

FCC TEST REPORT

Product Name: 3D Excavator Guidance System
Trade Mark: FJDynamics
Model No.: G31 Pro
Report Number: 24102114225RFC-2
Test Standards: FCC 47 CFR Part 15 Subpart C
FCC ID: 2A2LL-G31PRO
Test Result: PASS
Date of Issue: February 8, 2025

Prepared for:

FJ Dynamics Co., Ltd.
21F, Das Tower, No. 28, 1st South Keji Road, Nanshan District,
Shenzhen, China

Prepared by:

Shenzhen UnionTrust Quality and Technology Co., Ltd.
16/F, Block A, Building 6th, Baoneng Science and Technology Park,
Longhua Street, Longhua District, Shenzhen, China
TEL: +86-755-2823 0888
FAX: +86-755-2823 0886

Prepared by:

David Chen

David Chen
Senior Project Engineer

Reviewed by:

Henry Lu

Henry Lu
Team Leader

Approved by:

Robben Chen

Robben Chen
Assistant Manager

Date:

February 8, 2025

Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: 16/F, Block A, Building 6th, Baoneng Science and Technology Park, Longhua Street, Longhua District, Shenzhen, China

Tel: +86-755-28230888

Fax: +86-755-28230886

E-mail: info@uttlab.com

<http://www.uttlab.com>

UTTR-RF-FCCPART15.247-V1.1

Version

Version No.	Date	Description
V1.0	February 8, 2025	Original



Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: 16/F, Block A, Building 6th, Baoneng Science and Technology Park, Longhua Street, Longhua District, Shenzhen, China

Tel: +86-755-28230888

Fax: +86-755-28230886

E-mail: info@uttlab.com

<http://www.uttlab.com>

UTTR-RF-FCCPART15.247-V1.1

CONTENTS

1. GENERAL INFORMATION	4
1.1 CLIENT INFORMATION	4
1.2 EUT INFORMATION	4
1.2.1 GENERAL DESCRIPTION OF EUT	4
1.2.2 DESCRIPTION OF ACCESSORIES	4
1.3 PRODUCT SPECIFICATION SUBJECTIVE TO THIS STANDARD	5
1.4 OTHER INFORMATION	5
1.5 DESCRIPTION OF SUPPORT UNITS	5
1.6 TEST LOCATION	6
1.7 TEST FACILITY	6
1.8 DEVIATION FROM STANDARDS	6
1.9 ABNORMALITIES FROM STANDARD CONDITIONS	6
1.10 OTHER INFORMATION REQUESTED BY THE CUSTOMER	6
1.11 MEASUREMENT UNCERTAINTY	7
2. TEST SUMMARY	8
3. EQUIPMENT LIST	9
4. TEST CONFIGURATION	10
4.1 ENVIRONMENTAL CONDITIONS FOR TESTING	10
4.1.1 NORMAL OR EXTREME TEST CONDITIONS	10
4.1.2 RECORD OF NORMAL ENVIRONMENT AND TEST SAMPLE	10
4.2 TEST CHANNELS	10
4.3 EUT TEST STATUS	10
4.4 PRE-SCAN	11
4.5 TEST SETUP	11
4.5.1 FOR RADIATED EMISSIONS TEST SETUP	11
4.5.2 FOR CONDUCTED EMISSIONS TEST SETUP	13
4.5.3 FOR CONDUCTED RF TEST SETUP	13
4.6 SYSTEM TEST CONFIGURATION	14
4.7 DUTY CYCLE	15
5. RADIO TECHNICAL REQUIREMENTS SPECIFICATION	18
5.1 REFERENCE DOCUMENTS FOR TESTING	18
5.2 ANTENNA REQUIREMENT	18
5.3 CONDUCTED PEAK OUTPUT POWER	19
5.4 6 dB BANDWIDTH	20
5.5 POWER SPECTRAL DENSITY	21
5.6 CONDUCTED OUT OF BAND EMISSION	22
5.7 RADIATED SPURIOUS EMISSIONS	23
5.8 BAND EDGE MEASUREMENTS (RADIATED)	31
APPENDIX A RF TEST DATA	48
A.1 6dB BANDWIDTH	48
A.2 OCCUPIED CHANNEL BANDWIDTH	59
A.3 POWER SPECTRAL DENSITY	70
A.4 OUT OF BAND EMISSION	81
A.5 CONDUCTED SPURIOUS EMISSION	90
APPENDIX 1 PHOTOS OF TEST SETUP	121
APPENDIX 2 PHOTOS OF EUT CONSTRUCTIONAL DETAILS	121

1. GENERAL INFORMATION

1.1 CLIENT INFORMATION

Applicant:	FJ Dynamics Co., Ltd.
Address of Applicant:	21F, Das Tower, No. 28, 1st South Keji Road, Nanshan District, Shenzhen, China
Manufacturer:	FJ Dynamics Co., Ltd.
Address of Manufacturer:	21F, Das Tower, No. 28, 1st South Keji Road, Nanshan District, Shenzhen, China

1.2 EUT INFORMATION

1.2.1 General Description of EUT

Product Name:	3D Excavator Guidance System		
Model No.:	G31 Pro		
Trade Mark:	FJDynamics		
DUT Stage:	Identical Prototype		
EUT Supports Function: (Provided by the customer)	2.4 GHz ISM Band:	IEEE 802.11b/g/n Bluetooth 5.0	
	Radio Rx Band:	902-928MHz	
	RNSS Rx Bands:	1164-1300 MHz	GPS/ Galileo
		1559-1610 MHz	GPS/ Galileo/ GLONASS/ BDS/ SBAS
Software Version:	V1.3 (Provided by the customer)		
Hardware Version:	V1.1 (Provided by the customer)		
Sample Received Date:	October 21, 2024		
Sample Tested Date:	October 30, 2024 to November 14, 2024		
Remark:	The above EUT's information was provided by customer. Please refer to the specifications or user's manual for more detailed description.		

1.2.2 Description of Accessories

Optional Accessory:

- GNSS Antenna x 2
- Wi-Fi/BT Antenna x 1
- 902-928MHz RX Antenna x 1
- DC Power Cable x 1
- Sensor x 4
- DC Cable x 1
- Ethernet Cable x 1
- Other metal structural parts

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 MCS7 IEEE 802.11n-HT40: Up to MCS7
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)	External Antenna
Antenna Gain: (Provided by the customer)	2.86 dBi
Maximum Peak Power:	IEEE 802.11b: 19.84 dBm IEEE 802.11g: 22.92 dBm IEEE 802.11n-HT20: 22.64 dBm IEEE 802.11n-HT40: 21.78 dBm
Normal Test Voltage:	12 Vdc

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	HUAWVEI	KLVF-16	CUCBB22B148005 95	UnionTrust
Mouse	DELL	MS111	CN-011D3V-738	UnionTrust

2) Support Cable

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

1.6 TEST LOCATION

Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: 16/F, Block A, Building 6th, Baoneng Science and Technology Park, Longhua Street, Longhua District, Shenzhen, China

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.

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
7	Radiated emission 26GHz-40GHz	±4.6 dB
8	Conducted spurious emissions	± 2.7 dB
9	RF Power, Conducted	± 0.68 dB
10	Occupied Bandwidth	± 1.86 %
11	Radio Frequency	2.4 GHz: ± 6.5 x 10 ⁻⁸
12	Transmission Time	± 0.19 %

Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: 16/F, Block A, Building 6th, Baoneng Science and Technology Park, Longhua Street, Longhua District, Shenzhen, China

Tel: +86-755-28230888

Fax: +86-755-28230886

E-mail: info@uttlab.com

<http://www.uttlab.com>

UTTR-RF-FCCPART15.247-V1.1

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	N/A (Note 1,2)
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
Note: 1) N/A: In this whole report not applicable. 2) The product is powered by the car battery.			
Disclaimer and Explanations: The declared of product specification and data (e.g., antenna gain, RF specification, etc) for EUT presented in the report are provided by the customer, and the customer takes all the responsibilities for the accuracy of product specification.			

3. EQUIPMENT LIST

Radiated Emission Test Equipment List						
Used	Equipment	Manufacturer	Model No.	Serial Number	Cal. date	Cal. Due date
☒	3m SAC	ETS-LINDGREN	3M	Euroshiedpn-CT001270-1317	11-Nov-2023	10-Nov-2026
☒	Receiver	R&S	ESIB26	100114	25-Oct-2024	24-Oct-2025
☒	Loop Antenna	ETS-LINDGREN	6502	00202525	28-Oct-2024	27-Oct-2025
☒	Broadband Antenna	ETS-LINDGREN	3142E	00201566	29-Oct-2024	28-Oct-2025
☒	6dB Attenuator	Talent	RA6A5-N-18	18103001	29-Oct-2024	28-Oct-2025
☒	Preamplifier	HP	8447F	2805A02960	25-Oct-2024	24-Oct-2025
☒	Double-Ridged Waveguide Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3117-PA	00201541	01-Apr-2024	31-Mar-2025
☒	Pre-amplifier	ETS-LINDGREN	00118385	00201874	01-Apr-2024	31-Mar-2025
☒	Double-Ridged Waveguide Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3116C-PA	00202652	28-Oct-2024	27-Oct-2025
☒	Pre-amplifier	ETS-LINDGREN	00118384	00202652	28-Oct-2024	27-Oct-2025
☒	Multi device Controller	ETS-LINDGREN	7006-001	00160105	N/A	N/A
☒	Test Software	Audix	e3	Software Version: 9.160323		

RF Conducted Test Equipment List						
Used	Equipment	Manufacturer	Model No.	Serial Number	Cal. date	Cal. Due date
☐	EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY51440197	29-Mar-2024	28-Mar-2025
☒	EXA Spectrum Analyzer	KEYSIGHT	N9020A	MY51286807	25-Oct-2024	24-Oct-2025
☒	USB Wideband Power Sensor	KEYSIGHT	U2021XA	MY55430035	25-Oct-2024	24-Oct-2025

Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: 16/F, Block A, Building 6th, Baoneng Science and Technology Park, Longhua Street, Longhua District, Shenzhen, China

Tel: +86-755-28230888

Fax: +86-755-28230886

E-mail: info@uttlab.com

<http://www.uttlab.com>

UTTR-RF-FCCPART15.247-V1.1

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	12V Battery	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
Conducted Peak Output Power	24.6	45.8	100.4	S2024102114483-ZJB01/1	Allen Zhou
6dB Bandwidth					
Power Spectral Density					
Conducted Out of Band Emission					
Radiated Spurious Emissions	23.6	46.3	100.5	S2024102114483-ZJB01/1	Jackson Wu
Band Edge Measurements (Radiated)					

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.

Power Setting (Provided by the customer)			
Mode	Channel 1 -11	Channel 12	Channel 13
IEEE 802.11b	20	20	20
IEEE 802.11g	24	24	60
IEEE 802.11n-HT20	24	24	56
IEEE 802.11n-HT40	24	24	44

