Technical Datasheet

MG3690B

RF/Microwave Signal Generators

0.1 Hz to 67 GHz/325 GHz

MG**3690**B the ideal signal generator

Anritsu

Specifications

Frequency Coverage

Model/Option No.	Frequency Coverage	Output Type
MG3691B	2 to 10 GHz	K(f)
MG3692B	2 to 20 GHz	K(f)
MG3693B	2 to 30 GHz	K(f)
MG3694B	2 to 40 GHz	K(f)
MG3695B	2 to 50 GHz	V(f)
MG3696B	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

* Operational to 67 GHz

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. Selectable Bandwidth for best phase noise immunity or best phase tracking performance.

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

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.

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.

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.

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

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 ∨ 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 ∨ 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 ∨ 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
EN61000-4-11: 1994

Vibration: Random, 5-500 Hz, 0.015-0.0039g^2/Hz PSD
Sinusoidal, 5-55 Hz, 0.33 mm displacement

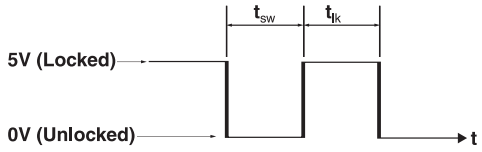
Safety Directive: EN 61010-1: 1993 + A1: 92 + A2: 95

Frequency Switching Time

Definitions

Free Running Mode:
(Step or List Sweep)

t_{sw} = Switching Time, Unlocked



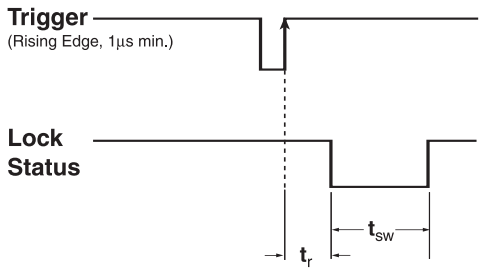
Lock Status Indicator
Rear Panel Aux I/O Connector (Pin 11)
(The lock status indicator goes high, when the output is within 1 kHz of the final frequency.)

t_{lk} = Locked Time = 1ms + t_{dw}

t_{dw} = Dwell Time, after locking. Selectable, 1 ms minimum

t_{lk} (min) = 2 ms

Single Frequency Trigger Mode:
(List, non-sequential, and CFx modes)



t_r = Trigger Response Time = 2 ms
(applies to both GPIB and External TTL triggers)

Switching Time (t_{sw})

t_{sw}* (ms)	Condition
5 ms + 1 ms/GHz	step not starting at, or crossing dwell frequencies
7 ms + 1 ms/GHz	step not starting at, or crossing band switching frequencies
8 ms + 1 ms/GHz	step starting at, or crossing band switching frequencies

Band Switching Dwell Frequencies: 2 (2.2 w/Opt. 4), 10, 20, 40 GHz

Filter Switching Dwell Frequencies: 3.3, 5.5, 8.4, 13.25, 25, 32 GHz

<2.2 GHz w/Opt. 4: 12.5, 15.625, 22.5, 31.25, 43.75, 62.5, 87.5, 125, 175, 250, 350, 500, 700, 1050, 1500 MHz

*Not applicable with FM mode active

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 Harmonically-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 (MG3695B)	<–40 dBc*
>40 GHz to ≤65 GHz (MG3696B)	<–25 dBc*

* –30 dBc typical with high power Option 15

Non-harmonics:

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	<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.

