SV3TX Production Procedure

Work Procedure

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Hardware Setup

The script and files required to perform CPTX calibration is available on SVN at:

1- The calibration script:
2- http://kramer2/svn/DV1600/sw/Scripts/Calibration/SV3/SV3_CPTXDPTX/CalFlow_v1

3- ESP3.6.47
http://kramer2/svn/DV1600/sw/Pinetree/Releases

4- Default Calibration File
http://kramer2/svn/production_DV1600/Data\SV3D\DefaultCal\SV3\FlashData_CPTX\RevD

5- Firmware:
http://kramer2/svn/DV1600/fw/iESP/Releases

6- Make sure you have Altera 15.0

7- You also need the drivers for the scope
http://www.ni.com/download/ni-visa-run-time-engine-15.0/5379/en/

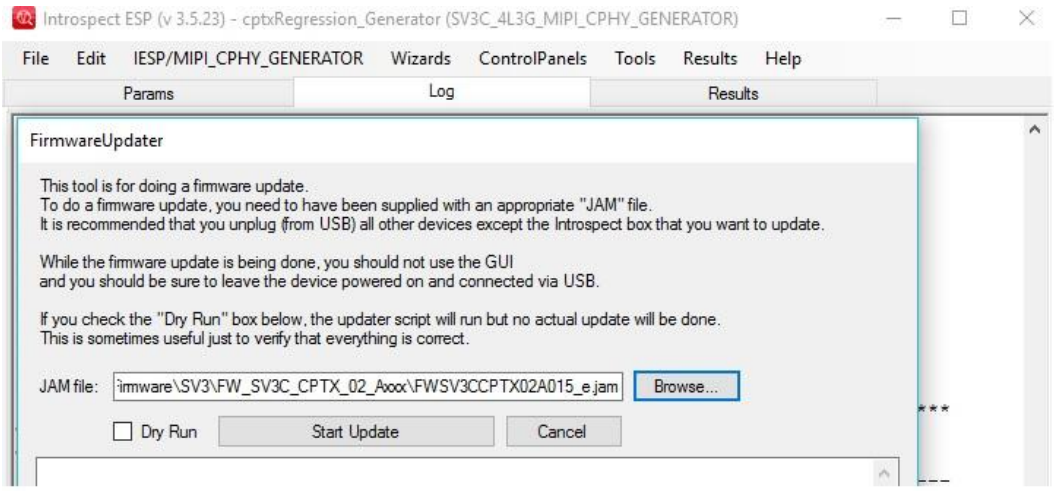
8- And for multimeter
http://www.ni.com/download/ni-488.2-17.0/6627/en/

Loading CPTX Firmware

Connect the SV3TX to PC via USB cable, load the CPTX firmware (Latest version) to this device.

Make sure that a required firmware file will be navigated, please check with your supervisor.

Open a ESP GUI, go to Tools, FirmwareUpdater, choose the CPTX firmware on your disk and click start.



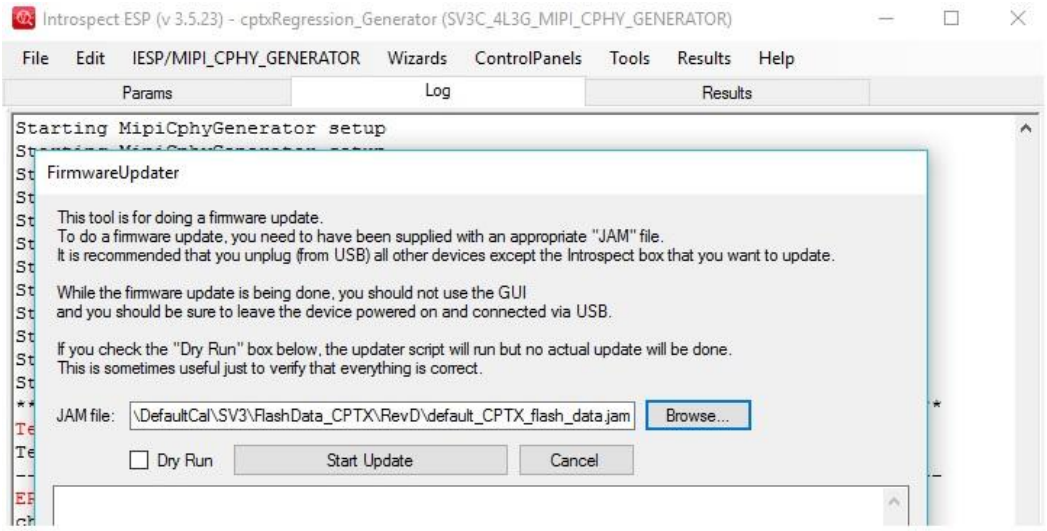
When completed please power cycle the module. Ensure both module LEDs are lighted.

Loading Default Calibration File

Before beginning the calibration, a default cal. file needs to be loaded.

Checkout the default calibration file from SVN
http://kramer2/svn/production_DV1600/Data/SV3D/DefaultCal/SV3/FlashData_CPTX/RevD/default_CPTX_flash_data.jam

Open a ESP GUI, go to Tools, FirmwareUpdater, choose the calibration on your disk and click start.



When completed please power cycle the module. Ensure both module LEDs are lighted.

Hardware Test Procedure

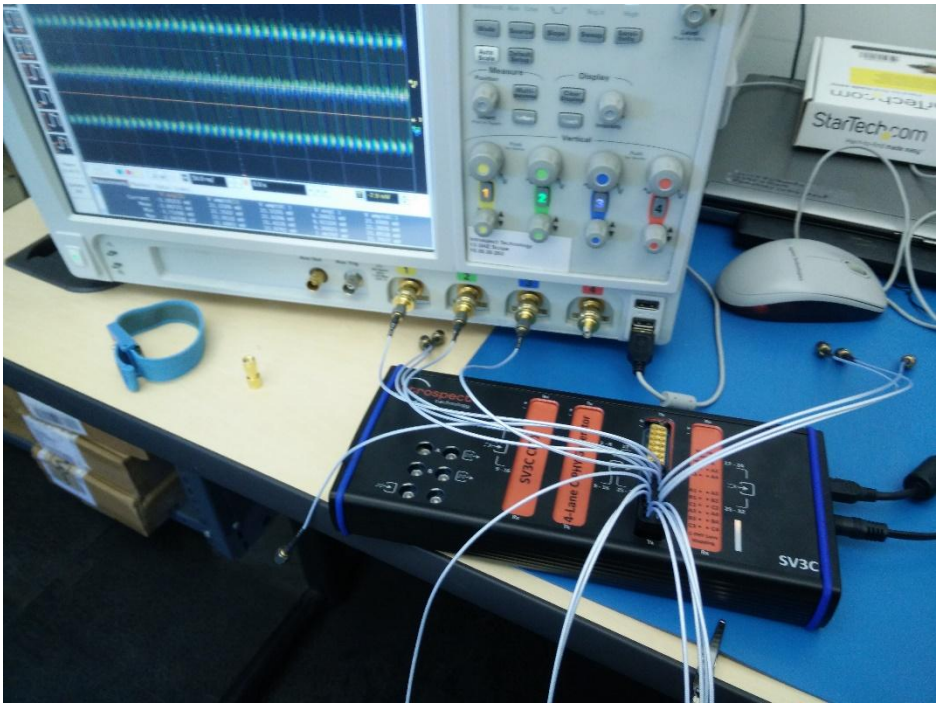
Procedure

Procedure (duration ~ 10 min):

Open IESP, click File-Open and go to
C:\Introspect\sw\Scripts\Calibration\SV3\SV3_CPTXDPTX

to open the "cptxIncomingInspection" procedure.

Connect channel A1, B1 and C1 of SV3TX unit on the scope, channel 1, 2, 3.



Run the Script and make sure lp and hs voltage increase. Do the same thing for lane 2,3 and 4

Common Mode CPTX Calibration Procedure

Procedure (duration ~ 20 min):

Open IESP-3.6.47, click File-Open and go to
http://kramer2/svn/DV1600/sw/Scripts/Calibration/SV3/SV3_CPTXDPTX/CalFlow_v1/ CommonModeCal/cptxCalUsingKeysightScope

Connect channel A1, B1 and C1 of SV3TX unit on the scope, channel 1, 2, 3.

Enter the scope IP address and the serial number in CalOptions and run.

Follow the instructions, you will need to change the channel.

When the test procedure is complete power cycle.

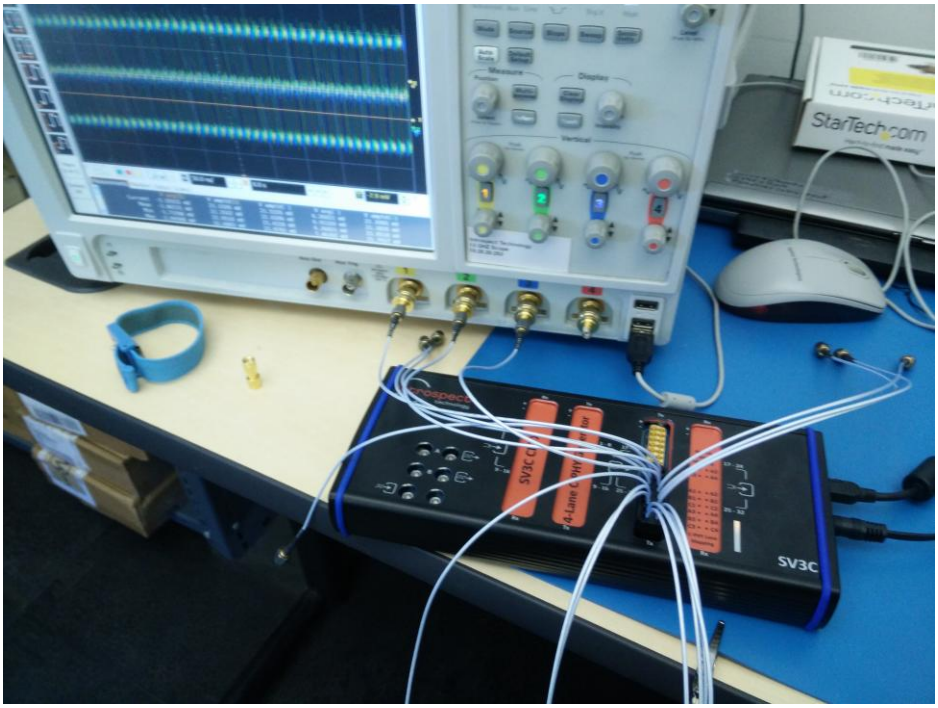
It is important that you rename results folder from the automatically generated name to the SV3TX module id <xx-xxx>.

