







#### ISO/IEC17025Accredited Lab.

Report No: FCC 1406125-01 File reference No: 2014-06-17

Applicant: Welgate Co.,Ltd

Product: U Stick (Mini PC)

Model No: WA-U420D, WA-U220D

Trademark: N/A

Test Standards: FCC Part 15.247

Test result:

It is herewith confirmed and found to comply with the

requirements set up by ANSI C63.4, FCC Part 15 Subpart C, Paragraph 15.247 regulations for the evaluation of

electromagnetic compatibility

Approved By

Jack Chung

Jack Chung

Manager

Dated: June 17, 2014

Results appearing herein relate only to the sample tested

The technical reports is issued errors and omissions exempt and is subject to withdrawal at

# SHENZHEN TIMEWAY TECHNOLOGY CONSULTING CO., LTD

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# **Special Statement:**

The testing quality ability of our laboratory meet with "Quality Law of People's Republic of China" Clause 19.

The testing quality system of our laboratory meet with ISO/IEC-17025 requirements, which is approved by CNAL. This approval result is accepted by MRA of APLAC.

Our test facility is recognized, certified, or accredited by the following organizations:

#### **CNAL-LAB Code: L2292**

The EMC Laboratory has been assessed and in compliance with CNAL/AC01:2002 accreditation criteria for testing Laboratories (identical to ISO/IEC 17025:1999 General Requirements) for the Competence of testing Laboratories.

# FCC-Registration No.: 899988

The EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications commission. The acceptance letter from the FCC is maintained in our files. Registration No.: 899988.

# IC- Registration No.: IC5205A-02

The EMC Laboratory has been registered and fully described in a report filed with the (IC) Industry Canada. The acceptance letter from the IC is maintained in our files. Registration IC No.: 5205A-02.

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# Test Report Conclusion

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#### 1.0 General Details

#### 1.1 Test Lab Details

Name: SHENZHEN TIMEWAY TECHNOLOGY CONSULTING CO., LTD

Address: 5/F,Block 4, Anhua Industrial Zone.,No.8 TaiRan Rd.CheGongMiao,FuTian District,

Shenzhen, CHINA.

Telephone: (755) 83448688 Fax: (755) 83442996

Site on File with the Federal Communications Commission – United Sates

Registration Number: 899988

For 3m & 10 m OATS

Site Listed with Industry Canada of Ottawa, Canada

Registration Number: IC: 5205A-02

For 3m & 10 m OATS

#### 1.2 Applicant Details

Applicant: Welgate Co.,Ltd

Address: 19F, Geopyeong Bldg, 129, Bongeunsa-ro, Gangnam-gu, Seoul, 135-726, Korea

Telephone: +82-2-3471-4181

Fax: --

#### 1.3 Description of EUT

Product: U Stick (Mini PC)

Manufacturer: ShenZhen Netxeon Technology Co.,Ltd

Address: Unit 708,7/F West, Building 202 Tai Ran Industrial Park, Chegongmiao,

Shenzhen, China

Brand Name: N/A

Model Number: WA-U420D Additional Model Number: WA-U220D

Type of Modulation IEEE 802.11b : DSSS (CCK, QPSK, DBPSK)

IEEE 802.11g/n (HT20): OFDM(64QAM, 16QAM, QPSK, BPSK)

Frequency range IEEE 802.11b/g/n (HT20) : 2412-2462MHz;

Channel Spacing 5MHz for IEEE 802.11b/g/n(HT20) Air Data Rate IEEE 802.11b : 11, 5.5, 2, 1 Mbps

IEEE 802.11g: 54, 48,36, 24, 18, 12, 9, 6 Mbps

IEEE 802.11n HT20: MCS0, MCS1, MCS2, MCS3, MCS4, MCS5, MCS6, MCS7

Frequency Selection By software

Channel Number IEEE 802.11b/g/n (HT20) : 11 Channels
Antenna: Integral Antenna with maximum gain 2.0dBi

Power Adapter Model No.1: K-E70501000U1

Input: 100-240V, 50/60Hz, 0.15A Max; Output: 5V, 1000mA

The report refers only to the sample tested and does not apply to the bulk.

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Model No.2: K-E30502000U1

Input: 100-240V, 50/60Hz, 0.35A Max; Output: 5V, 2000mA

Model No.3: SK21G-0500200U

Input: AC100-240V, 50/60Hz, 0.4A Max; Output: 5V, 2A

1.4 Submitted Sample: 2 Samples

1.5 Test Duration

Date: 2014-06-17

2014-05-29 to 2014-06-16

1.6 Test Uncertainty

Conducted Emissions Uncertainty = 3.6dB Radiated Emissions Uncertainty = 4.7dB

1.7 Test Engineer

Terry Tang

The sample tested by

Print Name: Terry Tang

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2.0	Test Equipments							
Instrument Type	Manufacturer	Model	Serial No.	Date of Cal.	Due Date			
ESPI Test Receiver	ROHDE&SCHWARZ	ESPI 3	100379	2013-08-23	2014-08-22			
TWO Line-V-NETW	ROHDE&SCHWARZ	EZH3-Z5	100294	2013-08-23	2014-08-22			
TWO Line-V-NETW	ROHDE&SCHWARZ	EZH3-Z5	100253	2013-08-23	2014-08-22			
Ultra Broadband ANT	ROHDE&SCHWARZ	HL562	100157	2013-08-25	2014-08-24			
ESDV Test Receiver	ROHDE&SCHWARZ	ESDV	100008	2013-08-23	2014-08-22			
Impuls-Begrenzer	ROHDE&SCHWARZ	ESH3-Z2	100281	2013-08-24	2014-08-23			
System Controller	CT	SC100	-					
Printer	EPSON	РНОТО ЕХЗ	CFNH234850					
Computer	IBM	8434	1S8434KCE99BLXL O*	-	-			
Loop Antenna	EMCO	6502	00042960	2013-08-23	2014-08-22			
ESPI Test Receiver	ROHDE&SCHWARZ	ESI26	838786/013	2013-08-23	2014-08-22			
3m OATS			N/A	2013-08-22	2014-08-21			
Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170265	2013-08-24	2014-08-23			
Horn Antenna	SCHWARZBECK	BBHA 9120D	9120D-631	2013-08-24	2014-08-23			
Power meter	Anritsu	ML2487A	6K00003613	2013-08-24	2014-08-23			
Power sensor	Anritsu	MA2491A	32263	2013-08-24	2014-08-23			
Bilog Antenna	Schwarebeck	VULB9163	9163/340	2013-08-21	2014-08-20			
LISN	AFJ	LS16C	10010947251	2013-08-21	2014-08-20			
LISN (Three Phase)	Schwarebeck	NSLK 8126	8126453	2013-08-23	2014-08-22			
9*6*6 Anechoic			N/A	2013-08-22	2014-08-21			
EMI Test Receiver	RS	ESCS30	100139	2013-08-23	2014-08-22			

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#### 3. DESCRIPTION OF TEST MODES

## IEEE 802.11b, 802.11g, 802.11n (HT20) mode

The EUT had been tested under operating condition. There are three channels have been tested as following:

Channel	Frequency (MHz)
Low	2412
Middle	2437
High	2462

IEEE 802.11b mode: 11Mbps data rate (worst case) was chosen for full testing. IEEE 802.11g mode: 54Mbps data rate (worst case) was chosen for full testing. IEEE 802.11n (HT20) mode: MCS0 data rate (worst case) were chosen for full testing

The worst-case data rates are determined according to the description above, based on the investigations by measuring the PSD and average power across all the data rates, bandwidths, modulations and spatial stream modes.

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#### 3.0 Technical Details

# 3.1 Summary of test results

Standard	Test Type	Result	Notes
CCC Part 15, Paragraph 15.107 & 15.207	<b>Conducted Emission Test</b>	PASS	Complies
FCC Part 15 Subpart C Paragraph 15.247(a)(2) Limit	Spectrum bandwidth of a Orthogonal Frequency Division Multiplex System Limit: 6dB bandwidth>500kHz	PASS	Complies
FCC Part 15, Paragraph 15.247(b)	Maximum peak output power Limit: max. 30dBm	PASS	Complies
FCC Part 15, Paragraph 15.109,15.205 & 15.209	Transmitter Radiated Emission Limit: Table 15.209	PASS	Complies
FCC Part 15, Paragraph 15.247(e)	Power Spectral Density Limit: max. 8dBm	PASS	Complies
FCC Part 15, Paragraph 15.247(d)	Out of Band Emission and Restricted Band Radiation Limit: 20dB less than peak value of fundamental frequency Restricted band limit: Table 15.209	PASS	Complies

## 3.2 Test Standards

FCC Part 15 Subpart & Subpart C, Paragraph 15.247

# 4.0 EUT Modification

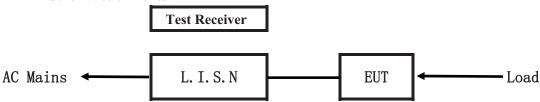
No modification by Shenzhen Timeway Technology Consulting Co., Ltd

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#### 5.0 Power Line Conducted Emission Test

#### 5.1 Schematics of the test

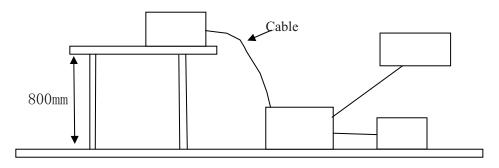


**EUT: Equipment Under Test** 

#### 5.2 Test Method and test Procedure

The EUT was tested according to ANSI C63.4-2003. The Frequency spectrum From 0.15MHz to 30MHz was investigated. The LISN used was 50ohm/50uH as specified by section 5.1 of ANSI C63.4-2003.

Test Voltage: 120V~, 60Hz Block diagram of Test setup



#### 5.3 Configuration of The EUT

The EUT was configured according to ANSI C63.4-2003. All interface ports were connected to the appropriate peripherals. All peripherals and cables are listed below.

#### A. EUT

Device	Manufacturer	Model	IC
U Stick (Mini PC)	ShenZhen Netxeon Technology	WA-U420D,	FCC ID: 2ACDD-0508
O Suck (Milli PC)	Co.,Ltd	WA-U220D	FCC ID. 2ACDD-0308

#### B. Internal Device

Device	Manufacturer	Model	FCC ID/DOC
N/A			

## C. Peripherals

Device	Manufacturer	Model	FCC ID/DOC	Cable

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# 5.4 EUT Operating Condition

Operating condition is according to ANSI C63.4 -2003.

- A Setup the EUT and simulators as shown on follow
- B Enable AF signal and confirm EUT active to normal condition

## 5.5 Power line conducted Emission Limit according to Paragraph 15.207 and 15.107 and RSS-210

Frequency	Class A Lim	its (dB µ V)	Class B Limits (dB µ V)			
(MHz)	Quasi-peak Level	Average Level	Quasi-peak Level	Average Level		
$0.15 \sim 0.50$	79.0	66.0	66.0~56.0*	56.0~46.0*		
$0.50 \sim 5.00$	73.0	60.0	56.0	46.0		
5.00 ~ 30.00	73.0	60.0	60.0	50.0		

Notes:

- 1. \*Decreasing linearly with logarithm of frequency.
- 2. The tighter limit shall apply at the transition frequencies

#### 5.6 Test Results

The frequency spectrum from 0.15MHz to 30MHz was investigated. All reading are quasi-peak values with a resolution bandwidth of 9kHz.

