LTA
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DIGITAL PRIDE
COWON

Dates of Tests: November 09 ~ 23, 2012
Test Report S/N: LR500111211F
Test Site : LTA CO., LTD.

CERTIFICATION OF COMPLIANCE

FCC ID **SXV-AW1**

APPLICANT **COWON SYSTEMS, INC.**

Equipment Class	**:**	**Digital Transmission System (DTS)**
Manufacturing Description	**:**	**BLACKBOX (WLAN embedded)**
Manufacturer	**:**	**COWON SYSTEMS, INC.**
Model Name	**:**	**COWON AW1**
Test Device Serial No.:	**:**	**Identical prototype**
Rule Part(s)	**:**	**FCC Part 15.247 Subpart C; ANSI C-63.4-2003**
Frequency Range	**:**	**2412MHz ~ 2462MHz**
Max. Output Power	**:**	**Max 11.57dBm - Conducted (802.11b)** **Max 11.32dBm - Conducted (802.11g)**
Data of issue	**:**	**November 26, 2012**

This test report is issued under the authority of:

Kyu-Hyun Lee, Manager

The test was supervised by:

Jung-Moo Her, Test Engineer

This test result only responds to the tested sample. It is not allowed to copy this report even partly without the allowance of the test laboratory. The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

NVLAP LAB Code.: 200723-0

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1. General information

1-1 Test Performed

Company name	:	LTA Co., Ltd.
Address	:	243, Jubug-ri,Yangji-Myeon,Youngin-Si, Kyunggi-Do, Korea. 449-822
Web site	:	http://www.ltalab.com
E-mail	:	chahn@ltalab.com
Telephone	:	+82-31-323-6008
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Quality control in the testing laboratory is implemented as per ISO/IEC 17025 which is the “General requirements for the competents of calibration and testing laboratory”.

1-2 Accredited agencies

LTA Co., Ltd. is approved to perform EMC testing by the following agencies:

Agency	Country	Accreditation No.	Validity	Reference
NVLAP	U.S.A	200723-0	2013-09-30	ECT accredited Lab.
RRL	KOREA	KR0049	2013-04-24	EMC accredited Lab.
FCC	U.S.A	610755	2014-04-27	FCC filing
FCC	U.S.A	649054	2013-04-13	FCC CAB
VCCI	JAPAN	R2133(10m), C2307	2014-06-21	VCCI registration
VCCI	JAPAN	T-2009	2013-12-23	VCCI registration
VCCI	JAPAN	G-563	2015-05-28	VCCI registration
IC	CANADA	5799A-1	2015-06-21	IC filing

2. Product Information

2-1 Applicant

Company name	:	COWON SYSTEMS, INC.
Address	:	COWON Tower, 689-3, Yeoksam-dong, Gangnam-gu, Seoul 135-080, Korea
Tel / Fax	:	+82-2-6900-0143 / +82-2-6900-0022

2-2 Equipment Under Test (EUT)

Trade name	:	COWON
Model name	:	COWON AW1
Date of receipt	:	November 9, 2012
EUT condition	:	Pre-production, not damaged
Antenna type	:	Chip antenna with Max. 2.1 dBi gain
Frequency Range	:	2412MHz ~ 2462MHz
RF output power	:	Max 11.57dBm - Conducted (802.11b)
		Max 11.32dBm - Conducted (802.11g)
Number of channels	:	11
Type of Modulation	:	CCK, DQPSK, DBPSK for DSSS
		64QAM, 16QAM, QPSK, BPSK for OFDM
Transfer Rate	:	11, 5.5, 2, 1 Mbps for 802.11b
		54, 48, 36, 24, 18, 12, 9, 6 Mbps for 802.11g
Power Source	:	DC 12~24V
Firmware Version	:	V1.0.0

2-3 Tested frequency

	LOW	MID	HIGH
Frequency (MHz) for 802.11b/g	2412	2437	2462

3. Test Report

3.1 Summary of tests

FCC Part Section(s)	Parameter	Limit	Test Condition	Status (note 1)
15.247(a)	6 dB Bandwidth	> 500kHz	Conducted	C
15.247(b)	Transmitter Peak Output Power	< 1Watt		C
15.247(d)	Transmitter Power Spectral Density	< 8dBm @ 3kHz		C
15.247(d)	Band Edge & Spurious	> 20 dBc		C
15.209	Field Strength of Harmonics	Emissions	Radiated	C
15.207	AC Conducted Emissions	Emissions	-	N/A
15.203	Antenna requirement	-	-	C

Note 1: C=Complies NC=Not Complies NT=Not Tested NA=Not Applicable

Note 2: The data in this test report are traceable to the national or international standards.

Note 3: This device is automotive devices powered by 12v vehicle power.

→ Antenna Requirement
The **COWON SYSTEMS Inc, FCC ID : SXV-AW1** unit complies with the requirement of §15.203.
The antenna type is **Chip antenna**.

The sample was tested according to the following specification:
*FCC Parts 15.247; ANSI C-63.4-2003
*FCC KDB Publication No. 558074 D01 DTS Meas. Guidance V01
*FCC TCB Workshop 2012, April

3.2 Technical Characteristics Test

3.2.1 6 dB Bandwidth

Procedure:

*The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance and TCB Workshop 2012, April.

The bandwidth at 6dB below the highest in-band spectral density was measured with a spectrum analyzer connected to the antenna terminal, while EUT is operating in transmission mode at the appropriate frequencies.

After the trace being stable, Use the marker-to-peak function to set the marker to the peak of the emission. Use the marker-delta function to measure 6dB down one side of the emission. Reset the marker-delta function, and move the marker to the other side of the emission, until it is (as close as possible to) even with the reference marker level. The marker-delta reading at this point is the 6 dB bandwidth of the emission.

The spectrum analyzer is set to:

Center frequency = the highest, middle and the lowest channels

RBW = 100 kHz

Span = 30 MHz

VBW = 100 kHz (VBW ≥ RBW)

Sweep = auto

Trace = max hold

Detector function = peak

Measurement Data: 802.11b

Frequency (MHz)	Channel No.	Test Results(MHz)
2412	1	7.03
2437	6	7.29
2462	11	7.51

Measurement Data: 802.11g

Frequency (MHz)	Channel No.	Test Results(MHz)
2412	1	15.76
2437	6	15.76
2462	11	16.02

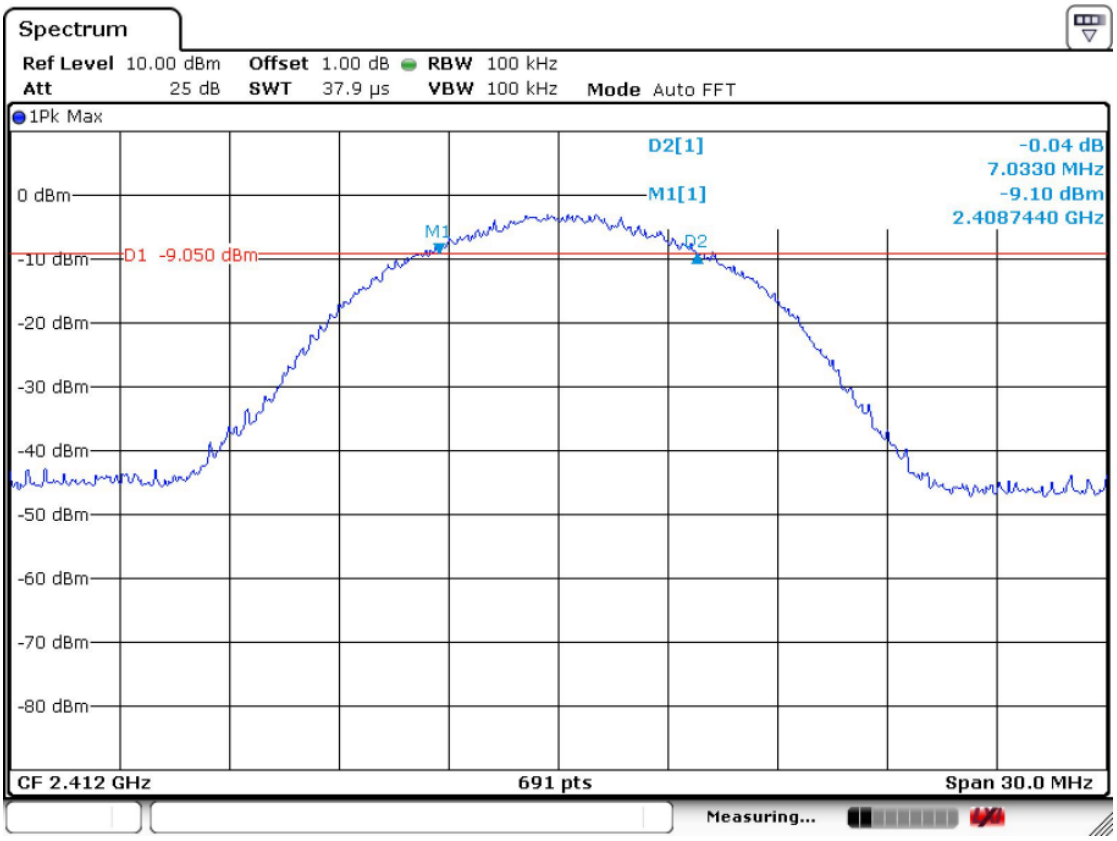
Minimum Standard:

6 dB Bandwidth > 500kHz

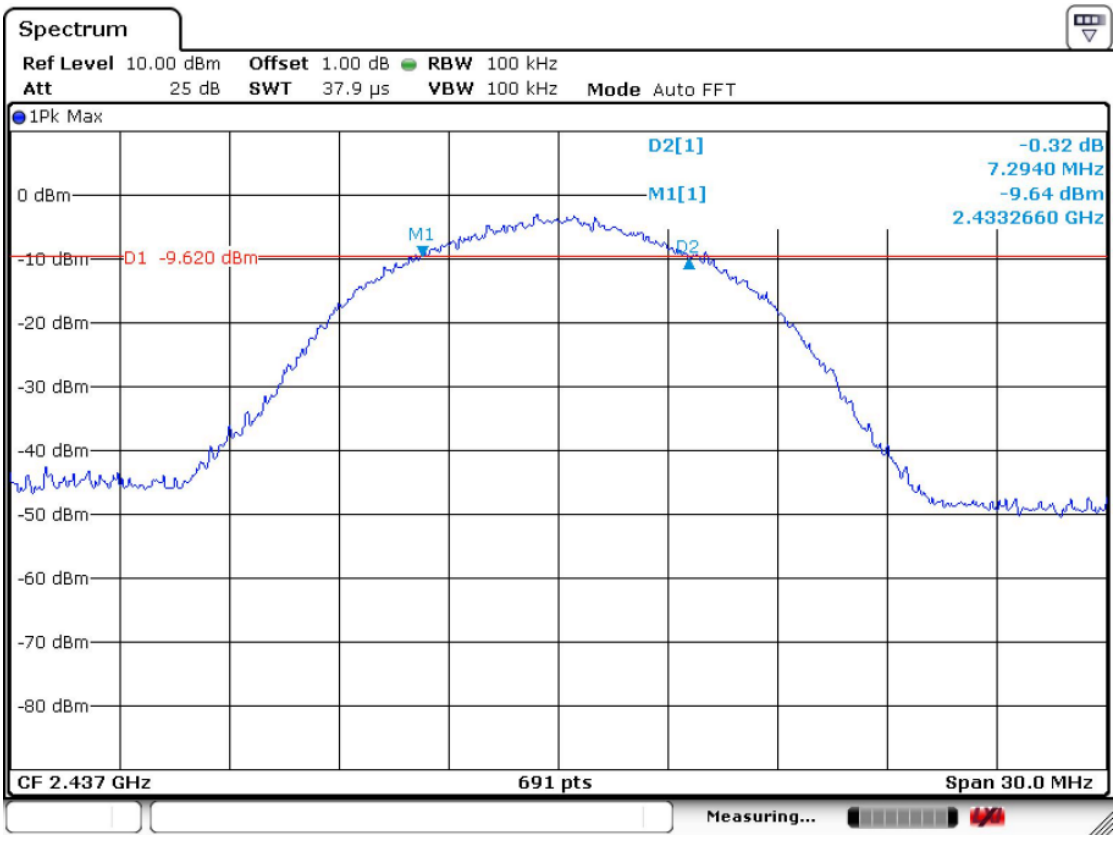
Measurement Setup

Same as the Chapter 3.2.1 (Figure 1)

