



TEST REPORT

Report Reference No.: **TRE1711002201** R/C.....: 71870

FCC ID: **2AIV9D68802**

Applicant's name: **Beijing Visual World Technology Co., Ltd.**

Address: 15th Floor and 17th Floor 1701-10A, Building 3, No. 10, Jiuxianqiao Road Jia, Chaoyang District, Beijing, China

Manufacturer.....: Beijing Visual World Technology Co., Ltd.

Address.....: 15th Floor and 17th Floor 1701-10A, Building 3, No. 10, Jiuxianqiao Road Jia, Chaoyang District, Beijing, China

Test item description: **360 Smart Camera**

Trade Mark.....: 360

Model/Type reference: D688-02

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

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

Date of receipt of test sample.....: Nov. 06, 2017

Date of testing.....: Nov. 07, 2017 - Nov. 23, 2017

Date of issue.....: Nov. 23, 2017

Result: **PASS**

Compiled by
(position+printedname+signature) ...: File administrators Shayne Zhu

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Jerry Wang

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

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. 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

[KDB558074 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	Nov. 23, 2017	Original

2. Test Description

Test Item	Section in CFR 47	Result
Antenna requirement	15.203/15.247 (c)	Pass
Line Conducted Emissions (AC Main)	15.207	Pass
Conducted Peak Output Power	15.247 (b)(3)	Pass
Power Spectral Density	15.247 (e)	Pass
6dB Bandwidth	15.247 (a)(2)	Pass
Restricted band	15.247(d)/15.205	Pass
Spurious Emissions	15.247(d)/15.209	Pass

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

3. Summary

3.1. Client Information

Applicant:	Beijing Visual World Technology Co., Ltd.
Address:	15th Floor and 17th Floor 1701-10A, Building 3, No. 10, Jiuxianqiao Road Jia, Chaoyang District, Beijing, China
Manufacturer:	Beijing Visual World Technology Co., Ltd.
Address:	15th Floor and 17th Floor 1701-10A, Building 3, No. 10, Jiuxianqiao Road Jia, Chaoyang District, Beijing, China

3.2. Product Description

Name of EUT:	360 Smart Camera			
Trade Mark:	360			
Model No.:	D688-02			
Listed Model(s):	-			
Power supply:	AC120V/60Hz			
Adapter information:	Model: TEKA012-1200800UK Input: 100-240Va.c., 50/60Hz, 0.35A MAX Output: 12Vd.c., 0.8A			
Hardware version:	RTL8188EUS-VH			
Software version:	rtl8188EUS_linux_v5.2.2_19960.20161226			
WIFI				
Supported type:	☒ 802.11b	☒ 802.11g	☒ 802.11n(HT20)	☒ 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:	Integral antenna			
Antenna gain:	2.0 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. :	
○	Person Computer	Manufacturer :	TOSHIBA
		Model No. :	M800-T30B1

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

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

4.2. 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.

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. Registration 762235.

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. Further more, 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 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-40 GHz	1.60 dB	(1)
Radiated spurious emissions 9KHz-40 GHz	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)
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.

4.5. Equipments Used during the Test

Line Conducted Emission (AC Main)					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. mm-dd-yy
1	EMI Test Receiver	R&S	ESCI	101247	2017/11/11
2	Artificial Mains	Shwarzbeck	NNLK 8121	573	2017/11/11
3	Pulse Limiter	R&S	ESH3-Z2	101488	2017/11/11
4	Test Software	R&S	ES-K1	N/A	N/A

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 mm-dd-yy
1	Spectrum Analyzer	Rohde&Schwarz	FSP	1164.4391.40	2017/11/11
2	Power Meter	Anritsu	ML2480B	100798	2017/11/11
3	Power Sensor	Anritsu	MA2411B	100258	2017/11/11
4	Test cable	FARPU	MCX-J	N/A	2017/11/11
5	Temporary antenna connector	D-LENP	NJ-SMAK	N/A	2017/11/11

NOTE: The temporary antenna connector is soldered on the PCB board in order to perform conducted tests and this temporary antenna connector is listed in the equipment list.

Radiated Emission					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. mm-dd-yy
1	Ultra-Broadband Antenna	SCHWARZBECK	VULB9163	538	04/05/2017
2	Emi Test Receiver	R&S	ESCI	101247	11/11/2017
3	Pre-amplifier	SCHWARZBECK	BBV 9742	N/A	11/22/2017
4	Turntable	Maturo Germany	TT2.0-1T	N/A	N/A
5	Antenna Mast	Maturo Germany	CAM-4.0-P-12	N/A	N/A
6	Test Software	R&S	ES-K1	N/A	N/A
7	Active Rod Antenna	BEIJING Radio	ZN30800	N/A	N/A
8	Loop Antenna	R&S	HFH2-Z2	100020	11/20/2017
9	RF Connection Cable	HUBER+SUHNER	N/A	N/A	11/21/2017
10	RF Connection Cable	HUBER+SUHNER	SUCOFLEX104	501184/4	11/21/2017
11	Horn Antenna	SCHWARZBECK	9120D	1011	03/27/2017
12	Horn Antenna	SCHWARZBECK	BBHA9170	25841	11/11/2017
13	Spectrum Analyzer	R&S	FSP40	100597	11/11/2017
14	Broadband Preamplifier	SCHWARZBECK	BBV 9718	9718-248	10/18/2017
15	RF Connection Cable	HUBER+SUHNER	MULTIFLEX 141	N/A	11/21/2017
16	Turntable	Maturo Germany	TT2.0-1T	N/A	N/A
17	Antenna Mast	Maturo Germany	CAM-4.0-P-12	N/A	N/A
18	Test Software	R&S	E3	N/A	N/A
19	Pre-amplifier	SCHWARZBECK	BBV 9743	9743-0022	10/18/2017
20	RF Connection Cable	HUBER+SUHNER	3m 18GHz S	N/A	11/21/2017

			Serisa		
21	RF Connection Cable	HUBER+SUHNER	3m 3GHz S Serisa	N/A	11/21/2017
22	RF Connection Cable	HUBER+SUHNER	3m 3GHz RG Serisa	N/A	11/21/2017
23	RF Connection Cable	HUBER+SUHNER	6m 18GHz S Serisa	N/A	11/21/2017
24	RF Connection Cable	HUBER+SUHNER	6m 18GHz S Serisa	N/A	N/A
25	RF Connection Cable	HUBER+SUHNER	3m 18GHz S Serisa	N/A	N/A

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.

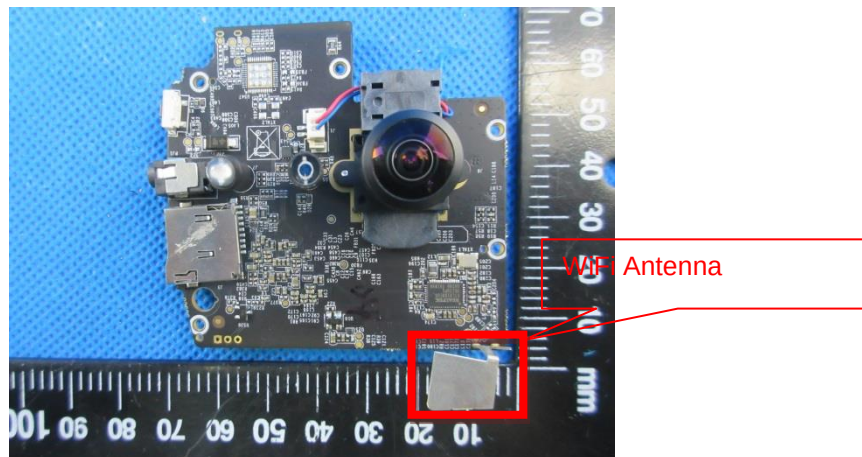
FCC CFR Title 47 Part 15 Subpart C Section 15.247(c) (1)(i):

(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 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 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)

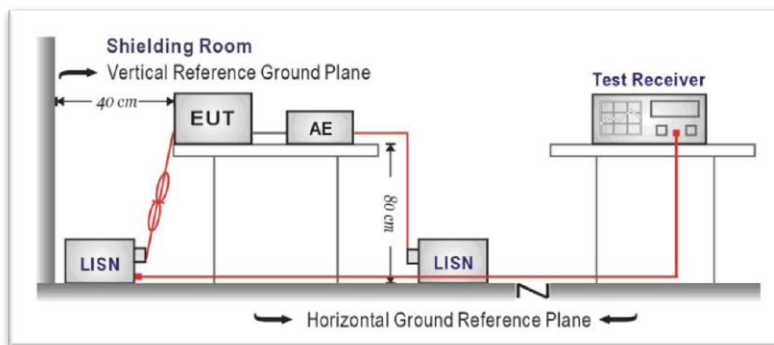
LIMIT

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 for compliance to FCC 47CFR 15.247 requirements.
2. The EUT was placed on a plat form of nominal size, 1 m by 1.5 m, raised 10 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 10 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 50ohm / 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:

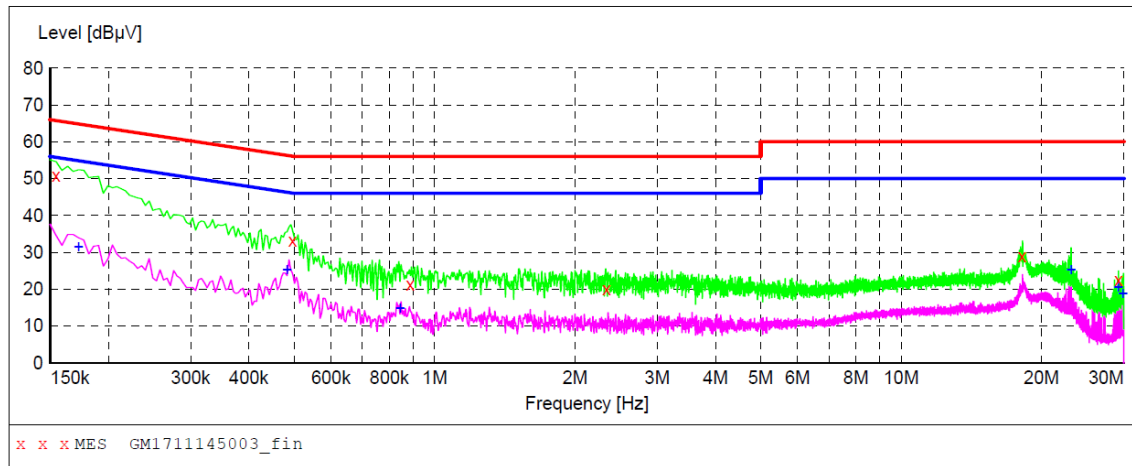
Please refer to the clause 3.3

TEST RESULTS

☒ Passed ☐ Not Applicable

Test Line:

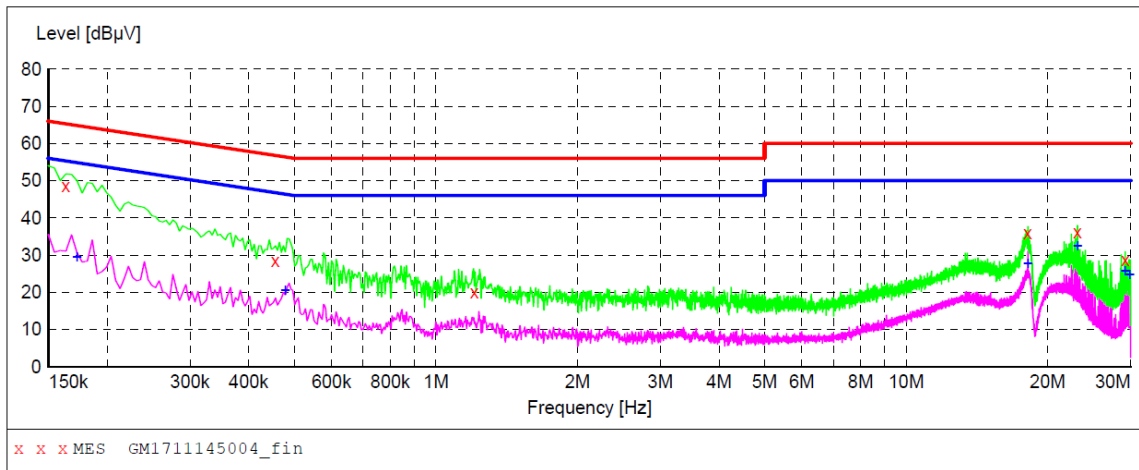
L



Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.154500	50.70	10.4	66	15.1	QP	L1	GND
0.496500	33.10	10.2	56	23.0	QP	L1	GND
0.888000	21.30	10.1	56	34.7	QP	L1	GND
2.337000	20.10	10.2	56	35.9	QP	L1	GND
18.177000	28.90	10.5	60	31.1	QP	L1	GND
29.233500	22.60	10.8	60	37.4	QP	L1	GND
Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.172500	31.50	10.4	55	23.3	AV	L1	GND
0.483000	25.30	10.2	46	21.0	AV	L1	GND
0.843000	14.80	10.1	46	31.2	AV	L1	GND
23.127000	25.20	10.7	50	24.8	AV	L1	GND
29.233500	20.50	10.8	50	29.5	AV	L1	GND
29.904000	18.90	10.8	50	31.1	AV	L1	GND

Test Line:

N



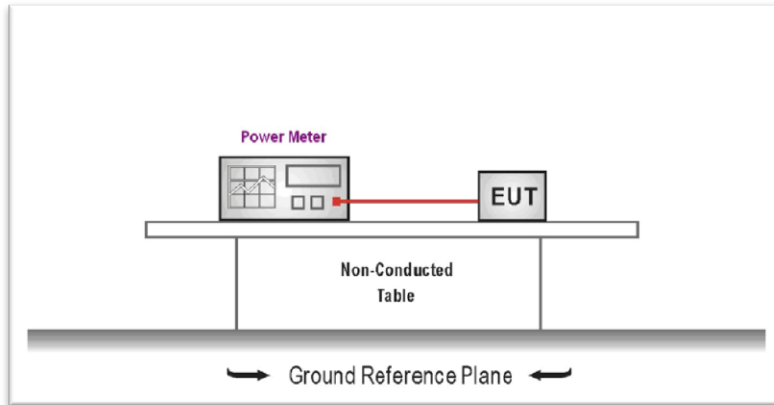
Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.163500	48.70	10.4	65	16.6	QP	N	GND
0.456000	28.60	10.2	57	28.2	QP	N	GND
1.207500	20.10	10.2	56	35.9	QP	N	GND
18.132000	36.00	10.5	60	24.0	QP	N	GND
23.127000	36.30	10.7	60	23.7	QP	N	GND
29.233500	28.70	10.8	60	31.3	QP	N	GND
Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.172500	29.50	10.4	55	25.3	AV	N	GND
0.478500	20.50	10.2	46	25.9	AV	N	GND
18.132000	27.80	10.5	50	22.2	AV	N	GND
23.127000	32.40	10.7	50	17.6	AV	N	GND
29.233500	25.80	10.8	50	24.2	AV	N	GND
29.904000	24.70	10.8	50	25.3	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 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 MODE:

Please refer to the clause 3.3

TEST RESULTS

☒ Passed ☐ Not Applicable

Type	Channel	Output power (dBm)	Limit (dBm)	Result
802.11b	01	18.73	30.00	Pass
	06	19.08		
	11	18.79		
802.11g	01	16.46	30.00	Pass
	06	17.03		
	11	16.89		
802.11n(HT20)	01	14.70	30.00	Pass
	06	15.24		
	11	15.21		
802.11n(HT40)	03	12.95	30.00	Pass
	06	13.08		
	09	13.27		

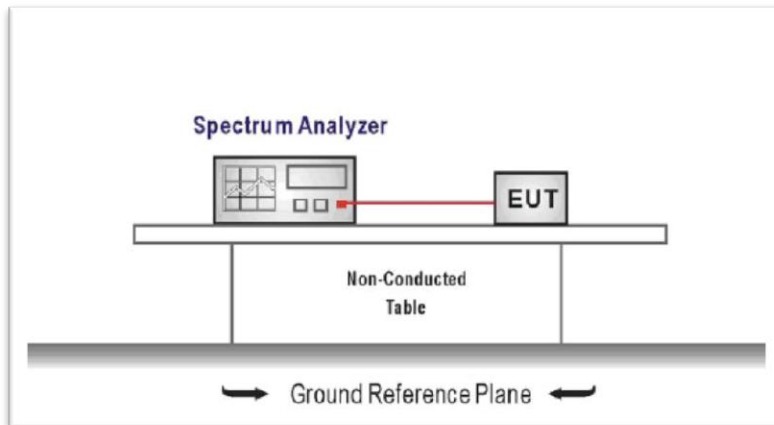
5.4. Power Spectral Density

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 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 MODE:

Please refer to the clause 3.3

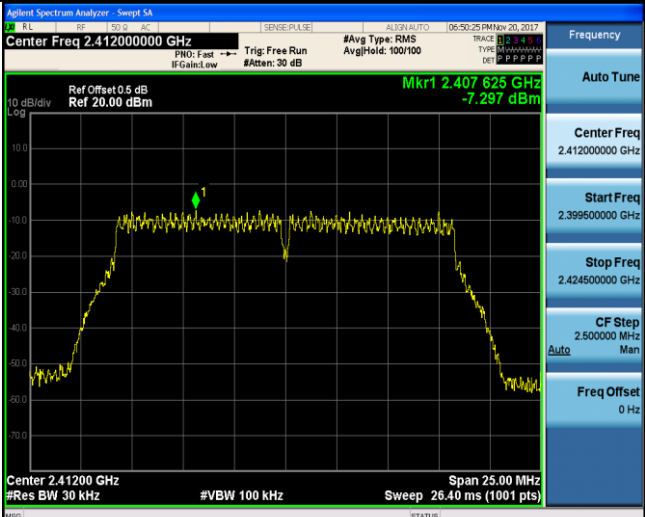
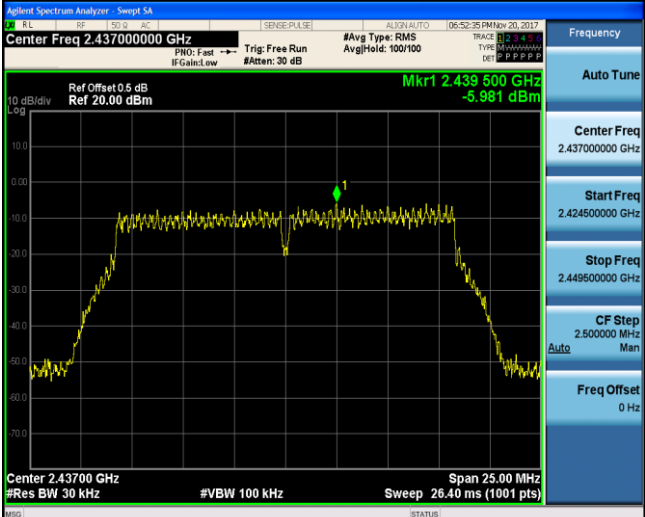
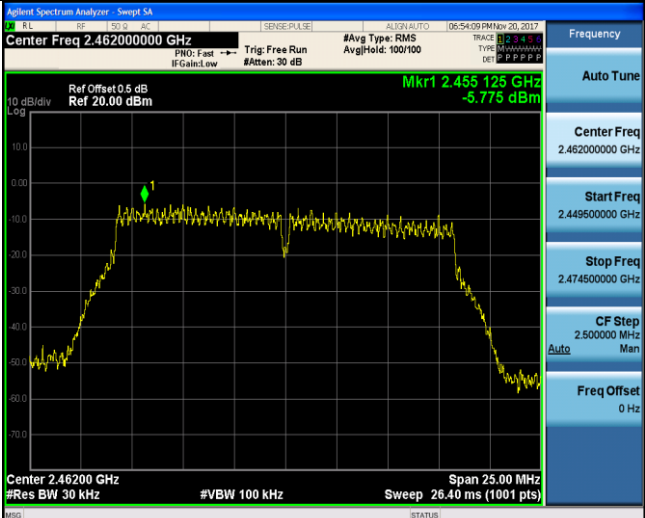
TEST RESULTS

