VME-DDS Testing Record

Version 1.

Date:

Tester:

Board #:

## Section II. Programming the FPGA’s.

FPGA Code Version:

FPGA Code Checksum:

Comments :

## Section III. Interfacing Through the MVME Crate Processor.

Node Used [blrfd3]:

MVME Version [2300/5500]:

Do serial terminal commands params, wrparam, rdparam, etc. work [Yes/No]:

Is memory initialization needed [Yes/No]:

Comments:

## Section IV. Test Equipment and Module Setup.

|  |  |  |
| --- | --- | --- |
|  | Model | Tag or Serial No. |
| Oscilloscope |  |  |
| Signal Generator |  |  |
| Multimeter |  |  |
| DC Voltage Source |  |  |
| other: |  |  |
| other: |  |  |
|  |  |  |

## Section V. Setting Up FLASH Memory for a New Module.

FLASH Initialization was successful [Yes/No/Not Needed]:

Does the “ena\_store” function work [Yes/No]:

Can curves be up loaded and down-loaded with ACNET App B30 [Yes/No]:

Comments:

## Section VI. Diagnostic DAC Outputs.

|  |  |  |  |
| --- | --- | --- | --- |
| Channel | Description | Works[Yes/No] | Comments |
| AO 1 | Base frequency curve, with the modified injection curve portion, but without the phase error feedback |  |  |
| AO 2 | Bias Curve |  |  |
| AO 3 | Base frequency curve, with the modified injection curve portion and phase error feedback |  |  |
| AO 4 | *Debug Output, not specified* |  | *Needs procedure for testing.* |

DAC Calibration

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Channel | Volts Out at  setdacs(-5.0) | Volts Out at  setdacs(5.0) | Volts Out at  setdacs(0.0) | Comments |
| AO 1 |  |  |  |  |
| AO 2 |  |  |  |  |
| AO 3 |  |  |  |  |
| AO 4 |  |  |  |  |

## Section VII. Bias Curve and Bias Gate Operation.

With SW[5] down, does Bias Curve appear on the output of DAC AO 2 [Yes/No]:

With SW[5] up, is the Bias Curve output gated by the Bias Gate Input [Yes/No]:

Does Bias Curve Output on DAC AO 2 match the Bias Curve loaded from ACNET application B30 [Yes/No]:

Comments:

## Section VIII. Analog Input, ADC Calibratio

Run “caltest(“filename”)

Cut and paste the results of “testchan 1” to “testchan 4” below.

“Paste here”

BLRFD3->testchan 1

Test Voltage Calibration Filename: t1

Opening File 't1'...

opening file ...

0. -9.9157 ( 134)

1. -8.3429 ( 2651)

2. -6.7699 ( 5168)

3. -5.1954 ( 7687)

4. -3.6247 (10200)

5. -2.0532 (12714)

6. -0.4824 (15228)

7. +0.4832 (16773)

8. +2.0560 (19289)

9. +3.6295 (21807)

10. +5.2022 (24323)

11. +6.7788 (26846)

12. +8.3541 (29366)

13. +9.9292 (31886)

Connected Channel 1 to the Test Voltage

ADC 1

volts ,average,expected,delta || stddev)

-9.9157, 132 , 134 , 2 || 6.63

-8.3429, 2648 , 2651 , 3 || 7.35

-6.7699, 5167 , 5168 , 1 || 7.55

-5.1954, 7683 , 7687 , 4 || 6.93

-3.6247, 10203 , 10200 , -3 || 7.00

-2.0532, 12715 , 12714 , -1 || 7.28

-0.4824, 15230 , 15228 , -2 || 6.56

+0.4832, 16791 , 16773 , -18 || 6.86

+2.0560, 19291 , 19289 , -2 || 7.28

+3.6295, 21811 , 21807 , -4 || 7.21

+5.2022, 24329 , 24323 , -6 || 6.86

+6.7788, 26854 , 26846 , -8 || 7.28

+8.3541, 29375 , 29366 , -9 || 6.71

+9.9292, 31919 , 31886 , -33 || 7.28

RMS Errors: Neg Side = 2.507133, Pos Side = 15.184579, Total = 10.882489

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Connected Channel 2 to the Test Voltage

