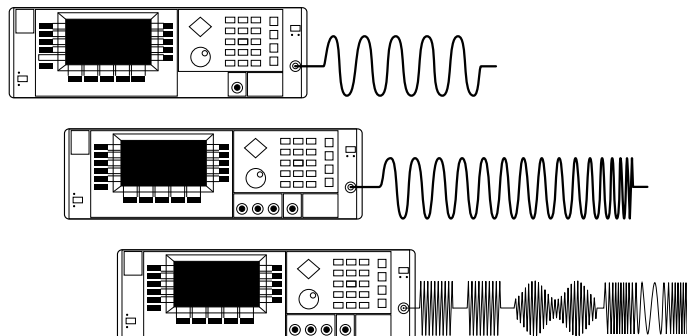


69A Series

Ultra Low Noise Synthesizers

10 MHz to 110 GHz

Technical Data Sheet



69A Series Synthesizer Product Selection Table

	69000A CW Generator	69100A Sweep Generator	69200A Signal Generator	69300A Sweep/Signal Generator
Step Sweep	Standard	Standard	Standard	Standard
Analog Sweep	N/A	Standard	N/A	Standard
Power Sweep	Standard	Standard	Standard	Standard
Alternate Sweep	Standard	Standard	Standard	Standard
Master/Slave	Standard	Standard	Standard	Standard
AM	N/A	Ext	Int/Ext	Int/Ext
FM	N/A	Ext	Int/Ext	Int/Ext
ΦM	N/A	N/A	Option 6	Option 6
Pulse Modulation	N/A	Int SQW and Ext	Int/Ext	Int/Ext
AM Scan (1-20 GHz)	N/A	N/A	Option 20	Option 20
Internal Power Meter	N/A	N/A	Option 8	Option 8
360B VNA Source Lock Mode	N/A	Standard	Standard	Standard

69A Series Synthesizer Model Summary

Frequency Range	CW Generators	Sweep Generators	Signal Generators	Sweep/Signal Generators
2 to 20 GHz	69037A	69137A	69237A	69337A
0.5 to 20 GHz	69045A	69145A	69245A	69345A
0.01 to 20 GHz	69047A	69147A	69247A	69347A
2 to 26.5 GHz	69053A	69153A	69253A	69353A
0.5 to 26.5 GHz	69055A	69155A	69255A	69355A
0.01 to 26.5 GHz	69059A	69159A	69259A	69359A
2 to 40 GHz	69063A	69163A	69263A	69363A
0.5 to 40 GHz	69065A	69165A	69265A	69365A
0.01 to 40 GHz	69069A	69169A	69269A	69369A
0.5 to 50 GHz	69075A	69175A	69275A	69375A
0.01 to 50 GHz	69077A	69177A	69277A	69377A
0.5 to 60 GHz	69085A	69185A	69285A	69385A
0.01 to 60 GHz	69087A	69187A	69287A	69387A
0.5 to 65 GHz	69095A	69195A	69295A	69395A
0.01 to 65 GHz	69097A	69197A	69297A	69397A

FREQUENCY

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: $< 2 \times 10^{-8}/\text{day}$ ($< 5 \times 10^{-10}/\text{day}$ with Option 16)

With Temperature: $< 2 \times 10^{-8}/^{\circ}\text{C}$ over 0°C to 55°C
($< 2 \times 10^{-10}/^{\circ}\text{C}$ with Option 16)

Resolution:

1 kHz (0.1 Hz with Option 11)

External 10 MHz Reference Input: Accepts external 10 MHz ± 100 Hz, 0 to +10 dBm time base signal. Automatically disconnects the internal high-stability time-base option, if installed. BNC, rear panel, 50 Ω impedance.

10 MHz Reference Output: 0.5V p-p into 50 Ω , AC coupled, from rear panel BNC connector.

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

ANALOG SWEEP MODE (69100A and 69300A only)

Sweep Width: Independently selected from 1 MHz to full range continuous sweep.

Accuracy: The lesser of:

± 30 MHz or (± 2 MHz + 0.25% of sweep width) for sweep speeds of ≤ 50 MHz/ms

Sweep Time Range: 30 ms to 99 seconds

PHASE-LOCKED STEP SWEEP MODE

Sweep Width: Independently selected, 1 kHz (0.1 Hz with Option 11) 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):

1 kHz (0.1 Hz with Option 11)

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

Number of Steps: Variable from 1 to 10,000

Step Size: 1 kHz (0.1 Hz with Option 11) 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

Switching Time (typical maximum): < 15 ms +1 ms/GHz step size or < 40 ms, whichever is less.

ALTERNATE SWEEP MODE

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

MANUAL SWEEP MODE

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

360B VNA SOURCE LOCK MODE

(69100A, 69200A, and 69300A only)

Under control of the Wiltron 360B Vector Network Analyzer, the synthesized signal generator is phase-locked at a < 8.5 ms/step sweep speed. Frequency resolution is limited to 100 kHz. Minimum specified frequency is 0.6 GHz for 69xx5A units and 2.1 GHz for 69x37A, 69x53A and 69x63A units.

PROGRAMMABLE FREQUENCY AGILITY

Under GPIB control, up to 1000 non-sequential frequencies can be stored and then addressed as a phase-locked step sweep. Data is 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 (Available in Analog Sweeps of < 1 Second Sweep Time): Produces an intensified dot on trace, obtained by momentary dwell in RF sweep.

Marker Accuracy: Same as sweep frequency accuracy.

Marker Resolution (Analog Sweep):

1 MHz or Sweep Width/4096, whichever is greater.

Marker Resolution (Step Sweep):

1 kHz (0.1 Hz with Option 11)

SWEEP TRIGGERING

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

Auto: Triggers sweep automatically.

External: Accepts a TTL low to high transition at AUX I/O connector on rear panel to trigger a sweep.

Single: Triggers, aborts, and resets a single sweep. Reset sweep may be selected to be at the top or bottom of the sweep. The 69100A/200A/300A pen lift will activate at sweep times ≥1 second.

SPECTRAL PURITY

All specifications apply to the phase-locked CW and Step Sweep modes at the lesser of +10 dBm output or maximum specified leveled output power, unless otherwise noted.

