

# Agilent 8560 E-Series Spectrum Analyzers

Data Sheet

**8560E 30 Hz to 2.9 GHz**

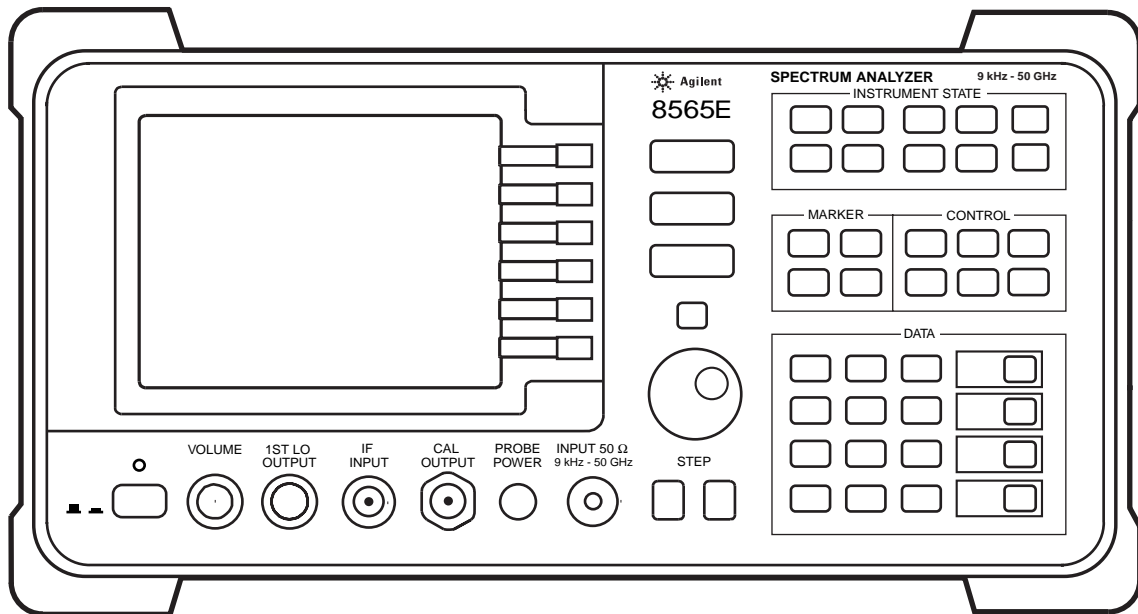
**8561E 30 Hz to 6.5 GHz**

**8562E 30 Hz to 13.2 GHz**

**8563E 30 Hz to 26.5 GHz**

**8564E 30 Hz to 40 GHz**

**8565E 30 Hz to 50 GHz**



Unless noted, all specifications describe the instruments' warranted performance under the following conditions: 5-minute warm-up from ambient conditions, autocoupled controls, digital display, IF ADJ ON, REF LVL CAL adjusted, SECOND IF OUTPUT and 1ST LO OUTPUT terminated in 50  $\Omega$ . After a 30-minute warm-up, and over a temperature range of 20  $^{\circ}\text{C}$  to 30  $^{\circ}\text{C}$ , the preselector does not have to

be peaked at each signal of interest; under these conditions factory preselector peak values are sufficient to meet all specifications. Typical performance is nonwarranted. Supplemental characteristics are denoted by "nominal" and "approximately"; these constitute nonwarranted functional performance information derived during the design process and are not tested on a continuing basis.



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# Frequency specifications, Agilent 8560 E-series

## Frequency range

	8560E	8561E	8562E	8563E	8564E	8565E
<b>Internal mixing</b>	30 Hz <sup>2</sup> to 2.9 GHz	30 Hz <sup>2</sup> to 6.5 GHz	30 Hz <sup>2</sup> to 13.2 GHz	30 Hz <sup>1</sup> to 26.5 GHz	30 Hz <sup>1</sup> to 40 GHz	30 Hz <sup>1</sup> to 50 GHz
<b>External mixing</b>	18 GHz to 325 GHz	18 GHz to 325 GHz	18 GHz to 325 GHz	18 GHz to 325 GHz	18 GHz to 325 GHz	18 GHz to 325 GHz

## Frequency band

Frequency band	Harmonic mixing mode (N)
30 Hz to 2.9 GHz	1
2.75 GHz to 6.46 GHz	1
5.86 GHz to 13.2 GHz	2
12.4 GHz to 26.8 GHz	4
26.4 GHz to 31.15 GHz	4
31.0 GHz to 50 GHz	8

