SST DEPARTMENT

VIBRATION TEST FACILITY

REPORT REF: AIV-2003-091-VIB

HERSCHEL : CARDIFF COMPONENTS

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CONTENTS

1) TEST ITEM DESCRIPTION

The test items consisted of :-

- Scal-B - nominal flight spare, reduced power option - SCAL-FS-000-FLIGHT COMPONENT
- Pcal DM – lifetest source in DM structure – non-flight, but flight replica
- 300mK System – 1 photometer support & 1 light baffle – both DM, but flight replica. Configuration as per previous shake.
- 2 additional Pcal sources (in sealed chambers). One mica device, one sapphire device.
- Beam divider in CQM Mount (flight replica)
- Black tiles
- Representative hot-pressed filter material in SPIRE-type mount

Testing would be carried out on the head of the shaker within the Cryostat.

2) TEST SPECIFICATION

The components were to be tested to Spire Qualification levels. A sine survey was to be initially carried out at ambient temperature/atmospheric pressure. A further sine survey followed by a random and post random sine survey would be carried out at sub 10 Kelvin/ Vacuum. A final sine survey at ambient temperature/atmospheric pressure would be undertaken.

A single axis accelerometer was to be used for monitoring.

SINE SURVEY TEST

One sweep @ 0.25g from 10 Hz to 2000 Hz at 2 octaves per minute.

RANDOM

FREQUENCY (Hz)	TEST LEVEL
20 - 100	+3 dB/oct
100 – 138.5	0.06 g^2 / Hz
138.5 - 170	0.06 – 0.7 g^2 / Hz
170 - 200	0.7 g^2 / Hz
200 - 220	0.7 – 0.1 g^2 / Hz
220 - 300	0.1 g^2 / Hz
300 - 2000	-9 dB/oct

Overall Test Level = 8.0 g rms. for 30 Seconds

3) ACCELEROMETER CALIBRATION STATUS

SINGLE AXIS - ENDEVCO 2272 & B&K 4393

SERIAL NUMBER	CALIBRATION PC/g	Date	SIGNAL CONDITIONER
A66B	12.67	11/03/04	ENDEVCO 2775A
YG32	13.77	11/03/04	
1434587	3.16	N/A	

NOTE

Due to the temperature effects, a reduction of 10% in the sensitivity values was used during all cold testing.

