



engineering dynamics

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Test Report EN2477

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VIBRATION TEST REPORT	
CUSTOMER	Button-fix Limited Unit A, 1 Britton Street London EC1M 5NW
ORDER NUMBER	Jessica
TEST DATE(S)	20 th May 2019
EQUIPMENT TESTED	Four Button-fix Type 1 Metal
SERIAL NUMBER	N/A
TEST ENGINEER	David Weeks
TEST WITNESS	Tony Wills
TEST ARRANGEMENT	



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TEST EQUIPMENT				
Item	Type Identification	Serial N°	Calibration Certificate No	Calibration Date
Vibrator	Ling 900 Combo V826LS	533	The vibrator and amplifier are part of the generating system, calibration of which is achieved by the Control Accelerometer.	
Amplifier	Ling DPA 16	204		
Controller	Bruel & Kjaer Laser USB LAS-200	10848686	CMR182115	29 October 2018
Reference Accelerometer	Endevco 213E	RE58	CMR182116	24 October 2018
Control Accelerometer	DJB	6012	ENV2466	25 March 2019
Response Accelerometer	DJB	11818	ENV2466	25 March 2019



Test Report EN2477

Four Button-fix Type 1 Metal quick release fasteners were attached to two pieces of plywood 70cm x 70cm x 1.8cm at 60cm centres. The total weight of buttons and outer plywood was 5.7Kgs.

	
Side view of Button-fix assembly	Button-fix latch
	
Top view of items under test	Plywood showing the four latches
	
Button	

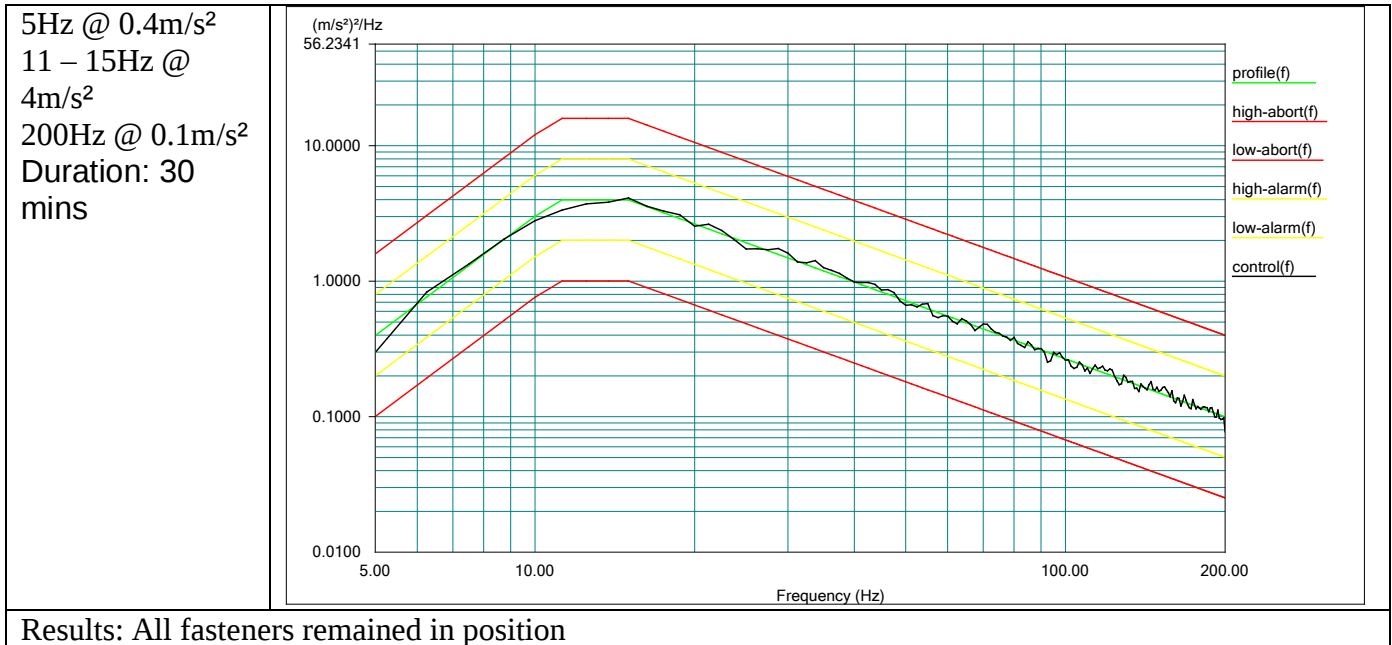


Test Report EN2477

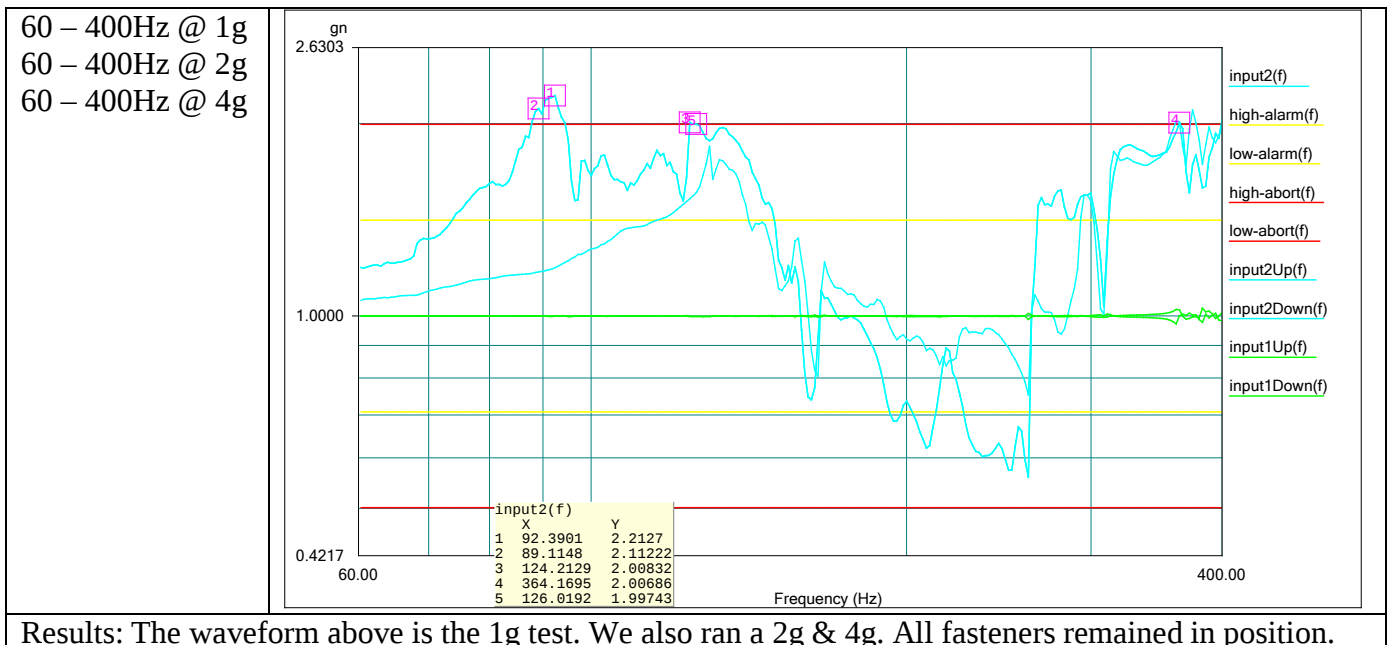
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Vibration Test carried out on the assembly were as follows:

1. Random: Vibration similar to IEC 60068-2 Vertical axis but with a duration of 30minutes.



2. Sinusoidal: The waveform below shows accelerometer





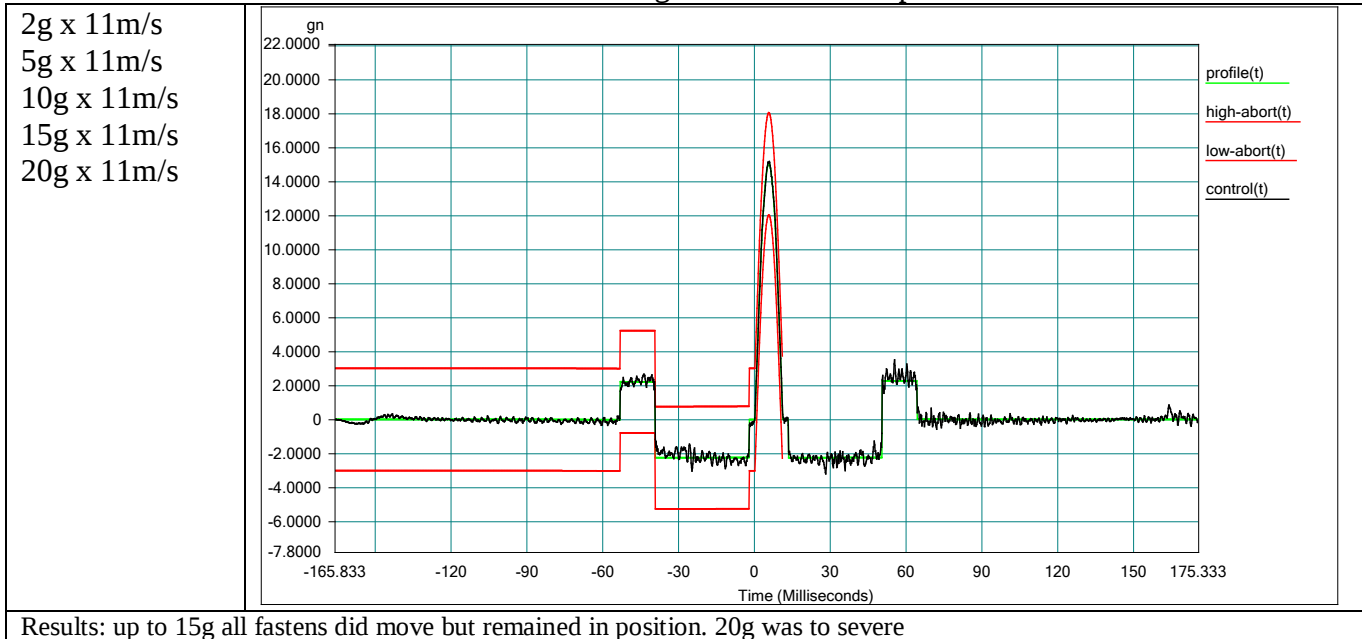
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3. Shock: The wave form below is the 15g x 11m/s Positive pulse.



All stored test are included in PDF format along with this report.

DUT: Z Button Fix Type 1 metal

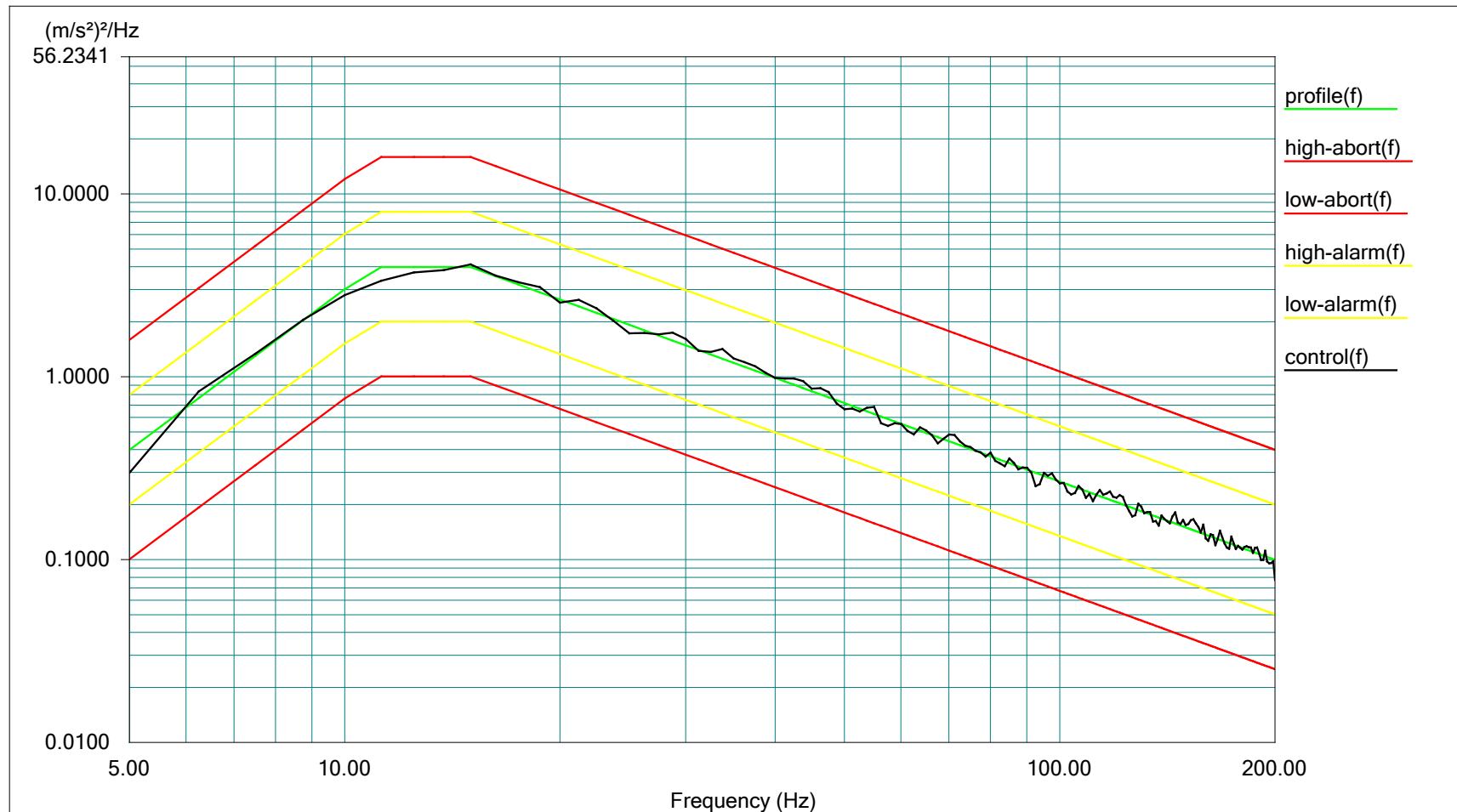
Serial Number:

