

TEST RESULT SUMMARY

FCC Part 15 Subpart C Section 15.247

FCC Part 15 Subpart C Section 15.207

Industry Canada RSS-210 Issue 8

Industry Canada RSS-Gen Issue 3

MANUFACTURER	Vaddio 9433 Science Center Drive New Hope MN 55428
DESCRIPTION OF EQUIPMENT	2.4GHz Wireless Audio Receiver (Transceiver)
NAME OF EQUIPMENT	EasyTalk AutoTrak 2.0 Wireless Audio Receiver
MODEL NUMBER(S) TESTED	998-7230-000
SERIAL NUMBER(S) TESTED	n/a
TEST REPORT NUMBER	WC1111680
TEST DATE(S)	16-17 January 2012

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, Sections 15.247 "Operation within the bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz", and 15.207 "Conducted limits" and Industry Canada RSS-210 Issue 8 "Licence-exempt Radio Apparatus (All Frequency Bands): Category I Equipment" and RSS-Gen Issue 3 "General Requirements and Information for the Certification of Radiocommunication 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: 13 February 2012

Tested by:



Approved by:



Joel T Schneider
Senior EMC Engineer

Location: Taylors Falls MN
USA

Greg S Jakubowski
EMC Test Engineer

Not Transferable

EMC TEST REPORT

Test Report No. WC1111680 Date of issue: 13 February 2012

Product Description 2.4GHz Wireless Audio Receiver (Transceiver)

Product Name EasyTalk AutoTrak 2.0 Wireless Audio Receiver

Model No(s) Tested 998-7230-000

Serial No(s) Tested n/a

Manufacturer Vaddio

Address 9433 Science Center Drive
New Hope MN 55428

Test Result Positive Negative

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REVISION RECORD

REVISION	TOTAL NUMBER OF PAGES	DATE	DESCRIPTION
	49	13 February 2012	Initial Release



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EMC TEST REGULATIONS:

The tests were performed according to the following regulations:

- FCC Part 15 Subpart C Section 15.247 Paragraphs (a)(2), (b)(3), (d), (e)
- FCC Part 15 Subpart C Section 15.207 Paragraphs (a)
- Industry Canada RSS-210 Issue 8, Sections A8.2(a), A8.4(4), A8.5, A8.2(b), A9.2, A9.3
- Industry Canada RSS-Gen Issue 3 Sections 4.6.1, 7.2.4

ENVIRONMENTAL CONDITIONS IN THE LAB

	<u>Actual</u>
Temperature:	: 15°C
Atmospheric pressure	: 98-99 kPa
Relative Humidity	: 19-26%

POWER SUPPLY UTILIZED

Power supply system : 110V / 60Hz – 1 phase

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.

Emission Bandwidth (EBW)

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

Test summary

The requirements are: - MET - NOT MET

Testing was performed in accordance with the test procedure of FCC KDB Publication 558074

The minimum 6 dB EBW = 2.07 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 Tech Area, conducted measurement

Test equipment

TUV ID	Model	Manufacturer	Description	Serial	Cal Due
WRLE10435	E4440A	Agilent	Spectrum Analyzer	MY44304483	22-Jul-12

