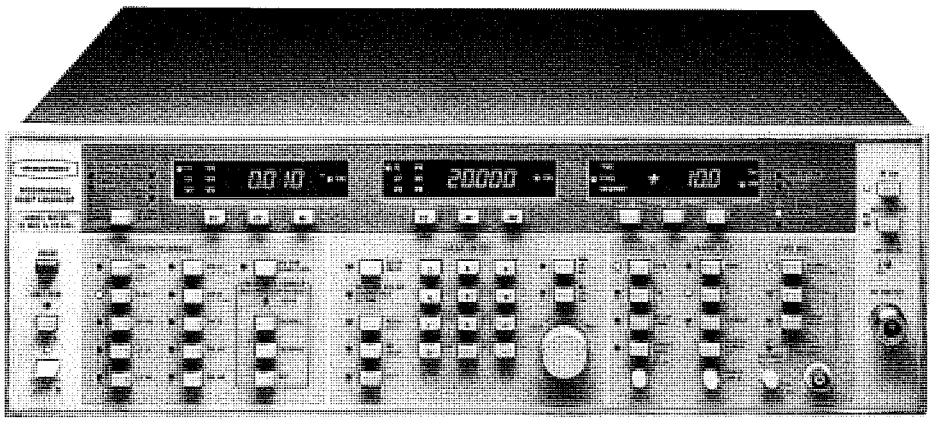
6600B Series, 10 MHz to 60 GHz



6600B Sweep Generator Highlights

- 50 mW Leveled Power from 10 MHz to 20 GHz
- 10 MHz to 60 GHz Sweep from a Single Connector
- Subharmonic-Free Signals from Fundamental Oscillators
- 15 dB Power Sweep Range Plus Optional 70 dB Attenuator
- Eight RF, Video, or Intensity Modulated Markers
- GPIB Interface Standard

Measurement Accuracy and Convenience

The 6600B Sweep Generators combine the latest microwave and microprocessor technology to produce a general-purpose swept signal source that makes the most accurate microwave measurements—in automated or manual systems. From a selection of 42 models, you choose the exact combination of capabilities you need: wideband sweep, narrowband sweep, and high power. All models feature exceptional source match, signal purity, frequency accuracy, resolution, and output flatness to improve the accuracy of your microwave measurements.

Innovative Design Philosophy

In designing the 6600B Series, Wiltron recognized that the great majority of a sweeper's cost is in the microwave components. Rather than mount these components in a plug-in, Wiltron engineers made each model a stand-alone, self-contained instrument. Every model is optimized to avoid the pick-up, interference, and over-heating that can plague plug-in sweeper designs. Each microwave module achieves the highest possible performance level, giving the 6600B distinct advantages over other sweepers.

Wide Selection

Model	Range	Output Power[2] (Minimum)
6609B	0.01 to 2 GHz	20 mW
6609B-50	0.01 to 2 GHz	50 mW
6617B	0.01 to 8 GHz	10 mW
6617B-40	0.01 to 8 GHz	40 mW
6622B	0.01 to 12.4 GHz	10 mW
6622B-40	0.01 to 12.4 GHz	40 mW
6645B	0.01 to 18 GHz	10 mW
6645B-40	0.01 to 18 GHz	40 mW
6647B	0.01 to 20 GHz	10 mW
6647B-40	0.01 to 20 GHz	40 mW
6659B	0.01 to 26.5 GHz	5 mW
6668B	0.01 to 40 GHz	4 mW
6669B	0.01 to 40 GHz	3 mW
6610B	1 to 2 GHz	20 mW
6616B	1.7 to 4.3 GHz	10 mW
6619B	2 to 8 GHz	10 mW
6619B-40	2 to 8 GHz	40 mW
6621B	2 to 12.4 GHz	10 mW
6621B-40	2 to 12.4 GHz	40 mW
6635B	2 to 18 GHz	10 mW
6635B-40	2 to 18 GHz	40 mW
6637B	2 to 20 GHz	10 mW
6637B-40	2 to 20 GHz	40 mW
6653B	2 to 26.5 GHz	5 mW
6662B	2 to 40 GHz	4 mW
6663B	2 to 40 GHz	3 mW
6620B	3.6 to 6.5 GHz	20 mW
6624B	4 to 8 GHz	10 mW
6627B	5.9 to 9 GHz	10 mW
6628B	8 to 12.4 GHz	10 mW
6628B-50	8 to 12.4 GHz	50 mW
6629B	8 to 20 GHz	10 mW
6629B-40	8 to 20 GHz	40 mW
6631B	10 to 15.5 GHz	10 mW
6630B	12.4 to 20 GHz	10 mW
6630B-50	12.4 to 20 GHz	50 mW
6660B	12.4 to 40 GHz	3 mW
6632B	17 to 22 GHz	5 mW
6636B	18 to 26.5 GHz	3 mW
6640B	26.5 to 40 GHz	1 mW
6640B-10	26.5 to 40 GHz	10 mW
6672B[2]	40 to 60 GHz	1 mW

[1]Without optional attenuator. [2]External leveling only.