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## A: Conducted Emission on Live Terminal (150kHz to 30MHz)

**EUT Operating Environment** 

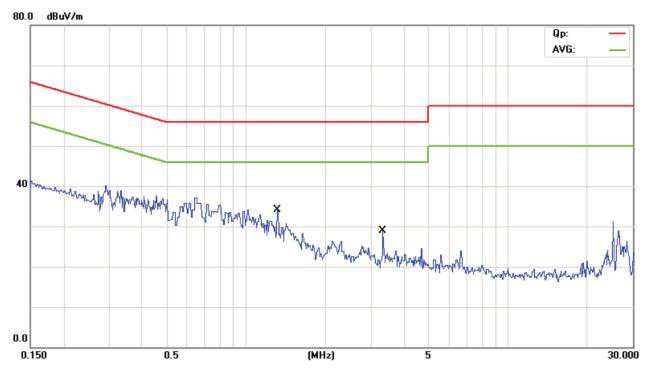
Temperature: 26°C Humidity: 65%RH Atmospheric Pressure: 101 KPa

**EUT set Condition: Keep WIFI Transmitting** 

**Equipment Level: Class B** 

**Results: PASS** 

Please refer to following diagram for individual



No. Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 *	1.3192	7.20	12.03	19.23	56.00	-36.77	QP	
2	1.3192	-15.80	12.03	-3.77	46.00	-49.77	AVG	
3	3.3245	5.93	12.83	18.76	56.00	-37.24	QP	
4	3.3245	-23.40	12.83	-10.57	46.00	-56.57	AVG	

Note: Three adaptors was tested, only worst case was recorded

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## B: Conducted Emission on Neutral Terminal (150kHz to 30MHz)

**EUT Operating Environment** 

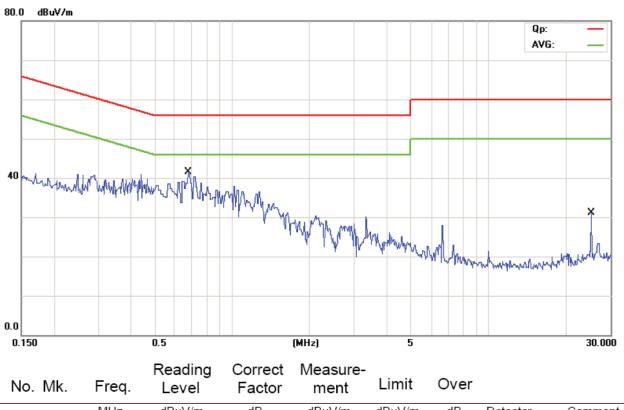
Temperature: 26°C Humidity: 65%RH Atmospheric Pressure: 101 KPa

**EUT set Condition: Keep WIFI Transmitting** 

**Equipment Level: Class B** 

**Results: Pass** 

Please refer to following diagram for individual



	No. Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over		
Ī		MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
-	1	0.6726	6.50	11.55	18.05	56.00	-37.95	QP	
	2	0.6726	-17.20	11.55	-5.65	46.00	-51.65	AVG	
	3 *	25.1738	19.50	11.40	30.90	60.00	-29.10	QP	
Ī	4	25.1738	-8.10	11.40	3.30	50.00	-46.70	AVG	

Note: Three adaptors was tested, only worst case was recorded

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#### **6** Radiated Emission Test

- 6.1 Test Method and test Procedure:
- (1) The EUT was tested according to ANSI C63.4 –2003. The radiated test was performed at Timeway Laboratory. This site is on file with the FCC laboratory division, Registration No.899988
- (2) The EUT, peripherals were put on the turntable which table size is 1m x 1.5 m, table high 0.8 m. All set up is according to ANSI C63.4-2003.
- (3) The frequency spectrum from 30 MHz to 25 GHz was investigated. All readings from 30 MHz to 1 GHz are Quasi-peak values with a resolution bandwidth of 120 kHz. For measurement above 1GHz, peak values with RBW=VBW=1MHz and PK detector. AV value with RBW=1MHz, VBW=10Hz and PK detector. Measurements were made at 3 meters.
- (4) The antenna high is varied from 1 m to 4 m high to find the maximum emission for each frequency.
- (5) Maximizing procedure was performed on the six (6) highest emissions to ensure EUT compliance is with all installation combinations. All data was recorded in the peak detection mode. Quasi-peak readings was performed only when an emission was found to be marginal (within -4 dB of specification limit), and are distinguished with a "QP" in the data table.
- (6) The antenna polarization : Vertical polarization and Horizontal polarization.

# Block diagram of Test setup Distance = 3m Computer Pre -Amplifier Furn-table Receiver

- 6.2 Configuration of The EUT

  Same as section 5.3 of this report
- 6.3 EUT Operating Condition
  Same as section 5.4 of this report.

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#### 6.4 Radiated Emission Limit

All emission from a digital device, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strength specified below:

#### Frequencies in restricted band are complied to limit on Paragraph 15.209 and 15.109 and RSS-210

Frequency Range (MHz)	Distance (m)	Field strength (dB µ V/m)
30-88	3	40.0
88-216	3	43.5
216-960	3	46.0
Above 960	3	54.0

Note:

- 1. RF Voltage (dBuV) = 20 log RF Voltage (uV)
- 2. In the Above Table, the higher limit applies at the band edges.
- 3. Distance refers to the distance in meters between the measuring instrument antenna and the EUT
- 4. Note: Three adaptors was tested, only worst case was recorded

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#### Test result

#### General Radiated Emission Data and Harmonics Radiated Emission Data

#### Radiated Emission In Horizontal/Vertical (30MHz----1000MHz)

EUT set Condition: **Keep Transmitting** 

**Results: Pass** 

Frequency (MHz)	Level@3m (dB \u03b4 V/m)	Antenna Polarity	Limit@3m (dB \( \mu \)V/m)
504.040	40.01	Н	46.00
168.000	34.67	Н	43.50
720.040	42.80	Н	46.00
504.040	40.68	V	46.00
168.000	30.26	V	43.50

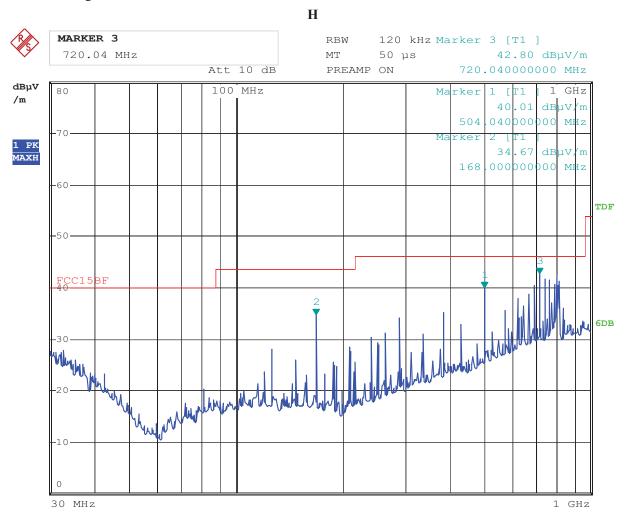
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#### Test Figure:



Date: 16.JUN.2014 15:29:54

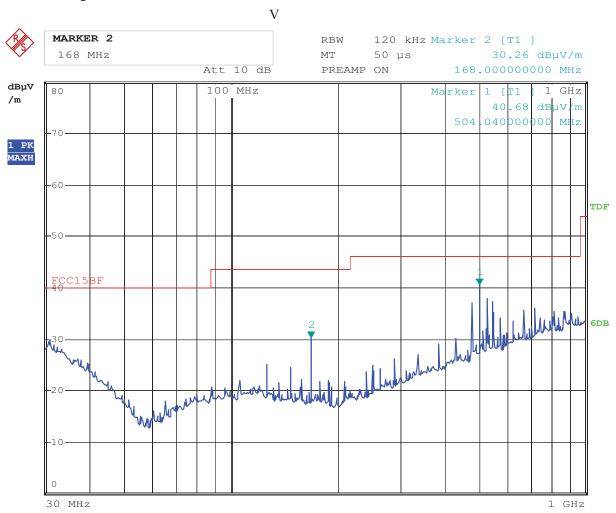
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#### Test Figure:



Date: 16.JUN.2014 15:26:24

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## Operation Mode: Transmitting under CH01 for 11g at 54Mbps

Frequency (MHz)	Level@3m (dB \u03b4 V/m)	Antenna Polarity	Limit@3m (dB \u03b4 V/m)
2412.00	93.43 (PK)	Н	Fundamental Frequency
2412.00	94.57 (PK)	H Fundamen V 74(Pea V 74(Pea H/V 74(Pea	Fundamental Frequency
4824.00	47.90 (PK)	Н	74(Peak)/ 54(AV)
4824.00	48.34 (PK)	V	74(Peak)/ 54(AV)
7236.00		H/V	74(Peak)/ 54(AV)
9648.00		H/V	74(Peak)/ 54(AV)
12060		H/V	74(Peak)/ 54(AV)
14472		H/V	74(Peak)/ 54(AV)
16884	16884		74(Peak)/ 54(AV)
19296	19296		74(Peak)/ 54(AV)
21708	21708		74(Peak)/ 54(AV)
24120		H/V 74(Peak)/ 54(A	

Note: 1. Level = Reading + AF + Cable - Preamp + Filter - Dist, Margin = Level - Limit

<sup>2.</sup> Remark "---" means that the emissions level is too low to be measured

<sup>3.</sup> For 802.11g mode 54Mbps

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## Operation Mode: Transmitting under CH06 for 11g at 54Mbps

Frequency (MHz)	Level@3m (dB \u03b4 V/m)	Antenna Polarity	Limit@3m (dB \mu V/m)
2437.00	93.47 (PK)	Н	Fundamental Frequency
2437.00	94.45 (PK)	V	Fundamental Frequency
4874.00	44.92 (PK)	V	74(Peak)/ 54(AV)
4874.00	48.71 (PK)	Н	74(Peak)/ 54(AV)
7311.00	-	H/V	74(Peak)/ 54(AV)
9748.00	-	H/V	74(Peak)/ 54(AV)
12185	-	H/V	74(Peak)/ 54(AV)
14622	-	H/V	74(Peak)/ 54(AV)
17059		H/V	74(Peak)/ 54(AV)
19496		H/V	74(Peak)/ 54(AV)
21933		H/V	74(Peak)/ 54(AV)
24370		H/V	74(Peak)/ 54(AV)

Note: 1. Level = Reading + AF + Cable - Preamp + Filter - Dist, Margin = Level - Limit

- 2. Remark "---" means that the emissions level is too low to be measured
- 3. For 802.11g mode 54 Mbps

#### Operation Mode: Transmitting under CH11 for 11g at 54Mbps

Frequency (MHz)	Level@3m (dB \u03b4 V/m)	Antenna Polarity	Limit@3m (dB \( \mu \)V/m)
2462.00	94.39 (PK)	Н	Fundamental Frequency
2462.00	94.80 (PK)	V	Fundamental Frequency
4924	47.64 (PK)	Н	74(Peak)/ 54(AV)
4924	46.93 (PK)	V	74(Peak)/ 54(AV)
7368	-	H/V	74(Peak)/ 54(AV)
9848		H/V	74(Peak)/ 54(AV)
12310	-	H/V	74(Peak)/ 54(AV)
14772	-	H/V	74(Peak)/ 54(AV)
17234	-	H/V	74(Peak)/ 54(AV)
19696		H/V	74(Peak)/ 54(AV)
22158		H/V	74(Peak)/ 54(AV)
24650		H/V	74(Peak)/ 54(AV)

Note: 1. Level = Reading + AF + Cable - Preamp + Filter - Dist, Margin = Level - Limit

- 2. Remark "---" means that the emissions level is too low to be measured
- 3. For 802.11g mode at 54 Mbps

The report refers only to the sample tested and does not apply to the bulk.

