

FCC PART 15, SUBPART B and C
TEST REPORT

for

THERMOSTAT RF MODULE

MODEL: S1-LXRFM

Prepared for

VENSTAR, INC.
9250 OWENSMOUTH AVE.
CHATSWORTH, CALIFORNIA 91311

Prepared by: 

ALEX BENITEZ

Approved by: 

KYLE FUJIMOTO

COMPATIBLE ELECTRONICS INC.
114 OLINDA DRIVE
BREA, CALIFORNIA 92823
(714) 579-0500

DATE: JULY 22, 2009

	REPORT BODY	APPENDICES					TOTAL
		A	B	C	D	E	
PAGES	17	2	2	2	13	28	64

This report shall not be reproduced except in full, without the written approval of Compatible Electronics.

TABLE OF CONTENTS

Section / Title	PAGE
GENERAL REPORT SUMMARY	4
SUMMARY OF TEST RESULTS	5
1. PURPOSE	6
1. PURPOSE	6
2. ADMINISTRATIVE DATA	7
2.1 Location of Testing	7
2.2 Traceability Statement	7
2.3 Cognizant Personnel	7
2.4 Date Test Sample was Received	7
2.5 Disposition of the Test Sample	7
2.6 Abbreviations and Acronyms	7
3. APPLICABLE DOCUMENTS	8
4. DESCRIPTION OF TEST CONFIGURATION	9
4.1 Description of Test Configuration - EMI	9
4.1.1 Cable Construction and Termination	10
5. LISTS OF EUT, ACCESSORIES AND TEST EQUIPMENT	11
5.1 EUT and Accessory List	11
5.2 EMI Test Equipment	12
6. TEST SITE DESCRIPTION	13
6.1 Test Facility Description	13
6.2 EUT Mounting, Bonding and Grounding	13
7. TEST PROCEDURES	14
7.1 RF Emissions	14
7.1.1 Conducted Emissions Test	14
7.1.2 Radiated Emissions (Spurious and Harmonics) Test	15
8. CONCLUSIONS	17

LIST OF APPENDICES

APPENDIX	TITLE
A	Laboratory Recognitions
B	Modifications to the EUT
C	Additional Models Covered Under This Report
D	Diagrams, Charts, and Photos • Test Setup Diagrams • Radiated and Conducted Emissions Photos • Antenna and Effective Gain Factors
E	Data Sheets

LIST OF FIGURES

FIGURE	TITLE
1	Conducted Emissions Test Setup
2	Plot Map And Layout of Test Site – 3 Meters

GENERAL REPORT SUMMARY

This electromagnetic emission test report is generated by Compatible Electronics Inc., which is an independent testing and consulting firm. The test report is based on testing performed by Compatible Electronics personnel according to the measurement procedures described in the test specifications given below and in the "Test Procedures" section of this report.

The measurement data and conclusions appearing herein relate only to the sample tested and this report may not be reproduced without the written permission of Compatible Electronics, unless done so in full.

This report must not be used to claim product endorsement by NVLAP or any other agency of the U.S. Government.

Device Tested: Thermostat RF Module
 Model: S1-LXRFM
 S/N: N/A

Product Description: See Expository Statement.

Modifications: The EUT was not modified in order to meet the specifications.

Manufacturer: Venstar, Inc.
 9250 Owensmouth Ave.
 Chatsworth, California 91311

Test Dates: July 3, 9, and 13, 2009

Test Specifications: EMI requirements
 CFR Title 47, Part 15, Subpart B; and Subpart C, sections 15.205, 15.209, and 15.249

Test Procedure: ANSI C63.4: 2003

Test Deviations: The test procedure was not deviated from during the testing.

SUMMARY OF TEST RESULTS

TEST	DESCRIPTION	RESULTS
1	Conducted RF Emissions, 150 kHz – 30 MHz	Complies with the Class B limits of CFR Title 47, Part 15, Subpart B; and CFR Title 47, Part 15, Subpart C, section 15.207 Highest reading in relation to spec limit: 53.32 dBuV @ 0.153 MHz (*Uc =0.49 dB)
2	Radiated RF Emissions 10 kHz – 9300 MHz (Transmitter Portion)	Complies with the limits of CFR Title 47, Part 15, Subpart C, sections 15.205, 15.209, and 15.249 Highest reading in relation to spec limit: 93.48 dBuV/m @ 920.4 MHz (*Uc =1.85 dB)
3	Radiated RF Emissions 10 kHz – 9300 MHz (Digital and Receiver Portion)	Complies with the Class B limits of CFR Title 47, Part 15, Subpart B.

1. PURPOSE

This document is a qualification test report based on the Electromagnetic Interference (EMI) tests performed on the Thermostat RF Module, Model: S1-LXRFM. The EMI measurements were performed according to the measurement procedure described in ANSI C63.4: 2003. The tests were performed in order to determine whether the electromagnetic emissions from the equipment under test, referred to as EUT hereafter, are within the Class B specification limits defined by CFR Title 47, Part 15, Subpart B; and Subpart C, sections 15.205, 15.207, 15.209, and 15.249.

Note: For the unintentional radiator portion of the test, the EUT was within the **Class B** specification limits defined by CFR Title 47, Part 15, Subpart B.

2. ADMINISTRATIVE DATA

2.1 Location of Testing

The EMI tests described herein were performed at the test facility of Compatible Electronics, 114 Olinda Drive, Brea, California 92823.

2.2 Traceability Statement

The calibration certificates of all test equipment used during the test are on file at the location of the test. The calibration is traceable to the National Institute of Standards and Technology (NIST).

2.3 Cognizant Personnel

Venstar, Inc.

Corey McTigue Engineering Manager

Compatible Electronics Inc.

Alex Benitez Test Technician

Kyle Fujimoto Test Engineer

2.4 Date Test Sample was Received

The test sample was received prior to the date of testing.

2.5 Disposition of the Test Sample

The test sample has not yet been returned as of the date of this report.

2.6 Abbreviations and Acronyms

The following abbreviations and acronyms may be used in this document.

RF	Radio Frequency
EMI	Electromagnetic Interference
EUT	Equipment Under Test
P/N	Part Number
S/N	Serial Number
HP	Hewlett Packard
ITE	Information Technology Equipment
CML	Corrected Meter Limit
LISN	Line Impedance Stabilization Network
N/A	Not Applicable

3. APPLICABLE DOCUMENTS

The following documents are referenced or used in the preparation of this EMI Test Report.

SPEC	TITLE
FCC Title 47, Part 15 Subpart C	FCC Rules - Radio frequency devices (including digital devices) – Intentional Radiators
ANSI C63.4 2003	Methods of measurement of radio-noise emissions from low-voltage electrical and electronic equipment in the range of 9 kHz to 40 GHz
FCC Title 47, Part 15 Subpart B	FCC Rules - Radio frequency devices (including digital devices) – Unintentional Radiators

4. DESCRIPTION OF TEST CONFIGURATION

4.1 Description of Test Configuration - EMI

The Thermostat RF Module, Model: S1-LXRFM (EUT) was connected to an AC Adapter and tested in two axis. During the test, the EUT was continuously sending to and receiving a signal to a Wireless Temp Sensor.

It was determined that the emissions were at their highest level when the EUT was operating in the above configuration. The final emissions data was taken in this mode of operation and any cables were maximized. All initial investigations were performed with the measurement receiver in manual mode scanning the frequency range continuously. Photographs of the test setup are in Appendix D of this report.

4.1.1 Cable Construction and Termination

Cable 1 This is a 1.5-meter unshielded cable connecting the AC adapter to the EUT. The cable is hard wired at both ends.



