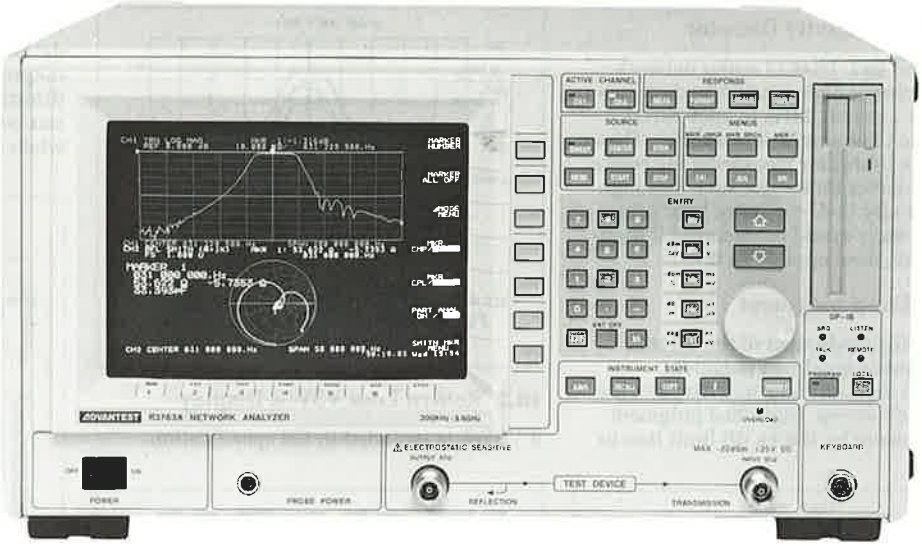
Network Analyzers

300 kHz to 3.6 GHz

R3763A

- Significantly Greater Space and Operation Efficiency
- Reflection Characteristic Measurement with a High Repeatability
- High-speed Measurement: 0.5 ms/point
- Built-in Parallel I/O Functions
- Built-in BASIC Controller Fucntions



R3763A
Network Analyzer

The R3763A network analyzer measures the transmission and reflection characteristics of RF/quasi-microwave electronic parts at a speed of 0.5 ms/point. Because it incorporates a bridge, the system can significantly enhance space and operation efficiency. For measurement and analytical functions, the system is provided with an innovative user sweep function, a limit line display function, a beep function, and a tracking search function in the paritial analysis mode. These functions enable the system to be the best for use in production and inspection. The BASIC controller contained in the system function uses its own editor to create the measurement, analysis, and data processing programs for automatic measurement and processing. This enables fast ATE construction as well as measurement with turn-key operation, without the need to use any external computer.

■ Enhancing Space and Operation Efficiency

It has been difficult to fully automate the testing and inspection of RF/quasi-microwave electronic parts. Because of the high frequencies of these machines, setup reproducibility cannot be achieved even with special jigs. As a result, testing and inspection are often manual processes. In addition, testing for transmission and reflection characteristics has required a separate power splitter as well as a SWR bridge and cabling to connect these parts. This configuration makes the work area more complicated and degrades the operational efficiency. Because these units are incorporated into the R3763A, the workplace remains clear and uncluttered, thereby improving efficiency. The BASIC controller contained in the system allows for easy manipulation of complicated measurements through a turn-key operation.

■ Providing a High-Throughput Measurement

The R3763A is prodvided with a number of functions which enhance the measurement throughput, including:features.

- Fast measurement at 0.5 ms/point by the high-speed settling signal source and a fast vector operation
- High throughput for automatic measurements implemented by the BASIC controller using built-in functions
- Increased measurement speed through the user sweep function
- SAVE/RECALL functions to store up to ten system states

■ Digital Processing for Highly Accurate Measurements

Digital processing is used in all stages of the receiver after the IF (Intermediate Frequency) stage. Using this function in conjunction with the calibration function will provide highly accurate measurements with:

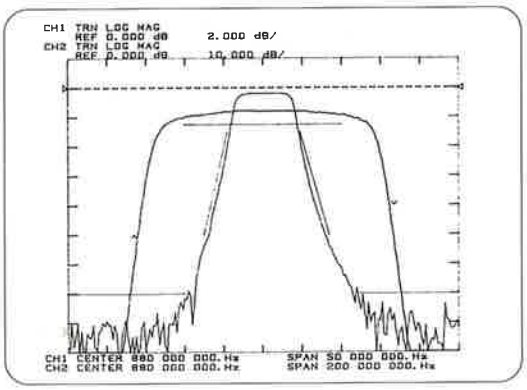
- An amplitude characteristic measurement accuracy of ±0.05 dB/0.001 dB resolution
- A phase characteristic measurement accuracy of ±0.3°/0.01° resolution

■ A Turn-key Operation through the BASIC Controller Functions

You can automate the processes from data processing to analysis by creating a sequential program through the BASIC controller functions incorporated in the system and by executing that program.

