METAF

Electronic Solutions – since 1993

Anritsu

Microwave/Millimeterwave Synthesizers

68C/69B Family

0.1 Hz to 110 GHz

The Smart Choice for Any Application

Linking the World

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 68C/69B series of synthesizers deliver the highest performance and the highest value available today. Match your application to one of these source types:

Anritsu Synthesized CW Generators

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 65 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

Anritsu Synthesized Signal Generators

All the features of the CW generators plus analog sweep and external modulation for network analysis and A.T.E. applications.

- Fast analog sweep
- External FM, locked or unlocked
- External AM, log or linear

High Performance Signal Generators

The ultimate in full-function signal generation. They provide all the features of the other families along with comprehensive, high-performance modulation for signal simulation applications. Additional features in these units include:

- Internal pulse generator with swept delay capability for moving target simulation
- Flexible pulse triggering including free-run, delayed, gated, and composite
- 0 to 90% AM, log or linear, over DC to 100 kHz rates
- Four FM modes for up to 10 MHz at 8 MHz rates or 100 MHz deviation at 100 Hz rates
- Optional phase modulation (ΦM) up to 400 radians at 1 MHz rates
- Internal AM, FM, and ΦM generators, each with 7 modulating waveforms
- Optional user-defined, downloaded complex modulation
- Optional AM SCAN modulator with 60 dB modulation depth

Function Keys

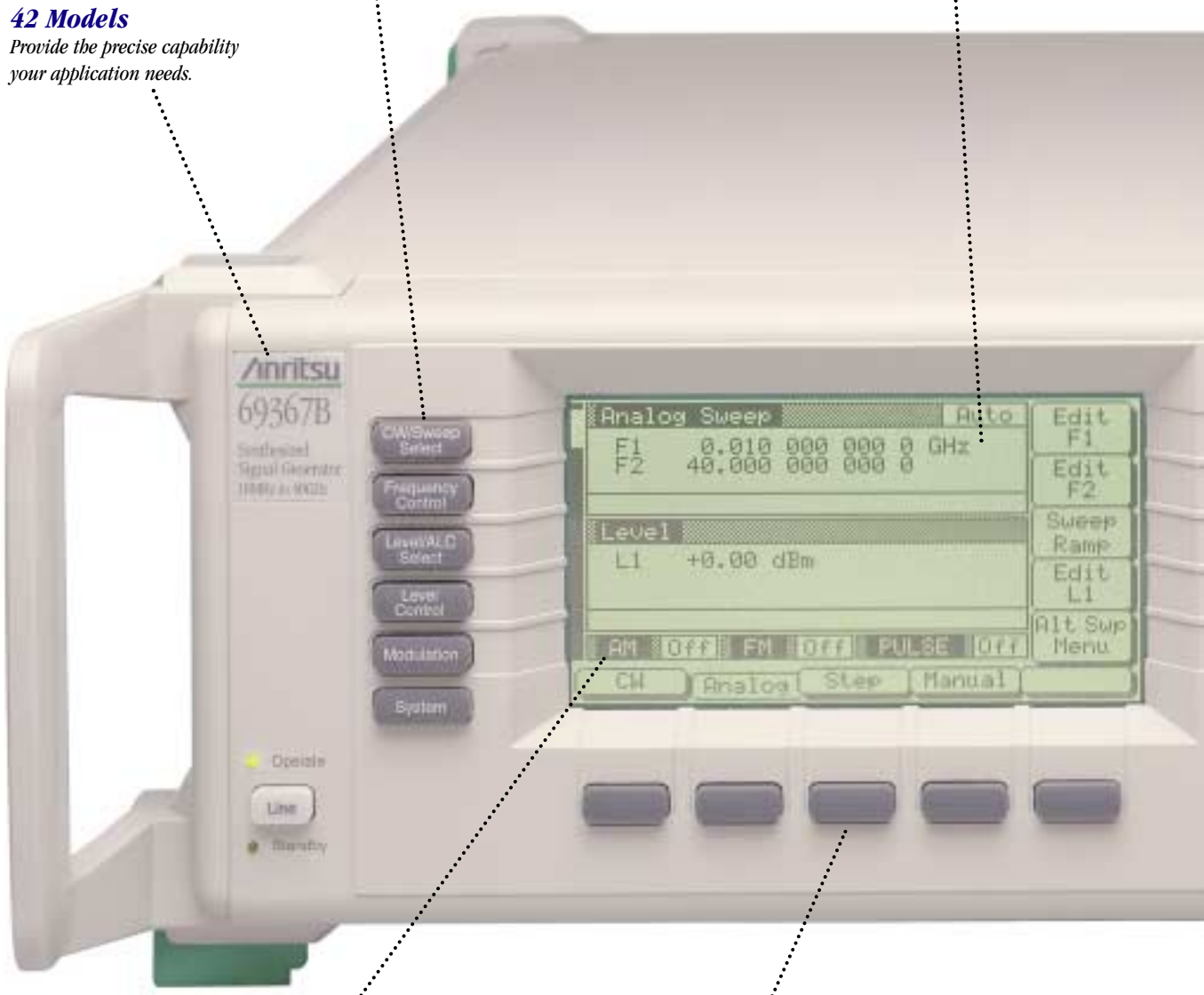
Group instrument functions for simple operation. Configure GPIB interface and input/output connectors. Initiate security mode and self-test diagnostics. Save and recall up to 10 front panel instrument states.

Easy to Read

Backlit LCD display presents instrument status and measurement setup menus.

42 Models

Provide the precise capability your application needs.



Comprehensive Modulation

for complex signal simulation. Internal modulation sources provide seven modulating waveforms plus user-defined modulation.

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.)

68xxxC AND 69xxxB

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

At 13.3 cm High
You get maximum performance in the minimum A.T.E. rack space.

Set Frequency from 0.1 Hz to 65 GHz in 0.1 Hz Steps.
Set power levels from +17 to -120 dBm in 0.01 dB steps.

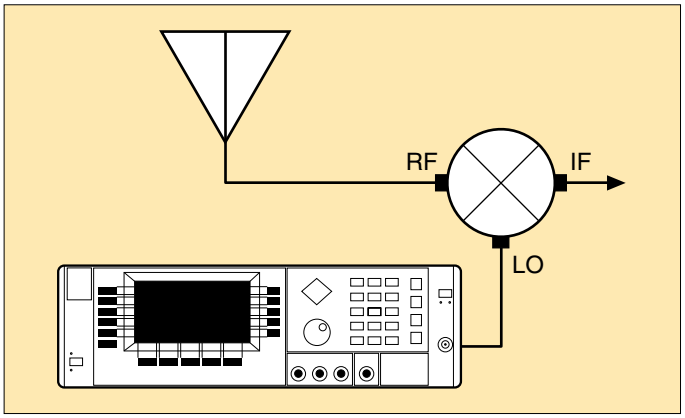
FAMILY SYNTHESIZERS

42 MODELS MATCH ANY REQUIREMENT

The 68C/69B's common, configurable platform allows Anritsu to configure a synthesizer that matches your requirements. Whether you need a basic synthesized CW generator for local oscillator use, or a full-featured configured 65 GHz signal generator with analog sweep and user-defined modulation, or anything in between. Anritsu has a synthesizer that matches your needs. Every model is easily upgraded to higher performance if your requirements change. You can't go wrong! Select the synthesizer that is right for your applications today. Economical upgrades ensure that your 68C/69B synthesizer will continue to satisfy your changing test requirements.