5. LISTS OF EUT, ACCESSORIES AND TEST EQUIPMENT**5.1 EUT and Accessory List**

EQUIPMENT	MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	FCC ID
THERMOSTAT RF MODULE (EUT)	VENSTAR, INC.	S1-LXRFM	N/A	MUH-RFM
AC ADAPTER	N/A	P/N: 412-224034	N/A	N/A
WIRELESS TEMP SENSOR	VENSTAR, INC.	S1-LXRFTS	N/A	MUH-RFTS

5.2 EMI Test Equipment

EQUIPMENT TYPE	MANU-FACTURER	MODEL NUMBER	SERIAL NUMBER	CALIBRATION DATE	CALIBRATION DUE DATE
GENERAL TEST EQUIPMENT USED FOR ALL RF EMISSIONS TESTS					
Computer	Hewlett Packard	4530	US91912319	N/A	N/A
Spectrum Analyzer – Main Section	Hewlett Packard	8566B	3638A08768	August 22, 2008	Aug. 22, 2009
Spectrum Analyzer – Display Section	Hewlett Packard	85662A	3701A22262	August 22, 2008	Aug. 22, 2009
Quasi-Peak Adapter	Hewlett Packard	85650A	2811A01363	August 22, 2008	Aug. 22, 2009
EMI Receiver	Rohde & Schwarz	ESIB40	100194	September 17, 2008	Sept. 17, 2010
Monitor	Hewlett Packard	D5258A	TW74500641	N/A	N/A
RF RADIATED EMISSIONS TEST EQUIPMENT					
Biconical Antenna	Com Power	AB-900	15250	February 23, 2009	Feb. 23, 2010
Log Periodic Antenna	Com Power	AL-100	16060	June 15, 2009	June 15, 2010
Preamplifier	Com-Power	PA-102	1017	January 12, 2009	Jan. 12, 2010
Loop Antenna	Com-Power	AL-130	17089	September 29, 2008	Sept. 29, 2009
Horn Antenna	Com-Power	AH-118	071175	June 27, 2008	June 27, 2010
Microwave Preamplifier	Com Power	PA-122	181921	March 12, 2009	March 12, 2010
Antenna Mast	Com Power	AM-100	N/A	N/A	N/A
RF CONDUCTED EMISSIONS TEST EQUIPMENT					
Emissions Program	Compatible Electronics	2.3 (SR19)	N/A	N/A	N/A
LISN	Com Power	LI-215	12078	September 29, 2008	Sept. 29, 2009
LISN	Com Power	LI-215	12082	September 29, 2008	Sept. 29, 2009
Transient Limiter	Com Power	252A910	1	September 26, 2008	Sept. 26, 2009

6. TEST SITE DESCRIPTION

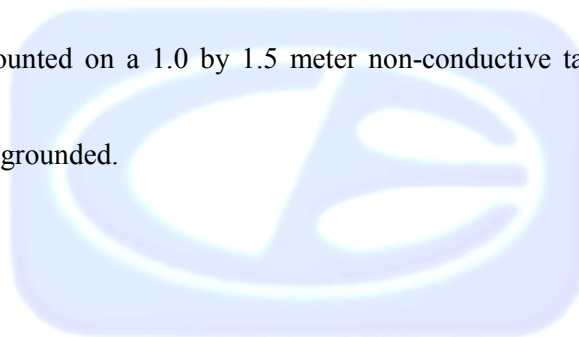
6.1 Test Facility Description

Please refer to section 2.1 and 7.1 of this report for EMI test location.

6.2 EUT Mounting, Bonding and Grounding

The EUT was mounted on a 1.0 by 1.5 meter non-conductive table 0.8 meters above the ground plane.

The EUT was not grounded.



7. TEST PROCEDURES

The following sections describe the test methods and the specifications for the tests. Test results are also included in this section.

7.1 RF Emissions

7.1.1 Conducted Emissions Test

The spectrum analyzer was used as a measuring meter. The data was collected with the spectrum analyzer in the peak detect mode with the "Max Hold" feature activated. The quasi-peak was used only where indicated in the data sheets. A transient limiter was used for the protection of the spectrum analyzer input stage, and the offset was adjusted accordingly to read the actual data measured. The LISN output was measured using the spectrum analyzer. The output of the second LISN was terminated by a 50 ohm termination. The effective measurement bandwidth used for this test was 9 kHz.

Please see section 6.2 of this report for mounting, bonding and grounding of the EUT. The EUT was powered through the LISN, which was bonded to the ground plane. The LISN power was filtered and the filter was bonded to the ground plane. The EUT was set up with the minimum distances from any conductive surfaces as specified in ANSI C63.4: 2003. The excess power cord was wrapped in a figure eight pattern to form a bundle not exceeding 0.4 meters in length.

The conducted emissions from the EUT were maximized for operating mode as well as cable placement. The final data was collected under program control by the Compatible Electronics conducted emissions software in several overlapping sweeps by running the spectrum analyzer at a minimum scan rate of 10 seconds per octave. The final qualification data is located in Appendix E.

Test Results:

Complies with the **Class B** limits of CFR Title 47, Part 15, Subpart B; and CFR Title 47, Part 15, Subpart C, section 15.207.

7.1.2 Radiated Emissions (Spurious and Harmonics) Test

The spectrum analyzer and EMI Receiver were used as a measuring meter along with the quasi-peak adapter. Amplifiers were used to increase the sensitivity of the instrument. The Com Power Preamplifier Model: PA-102 was used for frequencies from 30 MHz to 1 GHz and the Com Power Microwave Preamplifier Model: PA-122 was used for frequencies above 1 GHz. The spectrum analyzer and EMI Receiver were used in the peak detect mode with the "Max Hold" feature activated. In this mode, the spectrum analyzer records the highest measured reading over all the sweeps.

The quasi-peak adapter was used only for those readings which are marked accordingly on the data sheets.

The frequencies above 1 GHz were averaged manually by narrowing the video filter down to 10 Hz and putting the sweep time on AUTO on the EMI Receiver to keep the amplitude reading calibrated.

The measurement bandwidths and transducers used for the radiated emissions test were:

FREQUENCY RANGE	EFFECTIVE MEASUREMENT BANDWIDTH	TRANSDUCER
10 kHz to 150 kHz	200 Hz	Active Loop Antenna
150 kHz to 30 MHz	9 kHz	Active Loop Antenna
30 MHz to 300 MHz	120 kHz	Biconical Antenna
300 MHz to 1 GHz	120 kHz	Log Periodic Antenna
1 GHz to 9.3 GHz	1 MHz	Horn Antenna

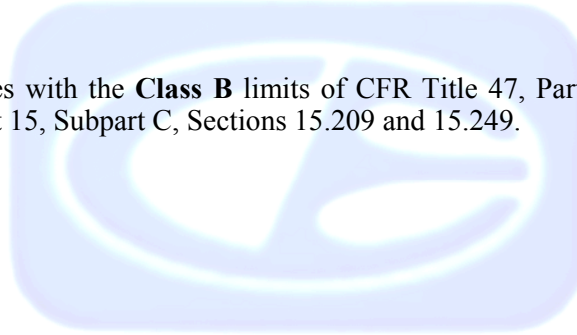
The open field test site of Compatible Electronics, Inc. was used for radiated emission testing. This test site is set up according to ANSI C63.4: 2003. Please see section 6.2 of this report for mounting, bonding and grounding of the EUT. The turntable supporting the EUT is remote controlled using a motor. The turntable permits EUT rotation of 360 degrees in order to maximize emissions. Also, the antenna mast allows height variation of the antenna from 1 meter to 4 meters. Data was collected in the worst case (highest emission) configuration of the EUT by the Radiated Emission Manual Test software. At each reading, the EUT was rotated 360 degrees and the antenna height was varied from 1 to 4 meters (for E field radiated field strength). The gunsight method was used when measuring with the horn antenna in order to ensure accurate results. The loop antenna was also rotated in the horizontal and vertical axis in order to ensure accurate results.

Radiated Emissions (Spurious and Harmonics) Test (con't)

The presence of ambient signals was verified by turning the EUT off. In case an ambient signal was detected, the measurement bandwidth was reduced temporarily and verification was made that an additional adjacent peak did not exist. This ensures that the ambient signal does not hide any emissions from the EUT. The EUT was tested at a 10 meter test distance from 10 kHz to 30 MHz, and at a 3 meter test distance from 30 MHz to 9.3 GHz to obtain the final test data.

Test Results:

The EUT complies with the **Class B** limits of CFR Title 47, Part 15, Subpart B; and the limits of CFR Title 47, Part 15, Subpart C, Sections 15.209 and 15.249.



8. CONCLUSIONS

The Thermostat RF Module Model: S1-LXRFM meets all of the specification limits defined in FCC Title 47, Part 15, Subpart C, sections 15.205, 15.209, and 15.249.

Note: For the unintentional radiator and receiver portion of the test, the EUT was within the **Class B** specification limits defined by CFR Title 47, Part 15, Subpart B.



APPENDIX A

LABORATORY RECOGNITIONS

LABORATORY RECOGNITIONS

Compatible Electronics has the following agency accreditations:

National Voluntary Laboratory Accreditation Program - Lab Code: 200528-0

Voluntary Control Council for Interference - Registration Numbers: R-983, C-1026, R-984 and C-1027

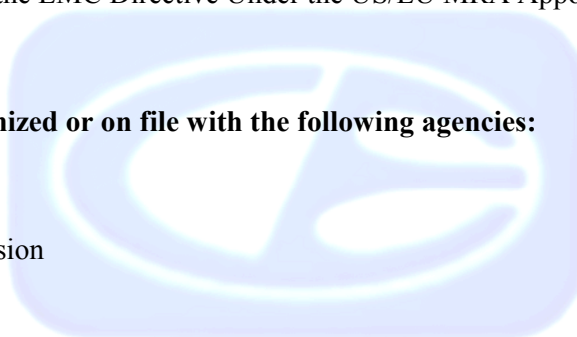
Bureau of Standards and Metrology Inspection - Reference Number: SL2-IN-E-1031

Conformity Assessment Body for the EMC Directive Under the US/EU MRA Appointed by NIST

Compatible Electronics is recognized or on file with the following agencies:

Federal Communications Commission

Industry Canada



APPENDIX B

MODIFICATIONS TO THE EUT

MODIFICATIONS TO THE EUT

The modifications listed below were made to the EUT to pass FCC Subpart B and FCC 15.249 specifications.

