



# FCC RF Test Report

**APPLICANT** : Samsara Networks  
**EQUIPMENT** : VG33  
**BRAND NAME** : SAMSARA  
**MODEL NAME** : 010-0033  
**MARKETING NAME** : VG33  
**FCC ID** : 2AIHD0033  
**STANDARD** : FCC Part 15 Subpart E §15.407  
**CLASSIFICATION** : (NII) Unlicensed National Information Infrastructure

The product was received on May 20, 2016 and testing was completed on Jul. 06, 2016. We, SPORTON INTERNATIONAL (SHENZHEN) INC., would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL (SHENZHEN) INC., the test report shall not be reproduced except in full.

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Approved by: Jones Tsai / Manager



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## TABLE OF CONTENTS

<b>1</b>	<b>GENERAL DESCRIPTION .....</b>	<b>5</b>
1.1	Applicant .....	5
1.2	Manufacturer .....	5
1.3	Product Feature of Equipment Under Test.....	5
1.4	Product Specification of Equipment Under Test.....	5
1.5	Modification of EUT .....	6
1.6	Testing Location .....	6
1.7	Applicable Standards.....	6
<b>2</b>	<b>TEST CONFIGURATION OF EQUIPMENT UNDER TEST .....</b>	<b>7</b>
2.1	Carrier Frequency and Channel .....	7
2.2	Pre-Scanned RF Power.....	8
2.3	Test Mode.....	9
2.4	Connection Diagram of Test System.....	10
2.5	Support Unit used in test configuration and system .....	10
2.6	EUT Operation Test Setup .....	10
2.7	Measurement Results Explanation Example.....	11
<b>3</b>	<b>TEST RESULT .....</b>	<b>12</b>
3.1	6dB and 26dB and 99% Occupied Bandwidth Measurement .....	12
3.2	Maximum Conducted Output Power Measurement .....	15
3.3	Power Spectral Density Measurement .....	16
3.4	Unwanted Emissions Measurement .....	18
3.5	Frequency Stability Measurement .....	24
3.6	Automatically Discontinue Transmission .....	25
3.7	Antenna Requirements .....	26
<b>4</b>	<b>LIST OF MEASURING EQUIPMENT .....</b>	<b>27</b>
<b>5</b>	<b>UNCERTAINTY OF EVALUATION .....</b>	<b>28</b>
<b>APPENDIX A. SETUP PHOTOGRAPHS</b>		
<b>APPENDIX B. RADIATED TEST RESULTS</b>		
<b>APPENDIX C. DUTY CYCLE PLOTS</b>		
<b>APPENDIX D. SETUP PHOTOGRAPHS</b>		



## REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR652039E	Rev. 01	Initial issue of report	Aug. 03, 2016

## SUMMARY OF TEST RESULT

Report Section	FCC Rule	IC Rule	Description	Limit	Result	Remark
3.1	15.403(i)	RSS-247 Section 6	6dB, 26dB and 99% Occupied Bandwidth	> 500kHz	Pass	-
3.2	15.407(a)	RSS-247 Section 6	Maximum Conducted Output Power	≤ 30 dBm	Pass	-
3.3	15.407(a)	RSS-247 Section 6	Power Spectral Density	≤ 30 dBm/500kHz	Pass	-
3.4	15.407(b)	RSS-247 Section 6	Unwanted Emissions	15.407(b)(4)(i) ≤ -17, -27 dBm/MHz &15.209(a)	Pass	Under limit 10.24 dB at 30.000 MHz
3.5	15.407(g)	-	Frequency Stability	Within Operation Band	Pass	-
3.6	15.407(c)	RSS-247 6.4(2)	Automatically Discontinue Transmission	Discontinue Transmission	Pass	-
3.7	15.203 & 15.407(a)	N/A	Antenna Requirement	N/A	Pass	-



# 1 General Description

## 1.1 Applicant

**Samsara Networks**

501 York St, San Francisco, CA 94110

## 1.2 Manufacturer

**Samsara Networks**

501 York St, San Francisco, CA 94110

## 1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	VG33
Brand Name	SAMSARA
Model Name	010-0033
Marketing Name	VG33
FCC ID	2AIHD0033
EUT supports Radios application	GPRS/EGPRS/WCDMA/HSPA/ WLAN2.4GHz 802.11b/g/n HT20/ WLAN5GHz 802.11a/n HT20/HT40/ Bluetooth v3.0 + EDR/Bluetooth v4.0 LE
HW Version	1.0
SW Version	1.0
EUT Stage	Production Unit

**Remark:** The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

## 1.4 Product Specification of Equipment Under Test

Standards-related Product Specification	
Tx/Rx Channel Frequency Range	5745 MHz ~ 5825 MHz
Maximum Output Power	802.11a : 12.77 dBm / 0.0189 W 802.11n HT20 : 13.21 dBm / 0.0209 W 802.11n HT40 : 13.85 dBm / 0.0243 W
99% Occupied Bandwidth	802.11a : 17.63 MHz 802.11n HT20 : 17.68 MHz 802.11n HT40 : 36.66 MHz
Type of Modulation	802.11a/n : OFDM (BPSK / QPSK / 16QAM / 64QAM)
Antenna Type / Gain	PIFA Antenna with gain 4.0 dBi
Type of Modulation	OFDM (BPSK / QPSK / 16QAM / 64QAM)

## 1.5 Modification of EUT

No modifications are made to the EUT during all test items.

## 1.6 Testing Location

<b>Test Site</b>	SPORTON INTERNATIONAL (SHENZHEN) INC.	
<b>Test Site Location</b>	1F & 2F, Building A, Morning Business Center, No. 4003 ShiGu Rd., Xili Town, Nanshan District, Shenzhen, Guangdong, P. R. China TEL: +86-755-8637-9589 FAX: +86-755-8637-9595	
<b>Test Site No.</b>	<b>Sporton Site No.</b>	
	TH01-SZ	
<b>Test Site</b>	SPORTON INTERNATIONAL (SHENZHEN) INC.	
<b>Test Site Location</b>	No. 3 Building, the third floor of south, Shahe River west, Fengzeyuan warehouse, Nanshan District, Shenzhen, Guangdong, P. R. China TEL: +86-755- 3320-2398	
<b>Test Site No.</b>	<b>Sporton Site No.</b>	<b>FCC/IC Registration No.</b>
	03CH03-SZ	565805/4086F

**Note:** The test site complies with ANSI C63.4 2014 requirement.

## 1.7 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- ♦ FCC Part 15 Subpart E
- ♦ FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r02
- ♦ ANSI C63.10-2013

**Remark:** All test items were verified and recorded according to the standards and without any deviation during the test.

## 2 Test Configuration of Equipment Under Test

The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: conducted emission (150 kHz to 30 MHz) and radiated emission (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower). For radiated measurement, pre-scanned in three orthogonal panels, X, Y, Z. The worst cases (Y plane) were recorded in this report.

### 2.1 Carrier Frequency and Channel

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
5725-5850 MHz Band 4 (U-NII-3)	149	5745	157	5785
	<b>151</b>	<b>5755</b>	<b>159</b>	<b>5795</b>
	153	5765	161	5805
	155	5775	165	5825

**Note:** The above Frequency and Channel in boldface were 802.11n HT40.

## 2.2 Pre-Scanned RF Power

Preliminary tests were performed in different data rate and data rate associated with the highest power were chosen for full test in the following tables.

