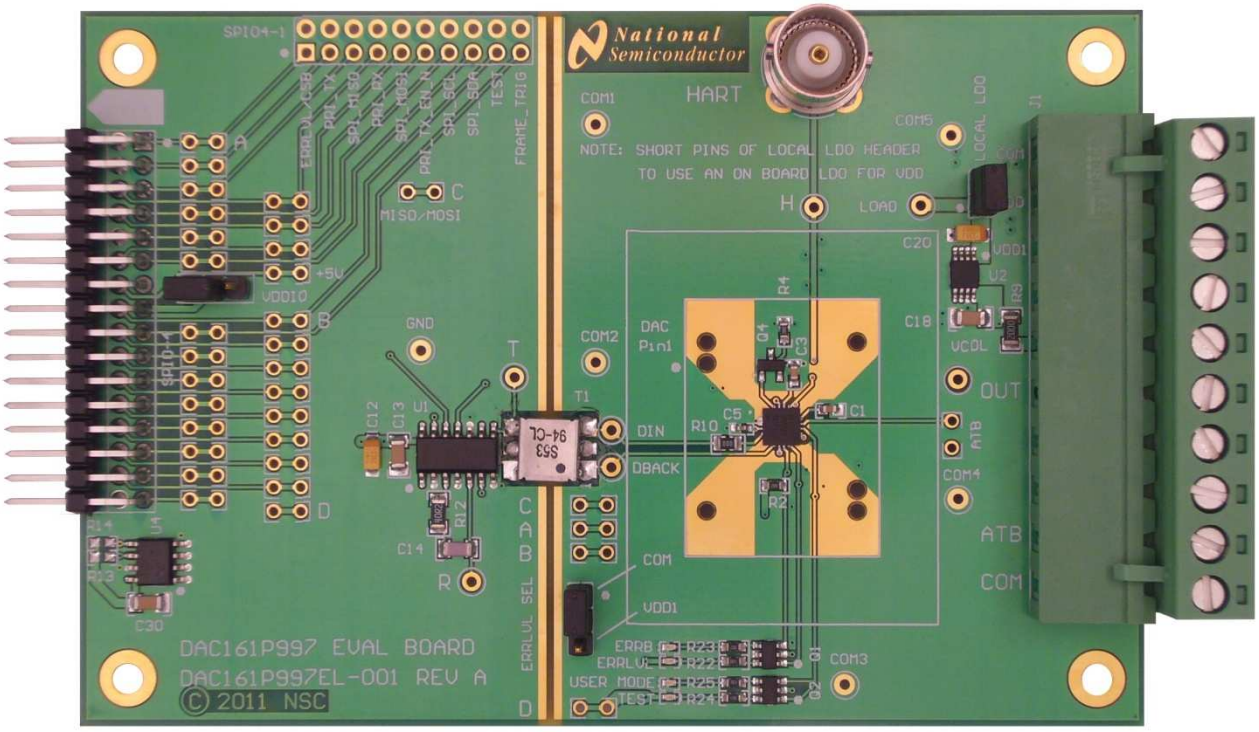
July 20, 2011
Rev – 0.00
RoHS Compliant

Evaluation Board User's Guide

DAC161P997 Single-Wire 16-bit DAC for 4-20mA Loops



1. Kit Components

Item	Qty.	Description
DAC161P997EVAL	1	DAC161P997CISQ Device evaluation board
PuffyALP_11012010_200_0026.exe	1	Application software available from: http://portal.national.com/store/view_item/index.html?nsid=DAC161P997EVAL
SPIO4	1	USB interface board purchased separately at: http://portal.national.com/store/view_item/index.html?nsid=SPIO-4

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2. Software Installation

Copy the installation program to a temporary directory. Start the program and follow the instruction on the screen: the user will be asked to agree to the terms and conditions, the options will be presented for selecting installation directory, etc. Note the path to which the software is installed (*installation_directory*).

