SP5 User Guide

ProGrAnalog
November 21, 2022

Bringing up LoadSlammer GUI and testing SP5

Scope

This document is a brief tutorial for working with LoadSlammer on AMD's SP5 (Genoa) platform

Please refer to the latest version of the AMD® "Infrastructure Roadmap (IRM) for Socket SP5 Processors"

SP5 SMB Scope Settings

Rail	SMB on ADJ to Scope Amps per Volt	SMB on ADJ to Scope Volts per Volt
VDDCR_CPU0	150	1
VDDCR_CPU1	150	1
VDDCR_SOC	100	1
VDDIO	100	1
VDD_11_S3	50	1
VDD_18_S5	10	1
VDD_33_S5	2.5	2.1

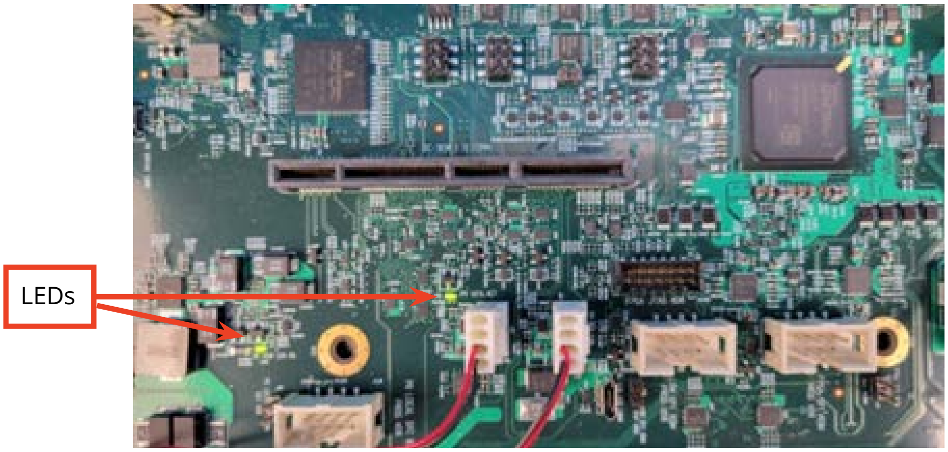
Table 1 Applied scaling factor for Orac-ADJ

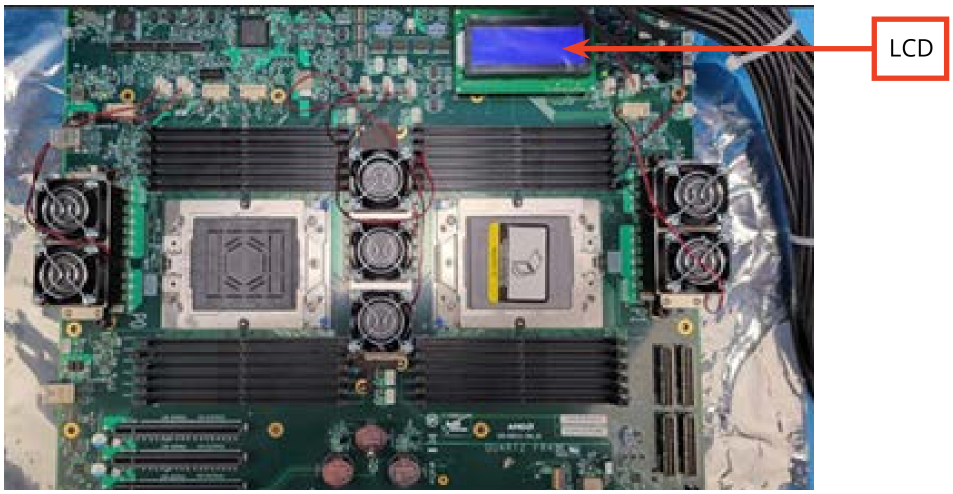
Setting up SP5 Test Board (DUT)

Careful setup is essential to achieving good results and avoiding costly errors, especially early in the development process. Prototype boards are often in short supply and test equipment can be expensive to replace. Simple protocols can avoid costly and frustrating failures. For SP5 PDN testing, an Orac-ADJ controller is required. There is 1 active modules that gets inserted into the CPU socket on the DUT

1. First, verify that the DUT is functional prior to installing LoadSlammer test tools.

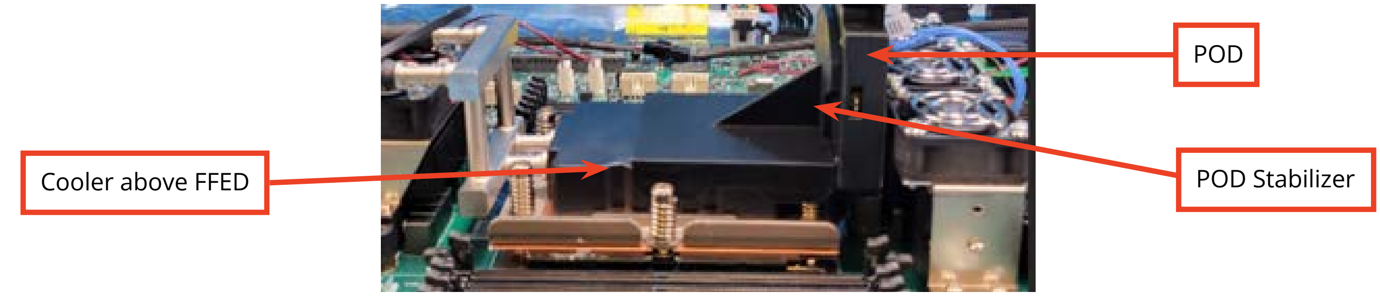
Connect power to the DUT. Verify that 2 green LEDs and blue LCD come up. Refer to AMD board instructions if LED/LCD errors are seen.

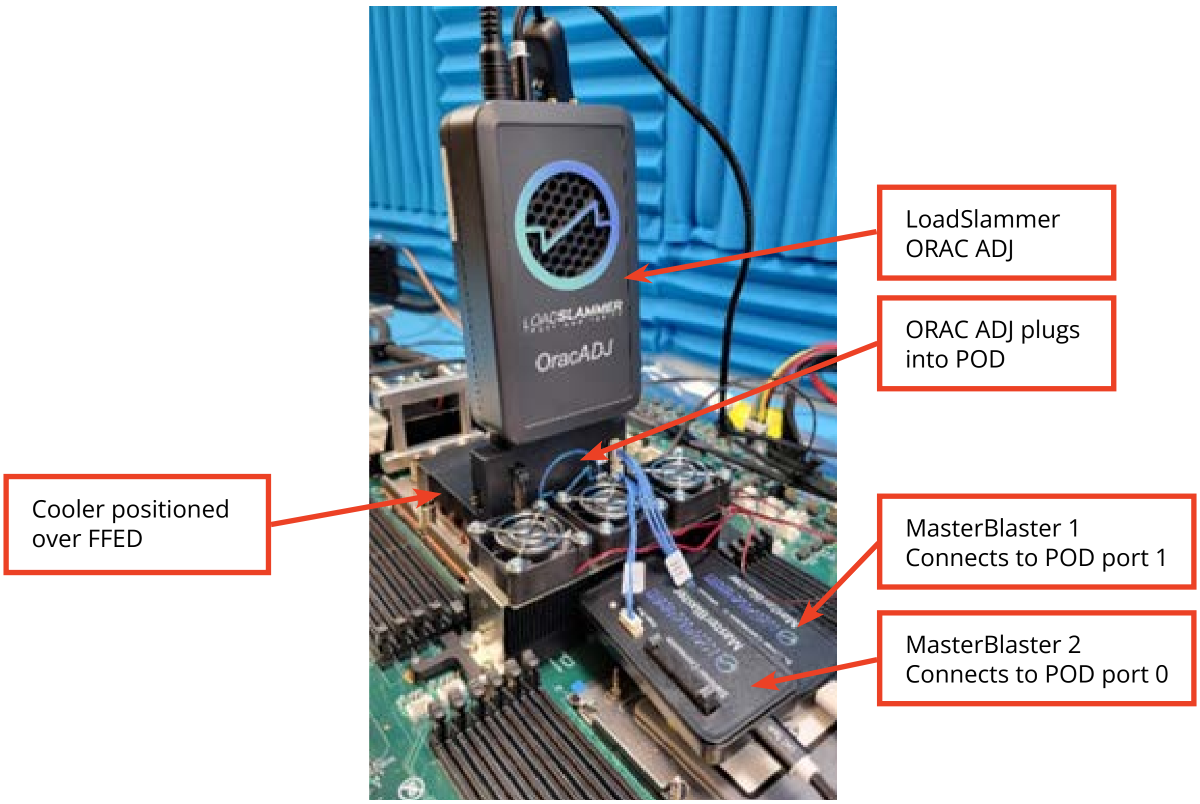




2. Installation of LoadSlammer test tools

Connect power to the DUT. Verify that 2 green LEDs and blue LCD come up.
Refer to AMD board instructions if LED/LCD errors are seen.