See test summary for details on S/N 1434587

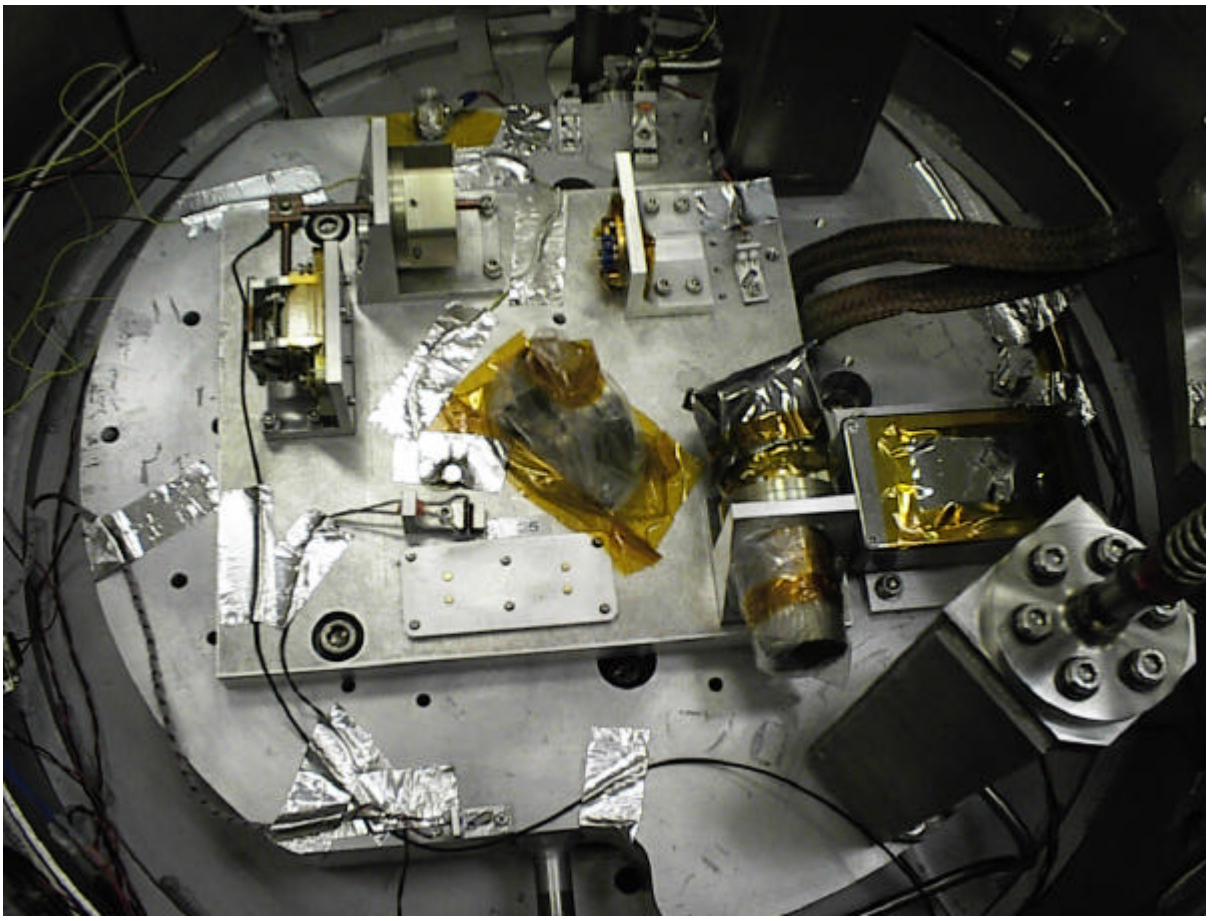
Signal Conditioners: Endevco 2775A
Calibrated on**:** September 2002

4) CLEANLINESS

Approved cleanroom gloves to be worn when handling the test items.

5) FIXTURE DETAILS

FIXTURE CONFIGURATION



A view of the test items mounted on their vibration fixture. The control strategy implemented involved taking the average response from the two accelerometers attached to the fixture.

6) TEST SUMMARY

Test Dates: 23 March 2004 to 25 March 2004

Observers: Dr. Peter Hargrave and Facility Staff

Organisation **:** Cardiff University

CHANNEL ALLOCATION:

CONTROL:-

Channel No.	Accelerometer Type/Serial No.	Testing Axis	Mounting Position
1	Endevco A66B	**N/A**	Fixture
2	Endevco YG32	**N/A**	Fixture

MONITORING:-

Channel No.	Accelerometer Type/Serial No.	Testing Axis	Mounting Position
3	B&K 1434587	**N/A**	300mK Busbar

NOTE

Accelerometer B&K 1434587 was an uncalibrated unit, which was not specified to have a working temperature range at the low temperatures it would be subjected too. As such the data collected should only be viewed as an indication of frequency response. The amplitude data has no relevance.

ACTION	DATE	TIME
Pumpdown Started	23/03/04	16:45
Cooldown Started	23/03/04	21:30
Cold Vib. Testing	24/03/04	11:30
Start Warm Up	24/03/04	12:00
Ambient Testing	25/03/04	08:40
Test Item Removed	25/03/04	11:00

ACCELEROMETER TEST PLOTS

ATMOSPHERIC/AMBIENT TEST CONDITIONS 23/03/04

RUN 00002 SINE SURVEY *FIG 1*

COLD TEST CONDITIONS 24/03/04

RUN 00003 SINE SURVEY *FIG 2*

RUN 00001 RANDOM *FIG 3*

RUN 00005 SINE SURVEY *FIG 4*

ATMOSPHERIC/AMBIENT TEST CONDITIONS 25/03/04

RUN 00006 SINE SURVEY *FIG 5*

7) CONCLUSION

The test items were subjected to the Spire Qualification levels of vibration. On inspection, post vibration testing, it was discovered that 3 of the 4 fasteners securing the photometer support to the fixture were loose. These had been torqued too 0.2 NM prior to testing.

