



Advanced Test Equipment Rentals
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Agilent 4352B VCO/PLL Signal Analyzer

Function Reference

SERIAL NUMBERS

This manual applies directly to instruments that have the firmware revision 2.x. For additional information about firmware revisions, see in Appendix A.



Agilent Technologies

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Specifications

These specifications are the performance standards and operation limits based on which the 4352B is tested. When shipped from the factory, the 4352B meets the specifications listed in this section. For the specifications of the 43521A (Downconverter Unit), see the User's Manual of the 43521A. Specifications list the 4352B's performance guaranteed over the temperature range of 0°C to 40°C (except as noted) and after a warm-up time of at least 30 minutes has elapsed from power-on. Information provided as *typical*, *typically*, *nominal* or *approximate* represents typical characteristics of the 4352B and is intended to serve as reference data for efficient operation of the 4352B.

Measurement Items (Tester Mode)

RF Power

Frequency band	10 MHz to 3 GHz
Input level	-10 dBm to +20 dBm
Resolution	0.01 dB
Accuracy	
@ ≤ 2 GHz, ≤ 15 dBm, Peak Voltage Response, $23\pm 10^\circ\text{C}$	$\pm 0.6\text{dB}$
@Other than the above, Peak Voltage Response, $23\pm 10^\circ\text{C}$	$\pm 1.0\text{dB}$
@ Peak Voltage Response, 0 to 40°C	$\pm 2.0\text{dB}$
@1 GHz, -5 dBm, Peak Voltage Response, $23\pm 10^\circ\text{C}$	$\pm 0.2\text{dB}(\text{typical})$

Frequency

Frequency band	10 MHz to 3 GHz
Resolution	
When @ 1kHz is selected as resolution	1 kHz
Accuracy	\pm (time base accuracy of the external signal source used + 1 kHz)

DC Current Consumption

Current range	0 to 50 mA
Accuracy	
@ $23\pm 10^\circ\text{C}$	$\pm(0.2\%$ of reading+ $100\ \mu\text{A})$
@0 to 40°C	$\pm(0.8\%$ of reading+ $400\ \mu\text{A})$
Resolution	$10\ \mu\text{A}$

Measurement Items

FM Deviation

Measurement Range	0 to 200 kHz
Deviation Resolution	4 digits
Deviation Accuracy	
@1 kHz FM, 2kHz range, 23±10°C	(±2% of reading+0.5% of measurement range)
@1 kHz FM, 2kHz range, 0 to 40°C	(±8% of reading+2.0% of reading)
@1 kHz FM, 20, 200 kHz range, 23±10°C	(±2% of reading+0.1% of measurement range)
@1 kHz FM, 20, 200 kHz range, 0 to 40°C ..	(±8% of reading+0.4% of measurement range)

Note



- The deviation accuracy obtained after FM deviation calibration is ±0.8% of the reading (typical data, @ ambient temperature during calibration:±5 °C).
- Perform calibration again if the detection band is changed.

Residual FM

@300 Hz to 3 kHz bandwidth	< 3 Hz _{rms} (typical)
@50 Hz to 20 kHz bandwidth	< 8 Hz _{rms} (typical)

C/N Ratio

Offset frequency range

@ Carrier ≥ 100 MHz	100 Hz to 9 MHz
@ Carrier < 100 MHz	100 Hz to 10% of carrier frequency

Phase noise

@100 Hz offset	85 dBc/Hz (90 dBc/Hz typical)
@1 kHz offset	110 dBc/Hz (117 dBc/Hz typical)
@10 kHz offset	130 dBc/Hz (137 dBc/Hz typical)
@100 kHz offset	140 dBc/Hz (147 dBc/Hz typical)
@1 M,9 MHz offset	150 dBc/Hz (157 dBc/Hz typical)

See also the section on **EMC** of “Others” in “General Characteristics”.