Single-Sideband Phase Noise*

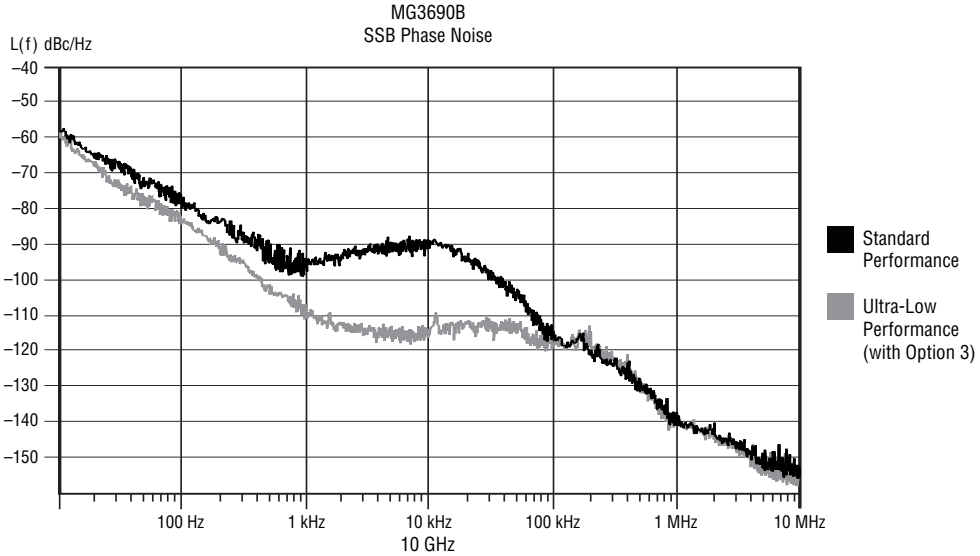
Single-Sideband Phase Noise (dBc/Hz):

	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

*Phase noise is specified and guaranteed only with internal reference. In External Reference mode, the phase noise of the external supplied reference, and the selected external reference bandwidth, will dictate the instrument phase noise performance. Phase noise is not degraded when adding high power Option 15.



Typical MG3690B 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)
MG3691B	w/opt 4 or 5 STD	≤2* GHz ≥2* to ≤10 GHz	+19.0 +19.0	+18.0 +18.0	+15.0 +13.0
MG3692B	w/opt 4 or 5 STD STD	≤2* GHz ≥2* to ≤10 GHz >10 to ≤20 GHz	+19.0 +19.0 +17.0	+18.0 +18.0 +15.0	Not Available
MG3693B	w/opt 4 or 5 STD STD STD	≤2* GHz ≥2* to ≤10 GHz >10 to ≤20 GHz >20 to ≤30 GHz	+15.0 +15.0 +12.0 +6.0	+14.0 +14.0 +10.0 +3.0	Not Available
MG3694B	w/opt 4 or 5 STD STD STD	≤2* GHz ≥2* to ≤10 GHz >10 to ≤20 GHz >20 to ≤40 GHz	+15.0 +15.0 +12.0 +6.0	+14.0 +14.0 +10.0 +3.0	Not Available
MG3695B	w/opt 4 or 5 STD STD	≤2* GHz ≥2* to ≤20 GHz >20 to ≤50 GHz	+12.0 +10.0 +3.0	+10.0 +8.0 +0.0	Not Available
MG3696B	w/opt 4 or 5 STD STD	≤2* GHz ≥2* to ≤20 GHz >20 to ≤65 GHz	+12.0 +10.0 +3.0	+10.0 +8.0 +0.0**	Not Available

