00403

SEISMIC TEST

ELECTRICAL PANEL-PANOSIS OTOMASYON-PSS-4000 A, FORM 4B

TEST REPORT

RAT-MTL-ELE25-054-R00

Customer: PANOSIS OTOMASYON ELEKTRIK MÜHENDISLIK INŞ. OTOMOTIV SAN. ve TIC. LTD. ŞTI.

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Seriate, 30/09/2025

Function	Name and Surname	Signature
Laboratory Technician	Marco Cardullo	
Manager of the Mechanical Testing Sector	Stefano Casari	

REVISION TRACKS

Date	Version	Description of changes	Reference
30/09/2025	00	First issue	-

The results contained in this Test Report is found exclusively to the items being tested.
The results were good for the sample as received.

The laboratory declines all responsibilities on the data provided by the Customer.

P&P LMC S.r.l. has adopted the ISO 9001:2015 certified Quality Management System, IMQ Certificate n. 9175.ILMC - IQNet Certificate n. IT - 20582.

[#] Data provided by the Customer.
[*] Activity not accredited by ACCREDIA.

SUMMARY

1. GENERAL DATA

1.1. Customer

PANOSIS OTOMASYON ELEKTRIK MÜHENDISLIK INŞ. OTOMOTIV SAN. ve TIC. LTD. ŞTI.
Egemenlik Mahallesi
6106/19 Sokak No:4/1
Bornova – Izmir - TÜRKIYE

1.2. Unit under test (UUT/EUT)

ID Sample	Quantity_(ID unit)	Sampling	Description unit under test	Sample receipt date	Components of the unit
Electric Panel / PSS - 4000A, FORM 4B	1 (25.100) #	Customer	Electrical panel 400V PSS - 4000A Mass: 707,5 kg Dimensions: 1600 (L) x 800 (W) x 2150 (H) mm	15/09/2025	SIEMENS ACB 4000A, SIEMENS ACB 2500A

1.3. Manufacturer

PANOSIS OTOMASYON ELEKTRIK MÜHENDISLIK INŞ. OTOMOTIV SAN. ve TIC. LTD. ŞTI.[#]
Egemenlik Mahallesi
6106/19 Sokak No:4/1
Bornova - Izmir- TÜRKIYE

1.4. Reference documents

1.4.1. Contract documents

a. Offer of P&P LMC S.r.l. no. OFF-MTL-ELE25-047-R00 dated 02/09/2025.

b. Purchase order by acceptance of OFF-MTL-ELE25-047-R00 dated 05/09/2025.

1.4.2. Technical documents

doc. 1.	GR-63-CORE Issue no. 05, date 2017	*Telcordia Technologies Generic Requirements - NEBS TM Requirements: Physical Protection*
doc. 2.	IEC 60068-2-6:2007	*Environmental testing – Part 2-6: Tests – Test Fc: Vibration (sinusoidal)*
doc. 3.	IEC 60068-2-47:2005	*Environmental testing – Part 2-47: Tests – Mounting of specimens for vibration, impact and similar dynamic tests.*
doc. 4.	IEC 60068-2-57: 2013	*Environmental testing – Part 2-57: Tests – Tests Ff: Vibration – Timehistory and sine-beat method*
doc. 5.	IEC 60068-3-3:2019	*Environmental testing – Part 3-3: Supporting documentation and guidance - Seismic test methods for equipment*
doc. 6.	IEC 60068-2-64:2019	*Envariomental testing – Part 2-64: Tests – test Fh:Vibration, broadband randoma and guidance*
doc. 7.	ISO 2041:2018	*Mechanical vibration, shock and conditioning monitoring - Vocabulary*

In the present report the reference documents will be identified by “doc.”.

1.5. Purpose of the tests

The purpose of the tests was to determine that the sample complied with the requirements reported in § 4.4, doc. 5 for “Criterion 0”.

1.6. Testing laboratory

P&P LMC S.r.l.
via Pastrengo, 9
24068 Seriate (BG)
Italy
VAT 02787860168

1.7. Tests date

Beginning date: 16/09/2025
Ending date: 17/09/2025

1.8. Responsibilities

Function	Name and surname	Company
Project manager (pro. PRO-MTL-ELE25-032)	Stefano Casari	P&P LMC S.r.l.
Laboratory technician	Marco Cardullo	P&P LMC S.r.l.
Customer technical interface	Aydin Ata	A Belgelendirme - Aydın ATA
Customer administrative interface	Aydin Ata	A Belgelendirme - Aydın ATA

1.9. Witness during the tests

Function	Name and surname	Company	Date
Laboratory technician	Marco Cardullo	P&P LMC S.r.l.	16/09/2025 to 17/09/2025
Laboratory technician	Lorenzo Maestri	P&P LMC S.r.l.	16/09/2025 to 17/09/2025

2. TESTING PROCEDURES

2.1. General remarks

Vibration tests were performed with a monoaxial electrodynamic vibration shaker. Along the vertical direction they were conducted on the vibration shaker in vertical position. For the horizontal directions the vibration shaker was rotated 90° and connected to a horizontal hydraulic slip-table. The directions of excitation and the coordinate reference system are shown in Figure 2.

2.2. Mounting technique

For the seismic test, the base of the unit was fixed onto the expander 1500x1500 mm of the vibration shaker by means of steel stirrups and n. 17 M14 bolts, with tightening at a torque of 80 Nm (ref. Photo 5), to reproduce the assembly operating conditions established by the Customer.
The head expander was fixed on the vibration shaker armature with n.16 M14 bolts with a tightening torque of 80 Nm.

2.3. Control and measuring positions

For motion control the mono-axial accelerometer (CP1) was placed on the expander in the direction of motion.
The chosen control strategy was to consider the average of the signals recorded by the control accelerometer (CP), shown in the legend of the test graphs with the AvgCtrl nomenclature.
The tri-axial accelerometers (MP1, MP2) were placed on the unit in the measuring spots.
The accelerometers were fixed by screwing them to a base at 1,5 Nm, then glued with methacrylate and on PET Liner adhesive tape treated with a special anti-adhesive for silicones.
The accelerometer MP3 was used as check point.
The MP accelerometers were used to recognise the resonance frequencies using the peaks of amplification factor (Q) and the corresponding phase angle.
The deflection at the top of the framework EUT's relative to its base (§ 5.4.1.2, doc. 1) was calculated in the direction of motion by double integration of the MP2 and MP3 acceleration time-histories and then by subtraction of their displacement time-histories.

The following table summarizes the control and measurement positions (CP and MP), identifying the transducers and their location during the tests.

Point ID	Description	Type	s/n	Direction	Output channel
CP1	Control point placed on top of the expander in the same direction of the motion.	Mono-axial	25210410 + LW48422	+Z, +X, +Y	01
MP1	Measuring point in the middle of the unit	Tri-axial	25210410 + 9829	-Z +Y -X	04 05 06
MP2	Measuring point placed on the top of the unit	Tri-axial	25210410 + 9830	-Z -Y +X	07 08 09
MP3	Measuring point placed near to the fixing point of the unit	Tri-axial	25210410 + 11804	-X +Y +Z	10 11 12

A digital camera with 1280 x 720 Pixel resolution and 30 fps (0,033 s < 0,1 s) was used to record the video, clearly recording the front view of the frame and the movement of the top of the EUT relative to its base (required by § 5.4.1.2, doc. 1).

2.4. Tests Description

The order of execution in the three directions was agreed with the Customer and was: Z, Y and X. The sequences of tests are as follows:

ID	Description	References	Carried out by
a)	Initial visual inspection for deformations or mechanical alterations.	-	P&P LMC S.r.l.
b)	Initial vibration response investigation test in the Z direction and analysis the resonance frequencies found based on the amplification factor.	§ 8.2, doc. 2 § 9.2, doc. 5	P&P LMC S.r.l.
c)	Perform the earthquake test in the X direction	§§ 4.4, 5.4, doc. 1 § 4.4, doc. 4	P&P LMC S.r.l.
d)	Final vibration response investigation test in the X direction. Comparison of the initial and final resonance frequencies.	§ 8.2, §§ 11, A.9, doc. 2 § 9.2, doc. 5	P&P LMC S.r.l.
e)	Final visual inspection for deformations or mechanical alterations.	-	P&P LMC S.r.l.
f)	Repeated steps b) to e) for Y direction and then Z direction	-	P&P LMC S.r.l.

2.4.1. Vibration response investigation – Sweep sine

The unit was subjected to sinusoidal sweep with the dynamic characteristics shown in the following table, along the Y, X and Z directions. The purpose of these tests was to find the resonance frequencies of the unit.

RESONANCE FREQUENCY SEARCH - Sweep sine (§ 5.4.1.5, doc. 1; § 8.2, doc. 2 and § 8.2 doc. 4)			
Conditions		Not operational during the test	
Frequency range	**Level (peak)**	**Sweep rate**	**Number of sweeps**
1,00[1] ÷ 50,00 Hz	± 0,10 g	1 oct/min	2 (down and up)
Duration			
09 min 17 s			
Filters			
High pass filter 0,5 Hz and Low pass filter 102400 Hz. "Harmonic estimator" to evaluate the amplitude (Q) of resonance frequency.			
Tolerances			
± 15 % on the control signal at the reference point (§ 4.1.4.1, doc. 2). ± 25 % @ ≤ 500 Hz on the control signal at the check point (MP3) (§ 4.1.4.2, doc. 2). ± 10 % @ 0,5 ÷ 5,0 Hz; ± 0,5 Hz @ 5 Hz ÷ 100 Hz on the critical frequencies measuring (§ 4.1.5.3, doc. 2). 50 % @ ≤ 500 Hz of specified amplitude at the check points (MP3) in any axis perpendicular to the excitation direction (§ 4.1.2.1, doc. 2). ± 10 % of the sweep rate (§ 4.1.6, doc. 2).			
Amplification factor (Q)			
Where there is a peak of Q with a phase change of 90°			
Criterion of conformity[2]			
Comparison of the initial and final resonant frequencies as per §§ 11, A.9, doc. 2 without acceptance or refusal.			

[1] Or the minimum achievable frequency due to the vibration shaker limits.

[2] The performances requirements and declaration of compliance of the unit operation (No loss of functionality) is performed by the P&P LMC s.r.l only for the specified checks. P&P LMC S.r.l. declares compliance only according to a visual inspection to assess deformations and mechanical alterations.

2.4.2. Vibration response investigation – Random[3]

RESONANCE FREQUENCY SEARCH - Random (§ 8.2, doc. 6 and § 8.2 doc. 4)			
Conditions		Not operational during the test	
Frequency range	**Level (peak)**	**Crest factor**	**r.m.s. (g)**
1,00[4] ÷ 50,00 Hz	± 0,10 g	3	0,05
Time at level 0 dB		**DOF**	
10min		>120	
Filters			
High pass filter 0,5 Hz and Low pass filter 102400 Hz. "Harmonic estimator" to evaluate the amplitude (Q) of resonance frequency.			
Tolerances			
± 3 dB on the control signal at the reference point (§ 4.6.1, doc. 6). ± 10 % of r.m.s value acceleration on the control signal at the at the reference point (§ 4.6.1, doc. 6). 3 dB < @ 500 Hz; of the specified ASD value on the cross axis at the check point (MP3) (§ 4.6.1, doc. 6). Total r.m.s. value of acceleration on the cross axis < 50 % of the R.M.S. value of the specified axis (§ 4.1.6.1, doc. 6).			
Amplification factor (Q)			
Where there is a peak of Q with a phase change of 90°			
Criterion of conformity[5]			
-			

[3] The Random vibration test was carried due to impossibility to conduct the VRI with the sine vibration due to the dynamic behavior of the unit along X direction.

[4] Or the minimum achievable frequency due to the vibration shaker limits.

[5] The performances requirements and declaration of compliance of the unit operation (No loss of functionality) is performed by the P&P LMC s.r.l only for the specified checks. P&P LMC S.r.l. declares compliance only according to a visual inspection to assess deformations and mechanical alterations.

2.4.3. Earthquake test method

The unit was tested with the pulse values shown in the following table, along the X, Y and Z directions, under conditions and duration prescribed by the Customer and doc. 1.

EARTHQUAKE TEST METHOD (§§ 4.4, 5.4, doc. 1 and §4.4, doc. 3)	
Conditions	Operational during testing (400V power supply)
Severity level	Zone 4
RRS	
Frequency [Hz]	**Floor acceleration [g]**
0,30	0,20
0,60	2,00
2,00	5,00
5,00	5,00
15,00	1,60
50,00	1,60
Viscous damping ratio (ξ)	2 % → Q factor = 25 → 1/6 octave bands (ref. § 5.4.1.2, doc. 1)
Zero Period Acceleration (ZPA)	1,60 g → directions Y, X and Z
Duration	30 s
Sample rate	400 Hz → ≥ 200 Hz (ref. § 5.4.1.2, doc. 1)
Filters	
High Pass filter 0,5 Hz; Low pass filter 102400 Hz.	
Tolerances	
± 25 % of the specified peak value in the time history at check point (MP3) in any axis perpendicular to the excitation direction (ref. § 4.4.2, doc. 3). ≤ +30 % @ 1 ÷ 7 Hz of RRS (ref. § 5.4.1.5, doc. 3). 0 ÷ +50 % of RRS; > 50 % is permitted @ > 1/3·f_2 (ref. § 4.4.4, doc. 3). If a small portion of the individual points lies outside the tolerance zone the test must still be acceptable (ref. §§ 4.4.4, A.1.2, doc. 3).	
Conformity criterion	
Qualification criteria (according to § 4.4, doc. 4): Criterion 0: Equipment subjected to seismic testing which experienced no malfunction either during or after the test.	

2.4.3.1. Method deviation

Due the vibration shaker technical characteristics the requirement of displacement as per § 5.4.1.2, doc. 1, “The usable peak-to-peak stroke of the shaker shall be a minimum of 250 mm (10 in)”, is reduced to the maximum stroke peak-to-peak 50,8 mm. Then, the acceleration time history waveform of VERTEQII (§ 5.4.1,doc. 1) was cut by applying a bandpass, starting from the minimum frequency at 2,80 Hz.

3. MEASURING, EXCITATION AND DATE PROCESSING EQUIPMENT

3.1. Equipment

Description	Manufacturer	Model	s/n	Internal ID	Calibration certificate	Calibration date
Mono-axial electrodynamic vibration shaker Maximum sinusoidal dynamic force: 100 kN Coil mass: 100 kg Frequency range: 0÷2000 Hz Max. displacement (peak-peak): 50,8 mm Max. accel.: 100 g	Elin	MZV 210 W 20	713255	MTL01SH02	-	-
Slip table Magnesium table moved with n. 4 hydrostatic bearings	Elin	MZL 1-070T 30	184314, 184315 184317, 184318 184319, 184320	MTL01TV01	-	-

3.2. Measure equipment

Description	Manufacturer	Model	s/n	Internal ID	Calibration certificate	Calibration date
Acquisition system channel 1 + acc. mono-axial (CP1)	Siemens + PCB Piezotronics, Inc	SCM2E05V + 393B04	25210410 + 48422	CH1 (MTL06SC00 + 48422)	LAT 178 S050/25	25/02/2025
Acquisition system channels 04, 05, 06 + acc. tri-axial (MP1)	Siemens + Dytran Instruments Inc	SCM2E05V + 3023A6	25210410 + 9829	CH4 (MTL06SC00 + MTL21AC01) CH5 (MTL06SC00 + MTL21AC01) CH6 (MTL06SC00 + MTL21AC01)	LAT 178 S014/25 LAT 178 S015/25 LAT 178 S016/25	11/02/2025
Acquisition system channels 07, 08, 09 + acc. tri-axial (MP2)	Siemens + Dytran Instruments Inc	SCM2E05V + 3023A6	25210410 + 9830	CH7 (MTL06SC00 + MTL22AC01) CH8 (MTL06SC00 + MTL22AC01) CH9 (MTL06SC00 + MTL22AC01)	LAT 178 S017/25 LAT 178 S018/25 LAT 178 S019/25	13/02/2025

Acquisition system channels 10, 11, 12 + acc. tri-axial (MP3)	Siemens + Dytran Instruments Inc	SCM2E05V + 3023A6	25210410 + 11804	CH10 (MTL06SC00 + MTL23AC01) CH11 (MTL06SC00 + MTL23AC01) CH12 (MTL06SC00 + MTL23AC01)	LAT 178 S020/25 LAT 178 S021/25 LAT 178 S022/25	13/02/2025
Mini data logger to environmental temperature measurement Accuracy: ±0,5 °C Resolution: 0,1 °C	Testo	174T	58908750	MTL02EV00	P&P LMC 06_2025	18/02/2025
Mini data logger to environmental temperature measurement Accuracy: ±0,5 °C Resolution: 0,1 °C	Testo	174T	58905544	MTL01EV00	P&P LMC 05_2025	18/02/2025
Dynamometer 6.000 kg, emax = 2 kg	-	MCWLT6	61835	MTL01FR09	P&P LMC 0551/23	18/04/2023
Torque wrench 20 ÷ 100 Nm; Resolution 0,25 Nm;	USAG	810N 100	V120422	MTL05CS00	LAT 166 25-G0338	25/06/2025
Torque bar, 1÷5 Nm Resolution 0,05 Nm;	USAG	811N 5	D050837	MTL14CS00	LAT 166 25-G0343	25/06/2025

The main features of the accelerometers are as follows:

Manufacturer	**Model**	**Nominal sensibility**	**Transverse sensibility (max)**	**Frequency range**	**Maximum acceleration**	**Resolution**	**Weight**
PCB Piezotronics, Inc	393B04	1000 mV/g	< 5%	1 ÷ 1700 Hz	+/- 5 g	0,01 g	0,50 N
Dytran Instruments, Inc	3023A6	5 mV/g	≤5 %	1,5 ÷ 5000 Hz (axis 1 e 2) 1,5 ÷ 10000 Hz (axis 3)	+/- 1000 g	0,010g	0,04 N

The instrumentation is subjected to a calibration program in accordance with internal procedures.

3.3. Data acquisition and processing equipment

Description	Manufacturer	Model	s/n	Internal ID	Calibration certificate	Calibration date
SCADAS Mobile 5 slots (with n. 2 SCM-V8-E 8 ch, n. 1 SCM-UPS Power supply and n. 1 LMS SCADAS Mobile 8 ch NVH	Siemens (Simcenter)	SCM2E05V	25210410	MTL06SC00	1478/23	22/12/2023
Control and acquisition software	Siemens (Simcenter)	Software Sim.Center TestLab ver. 2021.1	-	-	-	-

During the tests, the shaker was controlled by a SCADAS system consisting of a 24-channel acquisition unit and a Personal Computer with Sim.Center Test.Lab software. This control system generates the required motion profile with a closed loop control chain, fed back using the signal from the accelerometer chosen for the control.
The analog signals from the accelerometers are conditioned by the same SCADA unit and once digitized, are transmitted to the computer responsible for their collection within the test Database and the necessary processing and calculation phases.
The block diagram of the excitation, acquisition and processing system is shown in Figure 1.

3.4. Uncertainty of the measure

The extended uncertainty U is estimated by the laboratory with a confidence level of 95% and coverage factor k equal to 2.

Uncertainty of measurement chain:

- Uncertainty acceleration [g]: U: ± 30 % @ < 1,00 Hz; ± 20 % @ 1,00 ÷ < 3,00 Hz; ± 5 % @ 3,00 ÷ 2.000,00 Hz.
  Only for acc. 393B04: ± 8% @ 315,00 ÷ 1.000,00 Hz
- Uncertainty frequency [Hz]: U: ± 0,3 %.

4. TEST RESULTS

4.1.1. Vibration response investigation

The following table shows the characteristic parameters (frequency, amplification factor and the relationship between final and initial frequency) of the detected resonance frequencies in the measuring positions.
To detect resonance frequencies by Frequency Response Function (FRF), the peak value of amplitude and corresponding phase has been considered.
The MP accelerometers were used to recognize the resonance frequencies using the amplification factor (Q).

Z DIRECTION						
Point ID	**Sweep Direction**	**Beginning**		**Ending**		**fE/fB**
		Freq. [Hz]	**Q [adim]**	**Freq. [Hz]**	**Q [adim]**	**[%]**
MP1	Up	25,21	2,23	25,14	2,23	-0,3%
MP2	Up	26,72	2,43	26,5	2,53	-0,8%

X DIRECTION						
Point ID	**R.m.s. (g)**	**Beginning**		**Ending**		**fE/fB**
		Freq. [Hz]	**Q [adim]**	**Freq. [Hz]**	**Q [adim]**	**[%]**
MP1	0,05	10,10	5,68	10,40	5,06	3,0%
MP2	0,05	10,80	11,65	10,40	9,85	-3,7%

Y DIRECTION						
Point ID	**Sweep Direction**	**Beginning**		**Ending**		**fE/fB**
		Freq. [Hz]	**Q [adim]**	**Freq. [Hz]**	**Q [adim]**	**[%]**
MP1	Up	9,43	6,22	8,01	7,00	-15,1%
MP2	Up	9,64	10,72	8,01	12,07	-16,9%

These results are to be confronted with the limit indicated at §2.4.1.

4.1.2. Tests along Z direction

ID sample[#]	ID Unit[#]	Date execution test	Test method	Test parameters	Inspection after test and results	Reference technical documents	Reference value	Declaration of conformity[2]
Electric Panel / PSS - 4000A, FORM 4B	1 (s/n: 25.100)	Beginning 16/09/2025 Ending 16/09/2025	(Initial vibration response investigation) § 8.2, IEC 60068- 2-6:2007 § 5.4.1.5 Telcordia Technologies Generic Requirements GR-63-CORE Issue no. 05, date 2017 § 9.2, IEC 60068- 3-3:2019	Conditions: Not operational during testing **RUN01** Test Parameters: See § 2.4.1 Tolerances not respected: 50 % @ ≤ 500 Hz of specified amplitude at the check points (MP3) in any axis perpendicular to the excitation direction Temperature env.: 24 ÷ 25 °C Temperature env.: 24 ÷ 25 °C	See §§ 4.1.1 Tolerances not respected: See Figure 6	-	-	-
		Beginning 16/09/2025 Ending 16/09/2025	(Earthquake test method) § 5.4, Telcordia Technologies Generic Requirements GR- 63-CORE § 4.4, IEC 60068- 2-57:2013	Conditions: Operational during testing (400V power supply) **RUN02** Test Parameters: See § 2.4.2 Tolerances not respected: ≤ +30 % @ 1 ÷ 7 Hz of RRS. 0 ÷ +50 % of RRS ; > 50 % is permitted @ > 1/3·f2 If a small portion of the individual points lies outside the tolerance zone the test must still be acceptable. Temperature env.: 24 ÷ 25 °C	Visually unaltered after testing Tolerances not respected: See Figure 11	§ 4.4, IEC 60068-3-3:2019	Criterion 0: Equipment subjected to seismic testing which experienced no malfunction either during or after the test.	Compliant (Conformity verified only by visual inspection)
		Beginning 16/09/2025 Ending 16/09/2025	(final vibration response investigation) § 8.2, IEC 60068- 2-6:2007 § 5.4.1.5 Telcordia Technologies Generic Requirements GR-63-CORE Issue no. 05, date 2017 § 9.2, IEC 60068- 3-3:2019	Conditions: Not operational during testing **RUN03** Test Parameters: See § 2.4.1 Tolerances not respected: 50 % @ ≤ 500 Hz of specified amplitude at the check points (MP3) in any axis perpendicular to the excitation direction Temperature env.: 24 ÷ 25 °C	See §§ 4.1.1 Tolerances not respected: See Figure 16	§§ 11, A.9 IEC 60068-2-6:2007	Comparison of the initial and final resonant frequencies without acceptance or refusal criteria provided by the Customer.	-

4.1.3. Tests along Y direction

ID sample[#]	ID Unit[#]	Date execution test	Test method	Test parameters	Inspection after test and results	Reference technical documents	Reference value	Declaration of conformity[2]
Electric Panel / PSS - 4000A, FORM 4B	1 (s/n: 25.100)	Beginning 17/09/2025 Ending 17/09/2025	(initial vibration response investigation) § 8.2, IEC 60068-2-6:2007 § 5.4.1.5 Telcordia Technologies Generic Requirements GR-63-CORE Issue no. 05, date 2017 § 9.2, IEC 60068-3-3:2019	Conditions: Not operational during testing **RUN04** Test Parameters: See § 2.4.1 Tolerances not respected: -± 15 % on the control signal at the reference point Temperature env.: 24 ÷ 25 °C	See §§ 4.1.1 Tolerances not respected: See Figure 17	-	-	-
		Beginning 17/09/2025 Ending 17/09/2025	(Earthquake test method) § 5.4, Telcordia Technologies Generic Requirements GR-63-CORE § 4.4, IEC 60068-2-57:2013	Conditions: Operational during testing (400V power supply) **RUN05** Test Parameters: See § 2.4.2 Tolerances not respected: ≤ +30 % @ 1 ÷ 7 Hz of RRS. 0 ÷ +50 % of RRS; > 50 % is permitted @ > 1/3·f2 If a small portion of the individual points lies outside the tolerance zone the test must still be acceptable. Temperature env.: 24 ÷ 25 °C	Visually unaltered after testing Tolerances not respected: See Figure 11	§ 4.4, IEC 60068-3-3:2019	Criterion 0: Equipment subjected to seismic testing which experienced no malfunction either during or after the test.	Compliant (Conformity verified only by visual inspection)
		Beginning 17/09/2025 Ending 17/09/2025	(final vibration response investigation) § 8.2, IEC 60068-2-6:2007 § 5.4.1.5 Telcordia Technologies Generic Requirements GR-63-CORE Issue no. 05, date 2017 § 9.2, IEC 60068-3-3:2019	Conditions: Not operational during testing **RUN06** Test Parameters: See § 2.4.1 Tolerances not respected: -± 15 % on the control signal at the reference point Temperature env.: 24 ÷ 25 °C	See §§ 4.1.1 Tolerances not respected: See Figure 27	§§ 11, A.9 IEC 60068-2-6:2007	Comparison of the initial and final resonant frequencies without acceptance or refusal criteria provided by the Customer.	-

4.1.4. Tests along X direction

ID sample[#]	ID Unit[#]	Date execution test	Test method	Test parameters	Inspection after test and results	Reference technical documents	Reference value	Declaration of conformity[2]
Electric Panel / PSS - 4000A, FORM 4B	1 (s/n: 25.100)	Beginning 17/09/2025 Ending 17/09/2025	(initial vibration response investigation) § 8.2, IEC 60068-2-64:2019 § 5.4.1.5 Telcordia Technologies Generic Requirements GR-63-CORE Issue no. 05, date 2017 § 9.2, IEC 60068-3-3:2019	Conditions: Not operational during testing **RUN07** Test Parameters: See § 2.4.1 Tolerances not respected: ± 3 dB on the control signal at the reference point ± 10 % of r.m.s value acceleration on the control signal at the at the reference point Temperature env.: 24 ÷ 25 °C	See §§ 4.1.1 Tolerances not respected: See Figure 31	-	-	-
		Beginning 17/09/2025 Ending 17/09/2025	(Earthquake test method) § 5.4, Telcordia Technologies Generic Requirements GR-63-CORE § 4.4, IEC 60068-2-57:2013	Conditions: Operational during testing (400V power supply) **RUN08** Test Parameters: See § 2.4.2 Tolerances not respected: ≤ +30 % @ 1 ÷ 7 Hz of RRS. 0 ÷ +50 % of RRS ; > 50 % is permitted @ > 1/3·f2 If a small portion of the individual points lies outside the tolerance zone the test must still be acceptable. Temperature env.: 24 ÷ 25 °C	Visually unaltered after testing Tolerances not respected: See Figure 39	§ 4.4, IEC 60068-3-3:2019	Criterion 0: Equipment subjected to seismic testing which experienced no malfunction either during or after the test.	Compliant (Conformity verified only by visual inspection)
		Beginning 17/09/2025 Ending 17/09/2025	(final vibration response investigation) § 8.2, IEC 60068-2-64:2019 § 5.4.1.5 Telcordia Technologies Generic Requirements GR-63-CORE Issue no. 05, date 2017 § 9.2, IEC 60068-3-3:2019	Not operational during testing **RUN09** Test Parameters: See § 2.4.1 Tolerances not respected: ± 3 dB on the control signal at the reference point ± 10 % of r.m.s value acceleration on the control signal at the at the reference point Temperature env.: 24 ÷ 25 °C	See §§ 4.1.1 Tolerances not respected: See Figure 40	-	-	-

4.1.5. Declaration of conformity

The decision rule applies in cases where the conformity criterion is expressed on the basis of a comparison with numerical values.
For purely qualitative compliance criteria the decision rule is not applicable.
In the event that the Customer requests a declaration of conformity of the results with respect to the legal/specification limit values and when the decision rule to express the declaration of conformity is not dictated by the Customer, by regulations or regulatory documents, the laboratory proposes the following decision rule: the declaration of conformity is based on the comparison between the measured value and the legal/specification limit value; uncertainty is not considered when assessing whether the limit value has been exceeded. If the legal/specification limit value falls within the uncertainty range associated with the measured value, a level of risk of incorrect decision is assumed which can reach up to 50%.