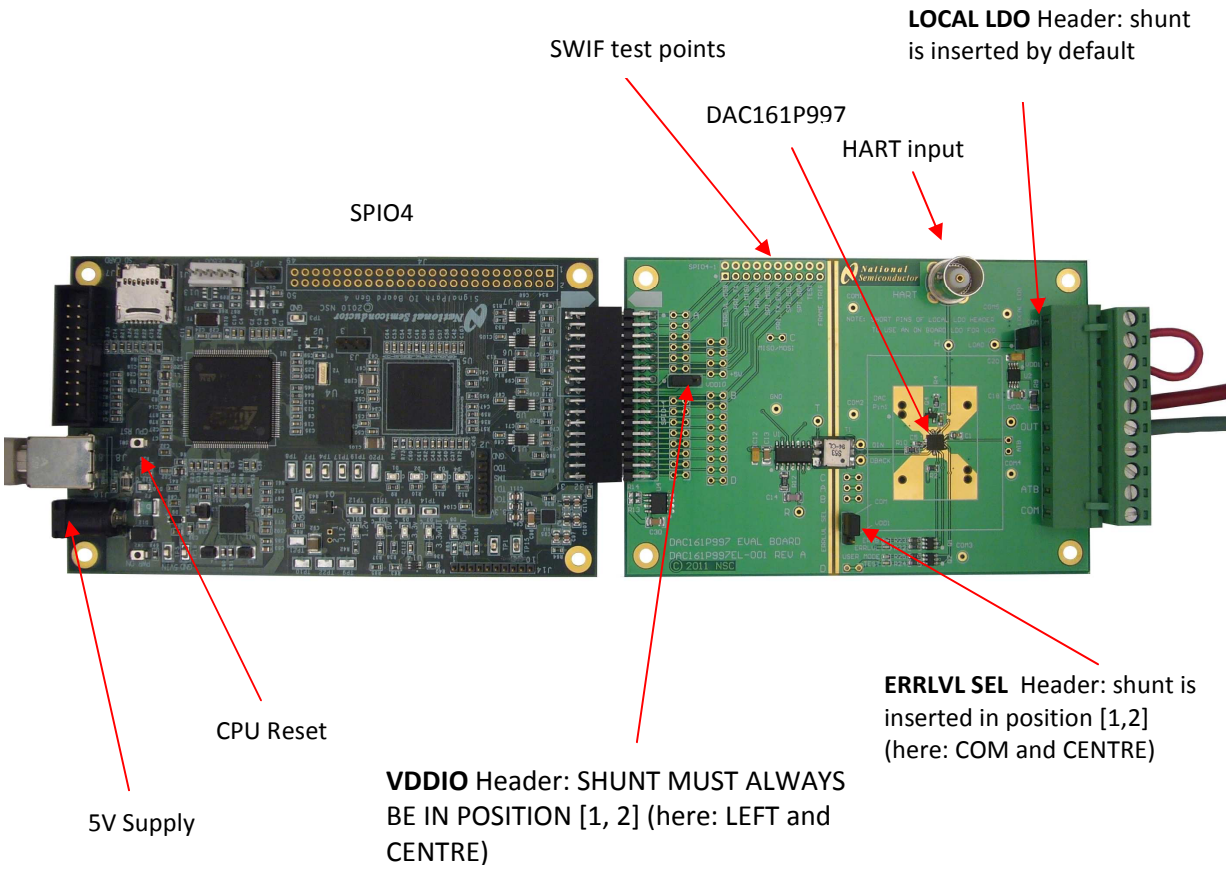
3. Kit Assembly

1. Plug in the DAC161P997EVAL board into 32 pin header of the SPIO4 board
2. Plug in the USB cable into the SPIO4 board socket
3. Plug in the USB cable to the USB port on the host PC

If this is the first time this evaluation system is connected to host PC, the operating system will attempt to install the USB driver software for the SPIO4 board. Follow the instruction on the screen and direct the operating system to search for appropriate drivers in the *installation_directory*\Drivers\NSC_USB_v1.0.8.0

