R3754A/3754B
New Network Analyzer

New Network Analyzer Released
with Exceptional Cost/Performance!
As reduced cost, downsizing, precision improvement, and power consumption reduction have advanced for information communication equipment and multimedia equipment, the high-frequency components used for them require new technology.

For test inspection of these parts, a unit capable of high accuracy, high reliability measurements is necessary to enable throughput improvement, price reduction, automation, including the test fixture, and basic performance improvement.

The Advantest network analyzer provides test cost reduction as well as offering the measurement solution. The R3754 Series is a high performance network analyzer with greatly enhanced functional performance and a low price.

Optimization for Each Application
Optimization has been made by setting the measurement frequency range to the limited bandwidth of 10 kHz to 150 MHz. The R3754 Series can be used for adjustment and test in the production and inspection processes of crystal, ceramic, LC, and sensor parts. Two types of display units are selectable according to the application. It is recommended to use the R3754A with monochrome display for the pre-process and the R3754B with color display for shipment inspection and receiving inspection.

Doubled Maximum Sweep Speed and High Throughput
Advantest in the R3754 has doubled the sweep speed in comparison to our previous model. The newly developed measurement algorithm greatly improves the total throughput. The improved noise floor and increased maximum input level create a measurement dynamic range of 127 dB (a 13 dB increase over the previous model). It is possible to measure the high attenuation filter at high speed. A 15 dB improvement in the C/N suppress the trace noise and enhance the throughput and basic performance. Fluctuation in the trace has been reduced to 1/5 the amount in previous instruments. The required time to achieve the specification-guaranteed stabilization from power-on has also been reduced to 1/3.

Self-diagnostic Function Minimizing Down Time
The attitude of Advantest is: if the unit should have a fault, how is it possible to reduce the down time of the production line? One of the answers is the self-diagnostic function. The R3754 series is loaded with a powerful self-diagnostic function. Advantest’s position is that in the event that any failure occurs, downtime must be minimized.
AMAZING COST/PERFORMANCE ACHIEVED
Sweep Speed 0.05 ms/point and Dynamic Range 127 dB Achieved

- Excellent basic performance (1)
  - Sweep time: 50 µs/point
    (2 times faster in comparison to previous Advantest model)
  - RBW step value: 27 steps
    (3 times more in comparison to previous Advantest model)

- Excellent basic performance (2)
  - Noise floor: -122dBm
    (7 dB improved in comparison to previous Advantest model)
  - Trace noise: typ. -0.0015dB
    (2 times improved in comparison to previous Advantest model)
  - Stability: typ. -0.02dB/°C
    (2 times improved in comparison to previous Advantest model)

6.5-inch color TFT LCD
* 5-inch monochrome LCD is used in type A

R3754B
(R3754A/3754B-1E Apr. '98)

(5-inch STN monochrome LCD)
**3 model FDD**
For storage of waveform data and condition settings

**BASIC controller function**
- Built-in program editor
- Uses IBM-PC/AT compatible keyboards
- Built-in functions for high speed analysis

**Self-diagnostic function**
Specifies the fault location minimizing down time if there is a problem.

**Input channels for various purposes**
Up to three input channels are provided depending on the requirement. The optimum channel count can be selected.
(2- or 3-channel input is optional.)

**Single key analysis functions**
- Filter analysis
- Equivalent circuit constant calculation
- RLA drive level measurement (option)

**Input channels for various purposes**
- PARALLEL I/O
- PRINTER I/F
- RS-232
- GPIB
- VIDEO
- EXTERNAL STD IN
- EXTERNAL TRIGGER IN
- 10 MHz STD OUT (Option)
Excellent Basic Performance

Basic Performance (1)

Sweep time: 50 µs/point
(2 times faster in comparison by Advantest)

No. of RBW variables: 27 steps
(3 times more in comparison by Advantest)

The basic performance relating to the measurement speed has been greatly improved. The measurement conditions suitable for the device are further optimized to achieve compatibility of high-speed and high-stability measurements.

Measurement Efficiency Improvement by New Functions

RLA drive level measurement (Option 71)

The drive level measurement function in the Reactance Linear Approximation method (RLA method) allows high-speed, high-accuracy measurement of the crystal impedance and the resonance frequency fluctuation at only two points per level. This function enables quantum improvement of the throughput in the drive level measurement process. (Option 71)

Gate ON/OFF comparison measurement

The filter analysis function has been enhanced and the oper-ability has been improved.

Gate function: Analyzes the characteristics with multiple reflection canceled.

