

Table 1-1. Specifications.

FUNCTIONS AND FREQUENCIES

Sine Wave:

Signal Output (Front or Rear Panel):

0.000 001 Hz to 20 999 999.999 Hz

Auxiliary Output (Rear Panel):

21 000 000.000 Hz to 60 999 999.999 Hz

Underrange to 19 000 000.001 Hz

Square Wave: 0.000 001 Hz to 10 999 999.999 Hz

Triangle: 0.000 001 Hz to 10 999.999 999 Hz

Positive and Negative Slope Ramp:

0.000 001 Hz to 10 999.999 999 Hz

FREQUENCY RESOLUTION

1 nHz for frequencies below 100 kHz

1 mHz for frequencies 100 kHz and higher

FREQUENCY ACCURACY (Standard Instrument)

 $\pm 5 \times 10^{-6}$ of selected value (20° to 30°C)

FREQUENCY STABILITY (Standard Instrument)

 $\pm 5 \times 10^{-6}$ per year (20° to 30°C)

SIGNAL CHARACTERISTICS

Sine Wave:

Harmonic Distortion relative to the amplitude of the fundamental frequency at full output on each range

Fundamental Frequency	No Harmonic Greater Than
0.1 Hz to 50 kHz	-65 dB
50 kHz to 200 kHz	-60 dB
200 kHz to 2 MHz	-40 dB
2 MHz to 15 MHz	-30 dB
15 MHz to 20 MHz	-25 dB

Spurious: All non-harmonically related output signals will be more than 70dB below the carrier (-60dB with DC offset), or less than -90dBm, whichever is greater.

Phase Noise: > -60dB (Option 001 Only) for a 30kHz band centered on a 20MHz carrier (excluding ± 1 Hz about the carrier).

Square Wave:

Rise/Fall Time: ≤ 20 nanoseconds, 10% to 90% at full output

Symmetry: <, .02% of period + 3 nanoseconds

Overshoot: $\leq 5\%$ of peak to peak amplitude at full output

Triangle:

Linearity, 10% to 90%, best fit straight line:
 $\pm 0.05\%$ of full p-p output for each range

Ramps (Positive or Negative Slope):

Linearity, 10% to 90%, best fit straight line: $\pm 0.05\%$ of full p-p output for each range

Retrace Time: <, 3 microseconds, 90% to 10%

Ramp Period Variation: < $\pm 1\%$ of period, maximum

AMPLITUDE

Amplitude Accuracy with no Attenuation (Attenuator range 1) into 50 ohm Load. (No D.C. offset)

Function and Tolerance relative to programmed frequency range amplitude

Sine Wave .001 Hz to 100 kHz	± 0.1 dB
Square Wave .001 Hz to 100 kHz	$\pm 1.0\%$
Triangle .001 Hz to 2 kHz 2 kHz to 10 kHz	$\pm 1.5\%$ $\pm 5\%$
Ramps .001 Hz to 500 Hz 500 Hz to 10 kHz	$\pm 1.5\%$ $\pm 10\%$

Flatness with no attenuation (Attenuator Range 1) into a 50 Ohm load Tolerance relative to programmed amplitude at 1 kHz

Sine Wave 100kHz to 20 MHz	± 0.3 dB
Square Wave 100 kHz to 10 MHz	$\pm 10\%$

Amplitude accuracy with D.C. offset and no attenuation (Range 1) into a 50 ohm load. Tolerance relative to programmed amplitude.

Sine Wave .001 Hz to 100 kHz	± 0.3 dB
Square .001 Hz to 100 kHz	$\pm 3\%$
Triangle .001 Hz to 2 kHz 2 kHz to 10 kHz	$\pm 4\% \pm 6\%$
Ramps .001 Hz to 500 Hz 500 Hz to 10 kHz	$\pm 4\% \pm 11\%$

Attenuator Accuracy (these errors are additive with the programmed amplitude. Tolerance relative to amplitude accuracy errors)

.001 Hz to 20 kHz Attenuator Range 1	No Error
.001 Hz to 100 kHz Attenuator ranges 2 through 8	± 0.1 dB
100 kHz to 10 MHz Attenuator ranges 2 through 8	± 0.2 dB
10 MHz to 20 MHz Attenuator ranges 2 through 4 Attenuator ranges 5 through 8	± 0.2 dB ± 0.5 dB

Table 1-1. Specifications (Cont'd).