Test limit

500 kHz minimum

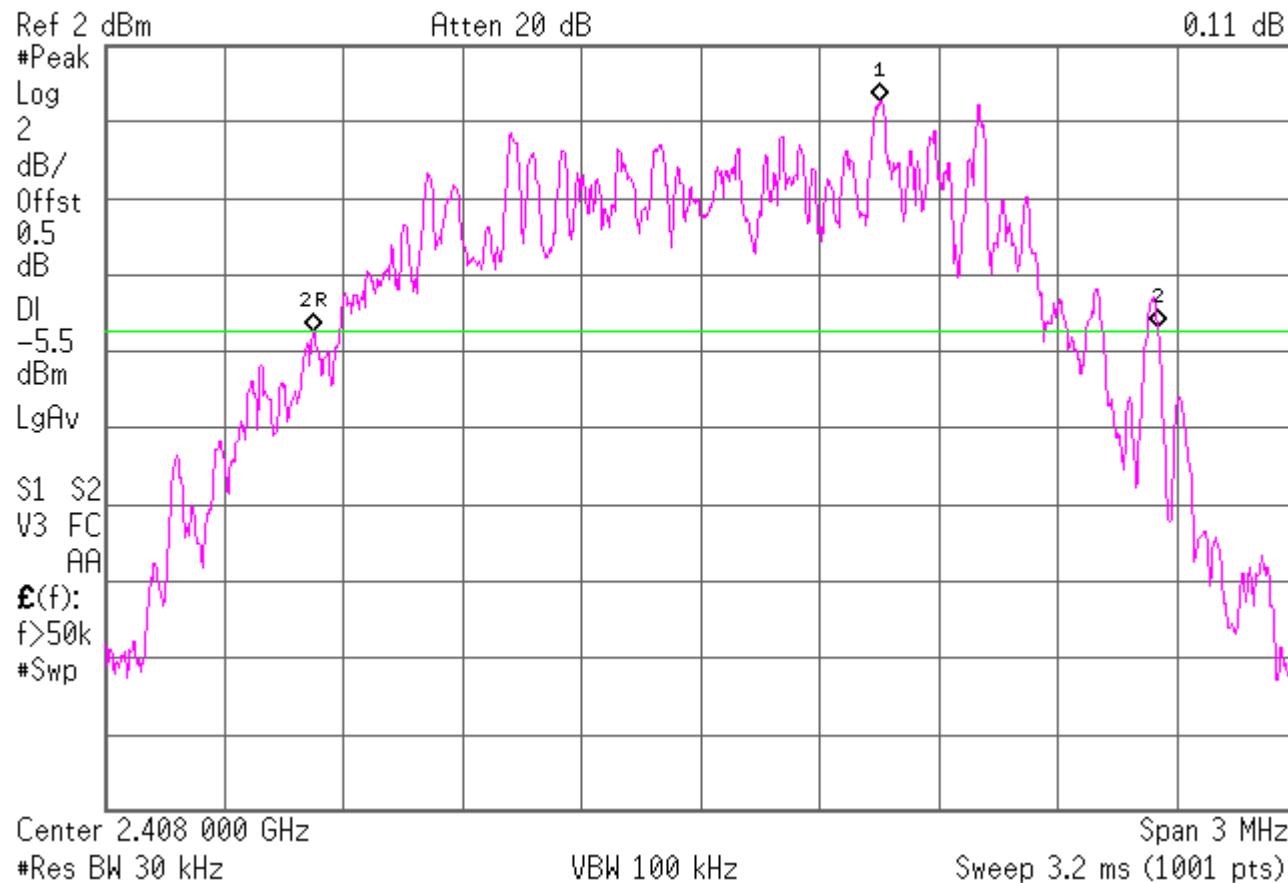
Test data

See following pages

6 dB Bandwidth
Low channel

* Agilent 12:48:26 Jan 17, 2012

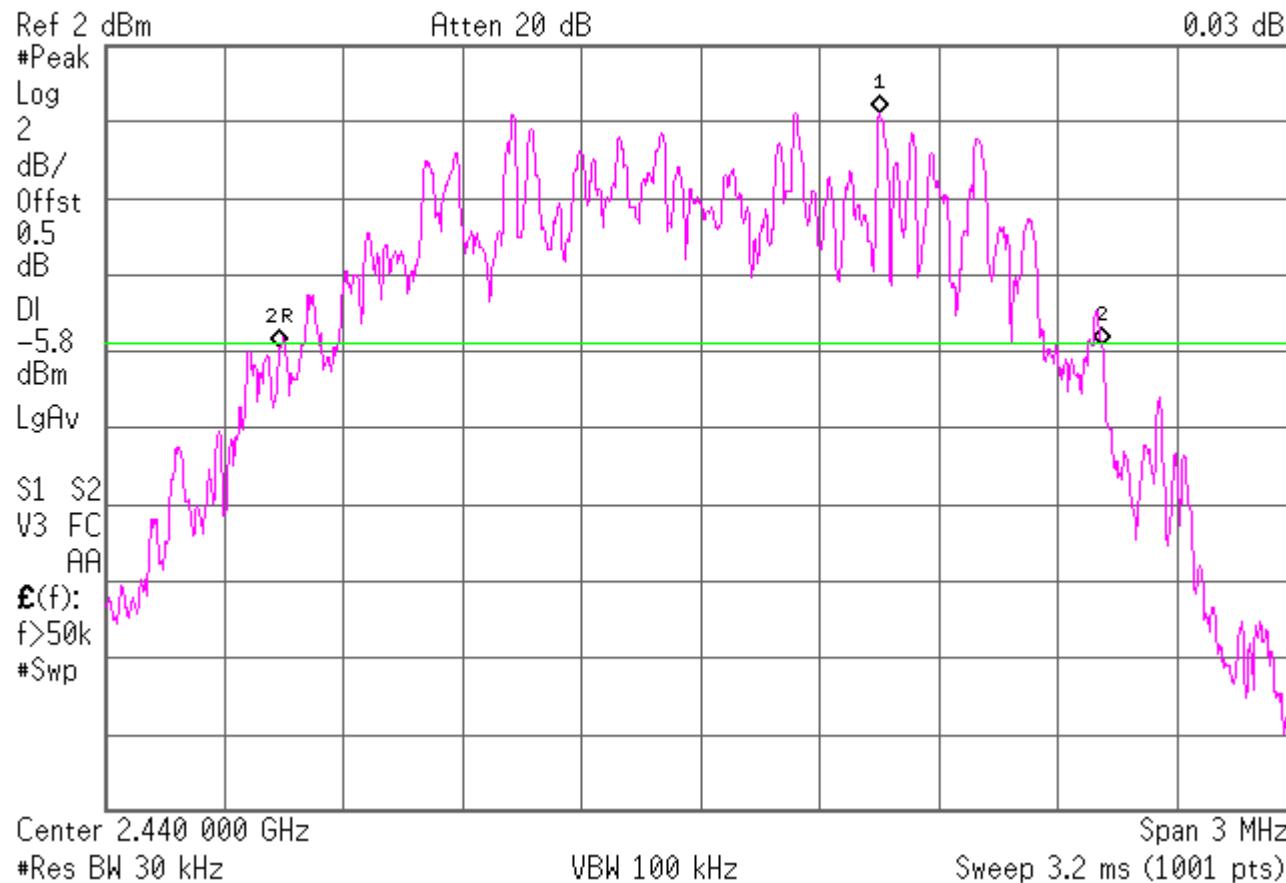
▲ Mkr2 2.130 MHz
0.11 dB



6 dB Bandwidth
Mid channel

* Agilent 12:49:48 Jan 17, 2012

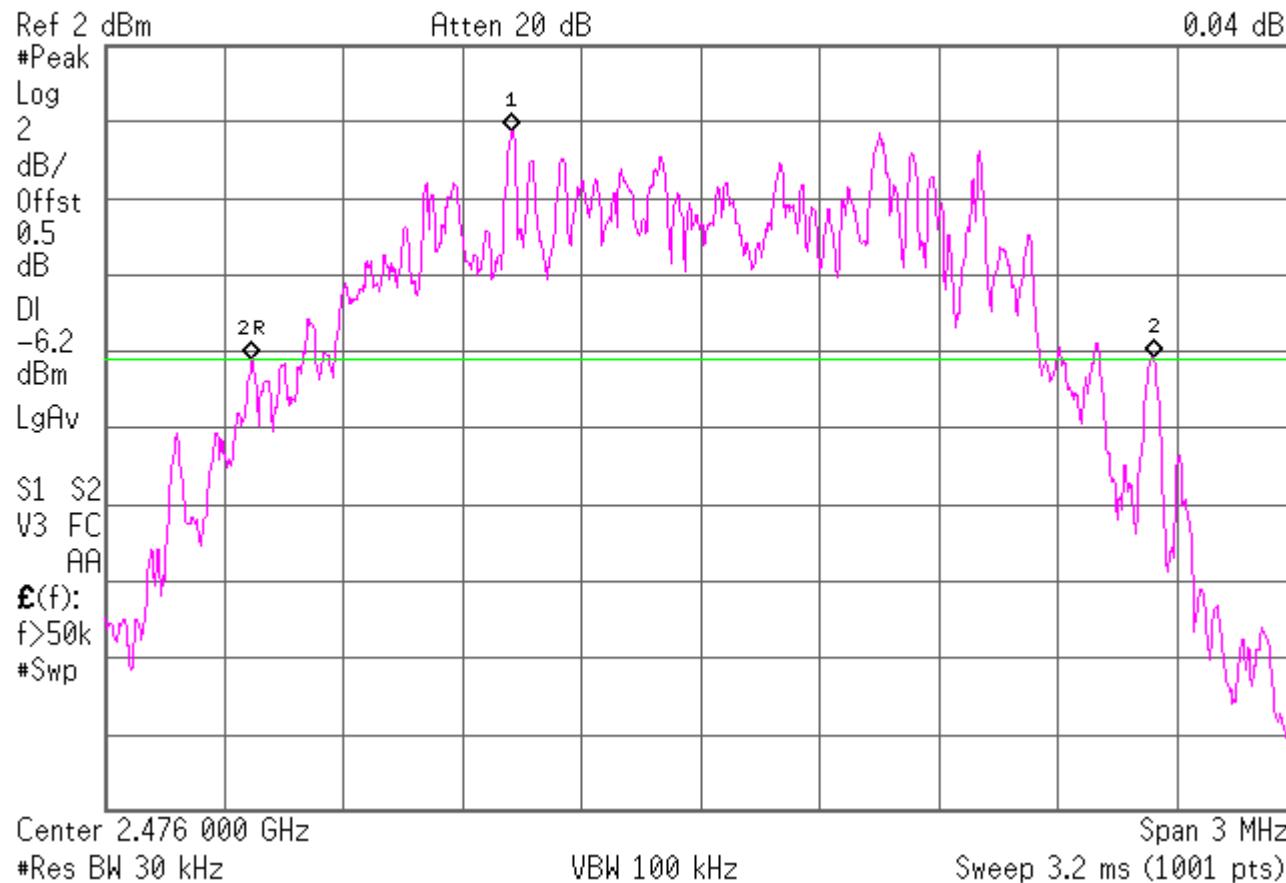
▲ Mkr2 2.070 MHz
0.03 dB



6 dB Bandwidth
High channel

* Agilent 12:51:37 Jan 17, 2012

▲ Mkr2 2.274 MHz
0.04 dB



Fundamental Emission Output Power FCC 15.247(b)(3), IC RSS-210 A8.4(4)

Test summary

The requirements are: - MET - NOT MET

Testing was performed in accordance with the test procedure of FCC KDB Publication 558074

Conducted measurements were made at the antenna port

Device power was adjusted to 0 dB setting

The maximum power output measured is 8.4 dBm or 6.94 mW

The antenna gain is 0 dBi.

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 Tech Area, conducted measurement

Test equipment

TUV ID	Model	Manufacturer	Description	Serial	Cal Due
WRLE10435 E4440A		Agilent	Spectrum Analyzer	MY44304483	22-Jul-12

Test limit

1 watt

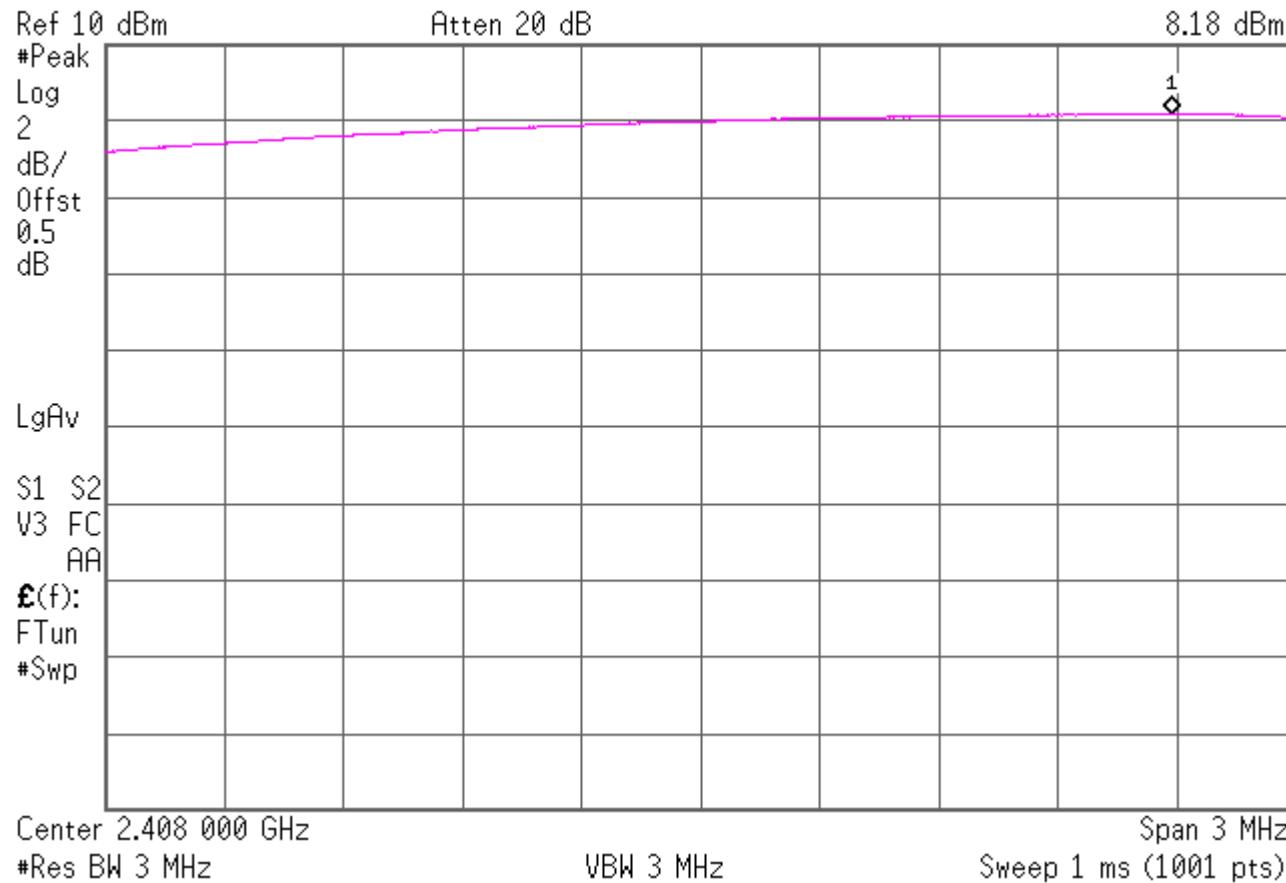
Test Data

See following pages

Maximum Peak Conducted Output Power Level
Low channel

* Agilent 12:59:29 Jan 17, 2012

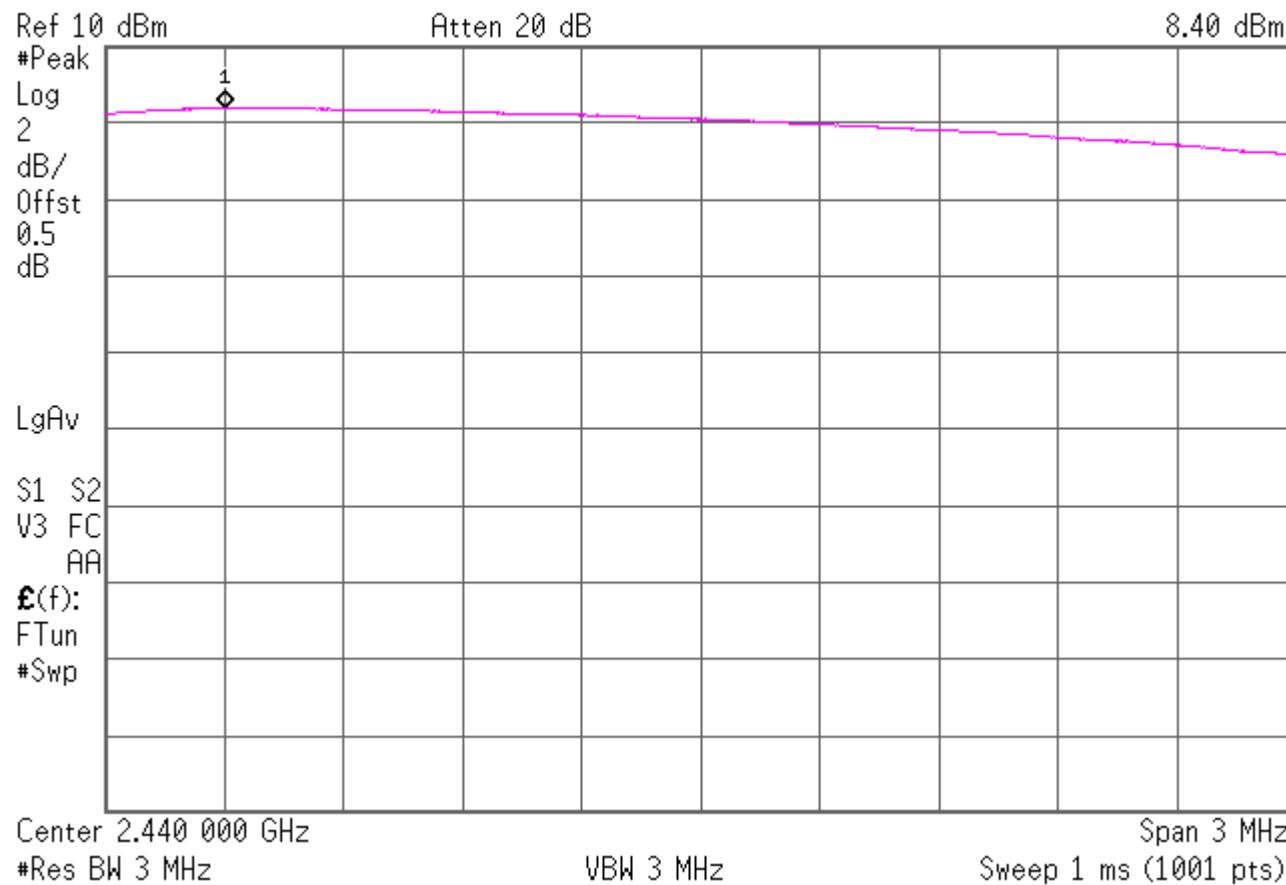
Mkr1 2.409 188 GHz
8.18 dBm



Maximum Peak Conducted Output Power Level
Mid channel

* Agilent 12:58:39 Jan 17, 2012

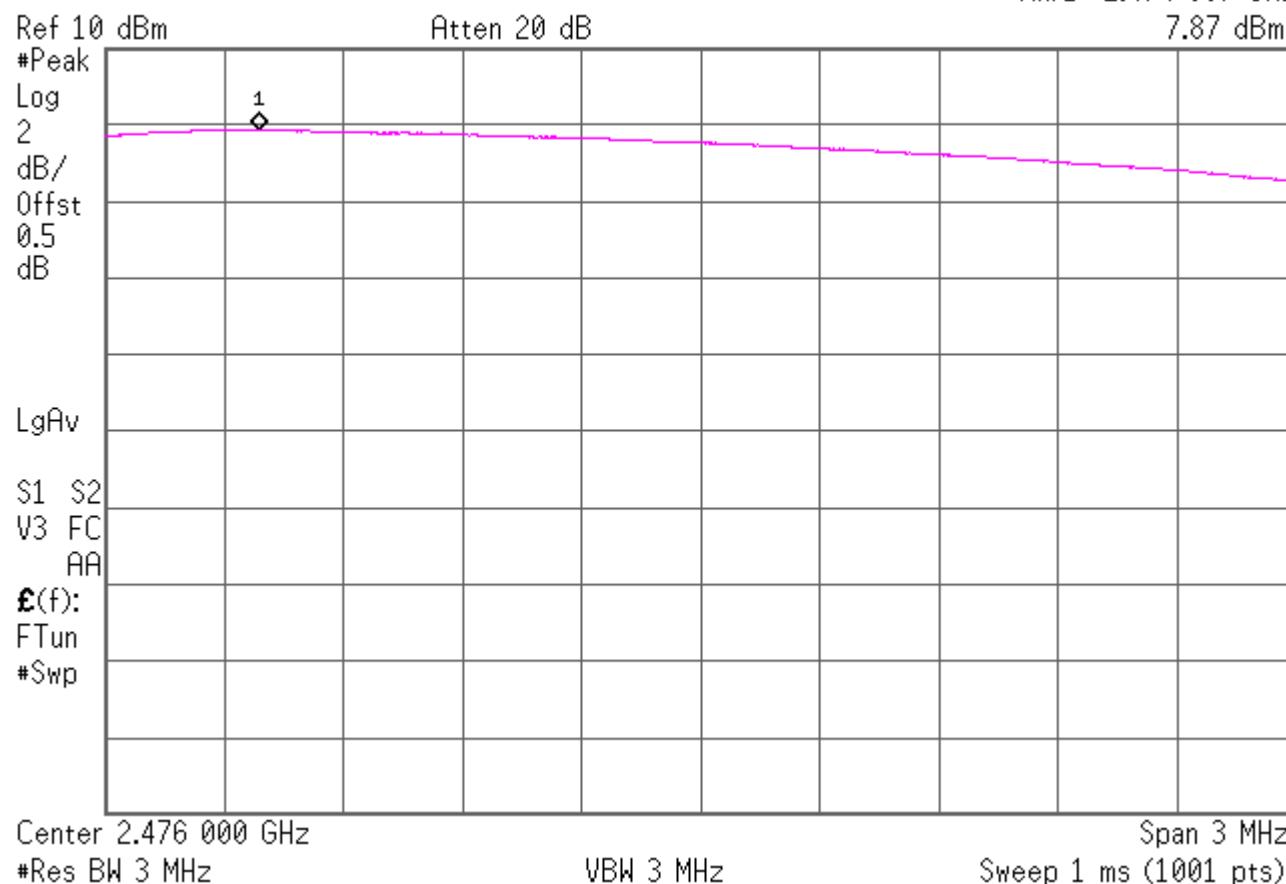
Mkr1 2.438 803 GHz
8.40 dBm



Maximum Peak Conducted Output Power Level
High channel

* Agilent 12:58:11 Jan 17, 2012

Mkr1 2.474 887 GHz
7.87 dBm



Power spectral density
FCC 15.247(e), IC RSS-210 A8.2(b)

