

SYNTHESIZED SIGNAL GENERATOR
MG3641A/MG3642A

125 kHz to 1040/2080 MHz

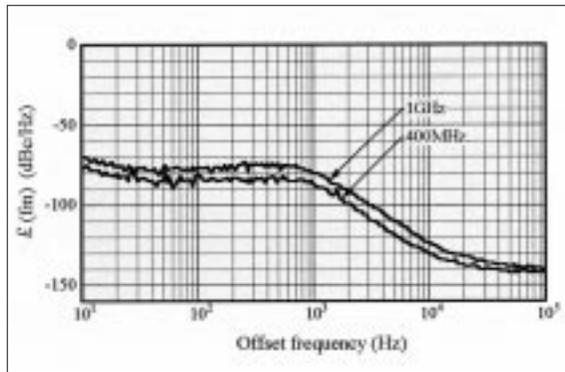
NEW



GPIB

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New Anritsu synthesizer technology permits frequency to be set with a resolution of 0.01 Hz across the full frequency range. And the non-harmonic spurious is better than -100 dBc for reliable measurement at any frequency. A unique low-noise YIG oscillator produces a high-purity signal with SSB phase noise of better than -130 dBc/Hz (1 GHz, 20 kHz offset) making these signal generators for interference testing of radio receivers and as sources for various local and reference signals.



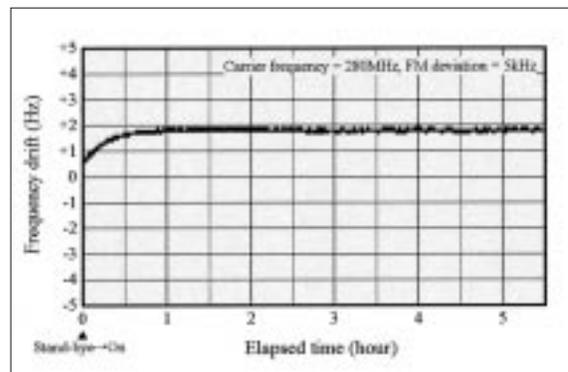
SSB phase noise characteristic

Features

- 0.01 Hz, 0.01 dB setting resolution
- High signal purity (-100 dBc spurious)
- Versatile modulation functions

Performance

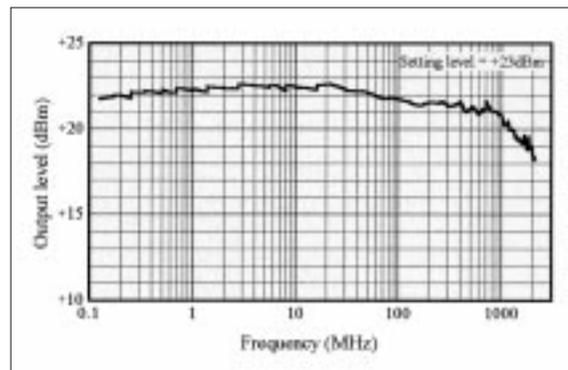
• **High-stable carrier frequency**
Carrier frequency is produced by a high-stability crystal oscillator. Furthermore, the carrier frequency remains phase locked even at frequency modulation. Then frequency calibration for testing FSK modulation receivers such as paging system is not necessary.



Carrier wave frequency stability at frequency modulation

• **High output**

A stable signal with an output of +17 dBm can be output across the full frequency range to drive a variety of local signal sources and power amplifiers. In addition, an overdrive level up to +23 dBm can be set so as to make full use of the internal amplifier capability. In case the amplifier's output power comes up to the limitation and output power does not reach the set value, a status message is displayed. This is useful for confirming the output limits.

