# Shenzhen Huatongwei International Inspection Co., Ltd.

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# TEST REPORT

Report Reference No.....:: CHTEW19070152

Project No....:: SHT1906074401EW

FCC ID.....:: QRP-SP-010

Applicant's name.....: Azumi S.A

Avenida Aquilino de la Guardia con Calle 47, PH Ocean Plaza, Address.....:

Piso 16 of. 16-01, Marbella, Ciudad de Panama, Panama

Report verification:

Manufacturer....: **AZUMI HK LTD** 

FLAT/RM 18 BLK 1 14/F GOLDEN INDUSTRIAL BUILDING 16-Address....:

26 KWAI TAK STREET KWAI CHUNG,HK

Test item description .....: **Mobile Phone** 

**AZUMI** Trade Mark .....:

Model/Type reference.....: M5

Listed Model(s) .....

Standard .....:: FCC CFR Title 47 Part 15 Subpart C Section 15.247

Date of receipt of test sample.....: Jun 28, 2019

Date of testing..... Jun 29, 2019- Jul 25, 2019

Date of issue.....: Jul 26, 2019

Result....: **PASS** 

Compiled by

( position+printedname+signature)...: File administrators Silvia Li

Supervised by

(position+printedname+signature)....: Project Engineer Aaron Fang Silvia Li Aaron.Fang

Approved by

(position+printedname+signature)....: RF Manager Hans Hu

Shenzhen Huatongwei International Inspection Co., Ltd. Testing Laboratory Name .....::

Address..... 1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road,

Tianliao, Gongming, Shenzhen, China

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The test report merely correspond to the test sample.

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# 1. TEST STANDARDS AND REPORT VERSION

# 1.1. Test Standards

The tests were performed according to following standards:

<u>FCC Rules Part 15.247:</u> 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

<u>KDB 558074 D01 15.247 Meas Guidance v05:</u> Guidance for Compliance Measurements on Digital Transmission System, Frequency Hopping Spread Spectrum System, and Hybrid System Devices Operating under Section 15.247 of The FCC Rules

# 1.2. Report version

Revision No.	Date of issue	Description		
N/A	2019-07-26	Original		

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# 2. TEST DESCRIPTION

Test Item	FCC Rule	Result	Test Engineer
Antenna requirement	15.203/15.247(c)	PASS	Kang Yang
Line Conducted Emissions (AC Main)	15.207	PASS	Kang Yang
Conducted Peak Output Power	15.247(b)(3)	PASS	Bruce Wong
Power Spectral Density	15.247(e)	PASS	Bruce Wong
6dB Bandwidth	15.247(a)(2)	PASS	Bruce Wong
Restricted band	15.247(d)/15.205	PASS	Tony Duan
Spurious Emissions	15.247(d)/15.209	PASS	Tony Duan

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

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# 3. **SUMMARY**

# 3.1. Client Information

Applicant:	Azumi S.A
Address:  Avenida Aquilino de la Guardia con Calle 47, PH Ocean Plaza 16-01, Marbella, Ciudad de Panama, Panama	
Manufacturer:	AZUMI HK LTD
Address:	FLAT/RM 18 BLK 1 14/F GOLDEN INDUSTRIAL BUILDING 16-26 KWAI TAK STREET KWAI CHUNG,HK

# 3.2. Product Description

3.2. I Toddet Description				
Name of EUT:	Mobile Phone			
Trade Mark:	AZUMI			
Model No.:	M5			
Listed Model(s):	-			
IMEI:	Conducted: 357665063588130 Radiated: 357665063587231			
Power supply:	DC 3.8V			
Adapter information:	nput:100-240Va.c., 50/60Hz, 0.2A Output:5.0Vd.c., 1.0A			
Hardware version: AZUMI_M5+_HW_V01				
Software version:	AZUMI_M5+_SW_V01			
WIFI				
Supported type:	802.11b/802.11g/802.11n(HT20)			
Modulation:	DSSS for 802.11b OFDM for 802.11g/802.11n(HT20)			
Operation frequency:	2412MHz~2462MHz			
Channel number: 11				
Channel separation:	5MHz			
Antenna type:	PIFA Antenna			
Antenna gain:	0.6dBi			

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# 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)					
Channel	Frequency (MHz)				
01	2412				
02	2417				
06	2437				
10	2457				
11	2462				

# Test mode

_		_
 $D\Gamma$	+00+	items
$\kappa$	1681	Herris

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 Radiated suprious emissions test item:

The engineering test program was provided and enabled to make EUT continuous transmit(duty cycle>98%). The 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

0	/	Manufacturer:	/
		Model No.:	/
0		Manufacturer:	/
		Model No.:	/

# 3.5. Modifications

No modifications were implemented to meet testing criteria.

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# 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.:5377A

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.: 5377A.

### 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.

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# 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	0.51 dB	(1)
Conducted spurious emissions 9kHz~40GHz	0.51 dB	(1)
Conducted Disturbance 150kHz~30MHz	3.02 dB	(1)
Radiated Emissions below 1GHz	4.90 dB	(1)
Radiated Emissions above 1GHz	4.96 dB	(1)
Occupied Bandwidth	70 Hz	(1)

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

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# 4.5. Equipments Used during the Test

•	Conducted Emission						
Used	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)	
•	Shielded Room	Albatross projects	N/A	N/A	2018/09/28	2023/09/27	
•	EMI Test Receiver	R&S	ESCI	101247	2018/10/27	2019/10/26	
•	Artificial Mains	SCHWARZBECK	NNLK 8121	573	2018/10/27	2019/10/26	
•	Pulse Limiter	R&S	ESH3-Z2	100499	2018/10/27	2019/10/26	
•	RF Connection Cable	HUBER+SUHNER	EF400	N/A	2018/11/15	2019/11/14	
•	Test Software	R&S	ES-K1	N/A	N/A	N/A	
0	Single Balanced Telecom Pair ISN	FCC	FCC-TLISN-T2-02	20371	2018/10/28	2019/10/27	
0	Two Balanced Telecom Pairs ISN	FCC	FCC-TLISN-T4-02	20373	2018/10/28	2019/10/27	
0	Four Balanced Telecom Pairs ISN	FCC	FCC-TLISN-T8-02	20375	2018/10/28	2019/10/27	
0	V-Network	R&S	ESH3-Z6	100211	2018/10/27	2019/10/26	
0	V-Network	R&S	ESH3-Z6	100210	2018/10/27	2019/10/26	
0	2-Line V-Network	R&S	ESH3-Z5	100049	2018/10/27	2019/10/26	

•	Radiated Emission-6th test site					
Used	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
•	Semi-Anechoic Chamber	Albatross projects	SAC-3m-02	N/A	2018/09/30	2021/09/29
•	EMI Test Receiver	R&S	ESCI	100900	2018/10/28	2019/10/27
•	Loop Antenna	R&S	HFH2-Z2	100020	2017/11/20	2020/11/19
•	Ultra-Broadband Antenna	SCHWARZBECK	VULB9163	546	2017/04/05	2020/04/04
•	Pre-Amplifer	SCHWARZBECK	BBV 9742	N/A	2018/11/15	2019/11/14
•	RF Connection Cable	HUBER+SUHNER	N/A	N/A	2018/09/28	2019/09/27
•	RF Connection Cable	HUBER+SUHNER	SUCOFLEX104	501184/4	2018/09/28	2019/09/27
•	Test Software	R&S	ES-K1	N/A	N/A	N/A
•	Turntable	Maturo Germany	TT2.0-1T	N/A	N/A	N/A
•	Antenna Mast	Maturo Germany	CAM-4.0-P-12	N/A	N/A	N/A

•	Radiated emissi	on-7th test site				
Used	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
•	Semi-Anechoic Chamber	Albatross projects	SAC-3m-01	N/A	2018/09/30	2021/09/29
•	Spectrum Analyzer	R&S	FSP40	100597	2018/10/27	2019/10/26
•	Horn Antenna	SCHWARZBECK	9120D	1011	2017/03/27	2020/03/26
•	Pre-amplifier	BONN	BLWA0160-2M	1811887	2018/11/14	2019/11/13
•	Pre-amplifier	CD	PAP-0102	12004	2018/11/14	2019/11/13
•	Broadband Pre- amplifier	SCHWARZBECK	BBV 9718	9718-248	2019/04/26	2020/04/25
•	RF Connection Cable	HUBER+SUHNER	RE-7-FH	N/A	2018/11/15	2019/11/14
•	RF Connection Cable	HUBER+SUHNER	RE-7-FL	N/A	2018/11/15	2019/11/14
•	Test Software	Audix	E3	N/A	N/A	N/A

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•	Turntable	Maturo Germany	TT2.0-1T	N/A	N/A	N/A
•	Antenna Mast	Maturo Germany	CAM-4.0-P-12	N/A	N/A	N/A

•	RF Conducted Method											
Used	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)						
•	Signal and spectrum Analyzer	R&S	FSV40	100048	2018/10/28	2019/10/27						
•	Spectrum Analyzer	Spectrum Analyzer Agilent		MY50510187	2018/09/29	2019/09/28						
•	OSP	R&S	OSP120	101317	N/A	N/A						
0	Radio communication tester	R&S	CMW500	137688-Lv	2018/09/29	2019/09/28						
0	Test software	Tonscend	JS1120-1(LTE)	N/A	N/A	N/A						
0	Test software	Tonscend	JS1120-2(WIFI)	N/A	N/A	N/A						
0	Test software	Tonscend	JS1120-3(WCDMA)	N/A	N/A	N/A						
0	Test software	Tonscend	JS1120-4(GSM)	N/A	N/A	N/A						

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# 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 anantenna 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.



