Making creative and unique products is our motto.

MICRONIX Products
DIGEST

Spectrum analyzer
Signal analyzer
Electromagnetic anechoic box/Shield box
EMC test system
Variable attenuator
Signal generator
ETC/DSRC inspection system
Measuring system
Test accessories
**Spectrum analyzer/Signal analyzer**

**MSA400 series spectrum analyzer**

**Standard model of sweep method**
**Compact, lightweight and low Price**

**Comparison between MSA400 and MSA500**

<table>
<thead>
<tr>
<th></th>
<th>MSA400 series</th>
<th>MSA500 series</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency range</td>
<td>5kHz to 3.3GHz: MSA438/TG/E to 3kHz to 8.5GHz: MSA458</td>
<td>20kHz to 3.3GHz: MSA538/TG/E to 20kHz to 8.5GHz: MSA558/558E</td>
</tr>
<tr>
<td>Center frequency setting resolution</td>
<td>2kHz to 100kHz</td>
<td>1kHz to 100kHz</td>
</tr>
<tr>
<td>Resolution bandwidth (RBW)</td>
<td>3kHz to 1.5MHz (1-3 step): MSA438/TG/458</td>
<td>500kHz to 1.5MHz (1-3 step): MSA538/TG/558</td>
</tr>
<tr>
<td>SSB phase noise</td>
<td>-90dBc/Hz @ 100kHz offset</td>
<td>-90dBc/Hz @ 100kHz offset</td>
</tr>
<tr>
<td>Average noise level</td>
<td>-127dBm @ 1GHz, RBW 3kHz: MSA438/TG</td>
<td>-127dBm @ 1GHz, RBW 3kHz: MSA438/TG/458</td>
</tr>
<tr>
<td>Real time mode</td>
<td>Sweep mode</td>
<td>Sweep mode</td>
</tr>
<tr>
<td>Time domain</td>
<td>Single, Delta</td>
<td>Single, Delta, Delta</td>
</tr>
</tbody>
</table>

*The dimensions and weight are almost same.*

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**3.3GHz band**

**MSA438**

**Frequency range:** 50kHz to 3.3GHz

The successor model of MSA338.

- Center frequency accuracy: ±52kHz
- Output frequency range: 5MHz to 3.3GHz
- Output level: -10dBm

- The successor model of MSA438.
- Center frequency accuracy: ±52kHz
- @ sweep 100ms, span 100MHz, RBW 3kHz
- RBW 3kHz to 3MHz (1-3 step)
- SSB phase noise: -90dBc/Hz @ 100kHz offset
- Reference level: +10 to -60dBm (1dB step)
- Average noise level: -127dBm @ 1GHz
- Sweep time: 10ms to 30s

**3.3GHz band with TG**

**MSA438TG**

**Frequency range:** 50kHz to 3.3GHz

(Tracking generator)

- Output frequency range: 5MHz to 3.3GHz
- Output level: -10dBm

- The desired characteristics data is obtained because frequency setting resolution is improved to 20kHz and 5dB/div is added to the display scale.
- By connecting VSWR bridge MVS300B, the return loss can be measured.
- By connecting DTF adapter MA430, the distance to discontinuity point of cable can be measured.

---

**8.5GHz band**

**MSA458**

**Frequency range:** 50kHz to 8.5GHz

The successor model of MSA358.

- Center frequency accuracy: ±52kHz
- @ sweep 100ms, span 100MHz, RBW 3kHz
- RBW 3kHz to 3MHz (1-3 step)
- SSB phase noise: -90dBc/Hz @ 100kHz offset
- Reference level: +10 to -60dBm (1dB step)
- Average noise level: -123dBm @ 1GHz
- Sweep time: 10ms to 30s

**3.3GHz band for EMI**

**MSA438E**

**Frequency range:** 50kHz to 3.3GHz

(EMI measurement)

- Detection mode: PK, QP and AV detection
- Resolution bandwidth: 9kHz/120kHz/1MHz @ 6dB

- The successor model of MSA338E.
- Provides a wider dynamic range and enables a lower noise measurement, because average noise level is improved 10dB.
- Radiated emission measurement by connecting antenna
- Conducted emission measurement by connecting LISN MPW201B
- Noise measurement on PCB by connecting magnetic field probe CP-25A < applied to all models >

---

**3.3GHz band with TG**

**MSA438TG**

**Frequency range:** 50kHz to 3.3GHz

(Tracking generator)

- Output frequency range: 5MHz to 3.3GHz
- Output level: -10dBm

- The successor model of MSA338TG.
- Center frequency accuracy: ±52kHz
- @ sweep 100ms, span 100MHz, RBW 3kHz
- RBW 3kHz to 3MHz (1-3 step)
- SSB phase noise: -90dBc/Hz @ 100kHz offset
- Reference level: +10 to -60dBm (1dB step)
- Average noise level: -124dBm @ 1GHz
- Sweep time: 10ms to 30s

**3.3GHz band for EMI**

**MSA438E**

**Frequency range:** 50kHz to 3.3GHz

(EMI measurement)

- Detection mode: PK, QP and AV detection
- Resolution bandwidth: 9kHz/120kHz/1MHz @ 6dB

- The successor model of MSA338E.
- Provides a wider dynamic range and enables a lower noise measurement, because average noise level is improved 10dB.
- Radiated emission measurement by connecting antenna
- Conducted emission measurement by connecting LISN MPW201B
- Noise measurement on PCB by connecting magnetic field probe CP-25A < applied to all models >

---

**3.3GHz band with TG**

**MSA438TG**

**Frequency range:** 50kHz to 3.3GHz

(Tracking generator)

- Output frequency range: 5MHz to 3.3GHz
- Output level: -10dBm

- The successor model of MSA338TG.
- Center frequency accuracy: ±52kHz
- @ sweep 100ms, span 100MHz, RBW 3kHz
- RBW 3kHz to 3MHz (1-3 step)
- SSB phase noise: -90dBc/Hz @ 100kHz offset
- Reference level: +10 to -60dBm (1dB step)
- Average noise level: -124dBm @ 1GHz
- Sweep time: 10ms to 30s

**3.3GHz band for EMI**

**MSA438E**

**Frequency range:** 50kHz to 3.3GHz

(EMI measurement)

- Detection mode: PK, QP and AV detection
- Resolution bandwidth: 9kHz/120kHz/1MHz @ 6dB

- The successor model of MSA338E.
- Provides a wider dynamic range and enables a lower noise measurement, because average noise level is improved 10dB.
- Radiated emission measurement by connecting antenna
- Conducted emission measurement by connecting LISN MPW201B
- Noise measurement on PCB by connecting magnetic field probe CP-25A < applied to all models >
For offering both the real time system based on Fast Fourier Transform (FFT) and the conventional sweep system, each strong points of both systems are effectively usable. 

