



MFG-3000A Series DDS Function Generator



Mywave Instrument Co., Ltd.

◆ Introduction

Based on the direct digital synthesis (DDS) technology and unique FPGA design, MFG-3000A Series are built with exceptionally performance far exceeding that of any conventional function generators at a very competitive price. Stable output frequency, low distortion, fine frequency resolution and small signal output are the most remarkable characteristics of this product series.

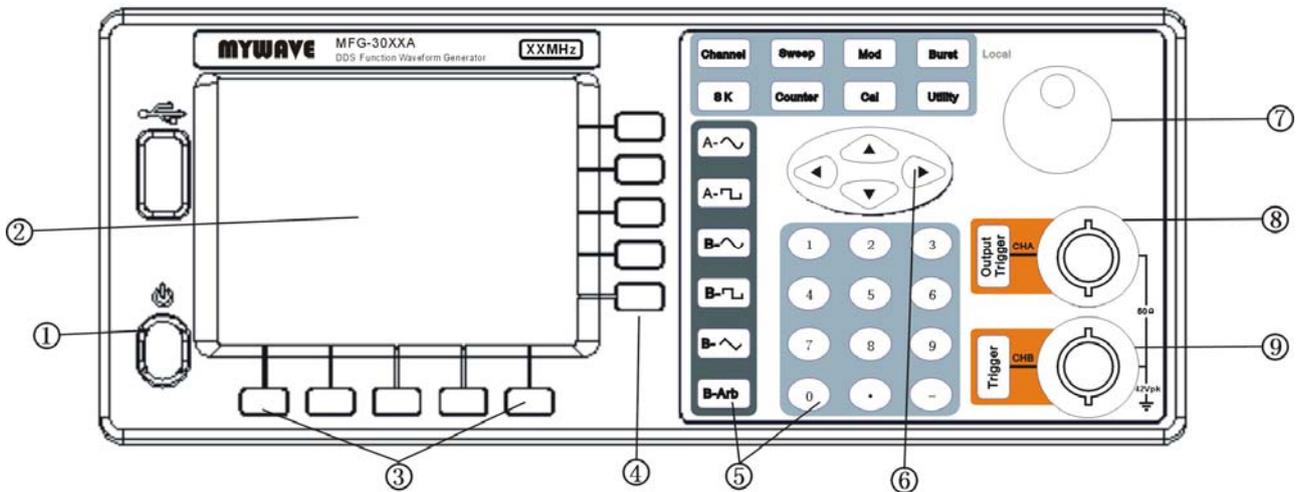
MFG-3000A Series include three members at 10MHz, 20MHz and 40MHz bandwidth. MFG-3000A Series provide 180MSa/s sample rate, 10bits vertical resolution, ± 1 ppm stability level, output waveform accuracy and multiple other functions, including FM, AM, FSK, PSK, frequency sweep, amplitude sweep, burst, AB add, channel B arbitrary waveform and 200MHz frequency counter etc., which can meet users' diversified needs. What's more, the TFT display, user-friendly interface design and panel layout bring users exceptional experience. The remote control of the generator can be easily done through standard configuration interfaces of USB and RS232 devices. These features make MFG-3000A Series excellent circuit debug tools for engineers.

◆ Main Features

- Direct Digital Synthesis (DDS) technology, 2 independent output channels
- 3.5-inch TFT display, English/Chinese menu
- 32 built-in pre-stored waveforms and 8 user defined arbitrary waveforms in channel B
- Minimum output amplitude: 1mVpp (high impedance)
- Maximum resolution: 1 μ Vpp (high impedance)
- Multiple modulation functions: FM, AM, FSK, PSK
- Frequency sweep, amplitude sweep, burst and CHA&CHB add functions
- Free to set the phase of the signal (Sine) from two channels
- Over voltage, over current, output short-circuit and reverse voltage protections
- Standard parts: 200MHz frequency counter, RS232 interface, USB interface

