



LSRESEARCH, LLC

Wireless Product Development

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ENGINEERING TEST REPORT # 311318

LSR Job #: C-1466

Compliance Testing of:

WiFi Thermostat

Test Date(s):

May 21,23,30,31; June 1,4,27,29; July 2 2012

Prepared For:

Honeywell

1985 Douglas Drive North

Golden Valley, MN 55422

Final

This Test Report is issued under the Authority of:

Signature:

Date: 7-2-12

Test Report Reviewed by:

Ryan M. Urness, Laboratory Manager

Signature:

Date: 6-11-12

Report by:

Adam Alger

Signature:

Date: 6-7-12

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Prepared For: Honeywell

Report: TR 311318 A FCCICTX V2

LSR: C-1466

Name: WiFi Thermostat

Model: TH8320WF

Serial: ENG Sample

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LS Research, LLC in Review

As an EMC Testing Laboratory, our Accreditation and Assessments are recognized through the following:



TESTING CERT #1255.01

A2LA – American Association for Laboratory Accreditation

Accreditation based on ISO/IEC 17025: 2005 with Electrical (EMC) Scope of Accreditation

A2LA Certificate Number: 1255.01



Federal Communications Commission (FCC) – USA

Listing of 3 Meter Semi-Anechoic Chamber based on Title 47 CFR – Part 2.948

FCC Registration Number: 90756



Industrie
Canada Industry
Canada

Canada

Industry Canada

On file, 3 Meter Semi-Anechoic Chamber based on RSS-212 – Issue 1

File Number: IC 3088-A

On file, 3 and 10 Meter OATS based on RSS-212 – Issue 1

File Number: IC 3088



U. S. Conformity Assessment Body (CAB) Validation

Validated by the European Commission as a U. S. Competent Body operating under the U. S./EU, Mutual Recognition Agreement (MRA) operating under the European Union

Electromagnetic Compatibility – Council Directive 2004/108/EC (formerly 89/336/EEC, Article 10.2).

Date of Validation: January 16, 2001

Validated by the European Commission as a U.S. Notified Body operating under the U.S. /EU, Mutual Recognition Agreement (MRA) operating under the European Union

Telecommunication Equipment – Council Directive 99/5/EC, Annex V.

Date of Validation: November 20, 2002

Notified Body Identification Number: 1243

Prepared For: Honeywell	Name: WiFi Thermostat
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1.0 Summary of Test Report

In May to July 2012 the Honeywell WiFi Vision Pro was tested and MEETS the following requirements.

Rule	Description	Procedure	Compliant	Note
FCC: 15.247(a)(1) IC: RSS-210 A8.4	Emission Bandwidth 6 & 20dB, 99%	ANSI C63.4-2003 FCC KDB558074	Yes	2
FCC: 15.247(b) IC: RSS-210 A8.4	Conducted Output Power	ANSI C63.4-2003 FCC KDB558074	Yes	2
FCC: 15.247(e) IC: RSS-210 A8.4	Power Spectral Density	ANSI C63.4-2003 FCC KDB558074	Yes	2
FCC: 15.247(d) IC: RSS-210 A8.4	Spurious Conducted Emissions	ANSI C63.4-2003 FCC KDB558074	Yes	2
FCC: 15.247(d) IC: RSS-210 A8.5	Radiated Harmonics in Restricted Bands	ANSI C63.4-2003 FCC KDB558074	Yes	1
FCC: 15.247(d) IC: RSS-210 A8.5	Radiated Emissions at Band-edge in Restricted Bands	ANSI C63.4-2003 FCC KDB558074	Yes	1
FCC: 15.247(d) IC: RSS-210 A8.5	Radiated Emissions	ANSI C63.4-2003 FCC KDB558074	Yes	1
FCC: 15.109 IC: RSS-GEN	Receiver radiated Emissions	ANSI C63.4-2003	Yes	1
FCC: 15.109/15.209 IC: RSS-GEN	AC Line Conducted	ANSI C63.4-2003	Yes	3
FCC: 2.1091 IC: RSS-102 2.5.1	RF Exemption Calculation	FCC KDB447498 RSS-102	Yes	None

Note 1: Tested with two EUT antennas in the EUT intended orientation.

Note 2: RF Conducted measurement at antenna terminal.

Note 3: 24VAC 60Hz

2.0 Test Facilities

All testing was performed at:

LS Research, LLC
W66 N220 Commerce Court
Cedarburg, Wisconsin, 53012 USA

LS Research, LLC is accredited by A2LA (American Association for Laboratory Accreditation) to the requirements of ISO/IEC 17025, 2005 “General Requirements for the Competence of Calibration and Testing Laboratories”.

LS Research, LLC’s scope of accreditation includes all test methods listed herein, unless otherwise noted.

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3.0 Client Information

Manufacturer Name:	Honeywell
Address:	1985 Douglas Drive North Golden Valley, MN 55422
Contact Person:	Gabe Bergman

3.1 Equipment Under Test (EUT) Information

The following information has been supplied by the applicant.

Product Name:	WiFi Thermostat
Model Number:	TH8320WF
Serial Number:	ENG Sample
FCC ID	HS9-TH8320WF01
IC Number	573R-TH8320WF01

3.2 Product Description

Wi-Fi Touch screen Programmable Thermostat

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3.2 Product Description

Frequency Range (MHz)	802.11b: 2412-2462 MHz 802.11g: 2412-2462 MHz 802.11n20: 2412-2462 MHz
RF Power In Watts (conducted)	802.11b: Max: 0.0281 Min: 0.0265 802.11g: Max: 0.0167 Min: 0.0088 802.11n20: Max: 0.0164 Min: 0.0079
Conducted Output Power (dBm)	802.11b: 14.49 802.11g: 12.24 802.11n20: 12.16
Field Strength at 3 meters (dB μ V/m)	114.0
Antenna Gain (Measured over ground plane)	4 dBi
Occupied Bandwidth 99%	802.11b: 11.6 MHz 802.11g: 16.73 MHz 802.11n20: 17.77 MHz
Type of Modulation	802.11b: DBPSK, QPSK, DQPSK (DSSS) 802.11g: QPSK, 16-QAM, BPSK, 64-QAM (DSSS/OFDM) 802.11n20: QPSK, 16-QAM, BPSK, 64-QAM (OFDM)
Emission Designator	802.11b: 11M6G2W 802.11g: 16M7G2W 802.11n20: 17M7G2W
Transmitter Spurious (worst case) at 3 meters	46.7 dB μ V/m average (extrapolated)
Stepped (Y/N)	No
Step Value	N/A
Frequency Tolerance %,Hz, ppm	Better than 100 ppm
Microprocessor Model #	ATSAM4S16BA
Antenna: Detachable / Non-detachable	Non-detachable
Antenna: Type	PCB trace and PIFA
FCC Rule Part	Title 47 Part 15.247
Industry Canada Rule Part	RSS-210 Issue 8 2010
Modular Filing	No
RF Exposure Type	Mobile
Receiver Spurious (worst case) at 3 meters	37.53 dB μ V/m

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3.3 Modifications Incorporated In the EUT for Compliance Purposes

Power Settings were determined to comply with radiated band-edge in restricted bands.

3.4 Deviations & Exclusions from Test Specifications

None noted at time of test.

4.0 Conditions of Test

Environmental:

Temperature: 20-25° C
Relative Humidity: 30-60%
Atmospheric Pressure: 86-106 kPa

Mains Voltage:

24 VAC 60Hz

5.0 Additional Information

The EUT has a proprietary test mode program built into the device to select transmit or receive modes, channels, data rates, and modulations.

The EUT utilizes two antennas. A0, a PIFA antenna and A1, a PCB trace antenna.

RF Conducted Emissions at the RF port were taken with an u.fl to sma connector.

6.0 Test Equipment

All test equipment is calibrated by a calibration laboratory accredited by A2LA to the requirements of ISO 17025. For a complete list of test equipment and calibration dates, see Appendix A. Unless otherwise noted, resolution bandwidth of measuring instrument used during testing for given frequency range, see below. For average measurements above 1000MHz the video bandwidth is set at 10Hz.

Frequency Range	Resolution Bandwidth
9 kHz – 150 kHz	200 Hz
150 kHz – 30 MHz	9 kHz
30 MHz – 1000 MHz	120 kHz
Above 1000 MHz	1 MHz

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7.0 Conformance Summary

The EUT was found to MEET the requirements as described within the specification of FCC Title 47, CFR Part 15.247 (2011) and Industry Canada RSS-210, Issue 8 (2010)

If some emissions are seen to be within 3 dB of their respective limits:

As these levels are within the tolerances of the test equipment and site employed, there is a possibility that this unit, or a similar unit selected out of production may not meet the required limit specification if tested by another agency.

LS Research, LLC certifies that the data contained herein was taken under conditions that meet or exceed the requirements of the test specifications. The results in this Test Report apply only to the item(s) tested on the above-specified dates. Any modifications made to the EUT subsequent to the indicated test date(s) will invalidate the data herein, and void this certification.

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Appendix A – Test Equipment



Date : 14-May-2012 Type Test : Equipment List Job # : C-1466
 Prepared By: Adam A Customer : Honeywell Quote #: 311318

No.	Asset #	Description	Manufacturer	Model #	Serial #	Cal Date	Cal Due Date	Equipment Status
1	EE 960073	Spectrum Analyzer	Agilent	E4446A	US45300564	5/9/2012	5/9/2013	Active Calibration
2	EE 960147	Pre-Amp	Adv. Micro	1/LA612	123101	1/6/2012	1/6/2013	Active Calibration
3	AA 960144	Phaseflex	Gore	EKD01D010720	5800373	6/1/2011	6/1/2013	Active Calibration
4	AA 960081	Double Ridge Horn Antenna	EMCO	3115	6907	1/6/2012	1/6/2013	Active Calibration
5	AA 960154	2.4GHz High Pass Filter	KVM	HPF-L-14186	7272-02	6/10/2011	6/10/2012	Active Calibration
6	EE 960146	Std. Gain Horn Ant. w/preamp	Adv. Micro	1/LA622-4	123001	11/3/2011	11/3/2012	Active Calibration
7	EE 960073	Spectrum Analyzer	Agilent	E4446A	US45300564	5/9/2012	5/9/2013	Active Calibration
8	EE 960156	100kHz-1GHz Analog Signal Generator	Agilent	N5181A	MY49060062	6/6/2011	6/6/2012	Active Calibration
9	EE 960157	3Hz-13.2GHz Spectrum Analyzer	Agilent	E4445A	MY48250225	6/6/2011	6/6/2012	Active Calibration
10	EE 960158	RF Preselector	Agilent	N9039A	MY46520110	6/11/2011	6/11/2012	Active Calibration
11	AA 960005	Biconical Antenna	EMCO	93110B	9601-2280	6/10/2011	6/10/2012	Active Calibration
12	AA 960078	Log Periodic Antenna	EMCO	93146	9701-4855	11/15/2011	11/15/2012	Active Calibration

Project Engineer: Adam

Quality Assurance: Aidi

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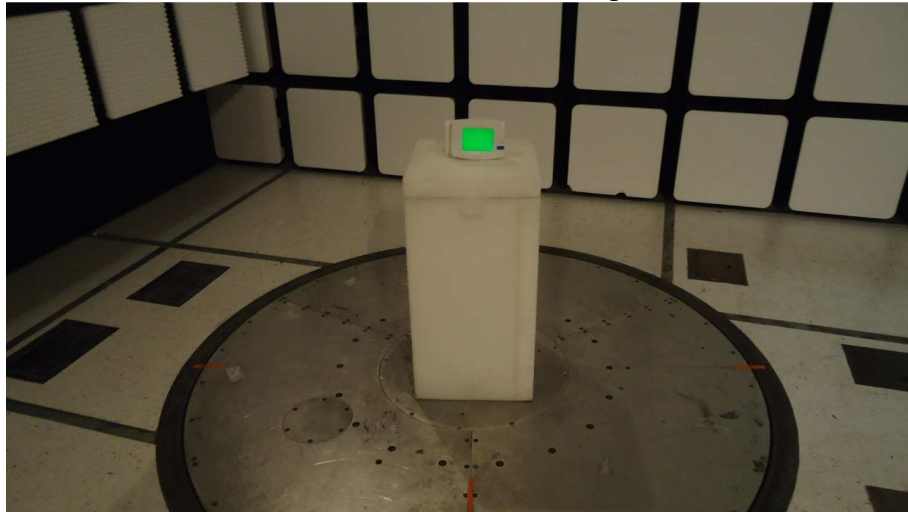
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Appendix B – Setup Photos

Radiated Emissions Setup



AC Line Conducted Emissions Setup



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Appendix C – Test Data

C.1 – RF Conducted Emissions

Manufacturer	Honeywell
Date	5-31, 6-1, 6-4, 6-27, 6-29, and 7-2 2012
Operator	Adam A / Mike H
Temp. / R.H.	20 - 25° C / 30-60% R.H.
Test Voltage	24 VAC 60 Hz
Test Location	LS Research, LLC – Bench Measurements
Rule Part	15.247
Measurement Procedure	FCC KDB 558074 D01 DTS Meas Guidance v01 1-18-2012 ANSI C63.10-2009 Section 6.7.
Description of Measurement	A direct measurement of the transmitted signal was performed at the antenna port of the EUT via a cable connection to a spectrum analyzer. An attenuator was placed in series with the cable to protect the spectrum analyzer. The loss from the cable and the attenuator were added on the analyzer as gain offset settings there by allowing direct measurements, without the need for any further corrections. The EUT was configured to run in a continuous transmit mode, while being supplied with typical data as a modulation source.
Additional Notes	<ol style="list-style-type: none">1) FCC KDB 558074 Section 5.2.2.2 used for (average) output power measurements. Data rates 12, 24, and MCS7 required signal to be gated to average only when the transmitter was on. Data rate 1 Mbps has a duty cycle greater than 98%.2) FCC KDB 558074 Section 5.3.2 used for (average) power spectral density measurements. Data rates 12, 24, and MCS7 required signal to be gated to average only when the transmitter was on. Data rate 1 Mbps has a duty cycle greater than 98%. PSD in 100 kHz meets limits in 3 kHz bandwidth.3) Per requirements of FCC Part 15.247 (d) spurious conducted emissions in 100 kHz bandwidth are attenuated -30dBc from average conducted output power. Data rate 1Mbps found to be worst case (highest power setting) for spurious emissions and reported.4) For 12, 24, MCS7 (802.11g and n) channels 1 and 11 were lowered in power for radiated band-edge in restricted band compliance. Channels 2-10 were adjusted for band-edge compliance at a higher power setting than channel 1 and 11. All Output power and PSD measurements are taken at final power setting values.5) 802.11b (1 Mbps) was tested and measured with the same power settings for channels 1 to 11.

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Bandwidth Summary

Data Rate	Modulation	IEEE Protocol	Channel	Frequency (MHz)	EBW 6dB (MHz)	EBW 20dB (MHz)	EBW 99 % (MHz)
1 Mbps	DBPSK	802.11b	1	2412	7.67	11.61	11.60
			6	2437	7.67	12.84	11.53
			11	2462	7.67	12.85	11.59
12 Mbps	QPSK	802.11g	1	2412	16.23	19.06	16.73
			6	2437	16.12	18.60	16.68
			11	2462	16.14	19.20	16.65
24 Mbps	16-QAM	802.11g	1	2412	16.28	18.56	16.64
			6	2437	16.32	18.48	16.70
			11	2462	16.24	18.66	16.65
MCS7	64-QAM	802.11n	1	2412	17.32	19.41	17.77
			6	2437	17.51	19.68	17.77
			11	2462	17.59	19.67	17.77

Output Power and PSD Summary

Data Rate	Modulation	IEEE Protocol	Channel	Frequency (MHz)	Output Power (dBm)	PSD 100 kHz (dBm)
1 Mbps	DBPSK	802.11b	1	2412	14.49	-0.57
			2	2417	14.29	-1.54
			6	2437	14.24	-1.67
			10	2457	14.40	-1.54
			11	2462	14.49	-1.41
12 Mbps	QPSK	802.11g	1	2412	10.91	-7.51
			2	2417	12.24	-6.96
			6	2437	12.10	-7.05
			10	2457	11.87	-7.11
			11	2462	9.42	-9.78
24 Mbps	16-QAM	802.11g	1	2412	10.88	-7.54
			2	2417	12.22	-6.61
			6	2437	12.03	-6.73
			10	2457	11.98	-6.80
			11	2462	9.46	-9.34
MCS7	64-QAM	802.11n	1	2412	10.36	-7.41
			2	2417	12.16	-6.01
			6	2437	11.92	-6.07
			10	2457	11.84	-6.04
			11	2462	9.03	-8.34

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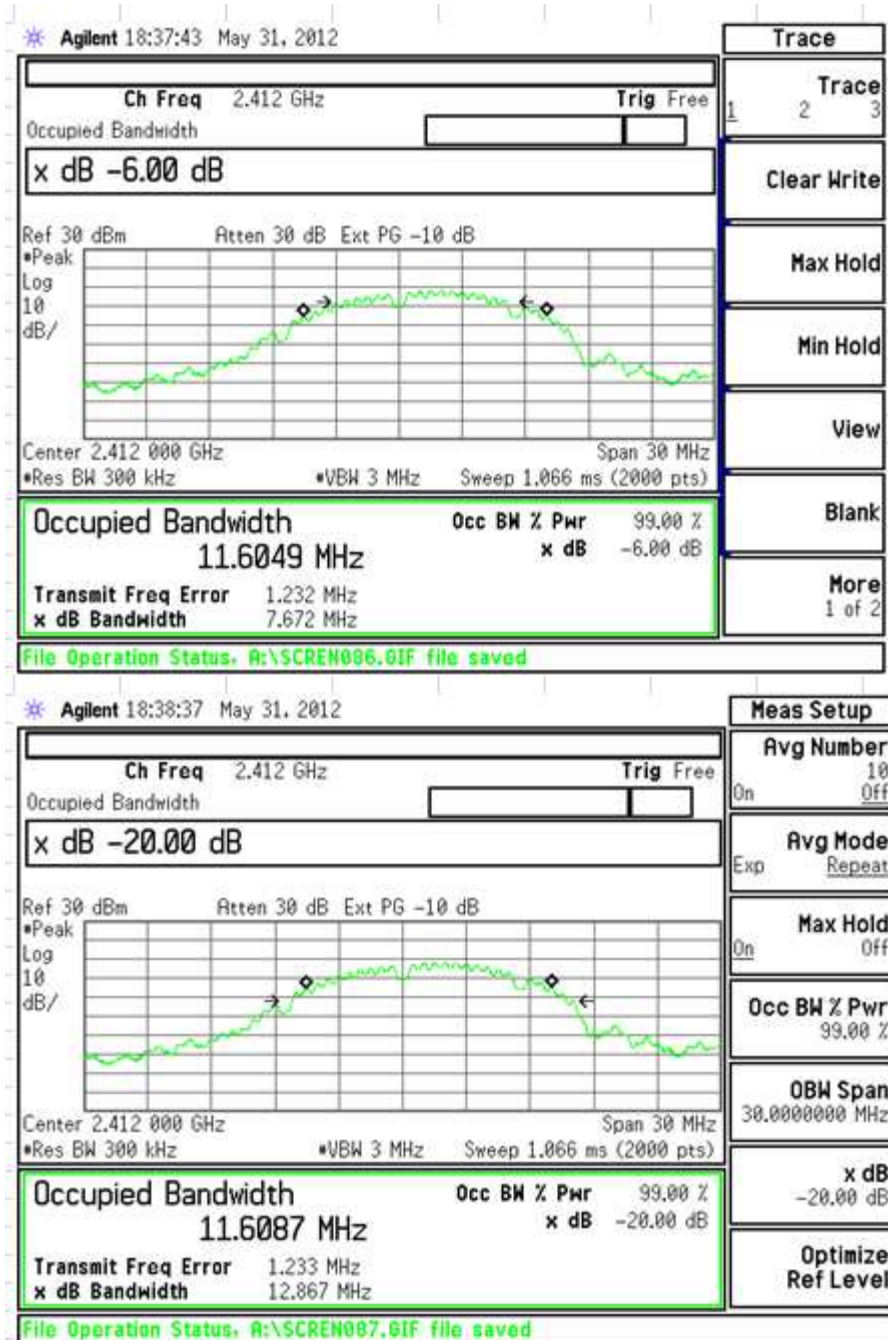
Model: TH8320WF

LSR: C-1466

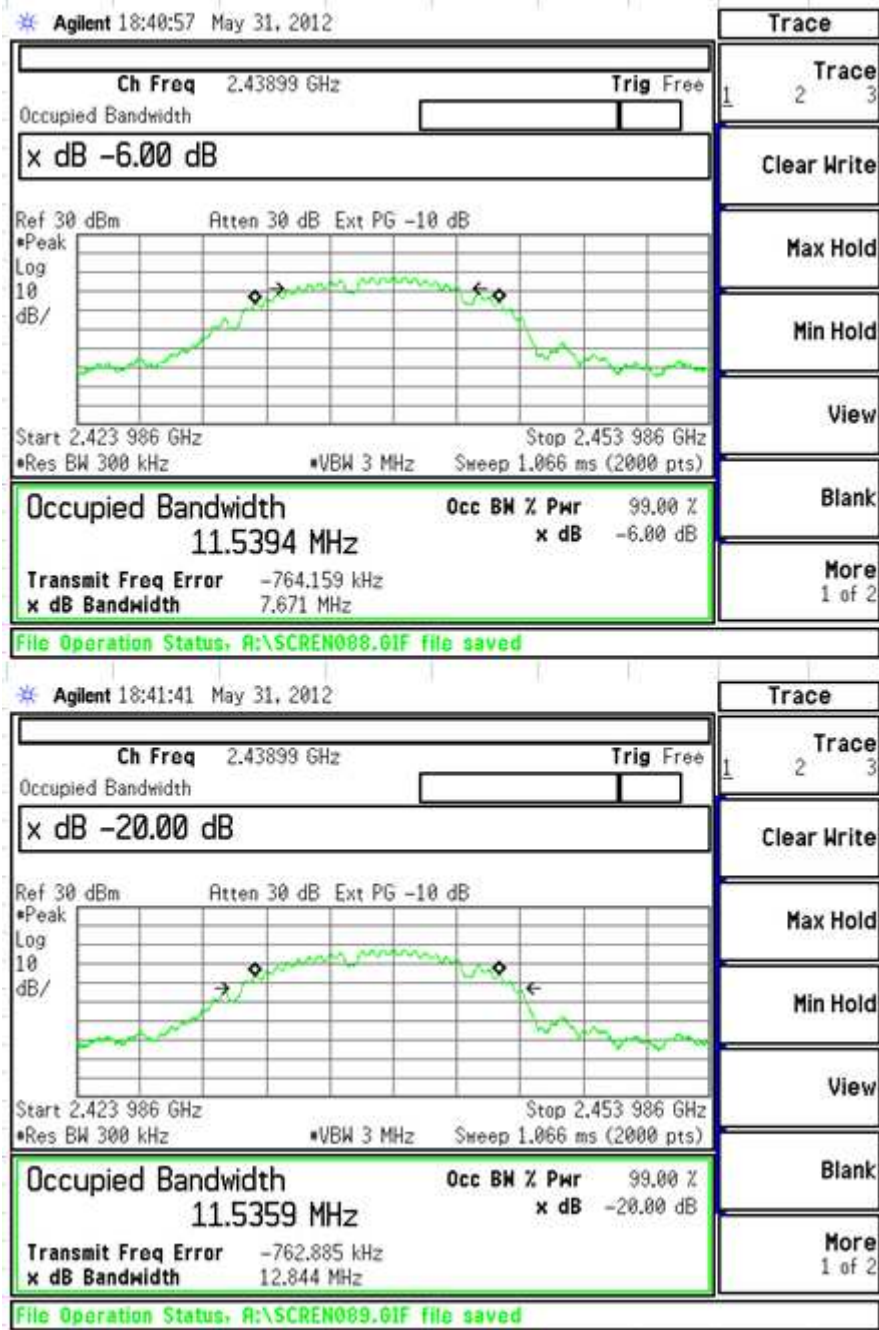
Serial: ENG Sample

C1.1 – Emission Bandwidth IEEE 802.11b

Emission Bandwidth – Channel 1 – 2412 MHz – 1 Mbps



Emission Bandwidth – Channel 6 – 2436 MHz – 1 Mbps



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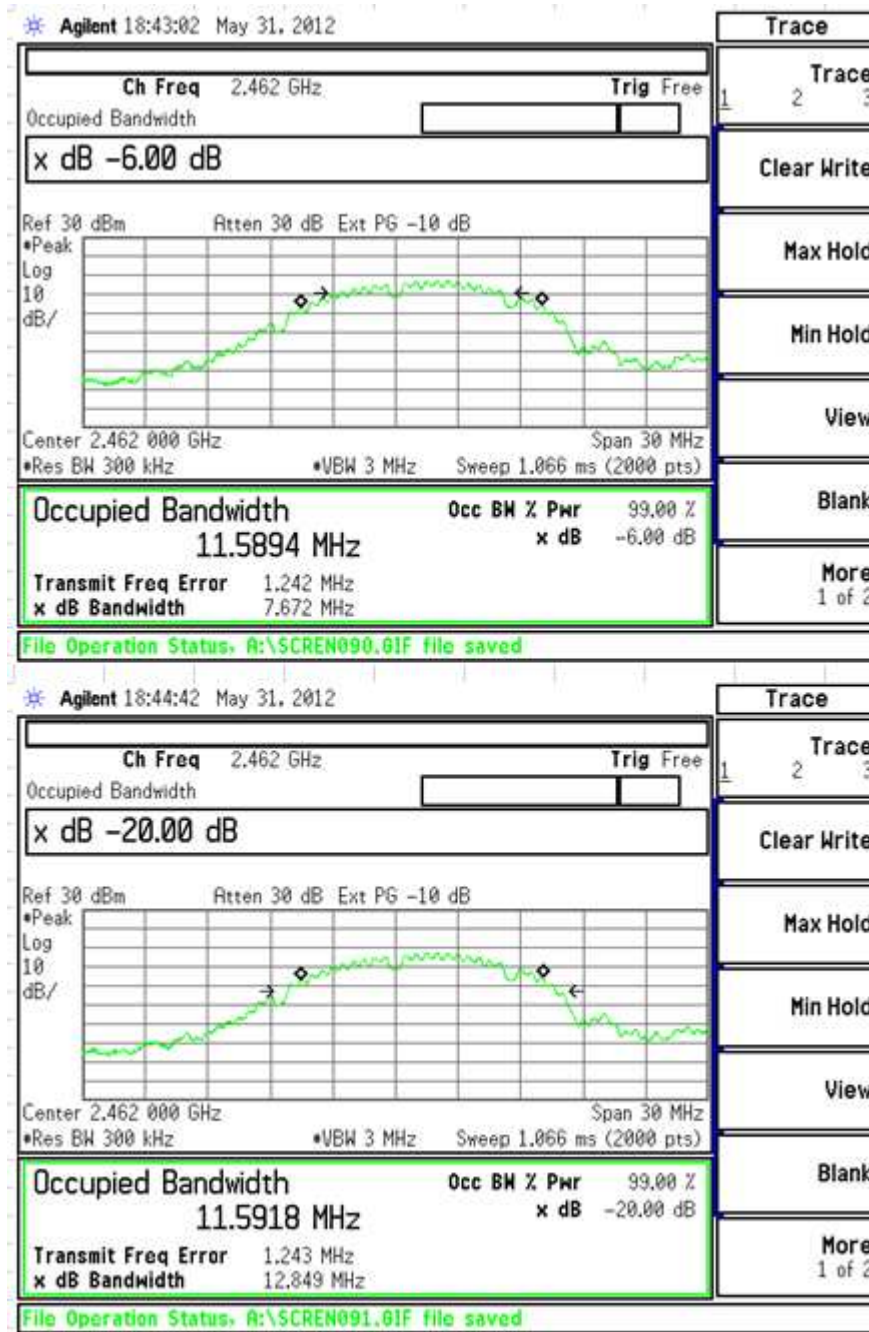
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Name: WiFi Thermostat

Model: TH8320WF

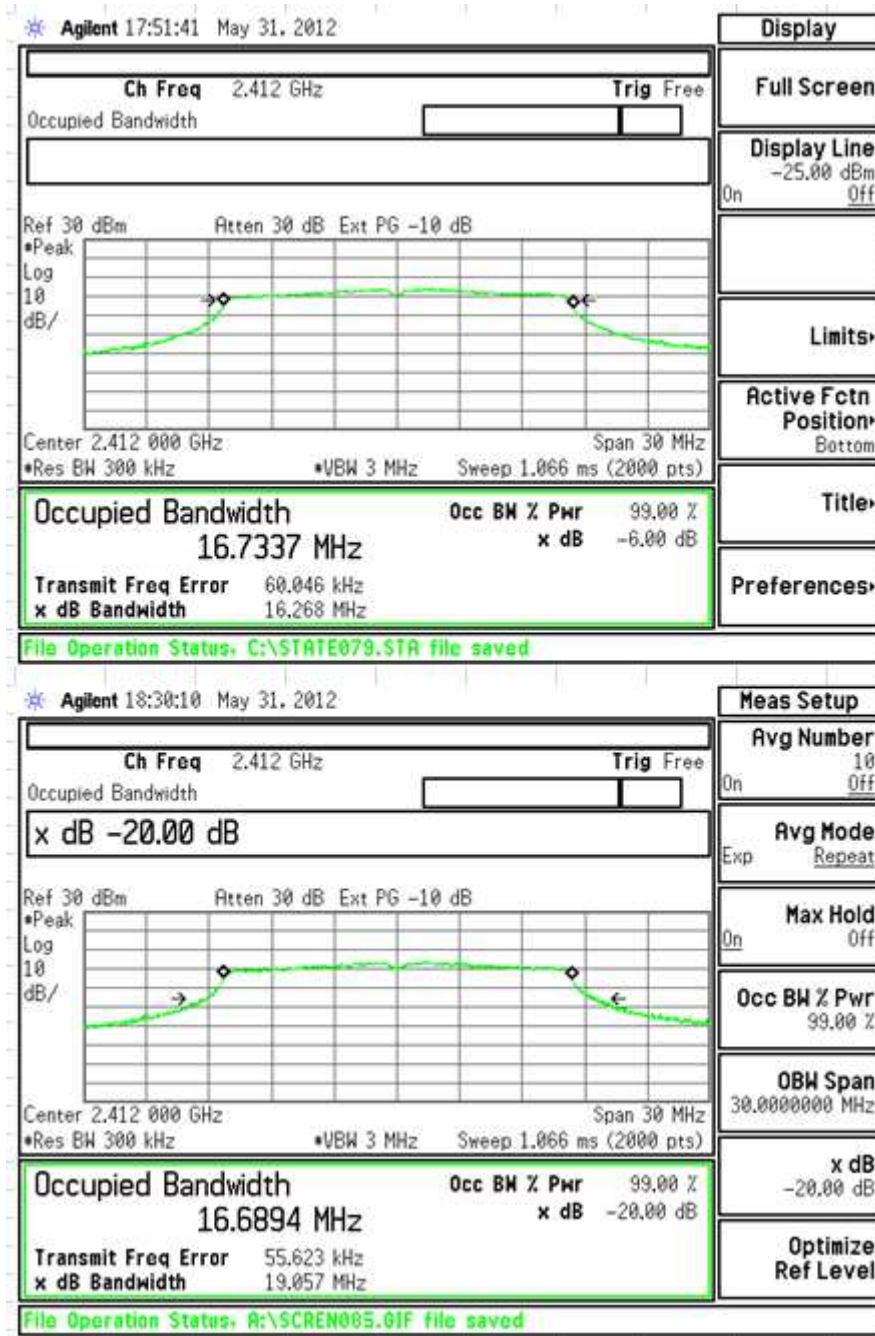
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Emission Bandwidth – Channel 11 – 2462MHz – 1 Mbps

