Discover What's Possible™ Anritsu

# MG3681A

## Digital Modulation Signal Generator

250 kHz to 3 GHz


For Evaluating Next Generation Digital Mobile Communications Systems

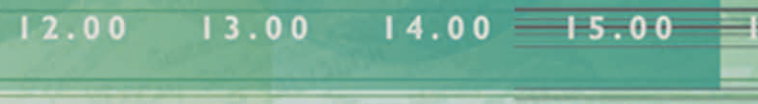
# For Wideband, High-speed Digital Mobile Communications

*The MG3681A uses a wideband vector modulator to output the high-accuracy, high-speed vector modulation signals that are required for R&D and manufacturing of digital mobile communications equipment and related devices. It covers, the frequency band of leading mobile communications systems for the frequency range of 250 kHz to 3 GHz.*

*It uses vector modulator to provide excellent frequency response, distortion and S/N ratio. It can perform accurate receiver sensitivity test and transmitter adjacent channel leakage power test for high-speed modulation communications systems.*

*Expansion units such as MU368040A CDMA Modulation Unit for modulation signals generation of W-CDMA communication system can be installed on the seven expansion slots in the MG3681A. Various modulation signals can be generated with the expansion units and associated software.*

*The MG3681A also has analog modulation functions such as AM and FM for testing of analog communications systems. In addition, its excellent signal purity and various functions such as memory and frequency sweep are useful as a general-purpose signal generator.*

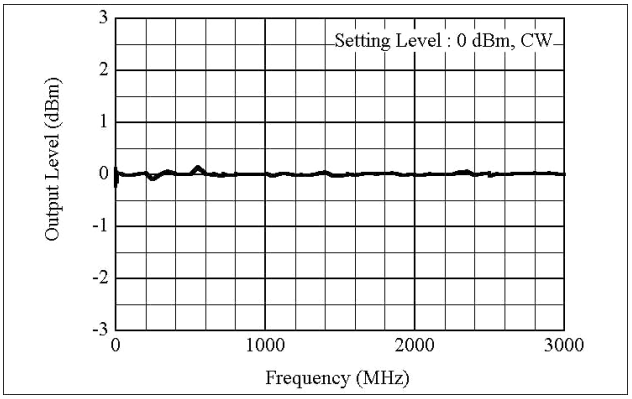


- High-resolution Setting of Frequency 0.01 Hz and Output Level 0.01 dB
- 30 MHz Wideband and High-Accuracy Vector Modulation
- Excellent Adjacent Channel Leakage Power Ratio
- Various Expansion Units

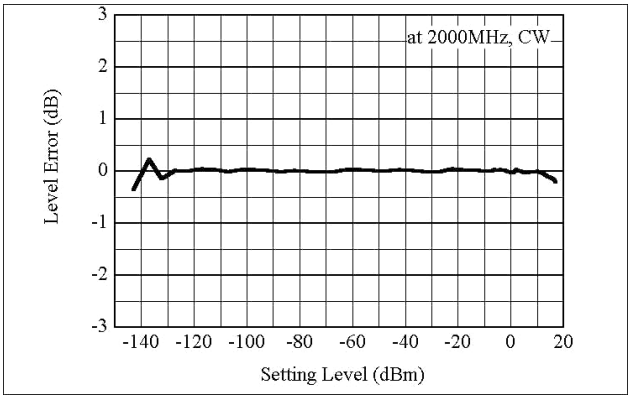
# Excellent Analog Basic Performance

### Excellent Level Accuracy Signal

The frequency response is excellent by calibrating output level across the entire output RF frequency range. Even low level can be output with high-accuracy due to use of a high-precision, high-reliability step attenuator calibrated.



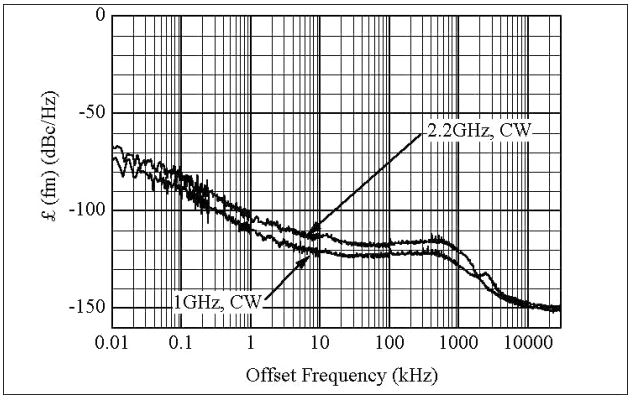

Output level frequency response




Output level accuracy

### Excellent Signal Purity

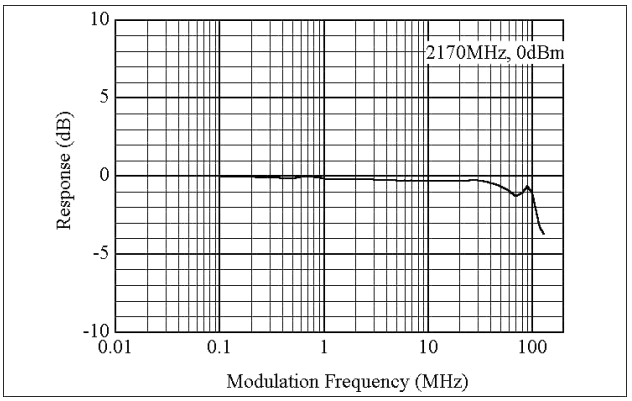
Digital mobile communications evolve into wideband RF frequency bandwidth, and signal generator requires low-noise signal to faraway frequency offset. A unique synthesizer technology achieves low noise floor characteristics of –145 dBc/Hz (typ. at above 5 MHz offset).



