Shock and Vibration Test Report
GEODE-OSB and GEODE-JSP Systems

May 13, 2024

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1 Introduction

This document provides a test report for shock and vibration tests performed on Geode-OSB and Geode-JSP rugged systems. The tests reported here were conducted on April 18, 2024 at Envitest Laboratories in Bangalore Electronics City, India: https://www.envitestlab.com/about-us/

- MIL-STD-810H_CONSOLIDATED_31JAN2019.pdf

The specific test methods used for this test are as follows:

Reference test Standard	MIL-STD-810H
Random vibration	Method 514.8, Table 514.8 C-VII, Category 4 Tested at x, y, z axes and envelope 40 Minutes per axis @ 2.24 Grms
Shock	Method 516.8, tested at x, y, z axes and envelope Terminal peak saw tooth, 40G, 11mSec 3 shocks/direction

2   Geode-OSB Test Sample Configuration

2.1   Configuration

Following describes the test configuration as well as the test sample details of Geode Osbourne system which is tested for shock and vibration test:

System Name	Boards/Modules list	Location	Part No.	Serial No.	Rev
Geode Osbourne P/N: **GEODE-OSB** SN# **E324305**	Osbourne Carrier Board	Fitted on enclosure top plate of the system	**OSB-BB01 Rev B**	P300144	B
	Osbourne Rugged Panel IO Board	Fitted on enclosure side wall and connected to Osbourne carrier board	**OSB-PNLR02 Rev A**	D889508	A
	PCIe Mini card 1	Mini card Socket 1 (J12) on Osbourne carrier board	**DS-MPE-SER4M Rev A**	W577289	A
	Nvidia Jetson AGX Orin 32GB Module	Attached on Osbourne carrier board	900-13701-0040-000**	1422822061283	NA
	M.2 PCIe SSD Module 512GB	Connected to M.2 Socket on Osbourne carrier board	TS512GMTE710T-I**	H80690-0009	NA

Note:

** Third party items

DSC products part numbers are shown in bold letters.

Geode-OSB is a Jetson AGX Orin module-based rugged system with rich graphics and camera input capability. The system incorporates standard D38999 Series III connectors and MIL Grade High Speed Rugged Circular connectors for accessing the interfaces. The Geode Osbourne system converts Jetson AGX Orin module into a complete rugged system by providing interface circuitry, I/O connector for all the major features of the module, camera interface, power supply and additional I/O capability.

DS-MPE-SER4M Serial minicard is inserted on the minicard slots.
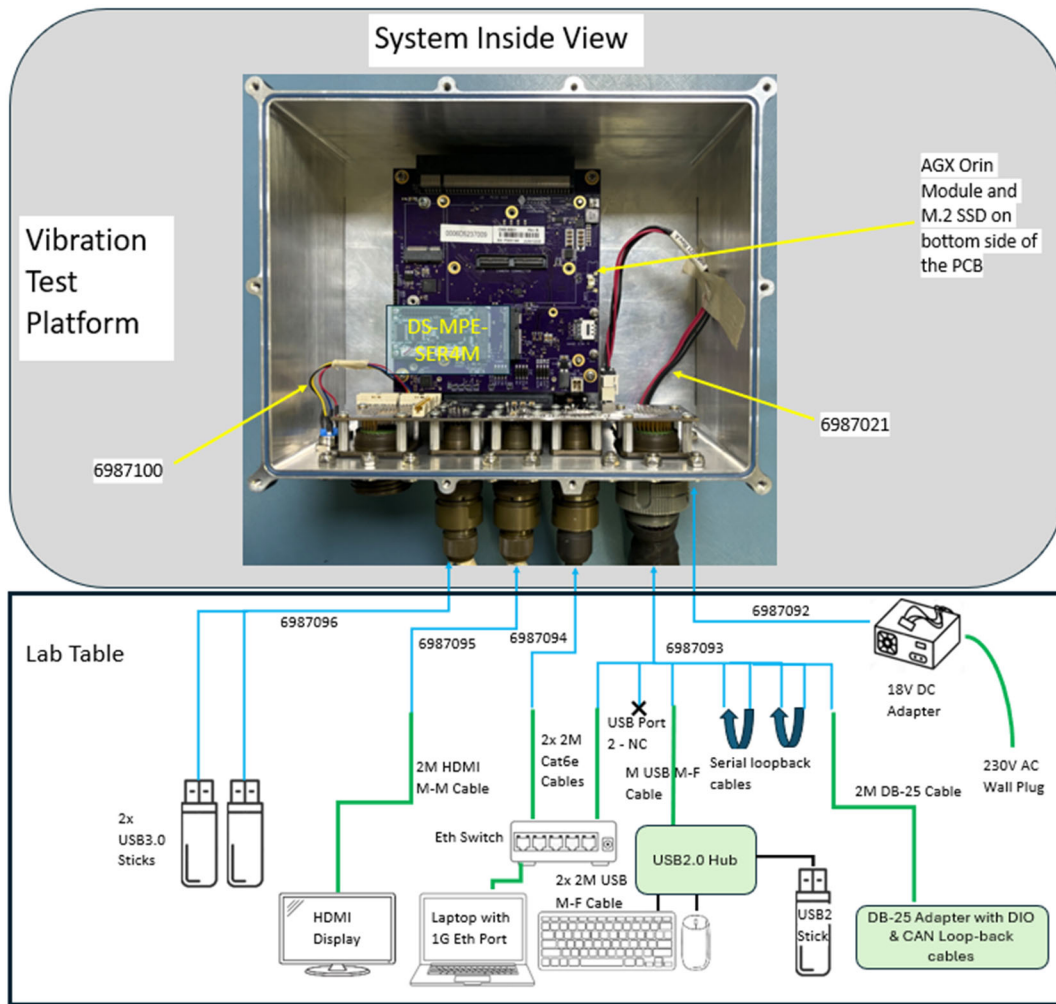
2.2 Test Fixture Block Diagram

Figure 1: Geode Osbourne S&V Test Fixture

The following interfaces/ports were tested on the GEODE-OSB system during the shock and vibration test:

- 1G & 10G Ethernet Ports – connected to Laptop port through Ethernet Switch using 2m long Cat6e cables
- 2x USB3.2 ports – USB3.0 memory sticks were connected directly to the connector on cable assembly. No USB extension cables were used.
- 2x USB2.0 ports – USB2.0 memory stick and USB mouse were connected to port0 on cable assembly through USB2.0 switch 2M length USB Male-Female extension cable. USB keyboard is attached to the Port1 through 2M length USB Male-Female extension cable.
- CAN Ports – CAN port 0 is looped back to can port 1 on DB25 expansion PCB. The PCB is attached to the DB-25 port using 2M length DB-25 Male – Female extension cable.
- DIO Ports – On board DIO ports were looped back to one another on DB25 expansion PCB
- Serial Ports – Serial ports 1 is looped back to Port 2 and Port 3 is looped back with Port 4. Loop-back is done using DB9 loop-back cable.
- Minicard 1 - DS-MPE-SER4M module is connected to Minicard 1 slot. Serial loop-back cable is connected on Serial port 1 and port 2 on the DS-MPE-SER4M card.
- M.2 PCIe SSD port – 512GB SSD module is attached to the M.2 port
- Nvidia Jetson AGX Orin 32GB Module is attached to the Osbourne carrier board
- HDMI Port – HDMI cable is connected to the display through KVM switch using 2m HDMI Male-Male cable.
- The system is powered by 18V AC-DC adapter.

2.3 System Preparation before the Test

The following section details the modifications done on the Osbourne carrier board as well as the rugged IO board.

2.3.1 Geode Osbourne Carrier Board

2.3.1.1 Jumper Block JP1

Geode Osbourne provides optional termination resistors for RS422 and RS485 protocols. JP1 jumpers are not loaded by default. So, no rework was done regarding JP1 jumper.

2.3.1.2 Jumper Block JP2

Jumper block JP2 configures the Voltage level for Digital IO and Pull up/down. Digital IO voltage of 3.3V is selected and pulled down is enabled on DIO lines.

PIN	Function	Desired settings	Rework done
PINS_1-2	V_3P3/5P0 = 5V	OUT	None
PINS_3-4	V_3P3/5P0 = 3.3V	IN	Mounted R244
PINS_5-6	V_PU/PD_DIOA = PU	OUT	None
PINS_7-8	V_PU/PD_DIOA = PD	IN	Mounted R245

2.3.1.3 Jumper Block JP3

Osbourne has jumper block JP3 to select the features such as X16 PCIe or Minicard, Config#1 or 2, WOL enable / disable, and Auto power enable /disable.

PIN	Function	Desired settings	Rework done
PINS_1-2	X16 PCIE -> MINICARD 1	IN	Mounted R369
PINS_3-4	CONFIG 2 -> CONFIG 1	IN	Mounted R368
PINS_5-6	WOL EN -> WOL DIS	IN	Mounted R367
PINS_7-8	AUTO PWR DIS->AUTO PWR EN	IN	Mounted R366

2.3.1.4 Complete reworks done on Osbourne carrier board:

1. Removed JP2, JP3 Jumper connectors.
2. Mounted R244, R245, R366, R367, R368, R369 with 0E 0603 resistors.
3. Removed BAT1 connector.

2.3.2 Osbourne Rugged IO Board

2.3.2.1 Complete reworks done on Osbourne Rugged IO board:

1. Removed BAT1 connector.

3 Geode-JSP Test Sample Configuration

Geode Jasper is a rugged system with COM Express carrier board and rugged IO board with MIL grade connectors. Jasper carrier board supports Type 6 Basic (125x95mm) and Compact (95x95mm) modules. It is designed for applications that require ruggedness, a high level of I/O, or extended product lifetime. Winsystems COM comet6-1100 module is mounted on Jasper baseboard. DS-MPE-SER4M Serial minicard and DS-MPE-GPIO GPIO minicards were inserted on the minicard slots. The system is powered from the JMM-7515-IF power module.

3.1 Test Configuration

The following describes the test configuration as well as the test sample details of Geode Jasper system which is tested for shock and vibration test:

System Name	Boards/Modules list	Location	Part No.	Serial No.	Rev
Geode Jasper P/N: **GEODE-JSP** SN# **E324306**	Jasper COM Carrier Board	Fitted on enclosure top plate of the system	**JSB-BB02D Rev A**	P300526	A
	Jasper Rugged Panel IO Board	Fitted on enclosure side wall and connected to Jasper carrier board	**JSP-PNLR02A Rev A**	D889509	A
	PCIe Mini card 1	Mini card 1 Socket on Jasper carrier board	**DS-MPE-SER4M Rev A**	W577284	A
	PCIe Mini card 2	Mini card 2 Socket on Jasper carrier board	**DS-MPE-GPIO Rev A**	P120232	A
	Winsystems COM Module with Intel® Core™ i7-1185GRE Processor	Fitted on Jasper carrier board	COMET6-1185GRE-32IL**	2308168286	NA
	M.2 SATA SSD Module 240GB	M.2 socket on Jasper carrier board	SA400M8/240G**	50026B768536CD89	NA
	Power Supply Module	Fitted on bottom plate of the enclosure and connected to Jasper carrier board	**JMM-7515-IF Rev A**	W575704	A

