Anritsu

MG3690A

Microwave CW Generators

0.1 Hz to 40 GHz

The Ideal Local Oscillator

VALUE WITHOUT COMPROMISE

Your microwave signal generation requirements have never been tougher, and yet your capital equipment budget has never been tighter. You need the most value you can get in a synthesizer, but you can't compromise performance. You need a synthesizer that meets today's needs yet can be upgraded at a reasonable cost to satisfy future requirements without shattering your test equipment budget. Anritsu's MG3690A series of synthesizers deliver the highest performance and the highest value available today.

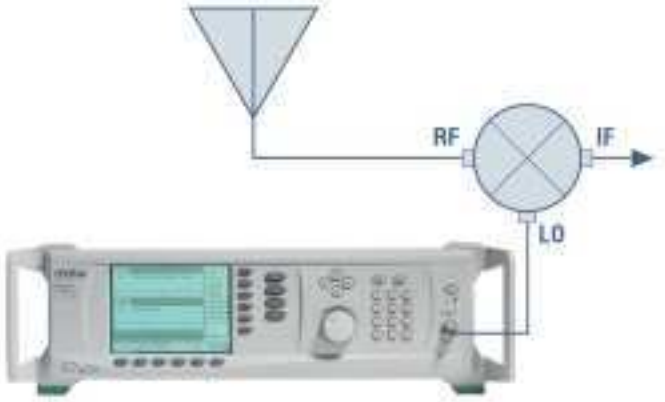
THE MG3690A SYNTHESIZED CW GENERATOR

These basic signal sources provide accurate outputs over a wide frequency and power range for Local Oscillator duty and other CW applications.

- Broad frequency coverage including 0.1 Hz to 40 GHz in a single coax output
- Ultra-low SSB phase noise and spurious
- +17 dBm guaranteed leveled power to 20 GHz
- 0.1 Hz optional frequency resolution
- <5 ms switching time for <100 MHz sweep steps
- Digital frequency sweep and digital power sweep
- Wide dynamic range with accurate output levels
- Intuitive, menu-driven front panel

BASIC LO APPLICATION

In local oscillator and other basic-signal applications, you need high output power, low phase noise, excellent frequency stability and low spurious signal levels. The MG3690A with High Power Option provides +17 dBm output power while ultra-low SSB phase noise and spurious signals below –60 dBc preserve signal fidelity. Oven-stabilized internal reference oscillators with $<5x10^{-10}$ per day frequency stability keep you on channel. When you need to add broader frequency coverage, modulation, or frequency and power sweep, simply upgrade to the performance you need.

