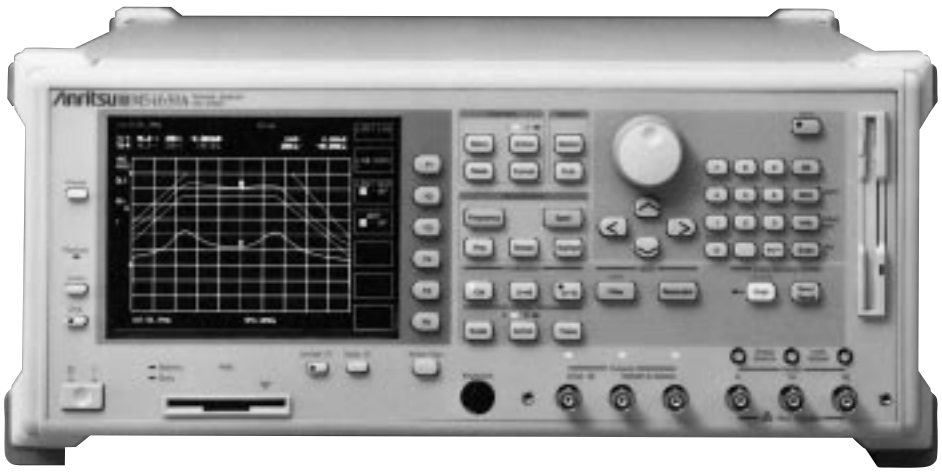
NETWORK ANALYZER
MS4630A
10 Hz to 300 MHz

NEW



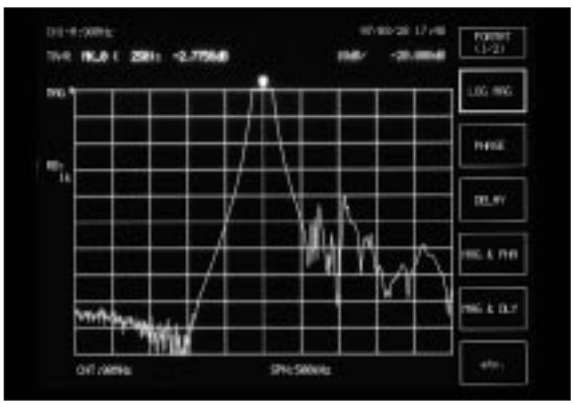
CE GPIB

The MS4630A is suitable for electronics production lines demanding fast and accurate device measurements. It is particularly well suited to accurate high-speed, evaluation of IF filter resonance and group delay characteristics, as well as evaluating the impedance characteristics of resonators in AV equipment and personal computers.
A fast sweep speed of 150 µs/measurement point is achieved using a high-speed synthesizer and digital signal processing (DSP) technologies. The post-processing data analysis functions have been strengthened with improved data-processing macros that have greatly increased the total production throughput.
In comparison to the earlier MS3401A/B and MS3606B network analyzers, the sweep speed is three times faster, and the group delay measurement accuracy and stability have been improved by more than 10 times. In addition, the dynamic range has been improved to 120 dB (RBW: 1 kHz) while the weight of the analyzer has been dramatically reduced. Compatibility has been maintained between PTA and GPIB software commands, maintaining any current investment in PTA software.

Features
- High-speed evaluation of IF filters, resonators, etc.
- Greatly increased production/inspection capacity

Performance and functions
- **High dynamic range**

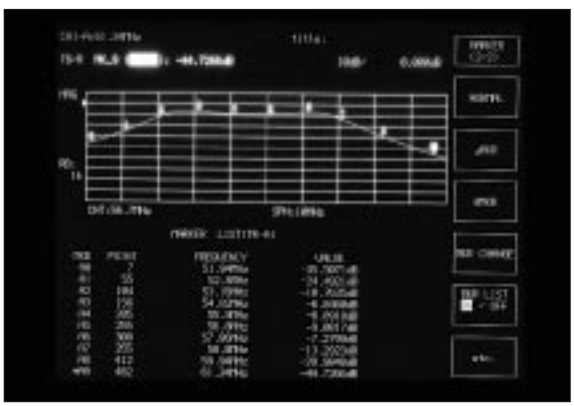
The high dynamic range of 120 dB (RBW: 1 kHz) permits fast and accurate out-of-band measurement of filter.