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# 5.2. Conducted Emissions (AC Main)

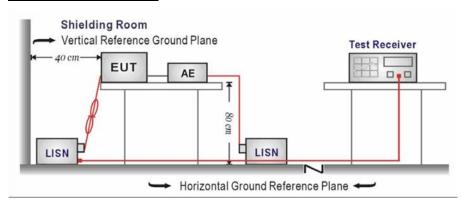
#### LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.207:

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

<sup>\*</sup> 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:

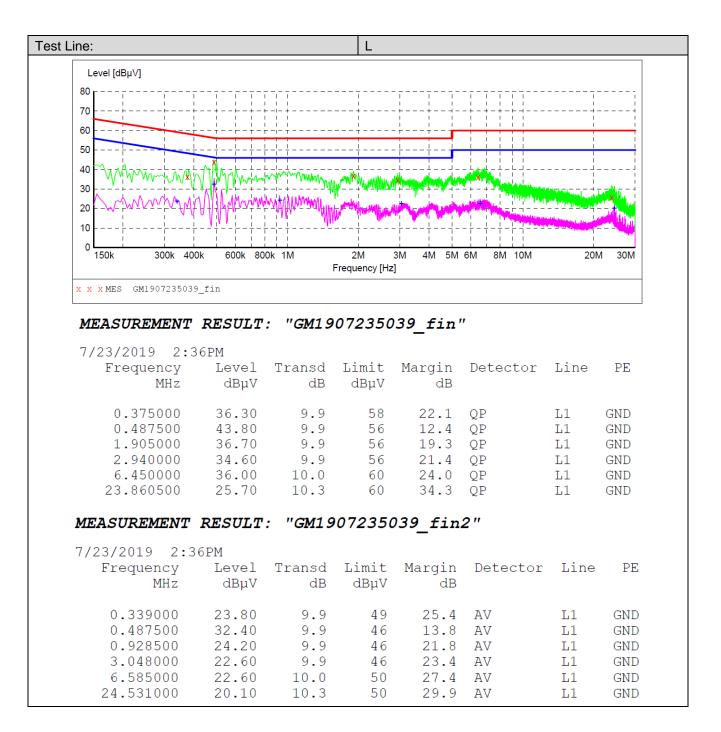
Please refer to the clause 3.3

#### **TEST RESULTS**

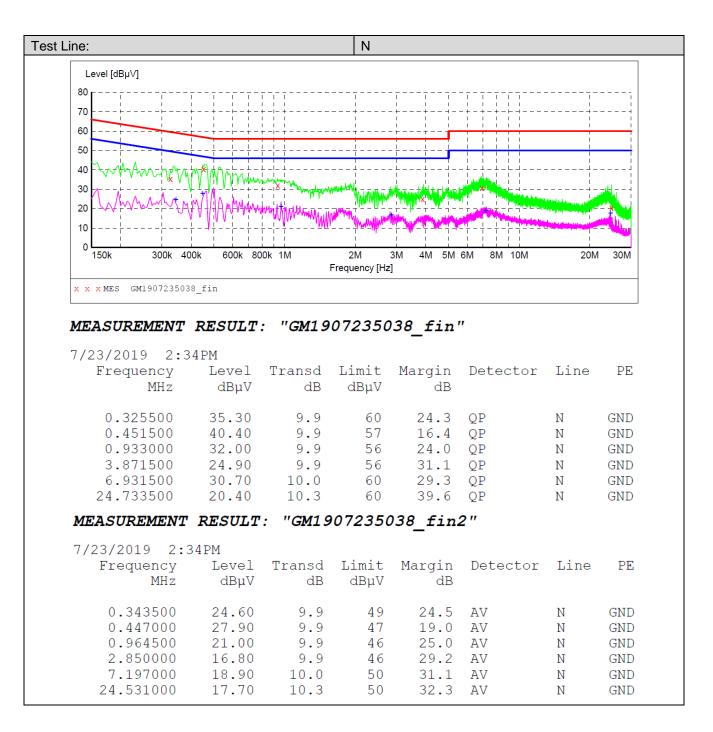
Note:

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

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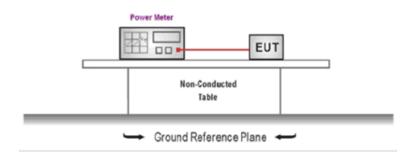
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# 5.3. Conducted Peak Output Power

# **LIMIT**

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

# **TEST CONFIGURATION**



# **TEST PROCEDURE**

- 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
- Record the measurement data.

# **TEST MODE:**

Please refer to the clause 3.3

#### **TEST RESULTS**

Туре	Channel	Peak Output power (dBm)			Result
	01	13.59	11.70		
802.11b	06	13.89	11.49	≤30.00	Pass
	11	13.84	12.05		
	01	16.38	12.45		
802.11g	06	17.13	12.48	≤30.00	Pass
	11	15.90	12.82		
	01	16.12	12.51		
802.11n(HT20)	06	16.16	12.53	≤30.00	Pass
	11	15.49	12.91		

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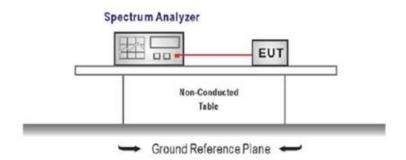
# 5.4. Power Spectral Density

## **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 kHz ≤ RBW ≤ 100 kHz, VBW ≥ 3 × 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

