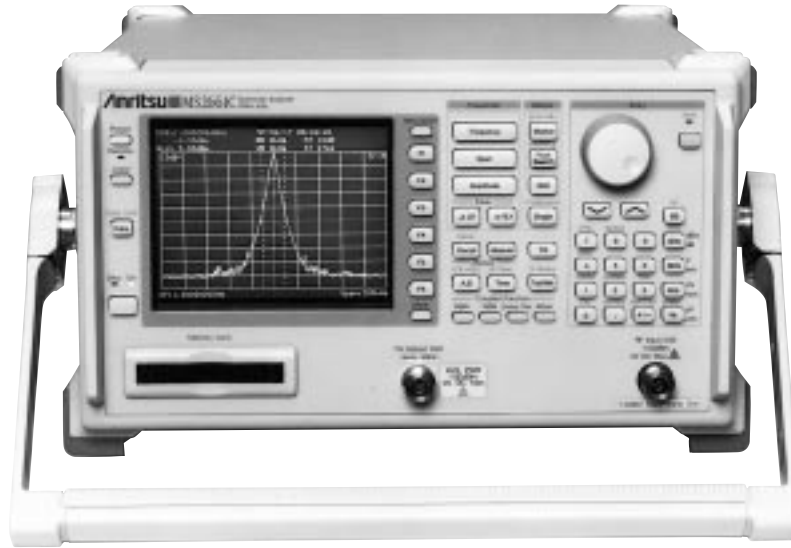


**SPECTRUM ANALYZER**  
**MS2661C**  
 9 kHz to 3 GHz

NEW



CE GPIB

The MS2661C Portable Spectrum Analyzer is for use in signal analysis of radio and other equipment related to improving frequency usage efficiency, higher modulation and digitalization. It is a synthesized spectrum analyzer covering a wide frequency range from 9 kHz to 3 GHz. It has superior basic performance such as high C/N ratio, low distortion, and high frequency/level accuracies and easy to

operate. It has a "Measure" function for evaluation of radio equipment (Frequency counter, C/N, adjacent channel power, occupied frequency bandwidth, burst average power and template decision function), and enables the Two-screen display and FM demodulation waveform display. The large selection of options means a wide range of applications can be handled at reasonable cost.

**Specifications**

Frequency	Frequency range	9 kHz to 3 GHz
	Frequency display accuracy	$\pm(\text{display frequency} \times \text{reference frequency accuracy} + \text{span} \times \text{span accuracy} + 100 \text{ Hz})$ *Span: $\geq 10 \text{ kHz}$ , after calibration
	Marker frequency display accuracy	Normal: Same as display frequency accuracy, Delta: Same as frequency span accuracy
	Frequency counter	Resolution: 1 Hz, 10 Hz, 100 Hz, 1 kHz Accuracy: $\pm(\text{display frequency} \times \text{reference frequency accuracy} \pm 1 \text{ LSD (at S/N: } \geq 20 \text{ dB)})$
	Frequency span	Setting range: 0 Hz, 1 kHz to 3.1 GHz Accuracy: $\pm 2.5\%$ (span: $\geq 10 \text{ kHz}$ ), $\pm 5\%$ (span: $< 10 \text{ kHz}$ with option 02)
	Resolution bandwidth (3 dB BW)	Setting range: 1 kHz, 3 kHz, 10 kHz, 30 kHz, 100 kHz, 300 kHz, 1 MHz, 3 MHz (manually settable, or automatically settable according to frequency span) *Option 02 : 30 Hz, 100 Hz, and 300 Hz are added. Measurements of noise, C/N, adjacent channel leakage power and channel power by measure function are executed with the calculated equivalent noise bandwidth of the RBW. Bandwidth accuracy: $\pm 20\%$ (1 kHz to 1 MHz), $\pm 30\%$ (3 MHz) Selectivity (60 dB : 3 dB): $\leq 15:1$
	Video bandwidth	1 Hz to 3 MHz (1-3 sequence), OFF (manually settable, or automatically settable according to RBW)
	Noise sideband and stability	Noise sideband: $\leq -100 \text{ dBc/Hz}$ (1 GHz, 10 kHz offset) Residual FM: $\leq 20 \text{ Hzp-p/0.1 s}$ (1 GHz, span: 0 Hz) Frequency drift: $\leq 200 \text{ Hz/min}$ (span: $\leq 10 \text{ kHz}$ , sweep time: $\leq 100 \text{ s}$ ) *After 1-hour warm-up at constant ambient temperature
Amplitude	Reference oscillator	Frequency: 10 MHz Aging rate: $2 \times 10^{-6}/\text{year}$ (typical); Option 01: $1 \times 10^{-7}/\text{year}$ , $2 \times 10^{-8}/\text{day}$ Temperature characteristics: $1 \times 10^{-5}$ (typical, $0^\circ$ to $50^\circ\text{C}$ ); Option 01: $\pm 5 \times 10^{-8}$ ( $0^\circ$ to $50^\circ\text{C}$ ) *Referenced to frequency at $25^\circ\text{C}$
	Level measurement	Measurement range: Average noise level to +30 dBm Maximum input level: +30 dBm (CW average power, RF ATT: $\geq 10 \text{ dB}$ ), $\pm 50 \text{ Vdc}$ Average noise level: $\leq -115 \text{ dBm}$ (1 MHz to 1 GHz), $\leq -115 \text{ dBm} + f[\text{GHz}] \text{ dB}$ ( $> 1 \text{ GHz}$ ), $\leq -114 \text{ dBm}$ (1 MHz to 1 GHz, at Option 08 pre-amplifier installed), $\leq -114 \text{ dBm} + 1.5f[\text{GHz}] \text{ dB}$ ( $> 1 \text{ GHz}$ , at Option 08 pre-amplifier installed) *RBW: 1 kHz, VBW: 1 Hz, RF ATT: 0 dB Residual response: $\leq -100 \text{ dBm}$ (RF ATT: 0 dB, input: $50 \Omega$ termination, 1 MHz to 3 GHz)
	Total level accuracy	$\pm 1.3 \text{ dB}$ (100 kHz to 3 GHz) *Level measurement accuracy after calibration using internal calibration signal Total level accuracy: Reference level accuracy (0 to $-49.9 \text{ dBm}$ ) + frequency response + log linearity (0 to $-20 \text{ dB}$ ) + calibration signal source accuracy

