User's Manual

1. Instrument introduction

These series two-channel function/arbitrary waveform generator is equipped with direct digital synthesis (DDS) technology which enables output signal to be stable, accurate and low distortion.

This series of instruments are divided into three models, the main difference is the maximum frequency of sine wave output,they are 20MHz、40MHz and 60 MHz.

1.1. Key Features

1.1.1. 2.4-inch 320x240 TFT LCD with clear graphic interface

1.1.2. Chinese / English menu available

1.1.3. The two channels are independent of each other, with phase synchronization function

1.1.4. Sampling rate: 200MSa/S, vertical resolution: 13 bit and storage depth: 8k

1.1.5. 5 basic waveform and 32 arbitrary waveform in-built

1.1.6. Waveform storage; Supports internal storage of 50 groups of user-defined edited waveform

1.1.7. Pulse wave output set in edge time

1.1.8. Internal AM, FM, PM modulation function (External AM, FM, PM modulation matching)

1.1.9. Internal/external ASK, FSK and PSK modulation function

1.1.10. Two-channel output, the highest output frequency is 60M

1.1.11. Output of linear/logarithmic frequency sweep and burst waveform

1.1.12. Frequency meter of high precision of 100MHz and 32-bit counter

1.1.13. With USB Device,external analog modulation interface

1.1.14. Multi-functional arbitrary waveform editing software equipped

1.2. Cautions

1.2.1. Ensure that the port voltage is within the rated range before accessing the signal

1.2.2. Do not operate the instrument in a humid environment

1.2.3. Ensure that the instrument is reliably grounded

1.2.4. To ensure high accuracy, preheat for 30 minutes in the temperature range of 18 ° C to 28 ° C before using

2. Panel introduction

This section describes front and rear panels of this instrument for your quick understanding of function and usage.

2.1. Front panel

Front panel includes liquid crystal, keys,CH1 output of channel 1,CH2 output of channel 2, and the external input terminal Ext.IN.

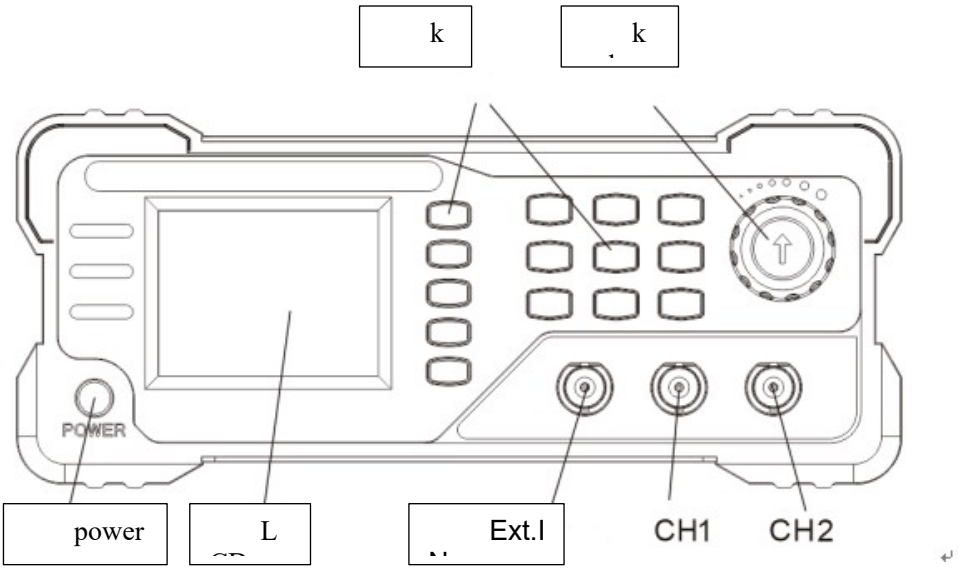


Figure 2-1Front panel

Power button: Long press this key to power on, and long press this key to power off.

WAVE key: enter the basic waveform output screen or selects a channel waveform under the basic waveform output screen.

MOD key: enter the modulation function screen.

SYS key:enter the system setting screen.

MEAS key: enter the frequency meter and counter measurement interface.

◄►Key: Left and right keys, as a switching key when editing parameters.

OK key: close or open the channel output at the same time under the basic waveform output screen. In the modulation related interface, as a manual trigger signal key.

CH1: Select channel 1 to turn on or off channel 1 output.

