



World Standardization Certification & Testing CO., LTD
World Standardization Safety and EMC Testing Centre

FCC ID TEST REPORT

for

WIFI Module

**MODEL: RA-WN11062A, RA-WN11060A, RA-WN11061A,
RA-WN11063A, RA-WN11064A, RA-WN11065A**

Trade Mark: N/A

FCC ID: AQF-WN11062A

Test Report Number: WSCT12020061E

Issued Date: February 17, 2012

Issued for

Forcelink Electronic Co., Ltd

**6 Floor, B Block , RunChang Industrial Park , Bantian Town,
Shenzhen City, China**

Issued By:

World Standardization Certification & Testing CO., LTD.

**Building A, Baoshi Road, Baoshi Science & Technology Park,
Bao'an District, Shenzhen, Guangdong, China**

TEL: +86-755-26996192

FAX: +86-755-26996253

Note: *This report shall not be reproduced except in full, without the written approval of World Standardization Certification & Testing CO., LTD. This document may be altered or revised by World Standardization Certification & Testing CO., LTD. Personnel only, and shall be noted in the revision section of the document. The test results in the report only apply to the tested sample.*



Report reference No.: WSCT12020061E

Issued: February 17, 2012

Revised: None

Revision History Of Report

Rev.	Issue No.	Revisions	Effect Page	Revised By
00	WSCT12020061E	Initial Issue	ALL	Kallen Wang



TABLE OF CONTENTS

1 TEST CERTIFICATION	4
2 TEST RESULT SUMMARY	5
3 EUT DESCRIPTION	6
4 SETUP OF EQUIPMENT UNDER TEST AND TEST EQUIPMENTS USED	7
4.1. DESCRIPTION OF SUPPORT UNITS	8
4.2. CONFIGURATION OF SYSTEM UNDER TEST	8
5 FACILITIES AND ACCREDITATIONS	9
5.1. FACILITIES	9
5.2. ACCREDITATIONS	9
5.3. MEASUREMENT UNCERTAINTY	9
§15.203 - ANTENNA REQUIREMENT	10
Standard Applicable	10
Antenna Connector Construction	10
§15.207 - CONDUCTED EMISSIONS	11
Applicable Standard	11
Test Procedure	11
Plot(s) of Test Data	11
§15.209, §15.205, §15.247(d) - SPURIOUS EMISSIONS	14
Test Equipment	14
Test Procedure	14
Radiated Test Setup	14
Radiated Emission Limit	15
Radiated Emission Test Result	15
§15.247(a) (2) – 6dB BANDWIDTH TESTING	30
Test Equipment	30
Test Procedure	30
Applicable Standard	30
Test Result: Pass	30
§15.247(b) (3) - MAXIMUM PEAK OUTPUT POWER	36
Test Equipment	36
Test Procedure	36
Applicable Standard	36
Test Result	37
§15.247(d) – 100 kHz BANDWIDTH OF FREQUENCY BAND EDGE	38
Test Equipment	38
Test Procedure	38
Applicable Standard	38
Test Result	38
§15.247(e) - POWER SPECTRAL DENSITY	44
Test Equipment	44
Test Procedure	44
Applicable Standard	44
Test Result	45
PHOTOGRAPHS OF THE TEST CONFIGURATION	51
PHOTOGRAPHS OF EUT	53



Report reference No.: WSCT12020061E
Issued: February 17, 2012
Revised: None

1 TEST CERTIFICATION

Product:	WIFI Module
Model:	RA-WN11062A, RA-WN11060A, RA-WN11061A, RA-WN11063A, RA-WN11064A, RA-WN11065A
Trade Mark	N/A
Applicant:	Forcelink Electronic Co., Ltd 6 Floor, B Block , RunChang Industrial Park , Bantian Town, Shenzhen City, China
Factory:	Forcelink Electronic Co., Ltd 6 Floor, B Block , RunChang Industrial Park , Bantian Town, Shenzhen City, China
Tested:	February 10 ~ February 17, 2012
Test Voltage:	DC 5V(PC Input AC 120V/60Hz)
Applicable Standards:	FCC Part 15 Subpart C: 2010 ANSI C63.4:2003

Deviation from Applicable Standard

None

The above equipment has been tested by World Standardization Certification & Testing Co., Ltd., and found compliance with the requirements set forth in the technical standards mentioned above. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Jack Ma

Tested By: _____

Date: 2012-02-17

(Jack Ma)

Mike Mo

Check By: _____

Date: 2012-02-17

(Mike Mo)

Kallen Wang

Approved By: _____

Date: 2012-02-17

(Kallen Wang)



Report reference No.: WSCT12020061E

Issued: February 17, 2012

Revised: None

2 TEST RESULT SUMMARY

FCC 15 Subpart C, Paragraph 15.247

FCC RULES	DESCRIPTION OF TEST	RESULT
§15.203	Antenna Requirement	Pass
§15.207 (a)	Conducted Emissions	Pass
§15.247(d)	Spurious Emissions at Antenna Port	Pass
§15.205	Restricted Bands	Pass
§15.209, §15.205, 1§15.247(d)	Spurious Emissions	Pass
§15.247 (a)(2)	6 dB Bandwidth	Pass
§15.247(b)(3)	Maximum Peak Output Power	Pass
§15.247(d)	100kHz Bandwidth of Frequency Band Edge	Pass
§15.247(e)	Power Spectral Density	Pass

Modifications:

No modification was made.

3 EUT DESCRIPTION

Product	WIFI Module
Trade Mark	N/A
Model	RA-WN11062A, RA-WN11060A, RA-WN11061A, RA-WN11063A, RA-WN11064A, RA-WN11065A
Applicant	Forcelink Electronic Co., Ltd
Housing material	Plastic
EUT Type	☒ Engineering Sample. ☐ Product Sample, ☐ Mass Product Sample.
Serial Number	N/A
Antenna Type	PCB Antenna
EUT Power Rating	DC 5V/3.3V 0.125A
Temperature Range(Operating)	-10 ~50°C
Type of the Equipment	Combined Equipment
Operating Frequency (WIFI)	2412MHz - 2462MHz
Number of Channels	11 Channels
Channel Separation	5MHz
Modulation type	DSSS for IEEE 802.11b/g/n

Note: N/A stand for no applicable.

Model Differences

No.	Model Number	Voltage	Tested With
1	RA-WN11060A	DC 5V/3.3V	☐
2	RA-WN11061A	DC 5V/3.3V	☐
3	RA-WN11062A	DC 5V/3.3V	☒
4	RA-WN11063A	DC 5V/3.3V	☐
5	RA-WN11064A	DC 5V/3.3V	☐
6	RA-WN11065A	DC 5V/3.3V	☐

NOTE: RA-WN11062A is tested model, other models are derivative models, The models are identical in circuit and PCB layout, only different on the model names, So the test data of RA-WN11062A can represent the remaining models.



Report reference No.:WSCT12020061E

Issued: February 17, 2012

Revised: None

4 SETUP OF EQUIPMENT UNDER TEST AND TEST EQUIPMENTS USED

EQUIPMENT/FACILITIES	MANUFACTURER	MODEL #	SERIAL NO.	DATE OF CAL.	CAL. INTERVAL
Cable	Resenberger	N/A	NO.1	Mar 10, 2011	1 Year
Cable	SCHWARZBECK	N/A	NO.2	Mar 10, 2011	1 Year
Cable	SCHWARZBECK	N/A	NO.3	Mar 10, 2011	1 Year
LISN	Rohde & Schwarz	ESH3-Z5	100305	Mar 10, 2011	1 Year
50 Ω Coaxial Switch	ANRITSU CORP	MP59B	6200283933	Mar 10, 2011	1 Year
EMI Test Receiver	Rohde & Schwarz	ESP13	100180	Oct.18,2011	1 Year
Spectrum Analyzer	Rohde & Schwarz	FSP40	100273	Sep.10,2011	1 Year
3m Semi-Anechoic Chamber	Albatross Projects	9m×6m×6m	N/A	Feb.20,2011	1 Year
Signal Generator	FLUKE	PM5418 + Y/C	LO747012	Feb.20,2011	1 Year
Signal Generator	FLUKE	PM5418TX	LO738007	Feb.20,2011	1 Year
Loop Antenna	SCHWARZBECK	FMZB1516	113	Jan.30,2012	1 Year
Trilog-Super Broadband Antenna	SCHWARZBECK	VULB9161	9161-4079	Sep.22,2011	1 Year
Broad-Band Horn Antenna	SCHWARZBECK	BBHA9120D	9120D-564	Sep.22,2011	1 Year
Ultra Broadband Antenna	Rohde & Schwarz	HL-562	100110	June.15,2011	1 Year
AMN	Rohde & Schwarz	ESH3-Z5	100196	Oct.11,2011	1 Year
AMN	Rohde & Schwarz	ESH3-Z5	100197	Oct.11,2011	1 Year
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	N/A	N/A	N/A
Power Meter	Rohde & Schwarz	NRVD	100041	Feb.20,2011	1 Year
EMI Test Receiver	Rohde & Schwarz	ESCS30	100003	Feb.20,2011	1 Year
Coaxial Cable with N-connectors	SCHWARZBECK	AK9515H	95549	Sep.22,2011	1 Year
Radio Communication Test Set	Rohde & Schwarz	CMS 54	846621/024	Feb.20,2011	1 Year
Modulation Analyzer	Hewlett-Packard	8901B	2303A00362	Feb.20,2011	1 Year
Absorbing clamp	Rohde & Schwarz	MDS-21	N/A	Oct.29,2011	1 Year

4.1. DESCRIPTION OF SUPPORT UNITS

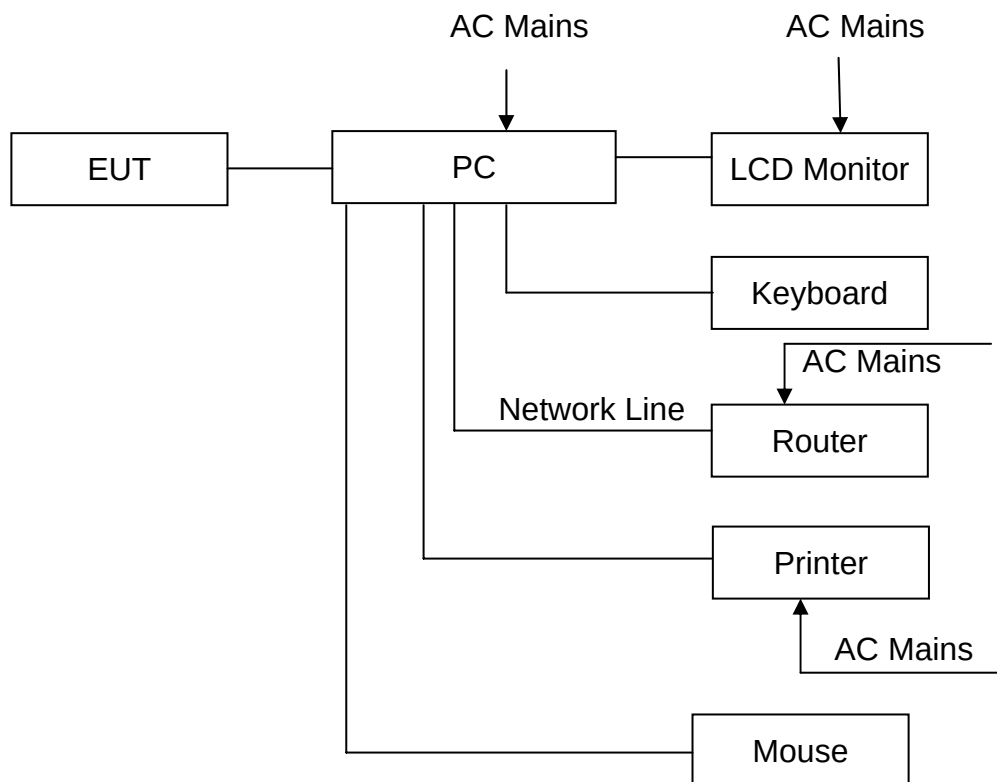
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

No.	Equipment	Model No.	Serial No.	FCC ID	Trade Name	Data Cable	Power Cord
1	Monitor	HPL1706V	CND74535YZ	N/A	HP	N/A	N/A
2	Keyboard	SK-2880	435302-AA1	N/A	HP	N/A	N/A
3	Mouse	M-F105	N/A	N/A	HP	N/A	N/A
4	PC	HPD005	CHT5701	N/A	HP	N/A	N/A
5	Printer	LBP2900	N/A	N/A	Canon	N/A	N/A
6	Router	N/A	N/A	N/A	Dlink	N/A	N/A

Note:

- 1) All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
- 2) Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

4.2. CONFIGURATION OF SYSTEM UNDER TEST



(EUT: WIFI Module)

5 FACILITIES AND ACCREDITATIONS

5.1. FACILITIES

All measurement facilities used to collect the measurement data are located at World Standardization Certification & Testing CO., LTD.

Building A, Baoshi Road, Baoshi Science & Technology Park, Bao'an District, Shenzhen, Guangdong, China

The sites are constructed in conformance with the requirements of ANSI C63.4 and CISPR Publication 22. All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

5.2. ACCREDITATIONS

Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025.

USA	FCC (certificate registration number is 131628) TIMCO (certificate registration number is Q2001)
Japan	VCCI (certificate registration number is C-2912, R-2662)
Germany	TUV Rheinland
Canada	INDUSTRY CANADA (certificated registration number is 7700A-1)

Copies of granted accreditation certificates are available for downloading from our web site, <http://www.wsct.org.cn>

5.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement	Frequency		Uncertainty
Conducted emissions	9kHz~30MHz		+/- 3.59dB
Radiated emissions	Horizontal	30MHz ~ 200MHz	+/- 4.77dB
		200MHz ~1000MHz	+/- 4.93dB
	Vertical	30MHz ~ 200MHz	+/- 5.04dB
		200MHz ~1000MHz	+/- 4.93dB

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

§15.203 - ANTENNA REQUIREMENT

Standard Applicable

According to § 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the user of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

- a. Antenna must be permanently attached to the unit.
- b. Antenna must use a unique type of connector to attach to the EUT.

Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.

And according to FCC 47 CFR section 15.247 (b), if the transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Antenna Connector Construction

The EUT uses a unique coupling antenna. The Antenna gain is 0dBi.please refer to the EUT internal photos.



Report reference No.: WSCT12020061E
Issued: February 17, 2012
Revised: None

§15.207 - CONDUCTED EMISSIONS

Applicable Standard

The specification used was with the FCC Part 15.207 limits.

Test Procedure

During the conducted emission test, the EUT was connected to the outlet of the LISN.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data was recorded in the Quasi-peak and average detection mode.

Test Result

PASS

Test Mode: Operating

Environmental Conditions

Temperature:	26 °C
Relative Humidity:	60%
ATM Pressure:	100.0kPa

Plot(s) of Test Data

Plot(s) of Test Data is presented hereinafter as reference.

