DynaQual Test Labs

Where being stressed is a good thing

PJLA

ISO 17025: 2017 ACCREDITED (#79999)

Test Report

Sine Sweep, Random Vibration and Classic Shock

TR-MMDDYY-1 May 12, 2021

COMPANY: XYZ Company
Address for XYZ
Houston, Texas xxxxx

COMPANY REP: Rep Names

DYNAQUAL TEST TECH: Name of Technician

PRODUCT(S) TESTED: Name of Product

The undersigned have produced and reviewed the data collected and presented in the following report. By signing below, DynaQual Test Labs technical staff verifies that the data is accurate and obtained from functioning and calibrated equipment. Also, the undersigned determine that all data collection techniques are authentic, and the observations and conclusions are true results of the tests performed on the dates indicated above.

APPROVAL SIGNATURE SECTION:

Testing Performed By:

Zachary Hausler, Lab Technician

Approved By:

Bill Burt, Sr. Lab Technician

x/xx/xxxx
Date

PROJECT SCOPE

“Customer” requested the services of DynaQual Test Labs to perform vibration testing on one of their “Test Article” assemblies to compare accelerometer responses from their device to that of the vibration system. The testing consisted of sine sweep, random vibration, and classic shock.

The following test report covers the test program and describes the tests performed, with any associated input/output profiles. The testing was performed at DynaQual’s vibration lab. All equipment and sensor measurements were performed with calibrated equipment and trained, qualified personnel.

Definitions

UUT – Unit(s) under Test

UUT Identification

The UUT and date the units were subjected to testing is shown in Table 1.

Table 1 – Product Identifiers

UUT	Description	Date Tested
1	UUT-1	x/xx/2021
2	UUT-2	x/xx/2021

VIBRATION TESTING PARAMETERS/SETUP

Table 2 – Description of Test Equipment

Description	Manufacturer	Model	S/N	Cal Due
Vibration System	ETS-714 Shaker	MPA714	SH1204115	N/A
Vibration Controller	Vibration Research	VR9500	9511B7F2	7/5/2021
Vibration Controller	Vibration Research	VR9500	950E43A0	7/5/2021
Control accelerometer	Dytran Instruments	3055B1T	16147	6/1/2021
Control accelerometer	PCB Piezotronics	353B33	LW210425	5/5/2022
Control accelerometer	Dytran Instruments	3055D1T	23190	12/3/2021
Response accelerometer	PCB Piezotronics	xxxx	xxxx	Date
Response accelerometer*	PCB Piezotronics	xxxx	xxxx	Date
Response accelerometer	Dytran Instruments	xxxx	xxxx	Date

* Denotes customer triaxial accelerometer

Vibration System: ETS MPA714 15,400 lbf shaker was used to perform the testing. (Figure 1)

Figure x: ETS-714, 15,400 lbf Shaker with 2'x5' slip table

Testing Program – Random Vibration

The UUT were subjected to testing per the following test plan:

1. Sine sweep, "freq"Hz, "G_{peak} level", at 1 octave per minute in the X, Y, and Z axes.
2. Classic shock, "G_{peak} level", "Pulse Width" msec., "Shape" (half-sine), "#pulses +ve", "#pulses -ve", in the X, Y, and Z axes.
3. Random vibration, "freq"Hz, "Level" G_{rms}, "Length of test", in the X, Y and Z Axes. (Description of Random Test Profile or reference to established spec.

The vibration Setup inputs are shown below in Figures x-xx.

