

SIGNAL GENERATORS

High-Performance RF (cont'd)

HP 8662A, 8663A

SSB broadband noise floor in 1 Hz BW at 3 MHz offset from carrier: < -146 dBc for f_c between 120 and 640 MHz at output levels above +10 dBm.

Spurious signals

	Frequency Range (MHz)				
	0.01 to 120	120 to 160	160 to 320	320 to 640	640 to 1280
Spurious non-harmonically related ^{1,2}	-90 dBc	-100 dBc	-96 dBc	-90 dBc	-84 dBc
Sub-harmonically related ($\frac{1}{2}, \frac{3f}{2}$, etc.)	none	none	none	none	-75 ³ dBc
Power-line (60 Hz) related or microphonically generated (within 300 Hz) ⁴	-90 dBc	-85 dBc	-80 dBc	-75 dBc	-70 dBc
Harmonics	< -30 dBc				

Output

Level range: +13 to -139.9 dBm (1V to 0.023 μ V_{rms} into 50 Ω)

Resolution: 0.1 dB

Absolute level accuracy (+15° to +45° C): ± 1 dB between +13 and -120 dBm, ± 3 dB between -120 and -130 dBm

SWR: Typically from 1.5 to 1.8, depending on output level and frequency

Reverse power protection: Typically up to 30 W or ± 8 Vdc

Amplitude Modulation

Depth: 0 to 95% at output levels of +8 dBm and below (+10 dBm in uncorrected mode). AM available above these output levels but not specified.

Resolution: 1%, 10 to 95% AM; 0.1%, 0 to 9.9% AM.

Incidental PM (at 30% AM): 0.15 to 640 MHz, < 0.12 radian peak; 640 to 1280 MHz, < 0.09 radian peak.

Incidental FM (at 30% AM): 0.15 to 640 MHz, $< 0.12 \times f_{mod}$; 640 to 1280 MHz, $< 0.09 \times f_{mod}$.

Indicated accuracy: $\pm 5\%$ of reading $\pm 1\%$ AM. Applies for rates given in table below, internal or external mode, for depths $\leq 90\%$.

Rates and distortion with internal or external modulating signal:

Frequency Range	AM Distortion			
	AM rate	0 to 30% AM	30 to 70% AM	70 to 90% AM
0.15 to 1 MHz	dc to 1.5 kHz	2%	4%	5.75%
1 to 10 MHz	dc to 5 kHz	2%	4%	5.75%
10 to 1280 MHz	dc to 10 kHz	2%	4%	5.75%

Frequency Modulation

FM rates (1 dB bandwidth): External ac, 20 Hz to 100 kHz; external dc, dc to 100 kHz.

FM deviation: 25 to 200 kHz, depending on carrier frequency.

Indicated FM accuracy: $\pm 8\%$ of reading plus 10 Hz (50 Hz to 20 kHz).

FM resolution: 100 Hz for deviations < 10 kHz, 1 kHz for deviations ≥ 10 kHz.

Incidental AM (AM sidebands at 1 kHz rate and 20 kHz deviation): < -72 dBc, $f_c < 640$ MHz; < -65 dBc, $f_c \geq 640$ MHz.

FM distortion: $< 1.7\%$ for rates < 20 kHz, $< 1\%$ for rates < 1 kHz.

Center frequency accuracy and long-term stability in AC mode: Same as CW mode.

Supplemental Characteristic

Frequency-switching speed:⁵ From 420 μ s to 12.5 ms, depending on the programming mode.

HP 8663A Specifications

The HP 8663A Signal Generator is related to the HP 8662A in both concept and structure. The HP 8662A concept of an extremely low phase noise signal source, incorporating signal generator modulation capabilities and output characteristics, is carried even further by the HP 8663A. While maintaining high spectral purity, the HP 8663A offers increased frequency range to 2560 MHz, increased output level to +16 dBm, and the addition of phase and pulse modulation. The result is a highly flexible and powerful signal generator that utilizes and extends the proven circuitry of the HP 8662A. Thus, the HP 8662A and HP 8663A share many of the same specifications.

Frequency

Range: 100 kHz to 2560 MHz (2559.9999996 MHz)

Resolution: 0.1 Hz ($f_c < 640$ MHz)

0.2 Hz ($640 \text{ MHz} \leq f_c < 1280 \text{ MHz}$)

0.4 Hz ($f_c \geq 1280 \text{ MHz}$)

Accuracy, stability, and internal reference oscillator: Identical to HP 8662A.

