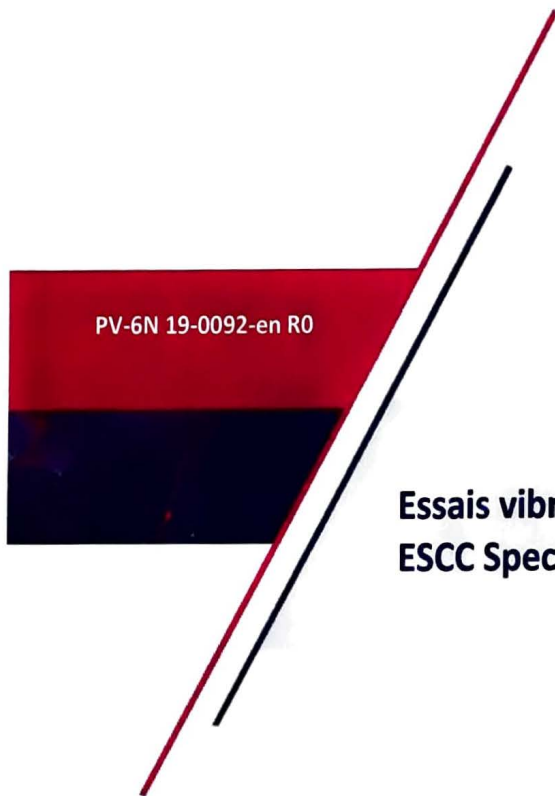


SMITHS INTERCONNECT
32 Rue Isidore Maille

76410 Saint-Aubin Les Elbeufs

To Monsieur Sylvain LEROY



Essais vibratoires sur connecteurs selon ESCC Specification

Quotation : DE-6N 19-0150

Order : 463701

Order agreement received on : 11/12/2019

Report drawn up : 17/01/2020

Reference specifications : ESCC. 3401

Editor

Paul MEURANT
Testing Engineer



Approver

Quentin PELLOIE
Dynamic Testing Manager



The results presented relate only to the parts tested.

Follow-up of revisions

Revisions index	Date	Modifications
0	17/01/2020	Document creation

Synthesis

Tests were performed the 07/01/2020 at 6NAPSE at Vernon. Those tests were according to quotation DE-6N 19-0150 and ESCC. 3401 specification.

Endurance test and shock test were performed on connectors.

Any breaking, rift or deformations were detected on products after all test.

During the vibration tests, microcut tests were performed.
Any microcut were detected during all tests.

Sinus Swep

Testing parts	Axis	Duration	Frequency band [Hz]	Post test examination
MHD1005510110 MHD1004430121	X	30 min	[10 – 2000]	Nothing to report
	Y	30 min	[10 – 2000]	Nothing to report
	Z	30 min	[10 – 2000]	Nothing to report

Random excitation

Testing parts	Axis	Duration	RMS Value [g]	Frequency band [Hz]	Post test examination
MHD1005510110 MHD1004430121	X	30 min	19.9	[20 – 2000]	Nothing to report
	Y	30 min	19.9	[20 – 2000]	Nothing to report
	Z	30 min	19.9	[20 – 2000]	Nothing to report

Shocks

Testing parts	Axis	Shock number	Type	Shock duration	Level	Post test examination
MHD1005510110 MHD1004430121	X	3 positives et 3 négatives	Half-Sinus	11 ms	50g	Nothing to report
	Y	3 positives et 3 négatives	Half-Sinus	11 ms	50g	Nothing to report
	Z	3 positives et 3 négatives	Half-Sinus	11 ms	50g	Nothing to report

The overall results are presented in the following pages.

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1. CONTEXT OF THE STUDY

30 minutes Sinus sweep and endurance tests were performed on connectors following X, Y and Z axis. Furthermore, 3 positives and 3 negatives 50g and 11ms shocks were performed on every axis. Microcut tests were performed during every test.

2. SAMPLE REFERENCES

OUR REFERENCE	YOUR REFERENCE	RECEIVED ON
PV-6N 19-0092-001	MHD1005510110	07/01/2020
PV-6N 19-0092-002	MHD1004430121	07/01/2020

In accordance with your request, the samples are returned to you by carrier.

3. EQUIPMENTS


Désignation	Brand/model	Fonctions
Shaker	IMV/A74	Vibrations
Acquisition system	LMS	Driving / Measurement
Hardware	LMS Test.Lab / 17A	Driving / Measurement
Accelerometers	1 x PCB 357B11	Driving / Measurement

Tableau 1: Means used for 19-0092 project.

As part of our Quality System, the laboratory equipment used for this study is monitored for maintenance and verification. This information is available on request.

4. OPERATING PROCEDURE / SAMPLE PREPARATION

4.1 Mounting and Instrumentation tests

Legend : Control sensor: 

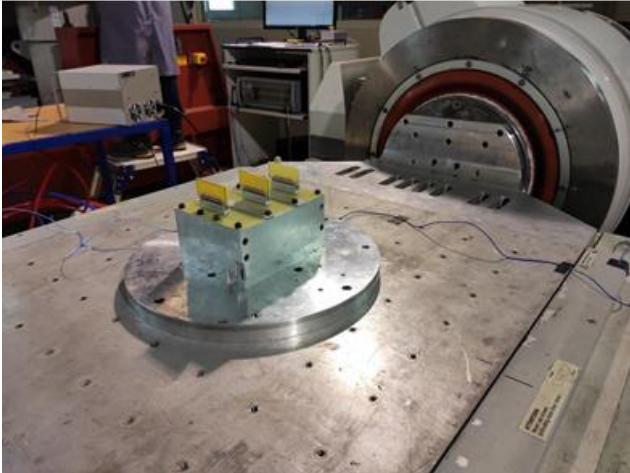


Figure 1: Mounting following Y.