All the rework described below was implemented during the test in a method that could be reproduced in all the units by the manufacturer.

There were no modifications made to the EUT.



APPENDIX C

***ADDITIONAL MODELS COVERED
UNDER THIS REPORT***

ADDITIONAL MODELS COVERED UNDER THIS REPORT

USED FOR THE PRIMARY TEST

Thermostat RF Module
Model: S1-LXRFM
S/N: N/A

ALSO APPROVED UNDER THIS REPORT:

There were no additional models covered under this report.



APPENDIX D***DIAGRAMS, CHARTS, AND PHOTOS***

FIGURE 1: CONDUCTED EMISSIONS TEST SETUP

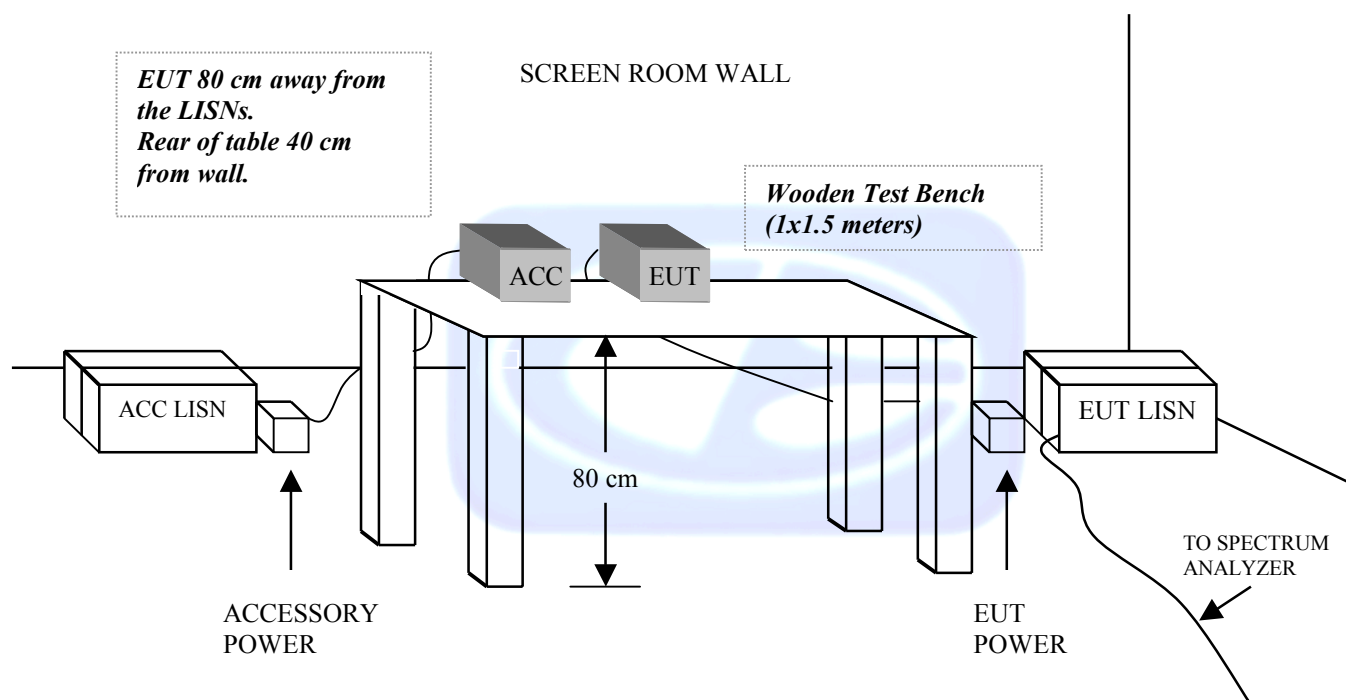
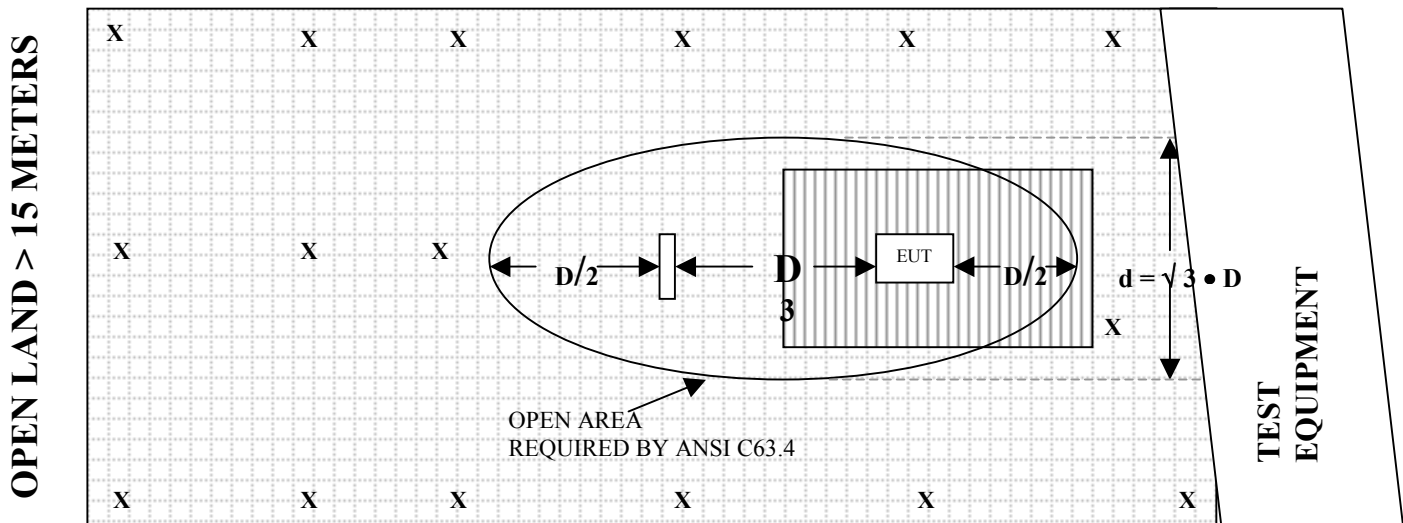


FIGURE 2: PLOT MAP AND LAYOUT OF RADIATED SITE – 3 METERS

OPEN LAND > 15 METERS



OPEN LAND > 15 METERS

X	= GROUND RODS		= GROUND SCREEN
D	= TEST DISTANCE (meters)		= WOOD COVER

COM-POWER AB-900**BICONICAL ANTENNA****S/N: 15250****CALIBRATION DATE: FEBRUARY 23, 2009**

FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
30	13.0	100	11.1
35	11.1	120	13.6
40	10.2	140	12.4
45	11.2	160	12.9
50	11.6	180	16.5
60	9.1	200	17.0
70	8.4	250	16.3
80	6.2	275	18.2
90	8.5	300	17.9

COM-POWER AL-100

LOG PERIODIC ANTENNA

S/N: 16060

CALIBRATION DATE: JUNE 15, 2009

FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
300	14.2	700	20.1
400	15.9	800	21.2
500	17.1	900	21.3
600	18.8	1000	22.3

COM POWER AH-118**HORN ANTENNA****S/N: 071175****CALIBRATION DATE: JUNE 27, 2008**

FREQUENCY (GHz)	FACTOR (dB)	FREQUENCY (GHz)	FACTOR (dB)
1.0	24.5	10.0	39.4
1.5	25.4	10.5	39.7
2.0	28.3	11.0	39.0
2.5	28.9	11.5	40.0
3.0	29.7	12.0	39.7
3.5	30.8	12.5	41.7
4.0	31.4	13.0	42.7
4.5	32.6	13.5	41.2
5.0	33.7	14.0	41.6
5.5	34.4	14.5	43.2
6.0	34.7	15.0	42.3
6.5	35.4	15.5	39.3
7.0	37.0	16.0	41.7
7.5	37.4	16.5	39.6
8.0	37.6	17.0	43.0
8.5	37.6	17.5	47.1
9.0	38.5	18.0	46.2
9.5	38.6		

COM-POWER PA-102**PREAMPLIFIER**

S/N: 1017

CALIBRATION DATE: JANUARY 12, 2009

FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
30	39.0	300	38.8
40	39.0	350	38.8
50	38.8	400	38.7
60	38.7	450	38.6
70	38.8	500	38.3
80	38.8	550	38.9
90	39.1	600	38.4
100	39.1	650	38.8
125	38.9	700	38.4
150	38.9	750	38.5
175	38.9	800	38.3
200	38.8	850	38.4
225	39.0	900	38.1
250	38.9	950	37.4
275	38.8	1000	38.1

