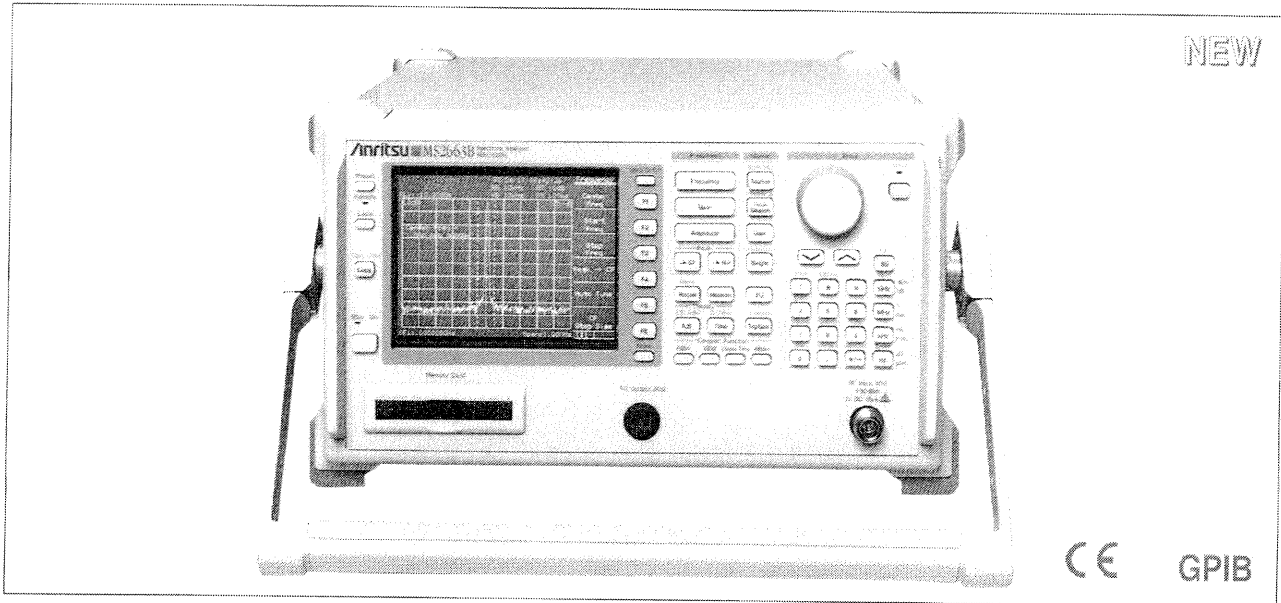


SPECTRUM ANALYZERS  
MS2653B/2663B

9 kHz to 8.1 GHz



The MS2653B/2663B cover a frequency range of 9 kHz to 8.1 GHz. This allows measurement of spurious frequencies of up to three times greater than the frequency bands used worldwide for mobile communications. The MS2653B/2663B have superior basic performance such as high C/N ratio, low distortion, and high frequency/level accuracies and are easy to operate. They have the "Measure" function for evaluation of radio equipment (Frequency counter, C/N, adjacent channel power, occupied frequency bandwidth, burst aver-

age 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.

The MS2663B is designed for manufacture and installation of radio equipment and devices, while the MS2653B is used for maintenance applications.

Specifications

Model	MS2653B	MS2663B
Frequency range	9 kHz to 8.1 GHz	
Frequency band	Band 0 (0 to 3.2 GHz), band 1 - (3.1 to 6.5 GHz), band 1 + (6.4 to 8.1 GHz)	
Pre-selector range	3.1 to 8.1 GHz (band 1-, 1+)	
Display frequency accuracy	± (display frequency x reference frequency accuracy + span x span accuracy + 100 Hz) *Span: ≥10 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: Display frequency x reference frequency accuracy ±1 LSD (at S/N: ≥20 dB)	
Frequency span	Setting range: 0 Hz, 1 kHz to 8.2 GHz Accuracy: ±2.5 % (span: ≥10 kHz)	Setting range: 0 Hz, 1 kHz to 8.2 GHz Accuracy: ±2.5 % (span: ≥10 kHz), ±5 % (span: <10 kHz, Option 02 installed)
Resolution bandwidth (3 dB BW)	Setting range: 1 kHz, 3 kHz, 10 kHz, 30 kHz, 100 kHz, 300 kHz, 1 MHz, 5 MHz (manually settable, or automatically settable according to frequency span) *Option 02 (MS2663B only): 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. Selectivity (60 dB : 3 dB ): ≤10 : 1 (RBW: 1 kHz to 300 kHz), ≤15 : 1 (RBW: 1, 5 MHz)	
Video bandwidth	1 Hz to 3 MHz (1-3 sequence), OFF *Manually settable, or automatically settable according to RBW	
Noise sideband and stability	Noise sidebands : ≤-90 dBc/Hz (1 GHz, 10 kHz offset) Residual FM: ≤20 Hzp-p/0.1 s (1 GHz, span: 0 Hz) Frequency drift: ≤200 Hz/min (span: ≤10 kHz, sweep time: ≤100 s) *After 1-hour warm-up at constant ambient temperature	Noise sidebands: ≤-100 dBc/Hz (1 GHz, 10 kHz offset)
Reference oscillator	Frequency: 10 MHz Aging rate: 2 x 10 <sup>-6</sup> /year (typical); Option 01: 1 x 10 <sup>-7</sup> /year, 2 x 10 <sup>-8</sup> /day Temperature characteristics: 1 x 10 <sup>-5</sup> (typical, 0° to 50 °C); Option 01: ±5 x 10 <sup>-8</sup> (0° to 50 °C)	

