Agilent 4395A
Network/Spectrum/Impedance Analyzer
Data Sheet

Specifications describe the instrument's warranted performance over the temperature range of 0°C to 40°C (except as noted). Supplemental characteristics are intended to provide information that is useful in applying the instrument by giving non-warranted performance parameters. These are denoted as *SPC (supplemental performance characteristics), typical,* or *nominal.* Warm up time must be greater than or equal to 30 minutes after power on for all specifications.

Network Measurement

Source Characteristics

Frequency Characteristics

Range . . . . . 10 Hz to 500 MHz

Resolution . . . . . 1 mHz

Frequency reference

Accuracy

at 23°C ± 5°C, referenced to 23°C . . . . . <±5.5 ppm

Aging . . . . . <±2.5 ppm/year (SPC)

Initial achievable accuracy . . . . . < ± 1.0 ppm (SPC)

Temperature stability

at 23°C ± 5°C, referenced to 23°C . . . . . <±2ppm (SPC)

Precision frequency reference (option 1D5)

Accuracy

at 0°C to 40°C, referenced to 23°C. . . . . <±0.13 ppm

Aging . . . . . <±0.1 ppm/year (SPC)

Initial achievable accuracy. . . . . <±0.02 ppm (SPC)

Temperature stability

at 0°C to 40°C, referenced to 23°C . . . . . <±0.01 ppm (SPC)

Output Characteristics

Power range. . . . . -50 dBm to + 15 dBm

Level accuracy

at 0 dBm output, 50 MHz, 23°C ± 5°C, ... ±1.0 dB

Level linearity

Output Power	Linearity[1]
≥ -40 dBm	±1.0 dB
< -40 dBm	±1.5 dB

1. At relative to 0 dBm output, 50 MHz, 23°C ± 5°C

Agilent Technologies

Flatness
at 0 dBm output, relative to 50 MHz, 23°C ± 5°C . . . . . ±2 dB
Resolution . . . . . 0.1 dB
Spectral Purity Characteristics
Harmonics
at +10 dBm output . . . . . <-30 dBc
Non-harmonics spurious
at +10 dBm output . . . . . <-30 dBc
Noise sidebands
at ≥ 10 kHz offset from carrier . . . . . <-95 dBc/Hz
Power sweep range . . . . . 20 dB max.
Power sweep linearity
deviation from linear power referenced to the stop power level . . . . . ±0.5 dB
Impedance . . . . . 50 Ω nominal
Return loss
frequency ≤ 200 MHz . . . . . >15 dB (SPC)
frequency > 200 MHz . . . . . >7dB (SPC)
Connector . . . . . Type N female

Receiver Characteristics

Input Characteristics

Frequency range . . . . . 10 Hz to 500 MHz
Input attenuator. . . . . 0 to 50 dB, 10 dB step
Full scale input level (R,A,B)

Attenuator setting (dB)	Full scale input level
0	-10 dBm
10	0 dBm
20	+10 dBm
30	+20 dBm
40	+30 dBm
50	+30 dBm

IF bandwidth (IFBW) . . . . . 2,10, 30,100, 300,1 k, 3 k,10 k, 30 kHz
Note: The IFBW should be set to less than 1/5 of the lowest frequency in the sweep range.
Noise level (referenced to full scale input level, 23°C ± 5°C)
at 10 Hz ≤ frequency < 100 Hz, IFBW=2 Hz . . . . . -85 dB (SPC)
at 100 Hz ≤ frequency < 100 kHz, IFBW=10 Hz . . . . . -85 dB
at 100 kHz ≤ frequency, IFBW=10 Hz . . . . . -115 dB
Input crosstalk
for input R ... + 10 dBm input, input attenuator: 20 dB
for input A, B ... input attenuator: 0 dB
at < 100 kHz
R through A, B . . . . . <-100 dB
others . . . . . <-100 dB (SPC)
at ≥ 100 kHz
R through A, B . . . . . <-120 dB
others . . . . . <-120 dB (SPC)
Source Crosstalk (for input A, B)(typical for input R)
at + 10 dBm output, < 100 kHz, input attenuator: 0 dB . . . . . <-100 dB
at + 10 dBm output, ≥100 kHz, Input attenuator: 0 dB. . . . . <-120 dB
Multiplexer switching impedance change
at Input attenuator 0 dB . . . . . <0.5% (SPC)
at Input attenuator 10 dB and above . . . . . <0.1% (SPC)
Connector . . . . . Type N female
Impedance . . . . . 50 Ω nominal
Return loss

	Input attenuator		
	0 dB	10 dB	20 dB to 50 dB
10 Hz ≤ frequency < 100 kHz	25 dB[1]	25 dB[1]	25 dB[1]
100 kHz ≤ frequency ≤ 100 MHz	25 dB[1]	25 dB	25 dB[1]
100 MHz < frequency	15 dB[1]	15 dB	15 dB[1]

1. SPC

Maximum input level . . . . . +30 dBm (at input attenuator: 40 dB or 50 dB)
Maximum safe input level . . . . . +30 dBm or ±7 Vdc (SPC)

Magnitude Characteristics

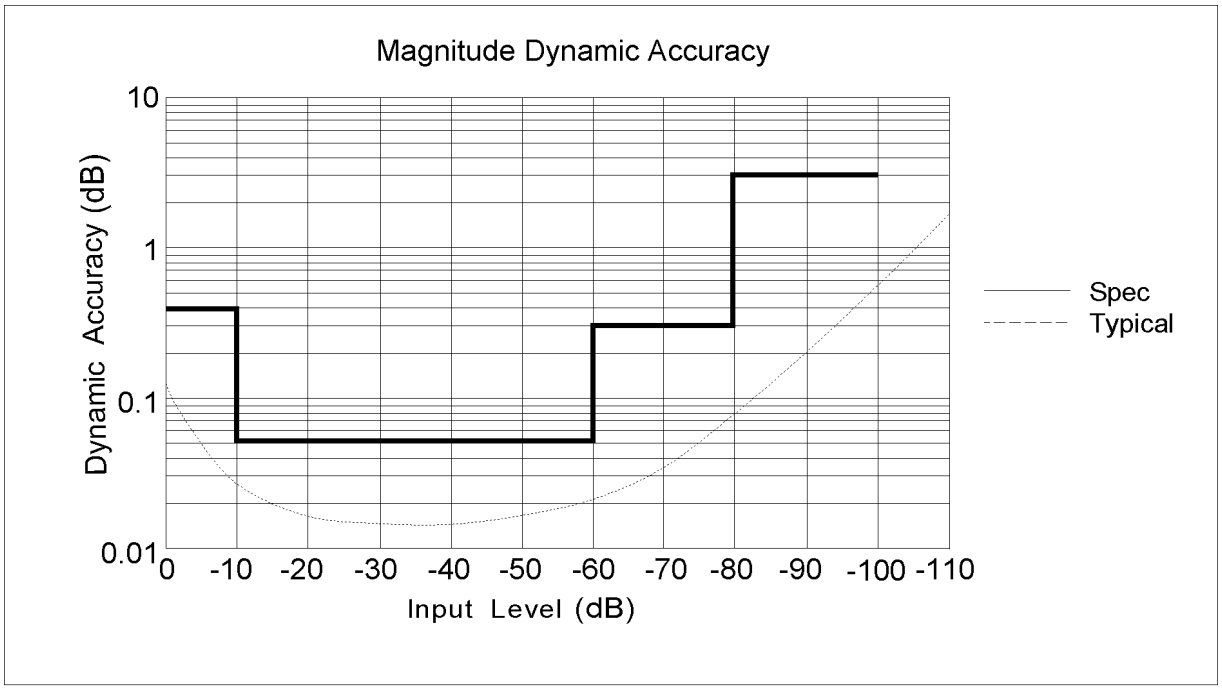
Absolute amplitude accuracy (R, A, B)
at -10 dBm input, input attenuator:10 dB, frequency ≥100 Hz, IFBW ≤ 3 kHz, 23°C ± 5°C, ... <±1.5 dB