Accuracy of DC Offset (into 50 ohms):

DC Only (No AC Function): $\pm 0.4\%$ of full peak output for each range**Except lowest attenuator range where accuracy is $\pm 20\%$.DC + AC, < 1 MHz: $\pm 1.2\%$, Ramps $\pm 2.4\%$ DC +AC, > 1 MHz: $\pm 3\%$ AMPLITUDE MODULATION (of Sim

Function only)

Modulation Envelope Distortion: -30 dB to 80% modulation at 1 kHz, 0 V dc Offset

PHASE OFFSET

Range: $\pm 719.9^\circ$ with respect to arbitrary starting phase, or assigned zero phaseResolution: 0.1° Stability: $\pm 1^\circ$ phase/ $^\circ$ C Increment Accuracy: $\pm 0.2^\circ$ PHASE MODULATIONLinearity (Sine Function): $\pm 0.5\%$, best fit straight line

SYNC OUTPUT

Output Levels into 50 ohms: Square wave with V.. .a + 1.2 V, V, $< + 0.2$ V
^ high low

X DRIVE OUTPUT

Amplitude: 0 to $+ 1.0$ V dc linear ramp proportional to sweep frequency (sweep up only)Linearity, 10% to 90% , best fit straight line: $\pm 0.1\%$ of final value. Specified for all linear sweep widths which are integral multiples of the minimum sweep width for each function and sweep time.

OPTION 001

HIGH STABILITY FREQUENCY REFERENCE

Ambient Stability: $\pm 5 \times 10^{-8}$ (0° to 55° C referenced to $+ 30^\circ$ C)Aging Rate: $\pm 5 \times 10^{-8}$ per week (after 72 hours continuous operation) $\pm 1 \times 10^{-7}$ per month (after 15 days continuous operation)

OPTION 002

HIGH VOLTAGE OUTPUT

Frequency Range:

Sine and Square Wave: 1 μ Hz to 1 MHz
Triangle and Ramps: 1 μ Hz to 10 kHz

Amplitude:

Range: 4 mVp-p to 40 Vp-p (a 5000 , < 500 pF load) maximum output current, ± 40 mAAccuracy (at 2 kHz): $\pm 2\%$ of full output for each rangeFlatness: $\pm 10\%$ of programmed amplitude

DC Offset:

Range: 4 times the range of the standard instrument

Accuracy: $\pm (1\% - 25 \text{ mV})$ of full output for each range

Signal Characteristics:

Sine Wave Harmonic Distortion (relative to the fundamental frequency at full output into > 500 ohms, < 500 pF)

Fundamental Frequency	No Harmonic Greater Than
10 Hz to 50 kHz	-65 dB
50 kHz to 200 kHz	-60 dB
200 kHz to 1 MHz	-40 dB

Square Wave:

Rise/Fall Time: < 125 nanoseconds, 10% to 90% at full output with $2: 500$ ohm, < 500 pF loadOvershoot: $< 10\%$ of peak amplitude with a: 500 ohm, < 500 pF load

Table 1-2 Supplemental Information

MAIN SIGNAL OUTPUT			4	30	299.9 mV to 100.0 mV
50 Ω Impedance			5	100	99.99 mV to 30.00 mV
			6	300	29.99 mV to 10.00 mV
			7	1000	9.999 mV to 3.000 mV
BNC Connector, switchable to front or rear panel (not switchable with Option 002)				3000	2.999 mV to 1.000 mV
May be floated a maximum of ± 42 V peak (ac + dc) from chassis (earth) ground			DC Offset Only:		
			No.	Attenuation Factor	Amplitude (Peak-to-Peak)
All AC Functions (with no dc offset):				1	5.000 V to 1.500 V
				2	1.499 V to 500.0 mV
				10	499.9 mV to 150.0 mV
				30	149.9 mV to 50.00 mV
Range i No. Attenuation Factor				100	49.99 mV to 15.00 mV
				300	14.99 mV to 5.000 mV
				1000	4.999 mV to 1.500 mV
				3000	1.499 mV to 1.000 mV
				5	
				1000	
				3000	
				8	

Table 1-2. Supplemental Information (Cont'd).