Test Software (Provided by the customer)
Test Software: EspRFTTestTool

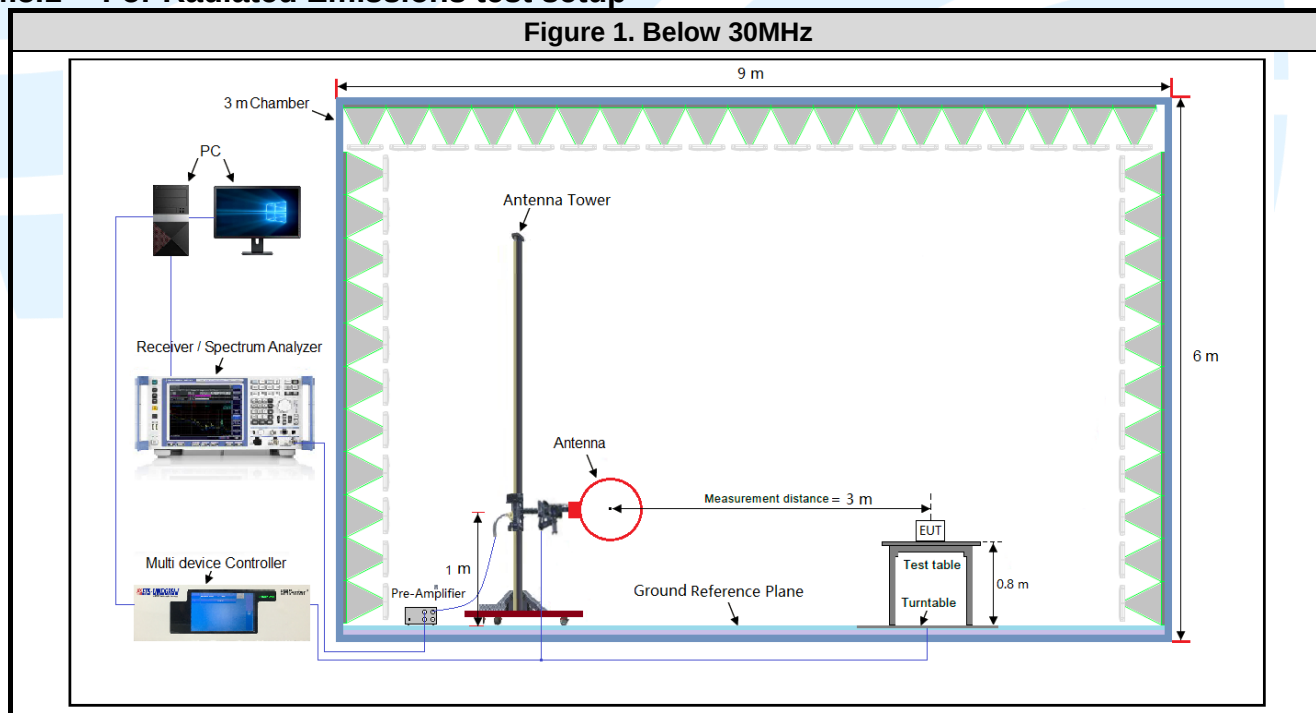
4.4 PRE-SCAN

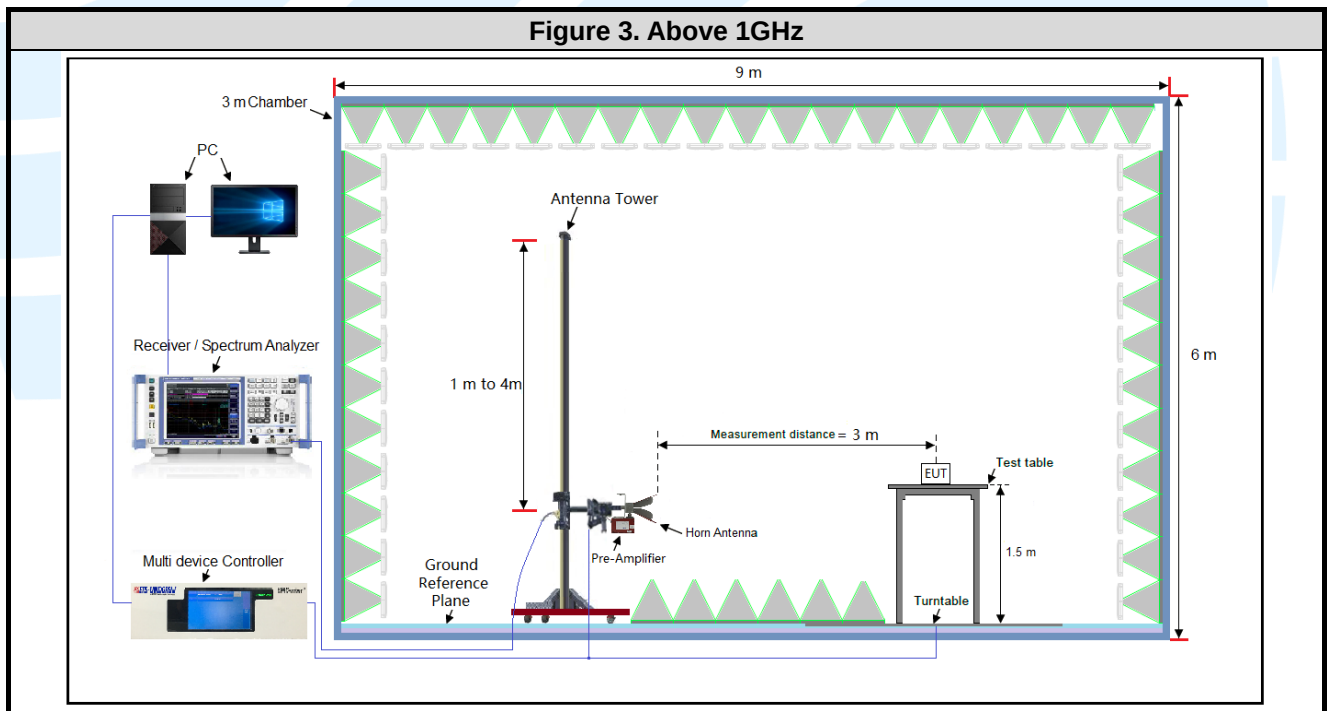
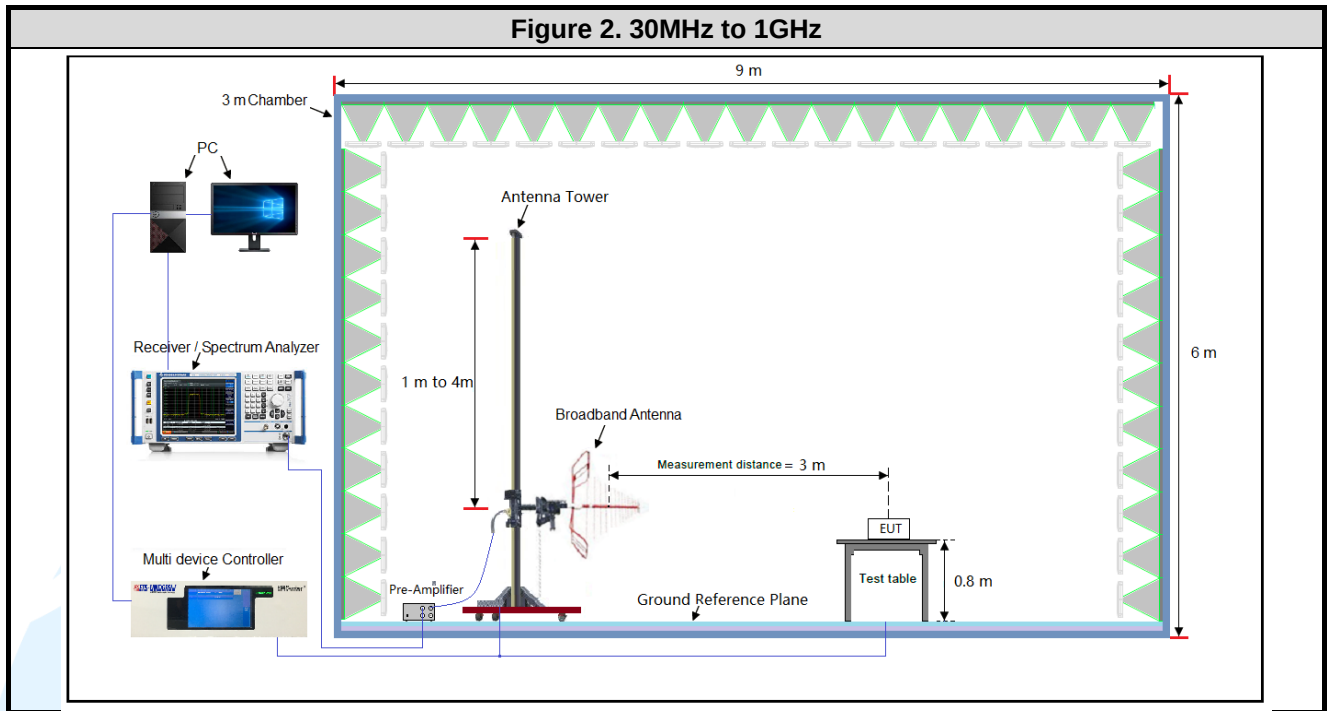
Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and data rate. Following data rate was (were) selected for the final test as listed below

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





The diagram illustrates the layout of a Shielding Room used for Electromagnetic Compatibility (EMC) testing. The room is a large rectangular enclosure. Inside, a test table is positioned. On the table, two Equipment Under Test (EUT/AE) units are placed, separated by 10 cm. To the right of the EUT/AE units is a PSU (Power Supply Unit). The distance between the EUT/AE units and the PSU is 10 cm. The test table is supported by legs, and the distance from the table to the floor is 40 cm. The floor is covered with insulation, with a thickness of ≤ 0.15 m. A Ground Reference Plane is indicated by a horizontal line at the base of the room. Two LISN (Line Impedance Stabilization Network) units, LISN 1 and LISN 2, are connected to the AC Mains. LISN 1 is connected to the AC Mains and the test table. LISN 2 is connected to the AC Mains and the PSU. A Receiver and a Pulse Limiter are connected to the test table. A PC is connected to the Receiver. The entire setup is within the Shielding Room.

The diagram illustrates a Shielding Chamber setup. A Spectrum analyzer is connected to an EUT (Equipment Under Test) via a cable. Both are placed on a Non-Conducted Table. The entire setup is enclosed within a Shielding Chamber, which is represented by a thick grey border. The Spectrum analyzer is a blue and white device with a screen showing a frequency spectrum. The EUT is a small black rectangular object. The Non-Conducted Table is a brown surface supported by two vertical legs. The Shielding Chamber is a large, light blue rectangular area surrounding the 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 a 12V battery. 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.

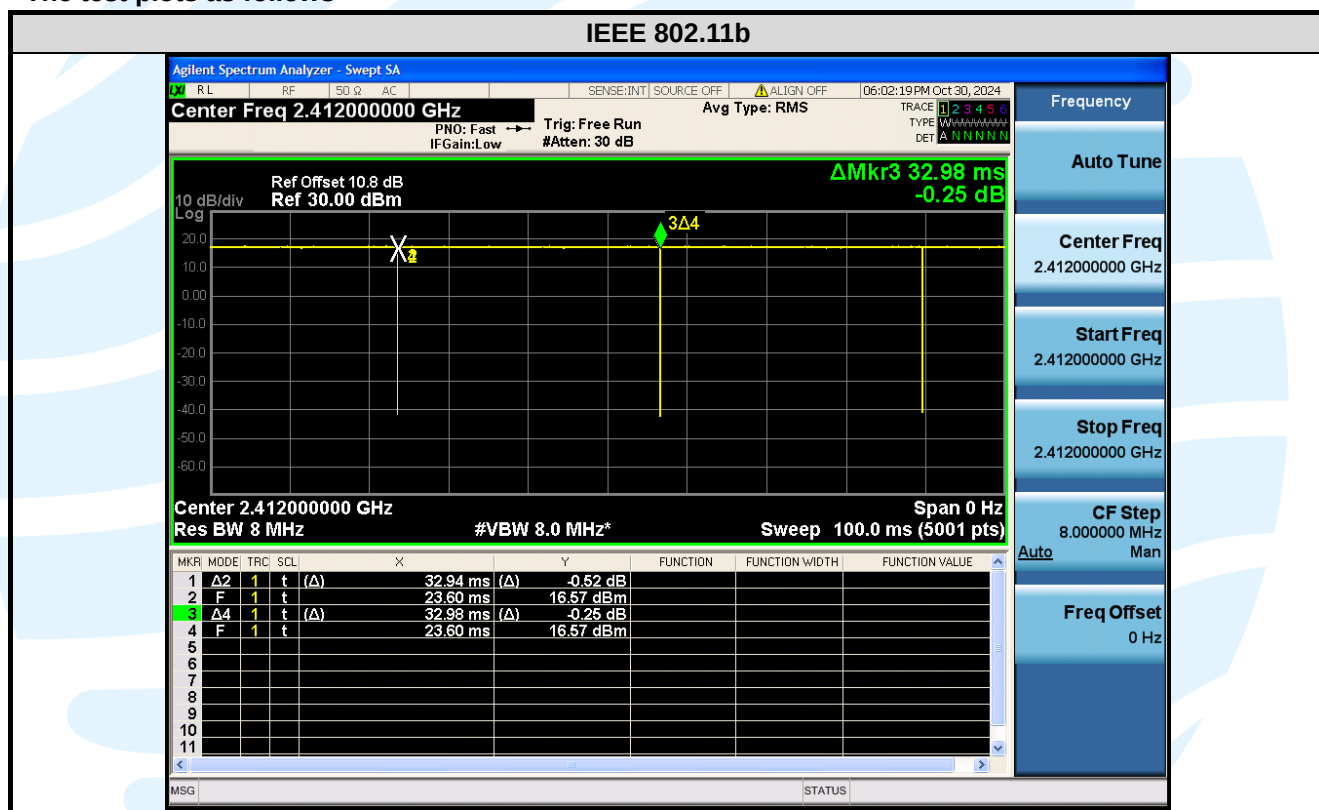
Test Results

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	32.94	32.98	1.00	99.88	0.00	0.01
IEEE 802.11g	6 Mbps	5.487	5.513	1.00	99.53	0.00	0.01
IEEE 802.11n-HT20	MCS 0	5.080	5.107	0.99	99.47	0.00	0.01
IEEE 802.11n-HT40	MCS 0	2.467	2.493	0.99	98.96	0.00	0.01

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.

Address: 16/F, Block A, Building 6th, Baoneng Science and Technology Park, Longhua Street, Longhua District, Shenzhen, China

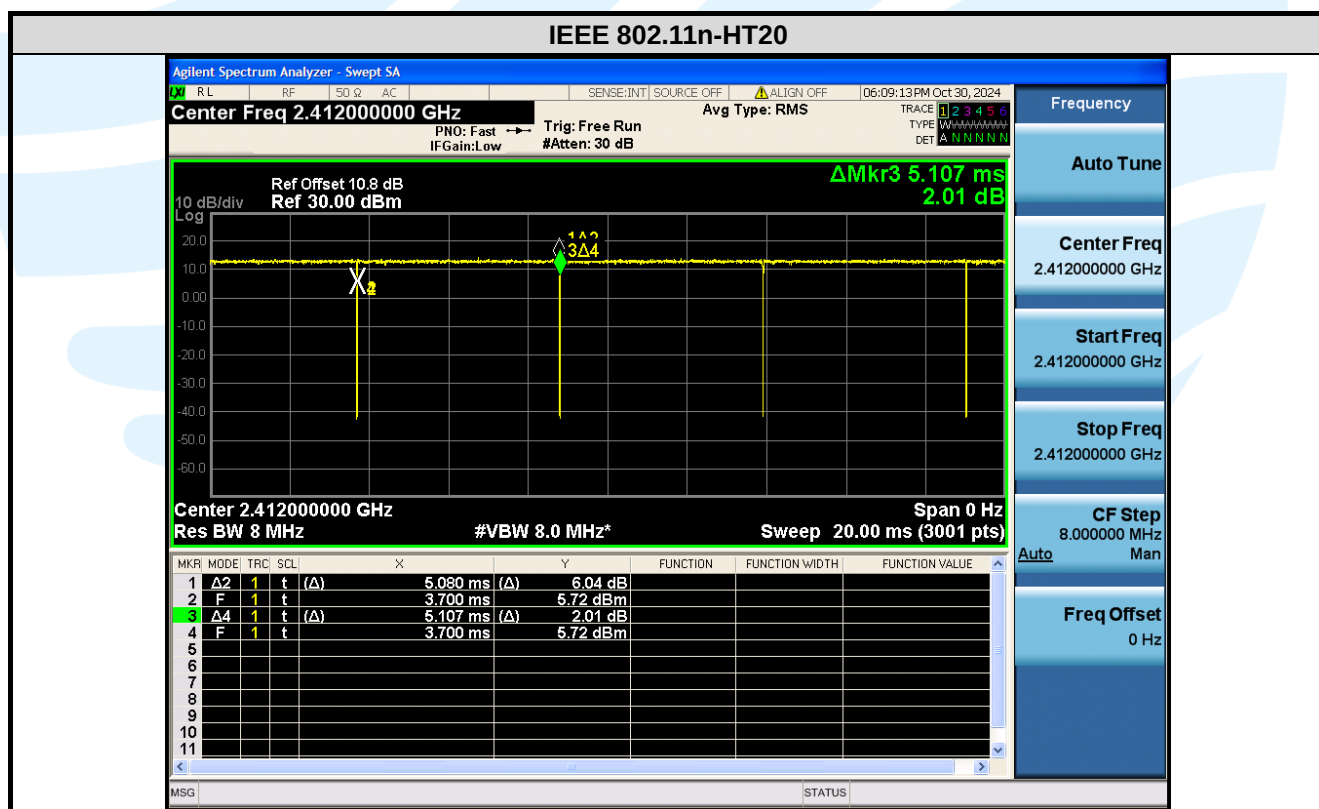
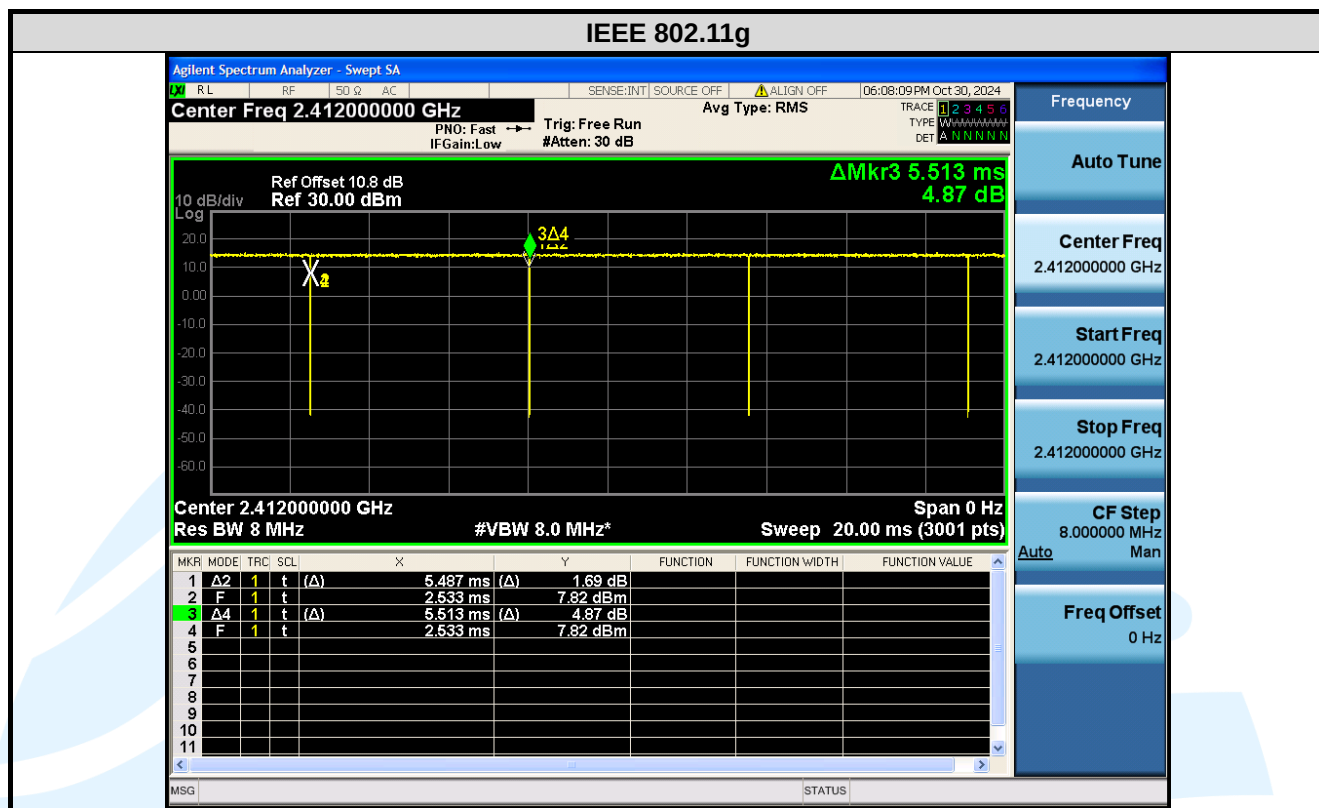
Tel: +86-755-28230888