Ratio accuracy (A/R, B/R) (typical for A/B)
at -10 dBm input, input attenuator:10 dB, IFBW ≤ 3 kHz, 23°C ± 5°C, ... <±2 dB

Dynamic accuracy (A/R, B/R) (typical for A/B)

Input Level (relative to full scale input level)	Dynamic Accuracy[1] frequency ≥ 100 Hz
0 dB ≥ input level > -10 dB	±0.4 dB
-10 dB ≥ input Level ≥-60 dB	±0.05 dB
-60 dB > input level ≥ -80 dB	±0.3 dB
-80 dB > input level ≥-100 dB	±3 dB

1. R input level (B input level for A/B) = full scale input level –10 dB, IFBW =10 Hz, 23°C ± 5°C



CC011001

Figure 1-1. Magnitude Dynamic Accuracy

Residual responses . . . . . <-80 dB full scale (SPC)
Trace noise (A/R, B/R, A/B)
at 50 MHz, both inputs: full scale input level -10 dB, IFBW = 300 Hz . . . . . <0.005 dB rms (SPC)
Stability (A/R, B/R, A/B). . . . . < ±0.01 dB/°C (SPC)

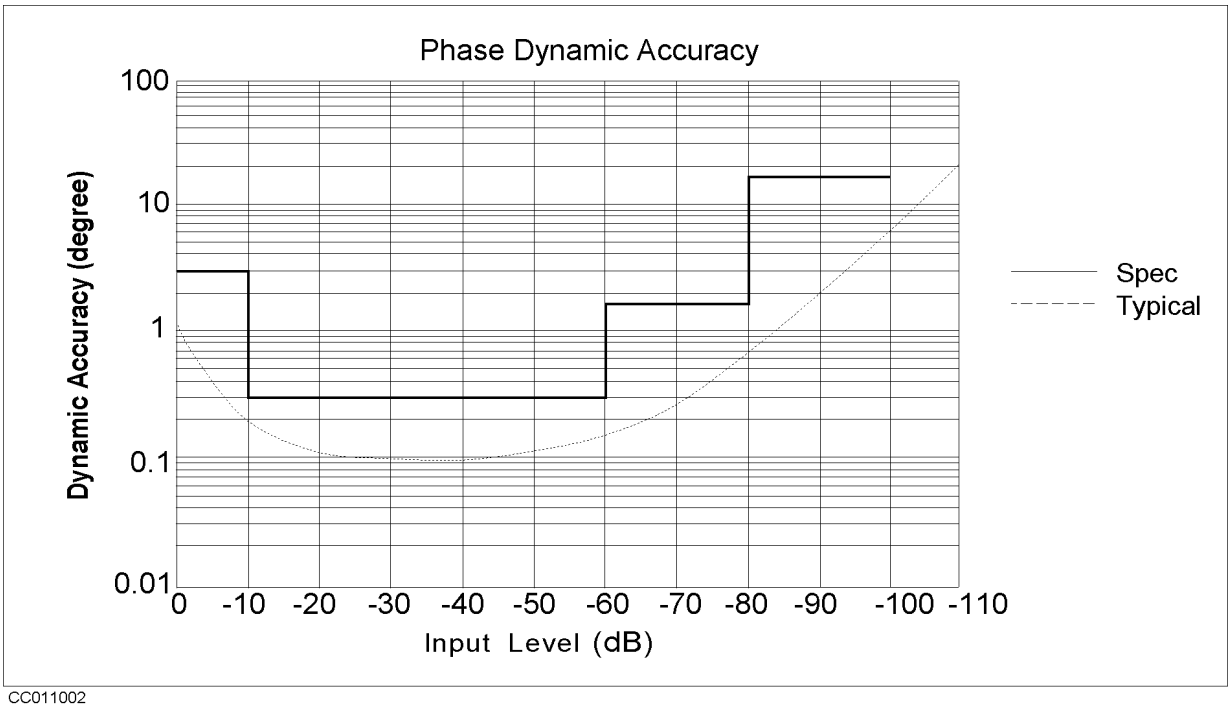
Phase Characteristics

Measurements format. . . . . Standard format, Expanded phase format
Frequency response (deviation from linear phase) (A/R, B/R) (SPC for A/B)
at -10 dBm input, input attenuator:10 dB, IFBW ≤ 3 kHz, 23°C ± 5°C . . . . . < ±12°

Dynamic accuracy (A/R, B/R) (SPC for A/B)

Input Level (relative to full scale input level)	Dynamic Accuracy[1] frequency ≥ 100 Hz
0 dB ≥ input level > -10 dB	±3°
-10 dB ≥ input level ≥-60 dB	±0.3°
-60 dB > input level ≥-80 dB	±1.8°
-80 dB > input level ≥ -100 dB	±18°

1. R input level (B input level for A/B) = full scale input level -10 dB, IFBW =10 Hz, 23°C ± 5°C



CC011002

Figure 1-2. Phase Dynamic Accuracy

Trace noise (A/R, B/R, A/B)
at 50 MHz, both inputs: full scale input level -10 dB, IFBW=300 Hz. . . . . <0.04° rms (SPC)
Stability (A/R, B/R, A/B) . . . . . < ±0.1 °/°C (SPC)

Group Delay Characteristics

Aperture [Hz] . . . . . 0.25% to 20% of span

Accuracy

In general, the following formula can be used to determine the accuracy, in seconds, of a specific group delay measurement:

$$\frac{\textit{Phase Accuracy}\ (\text{deg}\textit{ree})}{\textit{Aperture}(\textit{Hz}) \times 360\ (\text{deg}\textit{ree})}$$

Sweep Characteristics

Sweep type . . . . . Linear frequency, Log frequency, Power, List frequency

Sweep direction . . . . . Upper direction only

Trigger type . . . . . Hold, Single, Number of groups, Continuous

Trigger source . . . . . Internal (free run), External, Manual, GPIB (bus)

Event trigger . . . . . On point, On sweep

Spectrum Measurement

Frequency Characteristics

Frequency range . . . . . 10 Hz to 500 MHz

Frequency readout accuracy

. . . . . ±((*freq readout*[*Hz*]) x (*freq ref accuracy*[1]) + *RBW*[*Hz*] + $\frac{SPAN[Hz]}{NOP-1}$)) [*Hz*]

where NOP means number of display points

Frequency reference

Accuracy

at 23°C ± 5°C, referenced to 23°C. . . . . <±5.5 ppm

Aging . . . . . <±2.5 ppm/year (SPC)

Initial achievable accuracy . . . . . < ± 1.0 ppm (SPC)

Temperature stability

at 23°C ± 5°C, referenced to 23°C . . . . . <±2 ppm (SPC)

Precision frequency reference (option 1D5)

Accuracy

at 0°C to 40°C, referenced to 23°C . . . . . <±0.13 ppm

Aging . . . . . <±0.l ppm/year (SPC)

Initial achievable accuracy . . . . . <±0.02 ppm (SPC)

Temperature stability

at 0°C to 40°C, referenced to 23°C . . . . . <±0.01 ppm (SPC)