COM-POWER PA-122**PREAMPLIFIER****S/N: 181921****CALIBRATION DATE: MARCH 12, 2009**

FREQUENCY (GHz)	FACTOR (dB)	FREQUENCY (GHz)	FACTOR (dB)
1.0	36.46	10.0	35.06
1.5	35.36	10.5	34.82
2.0	34.76	11.0	33.12
2.5	34.94	11.5	34.33
3.0	34.59	12.0	34.75
3.5	34.55	12.5	33.94
4.0	34.25	13.0	35.50
4.5	33.89	13.5	34.89
5.0	34.22	14.0	36.56
5.5	34.81	14.5	36.06
6.0	35.74	15.0	36.67
6.5	36.51	15.5	36.84
7.0	36.66	16.0	34.31
7.5	35.72	16.5	35.11
8.0	33.28	17.0	35.35
8.5	33.11	17.5	34.11
9.0	34.71	18.0	33.88
9.5	35.50	18.5	32.20

COM-POWER AL-130**LOOP ANTENNA**

S/N: 17089

CALIBRATION DATE: SEPTEMBER 29, 2008

FREQUENCY (MHz)	MAGNETIC (dB/m)	ELECTRIC (dB/m)
0.009	-41.57	9.93
0.01	-42.06	9.44
0.02	-42.43	9.07
0.05	-42.50	9.00
0.07	-42.10	9.40
0.1	-42.03	9.47
0.2	-44.50	7.00
0.3	-41.93	9.57
0.5	-41.90	9.60
0.7	-41.73	9.77
1	-41.23	10.27
2	-40.90	10.60
3	-41.20	10.30
4	-41.30	10.20
5	-40.70	10.80
10	-41.10	10.40
15	-42.17	9.33
20	-42.00	9.50
25	-42.20	9.30
30	-43.10	8.40



FRONT VIEW

VENSTAR, INC.
THERMOSTAT RF MODULE
MODEL: S1-LXRFM
FCC SUBPART B AND C – RADIATED EMISSIONS

**PHOTOGRAPH SHOWING THE EUT CONFIGURATION
FOR MAXIMUM EMISSIONS**

Brea Division
114 Olinda Drive
Brea, CA 92823
(714) 579-0500

Agoura Division
2337 Troutdale Drive
Agoura, CA 91301
(818) 597-0600

Silverado Division
19121 El Toro Road
Silverado, CA 92676
(949) 589-0700

Lake Forest Division
20621 Pascal Way
Lake Forest, CA 92630
(949) 587-0400



REAR VIEW

VENSTAR, INC.
THERMOSTAT RF MODULE
MODEL: S1-LXRFM
FCC SUBPART B AND C – RADIATED EMISSIONS

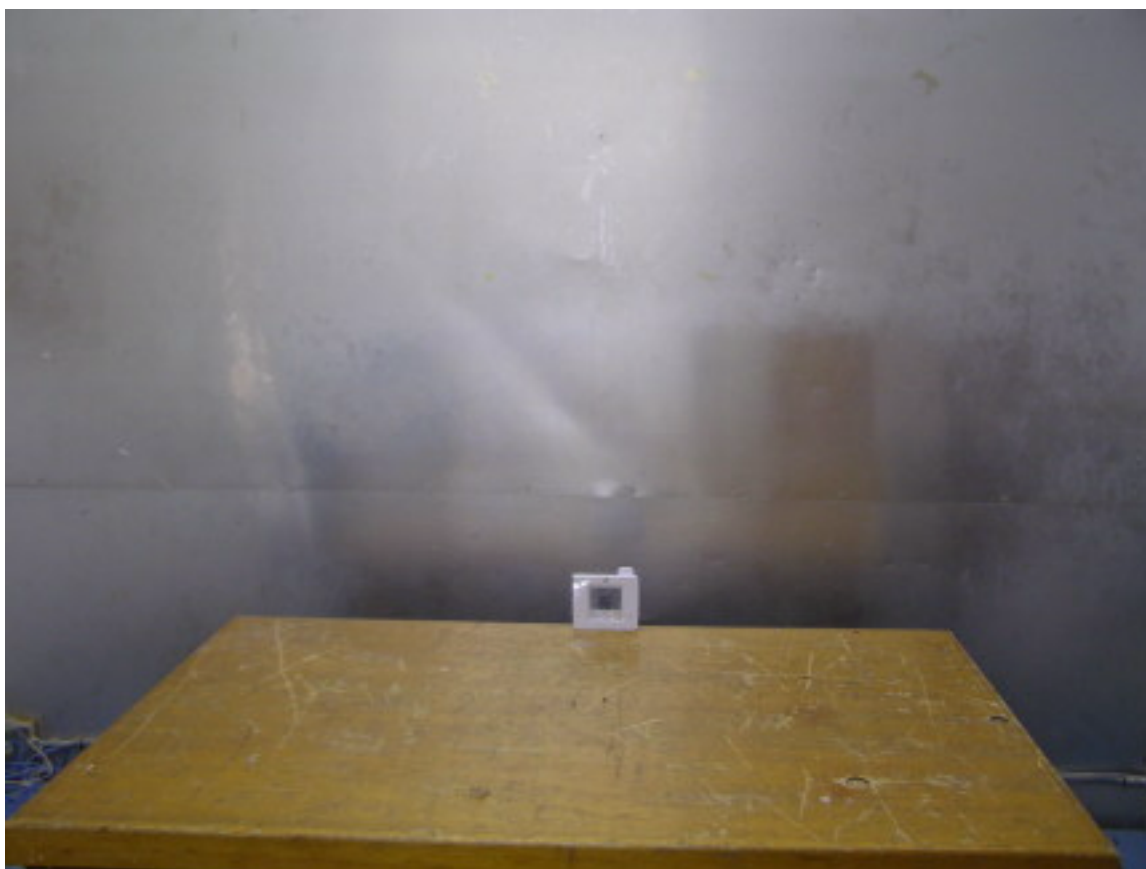
**PHOTOGRAPH SHOWING THE EUT CONFIGURATION
FOR MAXIMUM EMISSIONS**

Brea Division
114 Olinda Drive
Brea, CA 92823
(714) 579-0500

Agoura Division
2337 Troutdale Drive
Agoura, CA 91301
(818) 597-0600

Silverado Division
19121 El Toro Road
Silverado, CA 92676
(949) 589-0700

Lake Forest Division
20621 Pascal Way
Lake Forest, CA 92630
(949) 587-0400



FRONT VIEW

VENSTAR, INC.
THERMOSTAT RF MODULE
MODEL: S1-LXRFM
FCC SUBPART B AND C – CONDUCTED EMISSIONS

**PHOTOGRAPH SHOWING THE EUT CONFIGURATION
FOR MAXIMUM EMISSIONS**

Brea Division
114 Olinda Drive
Brea, CA 92823
(714) 579-0500

Agoura Division
2337 Troutdale Drive
Agoura, CA 91301
(818) 597-0600

Silverado Division
19121 El Toro Road
Silverado, CA 92676
(949) 589-0700

Lake Forest Division
20621 Pascal Way
Lake Forest, CA 92630
(949) 587-0400



REAR VIEW

VENSTAR, INC.
THERMOSTAT RF MODULE
MODEL: S1-LXRFM
FCC SUBPART B AND C – CONDUCTED EMISSIONS

**PHOTOGRAPH SHOWING THE EUT CONFIGURATION
FOR MAXIMUM EMISSIONS**

Brea Division
114 Olinda Drive
Brea, CA 92823
(714) 579-0500

Agoura Division
2337 Troutdale Drive
Agoura, CA 91301
(818) 597-0600

Silverado Division
19121 El Toro Road
Silverado, CA 92676
(949) 589-0700

Lake Forest Division
20621 Pascal Way
Lake Forest, CA 92630
(949) 587-0400

APPENDIX E

DATA SHEETS

Venstar, Inc.
Thermostat RF Module
Model: S1-LXRFM

Date: 07/09/09
Lab: B
Tested By: Kyle Fujimoto

X-Axis - Low Channel

[illegible]

FCC 15.249

Venstar, Inc.
Thermostat RF Module
Model: S1-LXRFM

Date: 07/09/09
Lab: B
Tested By: Kyle Fujimoto

X-Axis - Low Channel

Freq. (MHz)	Level (dBuV)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
909.4	97.87	H	94	3.87	Peak	1	90	
909.4	93.25	H	94	-0.75	QP	1	90	
1818.8	46.58	H	54	-7.42	Peak	1.35	150	
2728.2	45.61	H	54	-8.39	Peak	1.52	180	
3637.6	47.19	H	54	-6.81	Peak	1.35	150	
4547	49.03	H	54	-4.97	Peak	1.58	150	
5456.4								No Emission Detected
6365.8								No Emission Detected
7275.2								No Emission Detected
8184.6								No Emission Detected
9094								No Emission Detected

FCC 15.249

Venstar, Inc.

