

# Agilent E4401B, E4402B, E4404B, E4405B, and E4407B ESA-E Series Spectrum Analyzers

## Technical Specifications



**These specifications apply to the Agilent Technologies E4401B, E4402B, E4404B, E4405B, and E4407B spectrum analyzers.**

All specifications apply over 0 °C to + 55 °C unless otherwise noted. The analyzer will meet its specifications after 2 hours of storage within the operating temperature range, 5 minutes after the analyzer is turned on, and after AUTO ALIGN [ALL] has been run.

## Frequency specifications

### Frequency range

<b>E4401B</b>		
50 Ω		9 kHz to 1.5 GHz
75 Ω		1 MHz to 1.5 GHz
<b>E4402B</b>		9 kHz to 3.0 GHz
	(opt. UKB)	
dc coupled		100 Hz to 3 GHz
ac coupled		100 kHz to 3 GHz
<b>E4404B</b>		
dc coupled		9 kHz to 6.7 GHz
	(opt. UKB)	100 Hz to 6.7 GHz
ac coupled		100 kHz to 6.7 GHz
Band		
0		9 kHz to 3.0 GHz
	(opt. UKB)	100 Hz 3.0 GHz
1		2.85 GHz to 6.7 GHz
<b>E4405B</b>		
dc coupled		9 kHz to 13.2 GHz
	(opt. UKB)	100 Hz to 13.2 GHz
ac coupled		100 kHz to 13.2 GHz
Band	N <sup>4</sup>	
0	1-	9 kHz to 3.0 GHz
	(opt. UKB)	100 Hz 3.0 GHz
1	1-	2.85 GHz to 6.7 GHz
2	2-	6.2 GHz to 13.2 GHz
<b>E4407B</b>		
internal mixing		9 kHz to 26.5 GHz
external mixing (opt. AYZ)		18 GHz to 325 GHz
Band	N <sup>4</sup>	
0	1-	9 kHz to 3.0 GHz
1	1-	2.85 GHz to 6.7 GHz
2	2-	6.2 GHz to 13.2 GHz
3	4-	12.8 GHz to 19.2 GHz
4	4-	18.7 GHz to 26.5 GHz



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## Frequency reference (Opt. 1D5)

Aging	$\pm 2 \times 10^{-6}/\text{year}$	$\pm 1 \times 10^{-7}/\text{year}$
Temperature stability	$\pm 5 \times 10^{-6}$	$\pm 1 \times 10^{-8}$
Stability	$\pm 5 \times 10^{-7}$	$\pm 1 \times 10^{-8}$

## Frequency readout accuracy

(Start, Stop, Center, Marker)  $\pm(\text{frequency indication} \times \text{frequency reference error}^1 + \text{span accuracy} + 15\% \text{ of RBW} + 10 \text{ Hz} + 1 \text{ Hz} \times N^4)$

## Marker frequency counter<sup>2</sup>

Accuracy<sup>3</sup>  $\pm(\text{marker frequency} \times \text{frequency reference error}^1 + \text{counter resolution})$

Counter resolution Selectable from 1 Hz to 100 kHz

## Frequency span

Range 0 Hz (zero span), 100 Hz to the range of the spectrum analyzer

Resolution Four digits or  $2 \text{ Hz} \times N^4$  whichever is greater

Accuracy (8192 sweep points)  $\pm 0.5\%$  of span

## Frequency sweep time

Range 1 ms to 4000 s  
 Span = 0 Hz 10  $\mu\text{s}$  to 4000 s  
 (Opt. AXX) 50 ns to 4000 s  
 (Opt. B7D) 25 ns to 4000 s

Accuracy  $\pm 1\%$

Sweep trigger Free run, Single, Line, Video, External, Delay, Gate (Opt. 1D6), and TV (Opt. B7B)

Delay trigger range 1  $\mu\text{s}$  to 400 s

## Sweep (trace) point range 101 to 8192

Span = 0 Hz 2 to 8192

## Resolution bandwidth 1 kHz to 5 MHz (-3 dB) in 1-3-10 sequence.

9 kHz and 120 kHz (-6 dB) EMI bandwidths.  
 Option 1DR Adds 10, 30, 100, and 300 Hz (-3 dB) bandwidths and 200 Hz (-6 dB) EMI bandwidth.

