

# Agilent Technologies 8370 Series Synthesized Sources 10 MHz to 20 GHz



**Performance**  
**Price**  
**Reliability**



**Agilent Technologies**  
Innovating the HP Way

# The Agilent 8370 family provides excellent performance...

## Family platform

The affordable Agilent 8370 family (83750, 83730 and 83710 families) of microwave sources provide turnkey signal simulation of real-world signals. The family consists of sweepers for component test, signal generators for receiver test, and CW generators for local oscillator/exciter applications. The 8370 signal generators are compatible with the 8970B noise figure meters and the 83550 millimeter-wave source modules.

The signal generators offer a wide variety of modulation formats including phase modulation for satellite and radar applications. The sweepers provide a fully phase-locked analog sweep that combine accuracy and speed for component test, including filters.

The 8370 series also promote ease of use through common instrument design, user interface and programming codes.

## More capability than ever

The state-of-the-art 83730B (83732B and 83731B) signal generators and the 83710B (83712B and 83711B) CW generators now offer:

- Phase modulation for satellite radar applications
- Linear AM for group delay measurements
- -110 dB step attenuator (Option 1E1) for sensitivity measurements
- Seven convenient FM sensitivity ranges
- Internal modulation source for internal AM, FM and phase modulation capability
- Language mode that emulates most 8673 synthesized signal generators commands for retrofitability.

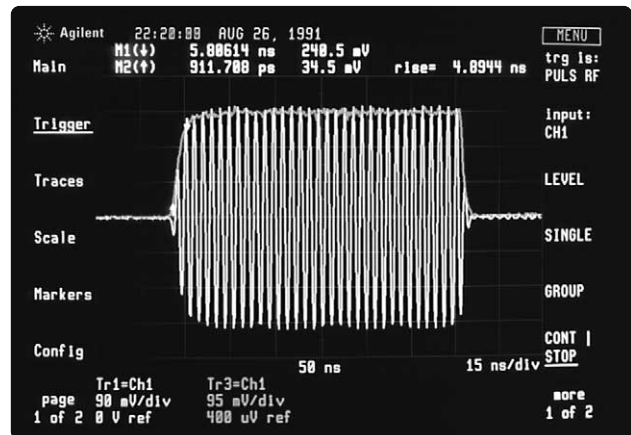


## Improve productivity

Spent time measuring test devices, not investigating signal source spurs. A new broadband fundamental oscillator design generates signals up to 20 GHz, with very low harmonics and no subharmonics.

## Overcome system losses

8370 sources have the power to overcome path losses from system components and drive high power devices. The output power provided is typically greater than +13 dBm to 20 GHz, with excellent flatness and accuracy. The user level-correction feature enhances these capabilities by extending the excellent performance of the source to a remote test port.



## Internally generate pulses

Standard built-in pulse modulators allow 8370 signal generators and sweepers to provide the pushbutton pulse performance your application requires.

## Standardize programming commands

Standard Commands for Programmable Instruments (SCPI) are standard on all 8370 sources. SCPI promote programming compatibility among test equipment suppliers, and lessens future software support problems.

## Versatile, lightweight and portable

The 8370 sources weigh only 35 lbs each and can easily be moved around in the field, lab or manufacturing environments. Optional packaging adds a tilt bail handle, front panel cover and rubberized bumper guard and feet.

# ...at affordable prices

## 8370 synthesized microwave source family

Models		Key features	Applications
<b>CW Generators</b>	83711B 83712B	1 to 20 GHz 0.01 to 20 GHz	<ul style="list-style-type: none"> <li>- &lt;-150 dBm/Hz broadband noise floor</li> <li>- &lt;-50 dBc harmonics, &lt;-60 dBc spurious, no subharmonics</li> <li>- &gt;+10 dBm output power with excellent accuracy and flatness</li> <li>- User flatness (level) power correction</li> <li>- Phase noise, typically &lt;-82 dBc at 10 GHz with 10 kHz offset; decreases 6 dB/octave below 500 MHz</li> </ul>
<b>Signal Generators</b>	83731B 83732B	1 to 20 GHz 0.01 to 20 GHz	<p><b>All the performance of the CW generator plus:</b></p> <ul style="list-style-type: none"> <li>- Multimode internal pulse modulation</li> <li>- High-performance pulse modulation, typically &lt;5 ns rise/fall times</li> <li>- High modulation index FM (&gt;300)</li> <li>- Fully independent AM, FM and pulse modulation</li> <li>- Simultaneous pulse modulation and log AM with &gt;60 dB depth</li> <li>- Linear AM</li> <li>- Analog phase modulation (Option 800)</li> </ul>
<b>Sweepers</b>	83751A 83752A	2 to 20 GHz 0.01 to 20 GHz	<ul style="list-style-type: none"> <li>- Fully synthesized swept frequency accuracy</li> <li>- &gt;+10 dBm output power with &lt;45 dBc harmonics</li> </ul>
<b>High-power models</b>	83751B 83752B	2 to 20 GHz 0.01 to 20 GHz	<ul style="list-style-type: none"> <li>- Excellent power accuracy and flatness</li> <li>- User flatness (level) power correction</li> <li>- 25 dB power sweep range</li> <li>- Optional mm-wave source module interface</li> <li>- +17 dBm specified leveled output power<sup>1</sup></li> </ul>

