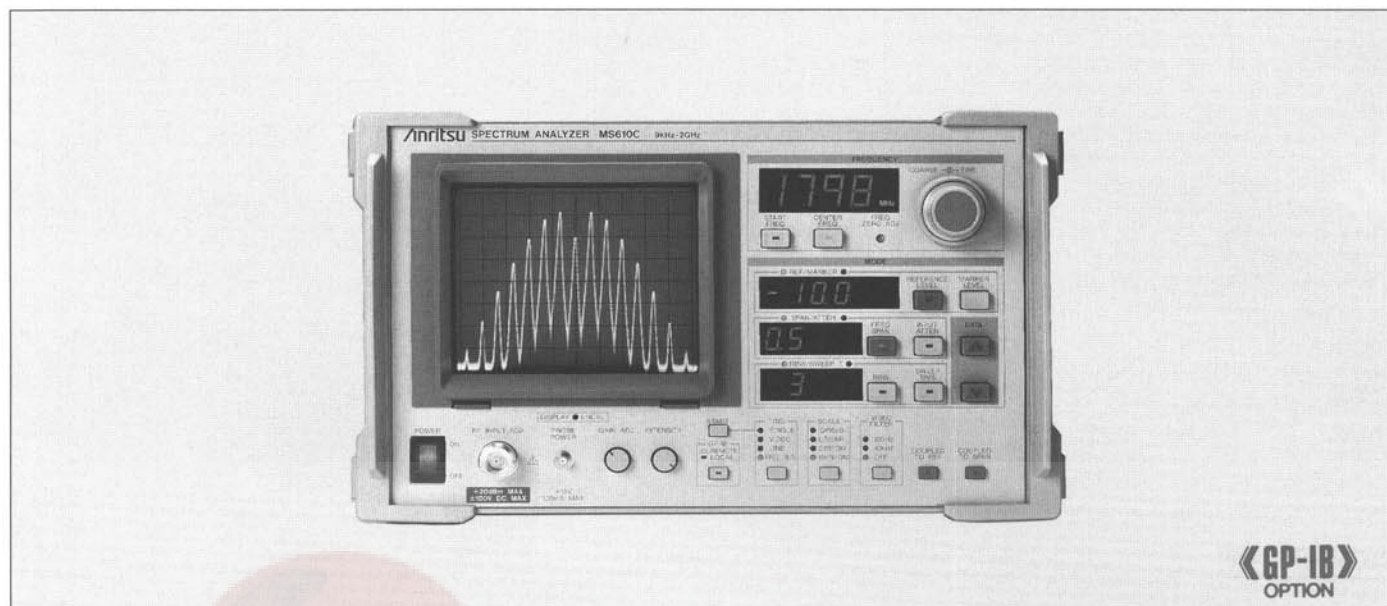


## SPECTRUM ANALYZERS

### SPECTRUM ANALYZER MS610B/C/J/K

9 kHz (10 kHz) to 2 GHz



The MS610 series are compact, lightweight portable spectrum analyzers that have low power consumption.

Battery back-up of the panel settings allows testing to be started very quickly whenever the MS610C/K is used for testing in the field. Also, the MS610C/K has a high-luminance CRT display, protectors and an optional tilt handle. A sensitivity of  $-25 \text{ dB}\mu\text{V}$  ( $-132 \text{ dBm}$ ) is achieved by connecting the ultracompact MA8610A Preamplifier directly to the MS610C.

They digitally display the level of the center marker of the screen via a large LED display and can measure transmission characteristics in combination with a tracking generator. Also, they can be easily configured into an automated measuring system via the GP-IB option. A battery pack is available for outdoor use.

They are suitable for a wide variety of measurement applications, from outdoor testing (such as when installing and performing maintenance on satellite communications antennas, cable TV equipment and community antenna systems or when conducting EMI field strength measurements) to production lines such as when inspecting electronic devices for their spurious and frequency characteristics.