Continued on next page

Amplitude	Reference level	<p>Setting range Log scale: -100 to +30 dBm, Linear scale: 224 <math>\mu</math>V to 7.07 V</p> <p>Unit Log scale: dBm, dB<math>\mu</math>V, dBmV, V, dB<math>\mu</math>Vemf, W, dB<math>\mu</math>V/m Linear scale: V</p> <p>Reference level accuracy: <math>\pm 0.4</math> dB (-49.9 to 0 dBm), <math>\pm 0.75</math> dB (-69.9 to -50 dBm, 0.1 to +30 dBm), <math>\pm 1.5</math> dB (-80 to -70 dBm) *After calibration, at 100 MHz, span 1 MHz (when RF ATT, RBW, VBW, and sweep time set to AUTO) RBW switching uncertainty: <math>\pm 0.3</math> dB (1 kHz to 1 MHz), <math>\pm 0.4</math> dB (3 MHz) *After calibration, referenced to RBW 3 kHz Input attenuator(RF ATT) Setting range: 0 to 70 dB (10 dB steps) *Manually settable, or automatically settable according to reference level Switching uncertainty: <math>\pm 0.3</math> dB (0 to 50 dB), <math>\pm 1.0</math> dB (0 to 70 dB) *After calibration, frequency: 100 MHz, referenced to RF ATT: 10 dB</p>
	Frequency response	<p><math>\pm 0.5</math> dB (100 kHz to 3 GHz, referenced to 100 MHz, RF ATT: 10 dB, temperature: 18° to 28°C) <math>\pm 1.5</math> dB (9 to 100 kHz, referenced to 100 MHz, RF ATT: 10 dB, temperature: 18° to 28°C) <math>\pm 1.0</math> dB (100 kHz to 3 GHz, referenced to 100 MHz, RF ATT: 10 to 50 dB)</p>
	Waveform display	<p>Scale (10 div) Log scale: 10, 5, 2, 1 dB/div Linear scale: 10, 5, 2, 1%/div</p> <p>Linearity (after calibration) Log scale: <math>\pm 0.4</math> dB (0 to -20 dB), <math>\pm 1.0</math> dB (0 to -70 dB), <math>\pm 1.5</math> dB (0 to -85 dB), <math>\pm 2.5</math> dB (0 to -90 dB) Linear scale: <math>\pm 4\%</math> (compared to reference level)</p> <p>Marker level resolution Log scale: 0.01 dB, Linear scale: 0.02% of reference level</p>
	Spurious response	<p>2nd harmonic distortion: <math>\leq -60</math> dBc (10 to 200 MHz), <math>\leq -75</math> dBc (0.2 to 1.5 GHz), <math>\leq -80</math> dBc (0.8 to 1 GHz) *Mixer input level: -30 dBm</p> <p>Two tone 3rd intermodulation distortion: <math>\leq -70</math> dBc (10 to 100 MHz), <math>\leq -80</math> dBc (0.1 to 3 GHz) *Frequency difference of two signals: <math>\geq 50</math> kHz, mixer input level: -30 dBm</p>
	1 dB gain compression	$\geq -5$ dBm ( $\geq 100$ MHz, at mixer input level)
	Maximum dynamic range	<p>1 dB gain compression level to average noise level: <math>&gt; 110</math> dB (0.1 to 1 GHz), <math>&gt; 110</math> dB - f[GHz] dB (<math>&gt; 1</math> GHz), <math>&gt; 109</math> dB (0.1 to 1 GHz, at Option 08 pre-amplifier installed), <math>&gt; 109</math> dB - 1.5f[GHz] (<math>&gt; 1</math> GHz, at Option 08 pre-amplifier installed)</p> <p>Distortion characteristics (RBW: 1 kHz) 2nd harmonic: <math>&gt; 72.5</math> dB (10 to 200 MHz), <math>&gt; 80</math> dB (200 to 500 MHz), <math>&gt; 80 - f</math>[GHz] dB (0.5 to 1.5 GHz), <math>&gt; 82.5 - f</math>[GHz] dB (0.8 to 1 GHz) 3rd intermodulation: <math>&gt; 80</math> dB (10 to 100 MHz), <math>&gt; 83.3</math> dB (0.1 to 1 GHz), <math>&gt; 83.3 - 2/3f</math>[GHz] dB (1 to 3 GHz)</p>