Accuracy 1 kHz to 3 MHz  $\pm 15\%$   
 5 MHz  $\pm 30\%$   
 10 Hz to 300 Hz (Opt. 1DR)  $\pm 10\%$

## Selectivity (characteristic)

-60 dB/-3 dB  
 10 Hz to 300 Hz  $< 5:1^6$   
 1 kHz to 5 MHz  $< 15:1^6$

## Video bandwidth range 30 Hz to 3 MHz<sup>6</sup> in 1-3-10 sequence

1 Hz to 3 MHz<sup>6</sup> (Opt. 1DR)

## Stability

Noise sidebands (1 kHz RBW, 30 Hz VBW and sample detector)  
 $\geq 10 \text{ kHz}$  offset from CW signal  $\leq -90 \text{ dBc/Hz} + 20 \text{ Log } N^4$   
 $\geq 20 \text{ kHz}$  offset from CW signal  $\leq -98 \text{ dBc/Hz} + 20 \text{ Log } N^4$   
 $\geq 30 \text{ kHz}$  offset from CW signal  $\leq -100 \text{ dBc/Hz} + 20 \text{ Log } N^4$   
 $\geq 100 \text{ kHz}$  offset from CW signal  $\leq -112 \text{ dBc/Hz} + 20 \text{ Log } N^4$

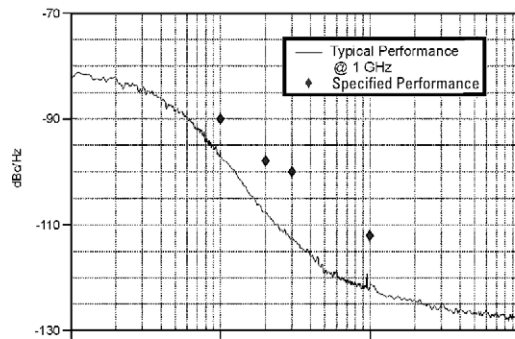


Figure 1. Noise sidebands for E4402B, E4404B, E4405B, and E4407B

## Residual FM

1 kHz RBW, 1 kHz VBW  $\leq 150 \times N^4 \text{ Hz pk-pk}$  in 100 ms  
 Option 1D5  $\leq 100 \times N^4 \text{ Hz pk-pk}$  in 100 ms  
 Option 1DR  $\leq 10 \times N^4 \text{ Hz}^6 \text{ pk-pk}$  in 20 ms  
 Option 1DR and 1D5  $\leq 2 \times N^4 \text{ Hz pk-pk}$  in 20 ms

## System-related sidebands

$\geq 30 \text{ kHz}$  offset from CW signal  $\leq -65 \text{ dBc} + 20 \text{ Log } N^4$

## Amplitude specifications

### Amplitude range

Measurement range Displayed average noise level (DANL) to maximum safe input level

Input attenuator range  
 E4401B 0 to 60 dB, in 5 dB steps  
 E4402B/04B/05B/07B 0 to 65 dB, in 5 dB steps

### Maximum safe input level

Average continuous power (input attenuator  $\geq 15 \text{ dB}$ )  
 E4401B +30 dBm (1 W)  
 E4401B (75  $\Omega$  Opt. 1DP) +75 dBmV (0.4 W)  
 E4402B/04B/05B/07B +30 dBm (1 W)  
 Peak pulse power (input attenuator  $\geq 30 \text{ dB}$ )  
 E4401B +30 dBm (1 W)  
 E4401B (75  $\Omega$  Opt. 1DP) +75 dBmV (0.4 W)  
 E4402B/04B/05B/07B +50 dBm (100 W)

### dc

E4401B, E4402B 100 Vdc  
 E4401B (75  $\Omega$  Opt. 1DP) 100 Vdc  
 E4404B, E4405B 0 Vdc (dc coupled)  
 50 V (ac coupled)  
 E4407B 0 Vdc

### 1 dB gain compression (total power at input mixer<sup>5</sup>)

50 MHz to 6.7 GHz 0 dBm  
 6.7 GHz to 13.2 GHz -3 dBm  
 13.2 GHz to 26.5 GHz -5 dBm

## Displayed Average Noise Level (DANL) (dBm)

(Input terminated, 0 dB attenuation, sample detector)