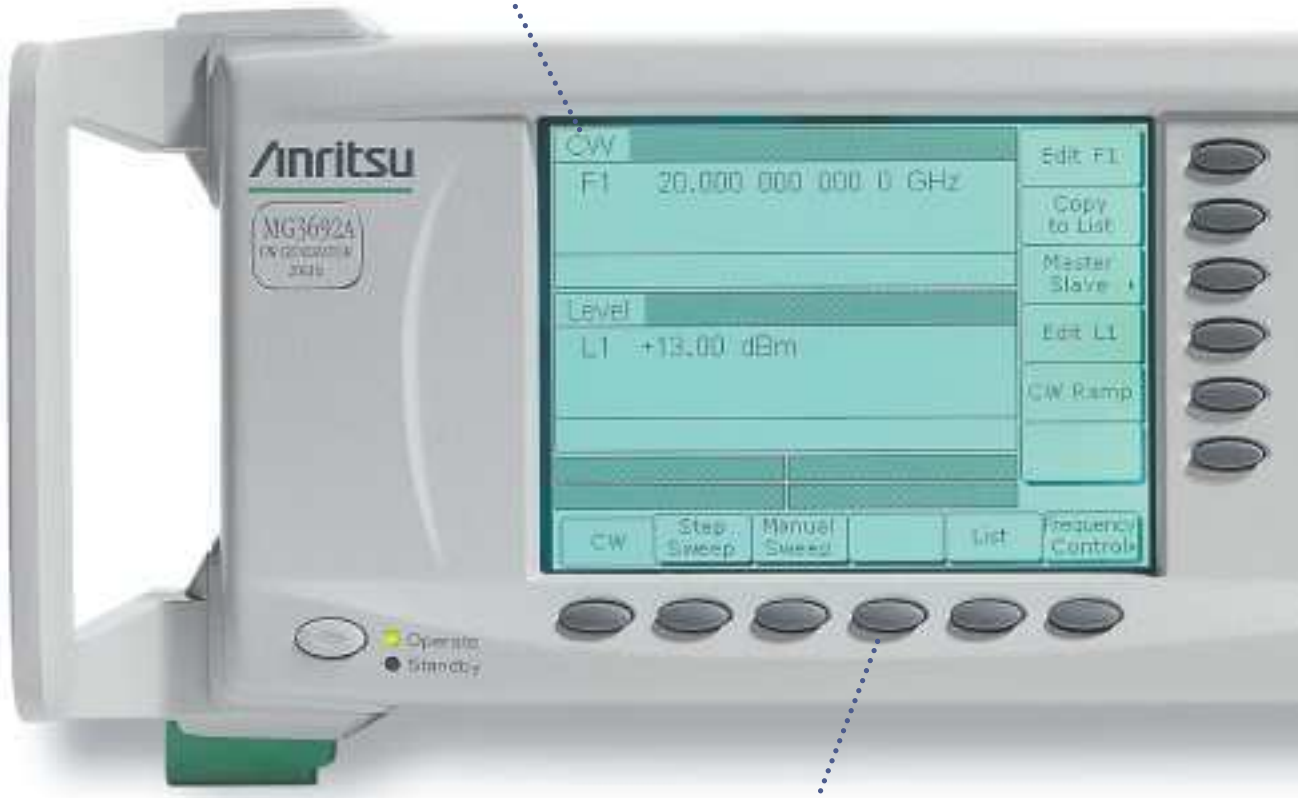


3 MODELS, FULLY CONFIGURABLE, FULLY UPGRADABLE

- MG3692A 2 to 20 GHz
- MG3693A 2 to 30 GHz
- MG3694A 2 to 40 GHz

The MG3690A series offers three basic models that cover the frequency ranges of 2 to 20, 30, or 40 GHz. Options can easily be added to configure these models to meet your specific needs. As your needs change, your unit can be upgraded in frequency or options, minimizing your capital equipment investment risks. Option 3, Ultra-Low Phase Noise, adds high performance lock loops that deliver unrivaled phase noise performance. Options 4 and 5 add RF frequency coverage down to 10 MHz. Option 4 adds a Digital Down Converter with the best RF phase noise performance. Option 5 adds an Analog Down Converter. For audio frequency coverage down to 0.1 Hz, Option 22 adds a Direct Digital Synthesizer. Option 13 offers external pulse capabilities. Check the last page of the brochure for the remaining traditional synthesizer options.

Easy to Read
backlit 1/4 VGA LCD display presents instrument status and measurement setup menus.



Softkey Menus
lead you step-by-step to the desired instrument setup. Intuitive menu flow virtually eliminates opening the operating manual! (Open it anyway, there's other good information in it.)

MG3690A Family

Function Keys
group instrument functions for simple operation. Configure GPIB interface and input/output connectors. Initiate security mode and self-test diagnostics. Save and recall up to 10 front panel instrument states.

Conveniently Enter and Edit Parameters
with the numeric keypad, cursor/increment-decrement key, or rotary data knob.

At 13.3 cm High
coupled with 45 cm depth, you get maximum performance in the minimum A.T.E. rack space.

Set Frequency from 0.1 Hz to 40 GHz in 0.1 Hz Steps.
Set power levels from +17 to –120 dBm in 0.01 dB steps.

CW GENERATORS

THE MG3690A – A NEW SYNTHESIZER FOR THE NEW MILLENNIUM

The MG3690A leverages the proven design of the El Toro family of Anritsu synthesizers, adding new features to meet the latest needs of the new millennium. The El Toro platform gives the MG3690A excellent performance with a proven reliability record of >49,000 hours MTBF. This allows the MG3690A to offer a standard 3-year warranty. From the sleek new lines of the front panel, the larger $^{1}/_{4}$ VGA LCD, the reduced front panel buttons and menu depth, to the 10 kg lighter and 15 cm shallower depth, the MG3690A meets the new millennium value-based needs.

AUTOMATIC TEST EQUIPMENT

The MG3690A is an ideal CW generator for an A.T.E. It packs the highest performance available in a 13.3 cm (3u) package, with a 450 mm depth that minimizes rack space. High output power assures adequate signal strength to the device under test even after A.T.E. switching and cabling losses. Accurately leveled output power to –120 dBm in 0.01 dB steps facilitates receiver sensitivity measurements. For improved MTBF, an electronic step attenuator replaces the traditional mechanical step attenuator. Fast 5 ms switching time maximizes system throughput. Internal list mode frees the A.T.E. controller to perform measurement analysis tasks. Free application drivers, including the IVI-COM driver and National Instruments LabView® drivers, save you time and money in code generation and maintenance. For additional cost savings, Option 17 eliminates the complete front panel including circuitry.

The Roos Instruments 7100A RFIC Tester with five Anritsu Synthesizers

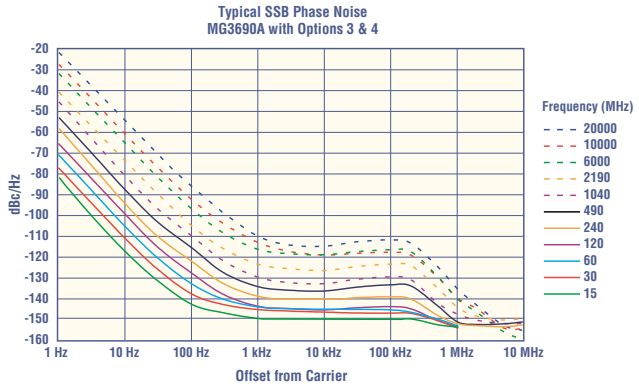
INTERCHANGEABLE VIRTUAL INSTRUMENTS STANDARD

The IVI standard defines a standard instrument driver model that enables instrument interchangeability and interoperability without software changes. Anritsu's IVI-driver supported synthesizer minimizes instrument development and maintanence cost through the use of IVI-standard interfaces as well as instrument-specific interfaces for unique instrument features. The IVI standard provides a single driver that supports the common application development environments such as Visual Basic, Visual C++, and Labview. The flexible I/O model supports new communication technologies such as USB, Ethernet, and Firewire.

