

FCC TEST REPORT

Product Name: SET TOP BOX
Trade Mark: N/A
Model No.: KM2 PLUS
Add. Model No.: KM2 PRO, KM3 PRO, KM3 PLUS, KM5 PRO, KM5 PLUS, KM6 PRO, KM6 PLUS, KM7 RPO, KM7 PLUS, HP44H, HP4414
Report Number: 220608033RFC-3
Test Standards: FCC 47 CFR Part 15 Subpart C
FCC ID: 2AGKB-KM2PLUS
Test Result: PASS
Date of Issue: August 5, 2022

Prepared for:

Videostrong Technology Co., Ltd
604, Lushi industrial Building, 28 District Bao'an District, Shenzhen, China

Prepared by:

Shenzhen UnionTrust Quality and Technology Co., Ltd.
Unit D/E of 9/F and 16/F, Block A, Building 6, Baoneng science and technology park, Longhua district, Shenzhen, China

TEL: +86-755-2823 0888

FAX: +86-755-2823 0886

Prepared by:


Kieron Luo
Project Engineer

Reviewed by:


Henry Lu
Team Leader

Approved by:


Kevin Liang
Assistant Manager

Date:

August 5, 2022

Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: Unit D/E of 9/F and 16/F, Block A, Building 6, Baoneng science and technology park, Longhua district, Shenzhen, China

Tel: +86-755-28230888

Fax: +86-755-28230886

E-mail: info@uttlab.com

<http://www.uttlab.com>

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Version

Version No.	Date	Description
V1.0	August 5, 2022	Original



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Address: Unit D/E of 9/F and 16/F, Block A, Building 6, Baoneng science and technology park, Longhua district, Shenzhen, China

Tel: +86-755-28230888

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1. GENERAL INFORMATION

1.1 CLIENT INFORMATION

Applicant:	Videostrong Technology Co., Ltd
Address of Applicant:	604, Lushi industrial Building, 28 District Bao'an District, Shenzhen, China
Manufacturer:	Videostrong Technology Co., Ltd
Address of Manufacturer:	604, Lushi industrial Building, 28 District Bao'an District, Shenzhen, China

1.2 EUT INFORMATION

1.2.1 General Description of EUT

Product Name:	SET TOP BOX		
Model No.:	KM2 PLUS		
Add. Model No.:	KM2 PRO, KM3 PRO, KM3 PLUS, KM5 PRO, KM5 PLUS, KM6 PRO, KM6 PLUS, KM7 RPO, KM7 PLUS, HP44H, HP4414		
Trade Mark:	N/A		
DUT Stage:	Identical Prototype		
EUT Supports Function: (Provided by the customer)	2.4 GHz ISM Band:	IEEE 802.11b/g/n	
		Bluetooth 5.0	
		PCB Antenna	
	5 GHz U-NII Bands:	5 150 MHz to 5 250 MHz	IEEE 802.11a/n/ac
		5 250 MHz to 5 350 MHz	IEEE 802.11a/n/ac
		5 470 MHz to 5 725 MHz	IEEE 802.11a/n/ac
		5 725 MHz to 5 850 MHz	IEEE 802.11a/n/ac
Software Version:	C2.1.4 (Provided by the customer)		
Hardware Version:	5800-2AHP44H-1102 (Provided by the customer)		
Sample Received Date:	June 6, 2022		
Sample Tested Date:	June 10, 2022 to July 11, 2022		
Note: The additional model KM2 PRO, KM3 PRO, KM3 PLUS, KM5 PRO, KM5 PLUS, KM6 PRO, KM6 PLUS, KM7 RPO, KM7 PLUS, HP44H, HP4414 is identical with the test model KM2 PLUS except the model number for marketing purpose.			

1.2.2 Description of Accessories

Adapter	
Model No.:	TEKA012-1201000UK
Input:	100-240 V~50/60 Hz 0.35 A Max
Output:	12.0 V = 1.0 A
AC Cable:	N/A
DC Cable:	1.2 Meter, Unshielded without ferrite

Cable	
Description:	HDMI Cable
Connector:	HDMI-A
Cable Type:	Shielded with two ferrite
Length:	1.5 Meter

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Fax: +86-755-28230886

E-mail: info@uttlab.com

<http://www.uttlab.com>

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1.3 PRODUCT SPECIFICATION SUBJECTIVE TO THIS STANDARD

Frequency Band:	2400 MHz to 2483.5 MHz	
Frequency Range:	2412 MHz to 2472 MHz	
Support Standards:	IEEE 802.11b, IEEE 802.11g, IEEE 802.11n-HT20, IEEE 802.11n-HT40	
Type of Modulation:	IEEE 802.11b: DSSS (CCK, DQPSK, DBPSK) IEEE 802.11g: OFDM (64-QAM, 16-QAM, QPSK, BPSK) IEEE 802.11n-HT20: OFDM (64-QAM, 16-QAM, QPSK, BPSK) IEEE 802.11n-HT40: OFDM (64-QAM, 16-QAM, QPSK, BPSK)	
Data Rate:	IEEE 802.11b: Up to 11 Mbps IEEE 802.11g: Up to 54 Mbps IEEE 802.11n-HT20: Up to MCS 15 IEEE 802.11n-HT40: Up to MCS 15	
Number of Channels:	IEEE 802.11b: 13 IEEE 802.11g: 13 IEEE 802.11n-HT20: 13 IEEE 802.11n-HT40: 9	
Channel Separation:	5 MHz	
Antenna Type: (Provided by the customer)	Ant. 0	PCB Antenna
	Ant. 1	PCB Antenna
Antenna Gain: (Provided by the customer)	Ant. 0	0.8 dBi
	Ant. 1	0.8 dBi
Maximum Peak Power:	SISO_ Ant. 0	IEEE 802.11b: 18.32 dBm IEEE 802.11g: 26.13 dBm IEEE 802.11n-HT20: 25.36 dBm IEEE 802.11n-HT40: 20.76 dBm
	SISO_ Ant. 1	IEEE 802.11b: 18.04 dBm IEEE 802.11g: 25.00 dBm IEEE 802.11n-HT20: 24.41 dBm IEEE 802.11n-HT40: 22.78 dBm
	MIMO_ Ant. 0+1	IEEE 802.11n-HT20: 27.92 dBm IEEE 802.11n-HT40: 24.70 dBm
Normal Test Voltage:	120V~60Hz/ 240V~50Hz	

1.4 OTHER INFORMATION

Operation Frequency Each of Channel	
IEEE 802.11b, IEEE 802.11g, IEEE 802.11n-HT20	$f = 2407 + 5k \text{ MHz}, k = 1, \dots, 13$
IEEE 802.11n-HT40	$f = 2407 + 5k \text{ MHz}, k = 3, \dots, 11$
Note: f is the operating frequency (MHz); k is the operating channel.	

1.5 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested with associated equipment below.

1) Support Equipment

Description	Manufacturer	Model No.	Serial Number	Supplied by
Notebook	DELL	Inspiron 5409	N/A	UnionTrust
Mouse	ASUS	N/A	N/A	UnionTrust
Monitor	DELL	P2719H	N/A	UnionTrust

2) Support Cable

Shenzhen UnionTrust Quality and Technology Co., Ltd.

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Cable No.	Description	Connector	Length	Supplied by
1	Antenna Cable x 2	SMA	0.3 Meter	UnionTrust

1.6 TEST LOCATION

Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: Unit D/E of 9/F and 16/F, Block A, Building 6, Baoneng science and technology park, Longhua district, Shenzhen, China, China 518109
Telephone: +86 (0) 755 2823 0888
Fax: +86 (0) 755 2823 0886

1.7 TEST FACILITY

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

CNAS-Lab Code: L9069

The measuring equipment utilized to perform the tests documented in this report has been calibrated once a year or in accordance with the manufacturer's recommendations, and is traceable under the ISO/IEC 17025 to international or national standards. Equipment has been calibrated by accredited calibration laboratories.

A2LA-Lab Certificate No.: 4312.01

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

ISED Wireless Device Testing Laboratories

CAB identifier: CN0032

FCC Accredited Lab.

Designation Number: CN1194

Test Firm Registration Number: 259480

1.8 DEVIATION FROM STANDARDS

None.

1.9 ABNORMALITIES FROM STANDARD CONDITIONS

None.

1.10 OTHER INFORMATION REQUESTED BY THE CUSTOMER

None.