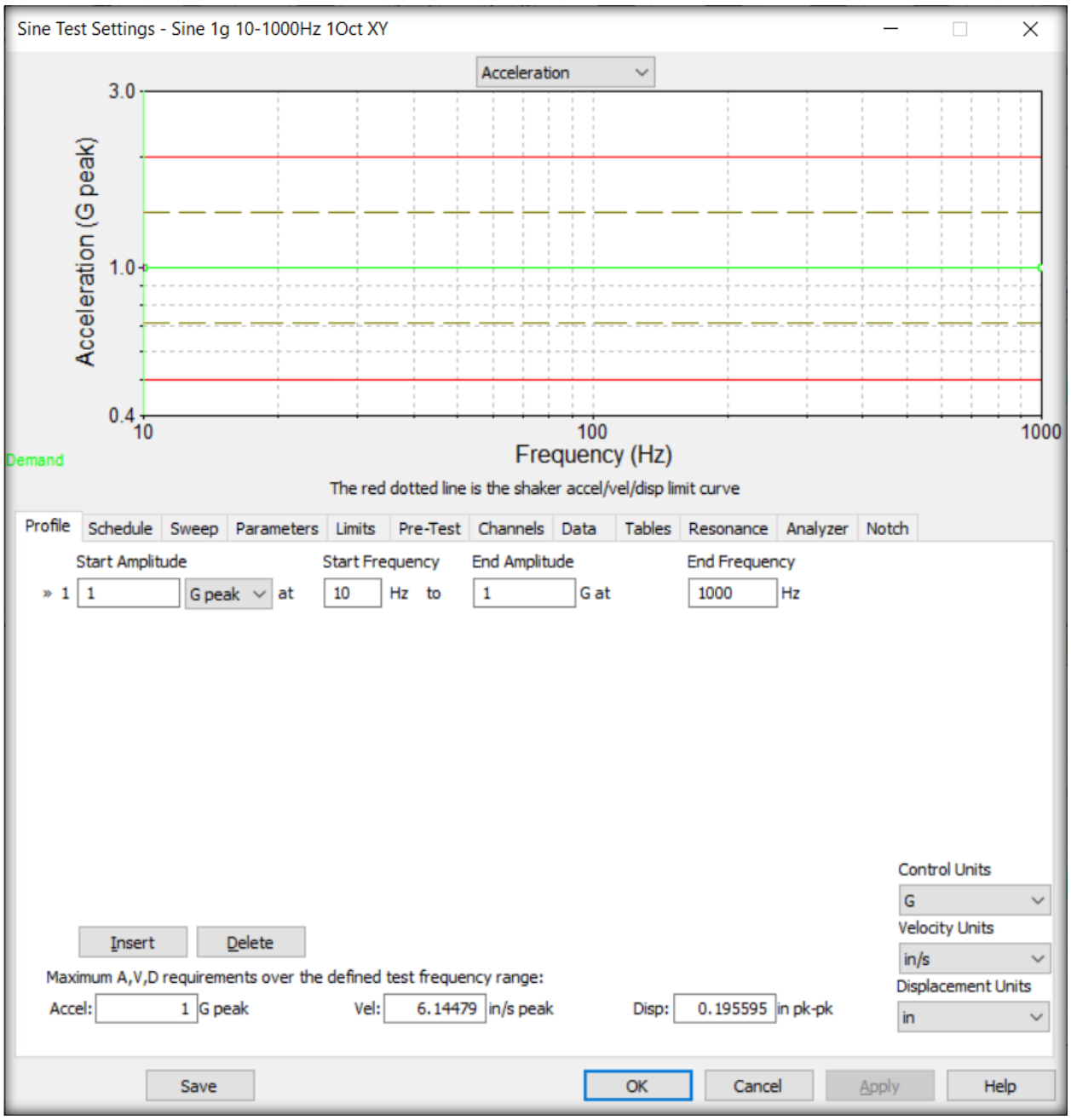


Figure x: Sine Sweep, 10-1000Hz, 1G$_{peak}$, 1 Octave per Minute – Profile

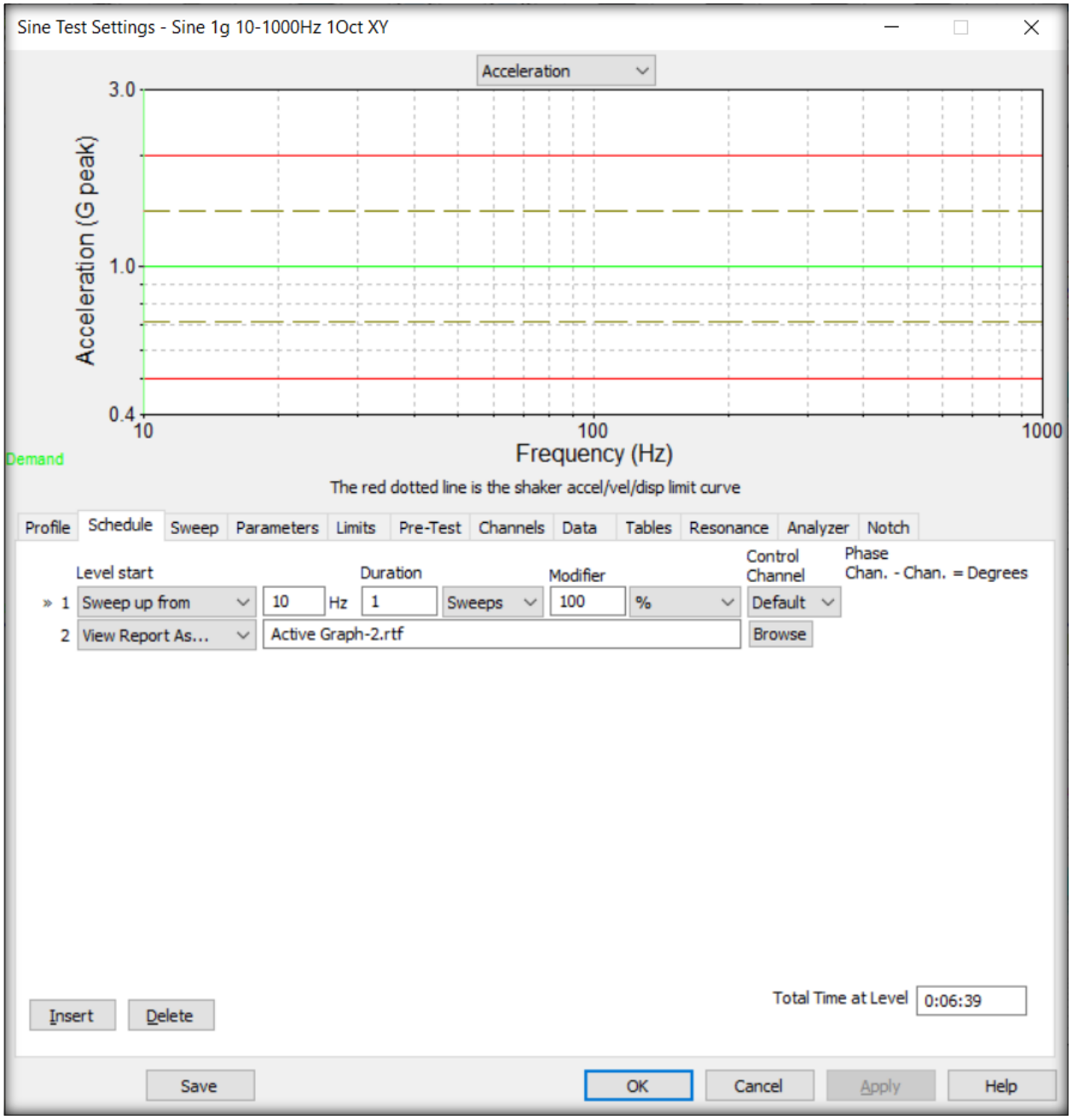


Figure x: Sine Sweep, 10-1000Hz, 1G$_{peak}$, 1 Octave per Minute – Schedule