** Third party items

DSC products part numbers are shown in bold.
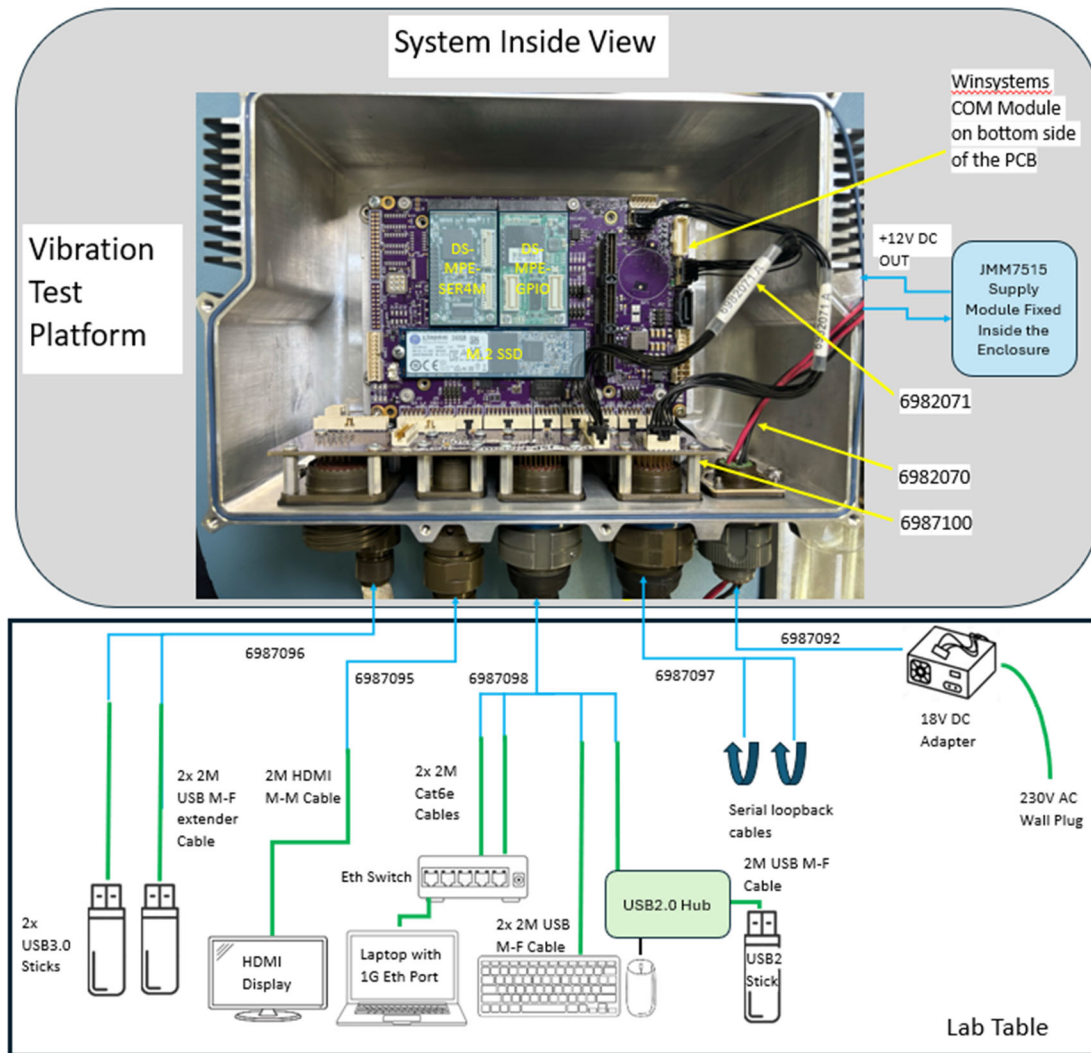
3.2 Test Fixture Block Diagram

Figure 2: Geode Jasper S&V Test Fixture

The following interfaces/ports were tested on the GEODE-JSP system during the shock and vibration test:

- Dual 1G Ethernet Ports – connected to the 1G Ethernet Switch using Cat6e cables of 2m length
- 2x USB3.2 ports – USB3.0 memory sticks were connected directly to the connector on geode cable assembly through USB3.0 Male-Female extension cables of 2m length.
- 2x USB2.0 ports – USB2.0 memory stick and USB mouse were connected to port0 on cable assembly through USB2.0 switch 2M length USB Male-Female extension cable. USB keyboard is attached to the Port1 through 2M length USB Male-Female extension cable.
- Serial Ports – loop-back is done on serial ports 1 and Port 2. DB-9 loop-back adapter is used for this purpose.
- M.2 SATA SSD Port – 240GB SATA SSD module with Windows 11 OS is attached to the M.2 slot. The system boots from this SSD device.
- Minicard slot 1: DS-MPE-SER4M module is connected to minicard 1 slot. Serial loop-back cable is connected on Serial port 1 and port 2 on the DS-MPE-SER4M card.
- Minicard slot 2: DS-MPE-GPIO module is connected to minicard 2 slot. DIO loop-back cable is connected on the DS-MPE-GPIO module connector.
- Winsystems COM Module with Intel® Core™ i7-1185GRE Processor is installed on the Jasper COM carrier board.
- HDMI Port – HDMI cable is connected to the display through KVM switch using 2m length HDMI Male-Male cable.
- Power supply - JMM-7515-IF power module is used to power the Geode Jasper system. The power module is modified to provide 12V output.
- Primary power to the system is 18V DC from AC-DC adapter.

3.3 System Preparation before the Test

The following section details the modifications done on the Jasper carrier boards as well as the rugged IO board.

3.3.1 Geode Jasper COM Carrier Board

3.3.1.1 Jumper Block JP1

JP1 Jumpers are provided to set the base address of the FPGA.

Not available in 8242211 and 8242210 model. So, no rework is done regarding this jumper.

3.3.1.2 Jumper Block JP2

JP2 Jumpers are provided to select the voltage level of the LVDS display and backlight.

AUO M215HTN01.1 dual channel LVDS display supports 12V backlight with 5V VDD power settings.

Position	Function	IN	OUT	Desired settings	Rework done
12V	LCD Backlight Voltage	12V*	-	IN	Mounted R268
5V	LCD Backlight Voltage	5V	-	OUT	None
5V	LCD VDD Voltage	5V	-	IN	Mounted R283
3V3	LCD VDD Voltage	3.3V*	-	OUT	None

3.3.1.3 Jumper Block JP3

JP3 Jumpers are provided to select the configuration pins of the FPGA, USB interface and Power IN option. USB interface from COMe Type AB connector is multiplex to mPCIe and PCIe/104 connector. Board can be powered with 18V-36V wide input or 12V fixed supply.

Position	Function	IN	OUT	Desired settings	Rework done
U0	FPGA Config 0	TBD	*TBD**	*OUT*	*None*
U1	FPGA Config 1	TBD	*TBD**	*OUT*	*None*
USB	USB SEL	Minicard	*PCIe104**	*OUT*	*None*
12VIN	Wide Input SEL	12V Fixed	*Wide Input**	*OUT*	*None*

3.3.1.4 Jumper Block JP4

JP4 Jumpers are provided to select the mode of serial ports 1, 2, 3 & 4. SC0 and SC1 jumpers are used to select mode for serial ports 1 & 2 and SC2 and SC3 jumpers are used to select mode for serial ports 3 & 4.

Position	Port	RS232	RS485	RS422	Internal Loop	Rework done
SC0	1&2	IN*	OUT	OUT	IN	Mounted R354
SC1	1&2	OUT*	IN	OUT	IN	None
SC2	3&4	IN*	OUT	OUT	IN	Mounted R352
SC3	3&4	OUT*	IN	OUT	IN	None

3.3.1.5 Jumper Block JP5

JP5 Jumpers are provided to select the voltage level and Pullup/pull down configuration of the DIO. By default, the DIOs are 3.3 Voltage and pulled down. This jumper is not available in 8242211 and 8242210 model. So, no rework is required.

3.3.1.6 Jumper Block JP6

JP6 Jumpers Configuration is provided to enable and disable the termination of serial ports3-4.

Position	Function	IN	OUT	Desired settings	Rework done
TX3	Serial Port3 TX Termination	Enabled	Disabled*	OUT	None
RX3	Serial Port3 RX Termination	Enabled	Disabled*	OUT	None
TX4	Serial Port4 TX Termination	Enabled	Disabled*	OUT	None
RX4	Serial Port4 RX Termination	Enabled	Disabled*	OUT	None

3.3.1.7 Jumper Block JP7

JP7 Jumpers Configuration is provided to enable and disable the termination of serial ports1-2.

Position	Function	IN	OUT	Desired settings	Rework done
TX1	Serial Port1 TX Termination	Enabled	Disabled*	OUT	None
RX1	Serial Port1 RX Termination	Enabled	Disabled*	OUT	None
TX2	Serial Port2 TX Termination	Enabled	Disabled*	OUT	None
RX2	Serial Port2 RX Termination	Enabled	Disabled*	OUT	None

3.3.1.8 Complete reworks done on Jasper:

1. Removed JP2, JP3, JP4, JP6, JP7 Jumper connectors.
2. Mounted R268, R283, R354, R352 with 0E 0603 resistors.
3. Removed BAT1 connector.

3.3.2 Jasper Rugged IO Board

3.3.2.1 Epoxy Adhesive on Jasper Rugged IO board:

As a standard practice during production, DP460 Epoxy adhesive is applied on L1, L2, L3 and L4 Common Mode Chokes.
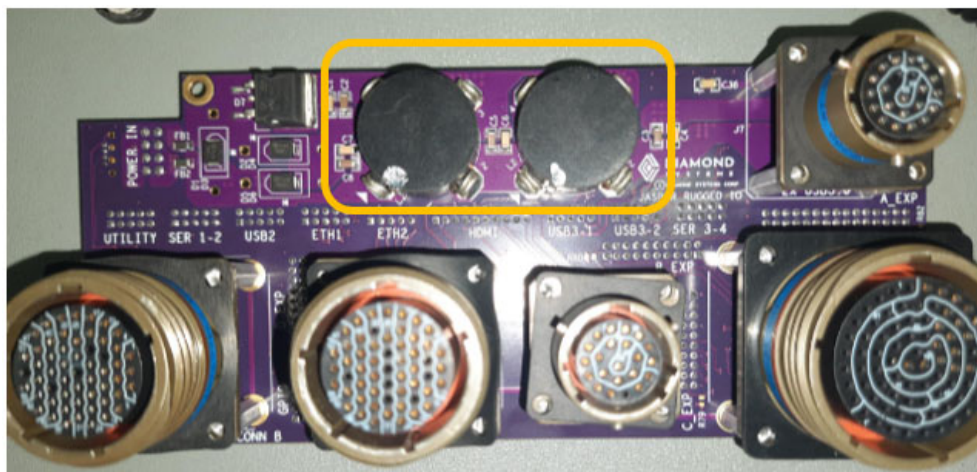

Figure 3: Glued components on Jasper Rugged IO Board

4   Test Specifications

4.1   Vibration Test Specifications

This section defines the vibration tests performed on the Geode Osbourne and Geode Jasper systems designed by Diamond Systems.

Test Conditions:

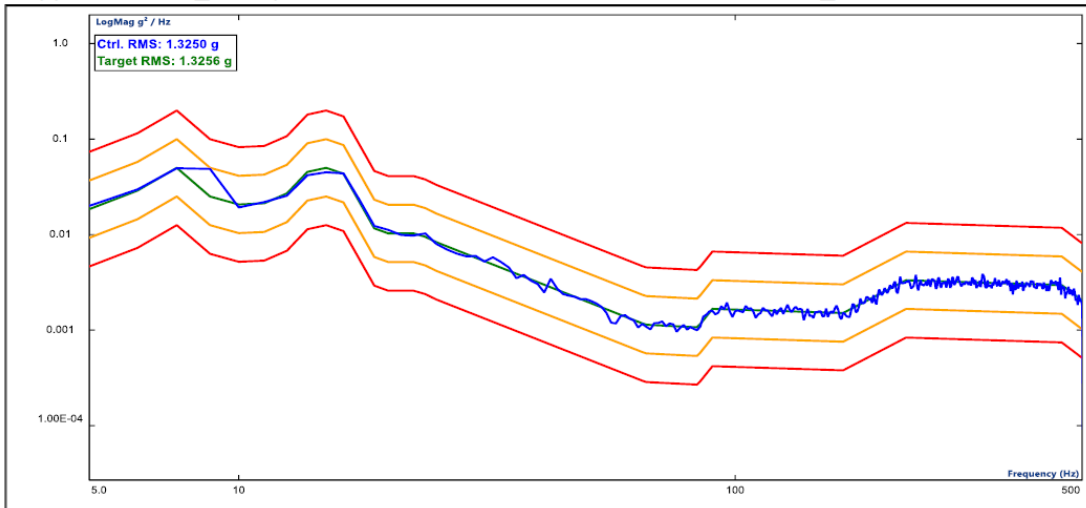**Axes**   **:** Vertical / Transverse / Longitudinal/Envelope
Test Condition **:** MIL-STD-810H:2019.
Test Description : Table 514.8 C-VII, Category 4 - Random vibration Test.
                                   Table 514.8 C-VIII, Category 4 - Envelope random vibration Test.