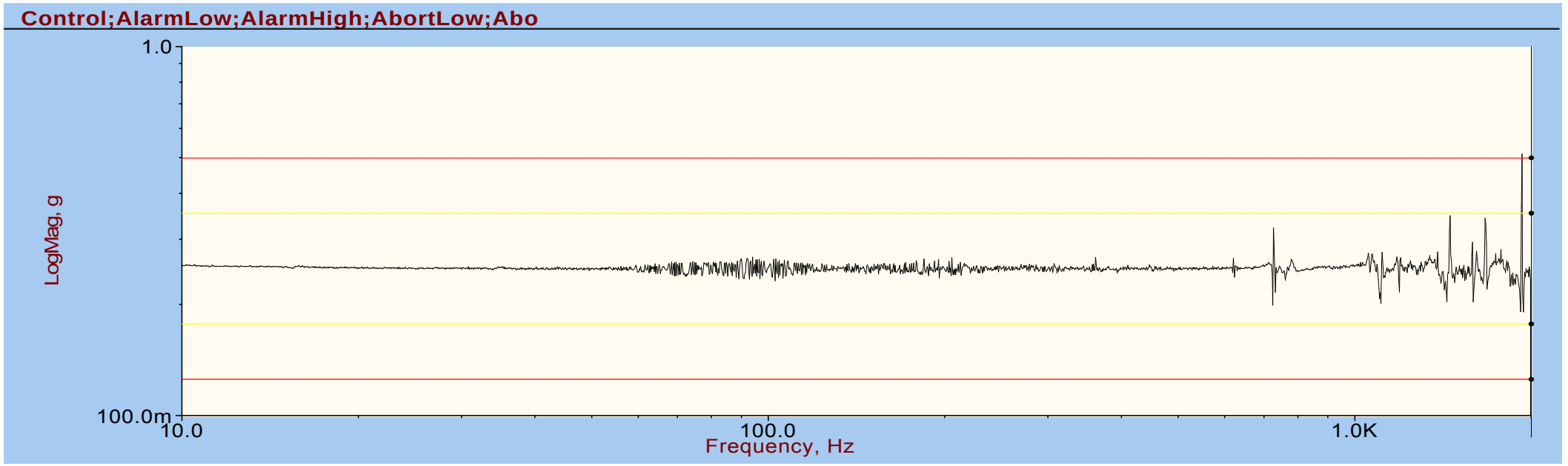
A visual inspection revealed no further problems with any other components.