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)
MG3691B	w/opt 4 or 5 w/opt 4 or 5 w/o opt 4 or 5	≤2* GHz ≥2* to ≤10 GHz ≥2 to ≤10 GHz	+19.0 +23.0 +25.0	+18.0 +21.0 +23.0	+15.0 +16.0 +16.0
MG3692B	w/opt 4 or 5 w/opt 4 or 5 w/o opt 4 or 5	≤2* GHz ≥2* to ≤20 GHz ≥2 to ≤20 GHz	+19.0 +21.0 +23.0	+18.0 +19.0 +21.0	Not Available
MG3693B	w/opt 4 or 5 w/opt 4 or 5 w/opt 4 or 5 w/o opt 4 or 5 w/o opt 4 or 5	≤2* GHz ≥2* to ≤20 GHz >20 to ≤30 GHz ≥2 to ≤20 GHz >20 to ≤30 GHz	+17.0 +21.0 +17.0 +23.0 +19.0	+16.0 +19.0 +15.0 +21.0 +17.0	Not Available
MG3694B	w/opt 4 or 5 w/opt 4 or 5 w/opt 4 or 5 w/o opt 4 or 5 w/o opt 4 or 5	≤2* GHz ≥2* to ≤20 GHz >20 to ≤40 GHz ≥2 to ≤20 GHz >20 to ≤40 GHz	+17.0 +21.0 +17.0 +23.0 +19.0	+16.0 +19.0 +15.0 +21.0 +17.0	Not Available
MG3695B	w/opt 4 or 5 w/o opt 4 or 5 w/o opt 4 or 5 w/o opt 4 or 5	≤2 GHz ≥2 to ≤20 GHz >20 to ≤40 GHz >40 to ≤50 GHz	Not Available +23.0 +19.0 +13.0	Not Available +21.0 +17.0 +10.0	Not Available

*2.2 GHz with Option 4
**For output power with Option 22, 0.1 Hz to 10 MHz coverage, derate all specifications by 2 dB
***Typical 60 to 65 GHz

Minimum Leveled Output Power

Without an Attenuator: –5 dBm (–10 dBm typical)

With an Attenuator: –105 dBm (MG3691B, MG3692B, MG3693B, and MG3694B)
–95 dBm (MG3695B, and MG3696B)

With an Electronic Attenuator: –115 dBm (MG3691B)

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 MG3691B. Option 2E is not available on units with Option 22, coverage down to 0.1 Hz.

Accuracy and Flatness

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

Step Sweep and CW Modes:

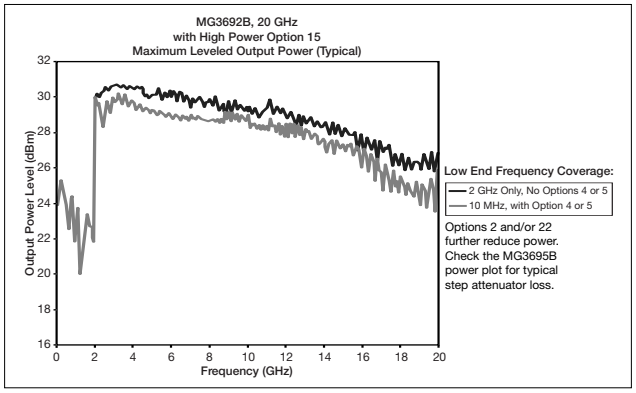
Attenuation Below Max Power	Frequency (GHz) ≤40**	40-50	50-60	60-65
Accuracy:				
0-25 dB	±1.0 dB	±1.5 dB	±1.5 dB	±1.5 dB
25-60 dB	±1.0 dB	±1.5 dB	±3.5 dB*	N/A
60-100 dB	±1.0 dB	±2.5 dB*	±3.5 dB*	N/A
Flatness:				
0-25 dB	±0.8 dB	±1.1 dB	±1.1 dB	±1.1 dB
25-60 dB	±0.8 dB	±1.1 dB	±3.1 dB*	N/A
60-100 dB	±0.8 dB	±2.1 dB*	±3.1 dB*	N/A

*Typical

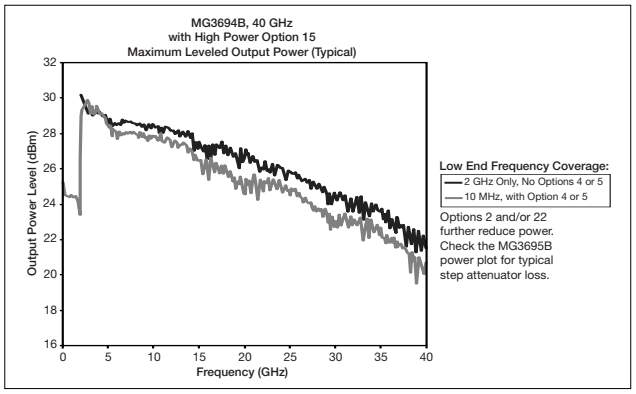
**Accuracy and Flatness, 20-40 GHz, with high power Option 15, is ±1.5 dB.