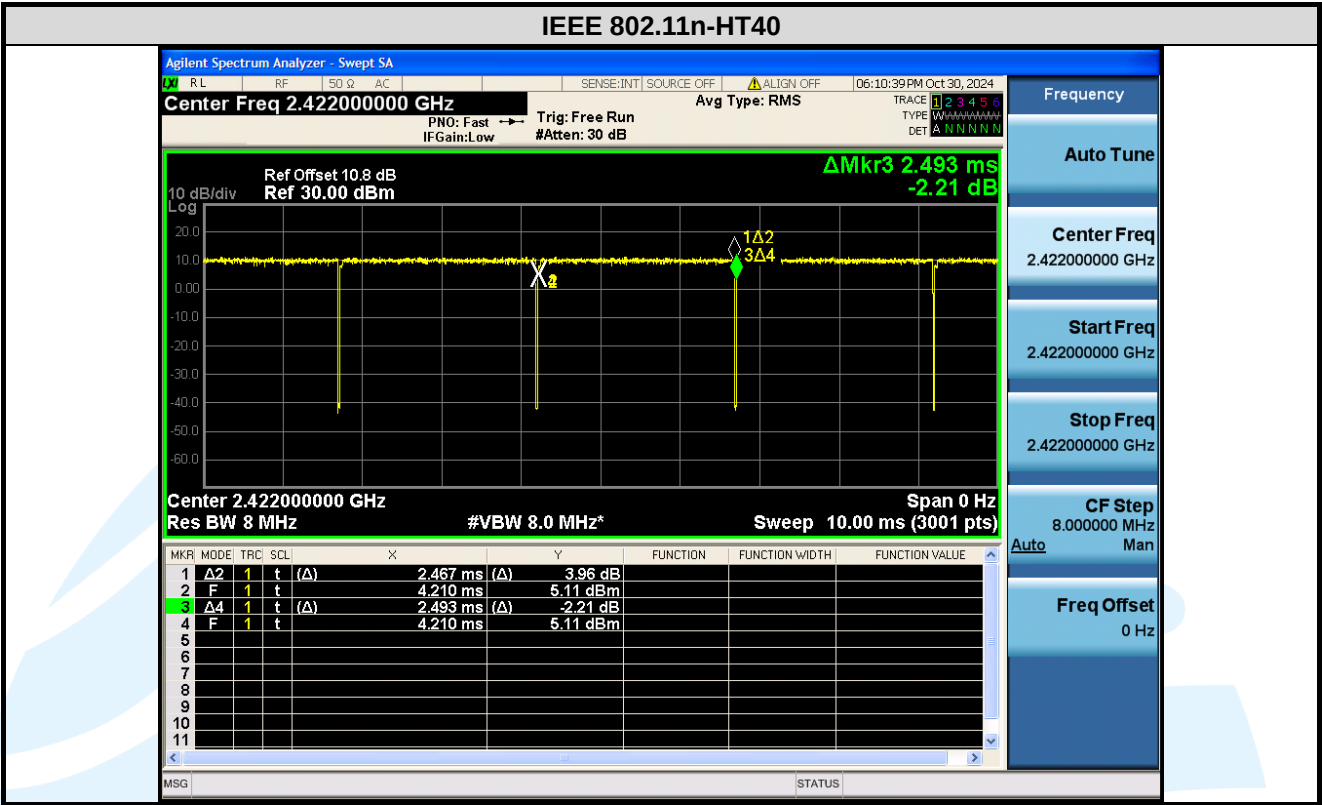
Fax: +86-755-28230886

E-mail: info@uttlab.com

<http://www.uttlab.com>

UTTR-RF-FCCPART15.247-V1.1





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

5.2 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: The antenna is on the External of the product and no consideration of replacement. The gain of the antenna is 2.86 dBi.

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	Channel/ Frequency (MHz)	Maximum Conducted Peak Power		Maximum Conducted Average Power (dBm)		Limit (dBm)	Result
		(dBm)	(W)	Measured Value	Corrected Value		
IEEE 802.11b	1(2412)	19.21	0.0834	15.98	15.98	30	Pass
	6(2437)	19.54	0.0899	16.32	16.32	30	Pass
	11(2462)	19.78	0.0951	16.51	16.51	30	Pass
	12(2467)	19.84	0.0964	16.12	16.12	30	Pass
	13(2472)	19.41	0.0873	16.05	16.05	30	Pass
IEEE 802.11g	1(2412)	22.88	0.1941	14.88	14.88	30	Pass
	6(2437)	22.64	0.1837	14.95	14.95	30	Pass
	11(2462)	22.85	0.1928	14.71	14.71	30	Pass
	12(2467)	22.92	0.1959	14.62	14.62	30	Pass
	13(2472)	13.43	0.0220	4.61	4.61	30	Pass
IEEE 802.11n- HT20	1(2412)	22.14	0.1637	13.31	13.31	30	Pass
	6(2437)	22.64	0.1837	13.15	13.15	30	Pass
	11(2462)	22.31	0.1702	13.46	13.46	30	Pass
	12(2467)	22.45	0.1758	13.24	13.24	30	Pass
	13(2472)	11.59	0.0144	4.26	4.26	30	Pass
IEEE 802.11n- HT40	3(2422)	21.59	0.1442	13.02	13.02	30	Pass
	6(2437)	21.78	0.1507	13.42	13.42	30	Pass
	9(2452)	21.65	0.1462	13.14	13.14	30	Pass
	10(2457)	21.49	0.1409	13.21	13.21	30	Pass
	11(2462)	15.01	0.0317	7.69	7.69	30	Pass

Note: The antenna gain of 2.86 dBi less than 6dBi maximum permission antenna gain value based on 1 watt (30dBm) peak output power limit.

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 Mode:	Link mode
Test Results:	Please refer to Appendix A

5.5 POWER SPECTRAL DENSITY

Test Requirement:	FCC 47 CFR Part 15 Subpart C Section 15.247 (e)
Test Method:	ANSI C63.10-2013 Clause 11.10.2
Limit:	For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3kHz band during any time interval of continuous transmission.
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: - Set analyzer center frequency to DTS channel center frequency. - Set the span to 1.5 times the DTS bandwidth. - Set the RBW to: $3\text{ kHz} \leq \text{RBW} \leq 100\text{ kHz}$. - Set the VBW $\geq 3 \times \text{RBW}$. - 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 within the RBW. - If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat. 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 Mode:	Link mode
Test Results:	Please refer to Appendix A

5.6 CONDUCTED OUT OF BAND EMISSION

Test Requirement:	FCC 47 CFR Part 15 Subpart C Section 15.247(d)
Test Method:	ANSI C63.10-2013 Clause 11.11
Limit:	In any 100kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power.
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: Step 1: Measurement Procedure REF - Set instrument center frequency to DTS channel center frequency. - Set the span to ≥ 1.5 times the DTS bandwidth. - Set the RBW = 100 kHz. - Set the 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. Step 2: Measurement Procedure OOB - Set RBW = 100 kHz. - Set VBW ≥ 300 kHz. - Detector = peak. - Sweep = auto couple. - Trace Mode = max hold. - Allow trace to fully stabilize. - Use the peak marker function to determine the maximum amplitude 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 Mode:	Link mode
Test Results:	Please refer to Appendix A

5.7 RADIATED SPURIOUS EMISSIONS

Test Requirement: FCC 47 CFR Part 15 Subpart C Section 15.205/15.209

Test Method: ANSI C63.10-2013 Clause 11.11 & Clause 11.12

Receiver Setup:

Frequency	RBW
0.009 MHz-0.150 MHz	200/300 kHz
0.150 MHz -30 MHz	9/10 kHz
30 MHz-1 GHz	100/120 kHz
Above 1 GHz	1 MHz

Limits:

Spurious Emissions

Frequency	Field strength (microvolt/meter)	Limit (dBμV/m)	Remark	Measurement distance (m)
0.009 MHz-0.490 MHz	2400/F(kHz)	--	--	300
0.490 MHz-1.705 MHz	24000/F(kHz)	--	--	30
1.705 MHz-30 MHz	30	--	--	30
30 MHz-88 MHz	100	40.0	Quasi-peak	3
88 MHz-216 MHz	150	43.5	Quasi-peak	3
216 MHz-960 MHz	200	46.0	Quasi-peak	3
960MHz-1GHz	500	54.0	Quasi-peak	3
Above 1 GHz	500	54.0	Average	3

Remark:

- The lower limit shall apply at the transition frequencies.
- Emission level (dBμV/m) = 20 log Emission level (uV/m).
- For frequencies above 1000 MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20 dB under any condition of modulation.

Test Setup: Refer to section 4.4.1 for details.

Test Procedures:

- From 30 MHz to 1GHz test procedure as below:
 - The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
 - The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
 - The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
 - For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rota table table was turned from 0 degrees to 360 degrees to find the maximum reading.
 - The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
 - If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
- Above 1GHz test procedure as below:
 - Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber and change form table 0.8 meter to 1.5 meter (Above 18GHz the distance is 1 meter and table is 1.5 meter).
 - Test the EUT in the lowest channel, middle channel, the Highest channel

Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: 16/F, Block A, Building 6th, Baoneng Science and Technology Park, Longhua Street, Longhua District, Shenzhen, China

Tel: +86-755-28230888

Fax: +86-755-28230886

E-mail: info@uttlab.com

<http://www.uttlab.com>

UTTR-RF-FCCPART15.247-V1.1

- 3) The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the Y positioning which it is worse case.
- 4) Repeat above procedures until all frequencies measured was complete.

Equipment Used: Refer to section 3 for details.

Test Result: Pass

The measurement data as follows:

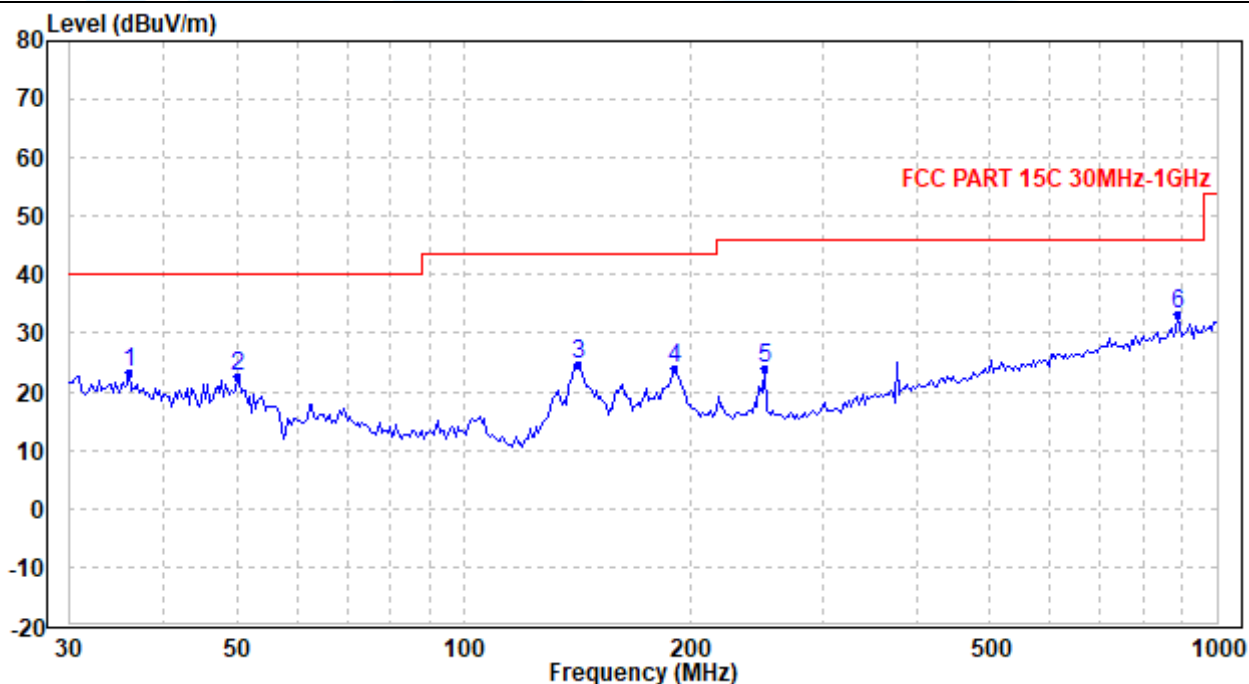
Radiated Emission Test Data (9 kHz ~ 30 MHz):

The amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required to be report.

