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## FarSync User Synthesizer Programming - Windows

This Technical Note describes how a user can program a *FarSync* card/device to generate non-standard user defined clock rates using the onboard synthesizer.

Custom rates are supported on the following FarSync cards/devices:

- T2Ue
- T2U-PMC
- T4E(+)
- T2Ee
- T4Ee
- Flex (V2)

The firmware for these cards/devices comes with a wide range of preset standard clock frequencies built in. When non-standard frequencies are required, a design tool from the synthesizer manufacturer may be used to calculate the programming sequence.

These non-standard frequencies may be configured prior to a port being opened (static), or may be configured and changed while a port is open and running (dynamic). Some restrictions apply to dynamic clock adjustment and are described later in this document.

Firstly, go <http://www.idt.com> and search for the product page on the ICS307G-03LF device, then locate the link for the *VersaClock II Desktop Software Setup* and download and install the application. The tool itself comes with a full User Manual, but the following notes are specifically for its use with a *FarSync* card/device.

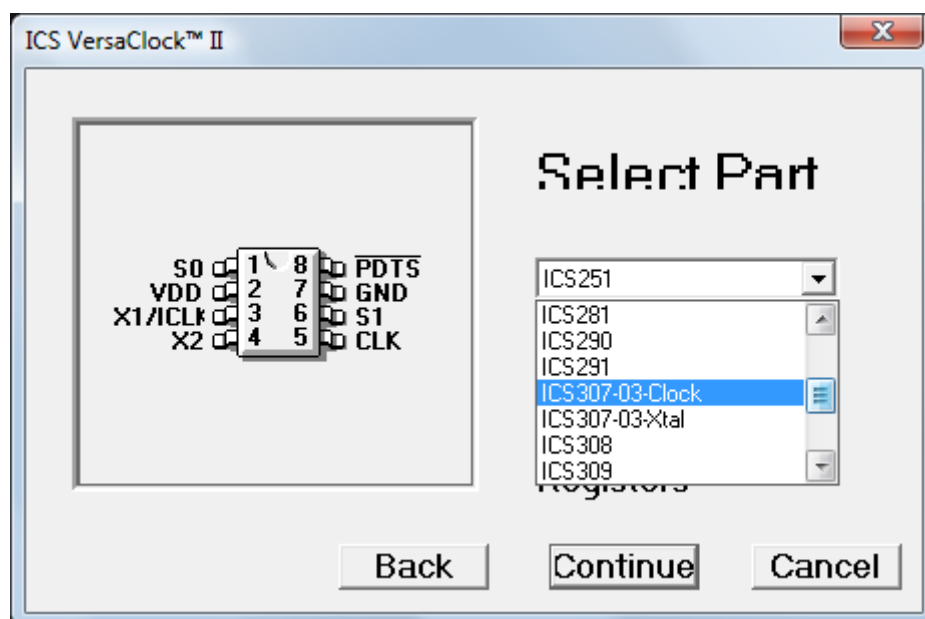
The *VersaClock II Desktop* application opens with the following screen:

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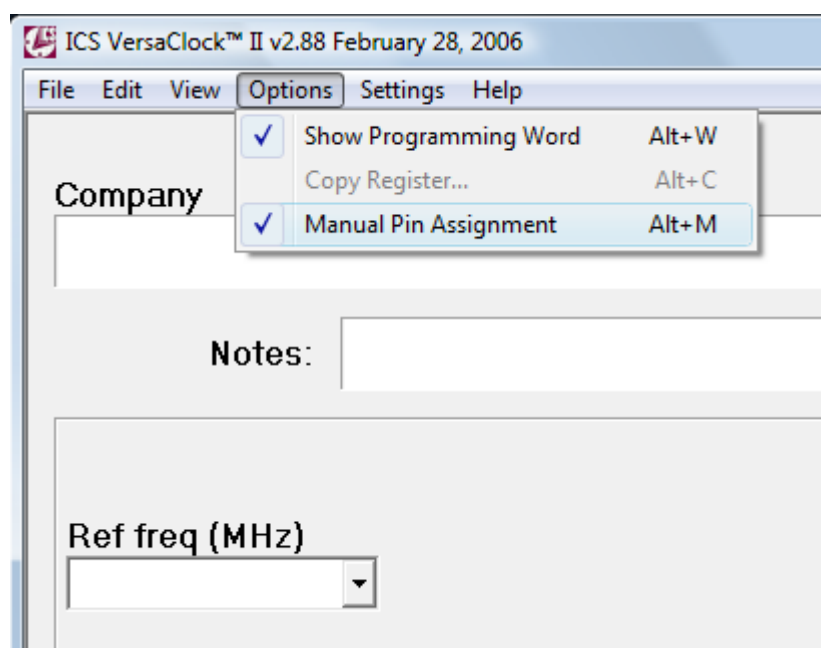