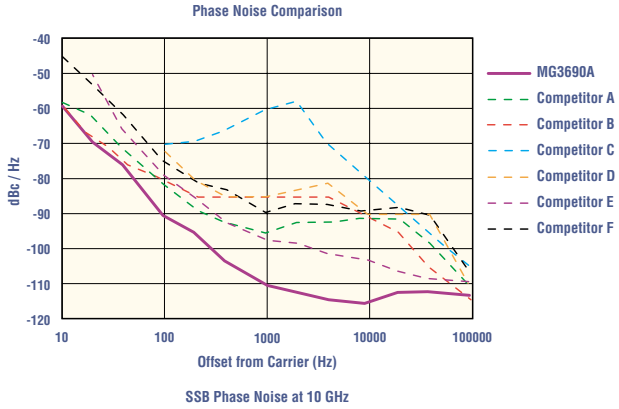
Anritsu Corporation leads the way with IVI technology, having released the first COM-based IVI driver supporting the Signal Generator instrument class, and includes the driver with every MG3690A series synthesizer. As an active member of the IVI Foundation, Anritsu supports the Foundation's drive toward instrument driver standardization as a powerful means of delivering interchangeable ATE instrumentation solutions.

INTERCHANGEABLE IVI™ VIRTUAL INSTRUMENTS

PERFORMANCE WITHOUT PEER



Phase Noise Performance typically only seen on narrow-band sources



Anritsu's phase noise eclipses the competition

CLEANER PHASE NOISE MEANS MORE ACCURATE MEASUREMENTS

Anritsu provides this high level of performance so that our customers can develop their own state-of-the-art products. With communications systems and modulation techniques becoming more complex, the low noise aspect of the MG3690A series becomes more important. For example, when the MG3690A is used as a clock source for Bit Error Rate Testing (BERT), the low SSB phase noise translates to precise clocks, with edges that are consistent period after period. The benefit is clear, a wider eye diagram with sharper transitions. The lower the SSB phase noise of the source, the less error the frequency source introduces into the measurement; it's as simple as that.

ONE-BOX, ULTRA-CLEAN RF AND MICROWAVE SIGNAL SOLUTIONS

Anritsu's MG3690A series of synthesizers utilize state-of-the-art technology to achieve extremely low phase noise over the full frequency spectrum.

Below 10 MHz, these synthesizers utilize Direct Digital Synthesis (DDS) techniques to achieve ultra-fine frequency resolution coupled with outstanding phase noise performance.

From 10 MHz to 2.2 GHz, the new Digital Down Converter (DDC) is available offering ultra-low SSB phase noise performance on a par with the best RF synthesizers on the market and typically 30-50 dB better than other microwave synthesizers. In this frequency range, this stellar SSB phase noise performance is important because the highly congested communications bands require extra clean signals. The DDC produces frequencies by successive binary division, eliminating the addition of non-harmonic spurious common with mixer-based down conversion schemes.

Above 2.2 GHz, Anritsu uses patented techniques that allow us to achieve the best possible phase noise performance. Where other manufacturers typically use only three or four phase locked loops for frequency synthesis, Anritsu adds additional loops optionally to provide the best SSB phase noise on the market today.

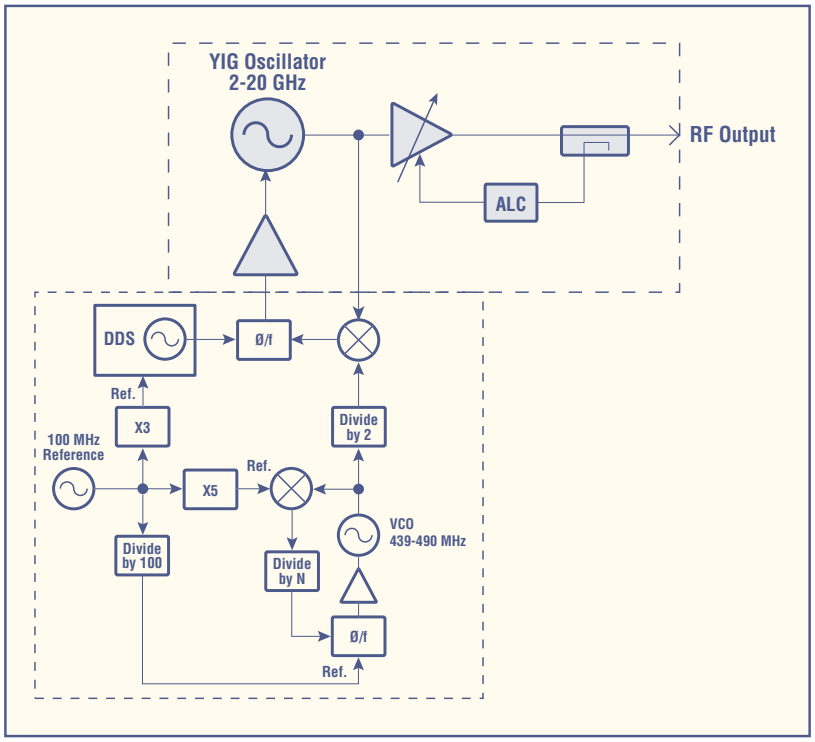
Anritsu synthesizers can truly provide a one-box solution for clean audio frequency, ultra-clean RF, and microwave signal generation, offering outstanding performance in applications that would have previously required a separate RF synthesizer. The phase noise plots included show the MG3690As superb performance at 15 MHz to 20 GHz, with offsets from 1 Hz to 10 MHz. Another plot compares the MG3690A's performance at 10 GHz with that of the major broadband synthesizers on the market. When it comes to clean broadband signals, the MG3690A eclipses the competition.