By real time system, unsteady signal can be measured, and time domain analysis and modulation analysis can be performed. By sweep system, the wide frequency range can be observed at a glance.

**MSA500 series signal analyzer**

**Handheld signal analyzer with REAL TIME plus SWEEP system**

**3.3GHz band**

**MSA538**

**Frequency range:** 20kHz to 3.3GHz

The most popular model of MSA500 series.

- Real time mode
  - 8 types of analysis functions
    - Spectrum, Spectrogram, OverWrite
  - Time domain (5 types)
- 20MHz maximum span
- Fast OverWrite analysis
- Large memory of 16K frames and high speed USB communication of 19ms/frame
- Sweep mode: 300Hz minimum RBW
- Average noise level: -162dBm
- Four hour battery operation

**8.5GHz band**

**MSA558**

**Frequency range:** 20kHz to 8.5GHz

Covering almost all applications of wireless communication systems because of 8.5GHz band.

- The specifications are almost same as MSA538 excepting frequency range.
- Since the frequency range is wider, 5GHz band wireless LAN and 5.8GHz band DSRC can be measured. Moreover, three times more spurious signal of 2.4GHz band equipment.
- Real time processing up to 8.5GHz
- Average noise level: -157dBm
- Four hour battery operation

**3.3GHz band with TG**

**MSA538TG**

**Frequency range:** 20kHz to 3.3GHz

(Tracking generator)

Output frequency range: 5MHz to 3.3GHz
Output level: -10dBm

By being equipped with a tracking generator and keeping the functions of MSA538, it is possible to perform the measurement and evaluation of the amplitude frequency characteristics of filter, amplifier, electronic component and circuit. Moreover, the following options are available.

- DTF adapter MA430
  - Enables to measure the distance to discontinuity point of cable and the length of normal cable.
- VSWR bridge MVS300B
  - Enables to measure the return loss of electronic component and circuit. The measuring frequency range is 5MHz to 3GHz.

**8.5GHz band for EMI**

**MSA558E**

**Frequency range:** 20kHz to 8.5GHz

(EMI measurement)

Detection mode: PK, QP and AV detections
Resolution bandwidth (6dB): 9kHz, 120kHz, 1MHz

A model being equipped with EMI measurement function and keeping the functions of MSA558. Capable of EMI measurement up to 8.5GHz.

- Radiated emission measurement by connecting antenna
- Conducted emission measurement by connecting LISN MPW201B
- Noise measurement on PCB by connecting magnetic field probe CP-2SA (applied to all models)

**3.3GHz band for EMI**

**MSA538E**

**Frequency range:** 20kHz to 3.3GHz

(EMI measurement)

Detection mode: PK, QP and AV detections
Resolution bandwidth (6dB): 9kHz, 120kHz, 1MHz

A model being equipped with EMI measurement function and keeping the functions of MSA538.

- Radiated emission measurement by connecting antenna
- Conducted emission measurement by connecting LISN MPW201B
- Noise measurement on PCB by connecting magnetic field probe CP-2SA (applied to all models)
This is a software that controls the spectrum analyzer or signal analyzer by the PC and displays the spectrum waveform on PC screen.

MAS400: for MSA400 series
MAS500: for MSA500 series

Enables a hard copy of the screen.
Interface: USB @ MSA400/500 series
Printing method: Thermal line dot method
Paper: 80mm width thermal paper
Power source: internal: AA-sized alkaline battery (4pcs)
external: 7.5VDC dedicated AC adapter
Applied models: MSA400/500 series

This is a PC software that collects the measurement data by uninhabited.
Optimum for watching an abnormal signal at night and recording the data by uninhabited for a long time.

MAS410: for MSA400 series
MAS510: for MSA500 series

Enables to measure the distance to discontinuity point of cable and the length of normal cable.
Distance range: 0.3 to 1000m @ 1.4GHz
1 to 400m @ 1.4GHz
Cable characteristics list:
11 types of cables @ 10GHz
11 types of cables @ 1.4GHz
Applied models: MSA438TG/538TG

Measures the magnetic field strength at pattern on PCB and terminals of device.
The probe is calibrated in the instrument.
Frequency range: 10MHz to 3GHz
Space resolution: approx. 0.25mm (depending on objects)
Applied models: MSA400/500 series

A passive probe with low input capacitance and wide frequency band.
Frequency range: DC to 6GHz
Attenuation ratio: 10:1, ±2%
Input resistance: 500Ω±2%
Input capacitance: 0.25pF (typ)
Applied models: MSA400/500 series

With AC adapter and one roll paper
@ Option: Rollpaper (10 rolls)

Enables to measure the return loss of electronic component and circuit.
Frequency range: 5 to 3000MHz
Directivity: more than 40dB @ 50 to 3000MHz
more than 25dB @ 5 to 50MHz
Insertion loss: less than 7dB @ SOURCE to DUT
less than 8dB @ DUT to REFLECTED
Applied models: MSA438TG/538TG

## Specifications

<table>
<thead>
<tr>
<th>Item</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency range</td>
<td>1MHz to 3.3GHz @ excepting MSA458</td>
</tr>
<tr>
<td></td>
<td>1MHz to 8.5GHz @ MSA458</td>
</tr>
<tr>
<td>Measured level</td>
<td>+10 to -70dBm @ 1MHz to 2GHz, RBW100kHz</td>
</tr>
<tr>
<td></td>
<td>+10 to -60dBm @ 2 to 8.5GHz, RBW100kHz</td>
</tr>
<tr>
<td>Measurement resolution</td>
<td>100kHz</td>
</tr>
<tr>
<td>Display digits</td>
<td>8 digits max</td>
</tr>
<tr>
<td>Reference X'tal</td>
<td>Accuracy: ±2ppm @ 23°C</td>
</tr>
<tr>
<td></td>
<td>Temp. characteristics: ±5ppm @ 0 to 40°C</td>
</tr>
<tr>
<td>Applied models</td>
<td>MSA400 series</td>
</tr>
</tbody>
</table>

7.4V/500mAh
Applied models: MSA400/500 series

Connector: A plug/B plug
Length: 1m
Applied models: MSA400/500 series

<table>
<thead>
<tr>
<th>Model</th>
<th>Freq. range</th>
</tr>
</thead>
<tbody>
<tr>
<td>M301</td>
<td>0.8 to 1GHz</td>
</tr>
<tr>
<td>M302</td>
<td>1.25 to 1.6GHz</td>
</tr>
<tr>
<td>M303</td>
<td>1.7 to 2.2GHz</td>
</tr>
<tr>
<td>M304</td>
<td>2.25 to 2.65GHz</td>
</tr>
<tr>
<td>M305</td>
<td>3 to 3.5GHz</td>
</tr>
<tr>
<td>M306</td>
<td>4.5 to 5GHz</td>
</tr>
<tr>
<td>M307</td>
<td>5 to 5.5GHz</td>
</tr>
</tbody>
</table>

Connectors: SMA(P) / N(P) / WR400
Applied models: M401 to M407 (MSA400/500 series)
Turntable unit

**Turntable unit for MY1530/1530N**

- **Diameter**: 200mm
- **Withstand load**: 10kg
- **Material**: Acrylic resin
- **Rotation angle**: 360°

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**Turntable unit MT103**

A module equipped with AC power supply, DC power supply, LAN, USB, SMA, BNC, N, Triaxial, D-sub connectors and Through pipe.