The declarations of conformity for each test direction are indicated in §§ 4.1.2, 4.1.3 and 4.1.4.
For each direction and for each test performed, the unit under test was found to comply with the reference value of the corresponding test method IEC 60068-2-6:2007[2].
For each direction and for each test performed, the unit under test was found to comply with the reference value of the corresponding test method IEC 60068-3-3:2019[2].

4.2. Opinions and interpretations - Not subject to ACCREDIA accreditation

-

PHOTO DOCUMENTATION

LIST OF FIGURES

Photo 1 – Test configuration in Z direction

Photo 2 – Test configuration in Y direction (CP1)

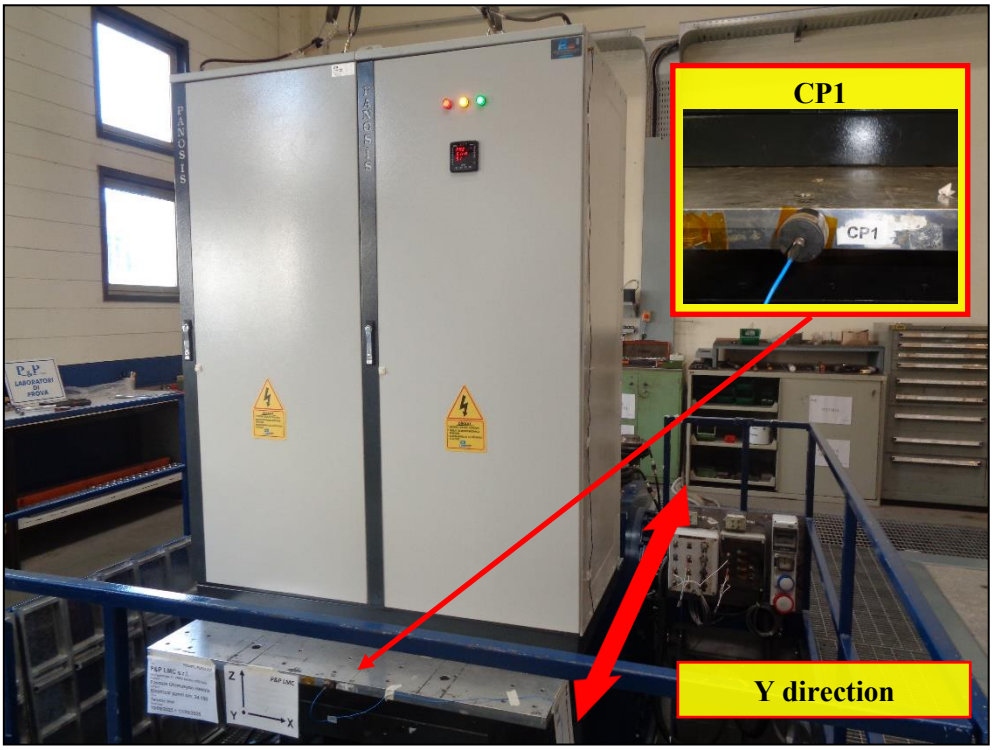

Photo 3 – Test configuration in X direction (CP1)

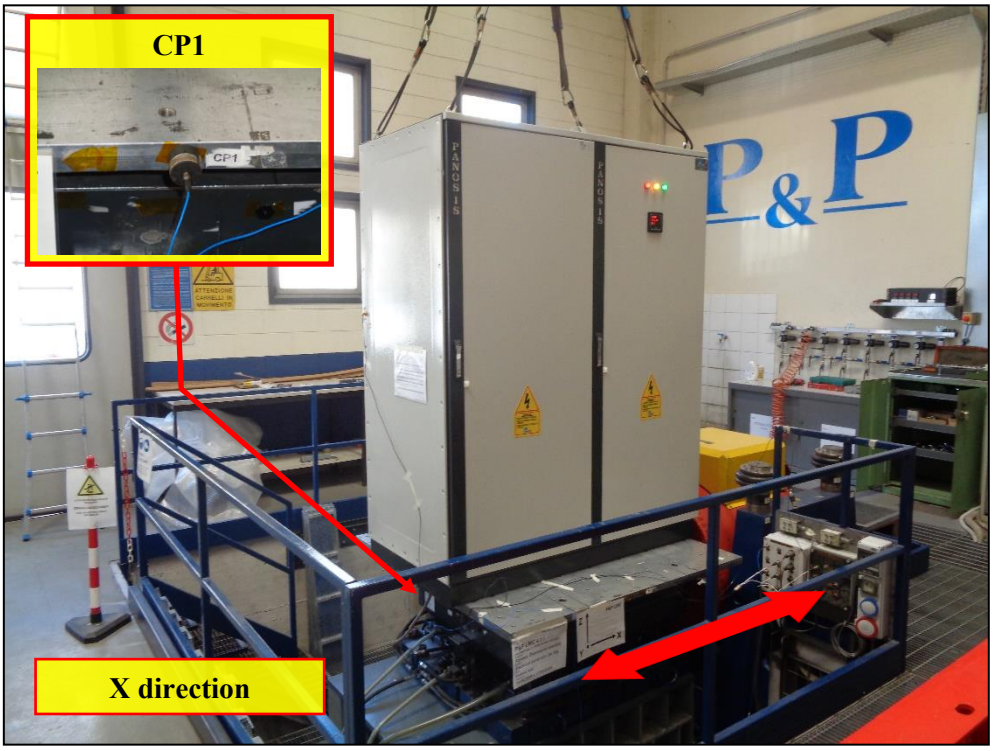

Photo 4 – Mounting technique – X and Y directions

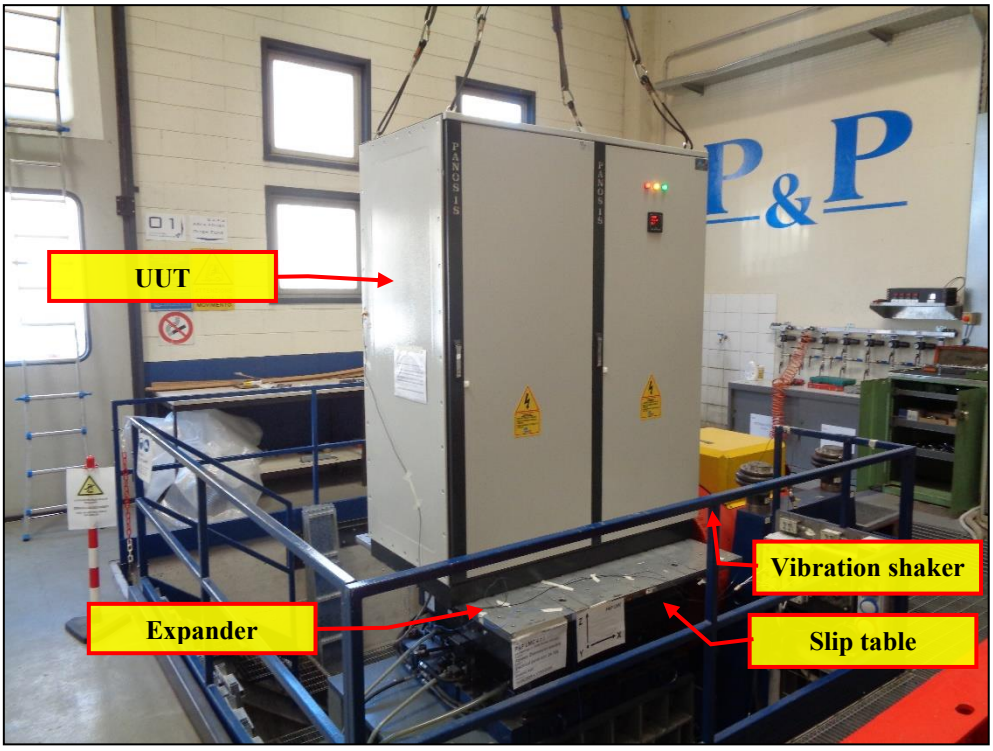

Photo 5 – Mounting technique – fixing points

Photo 6 – Mounting technique – Power cabling

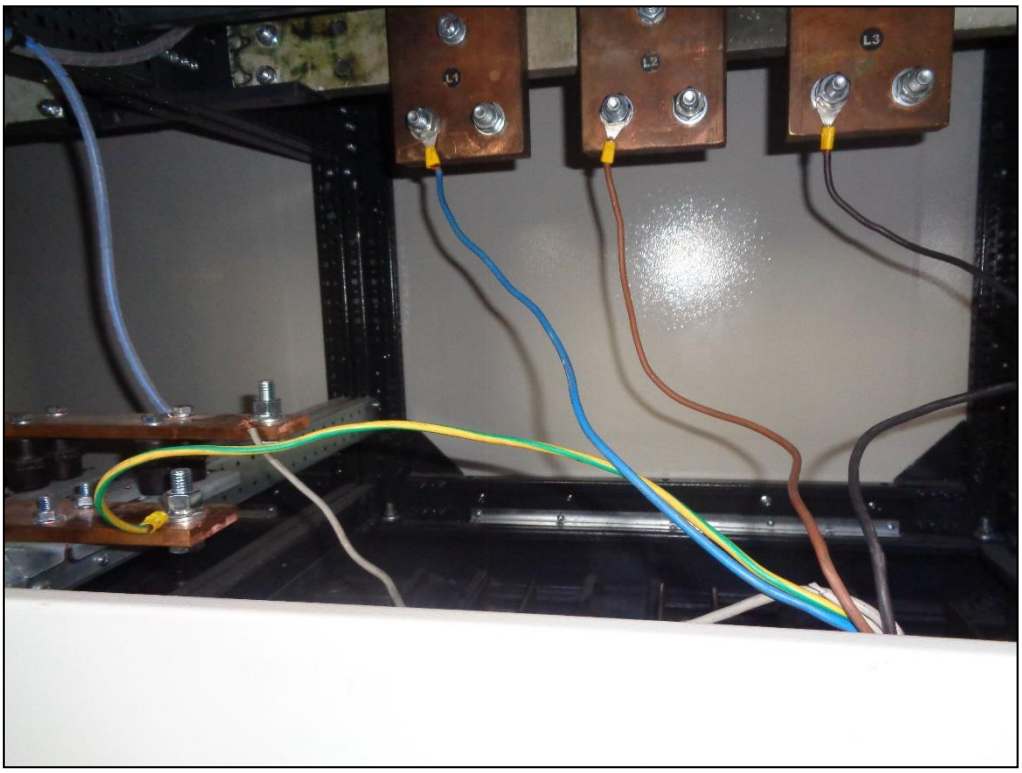

Photo 7 – Measuring points on the unit (MP1 – MP2)

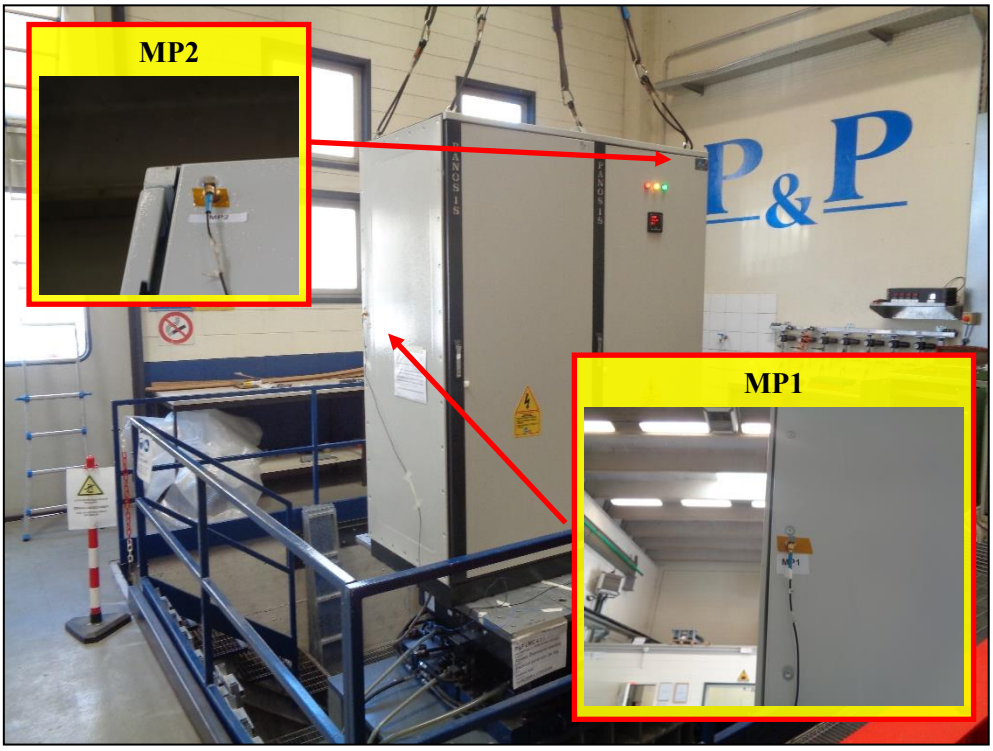

Photo 8 – Measuring points on the unit (MP3)

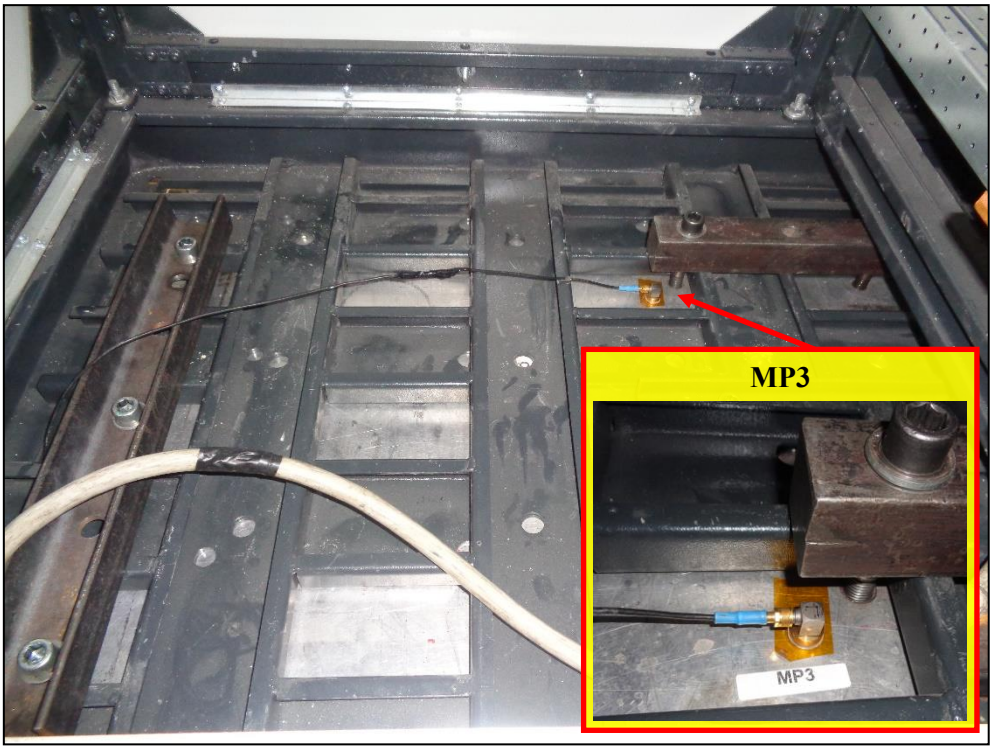

Photo 9 – Weight of EUT

Photo 10 – Final visual inspection after all direction tests

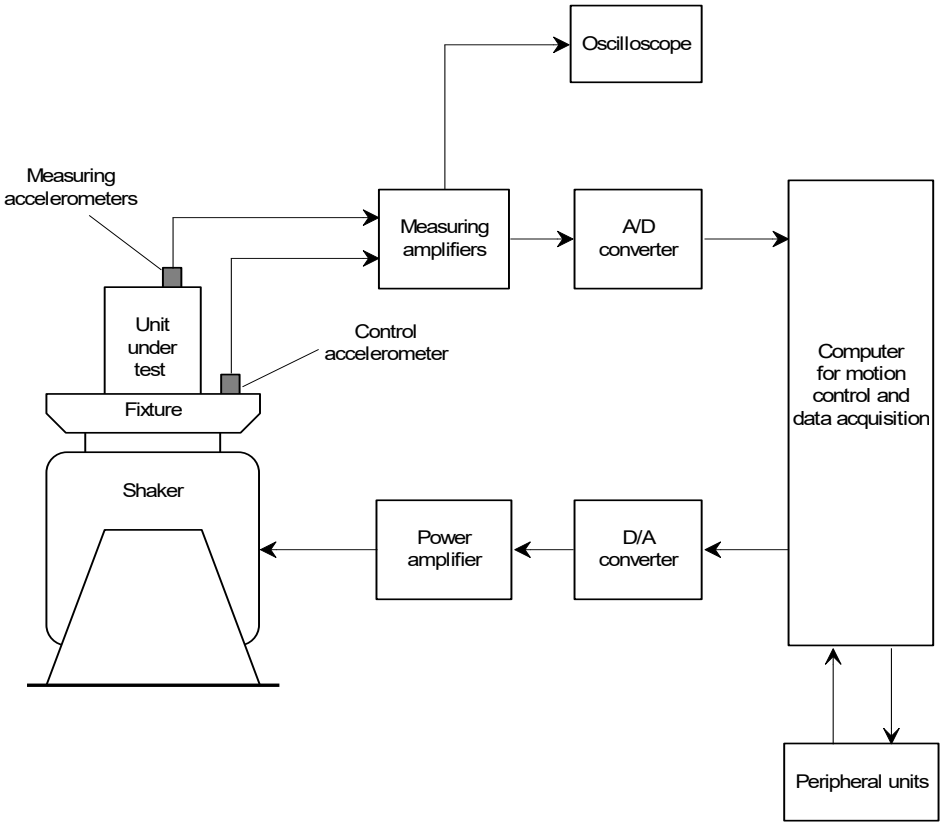

Figure 1 – Block diagram of the test equipment

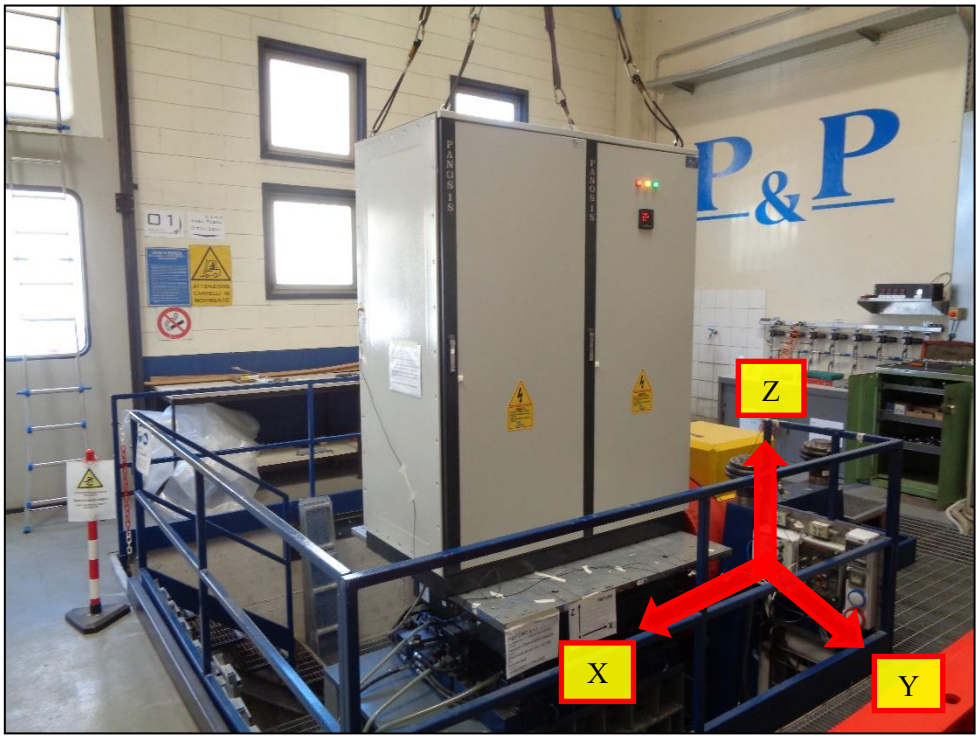

Figure 2 – Reference axis X, Y, Z of the tests

Project: PRO-MTL-ELE25-032
Section: Z_AXIS
Run: RUN01_Sine_1
Date: Tue Sep 16 2025 12:39:04
Sweep direction: Up
Sweep rate: 1 Oct/min
Sweep done: 2
Number of control channels: 1
Point id: AvgCtrl
Control strategy: Average

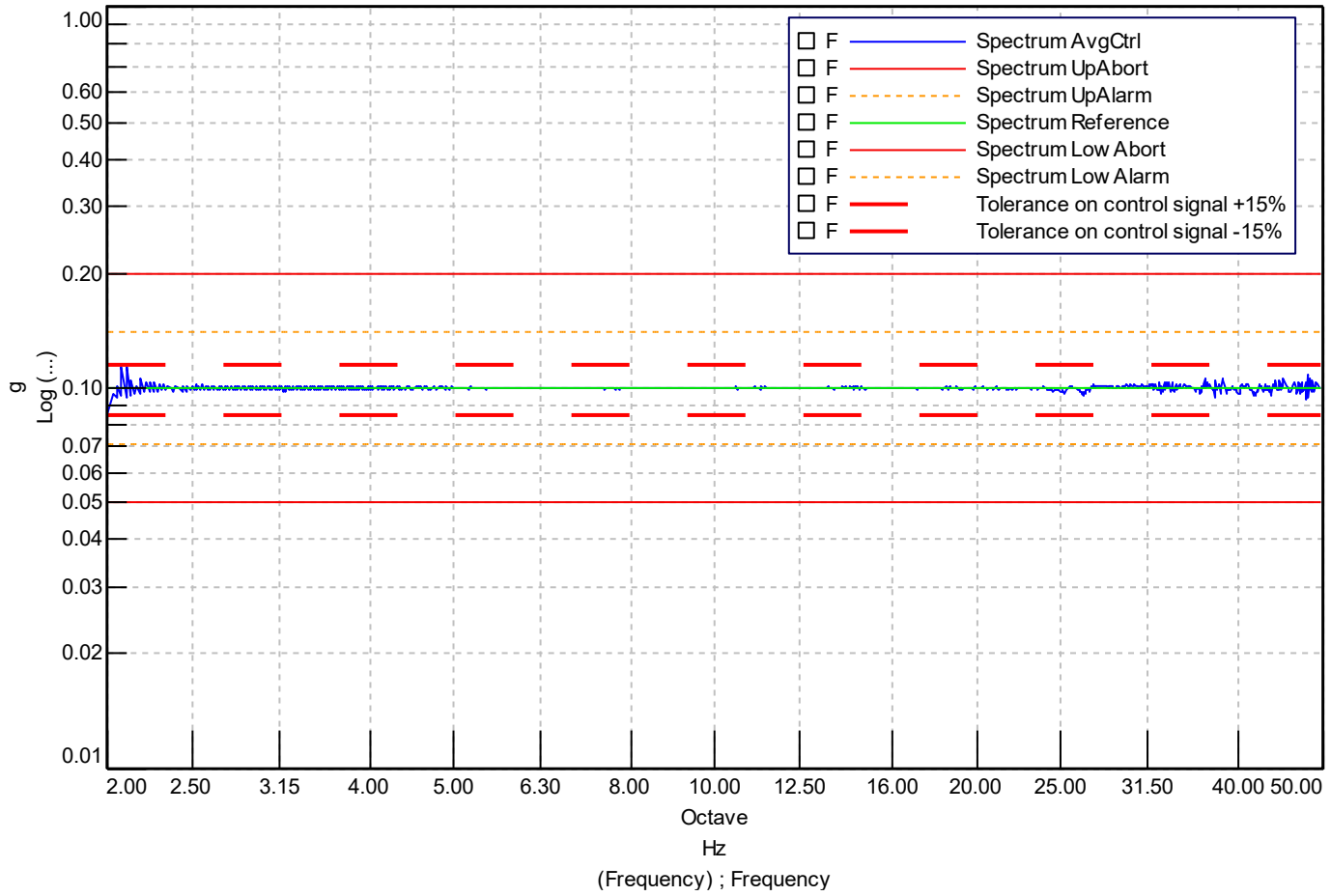

Figure 3 – Z Axis – AvgCtrl: Diagram of initial vibration response investigation test – Sweep Up

Project: PRO-MTL-ELE25-032
Section: Z_AXIS
Run: RUN01_Sine_1
Date: Tue Sep 16 2025 12:39:04
Sweep direction: Up
Sweep rate: 1 Oct/min
Sweep done: 2
Reference point id: AvgCtrl
Point id: MP1C
Control strategy: Average