Phase linearity: Phase linearity essential for the communication interface filter characteristics can be analyzed at high speed.

CDMA IF analysis: CDMA (IS-95) filters can be analyzed directly.

TDR analysis: Multiple reflection can be analyzed on the time axis. (Option 70)

Self-diagnostic Function

On the production line, equipment failures are grave problems. Advantest offers its products with warranties which take all possible measures to ensure product quality. However, if an equipment failure occurs, it must be remedied as soon as possible. To reduce the recovery time, the R3754 series comes with a self-diagnostic function which allows you to minimize the downtime through quick location of failures.
This function enables setting of optimal measurement conditions by allowing the segmentation of the swept frequency range. Up to 30 segments can be set for the span that include the frequency range, output level, and interface bandwidth, enhancing measurements for each device type. With use of the application software, it is possible to input the settings to commercially-available graphics software and perform the setup from the FD.

**High-speed Measurement (1)**

**Data transfer duration**
(repetition of frequency setting, sweep, and data transfer)

Sweep time is improved to 50µs/point, two times faster (compared by Advantest). The data transfer duration is shortened to greatly improve the system throughput.

**Extended Functions Suitable for System Use**

**Design optimum for automation**

Design has been made with assumption of incorporating an automated unit. It is possible to easily realize compatibility with any type of automation.

Parallel I/O (option)  GPIB (standard)
Printer (standard)  VGA monitor output (standard)
RS232 (standard)

**BASIC controller function/program editor**

Optimum to the system use because it is possible to establish an automated adjustment/inspection system without using an external computer. It is possible to use the built-in programming editor for programming as well as using a PC in the M S-D O S environment.
Offers Optimal features for Measurements at Pre-process

- **High-speed, high-accuracy measurement with low noise (-122 dBm)**
  Since non-contact measurements are made for blank selection, a crystal impedance (C1) increased, so that the influence of noise is readily apparent. It is then essential that the measuring unit has a low noise floor.
- **High-speed fr measurement by the synchronous high-speed sweep search function**
  The search execution function, which is synchronous with the sweep, further increases the measurement speed.

Drive Level Characteristic Measurement (Option 71)

- **High-speed and high-accuracy measurement through the RLA-based DLD measurement functions**
  The Advantest method implements high-accuracy measurement without search error. The measurement range is from 0.5 nW to 500 µW (varying with C1). Optimum measurement conditions are set according to the device type, improving the measurement speed.

Measurement results are displayed as waveforms, enabling detailed analysis.
Frequency Adjustment (Vacuum Evaporation)

- Frequency is adjusted at high speed with high precision by Advantest's frequency adjustment function.
- It is possible to update vacuum evaporators with a network analyzer. Contact Advantest for more information.

Equivalent Circuit Constant Analysis

- Direct equivalent circuit constant analysis can greatly improve the analysis efficiency. Compatibility with the 4-elements and the 6-elements equivalent circuit can improve the development efficiency of automation software.
Offers Optimal Features for Measurements at Pre-Process

- **50 µs/point high-speed sweep + synchronous high-speed sweep search (concurrent processing of measurement and search)**
  
  Resonance frequency check can be simultaneously performed in the grinding process.

- **Low noise (-122 dBm) implements high-accuracy measurement of high-impedance devices.**
  
  High-speed, high-accuracy measurement can be performed for frequency selection of the ceramic base.

- **Direct filter analysis allows improvement of the measurement efficiency for frequency and impedance at the resonant and anti-resonant points.**

Measurement of the 3-terminal Resonator with a Built-in Load Capacity (Option 72)

- **Dedicated high-precision calibration function**
  
  CAL kits of OPEN, SHORT, LOAD 50, LOAD 100 and LOAD 200 are available with the installed dedicated calibration algorithm.

  The load capacity and the resonator characteristics excluding load capacity can be measured with high accuracy.

* The R17041 test fixture and calibration kit are optional.
Filter/Resonator Spurious Measurement

- User-specified segment measurement function

Spurious measurements can be conducted over a wide band. Measurement of spurious data within a selected segment enables high speed, high precision results.

Note 1)
Only Segment 0 is swept. Sweep is executed at high speed to roughly measure the frequency of the primary oscillation or spurious emission.

Note 2)
Based on the pre-sweep measurement result, segments included within the measurement range are specified and the spurious emission is re-measured.