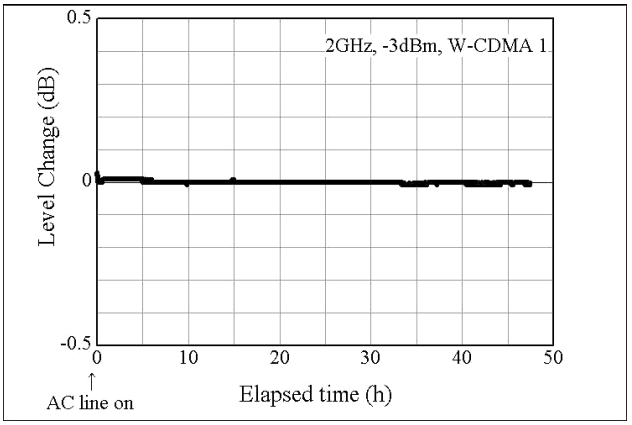

SSB phase noise characteristics

### Wideband Vector Modulation

The modulation frequency response of ±3 dB at the modulation frequency from DC to 30 MHz is achievable by the high-speed baseband signal processor and wideband vector modulator, permitting wideband vector modulation supporting high-speed data communications including W-CDMA system. Accurate wideband vector modulation is also available by using the external I/Q signals as well as internal modulation using the optional modulation units installed. In addition, a unique Automatic Level Control (ALC) technology assures stable output level at vector modulation.




Vector modulation frequency response




Output level stability at W-CDMA system modulation

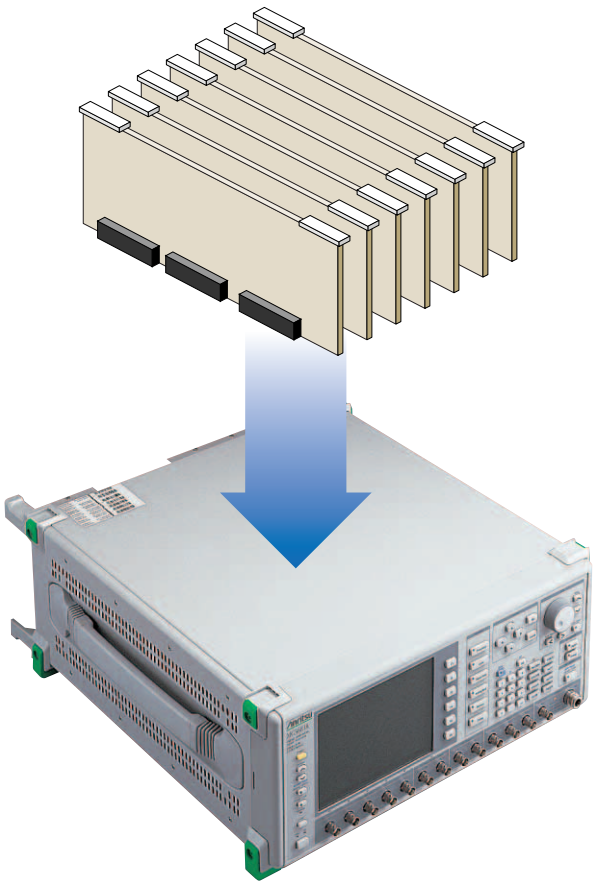
# Flexible System Configuration

### Expansion Units for up to Seven Slots

Seven slots for expansion units have 14 bits high-speed waveform data bus each In-phase and Quadrature signals. The excellent expansible platform covers future communication systems by addition of expansion units.

Note: Some expansion units require installation of dedicated software to enable functionality.

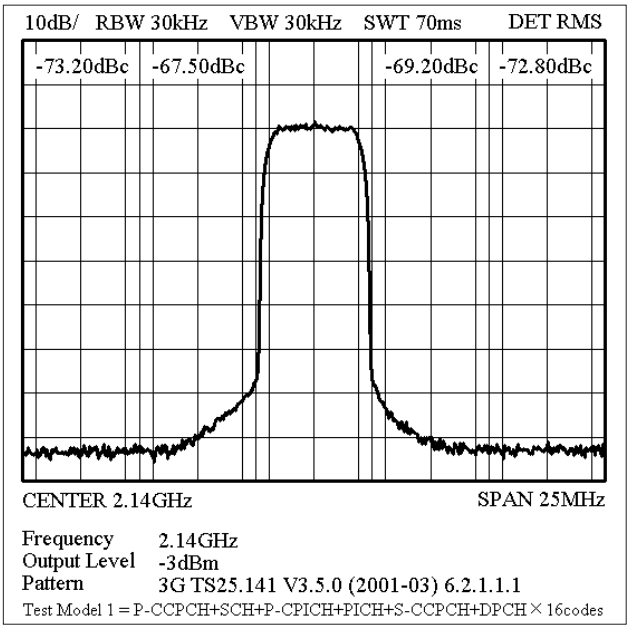
| Expansion unit | Software |
|---|---|
| MU368010A<br>TDMA Modulation Unit | MX368011A<br>PDC Software |
| | MX368012A<br>GSM Device Test Software |
| MU368040A<br>CDMA Modulation Unit | MX368041B<br>W-CDMA Software |
| | MX368042A<br>IS-95 Device Test Software |
| MU368030A<br>Universal Modulation Unit | MX368031A<br>Device Test Signal Generation Software |
| | MX368033A<br>CDMA2000 1xEV-DO Signal Generation Software |
| | MX368034A<br>PDC Packet Software |
| | MX368035A<br>PHS Signal Generation Software |
| MU368060A<br>AWGN Unit | – |



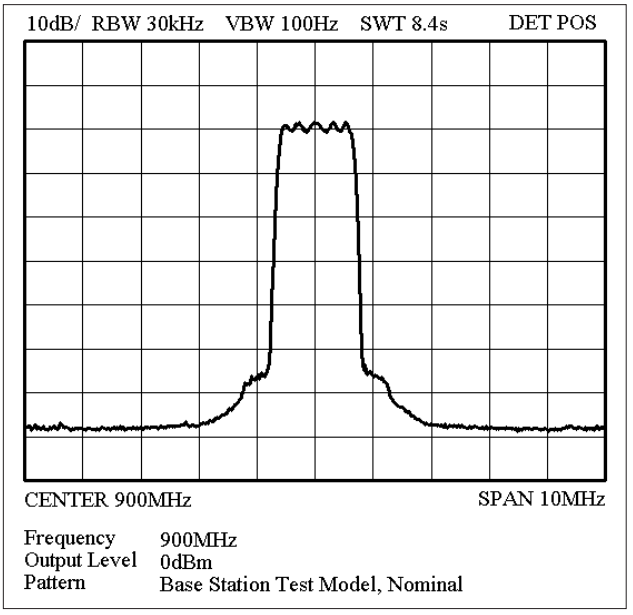
### Excellent Adjacent Channel Leakage Power Ratio

The adjacent channel leakage power ratio of the digital modulation signal generator is an important factor in distortion testing of device and interference testing of receiver.