Accuracy † ††

@100 Hz to 1 kHz offset	±4dB(typical)
@1 kHz to 1 MHz offset	±2dB
@1 MHz to 9 MHz offset	±4dB

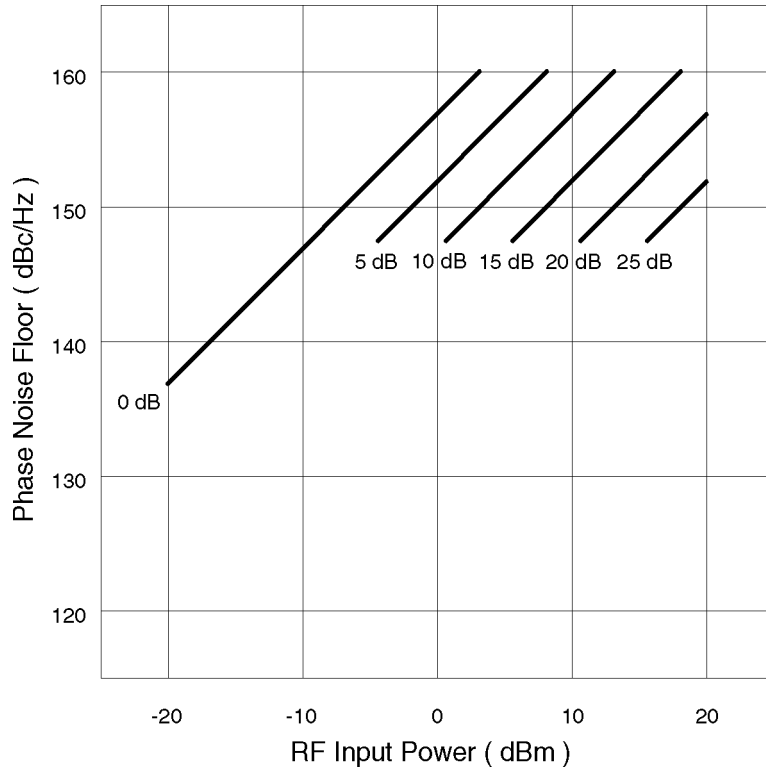
†(Note that if **NOISE PLL auto WIDE** (CNPLL WIDE) is selected, this accuracy is valid at offset frequency above 5 kHz.)

†† (No spurious components should not be assumed around the measurement point (for the tester mode only))

Note



The noise floor at 1 MHz and 9 MHz offsets depends on the input signal level and the RF attenuation setting. The figure shown below illustrates the relationship between them. The value below each line show the RF attenuator setting.



Note



Set the attenuation for noise measurement to 0dB when measuring the phase noise above 150 dBc. Other settings may not guarantee the phase noise specified as a typical value.

Measurement Items (Analyzer Mode)

RF Power Characteristics against DC Control Voltage

Refer to “RF Power” in “Measurement Items (Tester Mode)”.

Frequency/Tuning Sensitivity Characteristics against DC Control Voltage

Refer to “Frequency” in “Measurement Items (Tester Mode)”.

Phase Noise Characteristics against Offset Frequency

Same as “C/N Ratio” in “Measurement Items (Tester Mode)”.

Frequency Transient

Frequency Accuracy

\pm (frequency span \times 0.1% + Time base accuracy of external signal source used)
 The frequency span is displayed below the frequency transient measurement screen, as FSPAN xxxMHz. It is selected depending on the setting as follows:

When **FREQ SPAN 2MHz** is selected: 2 MHz

When **20MHz** is selected: 20 MHz

When **MAX xxxMHz** is selected: Depending on the entered target frequency and the target position value, one of 16 measurement frequency bands (see Table 11-1) is automatically selected inside the 4352B. The frequency span of that measurement range is used.