Filter out-of-band attenuation measurement

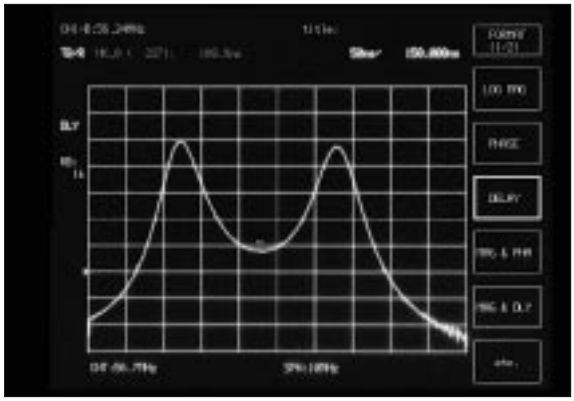
- **Multi-marker function**

Up to 10 markers can be set independently for each channel. The marker list function can be used to display all tabular data and waveform information simultaneously at each marker.



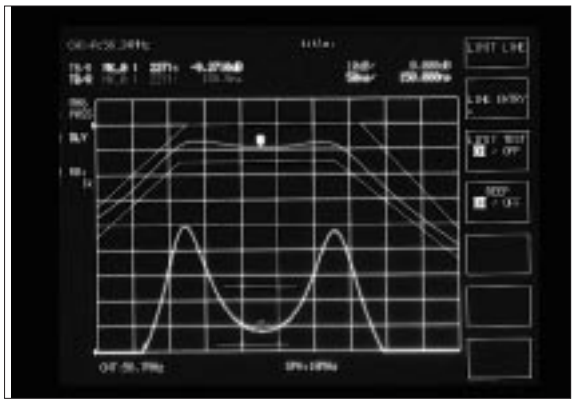
Multi-markers

• High-accuracy group delay measurement
The group delay characteristics can be measured with a high degree of accuracy at a resolution of 1/10,000 of the measurement range.



Group delay characteristics

• Limit test function
Device pass/fail evaluation can be performed in real-time using the single and segmented limit test functions.



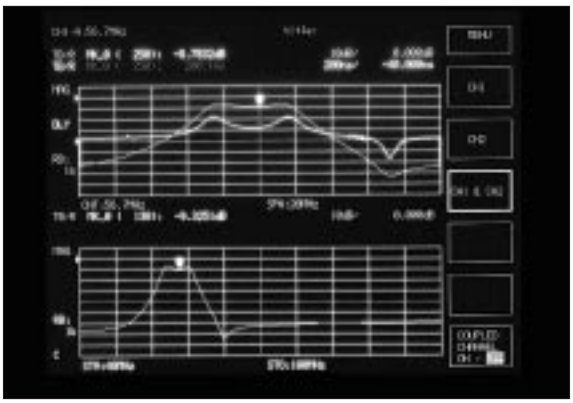
Filter pass/fail evaluation using limit test

• Filter measurement
Filter analysis functions
Filter characteristics such as 3 dB bandwidth, center frequency (fo), in-band ripple, out-of-band attenuation, etc., are digitally processed and analyzed at high speed. User can easily enter or change default values using filter set up menu.

Measurement using filter functions

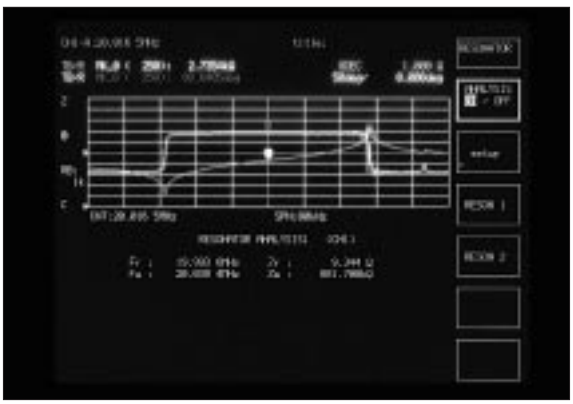
Set up menu for filter functions

Simultaneously in-band and spurious response data display
Previously, spurious detection and passband measurement required switching of the measurement setup. The MS4630A alternate sweeping function permits simultaneous display of the measured passband and spurious band data. The very short switching time greatly improves the measurement efficiency.



