



# TEST REPORT

**Report Reference No.**..... : **TRE1709025202** R/C.....: 48564  
**FCC ID**..... : **WA6S5031**  
**Applicant's name**..... : **Verykool USA Inc**  
**Address**..... : 3636 Nobel Drive, Suite 325, San Diego, CA 92122 USA  
**Manufacturer**..... : TEM MOBILE LIMITED  
**Address**..... : Room 1102, 11/F, Building B, TCL Plaza, GaoXin S. Rd. 1st, Hi-Tech industrial Park, Nanshan District, Shenzhen, China  
**Test item description** ..... : **3G Smart phone**  
**Trade Mark** ..... : Verykool  
**Model/Type reference**..... : s5031  
**Listed Model(s)** ..... : -  
**Standard** ..... : **FCC CFR Title 47 Part 15 Subpart C Section 15.247**  
**Date of receipt of test sample**..... : Sep.29, 2017  
**Date of testing**..... : Sep.30, 2017 - Oct.12, 2017  
**Date of issue**..... : Oct.13, 2017  
**Result**..... : **PASS**

**Compiled by**  
( position+printedname+signature).... : File administrators Candy Liu  
**Supervised by**  
(position+printedname+signature)..... : Project Engineer Edward Pan  
**Approved by**  
(position+printedname+signature)..... : RF Manager Hans Hu

*Candy Liu*

*Edward Pan*

*Hans Hu*

**Testing Laboratory Name** ..... : **Shenzhen Huatongwei International Inspection Co., Ltd.**  
**Address**..... : 1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road, Tianliao, Gongming, Shenzhen, China

**Shenzhen Huatongwei International Inspection Co., Ltd. All rights reserved.**

This publication may be reproduced in whole or in part for non-commercial purposes as long as the Shenzhen Huatongwei International Inspection Co., Ltd. is acknowledged as copyright owner and source of the material. Shenzhen Huatongwei International Inspection Co., Ltd. takes no responsibility for and will not assume liability for damages resulting from the reader's interpretation of the reproduced material due to its placement and context.

*The test report merely correspond to the test sample.*

## Contents

<b><u>1.</u></b>	<b><u>TEST STANDARDS AND REPORT VERSION</u></b>	<b><u>3</u></b>
1.1.	Test Standards	3
1.2.	Report version	3
<b><u>2.</u></b>	<b><u>TEST DESCRIPTION</u></b>	<b><u>4</u></b>
<b><u>3.</u></b>	<b><u>SUMMARY</u></b>	<b><u>5</u></b>
3.1.	Client Information	5
3.2.	Product Description	5
3.3.	Operation state	6
3.4.	EUT configuration	6
3.5.	Modifications	6
<b><u>4.</u></b>	<b><u>TEST ENVIRONMENT</u></b>	<b><u>7</u></b>
4.1.	Address of the test laboratory	7
4.2.	Test Facility	7
4.3.	Environmental conditions	8
4.4.	Statement of the measurement uncertainty	8
4.5.	Equipments Used during the Test	9
<b><u>5.</u></b>	<b><u>TEST CONDITIONS AND RESULTS</u></b>	<b><u>10</u></b>
5.1.	Antenna requirement	10
5.2.	Conducted Emissions (AC Main)	11
5.3.	Conducted Peak Output Power	14
5.4.	Power Spectral Density	15
5.5.	6dB bandwidth	21
5.6.	Restricted band	27
5.7.	Band edge and Spurious Emissions (conducted)	31
5.8.	Spurious Emissions (radiated)	48
<b><u>6.</u></b>	<b><u>TEST SETUP PHOTOS</u></b>	<b><u>55</u></b>
<b><u>7.</u></b>	<b><u>EXTERNAL AND INTERNAL PHOTOS OF THE EUT</u></b>	<b><u>56</u></b>

## 1. TEST STANDARDS AND REPORT VERSION

### 1.1. Test Standards

The tests were performed according to following standards:

[FCC Rules Part 15.247](#): Frequency Hopping, Direct Spread Spectrum and Hybrid Systems that are in operation within the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz.

[ANSI C63.10:2013](#): American National Standard for Testing Unlicensed Wireless Devices

[KDB 558074 D01 DTS Meas Guidance v04](#): Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating under §15.247

### 1.2. Report version

Version No.	Date of issue	Description
00	Oct.13, 2017	Original

## 2. TEST DESCRIPTION

Test Item	FCC Rule	Result	Test Engineer
Antenna requirement	15.203/15.247(c)	Pass	William Wang
Line Conducted Emissions (AC Main)	15.207	Pass	William Wang
Conducted Peak Output Power	15.247(b)(3)	Pass	William Wang
Power Spectral Density	15.247(e)	Pass	William Wang
6dB Bandwidth	15.247(a)(2)	Pass	William Wang
Restricted band	15.247(d)/15.205	Pass	William Wang
Spurious Emissions	15.247(d)/15.209	Pass	William Wang

Note: The measurement uncertainty is not included in the test result.

### 3. SUMMARY

#### 3.1. Client Information

Applicant:	Verykool USA Inc
Address:	3636 Nobel Drive,Suite 325, San Diego,CA 92122 USA
Manufacturer:	TEM MOBILE LIMITED
Address:	Room 1102,11/F, Building B,TCL Plaza,GaoXin S. Rd. 1st, Hi-Tech industrial Park,Nanshan District,Shenzhen,China

#### 3.2. Product Description

Name of EUT:	3G Smart phone			
Trade Mark:	Verykool			
Model No.:	s5031			
Listed Model(s):	-			
IMEI 1:	358723070876417			
IMEI 2:	358723070876425			
Power supply:	DC 3.7V From internal battery			
Adapter information:	Input: 100-240Va.c., 50/60Hz, 0.2A Output: 5Vd.c., 1A			
Hardware version:	ZH286-MB-V0.2A			
Software version:	s5031_VK_Generic_Dual_SW_1.0			
WIFI				
Supported type:	<input checked="" type="checkbox"/> 802.11b	<input checked="" type="checkbox"/> 802.11g	<input checked="" type="checkbox"/> 802.11n(HT20)	<input checked="" type="checkbox"/> 802.11n(HT40)
Modulation:	<u>DSSS</u> for 802.11b <u>OFDM</u> for 802.11g/802.11n(HT20)/802.11n(HT40)			
Operation frequency:	<u>2412MHz~2462MHz</u> for 802.11b/802.11g/802.11n(HT20) <u>2422MHz~2452MHz</u> for 802.11n(HT40)			
Channel number:	<u>11</u> for 802.11b/802.11g/802.11n(HT20) <u>7</u> for 802.11n(HT40)			
Channel separation:	5MHz			
Antenna type:	PIFA Antenna			
Antenna gain:	0.5 dBi			

### 3.3. Operation state

#### ➤ Test frequency list

According to section 15.31(m), regards to the operating frequency range over 10 MHz, must select three channel which were tested. the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, please see the above gray bottom.

802.11b/g/n(HT20)		802.11n(HT40)	
Channel	Frequency (MHz)	Channel	Frequency (MHz)
01	2412	01	-
02	2417	02	-
03	2422	03	2422
04	2427	04	2427
05	2432	05	2432
06	2437	06	2437
07	2442	07	2442
08	2447	08	2447
09	2452	09	2452
10	2457	10	-
11	2462	11	-

#### ➤ Test mode

For RF test items
The engineering test program was provided and enabled to make EUT continuous transmit (duty cycle>98%).
For AC power line conducted emissions:
The EUT was set to connect with the WLAN AP under large package sizes transmission.
For RF test axis
EUT in each of three orthogonal axis emissions had been tested ,but only the worst case (X axis) data Recorded in the report.

### 3.4. EUT configuration

The following peripheral devices and interface cables were connected during the measurement:

- - supplied by the manufacturer
- - supplied by the lab

○ /		Manufacturer:	/
		Model No.:	/
○ /		Manufacturer:	/
		Model No.:	/

### 3.5. Modifications

No modifications were implemented to meet testing criteria.

## **4. TEST ENVIRONMENT**

### **4.1. Address of the test laboratory**

Laboratory: Shenzhen Huatongwei International Inspection Co., Ltd.

Address: 1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road, Tianliao, Gongming, Shenzhen, China

### **4.2. Test Facility**

#### **CNAS-Lab Code: L1225**

Shenzhen Huatongwei International Inspection Co., Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC17025: 2005 General Requirements) for the Competence of Testing and Calibration Laboratories.

#### **A2LA-Lab Cert. No.: 3902.01**

Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

#### **FCC-Registration No.: 762235**

Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files.

#### **IC-Registration No.:5377B-1**

Two 3m Alternate Test Site of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No.: 5377B-1.

#### **ACA**

Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory can also perform testing for the Australian C-Tick mark as a result of our A2LA accreditation.

### 4.3. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	15~35°C
Relative Humidity:	30~60 %
Air Pressure:	950~1050mba

### 4.4. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors in calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report according to TR-100028-01 "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 1" and TR-100028-02 "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 2" and is documented in the Shenzhen Huatongwei International Inspection Co., Ltd. quality system according to ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Here after the best measurement capability for Shenzhen Huatongwei International Inspection Co., Ltd. is reported:

Test Items	Measurement Uncertainty	Notes
Transmitter power conducted	0.57 dB	(1)
Transmitter power Radiated	2.20 dB	(1)
Conducted spurious emissions 9kHz~40GHz	1.60 dB	(1)
Radiated spurious emissions 9kHz~40GHz	2.20 dB	(1)
Conducted Emissions 9kHz~30MHz	3.39 dB	(1)
Radiated Emissions 30~1000MHz	4.24 dB	(1)
Radiated Emissions 1~18GHz	5.16 dB	(1)
Radiated Emissions 18~40GHz	5.54 dB	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of  $k=1.96$ .



#### 4.5. Equipments Used during the Test

Conducted Emissions					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	Artificial Mains	Rohde&Schwarz	ESH2-Z5	100028	2016/11/13
2	EMI Test Receiver	Rohde&Schwarz	ESCI3	100038	2016/11/13
3	Pulse Limiter	Rohde&Schwarz	ESHSZ2	100044	2016/11/13
4	EMI Test Software	Rohde&Schwarz	ES-K1 V1.71	-	-

Radiated Emissions					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	EMI test receiver	Rohde&Schwarz	ESI 26	100009	2016/11/13
2	Loop Antenna	Rohde&Schwarz	HFH2-Z2	100020	2016/11/13
3	Ultra-Broadband Antenna	ShwarzBeck	VULB9163	538	2016/11/13
4	Horn antenna	ShwarzBeck	9120D	1011	2016/11/13
5	Horn Antenna	SCHWARZBECK	BBHA9170	25841	2016/11/13
6	Amplifier	Sonoma	310N	E009-13	2016/11/13
7	JS Amplifier	Rohde&Schwarz	JS4-00101800-28-5A	F201504	2016/11/13
8	Amplifier	Compliance Direction systems	PAP1-4060	120	2016/11/13
9	High pass filter	Compliance Direction systems	BSU-6	34202	2016/11/13
10	EMI test Software	Rohde&Schwarz	ESK1	-	-
11	EMI test Software	Audix	E3	-	-
12	TURNTABLE	MATURO	TT2.0	-	-
13	ANTENNA MAST	MATURO	TAM-4.0-P	-	-

RF Conducted methods					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	Spectrum Analyzer	Rohde&Schwarz	FSP	1164.4391.40	2016/11/13
2	MXA Signal Analyzer	Agilent Technologies	N9020A	MY5050187	2016/11/13

The Cal.Interval was one year.

## 5. TEST CONDITIONS AND RESULTS

### 5.1. Antenna requirement

#### REQUIREMENT:

#### **FCC CFR Title 47 Part 15 Subpart C Section 15.203:**

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, 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.

#### **FCC CFR Title 47 Part 15 Subpart C Section 15.247(c) (1)(i):**

(i) Systems operating in the 2400~2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

#### TEST RESULTS

☒ Passed      ☐ Not Applicable

The directional gain of the antenna less than 6 dBi, please refer to the below antenna photo.



## 5.2. Conducted Emissions (AC Main)

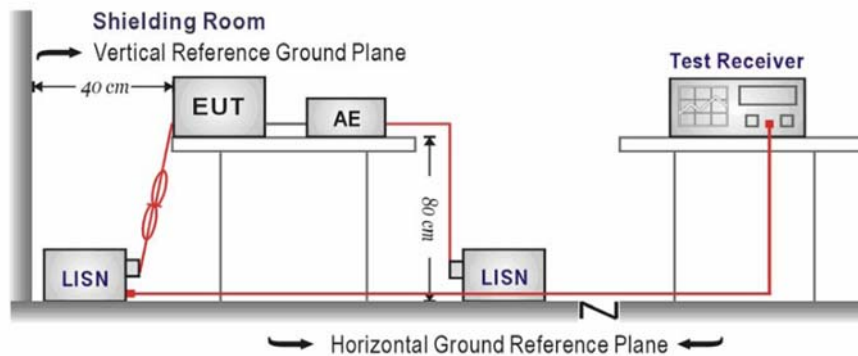
### LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.207:

Frequency range (MHz)	Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

\* Decreases with the logarithm of the frequency.

### TEST CONFIGURATION



### TEST PROCEDURE

1. The EUT was setup according to ANSI C63.10:2013 requirements.
2. The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface.
3. The EUT and simulators are connected to the main power through a line impedances stabilization network (LISN). The LISN provides a 50 ohm /50uH coupling impedance for the measuring equipment.
4. The peripheral devices are also connected to the main power through a LISN. (Please refer to the block diagram of the test setup and photographs)
5. Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source.
6. The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length.
7. Conducted Emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9 kHz.
8. During the above scans, the emissions were maximized by cable manipulation.

### TEST MODE:

Please refer to the clause 3.3

### TEST RESULTS

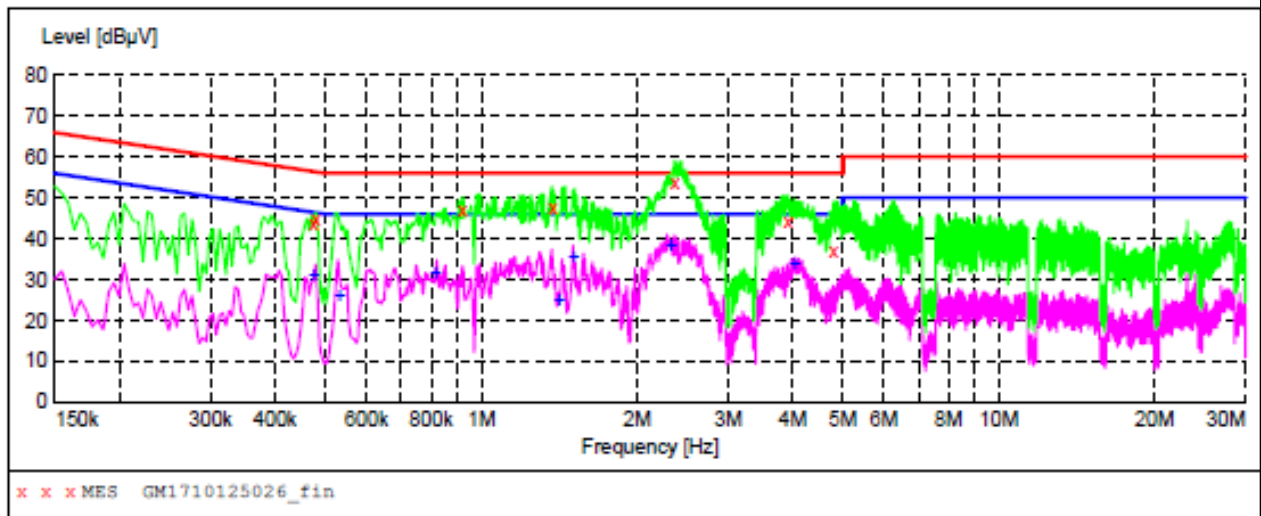
☒ Passed ☐ Not Applicable

Note:

- 1) Transd=Cable lose+ Pulse Limiter Factor + Artificial Mains Factor
- 2) Margin= Limit -Level

Test Line:

L

**MEASUREMENT RESULT: "GM1710125026\_fin"**

10/12/2017 1:15PM

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.474000	43.50	10.2	56	12.9	QP	L1	GND
0.478500	44.70	10.2	56	11.7	QP	L1	GND
0.919500	47.00	10.2	56	9.0	QP	L1	GND
1.374000	47.80	10.2	56	8.2	QP	L1	GND
2.373000	53.00	10.2	56	3.0	QP	L1	GND
3.925500	44.50	10.3	56	11.5	QP	L1	GND
4.807500	37.10	10.3	56	18.9	QP	L1	GND

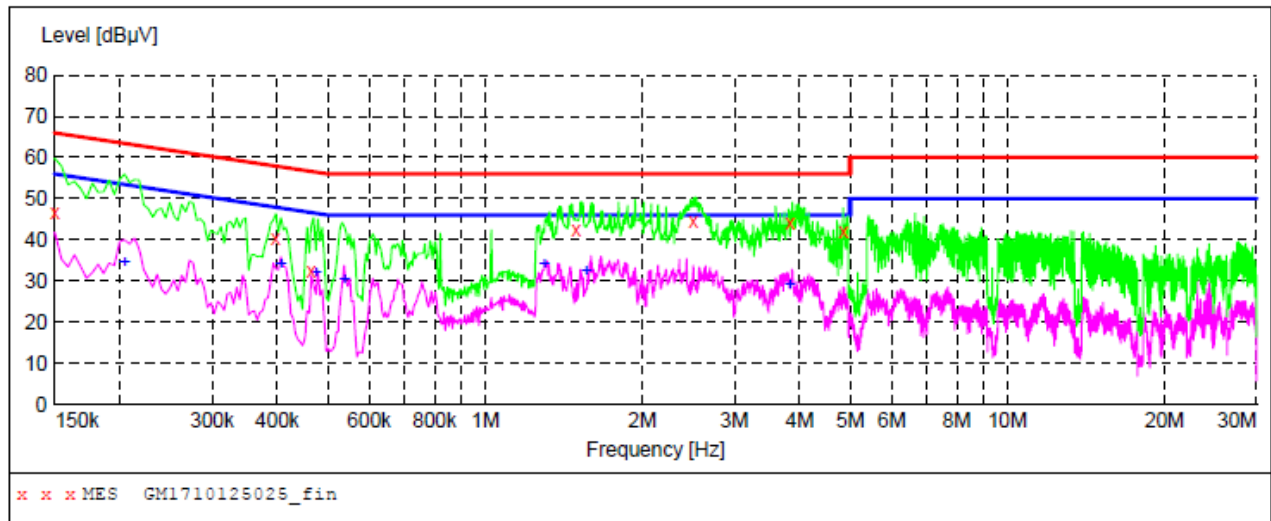
**MEASUREMENT RESULT: "GM1710125026\_fin2"**

10/12/2017 1:15PM

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.474000	31.50	10.2	46	14.9	AV	L1	GND
0.532500	26.60	10.2	46	19.4	AV	L1	GND
0.816000	32.00	10.2	46	14.0	AV	L1	GND
1.414500	25.30	10.2	46	20.7	AV	L1	GND
1.504500	36.00	10.2	46	10.0	AV	L1	GND
2.323500	38.90	10.2	46	7.1	AV	L1	GND
4.033500	34.20	10.3	46	11.8	AV	L1	GND

Test Line:

N

**MEASUREMENT RESULT: "GM1710125025\_fin"**

10/12/2017 1:11PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.150000	46.80	10.4	66	19.2	QP	N	GND
0.397500	40.30	10.2	58	17.6	QP	N	GND
0.465000	32.60	10.2	57	24.0	QP	N	GND
1.495500	42.60	10.2	56	13.4	QP	N	GND
2.503500	44.60	10.2	56	11.4	QP	N	GND
3.831000	44.30	10.3	56	11.7	QP	N	GND
4.857000	42.20	10.3	56	13.8	QP	N	GND

**MEASUREMENT RESULT: "GM1710125025\_fin2"**

10/12/2017 1:11PM

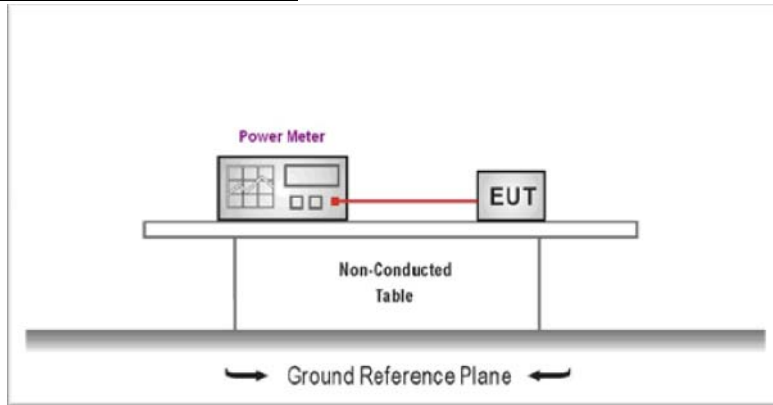
Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.204000	34.50	10.3	53	18.9	AV	N	GND
0.406500	34.20	10.2	48	13.5	AV	N	GND
0.474000	32.20	10.2	46	14.2	AV	N	GND
0.537000	30.50	10.2	46	15.5	AV	N	GND
1.297500	34.20	10.2	46	11.8	AV	N	GND
1.563000	32.60	10.2	46	13.4	AV	N	GND
3.826500	28.90	10.3	46	17.1	AV	N	GND

### 5.3. Conducted Peak Output Power

#### LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (b)(3): **30dBm**:

#### TEST CONFIGURATION



#### TEST PROCEDURE

1. The EUT was tested according to ANSI C63.10: 2013 and KDB 558074 D01 for compliance to FCC 47 CFR 15.247 requirements.
2. The maximum peak conducted output power may be measured using a broadband peak RF power meter.
3. The power meter shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall utilize a fast-responding diode detector
4. Record the measurement data.

#### TEST MODE:

Please refer to the clause 3.3

#### TEST RESULTS

☒ **Passed**      ☐ **Not Applicable**

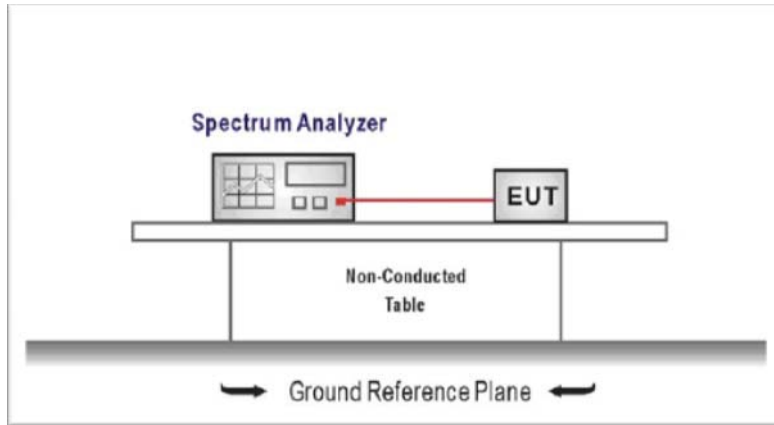
Type	Channel	Output power (dBm)	Limit (dBm)	Result
802.11b	01	13.81	≤30.00	Pass
	06	13.63		
	11	13.92		
802.11g	01	12.56	≤30.00	Pass
	06	12.09		
	11	12.48		
802.11n(HT20)	01	12.44	≤30.00	Pass
	06	12.56		
	11	11.92		
802.11n(HT40)	03	12.42	≤30.00	Pass
	06	12.33		
	09	12.28		

## 5.4. Power Spectral Density

### LIMIT

**FCC CFR Title 47 Part 15 Subpart C Section 15.247 (e):**For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

### TEST CONFIGURATION



### TEST PROCEDURE

1. Connect the antenna port(s) to the spectrum analyzer input,
2. Configure the spectrum analyzer as shown below:  
Center frequency=DTS channel center frequency  
Span =1.5 times the DTS bandwidth  
 $RBW = 3\text{ kHz} \leq RBW \leq 100\text{ kHz}$ ,  $VBW \geq 3 \times RBW$   
Sweep time = auto couple  
Detector = peak  
Trace mode = max hold
3. Place the radio in continuous transmit mode, allow the trace to stabilize, view the transmitter wave form on the spectrum analyzer.
4. Use the peak marker function to determine the maximum amplitude level within the RBW.
5. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

### TEST MODE:

Please refer to the clause 3.3




### TEST RESULTS


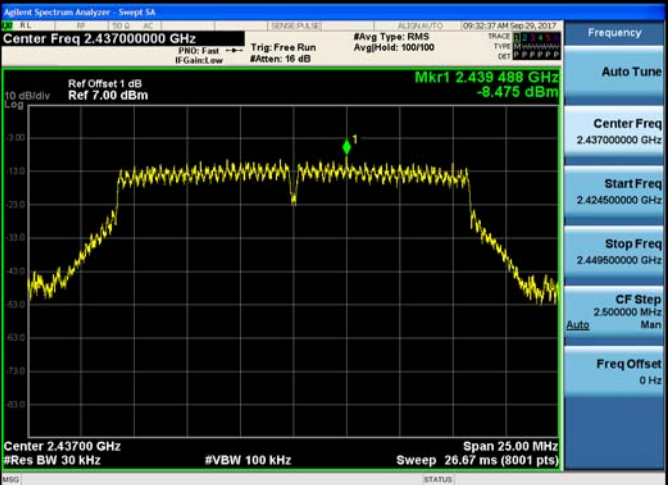
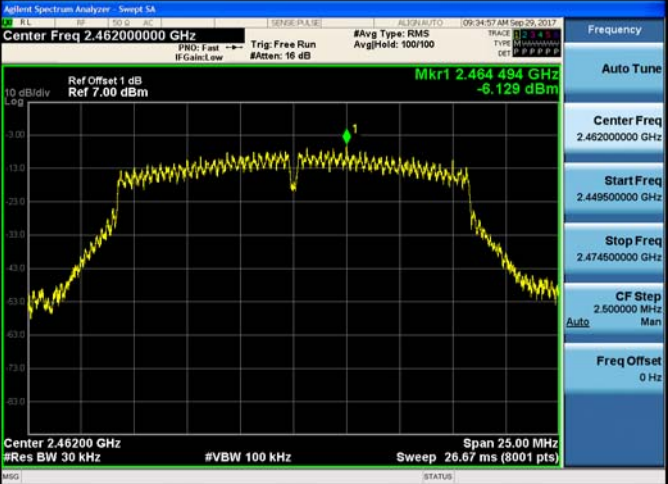
☒ Passed ☐ Not Applicable


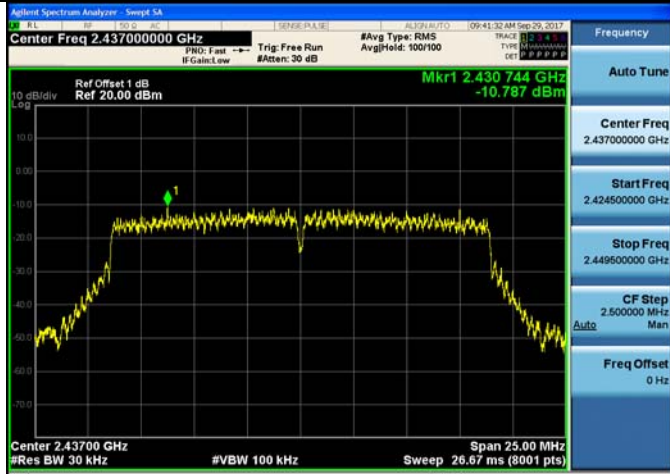
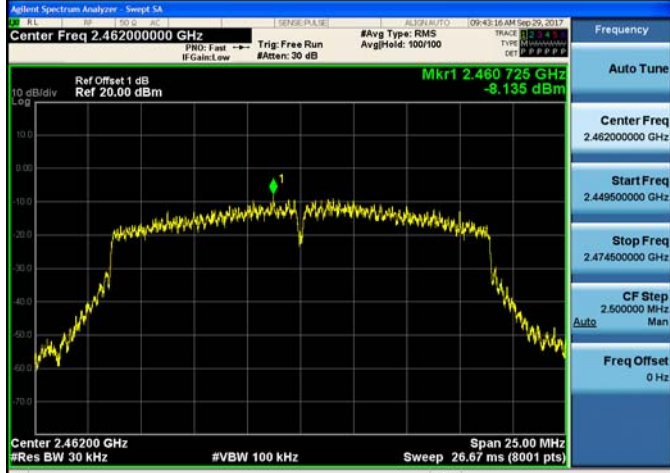
Type	Channel	Power Spectral Density (dBm/RBW)	Limit (dBm/RBW)	Result
802.11b	01	4.448	≤8.00	Pass
	06	-0.211		
	11	4.695		
802.11g	01	-7.043	≤8.00	Pass
	06	-8.475		
	11	-6.129		
802.11n(HT20)	01	-8.297	≤8.00	Pass
	06	-10.787		
	11	-8.135		
802.11n(HT40)	03	-13.720	≤8.00	Pass
	06	-13.639		
	09	-14.187		


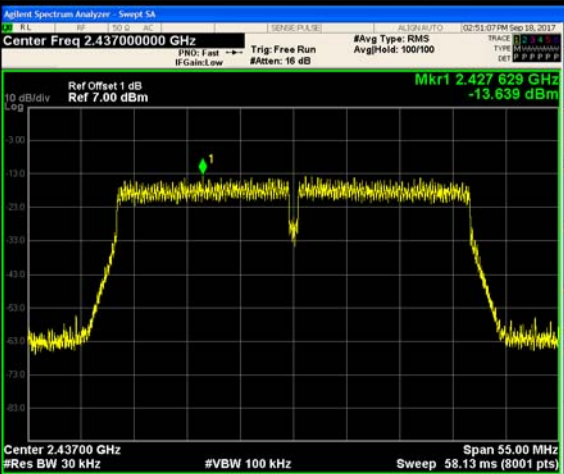
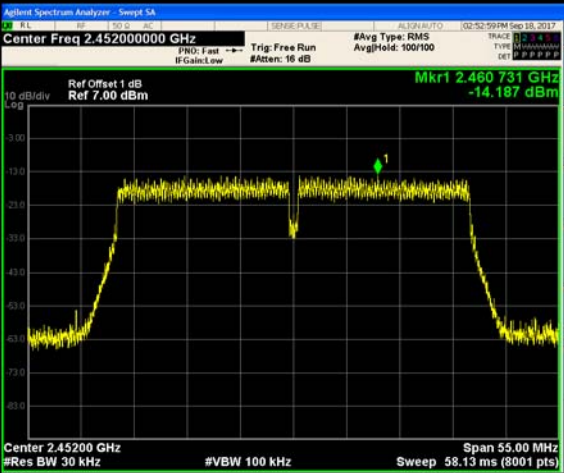
Test plot as follows:



Type:		802.11 b
CH01		<p>Agilent Spectrum Analyzer - Sweep SA</p> <p>Center Freq 2.412000000 GHz</p> <p>Ref Offset 1 dB Ref 7.00 dBm</p> <p>Mkr1 2.411 251 9 GHz 4.448 dBm</p> <p>Center 2.412000 GHz</p> <p>#Res BW 30 kHz</p> <p>#VBW 100 kHz</p> <p>Sweep 16.00 ms (8001 pts)</p> <p>Span 15.00 MHz</p> <p>Frequency</p> <p>Auto Tune</p> <p>Center Freq 2.412000000 GHz</p> <p>Start Freq 2.404500000 GHz</p> <p>Stop Freq 2.419500000 GHz</p> <p>CF Step 1.500000 MHz Auto Man</p> <p>Freq Offset 0 Hz</p>
CH06		<p>Agilent Spectrum Analyzer - Sweep SA</p> <p>Center Freq 2.437000000 GHz</p> <p>Ref Offset 1 dB Ref 7.00 dBm</p> <p>Mkr1 2.436 251 9 GHz -0.211 dBm</p> <p>Center 2.437000 GHz</p> <p>#Res BW 30 kHz</p> <p>#VBW 100 kHz</p> <p>Sweep 16.00 ms (8001 pts)</p> <p>Span 15.00 MHz</p> <p>Frequency</p> <p>Auto Tune</p> <p>Center Freq 2.437000000 GHz</p> <p>Start Freq 2.429500000 GHz</p> <p>Stop Freq 2.444500000 GHz</p> <p>CF Step 1.500000 MHz Auto Man</p> <p>Freq Offset 0 Hz</p>
CH11		<p>Agilent Spectrum Analyzer - Sweep SA</p> <p>Center Freq 2.462000000 GHz</p> <p>Ref Offset 1 dB Ref 7.00 dBm</p> <p>Mkr1 2.461 251 9 GHz 4.695 dBm</p> <p>Center 2.462000 GHz</p> <p>#Res BW 30 kHz</p> <p>#VBW 100 kHz</p> <p>Sweep 16.00 ms (8001 pts)</p> <p>Span 15.00 MHz</p> <p>Frequency</p> <p>Auto Tune</p> <p>Center Freq 2.462000000 GHz</p> <p>Start Freq 2.454500000 GHz</p> <p>Stop Freq 2.469500000 GHz</p> <p>CF Step 1.500000 MHz Auto Man</p> <p>Freq Offset 0 Hz</p>