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 MG3692B maximum available output power



Typical MG3694B maximum 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. L1 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. L1 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.

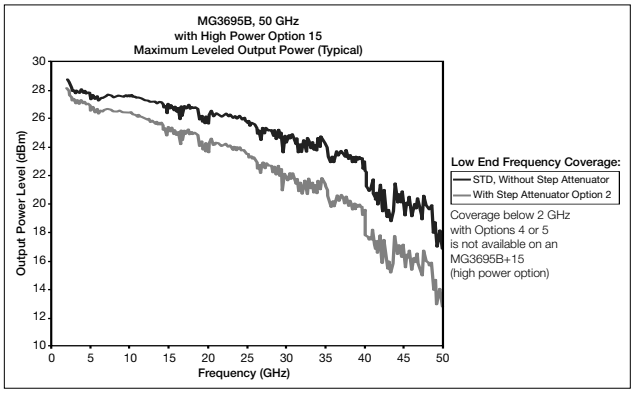
Internal Power Monitor (Option 8)

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



Typical MG3695B maximum available output power

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 the most accurate FM and 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

Frequency Modulation:

Parameter	Modes	Conditions for all Frequencies other than <2.2 GHz with Option 4	Specifications for all Frequencies other than <2.2 GHz with Option 4	Conditions for Frequencies <2.2 GHz with Option 4	Specifications 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		1 kHz to 10 MHz		1 kHz to (Lesser of 10 MHz or 0.03 * Fcarrier)
	Locked Low-noise		30 kHz to 10 MHz		30 kHz to (Lesser of 8 MHz or 0.03 * Fcarrier)
	Unlocked Narrow		DC to 10 MHz		DC to (Lesser of 10 MHz or 0.03 * Fcarrier)
	Unlocked Wide		DC to 100 Hz		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	1 MHz Rate, ±1 MHz Dev.	<2% typical	Rate and Dev.= Lesser of 1 MHz or 0.01 * Fcarrier	<2% 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	(±1V maximum input)	±(10 kHz/V to 20 MHz/V)/n 〃 〃 ±(100 kHz/V to 100 MHz/V)/n	(±1V maximum input)	±(10 kHz/V to 20 MHz/V)/n 〃 〃 ±(100 kHz/V to 100 MHz/V)/n

Phase Modulation:

Parameter	Modes	Conditions for all Frequencies other than <2.2 GHz with Option 4	Specifications for all Frequencies other than <2.2 GHz with Option 4	Conditions for Frequencies <2.2 GHz with Option 4	Specifications 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		DC to 10 MHz		DC to (Lesser of 10 MHz or 0.03 * Fcarrier)
	Wide		DC to 1 MHz		DC to (Lesser of 1 MHz or 0.03 * Fcarrier)
Flatness	Narrow	Rate= DC to 1 MHz	±1 dB relative to 100 kHz	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 = DC to (Lesser of 500 kHz or 0.01 * Fcarrier)	±1 dB relative to 100 kHz rate
Accuracy	Narrow and Wide	100 kHz Internal or 1Vpk External, sine	10%	100 kHz Internal or 1Vpk External, sine	10%
External Sensitivity	Narrow Wide	(±1V maximum input)	±(0.0025 rad/V to 5 rad/V)/n ±(0.25 rad/V to 500 rad/V)/n	(±1V maximum input)	±(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: Reading ±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

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 (>70 dB with high power Option 15)