Ceramic Filter Measurement

- Direct filter analysis function allows measuring all the filter characteristic items by a single-touch operation.
- Data transfer duration (repetition of frequency setting, sweep, and data transfer)
Excellent Operability

Direct Equivalent Circuit Constant Calculation Function

The resonator's equivalent circuit constant is directly measured. The 4-element and 6-element calculation functions are provided so that measurement results can be instantaneously obtained by direct operation in the manual mode. For automation, the software development efficiency is improved.

Multi-marker list

Up to 10 markers can be displayed for each channel. When large amount of information is required, as in the case of filter analysis, it is not necessary to change the marker positions which results in more efficient measurement.

Zoom display function (application software)

When it is necessary to make adjustments in a location at a distance from the measuring unit, the application software can be used to enlarge the displayed values.

Direct Filter Analysis Function

Filter characteristics can be measured directly. Measurement results can be instantaneously obtained in analysis of multi-item characteristics.

Limit line function

The standard value set with the limit line editor is judged for Pass/Fail. A beep can be sounded according to the judgment result or the result can be output to external equipment using the parallel I/O unit (Option 01). Also, use of the application software allows input of the set value for each device type to commercially-available graphics software and to make setup from FD.

256-color user edit

Production line operators look at the measuring unit screen for a long period of time. The ability to edit the screen colors helps to improve clarity and can also reduce eye strain.
## Ordering Information

### Main Unit

<table>
<thead>
<tr>
<th>Product Name</th>
<th>Main Unit</th>
<th>Input Channel</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>R3754A</td>
<td>5-inch monochrome LCD</td>
<td>RCH</td>
<td>Additional input channels are optional.</td>
</tr>
<tr>
<td>R3754B</td>
<td>6.5-inch color TFT LCD</td>
<td>RCH</td>
<td>Additional input channels are optional.</td>
</tr>
</tbody>
</table>

### Option

<table>
<thead>
<tr>
<th>Option Code</th>
<th>Option Code</th>
<th>Function</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>00</td>
<td>Parallel I/O</td>
<td>Plus/minus logic change</td>
<td></td>
</tr>
<tr>
<td>01</td>
<td>Parallel I/O</td>
<td>Pin assignment is changed</td>
<td></td>
</tr>
<tr>
<td>02</td>
<td>Parallel I/O</td>
<td>Optical Isolation</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>2-ch input</td>
<td>RCH, ACH</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>3-ch input</td>
<td>RCH, ACH, BCH</td>
<td></td>
</tr>
<tr>
<td>70</td>
<td>TDR function</td>
<td>Time-axis waveform display</td>
<td></td>
</tr>
<tr>
<td>71</td>
<td>Drive level measurement function</td>
<td>RLA method</td>
<td></td>
</tr>
<tr>
<td>72</td>
<td>3-terminal resonator measurement function</td>
<td>R1704 and CAL Kit are required.</td>
<td></td>
</tr>
</tbody>
</table>

### Accessory

<table>
<thead>
<tr>
<th>Product Name</th>
<th>Model Name</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixture for 3ports measurement</td>
<td>R17041</td>
<td>Consists of the test fixture and switch box.</td>
</tr>
<tr>
<td>Crystal Test Adapter</td>
<td>A07010</td>
<td>Circuit applicable to SMD</td>
</tr>
<tr>
<td>Crystal Test Adapter</td>
<td>A07011</td>
<td>Circuit applicable to the read type</td>
</tr>
<tr>
<td>Reflection bridge</td>
<td>A17020 Series</td>
<td>100Hz to 1MHz</td>
</tr>
<tr>
<td>Impedance conversion transformer</td>
<td>R17000 Series</td>
<td>100Hz to 1MHz</td>
</tr>
<tr>
<td>Power splitter</td>
<td>VCR-111 (Tama Electric)</td>
<td>3-branch</td>
</tr>
<tr>
<td>Active probe</td>
<td>AP003 (Stack Electric)</td>
<td>DC to 1000MHz FET probe</td>
</tr>
<tr>
<td>Rack mount set</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rail set</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Crystal Test Adapter