Type:		802.11 g
CH01		<p>Agilent Spectrum Analyzer - Sweep SA</p> <p>Center Freq 2.41200000 GHz</p> <p>Ref Offset 1 dB Ref 7.00 dBm</p> <p>Mkr1 2.411375 GHz -7.043 dBm</p> <p>Center 2.41200 GHz #Res BW 30 kHz</p> <p>#VBW 100 kHz</p> <p>Span 25.00 MHz Sweep 26.67 ms (8001 pts)</p> <p>Frequency</p> <p>Auto Tune</p> <p>Center Freq 2.412000000 GHz</p> <p>Start Freq 2.399500000 GHz</p> <p>Stop Freq 2.424500000 GHz</p> <p>CF Step 2.500000 MHz Auto Man</p> <p>Freq Offset 0 Hz</p>
CH06		<p>Agilent Spectrum Analyzer - Sweep SA</p> <p>Center Freq 2.43700000 GHz</p> <p>Ref Offset 1 dB Ref 7.00 dBm</p> <p>Mkr1 2.439488 GHz -8.475 dBm</p> <p>Center 2.43700 GHz #Res BW 30 kHz</p> <p>#VBW 100 kHz</p> <p>Span 25.00 MHz Sweep 26.67 ms (8001 pts)</p> <p>Frequency</p> <p>Auto Tune</p> <p>Center Freq 2.437000000 GHz</p> <p>Start Freq 2.424500000 GHz</p> <p>Stop Freq 2.449500000 GHz</p> <p>CF Step 2.500000 MHz Auto Man</p> <p>Freq Offset 0 Hz</p>
CH11		<p>Agilent Spectrum Analyzer - Sweep SA</p> <p>Center Freq 2.46200000 GHz</p> <p>Ref Offset 1 dB Ref 7.00 dBm</p> <p>Mkr1 2.464494 GHz -6.129 dBm</p> <p>Center 2.46200 GHz #Res BW 30 kHz</p> <p>#VBW 100 kHz</p> <p>Span 25.00 MHz Sweep 26.67 ms (8001 pts)</p> <p>Frequency</p> <p>Auto Tune</p> <p>Center Freq 2.462000000 GHz</p> <p>Start Freq 2.449500000 GHz</p> <p>Stop Freq 2.474500000 GHz</p> <p>CF Step 2.500000 MHz Auto Man</p> <p>Freq Offset 0 Hz</p>

Type:		802.11n(HT20)	
CH01			
CH06			
CH11			

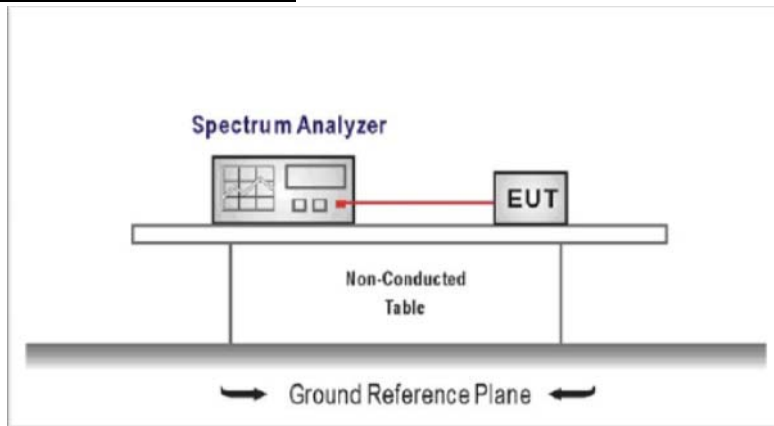
Type:		802.11n(HT40)	
CH03			<p>Frequency</p> <p>Auto Tune</p> <p>Center Freq 2.422000000 GHz</p> <p>Start Freq 2.394500000 GHz</p> <p>Stop Freq 2.449500000 GHz</p> <p>CF Step 5.500000 MHz Auto</p> <p>Freq Offset 0 Hz</p>
CH06			<p>Frequency</p> <p>Auto Tune</p> <p>Center Freq 2.437000000 GHz</p> <p>Start Freq 2.409500000 GHz</p> <p>Stop Freq 2.464500000 GHz</p> <p>CF Step 5.500000 MHz Auto</p> <p>Freq Offset 0 Hz</p>
CH09			<p>Frequency</p> <p>Auto Tune</p> <p>Center Freq 2.452000000 GHz</p> <p>Start Freq 2.424500000 GHz</p> <p>Stop Freq 2.479500000 GHz</p> <p>CF Step 5.500000 MHz Auto</p> <p>Freq Offset 0 Hz</p>

## 5.5. 6dB bandwidth

### LIMIT

**FCC CFR Title 47 Part 15 Subpart C Section 15.247 (a)(2):**For digital modulation systems, the minimum 6 dB bandwidth shall be at least 500 kHz.

### TEST CONFIGURATION



### TEST PROCEDURE

1. Connect the antenna port(s) to the spectrum analyzer input.
2. Configure the spectrum analyzer as shown below (enter all losses between the transmitter output and the spectrum analyzer).  
Center Frequency = DTS channel center frequency  
Span = 2 x DTS bandwidth  
RBW = 100 kHz, VBW  $\geq 3 \times$  RBW  
Sweep time = auto couple  
Detector = Peak  
Trace mode = max hold
3. Place the radio in continuous transmit mode, allow the trace to stabilize, view the transmitter wave form on the spectrum analyzer.
4. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission, and record the pertinent measurements.

### TEST MODE:

Please refer to the clause 3.3




### TEST RESULTS

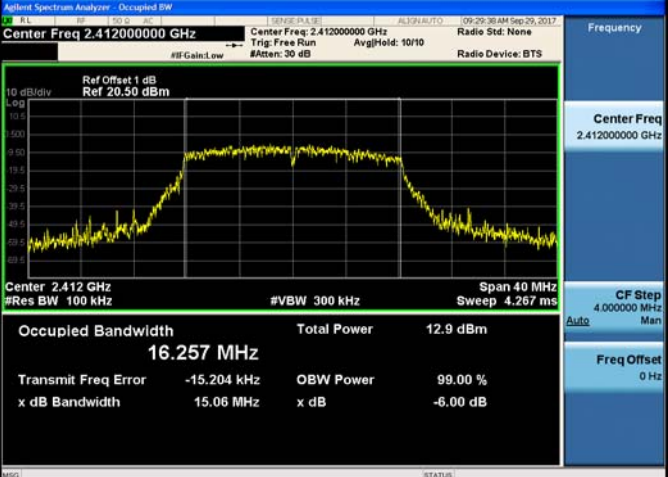

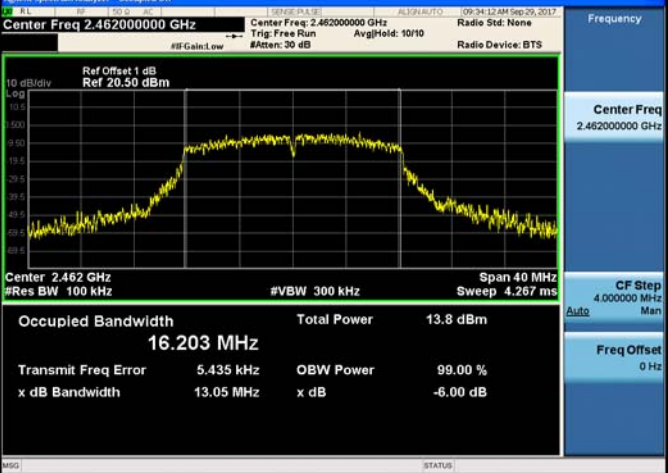
☒ Passed      ☐ Not Applicable

Type	Channel	6dB Bandwidth (MHz)	Limit (kHz)	Result
802.11b	01	8.005	≥500	Pass
	06	8.592		
	11	7.683		
802.11g	01	15.06	≥500	Pass
	06	16.42		
	11	13.05		
802.11n(HT20)	01	14.58	≥500	Pass
	06	16.44		
	11	13.38		
802.11n(HT40)	03	35.40	≥500	Pass
	06	36.37		
	09	35.44		

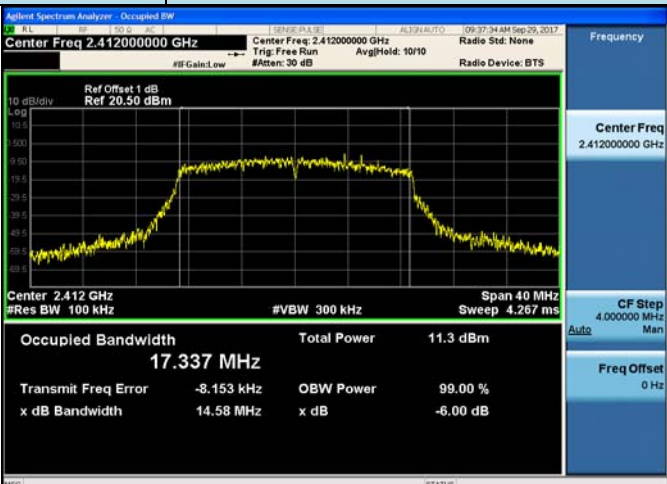
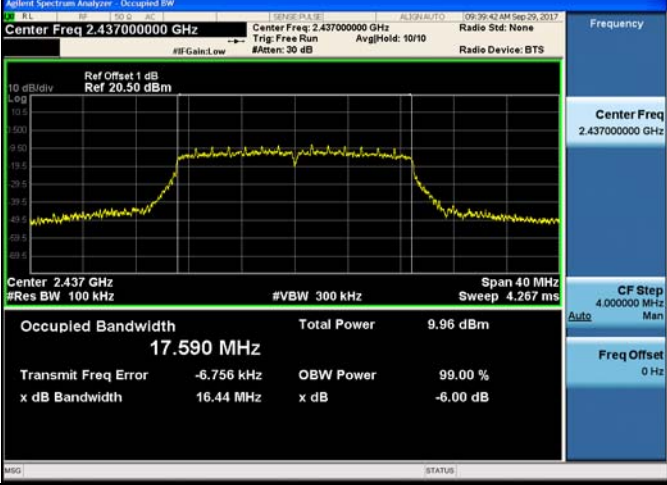
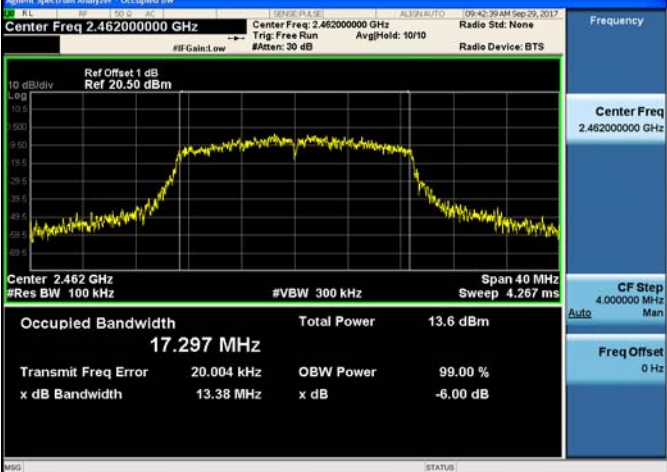
Test plot as follows:

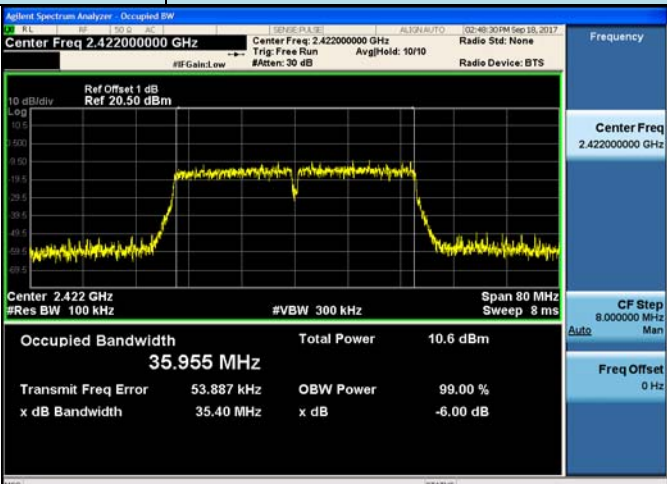
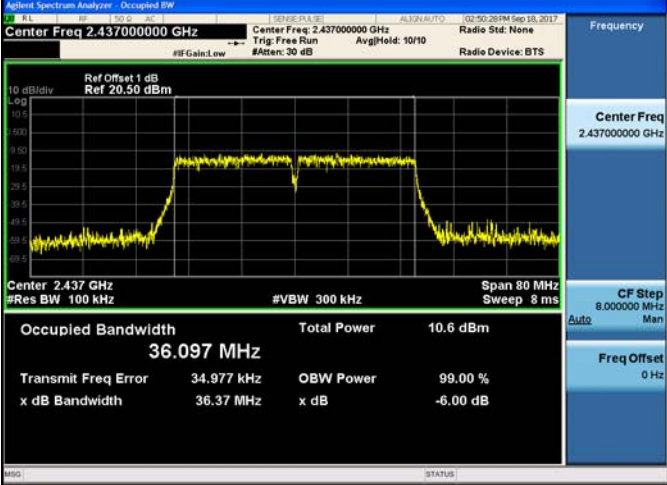
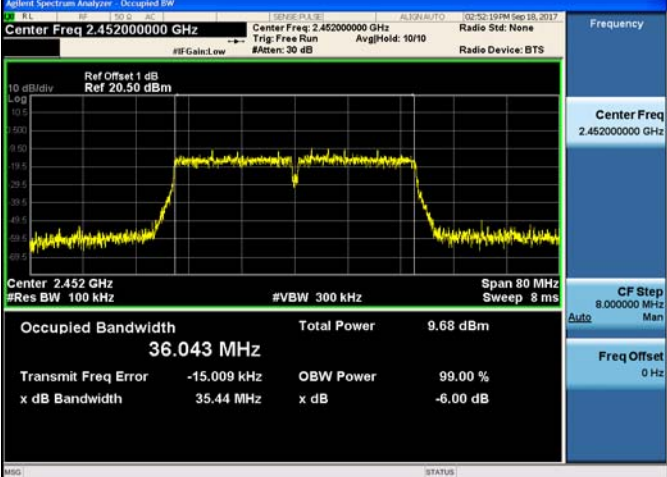


Type:		802.11 b
CH01		
CH06		
CH11		

Type:		802.11 g
CH01		 <p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq 2.412000000 GHz</p> <p>Ref Offset 1 dB Ref 20.50 dBm</p> <p>Center 2.412 GHz #Res BW 100 kHz</p> <p>Occupied Bandwidth 16.257 MHz</p> <p>Total Power 12.9 dBm</p> <p>Transmit Freq Error -15.204 kHz</p> <p>x dB Bandwidth 15.06 MHz</p> <p>CF Step 4.000000 MHz</p> <p>Freq Offset 0 Hz</p>
CH06		 <p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq 2.437000000 GHz</p> <p>Ref Offset 1 dB Ref 20.50 dBm</p> <p>Center 2.437 GHz #Res BW 100 kHz</p> <p>Occupied Bandwidth 16.427 MHz</p> <p>Total Power 9.27 dBm</p> <p>Transmit Freq Error -3.066 kHz</p> <p>x dB Bandwidth 16.42 MHz</p> <p>CF Step 4.000000 MHz</p> <p>Freq Offset 0 Hz</p>
CH11		 <p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq 2.462000000 GHz</p> <p>Ref Offset 1 dB Ref 20.50 dBm</p> <p>Center 2.462 GHz #Res BW 100 kHz</p> <p>Occupied Bandwidth 16.203 MHz</p> <p>Total Power 13.8 dBm</p> <p>Transmit Freq Error 5.435 kHz</p> <p>x dB Bandwidth 13.05 MHz</p> <p>CF Step 4.000000 MHz</p> <p>Freq Offset 0 Hz</p>



Type:		802.11n(HT20)
CH01		
CH06		
CH11		

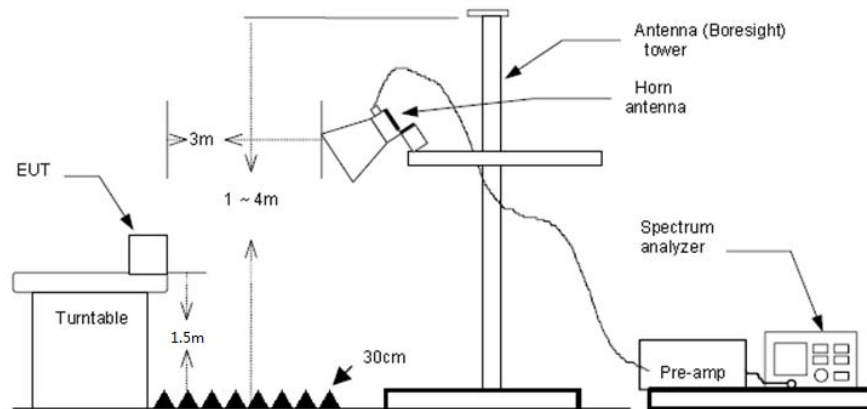
Type:		802.11n(HT40)
CH03		
CH06		
CH09		

## 5.6. Restricted band

### LIMIT

**FCC CFR Title 47 Part 15 Subpart C Section 15.247 (d):** In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, Radiated Emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the Radiated Emissions limits specified in §15.209(a) (see §15.205(c)).