## Frequency reference

		Option 103
<b>Temperature stability<sup>3</sup></b>	$\pm 1 \times 10^{-8}$	$\pm 1 \times 10^{-6}$
<b>Aging (per year)</b>	$\pm 1 \times 10^{-7}$	$\pm 2 \times 10^{-6}$
(per day nom.)	$\pm 5 \times 10^{-10(4)}$	
<b>Initial achievable accuracy</b>	$\pm 2.2 \times 10^{-8}$	$\pm 1 \times 10^{-6}$
<b>Short-term warm-up accuracy factors (nominal)</b>		
5 minute	$\pm 1 \times 10^{-7}$	
15 minute	$\pm 1 \times 10^{-8}$	

## Frequency readout accuracy

(Start, stop, center, and marker frequency functions)

Span >2 MHz x N <sup>5</sup>	$\pm(\text{freq readout} \times \text{freq ref accuracy}^6$ $+5\% \times \text{span} +15\% \times \text{RBW} +10 \text{ Hz})$
Span $\leq 2$ MHz x N <sup>5</sup>	$\pm(\text{freq readout} \times \text{freq ref accuracy}^6$ $+1\% \times \text{span} +15\% \times \text{RBW} +10 \text{ Hz})$

## Frequency counter accuracy

**Marker count accuracy** (S/N  $\geq 25$  dB)  $\pm(\text{marker freq} \times \text{freq ref accuracy}^6 + 2 \text{ Hz} \times N^5 + 1 \text{ LSD of counter})$

**Accuracy at 1 GHz** (25 °C, 1 yr aging, marker resolution = 1 Hz)  $\pm 225 \text{ Hz (5 minute warm-up)}^7$   
 $\pm 135 \text{ Hz (15 minute warm-up)}^7$   
 $\pm 3003 \text{ Hz (Option 103)}$

**Delta count accuracy** (S/N  $\geq 25$  dB)  $\pm(\text{delta freq} \times \text{freq ref accuracy}^6 + 4 \text{ Hz} \times N^5 + 2 \text{ LSD})$

**Counter resolution** Selectable from 1 Hz to 1 MHz

## Frequency span

**Range** 0, 100 Hz to full span (100 Hz x N<sup>10</sup> when using external mixers)

## Accuracy

Span >2 MHz x N<sup>5</sup>  $\pm 5\%$   
Span  $\leq 2$  MHz x N<sup>5</sup>  $\pm 1\%$

- 8563E, 8564E, 8565E require Option 006 for operation below 9 kHz.
- 8560E, 8561E, 8562E minimum frequency in AC coupled mode is 100 kHz. In DC coupled mode minimum frequency is 30 Hz.
- 10 °C to +55 °C, referenced to 25 °C
- After 7-day warm-up
- N = harmonic mixing mode number
- Frequency reference accuracy = aging x time since last adjustment + initial achievable accuracy + temperature stability
- Short term warm-up accuracy factors have been included in this calculation.

# Frequency specifications, continued

## Sweep time

### Range

Span = 0 Hz	50 $\mu$ s to 6000 s
Span $\pm$ 100 Hz	
RBW $\geq$ 300 Hz	50 ms to 2000 s
RBW $\leq$ 100 Hz	50 ms to 100 ks

### Accuracy (Span = 0 Hz)

Sweep time $\geq$ 30 ms	$\pm$ 1% (digitized trace data)
Sweep time <30 ms (non-Option 007)	$\pm$ 10% (analog trace data)
Sweep time <30 ms (Option 007 <sup>1</sup> )	$\pm$ 0.1% (digitized trace data)

### Sweep trigger

delayed, free run, single,  
line, video, external

## Resolution bandwidth

<b>Range</b> (–3 dB)	1 Hz to 1 MHz in a 1, 3, 10 sequence and 2 MHz (3 MHz at –6 dB)	
Option 103	10 Hz to 1 MHz in a 1, 3, 10 sequence and 2 MHz (3 MHz at –6 dB)	
<b>Accuracy</b>	1 Hz to 300 kHz	$\pm$ 10%
	1 MHz	$\pm$ 25%
	2 MHz	+50%, –25%