Conducted Emission Measurement

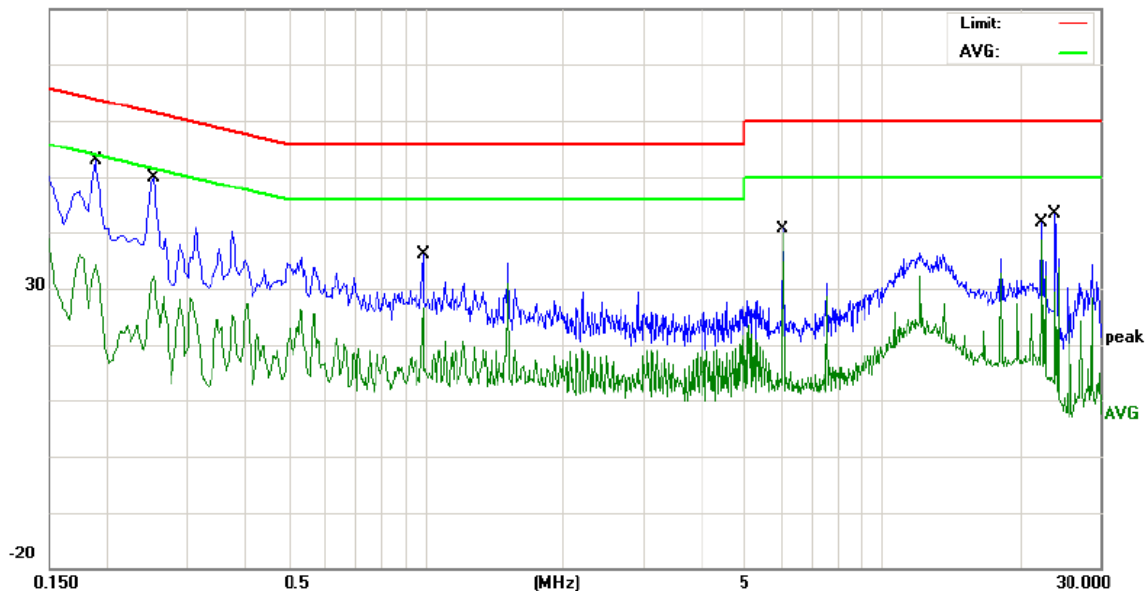
File :Forcelink

Data :#3

Date: 2012/02/15

Time: 17:41:21

80.0 dBuV



Site 843 Shielded Room

Phase: L1

Temperature: 26

Limit: FCC Part15B Conduction(QP)

Power:

Humidity: 60 %

EUT: WIFI Module

M/N: RA-WN11062A

Mode: ON

Note: DC 5V (PC Input AC 120V / 60Hz)

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.1900	39.25	10.33	49.58	64.03	-14.45	QP	
2		0.1900	24.25	10.33	34.58	54.03	-19.45	AVG	
3		0.2540	37.25	10.49	47.74	61.62	-13.88	QP	
4		0.2540	21.70	10.49	32.19	51.62	-19.43	AVG	
5		0.9900	22.00	10.54	32.54	56.00	-23.46	QP	
6		0.9900	14.86	10.54	25.40	46.00	-20.60	AVG	
7		6.0860	28.26	10.56	38.82	60.00	-21.18	QP	
8		6.0860	28.40	10.56	38.96	50.00	-11.04	AVG	
9		22.4220	31.89	10.52	42.41	60.00	-17.59	QP	
10	*	22.4220	30.06	10.52	40.58	50.00	-9.42	AVG	
11		23.9980	25.43	10.54	35.97	60.00	-24.03	QP	
12		23.9980	16.83	10.54	27.37	50.00	-22.63	AVG	

*:Maximum data x:Over limit !:over margin

(Reference Only)

Conducted Emission Measurement

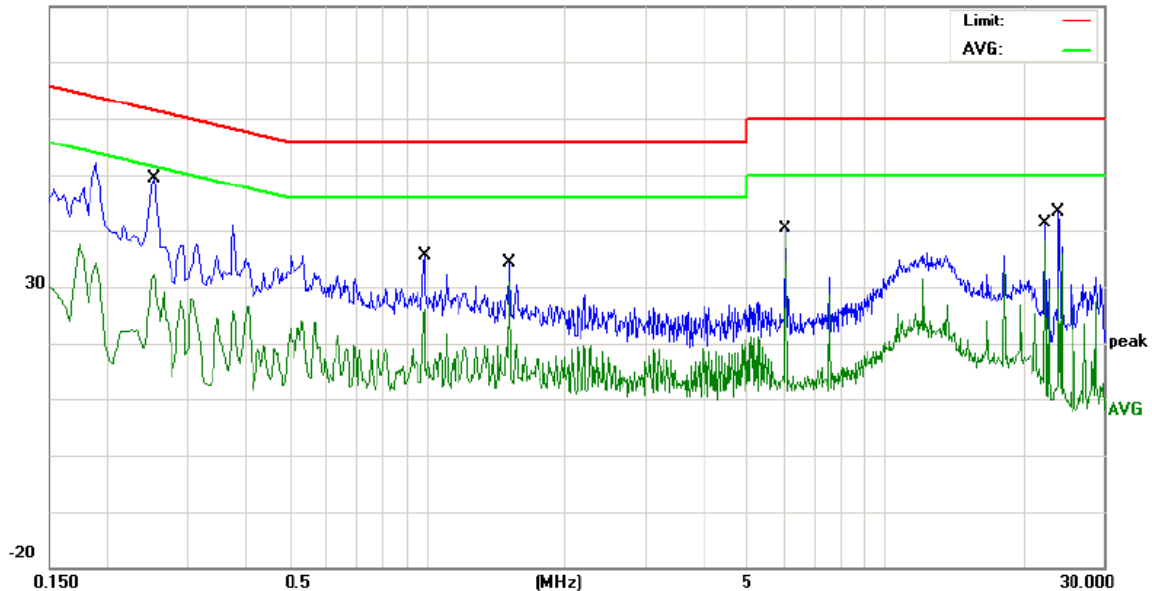
File :Forcelink

Data :#4

Date: 2012/02/15

Time: 17:43:59

80.0 dBuV



Site 843 Shielded Room

Phase: N

Temperature: 26

Limit: FCC Part15C Conduction(QP)

Power:

Humidity: 60 %

EUT: WIFI Module

M/N: RA-WN11062A

Mode: ON

Note: DC 5V (PC Input AC 120V / 60Hz)

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.2540	37.14	10.49	47.63	61.62	-13.99	QP	
2		0.2540	21.47	10.49	31.96	51.62	-19.66	AVG	
3		0.9900	21.96	10.54	32.50	56.00	-23.50	QP	
4		0.9900	14.74	10.54	25.28	46.00	-20.72	AVG	
5		1.5220	20.84	10.51	31.35	56.00	-24.65	QP	
6		1.5220	20.24	10.51	30.75	46.00	-15.25	AVG	
7		6.0860	28.85	10.56	39.41	60.00	-20.59	QP	
8	*	6.0860	28.98	10.56	39.54	50.00	-10.46	AVG	
9		22.4220	30.44	10.52	40.96	60.00	-19.04	QP	
10		22.4220	28.30	10.52	38.82	50.00	-11.18	AVG	
11		23.9980	26.13	10.54	36.67	60.00	-23.33	QP	
12		23.9980	17.52	10.54	28.06	50.00	-21.94	AVG	

*:Maximum data x:Over limit !:over margin

(Reference Only)

§15.209, §15.205, §15.247(d) - SPURIOUS EMISSIONS

Test Equipment

Please refer to section 4 this report.

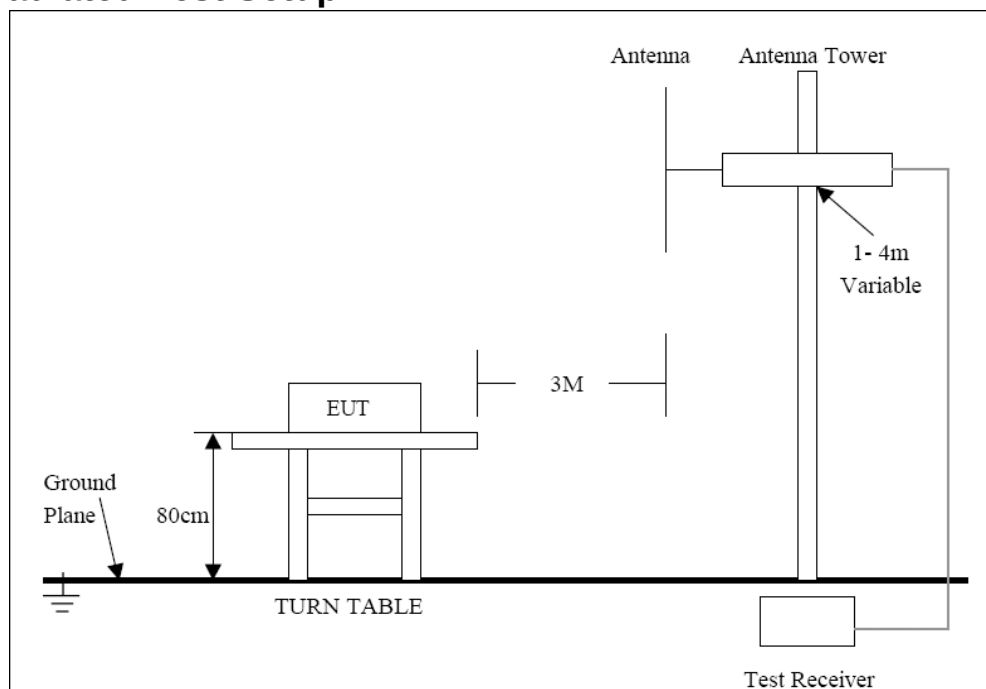
Test Procedure

The out of band emission tests were performed in the 3-meter chamber test site, using the setup accordance with the ANSI C63.4-2003. The specification used was the FCC Part Subpart C limits.

Environmental Conditions

Temperature:	26 °C
Relative Humidity:	55%
ATM Pressure:	100.0kPa

Radiated Test Setup



For the accrual test configuration, please refer to the related items-photos of Testing.



Report reference No.: WSCT12020061E
Issued: February 17, 2012
Revised: None

Radiated Emission Limit

CARRIER FREQUENCY WILL NOT EXCEEDS 48.0 dBuV/m AT 3M.

OUT-OF-BAND EMISSIONS SHALL NOT EXCEED:

Frequency (MHz)	Distance (m)	Field Strength (dBuV/m)
30-88	3	40.0
88-216	3	43.5
216-960	3	46.0
ABOVE 960	3	54.0

Radiated Emission Test Result

Test Mode: Operating

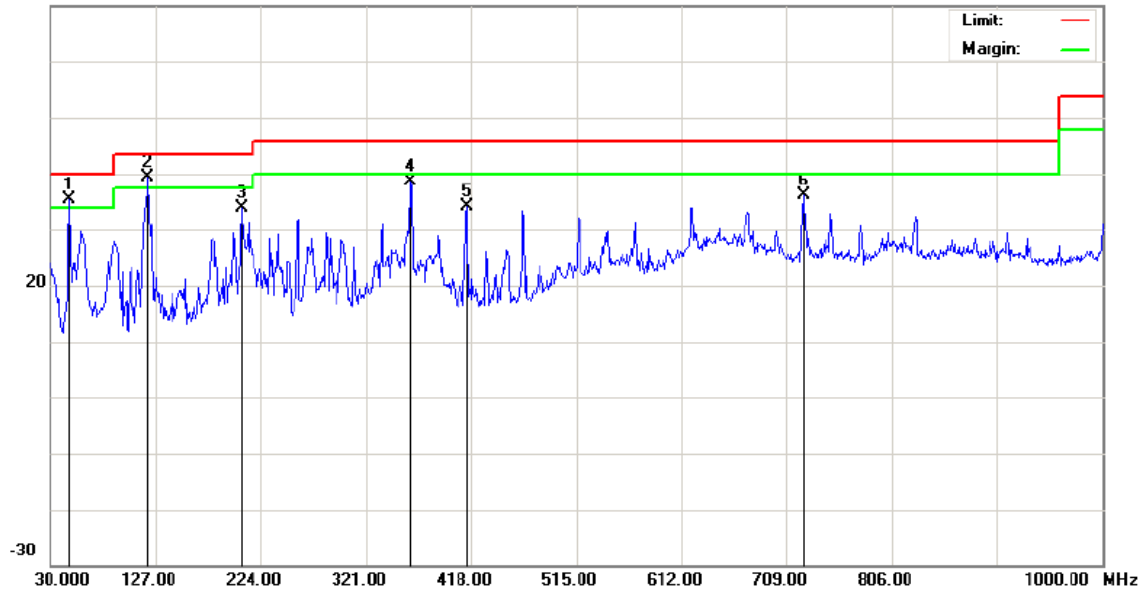
Radiated Emission Measurement

File :Forcelink
 70.0 dBuV/m

Data :#1

Date: 2012-2-16

Time: 16:36:49



Site 966

Polarization: **Horizontal**

Temperature: 26

Limit: FCC Part15B_ RE 3M

Power:

Humidity: 55 %

EUT: WIFI Module

Distance:

M/N: RA-WN11062A

Mode: ON

Note: DC 5V (PC Input AC 120V/60Hz)

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Antenna Height cm	Table Degree degree	Comment
1	!	47.4600	49.88	-14.40	35.48	40.00	-4.52	QP		
2	*	120.2100	45.48	-6.11	39.37	43.50	-4.13	QP		
3		206.5399	42.51	-8.66	33.85	43.50	-9.65	QP		
4		361.7400	43.31	-4.61	38.70	46.00	-7.30	QP		
5		414.1200	40.07	-5.89	34.18	46.00	-11.82	QP		
6		724.5200	33.80	2.26	36.06	46.00	-9.94	QP		

*:Maximum data x:Over limit !:over margin

⟨Reference Only

Radiated Emission Measurement

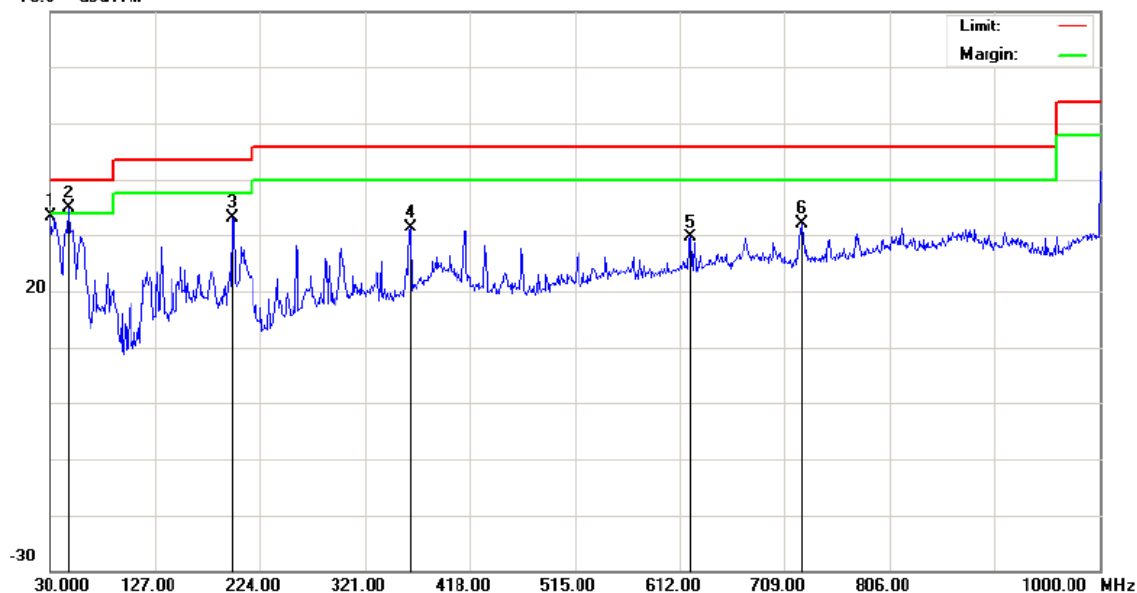
File :Forcelink

Data :#3

Date: 2012-2-16

Time: 16:41:28

70.0 dBuV/m



Site 966

Polarization: **Vertical**

Temperature: 26

Limit: FCC Part15B_ RE 3M

Power:

Humidity: 55 %

EUT: WIFI Module

Distance:

M/N: RA-WN11062A

Mode: ON

Note: DC 5V (PC Input AC 120V/60Hz)

No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Over	Antenna	Table	
		MHz	Level	Factor	ment			Height	Degree	
			dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		30.9700	37.61	-4.11	33.50	40.00	-6.50	QP		
2	*	47.4600	48.21	-13.26	34.95	40.00	-5.05	QP		
3		198.7800	38.26	-5.25	33.01	43.50	-10.49	QP		
4		362.7100	34.75	-3.46	31.29	46.00	-14.71	QP		
5		621.7000	29.95	-0.34	29.61	46.00	-16.39	QP		
6		724.5200	30.29	1.92	32.21	46.00	-13.79	QP		

*:Maximum data x:Over limit !:over margin

<Reference Only



Report reference No.: WSCT12020061E
 Issued: February 17, 2012
 Revised: None

Above 1GHz:
 802.11b

Indicated		Detector (PK/AV)	Table Angle Degree	Antenna		Correction Factor			FCC Part 15.247		
Frequency (MHz)	Receiver Reading (dBμV/m)			Height (m)	Polar (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Cord. Amp. (dBμV/m)	Limit (dBμV/m)	Margin (dB)
Low Channel (2412MHz)											
7236	37.5	AV	360	1.5	V	35.4	4.51	33.7	43.71	54	10.29
4824	39.3	AV	250	1.2	V	31.3	4.64	33.4	41.84	54	12.16
7236	35.2	AV	45	1.4	H	35.4	4.51	33.7	41.41	54	12.59
4824	38.6	AV	60	1.6	H	31.3	4.64	33.4	41.14	54	12.86
4824	53.6	PK	180	1.3	V	31.3	4.64	33.4	56.14	74	17.86
7236	48.6	PK	300	1.5	V	35.4	4.51	33.7	54.81	74	19.19
7236	47.7	PK	100	1.5	H	35.4	4.51	33.7	53.91	74	20.09
4824	49.9	PK	210	1.1	H	31.3	4.64	33.4	52.44	74	21.56
Middle Channel (2437MHz)											
7311	40.6	AV	180	1.5	V	35.4	4.75	33.7	47.05	54	6.95
7311	39.1	AV	185	1.3	H	35.4	4.75	33.7	45.55	54	8.45
4874	41.7	AV	200	1.5	V	31.3	4.64	33.4	44.24	54	9.76
4874	40.5	AV	360	1.5	H	31.3	4.64	33.4	43.04	54	10.96
7311	53.8	PK	120	1.2	V	35.4	4.75	33.7	60.25	74	13.75
4874	55.6	PK	75	1.5	V	31.3	4.64	33.4	58.14	74	15.86
7311	50.4	PK	220	1.4	H	35.4	4.75	33.7	56.85	74	17.15
4874	52.6	PK	0	1.1	H	31.3	4.64	33.4	55.14	74	18.86
High Channel (2462MHz)											
7386	42.0	AV	160	1.3	V	35.3	4.75	33.7	48.35	54	5.65
7386	41.9	AV	245	1.4	H	35.3	4.75	33.7	48.25	54	5.75
4924	43.8	AV	360	1.5	V	32.0	4.64	33.4	47.04	54	6.96
4924	42.4	AV	45	1.5	H	32.0	4.64	33.4	45.64	54	8.36
7386	52.2	PK	90	1.2	V	35.3	4.75	33.7	58.55	74	15.45
4924	55.1	PK	0	1.4	V	32.0	4.64	33.4	58.34	74	15.66
4924	54.6	PK	200	1.4	H	32.0	4.64	33.4	57.84	74	16.16
7386	51.3	PK	180	1.2	H	35.3	4.75	33.7	57.65	74	16.35