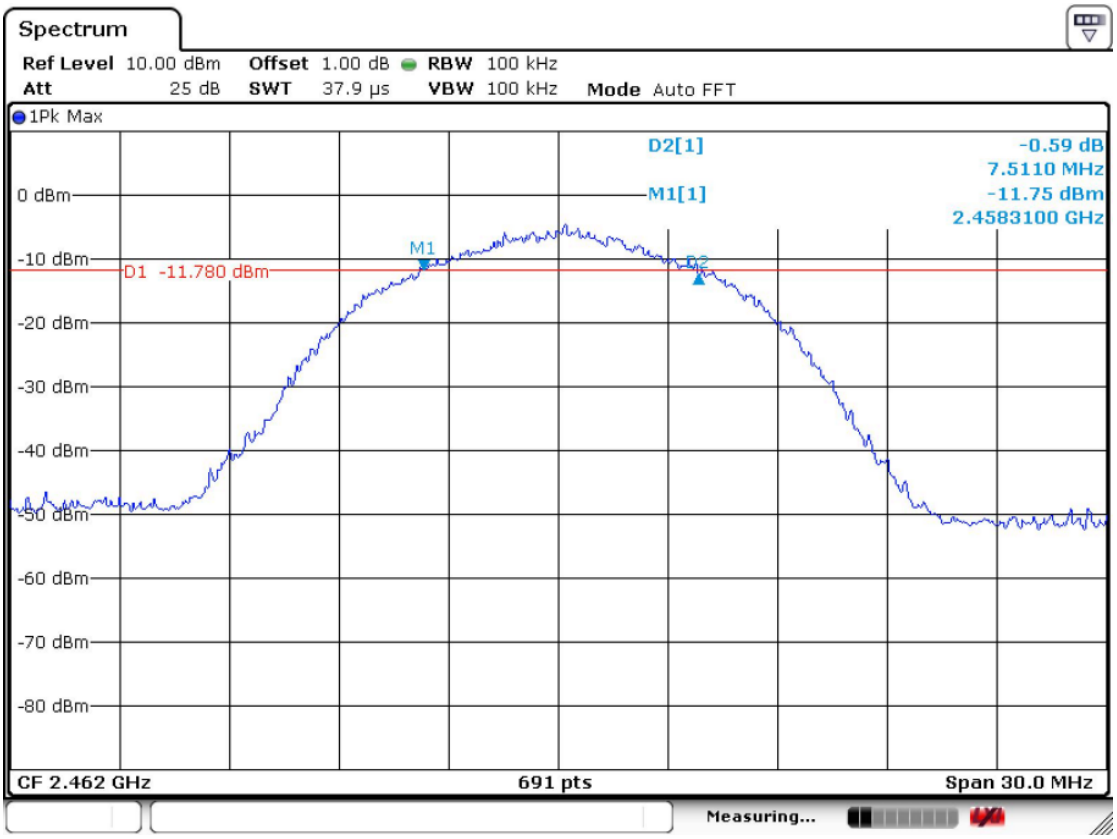
Channel 1 802.11b mode



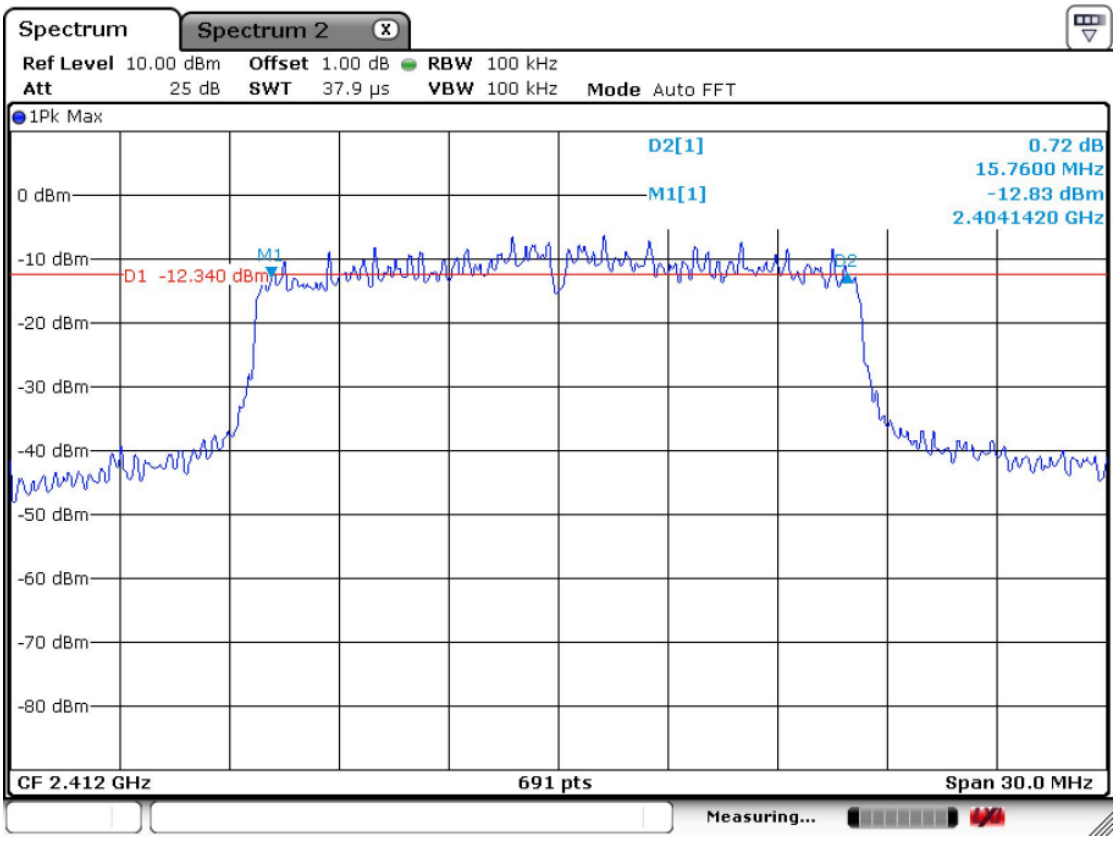
Channel 6 of 802.11b mode



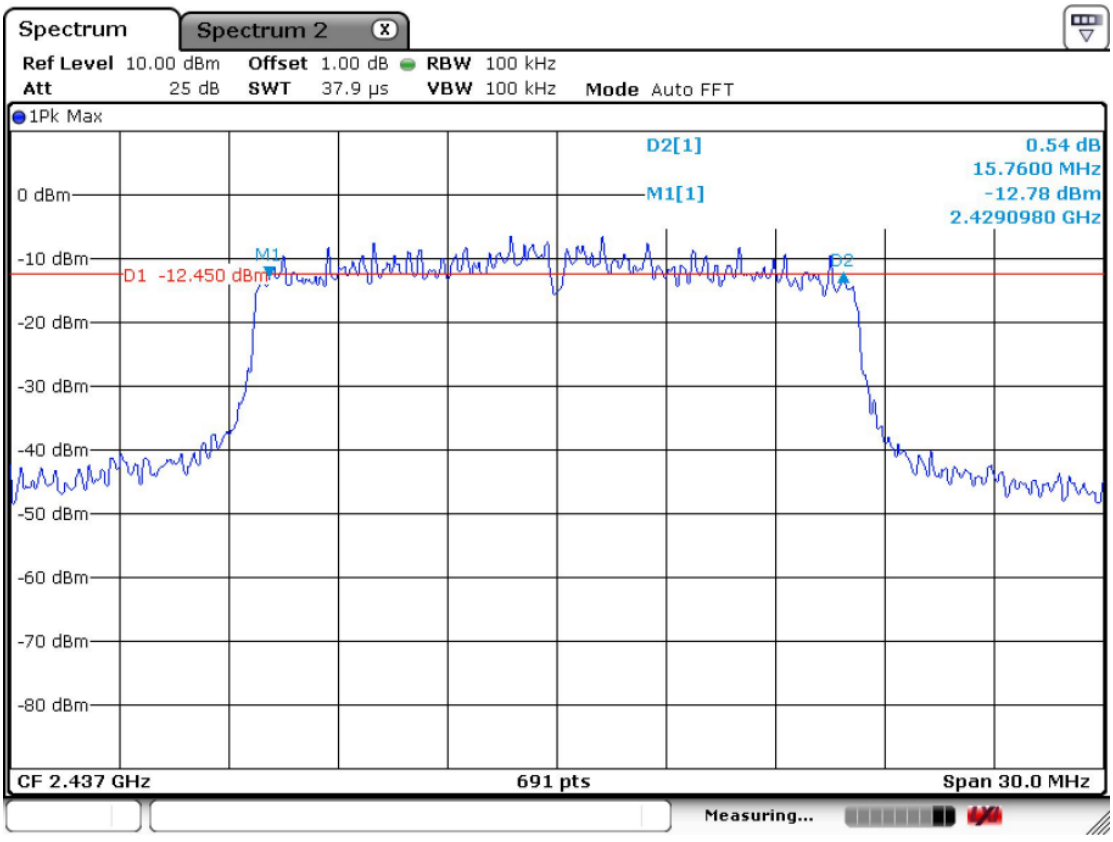
Channel 11 of 802.11b mode



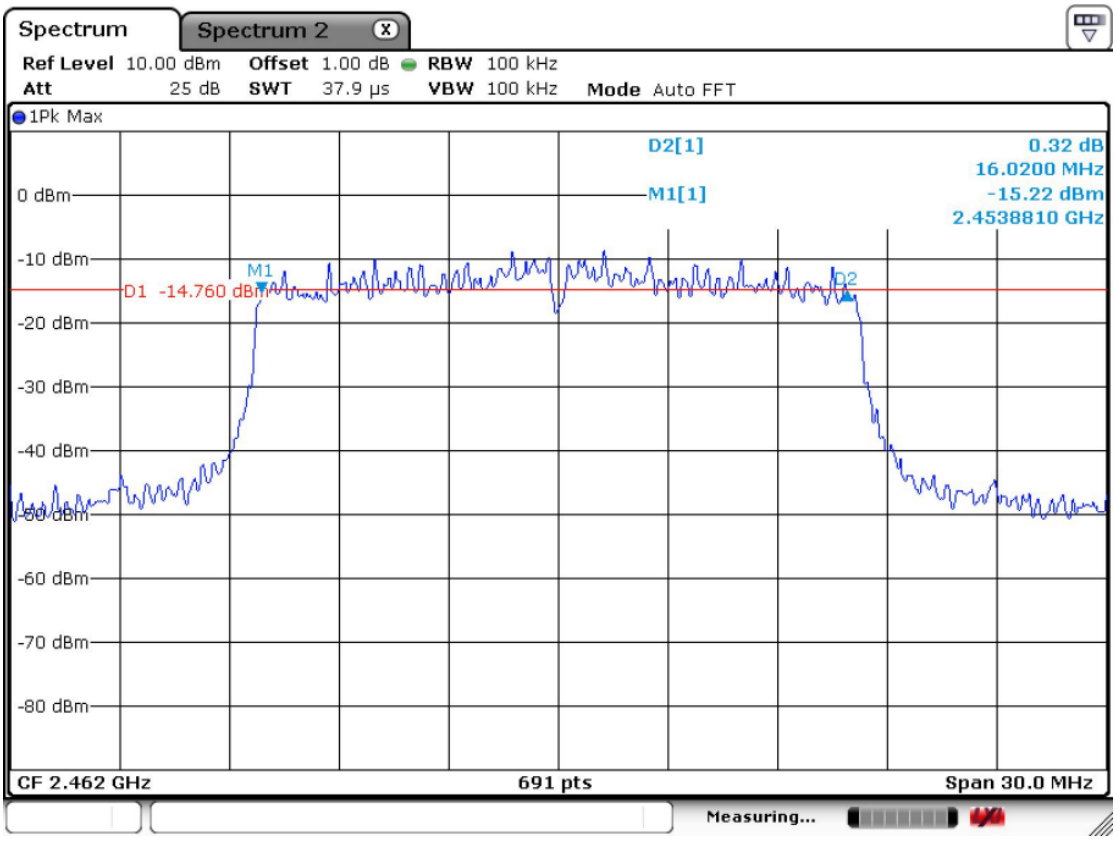
Channel 1 of 802.11g mode



Channel 6 of 802.11g mode



Channel 11 of 802.11g mode



3.2.2 Peak Output Power Measurement

Procedure:

*The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance and TCB Workshop 2012, April. The maximum peak output power was measured with the spectrum analyzer connected to the antenna output of the EUT. The spectrum analyzer's internal channel power integration function is used to integrate the power over a bandwidth greater than or equal to the 99% bandwidth. The EUT was operating in transmit mode at the appropriate center frequency.

The spectrum analyzer is set to:

Center frequency = the highest, middle and the lowest channels

RBW = 1MHz Span = auto

VBW = 1MHz (VBW ≥ RBW) Sweep = auto

Detector function = peak

Measurement Data:

Mode	Frequency (MHz)	Channel No.	Test Results	
			Measured Data (dBm)	Result
802.11b	2412	1	11.57	Complies
	2437	6	10.59	Complies
	2462	11	8.27	Complies
802.11g	2412	1	11.32	Complies
	2437	6	11.01	Complies
	2462	11	8.83	Complies

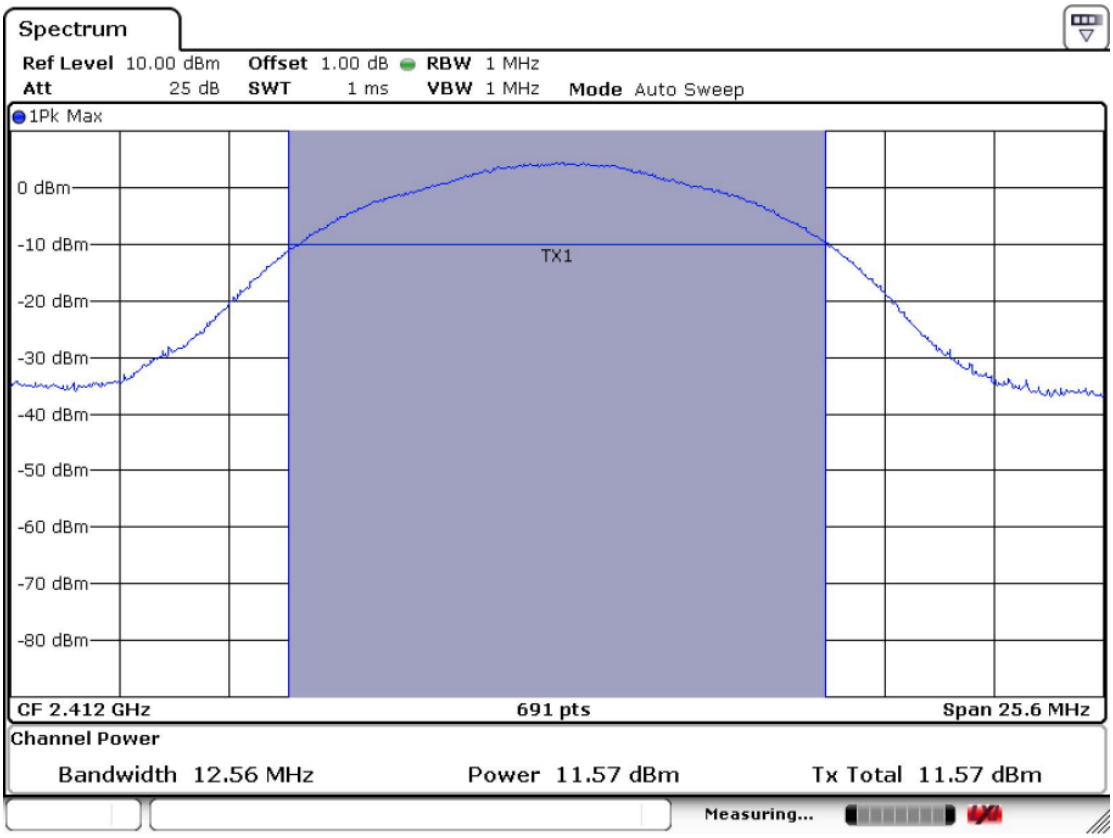
- See next pages for actual measured spectrum plots.