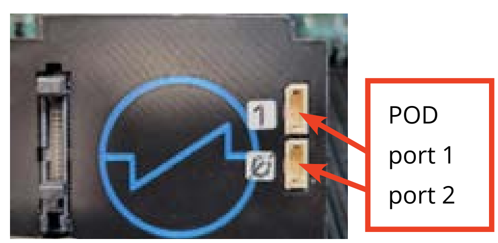




SP5 SVI Rail Mapping

Port 0	SVI0	VDDCR_CPU0 VDDCR_SOC
Port 1	SVI1	VDDCR_CPU1 VDDIO

Table 3 Master Blaster SVI connections to POD



3. Next, verify operation of the LoadSlammer

If connected correctly, Orac-ADJ LED turns green.

4. Boot the GUI and verify connection with the LoadSlammer.

After installation, start the GUI to access the Device settings window.
A web connection is necessary to boot, or an error will occur

> **If the GUI has not been installed, contact AMD for latest version**

5. Troubleshooting section.

Orac-ADJ LED colors used to indicate normal operation and any fault condition

- **Green LED** indicating that Orac-ADJ is reading the flash image from the active module
- **Blue flashing LED** indicating data transfer (slamming activated)
- **Red LED** indicating OTP event has occurred. Need to reset Orac-ADJ
- **White LED** indicating failure. Need to reset Orac-ADJ

> **In the event of an LED fault such as OTP (LED red) Power down Orac-ADJ and remove from POD. Wait 30 seconds to cool down and then reinsert Orac-ADJ into POD and turn power on.**

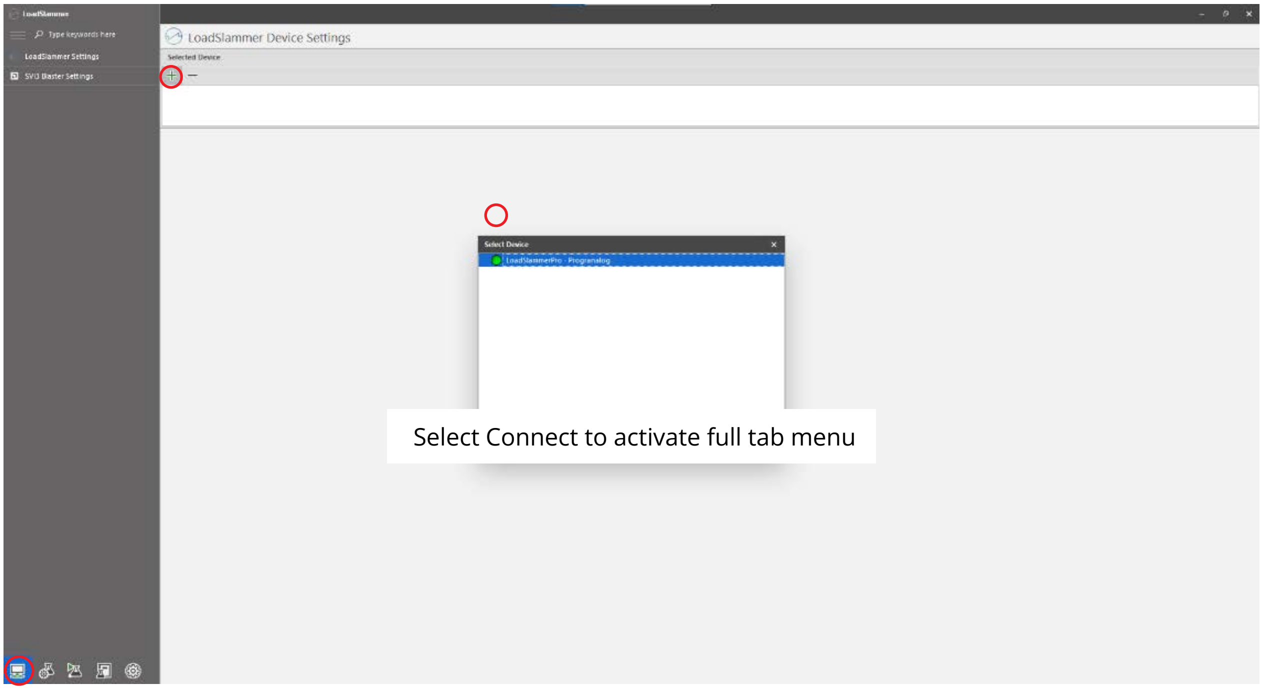
6. Updating Firmware

Updating Orac-ADJ firmware – This feature is not supported in the latest SVI3 GUI. Download the generic GUI from Download Software Run the GUI, once your device is listed, open the View menu in the top-left and select Device Management. Double click on the firmware that you wish to use, opening the Update Firmware window. Click on the flash button located on the bottom right of the window and do not disconnect device until the flash has completed.

Updating Blaster firmware – remove blaster casing and update SD card file with latest FW supplied by AMD

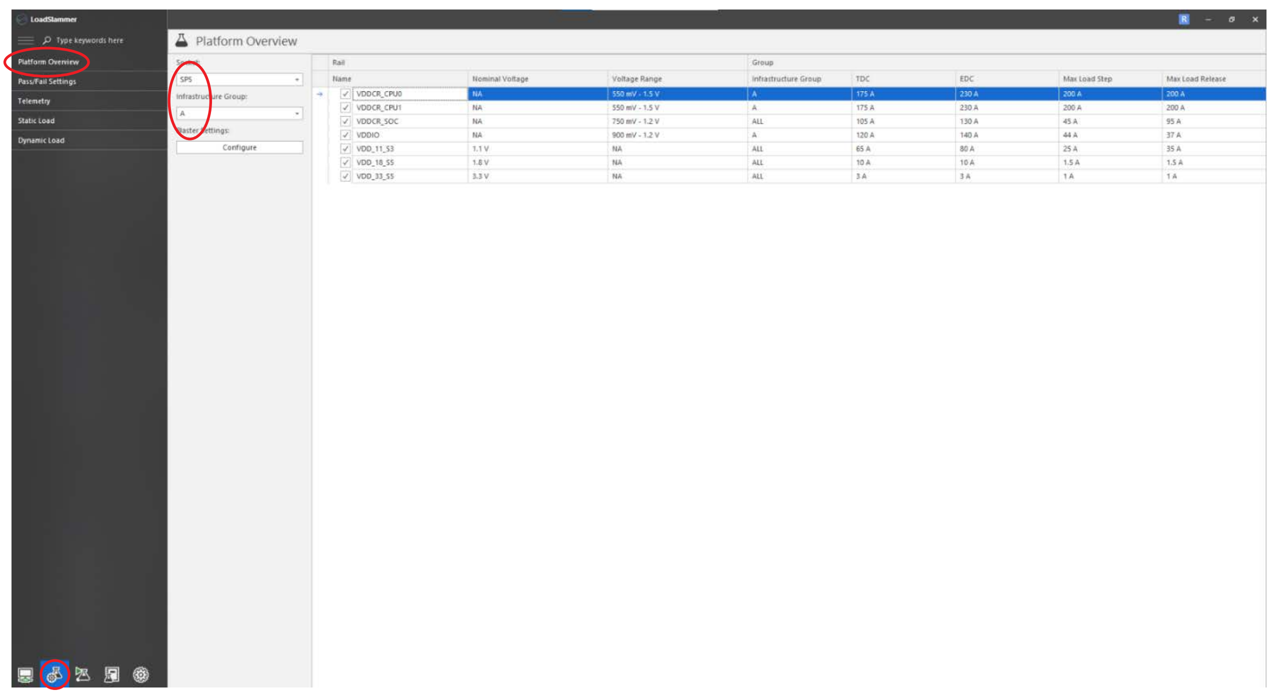
Device Settings

Select 1st tab (bottom left) and ➕ and the small pop-up window appears.