WLAN 5GHz 802.11a Average Power (dBm)										
Power vs. Channel			Power vs. Data Rate							
Channel	Frequency (MHz)	Data Rate 6Mbps	Channel	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps
CH 149	5745	12.33	CH 157	12.74	12.76	12.74	12.71	12.73	12.75	12.73
CH 157	5785	12.77								
CH 165	5825	11.52								

WLAN 5GHz 802.11n-HT20 Average Power (dBm)										
Power vs. Channel			Power vs. Data Rate							
Channel	Frequency (MHz)	MCS Index MCS0	Channel	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
CH 149	5745	12.48	CH 157	13.19	13.17	13.20	13.20	13.19	13.17	13.20
CH 157	5785	13.21								
CH 165	5825	12.06								

WLAN 5GHz 802.11n-HT40 Average Power (dBm)										
Power vs. Channel			Power vs. Data Rate							
Channel	Frequency (MHz)	MCS Index MCS0	Channel	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
CH 151	5755	13.38	CH 159	13.77	13.75	13.79	13.75	13.76	13.72	13.76
CH 159	5795	13.85								





## 2.3 Test Mode

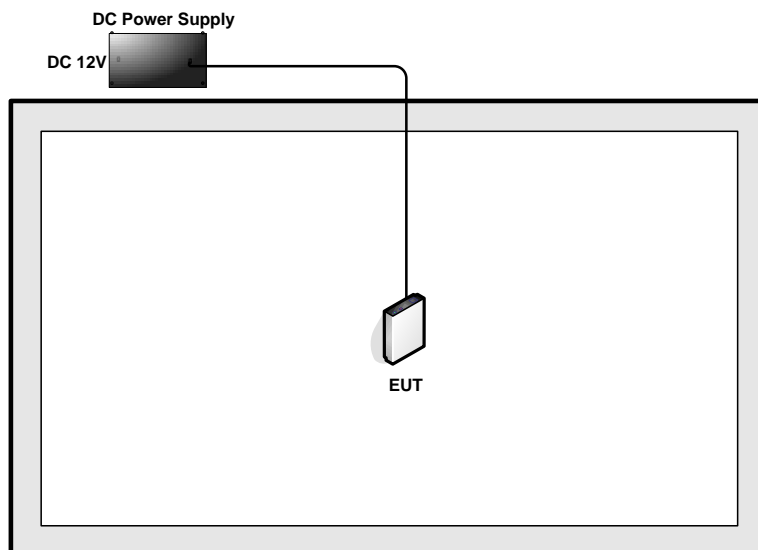
Final test mode of conducted test items and radiated spurious emissions are considering the modulation and worse data rates from the power table described in section 2.2.

Modulation	Data Rate
802.11a	6 Mbps
802.11n HT20	MCS0
802.11n HT40	MCS0

Ch. #		Band IV : 5725-5850 MHz		
		802.11a	802.11n HT20	802.11n HT40
L	Low	149	149	151
M	Middle	157	157	-
H	High	165	165	159

## 2.4 Connection Diagram of Test System

<WLAN Tx Mode>



## 2.5 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	DC Power Supply	Topward	3303DR	N/A	N/A	Unshielded, 1.8 m

## 2.6 EUT Operation Test Setup

For WLAN RF test items, an engineering test program was provided and enabled to make EUT continuously transmit/receive.

## 2.7 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

Example :

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

*Offset = RF cable loss + attenuator factor.*

Following shows an offset computation example with cable loss 6.5 dB and 10dB attenuator.

$$\begin{aligned}\text{Offset(dB)} &= \text{RF cable loss(dB)} + \text{attenuator factor(dB)} \\ &= 6.5 + 10 = 16.5 \text{ (dB)}\end{aligned}$$

### 3 Test Result

#### 3.1 6dB and 26dB and 99% Occupied Bandwidth Measurement

##### 3.1.1 Description of 6dB and 26dB and 99% Occupied Bandwidth

The minimum 6 dB bandwidth shall be at least 500 kHz.

26dB and 99% Occupied bandwidth are reporting only.

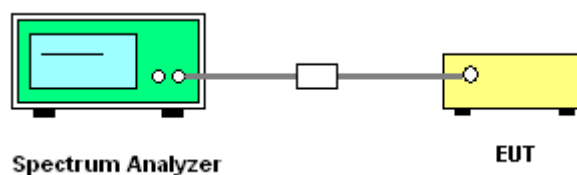
##### 3.1.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

##### 3.1.3 Test Procedures

1. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r02.  
Section C) Emission bandwidth for the band 5.725-5.85GHz
2. Set RBW = 100kHz.
3. Set the VBW  $\geq 3 \times$  RBW.
4. Detector = Peak.
5. Trace mode = max hold
6. Measure the maximum width of the emission that is 6 dB down from the peak of the emission.
7. Measure and record the results in the test report.

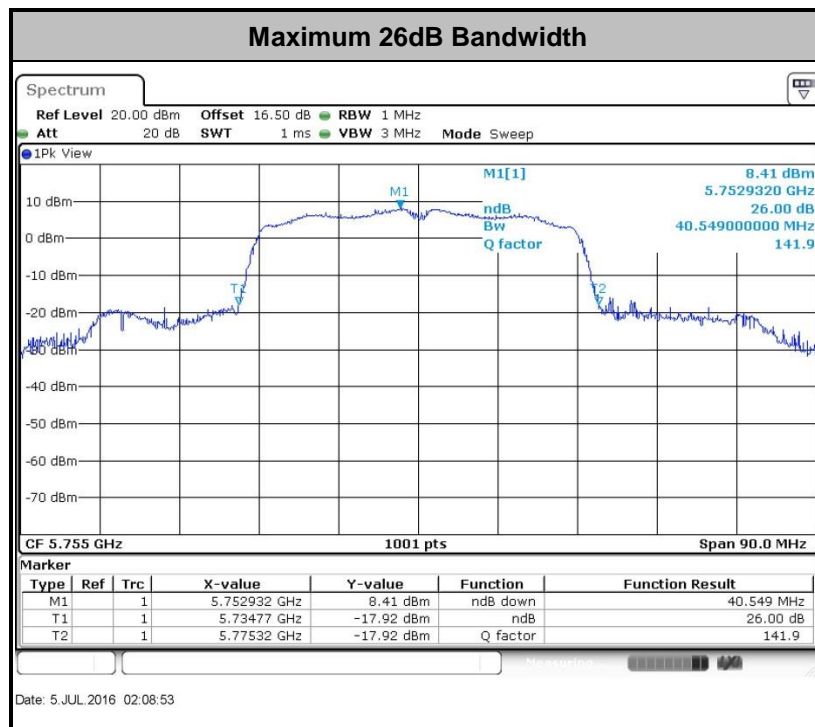
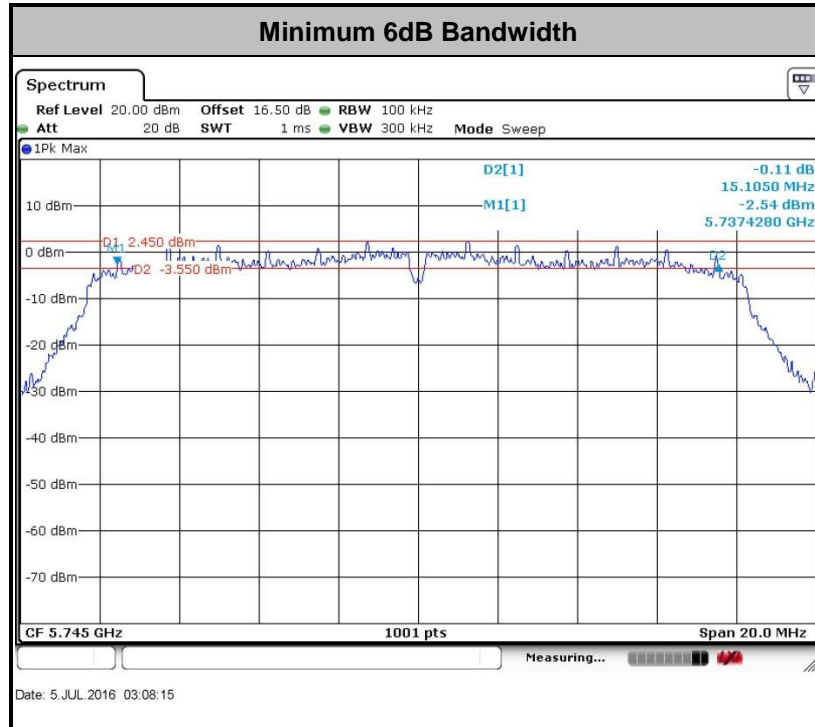
##### 3.1.4 Test Setup