SPURIOUS SIGNALS

Harmonic and Harmonic Related:

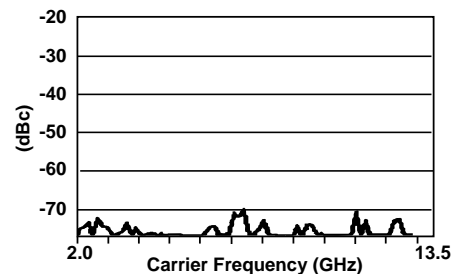
≥ 500 MHz to ≤ 2.2 GHz (69xx5A):	< -50 dBc
≥ 10 MHz to ≤ 50 MHz:	< -30 dBc
> 50 MHz to ≤ 2 GHz:	< -40 dBc
> 2 GHz (2.2 GHz for 69xx5A) to ≤ 20 GHz:	< -60 dBc
> 20 GHz to ≤ 40 GHz:	< -40 dBc

Harmonic and Harmonic Related (> 40 GHz units and units with Option 15 at maximum specified leveled output power):

≥ 500 MHz to ≤ 2.2 GHz (69xx5A):	< -50 dBc
≥ 10 MHz to ≤ 50 MHz:	< -30 dBc
> 50 MHz to ≤ 2 GHz:	< -40 dBc
> 2 GHz (2.2 GHz for 69xx5A) to ≤ 20 GHz:	< -50 dBc
> 20 GHz to ≤ 40 GHz:	< -40 dBc
50 GHz units; > 40 GHz to ≤ 50 GHz:	< -40 Bc
60 GHz units; > 40 GHz to ≤ 60 GHz:	< -30 Bc
65 GHz units; > 40 GHz to ≤ 45 GHz:	< -25 Bc
> 45 GHz to ≤ 65 GHz:	< -30 Bc

Nonharmonics:

≥ 500 MHz to ≤ 2.2 GHz (69xx5A):	< -50 dBc
≥ 10 MHz to ≤ 2 GHz:	< -40 dBc
> 2 GHz (2.2 GHz for 69xx5A) to ≤ 65 GHz:	< -60 dBc

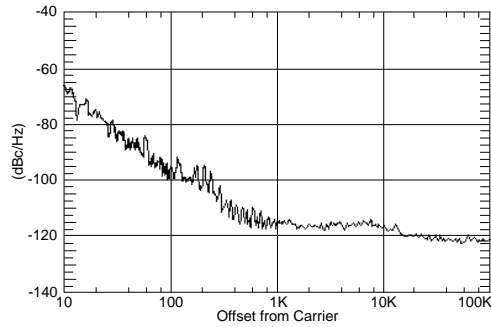


Typical second harmonic level measured at maximum output power.

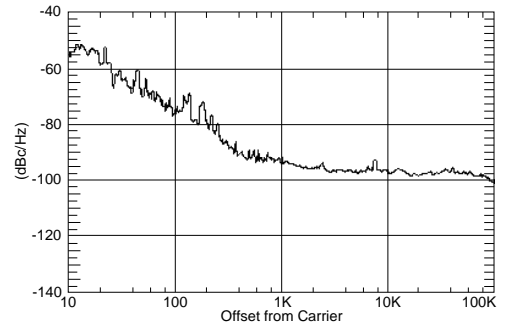
SINGLE-SIDEBAND PHASE NOISE

(dBc/Hz)

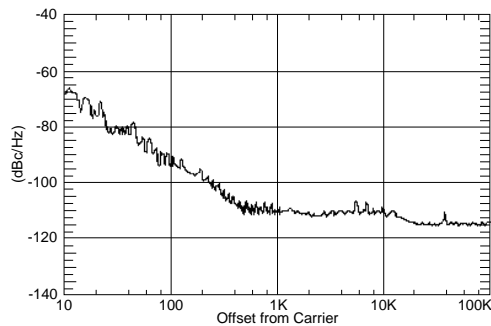
Frequency (GHz)	Offset From Carrier			
	100 Hz	1 kHz	10 kHz	100 kHz
0.6 (69xx5A)	-92	-112	-112	-117
0.6	-80	-98	-100	-102
2 (69xx5A)	-86	-106	-106	-111
2	-80	-100	-100	-105
6	-78	-100	-100	-105
10	-74	-98	-100	-105
20	-66	-95	-100	-102
26.5	-63	-91	-94	-96
40	-60	-89	-94	-96
50	-57	-83	-88	-90
65	-54	-83	-88	-90



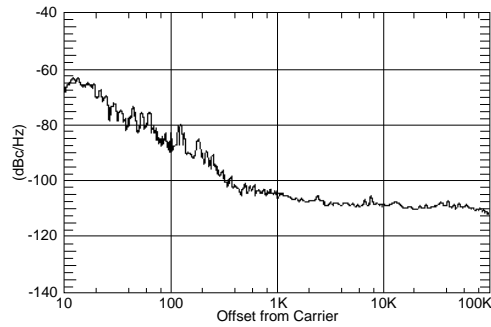
Typical single-sideband phase noise at 2 GHz carrier. (69xx5A)



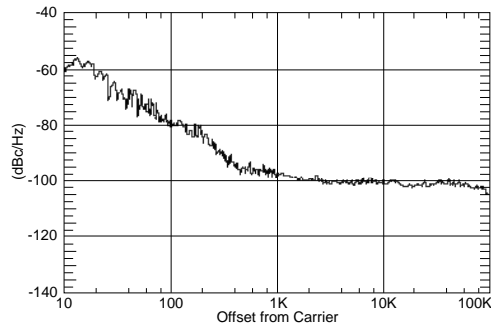
Typical single-sideband phase noise at 65 GHz carrier.



Typical single-sideband phase noise at 10 GHz carrier.



Typical single-sideband phase noise at 20 GHz carrier.



Typical single-sideband phase noise at 40 GHz carrier.

POWER LINE and FAN ROTATION SPURIOUS EMISSIONS (dBc)

Frequency Range (GHz)	Offset From Carrier		
	< 300 Hz	300 Hz to 1 kHz	> 1 kHz
≥ 0.5 to ≤ 1.0 (69xx5A)	< -62	< -72	< -72
> 1.0 to ≤ 2.2 (69xx5A)	< -56	< -66	< -66
≥ 0.01 (2.2 for 69xx5A) to ≤ 8.4	< -50	< -60	< -60
> 8.4 to ≤ 20	< -46	< -56	< -60
> 20 to ≤ 40	< -40	< -50	< -54
> 40 to ≤ 65	< -34	< -44	< -48

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

Frequency Range (GHz)	Residual FM (Hz RMS)
≥ 0.5 to ≤ 1.0 (69xx5A)	< 10
≥ 1.0 to ≤ 2.2 (69xx5A)	< 20
≥ 0.01 (2.2 for 69xx5A) to ≤ 8.4	< 40
> 8.4 to ≤ 20	< 40
> 20 to ≤ 40	< 80
> 40 to ≤ 65	< 160

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

Frequency Range (GHz)	Unlocked Narrow FM Mode (kHz RMS)	Unlocked Wide FM Mode or Analog Sweep (kHz RMS)
≥ 0.5 to ≤ 1.0 (69xx5A)	< 1.25	< 6.3
> 1.0 to ≤ 2.2 (69xx5A)	< 2.5	< 12.5
≥ 0.01 (2.2 for 69xx5A) to ≤ 20	< 5	< 25
> 20 to ≤ 40	< 10	< 50
> 40 to ≤ 65	< 20	< 100

AM Noise Floor:

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

RF OUTPUT

Power level specifications apply at $25^{\circ} \pm 10^{\circ}\text{C}$.