FROM THE BASIC

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 69017B 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.



TO THE ULTIMATE

Anritsu's 69397B synthesized signal generator provides the broadest frequency coverage and lowest phase noise today, 0.1 Hz to 65 GHz in a single instrument! If even 65 GHz is not sufficient, Anritsu millimeter wave source modules can extend your frequency range to 110 GHz with greater than 0 dBm output power. Of course, not everyone needs 65 GHz which is why we also offer models to 8.4, 20, 40, 50 and 60 GHz. And every model is upgradeable with our economical upgrades.

High output power, power sweep analog and digital frequency sweep, the most comprehensive internal modulation, the broadest frequency coverage and the lowest phase noise on the planet make the 69397B the signal source of choice in your most stringent applications.

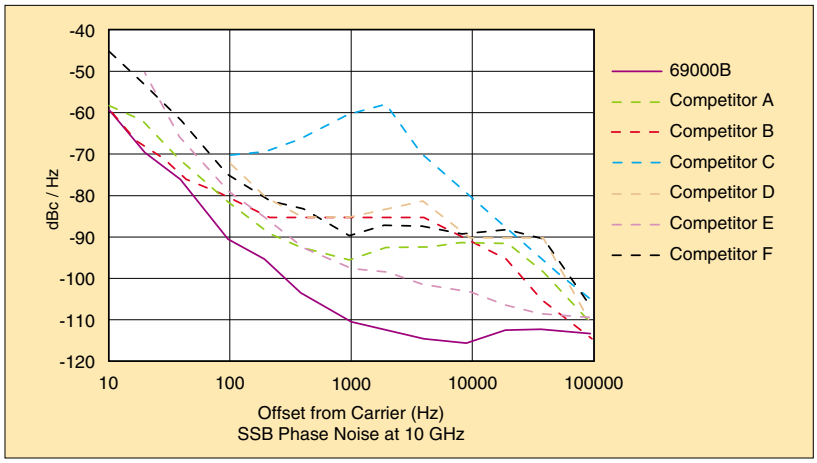
INTERCHANGEABLE VIRTUAL INSTRUMENTS STANDARD

INTERCHANGEABLE IVI™ VIRTUAL INSTRUMENTS

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 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 68C and 69B 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.

PERFORMANCE WITHOUT PEER



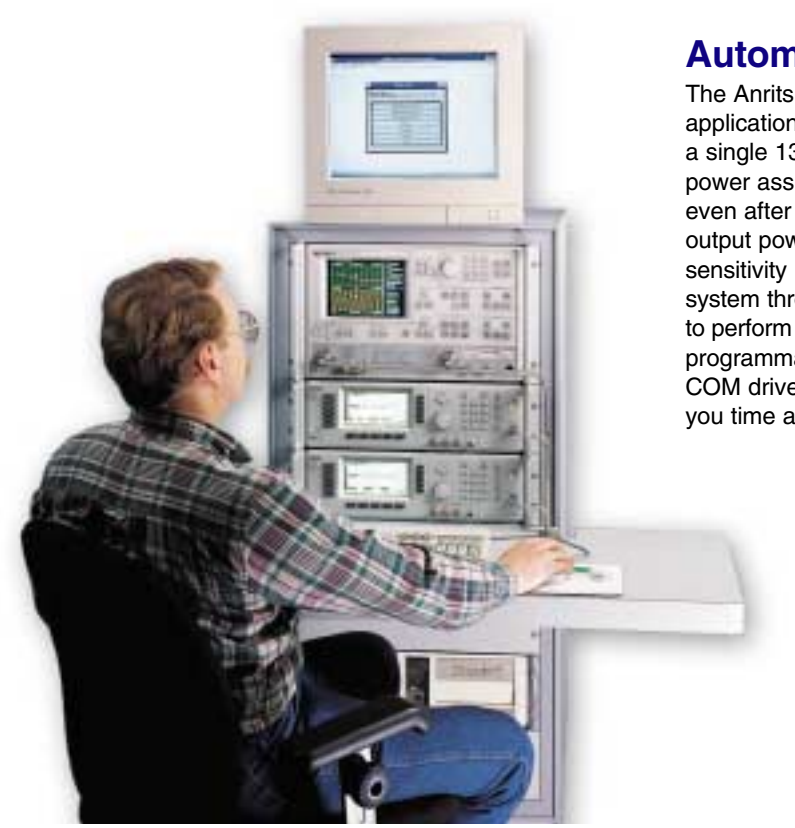
Anritsu's 69000B series utilize state-of-the-art technology to deliver extremely low SSB phase noise. These units are ideal as low-jitter clocks, references for LASER and other optical applications, and in high-bit-rate digital modulation systems where low phase noise is a critical specification.

One-box, Ultra-clean RF and Microwave Signal Solutions

The Anritsu "El Toro" synthesizers are now available with the new ultra-low phase noise Digital Downconverter. The new DDC offers ultra-low SSB phase noise in the 10 MHz to 2.2 GHz frequency range, where the highly congested communication bands require extra clean signals. The DDC phase noise performance is typically 30-50 dB better than other microwave synthesizers and comparable to the best RF synthesizers in the market.

The Digital Downconverter produces 10 MHz to 2.2 GHz signals by successive binary division of the synthesizer's microwave drive signal, so the DDC does not introduce non-harmonic spurious, which is a problem in mixer-based downconverters. Also, phase perturbations of the carrier are reduced with each successive frequency division, so phase noise decreases as the output frequency is decreased.

Now with the new DDC, Anritsu synthesizers are true one-box solutions for ultra-clean RF and microwave signal generation, offering outstanding performance in applications that previously required a separate RF synthesizer.



Automatic Test Equipment

The Anritsu 68C/69B series are your best choice for A.T.E. applications. They pack the highest performance available in a single 13.3 cm package to minimize 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. Fast 5 ms switching time maximizes system throughput. Internal list mode frees the A.T.E. controller to perform measurement analysis tasks. Optional SCPI programmability and free application drivers, including the IVI-COM driver and National Instruments LabView® drivers, save you time and money in code generation and maintenance.