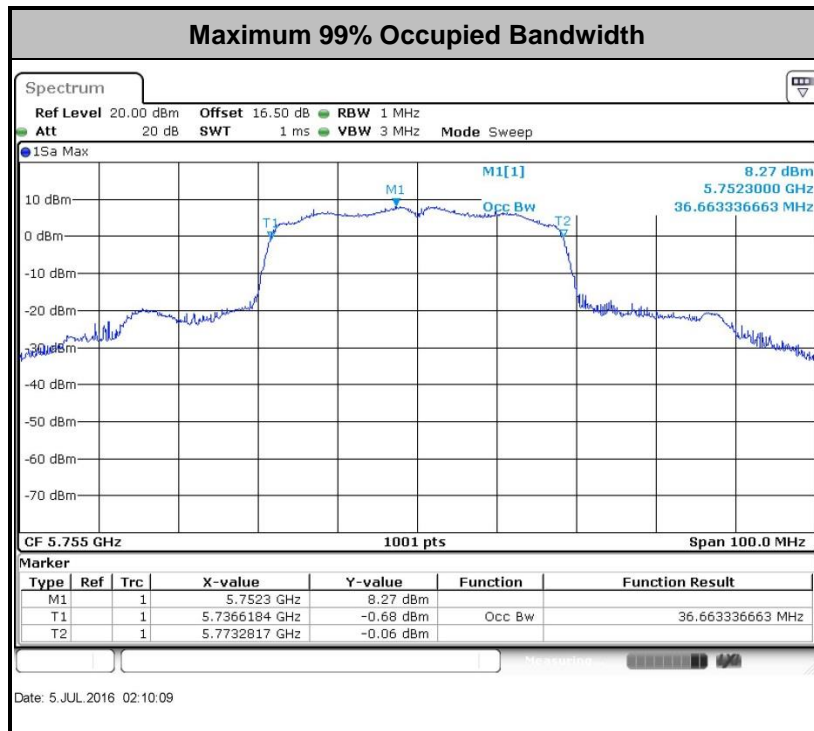




### 3.1.5 Test Result of 6dB and 26dB and 99% Occupied Bandwidth

Please refer to Appendix A.





**Note:** The occupied channel bandwidth is maintained within the band of operation for all of the modulations.

## 3.2 Maximum Conducted Output Power Measurement

### 3.2.1 Limit of Maximum Conducted Output Power

For the band 5.725–5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W.

If transmitting antennas of directional gain greater than 6 dBi are used, the peak output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

### 3.2.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

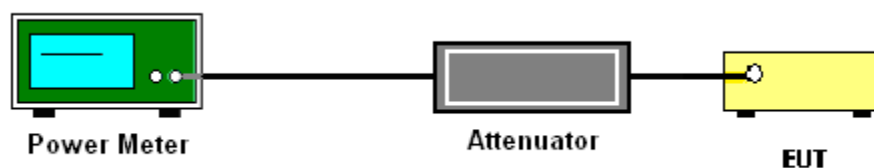
### 3.2.3 Test Procedures

The testing follows Method PM of FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r02.

Method PM (Measurement using an RF average power meter):

1. Measurement is performed using a wideband RF power meter.
2. The EUT is configured to transmit continuously with a consistent duty cycle at its maximum power control level.
3. Measure the average power of the transmitter, and the average power is corrected with duty factor,  $10 \log(1/x)$ , where  $x$  is the duty cycle.

### 3.2.4 Test Setup



### 3.2.5 Test Result of Maximum Conducted Output Power

Please refer to Appendix A.

### 3.3 Power Spectral Density Measurement

#### 3.3.1 Limit of Power Spectral Density

For the band 5.725–5.85 GHz, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band.

If transmitting antennas of directional gain greater than 6 dBi are used, the peak output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

#### 3.3.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

#### 3.3.3 Test Procedures

The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r02.  
Section F) Maximum power spectral density.

##### # Method SA-2 #

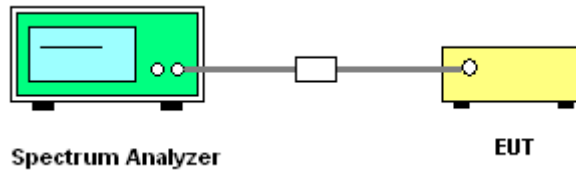
(trace averaging across on and off times of the EUT transmissions, followed by duty cycle correction).

1. The testing follows Method SA-2 of FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r02.
  - Measure the duty cycle.
  - Set span to encompass the entire emission bandwidth (EBW) of the signal.
  - Set RBW = 300 kHz.
  - Set VBW  $\geq$  1 MHz.
  - Number of points in sweep  $\geq$  2 Span / RBW.
  - Sweep time = auto.
  - Detector = RMS
  - Trace average at least 100 traces in power averaging mode.
  - Add  $10 \log(500\text{kHz}/\text{RBW})$  to the test result.
  - Add  $10 \log(1/x)$ , where  $x$  is the duty cycle, to the measured power in order to compute the average power during the actual transmission times. For example, add  $10 \log(1/0.25) = 6$  dB if the duty cycle is 25 percent.



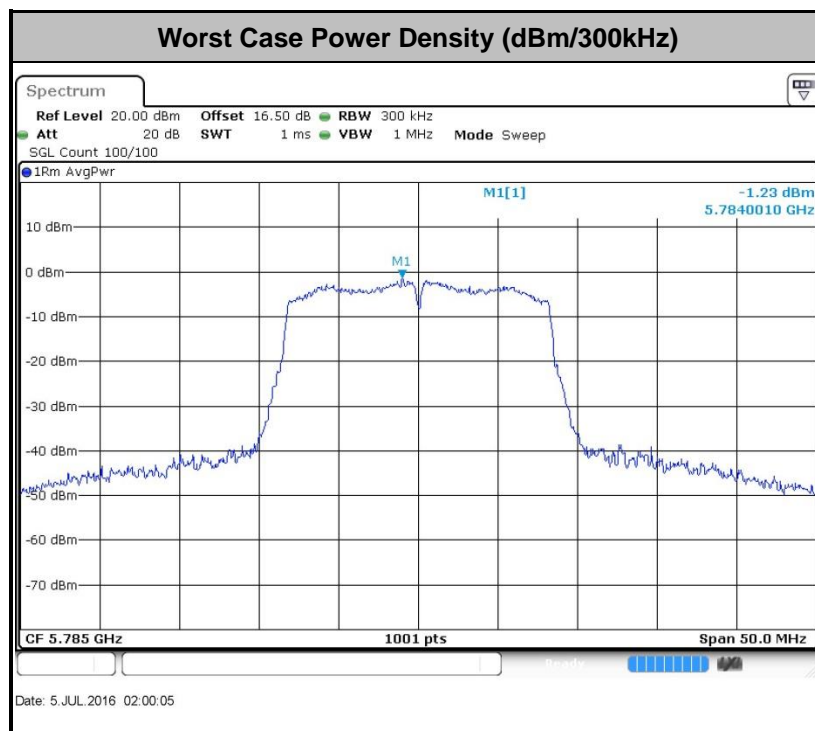
2. The RF output of EUT was connected to the spectrum analyzer by a low loss cable.
3. Each plot has already offset with cable loss, and attenuator loss. Measure the PSD and record it.

### 3.3.4 Test Setup



### 3.3.5 Test Result of Power Spectral Density

Please refer to Appendix A.



### 3.4 Unwanted Emissions Measurement

This section as specified in FCC Part 15.407(b) is to measure unwanted emissions through radiated measurement for band edge spurious emissions and out of band emissions measurement. The unwanted emissions shall comply with 15.407(b)(1) to (6), and restricted bands per FCC Part 15.205.

#### 3.4.1 Limit of Unwanted Emissions

- (1) For transmitters operating in the 5.725-5.85 GHz band:  
15.407(b)(4)(i) All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.
- (2) For transmitters operating in the 5725-5850 MHz band:  
all emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an EIRP of -17 dBm/MHz (78.3dBμV/m); for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an EIRP of -27 dBm/MHz (68.3dBμV/m).

- (3) Unwanted spurious emissions fallen in restricted bands per FCC Part15.205 shall comply with the general field strength limits set forth in § 15.209 as below table,

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30	30
30 – 88	100	3
88 – 216	150	3
216 - 960	200	3
Above 960	500	3

**Note:** The following formula is used to convert the EIRP to field strength.

$$E = \frac{1000000\sqrt{30P}}{3} \mu\text{V/m, where P is the eirp (Watts)}$$

EIRP (dBm)	Field Strength at 3m (dBμV/m)
-17	78.3
- 27	68.3

- (4) KDB 789033 D02 General UNII Test Procedures New Rules v01r02 G)2)c) As specified in 15.407(b), emissions above 1000 MHz that are outside of the restricted bands are subject to a peak emission limit of -27 dBm/MHz (or -17 dBm/MHz as specified in 15.407(b)(4)). However, an out-of-band emission that complies with both the average and peak limits of 15.209 is not required to satisfy the -27 dBm/MHz or -17 dBm/MHz peak emission limit.

### 3.4.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

### 3.4.3 Test Procedures

1. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r02.

Section G) Unwanted emissions measurement.