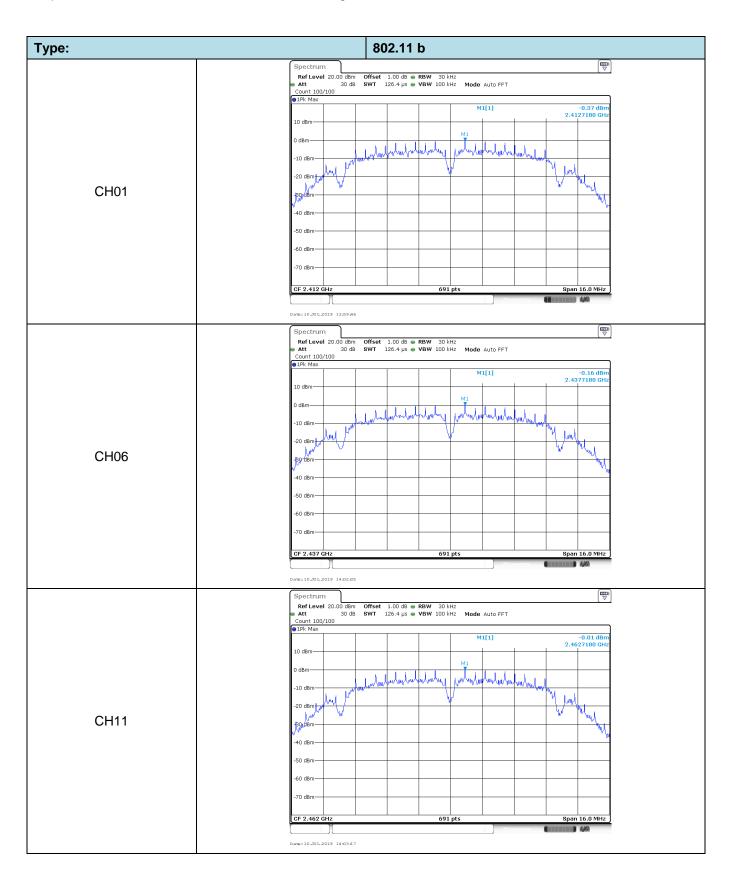
#### **TEST RESULTS**

#### 

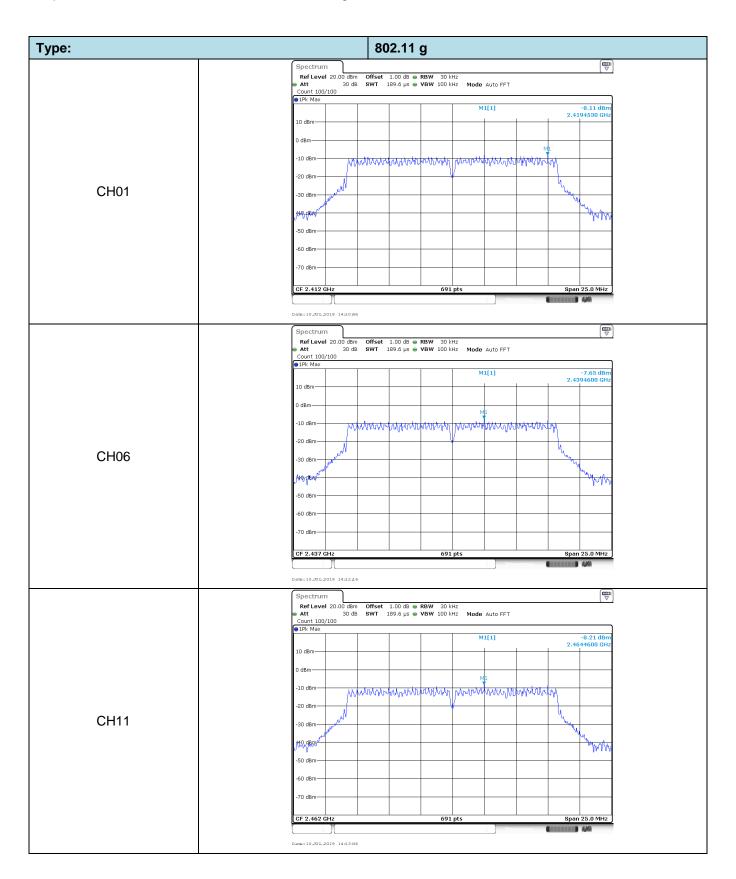
Туре	Channel	Power Spectral Density (dBm/30KHz)	Limit (dBm/3KHz)	Result
	01	-0.37		
802.11b	06	-0.16	≤8.00	Pass
	11	-0.01		
	01	-8.11		
802.11g	06	-7.65	≤8.00	Pass
	11	-8.21		
	01	-8.51		
802.11n(HT20)	06	-8.53	≤8.00	Pass
	11	-9.45		

Test plot as follows:

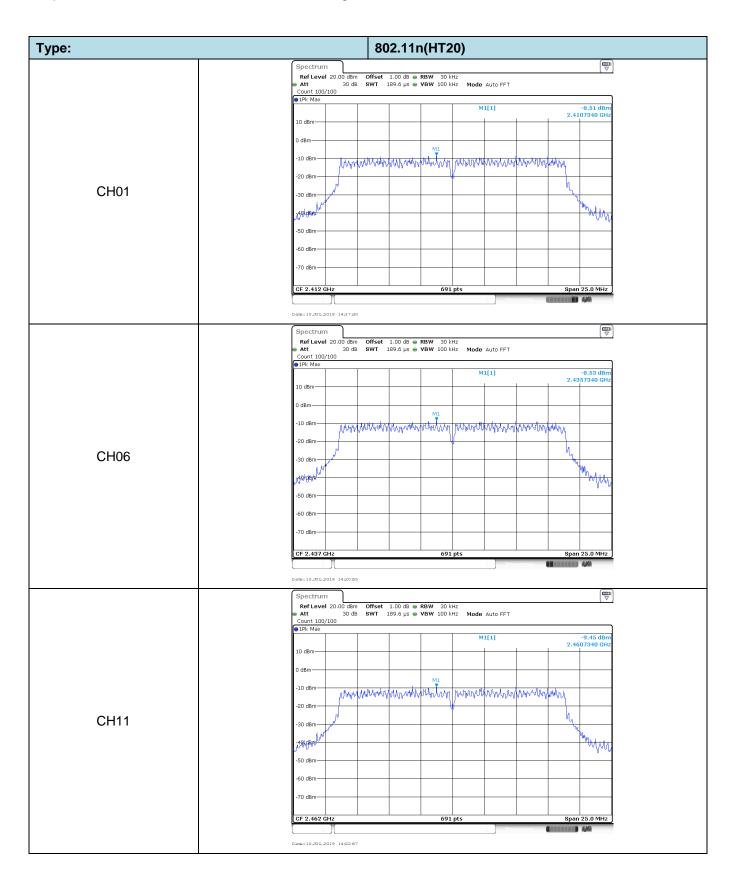
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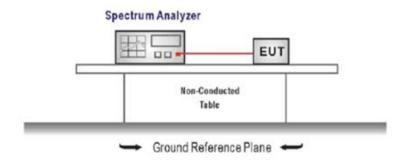
## 5.5. 6dB bandwidth

## **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.
- 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 ≥ 3 × 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

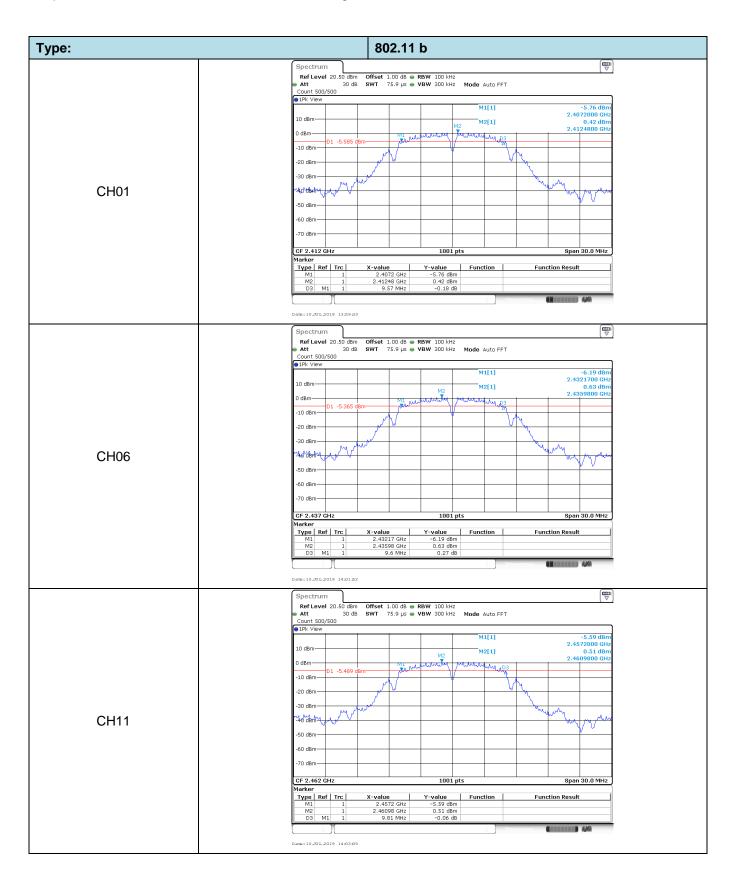
## **TEST RESULTS**

#### 

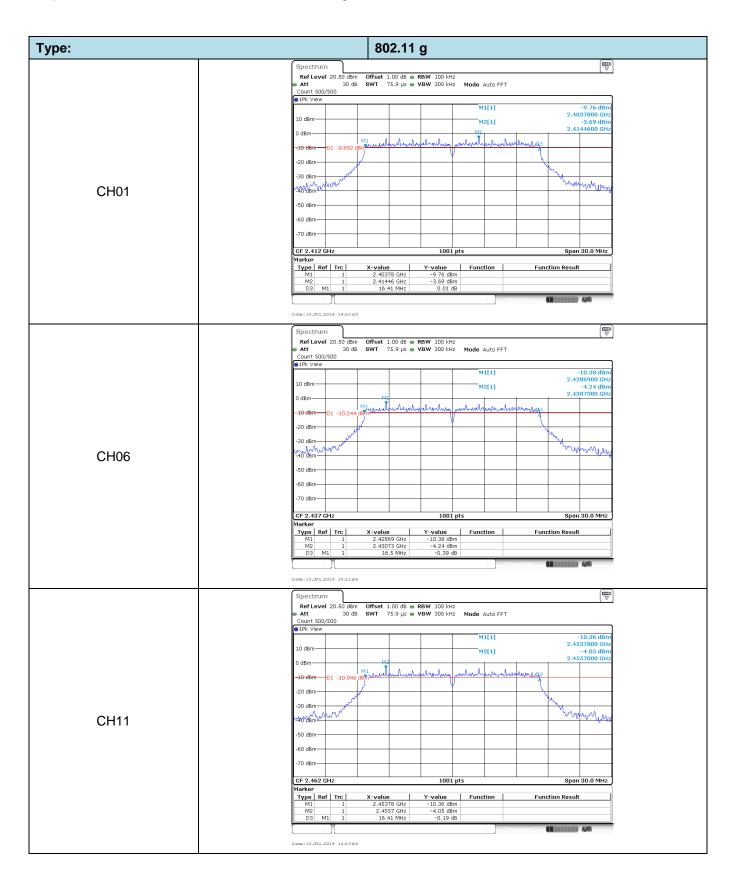
Туре	Channel	6dB Bandwidth (MHz)	Limit (kHz)	Result	
	01	9.57			
802.11b	06	9.60	≥500	Pass	
	11	9.81			
	01	16.41			
802.11g	06	16.50	≥500	Pass	
	11	16.41			
	01	17.64			
802.11n(HT20)	06	17.64	≥500	Pass	
	11	17.61			