Minimum Standard:

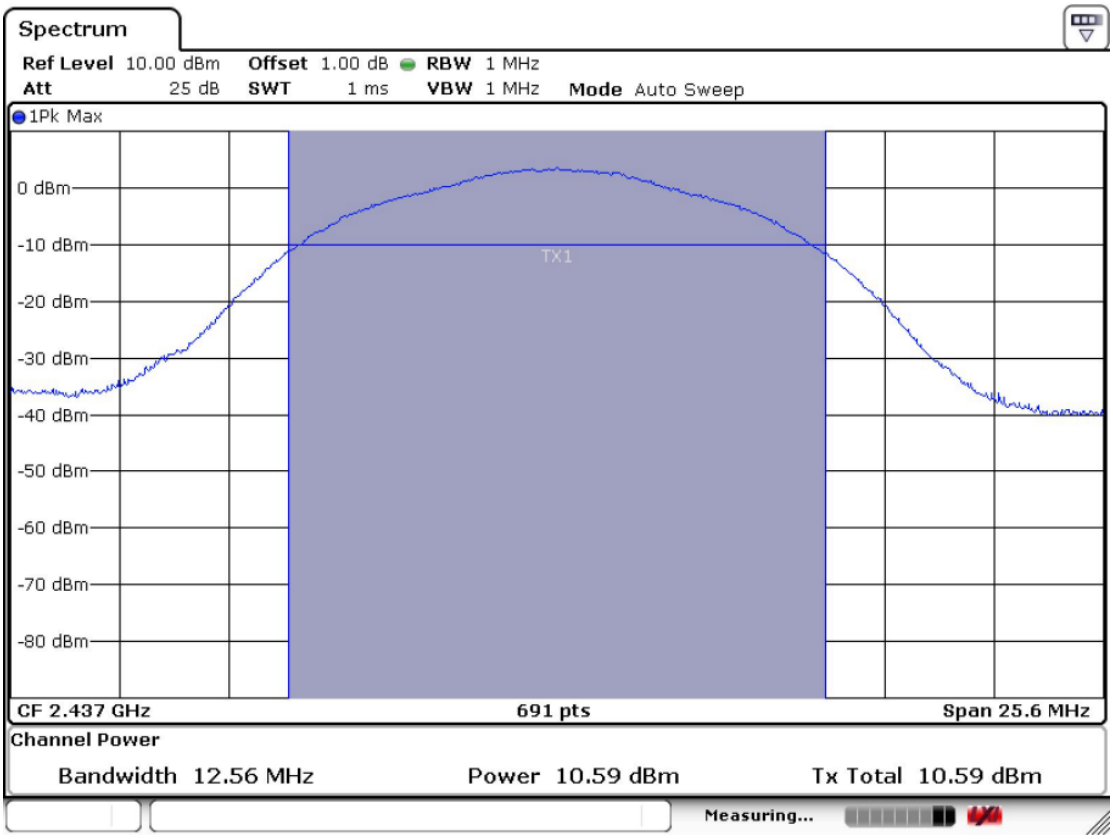
Peak output power	< 1W

802.11b

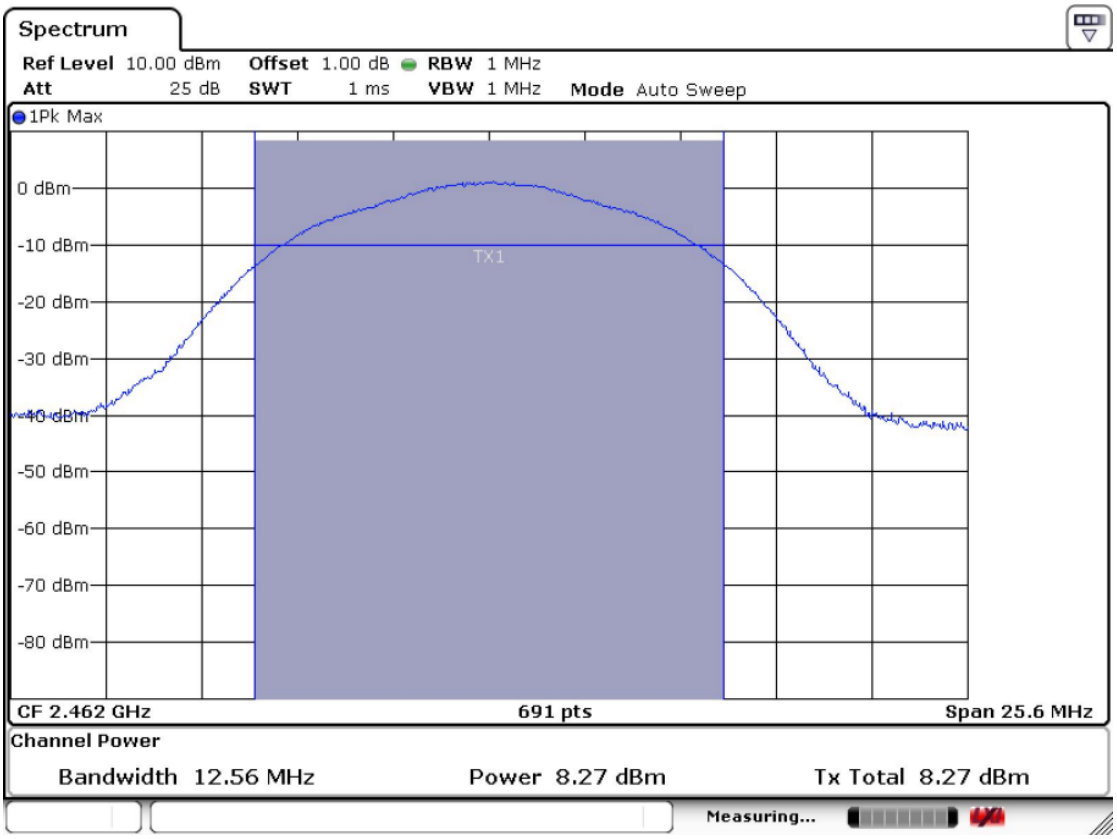
CH 1



CH 6

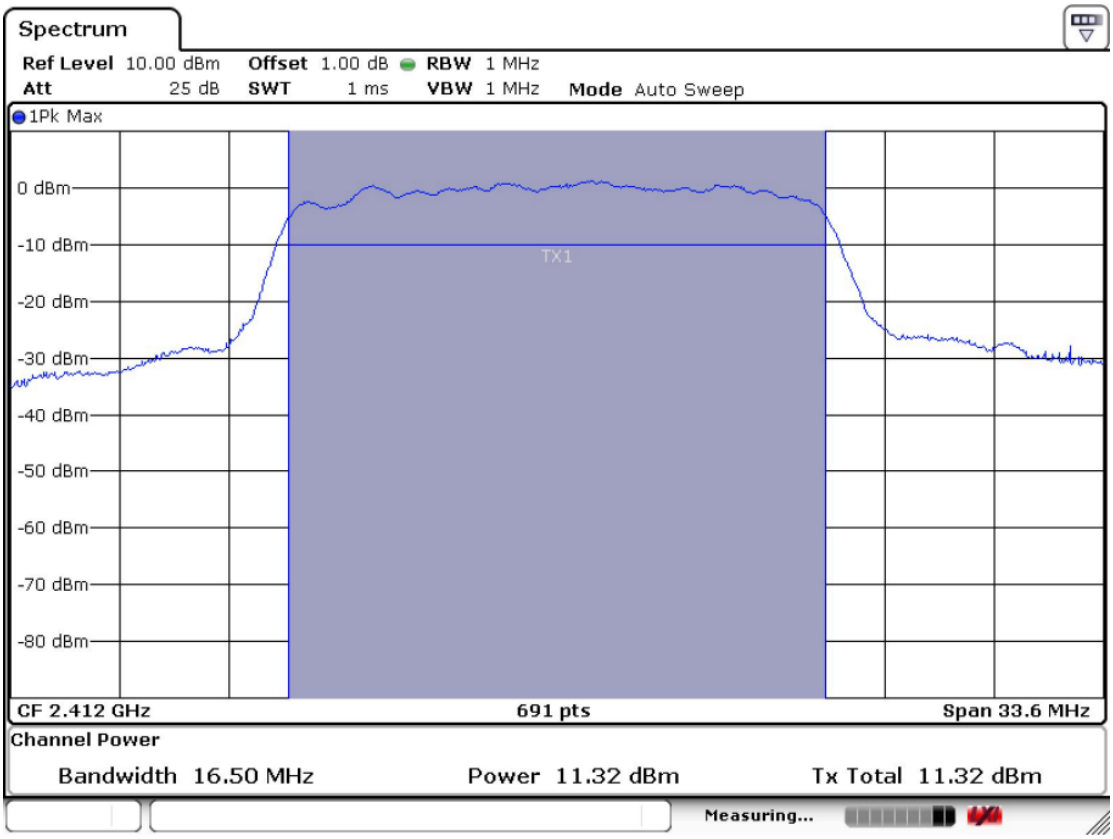


CH 11

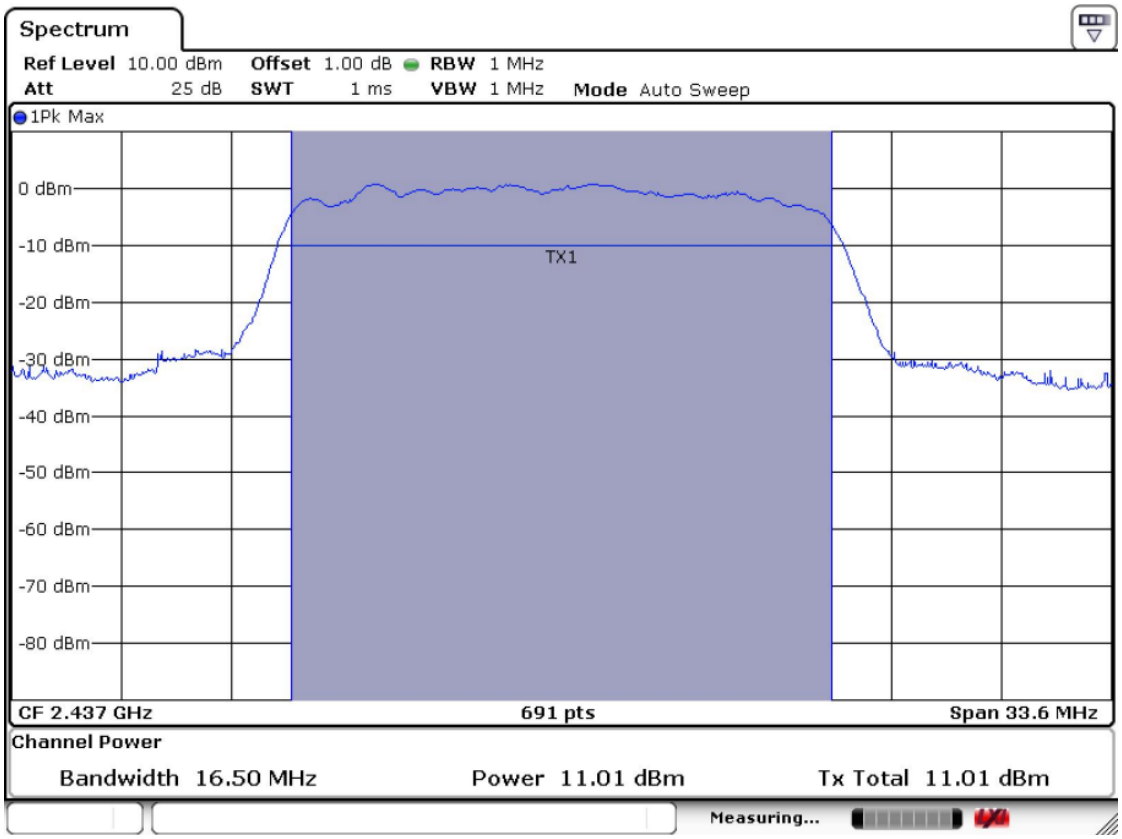

Spectrum
Ref Level 10.00 dBm Offset 1.00 dB RBW 1 MHz
Att 25 dB SWT 1 ms VBW 1 MHz Mode Auto Sweep
1Pk Max
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
TX1
CF 2.462 GHz
691 pts
Span 25.6 MHz
Channel Power
Bandwidth 12.56 MHz
Power 8.27 dBm
Tx Total 8.27 dBm
Measuring...

802.11g

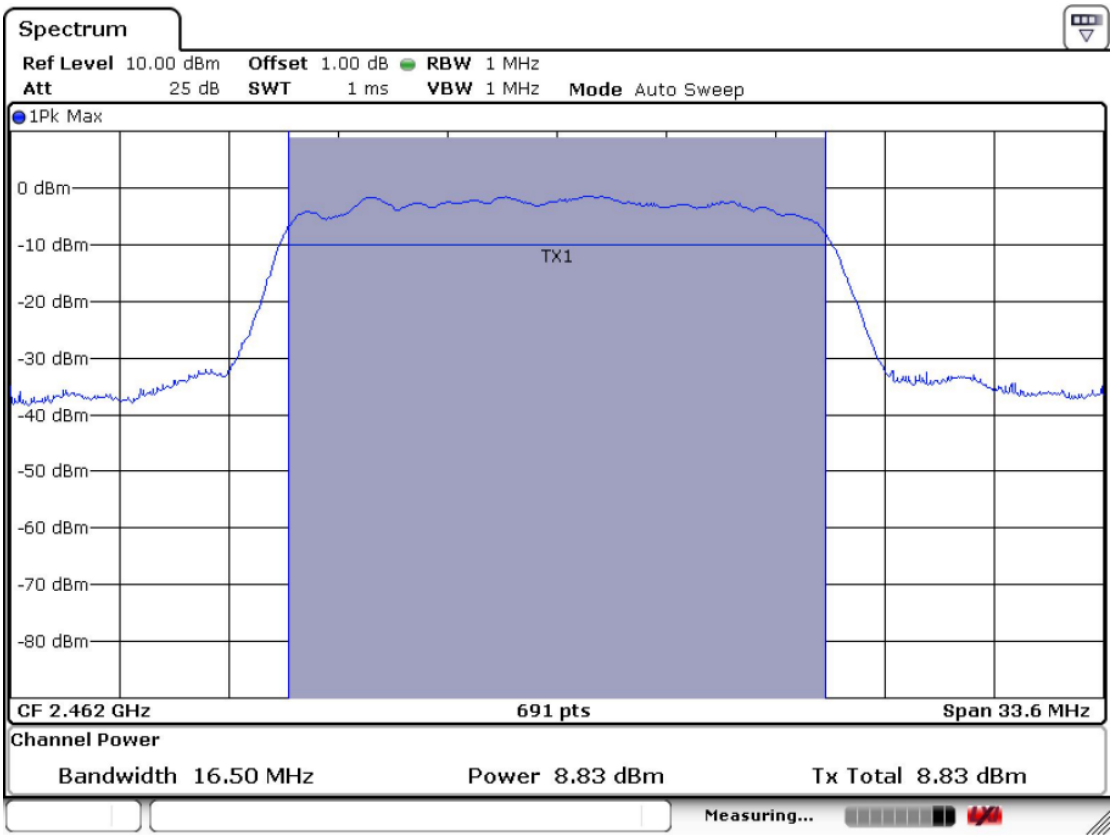
CH 1



CH 6



CH 11


Spectrum
Ref Level 10.00 dBm Offset 1.00 dB RBW 1 MHz
Att 25 dB SWT 1 ms VBW 1 MHz Mode Auto Sweep
1Pk Max
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
TX1
CF 2.462 GHz
691 pts
Span 33.6 MHz
Channel Power
Bandwidth 16.50 MHz
Power 8.83 dBm
Tx Total 8.83 dBm
Measuring...