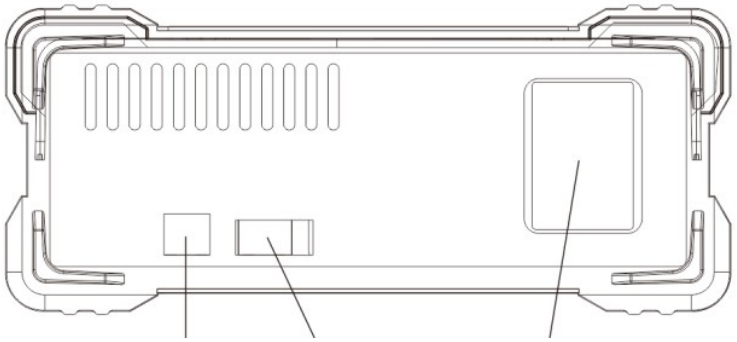
CH2: Select channel 2 to turn on or off channel 2 output.

F1 to F5: as a soft key for setting functions under the specific screen.

Knob: modify and switch values or options while editing parameters

2.2. Rear panel

The rear panel includes power socket, power switch, USB square port, 10P



communication expansion port, and external analog modulation input terminal (optional).

Figure 2-2Rear panel (standard, no optional)

3. Device Connection

3. 1. power connection

3. 1. 1. Connect one end of the attached power cable to the power socket on the rear panel of the instrument and the other end to the AC.

3. 1. 2. Turn on the power switch below the power socket to energize the instrument.

It will turn on directly when the power switch is energized. Long press the power button on the front panel to enter standby or start up.

3. 2. USB device interface

3. 2. 1. You should use this interface when this series connects to an external USB device as slave device. The SC COM baud rate is 115200.

3. 3. Communication extension interface

3. 3. 1. 10P communication expansion interface to extend TTL digital signal and serial signal

4. Basic operation

4. 1. Main interface operation

4. 1. 1. Enter the basic waveform interface every time you boot up, that is, the main interface, as shown below.

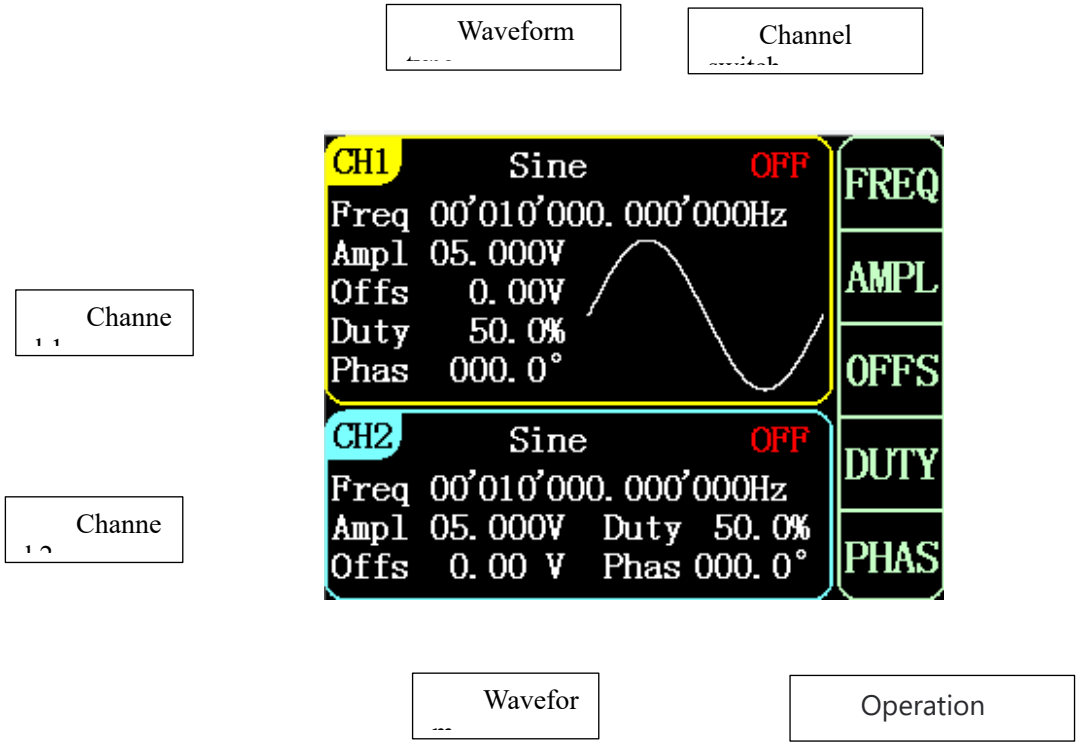


Figure 4-3-1Display interface (main interface)

4. 1. 2. Press the OK key to close or open the channel output at the same time, and perform an in-phase operation.