### Selectivity (–60 dB/–3 dB BW ratio)

RBW $\geq$ 300 Hz	<15:1
RBW $\leq$ 100 Hz	<5:1

**Video bandwidth range** 1 Hz to 3 MHz in a 1, 3, 10 sequence

## Noise sidebands (see figure 1)

Center Frequency  $\leq$ 1 GHz

### Offset

100 Hz	$\leq$ 88 dBc/Hz <sup>2</sup>	<b>Opt. 103</b> $\leq$ 70 dBc/Hz <sup>2</sup>
1 kHz	$\leq$ 97 dBc/Hz <sup>2</sup>	$\leq$ 90 dBc/Hz <sup>2</sup>
10 kHz <sup>6</sup>	$\leq$ 113 dBc/Hz <sup>3</sup>	$\leq$ 113 dBc/Hz <sup>3</sup>
30 kHz <sup>6,8</sup>	$\leq$ 113 dBc/Hz <sup>4</sup>	$\leq$ 113 dBc/Hz <sup>4</sup>
100 kHz <sup>7</sup>	$\leq$ 117 dBc/Hz <sup>5</sup>	$\leq$ 117 dBc/Hz <sup>5</sup>

## Residual FM

(zero span, 10 Hz RBW))	<1 Hz pk-pk x N <sup>9</sup> in 20 ms <0.25 Hz pk-pk x N <sup>9</sup> in 20 ms (typical)
Option 103	<10 Hz pk-pk x N <sup>9</sup> in 20 ms

1. Option 007 extends digitized trace data capability to sweep times <30 ms.  
2. Add  $5.2 \times ((f/1 \text{ GHz}) - 1)$  for  $f > 1 \text{ GHz}$  and  $f \leq 2.9 \text{ GHz}$   
3. Add  $2.5 \times ((f/1 \text{ GHz}) - 1)$  for  $f > 1 \text{ GHz}$  and  $f \leq 2.9 \text{ GHz}$   
4. Add  $3.0 \text{ dB} \times ((f/1 \text{ GHz}) - 1)$  for  $f > 1 \text{ GHz}$  and  $f \leq 2.9 \text{ GHz}$   
5. Add 2 dB for  $f > 1 \text{ GHz}$  and  $f \leq 2.9 \text{ GHz}$   
6. RBW  $\leq$ 1 k or Span  $\leq$ 745 kHz  
7. RBW  $\geq$ 3 k or Span  $>$ 745 kHz  
8. Not specified at 30 kHz offset for 8564E and 8565E  
9. N = harmonic mixing mode number

# Amplitude specifications, Agilent 8560 E-series

**Range**      Displayed average noise level to +30 dBm

## Maximum safe input level

**Average continuous power**      +30 dBm (1 W, input attn ≥10 dB)

**Peak pulse power**      +50 dBm (100 W, input attn ≥30 dB)  
 (≤10 μs pulse width, <1% duty cycle)

## Maximum DC input voltage

DC coupled      ±0.2 Vdc  
 AC coupled      ±50 Vdc

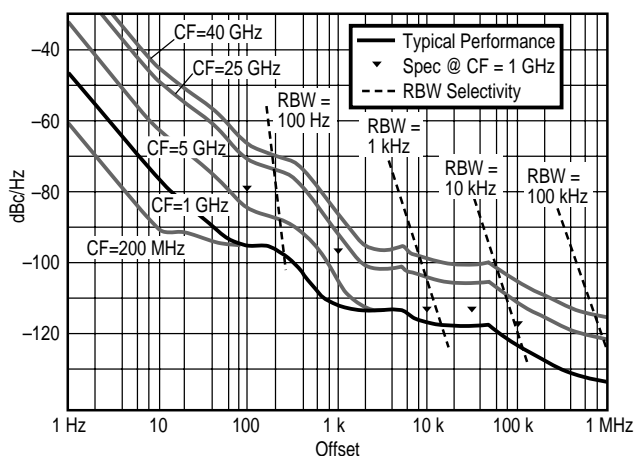
## 1 dB gain compression

Maximum power at mixer =  
 input power (dBm) – input attenuation (dB)

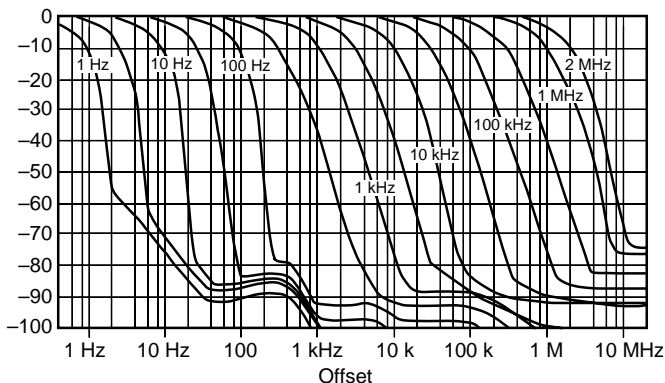
10 MHz to 2.9 GHz	–5 dBm
2.9 GHz to 6.46 GHz	+0 dBm <sup>3</sup>
6.46 GHz to 26.8 GHz	–3 dBm
26.8 GHz to 50 GHz	+0 dBm (nominal)

