

	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, Haversine, Sinever, Absin, Haversine, Stair_down, Absinehalf, 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°C ± 0.3 ppm 18 to 28°C		
	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	$\pm 1\%$ 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) ± 10 Vpk ac +dc (into open circuit)		
	Accuracy	1% of setting + 2 mV + 0.5% of amplitude		
Waveform Output	Impedance	50Ω typical (fixed)		

		> 10M Ω (output disabled)
	Protection	Short-circuit protected
		Overload relay automatically disables main output
SYNC Output	Level	TTL-compatible into >1k Ω
	Impedance	50 Ω 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%, \leq 25 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 \geq 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		50ps typical (<10kHz)
Harmonic		
Harmonic order		\leq 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	DC to 20 MHz		
	(1uHz resolution)	(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			
FrequencyRange	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, Sum		
VoltageRange	± 5V full scale		
Input Impedance	10kΩ		
Frequency	DC to 20 kHz		
Modulation Output		AFG-3031/3021 only	
Type	AM, FM, PM, PWM, SUM, Sweep		
AmplitudeRange	≥ 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: $39+(N-2)*39 \pm 25nS$		
	Parallel connection: $(N-1)*6 \pm 25nS$ (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.	