(1) Procedure for Unwanted Emissions Measurements Below 1000MHz

- RBW = 120 kHz
- VBW = 300 kHz
- Detector = Peak
- Trace mode = max hold

(2) Procedure for Peak Unwanted Emissions Measurements Above 1000 MHz

- RBW = 1 MHz
- VBW  $\geq$  3 MHz
- Detector = Peak
- Sweep time = auto
- Trace mode = max hold

(3) Procedures for Average Unwanted Emissions Measurements Above 1000MHz

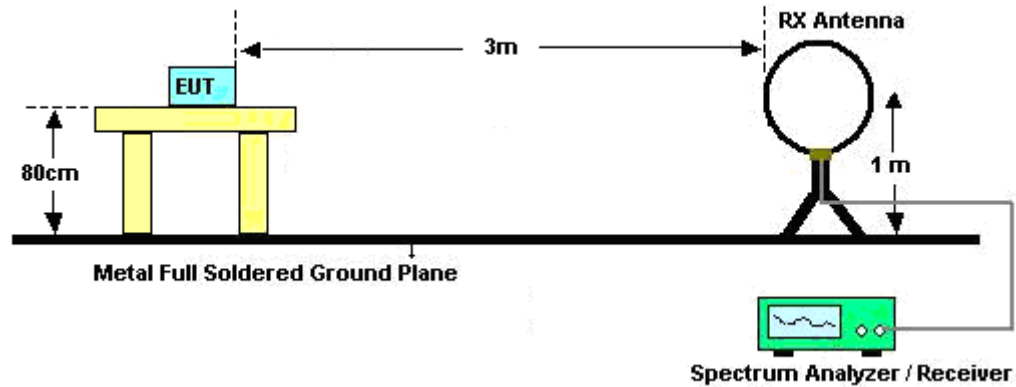
- RBW = 1 MHz
- VBW = 10 Hz, when duty cycle is no less than 98 percent.
- VBW  $\geq$  1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.



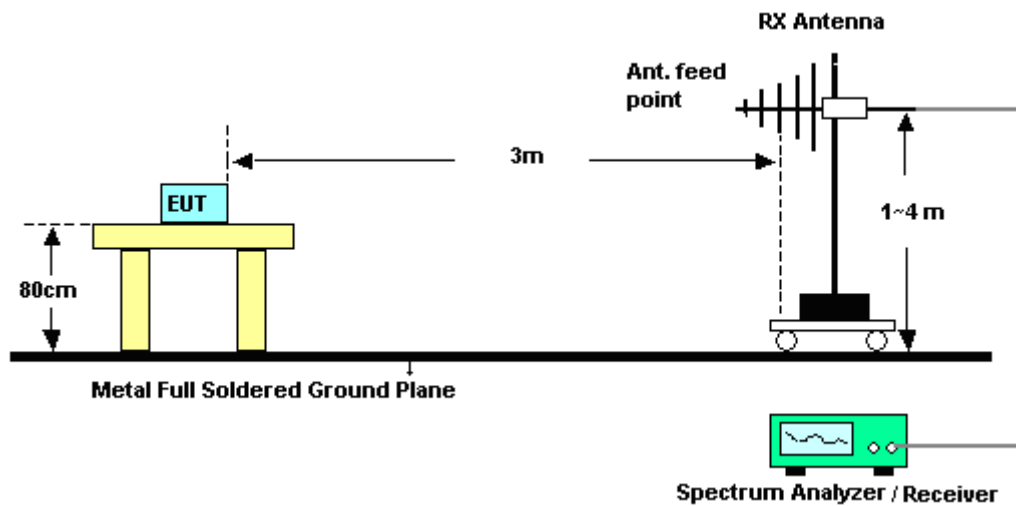
2. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
3. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
4. The antenna is a broadband antenna and its height is adjusted between one meter and four meters above ground to find the maximum value of the field strength for both horizontal polarization and vertical polarization of the antenna.
5. For each suspected emission, the EUT was arranged to its worst case and then adjust the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading.
6. For testing below 1GHz, if the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then peak values of EUT will be reported, otherwise, the emissions will be repeated one by one using the CISPR quasi-peak method and reported.
7. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than average limit (that means the emission level in average mode also complies with the limit in average mode), then peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.

### 3.4.4 Test Setup

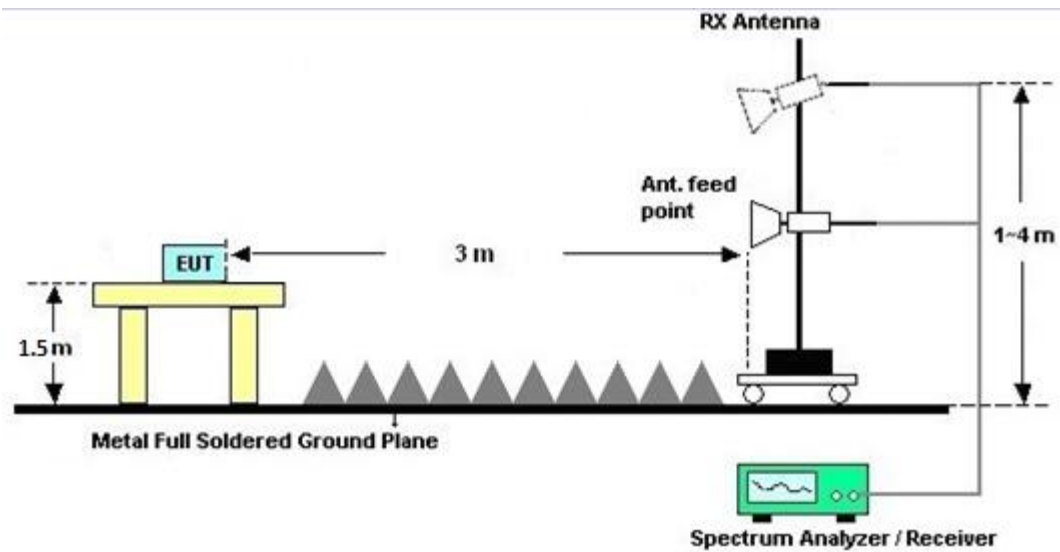
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



### 3.4.5 Test Results of Radiated Emissions (9 kHz ~ 30 MHz)

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

### 3.4.6 Test Result of Radiated Band Edges

Please refer to Appendix B.

### 3.4.7 Duty Cycle

Please refer to Appendix C.

### 3.4.8 Test Result of Unwanted Radiated Emission (30MHz ~ 10th Harmonic)

Please refer to Appendix B.

### 3.5 Frequency Stability Measurement

#### 3.5.1 Limit of Frequency Stability

Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

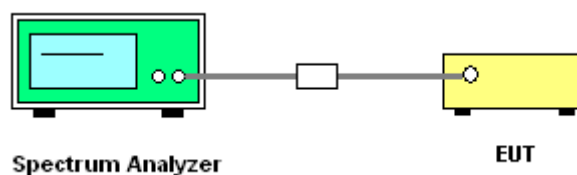
#### 3.5.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

#### 3.5.3 Test Procedures

1. To ensure emission at the band edge is maintained within the authorized band, those values shall be measured by radiation emissions at upper and lower frequency points, and finally compensated by frequency deviation as procedures below.
2. The EUT was operated at the maximum output power, and connected to the spectrum analyzer, which is set to maximum hold function and peak detector. The peak value of the power envelope was measured and noted. The upper and lower frequency points were respectively measured relatively 10dB lower than the measured peak value.
3. The frequency deviation was calculated by adding the upper frequency point and the lower frequency point divided by two. Those detailed values of frequency deviation are provided in table below.

#### 3.5.4 Test Setup



#### 3.5.5 Test Result of Frequency Stability

Please refer to Appendix A.



## **3.6 Automatically Discontinue Transmission**

### **3.6.1 Limit of Automatically Discontinue Transmission**

The device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. These provisions are not intended to preclude the transmission of control or signaling information or the use of repetitive codes used by certain digital technologies to complete frame or burst intervals. Applicants shall include in their application for equipment authorization to describe how this requirement is met.

### **3.6.2 Measuring Instruments**

The measuring equipment is listed in the section 4 of this test report.

### **3.6.3 Test Result of Automatically Discontinue Transmission**

While the EUT is not transmitting any information, the EUT can automatically discontinue transmission and become standby mode for power saving. The EUT can detect the controlling signal of ACK message transmitting from remote device and verify whether it shall resend or discontinue transmission.