Sweep	Sweep time	<p>Setting range : 20 ms to 1000 s (Manually settable, or automatically settable according to span, RBW, and VBW) Accuracy: <math>\pm 15\%</math> (20 ms to 100 s), <math>\pm 45\%</math> (110 to 1000 s), <math>\pm 1\%</math> (time domain sweep: digital zero span mode)</p>
	Sweep mode	Continuous, single
	Time domain sweep mode	Analog zero span, digital zero span
	Zone sweep	Sweeps only in frequency range indicated by zone marker
	Tracking sweep	Sweeps while tracing peak points within zone marker (zone sweep also possible)
Functions	Number of data points	501
	Detection mode	<p>NORMAL: Simultaneously displays max. and min. points between sample points POS PEAK: Displays max. point between sample points NEG PEAK: Displays min. point between sample points SAMPLE: Displays momentary value at sample points Detection mode switching uncertainty: <math>\pm 0.5</math> dB (at reference level)</p>
	Display	Color TFT-LCD, Size: 5.5", Number of colors: 17 (RGB, each 64-scale settable), intensity adjustment: 5 steps settable
	Display functions	<p>Trace A: Displays frequency spectrum Trace B: Displays frequency spectrum Trace Time: Displays time domain waveform at center frequency Trace A/B: Displays Trace A and Trace B simultaneously. Simultaneous sweep of same frequency, alternate sweep of independent frequencies Trace A/BG: Displays frequency region to be observed (background) and object band (foreground) selected from background with zone marker simultaneously at alternate sweep Trace A/Time: Displays frequency spectrum, and time domain waveform at center frequency simultaneously at alternate sweep</p>
	Storage functions	NORMAL, VIEW, MAX HOLD, MIN HOLD, AVERAGE, CUMULATIVE, OVER WRITE
	FM demodulation waveform display function	<p>Demodulation range: 2, 5, 10, 20, 50, 100, 200 kHz/div Marker display accuracy: <math>\pm 5\%</math> of full scale (referenced to center frequency, DC-coupled, RBW: 3 MHz, VBW: 1 Hz, CW) Demodulation frequency response: DC (50 Hz at AC-coupled) to 100 kHz *Range: <math>\leq 20</math> kHz/div, VBW: off, at 3 dB bandwidth DC (50 Hz at AC-coupled) to 500 kHz *Range: <math>\geq 50</math> kHz/div, VBW: off, at 3 dB bandwidth *RBW: <math>\geq 1</math> kHz usable</p>
	Input connector	N-J, 50 $\Omega$
	Auxiliary signal input and output	<p>IF OUTPUT: 10.69 MHz, BNC connector VIDEO OUTPUT (Y): 0 to 0.5 V <math>\pm 0.1</math> V (100 MHz, from lower edge to upper edge at 10 dB/div or 10%/div, 75 <math>\Omega</math> terminated, BNC connector) COMPOSITE OUTPUT: For NTSC, 1 Vp-p (75 <math>\Omega</math> terminated), BNC connector EXT REF INPUT: 10 MHz <math>\pm 10</math> Hz, <math>\geq 0</math> dBm (50 <math>\Omega</math> terminated), BNC connector</p>
	Signal search	AUTO TUNE, PEAK $\rightarrow$ CF, PEAK $\rightarrow$ REF, SCROLL
	Zone marker	NORMAL, DELTA
Marker $\rightarrow$	MARKER $\rightarrow$ CF, MARKER $\rightarrow$ REF, MARKER $\rightarrow$ CF STEP SIZE, $\Delta$ MARKER $\rightarrow$ SPAN, ZONE $\rightarrow$ SPAN	
Peak search	PEAK, NEXT PEAK, NEXT RIGHT PEAK, NEXT LEFT PEAK, MIN DIP, NEXT DIP	