Alignment CPTX Calibration Procedure

Procedure (duration ~ 45 min):

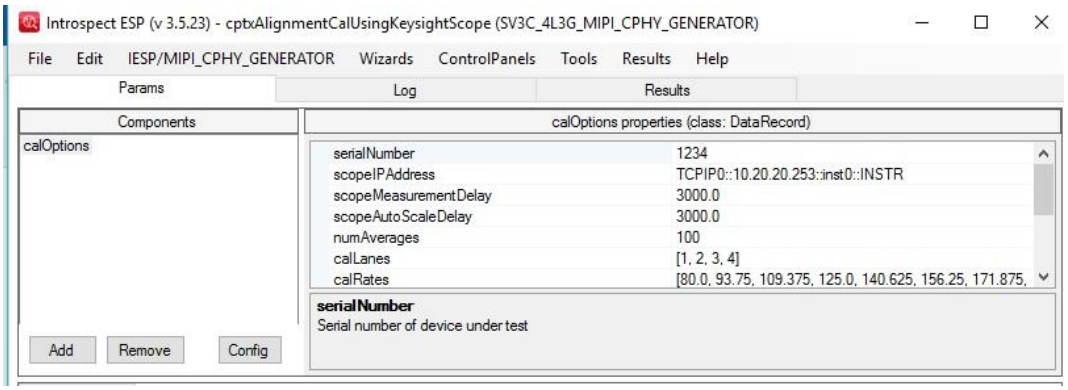
Open IESP-3.6.47, click File-Open and go to http://kramer2/svn/DV1600/sw/Scripts/Calibration/SV3/SV3_CPTXDPTX/CalFlow_v1/AlignmentCal/AlignmentCalCptx/cptxAlignmentCalUsingKeysightScope

Connect channel A1, B1 and C1 of SV3TX unit on the scope, channel 1, 2, 3.



Enter the scope IP address and the serial number in CalOptions and run.

Follow the instructions, you will need to change the channel. As mention in the instruction, do not disconnect channel A1.



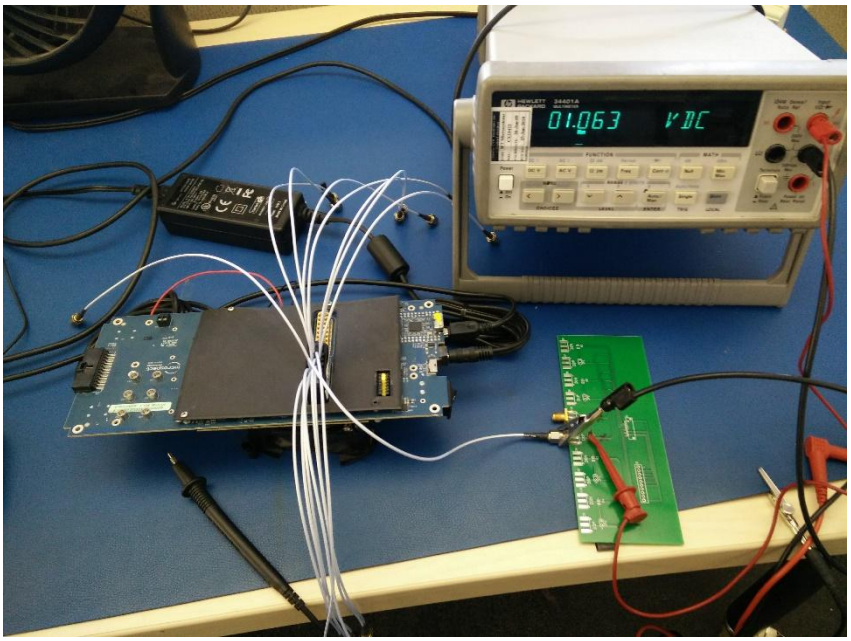
When the test procedure is complete power cycle.

It is important that you rename results folder from the automatically generated name to the SV3TX module id <xx-xxx>.

LP CPTX Calibration Procedure

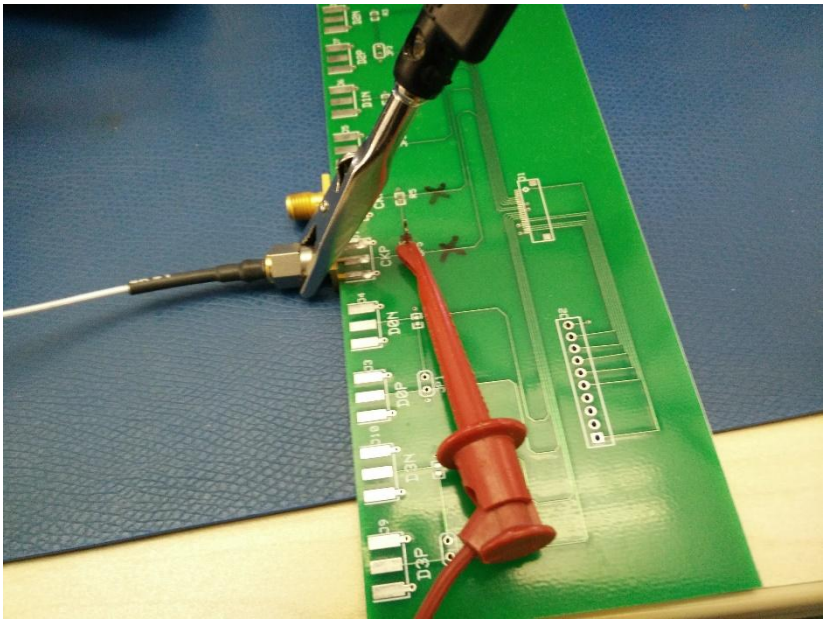
Procedure (duration ~ 20 min):

For LP you need to use the multimeter like this. Use multimeter 34461A.



Open IESP-3.6.47, click File-Open and go to http://kramer2/svn/DV1600/sw/Scripts/Calibration/SV3/SV3_CPTXDPTX/CalFlow_v1/ LpVoltageCal/cptxLpCalUsingMultiMeter

Plug A1 on the little board with red multimeter input on the little pin and ground to the A1 wire like this



Enter the scope IP address and the serial number in CalOptions and run.

Follow the instructions, you will need to change the channel.

When the test procedure is complete power cycle.

It is important that you rename results folder from the automatically generated name to the SV3TX module id <xx-xxx>.

Generation and loading Calibration Data

Go to
http://kramer2/svn/DV1600/sw/Scripts/Calibration/SV3/SV3_CPTXDPTX/CalFlow_v1/Scripts

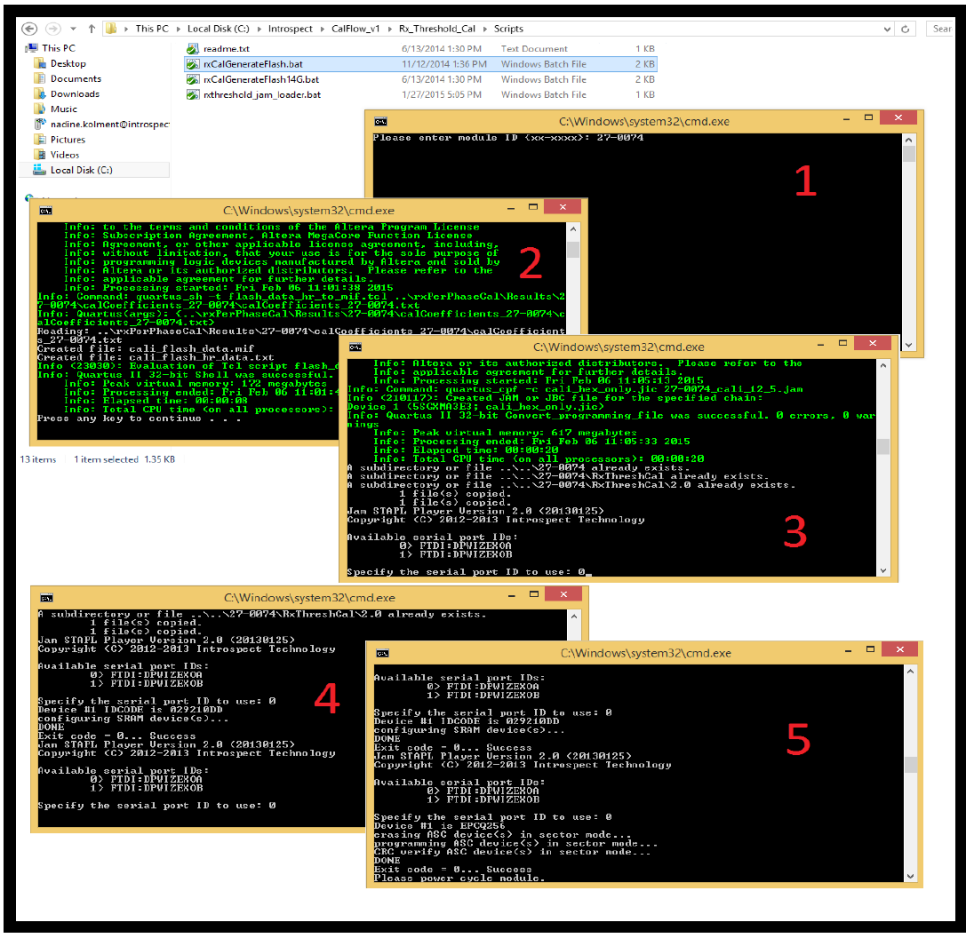
and run sv3CptxDptxGenerateFlash.bat. This batch file will generate and number of intermediate files and attempt to load the resulting jam. file. It is important to watch the execution of the batch file and take note of an error or warning messages.

Enter the unit serial number when prompted. Answer YES to LP Voltage alignment, HS common-mode voltage calibration data, CPTX alignment and DPTX alignment. Answer NO to CPTX and DPTX jitter data.

Press any key when prompted by the Green Quartus shell.