MAXIMUM LEVELED OUTPUT POWER

Model Number	Frequency Range (GHz)	Output Power (dBm)	Output Power with Step Attenuator (dBm)
69x37A	≥ 2 to ≤ 20	+13.0	+11.0
69x45A	≥ 0.5 to ≤ 20	+13.0	+11.0
69x47A	≥ 0.01 to ≤ 20	+13.0	+11.0
69x53A	≥ 2 to ≤ 20 > 20 to ≤ 26.5	+9.0 +6.0	+7.0 +3.5
69x55A	≥ 0.5 to ≤ 2.2 > 2.2 to ≤ 20 > 20 to ≤ 26.5	+13.0 +9.0 +6.0	+11.0 +7.0 +3.5
69x59A	≥ 0.01 to < 2 ≥ 2 to ≤ 20 > 20 to ≤ 26.5	+13.0 +9.0 +6.0	+11.0 +7.0 +3.5
69x63A	≥ 2 to ≤ 20 > 20 to ≤ 40	+9.0 +6.0	+7.0 +3.0
69x65A	≥ 0.5 to ≤ 2.2 > 2.2 to ≤ 20 > 20 to ≤ 40	+13.0 +9.0 +6.0	+11.0 +7.0 +3.0
69x69A	≥ 0.01 to < 2 ≥ 2 to ≤ 20 > 20 to ≤ 40	+13.0 +9.0 +6.0	+11.0 +7.0 +3.0
69x75A	≥ 0.5 to ≤ 2.2 > 2.2 to ≤ 20 > 20 to ≤ 40 > 40 to ≤ 50	+11.0 +10.0 +2.5 +2.5	+10.0 +8.5 0.0 -1.0
69x77A	≥ 0.01 to < 2 ≥ 2 to ≤ 20 > 20 to ≤ 40 > 40 to ≤ 50	+12.0 +10.0 +2.5 +2.5	+10.0 +8.5 0.0 -1.0
69x85A	≥ 0.5 to ≤ 2.2 > 2.2 to ≤ 20 > 20 to ≤ 40 > 40 to ≤ 50 > 50 to ≤ 60	+11.0 +10.0 +2.5 +2.0 +2.0	+10.0 +8.5 0.0 -1.5 -2.0
69x87A	≥ 0.01 to < 2 ≥ 2 to ≤ 20 > 20 to ≤ 40 > 40 to ≤ 50 > 50 to ≤ 60	+12.0 +10.0 +2.5 +2.0 +2.0	+10.0 +8.5 0.0 -1.5 -2.0
69x95A	≥ 0.5 to ≤ 2.2 > 2.2 to ≤ 20 > 20 to ≤ 40 > 40 to ≤ 50 > 50 to ≤ 65	+11.0 +10.0 +2.5 0.0 -2.0	Not Available
69x97A	≥ 0.01 to < 2 ≥ 2.0 to ≤ 20 > 20 to ≤ 40 > 40 to ≤ 50 > 50 to ≤ 65	+12.0 +10.0 +2.5 0.0 -2.0	Not Available

MAXIMUM LEVELED OUTPUT POWER With Option 15 (High Power) Installed

Model Number	Frequency Range (GHz)	Output Power (dBm)	Output Power with Step Attenuator (dBm)
69x37A	≥ 2 to ≤ 20	+17.0	+15.0
69x45A	≥ 0.5 to ≤ 2.2 > 2.2 to ≤ 20	+13.0 +17.0	+11.0 +15.0
69x47A	≥ 0.01 to < 2 ≥ 2 to ≤ 20	+13.0 +17.0	+11.0 +15.0
69x53A	≥ 2 to < 20 ≥ 20 to ≤ 26.5	+13.0 +10.0	+11.0 +7.5
69x55A	≥ 0.5 to ≤ 20 > 20 to ≤ 26.5	+13.0 +10.0	+11.0 +7.5
69x59A	≥ 0.01 to < 2 ≥ 2 to ≤ 20 > 20 to ≤ 26.5	+13.0 +13.0 +10.0	+11.0 +11.0 +7.5
69x63A	≥ 2 to ≤ 20 > 20 to ≤ 40	+13.0 +6.0	+11.0 +3.0
69x65A	≥ 0.5 to ≤ 20 > 20 to ≤ 40	+13.0 +6.0	+11.0 +3.0
69x69A	≥ 0.01 to ≤ 20 > 20 to ≤ 40	+13.0 +6.0	+11.0 +3.0

LEVELED OUTPUT POWER RANGE

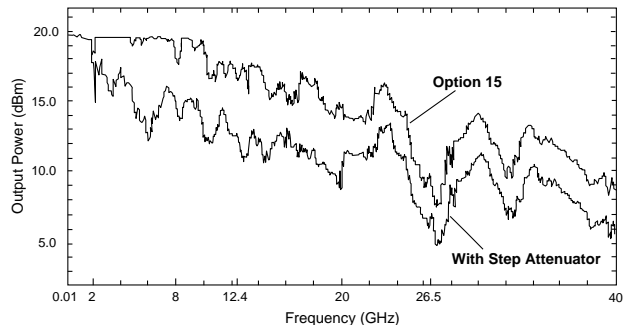
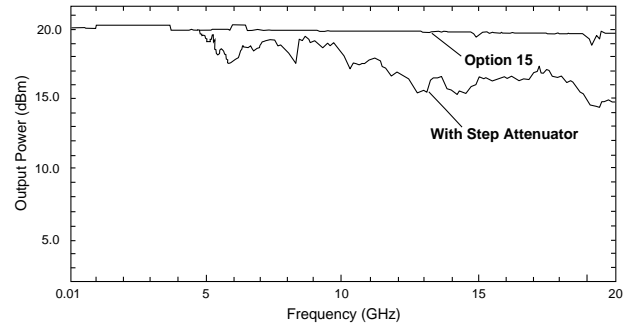
Without an Attenuator: Maximum leveled power to -15 dBm (-20 dBm typical). For units with Option 15 installed, minimum settable power is -5 dBm (-10 dBm typical).

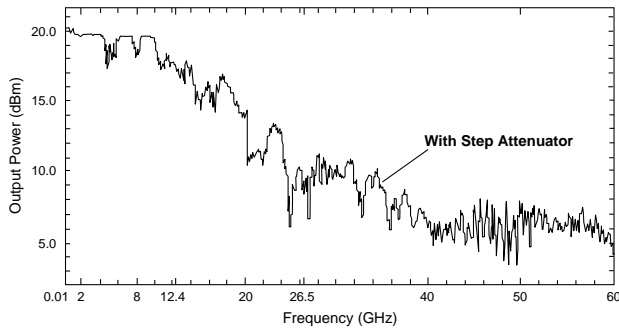
With an Attenuator: Maximum leveled power to -115 dBm (-120 dBm typical). For 69x75A, 69x77A, 69x85A, 69x87A and units with Option 15 installed, minimum settable power is -105 dBm (-110 dBm typical).

UNLEVELED OUTPUT POWER RANGE (typical)

Without an Attenuator: >40 dB below max power.

With an Attenuator: >130 dB below max power.





Typical maximum 69x87A available output power.

