MS2668C
Spectrum Analyzer
9 kHz to 40 GHz

For Microwave and Millimeter wave Measurements
In recent wireless communication market, the utilization of microwave/millimeter wave band frequencies is being considered in order to realize high-speed and large-capacity data communication. In the markets of ITS and ultrahigh-speed wireless LAN, aiming for the speedup of wireless LAN which began to be spread as a typical application, millimeter wave band is used for realizing collision avoidance radar.

MS2668C is a portable and high-performance spectrum analyzer that has various radio evaluation functions for microwave/millimeter wave devices and systems.
Compact and lightweight (15 kg in standard configuration)
- Easy portability for installation and maintenance

High C/N and superior distortion characteristics
- High-stability crystal oscillator as standard

Easy-to-use, simple operation
- Built-in "Measure" function for evaluation of radio equipment (frequency counter, C/N, channel power, adjacent channel power, occupied frequency bandwidth, burst average power and template pass/fail function)
- User-defined function
- Zone marker/zone sweep
- Two-screen display
- FM demodulation waveform display

Memory card interface (for saving/recalling trace data and set up parameter and for saving screen image in bitmap format)

Millimeter wave applications
- External mixer input/output as standard
- Up to 110 GHz with an external mixer

Options support wide range of applications
- Narrow resolution bandwidth (10 to 300 Hz)
- High-speed time domain sweep
- Trigger/gate circuit
- AM/FM demodulator (sound monitor)
- Centronics interface (cannot be installed with GPIB simultaneously)

Easy to set up automatic measurements
- Controller function built-in (PTA)
Compact and Powerful

Synthesized local oscillator
The synthesized local oscillator design permits stable measurements without disturbance due to frequency drift of the spectrum analyzer itself. The level stabilizes in 30 minutes after power-on, making this unit especially suitable for on-site maintenance and adjustment where work must be completed quickly.

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.

Excellent cost vs performance and the superior average noise level at 40 GHz
The superior basic performance, including noise sideband, average noise level, and spurious response, provides excellent cost vs performance. 10 Hz RBW (option 03) is provided.

100 dB display dynamic range
For measurements requiring a wide dynamic range such as adjacent channel power measurements, MS2668C can display nearly 90 dB on a single screen.

Highly-accurate measurement
Automatic calibration ensures a high level accuracy. A span accuracy of 5% and 501 sampling points ensure accurate occupied frequency bandwidth and adjacent channel power measurements.
Convenient, Easy-to-Use Functions

Simple operation
Users require ease of operation in a wide variety of contexts. The front panel, key layout, and softkey menu were simplified for ease-of-use. Also, “page-learning” and “user-defined” functions have been added to minimize the steps required for a given procedure.

Bright color screen
A 5.5 inch bright color TFT-LCD is used to custom configure the display scales, measured waveform data, settings and other parameters for easy viewing. Each color can be changed independently. When the soft key display is turned off, the scale area enlarges to 80 (H) × 180 (W) mm, comparable to an 8 inch CRT.

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.

Burst average power measurement

Mask measurement

Channel power measurement

Adjacent channel power measurement

Time template measurement
Convenient Easy-to-Use Functions

**FM-demodulated waveform display function**

This function displays FM-demodulated waveforms with an accuracy of 5% over the range ±10 kHz to ±1 MHz. When used with high-speed time domain sweep (Option 04) and trigger/gate circuit (Option 06), frequency deviation of the modulated signal, as well as frequency switching times of radio equipment and VCOs, can be measured.

**Zone sweep and multi-zone sweep functions**

Sweeps can be limited to zones defined by zone markers which results in reduced sweep time. This zone sweep function can be combined with “measure” functions such as “noise measure” which can directly read out the total noise power within the zone, to reduce measurement time greatly. The multi-zone sweep function enables up to ten zones to be swept.

**Zone markers and multimarkers**

Zone markers can be set automatically at the peak signal within a given marker range, enabling quick measurement.

