

Application Note:

Determining Frequencies for Oscillators using a 12 BIT TTL Digital Driver Interface.

To determine frequencies for each step for a 6000 to 18000 MHz oscillator, use the following formula: Example uses 10 steps. If your requirement is other than 10 steps simply insert your required quantity of steps.

$$\frac{F_{\max} - F_{\min} \text{ (MHz)}}{10 \text{ (steps)}} = \frac{12000}{10} = 1200 \text{ MHz per step}$$

The frequencies from 6000 to 18000 MHz would be:

6000, 7200, 8400, 9600, 10800, 12000, 13200, 14400, 15600, 16800, 18000

To determine the binary data needed to produce each frequency, use the following formula:

$$\frac{\text{Frequency delta (12000 MHz)}}{4095 \text{ (decimal full scale 12 bit DAC number)}} = \frac{12000}{4095} = 2.9304 \text{ MHz per Bit}$$

Note: This is the smallest frequency step that can be achieved for a 12 bit DAC. Therefore, the accuracy can be no better than 3 MHz.

If smaller steps are required, then you must use a 14 bit or 16 BIT TTL DAC.

For a 14 bit DAC substitute 16384 for 4095

For a 16 bit DAC substitute 65535 for 4095

Example:

$$\frac{\text{Frequency Requested} - F_{\min}}{2.9304 \text{ (MHz per bit)}} \quad \text{Then round this number and convert to binary.}$$

$$\text{Example for output frequency of 12000 MHz: } \frac{12000 - 6000}{2.9304} = 2047.5 \text{ rounded} = 2048$$

Converted to binary = 011111111111

$$\text{Example for output frequency of 8400 MHz: } \frac{8400 - 6000}{2.9304} = 819.0 \text{ rounded} = 819$$

Converted to binary = 001100110011

$$\text{Example for output frequency of 10567 MHz: } \frac{10567 - 6000}{2.9304} = 1558.5 \text{ rounded} = 1559$$

Converted to binary = 01100001011