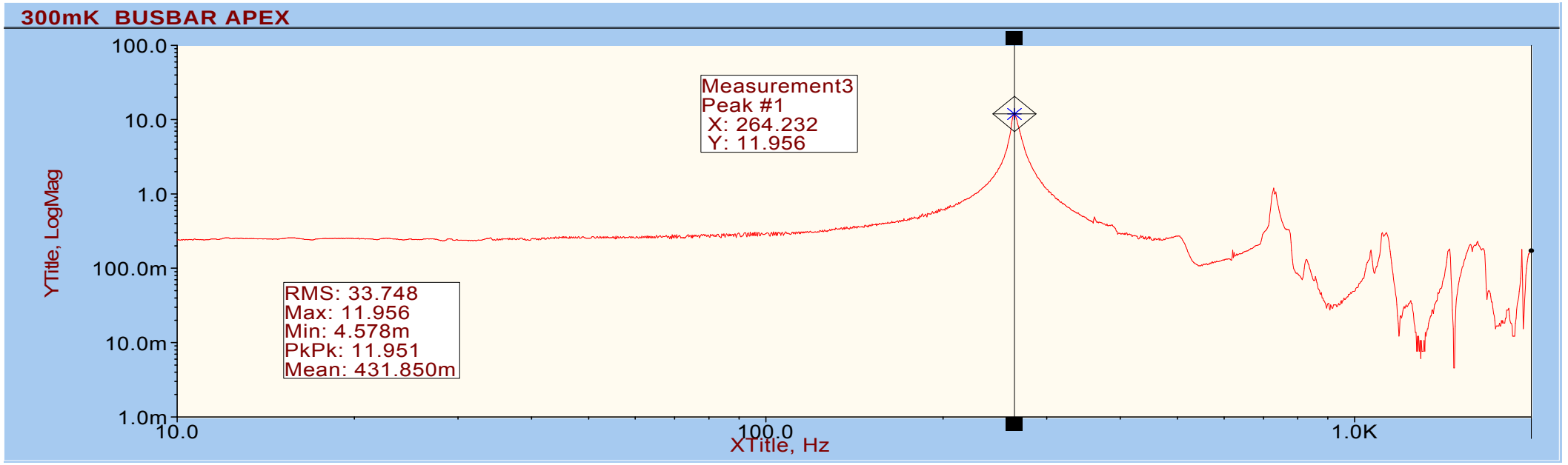
FACILITY OPERATOR: -

Signature Not Verified

Digitally signed by Dave Rippington
Date: 2004.04.22 15:28:12 +01'00'