802.11g

Indicated		Detector (PK/AV)	Table Angle Degree	Antenna		Correction Factor			FCC Part 15.247		
Frequency (MHz)	Receiver Reading (dBμV/m)			Height (m)	Polar (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Cord. Amp. (dBμV/m)	Limit (dBμV/m)	Margin (dB)
Low Channel (2412MHz)											
7236	38.6	AV	1.24	1.3	V	35.4	4.51	33.7	44.81	54	9.19
7236	37.8	AV	200	1.4	H	35.4	4.51	33.7	44.01	54	9.99
4824	40.7	AV	90	1.5	V	31.3	4.64	33.4	43.24	54	10.76
4824	39.1	AV	45	1.5	H	31.3	4.64	33.4	41.64	54	12.36
7236	46.5	PK	165	1.4	V	35.4	4.51	33.7	52.71	74	21.29
4824	49.8	PK	320	1.2	V	31.3	4.64	33.4	52.34	74	21.66
4824	47.5	PK	0	1.5	H	31.3	4.64	33.4	50.04	74	23.96
7236	42.7	PK	120	1.2	H	35.4	4.51	33.7	48.91	74	25.09
Middle Channel (2437MHz)											
7311	38.6	AV	200	1.5	H	35.4	4.75	33.7	45.05	54	8.95
4874	40.5	AV	120	1.4	H	31.3	4.64	33.4	43.04	54	10.96
7311	35.9	AV	320	1.3	V	35.4	4.75	33.7	42.35	54	11.65
4874	36.7	AV	190	1.3	V	31.3	4.64	33.4	39.24	54	14.76
7311	44.2	PK	45	1.5	H	35.4	4.75	33.7	50.65	74	23.35
7311	43.2	PK	360	1.4	V	35.4	4.75	33.7	49.65	74	24.35
4874	46.8	PK	0	1.4	V	31.3	4.64	33.4	49.34	74	24.66
4874	45.3	PK	60	1.2	H	31.3	4.64	33.4	47.84	74	26.16
High Channel (2462MHz)											
7386	38.2	AV	160	1.3	V	35.3	4.75	33.7	44.55	54	9.45
4924	41.3	AV	360	1.5	V	32.0	4.55	33.4	44.45	54	9.55
4924	40.5	AV	45	1.5	H	32.0	4.55	33.4	43.65	54	10.35
7386	37.1	AV	245	1.4	H	35.3	4.75	33.7	43.45	54	10.55
4924	54.7	PK	0	1.4	V	32.0	4.55	33.4	57.85	74	16.15
7386	50.6	PK	90	1.2	V	35.3	4.75	33.7	56.95	74	17.05
7386	47.6	PK	180	1.2	H	35.3	4.75	33.7	53.95	74	20.05
4924	49.4	PK	200	1.4	H	32.0	4.55	33.4	52.55	74	21.45



Report reference No.:WSCT12020061E

Issued: February 17, 2012

Revised: None

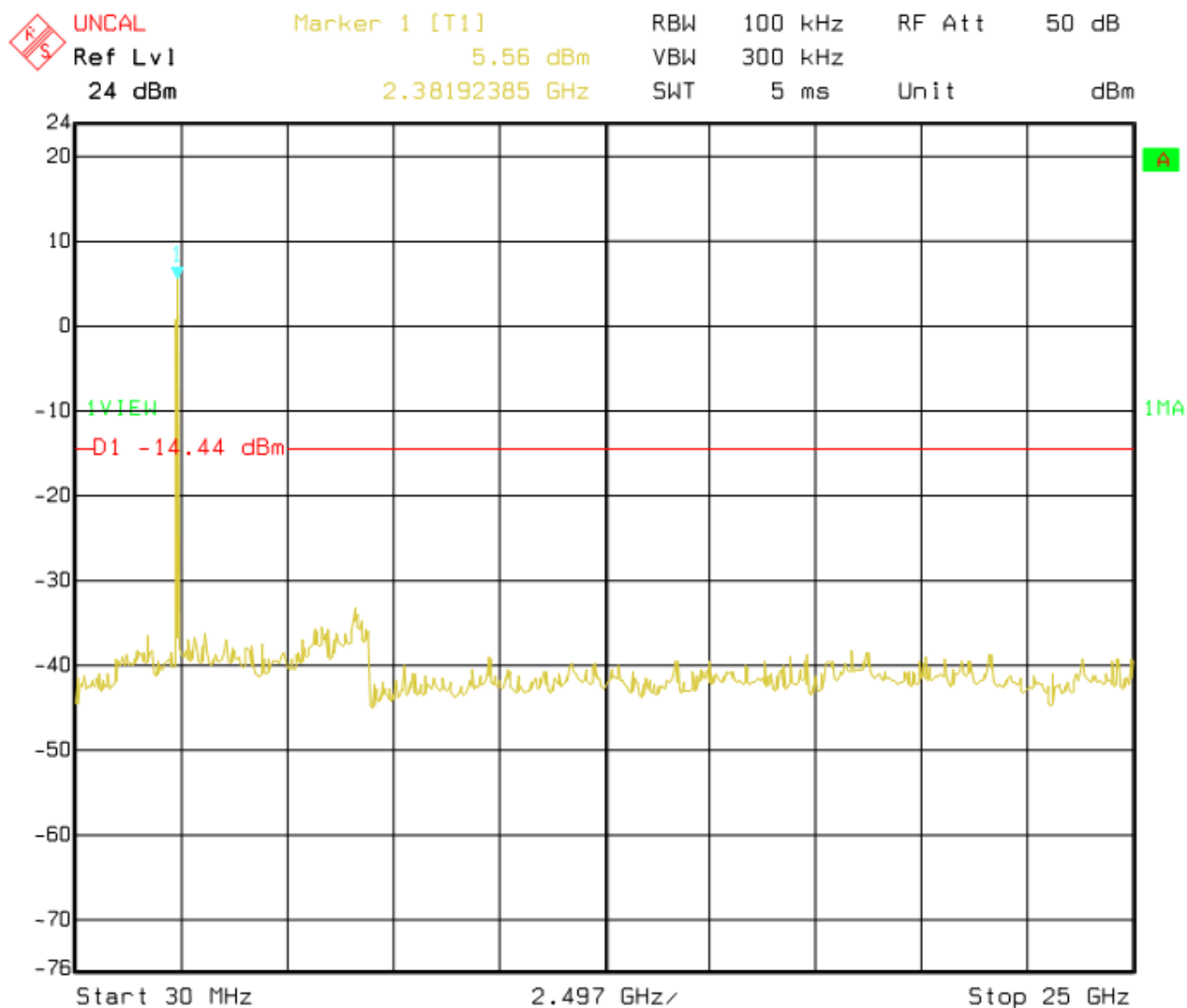
802.11n

Indicated		Detector (PK/AV)	Table Angle Degree	Antenna		Correction Factor			FCC Part 15.247		
Frequency (MHz)	Receiver Reading (dBμV/m)			Height (m)	Polar (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Cord. Amp. (dBμV/m)	Limit (dBμV/m)	Margin (dB)
Low Channel (2412MHz)											
7236	35.8	AV	355	1.3	V	41.3	8.90	34.1	51.9	54	2.10
4824	34.2	AV	120	1.3	H	41.3	8.90	34.1	50.3	54	3.70
7236	40.6	AV	100	1.4	H	36.1	6.38	34.2	48.88	54	5.12
4824	40.1	AV	90	1.5	V	36.1	6.38	34.2	48.38	54	5.62
4824	46.2	PK	165	1.2	V	41.3	8.90	34.1	62.3	74	11.70
7236	44.3	PK	45	1.4	H	41.3	8.90	34.1	60.4	74	13.60
7236	48.3	PK	210	1.5	V	36.1	6.38	34.2	56.58	74	17.42
4824	47.2	PK	200	1.2	H	36.1	6.38	34.2	55.48	74	18.52
Middle Channel (2437MHz)											
7311	34.7	AV	360	1.3	V	41.8	8.92	34.1	51.32	54	2.68
4874	34.1	AV	180	1.4	H	41.8	8.92	34.1	50.72	54	3.28
7311	52.9	PK	300	1.4	V	41.8	8.92	34.1	69.52	74	4.48
4874	38.4	AV	205	1.3	H	36.5	6.39	34.2	47.09	54	6.91
7311	48.5	PK	150	1.3	H	41.8	8.92	34.1	65.12	74	8.88
7311	36.1	AV	90	1.5	V	36.5	6.39	34.2	44.79	54	9.21
4874	53.4	PK	45	1.5	V	36.5	6.39	34.2	62.09	74	11.91
4874	50.6	PK	0	1.1	H	36.5	6.39	34.2	59.29	74	14.71
High Channel (2462MHz)											
7386	35.4	AV	210	1.5	H	42.0	8.90	34.3	52	54	2.00
4924	35.2	AV	0	1.3	V	42.0	8.90	34.3	51.8	54	2.20
4924	40.7	AV	115	1.4	H	36.4	6.39	34.2	49.29	54	4.71
7386	39.6	AV	45	1.4	V	36.4	6.39	34.2	48.19	54	5.81
4924	47.1	PK	180	1.4	V	42.0	8.90	34.3	63.7	74	10.30
7386	46.2	PK	95	1.4	H	42.0	8.90	34.3	62.8	74	11.20
7386	50.2	PK	360	1.5	V	36.4	6.39	34.2	58.79	74	15.21
4924	49.6	PK	265	1.1	H	36.4	6.39	34.2	58.19	74	15.81

Antenna port conducted spurious emissions

802.11b mode:

Low channel



Middle channel



UNCAL

Marker 1 [T1]

RBW 100 kHz RF Att 50 dB

Ref Lvl

4.65 dBm

VBW 300 kHz

24 dBm

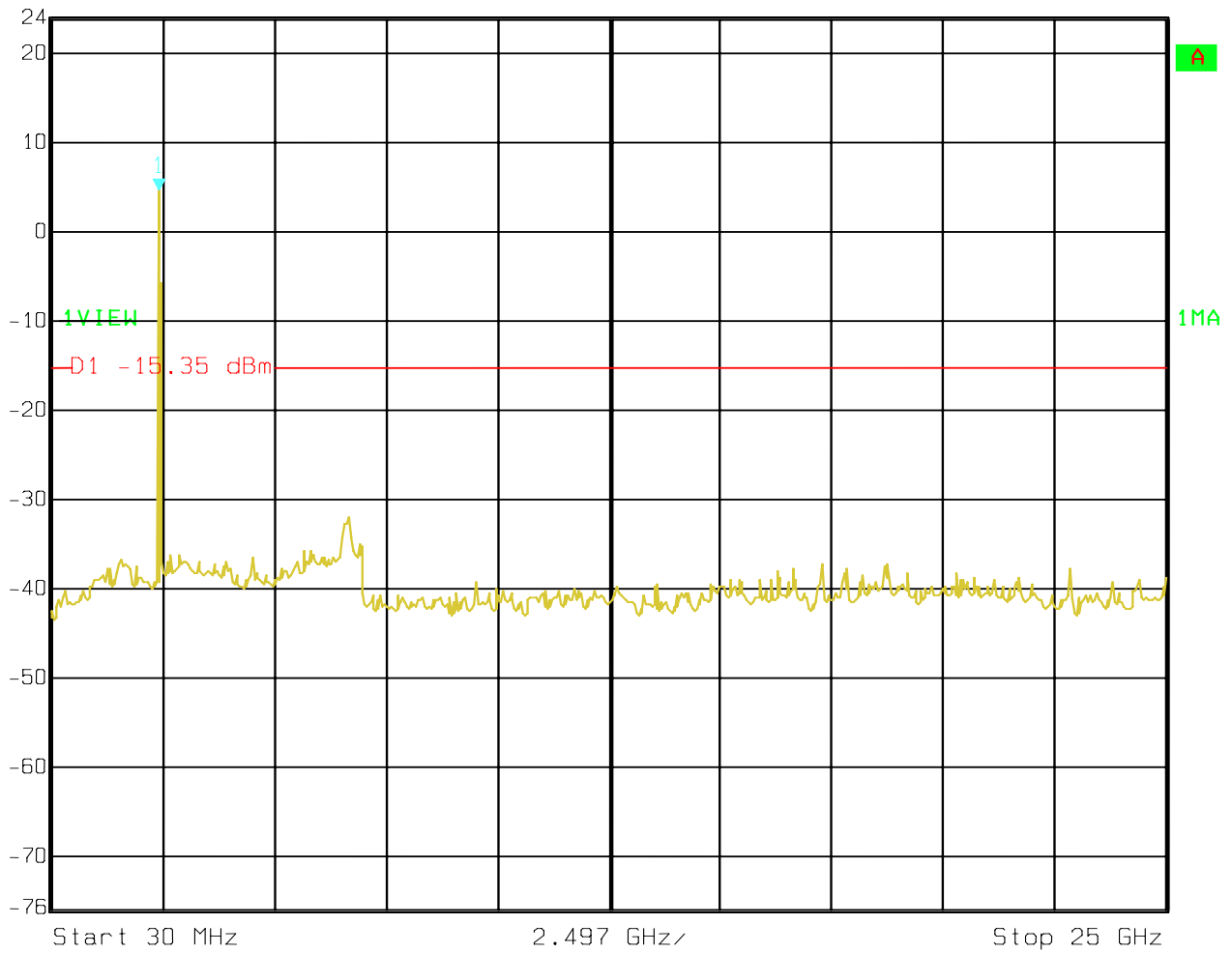
2.43192385 GHz

SWT

5 ms

Unit

dBm



High channel



UNCAL

Marker 1 [T1]