6600B Series

Versatile Sweep Modes and Eight Markers

The 6600B Series has five sweep modes, as well as five CW frequencies and eight markers, to enhance your network analyzer display of test data. With a single keystroke, you switch from broadband sweep (Full Range, F1 to F2, or M1 to M2) to narrow-band symmetrical sweep about center frequency CF or marker M1. The CW frequencies are also selected directly without use of a shift key or having to remember frequencies stored in memory, both required by a major competitor. The exceptional attention given to all aspects of front-panel layout make the 6600B a pleasure to use.

Power Sweep

In addition to the versatile frequency sweep modes, the 6600B has a power sweep with which the output is swept over a 15 dB range. Furthermore, with the addition of the Option 2 Attenuator, the 15 dB power sweep can be offset in 10 dB steps over a 70 dB range. Amplifier and semiconductor characteristics, such as gain compression and saturation, can be measured rapidly over a continuously variable input power range. In the Alternate Stored Setup mode, a set of power sweep and a set of frequency sweep parameters stored in memory can be recalled to provide a "simultaneous" two-trace display of test device power *and* frequency characteristics.

ROM Frequency Accuracy

The accuracy with which frequencies can be selected is especially important when measuring devices with rapidly changing frequency characteristics. By using ROM to correct for residual nonlinearities of YIG-tuned oscillators, Wiltron holds accuracy to ±10 MHz from 10 MHz to 20 GHz. In addition, there is no degradation of accuracy when tuning from one band to the next, as is the case with multiplier techniques.

Nine Stored Setups

Because the 6600B has memory for nine independent test setups, operation of the Alternate Stored Setup mode is as simple as recalling the test parameters from memory. Set-up time is virtually eliminated.

Front Panel Security

When test parameters must be kept secret, an instruction to blank the digital displays is stored with the other test setup information by simply pressing the security key. Also, the secure information can be easily cleared to reduce protection problems.

Fundamental Oscillators

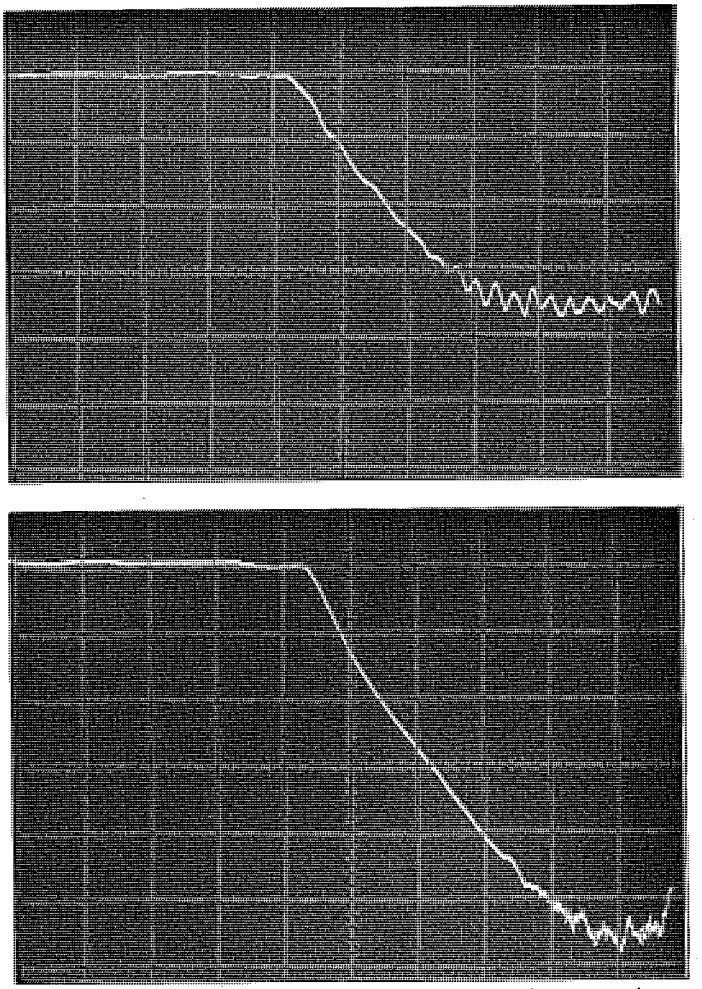
The 6600B Series uses fundamental oscillators over the 2 to 26.5 GHz range because they deliver the purest, most accurate signals. Four aspects of their performance contribute to accurate measurements:

- **Harmonic Content.** The troublesome subharmonics of multiplier-type sweep generators don't exist.
- **Residual FM.** Without a multiplier, residual FM is not degraded by the multiplication factor. Residual FM in CW or narrow-band mode is less than 10 kHz peak up to 20 GHz.
- **Frequency Accuracy.** CW accuracy is ±10 MHz over the full 10 MHz to 20 GHz range.
- **Output Flatness.** Since there is no tracking filter required to take out unwanted multiplier responses, the output level does not vary with sweep speed.

Low Harmonics

Harmonic content can cause large errors in the measurement of reflection and transmission. The photographs below show test results when a competitor's multiplier-type sweeper (A) and a Wiltron fundamental oscillator sweeper (B) are used to make the same measurement. Photograph (A) shows the effect of multiplier subharmonics from a 2–7 GHz oscillator on test results above 7 GHz. With a clean signal from its fundamental oscillator, the Wiltron 6659B shows in (B) a 20 dB improvement in dynamic range. This is a result of the 40 dB (typically 55 dB above 4 GHz) harmonic suppression of the 6659B, a vast improvement over the 25 dB specification of the sweeper shown in (A). Spurious signals are better than –60 dBc for all models between 2 and 60 GHz—one more reason why the 6600B is the preferred signal source for precise microwave measurements.

