TEST RESULT SUMMARY

FCC Part 15 Subpart C Section 15.247
Industry Canada RSS-210 Issue 8
Industry Canada RSS-Gen Issue 3

MANUFACTURER	Octane Fitness 7601 Northland Drive North #100 Brooklyn Park MN 55428
DESCRIPTION OF EQUIPMENT	Combination Bluetooth LE & ANT plus radio board
NAME OF EQUIPMENT	BTLE/ANT+ Radio Module
MODEL NUMBER(S) TESTED	108581-001
SERIAL NUMBER(S) TESTED	5
TEST REPORT NUMBER	NC1306948.1 Rev A
TEST DATE(S)	02 – 16 August 2013

TÜV SÜD America Inc, as an independent testing laboratory, declares that the equipment tested as specified above conforms to the applicable requirements of FCC Part 15 Subpart C Section 15.247 *"Operation within the bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz",* and Industry Canada RSS-210 Issue 8 *"Licence-exempt Radio Apparatus (All Frequency Bands): Category I Equipment".*

It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical characteristics. Any modifications necessary for compliance made during testing on the above mentioned date(s) must be implemented in all production units for compliance to be maintained.

Date:	20 November 2013	Tested by:	Approved by:
Location:	Taylors Falls MN USA	Greg Jakubowski Senior EMC Technician	Joel T Schneider Senior EMC Engineer

Not Transferable

EMC TEST REPORT

Test Report No.	NC1306948.1 Rev A	Date of issue:	20 November 2013
Product Description	Combination Bluetooth LE & ANT radio board		
Product Name	BTLE/ANT+ Radio Module		
Model No(s) Tested	108581-001		
Serial No(s) Tested	5		
Manufacturer	Octane Fitness		
Address	7601 Northland Drive North #100		
	Brooklyn Park MN 55428		

Test Result ■ **Positive** ☐ **Negative**

TÜV SÜD America Inc reports apply only to the specific samples tested under stated test conditions. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. TÜV SÜD America Inc shall have no liability for any deductions, inferences or generalizations drawn by the client or others from TÜV SÜD America Inc issued reports.

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REVISION RECORD

REVISION	TOTAL NUMBER OF PAGES	DATE	DESCRIPTION
	36	11 October 2013	Initial Release
A	36	20 November 2013	Added test mode information.

TEST REPORT CONTENTS **Page(s)**

EMC TEST REGULATIONS:
The tests were performed according to the following regulations:
- FCC Part 15 Subpart C Sections 15.247(a)(2), (b)(3), (b)(4), (d), (e)
- Industry Canada RSS-210 Issue 8, Section A8.2(a), (b), A8.4(4), A8.5
- Industry Canada RSS-Gen Issue 3 Section 4.6.1

ENVIRONMENTAL CONDITIONS IN THE LAB

	Actual
Temperature:	: 18-22°C
Atmospheric pressure	: 99 kPa
Relative Humidity	: 60-65%

POWER SUPPLY UTILIZED

Power supply system	: 3.2 VDC

TEST EQUIPMENT
All measurement instrumentation is traceable to the National Institute of Standards and Technology and is calibrated according to internal procedure.

SIGN EXPLANATIONS
☐ - not applicable
■ - applicable.

Fundamental set on low, mid & high channels. Device is set to continuous on, maximum power. The radio was put into a test mode that allows for a constant transmit carrier at specific channels with a specific modulation. The Nordic radio is capable of both ANT+ and Bluetooth operation simultaneously. The test mode allowed for testing the radio at the top channel, bottom channel and a mid channel. Results depict worst case mode.

Antenna gain

FCC 15.247(b)(4)

Test summary

The requirements are: ■ - MET ☐ - NOT MET
The PCB antenna, in the direction of maximum gain, is 8.51 dBi

Test location

■ - Wild River Lab Large Test Site (Open Area Test Site)
☐ - Wild River Lab Small Test Site (Open Area Test Site)
☐ - Oakwood Lab Medium Test Site (Open Area Test Site)

Test equipment

TUV ID	Model	Manufacturer	Description	Serial	Cal Due
NBLE03196	8566B	Hewlett-Packard	Spectrum Analyzer	2240A01856	13-Jan-14
NBLE03195	85662A	Hewlett-Packard	Analyzer Display	2648A13518	13-Jan-14
OWLE02682	85650A	Hewlett-Packard	Quasi-Peak Adapter	2811A01127	19-Mar-14
OWLE02074	3115	Electro-Mechanics (EMCO)	Ridge Guide Antenna	2504	07-Mar-14
WRLE03958	SL18B4020	Phase One Microwave	Preamplifier 1 – 18 GHz	0002	Code B 02-Jan-14

Test limit

(Not specified, if > 6 dBi, then max pwr limit is reduced)

Test data

Radiated field strength of fundamental at 3 meters
Fundamental maximized (EUT rotated 360 degrees, measurement antenna vertical & horizontal, 1 – 4 meters high)

List of measurements for run #: 1

FREQ	LEVEL (dBuV)	CABLE / ANT / PREAMP / ATTEN (dB)	FINAL (dBuV / m)	POL / HGT / AZ (m)(DEG)		
Find worst case of 3 orthogonal axis						
Mid channel, 2.440 GHz						
Fundamental maximized						
DUT laying flat						
2.44 GHz	69.5 Pk	5.91 / 28.4 / 0.0 / 0.0	103.81	H / 1.00 / 284		n/a

By calculation, field strength of 103.81 dBuV / m at 3 meters = 8.58 dBm eirp
The measured output power is 0.07 dBm.
Antenna gain = 8.58 – 0.07 = 8.51 dBi

DTS 6 dB signal bandwidth

FCC §15.247(a)(2) , IC RSS-210 A8.2(a)

Test summary

The requirements are: ■ - MET ☐ - NOT MET
Conducted measurements were performed per FCC 558074 D01 DTS Meas Guidance v03. 8.1 Option 1
The minimum 6 dB bandwidth is 658 kHz.

Test location

☐ - Wild River Lab Large Test Site (Open Area Test Site)
☐ - Wild River Lab Small Test Site (Open Area Test Site)
■ - Wild River Lab Shield Room 2

Test equipment

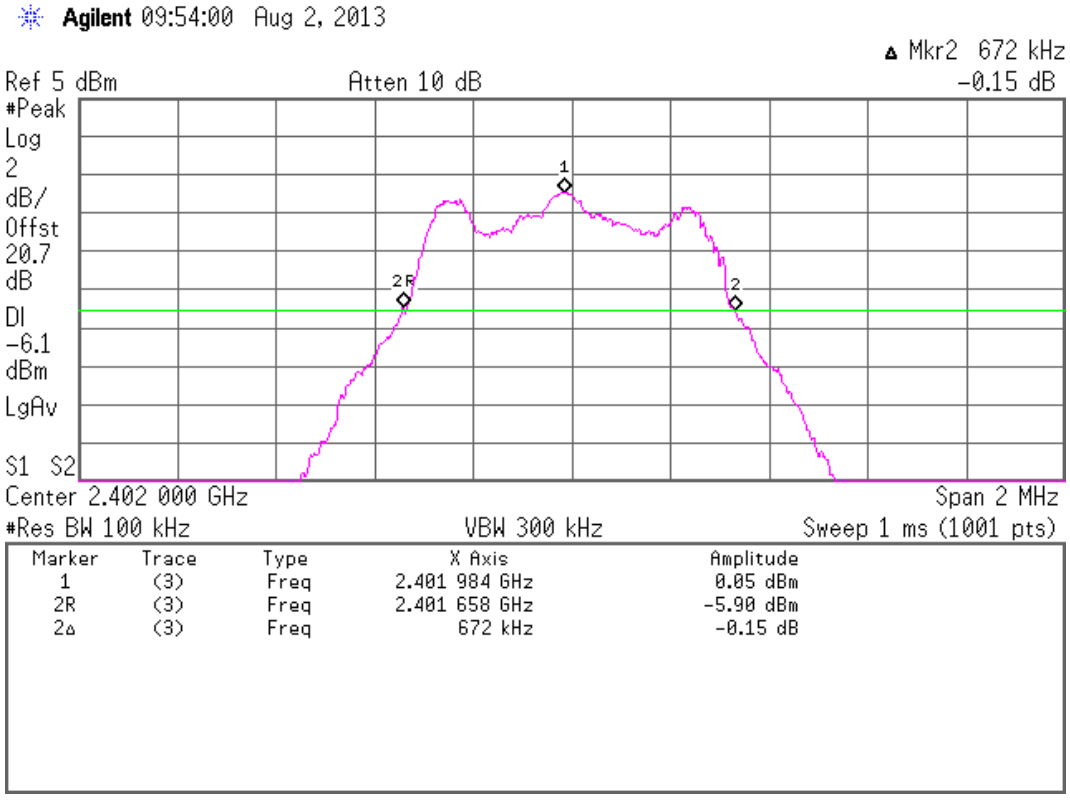
TUV ID	Model	Manufacturer	Description	Serial	Cal Due
WRLE03371	E4440A	Agilent	Spectrum Analyzer	MY43362222	06-Nov-13
WRLE03161	1	Weinschel	20 dB Attenuator	AH9049	Code B 01-Oct-13

Test limit

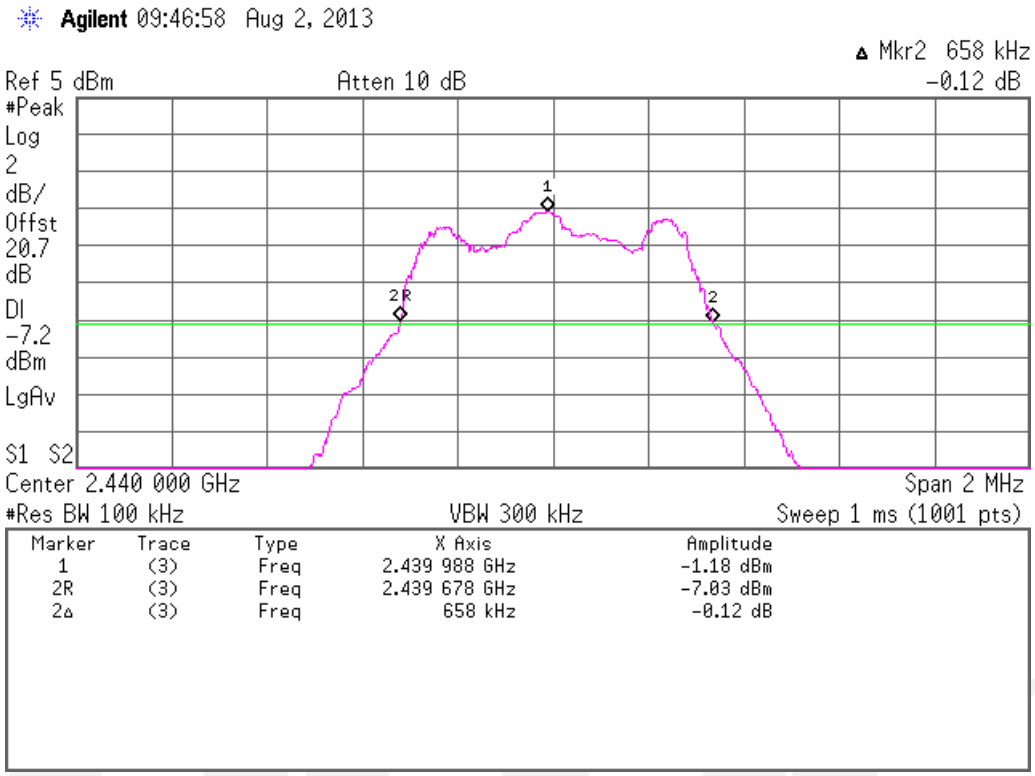
The minimum 6 dB bandwidth shall be at least 500 kHz

Test data

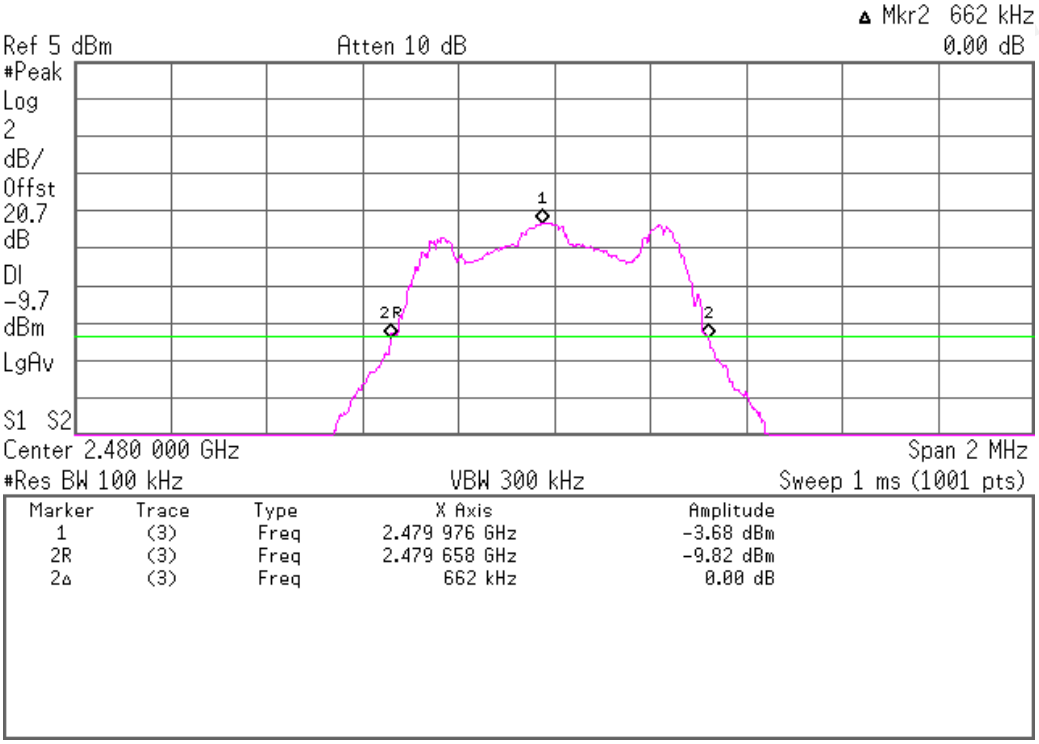
Low channel



Mid channel



High channel



Fundamental emission output power

FCC §15.247(b)(3), IC RSS-210 A8.4(4)

Test summary

The requirements are: ■ - MET ☐ - NOT MET
Conducted measurements were performed per FCC 558074 D01 DTS Meas Guidance v03. 9.1.1
The maximum peak conducted output power is 0.07 dBm

Test location

☐ - Wild River Lab Large Test Site (Open Area Test Site)
☐ - Wild River Lab Small Test Site (Open Area Test Site)
■ - Wild River Lab Shield Room 2

Test equipment

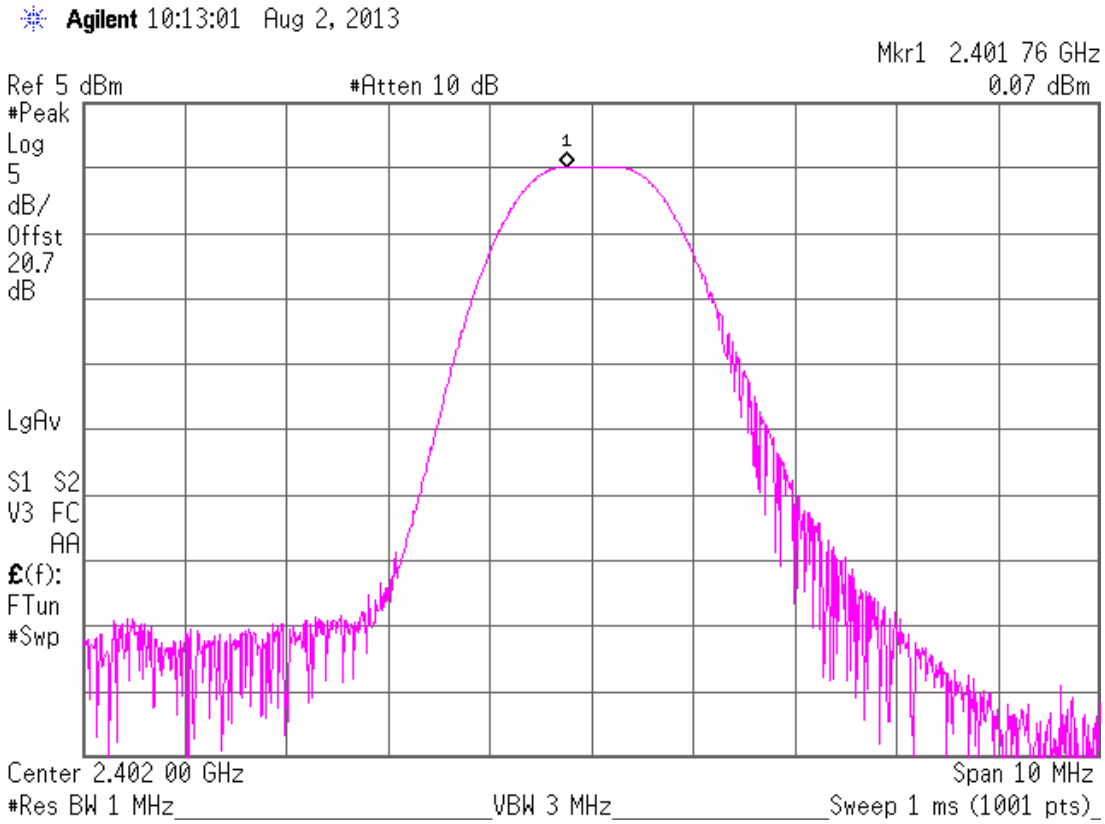
TUV ID	Model	Manufacturer	Description	Serial	Cal Due
WRLE03371	E4440A	Agilent	Spectrum Analyzer	MY43362222	06-Nov-13
WRLE03161	1	Weinschel	20 dB Attenuator	AH9049	Code B 01-Oct-13

Test limit

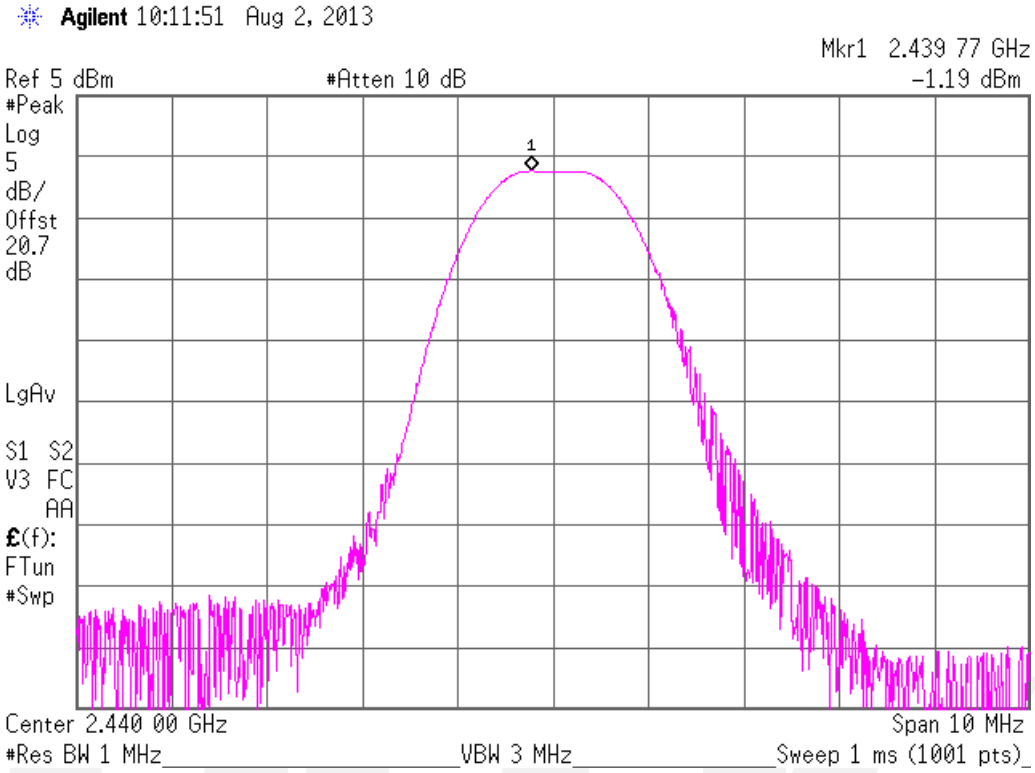
1 Watt (if antenna gain < 6 dBi) – antenna gain calculated to be 8.51 dBi, so limit = 30 dBm – 2.51 dB = 27.49 dBm, or 561 mW.

Test data

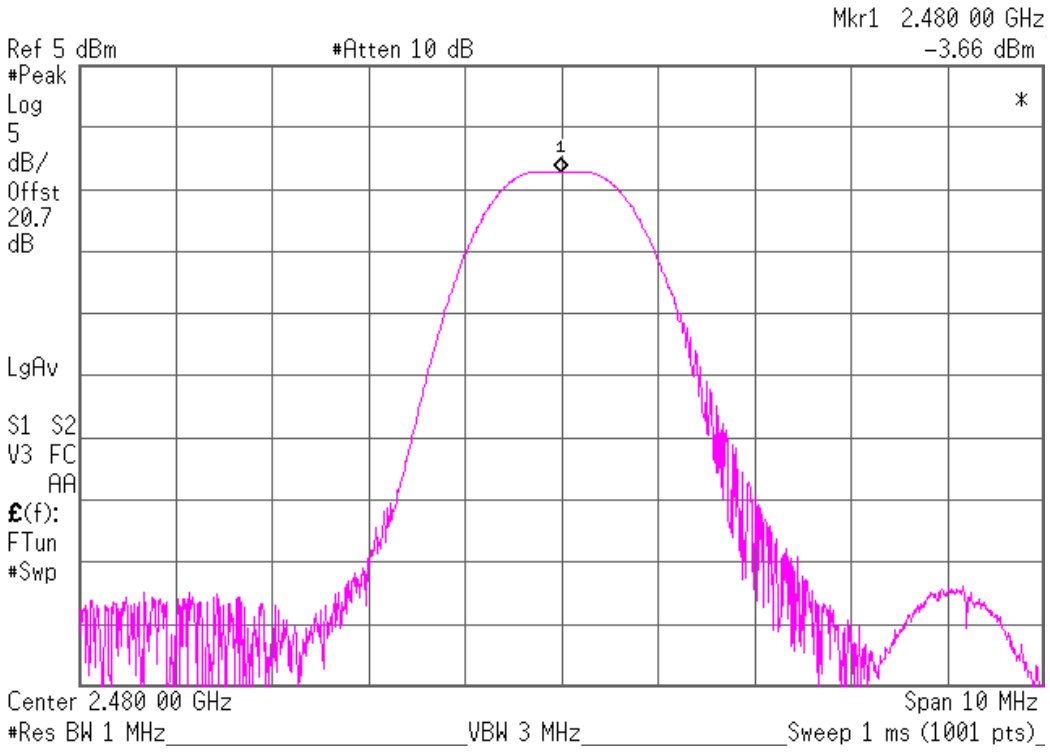
Low channel



Mid channel



High channel



Maximum power spectral density

FCC §15.247(e), IC RSS-210 A8.2(b)

Test summary

The requirements are: ■ - MET ☐ - NOT MET
Conducted measurements were performed per FCC 558074 D01 DTS Meas Guidance v03. 10.2
The peak power spectral density is 0.04 dBm

Test location

☐ - Wild River Lab Large Test Site (Open Area Test Site)
☐ - Wild River Lab Small Test Site (Open Area Test Site)
■ - Wild River Lab Shield Room 2

Test equipment

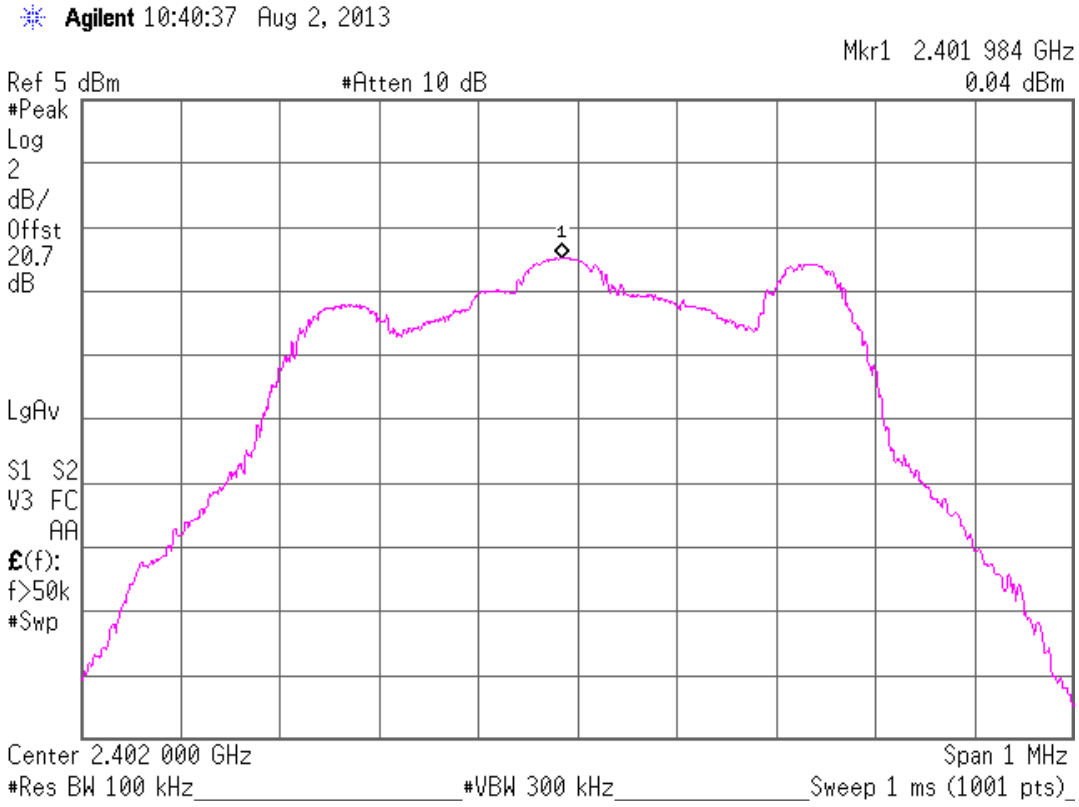
TUV ID	Model	Manufacturer	Description	Serial	Cal Due
WRLE03371	E4440A	Agilent	Spectrum Analyzer	MY43362222	06-Nov-13
WRLE03161	1	Weinschel	20 dB Attenuator	AH9049	Code B 01-Oct-13

Test limit

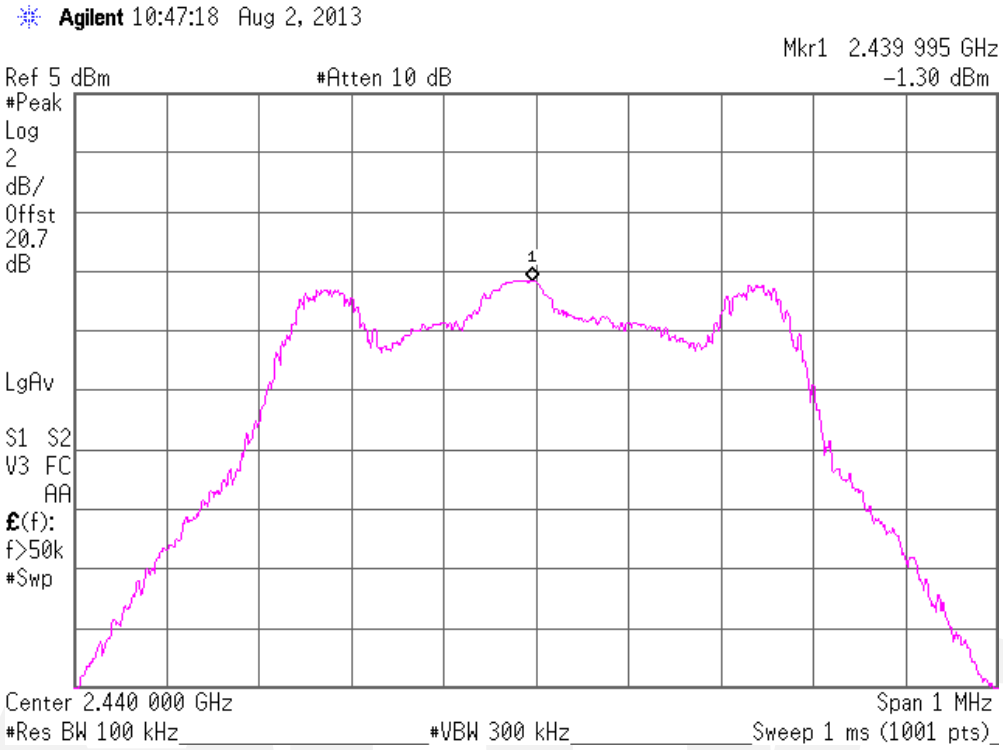
No greater than 8 dBm in any 3 kHz band

Test data

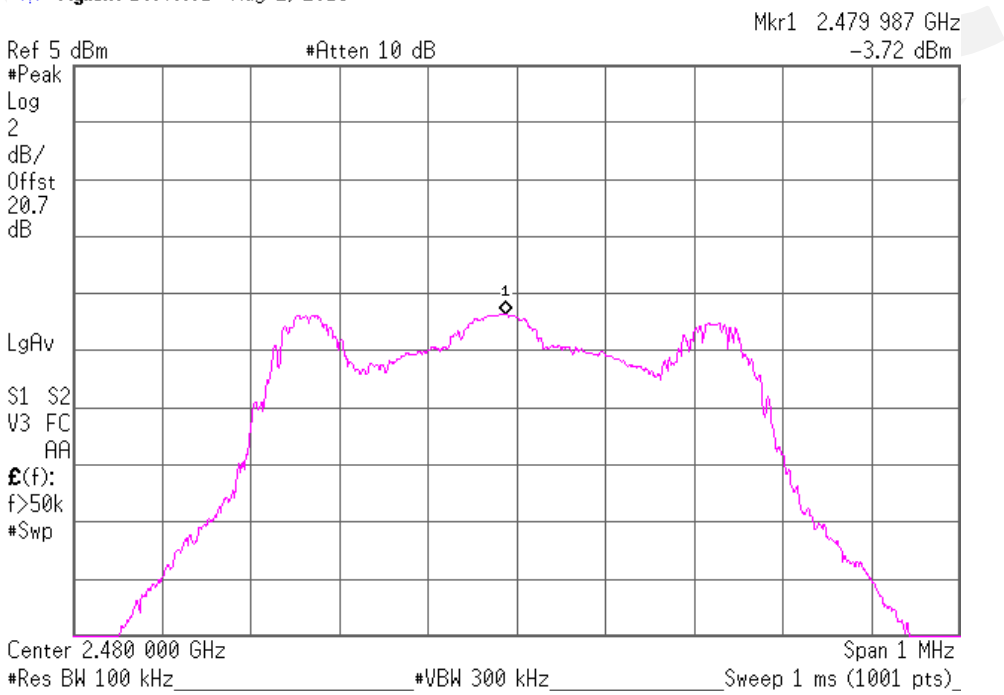
Low channel



Mid channel



High channel



Emissions in non-restricted frequency bands

FCC §15.247(d), IC RSS-210 A8.5

Test summary

The requirements are: ■ - MET ☐ - NOT MET
Conducted measurements were performed per FCC 558074 D01 DTS Meas Guidance v03. 11.2
The maximum conducted emission level is -56.97 dBm.

Test location

☐ - Wild River Lab Large Test Site (Open Area Test Site)
☐ - Wild River Lab Small Test Site (Open Area Test Site)
■ - Wild River Lab Shield Room 2

Test equipment

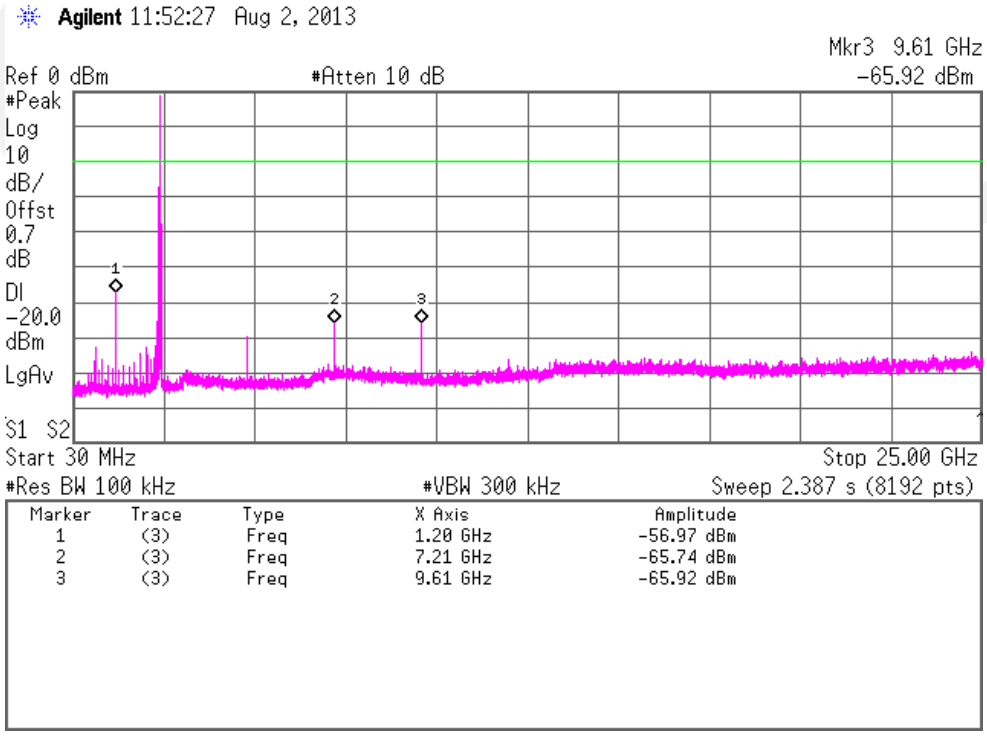
TUV ID	Model	Manufacturer	Description	Serial	Cal Due
WRLE03371	E4440A	Agilent	Spectrum Analyzer	MY43362222	06-Nov-13

Test limit

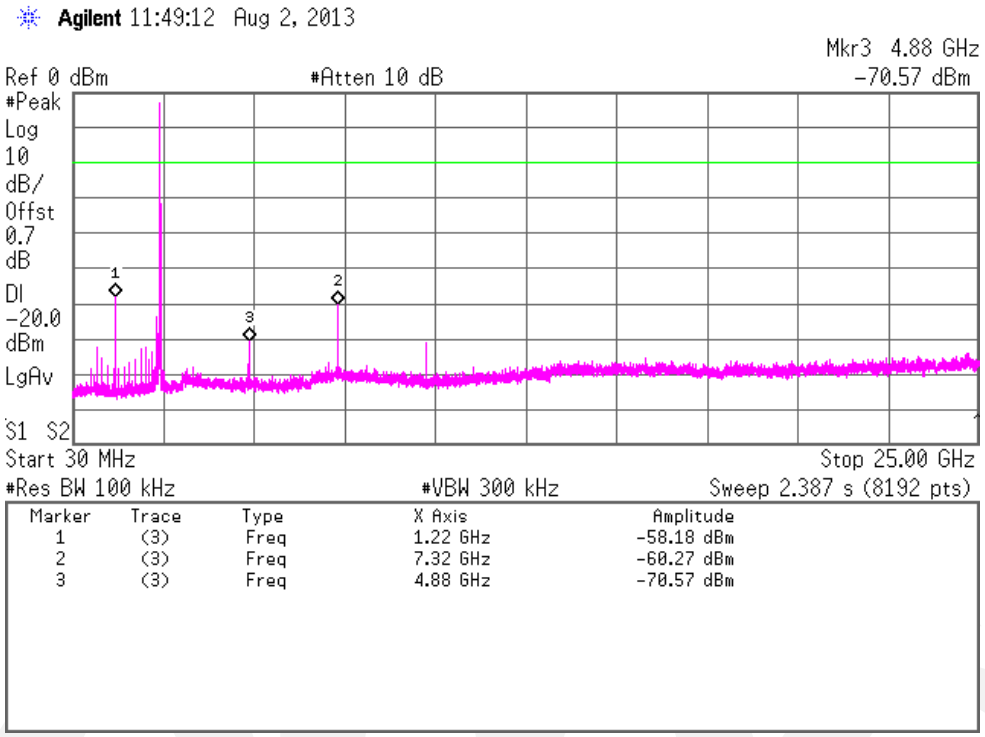
-20 dBc.

Test data

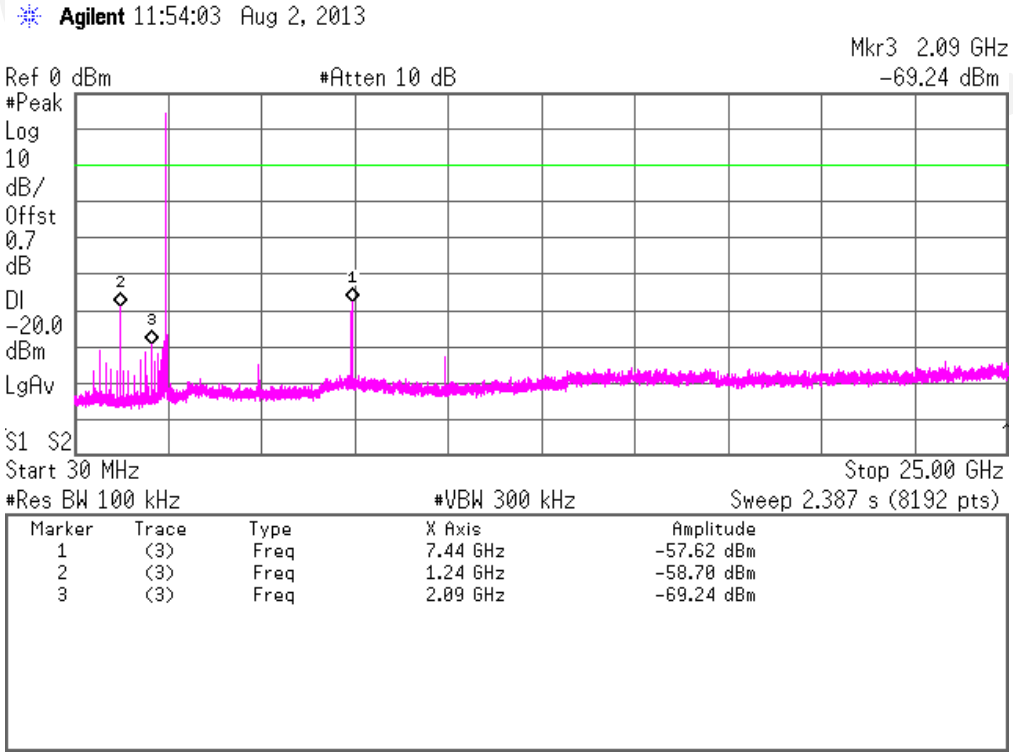
Low channel



Mid channel



High channel



Emissions in restricted frequency bands

FCC §15.247(d) , IC RSS-210 2.2

Test summary

The requirements are: ■ - MET ☐ - NOT MET
Radiated measurements were performed per FCC 558074 D01 DTS Meas Guidance v03. 12.2.6
The maximum radiated emission, relative to the limit, within the restricted bands is 53.33 dBuV/m pk at 3m at 4.805 GHz. The minimum margin of compliance is 0.67 dB.

Test location

☐ - Wild River Lab Large Test Site (Open Area Test Site)
■ - Wild River Lab Small Test Site (Open Area Test Site)
■ - Oakwood Lab Medium Test Site (Open Area Test Site)

Test equipment

TUV ID	Model	Manufacturer	Description	Serial	Cal Due
WRLE03203	EM-6917B	Electro-Metrics	Biconicalog Periodic	106	13-Sept-13
WRLE02668	8447D	Hewlett-Packard	Preamplifier	1937A02209	Code B 06-Aug-14
WRLE03294	8566B	Hewlett-Packard	Spectrum Analyzer	2349A03098	26-Jun-14
WRLE02673	85662A	Hewlett-Packard	Analyzer Display	2152A03687	26-Jun-14
WRLE02684	85650A	Hewlett-Packard	Quasi-Peak Adapter	2521A01006	26-Jun-14
OWLE02074	3115	Electro-Mechanics	Ridge Guide Antenna	2504	07-Mar-14
WRLE03958	SL18B4020	Phase One Microwave	Preamplifier 1 – 18 GHz	0002	Code B 02-Jan-14
WRLE03997	EWT-14-0066	EWT	2.4 GHz Notch filter	E2	Code B 08-Jan-14
WRLE02003	F550B1	Acronetics	4 – 8 GHz Bandpass Filter	010	Code B 08-Jan-14
WRLE03933	F551B-1	Acronetics	8 – 12 GHz Bandpass Filter	010	Code B 08-Jan-14
NBLE03196	8566B	Hewlett-Packard	Spectrum Analyzer	2240A01856	13-Jan-14
NBLE03195	85662A	Hewlett-Packard	Analyzer Display	2648A13518	13-Jan-14
WRLE03371	E4440A	Agilent	Spectrum Analyzer	MY43362222	06-Nov-13
WRLE03978	SL26-3010	Phase One Microwave	Amplifier 18-26.5 GHz	0005	Code B 02-Jan-14
OWLE03996	SAS-572	A.H. Systems	STD Gain Horn	183	Code Y

Test limit within the restricted bands

Frequency (MHz)	Field strength (μV/m)	Field strength (dBμV/m)	Distance (meters)
30-88	100	40	3
88-216	150	43.5	3
216-960	200	46	3
Above 960	500	54	3

CISPR quasi-peak detector below 1 GHz, Average detector above 1 GHz

Test data

See following pages

30 MHz - 1 GHz

Measurement summary for limit1: FCC 15.247(d) <1GHz 3m (Qp)					
FREQ	LEVEL (dBuV)	CABLE / ANT / PREAMP / ATTEN (dB)	FINAL (dBuV / m)	POL / HGT / AZ (m)(DEG)	DELTA1 FCC 15.247(d) <1GHz 3m
400.012 MHz	26.16 Qp	4.33 / 15.8 / 23.81 / 0.0	22.48	H / 1.90 / 80	-23.52
272.0 MHz	22.9 Qp	3.44 / 12.42 / 23.84 / 0.0	14.92	H / 1.80 / 75	-31.08
256.0 MHz	21.75 Qp	3.32 / 12.34 / 23.84 / 0.0	13.57	V / 1.00 / 180	-32.43
240.0 MHz	22.1 Qp	3.2 / 11.28 / 23.85 / 0.0	12.73	H / 1.80 / 0	-33.27

Above 1 GHz

Measurement summary for limit1: FCC 15.247 >1G 3m pk (Pk)					
FREQ	LEVEL (dBuV)	CABLE / ANT / PREAMP / ATTEN (dB)	FINAL (dBuV / m)	POL / HGT / AZ (m)(DEG)	DELTA1 FCC 15.247 >1G 3m pk
4.805 GHz	65.45 Pk	9.41 / 32.68 / 46.01 / 0.43	61.96	V / 1.42 / 26	-12.04
7.441 GHz	55.4 Pk	13.76 / 36.59 / 45.85 / 1.27	61.17	V / 1.27 / 72	-12.83
4.879 GHz	61.7 Pk	9.54 / 32.77 / 45.91 / 1.04	59.15	V / 1.40 / 76	-14.85
4.96 GHz	59.6 Pk	9.69 / 32.94 / 45.8 / 1.04	57.47	V / 1.37 / 64	-16.53
7.321 GHz	51.5 Pk	13.72 / 36.44 / 45.84 / 1.21	57.03	V / 1.40 / 115	-16.97

Measurement summary for limit2: FCC 15.247 >1G 3m av (Av)					
FREQ	LEVEL (dBuV)	CABLE / ANT / PREAMP / ATTEN (dB)	FINAL (dBuV / m)	POL / HGT / AZ (m)(DEG)	DELTA2 FCC 15.247 >1G 3m av
4.805 GHz	56.82 Av	9.41 / 32.68 / 46.01 / 0.43	53.33	V / 1.42 / 26	-0.67
4.88 GHz	54.95 Av	9.54 / 32.77 / 45.91 / 1.04	52.4	V / 1.40 / 76	-1.6
7.441 GHz	46.41 Av	13.76 / 36.59 / 45.85 / 1.27	52.18	V / 1.27 / 72	-1.82
4.96 GHz	53.69 Av	9.69 / 32.94 / 45.8 / 1.04	51.56	V / 1.37 / 64	-2.44
7.321 GHz	43.94 Av	13.72 / 36.44 / 45.84 / 1.21	49.47	V / 1.40 / 115	-4.53

Band-edge measurements

FCC §15.247(d)

Test summary

The requirements are: ■ - MET ☐ - NOT MET
Radiated measurements were performed per FCC 558074 D01 DTS Meas Guidance v03. 12.2.6
Neither the low or high channel emissions are within 2 MHz of the authorized band edge
The maximum band-edge radiated emission is 49.98 dBuV/m average at 3m at 2.4835 GHz.
The minimum margin of compliance for restricted bands is 4.02 dB.
The plots also demonstrate -20 dBc compliance at authorized band edges

Test location

☐ - Wild River Lab Large Test Site (Open Area Test Site)
☐ - Wild River Lab Small Test Site (Open Area Test Site)
■ - Oakwood Lab Medium Test Site (Open Area Test Site)

Test equipment

TUV ID	Model	Manufacturer	Description	Serial	Cal Due
OWLE02074	3115	Electro-Mechanics	Ridge Guide Antenna	2504	07-Mar-14
WRLE03958	SL18B4020	Phase One Microwave	Preamplifier 1 – 18 GHz	0002	Code B 02-Jan-14
NBLE03196	8566B	Hewlett-Packard	Spectrum Analyzer	2240A01856	13-Jan-14
NBLE03195	85662A	Hewlett-Packard	Analyzer Display	2648A13518	13-Jan-14
WRLE03161	1	Weinschel	20 dB Attenuator	AH9049	Code B 01-Oct-13

Test limit at 2.39 & 2.4835 GHz

Field strength (μV/m)	Field strength (dBμV/m)	Distance (meters)	Detector
500	54	3	av
5000	74	3	pk

Test data

Measurement summary for limit1: FCC 15.247 >1G 3m pk (Pk)

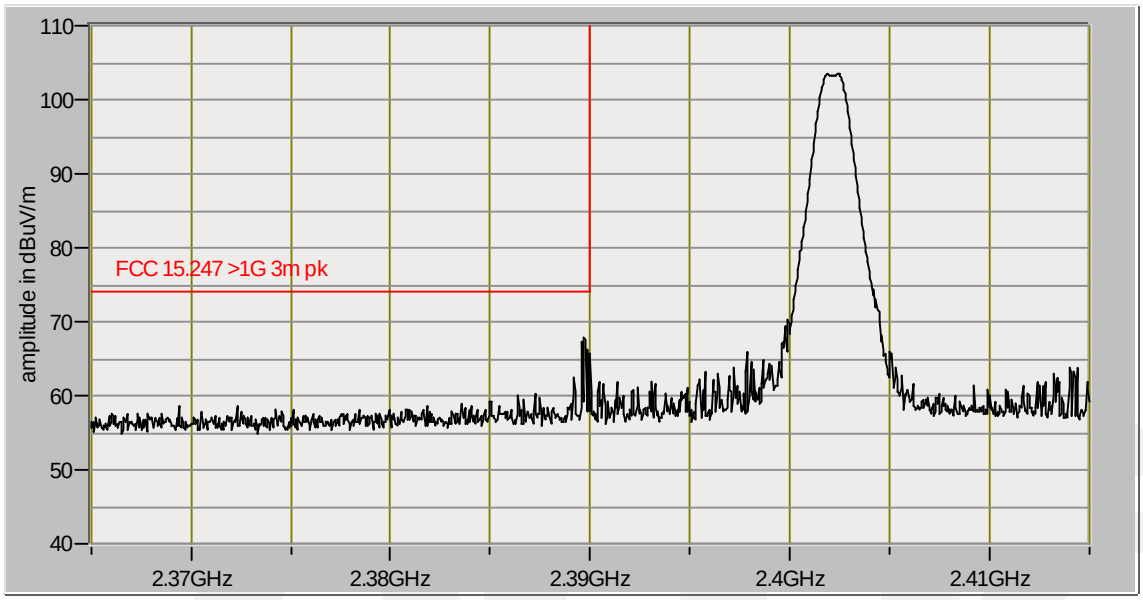
FREQ	LEVEL (dBuV)	CABLE / ANT / PREAMP / ATTEN (dB)	FINAL (dBuV / m)	POL / HGT / AZ (m)(DEG)	DELTA1 FCC 15.247 >1G 3m pk
2.39 GHz	61.5 Pk	5.78 / 28.15 / 48.89 / 19.83	66.37	H / 1.00 / 282	-7.63
2.4835 GHz	53.5 Pk	6.04 / 28.62 / 48.76 / 19.81	59.2	H / 1.00 / 281	-14.8

Measurement summary for limit2: FCC 15.247 >1G 3m av (Av)

FREQ	LEVEL (dBuV)	CABLE / ANT / PREAMP / ATTEN (dB)	FINAL (dBuV / m)	POL / HGT / AZ (m)(DEG)	DELTA2 FCC 15.247 >1G 3m av
2.4835 GHz	44.28 Av	6.04 / 28.62 / 48.76 / 19.81	49.98	H / 1.00 / 281	-4.02
2.39 GHz	42.0 Av	5.78 / 28.15 / 48.89 / 19.83	46.87	H / 1.00 / 282	-7.13

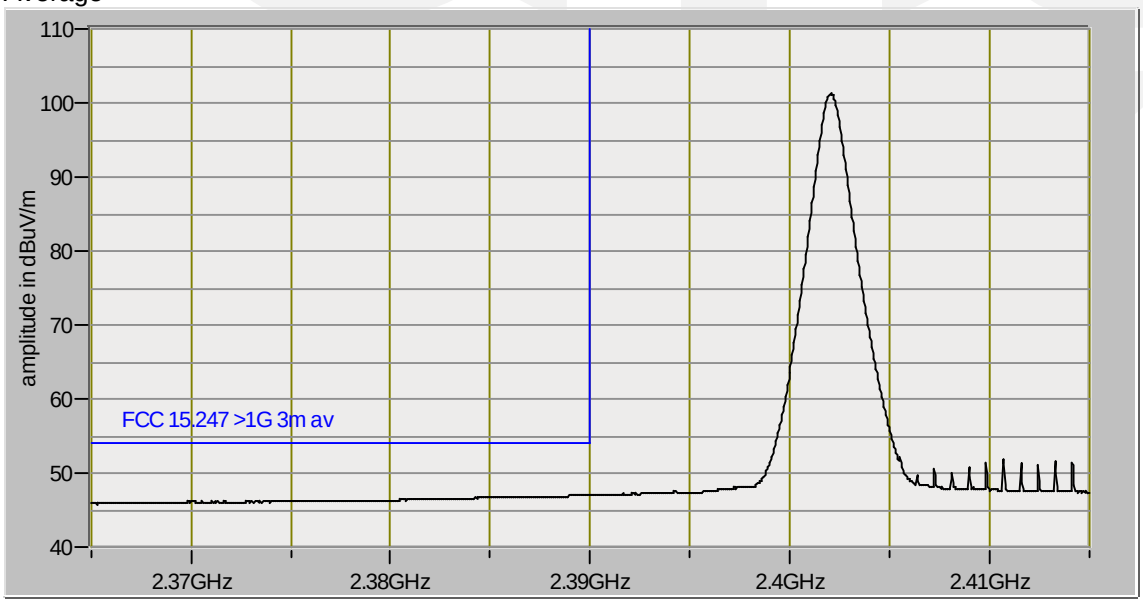
NC1306948, 06 Aug 2013
Band edge

Low channel, 2.402 GHz
Peak



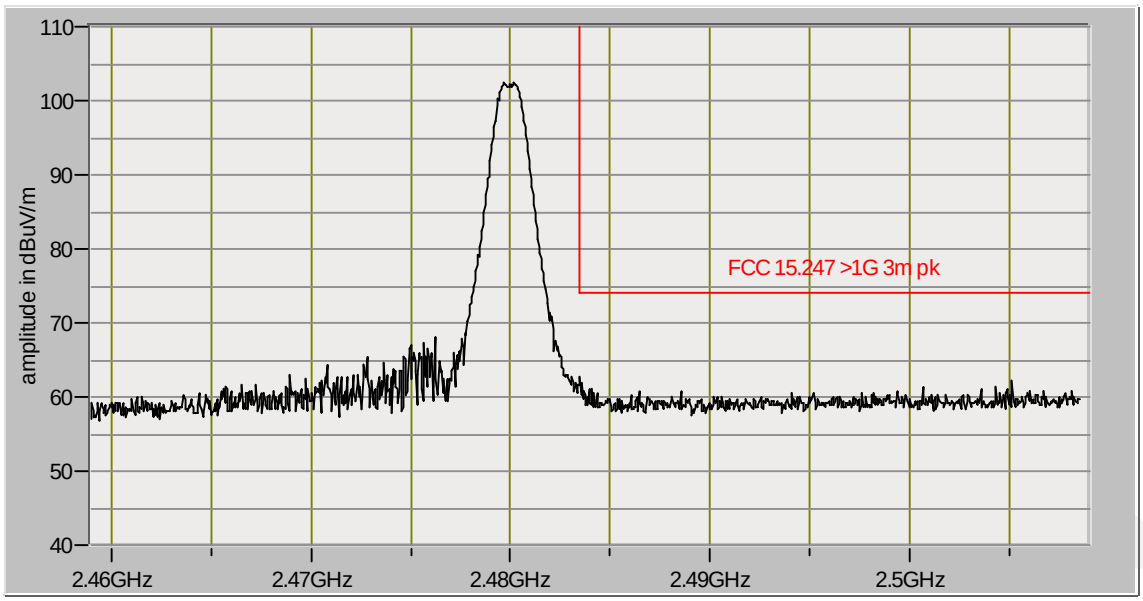
RBW 1 MHz VBW 1 MHz

Average



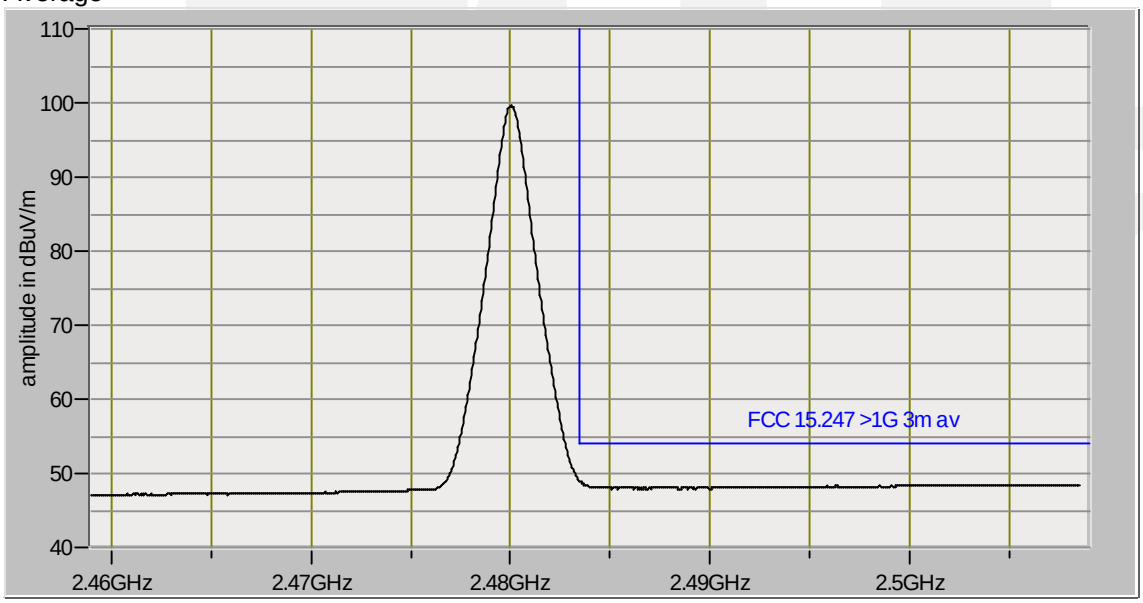
RBW 1 MHz VBW 10 Hz

High channel, 2.480 GHz
Peak



RBW 1 MHz VBW 1 MHz

Average



RBW 1 MHz VBW 10 Hz

Receiver spurious emissions

IC RSS-210 2.3

Test summary

The requirements are: ■ - MET ☐ - NOT MET
Radiated measurements were performed per ANSI C63.4-2009 Section 8
The maximum spurious emission relative to the limit is 22.48 dBuV/m qp at 3m at 400.012 MHz.
The minimum margin of compliance is 23.52 dB.

Test location

☐ - Wild River Lab Large Test Site (Open Area Test Site)
■ - Wild River Lab Small Test Site (Open Area Test Site)
☐ - Oakwood Lab Medium Test Site (Open Area Test Site)

Test equipment

TUV ID	Model	Manufacturer	Description	Serial	Cal Due
WRLE03203	EM-6917B	Electro-Metrics	Biconicalog Periodic	106	13-Sept-13
WRLE02668	8447D	Hewlett-Packard	Preamplifier	1937A02209	Code B 06-Aug-14
WRLE03294	8566B	Hewlett-Packard	Spectrum Analyzer	2349A03098	26-Jun-14
WRLE02673	85662A	Hewlett-Packard	Analyzer Display	2152A03687	26-Jun-14
WRLE02684	85650A	Hewlett-Packard	Quasi-Peak Adapter	2521A01006	26-Jun-14

Test limit

Frequency (MHz)	Field strength (μV/m)	Field strength (dBμV/m)	Distance (meters)
30-88	100	40	3
88-216	150	43.5	3
216-960	200	46	3
Above 960	500	54	3

Test data

Measurement summary for limit1: RSS-Gen 6.1 Rx <1GHz 3m (Qp)

FREQ	LEVEL (dBuV)	CABLE / ANT / PREAMP / ATTEN (dB)	FINAL (dBuV / m)	POL / HGT / AZ (m)(DEG)	DELTA1 RSS-Gen 6.1 Rx <1GHz 3m
400.012 MHz	26.16 Qp	4.33 / 15.8 / 23.81 / 0.0	22.48	H / 1.90 / 80	-23.52
336.012 MHz	27.15 Qp	3.92 / 14.23 / 23.82 / 0.0	21.48	H / 1.80 / 270	-24.52
80.0 MHz	28.55 Qp	1.63 / 7.55 / 23.89 / 0.0	13.85	V / 1.00 / 0	-26.15
320.0 MHz	22.5 Qp	3.8 / 13.77 / 23.83 / 0.0	16.24	V / 1.00 / 270	-29.76
192.0 MHz	23.7 Qp	2.96 / 10.23 / 23.86 / 0.0	13.04	V / 1.00 / 90	-30.46
208.0 MHz	23.2 Qp	3.04 / 10.48 / 23.85 / 0.0	12.86	V / 1.00 / 270	-30.64
176.011 MHz	24.45 Qp	2.85 / 9.21 / 23.86 / 0.0	12.65	V / 1.00 / 180	-30.85
272.0 MHz	22.9 Qp	3.44 / 12.42 / 23.84 / 0.0	14.92	H / 1.80 / 75	-31.08
304.012 MHz	21.75 Qp	3.68 / 13.31 / 23.83 / 0.0	14.91	H / 1.80 / 75	-31.09
160.0 MHz	23.75 Qp	2.63 / 8.75 / 23.87 / 0.0	11.27	H / 1.80 / 90	-32.23
256.0 MHz	21.75 Qp	3.32 / 12.34 / 23.84 / 0.0	13.57	V / 1.00 / 180	-32.43
240.0 MHz	22.1 Qp	3.2 / 11.28 / 23.85 / 0.0	12.73	H / 1.80 / 0	-33.27
144.0 MHz	20.3 Qp	2.42 / 9.64 / 23.87 / 0.0	8.49	H / 1.80 / 270	-35.01

Occupied bandwidth

IC RSS-Gen Issue 3 Section 4.6.1

Test summary

The requirements are: ■ - MET ☐ - NOT MET
The bandwidth measurement was performed per RSS-Gen
The 99% occupied bandwidth is 1.0044 MHz

Test location

☐ - Wild River Lab Large Test Site (Open Area Test Site)
☐ - Wild River Lab Small Test Site (Open Area Test Site)
■ - Wild River Lab Shield Room 2

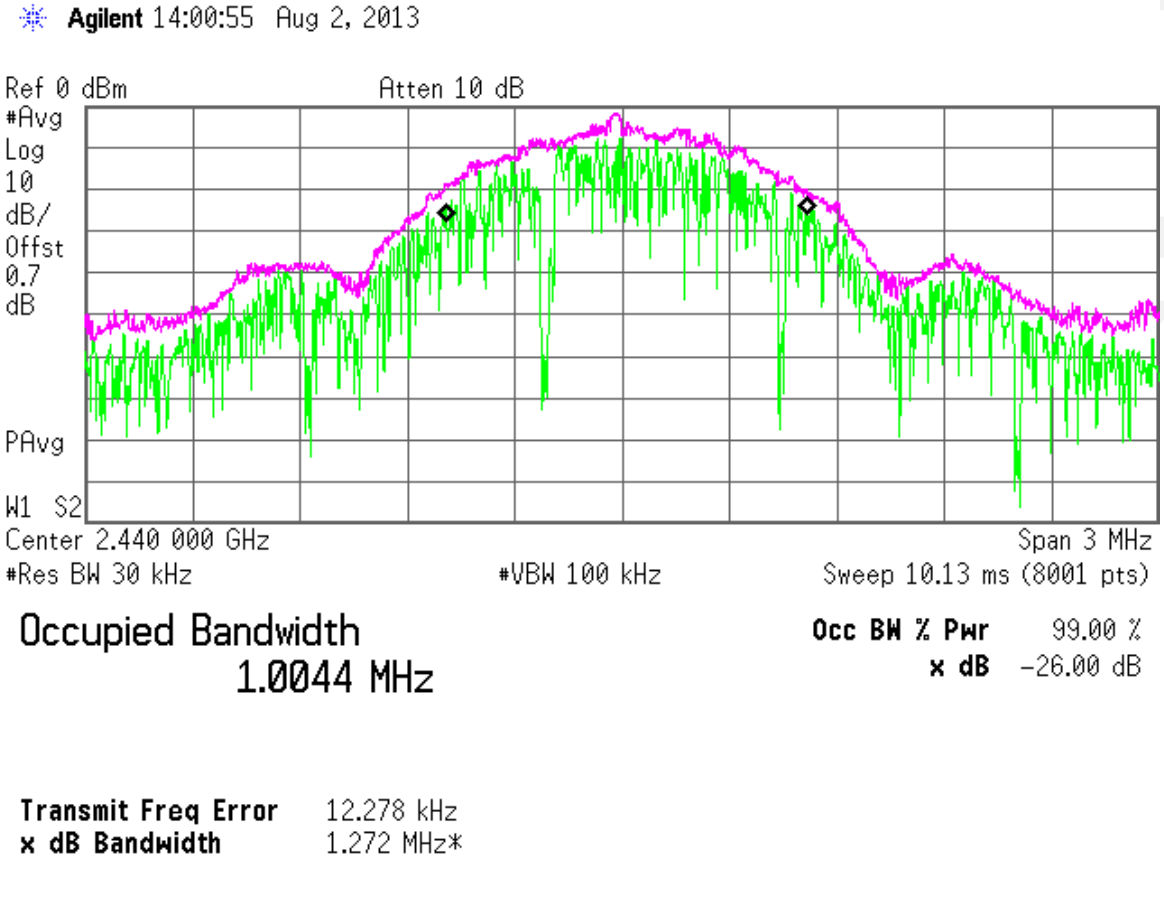
Test equipment

TUV ID	Model	Manufacturer	Description	Serial	Cal Due
WRLE03371	E4440A	Agilent	Spectrum Analyzer	MY43362222	06-Nov-13

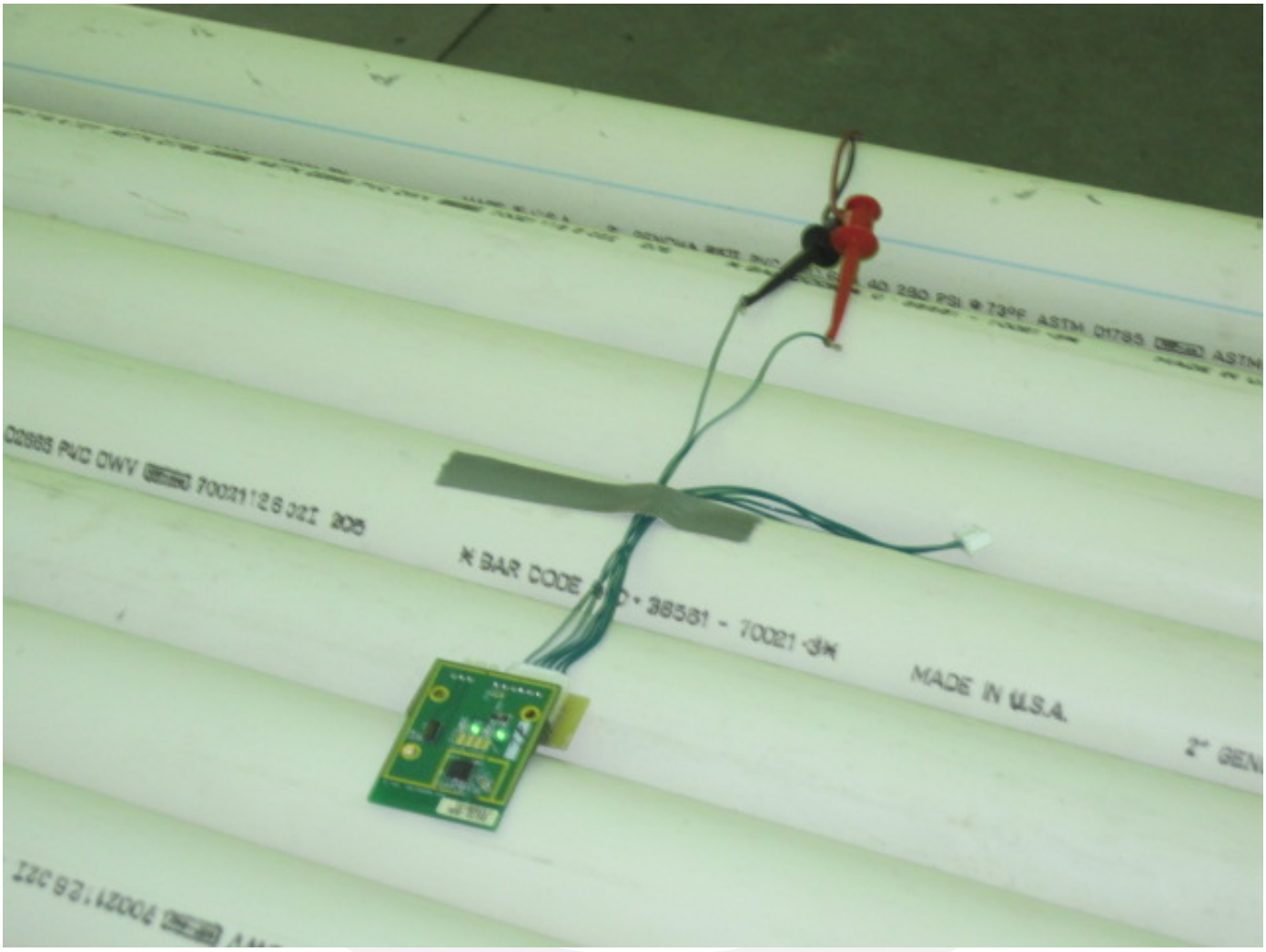
Test limit

No limit is specified

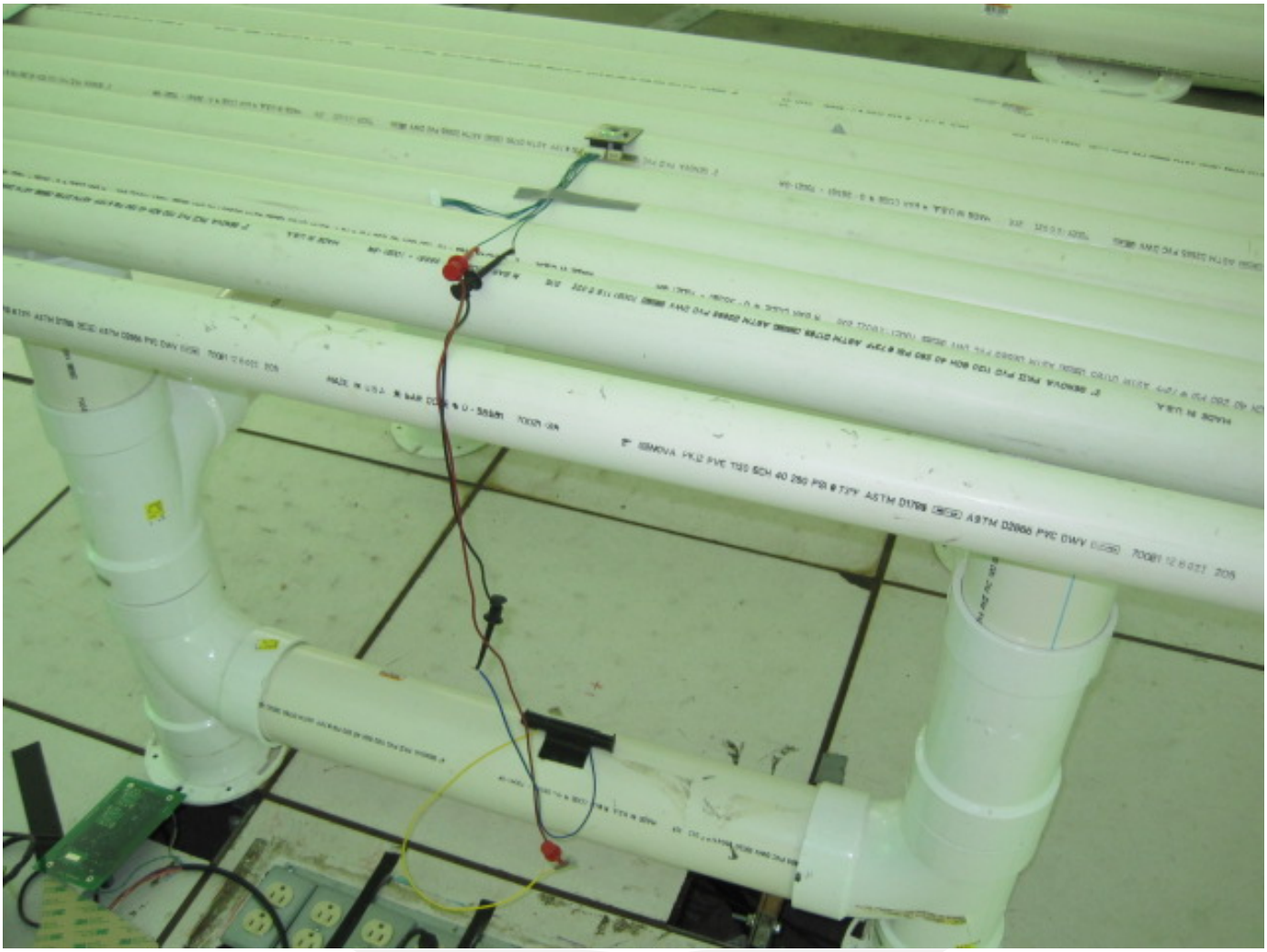
Test data



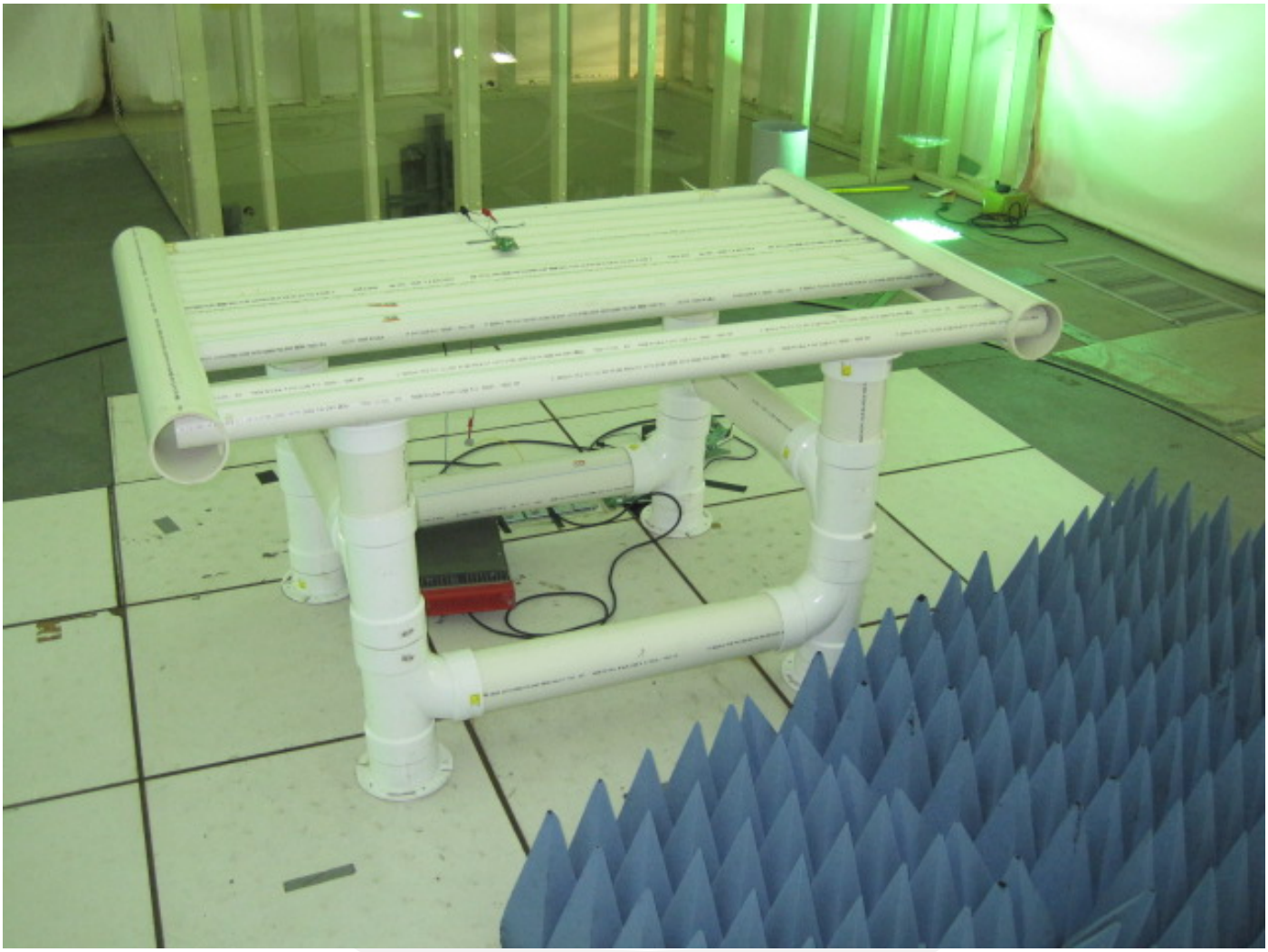
Test-setup photo(s):
Radiated measurements



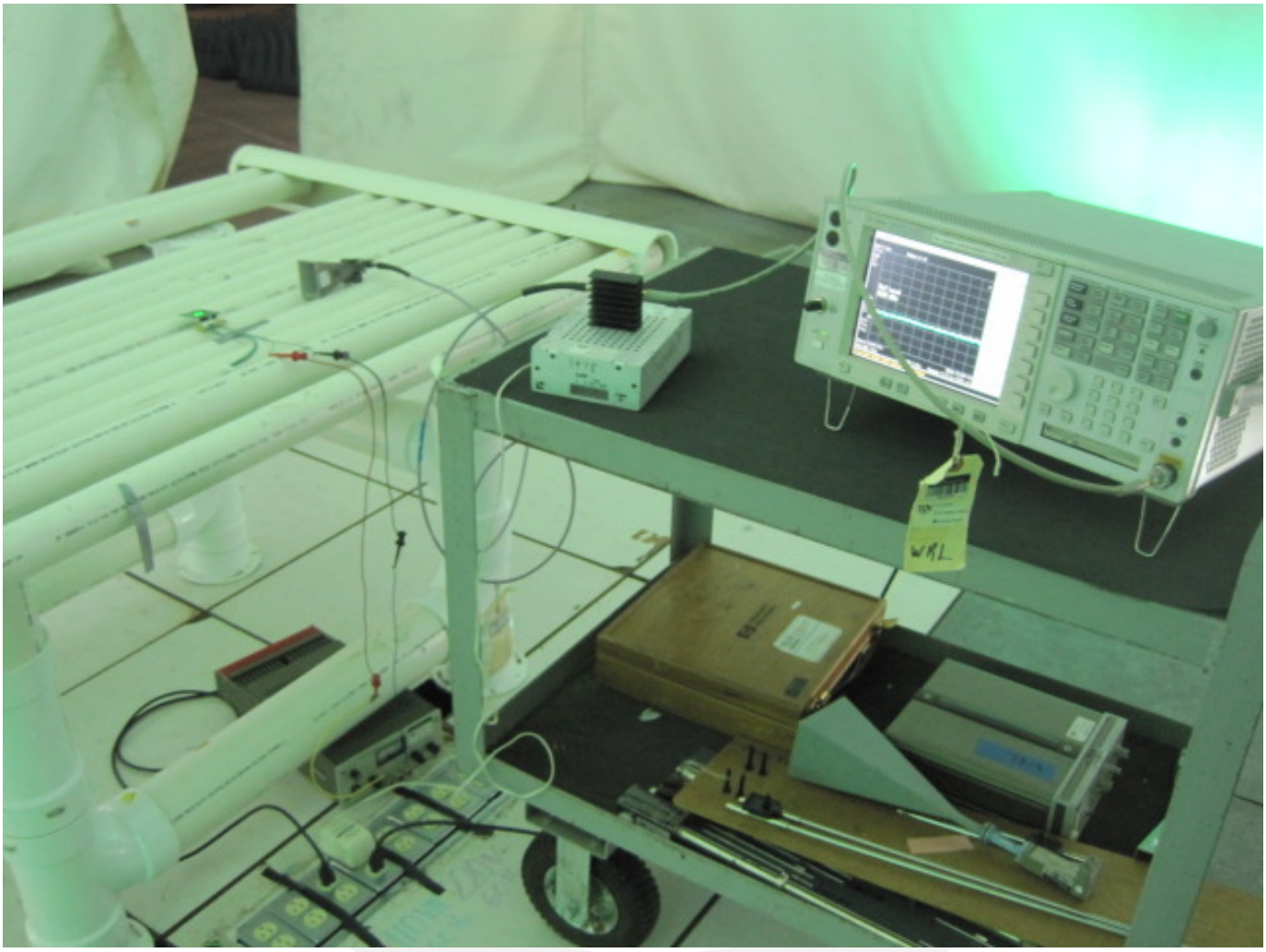
Test-setup photo(s):
Radiated measurements



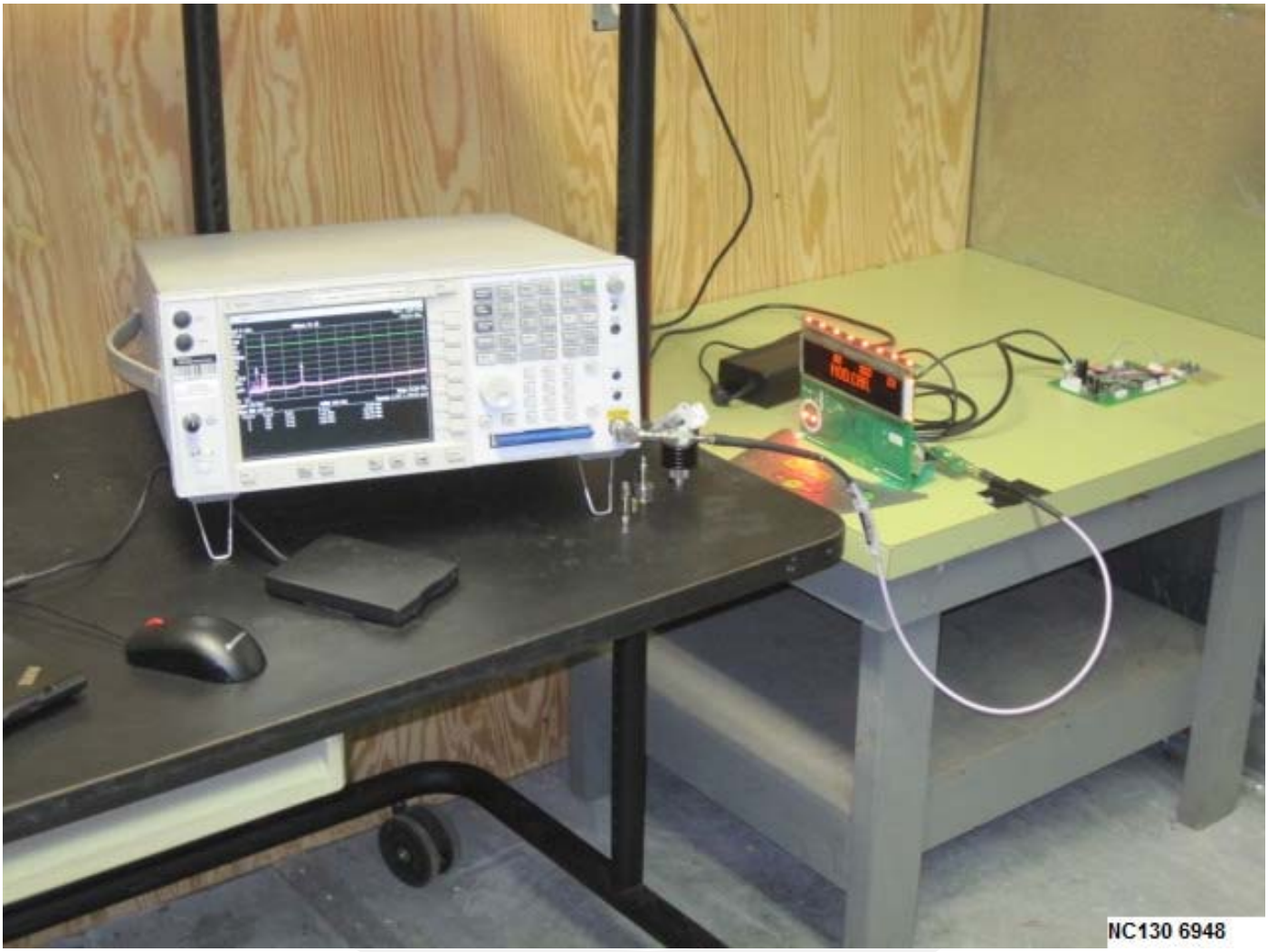
Test-setup photo(s):
Radiated measurements



Test-setup photo(s):
Radiated measurements



Test-setup photo(s):
Conducted measurements



Equipment Under Test (EUT) Test Operation Mode:

The device under test was operated under the following conditions during emissions testing:

☐ - Standby

☐ - Test program (H - Pattern)

☐ - Test program (color bar)

☐ - Test program (customer specific)

☐ - Practice operation

☐ - Normal Operating Mode

■ - Fundamental set on low, mid & high channels. Continuous on. Maximum power. The radio was put into a test mode that allows for a constant transmit carrier at specific channels with a specific modulation. The Nordic radio is capable of both ANT+ and Bluetooth operation simultaneously. The test mode allowed for testing the radio at the top channel, bottom channel and a mid channel. Results depict worst case mode.

Configuration of the device under test:

■ - See Constructional Data Form and Block Diagram in Appendix A

☐ - See Product Information Form in Appendix B

GENERAL REMARKS:

None

Modifications required to pass:

■ None
☐ As indicated on the data sheet(s)

Test Specification Deviations: Additions to or Exclusions from:

■ None
☐ As indicated in the Test Plan

SUMMARY:

The requirements according to the technical regulations are

■ - met and the equipment under test does fulfill the general approval requirements.
☐ - **not** met and the equipment under test does **not** fulfill the general approval requirements.

EUT Received Date:	02 August 2013
Condition of EUT:	Normal
Testing Start Date:	02 August 2013
Testing End Date:	16 August 2013

TÜV SÜD AMERICA INC

Tested by:

Greg Jakubowski
Senior EMC Technician

Approved by:

Joel T Schneider
Senior EMC Engineer

Appendix A

Constructional Data Form

Form

EMC Test Plan and Constructional Data Form

PLEASE COMPLETE THIS DOCUMENT IN FULL, ENTERING N/A IF THE FIELD IS NOT APPLICABLE. IF TESTING RESULTS IN MODIFICATIONS TO THE EQUIPMENT, PLEASE SUBMIT A REVISED TP/CDF INDICATING THOSE MODIFICATIONS.
NOTE: This information will be input into your test report as shown below. Press the F1 key at any time to get HELP for the current field selected.

Company:	Octane Fitness		
Address:	7601 Northland Dr. N		
	Brooklyn Park, MN55428		
Contact:	Tom Brindley	Position:	Hardware Engineer
Phone:	7632303047	Fax:	
E-mail Address:	tbrindley@octanefitness.com		

General Equipment Description -- ***NOTE: This information will be input into your test report as shown below.***

EUT Description	BTLE/ANT+ Radio Module		
EUT Name	BTLE/ANT+ Radio Module		
Model No.:	108581-001	Serial No.:	
Product Options:			
Configurations to be tested:	Installed in Q37xi and Q47xi consoles		

Equipment Modification (*If applicable, indicate modifications since EUT was last tested. If modifications are made during this testing, submit revised TP/CDF after testing is complete.)*

Modifications since last test:

Modifications made during test:

Test Objective(s): ***Please indicate the tests to be performed, entering the applicable standard(s) where noted.***

- ☐ EMC Directive 2004/108/EC (EMC) Std:
- ☐ Machinery Directive 89/392/EEC (EMC) Std:
- ☐ Medical Device Directive 93/42/EEC (EMC) Std:
- ☐ Vehicle Directive - 2004/104/EC (EMC)
  - ☐ Other Vehicle Std:
- ☐ FDA Reviewers Guidance for Premarket Notification Submissions (EMC)
- ☐ FCC: Class ☐ A ☐ B Part
- ☐ VCCI: Class ☐ A ☐ B
- ☐ BSMI: Class ☐ A ☐ B (Separate Report)
- ☐ Canada: Class ☐ A ☐ B
- ☐ Australia: Class ☐ A ☐ B
- ☐ Other:
- ☐ Ag Directive *2009/64/EC (EMC)

Third Party Certification (contact TÜV for quote), if applicable (*Signature on last page required).

☐ Attestation of Compliance (AoC)*	☐ EMC Certification (used with Octagon Mark)*
☐ Statement of Compliance (SoC, previously CoC)* - All aspects of the essential requirements were assessed	
Protection Class (Req'd for AoC, SoC, EMC Cert. N/A for vehicles) ☐ Class I ☐ Class II ☐ Class III (Press **F1** when field is selected to show additional information on Protection Class.)	
☐ FCC / TCB Certification	☐ Taiwan Certification
☐ Industry Canada / FCB Certification	☐ Korean Certification
☐ e-Mark Certification	

Form

EMC Test Plan and Constructional Data Form

Attendance

Test will be: ☒ Attended by the customer ☐ Unattended by the customer

Failure - *Complete this section if testing will not be attended by the customer.*

If a failure occurs, TÜV SÜD America should:

☒ Call contact listed above, if not available then stop testing. (After hrs phone): _____

☐ Continue testing to complete test series.

☐ Continue testing to define corrective action.

☐ Stop testing.

EUT Specifications and Requirements

Length: _____ Width: _____ Height: _____ Weight: _____

Power Requirements

Regulations require testing to be performed at typical power ratings in the countries of intended use. (i.e., European power is typically 230 VAC 50 Hz or 400 VAC 50 Hz, single and three phase, respectively)

Voltage: 3.3V DC (If battery powered, make sure battery life is sufficient to complete testing.)

# of Phases: _____

Current (Amps/phase(max)): _____ Current (Amps/phase(nominal)): _____

Other _____

Other Special Requirements

Must be plugged in to Octane Fitness console board

Typical Installation and/or Operating Environment

(ie. Hospital, Small Business, Industrial/Factory, etc.)
Home

EUT Power Cable

☐ Permanent OR ☐ Removable Length (in meters): _____

☐ Shielded OR ☐ Unshielded

☒ Not Applicable

Form

EMC Test Plan and Constructional Data Form

EUT Interface Ports and Cables

Type			During Test		Qty	Shielding			Termination	Connector Type	Port Termination	Length tested (in meters)	Removable	Permanent
	Analog	Digital	Active	Passive		Yes	No	Type						
EXAMPLE: *RS232*	☐	☒	☒	☐	*2*	☒	☐	*Foil over braid*	*Coaxial*	*Metallized 9-pin D-Sub*	*Characteristic Impedance*	*6*	☒	☐
	☐	☐	☐	☐		☐	☐						☐	☐
	☐	☐	☐	☐		☐	☐						☐	☐
	☐	☐	☐	☐		☐	☐						☐	☐
	☐	☐	☐	☐		☐	☐						☐	☐
	☐	☐	☐	☐		☐	☐						☐	☐
	☐	☐	☐	☐		☐	☐						☐	☐
	☐	☐	☐	☐		☐	☐						☐	☐
	☐	☐	☐	☐		☐	☐						☐	☐
	☐	☐	☐	☐		☐	☐						☐	☐
	☐	☐	☐	☐		☐	☐						☐	☐
	☐	☐	☐	☐		☐	☐						☐	☐
	☐	☐	☐	☐		☐	☐						☐	☐

Form

EMC Test Plan and Constructional Data Form

EUT Software.

Revision Level:

Description:

Equipment Under Test (EUT) Operating Modes to be Tested -- list the operating modes to be used during test. It is recommended the equipment be tested while operating in a typical operation mode. FCC testing of personal computers and/or peripherals requires that a simple program generate a complete line of upper case H's. Provide a general description of all software, firmware, and PLD algorithms used in the equipment. List all code modules as described above, with the revision level used during testing. Consult with your TÜV Product Service Representative if additional assistance is required.

1.

2.

3.

Equipment Under Test (EUT) System Components -- List and describe all components which are part of the EUT. For FCC & Taiwan testing a minimum configuration is required. (ie. Mouse, Printer, Monitor, External Disk Drive, Motherboard, etc)

Description	Model #	Serial #	FCC ID #

Form

EMC Test Plan and Constructional Data Form

Support Equipment -- List and describe all support equipment which is not part of the EUT. (i.e. peripherals, simulators, etc) This information is required for FCC & Taiwan testing.

Description	*Model #*	*Serial #*	*FCC ID #*

Oscillator Frequencies

Manufacturer	*Frequency*	*Derived Frequency*	*Component # / Location*	*Description of Use*
NDK	16MHz	16MHz	Y1	Radio System Clock

Power Supply

Manufacturer	*Model #*	*Serial #*	*Type*
			☐ Switched-mode: (Frequency) _____ ☐ Linear ☐ Other: _____
			☐ Switched-mode: (Frequency) _____ ☐ Linear ☐ Other: _____

Power Line Filters

Manufacturer	*Model #*	*Location in EUT*

Critical EMI Components (Capacitors, ferrites, etc.)

Description	*Manufacturer*	*Part # or Value*	*Qty*	*Component # / Location*

Form

EMC Test Plan and Constructional Data Form

EMC Critical Detail -- Describe other EMC Design details used to reduce high frequency noise.

PLEASE ENTER NAMES BELOW (INSERT ELECTRONIC SIGNATURE IF POSSIBLE)

Authorization (Signature Required if a Third Party Certification is checked on pg 1)	
Customer authorization to perform tests according to this test plan.	Date
Test Plan/CDF Prepared By (please print)	Date

Appendix B

Measurement Protocol

MEASUREMENT PROTOCOL

GENERAL INFORMATION

Test Methodology

Emission testing is performed according to the procedures in ANSI C63.4-2009, FCC KDB Publication 558074, the article “The Measurement of Occupied Bandwidth” by Industry Canada’s certification bureau, & FCC Public Notice DA 02-2138.

Measurement Uncertainty

The test system for conducted emissions – AC lines is defined as the LISN, tuned receiver or spectrum analyzer, and coaxial cable. The test system has a measurement uncertainty of ±1.8 dB. The test system for radiated emissions is defined as the antenna, the pre-amplifier, the spectrum analyzer and the coaxial cable. The test system has a measurement uncertainty of ±4.8 dB. The equipment comprising the test systems is calibrated on an annual basis.

Justification

The Equipment Under Test (EUT) is configured in a typical user arrangement in accordance with the manufacturer's instructions. A cable is connected to each available port and either terminated with a peripheral into its characteristic impedance or left unterminated. When appropriate, the cables are manually manipulated with respect to each other to obtain maximum emissions from the unit.

Conducted Emissions

Final measurement levels are determined by connecting the antenna port of the DUT to a spectrum analyzer input via coaxial adapters, high frequency coax, and attenuators as necessary. The loss created by the interconnect apparatus is offset by settings within the analyzer. Specific analyzer settings are determined by the procedures throughout this report.

Radiated Emissions

The spectrum analyzer uses a quasi-peak detector for frequencies up to and including 1 GHz. For measurements above 1 GHz, peak and average detectors are used. The bandwidths used are equal to or greater than 100 Hz from 9 kHz to 150 kHz, 9 kHz from 150 kHz to 30 MHz, 100 kHz from 30 MHz to 1000 MHz, and 1 MHz from 1 GHz to 40 GHz. Video bandwidths are at least three times greater than the IF bandwidth. Average measurements above 1 GHz are also achieved using a peak detector with 1 MHz RBW and 10 Hz VBW.

The final level, in dBμV/m, equals the reading from the spectrum analyzer (Level dBμV), adding the antenna correction factor and cable loss factor (Factor dB) to it, and subtracting the preamp gain (and duty cycle correction factor, if applicable). This result then has the limit subtracted from it to provide the Delta, which gives the tabular data as shown in the data. Intentional radiators are rotated through 3 orthogonal axes to determine the test position yielding the maximum emission levels.

Example:

FREQ (MHz)	LEVEL (dBuV)		CABLE/ANT/PREAMP (dB)	(dB/m)	(dB)	FINAL (dBuV/m)	POL/HGT/AZ	(m)	(deg)	DELTA1
60.80	42.5Qp	+	1.2	+ 10.9	- 25.5 =	29.1	V	1.0	0.0	-10.9

.

Test Equipment

All measurement instrumentation is traceable to the National Institute of Standards and Technology and is calibrated according to internal procedure.