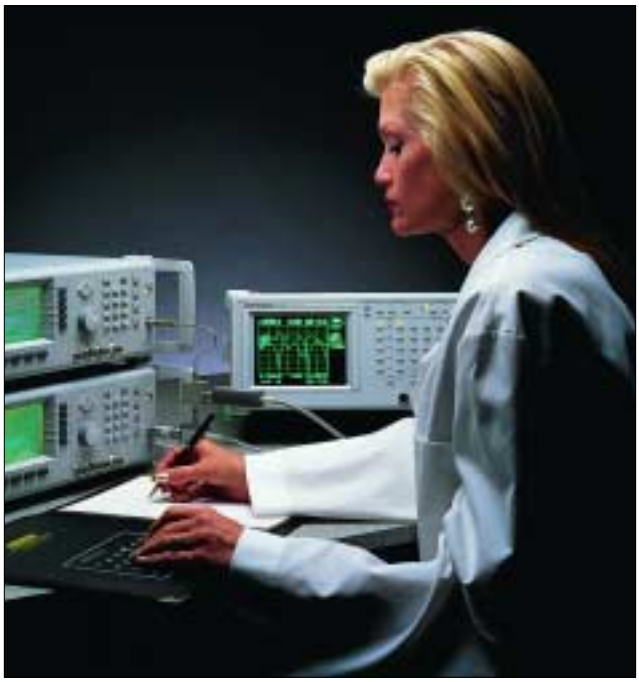
IN EVERY APPLICATION

Perfect for Component Test

The 68100C series are your ideal component test signal sources. Analyze key communications, electronic warfare and RADAR components at baseband, IF and carrier frequencies to 65 GHz. Analyze extremely high-Q components with the optional 0.1 Hz frequency resolution. Step sweep mode delivers synthesized frequency accuracy, or choose analog sweep for the fastest possible sweep times.

With <–60 dBc specified spurious levels, network analysis and power measurement errors are eliminated. Compression measurements are simple with the 0.01 dB resolution available in power sweep mode.

Sophisticated master/slave capability permits two synthesizers to sweep synchronously for mixer or frequency converter measurements. Up, down, harmonically related, and many other inter-dependent sweeps can be configured with the digitally-controlled master/slave capability.



Superior Signal Simulation Aids Receiver Testing

AM, FM, phase modulation, pulse modulation, scan modulation and user-defined modulation make the Anritsu 69300B series perfect for signal simulation.

Internal modulation generators offer 7 modulating waveforms plus optional user-defined modulation waveforms. Internal Gaussian and uniform noise capabilities provide controlled clock jitter for digital receiver testing.

Advanced internal pulse modulation generates single and multiple pulses, for the ultimate in radar blind spot and recovery time testing. In addition, Anritsu's unique pulse generator provides moving target simulation, radar and fading simulation.

User-defined modulation capability enables generation of custom modulated waveforms. Two internal arbitrary waveform generators simulate ASK, PSK, or FSK waveforms as well as antenna scan patterns, IFF patterns and TACAN waveforms without the need for external modulation sources.

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

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

Resolution: 1 kHz (0.1 Hz with Option 11)

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 Ω impedance.

10 MHz Reference Output: 0 dBm into 50 Ω, AC coupled, from rear panel BNC connector.

Switching Time (typical maximum):

Units with maximum frequency ≥20 GHz: <40 ms to be within 1 kHz of final frequency

Units with maximum frequency of 8.4 GHz: <15 ms to within 1 kHz of final frequency

Analog Sweep Mode

(681XXC, 683XXC, 691XXB and 693XXB only)

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

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.

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

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

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.)

Step Time:

Step Sweep: Variable from 1 ms/step to 99 seconds/step. Dwell time begins after phase lock.

Fixed Rate Step Sweep: Variable from 20 ms/step to 99 seconds/step. Dwell time includes phase lock time.

Switching Time (typical maximum):

Units having a high-end frequency of ≥20 GHz: <15 ms + 1 ms/GHz step size or <40 ms, whichever is less.

Units having a high-end frequency of 8.4 GHz: <7 ms

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.

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):

Units having a high-end frequency of ≥20 GHz: <25 ms to be within 1 kHz of final frequency.

Units having a high-end frequency of 8.4 GHz: <5 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 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.

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, List 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 68100C/300C and 69100B/300B pen lift will activate at sweep times ≥1 second.

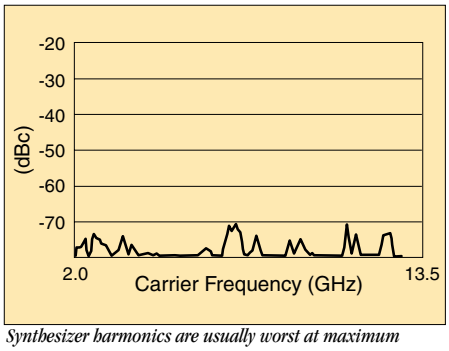
SPECTRAL PURITY

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 (dBc)

Frequency Range	Standard	with Option 15
≥0.1 Hz to <10 MHz (Option 22)	–30	–30
≥10 MHz to ≤100 MHz (Option 21)	–40	–40
>100 MHz to ≤2.2 GHz (Option 21)	–50	–50
≥10 MHz to ≤50 MHz	–30	–30
>50 MHz to ≤2 GHz	–40	–40
>2 GHz to ≤20 GHz	–60	–50
>20 GHz to ≤40 GHz	–40	–40
50 GHz Units >40 GHz to ≤50 MHz	–40	X
60 GHz Units >40 GHz to ≤60 MHz	–30	X
65 GHz Units >40 GHz to ≤65 MHz	–25	X



Synthesizer harmonics are usually worst at maximum output power. The excellent 68C/69B harmonic performance is demonstrated by this graph of a typical second harmonic level measured at maximum output power.

Non-harmonic (dBc)

Frequency Range	68xxxC	69xxxB
≥10 MHz to ≤2 GHz	–40	–40
>2 GHz to ≤65 GHz	–60	–60
≥10 MHz to ≤2.2 GHz (Option 21)	–60	–60
≥0.1 Hz to <10 MHz (Option 22)	–30	–30

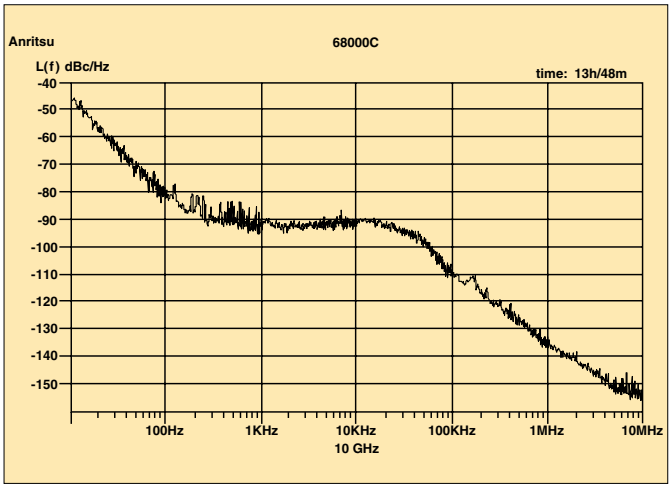
Single-Sideband Phase Noise 68xxxC (dBc/Hz)