By using the multimarker function, automatic measurements can be performed for up to ten markers, with the results displayed in a table. With the multimarker function, up to 10 harmonics of the carrier can be measured, as well as the 10 highest spurious levels within the frequency span. Also, up to 10 markers can be manually set for automatic frequency and amplitude measurements.
Convenient Easy-to-Use Functions

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

User-defined functions

Measurement programs downloaded to the spectrum analyzers from a personal computer or memory card can be executed by defining menu keys. The measurement program is executed simply by pressing the predefined key, with no further operation. Other panel and function keys can also be predefined in the same way.
Screen image bitmap saved to memory card

Instead of printing a hard copy of the screen, it is also possible to save the screen image to a memory card in bitmap format. Editing the saved bitmap data using a PC, makes report writing easy.

When the mode to save the screen image in bitmap format to the memory card is selected as a copy method at the hard copy function, just one press of the copy key saves the screen image as a bitmap format to the memory card. And the file number of each saved file is incremented automatically.

The screen image data can also be saved to the memory card using the save function. In this case, the file number of the saved file can be specified.
Versatile Options

The enhanced performance and digital functions of recent radio equipment necessitate measuring equipment with even more sophisticated functions and performance. Versatile options are available to meet such needs.

**To boost basic performance**

**Narrow resolution bandwidth (Option 02/03)**

The frequency resolution is improved by adding an optional narrow resolution bandwidth filter. Option 02 (30, 100, and 300 Hz) and 03 (10, 30, 100, 300 Hz) are provided. In Option 03, average noise level at RBW 10 Hz is specified.

**Trigger/gate circuit (Option 06)**

The trigger function provides stable measurements of burst signals in the time domain. External, video, wide IF video, or line trigger can be selected. PASS/FAIL measurements are easily made on TDMA radio burst signals using limit lines created in the template function. Pre-trigger and post trigger delays can be used. Burst signals can also be measured in the frequency domain using the gate sweep function. A wide IF video trigger function is used, eliminating the need for an external trigger source that was previously required.

**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 a 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)**

**Wide IF video trigger function**

**Wide IF video trigger and gate functions**
Easy-to-Use Key Layout
Function keys F1 to F6
Select on-screen menu items
Menu on/off keys turn menus on and off, and [more] key turns menu pages.

Save/recall
Saves and recalls measurement settings and measured waveforms
Data can be saved either to internal memory or to a memory card. (In internal memory, up to 12 data sets can be saved.)

Main Functions
Set frequency, span, amplitude and other parameters

Markers
Normal markers, multimarkers (maximum 10 numbers), zone markers and zone sweeping are provided.

Entry keys
Input numeric values, units, and alphabetic characters

User keys
Register any panel and menu key functions, as well as application software functions to user keys.

User define key
Define’s functions of user-defined keys
Up to 3-pages can be predefined.

Measure key
Executes various operations based on waveform data
High-speed measurements and computations are performed without the need for an external personal computer.

Calibration
The built-in high-precision calibration signal source provides accurate measurements.

Trigger/gate
The trigger can be set in the time domain mode.

Coupled-function keys
Set parameters other than those set using main function keys
Normally set “Auto” for optimum values.

Display
Can be switched between frequency and time domains, and has two-screen display modes.

Memory card slots
Support memory cards up to 2 Mbytes
Two type-1 memory cards conforming to PCMCIA ver. 2.0 standards can be used simultaneously.

RF connector
For input of signals at levels up to +30 dBm (maximum DC input: ±0 V)
Configuring Automated Measurement System

**RS-232C interface** *(standard)*
The RS-232C interface can be used to output hard copy data to a printer or plotter and for remote control of the analyzer. A notebook computer can be used for automated control and data collection in the field. In addition, a modem can be used for easy remote operation.

**GPIB interface** *(standard)*
In addition to remote control, the GPIB interface can also be used to output data to a printer/plotter. (GPIB and Option 10 can not be installed simultaneously.)

**Centronics interface** *(Option 10)*
The Centronics interface is used to output data to a printer. (GPIB and Option 10 can not be installed simultaneously.)

**Memory card interface** *(standard)*
Memory cards are used to save and recall measurement settings and waveform data, as well as to upload and download PTA programs. Cards up to 2 Mbytes are supported (PCMCIA ver. 2.0, type-I, 2-slots)
**Configuring Automated Measurement System**

**Automated measurement without external controller**

The built-in microcomputer (PTA) functions which utilize the spectrum analyzer as a controller, make an external controller unnecessary. An automated measurement system including control of other instruments is easily configured. The two methods for loading programs are shown below.