Measurement Resolution

The measurement resolution depends on the selected frequency span as follows:

When **FREQ SPAN 2MHz** is selected: 50 Hz

When **20MHz** is selected: 500 Hz

When **MAX xxxMHz** is selected: Depending on the entered target frequency and the target position value, one of 16 measurement frequency bands (see Table 11-1) is automatically selected inside the 4352B. The frequency resolution of that measurement band is used.

Table 11-1.
Available measurement frequency bands when **MAX xxxMHz is selected**

Measurement frequency band number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Maximum frequency (MHz)	192	384	576	768	960	1152	1354	1536	1728	1920	2112	2304	2496	2688	2880	3000
Minimum frequency (MHz)	64	128	192	256	320	384	448	512	576	640	704	768	832	896	960	1024
Frequency span (MHz)	128	256	384	512	640	768	896	1024	1152	1280	1408	1536	1664	1792	1920	2048
Frequency resolution (kHz)	3.2	6.4	9.6	12.8	16	19.2	22.4	25.6	28.8	32	35.2	38.4	41.6	44.8	48	51.2

Maximum Sweep Time20 sec

Minimum Sweep Time Resolution 12.5 μ sec

Time Base Accuracy

When the 4352B isn't phase locked to the external signal source
 ± 10 ppm (typical)
 When the 4352B is phase locked to the external signal source
 Time base accuracy of the external signal source used

Spectrum

When the detection mode (DETECTION) is set to the positive peak (POS PEAK).

Absolute level accuracy

When @-5 dBm is input, attenuation=0 dB, @23 \pm 10°C ± 2 dBm(typical)

Relative level accuracy

Ratio of -10 dBm to -60 dBm during sweep, attenuation=0 dB
 ± 0.5 dB (typical), ± 1.5 dB

I/O Signal

VCO Power Voltage Output

Voltage range 0 to +15.5 V (50 mA max.), variable in 1-mV steps
 Setting accuracy
 @23 \pm 10°C $\pm(0.2\% + 2$ mV)
 @0 to 40°C $\pm(0.6\% + 6$ mV)
 Noise
 @10 kHz 10nV/ \sqrt{Hz} (typical)
 Setup time
 @Error: 0.1% < 20 msec(typical)
 Connector BNC female
 Output resistance (DC) <0.3 Ω (typical)

VCO Control Voltage Output

Voltage range 0 to 20 V (20 mA max.), variable in 100- μ V steps
 With option 001, -15 to 35 V (20 mA max.), variable in 100- μ V steps
 Setting accuracy
 @23 \pm 10°C
 Output voltage range
 -15 V to -0.0001 V $\pm\{(setting + 15$ V) $\times 0.1\% + 5$ mV}
 0 V to 20 V $\pm(setting \times 0.1\% + 2$ mV)
 20.0001 V to 35 V $\pm\{(setting - 15$ V) $\times 0.1\% + 5$ mV}
 @0 to 40°C
 Output voltage range
 -15 V to -0.0001 V $\pm\{(setting + 15$ V) $\times 0.3\% + 15$ mV}
 0 V to 20 V $\pm(setting \times 0.3\% + 6$ mV)
 20.0001 V to 35 V $\pm\{(setting - 15$ V) $\times 0.3\% + 15$ mV}
 Noise

I/O Signal

@10 kHz	1nV/ \sqrt{Hz} (typical)
@10 kHz, voltage setting -15 to 0 , 20 to 35 V (option 001)	1.5nV/ \sqrt{Hz} (typical)
Setup time	
@Error: 0.1%	< 20 msec(typical)
Connector	BNC female
Output resistance (DC)	
0 to 20 V	<10 Ω (typical)
With option 001, -15 to 0 , 20 to 35 V	<50 Ω (typical)