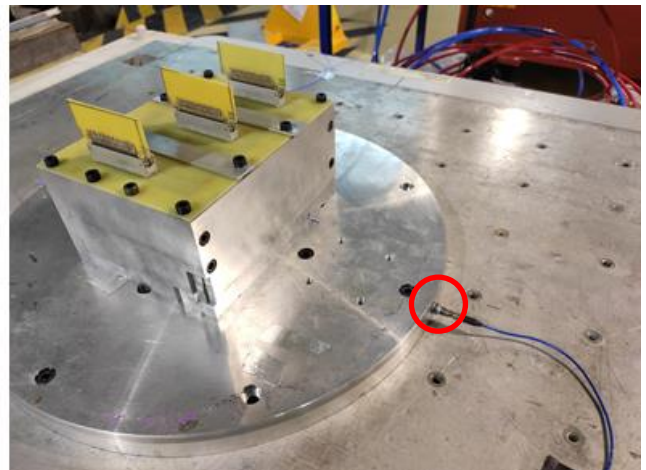
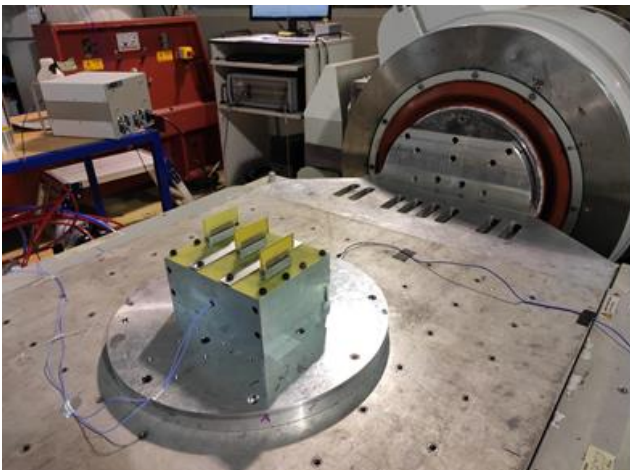


Figure 2: Mounting following X.

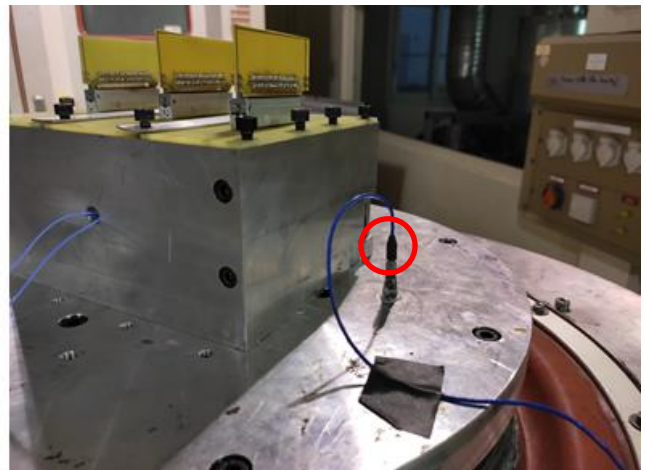
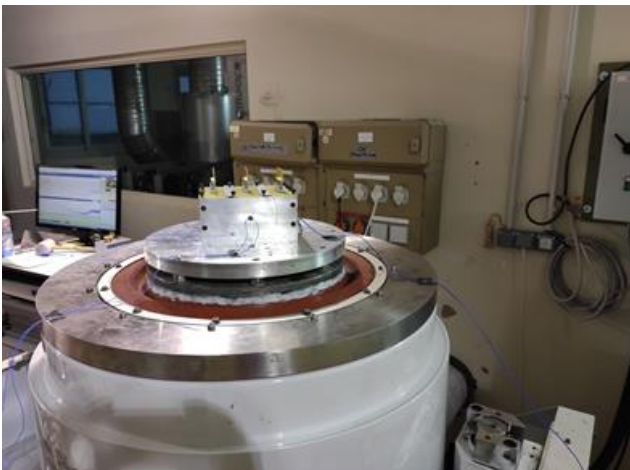


Figure 3: Mounting following Z.

4.2 Endurance test – Sinus sweep

Reference document	ESCC. 3401
Testing parts	MHD1005510110 MHD1004430121
Test conditions	Test are performed at room temperature.
Test setting	Endurance test through sinus sweep are defined during 30 minutes with 2 sweeps, following Tableau 2 profile for X, Y and Z axis. A constant 1.5 displacement is defined until reach a 20g acceleration, the acceleration is then defined constant. Microcut test are performed during endurance test. Alarm limits are defined for +3dB and -3dB and Abort limits for +6dB and -6dB.

Frequency (Hz)	Accélération (g)	Déplacement (mm)
10	-	1.5
57.55	-	1.5
2000	20	-

Tableau 2: Endurance test profile

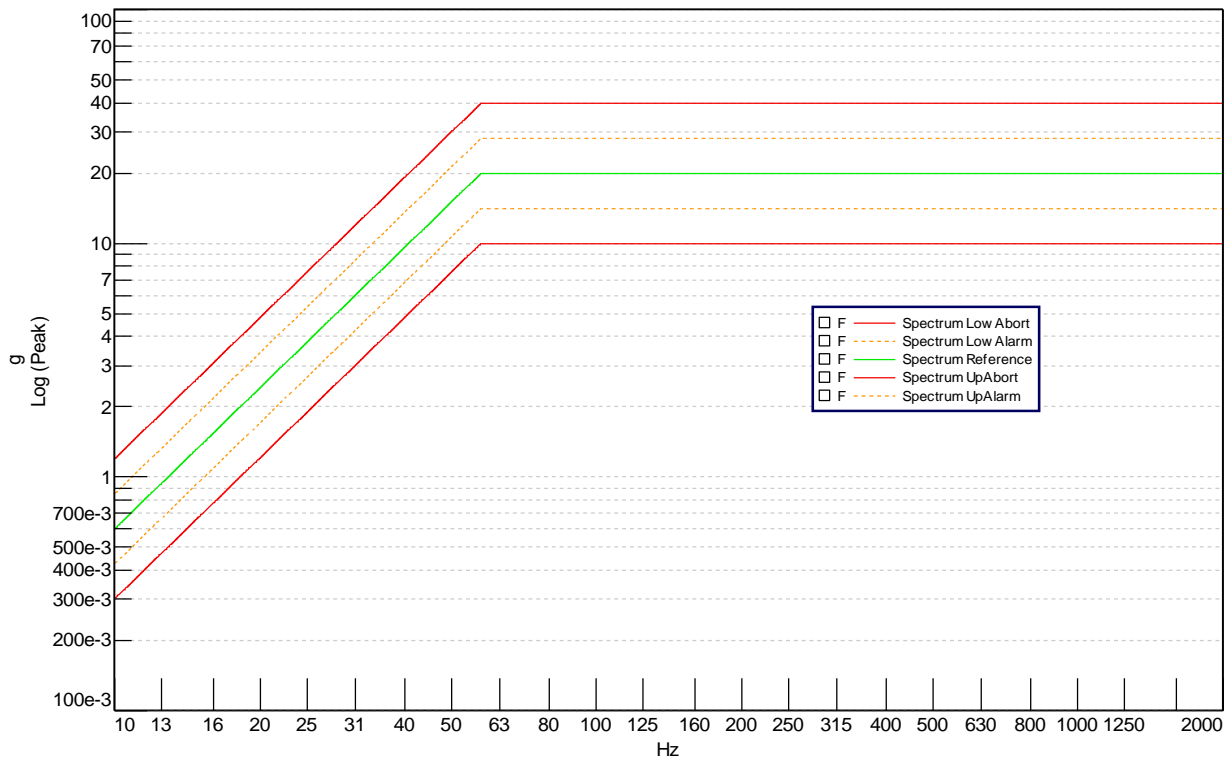


Figure 4 : Endurance test through sinus sweep following X, Y and Z axis.

