Technical Datasheet

MG3690A

RF/Microwave Signal Generators

0.1 Hz to 65 GHz/110 GHz

MG3690A the ideal signal generator

Anritsu

Specifications

Frequency Coverage:

Model/Option No.	Frequency Coverage	Output Type
MG3691A	2 to 8.4 GHz	K(f)
MG3692A	2 to 20 GHz	K(f)
MG3693A	2 to 30 GHz	K(f)
MG3694A	2 to 40 GHz	K(f)
MG3695A	2 to 50 GHz	V(f)
MG3696A	2 to 65 GHz	V(f)
Option 4	10 MHz to 2.2 GHz	Model No. Dependent
Option 5	10 MHz to 2 GHz	Model No. Dependent
Option 22	0.1 Hz to 10 MHz	Model No. Dependent

Options 4 and 5: Frequency extension down to 10 MHz
Two options are available to extend the 2 GHz low end frequency limit of the base models down to 10 MHz. Option 4 uses a digital down-converter (DDC) with successive divide-by-two circuitry. It offers the best phase noise performance of the two choices, at the expense of some analog performance <500 MHz. In that range, analog sweep mode is not available, and pulse modulation performance is specified as typical. In addition, frequency and phase modulation mod index is scaled by the division ratio of each band of the DDC. Option 5 maintains all analog performance by using a heterodyne mixing down-converter.

Option 22: Frequency extension down to DC
If frequency coverage down to 0.1 Hz is desired, Option 22 can be added with either Option 4 or 5. Option 22 uses Direct Digital Synthesis (DDS) for CW and Step Sweep modes of operation. Modulation and analog sweep are not available in the DDS band. Frequency resolution <10 MHz is 0.02 Hz. Output power across the complete instrument frequency range is degraded by 2 dB.

CW Mode

Output: Twenty independent, presettable CW frequencies (F0 – F9 and M0 –M9).

Accuracy: Same as internal or external 10 MHz time base.

Internal Time Base Stability:
With Aging: <2 x 10^{-9}/day (<5 x 10^{-10}/day with Option 16)
With Temperature: <2 x 10^{-8}/deg C over 0˚C to 55˚C
(<2 x 10^{-10}/deg C with Option 16)

Resolution: 0.01 Hz

External 10 MHz Reference Input: Accepts external 10 MHz ±50 Hz (typical), 0 to +20 dBm time base signal. Automatically disconnects the internal high-stability time-base option, if installed. BNC, rear panel, 50Ω impedance.

10 MHz Reference Output: 1 Vp-p into 50Ω, AC coupled.
Rear panel BNC; 50Ω impedance.

Switching Time (typical maximum): <40 ms to be within 1 kHz of final frequency.

Phase Offset: Adjustable in 0.1 degree steps.

Electronic Frequency Control (EFC) Input: –5V to +5V input range; 5 x 10^{-7}.Fout Hz/V sensitivity (typical); ≤250 Hz Modulation BW; Rear panel BNC; High Impedance

Phase-Locked Step Sweep Mode

Sweep Width: Independently selected, 0.01 Hz to full range. Every frequency step in sweep range is phase-locked.

Accuracy: Same as internal or external 10 MHz time base.

Resolution (Minimum Step Size): 0.01 Hz

Linear/Log Sweep: User-selectable linear or log sweep.
In log sweep, step size logarithmically increases with frequency.

Steps: User-selectable number of steps or the step size.

Number of Steps: Variable from 1 to 10,000

Step Size: 0.01 Hz to the full frequency range of the instrument. (If the step size does not divide into the selected frequency range, the last step is truncated.)

Dwell Time Per Step: Variable from 1 ms to 99 seconds

Fixed Rate Sweep: Allows the user to set the total time of the sweep, including lock time. Variable from 20 ms to 99 seconds.

Switching Time (typical maximum): <15 ms + 1 ms/GHz step size or <40 ms, whichever is less, to be within 1 kHz of final frequency.

Analog Sweep Mode (Option 6)

Sweep Width: Independently selected from 1 MHz to full frequency range. With Option 4, Digital Down Converter, Analog sweep is only available ≥500 MHz. Analog sweep is not available <10 MHz with Option 22.

Accuracy: The lesser of ± 30 MHz or (± 2 MHz + 0.25% of sweep width) for Sweep Speeds of ≤50 MHz/ms. (typical)

Sweep Time Range: 30 ms to 99 seconds

Alternate Sweep Mode

Sweeps alternately in step sweep between any two sweep ranges. Each sweep range may be associated with a power level.

Manual Sweep Mode

Provides stepped, phase-locked adjustment of frequency between sweep limits. User-selectable number of steps or step size.

List Sweep Mode

Under GPIB control or via the front panel, up to 4 tables with 2000 non-sequential frequency/power sets can be stored and then addressed as a phase-locked step sweep. One table of 2000 points is stored in non-volatile memory, all other tables are stored in volatile memory.

Switching Time (typical maximum): <25 ms to be within 1 kHz of final frequency.

Programmable Frequency Agility

Under GPIB control, up to 3202 non-sequential frequency/power sets can be stored and then addressed as a phase-locked step sweep. Data stored in volatile memory.

Switching Time (typical maximum): <25 ms to be within 1 kHz of final frequency.

Markers

Up to 20 independent, settable markers (F0 – F9 and M0 – M9).

Video Markers: +5V or –5V marker output, selectable from system menus. AUX I/O connector, rear panel.

Intensity Markers: Produces an intensity dot on analog display traces, obtained by a momentary dwell in RF sweep, in analog sweeps of <1s.

Marker Accuracy: Same as sweep frequency accuracy.

Marker Resolution:
Analog Sweep: 1 MHz or Sweep Width/4096 which ever is greater.
Step Sweep: 0.01Hz.

Sweep Triggering

Sweep triggering is provided for Analog Frequency Sweep, Step Frequency Sweep, List Frequency Sweep, and CW Power Sweep.

Auto: Triggers sweep automatically.

External: Triggers a sweep on the low to high transition of an external TTL signal. AUX I/O connector, rear panel.

Single: Triggers, aborts, and resets a single sweep. Reset sweep may be selected to be at the top or bottom of the sweep.

General

Stored Setups: Stores front panel settings and nine additional front-panel setups in a non-volatile RAM. A system menu allows saving and recalling of instrument setups. Whenever the instrument is turned on, control settings come on at the same functions and values existing when the instrument was turned off.

Memory Sequencing Input: Accepts a TTL low-level signal to sequence through ten stored setups. AUX I/O connector, rear panel.

Self-Test: Instrument self-test is performed when Self-Test soft-key is selected. If an error is detected, an error message is displayed in a window on the LCD identifying the probable cause and remedy.

Secure Mode: Disables all frequency and power level state displays. Stored setups saved in secure mode remain secured when recalled. Mode selectable from a system menu and via GPIB.

Parameter Entry: Instrument-controlled parameters can be entered in three ways: keypad, rotary data knob, or the ^ and v touch pads of the cursor-control key. The keypad is used to enter new parameter values; the rotary data knob and the cursor-control key are used to edit existing parameter values. The ^ and v touch pads of the cursor-control key move the cursor left and right one digit under the open parameter. The rotary data knob or the ^ and v touch pads will increment or decrement the digit position over the cursor. Controlled parameters are frequency, power level, sweep time, dwell time, and number of steps. Keypad entries are terminated by pressing the appropriate soft key. Edits are terminated by exiting the edit menu.

Reset: Returns all instrument parameters to predefined default states or values. Any pending GPIB I/O is aborted. Selectable from the system menu.

Master/Slave Operation: Allows two output signals to be swept with a user-selected frequency offset. One instrument controls the other via AUX I/O and SERIAL I/O connections. Requires a Master/Slave Interface Cable Set (Part No. ND36329).