#### Features

- High-order harmonic dynamic range of over 80 dB
- Compact and lightweight for enhanced portability
- DC operation for on-site testing

#### Uses

- Adjusting satellite communications antennas, monitoring signals and checking VSAT (Very Small Aperture Terminal)
- Testing cable TV equipment and community antenna systems
- Performing spurious, distortion and oscillation tests on electronic devices and radio equipment
- Measuring the modulation factor of video signals or monitoring AM/FM signals
- Conducting EMI measurements (noise source scanning on circuit boards)
- Testing the frequency response and impedance of electronic parts
- Measuring the center frequency of band pass filters

#### Applications

##### • Frequency measurement

Frequency can be measured very accurately when the MS610 series are used in combination with an MH680B Tracking Generator and a frequency counter, such as the Anritsu MF57A/58A or MF1603A/1604A. Consequently, the center frequency of band pass filters can be adjusted very easily.

##### • In-circuit measurement using a probe

If the MS610C (or K) is connected to the MA45B (or A) Probe, a system for analyzing RF signals in RF circuits with bandwidths of 9 kHz to 30 MHz can be constructed. Because of their high input impedance of  $3 \text{ M}\Omega/20 \text{ pF}$ , these probes do not affect the circuits under test. The MS610C/K has a connector for probe power on the front panel so that an external power supply is not required. The MZ134A Power Supply can be used with these probes when operating the MS610B/J.

##### • Frequency response measurement of amplifiers, filters, etc.

When used with a tracking generator, the MS610B/C can be used to measure frequency responses with high accuracy. Further, if a reflection bridge is used, impedance (return loss) characteristics can also be measured. The frequency response of this system is within  $\pm 1.5 \text{ dB}$  (typical value for frequencies of up to 1.5 GHz). A maximum testing sensitivity of  $-115 \text{ dBm}$  is achieved because internal crosstalk between the input and output signals has been suppressed.

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## EMI and electrical field strength measurements

EMI from electronic devices is strictly controlled by CISPR, VCCI, FCC, VDE and other regulations in Japan and other countries. Consequently, measures to safeguard against EMI are important in the development of OA equipment and consumer electronics.

When connected to the ultracompact MA8610A Preamplifier and the MA2601B/C EMI Probes, the MS610C can be used as a highly portable measuring instrument for investigating the source of noise from such equipment. In addition, the MS610 series has two resolution bandwidths of 9 kHz and 120 kHz as standard for the 150 kHz to 1 GHz band specified in the CISPR standards. An optional QP detector function is also available in accordance with CISPR standards. All of these features are responsible for the high sensitivity with which the MS610C performs EMI measurements.

Three antennas are provided for measuring the field strength due to EMI, etc. and the MS610B/C stores the antenna coefficients for each receiving antenna in memory so that field strengths of 25 MHz to 2 GHz can be measured directly in units of dBμV/m.

Switch *	2	3	4
	dBμ/m (1)	dBμ/m (2)	dBμ/m (3)
Model	MP534A	MP635A	MP666A
Name	Dipole antenna	Log-periodic antenna	Log-periodic antenna
Frequency range	25 to 520 MHz	85 to 1000 MHz	200 to 2000 MHz

\* Select the desired antenna with the switch on the rear panel.

