SPECTRUM ANALYZER
MS2668C
9 kHz to 40 GHz

For Measuring High-Speed Communications, such as MMAC and ITS

GPIB

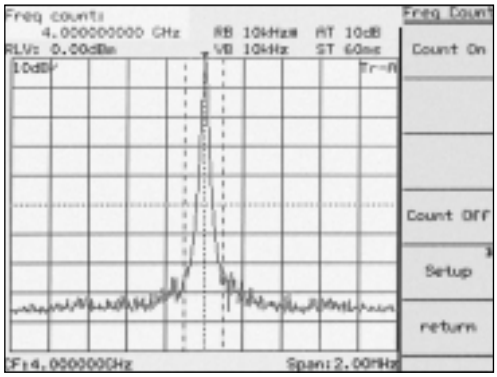
The MS2668C is a portable, high-performance spectrum analyzer that has various radio evaluation functions for evaluating microwave/millimeter wave devices and systems for the wireless communications market. In recent years in this market, microwave/millimeter wave band frequencies have been investigated to realize high-speed and large-capacity data communications capabilities. Local-to-multipoint-distribution systems (LMDS), multimedia-mobile-access-communication systems (MMAC) and high-speed wireless LAN are typical applications. To realize the collision avoidance of vehicles in the intelligent transport systems (ITS) market, millimeter wave band radar has been investigated. The MS2668C can be an extremely useful tool for assisting in these investigations.

Features

- Compact and lightweight (15 kg in standard configuration)
- High C/N and superior distortion characteristics
- Easy-to-use, simple operation
- Millimeter wave applications
- Options support wide range of applications

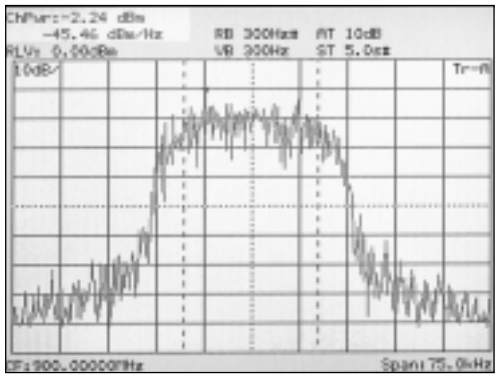
Performance and functions

• Counter with 1 Hz resolution
A full complement of frequency counter functions are provided. Resolution is as high as ±1 Hz even at full span, and high-speed frequency measurements can be performed. The high sensitivity compared with ordinary counters makes it easy to select one signal from many and to determine its frequency.

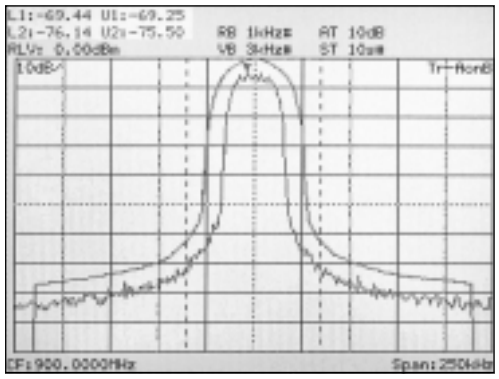


Frequency measurement (1 Hz resolution)

• Radio equipment evaluation functions (“measure” functions)
A full range of functions including measurement of power levels, frequencies, adjacent channel power, and mask and time template measurements are provided for performance evaluation of radio equipment. Key operation is simple and high-speed calculations make the measurement fast and efficient.



Channel power measurement



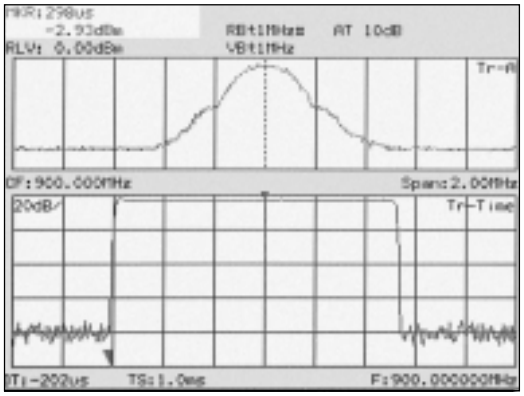
Adjacent channel power measurement

For product ordering information, see pages 4 – 10

• Multi-screen display

The Trace A and Trace B waveforms are superimposed on the same screen, and two spectra with different frequencies are displayed simultaneously. In addition, it is possible to simultaneously display spectrum and time domain screens for the same signal. The multi-screen display permits efficient signal level adjustment and harmonic distortion measurement, too.