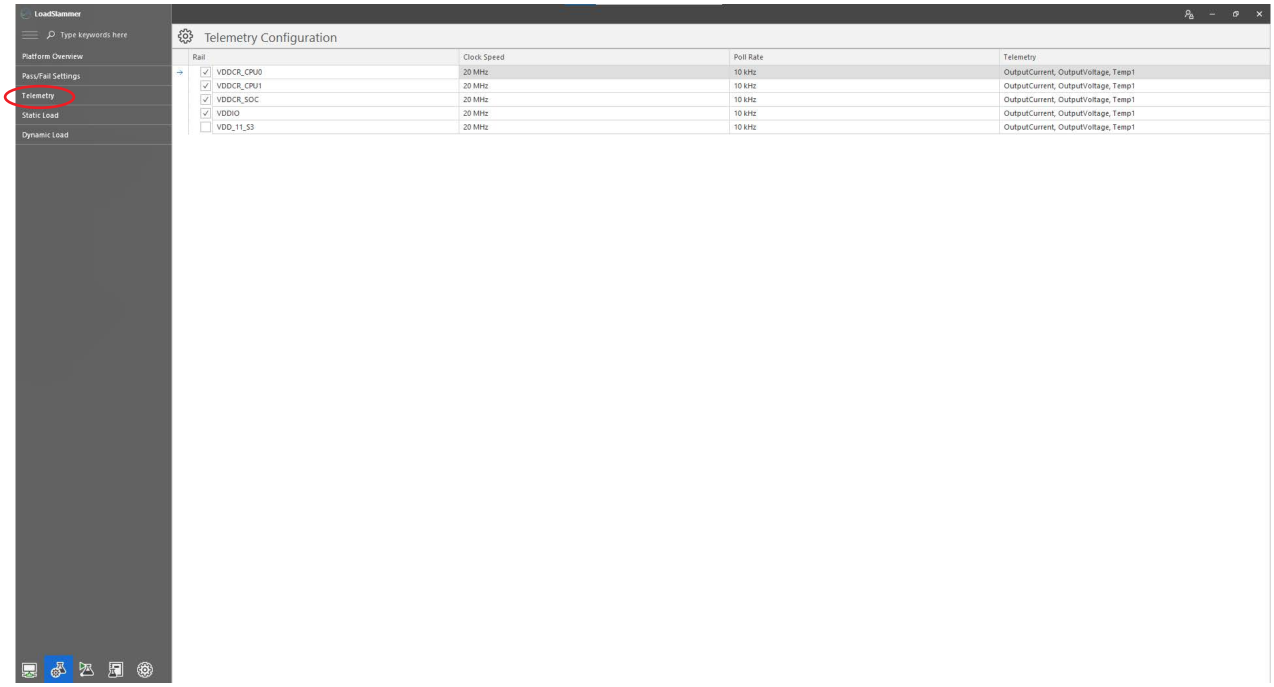


Select 2nd tab > **Platform Overview** – Select option **SP5 infrastructure group A**

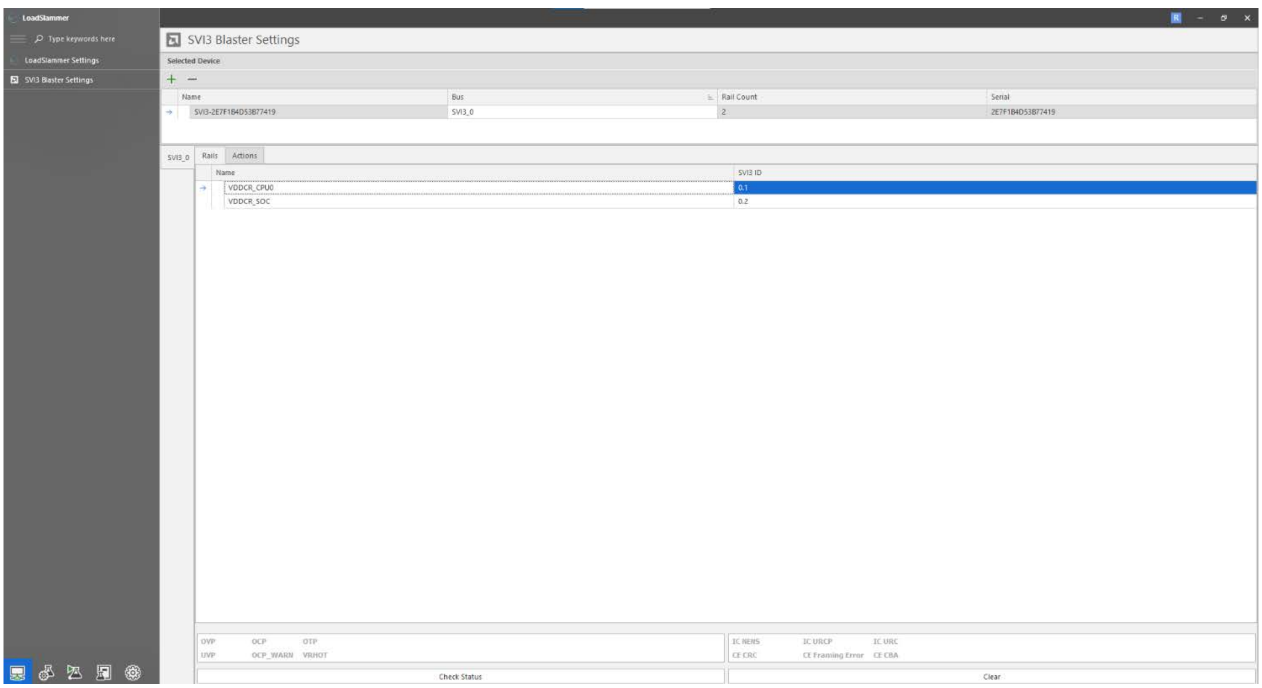
Right click anywhere in the table to toggle between Select All / Deselect All