1 kHz RBW; 30 Hz VBW

10 Hz RBW; 1 Hz VBW

	1 kHz RBW	10 Hz RBW (Opt. 1DR)	1 kHz RBW (w/preamp Opt. 1DS)	10 Hz RBW (w/preamp Opt. 1DR Opt. 1DS)
<b>E4401B</b>				
400kHz-1MHz	≤-115	≤-134	≤-131	≤-149
1MHz-500MHz	≤-119	≤-138	≤-135	≤-153
500MHz-1GHz	≤-117	≤-136	≤-133	≤-151
1GHz-1.5GHz	≤-113	≤-132	≤-129	≤-147
<b>E4402B</b>				
30 Hz to 9 kHz <sup>6</sup> (opt. UKB)	na	≤-85	na	na
9 kHz to 100 kHz <sup>6</sup>	na	≤-105	na	na
100 kHz to 1 MHz <sup>6</sup>	na	≤-131	na	na
1MHz-10MHz <sup>6</sup>	≤-117	≤-136	≤-132	≤-150
10MHz-1GHz	≤-117	≤-136	≤-132	≤-150
1GHz-2GHz	≤-116	≤-135	≤-131	≤-149
2GHz-3GHz	≤-114	≤-133	≤-129	≤-147
<b>E4404/05/07B</b>				
30 Hz to 9 kHz <sup>6</sup> (opt. UKB)	na	≤-85	na	na
9 kHz to 100 kHz <sup>6</sup>	na	≤-105	na	na
100 kHz to 1 MHz <sup>6</sup>	na	≤-131	na	na
1MHz-10MHz <sup>6</sup>	≤-116	≤-135	≤-131	≤-149
10MHz-1GHz	≤-116	≤-135	≤-131	≤-149
1GHz-2GHz	≤-115	≤-134	≤-129	≤-147
2GHz-3GHz	≤-112	≤-131	≤-127	≤-145
3GHz-6GHz	≤-112	≤-131	na	na
6GHz-12GHz	≤-110	≤-129	na	na
12GHz-22GHz	≤-107	≤-126	na	na
22GHz-26.5GHz	≤-101	≤-120	na	na
<b>E4407B (Opt. AYZ)</b>				
External mixer <sup>6</sup>	≤-134+ external mixer conversion loss	≤-153+ external mixer conversion loss	na	na

## Display range

Log scale	0.1, 0.2, 0.5 dB/division and 1 to 20 dB/division in 1dB steps; ten divisions displayed.
RBW ≥1 kHz	0 to -85 dB from reference level is calibrated
RBW ≤300 Hz (Opt. 1DR)	0 to -120 <sup>13</sup> dB from reference level is calibrated
Linear scale	10 divisions
Scale units (Opt. BAA)	dBm, dBmV, dBμV, Volts, and Watts add Hz

## Marker readout resolution

Log scale	
0 to -85 dB	0.04 dB
0 to -120 dB (Opt. 1DR)	0.04 dB
Linear scale	0.01% of reference level
Fast sweep times for zero span (Option AYZ)	
Log scale	
0 to -85 dB	0.3 dB
Linear	0.3% of reference level

## Frequency response

	(10 dB input attenuation)	
	Absolute <sup>7</sup>	Relative flatness <sup>8</sup>
30 Hz to 3 GHz <sup>6</sup> (opt. UKB)	±0.5 dB	±0.5 dB
9 kHz to 3.0 GHz	±0.5 dB	±0.5 dB
3.0 GHz to 6.7 GHz	±1.5 dB	±1.3 dB
6.7 GHz to 26.5 GHz	±2.0 dB	±1.8 dB

## Input attenuation switching uncertainty at 50 MHz

Attenuation setting	
0 dB to 5 dB	±0.3 dB
10 dB	reference
15 dB	±0.3 dB
20 to 60 dB (E4401B)	±(0.1 dB + 0.01 x attenuator setting)
20 to 65 dB	±(0.1 dB + 0.01 x attenuator setting)

## Absolute amplitude accuracy

At reference settings <sup>15</sup>	±0.34 dB
Preamp on <sup>16</sup> (Opt. 1DS)	±0.5 dB
External mixer (Opt. AYZ)	IF INPUT absolute amplitude accuracy + external mixer conversion loss accuracy <sup>17</sup>

Overall amplitude accuracy<sup>9</sup> ±(0.54 dB + absolute frequency response)