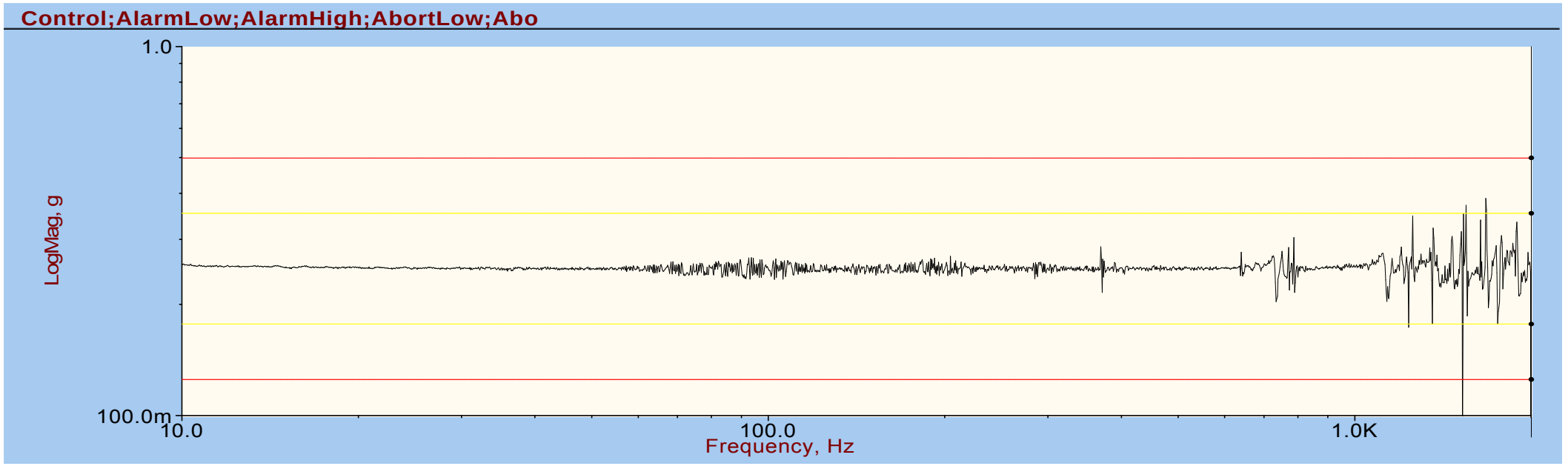
ANNEX: A ACCELEROMETER PLOTS
ANNEX: B COOLDOWN/WARM-UP GRAPH

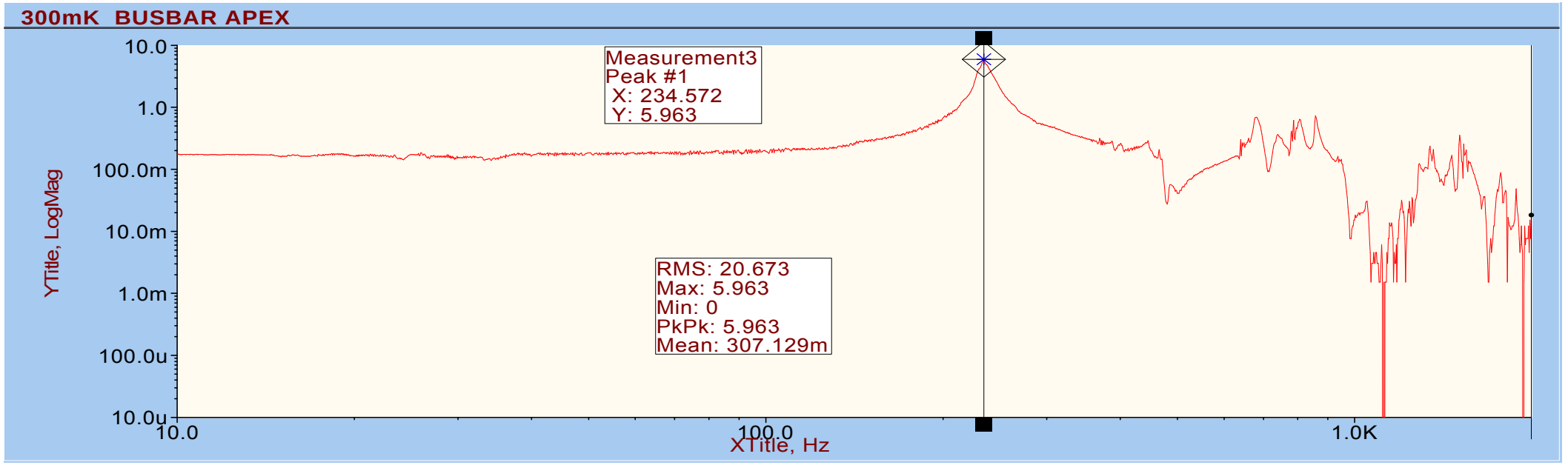




SPIRE CARDIFF COMPONENTS SINE SURVEY AMBIENT/ ATMOSPHERE
RUN 00002
N/A AXIS 16:01:23 23/03/2004