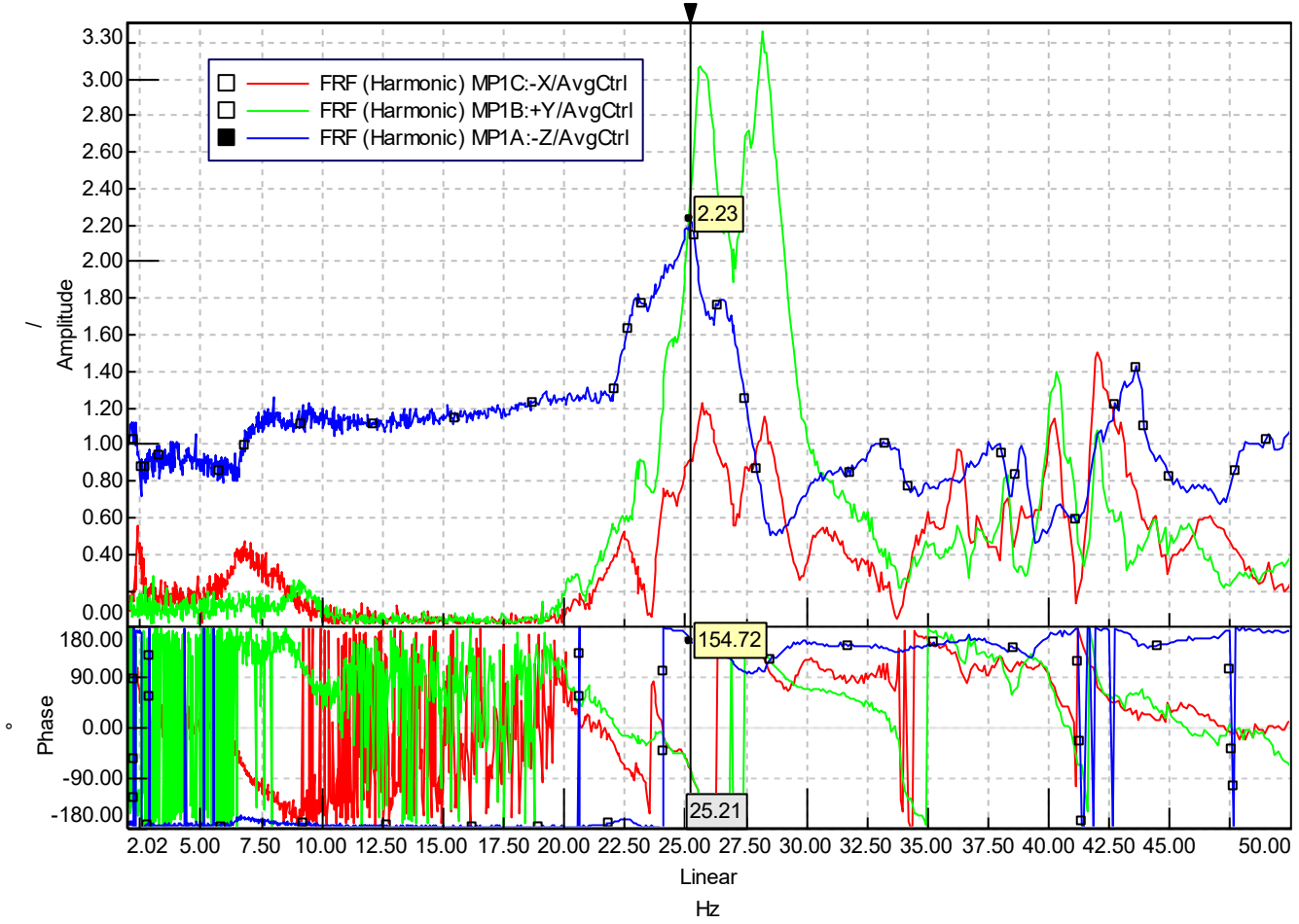

Figure 4 – Z Axis – MP1: Diagram of initial vibration response investigation test – Sweep Up

Project: PRO-MTL-ELE25-032
Section: Z_AXIS
Run: RUN01_Sine_1
Date: Tue Sep 16 2025 12:39:04
Sweep direction: Up
Sweep rate: 1 Oct/min
Sweep done: 2
Reference point id: AvgCtrl
Point id: MP2C
Control strategy: Average

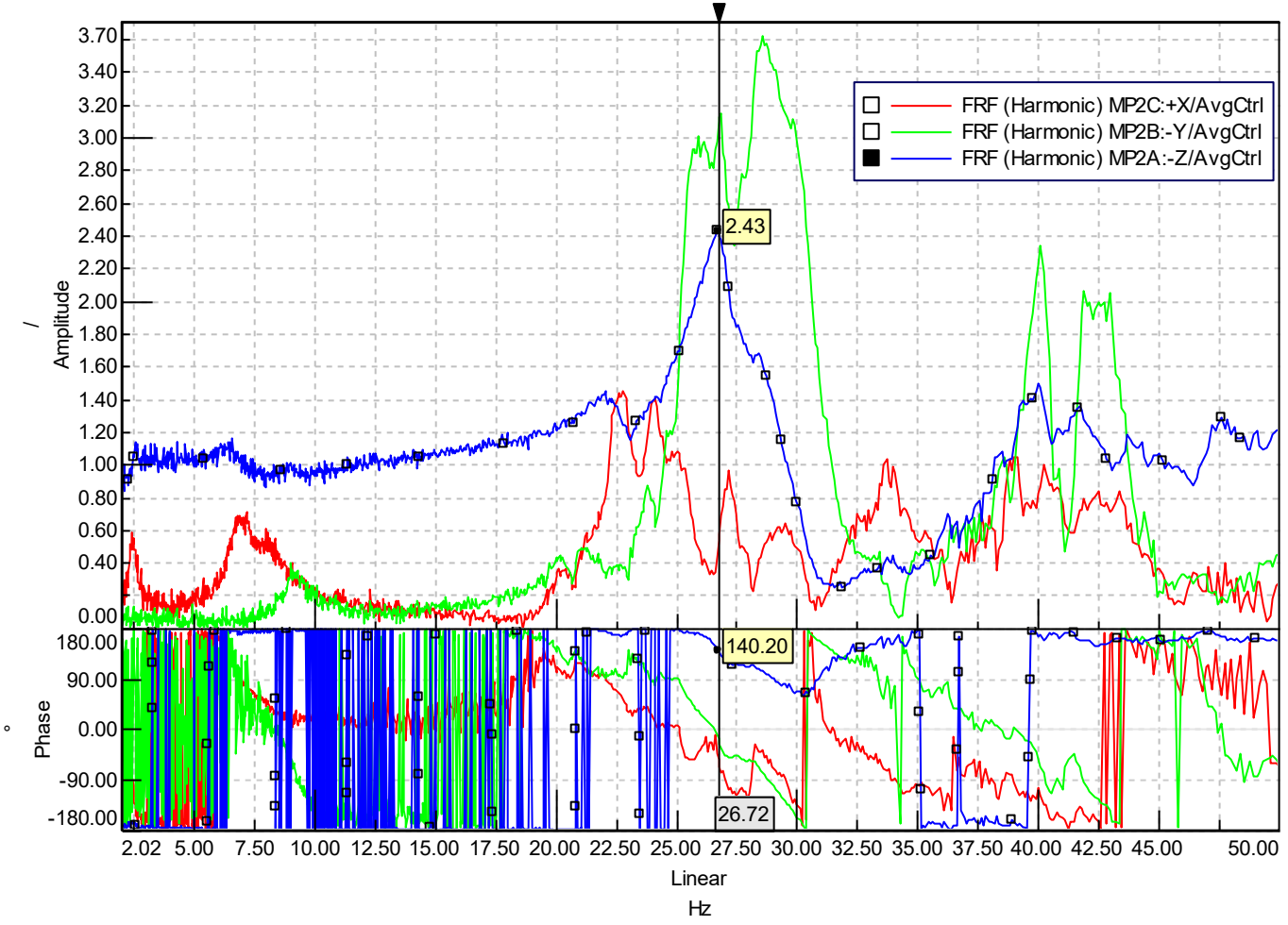

Figure 5 – Z Axis – MP2: Diagram of initial vibration response investigation test – Sweep Up

Project: PRO-MTL-ELE25-032
Section: Z_AXIS
Run: RUN01_Sine_1
Date: Tue Sep 16 2025 12:39:04
Sweep Direction: Up
Sweep Rate: 1 Oct/min
Sweep done: 2
Point id: MP3A
Control strategy: Average

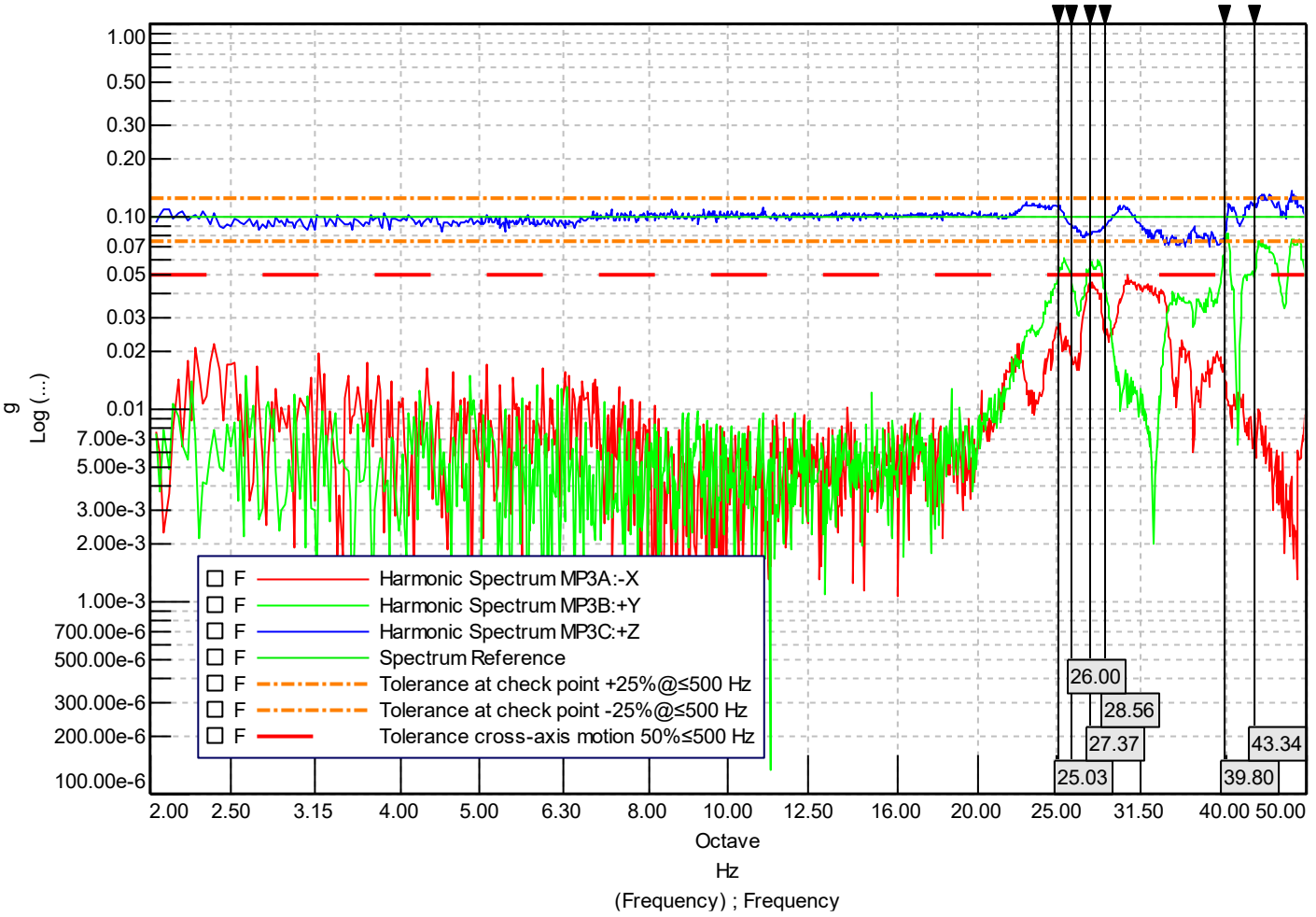

Figure 6 – Z Axis – MP3: Diagram of initial vibration response investigation test – Tolerances – Sweep Up

Project:PRO-MTL-ELE25-032
Section: Z_AXIS
Run: RUN02_Shock_1
Date:Tue Sep 16 2025 14:02:24
Point ID: CP1

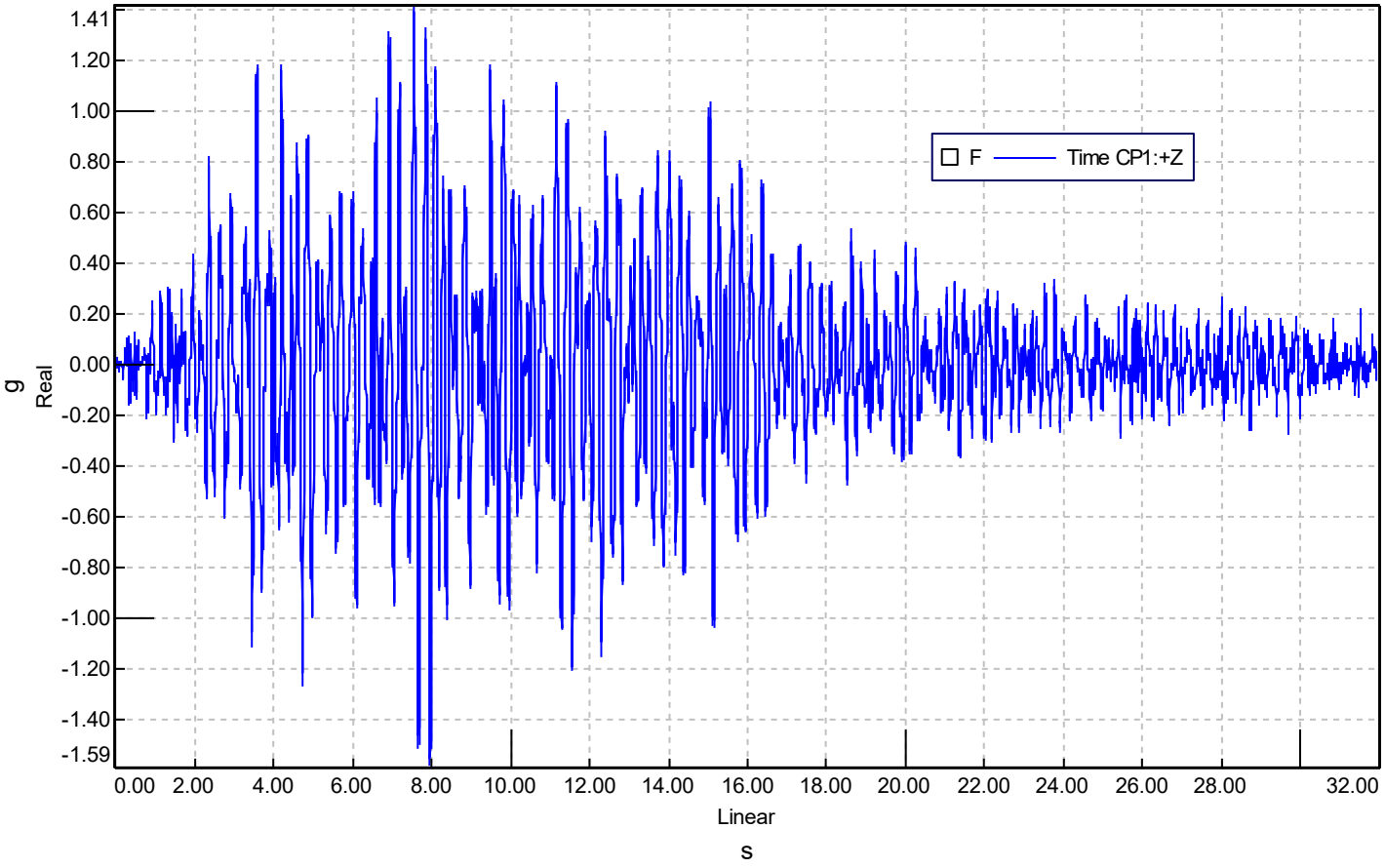

Figure 7 – Z Axis – CP1: Diagram of Seismic Test

Project: **PRO-MTL-ELE25-032**
Section: **Z_AXIS**
Run: **RUN02_Shock_1**
Date:Tue Sep 16 2025 14:02:24
Point ID: MP1C

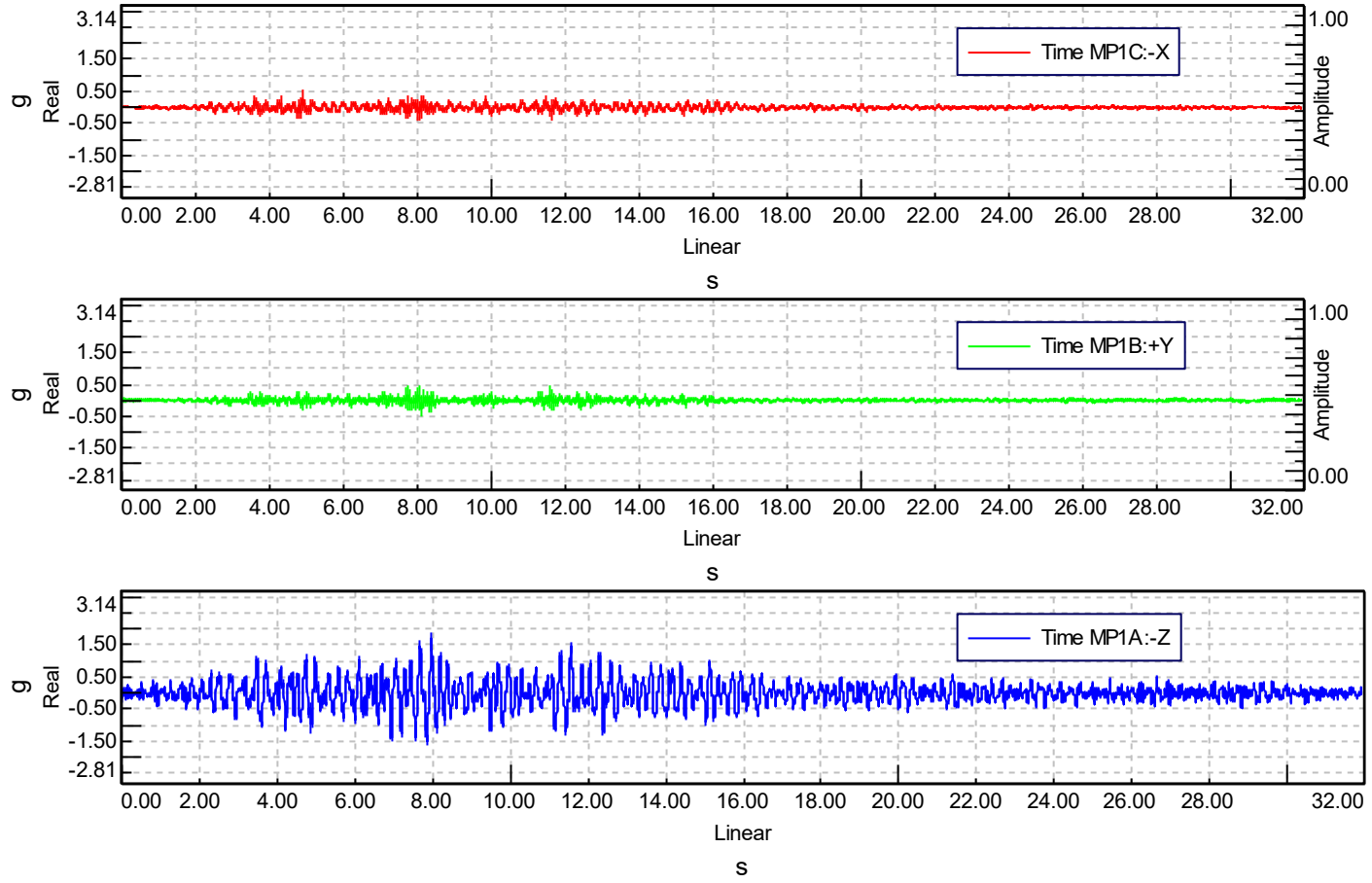

Figure 8 – Z Axis – MP1: Diagram of Seismic Test

Project:PRO-MTL-ELE25-032
Section:Z_AXIS
Run:RUN2_Shock_2
Date:Tue Sep 16 2025 15:04:47
Point ID: MP2C

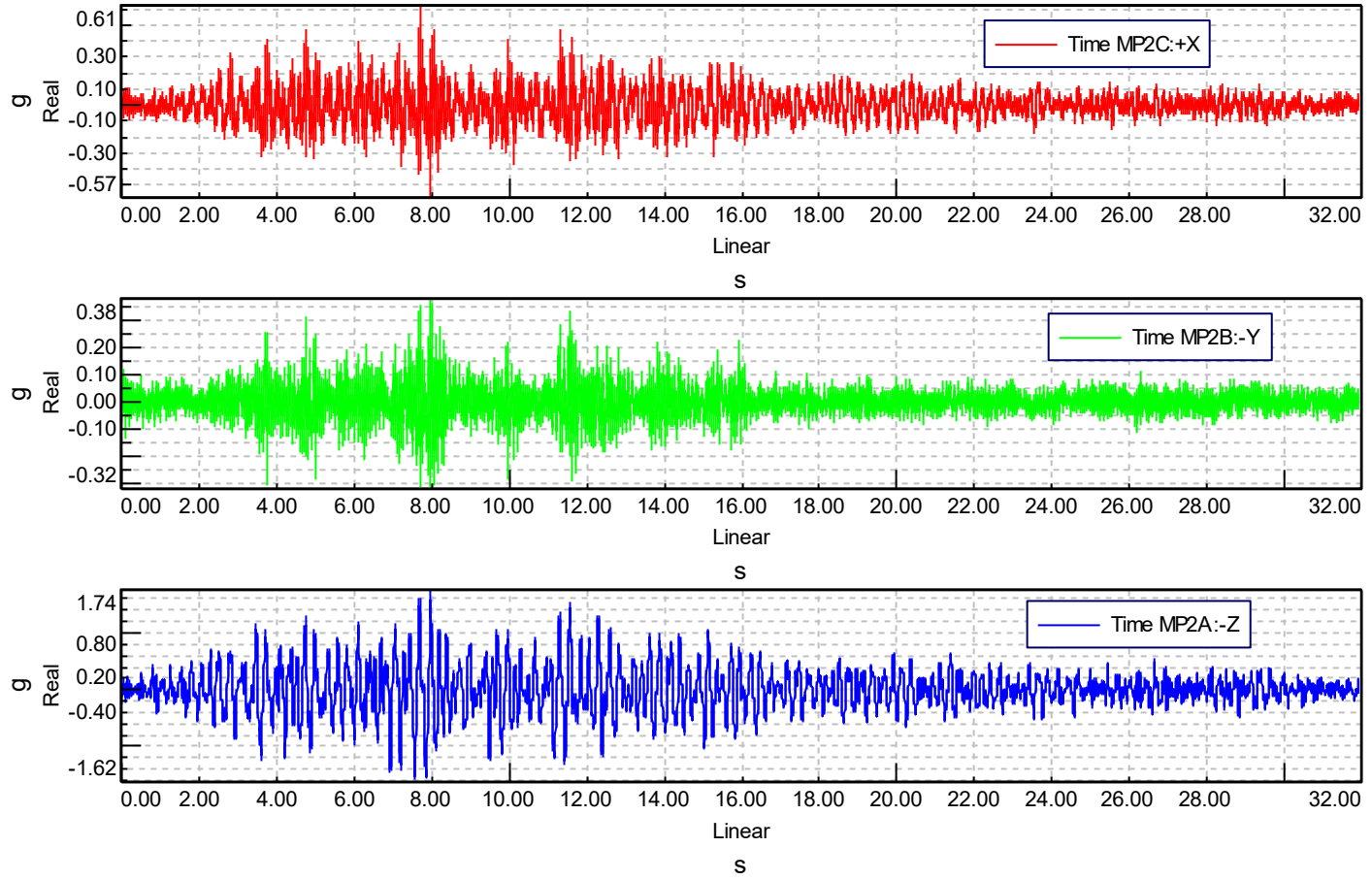

Figure 9 – Z Axis – MP2: Diagram of Seismic Test

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Section:Z_AXIS
Run:RUN2_Shock_2
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Point ID: MP3A

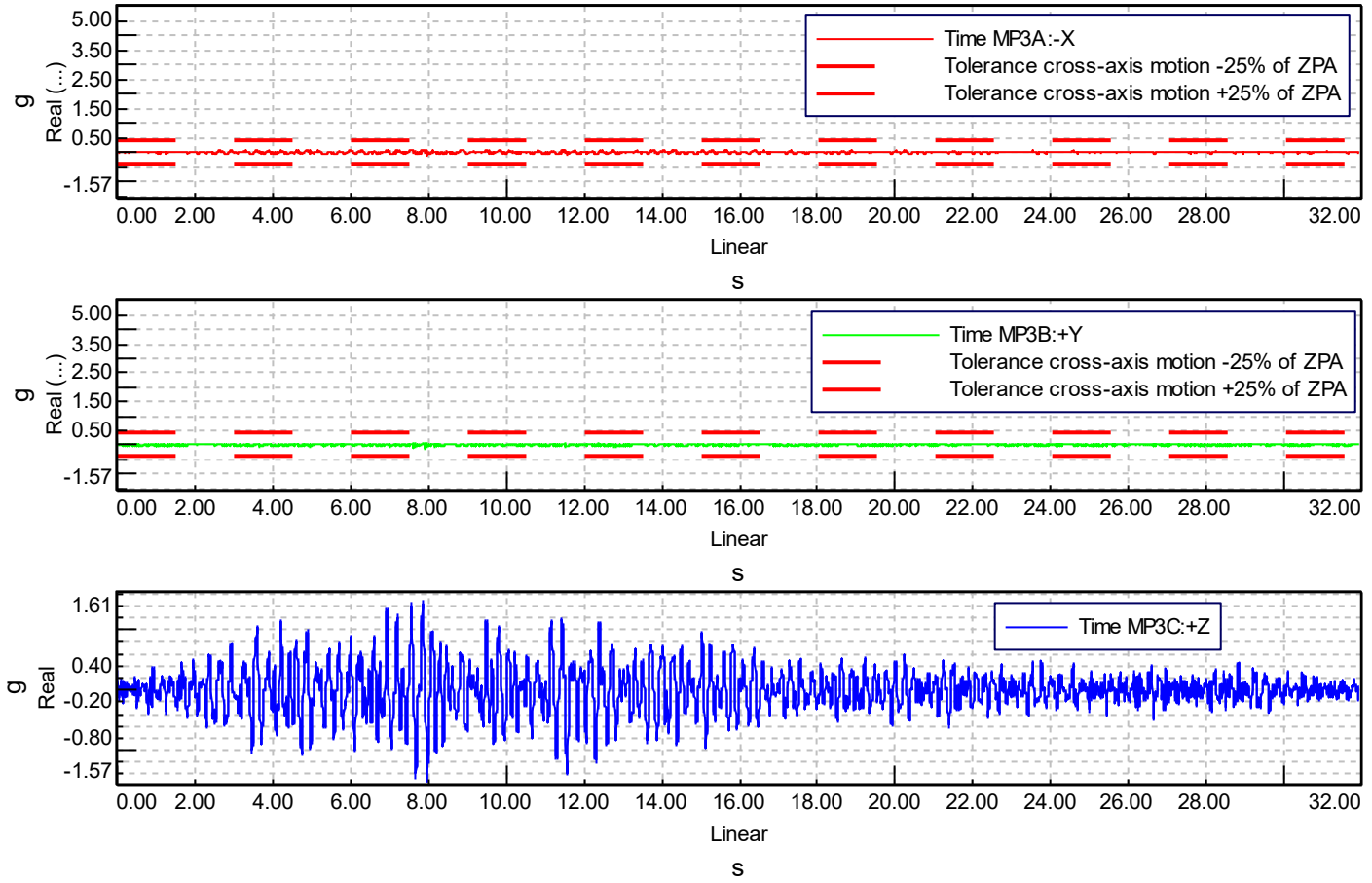

Figure 10 – Z Axis – MP3: Diagram of Seismic Test – Tolerances on cross axis motion

Project: **PRO-MTL-ELE25-032**
Section: **Z_AXIS**
Run: **RUN02_Shock_1**
Date:Tue Sep 16 2025 14:02:24
Point ID: CP1

