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ASNT_FS8151 Frequency Synthesizer USER GUIDE





Overview

The ADSANTEC Inc. ASNT_FS8151 frequency synthesizer can be used for test applications, design verification, and R&D environments. It contains three outputs which cover three different frequency ranges. The main output ranges from 4 to 32GHz. There is a sync output for trigger of the equivalent time sampling oscilloscope. The main output clock amplitude is adjustable over an approximate 3:1 amplitude range, up to approximately 200mV differentially at 32GHz. Outputs are K-type/SMA compatible female connectors. All operation and adjustment controls are accessed by a GUI controlled interface connected through a USB port.

Getting Started

Connect the provided +5V AC/DC adapter to the unit. Power the unit on by turning the rocker switch on the back panel to the "ON" position. Observe a green light on the front panel labeled PWR illuminate and the fan starting up. Next connect the provided USB cable to the computer and the unit. The USB connection on the back panel is a USB-B jack. Observe a green light illuminate on the front panel labeled USB when the USB cable is connected to the computer and unit.







1.0 Software

If the software has already been installed go to **1.8**

1.1 Locate the installation files given as shown below. Double left-click on *setup.exe*

🛃 bin	4/8/2014 1:32 PM	File folder	
J license	4/8/2014 1:32 PM	File folder	
J supportfiles	4/8/2014 1:33 PM	File folder	
CDM v2.10.00 WHQL Certified.exe	4/8/2014 12:09 PM	Application	1,913 KB
🔊 dp.pmf	4/8/2014 1:33 PM	PMF File	1 KB
🔊 nidist.id	4/8/2014 1:33 PM	ID File	1 KB
🛃 setup.exe	10/7/2013 4:35 PM	Application	1,394 KB
🖉 setup.ini	4/8/2014 1:33 PM	Configuration sett	5 KB

1.2 Select Target directory for the location of the installation files that will be installed, then left-click on *Next*.

J ASNT FreqSynth V1.1.0	
Destination Directory Select the primary installation directory.	
All software will be installed in the following locations. To install software into a different location, click the Browse button and select another directory.	
Target directory for application C:\Program Files (x86)\ADSANTEC\	Browse
Target directory for National Instruments software C:\Program Files (x86)\National Instruments\	Browse
<< Back Next >	> <u>C</u> ancel



- 1.3 Left-click on Next.
- **1.4** Wait for the files to be installed.
- 1.5 Left-click on Finish
- **1.6** Left-click on *Restart* if requested.

1.7 Double left-click on the "CDM v2.10.00 WHQL Certified.exe" to install USB drivers. This file can be found in the same directory as the setup file used earlier to install software.

遇 bin	4/8/2014 1:32 PM	File folder	
🛃 license	4/8/2014 1:32 PM	File folder	
🛃 supportfiles	4/8/2014 1:33 PM	File folder	
CDM v2.10.00 WHQL Certified.exe	4/8/2014 12:09 PM	Application	1,913 KB
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🚚 setup.exe	10/7/2013 4:35 PM	Application	1,394 KB
🖉 setup.ini	4/8/2014 1:33 PM	Configuration sett	5 KB

1.8 Double left-click on the icon *ASNT_Freq_Synth Vx.x.x* on the desktop to open the control software.

1.9 Wait until the USB indicator has turned green. This indicates that the software is connected to the ASNT_PRBS45. If the green indicator does not appear, then the USB drivers may not be installed correctly or the USB cable may need to be re-inserted. Make sure that both LED's on the front panel are illuminated.





Front Panel Connections



Clock Output

The Clock Out differential female K-type outputs are AC coupled inside the unit; therefore no external DC block is required. If not using an output, 50*Ohm* terminate it.

Sync

The Sync output is AC coupled inside the unit; therefore no external DC block is required. The connector is a female SMA connector. The Sync output is used to synchronize the data with an oscilloscope.



Operation



The GUI provides control of the unit. The output frequency can be modified through the use of the frequency slider, or directly entering numbers into the highlighted field on the upper right, or through the use of the buttons to the left of it, with the box below specifying the increment that the buttons will change the output frequency. The output amplitude is controlled through the slider labeled Amplitude. The range of this amplitude adjustment may differ with output frequency. Note that the sync divisor may be automatically adjusted when changing output frequency to ensure proper output.

The primary frequency range of 4GHz to 32GHz can be achieved through the basic use of this GUI. Additionally, settings can be saved and loaded through the use of the File Menu, and selecting "Save configuration" or "Open configuration" as shown below.

Frequency Synthesizer	ADSANTEC	
File Features Help		
Open configuration Save Configuration Quit Without Saving setup.cfg Exit	15.000 20.000 25.000	32.000 Freq Step ⋬ 0.10 GHz
Amplitude	485 mV (Compensated
Sync Divisor 🚆 21	19.20(GHz
Trig Freq 0.088 GHz	eset Configuration Loaded	
Г	USB SN SN	⁰⁰³ V 1.1.0



Extended Range Mode and Additional Features

The **Features** menu brings up an additional panel, with various options and features. Down at the bottom is "Extra Range and Precision", which impacts the main GUI panel by allowing additional frequency range and providing additional details regarding the trigger frequency.