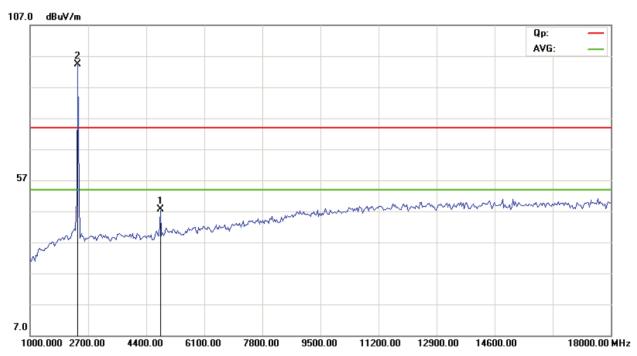
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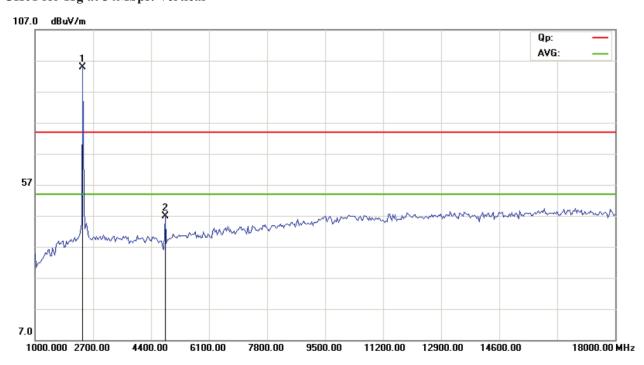


Please refer to the following test plots for details:

# CH01 for 11g at 54Mbps: Horizontal



## CH01 for 11g at 54Mbps: Vertical



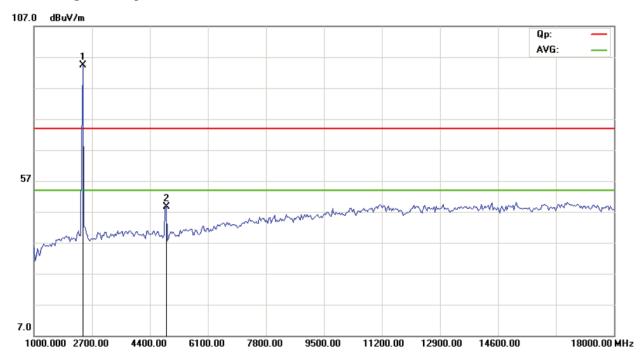
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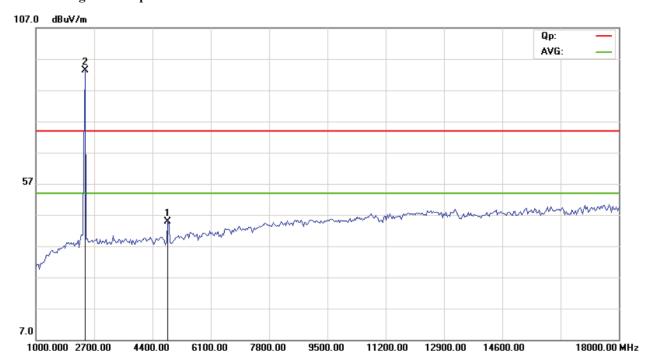
Date: 2014-06-17



## CH06 for 11g at 54Mbps: Vertical



# CH06 for 11g at 54Mbps: Horizontal



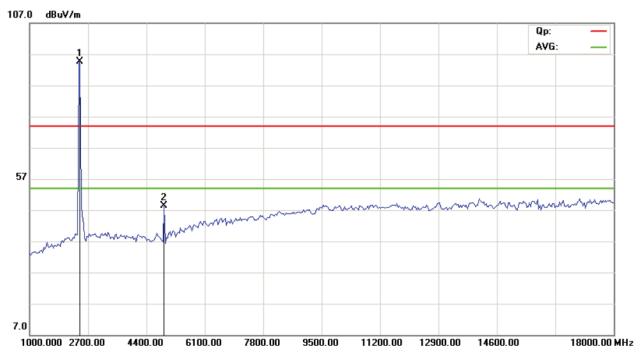
The report refers only to the sample tested and does not apply to the bulk.

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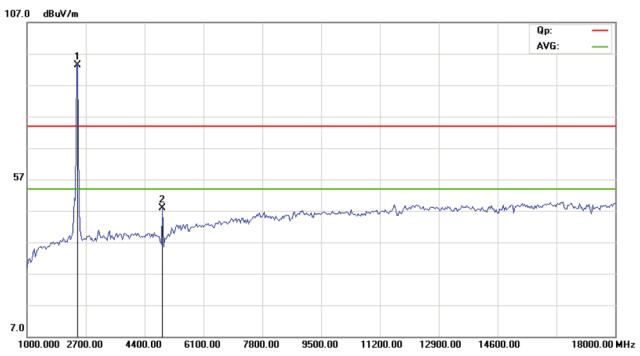
Date: 2014-06-17



# CH11 for 11g at 54Mbps: Vertical



#### CH11 for 11g at 54Mbps: Horizontal



Note: For radiated Emissions from 18-25GHz, it is only the floor noise.

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## Operation Mode: Transmitting under CH01 for 11b at 11Mbps

Frequency (MHz)	Level@3m (dB \u03b4 V/m)	Antenna Polarity	Limit@3m (dB \mu V/m)
2412.00	95.25 (PK)	Н	Fundamental Frequency
2412.00	96.82 (PK)	V	Fundamental Frequency
4824.00	45.60 (PK)	Н	74(Peak)/ 54(AV)
4824.00	48.40 (PK)	V	74(Peak)/ 54(AV)
7236.00		H/V	74(Peak)/ 54(AV)
9648.00		H/V	74(Peak)/ 54(AV)
12060		H/V	74(Peak)/ 54(AV)
14472		H/V	74(Peak)/ 54(AV)
16684		H/V	74(Peak)/ 54(AV)
19296		H/V	74(Peak)/ 54(AV)
21708		H/V	74(Peak)/ 54(AV)
24120		H/V	74(Peak)/ 54(AV)

Note: 1. Level = Reading + AF + Cable - Preamp + Filter - Dist, Margin = Level - Limit

- 2. Remark "---" means that the emissions level is too low to be measured
- 3. For 802.11b mode 11Mbps

#### Operation Mode: Transmitting under CH06 for 11b at 11Mbps

Frequency (MHz)	Level@3m (dB \u03b4 V/m)	Antenna Polarity	Limit@3m (dB \( \mu \)V/m)
2437.00	94.77 (PK)	Н	Fundamental Frequency
2437.00	95.65 (PK)	V	Fundamental Frequency
4874.00	47.65 (PK)	Н	74(Peak)/ 54(AV)
4874.00	46.72 (PK)	V	74(Peak)/ 54(AV)
7311.00	-	H/V	74(Peak)/ 54(AV)
9748.00		H/V	74(Peak)/ 54(AV)
12185		H/V	74(Peak)/ 54(AV)
14622	-	H/V	74(Peak)/ 54(AV)
17059	-	H/V	74(Peak)/ 54(AV)
19496		H/V	74(Peak)/ 54(AV)
21933		H/V	74(Peak)/ 54(AV)
24370		H/V	74(Peak)/ 54(AV)

Note: 1. Level = Reading + AF + Cable - Preamp + Filter - Dist, Margin = Level - Limit

- 2. Remark "---" means that the emissions level is too low to be measured
- 3. For 802.11b mode 11Mbps

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Date: 2014-06-17



## Operation Mode: Transmitting under CH11 for 11b at 11Mbps

Frequency (MHz)	Level@3m (dB \u03b4 V/m)	Antenna Polarity	Limit@3m (dB \mu V/m)
2462.00	94.52 (PK)	Н	Fundamental Frequency
2462.00	95.55 (PK)	V	Fundamental Frequency
4924	45.82 (PK)	Н	74(Peak)/ 54(AV)
4924	49.59 (PK)	V	74(Peak)/ 54(AV)
7368		H/V	74(Peak)/ 54(AV)
9848		H/V	74(Peak)/ 54(AV)
12310		H/V	74(Peak)/ 54(AV)
14772		H/V	74(Peak)/ 54(AV)
17234		H/V	74(Peak)/ 54(AV)
19696		H/V	74(Peak)/ 54(AV)
22158		H/V	74(Peak)/ 54(AV)
24650		H/V	74(Peak)/ 54(AV)

Note: 1. Level = Reading + AF + Cable - Preamp + Filter - Dist, Margin = Level - Limit

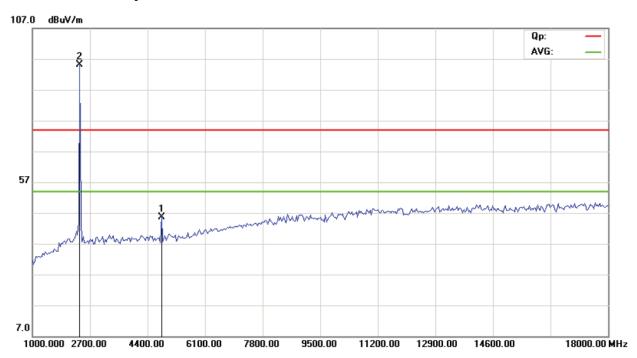
- 2. Remark "---" means that the emissions level is too low to be measured
- 3. For 802.11b mode at 11Mbps

Date: 2014-06-17

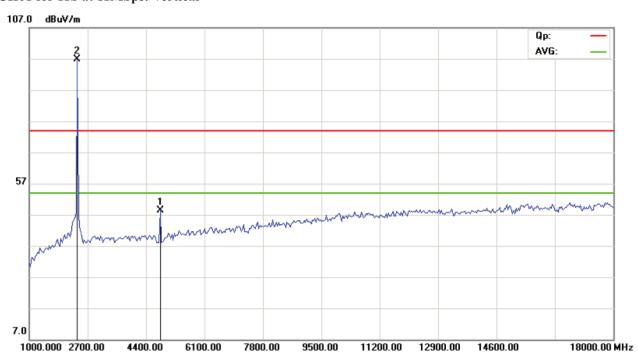


Please refer to the following test plots for details:

## CH01 for 11b at 11Mbps: Horizontal



#### CH01 for 11b at 11Mbps: Vertical



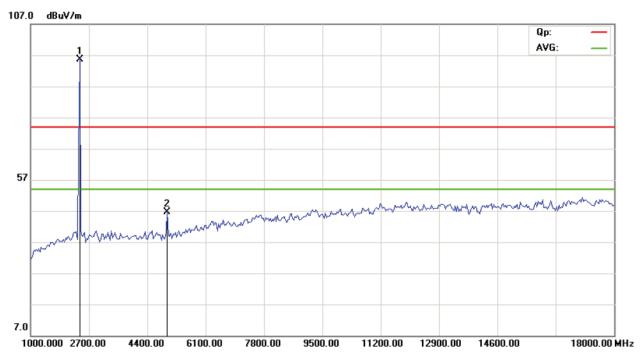
The report refers only to the sample tested and does not apply to the bulk.

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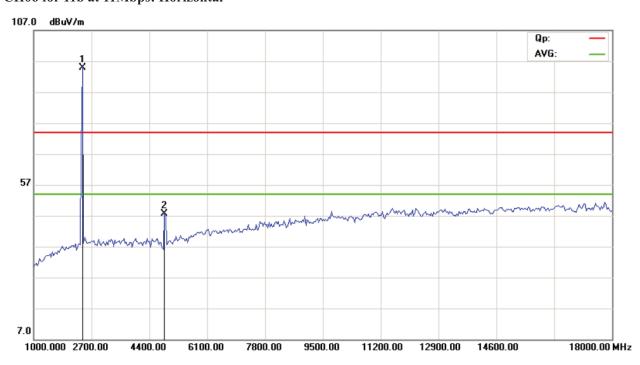
Date: 2014-06-17



# CH06 for 11b at 11Mbps: Vertical



# CH06 for 11b at 11Mbps: Horizontal



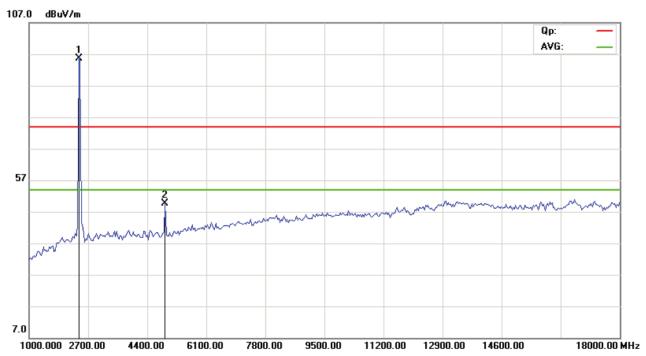
The report refers only to the sample tested and does not apply to the bulk.

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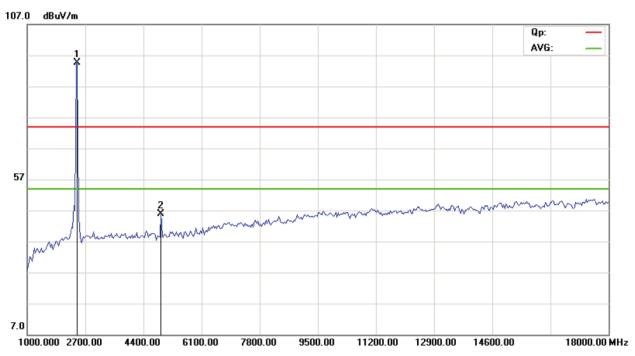
Date: 2014-06-17



# CH11 for 11b at 11Mbps: Vertical



#### CH11 for 11b at 11Mbps: Horizontal



Note: For radiated Emissions from 18-25GHz, it is only the floor noise.