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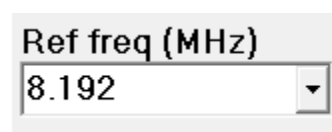
Select the *Part Number* as shown, then click *Continue*:



Select *Show Programming Word* and *Manual Pin Assignment* from the Options menu:



Select a *Ref freq (MHz)* of 8.192:




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Select the *Desired MHz* for Pin 8 (64500Hz in this example), leave the *Error ppm* blank:

Pin No	Desired MHz	Error ppm
8	0.064500	
12		
14		

Click on the *Calculate* Button:

Pin No	Desired MHz	Error ppm		Actual MHz	Error ppm
8	0.064500			0.0645000	0
12					
14					

For a generated clock that closely matches your requirements look for 5 green bars and 0 ppm. Less than 5 green bars and/or more than 0 ppm may be acceptable in some applications, it is left to the user to make this judgment.

**NOTE:**

A minimum frequency of 0.032MHz (32KHz) is recommended at the synthesizer output.

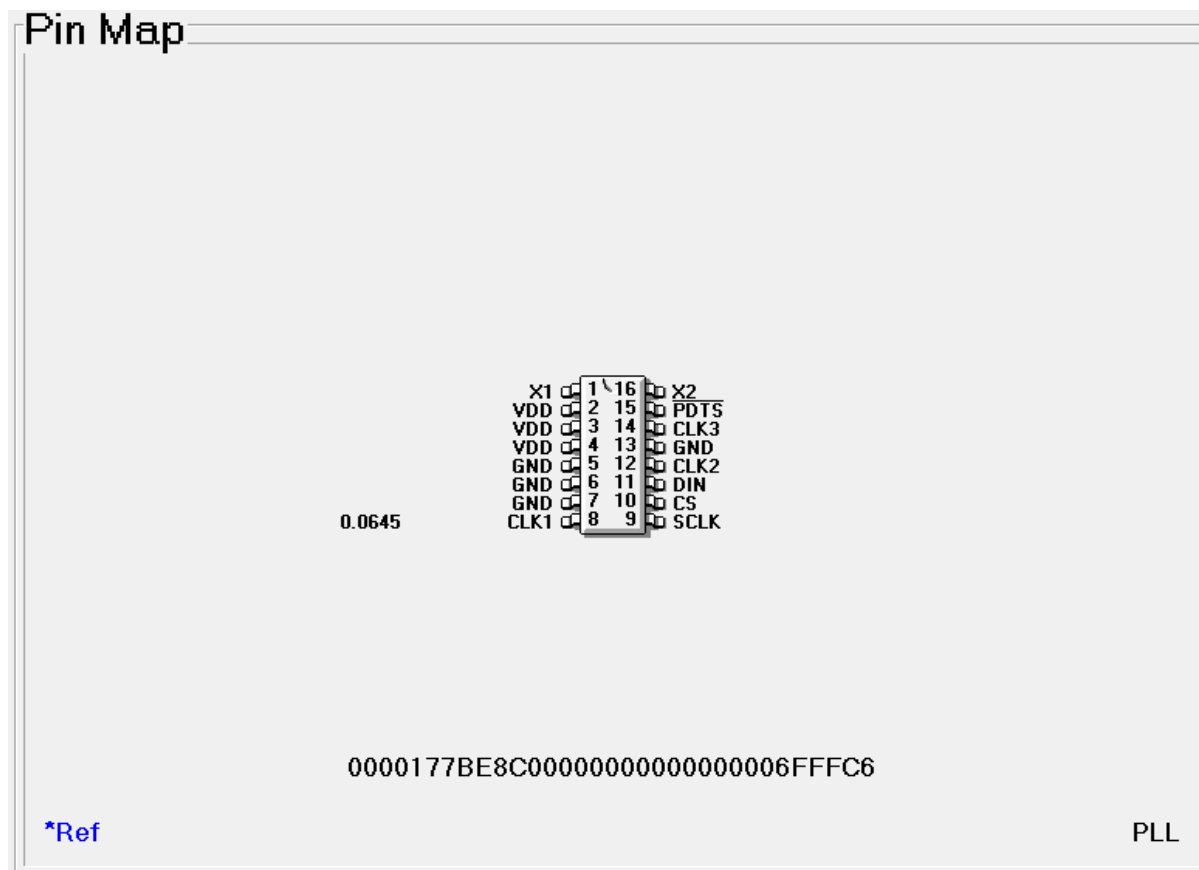
To generate lower frequencies, multiply the desired frequency by 256 and indicate that this has been done when the Programming Word is passed into the *fsclkgen* tool.