Harmonics can also introduce significant uncertainty when measuring power levels. For example, with the Wiltron specified harmonic level of <–40 dBc, the measurement uncertainty due to detection of harmonics is less than ±0.2 dB. In contrast, multplier-type sweepers with a specification of <–25 dBc can have as much as ±0.7 dB uncertainty.



(A) Subharmonics of multiplied frequencies in competitor's instrument give erroneous indication of response outside filter passband. (B) Clean signals from fundamental oscillators of 6600B Sweep Generator show that actual response of the filter is 20 dB better than that measured in (A).

Alternate Stored-Setup Sweep

In some applications, test times can be cut in half by simultaneously displaying two traces of characteristics over different frequency and/or power ranges. For example, with a simultaneous display of amplifier reflection and output power, you can adjust the amplifier for optimum balance of the two without changing the test setup. Similarly, the broadband rejection characteristics and the narrow passband response of a filter can be observed simultaneously. The time saved in avoiding sequential tests with two sets of test parameters is substantial.

Phase Lock

When resolution greater than 100 kHz is required, the 6600B can be phase locked to an external source. When phase locked to a frequency counter, accuracies of ±10 Hz or better can be achieved. Here is one more way the 6600B Series improves measurement accuracy and meets the needs of applications which formerly required a signal generator or synthesizer.

Exceptional Source Match

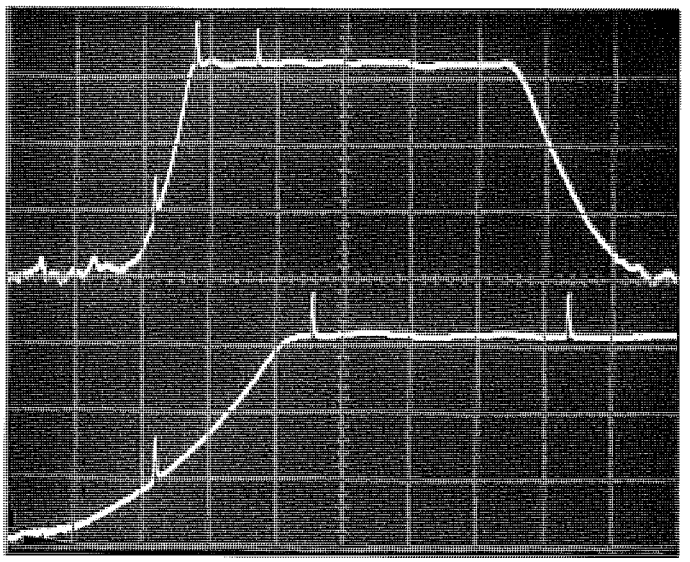
A poor source impedance match can introduce significant errors in test results. Energy reflected from the mismatch causes uncertainty in return loss and transmission measurements. This error is minimized by the exceptionally good source match of the 6600B. In the 6637B, for example, source SWR is 1.5 from 2 to 20 GHz. These values compare very favorably to the 1.9 SWR above 2 GHz specified for a competitor's unit. When a 10 dB return loss measurement is made on the competitor's unit, the uncertainty is 1.7 dB. In contrast, the 6600B sweeper with a source match of 1.5 SWR holds uncertainty to 1 dB, an improvement of 0.7 dB.

Frequency Vernier

The FREQUENCY VERNIER controls can be used to increase frequency accuracy in the CW and ΔF mode. While monitoring the output with a counter, you simply press the INCREASE and DECREASE buttons until the desired frequency is obtained. Subsequent requests for frequency will produce the same frequency, including the correction.

Complete Programmability

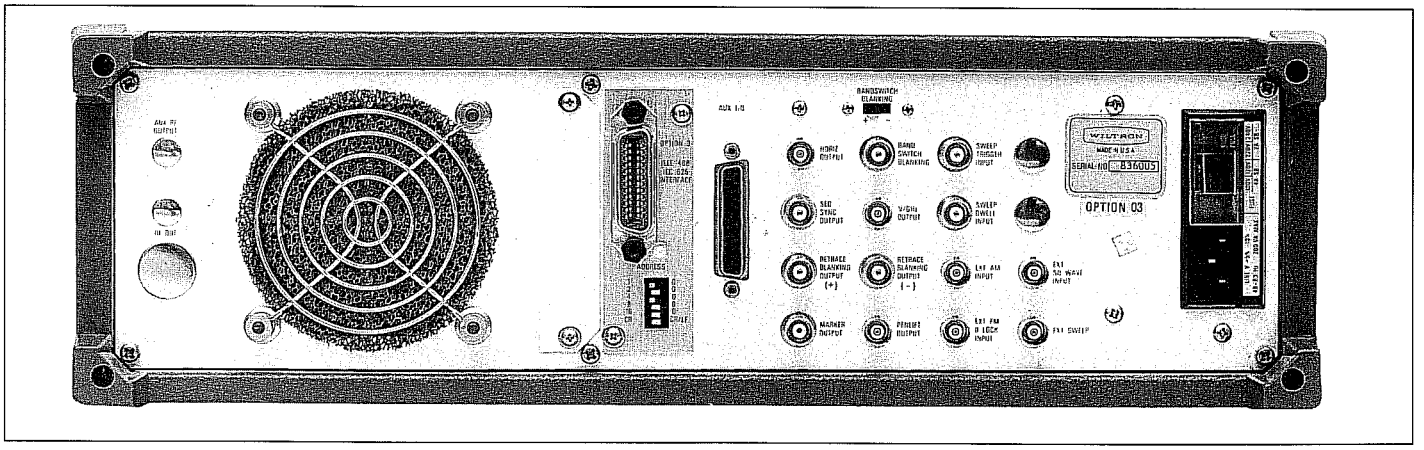
Every measurement parameter can be controlled over the standard GPIB (IEEE–488) by descriptive commands that make the 6600B compatible with every computer or controller. In addition, special interfaces are included to ensure compatibility with every available network analyzer. With complete programmability, the 6600B works smoothly in interactive, real-time systems. Parallel poll, serial poll, service request (SRQ), and group execute trigger provide programming flexibility to achieve optimum test sequencing, timing, and control. A local lock-out command protects the system against errors that might be inadvertently introduced by operating the front-panel controls.