Choose “Port B” twice when asked to specify which FTDI Port is to be used.

After the batch file has completed, power cycle the module and verify both module LEDs are lit.



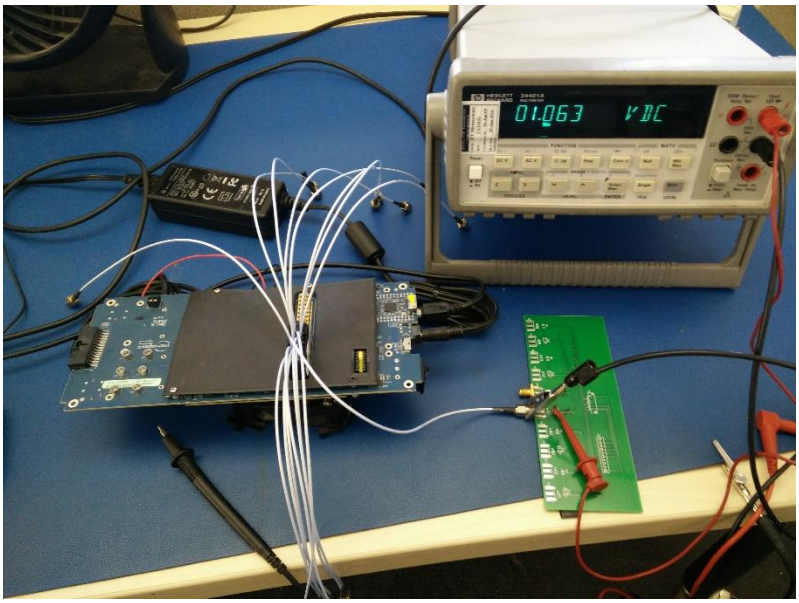
CPTX Calibration Validation

LP CPTX Calibration Procedure

Procedure (duration ~ 20 min):

Open IESP, click File-Open and go to http://kramer2/svn/DV1600/sw/Scripts/Calibration/SV3/SV3_CPTXDPTX/CalFlow_v1/ LpVoltageCal/cptxLpValUsingMultiMeter

Same things as calibration, need to be done on multimeter



Enter the scope IP address and the serial number in CalOptions and run.

Follow the instructions, you will need to change the channel. You should have a PASS at the end.

To test the internal impedance also run this procedure on the scope

http://kramer2/svn/DV1600/sw/Scripts/Calibration/SV3/SV3_CPTXDPTX/CalFlow_v1/cptxLpCalUsingKeysightScope_Validation

Follow the instructions, you will need to change the channel. You should have a PASS at the end.

Alignment CPTX

Procedure (duration ~ 45 min):

This is need to be run on the scope.

Open IESP-3.5.55, click File-Open and go to http://kramer2/svn/DV1600/sw/Scripts/Calibration/SV3/SV3_CPTXDPTX/CalFlow_v1/AlignmentCal/AlignmentCalCptx/cptxAlignmentCalUsingKeysightScope_Validation

Enter the scope IP address and the serial number in CalOptions and run.

Connect channel A1, B1 and C1 of SV3TX unit on the scope, channel 1, 2, 3, press run and follow the instruction. You should have a PASS at the end.

Common Mode

Procedure (duration ~ 20 min):

Open IESP-3.5.55, click File-Open and go to http://kramer2/svn/DV1600/sw/Scripts/Calibration/SV3/SV3_CPTXDPTX/CalFlow_v1/CommonModeCal/cptxCalUsingKeysightScope_Validation

Connect channel A1, B1 and C1 of SV3TX unit on the scope, channel 1, 2, 3.

Enter the scope IP address and the serial number in CalOptions and run.

Follow the instructions, you will need to change the channel. You should have a PASS at the end.

Loading DPTX Firmware

Connect the SV3TX to PC via USB cable, load the DPTX firmware (Latest version) to this device.

Make sure that a required firmware file will be navigated, please check with your supervisor.

Open a ESP GUI, go to Tools, FirmwareUpdater, choose the calibration on your disk and click start.

When completed please power cycle the module. Ensure both module LEDs are lighted.

Alignment DPTX Calibration Procedure

Procedure (duration ~ 45 min):

Open IESP-3.5.55, click File-Open and go to http://kramer2/svn/DV1600/sw/Scripts/Calibration/SV3/SV3_CPTXDPTX/CalFlow_v1/AlignmentCal/AlignmentCalDptx/dptxAlignmentCalUsingKeysightScope

Connect channel 1P, 1N of SV3TX unit on the scope, channel 1, 2.

Enter the scope IP address and the serial number in CalOptions and run.

Follow the instructions, you will need to change the channel. As mention in the instruction, do not disconnect channel 1P.

When the test procedure is complete power cycle.

It is important that you rename results folder from the automatically generated name to the SV3TX module id <xx-xxx>.

Jitter DPTX Calibration

Compensation Factor

Procedure (duration ~ 3hrs):

You will need a SV1 and connect it like this. Each connection need a dc-block.

SV3 1P -> SV1C RX1P

SV3 1N -> SV1C RX1N

SV3 2P -> SV1C RX2P

SV3 2N -> SV1C RX2N

SV3 3P -> SV1C RX3P

SV3 3N -> SV1C RX3N

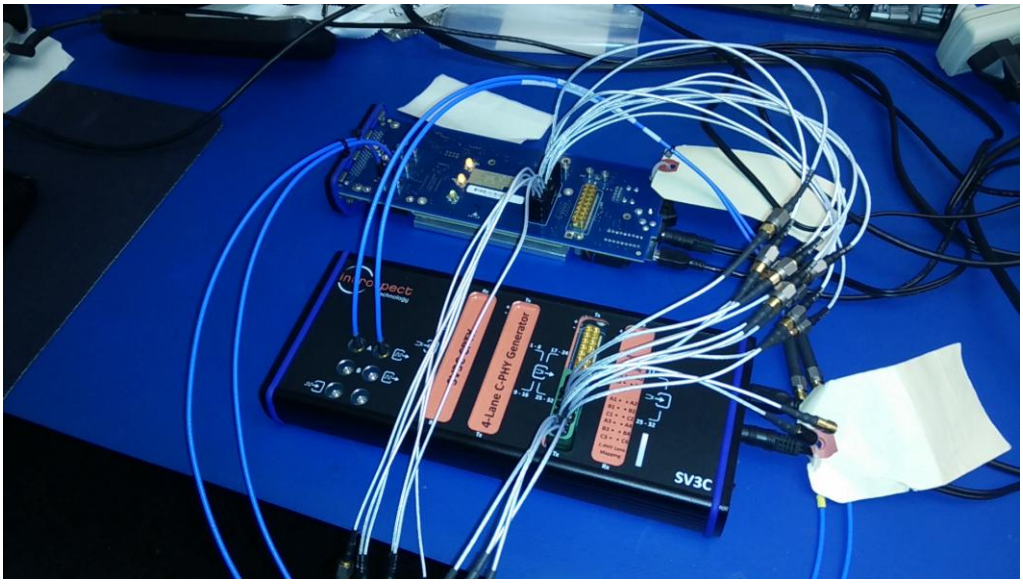
SV3 4P -> SV1C RX4P

SV3 4N -> SV1C RX4N

SV3 CLKP -> SV1C RX5P

SV3 CLKN -> SV1C RX5N

SV3 CLK OUT –> SV1 CLK IN



Open IESP-3.5.37. as SV1, click File-Open and go

http://kramer2/svn/DV1600/sw/Scripts/Calibration/SV3/SV3_CPTXDPTX/CalFlow_v1/JitterCal/JitterCalDptx/sv3DptxJitterInjectionCal_CompensationFactor

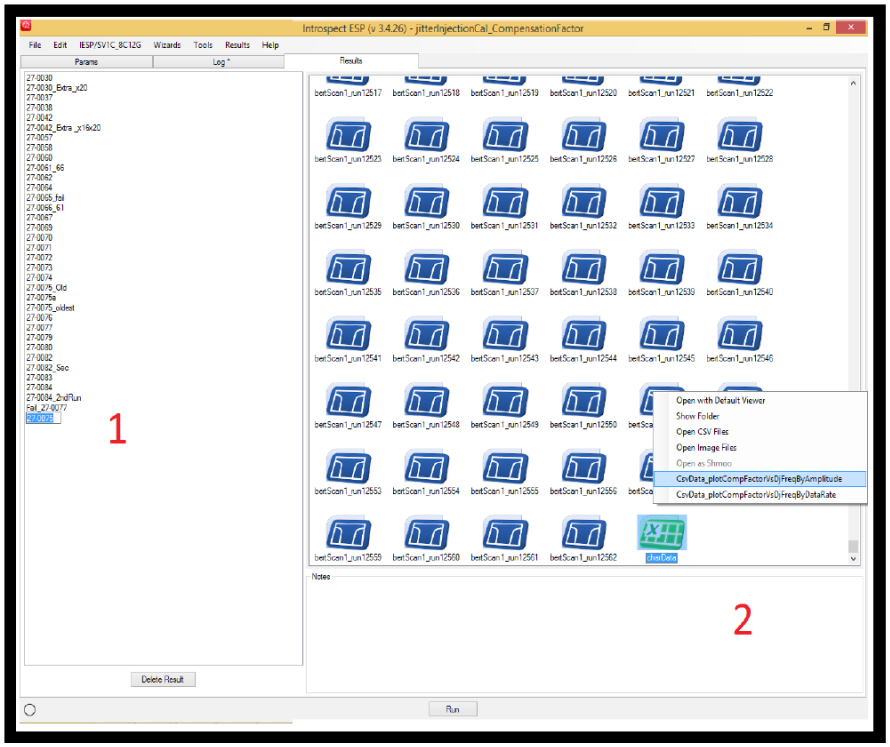
Open another IESP-3.6.47. as SV3DPTX, click File-Open and go

http://kramer2/svn/DV1600/sw/Scripts/Calibration/SV3/SV3_CPTXDPTX/CalFlow_v1/JitterCal/JitterCalDptx/sv3DptxJitterInjectionCal_Dut