## **3.7 Antenna Requirements**

### **3.7.1 Standard Applicable**

According to FCC 47 CFR Section 15.407(a)(1)(2), if transmitting antenna directional gain is greater than 6 dBi, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

### **3.7.2 Antenna Anti-Replacement Construction**

An embedded-in antenna design is used.

### **3.7.3 Antenna Gain**

The antenna gain is less than 6 dBi. Therefore, it is not necessary to reduce maximum output power limit.



## 4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSV40	101078	9kHz~40GHz	May 07, 2016	Jun. 16, 2016~ Jul. 05, 2016	May 06, 2017	Conducted (TH01-SZ)
Pulse Power Sensor	Anritsu	MA2411B	1207253	30MHz~40GHz	Jan. 12, 2016	Jun. 16, 2016~ Jul. 05, 2016	Jan. 11, 2017	Conducted (TH01-SZ)
Power Meter	Anritsu	ML2495A	1218010	50MHz Bandwidth	Jan. 12, 2016	Jun. 16, 2016~ Jul. 05, 2016	Jan. 11, 2017	Conducted (TH01-SZ)
Thermal Chamber	Ten Billion Hongzhangroup	LP-150U	H2014081803	-40~+150°C	Aug. 07, 2015	Jun. 16, 2016~ Jul. 05, 2016	Aug. 06, 2016	Conducted (TH01-SZ)
EMI Test Receiver&SA	KEYSIGHT	N9038A	MY54450083	20Hz~8.4GHz	May 07, 2016	Jun. 16, 2016~ Jul. 06, 2016	May 06, 2017	Radiation (03CH03-SZ)
EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY55150246	10Hz~44GHz	May 07, 2016	Jun. 16, 2016~ Jul. 06, 2016	May 06, 2017	Radiation (03CH03-SZ)
Loop Antenna	R&S	HFH2-Z2	100354	9kHz~30MHz	May 07, 2016	Jun. 16, 2016~ Jul. 06, 2016	May 06, 2017	Radiation (03CH03-SZ)
Bilog Antenna	TeseQ	CBL6112D	35408	30MHz~2GHz	May 21, 2016	Jun. 16, 2016~ Jul. 06, 2016	May 20, 2017	Radiation (03CH03-SZ)
Double Ridge Horn Antenna	SCHWARZBECK	BBHA9120D	9120D-1355	1GHz~18GHz	May 07, 2016	Jun. 16, 2016~ Jul. 06, 2016	May 06, 2017	Radiation (03CH03-SZ)
SHF-EHF Horn	com-power	AH-840	101071	18GHz~40GHz	Aug. 19, 2015	Jun. 16, 2016~ Jul. 06, 2016	Aug. 18, 2016	Radiation (03CH03-SZ)
Amplifier	PREAMPLIFIER	BPA-530	102210	0.01Hz ~3000MHz	Oct. 20, 2015	Jun. 16, 2016~ Jul. 06, 2016	Oct. 19, 2016	Radiation (03CH03-SZ)
Amplifier	Agilent Technologies	83017A	MY39501302	500MHz~26.5GHz	Jan. 12, 2016	Jun. 16, 2016~ Jul. 06, 2016	Jan. 11, 2017	Radiation (03CH03-SZ)
HF Amplifier	MITEQ	TTA1840-35-HG	1871923	18GHz~40GHz	Jul. 18, 2015	Jun. 16, 2016~ Jul. 06, 2016	Jul. 17, 2016	Radiation (03CH03-SZ)
AC Power Source	Chroma	61601	616010001985	N/A	NCR	Jun. 16, 2016~ Jul. 06, 2016	NCR	Radiation (03CH03-SZ)
Turn Table	EM	EM1000	N/A	0~360 degree	NCR	Jun. 16, 2016~ Jul. 06, 2016	NCR	Radiation (03CH03-SZ)
Antenna Mast	EM	EM1000	N/A	1 m~4 m	NCR	Jun. 16, 2016~ Jul. 06, 2016	NCR	Radiation (03CH03-SZ)

NCR: No Calibration Required



## 5 Uncertainty of Evaluation

### Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	5.0 dB
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### Uncertainty of Radiated Emission Measurement (1GHz ~ 18GHz)

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	4.8dB
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### Uncertainty of Radiated Emission Measurement (18GHz ~ 40GHz)

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	5.0dB
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## **Appendix A. Conducted Test Results**

Report Number : FR652039E

Test Engineer:	Sam Zheng	Temperature:	24~26	°C
Test Date:	2016/6/16 - 2016/7/5	Relative Humidity:	50~53	%

**TEST RESULTS DATA**  
**6dB and 26dB EBW and 99% OBW**

Band IV									
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	99% Bandwidth (MHz)	26 dB Bandwidth (MHz)	6 dB Bandwidth (MHz)	6dB Bandwidth min. Limit (MHz)	Pass/Fail
11a	6M bps	1	149	5745	17.63	20.28	15.11	0.5	Pass
11a	6Mbps	1	157	5785	17.63	20.33	15.11	0.5	Pass
11a	6Mbps	1	165	5825	17.53	20.33	15.33	0.5	Pass
HT20	MCS 0	1	149	5745	17.68	20.78	15.11	0.5	Pass
HT20	MCS 0	1	157	5785	17.63	20.13	15.31	0.5	Pass
HT20	MCS 0	1	165	5825	17.48	20.03	15.31	0.5	Pass
HT40	MCS 0	1	151	5755	36.66	40.55	34.97	0.5	Pass
HT40	MCS 0	1	159	5795	36.46	40.46	35.01	0.5	Pass

**TEST RESULTS DATA**  
**Average Power Table**

Band IV										
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power (dBm)	FCC Conducted Power Limit (dBm)	DG (dBi)	-	Pass/Fail
11a	6M bps	1	149	5745	0.29	12.33	30.00	4.00	-	Pass
11a	6Mbps	1	157	5785	0.29	12.77	30.00	4.00		Pass
11a	6Mbps	1	165	5825	0.29	11.52	30.00	4.00		Pass
HT20	MCS 0	1	149	5745	0.35	12.48	30.00	4.00		Pass
HT20	MCS 0	1	157	5785	0.35	13.21	30.00	4.00		Pass
HT20	MCS 0	1	165	5825	0.35	12.06	30.00	4.00		Pass
HT40	MCS 0	1	151	5755	0.58	13.38	30.00	4.00		Pass
HT40	MCS 0	1	159	5795	0.58	13.85	30.00	4.00		Pass



**TEST RESULTS DATA**  
**Power Spectral Density**

Band IV										
Mod.	Data Rate	N <sub>TX</sub>	CH.	Freq. (MHz)	Duty Factor (dB)	10log (500kHz /RBW) Factor (dB)	Average Power Density (dBm/500kHz)	Average PSD Limit (dBm/500kHz)	DG (dBi)	Pass/Fail
11a	6M bps	1	149	5745	0.29	2.22	0.40	30.00	4.00	Pass
11a	6Mbps	1	157	5785	0.29	2.22	0.47	30.00	4.00	Pass
11a	6Mbps	1	165	5825	0.29	2.22	0.45	30.00	4.00	Pass
HT20	MCS 0	1	149	5745	0.35	2.22	0.76	30.00	4.00	Pass
HT20	MCS 0	1	157	5785	0.35	2.22	1.34	30.00	4.00	Pass
HT20	MCS 0	1	165	5825	0.35	2.22	1.02	30.00	4.00	Pass
HT40	MCS 0	1	151	5755	0.58	2.22	-2.28	30.00	4.00	Pass
HT40	MCS 0	1	159	5795	0.58	2.22	-2.69	30.00	4.00	Pass

**TEST RESULTS DATA**  
**Frequency Stability**

Band IV										
Mod.	Data Rate	NTx	CH.	Freq. (MHz)	Center Frequency (MHz)	Frequency Deviation (MHz)	Frequency Stability (ppm)	Temperature (°C)	Voltage (V)	Note
11a	6M bps	1	149	5745	5745.000	0.000	0.00	20	7	-
11a	6M bps	1	149	5745	5744.975	-0.025	-4.35	20	24	-
11a	6M bps	1	149	5745	5744.950	-0.050	-8.70	20	12	-
11a	6M bps	1	149	5745	5744.950	-0.050	-8.70	-30	12	-
11a	6M bps	1	149	5745	5744.950	-0.050	-8.70	50	12	-