## Specifications

Model	MS610B		MS610J		MS610C		MS610K	
Frequency	Range		10 kHz to 2 GHz			9 kHz to 2 GHz		
	Display and display accuracy		4-digit LED, resolution: 1 MHz, CENTER/START switch selectable, ± 10 MHz					
	Frequency span	Span	Zero, 0.1 MHz to 1 GHz (ten divisions, 1-2-5 sequence)					
		Full span	0 to 2 GHz (with marker)					
		Accuracy	± 5%					
	Resolution bandwidth	Bandwidth	1 kHz to 1 MHz (3 dB), 1-3 sequence 9 kHz, 120 kHz (6 dB)					
		Selectivity	≤ 15 : 1 (ratio of 60 and 3 dB bandwidths) [ratio of 60 and 6 dB bandwidths at 9 kHz and 120 kHz]					
	Stability	Drift	≤ 50 kHz/5 min; (90 minutes after power on with fixed frequency setting, at 23° ± 5°C, constant temperature)					
Residual FM		≤ 2 kHz p-p (at sweep time: ≤ 0.1 s)						
Sideband noise		≤ - 70 dBc (resolution bandwidth: 1 kHz, video filter: 100 Hz, 20 kHz detuning from signal)						
Amplitude	Measurement range (CRT display range)	LOG	10 dB/div	- 115 to + 20 dBm (72 dB)	- 107 to + 20 dBm (72 dB)	- 115 to + 20 dBm (72 dB)	- 107 to + 20 dBm (72 dB)	
			2 dB/div	- 66 to + 20 dBm (16 dB)				
		LIN	- 66 to + 20 dBm (0 to 1)					
	Linearity of LOG display		± 1.5 dB/72 dB, ± 1 dB/16 dB					
	Frequency response		± 1.5 dB (100 kHz to 1.5 GHz), + 2/- 3 dB (1.5 to 2 GHz) When RF attenuation is set to ≥ 10 dB					
	Reference level	Scale	Vertical axis: 8 division (The reference level corresponds to the scale at the top of the screen.)					
		10 dB/div	- 50 to + 20 dBm, 1 dB step					
		2 dB/div	- 50 to + 20 dBm, 0.5 dB step					
		LIN	- 60 to + 20 dBm, 0.5 dB step					
		Accuracy	± 1.5 dB					
	Dynamic range	Average noise level*1	≤ - 115 dBm	≤ - 107 dBm	≤ - 115 dBm	≤ - 107 dBm		
		2nd and 3rd harmonic distortion	≤ - 80 dBc (5 to 800 MHz), ≤ - 70 dBc (100 kHz to 1000 MHz) [input level: - 30 dBm and RF attenuator: 0 dB]					
		Residual response*2	≤ - 100 dBm (for input termination: 50 Ω)	≤ - 100 dBm (for input termination: 75 Ω)	≤ - 100 dBm (for input termination: 50 Ω)	≤ - 100 dBm (for input termination: 75 Ω)		
	Video filter		100 Hz, 10 kHz, OFF					
	Level deviation for resolution bandwidth selection		± 1 dB, (± 2 dB for 9 kHz bandwidth)					
	Marker level	Display	4-digit LED indicates peak value at center of screen.					
		Resolution	0.1 dB (SCALE: 10 dB/div, 2 dB/div)					
Display units		dBm, dBμV, dBμV/m				dBm, dBμV, dBmV		

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## Selection Guide

Model number	MS610B	MS610J	MS610C	MS610K
Frequency range	10 kHz to 2 GHz		9 kHz to 2 GHz	
Input impedance	50 Ω	75 Ω	50 Ω	75 Ω
Maximum DC input	DC 50 V		DC 100 V	
Memory back-up of panel settings	Not provided		Provided	
CRT (analog)	Normal type		High-luminance type	
Protectors	Not provided		Provided	
Tilt handle	Not provided		Provided (optional)	
Level display units	dBm, dBμV, dBμV/m			dBm, dBμV, dBmV