4.3 Endurance test – Random excitation

Reference document ESCC. 3401

Testing parts MHD1005510110
MHD1004430121

Test conditions Test are performed at room temperature.

Test setting Endurance test through random excitation are defined during 30 minutes per axis, following Tableau 3 profile for X, Y and Z axis. The RMS value is equal to 19.9g.
The level is defined constant at 0.2 g²/Hz.
Microcut test are performed during endurance test

Alarm limits are defined for +3dB and -3dB and Abort limits for +6dB and -6dB.

Excitation type	Random
Frequency	[20 ;2000]Hz
Level	0,2 g ² /Hz constant
Sigma limiting	3
Duration	30 minutes per axis
Axis	X,Y and Z

Tableau 3: Endurance test profile

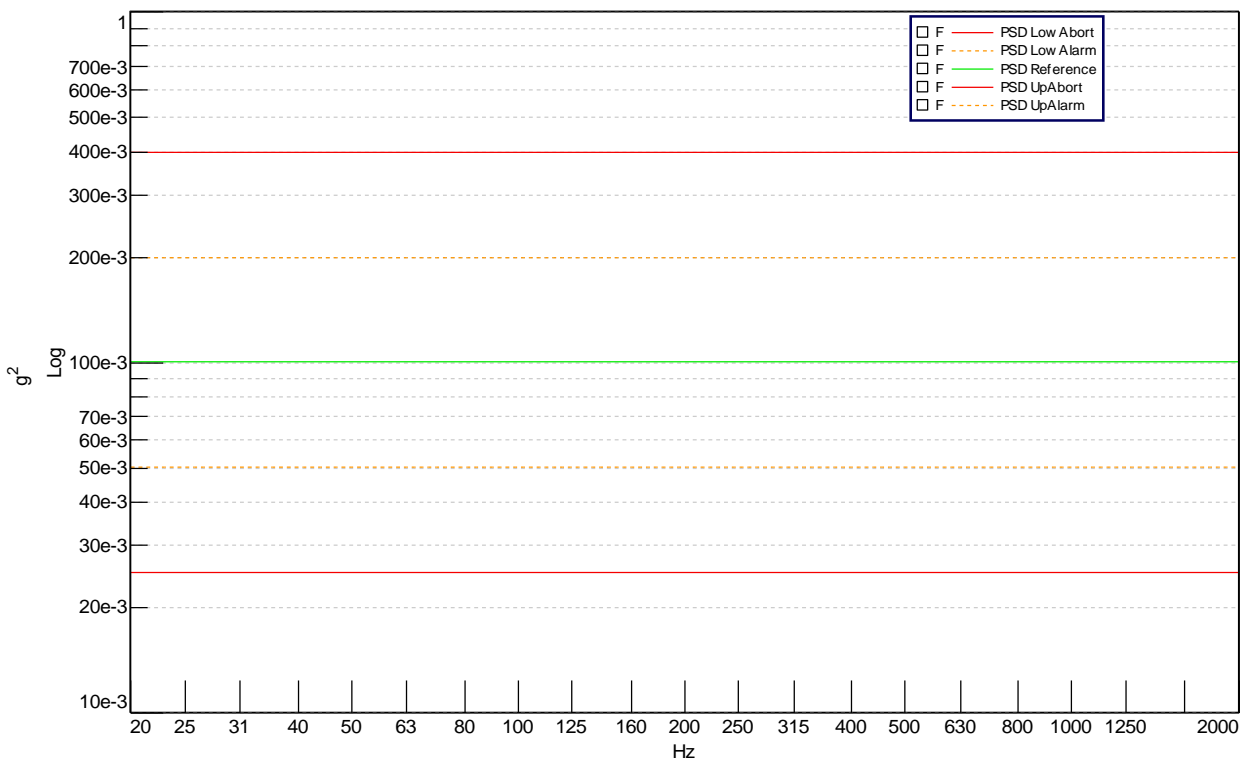


Figure 5 : Endurance test through random excitation following X, Y and Z axis.

4.4 Shocks Test

Reference document ESCC. 3401
 Testing parts MHD1005510110
 MHD1004430121
 Test conditions Test are performed at room temperature.
 Test setting Shocks are defined following Figure 6 profile for X, Y et Z axis. 3 positives and 3 negatives shocks are performed at 50g and 11 Ms.

In agreement with Smiths Interconnect, control is realised thanks to a mono-axis accélérometre placed at the bottom of the tooling close to tool binding point.

Microcut test are performed during endurance test.

Alarm limits are defined for +3dB and -3dB and Abort limits for +6dB and -6dB.

Excitation type	Demi-sinus
Level	50g
Duration	11 ms
Shocks number	3 positives, 3 négatives
Axis	X,Y and Z