Test summary

The requirements are: - MET - NOT MET

Testing was performed in accordance with the test procedure of FCC KDB Publication 558074

Maximum power spectral density is -10.11 dBm / 3 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 Tech Area, conducted measurement

Test equipment

TUV ID	Model	Manufacturer	Description	Serial	Cal Due
WRLE10435	E4440A	Agilent	Spectrum Analyzer	MY44304483	22-Jul-12

Test limit

No greater than 8 dBm in any 3 kHz band

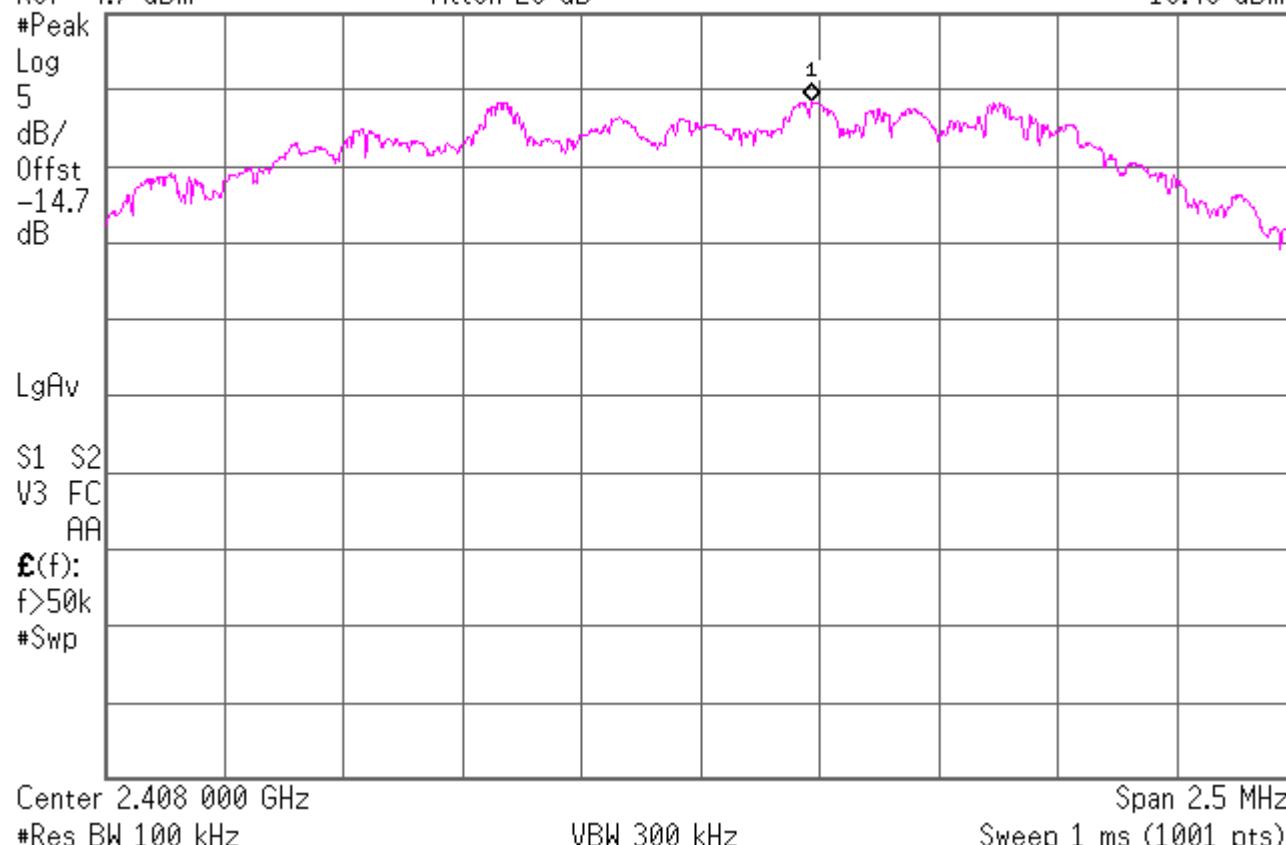
Test data

See following pages.

Power spectral density
Low channel

* Agilent 13:25:59 Jan 17, 2012
Offset=0.5dB cable - 15.2dB BWCF = -14.7dB
Ref -4.7 dBm Atten 20 dB

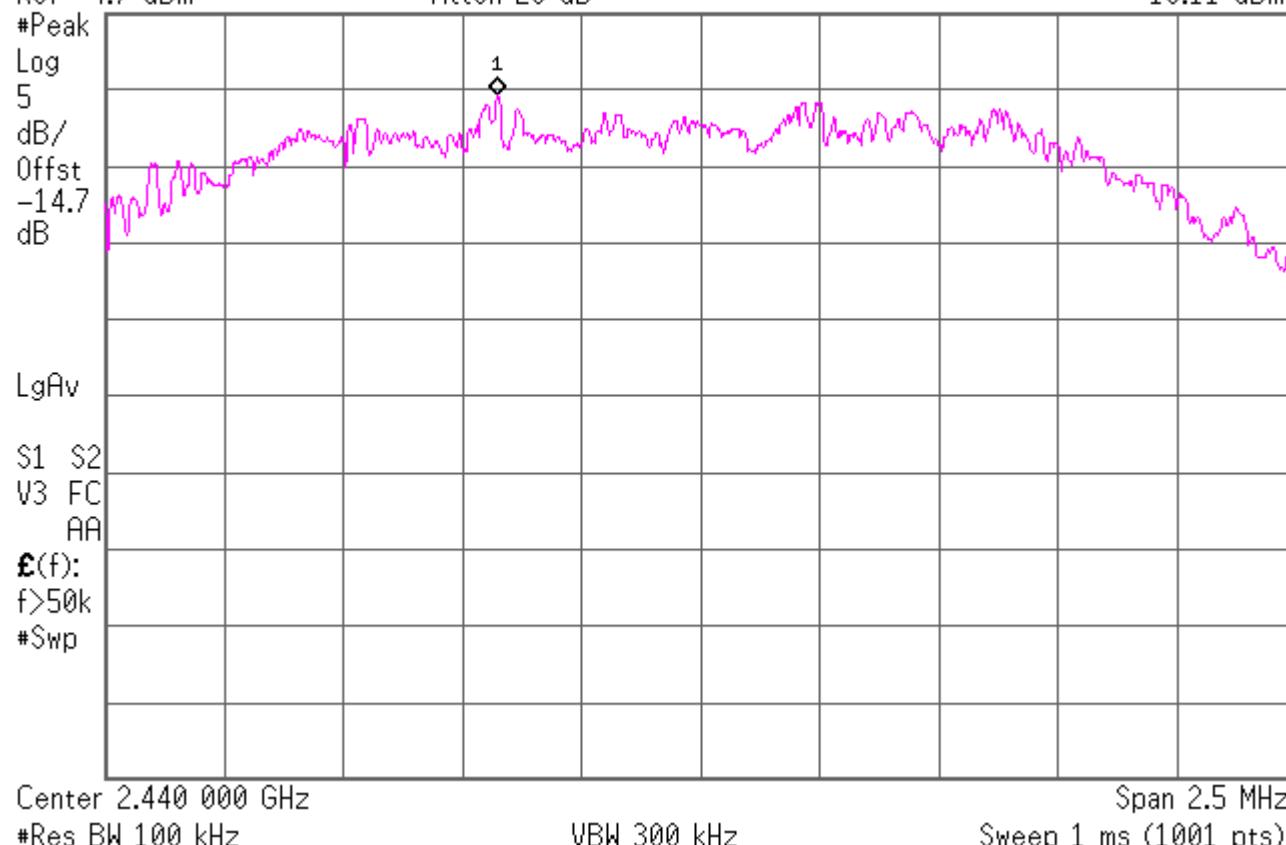
Mkr1 2.408 235 GHz
-10.49 dBm



Power spectral density
Mid channel

* Agilent 13:25:19 Jan 17, 2012
Offset=0.5dB cable - 15.2dB BWCF = -14.7dB
Ref -4.7 dBm Atten 20 dB

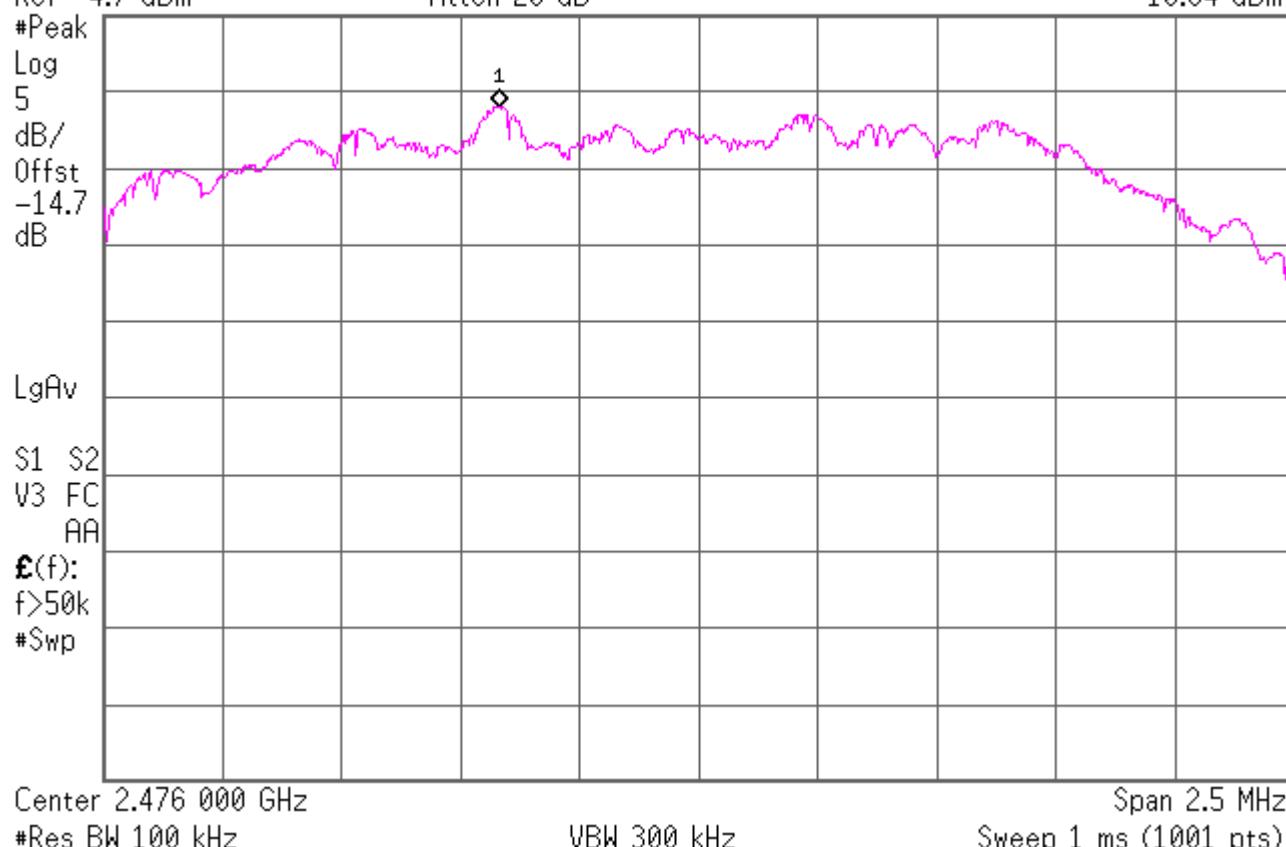
Mkr1 2.439 575 GHz
-10.11 dBm



Power spectral density
High channel

* Agilent 13:24:30 Jan 17, 2012
Offset=0.5dB cable - 15.2dB BWCF = -14.7dB
Ref -4.7 dBm Atten 20 dB

Mkr1 2.475 580 GHz
-10.64 dBm



Maximum Unwanted Emission Levels

FCC 15.247(d), IC RSS-210 A8.5

Test summary

The requirements are: ■ - MET □ - NOT MET

Testing was performed in accordance with FCC KDB Publication 558074

Maximum unwanted conducted emissions are > 40 dB below the limit

Maximum unwanted average radiated emission into a restricted frequency band above 1 GHz is 52.14 dB μ V/m (405 μ V/m) at 3 meters with average detector at 4.951 GHz.