## Displayed average noise level (DANL) (see figure 2) (0 dB attenuation, 1 Hz resolution bandwidth<sup>1</sup>)

	8560E	8561E	8562E	8563E	8564E, 8565E
30 Hz <sup>2</sup>	≤90 dBm	≤90 dBm	≤90 dBm	≤90 dBm	≤90 dBm
1 kHz <sup>2</sup>	≤105 dBm	≤105 dBm	≤105 dBm	≤105 dBm	≤105 dBm
10 kHz	≤120 dBm	≤120 dBm	≤120 dBm	≤120 dBm	≤120 dBm
100 kHz	≤120 dBm	≤120 dBm	≤120 dBm	≤120 dBm	≤120 dBm
1 MHz to 10 MHz	≤140 dBm	≤140 dBm	≤140 dBm	≤140 dBm	≤140 dBm
10 MHz to 2.9 GHz	≤149 dBm	≤145 dBm	≤151 dBm	≤151 dBm	≤145 dBm
2.9 GHz to 6.46 GHz		≤145 dBm	≤148 dBm	≤148 dBm	≤147 dBm
6.46 GHz to 13.2 GHz			≤145 dBm	≤145 dBm	≤143 dBm
13.2 GHz to 22.0 GHz				≤140 dBm	≤140 dBm
22.0 GHz to 26.8 GHz				≤139 dBm	≤136 dBm
26.8 GHz to 31.15 GHz					≤139 dBm
31.15 GHz to 40 GHz					≤130 dBm
40 GHz to 50 GHz					≤127 dBm



**Figure 1. Noise sidebands normalized to 1 Hz BW versus offset from carrier**



**Figure 2. Typical on-screen dynamic range versus offset from 1 GHz center frequency for all RBWs (mixer level = –10 dBm)**

1. For Option 103, degrade DANL by 10 dB  
 2. 8563E, 8564E, 8565E require Option 006 for operation below 9 kHz.  
 3. 8561E: -3 dBm

# Amplitude specifications, continued

## Dynamic range (see figure 3)

Compression to noise <sup>1</sup>	8560E	8561E	8562E	8563E	8564E, 8565E
10 MHz to 2.9 GHz	>146 dB	>140 dB	>146 dB	>144 dB	>145 dB
2.9 GHz to 6.46 GHz		>142 dB	>148 dB	>148 dB	>147 dB
6.46 GHz to 13.2 GHz			>142 dB	>142 dB	>140 dB
13.2 GHz to 22.0 GHz				>137 dB	>137 dB
22.0 GHz to 26.8 GHz				>136 dB	>133 dB
26.8 GHz to 31.15 GHz					>139 dB
31.15 GHz to 40 GHz					>130 dB
40 GHz to 50 GHz					>127 dB
<b>Signal to distortion</b>					
Harmonic <sup>2</sup>	8560E	8561E	8562E	8563E	8564E, 8565E
20 MHz to 1.45 GHz	>95 dB	>88.5 dB	>95 dB	>94 dB	>92 dB
1.45 GHz to 2 GHz		>98.5 dB	>111.5 dB	>111.5 dB	>111 dB
2 GHz to 3.25 GHz		>119 dB	>119 dB	>119 dB	>113.5 dB
3.25 GHz to 6.6 GHz			>117.5 dB	>117.5 dB	>111.5 dB
6.6 GHz to 11 GHz				>115 dB	>110 dB
11 GHz to 13.4 GHz				>114.5 dB	>108 dB
13.4 GHz to 15.6 GHz					>109.5 dB
15.6 GHz to 20 GHz					>105 dB
20 GHz to 25 GHz					>103.5 dB
<b>Intermodulation<sup>3</sup></b>					
10 MHz to 2.9 GHz	>108 dB	>103 dB	>108 dB	>107 dB	>104 dB
2.9 GHz to 6.46 GHz		>107 dB	>108.5 dB	>108.5 dB	>108 dB
6.46 GHz to 13.2 GHz			>101.5 dB	>101.5 dB	>100 dB
13.2 GHz to 22.0 GHz				>98 dB	>98 dB
22.0 GHz to 26.8 GHz				>97.5 dB	>95.5 dB
26.8 GHz to 31.15 GHz					>101 dB (nominal)
31.15 GHz to 40 GHz					>95 dB (nominal)
40 GHz to 50 GHz					>93 dB (nominal)