Spurious measurement using alternate sweeping

• Resonator measurement
High-speed measurement of resonator characteristics
The MS4630A has a number of dedicated waveform analysis functions to improve the evaluation efficiency of resonators. Resonator 1 analyzes the resonance frequency (Fr) and the resonance impedance (Zr). Resonator 2 is able to measure resonator equivalence in addition to the parameters for Resonator 1.



Resonator 1 measurement

Resonator 2 measurement

Specifications

Measurement items	Transmission characteristics (ratio measurement): Amplitude, phase, group delay Reflection/impedance characteristics: Amplitude, phase (with external transducer) Level characteristics: Absolute amplitude
Frequency	Range: 10 Hz to 300 MHz Resolution: 0.01 Hz Accuracy (standard) Aging rate: ≤1 x 10^{-6}/day (15 minutes after power-on) Temperature characteristics: ≤±5 x 10^{-6} (0˚ to 50˚C) Accuracy (Option 13: High-stability reference oscillator) Aging rate: ≤±2 x 10^{-8}/day (24 h after power-on) Temperature characteristics: ≤±5 x 10^{-8} (0˚ to 50˚C)
Input	Channel No. Standard: 2 (R, TA); Option 12: 3 (R, TA, TB) Impedance: 50 Ω, 1 MΩ switchable (when combined with MA4605A: 75 Ω, 1 MΩ) Input range (IRG): 0/+20 dBm Max. input power AC: +20 dBm; DC ±2.2 V (50 Ω) AC: 0 dBm; DC: ±20 V (1 MΩ) Connector: BNC-J Probe source: +12 ±1 V, 100 mA (with protective circuit for shorts)
Average noise level	≤–120 dBm (RBW: 1 kHz, 1 to 300 MHz), ≤–110 dBm (RBW: 1 kHz, 80 kHz to 1 MHz)
Crosstalk	Between channels: ≥120 dB (80 kHz to 300 MHz), ≥110 dB (up to 80 kHz) Between transmitter and receiver: ≥125 dB
Resolution bandwidth	3, 10, 30, 100, 500 Hz, 1, 2, 3, 4, 5, 10, 20 kHz and automatic setting
Output	Output level range Output A: 0 to +21 dBm; Option 10: –70 to +21 dBm Output B: –6 to +15 dBm (–9.5 to +11.5 dB when Option 14 added); Option 10: –76 to +15 dBm (–79.5 to +11.5 dB when Option 14 added) Output resolution: 0.01 dB Output level accuracy: ≤±1.0 dB (frequency: 100 MHz, Output A: +10 dBm) Output level linearity: ≤±0.5 dB (0 dBm reference, frequency: 100 MHz, Output A: 0 to +21 dBm) Output level deviation: ≤±1.5 dB (output A: +10 dBm, 100 MHz reference) Step error: ±0.5 dB (Option 10) Output impedance: 50 Ω (when combined with MA4605A: 75 Ω) Connector: BNC-J
Amplitude measurement	Measurement range: ≥120 dB Measurement resolution: 0.001 dB Display scale: 0.01 dB/div to 50 dB/div (1-2-5 sequence) Dynamic accuracy

Level relative to IRG	80 kHz to 100 MHz	10 kHz to 300 MHz
0 to –10 dB	±0.30 dB	±0.30 dB
–10 to –60 dB	±0.05 dB	±0.05 dB
–60 to –70 dB	±0.10 dB	±0.30 dB
–70 to –80 dB	±0.30 dB	±1.00 dB
–80 to –90 dB	±1.20 dB	±4.00 dB
–90 to –100 dB	±4.00 dB	–