Select 2nd tab > **Platform Overview** – Select option **Pass/Fail Settings**

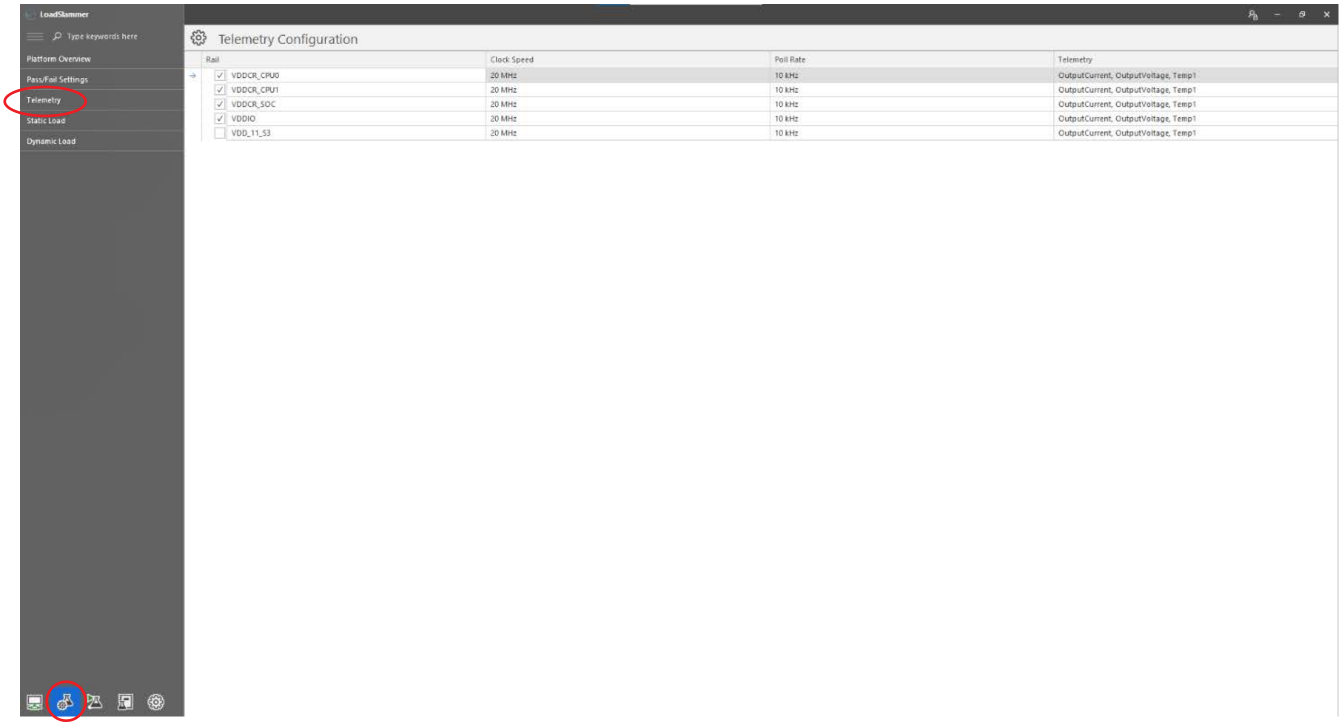


Select 1st tab > **SVI3 Blaster Settings**. This brings up the specific VRMs that are supported by the active module fitted into the DUT. GUI screenshot shows VRMs supported by POD port 0



Telemetry

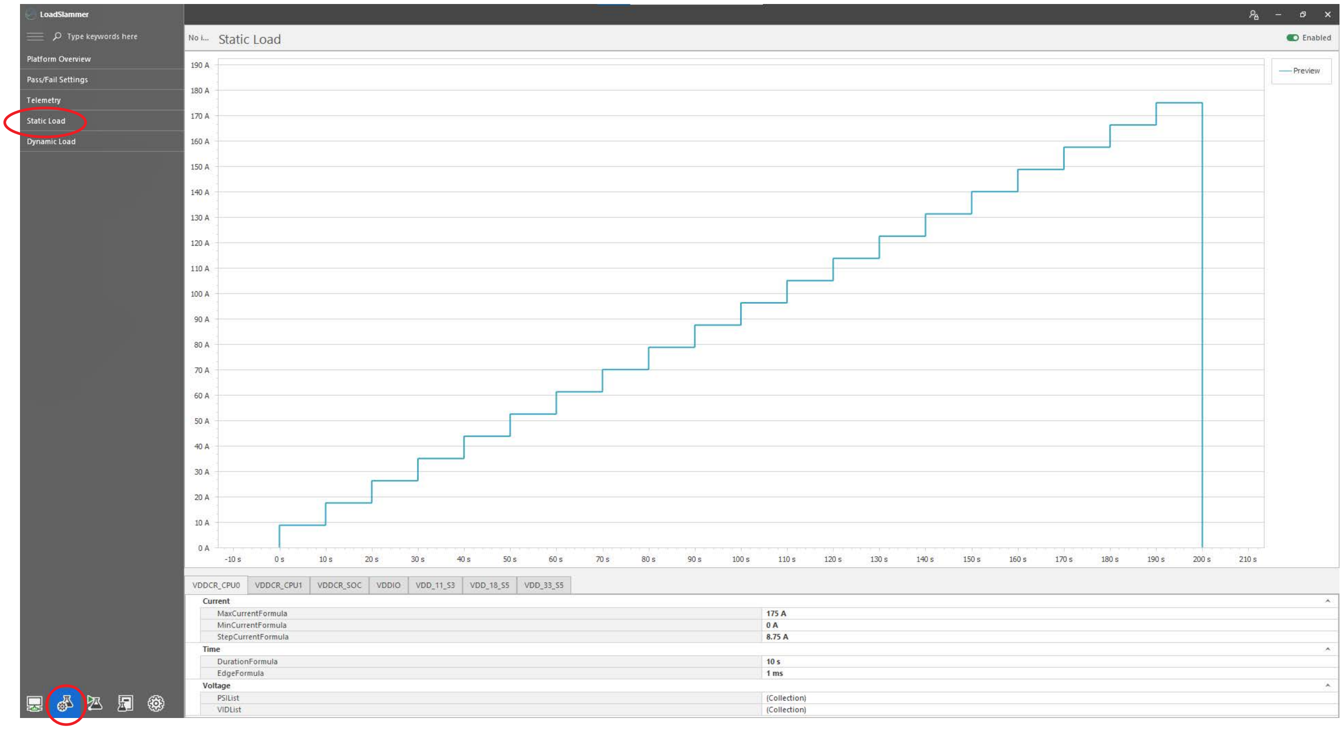
SP5 voltage rails are mapped over two SVI ports.