The MG3690A is the ideal clock source for BERTS, such as the Anritsu MP1632A or MP1763B/MP1764A combo.

INNOVATIONS IN SIGNAL SYNTHESIS

Many technologies come together in the Anritsu MG3690A series of synthesizers to provide an excellent price to performance ratio.

Several innovative technologies are incorporated into the frequency synthesis sections. By utilizing a 100 MHz crystal oscillator instead of the traditional 5 or 10 MHz references, the MG3690A is able to provide better SSB phase noise through lower Phase Locked Loop (PLL) multiplication ratios. New technology that has recently become available has allowed the use of a single Direct Digital Synthesizer (DDS) to provide the required fine frequency steps. Previous technologies forced the use of several PLLs in association with a DDS in order to provide acceptable spurious performance. This clearly allows a win-win situation where performance is not compromised yet complexity is reduced improving reliability as well as decreasing the cost of ownership.

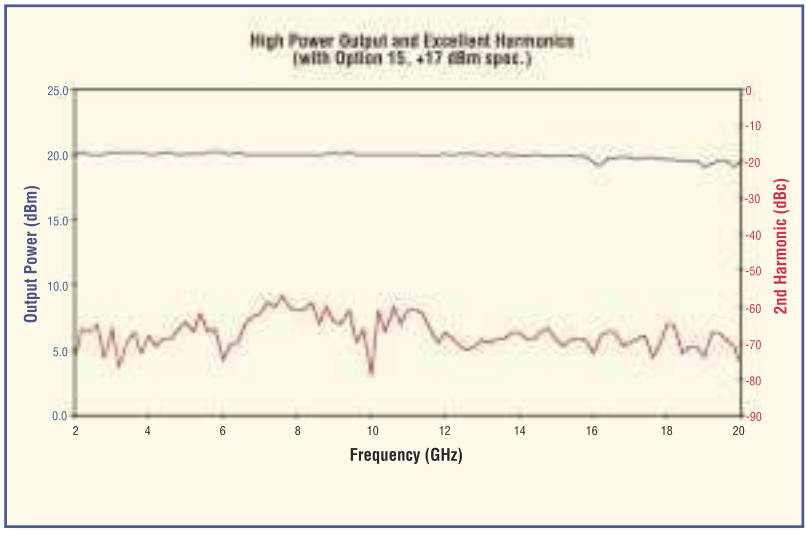


MG3690A Frequency Synthesis Block Diagram

The main output chain for the microwave frequencies also includes important performance enhancing technology. By using a single 2-20 GHz YIG oscillator in conjunction with a switched-filter bank, spectral purity can be maintained over the full frequency range. Other manufacturers often use frequency multiplication techniques for some of the frequency range which leads to degraded spurious and/or harmonic performance.

Even with all the new technology in the MG3690A series of synthesizers, these new sources still provide all of the reliability you've come to expect from Anritsu.

- **Complex ATE Setups**
- **Lengthy Cable Runs**
- **Coax Switch Arrays**
- **Power Splitters**
- **Couplers**



Typical performance of 20 dBm power with >60 dBc harmonics

These are important pieces of your measurement puzzle – and they all rob you of precious power needed to test the last device at the end of the line. You need full spectrum 2-20 GHz microwave power at that last device, but you can't afford to compromise signal purity. You need the MG3692A with Option 15. With the MG3692A/15 you get guaranteed +17 dBm with –50 dBc harmonics. But, with Anritsu's conservative power spec, the MG3692A/15 will give you typical output power of +19 dBm and –60 dBc. That margin is priceless when fighting those lossy components with less than perfect matches typical of complex test setups.

SPECIFICATIONS

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 (<5 x 10^{-9}/C with Option 16)

Resolution: 0.01 Hz

External 10 MHz Reference Input: Accepts external 10 MHz ±100 Hz, –10 to +20 dBm time base signal. Automatically disconnects the internal high-stability time-base option, if installed. BNC, rear panel, 50 ohm impedance.