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Date: 2014-06-17



## Operation Mode: Transmitting under CH01 for 11n HT20 at MCS0

Frequency (MHz)	Level@3m (dB \u03bc V/m)	Antenna Polarity	Limit@3m (dB µ V/m)
2412.00	95.36 (PK)	Н	Fundamental Frequency
2412.00	96.39 (PK)	V	Fundamental Frequency
4824.00	47.35 (PK)	Н	74(Peak)/ 54(AV)
4824.00	48.64 (PK)	V	74(Peak)/ 54(AV)
7236.00		H/V	74(Peak)/ 54(AV)
9648.00		H/V	74(Peak)/ 54(AV)
12060		H/V	74(Peak)/ 54(AV)
14472		H/V	74(Peak)/ 54(AV)
16684		H/V	74(Peak)/ 54(AV)
19296		H/V	74(Peak)/ 54(AV)
21708		H/V	74(Peak)/ 54(AV)
24120		H/V	74(Peak)/ 54(AV)

Note: 1. Level = Reading + AF + Cable - Preamp + Filter - Dist, Margin = Level - Limit

- 2. Remark "---" means that the emissions level is too low to be measured
- 3. For 802.11n (HT20) mode 65Mbps

## Operation Mode: Transmitting under CH06 for 11n HT20 at MCS0

Frequency (MHz)	Level@3m (dB \u03b4 V/m)	Antenna Polarity	Limit@3m (dB \( \mu \)V/m)
2437.00	94.66 (PK)	Н	Fundamental Frequency
2437.00	95.70 (PK)	V Fundamenta V 74(Peak) V 74(Peak) H/V 74(Peak) H/V 74(Peak)	Fundamental Frequency
4874.00	46.31 (PK)	Н	74(Peak)/ 54(AV)
4874.00	48.81 (PK)	V	74(Peak)/ 54(AV)
7311.00		H/V	74(Peak)/ 54(AV)
9748.00	-1	H/V	74(Peak)/ 54(AV)
12185		H/V	74(Peak)/ 54(AV)
14622	H/V		74(Peak)/ 54(AV)
17059		H/V	74(Peak)/ 54(AV)
19496	-	H/V	74(Peak)/ 54(AV)
21933		H/V	74(Peak)/ 54(AV)
24370		H/V	74(Peak)/ 54(AV)

Note: 1. Level = Reading + AF + Cable - Preamp + Filter - Dist, Margin = Level - Limit

- 2. Remark "---" means that the emissions level is too low to be measured
- 3. For 802.11n (HT20) mode 65Mbps

The report refers only to the sample tested and does not apply to the bulk.

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## Operation Mode: Transmitting under CH11 for 11n HT20 at MCS0

Frequency (MHz)	Level@3m (dB \u03b4 V/m)	Antenna Polarity	Limit@3m (dB µ V/m)
2462.00	94.57 (PK)	Н	Fundamental Frequency
2462.00	95.95 (PK)	V	Fundamental Frequency
4924	47.22 (PK)	Н	74(Peak)/ 54(AV)
4924	48.00 (PK)	V	74(Peak)/ 54(AV)
7368		H/V	74(Peak)/ 54(AV)
9848		H/V	74(Peak)/ 54(AV)
12310		H/V	74(Peak)/ 54(AV)
14772		H/V	74(Peak)/ 54(AV)
17234		H/V	74(Peak)/ 54(AV)
19696		H/V	74(Peak)/ 54(AV)
22158		H/V	74(Peak)/ 54(AV)
24650		H/V	74(Peak)/ 54(AV)

Note: 1. Level = Reading + AF + Cable - Preamp + Filter - Dist, Margin = Level - Limit

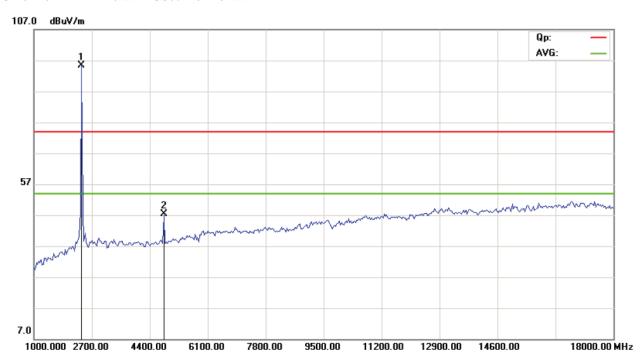
- 2. Remark "---" means that the emissions level is too low to be measured
- 3. For 802.11n (HT20) mode 65Mbps

Date: 2014-06-17

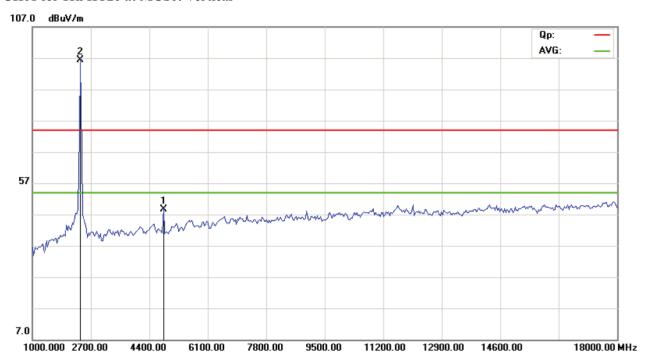


Please refer to the following test plots for details:

#### CH01 for 11n HT20 at MCS0: Horizontal



#### CH01 for 11n HT20 at MCS0: Vertical



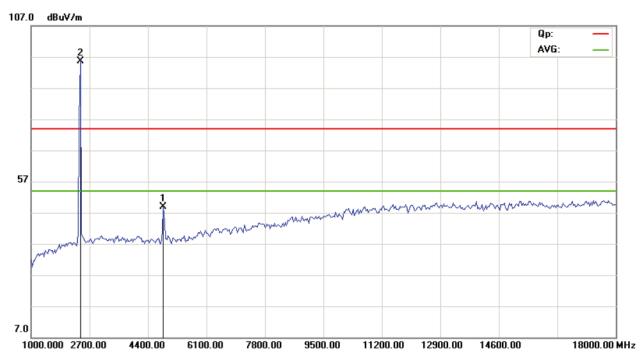
The report refers only to the sample tested and does not apply to the bulk.

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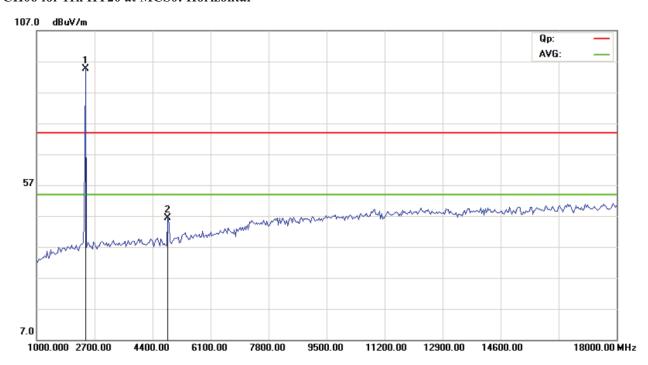
Date: 2014-06-17



#### CH06 for 11n HT20 at MCS0: Vertical



#### CH06 for 11n HT20 at MCS0: Horizontal



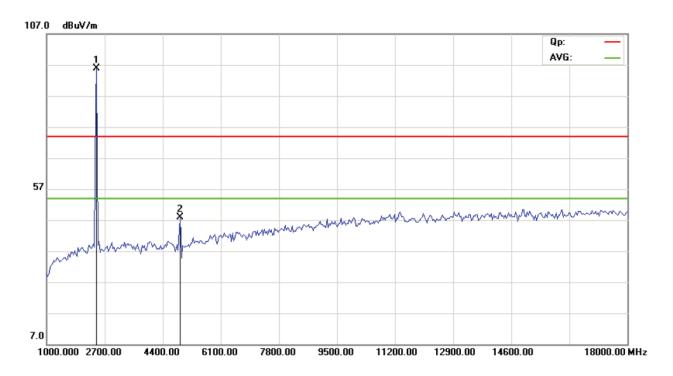
The report refers only to the sample tested and does not apply to the bulk.

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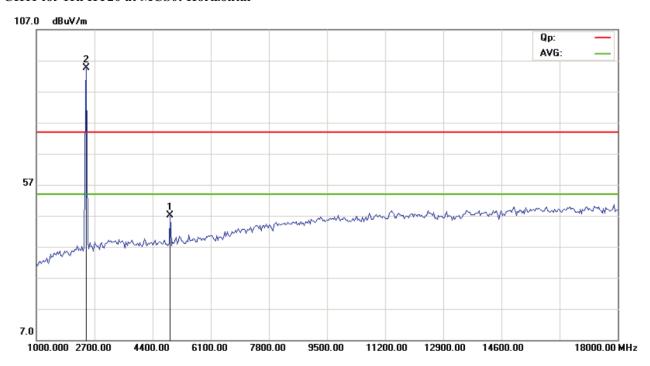
Date: 2014-06-17



#### CH11 for 11n HT20 at MCS0: Vertical



#### CH11 for 11n HT20 at MCS0: Horizontal



Note: For radiated Emissions from 18-25GHz, it is only the floor noise.

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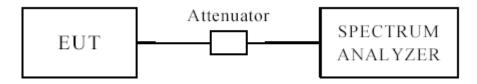
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#### 7.0 6dB Bandwidth Measurement

# 7.1 Test Setup



#### 7.2 Limits of 6dB Bandwidth Measurement

The minimum of 6dB Bandwidth Measurement is >500 kHz

#### 7.3 Test Procedure

- 1. Set resolution bandwidth (RBW) = 100 kHz
- 2. Set the video bandwidth (VBW)  $\geq$  3 x RBW.
- 3. Detector = Peak.
- 4. Trace mode = max hold.
- 5. Sweep = auto couple.
- 6. Allow the trace to stabilize.
- 7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

#### 7.4 Test Result

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## 6dB Occupied Bandwidth

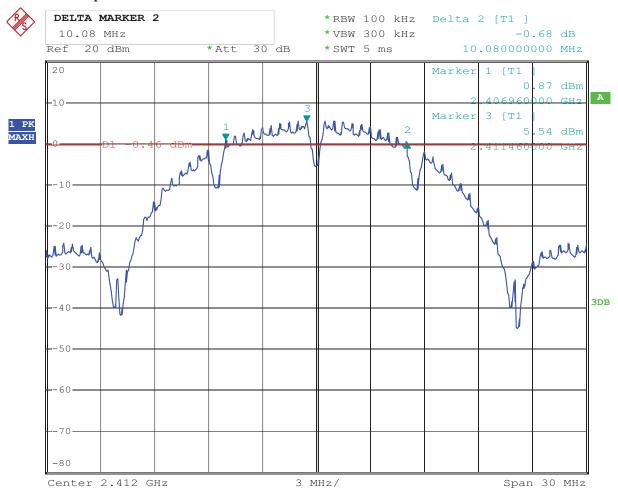
EUT		U Stick (Mini PC)		Model		WA-U420D,WA-U220D		
Mode 8		302.11b	Input Voltage		tage	e AC120V		
Temperat	ure	24	4 deg. C,		Humidity		56% RH	
Channel		el Frequency (MHz)	Data cy Transfer 6 dB Bandwi Rate (MHz) (Mbps)			Minimum Limit (MHz)		Pass/ Fail
1		2412	1	10.08			0.5	Pass
6		2437	1	10.08			0.5	Pass
11		2462	1	10.08			0.5	Pass
1		2412	11	8.76			0.5	Pass
6		2437	11	8.70			0.5	Pass
11		2462	11	8.	70		0.5	Pass

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## 1. 802.11b at 1Mbps of CH01