User Level Flatness Correction: Allows user to calibrate out path loss due to external switching and cables via entered power table from a GPIB power meter or calculated data. When user level correction is activated, entered power levels are delivered at the point where calibration was performed. Supported power meters are Anritsu ML2437A, ML2438A, and ML4803A and HP 437B, 438A, and 70100A. Five user tables are available with up to 801 points/table.

Warm Up Time:
From Standby: 30 minutes.
From Cold Start (0 deg C): 120 hours to achieve specified frequency stability with aging.
Instruments disconnected from AC line power for more than 72 hours require 30 days to return to specified frequency stability with aging.

Power: 85-264 Vac, 48-440 Hz, 250 VA maximum

Standby: With ac line power connected, unit is placed in standby when front panel power switch is released from the OPERATE position.

Weight: 18 kg maximum

Dimensions: 133 H x 429 W x 450 D mm

Warranty: 3 years from ship date

Remote Operation

All instrument functions, settings, and operating modes (except for power on/standby) are controllable using commands sent from an external computer via the GPIB (IEEE-488 interface bus).

GPIB Address: Selectable from a system menu

IEEE-488 Interface Function Subset:
- **Source Handshake:** SH1
- **Acceptor Handshake:** AH1
- **Talker:** T6
- **Listener:** L4
- **Service Request:** SR1
- **Remote/Local:** RL1
- **Parallel Poll:** PP1
- **Device Clear:** DC1
- **Device Trigger:** DT1
- **Controller Capability:** C0, C1, C2, C3, C28
- **Tri-State Driver:** E2

GPIB Status Annunciators: When the instrument is operating in Remote, the GPIB status annunciators (listed below) will appear in a window on the front panel LCD.

Remote: Operating on the GPIB (all instrument front panel keys except for the SYSTEM key and the RETURN TO LOCAL soft-key will be ignored).

LLO (Local Lockout): Disables the RETURN TO LOCAL soft-key. Instrument can be placed in local mode only via GPIB or by cycling line power.

Emulations: The instrument responds to the published GPIB commands and responses of the Anritsu Models 6600, 6700, and 6XX00-series signal sources. When emulating another signal source, the instrument will be limited to the capabilities, mnemonics, and parameter resolutions of the emulated instrument.

Environmental (MIL-PRF-28800F, class 3)

Storage Temperature Range: –40 to +75°C

Operating Temperature Range: 0 to +50°C

Relative Humidity: 5% to 95% at 40°C

Altitude: 4,600 meters, 43.9 cm Hg

EMI: Meets the emission and immunity requirements of
- EN61326: 1998
- EN55011: 1991/CISPR-11:1990 Group 1 Class A
- EN61000-4-2: 1995 – 4 kV CD, 8 kV AD
- EN61000-4-3: 1997 – 3 V/m
- EN61000-4-4: 1995 – 0.5 kV SL, 1 kV PL
- EN61000-4-5: 1995 – 1 kV – 2 kV L-E
- EN61000-4-6: 1996 – 3 Vrms
- EN61000-4-11: 1994 – 100% for 20 ms

Shock: 30G for 11 ms, $^1/_2$ sine

Spectral Purity

All specifications apply at the lesser of +10 dBm output or maximum specified leveled output power, unless otherwise noted.

Spurious Signals

Harmonic and Harmonic Related:

Frequency Range	Standard
0.1 Hz to 10 MHz (Option 22)	<–30 dBc
10 MHz to ≤100 MHz (Option 4)	<–40 dBc
>100 MHz to ≤2.2 GHz (Option 4)	<–50 dBc
10 MHz to ≤50 MHz (Option 5)	<–30 dBc
>50 MHz to ≤2 GHz (Option 5)	<–40 dBc
>2 GHz (2.2 GHz w/Option 4) to ≤20 GHz	<–60 dBc
>20 GHz to ≤40 GHz	<–40 dBc
>40 GHz to ≤50 GHz (MG3695A)	<–40 dBc
>40 GHz to ≤65 GHz (MG3696A)	<–25 dBc

Harmonic and Harmonic Related (for models with Option 15, at maximum specified leveled output power):

Frequency Range	Standard
0.1 Hz to 10 MHz (Option 22)	<–30 dBc
10 MHz to ≤100 MHz (Option 4)	<–40 dBc
>100 MHz to ≤2.2 GHz (Option 4)	<–50 dBc
10 MHz to ≤50 MHz (Option 5)	<–30 dBc
>50 MHz to ≤2 GHz (Option 5)	<–40 dBc
>2 GHz (2.2 GHz w/Option 4) to ≤20 GHz	<–50 dBc
>20 GHz to ≤40 GHz	<–30 dBc*

*Typical (<21 GHz: <–20 dBc typical)

Nonharmonics:

Frequency Range	Standard
0.1 Hz to 10 MHz (Option 22)	<–30 dBc
10 MHz to ≤2.2 GHz (Option 4)	<–60 dBc
10 MHz to ≤2 GHz (Option 5)	<–40 dBc
>2 GHz (2.2 GHz w/Option 4) to ≤65 GHz	<–60 dBc

Power Line and Fan Rotation Spurious Emissions (dBc):

	Offset from Carrier		
Frequency Range	<300 Hz	300 Hz to 1 kHz	>1 kHz
≥10 to ≤500 MHz (Option 4)	<–68	<–72	<–72
>500 to ≤1050 MHz (Option 4)	<–62	<–72	<–72
>1050 to ≤2200 MHz (Option 4)	<–56	<–66	<–66
≥0.01 to ≤8.4 GHz	<–50	<–60	<–60
>8.4 to ≤20 GHz	<–46	<–56	<–60
>20 to ≤40 GHz	<–40	<–50	<–54
>40 to ≤65 GHz	<–34	<–44	<–48

Residual FM (CW and Step Sweep modes, 50 Hz - 15 kHz BW):

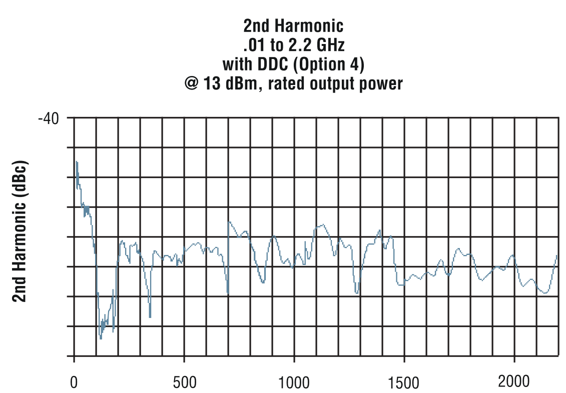
	Residual FM (Hz RMS)	
Frequency Range	Option 3	Standard
≤8.4 GHz	<40	<120
>8.4 to 20 GHz	<40	<220
>20 to ≤40 GHz	<80	<440
>40 to ≤65 GHz	<160	<880

Residual FM (Analog Sweep and Unlocked FM modes, 50 Hz - 15 kHz BW):

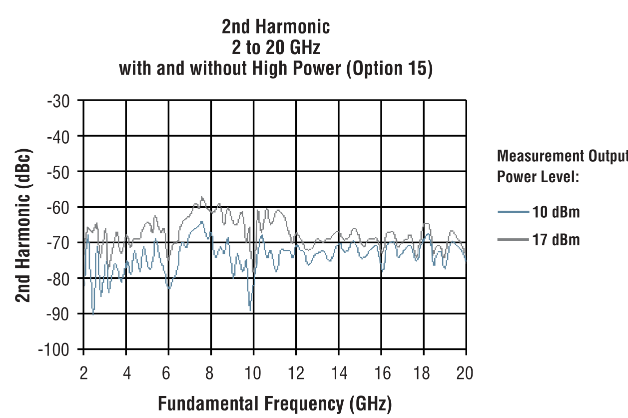
	Residual FM (kHz RMS)	
Frequency Range	Unlocked Narrow FM mode	Unlocked Wide FM mode or Analog Sweep (typ)
≥0.01 to ≤20 GHz	<5	<25
>20 GHz to ≤40 GHz	<10	<50
>40 GHz to ≤65 GHz	<20	<100

AM Noise Floor:

Typically <-145 dBm/Hz at 0 dBm output and offsets >5 MHz from carrier.