Project File Name: Vertical life.prj

Profile Name: Vertical life

Test Type: Random

Run Folder: .\RunFolder May 20, 2019 09-20-19



Level: 0 dB

Control RMS: 11.005314 m/s^2 Full Level Elapsed Time: 00:30:00

Demand RMS: 10.990476 m/s^2 Remaining Time: 00:00:00

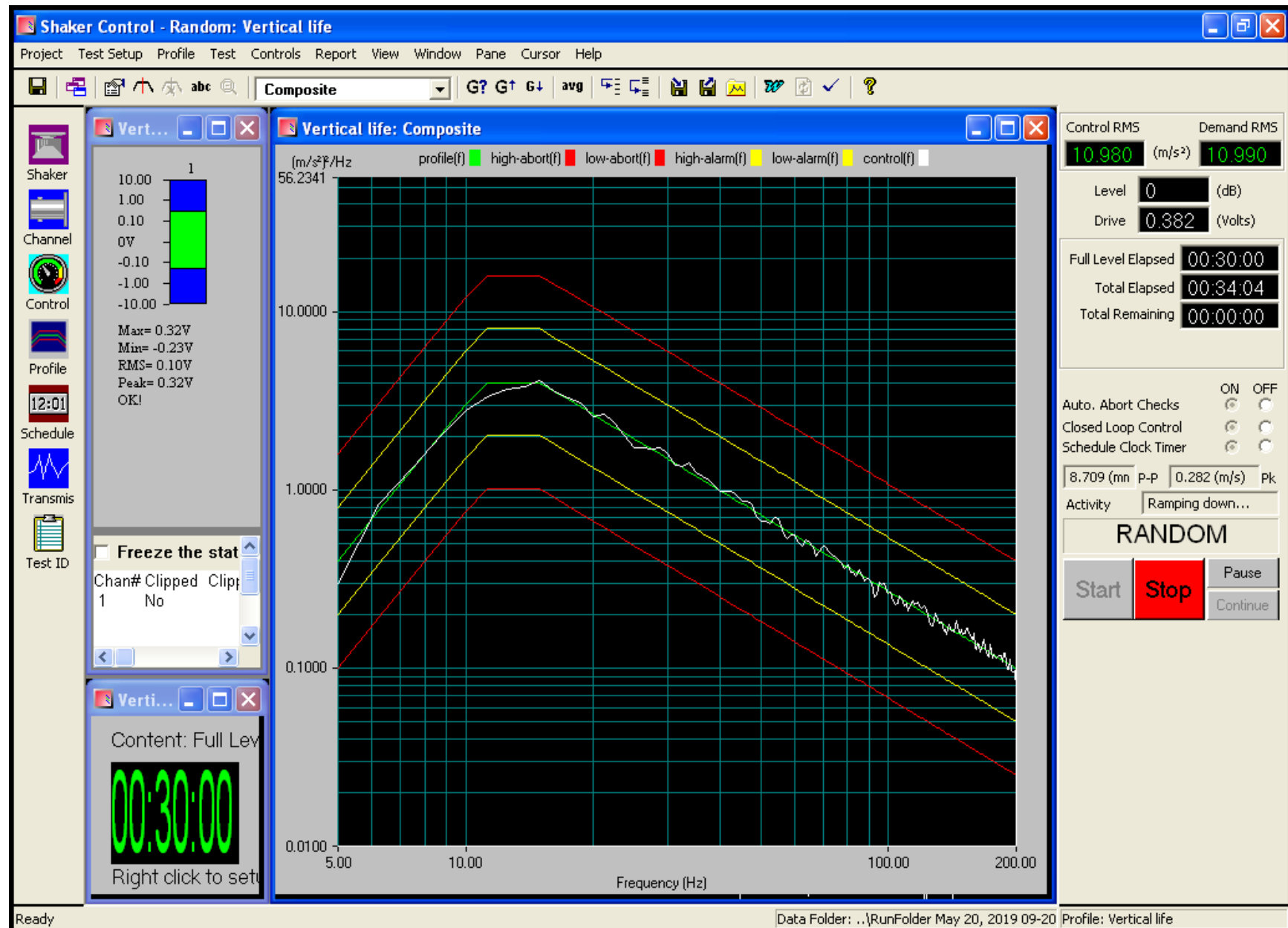
Lines: 200 Frame Time: 0.800000 Seconds

DOF: 154 dF: 1.250000 Hz

Data saved at 09:54:32 AM, Monday, May 20, 2019

Report created at 09:54:34 AM, Monday, May 20, 2019

Project File Name: Vertical life.prj



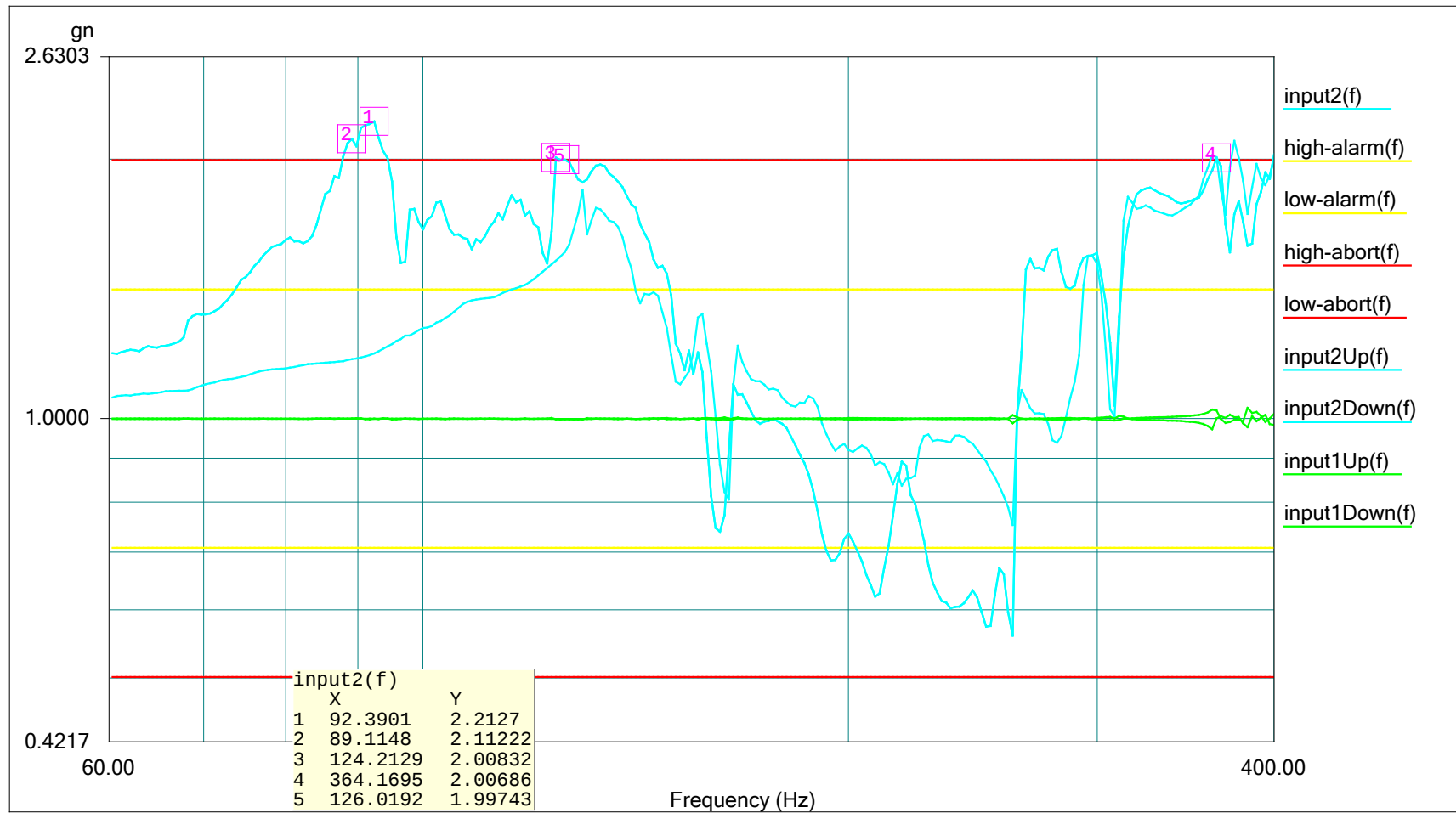
Data saved at 09:54:32 AM, Monday, May 20, 2019

Report created at 09:54:35 AM, Monday, May 20, 2019

DUT: Button Fix Type 1 Metal
Serial Number:
Project File Name: Untitled
Profile Name: Low Level

Test Type: Swept Sine

Run Folder: .\RunDefault May 20, 2019 10-19-53



Level: 100 % Full Level Time: 00:05:29 Sweep Type: Logarithmic
Frequency: 60.018509 Hz Time Remaining: 00:00:00 Sweep Rate: 1 Oct/Min

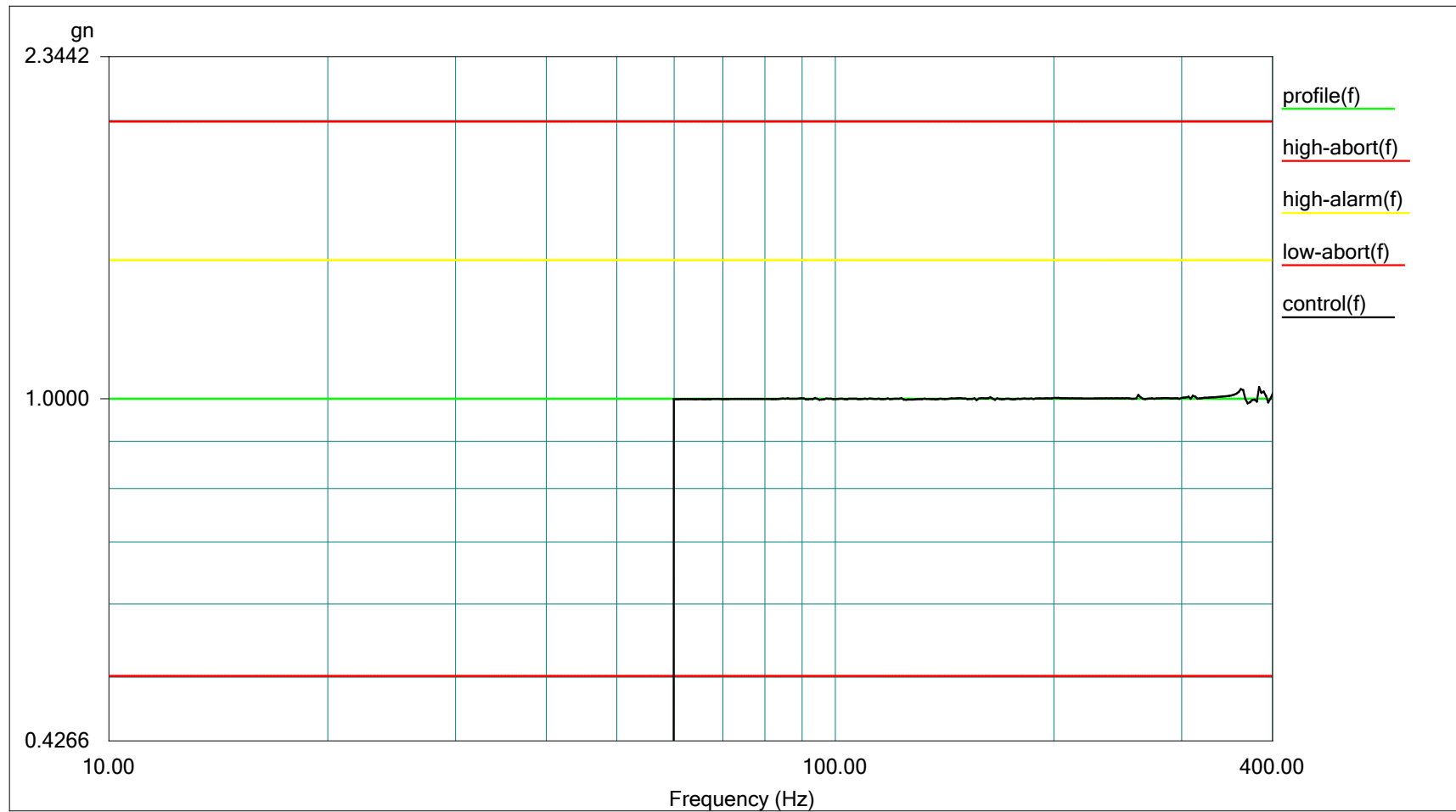
Data saved at 10:25:27 AM, Monday, May 20, 2019

Report created at 10:25:28 AM, Monday, May 20, 2019

DUT: Button Fix T6type 1 Metal
Serial Number:
Project File Name: Untitled
Profile Name: Low Level

Test Type: Swept Sine

Run Folder: .\RunDefault May 20, 2019 10-19-53



Level: 100 % Full Level Time: 00:05:29 Sweep Type: Logarithmic
Frequency: 60.018509 Hz Time Remaining: 00:00:00 Sweep Rate: 1 Oct/Min

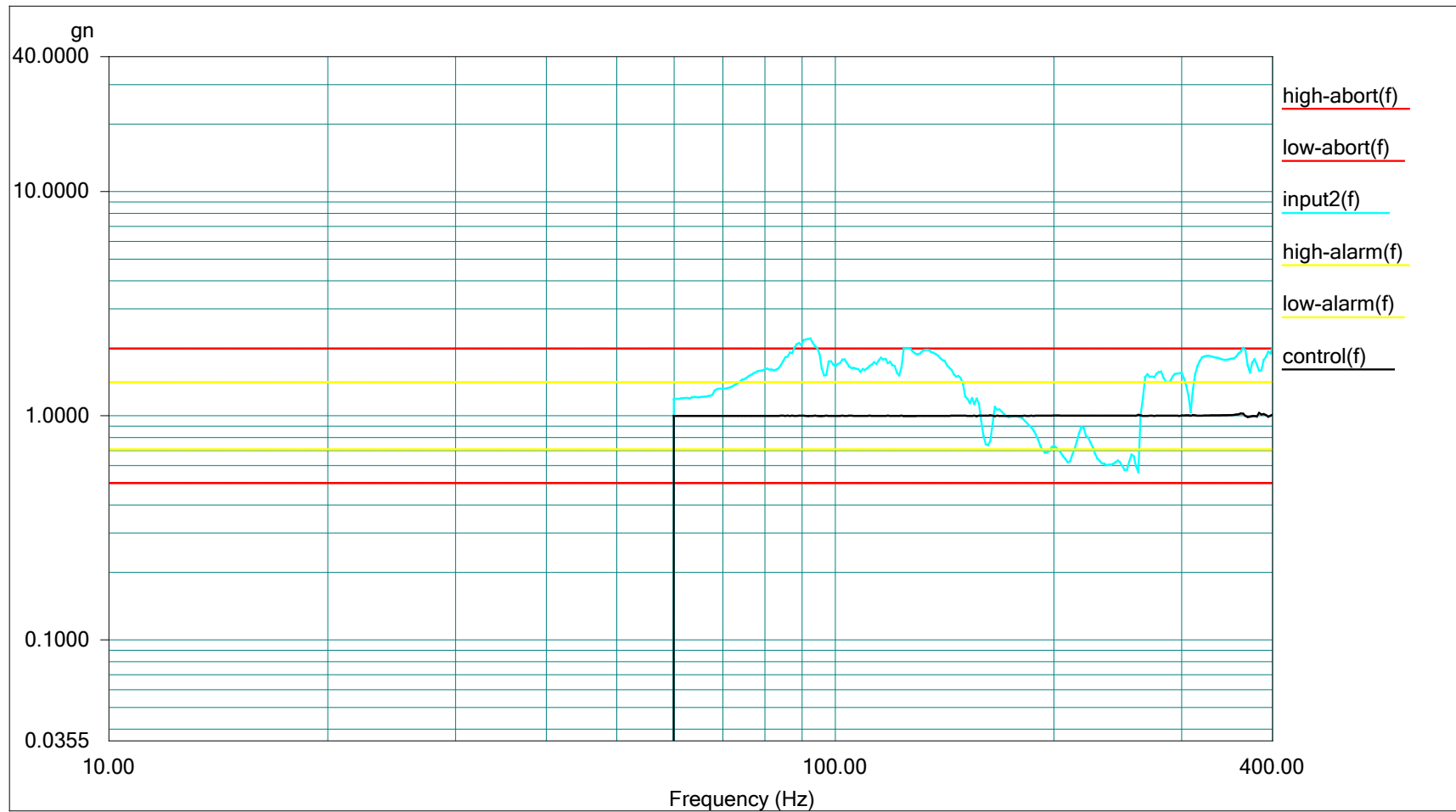
Data saved at 10:25:27 AM, Monday, May 20, 2019

Report created at 10:25:29 AM, Monday, May 20, 2019

DUT: Button Fix T6type 1 Metal
Serial Number:
Project File Name: Untitled
Profile Name: Low Level

Test Type: Swept Sine

Run Folder: .\RunDefault May 20, 2019 10-19-53

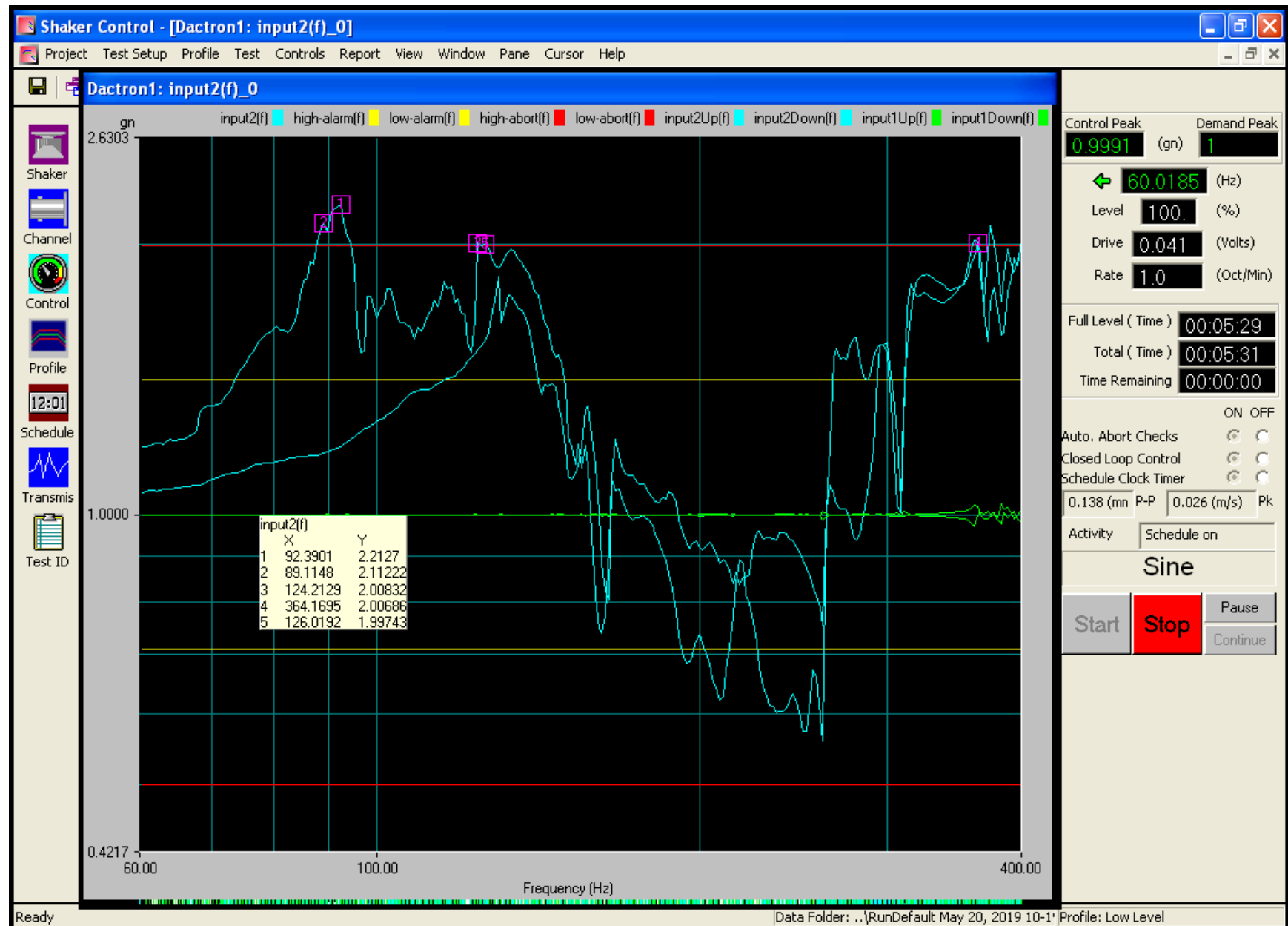


Level: 100 % Full Level Time: 00:05:29 Sweep Type: Logarithmic
Frequency: 60.018509 Hz Time Remaining: 00:00:00 Sweep Rate: 1 Oct/Min