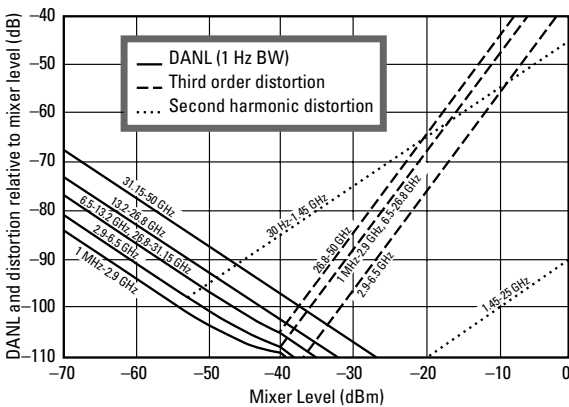


Figure 3. Agilent 8560E family nominal dynamic range

1. (1 dB compression - DANL) For Option 103, degrade compression to noise dynamic range by 10 dB.
2. 0.5 x (SHI - DANL at 2 x input frequency) For Option 103, degrade harmonic (SHI) dynamic range by 5 dB.
3. 0.67 x (TOI - DANL) For Option 103, degrade intermodulation (TOI) dynamic range by 6.67 dB.

# Amplitude specifications, continued

## Spurious responses

### General spurious responses

(Mixer level –40 dBm)  $<(-75 + 20 \times \log N^1)$  dBc

### Second harmonic distortion

input signal	Mixer level	Distortion	SHI
20 MHz to 1.45 GHz	–40 dBm	$\leq 79$ dBc <sup>2</sup>	+39 dBm <sup>2</sup>
1.45 GHz to 2 GHz	–10 dBm <sup>3</sup>	$\leq 85$ dBc <sup>3</sup>	+75 dBm <sup>3</sup>
2 GHz to 13.25 GHz			
8562E, 8563E	–10 dBm	$\leq 100$ dBc	+90 dBm
8564E, 8565E	–10 dBm	$\leq 90$ dBc	+80 dBm
13.25 GHz to 25 GHz	–10 dBm	$\leq 90$ dBc	+80 dBm

### Third order intermodulation distortion

(Two –30 dBm signals,  $\geq 1$  kHz apart)

Mixer level	Distortion	TOI
–30 dBm each	$\leq 82$ dBc <sup>4</sup>	+11 dBm
–30 dBm each	$\leq 90$ dBc	+15 dBm
–30 dBm each	$\leq 75$ dBc	+7.5 dBm
–30 dBm each	$\leq 85$ dBc (nominal)	+12.5 dBm (nominal)

### Image responses

Mixer level	
–10 dBm	–80 dBc
–30 dBm	–60 dBc

### Multiple and out-of-band responses

Mixer level	
–10 dBm	–80 dBc
–30 dBm	–55 dBc

## Residual responses

$\leq 90$  dBm, for the range from 200 kHz to 6.46 GHz, no input signal, 0 dB input attenuation

### Display range

<b>Viewing area</b>	approximately 7 cm (V) x 9 cm (H)
<b>Scale calibration</b>	10 x 10 divisions
<b>Log scale</b>	10, 5, 2, 1 dB per division
<b>Linear scale</b>	10% of reference level per division

## Scale fidelity

### Log range

RBW $\geq 300$ Hz	$\pm 0.1$ dB/dB
RBW $\leq 100$ Hz	$\pm 0.2$ dB/2dB
Linear range	$\pm 3\%$ of reference level

### Incremental

0 to –90 dB
$\pm 0.1$ dB/dB
$\pm 0.2$ dB/2dB

### Maximum

0 to –90 dB
$\pm 0.85$ dB
$\pm 0.85$ dB <sup>5</sup>

1. Excluding display related side bands at multiples of 60 Hz
2. 8561E: distortion –72 dBc, SHI +32 dBm
3. 8561E: mixer level –20 dBm, distortion –72 dBc, SHI +52 dBm
4. 8561E –78 dB distortion with two –30 dBm signals, 9 dBm TOI
5. Maximum for 0 to –100 dB is  $\pm 1.5$  dB

# Amplitude specifications, continued

## Reference level range

### Log, adjustable in 0.1 dB steps

30 Hz to 31.15 GHz	–120 to +30 dBm
31.15 GHz to 50 GHz	–115 to +30 dBm

### Linear, adjustable in 1% steps

30 Hz to 31.15 GHz	2.2 $\mu$ V to 7.07 V
31.15 GHz to 50 GHz	3.98 $\mu$ V to 7.07 V

## Frequency response in dB, 10 dB input attenuation, dc coupled relative/typical relative/absolute<sup>2</sup>/typical absolute<sup>3</sup>