POWER LEVEL SWITCHING TIME (to within specified accuracy)

Without Change in Step Attenuator: < 1 ms typical

With Change in Step Attenuator: < 20 ms typical

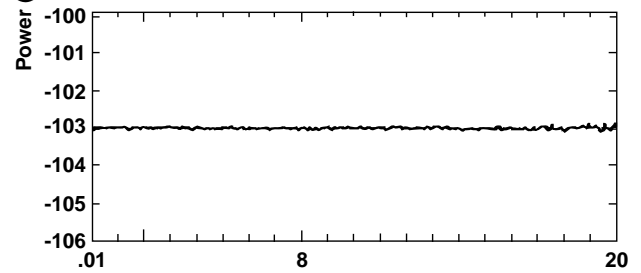
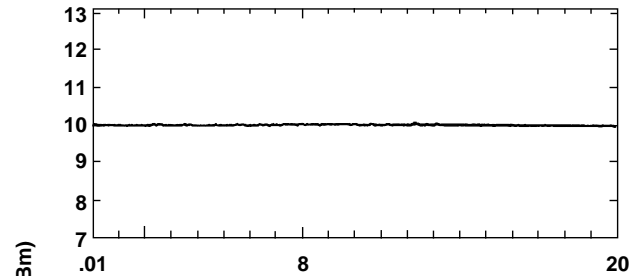
ACCURACY AND FLATNESS

Step Sweep and CW Modes

Attenuation Below Max Power	Frequency (GHz)					
	0.01-0.05	0.05-20	20-40	40-50	50-60	60-65
Accuracy:						
0-25 dB [Ⓜ]	± 2.0 dB	± 1.0 dB	± 1.0 dB	± 1.5 dB	± 1.5 dB	± 1.5 dB
25-60 dB	± 2.0 dB	± 1.0 dB	± 1.0 dB	± 1.5 dB	± 3.5 dB [Ⓜ]	N/A
> 60 dB	± 2.0 dB	± 1.0 dB	± 1.0 dB	± 2.5 dB [Ⓜ]	± 3.5 dB [Ⓜ]	N/A
Flatness:						
0-25 dB [Ⓜ]	± 2.0 dB	± 0.8 dB	± 0.8 dB	± 1.1 dB	± 1.1 dB	± 1.1 dB
25-60 dB	± 2.0 dB	± 0.8 dB	± 0.8 dB	± 1.1 dB	± 3.1 dB [Ⓜ]	N/A
> 60 dB	± 2.0 dB	± 0.8 dB	± 0.8 dB	± 2.1 dB [Ⓜ]	± 3.1 dB [Ⓜ]	N/A

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
0-30 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	± 1.0 dB	± 2.0 dB	± 2.5 dB
0-30 dB	± 3.5 dB	± 3.0 dB	± 4.1 dB	± 5.1 dB
30-60 dB	± 4.0 dB	± 3.5 dB	± 4.6 dB	± 5.6 dB
60-122 dB	± 5.0 dB	± 4.0 dB	± 5.2 dB	± 6.2 dB



Typical output level accuracy and flatness at +10 dBm and -103 dBm.

OTHER OUTPUT POWER SPECIFICATIONS

Output Power Resolution: 0.01 dB

Source Impedance: 50 Ω nominal.

Source SWR (Internal Leveling):

- Without Attenuator:**
 - < 1.7 at < 2 GHz typical
 - < 1.6 at 2 to 20 GHz typical
 - < 2.0 at > 20 GHz typical
- With Attenuator:** < 2.0 typical

Power Level Stability with Temperature:

0.04 dB/°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.

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

[Ⓜ] Typical

[Ⓜ] 0 to 25 dB or to minimum rated power, whichever is higher.

External Leveling:

External Detector: Levels output power at a remote detector location. Accepts a positive or negative 0.5 mV to 500 mV input from the remote detector. EXT ALC ADJUST 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 $\pm 1V$ full scale signal from the remote power meter. EXT ALC ADJUST adjusts the input signal range to an optimum value. BNC connector, front and 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

Accuracy: Same as CW power accuracy.

Step Size: User-controlled, 0.01 dB 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 METER

(Option 8 on 69200A and 69300A only)[®]

Range: +16 dBm to -35 dBm. Compatible with Wiltron 560-7, 5400-71, or 6400-71 Series Detectors. Rear panel input.

Accuracy:

± 1 dB (+10 dBm to -10 dBm)
 ± 2 dB (-10 dBm to -35 dBm)

Resolution: 0.1 dB minimum

69100A MODULATION

AMPLITUDE MODULATION

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.

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: $\pm 5\%$

Distortion: $< 5\%$ typical

Incidental Phase Modulation

(30% depth, 10 kHz rate): < 0.2 radians

External AM Input: Log AM or Linear AM input, front or rear-panel BNC, 50 Ω or 600 Ω input impedance. All options selectable from modulation menu.

AM 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: $\pm 1V$

FREQUENCY MODULATION

Maximum FM Deviation:

Locked Mode (1 kHz to 500 kHz rates): The lesser of ± 10 MHz or rate $\times 300$

Unlocked Narrow Mode: (DC to 500 kHz rates): ± 10 MHz

Unlocked Wide Mode (DC to 100 Hz rates): ± 100 MHz

FM Bandwidth (3 dB):

Locked Mode: 1 kHz to 500 kHz

Unlocked Narrow Mode: DC to 500 kHz

Unlocked Wide Mode: DC to 100 Hz

Flatness locked mode (10 kHz to 500 kHz rates): ± 1 dB

Accuracy (100 kHz rate, $\pm 1 V$ input): 10% (5% typical)

External FM Input: Front or rear panel BNC, 50 Ω or 600 Ω input impedance. All options selectable from modulation menu.

FM Sensitivity: Continuously variable from ± 10 kHz per volt to ± 20 MHz per volt (locked and unlocked narrow FM modes), or ± 100 kHz per volt to ± 100 MHz per volt (unlocked wide FM mode), selectable from modulation menu. For 691x5B units maximum sensitivity is divided by 2 from 1 to 2.2 GHz and is divided by 4 from 500 MHz to 1 GHz.

Maximum Input: $\pm 1V$

[®] When Option 8 Power Meter is installed, Option 7 (Delete AM/FM Generators) is not available.

SQUARE WAVE MODULATION

The RF output can be pulse modulated via an external modulating signal or an internal square wave generator.

On/Off Ratio: > 50 dB

Rise/Fall Time: < 1 μ s typical

Internal Square Wave Generator: Four square wave signals (400 Hz, 1 kHz, 7.8125 kHz, and 27.8 kHz), selectable from modulation menu.

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

Square Wave Symmetry: 50% \pm 5% at all power levels

External Input: Front or rear-panel BNC, selectable from modulation menu.

Drive Level: TTL compatible input

Minimum Pulse Width: > 5 μ s

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

69200A and 69300A MODULATION

AMPLITUDE MODULATION

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.

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): \pm 0.3 dB

Accuracy: \pm 5%

Distortion: < 5% typical

Incidental Phase Modulation

(30% depth, 10 kHz rate): < 0.2 radians

External AM Input: Log AM or Linear AM input, front or rear-panel BNC, 50 Ω or 600 Ω input impedance. All options selectable from modulation menu.