Maximum unwanted peak radiated emission into a restricted frequency band above 1 GHz is 60.61 dB μ V/m (1073 μ V/m) at 3 meters with peak detector at 2.484 GHz.

Average measurements above 1 GHz are made using a peak detector with 1 MHz RBW and 10 Hz VBW.

Maximum unwanted QP radiated emission into a restricted frequency band below 1 GHz is 25.12 dB μ V/m (18 μ V/m) at 3 meters with QP detector at 282.245 MHz

Test location

- - Wild River Lab Large Test Site (Open Area Test Site)
- - Wild River Lab Tech Area, conducted measurement

Test distance – radiated emissions

- - 0.3 meters
- - 1.0 meters
- - 3 meters

Test equipment

TUV ID	Model	Manufacturer	Description	Serial	Cal Due
NBLE03196	8566B	Hewlett-Packard	Spectrum Analyzer	2240A01856	04-Jan-13
NBLE03195	85662A	Hewlett-Packard	Analyzer Display	2648A13518	04-Jan-13
WRLE02680	85650A	Hewlett-Packard	Quasi-Peak Adapter	2043A00343	06-Jul-12
WRLE10527	SL18B4020	Phase One Microwave	Preamplifier 1 – 18 GHz	0001	Code B 05-Jan-13
WRLE03229	3115	EMCO	Ridge Guide Antenna	2483	04-Aug-12
WRLE03997	EWT-14-0066	EWT	2.4 GHz Notch filter	E2	Code B 12-May-12
WRLE10435	E4440A	Agilent	Spectrum Analyzer	MY44304483	22-Jul-12
WRLE03978	SL26-3010	Phase One Microwave	Amplifier 18-26.5 GHz	0005	Code B 11-Aug-12
WRLE06717	3116	EMCO	Ridge Guide Ant 18-40 GHz	2005	21-Jun-12
WRLE02003	F550B1	Acronetics	4 – 8 GHz Bandpass Filter	010	Code B 30-Nov-12
WRLE03933	F551B-1	Acronetics	8 – 12 GHz Bandpass Filter	010	Code B 30-Nov-12
WRLE03934	F549B-1	Acronetics	2 – 4 GHz Bandpass Filter	010	Code B 30-Nov-12
WRLE03935	F548B-1	Acronetics	1 – 2 GHz Bandpass Filter	010	Code B 30-Nov-12
WRLE03995	EM-6917B	Electro-Metrics	Biconicalog Periodic	151	06-May-12
WRLE02670	8447D	Hewlett-Packard	Preamplifier	2443A03954	Code B 17-Jan-12

Cal Code B = Calibration verification performed internally.

Test limits:

Conducted emissions into non-restricted bands, -20 dBc

Radiated emissions into restricted bands,

Frequency (MHz)	Field strength (μ V/meter)	Field strength (dB μ V/meter)
30 - 88	100, QP	40.0
88 - 216	150, QP	43.5
216 - 960	200, QP	46.0
Above 960	500, QP	54.0
> 1000	500, AV 5000, PK	54.0 74.0