10 MHz Reference Output: 0.5 Vp-p into 50 ohms, AC coupled. Rear panel BNC; 50 ohm impedance.

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

Phase Offset: Adjustable in 0.1 degree steps

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.

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.

Marker Accuracy: Same as sweep frequency accuracy.

Marker Resolution: 0.01 Hz

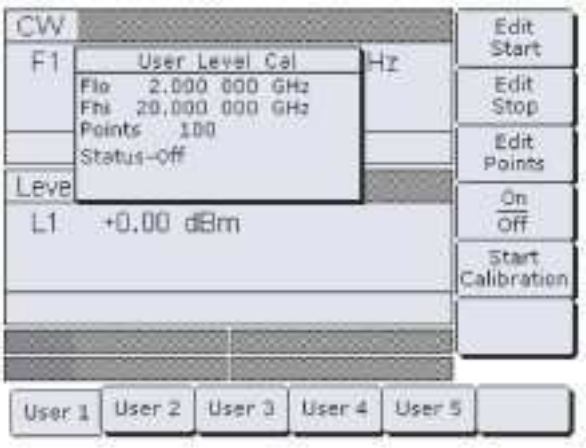
Sweep Triggering

Sweep triggering is provided for 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.



User Level Flatness Correction Screen

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 Selftest 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 > 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: 90-264 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: 14 kg maximum

Dimensions: 133 H x 429 W x 450 D mm

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

Storage Temperature Range: –40 to +75 deg C

Operating Temperature Range: 0 to +50 deg C

Relative Humidity: 5% to 95% at 40 deg C

Altitude: 4,600 meters, 43.9 cm Hg

EMI: Meets the emission and immunity requirements of
EN55011:1991/CISPR-11:1990 Group 1 Class A
EN50082-1:1997/
EN 61000-4-2:1995 – 4 kV CD, 8 kV AD
EN61000-4-3:1997 – 3 V/m
ENV50204 – 3 V/m
EN61000-4-4: 1995 – 0.5 kV SL, 1 kV PL
EN61000-4-5:1995 – 1 kV – 2 kV L-E
MIL-STD-461C Part 2 REO1, REO2, CEO1, CEO3, CSO1, CSO2, CSO6, RSO3

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

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

Frequency Range	Standard
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*

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 ≤40 GHz	<–60 dBc

Power Line and Fan Rotation Spurious Emissions (dBc):

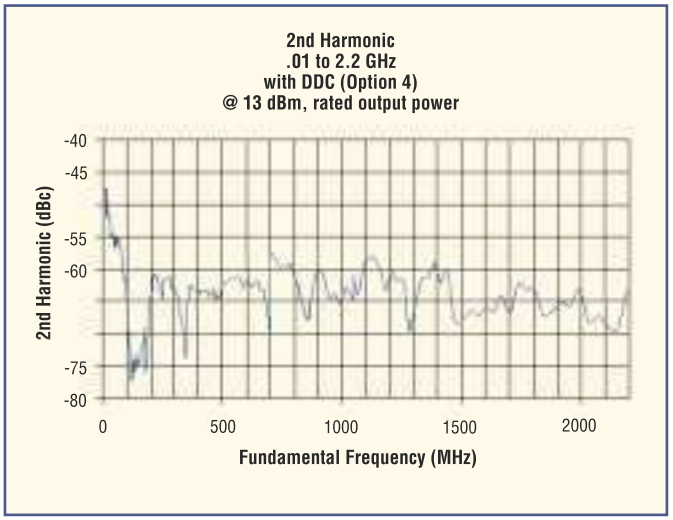
	Offset From Carrier		
Frequency Range	<300 Hz	300 Hz to 1 kHz	>1 kHz
≥10 to ≤500 MHz (Option 4)	<–68	<–72	<–72
>500 to ≤1050 MHz (Option 4)	<–62	<–72	<–72
>1050 to ≤2200 MHz (Option 4)	<–56	<–66	<–66
≥0.01 to ≤8.4 GHz	<–50	<–60	<–60
>8.4 to ≤20 GHz	<–46	<–56	<–60
>20 to ≤40 GHz	<–40	<–50	<–54

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

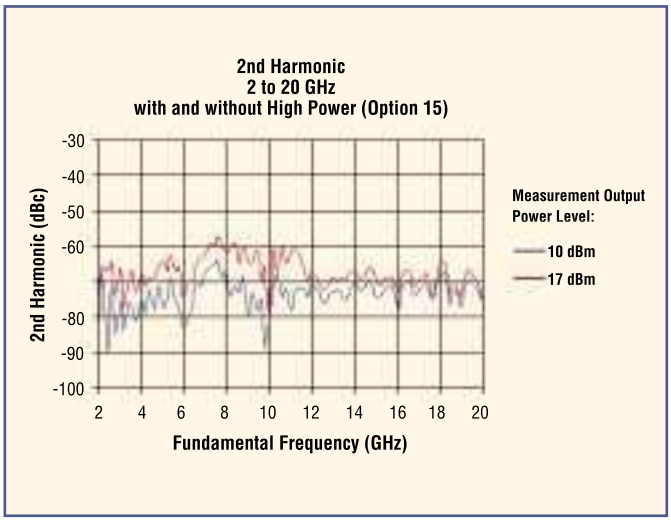
	Residual FM (Hz RMS)	
Frequency Range	Option 3, 4	Standard
≥0.01 to ≤8.4 GHz	<40	<120
>8.4 to ≤20 GHz	<40	<220
>20 to ≤40 GHz	<80	<440