Continued on next page

Functions	Multi-marker	Number of markers: 10 max. (HIGHEST 10, HARMONICS, MANUAL SET)
	Measure	Noise power (dBm/Hz, dBm/ch), C/N (dBc/Hz, dBc/ch), occupied bandwidth (power N% method, X-dB down method), adjacent channel power (REF: total power/reference level/in-band level method, channel designate display: 2 channels x 2 graphic display), average power of burst signal (average power in designated time range of time domain waveform), channel power (dBm, dBm/Hz), template comparison (upper/lower limits x each 2, time domain), MASK (upper/lower x each 2, frequency domain)
	Save/recall	Save and recall setting conditions and waveform data to internal memory (max. 12) or memory card
	Hard copy	Printer (HP dot matrix, EPSON dot matrix or compatible models): Display data can be hard-copied via RS-232C, GPIB and Centronics (Option 10) interface Plotter (HP-GL, GP-GL compatible models): Display can be output via RS-232C, and GPIB interface
	PTA	Language: PTL (interpreter based on BASIC) Programming: Using editor of external computer Program memory: Memory card, upload/download to/from external computer Programming capacity: 192 KB Data processing: Directly accesses measurement data according to system variables, system subroutines, and system functions
	RS-232C	Outputs data to printer and plotter. Control from external computer (excluding power switch)
	GPIB	Meets IEEE488.2. Controlled by external computer (excluding power switch). Or controls external equipment with PTA Interface : SH1, AH1, T6, L4, SR1, RL1, PP0, DC1, DT1, C1, C2, C3, C4, C28
	Correction	Automatic correction of insertion loss of MA1621A Impedance Transformer Correction accuracy (RF ATT: $\geq 10$ dB): $\pm 2.5$ dB (9 to 100 kHz), $\pm 1.5$ dB (100 kHz to 2 GHz), $\pm 2.0$ dB (2 to 3 GHz) *Typical value Antenna correction coefficients: Correct display and measurement of field strengths (dB $\mu$ V/m) for specified antennas, Internal antenna correction coefficients (MP534A/651A Dipole Antenna, MP635A/666A Log-Periodic Antenna, MP414B Loop Antenna, and four antennas user-defined), user-defined: write via GPIB or RS-232C interface, save/load to/from memory card
	Memory card interface	Functions: Saving/recalling measurement parameters/waveform data, uploading/downloading PTA programs; Applicable cards: SRAM, EPROM, Flash EPROM *Only SRAM writable; Card capacity: 2 MB max. Connector: Meets the JEIDA Ver 4/4.1, PCMCIA Rel. 2.0, 2 slots
Others	Conducted emission	Meets the EN55011 (Group 1, Class A)
	Radiated emission	Meets the EN55011 (Group 1, Class A)
	Static discharge	Meets the EN50082-1
	Radiation field	Meets the EN50082-1
	Conducted susceptibility	Meets the IEC801-4 (Level II)
	Vibration	Meets the MIL-STD-810D
	Power (operating range)	85 to 132/170 to 250 Vac (automatic voltage switching), 47.5 to 63 Hz, 380 to 420 Hz (85 to 132 V only), $\leq 330$ VA
	Dimensions and mass	320 (W) x 177 (H) x 351 (D) mm, $\leq 10.8$ kg (without option)
	Ambient temperature	0° to +50°C (operate), -40° to +75°C (storage)

### • Option 01: Reference crystal oscillator

Frequency	10 MHz
Aging rate	$\leq 1 \times 10^{-7}$ /year, $\leq 2 \times 10^{-8}$ /day (after power on, with reference to frequency after 24 h)
Temperature characteristics	$\pm 5 \times 10^{-8}$ (0° to 50°C, with reference to 25°C)
Buffer output	BNC connector, 10 MHz, $> 2$ Vp-p (200 $\Omega$ terminated)

### • Option 02: Narrow resolution bandwidth

Resolution bandwidth (3 dB)	30 Hz, 100 Hz, 300 Hz
Resolution bandwidth switching uncertainty	$\pm 0.4$ dB (RBW 3 kHz referenced)
Resolution bandwidth accuracy	$\pm 20\%$ (100, 300 Hz)
Selectivity (60 dB:3 dB)	$\leq 15:1$ (RBW: 100, 300 Hz), $\leq 20:1$ (RBW: 30 Hz)

### • Option 04: High-speed time domain sweep

Sweep time	12.5 $\mu$ s, 25 $\mu$ s, 50 $\mu$ s, 100 to 900 $\mu$ s (one most significant digit settable) 1.0 to 19 ms (two upper significant digits settable)
Accuracy	$\pm 1\%$
Marker level resolution	0.1 dB (log scale), 0.2% (linear scale, relative to reference level)