Programs written on a computer are saved to a memory card. The memory card is inserted into a memory card slot in the spectrum analyzer and the programs are loaded.

Programs written on a computer are transferred to the spectrum analyzer via the RS-232C or GPIB interface.
### 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.

<table>
<thead>
<tr>
<th>Frequency range</th>
<th>9 kHz to 40 GHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency band</td>
<td>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)</td>
</tr>
<tr>
<td>Pre-selector range</td>
<td>3.1 to 40 GHz</td>
</tr>
<tr>
<td>Frequency setting resolution</td>
<td>(1 × n) Hz; n: local harmonic order</td>
</tr>
<tr>
<td>Frequency display accuracy</td>
<td>± (display frequency × reference frequency accuracy + span × span accuracy)</td>
</tr>
<tr>
<td>Marker frequency display accuracy</td>
<td>Normal marker: Same as display frequency accuracy Delta marker: Same as frequency span accuracy</td>
</tr>
<tr>
<td>Frequency counter</td>
<td>Resolution: 1 Hz, 10 Hz, 100 Hz, 1 kHz</td>
</tr>
<tr>
<td>Frequency span</td>
<td>Setting range: 0 Hz, (100 × n) Hz to 40.0 GHz; n: local harmonic order Accuracy: ±5%</td>
</tr>
<tr>
<td>Resolution bandwidth (RBW)</td>
<td>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</td>
</tr>
<tr>
<td>Video bandwidth (VBW)</td>
<td>1 Hz to 3 MHz (1-3 sequence), OFF; Manuelly settable, or automatically settable according to RBW</td>
</tr>
<tr>
<td>Signal purity and stability</td>
<td>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 × n Hz/min (span: ≤10 kHz, sweep time: ≤100 s) After 1-hour warm-up at constant ambient temperature; n: local harmonic order</td>
</tr>
<tr>
<td>Reference oscillator</td>
<td>Frequency: 10 MHz Start-up characteristics: ≤5 × 10^−4/year (after 10 minutes warm-up, referenced to frequency after 24 hours warm-up) Aging rate: ≤1 × 10^−7/year, ≤1 × 10^−9/day Temperature characteristics: ±5 × 10^−4 (0° to 50°C, referenced to frequency at 25°C)</td>
</tr>
<tr>
<td>Level measurement</td>
<td>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 +1.5[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, 1 MHz, RBW: 1 Hz, RF ATT: 0 dB Residual response: ≤90 dBm (RF ATT: 0 dB, input: 50 Ω terminated, 1 MHz to 8.1 GHz)</td>
</tr>
<tr>
<td>Reference level</td>
<td>Setting range Log scale: −100 to +30 dBm, Linear scale: 224 µV to 7.07 V Unit Log scale: dBm, dBU, dBmV, V, dBU, V, 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</td>
</tr>
</tbody>
</table>
## Specifications

### 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

<table>
<thead>
<tr>
<th>Scale (10 div.)</th>
<th>Log scale: 10, 5, 2, 1 dB/div</th>
<th>Linear scale: 10, 5, 2, 1%/div</th>
</tr>
</thead>
</table>

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 dB (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)

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)

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 dB (≥100 MHz, at mixer input)

### 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)

### 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: 5.5 inch, Number of colors: 17 (RGB, each 64-scale settable), Intensity adjustment: 5 steps settable

### 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.

### Storage functions

NORMAL, VIEW, MAX HOLD, MIN HOLD, AVERAGE, CUMULATIVE, OVER WRITE

### FM demodulation

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)
- Marker: ≤±1 kHz to 3 MHz usable

### Input connector

K-J, 50 Ω
### Specifications

#### 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

#### 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) *

#### 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

#### 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)

#### EMC
- EN61326: 1997/A2: 2001 (Class A)
- EN61000-3-2: 2000 (Class A)
- **LVD**
  - EN61010-1: 2001 (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

#### Ambient temperature
- 0° to +50°C (operate), –40° to +75°C (storage)
## Specifications

### Option 02: Narrow resolution bandwidth

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resolution bandwidth (3 dB)</td>
<td>30 Hz, 100 Hz, 300 Hz</td>
</tr>
<tr>
<td>Resolution bandwidth switching uncertainty</td>
<td>±0.4 dB (RBW 3 kHz reference)</td>
</tr>
<tr>
<td>Resolution bandwidth accuracy</td>
<td>±20%</td>
</tr>
<tr>
<td>Selectivity (60 dB : 3 dB)</td>
<td>≤15:1</td>
</tr>
</tbody>
</table>