Minimum Leveled Pulse Width:
100 ns, ≥2 GHz①
1 µs, <2 GHz①

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 and 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 GHz②	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)

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

Modes: Singlet, doublet, triplet, quadruplet

Triggers: Free-run, triggered, gated, delayed, triggered with delay, swept-delay

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

	Selectable Clock Rate	
Parameter	40 MHz	10 MHz
Pulse Width	25 ns to 419 ms	100 ns to 1.6 s
Pulse Period③	250 ns to 419 ms	600 ns to 1.6 s
Variable Delay		
Singlet	0 to 419 ms	0 to 1.6 s
Doublet	100 ns to 419 ms	300 ns to 1.6 s
Triplet	100 ns to 419 ms	300 ns to 1.6 s
Quadruplet	100 ns to 419 ms	300 ns to 1.6 s
Resolution	25 ns	100 ns
Accuracy	10 ns (5 ns typical)	10 ns (5 ns typical)

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.
④ Rise time and Pulse Width Compression, >20 GHz, degrades by 2 ns, with High Power Option 15.
* 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 MG3690B, via three female K-Connectors. The typical application will feed the MG3690B 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	30 dBm
Isolation, RF to LO	23 dB
LO Drive Level (recommended)	+10 to +13 dBm
Input $P_{1\,dB}$	+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 MG3694B. 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 MG3690B 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.

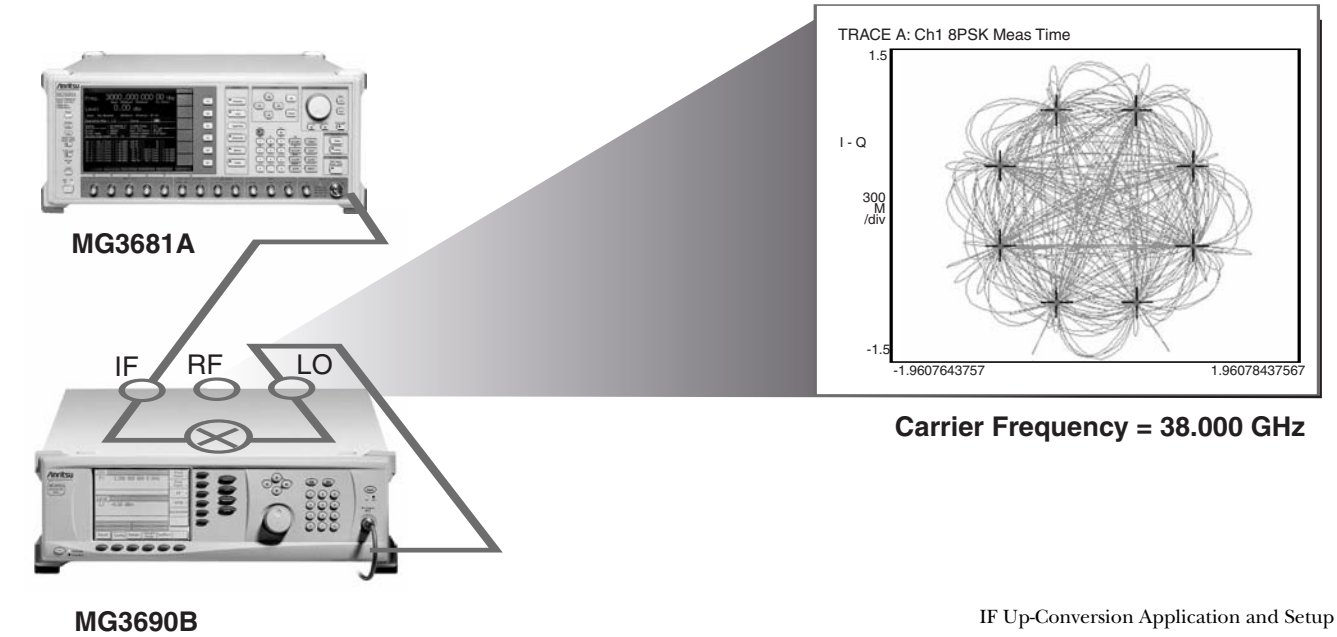
In addition to the capability of downloading custom waveforms, the software offers a virtual instrument modulation panel. Custom modulation setups with user waveforms can be stored for future use. For IFF signal simulation, the internal generators can be synchronized. They can also be disconnected from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

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.