Resolution bandwidth (RBW)

Range

3 dB RBW at span > 0 . . . . . 1 Hz to 1 MHz, 1-3 step

3 dB RBW at span = 0. . . . . 3k, 5k, 10k, 20k, 40k,100k, 200k, 400k, 800k,1.5M, 3M, 5MHz

Selectivity (60 dB BW/3 dB BW)

at span > 0 . . . . . <3

Mode . . . . . Auto or Manual

Accuracy

at span > 0 . . . . . <±10%

at span = 0 . . . . . <±30%

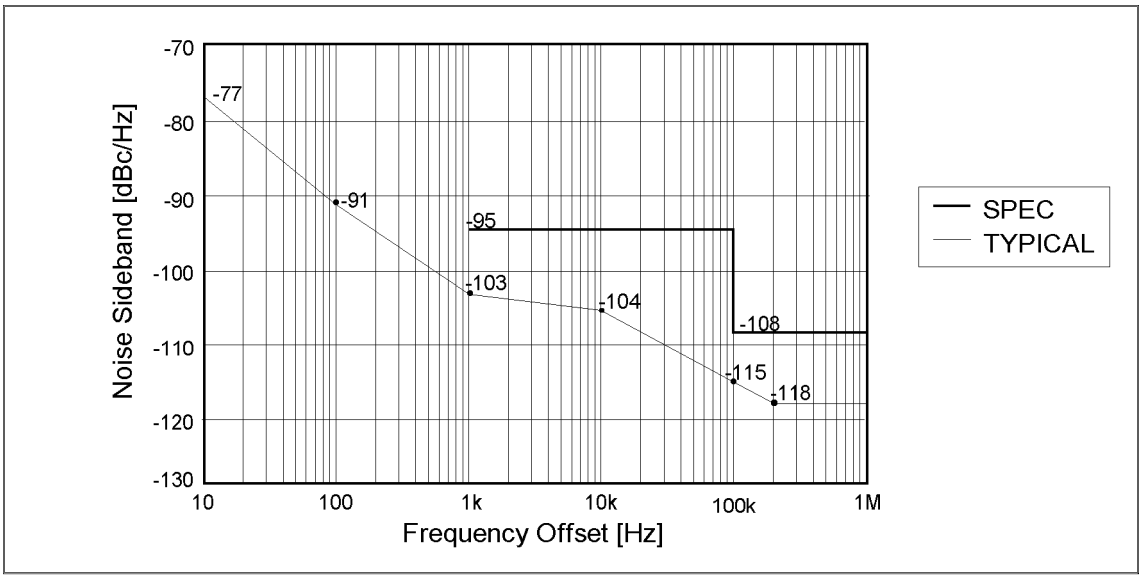
Video bandwidth (VBW)

Range

at span > 0 . . . . . 3 mHz to 3 MHz, 1-3 step, 0.003 ≤ VBW/RBW ≤ 1

Noise sidebands

Offset from Carrier	Noise Sidebands
≥1 kHz	< -95 dBc/Hz
≥100 kHz	< -108 dBc/Hz



CC011003

Figure 1-3. Noise Sidebands

Amplitude Characteristics

Amplitude range . . . . . displayed average noise level to +30 dBm

Reference value setting range . . . . . -100 dBm to +30 dBm

Level accuracy

at -20 dBm input, 50 MHz, input attenuator: 10 dB, 23°C ± 5°C . . . . . <±0.8 dB

Frequency response

at -20 dBm input, input attenuator: 10 dB, referenced to level at 50 MHz, 23°C ± 5°C

frequency ≥ 100 Hz . . . . . <±1.5 dB

frequency < 100 Hz . . . . . <±1.3 dB

Amplitude fidelity[1]

Log scale[2]

Range (dB to reference input lever [dB]	Amplitude Fidelity [dB]
0 to -30	±0.05
-30 to -40	±0.07
-40 to -50	±0.15
-50 to -60	±0.35
-60 to -70	±0.8
-70 to -80	±1.8

Linear scale[2] . . . . . < ±3%

1. Fidelity shows an extent of nonlinearity referenced to the reference input level.
2. RBW =10 Hz, -20 dBm ≤ reference value ≤ +30 dBm, reference input level=full scale input level -10 dB, 23 ± 5°C

Note: Refer to *Input attenuator* part for the definition of full scale input level.

Displayed average noise level

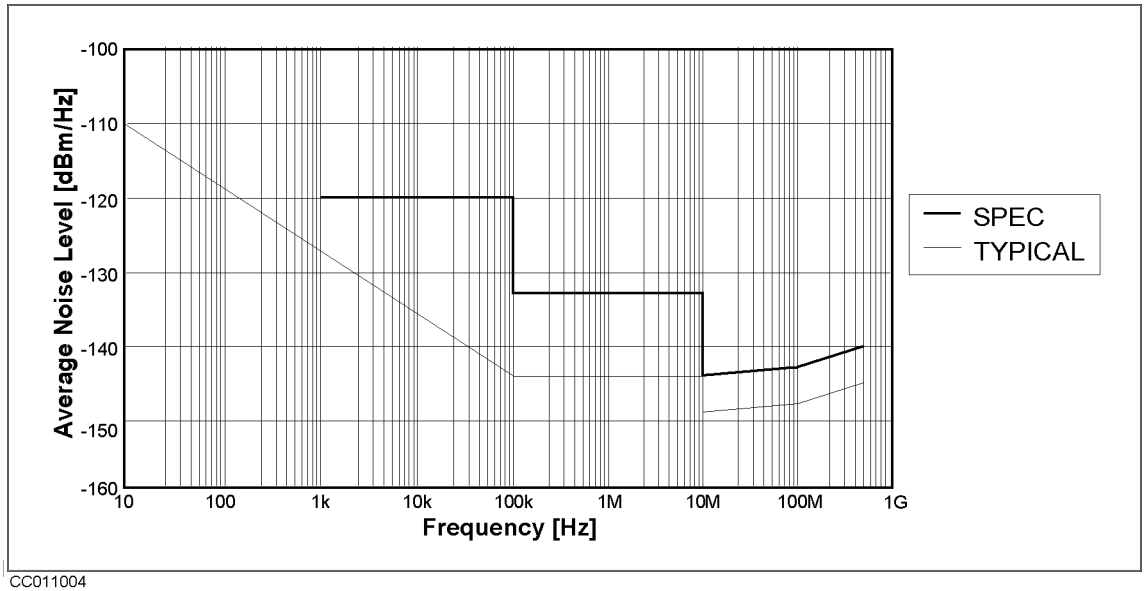
at reference value ≤–40 dBm, input attenuator: auto or 0 dB

at frequency ≥1 kHz . . . . . -120 dBm/Hz

at ≥100 kHz . . . . . -133 dBm/Hz

at ≥10 MHz . . . . . (-145 + frequency/100 MHz) dBm/Hz[1]