3.2.3 Power Spectral Density

Procedure:

*The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance and TCB Workshop 2012, April. The peak power density is measured with a spectrum analyzer connected to the antenna terminal while the EUT is operating in transmission mode at the appropriate frequencies.

The spectrum analyzer is set to:

RBW = 3 kHz — Span = 300 kHz

VBW = 3 kHz — Sweep = 100 sec

Detector function = peak — Trace = max hold

Measurement Data:

Mode	Frequency (MHz)	Ch.	Test Results	
			dBm	Result
802.11b	2412	1	-16.10	Complies
	2437	6	-16.53	Complies
	2462	11	-18.42	Complies
802.11b	2412	1	-22.26	Complies
	2437	6	-22.89	Complies
	2462	11	-25.02	Complies

- See next pages for actual measured spectrum plots.

Minimum Standard:

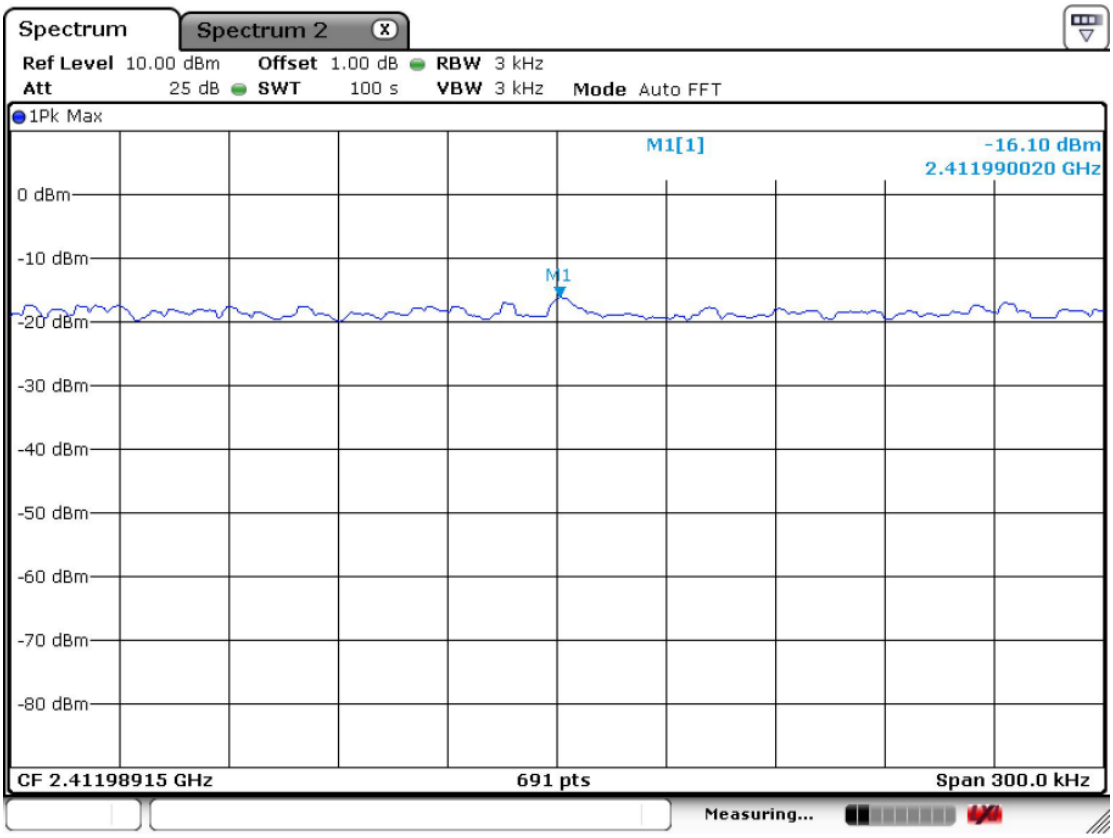
Power Spectral Density	< 8dBm @ 3kHz BW

Measurement Setup

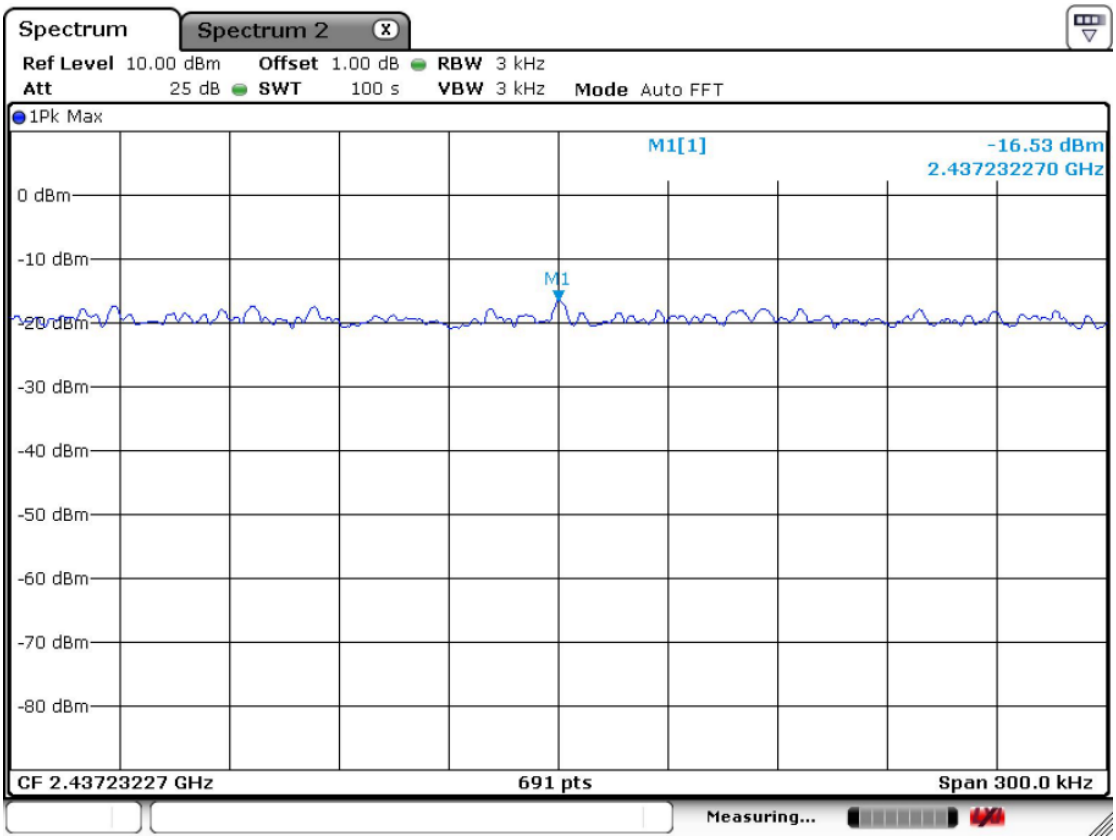
Same as the Chapter 3.2.1 (Figure 1)