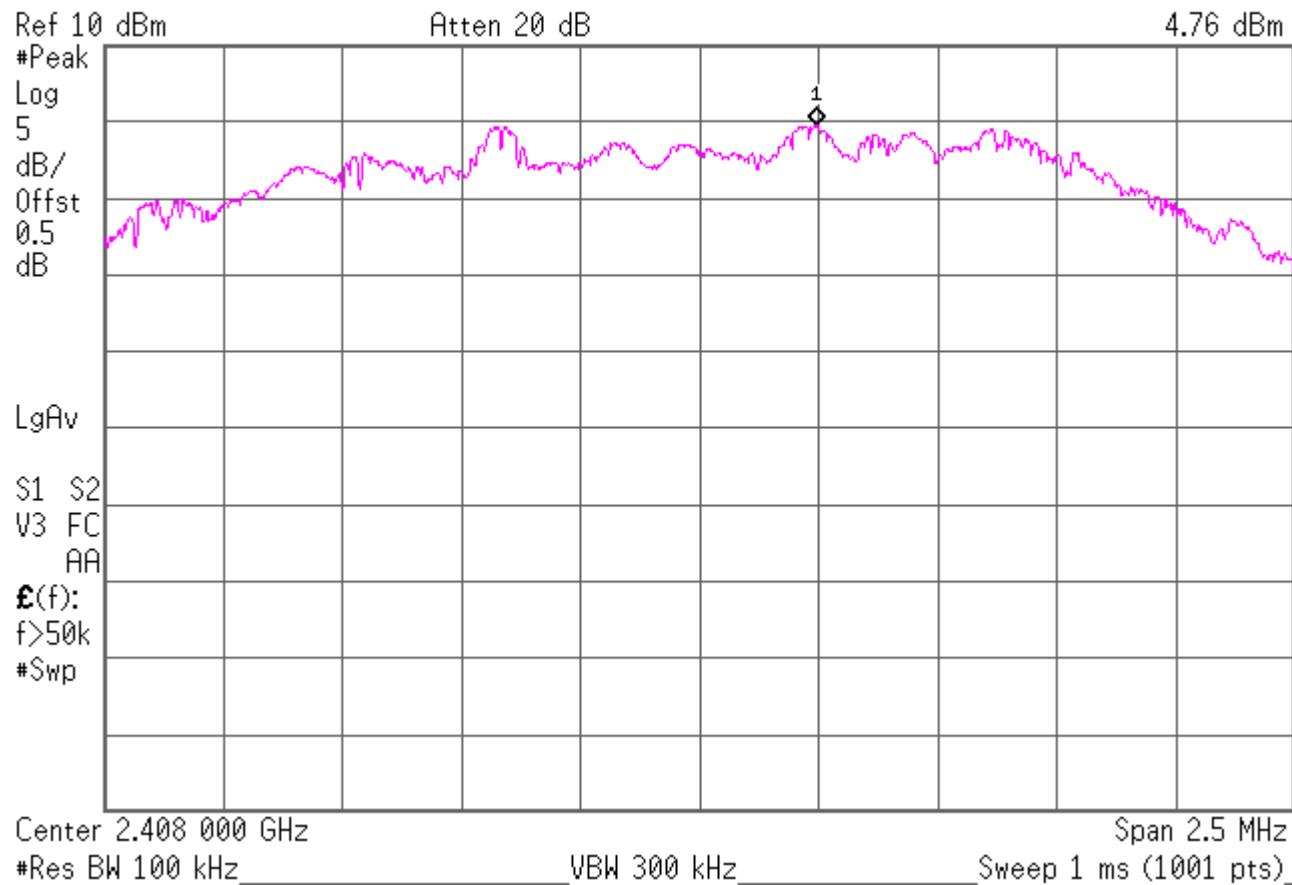
Test data

Unwanted conducted emissions into non-restricted frequency bands

Reference Level
Low channel

* Agilent 13:34:33 Jan 17, 2012

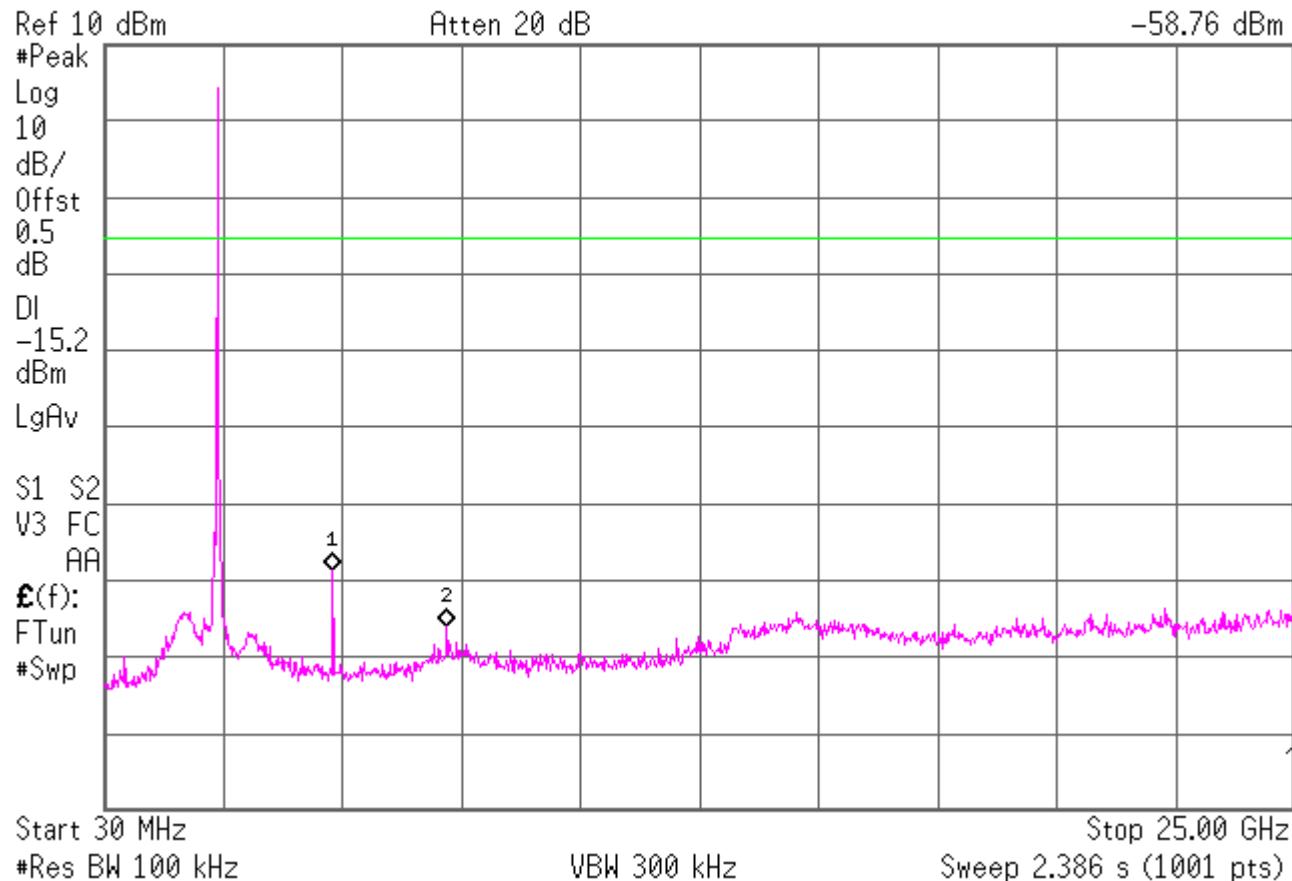
Mkr1 2.408 245 GHz
4.76 dBm



Unwanted Emissions
Low channel

* Agilent 13:55:02 Jan 17, 2012

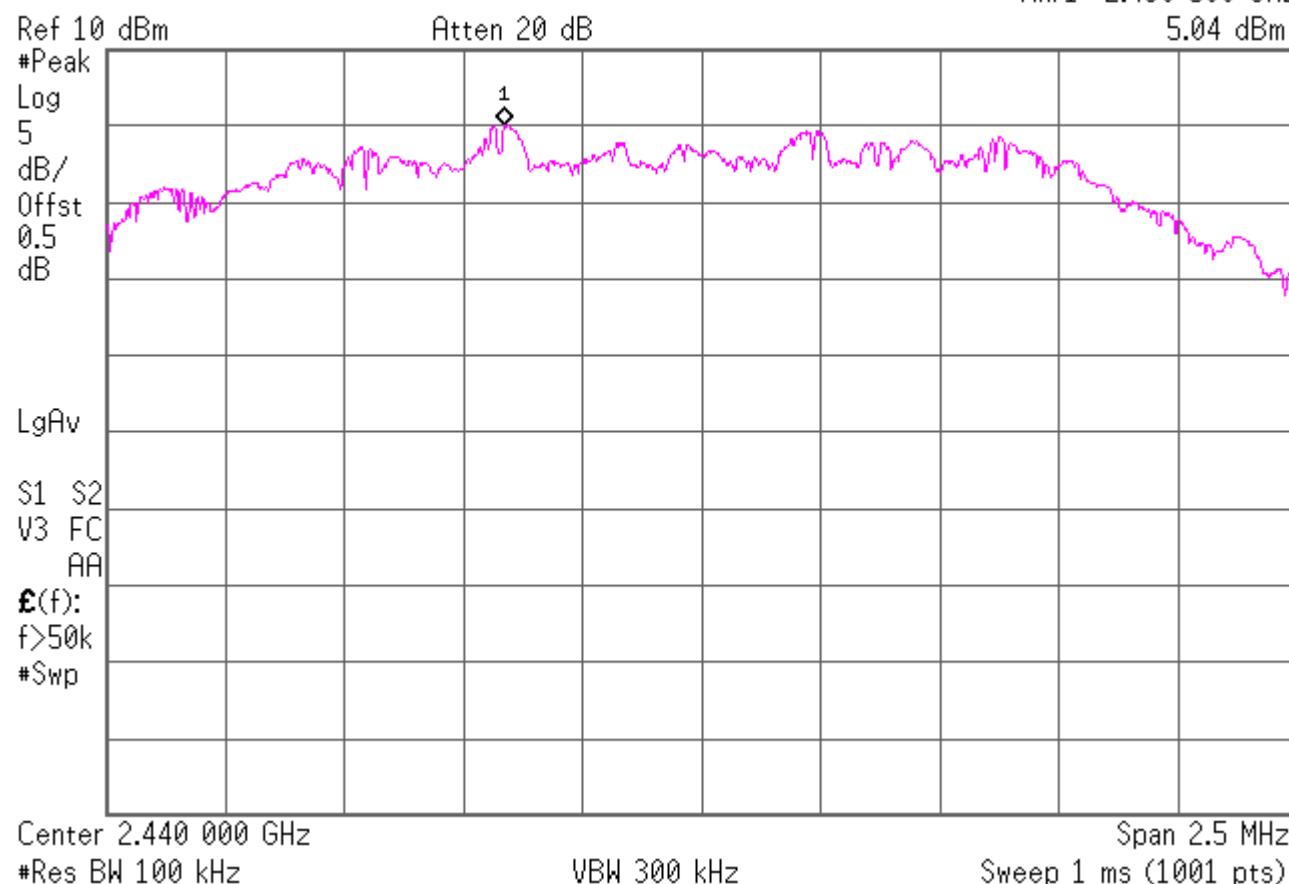
Mkr1 4.82 GHz
-58.76 dBm



Reference Level
Mid channel

* Agilent 13:35:14 Jan 17, 2012

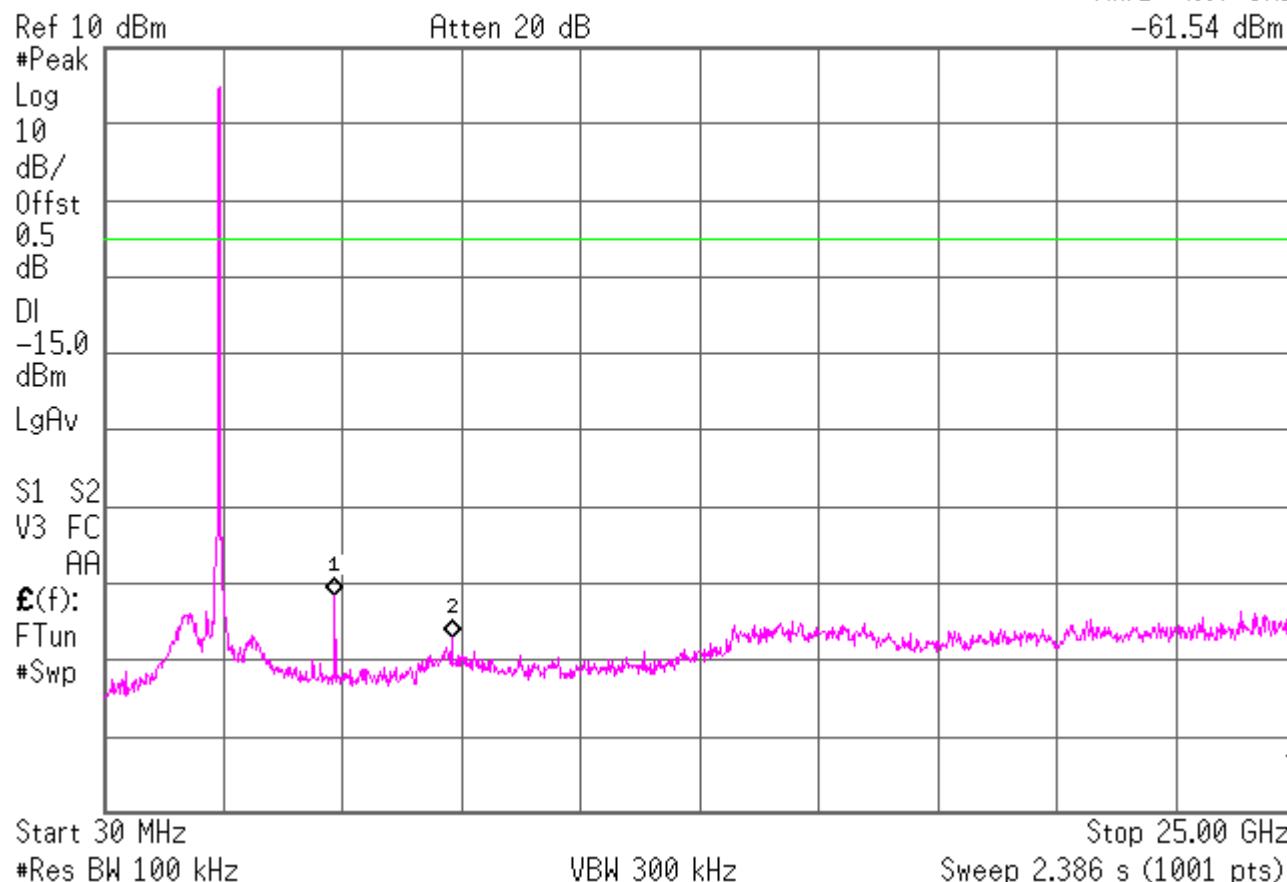
Mkr1 2.439 588 GHz
5.04 dBm



Unwanted Emissions
Mid channel

* Agilent 13:53:44 Jan 17, 2012

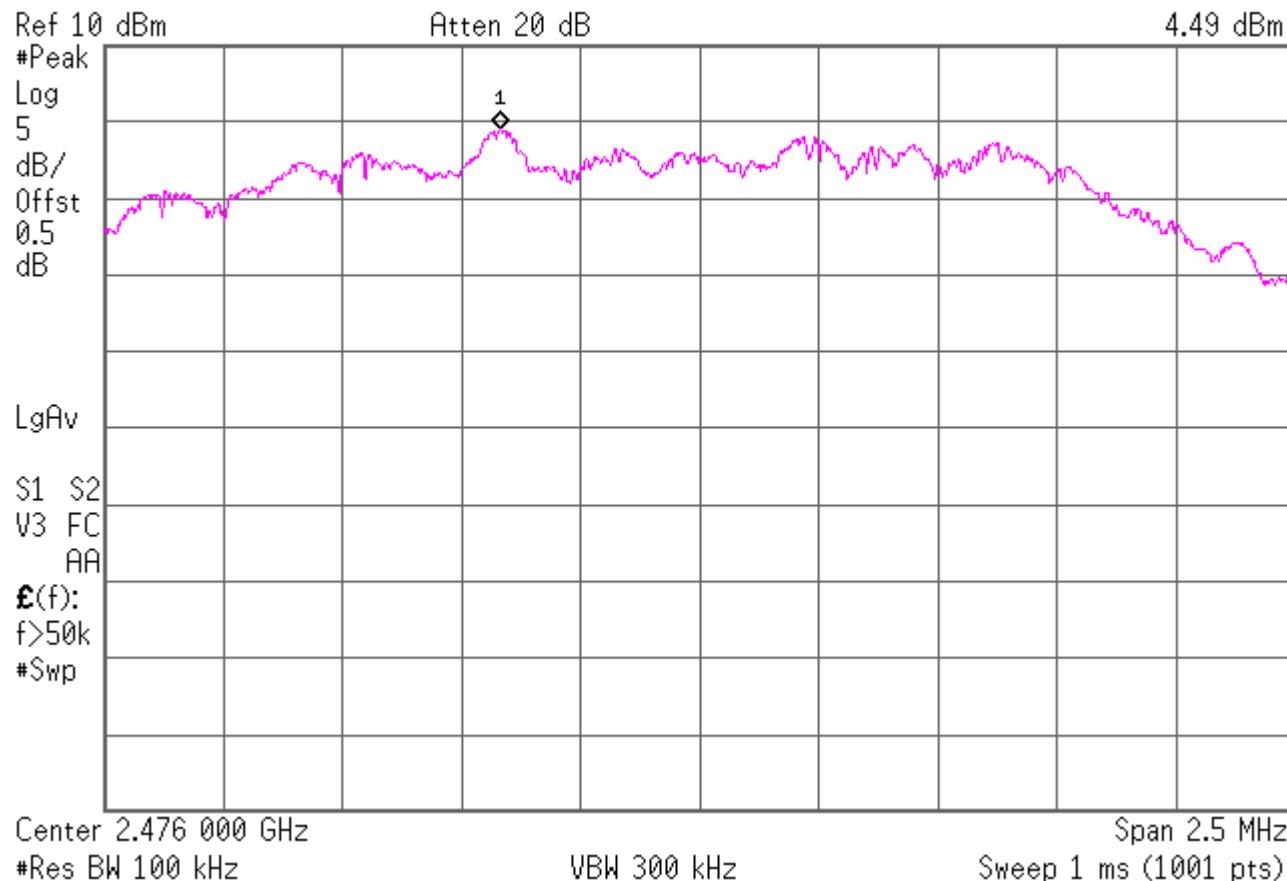
Mkr1 4.87 GHz
-61.54 dBm



Reference Level
High channel

* Agilent 13:36:03 Jan 17, 2012

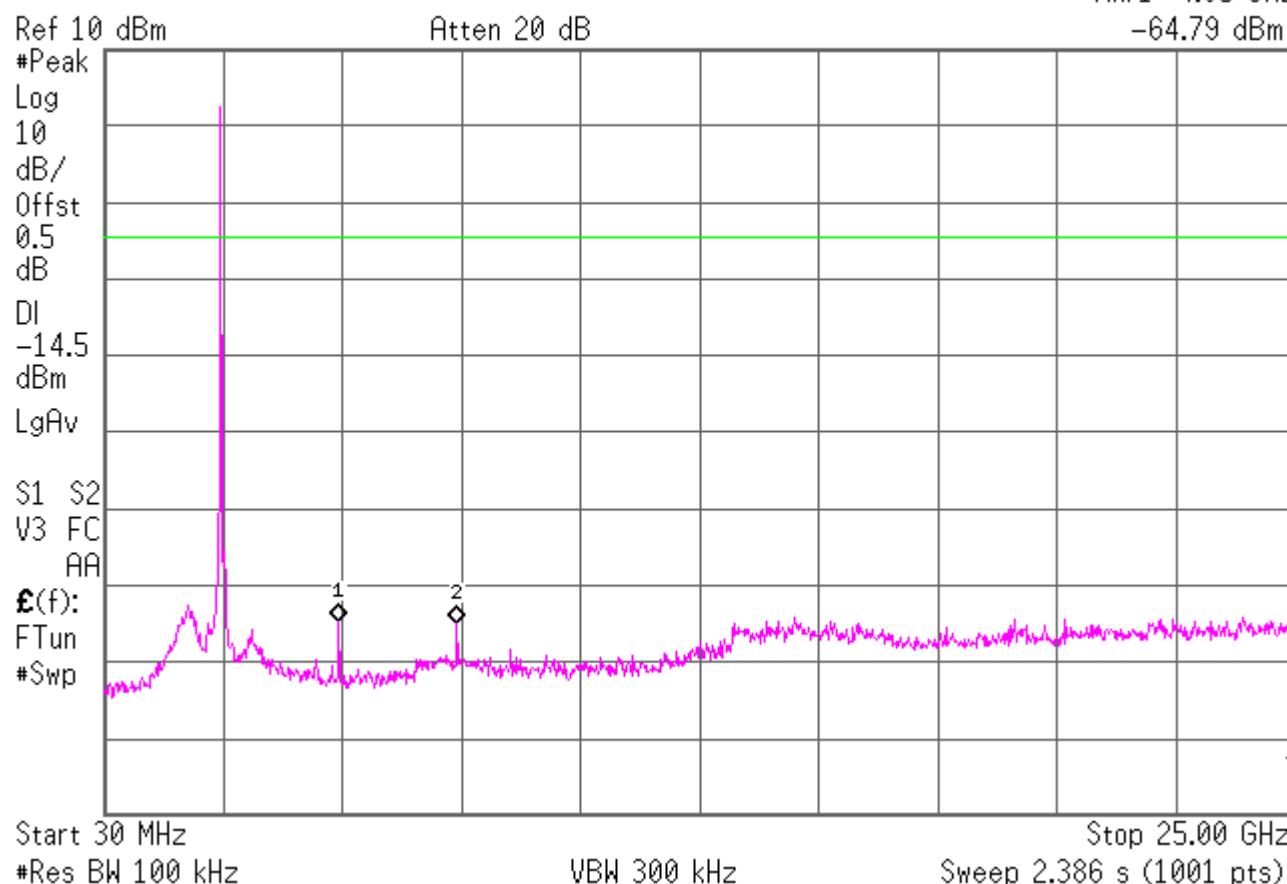
Mkr1 2.475 580 GHz
4.49 dBm



Unwanted Emissions
High channel

* Agilent 13:51:52 Jan 17, 2012

Mkr1 4.95 GHz
-64.79 dBm

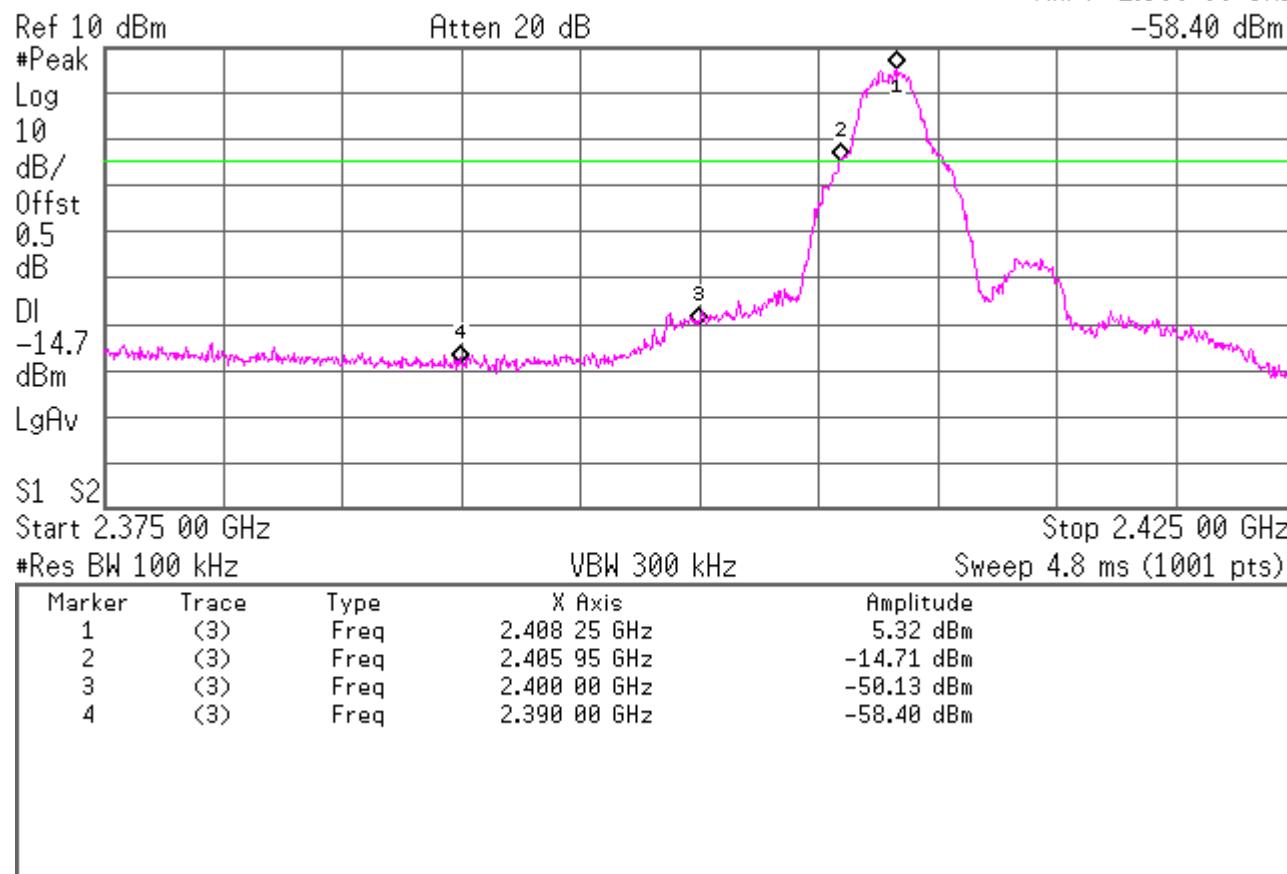


Low channel conducted band-edge

* Agilent 13:11:35 Jan 17, 2012

Mkr4 2.390 00 GHz

-58.40 dBm

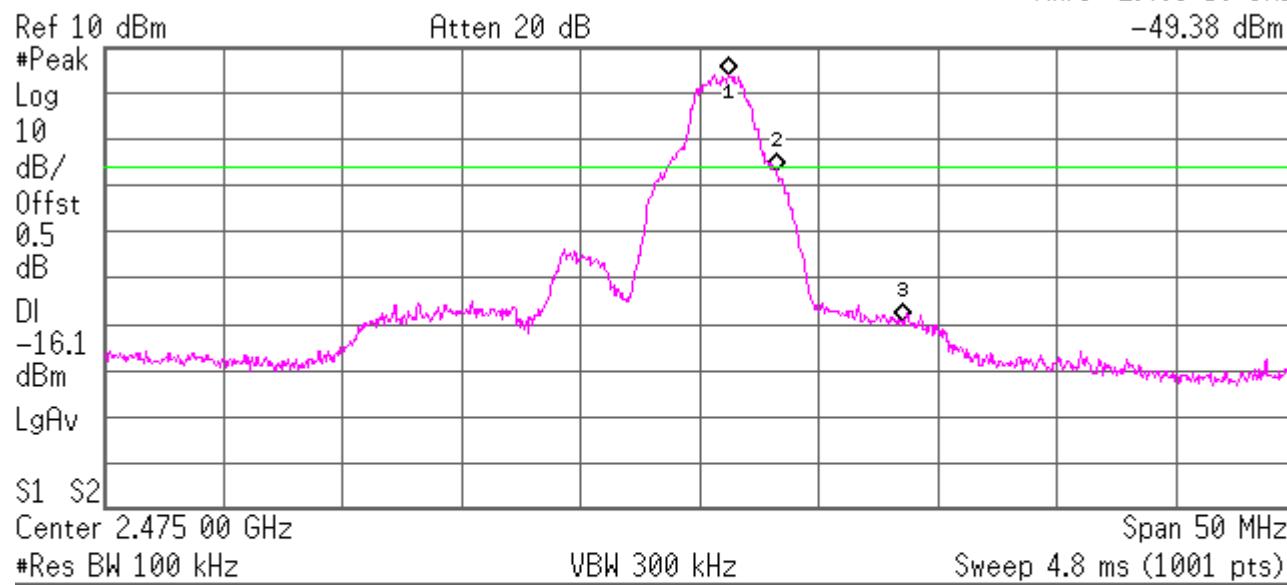


High channel conducted band-edge

* Agilent 13:14:06 Jan 17, 2012

Mkr3 2.483 50 GHz

-49.38 dBm



Unwanted radiated emissions into restricted frequency bands

Measurement summary for limit1: FCC 15.247 <1GHz 3m (Qp)

FREQ	LEVEL (dBuV)	CABLE / ANT / PREAMP / ATTEN (dB)	FINAL (dBuV / m)	POL / HGT / AZ (m)(DEG)	DELTA1 FCC 15.247 <1GHz 3m
282.245 MHz	38.55 Qp	1.56 / 12.24 / 27.4 / 0.16	25.12	H / 1.00 / 90	-20.88