**I/F module**

IFM1 to IFM6

Six types of modules are available in the combination of these connectors.

Ex. IFM2: AC(1), LAN(2), USB(2), D-sub9pin(1)
**Small / Medium type**

**ME8662E**
- Outside dimensions: 360(W)×166(H)×340(D)mm
- Inside dimensions: 293(W)×98.5(H)×273(D)mm
- Shielding effectiveness: 60dB typ @2.4GHz
- Reflection loss: urethane
  - approx. 11dB @1GHz
  - approx. 18dB @2GHz
  - approx. 24dB @5GHz
  - approx. ≥24dB @≥5GHz
- Connector: SMA(2pcs), D-sub9pin @back
- Weight: approx. 7.5kg

**ME8662N**
- Outside dimensions: 360(W)×166(H)×340(D)mm
- Inside dimensions: 354(W)×129(H)×334(D)mm
- Shielding effectiveness: 55dB typ @2.4GHz
- Connector: SMA(2pcs), D-sub9pin @back
- Weight: approx. 6.7kg

**MY5220**
- Outside dimensions: 456(W)×416(H)×416(D)mm
- Inside dimensions: 390(W)×340(H)×340(D)mm
- Shielding effectiveness: 75dB typ @2.4GHz
- Reflection loss: 20dB @2.4GHz, urethane
- Connector: SMA(3pcs) @back(2pcs) and right side
- Weight: approx. 25kg
- Option: Connector box @back

**MY5310**
- Outside dimensions: 1340(W)×1210(H)×1030(D)mm
- Inside dimensions: 1230(W)×920(H)×920(D)mm
- Manual turntable: 220mm/440mm/350mm
- Shielding effectiveness: 70dB typ @2.2GHz
- Reflection loss: 20dB @35MHz to 2.2GHz, ferrite
- Connector: N/J (2pcs) @front and right side
- D-sub25pin, LAN, Three pin power plug @front
- Weight: approx. 460kg
- Option: Antenna MAN101
  - Electric turntable MT106

**MY5310S/5310SU**
- Outside dimensions: 1350(W)×1200(H)×1080(D)mm
- Inside dimensions: 1230(W)×920(H)×920(D)mm
- Manual turntable: 220mm/440mm/350mm
- Shielding effectiveness: 70dB typ @2.2GHz
- Reflection loss: 20dB @35MHz to 2.2GHz, ferrite
- Connector: N/J (2pcs) @front and right side
- D-sub25pin, LAN, Three pin power plug @front
- Weight: approx. 460kg @MY5310S
  - approx. 650kg @MY5310SU
- Option: Antenna MAN101
  - Electric turntable MT106

**MY5410**
- Outside dimensions: 2364(W)×1902(H)×1424(D)mm
- Inside dimensions: 2170(W)×1450(H)×1230(D)mm
- Manual turntable: 750mm/1800mm/100kg
- Shielding effectiveness: 35dB typ @2.4GHz
- Reflection loss: 20dB @35MHz to 2.2GHz, ferrite
- Connector: N/J (2pcs) @both sides
- D-sub25pin, LAN, Three pin power plug @front
- Weight: approx. 1100kg
- Option: Antenna MAN102

**ME8661A**
- Outside dimensions: 830(W)×608(H)×503(D)mm
- Inside dimensions: 700(W)×380(H)×380(D)mm
- Acrylic resin table: 200-2000mm
- Shielding effectiveness: 65dB typ @2.4GHz
- Reflection loss: ≥20dB @≥1.2GHz, urethane
- Connector: SMA(3pcs) @left side(2pcs) and right side
- D-sub25pin @right side
- Weight: approx. 38kg
- Option: Manual turntable MT101

**ME8661B**
- Outside dimensions: 1500(W)×1100(H)×900(D)mm
- Inside dimensions: 1200(W)×600(H)×600(D)mm
- Shielding effectiveness: 65dB typ @2.4GHz
- Reflection loss: ≥20dB @≥600MHz, urethane
- Connector: SMA(3pcs) @left side(2pcs) and right side
- D-sub25pin @right side
- Weight: approx. 230kg
- Option: Manual turntable MT102
### Large type

**ME5630/MT5630ET**

- **Outside dimensions**: 230(W)×170(D)×192(H) mm
- **Inside dimensions**: 210(W)×120(D)×140(H) mm
- **Shielding effectiveness**: 60dB @600MHz to 6GHz
- **Reflection loss**: 30dB @1GHz, 40dB @3GHz, 50dB @5GHz
- **Front door**: 900×1150 mm
- **Turn table**: Manual @ME5630/Electric @ME5630ET
- **Table diameter**: 500mm / 30kg load capacity
- **Connectors**: SMA 4pcs @back
- **Shield window**: 140×140 mm
- **I/F Module**: 1 module max @back
- **Taurus option available (IFM1 to IFM6)**
- **Weight**: approx. 8kg (excluding I/F module)

### Production Line type

**ME8668**

- **Outside dimensions**: 922(W)×731(D) ×731(H) mm
- **Inside dimensions**: 790(W)×605(D)×605(H) mm
- **Automatic conveyer**: 634(W)×260(D)×260(H) mm
- **Test device**: 110(W)×150(D)×150(H) mm
- **Shielding effectiveness**: 70dB typ @2.4GHz
- **Reflection loss**: ±20dB @1GHz, urethane
- **Connectors**: SMA (2pcs) @both sides each 1pc, D-sub25pin @1pc
- **Weight**: approx. 94kg

### Hand-in type

**MY2510**

- **Outside dimensions**: 315(W)×315(D)×355(H) mm
- **Inside dimensions**: 250(W)×250(D)×250(H) mm
- **Shielding effectiveness**: 70dB typ @2.4GHz
- **Reflection loss**: ±20dB @2.4GHz, urethane
- **Connectors**: SMA(4) @back
- **I/F Module**: 1 module max @back
- **Taurus option available (IFM1 to IFM6)**
- **Weight**: approx. 15kg