AC Function with DC Offset: Range Attenuation AC Function No. Factor Amplitude (p-p)			Maximum DC Min. DC (+ or -) (+ or -)	
1		1	1.000 mV to 4.500 V	1.000 mV
2	2.000 V to 1.000 V	3	1.166 V to 1.499 V	0.100 mV
3		10	333.3 mV to 450.0 mV	0.100 mV
4		30	116.6 mV to 149.9 mV	0.010 mV
5		100	33.33 mV to 45.00 mV	0.010 mV
6		300	11.66 mV to 14.99 mV	0.001 mV
7		1000	3.333 mV to 4.500 mV	0.001 mV
to 1.000 mV				
High Voltage Output Option 002:			Amplitude Modulation Input (Sine Function Only):	
Amplitude and Ranges: 4 times the standard instrument amplitudes			Modulation depth at full output for each range: 0 to 100%	
Output Impedance: < 2 Ω at DC to < 100 Ω at 1 MHz			Modulation frequency range: DC to 500 kHz (0 to 21 MHz carrier frequency)	
Square Wave Settling Time: < 1 μ s to settle to within .05% of final value for frequencies of 10 Hz to 500 kHz, tested at full output with no load			Sensitivity: 5 V peak for 100% modulation	
FREQUENCY SWEEP			Input Impedance: 10 k Ω	
Sweep Time:			Connector: Rear panel BNC	
Linear Sweep: 0.01 second to 99.99 seconds (single or continuous)			Phase Modulation:	
Log Sweep:			Modulation Frequency Range: DC to 5 kHz	
Single Sweep: 2 seconds to 99.99 seconds			Modulation Depth	
Continuous Sweep: 0.1 second to 99.99 seconds				
Maximum Sweep Width: 1 Hz to maximum frequency of the function selected				
Minimum Sweep Width (Linear):				
	Minimum Sweep Width			
	Sweep Time	Sweep Time		
Function	0.01 second	99.99 seconds		
Ramps	0.01 MHz	99.99 MHz		
Minimum Sweep Width (Log): 1 decade				
Phase Continuity: Sweep is phase continuous over the full frequency range				
WARMUP TIME			Auxiliary Frequency Output (ac coupled output):	
Standard Instrument: 20 minutes to within specified accuracy			Frequency Range: 21 MHz to 60.999 999 999 MHz,	
Option 001 High Stability Frequency Reference: Reference will be within $\pm 1 \times 10^{-7}$ of final value ± 15 minutes after turn-on at 25°C for an off time of less than 24 hours			with underrange coverage to 19.000 000 001 MHz	
AUXILIARY INPUTS (May be floated a maximum of ± 42 V peak ac + del from chassis earth ground)			Amplitude: 0 dBm	
Reference: For phase-locking the 3325A to an external frequency reference of 10 MHz or a subharmonic of 10 MHz down to 1 MHz. Level must be 0 dBm to 40 dBm into 50 ohms. Rear panel BNC connector.			Output Impedance: 50 ohms	
			Connector: Rear panel BNC	
			Marker Output (Linear sweep only):	
			Levels: High to Low TTL compatible voltage transition at selected marker frequency, sweep up only.	
			Connector: Rear panel BNC	

Table 1-2. Supplemental Information (Cont'd).

X Drive Output (Sweep up only):
Amplitude: 0 to + 1 0 V linear ramp
proportional to sweep frequency

Connector: Rear panel BNC

Z Blank Output:
Levels (TTL compatible voltage levels):
Linear Sweep:
Single: Low at start of sweep, High at stop. Re-
mains High until start of next sweep.

Continuous: Low during sweep up. High during
sweep down.

Log Sweep:
Single: Low at start of sweep, High at stop. Re-
mains High until start of next sweep.

Continuous: Low during sweep. Goes
High momentarily at stop frequency.

10 MHz Oven Reference Output, Option 001, for phase
locking the 3325A to the optional high stability frequency
reference:

Amplitude: 0 dBm, 50 ohms

Connector: Rear panel BNC. Must be connected to
the rear panel EXT REF IN connector.

REMOTE CONTROL

Hewlett-Packard Interface Bus (HP-IB) Control: (HP-IB is
Hewlett-Packard Company's implementation of IEEE Stan-
dard 488-1978). Time shown is in addition to programming
time.

The following accessory options are also available for
the Model 3325A:

Option 907 Front Handle Assembly Option
908 Rack Mount Flange Kit Option 909
Rack Mount Flange Kit/Front
Handle Assembly Option 910
Additional Operating and Service
Manual

1 17. ACCESSORIES SUPPLIED.

1-18. A special connector is supplied with the High
Stability Frequency Reference Option 001 for connect-
ing the rear panel Reference Output to the Reference In-
put. This connector is Part No. 1250-1499.

Frequency Switching and Settling Time:*

< 1 0 ms to within 1 Hz of final value for 100 kHz span

< 25 ms to within 1 Hz of final value for 1 MHz span

< 70 ms to within 1 Hz of final value for 20 MHz span

Phase Switching and Settling Time:*

< 1 5 ms to within 90° of phase lock for 20 MHz fre
quency change

Amplitude Switching Time:"

<30 ms to within amplitude specifications

"Times shown are in addition to programming time

GENERAL

Operating Environment:

Temperature: 0° to 55°C
Relative Humidity: <95%, 0° to 40°C
Altitude: s 1 5,000 ft.

Storage Temperature: -50° to +75°C
Storage Altitude: <; 50,000 ft.

Power Requirements:

100/120/220/240V+5%,-10%,48 to 66 Hz 60
VA, 100 VA with all options, 10 VA standby

Dimensions in millimeters and (inches):

132.6 (5/4) high x 425.5 (16%) wide
x 497.8 (19-5/8) deep

Weight in kilograms and (lbs):

Net weight: 9(20) Shipping
Weight: 14.5 (32)

119. ACCESSORIES AVAILABLE.

1-20. The following accessories are available for use
with the Model 3325A:

Number	Description
11048C	50 ohm Feedthru Termination Ground
11356A	Isolator
03325-80001	Oven Board Assy. (Converts 3325A to Option 001)
03325-80002	High Voltage Option (Converts 3325A to Option 002)
5061-0077	Rack Mount Flange Kit (Option 908)
5061-0083	Rack Mount Flange/Front Handle Kit (Optibn 909)
5061-0089	Front Handle Kit (Option 907)