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1.11 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the Product as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

No.	Item	Measurement Uncertainty
1	Conducted emission 9KHz-150KHz	±3.2 dB
2	Conducted emission 150KHz-30MHz	±2.7 dB
3	Radiated emission 9KHz-30MHz	±4.7 dB
4	Radiated emission 30MHz-1GHz	±4.6 dB
5	Radiated emission 1GHz-18GHz	±4.4 dB
6	Radiated emission 18GHz-26GHz	±4.6 dB

2. TEST SUMMARY

FCC 47 CFR Part 15 Subpart C Test Cases			
Test Item	Test Requirement	Test Method	Result
Antenna Requirement	FCC 47 CFR Part 15 Subpart C Section 15.203/15.247 (b)	N/A	PASS
AC Power Line Conducted Emission	FCC 47 CFR Part 15 Subpart C Section 15.207	ANSI C63.10-2013 Clause 6.2	PASS
Conducted Peak Output Power	FCC 47 CFR Part 15 Subpart C Section 15.247 (b)(3)	ANSI C63.10-2013 Clause 11.9.1.3	PASS
6dB Bandwidth	FCC 47 CFR Part 15 Subpart C Section 15.247 (a)(2)	ANSI C63.10-2013 Clause 11.8.1	PASS
Power Spectral Density	FCC 47 CFR Part 15 Subpart C Section 15.247 (e)	ANSI C63.10-2013 Clause 11.10.2	PASS
Conducted Out of Band Emission	FCC 47 CFR Part 15 Subpart C Section 15.247(d)	ANSI C63.10-2013 Clause 11.11	PASS
Radiated Spurious Emissions	FCC 47 CFR Part 15 Subpart C Section 15.205/15.209	ANSI C63.10-2013 Clause 11.11 & Clause 11.12	PASS
Band Edge Measurements (Radiated)	FCC 47 CFR Part 15 Subpart C Section 15.205/15.209	ANSI C63.10-2013 Clause 11.13	PASS

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3. EQUIPMENT LIST

Radiated Emission Test Equipment List						
Used	Equipment	Manufacturer	Model No.	Serial Number	Cal. date	Cal. Due date
☒	3M Chamber & Accessory Equipment	ETS-LINDGREN	3M	Euroshiedpn-CT001270-1317	22-Jan-2021	21-Jan-2024
☒	Receiver	R&S	ESIB26	100114	5-Nov-2021	4-Nov-2022
☐	EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY51440197	15-Apr-2022	14-Apr-2023
☒	Loop Antenna	ETS-LINDGREN	6502	00202525	11-Nov-2021	10-Nov-2023
☒	Broadband Antenna	ETS-LINDGREN	3142E	00201566	11-Nov-2021	10-Nov-2023
☒	6dB Attenuator	Talent	RA6A5-N-18	18103001	11-Nov-2021	10-Nov-2023
☒	Preamplifier	HP	8447F	2805A02960	5-Nov-2021	4-Nov-2022
☒	Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3117-PA	00201874	17-Apr-2022	16-Apr-2024
☒	Pre-amplifier	ETS-LINDGREN	00118385	00201874	6-Nov-2021	5-Nov-2022
☐	Horn Antenna	ETS-LINDGREN	3116C	00200180	17-Apr-2022	16-Apr-2024
☒	Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3116C-PA	00202652	14-Nov-2020	13-Nov-2022
☒	Pre-amplifier	ETS-LINDGREN	00118384	00202652	17-Nov-2020	16-Nov-2022
☐	Band Reject Filter (2400MHz~2500MHz)	Micro-Tronics	BRM50702	G248	6-Nov-2021	5-Nov-2022
☒	Multi device Controller	ETS-LINDGREN	7006-001	00160105	N/A	N/A
☒	Test Software	Audix	e3	Software Version: 9.160323		

Conducted Emission Test Equipment List						
Used	Equipment	Manufacturer	Model No.	Serial Number	Cal. date	Cal. Due date
☒	Receiver	R&S	ESR7	101181	5-Nov-2021	4-Nov-2022
☒	Pulse Limiter	R&S	ESH3-Z2	0357.8810.54	5-Nov-2021	4-Nov-2022
☒	LISN	R&S	ESH2-Z5	860014/024	5-Nov-2021	4-Nov-2022
☒	LISN	ETS-Lindgren	3816/2SH	00201088	5-Nov-2021	4-Nov-2022
☒	Test Software	Audix	e3	Software Version: 9 20151119i		

RF Conducted Test Equipment List						
Used	Equipment	Manufacturer	Model No.	Serial Number	Cal. date	Cal. Due date
☒	EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY51440197	15-Apr-2022	14-Apr-2023
☒	USB Wideband Power Sensor	KEYSIGHT	U2021XA	MY55430035	5-Nov-2021	4-Nov-2022
☒	USB Wideband Power Sensor	KEYSIGHT	U2021XA	MY55430023	5-Nov-2021	4-Nov-2022

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4. TEST CONFIGURATION

4.1 ENVIRONMENTAL CONDITIONS FOR TESTING

4.1.1 Normal or Extreme Test Conditions

Environment Parameter	Selected Values During Tests		
Test Condition	Ambient		
	Temperature (°C)	Voltage	Relative Humidity (%)
NT/NV	+15 to +35	120V~60Hz or 240V~50Hz	20 to 75
Remark: 1) NV: Normal Voltage; NT: Normal Temperature			

4.1.2 Record of Normal Environment and Test Sample

Test Item	Temp. (°C)	Relative Humidity (%)	Pressure (kPa)	Sample No.	Tested by
AC Power Line Conducted Emission	24.5	47	101.1	220606012-A06/7	David Zhang
Conducted Peak Output Power	24.4	53	100.5	220606012-A01/7	Hank Wu
6dB Bandwidth					
Power Spectral Density					
Conducted Out of Band Emission					
Radiated Spurious Emissions	24.1	53	100.2	220606012-A05/7	Fire Huo
Band Edge Measurements (Radiated)	24.1	53	100.2	220606012-A05/7	Fire Huo

4.2 TEST CHANNELS

Mode	Tx/Rx Frequency	Test RF Channel Lists				
		Lowest(L)	Middle(M)	Highest(H11)	Highest(H12)	Highest(H13)
IEEE 802.11b	2412 MHz to 2472 MHz	Channel 1	Channel 7	Channel 11	Channel 12	Channel 13
		2412 MHz	2437 MHz	2462 MHz	2467 MHz	2472 MHz
IEEE 802.11g	2412 MHz to 2472 MHz	Channel 1	Channel 7	Channel 11	Channel 12	Channel 13
		2412 MHz	2437 MHz	2462 MHz	2467 MHz	2472 MHz
IEEE 802.11n-HT20	2412 MHz to 2472 MHz	Channel 1	Channel 7	Channel 11	Channel 12	Channel 13
		2412 MHz	2437 MHz	2462 MHz	2467 MHz	2472 MHz
Mode	Tx/Rx Frequency	Test RF Channel Lists				
		Lowest(L)	Middle(M)	Highest(H9)	Highest(H10)	Highest(H11)
IEEE 802.11n-HT40	2422 MHz to 2462 MHz	Channel 3	Channel 7	Channel 9	Channel 10	Channel 11
		2422 MHz	2437 MHz	2452 MHz	2457 MHz	2462 MHz

4.3 EUT TEST STATUS

Mode	Tx/Rx Function	Description
IEEE 802.11b IEEE 802.11g IEEE 802.11n-HT20 IEEE 802.11n-HT40	1Tx/1Rx	1. Keep the EUT in continuously transmitting or receiving with modulation test single.
IEEE 802.11n-HT20 IEEE 802.11n-HT40	2Tx/2Rx	2. Keep the EUT in continuously transmitting or receiving with modulation test single.

Power Setting (Provided by the customer)

Power Setting: not applicable, test used software default power level.

Test Software (Provided by the customer)

Test software name: cmd.exe;

