



## STC Test Report

**Date:** 2016-08-08

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**No.:** DMA000094

**Applicant:** Hip Shing Electronics Limited  
Units 1.2&3,20/F.,New Treasure Centre, 10., Ng Fong Street,  
San Po Kong, Kowloon, Hong Kong

**Manufacturer:** Dongguan Zhi Cheng Electronic Products Co., Ltd.  
No.11 Shangbao Road, 188 Industrial Zone, Pingshan,  
Tangxia, Dongguan, Guangdong, China

**Description of Sample(s):** Submitted sample(s) said to be  
Product: Internet/FM Digital Radio with Bluetooth  
and Spotify  
Brand Name: Como Audio  
Model Number: Duetto  
FCC ID: BZAWB16DUETTO

**Date Sample(s) Received:** 2016-07-26

**Date Tested:** 2016-07-29 to 2016-08-03

**Investigation Requested:** Perform ElectroMagnetic Interference measurement in  
accordance with FCC 47CFR [Codes of Federal Regulations]  
Part 15: 2015 and ANSI C63.10:2013 for FCC Certification.

**Conclusion(s):** The submitted product COMPLIED with the requirements of  
Federal Communications Commission [FCC] Rules and  
Regulations Part 15. The tests were performed in accordance  
with the standards described above and on Section 2.2 in this  
Test Report.

**Remark(s):** WIFI (802.11b, 802.11g, 802.11n20)

  
  
LONG Yun Jian, Along  
Authorized Signatory  
ElectroMagnetic Compatibility Department  
For and on behalf of  
The Hong Kong Standards and Testing Centre Ltd.

**The Hong Kong Standards and Testing Centre Ltd.**

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### **1.0 General Details**

#### **1.1 Test Laboratory**

The Hong Kong Standards and Testing Centre Ltd.  
EMC Laboratory  
10 Dai Wang Street, Taipo Industrial Estate, New Territories, Hong Kong

Telephone: 852 2666 1888

Fax: 852 2664 4353

#### **1.2 Equipment Under Test [EUT]**

##### **Description of Sample(s)**

Product: Internet/FM Digital Radio with Bluetooth and Spotify  
Manufacturer: Dongguan Zhi Cheng Electronic Products Co., Ltd.  
No.11 Shangbao Road, 188 Industrial Zone, Pingshan,  
Tangxia, Dongguan, Guangdong, China  
Brand Name: Como Audio  
Model Number: Duetto  
Rating: 100-240V a.c. 50/60Hz

##### **1.2.1 Description of EUT Operation**

The Equipment Under Test (EUT) is a Internet/FM Digital Radio with Bluetooth and Spotify, the transmission signal is digital modulated with channel frequency range 2412-2462MHz..

#### **1.3 Date of Order**

2016-07-26

#### **1.4 Submitted Sample(s):**

1 Sample

#### **1.5 Test Duration**

2016-07-29 to 2016-08-03

#### **1.6 Country of Origin**

China

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### 2.0 Technical Details

#### **2.1 Investigations Requested**

Perform Electromagnetic Interference measurements in accordance with FCC 47CFR [Codes of Federal Regulations] Part 15: 2015 Regulations and ANSI C63.10:2013 for FCC Certification.

#### **2.2 Test Standards and Results Summary Tables**

EMISSION Results Summary						
Test Condition	Test Requirement	Test Method	Class / Severity	Test Result		
				Pass	Fail	N/A
Output Power of Fundamental Emissions	FCC 47CFR 15.247(b)(3)	ANSI C63.10:2013	N/A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Radiated Emissions	FCC 47CFR 15.209	ANSI C63.10:2013	N/A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Conducted Emissions	FCC 47CFR 15.207	ANSI C63.10:2013	N/A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Power Spectral Density	FCC 47CFR 15.247(e)	N/A	N/A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6dB Bandwidth	FCC 47CFR 15.247(a)(2)	N/A	N/A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Band Edge Emissions	FCC 47CFR 15.247(d)	N/A	N/A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Antenna requirement	FCC 47CFR 15.203	N/A	N/A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
RF Exposure	FCC 47CFR 15.247(i)	N/A	N/A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Note: N/A - Not Applicable

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### **3.0 Test Results**

#### **3.1 Emission**

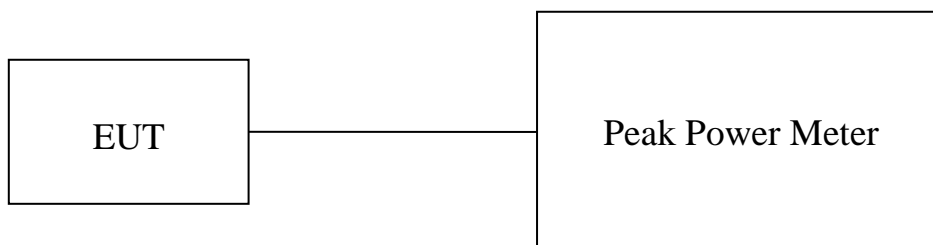
##### **3.1.1 Maximum Peak Output Power**

Test Requirement:	FCC 47CFR 15.247(b)(3)
Test Method:	N/A
Test Date:	2016-08-02
Mode of Operation:	WiFi mode

#### **Test Method:**

The RF output of the EUT was connected to the peak power meter. All the attenuation or cable loss will be added to the measured maximum output power. The results are recorded in Watt.

#### **Test Setup:**



Note: a temporary antenna connector was soldered to the RF output.

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### Limits for Maximum Peak Conducted Output Power [FCC 47CFR 15.247]:

The maximum peak output power shall not exceeded the following limits:  
For frequency hopping systems employing at least 75 hopping channels: 1 Watt  
For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 Watts  
For Digital Transmission systems in 2400-2483.5 MHz Band: 1 Watt

### Results of WiFi mode 802.11 b, (2412MHz to 2462MHz) : Pass (TX Unit)

Transmitter Frequency (MHz)	Maximum conducted output power (Watt)
2412	0.04656

Transmitter Frequency (MHz)	Maximum conducted output power (Watt)
2437	0.05470

Transmitter Frequency (MHz)	Maximum conducted output power (Watt)
2462	0.05200

### Results of WiFi mode 802.11 g, (2412MHz to 2462MHz) : Pass (TX Unit)

Transmitter Frequency (MHz)	Maximum conducted output power (Watt)
2412	0.06353

Transmitter Frequency (MHz)	Maximum conducted output power (Watt)
2437	0.07261

Transmitter Frequency (MHz)	Maximum conducted output power (Watt)
2462	0.06531

### Results of WiFi mode 802.11 n20, (2412MHz to 2462MHz) : Pass (TX Unit)

Transmitter Frequency (MHz)	Maximum conducted output power (Watt)
2412	0.05140

Transmitter Frequency (MHz)	Maximum conducted output power (Watt)
2437	0.05861

Transmitter Frequency (MHz)	Maximum conducted output power (Watt)
2462	0.06180

Calculated measurement uncertainty : 30MHz to 1GHz 1.7dB  
1GHz to 18GHz 1.7dB

Remark:

1. All test data for each data rate were verified, but only the worst case was reported.
2. The EUT is programmed to transmit signals continuously for all testing.

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### 3.1.2 Radiated Emissions

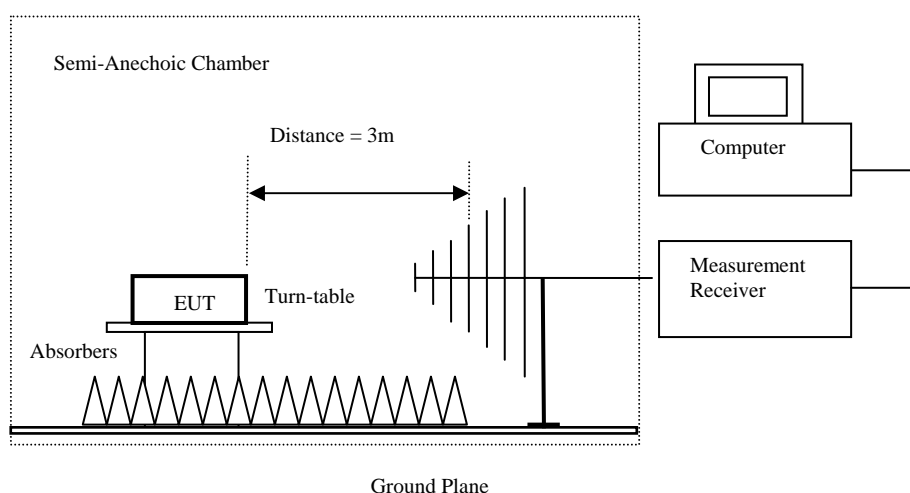
Test Requirement: FCC 47CFR 15.209  
Test Method: ANSI C63.10:2013  
Test Date: 2016-08-02  
Mode of Operation: Tx mode/ WiFi mode

#### Test Method:

For emission measurements at or below 1 GHz, the sample was placed 0.8m above the ground plane of semi-anechoic Chamber\*. For emission measurements above 1 GHz, the sample was placed 1.5m above the ground plane of semi-anechoic Chamber\*. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages.

\* Semi-Anechoic chamber located on the G/F of The Hong Kong Standards and Testing Centre Ltd. with a metal ground plane filed with the FCC pursuant to section 2.948 of the FCC rules, with Registration Number: 607756.

#### Test Setup:



Absorbers placed on top of the ground plane are for measurements above 1000MHz only.

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### Limits for Radiated Emissions [FCC 47 CFR 15.247 Class B]:

Frequency Range [MHz]	Quasi-Peak Limits [ $\mu$ V/m]
0.009-0.490	2400/F (kHz)
0.490-1.705	24000/F (kHz)
1.705-30	30
30-88	100
88-216	150
216-960	200
Above960	500

The emission limits shown in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on measurements employing an average detector.

### Result of Wifi mode (2412.0 MHz) (802.11b) (9kHz – 30MHz): Pass

Field Strength of Spurious Emissions Average Value						
Frequency MHz	Measured Level dB $\mu$ V	Correction Factor dB/m	Field Strength dB $\mu$ V/m	Field Strength dB $\mu$ V/m	Limit dB $\mu$ V/m	E-Field Polarity
<b>Emissions detected are more than 20 dB below the FCC Limits</b>						

### Result of Wifi mode (2412.0 MHz) (802.11b) (Above 1GHz): Pass

Field Strength of Spurious Emissions Peak Value						
Frequency MHz	Measured Level @3m dB $\mu$ V	Correction Factor dB/m	Field Strength dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB $\mu$ V/m	E-Field Polarity
4824.0	17.9	41.5	59.4	74.0	14.6	Vertical
4824.0	14.4	42.4	56.8	74.0	17.2	Horizontal
7236.0	12.0	45.1	57.1	74.0	16.9	Vertical
7236.0	8.9	46.2	55.1	74.0	18.9	Horizontal
9648.0	8.4	48	56.4	74.0	17.6	Vertical
9648.0	6.9	48.8	55.7	74.0	18.3	Horizontal
12060.0	4.5	51.8	56.3	74.0	17.7	Vertical
12060.0	1.0	52.4	53.4	74.0	20.6	Horizontal

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Result of Wifi mode (2412.0 MHz) (802.11b) (Above 1GHz): Pass

Field Strength of Spurious Emissions Average Value						
Frequency MHz	Measured Level @3m dBuV	Correction Factor dB/m	Field Strength dBuV/m	Limit @3m dBuV/m	Margin dBuV/m	E-Field Polarity
4824.0	2.7	41.5	44.2	54.0	9.8	Vertical
4824.0	-0.9	42.4	41.5	54.0	12.5	Horizontal
7236.0	-3.3	45.1	41.8	54.0	12.2	Vertical
7236.0	-6.2	46.2	40.0	54.0	14.0	Horizontal
9648.0	-6.7	48	41.3	54.0	12.7	Vertical
9648.0	-8.3	48.8	40.5	54.0	13.5	Horizontal
12060.0	-10.8	51.8	41.0	54.0	13.0	Vertical
12060.0	-14.1	52.4	38.3	54.0	15.7	Horizontal

Result of Wifi mode (2437.0 MHz) (802.11b) (9kHz – 30MHz): Pass

Field Strength of Spurious Emissions Average Value						
Frequency MHz	Measured Level dB $\mu$ V	Correction Factor dB/m	Field Strength dB $\mu$ V/m	Field Strength dB $\mu$ V/m	Limit dB $\mu$ V/m	E-Field Polarity
Emissions detected are more than 20 dB below the FCC Limits						

Result of Wifi mode (2437.0 MHz) (802.11b) (Above 1GHz): Pass

Field Strength of Spurious Emissions Peak Value						
Frequency MHz	Measured Level @3m dB $\mu$ V	Correction Factor dB/m	Field Strength dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB $\mu$ V/m	E-Field Polarity
4874.0	17.1	41.6	58.7	74.0	15.3	Vertical
4874.0	13.0	42.5	55.5	74.0	18.5	Horizontal
7311.0	3.2	53.2	56.4	74.0	17.6	Vertical
7311.0	7.3	46.3	53.6	74.0	20.4	Horizontal
9748.0	8.0	48.1	56.1	74.0	17.9	Vertical
9748.0	5.5	48.9	54.4	74.0	19.6	Horizontal
12185.0	5.1	51.6	56.7	74.0	17.3	Vertical
12185.0	0.8	52.5	53.3	74.0	20.7	Horizontal

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Result of Wifi mode (2437.0 MHz) (802.11b) (Above 1GHz): Pass

Field Strength of Spurious Emissions						
Average Value						
Frequency	Measured Level @ 3m	Correction Factor	Field Strength	Limit @ 3m	Margin	E-Field Polarity
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dBuV/m	
4874.0	2.0	41.6	43.6	54.0	10.4	Vertical
4874.0	-2.3	42.5	40.2	54.0	13.8	Horizontal
7311.0	-4.1	45.2	41.1	54.0	12.9	Vertical
7311.0	-7.9	46.3	38.4	54.0	15.6	Horizontal
9748.0	-7.1	48.1	41.0	54.0	13.0	Vertical
9748.0	-9.7	48.9	39.2	54.0	14.8	Horizontal
12185.0	-10.0	51.6	41.6	54.0	12.4	Vertical
12185.0	-14.3	52.5	38.2	54.0	15.8	Horizontal

Result of Wifi mode (2462.0 MHz) (802.11b) (9kHz – 30MHz): Pass

Field Strength of Spurious Emissions						
Average Value						
Frequency	Measured Level	Correction Factor	Field Strength	Field Strength	Limit	E-Field Polarity
MHz	dB $\mu$ V	dB/m	dB $\mu$ V/m	dB $\mu$ V/m	dB $\mu$ V/m	
Emissions detected are more than 20 dB below the FCC Limits						

Result of Wifi mode (2462.0 MHz) (802.11b) (Above 1GHz): Pass

Field Strength of Spurious Emissions						
Peak Value						
Frequency	Measured Level @3m	Correction Factor	Field Strength	Limit @3m	Margin	E-Field Polarity
MHz	dB $\mu$ V	dB/m	dB $\mu$ V/m	dB $\mu$ V/m	dB $\mu$ V/m	
4924.0	17.2	41.4	58.6	74.0	15.4	Vertical
4924.0	13.7	42.7	56.4	74.0	17.6	Horizontal
7386.0	9.7	45.6	55.3	74.0	18.7	Vertical
7386.0	6.9	46.5	53.4	74.0	20.6	Horizontal
9848.0	7.4	48.6	56.0	74.0	18.0	Vertical
9848.0	4.6	49.7	54.3	74.0	19.7	Horizontal
12310.0	3.7	51.7	55.4	74.0	18.6	Vertical
12310.0	0.4	52.7	53.1	74.0	20.9	Horizontal