Alternate Sweep mode sweeps alternately between two independent selected frequency ranges: 2–12.4 GHz for the top trace, 3–5 GHz for the bottom trace.

Self-Test

The 6600B Series features a self-test that allows you to diagnose problems and return the unit to service with a minimum of down-time. When the self-test is initiated, remotely or from the front panel, up to 25 error codes are available on the front panel LED readouts. The error codes direct the repair technician to the module(s) that needs service. These error codes are completely documented in the 6600B Service Manual so that the repair technician can proceed from an error code to at least a board level solution, often to component level. When self-test is initiated remotely, the 6600B supplies a pass or fail indication over the bus. The self-test is an independent function and does not disrupt previous front-panel settings.



6600B Series

Specifications

FREQUENCY

Frequency Range: 10 MHz to 60 GHz in 42 models. Please see pages 72 and 73.

Frequency Control:

Full: Sweeps upward across the complete frequency range.
F1–F2: Sweeps from F1 to F2, entered independently on keypad or control knob. F2 must be greater than F1.
M1–M2: Sweeps from M1 to M2 markers, entered independently on keypad or control knob. M2 must be greater than M1.
ΔF: Sweeps upward symmetrically about CF or M1. Sweep width is adjustable on keypad or control knob in MHz or GHz.
CW: Single frequency at CF, F1, F2, M1, and M2, entered independently on keypad or control knob.
Frequency Vernier: Fine adjustment of frequency in CW and ΔF modes up to ±12.7 MHz for models with specified frequency accuracies of <±10 MHz. A new correction in frequency can be made with the control knob. Correction applies until released with Off button or the frequency is changed. ACTIVE light is on whenever a vernier adjustment is in use.
Manual: Continuous manual adjustment of frequency between sweep limits in every sweep mode. Can be used to set recorder.

CW Filter Enable/Disable:

Enabled: Filter inserted for CW mode and sweep widths ≤50 MHz. Shift key function.
Disabled: Filter removed for all modes of operation.

Frequency Stability:

For Models With Upper Frequency Limit (GHz)	With Time (10 Minutes, Typical[1]) (kHz)	With 10% Line Voltage Change (kHz)
≤26.5	±200	±100
26.5 to 40	±400	±200
40 to 60	±600	±300

[1]After 30 minutes warmup at selected CW frequency.

Frequency Resolution:

Normal: 1 MHz
Frequency Vernier: 100 kHz on ±12.7 MHz range, 200 kHz on ±25 MHz range, 300 kHz on ±37.5 MHz range.
Step Sweep: 4096 programmable points

Frequency Accuracy: Please see pages 72 and 73.

MARKERS

Marker Selection: Eight markers at M1 through M8, entered independently on keypad or control knob in MHz or GHz.
Accuracy: Same as frequency accuracy. Please see page 72.
Resolution: 0.4% of sweep width
Display: Front-panel pushbuttons select one of three marker modes:
Video:* Positive video pulse, 0 to +5 volts, TTL-compatible, adjustable with MARKER CONTROL. 1KΩ impedance, rear panel BNC connector.
RF:* Up to 5 dB attenuated RF level at marker frequency, adjustable with MARKER CONTROL.
Intensity: Intensified dot on trace, obtained by momentary dwell in sweep.
*Amplitude of video and RF marker increases twofold when single marker is selected.

SWEEP AND TRIGGERING

Alternate Stored Setup: Sweeps alternately between the current front-panel setup and one of nine stored setups.
Sweep Triggering:
Auto: Triggers sweep automatically.
Line: Triggers sweep from power line frequency.
External: Triggers sweep from externally applied 4 to 25 Vpk or TTL-compatible pulse with >1 μs width and >5 μs fall time. Rear panel BNC connector.
Single: EXT OR SINGLE SWEEP selects mode, triggers, aborts, and resets single sweep.

Sweep Time: Adjustable from approximately 0.01 to 99 s. Entered on keypad or control knob in ms or s.
Retrace RF: Front panel pushbutton activates RF power during retrace.

Horizontal Output: 0 to 10V ramp coincident with sweep in all sweep modes. In CW mode, output voltage varies in proportion to frequency, 0V at 0 GHz and 10V at upper frequency limit. In shift key CW RAMP mode voltage varies from 0 to 10V between sweep limits. Rear panel BNC connector.

