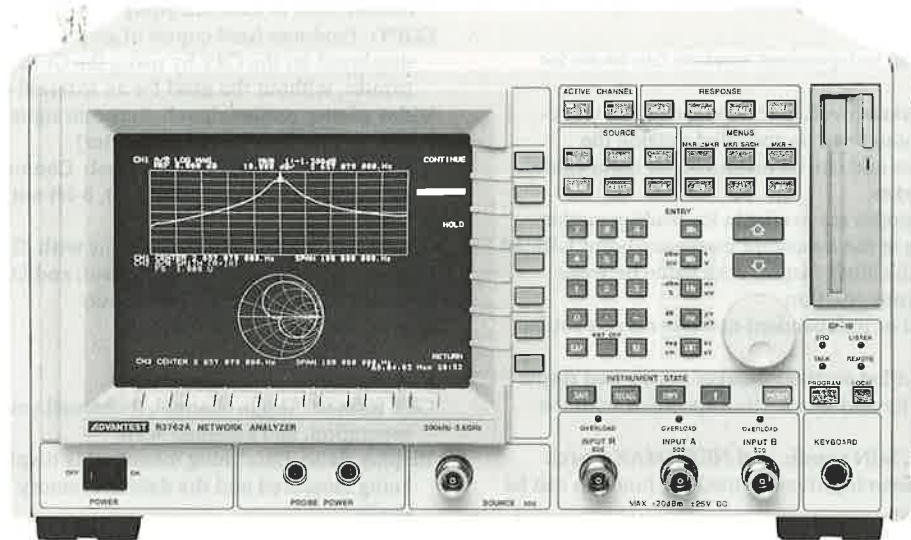


Network Analyzers

300 kHz to 3600 MHz

R3762A/3762B

- High-Accuracy, High-Resolution Measurement
- High-speed Measurement: 0.5 ms/point
- Powerful Analytical and Marker Functions
- BASIC Controller Functions



R3762A/3762B Network Analyzers

The R3762A/3762B of quasi-microwave vector network analyzers can quickly and accurately measure amplitude, phase, group delay, and impedance in the frequency range of 300 kHz to 3.6 GHz. In addition to its 0.5 ms/point high-speed measurement capability, the R3762A/3762B provides high measurement accuracy due to Advantest's exclusive RF analog and digital signal processing technologies. These analyzers also feature numerous useful functions such as those for measuring amplitude ripple and group delay ripple values in a given interval, and for measuring filter bandwidths and $Q = \Delta f/f_0$ measurements at an XdB-down point. These functions are not only easy to use, but also greatly improve the throughput of measuring instruments.

■ Choose the Type that Best Suits Your Needs.

The 3762A/3762B comes in two types: A and B. Thus you can select the type that best suits your needs. Type A is for single output and has three inputs to enable the simultaneous measurement of transmission and reflection in a single sweep. Type B incorporates a power splitter for dual outputs, and has two inputs enables the measurement of transmission or reflection.

● Main differences in R3762A/3762B

	R3762A	R3762B
Sweep speed	0.5 ms/point	
Output signal	Single	Dual (Power splitter built-in)
No. of input channels	A/R, B/R, A/B	A/R

*Power splitter is need for the ratio measurements with R3762A.

■ High-Resolution, High Accurate Measurements

The R3762A/3762B incorporates a 1 Hz high-resolution signal source using a high-speed synthesizer to provide an absolute amplitude accuracy of ± 1 dB. In addition, for relative value measurements, it provides such superior performance capabilities as an amplitude measurement accuracy of 0.05 dB with 0.001 dB resolution and phase measurement accuracy of 0.3° with 0.01° resolution. All this has been made possible by Advantest's exclusive analog circuit technology and powerful digital signal processing technology.

■ Phase/Group Delay Measurement Function Opens New Horizons in Analysis

The R3762A/3762B enables precise, phase characteristic measurements with a phase-measurement accuracy of 0.3° and resolution of 0.01° . In addition, because the electrical length can be compensated for by a simple, one-touch operation, the phase reference plane can be matched to the measurement object to accurately measure the electrical length of wires and coaxial cables.

The aperture can be very conveniently set with span % for optimum measurements based on the measurement frequency and band.

One new function of the R3762A/3762B is the phase-zero search function. Since this function automatically searches the frequency at phase zero, it is very convenient when analyzing crystal oscillators.