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Result of Wifi mode (2462.0 MHz) (802.11b) (Above 1GHz): Pass

Field Strength of Spurious Emissions						
Average Value						
Frequency MHz	Measured Level @3m dBuV	Correction Factor dB/m	Field Strength dBuV/m	Limit @3m dBuV/m	Margin dBuV/m	E-Field Polarity
4924.0	2.1	41.4	43.5	54.0	10.5	Vertical
4924.0	-1.5	42.7	41.2	54.0	12.8	Horizontal
7386.0	-5.6	45.6	40.0	54.0	14.0	Vertical
7386.0	-8.2	46.5	38.3	54.0	15.7	Horizontal
9848.0	-7.7	48.6	40.9	54.0	13.1	Vertical
9848.0	-10.6	49.7	39.1	54.0	14.9	Horizontal
12310.0	-11.6	51.7	40.1	54.0	13.9	Vertical
12310.0	-14.7	52.7	38.0	54.0	16.0	Horizontal

Result of Wifi mode (2412.0 MHz) (802.11g) (9kHz – 30MHz): Pass

Field Strength of Spurious Emissions						
Average Value						
Frequency MHz	Measured Level dB $\mu$ V	Correction Factor dB/m	Field Strength dB $\mu$ V/m	Field Strength dB $\mu$ V/m	Limit dB $\mu$ V/m	E-Field Polarity
Emissions detected are more than 20 dB below the FCC Limits						

Result of Wifi mode (2412.0 MHz) (802.11g) (Above 1GHz): Pass

Field Strength of Spurious Emissions						
Peak Value						
Frequency MHz	Measured Level @3m dB $\mu$ V	Correction Factor dB/m	Field Strength dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB $\mu$ V/m	E-Field Polarity
4824.0	17.7	41.5	59.2	74.0	14.8	Vertical
4824.0	14.0	42.4	56.4	74.0	17.6	Horizontal
7236.0	12.4	45.1	57.5	74.0	16.5	Vertical
7236.0	8.4	46.2	54.6	74.0	19.4	Horizontal
9648.0	8.3	48	56.3	74.0	17.7	Vertical
9648.0	5.8	48.8	54.6	74.0	19.4	Horizontal
12060.0	4.0	51.8	55.8	74.0	18.2	Vertical
12060.0	0.5	52.4	52.9	74.0	21.1	Horizontal

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Result of Wifi mode (2412.0 MHz) (802.11g) (Above 1GHz): Pass

Field Strength of Spurious Emissions Average Value						
Frequency MHz	Measured Level @3m dBuV	Correction Factor dB/m	Field Strength dBuV/m	Limit @3m dBuV/m	Margin dBuV/m	E-Field Polarity
4824.0	2.5	41.5	44.0	54.0	10.0	Vertical
4824.0	-1.2	42.4	41.2	54.0	12.8	Horizontal
7236.0	-2.9	45.1	42.2	54.0	11.8	Vertical
7236.0	-6.7	46.2	39.5	54.0	14.5	Horizontal
9648.0	-6.9	48	41.1	54.0	12.9	Vertical
9648.0	-9.4	48.8	39.4	54.0	14.6	Horizontal
12060.0	-11.4	51.8	40.4	54.0	13.6	Vertical
12060.0	-14.6	52.4	37.8	54.0	16.2	Horizontal

Result of Wifi mode (2437.0 MHz) (802.11g) (9kHz – 30MHz): Pass

Field Strength of Spurious Emissions Average Value						
Frequency MHz	Measured Level dB $\mu$ V	Correction Factor dB/m	Field Strength dB $\mu$ V/m	Field Strength dB $\mu$ V/m	Limit dB $\mu$ V/m	E-Field Polarity
Emissions detected are more than 20 dB below the FCC Limits						

Result of Wifi mode (2437.0 MHz) (802.11g) (Above 1GHz): Pass

Field Strength of Spurious Emissions Peak Value						
Frequency MHz	Measured Level @3m dBuV	Correction Factor dB/m	Field Strength dBuV/m	Limit @3m dBuV/m	Margin dBuV/m	E-Field Polarity
4874.0	17.1	41.6	58.7	74.0	15.3	Vertical
4874.0	13.0	42.5	55.5	74.0	18.5	Horizontal
7311.0	3.5	53.2	56.7	74.0	17.3	Vertical
7311.0	7.1	46.3	53.4	74.0	20.6	Horizontal
9748.0	7.4	48.1	55.5	74.0	18.5	Vertical
9748.0	4.8	48.9	53.7	74.0	20.3	Horizontal
12185.0	3.7	51.6	55.3	74.0	18.7	Vertical
12185.0	0.6	52.5	53.1	74.0	20.9	Horizontal

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Result of Wifi mode (2437.0 MHz) (802.11g) (Above 1GHz): Pass

Field Strength of Spurious Emissions Average Value						
Frequency MHz	Measured Level @3m dBuV	Correction Factor dB/m	Field Strength dBuV/m	Limit @3m dBuV/m	Margin dBuV/m	E-Field Polarity
4874.0	2.0	41.6	43.6	54.0	10.4	Vertical
4874.0	-2.3	42.5	40.2	54.0	13.8	Horizontal
7311.0	-3.8	45.2	41.4	54.0	12.6	Vertical
7311.0	-8.0	46.3	38.3	54.0	15.7	Horizontal
9748.0	-7.7	48.1	40.4	54.0	13.6	Vertical
9748.0	-10.5	48.9	38.4	54.0	15.6	Horizontal
12185.0	-11.5	51.6	40.1	54.0	13.9	Vertical
12185.0	-14.5	52.5	38.0	54.0	16.0	Horizontal

Result of Wifi mode (2462.0 MHz) (802.11g) (9kHz – 30MHz): Pass

Field Strength of Spurious Emissions Average Value						
Frequency MHz	Measured Level dB $\mu$ V	Correction Factor dB/m	Field Strength dB $\mu$ V/m	Field Strength dB $\mu$ V/m	Limit dB $\mu$ V/m	E-Field Polarity
Emissions detected are more than 20 dB below the FCC Limits						

Result of Wifi mode (2462.0 MHz) (802.11g) (Above 1GHz): Pass

Field Strength of Spurious Emissions Peak Value						
Frequency MHz	Measured Level @3m dB $\mu$ V	Correction Factor dB/m	Field Strength dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB $\mu$ V/m	E-Field Polarity
4924.0	17.0	41.4	58.4	74.0	15.6	Vertical
4924.0	13.6	42.7	56.3	74.0	17.7	Horizontal
7386.0	9.7	45.6	55.3	74.0	18.7	Vertical
7386.0	6.3	46.5	52.8	74.0	21.2	Horizontal
9848.0	7.1	48.6	55.7	74.0	18.3	Vertical
9848.0	4.9	49.7	54.6	74.0	19.4	Horizontal
12310.0	4.0	51.7	55.7	74.0	18.3	Vertical
12310.0	0.6	52.7	53.3	74.0	20.7	Horizontal

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Result of Wifi mode (2462.0 MHz) (802.11g) (Above 1GHz): Pass

Field Strength of Spurious Emissions						
Average Value						
Frequency MHz	Measured Level @3m dBuV	Correction Factor dB/m	Field Strength dBuV/m	Limit @3m dBuV/m	Margin dBuV/m	E-Field Polarity
4924.0	1.9	41.4	43.3	54.0	10.7	Vertical
4924.0	-1.6	42.7	41.1	54.0	12.9	Horizontal
7386.0	-5.6	45.6	40.0	54.0	14.0	Vertical
7386.0	-8.8	46.5	37.7	54.0	16.3	Horizontal
9848.0	-8.0	48.6	40.6	54.0	13.4	Vertical
9848.0	-10.3	49.7	39.4	54.0	14.6	Horizontal
12310.0	-11.3	51.7	40.4	54.0	13.6	Vertical
12310.0	-14.5	52.7	38.2	54.0	15.8	Horizontal

Result of Wifi mode (2412.0 MHz) (802.11n20) (9kHz – 30MHz): Pass

Field Strength of Spurious Emissions						
Average Value						
Frequency MHz	Measured Level dB $\mu$ V	Correction Factor dB/m	Field Strength dB $\mu$ V/m	Field Strength dB $\mu$ V/m	Limit dB $\mu$ V/m	E-Field Polarity
Emissions detected are more than 20 dB below the FCC Limits						

Result of Wifi mode (2412.0 MHz) (802.11n20) (Above 1GHz): Pass

Field Strength of Spurious Emissions						
Peak Value						
Frequency MHz	Measured Level @3m dB $\mu$ V	Correction Factor dB/m	Field Strength dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB $\mu$ V/m	E-Field Polarity
4824.0	17.3	41.5	58.8	74.0	15.2	Vertical
4824.0	13.8	42.4	56.2	74.0	17.8	Horizontal
7236.0	11.9	45.1	57.0	74.0	17.0	Vertical
7236.0	7.5	46.2	53.7	74.0	20.3	Horizontal
9648.0	7.8	48	55.8	74.0	18.2	Vertical
9648.0	4.9	48.8	53.7	74.0	20.3	Horizontal
12060.0	4.2	51.8	56.0	74.0	18.0	Vertical
12060.0	1.0	52.4	53.4	74.0	20.6	Horizontal

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Result of Wifi mode (2412.0 MHz) (802.11n20) (Above 1GHz): Pass

Field Strength of Spurious Emissions Average Value						
Frequency MHz	Measured Level @3m dBuV	Correction Factor dB/m	Field Strength dBuV/m	Limit @3m dBuV/m	Margin dBuV/m	E-Field Polarity
4824.0	2.2	41.5	43.7	54.0	10.3	Vertical
4824.0	-1.5	42.4	40.9	54.0	13.1	Horizontal
7236.0	-3.4	45.1	41.7	54.0	12.3	Vertical
7236.0	-7.6	46.2	38.6	54.0	15.4	Horizontal
9648.0	-7.4	48	40.6	54.0	13.4	Vertical
9648.0	-10.3	48.8	38.5	54.0	15.5	Horizontal
12060.0	-11.1	51.8	40.7	54.0	13.3	Vertical
12060.0	-14.1	52.4	38.3	54.0	15.7	Horizontal

Result of Wifi mode (2437.0 MHz) (802.11n20) (9kHz – 30MHz): Pass

Field Strength of Spurious Emissions Average Value						
Frequency MHz	Measured Level dB $\mu$ V	Correction Factor dB/m	Field Strength dB $\mu$ V/m	Field Strength dB $\mu$ V/m	Limit dB $\mu$ V/m	E-Field Polarity
Emissions detected are more than 20 dB below the FCC Limits						

Result of Wifi mode (2437.0 MHz) (802.11n20) (Above 1GHz): Pass

Field Strength of Spurious Emissions Peak Value						
Frequency MHz	Measured Level @3m dB $\mu$ V	Correction Factor dB/m	Field Strength dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB $\mu$ V/m	E-Field Polarity
4874.0	16.6	41.6	58.2	74.0	15.8	Vertical
4874.0	13.7	42.5	56.2	74.0	17.8	Horizontal
7311.0	3.2	53.2	56.4	74.0	17.6	Vertical
7311.0	7.5	46.3	53.8	74.0	20.2	Horizontal
9748.0	8.0	48.1	56.1	74.0	17.9	Vertical
9748.0	5.4	48.9	54.3	74.0	19.7	Horizontal
12185.0	4.1	51.6	55.7	74.0	18.3	Vertical
12185.0	1.6	52.5	54.1	74.0	19.9	Horizontal

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Result of Wifi mode (2437.0 MHz) (802.11n20) (Above 1GHz): Pass

Field Strength of Spurious Emissions Average Value						
Frequency MHz	Measured Level @3m dBuV	Correction Factor dB/m	Field Strength dBuV/m	Limit @3m dBuV/m	Margin dBuV/m	E-Field Polarity
4874.0	1.5	41.6	43.1	54.0	10.9	Vertical
4874.0	-1.6	42.5	40.9	54.0	13.1	Horizontal
7311.0	-4.1	45.2	41.1	54.0	12.9	Vertical
7311.0	-7.6	46.3	38.7	54.0	15.3	Horizontal
9748.0	-7.1	48.1	41.0	54.0	13.0	Vertical
9748.0	-9.9	48.9	39.0	54.0	15.0	Horizontal
12185.0	-10.1	51.6	41.5	54.0	12.5	Vertical
12185.0	-13.5	52.5	39.0	54.0	15.0	Horizontal

Result of Wifi mode (2462.0 MHz) (802.11n20) (9kHz – 30MHz): Pass

Field Strength of Spurious Emissions Average Value						
Frequency MHz	Measured Level dB $\mu$ V	Correction Factor dB/m	Field Strength dB $\mu$ V/m	Field Strength dB $\mu$ V/m	Limit dB $\mu$ V/m	E-Field Polarity
Emissions detected are more than 20 dB below the FCC Limits						

Result of Wifi mode (2462.0 MHz) (802.11n20) (Above 1GHz): Pass

Field Strength of Spurious Emissions Peak Value						
Frequency MHz	Measured Level @3m dB $\mu$ V	Correction Factor dB/m	Field Strength dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB $\mu$ V/m	E-Field Polarity
4924.0	16.9	41.4	58.3	74.0	15.7	Vertical
4924.0	13.4	42.7	56.1	74.0	17.9	Horizontal
7386.0	11.1	45.6	56.7	74.0	17.3	Vertical
7386.0	7.8	46.5	54.3	74.0	19.7	Horizontal
9848.0	7.7	48.6	56.3	74.0	17.7	Vertical
9848.0	4.5	49.7	54.2	74.0	19.8	Horizontal
12310.0	4.0	51.7	55.7	74.0	18.3	Vertical
12310.0	1.0	52.7	53.7	74.0	20.3	Horizontal

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Result of Wifi mode (2462.0 MHz) (802.11n20) (Above 1GHz): Pass

Field Strength of Spurious Emissions						
Average Value						
Frequency MHz	Measured Level @3m dBuV	Correction Factor dB/m	Field Strength dBuV/m	Limit @3m dBuV/m	Margin dBuV/m	E-Field Polarity
4924.0	1.8	41.4	43.2	54.0	10.8	Vertical
4924.0	-1.8	42.7	40.9	54.0	13.1	Horizontal
7386.0	-4.2	45.6	41.4	54.0	12.6	Vertical
7386.0	-7.3	46.5	39.2	54.0	14.8	Horizontal
9848.0	-7.4	48.6	41.2	54.0	12.8	Vertical
9848.0	-10.7	49.7	39.0	54.0	15.0	Horizontal
12310.0	11.3	51.7	63.0	54.0	-9.0	Vertical
12310.0	-14.1	52.7	38.6	54.0	15.4	Horizontal

Remarks:

No additional spurious emissions found between lowest internal used/generated frequency and 30 MHz

\* Denotes restricted band of operation.

Measurements were made using a peak detector. Any emission less than 1000MHz and falling within the restricted bands of FCC Rules Part 15 Section 15.205 and the limits of FCC Rules Part 15 Section 15.209 were applied.

Correction Factor included Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty : (9kHz-30MHz): 2.0dB  
(30MHz -1GHz): 4.9dB  
(1GHz -6GHz): 4.02dB  
(6GHz -26.5GHz): 4.03dB

Emissions in the vertical and horizontal polarizations have been investigated and the worst-case test results are recorded in this report.