1. +17 dBm is only specified for the 83751B/83752B high-power sweepers

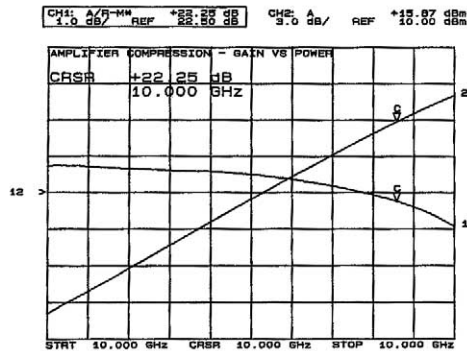
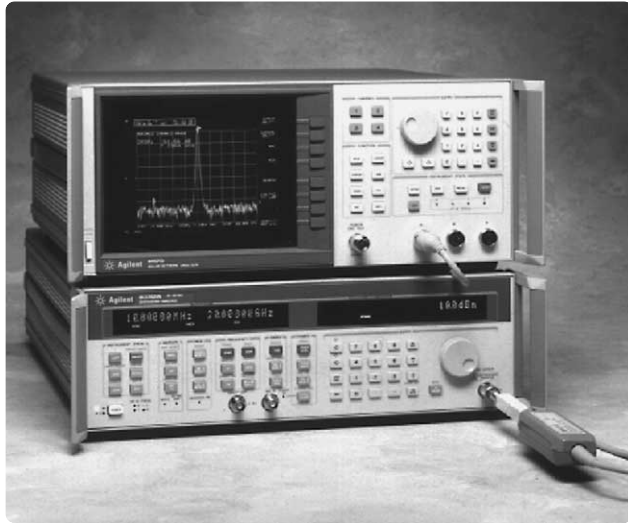
### Low cost of ownership

The 8370 sources are surprisingly affordable. Exceptional stability minimizes maintenance costs, by requiring fewer calibrations and adjustments. High reliability extends the estimated mean time between failures to >20,000 hours; that's eight hours a day, five days a week for nearly ten years!

### 8370 specification summary

	Frequency Range	Output Power	Harmonics	Modulation	Broadband Noise
<b>CW Generators</b>	1 to 20 GHz 0.01 to 20 GHz	+10 dBm	<-50 dBc	none	<-150 dBm/Hz
<b>Signal Generators</b>	1 to 20 GHz 0.01 to 20 GHz	+10 dBm	<-55 dBc	Log AM, Linear AM High index FM, FM Extensive pulse	<-150 dBm/Hz
<b>Sweepers</b>	2 to 20 GHz 0.01 to 20 GHz	+10 dBm +17 dBm ("B" models)	<-45 dBc <-20 dBc ("B" models)	Simple AM, FM and pulse	not specified

# 8370 sweepers...



## Tune real-time with synthesized precision

8370 synthesized sweepers set new standards for fast, accurate measurements with sweeps that are fully synthesized over any frequency span. Filter tuning can be achieved in real time with greater measurement confidence and throughput. The swept frequency accuracy of 8370 sweepers is typically 10 to 100 times better than traditional open-loop (analog) sweepers.

## Multiple sweep modes provide measurement flexibility

Choose between fast, continuous analog sweeps for interactive tuning or stepped sweeps for more accurate discrete frequency measurements. Use marker sweep to expand a specific portion of the test device response such as the passband of a filter, without changing source parameters. Simplify amplifier and mixer compression testing by using the 25 dB power sweep range to drive the test device from linear operation to saturation.