RF band harmonics with DDC option



Increase your output power without compromising your spectral purity

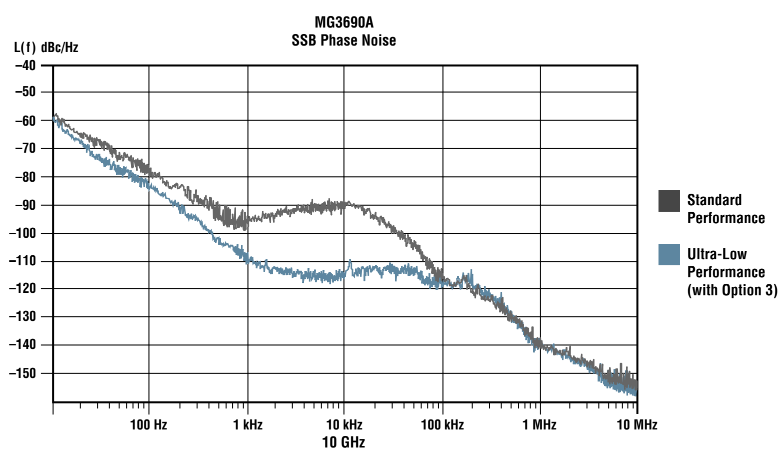
Single-Sideband Phase Noise

Single-Sideband Phase Noise (dBc/Hz):

	Offset from Carrier			
Frequency Range	**100 Hz**	**1 kHz**	**10 kHz**	**100 kHz**
≥0.1 Hz to <10 MHz (Option 22)	–90	–120	–130	–130
≥10 MHz to <500 MHz (Option 4)	–94	–106	–104	–120
≥500 MHz to <2.2 GHz (Option 4)	–82	–94	–92	–108
≥10 MHz to <2 GHz (Option 5)	–77	–88	–85	–100
≥2 GHz to ≤6 GHz	–77	–88	–86	–102
>6 GHz to ≤10 GHz	–73	–86	–83	–102
>10 GHz to ≤20 GHz	–66	–78	–77	–100
>20 GHz to ≤40 GHz	–60	–75	–72	–94
>40 GHz to ≤65 GHz	–54	–69	–64	–88

Single-Sideband Phase Noise (dBc/Hz) – Option 3:

	Offset from Carrier					
Frequency Range	**10 Hz**	**100 Hz**	**1 kHz**	**10 kHz**	**100 kHz**	**1 MHz**
≥0.1 Hz to <10 MHz (Option 22)	–60	–90	–120	–130	–130	–130
≥10 MHz to ≤15.625 MHz (Option 4)	–105	–126	–139	–142	–141	–145
>15.625 MHz to ≤31.25 MHz (Option 4)	–99	–120	–134	–137	–137	–145
>31.25 MHz to ≤62.5 MHz (Option 4)	–90	–114	–129	–136	–136	–144
>62.5 MHz to ≤125 MHz (Option 4)	–84	–108	–127	–135	–133	–144
>125 MHz to ≤250 MHz (Option 4)	–88	–102	–125	–132	–130	–143
>250 MHz to ≤500 MHz (Option 4)	–77	–99	–123	–125	–124	–142
>500 MHz to ≤1050 MHz (Option 4)	–71	–93	–118	–121	–119	–138
>1050 MHz to ≤2200 MHz (Option 4)	–66	–86	–112	–115	–113	–135
≥10 MHz to <2 GHz (Option 5)	–64	–83	–100	–102	–102	–111
≥2 GHz to ≤6 GHz	–54	–77	–104	–108	–107	–130
>6 GHz to ≤10 GHz	–52	–73	–100	–107	–107	–128
>10 GHz to ≤20 GHz	–45	–68	–94	–102	–102	–125
>20 GHz to ≤40 GHz	–45	–63	–92	–98	–98	–119
>40 GHz to ≤65 GHz	–37	–57	–86	–92	–90	–113



Typical MG3690A single sideband phase noise at 10 GHz carrier.
Standard and Ultra-Low performance with Option 3.

RF Output

Power level specifications apply at 25 ±10˚C.

Maximum Leveled Output Power:**

Model Number	Configuration	Frequency Range (GHz)	Output Power (dBm)	Output Power With Step Attenuator (dBm)	Output Power With Electronic Step Attenuator (dBm)
MG3691A	w/opt 4 w/opt 5 STD	≤2.2 GHz ≤2 GHz ≥2 to ≤8.4 GHz	+17.0 +17.0 +13.0	+15.0 +15.0 +11.0	+13.0 +13.0 +9.0
MG3692A	w/opt 4 w/opt 5 STD	≤2.2 GHz ≤2 GHz ≥2 to ≤20 GHz	+17.0 +17.0 +13.0	+15.0 +15.0 +11.0	Not Available
MG3693A	w/opt 4 w/opt 5 STD STD	≤2.2 GHz ≤2 GHz ≥2 to ≤20 GHz >20 to ≤30 GHz	+13.0 +13.0 +9.0 +6.0	+11.0 +11.0 +7.0 +3.0	Not Available
MG3694A	w/opt 4 w/opt 5 STD STD	≤2.2 GHz ≤2 GHz ≥2 to ≤20 GHz >20 to ≤40 GHz	+13.0 +13.0 +9.0 +6.0	+11.0 +11.0 +7.0 +3.0	Not Available
MG3695A	w/opt 4 w/opt 5 STD STD	≤2.2 GHz ≤2 GHz ≥2 to ≤20 GHz >20 to ≤50 GHz	+12.0 +12.0 +10.0 +3.0	+10.0 +10.0 +8.0 +0.0	Not Available
MG3696A	w/opt 4 w/opt 5 STD STD	≤2.2 GHz ≤2 GHz ≥2 to ≤20 GHz >20 to ≤65 GHz	+12.0 +12.0 +10.0 +3.0	+10.0 +10.0 +8.0 +0.0*	Not Available

*Typical 60 to 65 GHz

**For output power with Option 22, 0.1 Hz to 10 MHz, derate all specifications by 2 dB

Maximum Leveled Output Power With Option 15 (High Power) Installed:**

Model Number	Configuration	Frequency Range (GHz)	Output Power (dBm)	Output Power With Step Attenuator (dBm)	Output Power With Electronic Step Attenuator (dBm)
MG3691A	w/opt 4 w/opt 5 STD	≤2.2 GHz ≤2 GHz ≥2 to ≤8.4 GHz	+19.0 +19.0 +19.0	+18.0 +18.0 +18.0	+15.0 +15.0 +13.0
MG3692A	w/opt 4 w/opt 5 STD STD	≤2.2 GHz ≤2 GHz ≥2 to ≤10 GHz >10 to ≤20 GHz	+19.0 +19.0 +19.0 +17.0	+18.0 +18.0 +18.0 +15.0	Not Available
MG3693A	w/opt 4 w/opt 5 STD STD STD	≤2.2 GHz ≤2 GHz ≥2 to ≤10 GHz >10 to ≤20 GHz >20 to ≤30 GHz	+15.0 +15.0 +15.0 +12.0 +14.0	+14.0 +14.0 +14.0 +10.0 +12.0	Not Available
MG3694A	w/opt 4 w/opt 5 STD STD STD	≤2.2 GHz ≤2 GHz ≥2 to ≤10 GHz >10 to ≤20 GHz >20 to ≤40 GHz	+15.0 +15.0 +15.0 +12.0 +14.0	+14.0 +14.0 +14.0 +10.0 +12.0	Not Available

**For output power with Option 22, 0.1 Hz to 10 MHz, derate all specifications by 2 dB

Leveled Output Power Range

Standard Units:

Without an Attenuator: Maximum leveled output power to –15 dBm (–20 dBm typical).
With an Attenuator: Maximum leveled output power to –120 dBm (MG3691A, MG3692A, MG3693A, MG3694A), to –105 dBm (MG3695A, MG3696A).
With an Electronic Attenuator: Maximum leveled output power to –140 dBm.

