

# 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.

## 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

$\pm(\text{frequency readout} \times \text{frequency reference error}^{**} + 1\% \text{ of span} + 20\% \text{ of IF bandwidth} + \text{span accuracy} + 100 \text{ Hz})$

### Marker Count Accuracy

Frequency spans  $\leq 10$  MHz  $\pm(\text{marker frequency} \times \text{frequency reference error}^{**} + \text{counter resolution} + 100 \text{ Hz})$

Frequency spans  $> 10$  MHz  $\pm(\text{marker frequency} \times \text{frequency reference error}^{**} + \text{counter resolution} + 1 \text{ kHz})$

\* For 8546A EMI receiver only

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

## 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 Reference

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

### Frequency Span Accuracy

	<b>Bands 1 and 2</b>	<b>Band 3 and Bypass</b>
Span $\leq 10$ MHz	$\pm 2\%$ of span + 10 Hz	$\pm 4\%$ of span
Span $> 10$ MHz	$\pm 3\%$ of span	$\pm 6\%$ of span

### 85422E/85462A

Span $\leq 10$ MHz	$\pm 2\%$ of span + 10 Hz
Span $> 10$ MHz	$\pm 3\%$ of span

### Counter Resolution

Frequency spans $\leq 10$ 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



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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*
Specification	9 kHz to 50 MHz	20 MHz to 2.9 GHz	1 to 6.5 GHz
Characteristic	± 2 dB	± 2 dB	± 3 dB
	± 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 3 kHz to 3 MHz IF BW ≤ 1 kHz IF BW	(0 to -66 dB from reference level, 0 to -64 dB for Band 3 only) ±(0.3 dB + 0.01 x dB from reference level) ±(0.4 dB + 0.01 x dB from reference level)
Log incremental accuracy	±0.4 dB/4 dB
Linear scale	(0 to -56 dB from reference level; 0 to -54 dB for Band 3 only) ±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*
200 kHz ≤ f <sub>0</sub> < 10 MHz	9 kHz to 50 MHz < 0.75 dB	20 MHz to 2.9 GHz < 0.75 dB	1 to 6.5 GHz < 0.75 dB
f <sub>0</sub> ≥ 10 MHz	< 0.5 dB	< 0.5 dB	< 0.5 dB

Characteristic 1 dB compression point

#### 8542E/8546A

(f<sub>0</sub> ≥ 10 MHz)

Preamp off 89 dBμV 89 dBμV 102 dBμV

Preamp on 77 dBμV 77 dBμV 77 dBμV

(9 kHz < f<sub>0</sub> < 10 MHz)

Preamp off 85 dBμV

Preamp on 72 dBμV

#### 85422E/85462A

(f<sub>0</sub> > 10 MHz)

(No bands)

Preamp off 102 dBμV

Preamp on 75 dBμV

(9 kHz ≤ f<sub>0</sub> ≤ 10 MHz)

Preamp off 95 dBμV

Preamp on 68 dBμV

### Third Order Intercept Point

f<sub>0</sub> > 200 kHz, signal separation > 50 kHz

#### 8542E/8546A

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*
<b>8542E/8546A</b> 100 kHz $\leq f_0 \leq 1.8$ GHz, $> 2.9$ GHz	9 kHz to 50 MHz	20 MHz to 2.9 GHz	1 to 6.5 GHz
Preamp off	122 dB $\mu$ V	122 dB $\mu$ V	134 dB $\mu$ V
Preamp on	110 dB $\mu$ V	110 dB $\mu$ V	100 dB $\mu$ V
1.8 GHz $< f_0 \leq 2.9$ GHz			
Preamp off	105 dB $\mu$ V		
Preamp on	105 dB $\mu$ V		
<b>85422E/85462A</b> $f_0 > 200$ kHz	<b>(No bands)</b>		
Preamp off	134 dB $\mu$ V		
Preamp on	100 dB $\mu$ V		