## Expand dynamic range, reduce uncertainty

8370 sweepers provide signals with typically  $>+13$  dBm output power,  $<-50$  dBc harmonics above 2 GHz and no subharmonics. This performance improves the spurious-free measurement dynamic range, which is essential for filter and switch characterization. Spectrally clean signals also improve the accuracy of amplifier measurements and reduce the effects of unwanted intermodulation products in mixer testing.

## Quickly identify critical test frequencies

Ten independent, continuously variable frequency markers and versatile marker functions, allow fast analysis of a device response at or between critical measurement frequencies.

## Ideal scalar companion

The excellent performance of 8370 sweepers improve the measurement accuracy of 8757D scalar test systems. These sweepers provide the superior swept frequency accuracy that is crucial for characterizing very narrow band devices such as crystal or SAW (surface acoustic wave) filters. The improved power accuracy and flatness more accurately measure amplifier gain, gain flatness, compression, and output power. Use alternate sweep to optimize amplifier gain flatness and maximum output power at one dB compression points. It allows simultaneous measurement and adjustment of gain versus frequency, and output power versus input power.

8370 sweepers also provide square-wave modulated RF for use with the AC detection mode of the analyzer. AC detection reduces the effects of broadband noise, thermal drift and other unmodulated signals that can degrade measurement performance. Mixer test systems can improve measurement accuracy by square-wave modulating only the RF signal. Only the portion of the resulting intermediate frequency (IF) within the modulation envelope is detected, so errors from the unmodulated local oscillator (LO) such as LO feedthrough are eliminated.

# ...synthesized performance at sweeper prices

## Eliminate external amplification

High power models, 83751B/ 83752B sweepers, provide +17 dBm leveled output power to overcome system losses and drive high performance amplifiers and mixers.

## Precisely control test port power

8370 sweepers offer extremely flat and accurate output power levels, typically  $< \pm 0.4$  dB. Amplifier designers and manufacturers can use this excellent performance to characterize the linear response of their test devices at power levels just below saturation. In addition, user flatness correction extends the power accuracy and flatness of the source to a remote test port. This overcomes power variations created by components between the source output port and the amplifier under test. A different user flatness-correction table can be stored in each of the nine internal save/recall registers.

## Economically extend coverage to 110 GHz

Use high-power 8370 sweepers to directly drive the 83550 series mm-wave source modules. They provide banded frequency coverage from 26.5 to 110 GHz in waveguide. All 8370 sweepers with Option 1EE (mm-wave connector and cable) extend user-flatness and power-level control to the source module output. Standard 8370 sweepers (83751A/83752A) require an external amplifier such as the 8349B to drive a source module at the specified power level.

## Internally generate pulses

Characterize the pulsed performance of your device or avoid overheating high-power amplifiers with the simple internal pulse modulation capabilities of 8370 sweepers.

## Ideal stimulus for mixer characterization

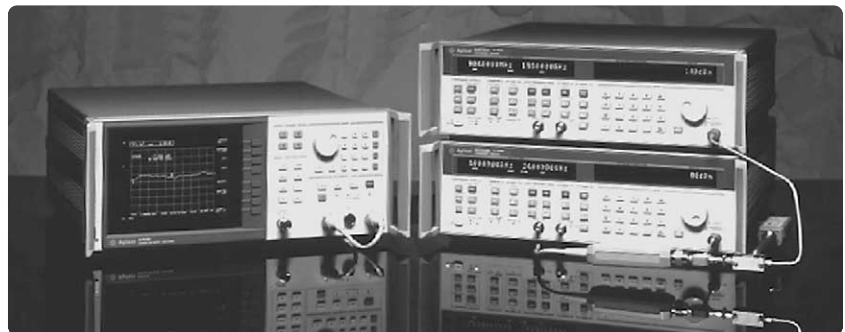
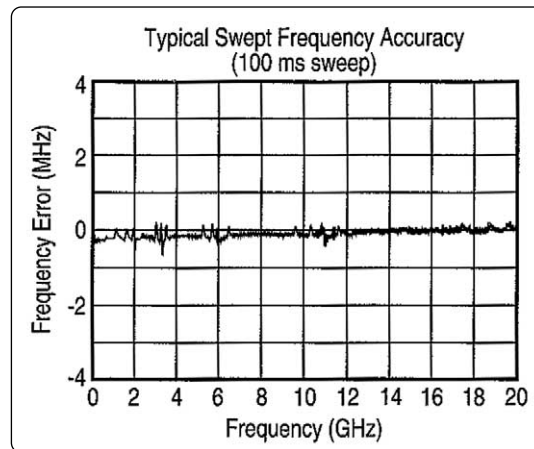
Use two synchronously tracking 8370 sweepers to eliminate tedious point-by-point CW mixer measurements. The excellent swept-frequency accuracy allows mixer manufacturers to precisely control fixed or swept intermediate frequencies (IF) at the mixer output.