4. Connect DAC161P997 Test Board to the Loop supply (up to 40V DC)

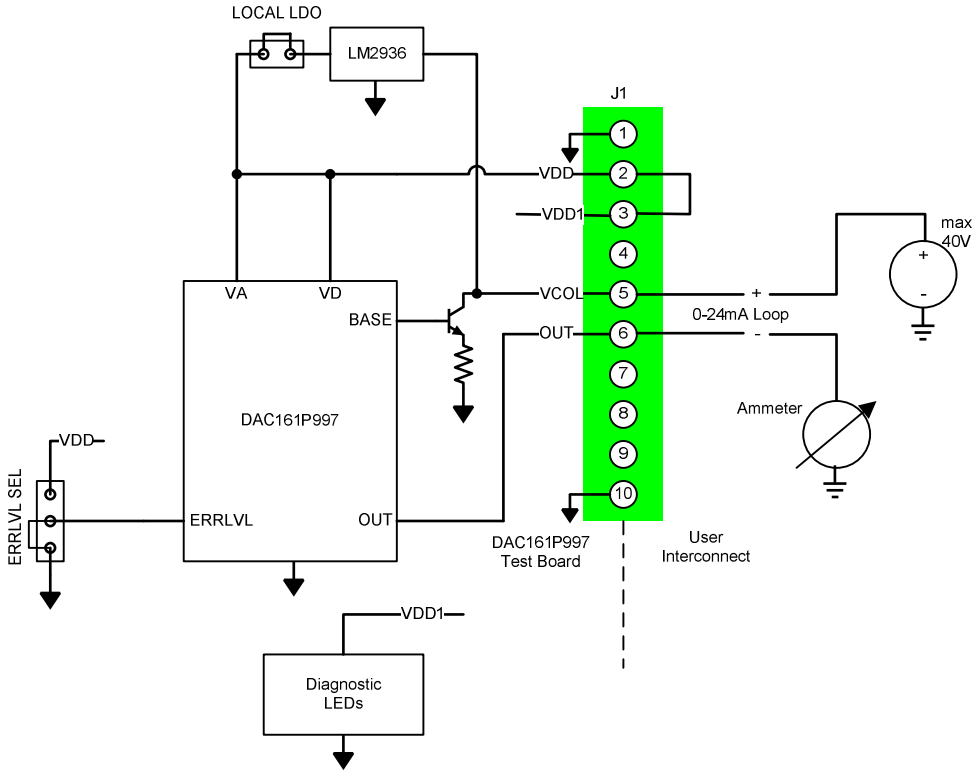
Complete evaluation system is shown below



4. Default Set-Up and Power-Up

As shipped the DAC161P997 Test Board is configured to be powered directly from the 0-20mA loop. Local LDO (LM2936) provides 3.3V to DAC161P997 by stepping down the loop supply.

The loop is connected via terminals 5 and 6 of J1 connector. The optional shunt between terminals 2 and 3 will power up the on board diagnostic LEDs.



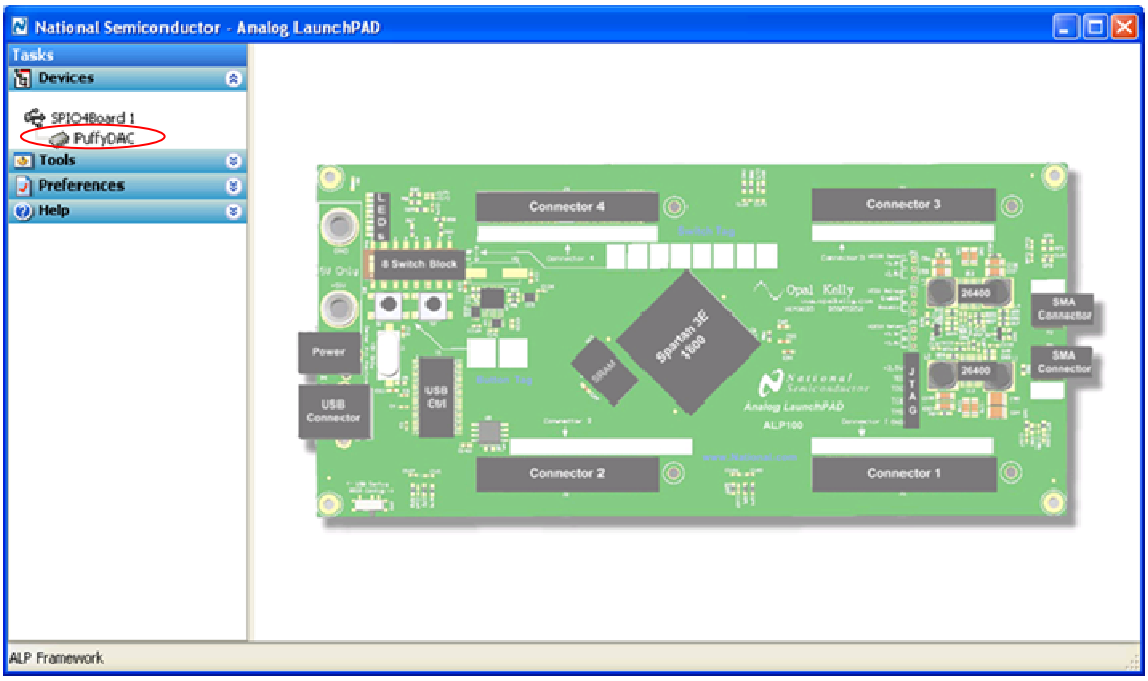
Jumper block	Shunt position	Function
LOCAL LDO	in	Connects the output of the 3.3V LDO to the VD (VA) rail of the DAC161P997
ERRLVL SEL	[COM, CENTER]	Sets the input to the ERRLVL pin of DAC161P997
VDDIO	[1,2]	Provides the rail potential to the stimulus board (SPIO-4).