### Option 03: Narrow resolution bandwidth

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resolution bandwidth (3 dB)</td>
<td>10 Hz, 30 Hz, 100 Hz, 300 Hz</td>
</tr>
<tr>
<td>Resolution bandwidth switching uncertainty</td>
<td>±0.4 dB (RBW 3 kHz reference)</td>
</tr>
<tr>
<td>Resolution bandwidth accuracy</td>
<td>±20%</td>
</tr>
<tr>
<td>Selectivity (60 dB : 3 dB)</td>
<td>≤15:1</td>
</tr>
<tr>
<td>Average noise level</td>
<td>≤−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)</td>
</tr>
</tbody>
</table>

* RBW: 10 Hz, VBW: 1 Hz, RF ATT: 0 dB

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

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sweep time</td>
<td>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)</td>
</tr>
<tr>
<td>Accuracy</td>
<td>±1%</td>
</tr>
<tr>
<td>Marker level resolution</td>
<td>Log scale: 0.1 dB, Linear scale: 0.2% (relative to reference level)</td>
</tr>
</tbody>
</table>

* : This option is recommended to be mounted together with option 06.
## Specifications

**Option 06: Trigger/gate circuit**

<table>
<thead>
<tr>
<th>Trigger switch</th>
<th>FREERUN, TRIGGERED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trigger source</td>
<td>EXT</td>
</tr>
<tr>
<td></td>
<td>Trigger level: ±10 V (resolution: 0.1 V), TTL level</td>
</tr>
<tr>
<td></td>
<td>Trigger slope: Rise/fall</td>
</tr>
<tr>
<td></td>
<td>Connector: BNC</td>
</tr>
<tr>
<td>VIDEO</td>
<td>Log scale: −100 to 0 dB (resolution: 1 dB)</td>
</tr>
<tr>
<td></td>
<td>Trigger slope: Rise/fall</td>
</tr>
<tr>
<td>WIDE IF VIDEO</td>
<td>Trigger level: High, middle, or low selectable</td>
</tr>
<tr>
<td></td>
<td>Bandwidth: ≥20 MHz</td>
</tr>
<tr>
<td></td>
<td>Trigger slope: Rise/fall</td>
</tr>
<tr>
<td>LINE</td>
<td>Frequency: 47.5 to 63 Hz (line lock)</td>
</tr>
</tbody>
</table>

| 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

<table>
<thead>
<tr>
<th>Models</th>
<th>Frequency range</th>
<th>Flange</th>
<th>Max. input power</th>
</tr>
</thead>
<tbody>
<tr>
<td>MA2740A</td>
<td>18 to 26.5 GHz</td>
<td>MIL-F-3922/68-001KM</td>
<td>100 mW</td>
</tr>
<tr>
<td>MA2741A</td>
<td>26.5 to 40 GHz</td>
<td>MIL-F-3922/68-001AM</td>
<td>100 mW</td>
</tr>
<tr>
<td>MA2742A</td>
<td>33 to 50 GHz</td>
<td>MIL-F-3922/67B-006</td>
<td>100 mW</td>
</tr>
<tr>
<td>MA2743A</td>
<td>40 to 60 GHz</td>
<td>MIL-F-3922/67B-007</td>
<td>100 mW</td>
</tr>
<tr>
<td>MA2744A</td>
<td>50 to 75 GHz</td>
<td>MIL-F-3922/87B-008</td>
<td>100 mW</td>
</tr>
<tr>
<td>MA2745A</td>
<td>60 to 90 GHz</td>
<td>MIL-F-3922/88B-009</td>
<td>100 mW</td>
</tr>
<tr>
<td>MA2746A</td>
<td>75 to 110 GHz</td>
<td>MIL-F-3922/88B-010</td>
<td>100 mW</td>
</tr>
<tr>
<td>Model/order No.</td>
<td>Main frame Name</td>
<td>Remarks</td>
<td></td>
</tr>
<tr>
<td>----------------</td>
<td>-----------------</td>
<td>---------</td>
<td></td>
</tr>
<tr>
<td>MS2668C</td>
<td>Spectrum analyzer</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Standard accessories**