<table>
<thead>
<tr>
<th>Applicable Device</th>
<th>Change Kit</th>
<th>CAL Kit</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>TSX-1</td>
<td>A07003-01</td>
<td>A07004-01</td>
<td>Circuit Adapter</td>
</tr>
<tr>
<td>TSX-2</td>
<td>A07003-02</td>
<td>A07004-02</td>
<td>Normal type</td>
</tr>
<tr>
<td>CP21B</td>
<td>A07003-03</td>
<td>A07004-03</td>
<td>With built-in variable load capacity function</td>
</tr>
<tr>
<td>CX-89F2</td>
<td>A07003-04</td>
<td>A07004-04</td>
<td></td>
</tr>
<tr>
<td>CX-91F</td>
<td>A07003-05</td>
<td>A07004-05</td>
<td></td>
</tr>
<tr>
<td>DSX631</td>
<td>A07003-06</td>
<td>A07004-06</td>
<td></td>
</tr>
<tr>
<td>DSX751</td>
<td>A07003-07</td>
<td>A07004-07</td>
<td></td>
</tr>
<tr>
<td>J1S43</td>
<td>A07003-08</td>
<td>A07004-08</td>
<td></td>
</tr>
<tr>
<td>J1S03</td>
<td>A07003-09</td>
<td>A07004-09</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Name</th>
<th>Model</th>
<th>Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Load capacity</td>
<td>A07005-01</td>
<td>5pF</td>
</tr>
<tr>
<td>A07005-02</td>
<td>10pF</td>
<td></td>
</tr>
<tr>
<td>A07005-03</td>
<td>15pF</td>
<td></td>
</tr>
<tr>
<td>A07005-04</td>
<td>20pF</td>
<td></td>
</tr>
<tr>
<td>A07005-05</td>
<td>25pF</td>
<td></td>
</tr>
<tr>
<td>A07005-06</td>
<td>30pF</td>
<td></td>
</tr>
<tr>
<td>Contact pin</td>
<td>A07006</td>
<td>10-pins/set</td>
</tr>
</tbody>
</table>

* The operating manual is optional.
Specifications

Measurement Function

Measurement channel: 2 channels (4-trace display)


Measurement format: Logarithmic/linear amplitude and phase, group delay

AC/DC display: Logarithmic/linear amplitude and phase for marker reading, real and imaginary portions, R+jX, G+jB

Polar coordinates display: Logarithmic/linear amplitude and phase for marker reading, real and imaginary portions

Signal purity

Harmonic wave distortion:
Non-harmonic wave spurious:
Phase noise:

Insertion loss:

Amplitude characteristics (absolute characteristics)

Measurement range: ATT AUTO AMP 0 dB ±5 dB
ATT 25 dB AMP 0 dB ±5 dB
ATT 0 dB AMP 0 dB ±5 dB
ATT 0 dB AMP 16 dB ±5 dB

Display resolution: 0.001 dB/div

Accuracy: ±0.5 dB (10 MHz, max. input level)

Dynamic accuracy: 0 to -10 dBm ±0.4 dB

Amplitude characteristics (relative characteristics)

Measurement range: Option 10, Option 11
ATT 25 dB AMP 0 dB ±120 dB
ATT 0 dB AMP 0 dB ±95 dB
ATT 0 dB AMP 16 dB ±86 dB

Display resolution: 0.001 dB/div

Accuracy: ±0.5 dB (10 MHz, max. input level)

Frequency response: 10 kHz to 1 MHz 3 dBp-p

Dynamic accuracy: 0 to -10 dBm ±0.1 dB

Amplitude characteristics (relative characteristics)**

Measurement range: CT607 (option 30)
ATT 25 dB AMP 0 dB ±95 dB
ATT 0 dB AMP 0 dB ±71 dB

Display resolution: 0.001 dB/div

Accuracy: ±0.5 dB (10 MHz, max. input level)

Frequency response: 10 kHz to 1 MHz 3 dBp-p

Dynamic accuracy: 0 to -10 dBm ±0.1 dB

Phase characteristics (relative characteristics)**

Measurement range: -180° Continuous display possible for more than ±180° by the display expansion function

Resolution: 0.01°

Dynamic accuracy: 0 to -10 dBm ±3.0°

 equivalents for values not guaranteed.

They are guaranteed when the unit is used with a measurement range setting between 10 kHz and 32.5 MHz or between 32.5 MHz and 150 MHz.