Continued on next page

Model		MS2653B	MS2663B
Level measurement	Measurement range	Average noise level to +30 dBm	
	Maximum input level	+30 dBm (CW average power, RF ATT: ≥10 dB), ±0 Vdc	
	Average noise level	≤-110 dBm (1 MHz to 1 GHz, band 0) ≤-110 dBm + f [GHz] dB (1 to 3.1 GHz, band 0) ≤-110 dBm + 0.5f [GHz] dB (3.1 to 8.1 GHz, band 1) *RBW: 1 kHz, VBW: 1 Hz, RF ATT: 0 dB	≤-115 dBm (1 MHz to 1 GHz, band 0) ≤-115 dBm + 1.5f [GHz] dB (1 to 3.1 GHz, band 0) ≤-115 dBm + 0.5f [GHz] dB (3.1 to 8.1 GHz, band 1) *RBW: 1 kHz, VBW: 1 Hz, RF ATT: 0 dB
	Residual response	≤-95 dBm (RF ATT: 0 dB, input: 50 Ω termination, 1 MHz to 8.1 GHz)	≤-100 dBm (RF ATT: 0 dB, input: 50 Ω termination, 1 MHz to 1 MHz to 8.1 GHz)
Total level accuracy	±1.3 dB (100 kHz to 3.1 GHz band 0), ±2.3 dB (3.1 to 8.1 GHz, band 1) *Level measurement accuracy after calibration using internal calibration signal Total level accuracy: Reference level accuracy (0 to -49.9 dBm) + frequency response + log linearity (0 to -20 dB) + calibrated signal source accuracy		
Reference level	Setting range Log scale: -100 to +30 dBm, Linear scale: 224 μV to 7.07 V Unit Log scale: dBm, dBμV, dBmV, V, dBμVemf, W, dBμV/m Linear scale: V Reference level accuracy: ±0.4 dB (-49.9 to 0 dBm), ±0.75 dB (-69.9 to -50 dBm, 0.1 to +30 dBm), ±1.5 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: ±0.3 dB (1 kHz to 1 MHz), ±0.4 dB (5 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 Accuracy: ±0.3 dB (0 to 50 dB), ±1.0 dB (0 to 70 dB) *After calibration, frequency: 100 MHz, referenced to RF ATT: 10 dB		
Frequency response	±0.5 dB (100 kHz to 3.2 GHz, band 0, referenced to 100 MHz, RF ATT: 10 dB, temperature: 18° to 28 °C) ±1.5 dB (9 to 100 kHz, band 0, referenced to 100 MHz, RF ATT: 10 dB, temperature: 18° to 28 °C) ±1.5 dB (3.1 to 8.1 GHz, band 1, referenced to 100 MHz, RF ATT: 10 dB, temperature: 18° to 28 °C) ±1.0 dB (100 kHz to 3.2 GHz, band 0, RF ATT: 10 to 50 dB) ±3.0 dB (3.1 to 8.1 GHz, band 1, RF ATT: 10 to 50 dB) *At band 1, after pre-selector tuning		
Waveform display	Scale (10 div) Log scale: 10, 5, 2, 1 dB/div Linear scale: 10, 5, 2, 1 %/div Linearity (after calibration) Log scale: ±0.4 dB (0 to -20 dB), ±1.0 dB (0 to -70 dB), ±1.5 dB (0 to -85 dB), ±2.5 dB (0 to -90 dB) Linear scale: ±4 % (compared to reference level) Marker level resolution Log scale: 0.01 dB, Linear scale: 0.02 % of reference level		
Spurious response	2nd harmonic distortion: ≤-55 dBc (10 to 100 MHz, band 0, mixer input: -30 dBm) ≤-60 dBc (0.1 to 1.55 GHz, band 0, mixer input: -30 dBm) ≤-100 dBc (1.55 to 4.05 GHz, band 1, mixer input: -20 dBm) Two tone 3rd order intermodulation distortion: ≤-70 dBc (10 MHz to 8.1 GHz) *Mixer input: -30 dBm *Frequency difference of two signals: ≥50 kHz, mixer input: -30 dBm	2nd harmonic distortion: ≤-60 dBc (10 to 200 MHz, band 0, mixer input: -30 dBm) ≤-75 dBc (0.2 to 1.3 GHz, band 0, mixer input: -30 dBm) ≤-70 dBc (1.3 to 1.55 GHz, band 0, mixer input: -30 dBm) ≤-80 dBc (0.8 to 1 GHz, band 0, mixer input: -30 dBm) ≤-100 dBc (1.55 to 4.05 GHz, band 1, mixer input: -20 dBm) Two tone 3rd order intermodulation distortion: ≤-70 dBc (10 to 100 MHz), ≤-80 dBc (0.1 to 8.1 GHz) *Frequency difference of two signals: ≥50 kHz, mixer input: -30 dBm	
1 dB gain compression	≥-5 dBm (≥100 MHz, at mixer input level)		
Maximum dynamic range	1 dB gain compression level to average noise level: >105 dB (100 MHz to 1 GHz, band 0) >105 dB -f [GHz] dB (1 to 3.1 GHz, band 0) >105 dB -0.5f [GHz] dB (3.1 to 8.1 GHz, band 1) Distortion characteristics (RBW: 1 kHz) 2nd harmonic: >67.5 dB (10 to 100 MHz) >70 dB (100 to 500 MHz) >70 -0.5f [GHz] dB (0.5 to 1.55 GHz) >95 -0.25f [GHz] dB (1.55 to 4.05 GHz) 3rd order intermodulation: >76.6 dB (10 to 1000 MHz) >76.6 -2/3f [GHz] dB (1 to 3.1 GHz) >76.6 -1/3f [GHz] dB (3.1 to 8.1 GHz)	1 dB gain compression level to average noise level: >110 dB (0.1 to 1 GHz, band 0) >110 dB -1.5f [GHz] dB (1 to 3.1 GHz, band 0) >110 dB -0.5f [GHz] dB (3.1 to 8.1 GHz, band 1) Distortion characteristics (RBW: 1 kHz) 2nd harmonic: >72.5 dB (10 to 200 MHz) >80 dB (200 to 500 MHz) >80 -0.75f [GHz] dB (0.5 to 1.3 GHz) >82.5 -0.75f [GHz] dB (0.8 to 1 GHz) >77.5 -0.75f [GHz] dB (1.3 to 1.55 GHz) >97.5 -0.25f [GHz] dB (1.55 to 4.05 GHz) 3rd order intermodulation : >80 dB (10 to 100 MHz) >83.3 dB (0.1 to 1 GHz) >83.3 -f [GHz] dB (1 to 3.1 GHz) >83.3 -1/3f [GHz] dB (3.1 to 8.1 GHz)	
Sweep	Sweep time	Setting range : 20 ms to 1000 s (manually settable, or automatically settable according to span, RBW, and VBW) Accuracy: ±15 % (20 ms to 100 s), ±45 % (1 to 1000 s), ±1 % (time domain sweep: digital zero span mode)	
	Sweep mode	Continuous, single	
	Time domain sweep mode	Analog zero span, digital zero span	
	Tracking sweep	Sweeps while tracing peak points within zone marker (zone sweep also possible)	