The MG3681A achieves an excellent adjacent channel leakage power ratio by an optimized circuit design. The typical adjacent channel leakage power ratio for W-CDMA system is –68 dBc/3.84 MHz and the secondary adjacent channel leakage power ratio is –75 dBc/3.84 MHz.




W-CDMA system adjacent channel leakage power ratio at 16 code multiplex



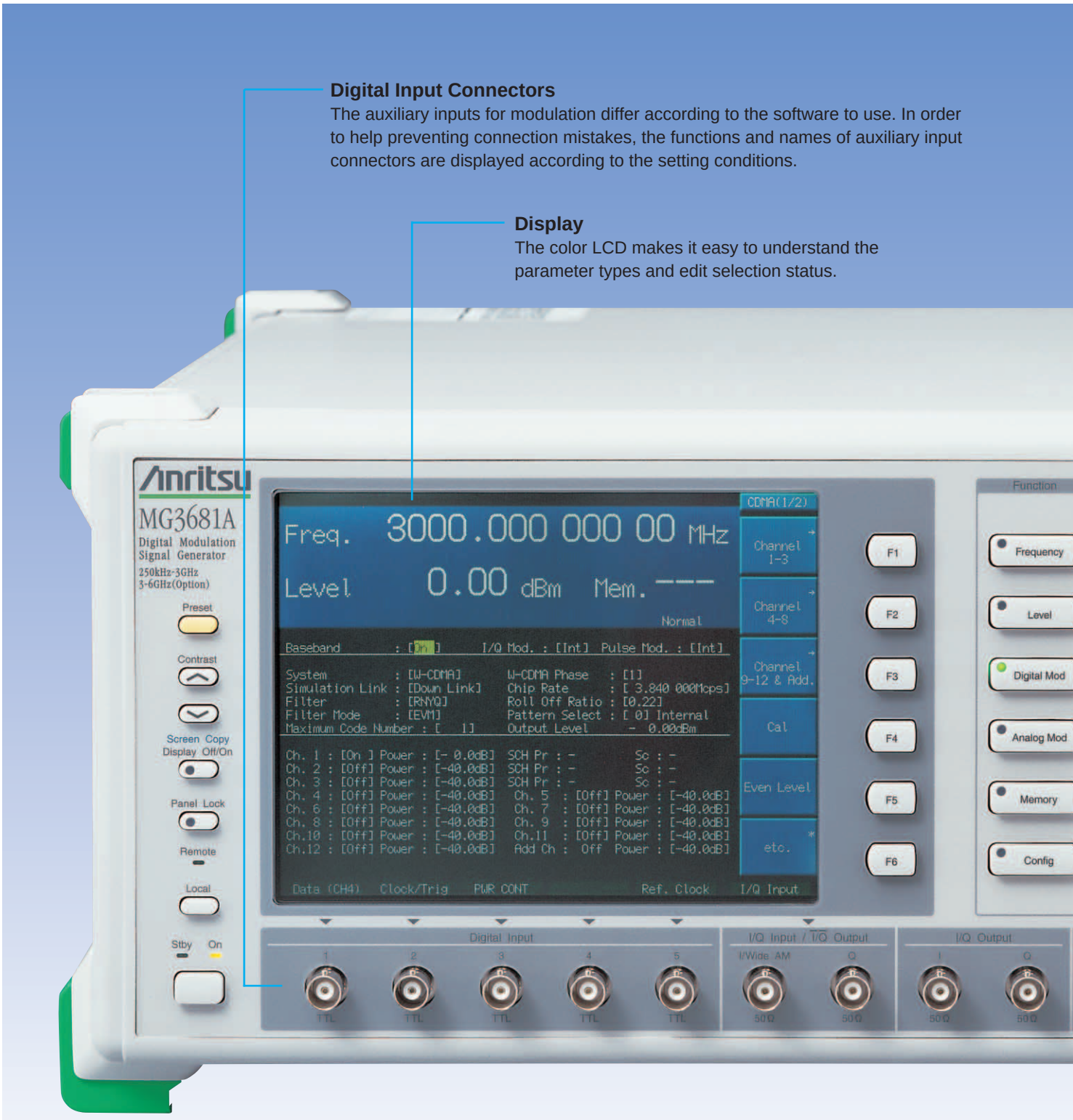

IS-95 system adjacent channel power ratio at 9 code multiplex

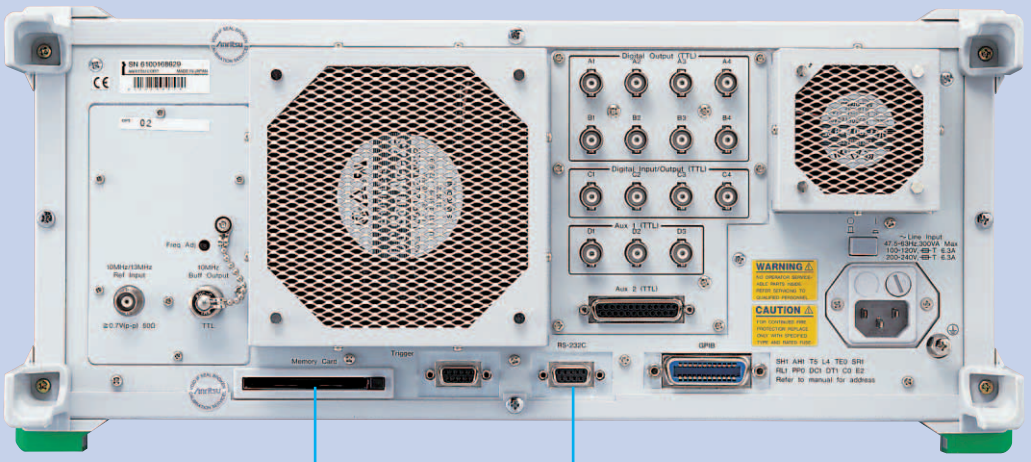
# Excellent Operability

In order to realize the good operability is the important element in using signal generators, the operational flow has been analyzed. Parameters can be selected using the cursor keys and changed using either the ten-key pad, rotary knob or step keys. The panel layout has been designed so that related operations can be performed smoothly and an easy-to-understand on-screen Help function facilitates the operation.