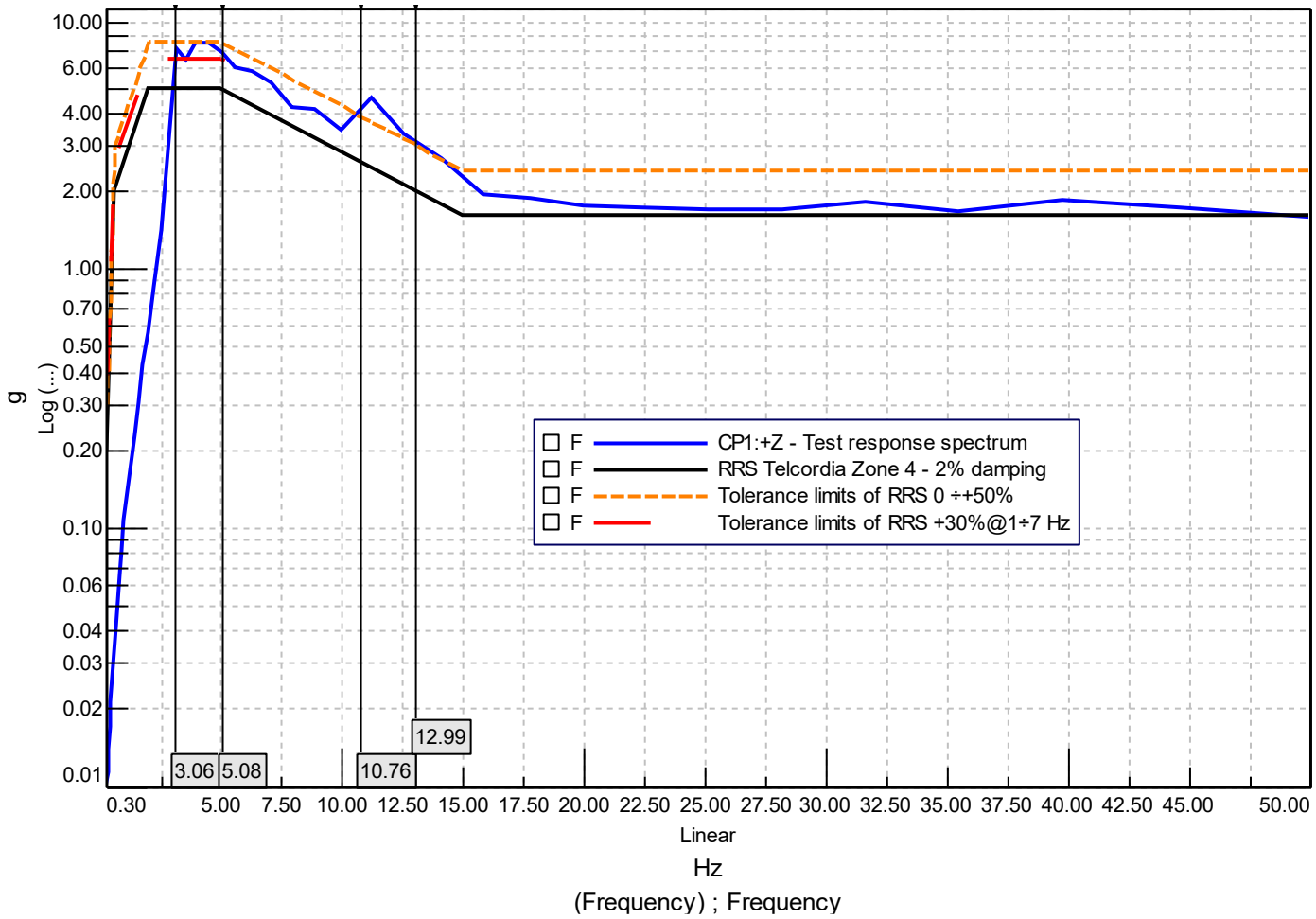

Figure 11 – Z Axis – AvgCtrl: Diagram of Test Response Spectrum

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Section: **Z_AXIS**
Run: **Property not found in**
Date:Property not found in property container.
Point ID: MP2-MP3

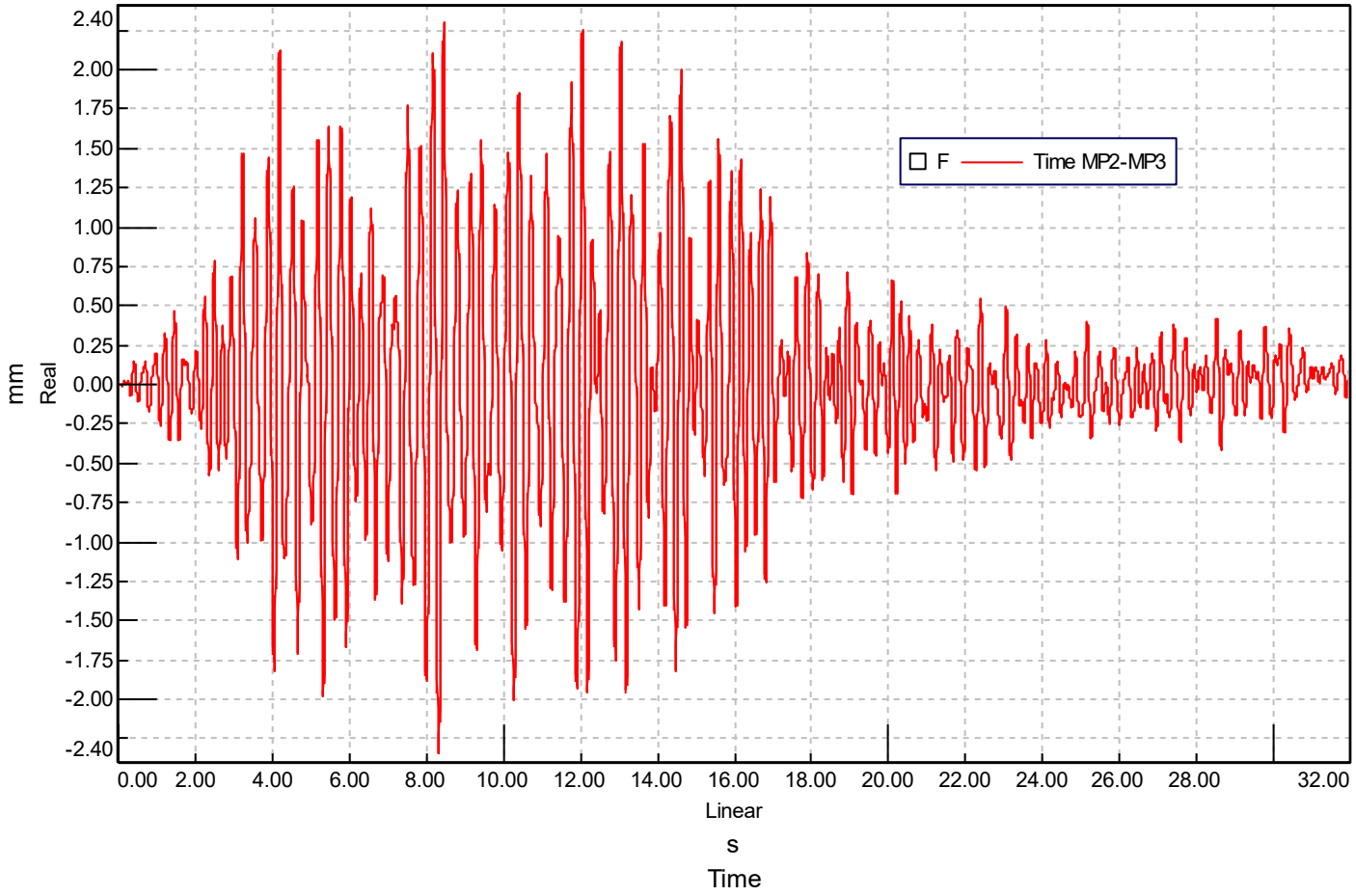

Figure 12 – Z Axis – MP2-MP3: Diagram of Seismic Test – Time-history of the relative displacement between the frame top and base of the EUT

Project: PRO-MTL-ELE25-032
Section: Z_AXIS
Run: RUN03_Sine_1
Date: Tue Sep 16 2025 14:24:40
Sweep direction: Up
Sweep rate: 1 Oct/min
Sweep done: 2
Number of control channels: 1
Point id: AvgCtrl
Control strategy: Average

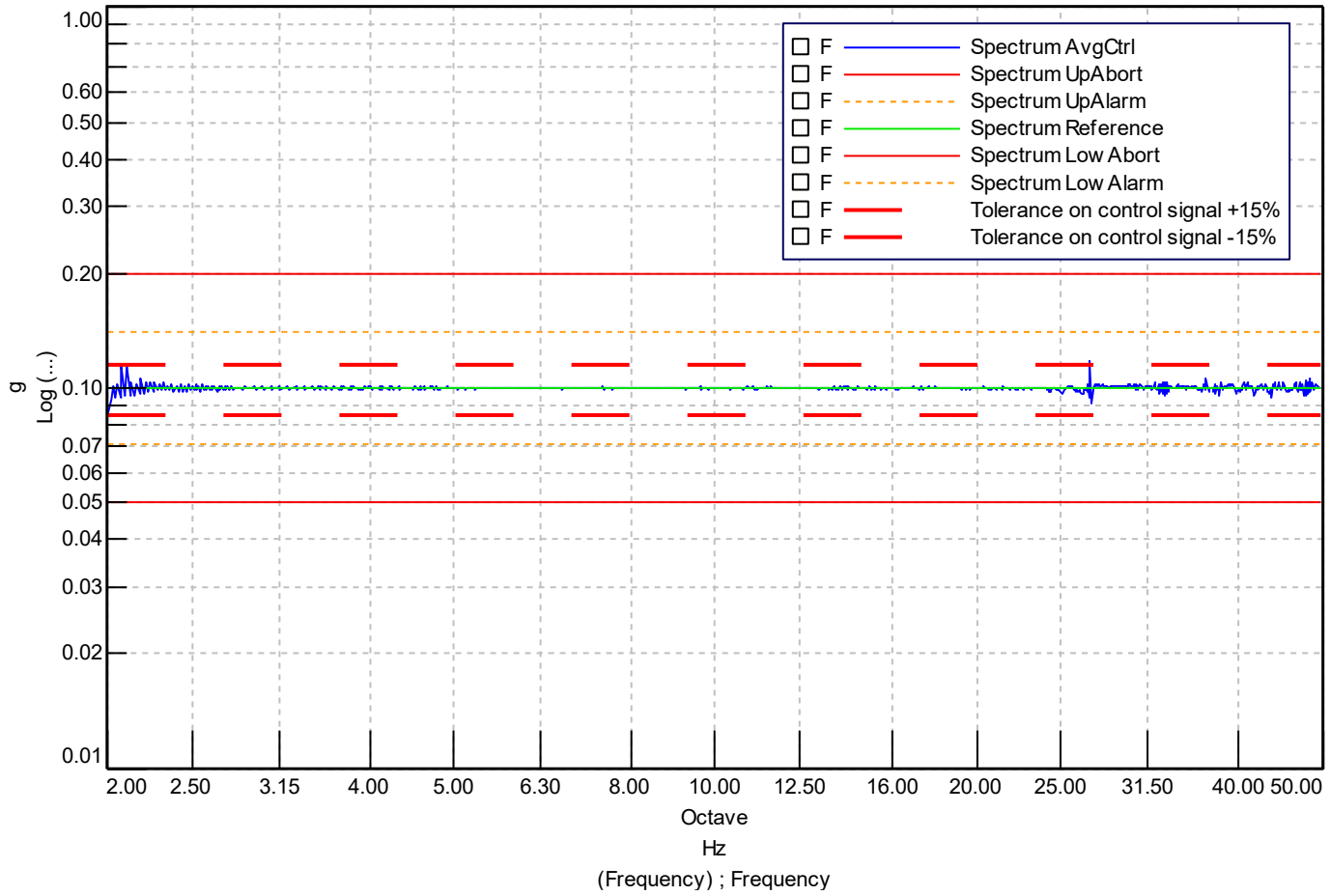

Figure 13 – Z Axis – AvgCtrl: Diagram of final vibration response investigation test – Sweep Up

Project: PRO-MTL-ELE25-032
Section: Z_AXIS
Run: RUN03_Sine_1
Date: Tue Sep 16 2025 14:24:40
Sweep direction: Up
Sweep rate: 1 Oct/min
Sweep done: 2
Reference point id: AvgCtrl
Point id: MP1C
Control strategy: Average

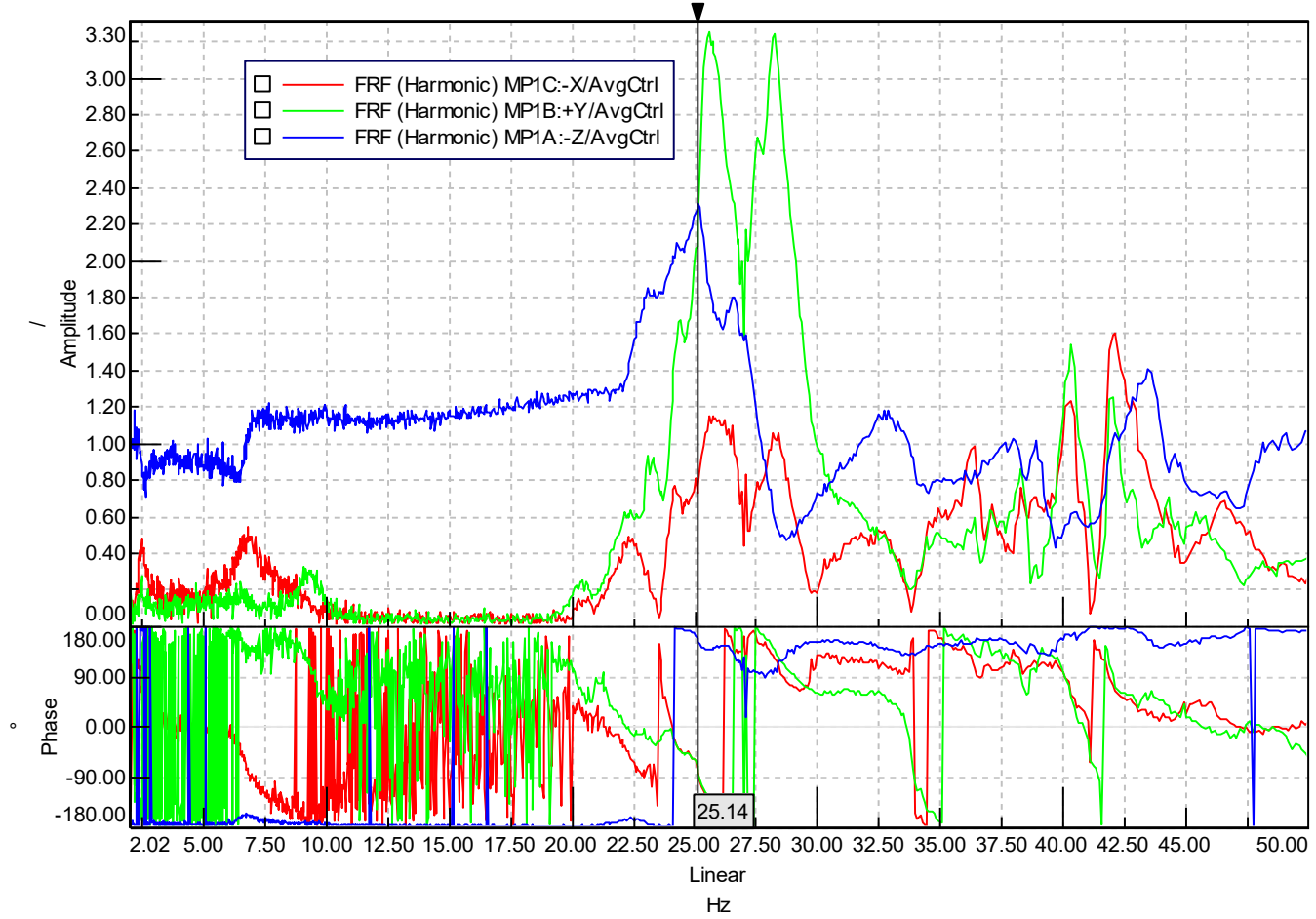

Figure 14 – Z Axis – MP1: Diagram of final vibration response investigation test – Sweep Up

Project: PRO-MTL-ELE25-032
Section: Z_AXIS
Run: RUN03_Sine_1
Date: Tue Sep 16 2025 14:24:40
Sweep direction: Up
Sweep rate: 1 Oct/min
Sweep done: 2
Reference point id: AvgCtrl
Point id: MP2C
Control strategy: Average

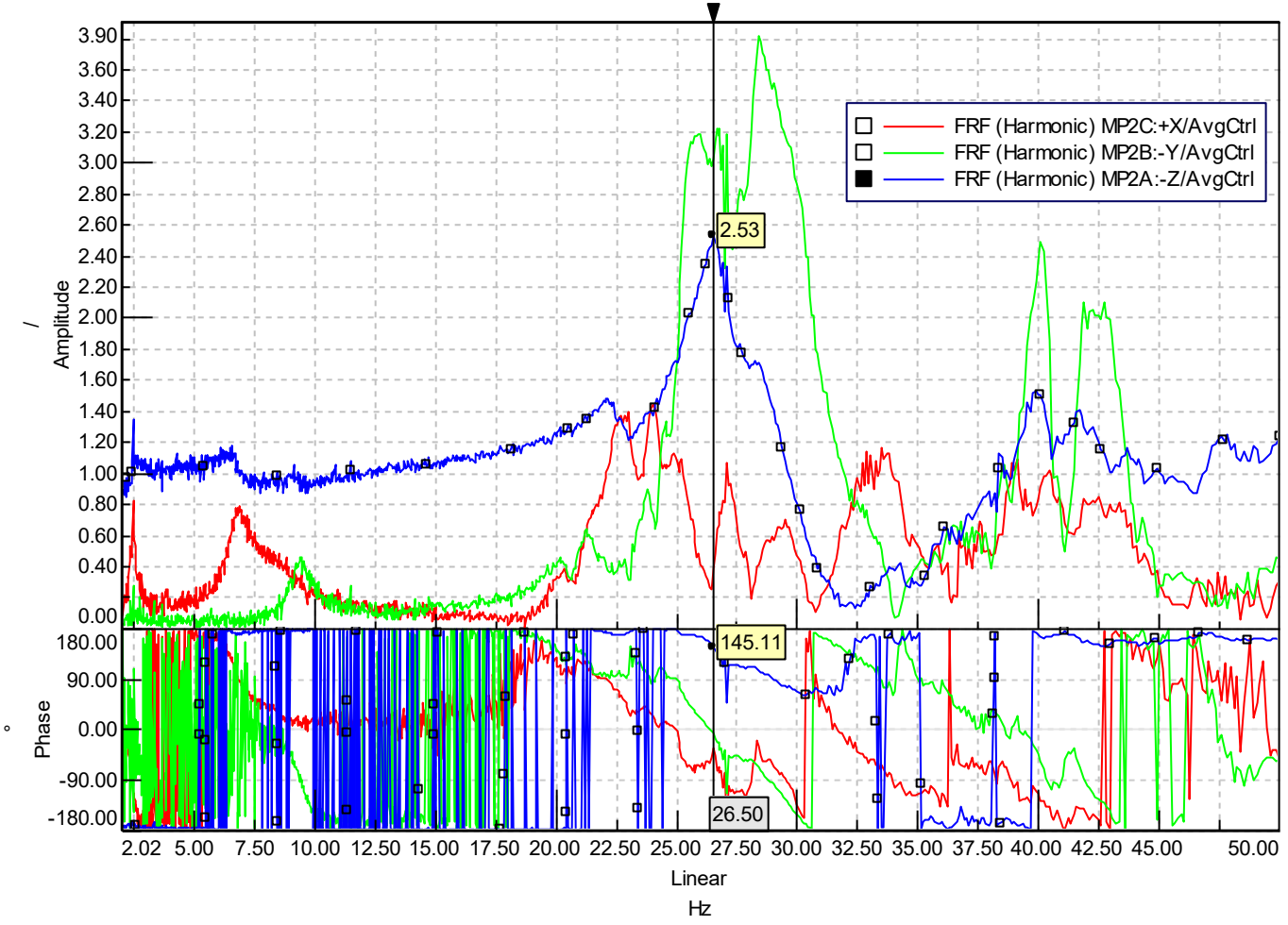

Figure 15 – Z Axis – MP2: Diagram of final vibration response investigation test – Sweep Up

Project: PRO-MTL-ELE25-032
Section: Z_AXIS
Run: RUN03_Sine_1
Date: Tue Sep 16 2025 14:24:40
Sweep Direction: Up
Sweep Rate: 1 Oct/min
Sweep done: 2
Point id: MP3A
Control strategy: Average

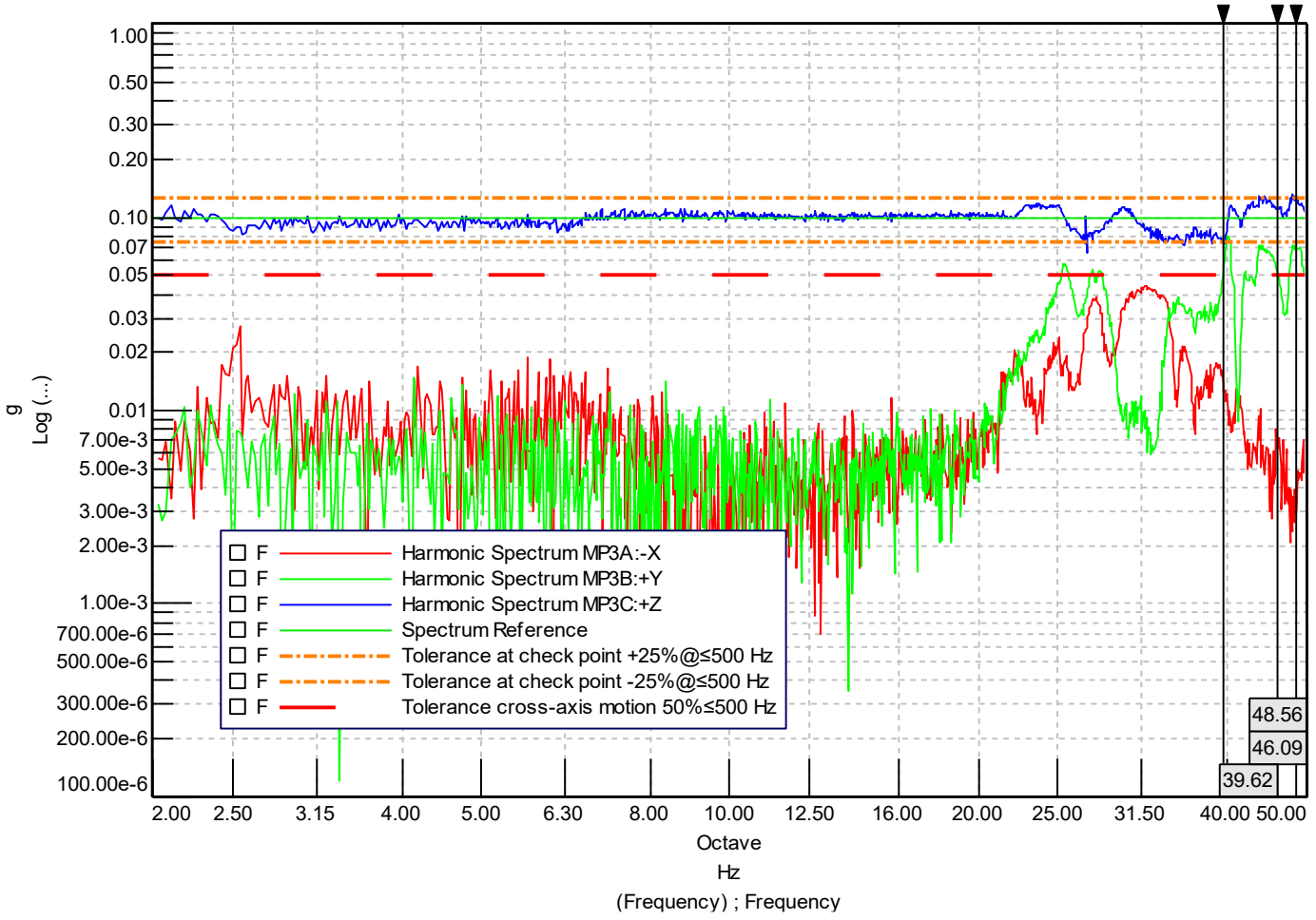

Figure 16 – Z Axis – MP3: Diagram of final vibration response investigation test – Tolerances – Sweep Up

Project: PRO-MTL-ELE25-032
Section: Y_AXIS
Run: RUN04_Sine_3
Date: Wed Sep 17 2025 10:21:23
Sweep direction: Up
Sweep rate: 1 Oct/min
Sweep done: 2
Number of control channels: 1
Point id: AvgCtrl
Control strategy: Average

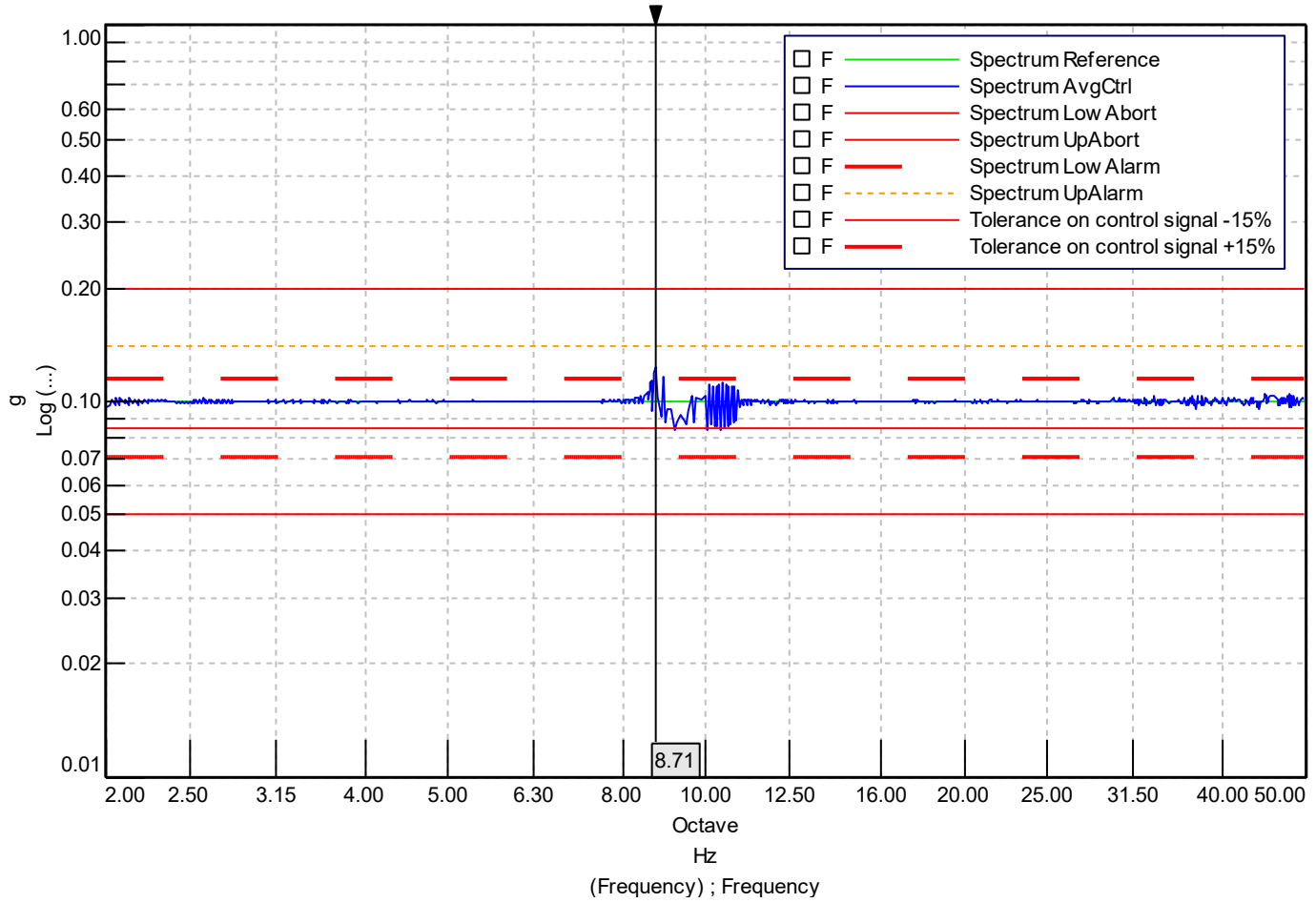

Figure 17 – Y Axis – AvgCtrl: Diagram of initial vibration response investigation test – Sweep Up