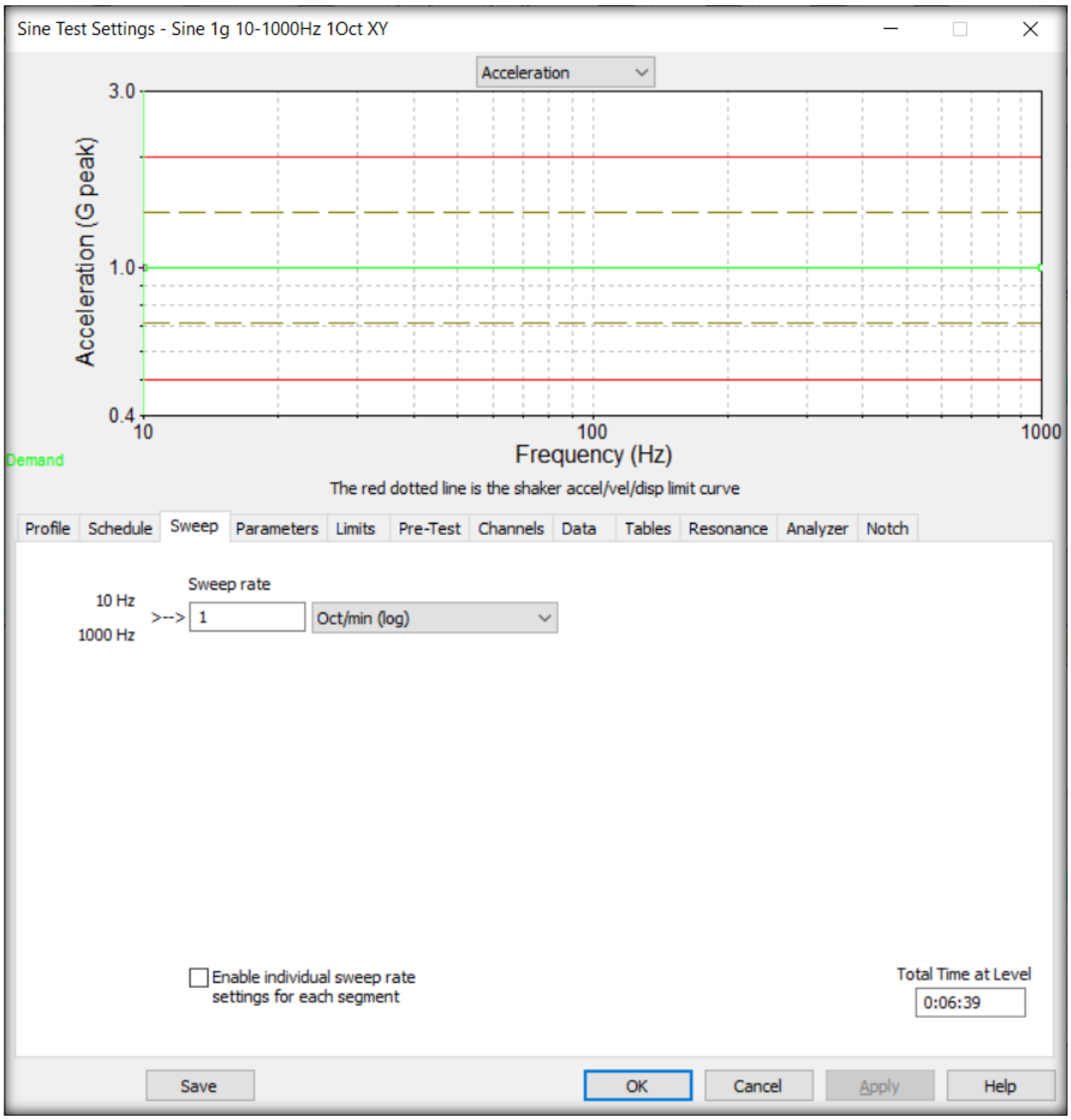


Figure x: Sine Sweep, 10-1000Hz, 1G$_{peak}$, 1 Octave per Minute – Sweep

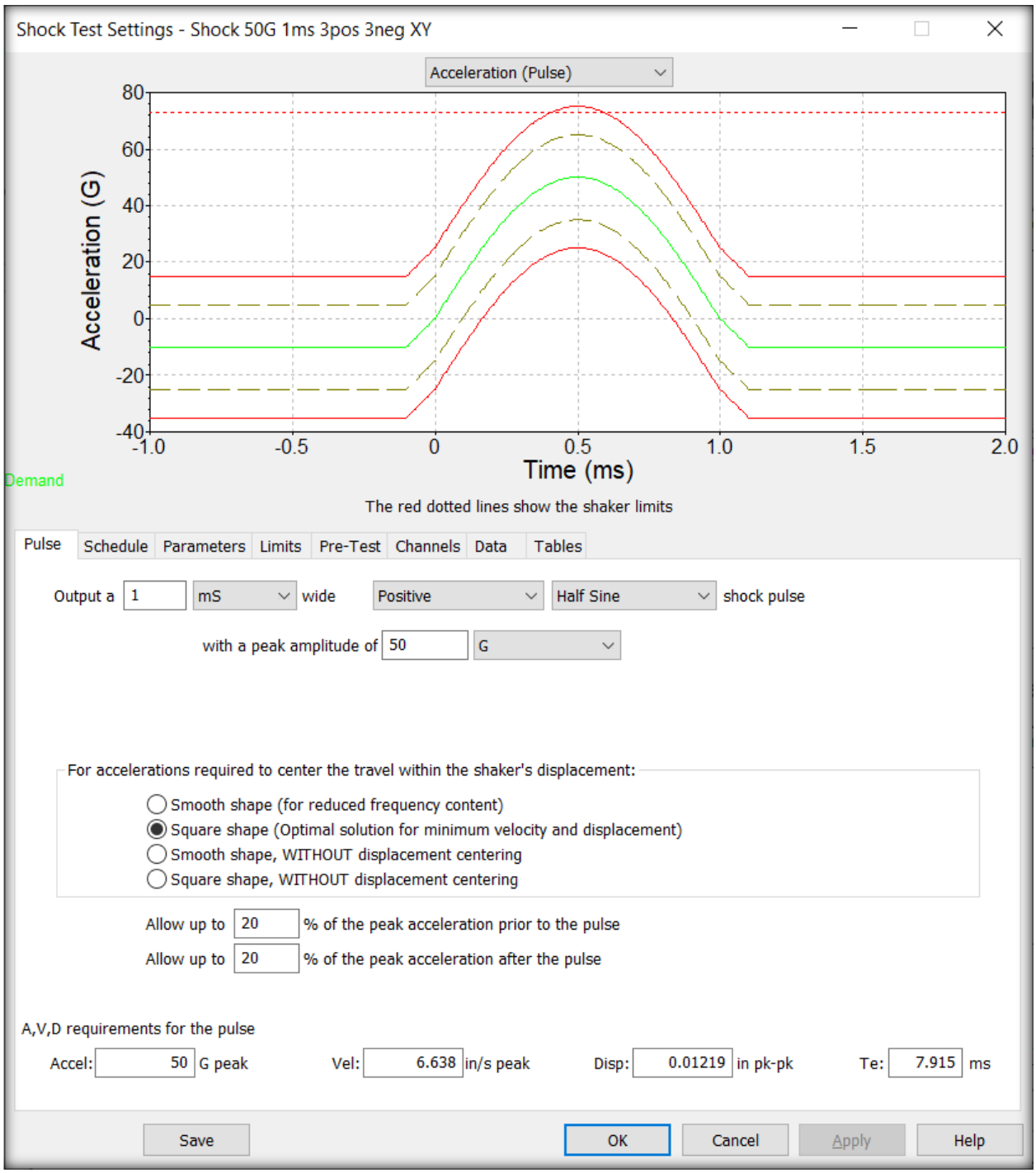


Figure x: Classic Shock, 50G$_{peak}$, 1mS, 3 Positive and Negative pulses – Pulse