S Frequency Synthesizer ADSANTEC	More Features FS ■ X
File Features Help	
Frequency (2500000 GHz 0.050000 10.000000 20.000000 32.000000	Derived Freq 2.500 GHz Derived Period 400.000 ps Derived Wavelength 119.917 mm
Amplitude (Compensated	Freq Multiplier
ats sóa	Xmission Loss 🖕 0.0 dB Derived Amplitude 3.5 dBm 950 mVpp
Sync Divisor 🛱 25	Snap to Detent 🛛 🖉 RF On
Prescalar 1.60 Net Divisor 40.00	Trig As Alt Out 4 1000.000 MHz
Trig Freq Q022 GHz	☑ Extra Range and Precision
USB SN \$1.1.0	Doubler Used

The Extra Range and Precision mode allows the lower end of the frequency range to extend all the way to $50MH_z$. Note that some frequencies within this extended range may have additional jitter or an imperfect duty cycle. Unchecking the "Extra Range and Precision" option restores basic functionality within the main GUI panel.

The additional options within the Features panel also allow for additional amplitude control, and use of the Sync output as an alternate output, with its own slider providing additional frequency range beyond the typical frequencies output during basic operation. Additionally,



Debug Panel

ĺ	📀 Debug		
	PRBS_SELECT	10' Calibration Mode 8	☐ Read Values
	"0" 1 "0" 2 "0" 3	MX2412D PHS	DEBUG IO_Dump DAC_Dump DAC_Sweep
	Err Inj Load	0 1 2 3 Cal Results	CLOSE

Through GUI

Here the Pulse period, Pulse width and error rate can be specified. It will provide a burst of errors based on the settings selected.





Through Text File Import

Serror Injection Setup			
Form Select Error Pattern File Text File Selected : z:\	at: Line 1: Decimal integer i Line 2: Decimal integer j Line 3: 256 bits as ASCI To be XOR'ed with PRE Board\System\ASNT_PF	, interpulse period (in pulse width (same ir II 0's (no error) and 3S RBS45\Software\s	crements 256 IU) ncrements) 1's (errors) sandbox\PRBS45 1
Load Error Pattern File -or- Errs/256 ≜ 1 One Bu	Pulse Period Pulse Width 1 390625 1 Inst	Error Rate 1.000000E-8 in 10000000.00	CLOSE

Error injection can also be achieved through the use of an error pattern file (text file), where the settings are configured as specified within the above window, with the first line specifying the pulse period, the second line specifying the pulse width, and the remainder of the file specifying the 256-bit error burst pattern. Zeroes (ASCII) denote no error and ones denote errors. When the text file is formatted and configured as desired, it can be selected through the "Select Error Pattern File" button, followed by "Load Error Pattern File", which can give greater control and allow the location of errors to be specified within each 256 bits.

S Advanced Science and Novel	Fechnology - PRBS45	V 1.0.3	
File Debug			
Pattern Select	PRBS31 V	RESET	
Data Amplitude			2.623
Duty Cycle 🛛 🔍)		2.651
■ Sync Output ■ PRBS7 pattern ■ Eye Diagram	Clock Output 1		_
Manual Divide Ratio	USB CONNECTED	V103	SN 006
	JOB COLLECTED	V 1.0.0	

When error injection is enabled, the PRBS selection dropdown menu will change in color to warn that the pattern being generated is not exact.



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DLL

The 32-bit DLL is compiled from CVI Labwindows. Its functions are in C style arguments and they return integers. The DLL can be used as an alternative to the GUI. This is useful for using the unit to automate control. A python example is provided as an example on how to use the DLL. The DLL may be used by any program that can deal with C type functions. The DLL and python example file can be found in the installation directory of the GUI. Note: 32-bit version of Python must be used.

int usb_init(void)

Description: Finds USB device. Must be called first in program. Argument: none Returns: '1' USB is connected, '0' USB is not connected

int usb_close(void)

Description: Closes USB devices. Must be called to clear USB handle so that another program can control the unit. Argument: none Returns: '1' USB closed, '0' Error (handle may be closed already)

int set_divide_ratio(int divide_ratio)

Description: Set Sync Output divider from 4 to 1024. Output Sync divide ratio = divide_ratio * 4 Argument: integer 1 to 256 Returns: '1' write successful, '0' write unsuccessful

int ClockOutput1(int ONoff)

Description: Turn clock output 1 ON or OFF Argument: integer 1 or 0 Returns: '1' write successful, '0' write unsuccessful

int set_dutycycle(float voltSetting)

Description: Adjust output data duty cycle Argument: float 1.8 to 3.3 Returns: '1' write successful, '0' write unsuccessful

int set_amplitude(float voltSetting)

Description: Adjust output data amplitude Argument: float 1.8 to 2.7 Returns: '1' write successful, '0' write unsuccessful



int prbs_select(int prbsSetting)

Description: Select output data PRBS pattern

- Argument: integer
 - 1 = PRBS7
 - 2 = PRBS9
 - 3 = PRBS11
 - 4 = PRBS15
 - 5 = PRBS17
 - 6 = PRBS20
 - 7 = PRBS23
 - 8 = PRBS29
 - 9 = PRBS31
 - 10 = Half-Rate Clock

Returns: '1' write successful, '0' write unsuccessful

int RST_PRBS(void)

Description: Resets PRBS generator. Note: This functions needs to be called whenever input clock frequency is changed. This includes turning on the unit or removing/applying a clock input.

Argument: none

Returns: '1' write successful, '0' write unsuccessful



REVISION HISTORY

Revision	Date	Changes
1.0.2	07-2019	Updated Letterhead
1.0.1	01-2017	Initial Release