Radiated Emission Test Data (30 MHz ~ 1 GHz):

IEEE 802.11g 2467MHz

Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	36.014	29.90	-6.72	23.18	40.00	-16.82	QP
2	50.108	36.19	-13.64	22.55	40.00	-17.45	QP
3	141.769	39.84	-15.15	24.69	43.50	-18.81	QP
4	190.441	35.89	-11.76	24.13	43.50	-19.37	QP
5	250.486	34.53	-10.61	23.92	46.00	-22.08	QP
6	887.398	28.56	4.58	33.14	46.00	-12.86	QP

Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: 16/F, Block A, Building 6th, Baoneng Science and Technology Park, Longhua Street, Longhua District, Shenzhen, China

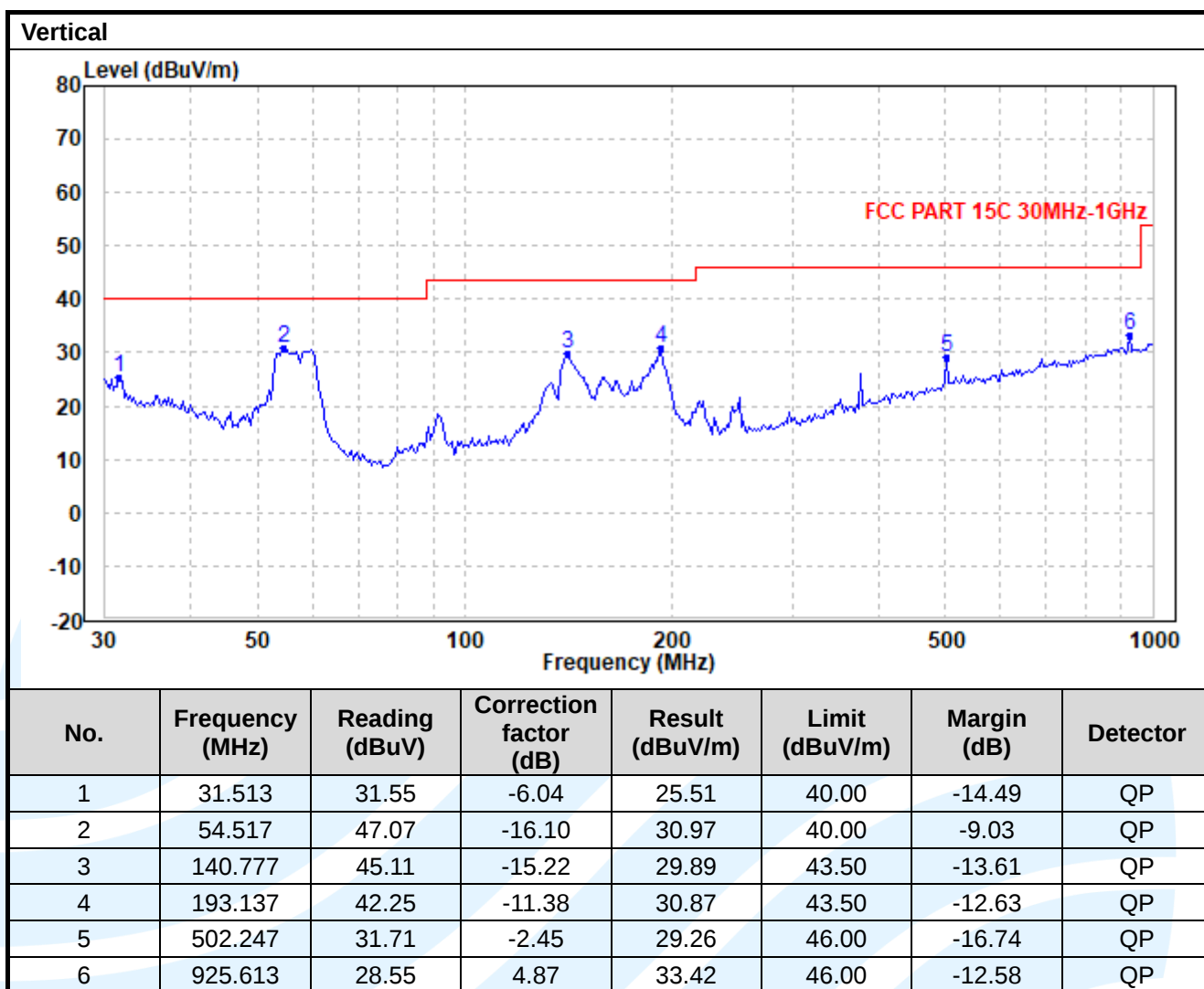
Tel: +86-755-28230888

Fax: +86-755-28230886

E-mail: info@uttlab.com

<http://www.uttlab.com>

UTTR-RF-FCCPART15.247-V1.1



Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: 16/F, Block A, Building 6th, Baoneng Science and Technology Park, Longhua Street, Longhua District, Shenzhen, China

Tel: +86-755-28230888

Fax: +86-755-28230886

E-mail: info@uttlab.com
<http://www.uttlab.com>

UTTR-RF-FCCPART15.247-V1.1

Radiated Emission Test Data (Above 1GHz):
IEEE 802.11b Channel 1:

No.	Frequency (MHz)	Reading (dBμV)	Correction factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Antenna Polaxis
1	4824	48.49	-2.07	46.42	74.00	-27.58	Peak	Horizontal
2	4824	35.09	-2.07	33.02	74.00	-40.98	Peak	Horizontal
3	7236	47.19	1.30	48.49	74.00	-25.51	Peak	Horizontal
4	7236	34.32	1.30	35.62	74.00	-38.38	Peak	Horizontal
5	4824	35.59	-2.07	33.52	54.00	-20.48	Average	Vertical
6	4824	47.49	-2.07	45.42	74.00	-28.58	Peak	Vertical
7	7236	34.91	1.30	36.21	54.00	-17.79	Average	Vertical
8	7236	46.77	1.30	48.07	74.00	-25.93	Peak	Vertical

IEEE 802.11b Channel 6:

1	4874	35.58	-2.05	33.53	54.00	-20.47	Average	Horizontal
2	4874	47.51	-2.05	45.46	74.00	-28.54	Peak	Horizontal
3	7311	34.83	1.31	36.14	54.00	-17.86	Average	Horizontal
4	7311	47.23	1.31	48.54	74.00	-25.46	Peak	Horizontal
5	4874	35.93	-2.05	33.88	54.00	-20.12	Average	Vertical
6	4874	47.77	-2.05	45.72	74.00	-28.28	Peak	Vertical
7	7311	34.77	1.31	36.08	54.00	-17.92	Average	Vertical
8	7311	47.34	1.31	48.65	74.00	-25.35	Peak	Vertical

IEEE 802.11b Channel 11:

1	4924	36.43	-2.03	34.40	54.00	-19.60	Average	Horizontal
2	4924	49.84	-2.03	47.81	74.00	-26.19	Peak	Horizontal
3	7386	34.27	1.31	35.58	54.00	-18.42	Average	Horizontal
4	7386	46.54	1.31	47.85	74.00	-26.15	Peak	Horizontal
5	4924	37.76	-2.03	35.73	54.00	-18.27	Average	Vertical
6	4924	52.64	-2.03	50.61	74.00	-23.39	Peak	Vertical
7	7386	34.41	1.31	35.72	54.00	-18.28	Average	Vertical
8	7386	46.69	1.31	48.00	74.00	-26.00	Peak	Vertical

IEEE 802.11b Channel 12:

1	4934	38.00	-2.03	35.97	54.00	-18.03	Average	Horizontal
2	4934	53.10	-2.03	51.07	74.00	-22.93	Peak	Horizontal
3	7401	33.77	1.32	35.09	54.00	-18.91	Average	Horizontal
4	7401	46.93	1.32	48.25	74.00	-25.75	Peak	Horizontal
5	4934	38.30	-2.03	36.27	54.00	-17.73	Average	Vertical
6	4934	53.28	-2.03	51.25	74.00	-22.75	Peak	Vertical
7	7401	33.92	1.32	35.24	54.00	-18.76	Average	Vertical
8	7401	45.22	1.32	46.54	74.00	-27.46	Peak	Vertical

Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: 16/F, Block A, Building 6th, Baoneng Science and Technology Park, Longhua Street, Longhua District, Shenzhen, China

Tel: +86-755-28230888

Fax: +86-755-28230886

E-mail: info@uttlab.com

<http://www.uttlab.com>

UTTR-RF-FCCPART15.247-V1.1

Radiated Emission Test Data (Above 1GHz):
IEEE 802.11b Channel 13:

No.	Frequency (MHz)	Reading (dBμV)	Correction factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Antenna Polaxis
1	4944	37.30	-2.02	35.28	54.00	-18.72	Average	Horizontal
2	4944	53.73	-2.02	51.71	74.00	-22.29	Peak	Horizontal
3	7416	33.92	1.32	35.24	54.00	-18.76	Average	Horizontal
4	7416	46.96	1.32	48.28	74.00	-25.72	Peak	Horizontal
5	4944	39.23	-2.02	37.21	54.00	-16.79	Average	Vertical
6	4944	54.33	-2.02	52.31	74.00	-21.69	Peak	Vertical
7	7416	33.53	1.32	34.85	54.00	-19.15	Average	Vertical
8	7416	44.66	1.32	45.98	74.00	-28.02	Peak	Vertical

IEEE 802.11g Channel 1:

No.	Frequency (MHz)	Reading (dBμV)	Correction factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Antenna Polaxis
1	4824	35.57	-2.07	33.50	54.00	-20.50	Average	Horizontal
2	4824	48.08	-2.07	46.01	74.00	-27.99	Peak	Horizontal
3	7236	34.86	1.30	36.16	54.00	-17.84	Average	Horizontal
4	7236	47.80	1.30	49.10	74.00	-24.90	Peak	Horizontal
5	4824	35.61	-2.07	33.54	54.00	-20.46	Average	Vertical
6	4824	46.77	-2.07	44.70	74.00	-29.30	Peak	Vertical
7	7236	34.83	1.30	36.13	54.00	-17.87	Average	Vertical
8	7236	46.65	1.30	47.95	74.00	-26.05	Peak	Vertical

IEEE 802.11g Channel 6:

1	4874	35.48	-2.05	33.43	54.00	-20.57	Average	Horizontal
2	4874	47.11	-2.05	45.06	74.00	-28.94	Peak	Horizontal
3	7311	34.80	1.31	36.11	54.00	-17.89	Average	Horizontal
4	7311	47.23	1.31	48.54	74.00	-25.46	Peak	Horizontal
5	4874	35.48	-2.05	33.43	54.00	-20.57	Average	Vertical
6	4874	47.04	-2.05	44.99	74.00	-29.01	Peak	Vertical
7	7311	34.83	1.31	36.14	54.00	-17.86	Average	Vertical
8	7311	46.76	1.31	48.07	74.00	-25.93	Peak	Vertical

IEEE 802.11g Channel 11:

1	4924	35.36	-2.03	33.33	54.00	-20.67	Average	Horizontal
2	4924	47.59	-2.03	45.56	74.00	-28.44	Peak	Horizontal
3	7386	34.15	1.31	35.46	54.00	-18.54	Average	Horizontal
4	7386	47.37	1.31	48.68	74.00	-25.32	Peak	Horizontal
5	4924	35.44	-2.03	33.41	54.00	-20.59	Average	Vertical
6	4924	46.84	-2.03	44.81	74.00	-29.19	Peak	Vertical
7	7386	34.15	1.31	35.46	54.00	-18.54	Average	Vertical
8	7386	46.83	1.31	48.14	74.00	-25.86	Peak	Vertical

Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: 16/F, Block A, Building 6th, Baoneng Science and Technology Park, Longhua Street, Longhua District, Shenzhen, China

Tel: +86-755-28230888

Fax: +86-755-28230886

E-mail: info@uttlab.com

<http://www.uttlab.com>

UTTR-RF-FCCPART15.247-V1.1

Radiated Emission Test Data (Above 1GHz):
IEEE 802.11g Channel 12:

No.	Frequency (MHz)	Reading (dBμV)	Correction factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Antenna Polaxis
1	4934	34.94	-2.03	32.91	54.00	-21.09	Average	Horizontal
2	4934	47.52	-2.03	45.49	74.00	-28.51	Peak	Horizontal
3	7401	33.68	1.32	35.00	54.00	-19.00	Average	Horizontal
4	7401	45.72	1.32	47.04	74.00	-26.96	Peak	Horizontal
5	4934	35.15	-2.03	33.12	54.00	-20.88	Average	Vertical
6	4934	47.10	-2.03	45.07	74.00	-28.93	Peak	Vertical
7	7401	33.77	1.32	35.09	54.00	-18.91	Average	Vertical
8	7401	45.72	1.32	47.04	74.00	-26.96	Peak	Vertical

IEEE 802.11g Channel 13:

1	4944	37.26	-2.02	35.24	54.00	-18.76	Average	Horizontal
2	4944	49.88	-2.02	47.86	74.00	-26.14	Peak	Horizontal
3	7416	33.68	1.32	35.00	54.00	-19.00	Average	Horizontal
4	7416	46.67	1.32	47.99	74.00	-26.01	Peak	Horizontal
5	4944	38.00	-2.02	35.98	54.00	-18.02	Average	Vertical
6	4944	51.59	-2.02	49.57	74.00	-24.43	Peak	Vertical
7	7416	33.65	1.32	34.97	54.00	-19.03	Average	Vertical
8	7416	46.01	1.32	47.33	74.00	-26.67	Peak	Vertical

Radiated Emission Test Data (Above 1GHz):
IEEE 802.11n-HT20 Channel 1:

No.	Frequency (MHz)	Reading (dBμV)	Correction factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Antenna Polaxis
1	4824	35.69	-2.07	33.62	54.00	-20.38	Average	Horizontal
2	4824	46.92	-2.07	44.85	74.00	-29.15	Peak	Horizontal
3	7236	34.94	1.30	36.24	54.00	-17.76	Average	Horizontal
4	7236	46.45	1.30	47.75	74.00	-26.25	Peak	Horizontal
5	4824	35.64	-2.07	33.57	54.00	-20.43	Average	Vertical
6	4824	48.17	-2.07	46.10	74.00	-27.90	Peak	Vertical
7	7236	34.80	1.30	36.10	54.00	-17.90	Average	Vertical
8	7236	47.24	1.30	48.54	74.00	-25.46	Peak	Vertical

IEEE 802.11n-HT20 Channel 6:

1	4874	35.53	-2.05	33.48	54.00	-20.52	Average	Horizontal
2	4874	48.39	-2.05	46.34	74.00	-27.66	Peak	Horizontal
3	7311	34.67	1.31	35.98	54.00	-18.02	Average	Horizontal
4	7311	46.68	1.31	47.99	74.00	-26.01	Peak	Horizontal
5	4874	35.53	-2.05	33.48	54.00	-20.52	Average	Vertical
6	4874	47.63	-2.05	45.58	74.00	-28.42	Peak	Vertical
7	7311	34.72	1.31	36.03	54.00	-17.97	Average	Vertical
8	7311	47.08	1.31	48.39	74.00	-25.61	Peak	Vertical

Radiated Emission Test Data (Above 1GHz):
IEEE 802.11n-HT20_ Channel 11:

No.	Frequency (MHz)	Reading (dBμV)	Correction factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Antenna Polaxis
1	4924	35.36	-2.03	33.33	54.00	-20.67	Average	Horizontal
2	4924	46.97	-2.03	44.94	74.00	-29.06	Peak	Horizontal
3	7386	34.30	1.31	35.61	54.00	-18.39	Average	Horizontal
4	7386	45.96	1.31	47.27	74.00	-26.73	Peak	Horizontal
5	4924	35.39	-2.03	33.36	54.00	-20.64	Average	Vertical
6	4924	47.11	-2.03	45.08	74.00	-28.92	Peak	Vertical
7	7386	34.01	1.31	35.32	54.00	-18.68	Average	Vertical
8	7386	46.32	1.31	47.63	74.00	-26.37	Peak	Vertical

IEEE 802.11n-HT20_ Channel 12:

1	4934	35.17	-2.03	33.14	54.00	-20.86	Average	Horizontal
2	4934	46.36	-2.03	44.33	74.00	-29.67	Peak	Horizontal
3	7401	33.74	1.32	35.06	54.00	-18.94	Average	Horizontal
4	7401	46.08	1.32	47.40	74.00	-26.60	Peak	Horizontal
5	4934	35.20	-2.03	33.17	54.00	-20.83	Average	Vertical
6	4934	47.04	-2.03	45.01	74.00	-28.99	Peak	Vertical
7	7401	33.62	1.32	34.94	54.00	-19.06	Average	Vertical
8	7401	45.88	1.32	47.20	74.00	-26.80	Peak	Vertical

IEEE 802.11n-HT20_ Channel 13:

1	4944	36.23	-2.02	34.21	54.00	-19.79	Average	Horizontal
2	4944	48.51	-2.02	46.49	74.00	-27.51	Peak	Horizontal
3	7416	33.74	1.32	35.06	54.00	-18.94	Average	Horizontal
4	7416	47.34	1.32	48.66	74.00	-25.34	Peak	Horizontal
5	4944	37.26	-2.02	35.24	54.00	-18.76	Average	Vertical
6	4944	48.61	-2.02	46.59	74.00	-27.41	Peak	Vertical
7	7416	33.68	1.32	35.00	54.00	-19.00	Average	Vertical
8	7416	46.81	1.32	48.13	74.00	-25.87	Peak	Vertical

Radiated Emission Test Data (Above 1GHz):
IEEE 802.11n-HT40_ Channel 3:

No.	Frequency (MHz)	Reading (dBμV)	Correction factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Antenna Polaxis
1	4844	35.58	-2.06	33.52	54.00	-20.48	Average	Horizontal
2	4844	48.63	-2.06	46.57	74.00	-27.43	Peak	Horizontal
3	7266	34.72	1.31	36.03	54.00	-17.97	Average	Horizontal
4	7266	46.55	1.31	47.86	74.00	-26.14	Peak	Horizontal
5	4844	35.63	-2.06	33.57	54.00	-20.43	Average	Vertical
6	4844	47.07	-2.06	45.01	74.00	-28.99	Peak	Vertical
7	7266	34.82	1.31	36.13	54.00	-17.87	Average	Vertical
8	7266	47.27	1.31	48.58	74.00	-25.42	Peak	Vertical

Radiated Emission Test Data (Above 1GHz):
IEEE 802.11n-HT40_ Channel 6:

No.	Frequency (MHz)	Reading (dBμV)	Correction factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Antenna Polaxis
1	4874	35.46	-2.05	33.41	54.00	-20.59	Average	Horizontal
2	4874	48.07	-2.05	46.02	74.00	-27.98	Peak	Horizontal
3	7311	34.85	1.31	36.16	54.00	-17.84	Average	Horizontal
4	7311	46.75	1.31	48.06	74.00	-25.94	Peak	Horizontal
5	4874	35.60	-2.05	33.55	54.00	-20.45	Average	Vertical
6	4874	48.29	-2.05	46.24	74.00	-27.76	Peak	Vertical
7	7311	34.67	1.31	35.98	54.00	-18.02	Average	Vertical
8	7311	47.52	1.31	48.83	74.00	-25.17	Peak	Vertical

IEEE 802.11n-HT40_ Channel 9:

1	4904	35.45	-2.04	33.41	54.00	-20.59	Average	Horizontal
2	4904	47.60	-2.04	45.56	74.00	-28.44	Peak	Horizontal
3	7356	34.21	1.31	35.52	54.00	-18.48	Average	Horizontal
4	7356	46.83	1.31	48.14	74.00	-25.86	Peak	Horizontal
5	4904	35.47	-2.04	33.43	54.00	-20.57	Average	Vertical
6	4904	47.51	-2.04	45.47	74.00	-28.53	Peak	Vertical
7	7356	34.07	1.31	35.38	54.00	-18.62	Average	Vertical
8	7356	47.39	1.31	48.70	74.00	-25.30	Peak	Vertical

IEEE 802.11n-HT40_ Channel 10:

1	4914	35.39	-2.03	33.36	54.00	-20.64	Average	Horizontal
2	4914	47.42	-2.03	45.39	74.00	-28.61	Peak	Horizontal
3	7371	33.86	1.32	35.18	54.00	-18.82	Average	Horizontal
4	7371	45.97	1.32	47.29	74.00	-26.71	Peak	Horizontal
5	4914	35.75	-2.03	33.72	54.00	-20.28	Average	Vertical
6	4914	46.90	-2.03	44.87	74.00	-29.13	Peak	Vertical
7	7371	33.89	1.32	35.21	54.00	-18.79	Average	Vertical
8	7371	45.94	1.32	47.26	74.00	-26.74	Peak	Vertical

IEEE 802.11n-HT40_ Channel 11:

1	4924	35.65	-2.03	33.62	54.00	-20.38	Average	Horizontal
2	4924	47.26	-2.03	45.23	74.00	-28.77	Peak	Horizontal
3	7386	33.98	1.31	35.29	54.00	-18.71	Average	Horizontal
4	7386	46.47	1.31	47.78	74.00	-26.22	Peak	Horizontal
5	4924	36.03	-2.03	34.00	54.00	-20.00	Average	Vertical
6	4924	48.01	-2.03	45.98	74.00	-28.02	Peak	Vertical
7	7386	33.90	1.31	35.21	54.00	-18.79	Average	Vertical
8	7386	46.81	1.31	48.12	74.00	-25.88	Peak	Vertical

Remark:

1. Correct Factor = Antenna Factor + Cable Loss - Amplifier Gain, the value was added to Original Receiver Reading by the software automatically.
2. Result = Reading + Correct Factor.
3. Margin = Result – Limit.

Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: 16/F, Block A, Building 6th, Baoneng Science and Technology Park, Longhua Street, Longhua District, Shenzhen, China

Tel: +86-755-28230888

Fax: +86-755-28230886

E-mail: info@uttlab.com

<http://www.uttlab.com>

UTTR-RF-FCCPART15.247-V1.1

5.8 BAND EDGE MEASUREMENTS (RADIATED)

Test Requirement: FCC 47 CFR Part 15 Subpart C Section 15.205/15.209

Test Method: ANSI C63.10-2013 Clause 11.13

Limits:

Radiated emissions which fall in the restricted bands, as defined in section 15.205(a), must also comply with the radiated emission limits specified in section 15.209(a).

Frequency	Limit (dB μ V/m @3m)	Remark
30 MHz-88 MHz	40.0	Quasi-peak Value
88 MHz-216 MHz	43.5	Quasi-peak Value
216 MHz-960 MHz	46.0	Quasi-peak Value
960 MHz-1 GHz	54.0	Quasi-peak Value
Above 1 GHz	54.0	Average Value
	74.0	Peak Value

Test Setup: Refer to section 4.4.1 for details.

Test Procedures:

Radiated band edge measurements at 2390 MHz and 2483.5 MHz were made with the unit transmitting in the low end of the channel range and the high end closest to the restricted bands respectively. The emissions were made on the 966 Semi-Chamber. Use (resolution bandwidth (RBW) = 1 MHz, video bandwidth (VBW) = 3 MHz for peak levels and RBW = 1 MHz and VBW = 10 Hz or 1/T for average levels).

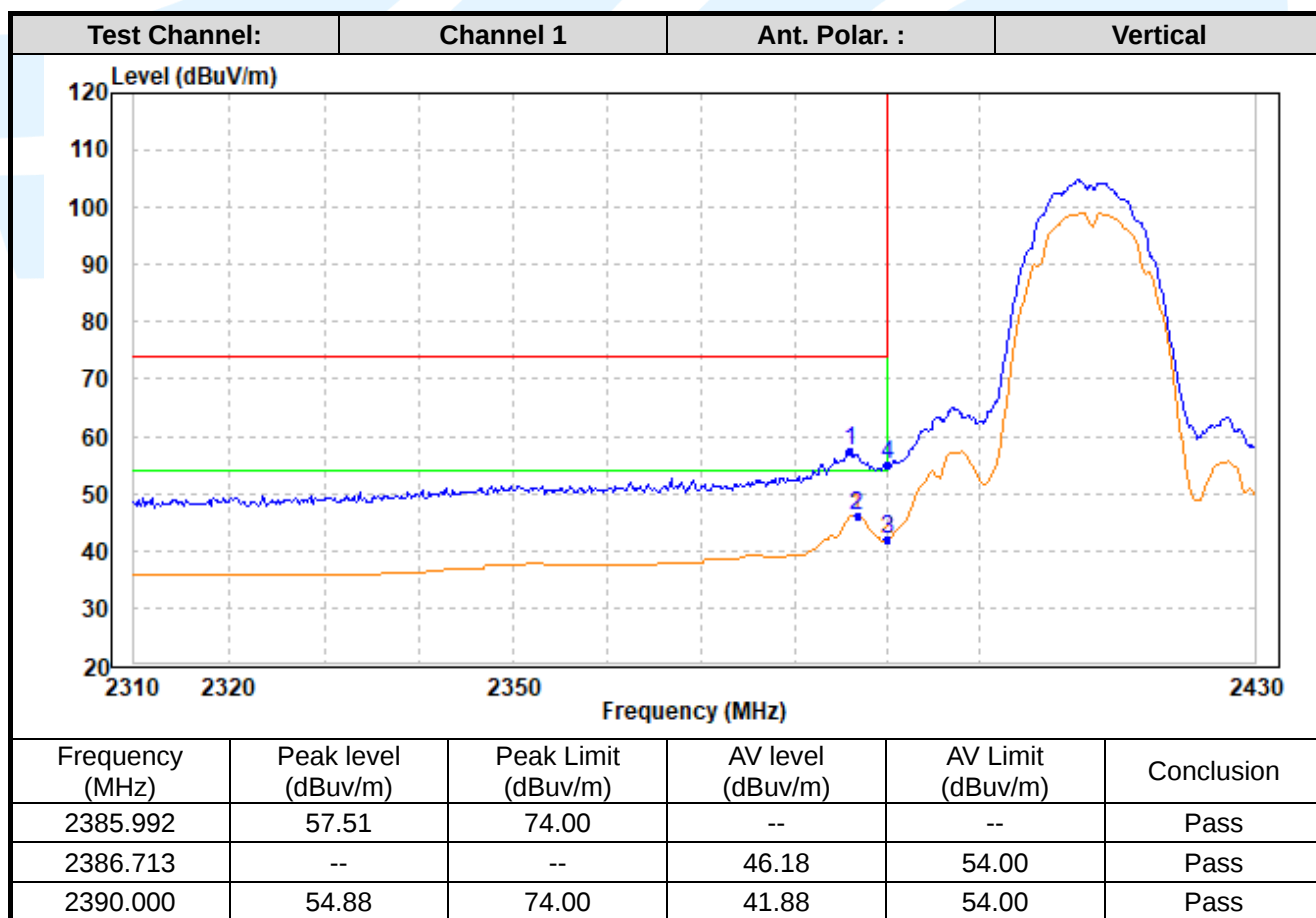
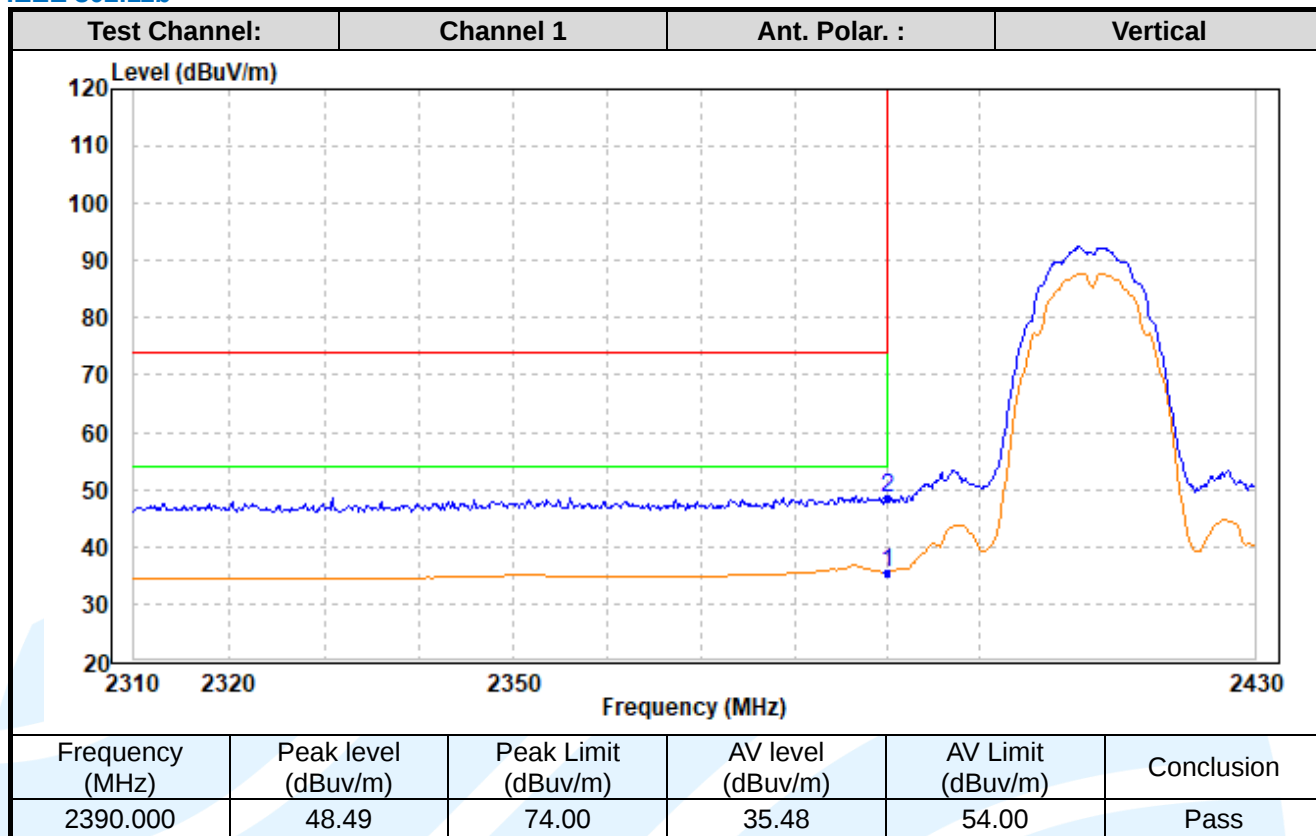
1. Use radiated spurious emission test procedure described in clause 5.10. The transmitter output (antenna port) was connected to the test receiver.
2. Set the PK and AV limit line.
3. Record the fundamental emission and emissions out of the band-edge.
4. Determine band-edge compliance as required.