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

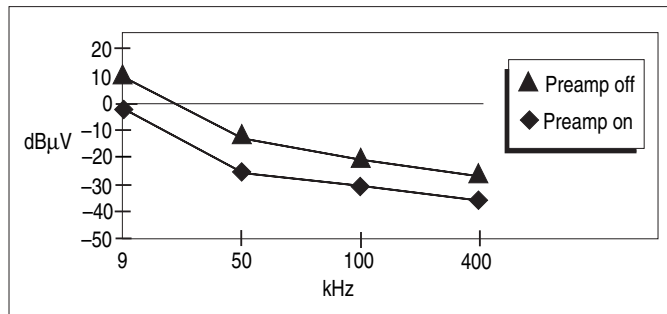
**Residual Responses** (0 dB attenuation, 50  $\Omega$  input termination, preamp on)

<b>8542E/8546A</b>	
$< 30$ kHz	$< -2$ dB $\mu$ V
$> 30$ kHz	$< -10$ dB $\mu$ V
<b>85422E/85462A</b>	
9 to 150 kHz	$< +2$ dB $\mu$ V
150 kHz to 2.9 (or 6.5 GHz*)	$< -8$ dB $\mu$ V

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

### 8542E/8546A

$f_0 \leq 400$  kHz

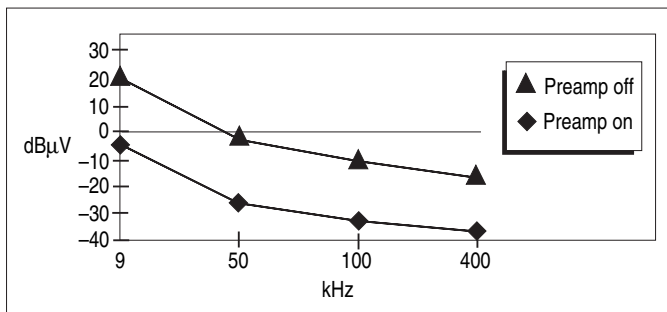


$f_0 > 400$  kHz

	Band 1	Band 2	Band 3*
	9 kHz to 50 MHz	20 MHz to 2.9 GHz	1 to 6.5 GHz
Preamp off	$\leq -31$ dB $\mu$ V	$\leq -31$ dB $\mu$ V	$\leq -16$ dB $\mu$ V
Preamp on	$\leq -39$ dB $\mu$ V	$\leq -39$ dB $\mu$ V	$\leq -37$ dB $\mu$ V

### 85422E/85462A

$f_0 \leq 400$  kHz



$f_0 > 400$  kHz

Preamp off	$\leq -18$ dB $\mu$ V
Preamp on	$\leq -39$ dB $\mu$ V

\* 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 $\pm$ 10%
Diagnostic (3 dB)	30 Hz to 300 kHz in 1-3-10 steps ( $\pm$ 20% characteristic), also 3 MHz and 5 MHz

### Demodulation

AM and FM

## Inputs and Outputs Specifications

### Front Panel Inputs

<b>8542E/8546A</b>	
Low frequency	Type-N female, 50 $\Omega$ nominal
High frequency	Type-N female, 50 $\Omega$ nominal
<b>85422E/85462A</b>	Type-N female, 50 $\Omega$ nominal

### Maximum Safe Input Level

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

### Input Attenuation

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

**Averaging Bandwidths** 30 Hz to 1 MHz in 1-3-10 steps  
( $\pm$  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	
<b>8542E/8546A</b>	Broadband RF (Bands 1 and 2 only) and IF
<b>85422E/85462A</b>	IF

### Preamplification

<b>8542E/8546A</b>	
Bands 1 and 2	12 dB
Band 3* and BYPASS	27 dB $\pm$ 4 dB
<b>85422E/85462A</b>	27 dB $\pm$ 1.5 dB $\leq$ 500 MHz, $\pm$ 4 dB > 500 MHz

### Input VSWR

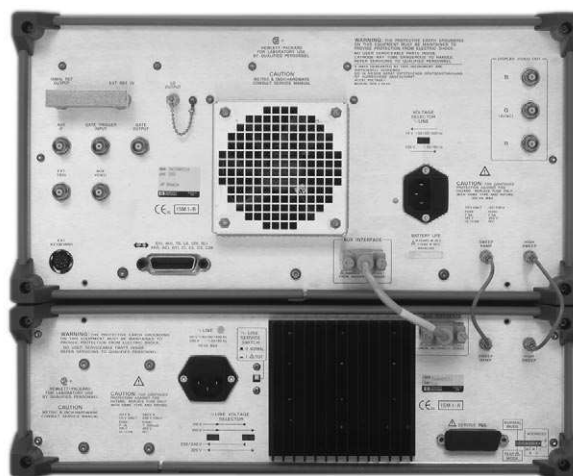
0 dB input attenuation	
$\leq$ 1.0 GHz	2 : 1
1.0 GHz < $f_0 \leq$ 2.9 GHz	2.5 : 1
10 dB input attenuation	
$\leq$ 1.2 GHz	1.2 : 1
1.2 GHz < $f_0 \leq$ 1.7 GHz	1.3 : 1
1.7 GHz < $f_0 \leq$ 2.9 GHz	1.6 : 1