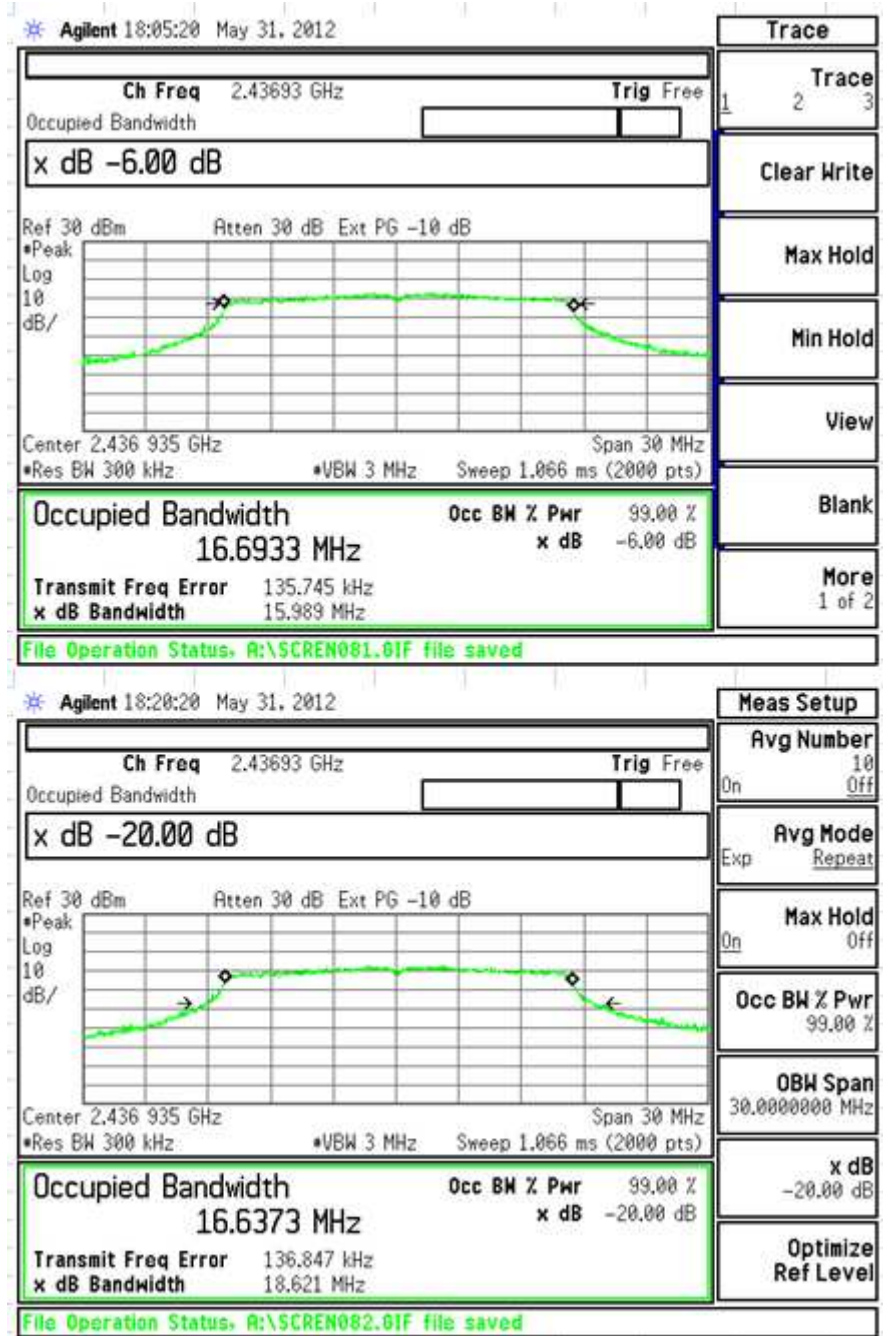


IEEE 802.11g

Emission Bandwidth – Channel 1 – 2412MHz – 12 Mbps



Emission Bandwidth – Channel 6 – 2436MHz – 12 Mbps



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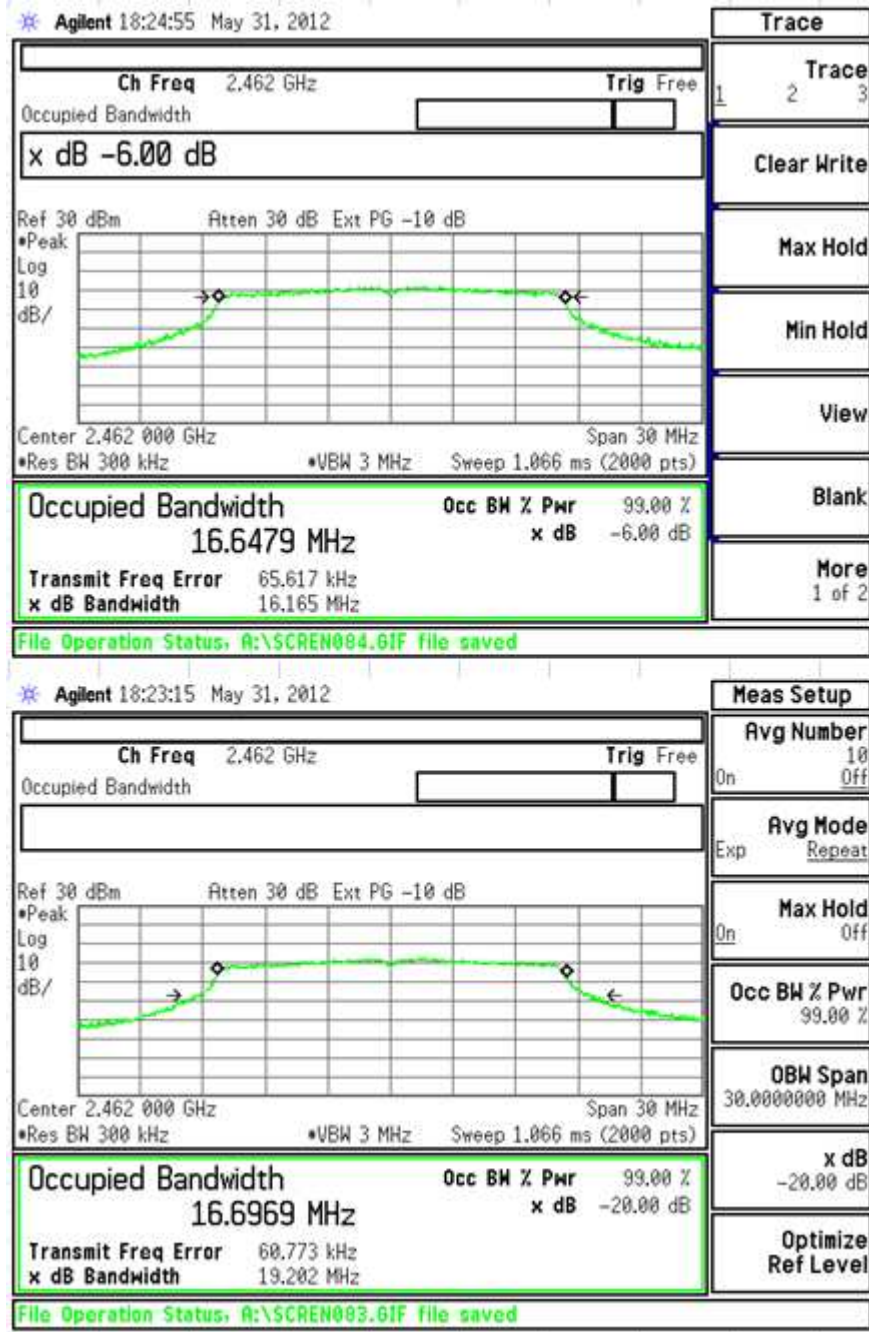
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Name: WiFi Thermostat

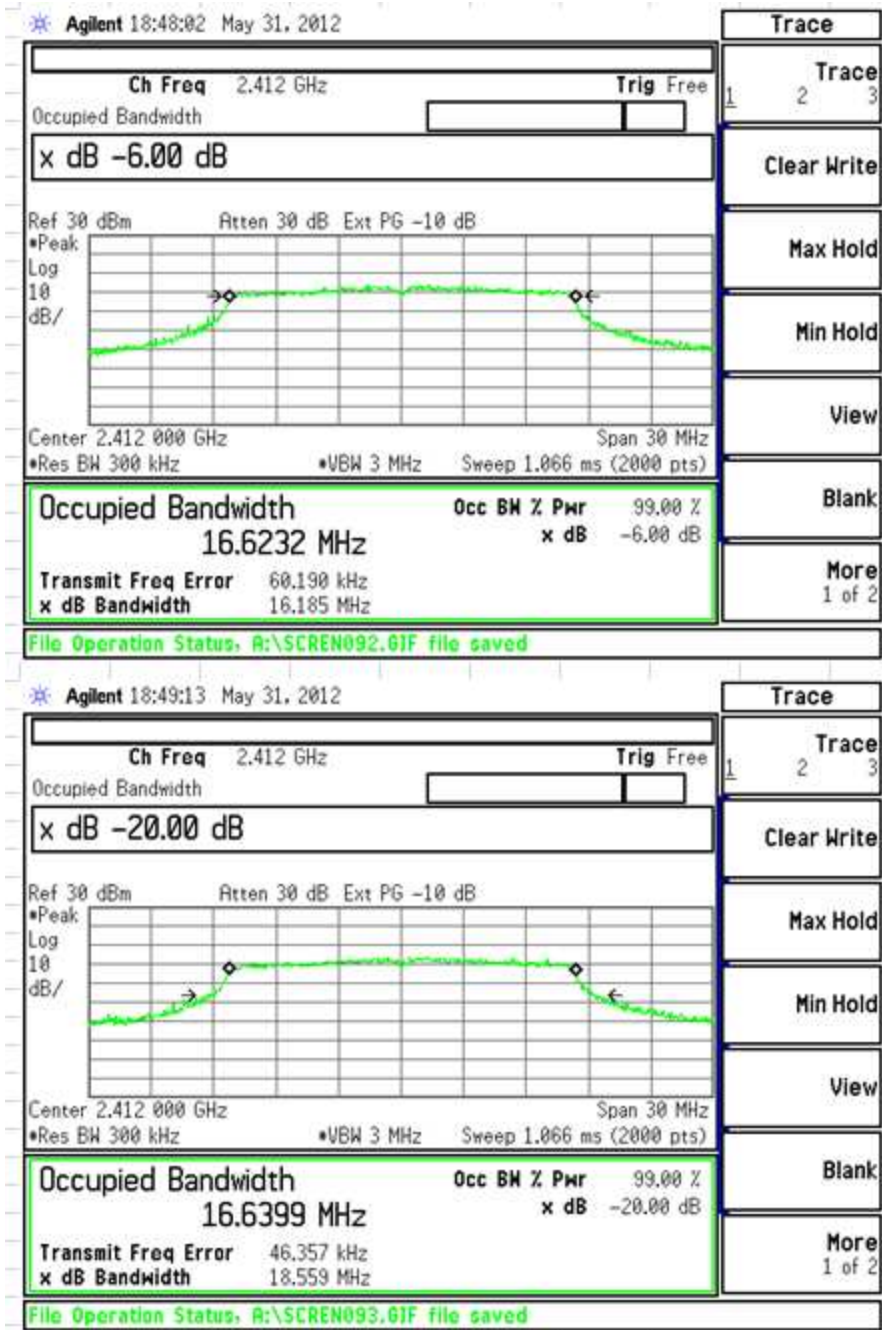
Model: TH8320WF

Serial: ENG Sample

Emission Bandwidth – Channel 11 – 2462MHz – 12 Mbps



Emission Bandwidth – Channel 1 – 2412MHz – 24 Mbps



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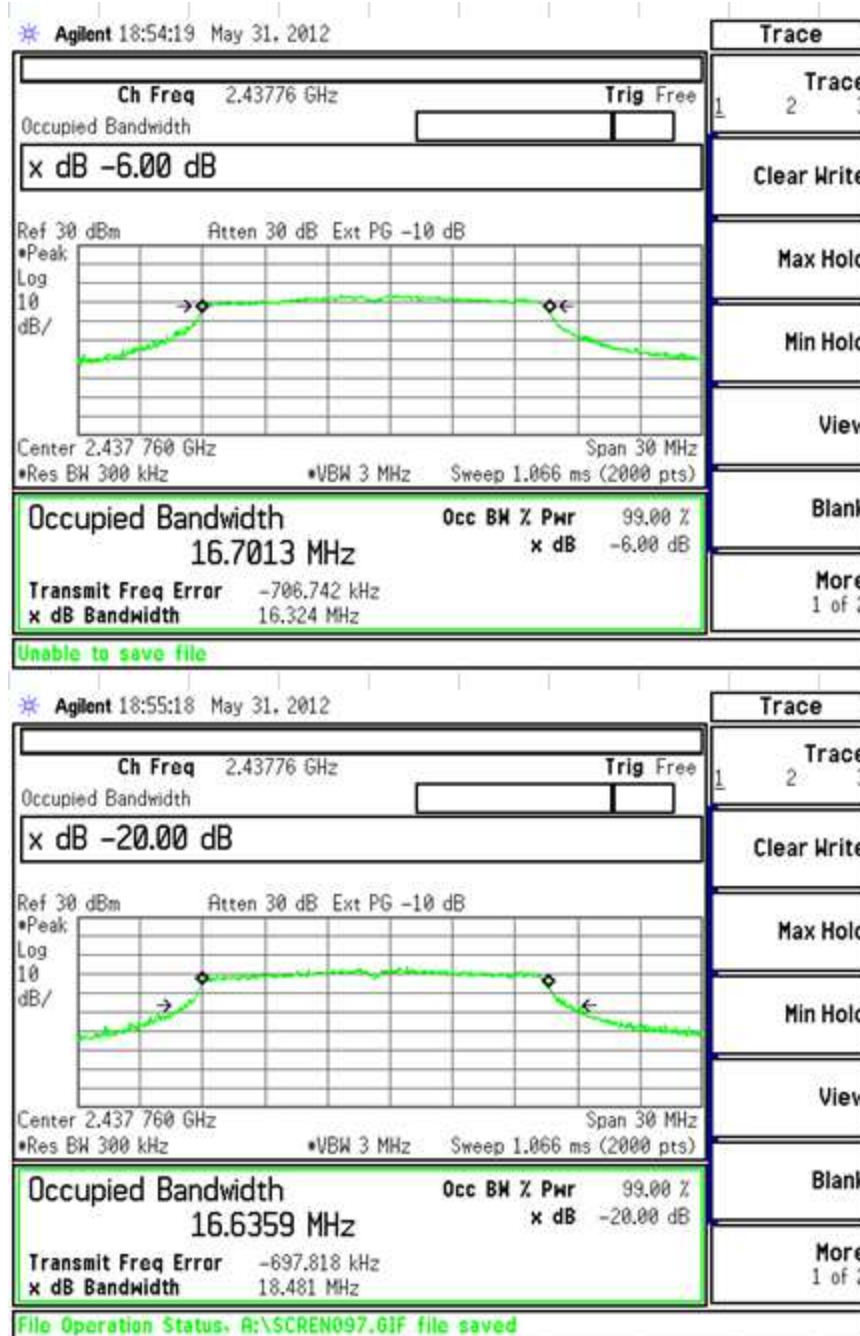
LSR: C-1466

Name: WiFi Thermostat

Model: TH8320WF

Serial: ENG Sample

Emission Bandwidth – Channel 6 – 2436MHz – 24 Mbps



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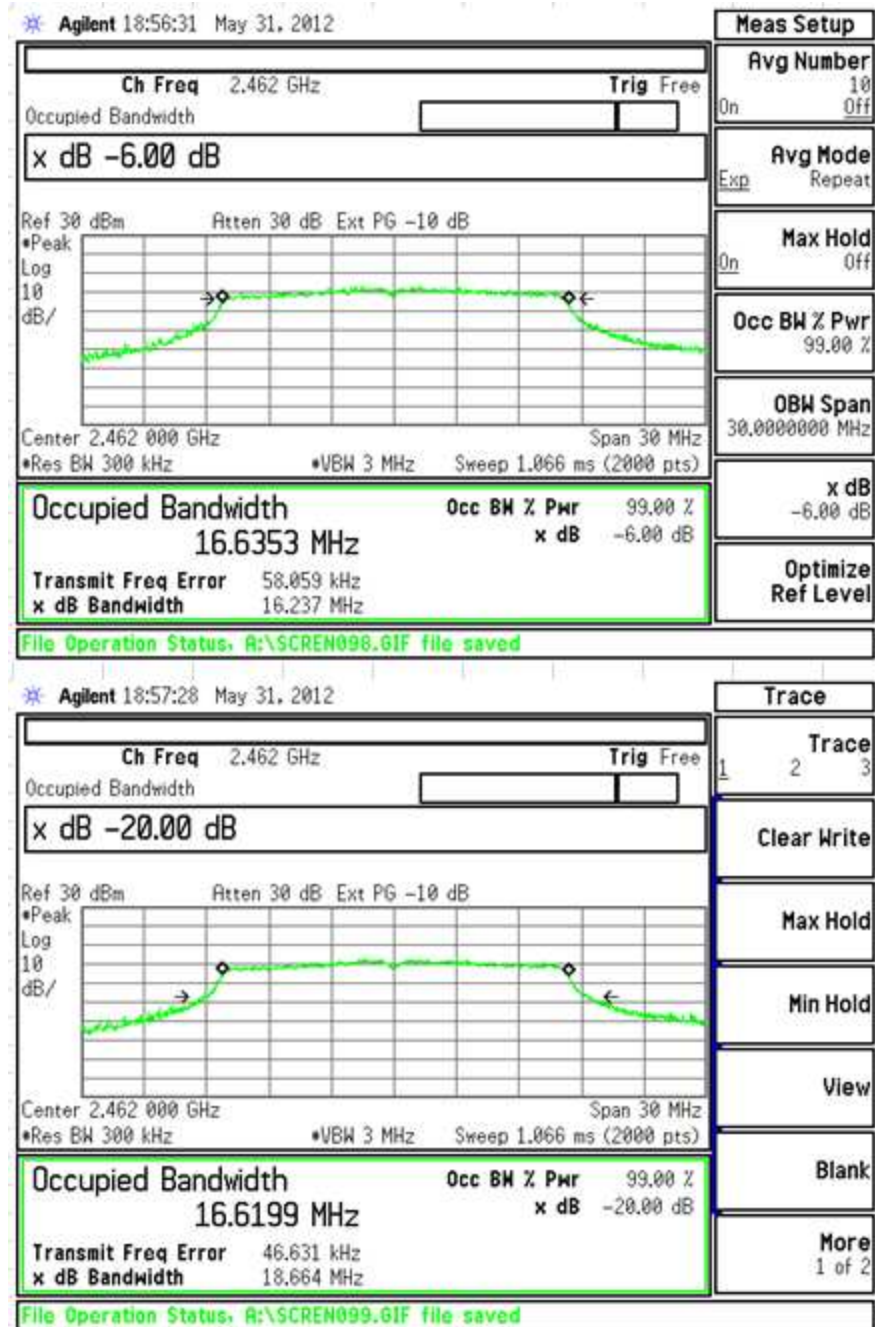
LSR: C-1466

Name: WiFi Thermostat

Model: TH8320WF

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Emission Bandwidth – Channel 11 – 2462MHz – 24 Mbps



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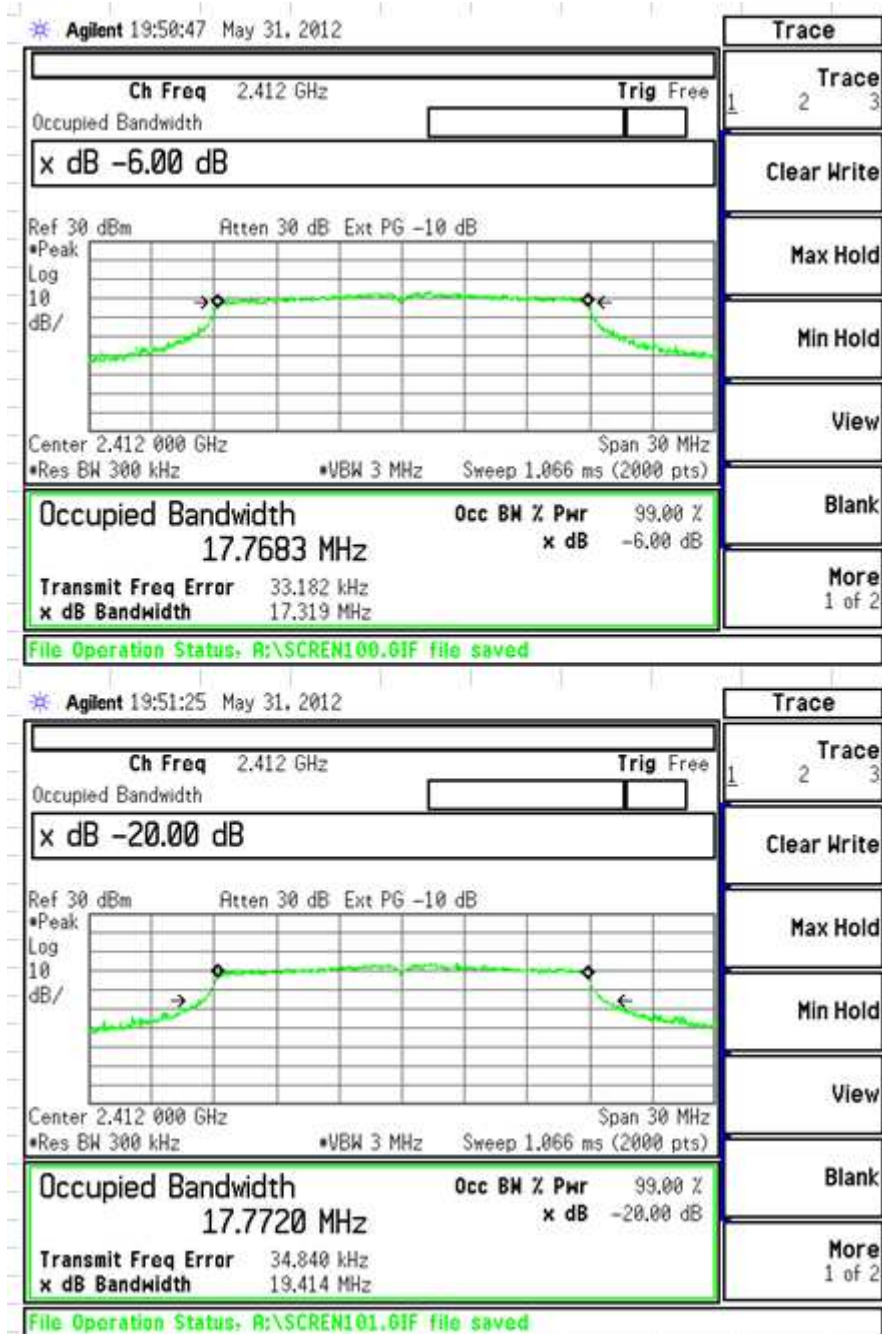
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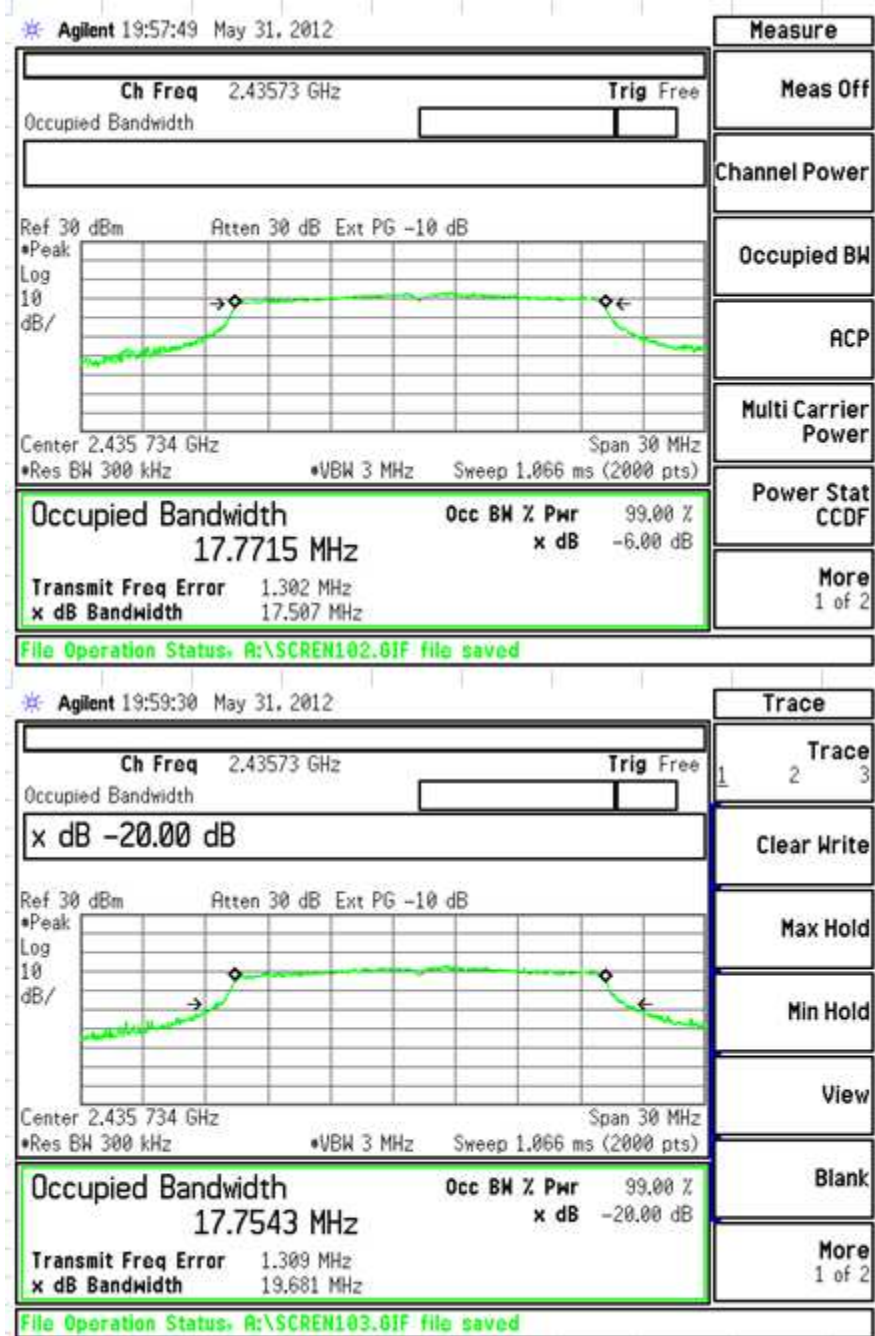
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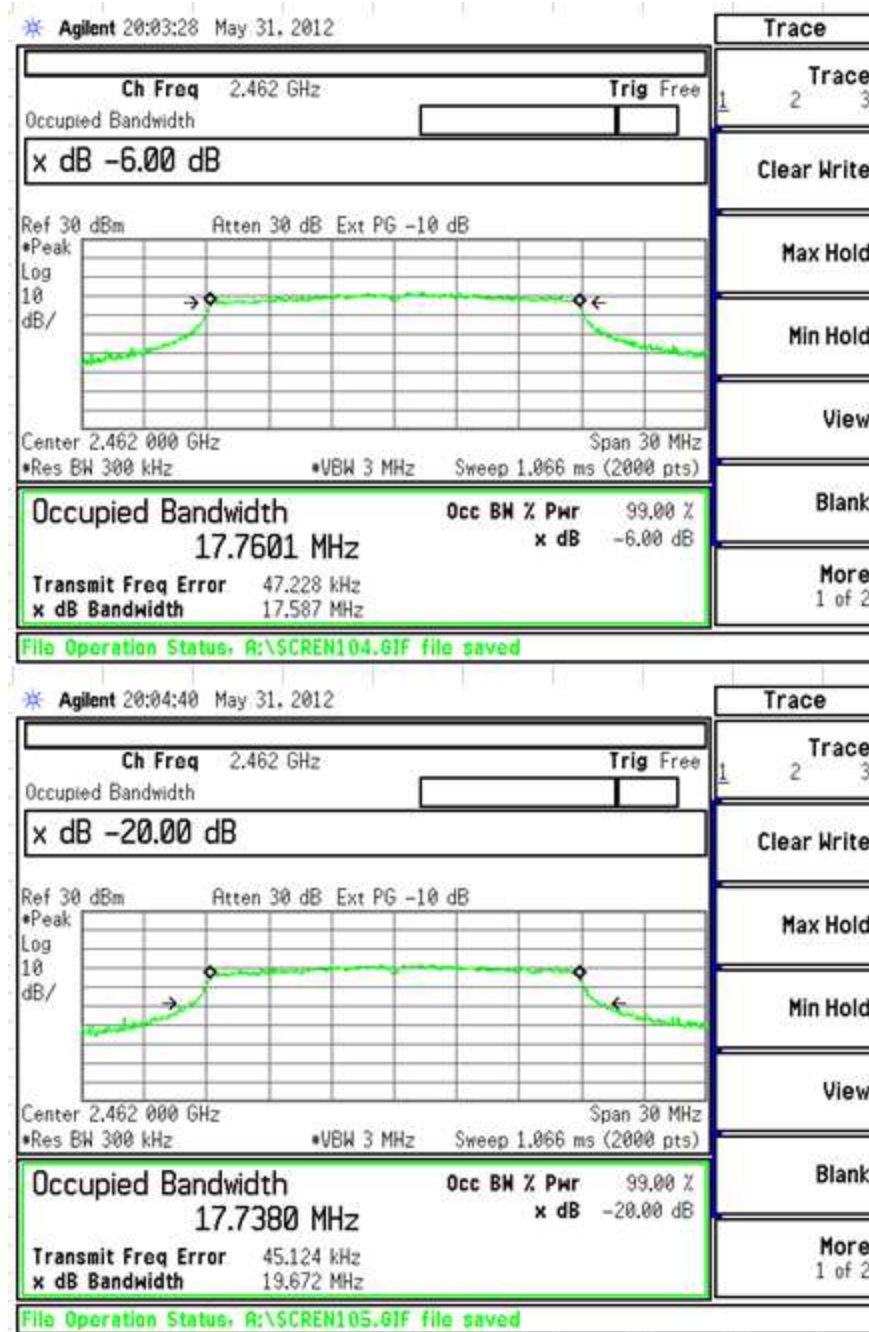
Emission Bandwidth – Channel 1 – 2412MHz – MCS7



Emission Bandwidth – Channel 6 – 2436MHz – MCS7



Emission Bandwidth – Channel 11 – 2462MHz – MCS7



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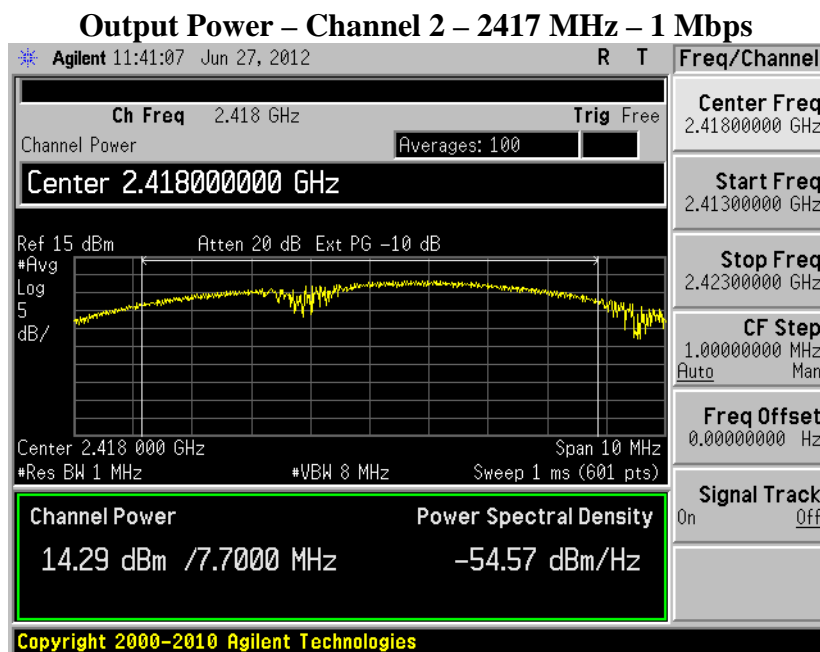
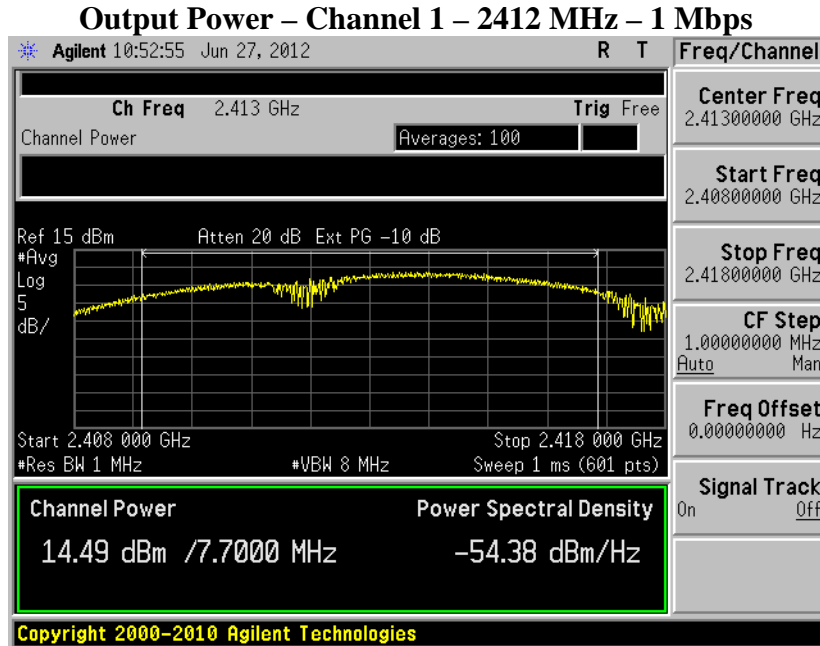
LSR: C-1466