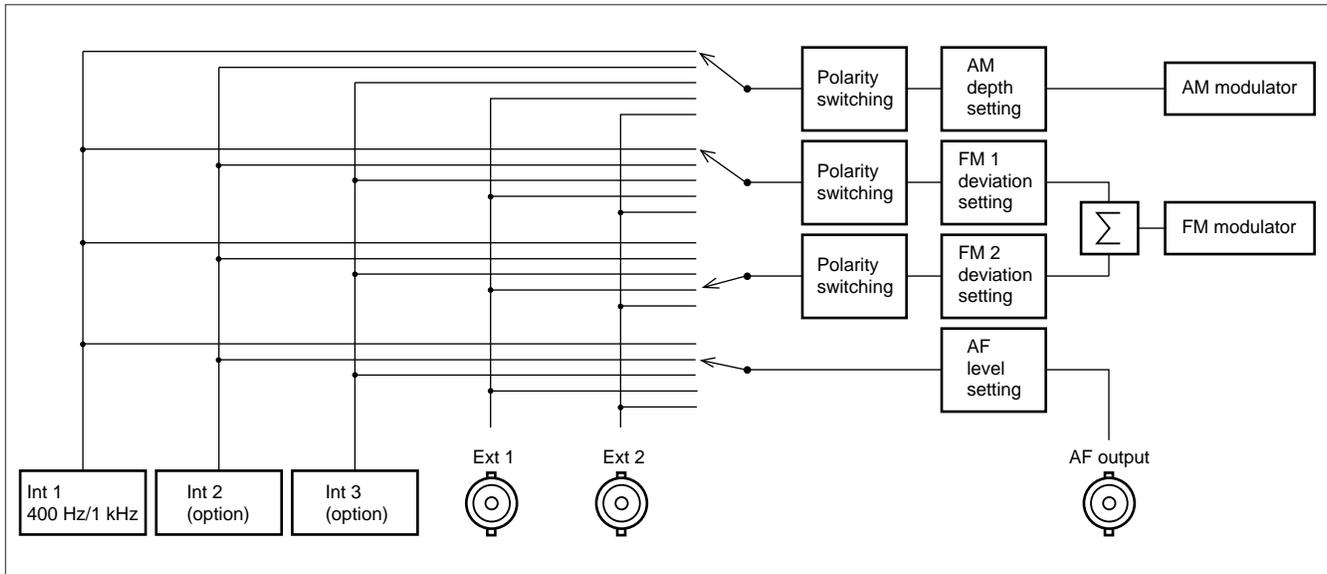


Maximum output level

• Various modulation types

Up to three internal AF signal sources can be incorporated by adding options to the standard sine-wave oscillator (1 kHz, 400 Hz). The AF synthesizer (Option 21) is a digital synthesizer for generating sine-wave, triangular, square and sawtooth waveforms; it can also be used as a function generator in addition to a modulation signal source. In addition to permitting simultaneous one route AM and two routes FM

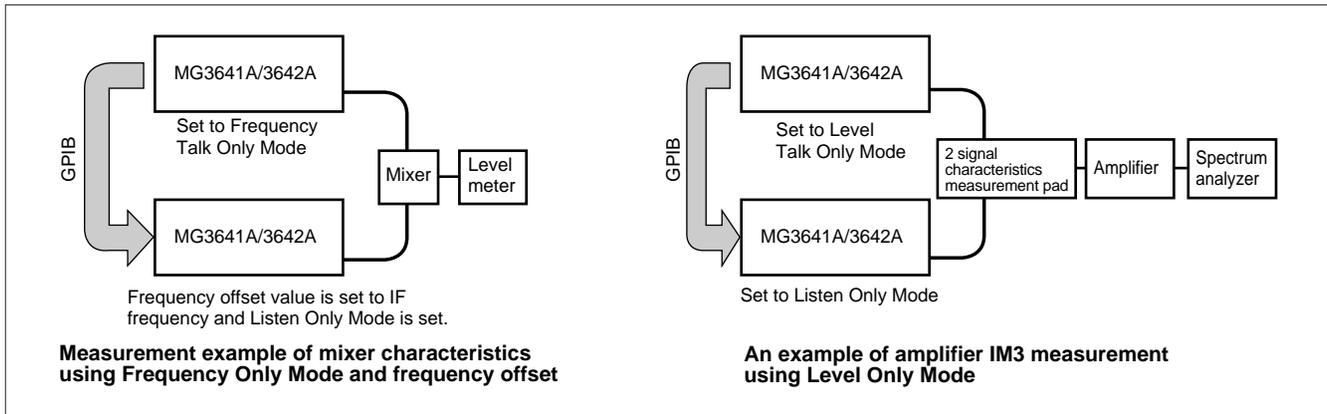
modulation, the modulation factor and polarity can be set independently. High-speed pulse modulation (Option 11) is possible using an external modulation signal (TTL level). The output can be used for various burst signals with an ON/OFF ratio of more than 80 dB, as well as a pseudo-random signal for radar.