Sequential Sync Output: +5V TTL-compatible pulse occurring at oscillator bandswitching points and during sweep retrace. –5V occurring at markers, –10V at selected marker. Rear panel BNC connector.

Retrace Blanking (–) Output: –5V pulse occurring during sweep retrace. Rear panel BNC connector. <100Ω impedance.

Retrace Blanking (+) Output: +5V TTL-compatible pulse occurring during sweep retrace. Rear panel BNC connector.

Bandswitching Blanking Output: ±5V pulse occurring during oscillator bandswitching points. Polarity selected on rear panel switch. Rear panel BNC connector. <100Ω impedance.

V/GHz: Reference voltage varying in proportion to output frequency as shown in the table below. Rear panel BNC. 100Ω impedance.

For Models With Upper Frequency Limit (GHz)	V/GHz Output (V/GHz)
≤20	1.00
20 to 40	0.50
40 to 60	0.33

Penlift Output: Normally open relay contacts for lifting recorder pen during sweep retrace. Internal jumper can be installed to provide normally closed contacts. Rear panel BNC connector.

Sweep Dwell Input: Low true TTL-compatible pulse causes frequency sweep to stop. Can be used to count marker frequencies with an external counter and Frequency Counter Interface output, Option 13.

External Sweep Input: Externally applied 0 to 10V ramp sweeps frequency between selected sweep limits. Rear panel BNC connector. 10KΩ impedance. Front-panel control.

POWER SWEEP AND LEVELING

Leveling:

Internal: Levels output power at front-panel connector. Please see pages 72 and 73 for power variation specifications. Not available on 6640B and 6672B.
External Detector: Levels output power at remote test position where directional detector samples RF power and provides a positive or negative polarity detected signal of 5 mV to 500 mV to front-panel BNC connector. Front-panel ALC control adjusts input signal level to optimum value.
Power Meter: Levels output power at remote test position where a power meter samples RF power and provides a ±1V full scale video signal to front-panel BNC connector. Front-panel ALC gain control adjusts input signal level to optimum value.
Unleveled Indicator: Lights when ouput is insufficient to maintain leveling across the selected sweep range.

Power Sweep: Sweeps over up to 15 dB range, entered on keypad or control knob. Option 2 Attenuator offsets sweep range in 10 dB steps over 70 dB range.

Attenuator: Option 2 adds a 10 dB attenuator with a 70 dB range. Please see pages 72 and 73 for accuracy specifications.

RF Slope Control: Adjusts slope of leveled output power by increasing power at the higher frequencies to compensate for frequency dependent cable losses in test setup.

MODULATION

External AM Input: Rear panel BNC connector. 10 KΩ impedance.
Sensitivity: 1 dB/V
Frequency Response (typical): DC–50 kHz
Input Impedance: 10 KΩ
Amplitude Control Range: 13 dB
Maximum Input: 20V
External FM and Phase-Lock Input: Rear panel BNC connector. 10 KΩ impedance.
Sensitivity: –6 MHz/V
Maximum Deviation for Modulation Frequency of:
DC–100 kHz: ±25 MHz
100–250 kHz: ±5 MHz
External Square Wave Input: Externally applied TTL-compatible square wave modulates output at dc to 50 kHz rate. Will accommodate ±6V square wave. On/Off ratio, typically 40 dB.
Maximum Input: ±20 volts.
Rear panel BNC connector.
Order Option 11 for 6610B, 6616B, 6619B 6619B–40, 6620B, 6624B, 6627B, 6628B, 6628B–50, 6630B, 6630B–50, 6631B, 6632B, 6636B, 6640B, and 6672B. Standard on all others.

INSTRUMENT STATUS

GPIB Indicators: LED lights indicate the following conditions:
Remote: Operating on GPIB
Talk: Talking on GPIB
Listen: Listening on GPIB
SRQ: Sending a service request
Local Lockout: Disabling the RETURN TO LOCAL pushbutton. The instrument can be placed in local mode only via GPIB.
Nonvolatile Memory: Retains front-panel control settings in memory for up to 10 years. Whenever instrument is turned on, control settings come on at the same functions and values existing when power was removed.
Self-Test: Performs self-test every time power is applied or when SELF TEST pushbutton is pressed. If an error is detected, a diagnostic code appears, identifying the cause and location of the error.

GENERAL

Test Setup Storage: Stores nine test setups for recall during normal or Alternate Stored Setup modes.
Continuous Control: Knob provides smooth, continuous control of frequency, sweep time, and power.
Front Panel Security: Blanks LEDs to secure test parameters.
Power Variation With Temperature: ±0.08 dB/°C. Not applicable to units with external leveling only.
Residual AM (30 kHz bandwidth): 50 dBc. Not applicable to units with external leveling only.
Output Connector: Type N female all models except:
Model 6632B and 6636B: Ruggedized WSMA female
Model 6640B: WR28 Waveguide (UG–599/U Flange)
Models 6662B and 6668B: Ruggedized WSMA female to 26.5 GHz; WR28 Waveguide, (UG-599/U), 26.5 to 40 GHz
Models 6653B, 6659B, 6660B, 6663B, and 6669B: Ruggedized K Connector® female.
Model 6672B: WR19 Waveguide (UG–383/U Flange)
Test Parameter Data Entry: Frequency sweep time and power level are entered on keypad with up to 5 digit resolution or on continuous control knob. Entry is terminated by pressing appropriate unit (MHz, dB, mS, or GHz) pushbutton. Entry errors are cleared by pressing CLEAR ENTRY.
Reset Control: Returns controls to following conditions:
Frequency Range: Full
Trigger: Auto
Markers: M1 and M2 only on
RF: On
Level: Specified power level
Leveling: Internal
Sweep Time: 50 ms
CW, Marker, ΔF Frequencies: Varies with model number.