Specifications

Measuring Functions

Display channels: 2 channels

Display parameter:

R3762A	R3762B
A/R, B/R, A/B	A/R

Includes conversion of impedance, admittance, S-parameter (R3762A). Characteristic impedance (Z_0) input also possible.

Format:

Orthogonal display Logarithm/linear amplitude, phase, group delay, real number and imaginary number parts of complex parameters

|Z|, R, X (for impedance conversion measurement)

|Y|, G, B (for admittance conversion measurement)

phase extension display function

Smith chart Marker read is logarithm/linear amplitude, phase, real number part + imaginary number part, $R + jX$, $G + jB$

Polar coordinate display Marker read is logarithm/linear amplitude, phase, real number part + imaginary number part

Signal Source Characteristics

• Measurement frequency

Range: 300 kHz to 3.6 GHz

Resolution: 1 Hz

Accuracy: +10 ppm (25°C +5°C)

• Output level

Range:

R3762A	R3762B
+20 dBm to -5 dBm	+13 dBm to -10 dBm

Resolution: 0.01 dB

Accuracy: ±0.5 dB (at R3762A: 0 dBm, R3762B: -6 dBm, 50 MHz, 25°C +5°C)

Output level linearity: At 25°C ±5°C

	R3762A (0 dBm referenced)	R3762B (-6 dBm referenced)
±0.4 dB	at -5 dBm to +15 dBm	at -10 dBm to +8 dBm
±0.7 dB	at +15 dBm to +20 dBm	at +8 dBm to +13 dBm

Flatness: At 25°C ±5°C

R3762A	R3762B
2.0 dBp-p	3.0 dBp-p

• Output format

Output:

R3762A	R3762B
Single	Dual

Power splitter is need for the ratio measurement with R3762A

Connector: N type (F), 50 Ω

• Signal purity

Harmonic distortion: ≤ -20 dBc (at maximum output)

Non-harmonic spurious: ≤ 25 dBc (at maximum output)

Phase noise: At 10 kHz offset, 1 Hz bandwidth

-75 dBc 300 kHz ≤ f < 3 MHz

-85 dBc 3 MHz ≤ f < 40 MHz

-85 dBc +20 log (f/40 MHz) f ≥ 40 MHz

• Sweep functions

Sweep parameter: Frequency, level

Maximum sweep range:

Frequency 300 kHz to 3.6 GHz

Signal level

R3762A	R3762B
-5 dBm to +20 dBm	-10 dBm to +13 dBm

Setting range: Start/stop or center/span

Sweep type: Can be selected from linear or logarithmic frequency sweep, partial and given frequency sweep, level sweep, and CW (single frequency).

Sweep time: 0.5 ms/point

Note that the minimum sweep time varies depending on the measurement format, type of error compensation, sweep width per point, number of measuring points, and the IF bandwidth of the measurement.

Measuring points: 3, 6, 11, 21, 51, 101, 201, 301, 601, 1201 points.

However, the maximum displayed number of points is 601.

Sweep trigger: Continuous, hold, single sweep or set by either line trigger or external trigger

Sweep mode:

Dual sweep Two channels are swept in the same frequency range.

Alternate sweep Two channels can be swept by different sweep types in different frequency ranges.

Receiver Characteristics

• Input characteristics

Input terminals:

R3762A	R3762B
3 channels (Rch, Ach, Bch)	2 channels (Rch, Ach)

Dynamic range: 100 dB (ch. A, ch. B), 30 dB (ch. R)

Noise level: -90 dBm (1 kHz bandwidth on chs. A, B)

-100 dBm (10 Hz bandwidth on chs. A, B)

Minimum input to Rch: -30 dBm (Minimum required level to ensure correct operation)

Maximum input level: 0 dBm

Input breakdown level: +20 dBm

Input impedance: 50 Ω

Return loss: 20 dB (at 25°C ±5°C)

Connector: N-type (F), 50 Ω

Input crosstalk: -100 dB (300 kHz to 1 GHz)

-90 dB (1 GHz to 3.6 GHz)

Resolution bandwidth: 1 kHz to 10 Hz (Variable in 1.3 steps)

• Amplitude characteristics

Measuring range: 0 ±100 dB (amplitude ratio)

Amplitude resolution: 0.001 dB

Dynamic accuracy:

0 to -10 dBm	±0.30 dB (300 kHz ≤ f ≤ 1.3 GHz) ±0.50 dB (1.3 GHz < f ≤ 3.6 GHz)
-10 to -60 dBm	±0.05 dB
-60 to -70 dBm	±0.15 dB
-70 to -80 dBm	±0.40 dB
-80 to -90 dBm	±1.00 dB (f ≥ 19 MHz)