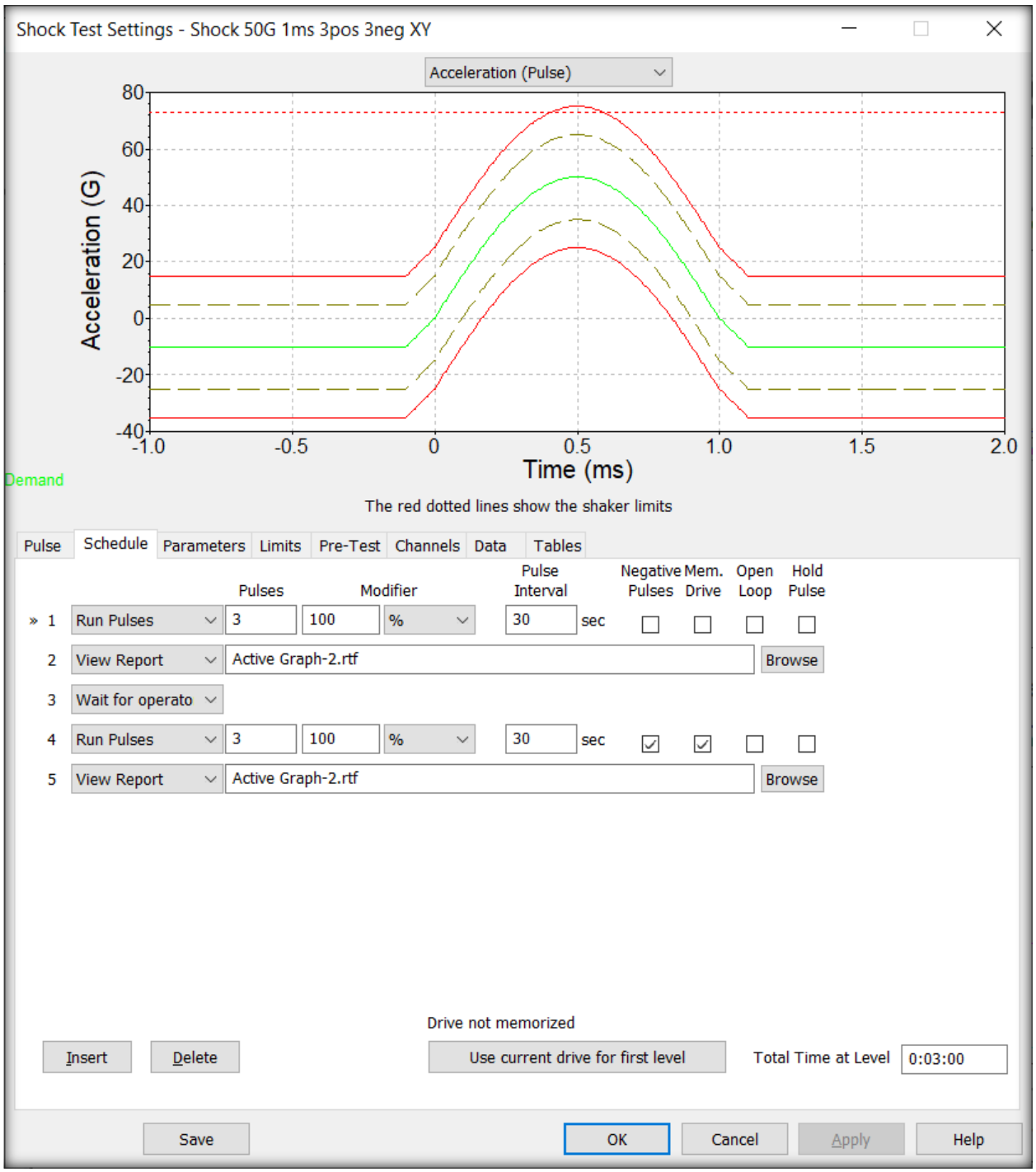


Figure x: Classic Shock, 50G$_{peak}$, 1mS, 3 Positive and Negative pulses – Schedule

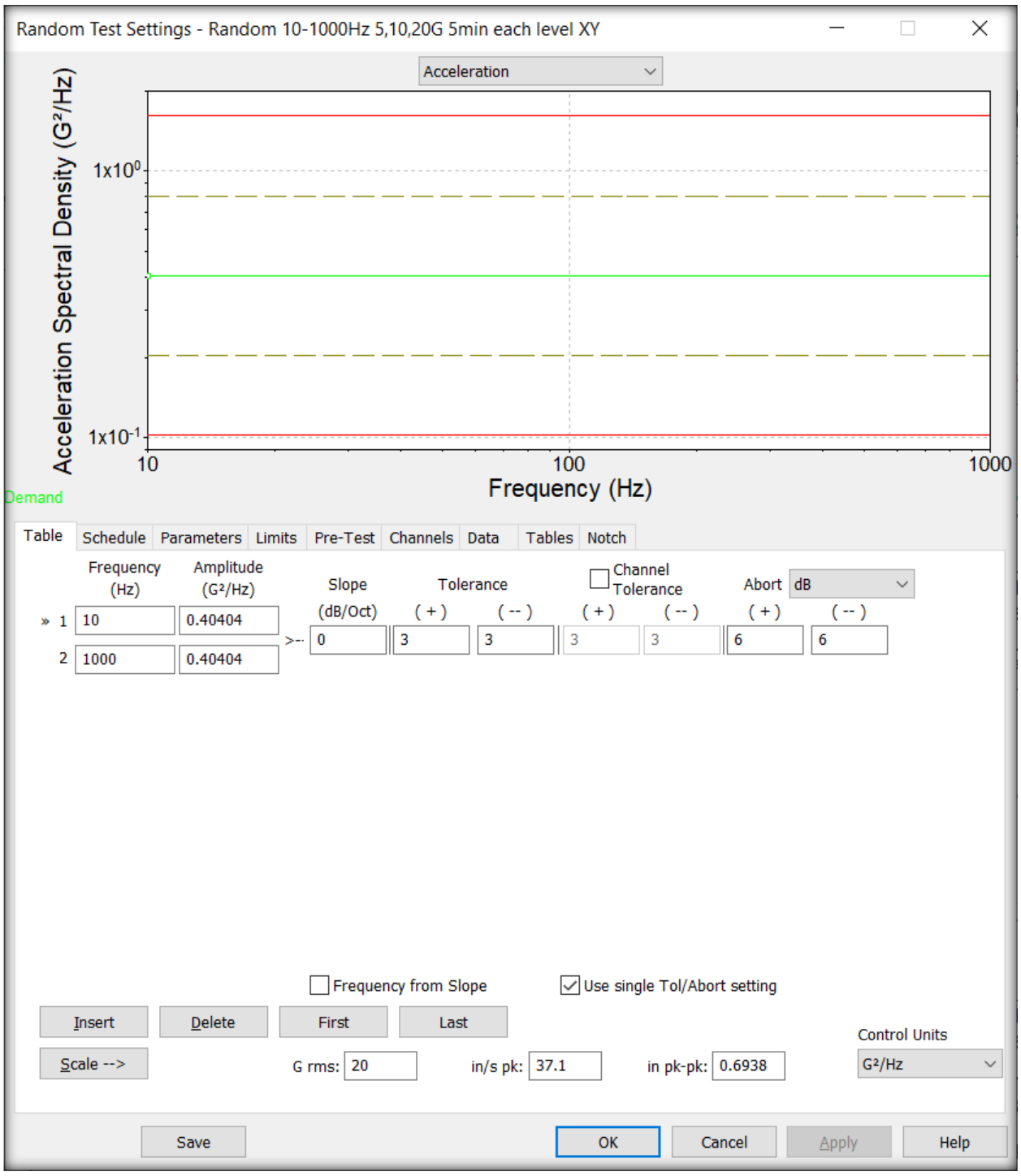


Figure x: Random vibration, 10-1000Hz, 5, 10, and 20G_{rms}, 5 Minutes each level – Table