	8560E	8561E	8562E	8563E	8564E, 8565E
100 MHz to 2 GHz	0.7/0.7/--/--		0.9/0.8/--/--	1.0/0.8/--/--	0.9/0.8/--/--
30 Hz <sup>1</sup> to 2.9 GHz	1/0.8/1.5/1.0	1.0/0.7/1.75/1.0	1.25/0.8/1.8/1.0	1.25/0.8/1.8/1.0	1.0/0.8/1.5/1.0
2.9 GHz to 6.46 GHz		1.5/1.1/2.5/1.5	1.5/1.1/2.5/1.5	1.5/1.0/2.4/1.5	1.7/1.4/2.6/1.8
6.46 to 13.2 GHz			2.2/1.5/2.9/2.0	2.2/1.5/2.9/2.0	2.6/2.2/3.0/2.8
13.2 to 22 GHz				2.5/1.5/4.0/2.5	2.5/2.5/4.0/3.5
22 to 26.8 GHz				3.3/2.2/4.0/2.5	3.3/2.2/4.5/4.0
26.8 to 31.15 GHz					3.1/2.9/4.0/3.0
31.15 GHz to 40 GHz (8564E)					2.6/2.4/4.0/3.2
31.15 GHz to 50 GHz (8565E)					3.2/3.0/4.0/4.0

## Band switching uncertainty

$\pm 1$  dB (added to relative frequency response for between-band measurements)

## Calibrator output

300 MHz x (1  $\pm$  frequency reference accuracy<sup>4</sup>) at –10 dBm  
 $\pm 0.3$  dB

## Input attenuator

**Switching uncertainty** (referenced to 10 dB attenuation)

30 Hz to 2.9 GHz for 20 to 70 dB settings of input attenuator:  
 $\pm 0.6$  dB/10 dB step, 1.8 dB maximum  
Repeatability  $\pm 0.1$  dB (nominal)

## IF gain uncertainty

$\pm 1$  dB (0 to –80 dBm reference levels with 10 dB input attenuation)

## IF alignment uncertainty

$\pm 0.5$  dB (additional uncertainty only when using 300 Hz RBW)

## Resolution bandwidth switching uncertainty

$\pm 0.5$  dB (relative to 300 kHz RBW)

1. Operation below 9 kHz requires Option 006.
2. Absolute flatness values referenced to 300 MHz CAL OUT
3. Typical values at 25 °C
4. Frequency reference accuracy = aging x time since last adjustment + initial achievable accuracy + temperature stability

# Amplitude specifications, continued

## Pulse digitization uncertainty

(Pulse response mode, PRF >720/sweep time)

	Log	Linear
RBW ≤1 MHz	<1.25 dB pk-pk	<4% of ref level
RBW = 2 MHz	<3 dB pk-pk	<12% of ref level
Standard deviation (RBW <1 MHz)		<0.2 dB (nominal)

## Time-gated spectrum analysis

Gate delay <sup>1</sup>	Edge mode	Level mode
Range	3 μs to 65.535 ms	≤0.5 μs
Resolution	1 μs	
Accuracy	±1 μs	

(From GATE TRIGGER INPUT to positive edge of GATE OUTPUT)

### Gate length

Range	1 μs to 65.535 ms
Resolution	1 μs
Accuracy	±1 μs

(From positive edge to negative edge of GATE OUTPUT)

## Delayed sweep

**Trigger modes** Free run, line, external, video

### Range

Non-Option 007 <sup>1</sup>	+2 μs to +65.535 ms
Option 007, sweep time <30 ms	-9.9 ms to +65.535 ms
sweep time ≥30 ms	+2 μs to +65.535 ms

**Resolution** 1 μs

**Accuracy** ±1 μs

## Demodulation

Spectrum demodulation

Modulation type AM and FM

Audio output Speaker and phone jack with volume control

Marker pause time 100 ms to 60 s (nominal)

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1. Up to 1 μs jitter due to 1 μs resolution of gate delay clock



# Inputs/outputs, Agilent 8560 E-series

(All values are nominal)