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### Radiated Emissions Measurement:

#### Limit :

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. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 5.205(c)).

#### Result: Band-edge Compliance of RF Radiated Emissions (Lowest)-802.11b

Field Strength of Band-edge Compliance Peak Value						
Frequency MHz	Measured Level @3m dB $\mu$ V	Correction Factor dB/m	Field Strength dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB $\mu$ V/m	E-Field Polarity
2390.0	14.4	36.8	51.2	74.0	22.8	Vertical
2390.0	8.4	36.4	44.8	74.0	29.2	Horizontal

Field Strength of Band-edge Compliance Average Value						
Frequency MHz	Measured Level @3m dB $\mu$ V	Correction Factor dB/m	Field Strength dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB $\mu$ V/m	E-Field Polarity
2390.0	4.0	36.8	40.8	54.0	13.2	Vertical
2390.0	-2.2	36.4	34.2	54.0	19.8	Horizontal

#### Result: Band-edge Compliance of RF Radiated Emissions (Highest) -802.11b

Field Strength of Band-edge Compliance Peak Value						
Frequency MHz	Measured Level @3m dB $\mu$ V	Correction Factor dB/m	Field Strength dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB $\mu$ V/m	E-Field Polarity
2483.5	10.9	36.8	47.7	74.0	26.3	Vertical
2483.5	6.2	36.4	42.6	74.0	31.4	Horizontal

Field Strength of Band-edge Compliance Average Value						
Frequency MHz	Measured Level @3m dB $\mu$ V	Correction Factor dB/m	Field Strength dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB $\mu$ V/m	E-Field Polarity
2483.5	0.7	36.8	37.5	54.0	16.5	Vertical
2483.5	-4.0	36.4	32.4	54.0	21.6	Horizontal

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**Result: Band-edge Compliance of RF Radiated Emissions (Lowest)-802.11g**

Field Strength of Band-edge Compliance Peak Value						
Frequency MHz	Measured Level @3m dB $\mu$ V	Correction Factor dB/m	Field Strength dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB $\mu$ V/m	E-Field Polarity
2390.0	13.9	36.8	50.7	74.0	23.3	Vertical
2390.0	8.4	36.4	44.8	74.0	29.2	Horizontal

Field Strength of Band-edge Compliance Average Value						
Frequency MHz	Measured Level @3m dB $\mu$ V	Correction Factor dB/m	Field Strength dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB $\mu$ V/m	E-Field Polarity
2390.0	3.5	36.8	40.3	54.0	13.7	Vertical
2390.0	-2.1	36.4	34.3	54.0	19.7	Horizontal

**Result: Band-edge Compliance of RF Radiated Emissions (Highest) -802.11g**

Field Strength of Band-edge Compliance Peak Value						
Frequency MHz	Measured Level @3m dB $\mu$ V	Correction Factor dB/m	Field Strength dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB $\mu$ V/m	E-Field Polarity
2483.5	10.1	36.8	46.9	74.0	27.1	Vertical
2483.5	6.2	36.4	42.6	74.0	31.4	Horizontal

Field Strength of Band-edge Compliance Average Value						
Frequency MHz	Measured Level @3m dB $\mu$ V	Correction Factor dB/m	Field Strength dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB $\mu$ V/m	E-Field Polarity
2483.5	-0.1	36.8	36.7	54.0	17.3	Vertical
2483.5	-4.1	36.4	32.3	54.0	21.7	Horizontal

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**Result: Band-edge Compliance of RF Radiated Emissions (Lowest)-802.11n20**

Field Strength of Band-edge Compliance Peak Value						
Frequency MHz	Measured Level @3m dB $\mu$ V	Correction Factor dB/m	Field Strength dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB $\mu$ V/m	E-Field Polarity
2390.0	13.4	36.8	50.2	74.0	23.8	Vertical
2390.0	8.8	36.4	<u>45.2</u>	74.0	28.8	Horizontal

Field Strength of Band-edge Compliance Average Value						
Frequency MHz	Measured Level @3m dB $\mu$ V	Correction Factor dB/m	Field Strength dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB $\mu$ V/m	E-Field Polarity
2390.0	3.0	36.8	39.8	54.0	14.2	Vertical
2390.0	1.7	36.4	<u>38.1</u>	54.0	15.9	Horizontal

**Result: Band-edge Compliance of RF Radiated Emissions (Highest) -802.11n20**

Field Strength of Band-edge Compliance Peak Value						
Frequency MHz	Measured Level @3m dB $\mu$ V	Correction Factor dB/m	Field Strength dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB $\mu$ V/m	E-Field Polarity
2483.5	10.5	36.8	47.3	74.0	26.7	Vertical
2483.5	7.1	36.4	<u>43.5</u>	74.0	30.5	Horizontal

Field Strength of Band-edge Compliance Average Value						
Frequency MHz	Measured Level @3m dB $\mu$ V	Correction Factor dB/m	Field Strength dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB $\mu$ V/m	E-Field Polarity
2483.5	0.4	36.8	37.2	54.0	16.8	Vertical
2483.5	-3.2	36.4	<u>33.2</u>	54.0	20.8	Horizontal

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### Limits for Radiated Emissions [FCC 47 CFR 15.209 Class B]:

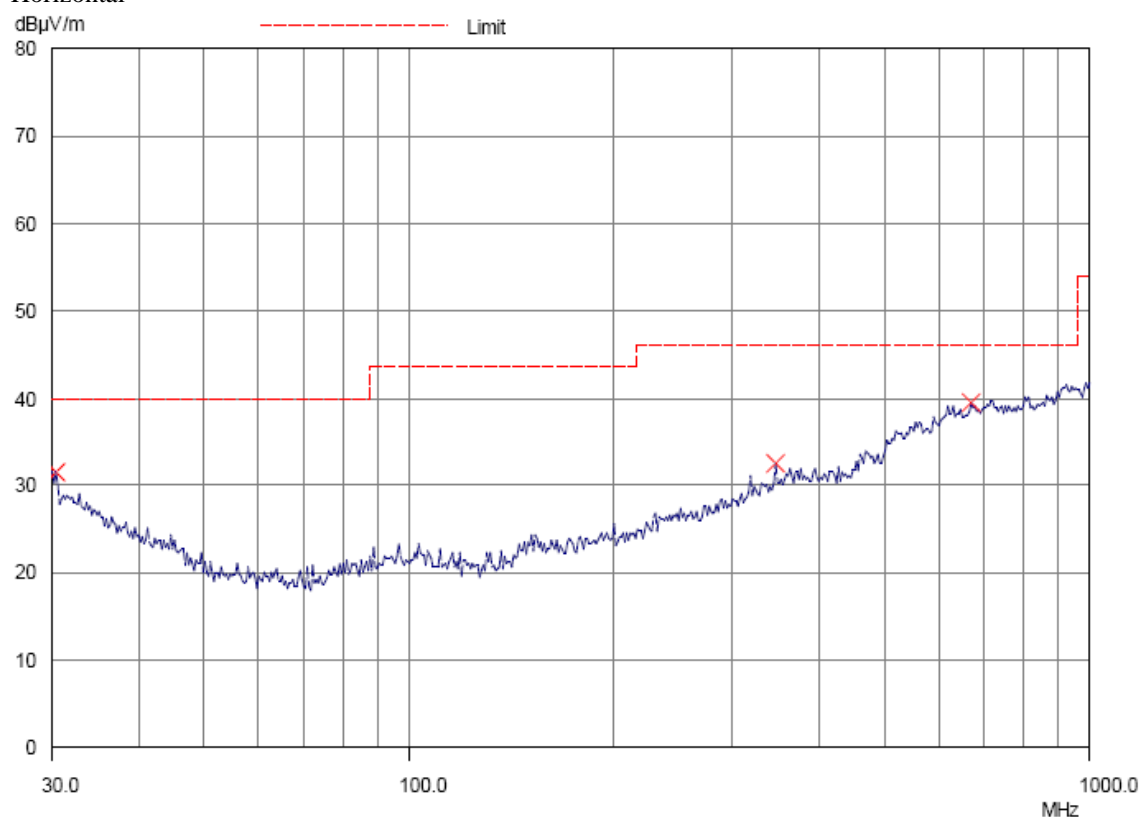
Frequency Range [MHz]	Quasi-Peak Limits [ $\mu\text{V}/\text{m}$ ]
0.009-0.490	2400/F (kHz)
0.490-1.705	24000/F (kHz)
1.705-30	30
30-88	100
88-216	150
216-960	200
Above960	500

The emission limits shown in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on measurements employing an average detector.

### Result of WiFi mode (2412MHz, 802.11b) (30MHz – 1GHz): Pass

Please refer to the following table for result details

Horizontal



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Result of WiFi mode (2412MHz, 802.11b) (30MHz – 1GHz): Pass

Radiated Emissions Quasi-Peak					
Emission Frequency MHz	E-Field Polarity	Level @3m dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Level @3m $\mu$ V/m	Limit @3m $\mu$ V/m
30.3	Horizontal	31.5	40.0	37.6	100
344.1	Horizontal	32.4	46.0	41.7	200
667.2	Horizontal	37.7	46.0	76.7	200

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### Limits for Radiated Emissions [FCC 47 CFR 15.209 Class B]:

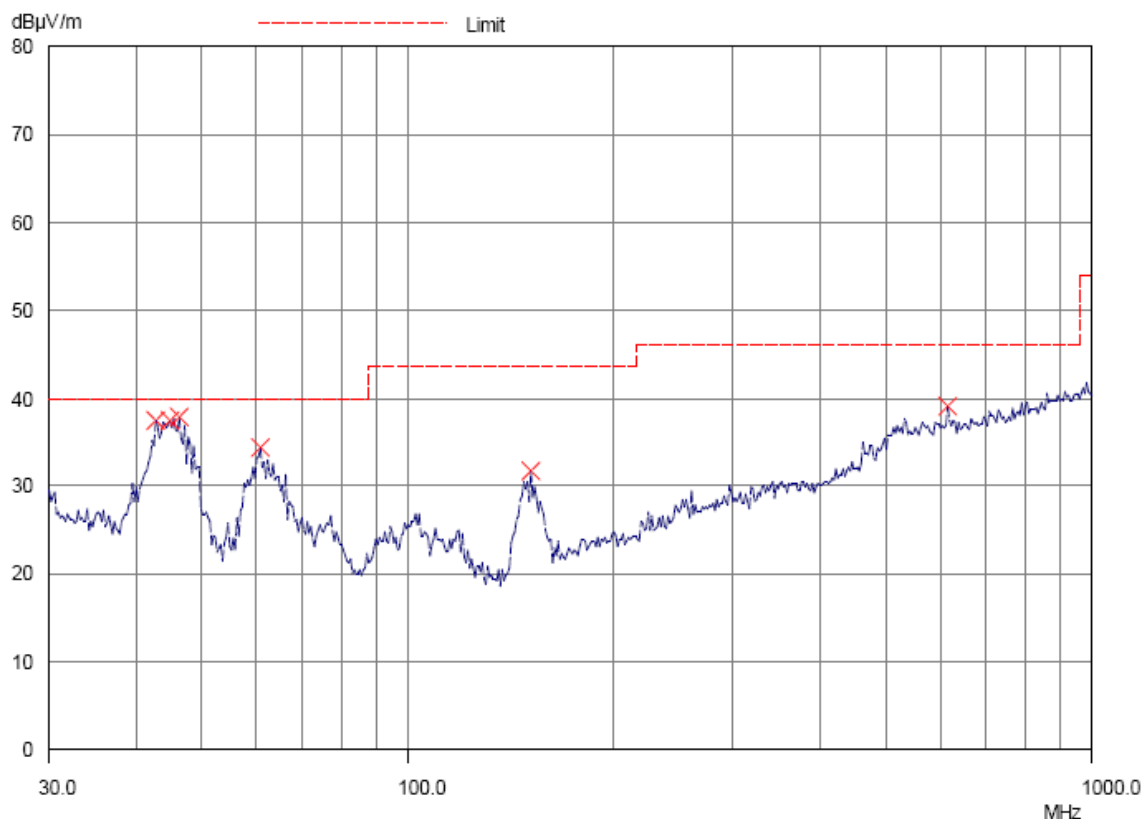
Frequency Range [MHz]	Quasi-Peak Limits [ $\mu$ V/m]
0.009-0.490	2400/F (kHz)
0.490-1.705	24000/F (kHz)
1.705-30	30
30-88	100
88-216	150
216-960	200
Above960	500

The emission limits shown in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on measurements employing an average detector.

### Result of WiFi mode (2412MHz, 802.11b) (30MHz – 1GHz): Pass

Please refer to the following table for result details

Vertical



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Result of WiFi mode (2412MHz, 802.11b) (30MHz – 1GHz): Pass

Radiated Emissions Quasi-Peak					
Emission Frequency MHz	E-Field Polarity	Level @3m dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Level @3m $\mu$ V/m	Limit @3m $\mu$ V/m
42.9	Vertical	35.4	40.0	58.9	100
44.8	Vertical	35.5	40.0	59.6	100
46.4	Vertical	36.1	40.0	63.8	100
60.9	Vertical	33.3	40.0	46.2	100
151.9	Vertical	31.7	43.5	38.5	150
612.9	Vertical	38.1	46.0	80.4	200

Remarks:

Calculated measurement uncertainty (30MHz – 1GHz): 4.9dB

Emissions in the vertical and horizontal polarizations have been investigated and the worst-case test results are recorded in this report.

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## STC Test Report

**Date: 2016-08-08**

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**No.: DMA000094**

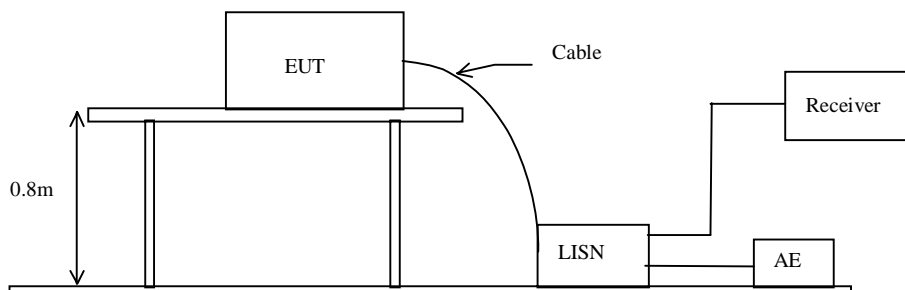
### **3.1.3 AC Mains Conducted Emissions (0.15MHz to 30MHz)**

Test Requirement:	FCC 47CFR 15.207
Test Method:	ANSI C63.10:2013
Test Date:	2016-08-02
Mode of Operation:	Wifi mode
Test Voltage:	120Va.c. 60Hz

#### **Test Method:**

The test was performed in accordance with ANSI C63.10:2013, with the following: an initial measurement was performed in peak and average detection mode on the live line, any emissions recorded within 30dB of the relevant limit line were re-measured using quasi-peak and average detection on the live and neutral lines with the worst case recorded in the table of results.