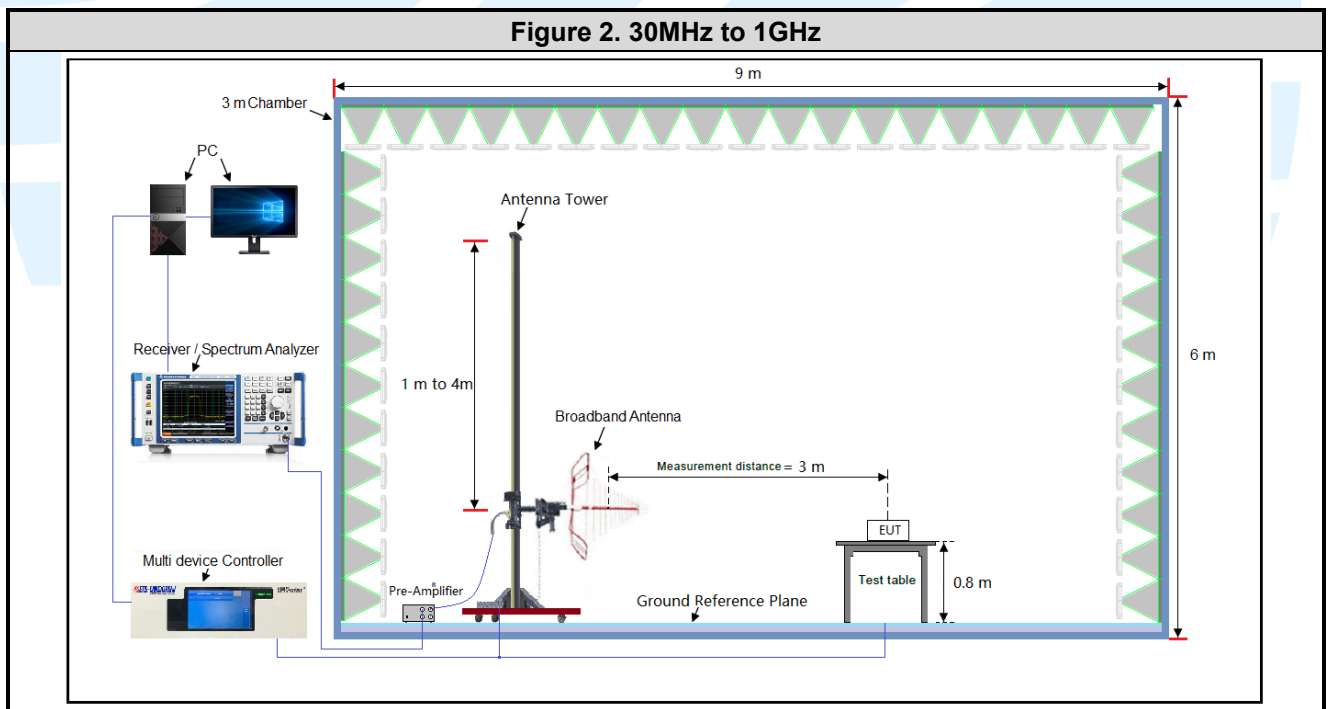
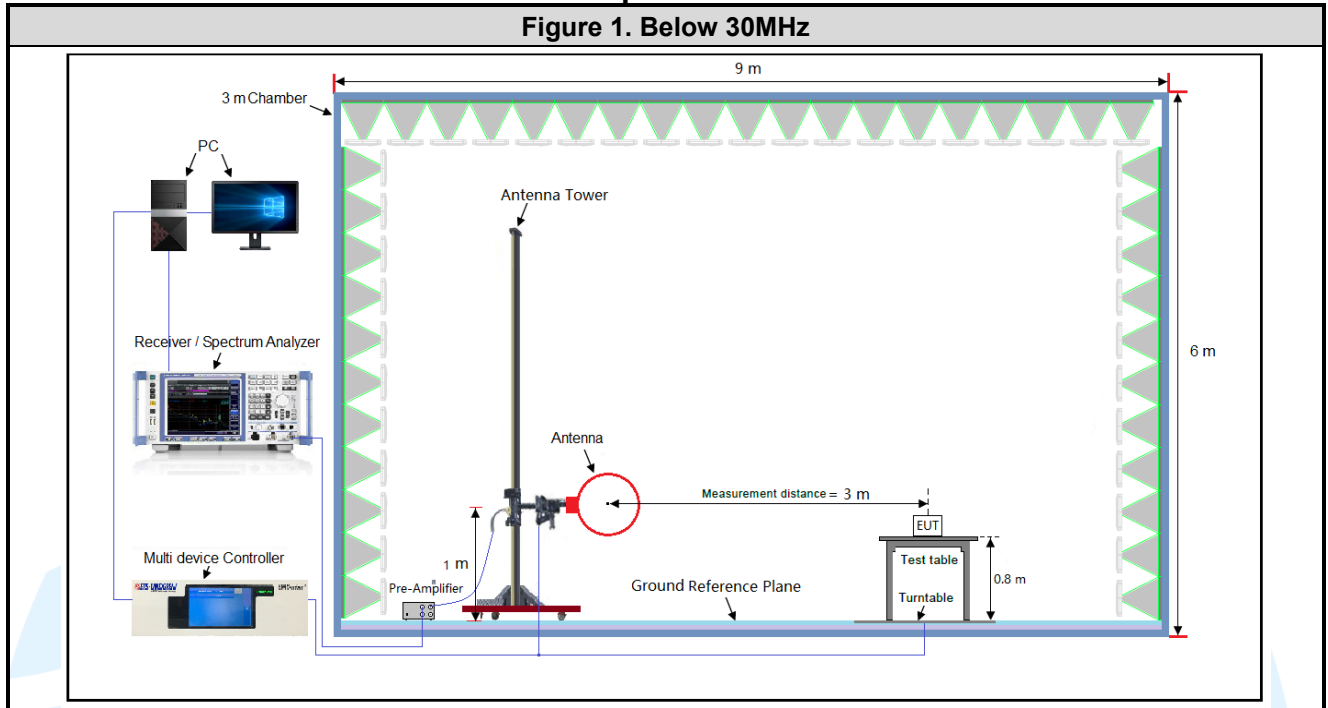
4.4 PRE-SCAN

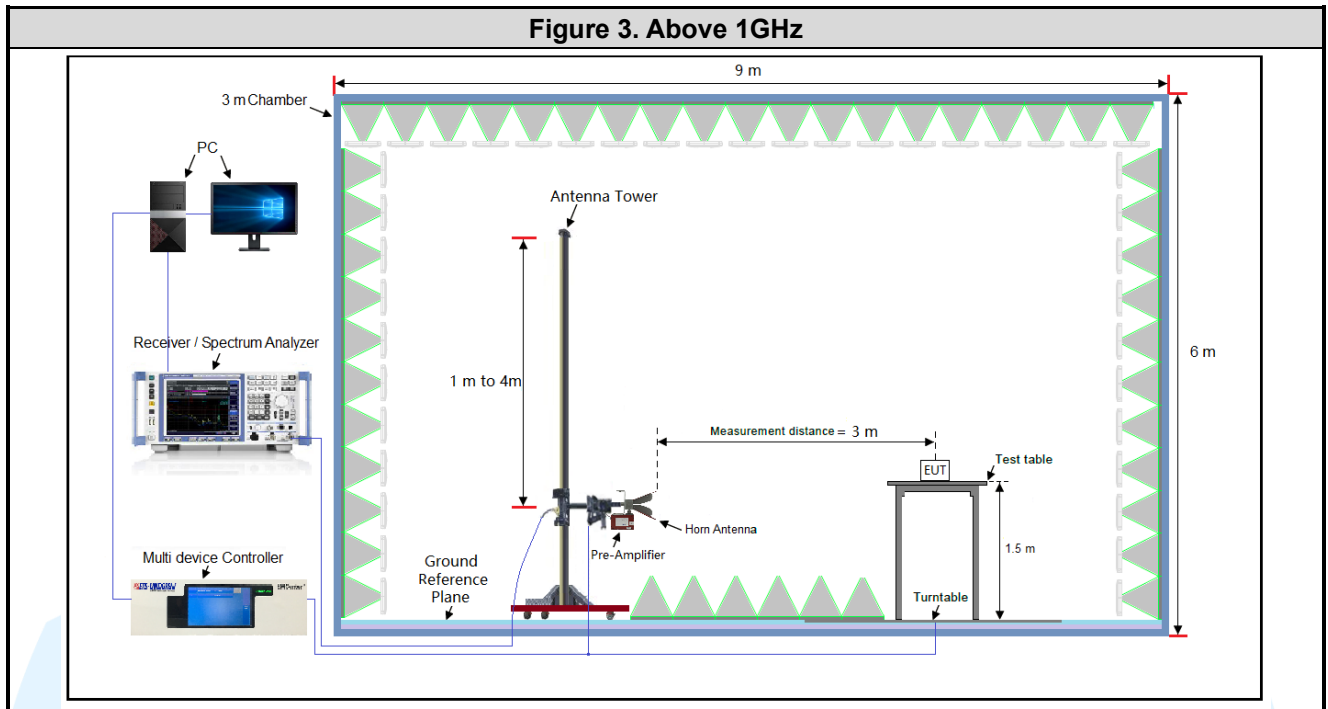
Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and data rate. Following data rate was (were) selected for the final test as listed below

Mode	Worst-case data rates
IEEE 802.11b	1 Mbps
IEEE 802.11g	6 Mbps
IEEE 802.11n-HT20	MCS0
IEEE 802.11n-HT40	MCS0