Test plot as follows:

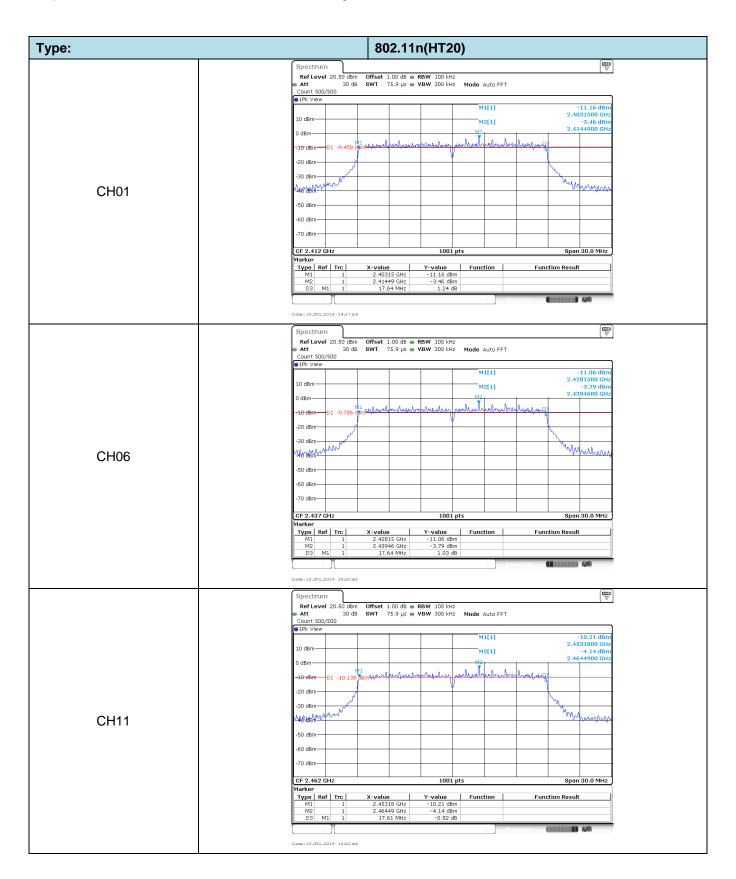
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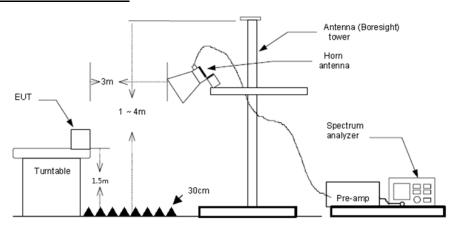
#### 5.6. Restricted band

#### **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**

- 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 waspositioned 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. Thisis repeated for both horizontal and vertical polarization of the antenna. In order to find themaximum 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**

#### Note:

Final level= Read level + Factor

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802.11b			(	CH01			
Frequency (MHz)	Read Level (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin (dB)	Polarization	Test value
2310.00	14.91	35.78	50.69	74.00	23.31	Horizontal	Peak
2390.00	14.46	35.50	49.96	74.00	24.04	Horizontal	Peak
2310.00	15.85	35.78	51.63	74.00	22.37	Vertical	Peak
2390.00	14.88	35.50	50.38	74.00	23.62	Vertical	Peak
2310.00	13.36	35.78	49.14	54.00	4.86	Horizontal	Average
2390.00	11.86	35.50	47.36	54.00	6.64	Horizontal	Average
2310.00	15.41	35.78	51.19	54.00	2.81	Vertical	Average
2390.00	14.08	35.50	49.58	54.00	4.42	Vertical	Average

802.11b			С	CH11			
Frequency (MHz)	Read Level (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin (dB)	Polarization	Test value
2483.50	14.90	35.31	50.21	74.00	23.79	Horizontal	Peak
2500.00	15.06	35.28	50.34	74.00	23.66	Horizontal	Peak
2483.50	16.79	35.31	52.10	74.00	21.90	Vertical	Peak
2500.00	16.34	35.28	51.62	74.00	22.38	Vertical	Peak
2483.50	14.22	35.31	49.53	54.00	4.47	Horizontal	Average
2500.00	13.63	35.28	48.91	54.00	5.09	Horizontal	Average
2483.50	14.20	35.31	49.51	54.00	4.49	Vertical	Average
2500.00	15.29	35.28	50.57	54.00	3.43	Vertical	Average

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802.11g			(	CH01				
Frequency (MHz)	Read Level (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin (dB)	Polarization	Test value	
2310.00	15.54	35.78	51.32	74.00	22.68	Horizontal	Peak	
2390.00	15.73	35.50	51.23	74.00	22.77	Horizontal	Peak	
2310.00	16.05	35.78	51.83	74.00	22.17	Vertical	Peak	
2390.00	17.06	35.50	52.56	74.00	21.44	Vertical	Peak	
2310.00	14.75	35.78	50.53	54.00	3.47	Horizontal	Average	
2390.00	13.59	35.50	49.09	54.00	4.91	Horizontal	Average	
2310.00	14.35	35.78	50.13	54.00	3.87	Vertical	Average	
2390.00	14.59	35.50	50.09	54.00	3.91	Vertical	Average	

802.11g			C	H11			
Frequency (MHz)	Read Level (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin (dB)	Polarization	Test value
2483.50	17.69	35.31	53.00	74.00	21.00	Horizontal	Peak
2500.00	13.37	35.28	48.65	74.00	25.35	Horizontal	Peak
2483.50	13.41	35.31	48.72	74.00	25.28	Vertical	Peak
2500.00	17.12	35.28	52.40	74.00	21.60	Vertical	Peak
2483.50	17.38	35.31	52.69	54.00	1.31	Horizontal	Average
2500.00	11.42	35.28	46.70	54.00	7.30	Horizontal	Average
2483.50	11.89	35.31	47.20	54.00	6.80	Vertical	Average
2500.00	14.73	35.28	50.01	54.00	3.99	Vertical	Average

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802.11n(HT20)				CH01				
Frequency (MHz)	Read Level (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin (dB)	Polarization	Test value	
2310.10	16.95	35.78	52.73	74.00	21.27	Horizontal	Peak	
2390.00	15.30	35.50	50.80	74.00	23.20	Horizontal	Peak	
2310.10	15.67	35.78	51.45	74.00	22.55	Vertical	Peak	
2390.00	16.27	35.50	51.77	74.00	22.23	Vertical	Peak	
2310.10	15.60	35.78	51.38	54.00	2.62	Horizontal	Average	
2390.00	14.03	35.50	49.53	54.00	4.47	Horizontal	Average	
2310.10	14.79	35.78	50.57	54.00	3.43	Vertical	Average	
2390.00	15.35	35.50	50.85	54.00	3.15	Vertical	Average	

802.11n(HT20	)		C	CH11				
Frequency (MHz)	Read Level (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin (dB)	Polarization	Test value	
2483.50	15.54	35.31	50.85	74.00	23.15	Horizontal	Peak	
2500.00	17.16	35.28	52.44	74.00	21.56	Horizontal	Peak	
2483.50	15.24	35.31	50.55	74.00	23.45	Vertical	Peak	
2500.00	14.80	35.28	50.08	74.00	23.92	Vertical	Peak	
2483.50	14.93	35.31	50.24	54.00	3.76	Horizontal	Average	
2500.00	15.55	35.28	50.83	54.00	3.17	Horizontal	Average	
2483.50	14.25	35.31	49.56	54.00	4.44	Vertical	Average	
2500.00	12.54	35.28	47.82	54.00	6.18	Vertical	Average	

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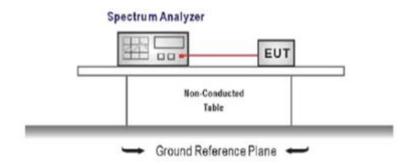
# 5.7. Band edge and Spurious Emissions (conducted)

## **LIMIT**

# FCC CFR Title 47 Part 15 Subpart C Section15.247 (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 ≥ 3 x 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 ≥ 3 x 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.