The frequency accuracy of the measured IF is equivalent to the sum of the accuracies of the individual sweepers. The following plot displays the typical swept frequency for a full-band 100 ms sweep.

Easily configure the 8370 sweepers to characterize mixers with near-CW measurement precision, in a fraction of the time.

## System compatibility

8370 sweepers are fully compatible with 8757A/C/D/E scalar network analyzers, 8970B noise figure meter and 83550 series mm-wave source modules. Two programming languages, either SCPI or 8350 compatibility protect your programming investment.



**Internal Pulse Generator**

Pulse modulate your test device with <2 ms pulse widths and rise/fall times typically <100 ns.

**Multiple Sweep Modes**

Analog (ramp), stepped, and manual sweep modes provide application flexibility.

**User Preset**

Return the instrument to the same user-defined conditions every time preset is selected.



**10 Storage Registers**

Save/recall up to 10 front-panel states.

**Wide Power Range**

Set power from +10 dBm to -110 dBm with 0.01 dB resolution.

**Low Broadband Noise**

Improve receiver sensitivity testing with broadband noise <-150 dBm/Hz.



### Power Sweep

Compression test your device with a 25 dB power sweep range.

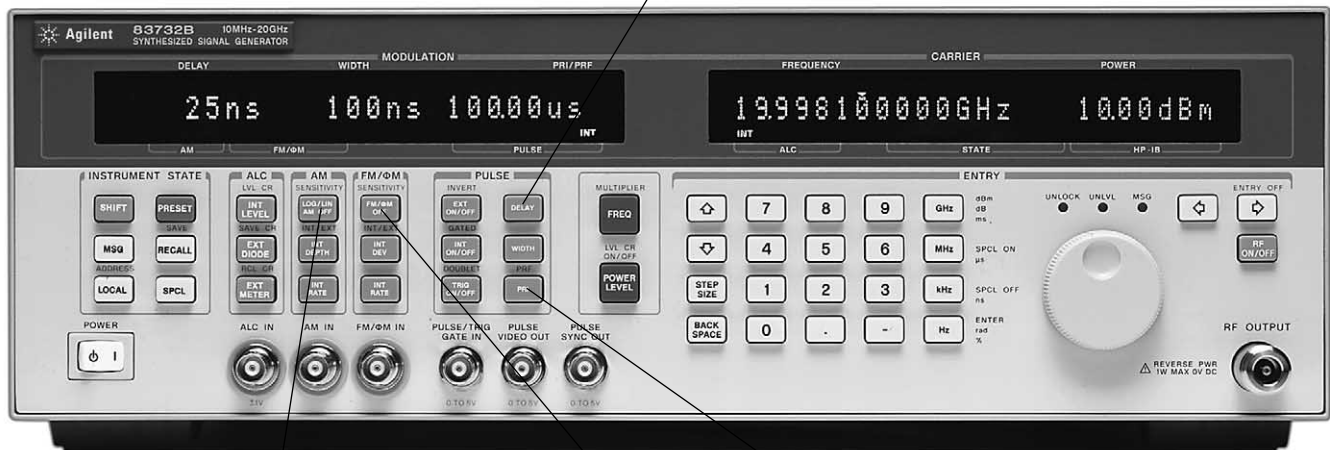
### User Flatness Correction

Compensate for power variations and losses between the source output and the test device. Store up to 9 correction arrays in the storage registers.



### Excellent Pulse Performance

State-of-the-art pulse modulator generates pulses <25 ns wide with rise and fall times <10 ns. Set pulse width, delay and PRI/PRF with synthesized accuracy.



### Built-in Pulse

Pulse modulate your receiver with one of four internal modes: free-run, triggered with delay, doublet and gated.

### Logarithmic AM

>60 dB depth at any attenuator setting promotes compression testing or antenna scan simulation.

### Linear AM

Maximum depth 90% for group-delay testing.

### High Modulation Index FM

Simplify simulation of frequency chirped and telemetry signals with >300 FM modulation indices.

### Phase Modulation

Low and wide deviation for satellite and other applications.