*BN C-BNC cable (A01036-0150) will be attached.
### Measurement Range

- **Range:** 1 ps to 250 s
- **Reference line position:** Vertical axis memory top section (100%) to bottom section (0%)

### Resolution

- **Frequency resolution:** 10 kHz to 1 MHz: 0.01°
- **Dynamic accuracy:**
  - 0 to -10 dBm: ±1.0°
  - -10 to -50 dBm: ±0.5°
  - -50 to -60 dBm: ±0.5°
  - -60 to -70 dBm: ±1.0°
  - -70 to -80 dBm: ±3.0°
  - -80 to -90 dBm: ±8.0°

### Delay Characteristics

- **Range:** Calculated using the following equation:
  \[ r = \frac{\text{Aperture frequency (Hz)}}{\text{Phase}} \]
- **Measurement range:** 1 ps to 250 s
- **Aperture frequency:** 1 ps
- **With this resolution, it is possible to set:** 100 X 2% of the frequency span.
- **Accuracy:** 360 X Phase accuracy

### Error Correction Functions

- **Normalization:** Corrects the frequency response (amplitude, phase) during transfer measurement.
- **1-port calibration:** Corrects the bridge direction, the frequency response, and the source matching error. Error correction requires Short, Open, and Load.
- **Data Averaging:** Averages data (vector values) for each sweep.
- **Transfer Full Calibration:** Averaging count can be set from 2 to 999. High accuracy measurement possible using transfer normalization in transfer measurement. Error correction requires Short and Load.

### Connection with External Equipment

- **External display signal output:** 15-pin D-sub connector (VGA)
- **GPIB data output and remote control:** Conforming to IEEE 488
- **Printer port:** 25-pin D-sub
- **Serial port:** Based on RS-232
- **Keyboard:** IBM-PC/AT compatible
- **External reference frequency input:** Available frequencies 1, 2, 5 and 10 MHz ±10 ppm, 0 dBm (50 Ω) or more
- **Parallel I/O output:** TTL level, 8-bit output (2 ports), 4-bit I/O (2 ports)
- **Probe power:** ±12 V
- **External trigger signal input:** BNC connector (female)

### Display Section

- **Display unit:** R3754A 5-inch STN monochrome LCD
- **Resolution:** 640 X 640 dots
- **Display mode:** AC-DC logarithmic/linear coordinates, polar coordinates, Smith chart (inductance/admittance indication)
- **Display format:** Single channel, dual channel (overlay display, split display)
- **Measurement condition display:** Start/stop, center/span, scale/DIV reference level, marker value, soft key functions, warning message.
- **Reference line position:** Vertical axis memory top section (100%) to bottom section (0%)

### Auto Scale

- **The optimum reference level and scale value are automatically set for the current measurement.**

### Backlight

- **ON/OFF, no adjustment for the R3754A**

### Contrast

- **Contrast control provided for R3754A**

### Marker Functions

- **Marker display:** Marker readings can be converted to display values corresponding to the respective measurement formats.
- **Multi-marker:** 10 individual markers can be set for each channel.
- **Delta marker:** Any of the 10 markers can be specified as the reference marker enabling delta value measurements between markers.
- **Marker couple:** Markers of each channel can be set in coupled or independent form.
- **Specific section analysis:** Marker search possible for a section specified by the delta marker.
- **MKR search:** MAX search, MIN search, NEXT search
- **Marker track:** Search is performed for each sweep.
- **Target search:** It is possible to calculate the bandwidth, center frequency, Q at the X dB down point. It is also possible to search the phase 0 degree frequency value and the ±X˚ frequency width. deg. frequency width.
- **MKR:** MKR - Reference value, MKR - START, MKR - STOP, MKR - CENTER
- **Limit line function:** Limit line can be set for up to 31 segments. Pass/Fail judgments can be performed for each segment.
- **Direct analysis function:** Resonator analysis, etc.

### Instrument State Functions

- **Save register:** Allows storing condition settings and CAL data in battery backed internal memory.
- **Data save/recall:** Allows storing/loading data to/from FDD

### Programming Functions

- **BASIC control function:** Standard control function allows the control of the main unit as well as other measurement equipment with the GPIB interface.
- **Built-in functions:** Allows high-speed analysis of measurement data.
- **FDD function:** Based on the MS-DOS format FD.
  - Storage capacity (DD: 720 Kbytes, HD: 1.2 Mbytes, 1.44 Mbytes)

### General Specifications

- **Operating environment FDD used:** Temperature range +5 to +40°C, humidity range 80% or less (no condensation)
- **No FDD used:** Temperature range 0 to +50°C, humidity range 80% or less (no condensation)
- **Storage environment:** -20°C to +60°C
- **Power supply:**
  - 100 VAC to 120 VAC, 220 VAC to 240 VAC
  - 48 Hz to 66 Hz, 100 VAC and 200 VAC systems are automatically changed.
- **Power consumption:** 200 VA or less
- **External dimensions:** Approx. 424 (W) X 177 (H) X 300 (D)
- **Mass:** 12 kg or less