RBW

100 kHz

RF Att

50 dB

Ref Lvl

4.54 dBm

VBW

300 kHz

24 dBm

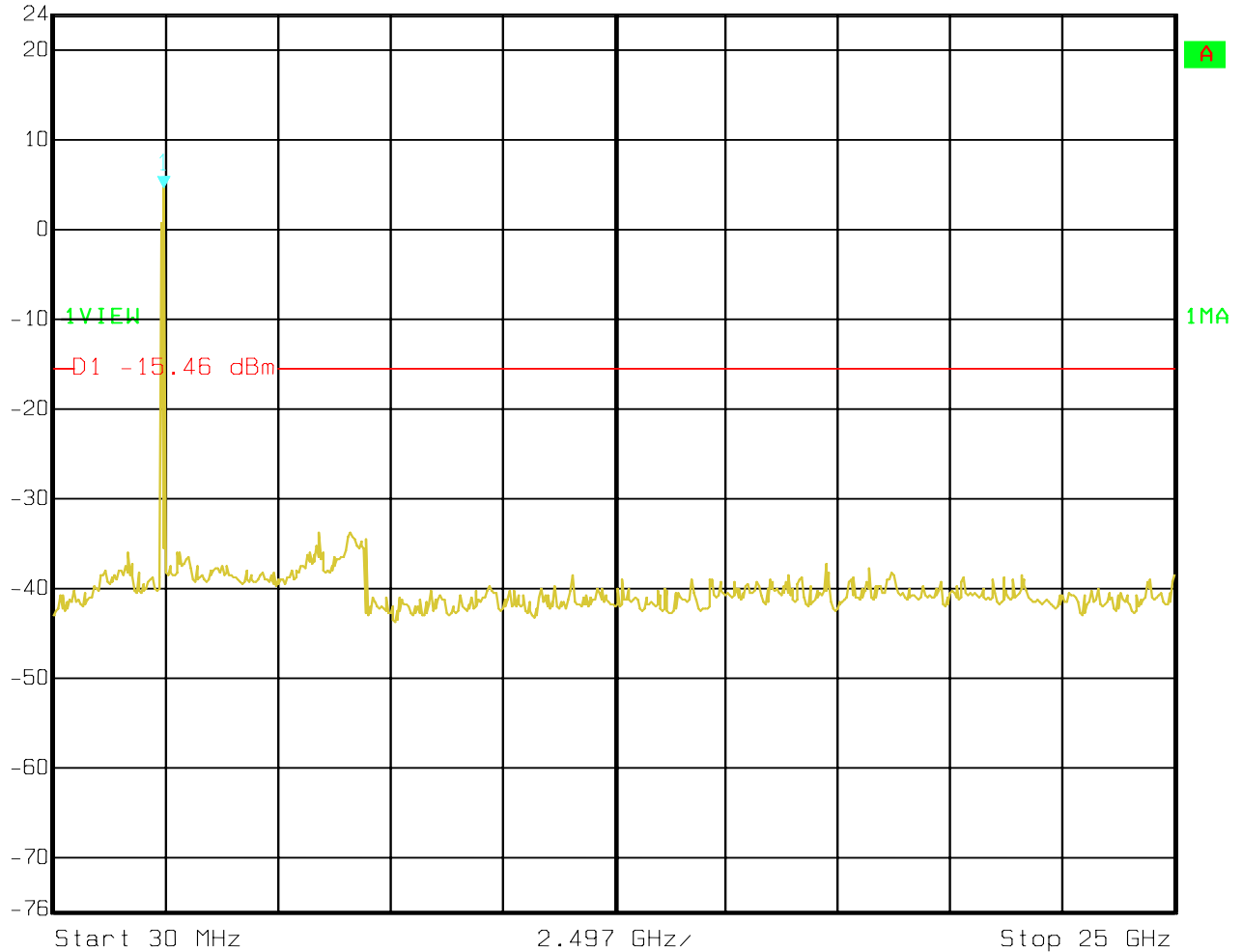
2.48196393 GHz

SWT

5 ms

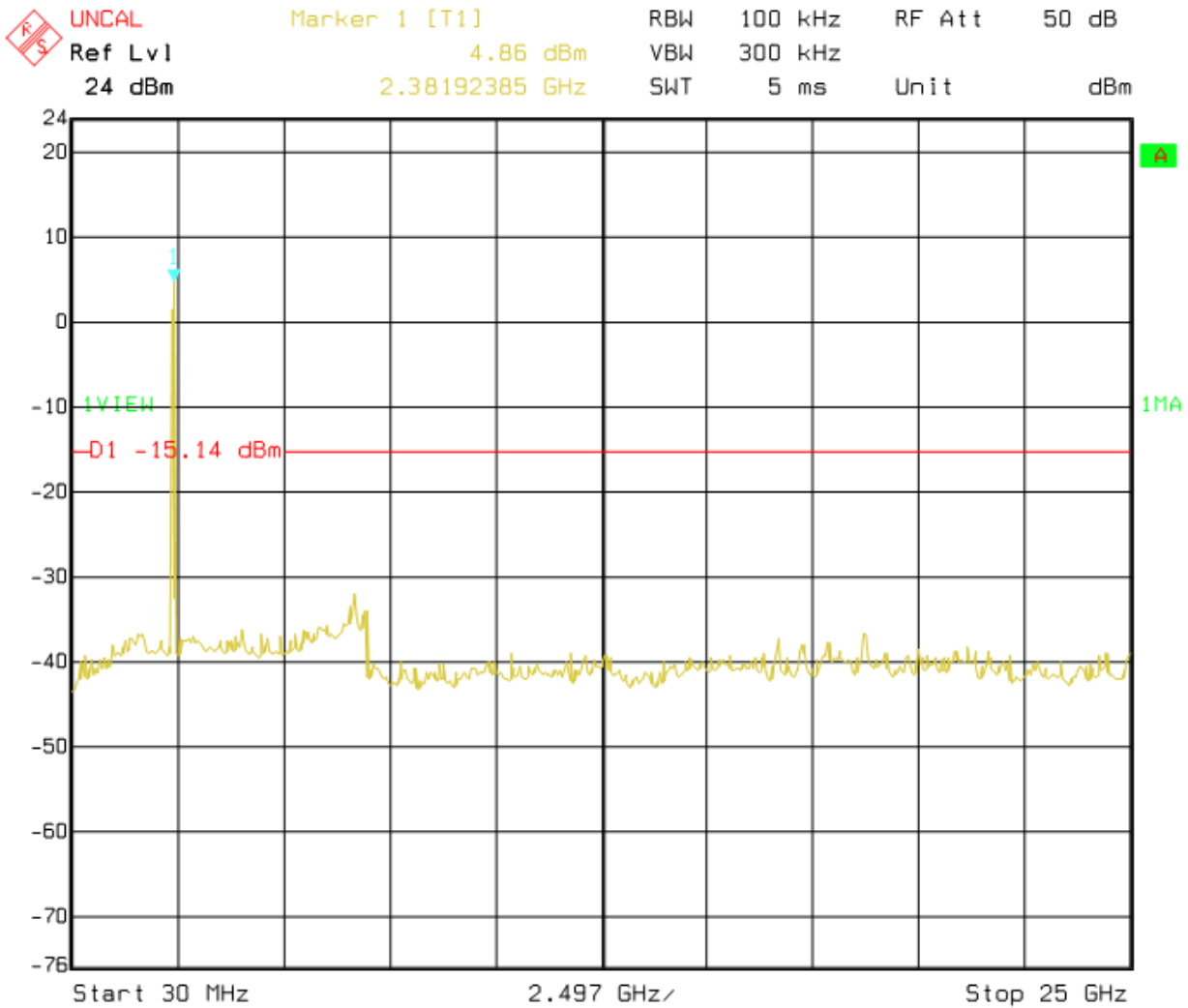
Unit

dBm



802.11g mode:

Low channel





Report reference No.: WSCT12020061E
Issued: February 17, 2012
Revised: None

Middle channel



UNCAL

Ref Lvl

24 dBm

Marker 1 [T1]

5.19 dBm

2.43192385 GHz

RBW

100 kHz

VBW

300 kHz

SWT

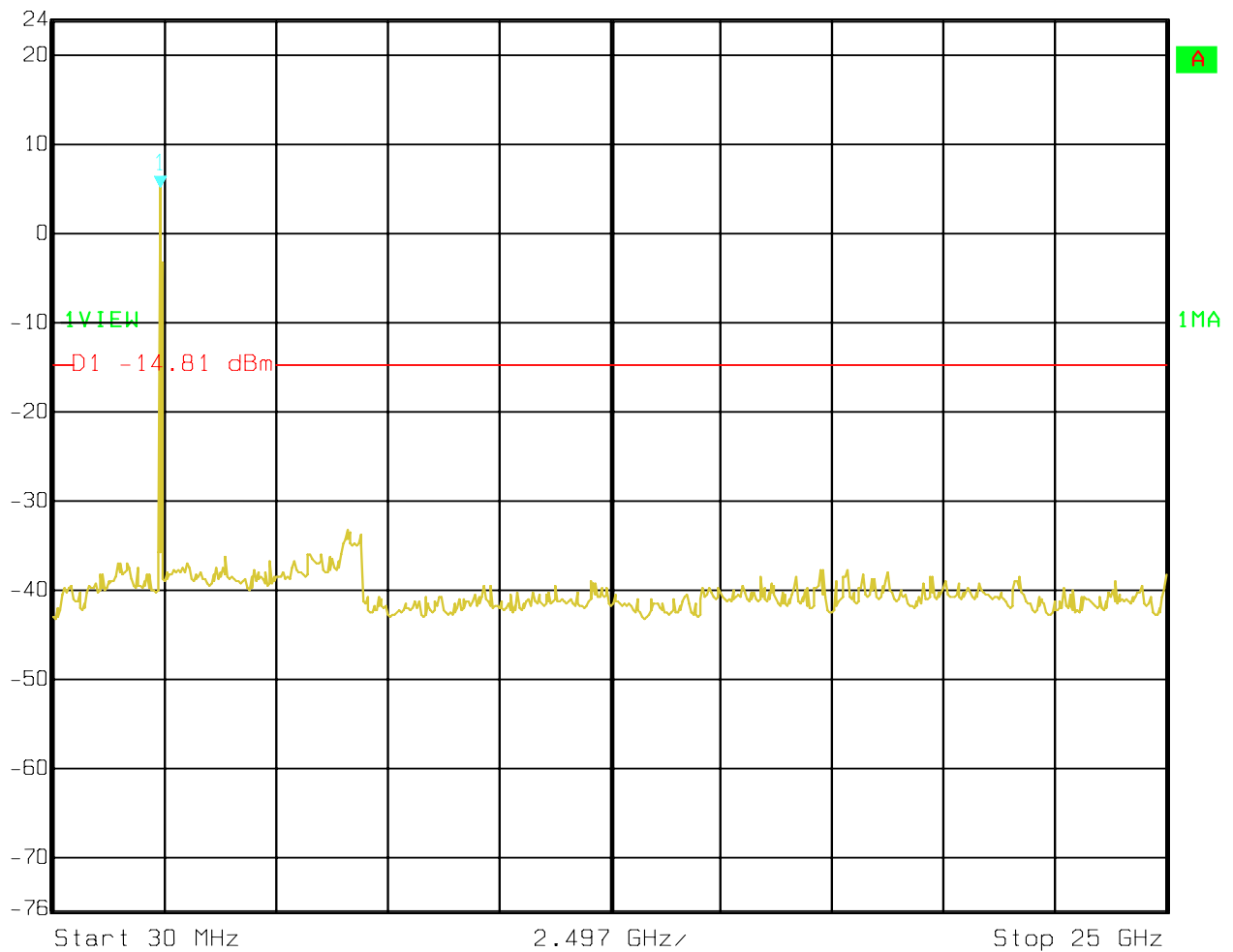
5 ms

RF Att

50 dB

Unit

dBm





Report reference No.: WSCT12020061E

Issued: February 17, 2012

Revised: None

High channel



UNCAL

Marker 1 [T1]