Data saved at 10:25:27 AM, Monday, May 20, 2019

Report created at 10:25:29 AM, Monday, May 20, 2019

Project File Name: Untitled



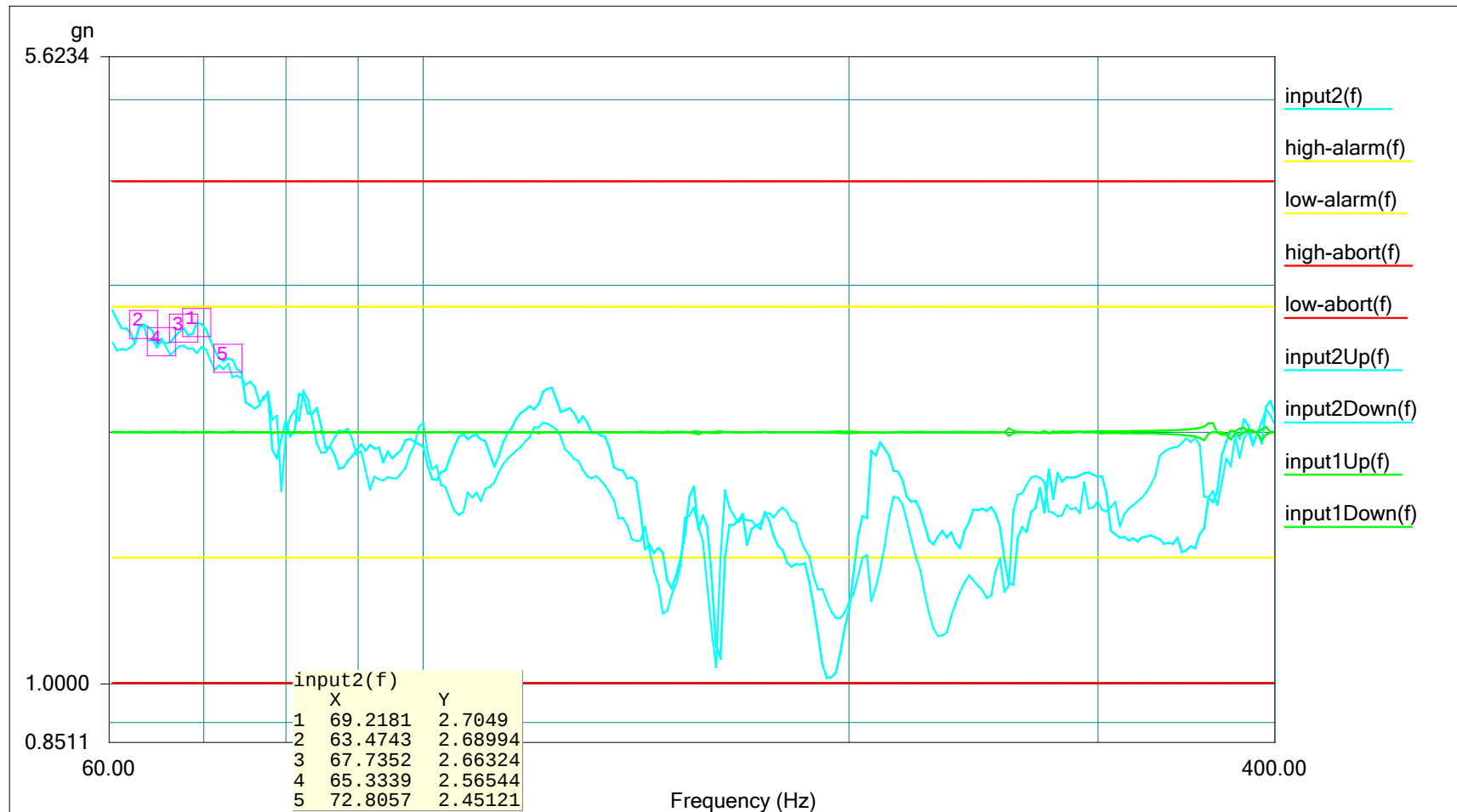
Data saved at 10:25:27 AM, Monday, May 20, 2019

Report created at 10:25:29 AM, Monday, May 20, 2019

DUT: Button Fix Type 1 Metal
Serial Number:
Project File Name: Untitled
Profile Name: Low Level

Test Type: Swept Sine

Run Folder: .\RunDefault May 20, 2019 10-28-26



Level: 100 % Full Level Time: 00:05:29 Sweep Type: Logarithmic
Frequency: 60.025909 Hz Time Remaining: 00:00:00 Sweep Rate: 1 Oct/Min

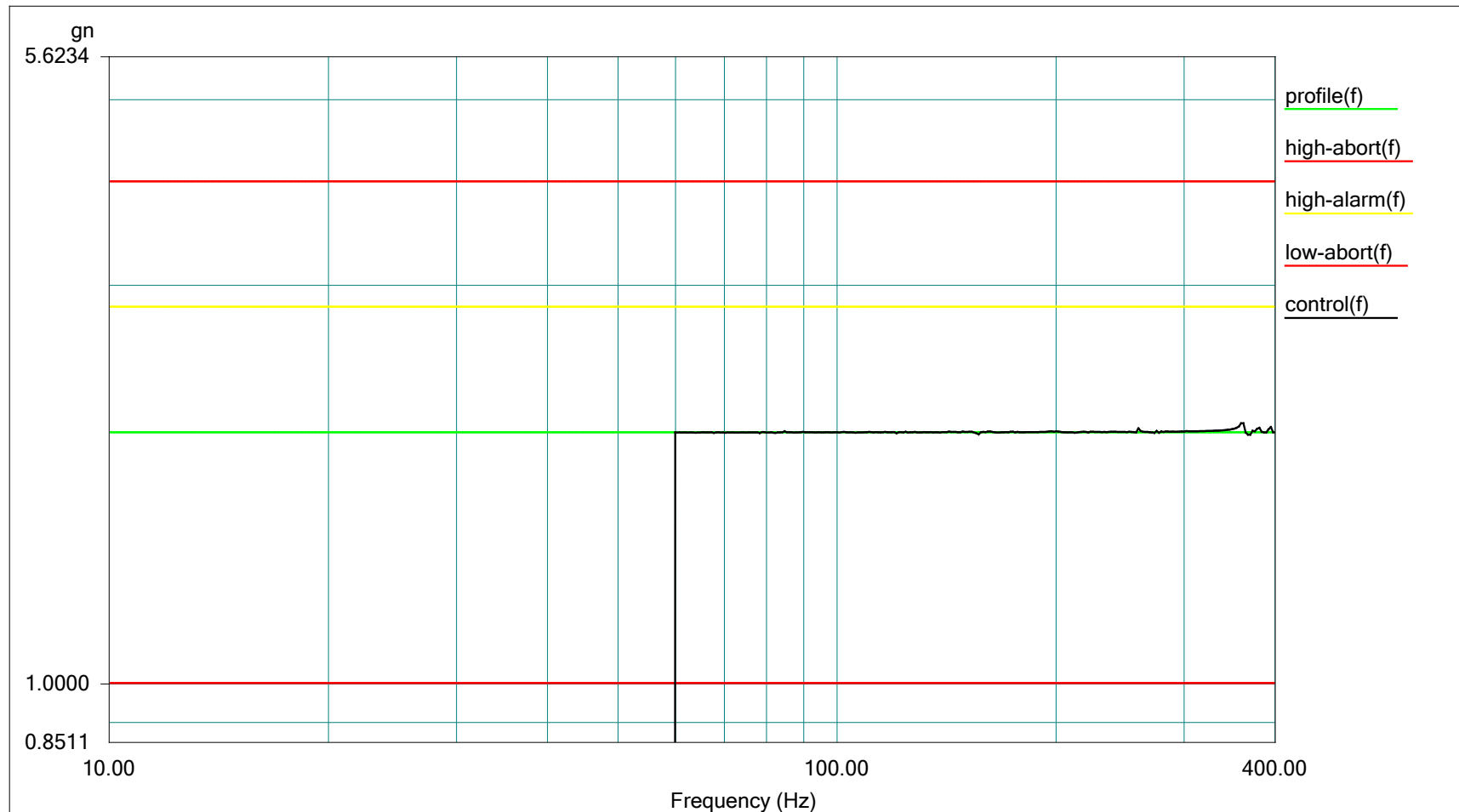
Data saved at 10:34:00 AM, Monday, May 20, 2019

Report created at 10:34:01 AM, Monday, May 20, 2019

DUT: Button Fix T6type 1 Metal
Serial Number:
Project File Name: Untitled
Profile Name: Low Level

Test Type: Swept Sine

Run Folder: .\RunDefault May 20, 2019 10-28-26



Level: 100 % Full Level Time: 00:05:29 Sweep Type: Logarithmic
Frequency: 60.025909 Hz Time Remaining: 00:00:00 Sweep Rate: 1 Oct/Min

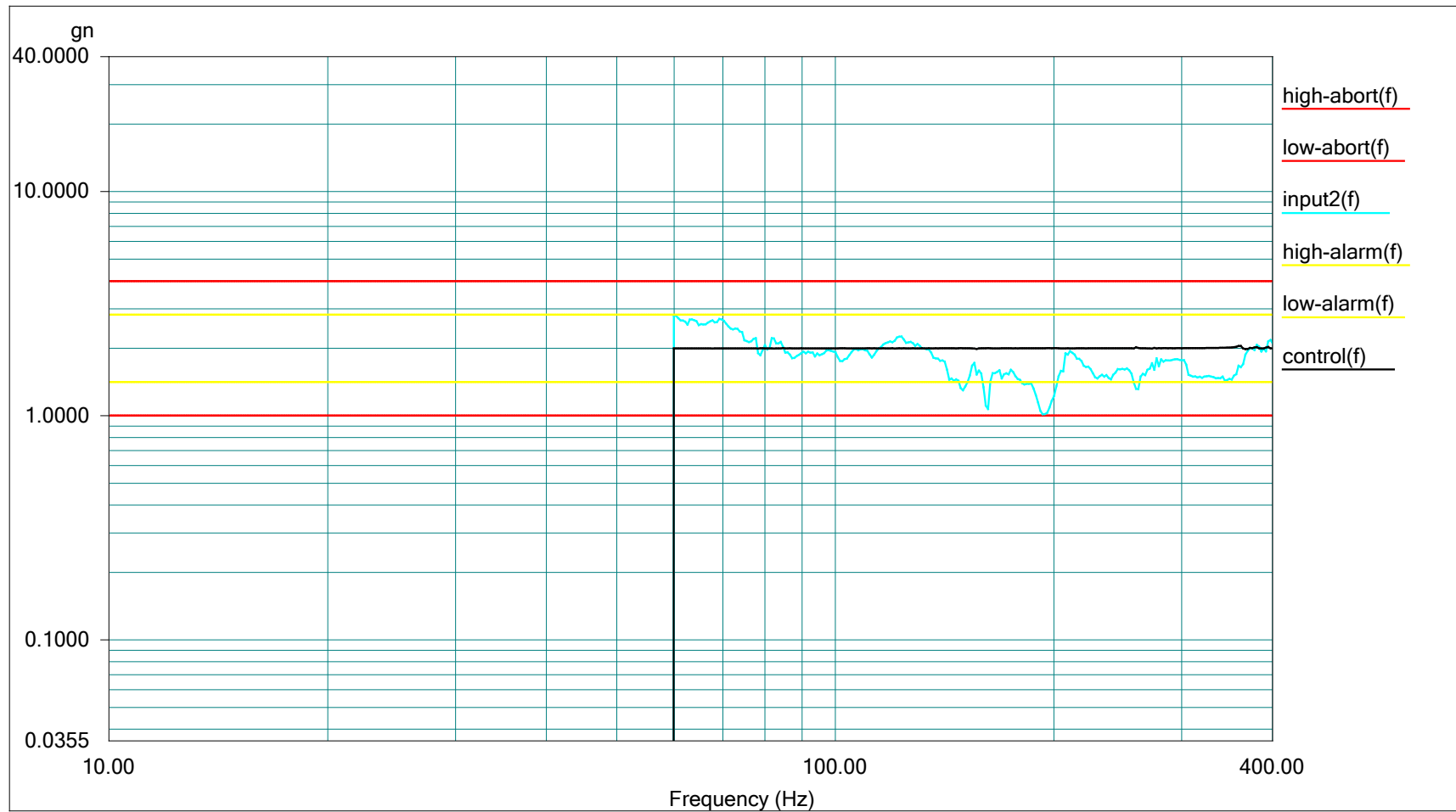
Data saved at 10:34:00 AM, Monday, May 20, 2019

Report created at 10:34:01 AM, Monday, May 20, 2019

DUT: Button Fix T6type 1 Metal
Serial Number:
Project File Name: Untitled
Profile Name: Low Level

Test Type: Swept Sine

Run Folder: .\RunDefault May 20, 2019 10-28-26

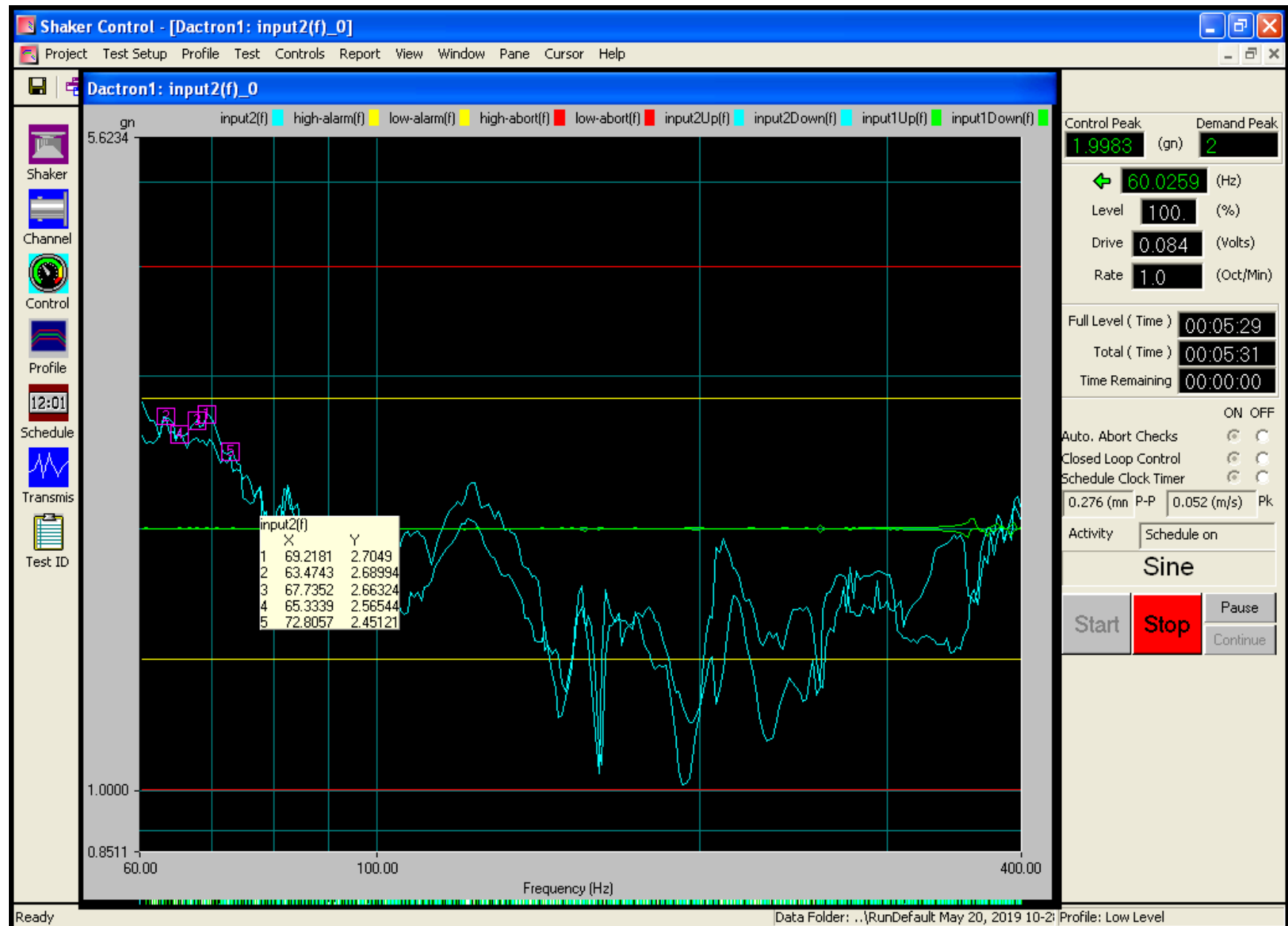


Level: 100 % Full Level Time: 00:05:29 Sweep Type: Logarithmic
Frequency: 60.025909 Hz Time Remaining: 00:00:00 Sweep Rate: 1 Oct/Min