In addition to being able to display amplitude in the time domain, it is possible to display the FM demodulation waveform.

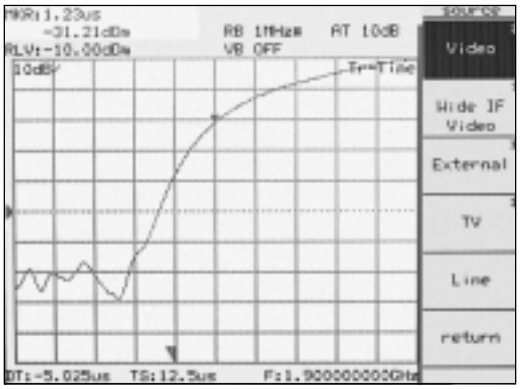


Spectrum and time domain measurement

• For testing digital mobile communication equipment

High-speed time domain sweep (Option 04)

Testing of TDMA-type radio equipment requires time domain (zero-span) measurements of antenna power, transient response characteristics of burst transmissions, transmission timing, and other characteristics. The high-speed time domain sweep option boosts sweep time to 12.5 µs and resolution to 0.025 µs. This option must be used with the trigger/gate circuit (Option 06).



High-speed time domain measurement (TS = 12.5 µs)

6

Specifications

Except where noted otherwise, specified values were obtained after warming up the equipment for 30 minutes at a constant ambient temperature and then performing calibration. The typical values are given for reference and are not guaranteed.

Frequency	Frequency range	9 kHz to 40 GHz
	Frequency band	Band 0: 0 kHz to 3.2 GHz (n = 1), Band 1–: 3.1 to 5.6 GHz (n = 1), Band 1+: 5.4 to 8.1 GHz (n = 1), Band 1+: 8.0 to 14.3 GHz (n = 2), Band 2–: 14.1 to 26.5 GHz (n = 4), Band 3–: 26.2 to 40 GHz (n = 6) *n: local harmonic order
	Pre-selector range	3.1 to 40 GHz
	Frequency setting resolution	(1 x n) Hz *n: local harmonic order
	Frequency display accuracy	± (display frequency x reference frequency accuracy + span x span accuracy)
	Marker frequency display accuracy	Normal marker: Same as display frequency accuracy Delta marker: 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, (100 x n) Hz to 40.0 GHz *n: local harmonic order Accuracy: ±5%
	Resolution bandwidth (RBW) (3 dB bandwidth)	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 Option 03: 10, 30, 100, 300 Hz are added Bandwidth accuracy: ±20% (1 kHz to 1 MHz), ±30% (3 MHz) Selectivity (60 dB : 3 dB): ≤15:1
	Video bandwidth (VBW)	1 Hz to 3 MHz (1-3 sequence), OFF *Manually settable, or automatically settable according to RBW
	Signal purity and stability	Noise sidebands: ≤ –95 dBc/Hz + 20 log n (1 MHz to 40 GHz, 10 kHz offset) *n: local harmonic order Residual FM: ≤20 Hzp-p/0.1 s (1 GHz, span: 0 Hz) Frequency drift: ≤200 x n Hz/min (span: ≤10 kHz, sweep time: ≤100 s) *After 1-hour warm-up at constant ambient temperature; n: local harmonic order
	Reference oscillator	Frequency: 10 MHz Start-up characteristics: ≤5 x 10^{-8} /year (after 10 minutes warm-up, referenced to frequency after 24 hours warm-up) Aging rate: ≤1 x 10^{-7} /year, ≤1 x 10^{-8} /day Temperature characteristics: ±5 x 10^{-8} (0° to 50°C, referenced to frequency at 25°C)
	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: ≤–115 dBm (1 MHz to 1 GHz), ≤–115 dBm + 1.5f [GHz] dB (1 to 3.1 GHz), ≤–114 dBm (3.1 to 8.1 GHz), ≤–113 dBm (8.0 to 14.3 GHz), ≤–105 dBm (14.1 to 26.5 GHz), ≤–101 dBm (26.2 to 40 GHz) *RBW: 1 kHz, VBW: 1 Hz, RF ATT: 0 dB Residual response: ≤–90 dBm (RF ATT: 0 dB, input: 50 Ω terminated, 1 MHz to 8.1 GHz)

