

AFG-303x & AFG-302x Specifications

The specifications apply when the AFG-303x & AFG-302x is powered on for at least 30 minutes under +20°C~+30°C.

		AFG-3031	AFG-3032	AFG-3021	AFG-3022
Channels		1	2	1	2
Features					
I/O signal ground for the instrument chassis		Isolation			
Connector shells for channel output(s), Sync output, 10MHz REF Input, Mod Input and Mod output are isolated from the instrument’s chassis. Maximum allowable voltage on isolated connector shells is ±42 Vpk. (DC + AC Peak)					
Each of the signal ground of CH1 & CH2		-	Isolated	-	Isolated
Standard Waveforms		Sine, Square, Triangle, Ramp, Pulse, Noise, Harmonic			
Arbitrary Waveforms					
Sample Rate		250 MSa/s			
Repetition Rate		125MHz			
Waveform Length		8M points			
Amplitude Resolution		16 bits			
Non-Volatile Memory		Ten 8M waveforms (1)			
User define Output Section		Any section from 2 to 8M points			
Trigger		External			
Built-in Arbitrary Waveforms		Sine, Square, Ramp, Sinc,Pulse, DC, Sin(x)/x, Exponential Rise, Exponential Fall, Negative Ramp, Absatan, Havercosine, Sinever, Abssin, Haversine, Stair_down, Abssinehalf, N_pulse, Stair_UD, Ampalt, Negramp, Stair_up, Attalt, Rectpuls1, Stepresp, Diric_even, Roundhalf, Trapezia, Diric_odd, Sawtoot, Tripuls1, Gauspuls1, Sinetra, Dlorentz, In, Sqrt, Exporise, Lorentz, Xsquare, Expofall, Gauss, Since, Arccos, Arctan, Sech, Arccot, Arctanh, Sinh, Arccsc, Cosh, Tan, Arcsec, Cot, Tanh, Arcsin, Csc, Arcsinh, Sec, Barthannwin, Chebwin, Kaiser, Bartlett, Flattopwin, Triang, Blackman, Hamming, Tukeywin, Bohmanwin, Hann			
Frequency Characteristics					
	Sine / Square	1uHz to 30MHz		1uHz to 20MHz	
	Pulse	1uHz to 25MHz		1uHz to 20MHz	
	Triangle / Ramp	1uHz to 1MHz			
Resolution		1uHz			
Accuracy	Stability	±1 ppm 0 to 50℃			
		±0.3 ppm 18 to 28℃			
	Aging	±1 ppm, per 1 year			
	Tolerance	≤ 1 uHz			
Output Characteristics (2)					
Amplitude	Range	1 mVpp to 10 Vpp (into 50Ω)			
		2 mVpp to 20 Vpp (into open-circuit)			
	Accuracy	± 1% of setting ±1 mVpp			
(at 1 kHz / into 50Ω without DC offset)					

	Resolution	0.1 mV or 4 digits			
	Flatness	0.1dB <10 MHz			
		0.2 dB 10 MHz to 30 MHz			
		(sinewave relative to 1 kHz/into 50Ω)			
	Units	Vpp, Vrms, dBm,			
Offset	Range	±5 Vpk ac +dc (into 50Ω)			
		±10Vpk ac +dc (into open circuit)			
	Accuracy	1% of setting + 2 mV+ 0.5% of amplitude			
Waveform Output	Impedance	50Ω typical (fixed)			
		> 10MΩ (output disabled)			
	Protection	Short-circuit protected			
		Overload relay automatically disables main output			
SYNC Output	Level	TTL-compatible into>1kΩ	-	TTL-compatible into>1kΩ	-
	Impedance	50Ω nominal			
Sine wave Characteristics					
Harmonic Distortion(5)		-60 dBc DC~1 MHz, Ampl<3 Vpp			
		-55 dBc DC~1 MHz, Ampl>3 Vpp			
		-45 dBc 1MHz~5 MHz, Ampl>3 Vpp			
		-30 dBc 5MHz~30 MHz, Ampl>3 Vpp			
Total Harmonic Distortion		< 0.2%+0.1mVrms			
		DC to 20 kHz			
Spurious (non-harmonic)(5)		-60 dBc DC~1 MHz			
		-50 dBc 1MHz~20MHz			
		-50 dBc+ 6 dBc/octave 1MHz~30MHz (AFG-3031/3032)			
Phase Noise		< -110dBc/Hz typical,15 kHz offset, fc = 10MHz,			
Square wave Characteristics					
Rise/Fall Time		<8 ns (3)			
Overshoot		< 5%			
Asymmetry		1% of period+1 ns			
Variable Duty Cycle		20.0% to 80.0%, ≤ 25 MHz		20.0% to 80.0% , ≤ 20 MHz	
		40.0% to 60.0%,25 to 30MHz			
Jitter		0.01%+525ps < 2 MHz			
		0.1%+75ps > 2 MHz			
Ramp Characteristics					
Linearity		< 0.1% of peak output			
Variable Symmetry		0% to 100% (0.1% resolution)			
Pulse Characteristics					
Pulse Width		20ns to 999,830s			
		Period ≥ Width-0.625 [(Rise Time-0.6ns)+(Fall Time-0.6ns)]			