1. at start frequency ≥ 10 MHz



CC011004

On-screen dynamic range

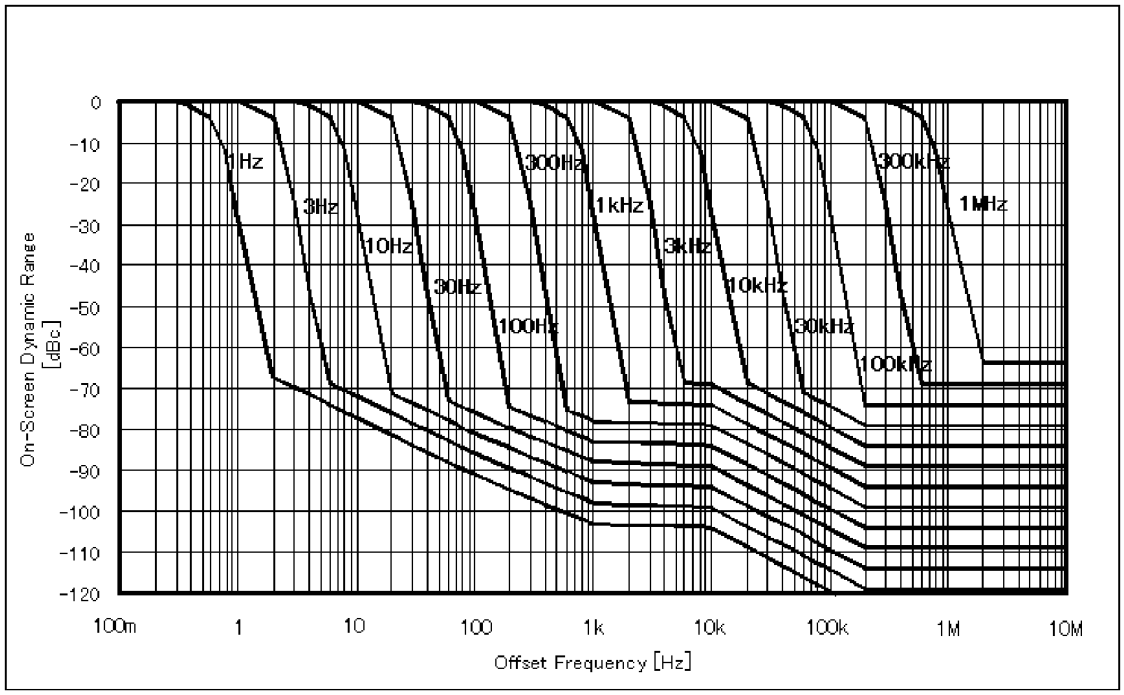


Figure 1-5. Typical On-screen Dynamic Range (Center: 100 MHz)

Spurious responses

Second harmonic distortion

at single tone input with full scale input level -10 dB, input signal frequency ≥ 100 kHz . . . . . <-70 dBc,<-75 dBc (SPC)

Third order inter-modulation distortion

at two tones input with full scale input level -16 dB, separation ≥ 100 kHz . . . . . <-75 dBc,<-80 dBc (SPC)

Spurious

at single tone input with full scale input level -10 dB, input signal frequency ≤ 500 MHz . . . . . <-75 dBc

except for the following frequency ranges:

5.6 MHz ± 1 MHz, 30.6 MHz ± 1 MHz, 415.3 MHz ± 1 MHz

Residual response

at reference value setting ≤–40 dBm, input attenuator: auto or 0 dB . . . . . <-110 dBm

Typical dynamic range

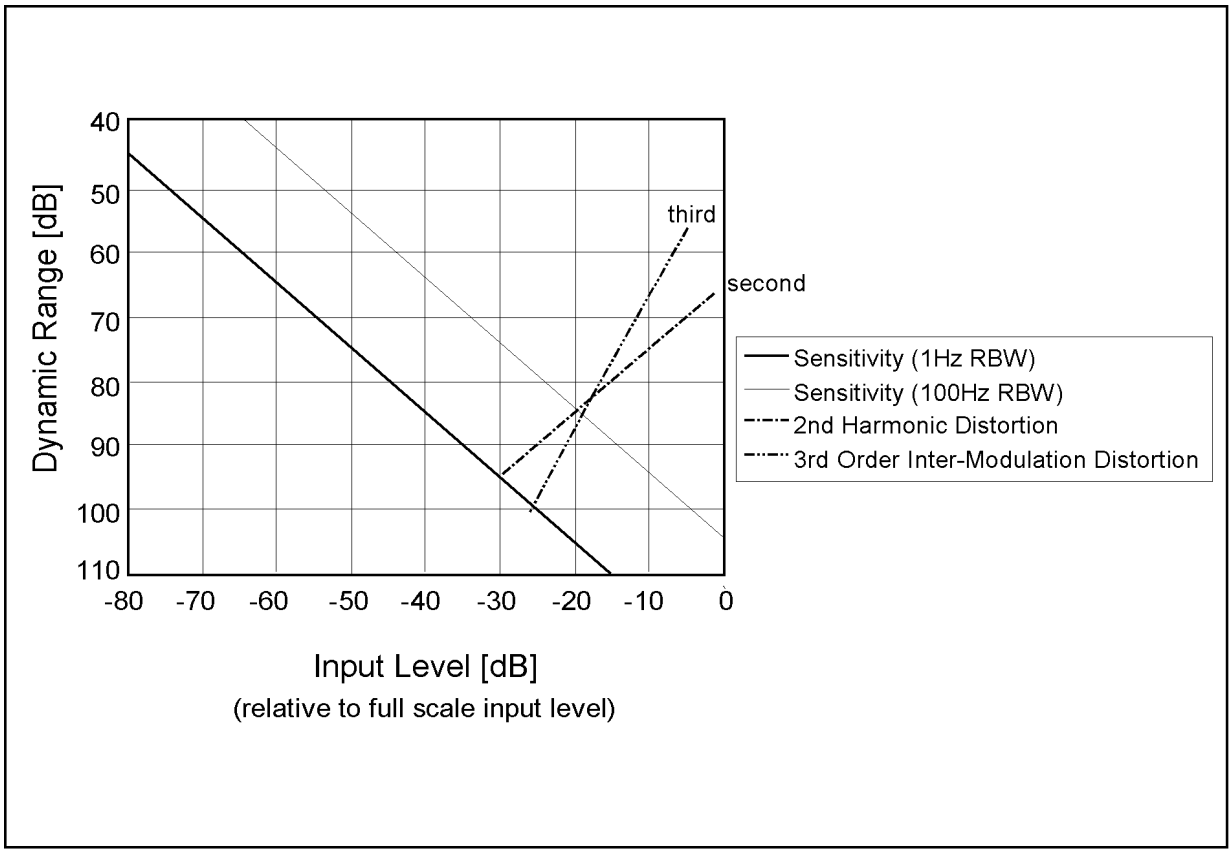


Figure 1-6. Typical Dynamic Range at Inputs R, A, and B

Input attenuator

Setting range . . . . . 0 dB to 50 dB, 10 dB step

Attenuator Setting (dB)	Full Scale Input Level (dBm)
0	-20
10	-10
20	0
30	+10
40	+20
50	+30

Mode . . . . . .Auto or Manual

(In auto mode, the attenuator is set to 20 dB above the reference value; this ensures that the maximum signal level after the attenuator will not be greater than -20 dBm.)