Modulation Signal Output

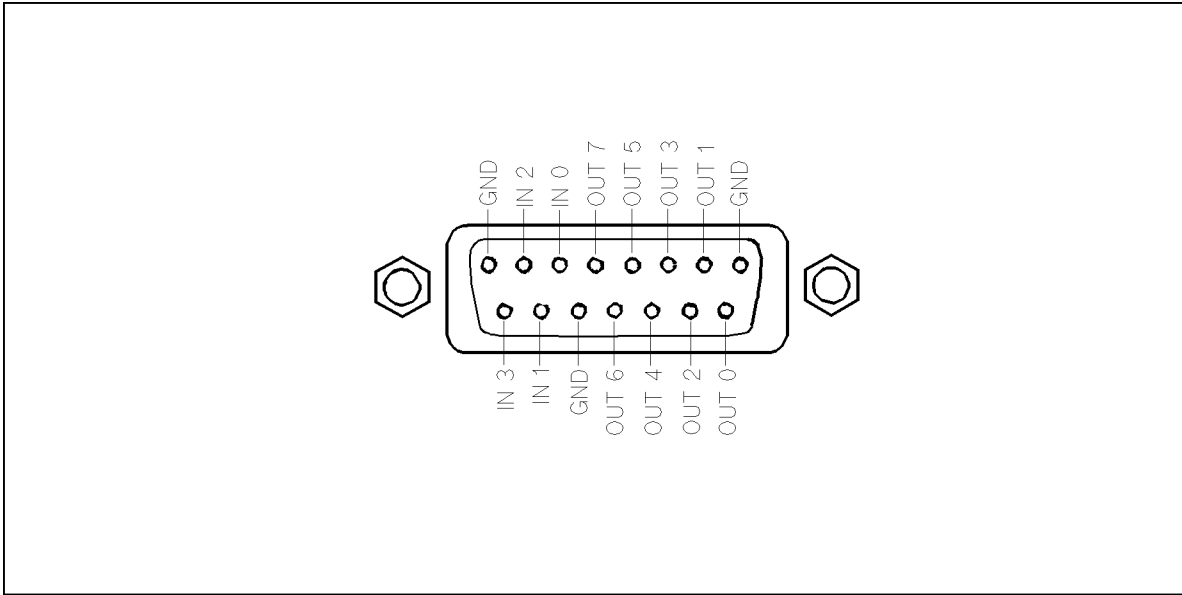
Frequency	1 kHz (fixed)
Level	
@Open load	0 to 1 V _{rms} , variable in 1 mV _{rms} steps
Setting Accuracy	
@ Open load, 23±10°C	±(0.5% + 1mV _{rms})
@ Open load, 0 to 40°C	±(1.5% + 3mV _{rms})
Harmonic Distortion	<-40 dBc(typical)
Connector	BNC female
Output impedance	
@1 kHz	Nominal: 50 Ω (typical)
Maximum output current	5mA _{rms} (typical)

RF Input

Frequency range	10 MHz to 3 GHz
Input level	-10 dBm to +20 dBm
Connector	N female
Input impedance	50 Ω , SWR < 1.3
@≤ 2 GHz	SWR < 1.2

Instrument BASIC Related Specifications

Keyboard	PS/2 style 101 english keyboard
Connector	mini-DIN
I/O port	
Connector	D-SUB (15-pin)
Level	TTL level
I/O	4-bit input/8-bit output port

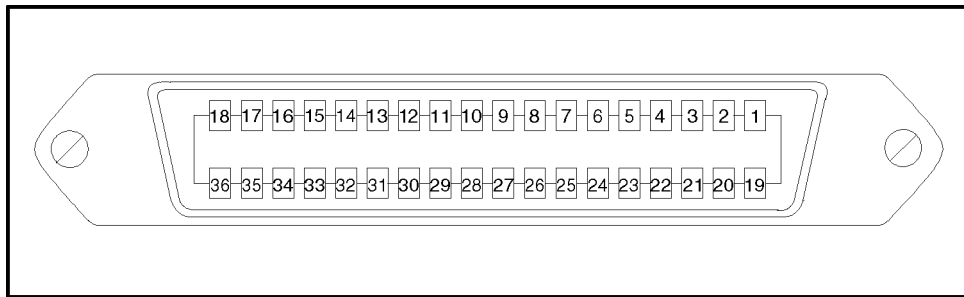


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Figure 11-1. I/O Port Pin Assignment