Name: WiFi Thermostat

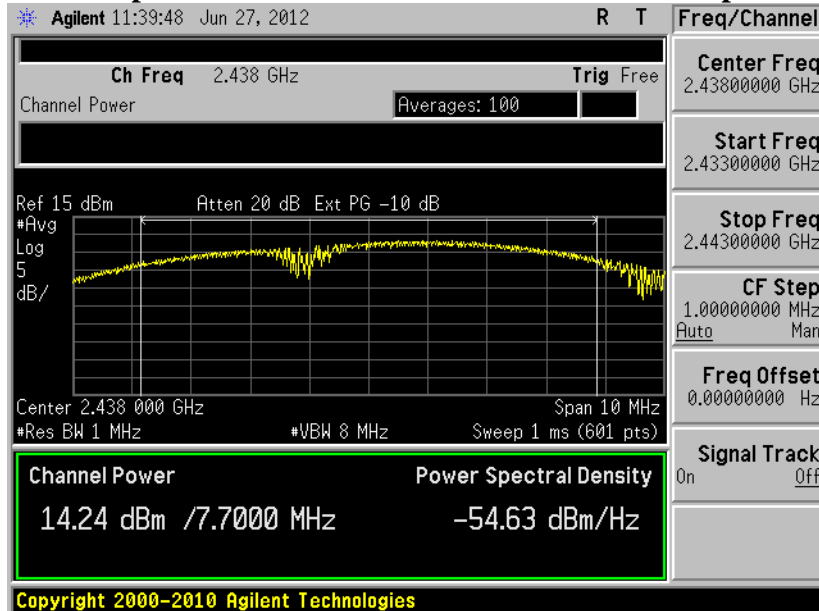
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Serial: ENG Sample

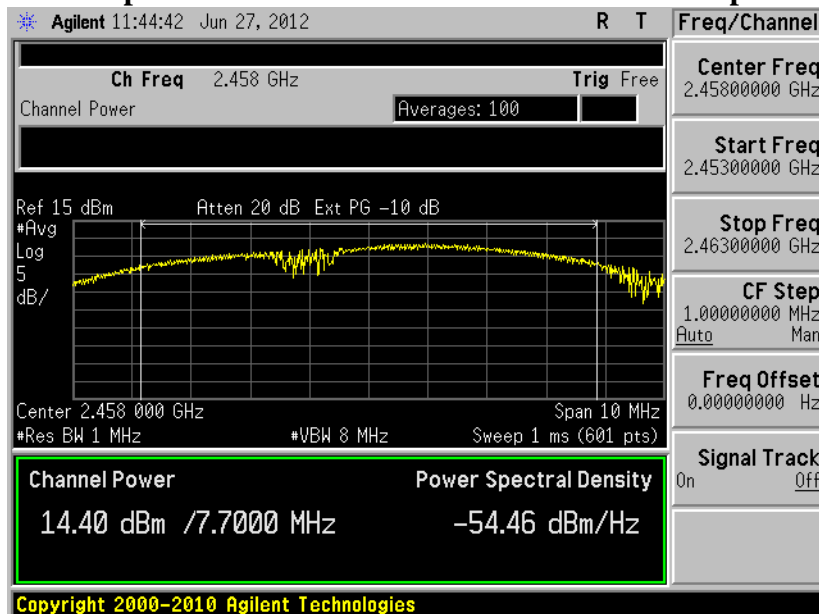
C1.2 – Output Power IEEE 802.11b



Output Power – Channel 6 – 2437 MHz – 1 Mbps



Output Power – Channel 10 – 2457 MHz – 1 Mbps



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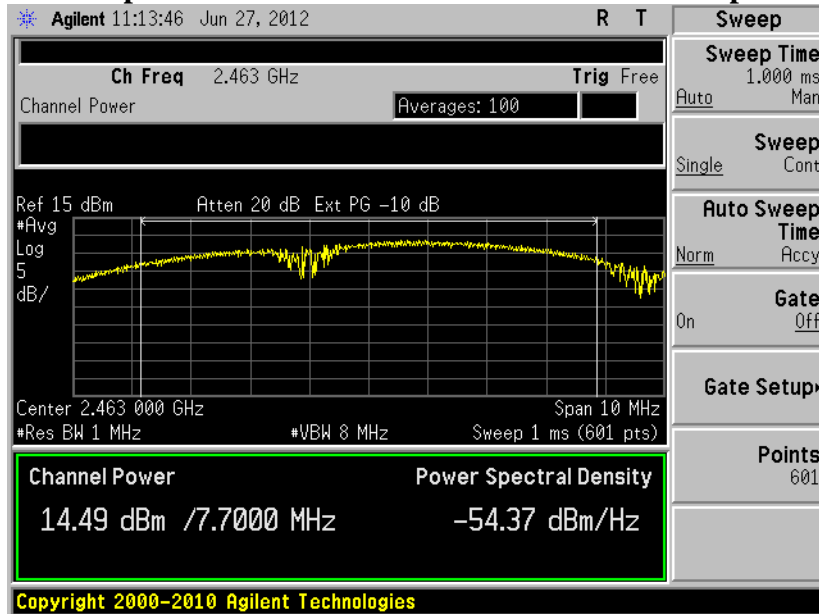
LSR: C-1466

Name: WiFi Thermostat

Model: TH8320WF

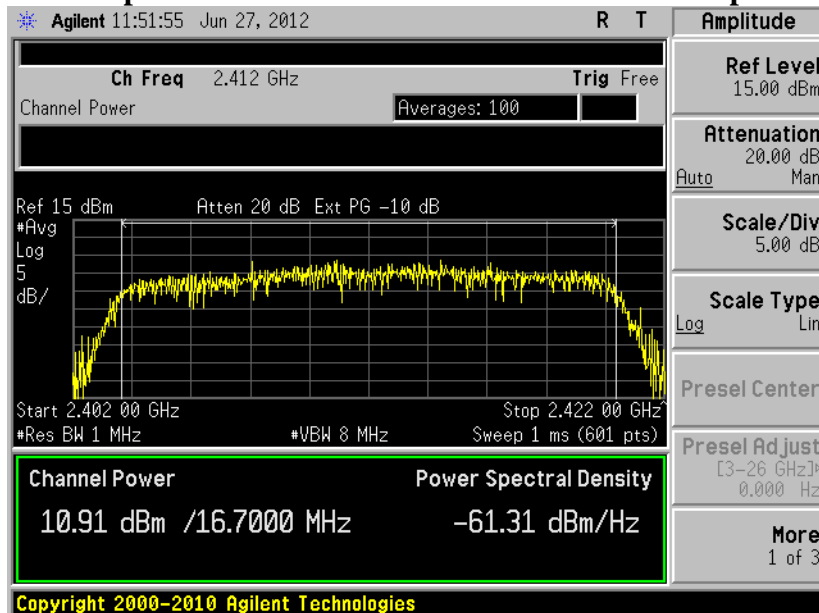
Serial: ENG Sample

Output Power – Channel 11 – 2462 MHz – 1 Mbps



IEEE 802.11g

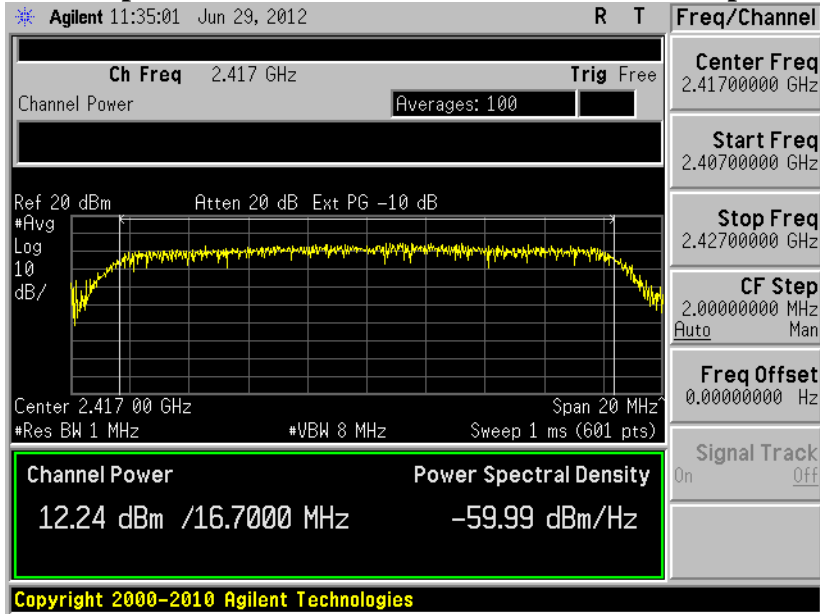
Output Power – Channel 1 – 2412 MHz – 12 Mbps



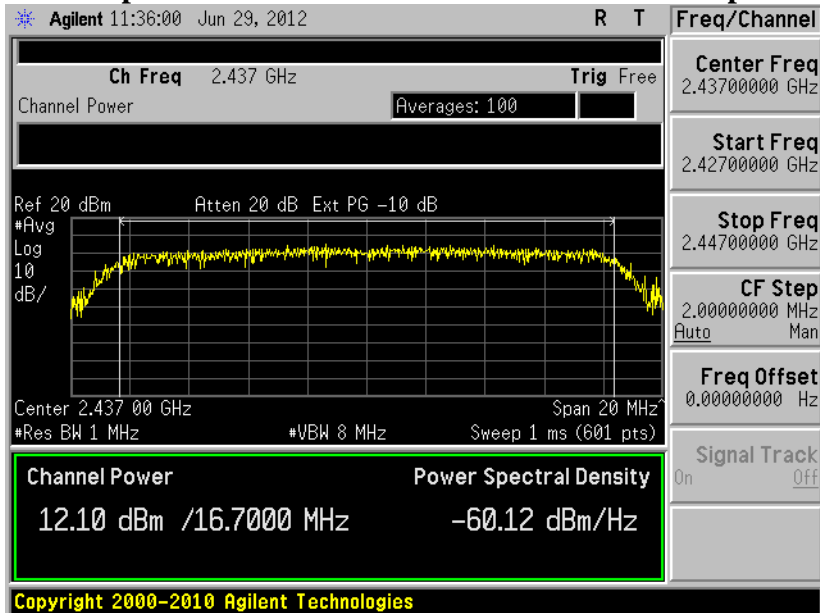
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Output Power – Channel 2 – 2417 MHz – 12 Mbps



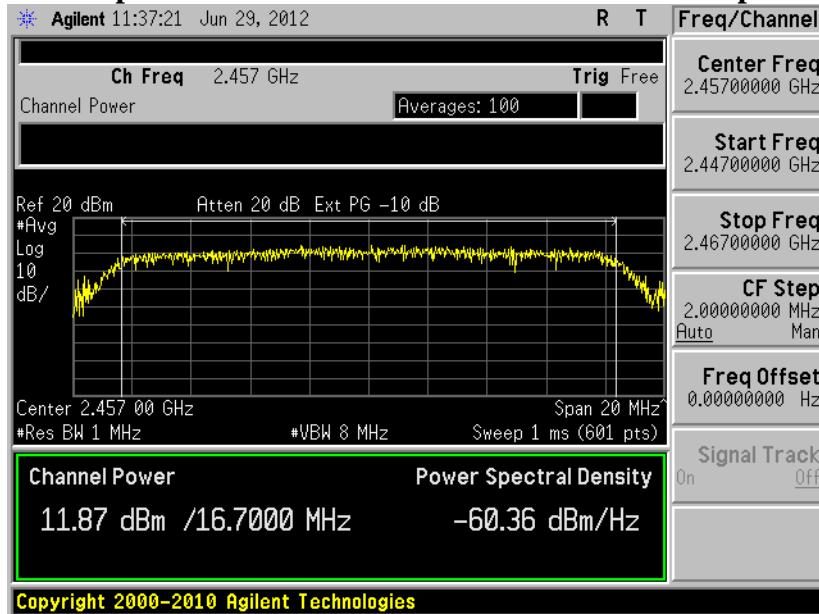
Output Power – Channel 6 – 2437 MHz – 12 Mbps



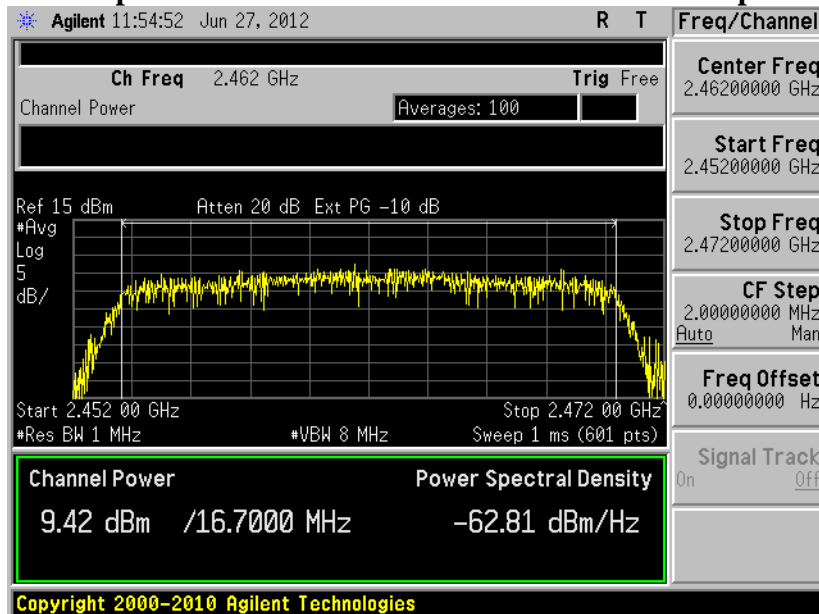
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Output Power – Channel 10 – 2457 MHz – 12 Mbps



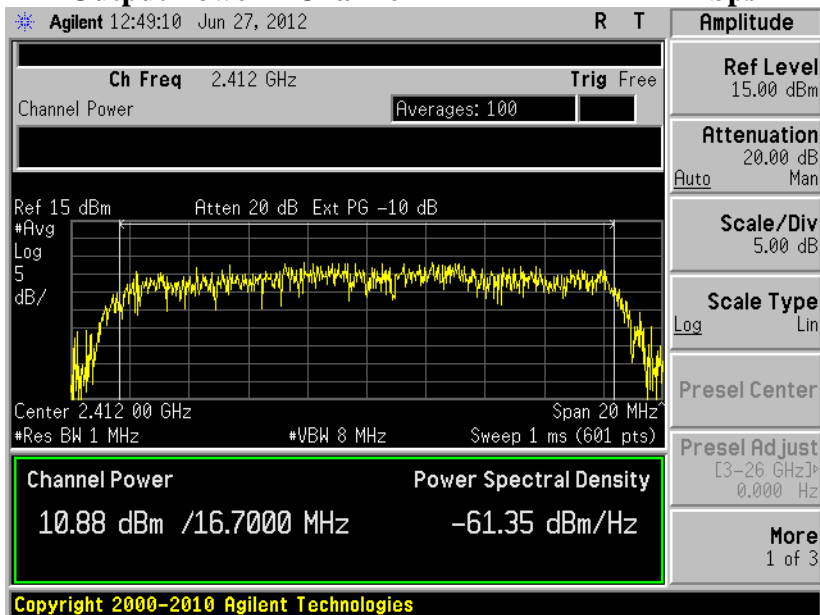
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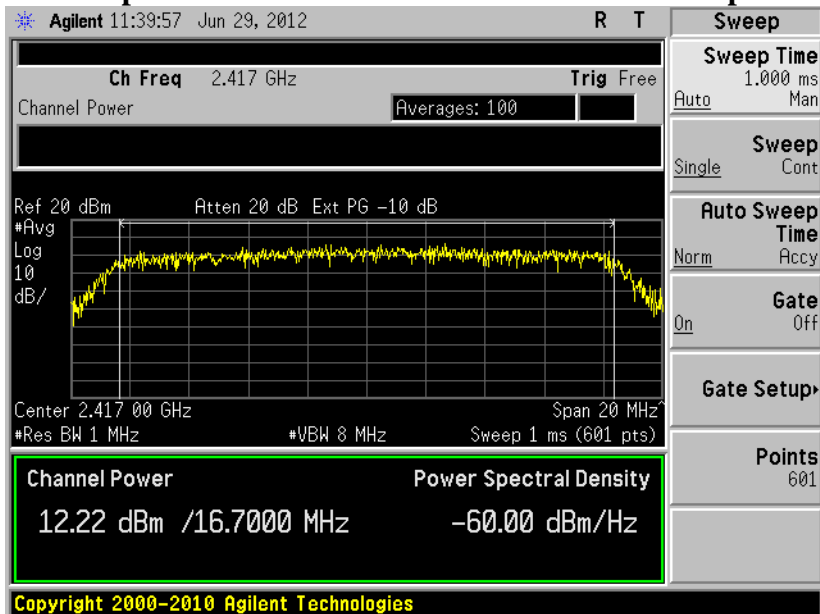
Prepared For: Honeywell
Report: TR 311318 A FCCICTX V2
LSR: C-1466

Name: WiFi Thermostat
Model: TH8320WF
Serial: ENG Sample

Output Power – Channel 1 – 2412 MHz – 24 Mbps



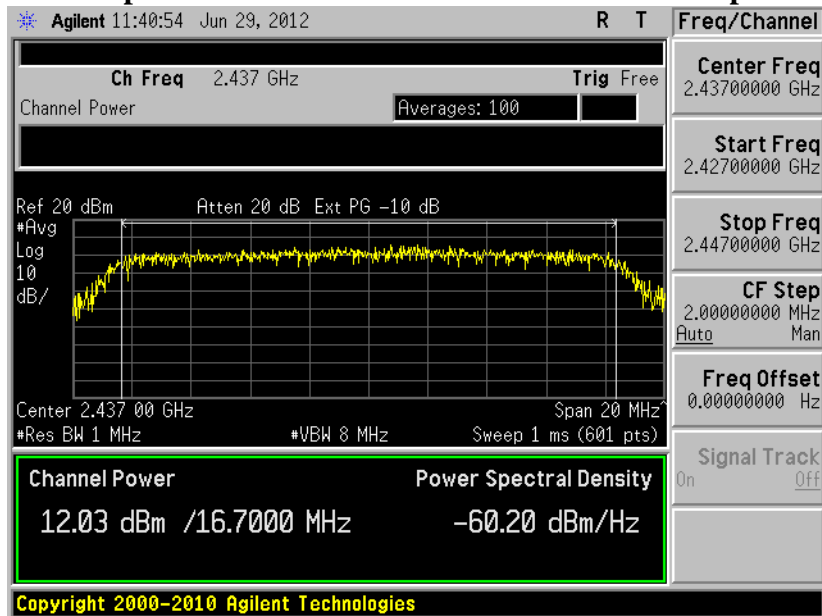
Output Power – Channel 2 – 2417 MHz – 24 Mbps



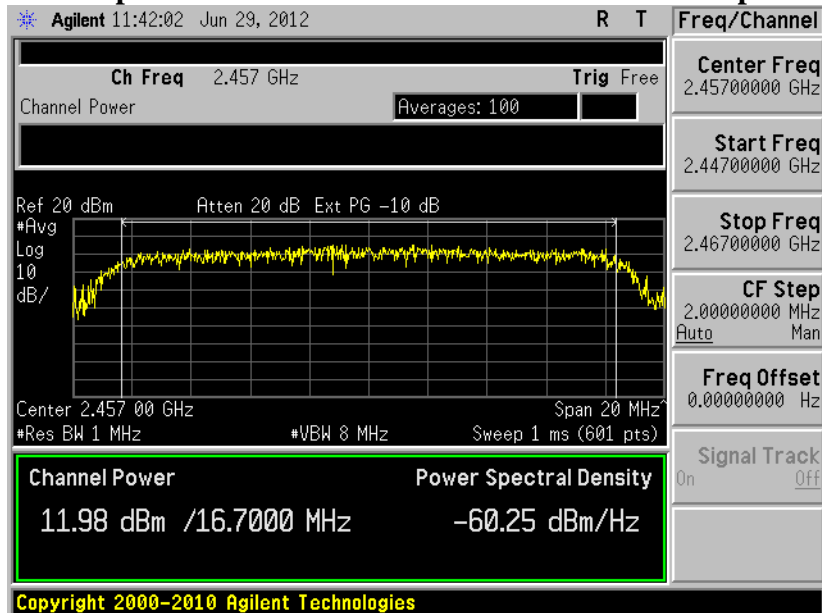
Prepared For: Honeywell
Report: TR 311318 A FCCICTX V2
LSR: C-1466

Name: WiFi Thermostat
Model: TH8320WF
Serial: ENG Sample

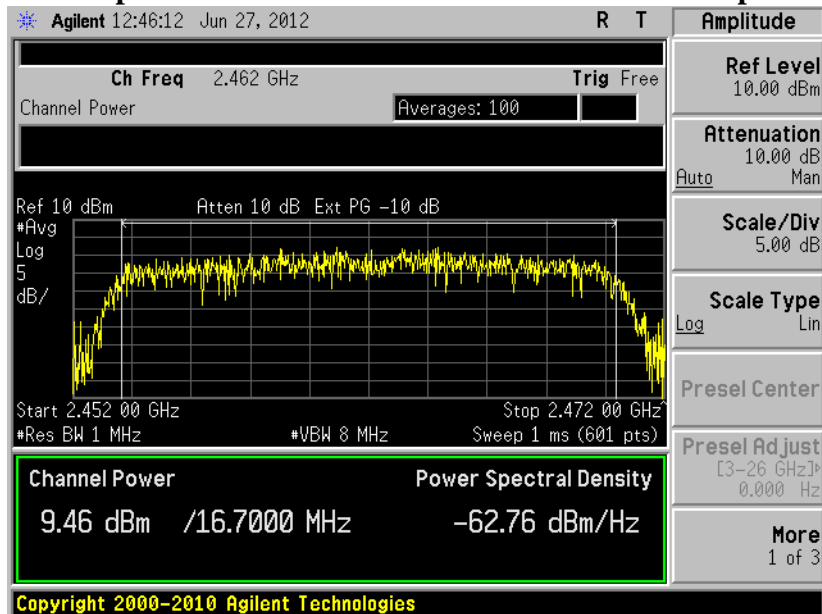
Output Power – Channel 6 – 2437 MHz – 24 Mbps



Output Power – Channel 10 – 2457 MHz – 24 Mbps

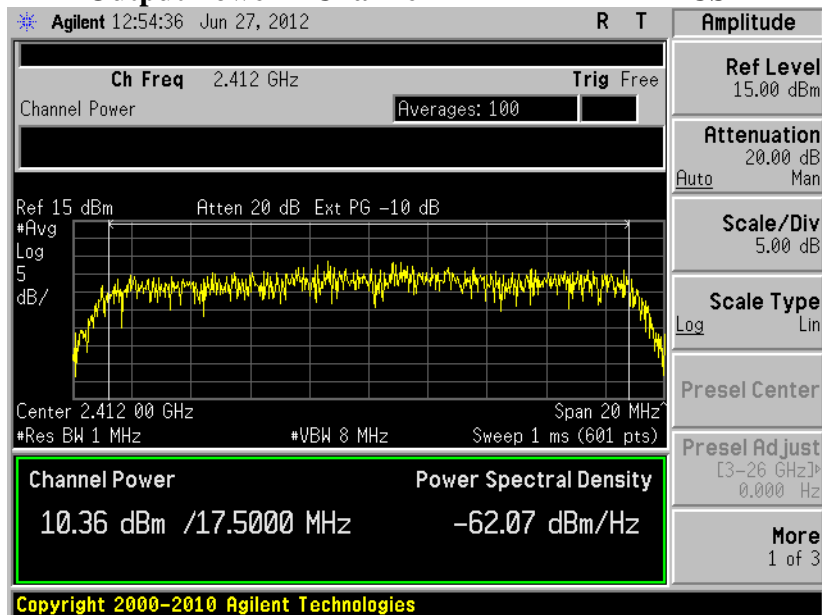


Output Power – Channel 11 – 2462 MHz – 24 Mbps



IEEE 802.11n

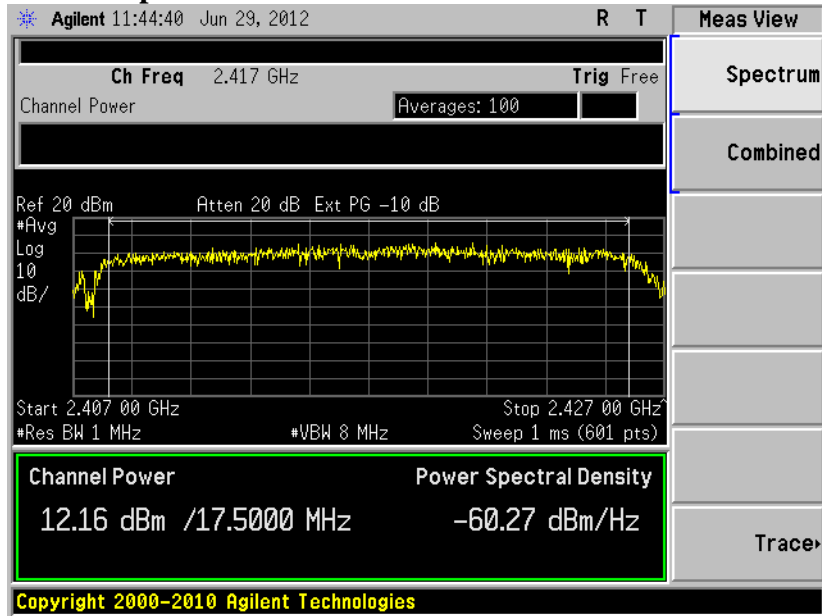
Output Power – Channel 1 – 2412 MHz – MCS7



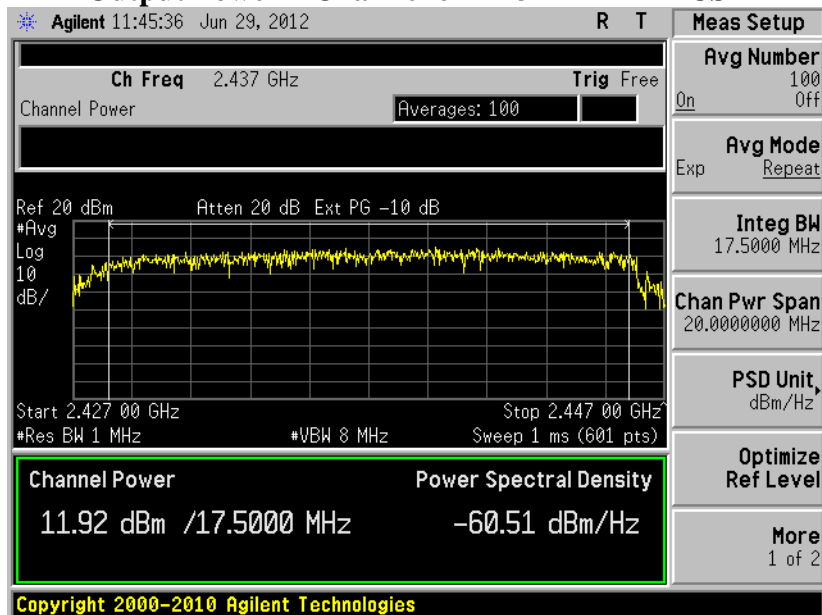
Prepared For: Honeywell
Report: TR 311318 A FCCICTX V2
LSR: C-1466

Name: WiFi Thermostat
Model: TH8320WF
Serial: ENG Sample

Output Power – Channel 2 – 2417 MHz – MCS7



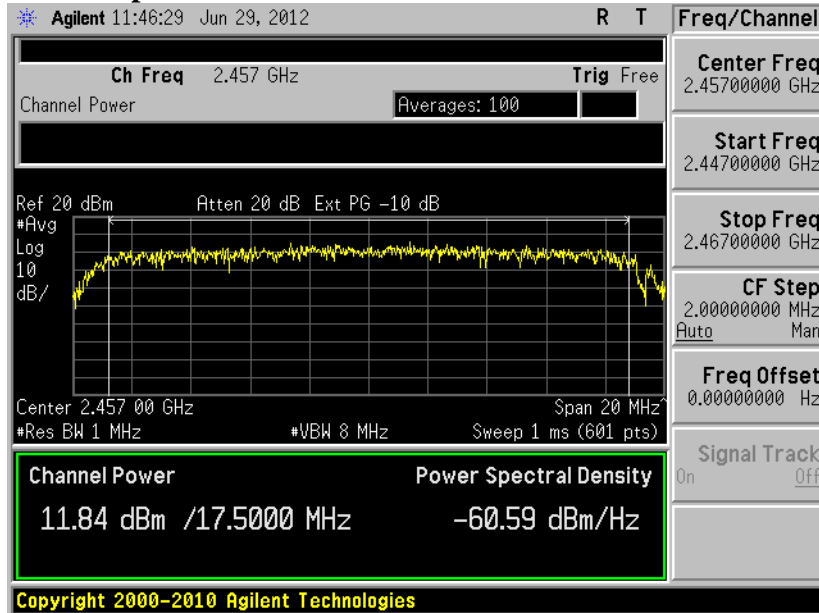
Output Power – Channel 6 – 2437 MHz – MCS7



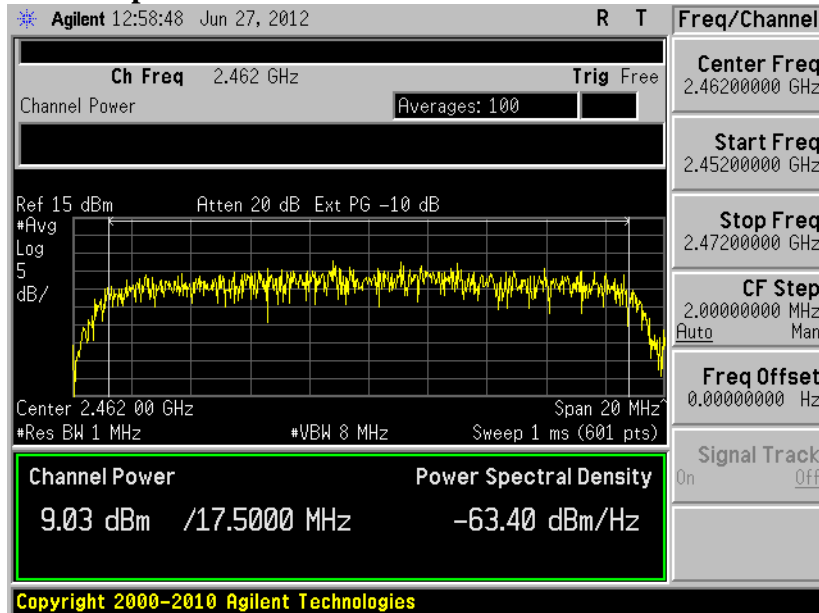
Prepared For: Honeywell
 Report: TR 311318 A FCCICTX V2
 LSR: C-1466

Name: WiFi Thermostat
 Model: TH8320WF
 Serial: ENG Sample

Output Power – Channel 10 – 2457 MHz – MCS7



Output Power – Channel 11 – 2462 MHz – MCS7

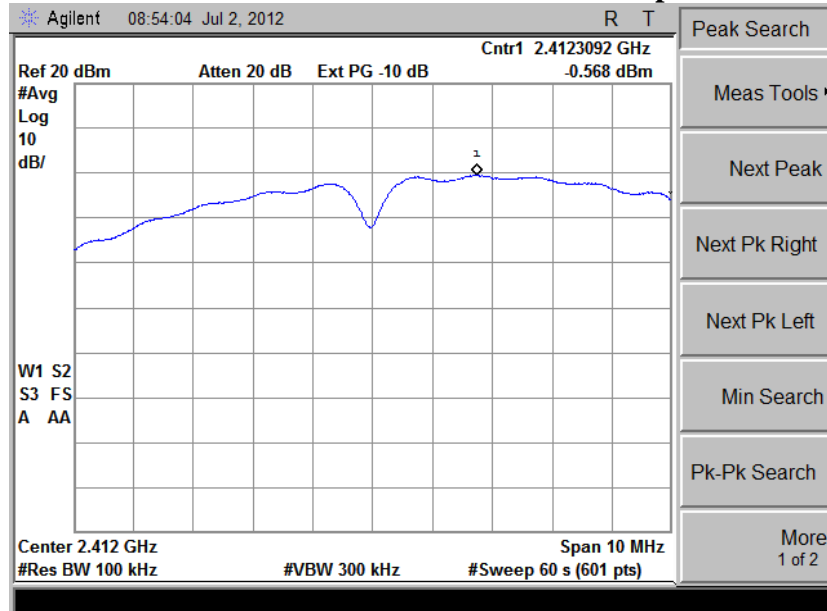


Prepared For: Honeywell
Report: TR 311318 A FCCICTX V2
LSR: C-1466

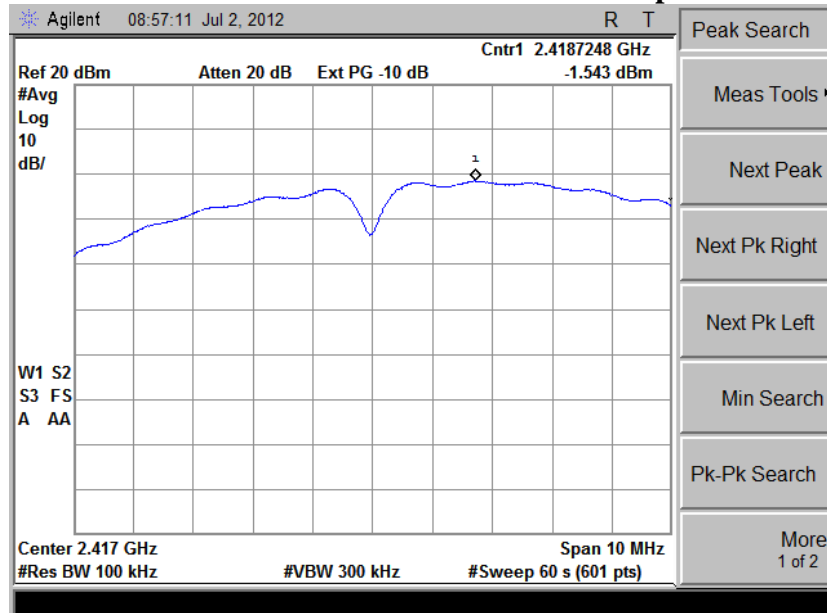
Name: WiFi Thermostat
Model: TH8320WF
Serial: ENG Sample

C1.3 – Power Spectral Density (PSD) IEEE 802.11b

PSD – Channel 1 – 2412MHz – 1 Mbps



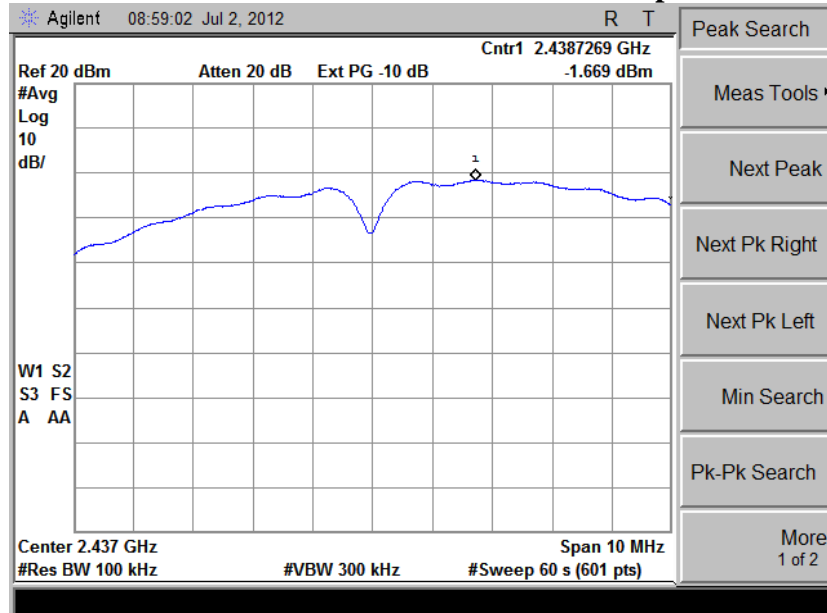
PSD – Channel 2 – 2417MHz – 1 Mbps



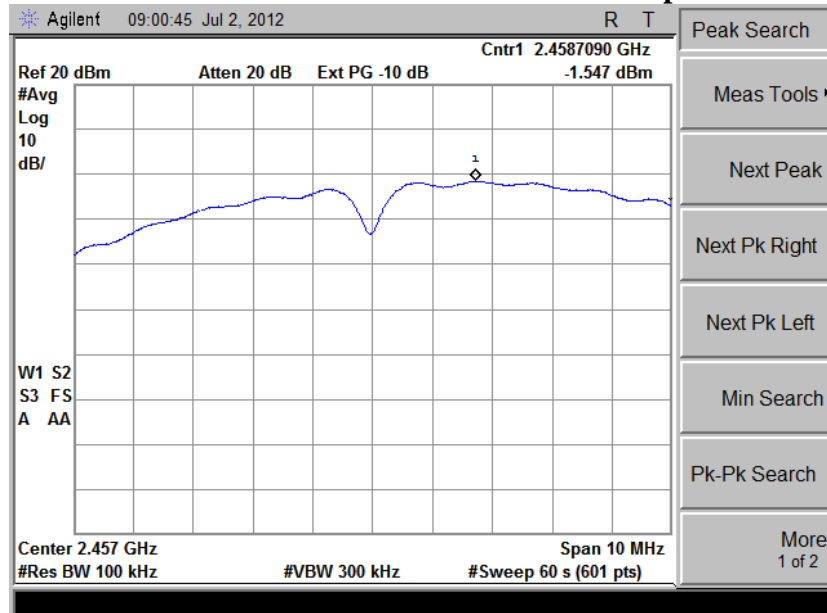
Prepared For: Honeywell
Report: TR 311318 A FCCICTX V2
LSR: C-1466

Name: WiFi Thermostat
Model: TH8320WF
Serial: ENG Sample

PSD – Channel 6 – 2437MHz – 1 Mbps



PSD – Channel 10 – 2457MHz – 1 Mbps



Prepared For: Honeywell

Report: TR 311318 A FCCICTX V2

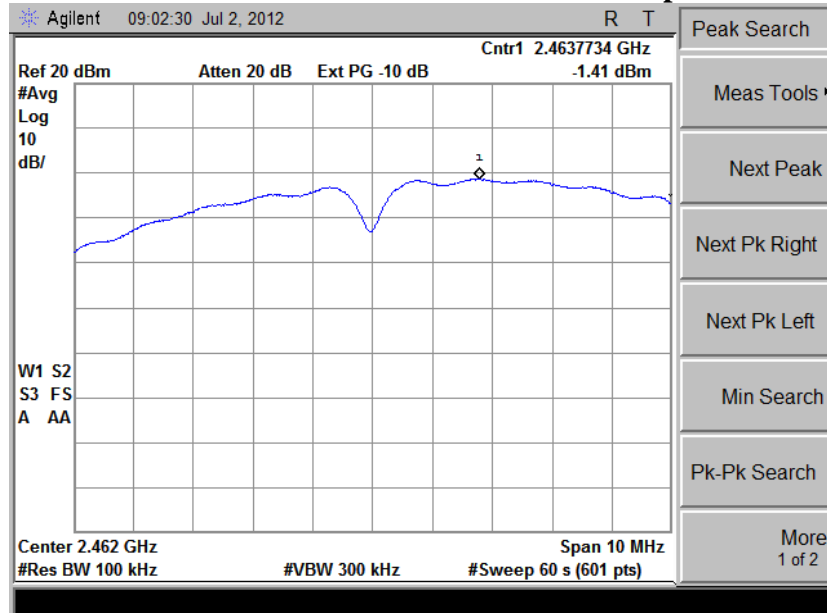
LSR: C-1466

Name: WiFi Thermostat

Model: TH8320WF

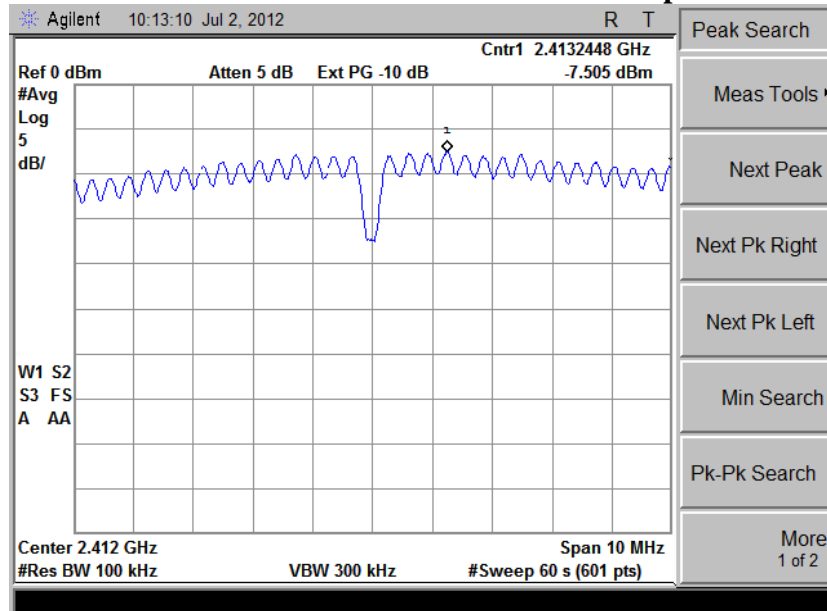
Serial: ENG Sample

PSD – Channel 11 – 2462MHz – 1 Mbps

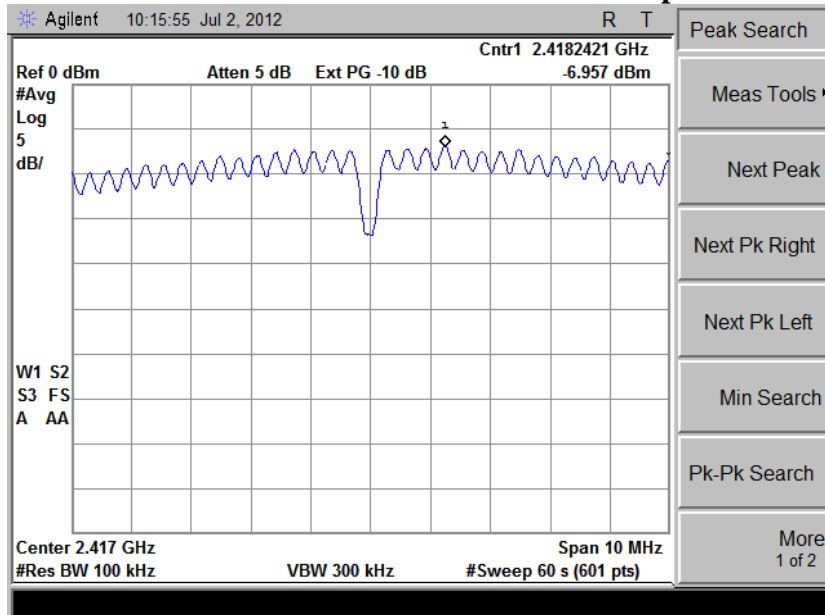


IEEE 802.11g

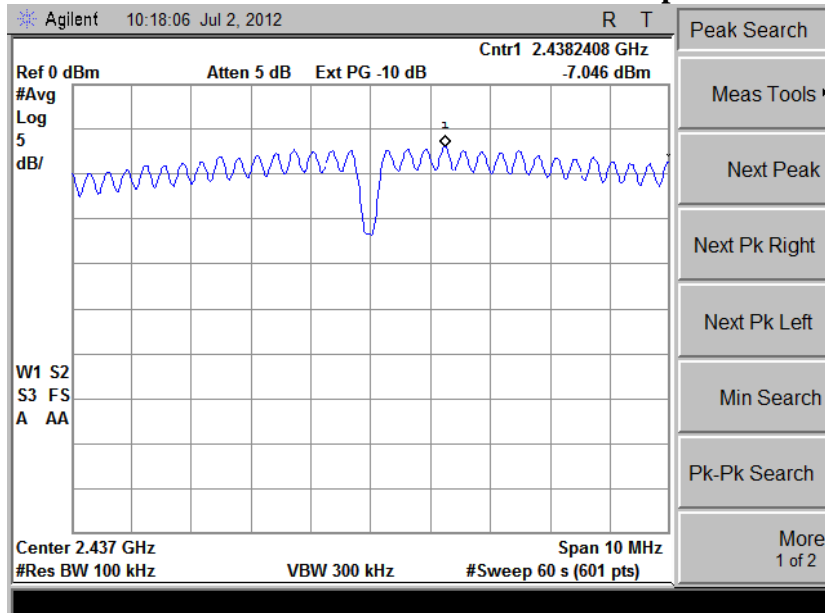
PSD – Channel 1 – 2412MHz – 12 Mbps



PSD – Channel 2 – 2417MHz – 12 Mbps



PSD – Channel 6 – 2437MHz – 12 Mbps



Prepared For: Honeywell

Report: TR 311318 A FCCICTX V2

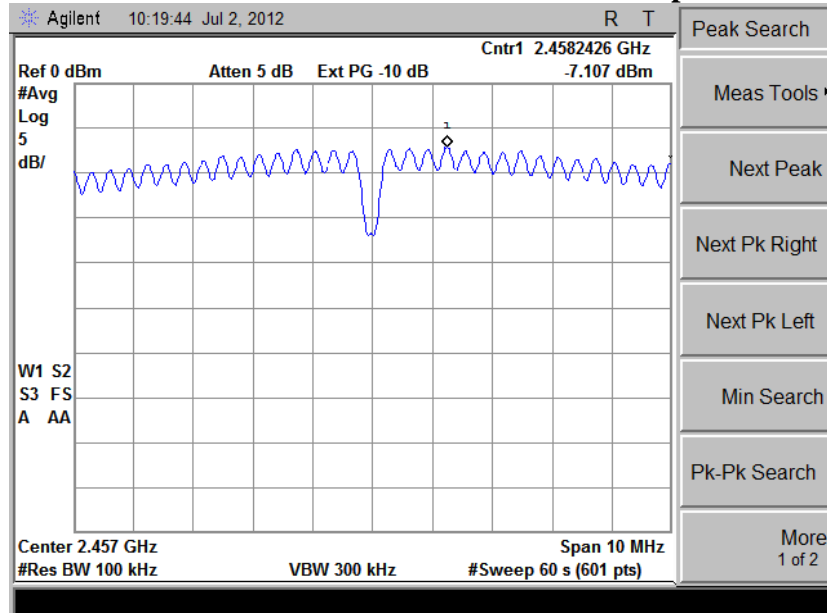
LSR: C-1466

Name: WiFi Thermostat

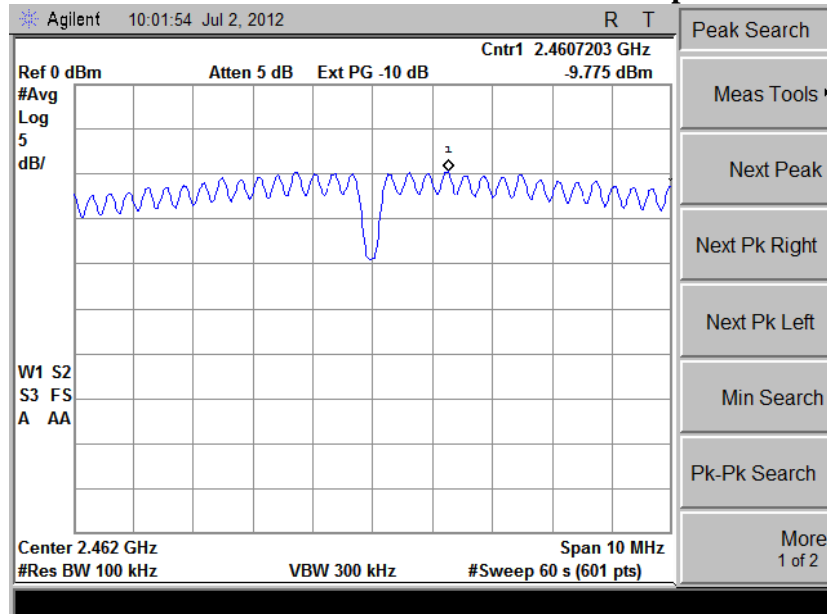
Model: TH8320WF

Serial: ENG Sample

PSD – Channel 10 – 2457MHz – 12 Mbps



PSD – Channel 11 – 2462MHz – 12 Mbps



Prepared For: Honeywell

Report: TR 311318 A FCCICTX V2

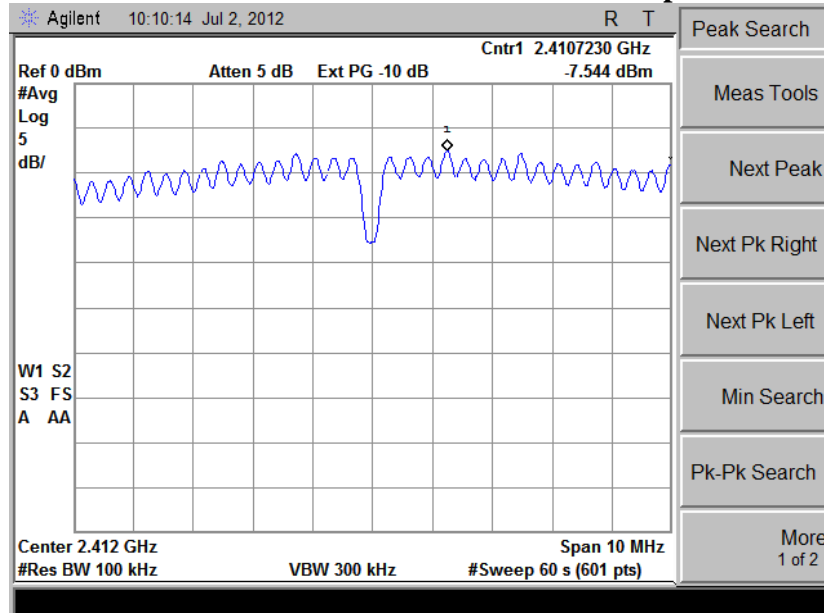
LSR: C-1466

Name: WiFi Thermostat

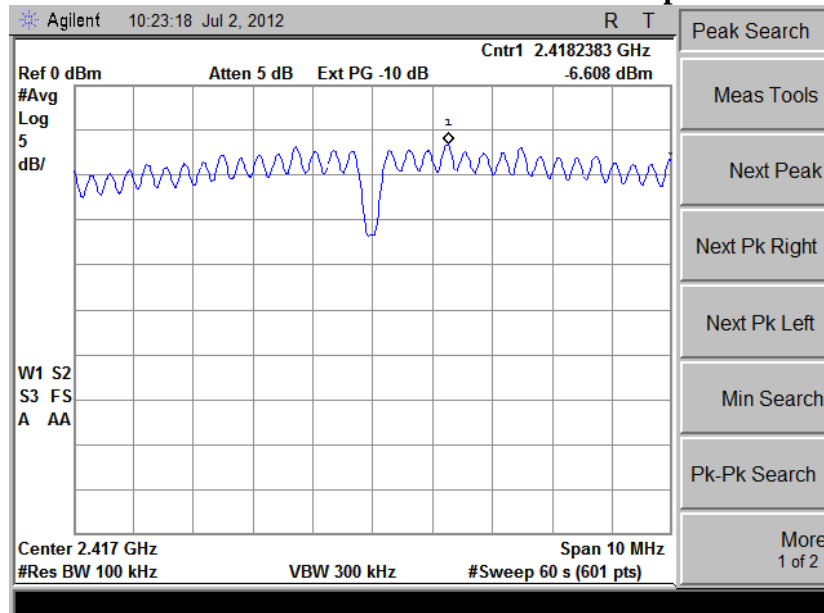
Model: TH8320WF

Serial: ENG Sample

PSD – Channel 1 – 2412MHz – 24 Mbps

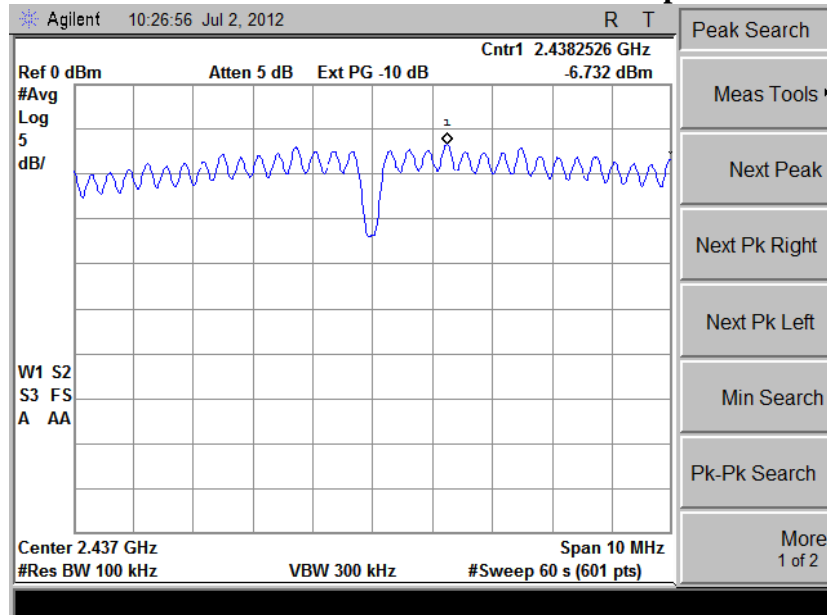


PSD – Channel 2 – 2417MHz – 24 Mbps

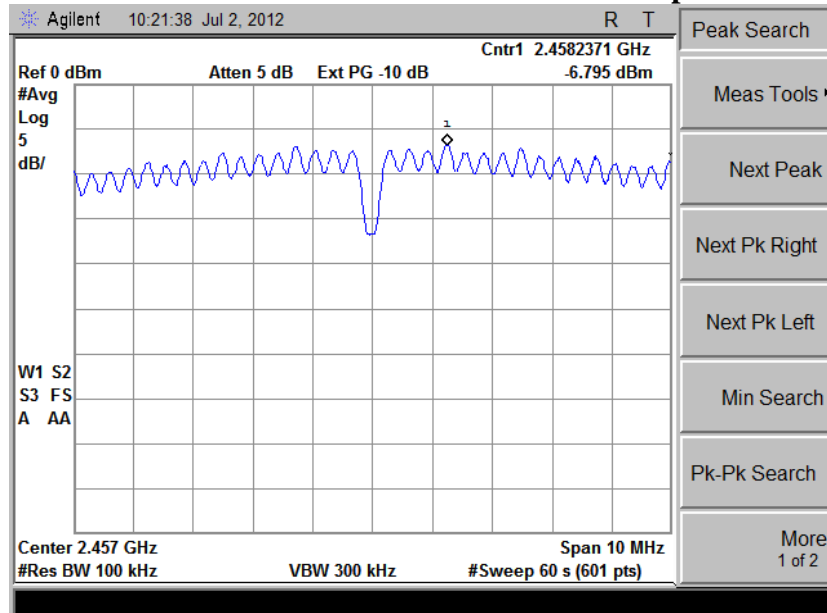


Prepared For: Honeywell	Name: WiFi Thermostat
Report: TR 311318 A FCCICTX V2	Model: TH8320WF
LSR: C-1466	Serial: ENG Sample

PSD – Channel 6 – 2437MHz – 24 Mbps



PSD – Channel 10 – 2457MHz – 24 Mbps



Prepared For: Honeywell

Report: TR 311318 A FCCICTX V2

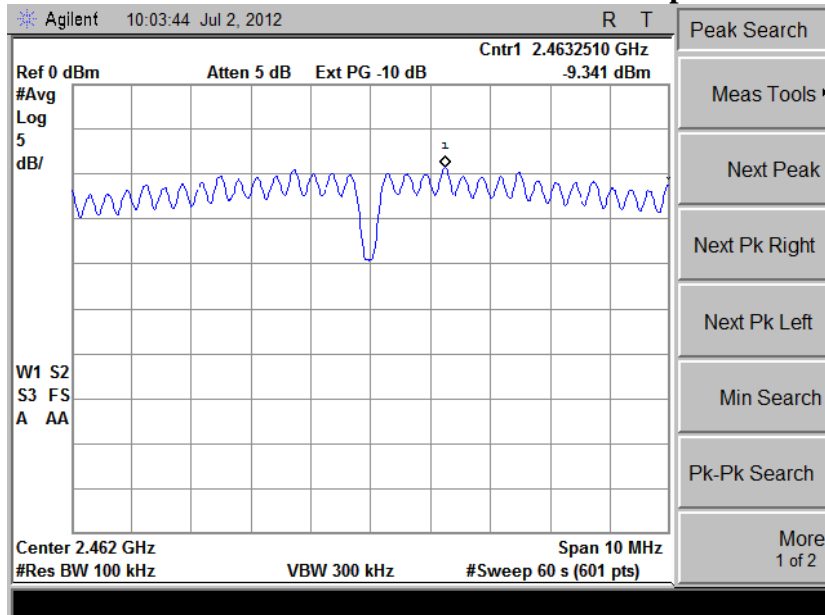
LSR: C-1466

Name: WiFi Thermostat

Model: TH8320WF

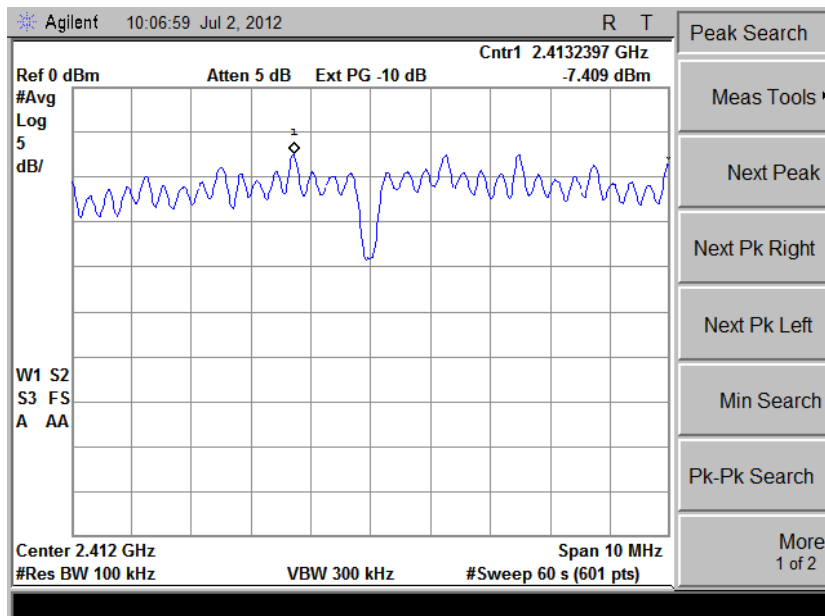
Serial: ENG Sample

PSD – Channel 11 – 2462MHz – 24 Mbps



IEEE 802.11n

PSD – Channel 1 – 2412MHz – MCS7



Prepared For: Honeywell

Report: TR 311318 A FCCICTX V2

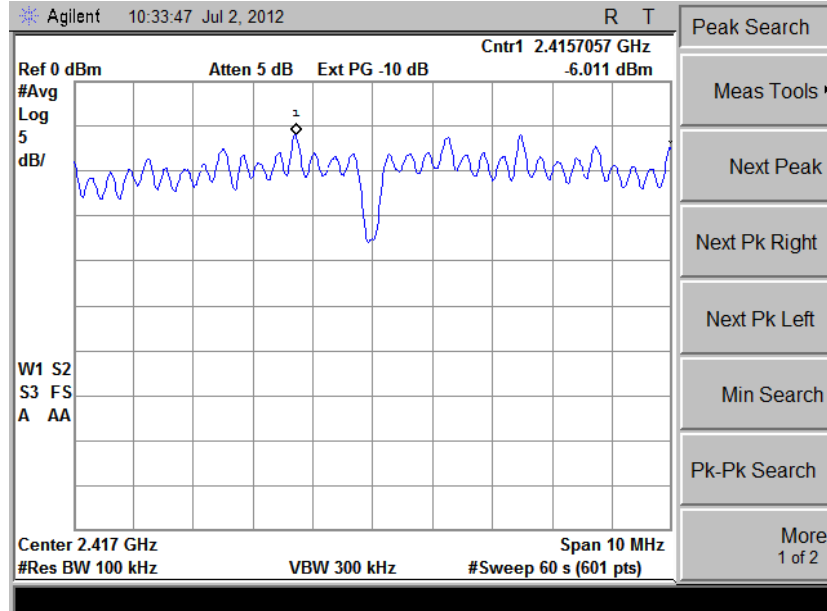
LSR: C-1466

Name: WiFi Thermostat

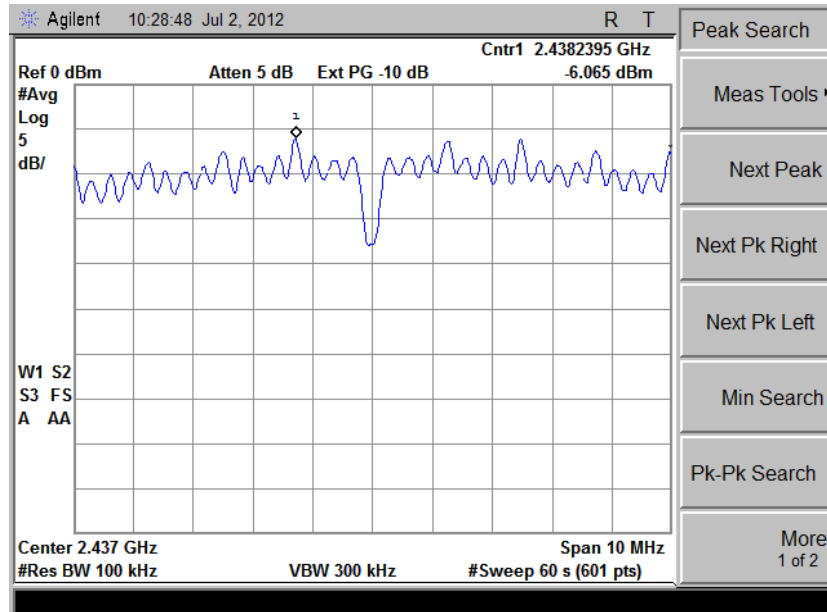
Model: TH8320WF

Serial: ENG Sample

PSD – Channel 2 – 2417MHz – MCS7



PSD – Channel 6 – 2437MHz – MCS7



Prepared For: Honeywell

Report: TR 311318 A FCCICTX V2

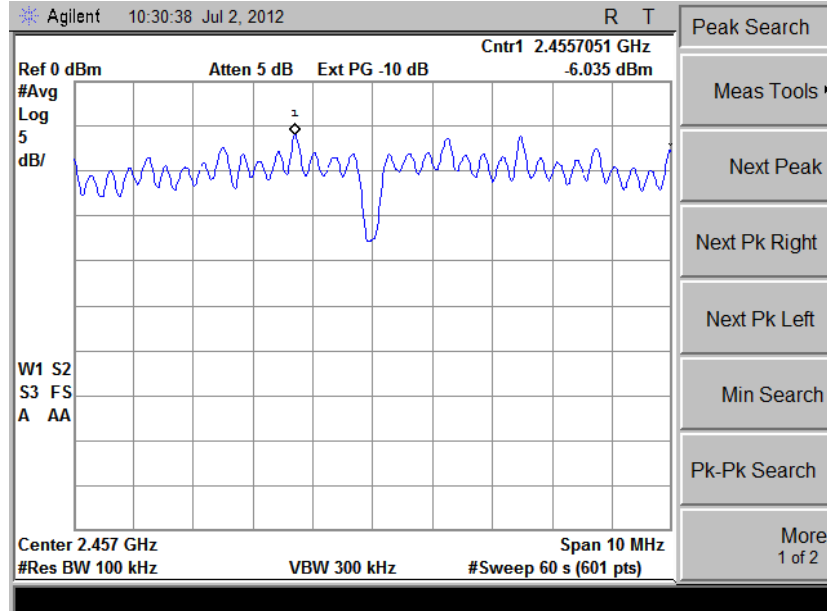
LSR: C-1466

Name: WiFi Thermostat

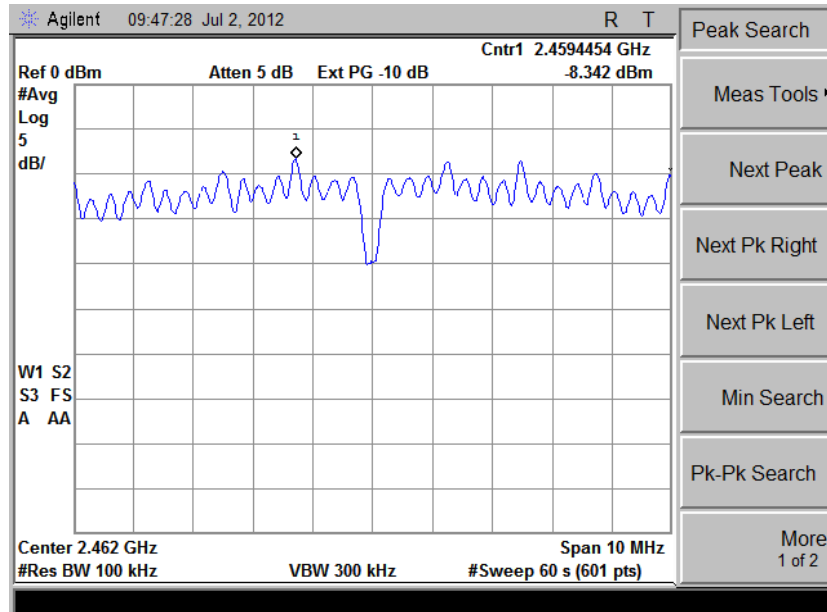
Model: TH8320WF

Serial: ENG Sample

PSD – Channel 10 – 2457MHz – MCS7



PSD – Channel 11 – 2462MHz – MCS7



Prepared For: Honeywell

Report: TR 311318 A FCCICTX V2

LSR: C-1466

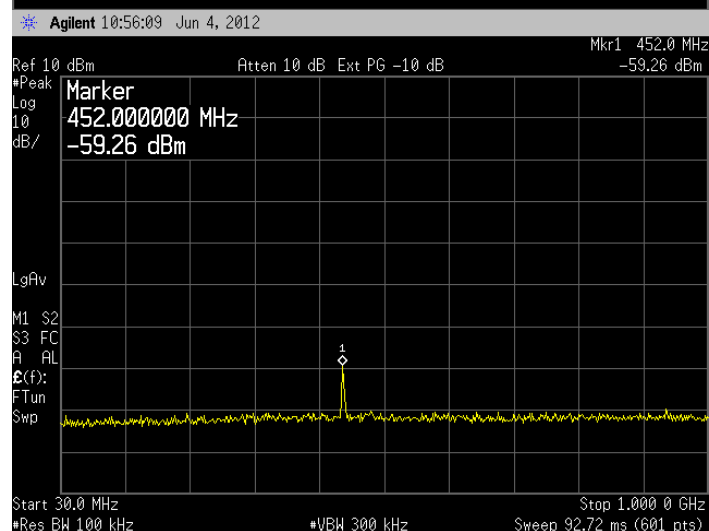
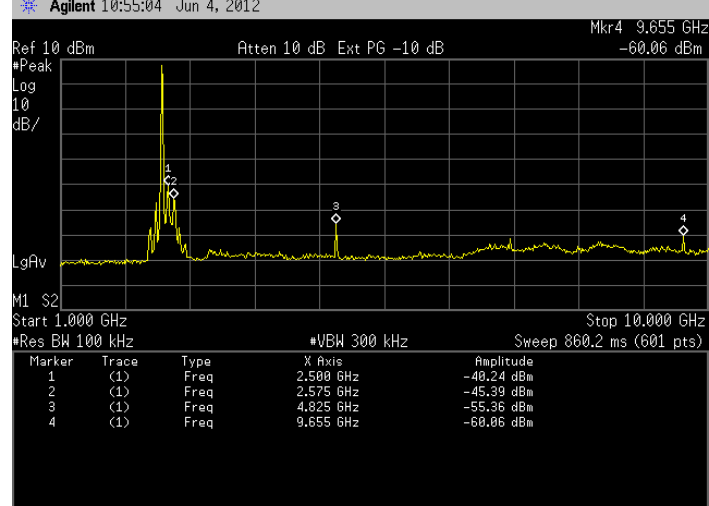
Name: WiFi Thermostat

Model: TH8320WF

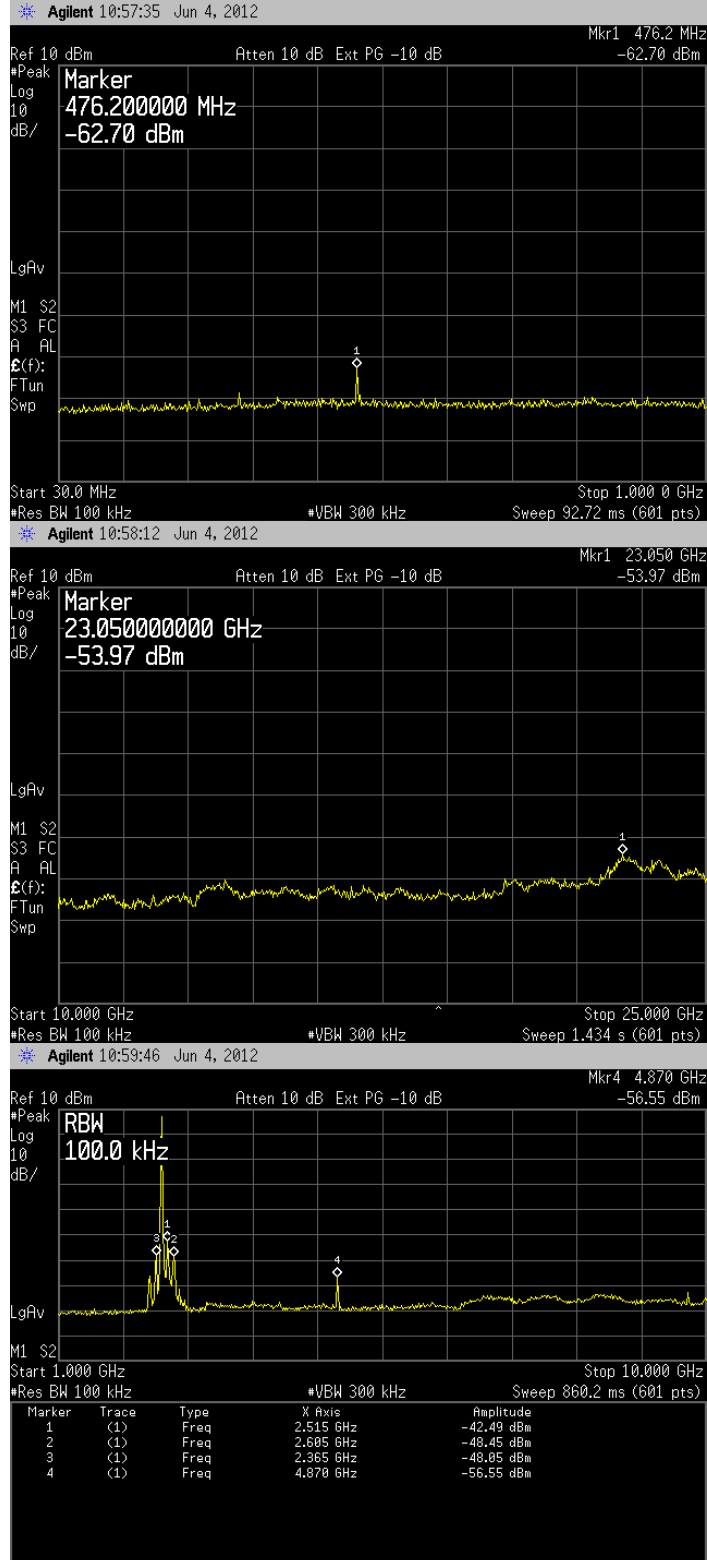
Serial: ENG Sample

C1.4 – Spurious Conducted IEEE 802.11b

Spurious – Channel 1 – 2412MHz – 1 Mbps



Spurious – Channel 6 – 2432MHz – 1 Mbps



Prepared For: Honeywell

Report: TR 311318 A FCCICTX V2

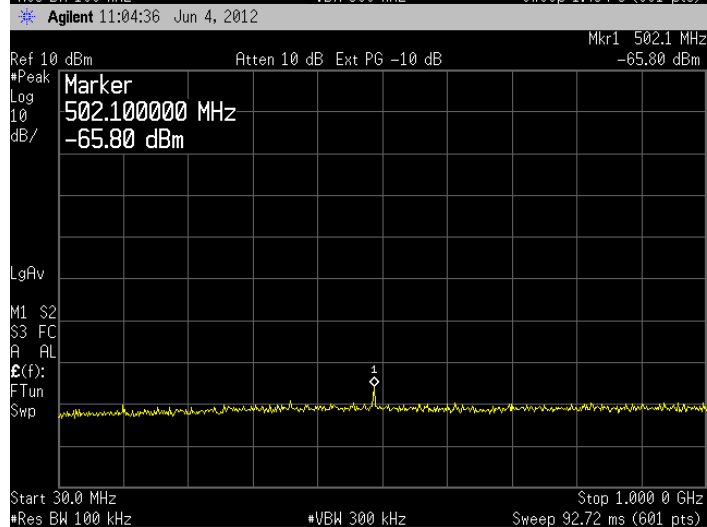
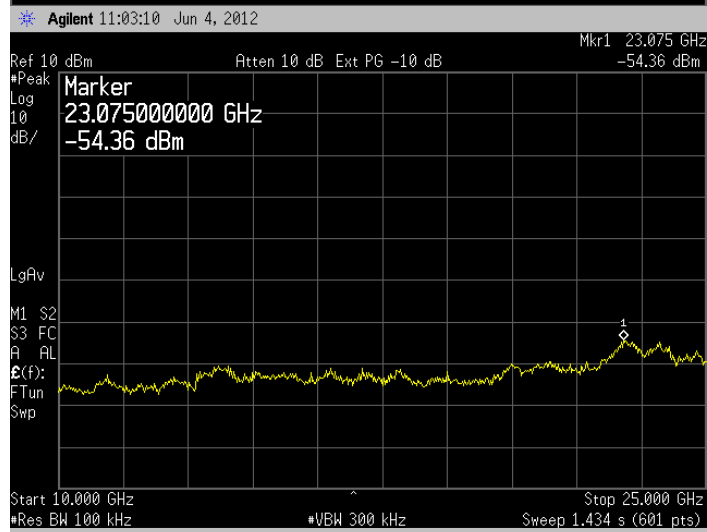
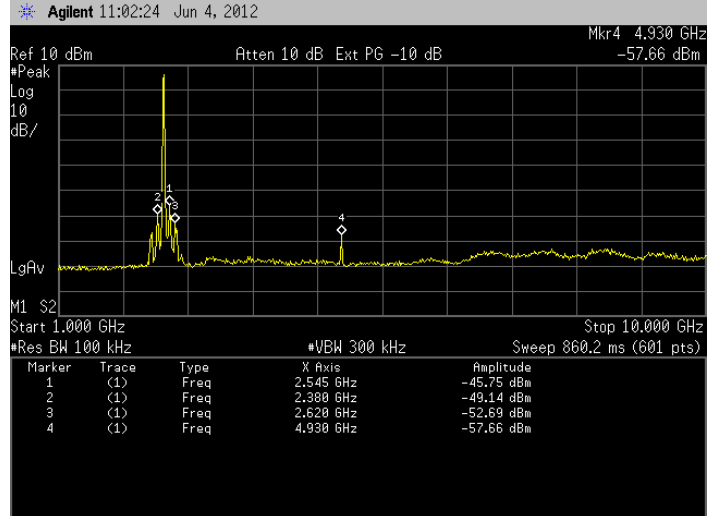
LSR: C-1466

Name: WiFi Thermostat

Model: TH8320WF

Serial: ENG Sample

Spurious – Channel 11 – 2462MHz – 1 Mbps

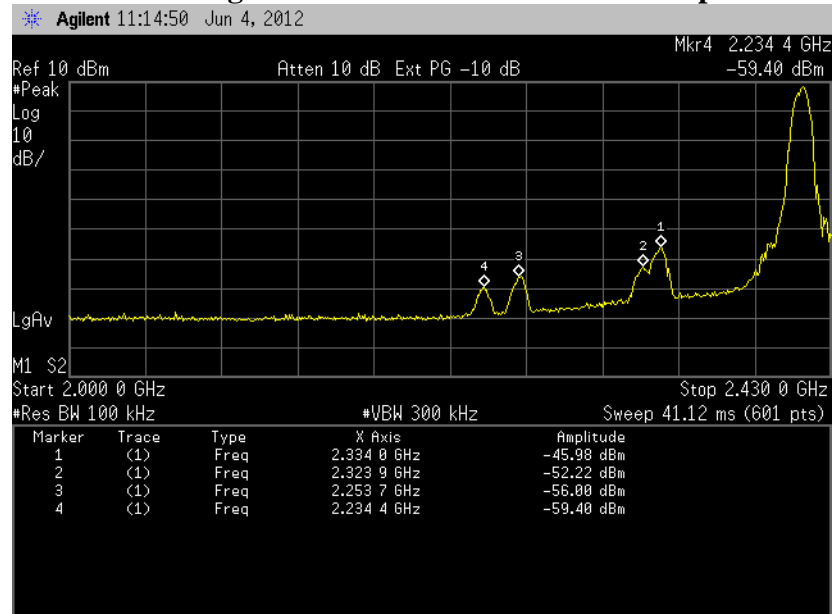


Prepared For: Honeywell
 Report: TR 311318 A FCCICTX V2
 LSR: C-1466

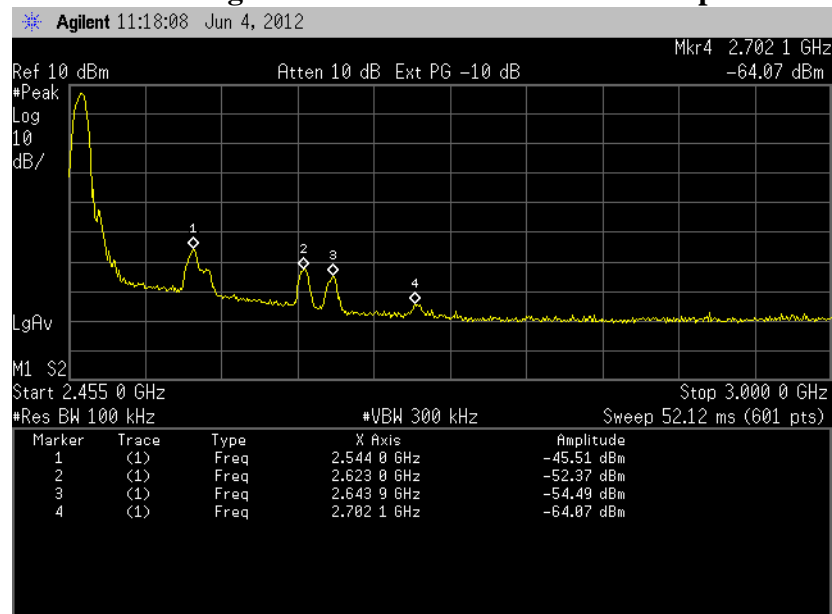
Name: WiFi Thermostat
 Model: TH8320WF
 Serial: ENG Sample

IEEE 802.11b

Band-edge – Channel 1 – 2412MHz – 1 Mbps



Band-edge – Channel 1 – 2462MHz – 1 Mbps



C1.5 - Frequency and Power Stability over Voltage Variations

	20.4 VAC		24 VAC		27.6 VAC		FREQ DRIFT (Hz)	Pout DRIFT (dBm)
	POWER (dBm)	FREQUENCY (Hz)	POWER (dBm)	FREQUENCY (Hz)	POWER (dBm)	FREQUENCY (Hz)		
LOW CHANNEL	-3.24	2413666333	-3.11	2413666666	-3.47	2413666666	333	0.4
MID CHANNEL	-3.31	2437833333	-3.05	2437833333	-3.44	2437866666	33333	0.4
HIGH CHANNEL	-3.63	2462866666	-3.51	2462833000	-3.81	2462833333	33666	0.3

The power and frequency stability of the device was examined as a function of the input voltage available to the EUT. A Spectrum Analyzer with 1 kHz Resolution bandwidth was used to measure the power and frequency at the appropriate frequency markers. Power was supplied by a variable AC power supply and was varied $\pm 15\%$ from the nominal.

The power was then cycled On/Off to observe system response. No unusual response was observed, the emission characteristics were well behaved, and the system returned to the same state of operation as before the power cycle.

C.2 – Radiated Emissions

The test setup was assembled in accordance with Title 47, CFR FCC Part 15, RSS GEN and ANSI C63.4-2003.

Radiated RF measurements were performed on the EUT placed on an 80cm high non-conductive pedestal in a 3 meter Semi-Anechoic, FCC listed Chamber. The frequency range from 30 MHz to 25000 MHz was scanned and investigated. The radiated RF emission levels were manually noted at the various fixed degree settings of azimuth on the turntable and antenna height. The EUT was placed on a non-conductive pedestal in the 3 meter Semi-Anechoic Chamber, with the antenna mast placed such that the antenna was 3 meters from the EUT. A Biconical Antenna was used to measure emissions from 30 MHz to 300 MHz, and a Log Periodic Antenna was used to measure emissions from 300 MHz to 1000 MHz. A Double-Ridged Waveguide Horn Antenna was used from 1 GHz to 18 GHz while a standard gain horn antenna was used in the 18 GHz to 40 GHz range. The maximum radiated RF emissions between 30MHz to 4 GHz were found by raising and lowering the sense antenna between 1 and 4 meters in height, using both horizontal and vertical antenna polarities. Measurements above 4 GHz are performed at 1 meter separation distance.

For both fundamental and spurious emissions measurement, the data reported includes all necessary correction factors. These correction factors are loaded onto the EMI receiver when measurements are performed.

Reported Measurement data = Raw receiver measurement (dB μ V/m) + Antenna correction Factor + Cable factor (dB) + Miscellaneous factors when applicable (dB) – amplification factor when applicable (dB).

Generic example of reported data at 200 MHz:

Reported Measurement data = 18.2 (raw receiver measurement) + 15.8 (antenna factor) + 1.45 (cable factor) = 35.45 (dB μ V/m).

As specified in 15.247 (d) and RSS 210 A8.2 (b), radiated emissions that fall within the restricted band described in 15.205(c) for FCC and section 2.2, 2.6 and 2.7 of RSS 210 for IC, must comply with the general emissions limit.

The following table depicts the general radiated emission limits above 30 MHz. These limits are obtained from Title 47 CFR, Part 15.209, for radiated emissions measurements. These limits were applied to any signals found in the 15.205 restricted bands. The mentioned limits correspond to those limits listed in RSS 210 section 2.7.

Frequency (MHz)	3 m Limit (μ V/m)	3 m Limit (dB μ V/m)
30-88	100	40.0
88-216	150	43.5
216-960	200	46.0
960-10,000	500	54.0

Note: Limits are rounded to the nearest tenth of a dB.

Prepared For: Honeywell	Name: WiFi Thermostat
Report: TR 311318 A FCCICTX V2	Model: TH8320WF
LSR: C-1466	Serial: ENG Sample

C.2.1 - Radiated Harmonics in Restricted Bands

Manufacturer	Honeywell
Date	5-21-2012
Operator	Mike H
Temp. / R.H.	20 - 25° C / 30-60% R.H.
Test Voltage	24 VAC 60 Hz
Test Location	LS Research, LLC - FCC Listed 3 meter Semi-Anechoic Chamber
Rule Part	15.247 / 15.205 / 15.209
Measurement Procedure	ANSI C63.4 - 2003 ANSI C63.10 - 2009
Test Distance	1 meter
EUT Placement	80 cm height non-conductive table
Detectors	RBW 1MHz; Peak (VBW 3MHz); Average (VBW 10Hz)
Additional Notes	1) Data rate 1Mbps (highest power setting among all data rates tested) was tested in continuous transmit modulated mode for radiated harmonics in restricted bands in low, mid, and high channels with EUT Antenna A0 and A1. 2) Where noise floor measurements made, peak measurement compared to average limit.

Antenna A0

Frequency (MHz)	Height (m)	Azimuth (degree)	Peak Reading (dBμV/m)	Avg Reading (dBμV/m)	Avg Limit (dBμV/m)	Margin (dB)	Antenna Polarity	EUT orientation
4824	1.00	187	50.34	38.95	63.5	24.55	Horizontal	Vertical
12060	1.00	0	53.47	~	63.5	10.03	Noise Floor	
14472	1.00	0	59.07	~	63.5	4.43	Noise Floor	
19296	1.00	0	53.21	~	63.5	10.29	Noise Floor	

Frequency (MHz)	Height (m)	Azimuth (degree)	Peak Reading (dBμV/m)	Avg Reading (dBμV/m)	Avg Limit (dBμV/m)	Margin (dB)	Antenna Polarity	EUT orientation
4874	1.00	196	50.83	39.56	63.5	23.94	Horizontal	Vertical
7311	1.00	162	55.71	46.06	63.5	17.44	Vertical	Vertical
12185	1.00	0	53.65	~	63.5	9.85	Noise Floor	
19496	1.00	0	54.15	~	63.5	9.35	Noise Floor	

Frequency (MHz)	Height (m)	Azimuth (degree)	Peak Reading (dBμV/m)	Avg Reading (dBμV/m)	Avg Limit (dBμV/m)	Margin (dB)	Antenna Polarity	EUT orientation
4924	1.04	194	50.65	40.61	63.5	22.89	Horizontal	Vertical
7386	1.01	159	57.69	50.07	63.5	13.43	Vertical	Vertical
12310	1.00	0	53.87	~	63.5	9.63	Noise Floor	
19696	1.00	0	54.36	~	63.5	9.14	Noise Floor	
22158	1.00	0	54.68	~	63.5	8.82	Noise Floor	

Prepared For: Honeywell	Name: WiFi Thermostat
Report: TR 311318 A FCCICTX V2	Model: TH8320WF
LSR: C-1466	Serial: ENG Sample

Radiated Harmonics in Restricted Bands

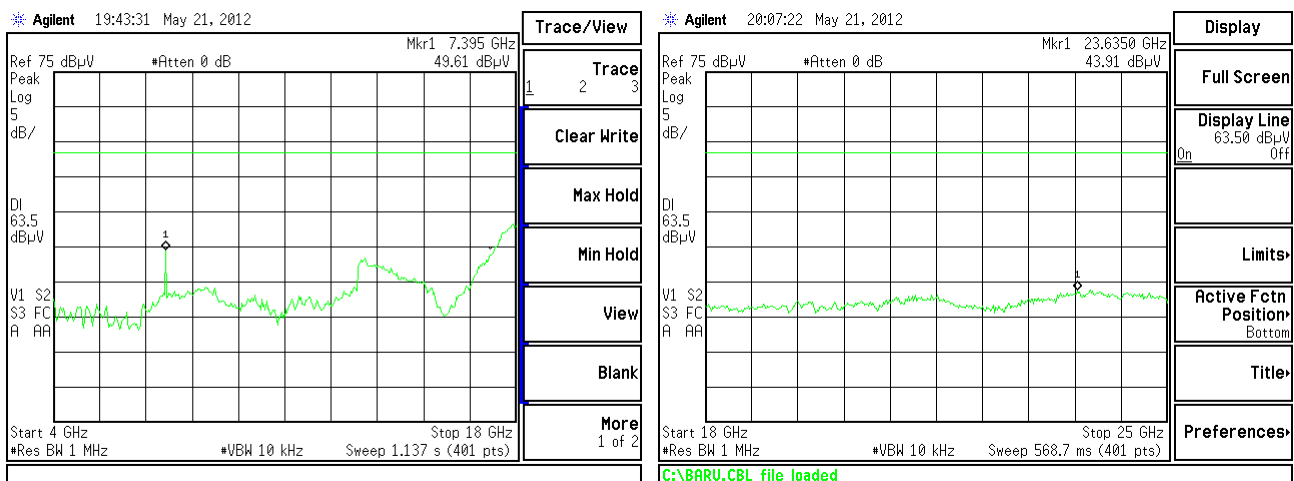
Antenna A1

Frequency (MHz)	Height (m)	Azimuth (degree)	Peak Reading (dBμV/m)	Avg Reading (dBμV/m)	Avg Limit (dBμV/m)	Margin (dB)	Antenna Polarity	EUT orientation
4824	1	188	51.32	40.7	63.5	22.8	Horizontal	Vertical
12060	1.00	0	53.47	~	63.5	10.03	Noise Floor	
14472	1.00	0	59.07	~	63.5	4.43	Noise Floor	
19296	1.00	0	53.21	~	63.5	10.29	Noise Floor	

Frequency (MHz)	Height (m)	Azimuth (degree)	Peak Reading (dBμV/m)	Avg Reading (dBμV/m)	Avg Limit (dBμV/m)	Margin (dB)	Antenna Polarity	EUT orientation
4874	1	188	49.89	39.68	63.5	23.82	Horizontal	Vertical
7311	1.02	126	58.75	51.9	63.5	11.6	Vertical	Vertical
12185	1.00	0	53.65	~	63.5	9.85	Noise Floor	
19496	1.00	0	54.15	~	63.5	9.35	Noise Floor	

Frequency (MHz)	Height (m)	Azimuth (degree)	Peak Reading (dBμV/m)	Avg Reading (dBμV/m)	Avg Limit (dBμV/m)	Margin (dB)	Antenna Polarity	EUT orientation
4924	1.06	1.87	49.84	38.63	63.5	24.87	Horizontal	Vertical
7386	1.05	138	62.12	56.25	63.5	7.25	Vertical	Vertical
12310	1.00	0	53.87	~	63.5	9.63	Noise Floor	
19696	1.00	0	54.36	~	63.5	9.14	Noise Floor	
22158	1.00	0	54.68	~	63.5	8.82	Noise Floor	

Graph of Radiated Spurious Harmonics in restricted bands with reduced video bandwidth. Maximized in vertical and horizontal polarization with EUT rotated on the azimuth.



Prepared For: Honeywell
 Report: TR 311318 A FCCICTX V2
 LSR: C-1466

Name: WiFi Thermostat
 Model: TH8320WF
 Serial: ENG Sample

C2.2 - Radiated Band-edge in Restricted Bands

Manufacturer	Honeywell
Date	6-27-12
Operator	Adam A
Temp. / R.H.	20 - 25° C / 30-60% R.H.
Test Voltage	24 VAC 60 Hz
Test Location	LS Research, LLC - FCC Listed 3 meter Semi-Anechoic Chamber
Rule Part	15.247 / 15.205 / 15.209
Measurement Procedure	ANSI C63.4 - 2003 ANSI C63.10 - 2009
Test Distance	3 meter
EUT Placement	80 cm height non-conductive table
Detectors	RBW 1MHz; Peak (VBW 3MHz); Average (VBW 10Hz)
Additional Notes	1) Worst Case Orientation Reported: Antenna A0, Vertical Receive Antenna at 1.0 meter height, EUT at 115° Azimuth. 2) Channel 2 and 10 for 802.11g and n (12 Mbps, 24Mbps, MCS7) were set at maximum allowable power setting to maintain band-edge compliance. Final power settings were lowered (less output power) at request of the client. RF conducted measurements (Section C1) for output power and PSD represent final levels.

Example Calculation:

Peak Limit – Peak Reading = Peak Margin

Average Limit – Average Reading = Average Margin

Summary of Results

Lower Band-Edge

Data Rate	Modulation	IEEE Protocol	Channel	Fundamental Frequency (MHz)	LBE AVG (dBμV/m)	LBE AVG Limit (dBμV/m)	LBE AVG Margin (dB)	LBE Peak (dBμV/m)	LBE Peak Limit (dBμV/m)	LBE Peak Margin (dB)
1 Mbps	DBPSK	802.11b	1	2412	49.39	54	4.61	56.86	74	17.14
1 Mbps	DBPSK	802.11b	2	2417	48.92	54	5.08	56.88	74	17.12
12 Mbps	QPSK	802.11g	1	2412	52.34	54	1.66	68.23	74	5.77
12 Mbps	QPSK	802.11g	2	2417	52.25	54	1.75	69.66	74	4.34
24 Mbps	16-QAM	802.11g	1	2412	51.75	54	2.25	67.92	74	6.08
24 Mbps	16-QAM	802.11g	2	2417	52.50	54	1.50	70.39	74	3.61
MCS7	64-QAM	802.11n	1	2412	51.69	54	2.31	71.42	74	2.58
MCS7	64-QAM	802.11n	2	2417	52.07	54	1.93	71.22	74	2.78

Upper Band-Edge

Data Rate	Modulation	IEEE Protocol	Channel	Frequency (MHz)	UBE AVG (dBμV/m)	UBE AVG Limit (dBμV/m)	UBE AVG Margin (dB)	UBE Peak (dBμV/m)	UBE Peak Limit (dBμV/m)	UBE Peak Margin (dB)
1 Mbps	DBPSK	802.11b	11	2462	49.70	54	4.30	59.00	74	15.00
1 Mbps	DBPSK	802.11b	10	2457	47.72	54	6.28	59.11	74	14.89
12 Mbps	QPSK	802.11g	11	2462	52.18	54	1.82	70.42	74	3.58
12 Mbps	QPSK	802.11g	10	2457	50.23	54	3.77	71.24	74	2.76
24 Mbps	16-QAM	802.11g	11	2462	51.69	54	2.31	69.91	74	4.09
24 Mbps	16-QAM	802.11g	10	2457	49.99	54	4.01	71.76	74	2.24
MCS7	64-QAM	802.11n	11	2462	52.44	54	1.56	72.49	74	1.51
MCS7	64-QAM	802.11n	10	2457	49.48	54	4.52	71.68	74	2.32

Prepared For: Honeywell

Name: WiFi Thermostat

Report: TR 311318 A FCCICTX V2

Model: TH8320WF

LSR: C-1466

Serial: ENG Sample

Radiated Band-edge in Restricted Bands

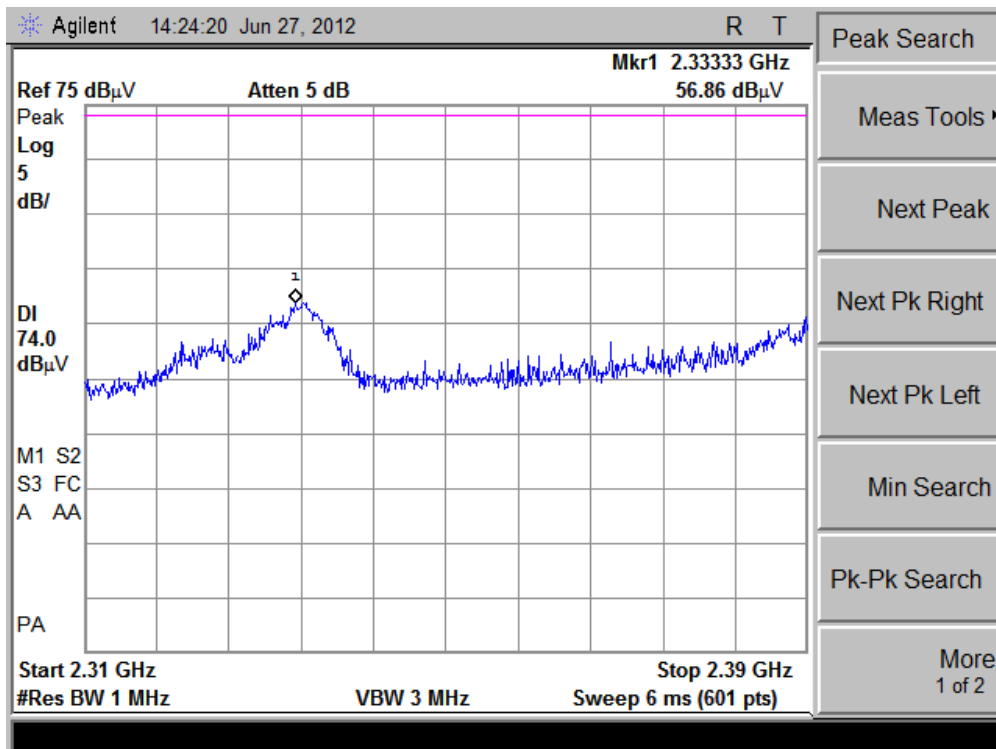
Lower Band-edge - Channel 1

1 Mbps

Average



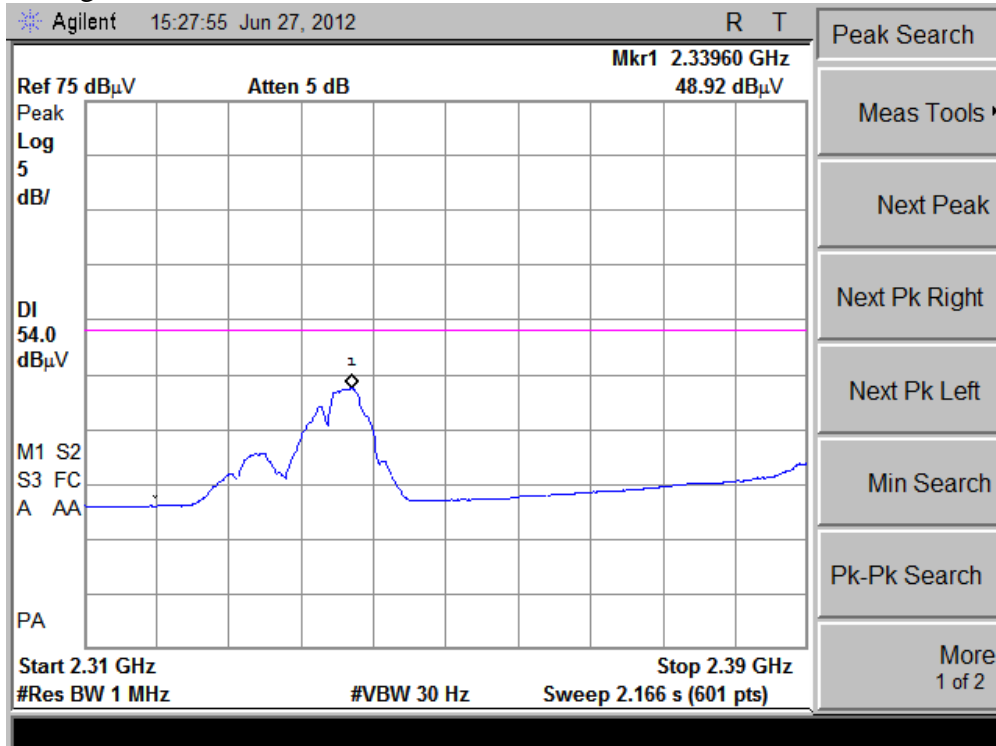
Peak



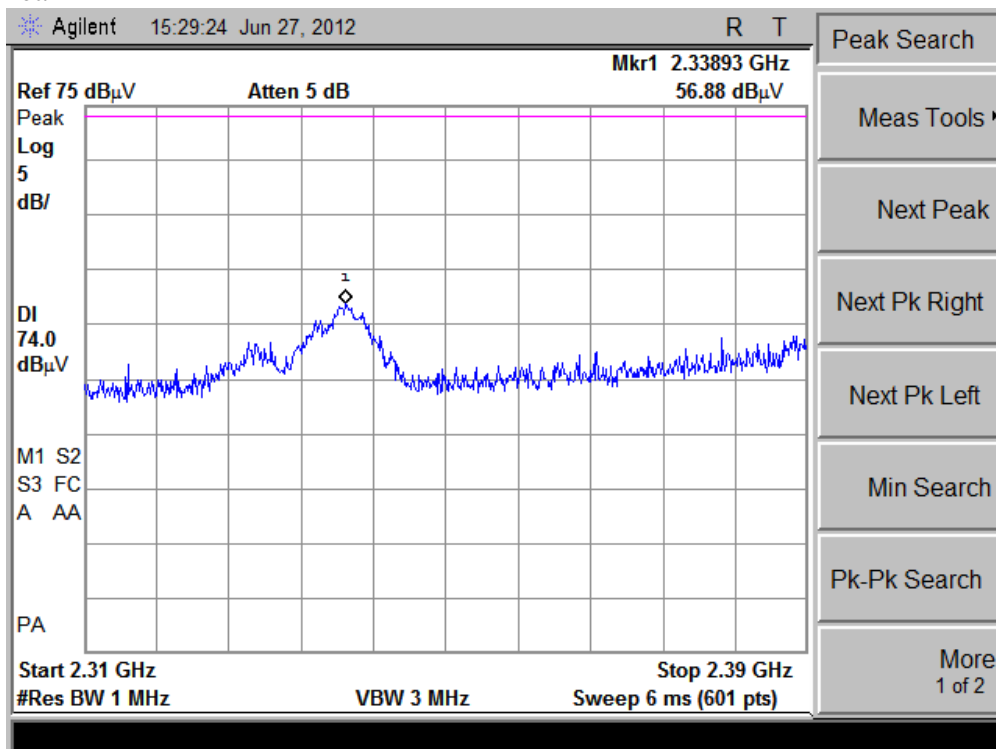
Lower Band-edge - Channel 2

1 Mbps

Average



Peak



Prepared For: Honeywell

Report: TR 311318 A FCCICTX V2

LSR: C-1466

Name: WiFi Thermostat

Model: TH8320WF

Serial: ENG Sample

Lower Band-edge - Channel 11

1 Mbps

Average



Lower Band-edge - Channel 10

1 Mbps

Average



Prepared For: Honeywell

Report: TR 311318 A FCCICTX V2

LSR: C-1466

Name: WiFi Thermostat

Model: TH8320WF

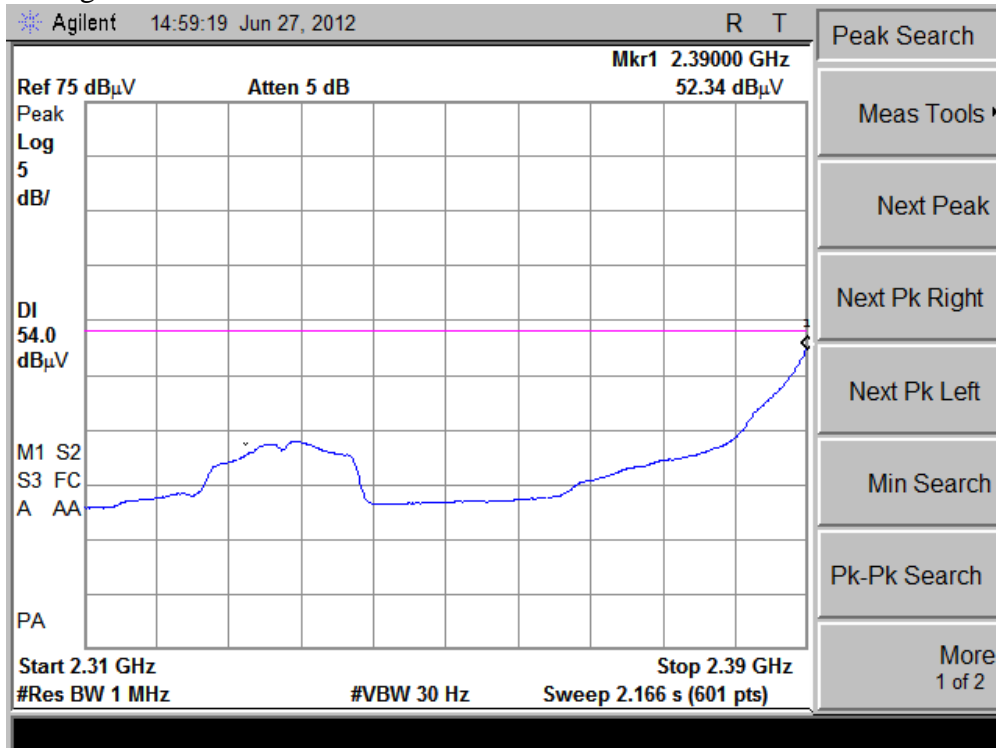
Serial: ENG Sample

Radiated Band-edge in Restricted Bands

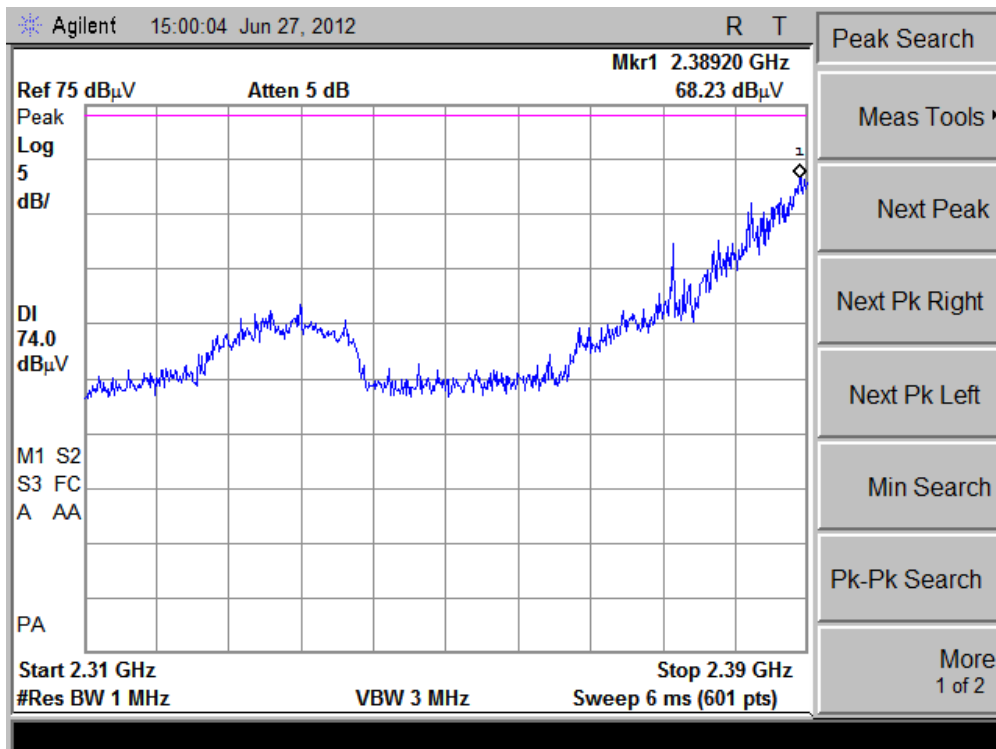
Lower Band-edge - **Channel 1**

12 Mbps

Average



Peak



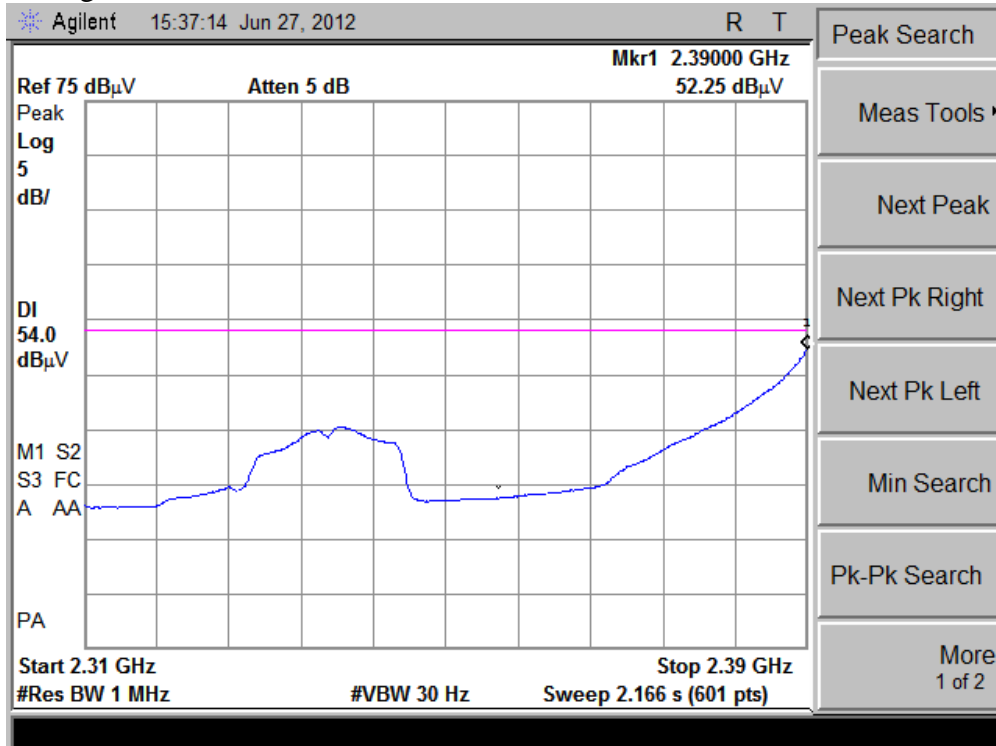
Prepared For: Honeywell
Report: TR 311318 A FCCICTX V2
LSR: C-1466

Name: WiFi Thermostat
Model: TH8320WF
Serial: ENG Sample

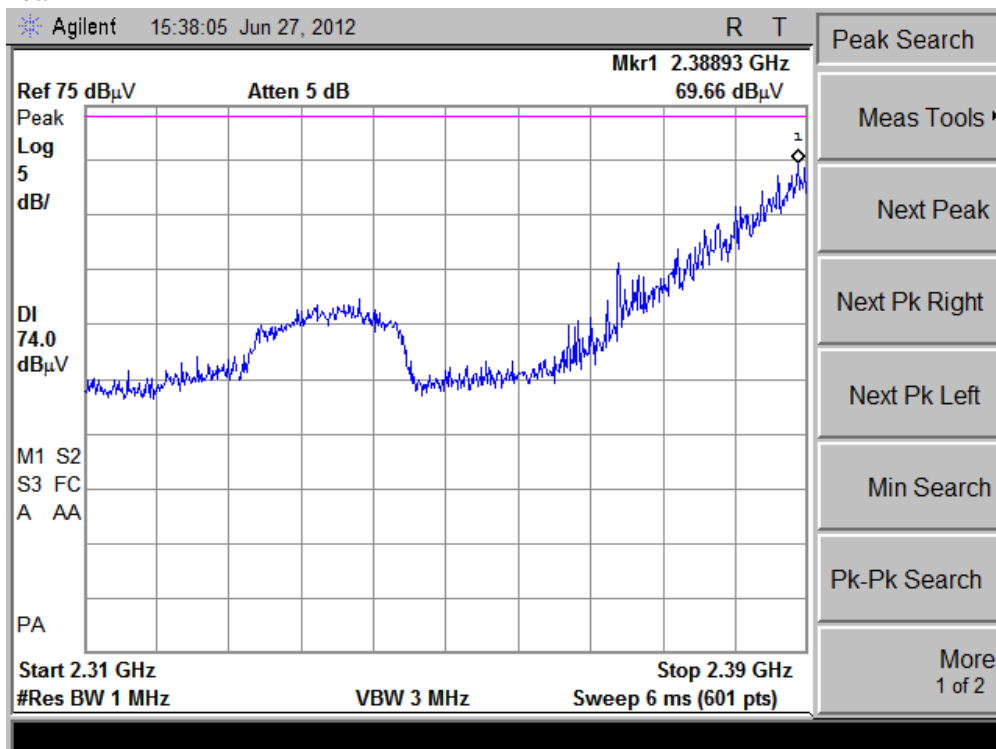
Lower Band-edge - **Channel 2** (See Note 2 in Section C2.2)

12 Mbps

Average



Peak



Prepared For: Honeywell

Report: TR 311318 A FCCICTX V2

LSR: C-1466

Name: WiFi Thermostat

Model: TH8320WF

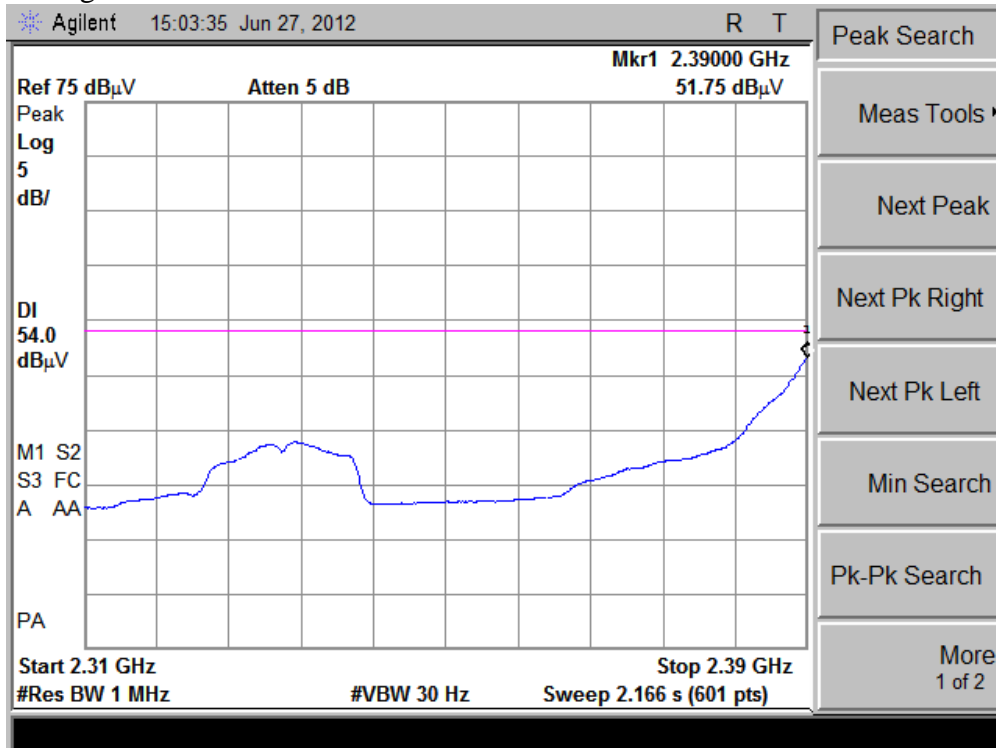
Serial: ENG Sample

Radiated Band-edge in Restricted Bands

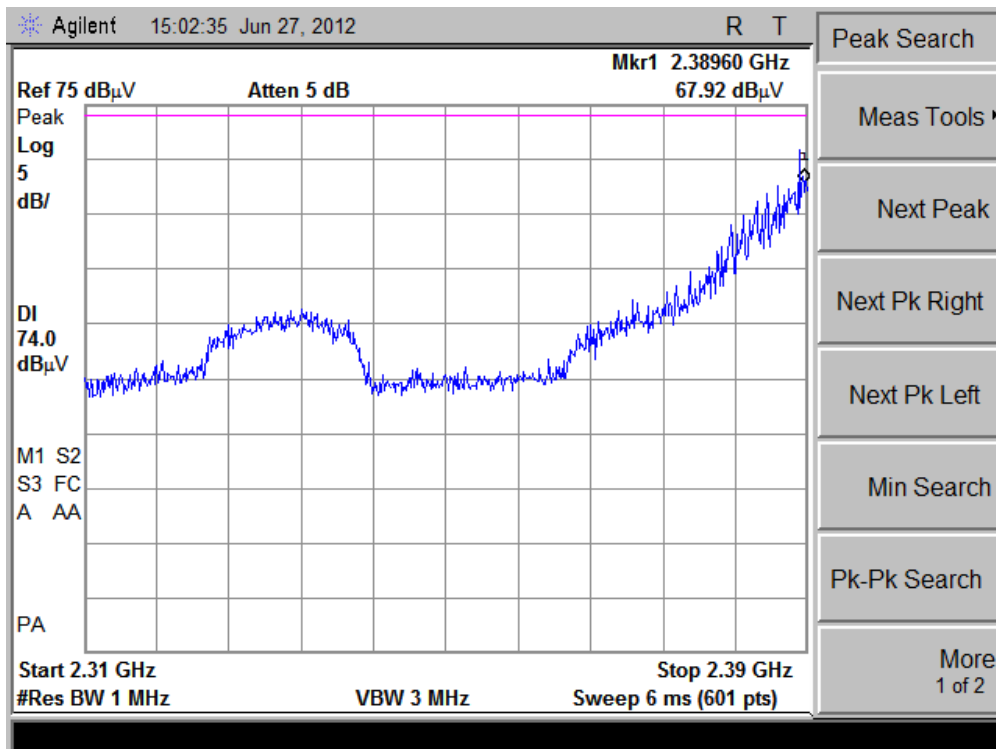
Lower Band-edge - **Channel 1**

24 Mbps

Average



Peak



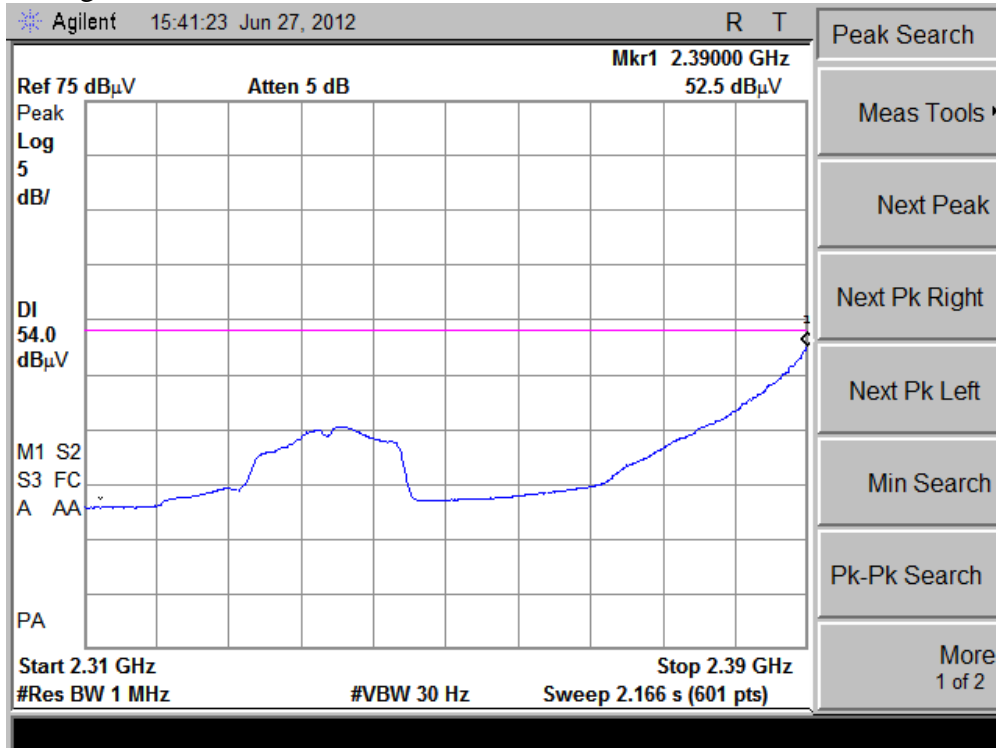
Prepared For: Honeywell
Report: TR 311318 A FCCICTX V2
LSR: C-1466

Name: WiFi Thermostat
Model: TH8320WF
Serial: ENG Sample

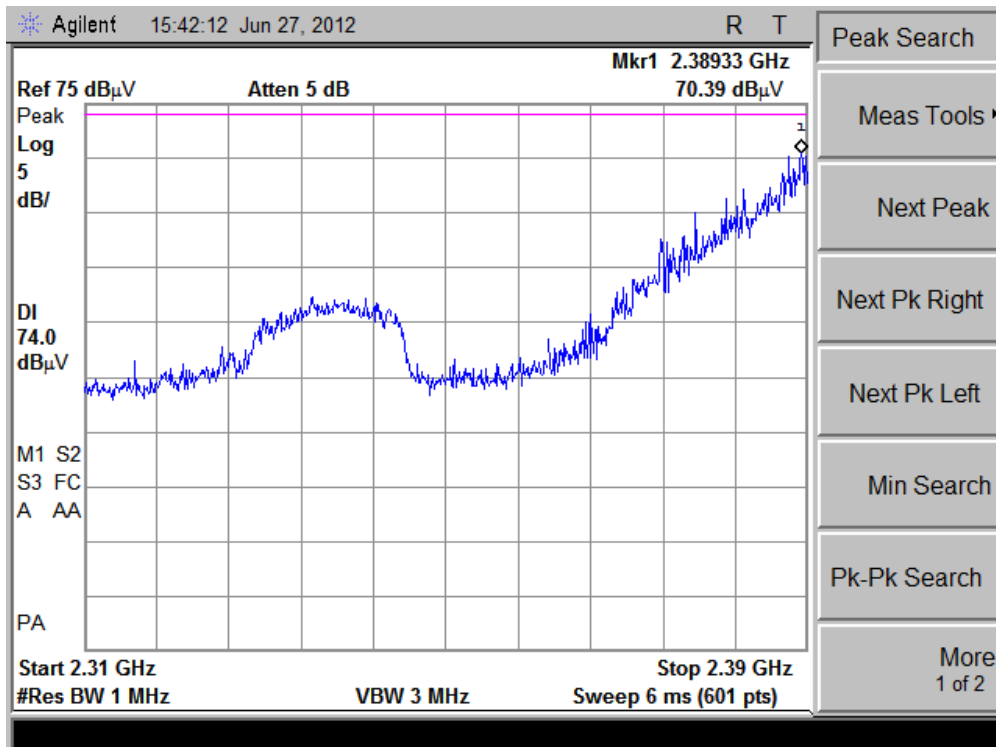
Lower Band-edge - **Channel 2** (See Note 2 in Section C2.2)

24 Mbps

Average



Peak

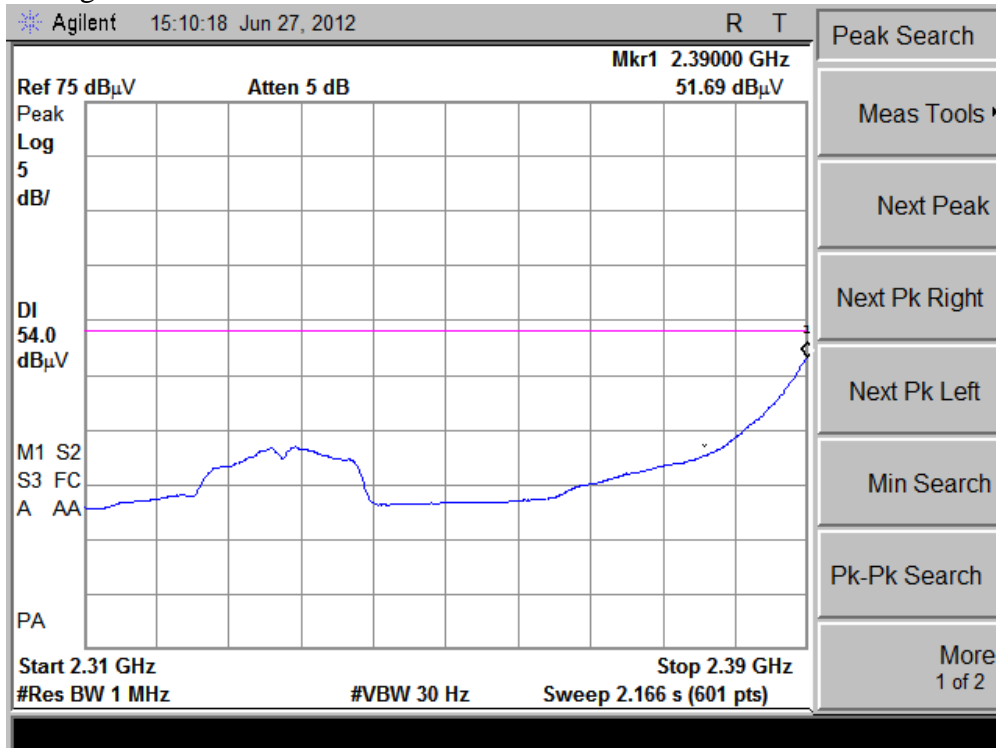


Radiated Band-edge in Restricted Bands

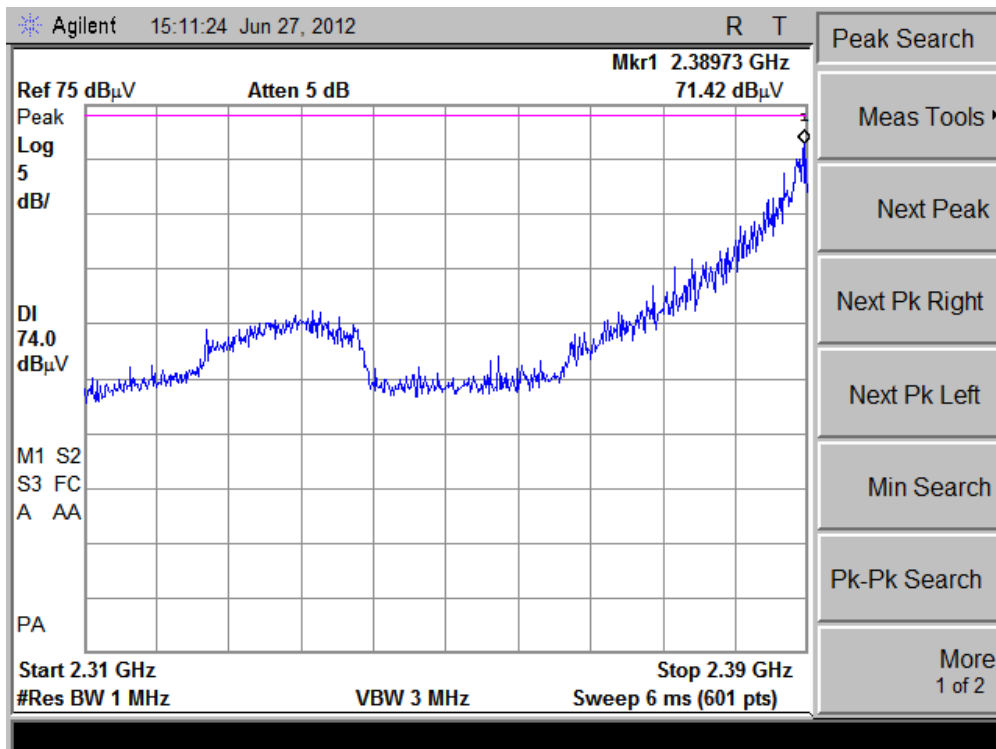
Lower Band-edge - **Channel 1**

MCS7

Average



Peak



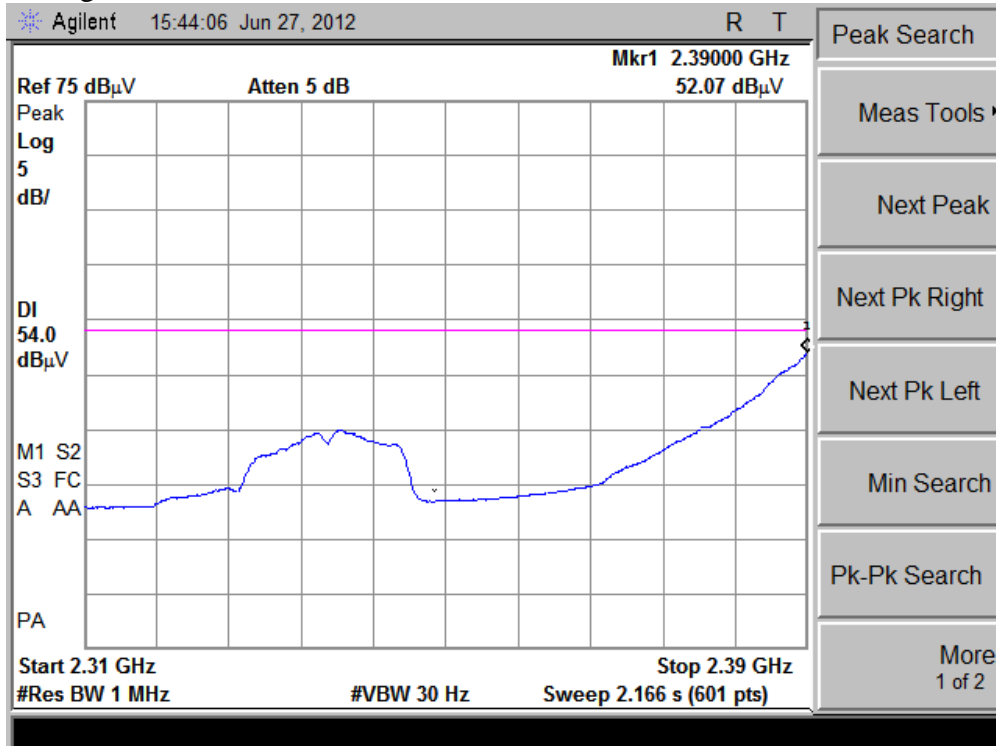
Prepared For: Honeywell
Report: TR 311318 A FCCICTX V2
LSR: C-1466

Name: WiFi Thermostat
Model: TH8320WF
Serial: ENG Sample

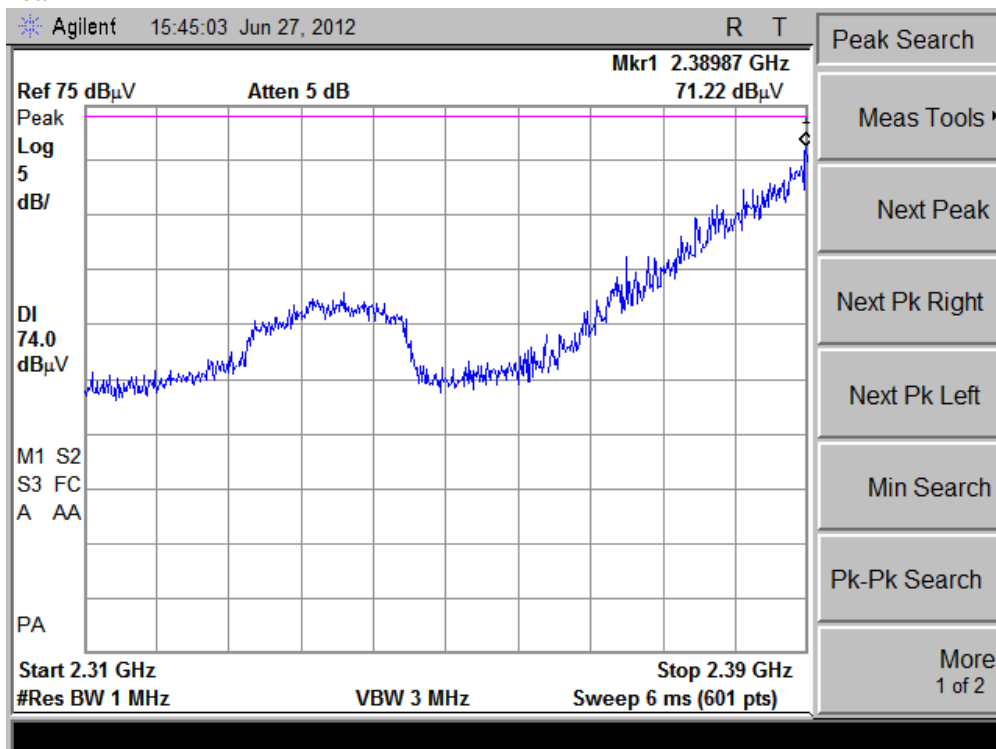
Lower Band-edge - Channel 2 (See Note 2 in Section C2.2)

MCS7

Average



Peak



Prepared For: Honeywell

Report: TR 311318 A FCCICTX V2

LSR: C-1466

Name: WiFi Thermostat

Model: TH8320WF

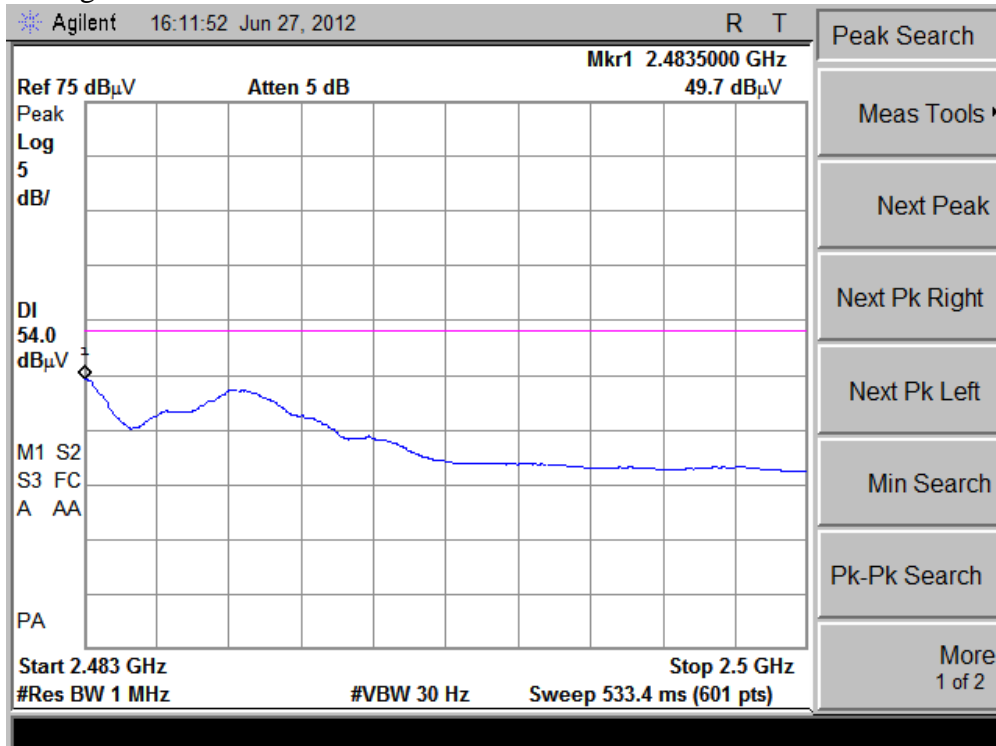
Serial: ENG Sample

Radiated Band-edge in Restricted Bands

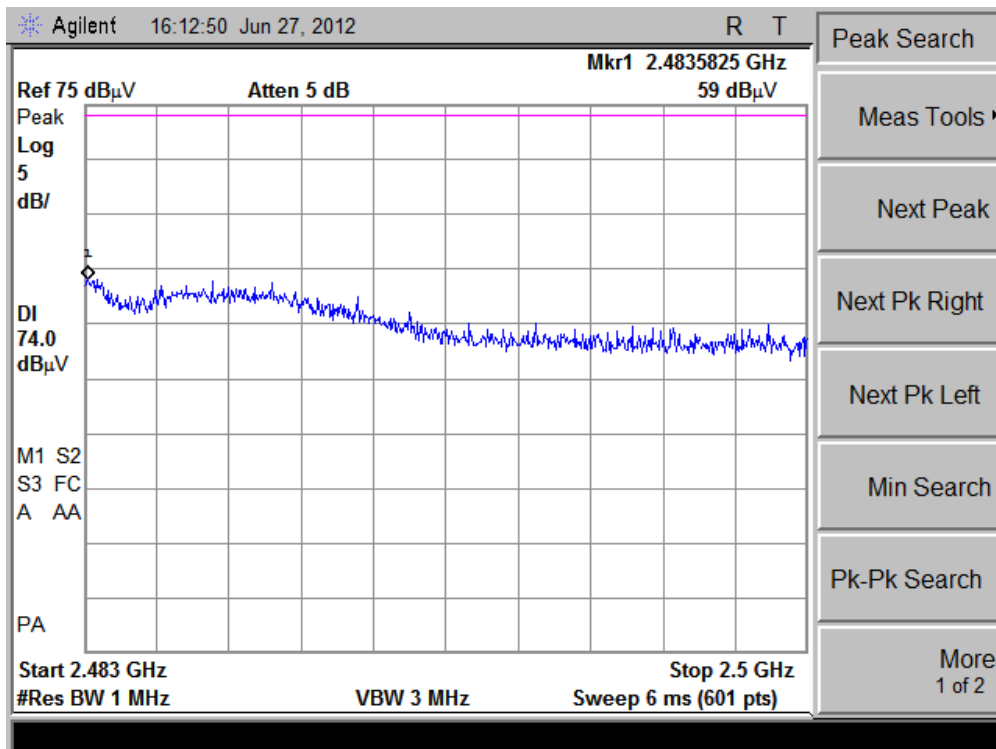
Upper Band-edge - **Channel 11**

1 Mbps

Average



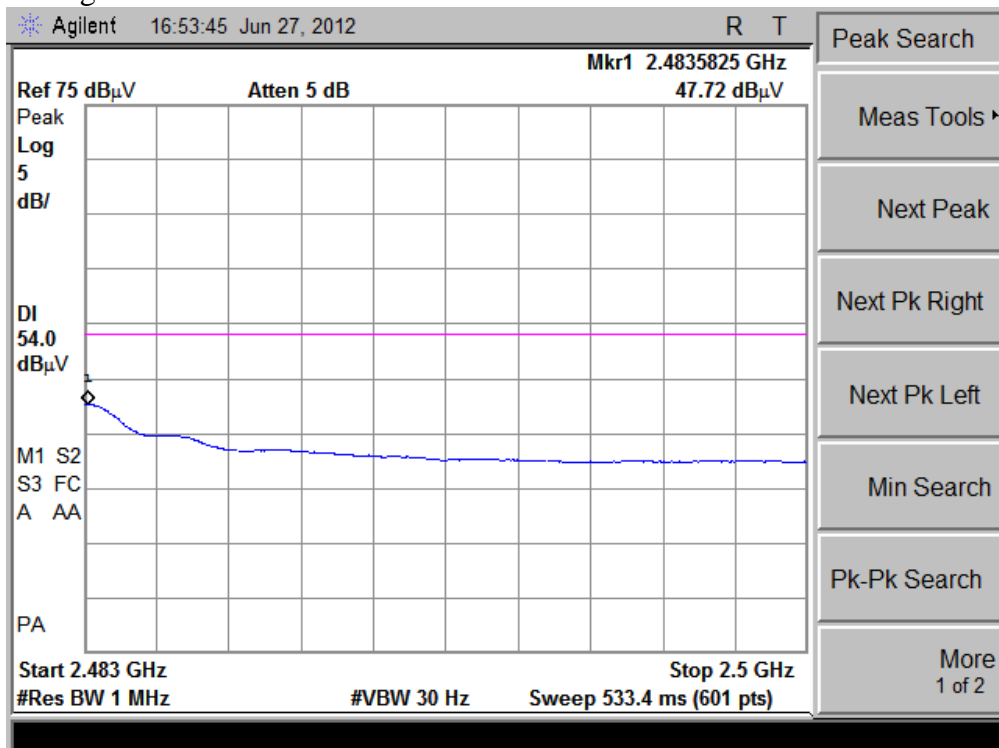
Peak



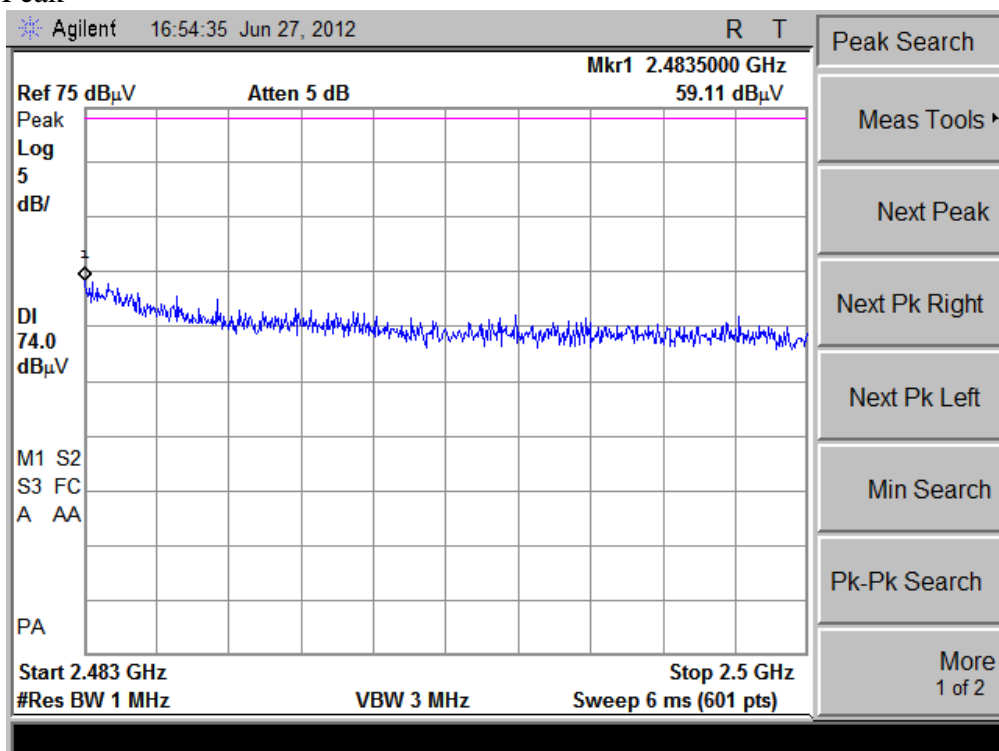
Upper Band-edge - Channel 10

1 Mbps

Average



Peak



Prepared For: Honeywell

Report: TR 311318 A FCCICTX V2

LSR: C-1466

Name: WiFi Thermostat

Model: TH8320WF

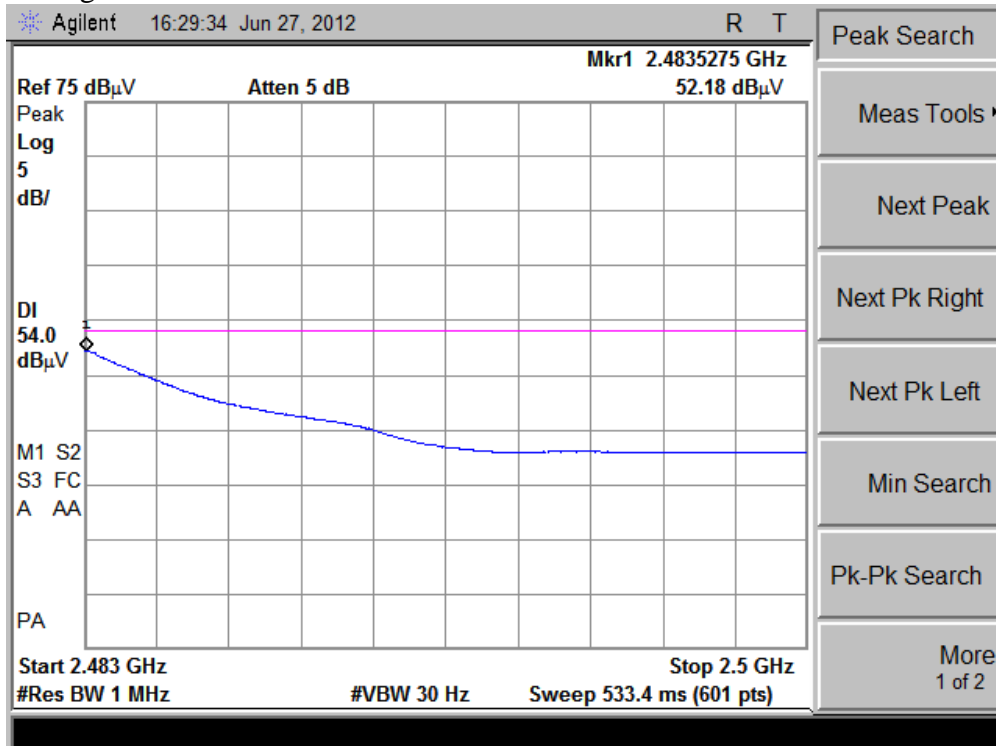
Serial: ENG Sample

Radiated Band-edge in Restricted Bands

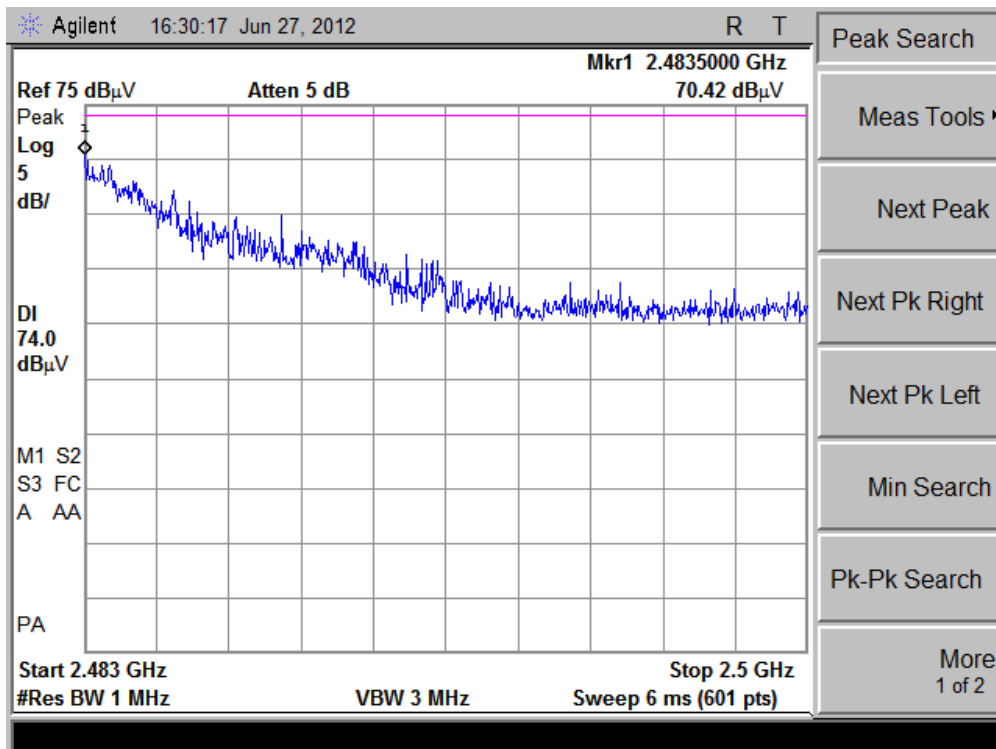
Upper Band-edge - **Channel 11**

12 Mbps

Average



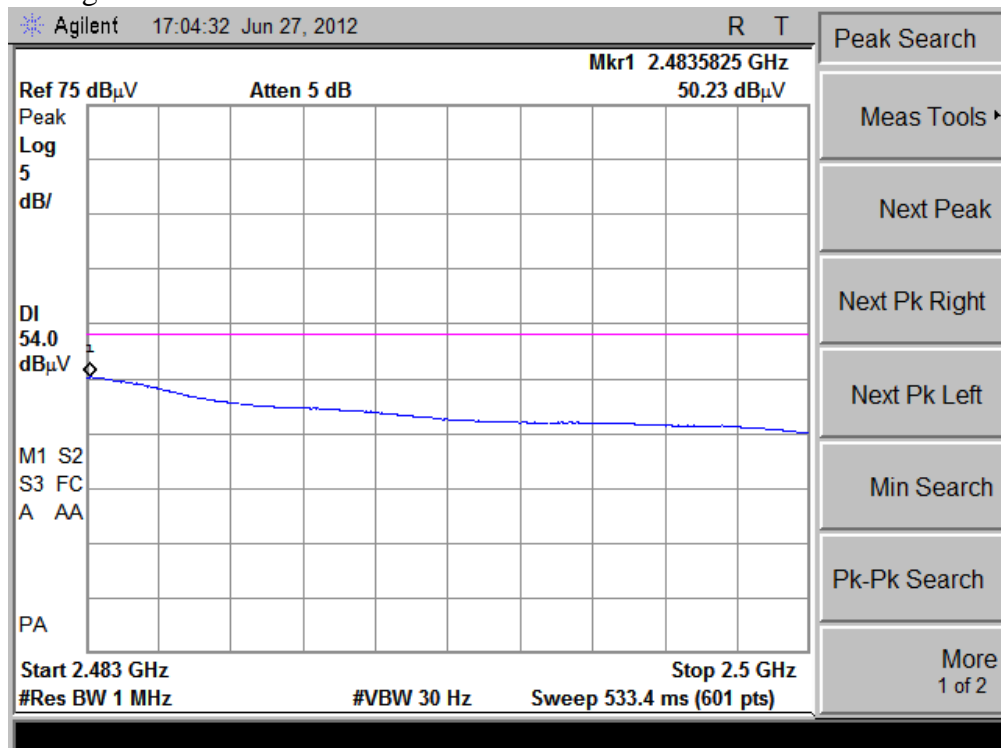
Peak



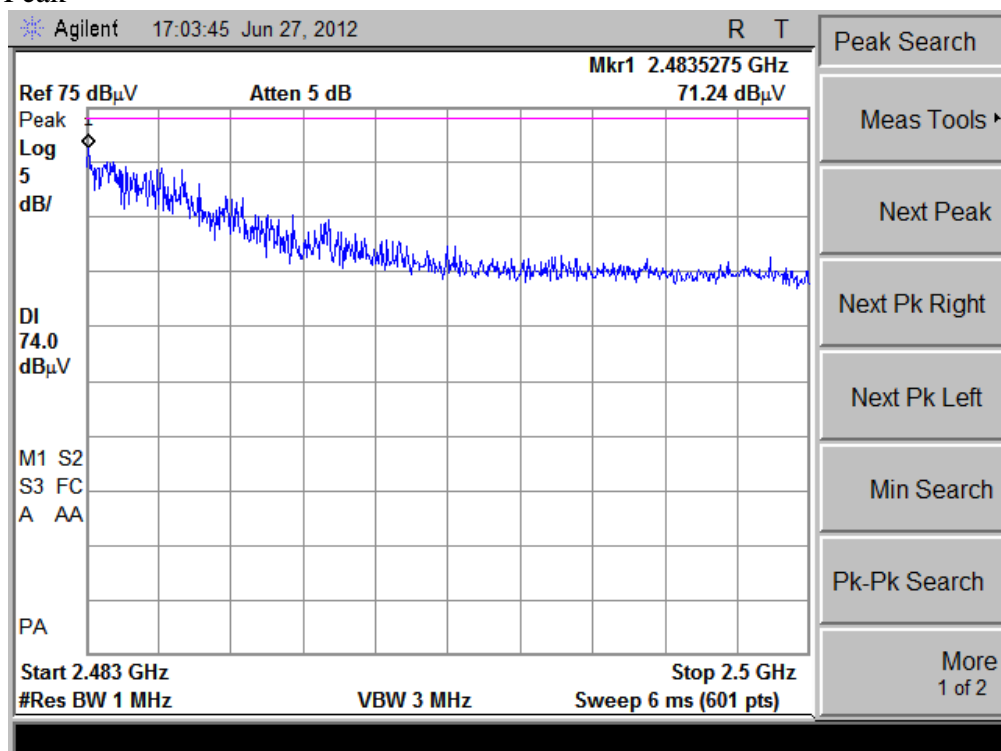
Upper Band-edge - Channel 10 (See Note 2 in Section C2.2)

12 Mbps

Average



Peak



Prepared For: Honeywell

Report: TR 311318 A FCCICTX V2

LSR: C-1466

Name: WiFi Thermostat

Model: TH8320WF

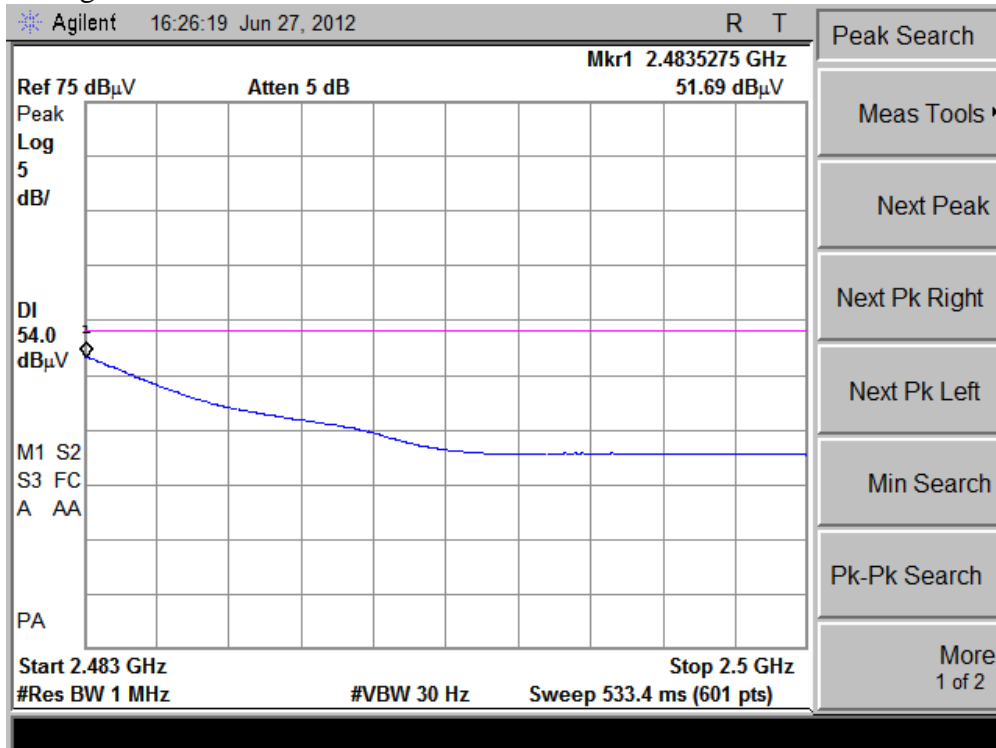
Serial: ENG Sample

Radiated Band-edge in Restricted Bands

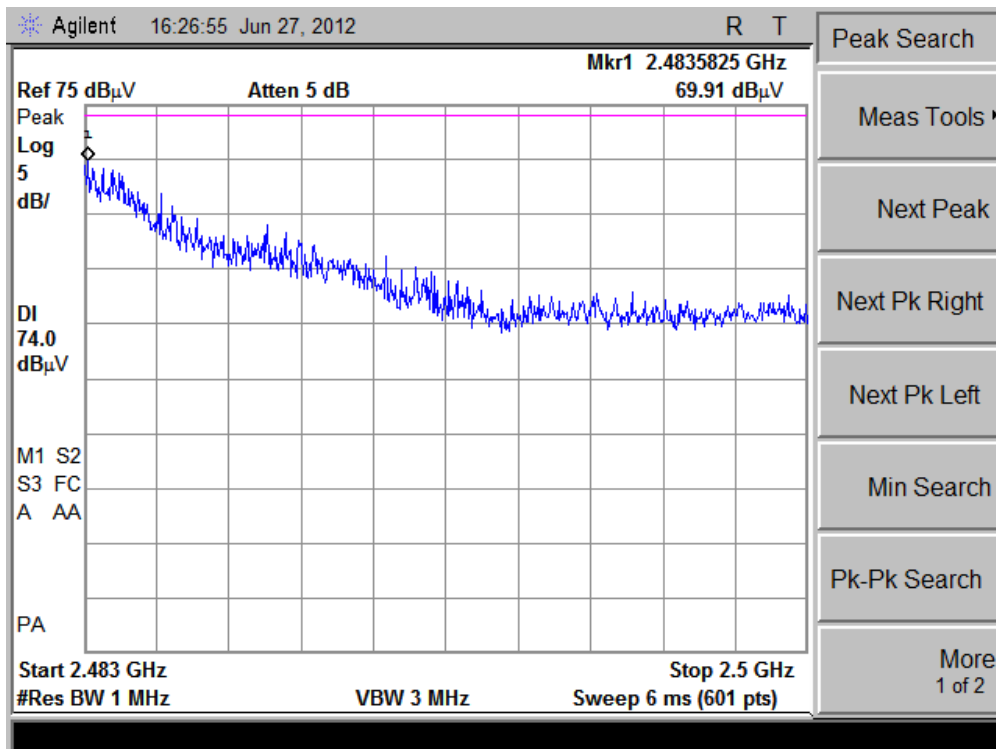
Upper Band-edge – Channel 11

24 Mbps

Average



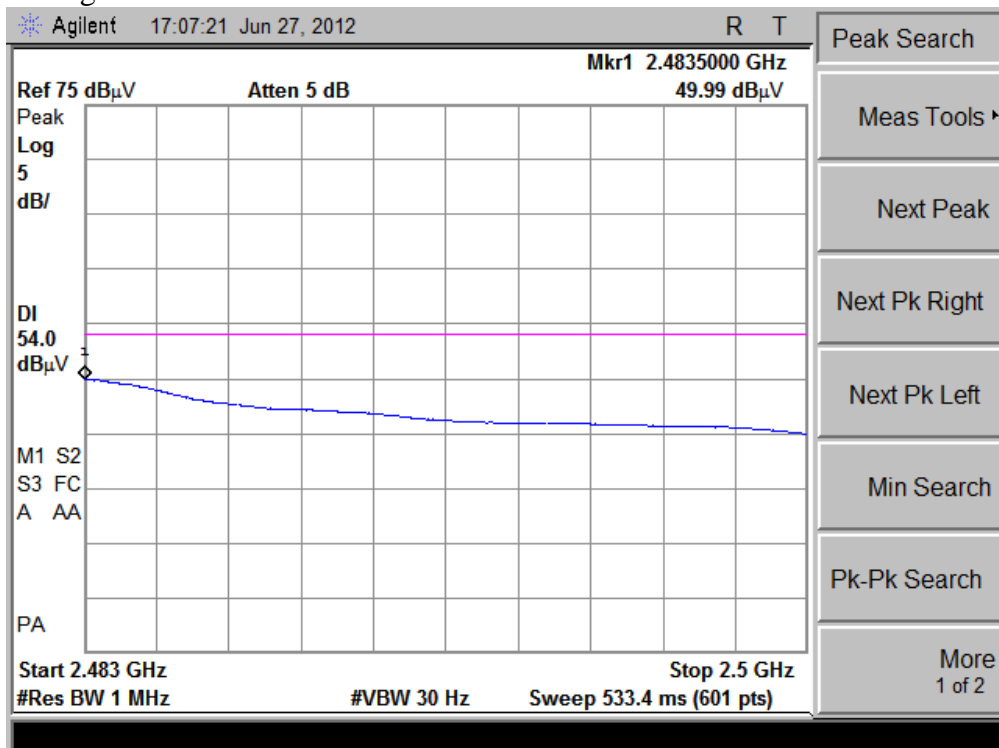
Peak



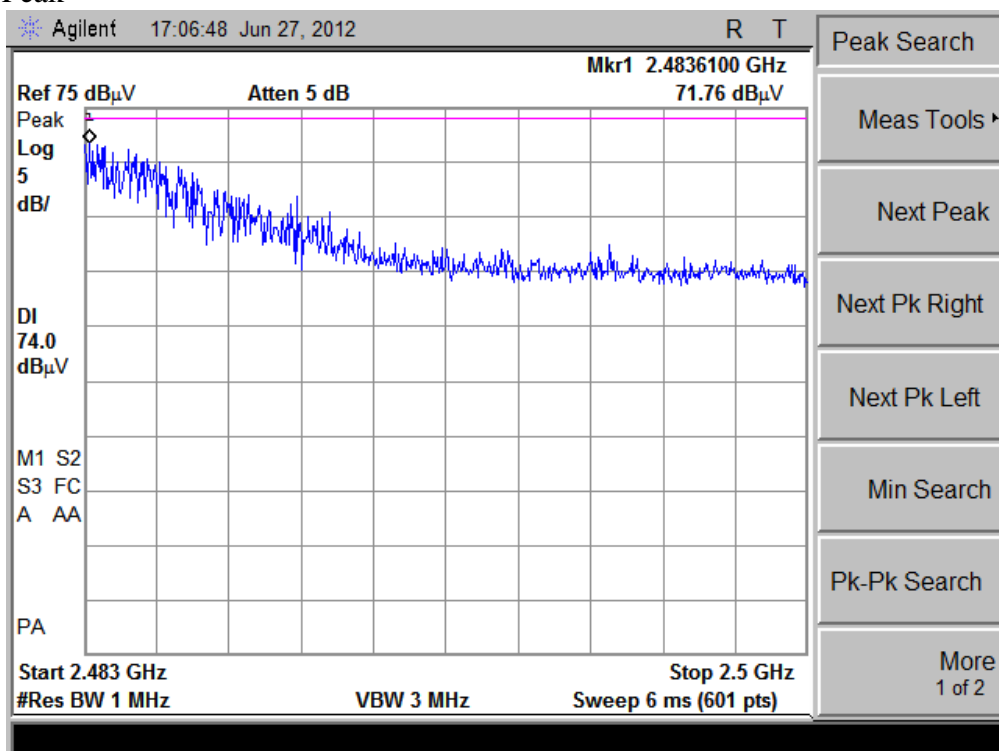
Upper Band-edge – Channel 10 (See Note 2 in Section C2.2)

24 Mbps

Average



Peak



Prepared For: Honeywell

Report: TR 311318 A FCCICTX V2

LSR: C-1466

Name: WiFi Thermostat

Model: TH8320WF

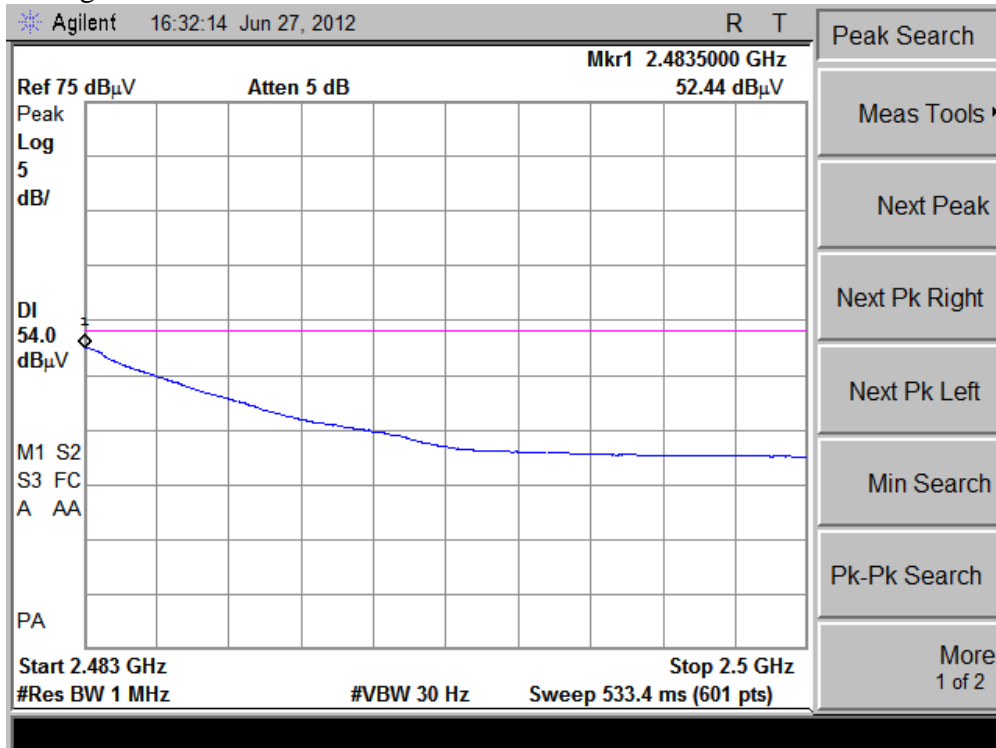
Serial: ENG Sample

Radiated Band-edge in Restricted Bands

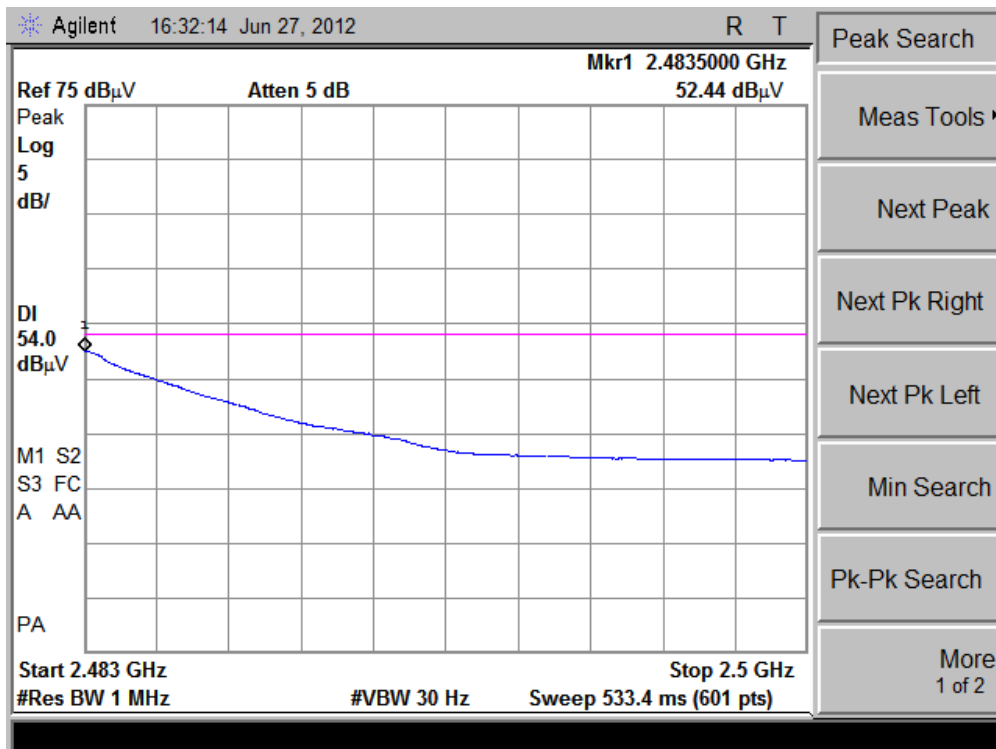
Upper Band-edge – Channel 11

MCS7

Average



Peak



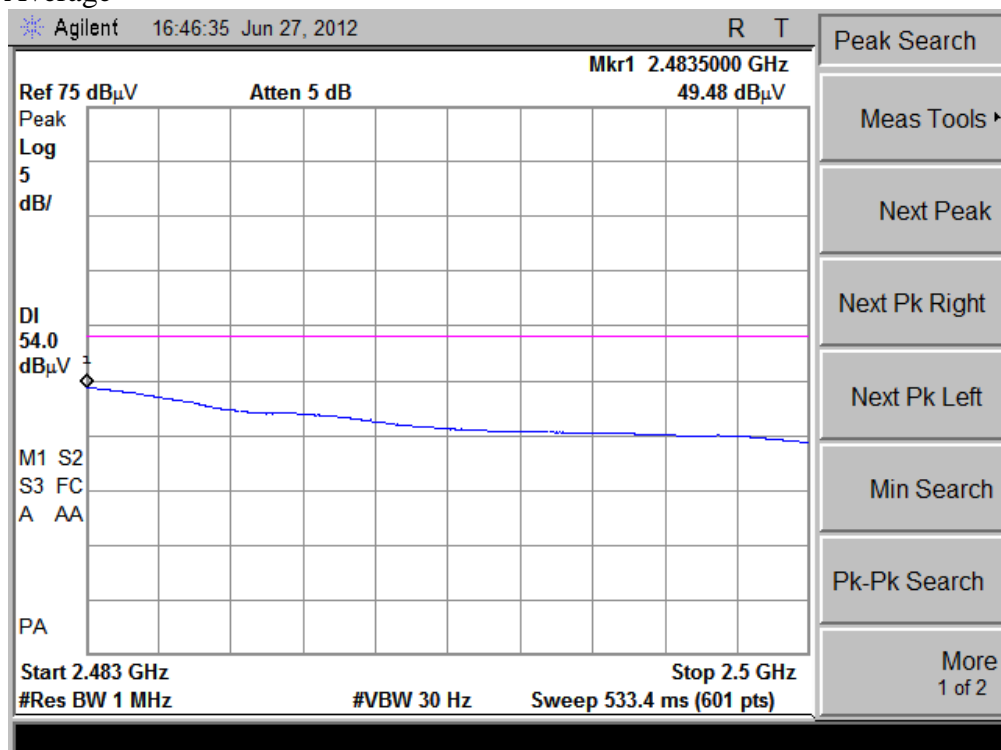
Prepared For: Honeywell
Report: TR 311318 A FCCICTX V2
LSR: C-1466

Name: WiFi Thermostat
Model: TH8320WF
Serial: ENG Sample

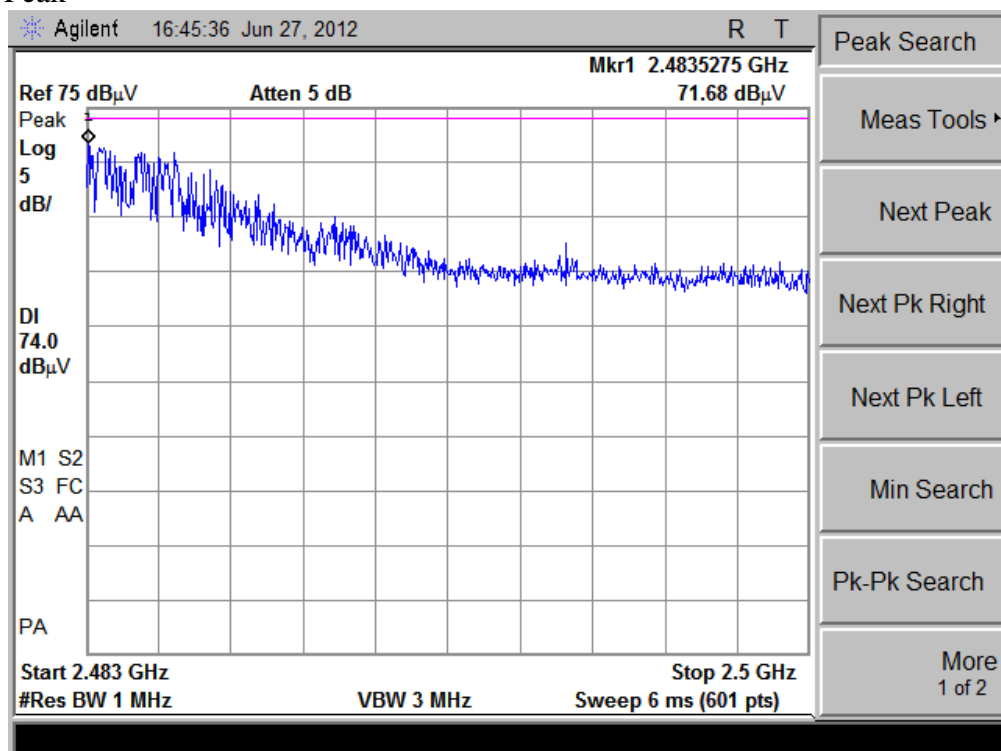
Upper Band-edge – Channel 10 (See Note 2 in Section C2.2)

MCS7

Average



Peak



C2.3 Radiated Emissions

30-1000MHz Transmit Mode (15.209) and 30MHz to 6GHz Receive Mode

Manufacturer	Honeywell
Date	6-4-12 and 6-6-12
Operator	Adam A / Mike H
Temperature	20 - 25° C
Humidity	30 – 60%
Test Voltage	24 VAC 60 Hz
Test Location	LS Research, LLC - FCC Listed 3 meter Semi-Anechoic Chamber
Test Distance	3 meter
EUT Placement	80 cm height non-conductive table
Measurements	Final
Detectors	Quasi-Peak
Additional Notes	1) Tested in transmit mode 1 Mbps data rate (highest power setting), low, mid, high channels, EUT Antenna A0 and A1 2) No difference of emissions in low, mid, high channels or A0 vs A1 EUT Antenna 3) Tested in continuous receive mode low, mid, high channels (no difference of emissions)

FCC Part 15.209 – Transmit Mode

Frequency (MHz)	Height (m)	Azimuth (degree)	Quasi Peak Reading (dBµV/m)	Quasi Peak Limit (dBµV/m)	Margin (dB)	Antenna Polarity	EUT orientation
787.2	1.00	211	36.95	46.0	9.1	H	TT
812.8	1.00	209	36.68	46.0	9.3	H	TT
800.0	1.00	209	36.82	46.0	9.2	H	TT

FCC Part 15.109 – Receive Mode

Frequency (MHz)	Height (m)	Azimuth (degree)	Quasi Peak Reading (dBµV/m)	Quasi Peak Limit (dBµV/m)	Margin (dB)	Antenna Polarity	EUT orientation
748.8	1.00	202	37.53	46.0	8.5	H	TT
774.4	1.00	207	37.39	46.0	8.6	H	TT
748.8	1.00	208	37.45	46.0	8.6	H	TT

Prepared For: Honeywell

Name: WiFi Thermostat

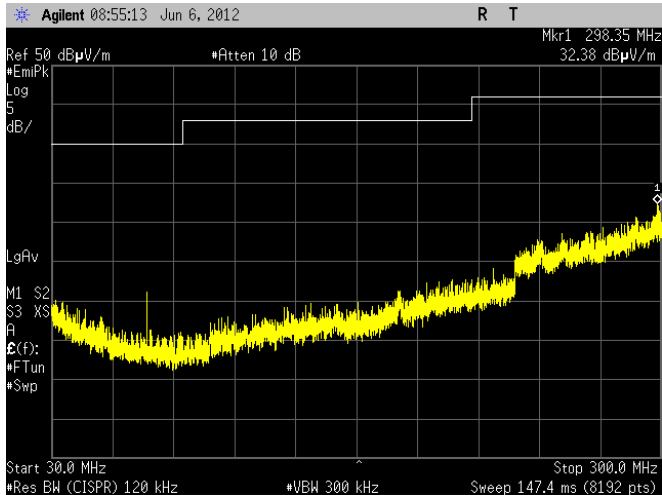
Report: TR 311318 A FCCICTX V2

Model: TH8320WF

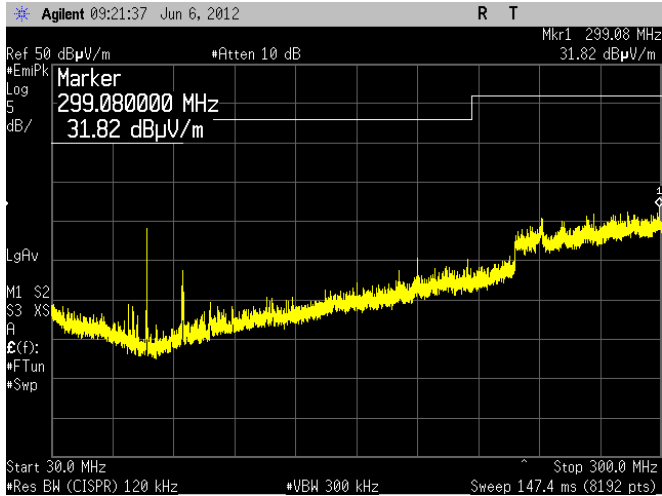
LSR: C-1466

Serial: ENG Sample

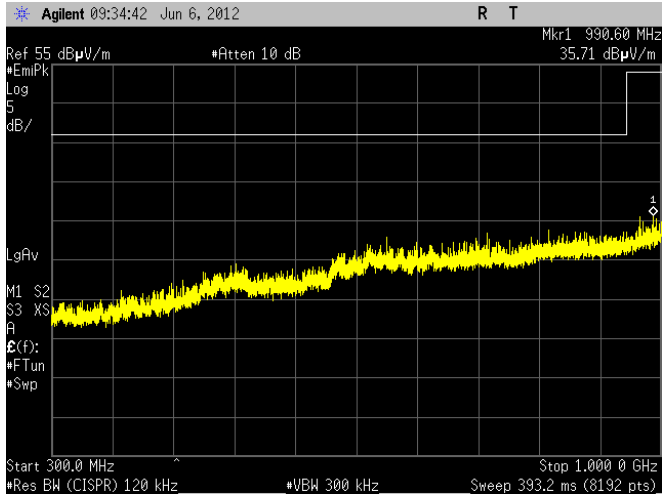
30-300MHz Horizontal



30-300MHz Vertical

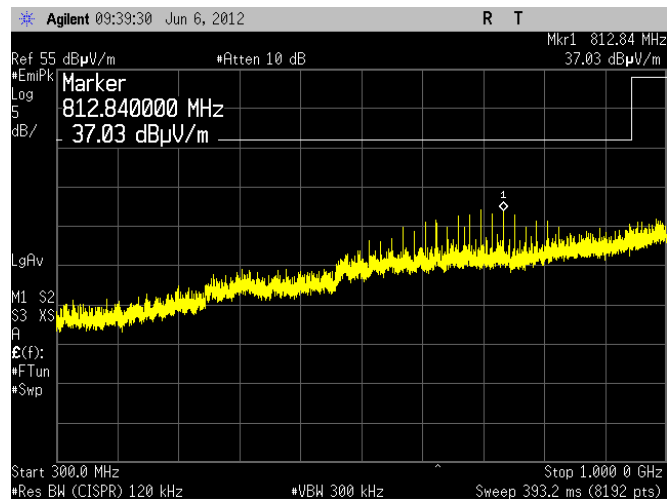


300-1000MHz Vertical

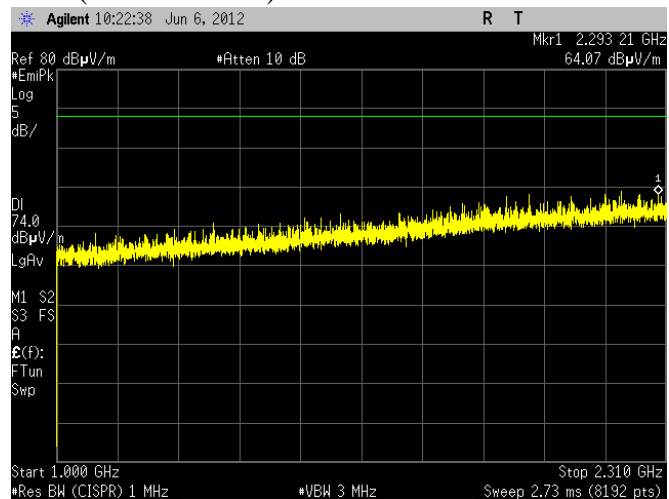


Prepared For: Honeywell	Name: WiFi Thermostat
Report: TR 311318 A FCCICTX V2	Model: TH8320WF
LSR: C-1466	Serial: ENG Sample

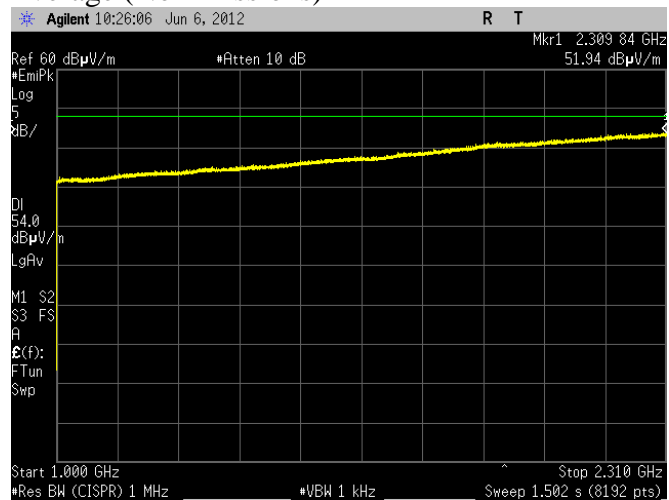
300-1000MHz Horizontal



1-2.310 GHz Peak (No Emissions)



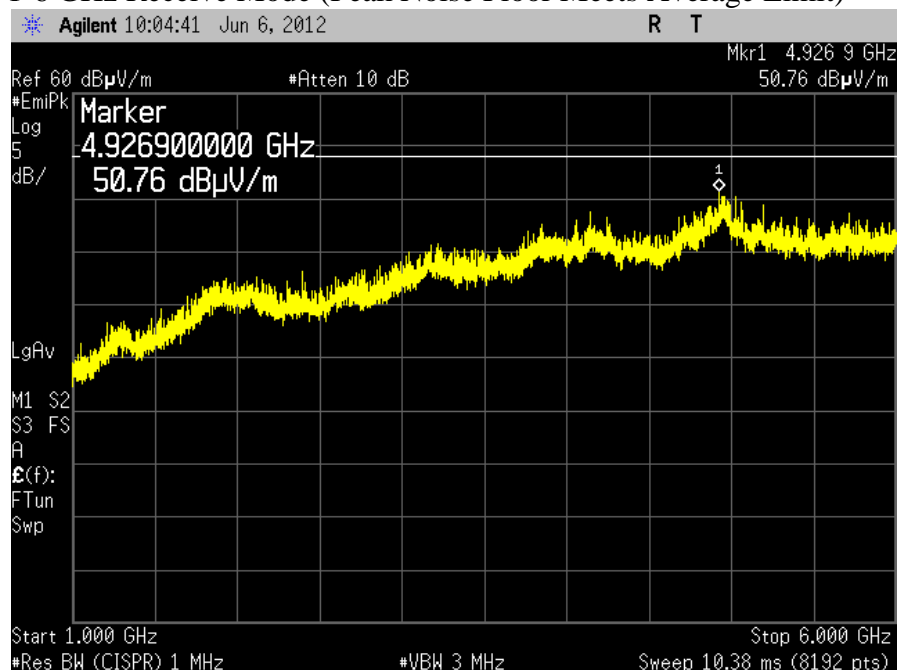
1-2.310 GHz Average (No Emissions)



Prepared For: Honeywell
Report: TR 311318 A FCCICTX V2
LSR: C-1466

Name: WiFi Thermostat
Model: TH8320WF
Serial: ENG Sample

1-6 GHz Receive Mode (Peak Noise Floor Meets Average Limit)



Prepared For: Honeywell
Report: TR 311318 A FCCICTX V2
LSR: C-1466

Name: WiFi Thermostat
Model: TH8320WF
Serial: ENG Sample

C.3 – AC Line Conducted Emissions

The test area and setup are in accordance with ANSI C63.4 per the requirements of Title 47 CFR, FCC Part 15, and RSS-GEN. The EUT was placed on a non-conductive wooden table, with a height of 80 cm above the reference ground plane. The EUT's power cable was plugged into a 50Ω (ohm), 50/250 μ H Line Impedance Stabilization Network (LISN). The AC power supply of 110V was provided via an appropriate broadband EMI Filter, and then to the LISN line input. Final readings were then taken and recorded. After the EUT was setup and connected to the LISN, the RF Sampling Port of the LISN was connected to a 10 dB Attenuator-Limiter, and then to the EMI System.

A list of the test equipment and accessories utilized for the Conducted Emissions test, including calibration information and equipment descriptions, is provided in Appendix A. All equipment is calibrated and used according to the operation manuals supplied by the manufacturers. All cables are calibrated and verified periodically for conformance. The emissions are measured on an EMI System, which has automatic correction for all factors stored in memory and allows direct readings to be taken.

Limits of Conducted Emissions at the AC Mains Ports
FCC Part 15.207 / RSS-GEN

Frequency Range (MHz)	Class B Limits (dBμV)		Measuring Bandwidth
	Quasi-Peak	Average	
0.150 -0.50 *	66-56	56-46	RBW = 9 kHz VBW ≥ 9 kHz for QP VBW = 1 Hz for Average
0.5 – 5.0	56	46	
5.0 – 30	60	50	
* The limit decreases linearly with the logarithm of the frequency in this range.			

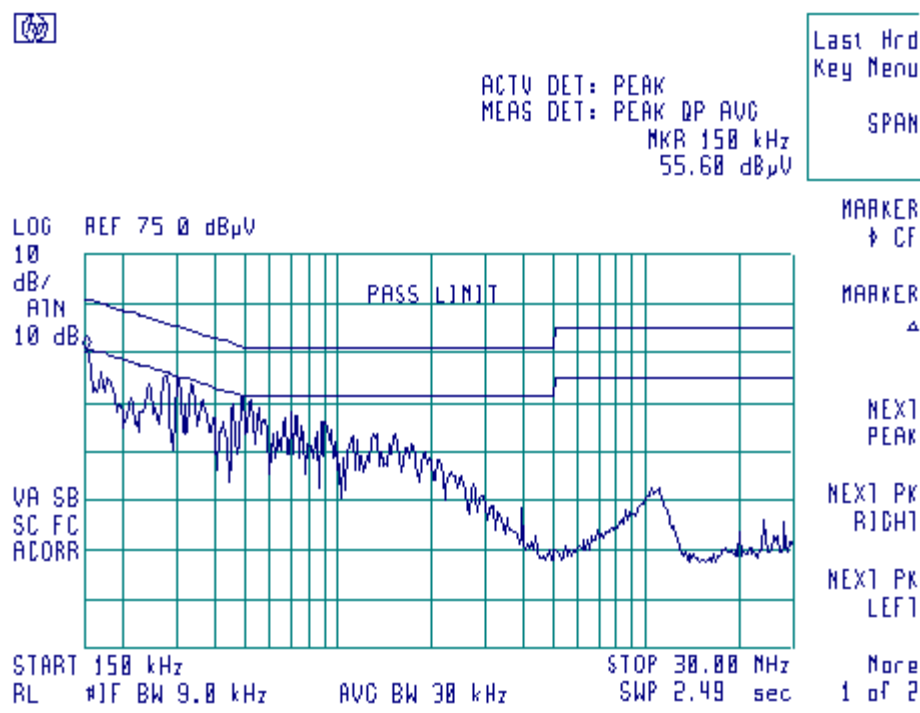
AC Line Conducted Emissions

Manufacturer	Honeywell
Date	5-30-12
Operator	Mike H
Temperature	20 - 25° C
Humidity	30 – 60%
Test Voltage	24VAC 60Hz
Test Location	LS Research, LLC – Conducted Emissions Area
Test Distance	40 cm from vertical conductive wall
EUT Placement	80 cm height non-conductive table
Measurements	Final
Detectors	Quasi-Peak, Average
Additional Notes	Continuous Transmit Modulated Mode at highest power setting used and determine worst case

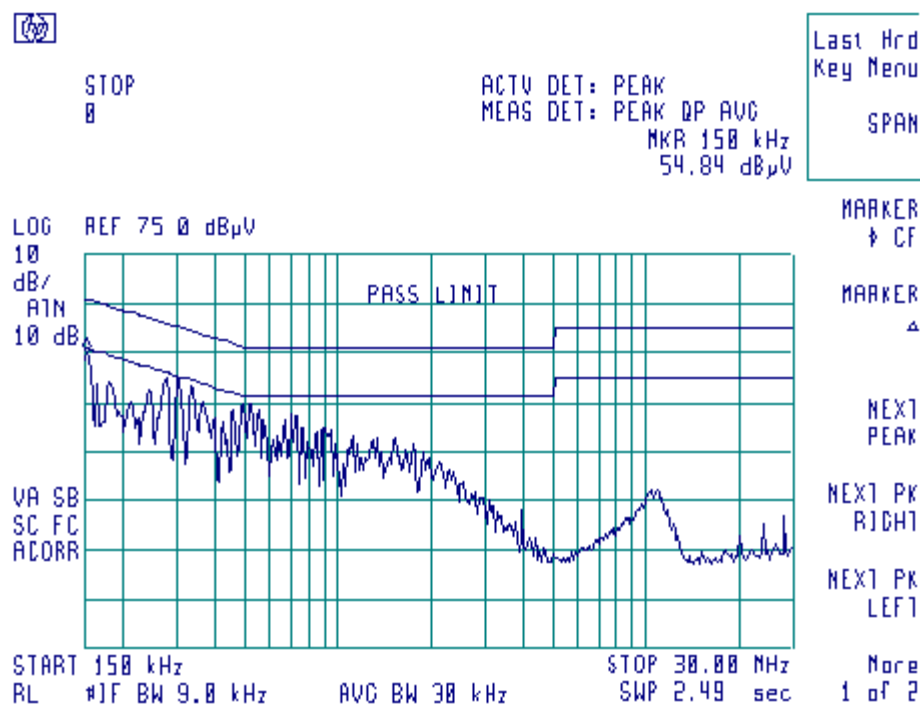
Frequency (MHz)	Line	Quasi-Peak			Average		
		Q-Peak Reading (dBμV)	Q-Peak Limit (dBμV)	Quasi- Peak Margin (dB)	Average Reading (dBμV)	Average Limit (dBμV)	Average Margin (dB)
0.150	L1	50.600	66.000	15.400	40.600	56.000	15.400
0.276	L1	49.700	60.937	11.237	39.400	50.937	11.537
0.150	L1	50.300	66.000	15.700	40.400	56.000	15.600
0.306	L1	49.400	60.080	10.680	39.300	50.080	10.780
0.340	L1	46.400	59.205	12.805	36.100	49.205	13.105

Prepared For: Honeywell	Name: WiFi Thermostat
Report: TR 311318 A FCCICTX V2	Model: TH8320WF
LSR: C-1466	Serial: ENG Sample

Transmit Mode - Line 1

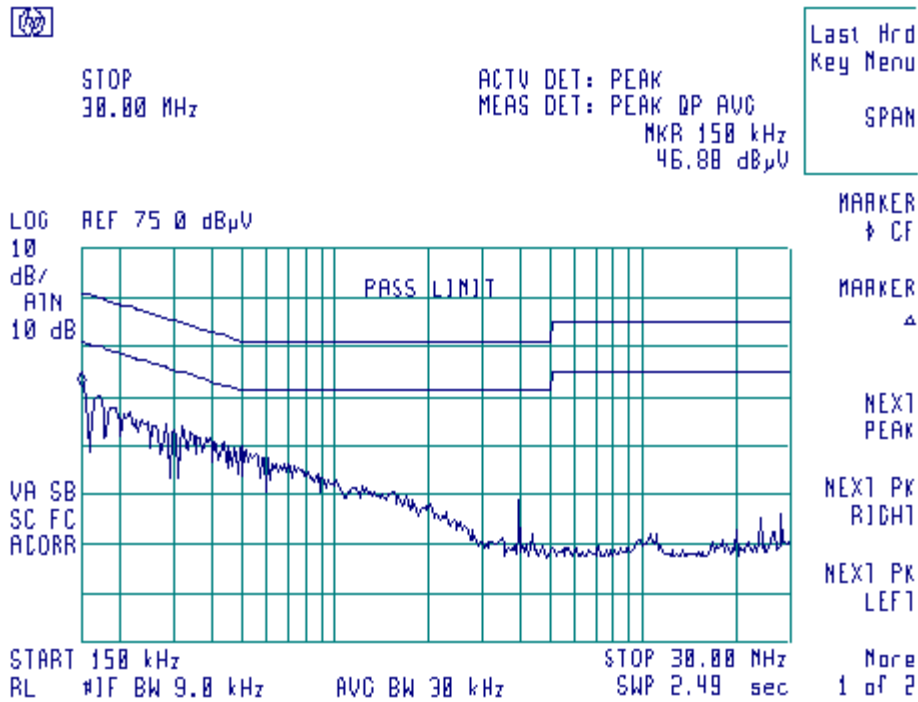


Transmit Mode - Line 2

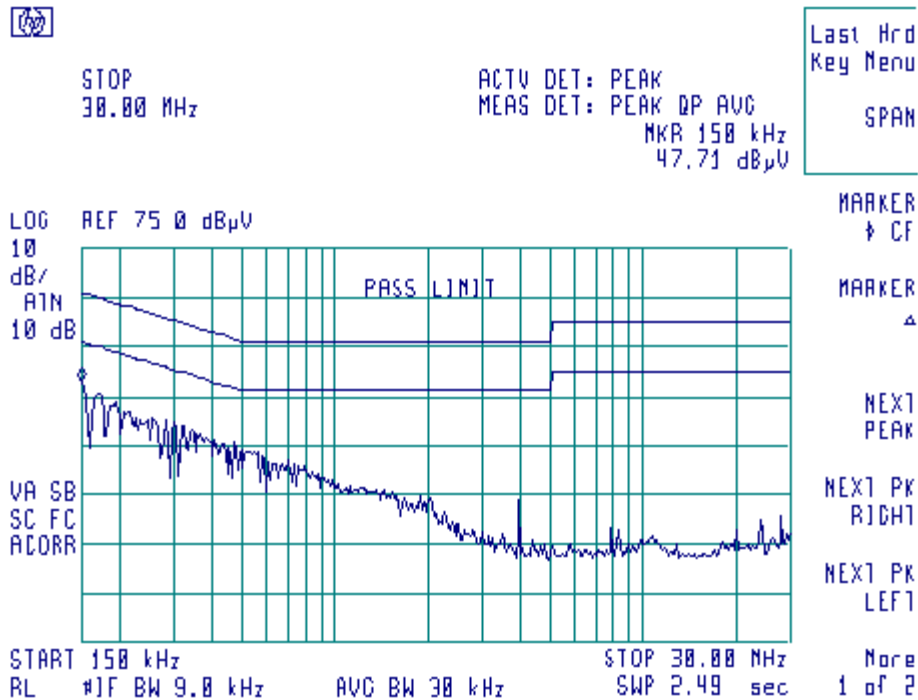


Prepared For: Honeywell	Name: WiFi Thermostat
Report: TR 311318 A FCCICTX V2	Model: TH8320WF
LSR: C-1466	Serial: ENG Sample

Receive Mode - Line 1



Receive Mode - Line 2



Appendix D - Uncertainty Summary

This uncertainty represents an expanded uncertainty expressed at approximately the 95 % confidence level, using a coverage factor of $k=2$.

Table of Expanded Uncertainty Values, ($K=2$) for Specified Measurements

Measurement Type	Particular Configuration	Uncertainty Values
Radiated Emissions	3 – Meter chamber, Biconical Antenna	4.82 dB
Radiated Emissions	3-Meter Chamber, Log Periodic Antenna	4.88 dB
Radiated Emissions	3-Meter Chamber, Horn Antenna	4.85 dB
Radiated Emissions	10-Meter OATS, Biconical Antenna	4.32 dB
Radiated Emissions	10-Meter OATS, Log Periodic Antenna	3.63 dB
Absolute Conducted Emissions	Agilent PSA/ESA Series	1.38 dB
AC Line Conducted Emissions	Shielded Room/EMCO LISN	3.20 dB
Radiated Immunity	3 Volts/Meter in 3-Meter Chamber	2.05 Volts/Meter
Conducted Immunity	3 Volts level	2.33 V
EFT Burst, Surge, VDI	230 VAC	54.4 V
ESD Immunity	Discharge at 15kV	3200 V
Temperature/Humidity	Thermo-hygrometer	0.64°/ 2.88 %RH

Appendix E - References

Publication	Year	Title
FCC CFR Parts 0-15	2011	Code of Federal Regulations – Telecommunications
ANSI C63.4	2003	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.
RSS-210 Annex 8	2010	Low-power License-exempt Radio communication Devices (All Frequency Bands): Category I Equipment
RSS-GEN Issue 3	2010	General Requirements and Information for the Certification of Radio Apparatus
ANSI C63.10	2009	American National Standard for Testing Unlicensed Wireless Devices
FCC KDB 558074 D01 DTS Meas Guidance v01	1-18-2012	Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247

Appendix F – RF Exposure Exemption

The following exemption calculations are based on a RF Conducted measurement of 14.57 dBm and a calculated antenna gain of 4dBi as measured over a ground plane and measured from the antenna port.

The output power is less than 5W and exempt from evaluation as stated in Industry Canada RSS-102 section 2.5.2.

Prediction of MPE limit at a given distance			
Equation from page 18 of OET Bulletin 65, Edition 97-01			
$S = \frac{PG}{4\pi R^2}$			
where: S = power density			
P = power input to the antenna			
G = power gain of the antenna in the direction of interest relative to an isotropic radiator			
R = distance to the center of radiation of the antenna			
Maximum peak output power at antenna input terminal:	14.57 (dBm)		
Maximum peak output power at antenna input terminal:	28.642 (mW)		
Antenna gain(typical):	4 (dBi)		
Maximum antenna gain:	2.512 (numeric)		
Prediction distance:	20 (cm)		
Prediction frequency:	2412 (MHz)		
PE limit for uncontrolled exposure at prediction frequency:	1 (mW/cm^2)		
Power density at prediction frequency:	0.014313 (mW/cm^2)		
Maximum allowable antenna gain:	22.4 (dBi)		
Margin of Compliance at	20	cm =	18.4 dB

END OF REPORT

Date	Version	Comments	Person
6-7-12	V0	Initial Draft Release	Adam A
6-13-12	V1	Revision	Adam A
7-2-12	V2	Updates to data for new power settings	Adam A

Prepared For: Honeywell	Name: WiFi Thermostat
Report: TR 311318 A FCCICTX V2	Model: TH8320WF
LSR: C-1466	Serial: ENG Sample