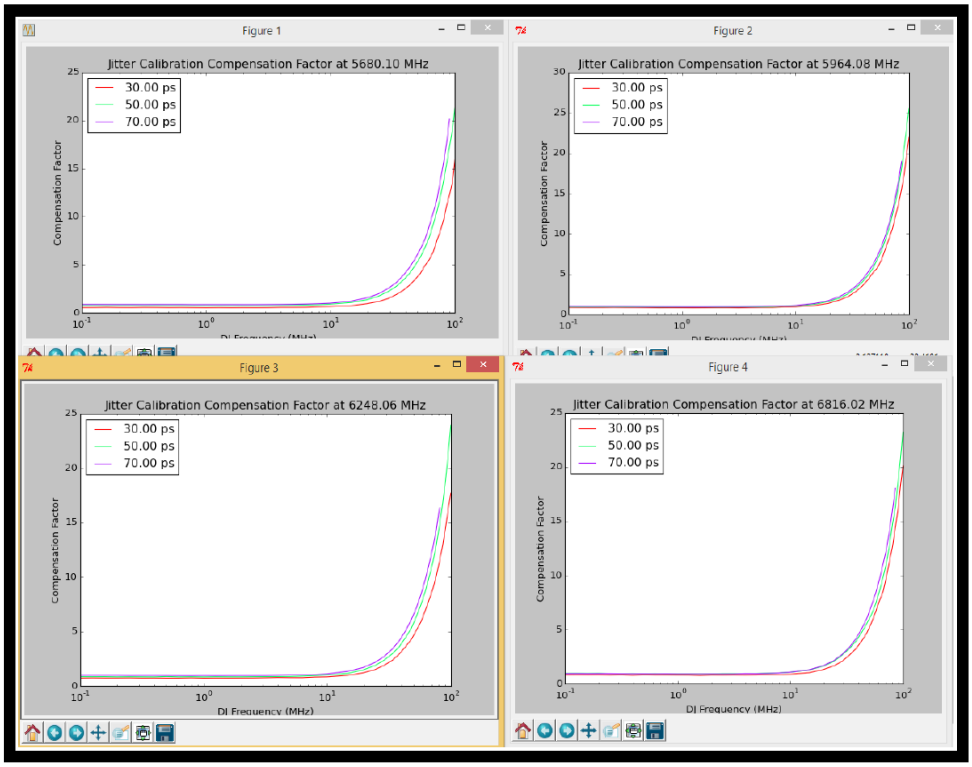
Run sv3DptxJitterInjectionCal_Dut first to start the coordinator. Run sv3DptxJitterInjectionCal_CompensationFactor.

Ensure that the software connects and that the test procedure starts without error.

When the test procedure is complete it is important that you rename the results folder in sv3DptxJitterInjectionCal_CompensationFactor from the automatically generated name to the Sv3TX module id <xx-xxx>.



At this point it is necessary to visually validate the generated results. Go to the bottom of the results screen and Right-Click the charData CSV file and run the "CsvData_plotCompFactorVsDjFreqByAmplitude" macro. A Quick way to check for valid data is to validate that no curves cross each other in any of the generated graphs.



Roll off

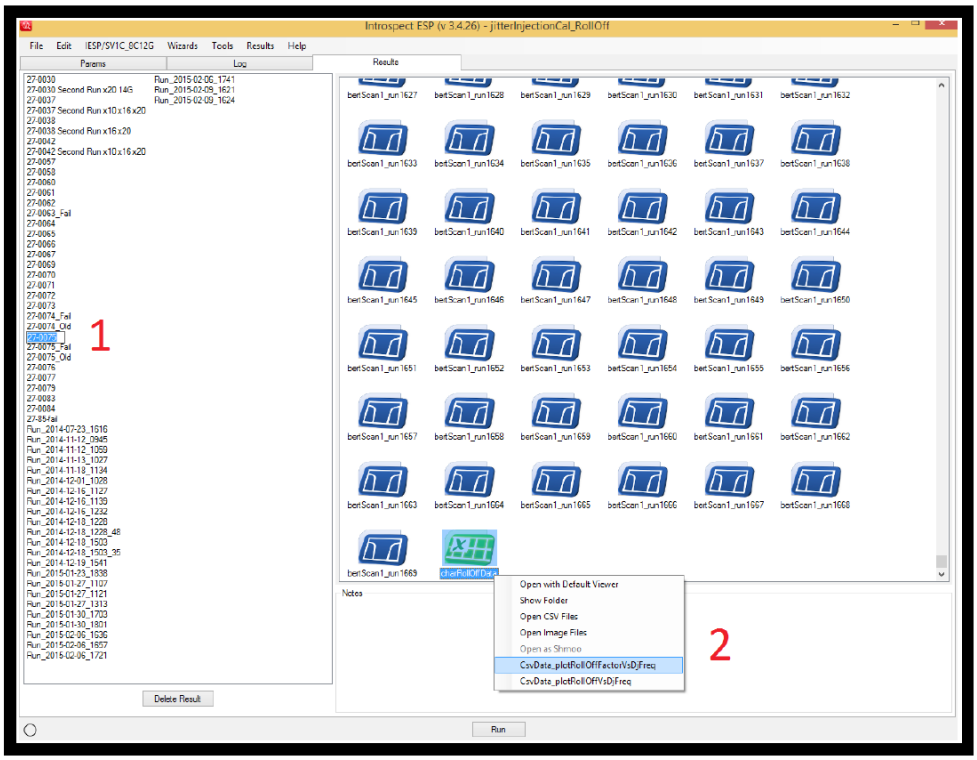
Procedure (duration ~ 30mins):

Open IESP-3.5.55, click File-Open and go to http://kramer2/svn/DV1600/sw/Scripts/Calibration/SV3/SV3_CPTXDPTX/CalFlow_v1/JitterCal/JitterCalDptx/sv3DptxJitterInjectionCal_RollOff

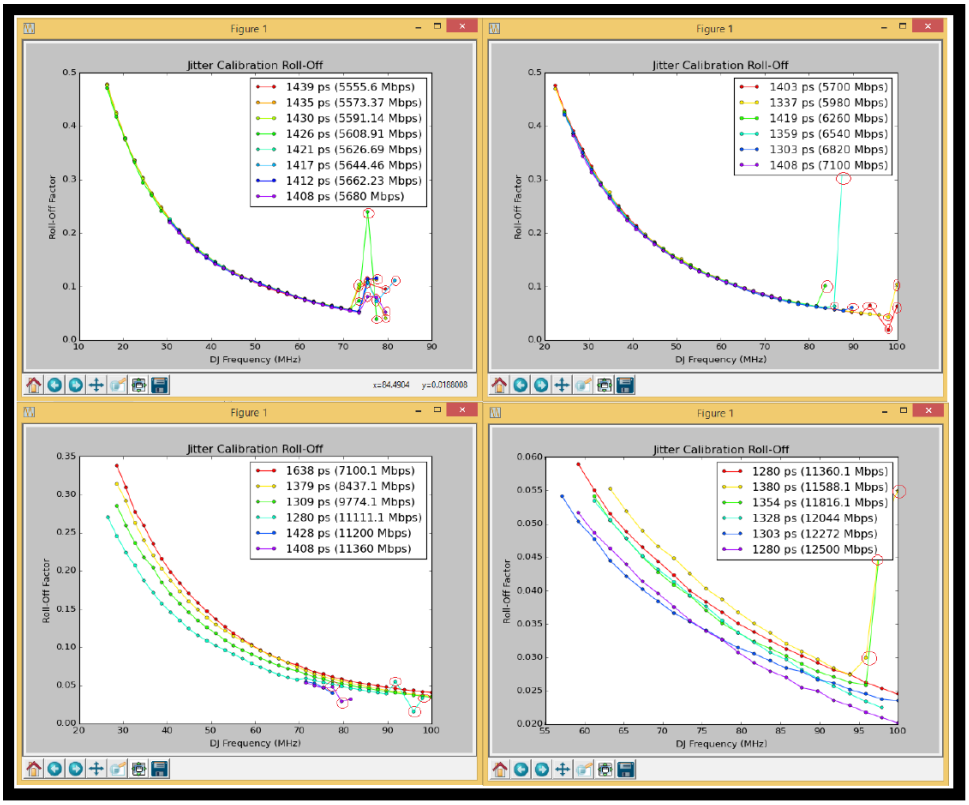
Connect to SV1. SV3 unit should still be connect to sv3DptxJitterInjectionCal_Dut

Click Run. Ensure that the software connects and that the test procedure starts without error.

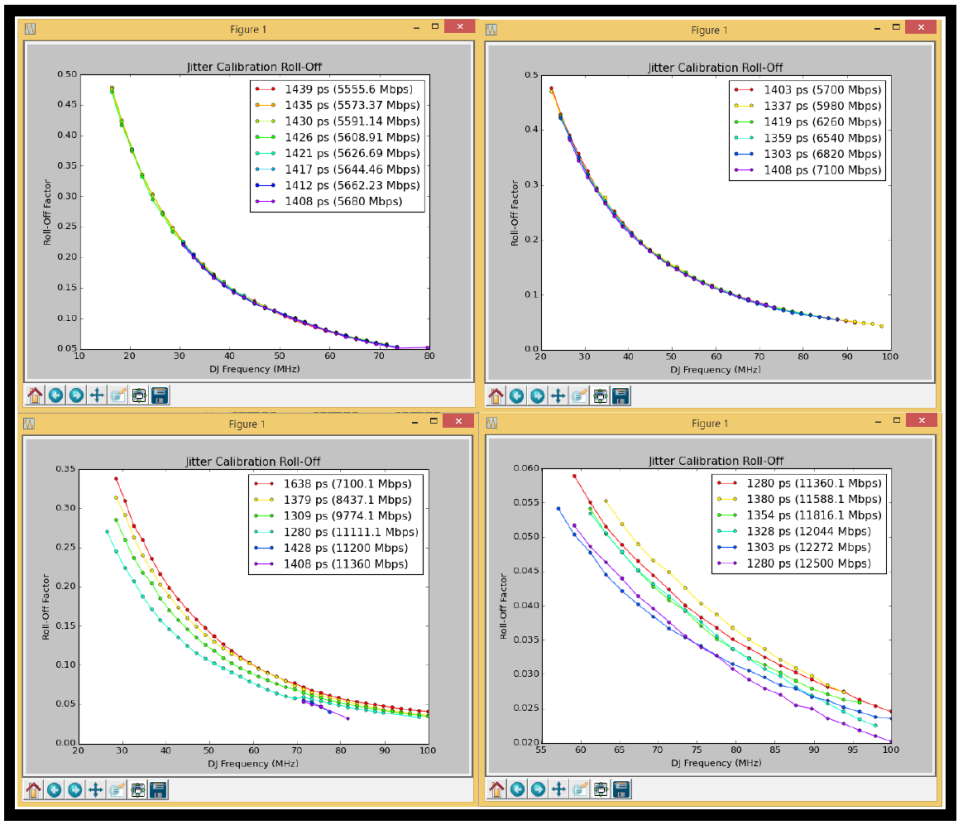
When the test procedure is complete is it important that you rename the results folder from the automatically generated name to the SV3TX module id <xx-xxx>.