## Appendix B. Radiated Spurious Emission

### Band 4 - 5725~5850MHz

#### WIFI 802.11a (Band Edge @ 3m)

WIFI	Note	Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level ( dBμV )	Antenna Factor ( dB/m )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Peak Avg. ( P/A )	Pol. ( H/V )
802.11a CH 149 5745MHz		5685	56.88	-37.35	94.23	41.58	35.37	8.15	28.22	150	257	P	H
		5698.2	61.74	-42.23	103.97	46.4	35.37	8.19	28.22	150	257	P	H
		5718.5	71.61	-38.87	110.48	56.22	35.41	8.19	28.21	150	257	P	H
		5724.1	74.18	-46.07	120.25	58.79	35.41	8.19	28.21	150	257	P	H
		5745	107.33	-	-	91.87	35.44	8.22	28.2	150	257	P	H
		5745	99.24	-	-	83.78	35.44	8.22	28.2	150	257	A	H
		5685	51.38	-42.85	94.23	36.08	35.37	8.15	28.22	248	29	P	V
		5699.2	54.93	-49.78	104.71	39.59	35.37	8.19	28.22	248	29	P	V
		5719.8	64.08	-46.76	110.84	48.69	35.41	8.19	28.21	248	29	P	V
		5724.2	71.79	-48.69	120.48	56.4	35.41	8.19	28.21	248	29	P	V
		5745	101.55	-	-	86.09	35.44	8.22	28.2	248	29	P	V
		5745	95.55	-	-	80.09	35.44	8.22	28.2	248	29	A	V



WIFI	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
		( MHz )	( dBμV/m )	( dB )	( dBμV/m )	( dBμV )	( dB/m )	( dB )	( dB )	( cm )	( deg )	( P/A )	( H/V )
<b>802.11a CH 157 5785MHz</b>		5685	50.1	-44.13	94.23	34.8	35.37	8.15	28.22	250	263	P	H
		5697.535	53.72	-49.76	103.48	38.38	35.37	8.19	28.22	250	263	P	H
		5718.235	60.04	-50.37	110.41	44.65	35.41	8.19	28.21	250	263	P	H
		5721.915	62.84	-52.43	115.27	47.45	35.41	8.19	28.21	250	263	P	H
		5785	107.96	-	-	92.41	35.49	8.25	28.19	250	263	P	H
		5785	100.25	-	-	84.7	35.49	8.25	28.19	250	263	A	H
		5849.91	56.92	-65.38	122.3	41.19	35.58	8.32	28.17	250	263	P	H
		5855.42	55.17	-55.61	110.78	39.41	35.61	8.32	28.17	250	263	P	H
		5878.22	52.17	-50.74	102.91	36.38	35.63	8.32	28.16	250	263	P	H
		5890	50	-44.17	94.17	34.14	35.66	8.35	28.15	250	263	P	H
		5685	48.88	-45.35	94.23	33.58	35.37	8.15	28.22	153	334	P	V
		5690.865	52.28	-46.28	98.56	36.94	35.37	8.19	28.22	153	334	P	V
		5716.51	54.11	-55.81	109.92	38.74	35.39	8.19	28.21	153	334	P	V
		5722.835	56.77	-60.59	117.36	41.38	35.41	8.19	28.21	153	334	P	V
		5785	102.56	-	-	87.01	35.49	8.25	28.19	153	334	P	V
		5785	93.92	-	-	78.37	35.49	8.25	28.19	153	334	A	V
		5852.19	51.88	-65.43	117.31	36.15	35.58	8.32	28.17	153	334	P	V
		5862.83	52.62	-56.09	108.71	36.85	35.61	8.32	28.16	153	334	P	V
		5882.97	51.36	-48.02	99.38	35.57	35.63	8.32	28.16	153	334	P	V
		5890	49.16	-45.01	94.17	33.3	35.66	8.35	28.15	153	334	P	V



WIFI	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
		( MHz )	( dBμV/m )	( dB )	( dBμV/m )	( dBμV )	( dB/m )	( dB )	( dB )	( cm )	( deg )	( P/A )	( H/V )
<b>802.11a CH 165 5825MHz</b>		5825	108.01	-	-	92.34	35.56	8.29	28.18	223	247	P	H
		5825	99.25	-	-	83.58	35.56	8.29	28.18	223	247	A	H
		5851.43	64.35	-54.69	119.04	48.62	35.58	8.32	28.17	223	247	P	H
		5855.04	59.08	-51.81	110.89	43.32	35.61	8.32	28.17	223	247	P	H
		5879.17	55.53	-46.67	102.2	39.74	35.63	8.32	28.16	223	247	P	H
		5890	51.21	-42.96	94.17	35.35	35.66	8.35	28.15	223	247	P	H
		5825	101.92	-	-	86.25	35.56	8.29	28.18	234	345	P	V
		5825	93.03	-	-	77.36	35.56	8.29	28.18	234	345	A	V
		5851.24	58.97	-60.5	119.47	43.24	35.58	8.32	28.17	234	345	P	V
		5855.8	54.19	-56.49	110.68	38.43	35.61	8.32	28.17	234	345	P	V
		5874.99	52.61	-52.69	105.3	36.82	35.63	8.32	28.16	234	345	P	V
		5890	51.04	-43.13	94.17	35.18	35.66	8.35	28.15	234	345	P	V
<b>Remark</b>	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



## Band 4 5725~5850MHz

## WIFI 802.11a (Harmonic @ 3m)

WIFI	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
		( MHz )	( dBμV/m )	( dB )	( dBμV/m )	( dBμV )	( dB/m )	( dB )	( dB )	( cm )	( deg )	( P/A )	( H/V )
802.11a CH 149 5745MHz		11490	50.77	-23.23	74	55	39.19	12.6	56.02	155	265	P	H
		17235	50.54	-17.76	68.3	48.86	41.67	15.46	55.45	174	321	P	H
		11490	50.63	-23.37	74	54.86	39.19	12.6	56.02	155	265	P	V
		17235	50.9	-17.4	68.3	49.22	41.67	15.46	55.45	174	321	P	V
802.11a CH 157 5785MHz		11570	50.55	-23.45	74	54.82	39.24	12.6	56.11	175	198	P	H
		17355	50.55	-17.75	68.3	49.1	41.86	15.6	56.01	189	185	P	H
		11570	50.05	-23.95	74	54.32	39.24	12.6	56.11	175	198	P	V
		17355	50.64	-17.66	68.3	49.19	41.86	15.6	56.01	189	185	P	V
802.11a CH 165 5825MHz		11650	50.4	-23.6	74	54.71	39.28	12.6	56.19	156	347	P	H
		17475	50.68	-17.62	68.3	49.47	42.05	15.73	56.57	150	360	P	H
		11650	50.62	-23.38	74	54.93	39.28	12.6	56.19	156	347	P	V
		17475	50.84	-17.46	68.3	49.63	42.05	15.73	56.57	150	360	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



## Band 4 5725~5850MHz

## WIFI 802.11n HT20 (Band Edge @ 3m)

WIFI	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
		( MHz )	( dBμV/m )	( dB )	( dBμV/m )	( dBμV )	( dB/m )	( dB )	( dB )	( cm )	( deg )	( P/A )	( H/V )
802.11n HT20 CH 149 5745MHz		5685	56.27	-37.96	94.23	40.97	35.37	8.15	28.22	250	248	P	H
		5699.9	59.62	-45.61	105.23	44.28	35.37	8.19	28.22	250	248	P	H
		5719.8	70.75	-40.09	110.84	55.36	35.41	8.19	28.21	250	248	P	H
		5724.2	72.48	-48	120.48	57.09	35.41	8.19	28.21	250	248	P	H
		5745	108.6	-	-	93.14	35.44	8.22	28.2	250	248	P	H
		5745	100.61	-	-	85.15	35.44	8.22	28.2	250	248	A	H
		5685	51.27	-42.96	94.23	35.97	35.37	8.15	28.22	150	360	P	V
		5685.8	54.77	-40.06	94.83	39.43	35.37	8.19	28.22	150	360	P	V
		5719.4	63.37	-47.36	110.73	47.98	35.41	8.19	28.21	150	360	P	V
		5722.9	64.69	-52.82	117.51	49.3	35.41	8.19	28.21	150	360	P	V
		5745	102.89	-	-	87.43	35.44	8.22	28.2	150	360	P	V
		5745	94.87	-	-	79.41	35.44	8.22	28.2	150	360	A	V