• GPIB Only-Mode linked operation

Two sets of MG3641A/3642A can be linked and operated without an external controller using the Frequency and Output Level Only Modes. The Frequency Only Mode in the frequency offset functions

is used for evaluating the characteristics of mixers. The Level Only Mode is useful for evaluating the cross-modulation characteristics of non-linear devices such as amplifiers.



Measurement example of mixer characteristics using Frequency Only Mode and frequency offset

An example of amplifier IM3 measurement using Level Only Mode

Specifications

● MG3641A/3642A (main frame)

| Carrier frequency | <p>Range: 125 kHz to 1040 MHz (MG3641A), 125 kHz to 2080 MHz (MG3642A) Resolution: 0.01 Hz Accuracy: Reference oscillator accuracy; reference oscillator accuracy $\pm(0.3\%$ of FM setting deviation + 5 Hz) at frequency modulation Internal reference oscillator*1 Frequency: 10 MHz Aging rate: $\pm 5 \times 10^{-9}$/day Start-up characteristics: 1×10^{-7}/10 min (for 24 h after power on) Temperature stability: $\pm 3 \times 10^{-8}$ (0° to 50°C) External reference input: 5/10 MHz, ± 10 ppm, ≥ 0.7 Vp-p/50 Ω (AC coupling), BNC connector (rear panel) Buffer output: 10 MHz, TTL level (DC coupling), BNC connector (rear panel) Switching time: <40 ms (external control, response time from last command until becomes within ± 0.1 ppm of set frequency)</p> | | | | | | | | | | | | | | | | | | | | | | |
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| Output | <p>Range: -143 to +17 dBm (settable range: -143 to +23 dBm) Units: dBm, dBμ, V, mV, μV (dBμ, V, mV and μV switchable between termination voltage display and open voltage display) Resolution: 0.01 dB Frequency characteristics (at 0 dBm): ± 0.5 dB, ± 1.0 dB (pulse modulation: on)*2 Accuracy: ± 1 dB (-127 to +17 dBm, upper limit at pulse modulation*2: +12 dBm), ± 3 dB (<-127 dBm) Impedance: 50 Ω (N connector), VSWR: <1.5 (≤ -3 dBm), <2.5 (> -3 dBm) Switching time: <50 ms (normal mode), <100 ms (level safety mode), <10 ms (continuous mode) *Response time from last command until becomes within ± 0.5 dB of final level Special setting mode Continuous mode: Variable within set value ± 10 dB with no interruption of output Safety mode: Prevent spike signal generation when operating mechanical-type attenuator Interference radiation: <0.1 μV (at output frequency), <1 μV (over entire frequency range, multi-menu display: OFF) *At point 25 mm from cabinet measured with 25 mm diameter loop antenna (2 windings) terminated at 50 Ω</p> | | | | | | | | | | | | | | | | | | | | | | |