4.1.1   Random Vibration Test

Random Vibration Test is profile is as mentioned below:

4.1.1.1   Longitudinal Axis

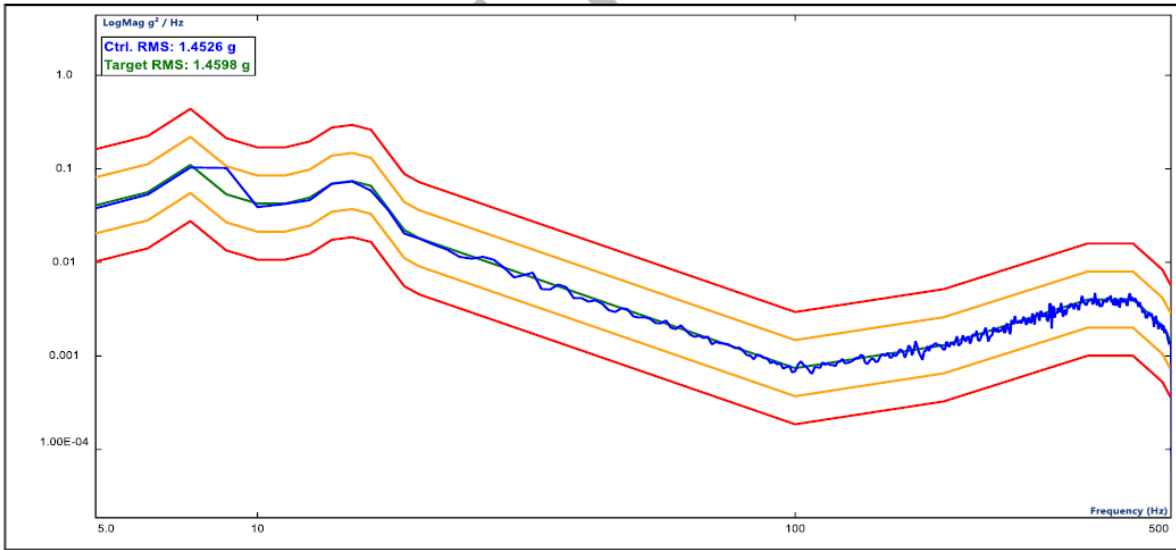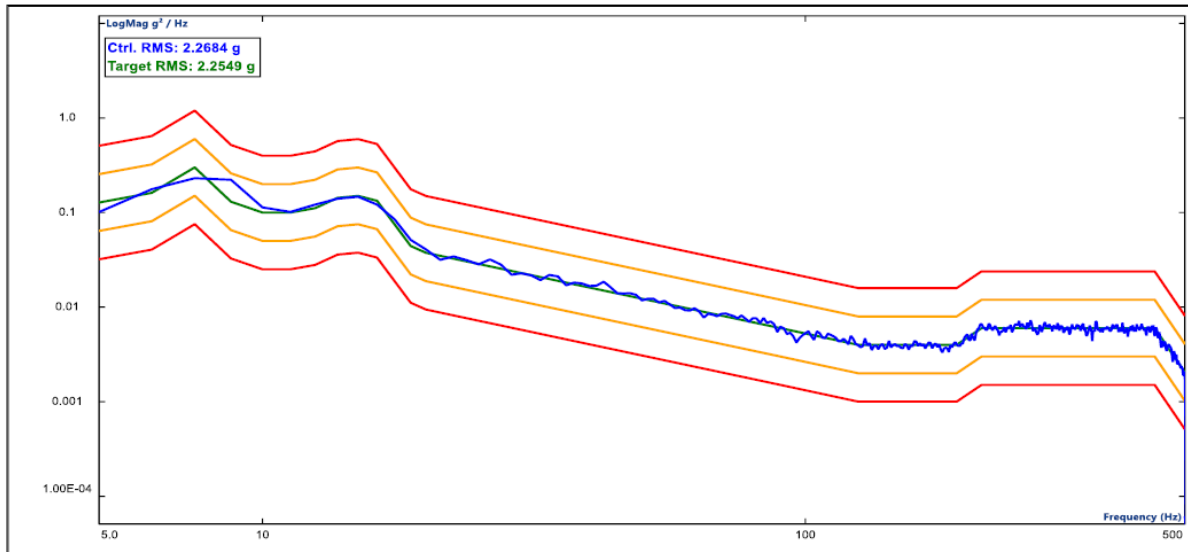| Axis	Frequency (Hz)	Acceleration Spectral Density (G^2/Hz)	Duration & Overall (gRMS)
Longitudinal Axis (X-Axis)	5	0.0407	40 Minutes duration 1.45 gRMS
	6	0.044155	
	7	0.11	
	8	0.11	
	9	0.0425	
	12	0.0425	
	14	0.074	
	16	0.074	
	19	0.02	
	23	0.0103	
	25	0.00833	
	66	0.00114	
	84	0.00107	
	90	0.00167	
	165	0.00151	
	221	0.00333	
	455	0.00296	
	500	0.00204	

Total elapsed time: 00:41:08   **Full level elapsed time:** 00:40:00   **Run Start Time:** Apr-18-2024 17:08:23

Graph 1: X-Axis Random vibration test

4.1.1.2   Transverse Axis

Axis	Frequency (Hz)	Acceleration Spectral Density (G^2/Hz)	Duration & Overall (gRMS)
Transverse Axis (Y-Axis)	5	0.0407	40 Minutes duration 1.45 gRMS
	6	0.044155	
	7	0.11	
	8	0.11	
	9	0.0425	
	12	0.0425	
	14	0.074	
	16	0.074	
	19	0.02	
	100	0.00074	
	189	0.0013	
	350	0.004	
	425	0.004	
	482	0.0021	
	500	0.00142	

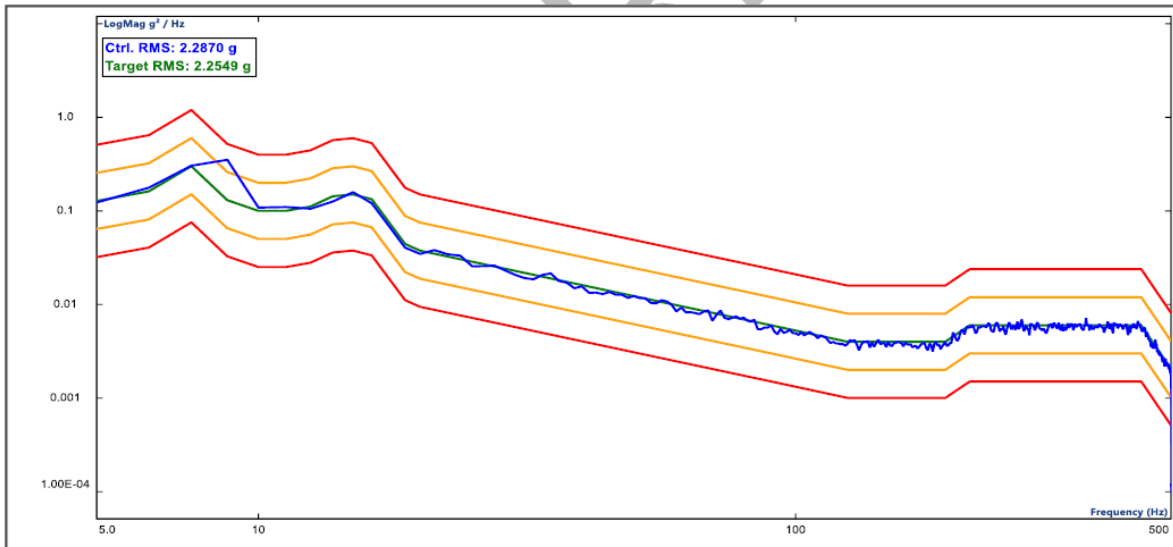LogMag g² / Hz
Ctrl. RMS: 1.4526 g
Target RMS: 1.4598 g

Total elapsed time: 00:41:08   **Full level elapsed time:** 00:40:00   **Run Start Time:** Apr-18-2024 19:30:02

Graph 2:-Y-Axis random vibration test

4.1.1.3 Vertical Axis

Axis	Frequency (Hz)	Acceleration Spectral Density (G^2/Hz)	Duration & Overall (gRMS)
Vertical Axis (Z-Axis)	5	0.12765	40 Minutes duration 2.24 gRMS
	6	0.12926	
	7	0.3	
	8	0.3	
	9	0.1	
	12	0.1	
	14	0.15	
	16	0.15	
	19	0.04	
	90	0.006	
	125	0.004	
	190	0.004	
	211	0.006	
	440	0.006	
	500	0.00204	

Total elapsed time: 00:41:37 **Full level elapsed time:** 00:40:00 **Run Start Time:** Apr-18-2024 11:41:18

Graph 3:-Z-Axis random vibration test

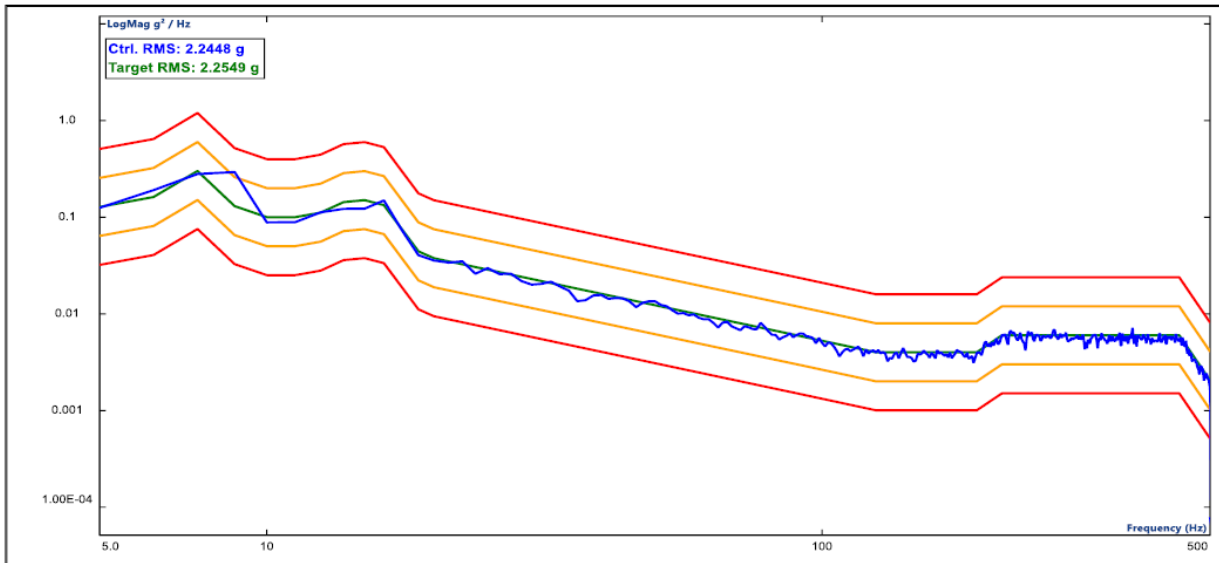#### 4.1.1.4 Envelope Axis Random Vibration Test

Envelope Vibration Test is profile is as mentioned below:

| Axis	Frequency (Hz)	Acceleration Spectral Density (G^2/Hz)	Duration & Overall (gRMS)
Vertical, Longitudinal & Transverse Axes (Z, X & Y Axes)	5	0.12765	40 Minutes duration 2.24 gRMS
	6	0.12926	
	7	0.3	
	8	0.3	
	9	0.1	
	12	0.1	
	14	0.15	
	16	0.15	
	19	0.04	
	90	0.006	
	125	0.004	
	190	0.004	
	211	0.006	
	440	0.006	
	500	0.00204	

Total elapsed time: 00:41:07   **Full level elapsed time:** 00:40:00   **Run Start Time:** Apr-18-2024 18:00:44

Graph 4: X-Axis Envelope random vibration test

Total elapsed time: 00:41:32   **Full level elapsed time:** 00:40:01   **Run Start Time:** Apr-18-2024 20:14:39

Graph 5:-Y-Axis Envelope random vibration test
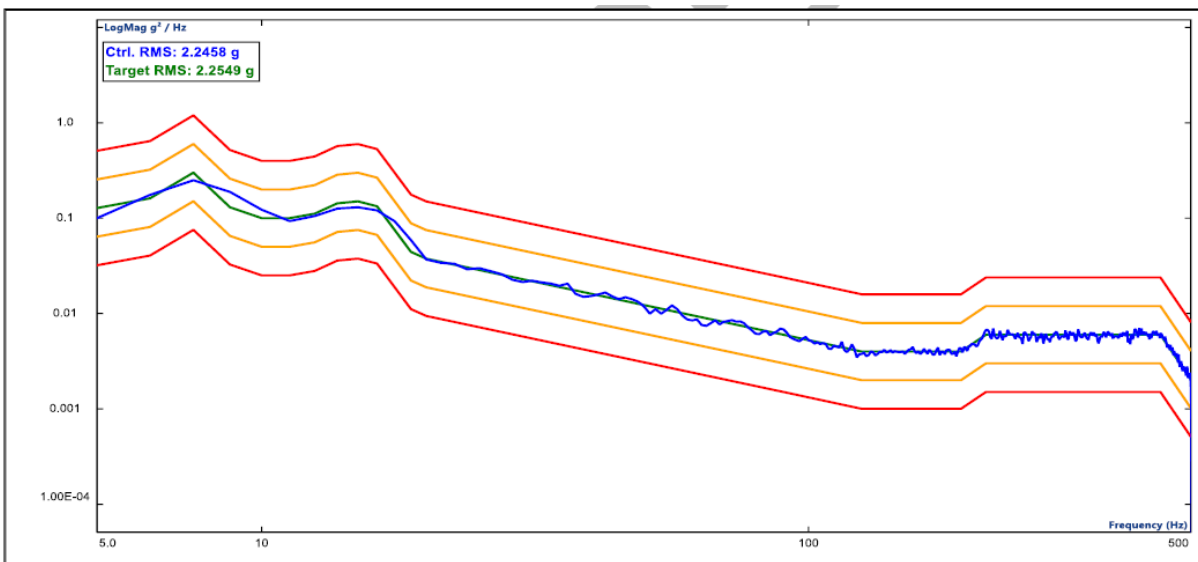
Total elapsed time: 00:42:36   **Full level elapsed time:** 00:40:02 **Run Start Time:** Apr-18-2024 13:18:20

Graph 6:-Z-Axis Envelope random vibration test

4.2 Shock Test Specification

This section defines the shock test performed on the 5 stacks designed by Diamond Systems.