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

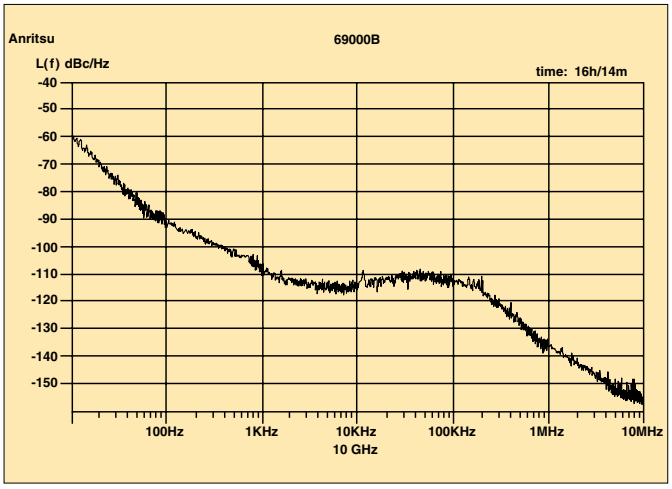
Single-Sideband Phase Noise 69xxxB (dBc/Hz)

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 21)	–101	–131	–140	–142	–141	–145
>15.625 MHz to ≤31.25 MHz (Option 21)	–95	–125	–135	–137	–137	–145
>31.25 MHz to ≤62.5 MHz (Option 21)	–89	–119	–134	–136	–136	–144
>62.5 MHz to ≤125 MHz (Option 21)	–83	–113	–133	–135	–133	–144
>125 MHz to ≤ 250 MHz (Option 21)	–77	–107	–130	–132	–130	–143
>250 MHz to ≤ 500 MHz (Option 21)	–71	–101	–125	–128	–124	–142
>500 MHz to ≤ 1050 MHz (Option 21)	–65	–95	–119	–122	–119	–138
>1050 MHz to ≤ 2200 MHz (Option 21)	–59	–89	–113	–116	–113	–135
≥10 MHz to <2 GHz	–57	–83	–100	–102	–102	–111
≥2 GHz to ≤6 GHz	–50	–80	–107	–110	–107	–130
>6 GHz to ≤10 GHz	–45	–75	–104	–107	–107	–128
>10 GHz to ≤20 GHz	–39	–69	–98	–104	–102	–125
>20 GHz to ≤40 GHz	–33	–63	–92	–98	–96	–119
>40 GHz to ≤65 GHz	–27	–57	–86	–92	–90	–113

TYPICAL SINGLE-SIDEBAND PHASE NOISE



Typical 68C single-sideband phase noise at 10 GHz carrier.



Typical 69B single-sideband phase noise at 10 GHz carrier.

The 68C family offers excellent phase noise performance at a moderate cost, while the 69B family offers the ultimate in phase noise performance.

RF Output

POWER LINE and FAN ROTATION SPURIOUS EMISSIONS (dBc)

Frequency Range	Offset from Center		
	<300 Hz	300 Hz to 1 kHz	>1 kHz
≥10 to ≤500 MHz (Option 21)	<–68	<–72	<–72
>500 to ≤1050 MHz (Option 21)	<–62	<–72	<–72
>1050 to ≤2200 MHz (Option 21)	<–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)

Frequency Range	Residual FM (Hz RMS)	
	69xxxB	68xxxC
≥0.01 to ≤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)

Frequency Range	Unlocked Narrow FM Mode (kHz RMS)	Unlocked Wide FM Mode or Analog Sweep (kHz RMS)
≥0.01 to ≤20 GHz	<5	<25
>20 to ≤40 GHz	<10	<50
>40 to ≤65 GHz	<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° ± 10° C.

MAXIMUM LEVELED OUTPUT POWER

Model Number	Frequency Range (GHz)	Output Power (dBm)	Output Power with Step Attenuator (dBm)	Output Power with Electronic Step Attenuator (dBm)
Option 22	≥0.1 Hz to ≤10 MHz	+13.0	+11.0	+9.0
Option 21	0.01 to ≤2.2 MHz	+13.0	+11.0	+9.0
68x17C & 69x17B	≥0.01 to ≤8.4	+13.0	+11.0	+9.0
68x37C & 69x37B	≥2 to ≤8.4 >8.4 to ≤20	+13.0 +13.0	+11.0 +11.0	+9.0 +3.0
68x47C & 69x47B	≥0.01 to ≤8.4 >8.4 to ≤20	+13.0 +13.0	+11.0 +11.0	+9.0 +3.0
68x67C & 69x67B	≥0.01 to <2 ≥2 to ≤20 >20 to ≤40	+13.0 +9.0 +6.0	+11.0 +7.0 +3.0	Not Available
68x77C & 69x77B	≥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	Not Available
68x87C & 69x87B	≥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	Not Available
68x97C & 69x97B	≥0.01 to <2 ≥2 to ≤20 >20 to ≤40 >40 to ≤50 >50 to ≤65	+12.0 +10.0 +2.5 0.0 –2.0	Not Available	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)	Output Power with Electronic Step Attenuator (dBm)
68x17C & 69x17B	≥0.01 to ≤2 ≥2 to ≤8.4	+13.0 +17.0	+11.0 +15.0	+9.0 +11.0
68x37C & 69x37B	≥2 to ≤8.4 >8.4 to ≤20	+17.0 +17.0	+15.0 +15.0	+11.0 +7.0
68x47C & 69x47B	≥0.01 to ≤2 >2 to ≤8.4 >8.4 to ≤20	+13.0 +17.0 +17.0	+11.0 +15.0 +15.0	+9.0 +11.0 +7.0
68x67C & 69x67B	≥0.01 to ≤20 >20 to ≤40	+13.0 +6.0	+11.0 +3.0	Not Available

Minimum Leveled Output Power Range

Standard Unit:

Without an attenuator: –15 dBm (–20 dBm typical).

With an attenuator: –120 dBm.

With an electronic attenuator: –140 dBm.

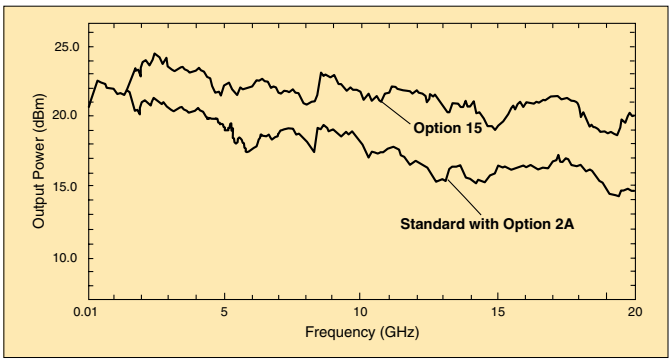
Unit with Option 15B, High Power:

Without an attenuator: –5 dBm (–10 dBm typical).