Project: PRO-MTL-ELE25-032
Section: Y_AXIS
Run: RUN04_Sine_3
Date: Wed Sep 17 2025 10:21:23
Sweep direction: Up
Sweep rate: Variable
Sweep done: 2
Reference point id: AvgCtrl
Point id: MP1C
Control strategy: Average

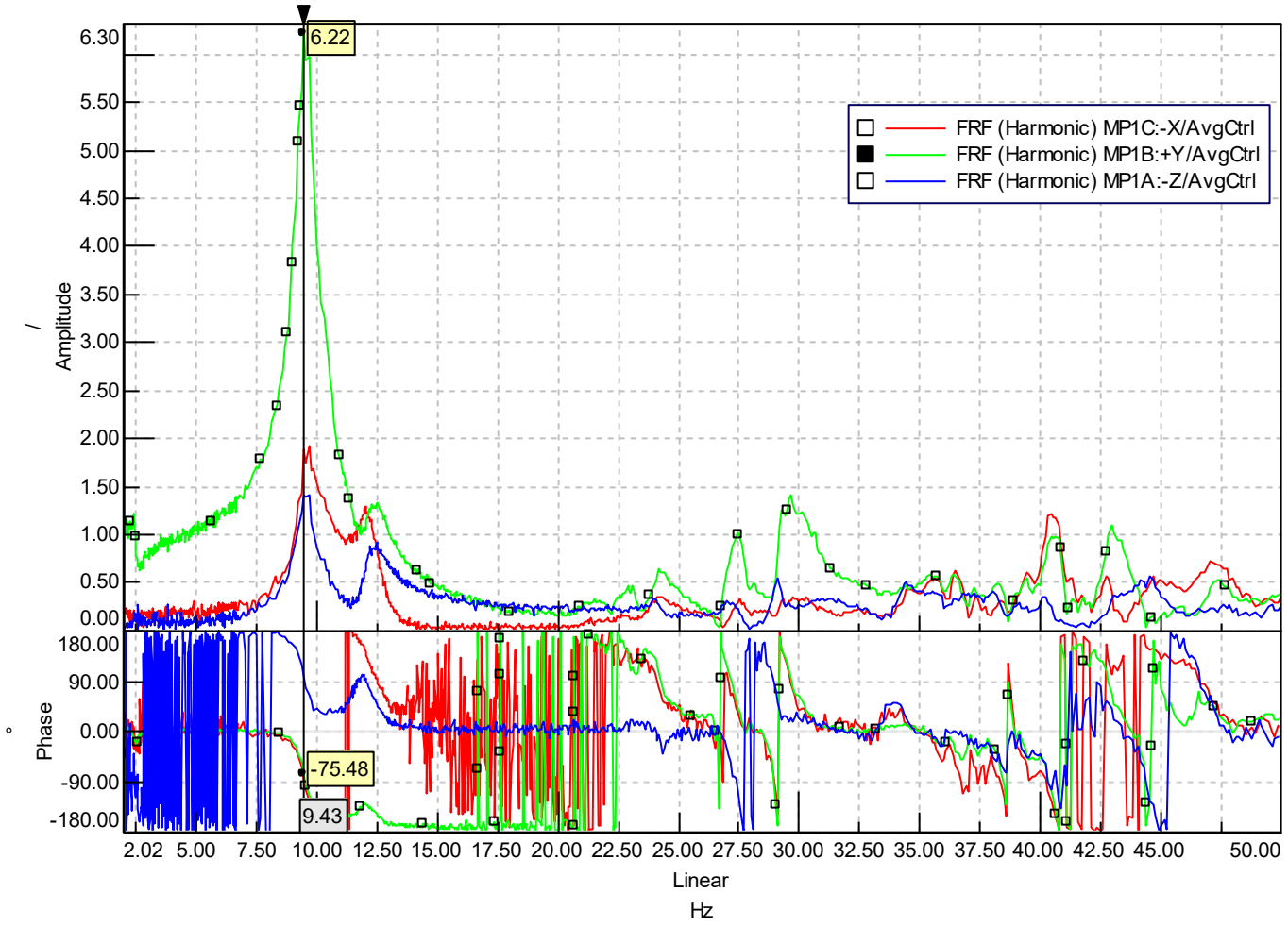

Figure 18 – Y Axis – MP1: Diagram of initial vibration response investigation test – Sweep Up

Project: PRO-MTL-ELE25-032
Section: Y_AXIS
Run: RUN04_Sine_3
Date: Wed Sep 17 2025 10:21:23
Sweep direction: Up
Sweep rate: Variable
Sweep done: 2
Reference point id: AvgCtrl
Point id: MP2C
Control strategy: Average

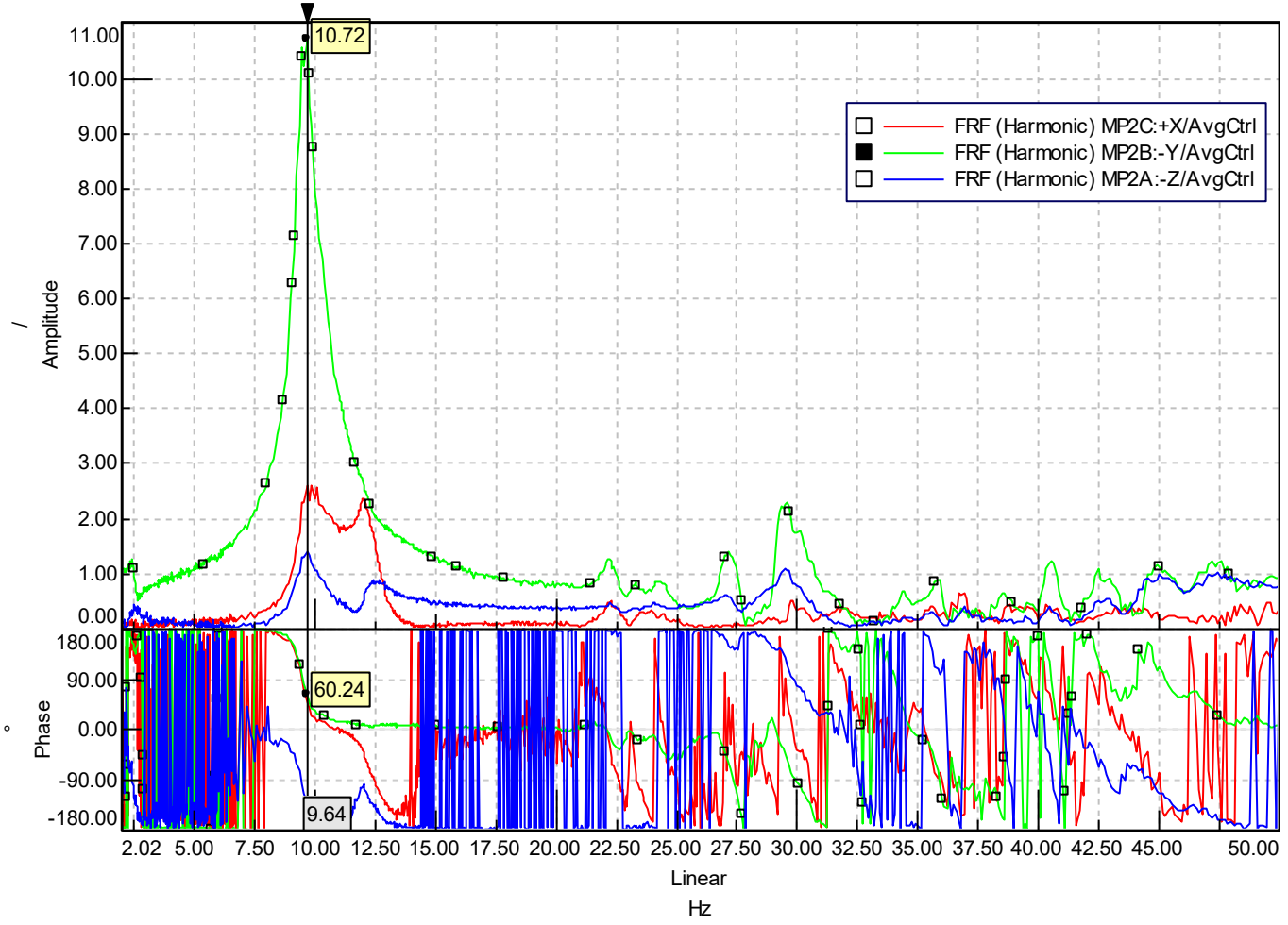

Figure 19 – Y Axis – MP2: Diagram of initial vibration response investigation test – Sweep Up

Project: PRO-MTL-ELE25-032
Section: Y_AXIS
Run: RUN04_Sine_3
Date: Wed Sep 17 2025 10:21:23
Sweep Direction: Up
Sweep Rate: Variable
Sweep done: 2
Point id: MP3A
Control strategy: Average

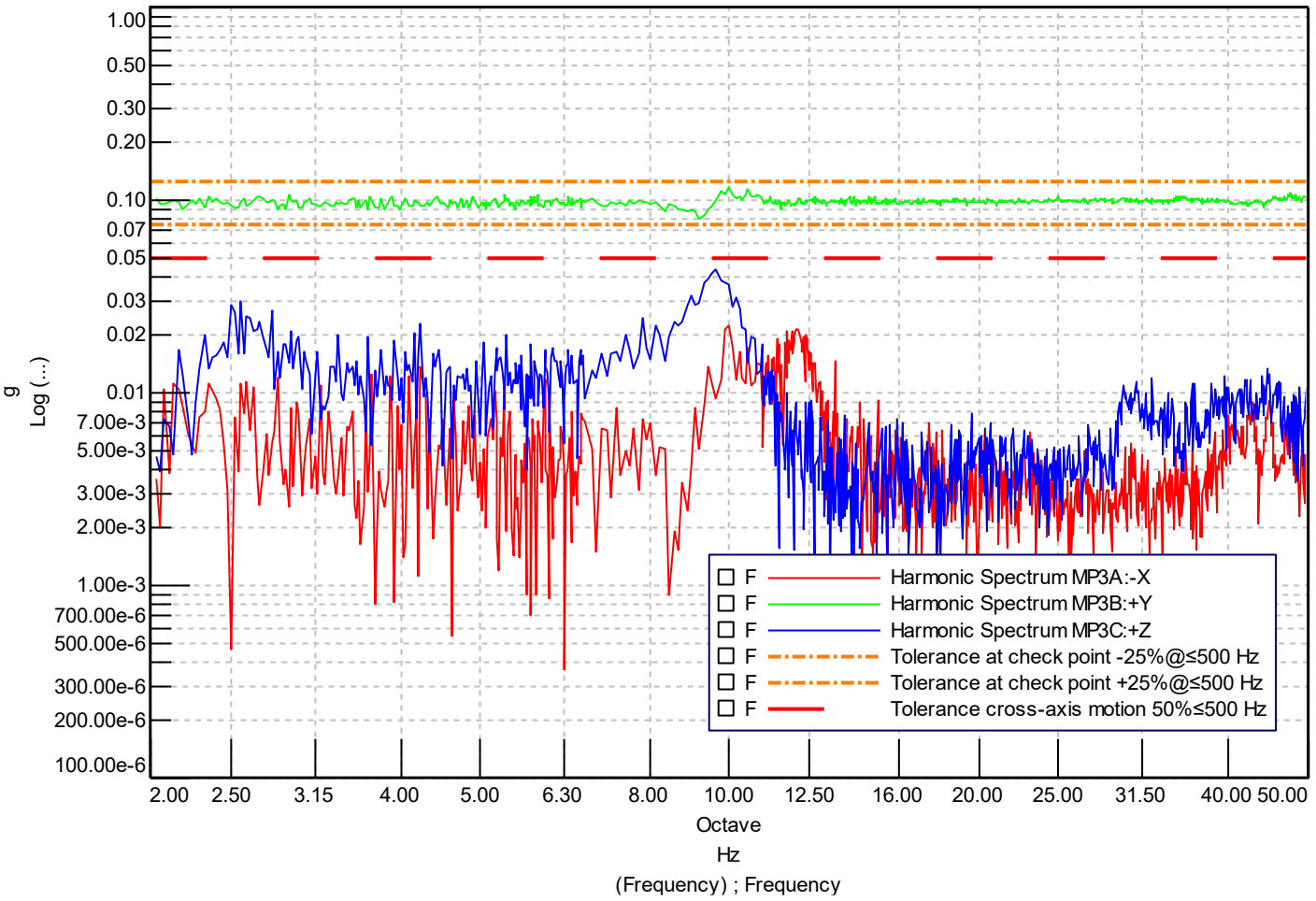

Figure 20 – Y Axis – MP3: Diagram of initial vibration response investigation test – Tolerances – Sweep Up

Project:PRO-MTL-ELE25-032
Section: Y_AXIS
Run: RUN05_Shock_2
Date:Wed Sep 17 2025 10:51:21
Point ID: CP1

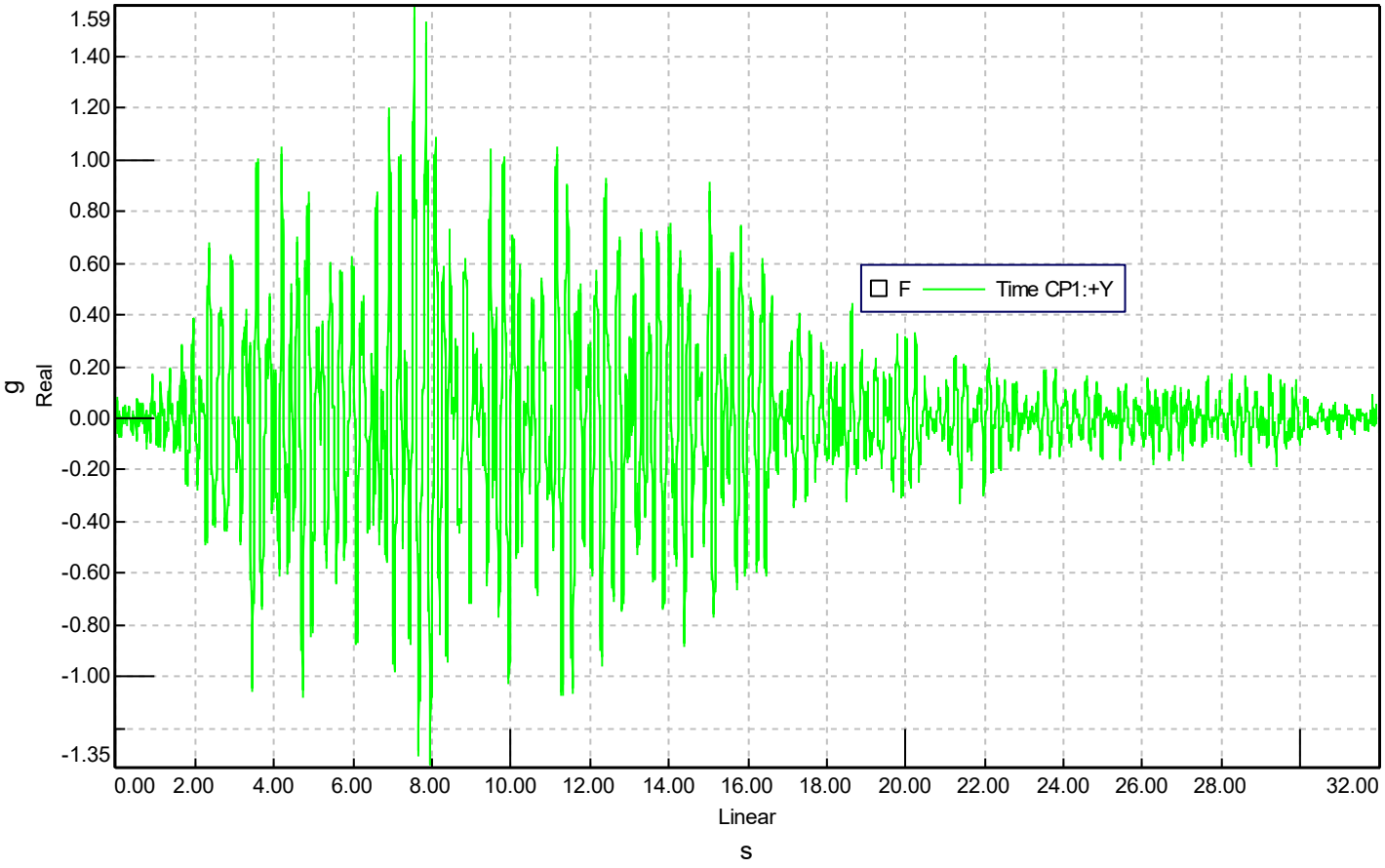

Figure 21 – Y Axis – CP1: Diagram of Seismic Test

Project: **PRO-MTL-ELE25-032**
Section: **Y_AXIS**
Run: **RUN05_Shock_2**
Date:Wed Sep 17 2025 10:51:21
Point ID: MP1C

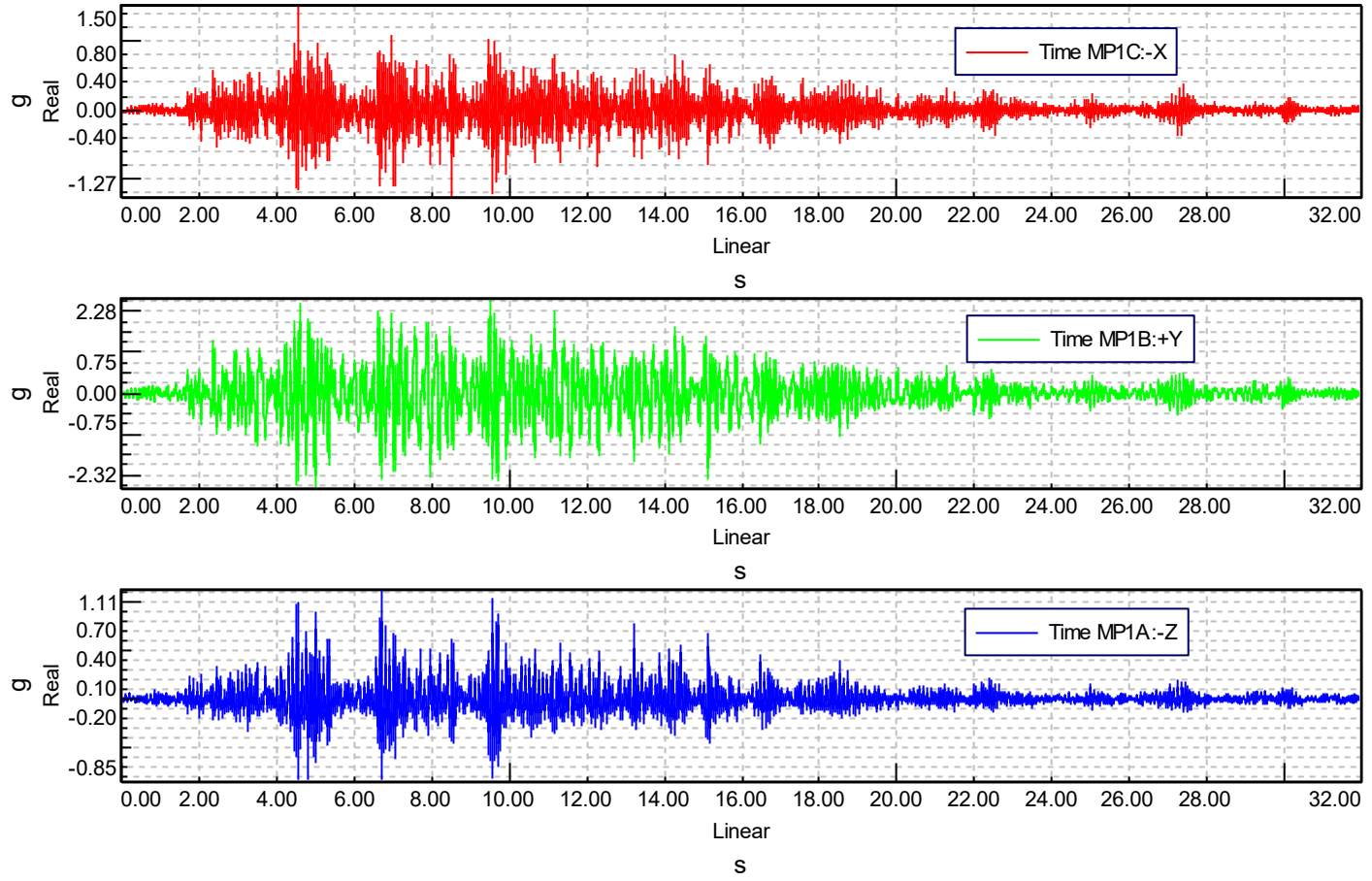

Figure 22 – Y Axis – MP1: Diagram of Seismic Test

Project:PRO-MTL-ELE25-032
Section:Y_AXIS
Run:RUN05_Shock_2
Date:Wed Sep 17 2025 10:51:21
Point ID: MP2C

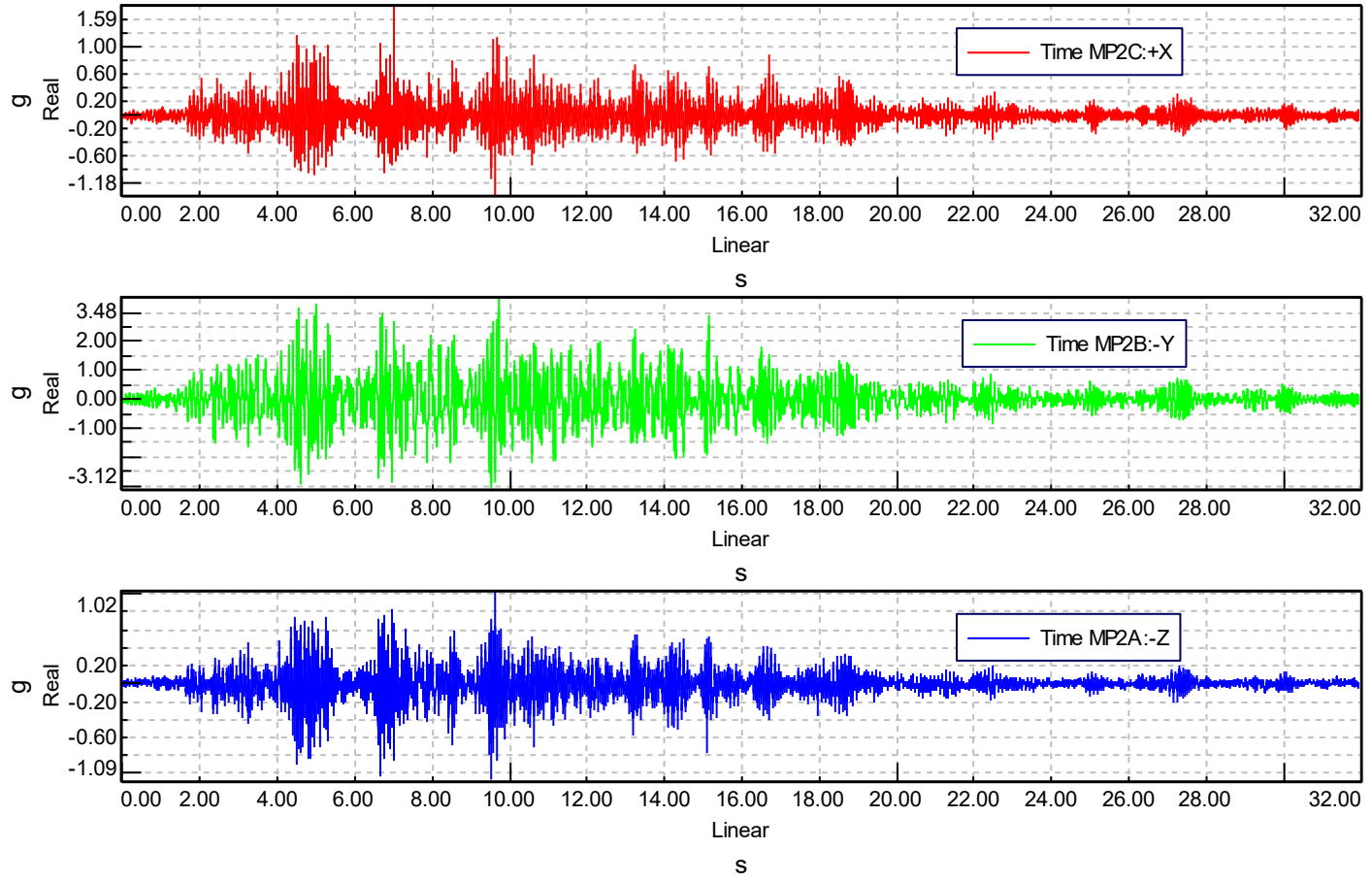

Figure 23 – Y Axis – MP2: Diagram of Seismic Test

Project:PRO-MTL-ELE25-032
Section:Y_AXIS
Run:RUN05_Shock_2
Date:Wed Sep 17 2025 10:51:21
Point ID: MP3A

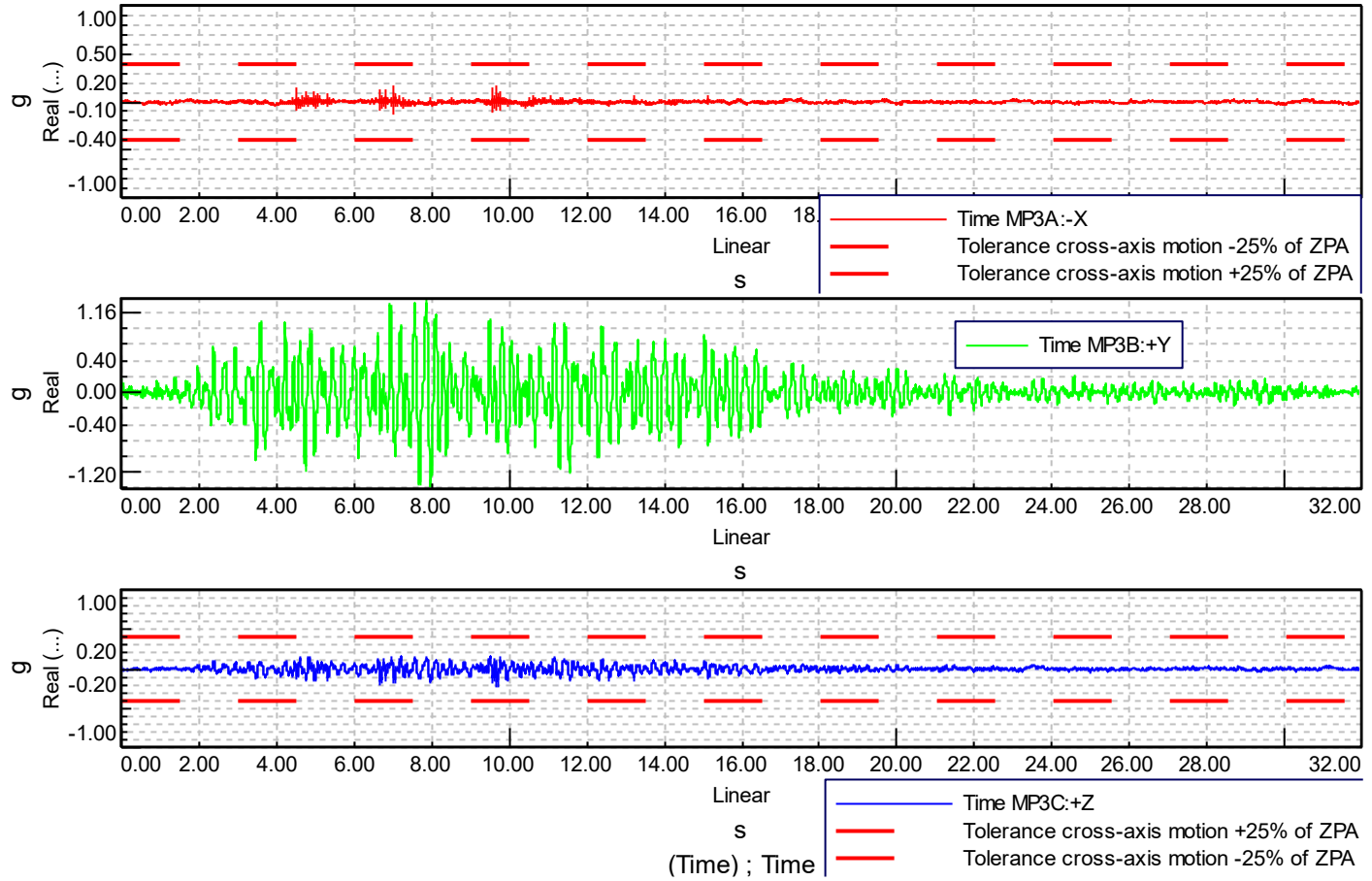

Figure 24 – Y Axis – MP3: Diagram of Seismic Test – Tolerances on cross axis motion

