Question: "There are many small spurious frequencies shown in DAC output. What are they?"
Don Blair

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When I check the spectrum performance of my DAC output with a spectrum analyzer many small spurious frequencies are shown. They are not the harmonics and they are seen in a lower frequency range also. The distances of each spurious frequency component are the same but this distance is not related to the sampling clock of the DAC. What are they?

Answer:

They must be the quantization noise of DAC. The quantization noise of the DAC appears almost like spurious frequencies. The frequencies of the quantization noise are varied by the number of data points of the waveform and the sampling clock frequency of the DAC.

$$f_{qm} = \frac{m}{N} \times f_s$$
$$m = 1, 2, 3, \cdots$$

Where, f_{qm} is the mth quantization noise frequency and fs is the sampling frequency of the DAC.

For example, if the sampling clock of DAC is 100MHz and the number of data points for the waveform is 4096, the quantization noise appears at every 24.4140625 KHz interval. If your waveform data has 819 cycles of a sine wave, the output frequency is about 20MHz, and you can see many quantization noise components below the 20MHz output frequency.

The amplitude of the quantization noise is varied by the number of bits of the DAC and the number of data points of the waveform. As you know, the total SNR value is defined by the number of bits of the DAC (SNR = 1.76 + 6.02 * (number of bits of the DAC)). Therefore, the SNR value becomes larger when the number of bits of the DAC is larger. And the amplitude of the quantization noise becomes smaller when the number of the data points of the waveform is increased.