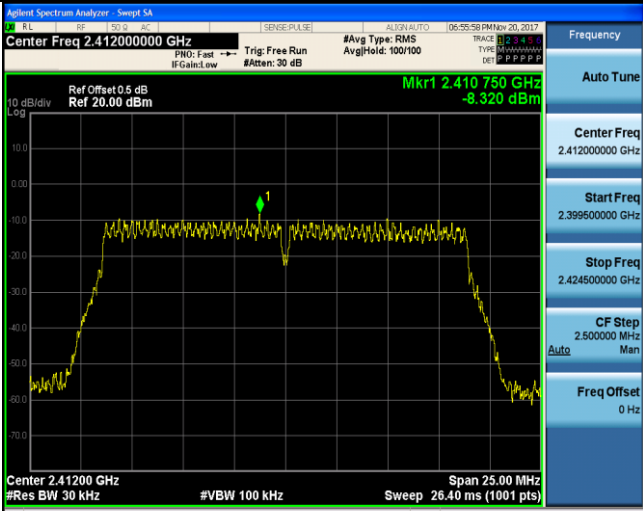
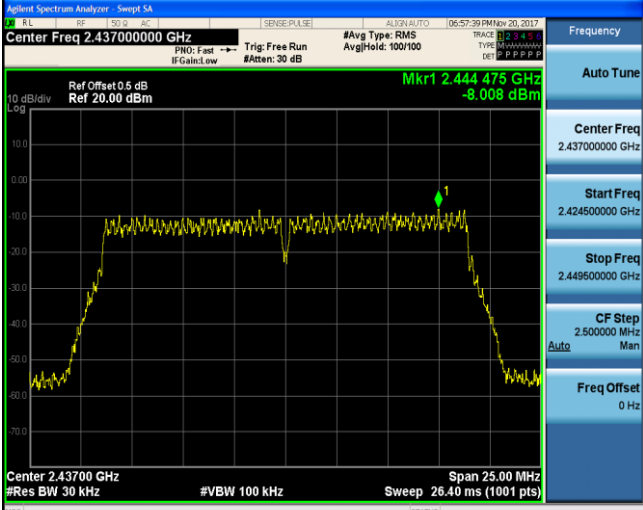
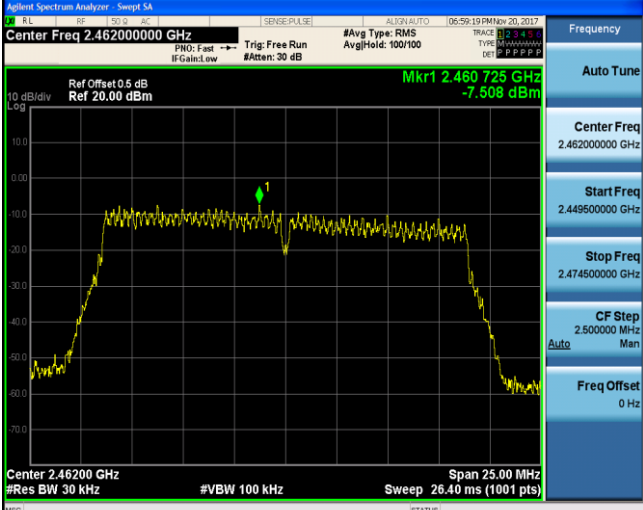
☒ Passed ☐ Not Applicable

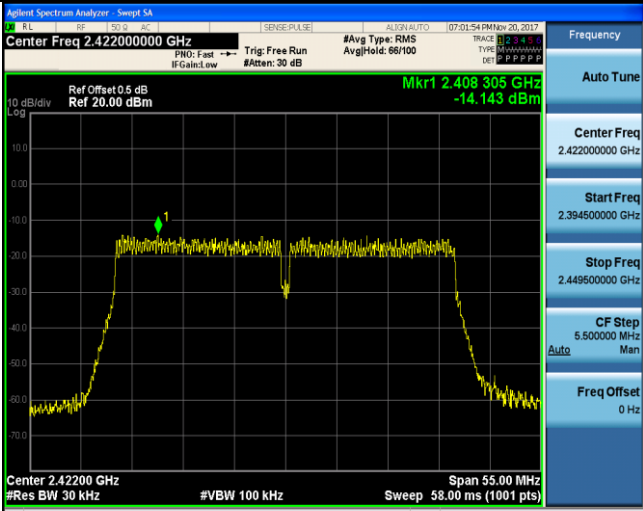
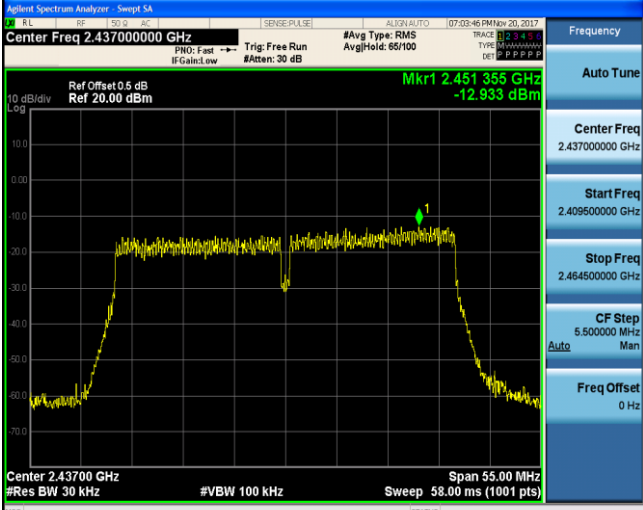
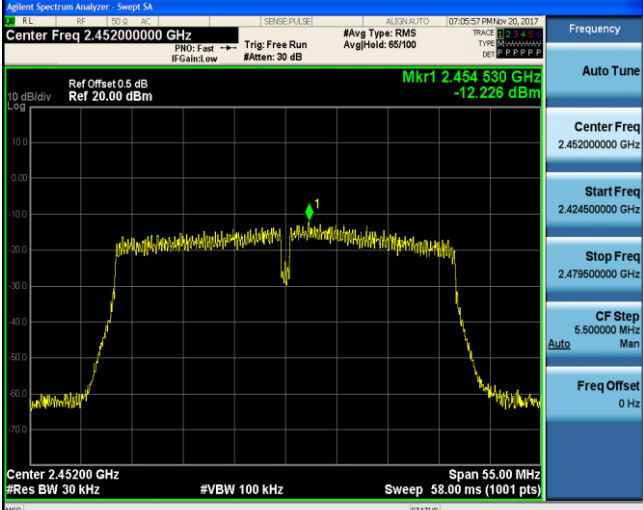
Type	Channel	Power Spectral Density (dBm/3KHz)	Limit (dBm/3KHz)	Result
802.11b	01	2.70	8.00	Pass
	06	5.04		
	11	3.14		
802.11g	01	-7.30	8.00	Pass
	06	-5.98		
	11	-5.78		
802.11n(HT20)	01	-8.32	8.00	Pass
	06	-8.01		
	11	-7.51		
802.11n(HT40)	03	-14.14	8.00	Pass
	06	-12.93		
	09	-12.23		

Test plot as follows:

Type:		802.11 b
CH01		Frequency Auto Tune Center Freq 2.412000000 GHz Start Freq 2.404000000 GHz Stop Freq 2.420000000 GHz CF Step 1.600000 MHz Auto Man Freq Offset 0 Hz
CH06		Frequency Auto Tune Center Freq 2.437000000 GHz Start Freq 2.429000000 GHz Stop Freq 2.445000000 GHz CF Step 1.600000 MHz Auto Man Freq Offset 0 Hz
CH11		Frequency Auto Tune Center Freq 2.462000000 GHz Start Freq 2.454000000 GHz Stop Freq 2.470000000 GHz CF Step 1.600000 MHz Auto Man Freq Offset 0 Hz

Type:		802.11 g	
CH01			
CH06			
CH11			

Type:		802.11n(HT20)	
CH01			
CH06			
CH11			

Type:		802.11n(HT40)	
CH03			
CH06			
CH09			

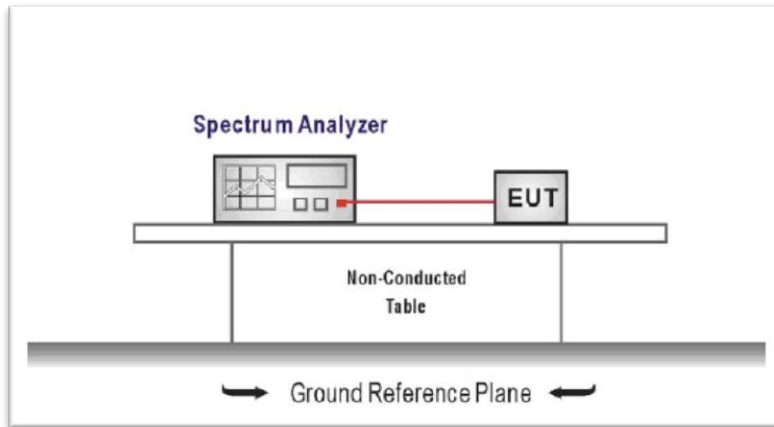
5.5. 6dB bandwidth

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 = $2 \times$ 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 MODE:

Please refer to the clause 3.3

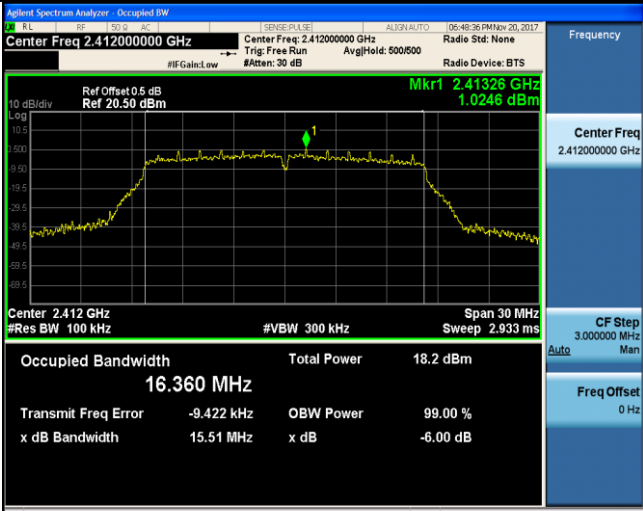
TEST RESULTS

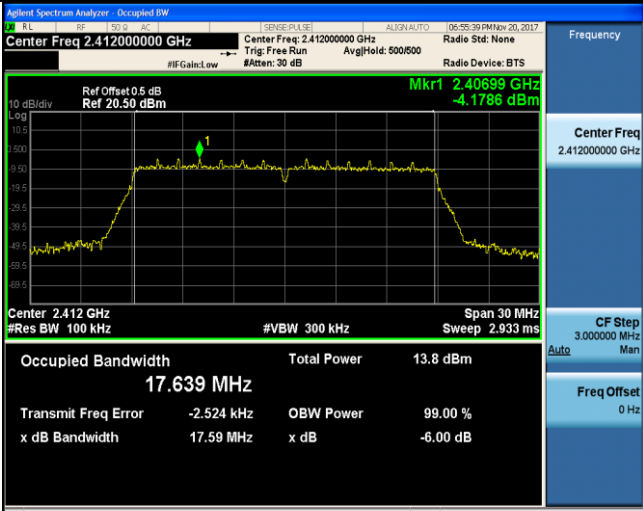
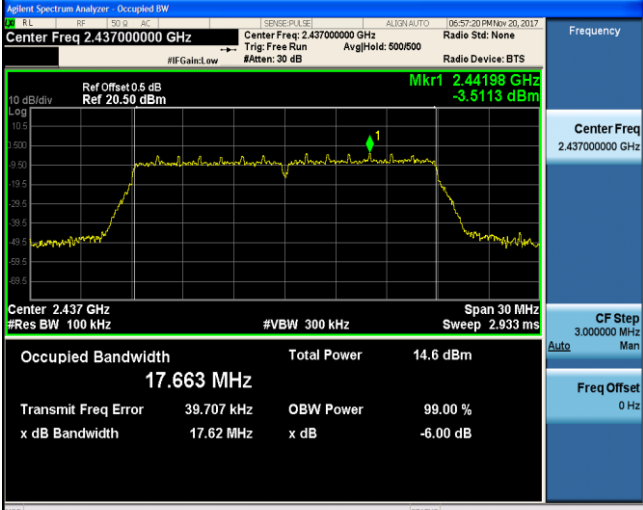
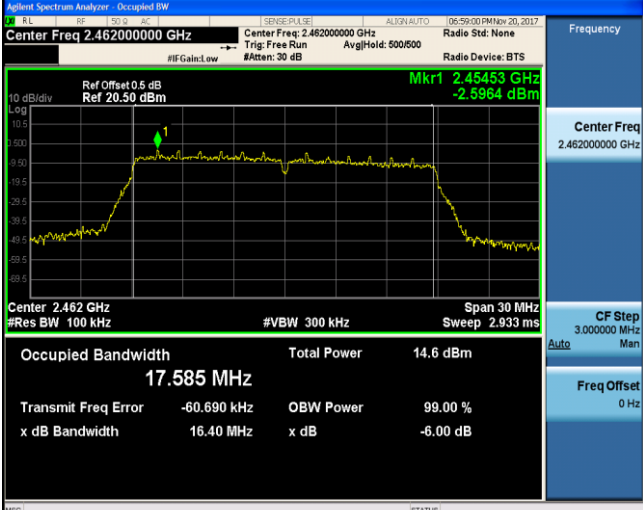
☒ Passed ☐ Not Applicable

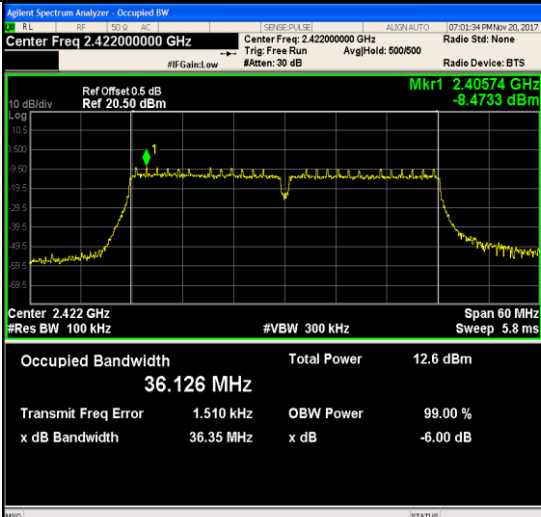
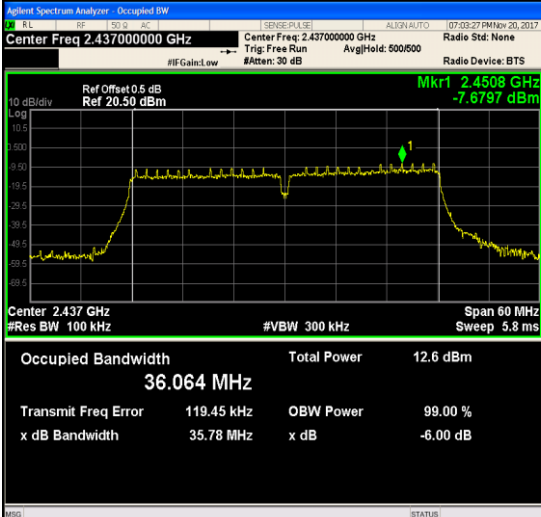
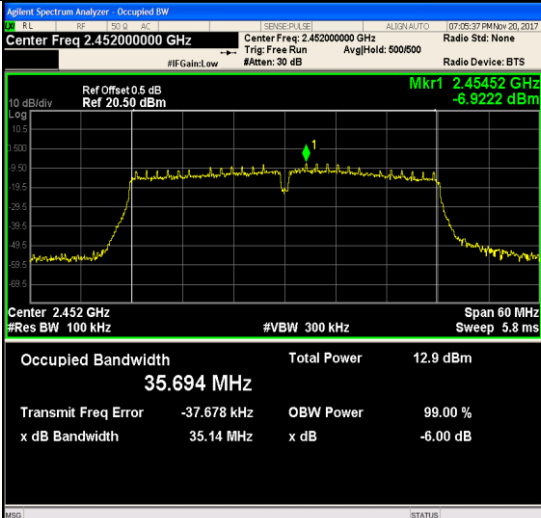
Type	Channel	6dB Bandwidth (MHz)	Limit (kHz)	Result
802.11b	01	9.60	≥500	Pass
	06	9.58		
	11	9.09		
802.11g	01	15.51	≥500	Pass
	06	16.41		
	11	15.76		
802.11n(HT20)	01	17.59	≥500	Pass
	06	17.62		
	11	16.40		
802.11n(HT40)	03	36.35	≥500	Pass
	06	35.78		
	09	35.14		

Test plot as follows:

Type:		802.11 b
CH01		
CH06		
CH11		

Type:		802.11 g
CH01		
CH06		
CH11		

Type:		802.11n(HT20)	
CH01			
CH06			
CH11			

Type:		802.11n(HT40)	
CH03		 Agilent Spectrum Analyzer - Occupied BW Center Freq 2.422000000 GHz Mkr1 2.40574 GHz -8.4733 dBm Center 2.422 GHz Res BW 100 kHz #VBW 300 kHz Span 60 MHz Sweep 5.8 ms Occupied Bandwidth 36.126 MHz Total Power 12.6 dBm Transmit Freq Error 1.510 kHz OBW Power 99.00 % x dB Bandwidth 36.35 MHz x dB -6.00 dB	Frequency Center Freq 2.422000000 GHz CF Step 6.000000 MHz Freq Offset 0 Hz
CH06		 Agilent Spectrum Analyzer - Occupied BW Center Freq 2.437000000 GHz Mkr1 2.4508 GHz -7.6797 dBm Center 2.437 GHz Res BW 100 kHz #VBW 300 kHz Span 60 MHz Sweep 5.8 ms Occupied Bandwidth 36.064 MHz Total Power 12.6 dBm Transmit Freq Error 119.45 kHz OBW Power 99.00 % x dB Bandwidth 35.78 MHz x dB -6.00 dB	Frequency Center Freq 2.437000000 GHz CF Step 6.000000 MHz Freq Offset 0 Hz
CH09		 Agilent Spectrum Analyzer - Occupied BW Center Freq 2.452000000 GHz Mkr1 2.45452 GHz -6.9222 dBm Center 2.452 GHz Res BW 100 kHz #VBW 300 kHz Span 60 MHz Sweep 5.8 ms Occupied Bandwidth 35.694 MHz Total Power 12.9 dBm Transmit Freq Error -37.678 kHz OBW Power 99.00 % x dB Bandwidth 35.14 MHz x dB -6.00 dB	Frequency Center Freq 2.452000000 GHz CF Step 6.000000 MHz Freq Offset 0 Hz

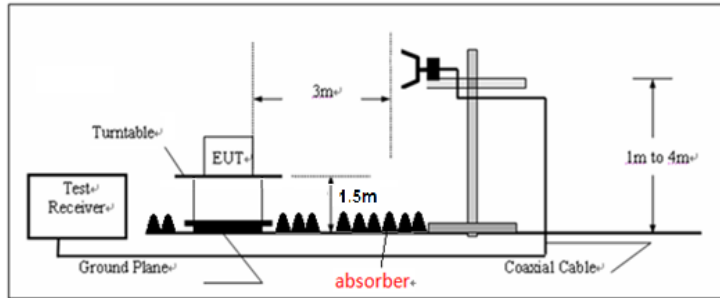
5.6. Restricted band

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 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 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)	Preamp Factor (dB)	Level (dBUV/m)	Limit Line (dBUV/m)	Margin Limit (dB)	Polarization	Test value
2310.00	13.38	28.05	6.62	0.00	48.05	74.00	-25.95	Horizontal	Peak
2390.01	14.55	27.65	6.75	0.00	48.95	74.00	-25.05	Horizontal	Peak
2310.00	14.48	28.05	6.62	0.00	49.15	74.00	-24.85	Vertical	Peak
2390.01	14.07	27.65	6.75	0.00	48.47	74.00	-25.53	Vertical	Peak
2310.00	11.33	28.05	6.62	0.00	46.00	54.00	-8.00	Horizontal	Average
2390.01	10.87	27.65	6.75	0.00	45.27	54.00	-8.73	Horizontal	Average
2310.00	11.31	28.05	6.62	0.00	45.98	54.00	-8.02	Vertical	Average
2390.01	10.87	27.65	6.75	0.00	45.27	54.00	-8.73	Vertical	Average

802.11b						CH11			
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
2483.49	12.58	27.26	6.83	0.00	46.67	74.00	-27.33	Horizontal	Peak
2500.00	12.53	27.20	6.84	0.00	46.57	74.00	-27.43	Horizontal	Peak
2483.49	14.70	27.26	6.83	0.00	48.79	74.00	-25.21	Vertical	Peak
2500.00	14.71	27.20	6.84	0.00	48.75	74.00	-25.25	Vertical	Peak
2483.49	10.93	27.26	6.83	0.00	45.02	54.00	-8.98	Horizontal	Average
2500.00	10.91	27.20	6.84	0.00	44.95	54.00	-9.05	Horizontal	Average
2483.49	10.89	27.26	6.83	0.00	44.98	54.00	-9.02	Vertical	Average
2500.00	10.92	27.20	6.84	0.00	44.96	54.00	-9.04	Vertical	Average

802.11g						CH01			
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
2310.00	14.17	28.05	6.62	0.00	48.84	74.00	-25.16	Horizontal	Peak
2390.01	15.13	27.65	6.75	0.00	49.53	74.00	-24.47	Horizontal	Peak
2310.00	14.81	28.05	6.62	0.00	49.48	74.00	-24.52	Vertical	Peak
2390.01	14.18	27.65	6.75	0.00	48.58	74.00	-25.42	Vertical	Peak
2310.00	11.36	28.05	6.62	0.00	46.03	54.00	-7.97	Horizontal	Average
2390.01	10.89	27.65	6.75	0.00	45.29	54.00	-8.71	Horizontal	Average
2310.00	11.36	28.05	6.62	0.00	46.03	54.00	-7.97	Vertical	Average
2390.01	10.90	27.65	6.75	0.00	45.30	54.00	-8.70	Vertical	Average

802.11g						CH11			
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
2483.49	14.57	27.26	6.83	0.00	48.66	74.00	-25.34	Horizontal	Peak
2500.00	12.38	27.20	6.84	0.00	46.42	74.00	-27.58	Horizontal	Peak
2483.49	13.44	27.26	6.83	0.00	47.53	74.00	-26.47	Vertical	Peak
2500.00	13.32	27.20	6.84	0.00	47.36	74.00	-26.64	Vertical	Peak
2483.49	10.98	27.26	6.83	0.00	45.07	54.00	-8.93	Horizontal	Average
2500.00	10.89	27.20	6.84	0.00	44.93	54.00	-9.07	Horizontal	Average
2483.49	11.01	27.26	6.83	0.00	45.10	54.00	-8.90	Vertical	Average
2500.00	10.88	27.20	6.84	0.00	44.92	54.00	-9.08	Vertical	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)	Margin Limit (dB)	Polarization	Test value
2310.00	14.10	28.05	6.62	0.00	48.77	74.00	-25.23	Horizontal	Peak
2390.01	14.09	27.65	6.75	0.00	48.49	74.00	-25.51	Horizontal	Peak
2310.00	12.98	28.05	6.62	0.00	47.65	74.00	-26.35	Vertical	Peak
2390.01	13.04	27.65	6.75	0.00	47.44	74.00	-26.56	Vertical	Peak
2310.00	11.35	28.05	6.62	0.00	46.02	54.00	-7.98	Horizontal	Average
2390.01	10.89	27.65	6.75	0.00	45.29	54.00	-8.71	Horizontal	Average
2310.00	11.37	28.05	6.62	0.00	46.04	54.00	-7.96	Vertical	Average
2390.01	10.92	27.65	6.75	0.00	45.32	54.00	-8.68	Vertical	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)	Margin Limit (dB)	Polarization	Test value
2483.49	12.37	27.26	6.83	0.00	46.46	74.00	-27.54	Horizontal	Peak
2500.00	12.37	27.20	6.84	0.00	46.41	74.00	-27.59	Horizontal	Peak
2483.49	12.24	27.26	6.83	0.00	46.33	74.00	-27.67	Vertical	Peak
2500.00	12.79	27.20	6.84	0.00	46.83	74.00	-27.17	Vertical	Peak
2483.49	11.27	27.26	6.83	0.00	45.36	54.00	-8.64	Horizontal	Average
2500.00	10.90	27.20	6.84	0.00	44.94	54.00	-9.06	Horizontal	Average
2483.49	11.11	27.26	6.83	0.00	45.20	54.00	-8.80	Vertical	Average
2500.00	10.91	27.20	6.84	0.00	44.95	54.00	-9.05	Vertical	Average

802.11n(HT40)						CH03			
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
2310.00	14.14	28.05	6.62	0.00	48.81	74.00	-25.19	Horizontal	Peak
2389.99	13.69	27.65	6.75	0.00	48.09	74.00	-25.91	Horizontal	Peak
2310.00	14.36	28.05	6.62	0.00	49.03	74.00	-24.97	Vertical	Peak
2389.99	13.24	27.65	6.75	0.00	47.64	74.00	-26.36	Vertical	Peak
2310.00	11.30	28.05	6.62	0.00	45.97	54.00	-8.03	Horizontal	Average
2389.99	11.52	27.65	6.75	0.00	45.92	54.00	-8.08	Horizontal	Average
2310.00	11.31	28.05	6.62	0.00	45.98	54.00	-8.02	Vertical	Average
2389.99	10.92	27.65	6.75	0.00	45.32	54.00	-8.68	Vertical	Average

802.11n(HT40)						CH09			
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	13.86	27.26	6.83	0.00	47.95	74.00	-26.05	Horizontal	Peak
2500.00	15.10	27.20	6.84	0.00	49.14	74.00	-24.86	Horizontal	Peak
2483.50	14.16	27.26	6.83	0.00	48.25	74.00	-25.75	Vertical	Peak
2500.00	14.20	27.20	6.84	0.00	48.24	74.00	-25.76	Vertical	Peak
2483.50	11.63	27.26	6.83	0.00	45.72	54.00	-8.28	Horizontal	Average
2500.00	10.94	27.20	6.84	0.00	44.98	54.00	-9.02	Horizontal	Average
2483.50	11.19	27.26	6.83	0.00	45.28	54.00	-8.72	Vertical	Average
2500.00	10.95	27.20	6.84	0.00	44.99	54.00	-9.01	Vertical	Average

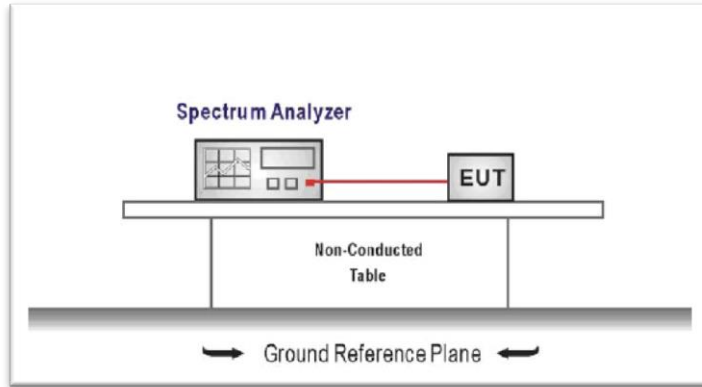
5.7. Band edge and Spurious Emission (conducted)