Once the above jumpers are in place, turn on the 5V power supply. In the configuration shown here the loop current sourced from OUT is 3.3mA.

5. ALP User Interface Software

Start by either navigating START-> National Semiconductor Corp -> Analog LaunchPAD v2…. ->Analog LaunchPAD or, if installed, by clicking desktop shortcut.

The first screen is shown below. If the system is properly assembled the SPIO4Board 1, and PuffyDAC should be listed in the Devices menu in the left-hand side of the window.

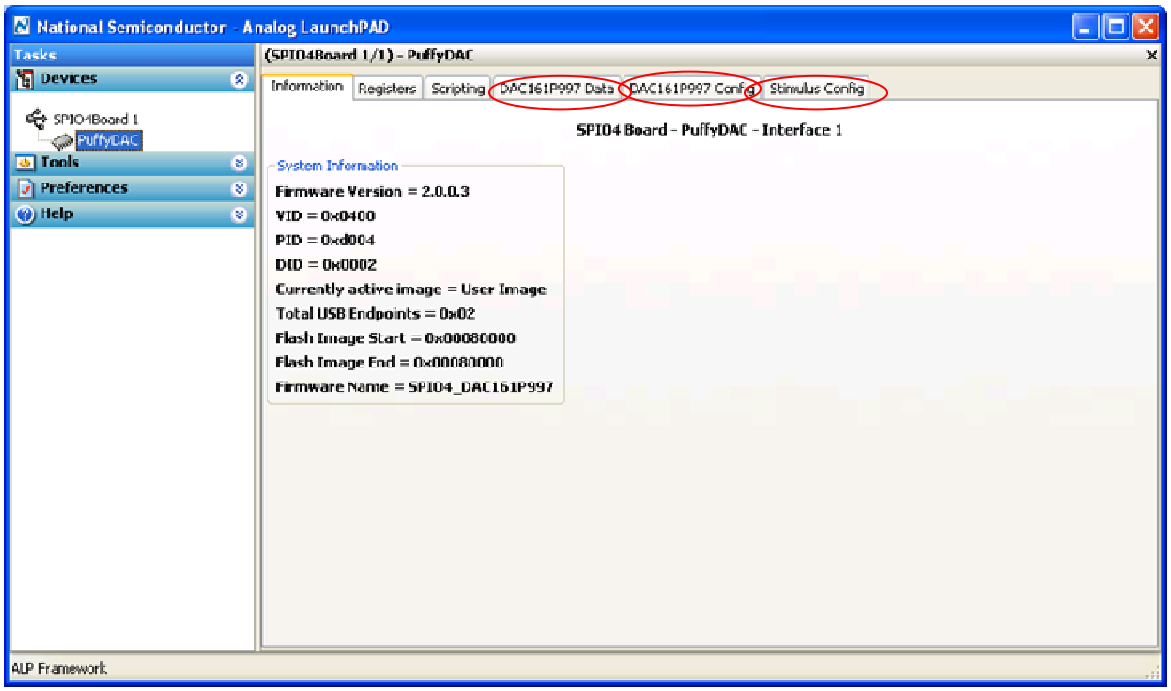


Click on PuffyDAC in Devices Menu to continue….

"Information" Tab

Selecting PuffyDAC in the Devices menu will activate the PuffyDAC screen. This screen contains 6 tabs.

