

Model 3400A Funktion-/ Arbitrary- Waveform Generator



- **50 MHz Sine, 25 MHz Square & 10 MHz arbitrary Waveforms**
- **14-bit, 125 MSa/s, 256 K-point Arbitrary Waveform**
- **Pulse, Ramp, Triangle, Noise & DC Waveforms**
- **Linear & Logarithmic Sweeps & Burst Operation**
- **AM, FM, PM (PSK), FSK & PWM Modulation Types**
- **Amplitude Range, 20 mVpp to 20 Vpp into Open Circuit**
- **Remote Control via USB, LAN or Opt. GPIB**
- **Graph Mode for Visual Verification of Signal Settings**
- **16-bit Data Output via Pattern Out**
- **Free Waveform Editor Software Wavepatt®**
- **User Friendly Operation**
- **Model 3400A Specifications:**

Great Performance for Functions and Waveforms:

The 3400A is the high performance 50MHz Waveform Generator. It can create stable, precise, clean and low distortion sine waves by using DDS (Direct Digital Synthesis) Technology. With fast rise and fall times up to 25MHz for square waves and 200KHz for linear ramp waves. The 3400A also can generate variable-edge-time pulses up to 10MHz and generate complex custom waveforms.

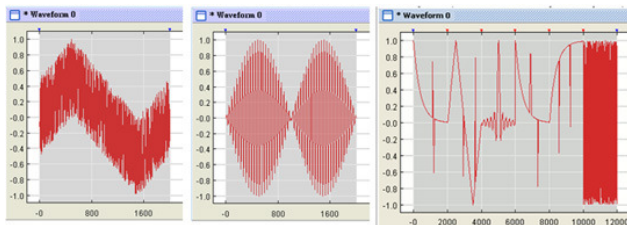
Pulse Generation:

3400A can generate variable-edge-time pulses up to 10MHz. With variable period, pulse width and amplitude the 3400A is perfectly suited to applications requiring a flexible pulse signal

Custom Waveform Generation:

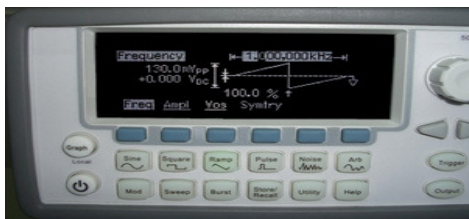
3400A can generate complex custom waveforms. With 14-bit resolution, and 125 MSa/s sampling rate, the GA5100 offers users the flexibility to create waveforms. It also allows users to store up to 5 waveforms, 4 (4 x 256K Points) in nonvolatile memory and 1 in volatile memory.

Waveform editor Wavepatt:



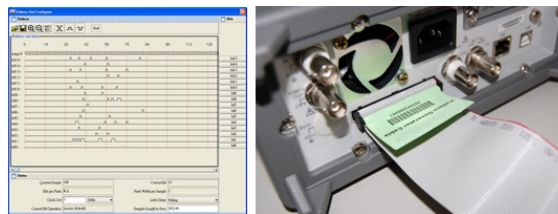
The Waveform Editor Software Wavepatt allows users to create, edit and download complex waveforms. In addition, users can retrieve waveforms from Agilent Oscilloscope MSO 8104 by using the Wavepatt

Graph mode:

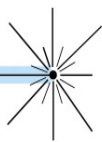


In graph mode, user can easily visual verify the signal settings. Also, user can always see the selected function on the upper left corner of display

Data Transmission via Pattern Out:



User can use Wavepatt to create and store 16-bit data in 3400A. The data can be transmitted via Pattern Out from 3400A rear panel as source for control



User Friendly Operation:



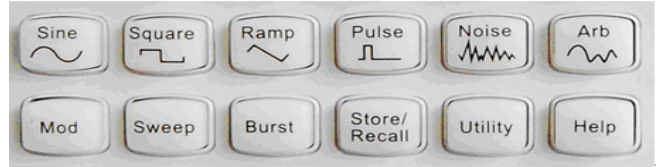
The front-panel operation of the 3400A is simple and user friendly. Users can enter all functions with a single key or two, and use knob or numeric keypad to

adjust frequency, amplitude, offset and other parameters. Otherwise, users can also directly input voltage values in Vpp, Vrms, dBm or high & low levels. Timing parameters can be entered in Hertz (Hz) or second.