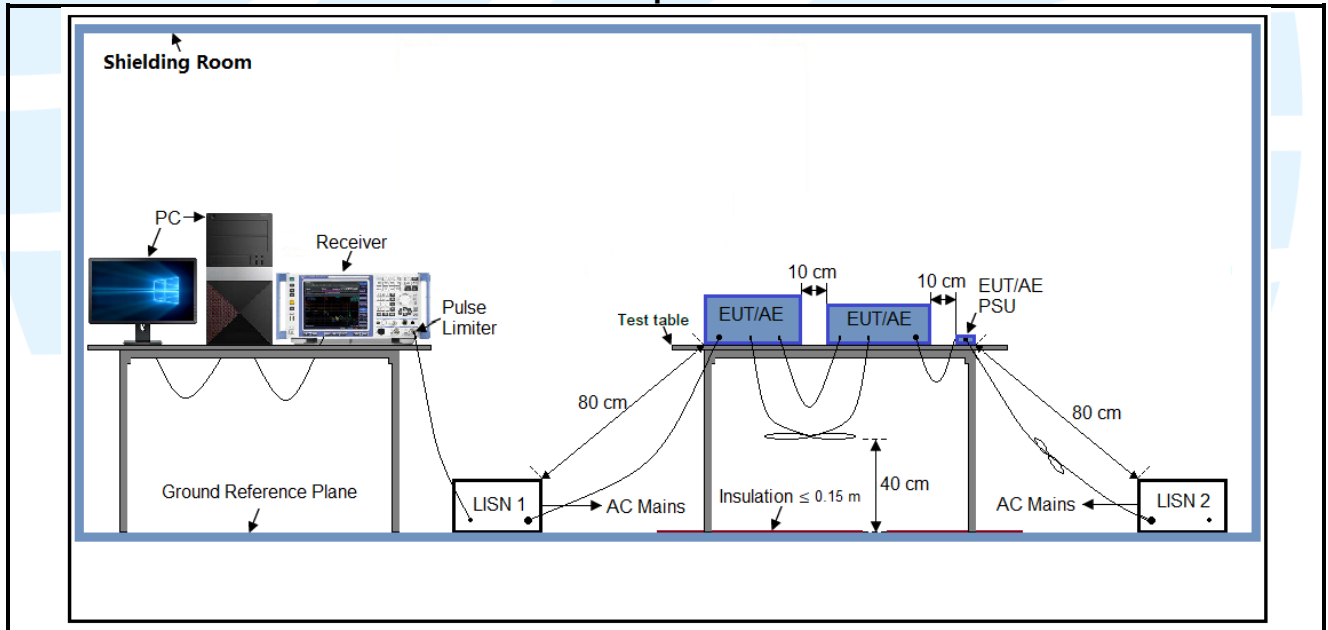
4.5 TEST SETUP

4.5.1 For Radiated Emissions test setup

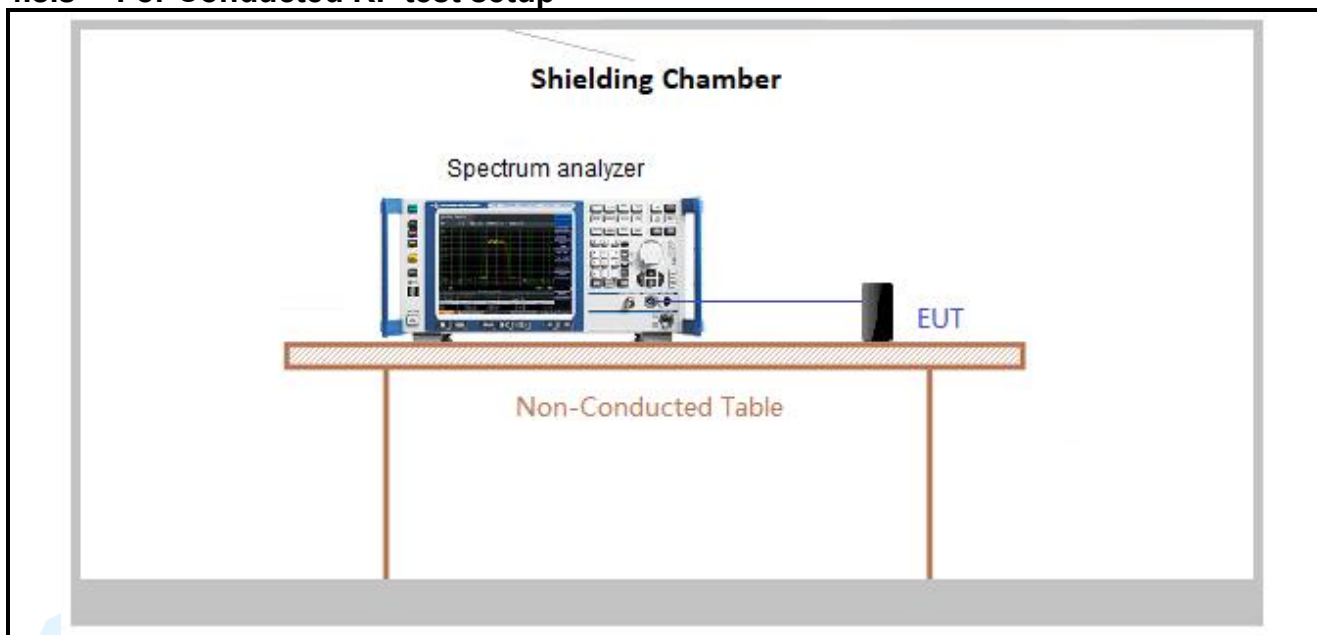




4.5.2 For Conducted Emissions test setup



4.5.3 For Conducted RF test setup



4.6 SYSTEM TEST CONFIGURATION

For emissions testing, the equipment under test (EUT) setup to transmit continuously to simplify the measurement methodology. Care was taken to ensure proper power supply voltages during testing. During testing, radiated emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario. It was powered by AC-DC adapter. Only the worst-case data were recorded in this test report.

The signal is maximized through rotation and placement in the three orthogonal axes. The antenna height and polarization are varied during the search for maximum signal level. The antenna height is varied from 1 to 4 meters. Radiated emissions are taken at three meters unless the signal level is too low for measurement at that distance. If necessary, a pre-amplifier is used and/or the test is conducted at a closer distance. Therefore, all final radiated testing was performed with the EUT in orientation.

All readings are extrapolated back to the equivalent three-meter reading using inverse scaling with distance. Analyzer resolution is 100 kHz or greater for frequencies below 1000 MHz. The resolution is 1 MHz or greater for frequencies above 1000 MHz. The spurious emissions more than 20 dB below the permissible value are not reported.

Radiated emission measurement were performed from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

4.7 DUTY CYCLE

Test Procedure: ANSI C63.10-2013 Clause 11.6.