## RF input VSWR<sup>6</sup> (at tuned frequency, ≥10 dB attenuation)

<b>E4401B</b>	
1 MHz to 1.1 GHz	1.35:1
1.1 GHz to 1.5 GHz	2:1
<b>E4402B</b>	
9 kHz to 100 kHz	2:1
100 kHz to 3 GHz	1.4:1
<b>E4404B/05B</b>	
9 kHz to 100 kHz	2:1
100 kHz to 6.7 GHz	1.3:1
6.7 GHz to 13.2 GHz	1.5:1
<b>E4407B</b>	
9 kHz to 6.7 GHz	1.3:1
6.7 GHz to 13.2 GHz	1.5:1
13.2 GHz to 22 GHz	2:1
22 GHz to 26.5 GHz	2.2:1

## Resolution bandwidth switching uncertainty

(Referenced to 1 kHz RBW, at reference level)

10 Hz to 3 MHz RBW	±0.3 dB
5 MHz RBW	±0.6 dB

## Reference level

Range	same as amplitude range
Resolution	
Log scale	±0.1 dB
Linear scale	±0.12% of reference level
Accuracy (reference level - attenuator setting + preamp gain)	±0.3 dB @ -10 dBm to -60 dBm ±0.5 dB @ -60 dBm to -85 dBm ±0.7 dB @ -85 dBm to -90 dBm

## Display scale fidelity

Log maximum cumulative	
0 dB to -85 dB level)	±(0.3 dB + 0.01 x dB from reference level)
Log incremental accuracy	
0 dB to -80 dB	±0.4dB/4dB from reference level
Linear accuracy	±2% of reference level

**Linear-to-log switching** ±0.15 dB at reference level

## Spurious responses

Second harmonic distortion

E4401B 2 MHz to 750 MHz	<−75 dBc for −40 dBm tone at input mixer <sup>5</sup> . (+35 dBm SHI)
E4402/04/05/07B 10 MHz to 500 MHz	<−65 dBc for −30 dBm tone at input mixer <sup>5</sup> .
500 MHz to 1.5 GHz	<−75 dBc for −30 dBm tone at input mixer <sup>2</sup> . (+45 dBm SHI)
1.5 GHz to 2.0 GHz	<−85 dBc for −10 dBm tone at input mixer <sup>2</sup> .
>2.0 GHz	<−100 dBc for −10 dBm tone at input mixer <sup>5</sup> (or below displayed average noise level).

Third-order intermodulation distortion

E4401B 10 MHz to 1.5 GHz	<−80 dBc for two −30 dBm tones at input mixer <sup>5</sup> and >50kHz separation. (+10 dBm TOI, +15 dBm typical)
E4402B/04B/05B/07B 100 MHz to 6.7 GHz	<−82 dBc for two −30 dBm tones at input mixer <sup>5</sup> and >50kHz separation. (+11 dBm TOI, +16 dBm typical)
> 6.7 GHz	<−75 dBc for two −30 dBm tones at input mixer <sup>5</sup> and >50kHz separation.
Other input-related spurious >30 kHz offset	<−65 dBc for −20 dBm tone at input mixer <sup>5</sup> .

**Residual responses** (input terminated and 0 dB attenuation)

150 kHz to 6.7 GHz <−90 dBm

## Amplitude reference output

E4402B/04B/05B/07B −20 dBm (nominal)

## General specifications

### Temperature range

Operating 0 °C to + 55 °C  
Storage −40 °C to + 75 °C

### EMI compatibility

Conducted and radiated interference is in compliance with CISPR Pub. 11/1990 Group 1 Class A

### Audible noise

<40 dBA pressure and <4.6 bels power (ISODP7779)

**Military specification** Type tested to the environmental specifications of MIL-PRF-28800F class 3.

### Power requirements

ON (line 1) 90 to 132 V rms, 47 to 440 Hz  
195 to 250 V rms, 47 to 66 Hz  
Power consumption <300 W  
Power consumption <5 W

Standby (line 0)

DC operation

Voltage 12 to 20 Vdc  
Power consumption <200 W

### Data storage (nominal)

Internal 200 traces or states  
External (floppy) 200 traces or states

### Weight<sup>6</sup> (without options)

E4401B 13.2 kg (29.1 lbs.)  
E4402B 15.5 kg (34.2 lbs.)  
E4404B/05B/07B 17.1 kg (37.7 lbs.)