24-bit I/O Interface

Connector	D-SUB (36-pin)
Level	TTL
I/O	8-bit input/16-bit output



U90E002

Figure 11-2. 24-bit I/O Interface Pin Assignment

General Characteristics

Table 11-2. Signal Source Assignment

Pin No.	Signal Name	Signal Standard
1	GND	0 V
2	INPUT1	TTL level, pulse input (pulse width: 1 μ s or above)
3	OUTPUT1	TTL level, latch output
4	OUTPUT2	TTL level, latch output
5	OUTPUT PORT A0	TTL level, latch output
6	OUTPUT PORT A1	TTL level, latch output
7	OUTPUT PORT A2	TTL level, latch output
8	OUTPUT PORT A3	TTL level, latch output
9	OUTPUT PORT A4	TTL level, latch output
10	OUTPUT PORT A5	TTL level, latch output
11	OUTPUT PORT A6	TTL level, latch output
12	OUTPUT PORT A7	TTL level, latch output
13	OUTPUT PORT B0	TTL level, latch output
14	OUTPUT PORT B1	TTL level, latch output
15	OUTPUT PORT B2	TTL level, latch output
16	OUTPUT PORT B3	TTL level, latch output
17	OUTPUT PORT B4	TTL level, latch output
18	OUTPUT PORT B5	TTL level, latch output
19	OUTPUT PORT B6	TTL level, latch output
20	OUTPUT PORT B7	TTL level, latch output
21	I/O PORT C0	TTL level, latch output
22	I/O PORT C1	TTL level, latch output
23	I/O PORT C2	TTL level, latch output
24	I/O PORT C3	TTL level, latch output
25	I/O PORT D0	TTL level, latch output
26	I/O PORT D1	TTL level, latch output
27	I/O PORT D2	TTL level, latch output
28	I/O PORT D3	TTL level, latch output
29	PORT C STATUS	TTL level, input mode: LOW, output mode: HIGH
30	PORT D STATUS	TTL level, input mode: LOW, output mode: HIGH
31	WRITE STROBE SIGNAL	TTL level, active low, pulse output (width: 10 μ s; typical)
32	+5V PULLUP	
33	SWEEP END SIGNAL	TTL level, active low, pulse output (width: 20 μ s; typical)
34	+5V	+5V, 100 mA MAX
35	PASS/FAIL SIGNAL	TTL level, PASS: HIGH, FAIL: LOW, latch output
36	PASS/FAIL WRITE STROBE SIGNAL	TTL level, active low, pulse output (width: 10 μ s; typical)

See *4352B GPIB Programming Manual* for details.

General Characteristics

I/O Characteristics

External input (1st LO)

Input Level + 10 dBm(typical)
 Connector N female

External reference input

Frequency 10 MHz±100 Hz(typical)
 Level -6 dBm to + 16 dBm(typical)
 Input Impedance 50 Ω(nominal)
 Connector BNC female

Internal reference output

Frequency 10 MHz±100 Hz(typical)
 Level 2.5 dBm(typical)
 Output impedance 50 Ω(nominal)
 Connector BNC female

External trigger input

Level TTL level
 Pulse width (T_p) $\geq 2 \mu s$ (typical)
 Polarity Positive/negative selectable
 Connector BNC female