Units with Option 15, High Power:

Without an Attenuator: Maximum leveled output power to –5 dBm (–10 dBm typical).
With an Attenuator: Maximum leveled output power to –105 dBm.
With an Electronic Attenuator: Maximum leveled output power to –115 dBm.

Unleveled Output Power Range (typical)

Without an Attenuator: >40 dB below max power.

With an Attenuator: >130 dB below max power.

Power Level Switching Time (to within specified accuracy)

Without Change in Step Attenuator: <3 ms typical

With Change in Step Attenuator: <20 ms typical
With Change in Electronic Step Attenuator: <3 ms typical. Power level changes across –70 dB step will result in 20 ms delay.

Step Attenuator (Option 2)

Adds a 10 dB/step attenuator, with 110 dB range on models ≤40 GHz, and 90 dB range on models >40 GHz. Option 2E adds an electronic version with 120 dB range, only available on an MG3691A.

Accuracy and Flatness

Accuracy specifies the total worst case accuracy. Flatness is included within the accuracy specification.

Step Sweep and CW Modes:

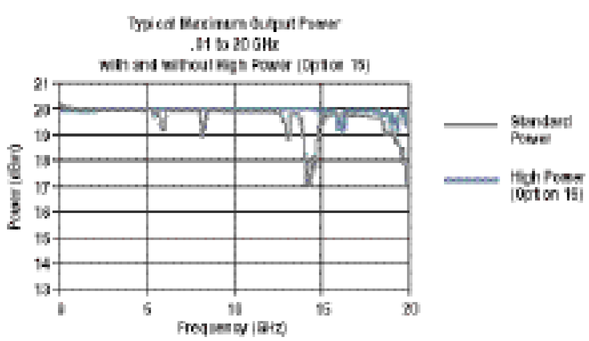
Attenuation Below Max Power	Frequency (GHz) ≤40	40-50	50-60	60-65
Accuracy:[1]				
0-25 dB	±1.0 dB	±1.5 dB	±1.5 dB	±1.5 dB
25-60 dB	±1.0 dB	±1.5 dB	±3.5 dB[2]	N/A
60-100 dB	±1.0 dB	±1.5 dB[2]	±3.5 dB[2]	N/A
Flatness:[1]				
0-25 dB	±0.8 dB	±1.1 dB	±1.1 dB	±1.1 dB
25-60 dB	±0.8 dB	±1.1 dB	±3.1 dB[2]	N/A
60-100 dB	±0.8 dB	±2.1 dB[2]	±3.1 dB[2]	N/A

① 0 to 25 dB or to minimum rated power, whichever is higher

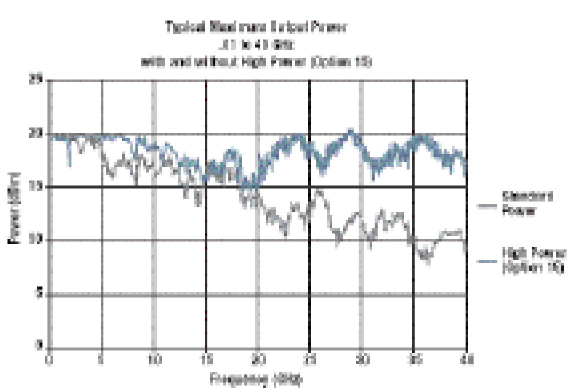
② Typical

Analog Sweep Mode (typical):

Attenuation Below Max Power	Frequency (GHz) 0.01-0.05	0.05-20	20-40	40-65
Accuracy:				
0-12 dB	±2.0 dB	±2.0 dB	±2.0 dB	±3.0 dB
12-30 dB	±3.5 dB	±3.5 dB	±4.6 dB	±5.6 dB
30-60 dB	±4.0 dB	±4.0 dB	±5.2 dB	±6.2 dB
60-122 dB	±5.0 dB	±5.0 dB	±6.2 dB	±7.2 dB
Flatness:				
0-12 dB	±2.0 dB	±2.0 dB	±2.0 dB	±2.5 dB
12-30 dB	±3.5 dB	±3.5 dB	±4.1 dB	±5.1 dB
30-60 dB	±4.0 dB	±4.0 dB	±4.6 dB	±5.6 dB
60-122 dB	±5.0 dB	±5.0 dB	±5.2 dB	±6.2 dB



Typical maximum MG3692A available output power



Typical maximum MG3694A available output power

Other Output Power Specifications

Output Units: Output units selectable as either dBm or mV. Selection of mV assumes 50Ω load. All data entry and display are in the selected units.

Output Power Resolution: 0.01 dB or 0.001 mV

Source Impedance: 50Ω nominal

Source SWR (Internal Leveling): <2.0 typical

Power Level Stability with Temperature: 0.04 dB/deg C typical

Level Offset: Offsets the displayed power level to establish a new reference level.

Output On/Off: Toggles the RF output between an Off and On state. During the Off state, the RF oscillator is turned off. The On or Off state is indicated by two LEDs located below the OUTPUT ON/OFF key on the front panel.

RF On/Off Between Frequency Steps: System menu selection of RF On or RF Off during frequency switching in CW, Step Sweep, and List Sweep modes.

RF On/Off During Retrace: System menu selection of RF On or RF Off during retrace.

Internal Leveling: Power is leveled at the output connector in all modes.

External Leveling:
- **External Detector:** Levels output power at a remote detector location. Accepts a positive or negative 0.5 mV to 500 mV input signal from the remote detector. EXT ALC ADJ adjusts the input signal range to an optimum value. BNC connector, rear panel.
- **External Power Meter:** Levels output power at a remote power meter location. Accepts a ±1V full scale input signal from the remote power meter. EXT ALC ADJ adjusts the input signal range to an optimum value. BNC connector, rear panel.
- **External Leveling Bandwidth:** 30 kHz typical in Detector mode. 0.7 Hz typical in Power Meter mode.
- **User Level Flatness Correction:**
  - **Number of points:** 2 to 801 points per table
  - **Number of tables:** 5 available
  - **Entry modes:** GPIB power meter or computed data

CW Power Sweep

Range: Sweeps between any two power levels at a single CW frequency.

Resolution: 0.01 dB/step (Log) or 0.001 mV (Linear)

Accuracy: Same as CW power accuracy.

Log/Linear Sweep: Power sweep selectable as either log or linear. Log sweep is in dB; linear sweep is in mV.

Step Size: User-controlled, 0.01 dB (Log) or 0.001 mV (Linear) to the full power range of the instrument.

Step Dwell Time: Variable from 1 ms to 99 seconds. If the sweep crosses a step attenuator setting, there will be a sweep dwell of approximately 20 ms to allow setting of the step attenuator.

Sweep Frequency/Step Power

A power level step occurs after each frequency sweep. Power level remains constant for the length of time required to complete each sweep.

Internal Power Monitor (Option 8)

Sensors: Compatible with Anritsu 560-7, 5400-71, or 6400-71 series detectors. Rear panel input.