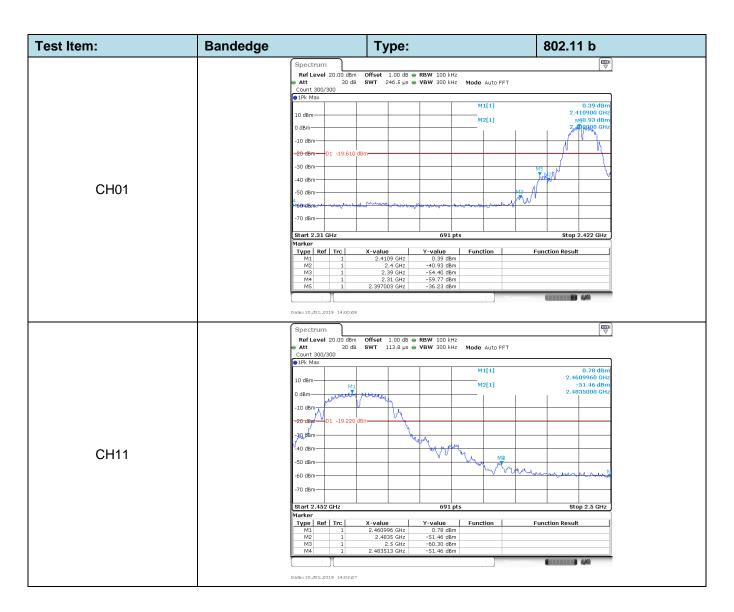
- 4. Place the radio in continuous transmit mode, allow the trace to stabilize, view the transmitter waveform on the spectrum analyzer.
- 5. Ensure that the amplitude of all unwanted emission outside of the authorized frequency band excluding restricted frequency bands) are attenuated by at least the 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:

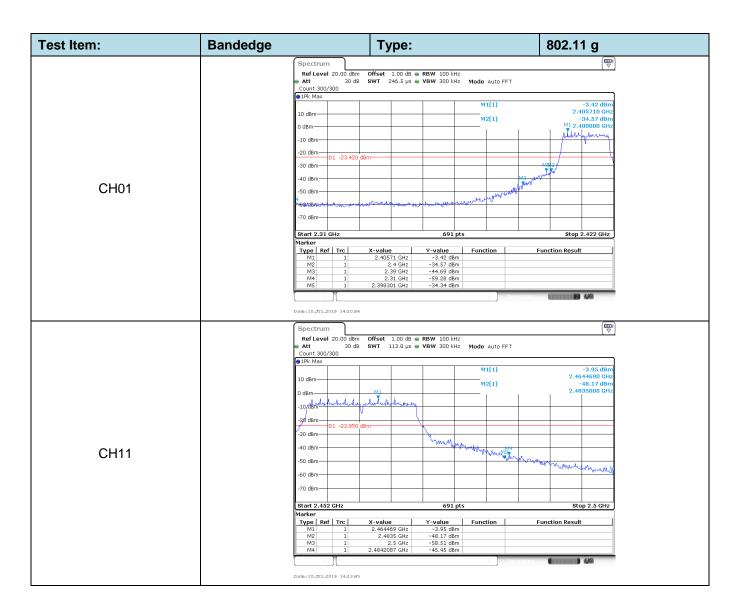
Please refer to the clause 3.3

# **TEST RESULTS**

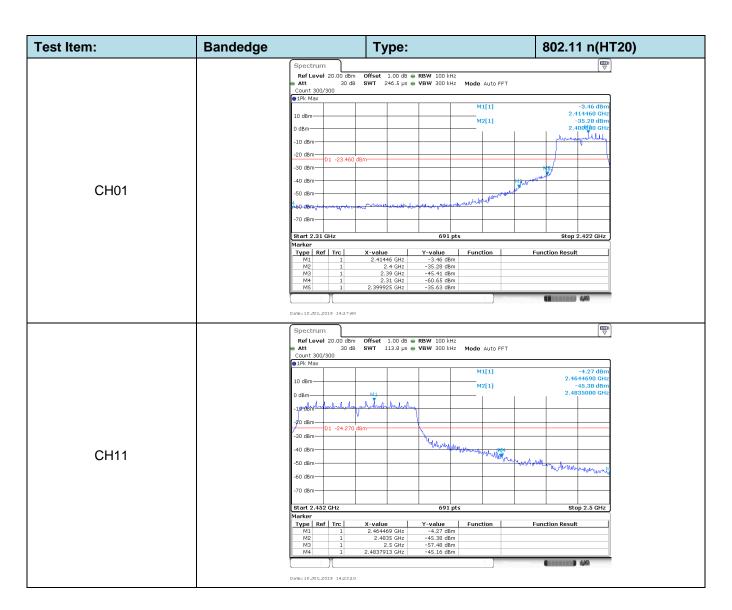
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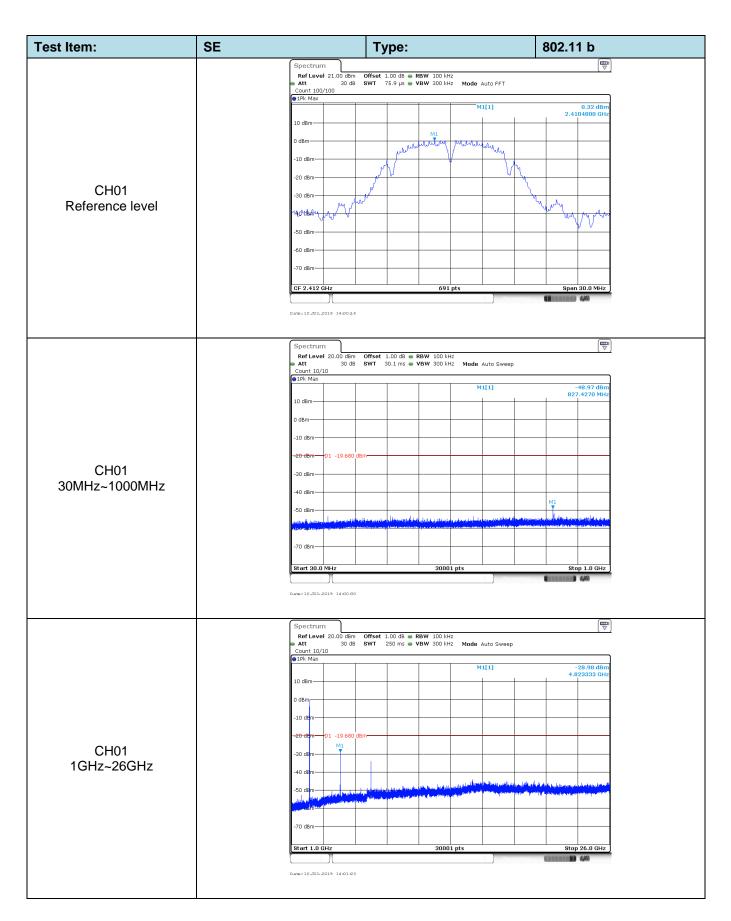
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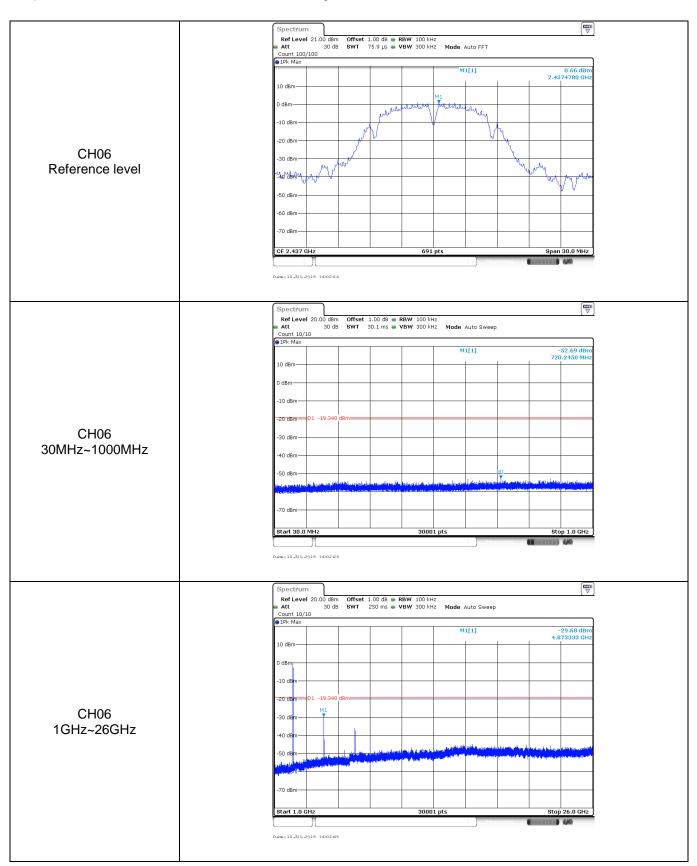
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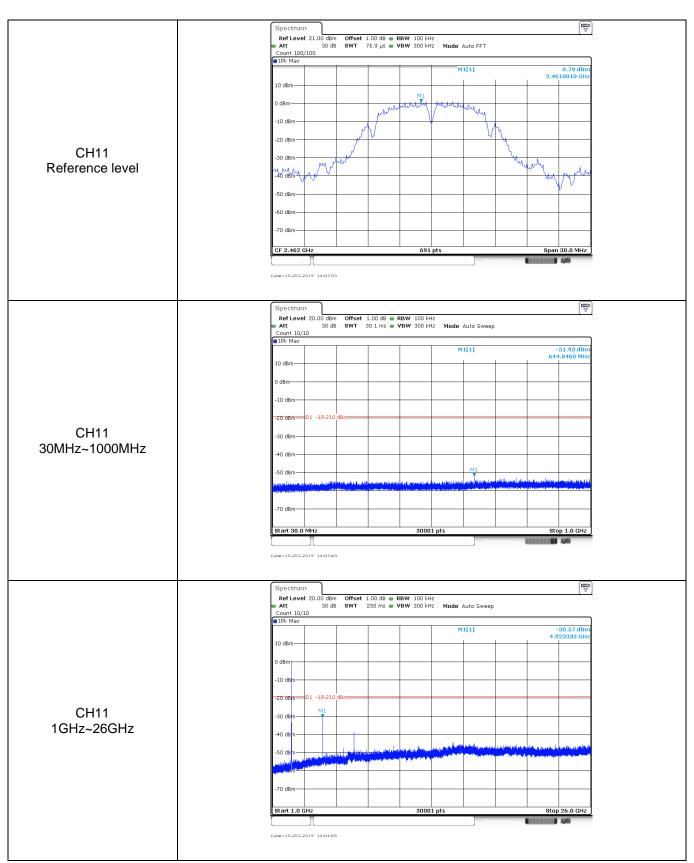
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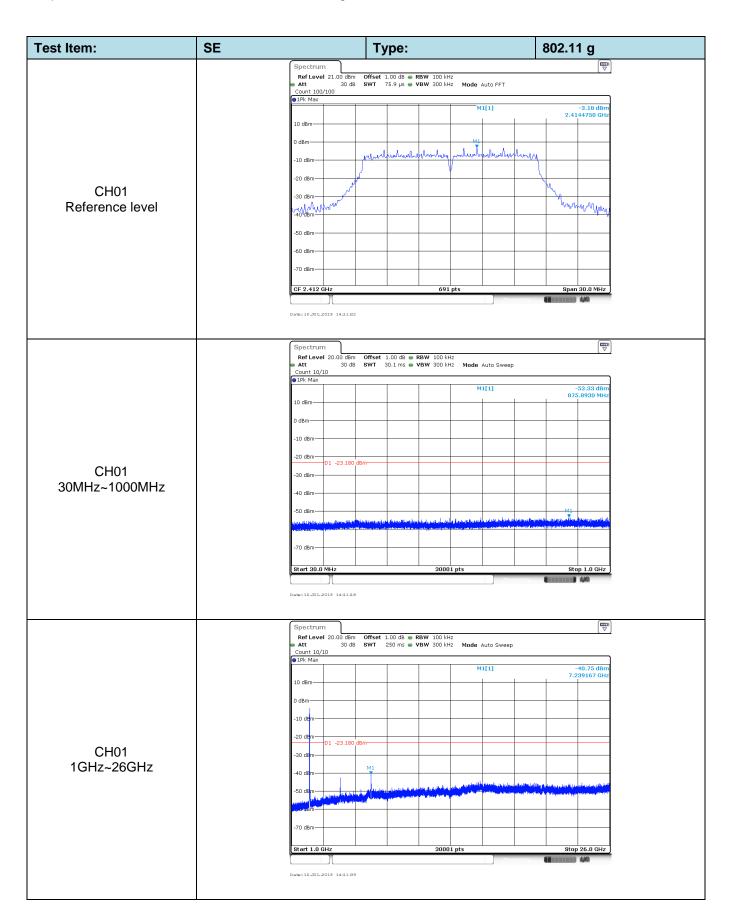
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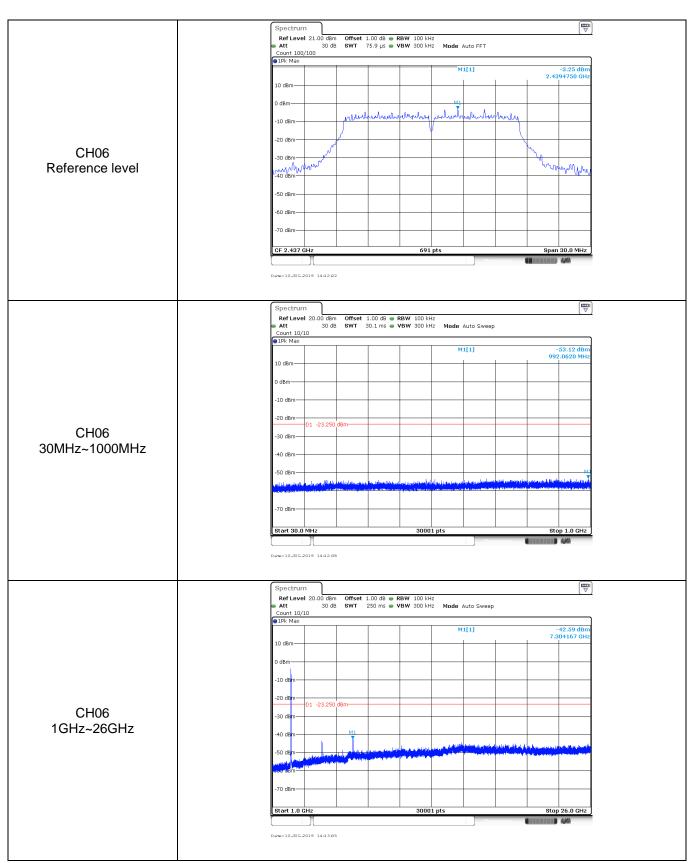
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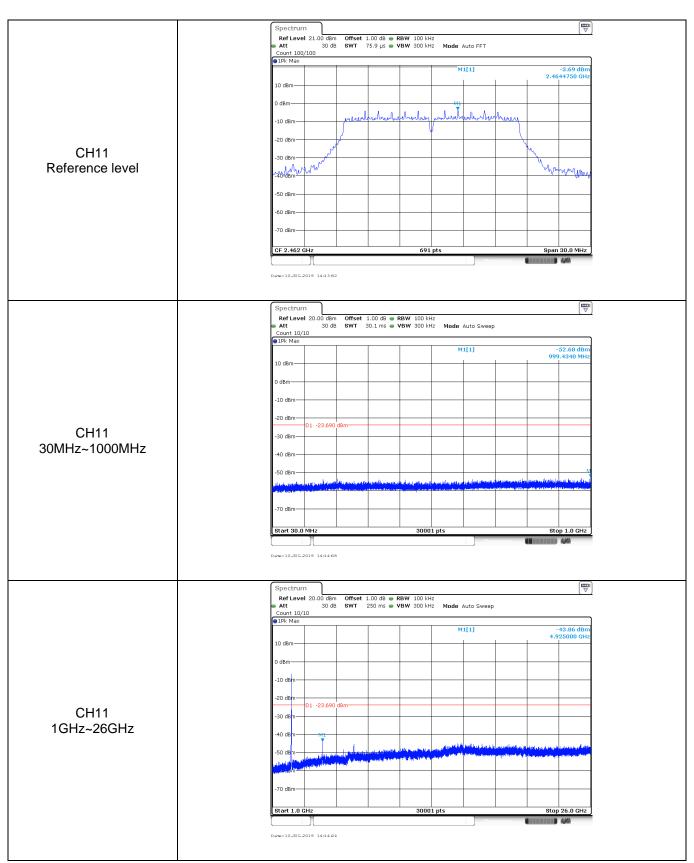
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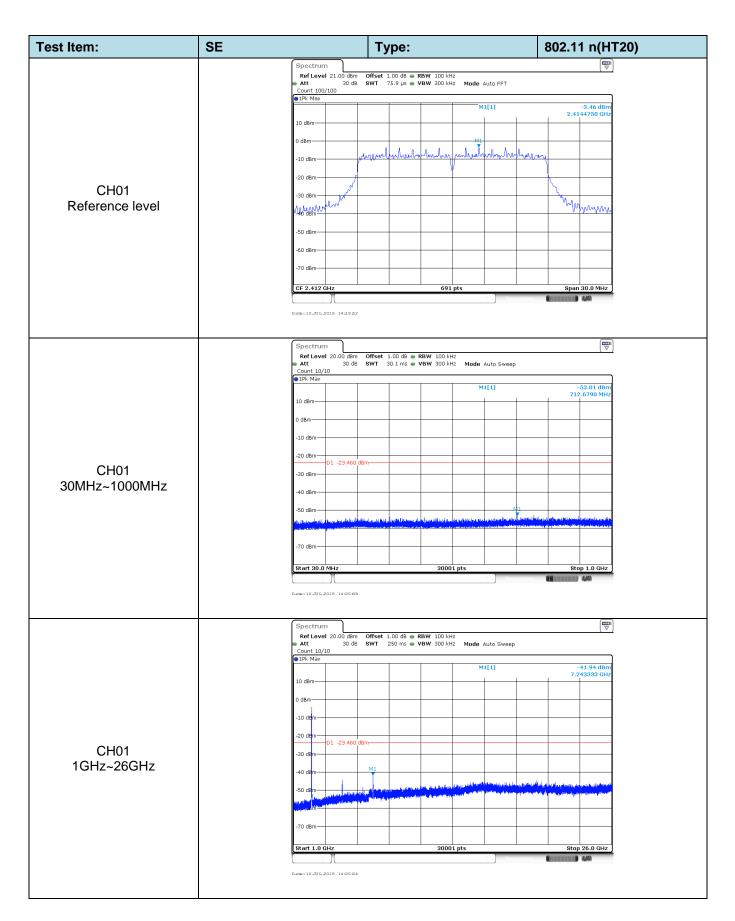
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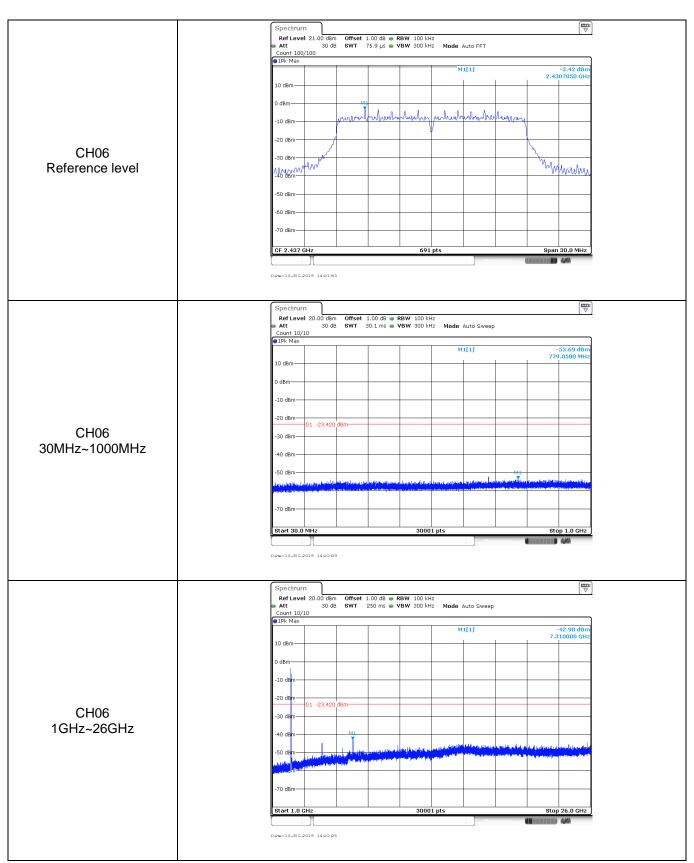
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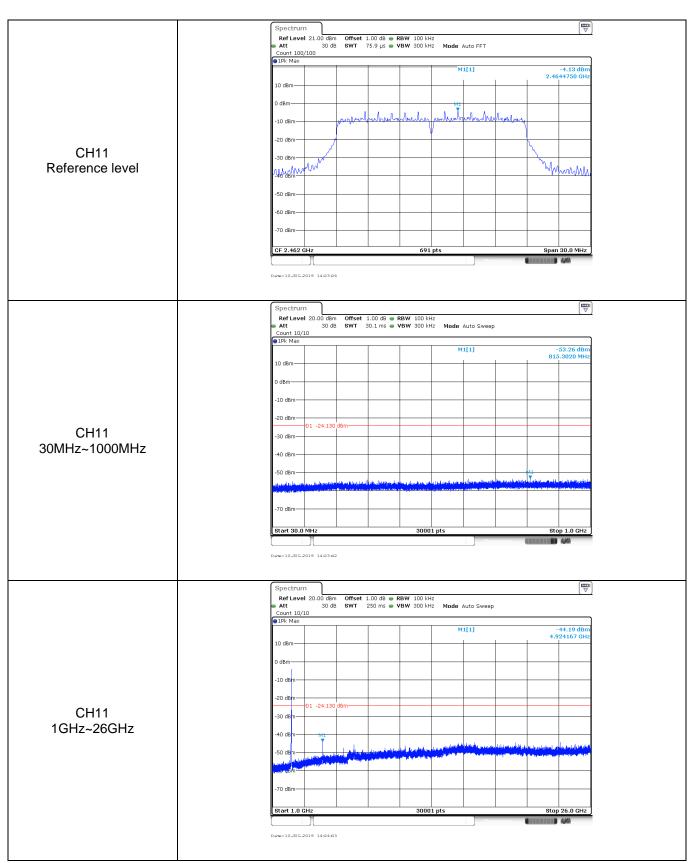
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# 5.8. Spurious Emissions (radiated)