Project: **PRO-MTL-ELE25-032**
Section: **Y_AXIS**
Run: **RUN05_Shock_2**
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Point ID: CP1

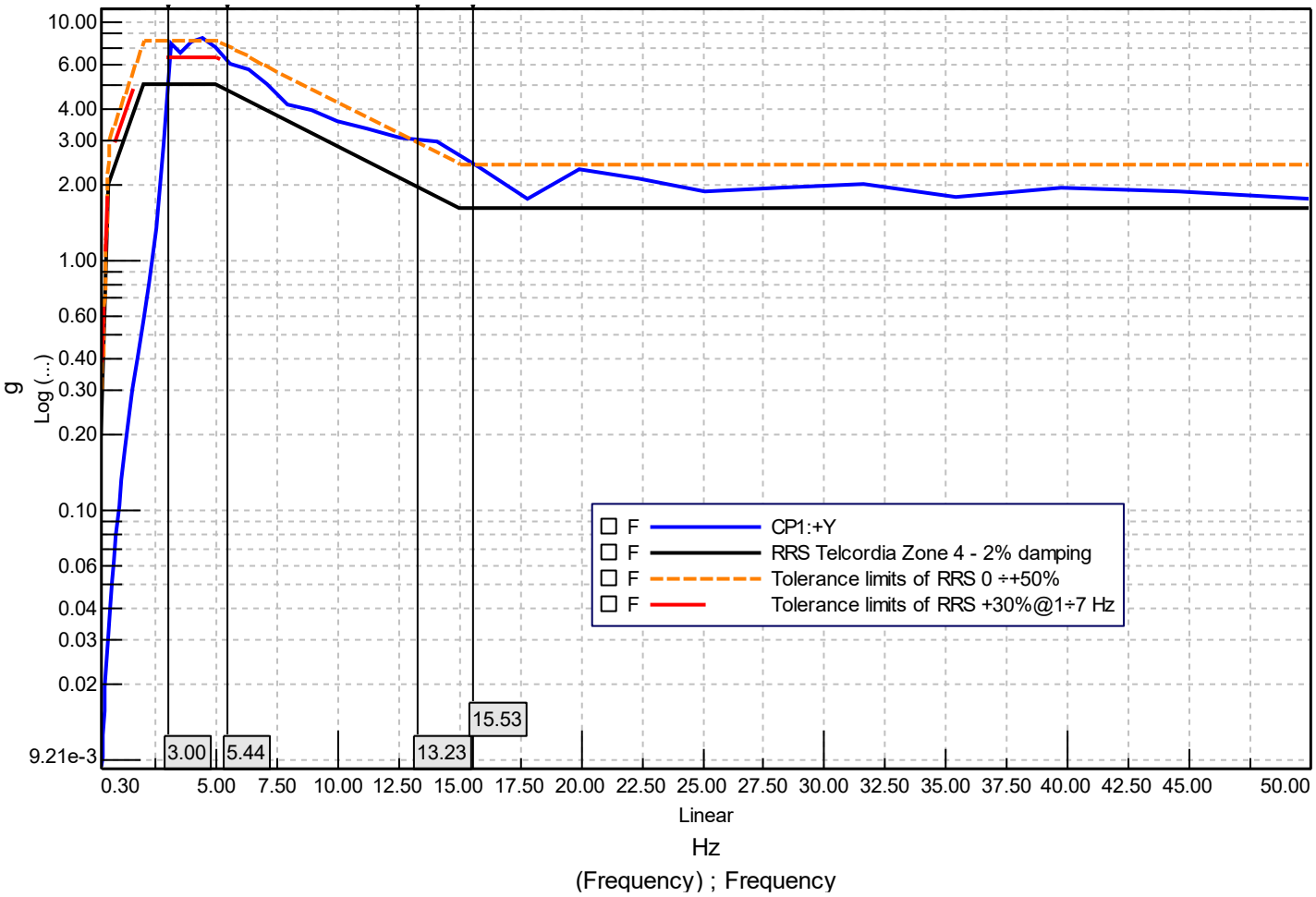

Figure 25 – Y Axis – AvgCtrl: Diagram of Test Response Spectrum

Project: **PRO-MTL-ELE25-032**
Section: **Y_AXIS**
Run: **RUN05_Shock_2**
Date:Wed Sep 17 2025 10:51:21
Point ID: MP2-MP3

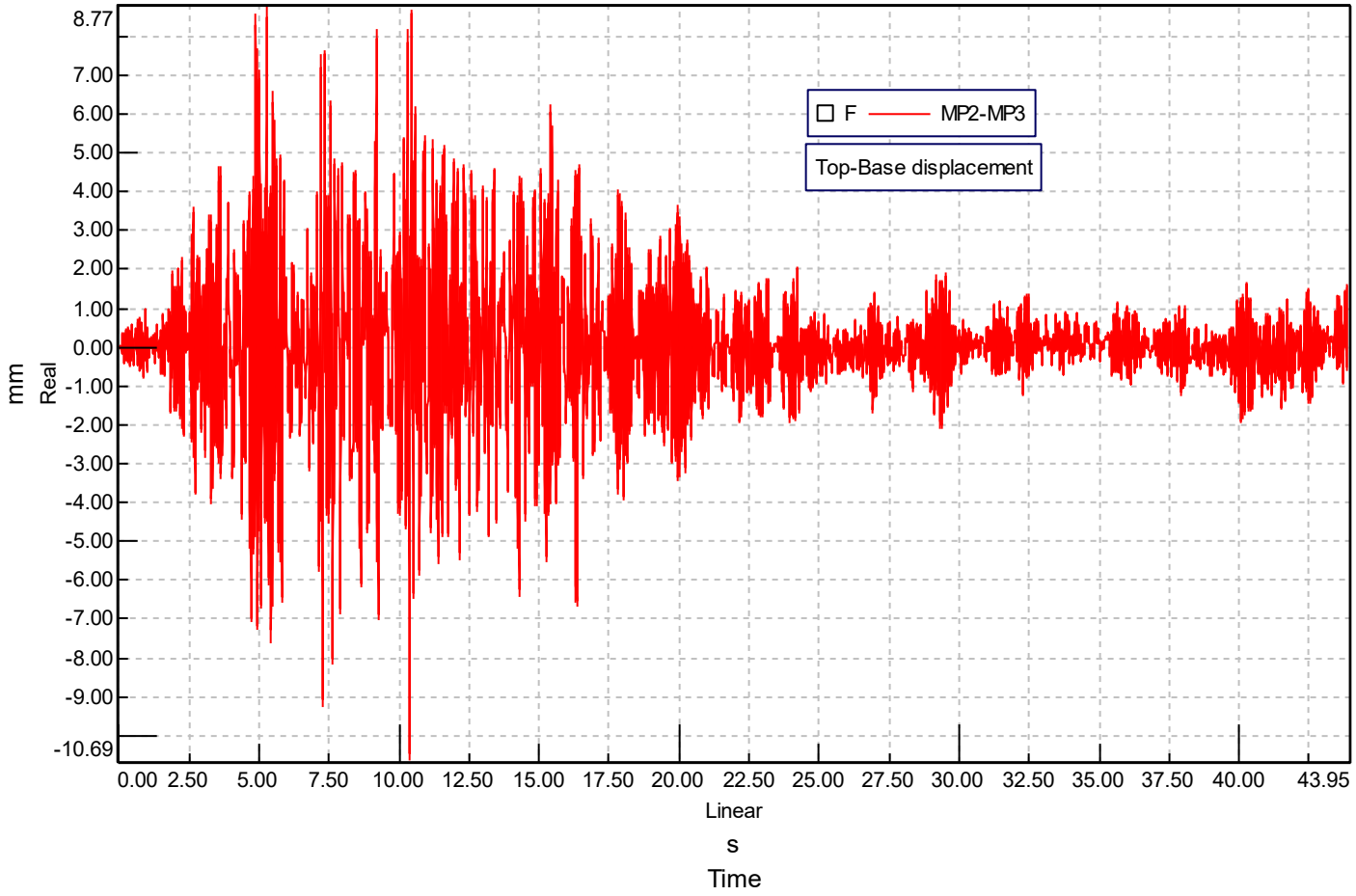

Figure 26 – Y Axis – MP2-MP3: Diagram of Seismic Test – Time-history of the relative displacement between the frame top and base of the EUT

Project: PRO-MTL-ELE25-032
Section: Y_AXIS
Run: RUN06_Sine_1
Date: Wed Sep 17 2025 11:30:37
Sweep direction: Up
Sweep rate: 1 Oct/min
Sweep done: 2
Number of control channels: 1
Point id: AvgCtrl
Control strategy: Average

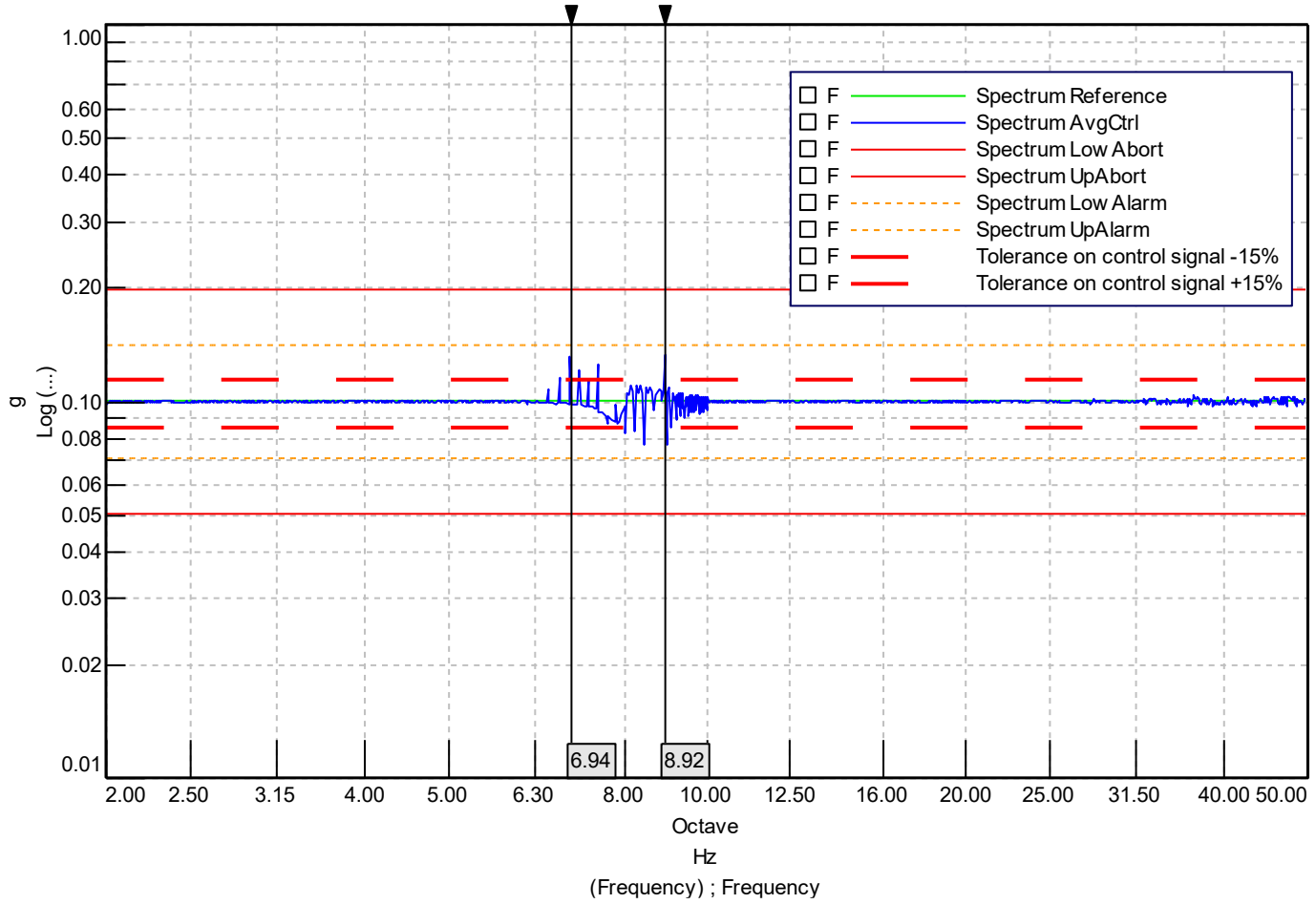

Figure 27 – Y Axis – AvgCtrl: Diagram of final vibration response investigation test – Sweep Up

Project: PRO-MTL-ELE25-032
Section: Y_AXIS
Run: RUN06_Sine_1
Date: Wed Sep 17 2025 11:30:37
Sweep direction: Up
Sweep rate: 1 Oct/min
Sweep done: 2
Reference point id: AvgCtrl
Point id: MP1C
Control strategy: Average

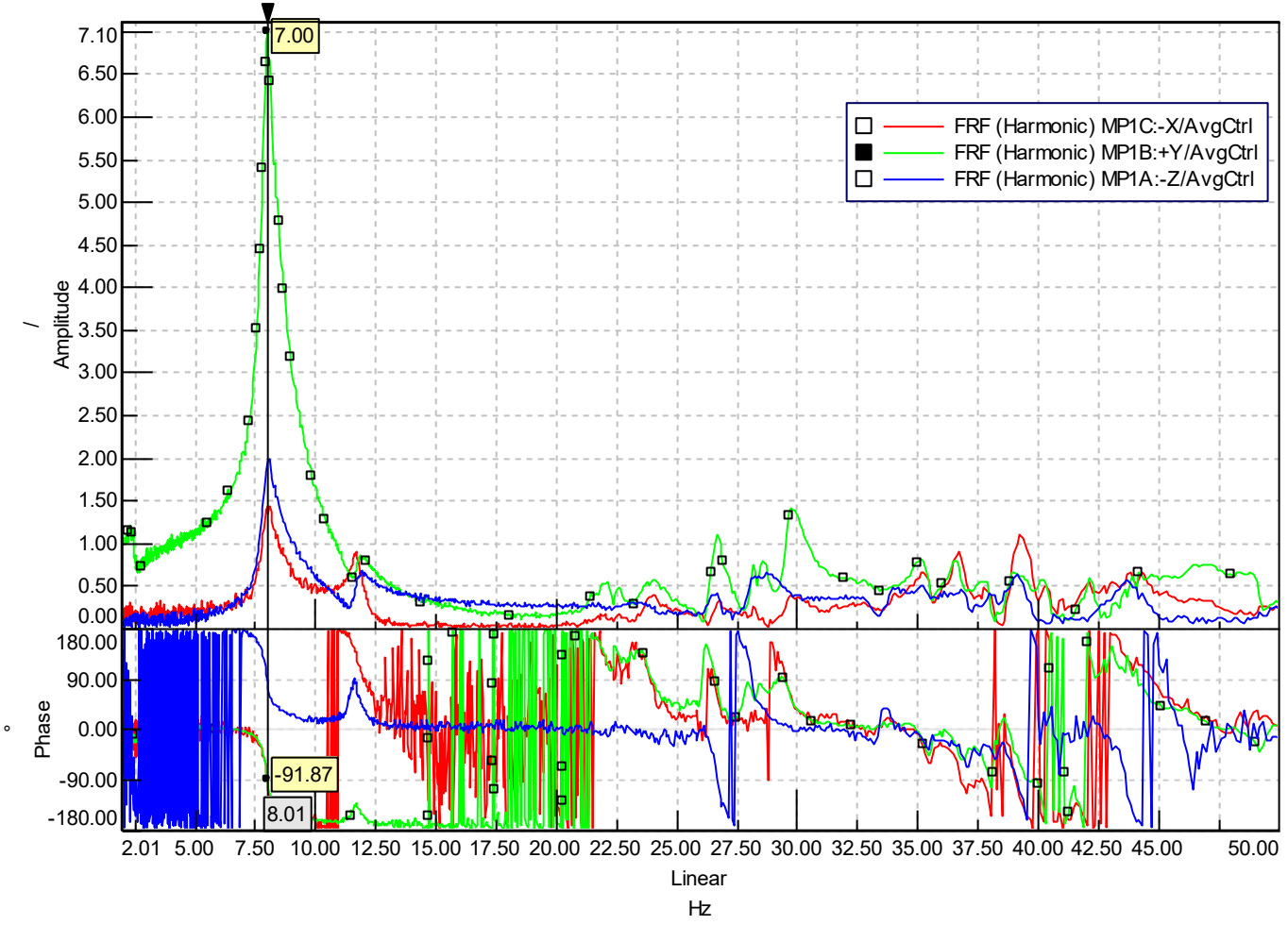

Figure 28 – Y Axis – MP1: Diagram of final vibration response investigation test – Sweep Up

Project: PRO-MTL-ELE25-032
Section: Y_AXIS
Run: RUN06_Sine_1
Date: Wed Sep 17 2025 11:30:37
Sweep direction: Up
Sweep rate: Variable
Sweep done: 2
Reference point id: AvgCtrl
Point id: MP2C
Control strategy: Average

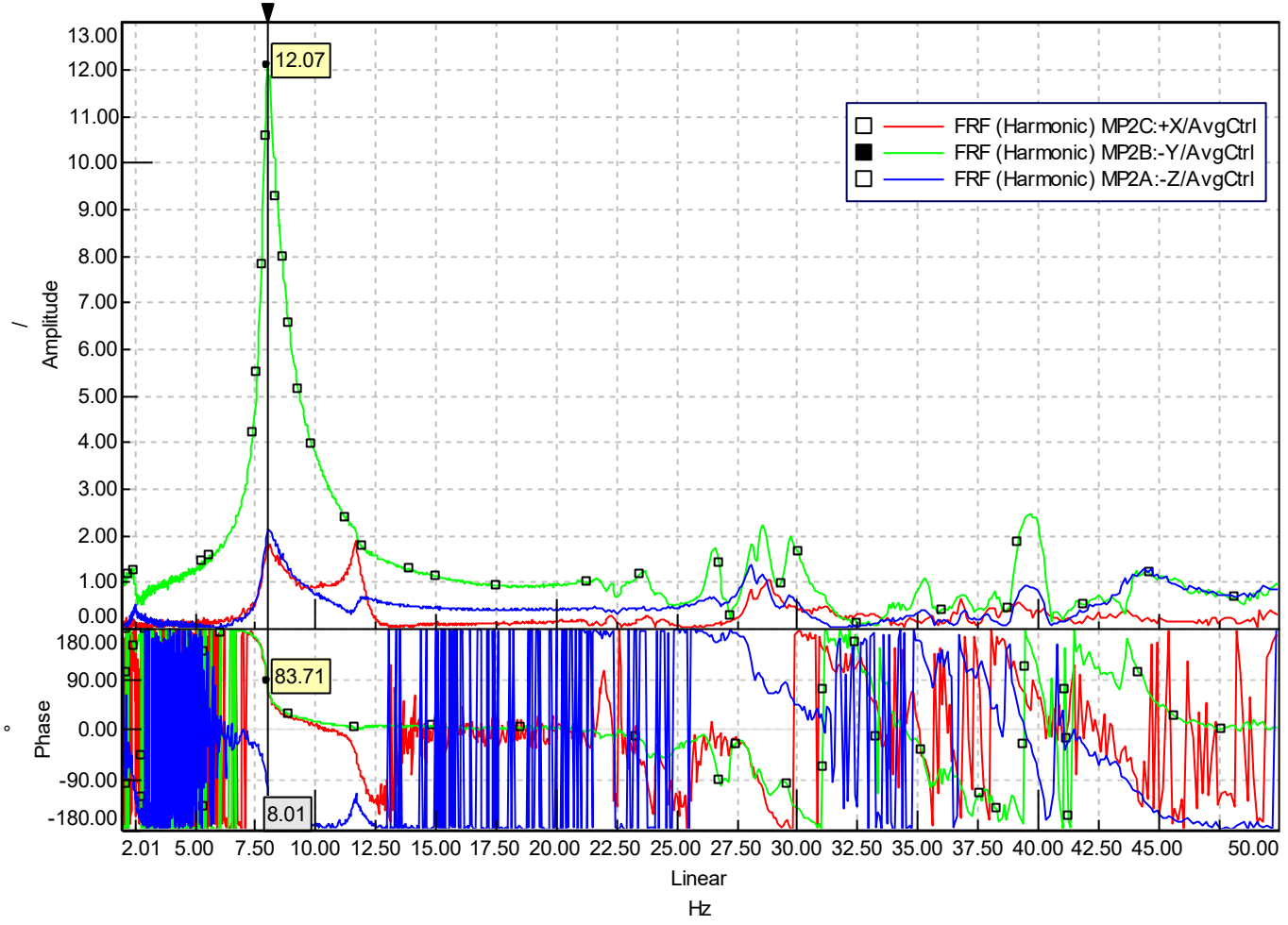

Figure 29 – Y Axis – MP2: Diagram of final vibration response investigation test – Sweep Up

Project: PRO-MTL-ELE25-032
Section: Y_AXIS
Run: RUN06_Sine_1
Date: Wed Sep 17 2025 11:30:37
Sweep Direction: Up
Sweep Rate: 1 Oct/min
Sweep done: 2
Point id: MP3A
Control strategy: Average

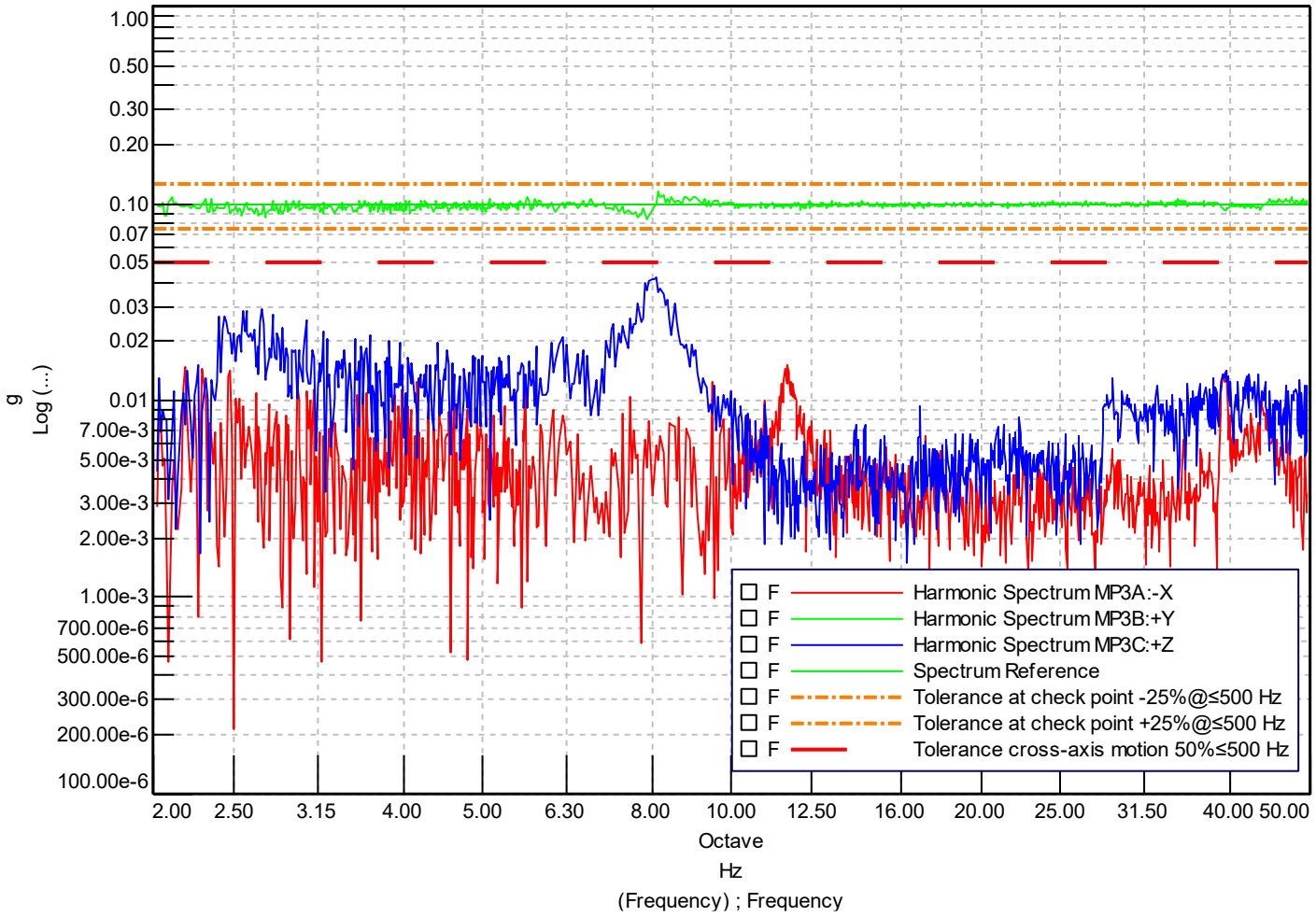

Figure 30 – Y Axis – MP3: Diagram of final vibration response investigation test – Tolerances – Sweep Up

Project: PRO-MTL-ELE25-032
Section: X_AXIS
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RMS: 0,05 g
Number of control channels: 1
Point id: AvgCtrl
Control strategy: Average