**Digital Input Connectors**
The auxiliary inputs for modulation differ according to the software to use. In order to help preventing connection mistakes, the functions and names of auxiliary input connectors are displayed according to the setting conditions.

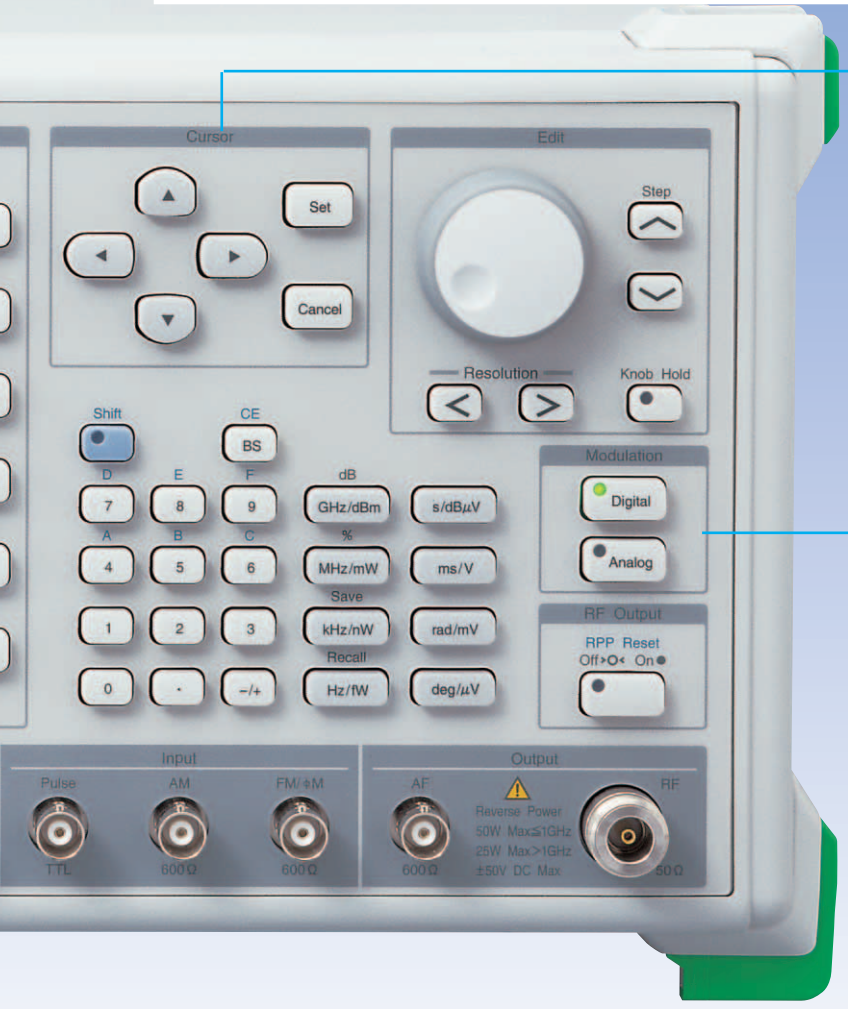
**Display**
The color LCD makes it easy to understand the parameter types and edit selection status.





**PC Card Slot**
A PC card slot simplifies firmware upgrades and data downloads.

**GPIB, RS-232C Interface**
Remote control by both GPIB and RS-232C is supported. In addition, high-speed control, such as frequency increase and decrease, can be performed using TTL level signals.



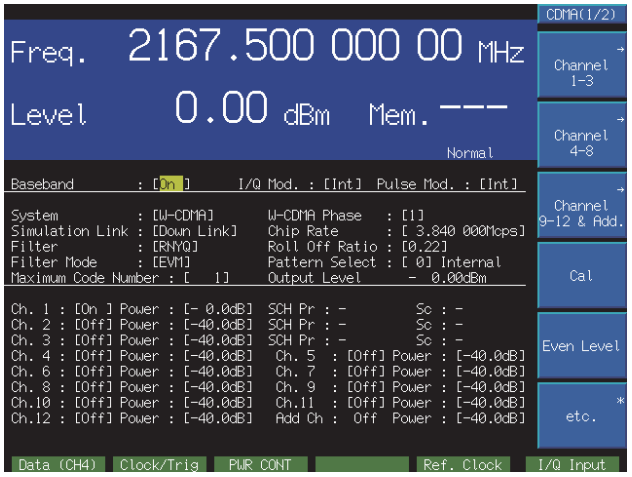

**Cursor Keys**
The cursor keys for selecting setting items have been arranged with consideration for good operability to permit efficient setting of many parameters. The setting method and setting range are different for each parameter, and are explained by on-screen Help display.

**Modulation, RF Output ON/OFF key**
The modulation and RF output can be switched on/off using one-touch keys.

# Various Modulation Types

## Digital Modulation

In addition to performing internal modulation using I/Q and burst signals generated by the expansion modulation units installed in the MG3681A, external modulation can also be performed using signals generated by an external baseband signal source. The expansion modulation unit operates irrespective of whether modulation is on or off and can be used as I/Q signals source. Moreover, when an optional additional function of I/Q output is installed, the I/Q signals amplitude and DC offset, etc., can be varied.