## Dimensions

w/o handle 222mm(H) x 409mm(D) x 373mm(W)  
w/handle (max.) 222mm(H) x 516mm(D) x 408mm(W)

## Measurement speed

	E4401B	E4402B	E4404B, E4405B E4407B
Local measurement rate <sup>10</sup>	≥50/sec	≥45/sec	≥40/sec
Remote measurement and GPIB transfer rate <sup>11</sup>	≥45/sec	≥45/sec	≥40/sec
RF center frequency tuning time <sup>18</sup>	≤75 ms	≤75 ms	≤75 ms

## Inputs/outputs

### Front panel connectors

INPUT	50 Ω Type N (f)
Opt. 1DP	75 Ω BNC (f)
Opt. BAB	50 Ω APC 3.5 (m)
RF OUT	50 Ω Type N (f)
Opt. 1DP	75 Ω BNC (f)
PROBE POWER	+15 Vdc, −12.6 Vdc at 150 mA max. characteristic
EXT KEYBOARD	6-pin mini-DIN, PC keyboards
Speaker	front-panel knob controls volume
Headphone	3.5mm (1/8 inch) miniature audio jack
Power output	0.2 W into 4 Ω
AMPTD REF OUT	50 Ω, BNC (f)
IF INPUT (Opt. AYZ)	50 Ω, SMA (f)
LO OUTPUT (Opt. AYZ)	50 Ω, SMA (f)

### Rear panel connectors

10 MHz REF OUT	50 Ω, BNC (f), >0 dBm
10 MHz REF IN	50 Ω, BNC (f), −15 to +10 dBm
GATE TRIG/EXT TRIG IN	BNC (f), 5 V TTL
GATE/HI SWP OUT	BNC (f), 5 V TTL
VGA OUTPUT	VGA compatible monitor, 15–pin mini D-SUB, (31.5 kHz horizontal, 60 Hz vertical sync rates, non-interlaced) Analog RGB 640 x 480

### Option A4J (IF and sweep ports) or Option AYX

AUX IF OUT	BNC (f), 21.4 MHz, nominal −10 to −70 dBm (uncorrected)
AUX VIDEO OUT	BNC (f), 0 to 1 V (uncorrected)
HI SWP IN	BNC (f), low stops sweep, (5 V TTL)
HI SWP OUT	BNC (f), (5 V TTL)
SWP OUT	BNC (f), 0 to +10 V ramp

## GPIB interface

(Option A4H) IEEE-488 bus connector

## Serial interface

(Option 1AX) RS-232, 9-pin D-SUB (m)

## Parallel interface

(Option A4H or 1AX) 25-pin D-SUB (f), printer port only

# Option specifications

## Option 1D6 time-gated spectrum analysis

### Gate delay/length

Range 1  $\mu$ s to 400 s  
Resolution <gate delay(s)/65000; rounded up to nearest  $\mu$ s.  
Accuracy  $\pm(500 \text{ ns} + 0.01\% \times \text{gate delay readout})$

## Option 1DN and 1DQ tracking generator

### Frequency range

E4401B  
Opt. 1DN, (50  $\Omega$ ) 9 kHz to 1.5 GHz  
Opt. 1DQ, (75  $\Omega$ ) 1 MHz to 1.5 GHz  
E4402B/04B/05B/07B  
Opt. 1DN, (50  $\Omega$ ) 9 kHz to 3.0 GHz

### Output level

Range  
E4401B  
Opt. 1DN 0 to -70 dBm  
Opt. 1DQ +42.76 to -27.24 dBmV  
E4402B/04B/05B/07B  
Opt. 1DN -1 to -66 dBm  
Resolution 0.1 dB  
Absolute accuracy (@ 50 MHz)  
Opt.1DN  $\pm 0.75$  dB  
Opt.1DQ  $\pm 1.5$  dB

### Vernier

Range  
E4401B 10 dB  
E4402B/04B/05B/07B 9 dB  
Accuracy  
E4401B  
Opt 1DN  $\pm 0.5$  dB, 0 to -10 dBm  
Opt 1DQ  $\pm 0.9$  dB, +42.76 to +32.76 dBmV  
E4402B/04B/05B/07B  
Opt 1DN  $\pm 0.75$  dB, 0 to -10 dBm