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<table>
<tr><td>Phase measurement</td><td>Measurement range: ±180˚
Measurement resolution: 0.001˚
Display scale: 0.01˚ to 50˚ /div (1-2-5 sequence)
Dynamic accuracy
<table>
<tr><th>Level relative to IRG</th><th>80 kHz to 100 MHz</th><th>10 kHz to 300 MHz</th></tr>
<tr><td>0 to –10 dB</td><td>±6.0˚</td><td>±6.0˚</td></tr>
<tr><td>–10 to –60 dB</td><td>±0.3˚</td><td>±0.3˚</td></tr>
<tr><td>–60 to –70 dB</td><td>±0.8˚</td><td>±2.0˚</td></tr>
<tr><td>–70 to –80 dB</td><td>±2.0˚</td><td>±6.0˚</td></tr>
<tr><td>–80 to –90 dB</td><td>±6.0˚</td><td>±20.0˚</td></tr>
<tr><td>–90 to –100 dB</td><td>±20.0˚</td><td>–</td></tr>
</table></td></tr>
<tr><td>Group delay measurement</td><td>DRG: Δθ/(360 x ΔF) ∗Δθ: phase measurement range; ΔF: frequency span x smoothing aperture (%);
smoothing aperture: 20% to $\left(\frac{2}{\text{number measurement points}}\right)$ x 100%
Measurement resolution: 2.78 x 10^{-5}/ΔF
Display scale: 1 ps/div to 50 ms/div
Dynamic accuracy: Phase measurement accuracy/(360 x aperture frequency)</td></tr>
<tr><td>Calibration, correction</td><td>Calibration types: Frequency response, 1 port, 1 path-2 port, frequency response/isolation calibration, π-NET calibration
Calibration data interpolation:
Measurement frequency, when number of measurement points changed, based on calibration data before change, new calibration data interpolation calculation possible (except at log frequency measurement and 1001 measurement points)
Normalize: X–S
Electrical length calibration
Range: 0 to ±999999.9999999 m, Resolution: 100 nm
Phase offset range: ±180˚</td></tr>
<tr><td>Sweeping</td><td>Frequency sweep: LIN (CENTER/SPAN, START/STOP), LOG (START/STOP)
Level sweep: LIN (START/STOP/STEP)
Number of measurement points: 11, 21, 51, 101, 251, 501, 1001
Break point: Anywhere between 1 and 1001
Sweep time: 150 µs/point, 38 ms/250 points full sweep (RBW: 20 kHz, normalize calibration, 1 trace)
Setting range: 1 ms to 27.5 h
Sweep functions
Sweep range: Full sweep, part sweep (between markers)
Sweep control: REPEAT/SINGLE, STOP/CONT
Sweep trigger: INT/EXT (RISE, FALL, LEVEL)</td></tr>
<tr><td>Display</td><td>Max. display screens: 2 channels, 4 traces
Display format: LOG MAG (M), PHASE (P), DELAY (D), M/P, M/D, LIN MAG (LIN), LIN/P, LIN/D, REAL (R), IMAG (I), R/I, Z, Z/θ, Q, Z/Q, POLAR, VSWR, IMPD (Z∠θ, Rs + Ls/Cs, Q/D, R + jx), ADMT (Y∠θ, Rp + Lp/Cp, Q/D, G + jB)
Display: 640 x 480 dots, 6.5” color LCD</td></tr>
<tr><td>Markers</td><td>Marker functions: NORMAL MKR, Δ MKR, 0 MKR, MKR → MAX, MKR → MIN, MKR → CF, Δ → SPAN, MKR → +PEAK, MKR → –PEAK, MKR TRACK + PEAK, MKR TRACK–PEAK, MKR CHANGE, MKR OFFSET
Setting: Set marker position to frequency or point
Multi-marker: Max. 10 markers for each trace
Filter function: F0, IL, passband (L, R), attenuation band (L, R), Ripple, Q, SF
Resonator function
RESON 1: Fr, Fa, Zr, Za (0 PHASE), Fm, Fn, Zm, Zn (MAX/MIN)
RESON 2: Fs, Fr, Fa, Zr, Za, Q, equivalence constant (R1, L1, C1, C0)</td></tr>
<tr><td>Trace data calculation</td><td>Averaging functions
Method: SUM, MAX, MIN, Count: 1 to 1000
Measurement data memory (max. 1001 points each memory in same format as display format)
Main trace (MT) memory: 2 each (XMEM) for Channel 1 and Channel 2
Calibration S memory: 2 each (SMEM) for Channel 1 and Channel 2
Image memory: 2 each (IMEM) for Channel 1 and Channel 2
Sub-trace (ST): Following calculation between MT and ST (traces calculation of same data as display format)
MT → ST, MT = MT–ST, MT = ST
Limit line: Single or segment (10) limit line, pass/fail evaluation against limit line</td></tr>
<tr><td>Measurement parameters auto-setting</td><td>Receive bandwidth and sweep time: Receive bandwidth set automatically for set sweep time
Automatically set to give minimum sweep time at set receive bandwidth</td></tr>
<tr><td>Auxiliary media</td><td>Saving/recalling data:
Measurement parameters, measured data, calibration data, PTA application programs saved/recalled to/from FD and PMC
Function memory
FD: 100 functions max.
PMC: 100 functions max. (depends on PMC capacity)
Drive and capacity
3.5” FDD: 1
Capacity: 720 KB (2DD), 1.44 MB (2HD), MS-DOS format
Option 01: PMC (32 to 512 KB)</td></tr>
<tr><td>Printing</td><td>Printing is available using video plotter or printer.</td></tr>
</table>