### • Option 06: Trigger/gate circuit

Trigger switch	FREERUN, TRIGGERED	
Trigger source	EXT	Trigger level: $\pm 10$ V (resolution: 0.1 V), TTL level Trigger slope: Rise/Fall Connector: BNC
	VIDEO	Trigger level (at log scale): -100 to 0 dB (resolution: 1 dB) Trigger slope: Rise/Fall
	WIDE IF VIDEO	Trigger level: High, Middle, or Low selectable Bandwidth: $\geq 20$ MHz Trigger slope: Rise/Fall
	LINE	Frequency: 47.5 to 63 Hz (line lock)
TV	Method: M-NTSC, B/G/H PAL Sync: V-SYNC, H-SYNC Sync line (NTSC) H-SYNC (ODD): 7 to 262 line, H-SYNC (EVEN): 1 to 263 line Sync line (PAL) H-SYNC (ODD): 1 to 312 line, H-SYNC (EVEN): 317 to 625 line *Option 16 required	
Trigger delay	Pre-trigger (displays waveform from previous max. 1 screen at trigger occurrence point) Range: -time span to 0 s Resolution: time span/500 Post trigger (displays waveform from after max. 65.5 ms at trigger occurrence point) Range: 0 to 65.5 ms Resolution: 1 $\mu$ s	
Gate sweep	In frequency domain, displays spectrum of input signal in specified gate interval Gate delay: 0 to 65.5 ms (from trigger point, resolution: 1 $\mu$ s) Gate width: 2 $\mu$ s to 65.5 ms (from gate delay, resolution: 1 $\mu$ s)	

### • Option 07: AM/FM demodulator

Voice output	With internal loudspeaker and earphone connector (ø3.5 jack), adjustable volume
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### • Option 10: Centronics interface

Function	Outputs data to printer (Centronics standard), GPIB interface can not be used simultaneously
Connector	D-sub 25-pin (jack)

### • Option 08: Pre-amplifier\*1

Frequency range	100 kHz to 3 GHz
Gain	20 dB ±2 dB (after calibration)
Noise figure	≤7 dB (<2 GHz, typical), ≤12 dB (≥2 GHz, typical)
Measurement range	Average noise level to +10 dBm
Max. input level	CW average power: +10 dBm, ±50 Vdc
Average noise level	≤-134 dBm (1 MHz to 1 GHz), ≤-134 dBm + 2f[GHz] dB (>1 GHz) *RBW: 1 kHz, VBW: 1 Hz, RF ATT: 0 dB
Reference level	Setting range Log scale: -120 to +10 dBm, or equivalent level Linear scale: 22.4 μV to 707 mV Reference level accuracy: ±0.5 dB (-69.9 to -20 dBm), ±0.75 dB (-89.9 to -70 dBm, -19.9 to +10 dBm) *After calibration, referenced to 100 MHz frequency, 1 MHz span (RF ATT, RBW and VBW set to AUTO) RBW switching uncertainty: ±0.5 dB *After calibration, referenced to 3 kHz RBW RF ATT switching uncertainty: ±0.5 dB (0 to 50 dB), ±1.0 dB (0 to 70 dB) *After calibration, referenced to 100 MHz frequency, 10 dB RF ATT
Frequency response	±2.0 dB (100 kHz to 3 GHz) *Referenced to 100 MHz (RF ATT: 10 to 50 dB)
Linearity of waveform display	Log scale (after calibration): ±0.5 dB (0 to -20 dB), ±1.0 dB (0 to -60 dB), ±1.5 dB (0 to -75 dB) Linear scale (after calibration): ±5% (according to reference level)
Spurious response	2 tone 3rd intermodulation distortion: ≤-70 dBc (10 MHz to 3 GHz) *Frequency difference of two signals: ≥50 kHz, Pre-amplifier input level*2: -55 dBm
1 dB gain compression	≥-35 dBm (≥100 MHz, at pre-amplifier input level*2)

\*1: Overall specification with pre-amplifier on (Noise figure is the simple performance)