Test Conditions:

**Axes**   : Vertical / Transverse / Longitudinal.
Test condition   : MIL-STD-810H.
Test Description : Method 516.8, Shock: Procedure I - Functional Shock & Procedure V - Crash Hazard Shock
Test Spec   : Procedure I - Functional Shock: 40G, 11ms 3 shocks per direction (Operational).
                        Procedure V - Crash Hazard Shock: 40G, 6ms 2 shocks per direction (Non-Operational).

4.2.1 Functional Shock Test

Axis	Peak Acceleration (g)	Pulse width (ms)	Shock Spectrum & No of Pulse / axis
X, Y & Z Axes	20	11	Terminal peak saw tooth, 3 shocks/direction, Total 18 shocks.
X, Y & Z Axes	40	11	Terminal peak saw tooth, 3 shocks/direction, Total 18 shocks.

Graph 7:-X Axis 20g 11ms positive direction
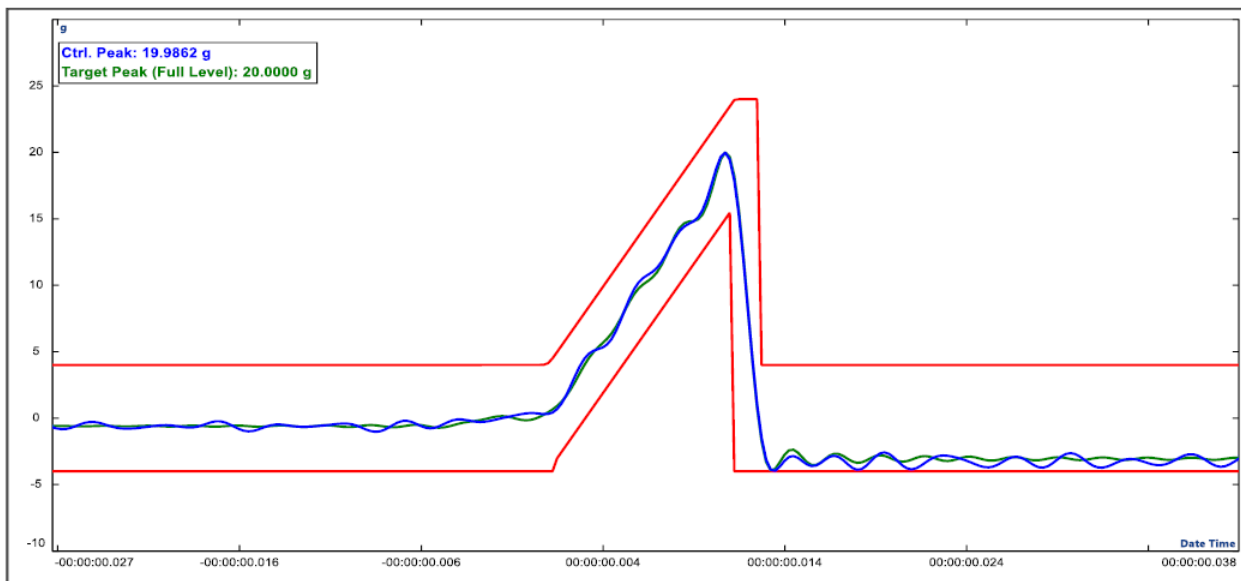
Full level elapsed: 3.0   Run Start Time: Apr-18-2024 18:48:00

Ctrl. Peak: -19.8182 g
Target Peak (Full Level): -20.0000 g
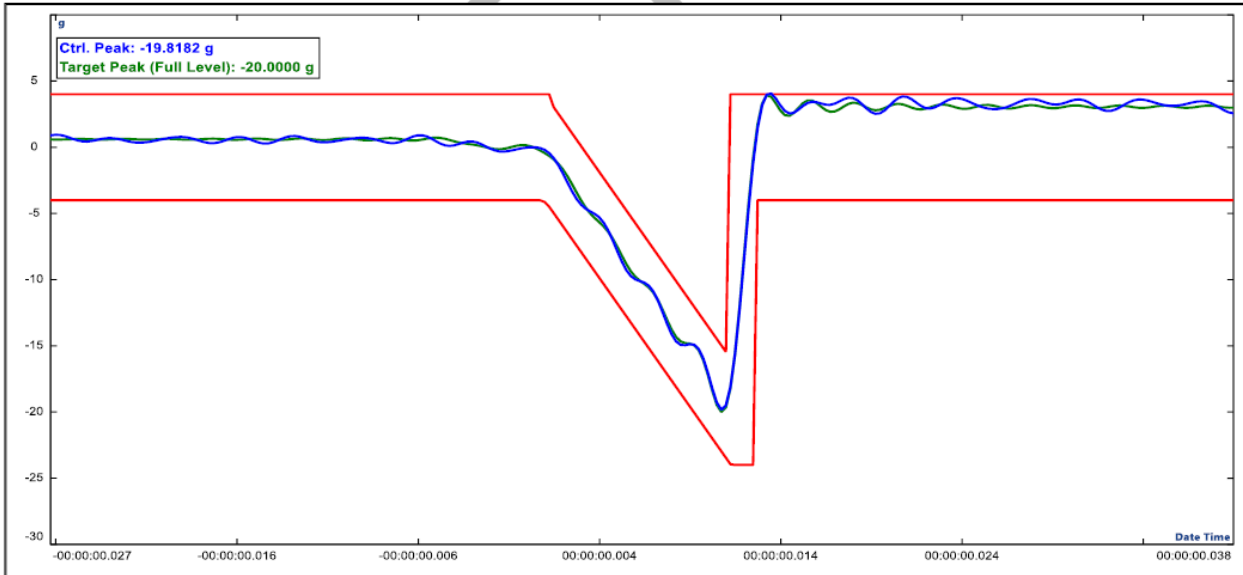
Full level elapsed: 3.0   **Run Start Time:** Apr-18-2024 18:49:07

Graph 8: X Axis 20g 11ms negative direction

Ctrl. Peak: 19.8322 g
Target Peak (Full Level): 20.0000 g
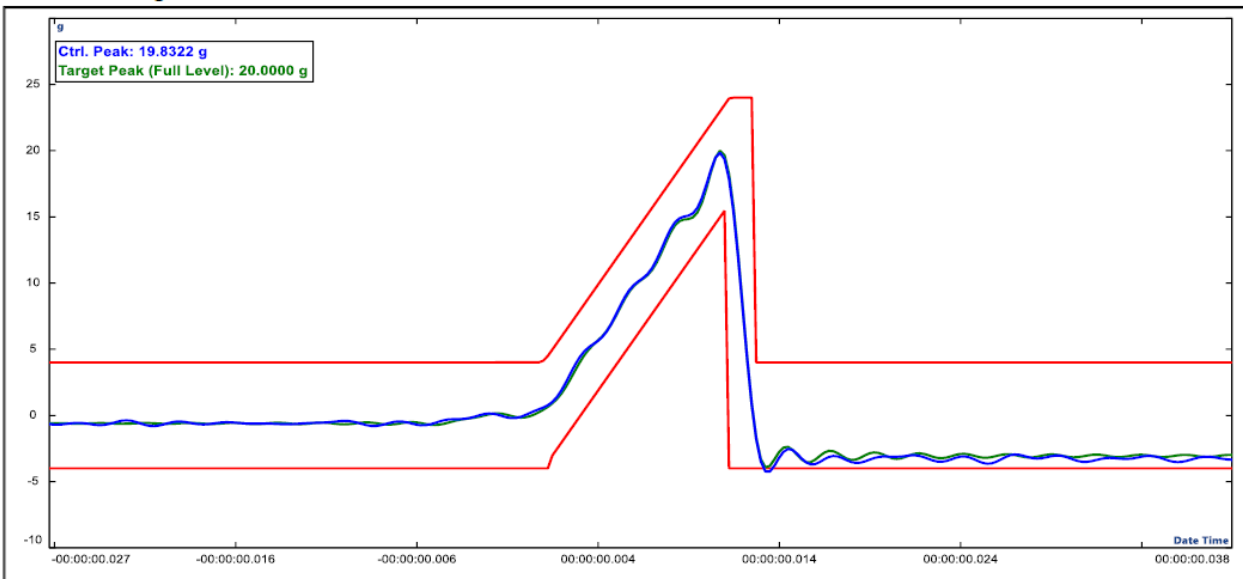
Full level elapsed: 3.0   **Run Start Time:** Apr-18-2024 21:04:53

Graph 9:- Y Axis 20g 11ms positive direction

Ctrl. Peak: -19.6043 g
Target Peak (Full Level): -20.0000 g
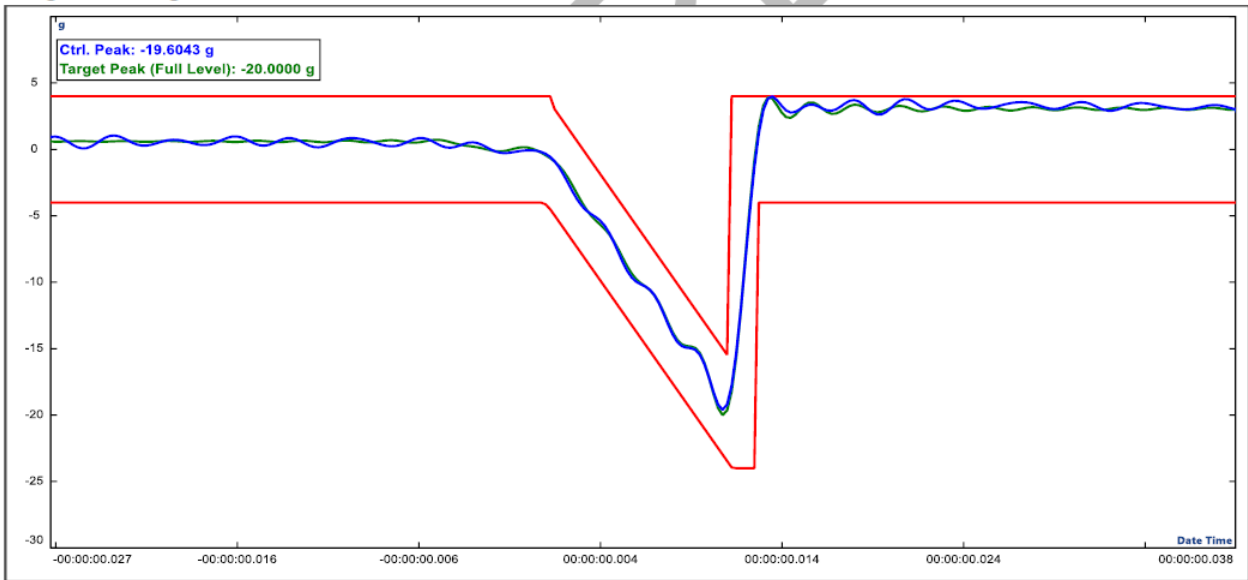
Full level elapsed: 3.0   **Run Start Time:** Apr-18-2024 21:06:13