Right-click the charRollOffData CSV file and navigate to it by selecting “Show Folder”. Make a copy of all four speed grade raw data csv files and store them in \....\charRollOffData\old\.



Perform data correction in the raw files by removing erroneous data points shown in the Roll Off Curves. For more information on this aspect please see the jitter calibration documentation. Go to c:\Introspect\CalFlow_v1\Jitter_Cal\doc\ and consult "DJ Amplitude Calibration.pdf".



IMPORTANT: Close the GUI.

Generation Calibration Data

Once both the jitter compensation and jitter roll off has been completed you can generate the final flash data. Go to http://kramer2/svn/DV1600/sw/Scripts/Calibration/SV3/SV3_CPTXDPTX/CalFlow_v1/JitterCal/JitterCalDptx/script and run "jitterCalGenerateHrFlashContent.bat".

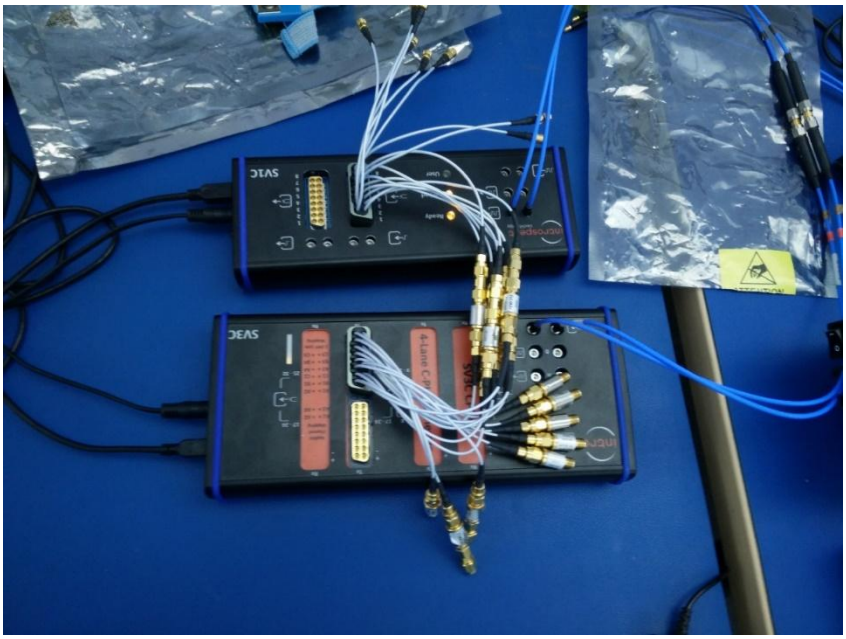
Supply the SV3TX module id <xx-xxx>.

JITTER DPTX

Procedure (duration 30 minutes):

This is run with a SV1.

Open IESP-3.5.55 as SV1, click File-Open and go to http://kramer2/svn/DV1600/sw/Scripts/Calibration/SV3/SV3_CPTXDPTX/CalFlow_v1/Jitter_Cal/JitterCal/JitterCalDptx to open the "sv3DptxJitterInjectionVal" test procedure.



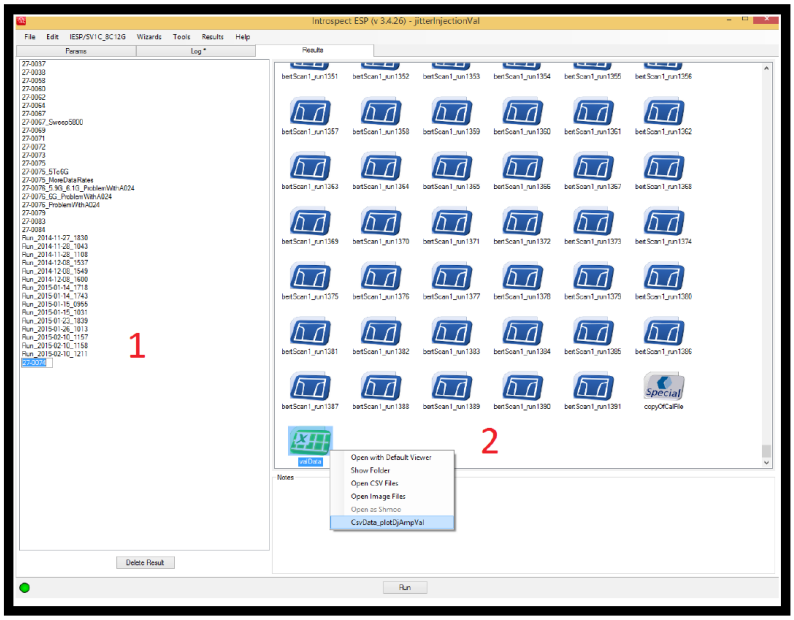
Open another IESP-3.5.55. as SV3DPTX, click File-Open and go

http://kramer2/svn/DV1600/sw/Scripts/Calibration/SV3/SV3_CPTXDPTX/CalFlow_v1/JitterCal/JitterCalDptx/sv3DptxJitterInjectionCal_Dut

Run sv3DptxJitterInjectionCal_Dut first to start the coordinator. Run sv3CptxJitterInjectionVal.

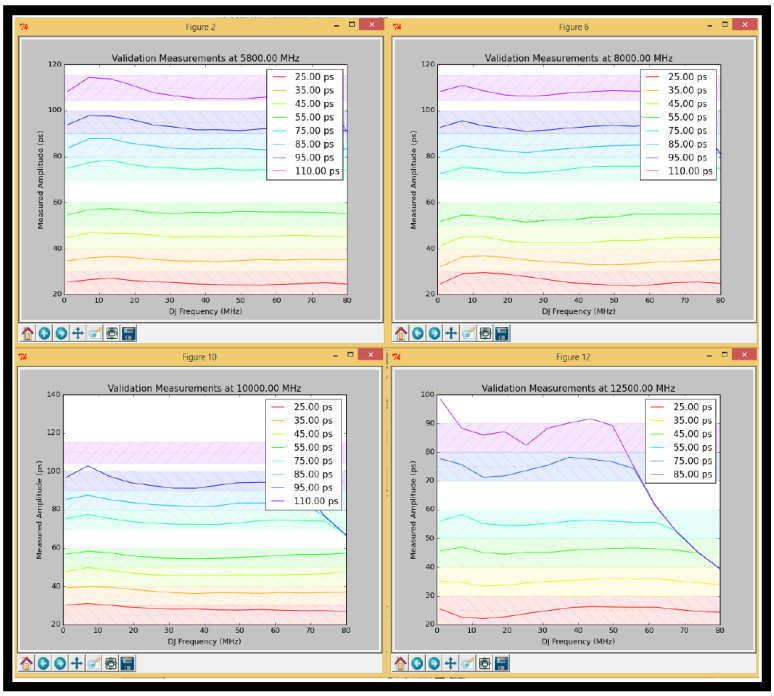
Ensure that the software connects and that the test procedure starts without error.

Go the bottom of the results screen and Right-Click the valData CSV file and run the "CsvData_plotDjAmpVal" macro.



At this point it is necessary to visually validate the generated results. For more information on this aspect please see the jitter calibration documentation. Go to c:\Introspect\CalFlow_v1\Jitter_Cal\doc\ and consult "DJ Amplitude Calibration.pdf".

The measured amplitudes must fall within the 10% water marked bands of each data rate and each jitter injected delay. However, for higher data rates (over 10G), the highest Measured Amplitudes(ps) will fail.



Loading CPTX Firmware

Connect the SV3TX to PC via USB cable, load the CPTX firmware (Latest version) to this device.

Make sure that a required firmware file will be navigated, please check with your supervisor.

Open a ESP GUI, go to Tools, FirmwareUpdater, choose the calibration on your disk and click start.

When completed please power cycle the module. Ensure both module LEDs are lighted.

Jitter CPTX Calibration

Compensation Factor

Procedure (duration ~ 3hrs):

You will need a SV1 and connect it like this.

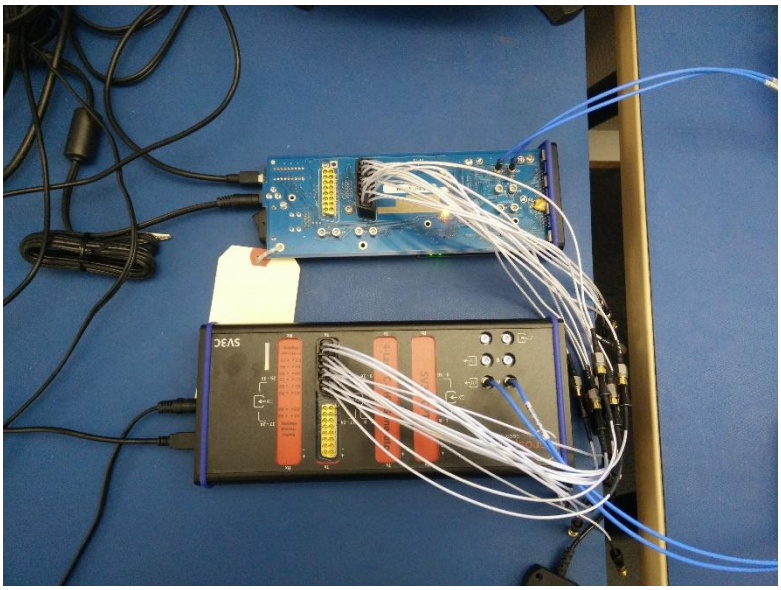
SV3C CPTX Clock Out A => SV1C Clock In

SV3C CPTX Lane 1A-B => SV1C RX1P-N

SV3C CPTX Lane 2A-B => SV1C RX2P-N

SV3C CPTX Lane 3A-B => SV1C RX3P-N

SV3C CPTX Lane 4A-B => SV1C RX4P-N



Open IESP-3.5.55. as SV1, click File-Open and go

http://kramer2/svn/DV1600/sw/Scripts/Calibration/SV3/SV3_CPTXDPTX/CalFlow_v1/JitterCal/JitterCalCptx/sv3CptxJitterInjectionCal_CompensationFactor