\*2: Pre-amplifier input level = RF input level – RF ATT setting level

### • Option 12: QP detector

Functions	Can only be installed with Option 02.																																											
6 dB bandwidth	200 Hz, 9 kHz, 120 kHz Accuracy: ±30% (18° to 28°C)																																											
Display	LOG Scale, 5 dB/div (10 divisions) Linearity: ≤±2.0 dB (0 to -40 dB, CW signal, reference level: 60 dBμV, RF ATT: 0 dB, 18° to 28°C)																																											
Pulse response characteristics	Response to CISPR pulse (DET mode: QP, 18° to 28°C)																																											
	<table border="1"> <thead> <tr> <th rowspan="2">Repetition frequency</th> <th colspan="3">Bandwidth</th> </tr> <tr> <th>120 kHz</th> <th>9 kHz</th> <th>200 Hz</th> </tr> </thead> <tbody> <tr> <td>1 kHz</td> <td>≤-8.0 ±1.0 dB</td> <td>≤-4.5 ±1.0 dB</td> <td>-</td> </tr> <tr> <td>100 Hz</td> <td>Referenced</td> <td>Referenced</td> <td>≤-4.0 ±1.0 dB</td> </tr> <tr> <td>60 Hz</td> <td>-</td> <td>-</td> <td>≤-3.0 ±1.0 dB</td> </tr> <tr> <td>25 Hz</td> <td>-</td> <td>-</td> <td>Referenced</td> </tr> <tr> <td>20 Hz</td> <td>≤+9.0 ±1.0 dB</td> <td>≤+6.5 ±1.0 dB</td> <td>-</td> </tr> <tr> <td>10 Hz</td> <td>≤+14.0 ±1.5 dB</td> <td>≤+10.0 ±1.5 dB</td> <td>≤+4.0 ±1.0 dB</td> </tr> <tr> <td>5 Hz</td> <td>-</td> <td>-</td> <td>≤+7.5 ±1.5 dB</td> </tr> <tr> <td>2 Hz</td> <td>≤+26.0 ±2.0 dB</td> <td>≤+20.5 ±2.0 dB</td> <td>≤+13.0 ±2.0 dB</td> </tr> <tr> <td>1 Hz</td> <td>≤+28.5 ±2.0 dB</td> <td>≤+22.5 ±2.0 dB</td> <td>≤+17.0 ±2.0 dB</td> </tr> </tbody> </table>	Repetition frequency	Bandwidth			120 kHz	9 kHz	200 Hz	1 kHz	≤-8.0 ±1.0 dB	≤-4.5 ±1.0 dB	-	100 Hz	Referenced	Referenced	≤-4.0 ±1.0 dB	60 Hz	-	-	≤-3.0 ±1.0 dB	25 Hz	-	-	Referenced	20 Hz	≤+9.0 ±1.0 dB	≤+6.5 ±1.0 dB	-	10 Hz	≤+14.0 ±1.5 dB	≤+10.0 ±1.5 dB	≤+4.0 ±1.0 dB	5 Hz	-	-	≤+7.5 ±1.5 dB	2 Hz	≤+26.0 ±2.0 dB	≤+20.5 ±2.0 dB	≤+13.0 ±2.0 dB	1 Hz	≤+28.5 ±2.0 dB	≤+22.5 ±2.0 dB	≤+17.0 ±2.0 dB
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QP on/off switching uncertainty (PEAK, QP)	≤±1.0 dB (CW signal, reference level -40 dB, after auto-calibration, 18° to 28°C)																																											
Detection mode	QP, AVERAGE																																											
Field strength measurement	Waveform data compensation data display for specified antenna factor, field strength (dBμV/m) Built-in antenna factors: MP534A/651A Dipole Antenna, MP635A/666A Log-Periodic Antenna, MP414B Loop Antenna, user-defined (four types writable via GPIB or RS-232C, can be saved/loaded to/from memory card)																																											