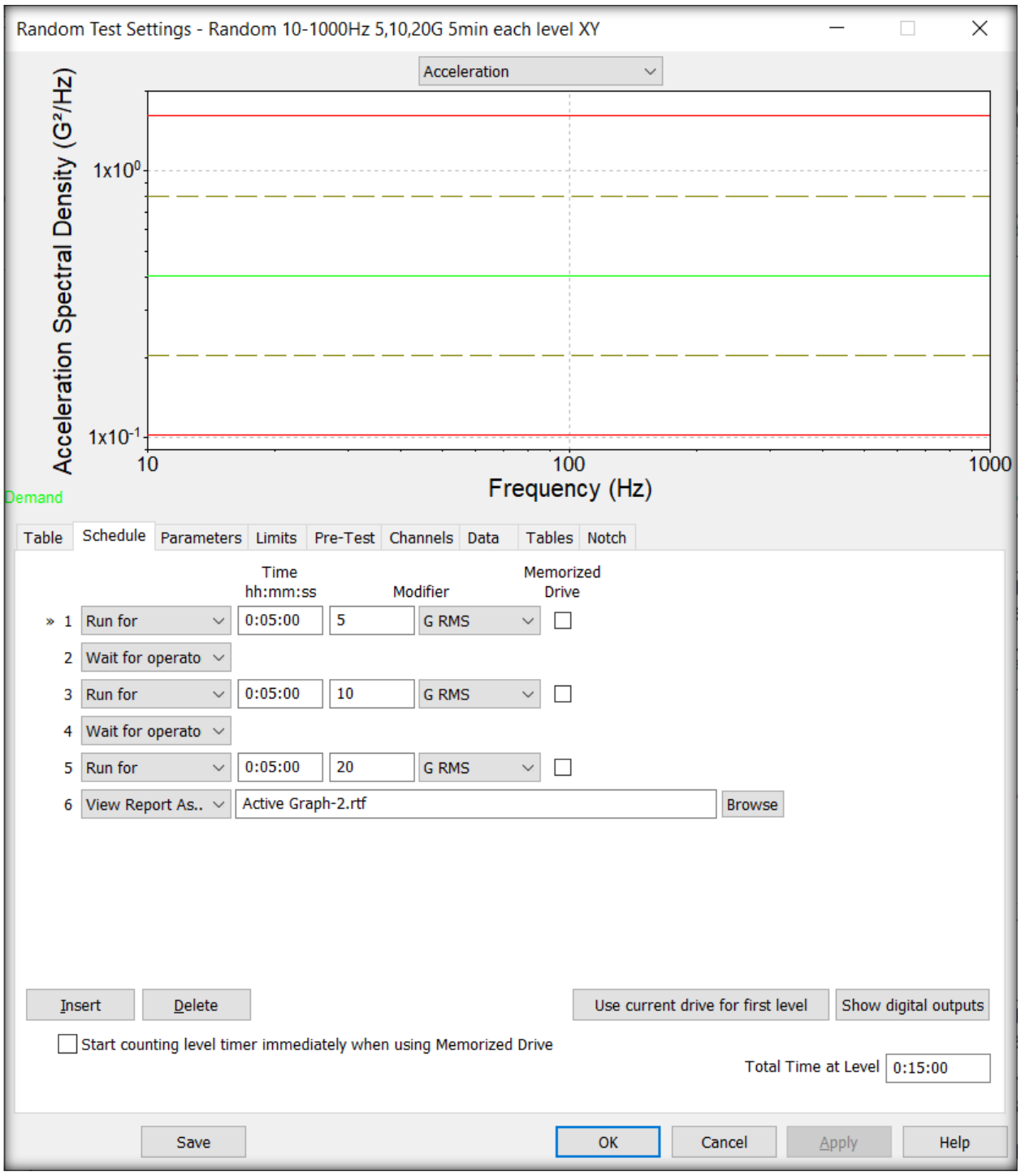


Figure x: Random vibration, 10-1000Hz, 5, 10, and 20G_{rms}, 5 Minutes each level – Schedule

Fixturing

The UUT were secured to the slip table using customer provided custom split radius clamps. The split radius clamps were secured to the table using 3/8-16 socket head cap screws. To differentiate between X and Y axis testing, the UUT were rotated 90° in the split radius clamps. For Z axis testing the split radius clamps were rotated 90° on the slip table. See figures x-xx below for illustrations of the UUT fixturing, along with views of the control and response accelerometer locations for each axis. Note that the customer provided triaxial accelerometer was mounted internally in UUT 1 prior to arriving at DynaQual and therefore is not shown in the photos below.