ADC 2

volts ,average,expected,delta || stddev)

-9.9157, 126 , 134 , 8 || 7.62

-8.3429, 2646 , 2651 , 5 || 7.48

-6.7699, 5164 , 5168 , 4 || 7.94

-5.1954, 7682 , 7687 , 5 || 8.06

-3.6247, 10201 , 10200 , -1 || 7.68

-2.0532, 12715 , 12714 , -1 || 7.48

-0.4824, 15229 , 15228 , -1 || 8.06

+0.4832, 16793 , 16773 , -20 || 8.00

+2.0560, 19294 , 19289 , -5 || 7.68

+3.6295, 21814 , 21807 , -7 || 7.87

+5.2022, 24331 , 24323 , -8 || 7.62

+6.7788, 26859 , 26846 , -13 || 8.06

+8.3541, 29381 , 29366 , -15 || 7.75

+9.9292, 31920 , 31886 , -34 || 8.72

RMS Errors: Neg Side = 4.358899, Pos Side = 17.270950, Total = 12.595351

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Connected Channel 3 to the Test Voltage

ADC 3

volts ,average,expected,delta || stddev)

-9.9157, 148 , 134 , -14 || 8.25

-8.3429, 2663 , 2651 , -12 || 8.72

-6.7699, 5180 , 5168 , -12 || 8.89

-5.1954, 7694 , 7687 , -7 || 8.89

-3.6247, 10210 , 10200 , -10 || 8.72

-2.0532, 12719 , 12714 , -5 || 9.11

-0.4824, 15231 , 15228 , -3 || 9.06

+0.4832, 16790 , 16773 , -17 || 8.66

+2.0560, 19289 , 19289 , 0 || 8.12

+3.6295, 21805 , 21807 , 2 || 9.11

+5.2022, 24321 , 24323 , 2 || 8.54

+6.7788, 26844 , 26846 , 2 || 8.49

+8.3541, 29362 , 29366 , 4 || 8.54

+9.9292, 31901 , 31886 , -15 || 8.72

RMS Errors: Neg Side = 9.761440, Pos Side = 8.799351, Total = 9.292854

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Connected Channel 4 to the Test Voltage

ADC 4

volts ,average,expected,delta || stddev)

-9.9157, 132 , 134 , 2 || 8.66

-8.3429, 2651 , 2651 , 0 || 9.33

-6.7699, 5168 , 5168 , 0 || 9.33

-5.1954, 7685 , 7687 , 2 || 9.22

-3.6247, 10204 , 10200 , -4 || 9.06

-2.0532, 12716 , 12714 , -2 || 9.22

-0.4824, 15230 , 15228 , -2 || 9.80

+0.4832, 16789 , 16773 , -16 || 8.54

+2.0560, 19291 , 19289 , -2 || 9.06

+3.6295, 21812 , 21807 , -5 || 8.43

+5.2022, 24327 , 24323 , -4 || 8.77

+6.7788, 26853 , 26846 , -7 || 9.27

+8.3541, 29373 , 29366 , -7 || 8.66

+9.9292, 31917 , 31886 , -31 || 9.54

RMS Errors: Neg Side = 2.138090, Pos Side = 13.938641, Total = 9.971388

Comments:

## Section IX. Measure the Phase Error Feedback.

Value of Parameter 4, Phase Error Gain:

Value of Parameter 7: Phase Error Trim: (set for minimum delta Freq at zero volts)

Fill out the table below.

|  |  |
| --- | --- |
| V pherr, Volts | Delta Freq. Hz |
| -1.000 |  |
| -0.800 |  |
| -0.400 |  |
| -0.200 |  |
| -0.060 |  |
| -0.020 |  |
| 0.000 |  |
| 0.020 |  |
| 0.060 |  |
| 0.200 |  |
| 0.400 |  |
| 0.800 |  |
| 1.000 |  |

## Section X. Measuring the Radial Position Phase Drive Feedback.

Value of Parameter 0, Injection Frequency:

Record Phase Drive Feedback Measurements.