4.1.3. Press CH1 or CH2 to select a corresponding channel as the primary channel. In the case of the main channel, press this key to close or open the corresponding channel output.

4.1.4. In the main screen, press the WAVE key to select a waveform. Switch the waveform by the knob or ◄► key. In the non-home screen, press the WAVE key to switch to the main screen.

4.1.5. You can press the soft key F1- F5 to edit the frequency, amplitude, bias, duty cycle, and phase of the currently selected channel. After the object is selected, you can move the cursor by the key ◄►, long press the key ◄► can move the cursor quickly,And change the value by turning the knob.

4.1.6. Press F5 to select the phase object, an in-phase operation will be performed.

4.2. Modulation mode operation

4.2.1. Press the MOD key to enter the Settings for pulse wave /sweep/burst/modulation output.

4.2.2. Every time you enter the modulation interface, "Control" set closing. Only when "Control" is turned on, the corresponding channel will output the corresponding modulation function.

4.2.3. Pulse wave belongs to the basic waveform, two channels can output at the same time.

4.2.4. When the Frequency sweep/pulse train (burst)/ modulation output at the same time, only one channel output them, and the other one output basic waveform.

4.2.5. After pressing the MOD key, the pulse wave setting interface will be entered first, as shown in Figure 4-2-1.

4.2.6. Pulse wave interface is mainly set the edge time of pulse wave.

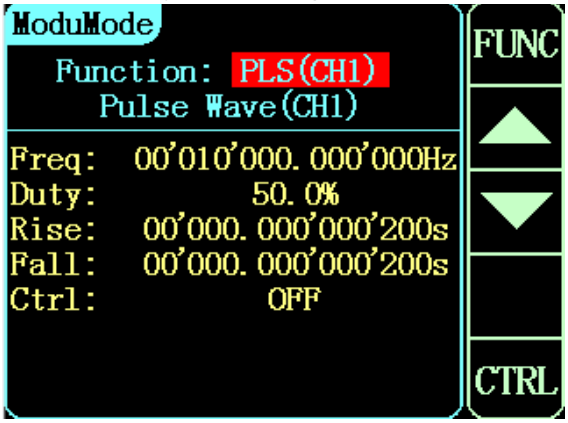


Figure 4-4-1Modulation mode - Pulse wave

4.2.7. Press the function key, the cursor will move to the function menu, and the function can be switched by pressing the function key, or by pressing the left and right keys and the knob.

4.2.8. In addition to pulse wave, you can also choose frequency sweep, burst, AM, FM, PM, ASK, FSK, PSK and other modulation functions. Press F1 key to select function menu and select the modulation function of specific channel

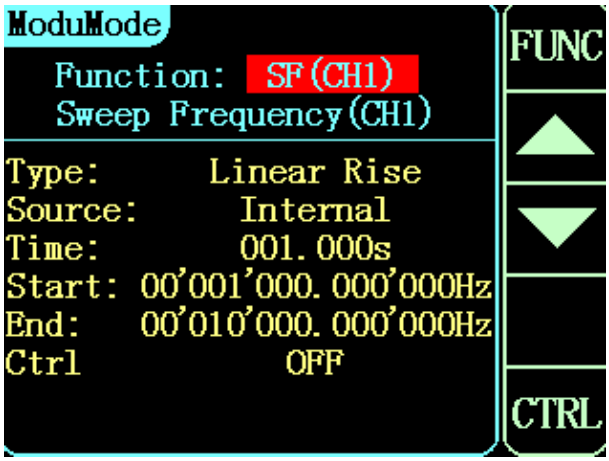


Figure 4-2-2Modulation mode-Frequency Sweep

4.2.9. Burst, AM, FM, PM, ASK, FSK and PSK can edit the carrier. Press the F4 carrier soft key to enter the carrier interface.