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

* Typical
(<21 GHz: <–20 dBc typical)

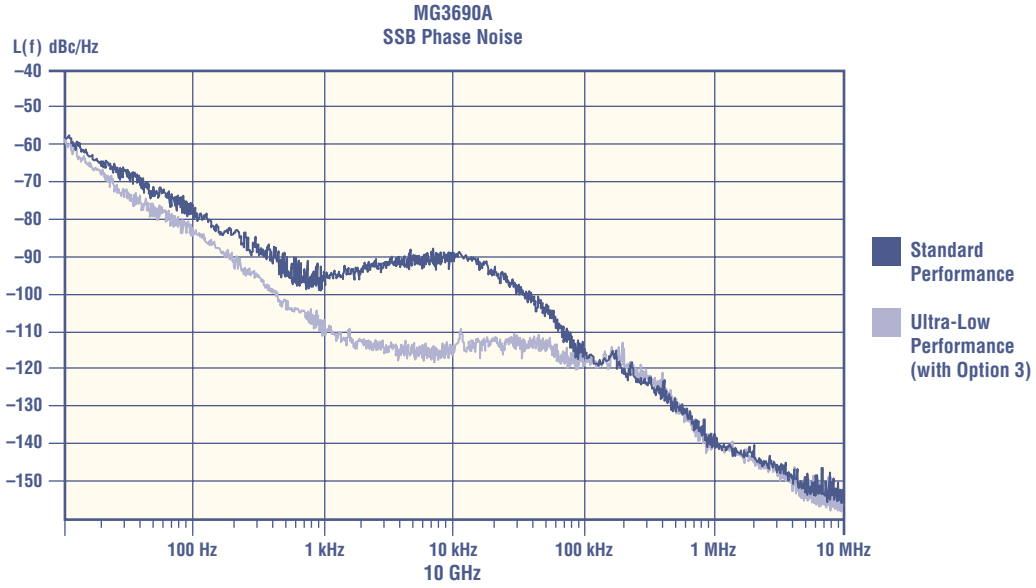
Single-Sideband Phase Noise

Single-Sideband Phase Noise (dBc/Hz):

Frequency Range	Offset From Carrier			
	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 <2200 MHz (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

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

Frequency Range	Offset From Carrier					
	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	–111	–130
>6 GHz to ≤10 GHz	–52	–73	–100	–107	–110	–128
>10 GHz to ≤20 GHz	–45	–68	–94	–102	–104	–125
>20 GHz to ≤40 GHz	–45	–63	–92	–98	–98	–119



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)
MG3692A	w/opt 4	≤2.2 GHz	+17.0	+15.0	+13.0
	w/opt 5	≤2 GHz	+17.0	+15.0	+13.0
	STD	≥2 to ≤8.4 GHz	+13.0	+11.0	+9.0
	STD	>8.4 to ≤20 GHz	+13.0	+11.0	+3.0
MG3693A	w/opt 4	≤2.2 GHz	+13.0	+11.0	Not Available
	w/opt 5	≤2 GHz	+13.0	+11.0	
	STD	≥2 to ≤20 GHz	+9.0	+7.0	
	STD	>20 to ≤30 GHz	+6.0	+3.0	
MG3694A	w/opt 4	≤2.2 GHz	+13.0	+11.0	Not Available
	w/opt 5	≤2 GHz	+13.0	+11.0	
	STD	≥2 to ≤20 GHz	+9.0	+7.0	
	STD	>20 to ≤40 GHz	+6.0	+3.0	

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)
MG3692A	w/opt 4	≤2.2 GHz	+19.0	+18.0	+15.0
	w/opt 5	≤2 GHz	+19.0	+18.0	+15.0
	STD	≥2 to ≤10 GHz	+19.0	+18.0	+13.0
	STD	>10 to ≤20 GHz	+17.0	+15.0	+7.0
MG3693A	w/opt 4	≤2.2 GHz	+15.0	+14.0	Not Available
	w/opt 5	≤2 GHz	+15.0	+14.0	
	STD	≥2 to ≤18 GHz	+15.0	+14.0	
	STD	>18 to ≤20 GHz	+12.0	+10.0	
	STD	>20 to ≤30 GHz	+14.0	+12.0	
MG3694A	w/opt 4	≤2.2 GHz	+15.0	+14.0	Not Available
	w/opt 5	≤2 GHz	+15.0	+14.0	
	STD	≥2 to ≤18 GHz	+15.0	+14.0	
	STD	>18 to ≤20 GHz	+12.0	+10.0	
	STD	>20 to ≤40 GHz	+14.0	+12.0	

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

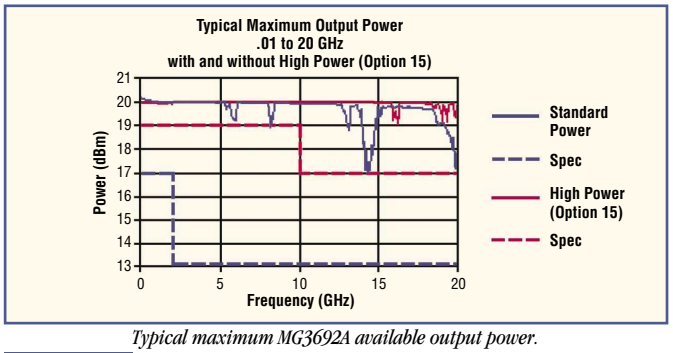
With an Electronic Attenuator: Maximum leveled output power to –140 dBm.