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Back-panel I/O	Frequency: 5/10 MHz ±10 ppm Level: ≥0.7 Vp-p (AC coupling) Input impedance: 50 Ω (connector: BNC-J) Reference oscillator output Frequency: 10 MHz Level: TTL (DC coupling, connector: BNC-J) External trigger input: TTL Level (connector: BNC-J) GPIB: IEEE488.2 (24-pin Amphenol connector) I/O Port: Parallel interface for PTA (36-pin Amphenol connector) RGB output: For external monitor (15-pin D-SUB connector) Video output: Separate (8-pin DIN) Centronics (Option 02): Parallel interface for printer (25-pin D-SUB connector) RS-232C (Option 02): Serial interface (9-pin D-SUB connector)
External control	Standard: GPIB and PTA; Option 02: RS-232C
Power	100 to 120/200 to 240 Vac (–15%/+10%, 250 Vac max, 100/200 V system auto-switching), 47.5 to 63 Hz, ≤180 VA (max.)
Dimensions and mass	426 (W) x 177 (H) x 451 (D) mm, ≤15 kg
Environmental conditions	Temperature range: 0˚ to +50˚C (operating; FDD: +4 to +50˚C), –20˚ to +60˚C (storage)
EMC	EN55011: 1991, Group 1, Class A EN50082-1: 1992
Safety	EN61010-1: 1993 (Installation Category II, Pollution Degree II)

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Ordering information

Please specify model/order number, name, and quantity when ordering.

Model/Order No.	Name	
	Main frame	
MS4630A	Network Analyzer	
	Standard accessories	
J0017	Power cord, 2.5 m:	1 pc
F0013	Fuse, 5 A:	2 pcs
W1248AE	MS4630A operation manual (main frame):	1 copy
W1249AE	MS4630A operation manual (remote control):	1 copy
	Options	
MS4630A-01	PMC interface	
MS4630A-02	RS-232C, Centronics interface (printer output, external control)	
MS4630A-10	Output attenuator (70 dB, mechanical type)	
MS4630A-12	3 channel receiver	
MS4630A-13	High stability reference oscillator (aging rate: ≤±2 x 10^{-8}/day)	
MS4630A-14	3 branch output (for 3 channel receiver)	
	Optional accessories	
62BF50	Reflection Bridge	
62B50	Reflection Bridge	
62BF75	Reflection Bridge	
62B75	Reflection Bridge	
MA2201A	Reflection Bridge	
MA2202A	Reflection Bridge	
MA2203A	Reflection Bridge	
MA2301A	Reflection Bridge	
MA2302A	Reflection Bridge	
MA2303A	Reflection Bridge	
MA2204A	Impedance Probe	
MA2403A	Impedance Probe	
MA414A	Impedance Measurement Kit (for MA2403A)	
MA1506A	π Network (DC to 125 MHz, for resonator measurement)	
MA4605A	Impedance Adapter (for MS4630A, 10 Hz to 300 MHz, 50/75 Ω, unbalanced)	
P005	Memory card (32 KB)	
P006	Memory card (64 KB))	
P007	Memory card (128 KB)	
P008	Memory card (256 KB)	
P009	Memory card (512 KB)	
MC3305A	PTA Key Board (JIS type)	
MC3306A	PTA Key Board (ASCII type)	
B0329C	Front cover (1MW65U)	
B0333C	Rack mount kit	
B0334C	Carrying case (hard type)	
	Optional instruments	
ME010 series	Test Fixture (PIN, SMD, tip-inductor, etc.)	
VP-870	Printer (EPSON product, for GPIB)	