Shift Key: Activates dual function controls:
CW RAMP (horizontal output ramp)
CW FILTER (CW filter enable/disable)
DISPLAY OFF (blanks front-panel LEDs)
FULL (Blanks frequency display)
POWER SWEEP (sweeps output power)
EXTERNAL SWEEP (external sweep input)
RETURN TO LOCAL (address selection)
SELECTED MARKER OFF (removal of all markers).
Warranties: Two years on YIG oscillators, one year on instruments.
Dimensions: 133 H x 432 W x 476 D mm
(5.25 H x 17 W x 18.75 D in.)
Weight: 16 kg (35.4 lb.) maximum
Input Power: 100V/120V/220V/240V ±5%, –10%, selectable on rear panel, 48–63 Hz, 250 VA maximum
Operating Temperature Range: 0 to 55°C

Ordering Information

Frequency Ranges: Please see pages 72 and 73.
Options:
Rack Mounting, Option 1: Unit supplied with mounting ears and chassis track slide (90° tilt) installed
Attenuator, Option 2: Adds 10 dB step attenuator with 70 dB range. Output power is selected on keypad or control knob directly in dBm over an 82 dB range.

For Models With Upper Frequency Limit (GHz)	Order	
≤20	Option 2A	
26.5	Option 2B	
40	Option 2C	

Rear Panel RF Output, Option 9: Option 9S adds SMA female and Option 9N adds Type N female rear-panel RF output connector and deletes front-panel RF connector, degrading output power (typically 1 dB at 20 GHz), source SWR (typically 2 at >8 GHz), and power variation. Not available on units with upper frequency above 26.5 GHz
Auxiliary Rear Panel RF Connector, Option 10: Adds SMA female connector to rear panel, providing an attenuated (approximately –15 to –25 dBm) sample of the reduced RF output signal (typically 1.5 dB ≤20 GHz; 2 dB, >20 GHz). Not available on models with upper frequency limit above 26.5 GHz.
External Square Wave Input, Option 11: Adds rear-panel BNC connector for externally applied TTL-compatible signal which modulates RF at rates from dc to 50 kHz. On/Off ratio, typically 40 dB. Maximum input, ±20 volts. Accommodates ±6V square wave. Order for 6610B, 6616B, 6619B, 6619B–40, 6620B, 6624B, 6627B, 6628B, 6628B–50, 6630B, 6630B–50, 6631B, 6632B, 6636B, 6640B, 6640B-10, and 6672B. Standard on all others
Auxiliary Rear Panel RF Connector, Option 12: Adds SMA female connector to rear panel, providing an RF sample that is approximately 10 dB below output power.

Frequency Range (GHz)	Order	
2 to 20	Option 12A	
2 to 26.5	Option 12B	

Frequency Counter Interface, Option 13: Adds rear panel BNC connector to provide interface with HP 5343A counter for counting marker frequencies

Extender Board 660-D-8062–3

Transit Case 760-84

6600B/2 GPIB Retrofit Kit Provides field upgrade of GPIB interface to Model 6600B units

6600B Series Sweep Generator Specifications (Cont.)