Thermostat RF Module

Model: S1-LXRFM

Date: 07/09/09

Lab: B

Tested By: Kyle Fujimoto

Y-Axis - Low Channel

Freq. (MHz)	Level (dBuV)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
909.4	96.69	V	94	2.69	Peak	1.25	135	
909.4	93.27	V	94	-0.73	QP	1.25	135	
1818.8	52.71	V	74	-21.29	Peak	1.35	150	
1818.8	50.25	V	54	-3.75	Avg	1.35	150	
2728.2	46.91	V	54	-7.09	Peak	1.25	150	
3637.6	47.81	V	54	-6.19	Peak	1.35	185	
4547	50.02	V	54	-3.98	Peak	1.58	150	
5456.4								No Emission Detected
6365.8								No Emission Detected
7275.2								No Emission Detected
8184.6								No Emission Detected
9094								No Emission Detected

FCC 15.249

Venstar, Inc.
Thermostat RF Module
Model: S1-LXRFM

Date: 07/09/09
Lab: B
Tested By: Kyle Fujimoto

Y-Axis - Low Channel

Freq. (MHz)	Level (dBuV)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
909.4	94.29	H	94	0.29	Peak	1.25	135	
909.4	91.12	H	94	-2.88	QP	1.25	135	
1818.8	47.31	H	54	-6.69	Peak	1.35	150	
2728.2	45.21	H	54	-8.79	Peak	1.58	175	
3637.6	47.41	H	54	-6.59	Peak	1.85	190	
4547	49.65	H	54	-4.35	Peak	1.35	150	
5456.4								No Emission Detected
6365.8								No Emission Detected
7275.2								No Emission Detected
8184.6								No Emission Detected
9094								No Emission Detected

Venstar, Inc.
Thermostat RF Module
Model: S1-LXRFM

Date: 07/09/09
Labs: B and D
Tested By: Kyle Fujimoto

Receive Mode - Low Channel

[illegible]

Venstar, Inc.
Thermostat RF Module
Model: S1-LXRFM

Date: 07/09/09
Lab: B
Tested By: Kyle Fujimoto

Non Harmonic Emissions from the Tx and Digital Portion 1 GHz to 9.3 GHz

[illegible]

Venstar, Inc.
Thermostat RF Module
Model: S1-LXRFM

Date: 07/09/09
Lab: B
Tested By: Kyle Fujimoto

X-Axis - Middle Channel

[illegible]

FCC 15.249

Venstar, Inc.

Thermostat RF Module

Model: S1-LXRFM

Date: 07/09/09

Lab: B

Tested By: Kyle Fujimoto

X-Axis - Middle Channel

Freq. (MHz)	Level (dBuV)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
914.2	95.24	H	94	1.24	Peak	1.15	150	
914.2	92.66	H	94	-1.34	QP	1.15	150	
1828.4	50.05	H	54	-3.95	Peak	1.05	90	
2742.6	46.91	H	54	-7.09	Peak	1.25	135	
3656.8	48.07	H	54	-5.93	Peak	1.58	150	
4571	48.81	H	54	-5.19	Peak	1.35	125	
5485.2								No Emission Detected
6399.4								No Emission Detected
7313.6								No Emission Detected
8227.8								No Emission Detected
9142								No Emission Detected

FCC 15.249

Venstar, Inc.

Thermostat RF Module

Model: S1-LXRFM

Date: 07/09/09

Lab: B

Tested By: Kyle Fujimoto

Y-Axis - Middle Channel

Freq. (MHz)	Level (dBuV)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
914.2	96.34	V	94	2.34	Peak	1.15	180	
914.2	92.45	V	94	-1.55	QP	1.35	180	
1828.4	50.67	V	54	-3.33	Peak	1.35	225	
1828.4	46.79	V	54	-7.21	Avg	1.35	225	
2742.6	49.25	V	54	-4.75	Peak	1.58	305	
3656.8	46.79	V	54	-7.21	Peak	1.35	315	
4571	49.98	V	54	-4.02	Peak	1.25	150	
5485.2								No Emission Detected
6399.4								No Emission Detected
7313.6								No Emission Detected
8227.8								No Emission Detected
9142								No Emission Detected

FCC 15.249

Venstar, Inc.
Thermostat RF Module
Model: S1-LXRFM

Date: 07/09/09
Lab: B
Tested By: Kyle Fujimoto

Y-Axis - Middle Channel

Freq. (MHz)	Level (dBuV)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
914.2	95.24	H	94	1.24	Peak	1.35	180	
914.2	92.66	H	94	-1.34	QP	1.35	180	
1828.4	46.94	H	54	-7.06	Peak	1.35	225	
2742.6	45.03	H	54	-8.97	Peak	1.25	150	
3656.8	46.75	H	54	-7.25	Peak	1.35	175	
4571	50.25	H	54	-3.75	Peak	1.58	150	
5485.2								No Emission Detected
6399.4								No Emission Detected
7313.6								No Emission Detected
8227.8								No Emission Detected
9142								No Emission Detected

Venstar, Inc.
Thermostat RF Module
Model: S1-LXRFM

Date: 07/09/09
Labs: B and D
Tested By: Kyle Fujimoto

Receive Mode - Middle Channel

[illegible]

Venstar, Inc.
Thermostat RF Module
Model: S1-LXRFM

Date: 07/09/09
Lab: B
Tested By: Kyle Fujimoto

Non Harmonic Emissions from the Tx and Digital Portion 1 GHz to 9.3 GHz

[illegible]

FCC 15.249

Venstar, Inc.
Wireless Temperature Sensor
Model: S1-LXRFM

Date: 07/09/09
Lab: B
Tested By: Kyle Fujimoto

X-Axis - High Channel

Freq. (MHz)	Level (dBuV)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
920.4	94.33	H	94	0.33	Peak	1	90	
920.4	91.37	H	94	-2.63	QP	1	90	
1840.8	48.59	H	54	-5.41	Peak	1.35	150	
2761.2	47.43	H	54	-6.57	Peak	1.25	175	
3681.6	47.38	H	54	-6.62	Peak	1.35	150	
4602	50.71	H	54	-3.29	Peak	1.51	165	
5522.4								No Emission Detected
6442.8								No Emission Detected
7363.2								No Emission Detected
8283.6								No Emission Detected
9204								No Emission Detected

FCC 15.249

Venstar, Inc.

Wireless Temperature Sensor

Model: S1-LXRFM

Date: 07/09/09

Lab: B

Tested By: Kyle Fujimoto

X-Axis - High Channel

Freq. (MHz)	Level (dBuV)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
920.4	93.23	V	94	-0.77	Peak	1.25	135	
920.4	88.29	V	94	-5.71	QP	1.25	135	
1840.8	45.35	V	54	-8.65	Peak	1.35	150	
2761.2	44.67	V	54	-9.33	Peak	1.58	175	
3681.6	47.71	V	54	-6.29	Peak	1.85	135	
4602	48.96	V	54	-5.04	Peak	1.35	150	
5522.4								No Emission Detected
6442.8								No Emission Detected
7363.2								No Emission Detected
8283.6								No Emission Detected
9204								No Emission Detected

FCC 15.249

Venstar, Inc.

Wireless Temperature Sensor

Model: S1-LXRFM

Date: 07/09/09

Lab: B

Tested By: Kyle Fujimoto

Y-Axis - High Channel

Freq. (MHz)	Level (dBuV)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
920.4	96.58	V	94	2.58	Peak	1.25	45	
920.4	93.31	V	94	-0.69	QP	1.25	45	
1840.8	49.71	V	54	-4.29	Peak	1.35	150	
1840.8	46.72	V	54	-7.28	Avg	1.35	150	
2761.2	48.74	V	54	-5.26	Peak	1.85	165	
3681.6	48.11	V	54	-5.89	Peak	1.35	150	
4602	50.01	V	54	-3.99	Peak	1.85	175	
5522.4								No Emission Detected
6442.8								No Emission Detected
7363.2								No Emission Detected
8283.6								No Emission Detected
9204								No Emission Detected

FCC 15.249

Venstar, Inc.

