

## DDS + Function Generator + Frequency Counter



A multi-function generator designed specifically to offer better value compared to the established big players(Tek, Agilent/Keysight). This device competes favorably in terms of performance at a fraction of the cost.

Featuring an advanced DDS(discrete digital synthesis) capability, as well as a function generator mode for creating sine, triangle/square/pulse/noise, and other waveforms. There's also a built in frequency counter with an additional time interval mode.

Some of the unique features include a real time mode over the high speed USB interface and an open software API(Linux and Windows) for direct access the the hardware. This allows users to get creative and implement custom applications where high speed digital to analog conversion can take place in real time, and sustained indefinitely(limited only by the USB bandwidth).

### Model Comparison

Model	Starter	Pro
D/A Sampling Rate	0.1Hz – 250Mhz	0.1Hz – 400Mhz
Channels	1	2
Vertical Resolution	12 bits	16 bits, 8bit mode
Memory Depth (Number of Samples)	36K, unlimited in real time mode	512M in 16 bit mode, 1G in 8 bit mode, unlimited in real time mode
amplitude control	10V pk/pk range, via rotary switch	20V pk/pk range, via rotary switch
offset control	via rotary switch	via rotary switch
Built in waveforms	sine, square, triangle, pulse, ramp noise, DC	Starter + exponential rise/decay
modulation	no	AM, FM, PM
Output Impedance(ohms)	50	50
synronization input port	yes	yes
synronization output port	yes	yes
advanced synchronization options	clock sync with another instrument(in or out), start on trigger input or output a start trigger	Starter + input clock division/multiplication, phase adjustment
modulation	no	AM, FM, PM
frequency counter	up to 300Mhz in frequency mode, 20ns resolution for time interval mode	up to 500Mhz in frequency mode, 8ns resolution for time interval mode
digital output, through sync out port	up to 250Mhz square wave	up to 400Mhz square wave
configuration setup storage	unlimited(stored on host)	unlimited(stored on host)
frequency sweep	yes	yes
user oscillator socket(custom freqs)	yes	yes
user interface	amplitude and offset control via rotary switches, everything else via PC side software	same as Starter
Host Interface	USB 2.0	USB 2.0
Power consumption	2W, usb powered	5W, from AC/DC power supply
firmware upgradable	yes	yes

## FAQ

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### **Is the unit field upgradable ?**

Yes, firmware can be upgraded over the USB interface.

### **Can multiple units be connected together ?**

Yes, there are currently two modes of operation. Trigger mode and synchronization mode.

Synchronization mode allows multiple units to run off the same clock. An example would be 3 units daisy chained together, outputting 1khz, 2khz, 4khz sine waves that are all in phase and without drift or wander.

In trigger mode a unit sits idle until it sees a start signal on the sync in connector. Additionally it can output a start pulse once it reaches the Nth(user selectable) sample. This allows precise triggering and sequencing between multiple units. More advanced trigger options may be added in the future via firmware upgrade.

### **What is 8 bit mode ?**

8 bit mode allows the memory depth to be effectively doubled, at the expense of a reduced vertical resolution(reduced to 8 bits).

This can be useful where the memory depth is a limiting factor, and 8bits of vertical resolution is adequate.

### **What is real time mode ?**

In real time mode data is continuously sent from host PC over the USB interface to the device. This is useful when the size of the file to be outputted is larger than the capacity of the internal RAM.

This mode allows very large files to be outputted, where the size of the file is only limited by the host PC's hardware and bandwidth limits of the USB interface.

Buffer levels are displayed in real time, and any under-runs are reported and saved to notify the user that

there was a hiccup and the system is having trouble keeping up.

Note:

The theoretical bandwidth of USB 2.0 is 480Mbit/s, however a more realistic sustained throughput is around 200Mbit – 300Mbit. This would allow a sustained output sampling rate of over 15Mega samples per second.

### **What is the frequency sweep ?**

The device outputs a sine wave and keeps changing the frequency either up or down. Start frequency, end frequency, step size, duration and direction are all user specified.

### **What is the user oscillator socket for ?**

Because the sampling frequency of the device is based on division/multiplication of the input oscillator, it sometimes helps to be able to change the oscillator to hit that exact desired frequency.

### **My waveform doesn't look right when I turn the offset knob all the way ?**

The device is most likely just fine, the issue is that amplifiers in general don't work well at the extreme range of their power rails. Please google "amplifier clipping" for a more thorough explanation.