#### **Test Setup:**



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**Limit for Conducted Emissions (FCC 47 CFR 15.207):**

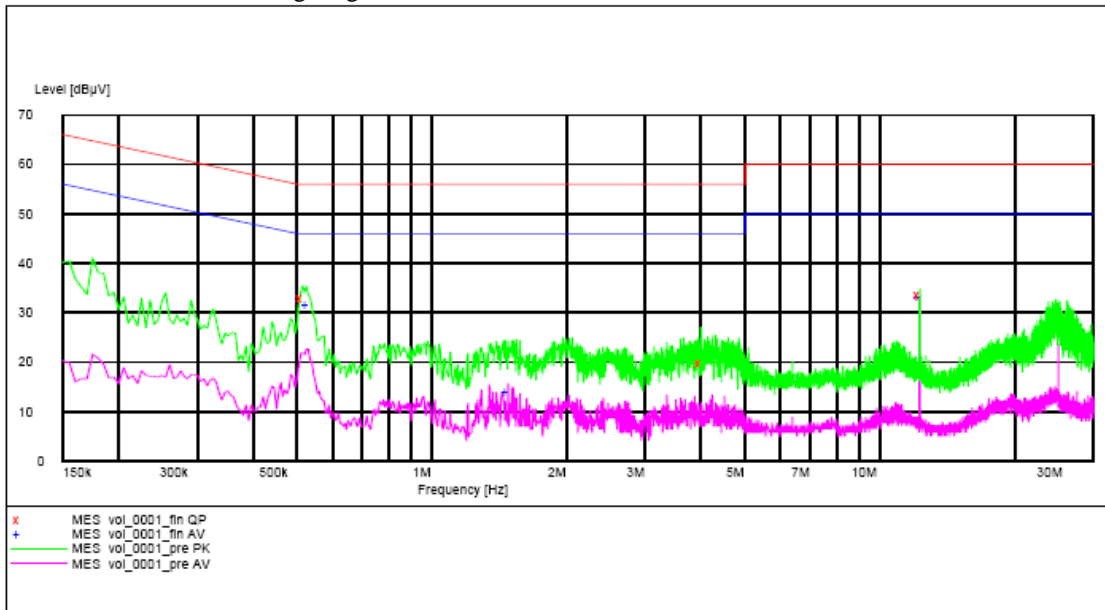
Frequency Range [MHz]	Quasi-Peak Limits [dBμV]	Average [dBμV]
0.15-0.5	66 to 56*	56 to 46*
0.5-5.0	56	46
5.0-30.0	60	50

\* Decreases with the logarithm of the frequency.

Limits for Conducted Emissions Test, please refer to limit lines (Quasi-Peak and Average) in the following diagram.

**Result of Wifi mode (L): PASS**

Please refer to the following diagram for individual results.



Conductor Live or Neutral	Frequency MHz	Quasi-peak		Average	
		Level dBμV	Limit dBμV	Level dBμV	Limit dBμV
Live	0.515	33.0	56.0	-*-	-*-
Live	4.000	19.8	56.0	-*-	-*-
Live	12.290	33.7	60.0	-*-	-*-
Live	0.530	-*-	-*-	31.6	46.0
Live	1.480	-*-	-*-	13.9	46.0
Live	12.290	-*-	-*-	33.4	50.0

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**Limit for Conducted Emissions (FCC 47 CFR 15.207):**

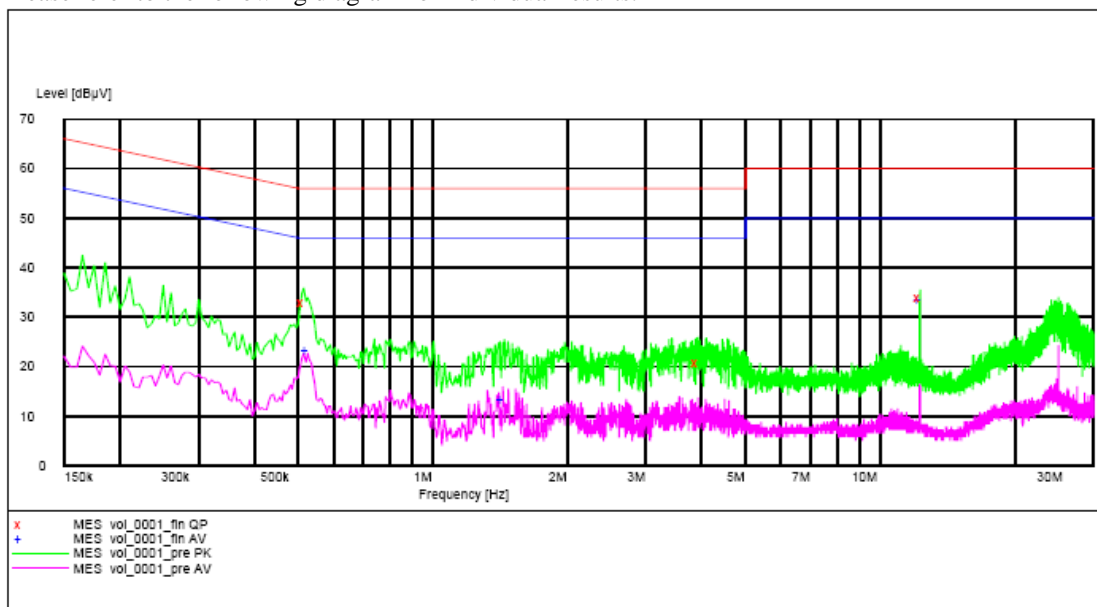
Frequency Range [MHz]	Quasi-Peak Limits [dB $\mu$ V]	Average [dB $\mu$ V]
0.15-0.5	66 to 56*	56 to 46*
0.5-5.0	56	46
5.0-30.0	60	50

\* Decreases with the logarithm of the frequency.

Limits for Conducted Emissions Test, please refer to limit lines (Quasi-Peak and Average) in the following diagram.

**Result of Wifi mode (N): PASS**

Please refer to the following diagram for individual results.



Conductor Live or Neutral	Frequency MHz	Quasi-peak		Average	
		Level dB $\mu$ V	Limit dB $\mu$ V	Level dB $\mu$ V	Limit dB $\mu$ V
Neutral	0.515	32.8	56.0	-*-	-*-
Neutral	3.920	20.6	56.0	-*-	-*-
Neutral	12.290	33.9	60.0	-*-	-*-
Neutral	0.525	-*-	-*-	23.3	46.0
Neutral	1.435	-*-	-*-	13.3	46.0
Neutral	12.290	-*-	-*-	33.6	50.0

**Remarks:**

Calculated measurement uncertainty (0.15MHz – 30MHz): 3.25dB

-\*- Emission(s) that is far below the corresponding limit line.

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### 3.1.4 Power Spectral Density

Test Requirement: FCC 47CFR 15.247(e)  
Test Method: ANSI C63.10:2013  
Test Date: 2016-08-02  
Mode of Operation: WiFi mode

#### Test Method:

The RF output of the EUT was connected to the spectrum analyzer. Set the fundamental frequency as the center frequency of the spectral analyzer. Use RBW=3kHz , VBW= 10KHz , Set the span to 1.5 times the DTS channel bandwidth. Detector = peak, Sweep time = auto couple , Trace mode = max hold. Measure the Power Spectral Density (PSD) and record the results in dBm.

#### Test Setup:

As Test Setup of clause 3.1.1 in this test report.

#### Test Limit:

The maximum power spectral density (PSD) shall not exceeded 8dBm in any 3kHz band.

#### Results of WiFi Mode 802.11 b (Tx:2412MHz to 2462MHz) : Pass (TX Unit)

##### Maximum power spectral density

Transmitter Frequency (MHz)	Maximum Power spectral density level / 3kHz band (dBm)	Maximum Power spectral density / 3kHz band limit
2412.0	-13.01	8dBm
2437.0	-12.65	8dBm
2462.0	-12.25	8dBm

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Results of WiFi Mode 802.11 g (Tx:2412MHz to 2462MHz) : Pass (TX Unit)

Maximum power spectral density

Transmitter Frequency (MHz)	Maximum Power spectral density level / 3kHz band (dBm)	Maximum Power spectral density / 3kHz band limit
2412.0	-18.42	8dBm
2437.0	-18.18	8dBm
2462.0	-16.71	8dBm

Results of WiFi Mode 802.11 n20 (Tx:2412MHz to 2462MHz) : Pass (TX Unit)

Maximum power spectral density

Transmitter Frequency (MHz)	Maximum Power spectral density level / 3kHz band (dBm)	Maximum Power spectral density / 3kHz band limit
2412.0	-17.78	8dBm
2437.0	-17.74	8dBm
2462.0	-15.94	8dBm

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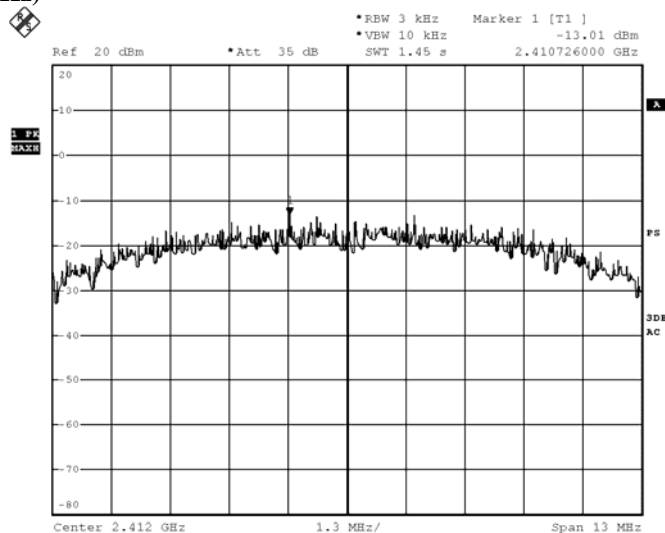
Date: 2016-08-08

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No.: DMA000094

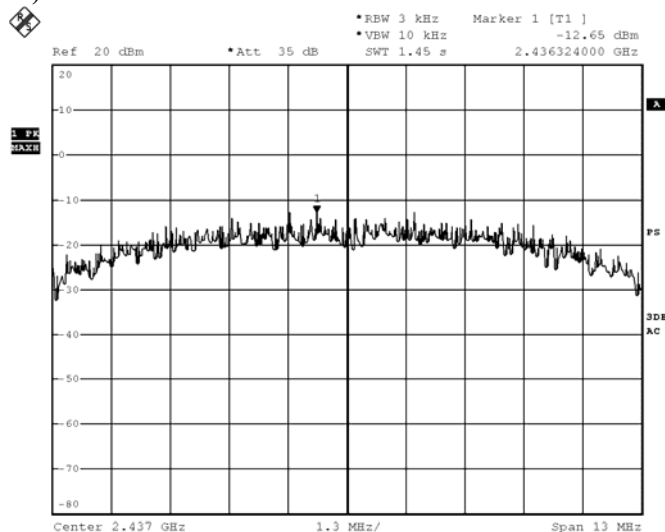
WiFi mode 802.11 b, (Tx: 2412MHz to 2462MHz)

CH 1 (2412.0 MHz)



BMP  
Date: 2.AUG.2016 20:58:13

CH 6 (2437.0 MHz)



BMP  
Date: 2.AUG.2016 20:58:53

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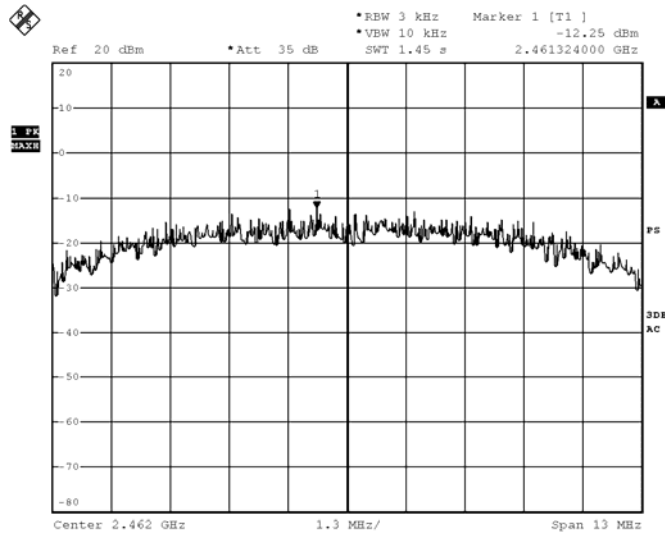


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Date: 2016-08-08  
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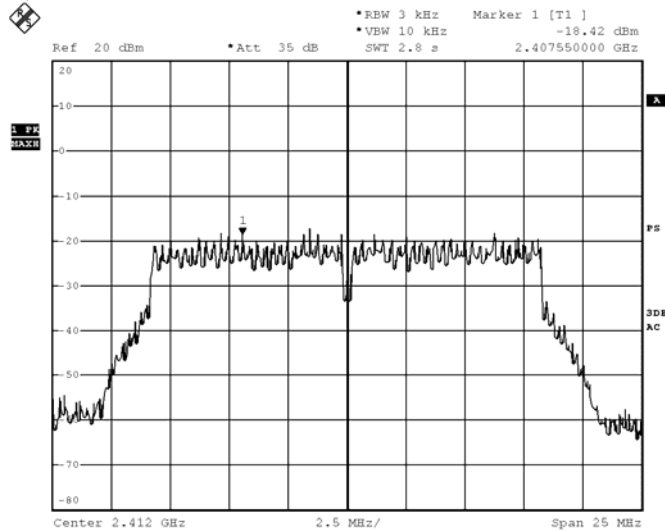
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CH 11 (2462.0 MHz)



BMP  
Date: 2.AUG.2016 20:59:38

WiFi mode 802.11 g, (Tx:2412MHz to 2462MHz)  
Ch 1 (2412.0 MHz)



BMP  
Date: 2.AUG.2016 21:02:40

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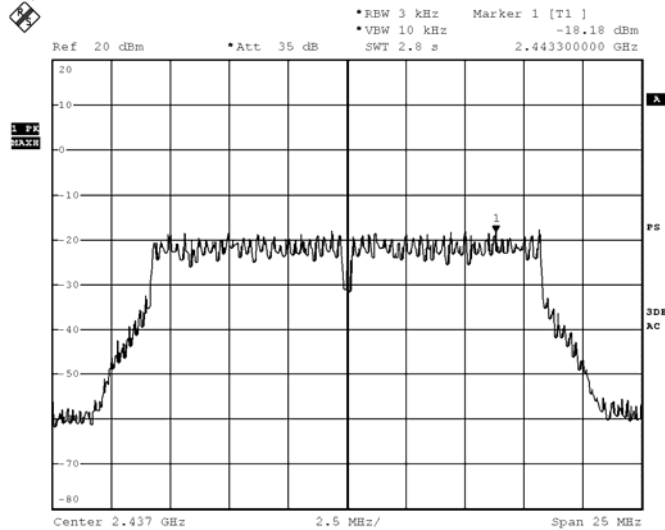


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Date: 2016-08-08  
No.: DMA000094

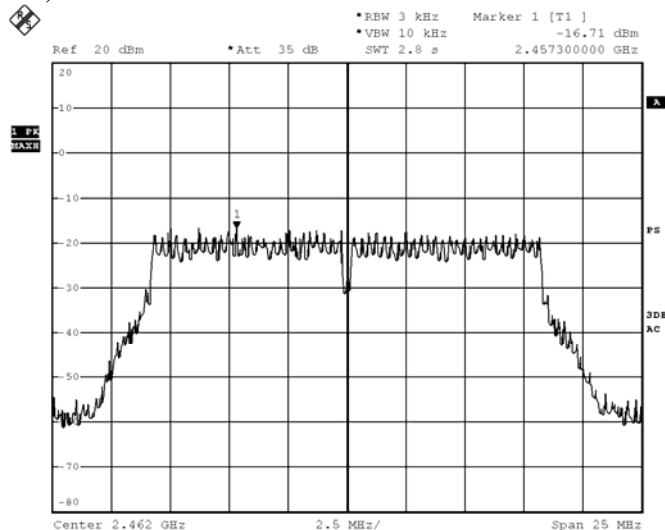
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## CH 6 (2437.0 MHz)