Wireless Temperature Sensor

Model: S1-LXRFM

Date: 07/09/09

Lab: B

Tested By: Kyle Fujimoto

Y-Axis - High Channel

Freq. (MHz)	Level (dBuV)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
920.4	96.33	H	94	2.33	Peak	1	90	
920.4	93.48	H	94	-0.52	QP	1	90	
1840.8	47.08	H	54	-6.92	Peak	1.35	150	
2761.2	47.09	H	54	-6.91	Peak	1.52	175	
3681.6	48.26	H	54	-5.74	Peak	1.35	150	
4602	47.86	H	54	-6.14	Peak	1.25	150	
5522.4								No Emission Detected
6442.8								No Emission Detected
7363.2								No Emission Detected
8283.6								No Emission Detected
9204								No Emission Detected

Venstar, Inc.
Wireless Temperature Sensor
Model: S1-LXRFM

Date: 07/09/09
Labs: B and D
Tested By: Kyle Fujimoto

High Channel Receive Mode

[illegible]

Test Location	: Compatible Electronics	Page	: 1/1
Customer	: Venstar, Inc.	Date	: 7/09/2009
Manufacturer	: Venstar, Inc.	Time	: 8:50:50
Eut name	: Thermostat RF Module	Lab	: D
Model	: S1-LXRFM	Test Distance	: 3.0 Meters
Serial #	: N/A		
Specification	: FCC Class B		
Distance correction factor (20 * log(test/spec))			: 0.00
Test Mode	: Tested By: Kyle Fujimoto Horizontal and Vertical Polarization 30 MHz - 1000 MHz Range Transmitter Mode		

Pol	Freq MHz	Rdng dBuV	Cable loss dB	Ant factor dB	Amp gain dB	Cor'd rdg = R dBuV	Limit = L dBuV/m	Delta R-L dB
1H	155.013	37.40	1.32	12.78	38.90	12.60	43.50	-30.90
2H	300.108	41.40	1.90	14.20	38.80	18.70	46.00	-27.30
3V	829.375	49.50	3.78	21.23	38.36	36.15	46.00	-9.85
4H	850.419	47.20	3.90	21.25	38.40	33.95	46.00	-12.05
5V	850.439	44.90	3.90	21.25	38.40	31.65	46.00	-14.35
6V	859.534	50.10	3.88	21.26	38.34	36.90	46.00	-9.10
7V	904.163	47.60	3.83	21.34	38.04	34.73	46.00	-11.27
8V	924.163	50.80	3.95	21.55	37.76	38.54	46.00	-7.46
9V	929.387	51.70	3.98	21.60	37.68	39.60	46.00	-6.40
10H	929.392	49.40	3.98	21.61	37.68	37.30	46.00	-8.70
11V	929.535	52.10	3.98	21.61	37.68	40.00	46.00	-6.00
12H	934.185	50.80	4.01	21.65	37.62	38.84	46.00	-7.16
13V	934.315	55.00	4.01	21.66	37.62	43.05	46.00	-2.95
14V	934.315Qp	52.94	4.01	21.66	37.62	40.99	46.00	-5.01
15H	939.366	45.70	4.04	21.71	37.55	33.90	46.00	-12.10
16H	940.416	51.70	4.04	21.72	37.53	39.93	46.00	-6.07
17V	940.563	54.70	4.04	21.72	37.53	42.93	46.00	-3.07
18V	944.157	49.90	4.07	21.75	37.48	38.24	46.00	-7.76
19H	944.165	46.10	4.07	21.75	37.48	34.44	46.00	-11.56
20H	950.392	46.30	4.10	21.82	37.41	34.81	46.00	-11.19
21H	959.387	47.50	4.18	21.91	37.53	36.05	46.00	-9.95
22V	959.534	49.70	4.18	21.91	37.54	38.25	46.00	-7.75
23V	964.143	49.20	4.22	21.95	37.60	37.77	54.00	-16.23
24H	964.332	47.50	4.22	21.96	37.60	36.07	54.00	-17.93
25V	969.359	48.80	4.26	22.00	37.68	37.39	54.00	-16.61
26H	969.387	47.00	4.26	22.00	37.68	35.59	54.00	-18.41
27H	970.562	47.00	4.27	22.02	37.69	35.59	54.00	-18.41
28V	970.573	49.80	4.27	22.02	37.69	38.39	54.00	-15.61
29H	974.163	46.50	4.30	22.05	37.74	35.10	54.00	-18.90
30V	979.358	42.30	4.34	22.10	37.82	30.92	54.00	-23.08
31V	980.411	48.80	4.35	22.11	37.83	37.43	54.00	-16.57
32H	989.524	44.80	4.42	22.20	37.96	33.46	54.00	-20.54
33V	990.418	43.10	4.42	22.21	37.97	31.76	54.00	-22.24
34V	994.168	45.20	4.45	22.24	38.02	33.88	54.00	-20.12

Venstar, Inc.
Thermostat RF Module
Model: S1-LXRFM

Date: 07/09/09
Lab: B
Tested By: Kyle Fujimoto

[illegible]

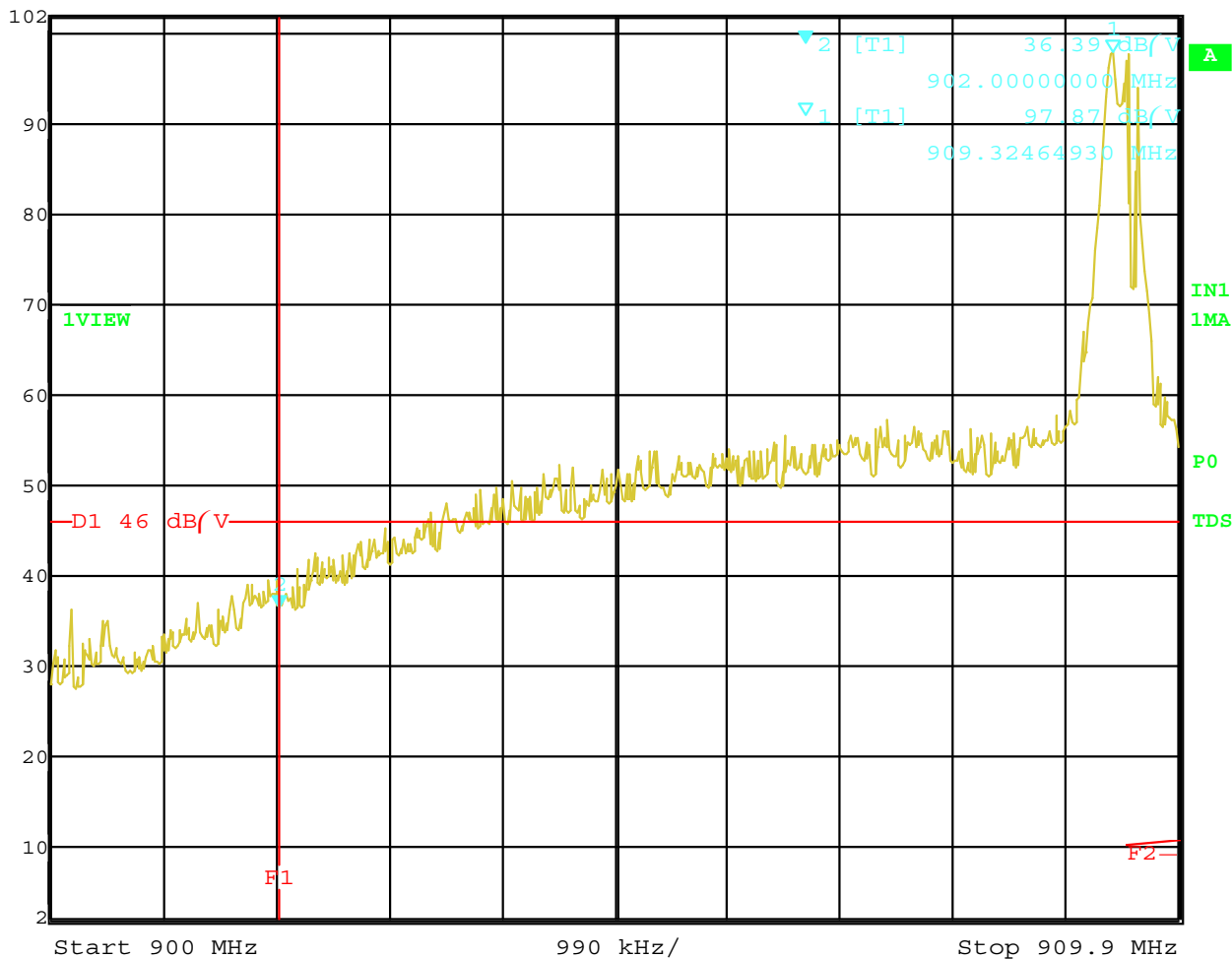
Venstar, Inc.
Thermostat RF Module
Model: S1-LXRFM

Date: 07/09/09
Lab: B
Tested By: Kyle Fujimoto

[illegible]



Ref Lvl 102 dB/V
Marker 2 [T1] 36.39 dB/V
902.00000000 MHz
RBW 100 kHz RF Att 10 dB
VBW 300 kHz
SWT 5 ms Unit dB/V