Range: +16 dBm to –35 dBm

Accuracy: ±1 dBm, (+16 to –10 dBm)
±2 dBm, (–10 to –35 dBm)

Resolution: 0.1 dBm minimum

Modulation

Frequency/Phase Modulation (Option 12)

Option 12 adds frequency and phase modulation, driven externally via a rear panel BNC connector, 50Ω. For internal modulation, add LF Generator Option 23. Frequency/Phase Modulation is not available <10 MHz with Option 22.

For most accurate FM, ΦM measurements, Bessel Null methods are used.

Frequency Generator Multiplication/Division Ratios:

Frequency Range	Divide Ratio, n
<10 MHz (Option 22)	modulation not available
≥10 to ≤15.625 MHz (Option 4)	256
>15.625 to ≤31.25 MHz (Option 4)	128
>31.25 to ≤62.5 MHz (Option 4)	64
>62.5 to ≤125 MHz (Option 4)	32
>125 to ≤250 MHz (Option 4)	16
>250 to ≤500 MHz (Option 4)	8
>500 to ≤1050 MHz (Option 4)	4
>1050 to ≤2200 MHz (Option 4)	2
>10 to ≤2000 MHz (Option 5)	1
>2 to ≤20 GHz	1
>20 to ≤40 GHz	1/2
>40 to ≤65 GHz	1/4

Maximum Input: ±1V

Frequency Modulation:

Parameter	Modes	Conditions	Specifications	Conditions	Specifications
		for all Frequencies other than <2.2 GHz with option 4		for Frequencies <2.2 GHz with option 4	
Deviation	Locked	Rate= 1 kHz to 8 MHz	±[Lesser of 10 MHz or 300 * (mod rate)]/n	Rate= 1 kHz to (Lesser of 8 MHz or 0.03 * Fcarrier)	±[Lesser of 10 MHz or 300 * (mod rate)]/n
	Locked Low-noise	Rate= 50 kHz to 8 MHz	±[Lesser of 10 MHz or 3 * (mod rate)]/n	Rate= 50 kHz to (Lesser of 8 MHz or 0.03 * Fcarrier)	±[Lesser of 10 MHz or 3 * (mod rate)]/n
	Unlocked Narrow	Rate= DC to 8 MHz	±10 MHz/n	Rate= DC to (Lesser of 8 MHz or 0.03 * Fcarrier)	±(10 MHz)/n
	Unlocked Wide	Rate= DC to 100 Hz	±100 MHz/n	Rate= DC to 100 Hz	±(100 MHz)/n
Bandwidth (3 dB)	Locked	100 kHz rate	1 kHz to 10 MHz	100 kHz rate	1 kHz to (Lesser of 10 MHz or 0.03 * Fcarrier)
	Locked Low-noise	100 kHz rate	30 kHz to 10 MHz	100 kHz rate	30 kHz to (Lesser of 8 MHz or 0.03 * Fcarrier)
	Unlocked Narrow	100 kHz rate	DC to 10 MHz	100 kHz rate	DC to (Lesser of 10 MHz or 0.03 * Fcarrier)
	Unlocked Wide	DC rate	DC to 100 Hz	DC rate	DC to 100 Hz
Flatness	Locked	Rate= 10 kHz to 1 MHz	±1 dB relative to 100 kHz	Rate= 10 kHz to (Lesser of 1 MHz or 0.01 * Fcarrier)	±1 dB relative to 100 kHz
Accuracy	Locked and Low-noise Unlocked Narrow	Rate= 100 kHz, Sinewave Int. or 1Vpk Ext.	10% (5% typical)	Rate= 100 kHz, Sinewave Int. or 1Vpk Ext.	10% (5% typical)
Incidental AM	Locked and Low-noise Unlocked Narrow	1 MHz Rate, ±1 MHz Dev.	<2% typical	Rate and Dev.= Lesser of 1 MHz or 0.01 * Fcarrier	<2% typical
Harmonic Distortion	Locked	10 MHz Rate, ±1 MHz Dev.	<1%	Rate= 10 kHz, Dev.= ±(1 MHz)/n	<1%
External Sensitivity	Locked Locked Low-noise Unlocked Narrow Unlocked Wide		±(10 kHz/V to 20 MHz/V)/n ±(100 kHz/V to 100 MHz/V)/n		±(10 kHz/V to 20 MHz/V)/n ±(100 kHz/V to 100 MHz/V)/n

Phase Modulation:

Parameter	Modes	Conditions	Specifications	Conditions	Specifications
		for all Frequencies other than <2.2 GHz with option 4		for Frequencies <2.2 GHz with option 4	
Deviation	Narrow	Rate= DC to 8 MHz	±[Lesser of 3 rad or (5 MHz)/(mod rate)]/n	Rate= DC to (Lesser of 8 MHz or 0.03 * Fcarrier)	±[Lesser of 3 rad or (5 MHz)/(mod rate)]/n
	Wide	Rate= DC to 1 MHz	±[Lesser of 400 rad or (10 MHz)/(mod rate)]/n	Rate= DC to (Lesser of 1 MHz or 0.03 * Fcarrier)	±[Lesser of 400 rad or (10 MHz)/(mod rate)]/n
Bandwidth (3 dB)	Narrow	100 kHz rate	DC to 10 MHz	100 kHz rate	DC to (Lesser of 10 MHz or 0.03 * Fcarrier)
	Wide	100 kHz rate	DC to 1 MHz	100 kHz rate	DC to (Lesser of 1 MHz or 0.03 * Fcarrier)
Flatness	Narrow	Rate= DC to 1 MHz	±1 dB relative to 100 kHz rate	Rate= DC to (Lesser of 1 MHz or 0.01 * Fcarrier)	±1 dB relative to 100 kHz rate
	Wide	Rate= DC to 500 kHz	±1 dB relative to 100 kHz rate	Rate= DC to (Lesser of 500 kHz or 0.01 * Fcarrier)	±1 dB relative to 100 kHz rate
Accuracy	Narrow & Wide	100 kHz, Int. or 1Vpk Ext., sine	10%	100 kHz, Int. or 1Vpk Ext., sine	10%
External Sensitivity	Narrow Wide		±(0.0025 rad/V to 5 rad/V)/n ±(0.25 rad/V to 500 rad/V)/n		±(0.0025 rad/V to 5 rad/V)/n ±(0.25 rad/V to 500 rad/V)/n

Amplitude Modulation (Option 14)

All amplitude modulation specifications apply at 50% depth, 1 kHz rate, with RF level set 6 dB below maximum specified leveled output power, unless otherwise noted. Amplitude Modulation is not available <10 MHz with Option 22.

AM Depth (typical): 0-90% linear; 20 dB log

AM Bandwidth (3 dB):
DC to 50 kHz minimum
DC to 100 kHz typical

Flatness (DC to 10 kHz rates): ±0.3 dB

Accuracy: ±5%

Distortion: <5% typical

Incidental Phase Modulation (30% depth, 10 kHz rate):
<0.2 radians typical

External AM Input: Log AM or Linear AM input, rear-panel BNC, 50Ω input impedance. For internal modulation, add LF Generator Option 23.
Sensitivity:
Log AM: Continuously variable from 0 dB per volt to 25 dB per volt.
Linear AM: Continuously variable from 0% per volt to 100% per volt.
Maximum Input: ±1V

LF Generator (Option 23)

Two internal waveform generators are added, one providing a frequency or phase modulating signal and the other an amplitude modulating signal. This Low Frequency (LF) Generator option can only be ordered in combination with either FM/ΦM or AM options, 12 and 14 respectively.