Graph 10: Y Axis 20g 11ms negative direction

Ctrl. Peak: 20.0600 g
Target Peak (Full Level): 20.0000 g
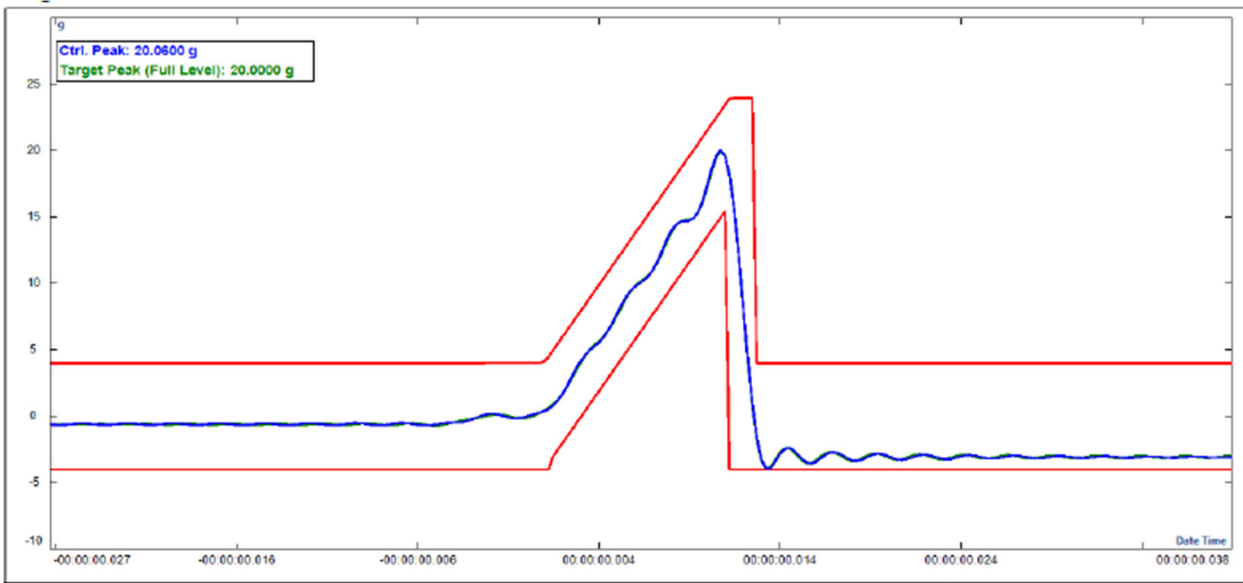
Full level elapsed: 3.0   **Run Start Time:** Apr-18-2024 15:37:34

Graph 11:- Z Axis 20g 11ms positive direction

Ctrl. Peak: -20.0544 g
Target Peak (Full Level): -20.0000 g

Full level elapsed: 3.0   **Run Start Time:** Apr-18-2024 15:38:46

Graph 12:- Z Axis 20g 11ms negative direction

Ctrl. Peak: 40.0164 g
Target Peak (Full Level): 40.0000 g
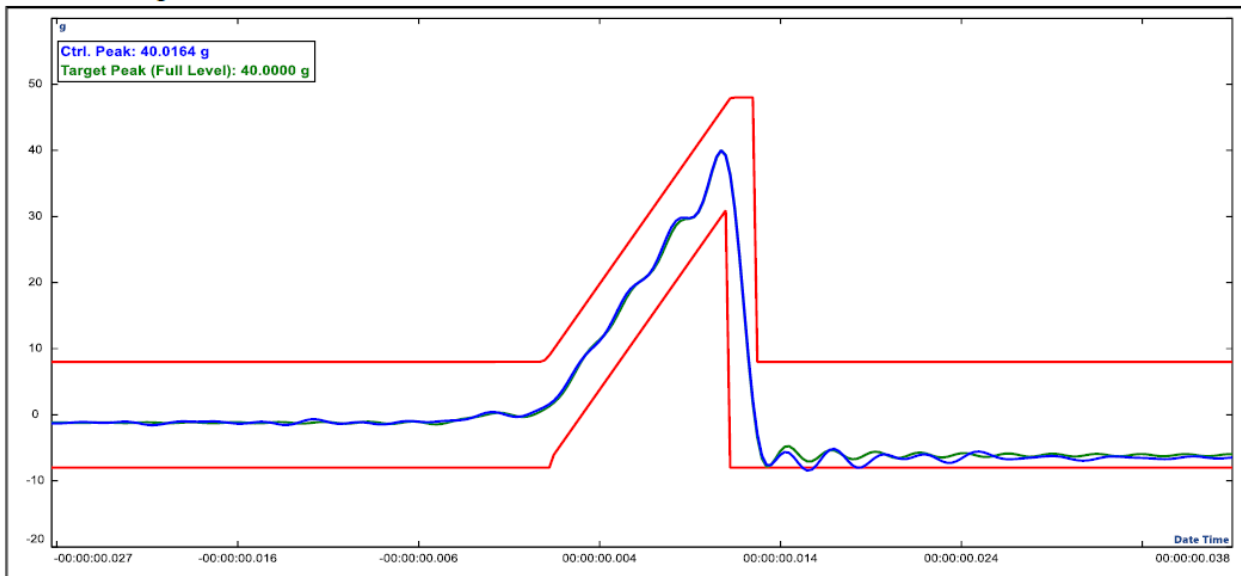
Full level elapsed: 3.0   **Run Start Time:** Apr-18-2024 18:50:31

Graph 13:- X Axis 40g 11ms positive direction

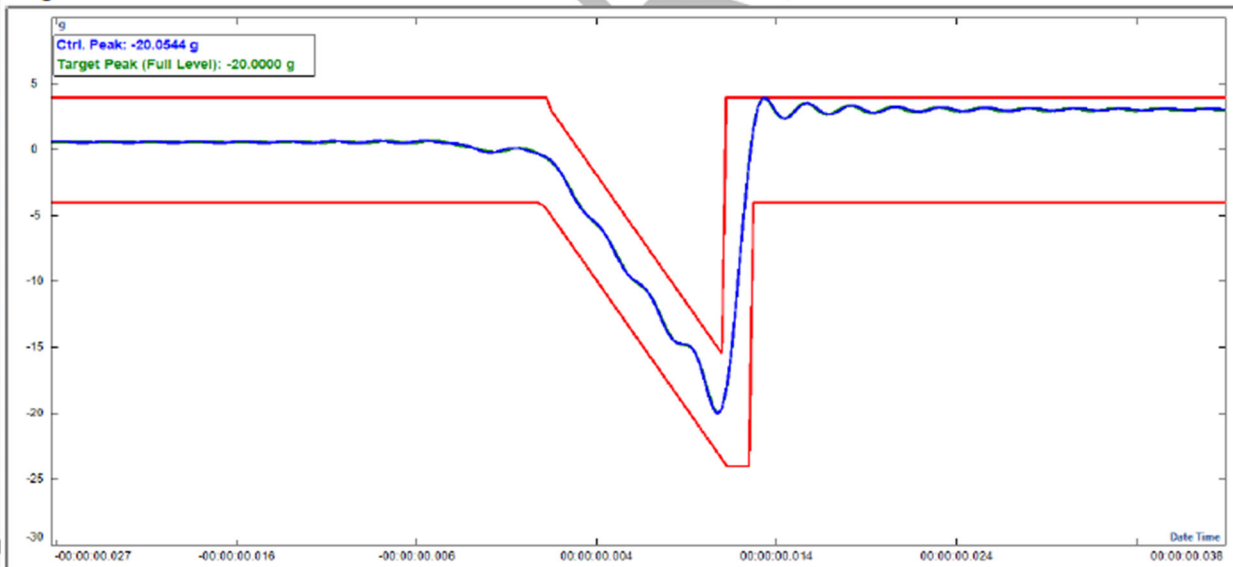**Full level elapsed:** 3.0   **Run Start Time:** Apr-18-2024 18:52:34
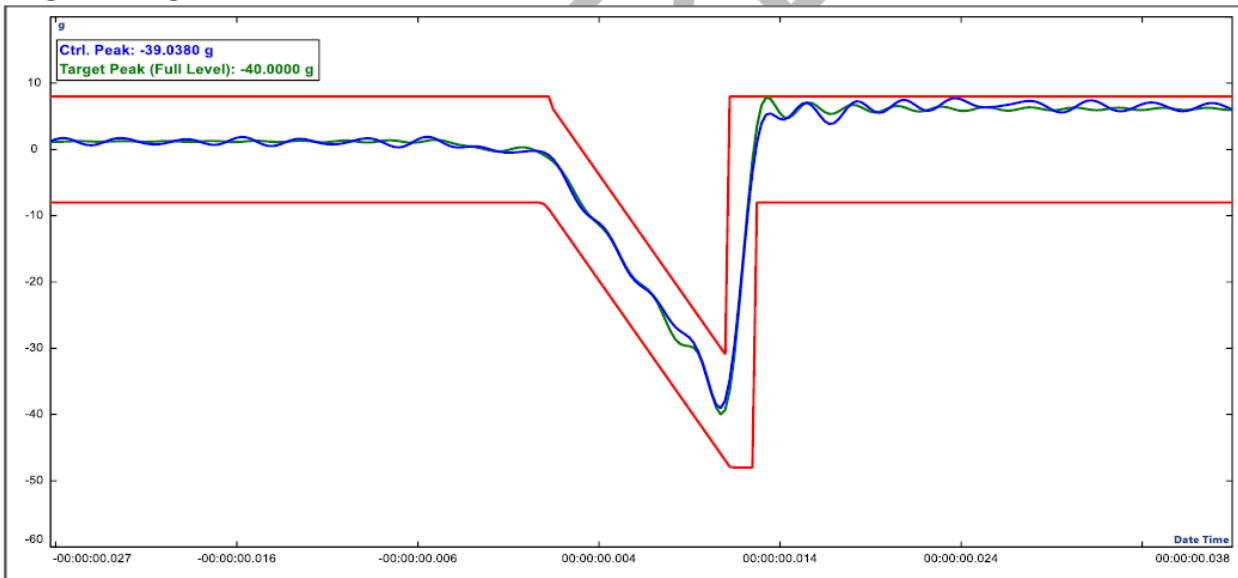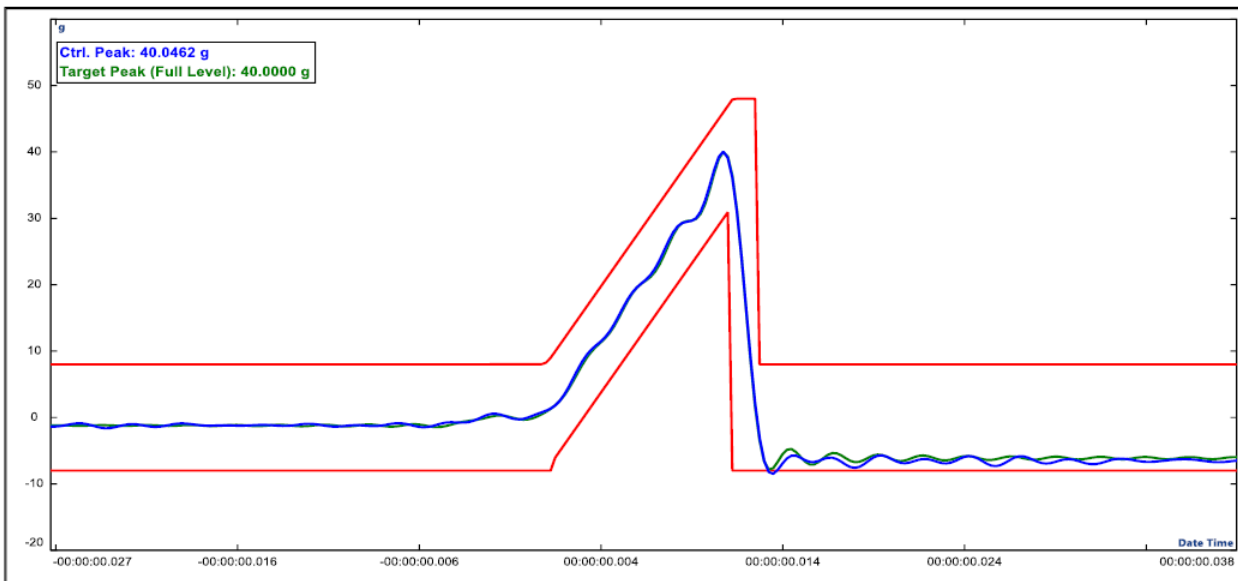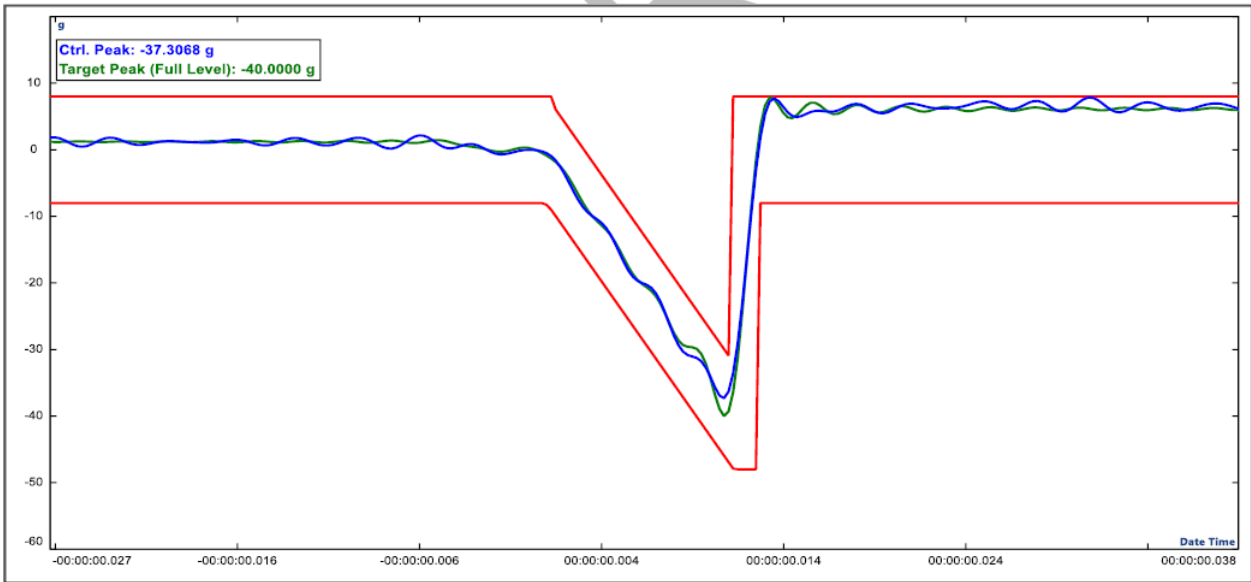
Graph 14:- X Axis 40g 11ms negative direction