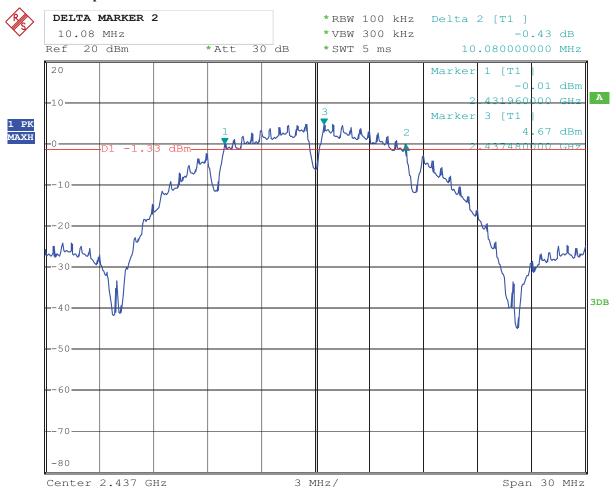
Date: 5.JUN.2014 16:18:13

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## 2. 802.11b at 1Mbps of CH06



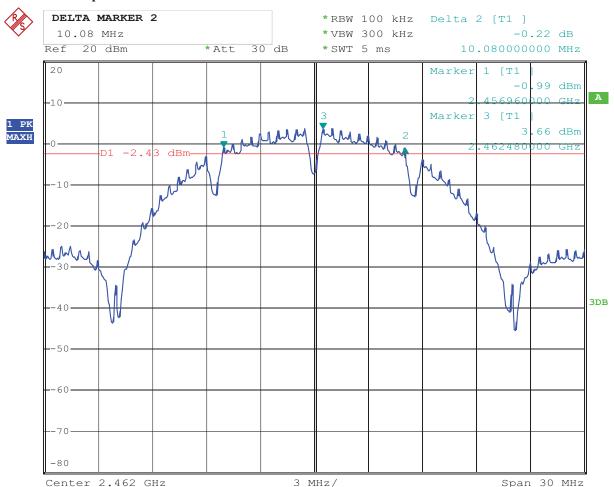
Date: 5.JUN.2014 16:32:27

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## 3. 802.11b at 1Mbps of CH11



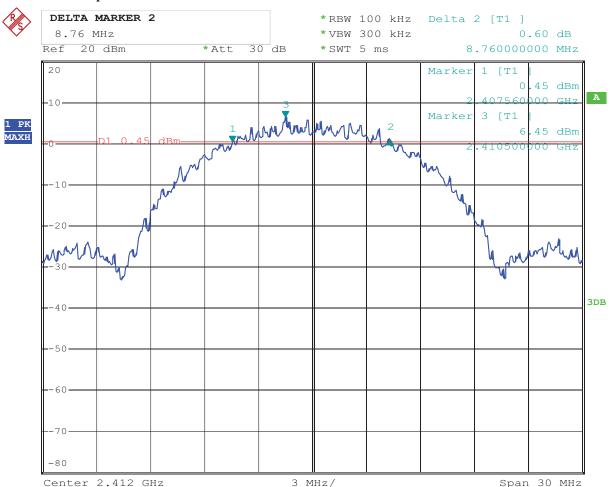
Date: 5.JUN.2014 16:34:55

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## 4. 802.11b at 11Mbps of CH01



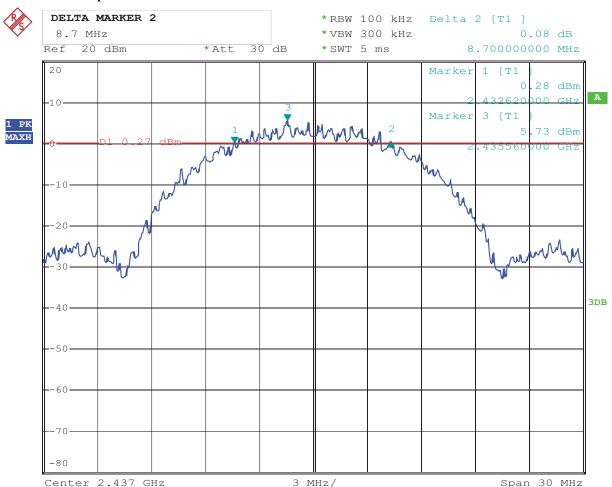
Date: 5.JUN.2014 16:25:22

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Date: 2014-06-17



## 5. 802.11b at 11Mbps of CH06



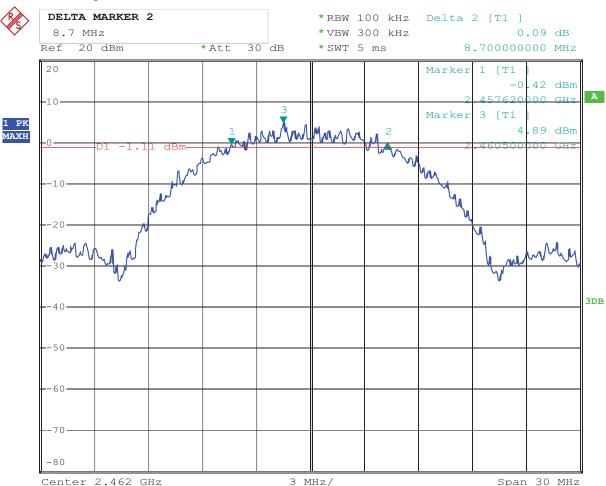
Date: 5.JUN.2014 16:29:52

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# 6. 802.11b at 11Mbps of CH11



Date: 5.JUN.2014 16:37:50

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Date: 2014-06-17



## 6dB Occupied Bandwidth

EUT		U Stic	ck (Mini PC	C)	Model		WA-U420D,WA-U220D	
Mode		8	302.11g		Input Vol	tage	A	C120V
Temperat	ure	24	4 deg. C,		Humidity	,	5	6% RH
Channel		el Frequency (MHz)	Data Transfer Rate (Mbps)		andwidth Hz)		mum Limit MHz)	Pass/ Fail
1		2412	54	16	.56	.56		Pass
6		2437	54	16.56		6 0.5		Pass
11		2462	54	16	5.56		0.5	Pass

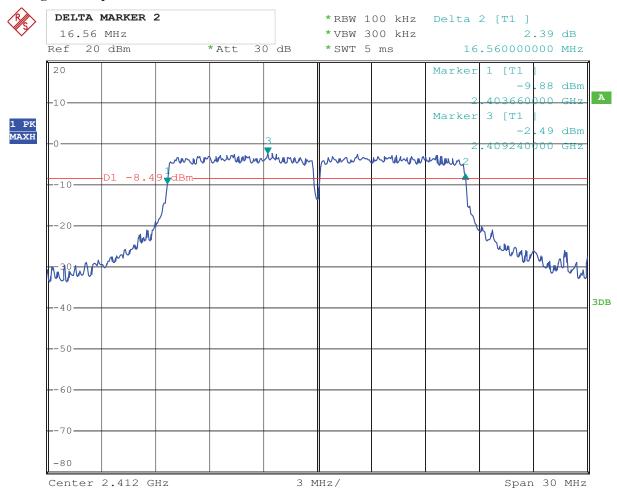
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#### **Test Plots:**

## 1. 802.11g at 54Mbps of CH01



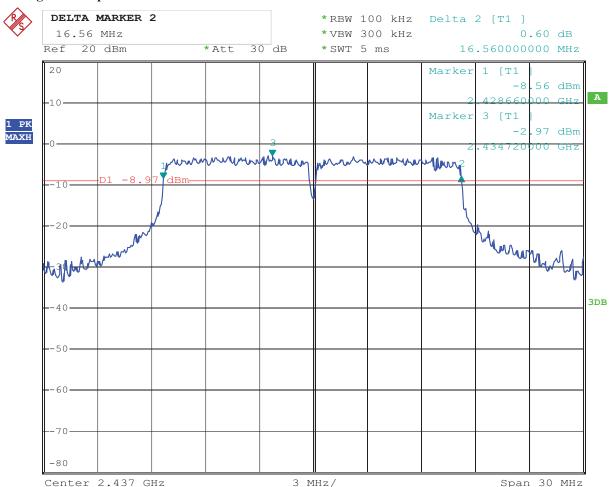
Date: 5.JUN.2014 16:19:46

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## 2. 802.11g at 54Mbps of CH06



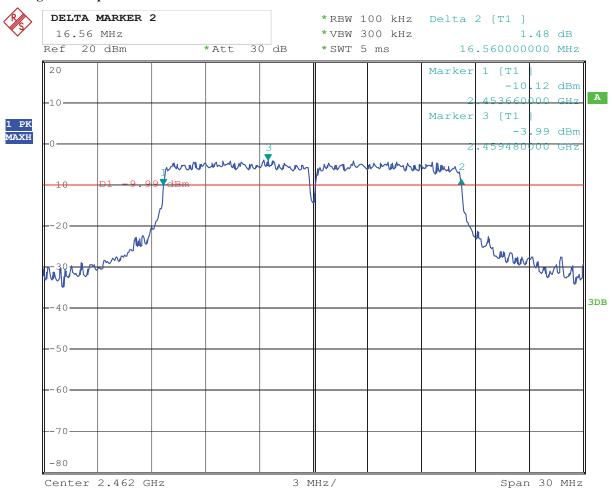
Date: 5.JUN.2014 16:31:15

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## 3. 802.11g at 54Mbps of CH11



Date: 5.JUN.2014 16:36:11

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## 6dB Occupied Bandwidth

EUT		U Stic	ck (Mini PC	C)	Model		WA-U420D,WA-U220D	
Mode		802	.11n HT20		Input Vol	tage	AC	120V
Temperat	ure	24	4 deg. C,		Humidity	y 56% RH		% RH
Channel		el Frequency (MHz)	Data Transfer Rate		ndwidth Hz)		mum Limit MHz)	Pass/ Fail
1		2412	MCS0	17	.76		0.5	Pass
6		2437	MCS0	17	.76	76 0		Pass
11		2462	MCS0	17	.76		0.5	Pass

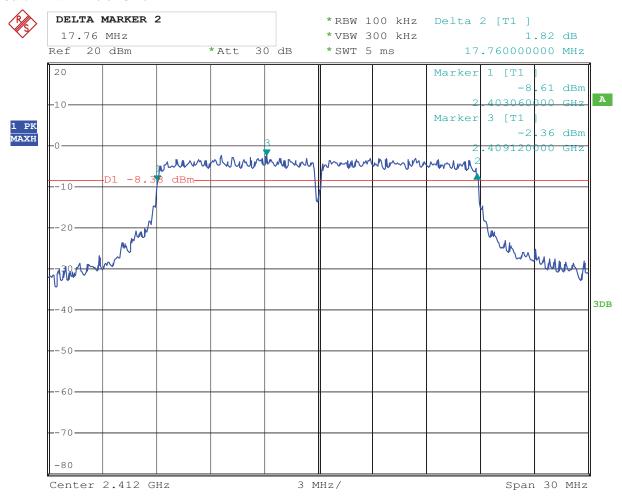
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Date: 2014-06-17



#### **Test Plots:**

#### 1. 802.11n at HT20 of CH01



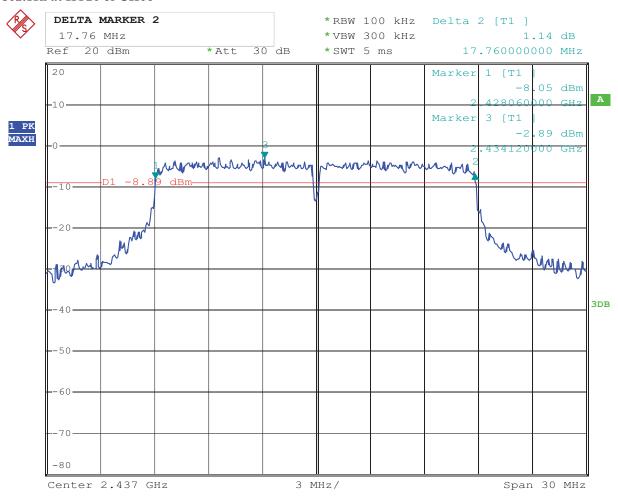
Date: 5.JUN.2014 16:26:41

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Date: 2014-06-17



#### 2. 802.11n at HT20 of CH06



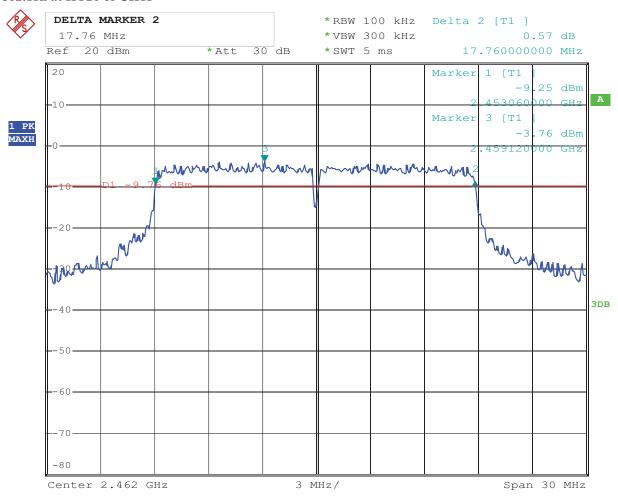
Date: 5.JUN.2014 16:28:08

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Date: 2014-06-17



#### 3. 802.11n at HT20 of CH11



Date: 5.JUN.2014 16:39:17

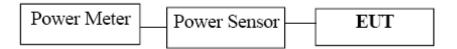
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Date: 2014-06-17



# 8. Maximum Peak Output Power

## 8.1 Test Setup



# 8.2 Limits of Maximum Peak Output Power

The Maximum Peak Output Power Measurement is 30dBm.