- Power cord, 2.6 m : 1 pc
- Fuse, 5 A : 2 pcs
- MS2668C operation manual : 1 copy
- Front cover : 3/4MW4U

**Options**

<table>
<thead>
<tr>
<th>Model/order No.</th>
<th>Name</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>MS2668C-02</td>
<td>Narrow resolution bandwidth</td>
<td>30, 100, 300 Hz</td>
</tr>
<tr>
<td>MS2668C-03</td>
<td>Narrow resolution bandwidth</td>
<td>10, 30, 100, 300 Hz</td>
</tr>
<tr>
<td>MS2668C-04</td>
<td>High-speed time domain sweep</td>
<td>1.25 µs/div</td>
</tr>
<tr>
<td>MS2668C-06</td>
<td>Trigger/gate circuit</td>
<td>Pre-trigger and post trigger available</td>
</tr>
<tr>
<td>MS2668C-07</td>
<td>AM/FM demodulator</td>
<td>Outputs to loudspeaker or earphone connector</td>
</tr>
<tr>
<td>MS2668C-10</td>
<td>Centronics interface</td>
<td>GPIB interface can not be used simultaneously.</td>
</tr>
<tr>
<td>MS2668C-15</td>
<td>Sweep signal output</td>
<td>X, Z</td>
</tr>
<tr>
<td>MS2668C-90</td>
<td>Extended three year warranty service</td>
<td></td>
</tr>
<tr>
<td>MS2668C-91</td>
<td>Extended five year warranty service</td>
<td></td>
</tr>
</tbody>
</table>

**Application parts**

<table>
<thead>
<tr>
<th>Model/order No.</th>
<th>Name</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>J0911</td>
<td>Coaxial cord (K-P • K-P), 1 m</td>
<td>DC to 40 GHz, SUCOFLEX 102A</td>
</tr>
<tr>
<td>J0912</td>
<td>Coaxial cord (K-P • K-P), 0.5 m</td>
<td>DC to 40 GHz, SUCOFLEX 102A</td>
</tr>
<tr>
<td>J0913</td>
<td>Coaxial cord (SM-A-P • SMA-P), 1 m</td>
<td>DC to 20 GHz, SWR: 1.5 (ruggedized K-P-N-J)</td>
</tr>
<tr>
<td>J0914</td>
<td>Coaxial cord (BNC • RG-55/U • N-P), 1 m</td>
<td>DC to 18 GHz, SUCOFLEX 104</td>
</tr>
<tr>
<td>CSCJ-256K-SM</td>
<td>256 KB memory card</td>
<td>Meets PCMCIA Rel. 2.0</td>
</tr>
<tr>
<td>CSCJ-512K-SM</td>
<td>512 KB memory card</td>
<td>Meets PCMCIA Rel. 2.0</td>
</tr>
<tr>
<td>CSCJ-1024K-SM</td>
<td>1024 KB memory card</td>
<td>Meets PCMCIA Rel. 2.0</td>
</tr>
<tr>
<td>CSCJ-002M-SM</td>
<td>2048 KB memory card</td>
<td>Meets PCMCIA Rel. 2.0</td>
</tr>
<tr>
<td>B03095</td>
<td>Rack mount kit (IEC)</td>
<td></td>
</tr>
<tr>
<td>B03095B</td>
<td>Rack mount kit (JIS)</td>
<td></td>
</tr>
</tbody>
</table>