Input attenuator switching uncertainty

at attenuator: ≤ 30 dB, referenced to 10 dB . . . . . .<±1.0 dB

at attenuator: ≥ 40 dB, referenced to 10 dB . . . . . <±1.5 dB

Temperature drift . . . . . .<±0.05 dB/°C (SPC)

Scale

Log . . . . . 0.1 dB/div to 20 dB/div

Linear

at watt . . . . . 1.0×10^{-12} W/div

at volt . . . . . 1.0×10^{-9} V/div

Measurement format. . . . . Spectrum or Noise (/Hz)

Display unit. . . . . dBm (unit of marker: dBm, dBV, dBµV, V, W)

Sweep Characteristics

Sweep type . . . . . Linear, List

Trigger type. . . . . Hold, Single, Number of groups, Continuous

Trigger source . . . . . Internal (free run), External, Manual, Level gate, Edge gate, GPIB (bus)

Sweep time (excluding each sweep setup time)

RBW	SPAN	Typical Sweep Time
1 MHz	500 MHz	190 ms
100 kHz	100 MHz	300 ms
10 kHz	10 MHz	240 ms
1 kHz	1 MHz	190 ms
100 Hz	100 kHz	270 ms
10 Hz	10 kHz	2.0 s
1 Hz	1 kHz	11 s
—	Zero Span	—*

* See the next item for sweep time at zero span

Zero span

RBW	Minimum Resolution	Maximum Sweep Time
5 MHz	40 ns	1.28 ms
100 kHz	1.28 µs	81.92 ms
3 kHz	40.96 µs	2.62 s

Number of display points

at span > 0 . . . . . 2 to 801 points (automatically set)

at span = 0. . . . . 2 to 801 points (selectable)

Input Characteristics

Input Port . . . . . R, A, B

Crosstalk

from any input to other inputs, at the same input attenuator settings . . . . . < -100 dB (SPC)

Connector . . . . . Type N female

Impedance . . . . . 50 Ω nominal

Return Loss

	Input Attenuator		
	0 dB	**10 dB**	**20 dB to 50 dB**
10 Hz ≤ frequency < 100 kHz	25 dB[1]	25 dB[1]	25 dB[1]
100 kHz ≤ frequency ≤ 100 MHz	25 dB[1]	25 dB	25 dB[1]
100 MHz < frequency	15 dB[1]	15 dB	15 dB[1]

1. (SPC)

Input Level . . . . . +30 dBm max. at input attenuator: 50 dB

Maximum safe input level . . . . . +30 dBm or ±7 Vdc (SPC)

Specifications when Option 1D6 Time-Gated spectrum analysis is installed

All specifications are identical to the standard Agilent 4395A except the following items.

Gate length

Range . . . . . 6 µs to 3.2 s

Resolution

Range of Gate Length (T_l)	Resolution
6 µs ≤ T_l ≤ 25 ms	0.4 µs
25 ms < T_l ≤ 64 ms	1 µs
64 ms < T_l ≤ 130 ms	2 µs
130 ms < T_l ≤ 320 ms	5 µs
320 ms < T_l ≤ 1.28 s	20 µs
1.28s < T_l ≤ 3.2 s	100 µs

Gate delay

Range . . . . . 2 µs to 3.2 s

Resolution

Range of Gate Delay (T_d)	Resolution
2 µs ≤ T_d ≤ 25 ms	0.4 µs
25 ms < T_d ≤ 64 ms	1 µs
64 ms <T_d ≤ 130 ms	2 µs
130 ms < T_d ≤ 320 ms	5 µs
320 ms < T_d ≤ 1.28 s	20 µs
1.28 s < T_d ≤ 3.2 s	100 µs

Additional Amplitude Error

Log scale . . . . . < 0.3 dB (SPC)

Linear scale . . . . . < 3% (SPC)

Gate Control Modes . . . . . Edge (positive/negative) or Level

Gate Trigger Input (External Trigger Input is used)

Connector . . . . . BNC female

level . . . . . TTL

Gate Output

Connector . . . . . BNC female

level . . . . . TTL

Agilent 4395A Option 010 Impedance Measurement

The following specifications are applied when the 43961A Impedance Test Kit is connected to the 4395A.

Measurement Functions

Measurement parameters	Z, Y, L, C, Q, R, X, G, B, θ
Display parameters	|Z|, 0_z, R, X, |Y|, θ_y, G, B, |Γ|, θ_γ, Γ_x, Γ_y, Cp, Cs, Lp, Ls, Rp, Rs, D, Q

Display Formats

- Vertical lin/log scale
- Complex plane
- Polar/Smith/admittance chart

Sweep Parameters

- Linear frequency sweep
- Logarithmic frequency sweep
- List frequency sweep
- Power sweep (in dBm unit)

IF Bandwidth

- 2,10, 30,100, 300,1k, 3k, 10k, 30k [Hz]

Calibration

- OPEN/SHORT/LOAD 3 term calibration
- Fixture compensation
- Port extension correction

Measurement Port Type

- APC-7

Output Characteristics

Frequency range . . . . . 100 kHz to 500 MHz
Frequency resolution . . . . . 1 MHz
Output impedance . . . . . 50 Ω nominal
Output Level
when the measurement port is terminated by 50 Ω [1] . . . . . -56 to +9 dBm
when the measurement port is open . . . . . 0.71 mVrms to 1.26 Vrms
Resolution 0.1 dBm
Level accuracy . . . . . ± (A + B + 6 x F/(1.8 x 10^9))dB
Where

A= 2 dB
B = 0 dB (at 0 dBm ≤ P ≤ + 15 dBm)
or B = 1 dB (at -40 dBm ≤ P < 0 dBm)
or B = 2 dB (at -50 dBm ≤ P < -40 dBm)
F is setting frequency [Hz], P is output power setting

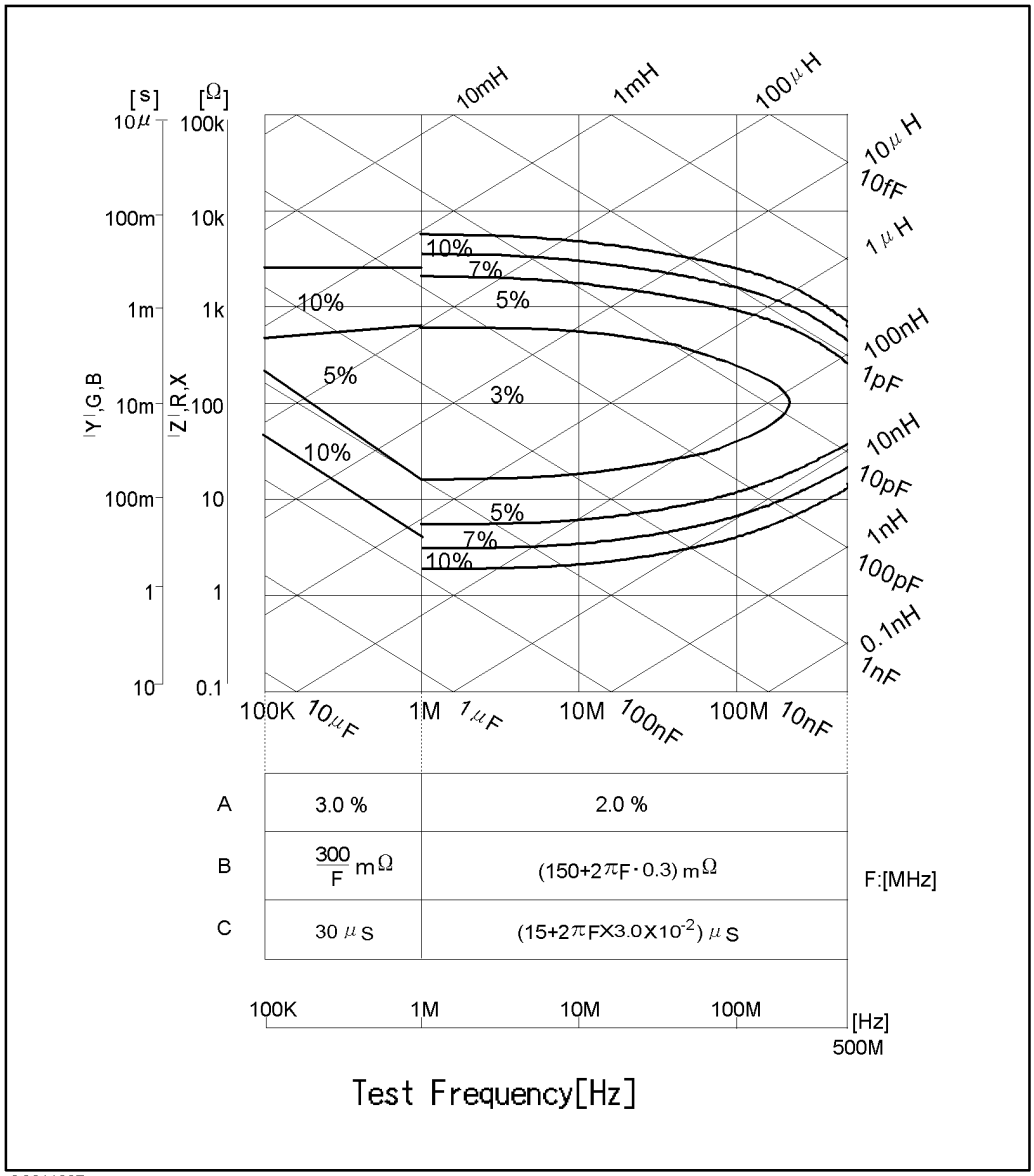
1 Note: When the measurement port is terminated with 50 Ω, the signal level at the measurement port is 6 dB lower than the signal level at the RF OUT port.