#### **8.3 Test Procedure**

The RF power output was measured with a Power meter connected to the RF Antenna connector (conducted measurement) while EUT was operating in transmit mode at the appropriate centre frequency.

Note: the peak power was measured

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#### **8.4Test Results**

EUT		U Stick (M	Mini PC) Mo		odel WA-U		420D,WA-U220D
Mode	Mode 802.11b		.1b	Input Voltage		AC120V	
Temperati	ure	24 deg	g. C,	Hur	midity 56%		56% RH
Channel	Channel Frequency (MHz)		Peak Power Output (dBm)		Peak Power Limit (dBm)		Pass/ Fail
1		2412	21.28		30		Pass
6		2437	20.58		30		Pass
11		2462	19.78		30		Pass

Note: 1. At finial test to get the worst-case emission at 11Mbps for CH01, CH06 and CH11

2. The result basic equation calculation as follow:

Peak Power Output = Peak Power Reading + Cable loss + Attenuator

3. The worse case was recorded

EUT		U Stick (M	Mini PC) Mo		odel WA-U <sup>2</sup>		420D,WA-U220D
Mode	Mode 802.11g		1g	Input Voltage		AC120V	
Temperat	ure	24 deg	g. C,	Hun	Humidity		56% RH
Channel	Channel Frequency (MHz)		Peak Power Output (dBm)		Peak Power Limit (dBm)		Pass/ Fail
1		2412	19.59		30		Pass
6		2437	18.97		30		Pass
11		2462	18.18		30	)	Pass

Note: 1. At finial test to get the worst-case emission at 54Mbps for CH01, CH06 and CH11

2. The result basic equation calculation as follow:

Peak Power Output = Peak Power Reading + Cable loss + Attenuator

3. The worse case was recorded

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EUT		U Stick (Mini PC)		Model		WA-U420D,WA-U220D		
Mode		802.11n (HT20) Input Vo		Voltage		AC120V		
Temperati	ure	24 deg	g. C,	Humidity			56% RH	
Channel	Cha	annel Frequency (MHz)	Peak Power Output (dBm)		Peak Power Limit (dBm)		Pass/ Fail	
1		2412	2412 19.79		30		Pass	
6		2437	19.38		30		Pass	
11		2462	18.40		30	)	Pass	

Note: 1. At finial test to get the worst-case emission at MCS0 of 11n HT20 for CH01, CH06 and CH11

- 2. The result basic equation calculation as follow: Peak Power Output = Peak Power Reading + Cable loss + Attenuator
- 3. The worse case was recorded

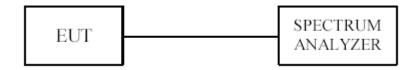
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# 9. Power Spectral Density Measurement

## 9.1 Test Setup



### 9.2 Limits of Power Spectral Density Measurement

The Maximum Power Spectral Density Measurement is 8dBm.

#### 9.3 Test Procedure

- 1. Use this procedure when the maximum peak conducted output power in the fundamental emission is used to demonstrate compliance.
- 2. Set the RBW = 10 kHz.
- 3. Set the VBW  $\geq$  30 kHz.
- 4. Set the span to 1.5 times the DTS channel bandwidth.
- 5. Detector = peak.
- 6. Sweep time = auto couple.
- 7. Trace mode = max hold.
- 8. Allow trace to fully stabilize.
- 9. Use the peak marker function to determine the maximum amplitude level.
- 10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.
- 11. The resulting peak PSD level must be  $\leq 8$  dBm.

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#### 9.4Test Result

EUT		U Stick (M	Mini PC) Mo		odel WA-U		420D,WA-U220D
Mode	Mode 802.11b 11Mbps		Input Voltage		AC120V		
Temperat	ure	24 deg. C, Humidity		nidity	56% RH		
Channel	Cha	annel Frequency (MHz)	Final RF Power Level (dBm)		Maximum Limit (dBm)		Pass/ Fail
			11Mbp	S			
1		2412	2412 -3.53		8		Pass
6		2437	2437 -4.03		8		Pass
11		2462	-4.63		8		Pass

EUT	EUT U Stick (M		Mini PC) Mo		odel WA-U-		420D,WA-U220D
Mode	Mode 802.11b 1Mbps		1Mbps	Input Voltage		AC120V	
Temperat	ure	24 deg	g. C,	Humidity			56% RH
Channel	Channel Frequency Final RF P		Final RF Pc	wer	Maximum Limit		Pass/ Fail
Chamie	(MHz)		Level in (dBm)		(dBm)		
			1Mbps				
1		2412	412 -5.18		8		Pass
6		2437	-5.78		8		Pass
11		2462	-6.64	•	8		Pass

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EUT		U Stick (M	Mini PC) Mo		odel WA-U <sup>2</sup>		420D,WA-U220D
Mode	Mode 802.11g 54Mbps Inpu		Input	Voltage		AC120V	
Temperat	ure	24 deg	g. C,	Hur	Humidity 569		56% RH
Channel			Final RF Po	ower Maximur		m Limit	Pass/ Fail
Chamin		(MHz)	Level in (dBm)		(dBm)		
			54Mbps	S			
1		2412 -10.72			8		Pass
6	·	2437	-11.13		8		Pass
11		2462	-11.64		8		Pass

EUT	U Stick (M		Mini PC) Mo		odel WA-U		420D,WA-U220D	
Mode 802.11n HT20 MCS0		20 MCS0	Input Voltage		AC120V			
Temperati	ure	24 deg	g. C,	Hur	Humidity 50		56% RH	
Channel	Channel Frequency		Final RF Power		Maximum Limit		Pass/ Fail	
Chamie		(MHz)	Level (dBm)		(dBm)			
			HT20					
1	2412		-10.02		8		Pass	
6		2437 -1		8			Pass	
11		2462	-11.37		8		Pass	

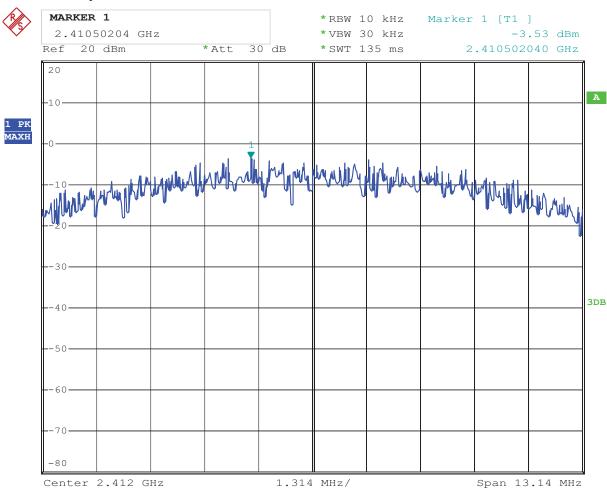
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## 9.5 Photo of Power Spectral Density Measurement

1.802.11b at 11Mbps of CH01



Date: 5.JUN.2014 17:11:20

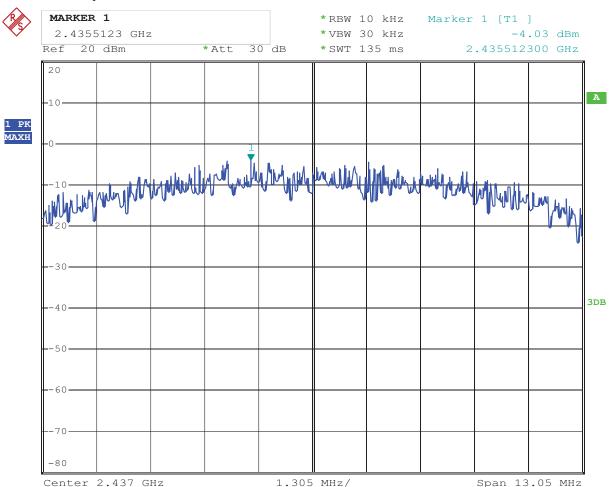
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### 2. 802.11b at 11Mbps at CH06

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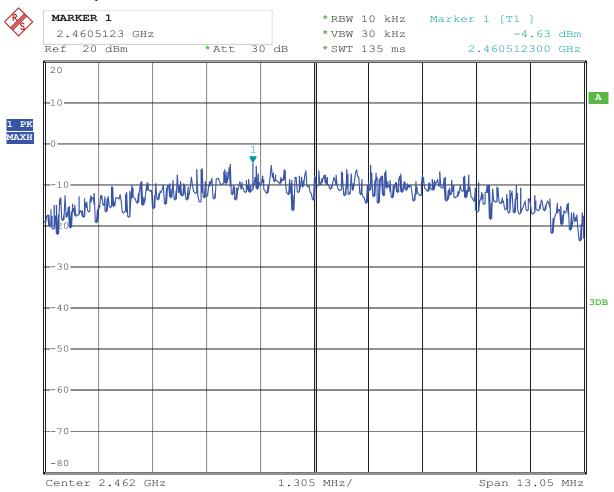
Date: 5.JUN.2014 17:12:36

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### 3. 802.11b at 11Mbps of CH11



Date: 5.JUN.2014 17:13:08

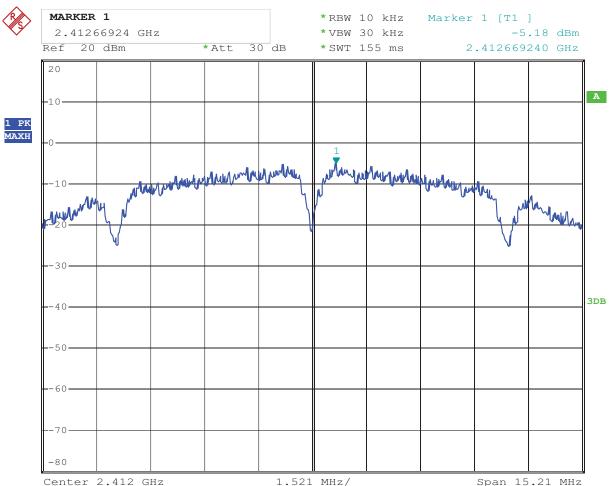
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## 4. 802.11b at 1Mbps of CH1



Date: 5.JUN.2014 17:06:15

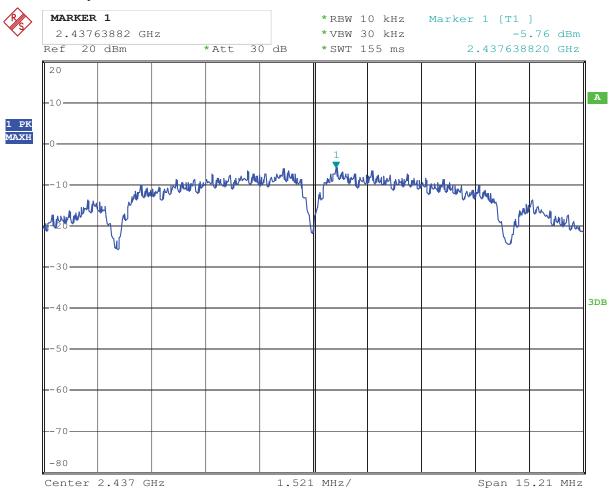
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## 5. 802.11b at 1Mbps of CH6