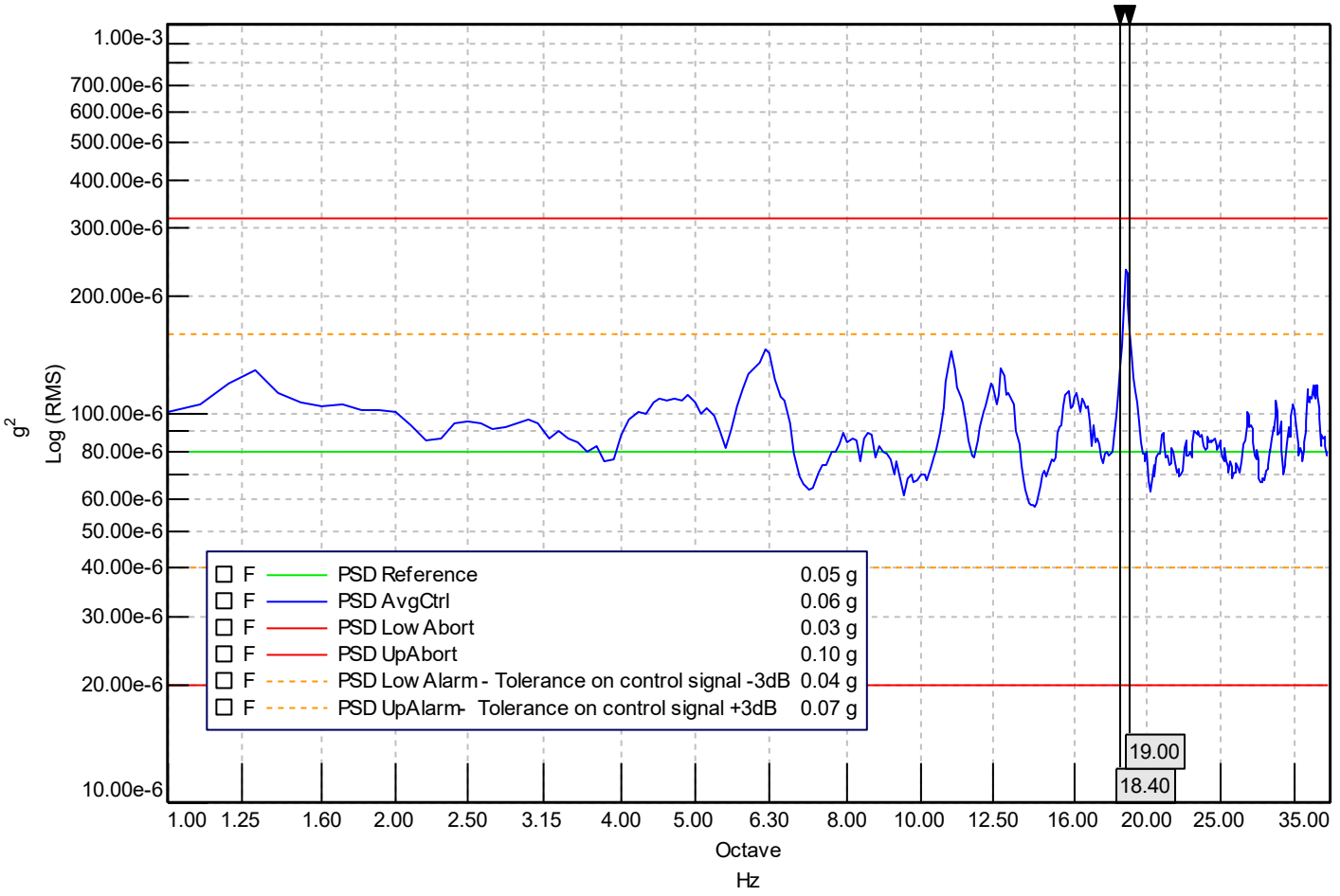

Figure 31 – X Axis – AvgCtrl: Diagram of initial vibration response investigation test

Project: PRO-MTL-ELE25-032
Section: X_AXIS
Run: RUN07_Random_1
Date: Wed Sep 17 2025 14:53:07
Reference point id: CP1
Point id: MP1C
Control strategy: Average

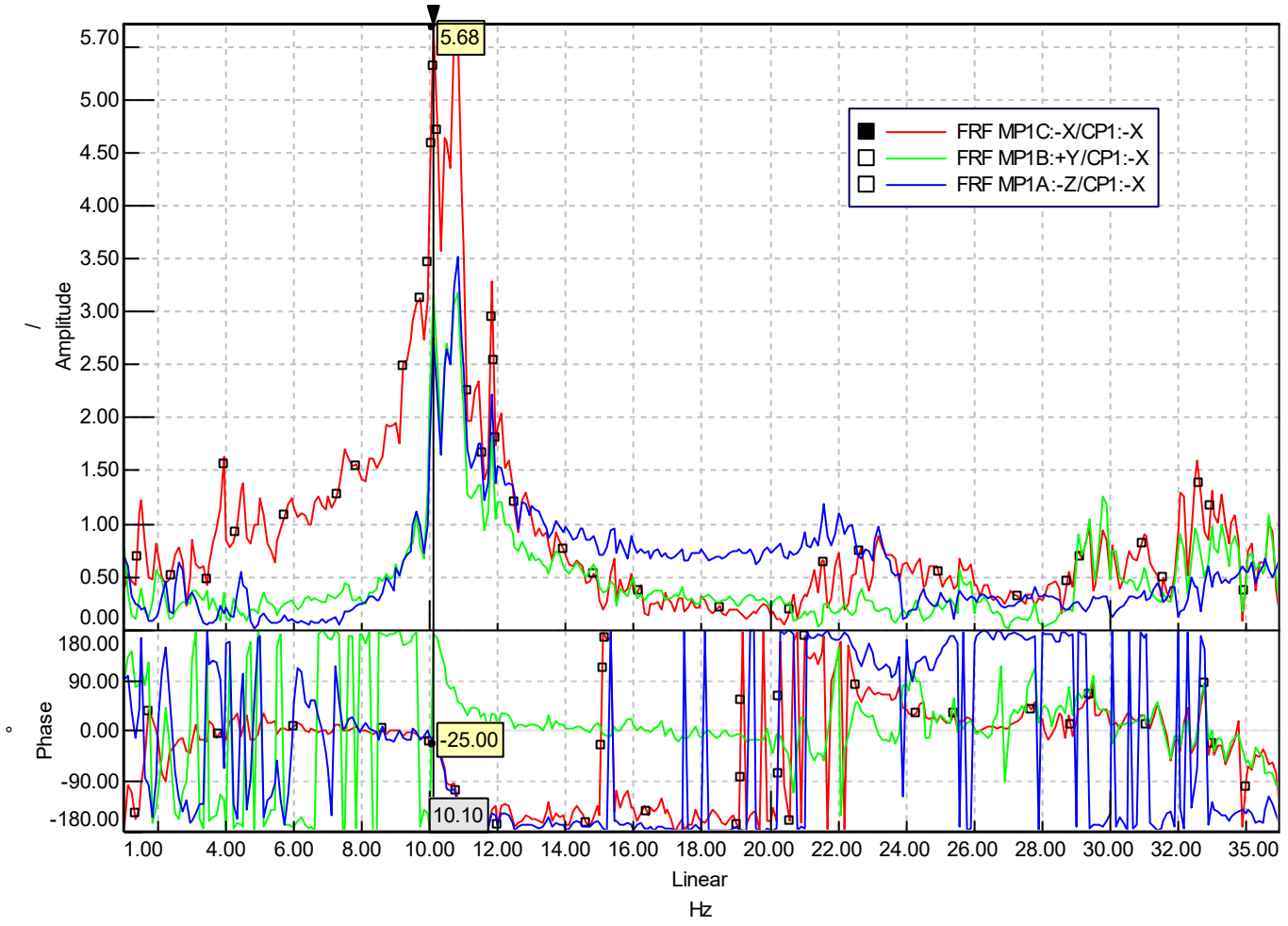

Figure 32 – X Axis – MP1: Diagram of initial vibration response investigation test

Project: PRO-MTL-ELE25-032
Section: X_AXIS
Run: RUN07_Random_1
Date: Wed Sep 17 2025 14:53:07
Reference point id: CP1
Point id: MP2C
Control strategy: Average

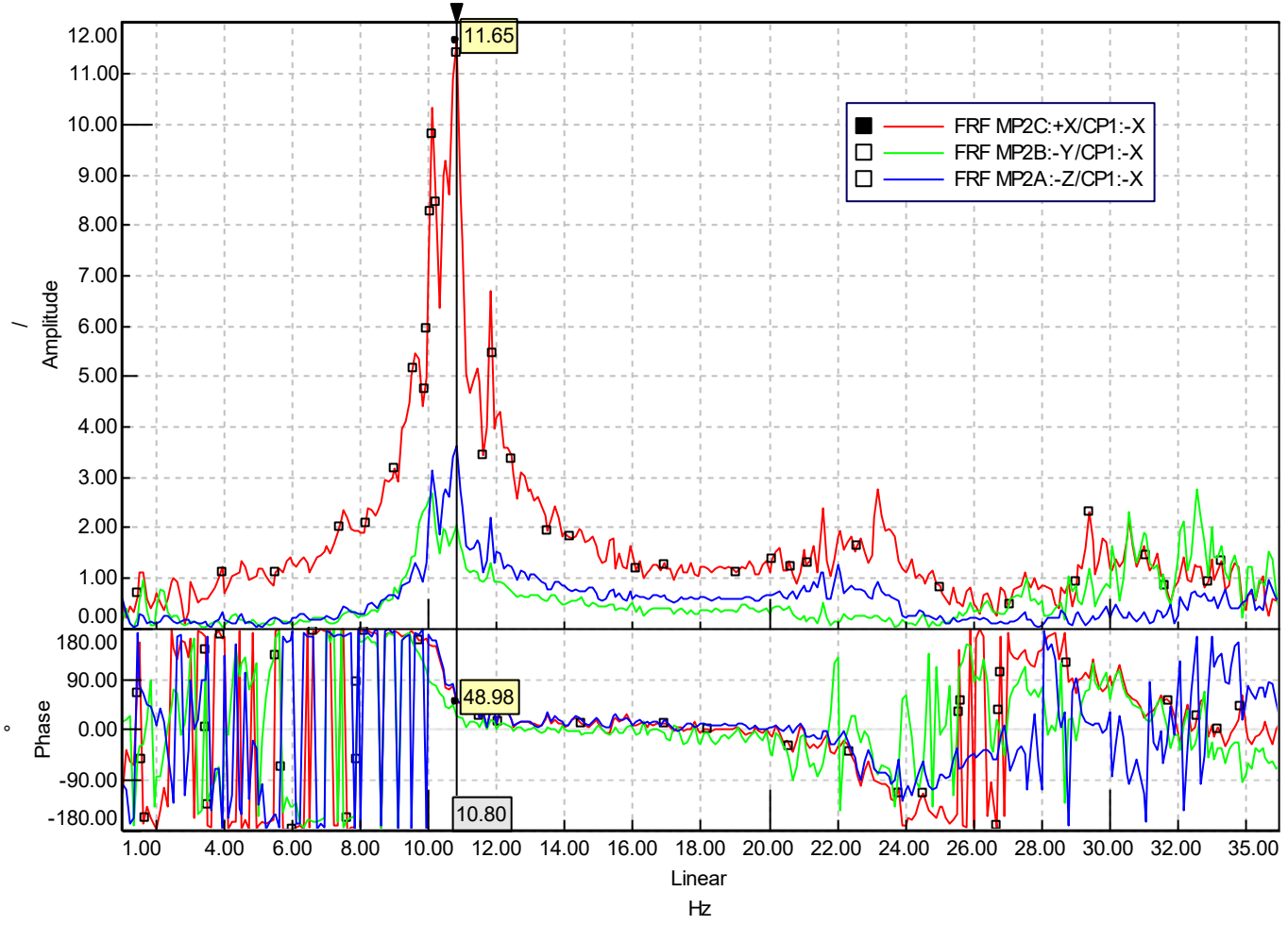

Figure 33 – X Axis – MP2: Diagram of initial vibration response investigation test

Project: PRO-MTL-ELE25-032
Section: X_AXIS
Run: RUN07_Random_1
Date: Wed Sep 17 2025 14:53:07
Point id: MP3A
Control strategy: Average

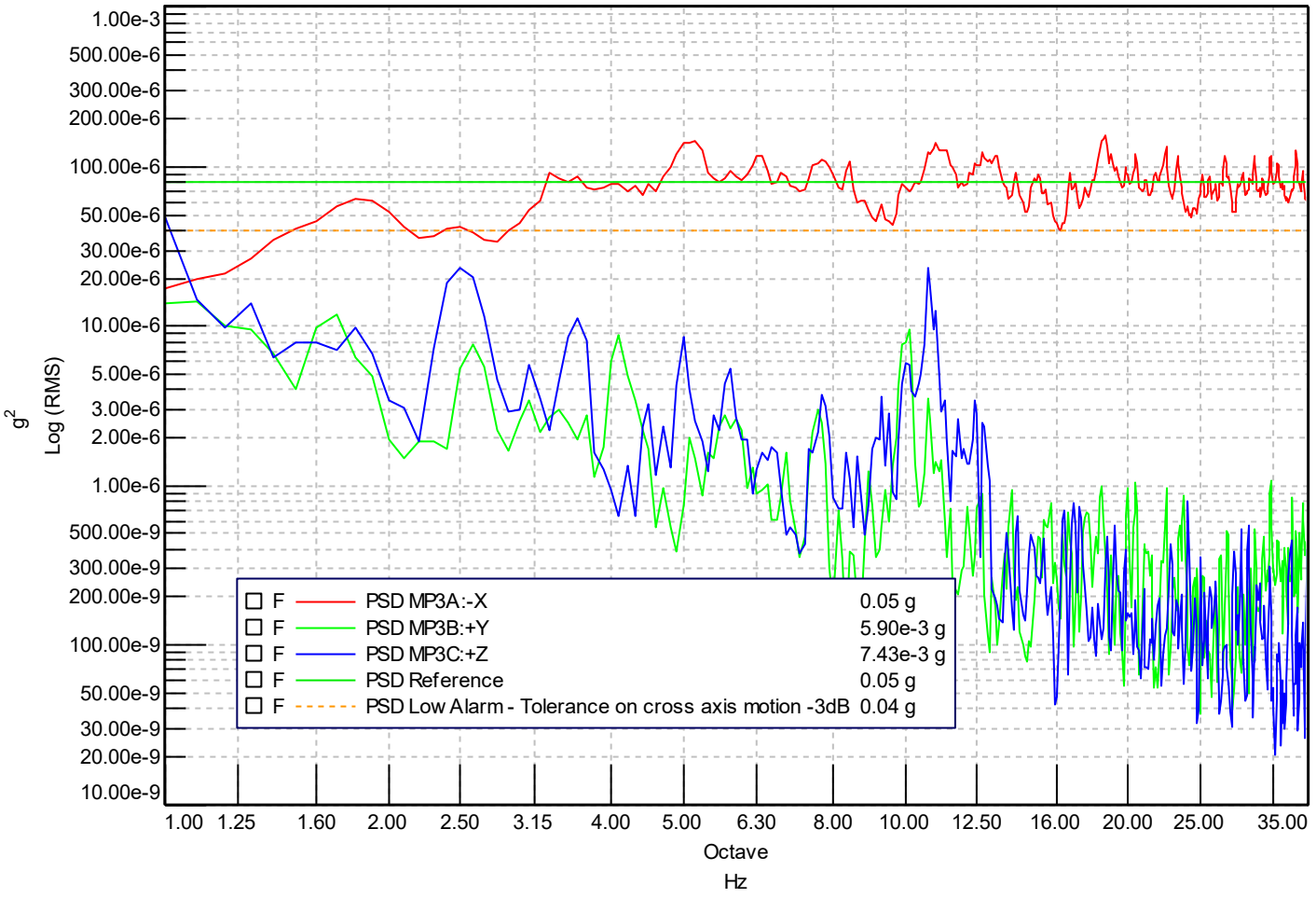

Figure 34 – X Axis – MP3: Diagram of initial vibration response investigation test – Tolerances

Project:PRO-MTL-ELE25-032
Section: X_AXIS
Run: RUN08_Shock_3
Date:Wed Sep 17 2025 15:38:24
Point ID: CP1

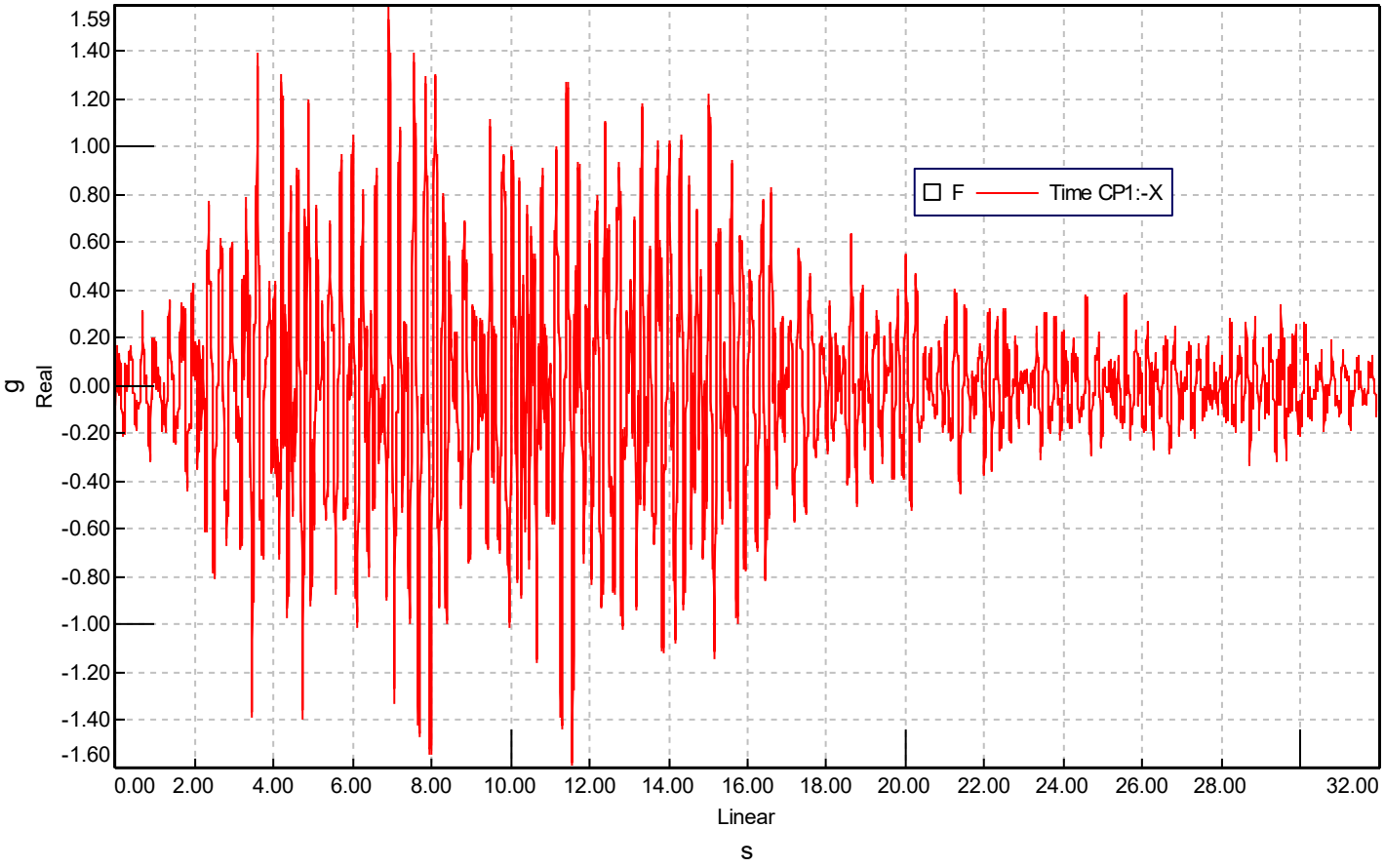

Figure 35 – X Axis – CP1: Diagram of Seismic Test

Project: **PRO-MTL-ELE25-032**
Section: **X_AXIS**
Run: **RUN08_Shock_3**
Date:Wed Sep 17 2025 15:38:24
Point ID: MP1C

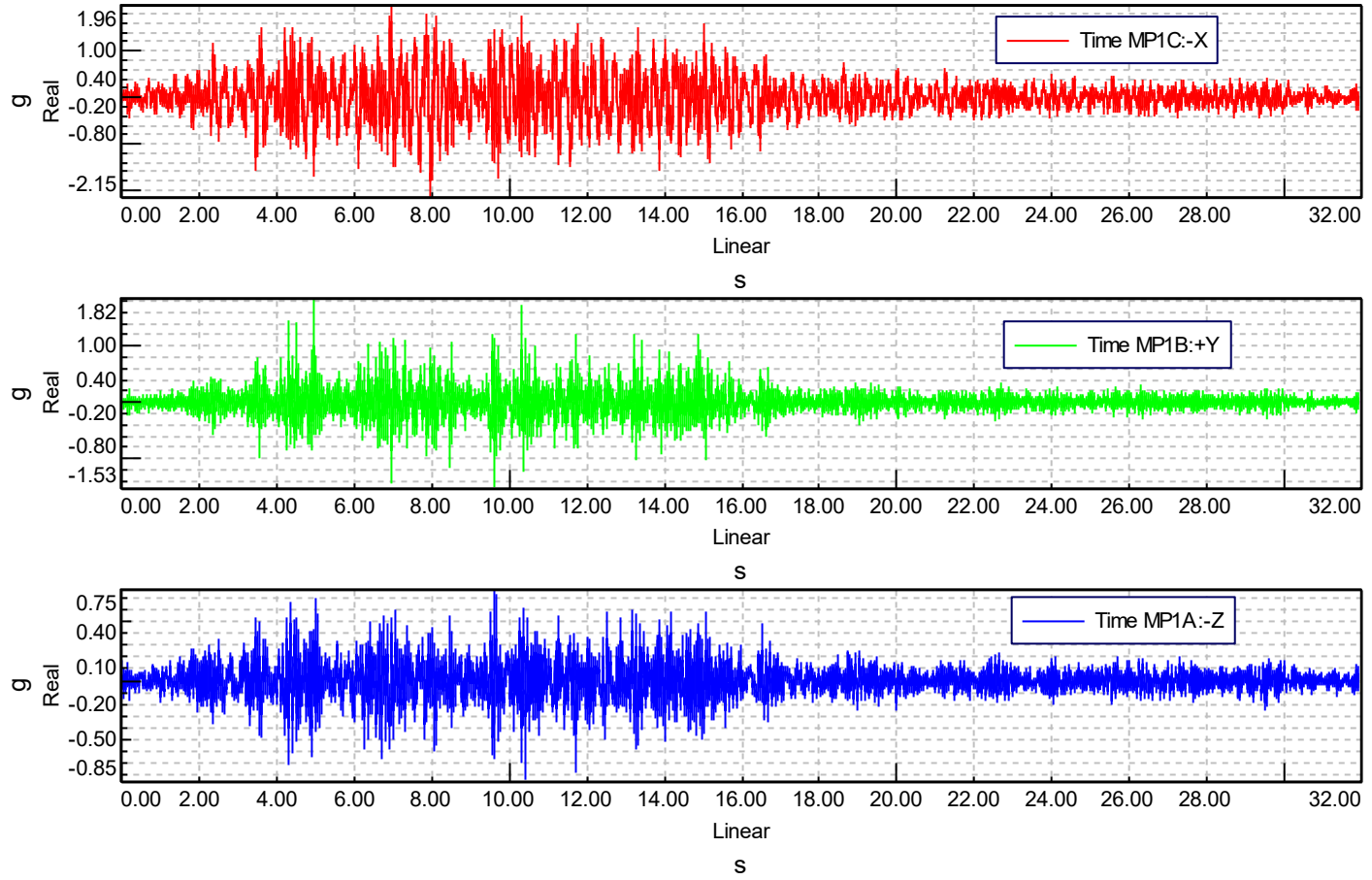

Figure 36 – X Axis – MP1: Diagram of Seismic Test

Project:PRO-MTL-ELE25-032
Section:X_AXIS
Run:RUN08_Shock_3
Date:Wed Sep 17 2025 15:38:24
Point ID: MP2C

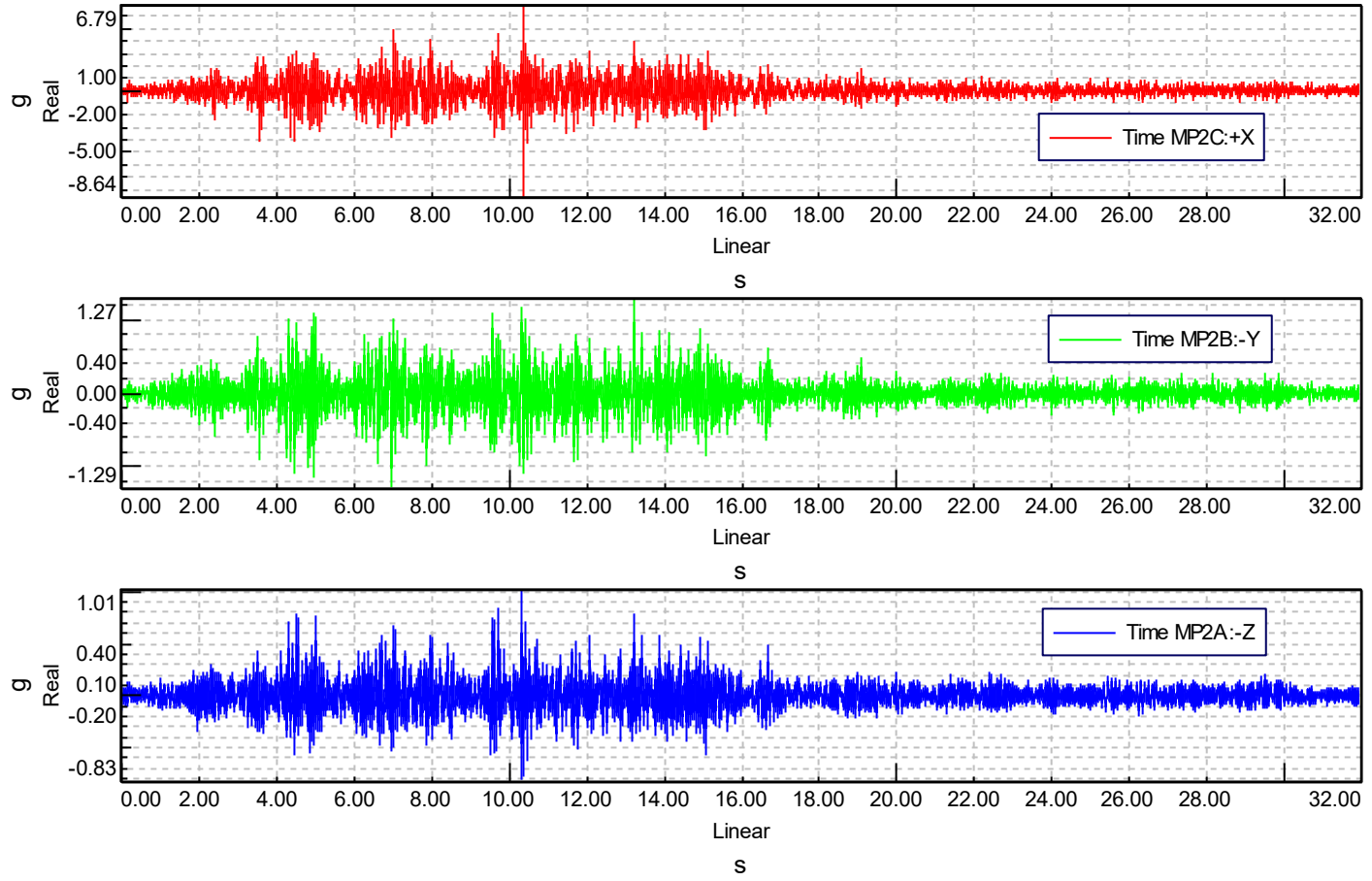

Figure 37 – X Axis – MP2: Diagram of Seismic Test

Project:PRO-MTL-ELE25-032
Section:X_AXIS
Run:RUN08_Shock_3
Date:Wed Sep 17 2025 15:38:24
Point ID: MP3A