# 8370 signal generators...

## High-performance in low band

Due to the use of divider technology the signal generators low band (0.01 to 1 GHz) can test communications receivers at both IF and RF frequencies. Now manufacturers can use one microwave source where they have used two in the past. Unlike other sources that have degraded performance in the low band, the architecture of the 83730B improves phase noise, harmonics and residual FM in its low band.

## Radar receiver test

The signal generators provide modulation schemes to simulate a wide range of real-world threats, which is important in radar applications. For example, the source provides scan modulation to simulate the signals received by a scanning antenna. These signal generators have superior scan modulation with their 60 dB log AM depth, 50 dB step response of <5 us and unmatched pulse performance.

The synthesized source provides a variable time delay internal pulse feature. This feature can be externally triggered for simulation and calibration of the range resolution of a pulse radar.

The 83730B family also provides a low-rate, high modulation index FM to simulate a frequency stable chirp signal. This chirp signal is used to improve a radar's range resolution.

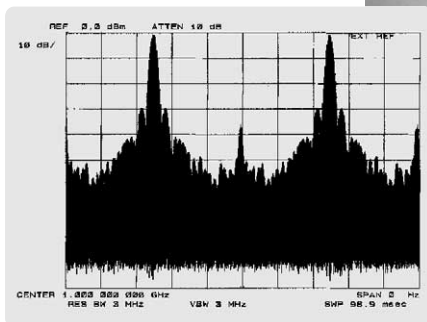
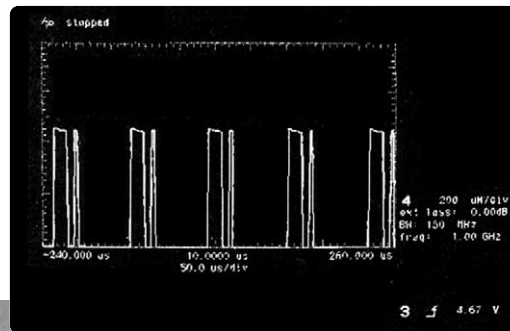
Many radars use Barker codes to achieve more accurate signal processing in the presence of noise and clutter. Above 2 GHz and at modulation rates below 200 kHz, the 83730B phase modulation (Option 800) allows simulation of Barker codes (with the use of the appropriate external modulation source like the 33120A function/arbitrary waveform source).

In a radar environment, background clutter and a noise increase the probability of false alarms. The Agilent signal generators provide low spurious signals and low phase noise for reducing these false alarms.

## Electronic warfare receivers

To be effective, an electronic warfare receiver must detect multiple targets clustered together, and identify two separate targets that are closely spaced in time. The 83730B provides a high performance pulse that can be externally triggered. This means sources can be combined to simulate multiple targets clustered together (pulse on pulse). The synthesizer also provides pulse doublets to test how fast the EW receiver recovers after detection of one target (recovery time).

EW receivers need low-level sensitivity to detect and characterize low-level threat signals. These signal generators provide a calibrated -110 dBm signal (Option 1E1) for measuring an EW receiver sensitivity. The Agilent signal generators also provide low video feed through to accurately characterize the EW receiver's sensitivity (power and frequency).





## ...all you need from a receiver test stimulus

EW receivers need to provide an accurate bearing and speed of the threat targets. The 83730B provides analog phase modulation for characterizing the angle of approach and speed of threat targets.

Many threat signals processed by an EW receiver are radar signals that can be simulated by the 83730B.

### Microwave communication

The 83730B synthesized signal generator simulates a wide variety of signals used in communication applications such as microwave radio links, wireless CATV, wireless LAN, PTT, service providers, and military communications.

The 83730B provides wideband FM, analog phase modulation, linear/log AM, pulse modulation and scan modulation for simulating communications traffic, telemetry tones, scanning antenna and others.

For simulating communications data the signal generator provides PSK or FSK with the use of an external generator for simulating communications data.

The signal generator also provides low single-sideband phase noise, non-harmonically related spurs, and a calibrated low-level output for more accurate out-of-channel tests, dynamic range measurements, and low-level sensitivity measurements.

### Automotive to education

The Agilent signal generators provide value in a variety of other applications like automotive electronics, surveillance, and education.

The ITS (intelligent transportation system), for example, may be segmented into communication and control. The communications aspects of ITS, which include navigation systems, RFID and automatic debiting systems, have the test requirements as microwave communications described earlier.

The control aspect of ITS includes collision avoidance and automatic cruise control and demands the same radar test features already mentioned for radar applications. ITS control also benefits from the full set of features of the 83730/10B.