**Impedance Fuses**

<table>
<thead>
<tr>
<th>Model/order No.</th>
<th>Name</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>MP512A</td>
<td>RF Fuse Holder</td>
<td>DC to 1000 MHz, 50 Ω (N-type)</td>
</tr>
<tr>
<td>MP613A</td>
<td>Fuse Element</td>
<td>For MP612A</td>
</tr>
<tr>
<td>J0805</td>
<td>DC block (Model 7003)</td>
<td>10 kHz to 18 GHz, ±50 V, N-type, Weinschel product</td>
</tr>
<tr>
<td>J0910</td>
<td>DC block (Model 7006)</td>
<td>10 kHz to 18 GHz, ±50 V, SMA-type, Weinschel product</td>
</tr>
<tr>
<td>MA2507A</td>
<td>DC Block Adapter</td>
<td>50 Ω, 9 kHz to 3 GHz, ±50 V, N-type</td>
</tr>
<tr>
<td>MA801A</td>
<td>DC Block Adapter</td>
<td>50 Ω, 30 kHz to 2 GHz, ±50 V, N-type</td>
</tr>
<tr>
<td>MA801J</td>
<td>DC Block Adapter</td>
<td>75 Ω, 10 kHz to 2.2 GHz, ±50 V, NC-type</td>
</tr>
<tr>
<td>MA1621A</td>
<td>50 Ω → 75 Ω Impedance Transformer</td>
<td>75 Ω, 9 kHz to 3 GHz, ±100 V, NC-type</td>
</tr>
<tr>
<td>MP614B</td>
<td>50 Ω → → 75 Ω Impedance Transformer</td>
<td>50 to 1200 MHz (transformer type), NC-type</td>
</tr>
<tr>
<td>J0007</td>
<td>GPIB cable, 1 m</td>
<td>408JE-101</td>
</tr>
<tr>
<td>J0008</td>
<td>GPIB cable, 2 m</td>
<td>408JE-102</td>
</tr>
<tr>
<td>J0742A</td>
<td>RS-232C cable, 1 m</td>
<td>For PC-98 Personal Computer and VP-600, D-sub 25-pins (straight)</td>
</tr>
<tr>
<td>J0943A</td>
<td>RS-2232 cable, 1 m</td>
<td>For PC/AT compatible, D-sub 9-pins (cross)</td>
</tr>
<tr>
<td>J0064A</td>
<td>7 GHz band coaxial/waveguide adaptor</td>
<td>8.5 to 8.6 GHz, N-J-101</td>
</tr>
<tr>
<td>J0064C</td>
<td>10 GHz band coaxial/waveguide adaptor</td>
<td>8.2 to 12.4 GHz, N-J-101</td>
</tr>
<tr>
<td>J0004</td>
<td>Coaxial adaptor (N-P • SMA-J)</td>
<td>N-type connector, general use</td>
</tr>
<tr>
<td>DGM010-02000EE</td>
<td>Coaxial cord, 2 m</td>
<td>N-type connector, low-loss type</td>
</tr>
<tr>
<td>DGM024-02000EE</td>
<td>Coaxial cord, 2 m</td>
<td>N-type connector, general use</td>
</tr>
<tr>
<td>J0053</td>
<td>Fixed attenuator for high power</td>
<td>30 dB, 10 W, DC to 12.4 GHz, N-type</td>
</tr>
<tr>
<td>J0395</td>
<td>Fixed attenuator for high power</td>
<td>30 dB, 30 W, DC to 9 GHz, N-type</td>
</tr>
<tr>
<td>J0078</td>
<td>Fixed attenuator for high power</td>
<td>20 dB, 10 W, DC to 18 GHz, N-type</td>
</tr>
<tr>
<td>MP528D</td>
<td>High Pass Filter</td>
<td>400 MHz band, N-type</td>
</tr>
<tr>
<td>MA1621A</td>
<td>High Pass Filter</td>
<td>800 MHz band, N-type</td>
</tr>
<tr>
<td>MA2740A</td>
<td>External mixer</td>
<td>18 to 26.5 GHz</td>
</tr>
<tr>
<td>MA2741A</td>
<td>External mixer</td>
<td>26.5 to 40 GHz</td>
</tr>
<tr>
<td>MA2742A</td>
<td>External mixer</td>
<td>33 to 50 GHz</td>
</tr>
<tr>
<td>MA2743A</td>
<td>External mixer</td>
<td>40 to 60 GHz</td>
</tr>
<tr>
<td>MA2744A</td>
<td>External mixer</td>
<td>50 to 75 GHz</td>
</tr>
<tr>
<td>MA2745A</td>
<td>External mixer</td>
<td>60 to 90 GHz</td>
</tr>
<tr>
<td>MA2746A</td>
<td>External mixer</td>
<td>75 to 110 GHz</td>
</tr>
<tr>
<td>B0421A</td>
<td>Carrying case (with type)</td>
<td>With caster</td>
</tr>
<tr>
<td>B0421B</td>
<td>Carrying case (soft type)</td>
<td>Without type</td>
</tr>
</tbody>
</table>

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