Model	Frequency Range (GHz)	Output Power (25°C ±5°C)		Power Level Accuracy			Leveled Power Variation		Source SWR (Leveled Power)
		Internally Leveled Maximum (mW)	With Opt. 2, 70 dB Attenuator (mW)	Leveled (dB)	With Opt. 2, 70 dB Attenuator Add (dB)	Attenuator Accuracy Per Step (dB)	With Frequency (dB)	With Frequency Opt. 2, 70 dB Attenuator (dB)	
6669B	0.01 to 40	>3.1	>1.5	±2	±2.5	±1	±1.5	±2	1.5 (≤18 GHz) 1.7 (>18 GHz) 2 (>26.5 GHz)
6668B[6]		>10 (≤18 GHz) >4 (>18 GHz)	N/A	±1.5 N/A (>26.5 GHz)	N/A	N/A	±1 N/A (>26.5 GHz)[1]	N/A	1.5 (≤18 GHz) 1.7 (>18 GHz) N/A (>26.5 GHz)[1]
6659B	0.01 to 26.5	>10 (≤18 GHz) >5 (>18 GHz)	>5 (≤18 GHz) >2 (>18 GHz)	±1.5	±2.0	±0.7	±1.0	±1.5	1.5 (≤18 GHz) 1.7 (>18 GHz)
6647B 6647B-40	0.01 to 20	>10 >40	>6.6 >26.3	±1	±1.5	±0.4	±0.6	±1.5	1.5
6645B 6645B-40	0.01 to 18	>10 >40	>6.6 >26.3	±1	±1.5	±0.4	±0.6	±1.5	1.5
6622B 6622B-40	0.01 to 12.4	>10 >40	>7.4 >29.5	±1	±1.5	±0.4	±0.5	±1.4	1.5
6617B 6617B-40	0.01 to 8	>10 >40	>7.9 >31.6	±0.9	±1	±0.4	±0.5	±1	1.5
6609B 6609B-50	0.01 to 2	>20 >50	>17.8 >44.5	±0.6	±0.8	±0.3	±0.3	±0.8	1.3
6610B	1 to 2	>20	>17.8	±1	±1.5	±0.4	±0.3	±0.5	1.3
6616B	1.7 to 4.3	>10	>7.8	±1	±1.5	±0.4	±0.4	±0.7	1.2
6663B	2 to 40	>3.1	>1.5	±2	±2.5	±1	±1.5	±2	1.5 (≤18 GHz) 1.7 (>18 GHz) 2 (>26.5 GHz)
6662B[7]		>10 (≤18 GHz) >4 (>18 GHz)	N/A	±1.5 N/A (>26.5 GHz)	N/A	N/A	±1 N/A (>26.5 GHz)	N/A	1.5 (≤18 GHz) 1.7 (>18 GHz) N/A (>26.5 GHz)
6653B	2 to 26.5	>10 (≤18 GHz) >5 (>18 GHz)	>5 (≤18 GHz) >2 (>18 GHz)	±1.5	±2.0	±0.7	±1.0	±1.5	1.5 (≤18 GHz) 1.7 (>18 GHz)
6637B 6637B-40	2 to 20	>10 >40	>6.6 >26.3	±1	±1.5	±0.4	±0.5	±1.5	1.5
6635B 6635B-40	2 to 18	>10 >40	>6.6 >26.3	±1	±1.5	±0.4	±0.5	±1.5	1.5
6621B 6621B-40	2 to 12.4	>10 >40	>7.4 >29.5	±1	±1.5	±0.4	±0.5	±1.4	1.5
6619B 6619B-40	2 to 8	>10 >40	>7.9 >31.6	±1	±1.5	±0.4	±0.4	±0.9	1.5
6620B	3.6 to 6.5	>20	>15.6	±1	±1.5	±0.4	±0.3 (±0.03 dB/30 MHz)	±0.8	1.5
6624B	4 to 8	>10	>7.8	±1	±1.5	±0.4	±0.4	±0.9	1.5
6627B	5.9 to 9.0	>10	>7.8	±1	±1.5	±0.4	±0.3	±0.8	1.5
6628B 6628B-50	8 to 12.4	>10 >50	>7.4 >37.2	±1	±1.5	±0.4	±0.4	±0.9	1.5
6629B 6629B-40	8 to 20	>10 >40	>6.6 >26.3	±1	±1.5	±0.4	±0.5	±1.5	1.5
6631B	10 to 15.5	>10	>7	±1	±1.5	±0.4	±0.4	±0.9	1.5
6630B 6630B-50	12.4 to 20	>10 >50	>6.6 >33.9	±1	±1.5	±0.4	±0.5	±1	1.5
6660B	12.4 to 40	>4	>2	±2	±2.5	±1	±1.5	±2	1.5 (≤18 GHz) 1.7 (18-26.5 GHz) 2 (>26.5 GHz)
6632B	17 to 22	>5	>3.2	±1	±3	±0.7	±0.8	±2.3	1.7
6636B	18 to 26.5	>3.1	>1.2	±1	±3	±0.7	±1	±2.5	1.7
6640B 6640B-10	26.5 to 40	>1[1] >10	N/A >5	N/A ±1	N/A æ2	N/A ±1	N/A ±1	N/A ±2	N/A 2.0
6672B	40 to 60	>1[1]	N/A	N/A	N/A	N/A	N/A	N/A	N/A

[1]External leveling only [2]Excluding 5% band edges where specification is >20 dBc [3]Measured in 30 Hz-15 kHz bandwidth [4]Subharmonics [5]At 25°C