| Signal purity | <p>Spurious (CW mode, $\leq +7$ dBm) Harmonics: <-30 dBc (2nd, 3rd) Non-harmonic: <-100 dBc (≥ 15 kHz offset) Those related power: <-40 dBc (<15 kHz offset) SSB phase noise (CW Mode, 20 kHz offset): <-140 dBc/Hz (10 to <256 MHz), <-136 dBc/Hz (256 to <512 MHz), <-130 dBc/Hz (512 to 1040 MHz), <-124 dBc/Hz (>1040 MHz, MG3642A only) Residual AM: <-80 dBc (≥ 500 kHz, CW mode, +7 dBm, 50 Hz to 15 kHz demodulation band) Residual FM (CW mode) 300 Hz to 3 kHz demodulation band: <4 Hzrms (10 to <512 MHz), <8 Hzrms (512 to 1040 MHz), <16 Hzrms (>1040 MHz, MG3642A only) 50 Hz to 15 kHz demodulation band: <5 Hzrms (10 to <512 MHz), <10 Hzrms (512 to 1040 MHz), <20 Hzrms (>1040 MHz, MG3642A only)</p> | | | | | | | | | | | | | | | | | | | | | | |
| Amplitude modulation | <p>Range: 0% to 100% Resolution: 0.1% Accuracy: $\pm(5\%$ of set value + 2%) *≥ 0.4 MHz, $\leq +7$ dBm, $\leq 90\%$ AM, source: Int 1 (1 kHz), 300 Hz to 3 kHz demodulation band Modulation frequency response (output: $\leq +7$ dBm)</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">Carrier frequency</th> <th colspan="2">Upper limit frequency</th> <th rowspan="2">Lower limit frequency</th> </tr> <tr> <th>AM: 30%</th> <th>AM: 90%</th> </tr> </thead> <tbody> <tr> <td>0.4 to <0.5 MHz</td> <td>2 kHz (± 1 dB bandwidth)</td> <td>1 kHz (± 1 dB bandwidth)</td> <td rowspan="6">DC: External DC coupling (± 1 dB bandwidth) 20 Hz: External AC coupling (± 1 dB bandwidth)</td> </tr> <tr> <td>0.5 to <2 MHz</td> <td>10 kHz (± 1 dB bandwidth)</td> <td>5 kHz (± 1 dB bandwidth)</td> </tr> <tr> <td>2 to <32 MHz</td> <td colspan="2">20 kHz (± 1 dB bandwidth)</td> </tr> <tr> <td>32 to <64 MHz</td> <td colspan="2">50 kHz (± 1 dB bandwidth)</td> </tr> <tr> <td>≥ 64 MHz</td> <td colspan="2">50 kHz (± 1 dB bandwidth), 100 kHz (± 3 dB bandwidth)</td> </tr> </tbody> </table> <p>Distortion: <-40 dB (30% AM), <-30 dB (90% AM) *≥ 0.4 MHz, $\leq +7$ dBm, source: Int 1 (1 kHz) Incidental FM: <200 Hz peak *≥ 0.4 MHz, $\leq +7$ dBm, source: Int 1 (1 kHz), 300 Hz to 3 kHz demodulation band Modulation signal source: One of internal (Int 1, Int 2, Int 3) and external (Ext 1, Ext 2) Modulation signal polarity: Positive/negative switchable</p> | Carrier frequency | Upper limit frequency | | Lower limit frequency | AM: 30% | AM: 90% | 0.4 to <0.5 MHz | 2 kHz (± 1 dB bandwidth) | 1 kHz (± 1 dB bandwidth) | DC: External DC coupling (± 1 dB bandwidth) 20 Hz: External AC coupling (± 1 dB bandwidth) | 0.5 to <2 MHz | 10 kHz (± 1 dB bandwidth) | 5 kHz (± 1 dB bandwidth) | 2 to <32 MHz | 20 kHz (± 1 dB bandwidth) | | 32 to <64 MHz | 50 kHz (± 1 dB bandwidth) | | ≥ 64 MHz | 50 kHz (± 1 dB bandwidth), 100 kHz (± 3 dB bandwidth) | |