AM 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: \pm 1V

INTERNAL AM GENERATOR

Waveforms:

Sinusoid, squarewave, triangle, positive ramp, negative ramp, Gaussian noise, uniform noise, user-defined[®]

Rate:

0.1 Hz to 1 MHz sinusoidal

0.1 Hz to 100 kHz squarewave, triangle, ramps

Resolution: 0.1 Hz

Accuracy: Same as instrument timebase

Output: BNC connector, rear panel

FREQUENCY MODULATION

Maximum FM Deviation:

Locked Mode (1 kHz to 8 MHz rates): The lesser of \pm 10 MHz or rate x 300

Locked Low Noise Mode (50 kHz to 8 MHz rates):

The lesser of \pm 10 MHz or rate x 3

Unlocked Narrow Mode (DC to 8 MHz rates): \pm 10 MHz

Unlocked Wide Mode (DC to 100 Hz rates): \pm 100 MHz
For 692x5A and 693x5A units, maximum deviation is divided by 2 from 1 to 2.2 GHz and is divided by 4 from 500 MHz to 1 GHz.

FM Bandwidth (3 dB):

Locked Mode: 1 kHz to 10 MHz

Locked Low Noise Mode: 30 kHz to 10 MHz

Unlocked Narrow Mode: DC to 10 MHz

Unlocked Wide Mode: DC to 100 Hz

Flatness (locked mode 10 kHz to 1 MHz rates):[®] \pm 1 dB

Accuracy (100 kHz rate):[®] 10% (5% typical)

Incidental AM (\pm 1 MHz deviation, 1 MHz rate): < 2%

Harmonic Distortion (\pm 1 MHz deviation, 10 kHz rate): < 1%

External FM Input: Front or rear panel BNC, 50 Ω or 600 Ω input impedance. All options selectable from modulation menu.

FM Sensitivity: Continuously variable from \pm 10 kHz per volt to \pm 20 MHz per volt (locked, locked low noise and unlocked narrow modes), or \pm 100 kHz per volt to \pm 100 MHz per volt (unlocked wide mode), selectable from modulation menu. For 692x5A and 693x5A units, maximum sensitivity is divided by 2 from 1 to 2.2 GHz and is divided by 4 from 500 MHz to 1 GHz.

Maximum Input: \pm 1V

INTERNAL FM GENERATOR

Waveforms:

Sinusoid, squarewave, triangle, positive ramp, negative ramp, Gaussian noise, uniform noise, user-defined[®]

Rate:

0.1 Hz to 1 MHz sinusoidal

0.1 Hz to 100 kHz squarewave, triangle, ramps

Resolution: 0.1 Hz

Accuracy: Same as instrument timebase

Output: BNC connector, rear panel

PHASE MODULATION (Φ M, OPTION 6)

Φ M Deviation:

Narrow Mode (DC to 8 MHz Rates): The lesser of \pm 3 radians or \pm 5 MHz/rate

Wide Mode (DC to 1 MHz Rates): The lesser of \pm 400 radians or \pm 10 MHz/rate. For 6xxx5 units, maximum deviation is divided by 2 from > 1.0 to \leq 2.2 GHz and is divided by 4 from \geq 0.5 to \leq 1.0 GHz.

Φ M Bandwidth (3 dB, relative to 100 kHz rate):

Narrow Mode: DC to 10 MHz

Wide Mode: DC to 1 MHz

Φ M Flatness (relative to 100 kHz rate):

Narrow Mode (DC to 1 MHz rates): \pm 1 dB

Wide Mode (DC to 500 kHz rates): \pm 1 dB

Φ M Accuracy (at 100 kHz sine wave): 10%[®]

[®] User-defined waveforms are available with Option 10, Complex Modulation Capability.

[®] For external input, accuracy applies at \pm 1 V input

External Φ M:

External Φ M Input: Front or rear panel BNC (shares the FM input), 50 Ω or 600 Ω input impedance. All options selectable from modulation menu. Shares connectors with FM.

Φ M Sensitivity: Continuously variable from ± 0.0025 radians per volt to ± 5.0 radians per volt (Narrow Φ M mode) or ± 0.25 radians per volt to ± 500.0 radians per volt (Wide Φ M mode), selectable from modulation menu. For 6xxx5 units, maximum sensitivity is divided by 2 from > 1.0 to ≤ 2.2 GHz and is divided by 4 from ≥ 0.5 to < 1.0 GHz.

External Φ M Maximum Input: ± 1 V

**INTERNAL Φ M GENERATOR
(Shares the Internal FM Generator)**

Waveforms: Sine, square, triangle, positive ramp, negative ramp, Gaussian noise, uniform noise, user defined[Ⓞ].

Rate:

0.1 Hz to 1 MHz for sine wave

0.1 Hz to 100 kHz for other waveforms

Resolution: 0.1 Hz

Accuracy: Same as instrument timebase.

Output: BNC connector, rear panel

PULSE MODULATION

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

On/Off Ratio: > 80 dB

Rise/Fall Time (10 to 90%): < 10 ns (< 5 ns typical)[Ⓞ]

Minimum Leveled Pulse Width:

100 ns, ≥ 2 GHz

1 μ s, < 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 μ s pulse width

± 1.0 dB, < 1 μ s pulse width

Video Feedthrough: $< \pm 10$ mV, ≥ 2 GHz

Pulse Width Compression: < 8 ns typical

Pulse Delay (typical):

Mode	Pulse Delay (ns)
External	50
Triggered	100
Triggered with Delay	200

PRF Range: DC to 10 MHz unleveled

100 Hz to 5 MHz leveled

External Input: Front or rear-panel BNC, selectable from modulation menu.

Drive Level: TTL compatible input

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

INTERNAL PULSE GENERATOR

Parameter	Selectable Clock Rate	
	40 MHz	10 MHz
Pulse Width	25 ns to 419 ms	100 ns to 1.6 s
Pulse Period [Ⓞ]	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

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

Accuracy: 10 ns (5 ns typical)

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

SCAN MODULATOR (Option 20)[Ⓞ]

Frequency Range: 1 to 20 GHz

Attenuation Range

(Maximum attenuation \pm flatness): 0 to 60 dB

Flatness: ± 2 dB, 0 to 40 dB

± 3.5 dB, 40 to 60 dB

Step Response: < 1 μ s

Sensitivity: -10 dB/V

Insertion Loss (when engaged): < 6 dB, 1 to 18 GHz

< 8 dB, 18 to 20 GHz

Input: Rear-panel BNC (f) connector

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

[Ⓞ] User-defined waveforms are available with Option 10, Complex Modulation Capability.

[Ⓞ] For 69xx5A units, Rise/Fall time below 1 GHz is < 15 ns.

[Ⓞ] For 60 and 65 GHz units, overshoot from 40 to 65 GHz is 20% typical at rated power.

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

[Ⓞ] Option 20, SCAN Modulator is available on models 69237A, 69245A, 69247A, 69337A, 69345A and 69347A only. When Option 20 SCAN Modulator is installed. Option 7 (Delete AM/FM Generators) is not available.

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 WILTRON Models 6600, 6700, and 6XX00-series signal sources. When emulating another signal source, the instrument is limited to the capabilities, mnemonics, and parameter resolutions of the emulated instrument.

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 nine 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.

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

Parameter Entry: Instrument parameters can be entered in three ways—keypad, rotary data knob, or the \wedge and \vee 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 \wedge and \vee 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 unit key (GHz/Sec/dBm, MHz/ms/dB, kHz/ μ s/STEPS, or Hz/ns/ADRS). Edits are terminated by exiting the edit menu.