External program RUN/CONT input

Connector BNC female
 Level TTL level

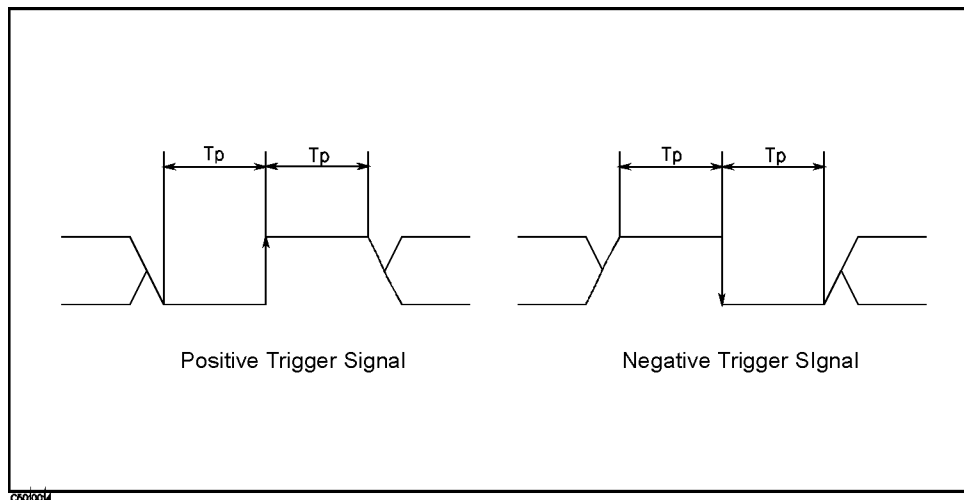


Figure 11-3. Trigger Signal

External monitor output

Connector D-SUB 15-pin HD
 Display resolution 640 × 480 VGA

LCD

Size/Type 8.4 inch color LCD
 Resolution 640 × 480

Operation Conditions

Effective Display Area 160 mm × 115 mm(600 × 430 dots)
Parallel interface
InterfaceCentronics standard compliant
Printer control language HP PCL3 Printer Control Language

Table 11-3. Supported Printers and Printing Modes

Printer	Monochrome Printing	Fixed Color Printing	Variable Color Printing
HP DeskJet 340J	✓	✓	
HP DeskJet 505	✓		
HP DeskJet 560C	✓	✓	
HP DeskJet 850C	✓	✓	
HP DeskJet 1200	✓	✓	✓
HP DeskJet 1600CM	✓	✓	✓

Operation Conditions

Temperature

Disk drive non-operating condition0°C to 40°C
 Disk drive operating condition 10°C to 40°C

Humidity

@wet bulb temperature ≤29°C, without condensation

Disk drive non-operating condition 15% to 95% RH
 Disk drive operating condition 15% to 80% RH

Altitude 0 to 2000 meters

Warm up time30 minutes

Non-operation Conditions

Temperature –20°C to 60°C

Humidity

@wet bulb temperature ≤45°C, without condensation 15% to 95% RH

Altitude 0 to 4572 meters

Others

EMCComplies with CISPR 11 (1990) / EN 55011 (1991) : Group 1, Class A
Complies with IEC 1000-3-2 (1995) / EN 6100-3-2 (1995)
Complies with IEC 1000-3-3 (1994) / EN 6100-3-3 (1995)
Complies with IEC 1000-4-2 (1995) / EN 50082-1 (1992) : 4 kV CD, 8 kV AD
Complies with IEC 801-3 (1984) / EN 50082-1 (1992) : 3 V/m
Complies with IEC 1000-4-4 (1995) / EN 50082-1 (1992) : 1 kV / Main,0.5kV / Signal Line

Note: Note: The 4352B meets the specifications for C/N ratio and phase noise over the entire immunity test frequency range between 27 to 1000 MHz when tested at 3V/m in compliance with IEC 801-3/1984. Note, however, that this does not apply when the frequency to be measured is the same as the test frequency of the interfering signal.

This ISM device complies with Canadian ICES-001.
Cet appareil ISM est conforme à la norme NMB-001 du Canada.

Power requirements 90 V to 132 V, or 198 V to 264 V, 47 to 63 Hz, 300 VA max
Weight21.5 kg max
Dimensions425(W) × 235(H) × 553(D) mm