Continued on next page

Frequency	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 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 (3 MHz) *After calibration, referenced to RBW: 3 kHz Input attenuator (RF ATT) Setting range: 0 to 70 dB (10 dB steps) *Manual settable, or automatically settable according to reference level Switching uncertainty: ±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
Amplitude	Frequency response	Relative: ±1.5 dB (9.0 kHz to 3.2 GHz), ±1.0 dB (100 kHz to 3.2 GHz), ±1.5 dB (3.1 to 8.1 GHz), ±3.0 dB (8.0 to 14.3 GHz), ±4.0 dB (14.1 to 26.5 GHz), ±4.0 dB (26.2 to 40 GHz) *After pre-selector tuning at microwave band, referenced to midpoint between highest and lowest frequency deviation in each band. Absolute: ±5.0 dB (9 kHz to 40 GHz, RF ATT: 10 dB, referenced to 100 MHz) *After pre-selector tuning at microwave band
	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, RBW: ≤1 MHz), ±1.0 dB (0 to –70 dB, RBW: ≤100 kHz), ±1.5 dB (0 to –85 dB, RBW: ≤3 kHz), ±2.5 dB (0 to –90 dB, RBW: ≤3 kHz) 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: ≤–60 dBc (10 to 200 MHz, mixer input: –30 dBm), ≤–70 dBc (0.2 to 1.55 GHz, mixer input: –30 dBm), ≤–90 dBc or noise level (1.55 to 20 GHz, mixer input: –10 dBm) Two signal 3rd order intermodulation distortion: ≤–70 dBc (10 to 100 MHz), ≤–80 dBc (0.1 to 8.1 GHz), ≤–75 dBc or average noise level (8.1 to 26.5 GHz), ≤–75 dBc or average noise level (typical, 26.5 to 40 GHz) *Frequency difference of two signals: ≥50 kHz, mixer input: –30 dBm Image response: ≤–65 dBc (≤18 GHz), ≤–60 dBc (≤22 GHz), ≤–55 dBc (≤40 GHz) Multiple/out of band response: ≤–70 dBc(≤14 GHz), ≤–60 dBc (≤26 GHz), ≤–55 dBc (≤40 GHz)
	1 dB gain compression	≥–5 dBm (≥100 MHz, at mixer input)
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), ±25% (110 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
	Zero 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	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: ±0.5 dB (at reference level)
	Display	Color TFT-LCD, Size: 14 cm, 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. Trace A/Time: Displays frequency spectrum, and time domain waveform at center frequency simultaneously. Trace move/calculation: A → B, B → A, A ⟷ B, A + B → A, A — B → A, A — B + DL → 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: ±5% 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: ≤20 kHz/div, VBW: off, at 3 dB bandwidth) DC (50 Hz at AC-coupled) to 500 kHz (range: ≤50 kHz/div, VBW: off, at 3 dB bandwidth) *RBW: ≥1 kHz to 3 MHz usable
	Input connector	K-J, 50 Ω
	Auxiliary signal input and output	IF OUTPUT: –10 dBm (typical, 100 MHz, upper edge of scale, 50 Ω terminated), 10.69 MHz, BNC connector VIDEO OUTPUT (Y): 0 to 0.5 V ± 0.1 V (typical, from lower edge to upper edge at 10 dB/div) 0 to 0.4 V± 0.1 V (typical, from lower edge to upper edge at 10%/div) BNC connector *75 Ω terminated at 100 MHz input COMPOSITE OUTPUT: For NTSC, 1 Vp-p (75 Ω terminated), BNC connector EXT REF INPUT: 10 MHz ± 10 Hz, –10 to +2 dBm (50 Ω terminated), BNC connector REF BUFFERED OUTPUT: ≥0 dBm (50 Ω terminated), BNC connector 1ST LOCAL OUTPUT: 4 to 7 GHz, ≥+8 dBm, 50 Ω, SMA-J connector