## Front panel connectors

### RF input

8560E, 8561E, 8562E, 8563E (Option 026, 8563E only)	Type N female, 50 $\Omega$ APC 3.5 mm male, 50 $\Omega$
8564E, 8565E	APC 2.4 mm male, 50 $\Omega$
VSWR ( $\geq 10$ dB atten)	
30 Hz to 2.9 GHz	<1.5:1 dB
2.9 GHz to 50 GHz	<2.3:1 dB
LO emission level (Average with 10 dB atten)	$\leq 80$ dBm

### IF input

Frequency	SMA female, 50 $\Omega$ 310.7 MHz
Full screen level	-30 dBm
Gain compression	-23 dB

### First LO output

Frequency	SMA female, 50 $\Omega$ 3.000 - 6.8107 GHz <sup>1</sup>
Amplitude	+16.5 dBm $\pm 2.0$ dB <sup>1</sup>

### Cal output

<b>Probe power</b>	BNC female, 50 $\Omega$ +15 Vdc, -12.6 Vdc, and Gnd (150 mA max each)
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## Rear panel connectors

### Earphone

Subminiature mono jack,  
0.2 W into 4  $\Omega$

### 10 MHz REF In/Out

Output freq accuracy  
 $\pm(10 \text{ MHz} \times \text{freq ref accuracy})$

Output amplitude

0 dBm

Input amplitude

-2 to +10 dBm

### Video output

BNC, 50  $\Omega$

Amplitude (RBW  $\geq 300$  Hz)

0 to +1 V full scale

### LO sweep frequency analog voltage output

(LO sweep or V/GHz function selectable from the front panel, BNC female, 120  $\Omega$ )

#### LO sweep output

0 to 10 V (no load)

#### Frequency analog voltage output (internal mixer mode)

Output ramp voltage proportional to start and stop frequencies.

Transfer function:

0.5 V/GHz

#### 0.5 V/GHz output (external mixer mode)

Output ramp voltage proportional to LO frequency:

(LO = 3 to 6.8107 GHz)

Transfer function: (1.5 V/GHz  $\times$  LO frequency (GHz)

-0.2054)  $\pm 50$  mV (typ)

### Blanking/gate

#### Output

Shared BNC female, 50  $\Omega$

Blanking mode

During sweep

Low TTL level

During retrace

High TTL level

Gate mode

Gate on

High TTL level

Gate off

Low TTL level

### External/gate

#### Trigger input

Shared BNC female, >10 k $\Omega$   
Settable to high TTL or low TTL

### GPIB

IEEE-488 bus connector

Interface functions

SH1, AH1, T6, L4, LE0, RL1, PP1,  
DC1, DT1, C1, C28, TE0, SR1

Direct printer output

Supports HP 3630A PaintJet  
printer, HP 2225A ThinkJet printer

Direct plotter output

Supports HP 7225A/7440A/  
7470A/7475A/7550A

1. Option 002: 3.9107 to 6.8107 GHz, +14.5 dBm  $\pm 3.0$  dB

# Options

## Option 001 second IF output, Agilent 8560 series

(All values are nominal)

3 dB bandwidth NF conversion gain	8560E	8561E	8562E	8563E	8564E,8565E
30 Hz to 2.9 GHz <sup>1</sup>	>25 MHz 24 dB 1.2 dB	>25 MHz 25 dB -6.5 dB	>25 dB 20 dB -1.2 dB	>25 MHz 25 dB -1.2 dB	>25 MHz 28 dB -1.2 dB
2.9 GHz to 6.5 GHz		>30 MHz 26 dB -1 dB	>30 MHz 22 dB -3 dB	>30 MHz 22 dB -1 dB	>30 MHz 23 dB -1 dB
6.5 GHz to 13.2 GHz			>37 MHz 26 dB -5.7 dB	>37 MHz 26 dB -5.7 dB	>37 MHz 28 dB -5.7 dB
13.2 GHz to 22 GHz				>45 MHz 30 dB -8 dB	>45 MHz 32 dB -8 dB
22 GHz to 26.8 GHz				>45 MHz 32 dB -8 dB	>45 MHz 35 dB -8 dB
26.8 GHz to 31.15 GHz					>25 MHz 28 dB -9 dB
31.15 GHz to 40 GHz					>25 MHz 38 dB -19 dB
40 GHz to 50 GHz					>25 MHz 42 dB -23 dB

## Option 002 built-in tracking generator<sup>2</sup> (8560E only)

### Frequency specifications

<b>Frequency range</b>	300 kHz to 2.9 GHz
<b>Accuracy</b> After peaking	±(frequency reference accuracy x tuned frequency +5% x span + 295 Hz)
<b>Tracking drift</b> (nominal)	Usable in 1 kHz RBW after 5-minute warm-up, usable in 300 Hz RBW after 30-minute warm-up.
<b>Minimum RBW</b>	300 Hz <sup>3</sup>