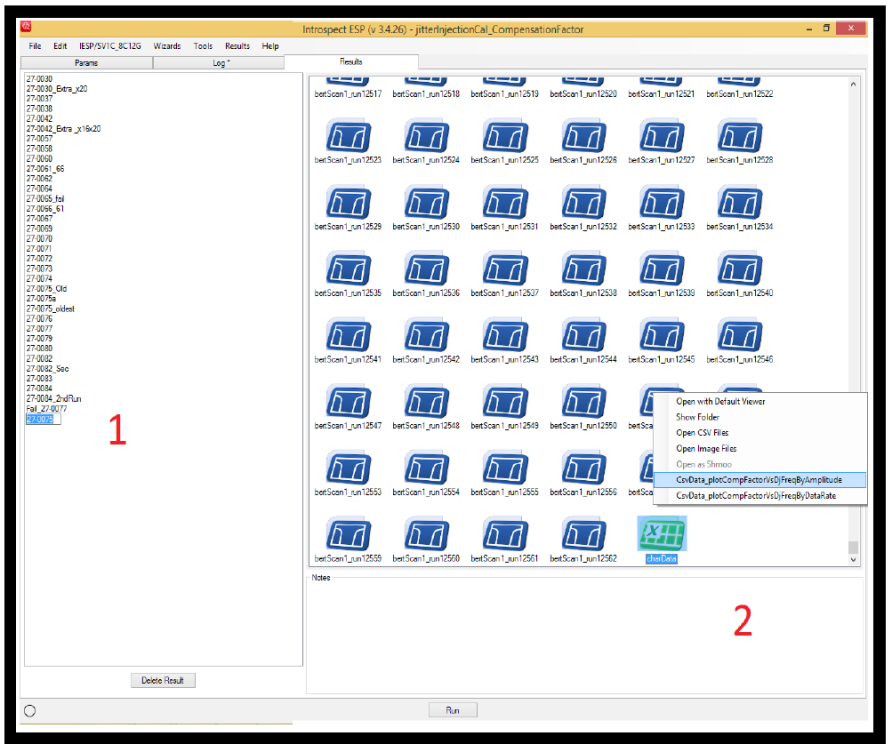
Open another IESP-3.5.55. as SV3CPTX, click File-Open and go

http://kramer2/svn/DV1600/sw/Scripts/Calibration/SV3/SV3_CPTXDPTX/CalFlow_v1/JitterCal/JitterCalCptx/sv3CptxJitterInjectionCal_Dut

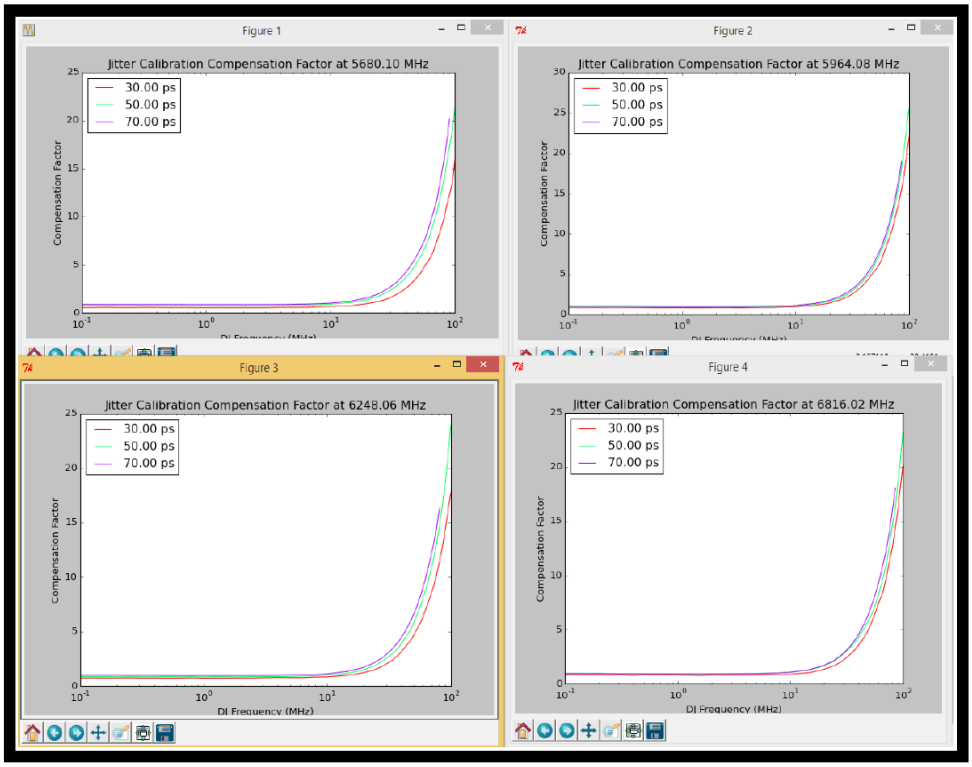
Run sv3CptxJitterInjectionCal_Dut first to start the coordinator. Run sv3CptxJitterInjectionCal_CompensationFactor.

Ensure that the software connects and that the test procedure starts without error.

When the test procedure is complete it is important that you rename the results folder in sv3CptxJitterInjectionCal_CompensationFactor from the automatically generated name to the Sv3TX module id <xx-xxx>.



At this point it is necessary to visually validate the generated results. Go to the bottom of the results screen and Right-Click the charData CSV file and run the "CsvData_plotCompFactorVsDjFreqByAmplitude" macro. A Quick way to check for valid data is to validate that no curves cross each other in any of the generated graphs.



Roll off

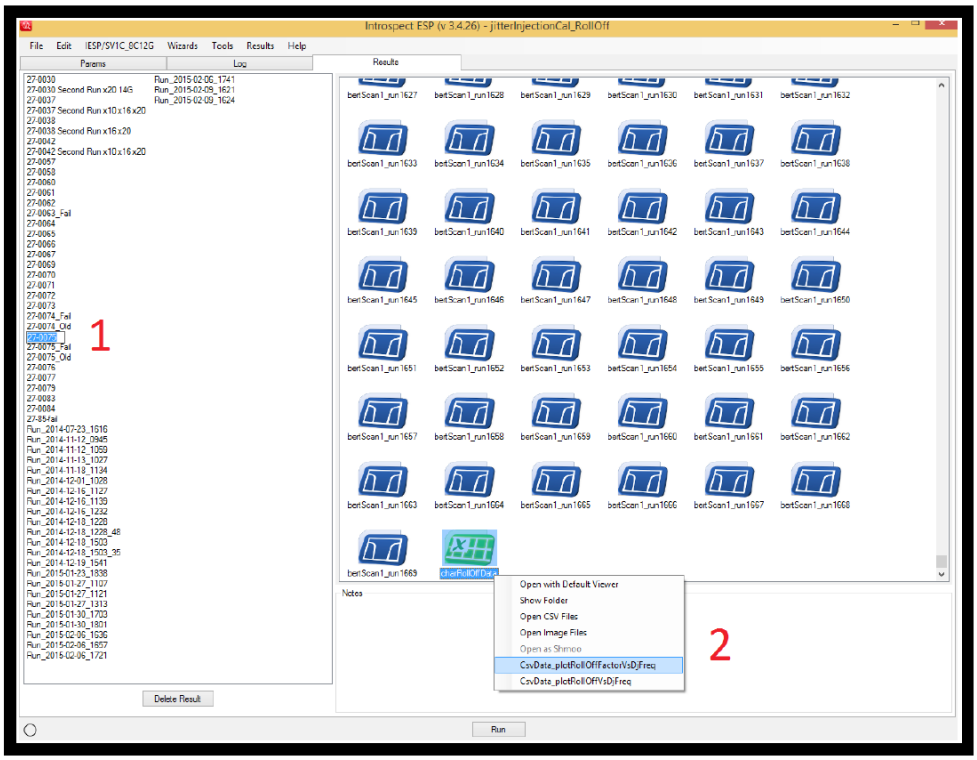
Procedure (duration ~ 30mins):

Open IESP-3.5.55, click File-Open and go to http://kramer2/svn/DV1600/sw/Scripts/Calibration/SV3/SV3_CPTXDPTX/CalFlow_v1/JitterCal/JitterCalCptx/sv3CptxJitterInjectionCal_RollOff

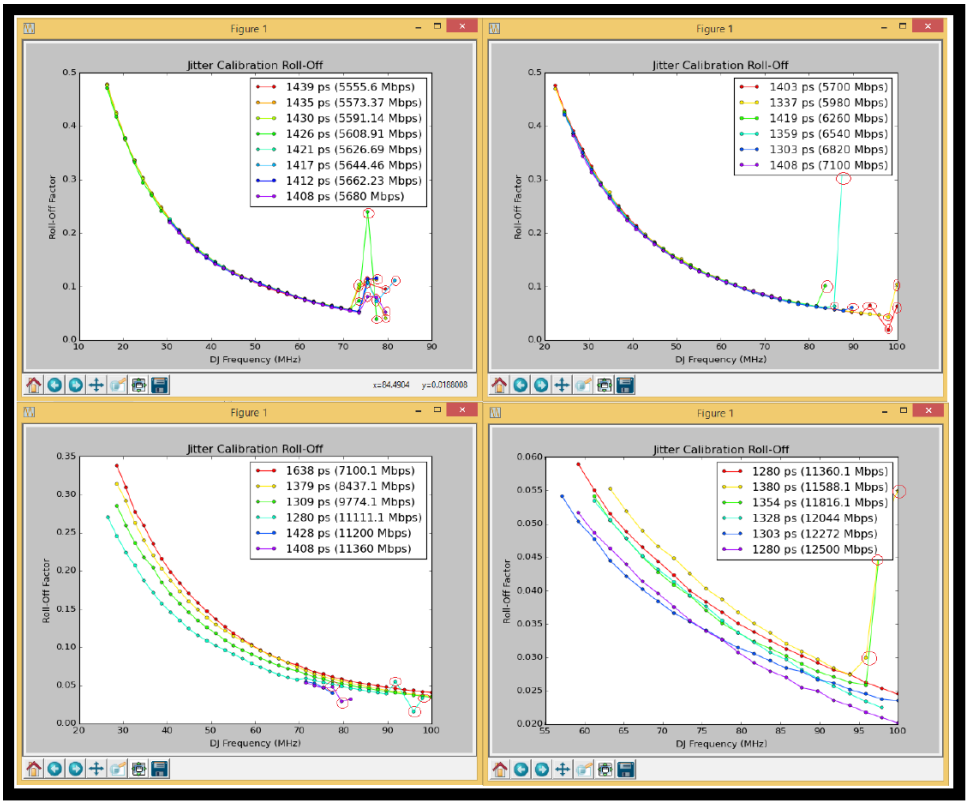
Connect to SV1. SV3 should still be connected to sv3CptxJitterInjectionCal_Dut.