Tableau 4: Shocks profile

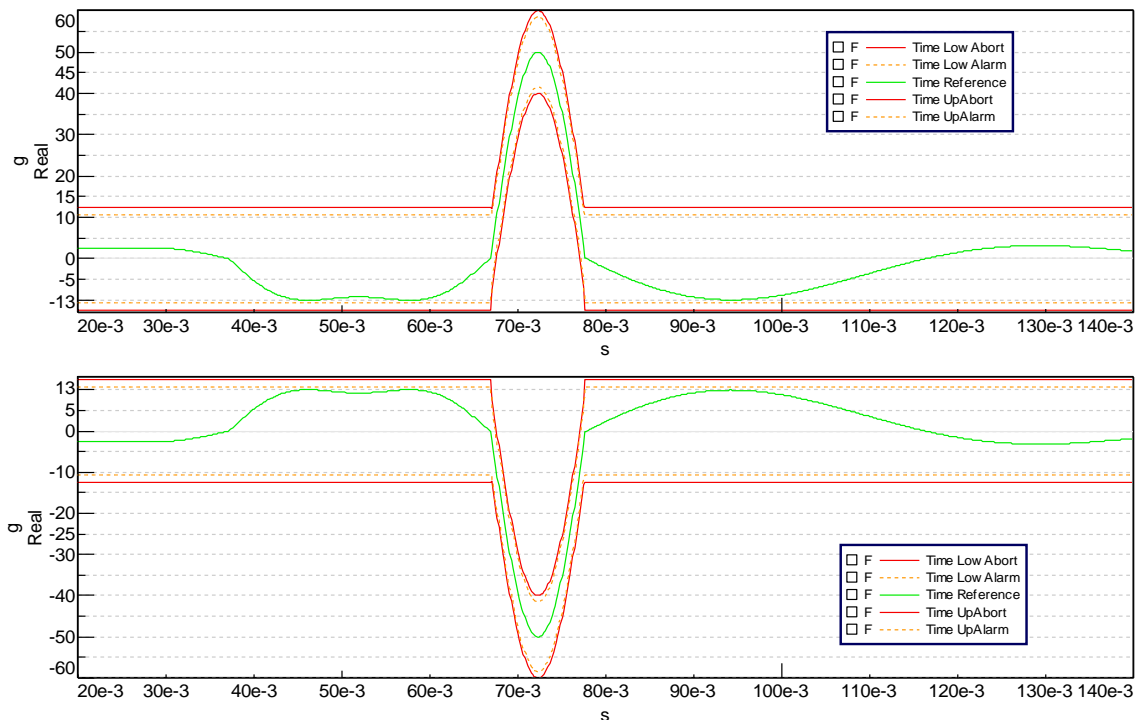


Figure 6 : Shocks profile following X, Y and Z axis.

5. RESULTS

Driving curves of endurance and shocks test are presented in the following pages.

5.1 List of tests performed

Chronology	Excitation axis	Testing parts	Test
1	\vec{Y}	MHD1005510110 MHD1004430121	Sinus sweep [5-2000 Hz]
2			Random excitation [20-2000 Hz] 0,2 g ² /hz
3			3 chocs positives et 3 chocs négatives 50g, 11 ms
4	\vec{X}	MHD1005510110 MHD1004430121	Sinus sweep [5-2000 Hz]
5			Random excitation [20-2000 Hz] 0,2 g ² /hz
6			3 chocs positives et 3 chocs négatives 50g, 11 ms
7	\vec{Z}	MHD1005510110 MHD1004430121	Sinus sweep [5-2000 Hz]
8			Random excitation [20-2000 Hz] 0,2 g ² /hz
9			3 chocs positives et 3 chocs négatives 50g, 11 ms

Tableau 5: Test chronology

5.2 Preliminary results

5.2.1 Driving curves of endurance test – Sinus sweep

Endurance test are drove thanks to a sensor placed close to tool binding point.

Following scheme is used:

- Blue curve : Driving curve of the 1st sweep
- Purple curve : Driving curve of the 2nd sweep

Alarm limits are defined for +3dB and -3dB and Abort limits for +6dB and -6dB.

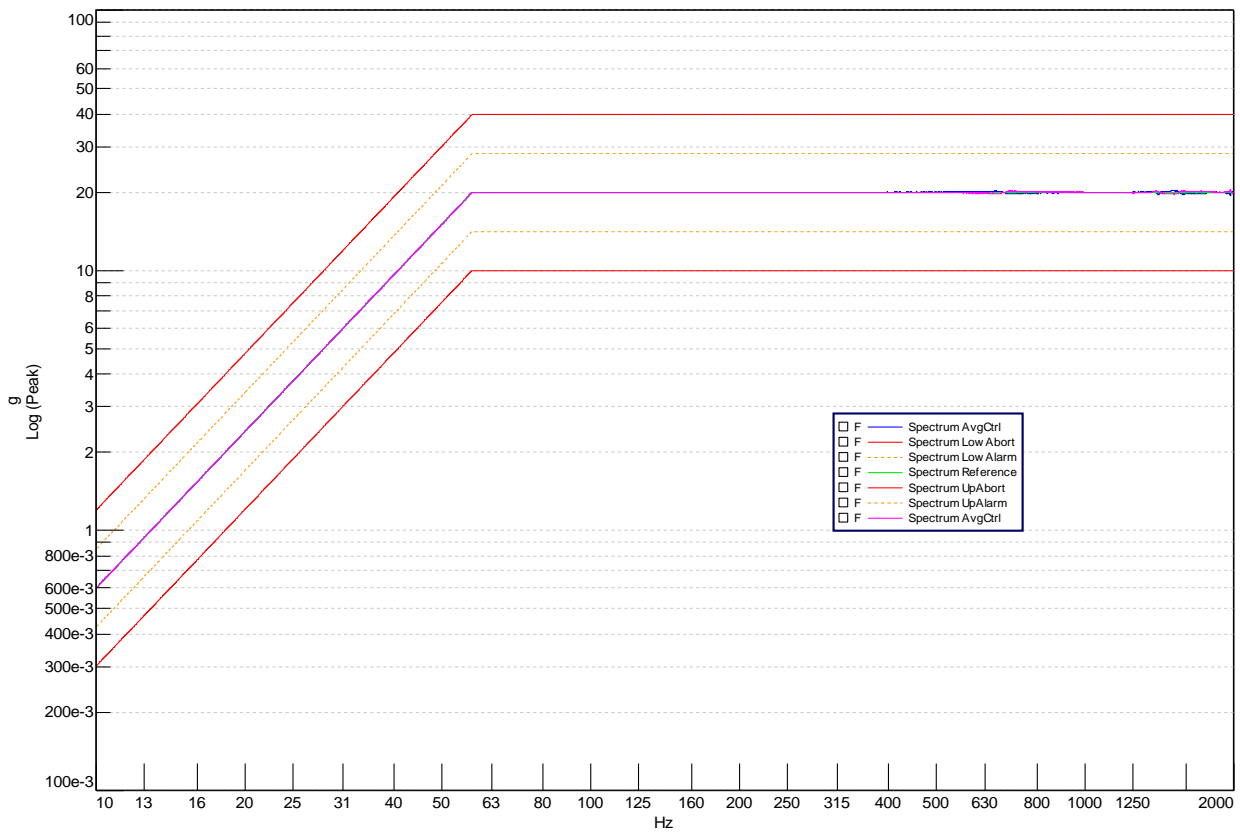


Figure 7: Driving curves of endurance test through sinus sweep following X axis.