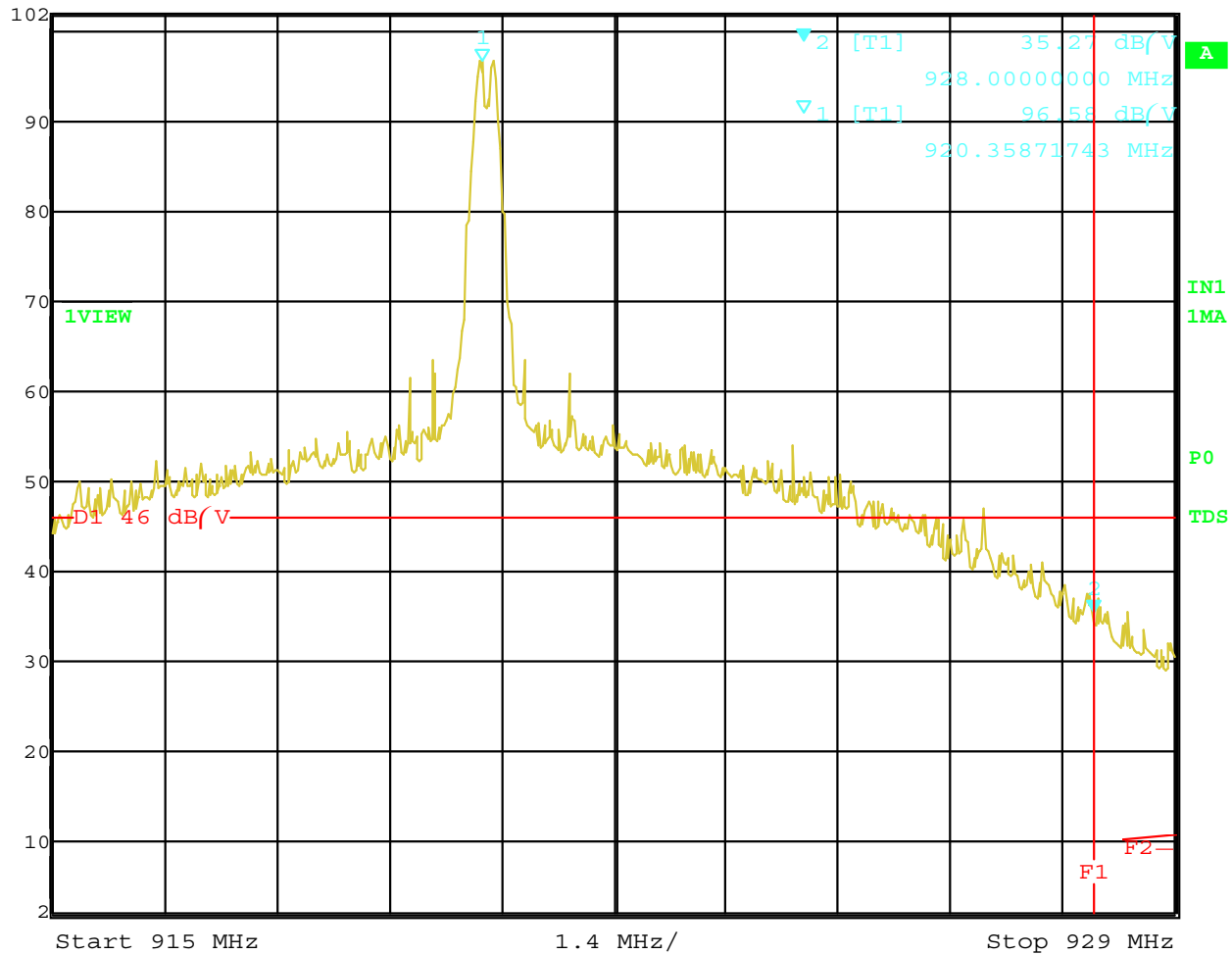


Date: 9.JUL.2009 08:41:34

Band Edge – Low Channel – Horizontal Polarization – X-Axis (Worst Case)



Ref Lvl 102 dB/V
Marker 2 [T1] 35.27 dB/V
928.00000000 MHz
RBW 100 kHz RF Att 10 dB
VBW 300 kHz
SWT 5 ms Unit dB/V

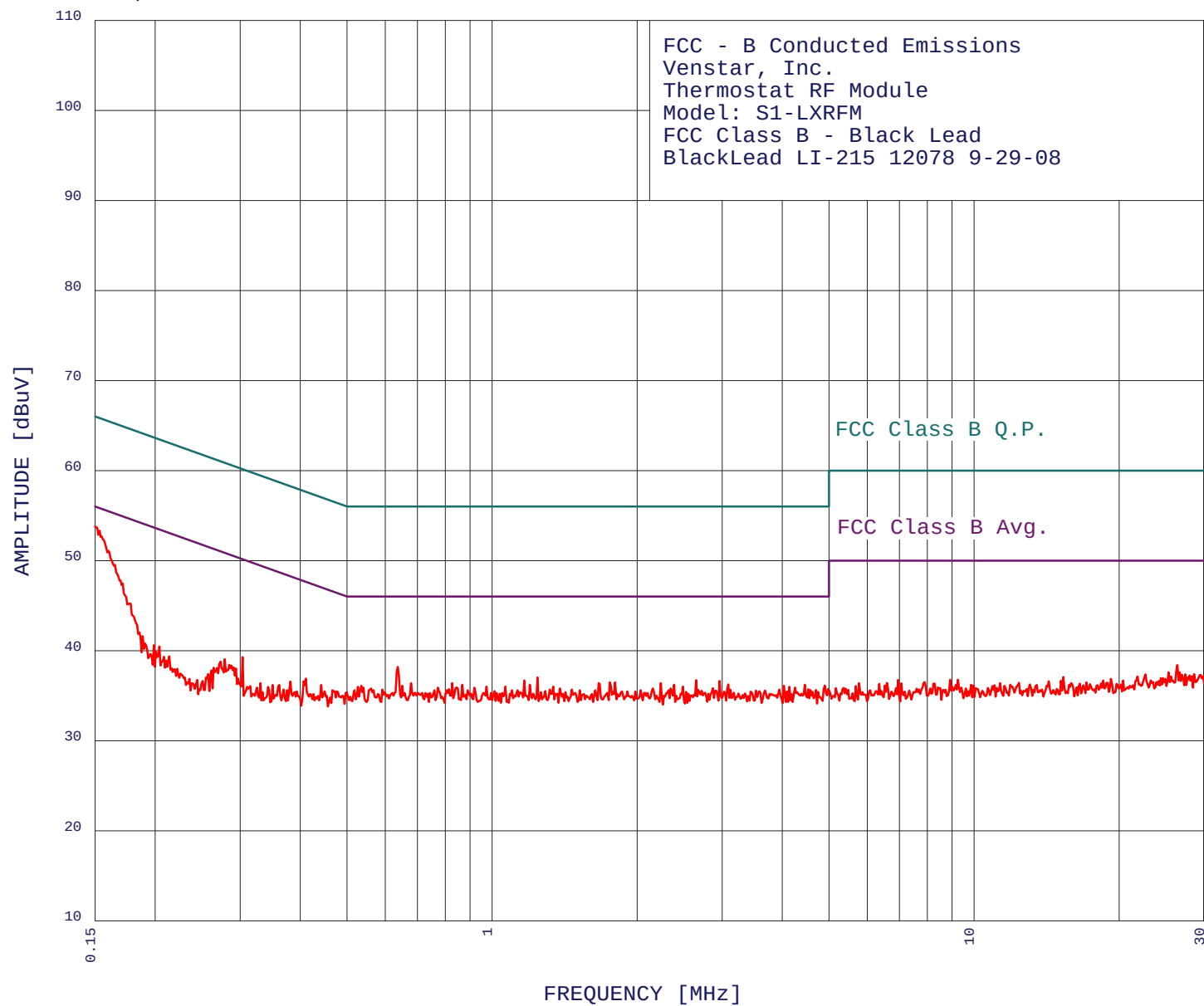


Date: 9.JUL.2009 08:58:48

Band Edge – High Channel – Vertical Polarization – Y-Axis (Worst Case)

EMISSION LEVEL [dBuV] PEAK
Graph for Peak

7/09/2009 15:28:48





**COMPATIBLE
ELECTRONICS**

7/09/2009

15:28:48

FCC - B Conducted Emissions

Venstar, Inc.