| Carrier frequency | Upper limit frequency | | Lower limit frequency | | | | | | | | | | | | | | | | | | | | |
| | AM: 30% | AM: 90% | | | | | | | | | | | | | | | | | | | | | |
| 0.4 to <0.5 MHz | 2 kHz (± 1 dB bandwidth) | 1 kHz (± 1 dB bandwidth) | DC: External DC coupling (± 1 dB bandwidth) 20 Hz: External AC coupling (± 1 dB bandwidth) | | | | | | | | | | | | | | | | | | | | |
| 0.5 to <2 MHz | 10 kHz (± 1 dB bandwidth) | 5 kHz (± 1 dB bandwidth) | | | | | | | | | | | | | | | | | | | | | |
| 2 to <32 MHz | 20 kHz (± 1 dB bandwidth) | | | | | | | | | | | | | | | | | | | | | | |
| 32 to <64 MHz | 50 kHz (± 1 dB bandwidth) | | | | | | | | | | | | | | | | | | | | | | |
| ≥ 64 MHz | 50 kHz (± 1 dB bandwidth), 100 kHz (± 3 dB bandwidth) | | | | | | | | | | | | | | | | | | | | | | |
| Frequency modulation | <p>Range: 0 to 125 Hz (125 to <250 kHz) 0 to 25.6 kHz (16 to <32 MHz) 0 to 250 Hz (250 to <500 kHz) 0 to 51.2 kHz (32 to <64 MHz) 0 to 500 Hz (0.5 to <1 MHz) 0 to 102 kHz (64 to <128 MHz) 0 to 1 kHz (1 to <2 MHz) 0 to 256 kHz (128 to <256 MHz) 0 to 2 kHz (2 to <4 MHz) 0 to 512 kHz (256 to <512 MHz) 0 to 4 kHz (4 to <8 MHz) 0 to 1024 kHz (512 to 1040 MHz) 0 to 10 kHz (8 to <16 MHz) 0 to 2048 kHz (>1040 MHz, MG3642A only)</p> <p>Resolution: 1 Hz (0 to 4 kHz deviation) 250 Hz (102.25 to 256 kHz deviation) 10 Hz (4.01 to 10 kHz deviation) 500 Hz (256.5 to 512 kHz deviation) 25 Hz (10.025 to 25.6 kHz deviation) 1 kHz (513 to 1024 kHz deviation) 50 Hz (25.65 to 51.2 kHz deviation) 1 kHz (1025 to 2048 kHz deviation, MG3642A only) 100 Hz (51.3 to 102 kHz deviation)</p> <p>Accuracy: $\pm(5\%$ of set value + 10 Hz) (0.4 to <512 MHz), $\pm(5\%$ of set value + 20 Hz) (512 to 1040 MHz) $\pm(5\%$ of set value + 40 Hz) (>1040 MHz, MG3642A only) *Source: Int 1 (1 kHz), 300 Hz to 3 kHz demodulation band Modulation frequency response: DC or 20 Hz*3 to 20 kHz (0.4 to <10 MHz), DC or 20 Hz*3 to 100 kHz (≥ 10 MHz) *± 1 dB bandwidth Distortion: <-40 dB *≥ 16 MHz, 3.5 kHz deviation, source: Int 1 (1 kHz) <-45 dB *≥ 16 MHz, 22.5 kHz deviation, source: Int 1 (1 kHz) Incidental FM: <1% peak *≥ 64 MHz, $\leq +7$ dBm, 100 kHz deviation, source: Int 1 (1 kHz), 300 Hz to 3 kHz demodulation band External modulation group delay: <30 μs *≥ 10 MHz, source: external DC coupling mode, modulation rate: ≤ 100 kHz Modulation signal source (FM1, FM2): One of internal (Int 1, Int 2, Int 3), and external (Ext 1, Ext 2) Modulation signal polarity: FM1, FM2 positive/negative switchable</p> | | | | | | | | | | | | | | | | | | | | | | |
| Pulse modulation | According to option specifications | | | | | | | | | | | | | | | | | | | | | | |