259.673 MHz	38.9 Qp	1.5 / 11.57 / 27.64 / 0.11	24.45	V / 1.00 / 0	-21.55
268.133 MHz	36.9 Qp	1.52 / 11.84 / 27.55 / 0.13	22.85	H / 1.00 / 270	-23.15
169.354 MHz	37.4 Qp	1.23 / 8.57 / 27.74 / 0.03	19.48	V / 1.00 / 90	-24.02
241.901 MHz	36.65 Qp	1.46 / 11.01 / 27.83 / 0.07	21.37	H / 2.00 / 270	-24.63
136.318 MHz	37.75 Qp	1.12 / 7.67 / 27.86 / 0.08	18.76	V / 1.00 / 0	-24.74

Measurement summary for limit1: FCC 15.247 >1GHz 3m av (Av)

FREQ	LEVEL (dBuV)	CABLE / ANT / PREAMP / ATTEN (dB)	FINAL (dBuV / m)	POL / HGT / AZ (m)(DEG)	DELTA1 FCC 15.247 >1GHz 3m av
4.816 GHz	51.46 Av	6.98 / 33.03 / 40.72 / 1.05	51.8	V / 1.44 / 179	-2.2
4.88 GHz	48.54 Av	7.03 / 33.14 / 40.76 / 1.04	48.99	V / 1.40 / 167	-5.01
4.952 GHz	44.76 Av	7.08 / 33.27 / 40.81 / 1.04	45.34	V / 1.38 / 170	-8.66
2.484 GHz	52.44 Av	4.93 / 28.41 / 42.33 / 0.0	43.45	V / 1.36 / 164	-10.55
2.39 GHz	52.19 Av	4.83 / 28.19 / 42.23 / 0.0	42.97	V / 1.10 / 171	-11.03

Measurement summary for limit2: FCC 15.247 >1GHz 3m pk (Pk)

FREQ	LEVEL (dBuV)	CABLE / ANT / PREAMP / ATTEN (dB)	FINAL (dBuV / m)	POL / HGT / AZ (m)(DEG)	DELTA2 FCC 15.247 >1GHz 3m pk
2.484 GHz	69.6 Pk	4.93 / 28.41 / 42.33 / 0.0	60.61	V / 1.36 / 164	-13.39
4.816 GHz	57.85 Pk	6.98 / 33.03 / 40.72 / 1.05	58.19	V / 1.44 / 179	-15.81
4.88 GHz	56.6 Pk	7.03 / 33.14 / 40.76 / 1.04	57.05	V / 1.40 / 167	-16.95
4.952 GHz	53.45 Pk	7.08 / 33.27 / 40.81 / 1.04	54.03	V / 1.38 / 170	-19.97
2.39 GHz	60.0 Pk	4.83 / 28.19 / 42.23 / 0.0	50.78	V / 1.10 / 171	-23.22