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.

Frequency Range	2 to 18 GHz
Attenuation Range	0 to 60 dB
Flatness/Accuracy	±1.5 dB/±1.5 dB, 0 to 40 dB ±3 dB/±2 dB, 40 to 60 dB
Step Response	< 1 μs
Sensitivity	–10 dB/V
Modulation Bandwidth	20 kHz (small signal) 5 kHz (large signal)
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[1] - 63850 series (Option 18 recommended for DC bias.)

63850 series external, waveguide output, multipliers are available for banded frequency coverage up to 325 GHz.

These external multipliers require at a minimum an MG3692B, with 20 GHz coverage. The output power required to drive the modules is +10 dBm. They can be powered up by an external power supply (+12Vdc, 1.5A typ.) using the supplied double banana power cord. It is recommended to purchase an MG3690B with option 18, which adds the capability to bias these modules without the need of an additional power supply. It adds a rear panel Twinax connector that supplies the proper DC bias for these modules, and a cable to power them up. Option 18 is not available with options 7 and 15.

63850 series multipliers have a saturated, unleveled, output power, yet their inherent flatness is exceptional. Modulating the input drive will indeed modulate the output, except for the case of Amplitude Modulation. Since the output is saturated, Amplitude Modulation is not recommended with these mmW modules. Frequency and Phase Modulation is possible, but the achieved deviation will be multiplied based on the multiplication factor of the module. Pulse modulation is also possible, with even sharper rise and fall times than the input. All modulation performances are not specified.

For ease of operation, the MG3690B allows the user to enter a frequency scaling factor, the module's multiplication factor, which will be used only for purposes of displaying the proper frequency at the output of the mmW module, on the MG3690B's front panel display.