802.11b Power Density Measurement

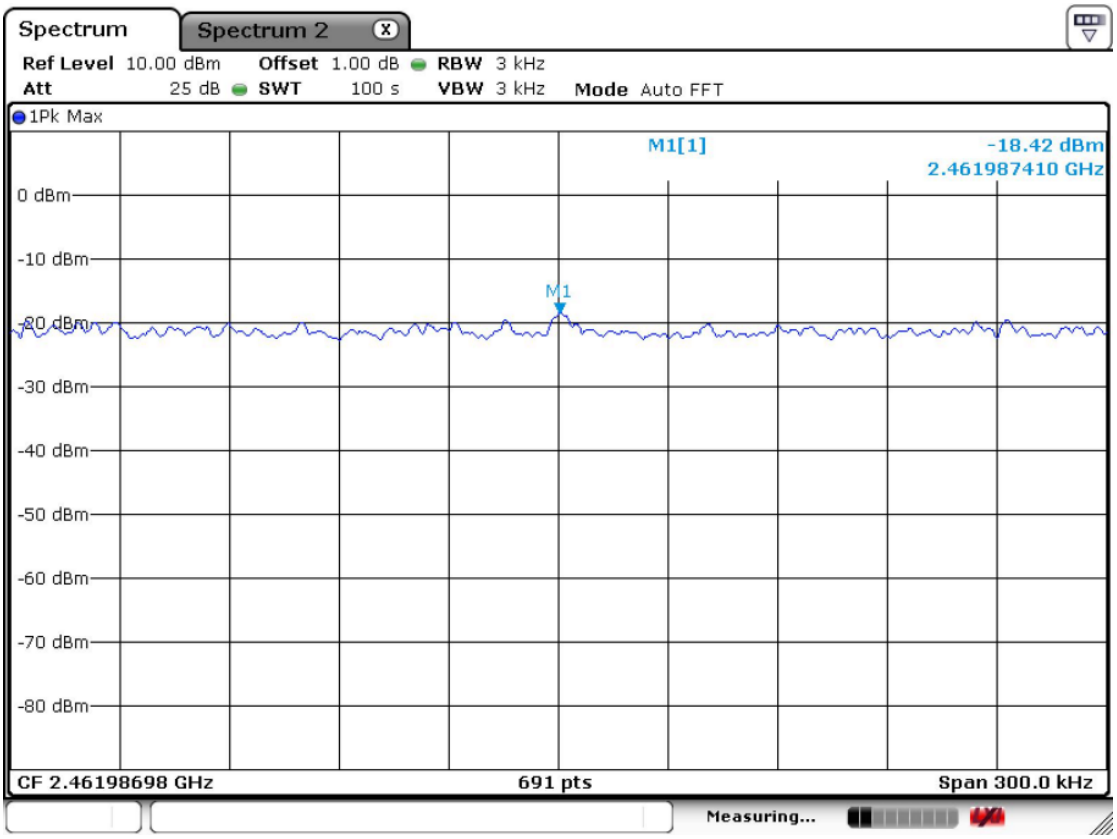
CH 1



CH 6

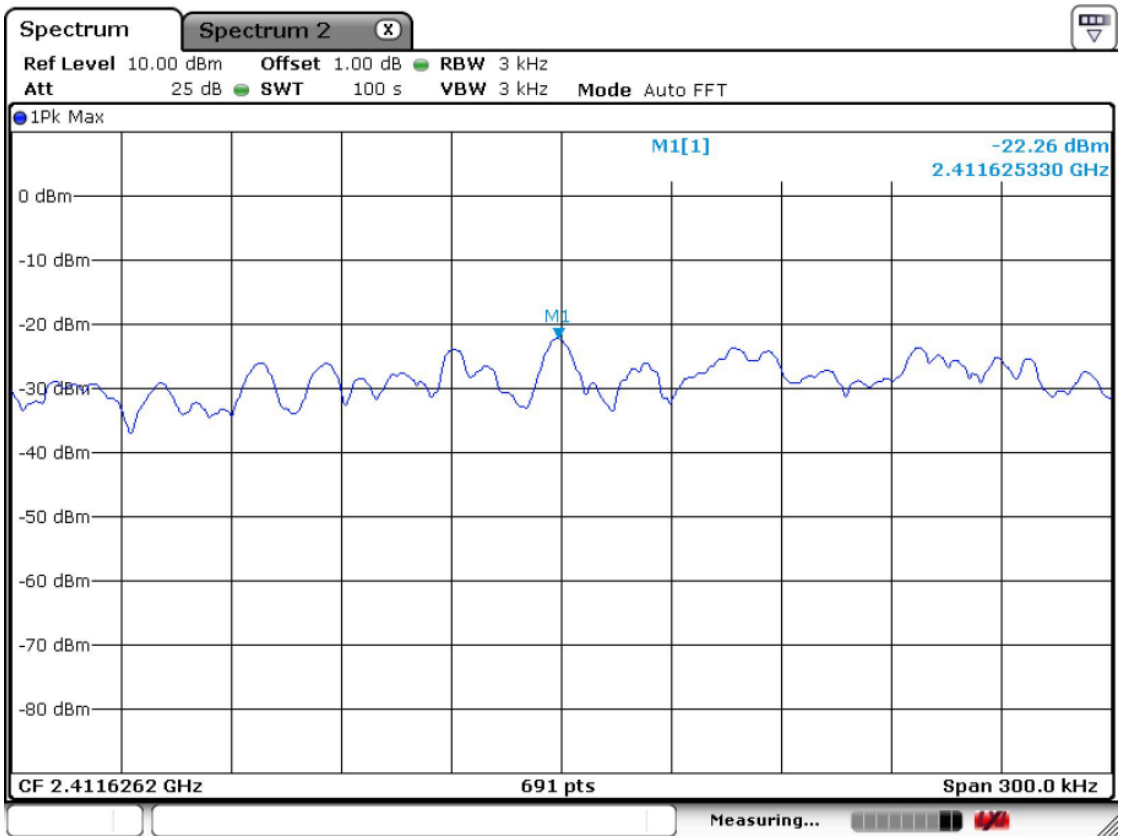


CH 11

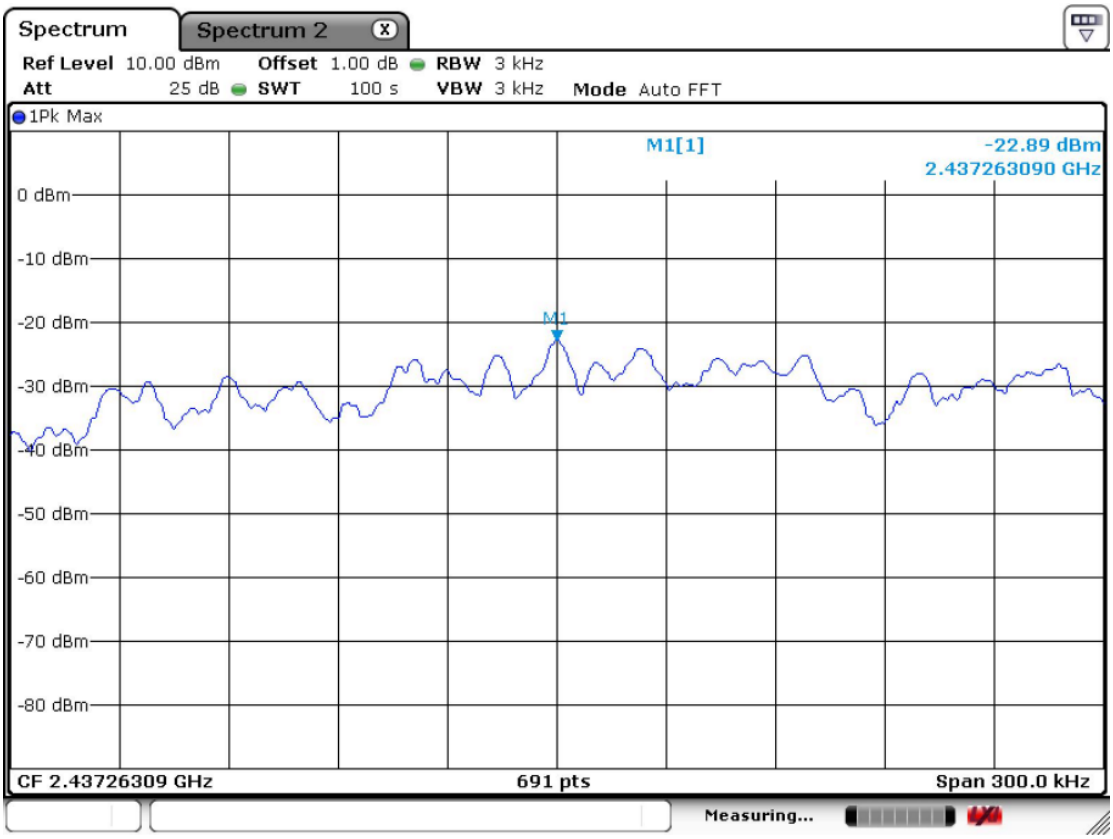

Spectrum
Spectrum 2
Ref Level 10.00 dBm Offset 1.00 dB RBW 3 kHz
Att 25 dB SWT 100 s VBW 3 kHz Mode Auto FFT
1Pk Max
M1[1]
-18.42 dBm
2.461987410 GHz
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
M1
CF 2.46198698 GHz
691 pts
Span 300.0 kHz
Measuring...

802.11g Power Density Measurement

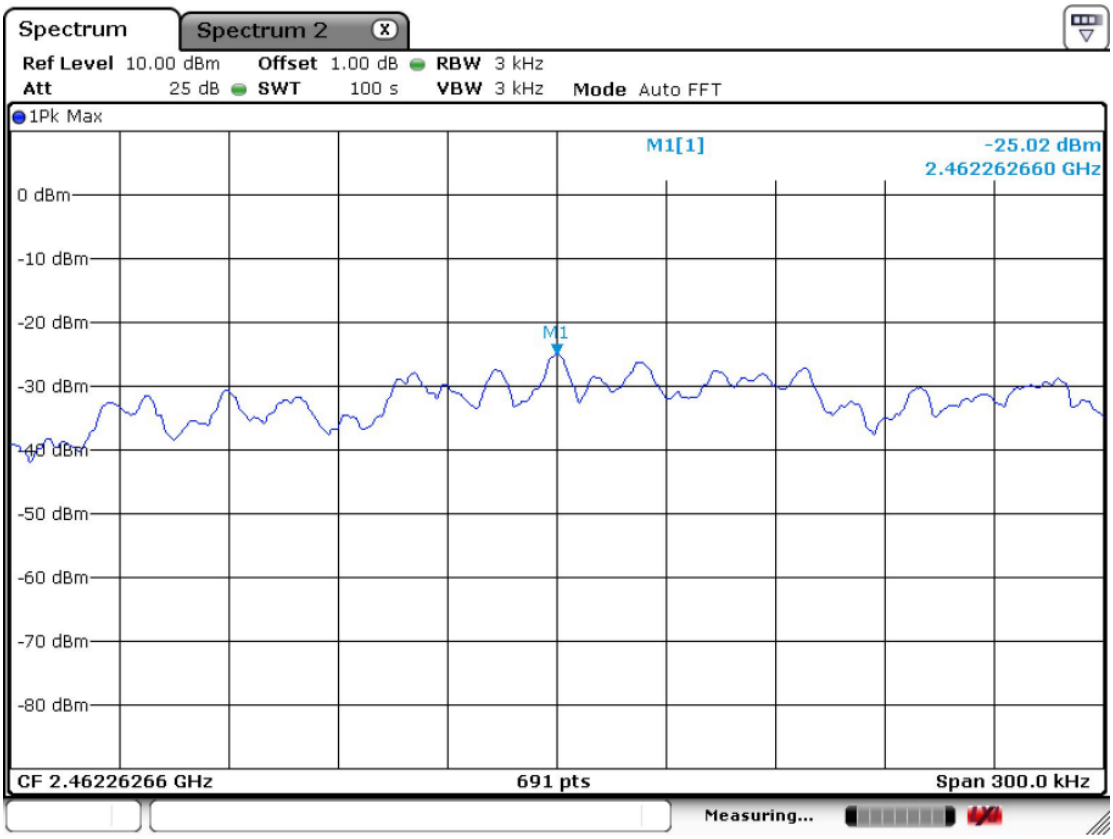
CH 1



CH 6



CH 11


Spectrum
Spectrum 2
Ref Level 10.00 dBm Offset 1.00 dB RBW 3 kHz
Att 25 dB SWT 100 s VBW 3 kHz Mode Auto FFT
1Pk Max
M1[1]
-25.02 dBm
2.462262660 GHz
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
M1
CF 2.46226266 GHz
691 pts
Span 300.0 kHz
Measuring...

3.2.4 Band - edge

Procedure:

*The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance and TCB Workshop 2012, April.

The bandwidth at 20dB down from the highest inband spectral density is measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function disabled at the highest, middle and the lowest available channels.

After the trace being stable, Use the marker-to-peak function to measure 20 dB down both sides of the intentional emission.

The spectrum analyzer is set to:

Center frequency = the highest, middle and the lowest channels

RBW = 100 kHz	VBW = 100 kHz
Span = 80 MHz	Detector function = peak
Trace = max hold	Sweep = auto

Measurement Data: Complies

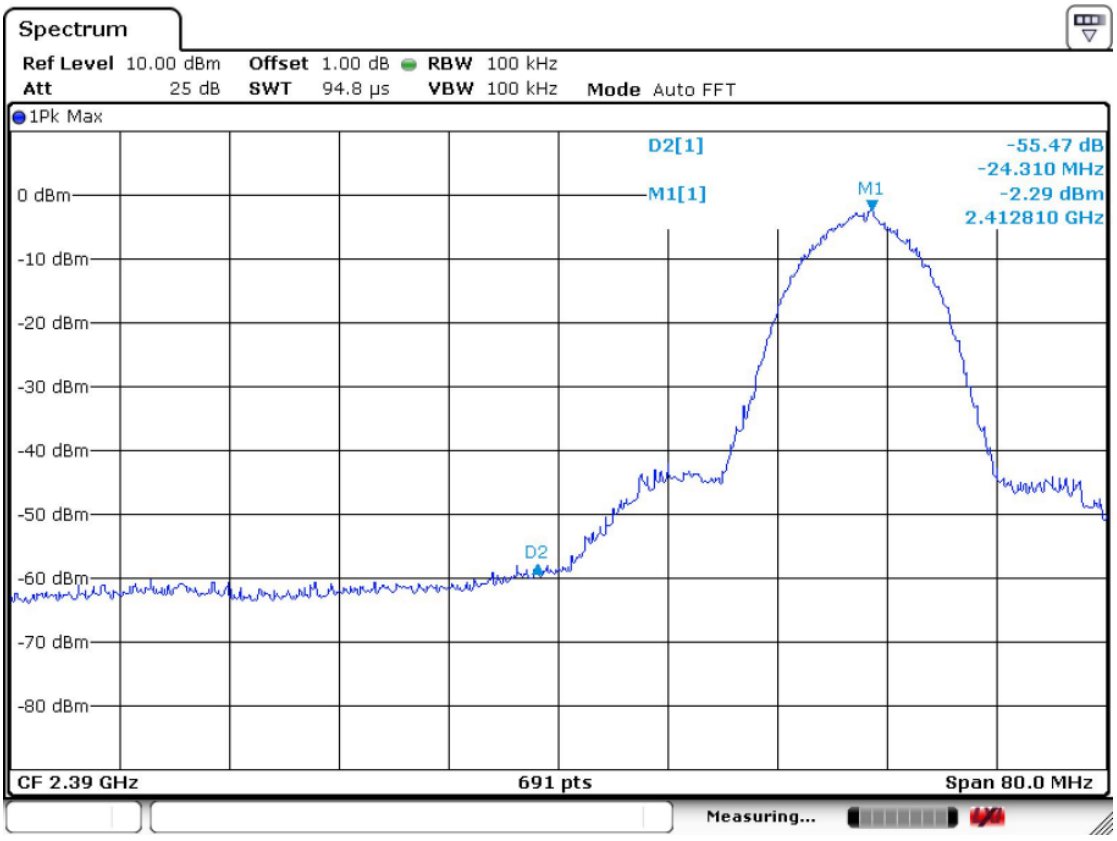
- All conducted emission in any 100kHz bandwidth outside of the spread spectrum band was at least 20dB lower than the highest inband spectral density. Therefore the applying equipment meets the requirement.
- See next pages for actual measured spectrum plots.

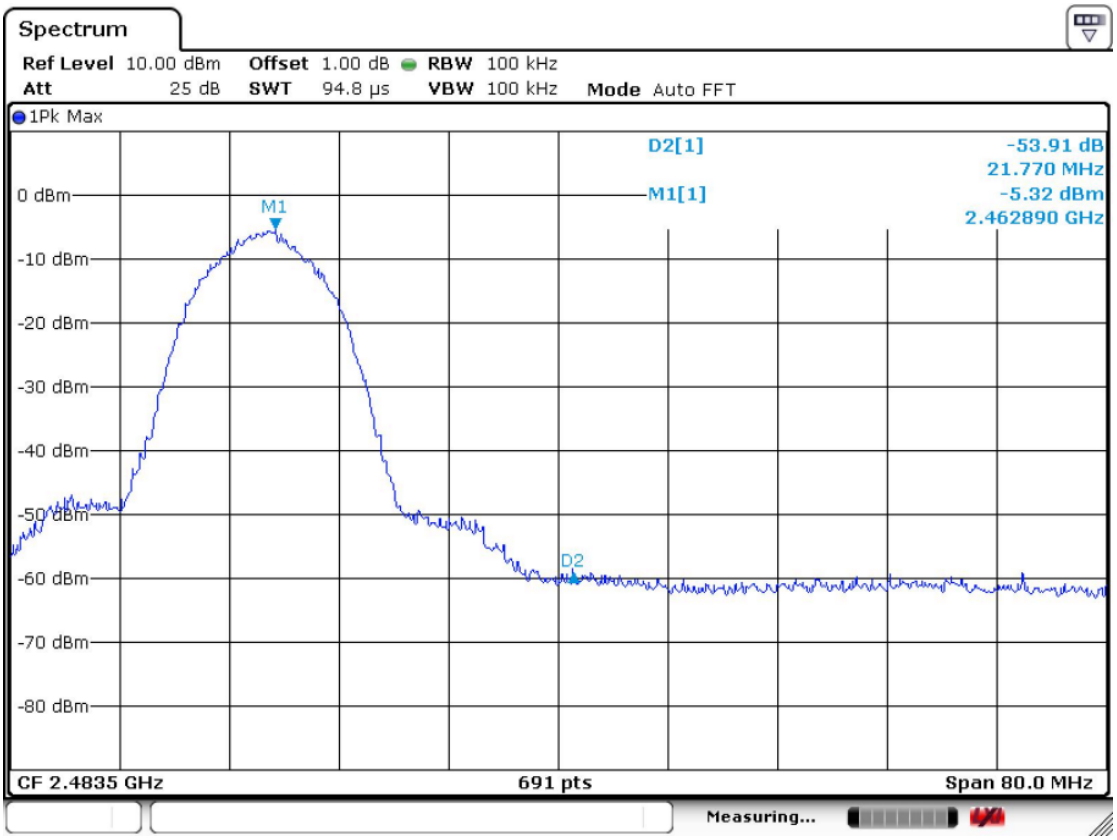
Minimum Standard:	> 20 dBc

Measurement Setup

Same as the Chapter 3.2.1 (Figure 1)