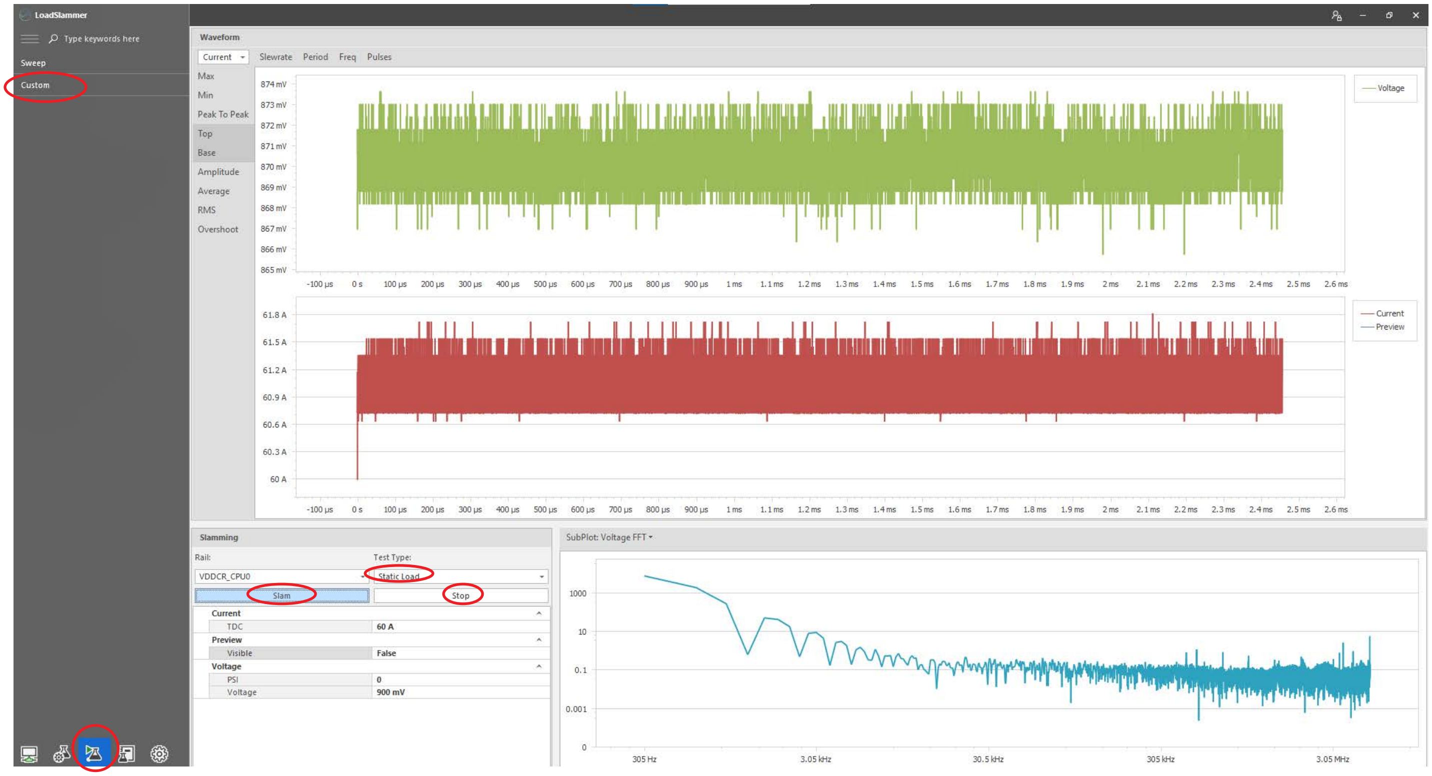
Examples

Static Load test - DC test

Configure static load test



Custom **Static Load** test - starts with selecting **slam** and runs continuously until **stop** is activated



Custom **dynamic** test - starts with selecting **slam** and runs continuously until **stop** is activated.

Selecting Sweep Mode

Prior to running the sweep review and update specific rail settings entered in **platform overview** and **pass/fail settings** (page 6)

As an example, for the following static and dynamic sweep tests, VDDCR_CPU0 was configured to

VDDCR_CPU0

Tolerance Settings:

Nominal	DC Range	Min AC	MaxAC
VID - (IDD * LL_SLOPE)	Nominal ± 0.02	VID - (EDC * LL_SLOPE) - 0.11	VID + 0.2

Marginal Range for Max: 10 %

Marginal Range for Min: 10 %

Load Line Slope: 400 μΩ

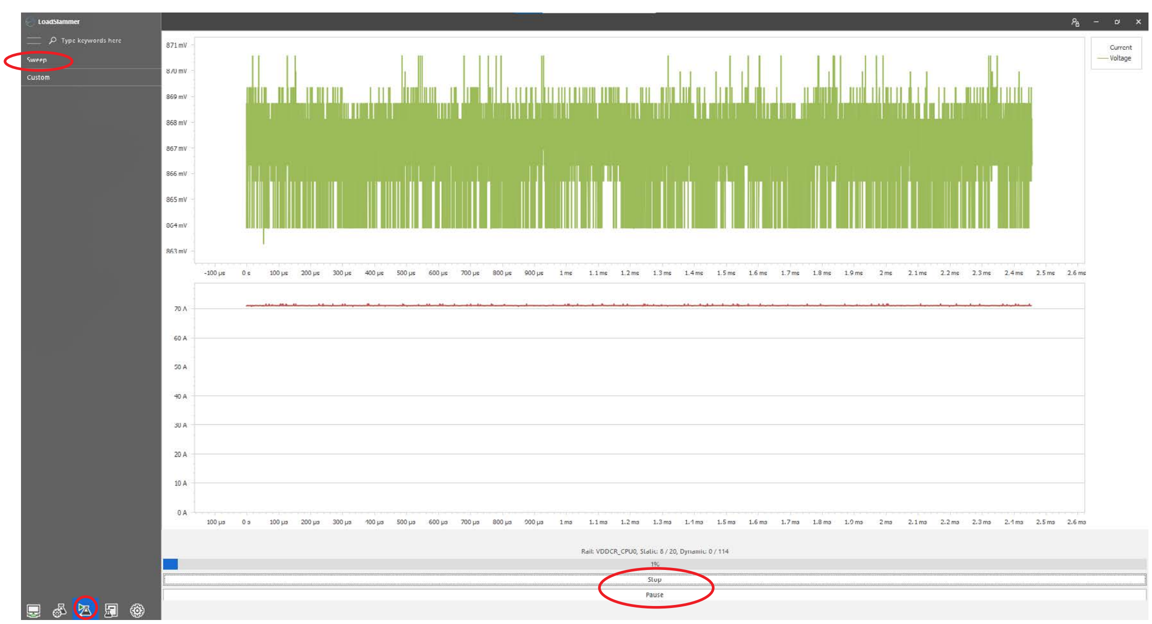
Dynamic Load Settings:

EDC:	230 A
Max Load Step:	200 A
Max Load Release:	200 A
Duration:	1 s

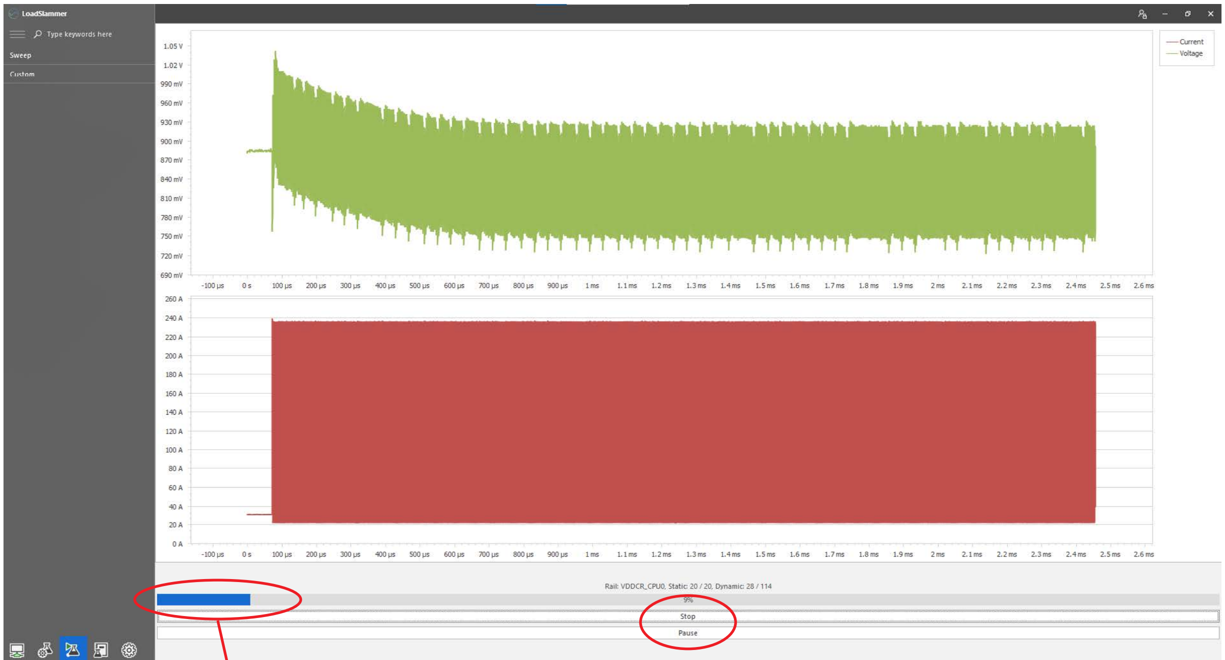
Static Load Settings:

Min Current:	0 A
Max Current:	175 A
Step Current:	8.75 A
Duration:	5 s

Example plot shown below is static load test 8 of 20 on VDDCR_CPU0 rail.
At any time during the sweep, you can pause or stop the sweep test