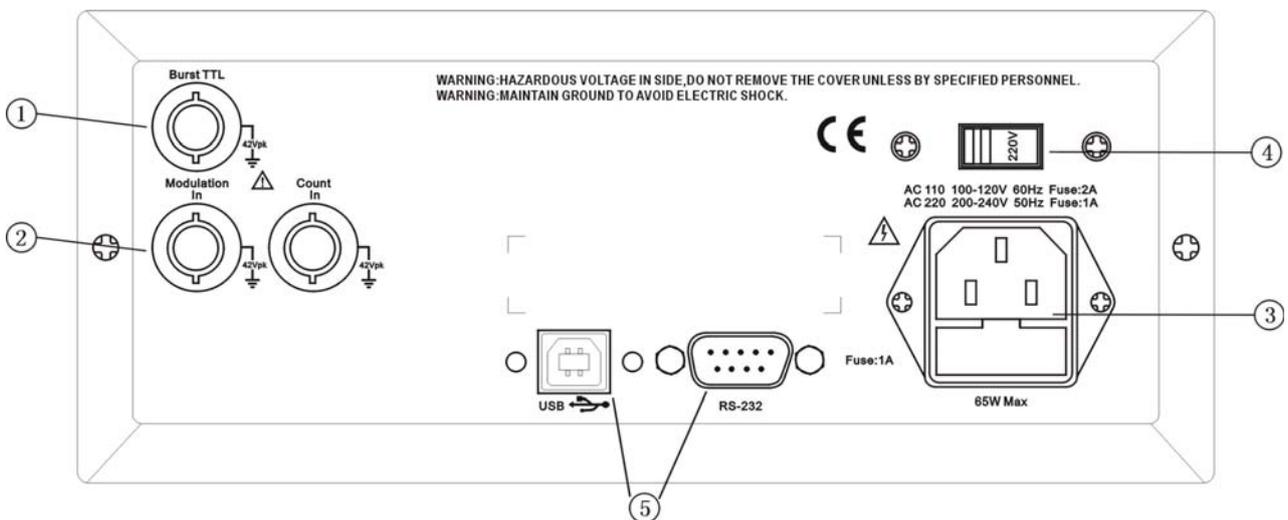
◆ Front Panel and Real Panel

Front Panel



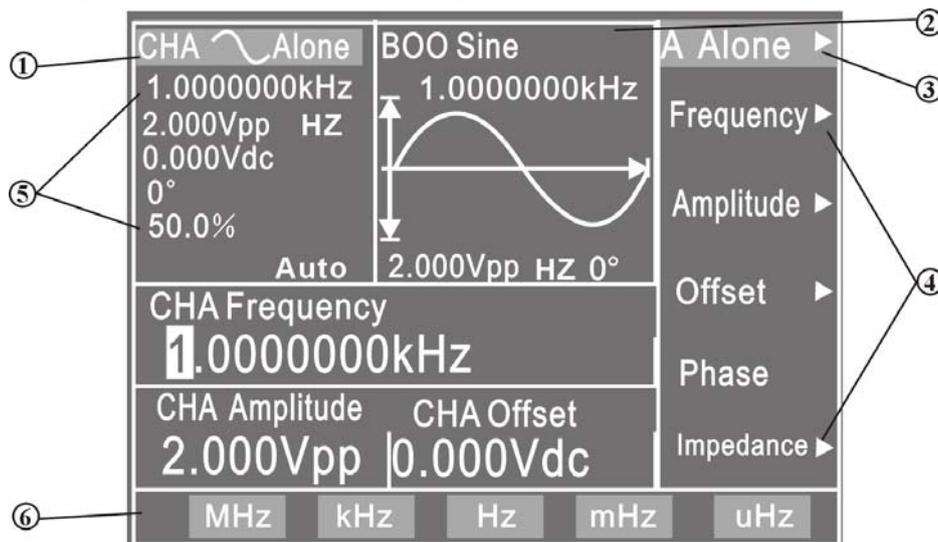
- | | | | |
|------------------------------------|----------------------|------------------|--------------------|
| 1. Power switch | 2. TFT display | 3. Unit soft key | 4. Software option |
| 5. Function key and Numeric keypad | 6. Direction key | 7. Rotary knob | |
| 8. Channel A output/trigger | 9. Channel B trigger | | |