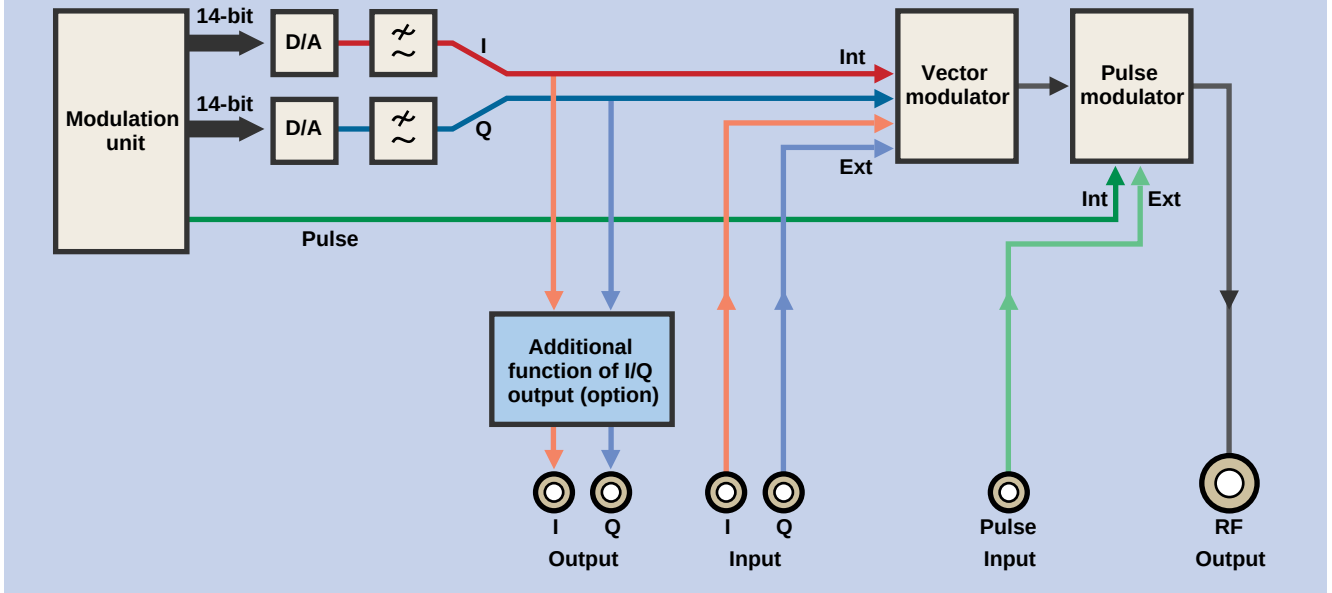

Digital modulation setting screen (when W-CDMA system selected)

## Analog Modulation

AM, FM and ϕM can be performed using an external modulation signal. When an optional AF synthesizer is installed, internal modulation at 0.01 Hz resolution with sine waves and triangular waves, etc., is also possible. The analog setting screen has been designed to provide an image of the modulation signal flow and greatly simplifies setting.


Analog modulation setting screen

### Digital modulation signal flow



# Full Function Lineup

### High-resolution Output Level Setting of 0.01 dB

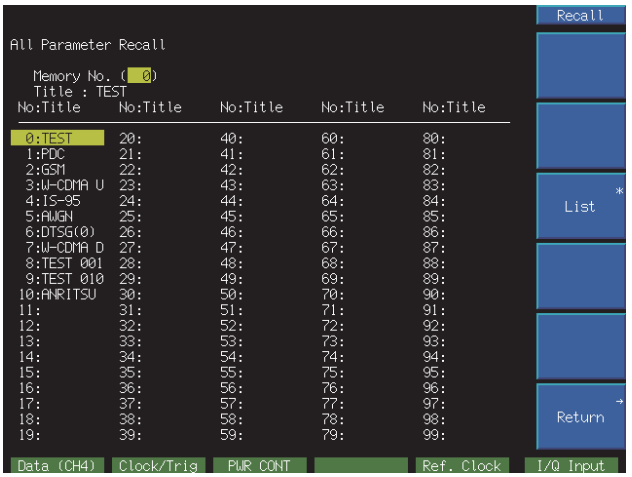
The output level can be set with a resolution of 0.01 dB across the entire level range. This is especially useful when wanting to set the level with a fine resolution for device tests, etc., as well as when calibrating the level with a standard such as a reference signal source or power meter, etc.


Output level display

### Large Capacity Memory

Basic parameter memory can save up to 512 frequency and output level settings. All parameter memory can save up to 100 all settings including modulation settings. Basic parameter memory has a dedicated memory address display field that can be recalled continuously using the rotary knob or step keys. All parameter memory can be input titles up to 8-character length each, to make it easy to check the memory contents.

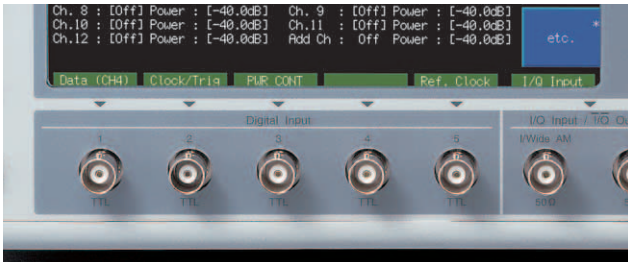

Basic parameter memory address display



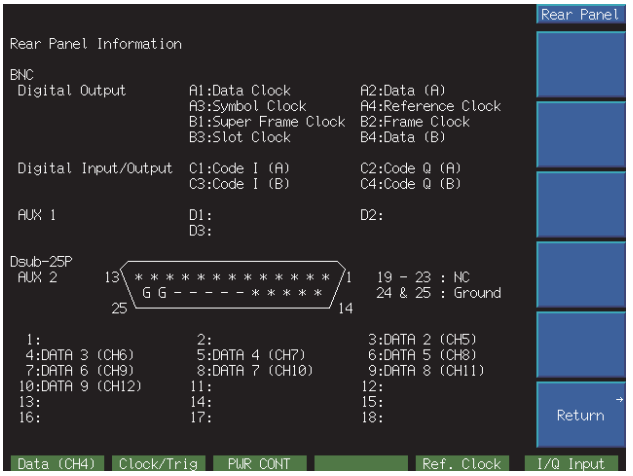

All parameter memory recall screen

### Connector Function Name Display

The type of required auxiliary input signals for modulation varies with the used software. The functions according to the setting conditions are assigned to the auxiliary connectors. The function and name of each connector is displayed on the LCD to simplify the work of connecting other equipment and prevent connection mistakes.




Example of front panel connector function display




Example of rear panel connector function display

### Operation Help Display

The parameters setting range and method are different at each item. The on-screen help for each setting range and method are displayed to simplify parameter operations in the setting window.