*Note: Highlight the calculated column and press F9 to recalculate the numbers.*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Frequency, MHz | V psdrv, Volts | delta T, ns | Phase Detector Volts | Phase Difference, Degrees *Calculated Column*  =R2C1\*1e6\*360\*1e-9\*RxC3 |
| 37.94 | -9 |  |  | 0.00 |
|  | -8 |  |  | 0.00 |
|  | -7 |  |  | 0.00 |
|  | -6 |  |  | 0.00 |
|  | -5 |  |  | 0.00 |
|  | -4 |  |  | 0.00 |
|  | -3 |  |  | 0.00 |
|  | -2 |  |  | 0.00 |
|  | -1 |  |  | 0.00 |
|  | 0 |  |  | 0.00 |
|  | 1 |  |  | 0.00 |
|  | 2 |  |  | 0.00 |
|  | 3 |  |  | 0.00 |
|  | 4 |  |  | 0.00 |
|  | 5 |  |  | 0.00 |
|  | 6 |  |  | 0.00 |
|  | 7 |  |  | 0.00 |
|  | 8 |  |  | 0.00 |
|  | 9 |  |  | 0.00 |

Comments:

## XI. Test the Phase Offset Curves

Setup several “poff1” Phase Offset Curves and compare the results to those given in Figure XI.1.

Comments:

## XIII. Measure the RF Amplitude Throughout the Frequency Sweep.

RF Amplitude Measurement Data.

|  |  |  |  |
| --- | --- | --- | --- |
| Offset from Trigger, ms | RF Amplitude, Vpp | | |
|  | DDS Ch 1 | DDS Ch 2 | DDS Ch 3 |
| 1 |  |  |  |
| 2 |  |  |  |
| 4 |  |  |  |
| 8 |  |  |  |
| 12 |  |  |  |
| 18 |  |  |  |
| 25 |  |  |  |
| Max |  |  |  |
| Min |  |  |  |
| Range |  |  |  |
| Percent Var. |  |  |  |

Comments:

## XIV. Verify Function of the Tuning Parameters.

### XIV.1 Measure the Injection Frequency.

Note the values of the parameter 0 Injection Frequency and the setting on the signal generator.

|  |  |
| --- | --- |
| Injection Frequency Setting (param 0) | Signal Generator Setting |
|  |  |
| 37,945,000 Hz (sample data) | 37,944,808 Hz (sample data) |

Change the Injection Frequency by 10 kHz.

Note the values again.

|  |  |
| --- | --- |
| Injection Frequency Setting (param 0) | Signal Generator Setting |
|  |  |
| 37,955,000 Hz (sample data) | 37,954,801 Hz (sample data) |

Comments:

### XIV.2 Measure the Curve Delay.

Value of parameter 2, Curve Delay:

Time from rising edge of Booster Cycle Trigger to first frequency update minus 4 us:

Change Curve Delay by 20 us (1000 counts).

Value of parameter 2, Curve Delay:

Time from rising edge of Booster Cycle Trigger to first frequency update minus 4 us:

Comments:

### XIV.3 Measure the Transition Trigger Frequency.

Transition Trigger fires at 52.22 MHz [Yes/No]:

Change Transition Trigger Frequency to 52.32 MHz.

Transition Trigger fires at 52.32 MHz [Yes/No]:

Change Transition Trigger Frequency to 52.12 MHz.

Transition Trigger fires at 51.32 MHz [Yes/No]:

Comments: