



TEST REPORT

Report Reference No...... : **TRE1611010503** R/C.....: 23530

FCC ID..... : **2AAA6-LS5**

Applicant's name..... : **SENWA MEXICO,S.A.DE C.V**

Address..... : Av. Javier Barros Sierra 540,Torre I, Piso 5; COL. LOMAS DE SANTA FE DELEGACION ALVARO OBREGON C.P. 01210 MEXICO,DISTRITO FEDERAL

Manufacturer.....: Senwa Mobile HK Ltd

Address.....: Room 910, International Trade Centre 11-19 Sha Tsui Road, Tsuen Wan, NT, HK

Test item description : Mobile Phone

Trade Mark: SENWA

Model/Type reference.....: LS5

Listed Model(s).....: -

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

Date of receipt of test sample.....: Nov. 18, 2016

Date of testing.....: Nov. 21, 2016 - Nov. 30, 2016

Date of issue.....: Nov. 30, 2016

Result.....: **PASS**

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Lion Cai

Approved by
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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

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1. APPLICABLE STANDARDS AND TEST DESCRIPTION

1.1. Applicable 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

[KDB558074 D01 V03R03](#): Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS)

1.2. Test Description

ReportSection	Test Item	FCC Rule	Result
4.1	Antenna requirement	15.203/15.247 (c)	Pass
4.2	Line Conducted Emission (AC Main)	15.207	Pass
4.3	Conducted Peak Output Power	15.247 (b)(3)	Pass
4.4	Power Spectral Density	15.247 (e)	Pass
4.5	6dB Bandwidth	15.247 (a)(2)	Pass
4.6	Restricted band	15.247(d)/15.205	Pass
4.7/4.8	Spurious Emission	15.247(d)/15.209	Pass

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

2. SUMMARY

2.1. Client Information

Applicant:	SENWA MEXICO,S.A.DE C.V
Address:	Av. Javier Barros Sierra 540,Torre I, Piso 5; COL. LOMAS DE SANTA FE DELEGACION ALVARO OBREGON C.P. 01210MEXICO,DISTRITO FEDERAL
Manufacturer:	Senwa Mobile HK Ltd
Address:	Room 910, International Trade Centre 11-19 Sha Tsui Road, Tsuen Wan, NT, HK

2.2. Product Description

Name of EUT	Mobile Phone
Trade Mark:	SENWA
Model No.:	LS5
Listed Model(s):	-
IMEI :	359434070000383
Power supply:	DC 3.7V From internal battery
Adapter information:	Model: LS5 Input: 100-240Va.c., 50-60Hz, 0.15A Output: 5Vd.c., 500mA
WIFI	
Supported type:	802.11b/802.11g/802.11n(H20)
Modulation:	802.11b: DSSS (DBPSK / DQPSK / CCK) 802.11g/n(H20): OFDM (BPSK / QPSK / 16QAM / 64QAM)
Operation frequency:	802.11b/g/n(H20): 2412MHz~2462MHz
Channel number:	802.11b/g/n(H20): 11
Channel separation:	5MHz
Antenna type:	Integral Antenna
Antenna gain:	1.4dBi

2.3. 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(H20)	
Channel	Frequency (MHz)
01	2412
02	2417
03	2422
⋮	⋮
06	2437
⋮	⋮
09	2452
10	2457
11	2462

◆ Data Rated

Preliminary tests were performed in different data rate, and found which the below bit rate is worst case mode, so only show data which it is a worst case mode.

Mode	datarate (worst mode)
802.11b	1Mbps
802.11g	6Mbps
802.11n(H20)	6.5Mbps

◆ Test mode

For RF test items:

the engineering test program was provided and enabled to make EUT continuous transmit/receive. The EUT was programmed to be in continuously transmitting mode and the transmit duty cycle is not less than 98%.

For AC power line conducted emissions:

the EUT was set to connect with the WLAN AP under large package sizes transmission.

2.4. EUT configuration

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

● - supplied by the manufacturer

○ - supplied by the lab

	Length (m) :	/
	Shield :	/
	Detachable :	/
	Manufacturer :	/
	Model No. :	/

2.5. Modifications

No modifications were implemented to meet testing criteria.

3. TEST ENVIRONMENT

3.1. 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

Phone: 86-755-26748019 Fax: 86-755-26748089

3.2. Test Facility

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

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, Date of Registration: February 28, 2015. Valid time is until February 27, 2018.

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. Valid time is until December 31, 2016.

FCC-Registration No.: 317478

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. Registration 317478, Renewal date Jul. 18, 2014, valid time is until Jul. 18, 2017.

IC-Registration No.: 5377A&5377B

The 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 on Dec. 31, 2013, valid time is until Dec. 31, 2016.

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 on Dec.03, 2014, valid time is until Dec.03, 2017.

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.

3.3. Equipments Used during the Test

Radiated Emission					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal
1	Ultra-Broadband Antenna	ShwarzBeck	VULB9163	538	11/13/2016
2	EMI TEST RECEIVER	Rohde&Schwarz	ESI 26	100009	11/13/2016
3	EMI TEST Software	Audix	E3	N/A	N/A
4	TURNTABLE	ETS	2088	2149	N/A
5	ANTENNA MAST	ETS	2075	2346	N/A
6	EMI TEST Software	Rohde&Schwarz	ESK1	N/A	N/A
7	HORNANTENNA	ShwarzBeck	9120D	1011	11/13/2016
8	Amplifer	Sonoma	310N	E009-13	11/13/2016
9	JS amplifer	Rohde&Schwarz	JS4-00101800-28-5A	F201504	11/13/2016
10	High pass filter	Compliance Direction systems	BSU-6	34202	11/13/2016
11	HORNANTENNA	ShwarzBeck	9120D	1012	11/13/2016
12	Amplifer	Compliance Direction systems	PAP1-4060	120	11/13/2016
13	Loop Antenna	Rohde&Schwarz	HFH2-Z2	100020	11/13/2016
14	TURNTABLE	MATURO	TT2.0	----	N/A
15	ANTENNA MAST	MATURO	TAM-4.0-P	----	N/A
16	Horn Antenna	SCHWARZBECK	BBHA9170	25841	11/13/2016
17	ULTRA-BROADBAND ANTENNA	Rohde&Schwarz	HL562	100015	11/13/2016

Maximum Peak Output Power / Power Spectral Density / 6dB Bandwidth / Band Edge Compliance of RF Emission / Spurious RF Conducted Emission					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal
1	Spectrum Analyzer	Rohde&Schwarz	FSP	1164.4391.40	11/13/2016
2	Power Meter	Anritsu	ML2480B	100798	11/13/2016
3	Power Sensor	Anritsu	MA2411B	100258	11/13/2016

The Cal.Interval was one year

3.4. 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

3.5. 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 within the 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 DIN EN 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.

Hereafter the best measurement capability for Shenzhen Huatongwei laboratory is reported:

Test Items	Measurement Uncertainty	Notes
Transmitter power conducted	0.57 dB	(1)
Transmitter power Radiated	2.20 dB	(1)
Conducted spurious emission 9KHz-40 GHz	1.60 dB	(1)
Radiated spurious emission 9KHz-40 GHz	2.20 dB	(1)
Conducted Emission 9KHz-30MHz	3.39 dB	(1)
Radiated Emission 30~1000MHz	4.24 dB	(1)
Radiated Emission 1~18GHz	5.16 dB	(1)
Radiated Emission 18-40GHz	5.54 dB	(1)
Occupied Bandwidth	-----	(1)

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

4. TEST CONDITIONS AND RESULTS

4.1. Antenna requirement

Requirement

FCC CFR Title 47 Part 15 Subpart C Section 15.203:

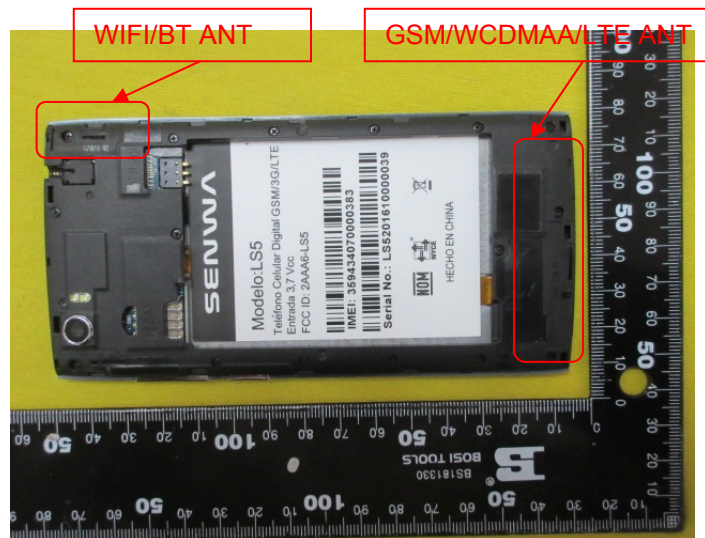
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit 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 6dBi 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 6dBi.

Test Result:

The antenna is integral antenna, the best case gain of the antenna is 1.4dBi.



4.2. Conducted Emission (AC Main)

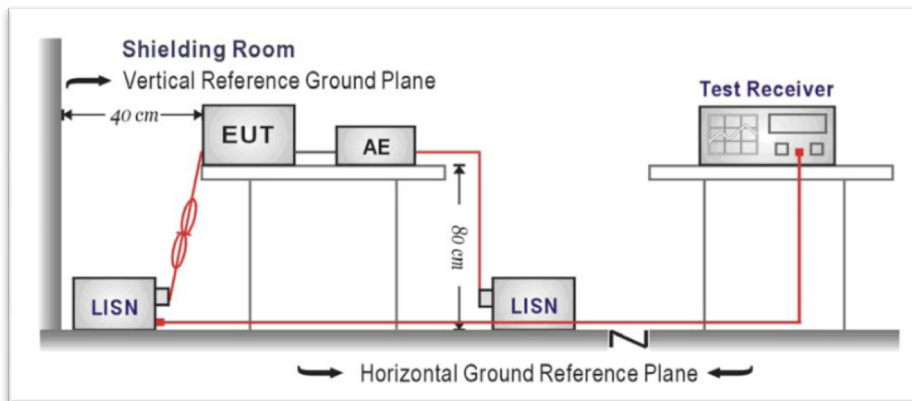
LIMIT

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 and tested according to ANSI C63.10:2013 for compliance to FCC 47CFR 15.247 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 impedance 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 0.15 MHz to 30 MHz using a receiver bandwidth of 9 kHz.

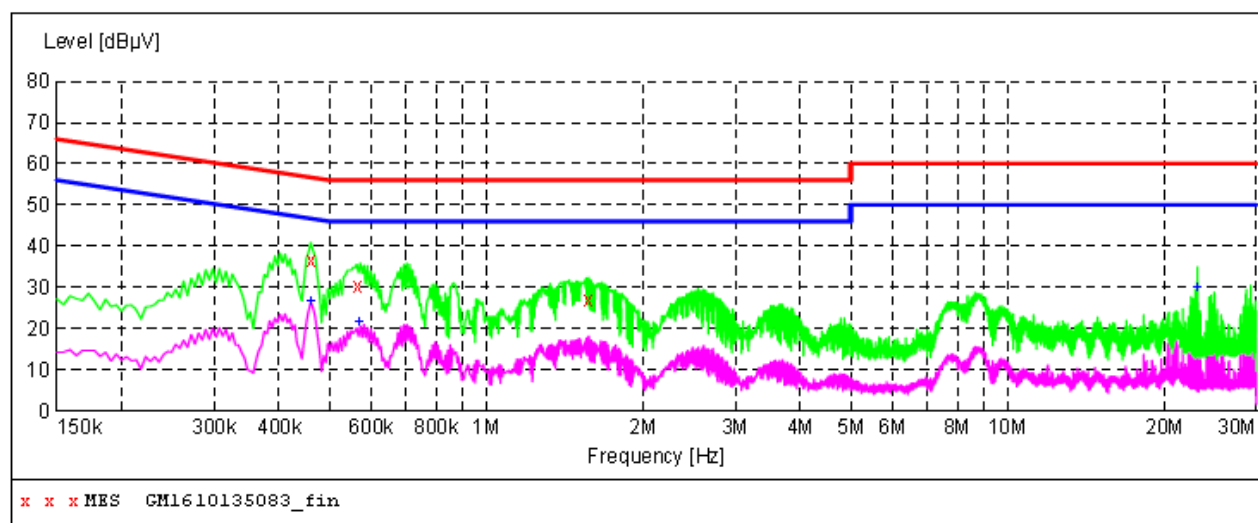
TEST RESULTS

Test mode: AC 120V

WIFI

Polarization

L



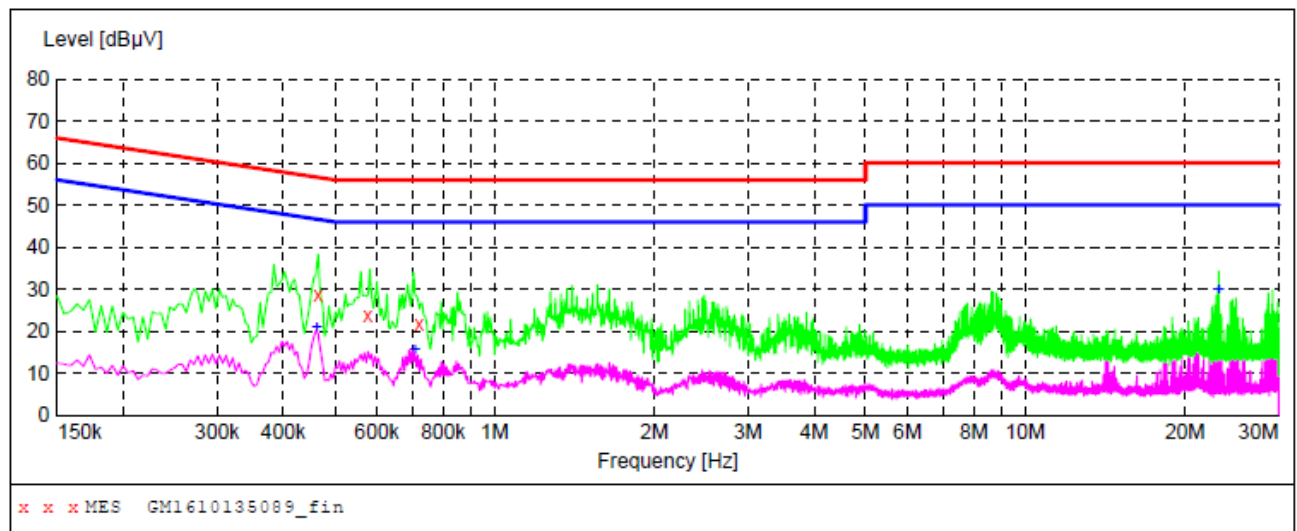
Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.460500	36.60	10.2	57	20.1	QP	L1	GND
0.568500	30.50	10.2	56	25.5	QP	L1	GND
1.567500	26.80	10.3	56	29.2	QP	L1	GND
Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.460500	26.50	10.2	47	20.2	AV	L1	GND
0.569000	21.70	10.2	46	24.3	AV	L1	GND
23.131500	29.80	10.8	50	20.2	AV	L1	GND

Test mode: AC 120V

WIFI

Polarization

N



Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.465000	28.60	10.2	57	28.0	QP	N	GND
0.577500	23.70	10.2	56	32.3	QP	N	GND
0.721500	21.90	10.2	56	34.1	QP	N	GND
Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.466000	20.80	10.2	47	26.2	AV	N	GND
0.705000	16.60	10.2	46	29.4	AV	N	GND
23.131500	29.70	10.8	50	20.3	AV	N	GND

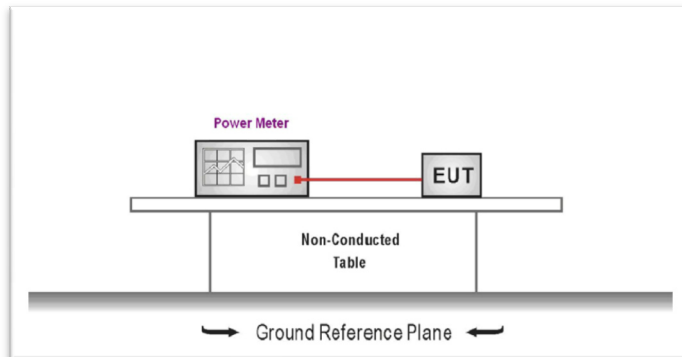
Remark: Transd=Cable lose+PULSE LIMITER factor+ARTIFICIAL MAINS factor; Margin=Limit-Level

4.3. 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 for compliance to FCC 47CFR 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 RESULTS

Type	Channel	Output power (dBm)	Limit (dBm)	Result
802.11b	01	14.44	30.00	Pass
	06	14.42		
	11	14.58		
802.11g	01	14.37	30.00	Pass
	06	13.87		
	11	14.42		
802.11n(H20)	01	21.75	30.00	Pass
	06	17.66		
	11	21.97		

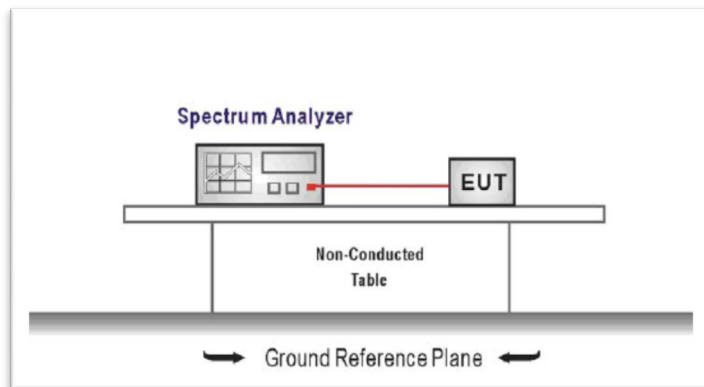
4.4. Power Spectral Density

LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (e): **8dBm/3KHz**

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



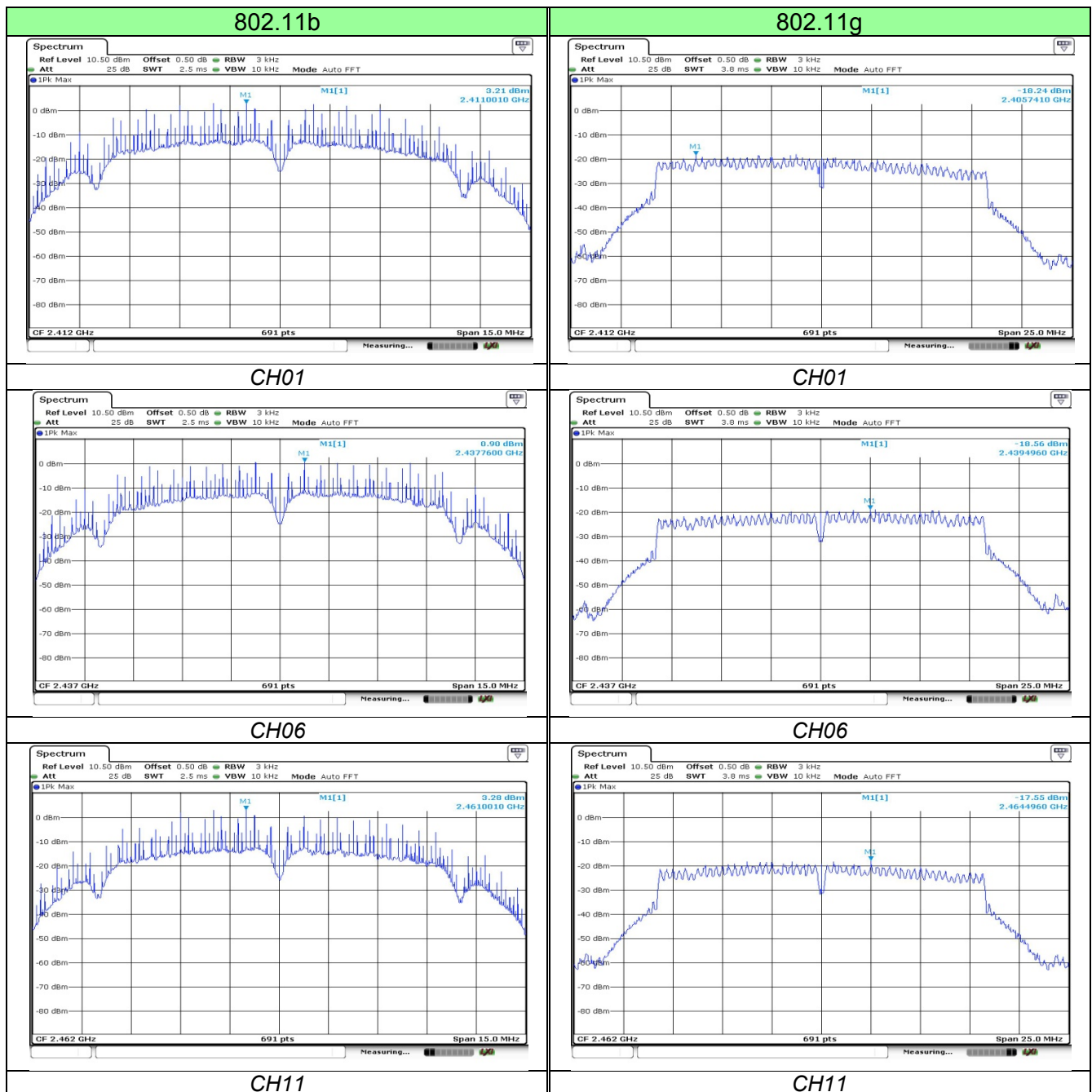
TEST PROCEDURE

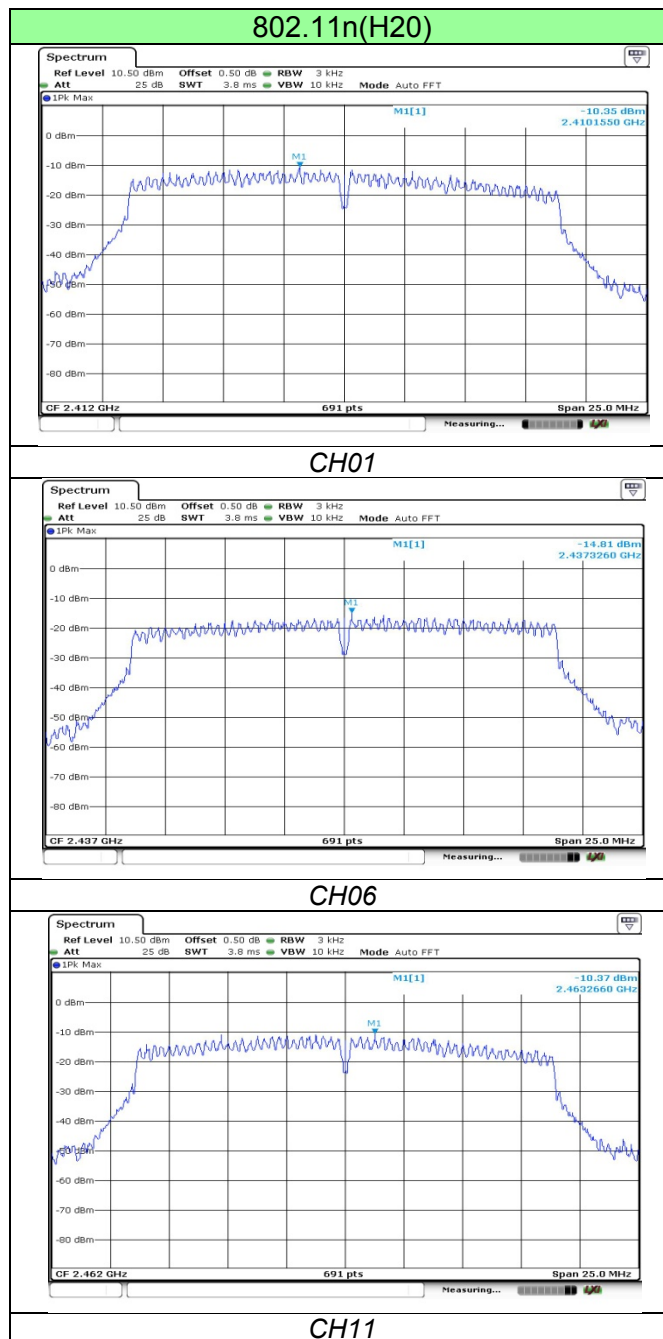
1. Connect the antenna port(s) to the spectrum analyzer input,
2. Configure the spectrum analyzer as shown below:
Center frequency=DTS channel center frequency
Span =1.5 times the DTS bandwidth
RBW = 3 kHz ≤ RBW ≤ 100 kHz, VBW ≥ 3 × RBW
Sweep time = auto couple
Detector = peak
Trace mode = max hold
3. Place the radio in continuous transmit mode, allow the trace to stabilize, view the transmitter waveform 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 RESULTS

Type	Channel	Power Spectral Density(dBm/3KHz)	Limit (dBm/3KHz)	Result
802.11b	01	3.21	8.00	Pass
	06	0.90		
	11	3.28		
802.11g	01	-18.24	8.00	Pass
	06	-18.56		
	11	-17.55		
802.11n(H20)	01	-10.35	8.00	Pass
	06	-14.81		
	11	-10.37		

Test plot as follows:





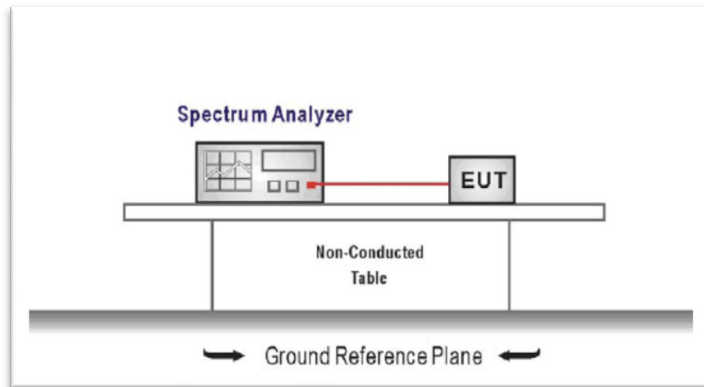
4.5. 6dB bandwidth

LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (a)(2): **at least 500KHz**

For digital modulation systems, the minimum 6 dB bandwidth shall be at least 500 kHz.

TEST CONFIGURATION



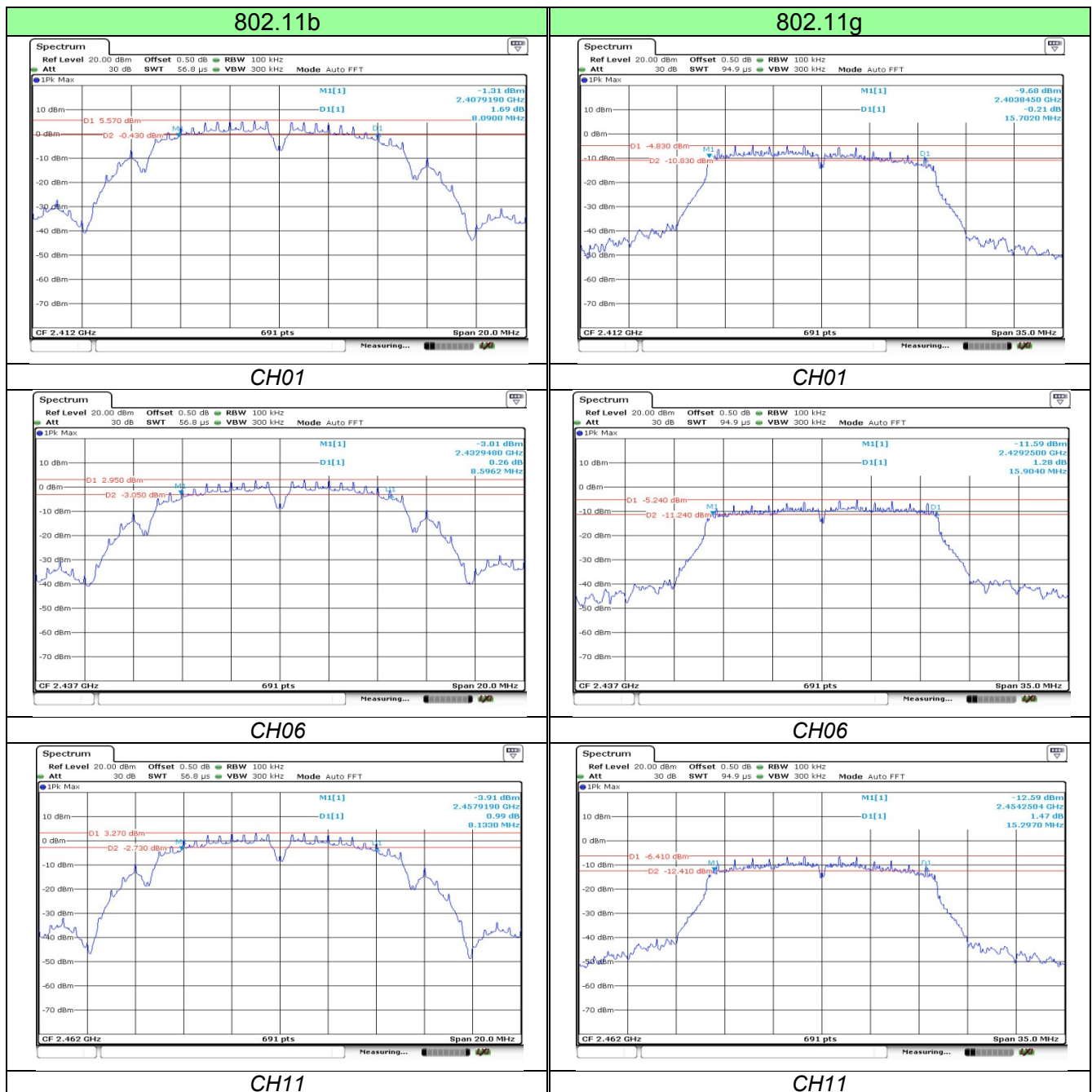
TEST PROCEDURE

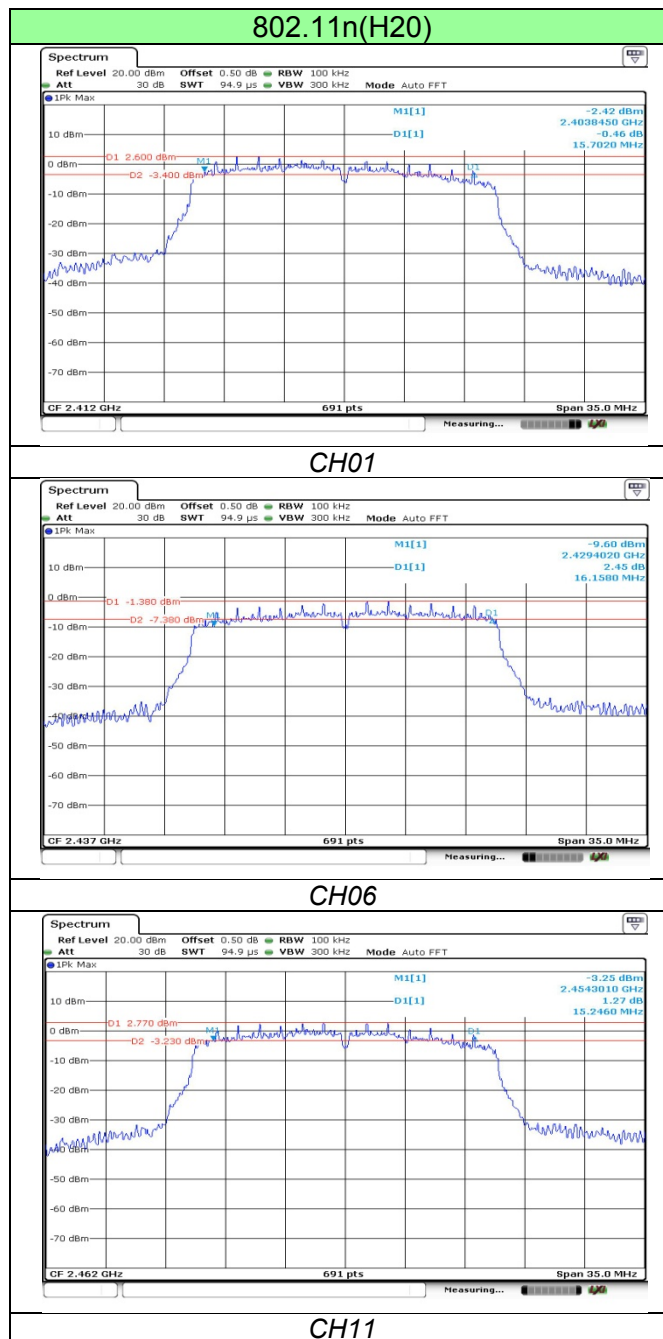
1. Connect the antenna port(s) to the spectrum analyzer input.
2. Configure the spectrum analyzer as shown below (enter all losses between the transmitter output and the spectrum analyzer).
 $Center\ Frequency = DTS\ channel\ center\ frequency$
 $Span = 2 \times DTS\ bandwidth$
 $RBW = 100\ kHz, VBW \geq 3 \times RBW$
 $Sweep\ time = auto\ couple$
 $Detector = Peak$
 $Trace\ mode = max\ hold$
3. Place the radio in continuous transmit mode, allow the trace to stabilize, view the transmitter waveform 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 RESULTS

Type	Channel	6dB Bandwidth(MHz)	Limit (KHz)	Result
802.11b	01	8.09	≥ 500	Pass
	06	8.60		
	11	8.13		
802.11g	01	15.70	≥ 500	Pass
	06	15.90		
	11	15.30		
802.11n(H20)	01	15.70	≥ 500	Pass
	06	16.16		
	11	15.25		

Test plot as follows:





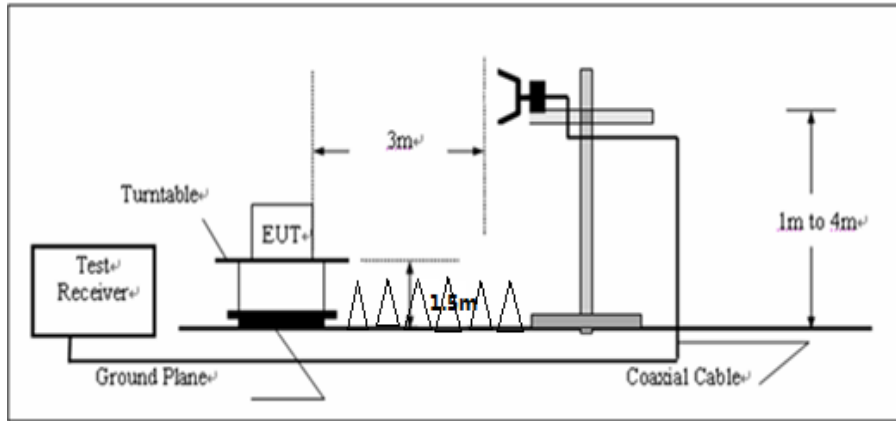
4.6. Restricted band

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 emission 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 for Peak value
RBW=1MHz, VBW=10Hz for Average value.
6. Pre-scan 2310-2390MHz, 2483.5-2500MHz, and only mark the worst case data in the test report

TEST RESULTS

CH01 for 802.11b									
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Test value
2390.00	54.98	27.53	6.81	37.45	51.87	74.00	-22.13	Vertical	Peak
2390.00	55.36	27.53	6.81	37.45	52.25	74.00	-21.75	Horizontal	
2390.00	48.08	27.53	6.81	37.45	44.97	54.00	-9.03	Vertical	Average
2390.00	48.11	27.53	6.81	37.45	45.00	54.00	-9.00	Horizontal	

CH11 for 802.11b									
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Test value
2483.50	56.54	27.85	6.96	37.57	53.78	74.00	-20.22	Vertical	Peak
2483.50	56.05	27.85	6.96	37.57	53.29	74.00	-20.71	Horizontal	
2483.50	48.08	27.85	6.96	37.57	45.32	54.00	-8.68	Vertical	Average
2483.50	48.12	27.85	6.96	37.57	45.36	54.00	-8.64	Horizontal	

CH01 for 802.11g									
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Test value
2390.00	57.08	27.53	6.81	37.92	53.50	74.00	-20.50	Vertical	Peak
2390.00	55.28	27.53	6.81	37.92	51.70	74.00	-22.30	Horizontal	
2390.00	48.57	27.53	6.81	37.92	44.99	54.00	-9.01	Vertical	Average
2390.00	48.63	27.53	6.81	37.99	44.98	54.00	-9.02	Horizontal	

CH11 for 802.11g									
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Test value
2483.50	55.54	27.85	6.96	37.60	52.75	74.00	-21.25	Vertical	Peak
2483.50	56.33	27.85	6.96	37.60	53.54	74.00	-20.46	Horizontal	
2483.50	48.65	27.85	6.96	37.60	45.86	54.00	-8.14	Vertical	Average
2483.50	49.44	27.85	6.96	37.60	46.65	54.00	-7.35	Horizontal	

CH01 for 802.11n(H20)									
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Test value
2390.00	55.37	27.53	6.81	37.58	52.13	74.00	-21.87	Vertical	Peak
2390.00	56.20	27.53	6.81	37.58	52.96	74.00	-21.04	Horizontal	
2390.00	49.12	27.53	6.81	37.58	45.88	54.00	-8.12	Vertical	Average
2390.00	49.18	27.53	6.81	37.58	45.94	54.00	-8.06	Horizontal	

CH11 for 802.11n(H20)									
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Test value
2483.50	55.02	27.85	6.96	37.67	52.16	74.00	-21.84	Vertical	Peak
2483.50	55.15	27.85	6.96	37.67	52.29	74.00	-21.71	Horizontal	
2483.50	49.16	27.85	6.96	37.67	46.30	54.00	-7.70	Vertical	Average
2483.50	49.32	27.85	6.96	37.67	46.46	54.00	-7.54	Horizontal	

Note: Level = Read + Antenna Factor + Cable Loss - Preamp Factor

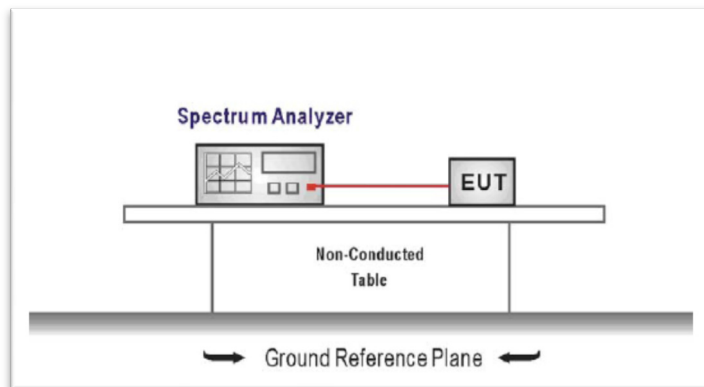
4.7. Band edge and Spurious Emission (conducted)

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

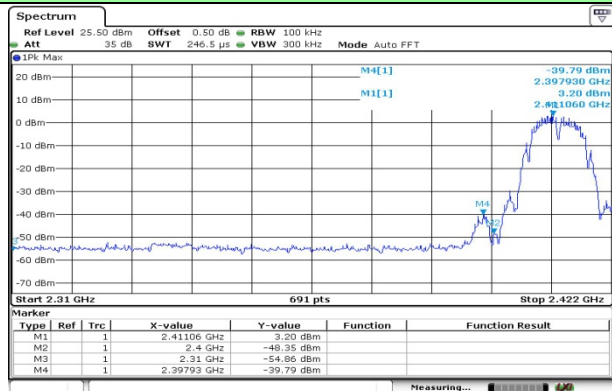
Note that the channel found to contain the maximum PSD level can be used to establish the reference level.

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 emissions 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 emissions relative to the limit.

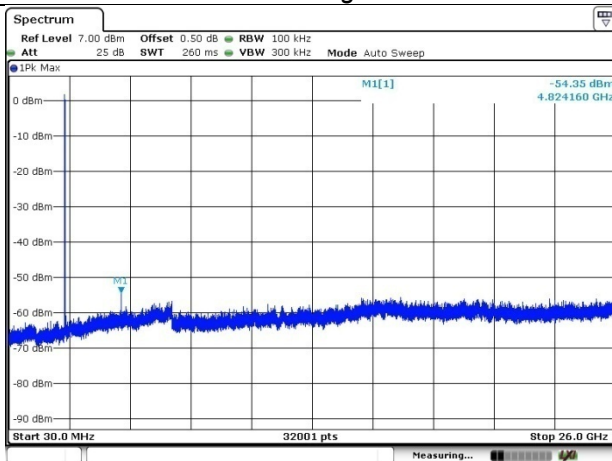
TEST RESULTS

Test plot as follows:

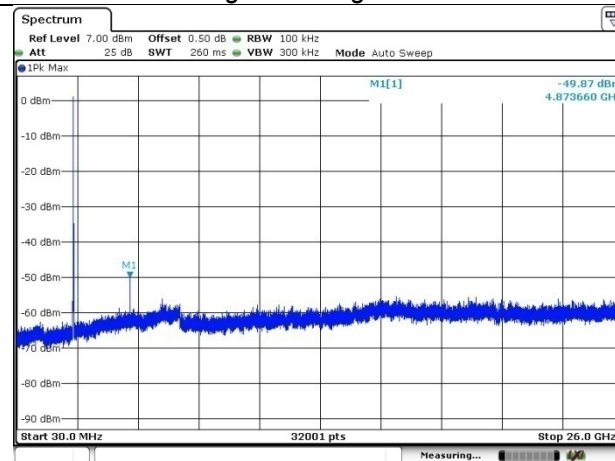
802.11b



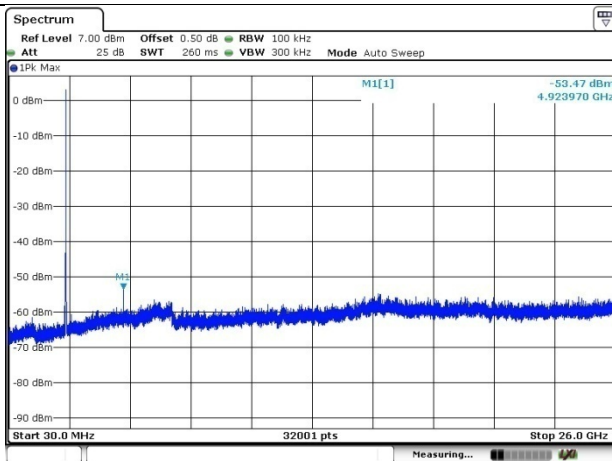
Low bandedge Plot



High bandedge Plot



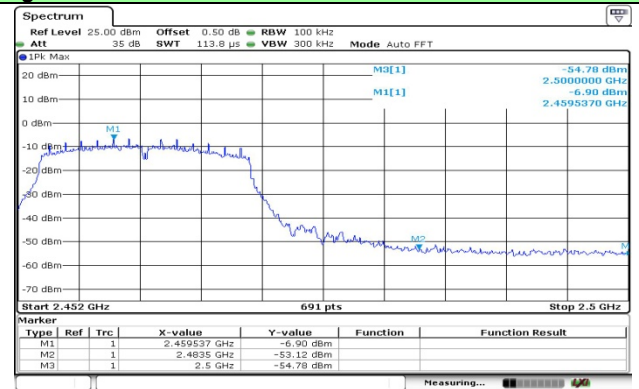
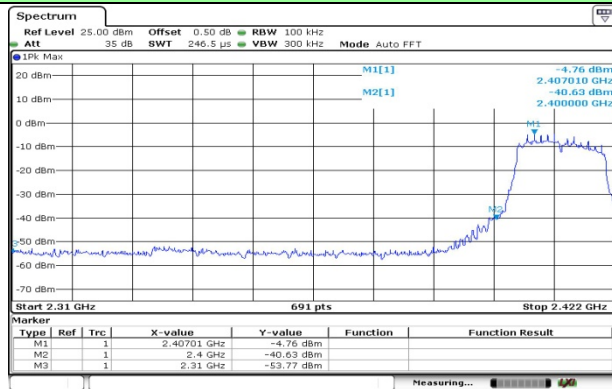
CH01



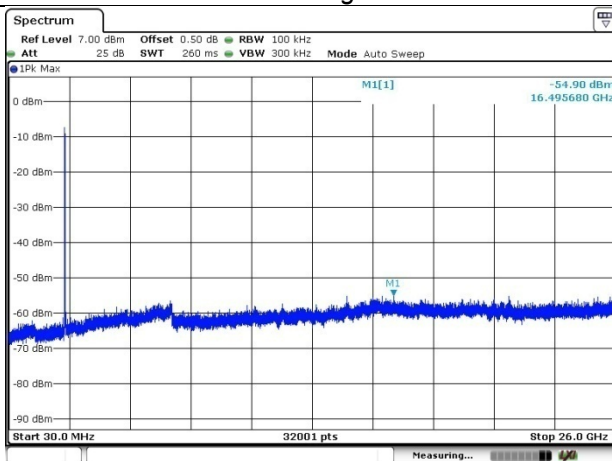
CH06

CH11

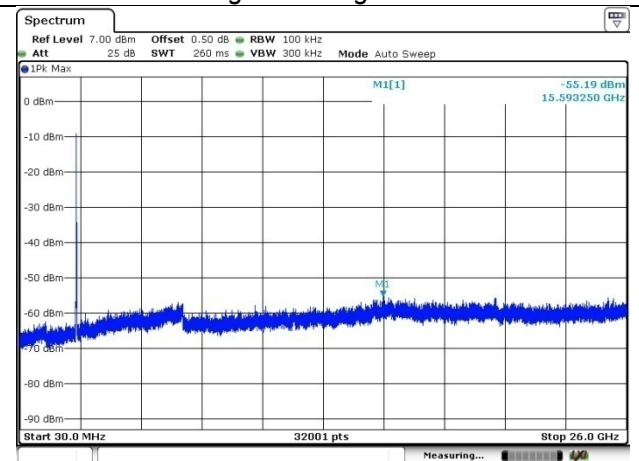
802.11g



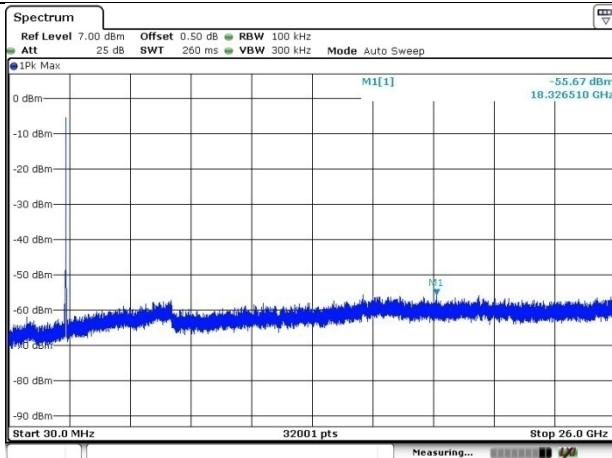
Low bandedge Plot



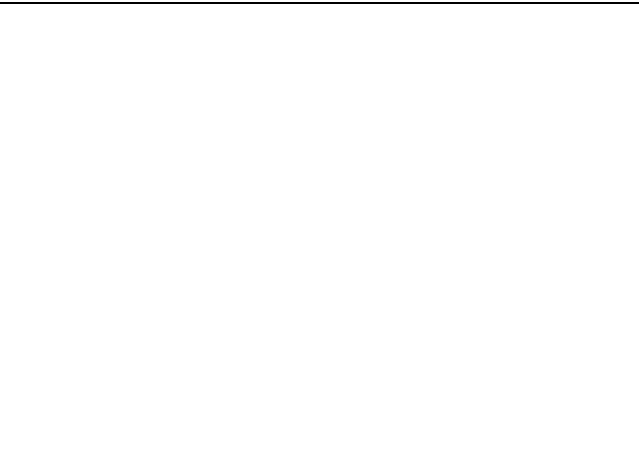
High bandedge Plot



CH01

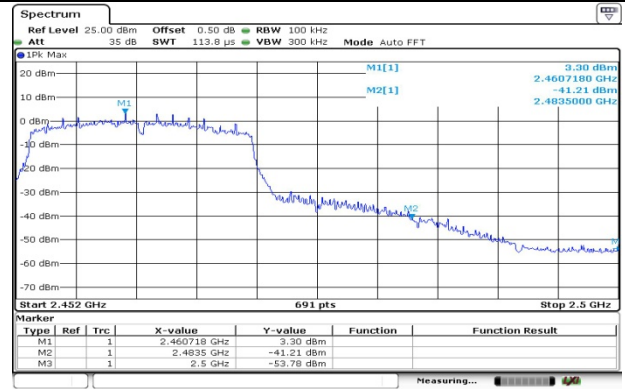


CH06

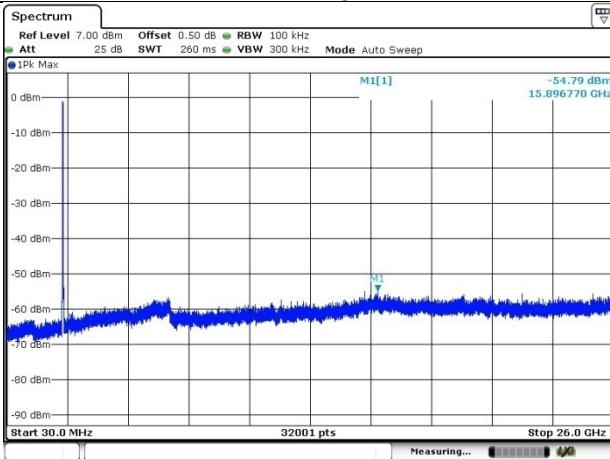


CH11

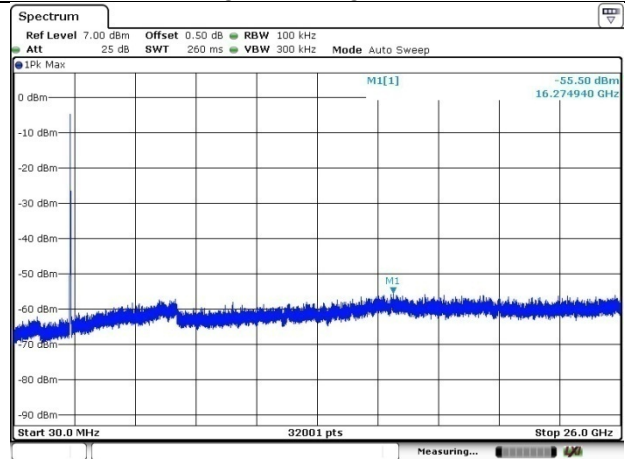
802.11n(H20)



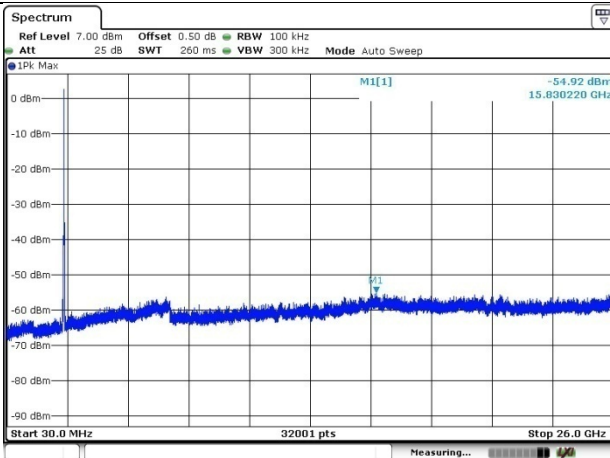
Low bandedge Plot



High bandedge Plot



CH01



CH06

CH11

4.8. Spurious Emission (radiated)

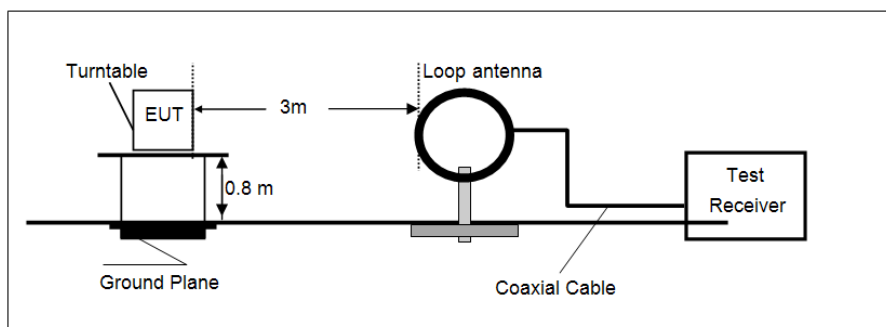
LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.209

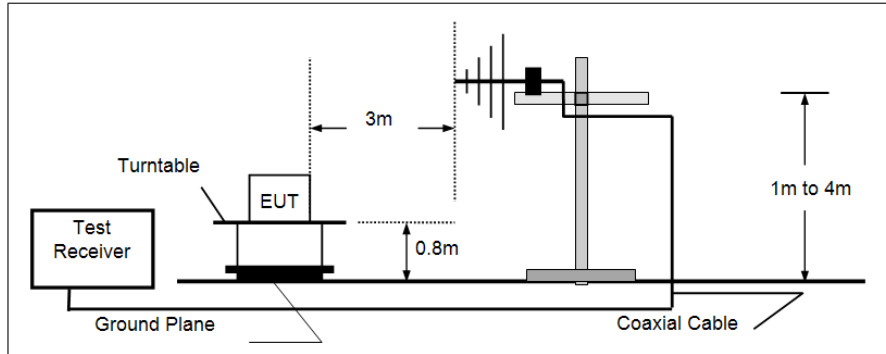
Frequency	Limit (dBuV/m @3m)	Value
30MHz-88MHz	40.00	Quasi-peak
88MHz-216MHz	43.50	Quasi-peak
216MHz-960MHz	46.00	Quasi-peak
960MHz-1GHz	54.00	Quasi-peak
Above 1GHz	54.00	Average
	74.00	Peak

TEST CONFIGURATION

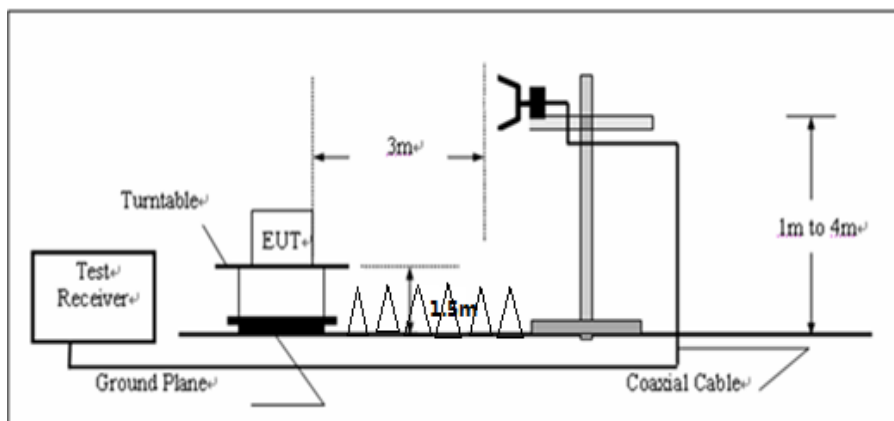
- 9KHz ~30MHz



- 30MHz ~ 1GHz



- Above 1GHz



TEST PROCEDURE

1. The EUT was 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 1GHz, and 1.5m for above 1GHz. 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. Use the following spectrum analyzer settings
 - (1) Span shall be 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 for Peak value
RBW=1MHz, VBW=10Hz for Average value.

TEST RESULTS

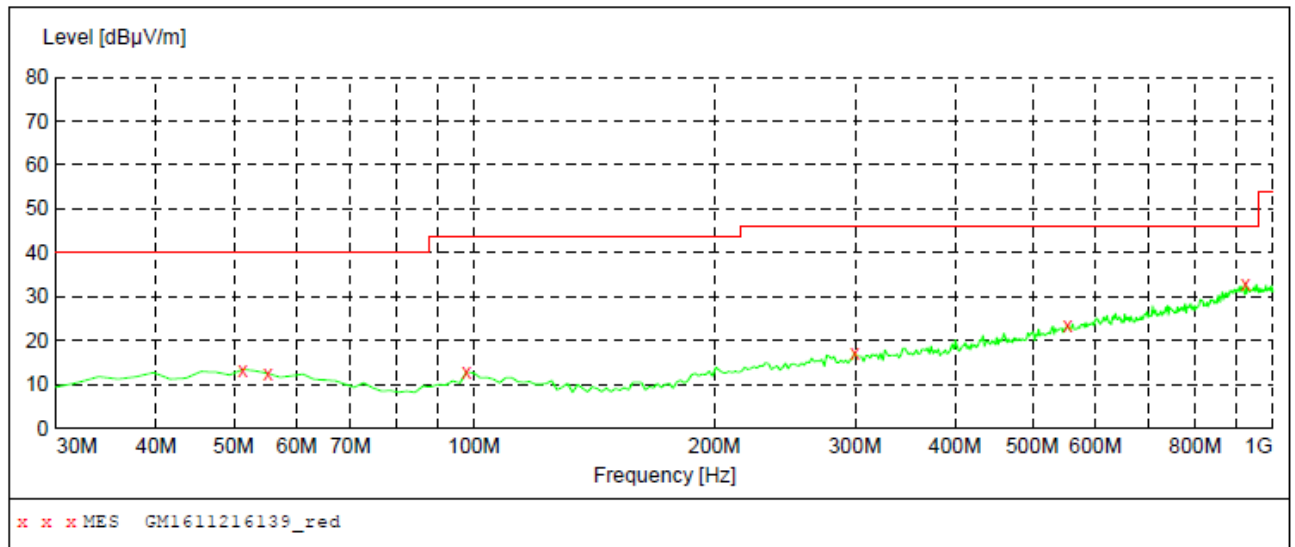
Noted:

Below 1GHz, 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.

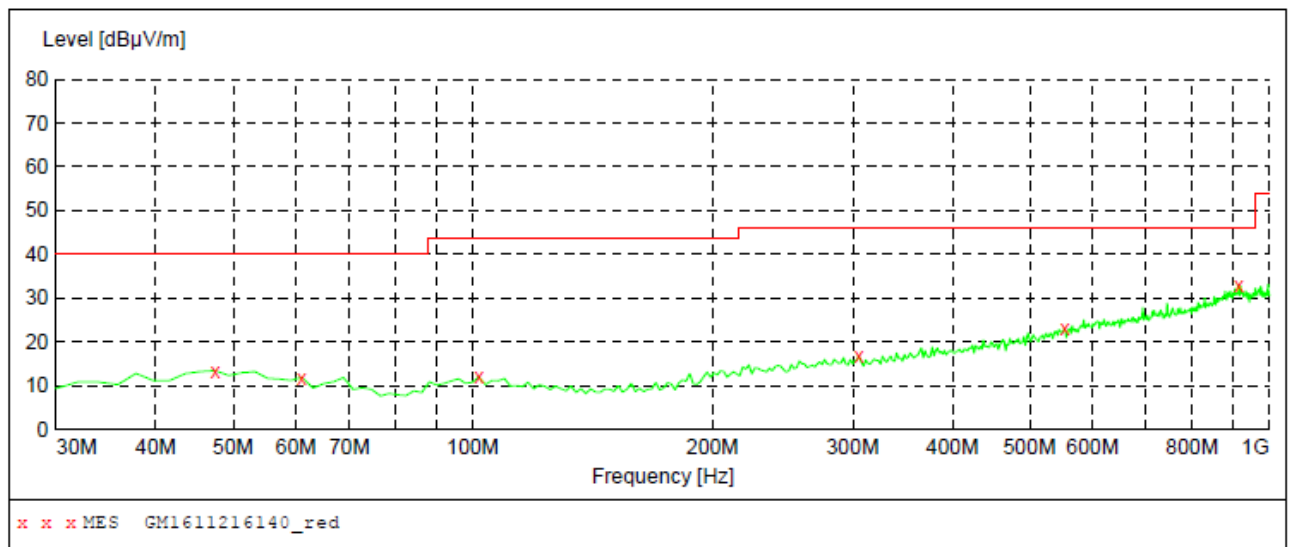
Measurement data:**■ 9kHz ~ 30MHz**

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

■ 30MHz ~ 1GHz



Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
51.340000	13.40	-16.3	40.0	26.6	QP	300.0	185.00	HORIZONTAL
55.220000	12.40	-16.7	40.0	27.6	QP	300.0	328.00	HORIZONTAL
97.900000	12.70	-17.7	43.5	30.8	QP	100.0	156.00	HORIZONTAL
299.660000	17.30	-13.0	46.0	28.7	QP	300.0	165.00	HORIZONTAL
553.800000	23.40	-6.1	46.0	22.6	QP	300.0	87.00	HORIZONTAL
924.340000	33.00	1.4	46.0	13.0	QP	100.0	0.00	HORIZONTAL



Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
47.460000	13.40	-16.3	40.0	26.6	QP	100.0	299.00	VERTICAL
61.040000	11.80	-17.4	40.0	28.2	QP	100.0	3.00	VERTICAL
101.780000	11.90	-17.5	43.5	31.6	QP	100.0	317.00	VERTICAL
305.480000	16.70	-12.8	46.0	29.3	QP	100.0	234.00	VERTICAL
553.800000	23.00	-6.1	46.0	23.0	QP	100.0	106.00	VERTICAL
914.640000	33.00	1.3	46.0	13.0	QP	100.0	186.00	VERTICAL

Remark: Transd=Cable lose+Antenna factor-Pre-amplifier; Margin=Limit-Level

Above 1GHz

CH01 for 802.11b									
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Test value
1125.81	39.18	24.35	4.49	36.61	31.41	74.00	-42.59	Vertical	Peak
1319.79	37.94	24.54	4.86	36.50	30.84	74.00	-43.16	Vertical	
1706.97	38.71	25.33	5.78	36.94	32.88	74.00	-41.12	Vertical	
3650.58	38.88	28.96	8.33	38.26	37.91	74.00	-36.09	Vertical	
4694.30	37.07	31.02	9.50	37.10	40.49	74.00	-33.51	Vertical	
6213.44	34.79	34.01	11.01	35.29	44.52	74.00	-29.48	Vertical	
1362.43	39.14	24.58	4.94	36.48	32.18	74.00	-41.82	Horizontal	
1625.12	38.41	25.09	5.62	36.77	32.35	74.00	-41.65	Horizontal	
2151.03	39.83	26.68	6.40	37.33	35.58	74.00	-38.42	Horizontal	
3671.75	38.47	28.99	8.35	38.26	37.55	74.00	-36.45	Horizontal	
4316.86	37.11	30.41	9.05	37.60	38.97	74.00	-35.03	Horizontal	
4959.31	38.65	31.18	9.64	36.51	42.96	74.00	-31.04	Horizontal	

CH06 for 802.11b									
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Test value
1135.62	30.29	24.36	4.52	36.60	22.57	74.00	-51.43	Vertical	Peak
1736.83	32.36	25.41	5.84	37.01	26.60	74.00	-47.40	Vertical	
3214.62	37.08	28.59	7.74	38.23	35.18	74.00	-38.82	Vertical	
4367.06	39.28	30.55	9.10	37.57	41.36	74.00	-32.64	Vertical	
5599.41	40.95	32.56	10.27	35.87	47.91	74.00	-26.09	Vertical	
7015.42	46.38	35.82	11.85	34.81	59.24	74.00	-14.76	Vertical	
7015.42	36.52	35.82	11.85	34.81	49.38	54.00	-4.62	Vertical	Average
1135.62	30.44	24.36	4.52	36.60	22.72	74.00	-51.28	Horizontal	Peak
1503.12	31.01	24.71	5.29	36.59	24.42	74.00	-49.58	Horizontal	
1721.83	32.45	25.37	5.81	36.98	26.65	74.00	-47.35	Horizontal	
3505.81	38.08	28.72	8.12	38.40	36.52	74.00	-37.48	Horizontal	
5075.32	41.08	31.38	9.73	36.32	45.87	74.00	-28.13	Horizontal	
6267.55	43.80	34.22	11.00	35.30	53.72	74.00	-20.28	Horizontal	

CH11 for 802.11b									
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Test value
1135.62	38.01	24.36	4.52	36.60	30.29	74.00	-43.71	Vertical	Peak
1736.83	38.12	25.41	5.84	37.01	32.36	74.00	-41.64	Vertical	
3214.62	38.98	28.59	7.74	38.23	37.08	74.00	-36.92	Vertical	
4367.06	37.20	30.55	9.10	37.57	39.28	74.00	-34.72	Vertical	
5599.41	33.99	32.56	10.27	35.87	40.95	74.00	-33.05	Vertical	
7015.42	33.52	35.82	11.85	34.81	46.38	74.00	-27.62	Vertical	
1278.49	37.80	24.50	4.79	36.53	30.56	74.00	-43.44	Horizontal	
1583.39	37.41	24.97	5.52	36.70	31.20	74.00	-42.80	Horizontal	
1716.86	37.94	25.36	5.80	36.97	32.13	74.00	-41.87	Horizontal	
3845.54	37.90	29.26	8.56	38.20	37.52	74.00	-36.48	Horizontal	
4521.19	36.68	30.92	9.33	37.36	39.57	74.00	-34.43	Horizontal	
5813.81	35.10	32.91	10.6	35.33	43.28	74.00	-30.72	Horizontal	

Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. The measurement result of peak value is smaller than the AVG Limit, so the AVG value is not show in the test report.

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

CH01 for 802.11g									
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Test value
1206.68	38.55	24.43	4.67	36.57	31.08	74.00	-42.92	Vertical	Peak
1716.86	40.30	25.36	5.80	36.97	34.49	74.00	-39.51	Vertical	
3475.54	39.43	28.69	8.08	38.44	37.76	74.00	-36.24	Vertical	
4341.88	37.30	30.48	9.07	37.59	39.26	74.00	-34.74	Vertical	
5424.18	35.36	32.22	10.15	36.69	41.04	74.00	-32.96	Vertical	
6894.80	33.55	35.66	11.72	34.90	46.03	74.00	-27.97	Vertical	
1293.35	37.92	24.52	4.82	36.52	30.74	74.00	-43.26	Horizontal	
1757.02	38.44	25.47	5.88	37.05	32.74	74.00	-41.26	Horizontal	
3168.50	39.23	28.57	7.68	38.20	37.28	74.00	-36.72	Horizontal	
4341.88	37.12	30.48	9.07	37.59	39.08	74.00	-34.92	Horizontal	
5535.04	34.83	32.45	10.22	36.17	41.33	74.00	-32.67	Horizontal	
6717.76	34.52	35.41	11.50	35.14	46.29	74.00	-27.71	Horizontal	

CH06 for 802.11g									
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Test value
1199.72	38.96	24.43	4.66	36.57	31.48	74.00	-42.52	Vertical	Peak
1658.33	37.15	25.19	5.68	36.84	31.18	74.00	-42.82	Vertical	
3546.57	39.36	28.79	8.19	38.34	38.00	74.00	-36.00	Vertical	
4653.77	36.58	31.00	9.48	37.16	39.90	74.00	-34.10	Vertical	
5746.98	34.62	32.80	10.51	35.47	42.46	74.00	-31.54	Vertical	
6414.16	35.18	34.76	11.02	35.31	45.65	74.00	-28.35	Vertical	
1267.45	37.18	24.49	4.77	36.53	29.91	74.00	-44.09	Horizontal	
1663.13	38.66	25.20	5.69	36.85	32.70	74.00	-41.30	Horizontal	
2163.50	37.81	26.73	6.41	37.33	33.62	74.00	-40.38	Horizontal	
3405.92	39.08	28.67	7.97	38.54	37.18	74.00	-36.82	Horizontal	
4804.11	36.14	31.09	9.54	36.95	39.82	74.00	-34.18	Horizontal	
6213.44	34.08	34.01	11.01	35.29	43.81	74.00	-30.19	Horizontal	

CH11 for 802.11g									
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Test value
1152.15	38.12	24.38	4.55	36.59	30.46	74.00	-43.54	Vertical	Peak
1323.61	37.58	24.55	4.87	36.50	30.50	74.00	-43.50	Vertical	
1751.96	38.69	25.46	5.87	37.04	32.98	74.00	-41.02	Vertical	
3465.51	38.42	28.69	8.06	38.46	36.71	74.00	-37.29	Vertical	
4316.86	36.78	30.41	9.05	37.60	38.64	74.00	-35.36	Vertical	
5763.62	33.94	32.83	10.53	35.42	41.88	74.00	-32.12	Vertical	
1697.12	38.63	25.30	5.76	36.92	32.77	74.00	-41.23	Horizontal	
2157.26	38.66	26.71	6.40	37.33	34.44	74.00	-39.56	Horizontal	
2558.37	38.01	27.98	6.88	37.85	35.02	74.00	-38.98	Horizontal	
3242.61	38.45	28.60	7.77	38.27	36.55	74.00	-37.45	Horizontal	
4508.13	36.82	30.91	9.31	37.38	39.66	74.00	-34.34	Horizontal	
6545.26	33.49	35.16	11.26	35.35	44.56	74.00	-29.44	Horizontal	

Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. The measurement result of peak value is smaller than the AVG Limit, so the AVG value is not show in the test report.
3. The emission levels of other frequencies are very lower than the limit and not show in test report.

CH01 for 802.11n(H20)									
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Test value
1274.80	37.34	24.5	4.79	36.53	30.10	74.00	-43.90	Vertical	Peak
1726.81	36.97	25.39	5.82	36.99	31.19	74.00	-42.81	Vertical	
2233.39	37.80	26.99	6.50	37.43	33.86	74.00	-40.14	Vertical	
3177.67	38.84	28.58	7.69	38.20	36.91	74.00	-37.09	Vertical	
4534.27	36.85	30.92	9.35	37.34	39.78	74.00	-34.22	Vertical	
6795.87	32.98	35.52	11.6	35.00	45.10	74.00	-28.90	Vertical	
1185.96	38.43	24.41	4.63	36.58	30.89	74.00	-43.11	Horizontal	
2144.82	37.96	26.66	6.39	37.33	33.68	74.00	-40.32	Horizontal	
3016.57	39.40	28.51	7.50	38.23	37.18	74.00	-36.82	Horizontal	
4027.55	38.12	29.57	8.80	38.05	38.44	74.00	-35.56	Horizontal	
6231.42	34.11	34.08	11.01	35.29	43.91	74.00	-30.09	Horizontal	
7035.72	33.12	35.83	11.85	34.84	45.96	74.00	-28.04	Horizontal	

CH06 for 802.11n(H20)									
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Test value
1323.61	36.56	24.55	4.87	36.5	29.48	74.00	-44.52	Vertical	Peak
2132.46	36.43	26.61	6.38	37.33	32.09	74.00	-41.91	Vertical	
3337.71	38.78	28.64	7.89	38.44	36.87	74.00	-37.13	Vertical	
4694.29	35.92	31.02	9.50	37.10	39.34	74.00	-34.66	Vertical	
5898.42	33.98	33.04	10.63	35.38	42.27	74.00	-31.73	Vertical	
7875.25	32.13	36.59	12.9	34.87	46.75	74.00	-27.25	Vertical	
1263.79	38.16	24.49	4.77	36.53	30.89	74.00	-43.11	Horizontal	
1711.90	37.37	25.34	5.79	36.96	31.54	74.00	-42.46	Horizontal	
3757.63	38.38	29.13	8.45	38.24	37.72	74.00	-36.28	Horizontal	
4534.27	36.72	30.92	9.35	37.34	39.65	74.00	-34.35	Horizontal	
6159.79	33.33	33.81	10.94	35.32	42.76	74.00	-31.24	Horizontal	
7541.11	33.62	36.25	12.53	34.93	47.47	74.00	-26.53	Horizontal	

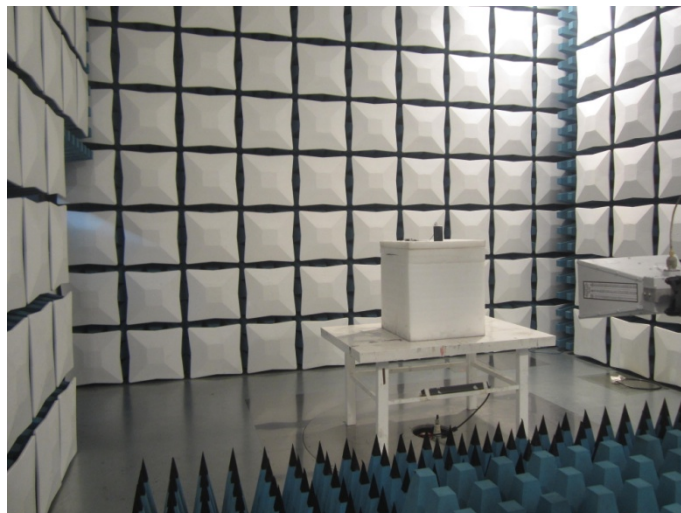
CH11 for 802.11n(H20)									
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Test value
1152.18	37.98	24.38	4.55	36.59	30.32	74.00	-43.68	Vertical	Peak
1653.55	38.71	25.18	5.67	36.83	32.73	74.00	-41.27	Vertical	
2239.86	38.99	27.01	6.51	37.45	35.06	74.00	-38.94	Vertical	
3577.46	38.45	28.84	8.24	38.3	37.23	74.00	-36.77	Vertical	
5567.13	35.29	32.51	10.25	36.02	42.03	74.00	-31.97	Vertical	
7326.26	34.85	36.07	11.99	34.92	47.99	74.00	-26.01	Vertical	
1263.79	37.54	24.49	4.77	36.53	30.27	74.00	-43.73	Horizontal	
1587.97	37.57	24.98	5.54	36.70	31.39	74.00	-42.61	Horizontal	
3546.57	39.09	28.79	8.19	38.34	37.73	74.00	-36.27	Horizontal	
4329.35	37.32	30.44	9.06	37.59	39.23	74.00	-34.77	Horizontal	
6267.55	33.99	34.22	11.00	35.3	43.91	74.00	-30.09	Horizontal	
7411.46	35.12	36.13	12.11	34.83	48.53	74.00	-25.47	Horizontal	

Remark:

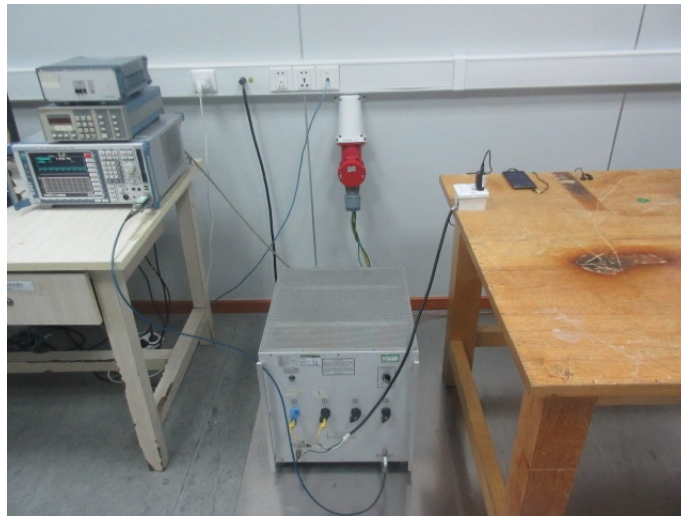
1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. The measurement result of peak value is smaller than the AVG Limit, so the AVG value is not show in the test report.
3. The emission levels of other frequencies are very lower than the limit and not show in test report.

5. Test Setup Photos of the EUT

Radiated Emission



Conducted Emission (AC Mains)



6. External and Internal Photos of the EUT

Reference to Test Report No.: TRE1611010501.

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