802.11b Band–edge : Conducted Measurements





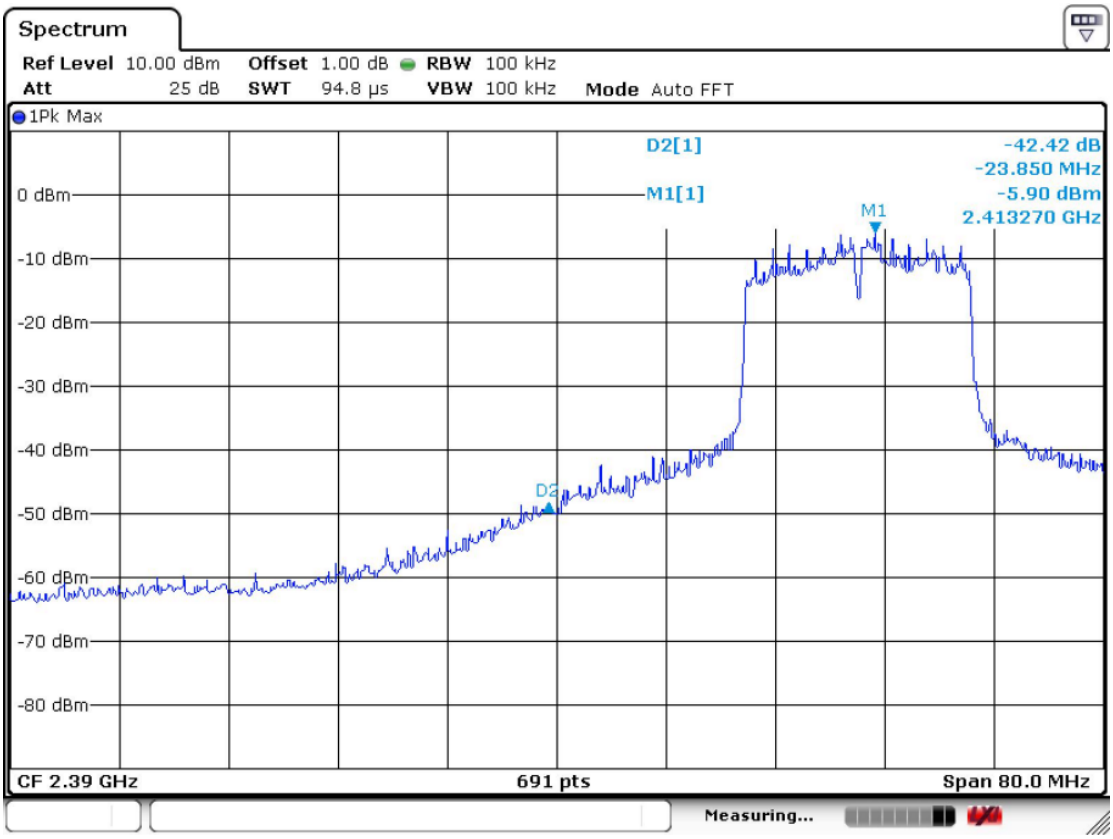
Band-edges in the restricted band 2310-2390 MHz measurement (802.11b mode)

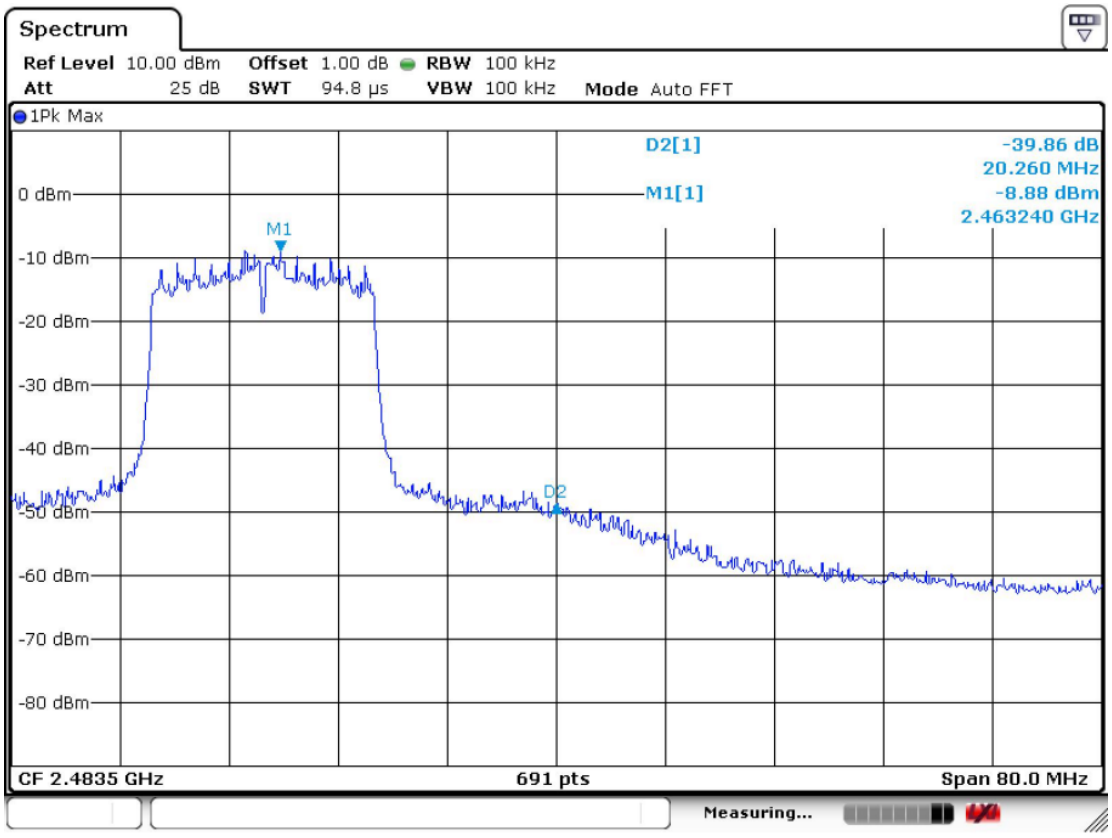
Frequency [MHz]	Reading [dBuV/m] AV	Reading [dBuV/m] Peak	Pol.	Correction Factor Antenna	Correction Factor Amp. Gain+Cable	Limits [dBuV/m] AV	Limits [dBuV/m] Peak	Result [dBuV/m] AV	Result [dBuV/m] Peak	Margin [dB] AV	Margin [dB] Peak
2388.7	40.7	53.7	V	28.2	31.6	54.0	74.0	37.3	50.3	16.7	23.7

Band-edges in the restricted band 2483.5-2500 MHz measurement

Frequency [MHz]	Reading [dBuV/m] AV	Reading [dBuV/m] Peak	Pol.	Correction Factor Antenna	Correction Factor Amp. Gain+Cable	Limits [dBuV/m] AV	Limits [dBuV/m] Peak	Result [dBuV/m] AV	Result [dBuV/m] Peak	Margin [dB] AV	Margin [dB] Peak
2489.9	41.5	54.2	V	28.2	31.6	54.0	74.0	38.1	50.8	15.9	23.2

802.11g Band–edge : Conducted Measurements





Band-edges in the restricted band 2310-2390 MHz measurement (802.11g mode)

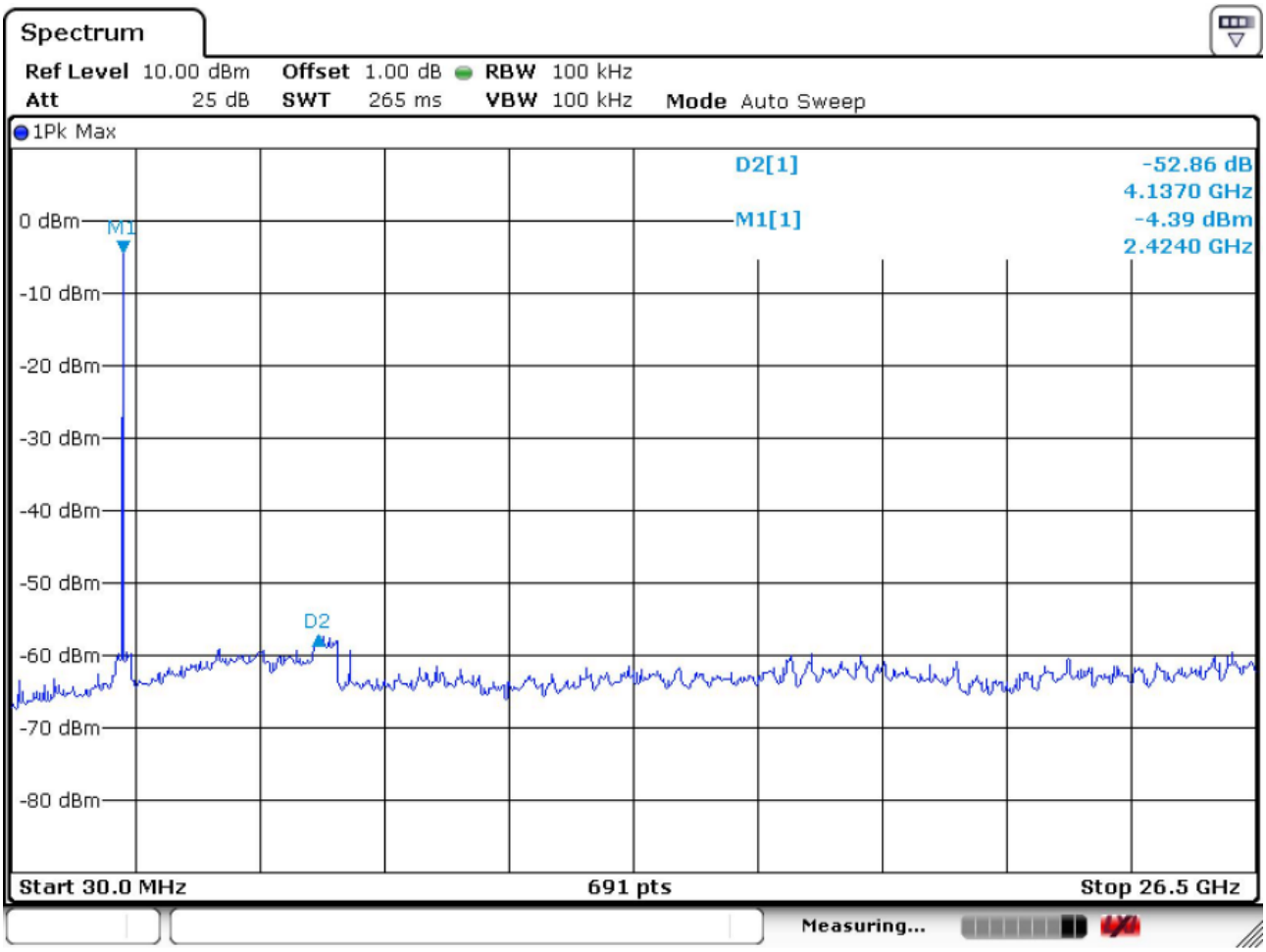
Frequency [MHz]	Reading [dBuV/m] AV	Reading [dBuV/m] Peak	Pol.	Correction Factor Antenna	Correction Factor Amp. Gain+Cable	Limits [dBuV/m] AV	Limits [dBuV/m] Peak	Result [dBuV/m] AV	Result [dBuV/m] Peak	Margin [dB] AV	Margin [dB] Peak
2389.3	46.4	65.1	V	28.2	31.6	54.0	74.0	43.0	61.7	11.0	12.3

Band-edges in the restricted band 2483.5-2500 MHz measurement

Frequency [MHz]	Reading [dBuV/m] AV	Reading [dBuV/m] Peak	Pol.	Correction Factor Antenna	Correction Factor Amp. Gain+Cable	Limits [dBuV/m] AV	Limits [dBuV/m] Peak	Result [dBuV/m] AV	Result [dBuV/m] Peak	Margin [dB] AV	Margin [dB] Peak
2491.8	45.3	64.1	V	28.2	31.6	54.0	74.0	41.9	60.7	12.1	13.3

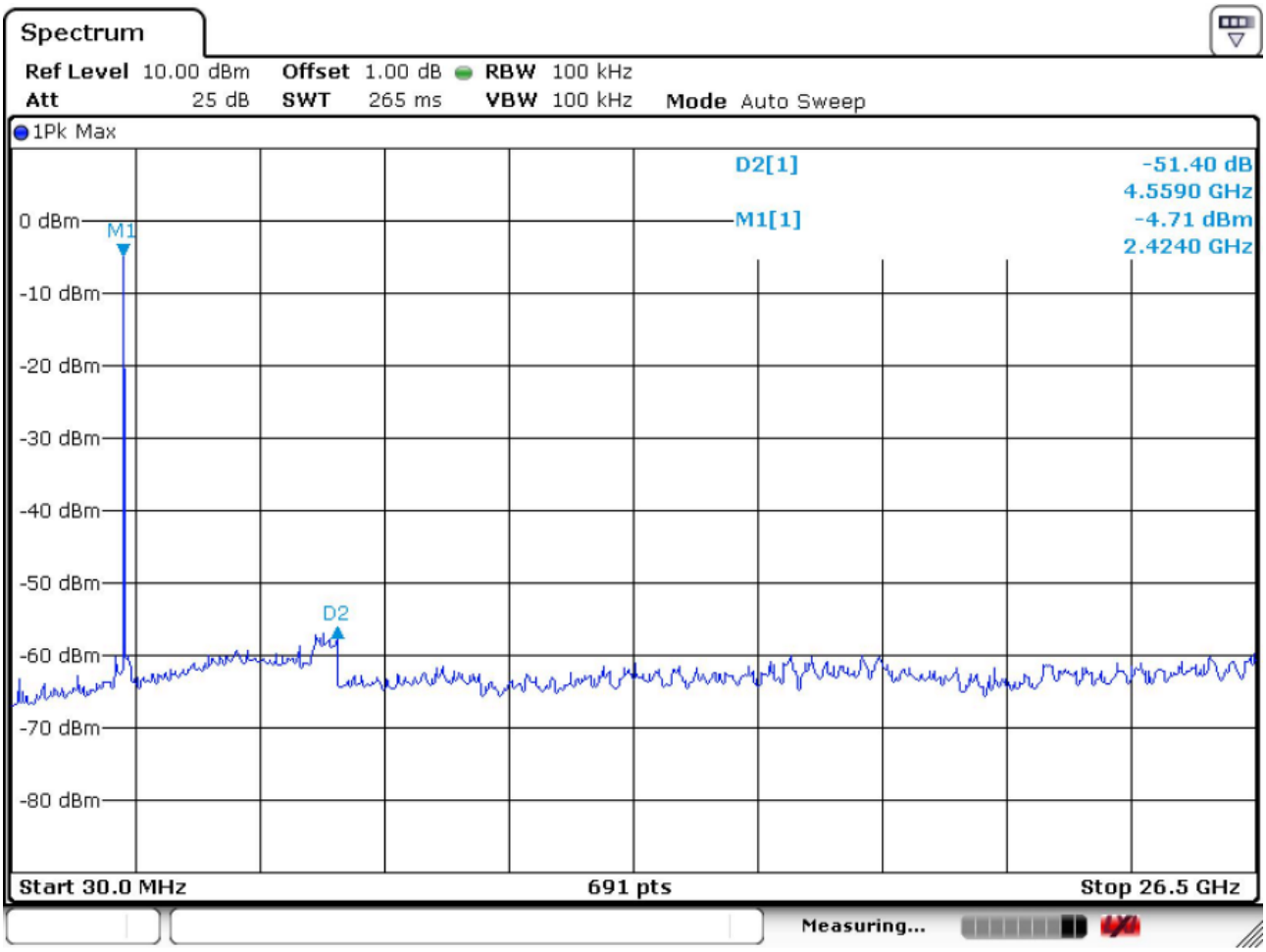
802.11b - Low channel

Frequency Range = 30 MHz ~ 10th harmonic.