Full level elapsed: 3.0   **Run Start Time:** Apr-18-2024 21:07:29

Graph 15:- Y Axis 40g 11ms positive direction

Ctrl. Peak: -37.3068 g
Target Peak (Full Level): -40.0000 g

Full level elapsed: 3.0   **Run Start Time:** Apr-18-2024 21:09:06

Graph 16:- Y Axis 40g 11ms negative direction

Ctrl. Peak: 40.1387 g
Target Peak (Full Level): 40.0000 g
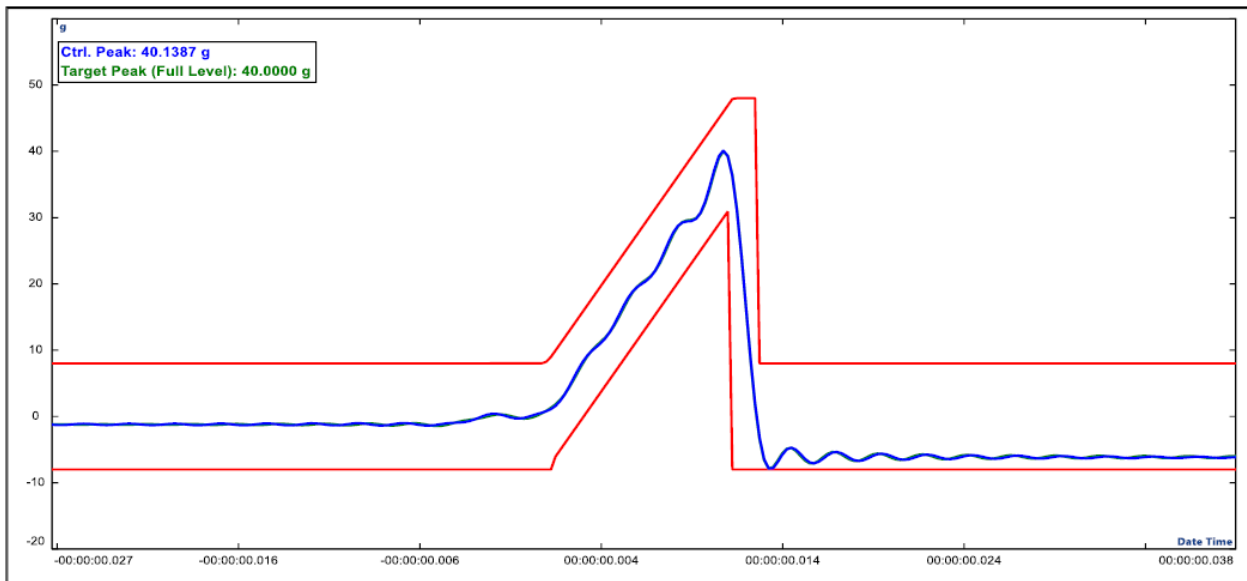
Full level elapsed: 3.0   **Run Start Time:** Apr-18-2024 16:58:14

Graph 17:- Z Axis 40g 11ms positive direction

Ctrl. Peak: -40.1274 g
Target Peak (Full Level): -40.0000 g
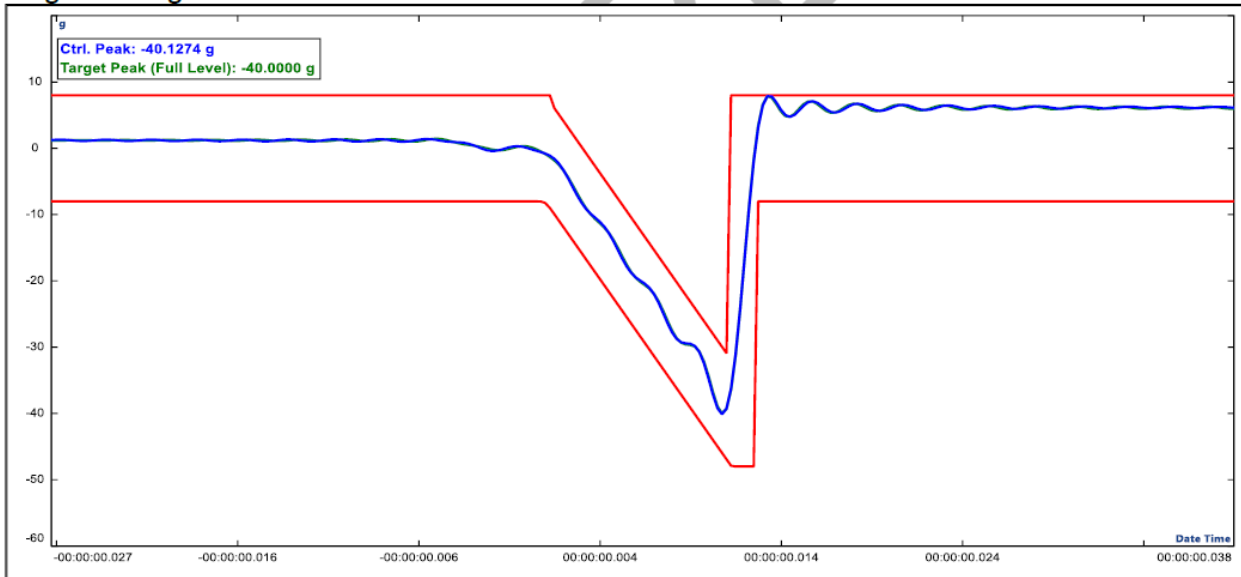
Full level elapsed: 3.0   **Run Start Time:** Apr-18-2024 15:32:17

Graph 18:- Z Axis 40g 11ms negative direction

4.2.2 Crash Hazard Shock Test

Axis	Peak Acceleration (g)	Pulse width (ms)	Shock Spectrum & No of Pulse / axis
X, Y & Z Axes	40	6	Terminal peak saw tooth, 2 shocks/direction, Total 12shocks.

Full level elapsed: 2.0   **Run Start Time:** Apr-18-2024 18:56:58

Graph 19:- X Axis 40g 06 ms positive direction

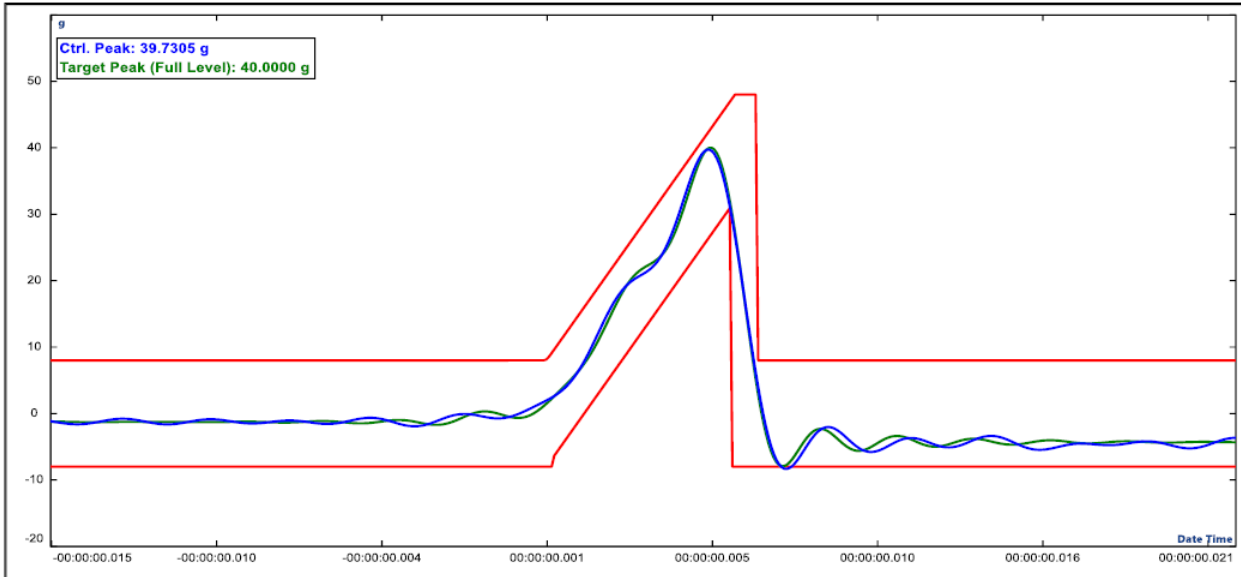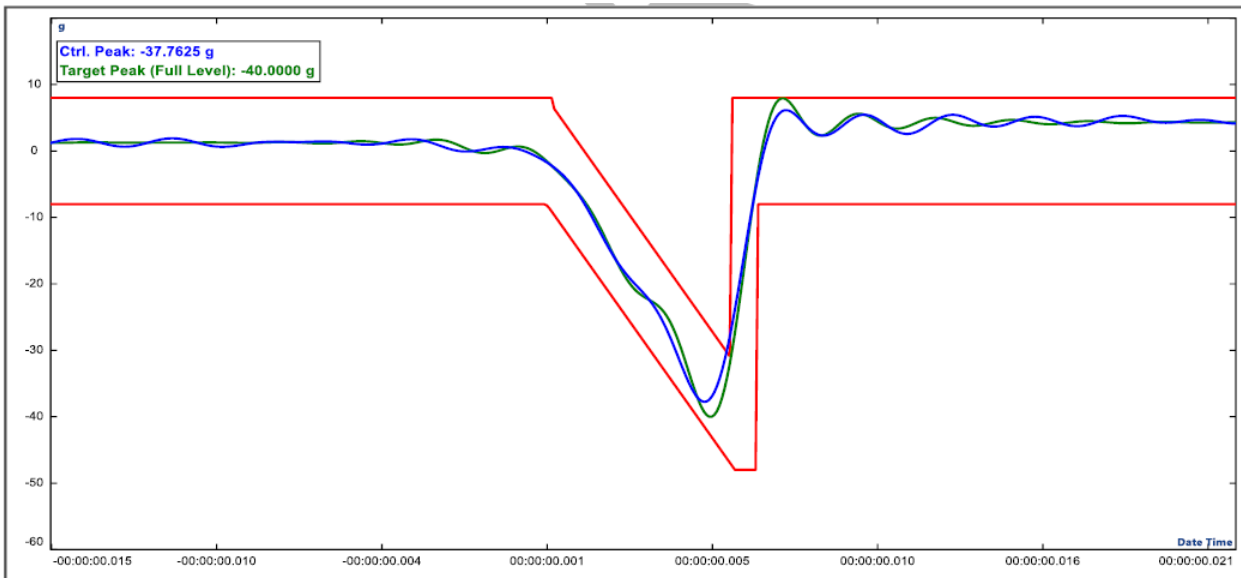**Full level elapsed:** 2.0   **Run Start Time:** Apr-18-2024 18:59:00