### TEST CONFIGURATION



### TEST PROCEDURE

- 1) The EUT was setup and tested according to ANSI C63.10:2013 for compliance to FCC 47CFR 15.247 requirements.
- 2) The EUT is placed on a turn table which is 1.5 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
- 3) The EUT was positioned such that the distance from antenna to the EUT was 3 meters.
- 4) The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10:2013 on radiated measurement.
- 5) The receiver set as follow:  
 RBW=1MHz, VBW=3MHz PEAK detector for Peak value.  
 RBW=1MHz, VBW=3MHz RMS detector for Average value.

### TEST MODE:

Please refer to the clause 3.3

### TEST RESULTS

☒ Passed ☐ Not Applicable

Note:

- 1) Final level= Read level + Antenna Factor+ Cable Loss- Preamp Factor

802.11b					CH01				
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization	Test value
2310.00	15.64	28.05	6.62	0.00	50.31	74.00	-23.69	Vertical	Peak
2390.01	14.81	27.65	6.75	0.00	49.21	74.00	-24.79	Vertical	Peak
2310.00	15.94	28.05	6.62	0.00	50.61	74.00	-23.39	Horizontal	Peak
2390.01	15.86	27.65	6.75	0.00	50.26	74.00	-23.74	Horizontal	Peak
2310.00	10.58	28.05	6.62	0.00	45.25	54.00	-8.75	Vertical	Average
2390.01	10.39	27.65	6.75	0.00	44.79	54.00	-9.21	Vertical	Average
2310.00	12.59	28.05	6.62	0.00	47.26	54.00	-6.74	Horizontal	Average
2390.01	12.61	27.65	6.75	0.00	47.01	54.00	-6.99	Horizontal	Average

802.11b					CH11				
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization	Test value
2483.49	17.23	27.26	6.83	0.00	51.32	74.00	-22.68	Vertical	Peak
2500.00	16.28	27.20	6.84	0.00	50.32	74.00	-23.68	Vertical	Peak
2483.49	16.47	27.26	6.83	0.00	50.56	74.00	-23.44	Horizontal	Peak
2500.00	17.41	27.20	6.84	0.00	51.45	74.00	-22.55	Horizontal	Peak
2483.49	10.15	27.26	6.83	0.00	44.24	54.00	-9.76	Vertical	Average
2500.00	10.13	27.20	6.84	0.00	44.17	54.00	-9.83	Vertical	Average
2483.49	10.15	27.26	6.83	0.00	44.24	54.00	-9.76	Horizontal	Average
2500.00	10.12	27.20	6.84	0.00	44.16	54.00	-9.84	Horizontal	Average

802.11g					CH01				
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization	Test value
2310.00	16.13	28.05	6.62	0.00	50.80	74.00	-23.20	Vertical	Peak
2390.01	16.39	27.65	6.75	0.00	50.79	74.00	-23.21	Vertical	Peak
2310.00	15.05	28.05	6.62	0.00	49.72	74.00	-24.28	Horizontal	Peak
2390.01	15.62	27.65	6.75	0.00	50.02	74.00	-23.98	Horizontal	Peak
2310.00	12.58	28.05	6.62	0.00	47.25	54.00	-6.75	Vertical	Average
2390.01	13.16	27.65	6.75	0.00	47.56	54.00	-6.44	Vertical	Average
2310.00	10.64	28.05	6.62	0.00	45.31	54.00	-8.69	Horizontal	Average
2390.01	13.20	27.65	6.75	0.00	47.60	54.00	-6.40	Horizontal	Average

802.11g					CH11				
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization	Test value
2483.49	16.50	27.26	6.83	0.00	50.59	74.00	-23.41	Vertical	Peak
2500.00	16.40	27.20	6.84	0.00	50.44	74.00	-23.56	Vertical	Peak
2483.49	18.08	27.26	6.83	0.00	52.17	74.00	-21.83	Horizontal	Peak
2500.00	17.12	27.20	6.84	0.00	51.16	74.00	-22.84	Horizontal	Peak
2483.49	10.83	27.26	6.83	0.00	44.92	54.00	-9.08	Vertical	Average
2500.00	10.31	27.20	6.84	0.00	44.35	54.00	-9.65	Vertical	Average
2483.49	11.96	27.26	6.83	0.00	46.05	54.00	-7.95	Horizontal	Average
2500.00	10.10	27.20	6.84	0.00	44.14	54.00	-9.86	Horizontal	Average

802.11n(HT20)					CH01				
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization	Test value
2310.00	14.92	28.05	6.62	0.00	49.59	74.00	-24.41	Vertical	Peak
2390.01	17.06	27.65	6.75	0.00	51.46	74.00	-22.54	Vertical	Peak
2310.00	14.41	28.05	6.62	0.00	49.08	74.00	-24.92	Horizontal	Peak
2390.01	15.49	27.65	6.75	0.00	49.89	74.00	-24.11	Horizontal	Peak
2310.00	10.60	28.05	6.62	0.00	45.27	54.00	-8.73	Vertical	Average
2390.01	10.99	27.65	6.75	0.00	45.39	54.00	-8.61	Vertical	Average
2310.00	9.60	28.05	6.62	0.00	44.27	54.00	-9.73	Horizontal	Average
2390.01	11.00	27.65	6.75	0.00	45.40	54.00	-8.60	Horizontal	Average

802.11n(HT20)					CH11				
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization	Test value
2483.66	15.35	27.26	6.83	0.00	49.44	74.00	-24.56	Vertical	Peak
2500.00	15.66	27.20	6.84	0.00	49.70	74.00	-24.30	Vertical	Peak
2483.49	15.64	27.26	6.83	0.00	49.73	74.00	-24.27	Horizontal	Peak
2500.00	14.42	27.20	6.84	0.00	48.46	74.00	-25.54	Horizontal	Peak
2483.49	12.59	27.26	6.83	0.00	46.68	54.00	-7.32	Vertical	Average
2500.00	12.19	27.20	6.84	0.00	46.23	54.00	-7.77	Vertical	Average
2483.49	12.93	27.26	6.83	0.00	47.02	54.00	-6.98	Horizontal	Average
2500.00	9.30	27.20	6.84	0.00	43.34	54.00	-10.66	Horizontal	Average

802.11n(HT40)					CH03				
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization	Test value
2310.00	18.14	28.05	6.62	0.00	52.81	74.00	-21.19	Vertical	Peak
2389.99	19.57	27.65	6.75	0.00	53.97	74.00	-20.03	Vertical	Peak
2310.00	16.82	28.05	6.62	0.00	51.49	74.00	-22.51	Horizontal	Peak
2389.99	20.02	27.65	6.75	0.00	54.42	74.00	-19.58	Horizontal	Peak
2310.00	12.65	28.05	6.62	0.00	47.32	54.00	-6.68	Vertical	Average
2389.99	15.59	27.65	6.75	0.00	49.99	54.00	-4.01	Vertical	Average
2310.00	12.62	28.05	6.62	0.00	47.29	54.00	-6.71	Horizontal	Average
2389.99	15.95	27.65	6.75	0.00	50.35	54.00	-3.65	Horizontal	Average

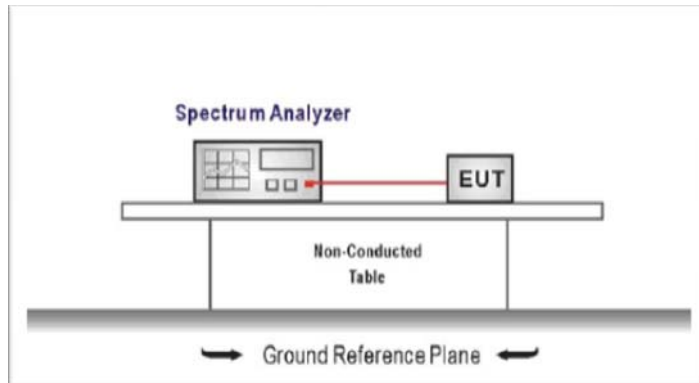
802.11n(HT40)					CH09				
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization	Test value
2483.50	21.54	27.26	6.83	0.00	55.63	74.00	-18.37	Vertical	Peak
2500.00	17.26	27.20	6.84	0.00	51.30	74.00	-22.70	Vertical	Peak
2483.50	23.99	27.26	6.83	0.00	58.08	74.00	-15.92	Horizontal	Peak
2500.00	20.07	27.20	6.84	0.00	54.11	74.00	-19.89	Horizontal	Peak
2483.50	13.14	27.26	6.83	0.00	47.23	54.00	-6.77	Vertical	Average
2500.00	10.35	27.20	6.84	0.00	44.39	54.00	-9.61	Vertical	Average
2483.50	19.07	27.26	6.83	0.00	53.16	54.00	-0.84	Horizontal	Average
2500.00	10.94	27.20	6.84	0.00	44.98	54.00	-9.02	Horizontal	Average

## 5.7. Band edge and Spurious Emissions (conducted)

### LIMIT

**FCC CFR Title 47 Part 15 Subpart C Section 15.247 (d):** In any 100 kHz bandwidth outside the frequency band in which the spread spectrum 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.

### TEST CONFIGURATION



### TEST PROCEDURE

1. Connect the antenna port(s) to the spectrum analyzer input.
2. Establish a reference level by using the following procedure  
Center frequency=DTS channel center frequency  
The span = 1.5 times the DTS bandwidth.  
RBW = 100 kHz, VBW  $\geq 3 \times$  RBW  
Detector = peak, Sweep time = auto couple, Trace mode = max hold  
Allow trace to fully stabilize  
Use the peak marker function to determine the maximum PSD level  
  
Note: the channel found to contain the maximum PSD level can be used to establish the reference level.
3. Emission level measurement  
Set the center frequency and span to encompass frequency range to be measured  
RBW = 100 kHz, VBW  $\geq 3 \times$  RBW  
Detector = peak, Sweep time = auto couple, Trace mode = max hold  
Allow trace to fully stabilize  
Use the peak marker function to determine the maximum amplitude level.
4. Place the radio in continuous transmit mode, allow the trace to stabilize, view the transmitter waveform on the spectrum analyzer.
5. Ensure that the amplitude of all unwanted emission outside of the authorized frequency band excluding restricted frequency bands) are attenuated by at least the minimum requirements specified (at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz). Report the three highest emission relative to the limit.

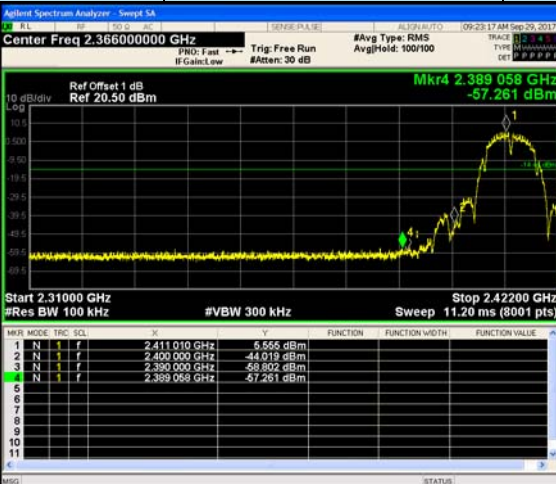

### TEST MODE:

Please refer to the clause 3.3

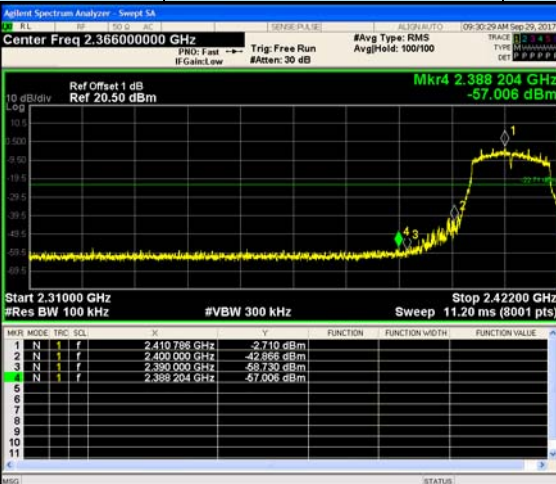
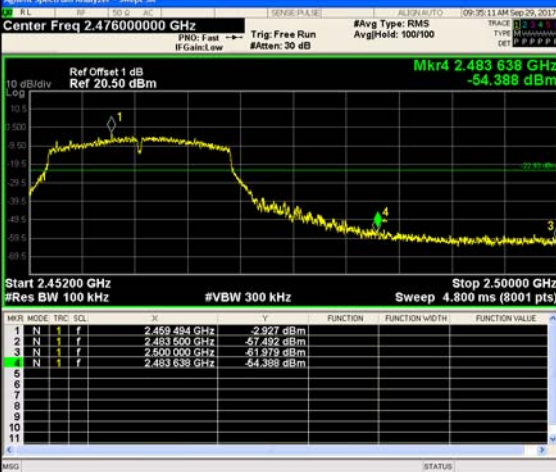
### TEST RESULTS

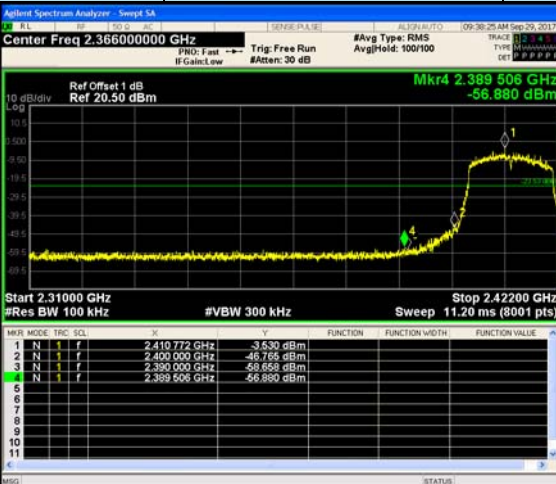
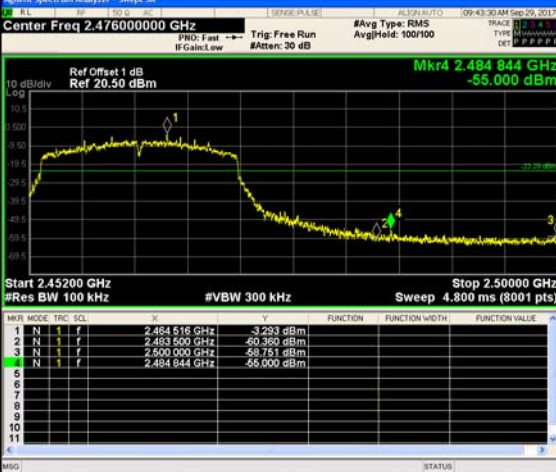
☒ Passed      ☐ Not Applicable