Real Panel



- | | |
|------------------------------|---|
| 1. Burst TTL output (BNC) | 2. Modulation/External signal input (BNC) |
| 3. Power connector with fuse | 4. AC110V/220V power selection switch |
| 5. RS232/USB connector | |

◆ Description of TFT Display



1. **A Waveform Display:** at the upper-left display area, displays the waveform of channel A and preset parameter.
2. **B Waveform Display:** at the upper-central display area, displays the waveform of channel B under the variety functions.
3. **Function Menu:** at the right-side display area, displays the function menu on the first line.
4. **Option Menu:** at the right-side display area, displays the option menu from the second line to the sixth line.
5. **Parameter Menu:** at the lower-left display area, displays the waveform of channel A, frequency, amplitude, offset, phase and duty cycle.
6. **Unit Menu:** at the bottom of display area, displays unit menu on the bottom line of TFT display.

◆ Technical Specifications

Model	MFG-3010A	MFG-3020A	MFG-3040A
Frequency range(sine)	40μHz~10MHz	40μHz~20MHz	40μHz~40MHz
Output Characteristics of Channel A			
Waveform Characteristics			
Waveform type	sine, square, pulse, DC		
Waveform length	4 ~ 16000 points		
Sample rate	180MSa/s		
Waveform amplitude resolution	10bits		
Sinusoidal harmonic rejection	≥50dBc (≤5MHz), ≥45dBc (≤10MHz), ≥40dBc (≤20MHz), ≥35dBc (≤40MHz)		
Sine wave total distortion	≤0.1 % (20Hz ~ 200kHz)		
Pulse and square rise/fall time	≤20ns		
Pulse and square overshoot	≤5%		

Square wave duty cycle	50%
Pulse wave duty cycle	1%~ 99% ($\leq 1\text{MHz}$)
Frequency Characteristics	
Frequency range (sine)	2kHz ~ the maximum frequency, resolution: 40 mHz 40 μHz ~ 2kHz, resolution: 40 μHz
Frequency range (square)	40 μHz ~10MHz (<20MHz); 40 μHz ~20MHz ($\geq 20\text{MHz}$)
Frequency range (pulse)	40 μHz ~10MHz
Frequency accuracy	$\pm(5 \times 10^{-5} + 40\text{mHz})$
Frequency stability	$\pm 1 \times 10^{-6}$ / 3 hours (small TCXO)
Amplitude Characteristics	
Amplitude range	1mVpp ~ 20Vpp (high impedance)
Maximum resolution	1 μVpp (high impedance)
Amplitude accuracy	$\pm (1\% + 1 \text{ mVrms})$ (high impedance, RMS, frequency 1 kHz)
Amplitude stability	$\pm 0.5\%$ /3 hours
Amplitude flatness	$\pm 5\%$ (frequency < 5MHz), $\pm 10\%$ (frequency < 10MHz), $\pm 20\%$ (frequency > 10MHz)
Output impedance	50 Ω
Sine wave amplitude setting range (50 Ω)	1mVpp ~ 10Vpp, when output frequency $\leq 10\text{MHz}$ 1mVpp ~ 7Vpp, when output frequency $\leq 40\text{MHz}$
Amplitude setting range (high impedance)	1mVpp ~ 20Vpp, when output frequency $\leq 10\text{MHz}$ 1mVpp ~ 14Vpp, when output frequency $\leq 40\text{MHz}$
Offset Characteristics	
Offset range	(offset + 0.5 \times peak-to-peak amplitude) $\leq 2\text{Vdc} \times$ attenuation coefficient, when peak-to-peak amplitude ≤ 4 , auto attenuation (offset + 0.5 \times peak-to-peak amplitude) $\leq 10\text{Vdc} \times$ attenuation coefficient, when peak-to-peak amplitude ≥ 4 , auto attenuation
Maximum resolution	20mV (high impedance)
Offset accuracy	$\pm (1\% + 20\text{mV})$ (amplitude < 4Vpp)
Sweep Characteristics	
Sweep parameters	frequency, amplitude
Sweep range	free to set the start and stop points
Sweep time	100ms~600s
Sweep direction	Up, Down, Up-Down
Sweep mode	linear, logarithmic
Control mode	auto sweep or manual sweep
Frequency Modulation Characteristics	
Carrier signal	sine or square wave, frequency range same as main waveforms
Modulation mode	Internal or external
Modulation signal	Channel B signals or external signals
Modulation frequency	Same as channel B signals
FM deviation	0%~20%
External input signal amplitude	20Vpp (-10V ~ +10V)
External FM	carrier frequency accuracy $\leq 10^{-3}$, modulation error $\leq \pm 20\%$
Amplitude Modulation Characteristics	
Carrier signal	sine or square wave, frequency range same as main waveforms