Click Run. Ensure that the software connects and that the test procedure starts without error.

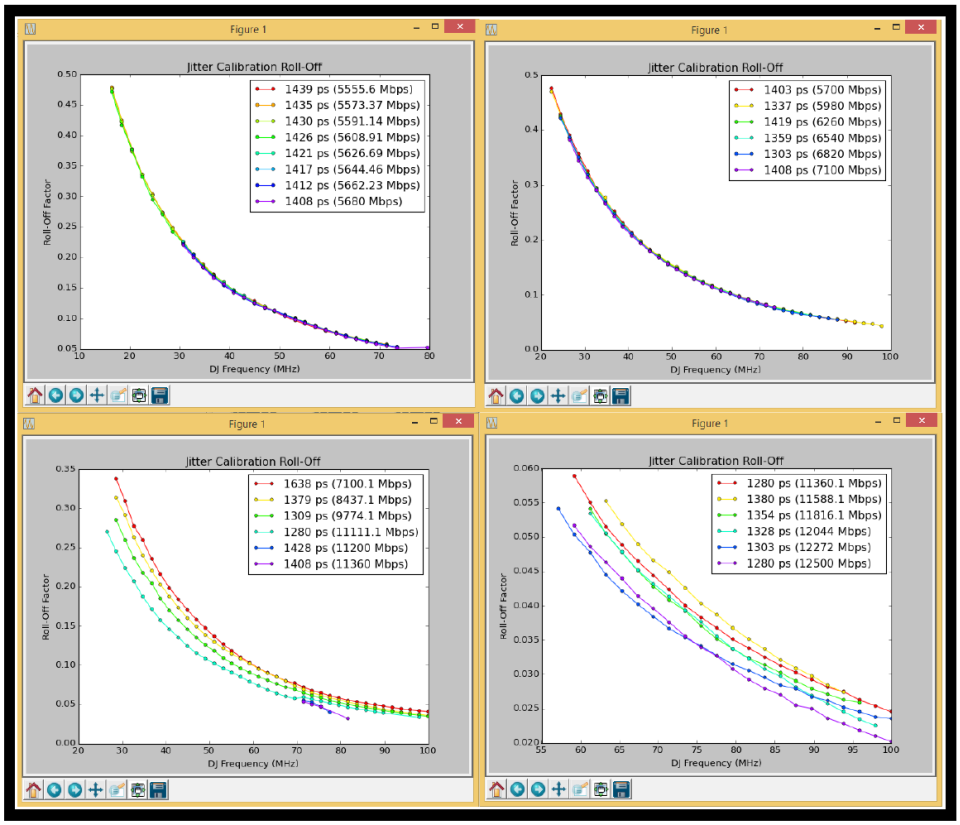
When the test procedure is complete is it important that you rename the results folder from the automatically generated name to the SV1D module id <xx-xxx>.



Right-click the charRollOffData CSV file and navigate to it by selecting “Show Folder”. Make a copy of all four speed grade raw data csv files and store them in \....\charRollOffData\old\.



Perform data correction in the raw files by removing erroneous data points shown in the Roll Off Curves. For more information on this aspect please see the jitter calibration documentation. Go to c:\Introspect\CalFlow_v1\Jitter_Cal\doc\ and consult "DJ Amplitude Calibration.pdf".



IMPORTANT: Close the GUI.

Generation and loading Calibration Data

Once both the jitter compensation and jitter roll off has been completed you can generate the final flash data. Go to

http://kramer2/svn/DV1600/sw/Scripts/Calibration/SV3/SV3_CPTXDPTX/CalFlow_v1/JitterCal/JitterCalCptx/Scripts

and run "jitterCalGenerateHrFlashContent.bat".

Supply the SV3TX module id <xx-xxx>.

Go to
http://kramer2/svn/DV1600/sw/Scripts/Calibration/SV3/SV3_CPTXDPTX/CalFlow_v1/Scripts

and run sv3CptxDptxGenerateFlash.bat. This batch file will generate and number of intermediate files and attempt to load the resulting jam. file. It is important to watch the execution of the batch file and take note of an error or warning messages.

Enter the unit serial number when prompted. Answer YES to all.

Press any key when prompted by the Green Quartus shell.

Choose "Port B" twice when asked to specify which FTDI Port is to be used.

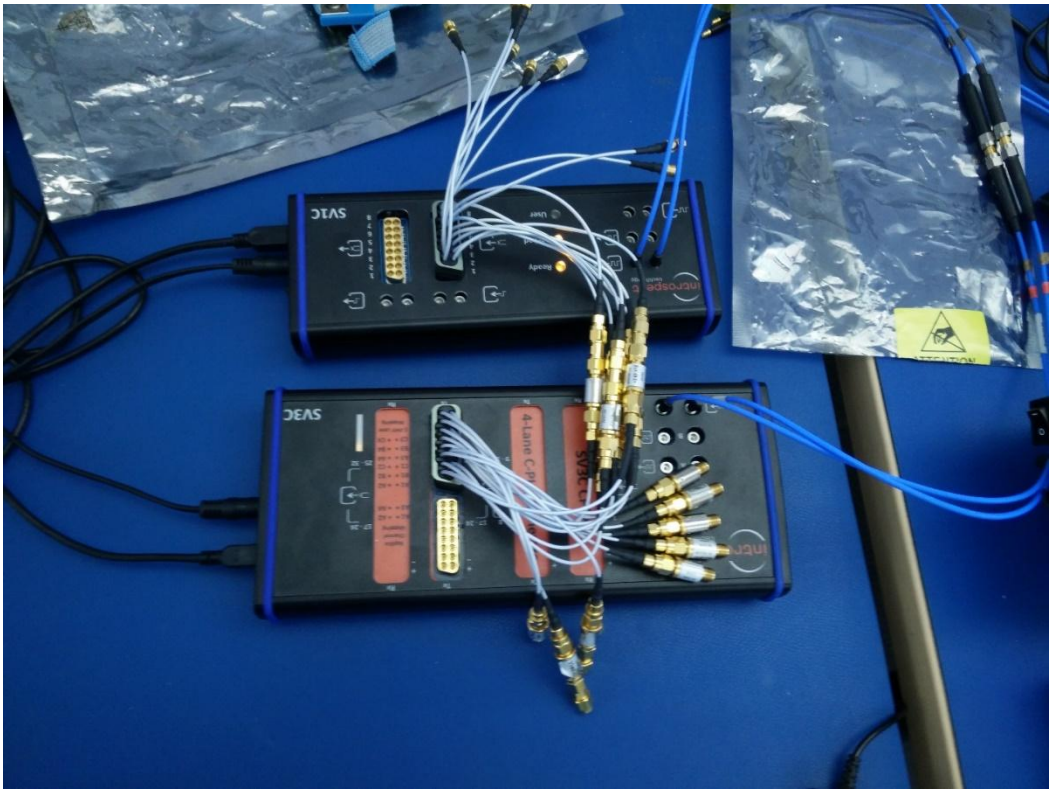
After the batch file has completed, power cycle the module and verify both module LEDs are lit.

CPTX JITTER Validation

Procedure (duration ~ 30 minutes):

This is run with a SV1.

Open IESP-3.5.55 as SV1, click File-Open and go to http://kramer2/svn/DV1600/sw/Scripts/Calibration/SV3/SV3_CPTXDPTX/CalFlow_v1/Jitter_Cal/JitterCal/JitterCalCptx to open the "sv3CptxJitterInjectionVal" test procedure.



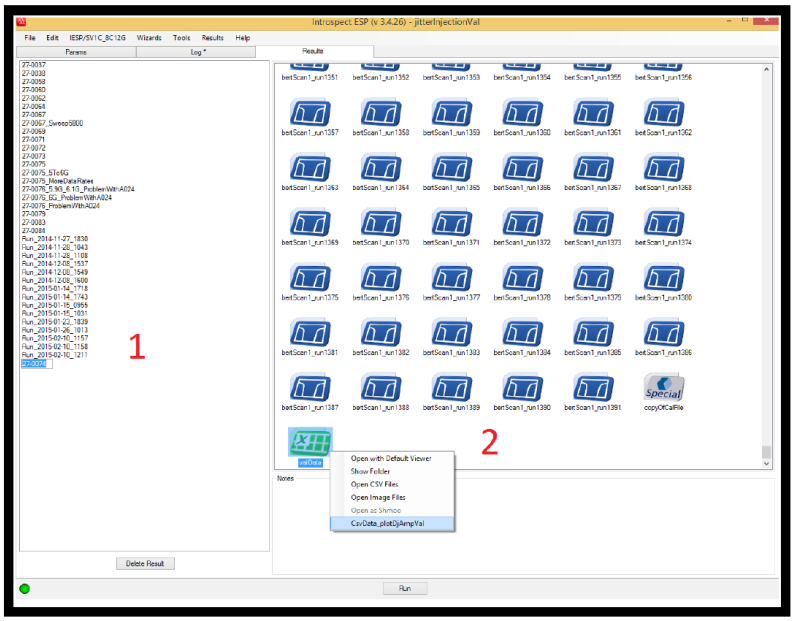
Open another IESP-3.6.47. as SV3CPTX, click File-Open and go

http://kramer2/svn/DV1600/sw/Scripts/Calibration/SV3/SV3_CPTXDPTX/CalFlow_v1/JitterCal/JitterCalCptx/sv3CptxJitterInjectionCal_Dut

Run sv3CptxJitterInjectionCal_Dut first to start the coordinator. Run sv3CptxJitterInjectionVal.