RBW 100 kHz

RF Att

50 dB

Ref Lvl

4.94 dBm

VBW 300 kHz

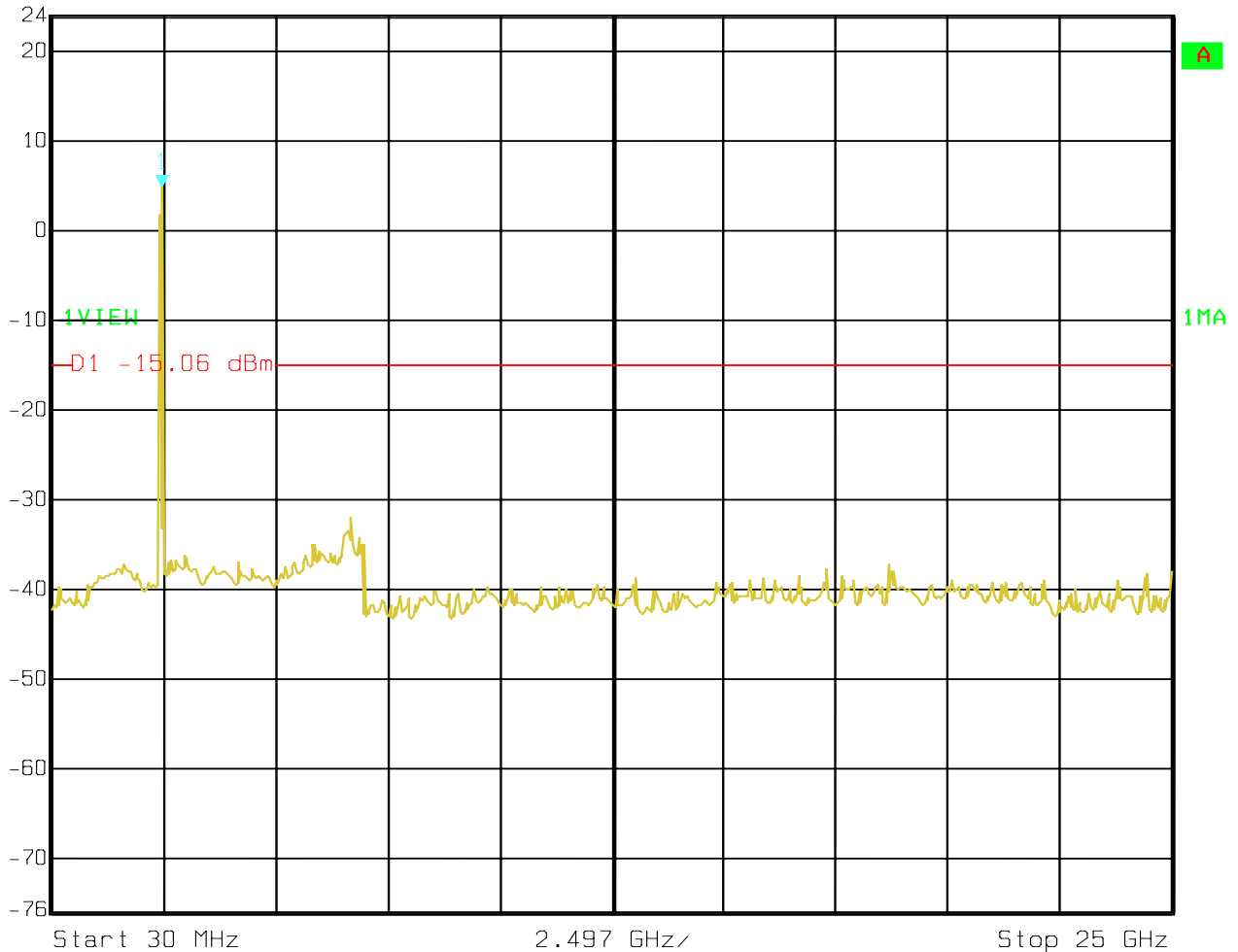
24 dBm

2.48196393 GHz

SWT 5 ms

Unit

dBm

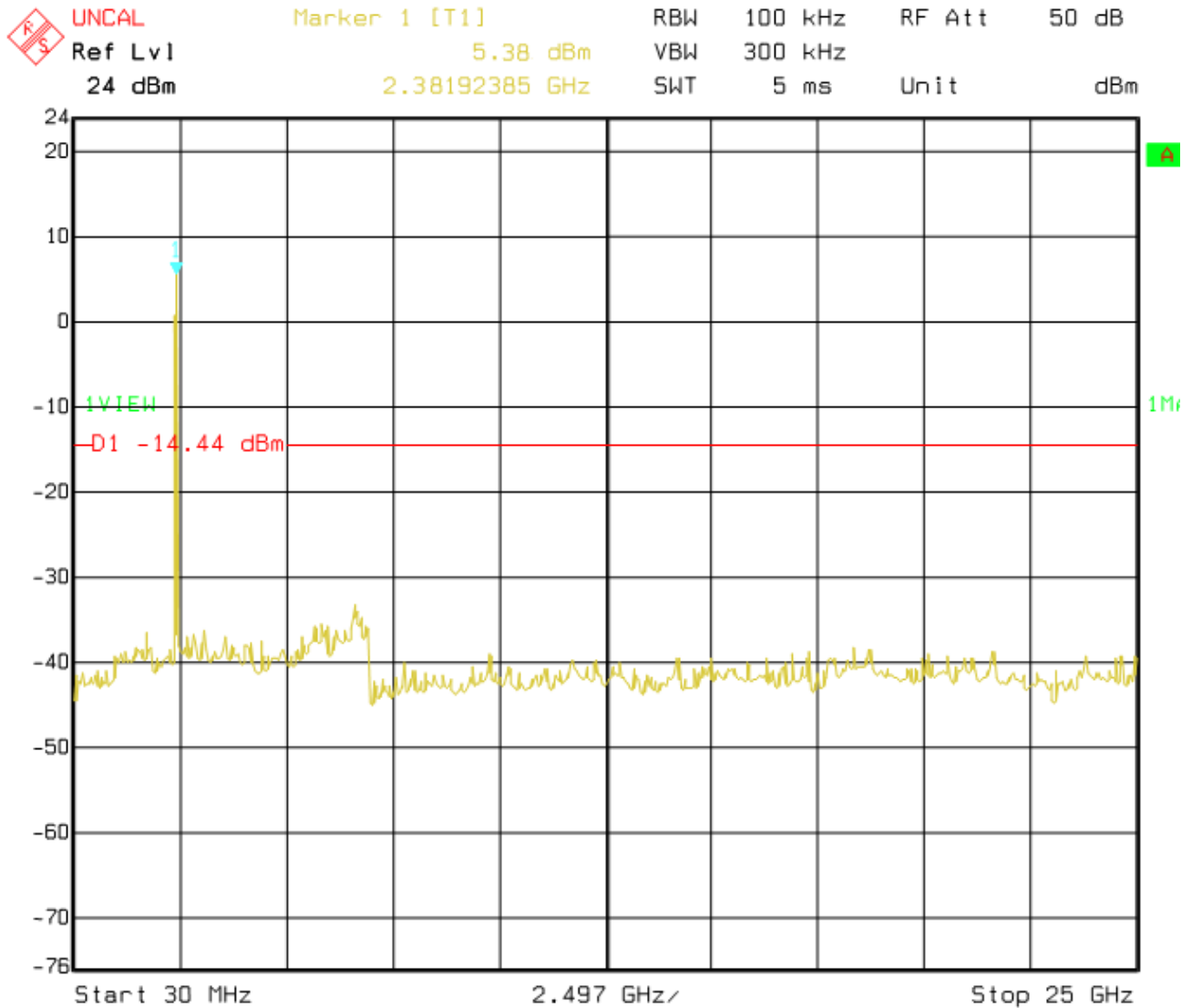




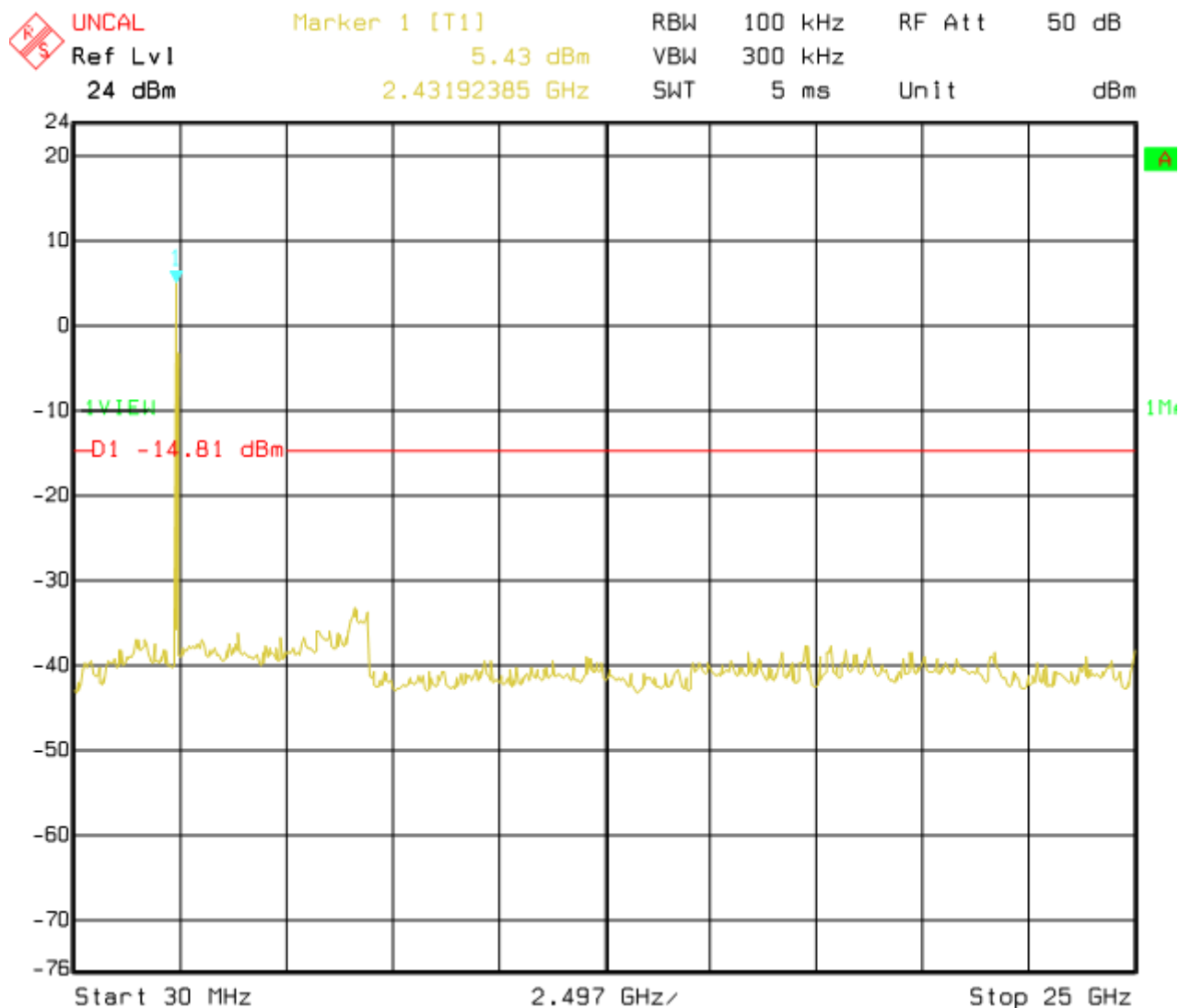
Report reference No.: WSCT12020061E
Issued: February 17, 2012
Revised: None

802.11n mode:

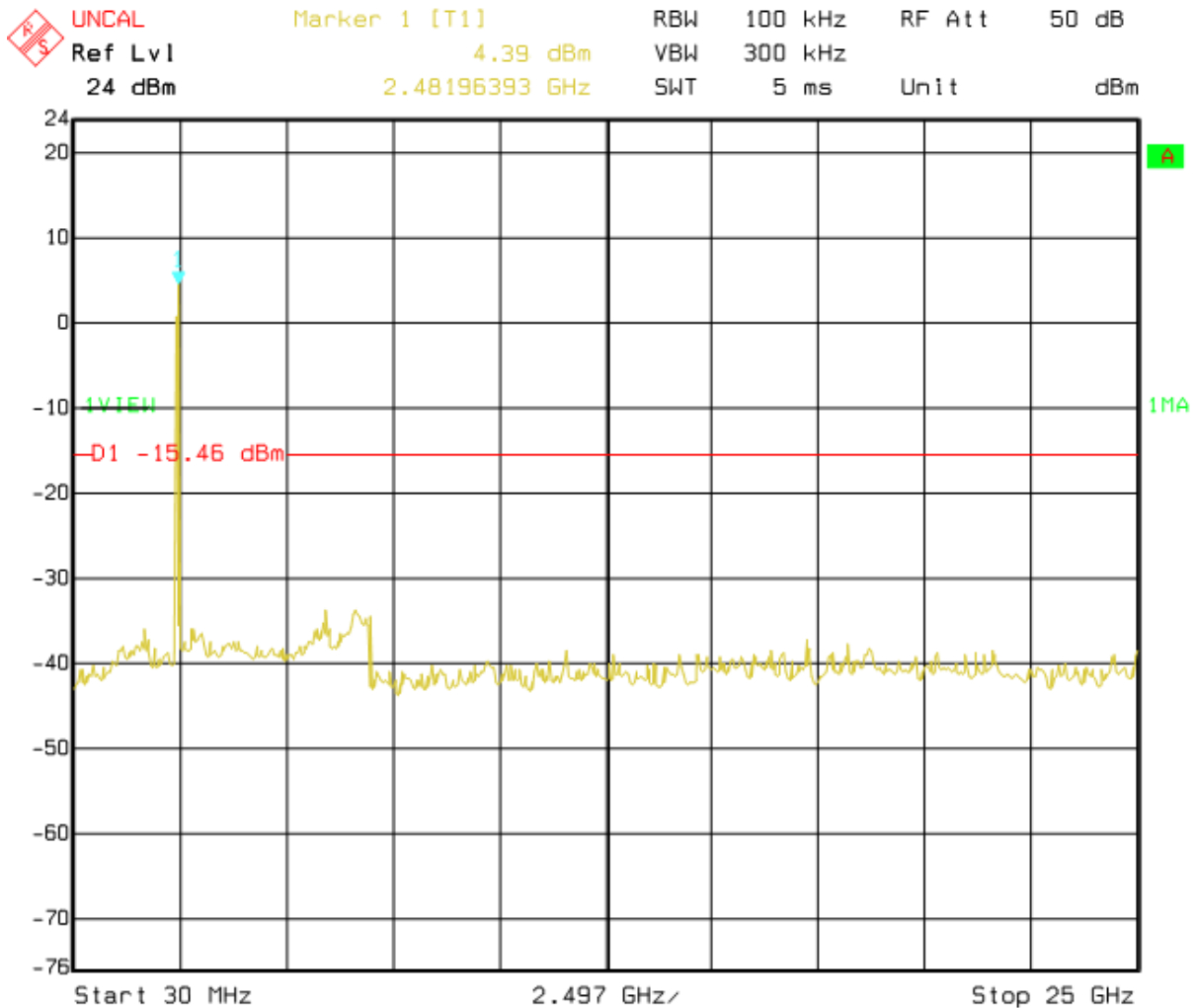
Low channel



Middle channel



High channel



§15.247(a) (2) – 6dB BANDWIDTH TESTING

Test Equipment

Please refer to Section 4 this report.

Test Procedure

1. Set EUT in the transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as RBW=100KHz, VBW $\geq$ RBW, Span=40MHz, Sweep=auto.
4. Mark the peak frequency and -6dB(upper and lower)frequency.
5. Repeat until all the rest channels are investigated.

Environmental Conditions

Temperature:	26 °C
Relative Humidity:	55%
ATM Pressure:	100.0kPa

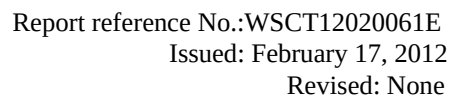
Applicable Standard

Systems using digital modulation techniques may operate in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

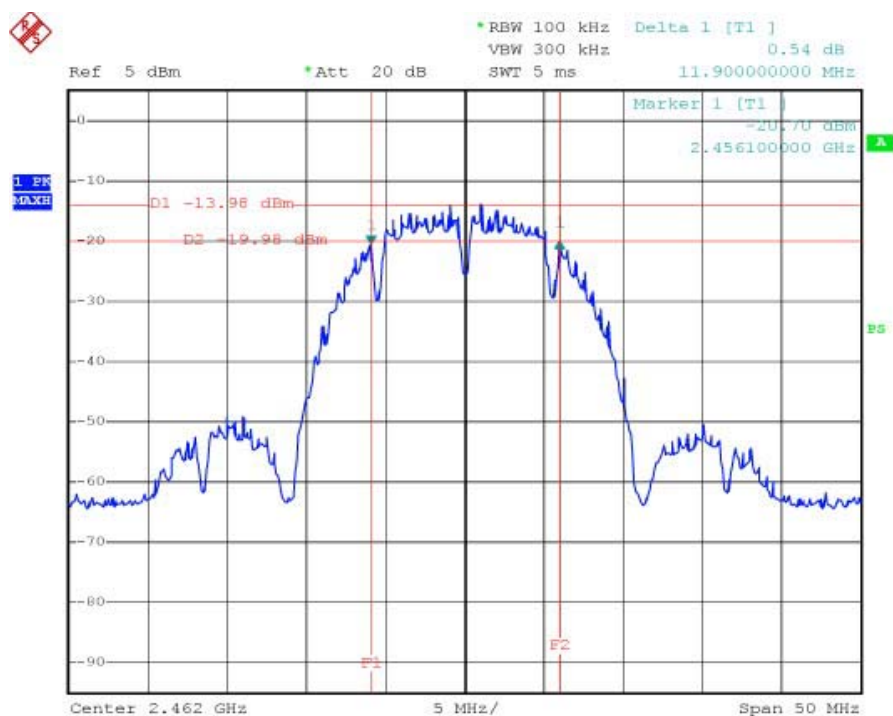
Test Result: Pass.

Please refer to the following tables

Channel Frequency (MHz)	Data Rate (Mbps)	6dB Bandwidth (kHz)	Limit (kHz)	Ref. Plot
802.11b Mode				
2412	1	11200	> 500	PLOT 1
2437	1	12000	> 500	PLOT 2
2462	1	11900	> 500	PLOT 3
802.11g Mode				
2412	6	16400	> 500	PLOT 4
2437	6	16500	> 500	PLOT 5
2462	6	16400	> 500	PLOT 6
802.11n Mode				
2412	6	16400	> 500	PLOT 7
2437	6	16500	> 500	PLOT 8
2462	6	16400	> 500	PLOT 9

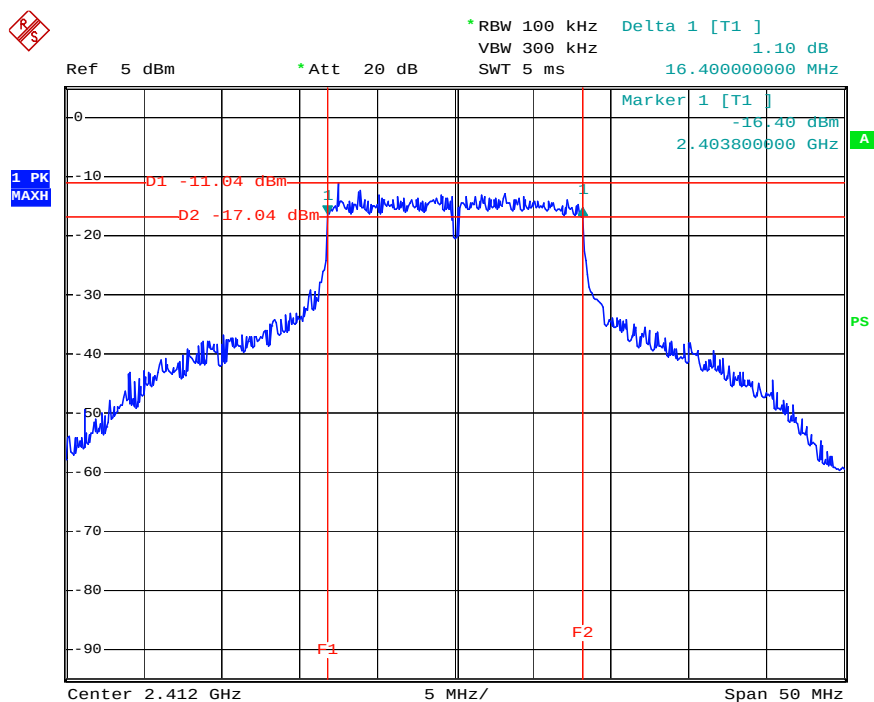


High Channel

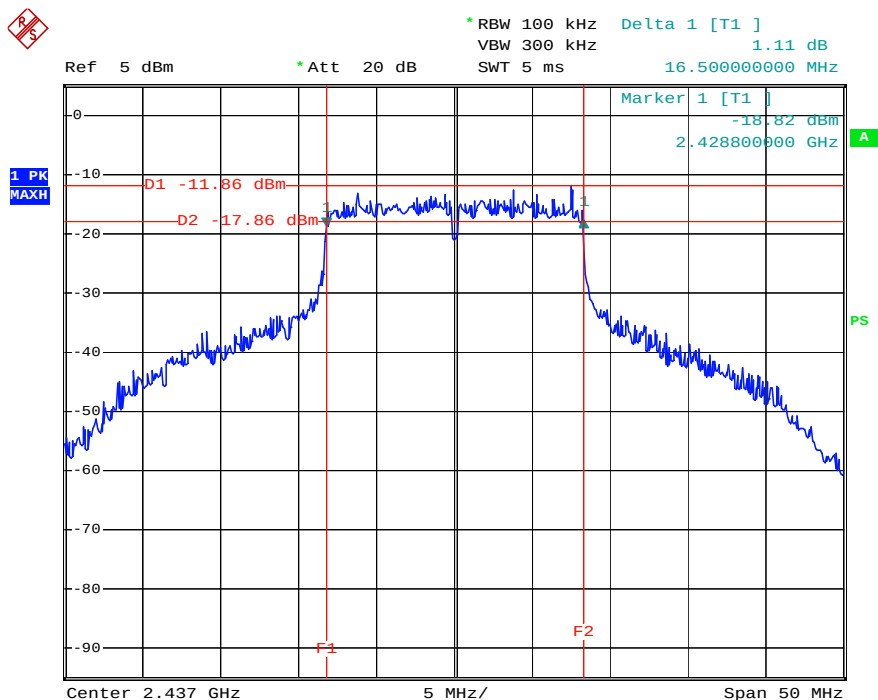


802.11g Mode:

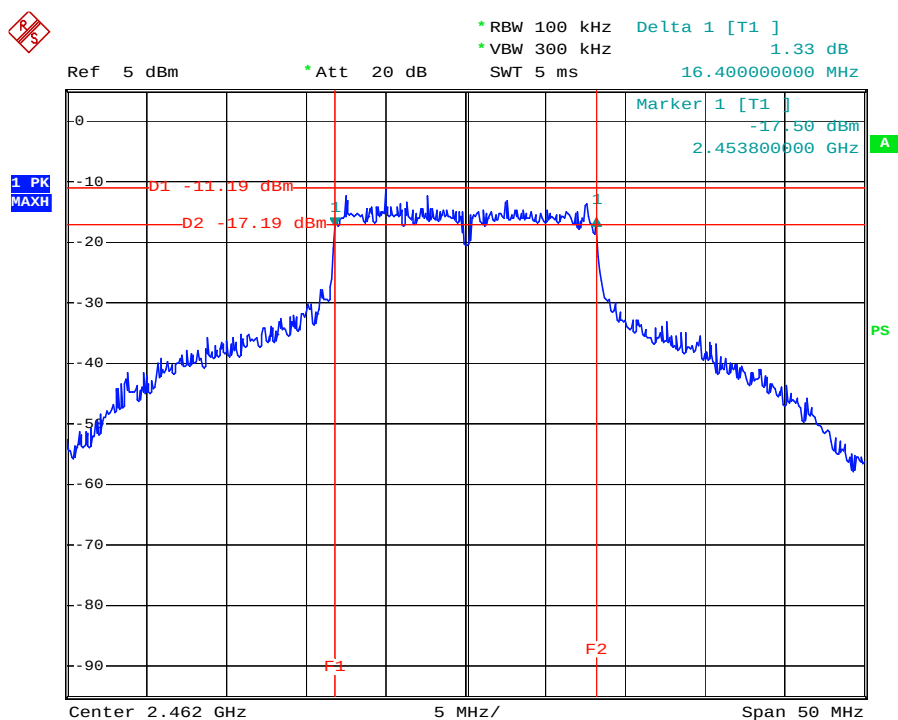
Low Channel



Middle Channel



High Channel

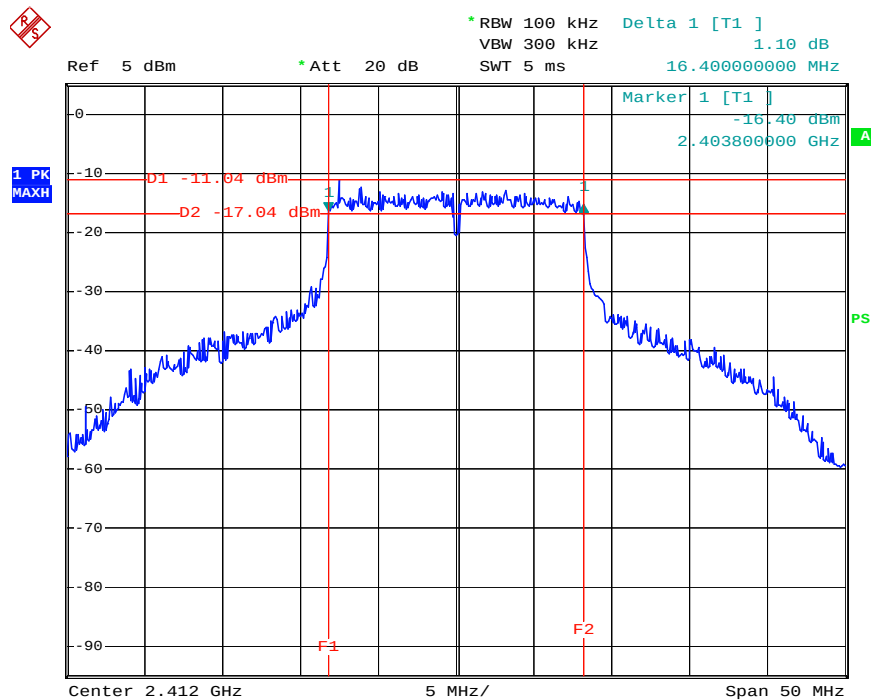




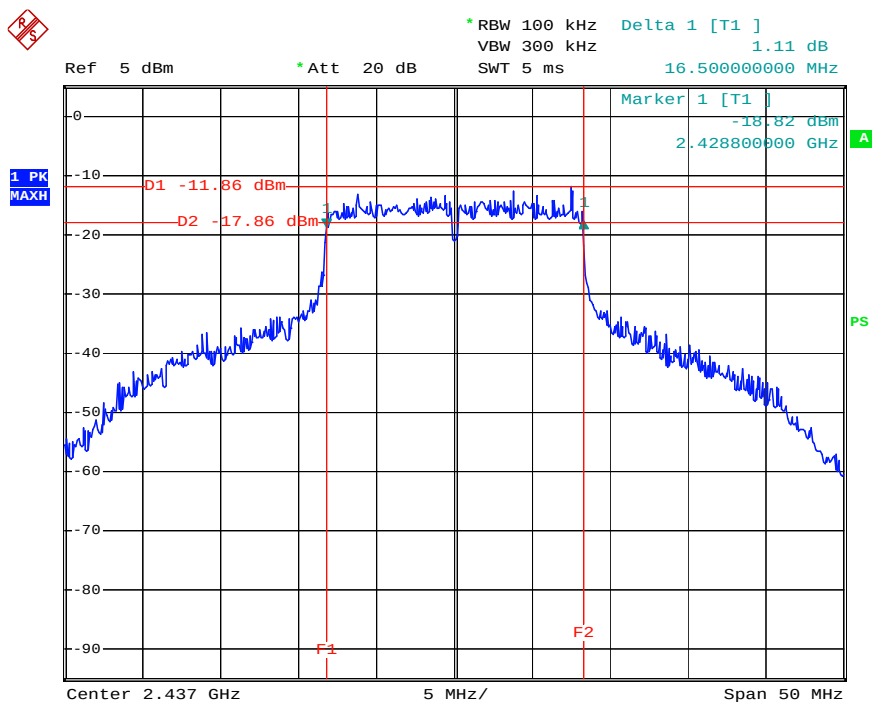
Report reference No.: WSCT12020061E
Issued: February 17, 2012
Revised: None

802.11n Mode:

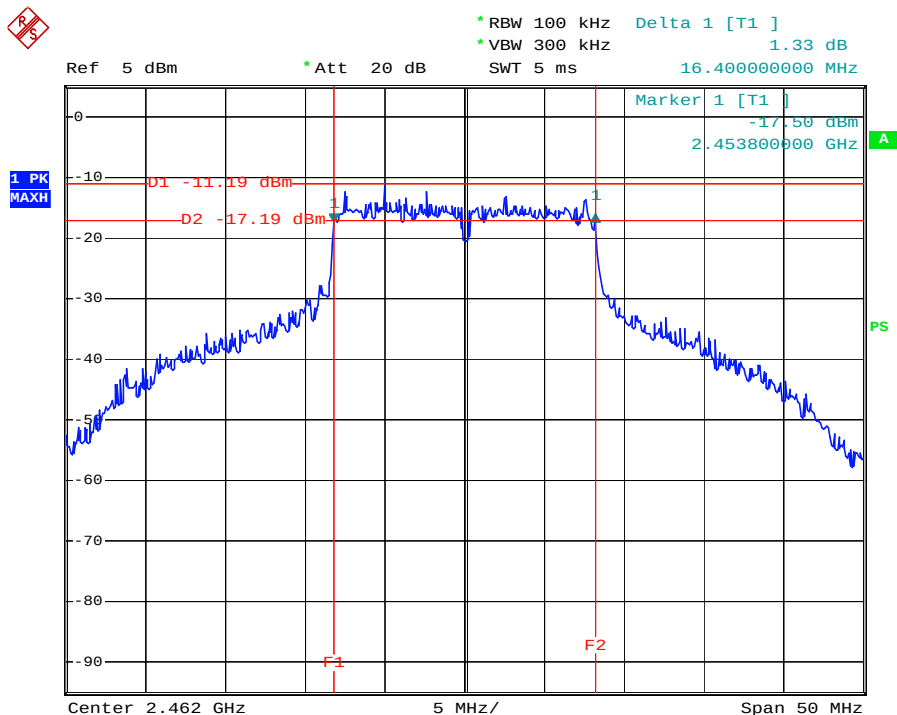
Low Channel



Middle Channel



High Channel



§15.247(b) (3) - MAXIMUM PEAK OUTPUT POWER

Test Equipment

Please refer to Section 4 this report.

Test Procedure

1. Set span to encompass the entire emission bandwidth (EBW) of the signal.
2. Set RBW = 1 MHz.
3. Set VBW $\geq$ 3 MHz.
4. Use sample detector mode if bin width (i.e., span/number of points in spectrum display) $<$ 0.5 RBW. Otherwise use peak detector mode.
5. Use a video trigger with the trigger level set to enable triggering only on full power pulses. Transmitter must operate at full control power for entire sweep of every sweep. If the device transmits continuously, with no off intervals or reduced power intervals, the trigger may be set to “free run”.
6. Trace average 100 traces in power averaging mode.
7. Compute power by integrating the spectrum across the 26 dB EBW of the signal. The integration can be performed using the spectrum analyzer’s band power measurement function with band limits set equal to the EBW band edges or by summing power levels in each 1 MHz band in linear power terms. The 1 MHz band power levels to be summed can be obtained by averaging, in linear power terms, power levels in each frequency bin across the 1 MHz.

Environmental Conditions

Temperature:	26 °C
Relative Humidity:	55%
ATM Pressure:	100.0kPa

Applicable Standard

According to §15.247(b) (3), for systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.



Report reference No.:WSCT12020061E

Issued: February 17, 2012

Revised: None

Test Result

Pass

802.11b Mode:

Channel	Frequency (MHz)	Data Rate (Mbps)	Conducted Power (dBm)	Limit (dBm)
Low	2412	1	14.12	30
Mid	2437	1	13.93	30
High	2462	1	13.56	30

802.11g Mode:

Channel	Frequency (MHz)	Data Rate (Mbps)	Conducted Power (dBm)	Limit (dBm)
Low	2412	6	14.01	30
Mid	2437	6	13.82	30
High	2462	6	13.47	30

802.11n Mode:

Channel	Channel Frequency (MHz)	Data Rate (Mbps)	Power Output (dBm)	Limit (dBm)
Low	2412	6	13.31	30
Mid	2437	6	13.10	30
High	2462	6	13.44	30



§15.247(d) – 100 kHz BANDWIDTH OF FREQUENCY BAND EDGE

Test Equipment

Please refer to Section 4 this report.

Test Procedure

The out of band emission tests were performed in the 3-meter chamber test site, using the setup accordance with the ANSI C63.4-2003. The specification used was the FCC Part Subpart C limits.

Environmental Conditions

Temperature:	26 °C
Relative Humidity:	55%
ATM Pressure:	100.0kPa

Applicable Standard

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

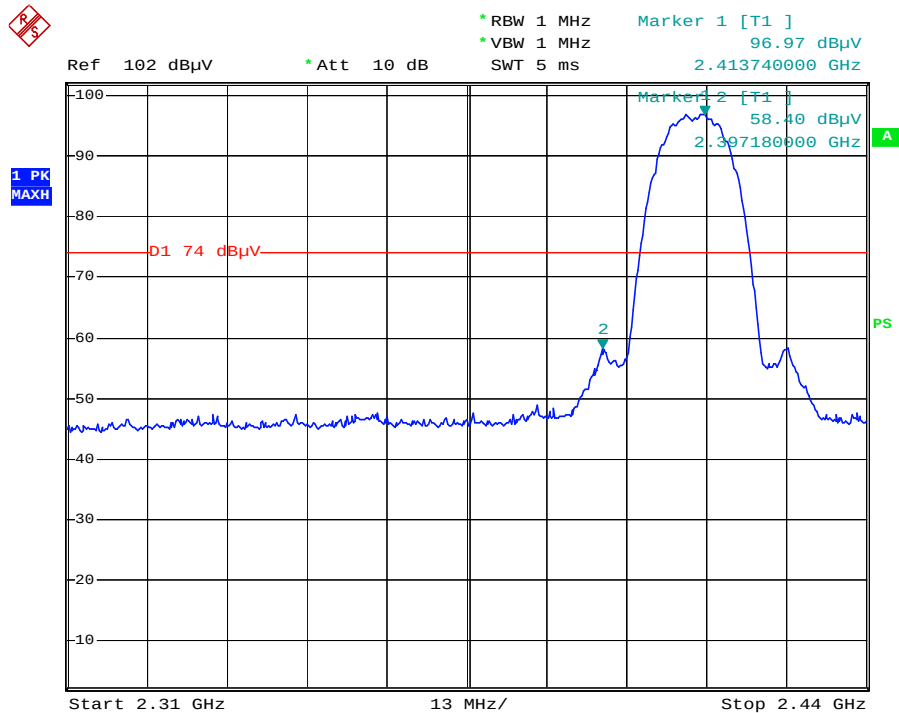
Test Result

PASS

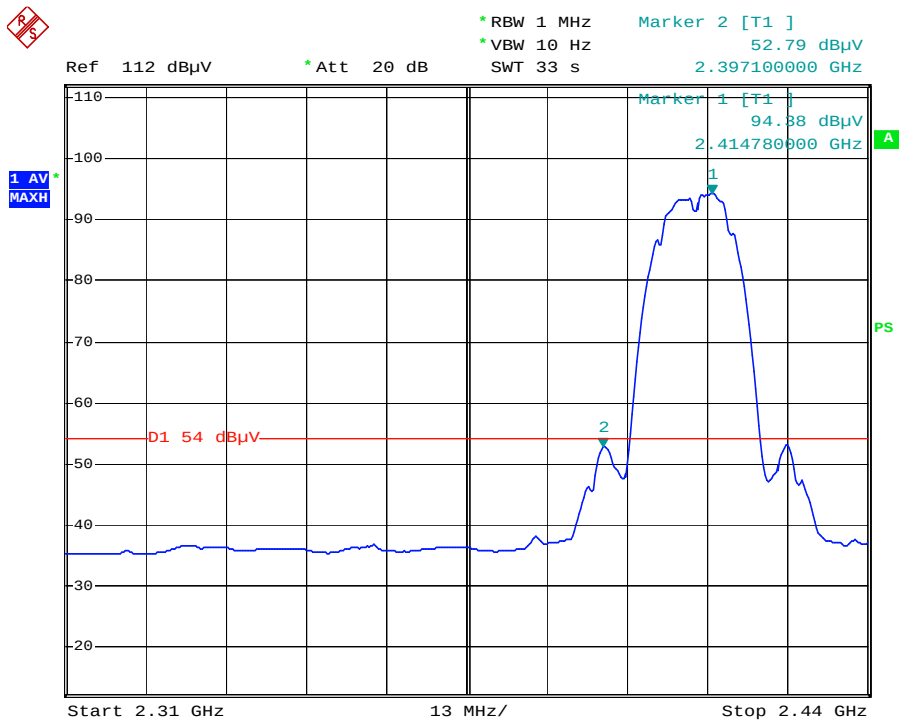
802.11b Mode:

Lowest channel

PK detector:

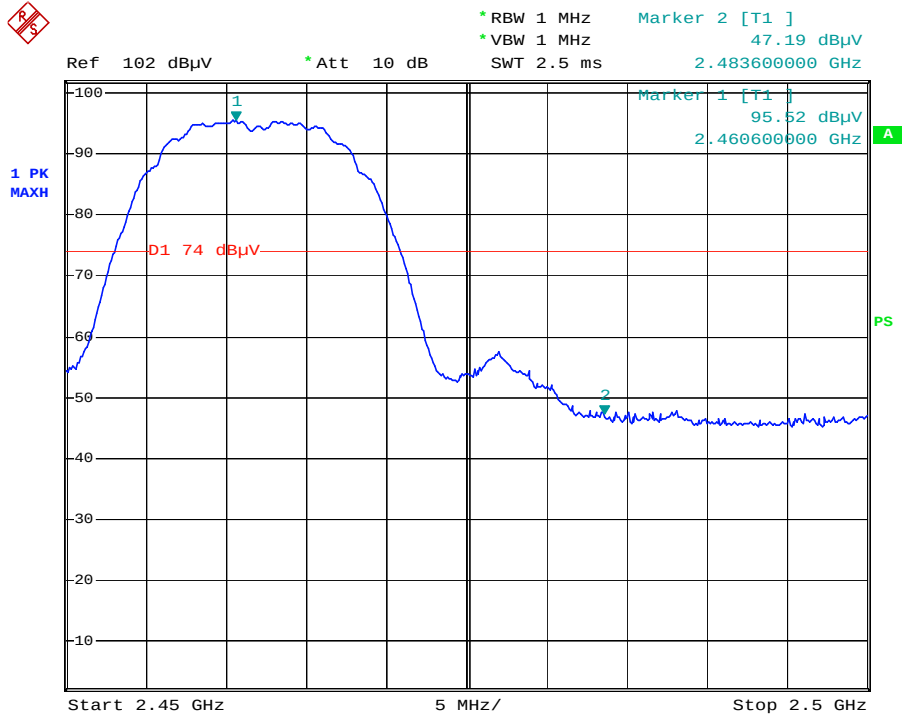


AV detector:

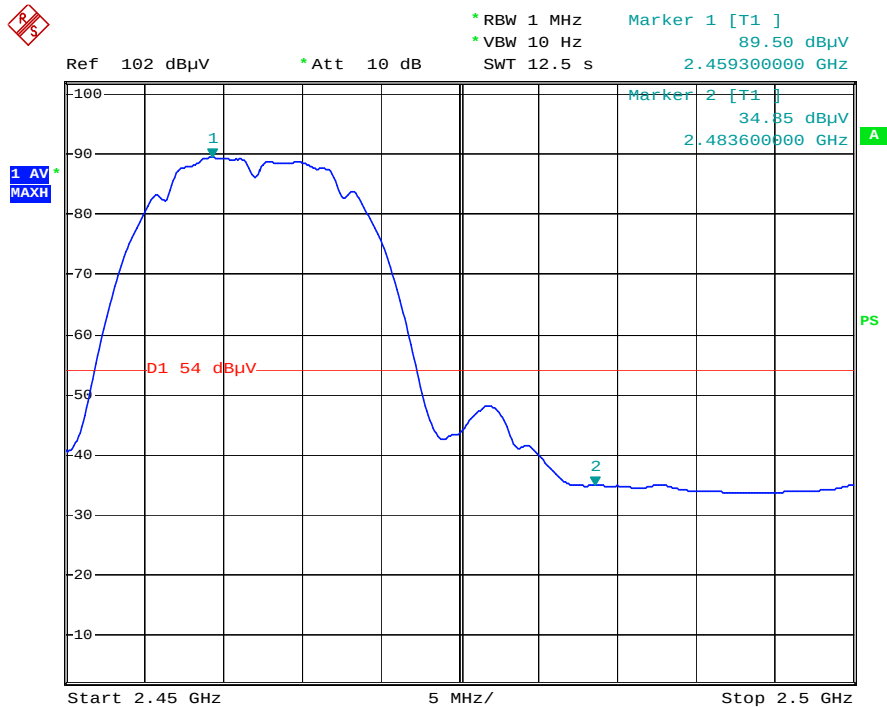


Highest Channel

PK detector:



AV detector:





Report reference No.: WSCT12020061E

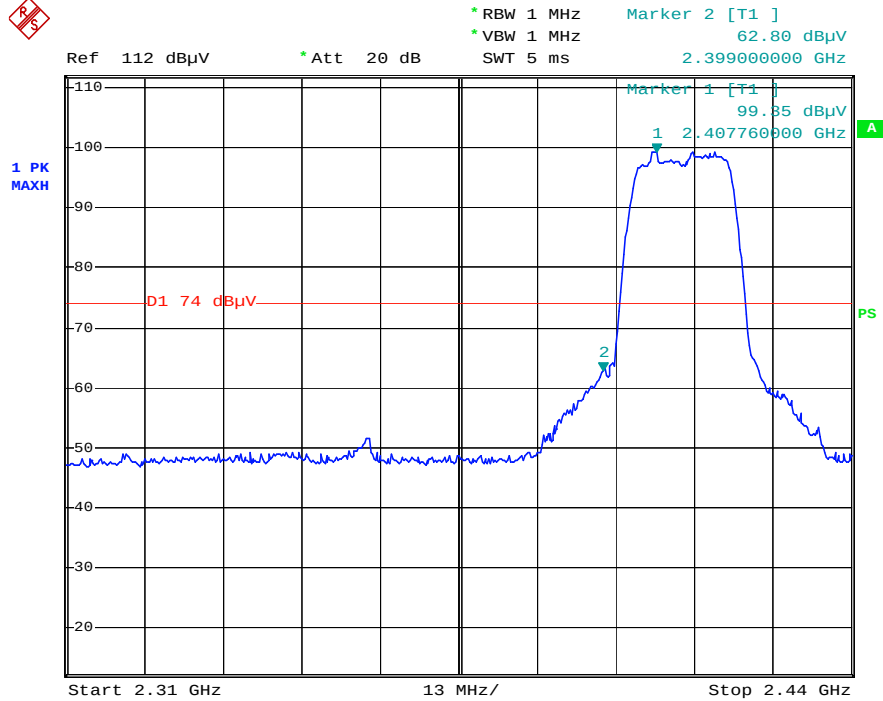
Issued: February 17, 2012

Revised: None

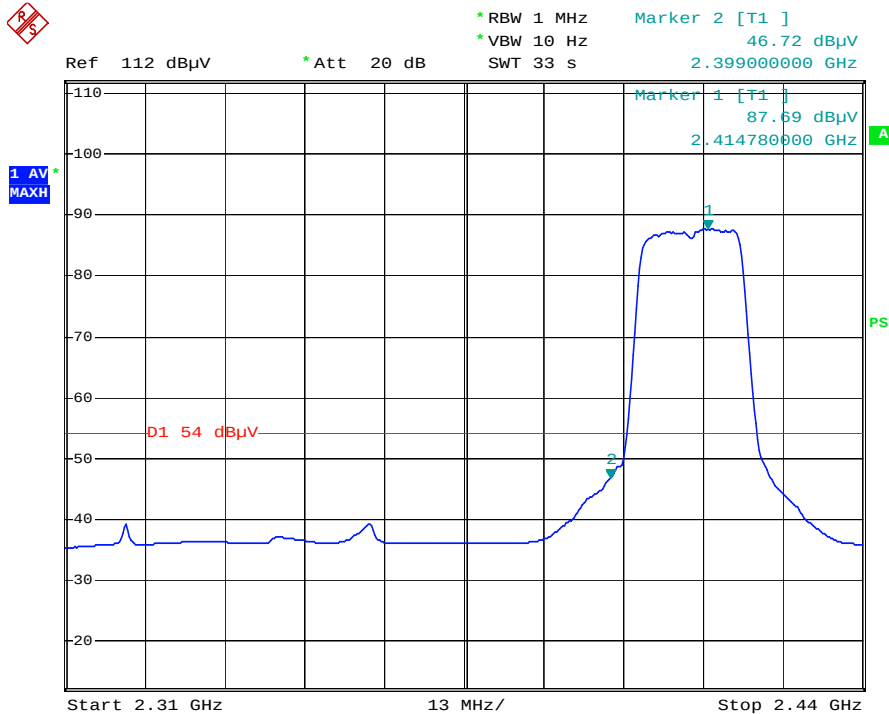
802.11g Mode:

Lowest Channel

PK detector:

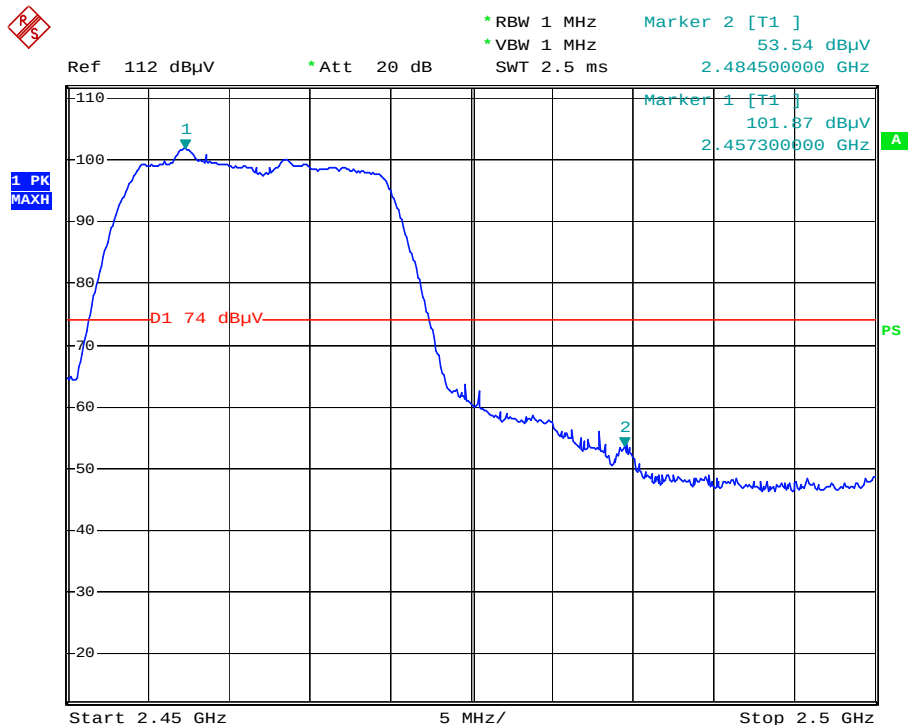


AV detector:

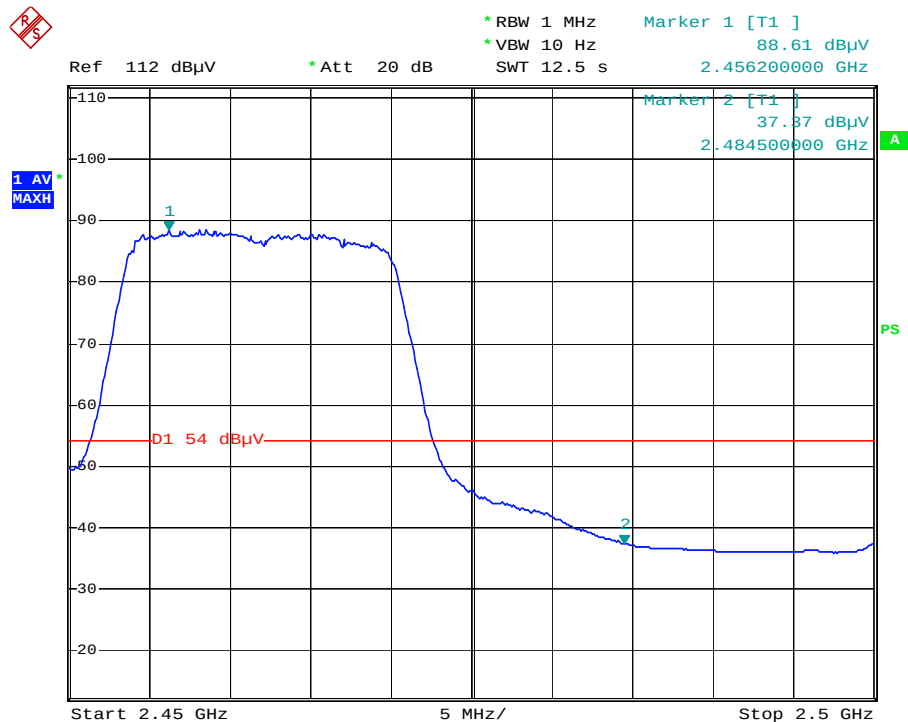


Highest Channel

PK detector:

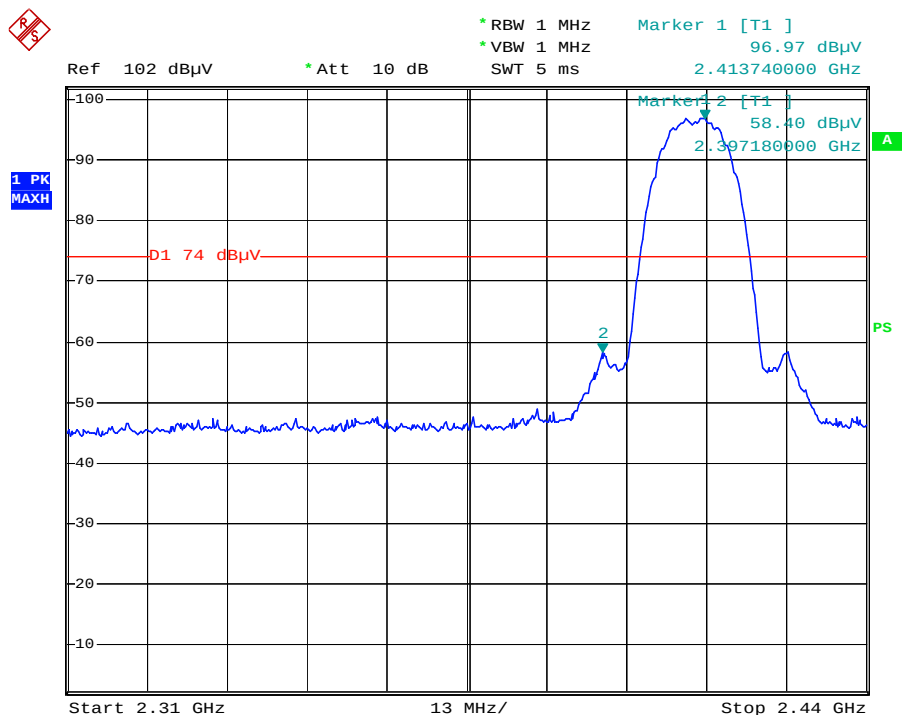


AV detector:

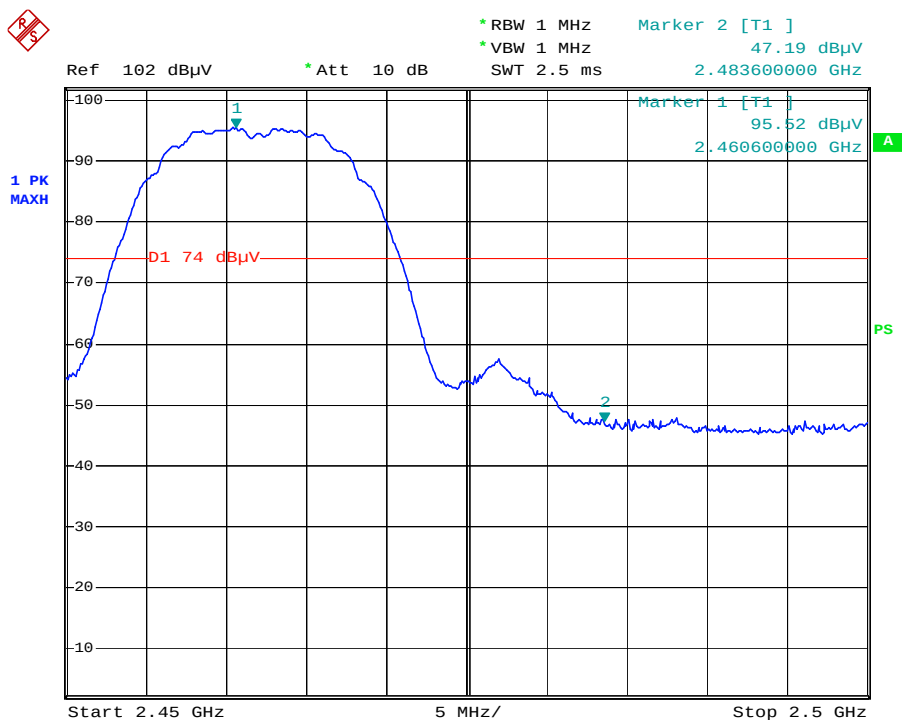


802.11n Mode:

Lowest channel



Highest Channel



§15.247(e) - POWER SPECTRAL DENSITY

Test Equipment

Please refer to Section 4 this report.

Test Procedure

- 1,Set EUT in the transmitting mode.
- 2,Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
- 3,Set the spectrum analyzer as RBW=3KHz,VBW=10KHz,Span=1.5MHz,Sweep=500S.
- 4,Record the max.reading
- 5, Repeat the above procedure until the measurements for all frequencies are completed.

Environmental Conditions

Temperature:	25 °C
Relative Humidity:	55%
ATM Pressure:	100.0kPa

Applicable Standard

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.



Report reference No.: WSCT12020061E
Issued: February 17, 2012
Revised: None

Test Result

PASS

Channel Frequency (MHz)	Data Rate (Mbps)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	RESULT
802.11b Mode				
2412	1	-2.33	8	Compliant
2437	1	-2.40	8	Compliant
2462	1	-3.40	8	Compliant
802.11g Mode				
2412	6	-3.95	8	Compliant
2437	6	-4.07	8	Compliant
2462	6	-3.60	8	Compliant
802.11n Mode				
2412	6	-2.41	8	Compliant
2437	6	-4.07	8	Compliant
2462	6	-3.48	8	Compliant



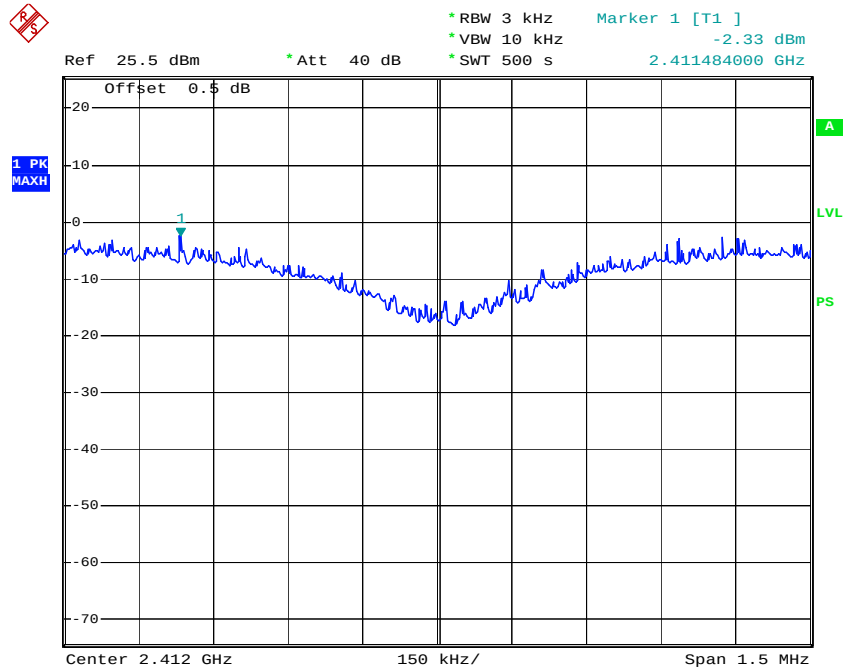
Report reference No.: WSCT12020061E

Issued: February 17, 2012

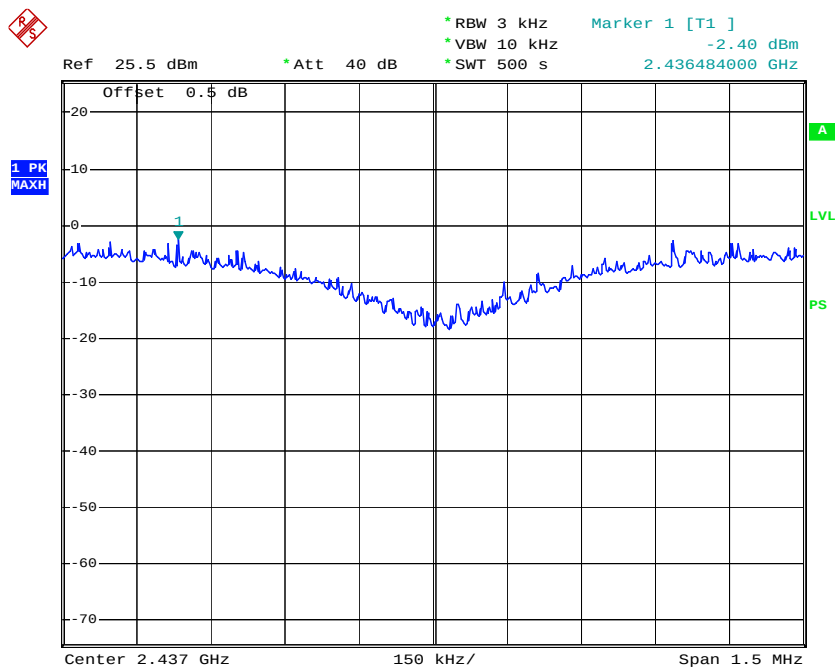
Revised: None

802.11b Mode:

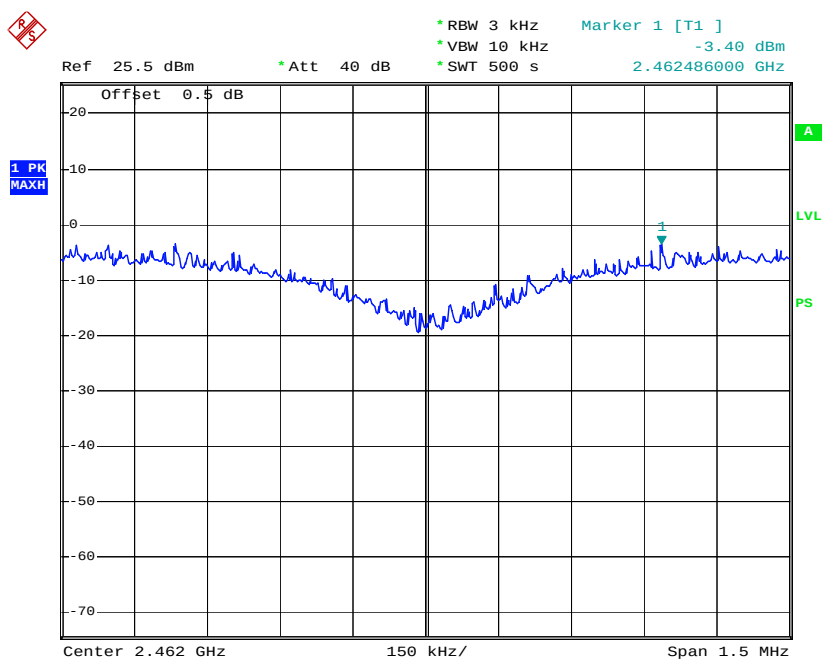
Low Channel



Middle Channel

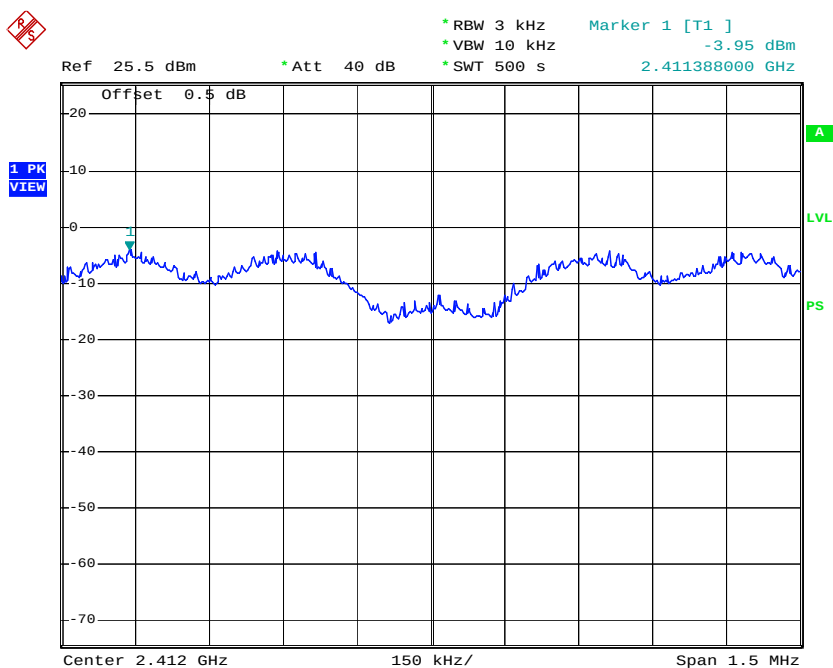


High Channel

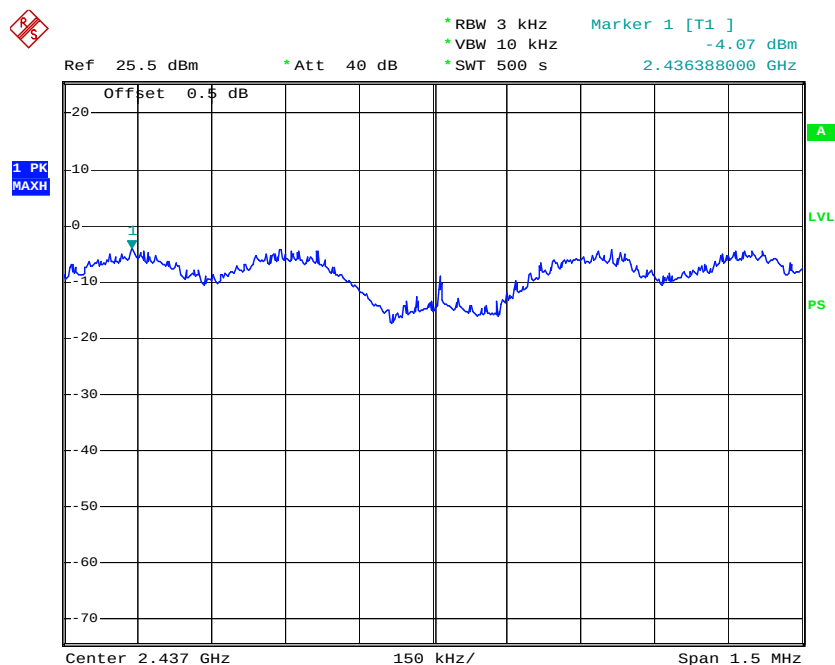


802.11g Mode:

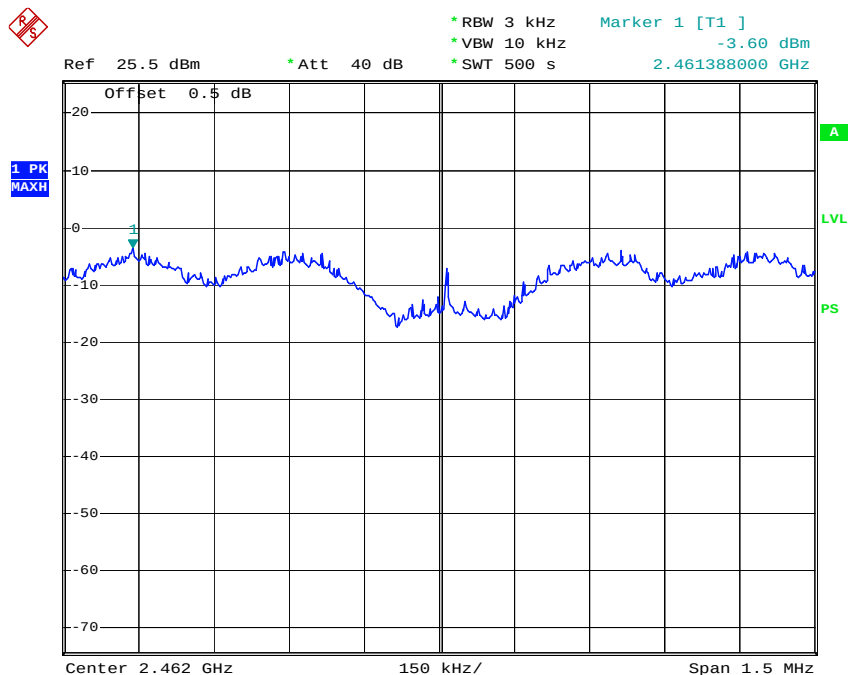
Low Channel



Middle Channel

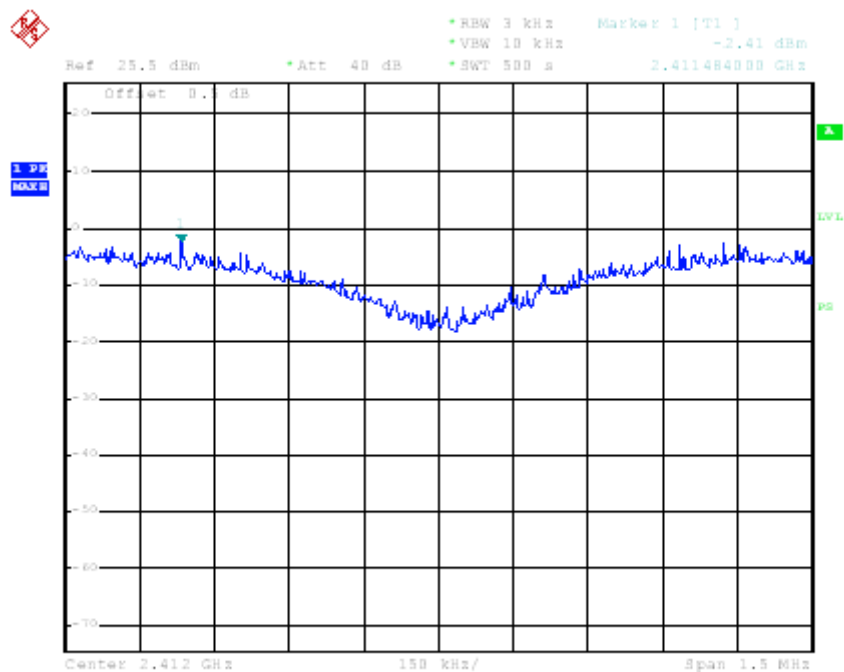


High Channel

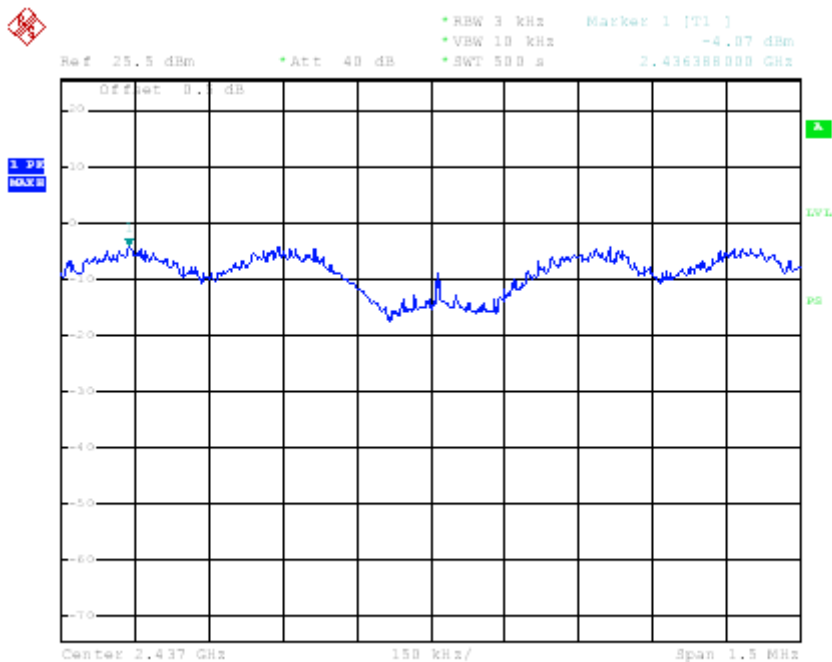


802.11n Mode:

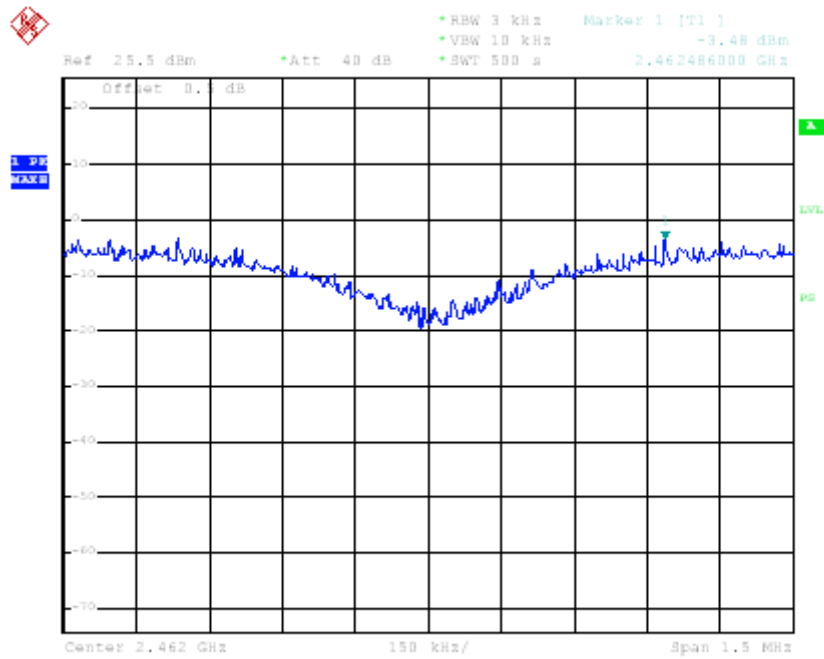
Low Channel



Middle Channel



High Channel



PHOTOGRAPHS OF THE TEST CONFIGURATION

CONDUCTED EMISSION TEST

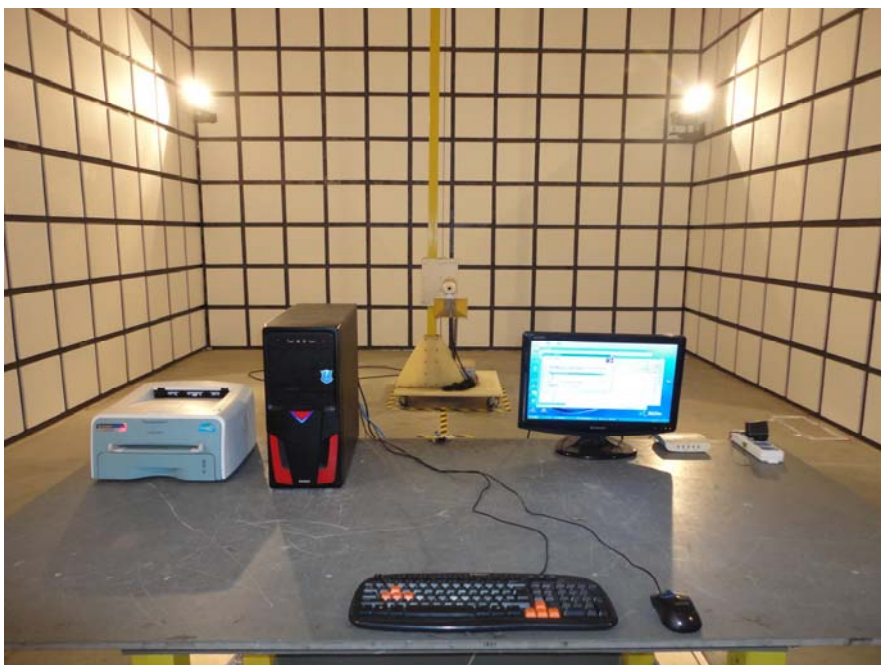


RADIATED EMISSION TEST BELOW 1GHz



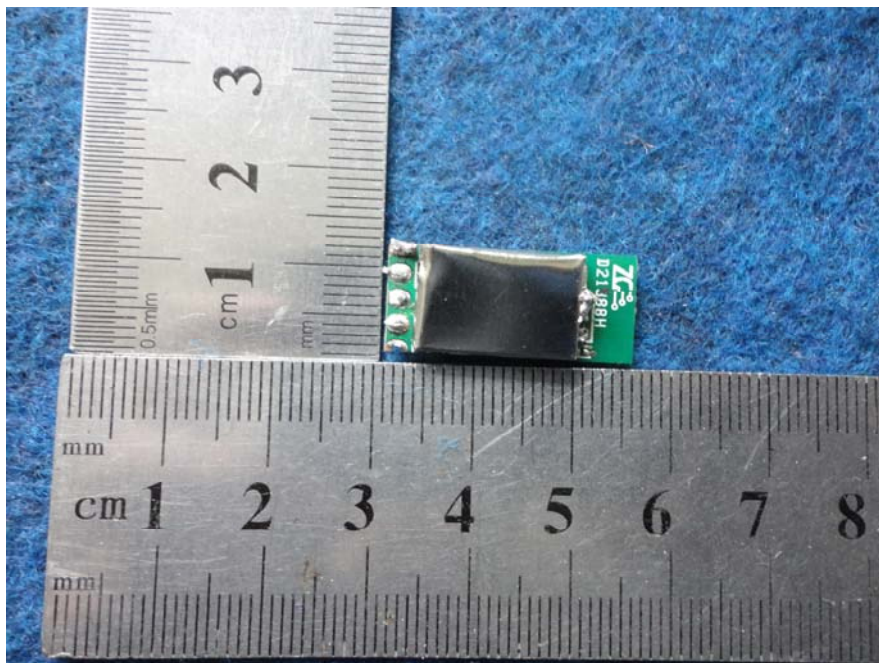


RADIATED EMISSION TEST ABOVE 1GHz



PHOTOGRAPHS OF EUT

Appearance photograph of EUT



Appearance photograph of EUT



Appearance photograph of EUT

