



How to Program Arbitrary Waveforms using ASCII files to the DG5

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Solution: The DG5000 series is a flexible arbitrary waveform generator. The easiest method of creating a waveform programmatically is outlined using an example here.

NOTE: The instrument must be running firmware \geq 00.01.08.

You can use LabVIEW, .NET, or any C based program to send the following commands:

“:SOURCE1:FUNCTION USER”

- Selects the User Defined Arbitrary waveform output shape

“:SOURCE1:FUNCTION:ARB:MODE PLAY”

- Puts the instrument into Play Mode. This mode allows you to set the output sample rate and ensures that each point in the arb is part of the output file.

“:DATA VOLATILE, 1, 1, 1, 1, 0.5, 0.5, 0.5, 0.5, -0.5, -0.5, -0.5, -0.5, -1, -1, -1, -1”

- Here, we create a simple stair step using sixteen points to create a stair step. The maximum number of points using this method is 512k points. All of them can be floating point numbers between 1 and -1.
- These are normalized output values. Therefore, “1” represents the maximum output voltage and “-1” represents the minimum output value. All values in between are scaled linearly. If the output is set to 5Vpp, all points “1” = 2.5V, “-1” = -2.5V, and all others scaled appropriately. “0.5” = 1.75V



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“:SOURCE1:FUNC:ARB:SAMPLE 0”
```

- Set Output Sample Rate.
- The functional relationship between the sample rate "fs" and the frequency division coefficient "N" is shown below:

When $N \leq 2$, $f_s = 1G/2^N$
When $N > 2$, $f_s = 1G/((N-2)*8)$
The range of N is from 0 to 268435456(2^{28}).

- Valid only in "Play" mode.

```
“:SOURCE1:VOLTAGE 5VPP”
```

- Set output voltage to 5Vpp

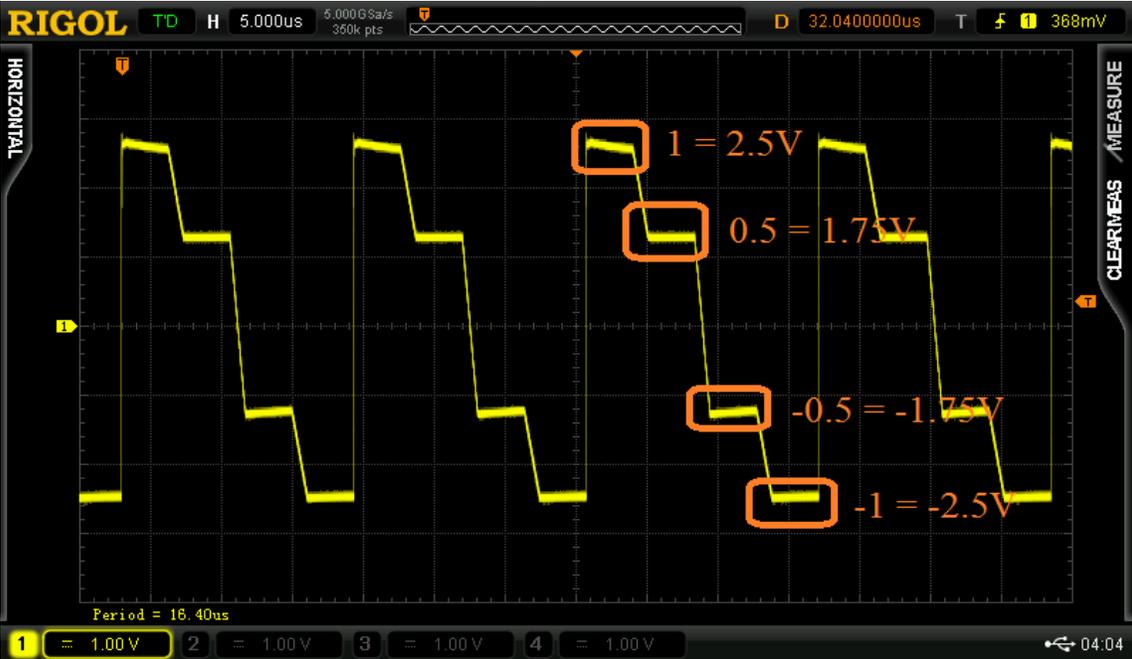


Figure 1: DG5 Play Mode Output for the above 16 points with the output sample N = 0. This equals an output sample rate of 1GS/s



Figure 2: DG5 Play Mode Output for the above 16 points with the output sample N = 1. This equals an output sample rate of 500MS/s

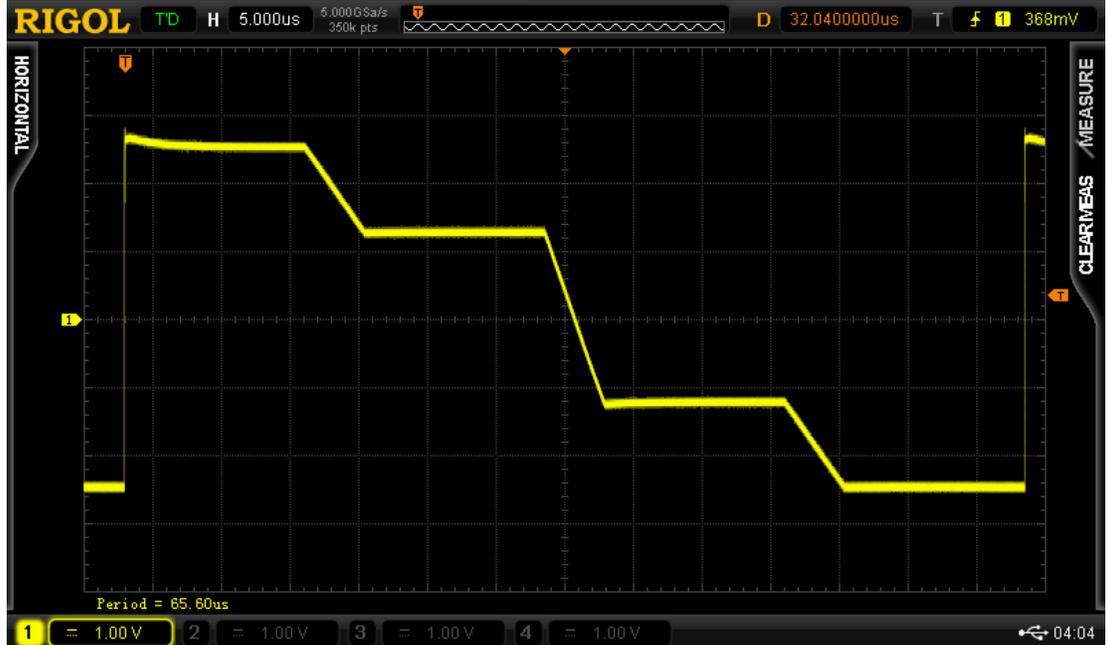


Figure 3: DG5 Play Mode Output for the above 16 points with the output sample N = 1. This equals an output sample rate of 250MS/s



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