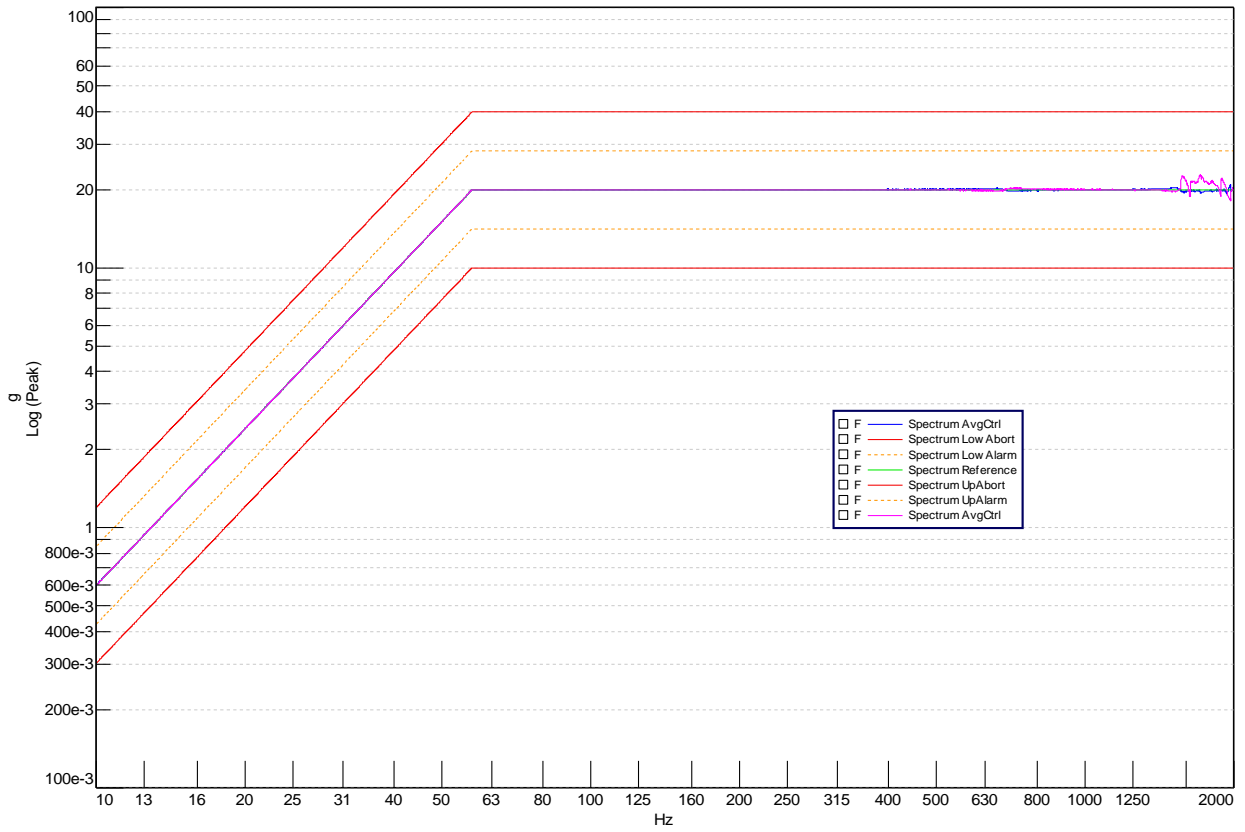


Figure 8: Driving curves of endurance test through sinus sweep following Y axis.

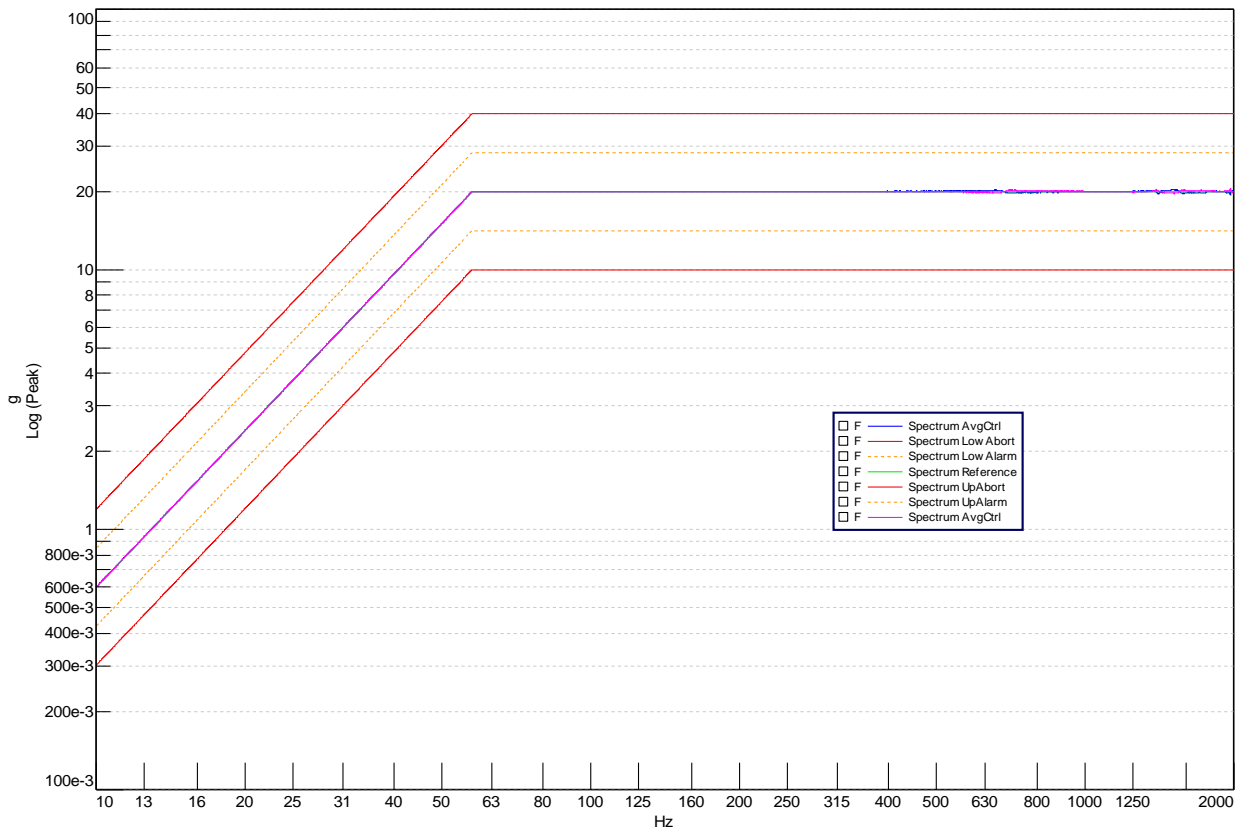


Figure 9: Driving curves of endurance test through sinus sweep following Z axis.

5.2.2 Driving curves of endurance test – Random excitation

Endurance test are drove thanks to a sensor placed close to tool binding point.
 To lighten the report a driving curves is given every 5 minutes, so 6 curves per endurance test.

Alarm limits are defined for +3dB and -3dB and Abort limits for +6dB and -6dB.

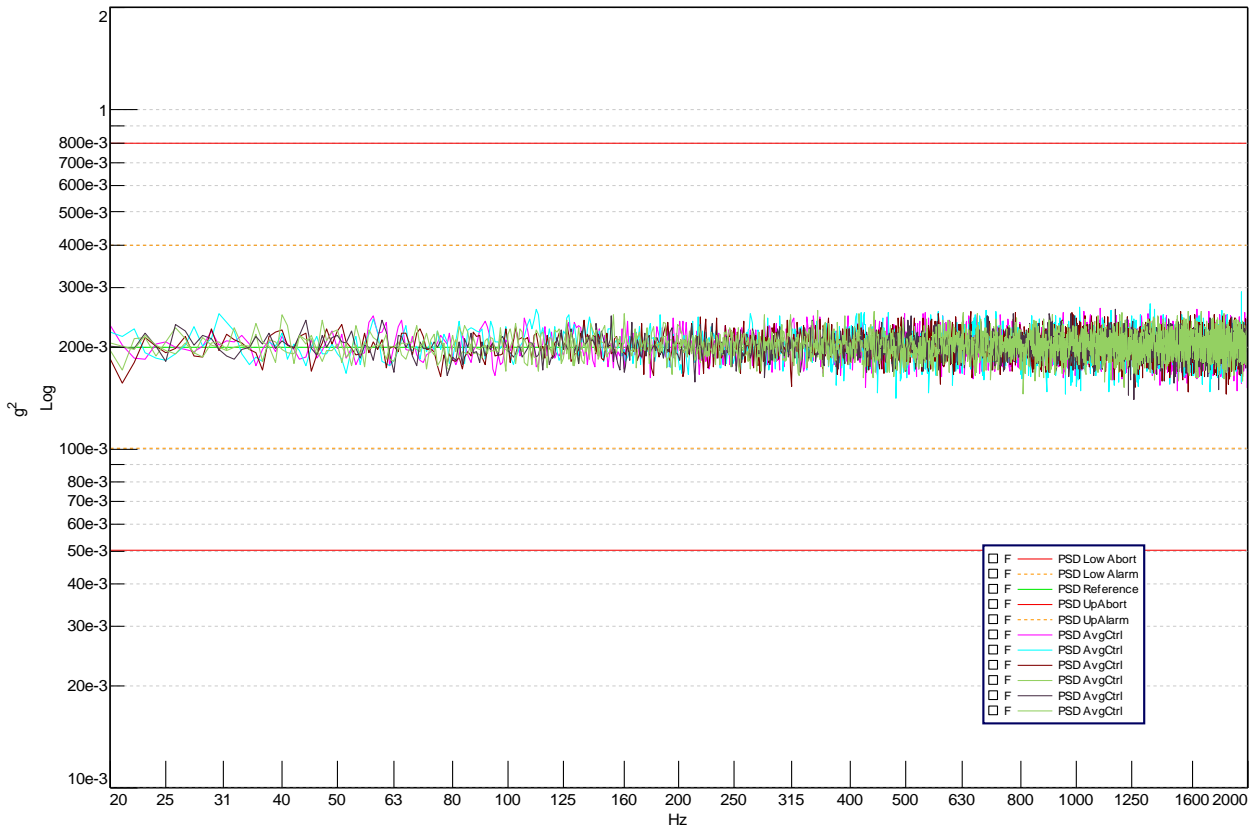


Figure 10: Driving curves of endurance test through random excitation following X axis

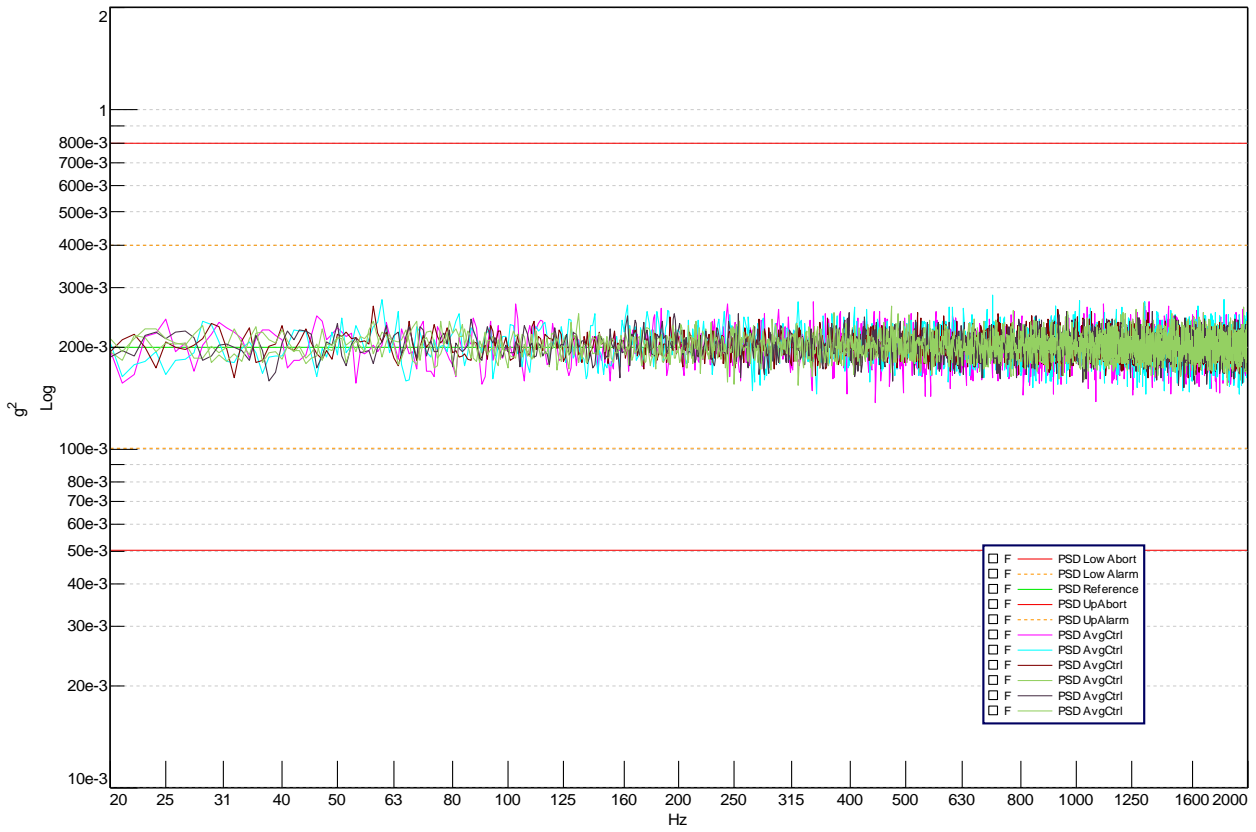


Figure 11: Driving curves of endurance test through random excitation following Y axis