Equipment Used: Refer to section 3 for details.

Test Result: Pass

The measurement data as follows:

IEEE 802.11b



Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: 16/F, Block A, Building 6th, Baoneng Science and Technology Park, Longhua Street, Longhua District, Shenzhen, China

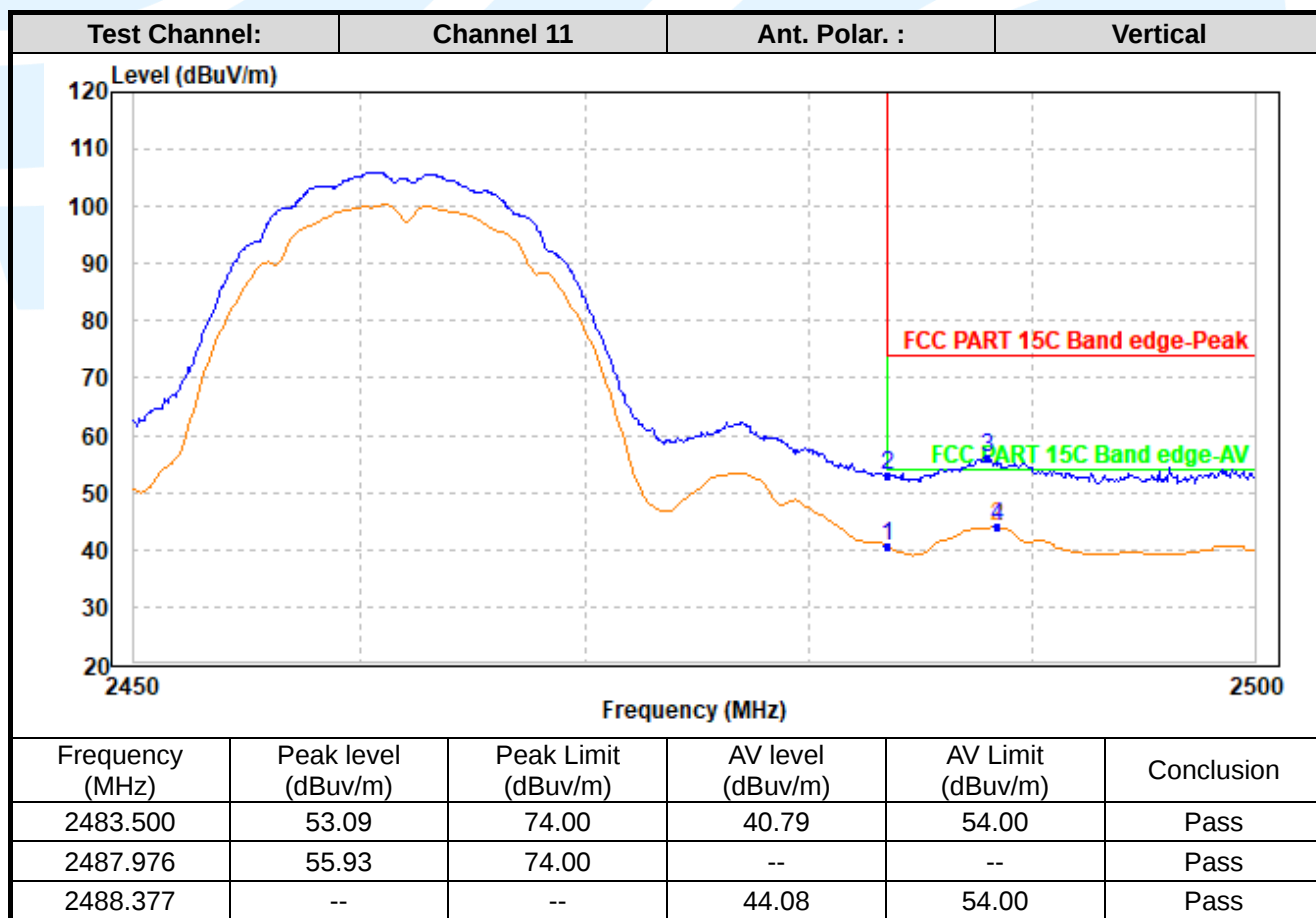
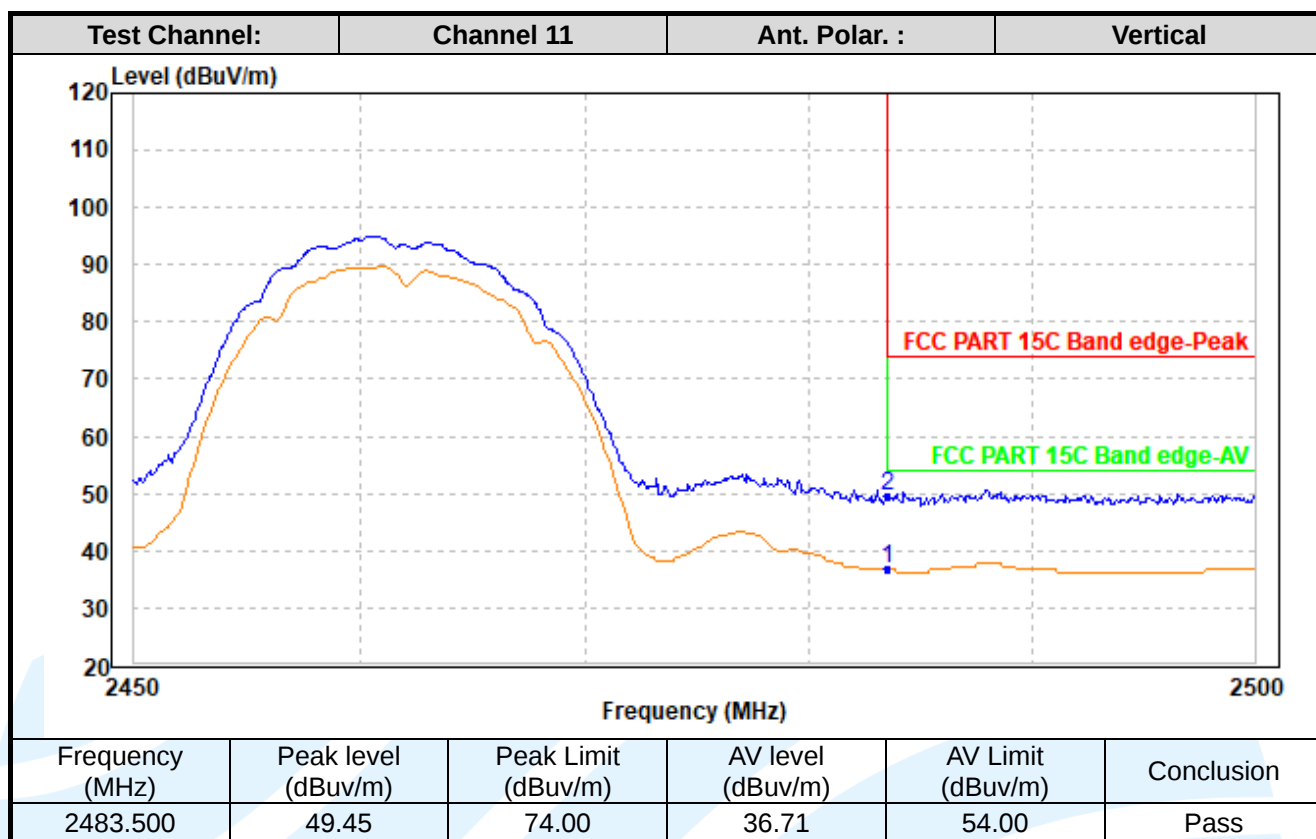
Tel: +86-755-28230888

Fax: +86-755-28230886

E-mail: info@uttlab.com

<http://www.uttlab.com>

UTTR-RF-FCCPART15.247-V1.1



Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: 16/F, Block A, Building 6th, Baoneng Science and Technology Park, Longhua Street, Longhua District, Shenzhen, China

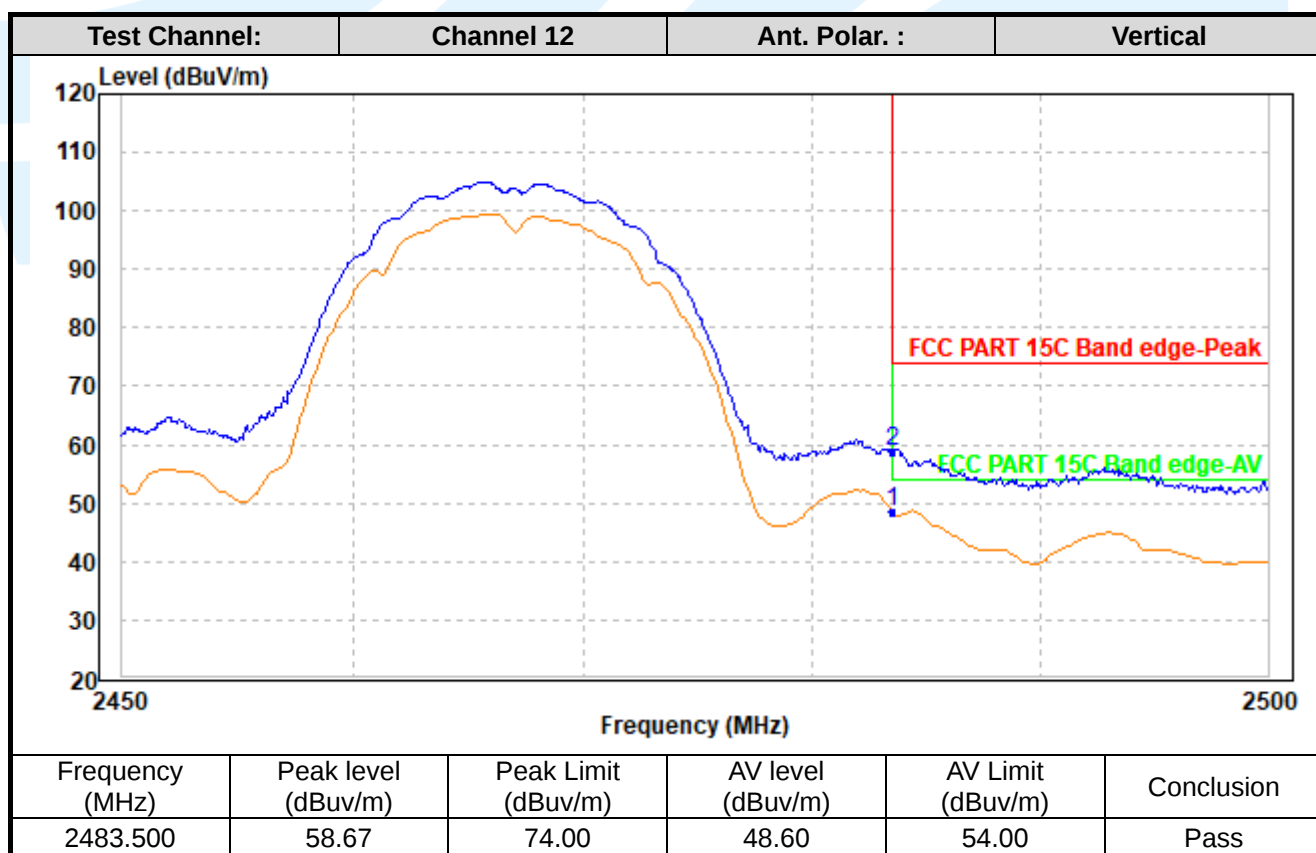
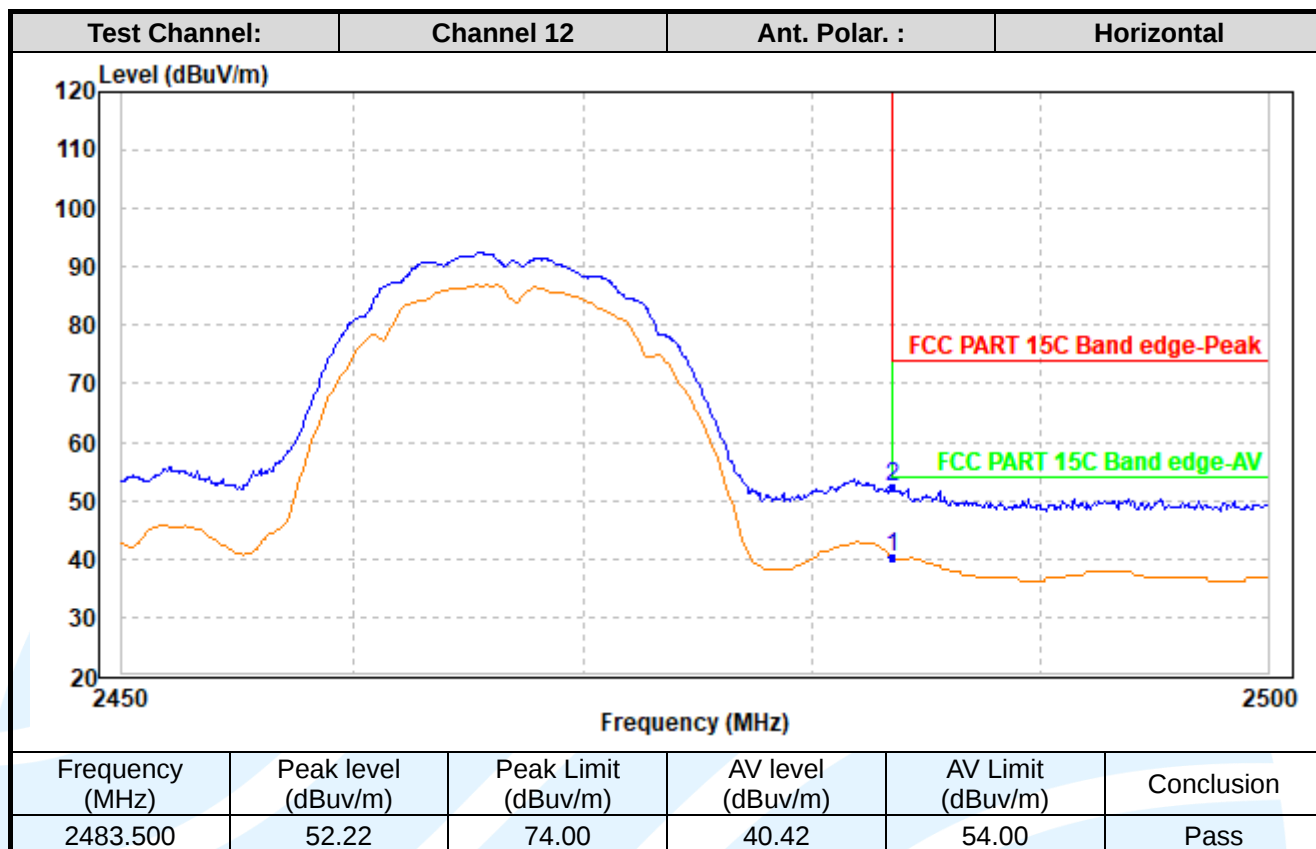
Tel: +86-755-28230888