Measurement Basic Accuracy (Supplemental Performance Characteristics)

Measurement accuracy is specified at the connecting surface of the APC-7 connector of the Agilent 43961A under the following conditions:

Warm up time . . . . . > 30 minutes
Ambient temperature . . . . . 23°C ± 5°C,
within ±1°C from the temperature at which calibration is performed

Signal level (setting) . . . . . 0 to +15 dBm
Correction . . . . . ON
IFBW (for calibration and measurement) . . . . . ≤ 300 Hz
Averaging factor (for calibration and measurement) . . . . . ≥ 8



CC011007

Figure 1-7. Impedance Measurement Accuracy

|Z| - θ Accuracy

|Z| accuracy $Z_a = A + (B/|Z_m| + C \times |Z_m|) \times 100$ [%]

θ accuracy $\theta_a = \sin^{-1}(Z_a/100)$

Where, $|Z_m|$ is |Z| measured. A, B, and C are obtained from Figure 1-7.

|Y| - θ Accuracy

|Y| accuracy $Y_a = A + (B \times |Y_m| + C/|Z_m|) \times 100[\%]$

θ accuracy $\theta_a = \sin^{-1}(Y_a/100)$

Where, $|Y_m|$ is |Y| measured. A, B, and C are obtained from Figure 1-7.

R - X Accuracy (Depends on D)

Accuracy	D ≤ 0.2	0.2 < D ≤ 5	5 < D
R_a	$\pm X_m \times X_a /100[\Omega]$	$R_a/\cos\theta[\%]$	$R_a[\%]$
X_a	$X_a[\%]$	$X_a/\sin\theta[\%]$	$\pm R_m \times R_a /100[\Omega]$

Where,

D can be calculated as: R/X, or
$R/(2\pi f \times L_s)$, or
$R \times 2\pi f \times C_s$

θ can be calculated as: $\tan^{-1}(X/R)$, or
$\tan^{-1}(2\pi f \times L_s/R)$, or
$\tan^{-1}(1/(R \times 2\pi f \times C_s))$

$R_a = A + (B/|R_m| + C \times |R_m|) \times 100\ |\%|$

$X_a = A + (B/|X_m| + C \times |X_m|) \times 100\ |\%|$

R_m and X_m are the measured R and X, respectively. A, B, and C are obtained from Figure 1-7.

G - B Accuracy (Depends on D)

Accuracy	D ≤ 0.2	0.2 < D ≤ 5	5 < D
G_a	$\pm B_m \times B_a /100[S]$	$G_a/\cos\theta[\%]$	$G_a[\%]$
B_a	$B_a[\%]$	$B_a/\sin\theta[\%]$	$\pm G_m \times G_a /100[S]$

Where,

D can be calculated as: G/B, or
$G/(2\pi f \times C_p)$, or
$G \times 2\pi f \times L_p$

θ can be calculated as: $\tan^{-1}(B/G)$, or
$\tan^{-1}(2\pi f \times C_p/G)$, or
$\tan^{-1}(1/(G \times 22\pi f \times L_p))$

$G_a = A + (B/|G_m| + C \times |G_m|) \times 100[\%]$

$B_a = A + (B/|B_m| + C \times |B_m|) \times 100[\%]$

G_m and B_m are the measured G and B, respectively. A, B, and C are obtained from Figure 1-7.

D Accuracy

Accuracy	D ≤ 0.2	0.2 < D
D_a	$Z_a/100$	$(Z_a/100) \times (1 + D^2)$

Where, Z_a is |Z| accuracy.

L Accuracy (Depends on D)

Accuracy	D ≤ 0.2	0.2 < D
L_a	$L_a/100$	$L_a (1 + D)$

Where, $L_a = A + (B/|Z_l| + C \times |Z_l|) \times 100[\%]$
$|Z_l| = 2\pi f \times L_m$, f is frequency in Hz, and L_m is measured L. A, B, and C are obtained from Figure 1-7.

C Accuracy (Depends on D)

Accuracy	D ≤ 0.2	0.2 < D
C_a	C_a	$C_a (1 + D)$

Where, $C_a = A + (B/|Z_c| + C \times |Z_c|) \times 100[\%]$
$|Z_c| = 2\pi f \times C_m$, f is frequency in Hz, and C_m is measured C. A, B, and C are obtained from Figure 1-7.

Common to Network/Spectrum/Impedance Measurement

Display

LCD

Size/Type . . . . . 8.4 inch color LCD

Number of pixels . . . . . 640 x 480

Effective Display Area . . . . . 160 mm x 115 mm(600 x 430 dots)

Number of display channels 2

Format . . . . . single, dual (split or overwrite)

Number of traces . . . . .

For measurement . . . . . 2 traces

For memory . . . . . 2 traces

Data math . . . . . *gain x data – offset,*
gain x (data - memory) – offset,
gain x (data + memory) – offset,
gain x (data/memory) – offset

Data hold . . . . . Maximum hold, Minimum hold

Marker

Number of markers

Main marker . . . . . 1 for each channel

Sub-marker . . . . . 7 for each channel

Δmarker . . . . . 1 for each channel

Hard copy

Mode . . . . . Dump mode only (including color dump mode)

Storage

Built-in flexible disk drive

Type . . . . . 3.5 inch, 1.44 MByte, or 720 KByte,
1.44 MByte format is used for disk initialization

Memory . . . . . 512 KByte, can be backed up by flash memory

GPIB

Interface . . . . . IEEE 488.1-1987, IEEE 488.2-1987,
IEC 625, and JIS C 1901-1987 standards compatible.

Interface function . . . . . SH1, AH1, T6, TEO, L4, LEO, SR1, RL1,
PP0, DC1, DT1, C1, C2, C3, C4, C11, E2

Data transfer formats . . . . . ASCII,
32 and 64 bit IEEE 754 Floating point format,
DOS PC format (32 bit IEEE with byte order reversed)

Printer parallel port

Interface . . . . . IEEE 1284 Centronics standard compliant
Printer control language . . . . . PCL3 Printer Control Language
Connector . . . . . D-SUB (25-pin)

Option 001 DC Voltage/Current Source

The setting of option 001 DC voltage/current source is independent of Channel 1 and Channel 2 settings.