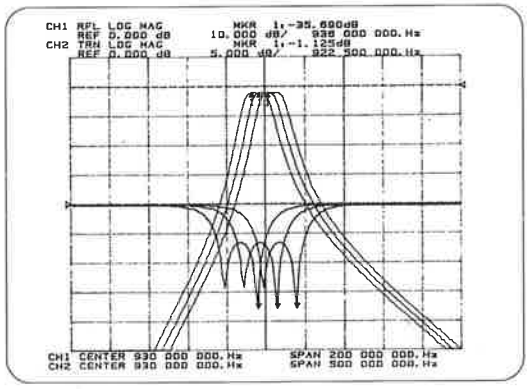
A Limit Line Function Useful for Adjustment and Judgement

The limit line display can specify the upper and lower limits at the point frequency and the upper and lower limits in a line (continuous frequency area). In addition, it can mix these limits and specify up to 30 segments. Also, it can specify a point in the basic data at which a pass or fail is decided, and set the limit values of ±X dB for up to 30 segments. The pass or fail result may be output through the GPIB. The limit line may be used to indicate a display circle as the pass/fail decision function on the polar coordinate display.



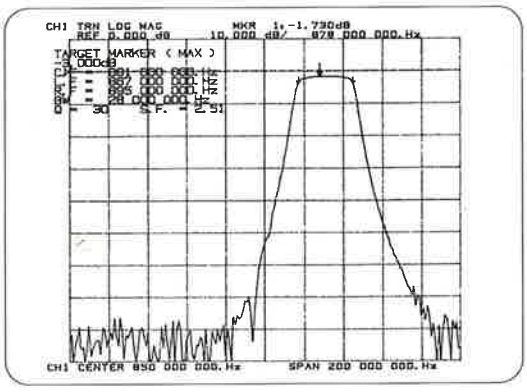
Marker Tracking Function Best Suited for Adjustment and Temperature/Time Variance Characteristics Measurements

The resonant frequency of the inductive resonator (TEM mode) is adjusted in real time by trimming in the order of a few tens of microns. Using the marker tracking function will provide continuous realtime measurements of the maximum value for transmission characteristics, the 3 dB bandwidth, and the minimum value for the reflection characteristics of each sweep.



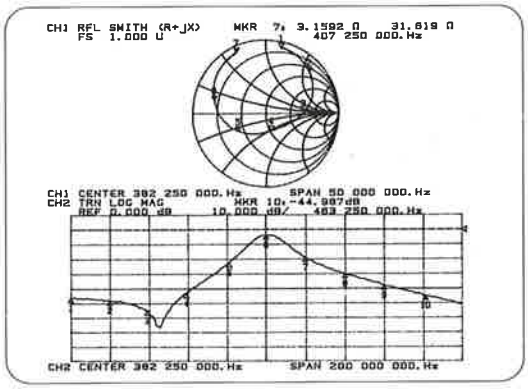
Filter Analysis Function Useful for Measuring Filter Characteristics

A special function called the Filter Analysis mode has been prepared to take a filter measurement. By using only one key, this versatile function can calculate and display the center frequency, 3 dB bandwidth, left/right frequencies, Q, and SF (Shape Factor) value of the filter to be measured.



Multimarker (ten markers) Function for the Best Adjustment

The R3763A can specify ten multimarkers for each channel. In addition, the delta from the active marker related to the specified marker (the frequency or level difference) can be determined by just pressing one key.



User Sweep Function to Enhance Throughput

The measuring speed depends on the number of frequency points required by the device to be measured. As the number of points decrease, the measurement throughput increases. Partial measurement may be sufficient for some devices to be measured. With the R3763A, you can set the number of points to 3 to 1201 and use the user sweep function to devide the frequency band needed for the measurements into as many as 15 segments for a data sweep. In particular, the user sweep function will specify only those parts required by the measurement. With the user sweep function, a single action is sufficient to carry out a high-resolution measurement which otherwise would require separate measurements in two or three different frequency bands.