Fax: +86-755-28230886

E-mail: info@uttlab.com

<http://www.uttlab.com>

UTTR-RF-FCCPART15.247-V1.1



Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: 16/F, Block A, Building 6th, Baoneng Science and Technology Park, Longhua Street, Longhua District, Shenzhen, China

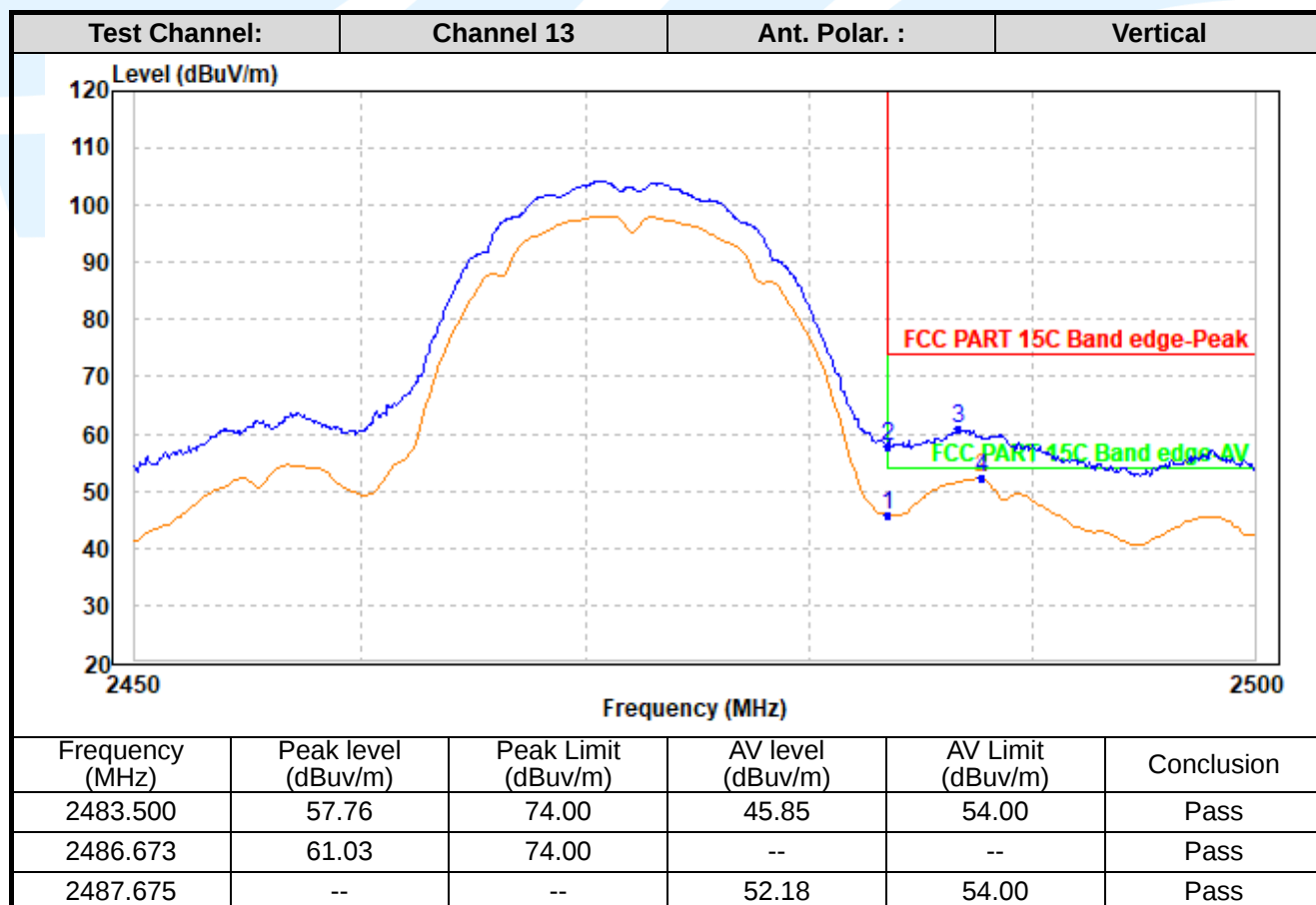
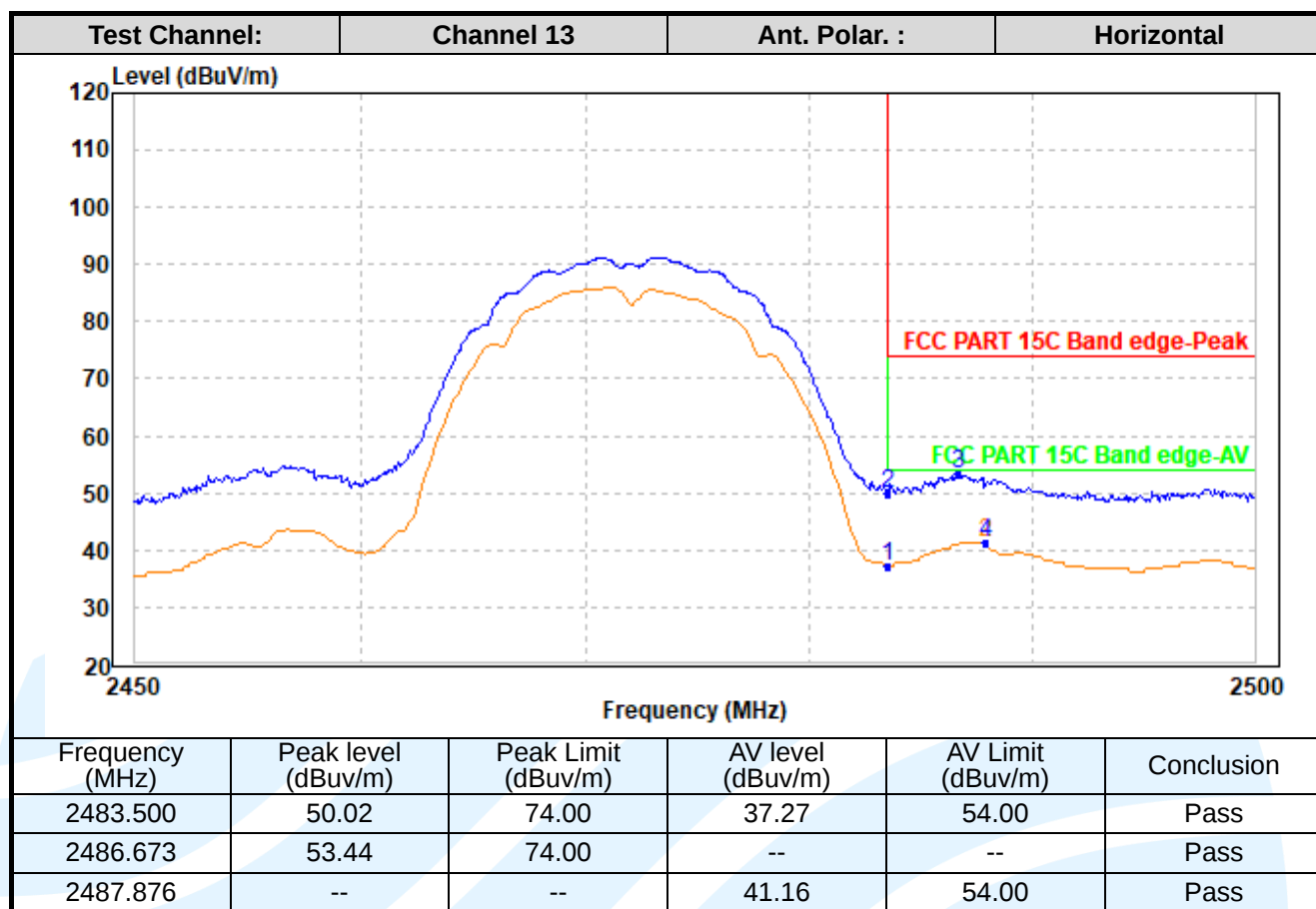
Tel: +86-755-28230888

Fax: +86-755-28230886

E-mail: info@uttlab.com

<http://www.uttlab.com>

UTTR-RF-FCCPART15.247-V1.1



Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: 16/F, Block A, Building 6th, Baoneng Science and Technology Park, Longhua Street, Longhua District, Shenzhen, China

Tel: +86-755-28230888

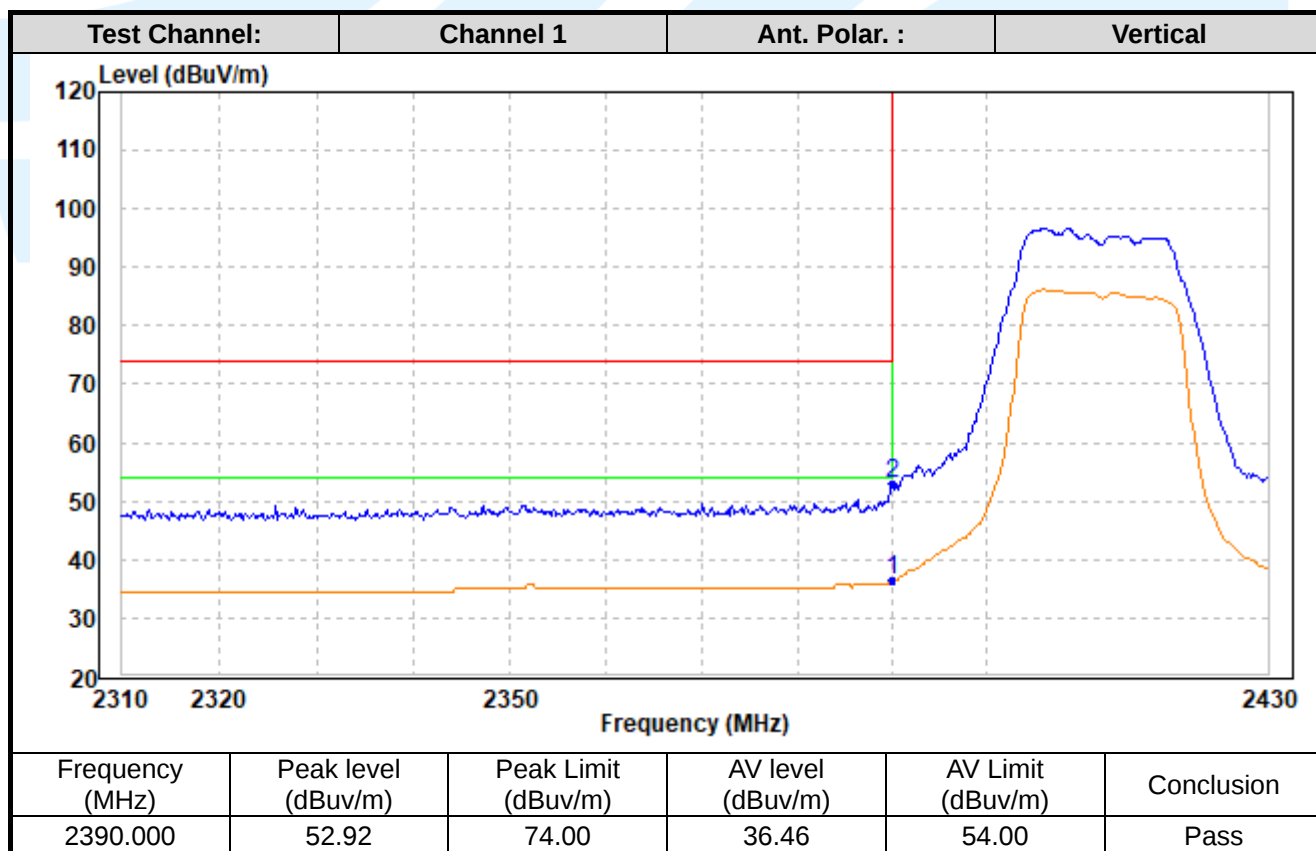
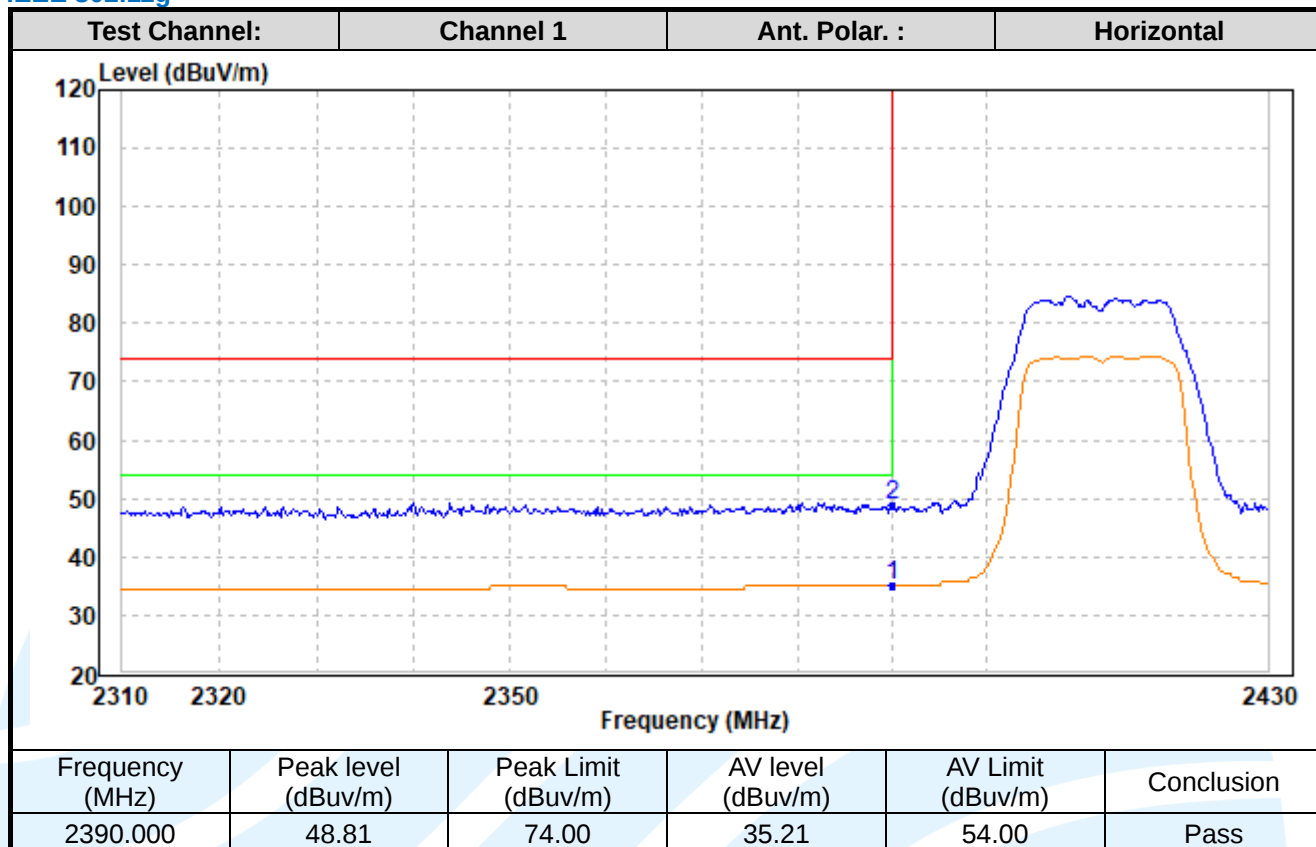
Fax: +86-755-28230886