Voltage

Range . . . . . -40 V to +40 V
Resolution . . . . . 1 mV

Current limitation

at Voltage setting = -25 V to +25 V . . . . . ±100 mA
at Voltage setting = -40 V to -25 V, 25 V to 40 V . . . . . ±20 mA

Current

Range . . . . . -20 µA to -100 mA, 20 µA to 100 mA
Resolution . . . . . 20 µA

Voltage limitation

at Current setting = -20 mA to +20 mA . . . . . ±40 V
at Current setting = -100 mA to -20 mA, 20 mA to 100 mA. . . . . ±25 V

Accuracy

Voltage

at 23°C ± 5°C . . . . . ±(0.1% + 4 mV + I_{dc}[1] [mA] x 5 [Ω] mV)

Current

at 23°C ± 5°C . . . . . ±(0.5% + 30 µA + V_{dc}[2] [V]/10 [kΩ] mA)

[1] current at DC source connector
[2] voltage at DC source connector

Probe Power

Output voltage . . . . . + 15 V (300 mA), -12.6 V (160 mA), GND nominal

Specifications When Instrument BASIC Is Operated

Keyboard . . . . . PS/2 style 101 English keyboard
Connector . . . . . mini-DIN

8 bit I/O port

Connector . . . . . D-SUB (15-pin)
Level . . . . . TTL
Number of Input/Output bit . . . . . 4 bit for Input, 8 bit for Output

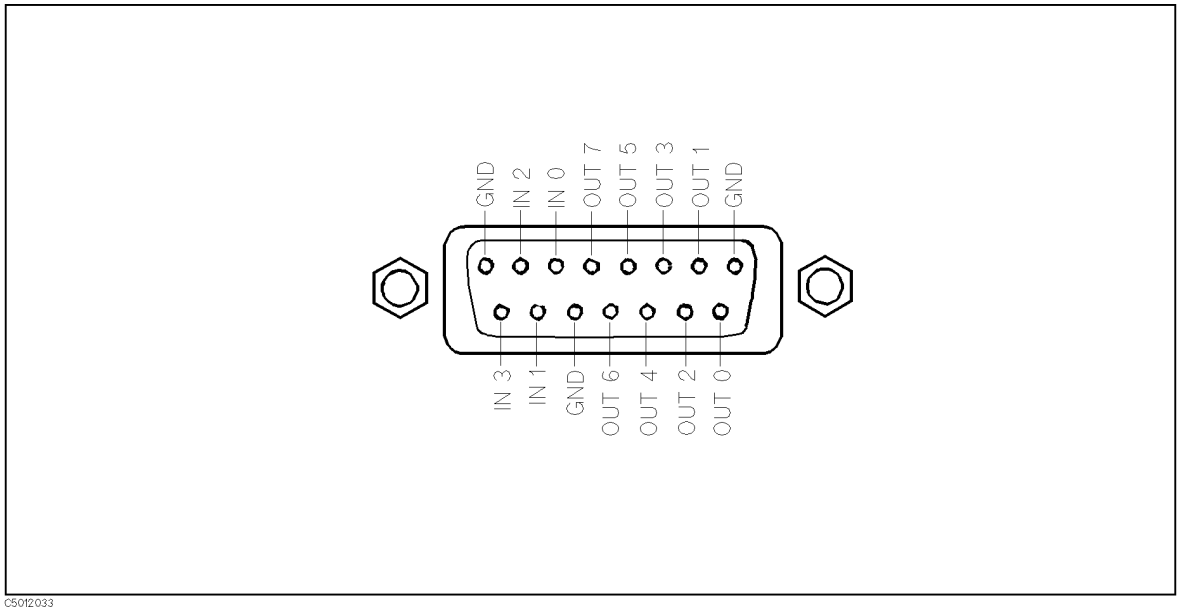


Figure 1-8. 8 bit I/O Port Pin Assignments

24-bit I/O Interface

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

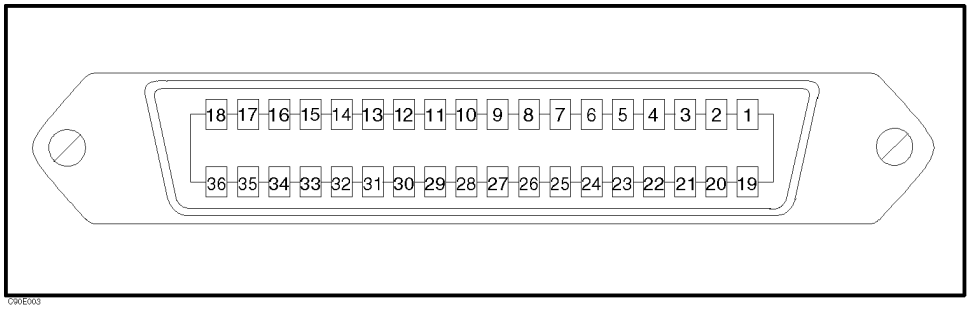


Figure 1-9. 24-bit I/O Interface Pin Assignment

Table 1-1. Signal Source Assignment

Pin No.	Signal Name	Signal Standard
1	GND	0 V
2	INPUT1	TTL level, pulse input (pulse width: 1 µs 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 µs; typical)
32	+5 V PULLUP	
33	SWEEP END SIGNAL	TTL level, active low, pulse output (width: 20 µs; typical)
34	+5 V	+5 V, 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 µs; typical)

General Characteristics

Input and Output Characteristics

External reference input

Frequency . . . . . 10 MHz ±100 Hz (SPC)
Level . . . . . -5 dBm to +5 dBm (SPC)
Input impedance . . . . . 50 Ω nominal
Connector . . . . . BNC female

Internal Reference Output

Frequency . . . . . 10 MHz nominal
Level . . . . . 0 dBm (SPC)
Output Impedance . . . . . 50 Ω nominal
Connector . . . . . BNC female

Reference oven output (Option 1D5)

Frequency . . . . . 10 MHz nominal
Level . . . . . 0 dBm (SPC)
Output impedance . . . . . 50 Ω nominal
Connector . . . . . BNC female

External trigger input

Level . . . . . TTL
Pulse width (T_p) . . . . . ≥2 µs Typically
Polarity . . . . . positive/negative selective
Connector . . . . . BNC female

External program Run/Cont input

Connector . . . . . BNC female
Level . . . . . TTL

Gate output (Option 1D6)