Example of help display when setting frequency offset

# Specifications

### MG3681A Main frame

<table>
<tr><td rowspan="6">Frequency</td><td>Range</td><td>250 kHz to 3000 MHz, Resolution: 0.01 Hz</td></tr>
<tr><td>Accuracy</td><td>Depends on installed reference oscillator, Reference frequency accuracy: ± (5% of FM setting deviation + 5 Hz) for frequency modulation</td></tr>
<tr><td>Internal reference oscillator</td><td>Aging rate: ±1 x $10^{-6}$/year, Temperature stability: ±1 x $10^{-6}$ (0˚ to 50˚C)*1</td></tr>
<tr><td>External reference input</td><td>10 MHz/13 MHz auto-switching, ±10 ppm, ≥0.7 V(p-p)/50 Ω (AC coupled), BNC connector (rear panel)</td></tr>
<tr><td>Buffer output</td><td>10 MHz, TTL level (DC coupled), BNC connector (rear panel)</td></tr>
<tr><td>Switching time</td><td>≤20 ms (response time from final command to ±500 Hz of set frequency on GPIB at CW, ALC on, except when setting frequency is crossing over 600 MHz and 1010 MHz)</td></tr>
<tr><td rowspan="8">Output level</td><td>Range</td><td>–143 to +13 dBm (settable range: –143 to +17 dBm)</td></tr>
<tr><td>Unit</td><td>dBm, W, dBμV, V (dBμV, V selected terminate/open voltage display)</td></tr>
<tr><td>Resolution</td><td>0.01 dB (dBm, dBμV units), 3 digits (W, V units)</td></tr>
<tr><td>Frequency response</td><td>±1 dB (CW, ALC on, 0 dBm)</td></tr>
<tr><td>Accuracy</td><td>CW, ALC on
<table>
<tr><td>Level \ Frequency</td><td>≤1 GHz</td><td>>1 GHz</td></tr>
<tr><td>≤+13 dBm, ≥–127 dBm</td><td>±1 dB</td><td>±2 dB</td></tr>
<tr><td><–127 dBm</td><td>±2 dB</td><td>±3 dB</td></tr>
</table></td></tr>
<tr><td>Output connector</td><td>50 Ω, N-type connector (front panel)</td></tr>
<tr><td>Switching time</td><td>≤50 ms (normal mode), ≤100 ms (safety mode), ≤10 ms (continuous mode)<br>*Response time from final command to ±0.5 dB of final level on GPIB at CW, ALC on</td></tr>
<tr><td>Special setting mode</td><td>Continuous mode:<br>Level continuously adjustable in set value range of ±10 dB (dBm, dBμV units only)<br>For vector modulation by optional digital modulation unit, continuous mode variance depends on modulation setting<br>Safety mode: Mechanical attenuator decreases level to prevent generation of high-level signal spikes</td></tr>
<tr><td>ALC mode</td><td>ALC on<br>Usage: Continuous wave or pulse modulation wave (burst wave) with RF On time of 10 μs or more<br>ALC time constant: Auto, 500 ns, 2.4 μs, 5 μs, 24 μs, 50 μs, 240 μs, 500 μs selectable<br>At Auto, automatically selected depending on frequency, AM and vector modulation [when digital modulation unit (option) is used]<br>The ALC time constant is automatically selected, depending on the set frequency, regardless of the time constant selected on the front panel<br>ALC off<br>Usage: Pulse modulation wave (burst wave) whose RF on time is less than 10 μs<br>Restrict item: Without AM<br>ALC calibration: Automatic during ALC Calibration operation and at frequency/level setting change</td></tr>
<tr><td rowspan="2">Signal purity</td><td>Spurious</td><td>Harmonics: <–30 dBc<br>Non harmonic:
<table>
<tr><td>Frequency</td><td>15 kHz to 300 MHz offset</td><td>>300 MHz offset</td><td>Fixed frequency spurious</td></tr>
<tr><td>≤2500 MHz</td><td><–60 dBc</td><td><–30 dBc</td><td>–50 dBc (660, 1320 MHz)</td></tr>
<tr><td>>2500 MHz</td><td colspan="2"><–30 dBc</td><td>–</td></tr>
</table>
Power line and Fan rotation: <–40 dBc *CW, continuous mode: off, ≤0 dBm</td></tr>
<tr><td>SSB phase noise</td><td><–118 dBc/Hz (≥10 MHz, ≤1010 MHz), <–112 dBc/Hz (>1010 MHz) *At CW, 20 kHz offset</td></tr>
<tr><td rowspan="4">AM</td><td>Range</td><td>0 to 100% (cannot set internal/external modulation independently), Resolution: 0.1%</td></tr>
<tr><td>Modulation frequency response</td><td>≤0 dBm, ALC on, in band of ±1.5 dB based on modulation frequency of 1 kHz
<table>
<tr><td rowspan="2">Frequency</td><td rowspan="2">Lower limit frequency</td><td colspan="3">Upper limit frequency</td></tr>
<tr><td colspan="2">Vector modulation and wideband AM off</td><td>Vector modulation or wideband AM on</td></tr>
<tr><td></td><td></td><td>AM: 30%</td><td>AM: 80%</td><td>AM: 30%</td></tr>
<tr><td>≥0.4 MHz, <2 MHz</td><td rowspan="3">DC (Internal modulation, External modulation DC coupled), 20 Hz (External modulation AC coupled)</td><td>3 kHz</td><td>1 kHz</td><td rowspan="3">1 kHz</td></tr>
<tr><td>≥2 MHz, <10 MHz</td><td>10 kHz</td><td>10 kHz</td></tr>
<tr><td>≥10 MHz</td><td>10 kHz</td><td>10 kHz</td></tr>
</table></td></tr>
<tr><td>Internal modulation</td><td>requires AF synthesizer (Option 21)</td></tr>
<tr><td>External modulation</td><td>2 V(p-p) approx., 600 Ω, AC/DC coupled switchable, BNC connector (front panel)</td></tr>
<tr><td>Modulation signal polarity</td><td>Positive/negative switchable</td></tr>
</table>