Source SWR With Opt., 2.70 dB Attenuator	Signal Purity			Frequency Accuracy[5]		Frequency Stability				Model
	Harmonics (dBc)	Non-Harmonics (dBc)	Residual FM[3] (kHz peak)	Cw Mode (MHz)	Sweep Mode ≤50 MHz (MHz)	With Temperature (MHz/°C)	With 10 dB Power Level Change (kHz)	With 3:1 Load SWR (kHz)		
1.25 (<8 GHz) 1.45 (8-12.4 GHz) 1.6 (12.4-20 GHz) 1.8 (20-26.5 GHz) 2.1 (26.5-40 GHz)	<–30 (<2 GHz) <–40 (2-26.5 GHz) <–30 (>26.5 GHz)[2]	<–40 (≤2 GHz) <–60 (>2 GHz)	<7 (<8 GHz) <10 (8-18 GHz) <15 (18-26.5 GHz <20 (>26.5 GHz)	±20	±30	±1 (≤26.5 GHz) ±2 (>26.5 GHz)	±500	±300		6669B 6668B[6]
1.7 (≤12.4 GHz) 2 (>12.4 GHz)	<–30 (<2 GHz) <–40 (>26.5 GHz)	<–40 (≤2 GHz) <–60 (>2 GHz)	<7 (<8 GHz) <10 (8-18 GHz) <15 (>26.5 GHz)	±20	±30	±1 (≤2 GHz) ±0.5 (>2 GHz)	±500	±300		6659B
1.7 (≤12.4 GHz) 2 (>12.4 GHz)	<–30 (≤2 GHz) <–40 (>2 GHz) <–20 (≤2 GHz) <–25 (>2 GHz)	<–40 (≤2 GHz) <–60 (>2 GHz)	<7 (≤8 GHz) <10 (>8 GHz)	±10	±15	±1 (≤2 GHz) ±0.5 (>2 GHz)	±500	±300		6647B 6647B-40
1.5 (<8 GHz) 1.6 (8-12.4 GHz) 1.8 (>12.4 GHz)	<–30 (≤2 GHz) <–40 (>2 GHz) <–20 (≤2 GHz) <–25 (>2 GHz)	<–40 (≤2 GHz) <–60 (>2 GHz)	<7 (≤8 GHz) <10 (>8 GHz)	±10	±15	±1 (≤2 GHz) ±0.5 (>2 GHz)	±500	±300		6645B 6645B-40
1.5	<–30 (≤2 GHz) <–40 (>2 GHz) <–20 (≤2 GHz) <–25 (>2 GHz)	<–40 (≤2 GHz) <–60 (>2 GHz)	<7 (≤8 GHz) <10 (>8 GHz)	±10	±15	±1 (≤2 GHz) ±0.5 (>2 GHz)	±500	±300		6622B 6622B-40
1.5	<–30 (≤2 GHz) <–40 (>2 GHz) <–20 (≤2 GHz) <–25 (>2 GHz)	<–40 (≤2 GHz) <–60 (>2 GHz)	<7	±5	±10	±1 (≤2 GHz) ±0.5 (>2 GHz)	±100	±100		6617B 6617B-40
1.5	<–30 <–20	<–40	<7	±5	±10	±1	±100	±100		6609B 6609B-50
1.5	<–30[2]	<–60	<7	±10	±15	±0.5	±500	±300		6610B
1.5	<–20 (<2.26 GHz) <–30 (≥2.26 GHz)	<–60	<7	±10	±15	±0.5	±500	±300		6616B
1.25 (<8 GHz) 1.45 (8-12.4 GHz) 1.6 (12.4-20 GHz) 1.8 (20-26.5 GHz) 2.1 (26.5-40 GHz)	<–40 (2-26.5 GHz) <–30 (>26.5 GHz)[2]	<–60	<7 (<8 GHz) <10 (8-18 GHz) <15 (18-26.5 GHz <20 (>26.5 GHz)	±20	±30	±1 (≤26.5 GHz) ±2 (>26.5 GHz)	±500	±300		6663B 6662B[7]
1.7 (≤12.4 GHz) 2 (>12.4 GHz)	<–40	<–60	<7 (<8 GHz) <10 (8-18 GHz) <15 (>8 GHz	±20	±30	±1	±500	±300		6653B
1.7 (≤12.4 GHz) 2 (>12.4 GHz)	<–40 <–25	<–60	<7 (<8 GHz) <10 (>8 GHz)	±10	±15	±0.5	±500	±300		6637B 6637B-40
1.5 (<8 GHz) 1.6 (8-12.4 GHz) 1.8 (>12.4 GHz)	<–40 <–25	<–60	<7 (<8 GHz) <10 (>8 GHz)	±10	±15	±0.5	±500	±300		6635B 6635B-40
1.5 (<8 GHz) 1.6 (8-12.4 GHz)	<–40 <–25	<–60	<10	±10	±15	±0.5	±500	±300		6621B 6621B-40
1.5	<–40 <–25	<–60	<7	±10	±15	±0.5	±100	±100		6619B 6619B-40
1.5	<–40	<–60	<7	±10	±15	±0.5	±500	±300		6620B
1.5	<–30[2]	<–60	<7	±10	±15	±0.5	±500	±300		6624B
1.8	<–40	<–60	<10	±10	±15	±0.5	±500	±300		6627B
1.8	<–40 <–25	<–60	<10	±10	±15	±0.5	±500	±300		6628B 6628B-50
1.6 (≤12.4 GHz) 1.8 (>12.4 GHz)	<–40 <–25	<–60	<10	±10	±15	±0.5	±500	±300		6629B 6629B-40
1.8	<–40	<–60	<10	±10	±15	±0.5	±500	±300		6631B
1.8	<–32 <–25	<–60	<10	±10	±15	±0.5	±500	±300		6630B 6630B-50
N/A	<–40 (≤26.5 GHz) <–20 (>26.5 GHz)	<–60	<10 (<18 GHz) <15 (18-26.5 GHz) <20 (>26.5 GHz)	±20	±30	±1 (≤26.5 GHz) ±2 (>26.5 GHz)	±300	±300		6660B
2	<–40	<–60	<10	±15	±25	±1	±500	±300		6632B
2	<–40	<–60	<30	±15	±25	±2	±500	±300		6636B
N/A	<–30[2]	<–60	<40	±20	±30	±2	±500	±300		6640B 6640B-10
N/A	<–20[4]	<–60	<50	±30	±45	±3	N/A	±300		6672B

[6]Dual outputs: 0.01-26.5 GHz and 26.5-40 GHz [7]Dual outputs: 2-26.5 GHz and 26.5-40 GHz