Reset: Returns 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 68XXB or 69XXA output signals to be swept with a user-selected frequency offset. One 69X00A unit controls the other via AUX I/O and SERIAL I/O connections. Requires 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 ML4803A and HP 437B, 438A, and 70100A. Five user tables are available at up to 801 points/table.

Warm Up Time (Standard Time Base):

From Standby: 30 minutes

From Cold Start (0°C): 120 hours to achieve $< 2 \times 10^{-8}$ per day frequency stability.

Warm Up Time (Option 16 Time Base):

From Standby: 30 minutes

From Cold Start (0°C): 72 hours to achieve $< 5 \times 10^{-10}$ per day frequency stability.

Power:

90–132 Vac or 180–264 Vac, 49–440 Hz, 400 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: 23 kg (50 lb) maximum

Dimensions:

133 H x 429 W x 597 D mm (5.25 H x 16.875 W x 23.5 D in)

RF Output Connector:

Type K female, \leq 40 GHz models

Type V female, $>$ 40 GHz models

ENVIRONMENTAL

Storage Temperature Range: -40°C to $+75^{\circ}\text{C}$

Operating Temperature Range: 0°C to $+50^{\circ}\text{C}$

Relative Humidity: 5% to 95% at 40°C

Altitude: 4,600 meters (15,000 ft), 17.3" Hg.

CE Marking: The 69XXXA family meets the European Community Standards for CE marking.

EMI: Meets the emission and immunity requirements of EN55011:1991/CISPR-11:1990 Group 1 Class A
EN50082:1992/

IEC 801-2:1992 – 4 kV CD, 8 kV AD

IEC 1000-4-3:1995 – 3 V/m


IEC 801-4:1988 – 0.5 kV SL, 1 kV PL

IEC 1000-4-5:1995 – 0.5 kV – 1 kV LN

0.5 kV – 1 kV NG

0.5 kV – 1 kV GL


MIL-STD-461C Part 2 REO1, REO2, CEO1, CEO3,
CSO1, CSO2, CSO6, RSO3.

Input/Output Connectors			
Nomenclature	Type	Location	Applicable Models
AM IN	BNC	Front & Rear Panel	69100A, 69200A & 69300A
FM IN	BNC	Front & Rear Panel	69100A, 69200A & 69300A
 IN	BNC	Front & Rear Panel	69100A
PULSE TRIG IN	BNC	Front & Rear Panel	69200A & 69300A
EXT ALC IN	BNC	Front & Rear Panel	69000A, 69100A, 69200A & 69300A
RF OUTPUT	K-Connector V-Connector	Standard-Front Panel Option 9-Rear Panel	69000A, 69100A, 69200A & 69300A
10 MHz REF IN	BNC	Rear Panel	69000A, 69100A, 69200A & 69300A
10 MHz REF OUT	BNC	Rear Panel	69000A, 69100A, 69200A & 69300A
HORIZ OUT	BNC	Rear Panel	69000A, 69100A, 69200A & 69300A
MARKER OUT	BNC	Rear Panel	69100A
PEN LIFT OUT	BNC	Rear Panel	69100A
RETRACE BLANK OUT	BNC	Rear Panel	69100A
SEQ SYNC OUT	BNC	Rear Panel	69000A, 69100A, 69200A & 69300A
AM OUT	BNC	Rear Panel	69200A & 69300A
FM OUT	BNC	Rear Panel	69200A & 69300A
PULSE VIDEO OUT	BNC	Rear Panel	69200A & 69300A
PULSE SYNC OUT	BNC	Rear Panel	69200A & 69300A
V/GHz OUT	BNC	Rear Panel	69000A, 69100A, 69200A & 69300A
DWELL IN	BNC	Rear Panel	69000A, 69100A, 69200A & 69300A
AUX I/O	25-pin D-type	Rear Panel	69000A, 69100A, 69200A & 69300A
SERIAL I/O	RJ45	Rear Panel	69000A, 69100A, 69200A & 69300A
IEEE-488 GPIB	Type 57	Rear Panel	69000A, 69100A, 69200A & 69300A

INPUTS and OUTPUTS

AM IN: Accepts an external signal to amplitude modulate the RF output signal. Front or rear-panel input, 50 Ω or 600 Ω impedance, both selectable from front-panel modulation menu.

FM IN: Accepts an external signal to frequency modulate the RF output signal. Front or rear-panel input, 50 Ω or 600 Ω impedance, both selectable from front-panel modulation menu.

 **IN:** Accepts an external TTL compatible signal to pulse modulate the RF output signal. Front or rear-panel input, selectable from front-panel modulation menu.

PULSE TRIG IN: Accepts an external TTL compatible signal to pulse modulate the RF output signal or trigger or gate the internal pulse generator. Front or rear-panel input, selectable from front-panel modulation menu.

EXT ALC IN (External ALC Input): Provides for leveling the RF output signal externally with either a detector or power meter.

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

10 MHz REF IN: Accepts an external 10 MHz \pm 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 0.5V p-p, AC coupled, 10 MHz signal derived from the internal frequency standard. 50 Ω impedance.

HORIZ OUT (Horizontal Sweep Output): Provides 0V at the 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.

MARKER OUT: Provides a +5V or –5V signal at each frequency marker in a sweep. Signal polarity selectable from system menu.

PEN LIFT OUT: Provides normally-open or normally-closed relay contacts, selectable from system menu, during bandswitch points and retrace.

RETRACE BLANK OUT: Provides a +5V or –5V signal coincident with sweep retrace. Signal polarity selectable from system menu.

SEQ SYNC OUT (Sequential Sync Output): Provides a +5V signal during retrace, at bandswitching points, and during each frequency step in step sweep mode, –5V during markers, and –10V during the selected marker.

AM OUT: Provides video modulating signal from internal AM generator.

FM OUT: Provides video modulating signal from internal FM generator.

PULSE VIDEO OUT: Provides video modulating signal from internal pulse generator or external pulse input.

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

V/GHz OUT: Provides a reference voltage relative to the RF output frequency (refer to the table below).

Model Number	V/GHz Output
69x37A, 69x45A, & 69x47A	1.0V/GHz
69x53A, 69x55A, & 69x59A	0.5V/GHz
69x63A, 69x65A, & 69x69A	0.5V/GHz
69x75A & 69x77A	0.25V/GHz
69x85A & 69x87A	0.25V/GHz
69x95A & 69x97A	0.25V/GHz

DWELL IN: Accepts an external TTL low-level signal to pause the sweep in both analog and step sweep modes. The sweep resumes when the signal is removed.

AUX I/O (Auxiliary Input/Output): Provides for most of the front and rear panel BNC connections through a single, 25-pin, D-type connector. Supports master-slave operation with another 68XXXB or 69XXXA synthesizer or allows for a single-cable interface with the Model 562 Scalar Network Analyzer and other WILTRON instruments.