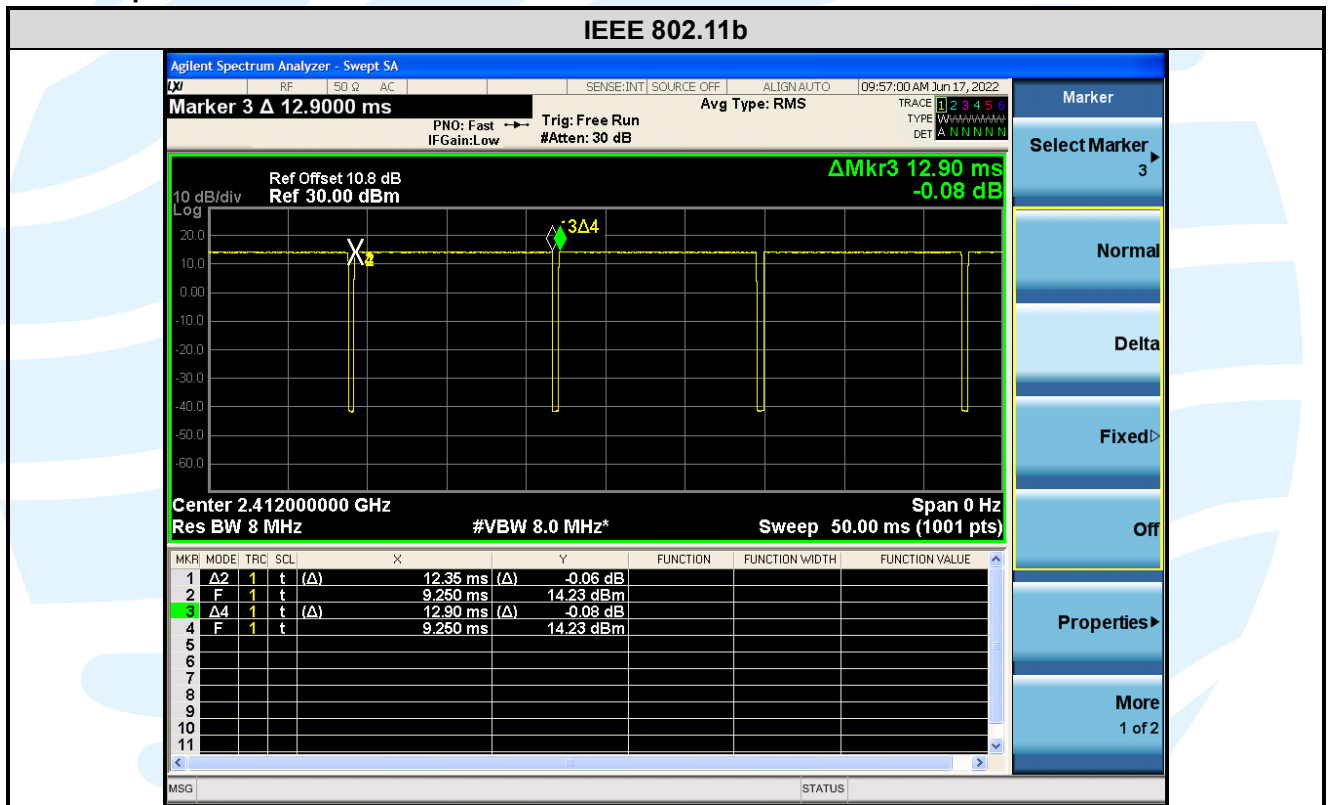
Test Results

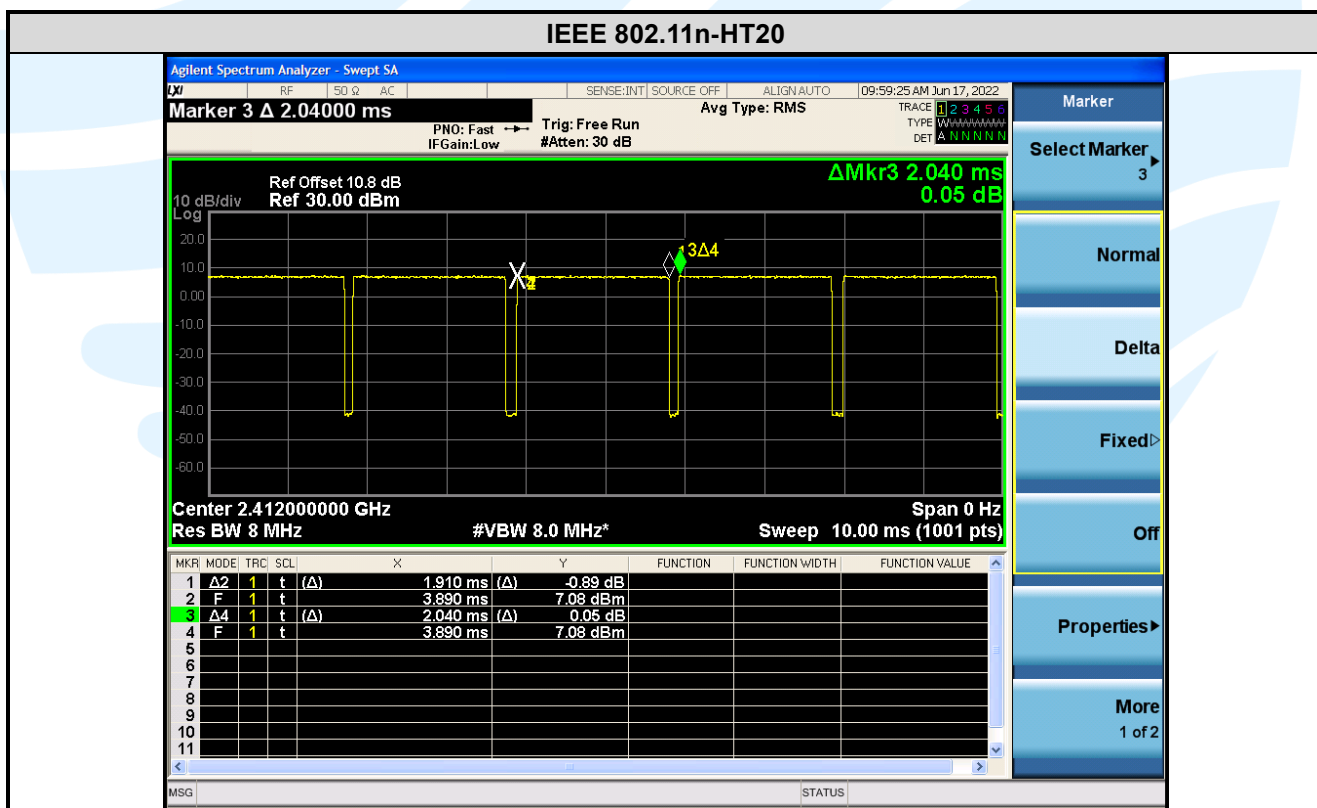
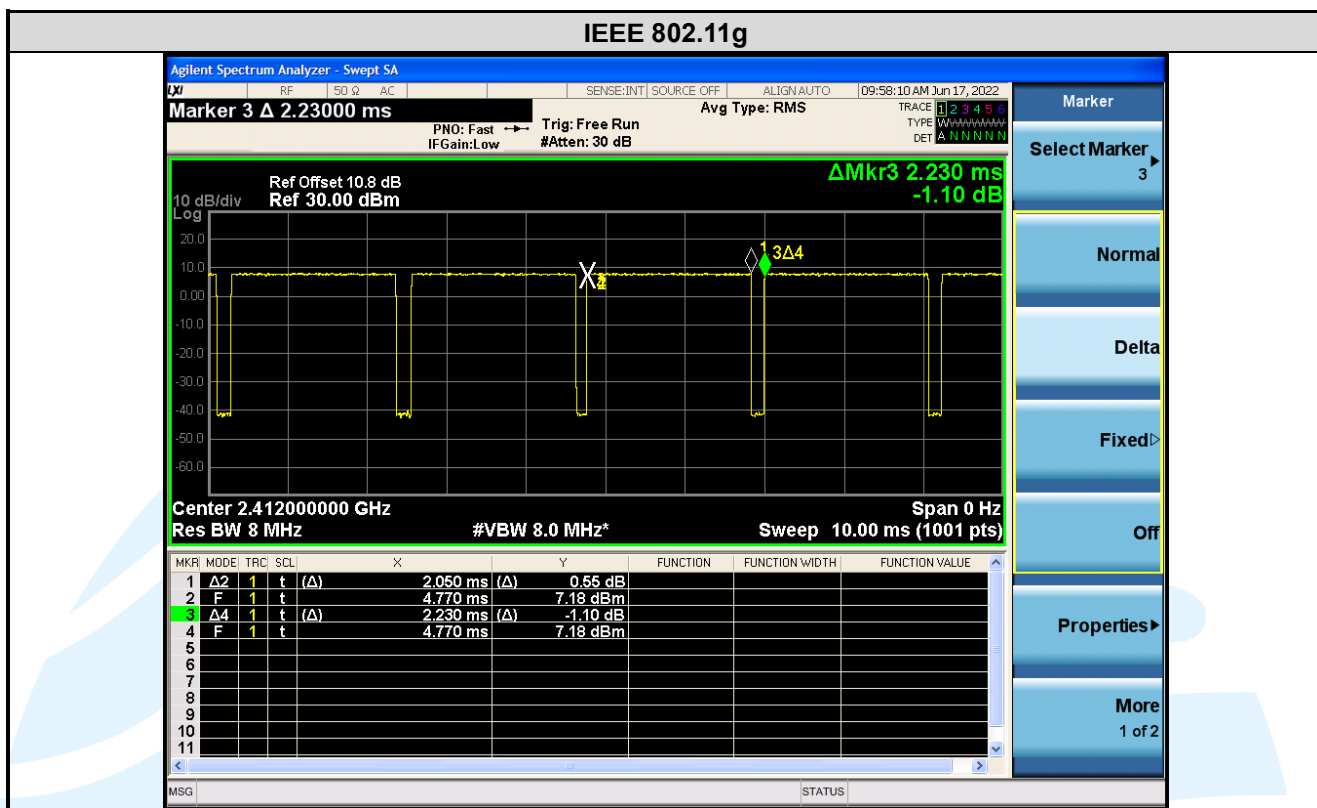
Mode	Data Rates	On Time (msec)	Period (msec)	Duty Cycle (linear)	Duty Cycle (%)	Duty Cycle Factor (dB)	1/T Minimum VBW (kHz)
IEEE 802.11b	1 Mbps	12.35	12.90	0.9574	95.74	0.189	0.08
IEEE 802.11g	6 Mbps	2.05	2.23	0.9193	91.93	0.366	0.49
IEEE 802.11n-HT20	MCS 0	1.91	2.04	0.9363	93.63	0.286	0.52
IEEE 802.11n-HT40	MCS 0	0.94	1.09	0.8624	86.24	0.643	1.06

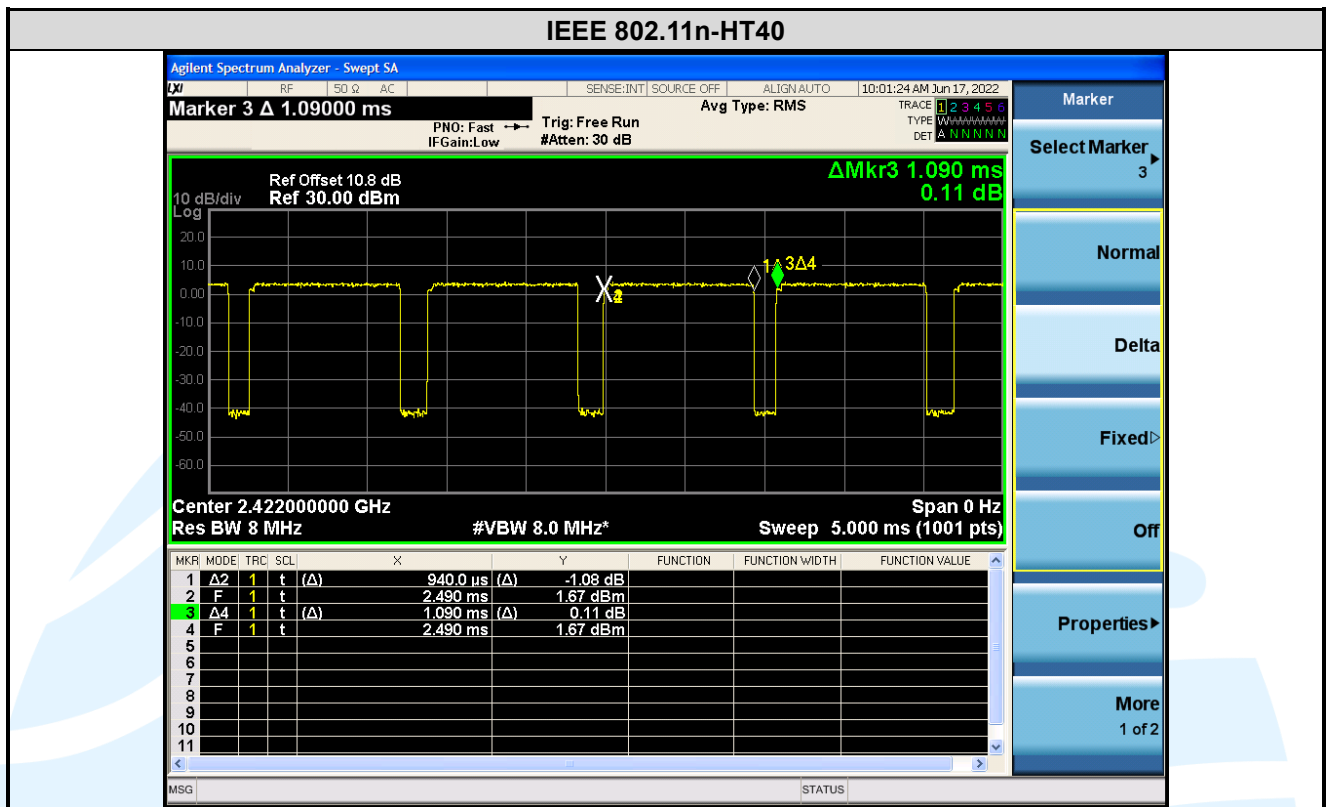
Remark:

- 1) Duty cycle= On Time/ Period;
- 2) Duty Cycle factor = $10 * \log(1/\text{Duty cycle})$

The test plots as follows







Shenzhen UnionTrust Quality and Technology Co., Ltd.