Date: 5.JUN.2014 17:07:00

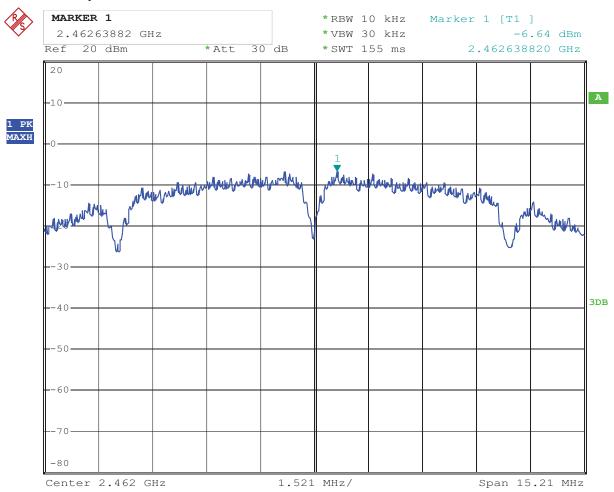
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## 6. 802.11b at 1Mbps of CH11



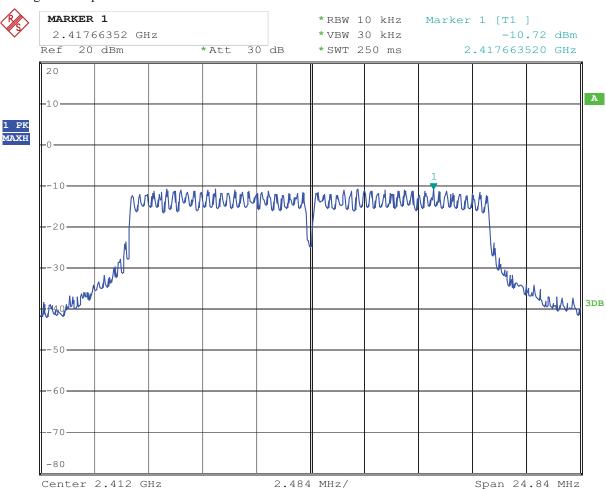
Date: 5.JUN.2014 17:07:38

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## 7. 802.11g at 54Mbps of CH1



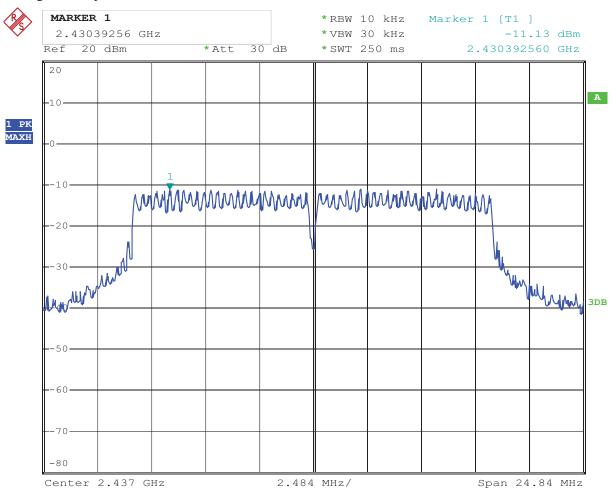
Date: 5.JUN.2014 17:10:26

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## 8. 802.11g at 54Mbps of CH6



Date: 5.JUN.2014 17:09:41

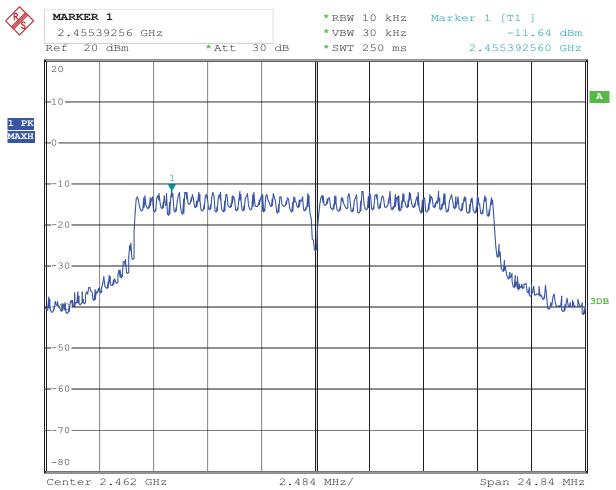
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## 9. 802.11g at 54Mbps of CH11



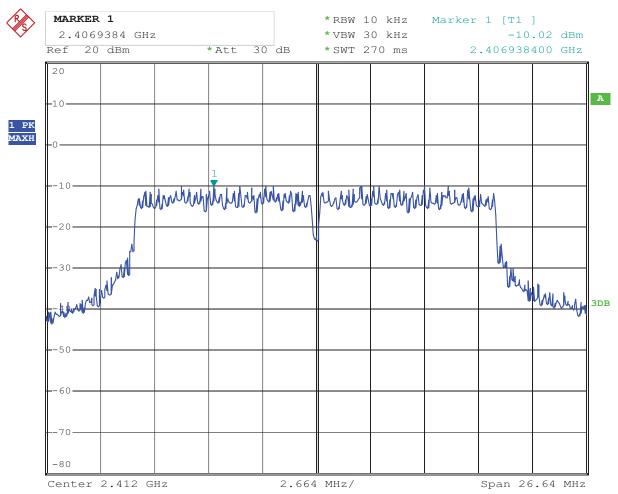
Date: 5.JUN.2014 17:08:48

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#### 10. 802.11n at HT20 of CH01



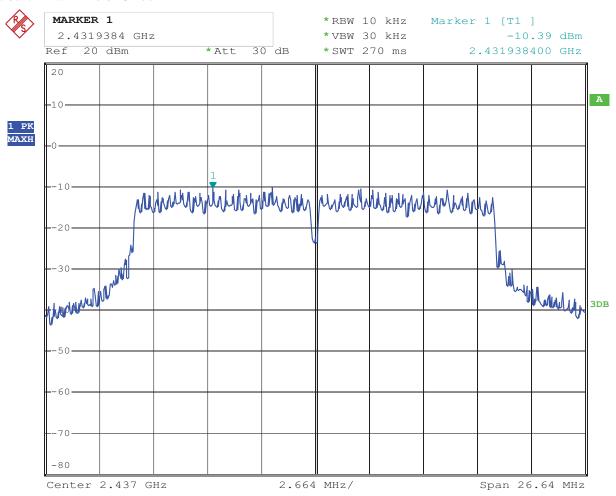
Date: 5.JUN.2014 17:15:28

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#### 11. 802.11n at HT20 of CH06



Date: 5.JUN.2014 17:14:46

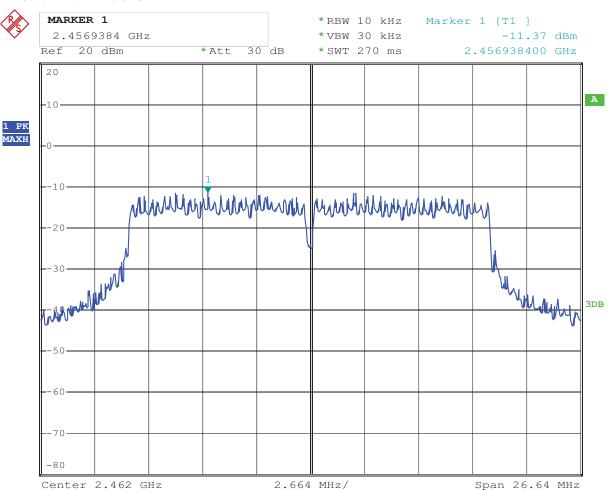
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#### 12. 802.11n at HT20 of CH11



Date: 5.JUN.2014 17:13:58

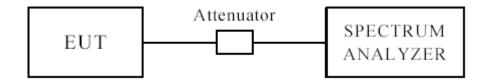
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## 10 Out of Band Measurement

# 10.1 Test Setup for band edge



The restricted band requirement based on radiated emission test; please see the clause 6 for the test setup

#### 10.2 Limits of Out of Band Emissions Measurement

- 1. Below –20dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).
- 2. Fall in the restricted bands listed in section 15.205. The maximum permitted average field strength is listed in section 15.209.

#### **10.3 Test Procedure**

For signals in the restricted bands above and below the 2.4-2.483GHz allocated band a measurement was made of radiated emission test.( Peak values with RBW=VBW=1MHz and PK detector. AV value with RBW=1MHz, VBW=10Hz and PK detector)

For bandage test, the spectrum set as follows: RBW=100, VBW=300 kHz. A conducted measurement used

### 10.4 Test Result

Please see next pages

Note: 1. this is a handhold device. The radiated emissions should be tested under 3-axes position (Lying, Side, and Stand), after pre-test. It was found that the worse radiated emission was get at the lying position. the worse case was recorded

2. For band-edge measurement, the frequency from 30MHz-25GHz was tested. And It met the FCC rule.

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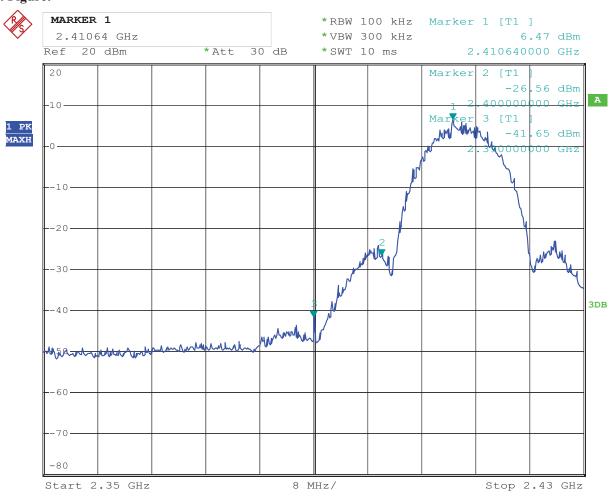
#### For 802.11b mode

CH01 at 11Mbps

10.4 Band-edge and Restricted band Measurement

EUT	U Stick (Mini PC)		Model	WA-U420D,WA-U220D
Mode	Keeping Transmitting		Input Voltage	AC120V
Temperature	24 deg. C,		Humidity	56% RH
Test Result:	Pass		Detector	PK
2400	PK (dBµV/m)	64.2	Limit	$74(dB\mu V/m)$
	AV (dBμV/m)	45.9	Limit	$54(dB\mu V/m)$
2390	PK (dBµV/m)	48.4	Limit	$74(dB\mu V/m)$
	AV (dBμV/m)		Lillit	$54(dB\mu V/m)$

### **Test Figure:**



Date: 5.JUN.2014 17:18:57

Note: The Max. FS in Restrict Band are measured in conventional method.

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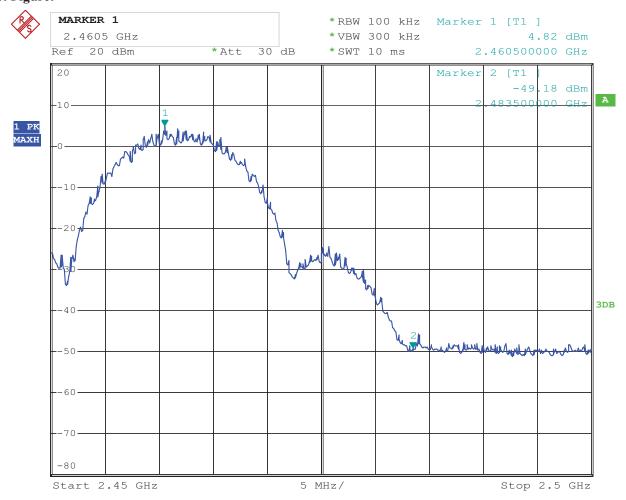


### CH11 at 11Mbps

#### **10.4** Band-edge and Restricted band Measurement

EUT	U Stick (Mini PC)		Model	WA-U420D,WA-U220D
Mode	Keeping	g Transmitting	Input Voltage	AC120V
Temperature	24 deg. C,		Humidity	56% RH
Test Result:		Pass	Detector	PK
2483.5	PK (dBμV/m)	50.5	T,	$74(dB\mu V/m)$
	AV (dBμV/m)		Limit	54(dBμV/m)

## **Test Figure:**



Date: 5.JUN.2014 17:21:01

Note: The Max. FS in Restrict Band are measured in conventional method.