BMP  
Date: 2.AUG.2016 21:01:36

## CH 11 (2462.0 MHz)



BMP  
Date: 2.AUG.2016 21:00:35

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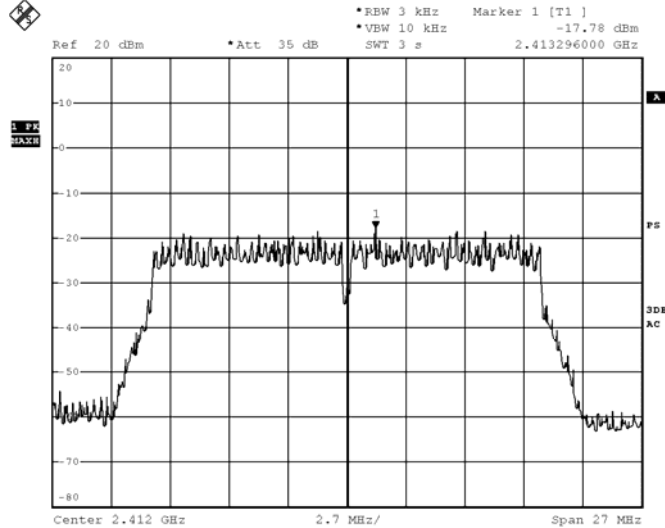


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No.: DMA000094

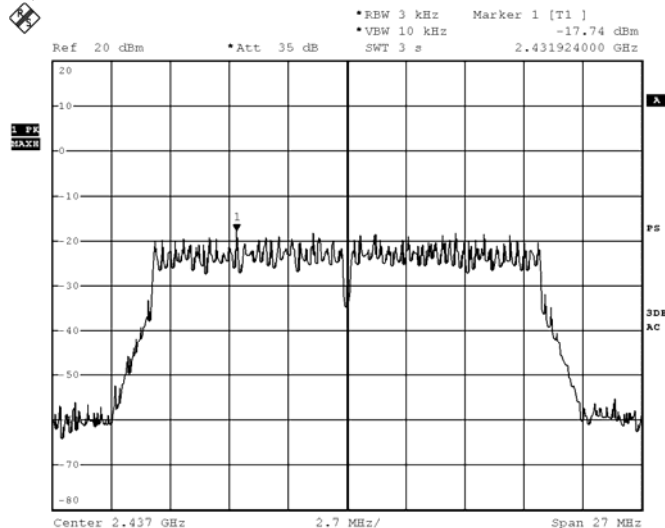
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WiFi mode 802.11 n20, (Tx: 2412MHz to 2462MHz)  
CH 1 (2412.0 MHz)



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CH 6 (2437.0 MHz)



BMP  
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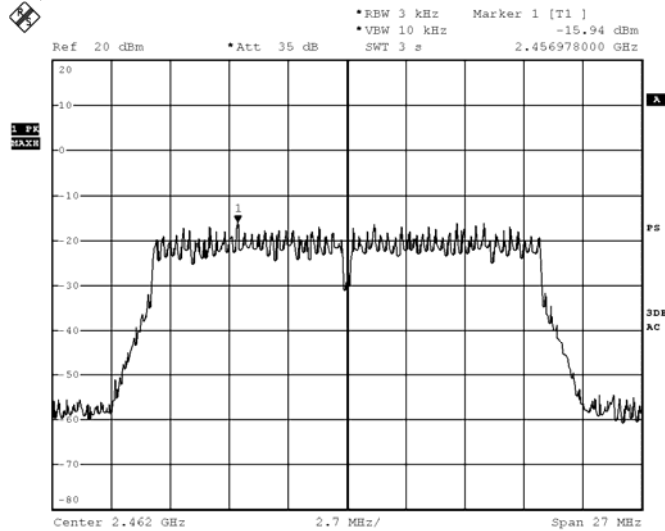


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Ch 11 (2462.0 MHz)



BMP  
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## **STC Test Report**

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### **3.1.5 6dB Spectrum Bandwidth Measurement**

Test Requirement:	FCC 47CFR 15.247(a)(2)
Test Method:	ANSI C63.10:2013
Test Date:	2016-08-02
Mode of Operation:	WiFi mode

#### **Test Method:**

The bandwidth is measured at an amplitude level reduced from the reference level by a specified ratio. The reference level is the level of the highest amplitude signal observed from the transmitter at the fundamental frequency. Once the reference level is established, the equipment is conditioned with typical modulating signal to produce the worst-case (i.e. the widest) bandwidth.

#### **Test Setup:**

As Test Setup of clause 3.1.1 in this test report.

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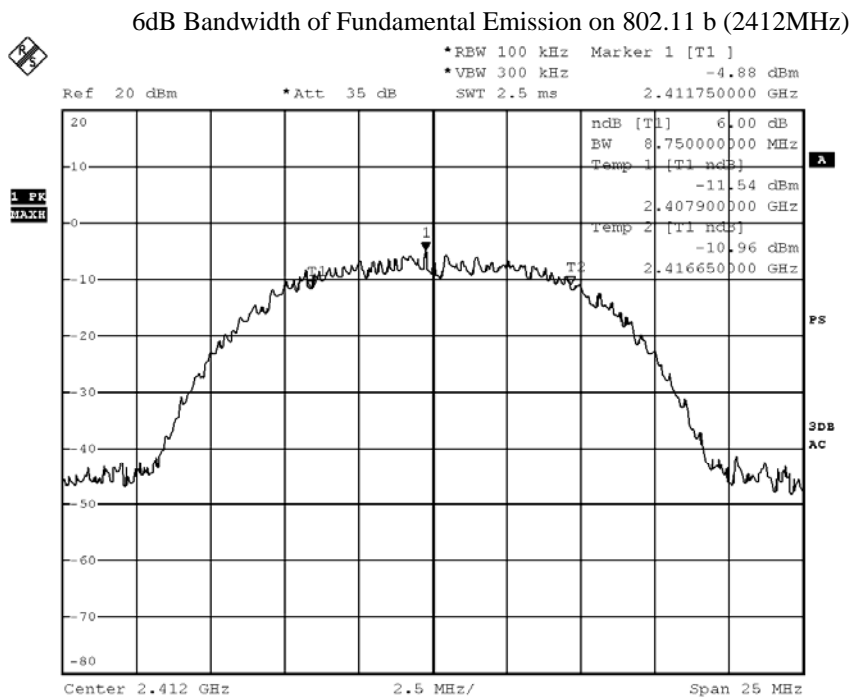
## STC Test Report

Date: 2016-08-08  
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### Limits for 6dB Spectrum Bandwidth Measurement:

Center Frequency [MHz]	6dB Bandwidth [MHz]	FCC Limits [kHz]
2412.0	8.750	> 500



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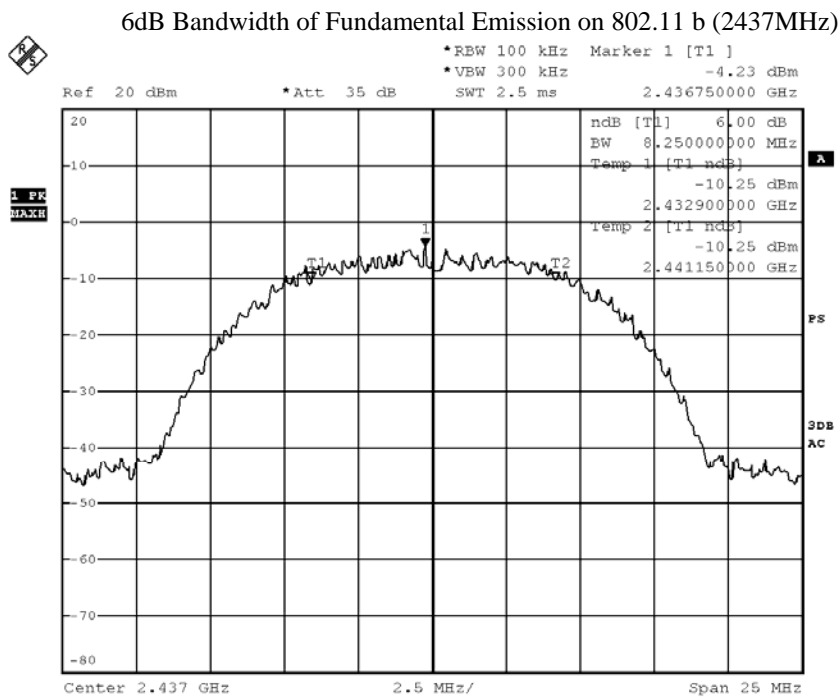
## STC Test Report

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### Limits for 6dB Spectrum Bandwidth Measurement:

Frequency Range [MHz]	6dB Bandwidth [MHz]	FCC Limits [kHz]
2437.0	8.250	> 500



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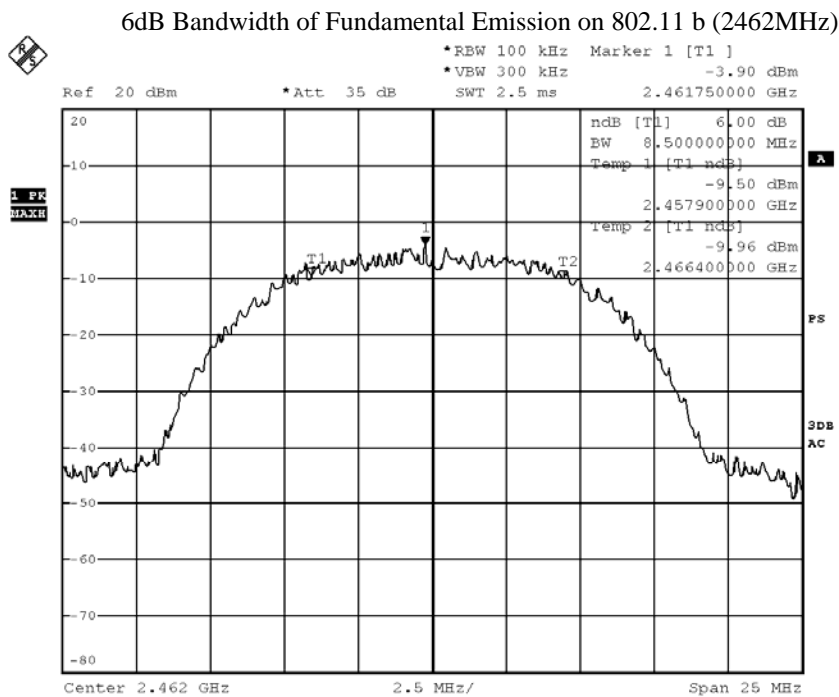
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### Limits for 6dB Spectrum Bandwidth Measurement:

Frequency Range [MHz]	6dB Bandwidth [MHz]	FCC Limits [kHz]
2462.0	8.500	> 500



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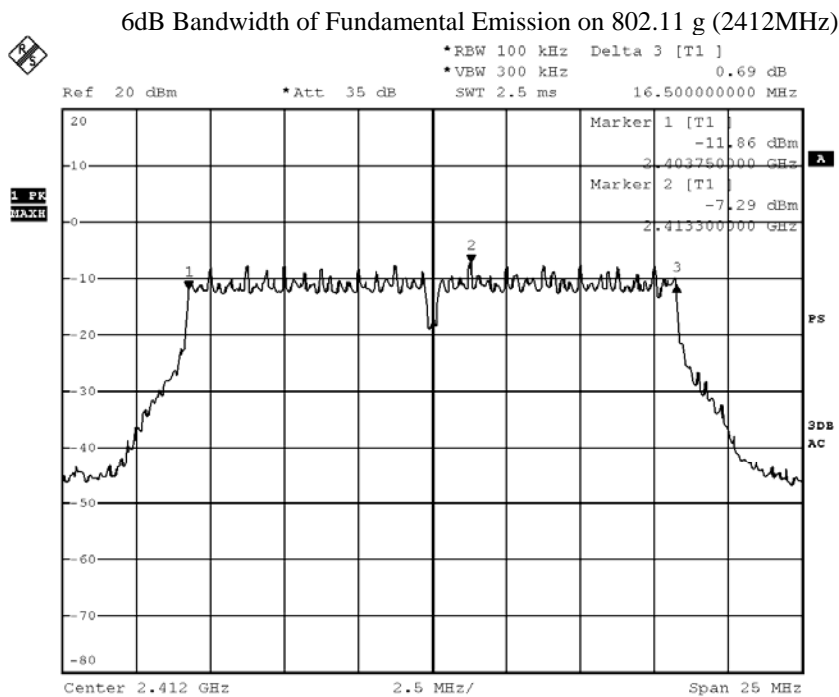
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### Limits for 6dB Spectrum Bandwidth Measurement:

Center Frequency [MHz]	6dB Bandwidth [MHz]	FCC Limits [kHz]
2412.0	16.500	> 500



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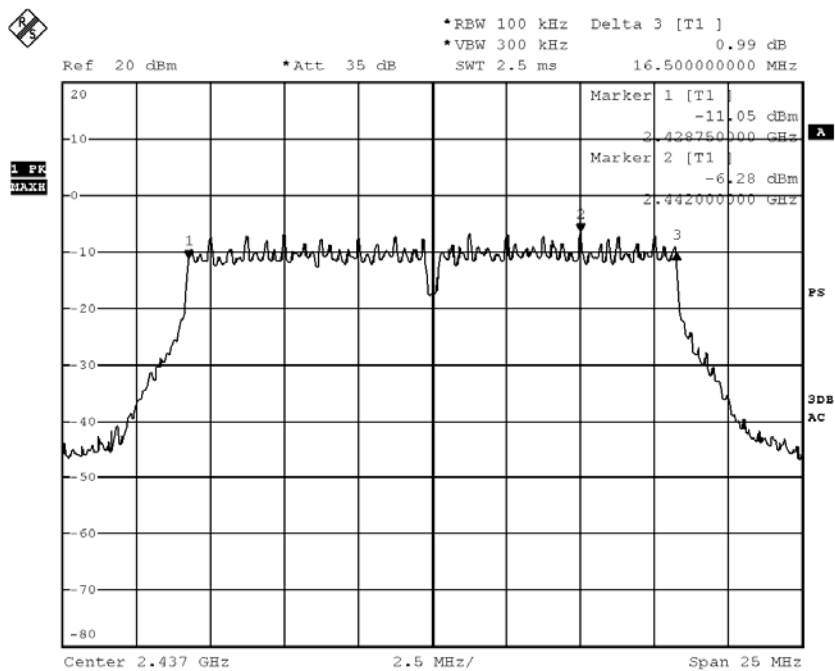
Date: 2016-08-08  
No.: DMA000094

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### Limits for 6dB Spectrum Bandwidth Measurement:

Frequency Range [MHz]	6dB Bandwidth [MHz]	FCC Limits [kHz]
2437.0	16.500	> 500

### 6dB Bandwidth of Fundamental Emission on 802.11 g (2437MHz)



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Date: 2.AUG.2016 20:35:14

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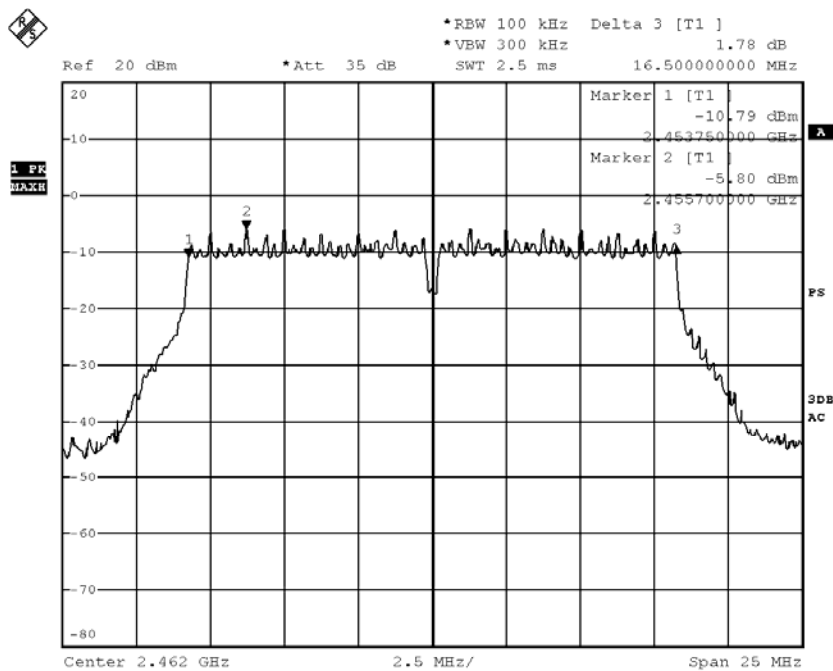
Date: 2016-08-08  
No.: DMA000094

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### Limits for 6dB Spectrum Bandwidth Measurement:

Frequency Range [MHz]	6dB Bandwidth [MHz]	FCC Limits [kHz]
2462.0	16.500	> 500

### 6dB Bandwidth of Fundamental Emission on 802.11 g (2462MHz)



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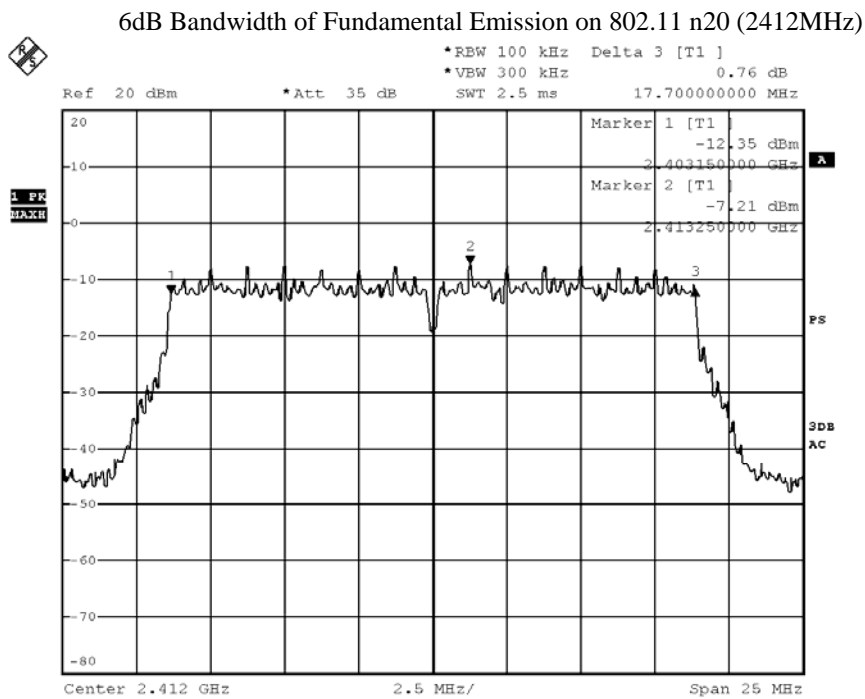
# STC Test Report

Date: 2016-08-08  
No.: DMA000094

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## Limits for 6dB Spectrum Bandwidth Measurement:

Center Frequency [MHz]	6dB Bandwidth [MHz]	FCC Limits [kHz]
2412.0	17.700	> 500



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Date: 2.AUG.2016 20:37:54

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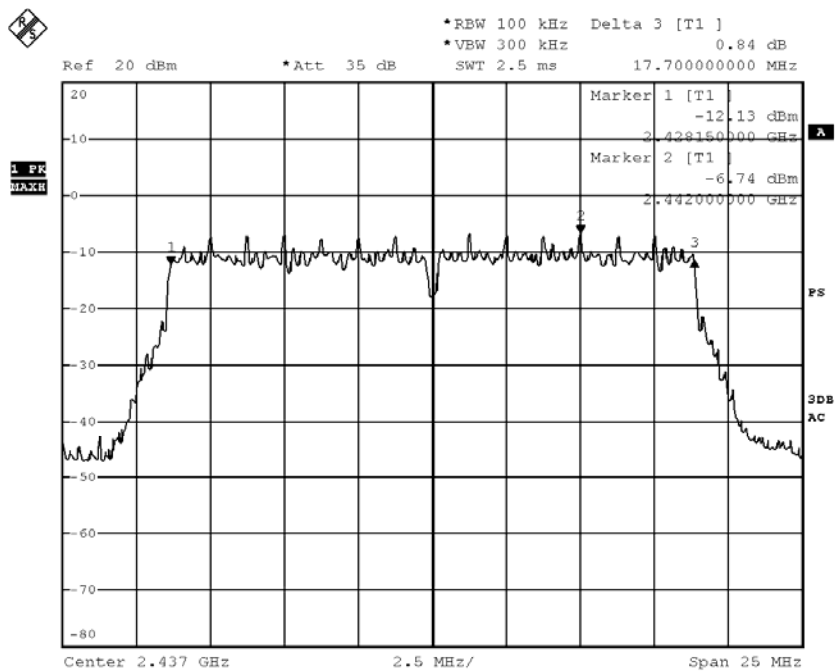
Date: 2016-08-08  
No.: DMA000094

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### Limits for 6dB Spectrum Bandwidth Measurement:

Frequency Range [MHz]	6dB Bandwidth [MHz]	FCC Limits [kHz]
2437.0	17.700	> 500

### 6dB Bandwidth of Fundamental Emission on 802.11 n20 (2437MHz)



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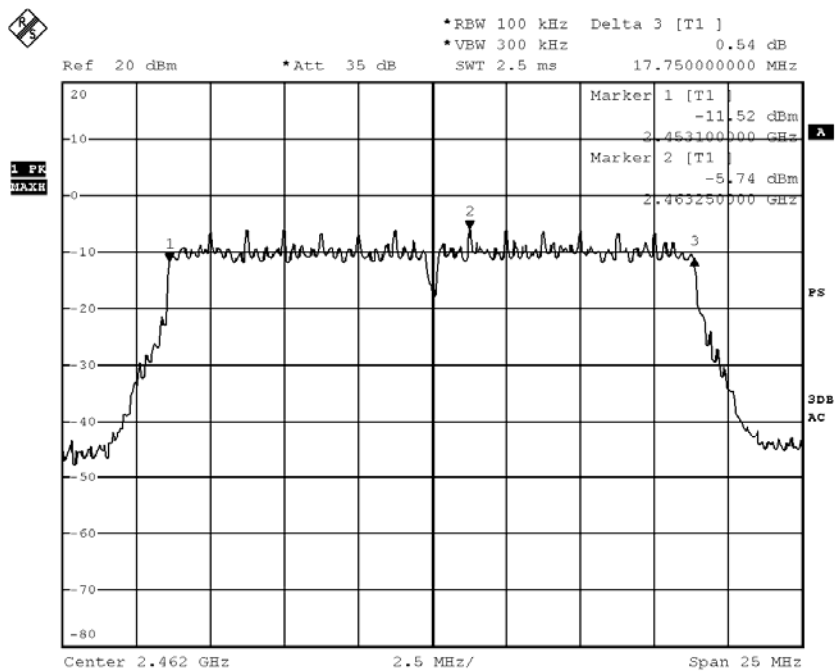
Date: 2016-08-08  
No.: DMA000094

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### Limits for 6dB Spectrum Bandwidth Measurement:

Frequency Range [MHz]	6dB Bandwidth [MHz]	FCC Limits [kHz]
2462.0	17.750	> 500

### 6dB Bandwidth of Fundamental Emission on 802.11 n20 (2462MHz)



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**Date: 2016-08-08**

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### **3.1.6 Band Edges Measurement**

Test Requirement:	FCC 47CFR 15.247
Test Method:	ANSI C63.10:2013
Test Date:	2016-08-02
Mode of Operation:	WiFi mode

#### **Test Method:**

The band edge is measured at an amplitude level reduced from the reference level by a specified ratio. The reference level is the level of the highest amplitude signal observed from the transmitter at the fundamental frequency. The RBW and VBW are set to 100kHz for this measurement.

#### **Test Setup:**

As Test Setup of clause 3.1.2 in this test report.

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# STC Test Report

Date: 2016-08-08

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No.: DMA000094

### Band-edge Compliance of RF Conducted Emissions Measurement:

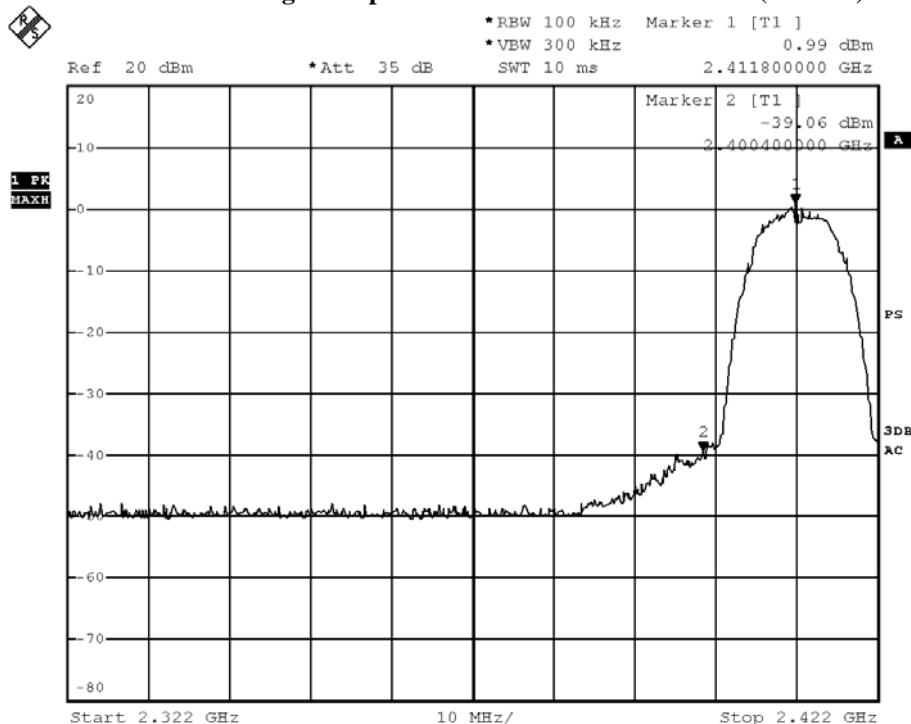
#### Limit :

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. Attenuation below the general limits specified in Section 15.209(a) is not required.

Remark: Emissions under the fixed frequency mode and hopping mode have been investigated, the worst-case measurement results were recorded in the test report

Frequency Range [MHz]	Radiated Emission Attenuated below the Fundamental [dB]
2400 – Lowest Fundamental (2412)	40.05

### Band-edge Compliance of RF Emissions – Lowest (802.11b)



BMP

Date: 2.AUG.2016 21:37:57

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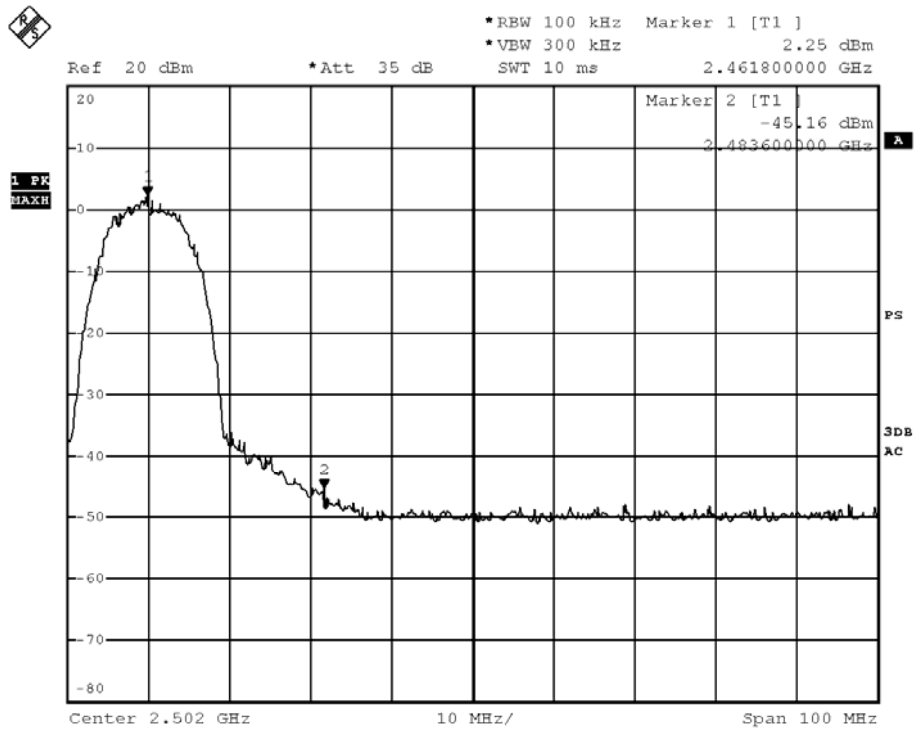
Date: 2016-08-08  
No.: DMA000094

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### Band-edge Compliance of RF Conducted Emissions Measurement:

Frequency Range [MHz]	Radiated Emission Attenuated below the Fundamental [dB]
2483.5 - Highest Fundamental (2462)	47.41

### Band-edge Compliance of RF Emissions – Highest (802.11b)



BMP

Date: 2.AUG.2016 21:53:44

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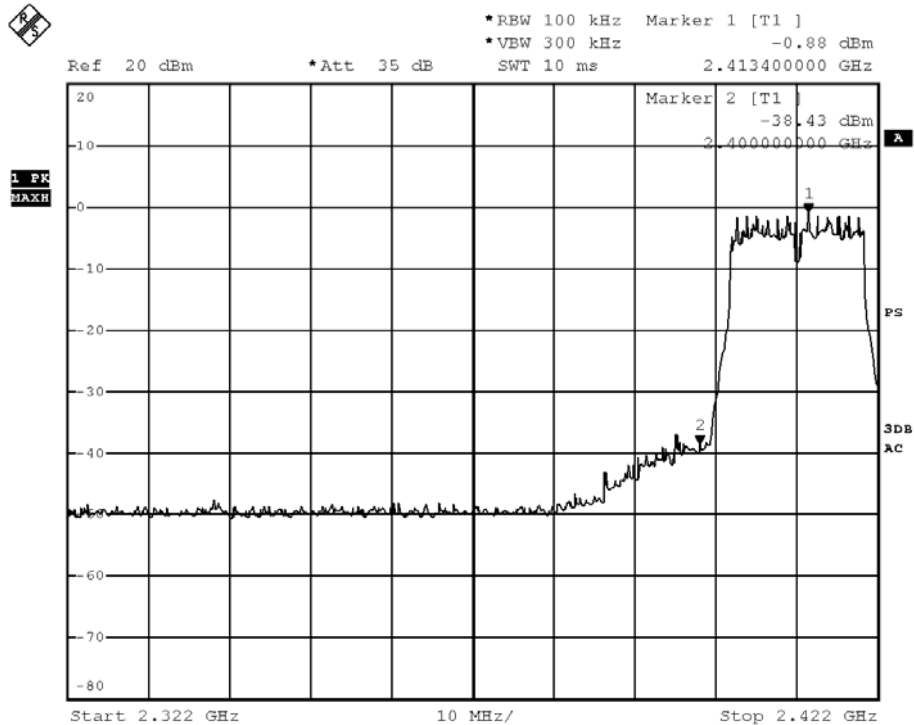
Date: 2016-08-08  
No.: DMA000094