Spectral Purity

(see HP 8662A specifications)

Spurious signals: Identical to HP 8662A, except that for f_c between 1280 and 2560 MHz the spurious non-harmonics are -78 dBc; the sub-harmonically related ($f/2, 3f/2$, etc.) between 640 and 1280 MHz are -70 dBc and between 1280 and 2560 MHz are -40 dBc; and the power-line (60 Hz) or microphonically generated spurious are -65 dBc.

Harmonics: < -30 dBc, $\leq +13$ dBm output, < -25 dBc, +13 dBm to +16 dBm output, $f_c < 1280$ MHz; < -25 dBc, $f_c \geq 1280$ MHz.

Output

Level range: +16 dBm to -129.9 dBm

Resolution: 0.1 dB

Absolute level accuracy (+15° to +45° C): ± 1 dB, +16 dBm to -119.9 dBm; ± 3 dB, -120 dBm and below

SWR: < 1.5

Amplitude Modulation

Depth: 0 to 95% at levels of +10 dBm and below

Resolution: 0.1%

Incidental FM (at 30% AM): Identical to HP 8662A except: $< 0.3 \times f_{mod}$ for 1280 $\leq f_c < 2560$ MHz

Indicated accuracy: $\pm 6\%$ of reading $\pm 1\%$ AM (400 Hz and 1 kHz, depth 90%)

AM bandwidth (1dB):

DC to > 1.5 kHz, 0.15 MHz $\leq f_c < 1$ MHz; dc to > 5 kHz, 1 MHz $\leq f_c \leq 10$ MHz; dc to > 10 kHz, $f_c > 10$ MHz: external dc coupling. External ac coupling or internal; low-frequency coupling is 20 Hz.

Distortion (400 Hz and 1 kHz): $< 2\%$ (0 to 30% AM); $< 4\%$ (30 to 70% AM); $< 6\%$ (70 to 90% AM).

Frequency Modulation

FM rates (1 dB bandwidth): External ac, 20 Hz to 100 kHz, external dc, dc to 100 kHz.

Maximum allowable peak deviation: Identical to HP 8662A for f_c between 100 kHz and 1280 MHz. Up to 400 kHz for f_c between 1280 and 2560 MHz.

Indicated FM accuracy (50 Hz to 20 kHz): $\pm 9\%$ of setting +10 Hz.

FM resolution: 100 Hz to 1 kHz, depending on f_c and deviation setting.

Incidental AM (AM sidebands at 1 kHz rate and 20 kHz deviation): < -72 dBc ($10 \leq f_c < 640$ MHz); < -65 dBc ($640 \leq f_c < 2560$ MHz).

FM distortion: $< 1.25\%$ (400 Hz and 1 kHz rates); $< 1.75\%$ (rates less than 20 kHz).

Phase Modulation (Option 002)

Maximum peak phase deviation: From $\pm 25^\circ$ for f_c between 120 and 160 MHz to $\pm 400^\circ$ for f_c between 1280 and 2560 MHz.

Maximum rate: From 10 kHz for f_c between 0.15 and 10 MHz to 10 MHz for f_c between 250 and 2560 MHz.

Phase deviation resolution: 1° ($0.1 \leq f_c < 640$ MHz); 2° ($640 \leq f_c < 1280$ MHz); 4° ($1280 \leq f_c < 2560$ MHz).

Phase modulation distortion: 10% at maximum rate.

Biphase Modulation

Biphase modulation is available on the standard HP 8663A for f_c less than 640 MHz and available for all f_c with Option 002.

Deviation: $\pm 90^\circ$.

Carrier null when modulated with 1 MHz, 50% duty cycle square wave: > 25 dBc.

Modulation input required: TTL positive true. The internal modulation oscillator can be used for 50% duty-cycle modulation. External input is on rear panel.

¹In the remote mode it is possible to have microprocessor clock-related spurious signals spaced 3 MHz apart at an absolute level of typically less than -145 dBm.

²Spurious signals can be up to 3 dB higher in the dc FM mode.

³ $f/2$ spurs not specified for carrier frequencies above 850 MHz.

⁴At a 50 Hz line frequency, power-line or microphonically related spurious signals may be up to 3 dB higher and appear at offsets as high as 1 kHz from the carrier.

⁵Due to automatic leveling loop bandwidth changes, brief (30 ms) level inaccuracies may occur when switching through 150 kHz and 1 MHz RF output frequencies.