UDB12xxS seriers
Direct Digital Synthesis (DDS)
Signal Generator

Users Manual

Introduction of the instrument

This 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, UDB100xS series have sweep function, 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.

Main technology data

◆ **Signal Output function**

Output waveforms	Sine wave, Square wave,Triangle wave,2 sawtooth wave
Output amplitude	≥9Vp-p (signal output, no load)（MAX）
	About 0.1Vp-p (MIN)
Output impedance	50Ω±10%(signal output)
DC offset	±2.5V(no load)
Display	LCD1602
Frequency range	0.01Hz ~ 2MHz(UDB1002)
	0.01Hz ~ 3MHz(UDB1003)
	0.01Hz ~ 5MHz(UDB1005)
Resolution	0.01Hz(10mHz)
Frequency Stability	$\pm 1 \times 10^{-6}$
Frequency accuracy	$\pm 5 \times 10^{-6}$
Sine wave distortion	≤0.8% (reference frequency is 1kHz)
Trinagle 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	0.001Hz ~ 2MHz(UDB1202S)
	0.001Hz ~ 3MHz(UDB1203S)
	0.001Hz ~ 5MHz(UDB1205S)
	0.001Hz ~ 10MHz(UDB1210S)
Two ways of output phase difference	180º
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

◆ **ADC function**

Voltage measurement range	**0 ~ 5V**
Resolution ratio	**0.001V(1mV)**
Accuracy	**±0.5%**

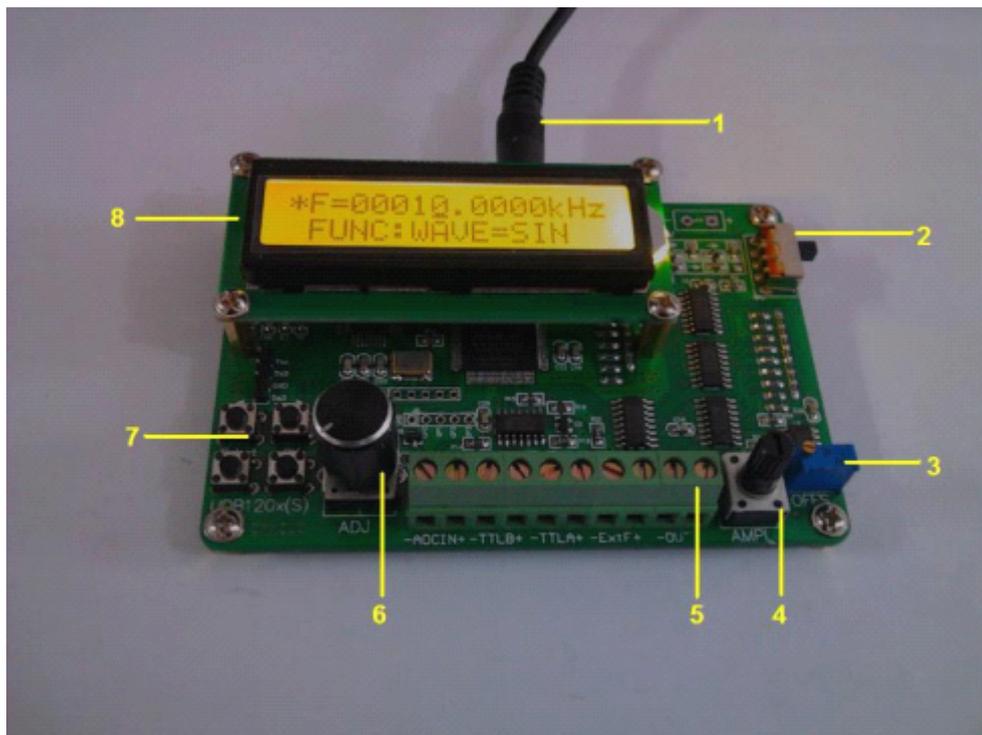◆ **SWEEP function**

Frequency range f_{M1} to f_{M2}

Sweep time   1s~99s

◆ **Others function**

       Save and Load Parameter   M0-M9(M0: default load)

The function introduction of front panel

1. DC 5V input   2. Power switch

3. Offset regulation   4. Amplitude adjust

5. Output terminal   6. Encoder

7. User key   8. LCD display

Operating Guide

1. **Pressing the "select" button which can switch from frequency adjusting to function adjusting, and the detailed condition (frequency adjusting or function adjusting) displayed after "*".**

```
*F=0010.00000kHz          F=0010.00000kHz
 FUNC:WAVE=SIN           *FUNC:WAVE=SIN
```

2. **As frequency adjusting, pressing the button of "left" and "right" can adjust**

position, and the "OK" button can switch units(Hz，kHz and MHz) and then adjust the code switch and the corresponding value of frequency appear.

*F=0010.00000kHz
FUNC:WAVE=SIN

step frequency：0.01kHz

*F=0010.00000kHz
FUNC:WAVE=SIN

step frequency：100kHz etc.

*F=0010000.00 Hz
FUNC:WAVE=SIN

The frequency unit is 'Hz'

*F=0.01000000MHz
FUNC:WAVE=SIN

The frequency unit is 'MHz'

3. As function adjusting, pressing the button of "left" and "right" can switch "WAVE，"DUTY"，"COUNTER"，"EXT.FREQ"，"SAVE"，"LOAD"，"TIME" and "SWEEP".

4. As WAVE adjusting, pressing "OK" which can change waves of SIN, TRI and SQR.

F=0010.00000kHz
*FUNC:WAVE=SIN

main output waveform is sine.

F=0010.00000kHz
*FUNC:WAVE=SQR

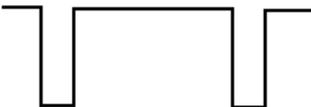main output waveform is square.

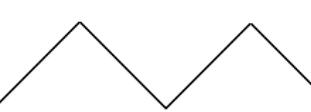F=0010.00000kHz
*FUNC:WAVE=TRI

main output waveform is triangle.

5. The "DUTY" means duty cycle, SQR adjusted from 1% to 99%, while TRI adjusted from 50%(standard TRI), above 50% to below 50% (both are different sawtooth waves, SIN is disable).
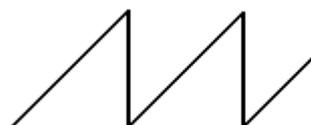
F=0010.00000kHz
*FUNC:DUTY=50% :

(WAVE=SQR)

F=0010.00000kHz
*FUNC:DUTY=8_0_% :   (WAVE=SQR)

F=0010.00000kHz
*FUNC:DUTY=5_0_% :   (WAVE=TRI)

F=0010.00000kHz
*FUNC:DUTY=5_1_% :   (WAVE=TRI)

F=0010.00000kHz
*FUNC:DUTY=4_9_% :   (WAVE=TRI)

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

CNTR=1246
*FUNC:COUNTER

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

ExtF=9.998kHz
*FUNC:EXT.FREQ

8. **SAVE can save the value of the current frequency, wave and duty, and there are 10 storage position from M0 to M9, 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 "M0", and the changed value will be called in next time, to UDB100xS series, the start frequency of sweep function is defined at M1, the end frequency is defined at M2. If the sweep function need to be run, the start and end frequency must to be set correctly, and $f_{M2} > f_{M1}$.**

F=0012.32000kHz
*FUNC:SAVE=_0_   （set position）

F=0012.32000kHz
*FUNC:SAVE=_0_ OK   (Save to "0 position" is OK)

9. **LOAD is function of calling in the parameters of memory, operation is**

similar to SAVE.

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

F=0010.00000kHz
*FUNC:TIME=10s

11. SWEEP is the function of sweep, the default setting is stop, it can be run as pressing the button of OK，the sweep time and frequency range (f_{M1} to f_{M2}) need to be set in advance.
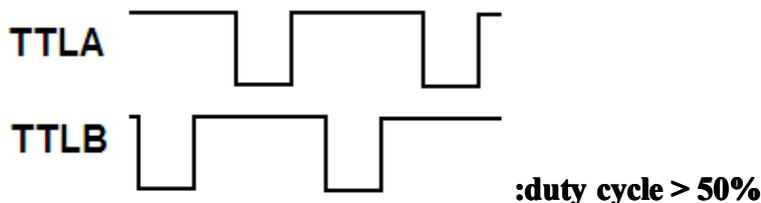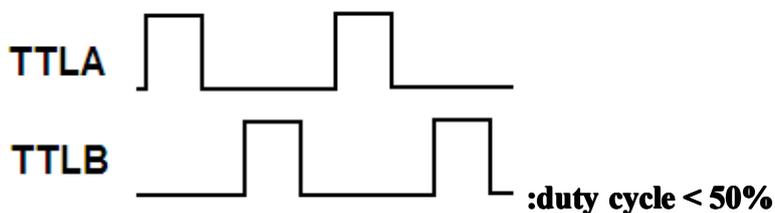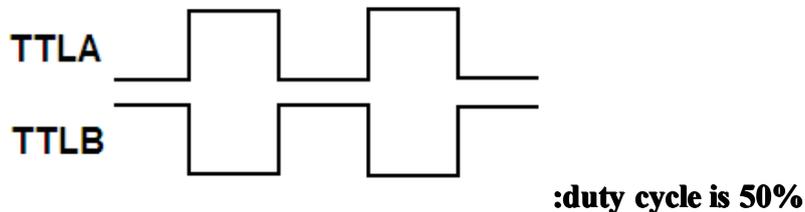
F=0010.00000kHz
*FUNC:SWEEP=STOP

F=0010.00000kHz
*FUNC:SWEEP=RUN

12. TTL output with the frequency of two way back TTL wave.

TTLA

TTLB

:duty cycle is 50%

TTLA

TTLB

:duty cycle＜50%

TTLA

TTLB

:duty cycle＞50%

13. The two right potentiometers adjust output amplitude and DC offset respectively. Amplitude adjustment can use encoder regulation. AMPL is amplitude control word,maximum 255,this can from 0 to 255 change.

F=00010.0000kHz
*FUNC:AMPL=128   :AMPL set at 128 amplitude is half.

14. One ADC converter,switching voltage range 0 to 5V,resolution ratio at 1mV.

F=00010.0000kHz
*FUNC:ADC=2.452V :Input DC voltage on ADC terminal, measurement results is 2.452V.

Appendix

complete set of instrument and auxiliary

DDS function generator / counter----------------1

DC 5V Power Supply----------------------------1