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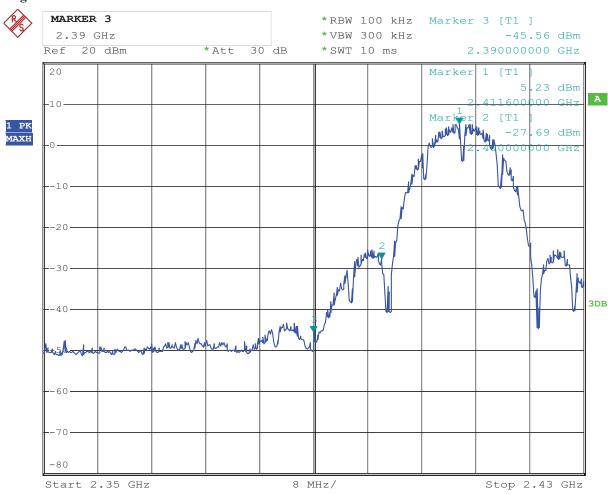
#### For 802.11b mode

CH01 at 1Mbps

10.4 Band-edge and Restricted band Measurement

EUT	U Stick (Mini PC)		Model	WA-U420D,WA-U220D
Mode	Keeping Transmitting		Input Voltage	AC120V
Temperature	24 deg. C,		Humidity	56% RH
Test Result:	Pass		Detector	PK
2400	PK (dBµV/m)	66.7	Limit	$74(dB\mu V/m)$
	AV (dBμV/m)	47.8	Limit	$54(dB\mu V/m)$
2390	PK (dBµV/m)	49.5	Limit	$74(dB\mu V/m)$
	AV (dBμV/m)		Lillit	$54(dB\mu V/m)$

#### **Test Figure:**



Date: 5.JUN.2014 17:16:43

Note: The Max. FS in Restrict Band are measured in conventional method.

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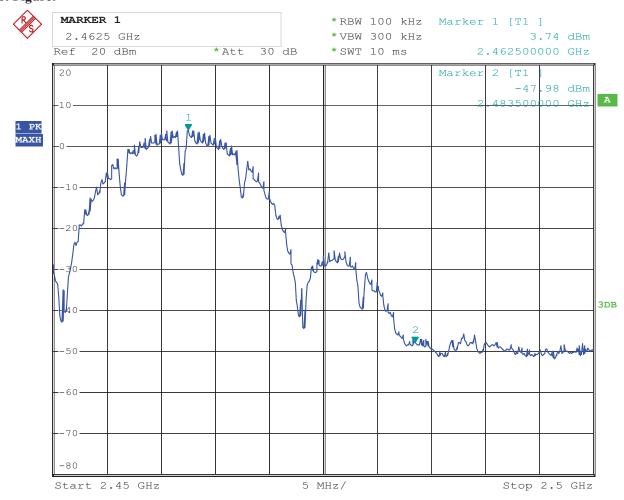


#### CH11 at 1Mbps

#### **10.4** Band-edge and Restricted band Measurement

EUT	U Stick (Mini PC)		Model	WA-U420D,WA-U220D
Mode	Keeping Transmitting		Input Voltage	AC120V
Temperature	24 deg. C,		Humidity	56% RH
Test Result:	Pass		Detector	PK
2483.5	PK (dBμV/m)	51.2	Limit	74(dBμV/m)
	AV (dBμV/m)			54(dBμV/m)

## **Test Figure:**



Date: 5.JUN.2014 17:22:23

Note: The Max. FS in Restrict Band are measured in conventional method.

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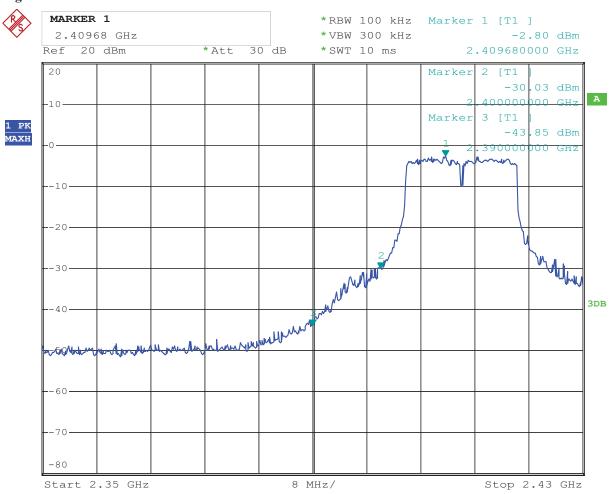
### For 802.11g mode

CH01 at 54Mbps

#### **10.4** Band-edge and Restricted band Measurement

EUT	U Stick (Mini PC)		Model	WA-U420D,WA-U220D			
Mode	Keeping Transmitting		Input Voltage	AC120V			
Temperature	24 deg. C,		Humidity	56% RH			
Test Result:	Pass		Detector	PK			
2400	PK (dBμV/m)	67.5	Limit	$74(dB\mu V/m)$			
	AV (dBμV/m)	48.2		54(dBμV/m)			
2390	PK (dBμV/m)	50.2	Limit	74(dBμV/m)			
	AV (dBμV/m)			54(dBμV/m)			

### **Test Figure:**



Date: 5.JUN.2014 17:18:14

Note: The Max. FS in Restrict Band are measured in conventional method.

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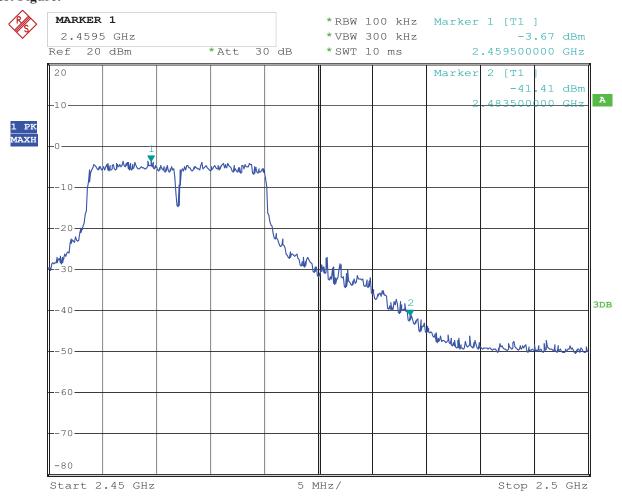


### CH11 at 54Mbps

#### **10.4** Band-edge and Restricted band Measurement

EUT	U Stick (Mini PC)		Model		WA-U420D,WA-U220D	
Mode	Keeping Transmitting		Input Voltage		AC120V	
Temperature	24 deg. C,		Humidity		56% RH	
Test Result:	Pass		Detector		PK	
2483.5	PK (dBµV/m)	54.6	T,		$74(dB\mu V/m)$	
	AV (dBμV/m)	36.8	Limit		$54(dB\mu V/m)$	

### **Test Figure:**



Date: 5.JUN.2014 17:21:52

Note: The Max. FS in Restrict Band are measured in conventional method.

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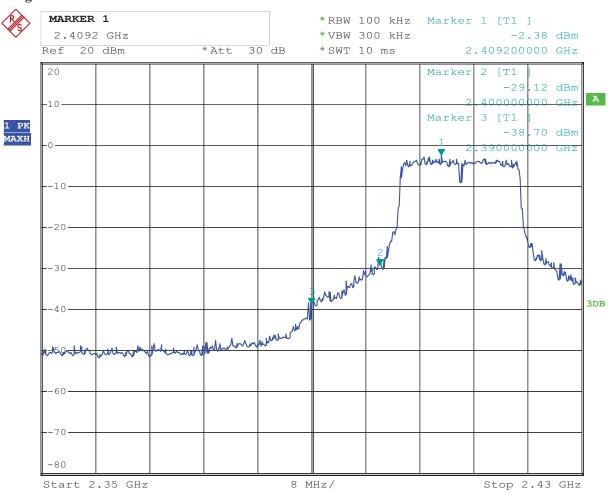
### For 802.11n (HT20) mode

CH01 at 65Mbps

### 10.4 Band-edge and Restricted band Measurement

EUT	U Stick (Mini PC)		Model	WA-U420D,WA-U220D
Mode	Keeping Transmitting		Input Voltage	AC120V
Temperature	24 deg. C,		Humidity	56% RH
Test Result:	Pass		Detector	PK
2400	PK (dBμV/m)	68.7	Limit	$74(dB\mu V/m)$
	AV (dBμV/m)	49.3	Limit	54(dBµV/m)
2390	PK (dBµV/m)	52.0	Limit	74(dBµV/m)
	AV (dBμV/m)		Lillit	54(dBµV/m)

### **Test Figure:**



Date: 5.JUN.2014 17:19:37

Note: The Max. FS in Restrict Band are measured in conventional method.

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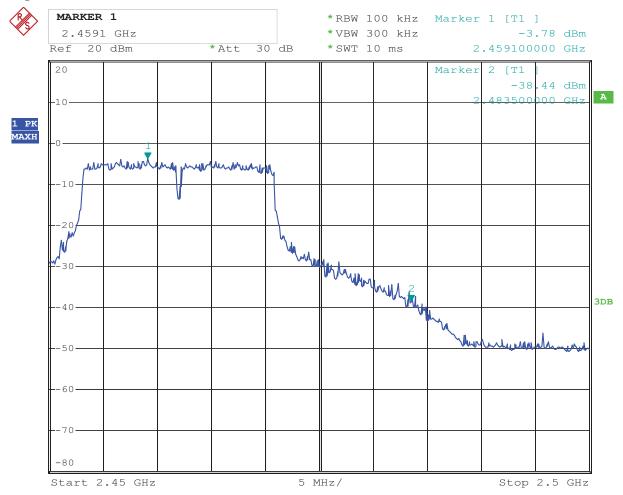


### CH11 at 65Mbps

#### **10.4** Band-edge and Restricted band Measurement

EUT	U Stick (Mini PC)		Model	WA-U420D,WA-U220D
Mode	Keeping Transmitting		Input Voltage	AC120V
Temperature	24 deg. C,		Humidity	56% RH
Test Result:	Pass		Detector	PK
2483.5	PK (dBμV/m)	56.5	T: '/	$74(dB\mu V/m)$
	AV (dBμV/m)	37.6	Limit	54(dBμV/m)

### **Test Figure:**



Date: 5.JUN.2014 17:20:26

Note: The Max. FS in Restrict Band are measured in conventional method.

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### 11.0 Antenna Requirement

### 11.1 Standard Applicable

For intentional device, according to FCC 47 CFR Section 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.

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

### 11.2 Antenna Connected construction

Integral antenna used. The maximum Gain of the antennas is 2.0dBi.

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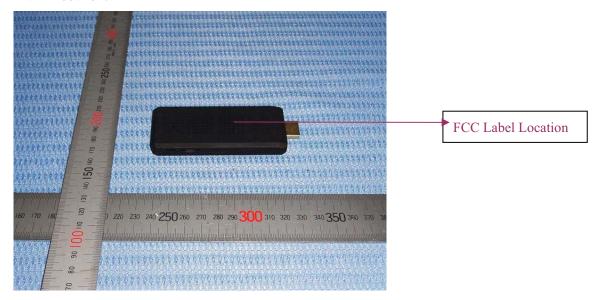


### 12.0 FCC ID Label

### **FCC ID: 2ACDD-0508**

The label must not be a stick-on paper label. The label on these products must be permanently affixed to the product and readily visible at the time of purchase and must last the expected lifetime of the equipment not be readily detachable.

### Mark Location:



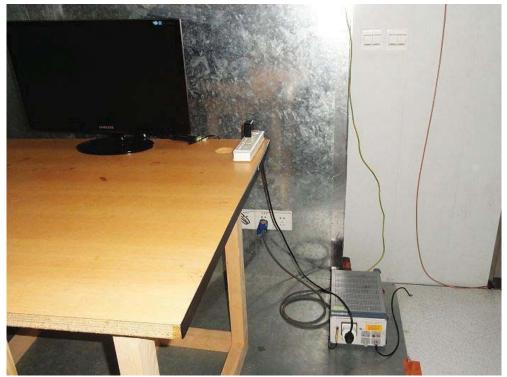
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### 13.0 Photo of testing

Conducted Emission Test Setup:



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## Radiated Emission Test Setup:





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# Photographs - EUT

### Outside view





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Outside view





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Outside view





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Outside view





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Inside view





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Inside view





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Inside view





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### Inside view



End of the report