Measuring accuracy: ±0.5 dB (-10 dBm, 25°C ±5°C)
calibrated by normalizing

Network Analyzers

300 kHz to 3600 MHz

R3762A/3762B

• Phase measurement

Measuring range: $\pm 180^\circ$ (Can be displayed in $\pm 180^\circ$ or more by display extension function)

Phase resolution: 0.01°

Frequency characteristics: $\pm 5^\circ$ (25°C $\pm 5^\circ$ C)

Dynamic accuracy:

0 to -10 dBm	$\pm 5.0^\circ$
-10 to -50 dBm	$\pm 0.3^\circ$
-50 to -60 dBm	$\pm 0.4^\circ$
-60 to -70 dBm	$\pm 1.5^\circ$
-70 to -80 dBm	$\pm 4.0^\circ$
-80 to -90 dBm	$\pm 8.0^\circ$ ($f \geq 19$ MHz)

• Group delay time characteristic (Linear logarithmic frequency sweep and sweep with arbitrary frequency)

Range: Calculated by the following equation

$$\tau = \frac{\Delta\phi}{360 \times \Delta f}$$

$\Delta\phi$: Phase
 Δf : Aperture frequency (Hz)

Measuring range: 1 ps to 250 s

Group delay time resolution: 1 ps

Aperture frequency: Equivalent to Δf ; Can be set to any desired frequencies up to 20% of frequency span.

Accuracy:

$$\frac{\text{Phase accuracy}}{360 \times \text{aperture frequency (Hz)}}$$

Other Functions

• Marker functions

Marker display: Marker read can be converted to display values corresponding to each measurement format.

Multi-marker: Ten independent channels can be set for each channel.

Delta marker: Any of Ten markers can be specified for the reference marker, making it possible to measure delta values between moved markers. In addition, amplitude ripples and group delay ripples can also be measured.

Fixed marker: Although normal markers are superimposed on the measurement waveform, the fixed marker can be assigned a marker value off the measurement display tube surface, making it possible to measure delta values with the reference marker.

Correction marker: Marker points can be read in two modes. In one mode, data at the measured frequency point is displayed directly; in the other mode, a measurement value at the appropriate frequency is displayed after obtaining the value by the insertion method.

Marker couple: Markers in each channel can be set either in a two-coupled form or entirely independent form.

Analysis in arbitrary specified section: Marker search and ripple measurement in the section specified by the Δ marker are possible.

Marker search: MAX search, MIN search, NEXT MAX search

Marker tracking: Marker search based on sweep-by-sweep tracking is possible.

Target search: Bandwidth, center frequency, and Q at the X dB down point can be calculated. In addition, the frequency value with phase 0° and frequency width at $\pm X^\circ$ can also be searched.

Marker →: MKR → reference value, MKR → Start, MKR → Stop, MKR → Center, MKR → / Span, MKR → Center scale
Furthermore, markers can be moved from a data waveform to a memory waveform or vice versa.

Auto zoom: Can be set to the span specified by Auto Zoom Span through automatic functioning of MAX search and MKR → Center.

• Error compensation functions

Normalize: Frequency responses (both amplitude and phase) during transmission measurement are compensated.

1-port calibration: Errors due to bridge directionality, frequency response, and source match during reflection measurement are compensated. Short, open, and load are required for error compensation.

Data averaging: Data (vector values) are averaged for every sweep. The average factor can be set to any value between 2 to 128.

Auto offset compensation:

Electric length compensation Equivalent electric length or delay time are added to the measured phase and group delay time.

Range -3×10^8 m to $+3 \times 10^8$ m or +1 sec. to -1 sec.

• Instrument state functions

Save: The set conditions are stored in an internal register pressing by the Save Register key. In addition, when the power is turned on, the unit is set to state held immediately before power-off by the Power Off Save function.

Measurement data, calibration data, and set conditions are saved on floppy disk (provided as standard) by pressing the Store key.

Recall: The set conditions stored in the internal register are recalled by pressing the Recall key.

The measurement data, calibration data, and set conditions saved on floppy disk (provided as standard) are recalled by pressing the Load key.

Limit line function: The limit line for GO/NO-GO tests (standard value line) is defined on the CRT screen.