Duty setting range	0.017% to 99.983%	
Period	40ns to 1,000,000s	
Rise Time and Fall Time	9.32 ns to 799,900s (0.01ns or 3 digit resolution)	
Resolution	0.0001%	
Overshoot	<5%	
Jitter	100 ppm + 50 ps	
Harmonic		
Harmonic order	≤ 8	
Harmonic Type	Even, Odd, All, User ; Amplitude and Phase can be set for all harmonics	
AM		
Carrier Waveforms	Sine, Square, Triangle, Ramp, Pulse, Arb	
Modulating Waveforms	Sine, Square, Triangle, Up/Dn Ramp	
Modulating Frequency	2 mHz to 20 kHz	
Depth	0% to 120.0%	
Source	Internal / External	
FM		
Carrier Waveforms	Sine, Square, Triangle, Ramp	
Modulating Waveforms	Sine, Square, Triangle, Up/Dn Ramp	
Modulating Frequency	2 mHz to 20 kHz	
Peak Deviation	DC to 30 MHz (1uHz resolution)	DC to 20 MHz (1uHz resolution)
Source	Internal / External	
PM		
Carrier Waveforms	Sine, Triangle, Ramp	
Modulating Waveforms	Sine, Square, Triangle, Up/Dn Ramp	
Phase Deviation	0° to 360°, 0.1° resolution	
Modulating Frequency	2 mHz to 20 kHz	
Source	Internal	
PWM		
Carrier Waveforms	Square	
Modulating Waveforms	Sine, Square, Triangle, Up/Dn Ramp	
Modulating Frequency	2 mHz to 20 kHz	
Deviation	0% ~ 100.0% of pulse width, 0.1% resolution	
Source	Internal / External	
Additive modulation (Sum)		
Carrier Waveforms	Sine, Triangle, Ramp, Pulse, Noise	
Modulating Waveforms	Sine, Square, Triangle, Up/Dn Ramp	
Ratio	0% to 100% of carrier amplitude, 0.01% resolution	
Modulating Frequency	2 mHz to 20 kHz	