### Output attenuator range

E4401B 0 to 60 dB, 10 dB steps  
E4402B/04B/05B/07B 0 to 56 dB, 8 dB steps

### Output flatness

E4401B  
Opt. 1DN, (50  $\Omega$ )  
9 kHz to 10 MHz  $\pm 2.0$  dB  
10 MHz to 1.5 GHz  $\pm 1.5$  dB  
Opt. 1DQ, (75  $\Omega$ )  
1 MHz to 10 MHz  $\pm 2.5$  dB  
1 MHz to 10 MHz  $\pm 2.0$  dB  
E4402B/04B/05B/07B  
9 kHz to 10 MHz  $\pm 3.0$  dB  
10 MHz to 3.0 GHz  $\pm 2.0$  dB

## Effective source match (characteristic)

E4401B <2.5:1  
E4402B/04B/05B/07B <2.0:1 (0 dB atten.)  
<1.5:1 ( $\geq 8$  dB atten.)

## Spurious output

Harmonic spurs  
E4401B  
(0 dBm output)  
9 kHz to 20 MHz <-20 dBc  
20 MHz to 1.5 GHz <-25 dBc  
E4402B/04B/05B/07B  
(-1 dBm output)  
9 kHz to 3 GHz <-25 dBc  
Non-Harmonic spurs  
E4401B <-35 dBc  
E4402B/04B/05B/07B  
9 kHz to 2 GHz <-27 dBc  
2 GHz to 3 GHz <-23 dBc

## Dynamic range

Maximum output power – displayed average noise level

## Power sweep

Range  
E4401B  
Opt. 1DN (-15 dBm to 0 dBm) – (source attenuator setting)  
(+27.76 dBmV to +42.76 dBmV) – (source attenuator setting)  
Opt. 1DQ  
E4402B/04B/05B/07B  
Opt. 1DN (-10 dBm to -1 dBm) – (source attenuator setting)  
Resolution 0.1 dB

## Option 1DS preamp<sup>6</sup>

Gain +20 dB, nominal

## Noise Figure

E4401B 4 dB  
E4402B/04B/05B/07B 5 dB

## Option AYZ external mixing

### LO OUTPUT

Frequency range 2.9 to 7.1 GHz  
Power  
2.9 to 6.1 GHz 14.5 to 16 dBm at the mixer when connected with an 5061-5458 cable  
13 to 17.5 dBm  
2.9 to 7.1 GHz  
VSWR <1.9:1

### IF INPUT

Frequency range 321.4 MHz  $\pm 5$  MHz  
Maximum safe input level 10 dBm (ac),  $\pm 10$  V (dc)  
VSWR <1.9:1

Absolute amplitude accuracy <sup>14</sup> (reference levels from –10 to –60 dB)		
Amplitude corrections	20 °C to 30 °C	0 °C to 55 °C
15 to 30 dB	1.0 dB	1.5 dB
>30 to 50 dB	1.2 dB	1.7 dB
>50 to 60 dB	1.4 dB	1.9 dB

1 dB gain compression level –20 dBm with –10 dBm reference level and 0 dB amplitude corrections

**Mixer bias (IF INPUT)**

Voltage  
 Maximum range ±3.3 V  
 Linear compliant range ±2 V

Current (0 Ω load)  
 Range ±10 mA  
 Resolution <20 mA  
 Accuracy ± (3% + resolution)

Output impedance 490 Ω

**Option BAA FM demodulation<sup>6</sup>**

**Input level** –60 dBm + attenuator setting–preamp gain  
**Signal level** 0 to –30 dB below reference level

**FM deviation (FM gain)**

Range 10 kHz to 1 MHz  
 Resolution provides 1 Hz display annotation resolution  
 FM deviation range

	10 kHz to 40 kHz	12 Hz
	>40 kHz to 200 kHz	60 Hz
	>200 kHz to 1 MHz	300 Hz
Accuracy <sup>12</sup>	<(2% of FM deviation range + 2 × resolution)	

**FM bandwidth (–3 dB)**

FM deviation range

10 kHz to 40 kHz	7.5 × FM deviation range
>40 kHz to 200 kHz	1.3 × FM deviation range
>200 kHz to 1 MHz	0.3 × FM deviation range

**Option B7B TV trigger and picture on screen**

**Amplitude requirements<sup>6</sup>**

TV source: SA Top 50% of linear display

TV source: EXT VIDEO IN 500 mVp-p to 2 Vp-p

**Compatible standards**

NTSC-M, NTSC-Japan  
 PAL-M, PAL-B, D, G, H, I,  
 PAL-N, PAL-N combination,  
 SECAM-L