WIFI Ant.	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
1		( MHz )	( dBμV/m )	( dB )	( dBμV/m )	( dBμV )	( dB/m )	( dB )	( dB )	( cm )	( deg )	( P/A )	( H/V )
<b>802.11n HT20 CH 157 5785MHz</b>		5685	51.5	-42.73	94.23	36.2	35.37	8.15	28.22	250	248	P	H
		5698.685	54.1	-50.23	104.33	38.76	35.37	8.19	28.22	250	248	P	H
		5716.855	58.43	-51.59	110.02	43.06	35.39	8.19	28.21	250	248	P	H
		5725.02	60.04	-62.26	122.3	44.65	35.41	8.19	28.21	250	248	P	H
		5785	109.55	-	-	94	35.49	8.25	28.19	250	248	P	H
		5785	100.98	-	-	85.43	35.49	8.25	28.19	250	248	A	H
		5850.29	55.6	-66.04	121.64	39.87	35.58	8.32	28.17	250	248	P	H
		5856.18	56.74	-53.83	110.57	40.98	35.61	8.32	28.17	250	248	P	H
		5882.59	52.96	-46.7	99.66	37.17	35.63	8.32	28.16	250	248	P	H
		5890	51.76	-42.41	94.17	35.9	35.66	8.35	28.15	250	248	P	H
		5685	49.09	-45.14	94.23	33.79	35.37	8.15	28.22	250	245	P	V
		5699.72	51.8	-53.29	105.09	36.46	35.37	8.19	28.22	250	245	P	V
		5719.73	54.16	-56.66	110.82	38.77	35.41	8.19	28.21	250	245	P	V
		5723.065	56.3	-61.59	117.89	40.91	35.41	8.19	28.21	250	245	P	V
		5785	103.4	-	-	87.85	35.49	8.25	28.19	250	245	P	V
		5785	94.37	-	-	78.82	35.49	8.25	28.19	250	245	A	V
		5855.04	52.5	-58.39	110.89	36.74	35.61	8.32	28.17	250	245	P	V
		5855.42	53.06	-57.72	110.78	37.3	35.61	8.32	28.17	250	245	P	V
		5877.46	53.62	-49.85	103.47	37.83	35.63	8.32	28.16	250	245	P	V
		5890	50.54	-43.63	94.17	34.68	35.66	8.35	28.15	250	245	P	V





WIFI	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
		( MHz )	( dBμV/m )	( dB )	( dBμV/m )	( dBμV )	( dB/m )	( dB )	( dB )	( cm )	( deg )	( P/A )	( H/V )
802.11n HT20 CH 165 5825MHz		5825	107.92	-	-	92.25	35.56	8.29	28.18	223	247	P	H
		5825	99.62	-	-	83.95	35.56	8.29	28.18	223	247	A	H
		5851.05	65.58	-54.33	119.91	49.85	35.58	8.32	28.17	223	247	P	H
		5855.61	65.95	-44.78	110.73	50.19	35.61	8.32	28.17	223	247	P	H
		5878.22	56.12	-46.79	102.91	40.33	35.63	8.32	28.16	223	247	P	H
		5890	52.96	-41.21	94.17	37.1	35.66	8.35	28.15	223	247	P	H
		5825	102.42	-	-	86.75	35.56	8.29	28.18	250	222	P	V
		5825	93.43	-	-	77.76	35.56	8.29	28.18	250	222	A	V
		5852	61.27	-56.47	117.74	45.54	35.58	8.32	28.17	250	222	P	V
		5857.7	55.14	-55	110.14	39.38	35.61	8.32	28.17	250	222	P	V
		5882.21	53.24	-46.71	99.95	37.45	35.63	8.32	28.16	250	222	P	V
		5890	49.64	-44.53	94.17	33.78	35.66	8.35	28.15	250	222	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



**Band 4 5725~5850MHz**  
**WIFI 802.11n HT20 (Harmonic @ 3m)**

WIFI	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
		( MHz )	( dBμV/m )	( dB )	( dBμV/m )	( dBμV )	( dB/m )	( dB )	( dB )	( cm )	( deg )	( P/A )	( H/V )
802.11n HT20 CH 149 5745MHz		11490	50.39	-23.61	74	54.62	39.19	12.6	56.02	155	265	P	H
		17235	50.35	-17.95	68.3	48.67	41.67	15.46	55.45	174	321	P	H
		11490	50.36	-23.64	74	54.59	39.19	12.6	56.02	155	265	P	V
		17235	50.27	-18.03	68.3	48.59	41.67	15.46	55.45	174	321	P	V
802.11n HT20 CH 157 5785MHz		11570	50.52	-23.48	74	54.79	39.24	12.6	56.11	175	198	P	H
		17355	50.96	-17.34	68.3	49.51	41.86	15.6	56.01	189	185	P	H
		11570	50.34	-23.66	74	54.61	39.24	12.6	56.11	175	198	P	V
		17355	50.69	-17.61	68.3	49.24	41.86	15.6	56.01	189	185	P	V
802.11n HT20 CH 165 5825MHz		11650	50.8	-23.2	74	55.11	39.28	12.6	56.19	156	347	P	H
		17475	50.46	-17.84	68.3	49.25	42.05	15.73	56.57	150	360	P	H
		11650	50.48	-23.52	74	54.79	39.28	12.6	56.19	156	347	P	V
		17475	50.3	-18	68.3	49.09	42.05	15.73	56.57	150	360	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



## Band 4 5725~5850MHz

## WIFI 802.11n HT40 (Band Edge @ 3m)

WIFI	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
		( MHz )	( dBμV/m )	( dB )	( dBμV/m )	( dBμV )	( dB/m )	( dB )	( dB )	( cm )	( deg )	( P/A )	( H/V )
802.11n HT40 CH 151 5755MHz		5685	52.89	-41.34	94.23	37.59	35.37	8.15	28.22	172	280	P	H
		5694.66	61.43	-39.93	101.36	46.09	35.37	8.19	28.22	172	280	P	H
		5719.155	74.23	-36.43	110.66	58.84	35.41	8.19	28.21	172	280	P	H
		5720.765	74.44	-38.21	112.65	59.05	35.41	8.19	28.21	172	280	P	H
		5755	104.27	-	-	88.79	35.46	8.22	28.2	172	280	P	H
		5755	97.07	-	-	81.59	35.46	8.22	28.2	172	280	A	H
		5852.19	53.11	-64.2	117.31	37.38	35.58	8.32	28.17	172	280	P	H
		5863.59	52.18	-56.31	108.49	36.41	35.61	8.32	28.16	172	280	P	H
		5882.4	52.44	-47.36	99.8	36.65	35.63	8.32	28.16	172	280	P	H
		5890	48.14	-46.03	94.17	32.28	35.66	8.35	28.15	172	280	P	H
		5685	48.91	-45.32	94.23	33.61	35.37	8.15	28.22	234	335	P	V
		5694.545	55.68	-45.6	101.28	40.34	35.37	8.19	28.22	234	335	P	V
		5719.73	70.68	-40.14	110.82	55.29	35.41	8.19	28.21	234	335	P	V
		5720.88	70.45	-42.46	112.91	55.06	35.41	8.19	28.21	234	335	P	V
		5755	98.62	-	-	83.14	35.46	8.22	28.2	234	335	P	V
		5755	90.49	-	-	75.01	35.46	8.22	28.2	234	335	A	V
		5850.1	51.08	-70.99	122.07	35.35	35.58	8.32	28.17	234	335	P	V
		5859.03	51.62	-58.15	109.77	35.85	35.61	8.32	28.16	234	335	P	V
		5883.92	51.59	-47.09	98.68	35.79	35.63	8.32	28.15	234	335	P	V
		5890	50.6	-43.57	94.17	34.74	35.66	8.35	28.15	234	335	P	V