Units with Option 15, High Power:

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

With an Attenuator: Maximum leveled power to –115 dBm (–120 dBm typical). For units with Option 15A, minimum settable power is –105 dBm (–110 dBm typical).

With an Electronic Attenuator: Maximum leveled power to –115 dBm (–110 dBm typical).



Typical maximum MG3692A available output power.

Unleveled Output Power Range (typical):

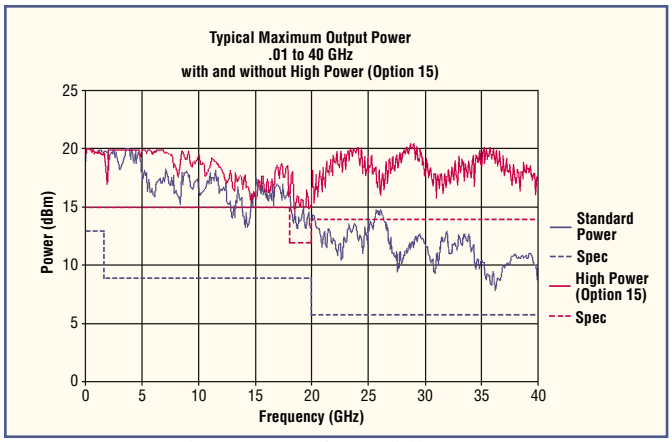
Without an Attenuator: >40 dB below max power.
With an Attenuator: >130 dB below max power.

Power Level Switching Time (to within specified accuracy):

Without Change in Step Attenuator: <3ms 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.



Typical maximum MG3694A available output power

Accuracy and Flatness

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

Accuracy = ±1.0 dB

Flatness = ±0.8 dB

Other Output Power Specifications

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

Output Power Resolution: 0.01 dB or 0.001 mV

Source Impedance: 50 ohms 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, front and 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.

External Pulse Modulation (Option 13)

Pulse modulation specifications apply at maximum rated power, unless otherwise noted.

On/Off Ratio: >80 dB

Rise/Fall Time (10 to 90%):

10 MHz to 1.0 GHz: 15 ns (<10 ns typical)
1.0 GHz to 40 GHz: 10 ns (<5 ns typical)

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

Minimum Unleveled Pulse Width: <10 ns

Pulse Overshoot: 10%

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

Video Feedthrough: < ±10 mV, ≥2 GHz

Pulse Width Compression: <8 ns typical

Pulse Delay (typical):

External Mode: 50 ns

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

External Input: Rear-panel BNC.

Drive Level: TTL compatible input

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

DIGITAL DOWN CONVERTER (OPTION 4)

MG3690A synthesizers with Option 4 DDC produce output frequencies from 10 MHz to 2.2 GHz by dividing the YTO frequency by 2^n. The divisor ranges from 2 at 2.2 GHz to 256 at 10-15.625 MHz.

Frequency Range	Divide Radio, n
≥10 to ≤15.625 MHz	256
>15.625 to ≤31.25 MHz	128
>31.25 to ≤62.5 MHz	64
>62.5 to ≤125 MHz	32
>125 to ≤250 MHz	16
>250 to ≤500 MHz	8
>500 to ≤1050 MHz	4
>1050 to ≤2200 MHz	2

RF Output

Frequency: 10-2200 MHz

Maximum Leveled Output Power: +13 dBm, typically +19 dBm

Spectral Purity

All specifications apply at maximum rated power, unless otherwise noted.

Harmonic and Harmonic Related:

–40 dBc, ≤100 MHz

–50 dBc, >100 MHz

Non-Harmonic Spurious:

–60 dBc

AM Noise:

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

Power Line and Fan-Related Spurious (dBc)

Frequency Range	Offset from Carrier	
	<300 Hz	≥300 Hz
≥10 MHz to ≤500 MHz	–68	–72
>500 MHz to ≤1050 MHz	–62	–72
>1050 MHz to ≤2200 MHz	–56	–66

Pulse Modulation

Pulse modulation specifications apply at maximum rated power, unless otherwise noted.