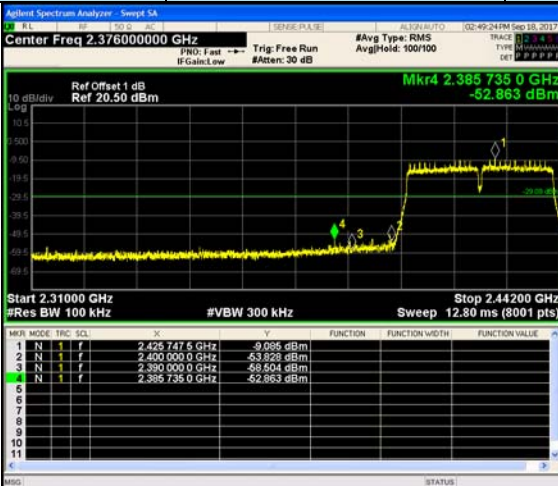


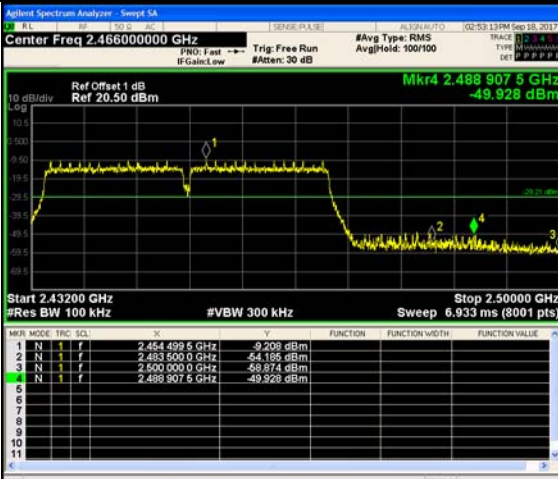
Test Item:	Bandedge	Type:	802.11 b
CH01			<div>Frequency</div> <div>Auto Tune</div> <div>Center Freq 2.366000000 GHz</div> <div>Start Freq 2.310000000 GHz</div> <div>Stop Freq 2.422000000 GHz</div> <div>CF Step 11.200000 MHz</div> <div>Freq Offset 0 Hz</div>
CH11			<div>Frequency</div> <div>Auto Tune</div> <div>Center Freq 2.476000000 GHz</div> <div>Start Freq 2.452000000 GHz</div> <div>Stop Freq 2.500000000 GHz</div> <div>CF Step 4.800000 MHz</div> <div>Freq Offset 0 Hz</div>


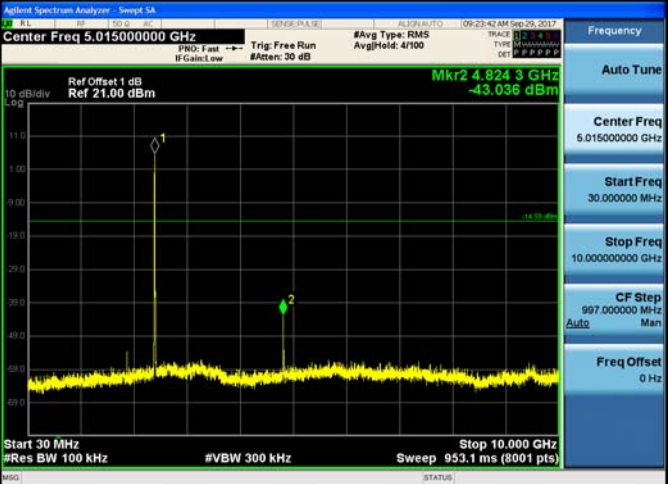



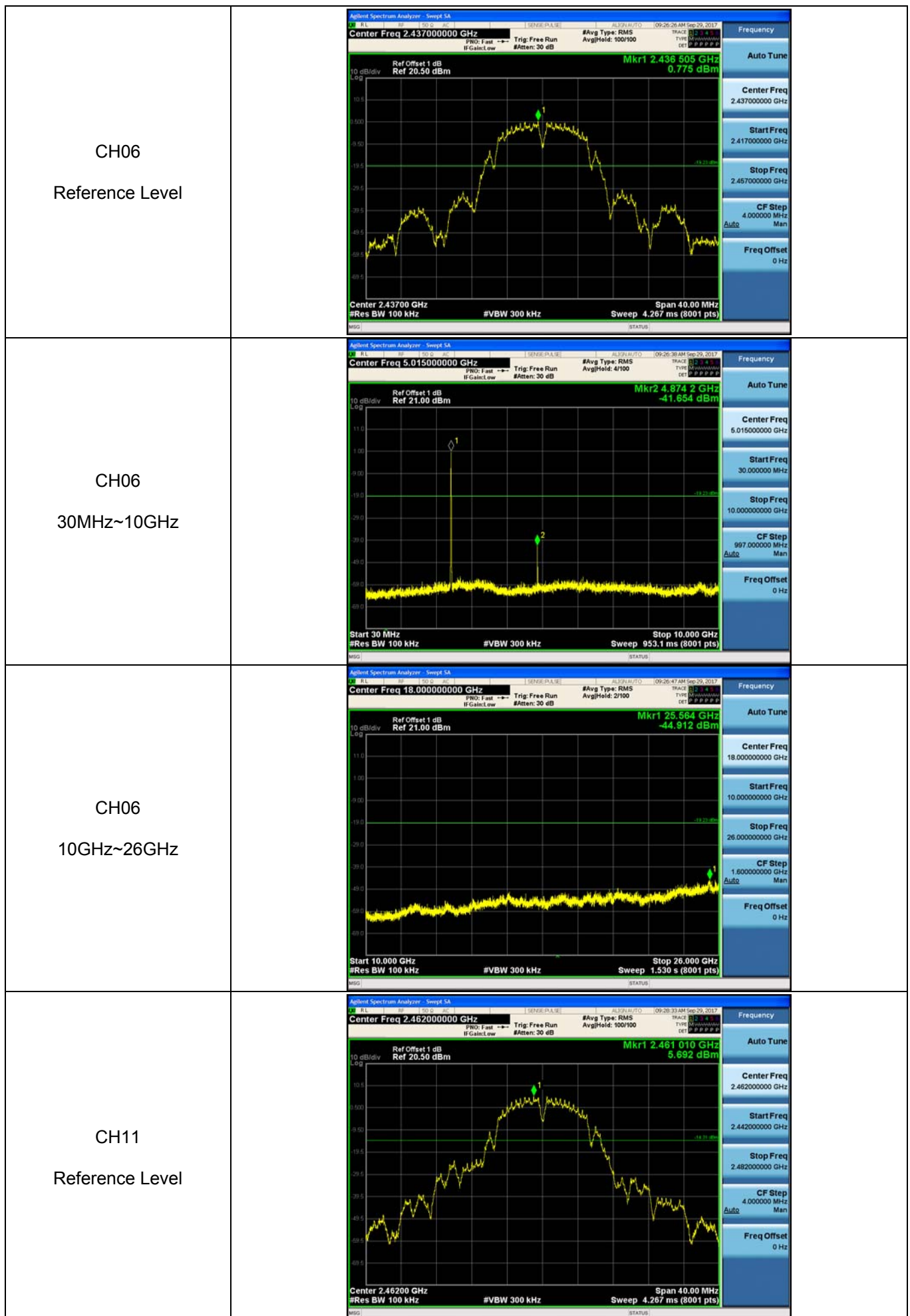
Test Item:	Bandedge	Type:	802.11 g
CH01			<p>Frequency</p> <p>Auto Tune</p> <p>Center Freq 2.366000000 GHz</p> <p>Start Freq 2.310000000 GHz</p> <p>Stop Freq 2.422000000 GHz</p> <p>CF Step 11.200000 MHz</p> <p>Freq Offset 0 Hz</p>
CH11			<p>Frequency</p> <p>Auto Tune</p> <p>Center Freq 2.476000000 GHz</p> <p>Start Freq 2.452000000 GHz</p> <p>Stop Freq 2.500000000 GHz</p> <p>CF Step 4.800000 MHz</p> <p>Freq Offset 0 Hz</p>

Test Item:	Bandedge	Type:	802.11 n(HT20)
CH01			<div>Frequency</div> <div>Auto Tune</div> <div>Center Freq 2.366000000 GHz</div> <div>Start Freq 2.310000000 GHz</div> <div>Stop Freq 2.422000000 GHz</div> <div>CF Step 11.200000 MHz</div> <div>Freq Offset 0 Hz</div>
CH11			<div>Frequency</div> <div>Auto Tune</div> <div>Center Freq 2.476000000 GHz</div> <div>Start Freq 2.452000000 GHz</div> <div>Stop Freq 2.500000000 GHz</div> <div>CF Step 4.800000 MHz</div> <div>Freq Offset 0 Hz</div>

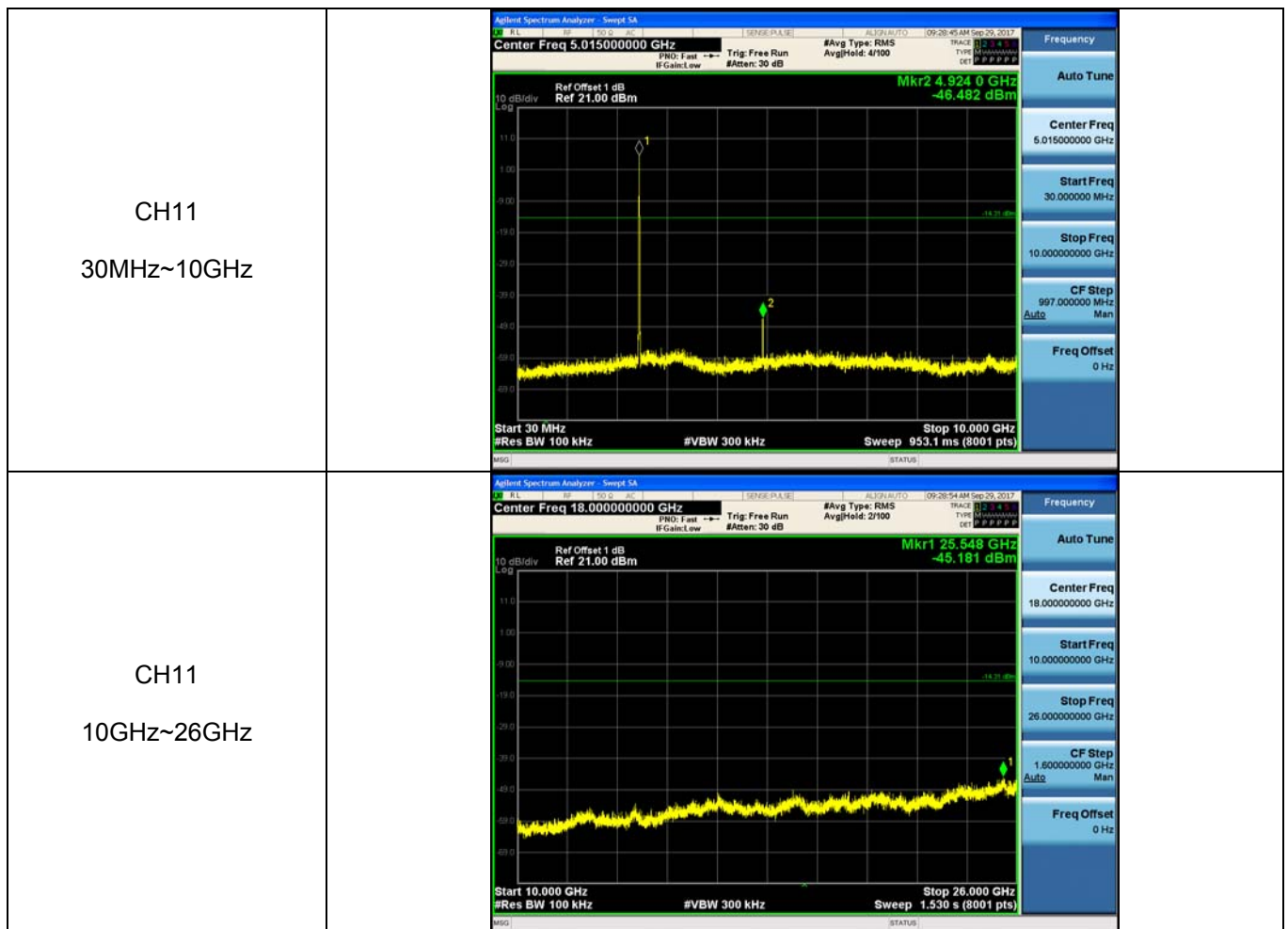
Test Item:	Bandedge	Type:	802.11 n(HT40)																																													
CH03	 <p>Agilent Spectrum Analyzer - Sweep SA</p> <p>Center Freq 2.376000000 GHz</p> <p>Ref Offset 1 dB Ref 20.50 dBm</p> <p>Mkr4 2.385 735 0 GHz -52.863 dBm</p> <p>Start 2.31000 GHz #Res BW 100 kHz</p> <p>Stop 2.44200 GHz #VBW 300 kHz Sweep 12.80 ms (8001 pts)</p> <table> <tr> <th>Marker</th><th>Mode</th><th>Trig</th><th>SQL</th><th>X</th><th>Y</th><th>Function</th><th>Function Width</th><th>Function Value</th></tr> <tr> <td>1</td><td>N</td><td>1</td><td>f</td><td>2.426 747 5 GHz</td><td>-9.086 dBm</td><td></td><td></td><td></td></tr> <tr> <td>2</td><td>N</td><td>1</td><td>f</td><td>2.400 000 0 GHz</td><td>-63.828 dBm</td><td></td><td></td><td></td></tr> <tr> <td>3</td><td>N</td><td>1</td><td>f</td><td>2.380 000 0 GHz</td><td>-68.504 dBm</td><td></td><td></td><td></td></tr> <tr> <td>4</td><td>N</td><td>1</td><td>f</td><td>2.385 735 0 GHz</td><td>-52.863 dBm</td><td></td><td></td><td></td></tr> </table>	Marker	Mode	Trig	SQL	X	Y	Function	Function Width	Function Value	1	N	1	f	2.426 747 5 GHz	-9.086 dBm				2	N	1	f	2.400 000 0 GHz	-63.828 dBm				3	N	1	f	2.380 000 0 GHz	-68.504 dBm				4	N	1	f	2.385 735 0 GHz	-52.863 dBm					
Marker	Mode	Trig	SQL	X	Y	Function	Function Width	Function Value																																								
1	N	1	f	2.426 747 5 GHz	-9.086 dBm																																											
2	N	1	f	2.400 000 0 GHz	-63.828 dBm																																											
3	N	1	f	2.380 000 0 GHz	-68.504 dBm																																											
4	N	1	f	2.385 735 0 GHz	-52.863 dBm																																											