MG3690B with 63850 Series Millimeter Wave Multiplier

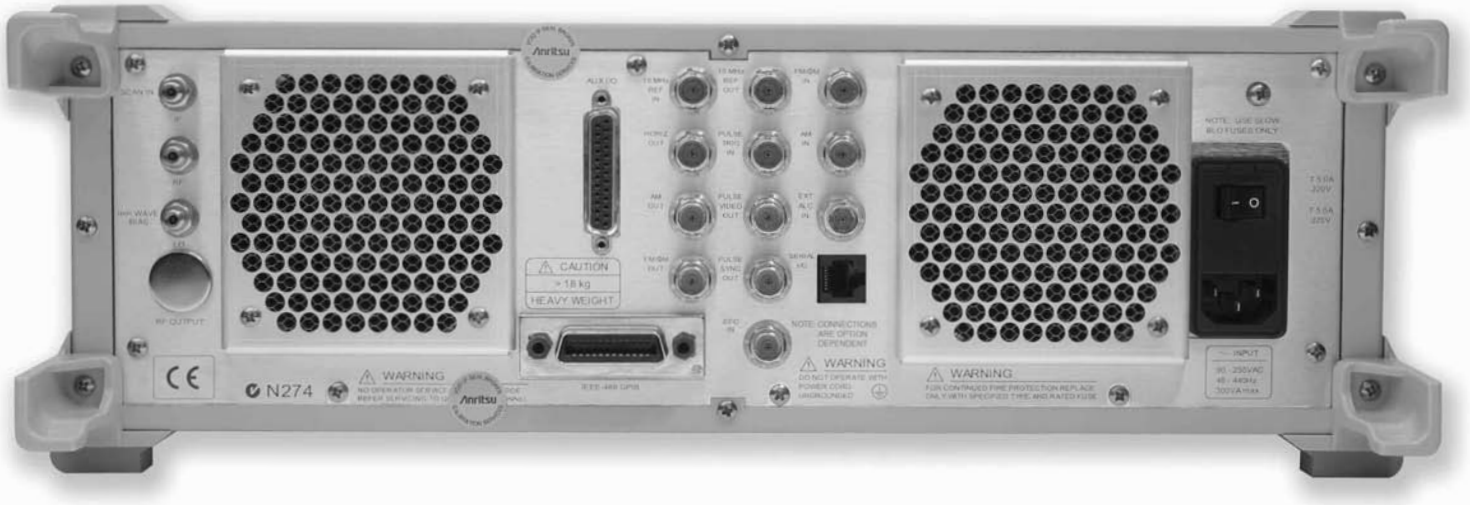
Multiplier p/n[1]	63850-15	63850-12	63850-10	63850-08	63850-06	63850-05	63850-03
Frequency	50-75 GHz	60-90 GHz	75-110 GHz	90-140 GHz	110-170 GHz	140-220 GHz	220-325 GHz
Waveguide Output	WR-15	WR-12	WR-10	WR-08	WR-06	WR-05	WR-03
Flange[2]	(008)	(009)	(010)	(M08)	(M06)	(M05)	(M03)
Output Power (typical)	+8 dBm	+6 dBm	+5 dBm	–5 dBm	–13 dBm	–15 dBm[3]	–25 dBm[4]
Output Flatness (typ.) (Unleveled)	±2 dB	±2 dB	±3 dB	—	—	—	—
Output Match	>12 dB	>12 dB	>12 dB	>12 dB	>12 dB	>12 dB	6 dB (typical)
Multiplication Factor (m)	x4	x6	x6	x8	x12	x12	x18
Input Frequency	12.5-18.75 GHz	10.0-15.0 GHz	12.5-18.4 GHz	11.2-17.5 GHz	9.1-14.2 GHz	11.6-18.4 GHz	12.2-18.1 GHz
Frequency Accuracy	(LO Synthesizer's Accuracy x m)						
Frequency Resolution	(LO Synthesizer's Resolution x m)						
Harmonics & Spurious	–15 dBc (typ.)						
Input Power Required	+10 dBm						
RF Input Connector	SMA (female)						
DC Power	12 Vdc, 1.5A (double banana power cord included) Option 18 is recommended on the synthesizer, to supply the necessary bias.						
Dimensions	120 mm x 110 mm x 70 mm (not including feet or interfaces)						
Weight	<1 kg						
Temperature	+20˚C to +30˚C						

[1] These mmW modules are produced by OML Inc. (Oleson Microwave Labs), co-located in Morgan Hill, Ca, with mutual collaborative experiences over many years. For detailed and up-to-date specifications, please call OML, Inc. or visit their website at www.oml-mmw.com.
[2] Waveguide output flanges are per MIL.F-3922/67B-(xxx)
[3] Power rolls off from –15 dBm at 200 GHz, to –25 dBm typical at 200 GHz.
[4] Output power is estimated.

Inputs and Outputs

Input/Output Connectors		
Nomenclature	**Type****	**Location**
EXT ALC IN	BNC	Rear Panel
RF OUTPUT* (Option 9)	Connector (female) fmax ≤40 GHz V Connector (female) fmax ≥40 GHz	Standard-Front Panel 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/FM 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.



MG3690B 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 1Vp-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 325 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

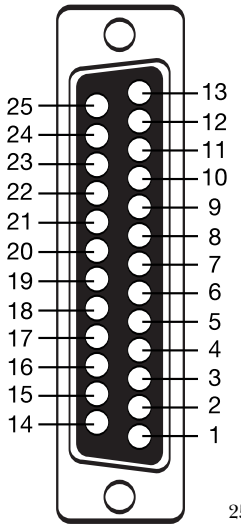
Provides the frequency or phase modulation waveform from the internal LF generator, Option 23.