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| Modulation signal source | <p>Internal modulation (Int 1) Frequency: 400 Hz, 1 kHz Accuracy: Same as reference oscillator accuracy</p> <p>Internal modulation (Int 2, Int 3): According to option specifications</p> <p>External modulation (Ext 1, Ext 2) Proper input level: 2 Vp-p approx. Input impedance: 600 Ω, BNC connector Coupling: DC/AC switchable</p> |
| AF output | <p>Output signal source: One of internal (Int 1, Int 2, Int 3), and external (Ext 1, Ext 2)</p> <p>Output level: 0 to 4 Vp-p Output level resolution: 1 mVp-p Output level accuracy: ±(5% of setting level + 2 mVp-p) *Source: Int 1 (1 kHz)</p> <p>Impedance: 600 Ω, BNC connector</p> |
| Simultaneous modulation | Excluding amplitude modulation and pulse modulation*2 combination, simultaneous modulation, modulation rate, deviation independently settable |
| Sweep function | <p>Sweep parameters: Frequency, output level, memory</p> <p>Sweep patterns</p> <ul style="list-style-type: none"> Frequency sweep (start/stop): Linear (specified step size and number of points), Log (multiplying factor: 1%) Frequency sweep (center/span): Linear (specified step size and number of points) Level sweep (start/stop, center/span): dB (specified step size and number of points) *Sweep: continuous mode (max. 20 dB width) <p>Memory sweep: Start/stop</p> <p>Sweep mode: Auto, single, manual</p> <p>Sweep time</p> <ul style="list-style-type: none"> Setting range: 1 ms to 600 s/point *Actual sweep time depends on sweep parameter (frequency, output level) Resolution: 10 μs/point <p>Auxiliary output</p> <ul style="list-style-type: none"> X-Out: Ramp waveform (sweep start point: 0 V, sweep end point: +10 V), BNC connector (rear panel) Z-Out: TTL level (H-level at sweeping), BNC connector (rear panel) Blanking-Out: TTL level (L-level at switching), BNC connector (rear panel) Maker-Out: TTL level (H-level at marker match), BNC connector (rear panel) |
| Functions | <p>Relative display: Carrier frequency, output level</p> <p>Offset display: Carrier frequency, output level</p> <p>Memory: Saves/recalls 1000 panel settings; recall contents: panel, frequency, frequency/output level selection</p> <p>Trigger: An external trigger signal (rear panel BNC connector, TTL level) can be used to execute a previously programmed operation sequence (except power switch, preset key, local key and rotary knob operations). Max. number of sequence steps of trigger program: 20 steps</p> <p>Back-up: The panel settings before power-off are back-upped and displayed again at power-on, except data-input contents, GPIB data contents, remote settings, RPP operations</p> <p>GPIB control: All functions, except power switch, local key, rotary knobs, and resolution keys (Interface: SH1, AH1, T5, L3, TE0, SR1, RL1, PP0, DC1, DT1, C0, E2)</p> |
| Reverse power protection | Max. reverse input power: ≤50 W (≤1040 MHz), ≤25 W (>1040 MHz, MG3642A only), ±50 Vdc |
| Power supply | *4 Vac (+10%, -15%), 47.5 to 63/380 to 420 Hz, ≤200 VA |
| Temperature | Operating: 0° to +50°C, Storage: -30° to +71°C |
| Dimensions and mass | 320 (W) x 177 (H) x 451 (D) mm, ≤20 kg |
| EMC | <p>EN55011: 1991, Group 1, Class A</p> <p>EN50082-1: 1992</p> <p>Harmonic current emissions EN61000-3-2: 1995 Class D</p> |
| Safety | EN61010-1: 1993 (Installation Category II, Pollution Degree II) |