Thermostat RF Module

Model: S1-LXRFM

FCC Class B - Black Lead

BlackLead LI-215 12078 9-29-08

TEST ENGINEER : Kyle Fujimoto

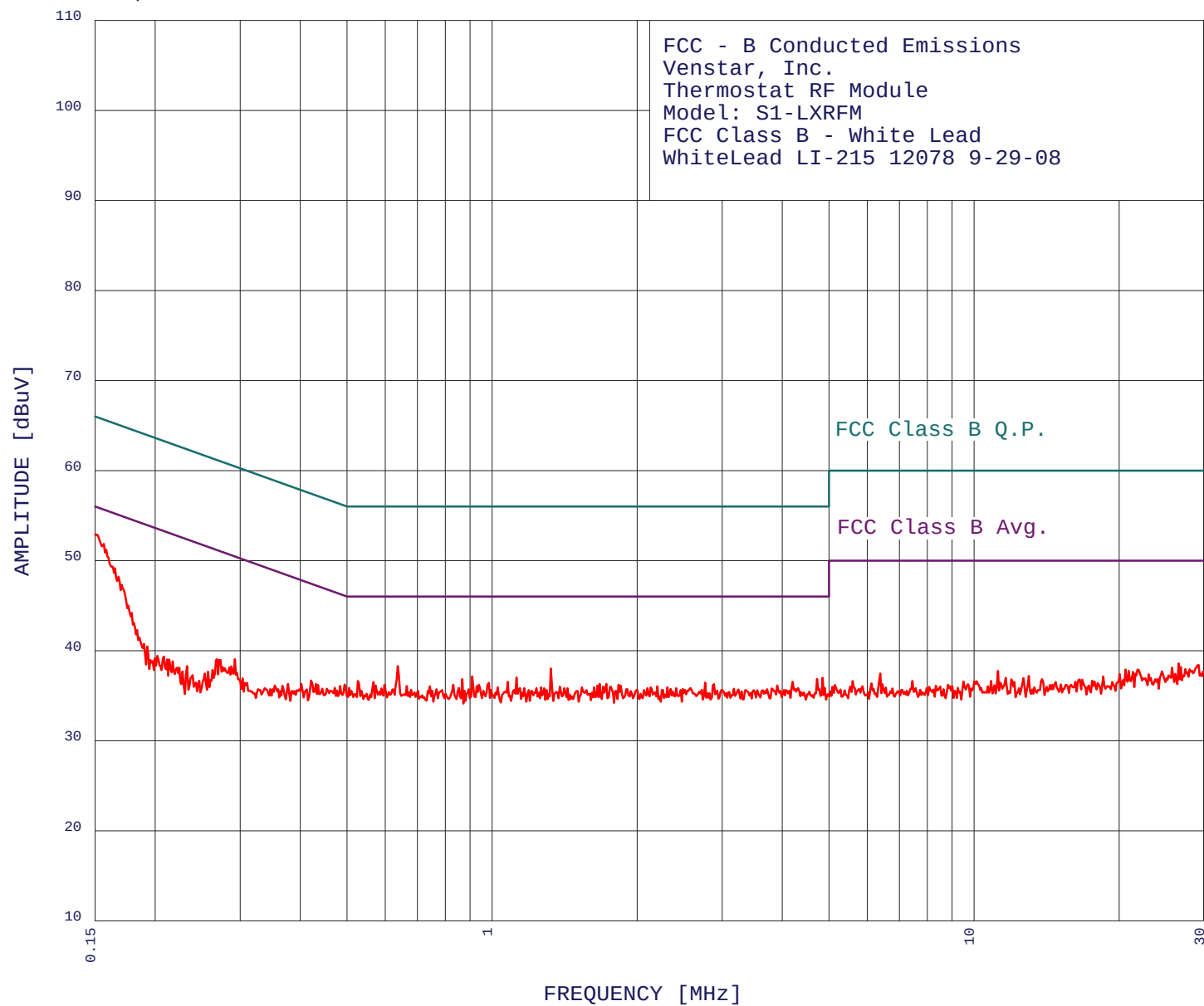
49 highest peaks above -50.00 dB of FCC Class B Avg. limit line

Peak criteria : 0.00 dB, Curve : Peak

Peak#	Freq(MHz)	Amp(dBuV)	Limit(dB)	Delta(dB)
1	0.153	53.32	55.82	-2.50
2	0.155	52.68	55.73	-3.05
3	0.160	51.07	55.47	-4.40
4	0.165	49.52	55.20	-5.68
5	0.171	47.46	54.90	-7.44
6	0.637	38.19	46.00	-7.81
7	1.243	36.99	46.00	-9.01
8	2.651	36.71	46.00	-9.29
9	1.166	36.70	46.00	-9.30
10	2.963	36.63	46.00	-9.37
11	0.176	45.22	54.68	-9.46
12	1.754	36.49	46.00	-9.51
13	1.800	36.48	46.00	-9.52
14	0.826	36.39	46.00	-9.61
15	2.238	36.39	46.00	-9.61
16	0.679	36.39	46.00	-9.61
17	1.663	36.39	46.00	-9.61
18	3.091	36.23	46.00	-9.77
19	4.456	36.20	46.00	-9.80
20	2.384	36.20	46.00	-9.80
21	0.867	36.20	46.00	-9.80
22	1.197	36.19	46.00	-9.81
23	4.902	36.12	46.00	-9.88
24	0.651	36.09	46.00	-9.91
25	0.535	36.09	46.00	-9.91
26	4.029	36.08	46.00	-9.92
27	2.488	36.00	46.00	-10.00
28	0.974	36.00	46.00	-10.00
29	1.066	36.00	46.00	-10.00
30	1.338	35.99	46.00	-10.01
31	0.527	35.99	46.00	-10.01
32	4.137	35.99	46.00	-10.01
33	0.919	35.90	46.00	-10.10
34	0.844	35.89	46.00	-10.11
35	0.771	35.89	46.00	-10.11
36	4.249	35.89	46.00	-10.11
37	0.541	35.89	46.00	-10.11
38	2.870	35.82	46.00	-10.18
39	2.346	35.80	46.00	-10.20
40	1.382	35.79	46.00	-10.21
41	2.156	35.79	46.00	-10.21
42	0.561	35.79	46.00	-10.21
43	4.980	35.73	46.00	-10.27
44	4.528	35.71	46.00	-10.29
45	0.814	35.69	46.00	-10.31
46	1.318	35.69	46.00	-10.31
47	1.464	35.69	46.00	-10.31
48	0.592	35.69	46.00	-10.31
49	3.945	35.68	46.00	-10.32

EMISSION LEVEL [dBuV] PEAK
Graph for Peak

7/09/2009 15:34:50




**COMPATIBLE
ELECTRONICS**

7/09/2009

15:34:50

FCC - B Conducted Emissions

Venstar, Inc.

Thermostat RF Module

Model: S1-LXRFM

FCC Class B - White Lead

WhiteLead LI-215 12078 9-29-08

TEST ENGINEER : Kyle Fujimoto

49 highest peaks above -80.00 dB of FCC Class B Avg. limit line

Peak criteria : 0.00 dB, Curve : Peak

Peak#	Freq(MHz)	Amp(dBuV)	Limit(dB)	Delta(dB)
1	0.152	52.89	55.91	-3.02
2	0.157	51.83	55.64	-3.81
3	0.158	51.18	55.56	-4.38
4	0.165	49.12	55.20	-6.09
5	0.168	48.21	55.07	-6.86
6	0.170	47.30	54.94	-7.64
7	0.637	38.28	46.00	-7.72
8	1.325	38.02	46.00	-7.98
9	0.909	37.12	46.00	-8.88
10	1.124	37.02	46.00	-8.98
11	4.851	36.97	46.00	-9.03
12	4.722	36.86	46.00	-9.14
13	0.867	36.82	46.00	-9.18
14	0.527	36.63	46.00	-9.37
15	4.204	36.53	46.00	-9.47
16	1.077	36.52	46.00	-9.48
17	0.567	36.51	46.00	-9.49
18	2.766	36.45	46.00	-9.55
19	0.984	36.42	46.00	-9.58
20	0.176	44.99	54.68	-9.68
21	1.671	36.31	46.00	-9.69
22	1.726	36.31	46.00	-9.69
23	2.885	36.26	46.00	-9.74
24	0.939	36.22	46.00	-9.78
25	0.831	36.22	46.00	-9.78
26	1.830	36.21	46.00	-9.79
27	0.598	36.20	46.00	-9.80
28	0.494	36.25	46.09	-9.85
29	3.903	36.11	46.00	-9.89
30	1.654	36.11	46.00	-9.89
31	1.849	36.11	46.00	-9.89
32	0.573	36.11	46.00	-9.89
33	0.665	36.06	46.00	-9.94
34	0.743	36.02	46.00	-9.98
35	2.201	36.02	46.00	-9.98
36	0.929	36.02	46.00	-9.98
37	1.382	36.02	46.00	-9.98
38	1.699	36.01	46.00	-9.99
39	1.763	36.01	46.00	-9.99
40	2.310	35.93	46.00	-10.07
41	1.027	35.92	46.00	-10.08
42	1.262	35.92	46.00	-10.08
43	2.134	35.92	46.00	-10.08
44	1.536	35.91	46.00	-10.09
45	1.629	35.91	46.00	-10.09
46	4.902	35.87	46.00	-10.13
47	0.505	35.84	46.00	-10.16
48	2.582	35.84	46.00	-10.16
49	4.316	35.84	46.00	-10.16