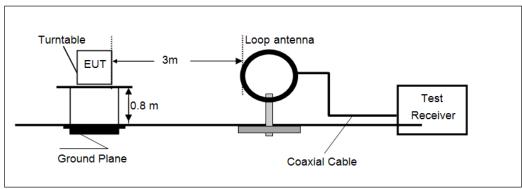
# **LIMIT**

FCC CFR Title 47 Part 15 Subpart C Section 15.209

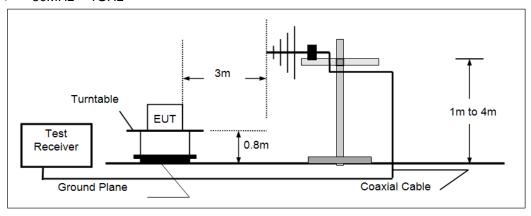
Frequency	Limit (dBuV/m @3m)	Value
30MHz-88MHz	40.00	Quasi-peak
88MHz-216MHz	43.50	Quasi-peak
216MHz-960MHz	46.00	Quasi-peak
960MHz-1GHz	54.00	Quasi-peak
Above 1GHz	54.00	Average
Above Toriz	74.00	Peak

# **TEST CONFIGURATION**

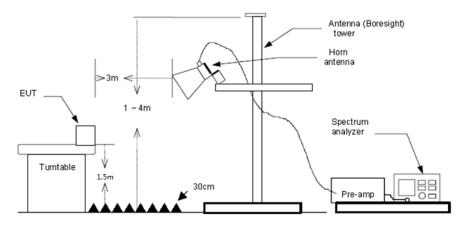
#### ➤ 9kHz ~30MHz



## ➤ 30MHz ~ 1GHz



## Above 1GHz



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### **TEST PROCEDURE**

- 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 0.8 meter above ground for below 1 GHz, and 1.5 m for above 1 GHz. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
- 3. The EUT was set 3 meters from the receiving antenna, which was mounted on the top of a variable height antenna tower.
- 4. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.
- 5. Set to the maximum power setting and enable the EUT transmit continuously.
- 6. Use the following spectrum analyzer settings
  - (1) Span shall wide enough to fully capture the emission being measured;
  - (2) Below 1 GHz:

RBW=120 kHz, VBW=300 kHz, 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) From 1 GHz to 10<sup>th</sup> harmonic:

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 + Factor
- The emission levels of other frequencies are very lower than the limit and not show in test report.

#### ➢ 9kHz ~ 30MHz

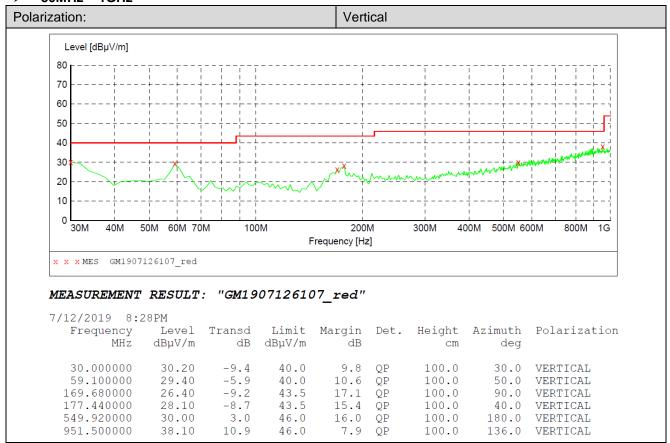
The EUT was pre-scanned the frequency band (9kHz~30MHz), found the radiated level lower than the limit, so don't show on the report.

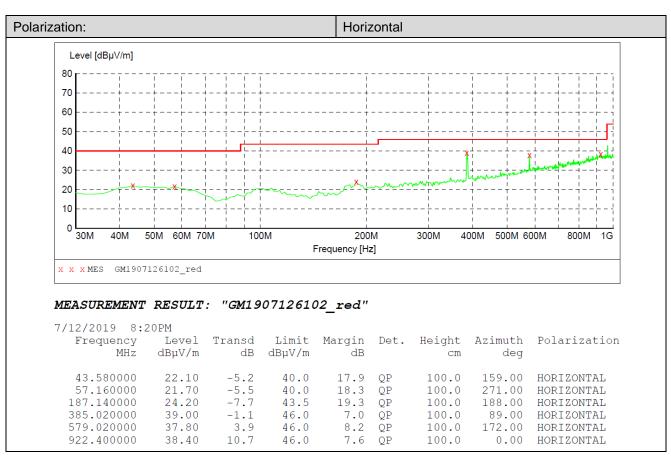
#### ➤ 30MHz ~1000MHz

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.