Waveforms: Sinusoid, square-wave, triangle, positive ramp, negative ramp, Gaussian noise, uniform noise. (Check Option 10 for User-Defined)

Rate:
0.1 Hz to 1 MHz sinusoidal
0.1 Hz to 100 kHz square-wave, triangle, ramps

Resolution: 0.1 Hz

Accuracy: Same as instrument timebase

Output: Two BNC connectors on the rear panel, FM/ΦM OUT and AM OUT

External Pulse Modulation (Option 13)

Pulse modulation specifications apply at maximum rated power, unless otherwise noted. Pulse modulation is not available <10 MHz with Option 22.

On/Off Ratio: >80 dB

Minimum Leveled Pulse Width:
100 ns, ≥2 GHz[1]
1 µs, <2 GHz[1]

Minimum Unleveled Pulse Width: <10 ns

Level Accuracy Relative to CW (100 Hz to 1 MHz PRF):
±0.5 dB, ≥1 µs pulse width
±1.0 dB, <1 µs pulse width

Pulse Delay (typical): 50 ns in External Mode

PRF Range:
DC to 10 MHz, unleveled
100 Hz to 5 MHz, leveled

Frequency Range	Rise & Fall Time (10% to 90%)	Overshoot	Pulse Width Compression	Video Feedthrough
≥10 to <31.25 MHz (Opt. 4)	400 ns*	33%*	40 ns*	±70 mV*
≥31.25 to <125 MHz (Opt. 4)	90 ns*	22%*	12 ns*	±130 mV*
≥125 to <500 MHz (Opt. 4)	33 ns*	11%*	12 ns*	±70 mV*
≥500 to <2200 MHz (Opt. 4)	15 ns	10%	12 ns*	±15 mV*
≥10 to <1000 MHz (Opt. 5)	15 ns 10 ns*	10%	8 ns*	±15 mV*
≥1 to <2 GHz (Opt. 5)	10 ns 5 ns*	10%	8 ns*	±15 mV*
≥2 to ≤65 GHz	10 ns 5 ns*	10%[2]	8 ns*	±10 mV*

External Input: Rear-panel BNC. For internal modulation, add Pulse Generator Option 24.

Drive Level: TTL compatible input

Input Logic: Positive-true or negative-true, selectable from modulation menu.

Pulse Generator (Option 24)

Modes: Free-run, triggered, gated, delayed, singlet, doublet, triplet, quadruplet.

Parameter	Selectable Clock Rate 40 MHz	10 MHz
Pulse Width	25 ns to 419 ms	100 ns to 1.6 s
Pulse Period[3]	250 ns to 419 ms	600 ns to 1.6s
Variable Delay Singlet Doublet Triplet Quadruplet	 0 to 419 ms 100 ns to 419 ms 100 ns to 419 ms 100 ns to 419 ms	 0 to 1.6 s 300 ns to 1.6 s 300 ns to 1.6 s 300 ns to 1.6 s
Resolution	25 ns	100 ns

Accuracy: 10 ns (5 ns typical)

Inputs/Outputs: Video pulse and sync out, rear-panel BNC connectors

Pulse Generator option is not available without Pulse Modulation Option 13.

[1] 2.2 GHz with Option 4, DDC.

[2] For 50 and 65 GHz units, overshoot >40 GHz is 20% typical at rated power.

[3] Period must be longer than the sum of delay and width by 5 clock cycles minimum.

* Typical

IF Up-Conversion (Option 7)

Option 7 adds an internal mixer that can be used for the generic up-conversion of an IF signal. The mixer's RF, LO, and IF ports are made available at the rear panel of the MG3690A, via three female K-Connectors. The typical application will feed the MG3690A microwave output, which can be moved to the rear panel via option 9K, to the mixer's LO port. An external IF signal will be fed to the mixer's IF port. The new up-converted signal will be available at the mixer's RF port.

Mixer Type	Double Balanced
RF, LO Range	1 to 40 GHz
IF Range	DC to 700 MHz
Conversion Loss	10 dB Typical
Max Power into any Port	23 dBm @ 25 °C
Isolation, RF to LO	30 dB
LO Drive Level (recommended)	+10 to +13 dBm
Input P_{1dB}	+3 dBm Typical

The IF Up-Conversion option is particularly useful to create a microwave frequency IQ-modulated signal. Lower frequency IQ-modulated RF sources are readily available, such as the Anritsu MG3681A. Option 7's IF input can be used to feed in an IQ-modulated signal from an MG3681A, up-converting it to as high as 40 GHz with an MG3694A. A typical setup is shown below.

User-Defined Modulation Waveform Software (Option 10)

An external software package provides the ability to download user-defined waveforms into the internal LF Generator's (Option 23) memory. The MG3690A provides as standard with the LF Generator sinusoidal, square-wave, triangle, positive ramp, Gaussian noise, and uniform noise waveforms.

Two look-up tables of 65,536 points can be used to generate two pseudo-random waveforms, one for amplitude modulation and the other for frequency or phase modulation. The download files are simple space-delimited text files containing integer numbers between 0 and 4095, where 0 corresponds to the minimum modulation level and 4095 the maximum.

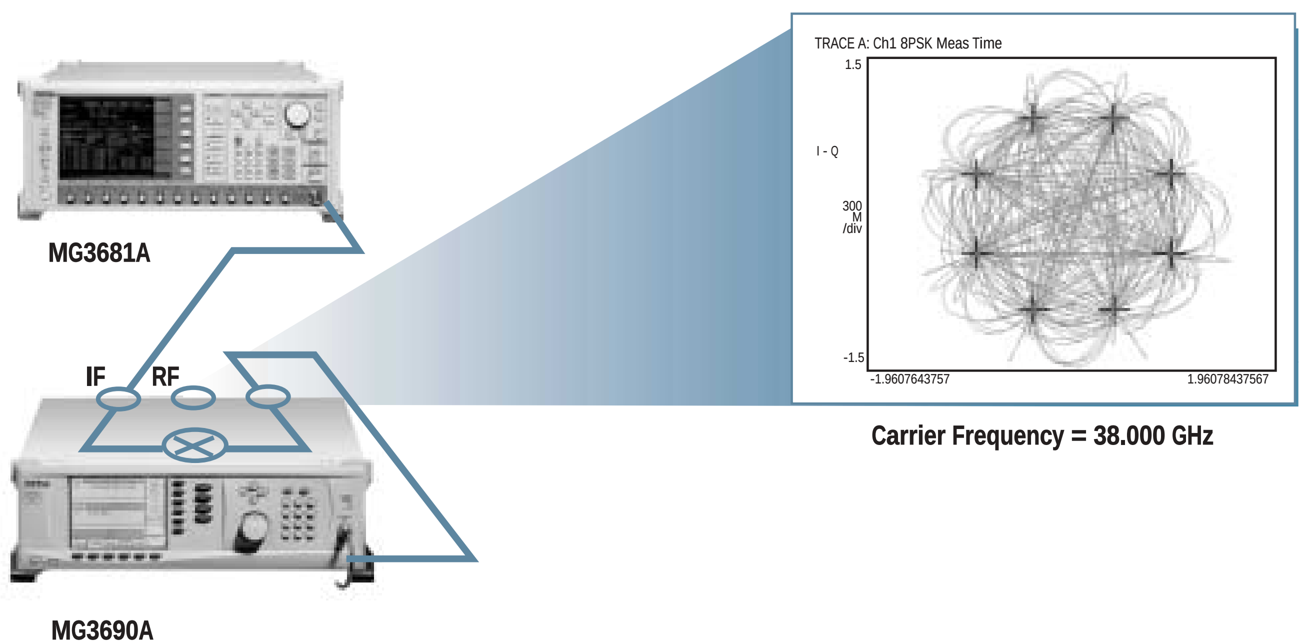
In addition to the capability of downloading custom waveforms, the software offers a virtual instrument modulation panel. Custom modulation setups with user waveforms can be stored for future use. For IFF signal simulation, the internal generators can be synchronized. They can also be disconnected from the internal modulators, making the low frequency waveforms available at the rear panel for external purposes.