## • Option 14: PTA parallel I/O

Functions	Controls external devices from PTA, cannot be installed when Option 10 installed																																																																															
System variables	As follows using PTA system variables IOA: Controls 8-bit parallel output port A IOB: Controls 8-bit parallel output port B IOC: Controls 4-bit parallel input/output port C	IOD: Controls 4-bit parallel input/output port D EIO: Controls I/O switching of ports C/D EXO: Controls I/O trigger																																																																														
PTL statements	External interrupt control of input to I/O ports using PTA-PTL statements IOEN statement: Enables interrupt input      ON TO GOTO statement: Changes program flow at interrupt generation IODI statement: Disables interrupt input      ON TO GOSUB statement: Changes program flow at interrupt generation IOMA statement: Masks interrupt input																																																																															
Write strobe signal	Write strobe signal (negative pulse) output externally at control of output ports C/D																																																																															
Power supply	External +5 ±0.5 Vdc (max. 100 mA) supply																																																																															
Signal logic levels	Negative logic, TTL level Specified current Output ports A/B (max. output current Hi: 2.6 mA, Lo: 24 mA) Output ports C/D (max. output current Hi: 15 mA, Lo: 24 mA) Other control output lines (max. output current Hi: 0.4 mA, Lo: 8 mA)																																																																															
Connection cable connectors	Amphenol 36 pins																																																																															
Connector pin layout	<table border="1"> <thead> <tr> <th>No.</th> <th>Item</th> <th>No.</th> <th>Item</th> <th>No.</th> <th>Item</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>GND</td> <td>13</td> <td>Output port B (0) LSB</td> <td>25</td> <td>I/O port D (0) LSB</td> </tr> <tr> <td>2</td> <td>Trigger input</td> <td>14</td> <td>Output port B (1)</td> <td>26</td> <td>I/O port D (1)</td> </tr> <tr> <td>3</td> <td>Trigger output 1</td> <td>15</td> <td>Output port B (2)</td> <td>27</td> <td>I/O port D (2)</td> </tr> <tr> <td>4</td> <td>Trigger output 2</td> <td>16</td> <td>Output port B (3)</td> <td>28</td> <td>I/O port D (3) MSB</td> </tr> <tr> <td>5</td> <td>Output port A (0) LSB</td> <td>17</td> <td>Output port B (4)</td> <td>29</td> <td>Port C status 0/1: I/O</td> </tr> <tr> <td>6</td> <td>Output port A (1)</td> <td>18</td> <td>Output port B (5)</td> <td>30</td> <td>Port D status 0/1: I/O</td> </tr> <tr> <td>7</td> <td>Output port A (2)</td> <td>19</td> <td>Output port B (6)</td> <td>31</td> <td>Write strobe signal</td> </tr> <tr> <td>8</td> <td>Output port A (3)</td> <td>20</td> <td>Output port B (7) MSB</td> <td>32</td> <td>Interruption signal</td> </tr> <tr> <td>9</td> <td>Output port A (4)</td> <td>21</td> <td>I/O port C (0) LSB</td> <td>33</td> <td>Not used</td> </tr> <tr> <td>10</td> <td>Output port A (5)</td> <td>22</td> <td>I/O port C (1)</td> <td>34</td> <td>+5 V power supply</td> </tr> <tr> <td>11</td> <td>Output port A (6)</td> <td>23</td> <td>I/O port C (2)</td> <td>35</td> <td>Not used</td> </tr> <tr> <td>12</td> <td>Output port A (7) MSB</td> <td>24</td> <td>I/O port C (3) MSB</td> <td>36</td> <td>Not used</td> </tr> </tbody> </table>		No.	Item	No.	Item	No.	Item	1	GND	13	Output port B (0) LSB	25	I/O port D (0) LSB	2	Trigger input	14	Output port B (1)	26	I/O port D (1)	3	Trigger output 1	15	Output port B (2)	27	I/O port D (2)	4	Trigger output 2	16	Output port B (3)	28	I/O port D (3) MSB	5	Output port A (0) LSB	17	Output port B (4)	29	Port C status 0/1: I/O	6	Output port A (1)	18	Output port B (5)	30	Port D status 0/1: I/O	7	Output port A (2)	19	Output port B (6)	31	Write strobe signal	8	Output port A (3)	20	Output port B (7) MSB	32	Interruption signal	9	Output port A (4)	21	I/O port C (0) LSB	33	Not used	10	Output port A (5)	22	I/O port C (1)	34	+5 V power supply	11	Output port A (6)	23	I/O port C (2)	35	Not used	12	Output port A (7) MSB	24	I/O port C (3) MSB	36	Not used
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## • Option 15: Sweep signal output

Sweep output (X)	0 to 10 V ±1 V (≥100 kΩ termination, from left side to right side of display scale), BNC connector
Sweep status output (Z)	TTL level (low level with sweeping), BNC connector

## • Option 16: Television monitor

Video	M-NTSC, B/G/H PAL, color
Audio	Simultaneous monitor video and audio needs Option 07
Function	Channel: Automatic setting to broadcast wave of CCIR, Japan, USA and Italy; automatic setting to CATV of CCIR, Japan and USA Trigger: Triggered sweep by V-SYNC, H-SYNC (trigger sweep and trigger gate; Option 06 required) Aux. output: Composite video signal, Connector: BNC

## • Option 19: DC coupled input

Functions	DC-couples input circuit of main unit and expands lower limit of receiver frequency range to 500 Hz *Can only be installed with Option 02 (narrow band RBW)
Electrical	The standard specifications of the main unit are supplemented and changed as follows: Frequency range: 500 Hz to 3.0 GHz Max. input level: +30 dBm (CW, RF ATT: ≥10 dB), ±0 Vdc Average noise level: <-80 dBm (500 Hz to 10 kHz), ≤-90 dBm (10 kHz to 200 kHz), ≤-110 dBm (200 kHz to 1 MHz) *RBW: 30 Hz, VBW: 1 Hz, RF ATT: 0 dB Frequency response: ±1.2 dB (500 Hz to 100 kHz), ±0.5 dB (100 kHz to 3 GHz) *Referenced to 100 MHz frequency, RF ATT: 10 dB, ambient temperature: 18° to 28°C

## • Option 20: Tracking generator

Frequency range	9 kHz to 3 GHz
Output level range	0 to -60 dBm
Setting resolution	0.1 dB
Output level accuracy	≤±1.0 dB (at 100 MHz, 0 dBm)
Output level flatness	≤±1.5 dB (100 kHz to 3 GHz, output level: 0 dBm, referenced to 100 MHz frequency)
Output level linearity	≤±1.0 dB (0 to -30 dBm), ≤±2.0 (-30 to -60 dBm) *100 kHz to 3 GHz, 0 dBm output level reference
Spurious	Harmonic: ≤-20 dBc (100 kHz to 3 GHz), Non-harmonic: ≤-35 dBc (100 kHz to 3 GHz)
Tracking generator feed through	≤-95 dBm (Spectrum Analyzer input and Tracking Generator output connectors terminated at 50 Ω)
Output connector	N-J, 50 Ω