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Fax: +86-755-28230886

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5. RADIO TECHNICAL REQUIREMENTS SPECIFICATION

5.1 REFERENCE DOCUMENTS FOR TESTING

No.	Identity	Document Title
1	FCC 47 CFR Part 2	Frequency allocations and radio treaty matters; general rules and regulations
2	FCC 47 CFR Part 15	Radio Frequency Devices
3	ANSI C63.10-2013	American National Standard for Testing Unlicensed Wireless Devices
4	KDB 558074 D01 15.247 Meas Guidance v05r02	Guidance for compliance measurements on Digital Transmission Systems, Frequency Hopping Spread Spectrum system, and Hybrid system devices operating under Section 15.247 of the FCC rules
5	KDB 662911 D01 Multiple Transmitter Output v02r01	Emissions Testing of Transmitters with Multiple Outputs in the Same Band

5.2 ANTENNA REQUIREMENT

Standard Requirement
15.203 requirement: 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. 15.247(b) (4) requirement: The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi. EUT Antenna: Both antenna in the interior of the equipment and no consideration of replacement. The transmit signals are correlated with each other and the antenna gain of both chains is completely consistent, the best case directional gain of the antenna is 3.81 dBi (See section 5.3).

5.3 CONDUCTED PEAK OUTPUT POWER

Test Requirement: FCC 47 CFR Part 15 Subpart C Section 15.247 (b)(3)

Test Method: ANSI C63.10-2013 Clause 11.9.1.3

Limit: For systems using digital modulation in the 2400-2483.5 MHz bands: 1 Watt.

Test Procedure:

1. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power meter.
2. Measure out each test modes' peak or average output power, record the power level.

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

Test Setup: Refer to section 4.5.3 for details.

Instruments Used: Refer to section 3 for details

Test Results:

Mode	Frequency (MHz)	Max. Peak Power (dBm)				Result
		Ant. 0	Ant. 1	Total	Limit dBm	
IEEE 802.11b	2412	18.15	17.88	N/A	30.00	Pass
	2437	18.32	18.04	N/A	30.00	Pass
	2462	17.74	17.19	N/A	30.00	Pass
	2467	13.65	12.44	N/A	30.00	Pass
	2472	12.63	11.33	N/A	30.00	Pass
IEEE 802.11g	2412	21.37	20.73	N/A	30.00	Pass
	2437	26.13	25.00	N/A	30.00	Pass
	2462	19.28	20.18	N/A	30.00	Pass
	2467	16.59	16.06	N/A	30.00	Pass
	2472	14.11	13.68	N/A	30.00	Pass
IEEE 802.11n-HT20	2412	20.31	19.37	22.88	30.00	Pass
	2437	25.36	24.41	27.92	30.00	Pass
	2462	19.44	18.98	22.23	30.00	Pass
	2467	13.39	15.97	17.88	30.00	Pass
	2472	13.72	13.33	16.54	30.00	Pass
IEEE 802.11n-HT40	2422	20.76	18.79	22.90	30.00	Pass
	2437	20.22	22.78	24.70	30.00	Pass
	2452	20.41	19.83	23.14	30.00	Pass
	2457	13.21	16.04	17.86	30.00	Pass
	2462	13.34	12.05	15.75	30.00	Pass

Mode	Frequency	Max. Avg. Power (dBm)				
	(MHz)	Meas Value Ant. 0	Meas Value Ant. 1	Corr'd Value Ant. 0	Corr'd Value Ant. 1	Total Ant.0+1
IEEE 802.11b	2412	16.06	15.65	16.25	15.84	N/A
	2437	16.22	15.89	16.41	16.08	N/A
	2462	15.67	14.99	15.86	15.18	N/A
	2467	11.54	10.20	11.73	10.39	N/A
	2472	10.27	9.13	10.46	9.32	N/A
IEEE 802.11g	2412	11.18	10.54	11.55	10.91	N/A
	2437	17.05	16.36	17.42	16.73	N/A
	2462	9.45	9.86	9.82	10.23	N/A
	2467	6.71	6.28	7.08	6.65	N/A
	2472	4.04	3.57	4.41	3.94	N/A
IEEE 802.11n-HT20	2412	10.61	9.88	10.90	10.17	13.56
	2437	16.22	15.71	16.51	16.00	19.27
	2462	9.79	8.96	10.08	9.25	12.69
	2467	3.27	5.91	3.56	6.20	8.08
	2472	3.76	3.18	4.05	3.47	6.78
IEEE 802.11n-HT40	2422	10.38	8.18	11.02	8.82	13.07
	2437	9.66	12.74	10.30	13.38	15.12
	2452	9.71	9.07	10.35	9.71	13.06
	2457	3.13	5.97	3.77	6.61	8.43
	2462	3.20	2.15	3.84	2.79	6.36

Remark:

1. Total (Ant 0+1) = $10 \cdot \log[(10^{\text{Ant. 0}/10}) + (10^{\text{Ant. 1}/10})]$

2. Directional gain and the maximum conducted output power limit see table below:

Frequency (MHz)	Antenna Gain (dBi)		Correlated Directional gain (dBi)		Limit	
	Ant .0	Ant .1	Power	PSD	Power (dBm)	PSD (dBm/3kHz)
2400 - 2483.5	0.8	0.8	0.8	3.81	30	8

For CDD transmissions, directional gain is calculated as follows. In all formulas,

N_{ANT} = number of transmit antennas and

N_{SS} = number of spatial streams. (Assume $N_{\text{SS}} = 1$ unless you have specific information to the contrary.)

If all antennas have the same gain, G_{ANT} , Directional gain = G_{ANT} + Array Gain, where Array Gain is as follows.

For power spectral density (PSD) measurements on all devices,

Array Gain = $10 \log(N_{\text{ANT}}/N_{\text{SS}})$ dB.

For power measurements on IEEE 802.11 devices, 1,2

Array Gain = 0 dB (i.e., no array gain) for $N_{\text{ANT}} \leq 4$;

Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any N_{ANT} ;

Array Gain = $5 \log(N_{\text{ANT}}/N_{\text{SS}})$ dB or 3 dB, whichever is less, for 20-MHz channel widths with $N_{\text{ANT}} \geq 5$.

5.46 DB BANDWIDTH

Test Requirement: FCC 47 CFR Part 15 Subpart C Section 15.247 (a)(2)

Test Method: ANSI C63.10-2013 Clause 11.8.1

Limit: For direct sequence systems, the minimum 6dB bandwidth shall be at least 500kHz

Test Procedure: Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

Use the following spectrum analyzer settings:

a) Set RBW = 100 kHz.

b) Set the video bandwidth (VBW) $\geq 3 \times$ RBW.

c) Detector = Peak.

d) Trace mode = max hold.

e) Sweep = auto couple.

f) Allow the trace to stabilize.

g) 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.

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

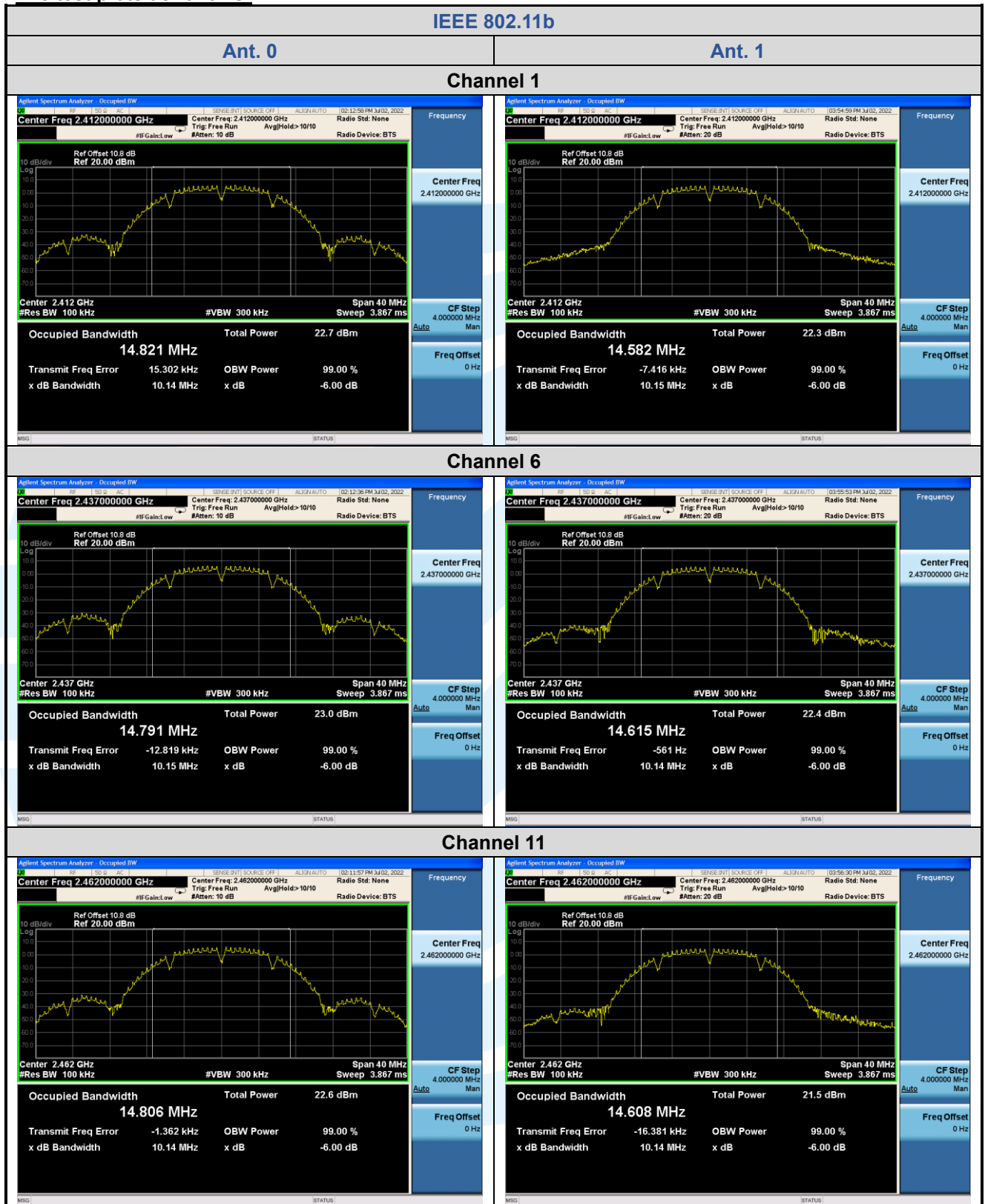
Test Setup: Refer to section 4.5.3 for details.