### Front Panel Outputs

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

### Rear Panel Inputs and Outputs

<b>10 MHz REF OUTPUT</b>	BNC female, 50 $\Omega$
Output amplitude	> 0 dBm
<b>EXT REF IN</b>	BNC female
Frequency	10 MHz
Input amplitude range	-2 to 10 dBm



\* For 8546A EMI receiver only

## Inputs and Outputs Specifications (continued)

<b>AUX IF OUT</b>	BNC female, 50 $\Omega$	<b>SWEEP INPUT/OUTPUT</b>	
Frequency	21.4 MHz	<b>85422E/85462A</b>	SMA female
Amplitude range	-10 to -60 dBm	Output	0 to 10 V ramp
<b>AUX VIDEO OUT</b>	BNC female	<b>85420E/85460A</b>	SMA female
Amplitude range	0 to 1 V (uncorrected)	Input	0 to 10 V
<b>EXT KEYBOARD</b>	Interface compatible with HP C1405A Option ABA keyboard and most IBM/AT non auto-switching keyboards	<b>REMOTE INTERFACE</b>	
<b>EXT TRIG INPUT</b>	BNC female	<b>85422E/85462A</b>	GPIB
Trigger level	Positive edge initiates sweep in EXT TRIG mode (TTL)	Option 023	RS-232
<b>LO OUTPUT</b>	SMA female, 50 $\Omega$	<b>85420E/85460A</b>	GPIB compatible service port (for use by qualified repair personnel only)
Frequency range	3.0 to 6.8214 GHz	<b>MONITOR OUTPUT</b>	R, G, B (composite video on G)
<b>HI-SWEEP IN/OUT</b>			25 kHz horizontal rate
<b>85422E/85462A</b>	SMA female, high=sweep, low=retrace (TTL)	<b>AUX INTERFACE</b>	60 Hz vertical rate
Output	open collector, low stops sweep	<b>85422E/85462A only</b>	9-pin subminiature "D"
Input	SMA female		
<b>85420E/85460A</b>	high=sweep, low=retrace (TTL)		
Output			

## Tracking Generator Specifications

<b>Output Frequency Range</b>	9 kHz to 2.9 GHz
<b>Output Power Level</b>	
Range	-1 to -66 dBm
Resolution	0.1 dB
Vernier	
Range	9 dB
Accuracy (25 ° $\pm$ 10 °C)	
(-20 dBm at 300 MHz, 16 dB attenuation)	$\pm$ 0.2 dB / dB
Incremental cumulative	$\pm$ 0.5 dB total
Output attenuator range	0 to 56 dB in 8 dB steps
<b>Output Power Sweep</b>	
Range	(-10 to -1 dBm)-(source attenuator setting)
Resolution	0.1 dB

## General Specifications

<b>EMI Compatibility</b>	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	
<b>Storage Media</b>	Internal 3.5-inch disk drive. 1.44 MByte DOS and LIF format	
<b>Temperature Range</b>		
Operating	0 to 55 °C	
Storage Media	5 to 45 °C	
Storage	-20 to 65 °C	
<b>Power Requirements</b>	<b>Voltage</b>	<b>Power Consumption</b>
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**

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

### **Accessories**

<b>92203K</b>	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
<b>HP C1405B</b>	101-key, enhanced PC keyboard
<b>85460-20036</b>	Replacement semi-rigid cable for front panel
<b>8120-8154</b>	Replacement flexible cable for rear panel (for high sweep or sweep ramp)
<b>8120-6337</b>	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.

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

## Related Literature

	<b>Pub. Number</b>
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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Printed in U.S.A. 5/00  
5965-7096E



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