## Ordering information

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

Model/order No.	Name
MS2661C	<b>Main frame</b> Spectrum Analyzer
	<b>Standard accessories</b>
	Power cord, 2.5 m: 1 pc
F0013	Fuse, 5 A: 2 pcs
W1251AE	MS2661C operation manual: 1 copy
	<b>Options</b>
MS2661C-01	Reference crystal oscillator
MS2661C-02	Narrow resolution bandwidth
MS2661C-04	High-speed time domain sweep
MS2661C-06	Trigger/gate circuit
MS2661C-07	AM/FM demodulator
MS2661C-08	Pre-amplifier
MS2661C-10	Centronics interface (GPIB cannot be used.)
MS2661C-12	QP detector (used Option 02 simultaneously, QP-BW: 0.2/9/120kHz)
MS2661C-14	PTA parallel I/O (Option 10 cannot be used simultaneously.)
MS2661C-15	Sweep signal output
MS2661C-16	Television monitor
MS2661C-19	DC coupled input (used Option 02 simultaneously)
MS2661C-20	Tracking generator
	<b>Application parts</b>
J0561	Coaxial cord (N-P-5W•5D-2W•N-P-5W), 1 m
J0104A	Coaxial cord (BNC-P•RG-55/U•N-P), 1 m
CSCJ-256K-SM	256 KB memory card (meets PCMCIA Rel. 2.0)
CSCJ-512K-SM	512 KB memory card (meets PCMCIA Rel. 2.0)
CSCJ-001M-SM	1024 KB memory card (meets PCMCIA Rel. 2.0)
CSCJ-002M-SM	2048 KB memory card (meets PCMCIA Rel. 2.0)
B0329G	Protective cover (3/4MW4U)
B0395A	Rack mount kit (IEC)
B0395B	Rack mount kit (JIS)
J0055	Coaxial adaptor (NC-P•BNC-J)
J0076	Coaxial adaptor (NC-P•F-J)
B0391A	Carrying case (hard type, with casters)
B0391B	Carrying case (hard type, without casters)
MP612A	RF Fuse Holder
MP613A	Fuse Element
J0805	DC block (MODEL 7003, 10 kHz to 18 GHz, Weinschel product)
MA2507A	DC Block Adaptor (50 Ω, 9 kHz to 3 GHz, allowable voltage: ±50 V)
MA8601A	DC Block Adaptor (50 Ω, 30 kHz to 2 GHz, allowable voltage: ±50 V)
MA8601J	DC Block Adaptor (75 Ω, 10 kHz to 2.2 GHz, allowable voltage: ±50 V)
MA1621A	50 Ω → 75 Ω Impedance Transformer (9 kHz to 3 GHz, ±100 V)

Model/order No.	Name
MP614A	50 Ω ↔ 75Ω Impedance Transformer
J0121	Coaxial cord (NC-P-3W•3C-2WS•NC-P-3W), 1 m
J0308	Coaxial cord (BNC-P•3C-2WS•NC-P-3W), 1 m
J0063	Fixed attenuator for high power (30 dB, 10 W, DC to 12.4 GHz)
J0395	Fixed attenuator for high power (30 dB, 30 W, DC to 9 GHz)
MP640A	Branch
MP654A	Branch
MP520A	CM Directional Coupler
MP520B	CM Directional Coupler
MP520C	CM Directional Coupler
MP520D	CM Directional Coupler
MP526A	High Pass Filter
MP526B	High Pass Filter
MP526C	High Pass Filter
MP526D	High Pass Filter
MP526G	High Pass Filter
MA1601A	High Pass Filter (800/900 MHz band, N)
J0007	GPIB cable, 1 m
J0008	GPIB cable, 2 m
J0742A	RS-232C cable, 1 m [for PC-98 Personal Computer and VP-600, D-sub 25 pins (straight)]
J0743A	RS-232C cable, 1 m [for DOS/V compatible, D-sub 9-pins (cross)]
60N50-1	Reflection bridge
60NF50-1	Reflection bridge
87A50	Reflection bridge
62N75	Reflection bridge
62NF75	Reflection bridge
MH648A	Pre-Amplifier
MP534A	Dipole Antenna
MP651A	Dipole Antenna
BBA9106/VHA9103	Biconical Antenna
6502	Loop Antenna
MP414B	Loop Antenna
MP415B	Rod Antenna
MP635A	Log-Periodic Antenna
MP666A	Log-Periodic Antenna
MB9A	Tripod
MB19A	Tripod
MN423B	Artificial Mains Network
MN424B	Artificial Mains Network
MA2601B	EMI Probe
MA2601C	EMI Probe
KT-10	EMI clamp
KT-20	EMI clamp