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	Model	MS2653B	MS2663B
Functions	Number of data points	501	
	Detection mode	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: $\pm 0.5$ dB (at reference level)	
	Display	Color TFT-LCD, Size: 5.5". Number of colors: 17 (RGB, each 64-scale settable), Intensity adjustment: 5 steps settable	
	Display functions	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, alternate sweep Trace A/Time: Displays frequency spectrum, and time domain waveform at center frequency simultaneously, alternate sweep Trace move/calculation: A $\rightarrow$ B, B $\rightarrow$ A, A $\leftrightarrow$ B, A+B $\rightarrow$ A, A-B $\rightarrow$ A, A-B+DL $\rightarrow$ A	
	Storage functions	NORMAL, VIEW, MAX HOLD, MIN HOLD, AVERAGE, CUMULATIVE, OVER WRITE	
	FM demodulation waveform display function	Demodulation range: 2, 5, 10, 20, 50, 100, 200 kHz/div Marker display Accuracy: $\pm 5$ % of full scale (referenced to center frequency, DC-coupled. RBW: 5 MHz, VBW: 1 Hz, CW) Demodulation frequency range: DC (50 Hz at AC-coupled) to 100 kHz (range: $\leq 20$ kHz/div, VBW: off, at 3 dB bandwidth) DC (50 Hz at AC-coupled) to 500 kHz (range: $\geq 50$ kHz/div, VBW: off, at 3 dB bandwidth) *RBW: $\geq 100$ kHz usable	
	Input connector	N-J, 50 $\Omega$	
	Auxiliary signal input and output	IF OUTPUT: 455 kHz (RBW: $\leq 30$ kHz), 10.695 MHz (RBW: $\geq 100$ kHz), BNC connector VIDEO OUTPUT (Y): 0 to 0.5 V $\pm 0.1$ V (100 MHz, from lower edge to upper edge at 10 dB/div or 10 %/div, 75 $\Omega$ terminated), BNC connector COMPOSITE OUTPUT: For NTSC, 1 Vp-p (75 $\Omega$ terminated), BNC connector EXT REF INPUT: 10 MHz $\pm 10$ Hz, $\geq 0$ dBm (50 $\Omega$ terminated), BNC connector	
	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	
	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 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 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 data can be output via RS-232C, and GPIB interface	
	PTA	Language: PTL (interpreter based on BASIC) Programming: Using 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) Antenna correction coefficients: Correct display and measurement of field strengths (dB $\mu$ /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), write via GPIB or RS-232C, 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), $\leq 320$ VA	
	Dimensions and mass	320 (W) x 177 (H) x 351 (D) mm, $\leq 13.5$ kg	
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, $\leq 2 \times 10^{-9}$ /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 $\Omega$ termination)

