FY21xxS series
Direct Digital Synthesis (DDS)
Signal Generator

User's Manual

Rev2. 2

2014-3-1

Thank you for purchasing our products, please carefully read the contents of the use's manual before use, to ensure the normal use of the instrument.

Introduction of the instrument

This manual applies to each mode of FY21xxS series Direct Digital Synthesis (DDS) Signal Generator. In this series, the last two digits "xx" represent the upper limit frequency value (MHz) of each mode.

FY21xxS series direct digital synthesis signal generator use DDS technology and FPGA design with the characters of high stability and low distortion ect.,with the function of TTL output and 60MHz frequency meter.It can output Sine wave, Square wave (Duty cycle adjustable from 1% to 99%) and Triangle wave (include sawtooth wave). Maximum effective output is greater than 9Vpp with resolution of 0.01Hz (10mHz). Output amplitude and DC offset can be adjusted continuously. It has two sweep functions, linear sweep and logarithmic sweep. the start and end frequency and sweep time can be set at will. It's the ideal equipment of electronic engineer, laboratory, production lines, the teaching and scientific research.

It has excellent technical indexes and function features:

- ◆High frequency accuracy: $\pm 5\times 10^{-6}$
- ◆High resolution: 10 mHz
- ◆All range continuously adjustable, digital setting.
- ◆High waveform accuracy: The output waveform synthesis by calculating function.
- ◆3.3V TTL electric level output.
- ◆Several different waveforms: Sine wave, Square wave (Duty cycle adjustable) and Triangle wave (include sawtooth wave).
- ◆Sweep function: Linear sweep, Logarithmic sweep. Starting and stop points can be set optionally.
- ◆Save function: 20 sets of parameters defined by the users can be saved and loaded anytime.
- ◆Operation mode: Button controlled, LCD display, digital setting, knob adjusted continuously.
- ◆Output mode： Standard BNC port output.
- ◆Highly reliable： Large scale integrated circuit, Surface mounting technology, reliable and durable.
- ◆Frequency measurement： Frequency of internal / external signal can be measured through built-in 60MHz frequency meter.

Main technology indexes

◆ **Signal Output function**

Output waveforms	Sine wave, Square wave (Duty cycle adjustable) and Triangle wave (include sawtooth wave)
Output amplitude	≥9Vp-p (signal output, no load)（MAX） ≤20mVp-p (MIN)
Output impedance	51Ω±10%(signal output)
DC offset	±2.5V(no load)
Frequency range	0.01Hz ~ 2MHz (FY2102S) 0.01Hz ~ 5MHz (FY2105S) 0.01Hz ~ 8MHz (FY2108S) 0.01Hz ~ 10MHz (FY2110S)
Resolution	0.01Hz(10mHz)
Frequency accuracy	$\pm 1\times 10^{-6}$
Frequency Stability	$\pm 5\times 10^{-6}$/3 Hours
Sine wave distortion	≤0.8% (reference frequency is 1kHz)
Triangle linearity	≥98% (0.01Hz~10kHz)
Rise and fall time of square wave	≤100ns
Square Wave Duty range	1%~99%(digital control mode)

◆ **TTL Output function**

Frequency range	0.01Hz ~ 2MHz (FY2102S) 0.01Hz ~ 5MHz (FY2105S) 0.01Hz ~ 8MHz (FY2108S) 0.01Hz ~ 10MHz (FY2110S)
Amplitude	>3Vp-p
Fan Out	>20 TTL loads

◆ **COUNTER function**

Counter Range	0-4294967295
Frequency Meter Range	1Hz~60MHz
Input Voltage Range	0.5Vp-p~20Vp-p