### Electric Turn table for Large type

**MT106**

- **Outside dimensions**: 2504(W)×1704(D)×1921.5(H) mm
- **Inside dimensions**: 2010(W)×1210(D)×1140(H) mm
- **Shielding effectiveness**: 80dB typ @1GHz to 6GHz
- **Reflection loss**: 30dB @1GHz, 40dB @3GHz, 50dB @5GHz
- **Front door**: 900×1150 mm
- **Turn table**: Manual @MY5310/Electric @MY5630ET
- **Control software**:
  - Manual control software MAS20T
  - Automatic control software MAS440T/540T
- **Weight**: 750kg @MY5630/765kg @MY5630ET

### Special type

**MY2520**

- **Outside dimensions**: 470(W)×470(D)×520(H) mm
- **Inside dimensions**: 400(W)×400(D)×400(H) mm
- **Shielding effectiveness**: 70dB typ @3GHz
- **Reflection loss**: ±20dB @2.4GHz, urethane
- **Connectors**: SMA(4) @back
- **I/F Module**: 2 module max @back
- **Taurus option available (IFM1 to IFM6)**
- **Weight**: approx. 205kg

**MY3710**

- **Outside dimensions**: 320(W)×240(H)×360(D) mm
- **Inside dimensions**: 250(W)×160(D)×290(H) mm
- **Shielding effectiveness**: ±60dB @600MHz to 6GHz
- **Reflection loss**: ±20dB @2.4GHz, urethane
- **Connectors**: SMA 4pcs @back
- **Shield window**: 140×140 mm
- **I/F Module**: 1 module max @back
- **Taurus option available (IFM1 to IFM6)**
- **Weight**: approx. 8kg (excluding I/F module)

**MY3710HS**

- **Outside dimensions**: 320(W)×260(H)×360(D) mm
- **Inside dimensions**: 250(W)×145(D)×290(H) mm
- **Shielding effectiveness**: ±60dB @600MHz to 6GHz
- **Reflection loss**: ±20dB @2.4GHz, urethane
- **Connectors**: SMA 4pcs @back
- **Shield window**: 140(W)×140(D) mm
- **I/F Module**: 1 module max @back
- **Taurus option available (IFM1 to IFM6)**
- **Weight**: approx. 9kg (excluding I/F module)

**MY3720**

- **Outside dimensions**: 615(W)×515(H)×518(D) mm
- **Inside dimensions**: 550(W)×450(H)×450(D) mm
- **Shielding effectiveness**: ±60dB @600MHz to 6GHz
- **Reflection loss**: ±20dB @2.4GHz, urethane
- **Connectors**: SMA 6pcs @both sides each 3pcs
- **Shield window**: 275(W)×255(D) mm
- **I/F Module**: 2 module max @both sides each 3pcs
- **Taurus option available (IFM1 to IFM6)**
- **Weight**: approx. 21kg (excluding I/F module)

**MY5305**

- **Outside dimensions**: 1150(W)×765(D)×635(H) mm
- **Inside dimensions**: 1000(W)×500(D)×500(H) mm
- **Shielding effectiveness**: 75dB typ @300MHz
- **Reflection loss**: ±20dB @35 MHz to 2.2GHz, ferrite
- **Connectors**: N(J)(2pcs) @both sides each 1pc, D-sub25pin, LAN, Three pin power plug @front
- **Weight**: approx. 195kg
The nine kinds of antennas cover the frequency band from 300MHz to 6.2GHz. Connector is SMA(P).

- **Dipole antenna**
  - Frequency range: 20MHz to 3GHz
  - Gain: -45 to +1dBi (nominal)
  - Antenna factor: 20 to 51dB/m
  - Dimensions: 350(L)×160(W)×140(D)mm
  - Weight: approx. 350g

- **Log periodic antenna**
  - Frequency range: 30MHz to 1GHz
  - Gain: -31 to +1dBi (nominal)
  - Antenna factor: 17 to 31dB/m
  - Dimensions: 540(L)×225(W)×225(D)mm
  - Weight: approx. 1150g

- **Biconical antenna**
  - Frequency range: 30MHz to 1GHz
  - Gain: -31 to +1dBi (nominal)
  - Antenna factor: 17 to 31dB/m
  - Dimensions: 540(L)×225(W)×225(D)mm
  - Weight: approx. 1150g

- **Ferrite**
  - Reflection loss:
    - 20dB@30MHz
    - 30dB@150MHz
    - 40dB@260MHz
    - 30dB@430MHz
    - 20dB@930MHz
  - Specifications:
    - Thickness: 28mm

- **Electric Turn table**
  - This electric turntable is ideal for evaluating small antennas and radios.
  - It can be used to evaluate antenna radiation pattern, beamforming, beam tracking, etc.
  - Compact and low-profile specification, it can be incorporated into our anechoic box.

### Antenna

### Dipole antenna

**M301 to M309**

- Frequency range: 20MHz to 3GHz
- Gain: -45 to +1dBi (nominal)
- Antenna factor: 20 to 51dB/m
- Dimensions: 350(L)×160(W)×140(D)mm
- Weight: approx. 350g

### Log periodic antenna

**M213/213R**

- Frequency range: from 700MHz to 5GHz.
- The reference antenna M213R is with an antenna gain & VSWR data.

### Biconical antenna

**MAN150/150B**

- Broadband, compact and lightweight antenna.

#### MAN150

- Frequency range: 20MHz to 3GHz
- Gain: -45 to +1dBi (nominal)
- Antenna factor: 20 to 51dB/m
- Dimensions: 350(L)×160(W)×140(D)mm
- Weight: approx. 350g

#### MAN150B

- Frequency range: 30MHz to 1GHz
- Gain: -31 to +1dBi (nominal)
- Antenna factor: 17 to 31dB/m
- Dimensions: 540(L)×225(W)×225(D)mm
- Weight: approx. 1150g

### Electric Turn table

**MT107-MYA75**

- This electric turntable is ideal for evaluating small antennas and radios.
- It can be used to evaluate antenna radiation pattern, beamforming, beam tracking, etc.
- Compact and low-profile specification, it can be incorporated into our anechoic box.