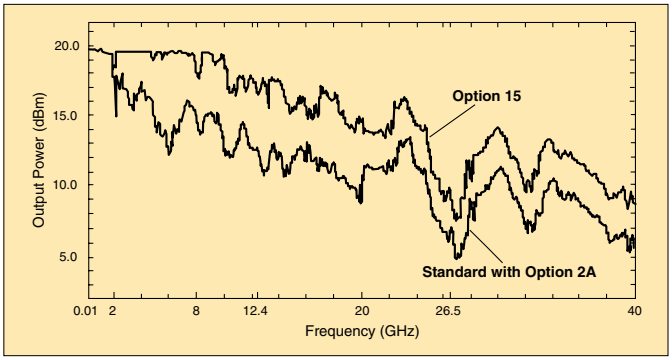
With an attenuator: –115 dBm (–120 dBm typical). For units with a high frequency limit >40 GHz and units with Option 15: minimum settable power is –105 dBm (–110 dBm typical).

With an electronic attenuator: –115 dBm (–110 dBm typical).

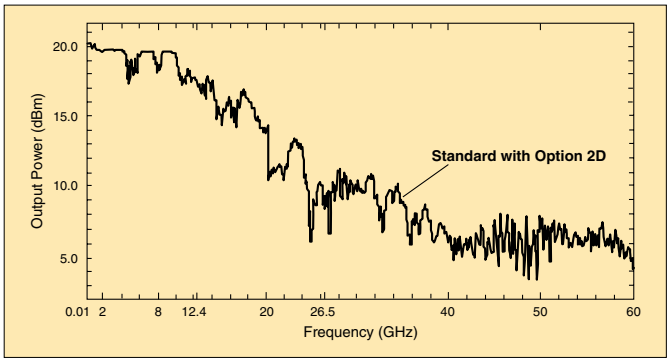
RF OUTPUT



Typical maximum 68x47C and 69x47B available output power



Typical maximum 68x69C and 69x69B available output power



Typical maximum 68x87C and 69x87B available output power

The 68C/69B provide sufficient power to drive L.O.S. even after system and cabling losses.

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.

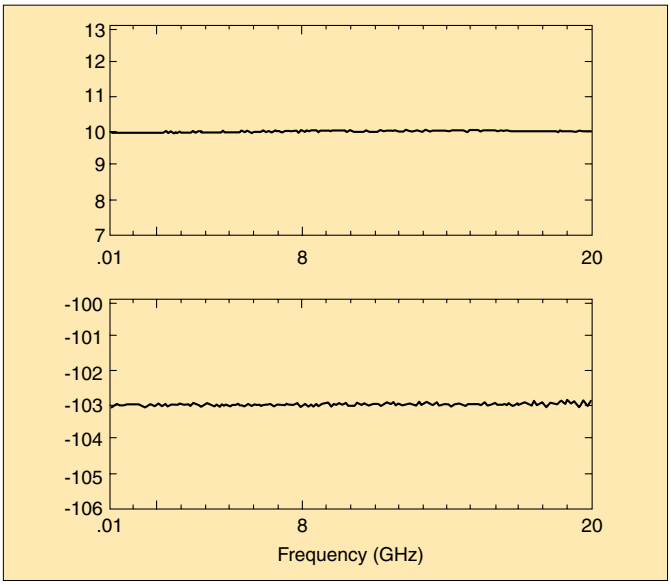
Accuracy and Flatness

Step Sweep and CW Modes

Attenuation Below Max Power	Frequency (GHz)			
	0.01-40	40-50	50-60	60-65
Accuracy:				
0-25 dB②	±1.0 dB	±1.5 dB	±1.5 dB	±1.5 dB
25-60 dB	±1.0 dB	±1.5 dB	±3.5 dB①	N/A
>60 dB	±1.0 dB	±2.5 dB①	±3.5 dB①	N/A
Flatness:				
0-25 dB②	±0.8 dB	±1.1 dB	±1.1 dB	±1.1 dB
25-60 dB	±0.8 dB	±1.1 dB	±3.1 dB①	N/A
>60 dB	±0.8 dB	±2.1 dB①	±3.1 dB①	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
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	±3.0 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

Anritsu's unique power correction provides the best low-level power accuracy available.

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

Other Output Power Specifications

Output Units: Output units selectable as either dBm or mV. Selection of mV assumes 50Ω load. All data entries and displays 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/°C typical

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

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 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 ±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 (Log) or 0.001 mV/step (Linear)

Accuracy: Same as CW power accuracy.

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. The power level remains constant for the length of time required to complete each sweep.

Internal Power Measurement

(Option 8 on 68300C and 69300B only)③

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

Range: +16 dBm to –35 dBm.

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

Resolution: 0.1 dB minimum

③ When Option 8 Power Meter is installed, Option 7 (Delete AM/FM Generators) is not available.

681XXC/691XXB 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: ±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: ±1V

Frequency Modulation

Maximum FM Deviation:

Locked Mode (1 kHz to 500 kHz rates): The lesser of ±10 MHz or rate x 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, ±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.

Maximum Input: ±1V

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 µs 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% ±5%

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

Drive Level: TTL compatible input

Minimum Pulse Width: >5 µs

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

683XXC/693XXB 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: ±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, front or rear-panel BNC, 50 Ω or 600 Ω input impedance. All options selectable from modulation menu.

- **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

Internal AM Generator:

- **Waveforms:** Sinusoid, squarewave, triangle, positive ramp, negative ramp, Gaussian noise, uniform noise, user-defined④
- **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 ±10 MHz or rate x 300

- **Locked Low Noise Mode (50 kHz to 8 MHz rates):** The lesser of ±10 MHz or rate x 3
- **Unlocked Narrow Mode (DC to 8 MHz rates):** ±10 MHz
- **Unlocked Wide Mode (DC to 100 Hz rates):** ±100 MHz

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):⑤ ±1 dB

Accuracy (100 kHz rate):⑤ 10% (5% typical)

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

Harmonic Distortion (±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 ±10 kHz per volt to ±20 MHz per volt (Locked, Locked Low Noise and Unlocked Narrow FM modes), or ±100 kHz per volt to ±100 MHz per volt (Unlocked Wide FM mode), selectable from modulation menu.
- **Maximum Input:** ±1V

Internal FM Generator:

- **Waveforms:** Sinusoid, squarewave, triangle, positive ramp, negative ramp, Gaussain noise, uniform noise, user-defined④
- **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 (FM, Option 6)

ΦM Deviation:

- **Narrow Mode (DC to 8 MHz Rates)**: The lesser of ±3 radians or ±5 MHz/rate
- **Wide Mode (DC to 1 MHz Rates):** The lesser of ±400 radians or ±10 MHz/rate.

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

- **Narrow Mode:** DC to 10 MHz
- **Wide Mode:** DC to 1 MHz

ΦM Flatness (relative to 100 kHz rate):

- **Narrow Mode (DC to 1 MHz rates):** ±1 dB
- **Wide Mode (DC to 500 kHz rates):** ±1 dB

ΦM Accuracy (at 100 kHz sine wave): 10%⑤

External ΦM 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.