Source	Internal / External			
FSK				
Carrier Waveforms	Sine, Square, Triangle, Ramp			
Modulating Waveforms	50% duty cycle square			
Internal Rate	2 mHz to 1 MHz			
Frequency Range	DC to 30 MHz	DC to 30MHz	DC to 20MHz	DC to 20MHz
Source	Internal / External			
SWEEP				
Waveforms	Frequency Sweep: Sine, Square, Triangle, Ramp Amplitude Sweep: Sine, Square, Triangle, Ramp, Pulse, Noise, ARB			
Type	Frequency, Amplitude			
Functions	Linear or Logarithmic			
Direction	Up or Down			
Start F / Stop FREQ	Any frequency within the waveform's range			
Sweep Time	1 ms to 500 s (1 ms resolution)			
Trigger Mode	Single, External, Internal			
Trigger Source	Internal / External			
BURST				
Waveforms	Sine, Square, Triangle, Ramp, Pulse, Noise			
Frequency	1 uHz to 30 MHz (4)		1uHz to 20MHz	
Burst Count	1 to 1,000,000 cycles or Infinite			
Start / Stop Phase	-360.0°to +360.0° (0.1° resolution)			
Internal Period	1 us to 500 s			
Gate Source	External Trigger (pulse waveforms can only be used in gate mode)			
Trigger Source	Single, External or Internal Rate			
Trigger Delay	N-Cycle, Infinite: 0us to 100s (1us resolution)			
External Modulation Input				
Type	AM, FM, PWM			
Voltage Range	± 5V full scale			
Input Impedance	10kΩ			
Frequency	DC to 20 kHz			
Modulation Output	AFG-3031/3021 only			
Type	AM, FM, PM, PWM, SUM, Sweep			
Amplitude Range	≥ 1Vpp			
Impedance	> 10kΩ typical			
External Trigger Input				
Type	For FSK, Burst, Sweep, N Cycle ARB			
Input Level	TTL Compatibility			
Slope	Rising or Falling (Selectable)			
Pulse Width	> 100 ns			

Input rate		DC to 1 MHz			
Input Impedance		10kΩ,DC coupled			
Latency	Sweep	< 10 us (typical)			
	Burst	< 100 ns (typical)			
Jitter	Sweep	2.5 us			
	Burst	1 ns; except pulse,300 ps			
10MHz Reference Output					
Output voltage		1 Vp-p / 50 Ω square wave			
Output Impedance		50 Ω, AC coupled			
Output Frequency		10MHz			
10MHz Reference Input					
Input Voltage		0.5Vpp to 5Vpp			
Input Impedance		1k Ω, unbalanced, AC coupled			
Input Frequency		10MHz ± 10Hz			
Waveform		Sine or Square (50±5% duty)			
Ground Isolation		42Vpk max.			
External-Sync					
Phase Delay (max.)		Series Connection: 39+(N-2)*39 ±25nS Parallel connection: (N-1)*6 ±25nS (where N=number of connected units)			
Maximum number of connected units		Series Connection: 4 Parallel Connection: 6			
Applicable Functions		Sine, Square, Triangle, Pulse, Ramp, Harmonic, MOD, Sweep, Burst			
Store/Recall		10 Groups of Setting Memories			
Interface		GPIB(Optional), LAN, USB			
Display		4.3 inch TFT LCD, 480 × 3 (RGB) × 272			
General Specifications					
Power Source		AC 100 ~ 240V , 50 ~ 60Hz			
Power Consumption		50VA	85VA	50VA	85VA
Operating Environment		Temperature to satisfy the specification : 18 ~ 28°C			
		Operating temperature : 0 ~ 40°C			
		Relative Humidity:			
		≤ 80%, 0 ~ 40°C			
		≤ 70%, 35 ~ 40°C			
		Installation category : CAT II			
Operating Altitude		2000 meters			
Pollution Degree		IEC 61010 Degree 2, Indoor Use			
Storage Temperature		-10 ~ 70°C, Humidity: ≤70%			
Dimensions (WxHxD)		Bench Top : 265 (W) x 107 (H) x 374 (D)			
Weight		Approx. 4kg			

Safety Designed to	EN61010-1
EMC Tested to	IEC-61326, EN 55011
Accessories	Test cable(GTL-110×1 for AFG-3031/AFG-3021, GTL-110×2 for AFG-3032/AFG-3022), User Manual Compact Disk × 1, Quick Start Guide × 1, Power cord × 1
(1). A total of ten waveforms can be stored. (Every waveform can composed of 8M points maximum.)	
(2). Add 1/10th of output amplitude and offset specification per °C for operation outside of 0°C to 28°C range (1-year specification).	
(3). Edge time decreased at higher frequency.	
(4). Sine and square waveforms above 25 MHz are allowed only with an "Infinite" count.	
(5). Harmonic distortion and Spurious noise at low amplitudes is limited by a -70 dBm floor.	