One application of this feature is storing an antenna pattern wave form in memory and using it to feed the external input to the scan modulator, Option 20.

Scan Modulation (Option 20)

Option 20 adds a microwave linearly controlled alternator to provide deep AM capability. This modulator is inserted outside the leveling loop but before the optional step alternator. It is switched in and out of the RF path. Scan modulation is driven externally only.

Frequency Range	2 to 18 GHz
Attenuation Range	0 to 60 dB
Flatness	±2 dB, 0 to 40 dB
	±2 dB, 40 to 60 dB
Step Response	< 1 ms
Sensitivity	-10 dB/V
Insertion Loss	< 6 dB (when engaged)
Input	Rear Panel BNC connector High Impedance



IF Up-Conversion Application and Setup

mmW Frequency Coverage

Millimeter Wave Multipliers (54000 Series plus Option 18)

External multipliers can be added to the MG3690A to provide coverage as high as 110 GHz. Please call us for solutions beyond 110 GHz.

The 54000 series multipliers provide 50 to 75 GHz coverage in WR15 or 75 to 110 GHz in WR10. An MG3690A with Option 18, mmW bias, is required to drive these multipliers. The MG3692A provides the input frequencies which are below 20 GHz. Higher frequency MG3690A models could be used, but are not necessary. Option 18 adds a rear panel BNC Twinax connector that supplies the proper DC bias to power these external multipliers. (Option 18 is not available with Option 7.)

The 54000 series multipliers come in two versions, –4 and –5. Both versions include input and output isolators for improved source match. An external full-band “Through” (FL1) can be replaced with either one of two split-band supplied external filters (FL2, FL3) for better than –50 dBc spurious. The –5 version adds an internal output coupler and a detector to supply a detected voltage output. This output can be routed to the synthesizer’s external ALC input for a flatter response, using External ALC Leveling mode.

Modulation can be used up to 110 GHz with these multipliers. FM/ΦM’s deviation will be multiplied based on the multiplication factor of the 54000 used. Pulse Modulation is available, with sharper rise and fall times. AM is not recommended.
All performance is typical.

MG3690A with 54000 Series Millimeter Wave Multiplier

	54000-4WR15, 54000-5WR15	54000-4WR10, 54000-5WR10
Frequency	50-75 GHz	75-110 GHz
Waveguide Output	WR15	WR10
Flange	UG-387/U	UG-385/U
Source Match	<1.7 typical	<1.7 typical
Output Power	0.0 dBm (+4 dBm typical)	–5 dBm (+1 dBm typical)
Power Flatness, Unleveled	±3.0 dB typical	±3.0 dB typical
Power Flatness, Leveled (54000-5WRxx)	±1.0 dB typical	±1.0 dB typical
Power Leveling Range (54000-5WRxx)	10 dB typical	10 dB typical
Required Input Frequency	12.75 to 18.75 GHz	12.75 to 18.75 GHz
Multiplication Factor	x4	x6
Frequency Accuracy	Synthesizer Accuracy x4	Synthesizer Accuracy x6
Frequency Resolution	Synthesizer Resolution x4	Synthesizer Resolution x6
Filters		
FL1 (Through)	50 to 75 GHz	75 to 110 GHz
FL2	50 to 58 GHz	75 to 92 GHz
FL3	57 to 75 GHz	89 to 110 GHz
Spurious		
with FL2, FL3	–50 dBc	–50 dBc
with FL1 (Through)	–20 dBc typical	–20 dBc typical
Input	N(f)	N(f)

Inputs and Outputs

Nomenclature	Input/Output Connectors Type**	Location
EXT ALC IN	BNC	Rear Panel
RF OUTPUT* (Option 9)	K Connector (female) fmax ≤40 GHz	Standard-Front Panel
	V Connector (female) fmax ≥40 GHz	Option 9-Rear Panel
10 MHz REF IN	BNC	Rear Panel
10 MHz REF OUT	BNC	Rear Panel
HORIZ OUT	BNC	Rear Panel
EFC IN	BNC	Rear Panel
AUX I/O	25 pin D-type	Rear Panel
SERIAL I/O	RJ45	Rear Panel
IEEE-488 GPIB	Type 57	Rear Panel
mmW/BIAS* (Option 18)	Twinax	Rear Panel
RF, LO, IF* (Option 7)	K Connector (female) 3x	Rear Panel
PULSE TRIG IN (Option 13)	BNC	Rear Panel
PULSE SYNC OUT (Option 24)	BNC	Rear Panel
PULSE VIDEO OUT (Option 24)	BNC	Rear Panel
AM IN (Option 14)	BNC	Rear Panel
FM/ΦM IN (Option 12)	BNC	Rear Panel
AM OUT (Option 23)	BNC	Rear Panel
FM/ΦM OUT (Option 23)	BNC	Rear Panel
SCAN MOD IN* (Option 20)	BNC	Rear Panel
POWER MONITOR IN* (Option 8)	Custom	Rear Panel

* Options (7 & 18), (7 & 20), (8 & 9) are mutually exclusive, as they share the same rear panel space.
** Connectors may be available but not active, if option is not ordered.

MG3690A Rear Panel

EXT ALC IN
Provides for leveling the RF output signal externally with either a detector or power meter. Signal requirements are shown in the RF Output specifications.

RF OUTPUT
Provides for RF output from 50Ω source impedance. K Connector, female. Option 9 moves the RF Output connector to the rear panel.

10 MHz REF IN
Accepts an external 10 MHz ±100 Hz, 0 to +20 dBm time-base signal. Automatically disconnects the internal high-stability time-base option, if installed. 50Ω impedance.

10 MHz REF OUT
Provides a 1 Vp-p, AC coupled, 10 MHz signal derived from the internal frequency standard. 50Ω impedance.

HORIZ OUT (Horizontal Sweep Output)
Provides 0V at beginning and +10V at end of sweep, regardless of sweep width. In CW mode, the voltage is proportional to frequency between 0V at low end and +10V at the high end of range. In CW mode, if CW RAMP is enabled, a repetitive, 0V to +10V ramp is provided.

EFC IN
Provides the capability to frequency modulate the internal crystal oscillator, allowing phase locking the synthesizer inside an external lock loop. Specifications on page 2.

AUX I/O (Auxiliary Input/Output)
Provides for most of the rear panel BNC connections through a single, 25-pin, D type connector. Supports master-slave operation with another synthesizer or allows for a single-cable interface with the Model 56100A Scalar Network Analyzer and other Anritsu instruments. (see figure below)

SERIAL I/O (Serial Input/Output)
Provides access to RS-232 terminal ports to support service and calibration functions and master-slave operations.

IEEE-488 GPIB
Provides input/output connections for the General Purpose Interface Bus (GPIB).

mmW BIAS
Provides the bias for the external waveguide multipliers for coverage up to 110 GHz.

RF, LO, IF
Provides access to an internal IF up-conversion mixer, Option 7.

PULSE TRIG IN
Accepts an external TTL compatible signal to pulse modulate the RF output signal or to trigger or to gate the optional internal pulse generator. Available with Option 13, Pulse Modulation.

PULSE SYNC OUT
Provides a TTL compatible signal, synchronized to the internal pulse modulation output, Option 24.

PULSE VIDEO OUT
Provides a video modulating signal from the internal pulse generator, Option 24.

AM IN
Accepts an external signal to amplitude modulate the RF output signal, Option 14. 50Ω impedance.