*1: Can be changed to 5×10^{-10} /day using reference crystal oscillator (Option 01)

*2: Only with pulse modulator (Option 11) installed

*3: External DC coupling: DC, External AC coupling: 20 Hz

*4: Specify a nominal voltage of either 100 V and 240 V when ordering; the maximum operating voltage is 250 V.

• Options

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| Option 01: Reference oscillator | Frequency: 10 MHz Aging rate: 5×10^{-10} /day Temperature stability: $\pm 5 \times 10^{-9}$ (0° to 50°C) |
| Option 11: Pulse modulator | Frequency: 125 kHz to 2080 MHz On/off ratio: >80 dB Rise/fall time: <100 ns Min. pulse width: <500 ns Pulse repetition rate: DC to 1 MHz Max. delay time: <100 ns Overshoot, ringing: <20% Video feed-through: <20% Pulse modulation input: 50/600 Ω , TTL (positive logic), BNC connector (rear panel) |
| Option 21: AF synthesizer | Frequency: 0.01 Hz to 400 kHz (sine-wave), 0.01 Hz to 50 kHz (triangular, square and sawtooth waveforms) Resolution: 0.01 Hz Waveform: Sine-wave, triangular, square and sawtooth waveforms Frequency accuracy: Same as reference oscillator accuracy |
| Option 22: FSK encoder | Frequency shift (Data 2 ¹ , Data 2 ⁰) = (0, 0): -frequency deviation setting, (Data 2 ¹ , Data 2 ⁰) = (0, 1): -frequency deviation setting/3, (Data 2 ¹ , Data 2 ⁰) = (1, 0): +frequency deviation setting, (Data 2 ¹ , Data 2 ⁰) = (1, 1): +frequency deviation setting/3 Frequency decision Free: Frequency shift simultaneously with data input Rise trigger: Frequency shift at external clock rise time Fall trigger: Frequency shift at external clock fall time Baseband filter Filter type: 10-th order Bessel filter Cut-off frequency: 100 Hz to 30 kHz (-3 dB) Setting resolution: Upper 2 digits Frequency deviation accuracy: Depends on frequency modulation deviation accuracy of main frame (at by-pass to baseband filter) External modulation input Data 2 ⁰ /2 ¹ : TTL level (pull-down), BNC connector (rear panel) External clock input: TTL level (pull-up), BNC connector (rear panel) |

Ordering information

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

| Model/Order No. | Name |
|---------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MG3641A MG3642A | Main frame Synthesized Signal Generator Synthesized Signal Generator |
| J0017F B0325 F0013 F0012 W1137AE W1137BE | Standard accessories Power cord, 2.5 m: 1 pc GPIB connector shielded cap: 1 pc Fuse, 5 A (for 100 Vac mains): 2 pcs Fuse, 3.15 A (for 200 Vac mains): 2 pcs MG3641A/3642A operation manual: 1 copy MG3641A/3642A service manual: 1 copy |
| MG364[]A-01 MG364[]A-11 MG364[]A-21 MG364[]A-22 | Option Reference oscillator (aging rate: 5×10^{-10} /day) Pulse modulator (pulse repetition rate: DC to 1 MHz) AF synthesizer (0.01 Hz to 400 kHz, resolution: 0.01 Hz) FSK encoder (2 or 4 levels FSK) |
| J0576B J0127B J0007 J0008 MP51A MP52A MA1612A MP721[] B0395C B0329G B0412A B0330B | Optional accessories Coaxial cord (N-P•5D-2W•N-P), 1 m Coaxial cord (BNC-P•RG58A/U•BNC-P), 1 m GPIB cable, 1 m GPIB cable, 2 m Pad Pad Four-Point Junction Pad Attenuator (DC to 12.4 GHz) Rack mount kit (EIA/IEC) Front cover Carrying case (with casters and B0329G front cover) Tilt bail |