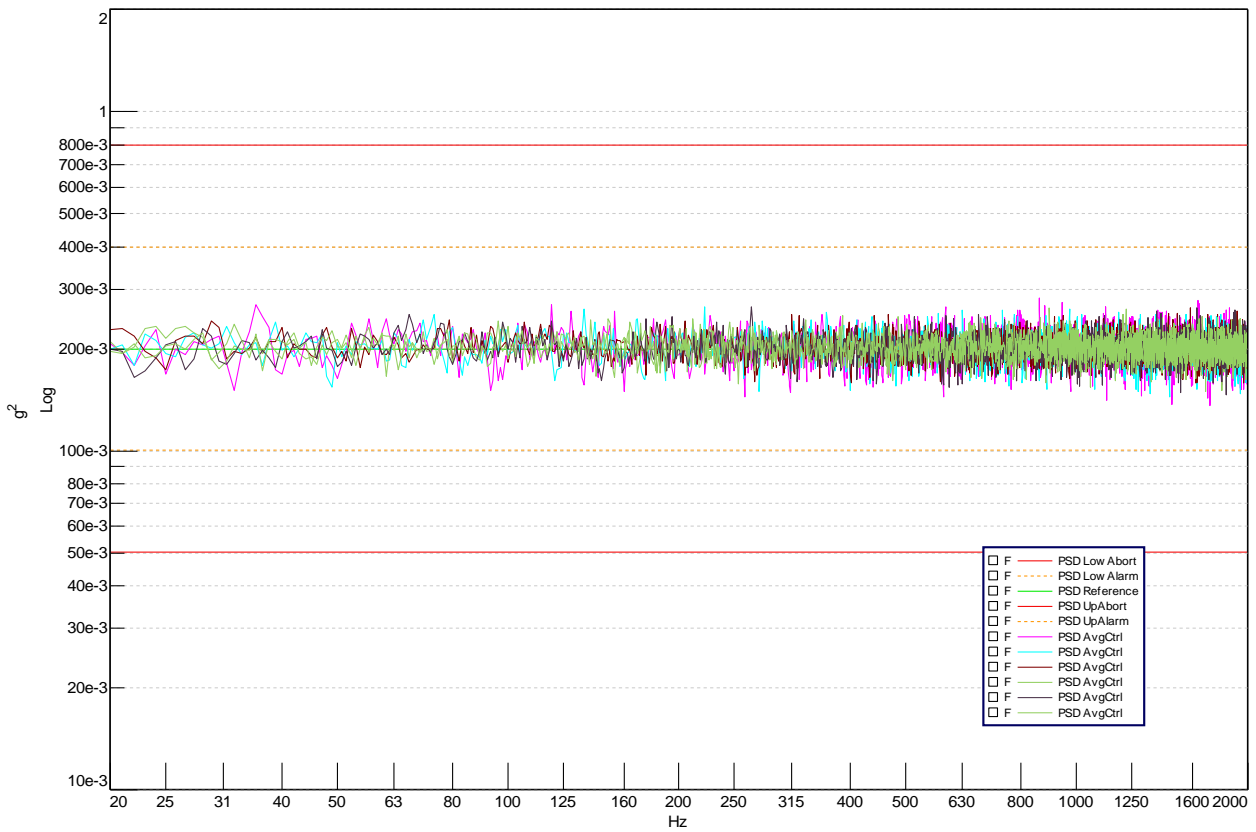


Figure 12: Driving curves of endurance test through random excitation following Z axis

5.2.1 Driving curves of shocks test

Shocks test are drove thanks to a sensor placed close to tool binding point.

Alarm limits are defined for +3dB and -3dB and Abort limits for +6dB and -6dB.

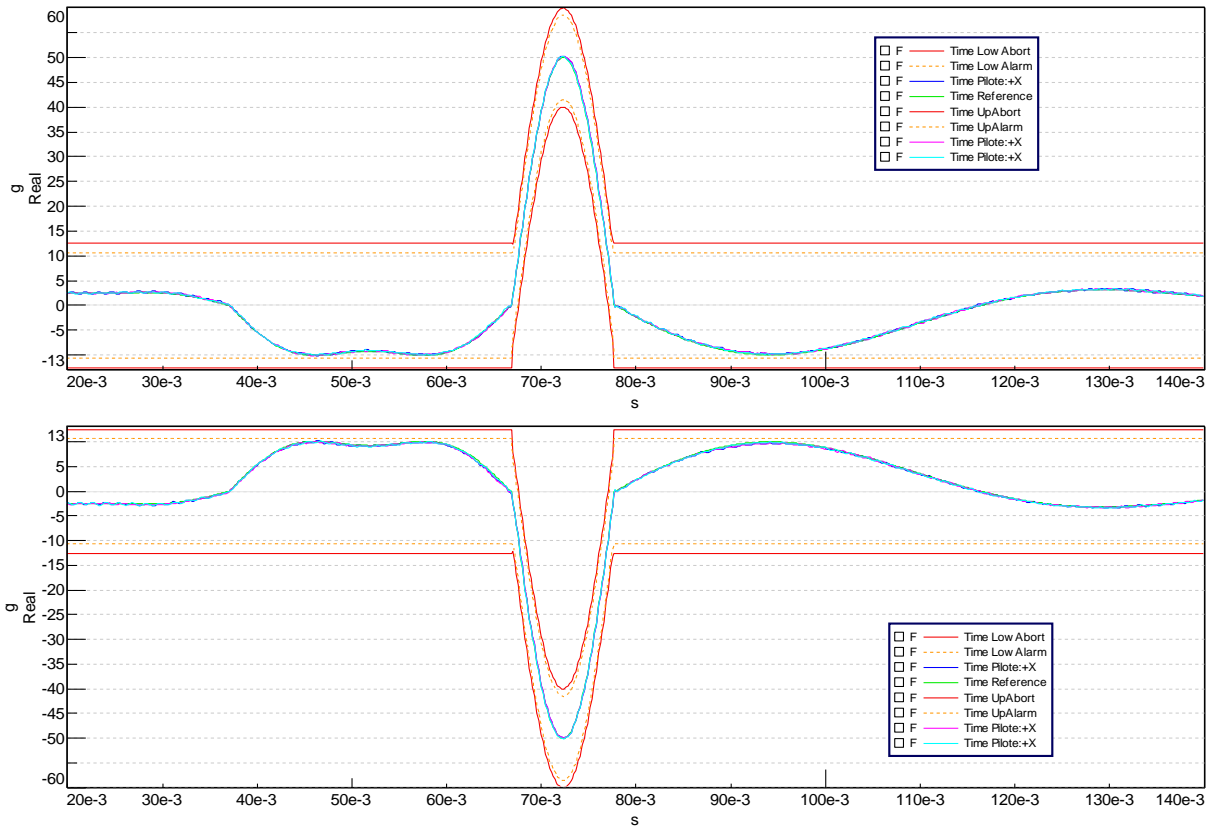


Figure 13: Driving curves of shocks following X axis.