WIFI	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
		( MHz )	( dBμV/m )	( dB )	( dBμV/m )	( dBμV )	( dB/m )	( dB )	( dB )	( cm )	( deg )	( P/A )	( H/V )
802.11n HT40 CH 159 5795MHz		5685	50.92	-43.31	94.23	35.62	35.37	8.15	28.22	150	264	P	H
		5687.53	54.82	-41.28	96.1	39.48	35.37	8.19	28.22	150	264	P	H
		5713.06	56.17	-52.79	108.96	40.8	35.39	8.19	28.21	150	264	P	H
		5722.26	56.96	-59.09	116.05	41.57	35.41	8.19	28.21	150	264	P	H
		5795	105.02	-	-	89.45	35.51	8.25	28.19	150	264	P	H
		5795	97.69	-	-	82.12	35.51	8.25	28.19	150	264	A	H
		5854.28	58.01	-54.53	112.54	42.25	35.61	8.32	28.17	150	264	P	H
		5855.04	56.42	-54.47	110.89	40.66	35.61	8.32	28.17	150	264	P	H
		5880.88	54.11	-46.82	100.93	38.32	35.63	8.32	28.16	150	264	P	H
		5890	50.91	-43.26	94.17	35.05	35.66	8.35	28.15	150	264	P	H
		5685	49.37	-44.86	94.23	34.07	35.37	8.15	28.22	150	29	P	V
		5699.145	53.12	-51.55	104.67	37.78	35.37	8.19	28.22	150	29	P	V
		5718.235	52.66	-57.75	110.41	37.27	35.41	8.19	28.21	150	29	P	V
		5721.915	52.63	-62.64	115.27	37.24	35.41	8.19	28.21	150	29	P	V
		5795	98.69	-	-	83.12	35.51	8.25	28.19	150	29	P	V
		5795	90.73	-	-	75.16	35.51	8.25	28.19	150	29	A	V
		5849.91	54.35	-67.95	122.3	38.62	35.58	8.32	28.17	150	29	P	V
		5855.8	54.92	-55.76	110.68	39.16	35.61	8.32	28.17	150	29	P	V
		5888.86	51.17	-43.84	95.01	35.31	35.66	8.35	28.15	150	29	P	V
		5890	49.12	-45.05	94.17	33.26	35.66	8.35	28.15	150	29	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



**Band 4 5725~5850MHz**  
**WIFI 802.11n HT40 (Harmonic @ 3m)**

WIFI	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
		( MHz )	( dBμV/m )	( dB )	( dBμV/m )	( dBμV )	( dB/m )	( dB )	( dB )	( cm )	( deg )	( P/A )	( H/V )
802.11n HT40 CH 151 5755MHz		11510	50.76	-23.24	74	54.99	39.2	12.6	56.03	160	360	P	H
		17265	50.35	-17.95	68.3	48.72	41.73	15.51	55.61	170	360	P	H
		11510	50.67	-23.33	74	54.9	39.2	12.6	56.03	160	360	P	V
		17265	50.12	-18.18	68.3	48.49	41.73	15.51	55.61	170	360	P	V
802.11n HT40 CH 159 5795MHz		11590	50.42	-23.58	74	54.7	39.25	12.6	56.13	100	300	P	H
		17385	50.73	-17.57	68.3	49.35	41.91	15.64	56.17	100	200	P	H
		11590	50.79	-23.21	74	55.07	39.25	12.6	56.13	100	300	P	V
		17385	50.46	-17.84	68.3	49.08	41.91	15.64	56.17	100	200	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

**Emission below 1GHz****5GHz WIFI 802.11n HT40 (LF @ 3m)**

WIFI	Note	Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level (dBμV)	Antenna Factor ( dB/m )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Peak Avg. (P/A)	Pol. (H/V)
<b>5GHz 802.11n HT40 LF</b>		30	29.76	-10.24	40	28.48	26.6	0.75	26.07	100	0	P	H
		450.98	29.19	-16.81	46	28.69	24.46	2.12	26.08	-	-	P	H
		572.23	29.37	-16.63	46	28.98	24.28	2.52	26.41	-	-	P	H
		830.25	33.94	-12.06	46	29.24	27.83	2.95	26.08	-	-	P	H
		903.97	35.04	-10.96	46	29.36	28.44	3.08	25.84	-	-	P	H
		930.16	34.6	-11.40	46	28.39	28.7	3.15	25.64	-	-	P	H
		30	29.11	-10.89	40	27.83	26.6	0.75	26.07	-	-	P	V
		49.4	27.74	-12.26	40	37.37	15.6	0.75	25.98	-	-	P	V
		426.73	29.04	-16.96	46	29.06	23.85	2.08	25.95	-	-	P	V
		683.78	32.73	-13.27	46	30.39	26.11	2.61	26.38	-	-	P	V
		860.32	34.93	-11.07	46	29.74	28.16	3.02	25.99	-	-	P	V
		933.07	35.32	-10.68	46	29.06	28.73	3.15	25.62	100	0	P	V
<b>Remark</b>	1. No other spurious found. 2. All results are PASS against limit line.												

**Note symbol**

*	<b>Fundamental Frequency</b> which can be ignored. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency.
!	Test result is <b>over limit</b> line.
P/A	<b>P</b> eak or <b>A</b> verage
H/V	<b>H</b> orizontal or <b>V</b> ertical



A calculation example for radiated spurious emission is shown as below:

WIFI	Note	Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level ( dBμV )	Antenna Factor ( dB/m )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Peak Avg. ( P/A )	Pol. ( H/V )
802.11b CH 01		2390	55.45	-18.55	74	54.51	32.22	4.58	35.86	103	308	P	H
2412MHz		2390	43.54	-10.46	54	42.6	32.22	4.58	35.86	103	308	A	H

1. Level(dBμV/m) =

Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

2. Over Limit(dB) = Level(dBμV/m) – Limit Line(dBμV/m)

**For Peak Limit @ 2390MHz:**

1. Level(dBμV/m)

= Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

= 32.22(dB/m) + 4.58(dB) + 54.51(dBμV) – 35.86 (dB)

= 55.45 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 55.45(dBμV/m) – 74(dBμV/m)

= -18.55(dB)

**For Average Limit @ 2390MHz:**

1. Level(dBμV/m)

= Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

= 32.22(dB/m) + 4.58(dB) + 42.6(dBμV) – 35.86 (dB)

= 43.54 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 43.54(dBμV/m) – 54(dBμV/m)

= -10.46(dB)

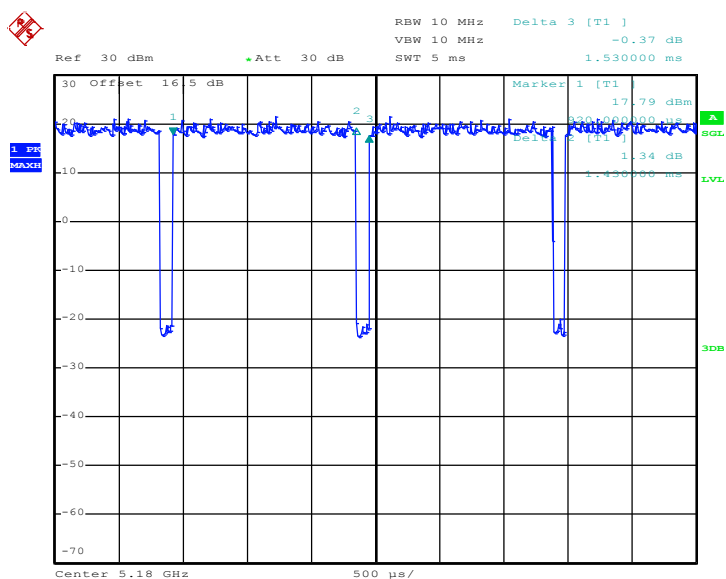
**Both peak and average measured complies with the limit line, so test result is “PASS”.**



## Appendix C. Duty Cycle Plots

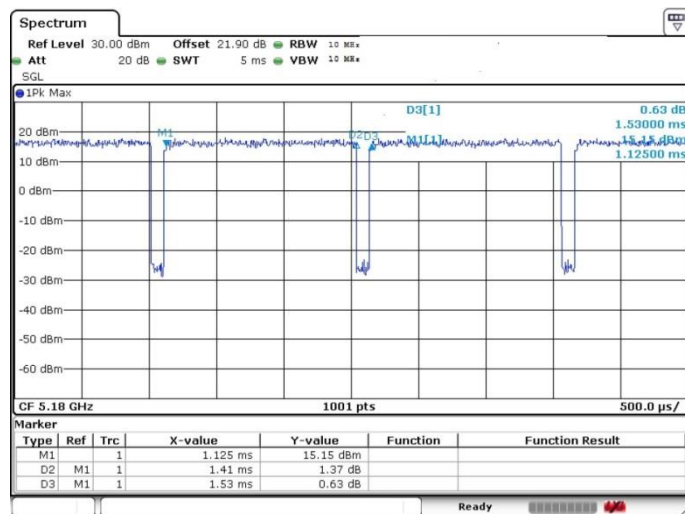
Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
802.11a	93.46	1.43	0.70	1kHz
802.11n HT20	92.16	1.41	0.71	1kHz
802.11n HT40	87.40	0.67	1.50	3kHz

802.11a





802.11n HT20



802.11n HT40