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. Master Reset
22. Horizontal Sweep Input
23. Horizontal Sweep Input Return
24. Chassis Ground
25. Memory Sequencing Input

Ordering Information

Models

MG3691B	2 – 10 GHz Signal Generator
MG3692B	2 – 20 GHz Signal Generator
MG3693B	2 – 30 GHz Signal Generator
MG3694B	2 – 40 GHz Signal Generator
MG3695B	2 – 50 GHz Signal Generator
MG3696B	2 – 65 GHz Signal Generator (operational to 67 GHz)

Options and Accessories

MG3690B/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.
MG3690B/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.
MG3690B/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.)
MG3690B/2E	Electronic Step Attenuator – Adds a 10 dB/step electronic attenuator with a 120 dB range for the MG3691B. Rated RF output power is reduced. (Not available with Option 20 or 22.)
MG3690B/3	Ultra Low Phase Noise, main band – Adds new modules to significantly reduce SSB phase noise.
MG3690B/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 (not available with MG3695B with Option 15).
MG3690B/5	10 MHz to 2 GHz RF coverage – Uses an analog down converter (not available with MG3695B with Option 15).
MG3690B/6	Analog Sweep Capability – (limited to ≥500 MHz when used with Option 4.)
MG3690B/7	IF Up-Conversion – Adds an internal 40 GHz mixer for up-converting an IF signal. (Not available with MG3695B, MG3696B, or with Options 18 or 20.)
MG3690B/8	Power Monitor – Adds internal power measurement capability. (Not available with Option 9.)
MG3690B/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.)
MG3690B/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.
MG3690B/12	Frequency and Phase Modulation – External, via a rear panel BNC connector. For internal modulation capability, requires additionally LF Generator, Option 23.
MG3690B/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.)
MG3690B/14	Amplitude Modulation – External, via a rear panel BNC connector. For internal modulation capability, requires additionally LF Generator, Option 23.
MG3690B/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, not available on MG3696B)
MG3690B/16	High Stability Time Base – Adds an ovenized, 10 MHz crystal oscillator as a high-stability time base.
MG3690B/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)
MG3690B/18	mmW Bias Output – Adds a rear panel BNC Twinax connector required to bias the 63850 series millimeter wave source modules, sold separately. Includes DC bias cable. (Not available with Option 7 or 15x)
MG3690B/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 MG3693B, MG3694B, MG3695B, MG3696B, or with Options 2E, 7, or 22.)
MG3690B/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)
MG3690B/23	LF Generator – Provides modulation waveforms for internal AM, FM, or ΦM. (Not available without Option 12 or 14.)
MG3690B/24*	Pulse Generator – Provides pulse waveforms for internal Pulse Modulation. (Not available without Option 13.)
MG3690B/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.)

* Pulse Modulation performance is controlled by United States Export Control regulations, >31.8 GHz. For Pulse Modulation solutions that do not require export licenses, please consult with your Anritsu sales representative.

Millimeter Wave Accessories
(Option 18 recommended for DC bias)

63850-15	50-75 GHz V band Multiplier Source Module, WR-15
63850-12	60-90 GHz E band Multiplier Source Module, WR-12
63850-10	75-110 GHz W band Multiplier Source Module, WR-10
63850-08	90-140 GHz F band Multiplier Source Module, WR-08
63850-06	110-170 GHz D band Multiplier Source Module, WR-06
63850-05	140-220 GHz G band Multiplier Source Module, WR-05
63850-03	220-325 GHz H band Multiplier Source Module, WR-03
806-121	SMA male-male flexible cable, 90 cm (3 ft) (could be used to connect the MG3690B output to the module's LO input)

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 (16 kg, 66 cm x 41 cm x 81 cm, roll-away on four wheels)
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.

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