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#### 30MHz ~ 1GHz





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#### > 1 GHz ~ 25 GHz

802.11b				CH01			
Frequency (MHz)	Read Level (dBuV/m)	Factor (dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin(dB)	Polarization	Test value
1352.5000	33.56	-5.58	27.98	74.00	46.02	Vertical	Peak
3153.1875	34.26	0.60	34.86	74.00	39.14	Vertical	Peak
4823.1563	43.79	7.08	50.87	74.00	23.13	Vertical	Peak
7237.7813	35.48	16.01	51.49	74.00	22.51	Vertical	Peak
1399.5000	32.86	-5.58	27.28	74.00	46.72	Horizontal	Peak
3066.5313	34.72	0.17	34.89	74.00	39.11	Horizontal	Peak
4823.1563	42.78	7.08	49.86	74.00	24.14	Horizontal	Peak
7234.8438	37.57	16.01	53.58	74.00	20.42	Horizontal	Peak

802.11b	CH06							
Frequency (MHz)	Read Level (dBuV/m)	Factor (dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin(dB)	Polarization	Test value	
1528.7500	34.11	-5.82	28.29	74.00	45.71	Vertical	Peak	
3139.9688	34.00	0.53	34.53	74.00	39.47	Vertical	Peak	
4873.0938	43.21	7.15	50.36	74.00	23.64	Vertical	Peak	
7309.7500	34.40	16.08	50.48	74.00	23.52	Vertical	Peak	
1578.6875	34.17	-6.14	28.03	74.00	45.97	Horizontal	Peak	
4873.0938	42.40	7.15	49.55	74.00	24.45	Horizontal	Peak	
6499.0000	34.55	12.51	47.06	74.00	26.94	Horizontal	Peak	
7311.2188	35.87	16.09	51.96	74.00	22.04	Horizontal	Peak	

802.11b				CH11			
Frequency (MHz)	Read Level (dBuV/m)	Factor (dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin(dB)	Polarization	Test value
1682.9688	35.19	-6.13	29.06	74.00	44.94	Vertical	Peak
3768.5938	33.74	1.86	35.60	74.00	38.40	Vertical	Peak
4924.5000	41.04	7.34	48.38	74.00	25.62	Vertical	Peak
6565.0938	34.28	12.93	47.21	74.00	26.79	Vertical	Peak
1637.4375	34.71	-6.21	28.50	74.00	45.50	Horizontal	Peak
3192.8438	34.23	0.80	35.03	74.00	38.97	Horizontal	Peak
4924.5000	41.05	7.34	48.39	74.00	25.61	Horizontal	Peak
6565.0938	35.35	12.93	48.28	74.00	25.72	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(test frequency band is 1GHz to 25GHz) are very lower than the limit and not show in test report.

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802.11g				CH01			
Frequency (MHz)	Read Level (dBuV/m)	Factor (dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin(dB)	Polarization	Test value
1279.0625	34.82	-5.62	29.20	74.00	44.80	Vertical	Peak
3153.1875	34.55	0.60	35.15	74.00	38.85	Vertical	Peak
4818.7500	34.21	7.07	41.28	74.00	32.72	Vertical	Peak
7553.5625	30.91	16.66	47.57	74.00	26.43	Vertical	Peak
1258.5000	35.05	-5.68	29.37	74.00	44.63	Horizontal	Peak
3154.6563	33.94	0.60	34.54	74.00	39.46	Horizontal	Peak
4824.6250	33.29	7.08	40.37	74.00	33.63	Horizontal	Peak
6431.4375	34.46	11.67	46.13	74.00	27.87	Horizontal	Peak

802.11g		CH06						
Frequency (MHz)	Read Level (dBuV/m)	Factor (dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin(dB)	Polarization	Test value	
1715.2813	34.45	-6.05	28.40	74.00	45.60	Vertical	Peak	
3206.0625	34.43	0.77	35.20	74.00	38.80	Vertical	Peak	
4873.0938	33.81	7.15	40.96	74.00	33.04	Vertical	Peak	
7134.9688	30.43	15.63	46.06	74.00	27.94	Vertical	Peak	
1680.0313	33.97	-6.14	27.83	74.00	46.17	Horizontal	Peak	
3235.4375	33.89	0.42	34.31	74.00	39.69	Horizontal	Peak	
4874.5625	33.86	7.15	41.01	74.00	32.99	Horizontal	Peak	
6499.0000	34.87	12.51	47.38	74.00	26.62	Horizontal	Peak	

802.11g				CH11			
Frequency (MHz)	Read Level (dBuV/m)	Factor (dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin(dB)	Polarization	Test value
1763.7500	34.26	-5.91	28.35	74.00	45.65	Vertical	Peak
3132.6250	34.59	0.49	35.08	74.00	38.92	Vertical	Peak
4924.5000	33.77	7.34	41.11	74.00	32.89	Vertical	Peak
7433.1250	31.13	16.38	47.51	74.00	26.49	Vertical	Peak
1718.2188	34.05	-6.05	28.00	74.00	46.00	Horizontal	Peak
3181.0938	33.88	0.74	34.62	74.00	39.38	Horizontal	Peak
4830.5000	30.72	7.09	37.81	74.00	36.19	Horizontal	Peak
6565.0938	35.04	12.93	47.97	74.00	26.03	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(test frequency band is 1GHz to 25GHz) are very lower than the limit and not show in test report.

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802.11n(HT20	))			CH01			
Frequency (MHz)	Read Level (dBuV/m)	Factor (dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin(dB)	Polarization	Test value
1571.3438	34.48	-6.09	28.39	74.00	45.61	Vertical	Peak
3191.3750	34.17	0.80	34.97	74.00	39.03	Vertical	Peak
4823.1563	33.86	7.08	40.94	74.00	33.06	Vertical	Peak
7985.3750	31.07	18.06	49.13	74.00	24.87	Vertical	Peak
1549.3125	33.29	-5.95	27.34	74.00	46.66	Horizontal	Peak
3142.9063	34.14	0.54	34.68	74.00	39.32	Horizontal	Peak
4406.0313	30.83	4.95	35.78	74.00	38.22	Horizontal	Peak
7350.8750	30.87	16.21	47.08	74.00	26.92	Horizontal	Peak

802.11n(HT20	))			CH06			
Frequency (MHz)	Read Level (dBuV/m)	Factor (dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin(dB)	Polarization	Test value
1587.5000	33.89	-6.20	27.69	74.00	46.31	Vertical	Peak
3003.3750	34.31	-0.11	34.20	74.00	39.80	Vertical	Peak
4784.9688	31.54	6.95	38.49	74.00	35.51	Vertical	Peak
6499.0000	31.90	12.51	44.41	74.00	29.59	Vertical	Peak
1279.0625	34.62	-5.62	29.00	74.00	45.00	Horizontal	Peak
4663.0625	30.92	6.15	37.07	74.00	36.93	Horizontal	Peak
6499.0000	34.79	12.51	47.30	74.00	26.70	Horizontal	Peak
7295.0625	30.48	16.05	46.53	74.00	27.47	Horizontal	Peak

802.11n(HT20	)			CH11			
Frequency (MHz)	Read Level (dBuV/m)	Factor (dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin(dB)	Polarization	Test value
1700.5938	34.36	-6.10	28.26	74.00	45.74	Vertical	Peak
3890.5000	33.02	2.61	35.63	74.00	38.37	Vertical	Peak
4924.5000	33.21	7.34	40.55	74.00	33.45	Vertical	Peak
6565.0938	33.13	12.93	46.06	74.00	27.94	Vertical	Peak
1649.1875	34.27	-6.19	28.08	74.00	45.92	Horizontal	Peak
3821.4688	31.97	2.14	34.11	74.00	39.89	Horizontal	Peak
5216.7813	31.36	8.89	40.25	74.00	33.75	Horizontal	Peak
6565.0938	36.46	12.93	49.39	74.00	24.61	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(test frequency band is 1GHz to 25GHz) are very lower than the limit and not show in test report.

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# 6. TEST SETUP PHOTOS

Conducted Emissions (AC Mains)

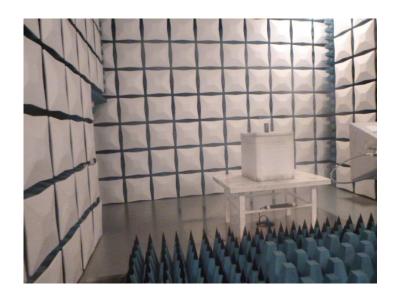


**Radiated Emissions** 





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# 7. EXTERANAL AND INTERNAL PHOTOS

Reference to the test report No.: CHTEW19070148

-----End of Report-----