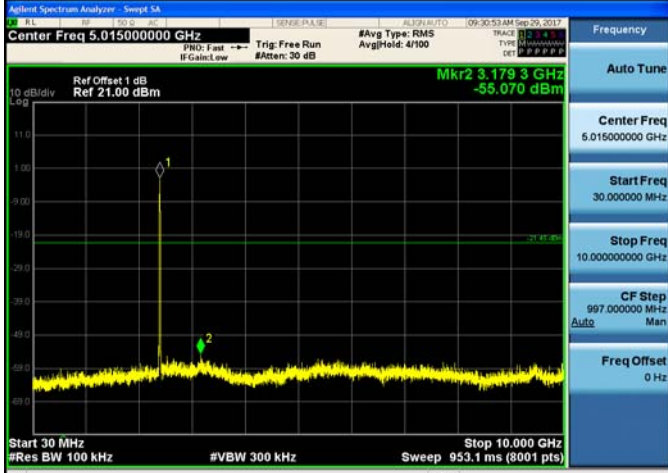

CH09	 <p>Agilent Spectrum Analyzer - Sweep SA</p> <p>Center Freq 2.466000000 GHz</p> <p>Ref Offset 1 dB Ref 20.50 dBm</p> <p>Mkr4 2.488 907 5 GHz -49.928 dBm</p> <p>Start 2.43200 GHz #Res BW 100 kHz</p> <p>Stop 2.50000 GHz #VBW 300 kHz Sweep 6.933 ms (8001 pts)</p> <table> <tr> <th>Marker</th><th>Mode</th><th>Trig</th><th>SQL</th><th>X</th><th>Y</th><th>Function</th><th>Function Width</th><th>Function Value</th></tr> <tr> <td>1</td><td>N</td><td>1</td><td>f</td><td>2.484 499 5 GHz</td><td>-9.208 dBm</td><td></td><td></td><td></td></tr> <tr> <td>2</td><td>N</td><td>1</td><td>f</td><td>2.483 500 0 GHz</td><td>-64.196 dBm</td><td></td><td></td><td></td></tr> <tr> <td>3</td><td>N</td><td>1</td><td>f</td><td>2.500 000 0 GHz</td><td>-68.874 dBm</td><td></td><td></td><td></td></tr> <tr> <td>4</td><td>N</td><td>1</td><td>f</td><td>2.488 907 5 GHz</td><td>-49.928 dBm</td><td></td><td></td><td></td></tr> </table>	Marker	Mode	Trig	SQL	X	Y	Function	Function Width	Function Value	1	N	1	f	2.484 499 5 GHz	-9.208 dBm				2	N	1	f	2.483 500 0 GHz	-64.196 dBm				3	N	1	f	2.500 000 0 GHz	-68.874 dBm				4	N	1	f	2.488 907 5 GHz	-49.928 dBm					
Marker	Mode	Trig	SQL	X	Y	Function	Function Width	Function Value																																								
1	N	1	f	2.484 499 5 GHz	-9.208 dBm																																											
2	N	1	f	2.483 500 0 GHz	-64.196 dBm																																											
3	N	1	f	2.500 000 0 GHz	-68.874 dBm																																											
4	N	1	f	2.488 907 5 GHz	-49.928 dBm																																											

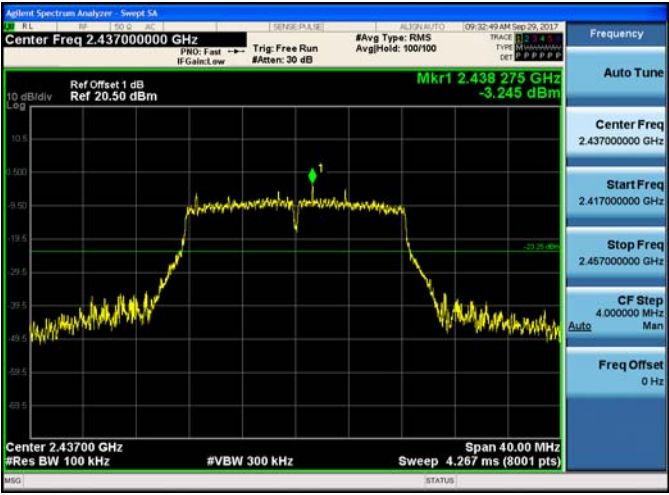
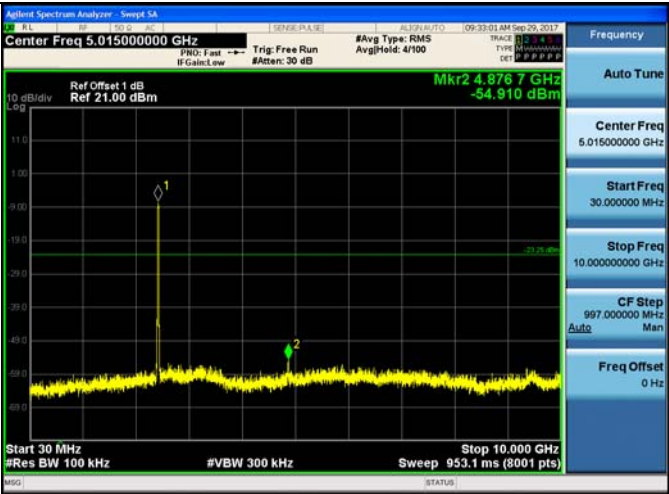


Test Item:	SE	Type:	802.11 b
CH01 Reference Level			
CH01 30MHz~10GHz			
CH01 10GHz~26GHz			



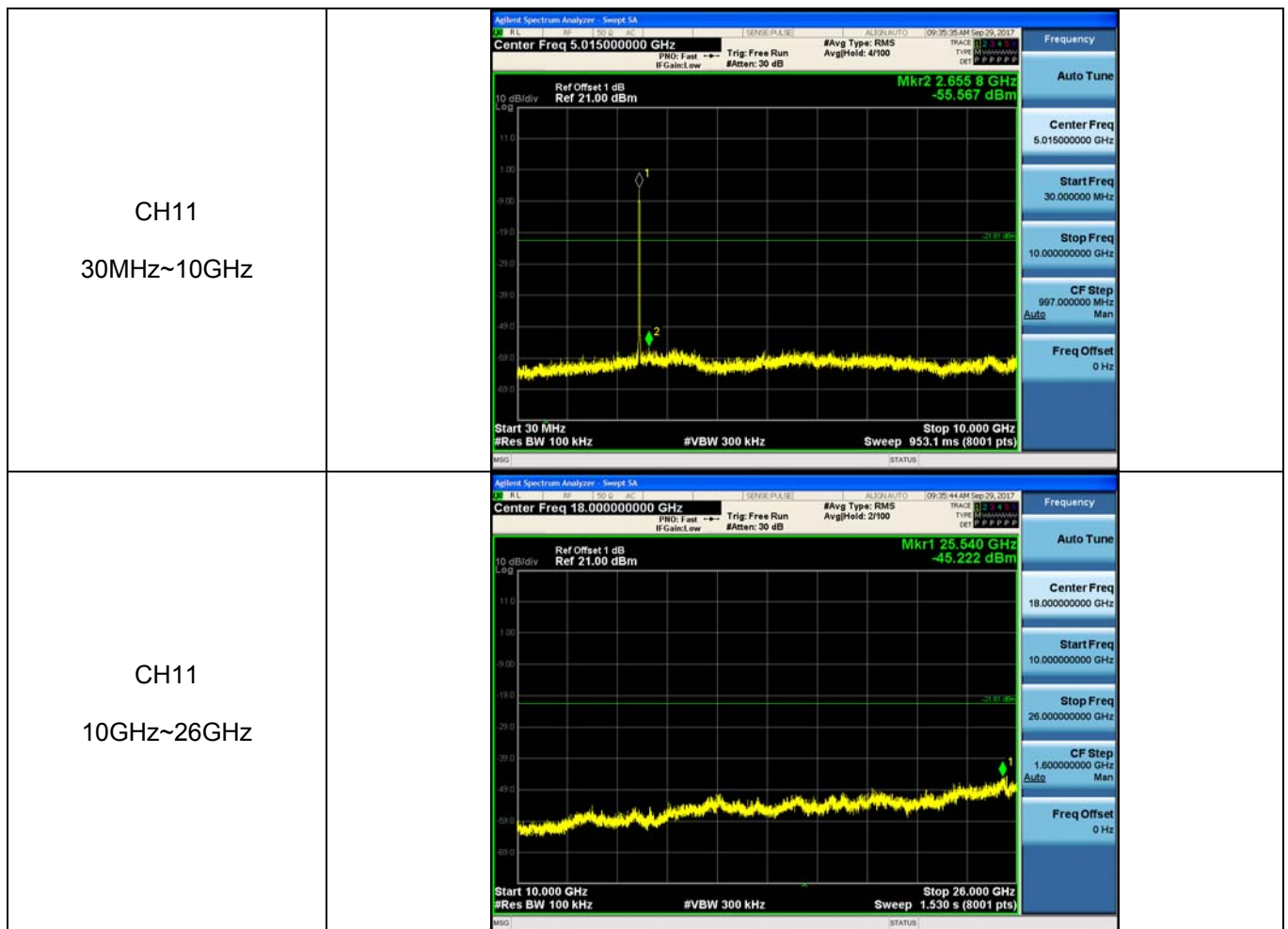





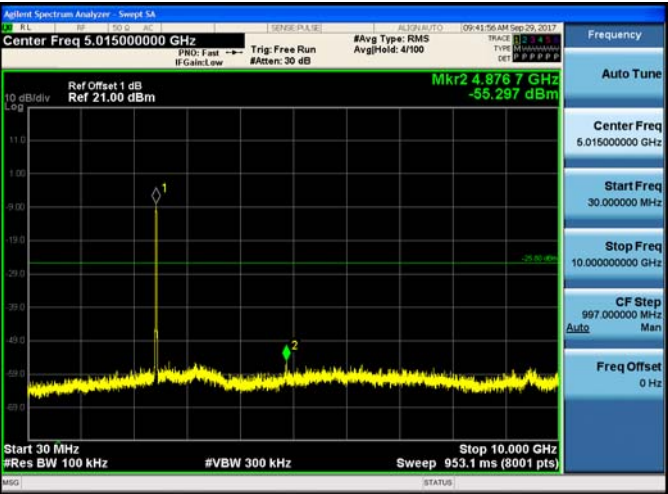


Test Item:	SE	Type:	802.11 g
CH01 Reference Level			
CH01 30MHz~10GHz			
CH01 10GHz~26GHz			

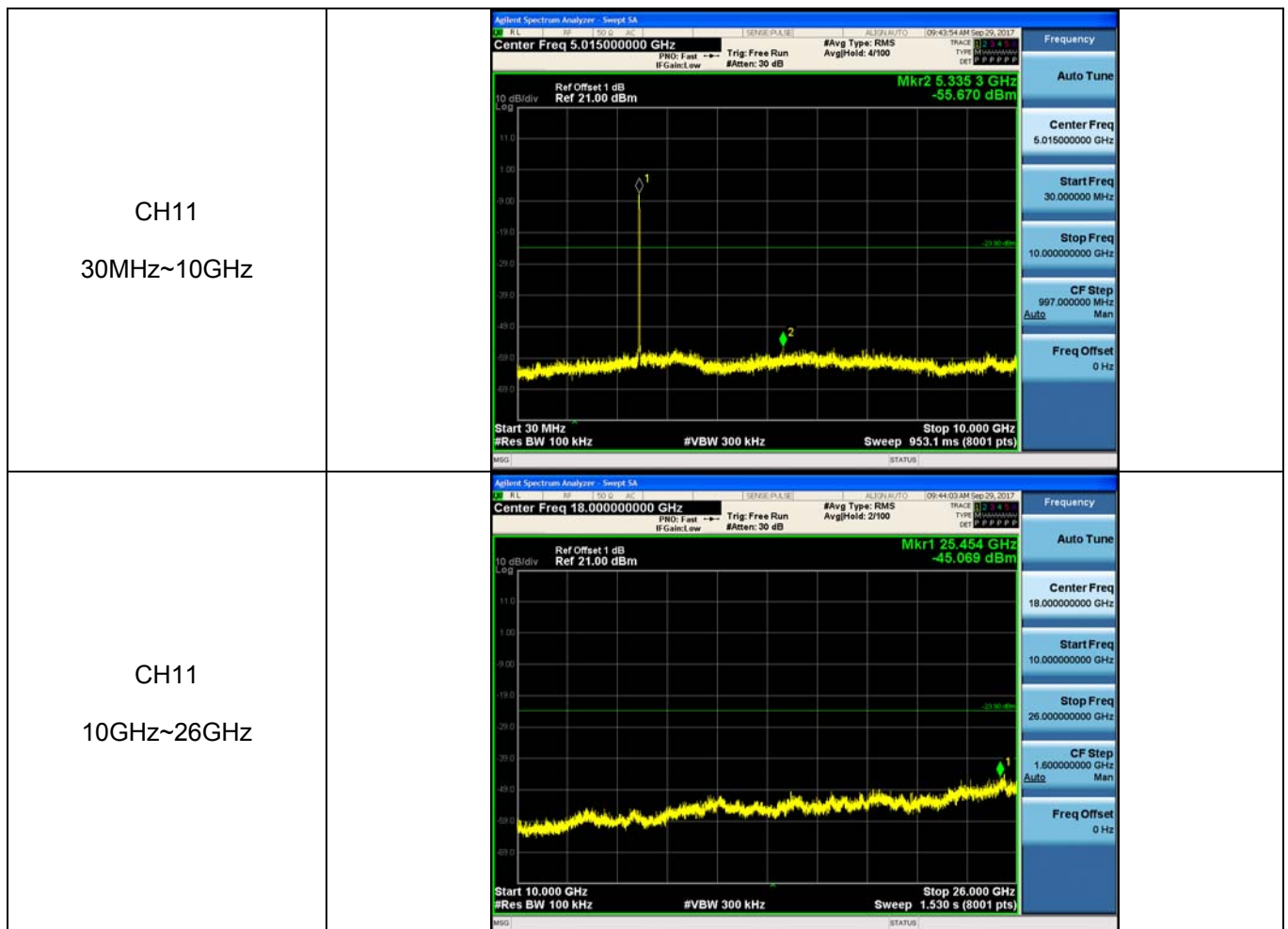
<p>CH06</p> <p>Reference Level</p>	
<p>CH06</p> <p>30MHz~10GHz</p>	
<p>CH06</p> <p>10GHz~26GHz</p>	
<p>CH11</p> <p>Reference Level</p>	

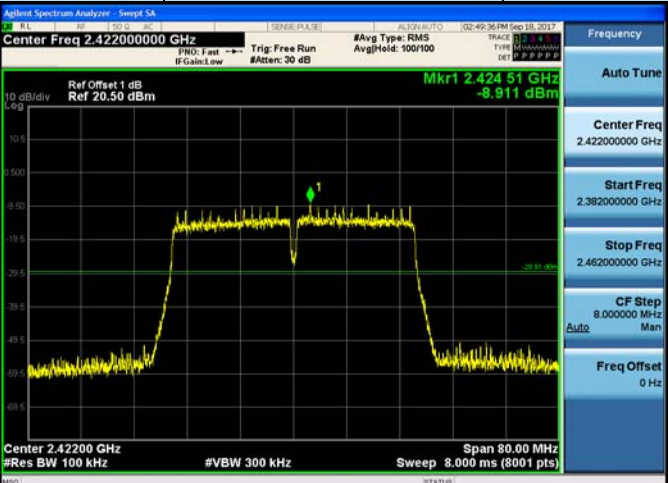
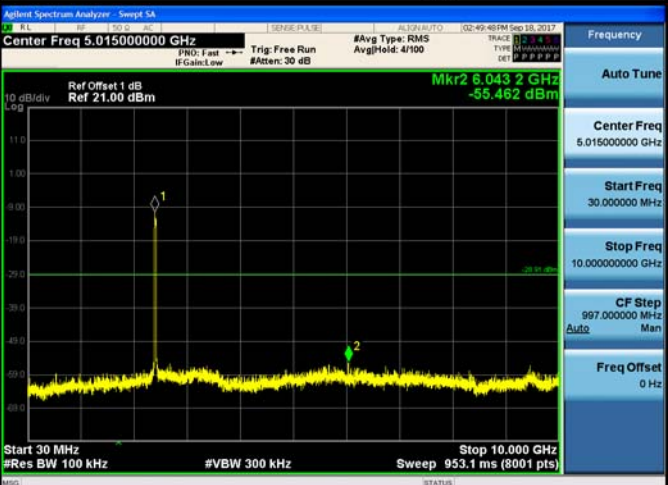