Modulation mode	Internal or external
Modulation signal	Channel B signals or external signals
Modulation frequency	Same as channel B signals
Distortion	≤ 2%
AM depth	0%~120%
Relative modulation error	≤ ± 5%
External input signal amplitude	20Vpp (-10V ~ +10V)
Shift Keying Characteristics	
FSK	free to set carrier frequency and hop frequency
PSK	hop phase 0~360°, resolution 11.25°
Control mode	internal
Alternative rate	10ms~60s
Output Characteristics of Channel B	
Waveform Characteristics	
Waveform type	32 kinds of pre-stored waveforms, like sine, square, triangle, sawtooth, ladder etc. and 8 kinds of user defined arbitrary waveforms.
Waveform length	1024 points
Sample rate	100MSa/s
Waveform amplitude resolution	8bits
Frequency Characteristics	
Frequency range	Sine: 10mHz~1MHz Other waveforms: 10mHz~50kHz
Frequency resolution	40mHz
Frequency accuracy	±(1×10 ⁻⁵ +40mHz)
Amplitude Characteristics	
Amplitude range	100mVpp~20Vpp (high impedance)
Maximum resolution	2mVpp
Output impedance	50Ω
Harmonic Characteristics (channel B frequency is the harmonic wave of channel A)	
Harmonic time	0.1 ~ 250.0 times
Harmonic frequency	<1MHz
Phase adjustment	1 degree/step
Burst Characteristics (channel B signal is used as burst signal)	
Frequency of Channel B	40mHz ~ 1MHz
Burst Frequency	10mHz ~ 50kHz
Burst count	1~65000 cycles
Burst mode	internal trigger, single trigger, TTL trigger
Frequency Counter	
Frequency range	1Hz ~ 200MHz
Input signal amplitude	100mVpp ~ 20Vpp
Low pass filter	cut off frequency 100kHz
Gate time	10ms ~ 60.0s
Remote Control	
Remote interface	Standard USB Universal Serial Bus Interface Standard RS232 serial interface

Common Characteristics	
Power source	Voltage: AC200V~AC240V, 50Hz; AC100V~AC127V, 60Hz (Pay attention to the position of voltage selection switch) Power: <45VA
Environment	Temperature: 0~40°C Humidity: <80%
Operation characteristics	Key operation for all functions, menu display, rotary dial adjustment
Display	TFT display, 320*240, English, Chinese (simplified), Chinese (traditional)
Manufacturing technology	Surface Mount Technology, Integrated Circuit. High reliability and stability.
Accessories	Power cord, Q9 test lead, Q9 BNC-clip test lead, Operation manual RS232 cable, USB cable, RS232 & USB interface software CD
Dimension	Machine dimension: 385(D)×260(W)×110(H)mm Chassis dimension: 415(D)×295(W)×195(H)mm
Weight	4kg

Shenzhen Mywave Instrument Co., Ltd.

Address: 3F North, 36 Building, Yangmen Industrial Zone, Dakan, Xili,
Nanshan District, Shenzhen, P.R. China

Post code: 518055

Tel: 0755-86114586/86114587 Fax: 0755-86164270

[Http://www.szmywave.com](http://www.szmywave.com) E-mail: mw@szmywave.com