- **ΦM Sensitivity:** Continuously variable from ±0.0025 radians per volt to ±5.0 radians per volt (Narrow ΦM mode) or ±0.25 radians per volt to ±500.0 radians per volt (Wide ΦM mode), selectable from modulation menu.

④ User-defined waveforms are available with Option 10.
⑤ For external input, accuracy applies at ±1 V input

683XXC/693XXB MODULATION

Internal ΦM Generator
(Shares the Internal FM Generator)

Waveforms: Sine, square, triangle, positive ramp, negative ramp, Gaussian noise, uniform noise, user defined⑥

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

1.0 GHz to 65 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%⑦

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):

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 1.6s
Pulse Period⑧	250 ns to 419 ms	600 ns to 1.6s
Variable Delay		
Singlet	0 to 419 ms	0 to 1.6s
Doublet	100 ns to 419 ms	300 ns to 1.6s
Triplet	100 ns to 419 ms	300 ns to 1.6s
Quadruplet	100 ns to 419 ms	300 ns to 1.6s
Resolution	25 ns	100 ns

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

Accuracy: 10 ns (5 ns typical)

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

Scan Modulation (Option 20)⑨

Frequency Range: 1 to 20 GHz

Attenuation Range: 0 to 60 dB

Flatness: ±2 dB, 0 to 40 dB
±3.5 dB, 40 to 60 dB

Step Response: <1 µs

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

⑥ User-defined waveforms are available with Option 10.

⑦ For 50, 60 and 65 GHz units, overshoot from 40 to 65 GHz is 20% typical at rated power.

⑧ Period must be longer than the sum of delay and width by 5 clock cycles minimum.

⑨ Option 20, SCAN Modulator is available on models 68337C, 68347C, 69337B and 69347B only. When Option 20 SCAN Modulator is installed, Option 7 and Option 8 are not available.

DIGITAL DOWNCONVERTER SPECIFICATIONS (OPTION 21)

RF Output

Frequency: 10-2200 MHz

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

Spectral Purity

All specifications apply at +10 dBm output, 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

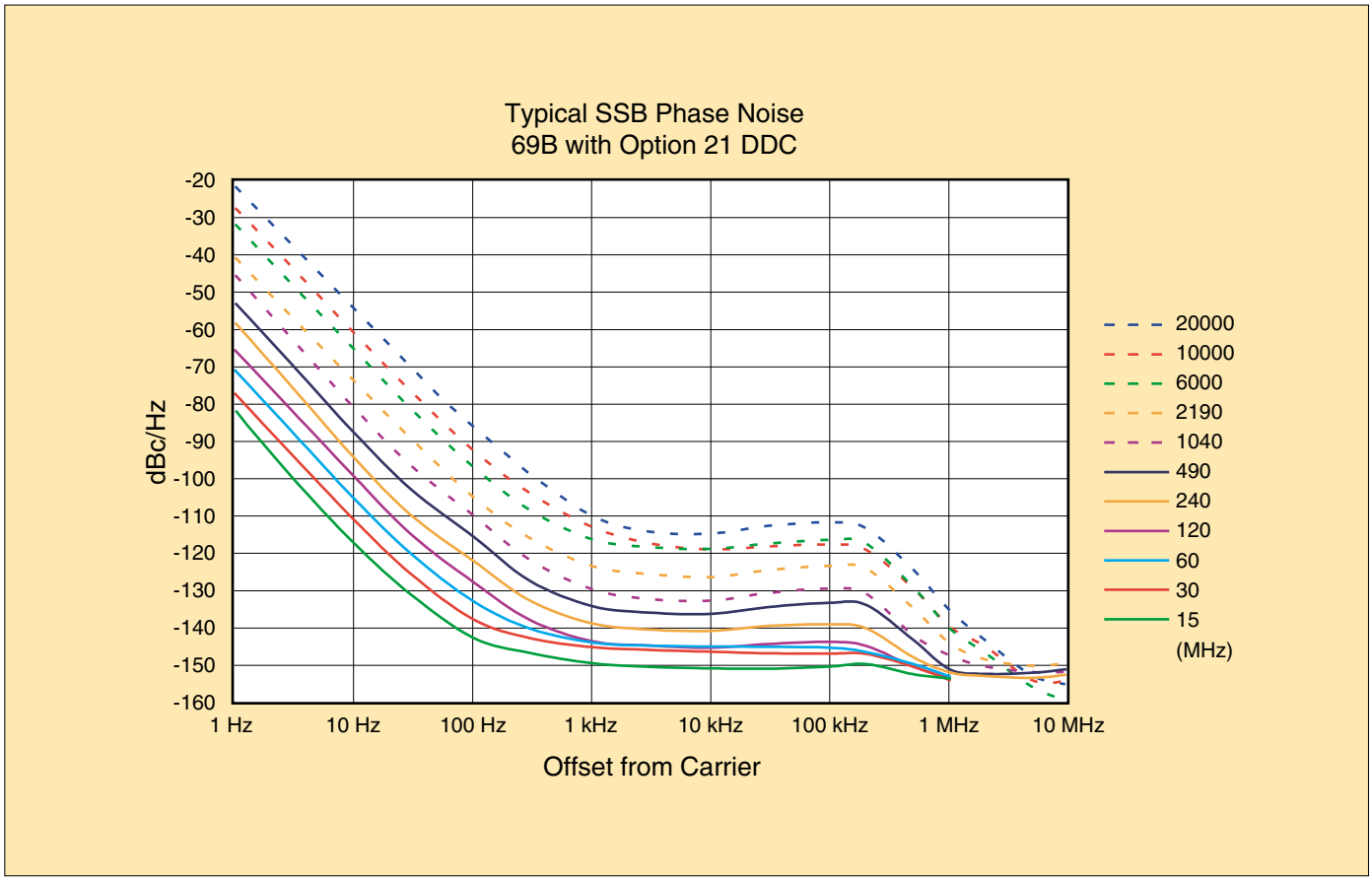
On/Off Ratio: >80 dB

Minimum Leveled Pulse Width: 1 µsec

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

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



DIGITAL DOWNCONVERTER SPECIFICATIONS

FM/ϕM Specifications:

69B synthesizers with Option 21 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. In FM and ΦM modes, FM deviation is divided as well, so deviation at the YTO is greater than at the RF output.