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Model	MS610B	MS610J	MS610C	MS610K
Automatic setting	COUPLED TO SPAN: The resolution bandwidth and sweep time are automatically set to the optimum values for the span. COUPLED TO REF: The RF attenuator is automatically set to the optimum value for the reference level. (provided that the mixer level $\leq -20$ dBm)			
Input	Connector	N-type, 50 $\Omega$	NC-type, 75 $\Omega$	N-type, 50 $\Omega$
	VSWR	$\leq 1.5$ (provided that RF attenuator: $\geq 10$ dB and frequency: $\geq 50$ kHz)		
	Maximum input	+20 dBm, DC $\pm 50$ V		
	RF attenuator	0 to 50 dB, 10 dB step		
Sweep	Time	10 ms to 10 s (1-2-5 sequence), 20, 30, 40, 50, 60, 70, 99 s		
	Trigger	FREE RUN, LINE, VIDEO, SINGLE		
Output	Calibrator	50 MHz $\pm 150$ kHz, $-30$ dBm $\pm 0.5$ dB, BNC connector		
	XYZ	X-axis: 0 to 5 V, Y-axis: 0 to 5 V, Z-axis: 0 to 5 V, BNC connector		
	Counter control	TTL level, BNC connector		
	Probe power	—		
CRT		Graticule: 8 $\times$ 10 DIV, 6-inch, long luminance phosphor screen		Graticule: 8 $\times$ 10 DIV, 6-inch, high-luminance, short luminance phosphor screen
Power		AC <sup>*3</sup> V <sub>-15</sub> <sup>+10</sup> %, 48 to 63 Hz, $\leq 85$ VA		AC <sup>*3</sup> V <sub>-15</sub> <sup>+10</sup> %, 48 to 63 Hz, $\leq 95$ VA
Dimensions and weight		177H $\times$ 284W $\times$ 351D mm, <13.5 kg		177H $\times$ 284W $\times$ 351D mm, <14 kg (193H $\times$ 308W $\times$ 417D mm, with protectors)
Operating temperature range		0° to 50°C		

\*1 When the resolution bandwidth is 1 kHz, video filter is 100 Hz and the frequency is  $\geq 1$  MHz.

\*2 When the RF attenuator is 0 dB and the frequency is  $\geq 100$  kHz.

\*3 Specify one nominal line voltage between 100 and 240 V when ordering. Maximum operational voltage is 250 V.

## Options

### Option 01: GP-IB

External control	Conforms to IEEE 488.1 (Interface functions: SH1, AH1, T8, L4, SR0, RL1, PP0, DC1, DT0, C0) All items except power switch, CRT intensity, frequency adjustment, and level adjustment can be controlled. (frequency setting can be controlled with a resolution of 1 MHz and an accuracy of $\pm 20$ MHz)
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### Option 02: QP Detector

Detector	Electrical charge time constant	1 ms
	Electrical discharge time constant	160 ms (for resolution bandwidth of 9 kHz), 550 ms (for resolution bandwidth of 120 kHz)
Display section time constant		160 ms (for resolution bandwidth of 9 kHz), 100 ms (for resolution bandwidth of 120 kHz)

### Option 03: Tilt handle (MS610C/K)

MS610C/K with the tilt handle	Dimensions	193H $\times$ 370W $\times$ 502D mm (when the tilt handle extends horizontally)
	Weight	$\leq 15$ kg

## Ordering information

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

Model/Order No.	Name	Remarks
MS610B	<b>Main frame</b>	
MS610C	Spectrum Analyzer	10 kHz to 2 GHz, 50 $\Omega$
MS610J	Spectrum Analyzer	9 kHz to 2 GHz, 50 $\Omega$
MS610K	Spectrum Analyzer	10 kHz to 2 GHz, 75 $\Omega$
	Spectrum Analyzer	9 kHz to 2 GHz, 75 $\Omega$
J0025A	<b>Standard accessories</b>	
J0104A	Coaxial Cable, 1 m:	1 pc
J0121	Coaxial Cable, 1 m:	1 pc
J0308	Coaxial Cable, 1 m:	1 pc
J0017	Power Cord, 2.5 m:	1 pc
F0008	Fuse, 1.0 A:	2 pcs
W0268AE	MS610B/J Operation Manual:	1 copy
W0268BE	MS610B/J Service Manual:	1 copy
W0620AE	MS610C/K Operation Manual:	1 copy
W0620BE	MS610C/K Service Manual:	1 copy

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