### Radio wave absorber

<table>
<thead>
<tr>
<th>Item</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thickness</td>
<td>10mm</td>
</tr>
<tr>
<td>Reflection loss</td>
<td>20dB@30MHz, 30dB@150MHz, 40dB@260MHz, 30dB@430MHz, 20dB@930MHz</td>
</tr>
</tbody>
</table>

- **Urethane foam**
  - Reflection loss:
    - 20dB@30MHz
    - 30dB@150MHz
    - 40dB@260MHz
    - 30dB@430MHz
    - 20dB@930MHz
  - Specifications:
    - Thickness: 19mm

- **Ferrite**
  - Reflection loss:
    - 17dB@30MHz
    - ≥20dB@35MHz to 2.2GHz
    - ≥10dB@2.2 to 2.7GHz
  - Specifications:
    - Thickness: 21mm

### Extremely High Frequency type

**MY6520**

- Outside dimensions: 743(W)×830(H)×721(D)mm
- Inside dimensions: 500(W)×500(D)×500(D)mm
- Shielding effectiveness: ≥60dB @700MHz to 5GHz, 20GHz to 30GHz
- Reflection loss:
  - 25dB @3GHz, 35dB @5GHz, 50dB @≥24GHz, Pyramid urethane type
- Connector: 2.92mm(J-J), SMA(J-J) ×2pcs, AC×1pc, DC, USB3.0, LAN ×2pcs
- Weight: approx. 33kg

### Option

**Radio wave absorber**

<table>
<thead>
<tr>
<th>Item</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thickness</td>
<td>29mm 57mm 114mm</td>
</tr>
<tr>
<td>Reflection loss</td>
<td>10dB 1GHz 350MHz 250MHz, 15dB 1.9GHz 700MHz 370MHz, 20dB 2.4GHz 1.2GHz 800MHz, 24dB 3.5GHz 5.5GHz 9.2GHz 12GHz</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Item</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thickness</td>
<td>10mm</td>
</tr>
<tr>
<td>Reflection loss</td>
<td>20dB@30MHz, 30dB@150MHz, 40dB@260MHz, 30dB@430MHz, 20dB@930MHz</td>
</tr>
</tbody>
</table>

**Urethane foam**

- Reflection loss:
  - 20dB@30MHz
  - 30dB@150MHz
  - 40dB@260MHz
  - 30dB@430MHz
  - 20dB@930MHz

<table>
<thead>
<tr>
<th>Item</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thickness</td>
<td>19mm</td>
</tr>
<tr>
<td>Reflection loss</td>
<td>17dB@30MHz, ≥20dB@35MHz to 2.2GHz, ≥10dB@2.2 to 2.7GHz</td>
</tr>
</tbody>
</table>

**Ferrite**

- Reflection loss:
  - 17dB@30MHz
  - ≥20dB@35MHz to 2.2GHz
  - ≥10dB@2.2 to 2.7GHz

<table>
<thead>
<tr>
<th>Item</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thickness</td>
<td>21mm</td>
</tr>
<tr>
<td>Reflection loss</td>
<td>17dB@30MHz, ≥20dB@35MHz to 2.2GHz, ≥10dB@2.2 to 2.7GHz</td>
</tr>
</tbody>
</table>

**Electric Turn table**

**MT107-MYA75 MT107-MYA77**
MR2300 is a first EMI total test system for “Precompliance” that measures the radiated and conducted emission noise. The miniaturization of the system is realized by small and broadband antenna MAN101/102 developed by ourselves. The whole system is calibrated. In addition, four types of anechoic boxes MY5310/5310S/5310SU/5410 are available according to the EUT.

**Spectrum analyzer for EMI test**

**MSA438E/538E/658E**

- Used in MR2300 system for the radiated emission test and the conducted emission test.
- Measures the conducted emission by using with LISN MPW201B and PC software MAS430/530.
- Measures the noise on PCB by connecting a magnetic field probe CP-2SA.

**LISN (Line impedance stabilization network)**

**MPW201B**

LISN is used to make constant the power source impedance observed from EUT and to measure noise with reproducibility when the conducted emission discharged through the power supply line is measured.

- Frequency range: 150kHz to 30MHz
- Circuit type: 50Ω/50µH and V type based on CISPR16-1
- Rated current: 15A
- Power supply: single phase, 50/60Hz, 250V AC max

**Low noise amplifier**

**MAP301/302**

MAP301 is optimum for emission noise measurement of CISPR25 in combination with loop antenna MAN120. MAP302 is optimum for emission noise measurements of both horizontal and vertical polarizations in combination with biconical antenna MAN150.

<table>
<thead>
<tr>
<th>Item</th>
<th>MAP301</th>
<th>MAP302</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency range</td>
<td>100kHz to 500MHz</td>
<td>20MHz to 3GHz</td>
</tr>
<tr>
<td>Gain</td>
<td>50dB</td>
<td>20dB</td>
</tr>
<tr>
<td>Noise figure</td>
<td>3.5dB</td>
<td>3.5dB</td>
</tr>
</tbody>
</table>

**Conducted EMI Test System**

**MR2150**

MR2150 is a precompliance test system for conducted EMI. The development cost can be significantly reduced by debugging and evaluating EUT using this system before testing in the formal EMC site.

**Electromagnetic anechoic box lineup**

The following four types of anechoic boxes MY5310/5310S/5310SU/5410 are selectable according to the EUT.

**MY5310**

An anechoic box for a small EUT and of the lowest price. The maximum size of EUT will be approx. 220mm cube.

- Outside dimensions: 1340(W)×1210(H)×1030(D)mm
- Inside dimensions: 1230(W)×920(H)×920(D)mm
- Weight: approx. 460kg
- Manual turntable: 220mm/sq/load 10kg
- Antenna: MAN101, fixed in an anechoic box

**MY5310S/SU**

A separation type of MY5310. It is easy to carry it with a small elevator and to install in the narrow space because divided into two.

- Outside dimensions: 1350(W)×1220(H)×1080(D)mm
- Inside dimensions: 1230(W)×920(H)×920(D)mm
- Weight: approx. 460kg
- Manual turntable: 220mm/sq/load 10kg
- Antenna: MAN101, fixed in an anechoic box

**MY5310SU**

An anechoic box of large EUT and of the biggest size. The maximum size of EUT will be approx. 756mm cube.

- Outside dimensions: 2364(W)×1902(H)×1424(D)mm
- Inside dimensions: 2170(W)×1450(H)×1230(D)mm
- Manual turntable: 756mm/sq/load 100kg
- Weight: approx. 1100kg
- Antenna: MAN102, movable up and down up to 90cm in 10cm step by hand

**MY5410**

An anechoic box for large EUT and of the biggest size. The maximum size of EUT will be approx. 756mm cube.

- Outside dimensions: 2364(W)×1902(H)×1424(D)mm
- Inside dimensions: 2170(W)×1450(H)×1230(D)mm
- Manual turntable: 756mm/sq/load 100kg
- Weight: approx. 1100kg
- Antenna: MAN102, movable up and down up to 90cm in 10cm step by hand.
**Power amplifier**

**MAP202**

Frequency range: 30 to 1000 MHz
Gain: 46 dB typ @ 30 to 600 MHz
44.5 dB typ @ 600 to 1000 MHz
1 dB compression level:
42.5 dBm typ @ 30 to 600 MHz
41 dBm typ @ 600 to 1000 MHz

**EUT camera monitor**

**MEC235**

The camera monitor MEC235 can view the malfunction of the EUT on a PC screen through the EUT camera monitor MEC235 put in the anechoic box. In addition, three types of anechoic boxes MY5310/5310S/5410 are available according to the EUT.