No other significant spurious/harmonic emissions detected from 1 to 18 GHz

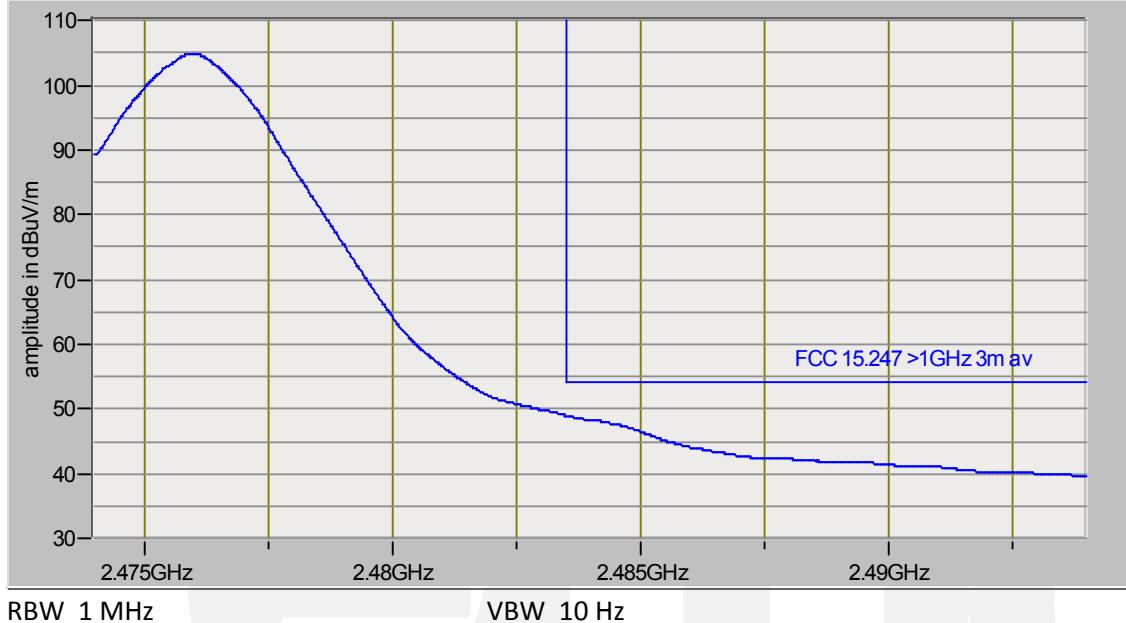
Low, mid, or high channels

Begin scan 18 - 25 GHz, 0.3m distance, all sides, vertical and horizontal, low, mid, & high channels

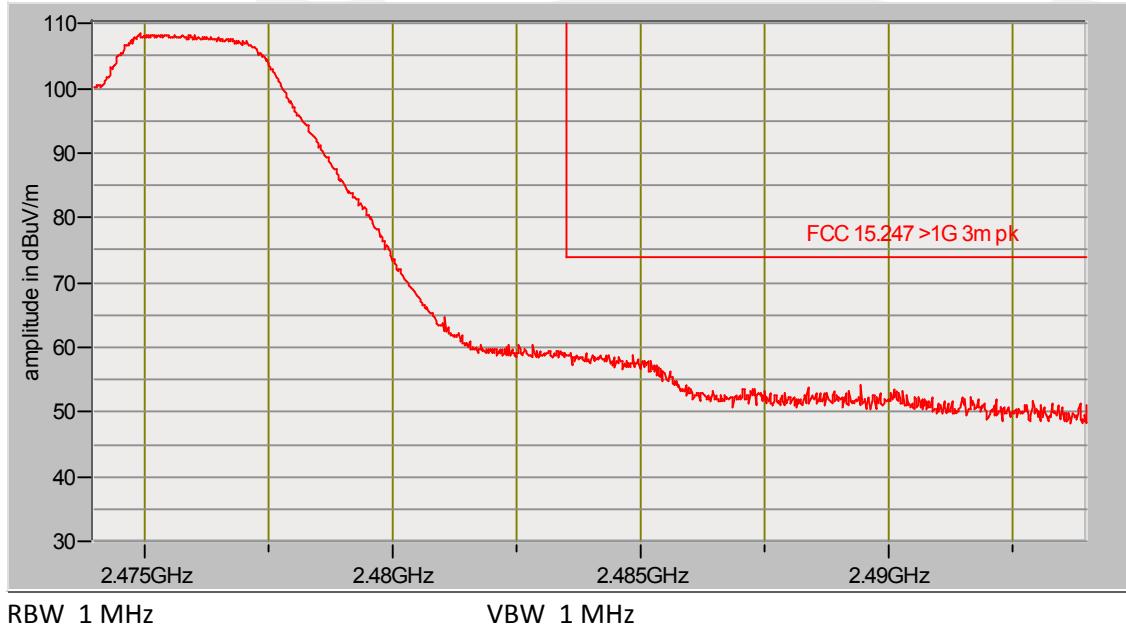
No significant emissions detected

Radiated band edge

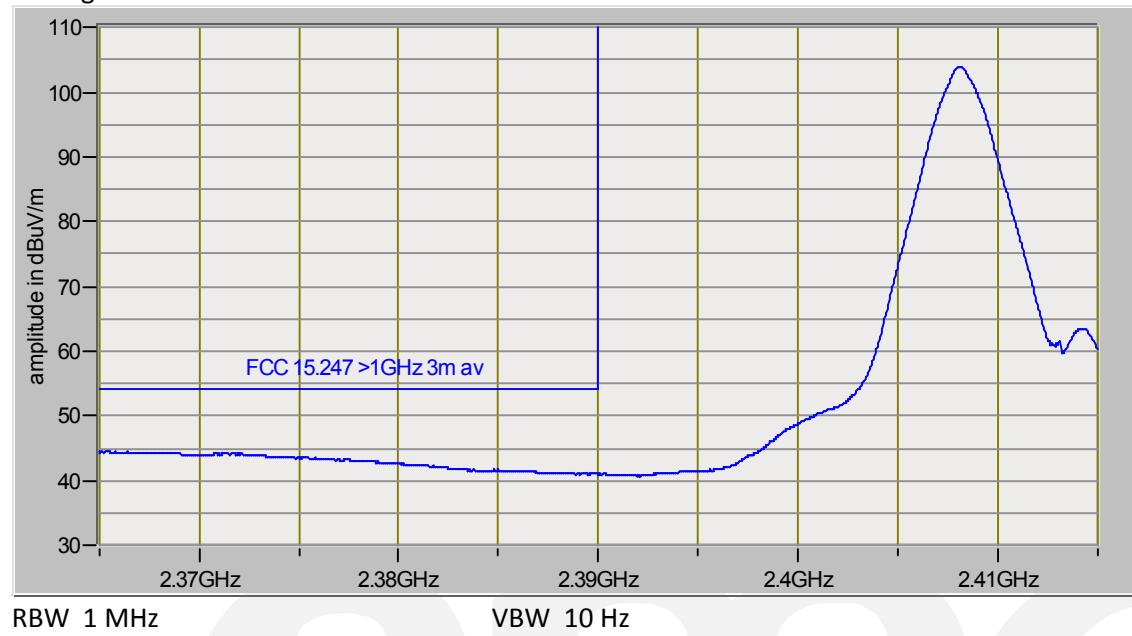
Band edge
High channel
Average



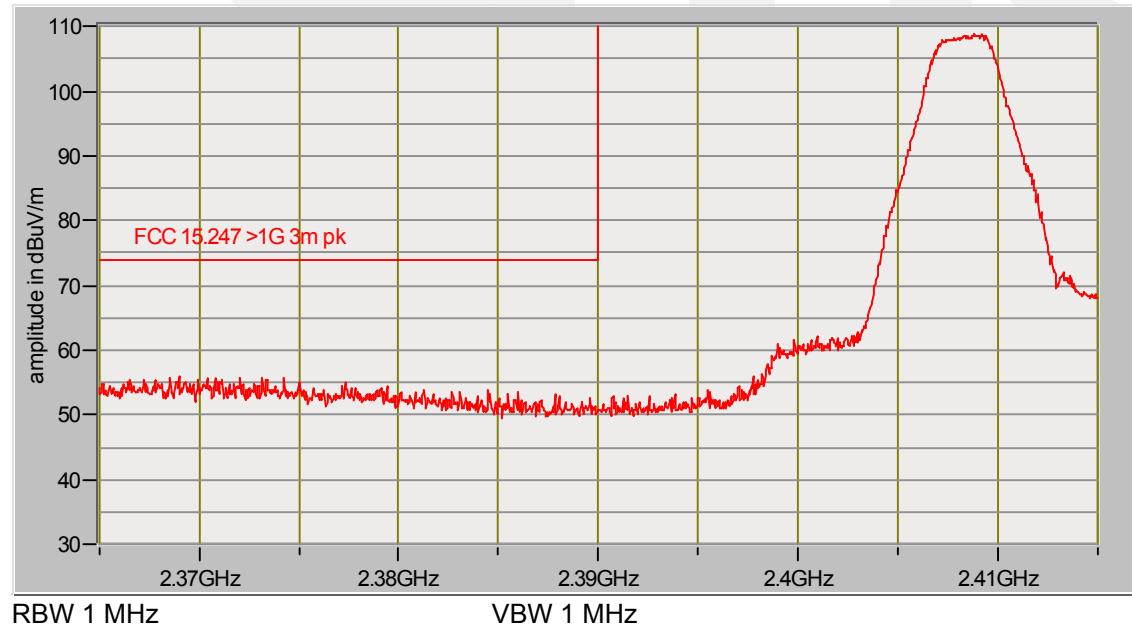
Band edge
High channel
Peak



Band edge
Low channel
Average



Band edge
Low channel
Peak



99% Bandwidth IC RSS-GEN 4.6

Test summary

The requirements are: ■ - MET □ - NOT MET

Test was performed in accordance with the article "The Measurement of Occupied Bandwidth" by Industry Canada's certification bureau

99% Occupied bandwidth is 2.6 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 Tech Area, conducted measurement

Test equipment

TUV ID	Model	Manufacturer	Description	Serial	Cal Due
WRLE10435	E4440A	Agilent	Spectrum Analyzer	MY44304483	22-Jul-12

Test limit

Not applicable

Test data

* Agilent 14:13:10 Jan 17, 2012

Ref lvl = Pk with max RBW

Ref 8.5 dBm

Atten 20 dB

△ Mkr1 2.60 MHz

-0.30 dB

#Samp

Log

5

dB/

Offst

0.5

dB

DI

-11.5

dBm

LgAv

S1

S2

V3

FC

AA

£(f):

f>50k

#Swp

Conducted limits – AC lines

FCC 15.207(a), IC RSS-Gen 7.2.4

Test summary

The requirements are: - MET - NOT MET

Testing was performed in accordance with the test procedure of ANSI C63.4-2003 7.2

Maximum conducted emission, relative to the limit, is 49.02 dB μ V qp at 163.0 kHz

Maximum conducted emission, relative to the limit, is 33.58 dB μ V qp at 313.0 kHz

Minimum margin of compliance is 16.28 dB

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 Tech Area, conducted measurement
- Wild River Lab shield room 2

Test equipment

TUV ID	Model	Manufacturer	Description	Serial	Cal Due
OWLE02078 3825/2	Electro-Mechanics		50 Ω LISN	1326	Code B 20-Jul-12
WRLE02476 11947A	Hewlett Packard		Transient Limiter	3107A00780	Code B 11-Feb-12
OWLE02532 ESHS-10	Rohde & Schwarz		EMI Receiver	828178/006	27-Oct-12

Test limit

Frequency (MHz)	Conducted limit (dB μ V)	
	Quasi-peak	Average
0.15–0.5	66 to 56*	56 to 46*
0.5–5	56	46
5–30	60	50

*Decreases with the logarithm of the frequency

Test data

Measurement summary for limit1: EN55022 B Qp (Qp)

FREQ	LEVEL (dB μ V)	CABLE / ANT / PREAMP / ATTEN (dB)	FINAL (dB μ V)	EUT Lead	DELTA1 EN55022 B Qp
163.0 kHz	47.68 Qp	0.06 / 1.29 / 0.0 / 0.0	49.02	L1	-16.28
313.0 kHz	37.28 Qp	0.1 / 1.06 / 0.0 / 0.0	38.44	L2	-21.45
150.0 kHz	39.24 Qp	0.05 / 1.31 / 0.0 / 0.0	40.6	L1	-25.4
838.0 kHz	28.26 Qp	0.17 / 0.25 / 0.0 / 0.0	28.68	L2	-27.32
1.367 MHz	28.28 Qp	0.25 / 0.01 / 0.0 / 0.0	28.54	L2	-27.46
27.7 MHz	29.02 Qp	1.31 / 0.5 / 0.0 / 0.0	30.83	N	-29.17
5.95 MHz	26.88 Qp	0.58 / 0.13 / 0.0 / 0.0	27.59	L2	-32.41
20.48 MHz	25.7 Qp	1.03 / 0.5 / 0.0 / 0.0	27.23	L2	-32.77
30.0 MHz	20.66 Qp	1.36 / 0.5 / 0.0 / 0.0	22.52	N	-37.48
12.16 MHz	17.84 Qp	0.75 / 0.29 / 0.0 / 0.0	18.88	L2	-41.12
9.67 MHz	16.4 Qp	0.67 / 0.23 / 0.0 / 0.0	17.3	L2	-42.7