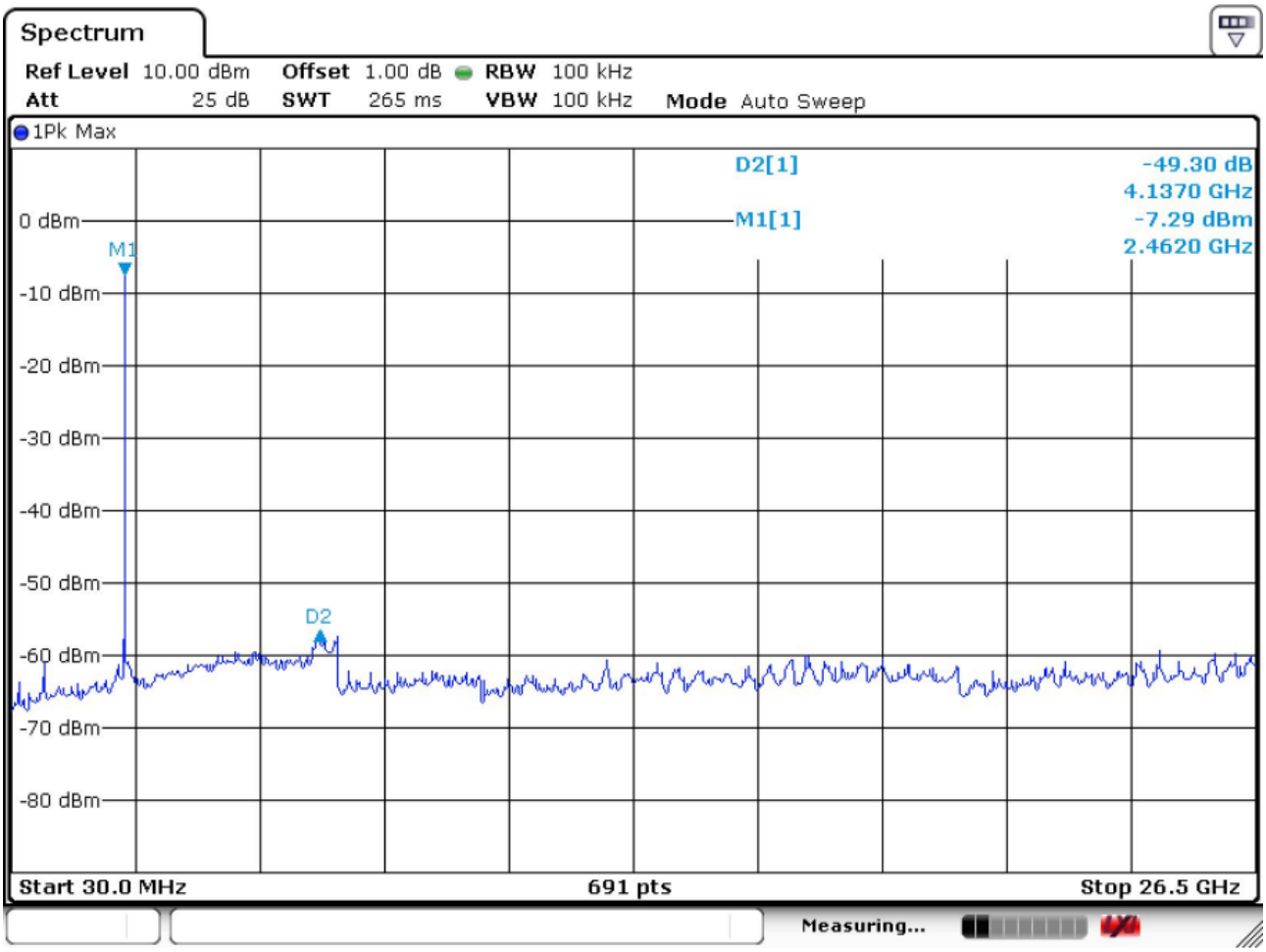
802.11b - Mid channel

Frequency Range = 30 MHz ~ 10th harmonic.



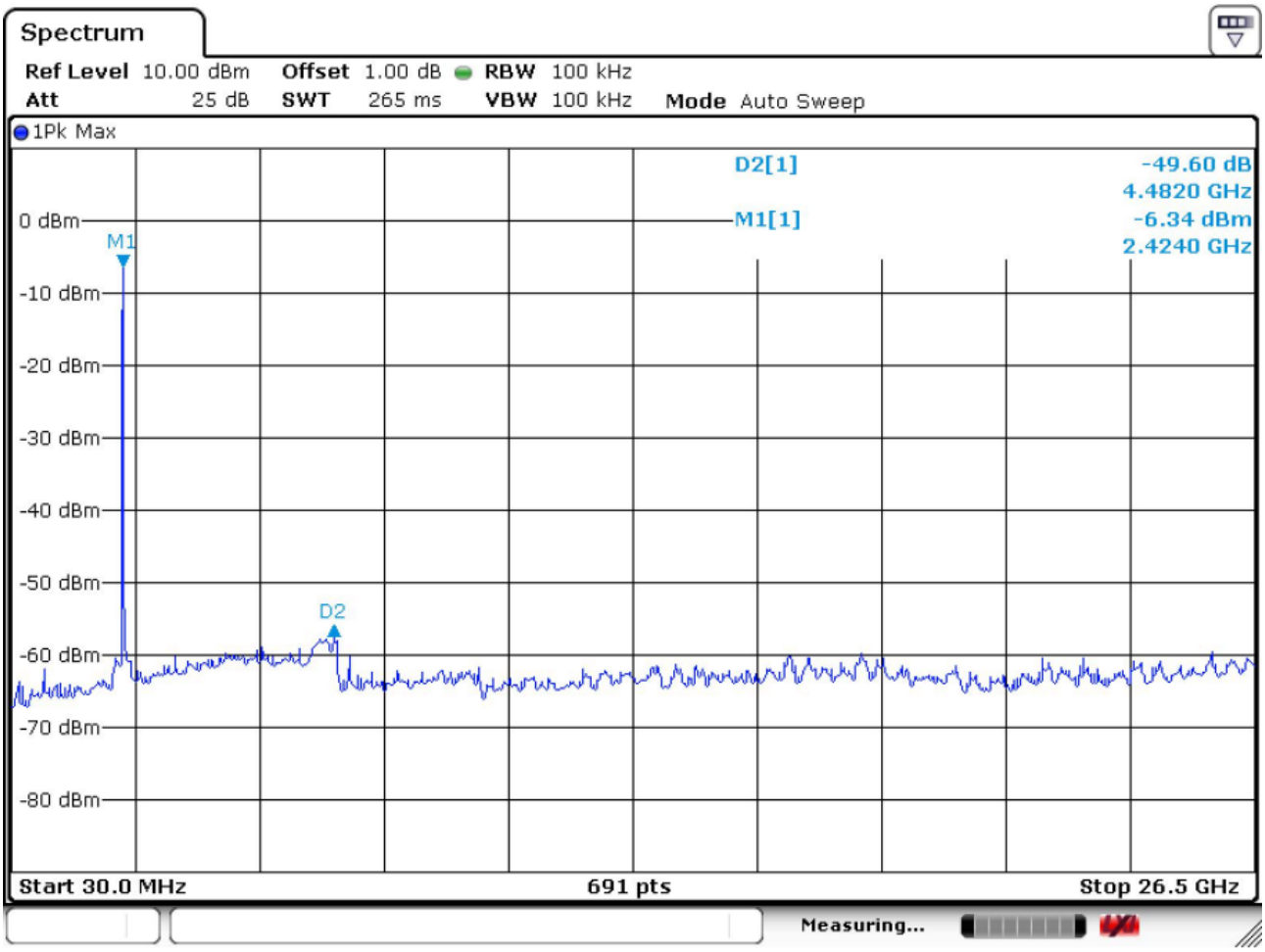
802.11b – High channel

Frequency Range = 30 MHz ~ 10th harmonic.



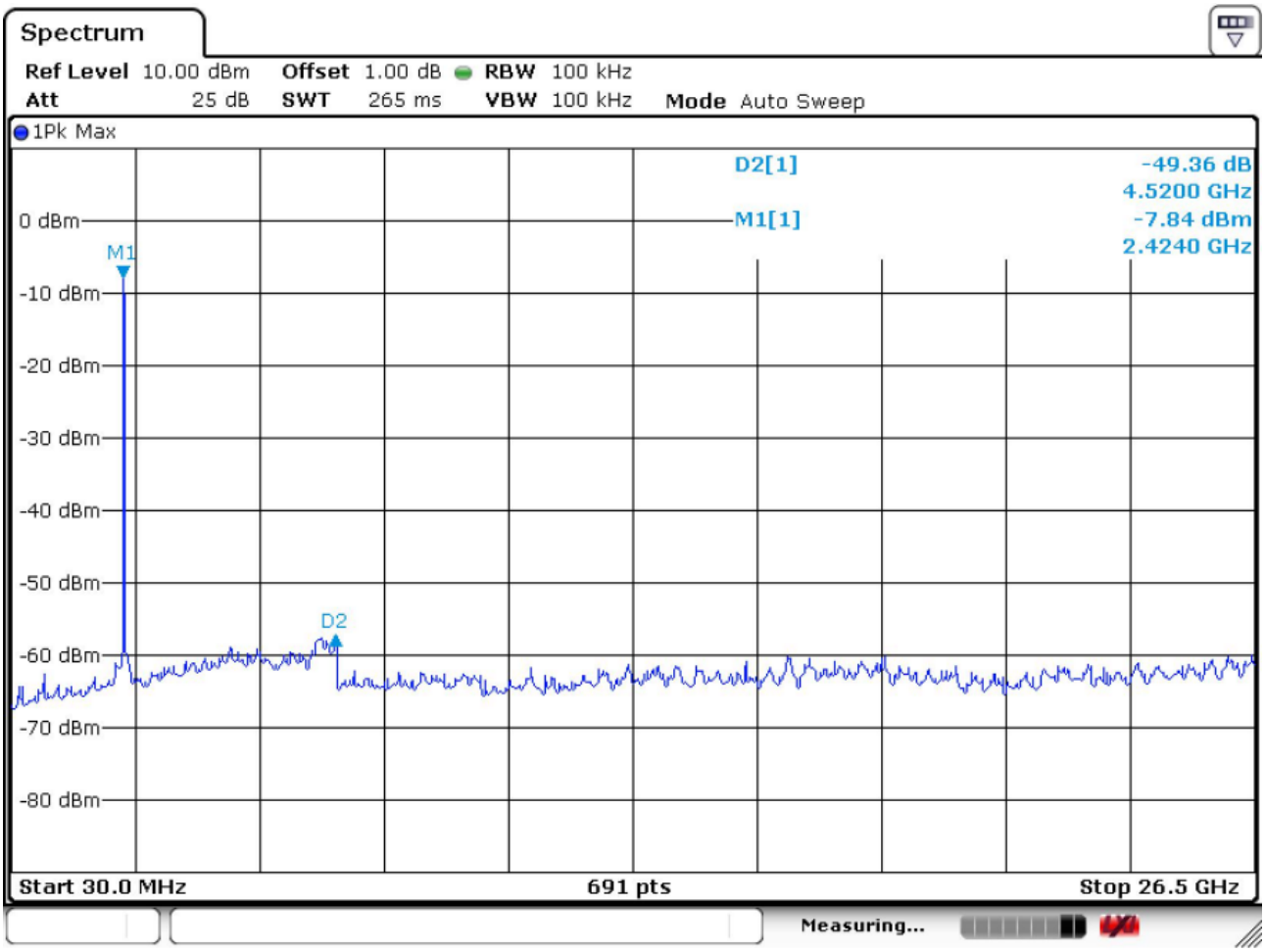
802.11g - Low channel

Frequency Range = 30 MHz ~ 10th harmonic.



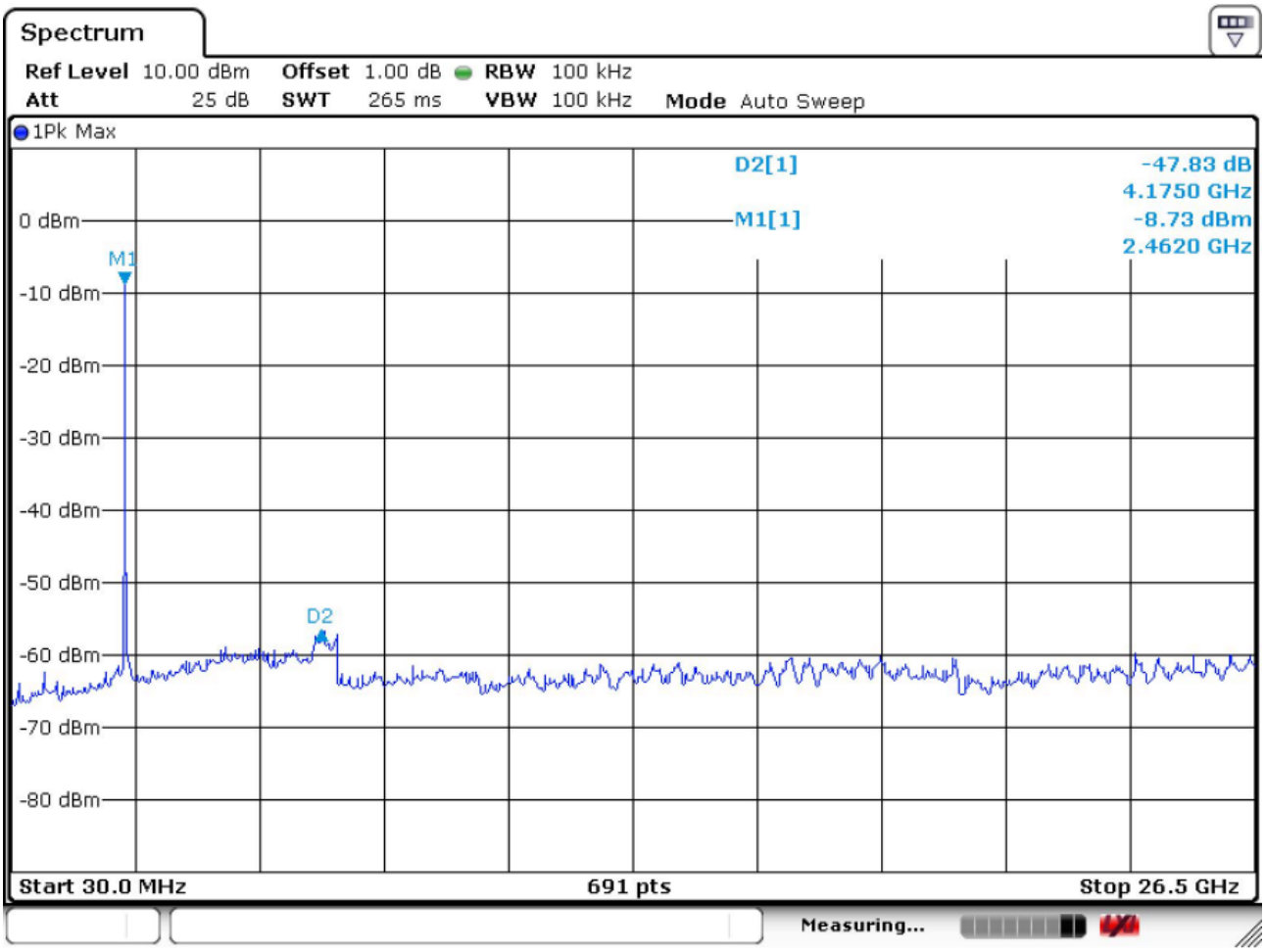
802.11g - Mid channel

Frequency Range = 30 MHz ~ 10th harmonic.