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

Frequency Modulation (for 691xxB):

Parameter	Modes	Conditions	Specification
Deviation	Locked Unlocked Narrow Unlocked Wide	Rate= 1 Hz to (Lesser of 500 kHz or 0.03* Fcarrier) Rate= DC to (Lesser of 500 kHz or 0.03* Fcarrier) Rate= DC to 100 Hz	±[Lesser of 10 MHz or 300 (mod rate)]/n ±(10 MHz)/n ±(100 MHz)/n
Bandwidth (3 dB)	Locked Unlocked Narrow Unlocked Wide	100 kHz rate 100 kHz rate DC rate	1 kHz to (Lesser of 500 kHz or 0.03*Fcarrier) DC to (Lesser of 500 kHz or 0.03*Fcarrier) DC to 100 Hz
Flatness	Locked	Rate= 10 kHz to (Lesser of 1 MHz or 0.01*Fcarrier)	±1 dB relative to 100 kHz rate
Accuracy	Locked and Unlocked Narrow	Rate= 100 kHz, Sineware, Int. or 1Vpk Ext.	10% (5% typical)
External Sensitivity	Locked and Unlocked Narrow Unlocked Wide		±(10 kHz/V to 20 MHz/V)/n ±(100 kHz/V to 100 MHz/V)/n

Frequency Modulation (for 693xxB):

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

Phase Modulation:

Parameter	Modes	Conditions	Specification
Deviation	Narrow Wide	Rate= DC to (Lesser of 8 MHz or 0.03* Fcarrier) Rate= DC to (Lesser of 1 MHz or 0.03* Fcarrier)	±[Lesser of 3 rad or (5 MHz)/(mod rate)]/n ±[Lesser of 400 rad or (10 MHz)/(mod rate)]/n
Bandwidth (3 dB)	Narrow Wide	100 kHz rate 100 kHz rate	DC to (Lesser of 10 MHz or 0.03*Fcarrier) DC to (Lesser of 1 MHz or 0.03*Fcarrier)
Flatness	Narrow Wide	Rate= DC to (Lesser of 1 MHz or 0.01*Fcarrier) Rate= DC to (Lesser of 500 kHz or 0.01*Fcarrier)	±1 dB relative to 100 kHz rate ±1 dB relative to 100 kHz rate
Accuracy	Narrow and Wide	100 kHz, Int. or 1Vpk Ext., sine	10%
External Sensitivity	Narrow Wide		±(0.0025 rad/V to 5 rad/V)/n ±(0.25 rad/V to 500 rad/V)/n

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).

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.

Command Structures: 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 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 the 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.

System 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 68xxxC or 69xxxB output signals to be swept with a user-selected frequency offset. One unit controls the other via AUX I/O and SERIAL I/O connections.

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. Supported power meters are Anritsu ML243xA, ML4803A and HP 437B, 438A, 70100A. Five user tables are available at up to 801 points/table.

Warm Up Time :

From standby: 30 minutes
From cold start (0°C): 120 hours to achieve specified aging day frequency stability. Instruments disconnected from AC power for more than 72 hours require 30 days to return to specified aging.

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 maximum

Dimensions: 133 H x 429 W x 597 D mm

RF Output Connector:

Type K female, ≤40 GHz models
Type V female, >40 GHz models

Environmental

Storage Temperature Range: –40°C to +75°C

Operating Temperature Range: 0°C 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
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.

INPUTS AND OUTPUTS

Input/Output Connectors			
Nomenclature	**Type**	**Location**	**Applicable Models**
AM IN	BNC	Front and Rear Pane	68100C and 68300C 69100B and 69300B
FM IN	BNC	Front and Rear Panel	68100C and 68300C 69100B and 69300B
⊓⊔ IN	BNC	Front and Rear Panel	68100C and 69100B
PULSE TRIG IN	BNC	Front and Rear Panel	68300C and 69300B
EXT ALC IN	BNC	Front and Rear Panel	68000C, 68100C and 68300C 69000B, 69100B and 69300B
RF OUTPUT	K-Connector V-Connector	Standard-Front Pane Option 9-Rear Panel	68000C, 68100C and 68300C 69000B, 69100B and 69300B
10 MHz REF IN	BNC	Rear Panel	68000C, 68100C and 68300C 69000B, 69100B and 69300B
10 MHz REF OUT	BNC	Rear Panel	68000C, 68100C and 68300C 69000B, 69100B and 69300B
HORIZ OUT	BNC	Rear Panel	68000C, 68100C and 68300C 69000B, 69100B and 69300B
AM OUT	BNC	Rear Panel	68300C and 69300B
FM OUT	BNC	Rear Panel	68300C and 69300B
PULSE VIDEO OUT	BNC	Rear Panel	68300C and 69300B
PULSE SYNC OUT	BNC	Rear Panel	68300C and 69300B
AUX I/O	25-pin D-type	Rear Panel	68000C, 68100C and 68300C 69000B, 69100B and 69300B
SERIAL I/O	RJ45	Rear Panel	68000C, 68100C and 68300C 69000B, 69100B and 69300B
IEEE-488 GPIB	Type 57	Rear Panel	68000C, 68100C and 68300C 69000B, 69100B and 69300B

AM IN: Accepts an external signal to amplitude modulate the RF output signal. Front or rear-panel input, 50Ω or 600Ω 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, 50Ω or 600Ω 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 50Ω 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 ±100 Hz, 0 to +10 dBm time-base signal. Automatically disconnects the internal high-stability time-base option, if installed. 50Ω impedance.

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

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.

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 68XXXC or 69XXXB synthesizer or allows for a single-cable interface with the Model 56100A Scalar Network Analyzer and other ANRITSU instruments. Provides V/GHz and Sequential Sync Connection.

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).

Rear panel Inputs/Outputs

Millimeter Wave Multipliers

54000-4WRxx and 54000-5WRxx multipliers provide 50 to 110 GHz outputs when driven by a 68xxxC or 69xxxB 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.

	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 typical	<1.7 typical
Output Power	0.0 dBm (+4 dBm typical)	–5 dBm (+1 dBm typical)
Power Flatness, Unleveled	±3.0 dB typical	±3.0 dB typical
Power Flatness, Leveled (54000-5WRxx)	±1.0 dB typical	±1.0 dB typical
Power Leveling Range (54000-5WRxx)	10 dB typical	10 dB typical
Required Input Frequency	12.75 to 18.75 GHz	12.75 to 18.34 GHz
Multiplication Factor	x4	x6
Frequency Accuracy	Synthesizer Accuracy x4	Synthesizer Accuracy x6
Frequency Resolution	Synthesizer Resolution x4	Synthesizer Resolution x6
Filters **FL1** **FL2** **FL3**	 50 to 75 GHz 50 to 58 GHz 57 to 75 GHz	 75 to 110 GHz 75 to 92 GHz 89 to 110 GHz
Spurious **with FL2, FL3** **with FL1**	 –50 dBc –20 dBc typical	 –50 dBc –20 dBc typical

ORDERING INFORMATION

Models

Synthesized CW Generators

68017C, 0.01 to 8.4 GHz	69017B, 0.01 to 8.4 GHz
68037C, 2 to 20 GHz	69037B, 2 to 20 GHz
68047C, 0.01 to 20 GHz	69047B, 0.01 to 20 GHz
68067C, 0.01 to 40 GHz	69067B, 0.01 to 40 GHz
68077C, 0.01 to 50 GHz	69077B, 0.01 to 50 GHz
68087C, 0.01 to 60 GHz	69087B, 0.01 to 60 GHz
68097C, 0.01 to 65 GHz	69097B, 0.01 to 65 GHz