Instruments Used: Refer to section 3 for details

Test Results:

Mode	Channel/ Frequency (MHz)	6 dB Bandwidth (MHz)		99% Bandwidth (MHz)		6 dB Bandwidth Limit	Pass / Fail
		Ant. 0	Ant. 1	Ant. 0	Ant. 1		
IEEE 802.11b	1(2412)	10.14	10.15	14.821	14.582	> 500 kHz	Pass
	6(2437)	10.15	10.14	14.791	14.615	> 500 kHz	Pass
	11(2462)	10.14	10.14	14.806	14.608	> 500 kHz	Pass
	12(2467)	10.15	10.14	14.633	14.518	> 500 kHz	Pass
	13(2472)	10.15	10.15	14.629	14.535	> 500 kHz	Pass
IEEE 802.11g	1(2412)	15.84	15.34	16.344	16.340	> 500 kHz	Pass
	6(2437)	15.49	15.49	16.345	16.367	> 500 kHz	Pass
	11(2462)	16.11	15.67	16.376	16.362	> 500 kHz	Pass
	12(2467)	15.78	15.67	16.358	16.348	> 500 kHz	Pass
	13(2472)	16.35	16.34	16.319	16.317	> 500 kHz	Pass
IEEE 802.11n-HT20	1(2412)	15.18	16.05	17.542	17.534	> 500 kHz	Pass
	6(2437)	15.36	16.54	17.530	17.551	> 500 kHz	Pass
	11(2462)	15.37	16.42	17.534	17.539	> 500 kHz	Pass
	12(2467)	15.69	16.02	17.527	17.531	> 500 kHz	Pass
	13(2472)	17.53	17.31	17.516	17.518	> 500 kHz	Pass
IEEE 802.11n-HT40	3(2422)	35.25	35.22	35.927	35.859	> 500 kHz	Pass
	6(2437)	35.20	35.22	35.916	35.889	> 500 kHz	Pass
	9(2452)	35.28	35.18	35.934	35.901	> 500 kHz	Pass
	10(2457)	35.24	35.18	35.883	35.920	> 500 kHz	Pass
	11(2462)	35.23	35.22	35.918	35.887	> 500 kHz	Pass

The test plots as follows:



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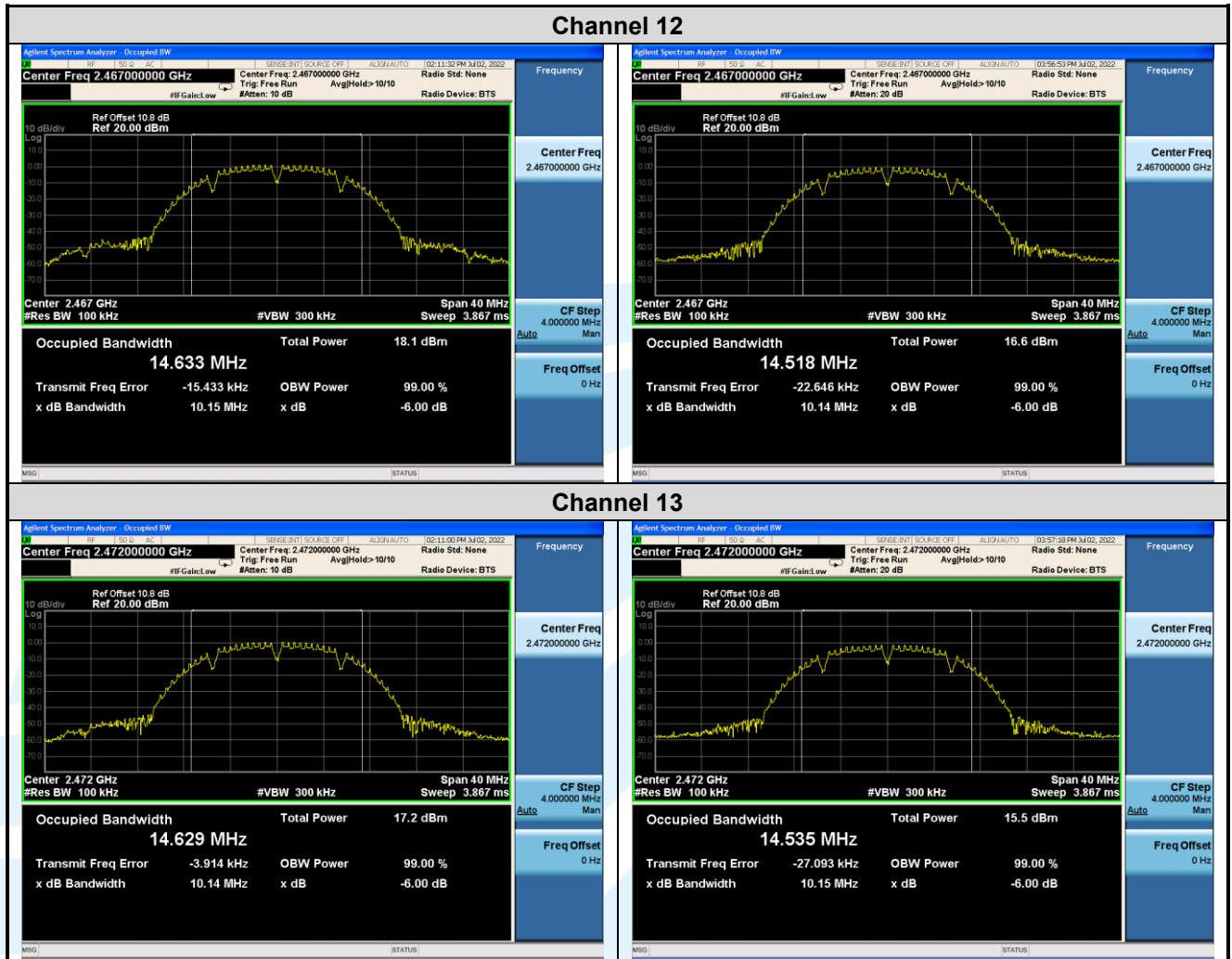
Tel: +86-755-28230888