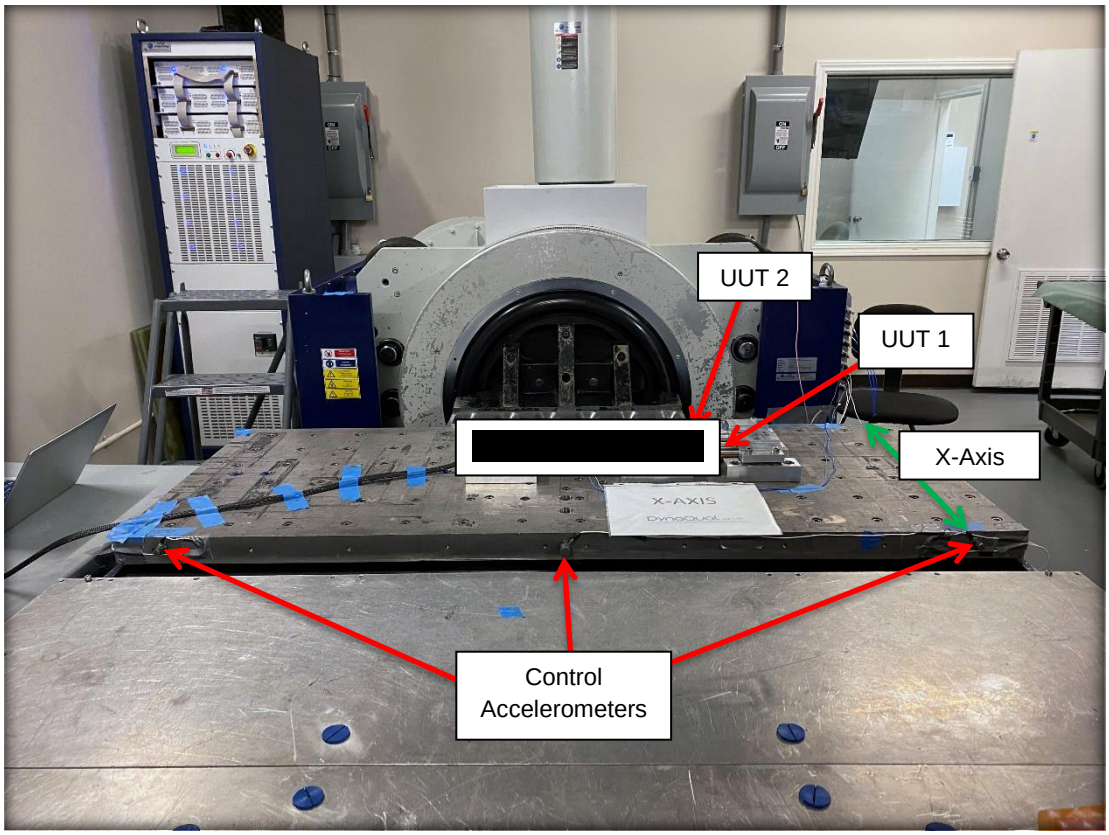


Figure 1: UUT shown fixtured for X axis testing

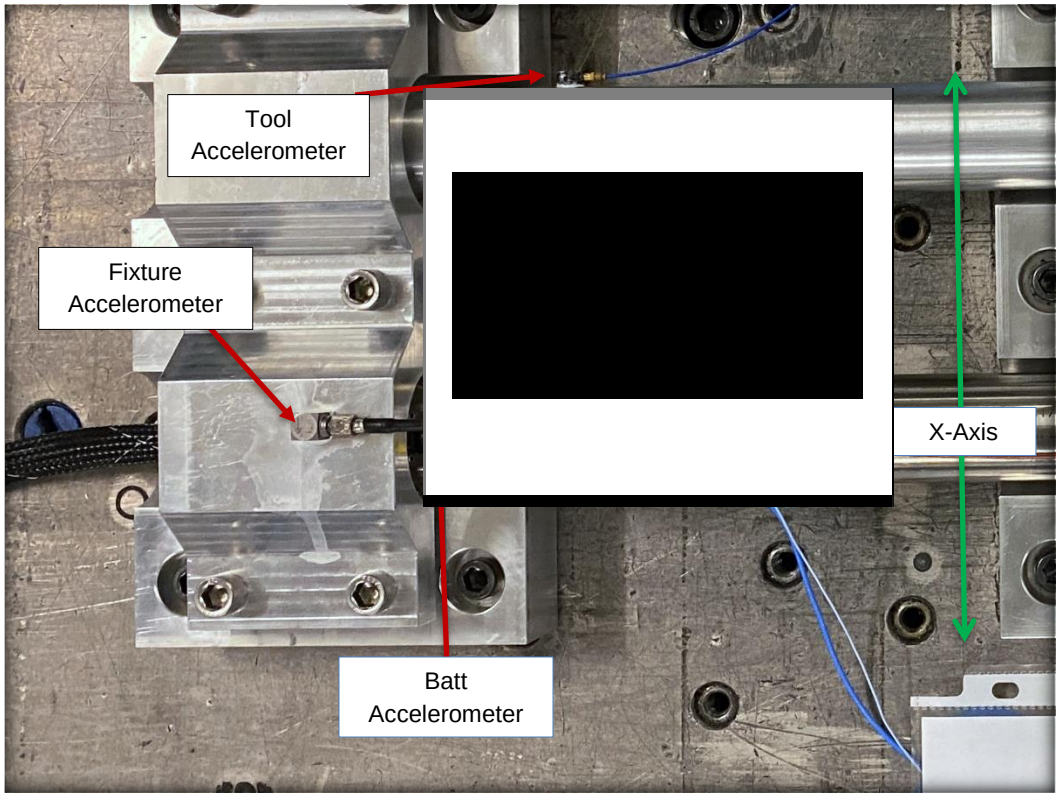


Figure x: Detailed view of response accelerometer locations for X-Axis testing

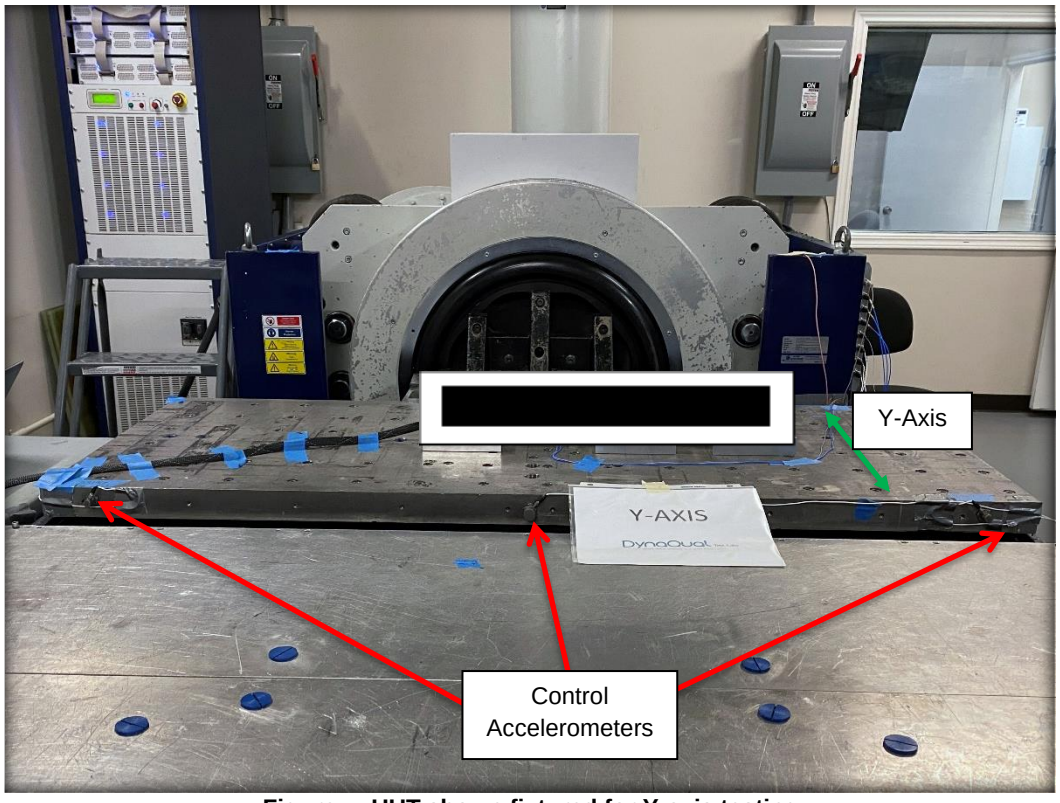


Figure x: UUT shown fixtured for Y-axis testing

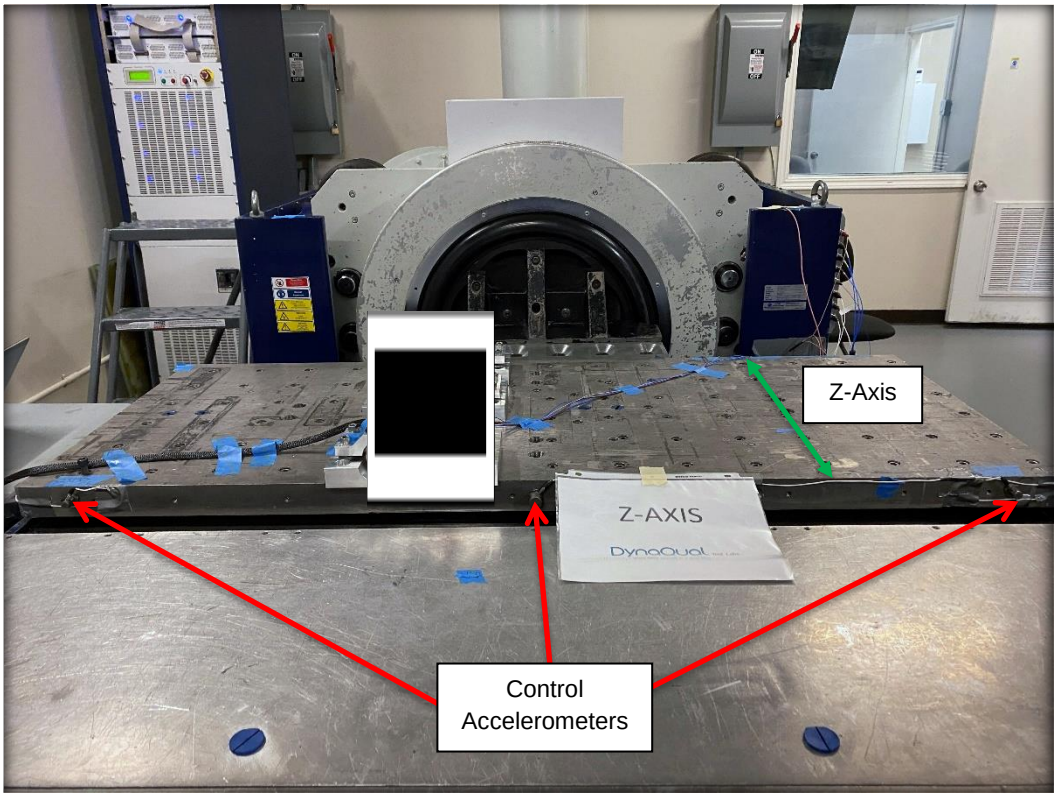


Figure x: UUT shown fixtured for Z-axis testing

Product Functional Testing

UUT-1 was powered and monitored during the vibration testing by Customer personnel. The equipment used to functionally test the UUT is shown below in Figure 24.