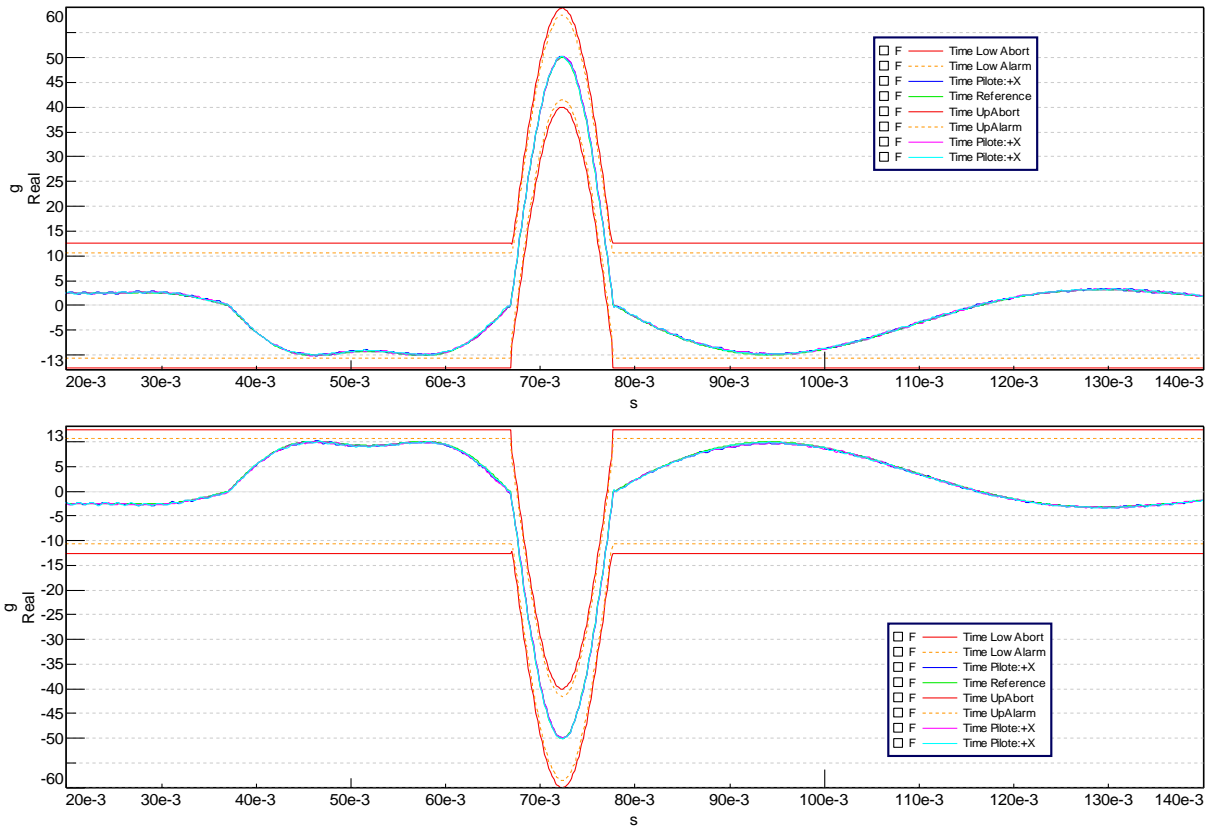


Figure 14: Driving curves of shocks following Y axis.

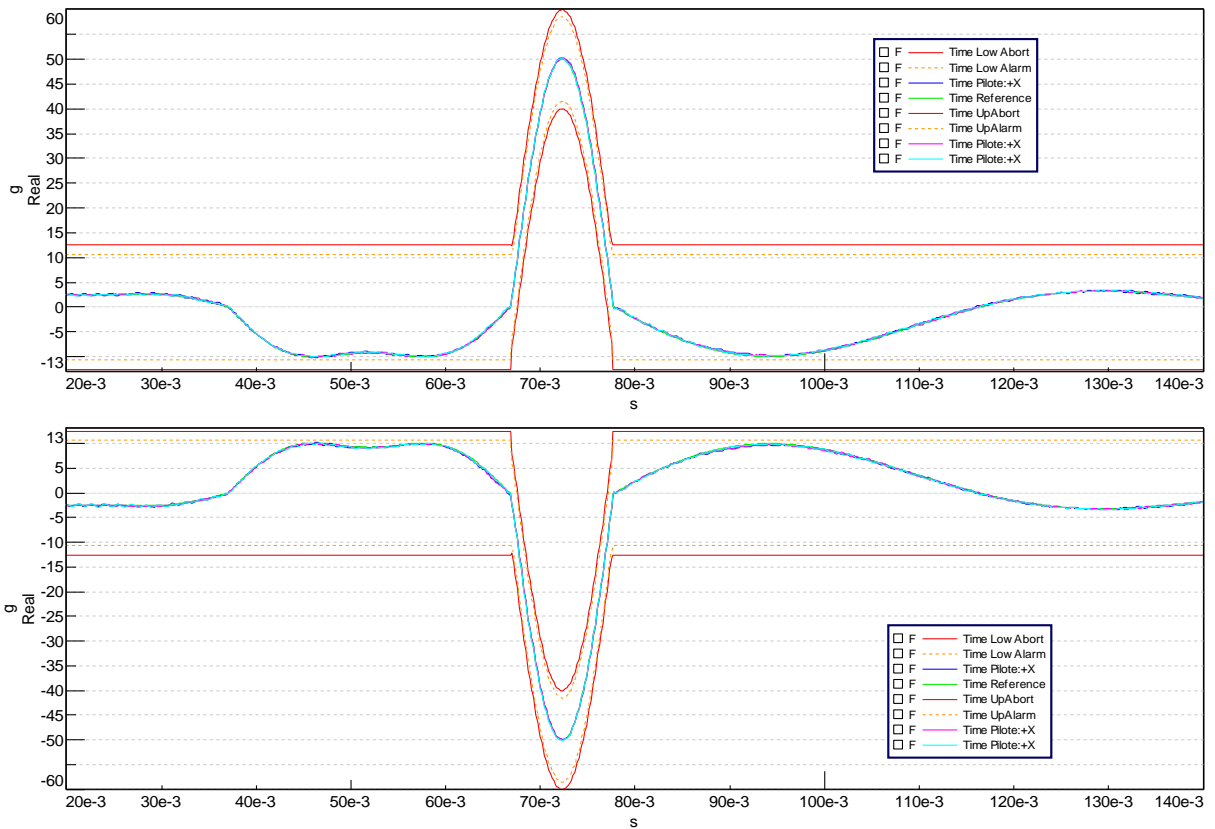


Figure 15: Driving curves of shocks following Z axis.