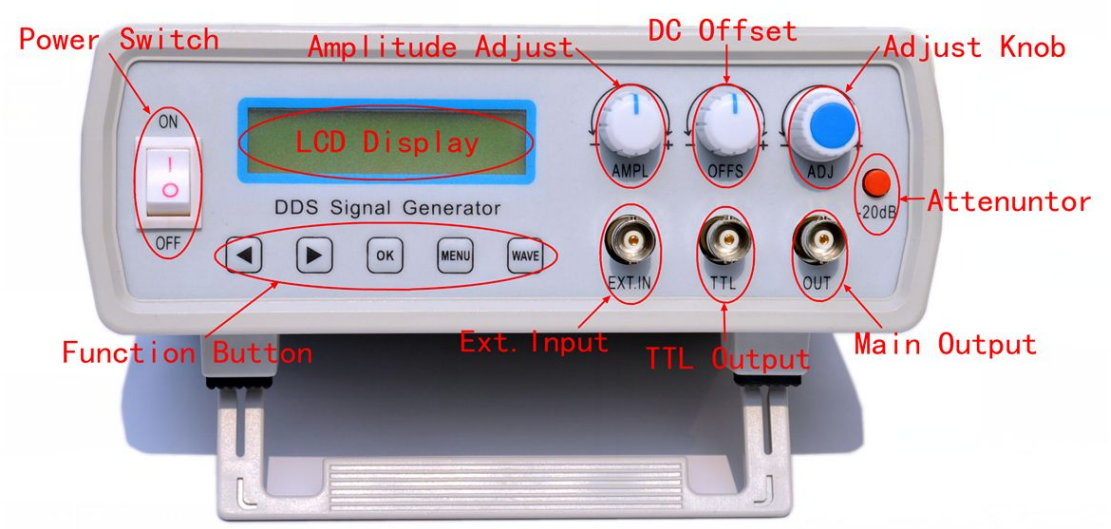
◆ **SWEEP function**

Sweep mode	Linear sweep, Logarithmic sweep
Sweep range	**f_{M1} to f_{M2}**
Sweep time	1s~99s

◆ **Others**

Display	LCD1602
Save and Load Parameter	M00-M19(M00: default load)
Size	200mm(Length)×190mm(Width)×90mm(Height)
Buzzer warning tone	Can be turned On/Off by setting
Production technology	Surface mounting technology, large scale integrated circuit, reliable and durable
Operation feature	Button-controlled, Knob-adjusted continuously
Conditions requirement	Temp: 0~40℃ Humidity: < 80%

The function introduction of front panel



Operating Guide

1. Press the button【Menu】 to switch between Frequency adjusting and Function adjusting. The detailed condition (frequency adjusting or function adjusting) displayed after "*"

*F=0010.00000kHz
FUNC:WAVE=SINE

F=0010.00000kHz
*FUNC:WAVE=SINE

2. As frequency adjusting, pressing the button 【◄】 or 【►】 to adjust position of cursor, and pressing the 【OK】 button can switch units (Hz，kHz or MHz), and then adjust the code switch and the corresponding value of frequency appear.

*F=0010.00000kHz
FUNC:WAVE=SINE
Step frequency：1 kHz

*F=0010.00000kHz
FUNC:WAVE=SINE
Step frequency：100 kHz **etc.**

*F=0010000.00 Hz
FUNC:WAVE=SINE
The frequency unit is Hz

*F=0.01000000MHz
FUNC:WAVE=SINE
The frequency unit is MHz

3. As function adjusting, pressing the button 【◄】or【►】to toggle among "WAVE"，"DUTY"， "COUNTER"， "EXT.FREQ"， "TIME"，"SWEEP"，"SAVE" and "LOAD".

4. The "WAVE" shows the current wave state. Pressing 【Wave】 button which can change output waveforms among SINE, TRGL and SQUR.

F=0010.00000kHz
*FUNC:WAVE=SINE

Main output of waveform is SINE.

F=0010.00000kHz
*FUNC:WAVE=SQUR

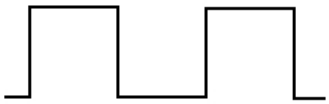
Main output of waveform if SQUR.

F=0010.00000kHz
*FUNC:WAVE=TRGL

Main output of waveform is TRGL.

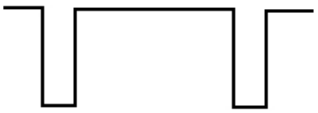
5. The "DUTY" means duty cycle, SQUR adjusted from 1% to 99%, while TRGL adjusted among 50% (standard TRGL), above 50% and below 50% (both are different saw tooth waves). SIN is disabled in this case.

F=0010.00000kHz
*FUNC:DUTY=50%



(WAVE=SQUR)

F=0010.00000kHz
*FUNC:DUTY=80%

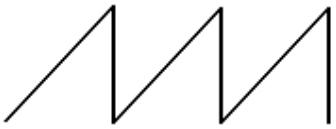


(WAVE=SQUR)

F=0010.00000kHz
*FUNC:DUTY=50%

(WAVE=TRGL)

F=0010.00000kHz
*FUNC:DUTY=51%



(WAVE=TRGL)

F=0010.00000kHz
*FUNC:DUTY=49%

(WAVE=TRGL)

6. COUNTER is counter function, and the counter values displayed on the screen, impulse inputted from Ext.Input, reset to "0" as "OK" pressed and counting again.

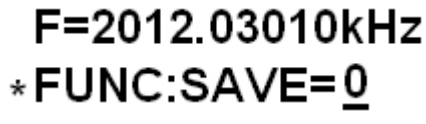
CNTR=1201
*FUNC:COUNTER

7. EXT.FREQ is exterior frequency measuring function, which can measure the frequency of input signal.

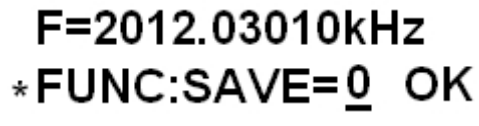
ExtF=10.00kHz
*FUNC:EXT.FREQ

8. SAVE can save the value of the current frequency, wave and duty, and there are 20 storage position from M00 to M19, which adjusted by code switch, as setting finished, then press "OK" button, when "OK" appeared on the screen,

storage is over. If the current value is saved to "M00", and the changed value will be called in next time, to FY21xxS series, the start frequency of sweep function is defined at M01, the end frequency is defined at M02. If the sweep function need to be run, the start and end frequency must to be set correctly.



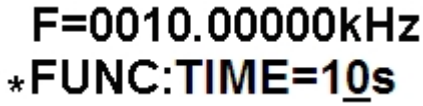
（Choose storage position）



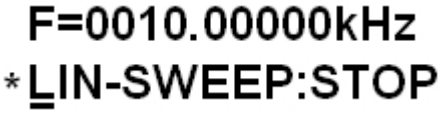
(Save to "0 position" is OK)

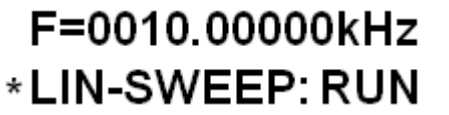
9. The "LOAD" is function of loading the parameters of memory. Operation is similar to SAVE.

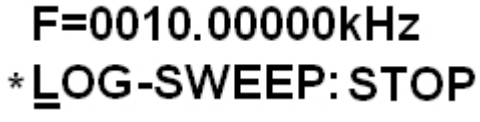
10. TIME is the function of set sweep time from 1 second to 99 seconds.

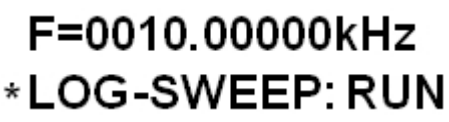


11. The "SWEEP" is the function of sweep includes LIN-SWEEP Mode and LOG-SWEEP Mode. The default setting is LIN-SWEEP Mode. You can rotate the 【Main knob】 to switch between these two modes. Then press the button 【OK】 to start and press it again to stop. But primarily the starting frequency (fM1) and stop frequency (fM2) need to be set in the "LOAD" function and sweep time need to be set in the "TIME" function.









12. TTL output the synchronized TTL wave of the same frequency.

13. The【AMPL】knob adjusts the amplitude of output signal.

14. The【OFFS】knob adjusts the DC offset of output signal.

15. The buzzer function. Each time when you press a button or rotate a knob, an impulse will be generated and the buzzer will beep once. It will beep longer if invalid operation is conducted. The buzzer can be turned off by pressing and holding the button【Menu】and then turning on the power switch in shutdown state if it is noisy. The buzzer can be turned on by repeating above operations.

16. Pressing the button of -20dB attenuator and the output amplitude can attenuate -20dB (abt. 10x), otherwise, which can output the small signal.

Safety Notes

1、Before using this instrument, please check if the power supply is normal, to ensure the normal use and personal safety.

2、This instrument must be used in the technical index range.

3、Please do not change the instrument circuit arbitrarily, so as to avoid damaging equipment or endangering the safety.

Warning and personal injury

Do not apply the product in the safety protection device or emergency stop device, or any other applications that the product failure could result in personal injury, unless there is special purpose or use authorization. Before the installation and use, each parameter of the technical indexes in this manual should be referred to. If this suggestion is not obeyed, death or serious personal injury could be caused. In this condition the company will not be responsible for any compensation of personal injury or death, and all the company managers and employees and auxiliary agents, distributors, other personnel concerned will be released from any claim (including all the costs, expenses, attorney fees etc.) that may result in.

Appendix

Complete set of instrument and auxiliary

FY21xxS DDS function generator / counter----------1 set
DC5V Power Supply----------1 pc
Signal output cable----------1 pc
User's manual----------1 book(PDF Format)