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### Band-edge Compliance of RF Conducted Emissions Measurement:

Frequency Range [MHz]	Radiated Emission Attenuated below the Fundamental [dB]
2400 – Lowest Fundamental (2412)	37.55

### Band-edge Compliance of RF Emissions – Lowest (802.11g)



BMP

Date: 2.AUG.2016 21:42:08

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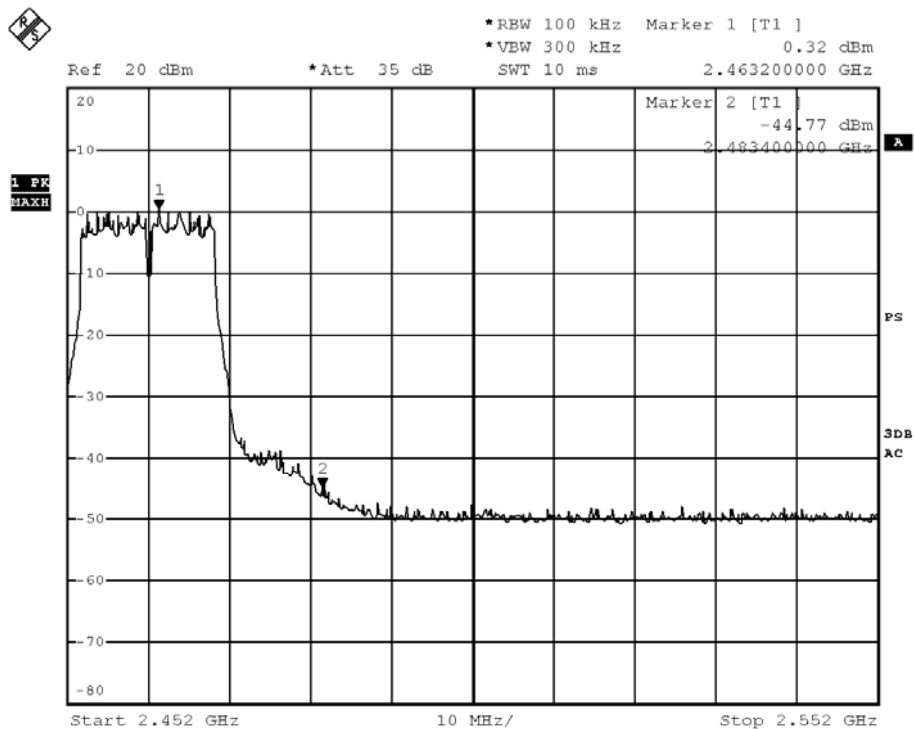
Date: 2016-08-08  
No.: DMA000094

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### Band-edge Compliance of RF Conducted Emissions Measurement:

Frequency Range [MHz]	Radiated Emission Attenuated below the Fundamental [dB]
2483.5 - Highest Fundamental (2462)	45.09

### Band-edge Compliance of RF Emissions – Highest (802.11g)



BMP

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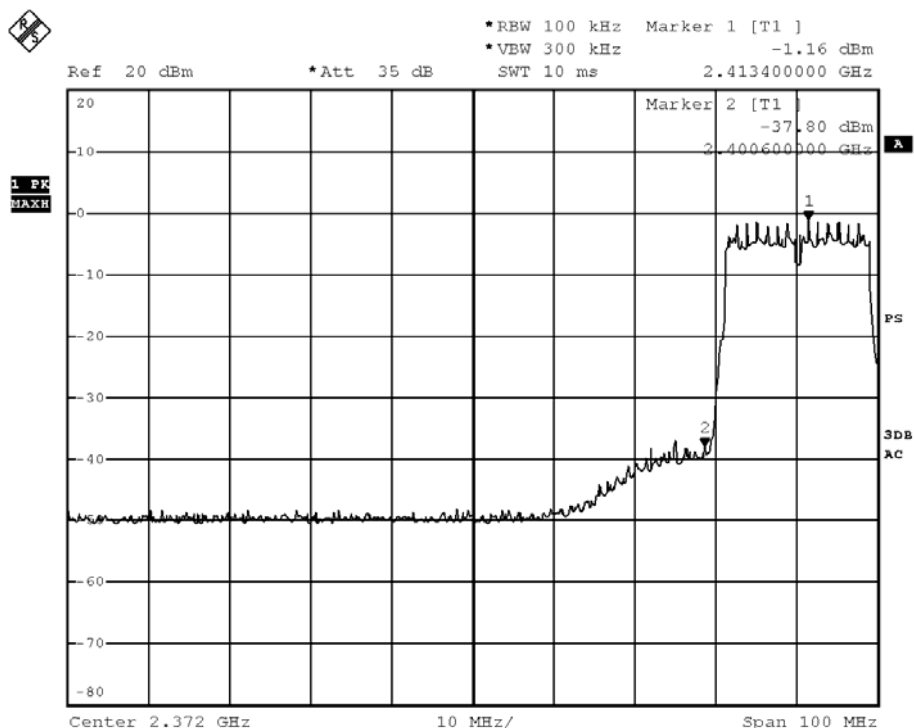
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No.: DMA000094

### Band-edge Compliance of RF Conducted Emissions Measurement:

Frequency Range [MHz]	Radiated Emission Attenuated below the Fundamental [dB]
2400 – Lowest Fundamental (2412)	36.64

### Band-edge Compliance of RF Emissions – Lowest (802.11n20)



BMP

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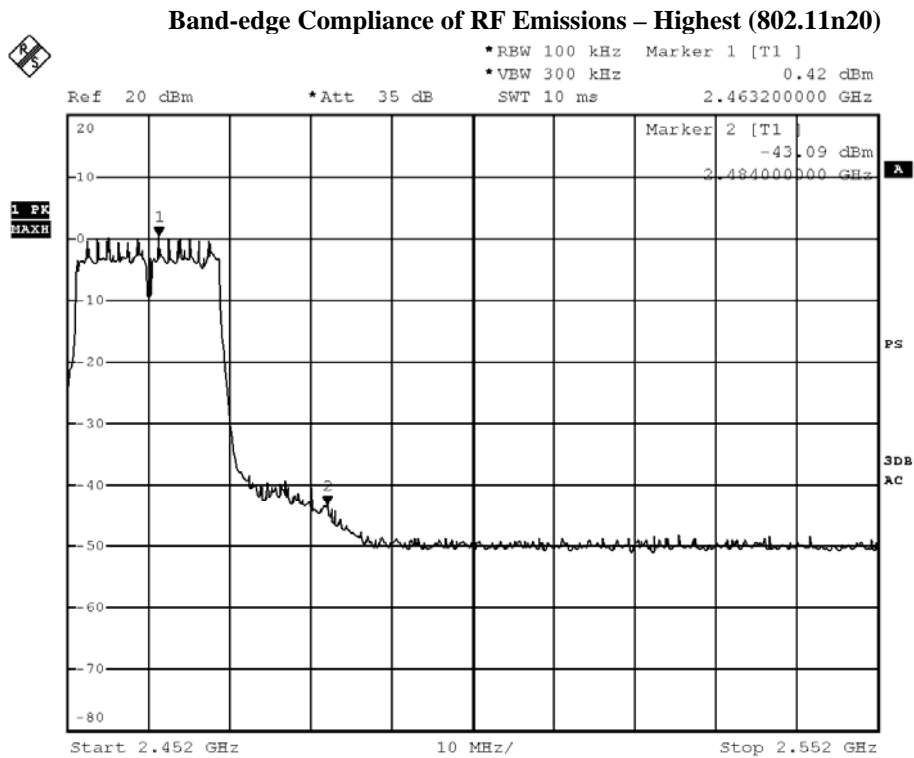
## STC Test Report

Date: 2016-08-08  
No.: DMA000094

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### Band-edge Compliance of RF Conducted Emissions Measurement:

Frequency Range [MHz]	Radiated Emission Attenuated below the Fundamental [dB]
2483.5 - Highest Fundamental (2462)	43.51



BMP

Date: 2.AUG.2016 21:48:46

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Date: 2016-08-08

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## Band-edge Compliance of RF Conducted Emissions Measurement:

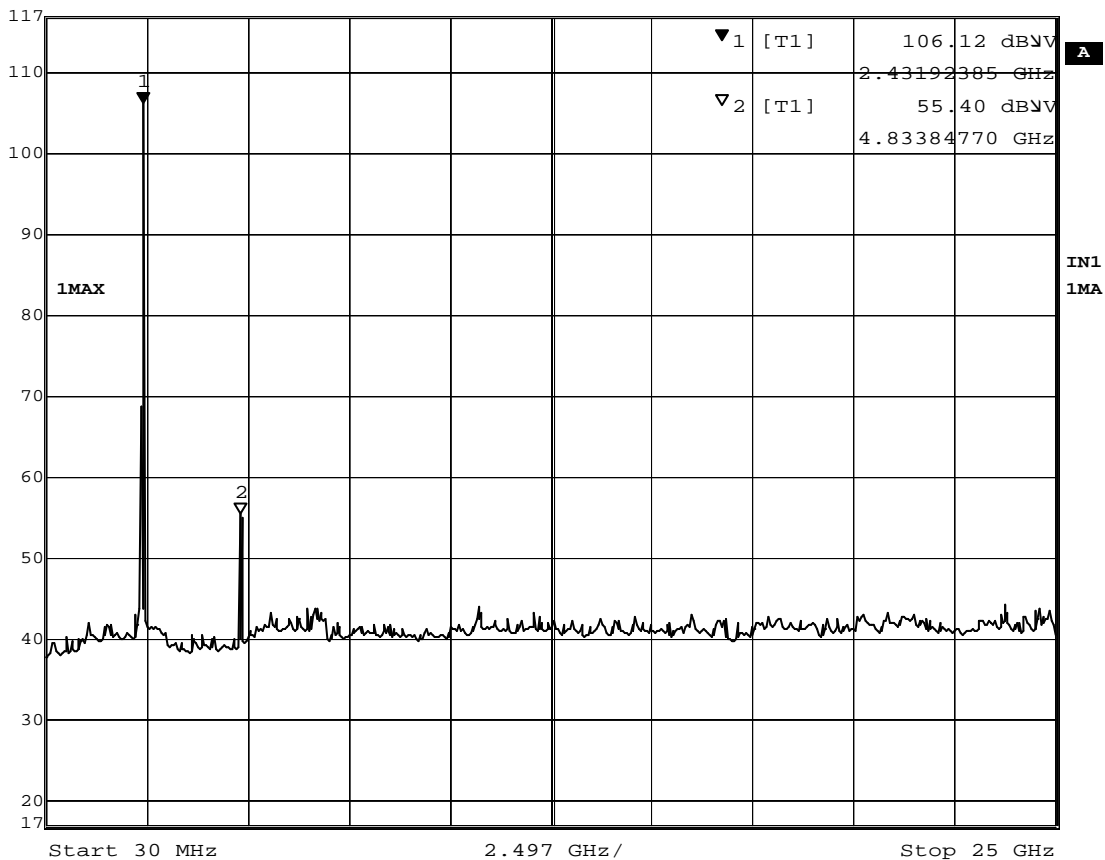
### Limit :

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. Attenuation below the general limits specified in Section 15.209(a) is not required.

Remark: Emissions under the fixed frequency mode and hopping mode have been investigated, the worst-case measurement results were recorded in the test report

### Band-edge Compliance of RF Emissions (802.11b 2437MHz)

FS	Marker 1 [T1]	RBW	100 kHz	RF Att	20 dB
	Ref Lvl	106.12 dB $\mu$ V	VBW	300 kHz	
	117 dB $\mu$ V	2.43192385 GHz	SWT	6.4 s	Unit dB $\mu$ V



Date: 3.AUG.2016 01:12:57

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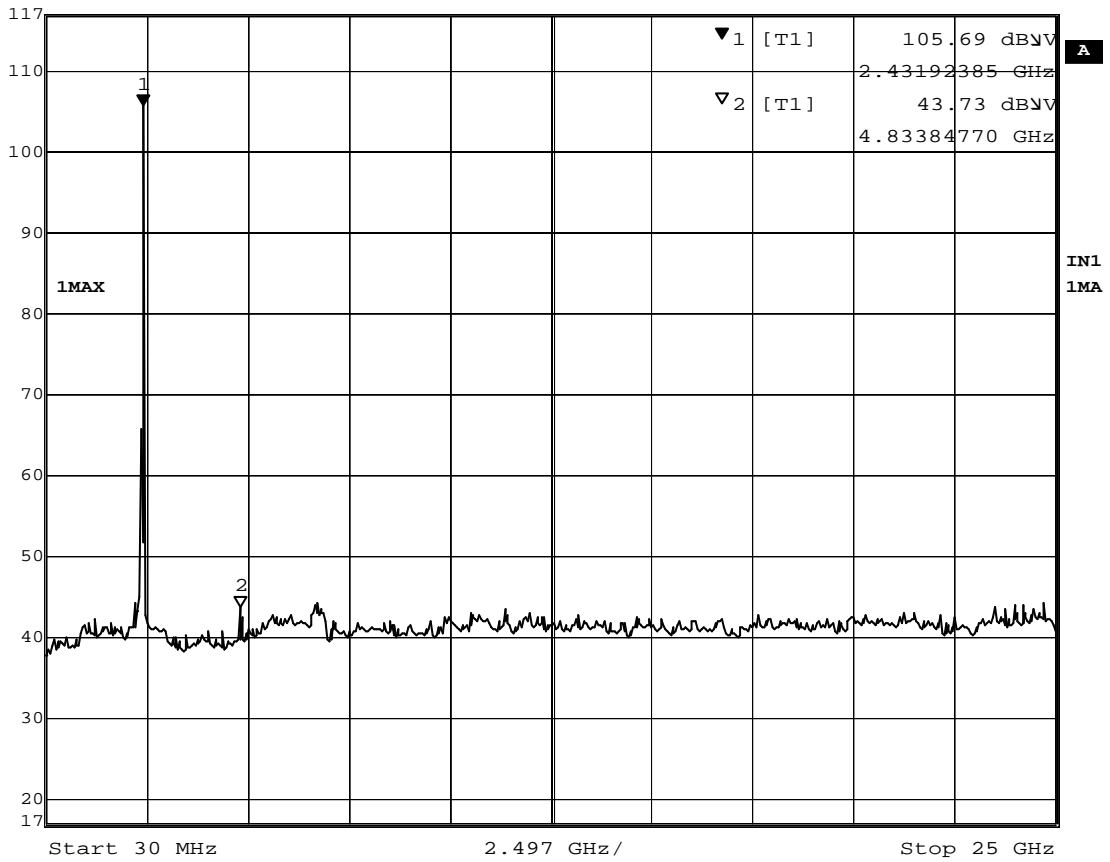
# STC Test Report