When using dynamic clock adjustments, it is important that you do not switch between a clock that requires a divide by 256 and one that does not.

For dynamic clock adjustment, in order to achieve a glitch-free transition from one clock to another, there should be no change in the synthesizer output divider configuration.

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The *Pin Map* shows the pin out of the device and the calculated 16½ byte Programming Word:



Click on the *Prog. word to Clipboard* button:



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Now save the programming word that is now stored in the clipboard. This string is used to program the new rate into the FarSync card/device.

For example, to add custom rate 63500 you can use the fswinclk application (or, if you own the FarSync SDK, extract the sample's code into your own application) as follows:

```
fswinclk -c0 -r63500 -R0000177BE8C000000000000000006E3FC6 -S
```

-r – specifies the rate to be added  
-R – the programming word corresponding to the required rate i.e. copied from the clipboard above  
-c – the number of the FarSync card/device to program e.g. SDCI0  
-S – if specified, this will instruct the FarSync card/device to switch to the new rate once it has been added

The new rate will be available when the port is next opened (or it will immediately have switched if the -S parameter was specified). Note that with PCI and PCIe FarSync devices, the newly added rate will persist until the FarSync card is restarted. In the case of the FarSync Flex, you can instruct the FarSync driver to save the value for use whenever that Flex device is reinserted – this is achieved by adding the -P command line parameter when executing the using fswinclk application.

For details of how to add the custom rate programmatically, please refer to the fswinclk sample source and/or the FsWinAPI User Guide that are provided in the FarSync SDK.

## Example Programming

The following programming words have been tested and shown to work and may be used to check correct usage of the design tools:

Freq	Programming Seq	Error
64K +/- 500Hz		
63500:	0000177BE8C0000000000000000006E3FC6	( 0 ppm)
64500:	0000177BE8C0000000000000000006FFFC6	( 0 ppm)
76.8K +/- 500Hz		
76300:	000016EDE8C000000000000000004C5FDA	(<0.5 ppm)
77300:	000016B1E8C0000000000000000074E02B	(<0.5 ppm)
80K +/- 500Hz		
79500:	0000167BE9400000000000000000627FC6	( 0 ppm)
80500:	0000167BE940000000000000000063BFC6	( 0 ppm)
96K +/- 500Hz		
95500:	180015FBE9A0000000000000000016FFF6	( 0 ppm)
96500:	0000161FA940000000000000000079E02F	(<0.5 ppm)
115.2K +/- 200Hz		
115000:	000015BBE940000000000000000063BFC6	( 0 ppm)
115400:	0000177F29400000000000000000519FD2	(<0.5 ppm)