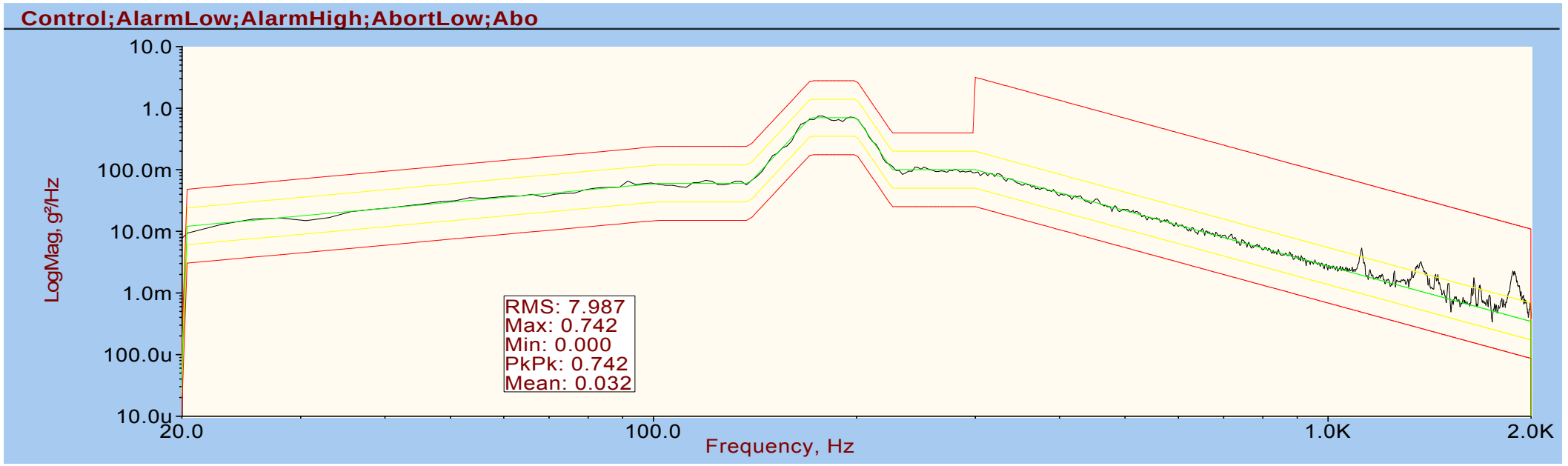
Fig 1

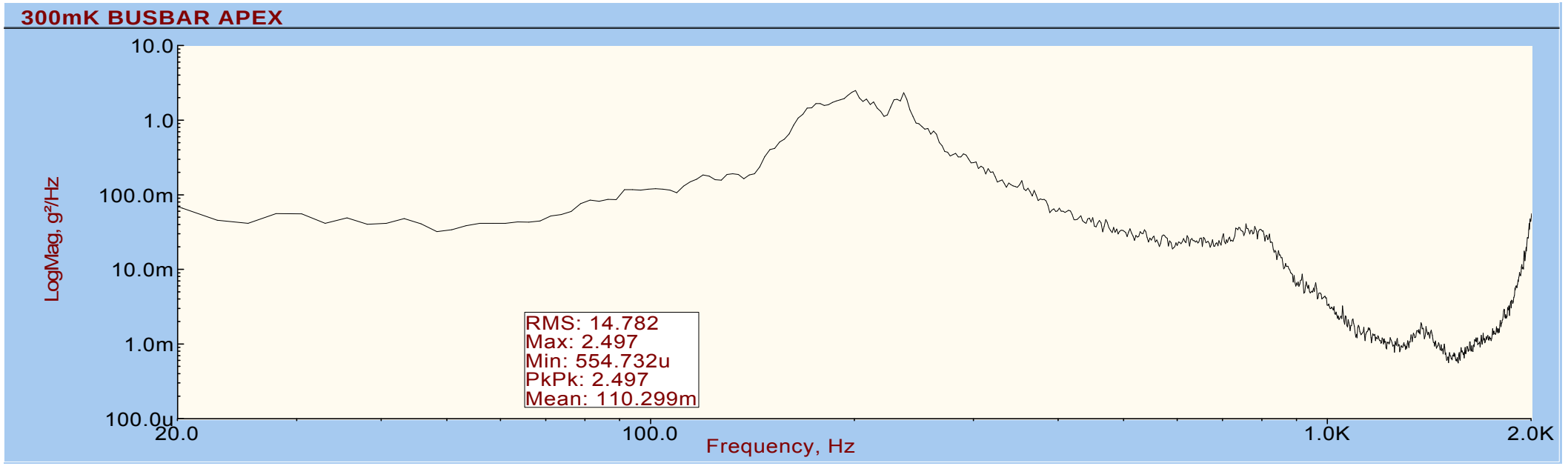




SPIRE CARDIFF COMPONENTS SINE SURVEY 7 Kelvin 5.8E-6mBAR
RUN 00003
N/A AXIS 11:37:40 24/03/2004

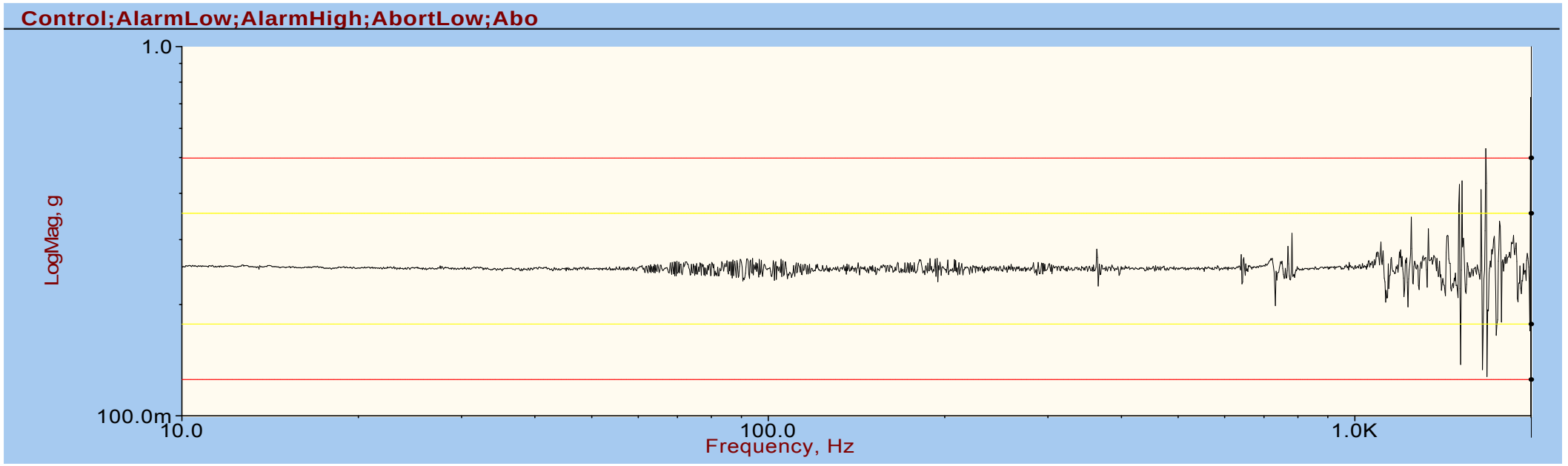
Fig 2