802.11g – High channel

Frequency Range = 30 MHz ~ 10th harmonic.



3.2.5 Field Strength of Harmonics

Procedure:

*The testing follows TCB Workshop 2012, April and fulfills ANSI C63.4-2003 and the guidelines in ANSI C63.10-2009 test requirement. The EUT was placed on a 0.8m high wooden table inside a shielded enclosure. An antenna was placed near the EUT and measurements of frequencies and amplitudes of field strengths were recorded for reference during final measurements. For final radiated testing, measurements were performed in OATS. Measurements were performed with the EUT oriented in 3 orthogonal axis and rotated 360 degrees to determine worst-case orientation for maximum emissions.

The spectrum analyzer is set to:

Center frequency = the worst channel

Frequency Range = 9 KHz ~ 10th harmonic.

RBW = 120 kHz (9 KHz ~ 1 GHz) Peak:VBW ≥ RBW

= 1 MHz (1 GHz ~ 10th harmonic) Average:VBW=10Hz

Span = 100 MHz Detector function = Peak and Average

Trace = max hold Sweep = auto

Measurement Data: Complies

- Refer to the next page.
- No other emissions were detected at a level greater than 20dB below limit.
- The three antennas were used with this EUT during the Testing.

Minimum Standard: FCC Part 15.109

Frequency (MHz)	Limit (uV/m) @ 10m
0.009 ~ 0.490	2400/F (kHz) @ 300m
0.490 ~ 1.705	24000/F (kHz) @ 30m
1.705 ~ 30	30 @ 30m
30 ~ 88	90
88 ~ 216	150
216 ~ 960	210
Above 960	300

** Except as provided in 15.209(g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88MHz, 174-216MHz or 470-806MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g. 15.231 and 15.241.

802.11b Measurement Data: (above 1GHz)

Frequency [MHz]	Reading [dBuV/m] AV	Reading [dBuV/m] Peak	Pol.	Correction Factor Antenna	Correction Factor Amp. Gain+Cable	Limits [dBuV/m] AV	Limits [dBuV/m] Peak	Result [dBuV/m] AV	Result [dBuV/m] Peak	Margin [dB] AV	Margin [dB] Peak
4824.1	45.3	58.6	V	33.1	28.7	54.0	74.0	49.7	63.0	4.3	11.0
-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-

Frequency [MHz]	Reading [dBuV/m] AV	Reading [dBuV/m] Peak	Pol.	Correction Factor Antenna	Correction Factor Amp. Gain+Cable	Limits [dBuV/m] AV	Limits [dBuV/m] Peak	Result [dBuV/m] AV	Result [dBuV/m] Peak	Margin [dB] AV	Margin [dB] Peak
4874.1	43.8	56.3	V	33.1	28.7	54.0	74.0	48.2	60.7	5.8	13.3
-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-

Frequency [MHz]	Reading [dBuV/m] AV	Reading [dBuV/m] Peak	Pol.	Correction Factor Antenna	Correction Factor Amp. Gain+Cable	Limits [dBuV/m] AV	Limits [dBuV/m] Peak	Result [dBuV/m] AV	Result [dBuV/m] Peak	Margin [dB] AV	Margin [dB] Peak
4924.1	43.2	56.3	V	33.1	28.7	54.0	74.0	47.6	60.7	6.4	13.3
-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-

No other emissions were detected at a level greater than 20dB below limit.

802.11b Measurement Data: (9kHz - 30MHz)

Frequency [MHz]	Reading [dBuV/m] AV	Reading [dBuV/m] Peak	Pol.	Correction Factor Antenna	Correction Factor Amp.Gain+Cable	Limits [dBuV/m] AV	Limits [dBuV/m] Peak	Result [dBuV/m] AV	Result [dBuV/m] Peak	Margin [dB] AV	Margin [dB] Peak
-	-	-	-	-	-	-	-	-	-	-	-
No emissions were detected at a level greater than 20dB below limit.											
-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-

*No emissions were detected at a level greater than 20dB below limit.

802.11g Measurement Data: (above 1GHz)

Frequency [MHz]	Reading [dBuV/m] AV	Reading [dBuV/m] Peak	Pol.	Correction Factor Antenna	Correction Factor Amp. Gain+Cable	Limits [dBuV/m] AV	Limits [dBuV/m] Peak	Result [dBuV/m] AV	Result [dBuV/m] Peak	Margin [dB] AV	Margin [dB] Peak
4825.7	41.1	57.9	V	33.1	28.7	54.0	74.0	45.5	62.3	8.5	11.7
-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-

Frequency [MHz]	Reading [dBuV/m] AV	Reading [dBuV/m] Peak	Pol.	Correction Factor Antenna	Correction Factor Amp. Gain+Cable	Limits [dBuV/m] AV	Limits [dBuV/m] Peak	Result [dBuV/m] AV	Result [dBuV/m] Peak	Margin [dB] AV	Margin [dB] Peak
4874.4	38.9	54.6	V	33.1	28.7	54.0	74.0	43.3	59.0	10.7	15.0
-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-

Frequency [MHz]	Reading [dBuV/m] AV	Reading [dBuV/m] Peak	Pol.	Correction Factor Antenna	Correction Factor Amp. Gain+Cable	Limits [dBuV/m] AV	Limits [dBuV/m] Peak	Result [dBuV/m] AV	Result [dBuV/m] Peak	Margin [dB] AV	Margin [dB] Peak
4915.1	38.6	54.5	V	33.1	28.7	54.0	74.0	43.0	58.9	11.0	15.1
-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-

No other emissions were detected at a level greater than 20dB below limit.

802.11g Measurement Data: (9kHz - 30MHz)

Frequency [MHz]	Reading [dBuV/m] AV	Reading [dBuV/m] Peak	Pol.	Correction Factor Antenna	Correction Factor Amp.Gain+Cable	Limits [dBuV/m] AV	Limits [dBuV/m] Peak	Result [dBuV/m] AV	Result [dBuV/m] Peak	Margin [dB] AV	Margin [dB] Peak
-	-	-	-	-	-	-	-	-	-	-	-
No emissions were detected at a level greater than 20dB below limit.											
-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-

*No emissions were detected at a level greater than 20dB below limit.

Radiated Emissions – Wi-Fi+Capture mode (Worst case, B mode)

LTA
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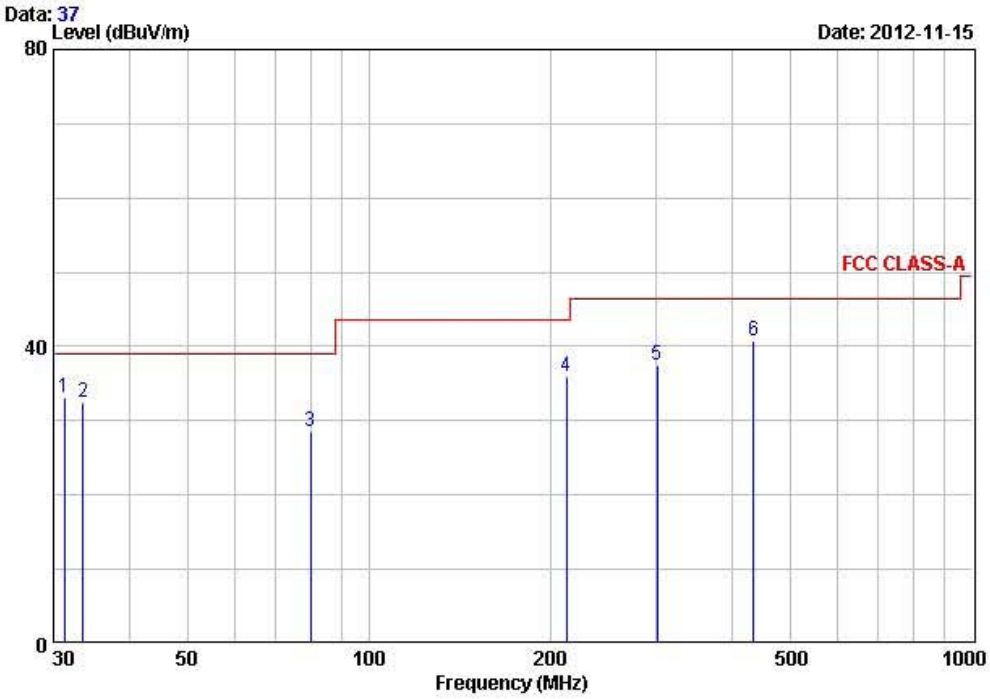
Tel :+82-31-3236008,9
Fax:+82-31-3236010

EUT/Model No.: COWON AW1 TEST MODE: Wi-Fi + Capture mode

Temp Humi : 8 / 38 Tested by: PARK.H.W



	Freq	Reading	C.F	Result	Limit QP	Margin	Height	Angle	Polarity
	MHz	dBuV/m	dB/m	dBuV/m	dBuV/m	dB	cm	deg	
1	31.24	50.50	-17.32	33.18	39.00	5.82	100	76	VERTICAL
2	33.60	49.70	-17.12	32.58	39.00	6.42	100	98	VERTICAL
3	80.08	48.10	-19.62	28.48	39.00	10.52	100	167	VERTICAL
4	212.48	51.50	-15.53	35.97	43.50	7.53	400	251	HORIZONTAL
5	300.37	48.90	-11.51	37.39	46.40	9.01	296	83	HORIZONTAL
6	434.07	49.20	-8.43	40.77	46.40	5.63	257	46	HORIZONTAL

Remarks: C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain

APPENDIX

TEST EQUIPMENT USED FOR TESTS

	Description	Model No.	Serial No.	Manufacturer	Interval	Last Cal. Date
1	Spectrum Analyzer (~30GHz)	FSV-30	100757	R&S	1 year	2012-01-10
2	Spectrum Analyzer (~2.9GHz)	8594E	3710A04074	HP	2 year	Self-Calibration
3	Signal Generator (~3.2GHz)	8648C	3623A02597	HP	1 year	2012-03-26
4	Signal Generator (1~20GHz)	83711B	US34490456	HP	1 year	2012-03-26
5	Attenuator (3dB)	8491A	37822	HP	2 year	2012-09-22
6	Attenuator (10dB)	8491A	63196	HP	2 year	2012-09-22
7	Attenuator (30dB)	8498A	3318A10929	HP	2 year	2011-01-05
8	Test Receiver (~30MHz)	ESHS10	828404/009	R&S	1 year	2012-03-26
9	EMI Test Receiver (~7GHz)	ESCI7	100722	R&S	1 year	2012-09-22
10	RF Amplifier (~1.3GHz)	8447D	2439A09058	HP	2 year	2012-09-22
11	RF Amplifier (1~18GHz)	8449B	3008A02126	HP	2 year	2012-03-26
12	Horn Antenna (1~18GHz)	BBHA 9120D	9120D122	SCHWARZBECK	2 year	2010-12-24
13	Horn Antenna (18 ~ 40GHz)	SAS-574	154	Schwarzbeck	2 year	2012-11-24
14	Horn Antenna (18 ~ 40GHz)	SAS-574	155	Schwarzbeck	2 year	2012-11-24
15	TRILOG Antenna	VULB 9160	9160-3172	SCHWARZBECK	2 year	2012-09-20
16	Hygro-Thermograph	THB-36	0041557-01	ISUZU	1 year	2012-09-26
17	Splitter (SMA)	ZFSC-2-2500	SF617800326	Mini-Circuits	-	-
18	Power Divider	11636A	6243	HP	2 year	2012-09-22
19	DC Power Supply	6622A	3448A03079	HP	-	-
20	Frequency Counter	5342A	2826A12411	HP	1 year	2012-03-26
21	Power Meter	EPM-441A	GB32481702	HP	1 year	2012-03-26
22	Power Sensor	8481A	US41030291	HP	1 year	2012-09-22
23	Audio Analyzer	8903B	3729A18901	HP	1 year	2012-09-22
24	Modulation Analyzer	8901B	3749A05878	HP	1 year	2012-09-22
25	TEMP & HUMIDITY Chamber	YJ-500	LTAS06041	JinYoung Tech	1 year	2012-09-22
26	Stop Watch	HS-3	601Q09R	CASIO	2 year	2012-03-26
27	LISN	ENV216	100408	R&S	1 year	2012-09-22
28	UNIVERSAL RADIO COMMUNICATION TESTER	CMU200	106243	R&S	2 year	2012-06-27
29	Highpass Filter	WHKX1.5/15G-10SS	74	Wainwright Instruments	-	-
30	Highpass Filter	WHKX3.0/18G-10SS	118	Wainwright Instruments	-	-