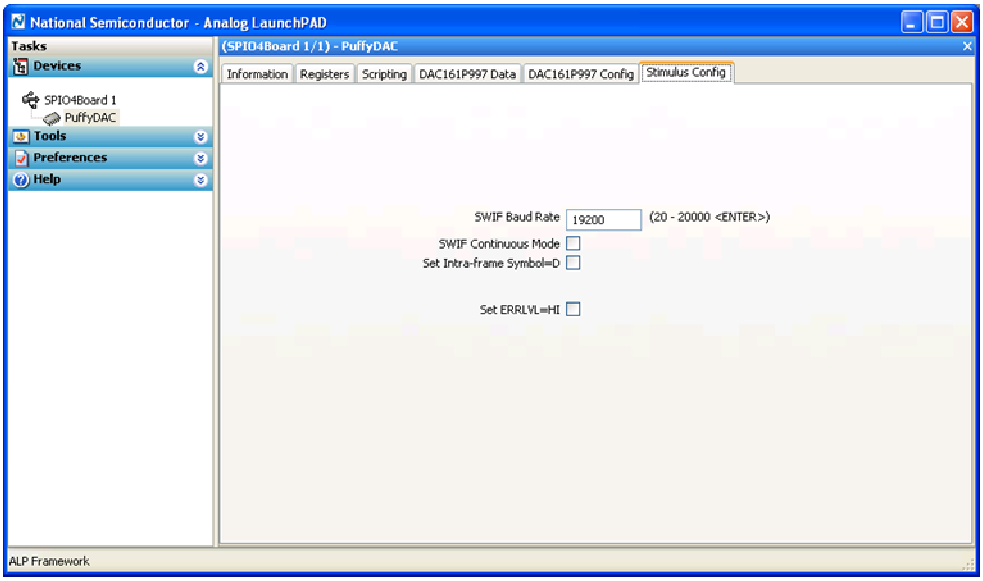
1. Information: Shows the basic system information
2. Registers: this tab is not activated in present release of software
3. Scripting: Python interpreter window
4. DAC161P997 Data: lets user send DAC output update data (DAC update data changes output current at OUT pin of the device)
5. DAC161P997 Config: lets user send data destined for the DAC161P997 internal configuration registers
6. Stimulus Config: lets user modify the operation of the SPIO4 board (stimulus board)



The following sections will present the tabs in order that lets the first time user produce output from the DAC161P997 quickly.

First select "Stimulus Config" tab…..

"Stimulus Config" Tab



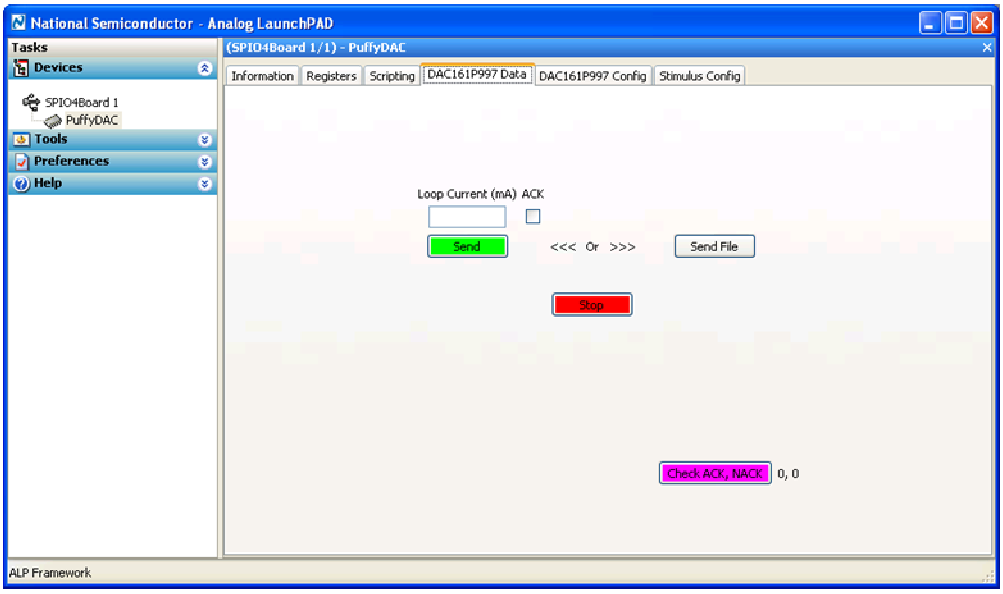
Check the "SWIF Continuous mode". Then go to "DAC161P997 Data" tab….