Easy-to-use Functions:

Users can easily use the following functions.

- Internal modulations of AM, FM, PM (PSK), FSK & PWM for waveform adjustment.
- Built-in linear and logarithmic sweeps from 1ms to 500 s.
- The burst mode has a selectable number of cycles per period of



time.

- Using remote control via USB, LAN or Opt. GPIB interface.
- The programmability by SCPI commands under the remote control connection.
- Precise phase adjustments and calibrations can be done from the front panel or via a PC.

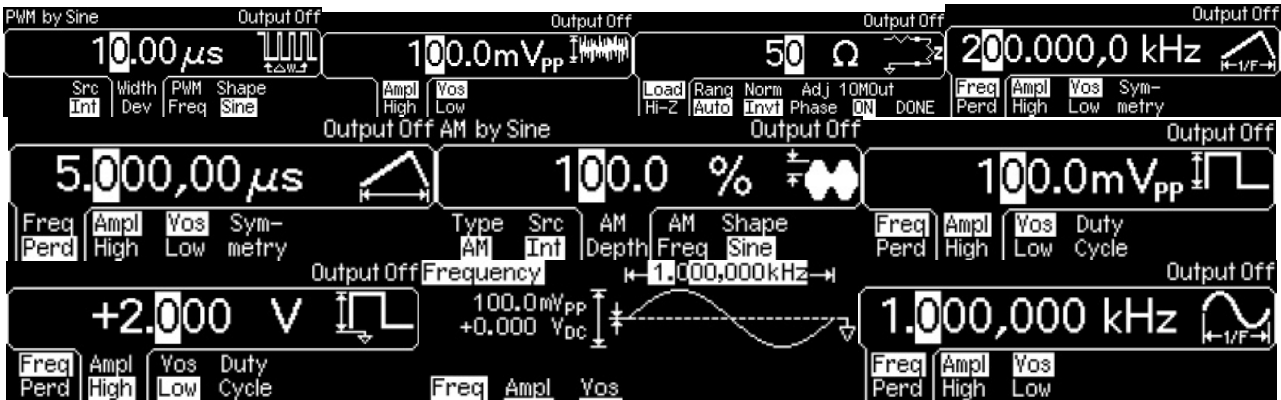
Support External Frequency Output:

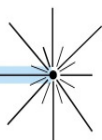


The 3400A external frequency reference allows users synchronizing to an external 10 MHz clock, to another 3400A, or any other unit which can support 10-MHz-frequency-input function



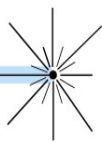
Screenshots des Displays:



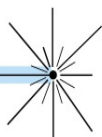


SPECIFICATION 3400A

Display	Graph mode for visual verification of signal setting		
Capability	Standard waveforms	Sine, Square, Ramp, Triangle, Pulse, Noise, DC	
	Built-in arbitrary waveforms	Exponential Rise and Fall, Negative ramp, Sin(x)/(x), Cardiac	
WAVEFORM CHARACTERISTIC			
Sine	Frequency	1 μ Hz to 50 MHz	
	Amplitude Flatness[1][2] (Relative to 1 kHz)	0.1 dB (< 100 kHz)	
		0.15 dB (< 5 MHz)	
		0.3 dB (< 20 MHz)	
		0.5 dB (< 50 MHz)	
	Harmonic distortion[2][3] (unit: dBc)	DC to 20 kHz	-70 (< 1 Vpp) -70 (= 1 Vpp)
		20 kHz to 100 kHz	-65 (< 1 Vpp) -60 (= 1 Vpp)
		100 kHz to 1 MHz	-50 (< 1 Vpp) -45 (= 1 Vpp)
		1 MHz to 20 MHz	-40 (< 1 Vpp) -35 (= 1 Vpp)
		20 MHz to 50 MHz	-35 (< 1 Vpp) -30 (= 1 Vpp)
Total Harmonic distortion[2][3]		DC to 20 kHz, Output = 0.5 Vpp THD+N = 0.06%	
Spurious [3][4] (non-harmonic)		DC to 1 MHz	-70 dBc
		1 MHz to 50 MHz	-70 dBc + 6 db/octave
	Phase Noise (10 k offset)	-115/dBc/Hz, typical when f = 1 MHz, V = 0.1 Vpp	
Square	Frequency	1 μ Hz to 25 MHz	
	Rise/Fall time	< 10 ns	
	Overshoot	< 2 %	
	Variable Duty Cycle	20 % to 80 % (to 10 MHz)	
		40 % to 60 % (to 25 MHz)	
	Asymetry	1 % of period + 5 ns (@ 50 % duty)	
Jitter (RMS)	200 ps when f = 1 MHz, V = 0.1 Vpp		
Ramp, Triangle	Frequency	1 μ Hz to 200 kHz	
	Linearity	< 0.1 % of peak output	
	Symetry	0.0 % ~ 100 %	
Pulse	Frequency	500 μ Hz to 10 MHz	
	Pulse width	20 ns minimum	
		10 ns res. (period = 10 s)	
	Overshoot	< 2 %	
Jitter (RMS)	200 ps when f = 50 kHz, V = 0.1 Vpp		
Noise	Bandwidth	20 MHz typical	
Arbitrary	Frequency	1 μ Hz to 10 MHz	
	Length	2 to 256 K	
	Resolution	14 bits (including sign)	
	Sample Rate	125 MSa/s	
	Min Rise/Fall Time	30 ns typical	
	Linearity	< 0.1 % of peak output	
	Settling Time	< 250 ns to 0.5 % of final value	
	Jitter (RMS)	6 ns + 30 ppm	
	Non-volatile Memory	4 waveforms * 256K Points	
COMMON CHARACTERISTIC			
Frequency	Resolution	1 μ Hz	
Amplitude	Range	10 mVpp to 10 Vpp in 50 Ω	
		20 mVpp to 20 Vpp in Hi-Z	
	Accuracy [1][2] (at 1 kHz)	\pm 1 % of setting \pm 1 mVpp	
	Units	Vpp, Vrms, dBm	
DC Offset	Resolution	4 digits	
	Range	\pm 5 V in 50 Ω (Peak AC+DC) \pm 10 V in Hi-Z	