Data saved at 10:34:00 AM, Monday, May 20, 2019

Report created at 10:34:02 AM, Monday, May 20, 2019

Project File Name: Untitled



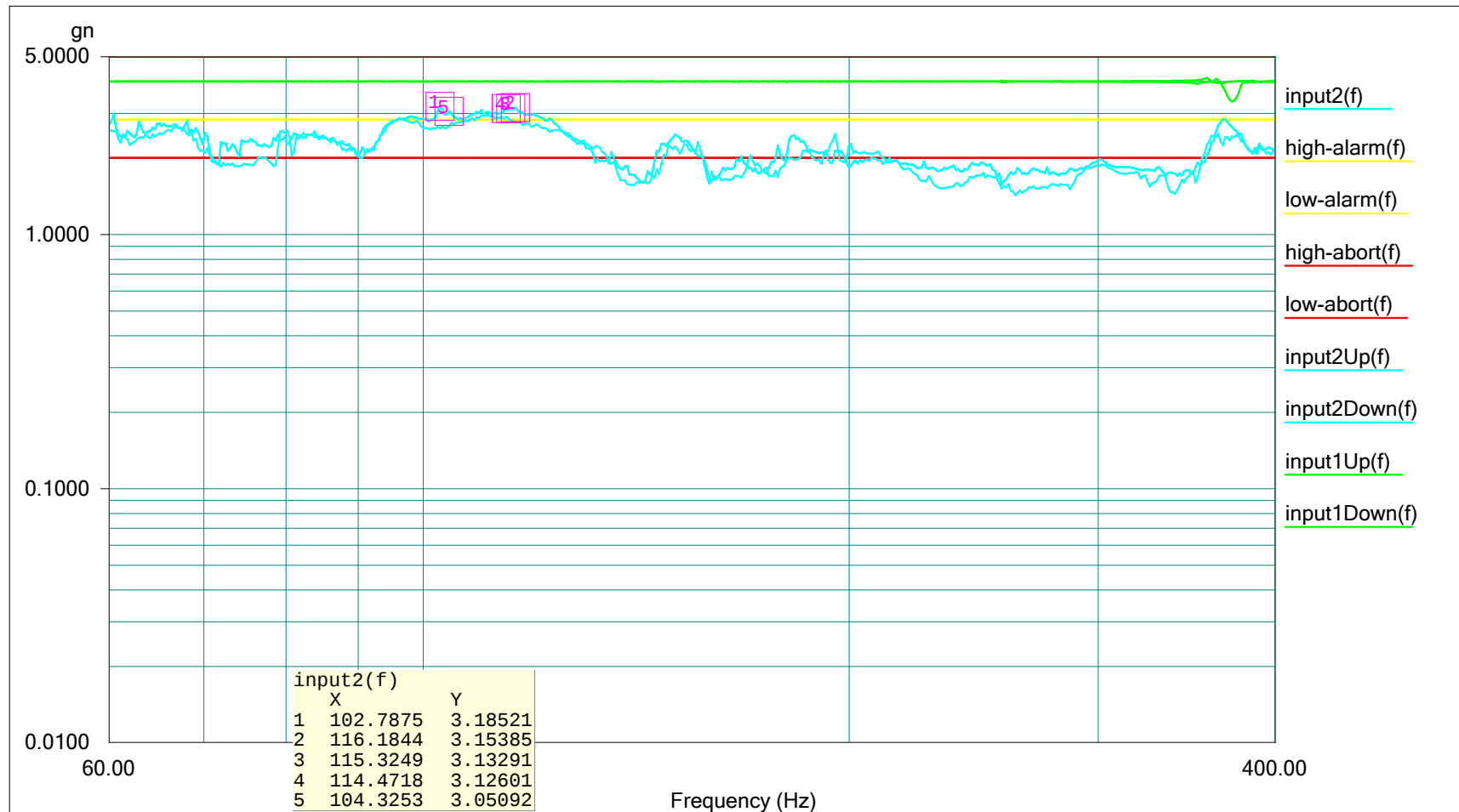
Data saved at 10:34:00 AM, Monday, May 20, 2019

Report created at 10:34:02 AM, Monday, May 20, 2019

DUT: Button Fix Type 1 Metal
Serial Number:
Project File Name: Untitled
Profile Name: Low Level

Test Type: Swept Sine

Run Folder: .\RunDefault May 20, 2019 10-35-33



Level: 100 % Full Level Time: 00:05:29 Sweep Type: Logarithmic
Frequency: 60.025909 Hz Time Remaining: 00:00:00 Sweep Rate: 1 Oct/Min

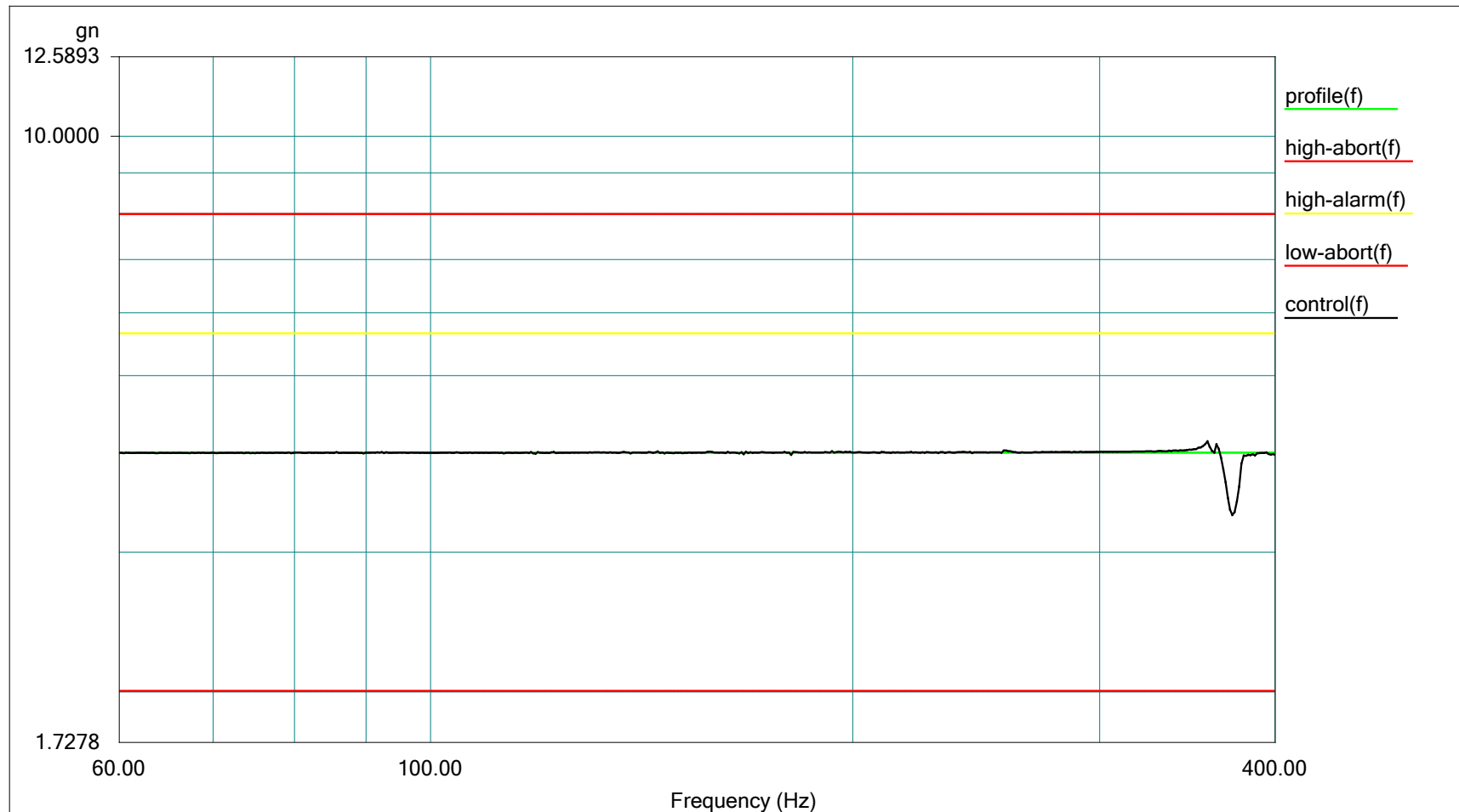
Data saved at 10:41:07 AM, Monday, May 20, 2019

Report created at 10:41:08 AM, Monday, May 20, 2019

DUT: Button Fix Type 1 Metal
Serial Number:
Project File Name: Untitled
Profile Name: Low Level

Test Type: Swept Sine

Run Folder: .\RunDefault May 20, 2019 10-35-33



Level: 100 % Full Level Time: 00:05:29 Sweep Type: Logarithmic
Frequency: 60.025909 Hz Time Remaining: 00:00:00 Sweep Rate: 1 Oct/Min

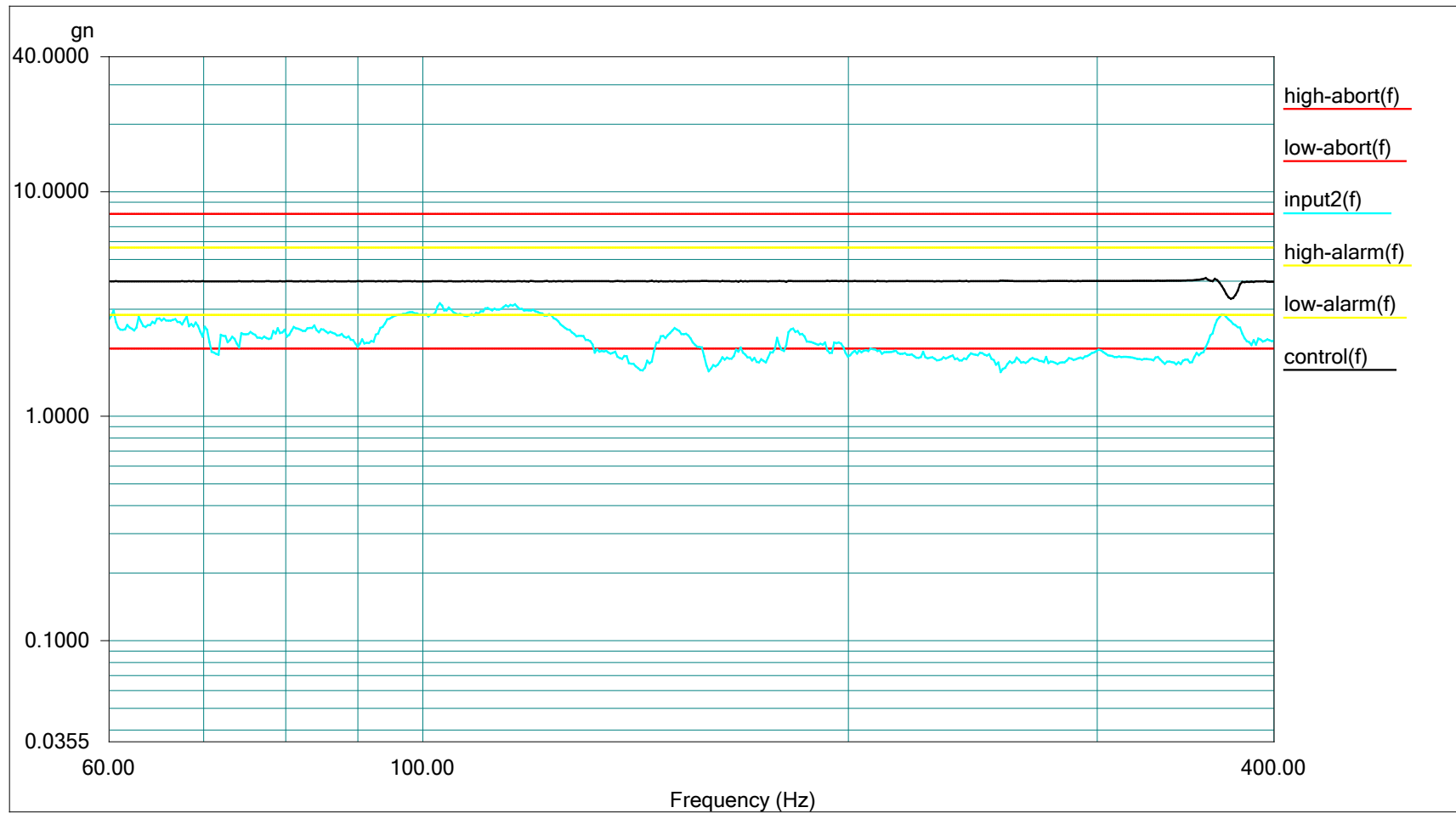
Data saved at 10:41:07 AM, Monday, May 20, 2019

Report created at 10:41:08 AM, Monday, May 20, 2019

DUT: Button Fix Type 1 Metal
Serial Number:
Project File Name: Untitled
Profile Name: Low Level

Test Type: Swept Sine

Run Folder: .\RunDefault May 20, 2019 10-35-33



Level:	100 %	Full Level Time:	00:05:29	Sweep Type:	Logarithmic
Frequency:	60.025909 Hz	Time Remaining:	00:00:00	Sweep Rate:	1 Oct/Min

Data saved at 10:41:07 AM, Monday, May 20, 2019

Report created at 10:41:09 AM, Monday, May 20, 2019

Project File Name: Untitled



Data saved at 10:41:07 AM, Monday, May 20, 2019

Report created at 10:41:09 AM, Monday, May 20, 2019

DUT: Button Fix Type 1 Metal

Serial Number:

Project File Name: Untitled

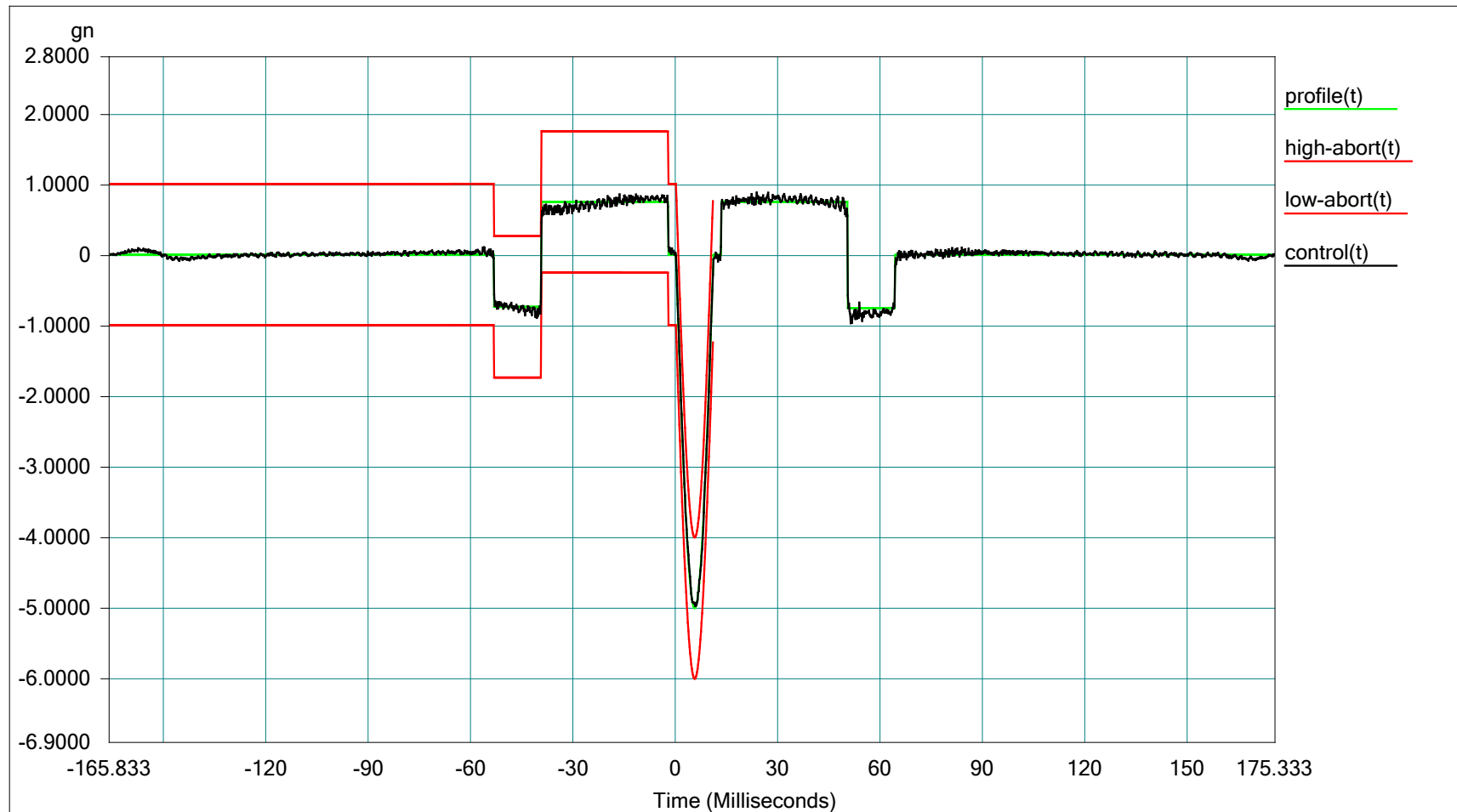
Profile Name: Shock

Test Type:

Classical Shock

Run Folder:

.\RunDefault May 20, 2019 10-47-23



Level: 0 dB

Frame Time: 0.341333 Seconds

dT: 0.000167 Seconds

Pulse Type: Half Sine

Block Size: 2048

Control Peak: 4.972247

Demand Peak: 5.000000

Amplitude: 5.000000

Elapsed Pulses: 24

Control RMS: 0.757117

Demand RMS: 0.754290

Pulse Width: 11.000000 ms

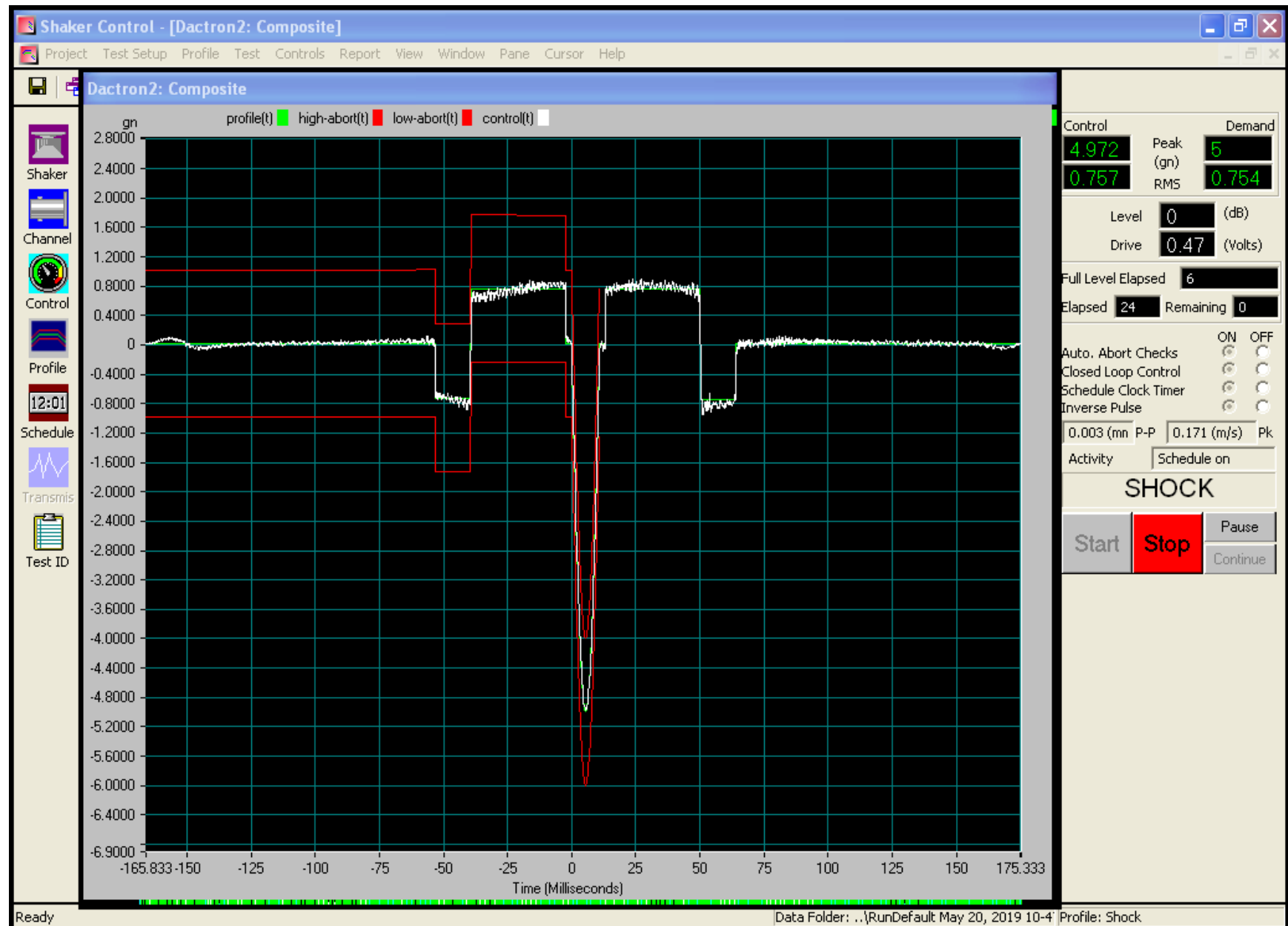
Full Level Elapsed Pulses: 6

Remaining Pulses: 0

Data saved at 10:48:12 AM, Monday, May 20, 2019

Report created at 10:48:13 AM, Monday, May 20, 2019

Project File Name: Untitled



Data saved at 10:48:12 AM, Monday, May 20, 2019

Report created at 10:48:13 AM, Monday, May 20, 2019

DUT: Button Fix Type 1 Metal

Serial Number:

Project File Name: Untitled

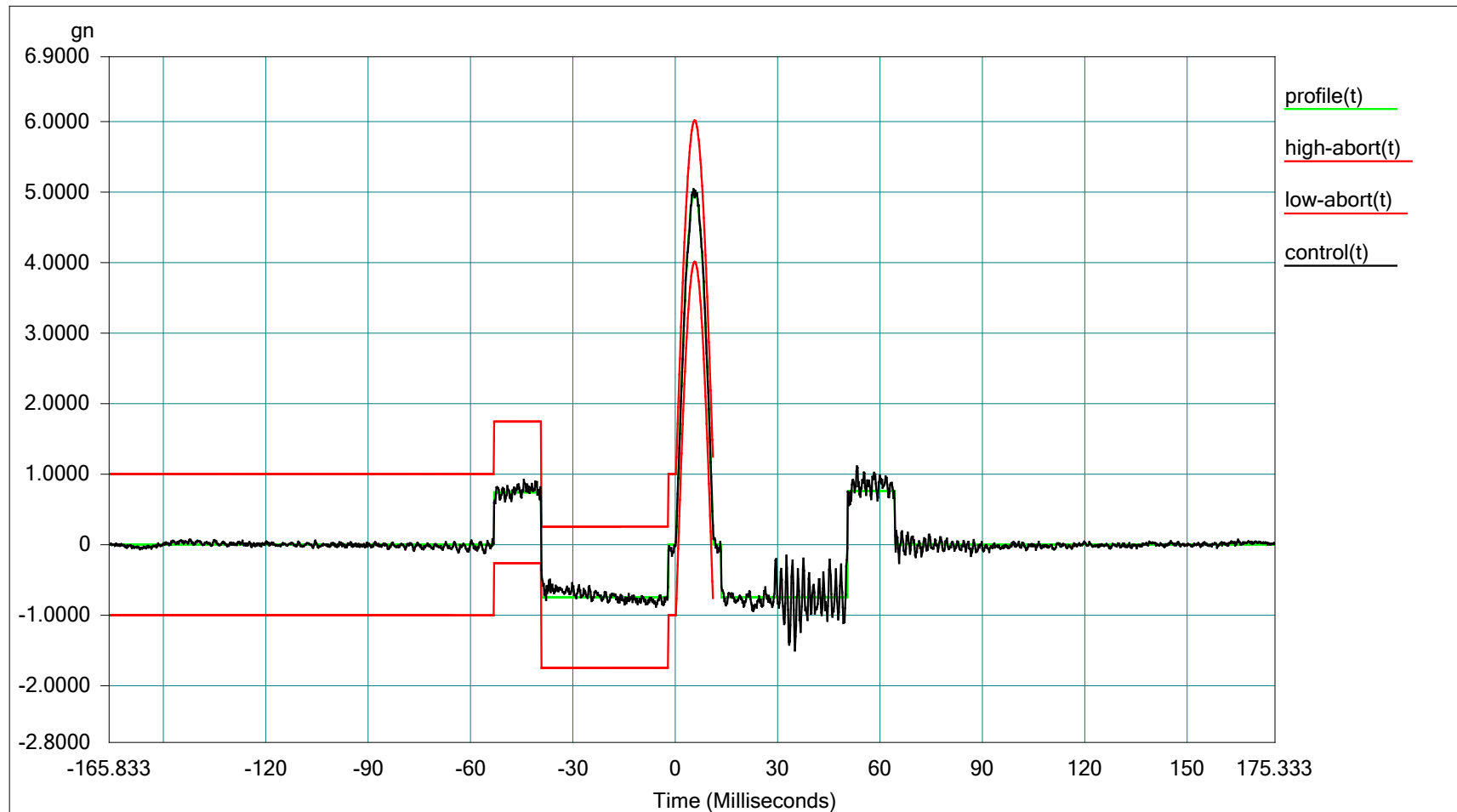
Profile Name: Shock

Test Type:

Classical Shock

Run Folder:

.\RunDefault May 20, 2019 10-47-23



Level: 0 dB

Frame Time: 0.341333 Seconds

dT: 0.000167 Seconds

Pulse Type: Half Sine

Block Size: 2048

Control Peak: 5.027239

Demand Peak: 5.000000

Amplitude: 5.000000

Elapsed Pulses: 15

Control RMS: 0.763312

Demand RMS: 0.754290

Pulse Width: 11.000000 ms

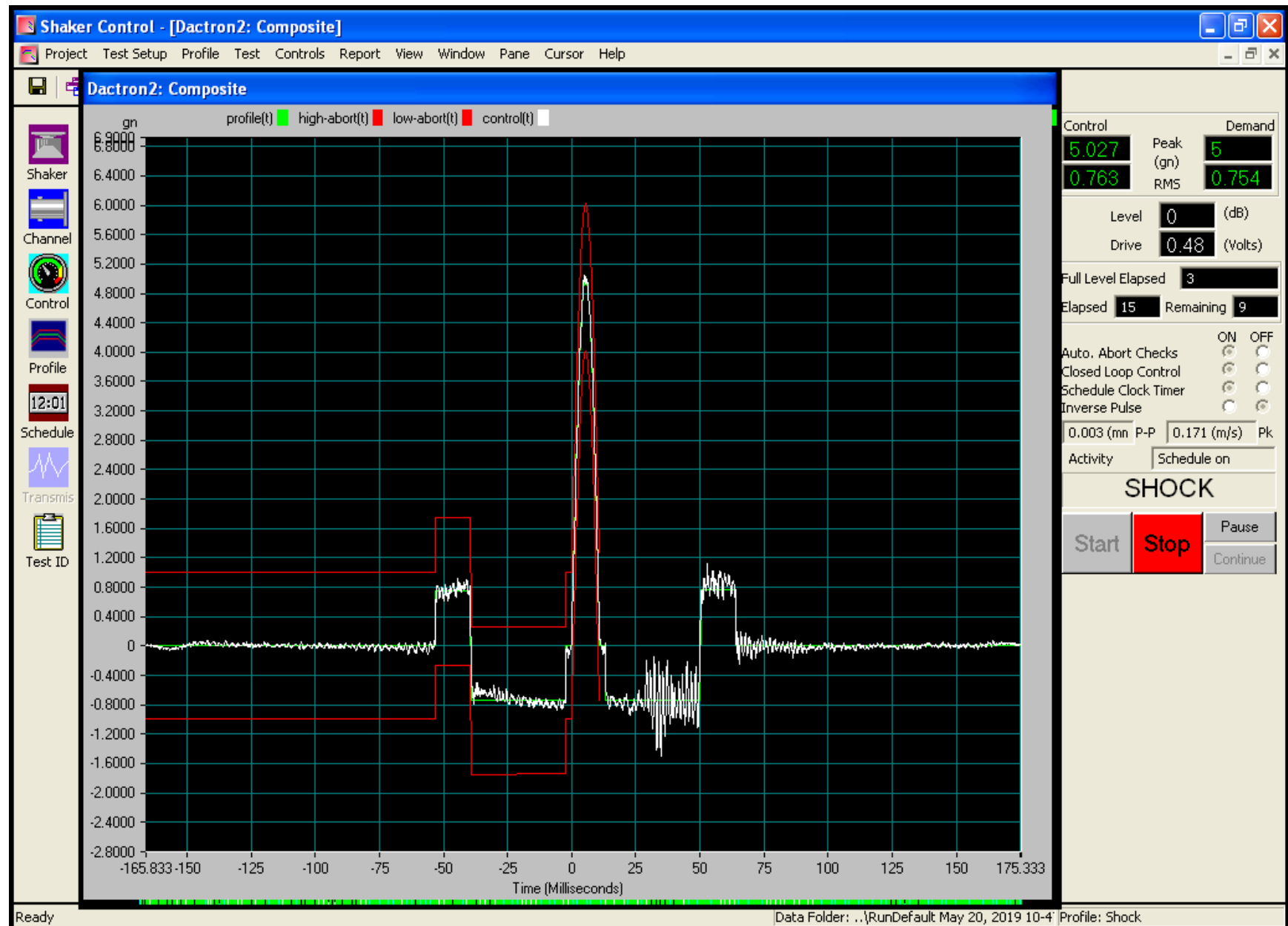
Full Level Elapsed Pulses: 3

Remaining Pulses: 9

Data saved at 10:47:54 AM, Monday, May 20, 2019

Report created at 10:47:55 AM, Monday, May 20, 2019

Project File Name: Untitled



Data saved at 10:47:54 AM, Monday, May 20, 2019

Report created at 10:47:55 AM, Monday, May 20, 2019

DUT: Button Fix Type 1 Metal

Serial Number:

Project File Name: Untitled

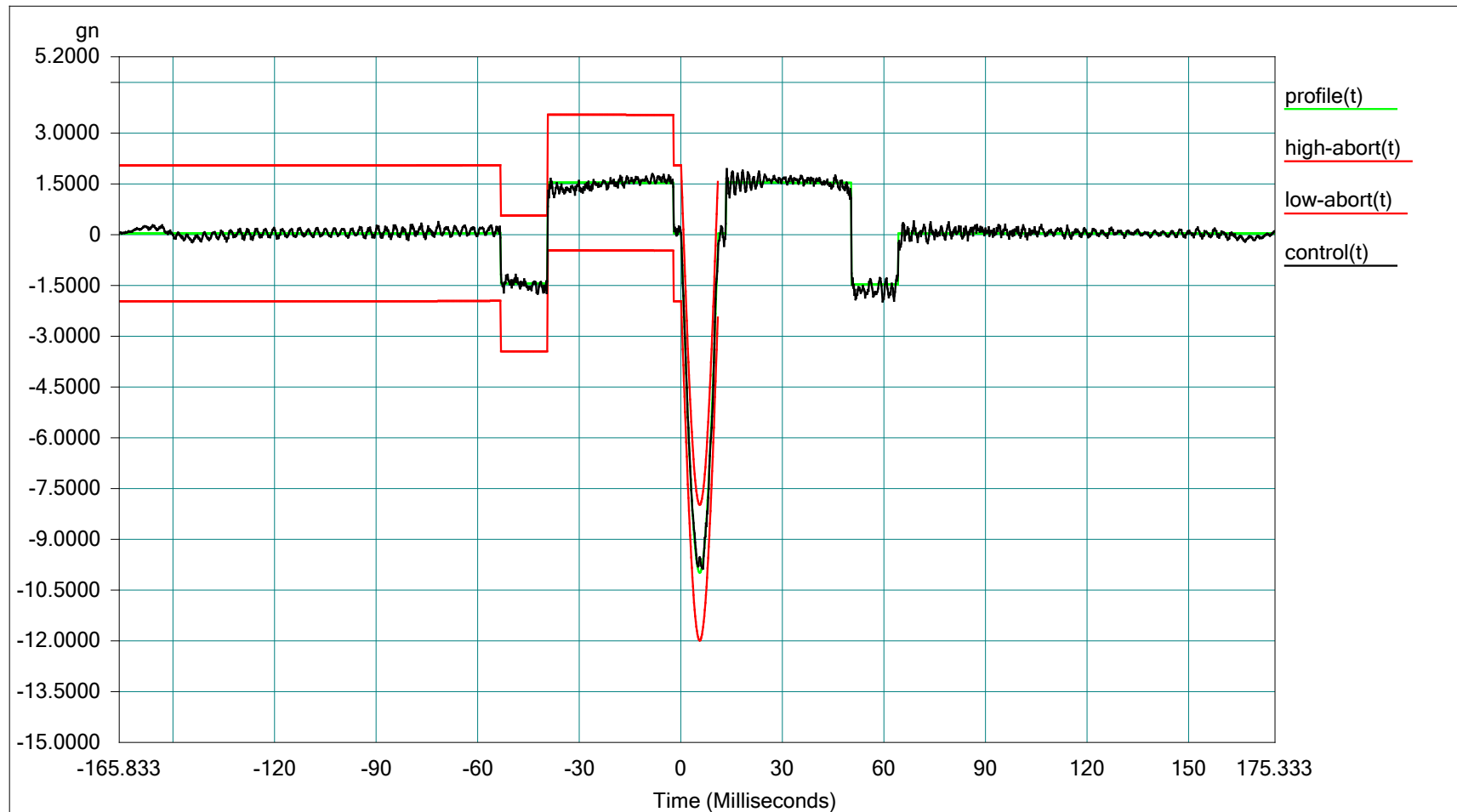
Profile Name: Shock

Test Type:

Classical Shock

Run Folder:

.\RunDefault May 20, 2019 10-49-11



Level: 0 dB

Frame Time: 0.341333 Seconds

dT: 0.000167 Seconds

Pulse Type: Half Sine

Block Size: 2048

Control Peak: 9.883035

Demand Peak: 10.000000

Amplitude: 10.000000

Elapsed Pulses: 25

Control RMS: 1.515863

Demand RMS: 1.508581

Pulse Width: 11.000000 ms

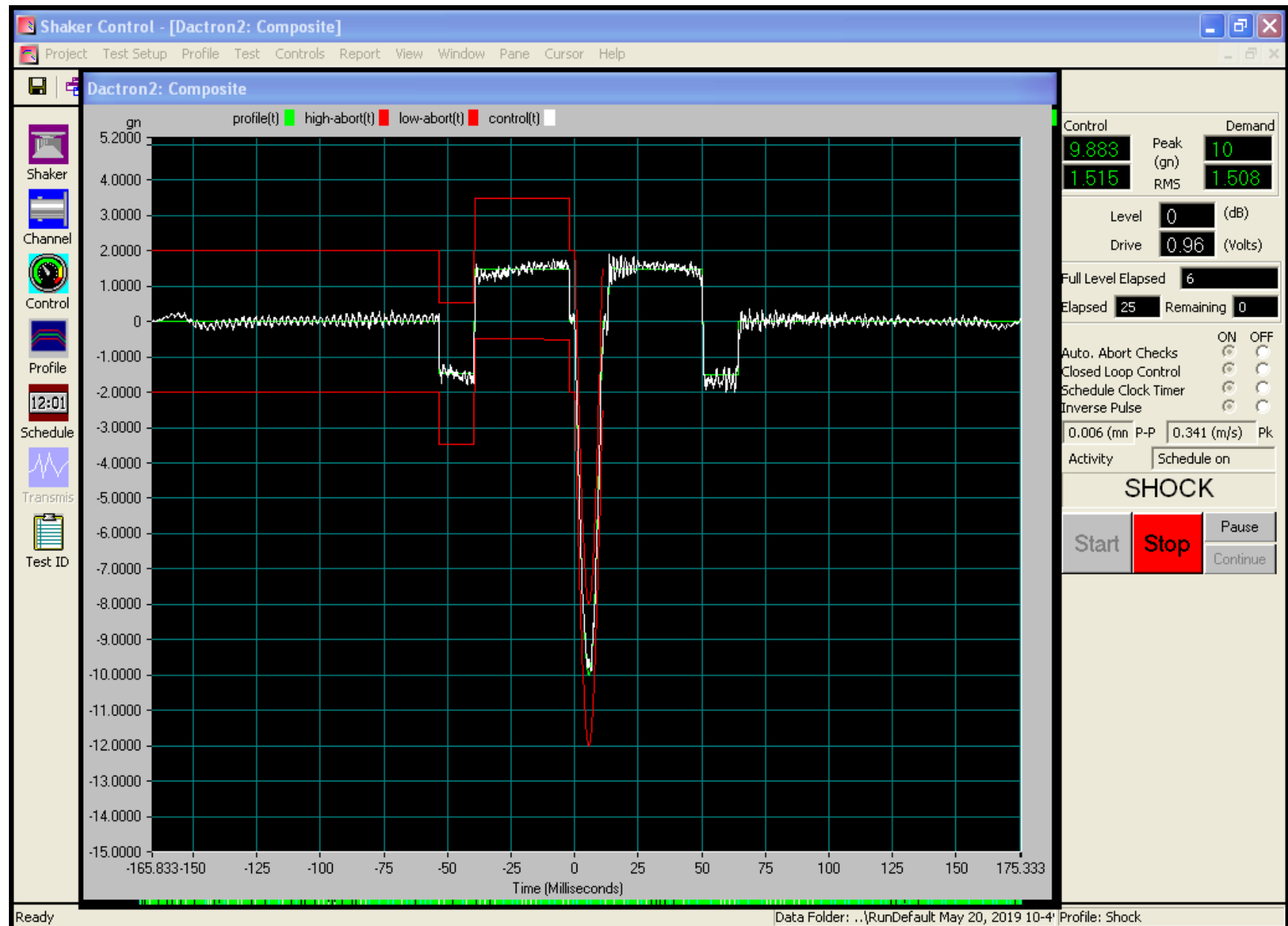
Full Level Elapsed Pulses: 6

Remaining Pulses: 0

Data saved at 10:50:02 AM, Monday, May 20, 2019

Report created at 10:50:03 AM, Monday, May 20, 2019

Project File Name: Untitled



Data saved at 10:50:02 AM, Monday, May 20, 2019

Report created at 10:50:03 AM, Monday, May 20, 2019

DUT: Button Fix Type 1 Metal

Serial Number:

Project File Name: Untitled

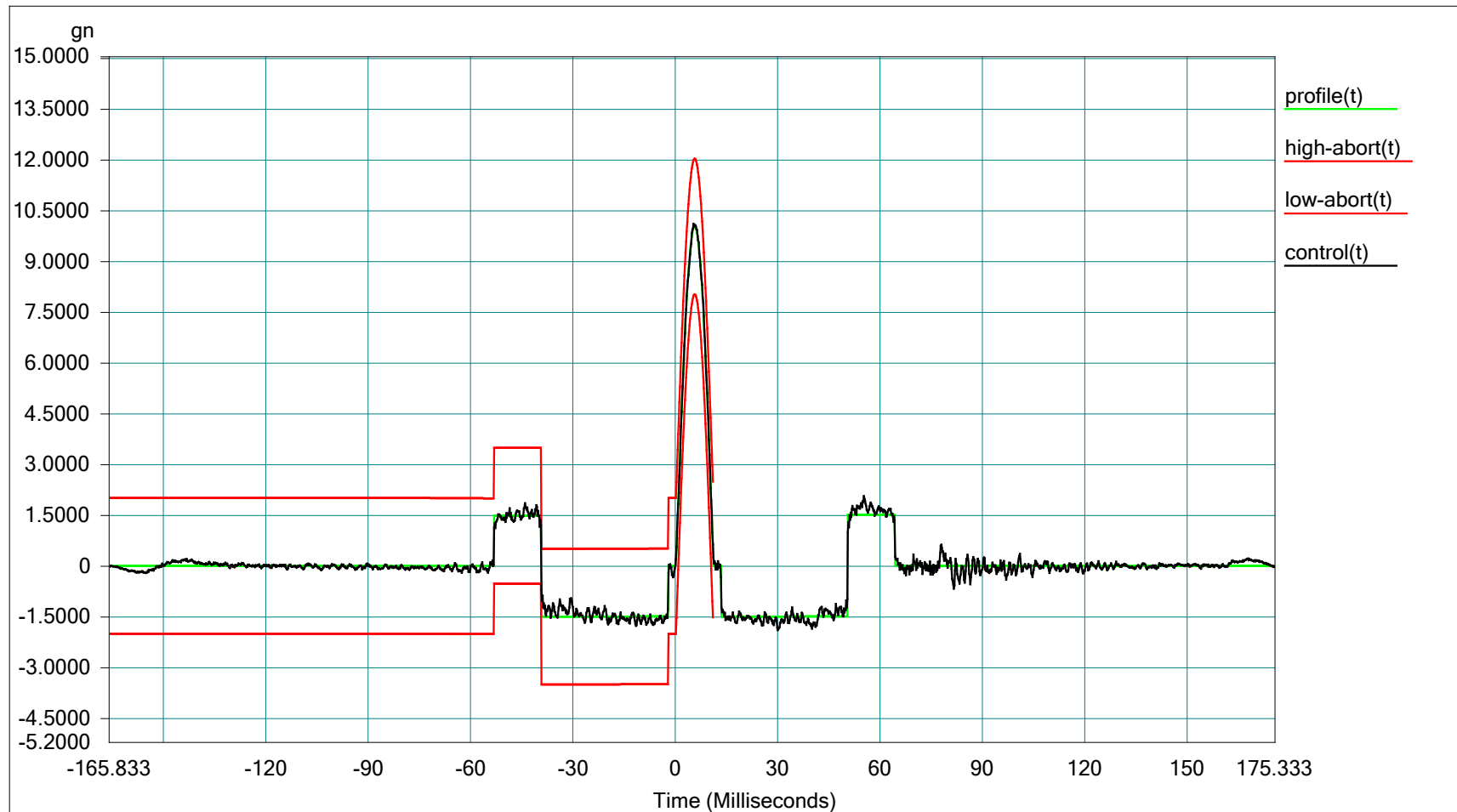
Profile Name: Shock

Test Type:

Classical Shock

Run Folder:

.\RunDefault May 20, 2019 10-49-11



Level: 0 dB

Frame Time: 0.341333 Seconds

dT: 0.000167 Seconds

Pulse Type: Half Sine

Block Size: 2048

Control Peak: 10.078890

Demand Peak: 10.000000

Amplitude: 10.000000

Elapsed Pulses: 16

Control RMS: 1.519085

Demand RMS: 1.508581

Pulse Width: 11.000000 ms

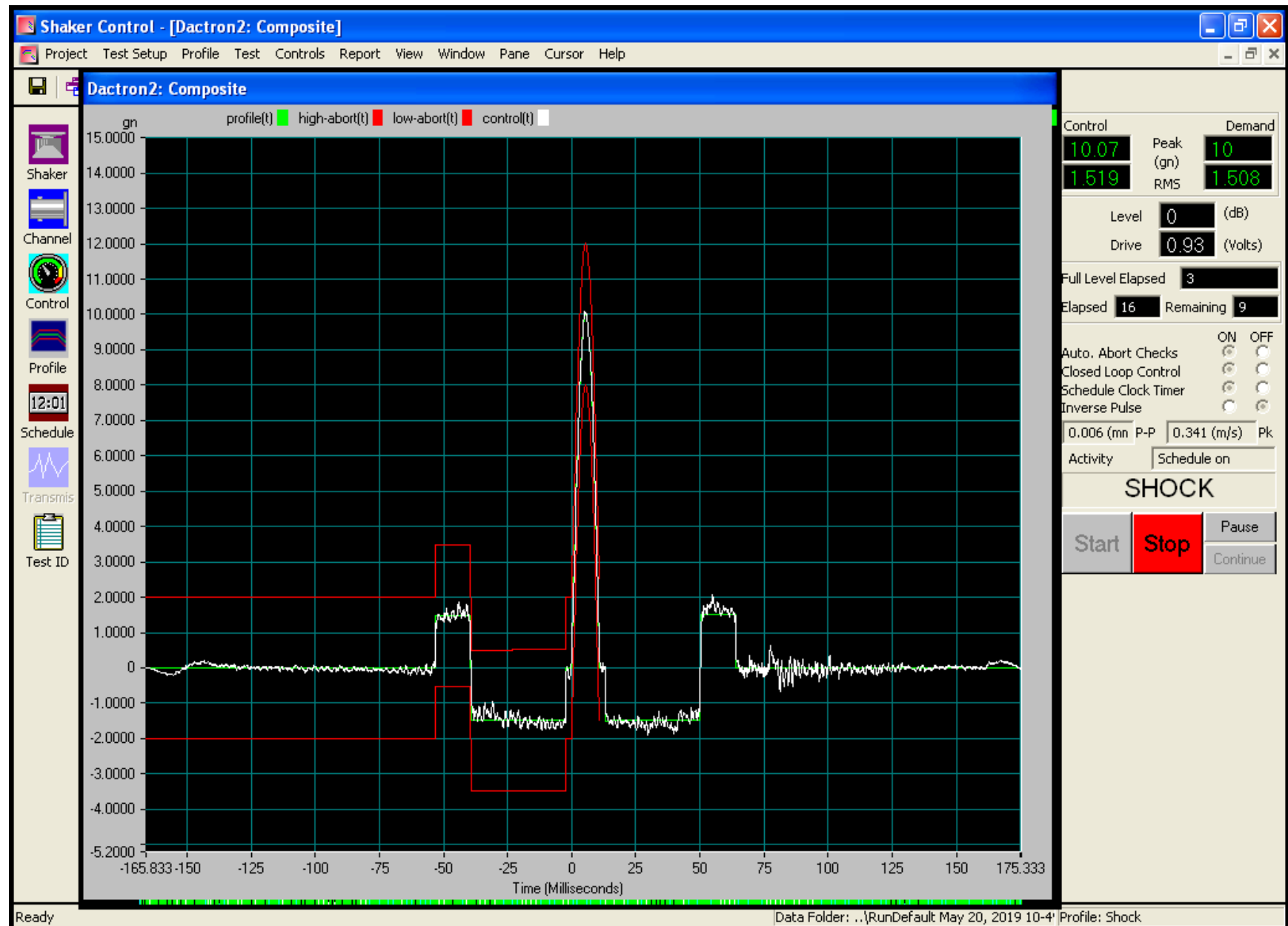
Full Level Elapsed Pulses: 3

Remaining Pulses: 9

Data saved at 10:49:44 AM, Monday, May 20, 2019

Report created at 10:49:45 AM, Monday, May 20, 2019

Project File Name: Untitled



Data saved at 10:49:44 AM, Monday, May 20, 2019

Report created at 10:49:45 AM, Monday, May 20, 2019

DUT: Button Fix Type 1 Metal

Serial Number:

Project File Name: Untitled

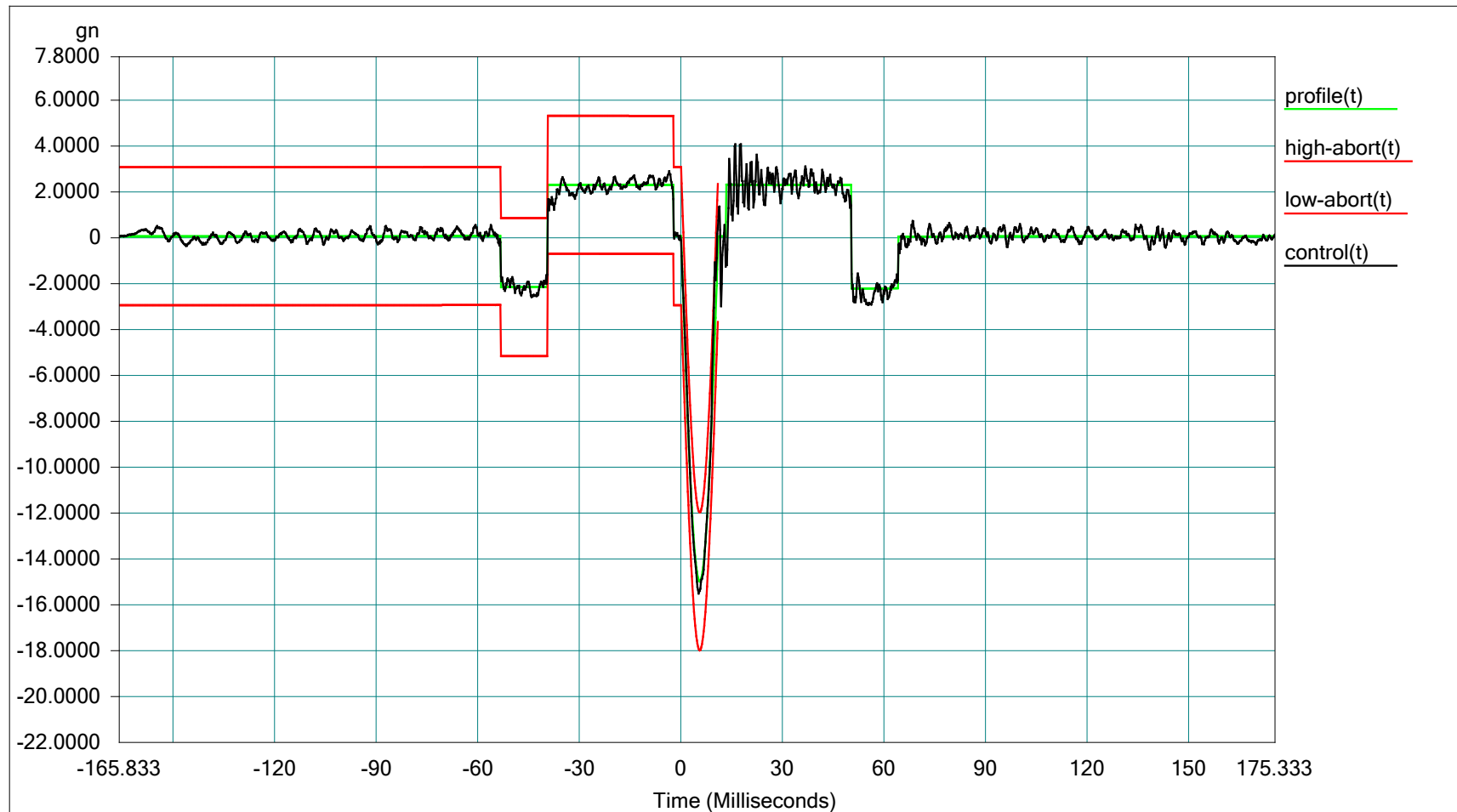
Profile Name: Shock

Test Type:

Classical Shock

Run Folder:

.\RunDefault May 20, 2019 10-51-48



Level: 0 dB

Frame Time: 0.341333 Seconds

dT: 0.000167 Seconds

Pulse Type: Half Sine

Block Size: 2048

Control Peak: 15.531445

Demand Peak: 14.999999

Amplitude: 14.999999

Elapsed Pulses: 26

Control RMS: 2.287334

Demand RMS: 2.262871

Pulse Width: 11.000000 ms

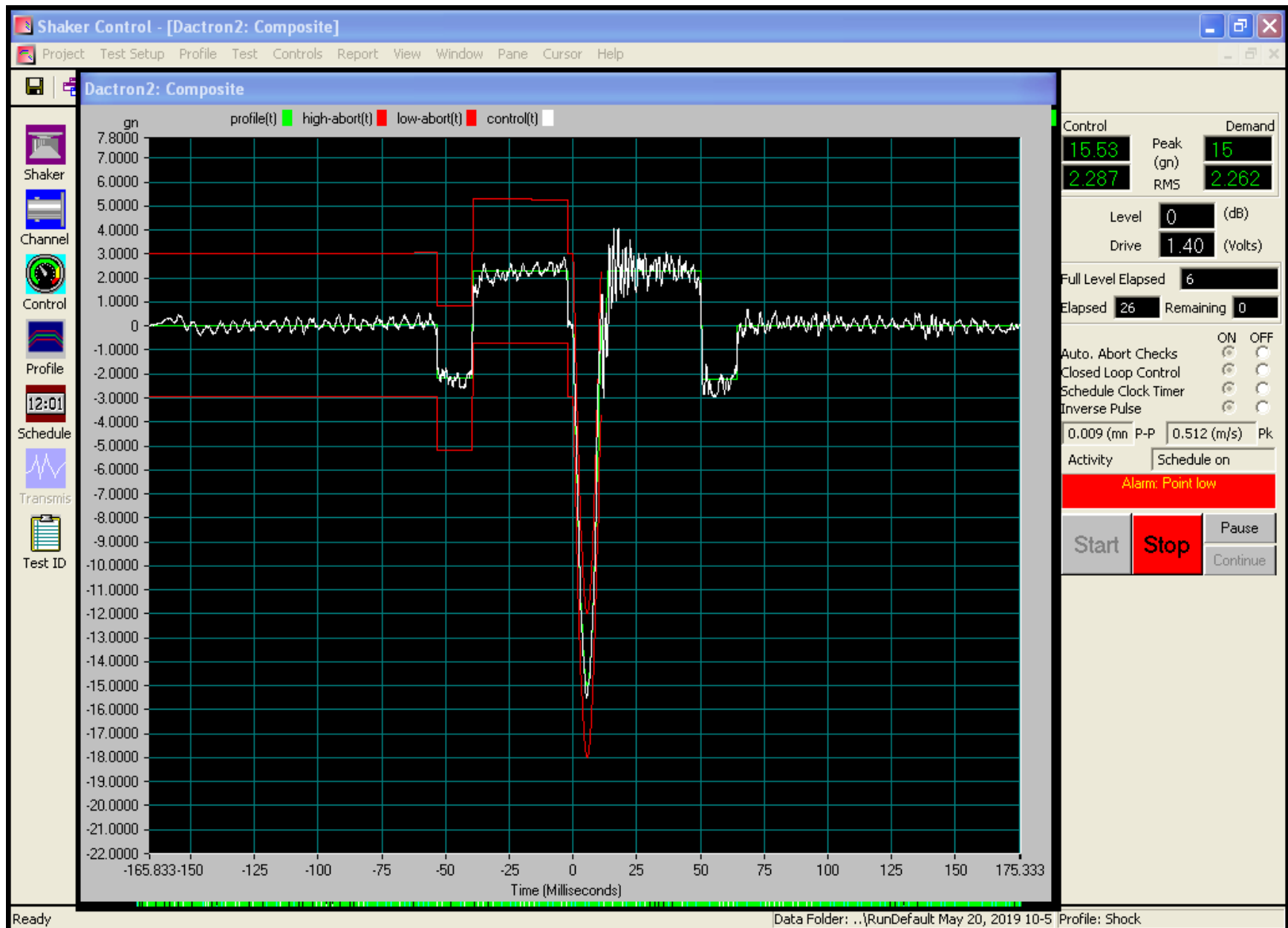
Full Level Elapsed Pulses: 6

Remaining Pulses: 0

Data saved at 10:52:46 AM, Monday, May 20, 2019

Report created at 10:52:47 AM, Monday, May 20, 2019

Project File Name: Untitled



Data saved at 10:52:46 AM, Monday, May 20, 2019

Report created at 10:52:47 AM, Monday, May 20, 2019

DUT: Button Fix Type 1 Metal

Serial Number:

Project File Name: Untitled

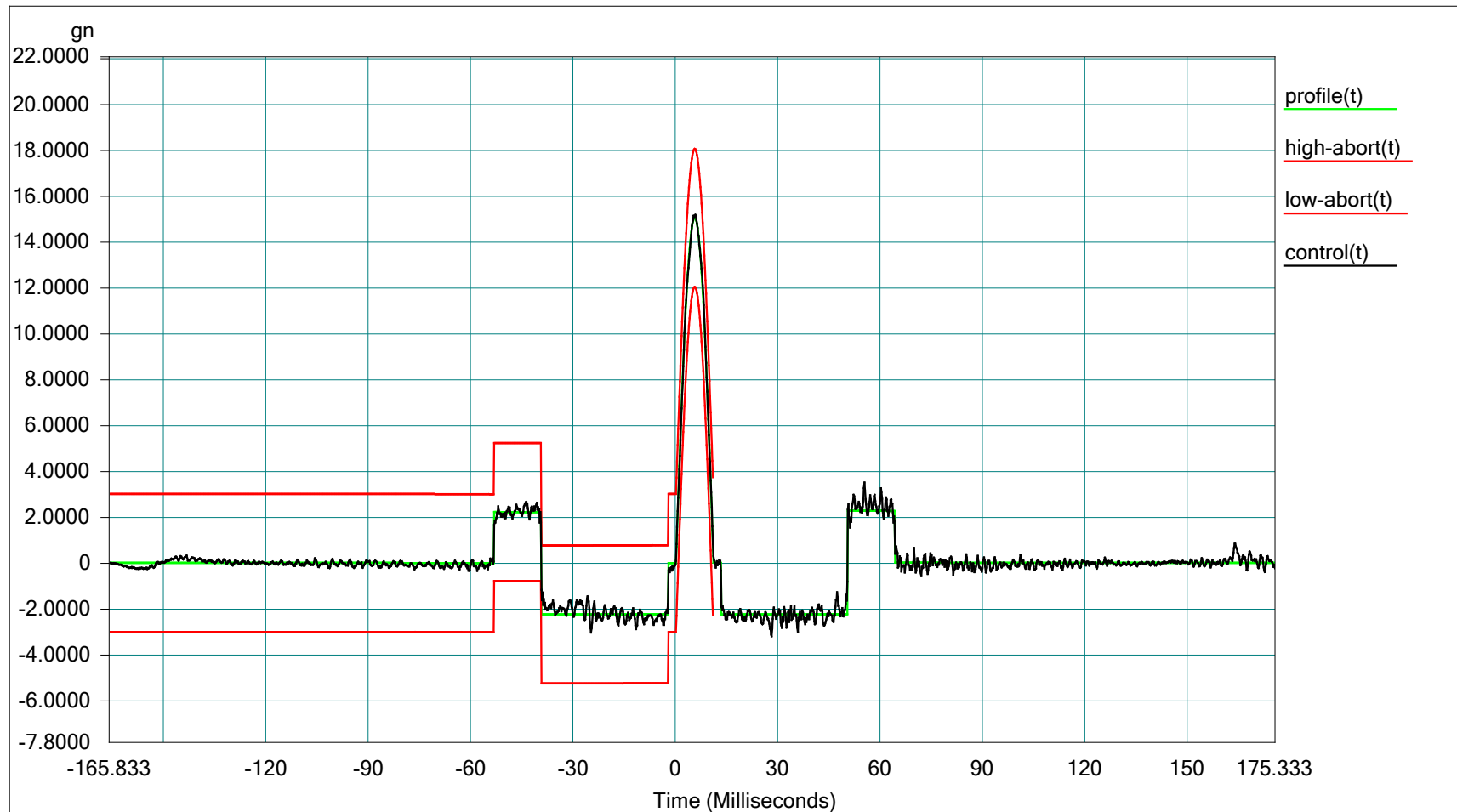
Profile Name: Shock

Test Type:

Classical Shock

Run Folder:

.\RunDefault May 20, 2019 10-51-48



Level: 0 dB

Frame Time: 0.341333 Seconds

dT: 0.000167 Seconds

Pulse Type: Half Sine

Block Size: 2048

Control Peak: 15.132385

Demand Peak: 14.999999

Amplitude: 14.999999

Elapsed Pulses: 17

Control RMS: 2.282368

Demand RMS: 2.262871

Pulse Width: 11.000000 ms

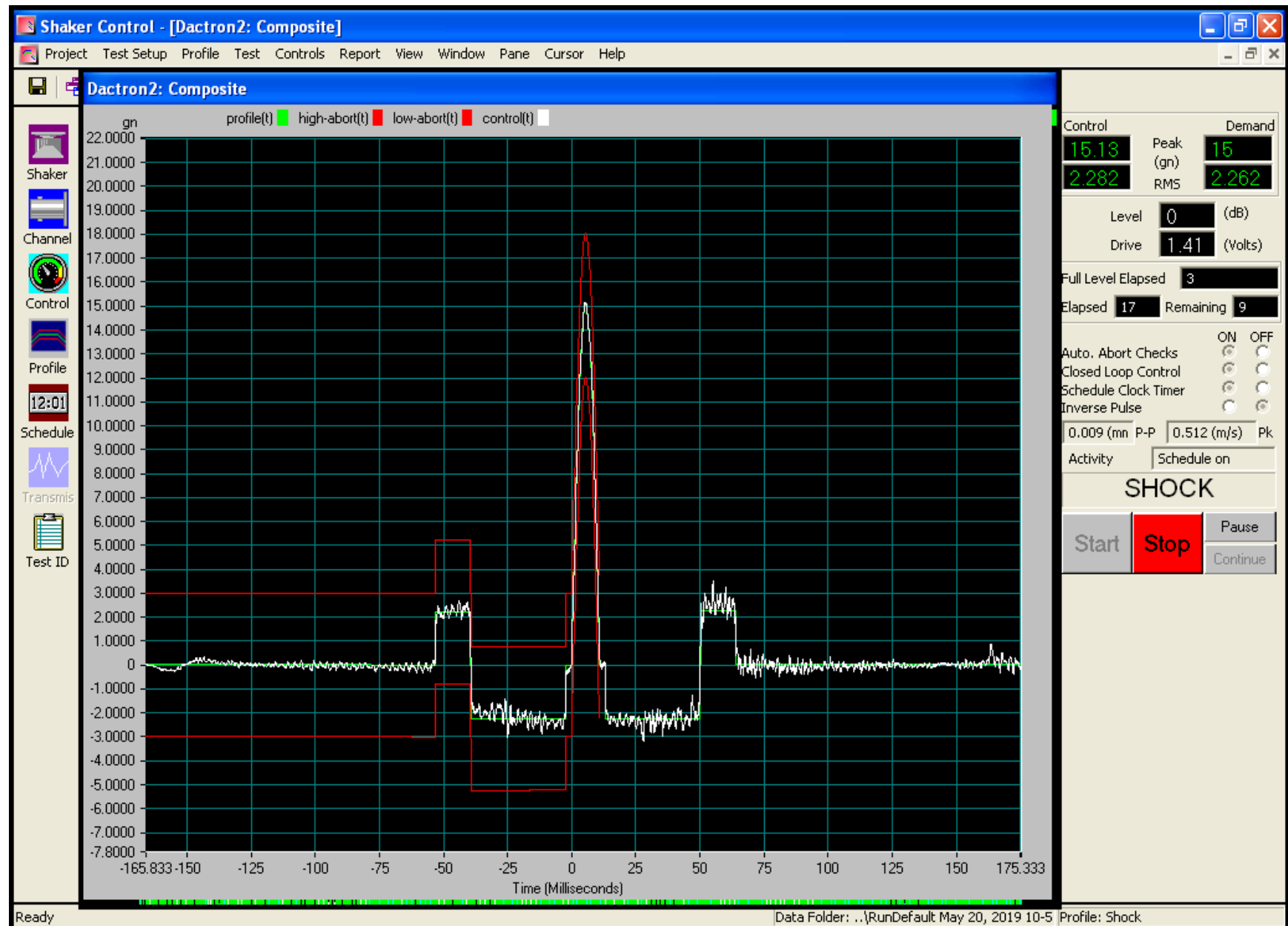
Full Level Elapsed Pulses: 3

Remaining Pulses: 9

Data saved at 10:52:28 AM, Monday, May 20, 2019

Report created at 10:52:29 AM, Monday, May 20, 2019

Project File Name: Untitled



Data saved at 10:52:28 AM, Monday, May 20, 2019

Report created at 10:52:29 AM, Monday, May 20, 2019

DUT: Button Fix Type 1 Metal

Serial Number:

Project File Name: Untitled

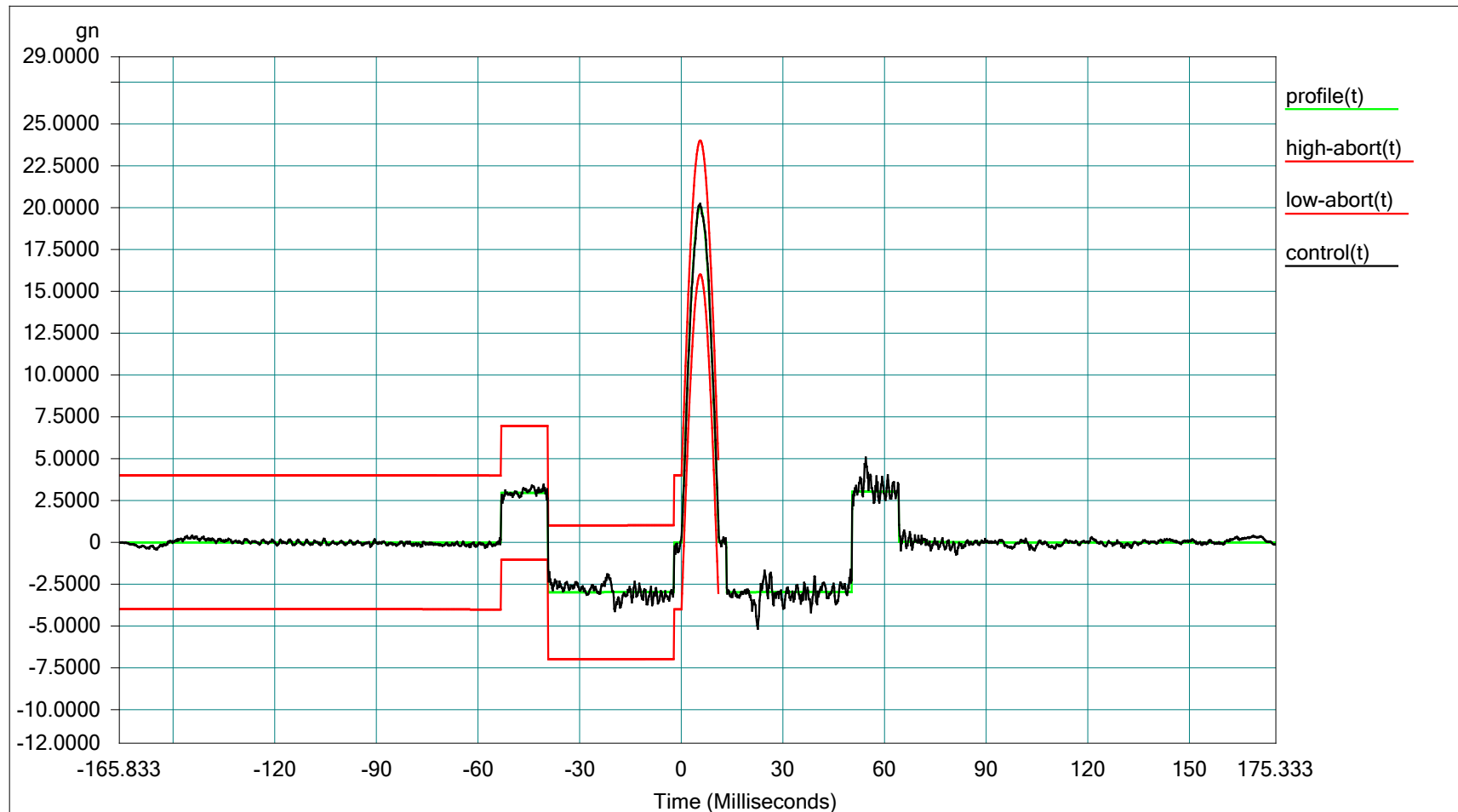
Profile Name: Shock

Test Type:

Classical Shock

Run Folder:

.\RunDefault May 20, 2019 10-55-25



Level: 0 dB

Frame Time: 0.341333 Seconds

dT: 0.000167 Seconds

Pulse Type: Half Sine

Block Size: 2048

Control Peak: 20.226744

Demand Peak: 20.000000

Amplitude: 20.000000

Elapsed Pulses: 18

Control RMS: 3.048818

Demand RMS: 3.017161

Pulse Width: 11.000000 ms

Full Level Elapsed Pulses: 3

Remaining Pulses: 9

Data saved at 10:56:14 AM, Monday, May 20, 2019

Report created at 10:56:15 AM, Monday, May 20, 2019

Project File Name: Untitled



Data saved at 10:56:14 AM, Monday, May 20, 2019

Report created at 10:56:15 AM, Monday, May 20, 2019

65275/M - B

**LABORATORY TESTING OF BUTTON- FIX
SYSTEM - TYPE 1 - METAL**

BUTTONFIX LIMITED

Sandberg LLP
40 Grosvenor Gardens
London SW1W 0EB

Tel: 020 7565 7000
Fax: 020 7565 7100
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web: www.sandberg.co.uk

SANDBERG

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web: www.sandberg.co.uk

65275/M - B

LABORATORY TESTING OF BUTTON-FIX SYSTEM

BUTTON-FIX LIMITED

- TYPE 1 - METAL

Buttonfix Limited
Unit A, 1 Britton Street
London
EC1M 5NW

This report comprises:
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For the attention of: Mr Tony Wills

16 July 2019

Partners: N C D Sandberg S C Clarke D J Ellis A A Willmott R A Rogerson M A Eden J D French C Morgan G S Mayers G C S Moor J Fagan J H Dell
Senior Associates: R D Easthope I M Hudson S R P Morris M I Ingle M Faliva R A Lucas A L Pitman D A Kinnersley A T Hollyman J Glen Dr W R Newby
Associates: D Hunt J Carmichael Y N P Guellil K J Green Dr S E Tulip J Gallagher Dr E D W MacLean N A Fetter E McPheat L D Nunn

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Materials, samples and test specimens are retained for a period of 2 months from the issue of the final report. Your attention is drawn to the enclosed sample retention form and we would be grateful if you could complete the form and return it within one month from the date of the report.

Tests reported on sheets not bearing the UKAS mark in this report/certificate are not included in the UKAS accreditation schedule for this laboratory.

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.

Summary of Test Results:

Type 1 - Metal

Test	Vertical Shear (kg) MZ 564	Horizontal Shear (kg) MZ 565	Pull Apart (kg) MZ 566
A	299.8	375.2	217.2
B	347.2	355.4	214.6
C	351.8	311.5	233.5
Average	333	347	222
Standard Deviation	24	27	8

Type 1 - Metal - 4 Buttons

Test	Vertical Shear (kg) MZ 618	Horizontal Shear (kg) MZ 619	Pull Apart (kg) MZ 620
A	1280	1363	818.3
B	1311	1352	873.4
C	1304	1251	894.3
Average	1298	1322	862
Standard Deviation	13	50	32

SANDBERG

CONSULTING ENGINEERS

INVESTIGATION INSPECTION
MATERIALS TESTING

Sandberg LLP
40 Grosvenor Gardens
London SW1W 0EB

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web: www.sandberg.co.uk

TEST CERTIFICATE

Certificate:	65275/M - B/1	Order Ref:	PO - 19/190
Samples Received:	03 June 2019	Tested By:	NAF/AT
Test Date:	07 June 2019	Test Procedure:	In House
Client Details:	Buttonfix Limited, Unit A, 1 Britton Street, London, EC1M 5NW		

STRENGTH TESTING OF BUTTON-FIX SYSTEM

Test Details:	Type 1 - Metal
Button-Fix Type:	Diecast ZL2 Zinc Alloy Button-Fix with Stainless Steel Spring
Fixing Screw Details:	Spax 5 x 20 mm Pan Head for the fixes and 5 x 20 mm countersunk for the buttons
Substrate Material:	18 mm Birch Faced Plywood
Test equipment:	Hounsfield Tensometer ref.: C/002

TEST RESULTS

Sample Reference	Load Direction	Maximum Failure Load (kN)	Comments
MZ 564-A	X - Vertical Shear Surface Mounted	2.940 (299.8 kg)	Fractured in zinc & pulled out screw
MZ 564-B	X - Vertical Shear Surface Mounted	3.405 (347.2 kg)	Fractured in zinc & pulled out screw
MZ 564-C	X - Vertical Shear Surface Mounted	3.450 (351.8 kg)	Fractured in zinc & pulled out screw
MZ 565-A	Y - Horizontal Side Shear Surface Mounted	3.680 (375.2 kg)	Fix plate fractured Fractured in zinc & pulled out screw
MZ 565-B	Y - Horizontal Side Shear Surface Mounted	3.485 (355.4 kg)	Fractured in zinc & pulled out screw
MZ 565-C	Y - Horizontal Side Shear Surface Mounted	3.055 (311.5 kg)	Fractured in zinc & pulled out screw
MZ 566-A	Z - Pull Out from Panel Surface Mounted	2.130 (217.2 kg)	Fractured in zinc
MZ 566-B	Z - Pull Out from Panel Surface Mounted	2.105 (214.6 kg)	Fractured in zinc
MZ 566-C	Z - Pull Out from Panel Surface Mounted	2.290 (233.5 kg)	Fractured in zinc

For Sandberg LLP



Date: 16 July 2019

Neale Fetter - Assistant Manager Metallurgy Department

Materials, samples and test specimens are retained for a period of 2 months from the issue of the final report.
Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.

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TEST CERTIFICATE

Certificate:	65275/M - B/2	Order Ref:	PO - 19/190
Samples Received:	21 June 2019	Tested By:	NAF/AT
Test Date:	28 June 2019	Test Procedure:	In House
Client Details:	Buttonfix Limited, Unit A, 1 Britton Street, London, EC1M 5NW		

STRENGTH TESTING OF BUTTON-FIX SYSTEM

Test Details:	Four number Type 1 - Metal
Button-Fix Type:	Diecast ZL2 Zinc Alloy Button-Fix with Stainless Steel Spring
Fixing Screw Details:	Spax 5 x 20 mm Pan Head for the fixes and 5 x 20 mm countersunk for the buttons
Substrate Material:	18 mm Birch Faced Plywood
Test equipment:	Universal Testing Machine ref.: C/238

TEST RESULTS

Sample Reference	Load Direction	Maximum Failure Load - 4 Fixings (kN)	Comments
MZ 618-A	X - Vertical Shear Surface Mounted	12.556 (1280 kg)	Fractured in zinc & pulled out screws
MZ 618-B	X - Vertical Shear Surface Mounted	12.854 (1311 kg)	Fractured in zinc & pulled out screws
MZ 618-C	X - Vertical Shear Surface Mounted	12.785 (1304 kg)	Fractured in zinc & pulled out screws
MZ 619-A	Y - Horizontal Side Shear Surface Mounted	13.366 (1363 kg)	Fractured in zinc & pulled out screws
MZ 619-B	Y - Horizontal Side Shear Surface Mounted	13.260 (1352 kg)	Fractured in zinc & pulled out screws
MZ 619-C	Y - Horizontal Side Shear Surface Mounted	12.273 (1251 kg)	Fractured in zinc & pulled out screws
MZ 620-A	Z - Pull Out from Panel Surface Mounted	8.025 (818.3 kg)	Fractured in zinc & pulled out screws
MZ 620-B	Z - Pull Out from Panel Surface Mounted	8.565 (873.4 kg)	Fractured in zinc & pulled out screws
MZ 620-C	Z - Pull Out from Panel Surface Mounted	8.770 (894.3 kg)	Fractured in zinc & pulled out screws

For Sandberg LLP

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APPENDIX A

Photographs 1 to 9



Photograph 1 A view showing the general condition of the button after a vertical shear test on a type 1 - metal fixing.



Photograph 2 A view showing the general condition of the fixing after a vertical shear test on a type 1 - metal fixing.



Photograph 3 A view showing the general condition of the fixing after a horizontal shear test on a type 1 - metal fixing.



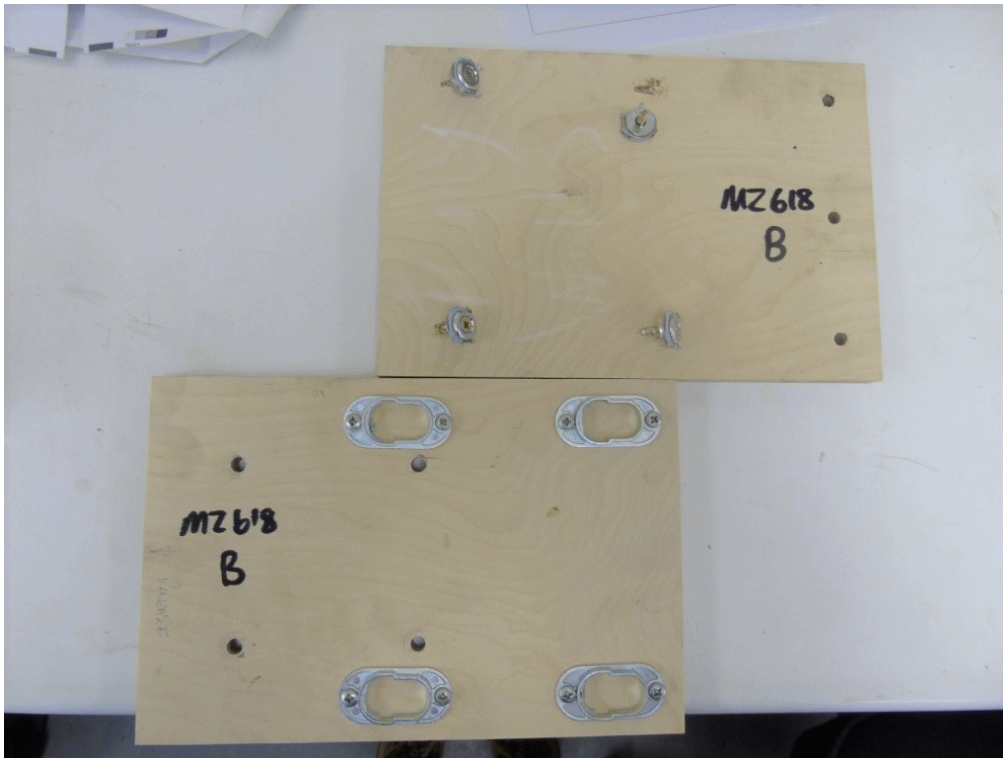
Photograph 4 A view showing the general condition of the button after a horizontal shear test on a type 1 - metal fixing.



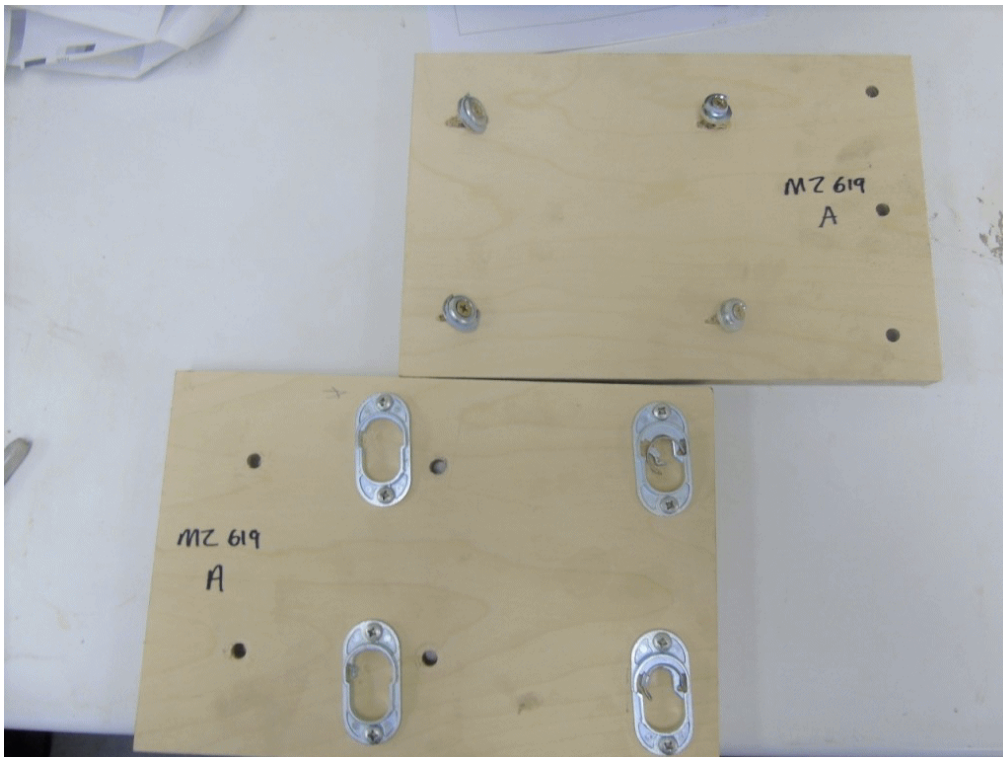
Photograph 5 A view showing the general condition of the fixing after a pull apart test on a type 1 - metal fixing.



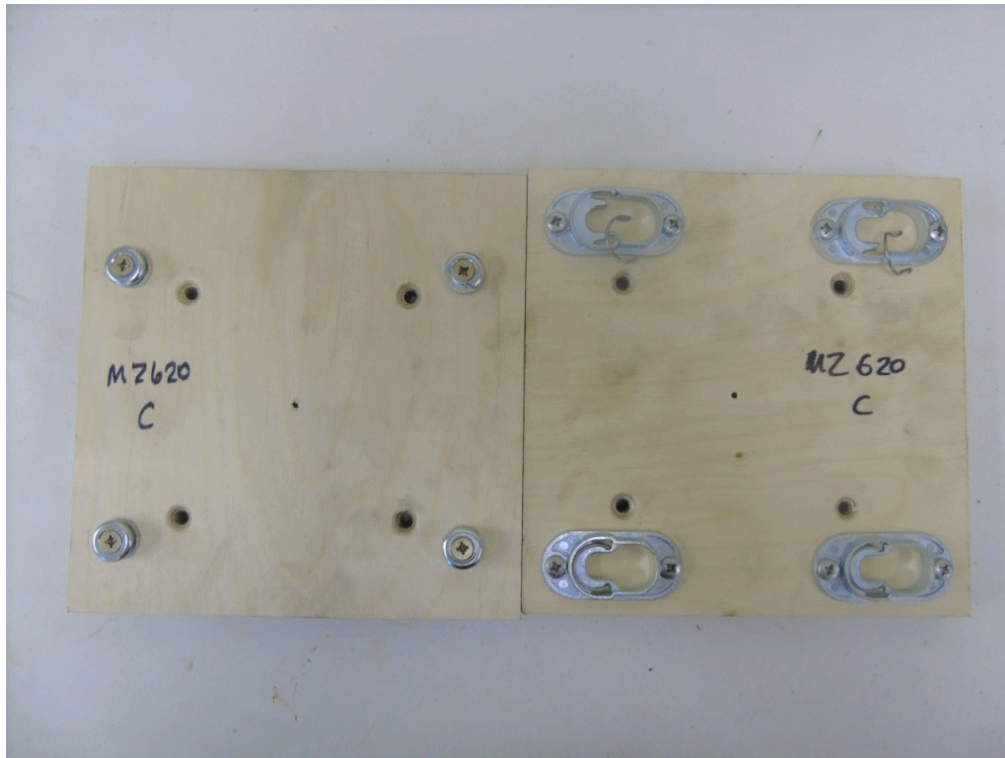
Photograph 6 A view showing the general condition of the button after a pull apart test on a type 1 - metal fixing.



Photograph 7 A view showing the general condition of the buttonfix system after a vertical shear test on a type 1 - metal with four fixings.



Photograph 8 A view showing the general condition of the buttonfix system after a horizontal shear test on a type 1 - metal with four fixings.



Photograph 9 A view showing the general condition of the buttonfix system after a pull apart test on a type 1 - metal with four fixings.

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Where our involvement consists exclusively of testing samples, the results and our conclusions relate only to the samples tested.