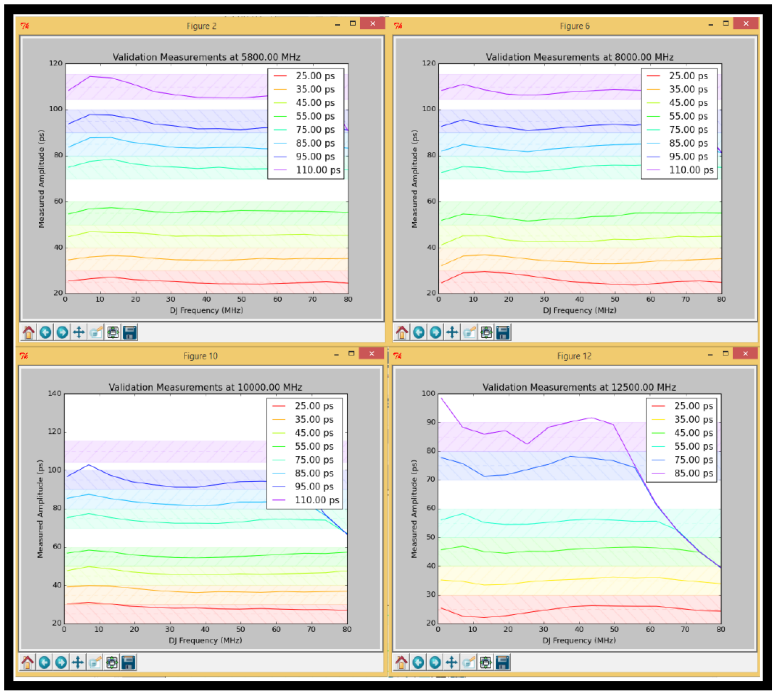
Ensure that the software connects and that the test procedure starts without error.

Go the bottom of the results screen and Right-Click the valData CSV file and run the "CsvData_plotDjAmpVal" macro.



At this point it is necessary to visually validate the generated results. For more information on this aspect please see the jitter calibration documentation. Go to c:\Introspect\CalFlow_v1\Jitter_Cal\doc\ and consult "DJ Amplitude Calibration.pdf".

The measured amplitudes must fall within the 10% water marked bands of each data rate and each jitter injected delay. However, for higher data rates (over 10G), the highest Measured Amplitudes(ps) will fail.



Loading DPTX Firmware

Connect the SV3TX to PC via USB cable, load the DPTX firmware (Latest version) to this device.

Make sure that a required firmware file will be navigated, please check with your supervisor.

Open a ESP GUI, go to Tools, FirmwareUpdater, choose the calibration on your disk and click start.

When completed please power cycle the module. Ensure both module LEDs are lighted.

DPTX Calibration Validation

Alignment DPTX

Procedure (duration ~ 45 min):

Open IESP-3.5.55, click File-Open and go to http://kramer2/svn/DV1600/sw/Scripts/Calibration/SV3/SV3_CPTXDPTX/CalFlow_v1/AlignmentCal/AlignmentCalDptx/dptxAlignmentCalUsingKeysightScope_Validation

Enter the scope IP address and the serial number in CalOptions and run.

Connect channel 1P and 1N of SV3TX unit on the scope, channel 1, 2, press run and follow the instruction. You should have a PASS at the end.

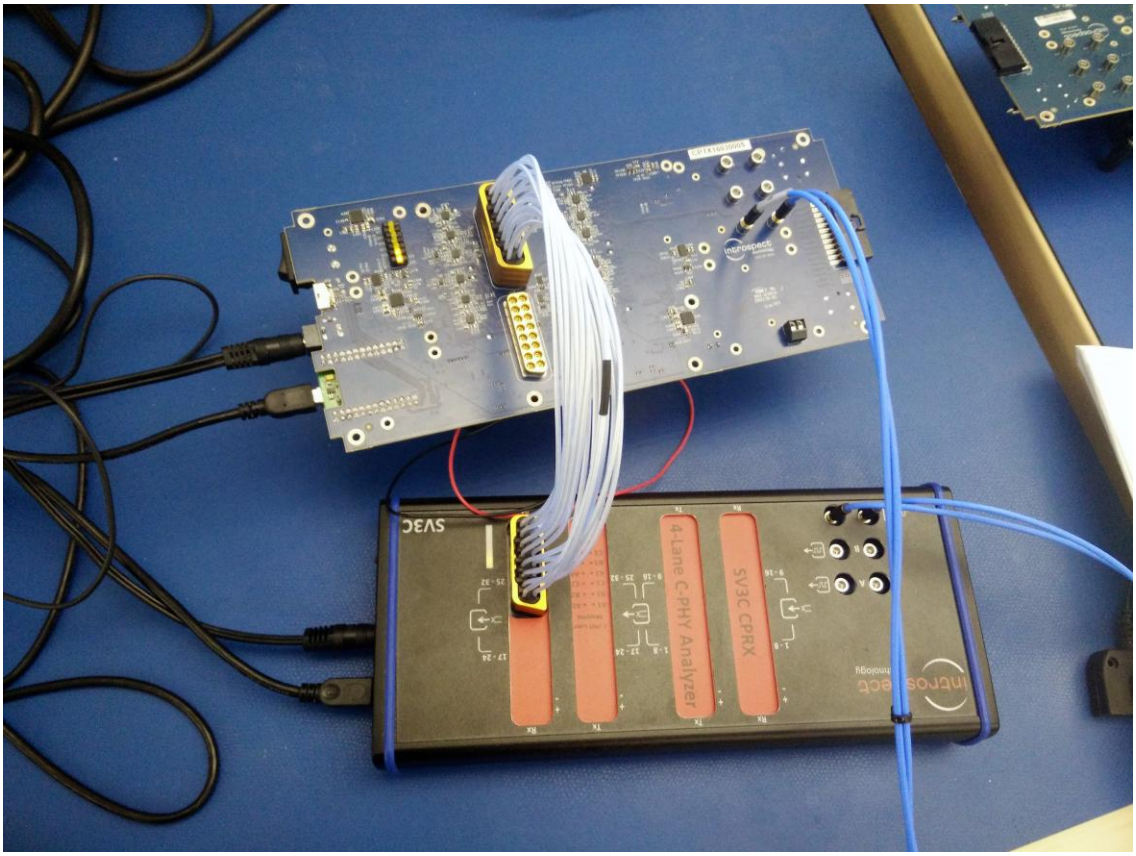
Relocation Validation Data

When everything is done, put the results from C:\Introspect\sw\Scripts\Calibration\SV3\SV3_CPTXDPTX\CalFlow_v1\<serial number>

In SVN here: http://kramer2/svn/production_DV1600/Data/SV3D

Regression

For the regression you will need a SV3RX connect to TX with a loopback cable. You also need to connect the external clock from the TX to the RX.



Open this procedure and connected it to the RX
http://kramer2/svn/DV1600/sw/Scripts/Regression/SV3/SV3_CPTX/cptxRegression/cptxRegression_Analyzer

Open this procedure and connected it to the TX
http://kramer2/svn/DV1600/sw/Scripts/Regression/SV3/SV3_CPTX/cptxRegression/cptxRegression_Generator

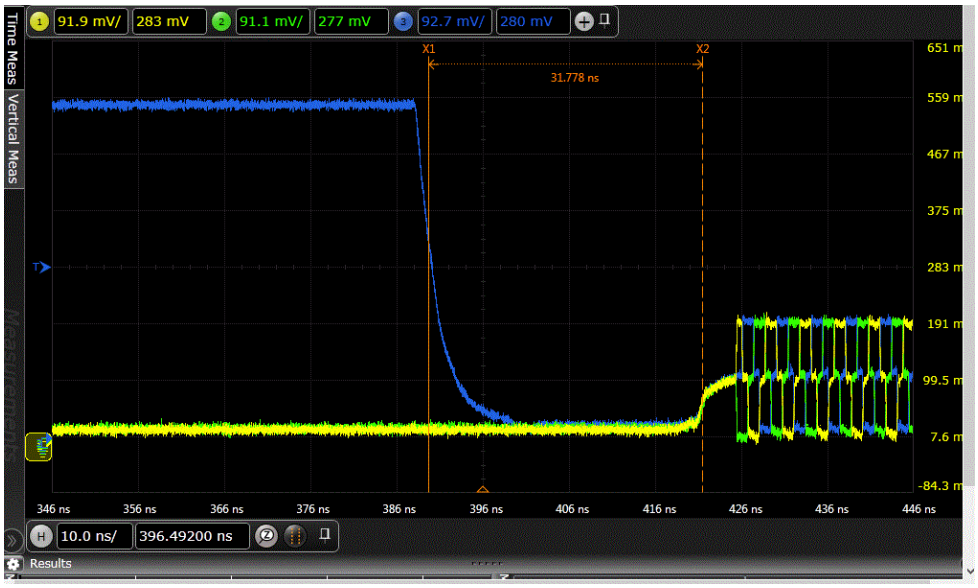
Run the Generator first to start the coordinator and the run the analyzer. You should have a PASS when finish.

Validation Report

You now need to generate validation report. The procedures are here: http://kramer2/svn/DV1600/sw/Scripts/Calibration/SV3/SV3_CPTXDPTX/GeneratorCertification

Run the procedure cptxUsingKeysightScope_Certification and dptxUsingKeysightScope_Certification. This should take 1.5 hours each. Copy the results in CPTX_Amplitude and DPTX_Amplitude of the template CPTXXXXXXXXX (39-XXXX) Validation.xlsx

Open the procedure CPTX_txAmpChar. Run it and measure LP000 on the scope like this. Write the value in the template.



Repeat for datarate = 1000Mpbs and change range(10,151,1).

Repeat with DPTX_txAmpChar.

Revision Number	History	Date
01	First release	2016-09-06
02	Add report validation	2017-06-22

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