### • 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)
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 07: AM/FM demodulator

Voice output	With internal loudspeaker and earphone connector ( $\phi$ 3.5 jack), adjustable volume
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### • Option 10: Centronics interface

Function	Output data to printer (Centronics standard)
Connector	D-sub 25-pin (jack)

### • Option 12: QP detector (MS2663B only)

Functions	Can only be installed with Option 02. When Option 12 installed, Option 02 RBW 100 Hz 3 dB bandwidth changed to 150 Hz (typical)																																											
6 dB bandwidth	200 Hz, 9 kHz, 120 kHz Accuracy: $\pm 30$ % (18° to 28 °C)																																											
Display	LOG scale, 5 dB/div (10 divisions) Linearity: $\pm 2.0$ dB (0 to -40 dB, CW signal, reference level: 60 dB $\mu$ V, RF ATT: 0 dB, 18° to 28 °C)																																											
Pulse response characteristics	Response to CISPR pulse (DET mode: QP, 18° to 28 °C)																																											
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QP on/off switching uncertainty (PEAK, QP)	$\leq \pm 1.0$ 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 (dBmV/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 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	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 ms
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 ms) Gate width: 2 ms to 65.5 ms (from gate delay, resolution: 1 ms)	

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• **Option 13: QP detector (MS2653B only)**

6 dB bandwidth	9 kHz, 120 kHz Accuracy: $\pm 30\%$ (18° to 28°C)																																
Display	LOG scale, 5 dB/div (10 divisions) Linearity: $\leq \pm 2.0$ dB (0 to -40 dB, CW signal, reference level: 60 dBmV, RF ATT: 0 dB, 18° to 28°C)																																
Pulse response characteristics	Response to CISPR pulse (DET mode: QP, 18° to 28°C)																																
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QP on/off switching uncertainty (PEAK, QP)	$\leq \pm 1.0$ 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 (dBmV/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      IOD: Controls 4-bit parallel input/output port D IOB: Controls 8-bit parallel output port B      EIO: Controls I/O switching of ports C/D IOC: Controls 4-bit parallel input/output port C      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 $+5 \pm 0.5$ 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 $\pm 1$ V ( $\geq 100$ k $\Omega$ 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)

## Ordering information

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

Model/order No.	Name
MS2653B	<b>Main frame</b>
MS2663B	Spectrum Analyzer
	<b>Standard accessories</b>
F0013	Power cord, 2.5 m: 1 pc
W1251AE	Fuse, 5 A: 2 pcs
	MS2653B/2663B operation manual: 1 copy
	<b>Options</b>
MS2653B/2663B-01	Reference crystal oscillator
MS2663B-02	Narrow resolution bandwidth
MS2653B/2663B-04	High-speed time domain sweep
MS2653B/2663B-06	Trigger/gate circuit
MS2653B/2663B-07	AM/FM demodulator
MS2653B/2663B-10	Centronics interface ( GPIB cannot be used)
MS2663B-12	QP detector (used Option 02 simultaneously, QP-BW: 0.2/9/120 kHz)
MS2653B-13	QP detector (QP-BW: 9/120 kHz)
MS2653B/2663B-14	PTA parallel I/O (Option 10 cannot be used simultaneously)
MS2653B/2663B-15	Sweep signal output
MS2653B/2663B-16	Television monitor
	<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 8 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→75 Ω 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/4 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