| | | |
|---|---|---|
| FM | Range | 0 to 1000 kHz (≥10 MHz, ≤1010 MHz), 0 to 2000 kHz (>1010 MHz)<br>*Cannot set internal/external modulation independently. |
| | Resolution | 10 Hz (0 to 10 kHz deviation), 100 Hz (10.1 to 100 kHz deviation), 1 kHz (101 to 1000 kHz deviation),<br>10 kHz (1010 to 2000 kHz deviation) |
| | Modulation frequency response | DC to 20 kHz (internal modulation, external modulation DC coupled), 20 Hz to 20 kHz (external modulation AC coupled) *In band of ±1 dB based on modulation frequency of 1 kHz |
| | Internal modulation | requires AF synthesizer (Option 21) |
| | External modulation | 2 V(p-p) approx., 600 Ω, AC/DC coupled switchable, BNC connector (front panel) |
| | Modulation signal polarity | Positive/negative switchable |
| øM | Range | 0 to 6.28 rad (≥10 MHz, ≤1010 MHz), 0 to 12.56 rad (>1010 MHz)<br>*Cannot set internal/external modulation independently. |
| | Unit | rad, deg |
| | Resolution | rad unit: 0.01 rad, deg unit: 1 deg |
| | Modulation frequency response | DC to 20 kHz (internal modulation, external modulation DC coupled), 20 Hz to 20 kHz (external modulation AC coupled) *In band of ±1 dB based on modulation frequency of 1 kHz |
| | Internal modulation | requires AF synthesizer (Option 21) |
| | External modulation | 2 V(p-p) approx., 600 Ω, AC/DC coupled switchable, BNC connector (front panel) |
| | Modulation signal polarity | Positive/negative switchable |
| Wideband AM | Modulation frequency response | DC to 15 MHz (±2 dB bandwidth), DC to 30 MHz (±3 dB bandwidth)<br>*External modulation, input level: 0.9 V(p-p), ≥100 MHz, ≤0 dBm, modulation frequency of 1 kHz |
| | Internal modulation | requires digital modulation unit (option) |
| | External modulation | ≤1 V(p-p), 50 Ω, BNC connector (front panel), sensitivity: 1 V(p-p) = 100% |
| Pulse modulation | On/off ratio | >60 dB |
| | Rise/fall time | <100 ns (external modulation) |
| | Minimum pulse width | <500 ns (external modulation) |
| | Pulse repetition frequency | DC to 1 MHz (external modulation, ALC off) |
| | Internal modulation | requires digital modulation unit (option) |
| | External modulation | TTL level, positive logic, 50 Ω, BNC connector (front panel) |
| Vector modulation | Modulation frequency response | DC to 15 MHz (±2 dB bandwidth), DC to 30 MHz (±3 dB bandwidth)<br>*External modulation, input level: 0.5 V(rms), ≥100 MHz, ≤0 dBm, modulation frequency of 1 kHz |
| | Vector error | ≤2.5%(rms) [External modulation, input level: 0.5 V(rms), ≥100 MHz, ≤0 dBm, 3.84 Msps QPSK modulation] |
| | Internal modulation | requires digital modulation unit (option) |
| | External modulation | $\sqrt{(I^2 + Q^2)}$ = 0.5 V(rms), I/Q = ±1.5 V(peak), 50 Ω, BNC connector (front panel) |
| | Quadrature degree adjustment function | Adjustment range: ≥±1 deg |
| | I/Q change | I, Q signal changeable (RF spectrum invert) |
| Simultaneous modulation | | Modulation depth and deviation same for combinations below:<br>AM (internal/external), FM (internal/external), øM (internal/external)<br>Frequency and waveform of modulation signal source same for combinations below:<br>AM (internal)/FM (internal), AM (internal)/øM (internal)<br>Simultaneous modulation impossible as below:<br>FM/øM, wideband AM/vector modulation, vector (internal)/Vector (external) modulation |
| AF signal output | | requires AF synthesizer (Option 21) |
| I/Q signal output*2 | Output level | requires digital modulation unit (option) |
| | Output signal source | requires digital modulation unit (option) |
| | Output connector | 50 Ω, BNC connector (front panel) |
| Memory function | Basic parameter memory | 512 sets of frequency and level |
| | All parameter memory | All parameters including 100 sets maximum of analog modulation and digital modulation units (option) |
| Sweep function | Sweep parameter | Basic parameter memory address |
| | Sweep pattern | Start address → stop address |
| | Sweep time | 1 ms to 600 s (per memory; memory recall time restricts lower limit, resolution: 1 ms) |
| | Sweep mode | Auto (repetition sweep), single (single sweep) |
| Special display | Relative display | Frequency, output level (dBm, dBµV units only) |
| | Offset display | Frequency (offset range: –3 to +3 GHz), output level (offset range: –50 to +50 dB, dBm, dBµV units only) |
| Display | Size | 7.2 inch, 480 x 640 dots, color D-STN |
| | On/off setting | Panel display on/off |
| Backup function | | All items reset at power-on except following: Input data contents, remote condition, contents of GPIB data being transferred, RPP operation condition, screen condition, main function selections |

| | | |
|---|---|---|
| Panel lock function | Panel lock | Disable operation of all keys except front panel power key, panel lock key, local key and contrast key |
| | Knob hold | Disable rotary knob on front panel operation |
| External interface | GPIB | Remote control: All functions except power switch, local key, and contrast key<br>Interfaces: SH1, AH1, T5, L4, TE0, SR1, RL1, DP0, PP0, DC1, DT1, C1, E2<br>Connector: Rear panel |
| | RS-232C | Remote control: All functions except power switch, local key, and contrast key<br>Communications method: Async (start-stop), half-duplex<br>Communications control method: X on/off by command<br>Baud rate: 1200, 2400, 4800, 9600, 19200, 38400 bps<br>Data bits; 7 or 8<br>Parity: Odd, even, none<br>Start bit; 1<br>Stop bit: 1 or 2<br>Connector: D-sub 9 pins, rear panel |
| | PC card | Memory card (memory backup, screen hard copy)<br>Connector: JEIDA Ver 4/4.1 PCMCIA Rel 2.0, 1 slot (rear panel) |
| | Trigger | Executes item specified by command-input signals (3 bits) from following items:<br>Frequency step-up/step-down, output level step-up/step-down, basic parameter memory recall address up/down, output level on/off<br>Interface: TTL level<br>Connector: D-sub 9-pin, female (rear panel) |
| Reverse power protection | | ≤50 W (≤1 GHz), ≤25 W (>1 GHz), ±50 V (DC) |
| Power | | AC 100 to 120/200 to 240 V (–15/+10%, 250 V max, automatic selection), 47.5 to 63 Hz, ≤300 VA |
| Temperature | | Operating: 0˚ to 50˚C, Storage: –20˚ to +60˚C |
| Dimensions and mass | | 426 (W) x 177 (H) x 451 (D) mm, ≤25 kg (excluding option) |
| EMC | | EN61326: 1997/A2: 2001 (Class A)<br>EN61000-3-2: 2000 (Class A)<br>EN61326: 1997/A2: 2001 (Annex A) |
| LVD | | EN61010-1: 2001 (Pollution Degree 2) |