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

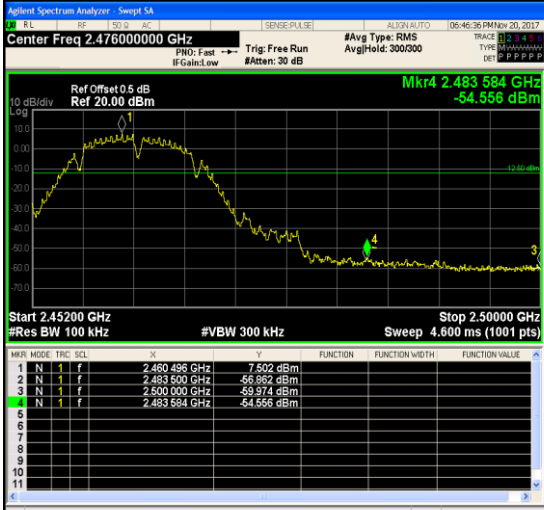
Note: the channel found to contain the maximum PSD level can be used to establish the reference level.
3. Emission level measurement
Set the center frequency and span to encompass frequency range to be measured
RBW = 100 kHz, VBW $\geq 3 \times$ RBW
Detector = peak, Sweep time = auto couple, Trace mode = 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.

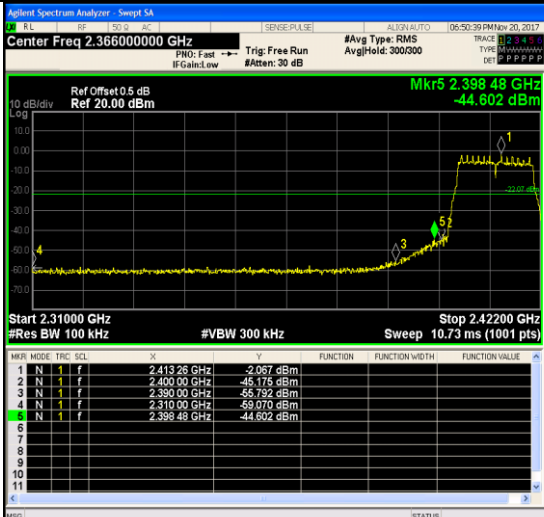
TEST MODE:

Please refer to the clause 3.3

TEST RESULTS

☒ Passed ☐ Not Applicable

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

Test Item:	Bandedge	Type:	802.11 g																																																					
CH01	 Agilent Spectrum Analyzer - Swept SA Center Freq 2.366000000 GHz Ref Offset 0.5 dB Ref 20.00 dBm Mkr5 2.39848 GHz -44.602 dBm Start 2.31000 GHz #Res BW 100 kHz Stop 2.42200 GHz #VBW 300 kHz Sweep 10.73 ms (1001 pts) <table><tr><th>MARK</th><th>MODE</th><th>TRIG</th><th>SCL</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>2.41326 GHz</td><td>-2.067 dBm</td><td></td><td></td><td></td></tr><tr><td>2</td><td>N</td><td>1</td><td>f</td><td>2.40000 GHz</td><td>-45.176 dBm</td><td></td><td></td><td></td></tr><tr><td>3</td><td>N</td><td>1</td><td>f</td><td>2.39000 GHz</td><td>-55.792 dBm</td><td></td><td></td><td></td></tr><tr><td>4</td><td>N</td><td>1</td><td>f</td><td>2.31000 GHz</td><td>-59.070 dBm</td><td></td><td></td><td></td></tr><tr><td>5</td><td>N</td><td>1</td><td>f</td><td>2.39848 GHz</td><td>-44.602 dBm</td><td></td><td></td><td></td></tr></table>	MARK	MODE	TRIG	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	N	1	f	2.41326 GHz	-2.067 dBm				2	N	1	f	2.40000 GHz	-45.176 dBm				3	N	1	f	2.39000 GHz	-55.792 dBm				4	N	1	f	2.31000 GHz	-59.070 dBm				5	N	1	f	2.39848 GHz	-44.602 dBm				Frequency Auto Tune Center Freq 2.366000000 GHz Start Freq 2.310000000 GHz Stop Freq 2.422000000 GHz CF Step 11.200000 MHz Auto Man Freq Offset 0 Hz
MARK	MODE	TRIG	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE																																																
1	N	1	f	2.41326 GHz	-2.067 dBm																																																			
2	N	1	f	2.40000 GHz	-45.176 dBm																																																			
3	N	1	f	2.39000 GHz	-55.792 dBm																																																			
4	N	1	f	2.31000 GHz	-59.070 dBm																																																			
5	N	1	f	2.39848 GHz	-44.602 dBm																																																			
CH11	 Agilent Spectrum Analyzer - Swept SA Center Freq 2.476000000 GHz Ref Offset 0.5 dB Ref 20.00 dBm Mkr4 2.483584 GHz -53.900 dBm Start 2.45200 GHz #Res BW 100 kHz Stop 2.50000 GHz #VBW 300 kHz Sweep 4.600 ms (1001 pts) <table><tr><th>MARK</th><th>MODE</th><th>TRIG</th><th>SCL</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>2.456992 GHz</td><td>-0.774 dBm</td><td></td><td></td><td></td></tr><tr><td>2</td><td>N</td><td>1</td><td>f</td><td>2.483500 GHz</td><td>-56.276 dBm</td><td></td><td></td><td></td></tr><tr><td>3</td><td>N</td><td>1</td><td>f</td><td>2.500000 GHz</td><td>-60.199 dBm</td><td></td><td></td><td></td></tr><tr><td>4</td><td>N</td><td>1</td><td>f</td><td>2.483584 GHz</td><td>-53.900 dBm</td><td></td><td></td><td></td></tr></table>	MARK	MODE	TRIG	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	N	1	f	2.456992 GHz	-0.774 dBm				2	N	1	f	2.483500 GHz	-56.276 dBm				3	N	1	f	2.500000 GHz	-60.199 dBm				4	N	1	f	2.483584 GHz	-53.900 dBm				Frequency Auto Tune Center Freq 2.476000000 GHz Start Freq 2.452000000 GHz Stop Freq 2.500000000 GHz CF Step 4.800000 MHz Auto Man Freq Offset 0 Hz									
MARK	MODE	TRIG	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE																																																
1	N	1	f	2.456992 GHz	-0.774 dBm																																																			
2	N	1	f	2.483500 GHz	-56.276 dBm																																																			
3	N	1	f	2.500000 GHz	-60.199 dBm																																																			
4	N	1	f	2.483584 GHz	-53.900 dBm																																																			