Synthesized Signal Generators

68117C, 0.01 to 8.4 GHz	69117B, 0.01 to 8.4 GHz
68137C, 2 to 20 GHz	69137B, 2 to 20 GHz
68147C, 0.01 to 20 GHz	69147B, 0.01 to 20 GHz
68167C, 0.01 to 40 GHz	69167B, 0.01 to 40 GHz
68177C, 0.01 to 50 GHz	69177B, 0.01 to 50 GHz
68187C, 0.01 to 60 GHz	69187B, 0.01 to 60 GHz
68197C, 0.01 to 65 GHz	69197B, 0.01 to 65 GHz

Synthesized High Performance Signal Generators

68317C, 0.01 to 8.4 GHz	69317B, 0.01 to 8.4 GHz
68337C, 2 to 20 GHz	69337B, 2 to 20 GHz
68347C, 0.01 to 20 GHz	69347B, 0.01 to 20 GHz
68367C, 0.01 to 40 GHz	69367B, 0.01 to 40 GHz
68377C, 0.01 to 50 GHz	69377B, 0.01 to 50 GHz
68387C, 0.01 to 60 GHz	69387B, 0.01 to 60 GHz
68397C, 0.01 to 65 GHz	69397B, 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 48 cm equipment rack.

Option 2A, Step Attenuator: Adds a 10 dB/step attenuator for models having a high-end frequency of ≤20 GHz. Rated RF output power is reduced.

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

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

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

Option 2E, Electronic Step Attenuator: Adds a 10 dB/step electronic attenuator for models having a high-end frequency of ≤8.4 GHz. Rated RF output power is reduced.

Option 2F, Electronic Step Attenuator: Adds a 10 dB/step electronic attenuator for models having a high-end frequency of ≤20 GHz. Rated RF output power is reduced.

Option 6, Phase Modulation (ΦM) (683xxC and 693xxB): Provides phase modulation capability. FM input, FM output and FM generator become FM/ΦM input, FM/ΦM output and FM/ΦM generator.

Option 7, Delete AM/FM Generators (683xxC and 693xxB): Deletes the internal AM and FM generators. External AM and FM capability remains unchanged. (Not available in combination with Option 8 or Option 20.)

Option 8, Internal Power Measurement (683xxC and 693xxB): Adds an internal power measurement function that is compatible with Anritsu 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, User-defined Modulation Capability (683xxC, and 693xxB): Provides user-defined waveform capability. Requires controller (not included). Includes cable and Windows® based software.

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

Option 14, Anritsu 360B VNA Compatibility: Modifies rack mounting hardware to mate the unit in an Anritsu 360B VNA console.

Option 15A, High Power Output (680xxC, 681xxC, 690xxB and 691xxB): Adds high power RF components to the instrument in the 2–20 GHz frequency range.

Option 15B, High Power Output (683xxC and 693xxB): Adds high-power RF components to the instrument in the 2–20 GHz frequency range.

Option 16, High Stability Time Base: Adds an ovenized, 10 MHz crystal oscillator as a high-stability time base. Derate phase noise specification at 10 Hz offset by 8 dB.

Option 17A, Delete Front Panel (68100C, 68300C, 69100B and 69300B): 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 (68000C and 69000B): 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 68337C, 68347C, 69337B and 69347B only. Requires an external modulating signal input. (Not available in combination with Option 7, Option 18, or Option 22.)

Option 21A, (690xxB, 691xxB): Low Phase Noise, Non-pulsed Digital Downconverter replaces standard analog downconverter on units with low frequency limit of 10 MHz. CW only from 10 MHz to 2.2 GHz

Option 21B, (693xxB): Low Phase Noise, Pulsed Digital Downconverter replaces standard analog downconverter on units with low frequency limit of 10 MHz. CW with pulse modulation from 10 MHz to 2.2 GHz

Option 22, 0.1 Hz to 10 MHz Audio Frequency: Adds CW and step sweep frequency coverage below 10 MHz. No modulation is available below 10 MHz. Derate output power by 1 dB for ≤20 GHz and 2 dB for >20 GHz (Not available in combination with Option 20.)

Accessories

34RKNF50	DC to 20 GHz, Ruggedized Type N female adapter for units with a K Connector output.
34RVNF50	DC to 20 GHz, Ruggedized Type N female adapter for units with a V Connector output.
34VKF50	DC to 46 GHz, V male-to-K female Precision Adapter.
ND36329	MASTER/SLAVE interface cable set.
D37178-2	Protective front panel cover.
760-177	Transit case.
2300-218	Anritsu Power Tools: Provides Comprehensive interface dll's to be used as drivers for any Windows® based application. Includes driver for National Instruments LabView®.
806-90	AUX I/O Cable, 25 pin to BNC: Provides BNC access to V/GHz and Sequential Sync connections and other AUX I/O datalines.

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	75-110 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

Economical upgrades are available to upgrade any model to any higher performing model or to upgrade 68xxxC synthesizers to 69xxxB synthesizers. Consult Anritsu for details.

68C/69B Family Synthesizers Product Selection Table

Features	68000C CW Generator	69000B CW Generator	68100C Signal Generator	69100B Signal Generator	68300C High Performance Signal Generator	69300B High Performance Signal Generator
Ultra Low Φ Noise		✓		✓		✓
Step Sweep	✓	✓	✓	✓	✓	✓
Analog Sweep			✓	✓	✓	✓
Power Sweep	✓	✓	✓	✓	✓	✓
Alternate Sweep	✓	✓	✓	✓	✓	✓
Master/Slave	✓	✓	✓	✓	✓	✓
AM			Ext	Ext	Int/Ext	Int/Ext
FM			Ext	Ext	Int/Ext	Int/Ext
ΦM					Option 6	Option 6
Pulse Modulation			Ext	Ext	Int/Ext	Int/Ext
AM Scan (1-20 GHz)					Option 20	Option 20
Internal Power Measurement					Option 8	Option 8

68C/69B Family Synthesizers Model Summary

Frequency Range	CW Generators		Signal Generators		High Performance Signal Generators	
0.01 to 8.4 GHz*	68017C	69017B	68117C	69117B	68317C	69317B
2 to 20 GHz	68037C	69037B	68137C	69137B	68337C	69337B
0.01 to 20 GHz*	68047C	69047B	68147C	69147B	68347C	69347B
0.01 to 40 GHz*	68067C	69067B	68167C	69167B	68367C	69367B
0.01 to 50 GHz*	68077C	69077B	68177C	69177B	68377C	69377B
0.01 to 60 GHz*	68087C	69087B	68187C	69187B	68387C	69387B
0.01 to 65 GHz*	68097C	69097B	68197C	69197B	68397C	69397B

* Optional frequency extension down to 0.1 Hz is available

To Select the optimum source for your application:

1) On the top table, select the feature set you require.
2) Staying in the same column, look down to the second table and select your required frequency range. This is the model you require.
3) If your needs expand in the future, don't worry. Economical upgrades can expand your synthesizer's capabilities to fit your future needs.