AFG-3000 Series

Features
* Wide frequency range from 1uHz to 80/50MHz
* Supports many types of signal applications
* High 200MSa/s sampling rate
* 16-bit Amplitude Resolution
* Output from any section of 1M-point-long waveforms
* 4.3" high resolution LCD display
* Four ways to generate arbitrary waveforms from Front Panel Operation, CSV file uploading, Direct Waveform Reconstruction (DWR), Arbitrary Waveform Editing PC Software
* Impedance switch / on-screen help
* USB, RS-232, GPIB interface support

		AFG-3081	AFG-3051
Waveforms		**Sine, Square, Ramp, Pulse, Noise, DC, Sin(x)/x, Exponential Rise, Exponential Fall, Negative Ramp**	
Arbitrary Waveforms			
ARB Function		**Built in**	
Sample Rate		**200 MSa/s**	
Repetition Rate		**100MHz**	
Waveform Length		**1M points**	
Amplitude Resolution		**16 bits**	
Non-Volatile Memory		**Ten 1M waveforms**(1)	
User define Output Section		**Any section from 2 to 1M points**	
User define Mark Output		**Any section from 2 to 1M points**	
Frequency Characteristics			
Range	Sine	**80MHz**	**50MHz**

	Square	
	Triangle, Ramp	**1MHz**
Resolution		**1uHz**
Accuracy		**±1 ppm** 0 to 50☐
	Stability	**±0.3 ppm** 18 to 28☐
	Aging	**±1 ppm,** per 1 year
	Tolerance	☐ **1 uHz**
Output Characteristics(2)		
Amplitude	Range	**10 mVpp to 10 Vpp**(into 50Ω) **20 mVpp to 20 Vpp**(open-circuit)
	Accuracy	**± 1% of setting ±1 mVpp** (at 1 kHz,>10 mVpp)
	Resolution	**0.1 mV or 4 digits**
	Flatness	**± 1% (0.1dB) <10 MHz** **± 2% (0.2 dB) 10 MHz to 50 MHz** **± 10% (0.9 dB) 50 MHz to 70 MHz** **± 20% (1.9 dB) 70 MHz to 80 MHz** (sinewave relative to 1 kHz)
	Units	**Vpp, Vrms, dBm,**
Offset	Range	**±5 Vpk ac +dc** (into 50Ω) **±10Vpk ac +dc** (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 auto-matically disables main output**
SYNC Output	Level	**TTL-compatible into>1kΩ**
	Impedance	**50Ω nominal**
Sinewave 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□80 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□80MHz
Phase Noise	□**-65dBc typical** 10MHz, 30 kHz band □**-47dBc typical** 80MHz, 30 kHz band
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 **40.0% to 60.0%** 25□50MHz **50.0%(Fixed)** 50□80MHz
Jitter	**0.01%+525ps** □ 2 MHz **0.1%+75ps** □ 2 MHz
Ramp Characteristics	
Linearity	□ **0.1% of peak output**
Variable Symmetry	**0% to 100%**
Pulse Characteristics	
Period	**20ns□ 2000s**
Pulse Width	**8ns□ 1999.9s** Minimum Pulse Width: 8nS when FREQ□50MHz 5% of setting period when FREQ□6.5MHz Resolution: 1nS when FREQ□50MHz 1% of setting period when FREQ□6.5MHz
Overshoot	**<5%**
Jitter	**100 ppm +50 ps**
AM Modulation	
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 Modulation	
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 80 MHz**	**DC to 50 MHz**
Source	**Internal / External**	
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**	
Source	**Internal / External**	
FSK		
Carrier Waveforms	**Sine, Square, Triangle, Ramp, Pulse**	
Modulating Waveforms	**50% duty cycle square**	
Internal Rate	**2 mHz to 100 kHz**	
Frequency Range	**DC to 80 MHz**	**DC to 50 MHz**
Source	**Internal / External**	
SWEEP		
Waveforms	**Sine, Square, Triangle, Arb**	
Type	**Linear or Logarithmic**	
Direction	**Up or Down**	
Start F / Stop FREQ	**100 uHz to 80 MHz**	**100 uHz to 50 MHz**
Sweep Time	**1 ms to 500 s**	
Trigger	**Single, External, Internal**	
Marker	**Falling edge of Mark signal (Programmable frequency)**	
Source	**Internal / External**	
BURST		
Waveforms	**Sine, Square, Triangle, Ramp**	
Frequency	**1 uHz to 80 MHz**(4)	**1 uHz to 50 MHz(4)**
Burst Count	**1 to 1000000 cycles or Infinite**	
Start / Stop Phase	**-360.0◦to +360.0◦**	
Internal Period	**1 ms to 500 s**	
Gate Source	**External Trigger**	
Trigger Source	**Single, External or Internal Rate**	
Trigger Delay	**N-Cycle, Infinite: 0s to 85 s**	
External Modulation Input		
Type	**for AM, FM, Sweep, PWM**	
Voltage Range	**± 5V full scale**	
Input Impedance	**10kΩ**	
Frequency	**DC to 20 kHz**	
External Trigger Input		
Type	**for FSK, Burst, Sweep**	
Input Level	**TTL Compatible**	
Slope	**Rising or falling(selectable)**	
Pulse Width	**> 100 ns**	
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**		
Modulation Output				
Type		**for AM, FM, Sweep, PWM**		
Amplitude	Range	**☐1Vpp**		
	Impedance	**> 10kΩ typical** (fixed)		
Trigger Output				
Type		**for Burst, Sweep**		
Level		**TTL Compatible into 50Ω**		
Pulse Width		**> 450 ns**		
Maximum Rate		**1 MHz**		
Fan-out		**☐4 TTL load**		
Impedance		**50Ω typical**		
Marker Output				
Type		**for ARB, Sweep**		
Level		**TTL Compatible into 50Ω**		
Fan-out		**☐4 TTL load**		
Impedance		**50Ω typical**		
Store/Recall		**10 Groups of Setting Memories**		
Interface		**GPIB, RS232, USB**		
Display		**4.3 inch TFT LCD** **480 × 3 (RGB) × 272**		
System Characteristics				
Configuration Times (typical)		**Function Change:** Standard---->102ms Pulse-------->660ms Built-In Arb- >240ms **Frequency Change:** 24ms **Amplitude Change:** 50ms **Offset Change:** 50ms **Select User Arb:** < 2s for 1M points **Modulation Change:** < 200ms		
Arb Download Times (typical)		**Binary Code**		**ASCII Code**
		GPIB / RS-232 (115 Kbps)	**USB(Device)**	**USB(Host)**
1M points		**189 Sec**	**34 Sec**	**70 Sec**
512K points		**95 Sec**	**18Sec**	**35 Sec**
256K points		**49 Sec**	**9 Sec**	**18 Sec**
64K points		**16 Sec**	**3 Sec**	**6 Sec**
16K points		**7 Sec**	**830mS**	**1340 mS**
8K points		**6 Sec**	**490mS**	**780mS**

4K points	**6 Sec**	**365mS**	**520 mS**
2K points	**5 Sec**	**300mS**	**390 mS**
General Specifications			
Power Source	**AC100□240V , 50□60Hz**		
Power Consumption	**65 VA**		
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** □		
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	**EN 55011, IEC-61326-1**		
Accessories	**GTL-110× 1** **Instruction Manual×1** **Power cord×1**		

(1). A total of ten waveforms can be stored.(Every waveform can composed of 1M 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.