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Functions	Signal search	AUTO TUNE, PEAK → CF, PEAK → REF, SCROLL
	Zone marker	NORMAL, DELTA
	Marker →	MARKER → CF, MARKER → REF, MARKER → CF STEP SIZE, Δ MARKER → SPAN, ZONE → SPAN
	Peak search	PEAK, NEXT PEAK, NEXT RIGHT PEAK, NEXT LEFT PEAK, MIN DIP, NEXT DIP
	Multimarker	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	Saves setting conditions and waveform data to internal memory (max. 12) or memory card.
	Hard copy	Printer (HP dotmatrix, EPSON dotmatrix 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 function: 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: ≥10 dB): ±2.5 dB (9 to 100 kHz), ±1.5 dB (100 kHz to 2 GHz), ±2.0 dB (2 to 3 GHz) ∗Typical value
	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 PCMCIA Rel. 2.0; 2 slots
External mixer	Frequency	Frequency range: 18 to 110 GHz Frequency band configuration Band K: 18 to 26.5 GHz (n = 4), Band A: 26.5 to 40 GHz (n = 6), Band Q: 33 to 50 GHz (n = 8), Band U: 40 to 60 GHz (n = 9), Band V: 50 to 75 GHz (n = 11), Band E: 50 to 90 GHz (n = 13), Band W: 75 to 110 GHz (n = 16) Span setting range: 0 Hz, (100 x n) Hz to each bandwidth ∗n: local harmonic order
	Amplitude	Level measurement Mixer conversion loss setting range: 15 to 85 dB Maximum input level: Depends on the external mixer used Average noise level: Depends on the external mixer used Reference level setting range: –100 dBm to (–25 to M) dBm ∗Log scale, M: mixer conversion loss Frequency response: Depends on the external mixer used
	Input/output	Suitable mixer: 2-port mixer only (local frequency: 4 to 7 GHz, IF frequency: 689.31 MHz) Display gain: 0 ±2 dB (external mixer input: –10 dBm, when the mixer conversion loss is 15 dB)
Others	EMC	EN61326: 1997/A1, 1998 (Class A) EN61000-3-2: 1995/A2, 1998 (Class A) EN61326: 1997/A1, 1998 (Annex A)
	LVD	EN610101-1: 1993/A2, 1995 (Installation Category Ⅱ, Pollution degree 2)
	Vibration	Meets the MIL-STD-810D
	Power (operating range)	85 to 132/170 to 250 Vac (automatic voltage switching), 47.5 to 63 Hz, ≤400 VA
	Dimensions and mass	320 (W) x 177 (H) x 381 (D) mm, ≤15 kg (without option)
	Ambient temperature	0° to +50°C (operate), –40° to +75°C (storage)

6

• Option 02: Narrow resolution bandwidth

Resolution bandwidth (3 dB)	30 Hz, 100 Hz, 300 Hz
Resolution bandwidth switching uncertainty	±0.4 dB (RBW 3 kHz reference)
Resolution bandwidth accuracy	±20%
Selectivity (60 dB : 3 dB)	≤15:1

• Option 03: Narrow resolution bandwidth

Resolution bandwidth (3 dB)	10 Hz, 30 Hz, 100 Hz, 300 Hz
Resolution bandwidth switching uncertainty	±0.4 dB (RBW 3 kHz reference)
Resolution bandwidth accuracy	±20%
Selectivity (60 dB : 3 dB)	≤15:1
Average noise level	≤–135 dBm (1 MHz to 1 GHz), ≤–135 dBm + 1.5f [GHz] dB (1 to 3.1 GHz), ≤–132 dBm (3.1 to 8.1 GHz), ≤–131 dBm (8.0 to 14.3 GHz), ≤–123 dBm (14.1 to 26.5 GHz), ≤–119 dBm (26.2 to 40 GHz) ∗RBW: 10 Hz, VBW: 1 Hz, RF ATT: 0 dB

• Option 04: High-speed time domain sweep

Sweep time	12.5 µs, 25 µs, 50 µs, 100 to 900 µs (one most significant digit settable), 1.0 to 19 ms (two upper significant digits settable)
Accuracy	±1%
Marker level resolution	Log scale: 0.1 dB Linear scale: 0.2% (relative to reference level)

• Option 06: Trigger/gate circuit

Trigger switch	FREERUN, TRIGGERED
Trigger source	EXT Trigger level: ±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: ≥20 MHz Trigger slope: Rise/fall LINE Frequency: 47.5 to 63 Hz (line lock)
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 µs
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 µs) Gate width: 2 µs to 65.5 ms (from gate delay, resolution: 1 µs)

• Option 07: AM/FM demodulator

Voice output	With internal loudspeaker and earphone connector (ø3.5 jack), adjustable volume

• Option 10: Centronics interface*1

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

*1: GPIB interface can not be installed simultaneously.