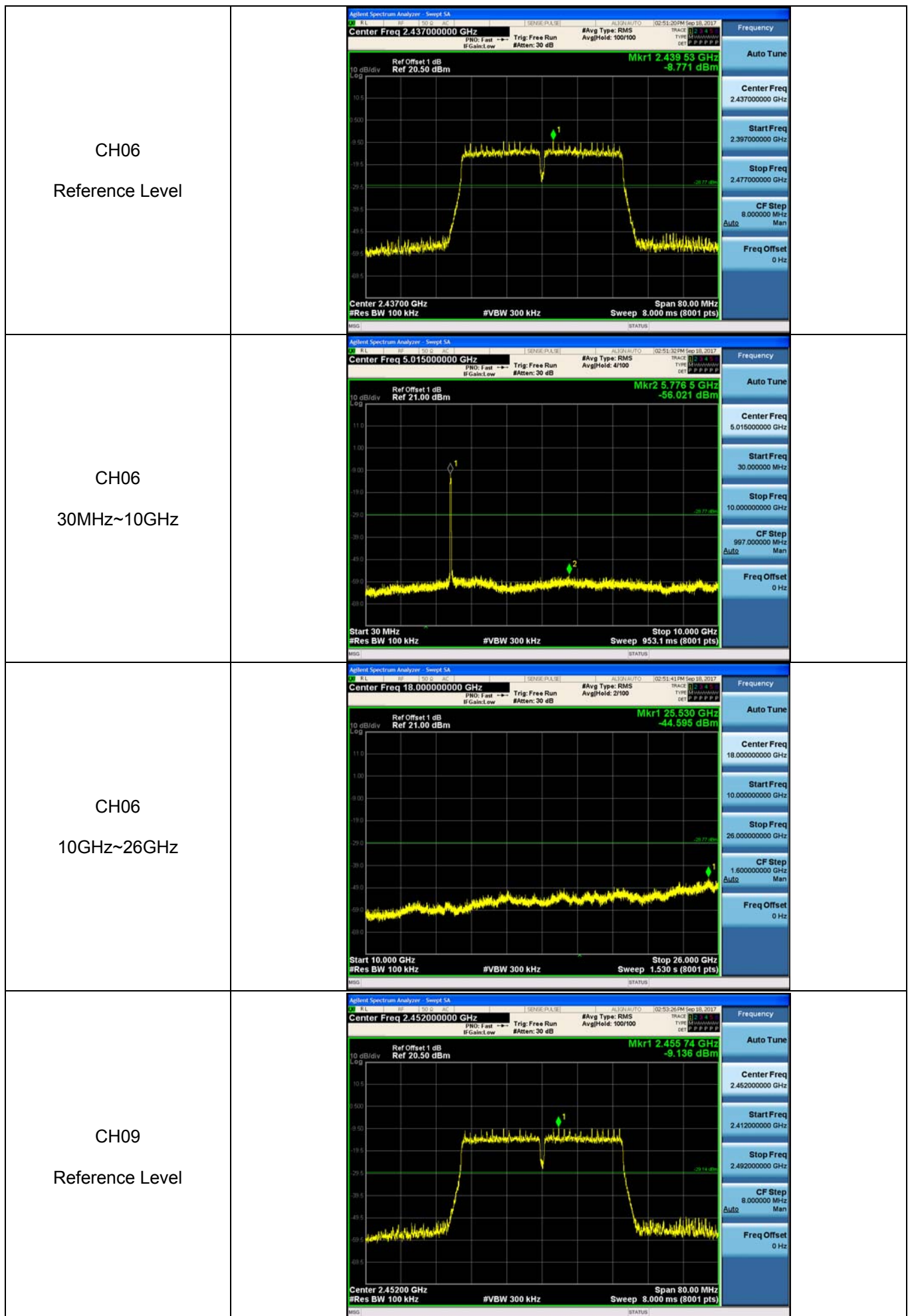
Test Item:	SE	Type:	802.11 n(HT20)
CH01 Reference Level	<p>Agilent Spectrum Analyzer - Sweep SA</p> <p>Center Freq 2.412000000 GHz</p> <p>Ref Offset 1 dB Ref 20.50 dBm</p> <p>Mkr1 2.413 285 GHz -3.208 dBm</p> <p>Span 40.00 MHz #Res BW 100 kHz #VBW 300 kHz Sweep 4.267 ms (8001 pts)</p> <p>Frequency</p> <p>Auto Tune</p> <p>Center Freq 2.412000000 GHz</p> <p>Start Freq 2.392000000 GHz</p> <p>Stop Freq 2.432000000 GHz</p> <p>CF Step 4.000000 MHz Auto Man</p> <p>Freq Offset 0 Hz</p>		
CH01 30MHz~10GHz	<p>Agilent Spectrum Analyzer - Sweep SA</p> <p>Center Freq 5.015000000 GHz</p> <p>Ref Offset 1 dB Ref 21.00 dBm</p> <p>Mkr2 2.629 7 GHz -55.374 dBm</p> <p>Start 30 MHz #Res BW 100 kHz #VBW 300 kHz Sweep 953.1 ms (8001 pts)</p> <p>Frequency</p> <p>Auto Tune</p> <p>Center Freq 5.015000000 GHz</p> <p>Start Freq 30.000000 MHz</p> <p>Stop Freq 10.000000000 GHz</p> <p>CF Step 997.000000 MHz Auto Man</p> <p>Freq Offset 0 Hz</p>		
CH01 10GHz~26GHz	<p>Agilent Spectrum Analyzer - Sweep SA</p> <p>Center Freq 18.000000000 GHz</p> <p>Ref Offset 1 dB Ref 21.00 dBm</p> <p>Mkr1 25.548 GHz -44.699 dBm</p> <p>Start 10.000 GHz #Res BW 100 kHz #VBW 300 kHz Sweep 1.530 s (8001 pts)</p> <p>Frequency</p> <p>Auto Tune</p> <p>Center Freq 18.000000000 GHz</p> <p>Start Freq 10.000000000 GHz</p> <p>Stop Freq 26.000000000 GHz</p> <p>CF Step 1.600000000 GHz Auto Man</p> <p>Freq Offset 0 Hz</p>		

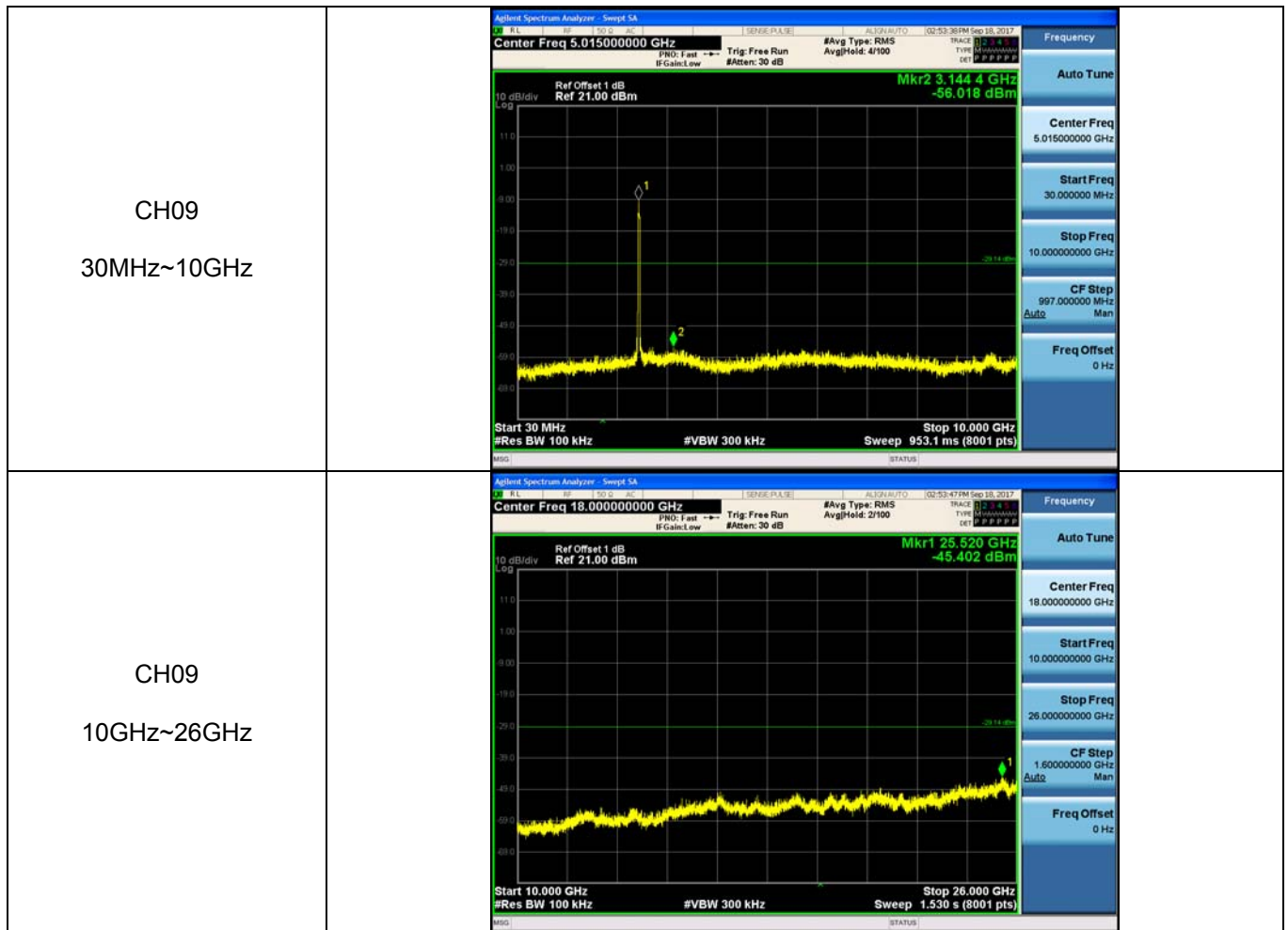
<p>CH06</p> <p>Reference Level</p>	
<p>CH06</p> <p>30MHz~10GHz</p>	
<p>CH06</p> <p>10GHz~26GHz</p>	
<p>CH11</p> <p>Reference Level</p>	



Test Item:	SE	Type:	802.11 n(HT40)
CH03 Reference Level			
CH03 30MHz~10GHz			
CH01 10GHz~26GHz			







## 5.8. Spurious Emissions (radiated)

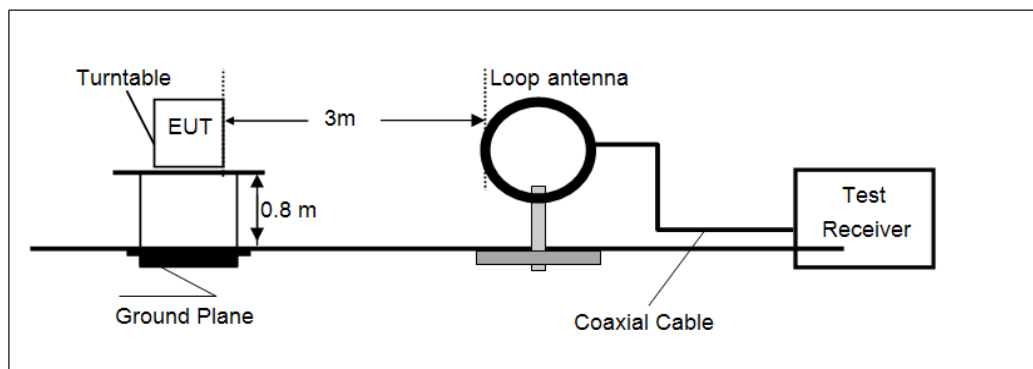
### LIMIT

#### FCC CFR Title 47 Part 15 Subpart C Section 15.209

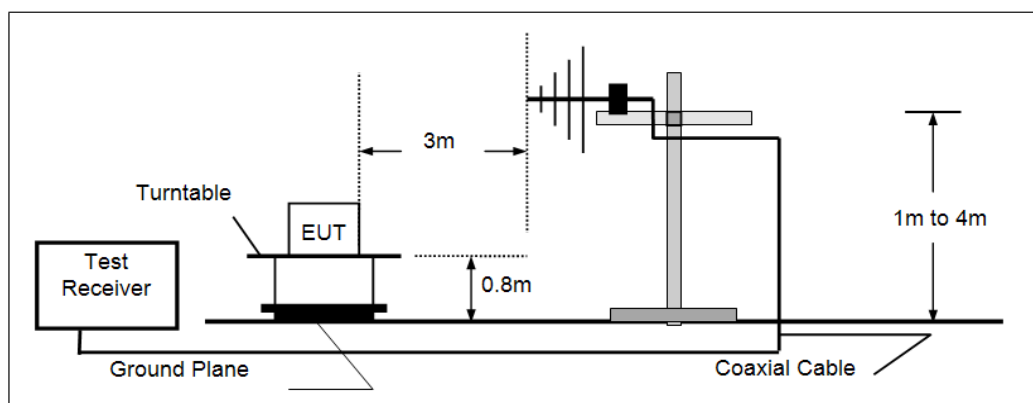
Frequency	Limit (dBuV/m @3m)	Value
30MHz-88MHz	40.00	Quasi-peak
88MHz-216MHz	43.50	Quasi-peak
216MHz-960MHz	46.00	Quasi-peak
960MHz-1GHz	54.00	Quasi-peak
Above 1GHz	54.00	Average
	74.00	Peak

### TEST CONFIGURATION

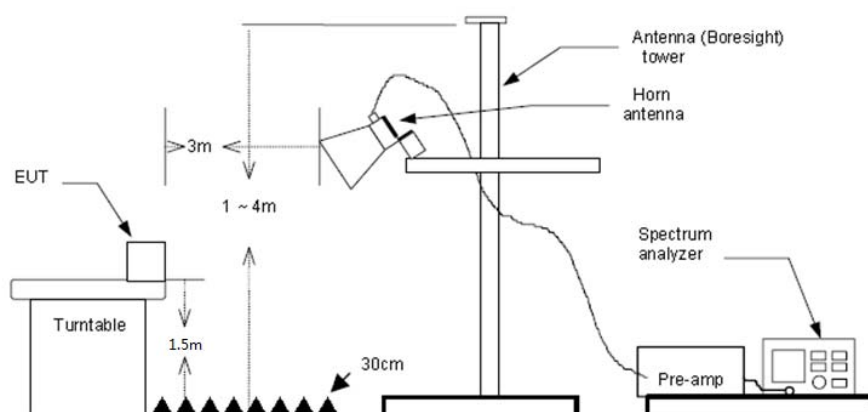
#### ➤ 9kHz ~30MHz



#### ➤ 30MHz ~ 1GHz



#### ➤ Above 1GHz





**TEST PROCEDURE**

1. The EUT was tested according to ANSI C63.10:2013 for compliance to FCC 47CFR 15.247 requirements.
2. The EUT is placed on a turn table which is 0.8 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
3. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.
4. The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna.
5. Use the following spectrum analyzer settings
  - (1) Span shall wide enough to fully capture the emission being measured;
  - (2) Below 1GHz, RBW=120kHz, VBW=300kHz, Sweep=auto, Detector function=peak, Trace=max hold;  
If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
  - (3) Above 1GHz, RBW=1MHz, VBW=3MHz PEAK detector for Peak value.  
RBW=1MHz, VBW=3MHz RMS detector for Average value.

**TEST MODE:**

Please refer to the clause 3.3

**TEST RESULTS**

☒ **Passed**      ☐ **Not Applicable**

Note:

- 1) Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
- 2) The emission levels of other frequencies are very lower than the limit and not show in test report.

➤ **9kHz ~ 30MHz**

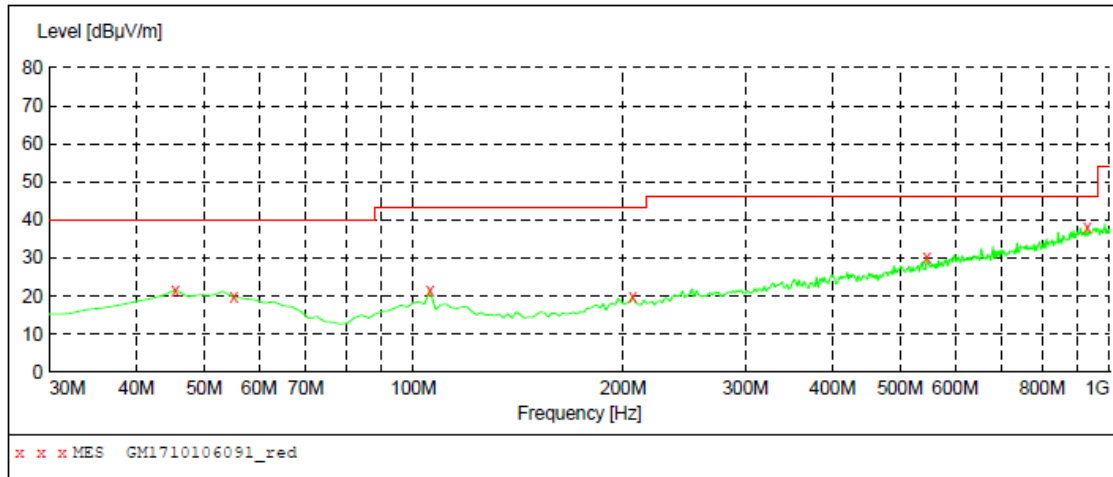
The EUT was pre-scanned the frequency band (9kHz~30MHz), found the radiated level lower than the limit, so don't show on the report.

