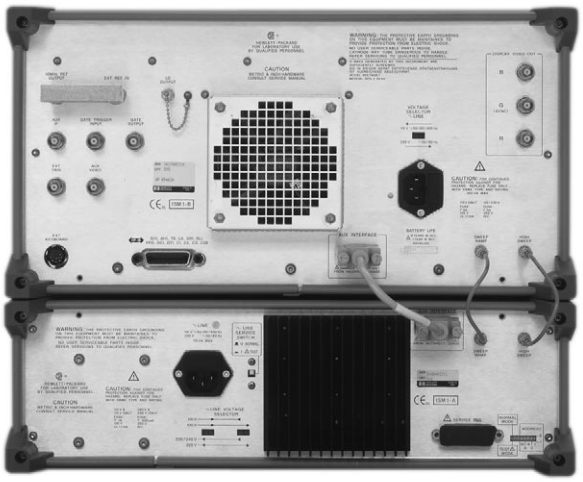
0 dB input attenuation	
≤1.0 GHz	2 : 1
1.0 GHz < f_0 ≤ 2.9 GHz	2.5 : 1
10 dB input attenuation	
≤1.2 GHz	1.2 : 1
1.2 GHz< f_0 ≤ 1.7 GHz	1.3 : 1
1.7 GHz< f_0 ≤ 2.9 GHz	1.6 : 1

Front Panel Outputs

Tracking generator	Type-N female, 50 Ω nominal
85422E/85462A only	
Probe power	+15 Vdc ± 7% at 150 mA max –12.6 Vdc ± 10% at 150 mA max
Earphone jack	1/8 in monoaural jack
Calibrator signal	Type-N female, 50 Ω nominal, 300 MHz, –20 dBm ± 0.4 dB
External ALC	negative detector

Rear Panel Inputs and Outputs

10 MHz REF OUTPUT	BNC female, 50 Ω
Output amplitude	> 0 dBm
EXT REF IN	BNC female
Frequency	10 MHz
Input amplitude range	-2 to 10 dBm



* For 8546A EMI receiver only

Inputs and Outputs Specifications (continued)

AUX IF OUT	BNC female, 50 Ω
Frequency	21.4 MHz
Amplitude range	–10 to –60 dBm
AUX VIDEO OUT	BNC female
Amplitude range	0 to 1 V (uncorrected)
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, 50 Ω
Frequency range	3.0 to 6.8214 GHz
HI-SWEEP IN/OUT	
85422E/85462A	SMA female,
Output	high=sweep, low=retrace (TTL)
Input	open collector, low stops sweep
85420E/85460A	SMA female
Output	high=sweep, low=retrace (TTL)

SWEEP INPUT/OUTPUT	
85422E/85462A	SMA female
Output	0 to 10 V ramp
85420E/85460A	SMA female
Input	0 to 10 V
REMOTE INTERFACE	
85422E/85462A	GPIB
Option 023	RS-232
85420E/85460A	GPIB compatible service port (for use by qualified repair personnel only)
MONITOR OUTPUT	R,G, B (composite video on G) 25 kHz horizontal rate 60 Hz vertical rate
AUX INTERFACE	
85422E/85462A only	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
Vernier	
Range	9 dB
Accuracy (25 ° ± 10 °C) (–20 dBm at 300 MHz, 16 dB attenuation)	± 0.2 dB / dB
Incremental cumulative	± 0.5 dB total
Output attenuator range	0 to 56 dB in 8 dB steps
Output Power Sweep	
Range	(–10 to –1 dBm)-(source attenuator setting)
Resolution	0.1 dB

General Specifications

EMI Compatibility

Measurement characteristics are in compliance with CISPR Publication 16-1. IF has 6 dB measurement bandwidths of use above or below 1 GHz. Receiver is compliant with CISPR 11/1990, Group 1, Class B and EN 50082-1/1992

Storage Media

Internal 3.5-inch disk drive. 1.44 MByte DOS and LIF format

Temperature Range		
Operating	0 to 55 °C	
Storage Media	5 to 45 °C	
Storage	–20 to 65 °C	
Power Requirements	**Voltage**	**Power Consumption**
8542E/8546A	90 to 132 V_{rms}, 47 to 440 Hz	On<615 VA; <265 W
	198 to 264 V_{rms}, 47 to 66 Hz	Off<5 W
Receiver RF section	90 to 132 V_{rms}, 47 to 440 Hz	On<500 VA; <180 W
	198 to 264 V_{rms}, 47 to 66 Hz	Off<5 W
RF filter section	90 to 132 V_{rms}, 47 to 440 Hz	On<115 VA; <85 W
	198 to 264 V_{rms}, 47 to 66 Hz	Off=0 W

General Specifications (continued)

Dimensions

8542E/8546A

Width	458 mm (18 inches)
Height	368 mm (14 3/8 inches)
Depth	644 mm (25 3/8 inches)
Weight	49 kg (108 lb)

85422E/85462A

Width	458 mm (18 inches)
Height	235 mm (9 1/4 inches)
Depth	644 mm (25 3/8 inches)
Weight	28.1 kg (62 lb)

85420E/85460A

Width	458 mm (18 inches)
Height	133 mm (5 1/4 inches)
Depth	644 mm (25 3/8 inches)
Weight	20.9 kg (46 lb)

Model and Option Listing

Complete EMI receiver	8542E	8546A
Receiver RF section	85422E	85462A
RF filter section	85420E	85460A
Option 0B1	Add extra manual set	
Option 1CM	Rack mount kit	
Option 023	Substitutes RS-232 for GPIB interface	
Option W30	Three year return to Agilent service	
Option UK6	Calibration data	

Accessories

92203K	GPIB to Centronics adapter. No ac adapter included. Order 82241A adapter with the appropriate country option: ABA - United States ABB - Europe ABG - Australia ABJ - Japan ABU - United Kingdom
HP C1405B	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 GPIB interfaces can be connected directly to the GPIB port on the receiver RF section. Printers with parallel (Centronics) interfaces require a GPIB to Centronics adapter. Printers with RS-232 interfaces can be connected directly to the receiver RF section if Option 023 is installed.

HP DeskJet printers	HP DeskJet, DeskJet Plus, DeskJet Portable, 310, 320, 340, 500, 500C, 520, 540, 550C, 560C, 600, 660C, 850C and 1600C
HP LaserJet printers	I, II, III, IV, 4, 4L, 4P, 4 Plus and 5P
Other HP printers	HP ThinkJet, QuietJet, PaintJet
Others	Canon BJ-10ex, Epson MX-80, Epson FX-85, Epson LQ-570, Kodek Diconix 180si and Panasonic Kx-P1091i

Related Literature	Pub. Number
Agilent 85875A Commercial Conducted EMI Measurement Software	5964-1968E
Agilent 85876A Commercial Radiated EMI Measurement Software	5962-9450E
Agilent 85878A EMI Report Generator	5965-6473E
Agilent 85869PC EMI Measurement Software	5965-2885E

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