114 dynamic tests on VDDCR_CPU0 rail – example shown is for test 28 of 114



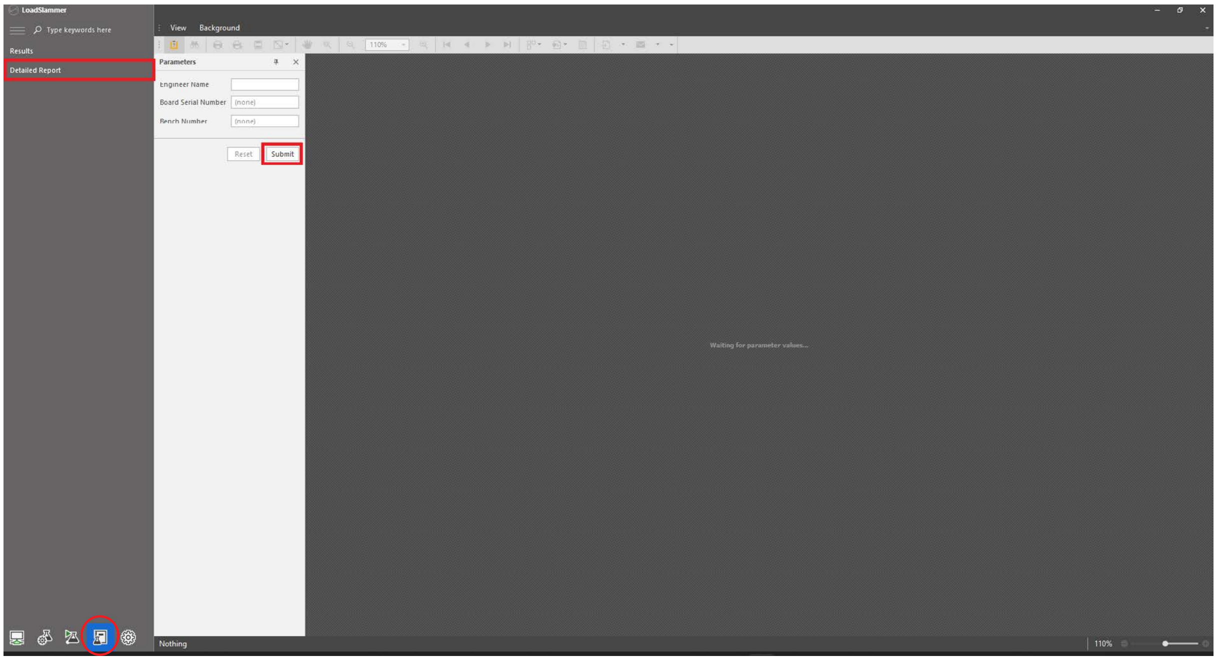
Auto sweep test
progress indicator

114 dynamic tests on VDDCR_VCPU0 rail – example shown is test 41 of 114

Test Outputs

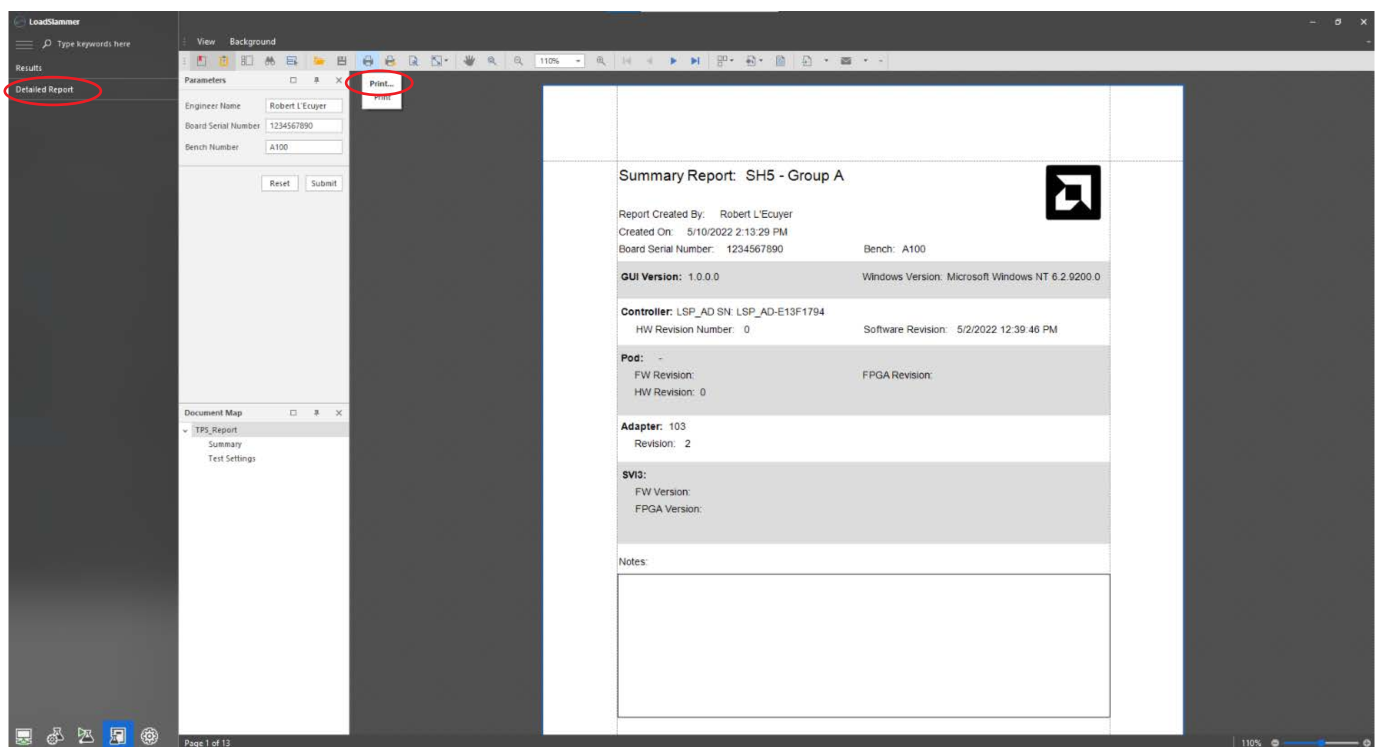
After running the sweep routine, go to the fourth tab and there are two options on the left:

- Selecting **Results** shows a summary
- Selecting **Detailed Report** and **Submit** generates the test report (PDF format)



Reports

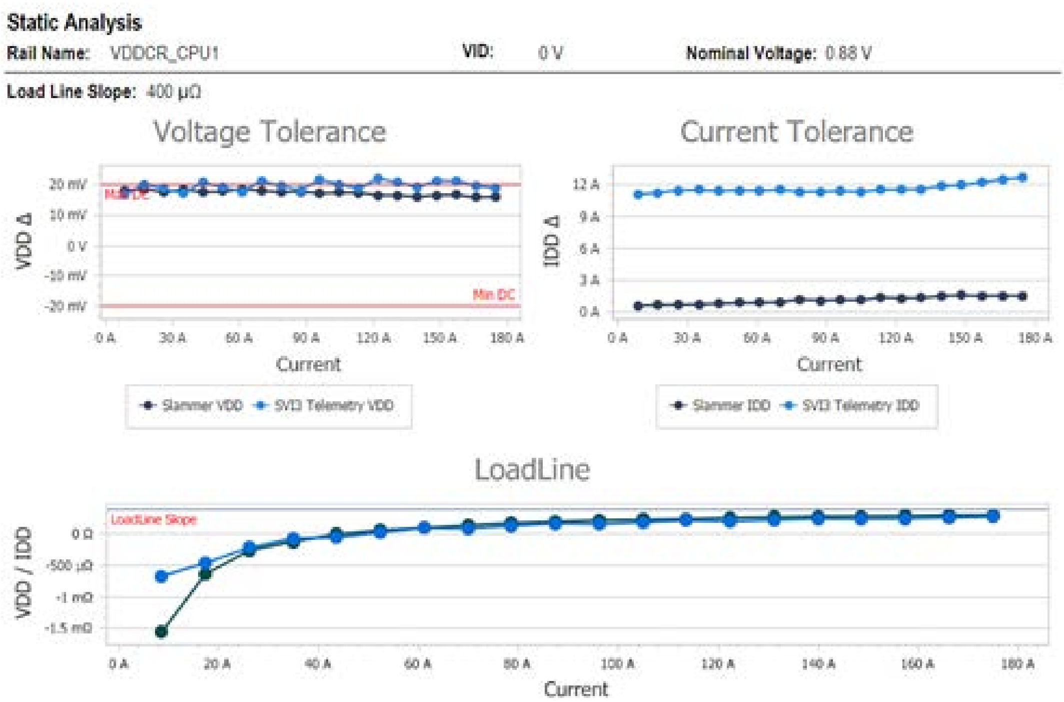
Detailed Report – select **print** icon in the task bar to print to PDF