Level . . . . . TTL
Connector . . . . . BNC female

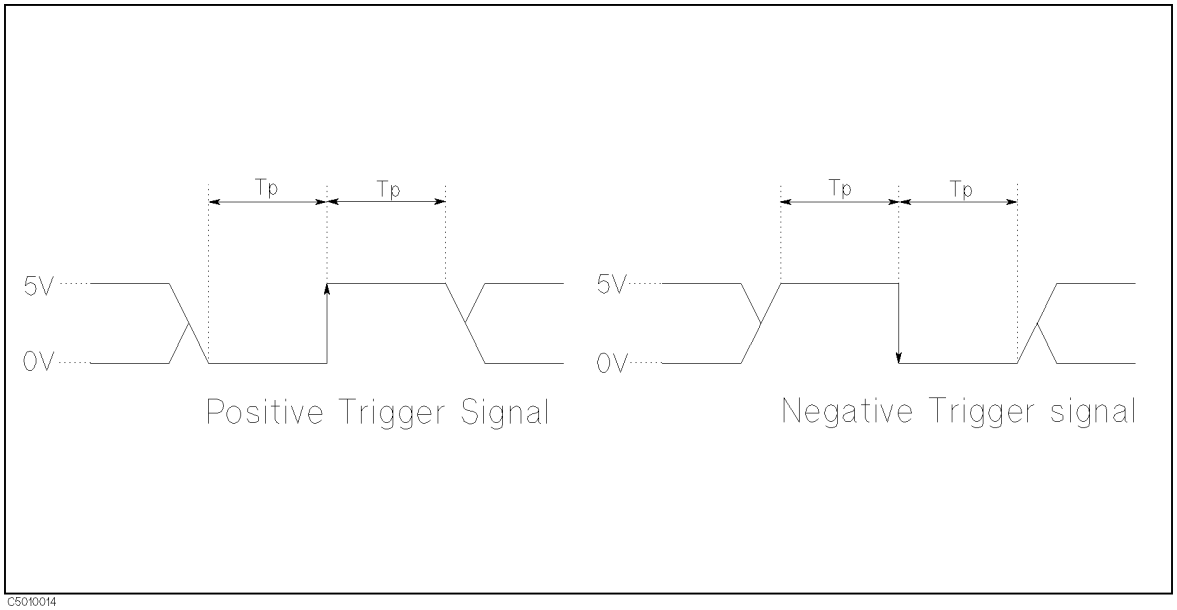


Figure 1-10. Trigger Signal (External trigger input)

S-parameter test set interface

Connector . . . . . D-SUB (25-pin)

Caution

Do not connect a printer to this connector. If you connect a printer with the S-parameter test set interface connector (TEST SET-I/0 INTERCONNECT), it may cause damage to the printer.

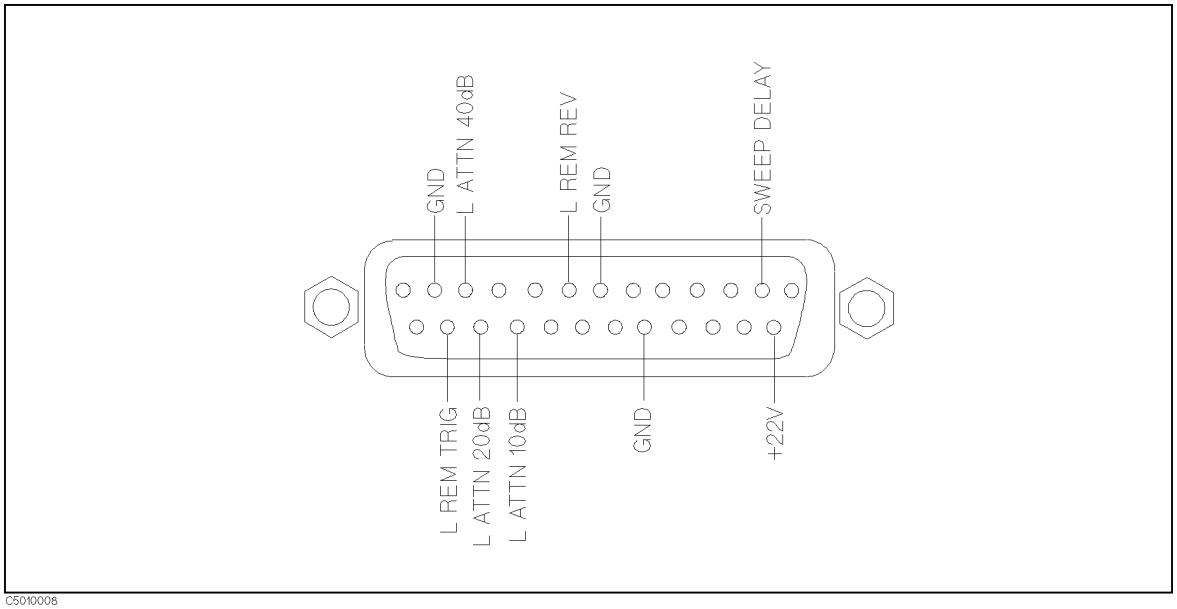


Figure 1-11. S-Parameter Test Set Interface Pin Assignments

External monitor output

Connector . . . . . D-SUB (15-pin HD)

Display resolution . . . . . 640 x 480 VGA

Operation Conditions

Temperature

Disk drive non-operating condition . . . . . 0°C to 40°C

Disk drive operating condition . . . . . 10°C to 40°C

Humidity

at 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 2,000 m

Warm up time . . . . . 30 minutes

Non-operation Conditions

Temperature . . . . . -20°C to 60°C

Humidity

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

Altitude . . . . . Oto 4,572 m

Others

EMC . . . . . Complies with CISPR 11 (1990) / EN 55011(1991) : Group 1, Class A
Complies with EN 50082-1 (1992) / IEC 1000-4-2 (1995) : 4 kV CD, 8 kV AD
Complies with EN 50082-1 (1992) / IEC 801-3 (1984) : 3 V/m
Complies with EN 50082-1 (1992) / IEC 1000-4-4 (1995) :1 kV / Main, 0.5kV / Signal Line
Complies with IEC 1000-3-2 (1995) / EN 61000-3-2 (1995)
Complies with IEC 1000-3-3 (1994) / EN 61000-3-3 (1995)

Safety . . . . . Complies with IEC 1010-1 (1990), Amendment 1(1992), Amendment 2 (1995)
Certified by CSA-C22.2 No.1010.1-92

Power requirements . . . . . 90 V to 132 V, or 198 V to 264 V (automatically switched), 47 to 63 Hz, 300 VA max.

Weight . . . . . 21 kg (SPC)

Dimensions . . . . . 425 (W) x 235 (H) x 553 (D) mm

Furnished Accessories

Accessory	part number	Accessory	part number
Operation Manual	04395-90000	Power Cable[2]	—
Programming Manual	04395-90001	BNC Adapter[3]	1250-1859
Instrument BASIC Users Handbook	E2083-90005	50 Ω to 75 Ω minimum loss pad [4]	11825B option C04
Service Manual[1]	04395-90100	50 W to 75 W adapter [4]	1250-2438
Sample Program Disk	04395-18000	mini-DIN keyboard	C3757-60401
Floppy Disk	9164-0299	Handle Kit[5]	5062-3991
BNC cable	8120-1839	Rack Mount Kit[6]	5062-3979
BNC-N adapter	1250-0780	Rack Mount and Handle Kit[7]	5062-3985

1. Option 0BW only
2. The power cable depends on where the instrument is used.
3. Option 1D5 only
4. Option 1D7 only
5. Option 1CN only
6. Option 1CM only
7. Option 1CP only

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 underlie 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 contracting with 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.

By internet, phone, or fax, get assistance with all your test & measurement needs

Online assistance:

www.agilent.com/find/assist

Phone or Fax

United States:
(tel) 1 800 452 4844

Canada:
(tel) 1 877 894 4414
(fax) (905) 282-6495

China:
(tel) 800-810-0189
(fax) 1-0800-650-0121

Europe:
(tel) (31 20) 547 2323
(fax) (31 20) 547 2390

Japan:
(tel) (81) 426 56 7832
(fax) (81) 426 56 7840

Korea:
(tel) (82-2) 2004-5004
(fax) (82-2) 2004-5115

Latin America:
(tel) (305) 269 7500
(fax) (305) 269 7599

Taiwan:
(tel) 080-004-7866
(fax) (886-2) 2545-6723

Other Asia Pacific Countries:
(tel) (65) 375-8100
(fax) (65) 836-0252
Email: tm_asia@agilent.com

Printed in USA December 11, 2001
5965-9340E

Agilent Technologies