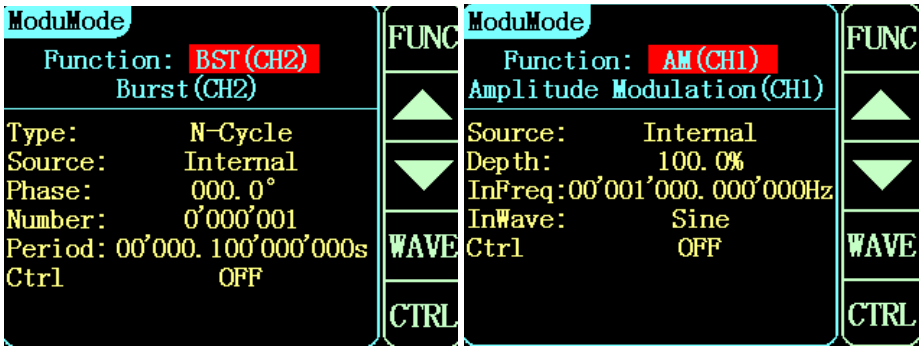


Figure 4-2-3Modulation mode - burst, AM

4.2.10. The carrier interface is shown in Figure. 4-2-4. The carrier interface is the same as the waveform interface, and the related operations are also the same, but the carrier output channel have a "MOD"character display.

4.2.11. Press the MOD key returns to the modulation interface.

4.2.12. Press the SYS or MEAS key at the modulated carrier interface, it will enter the system setting or measurement mode accordingly and exit the modulated output

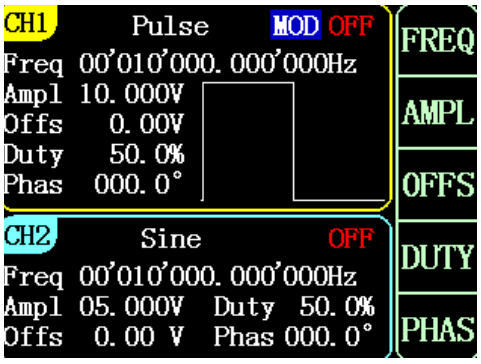


Figure 4-2-4Modulation - carrier editing

4.3. Measurement mode operation

4.3.1. Press the MEAS key to enter the measurement mode, as shown in Figure 4-3-1

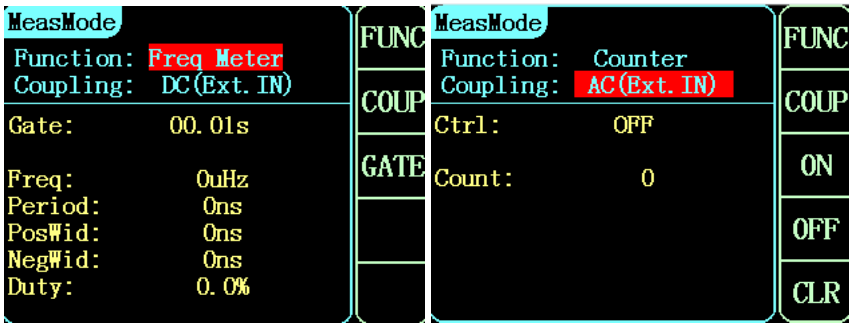


Figure 4-3-1 Measurement mode - Frequency meter and counter

4.3.2. The measurement mode have two functions, one is a frequency meter, the other is a counter. They measure digital signals of the external input port.

4.3.3. The frequency meter is used to measure the frequency,can measure the frequency by equal precision measurement,and set coupling and gate time.

4.3.4. The counter is used to count the pulses number, set the coupling and function switch, as well as reset number

4.4. System Interface operation

4.4.1. Press the SYS key to enter the system Setting, as shown in Figure 4-4-1

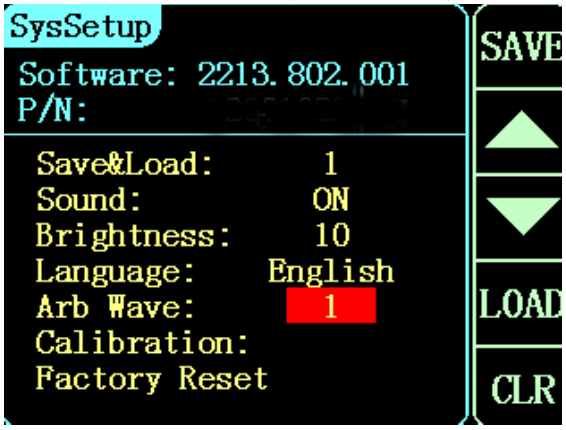


Figure 4-4-1 System Setting

4.4.2. The system setting interface display the current software version.

4.4.3. It can invoke and save the system parameters, set the buzzer switching, screen brightness, the English and Chinese language switching,arbitrary waveform of the editing saving and invoking , standard calibration r, factory setting restoration.