**Field selection**

Entire frame, even, odd

## Notes

1. Frequency reference error = (aging rate  $\forall$  period of time since adjustment + settability + temperature stability).
2. Not available in RBW <1 kHz (Option 1DR).
3. Marker level to DANL >25 dB, span  $\leq$ 1.5 GHz, RBW/span  $\geq$ 0.002.
4. N = LO harmonic mixing mode.
5. Mixer power level (dBm) = input power (dBm)—input attenuation (dB).
6. Characteristic.
7. Referenced to 50 MHz amplitude reference (20 °C to 30 °C).
8. Referenced to midpoint between highest and lowest frequency response deviations (20 °C to 30 °C).
9. For reference levels 0 to -50 dBm; input attenuation 10 dB; 1 kHz RBW; 1 kHz video BW; log scale; log range, 0 to 50 dB; coupled sweep time; sample detector; signal input, 0 to -50 dBm; span  $\leq$ 20 kHz; internal mixing (20 °C to 30 °C).
10. Characteristic; factory preset, fixed center frequency, sweep points = 101, auto align off, RBW = 1 MHz, stop frequency  $\leq$  3 GHz., span > 10MHz and  $\leq$  600 MHz (E4401B, span > 102 MHz and  $\leq$  400 MHz).
11. Characteristic; factory preset, fixed center frequency, sweep points = 101, auto align off, RBW = 1 MHz, stop frequency  $\leq$  3 GHz., span  $\geq$  20 MHz, GPIB interface, display and markers off, fixed center frequency, single sweep.
12. In time-domain sweeps.
13. 0 to -70 dB range when span = 0 Hz, or when auto ranging is off.
14. RBW 1 kHz; VBW 1 kHz; scale linear or log; span 2 kHz; sweep time coupled; sample detector; signal at reference level.
15. Reference level -25 dBm (E4401B) or -20 dBm (E4402B/04B/05B/07B); (75  $\Omega$  reference level + 28.75 dBmV); input attenuation 10 dB; center frequency 50 MHz; RBW 1 kHz; VBW 1 kHz; scale linear or log; span 2 kHz; sweep time coupled, sample detector, signal at reference level.
16. Reference level -30 dBm; (75  $\Omega$  reference level + 18.75 dBmV); input attenuation 0 dB; center frequency 50 MHz; RBW 1 kHz; VBW 1 kHz; scale linear or log; span 2 kHz; sweep time coupled, signal at reference level.
17. Preselector centered with the Agilent 11974-series mixers.
18. Characteristic; includes center frequency tuning + measurement + GPIB transfer times, stop frequency  $\leq$  3GHz, sweep points = 101, display and markers off, single sweep.

## **Agilent Technologies' Test and Measurement Support, Services, and Assistance**

Agilent Technologies aims to maximize the value you receive, while minimizing your risk and problems. We strive to ensure that you get the test and measurement capabilities you paid for and obtain the support you need. Our extensive support resources and services can help you choose the right Agilent products for your applications and apply them successfully. Every instrument and system we sell has a global warranty. Support is available for at least five years beyond the production life of the product. Two concepts underlay Agilent's overall support policy: "Our Promise" and "Your Advantage."

### **Our Promise**

Our Promise means your Agilent test and measurement equipment will meet its advertised performance and functionality. When you are choosing new equipment, we will help you with product information, including realistic performance specifications and practical recommendations from experienced test engineers. When you use Agilent equipment, we can verify that it works properly, help with product operation, and provide basic measurement assistance for the use of specified capabilities, at no extra cost upon request. Many self-help tools are available.

### **Your Advantage**

Your Advantage means that Agilent offers a wide range of additional expert test and measurement services, which you can purchase according to your unique technical and business needs. Solve problems efficiently and gain a competitive edge by contacting us for calibration, extra-cost upgrades, out-of-warranty repairs, and on-site education and training, as well as design, system integration, project management, and other professional services. Experienced Agilent engineers and technicians worldwide can help you maximize your productivity, optimize the return on investment of your Agilent instruments and systems, and obtain dependable measurement accuracy for the life of those products.

**For more assistance with your test & measurement needs go to**

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