	Accuracy [1][2]	± 2 % of offset setting ± 0.5 % of amplitude setting
	Resolution	4 digits
Main Output	Impedance	50 Ω typical
	Isolation	42 Vpk maximum to earth
	Protection	short-circuit protected; overload automatically disables main output
	Internal Frequency reference Accuracy [5]	± 10 ppm in 90 days ± 20 ppm in 1 year
External Frequency reference	Standard/Option	Standard
External Frequency Input	Lock Range	10 MHz ± 500 Hz
	Level	100 mVpp ~ 5 Vpp
	Impedance	1 kΩ typical, AC coupled
	Lock Time	< 2 sec
External	Lock Range	10 MHz
Frequency Output	Level	632 mVpp (0dBm), typical
	Impedance	50 Ω typical, AC coupled
Phase Offset	Range	- 360° to + 360°
	Resolution	0.001°
	Accuracy	8 ns
MODULATION		
Modulation Type		AM, FM, PM, PWM, Sweep and Burst
AM	Carrier	Sine, Square, Ramp, Arb
	Source	Internal / External
	Internal Modulation	Sine, Square, Ramp, Triangle, Noise, Arb
	Frequency (Internal)	2 mHz to 20 kHz
	Depth	0.0 % ~ 120 %
FM	Carrier	Sine, Square, Ramp, Arb
	Source	Internal / External
	Internal Modulation	Sine, Square, Ramp, Triangle, Noise, Arb
	Frequency (Internal)	2 mHz to 20 kHz
	Deviation	DC ~ 25 MHz
PM	Carrier	Sine, Square, Ramp, Arb
	Source	Internal / External
	Internal Modulation	Sine, Square, Ramp, Triangle, Noise, Arb
	Frequency (Internal)	2 mHz to 20 kHz
	Deviation	0° to 360°
PWM	Carrier	Pulse
	Source	Internal / External
	Internal Modulation	Sine, Square, Ramp, Triangle, Noise, Arb
	Frequency (Internal)	2 mHz to 20 kHz
	Deviation	0 % ~ 100 % of pulse width
FSK	Carrier	Sine, Square, Ramp, Arb
	Source	Internal / External
	Internal Modulation	50 % duty cycle Square
	Frequency (Internal)	2 mHz to 100 kHz
External Modulation Input[6]	Voltage Range	± 5 V full scale
	Input Resistance	8.7 kΩ typical
	Bandwidth	DC to 20 kHz
SWEEP	Waveforms	Sine, Square, Ramp, Arb
	Type	Linear or Logarithmic
	Direction	up or down
	Sweep Time	1 ms ~ 500 sec
	Trigger	Internal, External or Manual
	Marker	falling edge of sync signal (programmable frequency)
BURST[7]	Waveforms	Sine, Square, Ramp, Triangle, Noise, Arb
	Type	Counted (1 to 50000 cycles), Infinite, Gated
	Start/Stop Phase	- 360° to + 360°
	Internal Period	1 μs ~ 500 sec
	Gated Source	External trigger
	Trigger Source	Internal, External or Manual
Trigger Input	Level	TTL compatible
	Slope	Rising or Falling (selectable)
	Pulse width	> 100 ns
	Impedance	> 10 kΩ, DC coupled
	Latency	< 500 ns



Trigger Output	Level	TTL compatible into = 1 k Ω
	Slope	Rising or Falling (selectable)
	Pulse width	> 400 ns
	Output Impedance	50 Ω typical
	Maximum rate	1 MHz
	Fan-out	= 4
Pattern Mode CHARACTERISTIC		
Clock	Maximum rate	50 MHz
Output	Level	TTL compatible into = 2 k Ω
	Impedance	110 Ω typical
Pattern	Length	2 to 256 K
GENERAL		
Power Supply	CAT II 110 + 240 V AC \pm 10 %	
Line Freq.	50 Hz to 60 Hz	
Power Consumpt.	50 VA max.	
Operating Enviroment	0° C to 55° C	
Storage Temperature	- 30° C to +70° C	
Interface	(Standard) USB, LAN, (Optional) GPIB	
Language	SCPI-1933, IEEE-488.2	
Dimensions	107 (H) x 224 (W) x 380 (D) mm	
Weight	4.08 kg	
Safety Designed to	IEC61010-1, EN61010-1, UL61010-1	
EMC Tested to	EN61326, IEC61000-3, IEC61000-4	
Warm-up Time	1 hour	
Warranty	1 Year	

[1] Add 1/10th of output amplitude and offset spec per °C for operation outside the range of 18 °C to 28 °C

[2] Autorange enabled

[3] DC offset set to 0 V

[4] Spurious output at low amplitude is - 75 dBm typical

[5] Add 1 ppm/°C average for operation outside the range of 18 °C to 28 °C

[6] FSK uses trigger input (1 MHz maximum)

[7] Sine and sqare waveforms above 6 MHz are allowed only with and "infinite" burst count