### Amplitude specifications

Output level (10 dBm to +2.8 dBm typical)	-10 dBm to +1 dBm
Resolution	0.1 dB
<b>Accuracy</b> Vernier	±0.20 dB/dB, ±0.5 dBm max (25 °C ±10 °C)
Absolute	±0.75 dB
Level flatness	±2.0 dB
Effective source match	1.92:1 (nominal)
Total absolute accuracy	±3.25 dB

1. DC coupled for frequencies below 100 kHz. Option 006 required for operation below 9 kHz in 8563E, 8564E, 8565E.

2. Option 002 deletes millimeter external mixer capability (Second IF input is deleted)

3. Tracking generator not usable with resolution bandwidths ≤100 Hz

## Option 002 built-in tracking generator (8560E only), continued

### Spurious output (at +1 dBm output power)

Harmonic spurious	-25 dBc
Non-harmonic spurious	
300 kHz to 2.0 GHz	-27 dBc
2.0 GHz to 2.9 GHz	-23 dBc
LO feedthrough	-16 dBm
	(3.9 GHz to 6.8 GHz)
Residuals (RF-Power-Off)	-78 dBm
	(300 kHz to 2.9 GHz)

### Dynamic range

TG feedthrough <sup>1</sup>	
300 kHz to 1 MHz	-95 dBm
1 MHz to 2.7 GHz	-115 dBm
2.7 GHz to 2.9 GHz	-110 dBm

### Dynamic range<sup>2</sup>

300 kHz to 1 MHz	96 dB
1 MHz to 2.7 GHz	116 dB
2.7 to 2.9 GHz	111 dB
<b>Power sweep</b>	10 dB range, 0.1 dB resolution

### Inputs/outputs

<b>RF output</b> (front panel) (nominal)	Type-N female, 50 Ω
Maximum safe reverse level	+30 dBm, ±30 Vdc

### External ALC input (rear panel)

BNC female, use with negative detector

## Environmental specifications, Agilent 8560 E-series

Per MIL-T-28800, type III, class 3<sup>3</sup>, style C

### Calibration interval

8560E, 8561E, 8562E, 8563E	2 years
8564E, 8565E	1 year

### Warm-up time

5-minutes in ambient conditions

### Temperature

-10 °C to +55 °C (operating); -51 °C to +71 °C (not operating)

### Humidity

95% @ 40 °C for 5 days

### Rain resistance

Drip-proof at 16 liters/hour/sq. ft.

### Altitude

15,000 ft. (operating),  
50,000 ft. (non-operating)

### Pulse shock (half sine)

30 g for 11 ms duration

### Transit drop

8-inch drop on six faces and eight corners

### Electromagnetic compatibility

Conducted and radiated interference in compliance with CISPR Pub. 11 (1990). Meets Mil-STD-461C, part 2, with certain exceptions.

### Power requirements

115 VAC operation:  
90 to 140 V rms,  
3.2 A rms max,  
47 to 440 Hz  
230 VAC operation:  
180 to 250 V rms,  
1.8 A rms max,  
47 to 66 Hz

### Maximum power dissipation

8560E, 8561E, 8562E, 8563E	180 W
8564E, 8565E	260 W

### Audible noise (nominal)

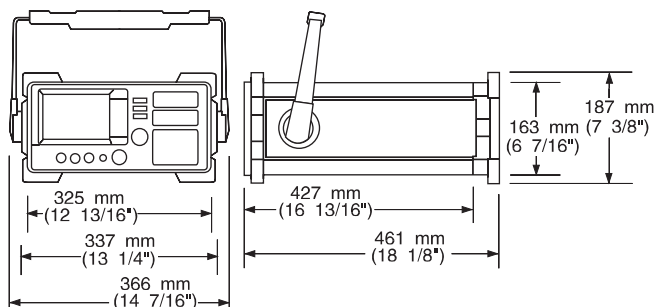
<5.0 Bels power at room temp (ISO DP7779)

### Dimensions (w/o handle, cover)

337 mm W x 187 mm H x 461 mm D

### Weight (nominal)

8560E, 8561E, 8562E, 8563E	20 kg (44 lbs)
8564E, 8565E	21 kg (46 lbs)



1. Leakage measured with maximum power into 50 Ω and with 50 Ω on RF input  
2. Difference between maximum power output and tracking generator feedthrough  
3. 8564E, 8565E: Class 5

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