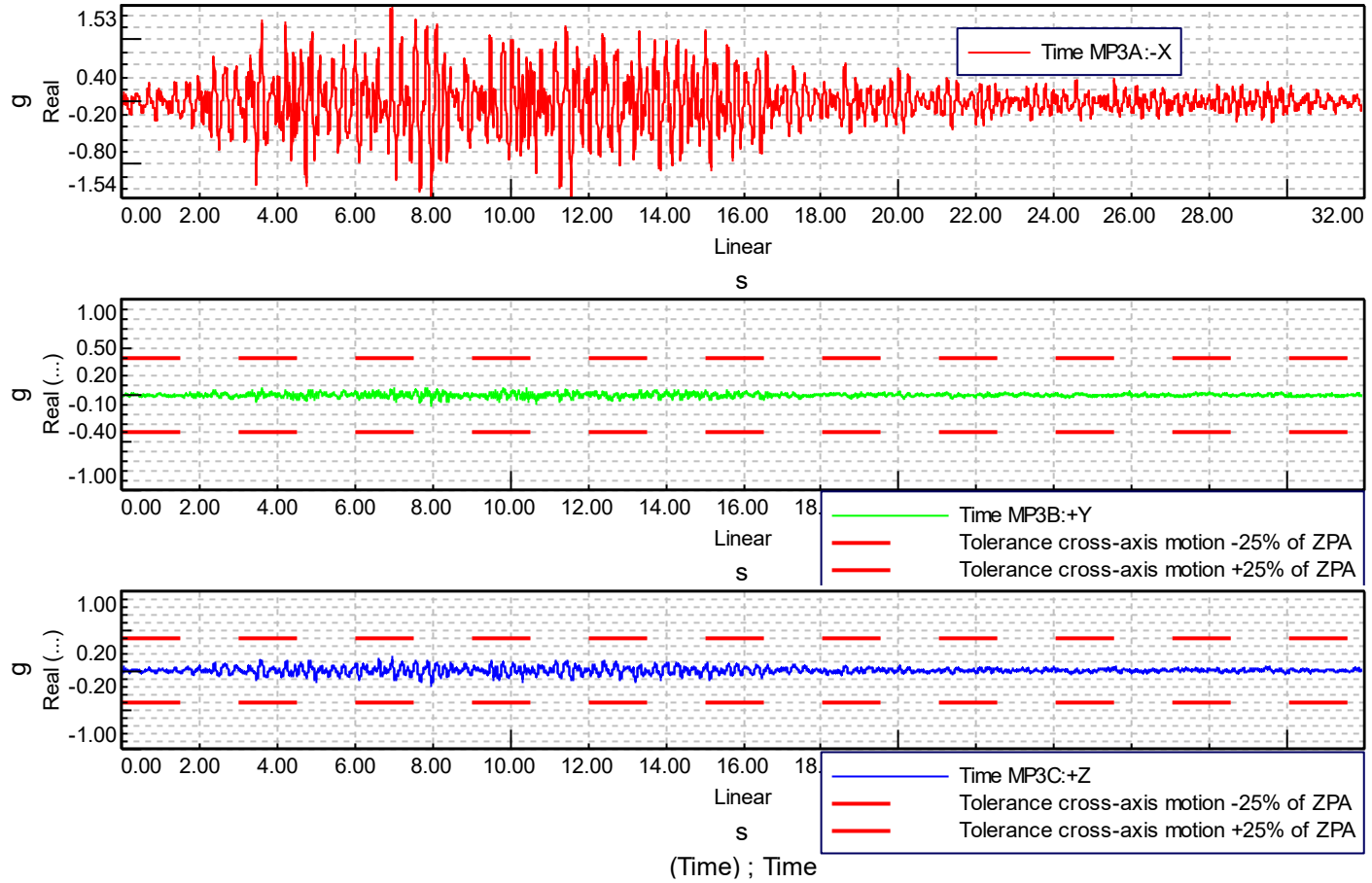

Figure 38 – X Axis – MP3: Diagram of Seismic Test – Tolerances on cross axis motion

Project: **PRO-MTL-ELE25-032**
Section: **X_AXIS**
Run: **RUN08_Shock_3**
Date:Wed Sep 17 2025 15:38:24
Point ID: CP1

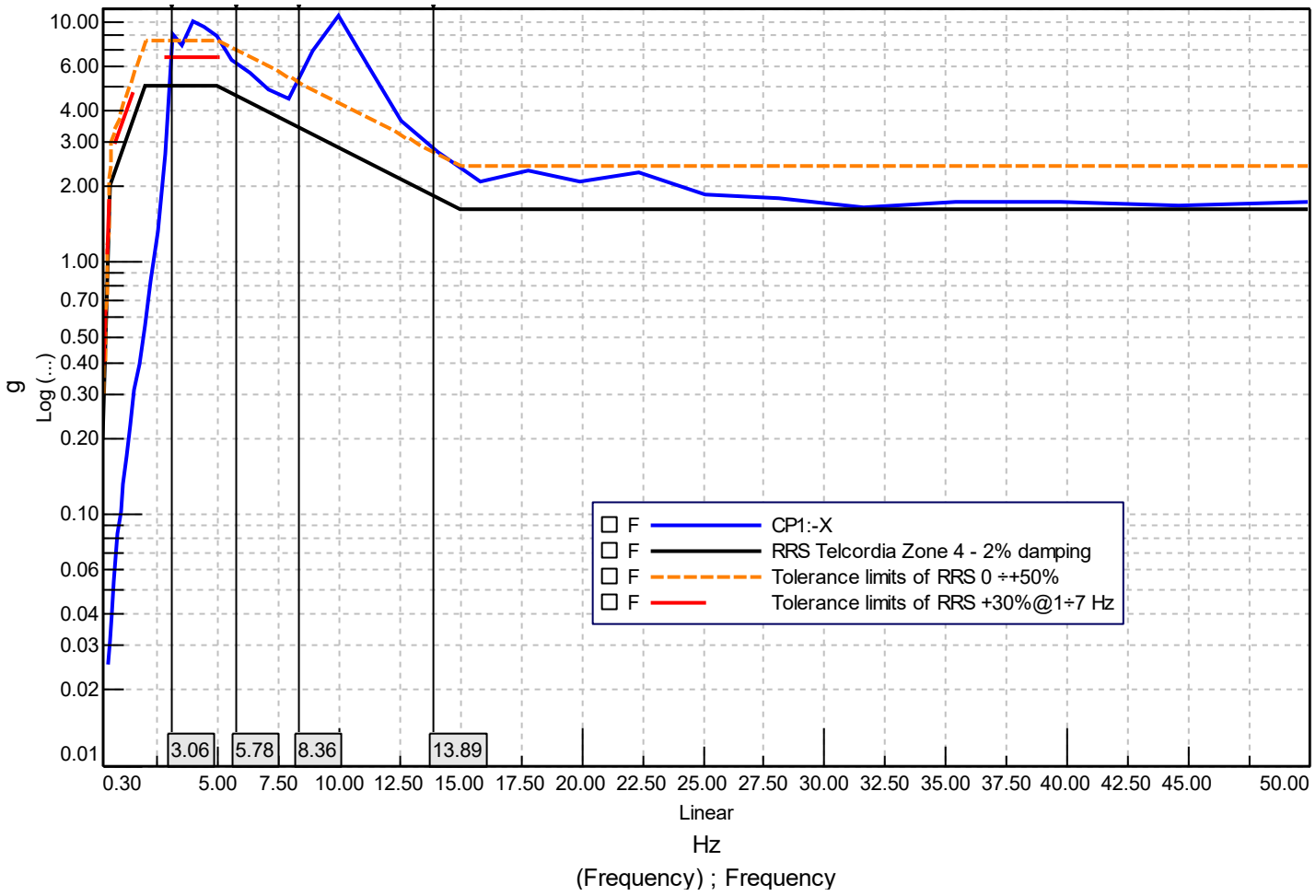

Figure 39 – X Axis – AvgCtrl: Diagram of Test Response Spectrum

Project: **Property not found in**
Section: **Property not found in**
Run: **Property not found in**
Date:Property not found in property container.
Point ID: Point1

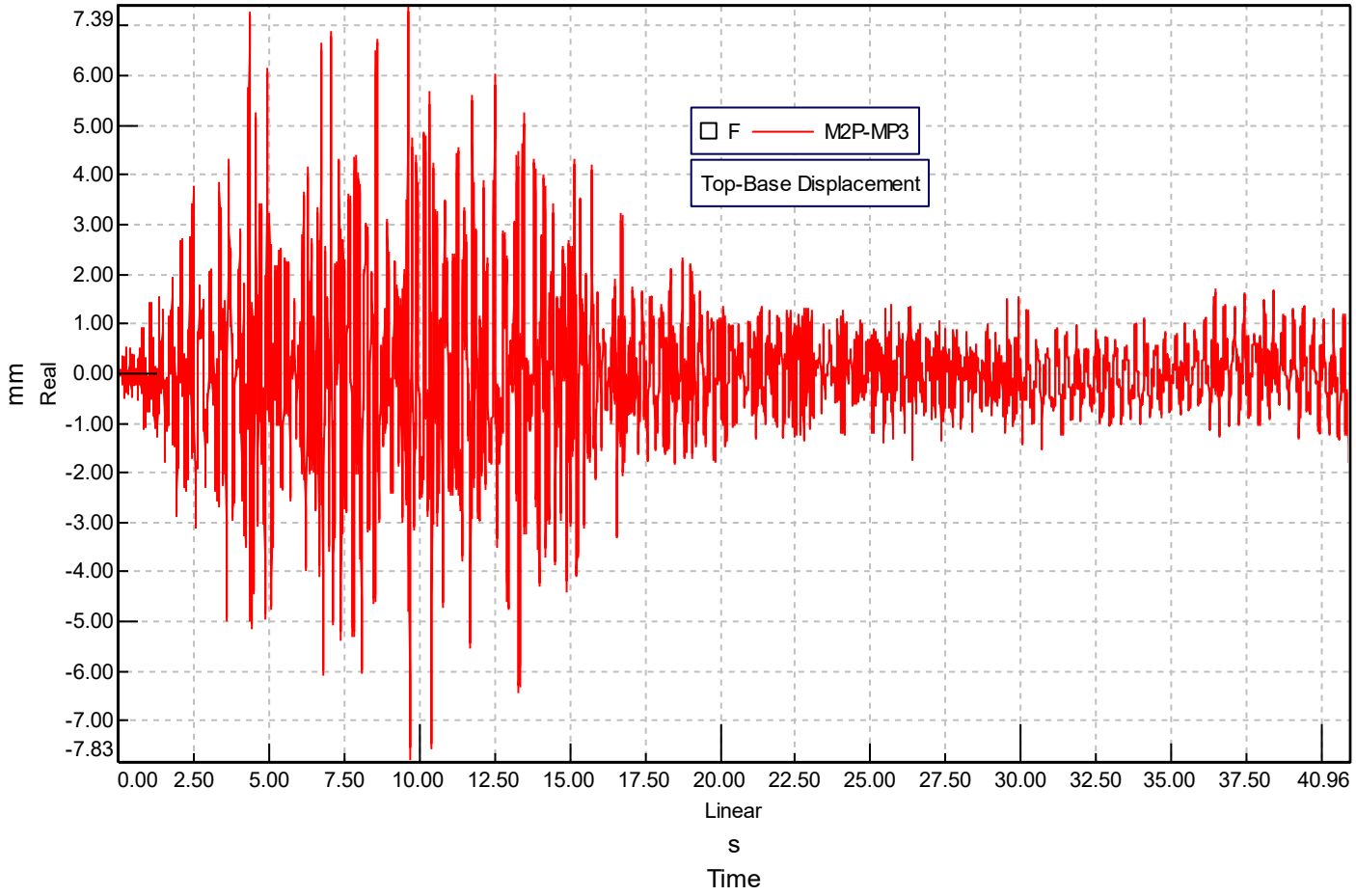

Figure 40 – X Axis – MP2-MP3: Diagram of Seismic Test – Time-history of the relative displacement between the frame top and base of the EUT

Project: PRO-MTL-ELE25-032
Section: X_AXIS
Run: RUN09_Random_1
Date: Wed Sep 17 2025 16:03:58
RMS: 0,05 g
Number of control channels: 1
Point id: AvgCtrl
Control strategy: Average

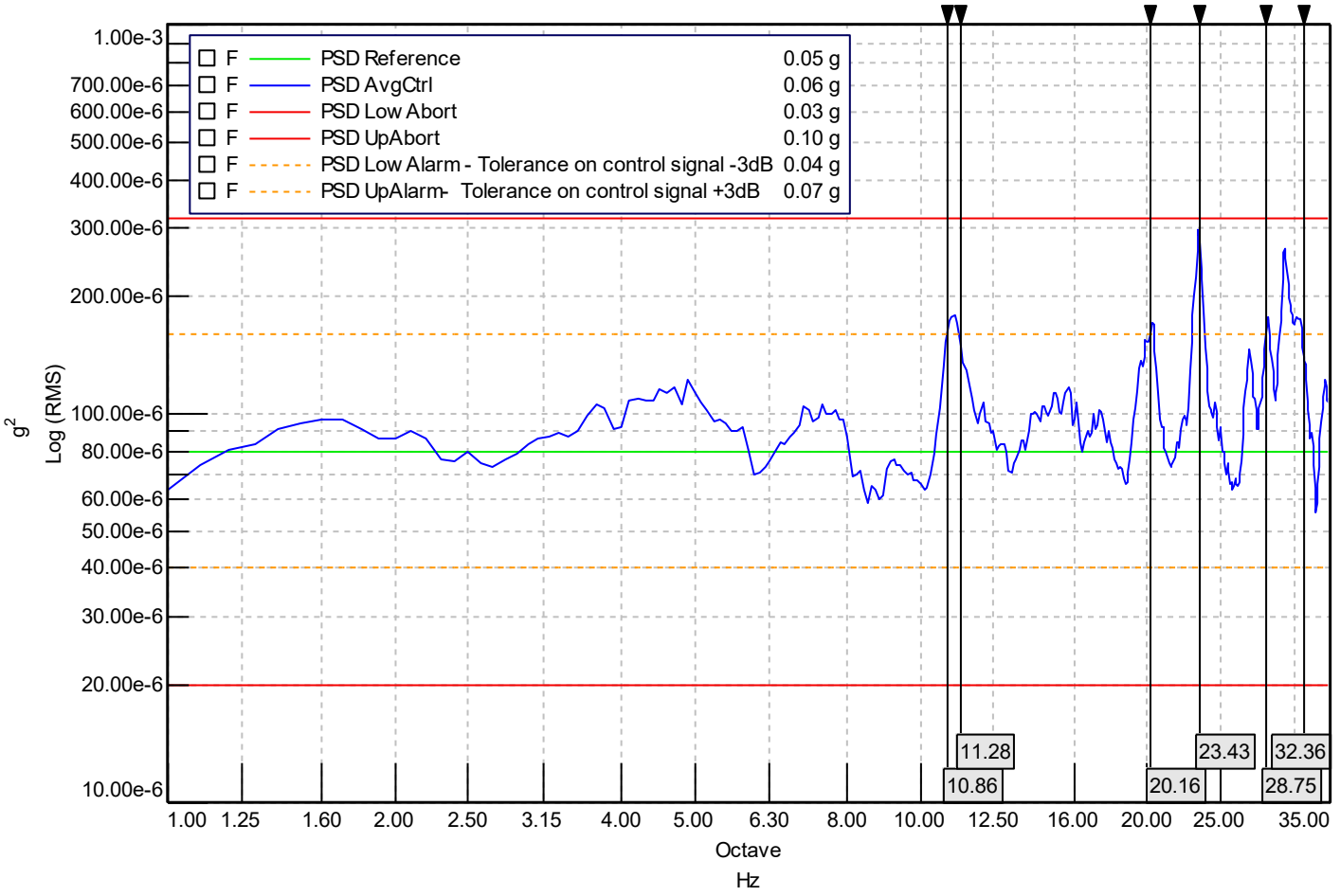

Figure 41 – X Axis – AvgCtrl: Diagram of final vibration response investigation test

Project: PRO-MTL-ELE25-032
Section: X_AXIS
Run: RUN09_Random_1
Date: Wed Sep 17 2025 16:03:58
Reference point id: CP1
Point id: MP1C
Control strategy: Average

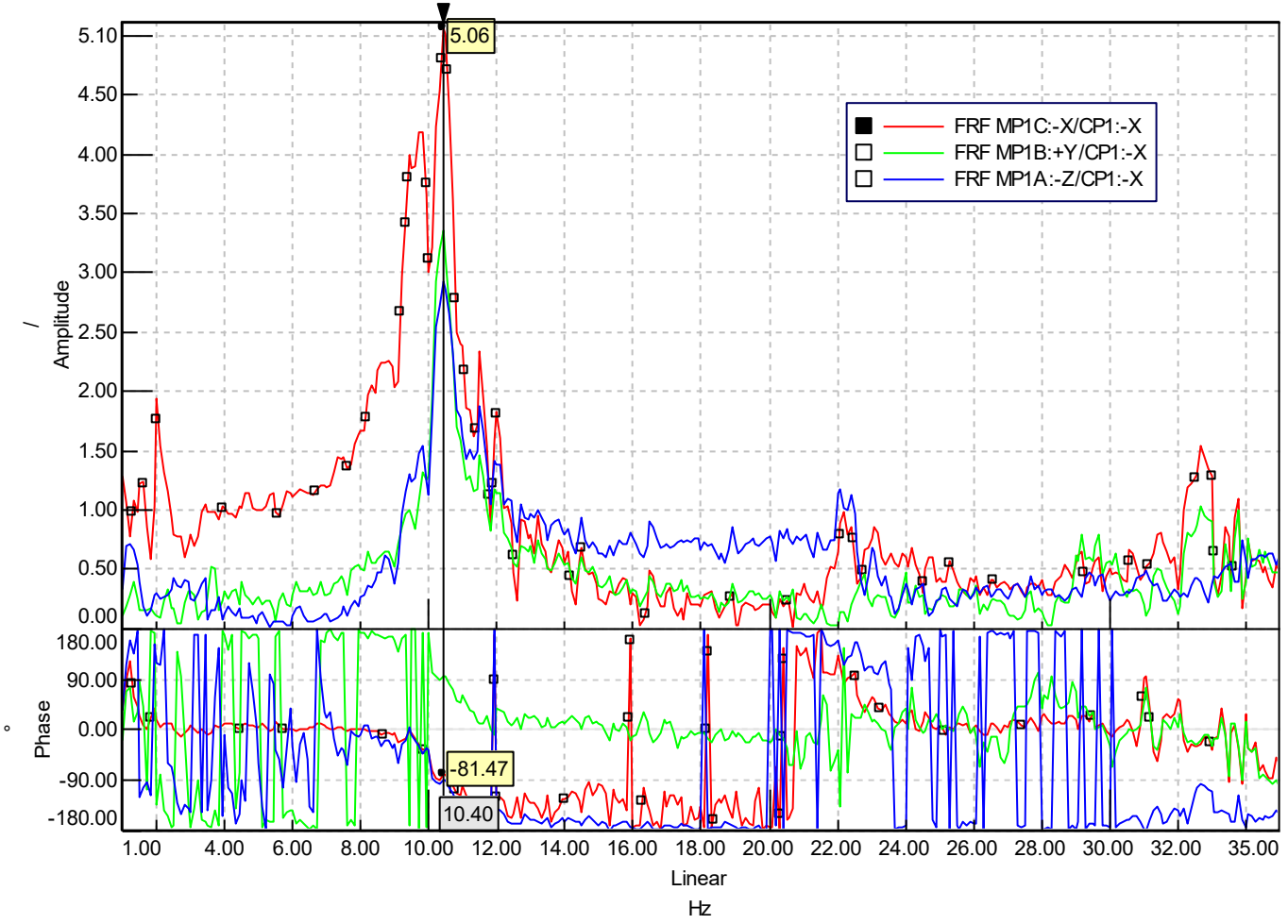

Figure 42 – X Axis – MP1: Diagram of initial vibration response investigation test

Project: PRO-MTL-ELE25-032
Section: X_AXIS
Run: RUN09_Random_1
Date: Wed Sep 17 2025 16:03:58
Reference point id: CP1
Point id: MP2C
Control strategy: Average

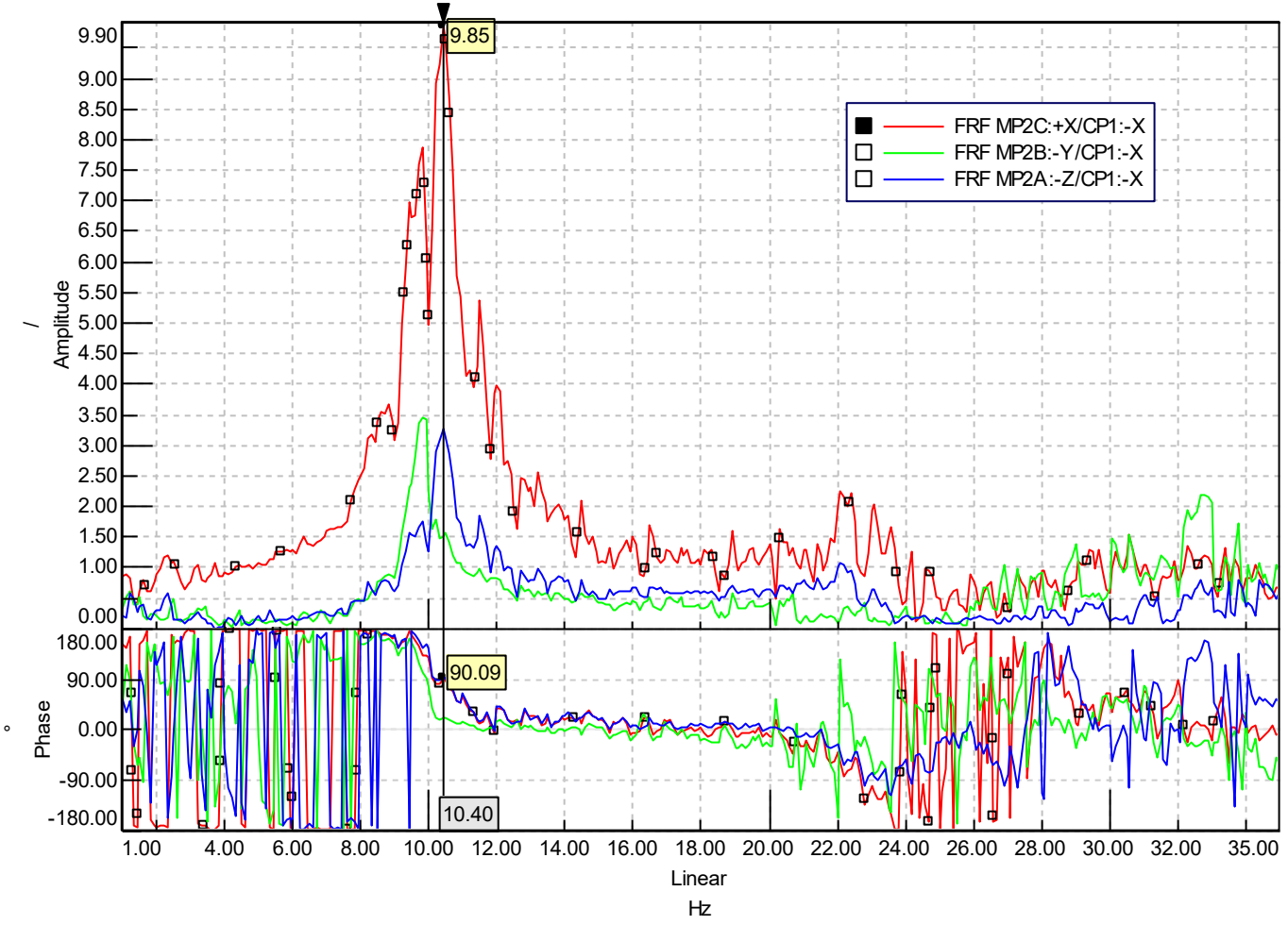

Figure 43 – X Axis – MP2: Diagram of initial vibration response investigation test

Project: PRO-MTL-ELE25-032
Section: X_AXIS
Run: RUN09_Random_1
Date: Wed Sep 17 2025 16:03:58
Point id: MP3A
Control strategy: Average

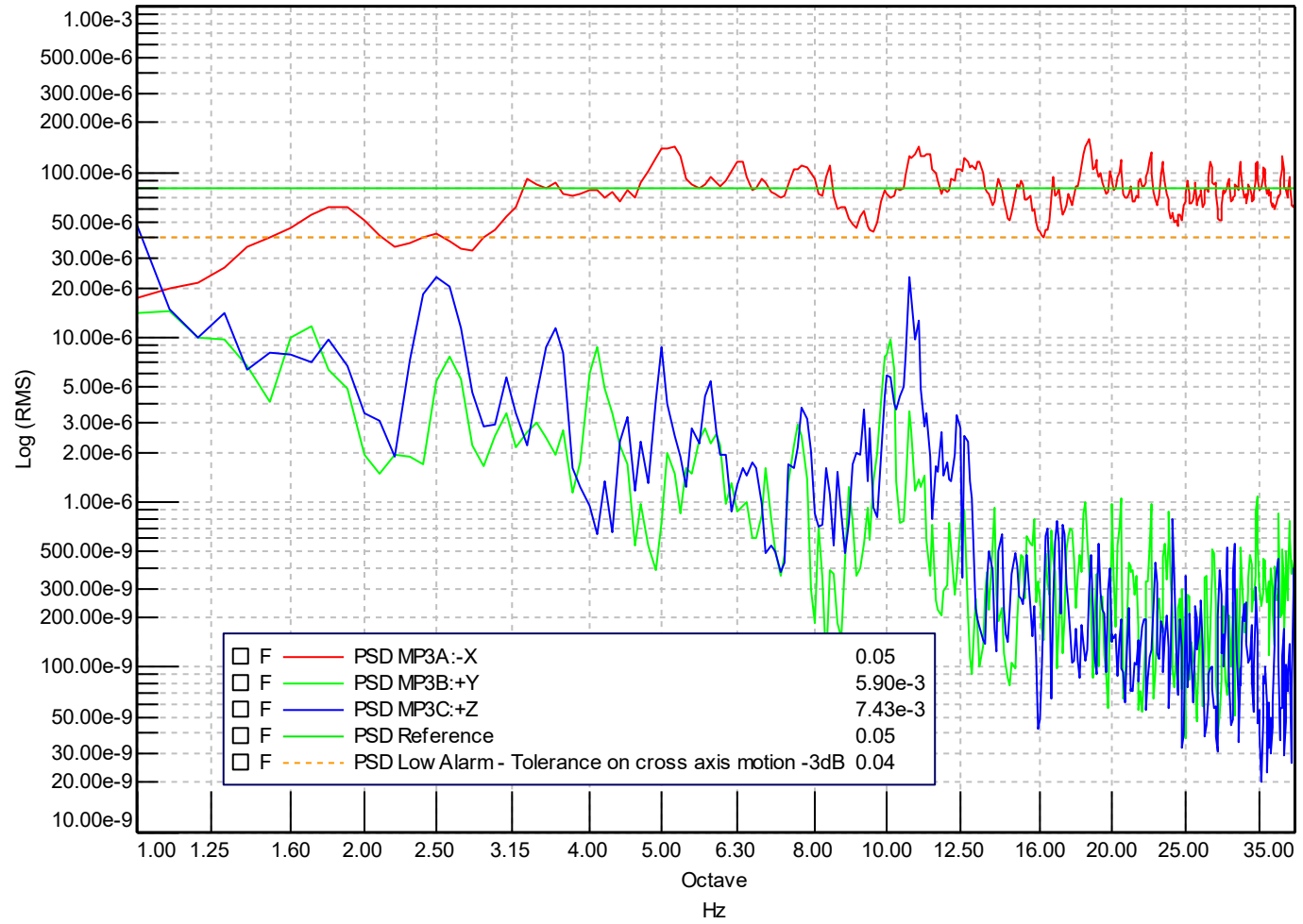

Figure 44 – X Axis – MP3: Diagram of final vibration response investigation test – Tolerances

ATTACHMENTS

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| End of test report |