Custom sweep of 536 tests, total test time in 15’ 24”

Summary

	Pass	Borderline	Fail	Total
VDDCR_CPU0	109	25	0	134
VDDCR_CPU1	114	20	0	134
VDDCR_SOC	134	0	0	134
VDDIO	134	0	0	134
Summary Total	92%	8%	0%	536



Dynamic Analysis:

Rail Name: VDDCR_CPU1 **VID:** 0 V **Nominal Voltage:** 0.88 V

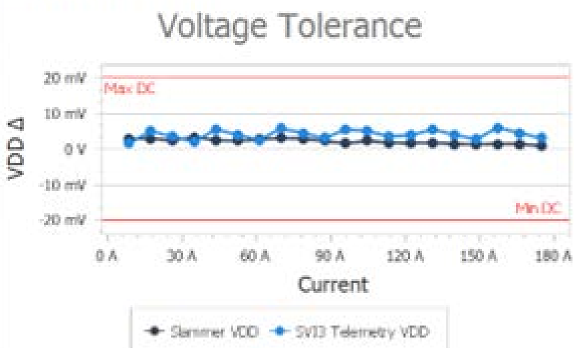
Max AC: 1.08 V **Min AC:** 0.68 V **Load Line Slope:** 400 µΩ

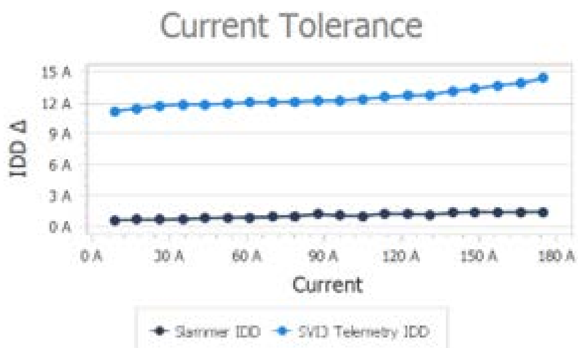
Duty	25%			50%			75%		
Frequency	RMS	Min	Max	RMS	Min	Max	RMS	Min	Max
1 kHz	859.3 mV	733.8 mV	1.0049 V	838.4 mV	735.0 mV	1.0043 V	821.5 mV	733.8 mV	1.0049 V
2 kHz	863.5 mV	733.8 mV	1.0049 V	843.1 mV	733.8 mV	1.0037 V	821.9 mV	733.8 mV	1.0037 V
3 kHz	863.2 mV	734.4 mV	1.0049 V	844.2 mV	733.8 mV	1.0037 V	824.4 mV	732.6 mV	1.0049 V
4 kHz	863.9 mV	733.8 mV	1.0055 V	843.4 mV	731.4 mV	1.0037 V	823.6 mV	730.2 mV	1.0055 V
5 kHz	864.7 mV	731.4 mV	1.0024 V	845.0 mV	730.2 mV	1.0049 V	824.6 mV	727.1 mV	1.0049 V
6 kHz	864.1 mV	732.6 mV	1.0031 V	844.3 mV	731.4 mV	1.0037 V	824.5 mV	727.1 mV	1.0037 V
7 kHz	864.6 mV	732.0 mV	1.0031 V	844.6 mV	730.2 mV	1.0037 V	823.9 mV	730.2 mV	1.0043 V
8 kHz	864.8 mV	732.0 mV	1.0024 V	845.1 mV	730.2 mV	1.0031 V	824.9 mV	727.1 mV	1.0049 V
9 kHz	864.7 mV	727.1 mV	1.0006 V	844.4 mV	730.2 mV	1.0031 V	824.4 mV	727.1 mV	1.0037 V
10 kHz	865.0 mV	730.2 mV	1.0031 V	845.2 mV	727.1 mV	1.0024 V	824.8 mV	727.1 mV	1.0049 V
20 kHz	865.1 mV	724.1 mV	1.0061 V	845.8 mV	726.5 mV	1.0031 V	824.9 mV	716.7 mV	1.0024 V
30 kHz	869.0 mV	721.6 mV	1.0073 V	844.2 mV	713.1 mV	1.0006 V	823.6 mV	731.4 mV	1.0037 V
40 kHz	865.2 mV	704.5 mV	1.0061 V	843.1 mV	702.1 mV	1.0043 V	822.7 mV	732.6 mV	1.0006 V
50 kHz	876.0 mV	716.1 mV	987.8 mV	852.6 mV	707.0 mV	1.0073 V	823.2 mV	732.6 mV	1.0031 V
60 kHz	876.2 mV	717.3 mV	975.6 mV	852.5 mV	722.2 mV	1.0061 V	824.8 mV	733.8 mV	1.0006 V
70 kHz	875.5 mV	722.8 mV	968.3 mV	852.0 mV	727.1 mV	1.0085 V	833.8 mV	732.6 mV	1.0037 V
80 kHz	875.6 mV	724.1 mV	968.3 mV	857.7 mV	735.0 mV	1.0006 V	829.7 mV	733.8 mV	1.0037 V
90 kHz	873.2 mV	727.1 mV	956.0 mV	857.5 mV	736.3 mV	996.3 mV	831.5 mV	732.0 mV	1.0024 V
100 kHz	875.2 mV	725.3 mV	969.5 mV	856.0 mV	735.0 mV	996.3 mV	835.7 mV	736.3 mV	1.0049 V
120 kHz	872.4 mV	731.4 mV	951.8 mV	859.0 mV	733.8 mV	987.8 mV	827.6 mV	735.0 mV	1.0000 V
140 kHz	869.9 mV	733.8 mV	951.8 mV	853.8 mV	736.3 mV	976.2 mV	823.7 mV	733.8 mV	993.3 mV
160 kHz	869.7 mV	727.1 mV	961.5 mV	855.8 mV	736.9 mV	990.2 mV	826.3 mV	736.3 mV	990.2 mV
180 kHz	872.5 mV	724.1 mV	981.1 mV	856.4 mV	736.3 mV	990.2 mV	831.4 mV	733.8 mV	989.0 mV
200 kHz	870.6 mV	717.3 mV	984.1 mV	857.2 mV	735.0 mV	987.8 mV	827.8 mV	735.0 mV	978.6 mV
220 kHz	870.8 mV	722.8 mV	998.2 mV	858.7 mV	735.0 mV	988.4 mV	828.9 mV	733.8 mV	978.0 mV