Measurement summary for limit2: EN55022 B Avg (Av)

FREQ	LEVEL (dBuV)	CABLE / ANT / PREAMP / ATTEN (dB)	FINAL (dBuV)	EUT Lead	DELTA2 EN55022 B Avg
313.0 kHz	32.42 Av	0.1 / 1.06 / 0.0 / 0.0	33.58	L2	-16.31
1.367 MHz	22.7 Av	0.25 / 0.01 / 0.0 / 0.0	22.96	L2	-23.04
163.0 kHz	30.89 Av	0.06 / 1.29 / 0.0 / 0.0	32.23	N	-23.07
838.0 kHz	22.51 Av	0.17 / 0.25 / 0.0 / 0.0	22.93	L2	-23.07
27.7 MHz	24.11 Av	1.31 / 0.5 / 0.0 / 0.0	25.92	N	-24.08
5.95 MHz	22.19 Av	0.58 / 0.13 / 0.0 / 0.0	22.9	L2	-27.1
20.48 MHz	19.78 Av	1.03 / 0.5 / 0.0 / 0.0	21.31	L2	-28.69
30.0 MHz	14.76 Av	1.36 / 0.5 / 0.0 / 0.0	16.62	N	-33.38
150.0 kHz	19.34 Av	0.05 / 1.31 / 0.0 / 0.0	20.7	L2	-35.3
12.16 MHz	10.86 Av	0.75 / 0.29 / 0.0 / 0.0	11.9	N	-38.1
9.67 MHz	10.97 Av	0.67 / 0.23 / 0.0 / 0.0	11.87	L2	-38.13

PAGES 33 - 38 REMOVED – SEE TEST SET-UPS EXHIBIT

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
- See Software and/or Operating Modes in Appendix A.
Transmitter testing. Power output adjusted to the 0 dB setting. Frequency, modulation, and power adjusted via DIP switch settings as necessary.

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)
- Transmitter output power adjusted to 0 dB setting. Added low pass Pi filter in line with antenna. 1.3 pF caps, 3.3 nH inductor

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: 16 January 2012
Condition of EUT: Normal
Testing Start Date: 16 January 2012
Testing End Date: 17 January 2012

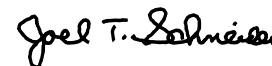
TÜV SÜD AMERICA INC

Tested by:



Greg S Jakubowski
EMC Test Engineer

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: Vaddio
Address: 9433 Science Center Drive

New Hope, MN 55428
Contact: Tim Wall Position: Engineer
Phone: 763-971-4443 Fax: 763-971-4464
E-mail Address: twall@vaddio.com

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

EUT Description 2.4GHz Wireless Audio Receiver (Transceiver)
EUT Name EasyTalk AutoTrak 2.0 Wireless Audio Receiver
Model No.: 998-7230-000 (North America) Serial No.:
998-7230-001 (International)
(only difference is AC power cord)

Product Options: none
Configurations to be tested: normal

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.

<input type="checkbox"/> EMC Directive 2004/108/EC (EMC) Std: <u>test to quote # CG40242266836</u>	<input type="checkbox"/> FCC: <u>Class</u> <input type="checkbox"/> A <input type="checkbox"/> B Part _____
<input type="checkbox"/> Machinery Directive 89/392/EEC (EMC) Std: _____	<input type="checkbox"/> VCCI: <u>Class</u> <input type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> BSMI: <u>Class</u> <input type="checkbox"/> A <input type="checkbox"/> B (Separate Report)
<input type="checkbox"/> Medical Device Directive 93/42/EEC (EMC) Std: _____	<input type="checkbox"/> Canada: <u>Class</u> <input type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> Australia: <u>Class</u> <input type="checkbox"/> A <input type="checkbox"/> B
<input type="checkbox"/> Vehicle Directive: <input type="checkbox"/> 2001/3/EC (EMC) <input type="checkbox"/> 2004/104/EC (EMC) <input type="checkbox"/> Other Vehicle Std: _____	<input type="checkbox"/> Other: _____
<input type="checkbox"/> FDA Reviewers Guidance for Premarket Notification Submissions (EMC)	

Form



EMC Test Plan and Constructional Data Form

Third Party Certification, if applicable (*Signature on Page 6 Required)

<input type="checkbox"/> Attestation of Conformity (AoC)*	<input type="checkbox"/> EMC Certification (used with Octagon Mark)*
<input type="checkbox"/> Certificate of Conformity (CoC)*	<input type="checkbox"/> Compliance Document*
Protection Class (N/A for vehicles)	<input type="checkbox"/> Class I <input type="checkbox"/> Class II <input type="checkbox"/> Class III
(Press F1 when field is selected to show additional information on Protection Class.)	
<input type="checkbox"/> FCC / TCB Certification	<input type="checkbox"/> Industry Canada / FCB Certification
<input type="checkbox"/> E-Mark Certification	<input type="checkbox"/> Taiwan Certification

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: 6" Width: 19" Height: 1.7" Weight: 3lbs

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: 120VAC 60hz, (If battery powered, make sure battery life is sufficient to complete testing.)
 230VAC 50hz

of Phases: 1

Current Current
(Amps/phase(max)): .35 (Amps/phase(nominal)): .1

Other _____

Other Special Requirements

Typical Installation and/or Operating Environment

(ie. Hospital, Small Business, Industrial/Factory, etc.)
Office, presentation room

EUT Power Cable

<input type="checkbox"/> Permanent OR <input type="checkbox"/> Removable	Length (in meters): _____
<input type="checkbox"/> Shielded OR <input type="checkbox"/> Unshielded	
<input type="checkbox"/> 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							
EXAMPLE: RS232	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Foil over braid	Coaxial	Metallized 9-pin D-Sub	Characteristic Impedance	6	<input checked="" type="checkbox"/>	<input type="checkbox"/>
unbalanced audio	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1	<input checked="" type="checkbox"/>	<input type="checkbox"/>			RCA		.9	<input checked="" type="checkbox"/>	<input type="checkbox"/>
balanced audio	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1	<input checked="" type="checkbox"/>	<input type="checkbox"/>			XLR		1.5	<input checked="" type="checkbox"/>	<input type="checkbox"/>
RS232	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1	<input checked="" type="checkbox"/>	<input type="checkbox"/>			Metal 9-pin D-sub	10K ohm	1.5	<input checked="" type="checkbox"/>	<input type="checkbox"/>
USB	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1	<input checked="" type="checkbox"/>	<input type="checkbox"/>			Type B to A		2	<input checked="" type="checkbox"/>	<input type="checkbox"/>
GPIO	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1	<input type="checkbox"/>	<input checked="" type="checkbox"/>			Terminal	10K ohm	.5	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>

Form



EMC Test Plan and Constructional Data Form

EUT Software.

Revision Level: v1.0.0

Description: EMC Test firmware to produce required modes of operation.

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. Transmitter testing. Frequency, modulation, and power may be changed via DIP switch settings.
- 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 #
2.4GHz Wireless Audio Receiver	998-7230-000		
Power Supply	TPI # HK-CH12-A12		

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 #
Acer Notebook PC	5720-6722	LXTKE06001736 11D872000	PD9WM3945ABG
Mackie PA Speaker	SRM150	203384900AKCO 0385	
LITEON power supply (for Notebook PC)	PA-1650-02		

Oscillator Frequencies

Manufacturer	Frequency	Derived Frequency	Component # / Location	Description of Use
Abraccon	12MHz	12MHz	X1	USB ASIC clock
TXC	48MHz	various	X2	radio frequency synthesizer clock

Power Supply

Manufacturer	Model #	Serial #	Type
TPI	HK-CH12-A12		<input checked="" type="checkbox"/> Switched-mode: (Frequency) _____ <input type="checkbox"/> Linear <input type="checkbox"/> Other: _____
			<input type="checkbox"/> Switched-mode: (Frequency) _____ <input type="checkbox"/> Linear <input type="checkbox"/> Other: _____

Power Line Filters

Manufacturer	Model #	Location in EUT

Form



EMC Test Plan and Constructional Data Form

Critical EMI Components (Capacitors, ferrites, etc.)

Description	Manufacturer	Part # or Value	Qty	Component # / Location

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)

Tim Wall

1-17-12

Customer authorization to perform tests
according to this test plan.

Date

Tim Wall

1-17-12

Test Plan/CDF Prepared By (please print)

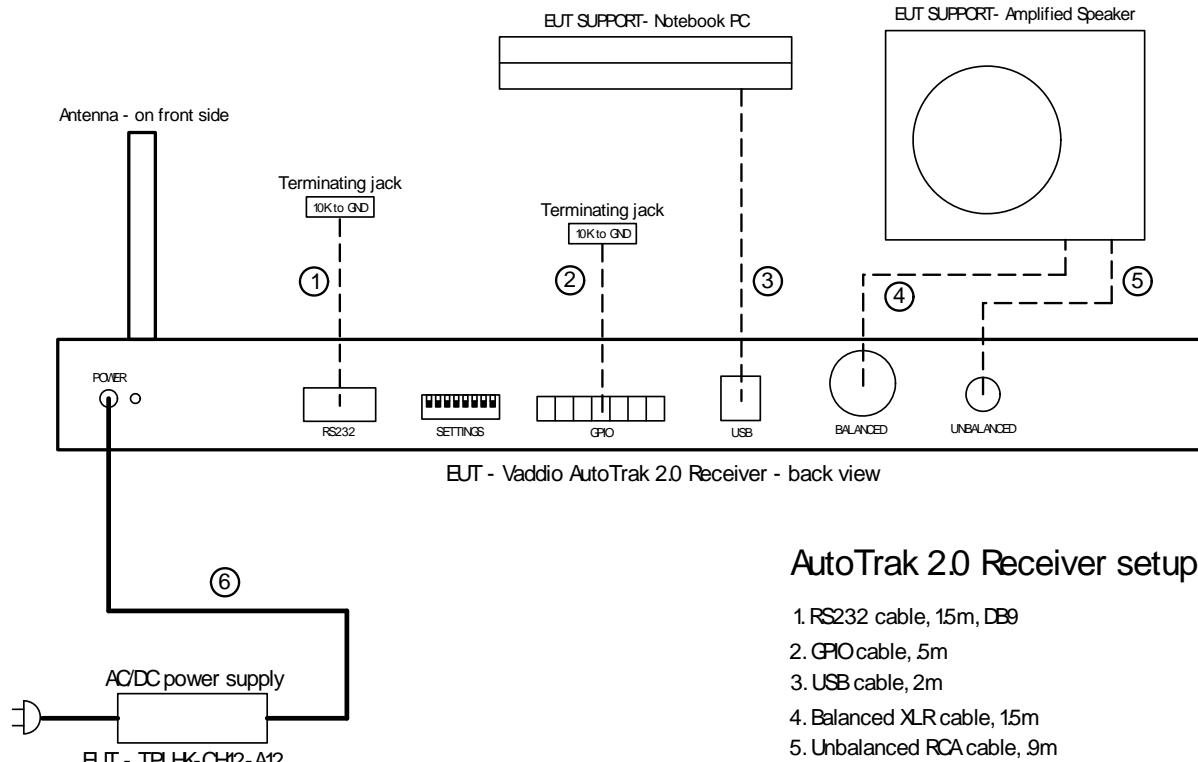
Date

Form



EMC Block Diagram Form

System Configuration Block Diagram -- Provide a line drawing identifying the EUT, simulators, support equipment, I/O cables, power cables, and any other pertinent components to be used during testing. Use a dashed line to separate the equipment in the testing field versus equipment outside testing field.



AutoTrak 2.0 Receiver setup

1. RS232 cable, 15m, DB9
2. GPIO cable, 5m
3. USB cable, 2m
4. Balanced XLR cable, 15m
5. Unbalanced RCA cable, 9m
6. DC Power cable, 2m

Authorization Signatures

Tim Wall

1-17-12

Customer authorization to perform tests
according to this test plan.

Date

Tim Wall

1-17-12

Test Plan/CDF Prepared By (please print)

Date

Appendix B

Measurement Protocol



MEASUREMENT PROTOCOL

GENERAL INFORMATION

Test Methodology

Emissions testing is performed according to the procedures in ANSI C63.4-2003, 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 $\text{dB}\mu\text{V}/\text{m}$, equals the reading from the spectrum analyzer (Level $\text{dB}\mu\text{V}$), 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 (dB μ V)	CABLE/ANT/PREAMP (dB)	FINAL (dB μ V/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.