• Programming Functions

BASIC controller function: The standard, built-in controller function enables the unit to control itself and other measuring instruments equipped with the GPIB interface.

Built-in arithmetic functions: The built-in arithmetic functions provide high-speed analysis of measured data.

FDD functions:

Disk capacity 1 M byte (unformatted), 750 K bytes (formatted)

Type of media 3.5-inch, double-sided, double-density floppy disk

• Connection with External Equipment

Copy: Graphs displayed on the CRT and data lists can be output to a GPIB compatible plotter or printer without requiring an external controller.

Video plotter output signals: Separate signal (DIN 8-pin), Composite signal (BNC)

GPIB data output and remote control: Based on IEEE488

S-parameter test set control: 14 pin

Parallel I/O output: TTL level, 8-bit output (2 ports), 4-bit input/output (2 ports)

RS-232C: Serial output based on RS-232C standards

External trigger: BNC socket connector, TTL level, LOW enable

External reference frequency input:

Frequency 1, 2, 5, 10 MHz

Connector BNC socket connector

Display Section

CRT: 9-inch solenoid-deflected display (amber)

CRT format: Single-channel display, 2-channel superimposed display, 2-channel isolated display, enlarged scale display

Reference line position: From top (100%) to bottom (0%) of the vertical axis scale

Auto scale: Reference value and scale resolution are set so that all traces being measured can be displayed on the CRT in optimum form.

Time display: Calendar date (year/month/day) and time (hour/minute/second) can be set for display.

Label: Up to 45 characters can be entered.

General Specifications

Ambient temperature/humidity range:

When using FDD Temperature +5°C to +40°C, Relative humidity 85% or less

When not using FDD Temperature 0°C to +40°C, Relative humidity 85% or less

Power requirements: Please specify when ordering.

Option No.	Standard	40
Supply voltage (V)	90 to 132	198 to 250

48 Hz to 63 Hz

Power consumption: 280 VA or less

Dimensions: Approx. 424 (W) × 221 (H) × 450 (D) mm

Weight: 23 kg max.

Standard Accessories

Name	Type	Remarks
Power cable	A01402	
Input cable	A01212	NP-NP cable (for R3762B)
Floppy disk	PR37620-FJ	For limit line editor



Accessories



R3961A/3961AN S-Parameter Test Sets

The S-Parameter test sets R3961A/3961AN are connected to the network analyzer R3762A to measure the transmission/reflection characteristics for frequencies of 5 MHz to 3 GHz (for R3961A) and 5 MHz to 2 GHz (for R3961AN). The R3961A/3961AN contain the devices necessary for measurement, such as the SWR bridge, power splitter, and switches. They can measure all S-Parameters of S11, S12, S21, and S22, without having to change the cable.

Specifications

Model		R3961A	R3961AN
Frequency range		5 MHz to 3 GHz	5 MHz to 2 GHz
Test port impedance		50 Ω	75 Ω
Directivity		35 dB or more (5 MHz to 1.3 GHz) 30 dB or more (1.3 GHz to 3 GHz)	30 dB or more
Input port return loss		17 dB or more (5 MHz to 1.3 GHz) 12 dB or more (1.3 GHz to 3 GHz)	17 dB or more (5 MHz to 1.3 GHz) 12 dB or more (1.3 GHz to 2 GHz)
Test port return loss		20 dB or more (5 MHz to 1.3 GHz) 16 dB or more (1.3 GHz to 3 GHz)	17 dB or more
Frequency characteristic	Transmission amplitude	1.5 dBp-p Typ.	3 dBp-p Typ.
	Transmission phase	10 deg.p-p Typ.	20 deg.p-p Typ.
	Reflection amplitude	1.5 dBp-p Typ.	3 dBp-p Typ.
	Reflection phase	10 deg.p-p Typ.	3 deg.p-p Typ.
Insertion loss	RF IN to PORT 1,2	15 dB Typ.	20 dB Typ.
	RF IN to OUTPUT R	21 dB Typ.	19 dB Typ.
	RF IN to OUTPUT A&B	22 dB Typ.	31 dB Typ.

RF destructive level: +27 dBm max.

Test ports 1 and 2 isolation: 90 dB or more

Coaxial switch reproducibility: ±0.03 dB (at the tenth changeover)

Operating temperature range: 0°C to +40°C

Storing temperature range: -20°C to +60°C

Dimensions: Approx. 424(W) × 132(H) × 450(D) mm

Weight: 8 kg max.