On/Off Ratio: >80 dB

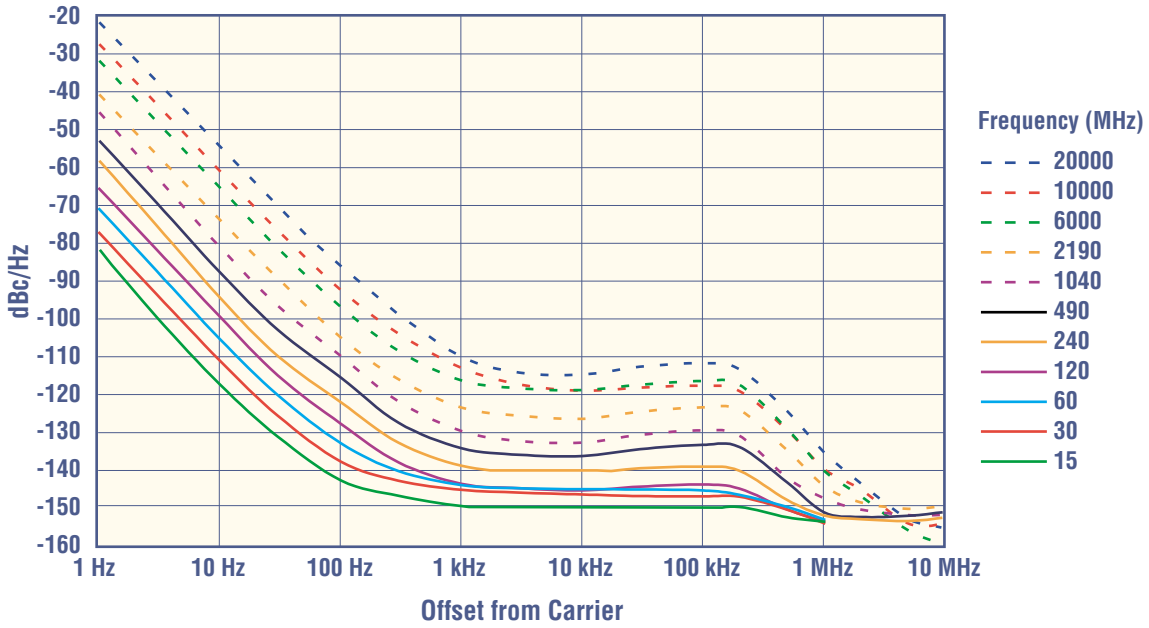
Minimum Leveled Pulse Width: 1 µsec

Level Accuracy Relative to CW: ± 0.5 dB (100 Hz to 500 kHz PRF)

Frequency Range	Rise and Fall Time	Overshoot	Width Compression	Video Feedthrough
>500 to ≤2200 MHz	15 ns	10%	12 ns*	±15 mV*
>125 to ≤500 MHz	<33 ns*	<11%*	<12 ns*	±70 mV*
>31.25 to ≤125 MHz	<90 ns*	<22%*	<12 ns*	±130 mV*
≥10 to ≤31.25 MHz	<400 ns*	<33%*	<40 ns*	±70 mV*

* Typical

Typical SSB Phase Noise
MG3690A with Options 3 & 4



INPUTS AND OUTPUTS

Input/Output Connectors		
Nomenclature	**Type**	**Location**
PULSE TRIG IN	BNC	Rear Panel
EXT ALC IN	BNC	Rear Panel
RF OUTPUT	K-Connector (female)	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
AUX I/O	25-pin D-type	Rear Panel
SERIAL I/O	RJ45	Rear Panel
IEEE-488 GPIB	Type 57	Rear Panel

PULSE TRIG IN: Accepts an external TTL compatible signal to pulse modulate the RF output signal.

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 50 ohm 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 +10 dBm time-base signal. Automatically disconnects the internal high-stability time-base option, if installed. 50 Ω impedance.

10 MHz REF OUT: Provides a 0.5 Vp-p, AC coupled, 10 MHz signal derived from the internal frequency standard. 50 Ω 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.

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.

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).

MG3690A rear panel Inputs/Outputs

ORDERING INFORMATION

Models

MG3692A 2 – 20 GHz CW Generator

MG3693A 2 – 30 GHz CW Generator

MG3694A 2 – 40 GHz CW 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 with 110 dB range. Rated RF output power is reduced. (This option comes in different versions, based on instrument configuration.)

MG3690A/2F Electronic Step Attenuator – 20 GHz; Adds a 10 dB/step electronic attenuator with a 120 dB range for the MG3692A. Rated RF output power is reduced.

MG3690A/3 Ultra Low Phase Noise, main band, ≥ 2 GHz; 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/9K Rear Panel Output – Moves the RF output connector to the rear panel.

MG3690A/13 External Pulse Modulation; rear panel BNC connector for connection of external pulse modulation signal

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.

MG3690A/18 mmW Bias Output – Adds a rear panel BNC Twinax connector to bias the 5400-xWRxx millimeter wave source modules.

MG3690A/22 0.1Hz to 10 MHz Audio coverage – Uses a DDS for coverage down to approximately DC. When adding Option 22, the output power is derated by 1 dB for frequencies <20 GHz and 2 dB greater than 20 GHz. The frequency resolution below 10 MHz is 0.02 Hz. No modulation is available in the 0.1 Hz to 10 MHz band.

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 V/GHz and Sequential Sync connections and other AUX I/O data lines

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).

Upgrades

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

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