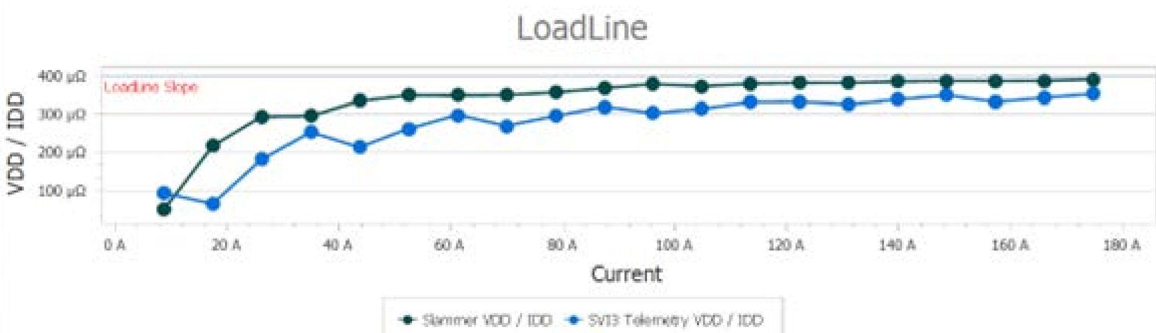
Static Analysis

Rail Name: VDDCR_CPU0 **VID:** 0 V **Nominal Voltage:** 0.89 V

Load Line Slope: 400 µΩ







Static Analysis

Rail Name: VDDCR_CPU0 **VID:** 0 V **Nominal Voltage:** 0.89 V

Load Line Slope: 400 µΩ

			VOUT			IOUT		
I_Load (A)	Max DC	Min DC	V	VMax	VMin	I	I_Max	I_Min
Slammer - 8.75 A	908.4 mV	868.4 mV	891.4 mV	895.6 mV	887.1 mV	9.42 A	10.44 A	8.97 A
SVI3 - 8.75 A			890.0 mV	895.0 mV	890.0 mV	19.94 A	21.50 A	18.50 A
Slammer - 17.5 A	904.9 mV	864.9 mV	887.9 mV	893.2 mV	883.4 mV	18.20 A	18.86 A	17.49 A
SVI3 - 17.5 A			890.0 mV	890.0 mV	890.0 mV	28.97 A	30.00 A	27.50 A
Slammer - 26.25 A	901.4 mV	861.4 mV	883.9 mV	890.1 mV	879.1 mV	26.94 A	27.01 A	25.55 A
SVI3 - 26.25 A			885.0 mV	885.0 mV	885.0 mV	37.94 A	39.00 A	36.50 A
Slammer - 35 A	897.9 mV	857.9 mV	881.3 mV	887.7 mV	876.7 mV	35.76 A	36.45 A	35.16 A
SVI3 - 35 A			880.0 mV	880.0 mV	880.0 mV	46.85 A	48.00 A	45.50 A
Slammer - 43.75 A	894.4 mV	854.4 mV	877.0 mV	881.6 mV	873.0 mV	44.58 A	45.60 A	44.14 A
SVI3 - 43.75 A			880.0 mV	880.0 mV	875.0 mV	55.58 A	57.00 A	54.50 A
Slammer - 52.5 A	890.9 mV	850.9 mV	873.2 mV	877.3 mV	870.6 mV	53.40 A	54.12 A	52.93 A
SVI3 - 52.5 A			875.0 mV	875.0 mV	875.0 mV	64.41 A	65.50 A	63.00 A
Slammer - 61.25 A	887.4 mV	847.4 mV	870.2 mV	876.7 mV	866.3 mV	62.18 A	63.19 A	61.81 A
SVI3 - 61.25 A			870.0 mV	870.0 mV	870.0 mV	73.29 A	74.50 A	72.00 A
Slammer - 70 A	883.9 mV	843.9 mV	867.0 mV	870.6 mV	863.2 mV	70.96 A	71.61 A	70.51 A
SVI3 - 70 A			869.7 mV	870.0 mV	865.0 mV	82.07 A	83.50 A	80.50 A
Slammer - 78.75 A	880.4 mV	840.4 mV	863.4 mV	868.1 mV	859.6 mV	79.80 A	80.77 A	79.30 A
SVI3 - 78.75 A			865.0 mV	865.0 mV	865.0 mV	90.88 A	92.50 A	89.50 A
Slammer - 87.5 A	876.9 mV	836.9 mV	859.2 mV	863.9 mV	854.1 mV	88.72 A	89.56 A	88.10 A
SVI3 - 87.5 A			860.0 mV	860.0 mV	860.0 mV	99.71 A	101.00 A	98.50 A
Slammer - 96.25 A	873.4 mV	833.4 mV	855.0 mV	860.2 mV	851.0 mV	97.35 A	98.35 A	96.61 A

Static Analysis

Rail Name: VDDCR_CPU0 **VID:** 0 V **Nominal Voltage:** 0.89 V

Load Line Slope: 400 µΩ

			VOUT			IOUT		
I_Load (A)	Max DC	Min DC	V	VMax	VMin	I	I_Max	I_Min
SVI3 - 96.25 A			859.0 mV	860.0 mV	855.0 mV	108.46 A	110.00 A	107.00 A
Slammer - 105 A	869.9 mV	829.9 mV	852.3 mV	858.4 mV	848.6 mV	106.07 A	106.78 A	105.49 A
SVI3 - 105 A			855.0 mV	855.0 mV	855.0 mV	117.38 A	119.00 A	116.00 A
Slammer - 113.75 A	866.4 mV	826.4 mV	848.2 mV	852.9 mV	844.3 mV	115.03 A	115.93 A	114.29 A
SVI3 - 113.75 A			850.0 mV	850.0 mV	850.0 mV	126.30 A	128.00 A	125.00 A
Slammer - 122.5 A	862.9 mV	822.9 mV	844.6 mV	849.8 mV	841.3 mV	123.75 A	124.45 A	123.26 A
SVI3 - 122.5 A			846.9 mV	850.0 mV	845.0 mV	135.17 A	136.50 A	134.00 A
Slammer - 131.25 A	859.4 mV	819.4 mV	841.2 mV	844.3 mV	836.4 mV	132.45 A	133.15 A	131.78 A
SVI3 - 131.25 A			845.0 mV	845.0 mV	845.0 mV	144.04 A	145.50 A	142.50 A
Slammer - 140 A	855.9 mV	815.9 mV	837.4 mV	841.3 mV	833.9 mV	141.35 A	142.12 A	140.48 A
SVI3 - 140 A			840.0 mV	840.0 mV	840.0 mV	153.15 A	154.50 A	151.50 A
Slammer - 148.75 A	852.4 mV	812.4 mV	833.8 mV	838.8 mV	829.1 mV	150.21 A	150.82 A	149.63 A
SVI3 - 148.75 A			835.2 mV	840.0 mV	835.0 mV	162.11 A	163.50 A	160.50 A
Slammer - 157.5 A	848.9 mV	808.9 mV	830.4 mV	834.6 mV	824.8 mV	158.92 A	159.62 A	158.15 A
SVI3 - 157.5 A			835.0 mV	835.0 mV	835.0 mV	171.19 A	173.00 A	170.00 A
Slammer - 166.25 A	845.4 mV	805.4 mV	826.9 mV	831.5 mV	821.7 mV	167.70 A	168.41 A	166.94 A
SVI3 - 166.25 A			830.0 mV	830.0 mV	830.0 mV	180.15 A	181.50 A	179.00 A
Slammer - 175 A	841.9 mV	801.9 mV	822.9 mV	824.8 mV	819.3 mV	176.46 A	177.47 A	175.82 A
SVI3 - 175 A			825.0 mV	825.0 mV	825.0 mV	189.38 A	190.50 A	188.00 A

Reaping the Benefits

Besides simply being able to test voltage regulator performance per a specification, there are additional ways to benefit from using LoadSlammers with a suite of tests.

- **Reduced development and debugging time from automated testing.**
- **Faster optimization, enabling smaller output filtering, saving cost and board space.**
- **Easier testing and documentation over a wide range of electrical and environmental conditions for a more robust design.**
- **Manufacturing testing to verify and document performance of individual boards and fixtures for future reference, increasing production yield.**
- **Verifying board performance over time as components degrade.**
- **Debugging field returns.**
- **Reduced heat and power consumption.**

Summary

Fast transient load testers provide unique, large signal testing capabilities for qualifying high performance board level power converters. This capability can yield multiple reliability, cost, and time benefits for boards and systems.

LOADSLAMMER
TRUST AND VERIFY