4.4.4. Use soft keys F1- F5 to select and operate objects

4.4.5. The operation of invoking and saving can save the current various parameter setting. After the sound and brightness are changed, you need to press the save soft key of F1 to save the parameter setting， the setting value will be maintained only after restarting the instrument during power failure, otherwise the original setting value will be restored.

4.4.6. Arbitrary wave can save the waveform data of the current main channel to any set wave position,clear or invoke the waveform data at arbitrary wave position currently set

5. Accessories

5.1. Standard accessories:

Power cable with three cords	1pc
BNC coaxial cable	2pc
USB data line	1pc
Signal straight line	1pc
Manual	1pc

6. Product Technical Indicators

Frequency characteristics			
Model	20MHz	40MHz	60MHz
Sine wave	1μHz~ 20MHz	1μHz ~ 40MHz	1μHz ~ 60MHz
Square wave	1μHz ~ 15MHz	1μHz ~ 15MHz	1μHz ~ 15MHz
Triangle wave	1μHz ~ 15MHz	1μHz ~ 15MHz	1μHz ~ 15MHz
Pulse wave	100μHz ~ 6MHz	100μHz ~ 6MHz	100μHz ~ 6MHz
Arbitrary	1μHz ~ 6MHz	1μHz ~ 6MHz	1μHz ~ 6MHz
Frequency resolution	1uHz		
Frequency accuracy	±20ppm		
Frequency stability	±1ppm/3hours		
Waveform characteristics			
Waveform type	Sine、Square、 triangular wave, pulse,noise, arbitrary wave (including DC).32 kinds of built-in arbitrary waves and 50 kinds of user-defined arbitrary waves.		
Wave length	8192 points		
Waveform sampling rate	200MSa/s		
Waveform vertical resolution	13-bits		
Sine wave characteristics			
Sine wave	Harmonic Suppression	≥45dBc(<1MHz); ≥40dBc(1MHz~20MHz)	
	Total harmonic distortion	<0.8%(20Hz~20kHz,0dBm)	
Square wave signal characteristics			
Square wave	Rise/Fall time	<20ns	
	Overshoot	<5%	

	Duty cycle range	Frequency < 100 KHZ: 1% ~ 99%; 100kHz≤ frequency <5MHz: 20% ~ 80%; 5MHz≤ frequency: 40% ~ 60%(0.1% resolution)	
Pulse wave characteristics			
Pulse wave	Pulse width	Minimum 20ns; 1ns resolution	
	Edge jumping time	Minimum 20ns	
	Overshoot	<5%	
	Shaking	6ns+0.1% period cycle	
Sawtooth wave characteristics			
Sawtooth wave	Linearity	≥98%(0.01Hz~10kHz)	
	Symmetry	0.0 ~ 100.0%(resolution 0.1%)	
Output characteristics			
Amplitude			
Amplitude range	Frequency <10MHz	10MHz ≤ Frequency ≤ 30MHz	30MHz ≤ Frequency
	2mVpp~20Vpp	2mVpp~10Vpp	2mVpp~5Vpp
Amplitude resolution	1mV		
Amplitude accuracy	1% +2mVpp of set value (1kHz sine wave, 0 offset, >10mVpp)		
Amplitude flatness (Relative to 1k sine wave, 1Vpp)	±0.4dB <10MHz ; ±1.0dB ≥10MHz。		
Output impedance	50Ω±10% (typical)		
Protection	All signal outputs can work within 60 when the load is short-circuited.		
Offset			
Output range	Output amplitude > 0.1V	2mV < Output amplitude ≤ 0.1V	
	±10Vpk，ac + dc	±0.250Vpk，ac + dc	
Offset resolution	1mV		
Phase characteristics			
Phase adjustment range	0~359.9°		
Phase resolution	0.1°		
External measurement function			