• 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

• External mixer

Models	Frequency range	Flange	Max. input power
MA2740A	18 to 26.5 GHz	MIL-F-3922/68-001KM	100 mW
MA2741A	26.5 to 40 GHz	MIL-F-3922/68-001AM	100 mW
MA2742A	33 to 50 GHz	MIL-F-3922/67B-006	100 mW
MA2743A	40 to 60 GHz	MIL-F-3922/67B-007	100 mW
MA2744A	50 to 75 GHz	MIL-F-3922/67B-008	100 mW
MA2745A	60 to 90 GHz	MIL-F-3922/68B-009	100 mW
MA2746A	75 to 110 GHz	MIL-F-3922/68B-010	100 mW

Ordering information

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

Model/Order No.	Name
	Main frame
MS2668C	Spectrum analyzer
	Standard accessories
	Power cord, 2.6 m: 1 pc
F0013	Fuse, 5 A: 2 pcs
W1335AE	MS2668C operation manual: 1 copy
B0329G	Front cover (3/4MW4U): 1 pc
	Options
MS2668C-02	Narrow resolution bandwidth
MS2668C-03	Narrow resolution bandwidth
MS2668C-04	High-speed time domain sweep
MS2668C-06	Trigger/gate circuit
MS2668C-07	AM/FM demodulator (outputs to loudspeaker or earphone connector)
MS2668C-10	Centronics interface (GPIB interface can not be used simultaneously)
MS2668C-15	Sweep signal output
	Application parts
J0911	Coaxial cord (K-P · K-P), 1 m (DC to 40 GHz, SUCOFLEX 102A)
J0912	Coaxial cord (K-P · K-P), 0.5 m (DC to 40 GHz, SUCOFLEX 102A)
34AKNF50	Coaxial adaptor (DC to 20 GHz, SWR: 1.5, ruggedized K-P · N-J)
J0322B	Coaxial cord (SMA-P · SMA-P), 1 m (DC to 18 GHz, SUCOFLEX 104)
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)
B0395A	Rack mount kit (IEC)
B0395B	Rack mount kit (JIS)
MP612A	RF Fuse Holder
MP613A	Fuse Element
J0805	DC block (Model 7003, 10 kHz to 18 GHz, ±50 V, N-type, Weinschel product)

Model/Order No.	Name
J0910	DC block (Model 7006, 10 kHz to 18 GHz, ±50 V, SMA-type, Weinschel product)
MA2507A	DC Block Adaptor (50 Ω, 9 kHz to 3 GHz, ±50 V, N-type)
MA8601A	DC Block Adaptor (50 Ω, 30 kHz to 2 GHz, ±50 V, N-type)
MA8601J	DC Block Adaptor (75 Ω, 10 kHz to 2.2 GHz, ±50 V, NC-type)
MA1621A	50 Ω → 75 Ω Impedance Transformer (75 Ω, 9 kHz to 3 GHz, ±100 V, NC-type)
MP614A	50 Ω ↔ 75 Ω Impedance Transformer (10 to 1200 MHz, transformer type, NC-type)
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 PC/AT compatible, D-sub 9-pins, cross)
J0064A	7 GHz band coaxial/waveguide adaptor (5.8 to 8.6 GHz, N-J · BRJ-7)
J0064C	10 GHz band coaxial/waveguide adaptor (8.2 to 12.4 GHz, N-J · BRJ-10)
J0004	Coaxial adaptor (N-P · SMA-J)
DGM010-02000EE	Coaxial cord, 2 m (N-type connector, general use)
DGM024-02000EE	Coaxial cord, 2 m (N-type connector, low-loss type)
J0063	Fixed attenuator for high power (30 dB, 10 W, DC to 12.4 GHz, N-type)
J0395	Fixed attenuator for high power (30 dB, 30 W, DC to 9 GHz, N-type)
J0078	Fixed attenuator for high power (20 dB, 10 W, DC to 18 GHz, N-type)
MP526D	High Pass Filter (400 MHz band, N-type)
MA1601A	High Pass Filter (800/900 MHz band, N-type)
MA2740A	External Mixer (18 to 26.5 GHz)
MA2741A	External Mixer (26.5 to 40 GHz)
MA2742A	External Mixer (33 to 50 GHz)
MA2743A	External Mixer (40 to 60 GHz)
MA2744A	External Mixer (50 to 75 GHz)
MA2745A	External Mixer (60 to 90 GHz)
MA2746A	External Mixer (75 to 110 GHz)
B0421A	Carrying case (hard type, with casters)
B0421B	Carrying case (hard type, without casters)
B0435A	Carrying case (soft type)

For product ordering information, see pages 4 – 10