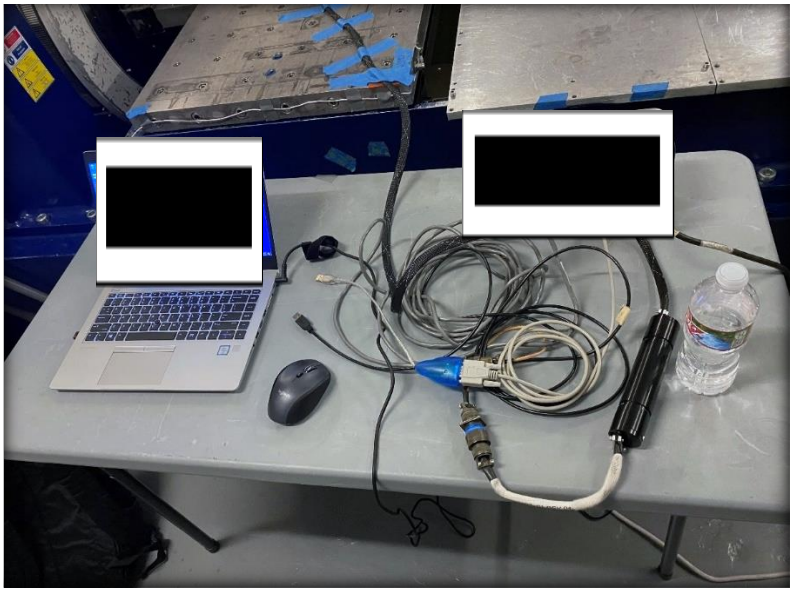


Figure x: Test equipment used to functionally test the UUT

Vibration Testing Program

Table 3 summarizes the vibration test steps for the UUT, showing the type of test, axis, input parameters, any associated notes referencing the data collected, and observations or changes noted. Software generated reports for each test performed are shown below Table 3 and are also provided in the customer data file made available with the distribution of this report.

Table 3 – Vibration Testing Program

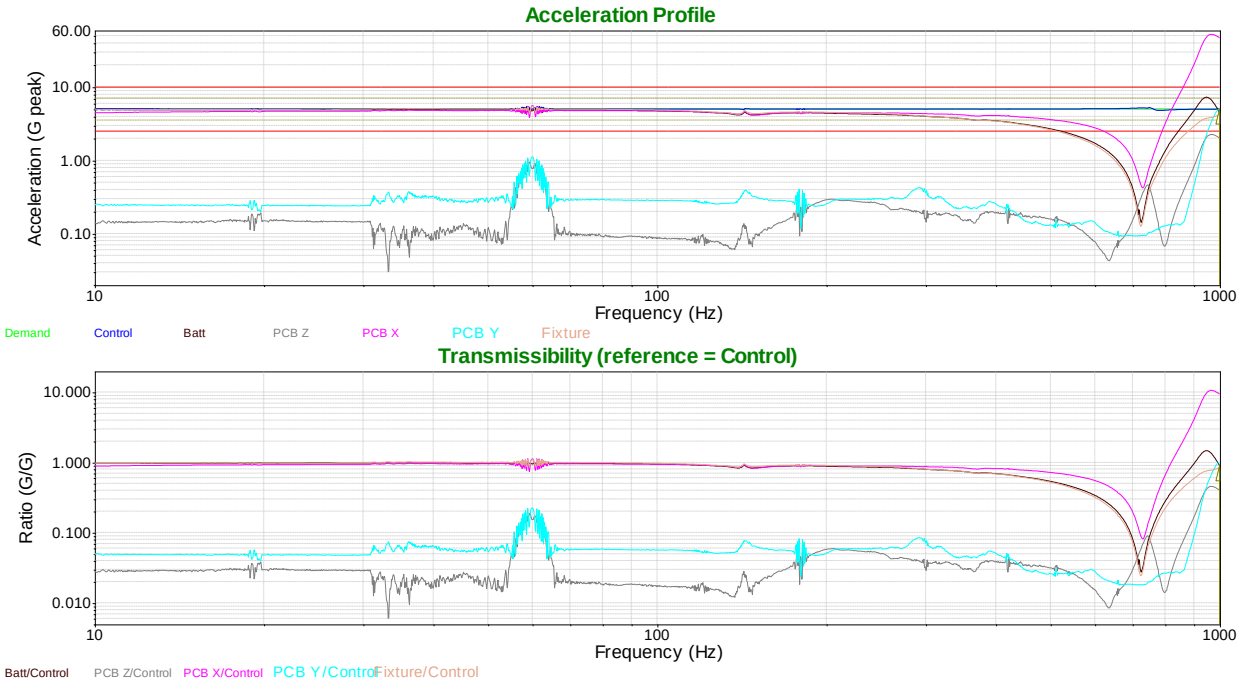
Test #	Axis	Test Type	Freq/Pulse	Amplitude	Rate/Dur.	Notes
1	X	Sine Sweep UP	10-1000Hz	$5G_{peak}$	1 Oct/Min.	
2	X	Random Vibe	10-1000Hz	$20G_{rms}$	60 Mins.	1
3	X	Classic Shock	3 Positive	$50G_{peak}$	1 mS	1
4	X	Classic Shock	3 Negative	$50G_{peak}$	1 mS	1
5	Y	Sine Sweep UP	10-1000Hz	$1G_{peak}$	1 Oct/Min.	
6	Y	Random Vibe	10-1000Hz	$20G_{rms}$	60 Mins.	1
7	Y	Classic Shock	3 Positive	$50G_{peak}$	1 mS	1
8	Y	Classic Shock	3 Negative	$50G_{peak}$	1 mS	1
9	Z	Sine Sweep UP	10-1000Hz	$1G_{peak}$	1 Oct/Min.	
10	Z	Random Vibe	10-1000Hz	$20G_{rms}$	60 Mins.	1
11	Z	Classic Shock	3 Positive	$50G_{peak}$	1 mS	1
12	Z	Classic Shock	3 Negative	$50G_{peak}$	1 mS	1,2

Note:

1. Response accelerometer was used during this test in place of the Tool accelerometer.
2. The vibration testing concluded with no failures reported.
3. Add any other notes worth sharing.

Test x: X Axis
Test Mode: Sine Sweep Up
Frequency: 10-1000 Hz
Rate: 1 Octave per Minute
Amplitude: 5 G_{peak}

Data: C:\VibrationVIEW\Data
Test: C:\VibrationVIEW\Profiles\Customers Profiles\Data stored on