Frequency meter function	Frequency measurement range	1Hz~100MHz
	Gate time	0.01S~10s continuous adjustment
Counter function	Counting range	0-4294967295
	Counting method	Manually
Input signal voltage range	2Vpp~20Vpp	
Coupling	DC or AC	
Pulse width measurement	1ns resolution, maximum measurable 20s	
Period measurement	1ns resolution, maximum measurable 20s	
AM modulation		
Output channel	CH1 or CH2	
Signal Carrier	Sine, square,sawtooth, pulse and arbitrary waveform (excluding DC)	
Source	Internal/External VCO(external is optional)	
Modulation Wave	Sine, square, triangle and ramp	
Modulation Frequency	2mHz~20kHz	
Modulation Depth	0%~120%	
FM Modulation		
Output Channel	CH1 or CH2	
Carrier Wave	Sine, square,sawtooth, pulse and arbitrary waveform (excluding DC)	
Source	Internal/External(external is optional)	
Modulation Wave	Sine, square, triangle and ramp	
Modulation Frequency	2mHz~20kHz	
Frequency Offset	0~Maximum carrier frequency	
PM Modulation		
Output Channel	CH1 or CH2	
Carrier Wave	Sine, square,sawtooth, pulse and arbitrary waveform (excluding DC)	
Source	Internal/External(external is optional)	
Modulation Wave	Sine, square, triangle and ramp	
Modulation Frequency	2mHz~20kHz	
Phase Offset	0°~ 360°	
ASK Modulation		
Output Channel	CH1 or CH2	

Carrier Wave	Sine, square,sawtooth, pulse and arbitrary waveform (excluding DC)
Source	Internal/External
Modulation Wave	Square wave of 50% duty ratio
Keying Frequency	2mHz~1MHz
Modulation Amplitude	0~Carrier Amplitude
FSK Modulation	
Output Channel	CH1 or CH2
Carrier Wave	Sine, square,sawtooth, pulse and arbitrary waveform (excluding DC)
Source	Internal/External
Modulation Wave	Square wave of 50% duty ratio
Keying Frequency	2mHz~1MHz
Hop Frequency	Carrier frequency range
PSK Modulation	
Output Channel	CH1 or CH2
Carrier Wave	Sine, square,sawtooth, pulse and arbitrary waveform (excluding DC)
Source	Internal/External
Modulation Wave	Square wave of 50% duty ratio
Keying Frequency	2mHz~1MHz
Modulation Phase	0°~ 360°
Frequency Sweep	
Output Channel	CH1 or CH2
Types	Linearity/Logarithm
Sweep Frequency Time	1ms ~ 999.999s
Start/Stop Frequency	Arbitrary set
Sweep Direction	Forward,Reverse.Backward
Trigger Source	Manual operating, internal, external
Burst Characteristics	
Output Channel	CH1 or CH2
Carrier Wave	Sine, square,sawtooth, pulse, noise and arbitrary waveform (excluding DC)
Pulse Count	1~1048575 or infinite, gated

Start/Stop Phase	0~360°
Internal Period	1μs~500s
Gating Source	External
Trigger Source	Internal, external, manual operating
Trigger Input	
Signal Range	2Vpp~20Vpp
Coupling	AC or DC
Pulse Width	>100ns
Reaction Time	<500ns（Burst）
	<10μs（Sweep）
Modulation Input	
Impedance	1MΩ
Signal Range	±2.5V ac+dc

7. General Technical Specification

Power Supply	
Supply Voltage	AC 110~240V，50~60Hz
Power Consumption	<15W
Display	
Types	2.4-inch TFT LCD screen
Resolution	320×240
Color	16M color
Environment	
Temperature Range	Operation: 10℃~+40℃ Non-operation: -10℃~+60℃
Cooling Methods	Natural cooling
Humidity Range	Below +35℃: ≤90％ relative humidity,+B14035℃ ~ +40℃: ≤60％ relative humidity
Interface	USB Device

8. Software materials download link

http://www.china-victor.com

Appendix

32 arbitrary wave English table

NegRamp	Boxcar
AttALT	Barlett
AmpALT	Triang

StairUP	Blackman
Halfsin	Hamming
stairUD	Hanning
stairDn	Kaiser
PPluse	DC
ExpRise	Comp
ExpFall	Tanh
Tan	Coth
Cot	Gamma
Sqrt	Lerendre
X^2	Chebyshev
Sinc	Bessel
Gauss	StepResp