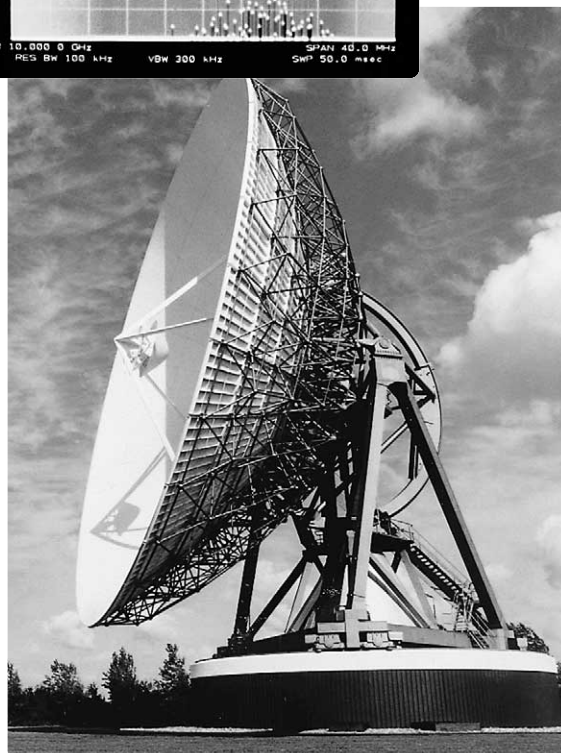
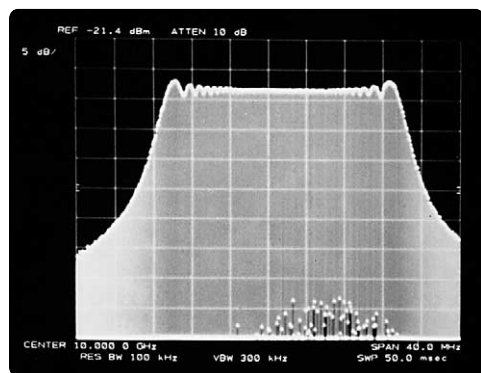
For testing surveillance receivers, and in educational settings, users will find the 83730/10B architecture and the user interface very user friendly and easy to automate.

### Satellite communication

From subsystem test through manufacturing to post-launch tests, the 83730B signal generators and 83710 CW generators offer a wide range of capabilities. They provide wide-band FM and high-modulation index FM capability for simulating telemetry tones. By using an external modulation source, these same features allow you to do frequency or phase shift keying to simulate satellite communication traffic.

The 83730Bs provide phase modulation for modulating multiplexed sub-carriers onto the signal, which is then used for simulating satellite data. The Agilent signal generators provide linear amplitude modulation for measuring group delay in pre- and post-launch phases of satellite test.

The 83730Bs also provide user flatness correction, and low single-sideband phase noise for measuring linearity, fidelity, compression and out-of-channel tests.



# 8370 CW generators...low-cost solutions for exciter and local oscillator applications

## Ideal exciter/local oscillator

Whether exciting a TWT amplifier, or driving a local oscillator input in a communications subsystem, the 8370 CW generators provide the performance you need to accurately characterize the test device.

Broad 20 GHz coverage simplifies the measurement configuration, since only one source is required to span the entire range of the device. A choice of frequency ranges, 1 to 20 GHz (83711B) and 10 MHz to 20 GHz (83712B) allow you to match the coverage to your application requirements.

High output power (+ 10 dBm), provides the required drive level for high-performance mixers and amplifiers. Low close-in phase noise, typically <-82 dBc/ Hz at 10 kHz offsets for 10 GHz signals, and low spurs (typically <-60 dBc) increase measurement accuracy. In addition, the 83712B extends this excellent spectral performance to 10 MHz, and improves the close-in stability (residual FM and phase noise) below 1 GHz.

## Increase measurement sensitivity

Broadband noise from the local oscillator can significantly degrade measurement sensitivity and accuracy by appearing at the output of the test device. The exceptionally low noise floor (<-150 dBm/Hz at all specified power levels >1 GHz;) of 8370 CW generators eliminates this problem and provides worry-free measurements.

## Improve accuracy of noise figure systems

Since noise figure meters will detect any signals in their passband, they are particularly susceptible to the negative effects of broadband noise and spurious signals from the local oscillator. This is not an issue with 8370 CW generators—their excellent performance actually improves the accuracy of noise figure measurement systems. Fully compatible with the 8970B noise figure meter, 8370 CW generators are the recommended local oscillators for these measurement systems.





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