➤ **30MHz ~1000MHz**

Have pre-scan all modulation mode, found the 802.11b mode CH01 which it was worst case, so only the worst case's data on the test report.

## ➤ 30MHz ~ 1GHz

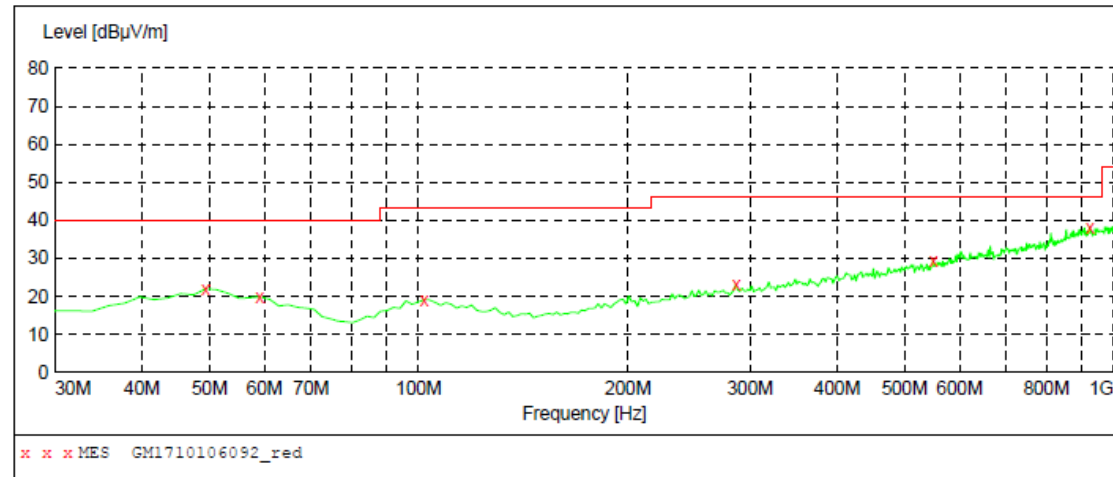
Polarization: Vertical

**MEASUREMENT RESULT: "GM1710106091\_red"**

10/10/2017 9:15PM

Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
45.520000	21.70	-8.8	40.0	18.3	QP	100.0	342.00	VERTICAL
55.220000	19.80	-9.2	40.0	20.2	QP	100.0	165.00	VERTICAL
105.660000	21.40	-10.5	43.5	22.1	QP	100.0	352.00	VERTICAL
206.540000	19.90	-10.5	43.5	23.6	QP	100.0	342.00	VERTICAL
546.040000	30.10	-0.8	46.0	15.9	QP	100.0	273.00	VERTICAL
928.220000	38.00	7.1	46.0	8.0	QP	100.0	359.00	VERTICAL

Polarization: Horizontal

**MEASUREMENT RESULT: "GM1710106092\_red"**

10/10/2017 9:18PM

Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
49.400000	22.00	-8.7	40.0	18.0	QP	300.0	325.00	HORIZONTAL
59.100000	19.90	-9.8	40.0	20.1	QP	100.0	130.00	HORIZONTAL
101.780000	19.20	-10.5	43.5	24.3	QP	100.0	52.00	HORIZONTAL
286.080000	23.00	-7.5	46.0	23.0	QP	300.0	175.00	HORIZONTAL
549.920000	29.20	-0.8	46.0	16.8	QP	100.0	279.00	HORIZONTAL
924.340000	38.10	7.0	46.0	7.9	QP	300.0	352.00	HORIZONTAL

## ➤ Above 1 GHz

802.11b					CH01				
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization	Test value
1263.88	36.26	26.24	4.77	36.53	30.74	74.00	-43.26	Vertical	Peak
3616.45	39.02	29.30	8.29	38.27	38.34	74.00	-35.66	Vertical	Peak
4055.37	34.32	29.81	8.82	37.98	34.97	74.00	-39.03	Vertical	Peak
6315.23	32.86	33.13	11.00	35.30	41.69	74.00	-32.31	Vertical	Peak
1222.74	36.26	26.28	4.70	36.56	30.68	74.00	-43.32	Horizontal	Peak
3616.45	38.36	29.30	8.29	38.27	37.68	74.00	-36.32	Horizontal	Peak
6696.01	31.95	34.20	11.48	35.18	42.45	74.00	-31.55	Horizontal	Peak
7961.43	31.79	36.95	12.49	34.63	46.60	74.00	-27.40	Horizontal	Peak

802.11b					CH06				
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization	Test value
1319.78	36.79	26.14	4.86	36.50	31.29	74.00	-42.71	Vertical	Peak
4871.10	35.49	31.46	9.59	36.76	39.78	74.00	-34.22	Vertical	Peak
5821.21	42.34	32.14	10.60	35.33	49.75	74.00	-24.25	Vertical	Peak
8725.48	33.44	37.85	13.02	34.37	49.94	74.00	-24.06	Vertical	Peak
1764.12	44.90	25.33	5.89	37.06	39.06	74.00	-34.94	Horizontal	Peak
4700.57	35.31	31.20	9.50	37.09	38.92	74.00	-35.08	Horizontal	Peak
5821.21	39.34	32.14	10.60	35.33	46.75	74.00	-27.25	Horizontal	Peak
7981.72	34.10	37.03	12.39	34.58	48.94	74.00	-25.06	Horizontal	Peak

802.11b					CH11				
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization	Test value
1235.26	36.62	26.26	4.72	36.55	31.05	74.00	-42.95	Vertical	Peak
3690.85	36.04	29.30	8.37	38.25	35.46	74.00	-38.54	Vertical	Peak
4920.96	34.77	31.42	9.62	36.62	39.19	74.00	-34.81	Vertical	Peak
7063.69	32.57	35.49	11.85	34.88	45.03	74.00	-28.97	Vertical	Peak
3690.85	36.04	29.30	8.37	38.25	35.46	74.00	-38.54	Horizontal	Peak
5617.41	33.69	31.76	10.30	35.82	39.93	74.00	-34.07	Horizontal	Peak
7394.88	33.32	36.30	12.06	34.83	46.85	74.00	-27.15	Horizontal	Peak
8063.40	33.43	37.04	12.45	34.54	48.38	74.00	-25.62	Horizontal	Peak

Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. The peak level is lower than average limit(54 dBuV/m), this data is the too weak instrument of signal is unable to test.
3. The emission levels of other frequencies are very lower than the limit and not show in test report.

802.11g					CH01				
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization	Test value
1263.88	36.26	26.24	4.77	36.53	30.74	74.00	-43.26	Vertical	Peak
3616.45	39.02	29.30	8.29	38.27	38.34	74.00	-35.66	Vertical	Peak
4821.76	35.84	31.56	9.55	36.90	40.05	74.00	-33.95	Vertical	Peak
7081.70	31.77	35.55	11.85	34.91	44.26	74.00	-29.74	Vertical	Peak
1260.67	35.69	26.24	4.76	36.54	30.15	74.00	-43.85	Horizontal	Peak
3616.45	38.36	29.30	8.29	38.27	37.68	74.00	-36.32	Horizontal	Peak
5617.41	31.34	31.76	10.30	35.82	37.58	74.00	-36.42	Horizontal	Peak
7604.87	31.86	36.20	12.73	34.98	45.81	74.00	-28.19	Horizontal	Peak

802.11g					CH06				
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization	Test value
1755.16	38.03	25.31	5.87	37.05	32.16	74.00	-41.84	Vertical	Peak
3653.46	38.59	29.30	8.33	38.26	37.96	74.00	-36.04	Vertical	Peak
5821.21	39.34	32.14	10.60	35.33	46.75	74.00	-27.25	Vertical	Peak
7319.96	34.51	36.30	11.99	34.92	47.88	74.00	-26.12	Vertical	Peak
1755.16	38.03	25.31	5.87	37.05	32.16	74.00	-41.84	Horizontal	Peak
3653.46	38.59	29.30	8.33	38.26	37.96	74.00	-36.04	Horizontal	Peak
5821.21	39.34	32.14	10.60	35.33	46.75	74.00	-27.25	Horizontal	Peak
7981.72	34.10	37.03	12.39	34.58	48.94	74.00	-25.06	Horizontal	Peak

802.11g					CH11				
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization	Test value
1235.26	36.62	26.26	4.72	36.55	31.05	74.00	-42.95	Vertical	Peak
3690.85	36.04	29.30	8.37	38.25	35.46	74.00	-38.54	Vertical	Peak
4920.96	34.77	31.42	9.62	36.62	39.19	74.00	-34.81	Vertical	Peak
7394.88	33.32	36.30	12.06	34.83	46.85	74.00	-27.15	Vertical	Peak
1079.36	37.30	25.44	4.39	36.63	30.50	74.00	-43.50	Horizontal	Peak
3690.85	36.04	29.30	8.37	38.25	35.46	74.00	-38.54	Horizontal	Peak
5925.86	32.88	32.35	10.64	35.40	40.47	74.00	-33.53	Horizontal	Peak
7063.69	32.57	35.49	11.85	34.88	45.03	74.00	-28.97	Horizontal	Peak

## Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. The peak level is lower than average limit(54 dBuV/m), this data is the too weak instrument of signal is unable to test.
3. The emission levels of other frequencies are very lower than the limit and not show in test report.

802.11n(HT20)					CH01				
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization	Test value
1597.40	36.41	24.92	5.56	36.72	30.17	74.00	-43.83	Vertical	Peak
3625.67	37.46	29.30	8.30	38.26	36.80	74.00	-37.20	Vertical	Peak
4478.63	34.93	30.66	9.26	37.43	37.42	74.00	-36.58	Vertical	Peak
6315.23	32.49	33.13	11.00	35.30	41.32	74.00	-32.68	Vertical	Peak
1601.47	37.12	24.90	5.57	36.72	30.87	74.00	-43.13	Horizontal	Peak
3795.66	36.22	29.59	8.50	38.23	36.08	74.00	-37.92	Horizontal	Peak
5776.92	32.35	31.99	10.55	35.38	39.51	74.00	-34.49	Horizontal	Peak
6868.65	32.63	34.48	11.69	34.92	43.88	74.00	-30.12	Horizontal	Peak

802.11n(HT20)					CH06				
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization	Test value
1410.08	35.54	25.89	5.03	36.47	29.99	74.00	-44.01	Vertical	Peak
3507.65	36.31	29.02	8.13	38.40	35.06	74.00	-38.94	Vertical	Peak
5791.65	32.52	32.06	10.58	35.34	39.82	74.00	-34.18	Vertical	Peak
7451.57	32.64	36.20	12.24	34.86	46.22	74.00	-27.78	Vertical	Peak
1518.11	35.74	25.63	5.34	36.61	30.10	74.00	-43.90	Horizontal	Peak
3112.13	36.16	28.80	7.61	38.21	34.36	74.00	-39.64	Horizontal	Peak
4664.81	33.70	31.10	9.49	37.14	37.15	74.00	-36.85	Horizontal	Peak
6235.36	32.73	32.97	11.01	35.29	41.42	74.00	-32.58	Horizontal	Peak

802.11n(HT20)					CH11				
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization	Test value
1764.12	43.36	25.33	5.89	37.06	37.52	74.00	-36.48	Vertical	Peak
3216.84	35.60	28.70	7.74	38.23	33.81	74.00	-40.19	Vertical	Peak
5138.58	32.84	31.74	9.78	36.26	38.10	74.00	-35.90	Vertical	Peak
6730.19	32.73	34.14	11.52	35.12	43.27	74.00	-30.73	Vertical	Peak
1741.81	36.43	25.29	5.85	37.02	30.55	74.00	-43.45	Horizontal	Peak
3854.08	35.27	29.65	8.58	38.20	35.30	74.00	-38.70	Horizontal	Peak
5125.52	32.95	31.80	9.77	36.27	38.25	74.00	-35.75	Horizontal	Peak
6251.26	32.47	33.00	11.00	35.30	41.17	74.00	-32.83	Horizontal	Peak

Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. The peak level is lower than average limit(54 dBuV/m), this data is the too weak instrument of signal is unable to test.
3. The emission levels of other frequencies are very lower than the limit and not show in test report.

802.11n(HT40)					CH03				
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization	Test value
1173.94	37.05	26.10	4.60	36.58	31.17	74.00	-42.83	Vertical	Peak
3644.18	37.14	29.30	8.32	38.26	36.50	74.00	-37.50	Vertical	Peak
4846.37	33.76	31.51	9.57	36.83	38.01	74.00	-35.99	Vertical	Peak
6094.14	32.93	32.50	10.83	35.37	40.89	74.00	-33.11	Vertical	Peak
1706.70	36.57	25.21	5.78	36.94	30.62	74.00	-43.38	Horizontal	Peak
3410.80	36.48	28.29	7.98	38.53	34.22	74.00	-39.78	Horizontal	Peak
5631.73	32.34	31.74	10.32	35.78	38.62	74.00	-35.38	Horizontal	Peak
7981.72	32.31	37.03	12.39	34.58	47.15	74.00	-26.85	Horizontal	Peak

802.11n(HT40)					CH06				
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization	Test value
1525.86	35.24	25.56	5.36	36.62	29.54	74.00	-44.46	Vertical	Peak
4444.56	34.20	30.59	9.20	37.49	36.50	74.00	-37.50	Vertical	Peak
5646.08	32.46	31.71	10.34	35.74	38.77	74.00	-35.23	Vertical	Peak
7154.17	32.81	35.93	11.86	35.01	45.59	74.00	-28.41	Vertical	Peak
1216.53	36.17	26.28	4.69	36.56	30.58	74.00	-43.42	Horizontal	Peak
1943.29	40.04	25.74	6.18	37.25	34.71	74.00	-39.29	Horizontal	Peak
3088.45	35.73	28.78	7.59	38.22	33.88	74.00	-40.12	Horizontal	Peak
5732.97	33.38	31.77	10.48	35.50	40.13	74.00	-33.87	Horizontal	Peak

802.11n(HT40)					CH09				
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization	Test value
1832.79	36.94	25.37	6.01	37.17	31.15	74.00	-42.85	Vertical	Peak
6125.24	32.04	32.60	10.88	35.35	40.17	74.00	-33.83	Vertical	Peak
7624.25	33.15	36.18	12.79	34.99	47.13	74.00	-26.87	Vertical	Peak
8996.12	32.53	37.90	13.31	34.41	49.33	74.00	-24.67	Vertical	Peak
1609.65	35.84	24.93	5.59	36.74	29.62	74.00	-44.38	Horizontal	Peak
3883.62	35.12	29.68	8.62	38.18	35.24	74.00	-38.76	Horizontal	Peak
6219.51	32.65	32.94	11.01	35.29	41.31	74.00	-32.69	Horizontal	Peak
7508.69	33.31	36.11	12.42	34.91	46.93	74.00	-27.07	Horizontal	Peak

Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. The peak level is lower than average limit(54 dBuV/m), this data is the too weak instrument of signal is unable to test.
3. The emission levels of other frequencies are very lower than the limit and not show in test report.



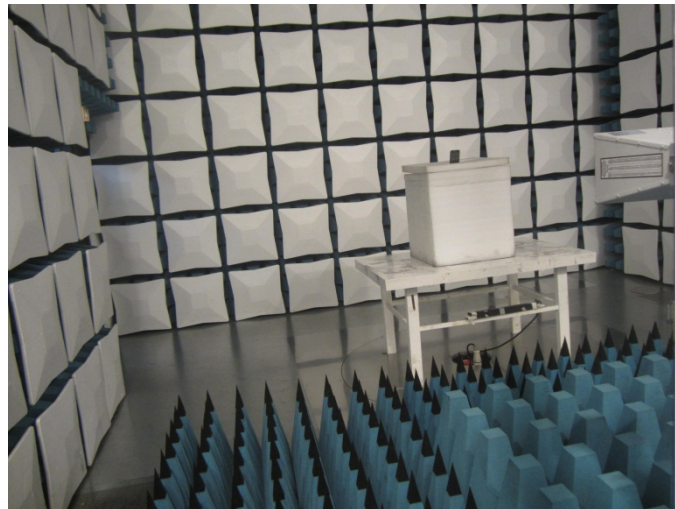
## 6. TEST SETUP PHOTOS

### Conducted Emissions (AC Mains)



### Radiated Emissions





## **7. External and Internal Photos of the EUT**

Reference to Test Report TRE1709025201

.....**End of Report**.....