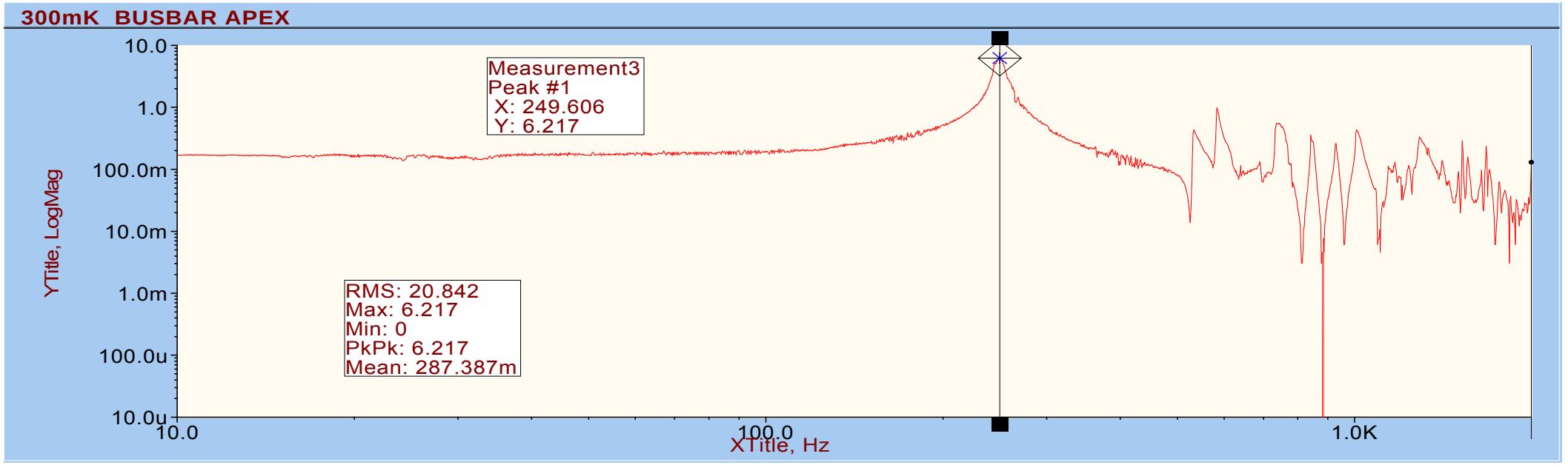




SPIRE CARDIFF COMPONENTS RANDOM 7 KELVIN @ 5.6e-6mBAR
RUN 00001
N/A AXIS 11:46:44 24/03/2004

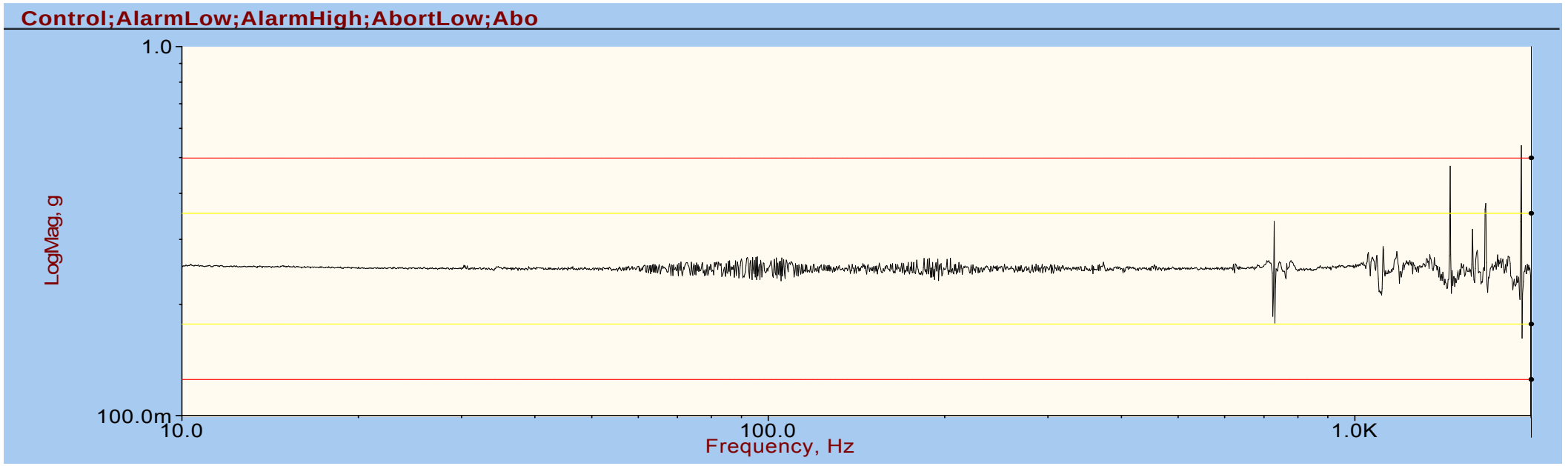
Fig 3

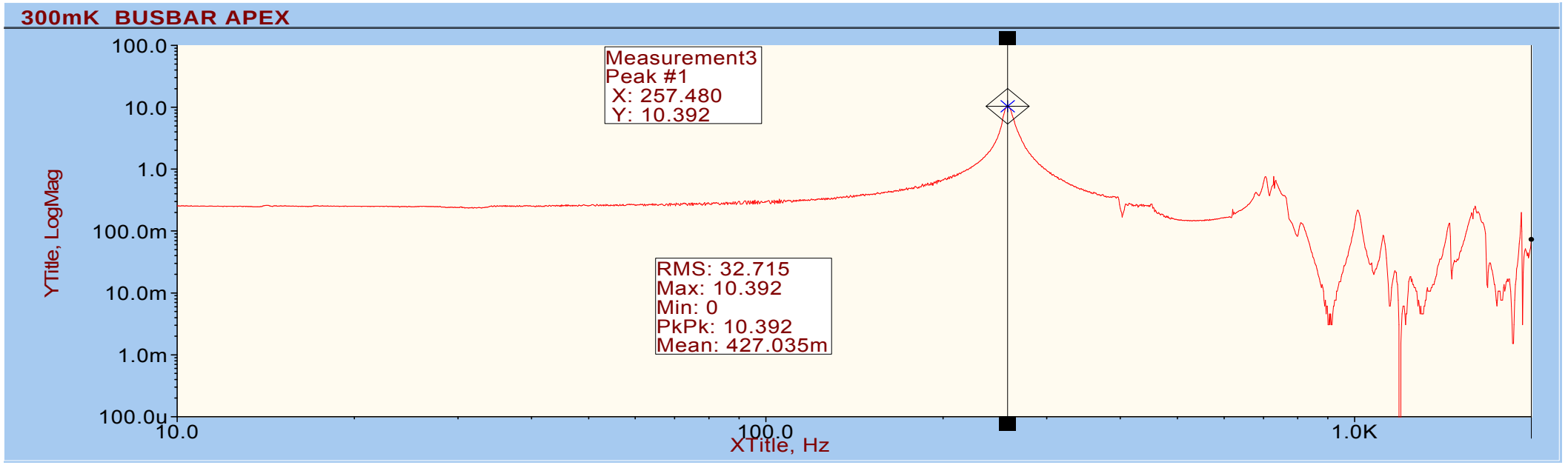




SPIRE CARDIFF COMPONENTS POST RANDOM SINE SURVEY 7 Kelvin 5.8E-6mBAR
RUN 00005
N/A AXIS 11:55:48 24/03/2004

Fig 4





SPIRE CARDIFF COMPONENTS POST RANDOM SINE SURVEY AMBIENT/ATMOSPHERE
RUN 00006
N/A AXIS 08:38:48 25/03/2004

Fig 5

BSM 300mK Components Cooldown/Warmup Data