**Electric turntable (factory option)**

**MT106**

An electric turntable of 220 mm in diameter and 15 kg in load. This is controlled by the PC and can be installed only in the anechoic box MY5310/5310S.

Control software (option):
- Manual control software MAS20T
- Automatic control software MAS440T/540T

A precompliance EMS test system with which the radiation immunity test (IEC/EN61000-4-3) can be done.

Electric field strength: 1, 3, 10 V/m

The malfunction of the EUT can be observed on the PC screen through the EUT camera monitor MEC235 put in the anechoic box. In addition, three types of anechoic boxes MY5310/5310S/5410 are available according to the EUT.

**Biconical antenna**

**MAN150/150B**

Frequency range: 20 MHz to 3 GHz
Gain: -45 to +1 dBi (nominal)
Antenna factor: 20 to 51 dB/m
Dimensions: 350(L) x 160(W) x 140(D) mm
Weight: approx. 350g

Frequency range: 30 MHz to 1 GHz
Gain: -31 to +1 dBi (nominal)
Antenna factor: 17 to 31 dB/m
Dimensions: 540(L) x 225(W) x 225(D) mm
Weight: approx. 1150 g

**Loop antenna**

**MAN120**

Frequency range: 50 kHz to 33 MHz
Polarization: Vertical
Ground plate size:
- 700(W) x 900(D) mm @ MAN101
- 800(W) x 950(D) mm @ MAN102

*factory option*

**Magnetic field probe**

**CP-25A**

Frequency range: 10 MHz to 3 GHz
A probe to measure the magnetic field strength of the noise on PCB.

This is used when connecting to a spectrum analyzer or signal analyzer of MSA400/500 series. The measured value is calibrated in the instrument.

**Electric turntable (factory option)**

**MT106**

An electric turntable of 220 mm in diameter and 15 kg in load. This is controlled by the PC and can be installed only in the anechoic box MY5310/5310S.

Control software (option):
- Manual control software MAS20T
- Automatic control software MAS440T/540T

A precompliance EMS test system with which the radiation immunity test (IEC/EN61000-4-3) can be done.

Electric field strength: 1, 3, 10 V/m

The malfunction of the EUT can be observed on the PC screen through the EUT camera monitor MEC235 put in the anechoic box. In addition, three types of anechoic boxes MY5310/5310S/5410 are available according to the EUT.

**A system combining the EMI test system MR2300 and the EMS test system MR2350. PC software is MAS440T/540T/235B. The price of MR2400 becomes much lower than purchasing MR2300 and MR2350 separately because the anechoic box and the broadband antenna are common to two systems. In addition, three types of anechoic boxes MY5310/5310S/5410 are available according to the EUT.**

**Emc test system**
High-speed programmable attenuator
MAT800

By reading out the attenuation data stored in the built-in memory of 128k words, it is possible to generate the arbitrary attenuation pattern. That is, the amplitude curve of a microwave signal can be generated freely. The readout speed is 2μs/word maximum, and the spike won't be generated at the moment of switching the attenuation.

The attenuation pattern is transferred to the program memory in the MAT800 after that the attenuation pattern is transferred to the program memory in the MAT800 after being made using a standard accessory "Software for making attenuation program MAS800" on the PC.

Suitable for the air simulation of such wireless communication as a handover test of mobile communication equipment and a dynamic motion test of ETC/DSRC.

Five models are available for each frequency band.
- model A 1.5 to 4.5GHz
- model B 3 to 9GHz
- model C 4.5 to 12.5GHz
- model D 1.95 to 5.85GHz
- model E 0.75 to 2.25GHz

Maximum attenuation 80dB
Minimum step of attenuation 0.05dB

High-speed programmable attenuator
MAT810

A multifunctional programmable attenuator which can switch the attenuation of a microwave signal at high speed (2μs). The attenuation pattern is transferred to the program memory in the MAT810 after being made using a standard accessory on the PC. Suitable for the evaluation of communication quality of such wireless communication devices as mobile phone, WiMAX, PHS, ETC/DSRC and wireless LAN.

Frequency range 300MHz to 6.6GHz
Maximum attenuation 60dB
Minimum step of attenuation 0.05dB

Step attenuator
MAT850

A compact and lightweight step attenuator in which the attenuation can be changed confirming the value by LED display. The chattering and spike won't be generated at the moment of switching the attenuation.

Suitable for the evaluation of communication quality of such wireless communication devices as mobile phone, WiMAX, PHS, ETC/DSRC and wireless LAN.

Frequency range 300MHz to 6.1GHz
Maximum attenuation 60dB
Minimum step of attenuation 0.1dB

Signal generator
MSG703

- IQ modulation signal output (factory option)
- Fast switching
- The high accurate RF output level by ALC circuit (Auto Level Control circuit)
- High accurate frequency and level output
- Frequency and level setting by three ways
- Abundant modulation functions
- Sufficient sweep functions
- Phase offset function
- Small size and lightweight
- Sufficient interfaces
- Large and color LCD display
- Displaying sweep waveform and modulation waveform on the screen

<table>
<thead>
<tr>
<th>Item</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency range</td>
<td>5MHz to 3GHz</td>
</tr>
<tr>
<td>SSB phase noise</td>
<td>← 95dBc/Hz @1 to 3GHz, 20kHz offset</td>
</tr>
<tr>
<td></td>
<td>← -100dBc/Hz @5M to 1GHz, 20kHz offset</td>
</tr>
<tr>
<td>Maximum output level</td>
<td>&lt;at ALC or&gt;</td>
</tr>
<tr>
<td></td>
<td>±14dBm @5MHz to &lt;1.025GHz</td>
</tr>
<tr>
<td></td>
<td>±13dBm @1.025 to &lt;2.025GHz</td>
</tr>
<tr>
<td></td>
<td>±11dBm @2.025 to &lt;2.85GHz</td>
</tr>
<tr>
<td></td>
<td>±10dBm @2.825 to 3GHz</td>
</tr>
<tr>
<td>Kinds of sweep</td>
<td>List sweep, Step sweep</td>
</tr>
<tr>
<td>Kinds of modulation</td>
<td>PSK modulation, QSK modulation, Amplitude modulation(AM)</td>
</tr>
<tr>
<td>Interface</td>
<td>USB device, USB host, LAN(1000BASE-T)</td>
</tr>
<tr>
<td>Option</td>
<td>IQ modulator MIQ709</td>
</tr>
<tr>
<td></td>
<td>High stability timebase MSG700-03</td>
</tr>
</tbody>
</table>
ETC/DSRC inspection system

### Automatic inspection system

#### RSU/OBE inspection system
**ME8500**

ME8500 was developed for the production or inspection line of RSU and OBE of ETC. This allows to automatically do the wireless system test and the dynamic motion test. It is possible to perform a test of whole device or only RF circuit.