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Specifications

Measurement Functions

Display channel: Two channels
Display parameter: REFL (reflection, S11), TRNS (transmission, S21)
Including conversion of impedance and admittance.
Characteristic impedance (Zo) can be input.
Format:
Orthogonal display Log/linear amplitude, phase, group delay, real and imaginaly parts of complex parameters
|Z|, R, X (at impedance conversion measurement)
|Y|, G, B (admittance conversion measurement)
Phase extension display function
Smith chart Marker readout for log/linear amplitude, phase, real + imaginary parts, R + jX, G + jB
Polar coordinate display Marker readout for log/liner amplitude, phase, real + imaginary parts

Signal Source Characteristics

• **Measurement Function**
Range: 300 kHz to 3.6 GHz (TRNS), 20 MHz to 2.0 GHz (REFL)
Resolution: 1 Hz
Accuracy: ±10 ppm (25°C ± 5°C)
• **Output level**
Range: +5 dBm to –18 dBm
Accuracy: ±0.5 dB (–14 dBm, 50 MHz, 25°C ± 5°C)
Output level linearity: –14 dBm (reference)
±0.7 dB (–14 dBm to +5 dBm)
±1.0 dB (–18 dBm to –14 dBm)
Flatness: 2.0 dBp-p (–14 dBm, 25°C ± 5°C)
Output: 50 Ω
• **Output form**
Output: Single
Connector: 50 ohms, N type (f)
• **Signal purity**
Harmonic distortion: –20 dBc (at max. output, 25 ± 5°C)
Non-harmonic spurious: Value related to mixer ≤ –25 dBc (at max. output, 25 ± 5°C)
Phase noise: 10 kHz offset, 1 Hz bandwidth

–75 dBc	300 kHz ≤ f < 3 MHz
–85 dBc	3 MHz ≤ f < 40 MHz
–85 dBc + 20log (f/40 MHz)	f ≥ 40 MHz

• **Sweep functions**
Sweep parameters: Frequency and signal level
Max. sweep range:
Frequency 300 kHz to 3.6 GHz
Signal level –18 dBm to + 5 dBm
Range setting: Start/stop or center/span
Sweep time: 0.5 ms/point min. Sweep time depends on measuremen format, type of error correction, sweep width per point, number of measurement points, and IF bandwidth for measurement
No. of measurement points: 3, 6, 11, 21, 51, 101, 201, 301, 601, 1201 (max. number of display points is 601.)
Sweep mode:
Dual sweep Two channels swept in the same frequency range
Alternate Sweep Two channels can be swept using two different types of sweep in different frequency ranges.

Receives Transmission Characteristics

• **Input characteristics**
Frequency range: 300 kHz to 3.6 GHz
Resolution bandwidth: 10 Hz to 1 kHz (variable in 1 or 3 steps)
Dynamic range: 100 dB
Noise level: –90 dBm (in 1 kHz bandwidth)
–100 dBm (in 10 Hz bandwidth ≥ 20 MHz)
Max. input level: 0 dBm
Max. breakdown level: +20 dB, ± 25 VDC
Return loss: 20 dB or more (25°C ±5°C)
Input crosstalk:
–100 dB (20 MHz ± 1 GHz)
–90 dB (300 kHz ± 3.6 GHz)
• **Amplitude characteristics**
Measurement range: 0 ± 100 dB (amplitude ratio)
Amplitude resolution: 0.001 dB
Dynamic accuracy:

0 to –10 dBm	±0.30 dB f ≤ 1.3 GHz
0 to –10 dBm	±0.50 dB f > 1.3 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

• **Phase measurement**
Measurement range: ±180° (Measurement range exceeding ±180° are enabled by using the display extension function)
Phase resolution: 0.01°
Dynamic accuracy: at f ≥ 19 MHz

0 to –10 dBm	±5.0°
–10 to –50 dBm	±0.3°
–50 to –60 dBm	±0.4°
–60 to –70 dBm	±1.5°
–70 to –80 dBm	±4.0°
–80 to –90 dBm	±8.0°

• **Group delay time characteristics (linear/logarithmic frequency sweeps and over sweeps all frequencies)**
Range: Derived from the equation below:

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

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

Measurement range: 1 ps to 250 ps
Aperture frequency: Corresponds to f; can be set to any value up to 100% of frequency span

Accuracy: $\dfrac{\text{Phase accuracy}}{360 \times \text{aperture frequency (Hz)}}$

Receives Reflection Characteristics

• **Input characteristics**
Frequency range: 20 MHz to 2.0 GHz
Resolution band width: 1 kHz to 10 Hz
Max. input level: +6 dBm
Max. breakdown level : +26 dBm, 0VDC
Directivity: 35 dB or more (20 MHz to 2.0 GHz, 25°C ± 5°C)
Test port source match: 16 dB or more (20 MHz to 2.0 GHz, 25°C ± 5°C)
• **Amplitude characteristics**
Measurement range: 0 ± 100 dB (amplitude ratio)
Amplitude resolution: 0.001 dB
Amplitude tracking: ±0.5 dB (–14 dBm, 20 MHz to 3.6 GHz, 25°C ±5°C)
• **Phase characteristics**
Measurement range: ±180° (Measurements exceeding ±180° can be displayed continuously by using the display extension function.)
Phase resolution: 0.01°
Phase tracking: ±5° (–14 dBm, 20 MHz to 3.6 GHz, 25°C ±5°C)
• **Group delay time characteristics linear/logarithmic frequency sweeps and sweeps over all frequencies)**
Range: Derived from the equation below:

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

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

A Built-in Bridge Improves the Ease of Operation

R3763A

Measurement range: 1 ps to 250 ps
Group delay time resolution: 1 ps
Aperture frequency: Corresponds to Δf, and can be set to any value to 100 % of frequency span.

Other Functions

• Marker function
Multiple markers: Up to ten independent markers can be set for each channel.
Fixed marker: Normal markers overlap the measurement waveform, but fixed marker values can be specified outside the measurement display area and can be measured for delta values against the reference marker.
Correction marker: Two modes are available for reading marker points; one displays data at the measured frequency point without further processing, and the other displays the value between measurement points by interpolation.
Marker coupling: Coupled or independent markers may be set for each channel.
Analysis of any freely specified section: Marker search and ripple measurement can be performed in a section specified with the marker.
MKR search: MAX search, MIN search, and NEXT MAX search
Marker tracking: Marker search activation tracking function can be performed for each sweep.
Target search: Band width, center frequency, and Q at the X dB DOWN point can be calculated. The frequency of phase 0° and the frequency width at ±X° can be searched for.
AUTO ZOOM: MAX search and MKR→CENTER automatically set the value to the SPAN specified by AUTO ZOOM SPAN.
• Error correction functions
Normalize: Corrects the frequency response (both amplitude and phase) at transmission measurement.
One-port calibration: Corrects bridge directivity, frequency response, and errors caused by source match during reflection measurement. Error correction requires Short, Open, and Load.
Data averaging: Averages data (vector value) for each sweep. Averaging factors can be set from 2 to 128.
Automatic offset correction:
Electrical length correction Equivalent electrical length or delay time is added to measured phase and group delay time.
Range -3×10^8 m to $+3 \times 10^8$ m or +1 to −1 second
• Instrument state functions
Save: The save register key stores setting states in the internal register. When the power is turned on, the Power Off Save function restores the state immediately before power off.
The STORE key stores measurement data, calibration data, and setting states on a standard floppy disk.
Recall: The RECALL key invokes the setting state in the internal register.
The LOAD key invokes measurement data, calibration data, and setting states stored on a standard floppy disk.
Limit line function: Limit lines (standard value lines) for the Pass/Fail test can be defined on the CRT.
• Programming functions
BASIC controller function: The standard controller function in the analyzer controls the analyzer itself and other instruments with the GPIB interface. This control is executed by programs created on the analyzer.
Built-in functions: The built-in functions contained in the analyzer provide fast analysis of measurement data.

Floppy Drive function:
Disk capacity 1 M bytes (unformatted)
750 K bytes (formatted)
Media type 3.5 inches, double-sided, double density
• Connections to external equipment
COPY: Produces hard copies of graphs and printouts of data lists displayed on the CRT by using the GPIB-compatible plotter and printer, without the need for an external controller.
Video plotter output signal: Separate signal (8-pole DIN socket) and Composite signal (BNC connector)
GPIB data output & remote control: Conforms to IEEE 488
Parallel I/O: TTL level (36 poles), 8-bit output (2 ports), and 4-bit I/O (2 ports)
EIA-232-D: Serial output conforms with EIA-232-D
External trigger: BNC (f), TTL level, and LOW enable
External reference frequency input:
Frequency 1, 2, 5, 10 MHz
Connector BNC (f)

Display Part

CRT format: Single channel, 2-channel overlay, 2-channel separation, and enlarged scale
Display data: Data being measured is displayed, or both the data being measured and the data in memory are displayed simultaneously.
Reference line position: Between the top (100%) and bottom (0%) of the vertical axis scale
Time display: The calendar date (year/month/day) and time of day (hour/minute/second) can be set and displayed.
Label: Up to 45 characters can be entered.

General Specifications

Operating environment:
When FDD is used Temperature +5 to +40°C,
Relative humidity at 85% or less
Power source: Specify with your order.

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

48 Hz to 66 Hz

Power consumption: 280 VA or less
External dimensions: Approx. 424 (W) × 221 (H) × 450 (D) mm
Weight: 25 kg or less

Standard Accessories

Name	Type	Remarks
Power cable	A01402	
Floppy disk	PR376201-FJ	For limit line editor