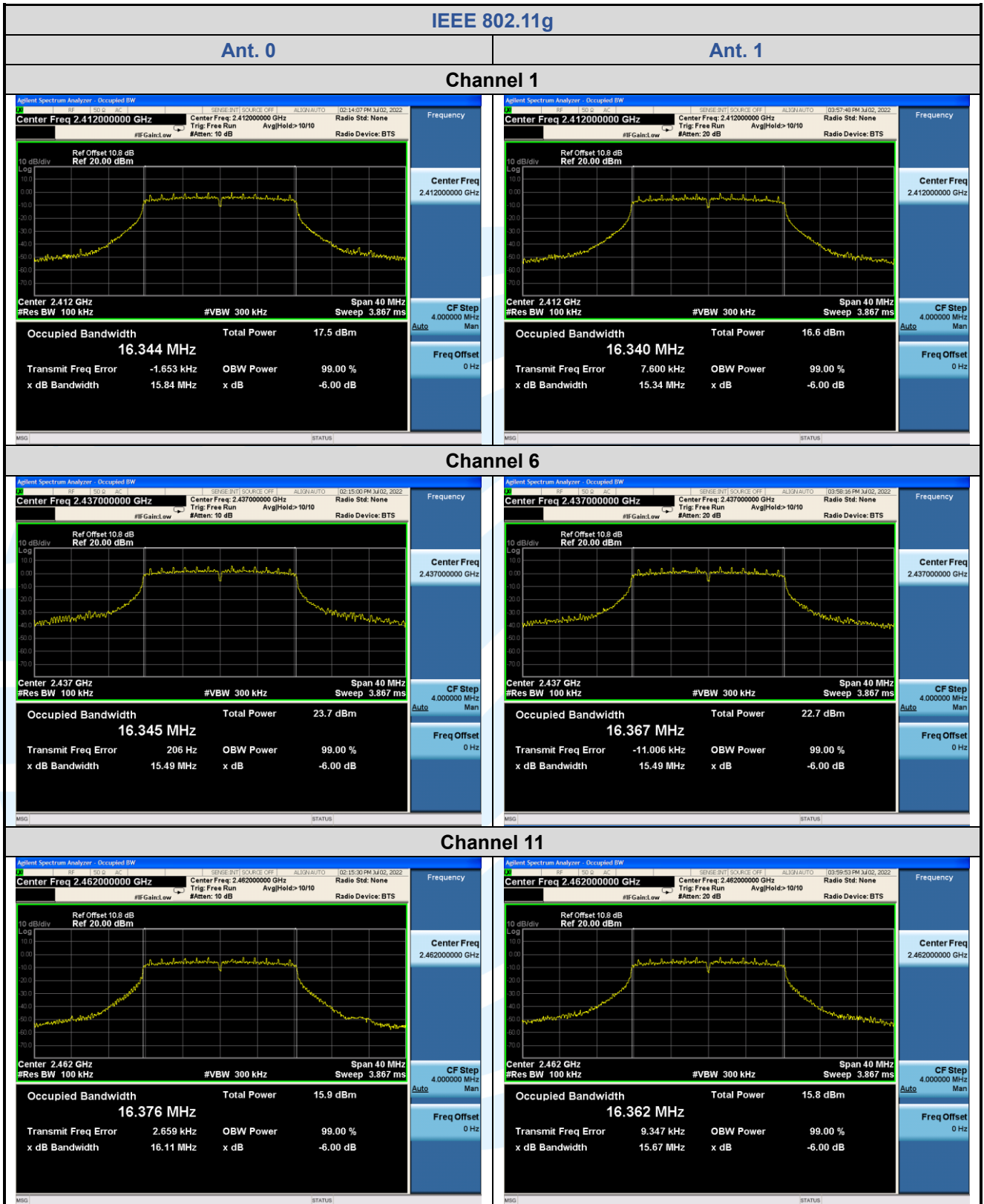
Fax: +86-755-28230886

E-mail: info@uttlab.com

<http://www.uttlab.com>

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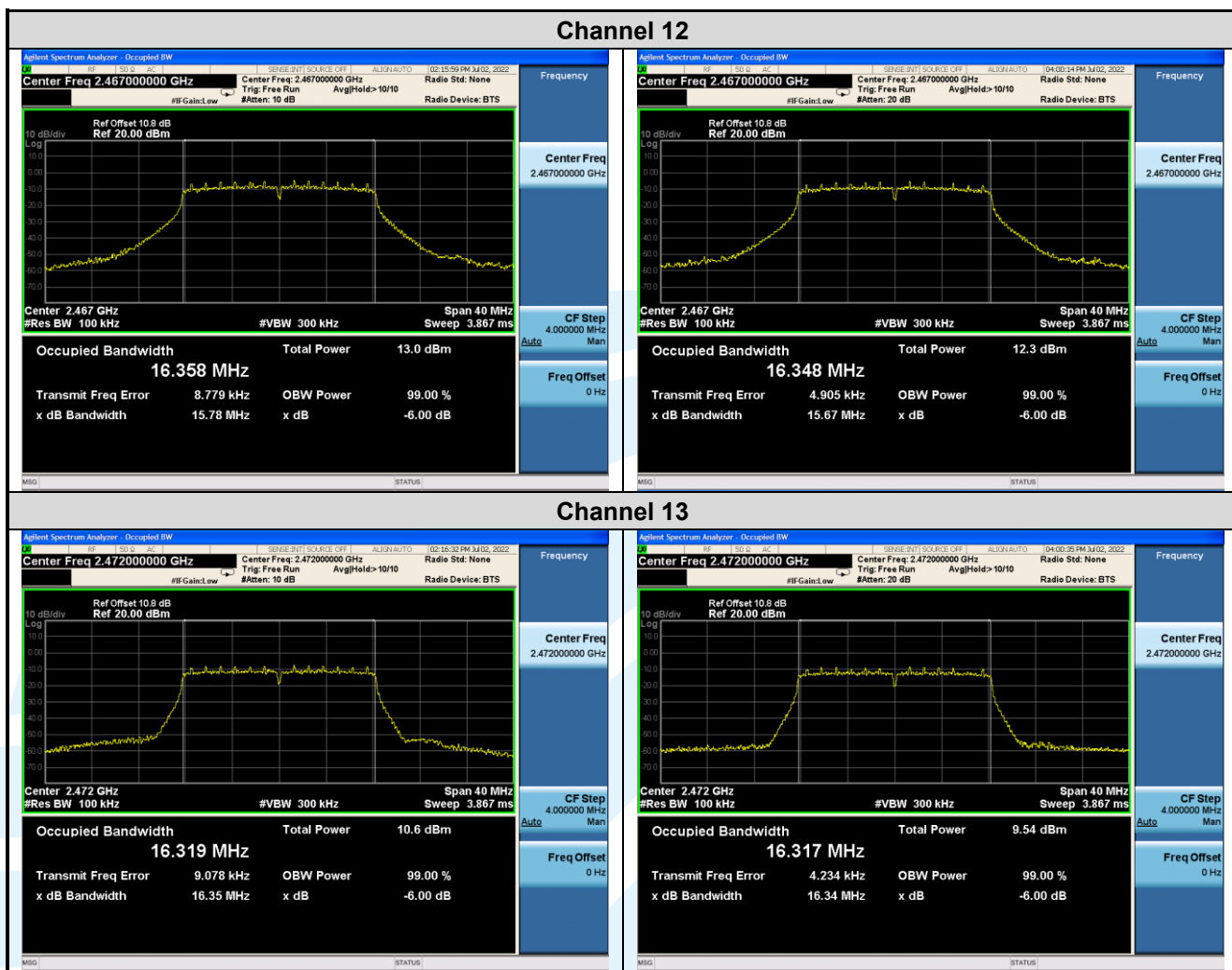
Tel: +86-755-28230888

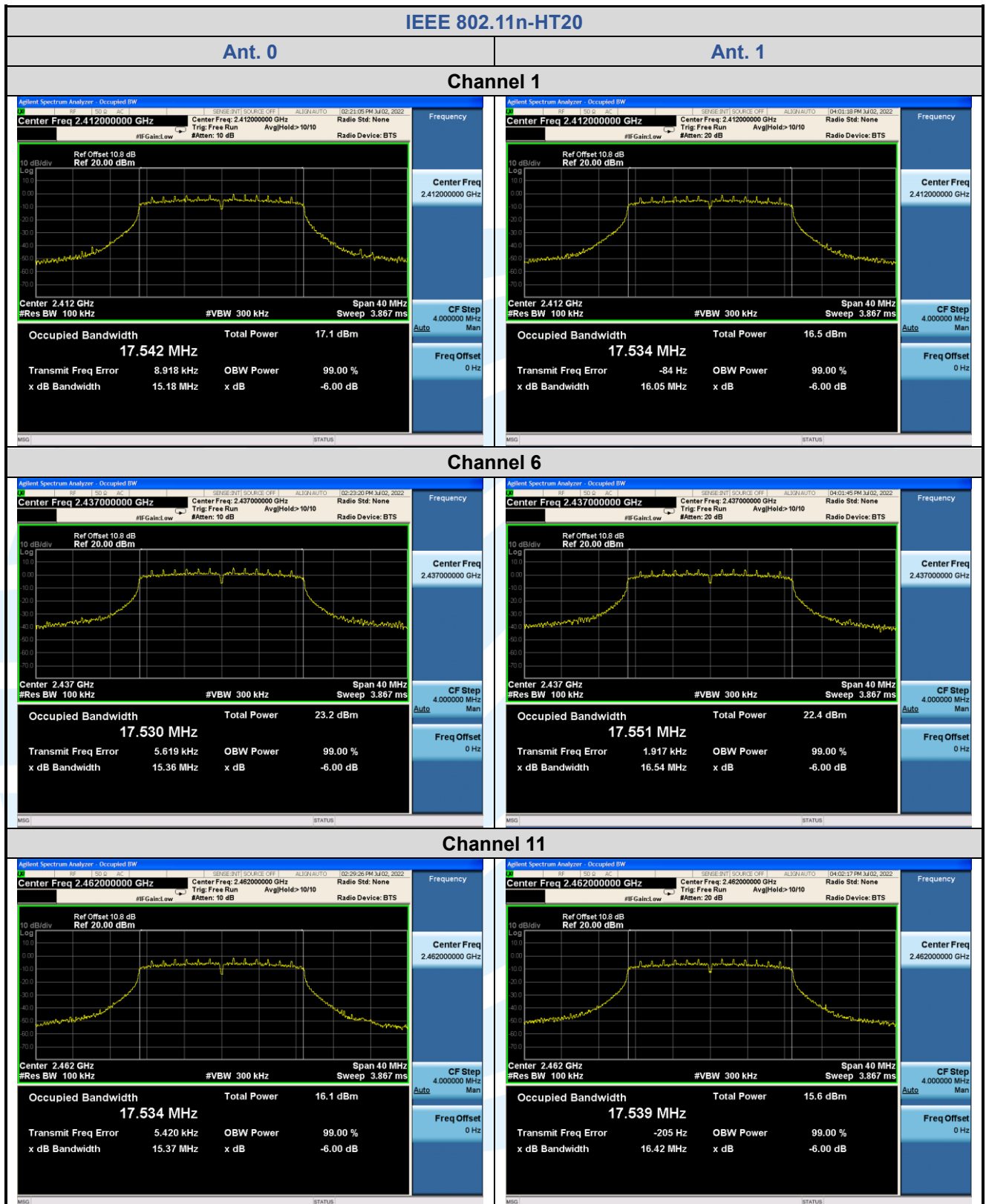
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E-mail: info@uttlab.com

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Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: Unit D/E of 9/F and 16/F, Block A, Building 6, Baoneng science and technology park, Longhua district, Shenzhen, China

Tel: +86-755-28230888

Fax: +86-755-28230886

E-mail: info@uttlab.com

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