#### OBE inspection system
**ME8600**

ME8600 is a low price automatic inspection system developed for ETC/OBE production line. It is possible of wireless system test, protocol test and dynamic motion test (option).

**Option**
- Receiving sensitivity test (option A)
- Burst BER measurement (option B)
- Communication test (R/W) (option C)
- Dynamic motion test (option E)

### DSRC OBE tester

**ME9100**

ME9100 is a tester to check the wireless communication of DSRC OBE installed on a car. After transmitting FCMC from ME9100, it is confirmed whether ACTC and WCNC are returned by OBE correctly. Since the power is automatically turned off after 7 seconds from test start, battery life becomes longer. The number of test times is about 500 times without exchanging the battery.

- Supporting ETC and ITS spot
- Supporting all 7 channels and all 4 profiles
- Complete one piece and handheld type without any connection cable
- Easy operation by one multi-direction switch
- Technical standards conformity certification has been obtained. (Radio license is not required.)

### ASK+QPSK OBE inspection system
**ME9000**

**Option**
- Reading and displaying WCN of OBE
- Measuring electric field strength of OBE and RSU

**Model A+C**

Is a compound equipment of model A and model C.

**Model CN**

Measures electric field strength of RSU such as “ITS spot” in a moving car, extending the function of model C.

WCN and electric field strength measurement data can be saved up to maximum 100 data respectively. Moreover, since this operates as a removable disk, the saved data can be transferred to the PC through USB interface.

### DSRC communication unit

**ME9115**

Lineup by 4 models of A, C, A+C and CN. It is possible to read WCN of OBE and to measure electric field strength of OBE and RSU.

- Model A
  - Reads and displays WCN of OBE
- Model C
  - Measures electric field strength of OBE and RSU
- Model A+C
  - Is a compound equipment of model A and model C
- Model CN
  - Measures electric field strength of RSU such as “ITS spot” in a moving car, extending the function of model C

### ETC OBE tester

**ME8800Dα**

ME8800D on hand is upgraded.

The modulation factor of radio wave of ETC OBE has changed compared with the early stage. For this fact, some OBE needs the distance shorter than 1m in order to communicate with ME8800D which is an initial version of the tester. So, ME8800D will be returned as ME8800Dα after revised to communicate securely at the distance of 1m.
A system utilizing ETC used on highway as a private service. Capable of use for various applications by reading specific WCN for each ETC OBE (On-board equipment).

- **System configuration**
  - DSRC antenna ME9301/ME9301V
  - Interface Box ME9302
  - Dedicated I/F cable ME9303

Equipped with both ASK and QPSK modulations.

ME9010 is based on ARIB STD-T75 and ARIB TR-T16. Moreover, this is RSU simulator equipped with ASK and QPSK modulations and supporting profile 9 to 12.

This is a necessary tool by all means to do Protocol test, Dynamic motion test and Wireless system test of ASK OBE, QPSK OBE or ASK+QPSK OBE.

PC software MAS960 is available for controlling ME9010 and external equipment (spectrum analyzer, high-speed programmable attenuator MAT800/B, microwave AM detector MMD850, digital oscilloscope and power meter), and displaying the test result.

The dynamic motion test described in ARIB TR-T16 <2-2-1> to <2-2-3> can be easily done with MAT800/B. The power pattern is created in the way of making arbitrary waveform on the PC using a standard accessory "Software for making attenuation program". And then this power pattern is transferred to the memory of MAT800/B.

The dynamic motion test is performed connecting such ETC/DSRC signal generator as RSU simulator to the input of MAT800/B and connecting antenna or OBE to the output.

ME9200 is a system that measures the electric field strength distribution of ETC or ITS spot and makes a graph and map of electric field strength.

- Actual wave or CW is measured in a short time.
- Capable of the measurement by cart type and on-board type.
- Capable of being equipped with maximum 17 antennas (9 pcs at standard).
- If the cart is equipped with 17 antennas at 20cm intervals, the lane width of 3.2m will be measured at one time.
- When some RSUs on the main lane are measured with the on-board type using the automatic mode, the measurement is automatically performed in accordance with the position within the measurement section and the measurement conditions that are registered in advance.

ME9010 is based on ARIB STD-T75 and ARIB TR-T16. Moreover, this is RSU simulator equipped with ASK and QPSK modulations and supporting profile 9 to 12.

This is a necessary tool by all means to do Protocol test, Dynamic motion test and Wireless system test of ASK OBE, QPSK OBE or ASK+QPSK OBE.

PC software MAS960 is available for controlling ME9010 and external equipment (spectrum analyzer, high-speed programmable attenuator MAT800/B, microwave AM detector MMD850, digital oscilloscope and power meter), and displaying the test result.

Suitable for basic operation test, dynamic motion test and wireless system test of ETC/DSRC OBE by the space coupling. Various antennas, antenna movable mechanism and turntable are available as options.

Outside dimensions: 830 (W) × 608 (H) × 503 (D) mm
Inside dimensions: 700 (W) × 380 (H) × 380 (D) mm
Acrylic resin table: 200×200 mm

Frequency range: 5820±35 MHz

M211 is a transmission & receiving antenna with right circular polarization used in the ETC/DSRC test. The reference antenna M211R is with an antenna gain & VSWR data and is used when obtaining RF space coupling degree.

Various antennas, antenna movable mechanism and turntable are available as options.

Outside dimensions: 830 (W) × 608 (H) × 503 (D) mm
Inside dimensions: 700 (W) × 380 (H) × 380 (D) mm
Acrylic resin table: 200×200 mm

Suitable for basic operation test, dynamic motion test and wireless system test of ETC/DSRC OBE by the space coupling. Various antennas, antenna movable mechanism and turntable are available as options.

Outside dimensions: 830 (W) × 608 (H) × 503 (D) mm
Inside dimensions: 700 (W) × 380 (H) × 380 (D) mm
Acrylic resin table: 200×200 mm
Measuring system

Radio wave absorption equipment

200MHz to 28GHz compatible Radio wave absorption equipment

We hear the objective test standard, the budget, setting environment and offer the most suitable radio wave absorption equipment under the limited condition.

Handover tester

MH3800

The total system that can easily perform "Handover (hand-off)" evaluation of wireless communication equipment and "Fall back (decrease transmission speed)" operation test by distance attenuation in real environment.

RF matrix switch box MM6000

MM6000 series

Wireless environment simulation of many base stations and terminals in the field - Handover

Multi-wave electric field strength automatic measurement system

ME9500

As the electric field strength such as AM radio, FM radio, business radio and VICS can be measured at high speed, it is the optimum system for investigation of radio wave service area and maintenance of retransmission system.

GPS radio wave retransmission system

MN1600

The MN1600 is a retransmission system that receives GPS radio wave with a receiving antenna installed outdoors, amplifies it and then radiates again with an indoor transmitting antenna.