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

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

Millimeter Wave Multipliers

54000-4WRxx and 54000-5WRxx multipliers provide 50 to 110 GHz outputs when driven by a 68B or 69A synthesizer. 54000-4WRxx multipliers are self-contained with internal isolators for improved source match. 54000-5WRxx adds a reference coupler and detector for leveling the output via the synthesizer's external leveling circuitry. Integral filters provide excellent spurious performance. FM and Φ M are multiplied in multipliers. Pulse Modulation is preserved. AM is not available.

	54000-4WR15 54000-5WR15	54000-4WR10 54000-5WR10
Frequency	50-75 GHz	75-110 GHz
Waveguide	WR15	WR10
Flange	UG-387/U	UG-385/U
Source Match	< 1.7 typ.	< 1.7 typ.
Output Power	0.0 dBm (+4 dBm typ.)	–5 dBm (+1 dBm typ.)
Power Flatness, Unleveled	± 3.0 dB typ.	± 3.0 dB typ.
Power Flatness, Leveled (54000-5WRxx)	± 1.0 dB typ.	± 1.0 dB typ.
Power Leveling Range (54000-5WRxx)	10 dB typ.	10 dB typ.
Required Input Frequency	12.75 to 18.75 GHz	12.75 to 18.34 GHz
Multiplication Factor	x4	x6
Frequency Accuracy	Synthesizer Accuracy x4	Synthesizer Accuracy x6
Frequency Resolution	Synthesizer Resolution x4	Synthesizer Resolution x6
Filters		
FL1	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, with FL1	–50 dBc –20 dBc typical	–50 dBc –20 dBc typical

Ordering Information

MODELS

69037A, Synthesized CW Generator, 2 to 20 GHz
69045A, Synthesized CW Generator, 0.5 to 20 GHz
69047A, Synthesized CW Generator, 0.01 to 20 GHz
69053A, Synthesized CW Generator, 2 to 26.5 GHz
69055A, Synthesized CW Generator, 0.5 to 26.5 GHz
69059A, Synthesized CW Generator, 0.01 to 26.5 GHz
69063A, Synthesized CW Generator, 2 to 40 GHz
69065A, Synthesized CW Generator, 0.5 to 40 GHz
69069A, Synthesized CW Generator, 0.01 to 40 GHz
69075A, Synthesized CW Generator, 0.5 to 50 GHz
69077A, Synthesized CW Generator, 0.01 to 50 GHz
69085A, Synthesized CW Generator, 0.5 to 60 GHz
69087A, Synthesized CW Generator, 0.01 to 60 GHz
69095A, Synthesized CW Generator, 0.5 to 65 GHz
69097A, Synthesized CW Generator, 0.01 to 65 GHz

69137A, Synthesized Sweep Generator, 2 to 20 GHz
69145A, Synthesized Sweep Generator, 0.5 to 20 GHz
69147A, Synthesized Sweep Generator, 0.01 to 20 GHz
69153A, Synthesized Sweep Generator, 2 to 26.5 GHz
69155A, Synthesized Sweep Generator, 0.5 to 26.5 GHz
69159A, Synthesized Sweep Generator, 0.01 to 26.5 GHz
69163A, Synthesized Sweep Generator, 2 to 40 GHz
69165A, Synthesized Sweep Generator, 0.5 to 40 GHz
69169A, Synthesized Sweep Generator, 0.01 to 40 GHz
69175A, Synthesized Sweep Generator, 0.5 to 50 GHz
69177A, Synthesized Sweep Generator, 0.01 to 50 GHz
69185A, Synthesized Sweep Generator, 0.5 to 60 GHz
69187A, Synthesized Sweep Generator, 0.01 to 60 GHz
69195A, Synthesized Sweep Generator, 0.5 to 65 GHz
69197A, Synthesized Sweep Generator, 0.01 to 65 GHz

69237A, Synthesized Signal Generator, 2 to 20 GHz
69245A, Synthesized Signal Generator, 0.5 to 20 GHz
69247A, Synthesized Signal Generator, 0.01 to 20 GHz
69253A, Synthesized Signal Generator, 2 to 26.5 GHz
69255A, Synthesized Signal Generator, 0.5 to 26.5 GHz
69259A, Synthesized Signal Generator, 0.01 to 26.5 GHz
69263A, Synthesized Signal Generator, 2 to 40 GHz
69265A, Synthesized Signal Generator, 0.5 to 40 GHz
69269A, Synthesized Signal Generator, 0.01 to 40 GHz
69275A, Synthesized Signal Generator, 0.5 to 50 GHz
69277A, Synthesized Signal Generator, 0.01 to 50 GHz
69285A, Synthesized Signal Generator, 0.5 to 60 GHz
69287A, Synthesized Signal Generator, 0.01 to 60 GHz
69295A, Synthesized Signal Generator, 0.5 to 65 GHz
69297A, Synthesized Signal Generator, 0.01 to 65 GHz

69337A, Synthesized Sweep/Signal Generator, 2 to 20 GHz
69345A, Synthesized Sweep/Signal Generator, 0.5 to 20 GHz
69347A, Synthesized Sweep/Signal Generator, 0.01 to 20 GHz
69353A, Synthesized Sweep/Signal Generator, 2 to 26.5 GHz
69355A, Synthesized Sweep/Signal Generator, 0.5 to 26.5 GHz
69359A, Synthesized Sweep/Signal Generator, 0.01 to 26.5 GHz
69363A, Synthesized Sweep/Signal Generator, 2 to 40 GHz
69365A, Synthesized Sweep/Signal Generator, 0.5 to 40 GHz
69369A, Synthesized Sweep/Signal Generator, 0.01 to 40 GHz
69375A, Synthesized Sweep/Signal Generator, 0.5 to 50 GHz
69377A, Synthesized Sweep/Signal Generator, 0.01 to 50 GHz
69385A, Synthesized Sweep/Signal Generator, 0.5 to 60 GHz
69387A, Synthesized Sweep/Signal Generator, 0.01 to 60 GHz
69395A, Synthesized Sweep/Signal Generator, 0.5 to 65 GHz
69397A, Synthesized Sweep/Signal Generator, 0.01 to 65 GHz

OPTIONS

Option 1, Rack Mounting: Rack mount kit containing a set of track slides (90° tilt capability), mounting ears, and front panel handles to let the instrument be mounted in a standard 19-inch equipment rack.

Option 2A, 110 dB Step Attenuator: Adds a 10 dB/step attenuator with 110 dB range for models having a high-end frequency of ≤ 26.5 GHz. Rated RF output power is reduced.

Option 2B, 110 dB Step Attenuator: Adds a 10 dB/step attenuator with 110 dB range for models having a high-end frequency of ≤ 40 GHz. Rated RF output power is reduced.

Option 2C, 90 dB Step Attenuator: Adds a 10 dB/step attenuator with 90 dB range for models having a high-end frequency of ≤ 50 GHz. Rated RF output power is reduced.

Option 2D, 90 dB Step Attenuator: Adds a 10 dB/step attenuator with 90 dB range for models having a high-end frequency of ≤ 60 GHz. Rated RF output power is reduced.

Option 6, Phase Modulation Φ M (69200A and 69300A): Provides phase modulation capability. FM input, FM output and FM generator become FM/ Φ M input, FM/ Φ M output and FM/ Φ M generator. (Not available in combination with Option 7.)