Graph 20:- X Axis 40g 06 ms negative direction

Ctrl. Peak: 39.6796 g
Target Peak (Full Level): 40.0000 g
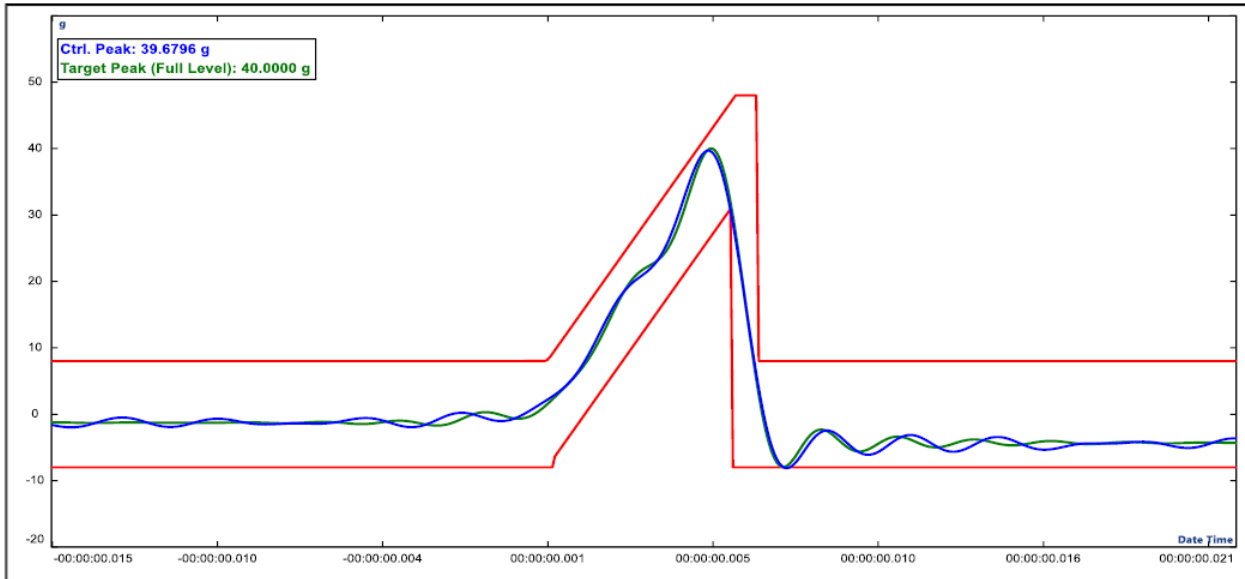
Full level elapsed: 2.0   **Run Start Time:** Apr-18-2024 21:13:59

Graph 21:- Y Axis 40g 06 ms positive direction

Ctrl. Peak: -38.6735 g
Target Peak (Full Level): -40.0000 g
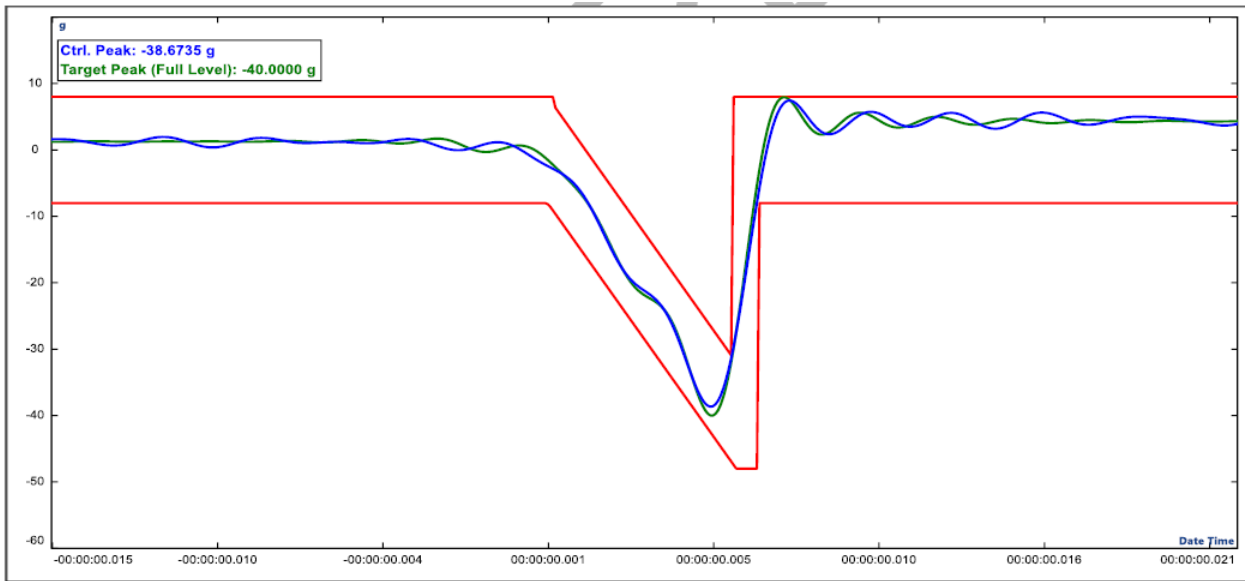
Full level elapsed: 2.0   **Run Start Time:** Apr-18-2024 21:15:16

Graph 22:- Y Axis 40g 06 ms negative direction

Ctrl. Peak: 39.6931 g
Target Peak (Full Level): 40.0000 g
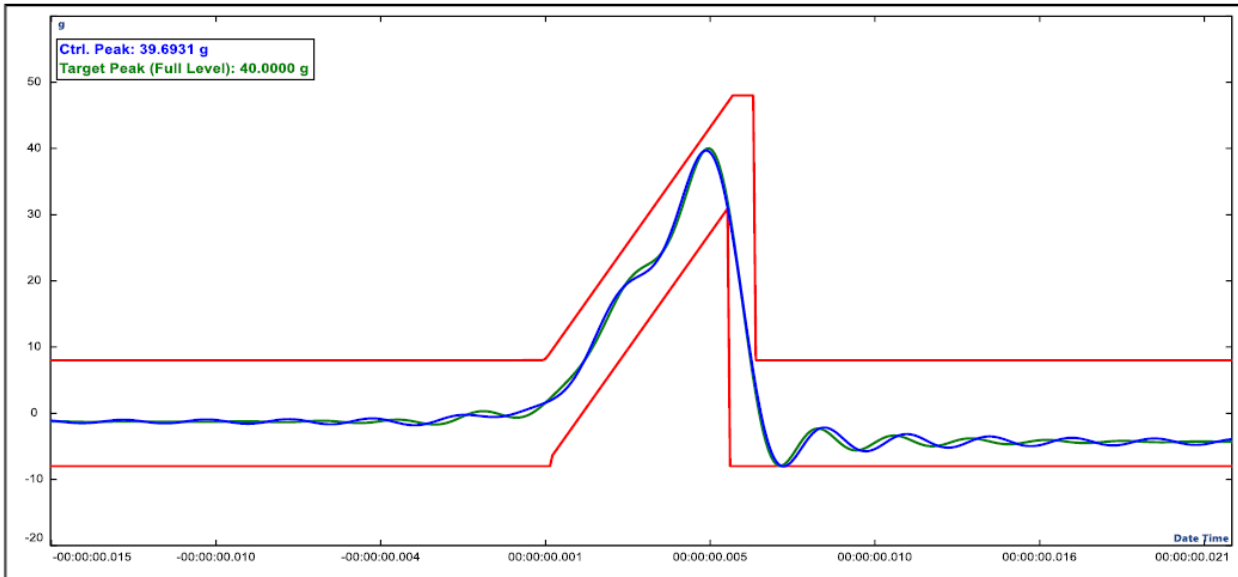
Full level elapsed: 2.0   **Run Start Time:** Apr-18-2024 15:50:28

Graph 23:- Z Axis 40g 06 ms positive direction

Ctrl. Peak: -39.6551 g
Target Peak (Full Level): -40.0000 g
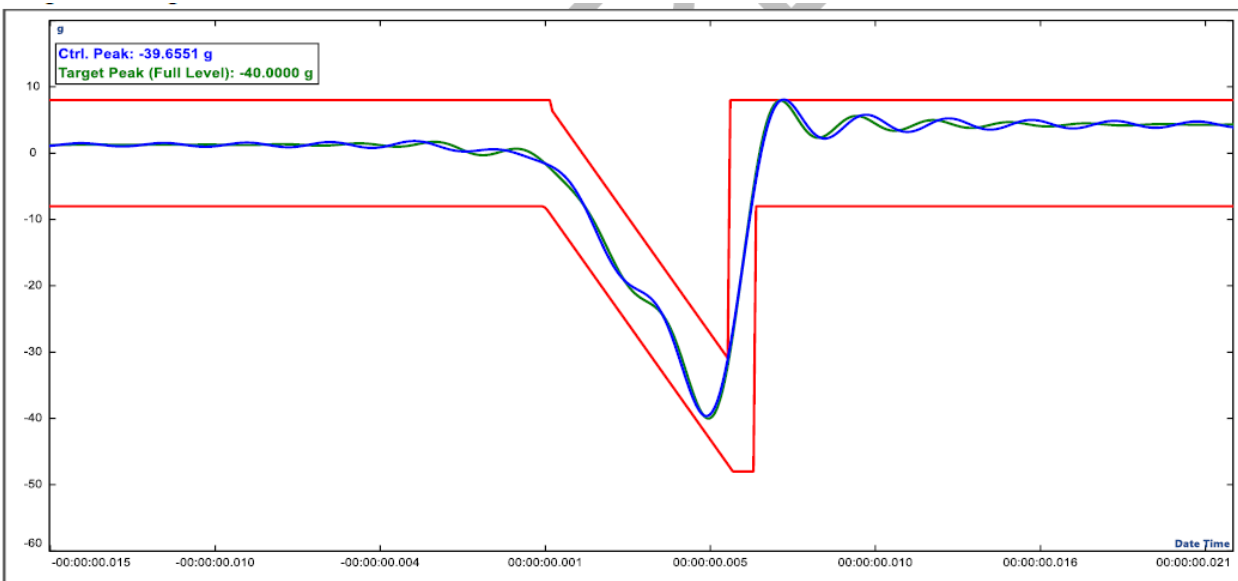
Full level elapsed: 2.0   **Run Start Time:** Apr-18-2024 15:51:37

Graph 24:- Z Axis 40g 06 ms negative direction

5 Test Sequence

The Shock and Vibration test was performed in the sequence described below:

1. Z axis test: Performed all tests in the Z axis first.
   i. Random Vibration Test
   ii. Envelope Vibration Test
   iii. Mechanical Shock Test
2. X axis test: Performed all tests in the X axis after the Z axis test.
   i. Random Vibration Test
   ii. Envelope Vibration Test
   iii. Mechanical Shock Test
3. Y axis test: Performed all tests in the Y axis after the X axis test.
   i. Random Vibration Test
   ii. Envelope Vibration Test
   iii. Mechanical Shock Test

The below pictures depict the test fixture with X, Y, and Z axis positive direction indication. The X and Z axis movement was in forward and backward direction, rotated Geode Osbourne by 90 degrees anti-clockwise and Geode Jasper 90 degree clockwise for Y direction testing after the X direction test. Z axis movement was in upward and downward direction of system.