*1: Aging rates down to 5 x $10^{-10}$/day are available as reference crystal oscillator (MG3681A Option 01/02).
*2: Possible to expand the function with MG3681A Option 11

## Options

| | |
|---|---|
| Option 01<br>(Reference crystal oscillator) | Frequency: 10 MHz<br>Aging rate: ±5 x $10^{-9}$/day<br>Start-up characteristics: 1 x $10^{-7}$ (After 10 min, compared to frequency after 24 h warm-up)<br>Temperature stability: ±3 x $10^{-8}$ (0˚ to 50˚C) |
| Option 02<br>(Reference crystal oscillator) | Frequency: 10 MHz<br>Aging rate: ±5 x $10^{-10}$/day<br>Start-up characteristics: 1 x $10^{-7}$ (After 10 min, compared to frequency after 24 h warm-up)<br>Temperature stability: ±5 x $10^{-9}$ (0 to 50˚C) |
| Option 11<br>(Additional function of I/Q output) | Functions: Adds level, offset setting, and differential output functions to I/Q output<br>Level<br>Range: 80 to 120% of nominal level, Resolution: 0.1% *2 sets of I/$\overline{I}$ and Q/$\overline{Q}$ set independently, 50 Ω termination<br>Offset<br>Range: –0.5 to +1.5 V, Resolution: 0.5 mV *4 sets of I, $\overline{I}$, Q, $\overline{Q}$ set independently, 50 Ω termination<br>Quadrature degree variable function<br>Range: ±5 deg, Resolution: 0.5 deg<br>Differential output: $\overline{I}$, $\overline{Q}$ signals (Using front I/Q input connector)<br>Signal source: Depends on installed digital modulation unit (option)<br>Output connector: 50 Ω, BNC connector (front panel) |
| Option 21<br>(AF synthesizer) | Frequency: 0.01 Hz to 400 kHz, Resolution: 0.01 Hz, Accuracy: same as reference oscillator<br>Waveform: Sine, triangular, square, sawtooth<br>Frequency response:<br>±1 dB [sine wave, level: 2 V(p-p), offset: 0 V, 600 Ω termination, reference to 1 kHz, 10 Hz to 100 kHz]<br>Harmonics: ≤–50 dB [sine wave, level: 2 V(p-p), offset: 0 V, 600 Ω termination, 1 kHz]<br>Level<br>Range: 0 to 4 V(p-p), Resolution: 1 mV(p-p), Accuracy: ± [8% of set level + 2 mV(p-p)] *600 Ω termination<br>Offset<br>Range: –2 to +2 V, Resolution: 1 mV, Accuracy: ± (8% of set level + 2 mV) *600 Ω termination<br>Output connector: 600 Ω, BNC connector (front panel) |
| Option 42<br>(RF high level output) | Functions: 8 dB gain of maximum output level<br>Frequency: 1900 to 2300 MHz<br>Gain: 8 ±1 dB (from –3 dBm, RF high level output off, 2.1 GHz)<br>Gain frequency response: ±1 dB (at +5 dBm, referenced to 2.1 GHz) |

# Ordering Information

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

| Model/Order No. | Name | | Remarks |
|---|---|---|---|
| | **Main frame** | | |
| MG3681A | Digital Modulation Signal Generator | | |
| | **Standard accessories** | | |
| | Power cord, 2.6 m: | 1 pc | |
| B0325 | GPIB connector shield cap: | 1 pc | |
| F0014 | Fuse, 6.3 A: | 2 pcs | |
| W1708AE | MG3681A operation manual: | 1 copy | |
| | **Options** | | |
| MG3681A-01 | Reference oscillator | | Aging rate: 5 x $10^{-9}$/day |
| MG3681A-02 | Reference oscillator | | Aging rate: 5 x $10^{-10}$/day |
| MG3681A-11 | Additional function of I/Q output | | Level and DC offset setting, differential output |
| MG3681A-21 | AF synthesizer | | 0.01 Hz to 400 kHz, resolution: 0.01 Hz |
| MG3681A-42 | RF high level output | | 8 dB gain |
| | **Maintenance service** | | |
| MG3681A-90 | Extended three years warranty service | | |
| MG3681A-91 | Extended five years warranty service | | |
| | **Expansion unit** | | |
| MU368010A | TDMA Modulation Unit*1,*2 | | |
| MU368030A | Universal Modulation Unit*1,*2 | | |
| MU368040A | CDMA Modulation Unit*1,*2 | | |
| MU368060A | AWGN Unit*2 | | |
| | **Softwares** | | |
| MX368011A | PDC Software*2 | | For MU368010A |
| MX368012A | GSM Device Test Software*2 | | For MU368010A |
| MX368031A | Device Test Signal Generation Software*2 | | For MU368030A |
| MX368033A | CDMA2000 1xEV-DO Signal Generation Software | | For MU368030A |
| MX368034A | PDC Packet Software | | For MU368030A |
| MX368035A | PHS Signal Generation Software | | For MU368030A |
| MX368041B | W-CDMA Software*2 | | For MU368040A |
| MX368041B-11 | HSDPA Signal Pattern | | |
| MX368042A | IS-95 Device Test Software*2 | | For MU368040A |
| | **Application parts** | | |
| J0576B | Coaxial cord (N-P • 5D-2W • N-P), 1 m | | |
| J0576D | Coaxial cord (N-P • 5D-2W • N-P), 2 m | | |
| J0127C | Coaxial cord (BNC-P • RG-58A/U • BNC-P), 0.5 m | | |
| J0127A | Coaxial cord (BNC-P • RG-58A/U • BNC-P), 1 m | | |
| J0007 | GPIB connection cable, 1 m | | |
| J0008 | GPIB connection cable, 2 m | | |
| B0329C | Front cover (1MW4U) | | |
| B0331C | Front-panel handle kit | | 2 pcs/set |
| B0332 | Joint plate | | 4 pcs/set |
| B0333C | Rack mount kit | | |
| B0334C | Carrying case | | Hard type, with front cover and casters |
| MA2512A | Band Pass Filter*2 | | For W-CDMA, pass band: 1.92 to 2.17 GHz |

*1: When using the MU368010A, MU368030A and MU368040A, dedicated software must be installed.
*2: Refer to the data sheets for the expansion units, software and Band pass filter.

***Notes:***

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Specifications are subject to change without notice.

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