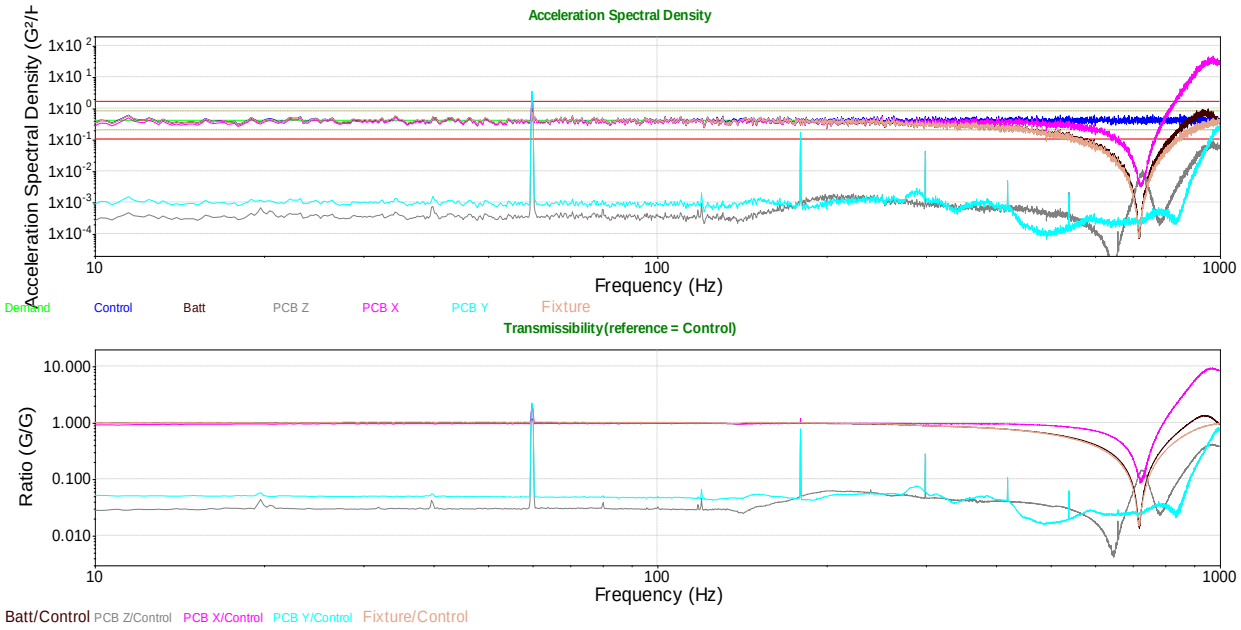
Test level schedule:

	Duration	Level
1)	1 sweeps	100 %
2)	View Report (prompt)	

** Current level: 1, running at 100 % for 0:06:39 of 1 sweeps

Test x: X Axis
Test Mode: Random
Frequency: 10-1000 Hz
Duration: 60 Minutes
Amplitude: 10 G_{rms}

Data: C:\VibrationVIEW\DataTest: C:\VibrationVIEW\Profiles\Customers Profiles



Test level schedule:

	Duration	Level
3)	0:30:00	10 G
4)	Wait for operator	

Test x: X Axis

Test Mode: Classic Shock (+ve pulse)
Shocks: 3
Duration: 2 mS
Amplitude: 25 G_{peak}

Data: C:\VibrationVIEW\Data
Test: C:\VibrationVIEW\Profiles\Customers Profiles\
Data stored on

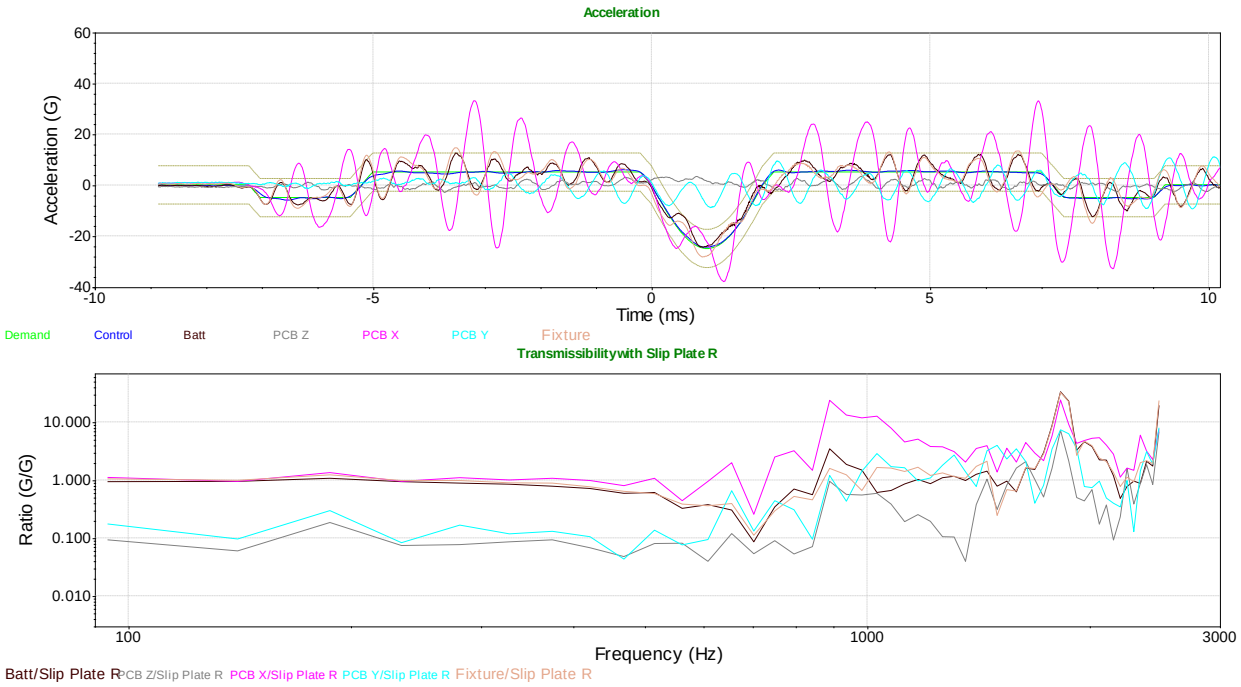
Test level schedule:

	Duration	Level	
1)	3	100 %	
2)	View Report		
3)	Wait for operator		
4)	3	* 100 %	(MD)
5)	View Report		

Test x: X Axis

Test Mode: **Classic Shock (-ve pulse)**
Shocks: **3**
Duration: **2 mS**
Amplitude: **25 G_{peak}**

Data: C:\VibrationVIEW\Data
Test: C:\VibrationVIEW\Profiles\Customers Profiles
Data stored on



Test level schedule:

	Duration	Level	
1)	3	100 %	
2)	View Report		
3)	Wait for operator		
4)	3	* 100 %	(MD)
5)	View Report		

NOTE: Plots for other two axes are also included in a final report. The above are representative profiles

TESTING SUMMARY/CONCLUSIONS

The following summarizes the vibration testing performed for “Customer” on “Date”.

1. DynaQual Test Labs performed vibration testing for “Customer” on one of their “Product Name” assemblies for the purpose of comparing accelerometer responses from their device to that of the vibration system. The testing consisted of sine sweep, random vibration, and classic shock.
2. Sine sweep was performed between the frequencies of x-xxHz, at a level of x G_{peak}, at a rate of 1 octave per minute in the X, Y, and Z axes.
3. Classic shock was applied at a level of x G_{peak} for a period of 5 mS with three positive and 3 negative pulses in the X, Y, and Z axes.
4. Random vibration was applied at a frequency range of x-xxHz, at x G_{rms}, for a period of 60 min., in the X, Y and Z axes.
5. UUT-1 was powered and monitored during the vibration testing.
6. The UUT performed properly, and no failures were observed or reported.
7. The testing provided good data for further analysis by the customer at their facility.
8. There was no PASS/FAIL Criteria for this test plan.

Data File Provided to Customer
(Profile Screen Shots, Graphs, Test Data, Pictures of set up)

END OF REPORT