Details for later:

Control	Description of Functionality
SWIF Baud Rate	Sets the Bud rate of the SWIF link. New entry must be followed by <ENTER> key. NOTE: Update stops the SWIF activity. Re-start SWIF with any of the SEND buttons in other tabs
SWIF Continuous Mode	When checked SPIO4 will continue looping through the content of the SWIF data buffer (Continuous Mode) until STOP button is clicked When cleared SPIO4 sends the content of the SWIF data buffer only once (One Shot Mode)and follows it with repeated Intra-Frame symbol until STOP is clicked NOTE: Updating this control stops SWIF if already active. Re-start SWIF with any of the SEND buttons in other tabs
Set Intra-Frame Symbol=D	When checked SPIO4 sets the Intra-Frame Symbol to D (50% duty cycle). This setting keeps the link active at all times, even though no meaningful data is being sent. When cleared SPIO4 sets the Intra-Frame Symbol to LO (0% duty cycle). NOTE: Intra-Frame Symbol exists only in the context of the "SWIF One Shot Mode" NOTE: Updating this control stops SWIF if already active. Re-start SWIF with any of the SEND buttons in other tabs
Set ERRLVL=HI	Instructs SPIO4 board to set HI the ERRLVL input to DAC161P997. In the default set-up that functionality is not available. To enable it a jumper should be installed connecting points marked with "A" on the DAC161P997 Test Board

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"DAC161P997 Data" Tab



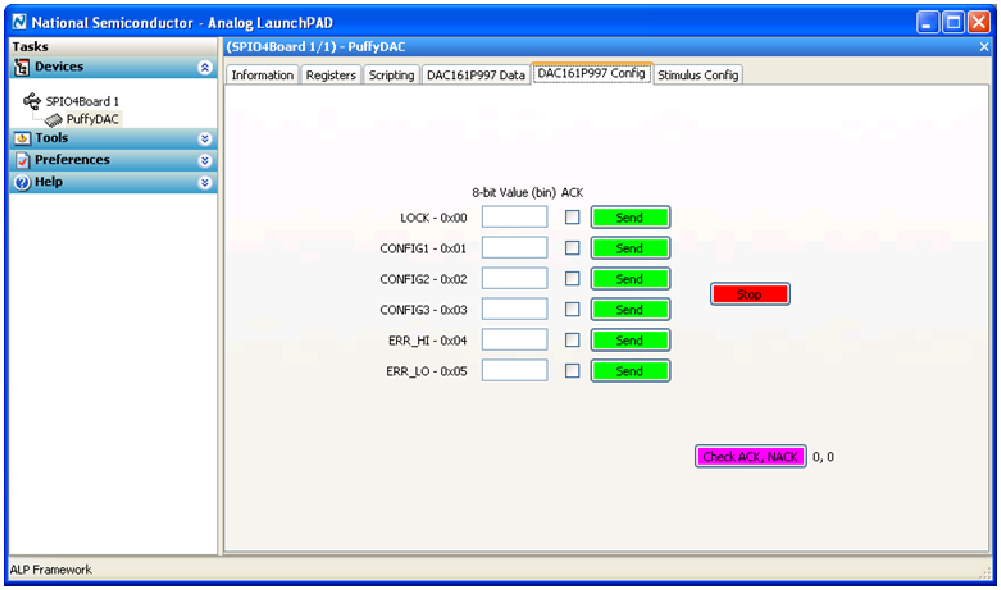
Click on and type in the "Loop Current (mA)" the desired current magnitude to be produced by DAC161P997 output. Then press green SEND button. Observe the current….

Details for later:

Control	Description of Functionality
ACK	Check this box to insert and ACK symbol in the SWIF data stream
Send	Sends the data representing the output current magnitude to SWIF data buffer on SPIO4, and activates the link to DAC161P997
Send File	Click this control to select a file as the source of SWIF data. SWIF data file is a text file containing only '0', '1', 'A' or 'D' characters (representing valid SWIF symbols). It is up to the user to format the data frames. When file is read-in the name of the file will appear above "Send File" button and the "Loop Current" entry box will be cleared.
Stop	Stops SWIF activity
Check ACK, NACK	SPIO4 monitors the number of A symbols issued by the SWIF. Each symbol issued increments the ACK count. The number of responses from the DAC161P997 is also being monitored: for every A issued by SWIF **the lack of response** from DAC161P997 increments the NACK count. Both counters are cleared by STOP followed by SEND

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"DAC161P997 Config" Tab



Control	Description of Functionality
8-bit Value (bin)	Enter a string of '0' and '1' characters representing configuration data for each of the DAC161P977 internal registers
ACK	same as in "DAC161P997 Data" tab
Send	Sends the register address and data to the SWIF data buffer on SPIO4, and activates the link to DAC161P997
STOP	same as in "DAC161P997 Data" tab
Check ACK, NACK	same as in "DAC161P997 Data" tab

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