Option 7, Delete AM/FM Generators (69200A and 69300A): Deletes the internal AM and FM generators. External AM and FM capability remains unchanged. (Not available in combination with Option 6, Option 8, Option 10 or Option 20.)

Option 8, Internal Power Meter (69200A and 69300A): Adds an internal power meter that is compatible with Wiltron 560-7, 5400-71 or 6400-71 series detectors. (Not available in combination with Option 7.)

Option 9, Rear Panel RF Output: Moves RF output connector to the rear panel.

Option 10, Complex Modulation Capability (69200A and 69300A): Provides user-defined waveform capability for complex modulation. Requires controller (not included). Includes cable and Windows® based software. (Not available in combination with Option 7.)

Option 11, 0.1 Hz Frequency Resolution: Provides frequency resolution of 0.1 Hz.

Option 14, WILTRON 360B VNA Compatibility: Modifies rack mounting hardware to mate unit in a Wiltron 360B VNA console.

Option 15A, High Power Output (69000A and 69100A): Adds high power RF components to the instrument in the 2–26.5 GHz frequency range. Option 15A is standard in the > 40 GHz units.

Option 15B, High Power Output (69200A and 69300A): Adds high-power RF components to the instrument in the 2–26.5 GHz frequency range. Option 15B is standard in the > 40 GHz units.

Option 16, High Stability Time Base: Adds an ovenized, 10 MHz crystal oscillator as a high-stability time base.

Option 17A, Delete Front Panel (69100A, 69200A, 69300A): Deletes the front panel for use in remote control applications where a front panel display and keyboard control are not needed.

Option 17B, Delete Front Panel (69000A): Deletes the front panel for use in remote control applications where a front panel display and keyboard control are not needed.

Option 18, mmWave Bias Output: Adds rear panel bias output to drive 54000-xWRxx millimeter wave source modules. BNC Twinax connector. (Not available in combination with Option 20.)

Option 19, SCPI Programmability: Adds GPIB command mnemonics complying with Standard Commands for Programmable Instruments (SCPI), Version 1993.0. SCPI programming complies with IEEE 488.2–1987.

Option 20, SCAN Modulator: Adds an internal SCAN modulator for simulating high-depth amplitude modulated signals in models 69237A, 69245A, 69247A, 69337A, 69345A, and 69347A only. Requires an external modulating signal input. (Not available in combination with Option 7 or Option 18.)

ACCESSORIES

34RKNF50	DC to 20 GHz, Ruggedized K-to-Type N female adapter.
34VKF50	DC to 46 GHz, V male-to-K female Precision Adapter.
34RVNF50	DC to 20 GHz, Ruggedized V-to-Type N female adapter.
ND36329	MASTER/SLAVE interface cable set.
761-69	Protective front panel cover.
760-177	Transit case.
2300-16	69100A/68100B/68100A Instrument Driver for National Instruments LabWindows® Ver. 2.2
2300-19	69200A/69300A/68200B/68300B Instrument Driver for National Instruments LabWindows® Ver. 2.2
2300-20	69000A/68000B Instrument Driver for National Instruments LabWindows® Ver. 2.2
2300-213	69000A/68000B Instrument Driver for National Instruments LabVIEW®
2300-214	69100A/68100B Instrument Driver for National Instruments LabVIEW®
2300-215	69200A/68200B Instrument Driver for National Instruments LabVIEW®
2300-216	69300A/68300B Instrument Driver for National Instruments LabVIEW®

MILLIMETER WAVE ACCESSORIES

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 to 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), 6 inches long, connects synthesizer's RF output to multiplier's RF input (also requires 34RKNF50 or 34RVNF50 Adapter).

UPGRADES

Economical upgrades are available to upgrade any model to any higher performing model or to upgrade 68B synthesizers to 69A synthesizers. Consult Anritsu Wiltron for details.



El Toro Synthesizers Product Selection Table

	68000B ¹ CW Generator	69000A CW Generator	68100B ¹ Sweep Generator	69100A Sweep Generator	68200B ¹ Signal Generator	69200A Signal Generator	68300B ¹ Sweep/Signal Generator	69300A Sweep/Signal Generator
Ultra Low Φ Noise		■		■		■		■
Step Sweep	■	■	■	■	■	■	■	■
Analog Sweep			■	■			■	■
Power Sweep	■	■	■	■	■	■	■	■
Alternate Sweep	■	■	■	■	■	■	■	■
Master/Slave	■	■	■	■	■	■	■	■
AM			Ext	Ext	Int/Ext	Int/Ext	Int/Ext	Int/Ext
FM			Ext	Ext	Int/Ext	Int/Ext	Int/Ext	Int/Ext
Φ M					Option 6	Option 6	Option 6	Option 6
Pulse Modulation			Ext	Ext	Int/Ext	Int/Ext	Int/Ext	Int/Ext
AM Scan (1-20 GHz)					Option 20	Option 20	Option 20	Option 20
Internal Power Meter					Option 8	Option 8	Option 8	Option 8
360B SS Mode			■	■	■	■	■	■



El Toro Synthesizers Model Summary

	68000B ¹ CW Generator	69000A CW Generator	68100B ¹ Sweep Generator	69100A Sweep Generator	68200B ¹ Signal Generator	69200A Signal Generator	68300B ¹ Sweep/Signal Generator	69300A Sweep/Signal Generator
2 to 20 GHz	68037B	69037A	68137B	69137A	68237B	69237A	68337B	69337A
0.5 to 20 GHz	68045B	69045A	68145B	69145A	68245B	69245A	68345B	69345A
0.01 to 20 GHz	68047B	69047A	68147B	69147A	68247B	69247A	68347B	69347A
2 to 26.5 GHz	68053B	69053A	68153B	69153A	68253B	69253A	68353B	69353A
0.5 to 26.5 GHz	68055B	69055A	68155B	69155A	68255B	69255A	68353B	69355A
0.01 to 26.5 GHz	68059B	69059A	68159B	69159A	68259B	69259A	68359B	69359A
2 to 40 GHz	68063B	69063A	68163B	69163A	68259B	69263A	68363B	69363A
0.5 to 40 GHz	68065B	69065A	68165B	69165A	68265B	69265A	68363B	69365A
0.01 to 40 GHz	68069B	69069A	68169B	69169A	68265B	69269A	68369B	69369A
0.5 to 50 GHz	68075B	69075A	68175B	69175A	68275B	69275A	68369B	69375A
0.01 to 50 GHz	68077B	69077A	68177B	69177A	68277B	69277A	68377B	69377A
0.5 to 60 GHz	68085B	69085A	68185B	69185A	68285B	69285A	68377B	69385A
0.01 to 60 GHz	68087B	69087A	68187B	69187A	68285B	69287A	68377B	69387A
0.5 to 65 GHz	68095B	69095A	68195B	69195A	68295B	69295A	68395B	69395A
0.01 to 65 GHz	68097B	69097A	68197B	69197A	68297B	69297A	68395B	69397A

¹ Complete performance specifications for Wiltron 68B synthesizers are available in the 68B Series Synthesizers Technical Data Sheet, Wiltron part number 11410-00170



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