Real time IQ data recorder system

MQ5300

The ideal system to measure in the maximum 60MHz span, to measure simultaneously different frequency bands, and to record over a long time.

Multiwindow waveform monitor

MW4500

This is a system which displays the signal waveforms captured with spectrum analyzer MSA400/500 series by split-screen of maximum 9 channels on a big display.

Test accessories

Antenna

Dipole antenna

M301 to 309/M401 to 407

<table>
<thead>
<tr>
<th>Model</th>
<th>Freq. range</th>
</tr>
</thead>
<tbody>
<tr>
<td>M301/401</td>
<td>0.8 to 1GHz</td>
</tr>
<tr>
<td>M302/402</td>
<td>1.25 to 1.65GHz</td>
</tr>
<tr>
<td>M303/403</td>
<td>1.7 to 2.2GHz</td>
</tr>
<tr>
<td>M304/404</td>
<td>2.25 to 2.6GHz</td>
</tr>
<tr>
<td>M305/405</td>
<td>3.0 to 500MHz</td>
</tr>
<tr>
<td>M306/406</td>
<td>4.8 to 6.2GHz</td>
</tr>
<tr>
<td>M307/407</td>
<td>470 to 770MHz</td>
</tr>
<tr>
<td>M308</td>
<td>3.6 to 4.2GHz</td>
</tr>
<tr>
<td>M309</td>
<td>4.4 to 4.9GHz</td>
</tr>
</tbody>
</table>

M300 series: SMA(P)
M400 series: N(P)

M301 to 309

M401 to 407

Patch antenna

M211/211R

A right circular polarization antenna suitable for ETC/DSRC test.
Frequency range: 5820±35MHz

Log periodic antenna

M213/213R

A linear polarization antenna with frequency band from 700MHz to 5GHz.
The reference antenna M213R is with an antenna gain & VSWR data.
There are SMA (P) type (MG-50S) and N (P) type (MG-50N).

**Terminator**

- Connector: SMA(P)/SMA(U)
- Frequency range: DC to 1GHz
- Gain: +35 dB
- Impedance: 50Ω

**Coaxial Attenuator / Terminator**

- Connector: SMA(P)/SMA(U)
- Frequency range: DC to 1GHz
- Gain: +35 dB
- Impedance: 50Ω

**Interface Cable**

<table>
<thead>
<tr>
<th>Model</th>
<th>Name</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>M180</td>
<td>RS-232C cable</td>
<td>1.5m</td>
</tr>
<tr>
<td>M200</td>
<td>GP-Ill cable</td>
<td>2m</td>
</tr>
<tr>
<td>M400</td>
<td>USB cable</td>
<td>1m</td>
</tr>
</tbody>
</table>

**GPS Radio Wave Retransmission System**

- **Loop Antenna MAN120**
  - A small and 40cm loop antenna suitable for low frequency measurement.
  - The noise measurement of the magnetic field radiation from LED lighting and the EMI measurement can be performed.
  - Frequency range: 50kHz to 33MHz
  - Connector: N(P)
  - Impedance: 50Ω
  - Dimensions: 420(δ(outside)) x 320(δ(inside)) x 13(δ(thickness))
  - Weight: 1.2kg

- **Biconical Antenna MAN150/150B**
  - Broadband, compact and lightweight antenna.
  - Frequency range: 20MHz to 3GHz
  - Gain: +20 to +51dBm
  - Dimensions: 350(L) x 160(W) x 140(D)mm
  - Weight: approx. 350g

**Test Accessories**

- **Loop Antenna**
  - MAN120
  - Frequency range: 20MHz to 3GHz
  - Gain: +45 to +1dB (nominal)
  - Antenna factor: 2.0 to 51dBm
  - Dimensions: 350(L) x 160(W) x 140(D)mm
  - Weight: approx. 350g

- **Biconical Antenna MAN150/150B**
  - Frequency range: 30MHz to 1GHz
  - Gain: +31 to +1dB (nominal)
  - Antenna factor: 17 to 31dBm
  - Dimensions: 540(L) x 225(W) x 225(D)mm
  - Weight: approx. 1150g

- **Probe**
  - **Hantagfield Probe CP-2SA**
  - Measures the magnetic field strength at pattern on PCB and terminals of device.
  - Frequency range: 10MHz to 3GHz
  - Space resolution: 0.25mm (depending on objects)
  - Applied models: MSA400/500 series

- **Magnetic Field Probe**
  - **CP-2SA**
  - Measures the magnetic field strength at pattern on PCB and terminals of device.
  - Frequency range: 10MHz to 3GHz
  - Space resolution: 0.25mm (depending on objects)
  - Applied models: MSA400/500 series

- **Wideband Passive Probe**
  - **MP300**
  - A passive probe with low input capacitance and wide frequency band.
  - Frequency range: DC to 6GHz
  - Attenuation ratio: 10:1, ±2%
  - Input resistance: 500Ω±2%
  - Input capacitance: 0.25pF typ

- **VSWR Bridge**
  - **MVS300B**
  - Enables to measure the return loss of electronic component and circuit.
  - Frequency range: 5 to 3000MHz
  - Directivity: more than 40dB @ 50 to 3000MHz
  - more than 25dB @ 5 to 50MHz
  - Insertion loss: less than 7dB @ SOURCE-DUT
  - less than 8dB @ DUT-REFLECTED

**Adapter**

<table>
<thead>
<tr>
<th>Model</th>
<th>Connector</th>
<th>Impedance</th>
<th>Freq. range</th>
</tr>
</thead>
<tbody>
<tr>
<td>MA301</td>
<td>BNC(P)/BNC(U)</td>
<td>50Ω/75Ω</td>
<td>DC to 2GHz</td>
</tr>
<tr>
<td>MA302</td>
<td>BNC(P)/N(J)</td>
<td>75Ω/75Ω</td>
<td>DC to 1.8GHz</td>
</tr>
<tr>
<td>MA303</td>
<td>BNC(P)/N(U)</td>
<td>75Ω/75Ω</td>
<td>DC to 1.8GHz</td>
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<td>75Ω/75Ω</td>
<td>DC to 1.8GHz</td>
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<td>MA305</td>
<td>BNC(P)/F(U)</td>
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<td>MA306</td>
<td>N(P)/SMA(U)</td>
<td>50Ω/50Ω</td>
<td>DC to 12.4GHz</td>
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<tr>
<td>MA307</td>
<td>N(P)/BNC(U)</td>
<td>50Ω/50Ω</td>
<td>DC to 2GHz</td>
</tr>
<tr>
<td>MA308</td>
<td>N(P)/BNC(J)</td>
<td>50Ω/75Ω</td>
<td>DC to 2GHz</td>
</tr>
<tr>
<td>MA309</td>
<td>N(J)/BNC(U)</td>
<td>50Ω/50Ω</td>
<td>DC to 2GHz</td>
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