Date: 2016-08-08  
No.: DMA000094

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## Band-edge Compliance of RF Emissions (802.11g 2437MHz)

Ref Lvl	117 dB $\mu$ V	Marker 1 [T1]	105.69 dB $\mu$ V	RBW	100 kHz	RF Att	20 dB
			2.43192385 GHz	VBW	300 kHz		
				SWT	6.4 s	Unit	dB $\mu$ V



Date: 3.AUG.2016 01:16:34

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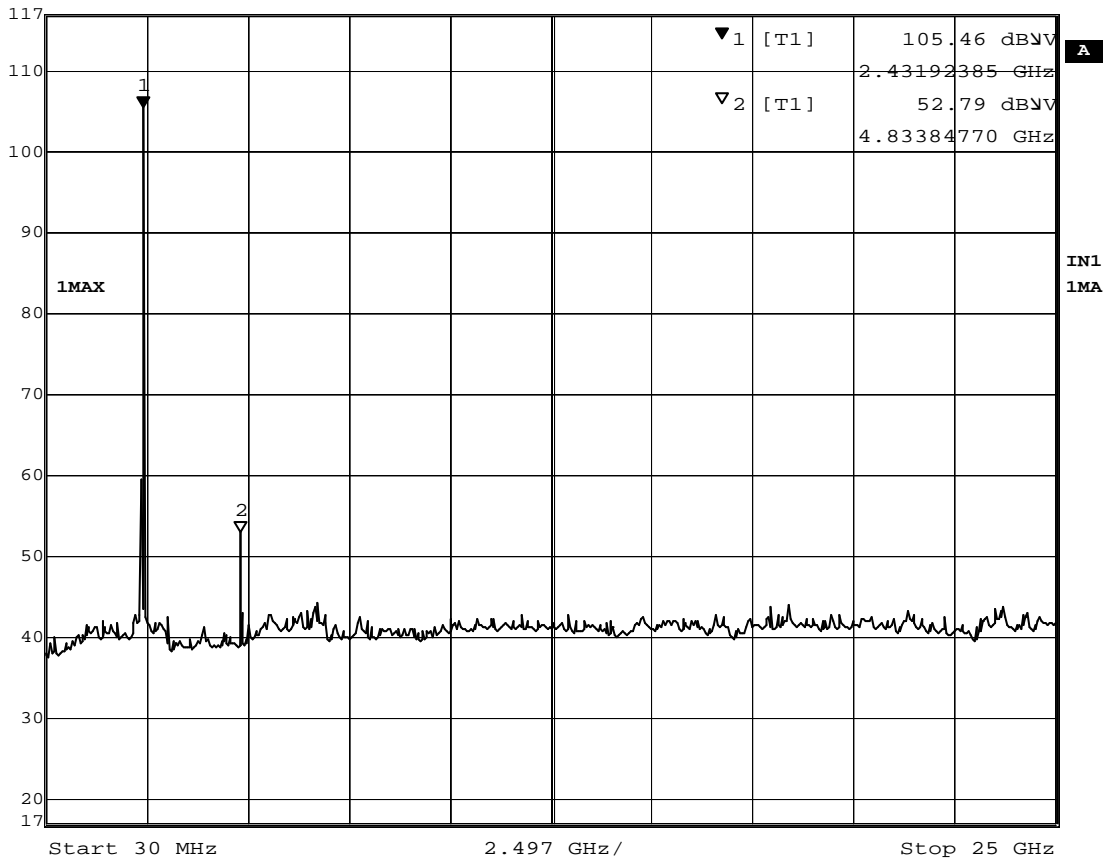
# STC Test Report

Date: 2016-08-08  
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## Band-edge Compliance of RF Emissions (802.11n20 2437MHz)

Ref Lvl	117 dB $\mu$ V	Marker 1 [T1]	2.43192385 GHz	RBW	100 kHz	RF Att	20 dB
				VBW	300 kHz		
				SWT	6.4 s	Unit	dB $\mu$ V



Date: 3.AUG.2016 01:20:01

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## **STC Test Report**

**Date: 2016-08-08**  
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### **3.1.7 Antenna Requirement**

**Test Requirements: § 15.203**

#### **Test Specification:**

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 use of a standard antenna jack or electrical connector is prohibited.

#### **Test Results:**

This is pcb antenna. There is no external antenna, the antenna gain = 4dBi. User is unable to remove or changed the Antenna.

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### **3.1.8 RF Exposure**

Test Requirement: FCC 47CFR 15.247(i)  
Test Date: 2016-08-03  
Mode of Operation: WiFi mode

#### **Test Method:**

Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines.

#### **Test Results:**

The EUT complied with the requirement(s) of this section.  
EUT meets the requirements of these sections as proven through MPE calculation  
The MPE calculation for EUT @ 20cm  
Based on the highest P = 72.61 mW

$$\begin{aligned} P_d &= PG / 4\pi R^2 = (72.61 \times 2.51) / 12.566 \times (20)^2 \\ &= (182.251) / 12.566 \times 400 = 182.251 / 5026.4 \\ &= 0.0363 \text{ mW/cm}^2 \end{aligned}$$

where:

- \*Pd = power density in mW/cm<sup>2</sup>
- \* G = Antenna numeric gain (2.51); Log G = g/10 ( g = 4dBi ).
- \* P = Conducted RF power to antenna (72.61 mW).
- \* R = Minimum allowable distance.(20 cm)

- \*The power density Pd = 0.0363mW/cm<sup>2</sup> is less than 1 mW/cm<sup>2</sup> (listed MPE limit)
- \*The SAR evaluation is not needed ( this is a desk top device, R> 20 cm )
- \* The EUT( antenna ) must be 0.2 meters away from the General Population.

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## STC Test Report

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### Appendix A

#### List of Measurement Equipment

##### Radiated Emission

EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	LAST CAL	DUE CAL
EM299	Double-Ridged Waveguide Horn Antenna	ETS-Lindgren	3115	00114120	2016/04/27	2018/04/27
EM215	MULTIDEVICE CONTROLLER	EMCO	2090	00024676	N/A	N/A
EM216	MINI MAST SYSTEM	EMCO	2075	00026842	N/A	N/A
EM217	ELECTRIC POWERED TURNABLE	EMCO	2088	00029144	N/A	N/A
EM218	ANECHOIC CHAMBER	ETS-Lindgren	FACT-3	--	2016/04/24	2017/04/24
EM355	Biconilog Antenna	ETS-Lindgren	3143B	00094856	2016/03/03	2018/03/03
EM229	EMI Test Receiver	R&S	ESIB40	100248	2016/06/01	2017/06/01
EM181	EMI TEST RECEIVER	ROHDE & SCHWARZ	ESIB7	100072	2016/06/01	2017/06/01
EM145	EMI Test Receiver	R & S	ESCS 30	830245/021	2016/06/01	2017/06/01
EM353	LOOP ANTENNA	ETS_LINDGREN	6502	00206533	2016/03/16	2018/03/16
EM302	Precision Omnidirectional Dipole (1 – 6GHz)	Seibersdorf Laboratories	POD 16	161806/L	2016/05/11	2018/05/11
EM303	Precision Omnidirectional Dipole (6 – 18GHz)	Seibersdorf Laboratories	POD 618	6181908/L	2016/05/11	2018/05/11

##### Line Conducted

EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	LAST CAL	DUE CAL
EM119	LISN	R & S	ESH3-Z5	0831.5518.52	2015/10/22	2016/10/22
EM145	EMI Test Receiver	R & S	ESCS 30	830245/021	2016/06/01	2017/06/01
EM179	IMPULSE LIMITER	ROHDE & SCHWARZ	ESH3-Z2	357-8810.52/54	2016/01/11	2017/01/11
EM154	SHIELDING ROOM	SIEMENS MATSUSHITA COMPONENTS	N/A	803-740-057-99A	2012/02/03	2017/02/03
N/A	mEASUREMENT AND EVALUATION SOFTWARE	ROHDE & SCHWARZ	esib-k1	v1.20	n/a	n/a

#### Remarks:-

CM Corrective Maintenance

N/A Not Applicable

TBD To Be Determined

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### Appendix B

#### Photographs of EUT

Front View of the product



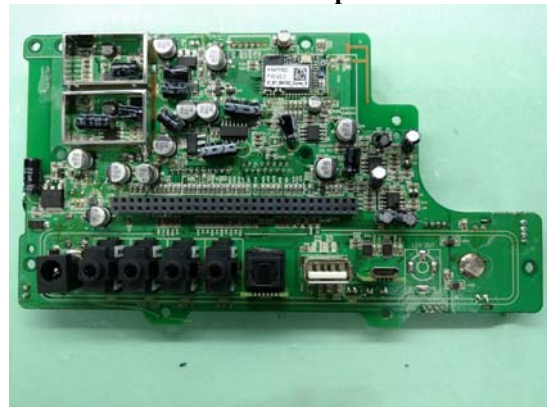
Rear View of the product



Inside View of the product



Inner Circuit Top View



Inner Circuit Bottom View



Inner Circuit Top View



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### Photographs of EUT

**Inner Circuit Bottom View**

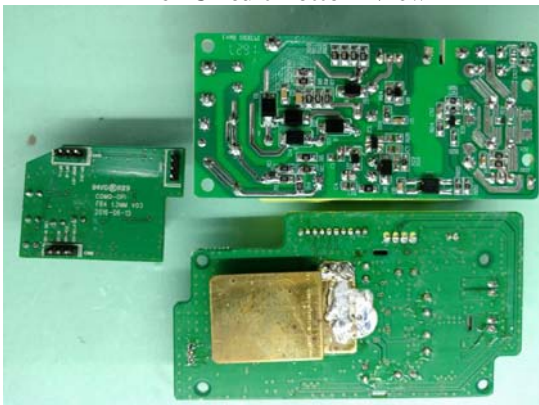


**Inner Circuit Bottom View**

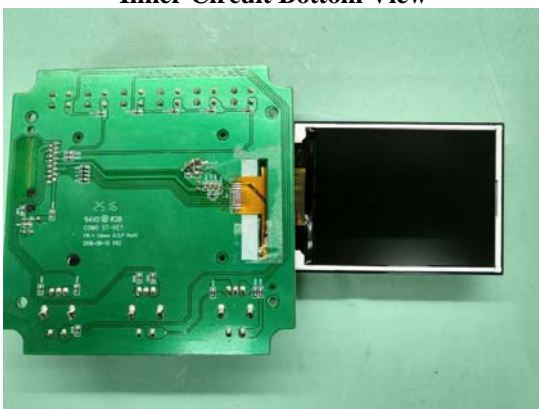
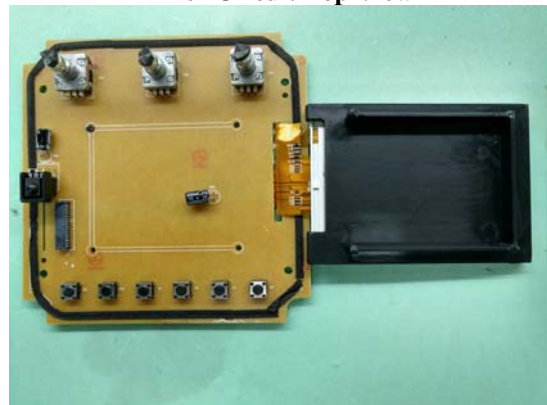
**Inner Circuit Top View**



**Inner Circuit Top View**



**Inner Circuit Bottom View**



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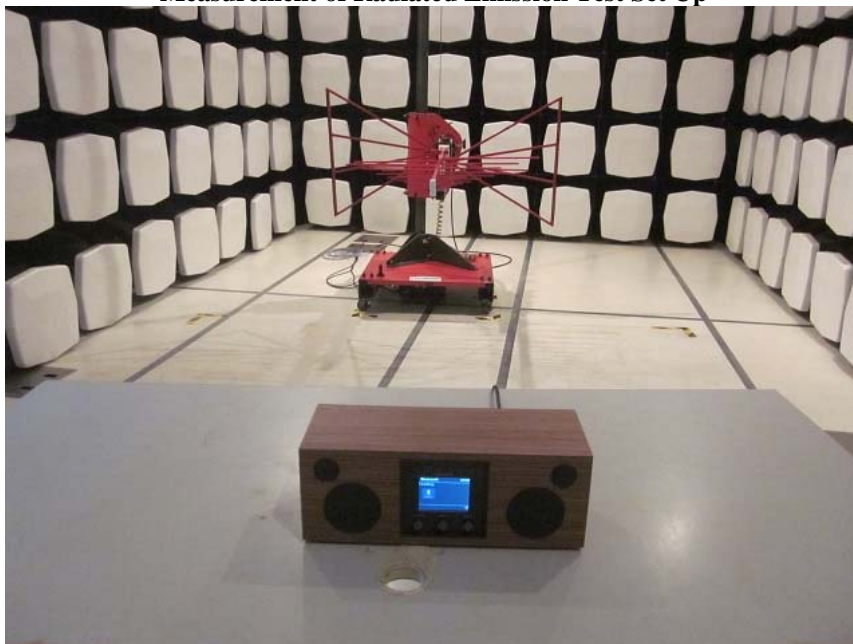
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Photographs of EUT

Measurement of Radiated Emission Test Set Up



Measurement of Radiated Emission Test Set Up



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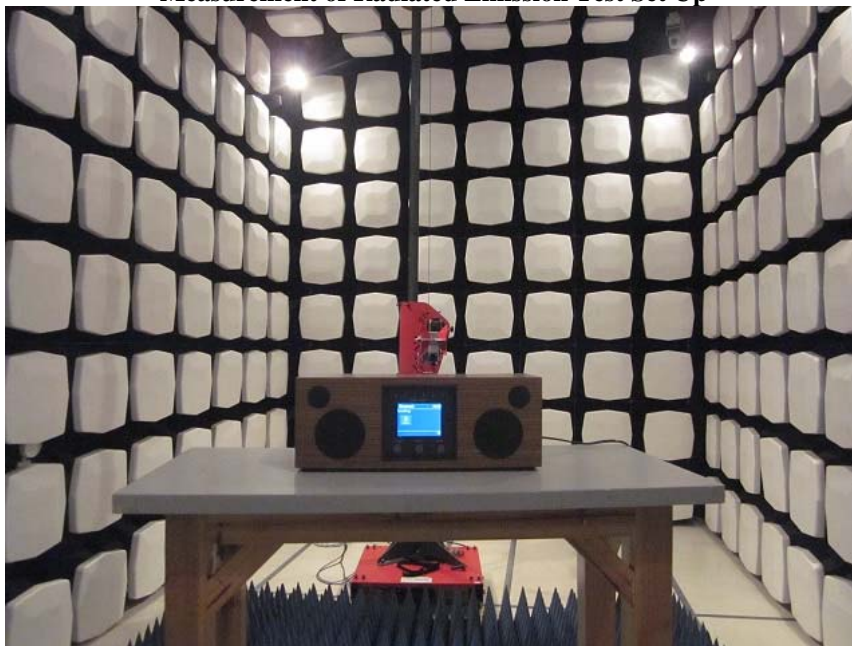
## STC Test Report

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Photographs of EUT

Measurement of Radiated Emission Test Set Up



Measurement of Conducted Emission Test Set Up



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