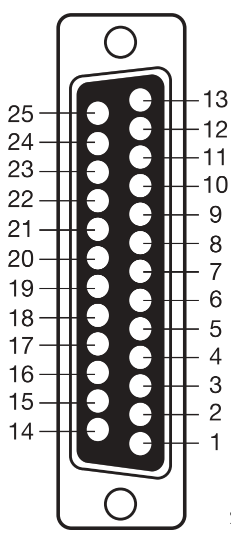
FM/ΦM IN
Accepts an external signal to frequency or phase modulate the RF output signal, Option 12. 50Ω impedance.

AM OUT
Provides the amplitude modulation waveform from the internal LF generator, Option 23.

FM/ΦM OUT
Provides the frequency or phase modulation waveform from the internal LF generator, Option 23.

SCAN MOD IN
Accepts an external signal to scan modulate the RF output signal, Option 20. High Impedance.

POWER MONITOR IN
Accepts an external detector for power monitoring, Option 8.



25-pin, D type connector

Aux I/O pins:
1. Horizontal Output
2. Chassis Ground
3. Sequential Sync Output
4. Low Alternate Enable Output
5. Marker Output
6. Retrace Blanking Output
7. Low Alternate Sweep Output
8. Chassis Ground
9. -
10. Sweep Dwell Output
11. Lock Status Output
12. Penlift
13. External Trigger Input
14. V/GHz Output
15. End-of-Sweep Input
16. End-of-Sweep Output
17. -
18. Sweep Dwell Input
19. -
20. Bandswitch Blanking Output
21. -
22. Horizontal Sweep Input
23. Horizontal Sweep Input Return
24. Chassis Ground
25. Memory Sequencing Input

Ordering Information

Models

MG3691A	2 – 8.4 GHz Signal Generator
MG3692A	2 – 20 GHz Signal Generator
MG3693A	2 – 30 GHz Signal Generator
MG3694A	2 – 40 GHz Signal Generator
MG3695A	2 – 50 GHz Signal Generator
MG3696A	2 – 65 GHz Signal Generator

Options and Accessories

MG3690A/1A	**Rack Mount with slides** – Rack mount kit containing a set of track slides (90 degree tilt capability), mounting ears, and front panel handles to let the instrument be mounted in a standard 19-inch equipment rack.
MG3690A/1B	**Rack Mount without slides** – Modifies rack mounting hardware to install unit in a console that has mounting shelves. Includes mounting ears and front panel handles.
MG3690A/2X	**Mechanical Step Attenuator** – Adds a 10 dB/step attenuator. Rated RF output power is reduced. (This option comes in different versions, based on instrument configuration.)
MG3690A/2E	**Electronic Step Attenuator** – Adds a 10 dB/step electronic attenuator with a 120 dB range for the MG3691A. Rated RF output power is reduced. (Not available with Option 20 or 22.)
MG3690A/3	**Ultra Low Phase Noise, main band** – Adds new modules to significantly reduce SSB phase noise.
MG3690A/4	**10 MHz to 2.2 GHz RF coverage**, Ultra-Low Phase Noise version – Uses a digital down converter to significantly reduce SSB phase noise.
MG3690A/5	**10 MHz to 2 GHz RF coverage** – Uses an analog down converter.
MG3690A/6	**Analog Sweep Capability** – (limited to ≥500 MHz when used with Option 4.)
MG3690A/7	**IF Up-Conversion** – Adds an internal 40 GHz mixer for up-converting an IF signal. (Not available with MG3695A, MG3696A, or with Options 18 or 20.)
MG3690A/8	**Power Monitor** – Adds internal power measurement capability. (Not available with Option 9.)
MG3690A/9X	**Rear Panel Output** – Moves the RF output connector to the rear panel. (This option comes in different versions, based on instrument configuration.) (Not available with Option 8.)
MG3690A/10	**User-Defined Modulation Waveform Software** – External software package provides the ability to download user-defined waveforms into the memory of the internal waveform generator, serially or via GPIB. External PC and an instrument with LF Generator, Option 23, are required.
MG3690A/12	**Frequency and Phase Modulation** – External, via a rear panel BNC connector. For internal modulation capability, requires additionally LF Generator, Option 23.
MG3690A/13X	**Pulse Modulation** – External, via a rear panel BNC connector. For internal modulation capability, requires additionally Pulse Generator, Option 24. (This option comes in different versions, based on instrument configuration.)
MG3690A/14	**Amplitude Modulation** – External, via a rear panel BNC connector. For internal modulation capability, requires additionally LF Generator, Option 23.
MG3690A/15X	**High Power** – Adds high-power RF components to the instrument to increase its output power level. (This option comes in different versions, based on instrument configuration.)
MG3690A/16	**High Stability Time Base** – Adds an ovenized, 10 MHz crystal oscillator as a high-stability time base.
MG3690A/17	**Delete Front Panel** – Deletes the front panel for use in remote control applications where a front panel display and keyboard control are not needed. (Only available with Options 1A or 1B)
MG3690A/18	**mmW Bias Output** – Adds a rear panel BNC Twinax connector required to bias the 5400-xWRxx millimeter wave source modules, sold separately. (Not available with Option 7.)
MG3690A/20	**Scan Modulation** – Adds an internal Scan modulator for simulating high-depth amplitude modulated signals. Requires an external modulating signal input capability. (Not available on models MG3693A, MG3694A, MG3695A, MG3696A, or with Options 2E, 7, or 22.)
MG3690A/22	**0.1 Hz to 10 MHz Audio coverage** – Uses a DDS for coverage down to approximately DC. When adding Option 22, the output power is derated by 2 dB. The frequency resolution below 10 MHz is 0.02 Hz. No modulation is available in the 0.1 Hz to 10 MHz band. (Not available without Option 4 or 5, or with Option 20 or 2E)
MG3690A/23	**LF Generator** – Provides modulation waveforms for internal AM, FM, or ΦM. (Not available without Option 12 or 14.)
MG3690A/24	**Pulse Generator** – Provides pulse waveforms for internal Pulse Modulation. (Not available without Option 13.)
MG3690A/25X	**Analog Modulation Suite** – For ease of ordering and package pricing, this option bundles Options 12, 13, 14, 23 and 24, offering internal and external AM, FM, ΦM, and Pulse Modulation. (This option comes in different versions, based on instrument configuration.)

Millimeter Wave Accessories (Requires MG3690A Option 18)

54000-4WR15	50 to 75 GHz, V Band X4 Multiplier-Source Module (includes A36599 power cable and 3 filters).
54000-5WR15	50 to 75 GHz, V Band X4 Multiplier-Source Module with internal reference coupler/detector (includes A36599 power cable, 3 filters, and 560-10BX-2 detector adapter cable).
54000-4WR10	75-110 GHz, W Band X6 Multiplier-Source Module (includes A36599 power cable and 3 filters).
54000-5WR10	75-110 GHz, W Band X6 Multiplier-Source Module with internal reference coupler/detector (includes A36599 power cable, 3 filters, and 560-10BX-2 detector adapter cable).
N120-6	Semi-rigid cable, N(m) to N(m), 15 cm long, connects synthesizer's RF output to multiplier's RF input. (Also requires 34RKNF50 or 34RVNF50 Adapter).

Accessories

34RKNF50	DC to 20 GHz, Ruggedized Type N female adapter for units with a K connector output
ND36329	MASTER/SLAVE interface cable set
760-212A	Transit case
2300-469	IVI Driver, includes LabView® driver
806-97	Aux I/O Cable, 25 pin to BNC: Provides BNC access to Aux I/O Data Lines: Sequential Sync, Marker Out, Bandswitch Blanking, Retrace Blanking, Sweep Dwell In, V/GHz, Horizontal Out.

Upgrades

Economical upgrades are available to upgrade any model to any higher performing model. Consult Anritsu for details.

SALES CENTERS:

United States (800) ANRITSU
Canada (800) ANRITSU
South America 55 (21) 2527-6922

Europe 44 (0) 1582-433433
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