(The test platform was hollowed out to meet the maximum weight limit of the shaker table.)
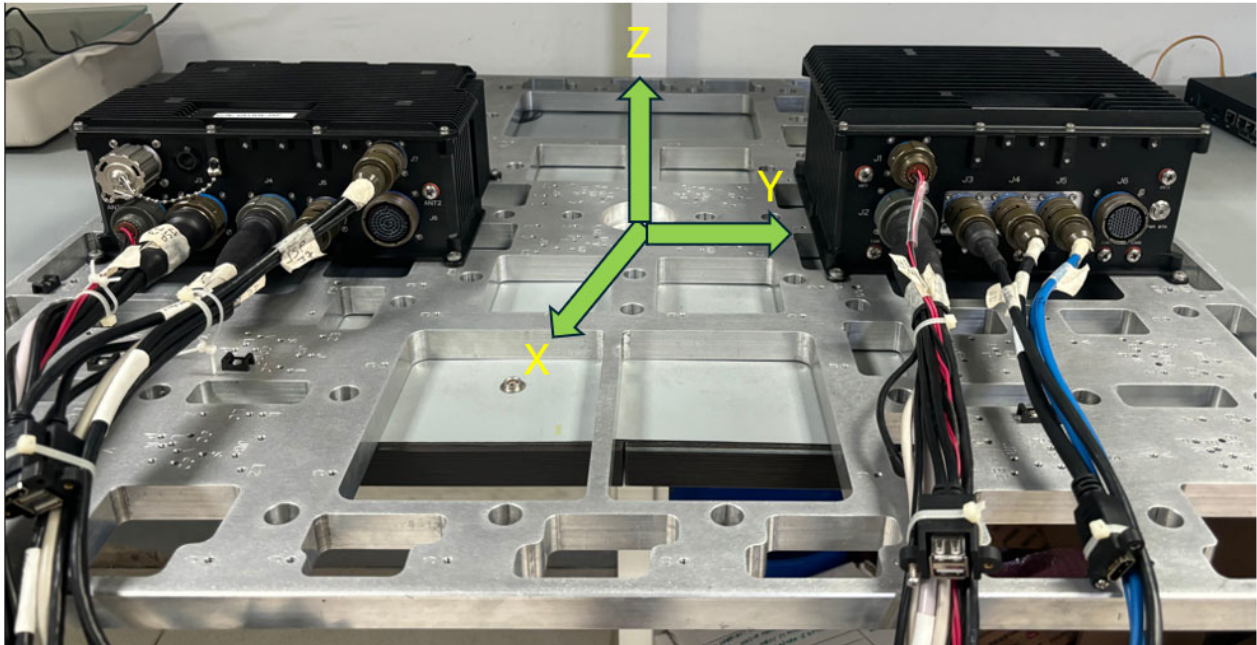

Figure 4: Side View of X and Z Axes Vibration Test Setup

Figure 5: Top View of X and Z Axes Vibration test Setup

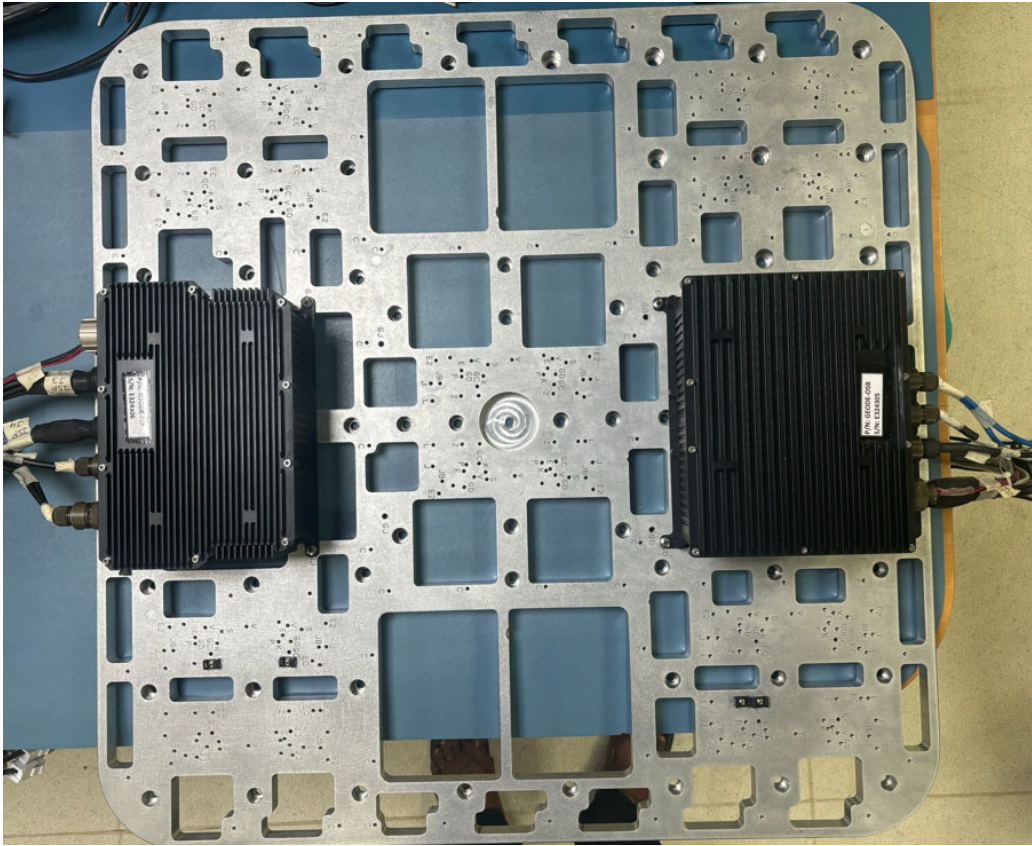*Figure 6: Side View of Y Axis Vibration test Setup*

Figure 7: Top View of Y Axis Vibration test Setup

6 Test Results

During the vibration tests and functional shock tests both the systems were in power on condition in all three axes. During and after each vibration test, board has been checked for the following diagnostic tests:

a) Functional check: Run the test software and tested the interfaces on Systems. The test has passed without any errors. Please refer to the tables below for more details.
b) Visual inspection: Not observed any sign of damaged or loose components on any board.

6.1 Geode Osbourne - Detailed Interface Test Results

SL. No	IO card	Connector RefDes	Interface	Before SNV test	During SNV test	After SNV test	Remarks
1	NA	J4	HDMI 1 Display	PASS	PASS	PASS	
2	NA	J2	USB 2.0 x2	PASS	PASS	PASS	
3	NA	J5	USB 3.0 x2	PASS	PASS	PASS	
4	NA	J2	Ethernet 1G	PASS	PASS	PASS	
5	NA	J3	Ethernet 10G	PASS	PASS	PASS	
6	NA	J2	Serial interface	PASS	PASS	PASS	
7	NA	J2	2x CAN Interface	PASS	PASS	PASS	
8	NA	J2	On-board DIO	PASS	PASS	PASS	
9	TS512GMTE710T-I	J3	M.2 PCIe Interface	PASS	PASS	PASS	Connector is on Osbourne carrier board
	DS-MPE-SER4M	J12	Minicard 1	PASS	PASS	PASS	Connector is on Osbourne carrier board
10	NA	J2	Audio	PASS	Not tested	PASS	
11	NA	J12	Power Button	PASS	Not tested	PASS	

6.1.1 Detailed Summary of Failures and Observations

6.1.1.1 USB3.0 Port 1 fails to detect during test

Test details: Envelope Random vibration test at Z axis.

Observation:

- The USB memory stick connected to USB3.0 Port 1 failed to detect intermittently during the test.
- USB memory stick connected on USB3.0 Port 2 observed to be working without any issues throughout the test.

Post Shock and Vibration Test observation:

- The failure is due to the loose contact of USB stick at the connector.
- No issues were observed during the post vibration test in the hardware lab.

6.2 Geode Jasper – Detailed Interface Test Results

SL. No	IO card	Connector RefDes	Feature/ IO	Before SNV test	During SNV test	After SNV test	Remarks
1	NA	J5	HDMI 1	PASS	PASS	PASS	
2	NA	NA	HDMI 2	PASS	Not tested	PASS	
3	NA	J3	USB 2.0 x2	PASS	PASS	PASS	
4	NA	J7	USB 3.0 x2	PASS	PASS	PASS	
5	NA	J3	Ethernet x2	PASS	PASS	PASS	
6	NA	J4	Serial interface	PASS	PASS	PASS	
7	NA	J4	Serial interface	PASS	Not tested	PASS	
8	SA400M8/240G	J15	M.2 socket (SATA)	PASS	PASS	PASS	
9	DS-MPE-SER4M	J11 (on carrier Board)	Minicard 1	PASS	PASS	PASS	Connector is on Jasper carrier board. Serial ports 1-2 were tested on DS-MPE-SER4M minicard
10	DS-MPE-GPIO	J12 (on carrier Board)	Minicard 2	PASS	PASS	PASS	Connector is on Jasper carrier board
11	NA	J12	Power Button	PASS	Not tested	PASS	NA
	JMM-7515-IF	J16	Power Supply Module	PASS	PASS	PASS	Module modified to output 12V DC
12	EMM-8EL-XT	J1	PCIe104	PASS	Not tested	PASS	Tested before and after S&V test to verify the connector functionality
15	NA	J3	Audio	PASS	Not tested	PASS	

6.2.1 Detailed Summary of Failures and Observations

6.2.1.1 Serial ports 3 & 4 loop-back test failure

Test details: Envelope random vibration test at Z axis:

Observation:
- The serial loop-back test on ports 3 & 4 observed to be failed during vibration testing.
- The vibration test is paused and the test script running on Jasper system is stopped.
- The loop-back on both the ports 3&4 is observed to be successful after the test script is restarted
- No more issues are observed on the serial ports until the shock and vibration test completion.

Post Shock and Vibration Test observation:
- During the Z-axis vibration test the serial port loop back cable and connector is subjected to high vibration as no extension cable is used. The one-time failure is due to the loose contact in the loop-back cable connector during the test.

6.3 Shock and Vibration Consolidated Test Summary

This table lists the complete passed boards in the shock and vibration test.

System Name	Boards/Modules list	Location	Part No.	Serial No.	Rev	Random vibration test	Envelope vibration test	Shock test
Geode Osbourne P/N: **GEODE-OSB** SN# **E324305**	Osbourne Carrier Board	Fitted on enclosure top plate of the system	OSB-BB01 Rev B	P300144	B	PASS	PASS	PASS
	Osbourne Rugged Panel IO Board	Fitted on enclosure side wall and connected to Osbourne carrier board	OSB-PNLR02 Rev A	D889508	A	PASS	PASS	PASS
	PCIe Mini card 1	Mini card Socket 1 on Osbourne carrier board	DS-MPE-SER4M Rev A	W577289	A	PASS	PASS	PASS
	Nvidia Jetson AGX Orin 32GB Module	Attached on Osbourne carrier board	900-13701-0040-000	1422822061283	NA	PASS	PASS	PASS
	M.2 PCIe SSD Module 512GB	Connected to M.2 Socket on Osbourne carrier board	TS512GMTE710T-I	H80690-0009	NA	PASS	PASS	PASS
Geode Jasper P/N: **GEODE-JSP** SN# **E324306**	Jasper COM Carrier Board	Fitted on enclosure top plate of the system	JSB-BB02D Rev A	P300526	A	PASS	PASS	PASS
	Jasper Rugged Panel IO Board	Fitted on enclosure side wall and connected to Jasper carrier board	JSP-PNLR02A Rev A	D889509	A	PASS	PASS	PASS
	PCIe Mini card 1	Mini card 1 Socket on Jasper carrier board	DS-MPE-SER4M Rev A	W577284	A	PASS	PASS	PASS
	PCIe Mini card 2	Mini card 2 Socket on Jasper carrier board	DS-MPE-GPIO Rev A	P120232	A	PASS	PASS	PASS
	Winsystems COM Module with Intel® Core™ i7-1185GRE Processor	Fitted on Jasper carrier board	COMET6-1185GRE-32IL	2308168286	NA	PASS	PASS	PASS
	M.2 SATA SSD Module 240GB	M.2 socket on Jasper carrier board	SA400M8/240G	50026B768536CD89	NA	PASS	PASS	PASS
	Power Supply Module	Fitted on bottom plate of the enclosure and connected to Jasper carrier board	JMM-7515-IF Rev A	W575704	A	PASS	PASS	PASS

7 Test Setup Photos

7.1 X axis test photo

7.2 Y axis test photo

7.3 Z axis test photo

7.4 Geode Osbourne test sample photo

7.5 Geode Jasper test sample photo