E-mail: info@uttlab.com

<http://www.uttlab.com>

UTTR-RF-FCCPART15.247-V1.1

IEEE 802.11g



Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: 16/F, Block A, Building 6th, Baoneng Science and Technology Park, Longhua Street, Longhua District, Shenzhen, China

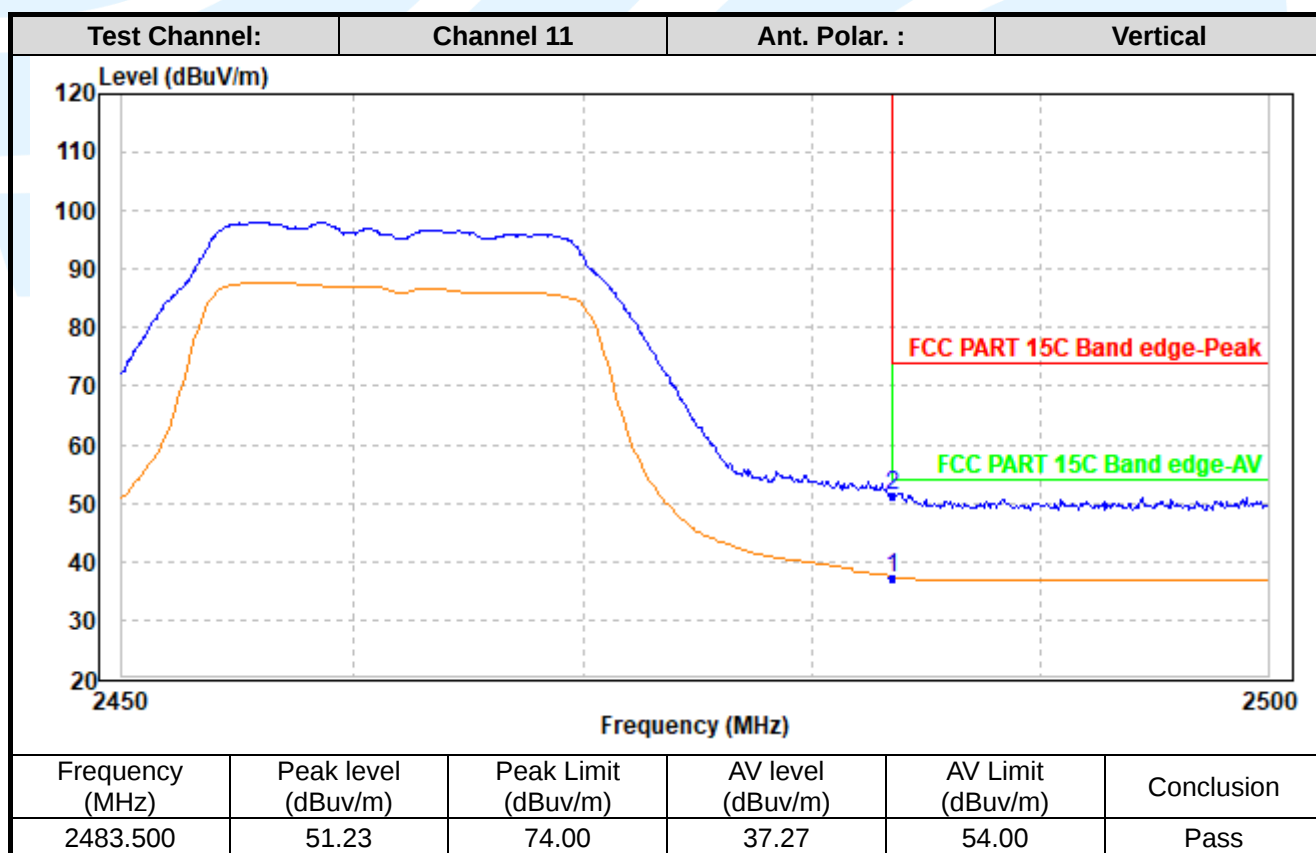
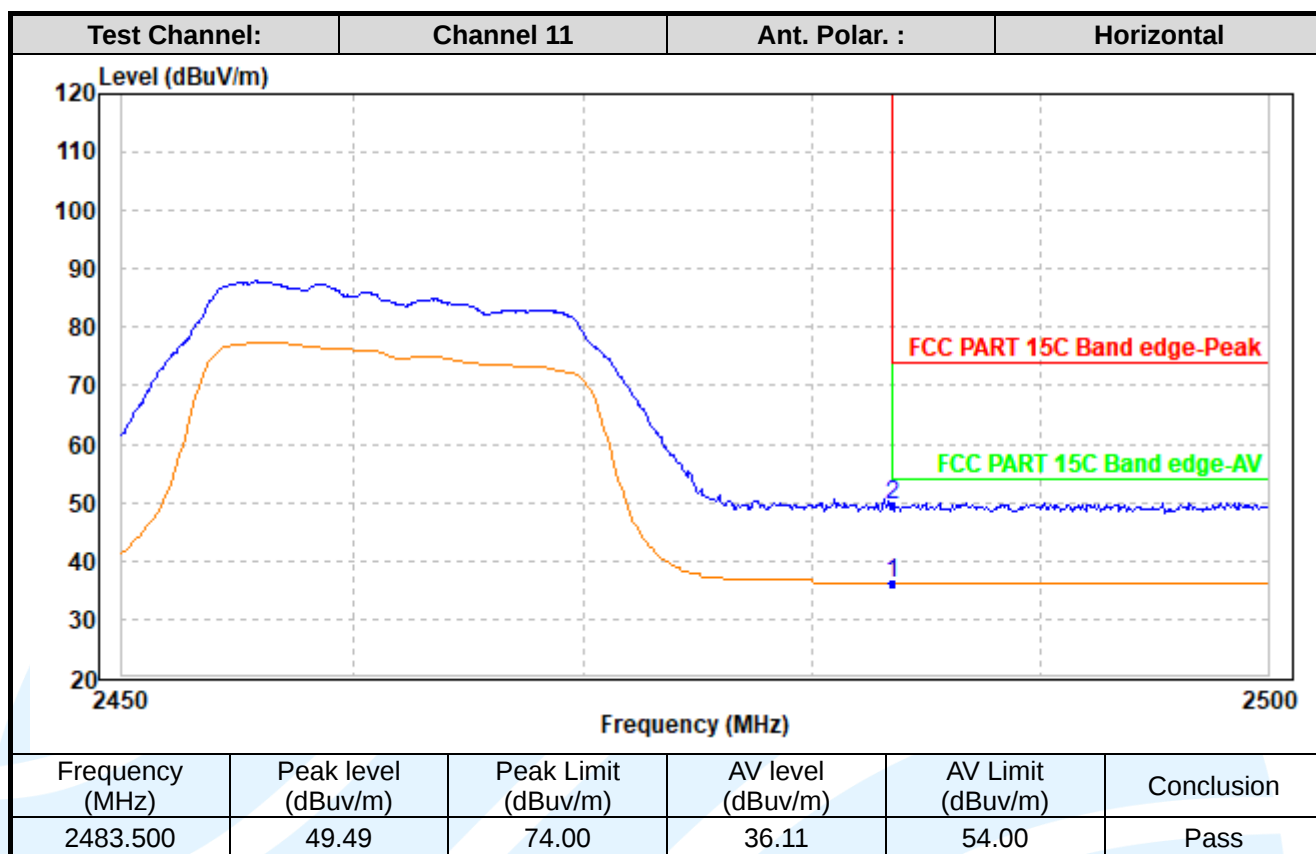
Tel: +86-755-28230888

Fax: +86-755-28230886

E-mail: info@uttlab.com

<http://www.uttlab.com>

UTTR-RF-FCCPART15.247-V1.1



Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: 16/F, Block A, Building 6th, Baoneng Science and Technology Park, Longhua Street, Longhua District, Shenzhen, China

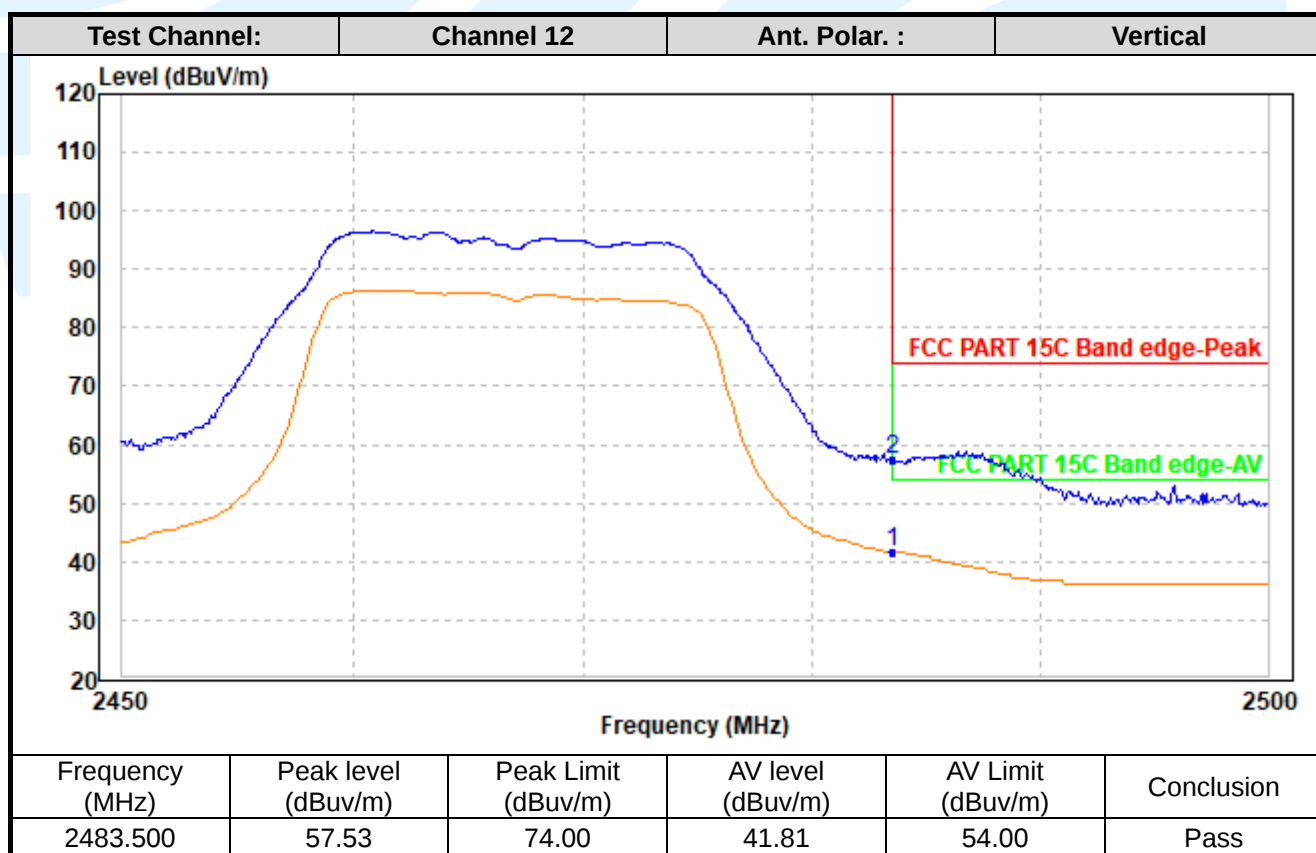
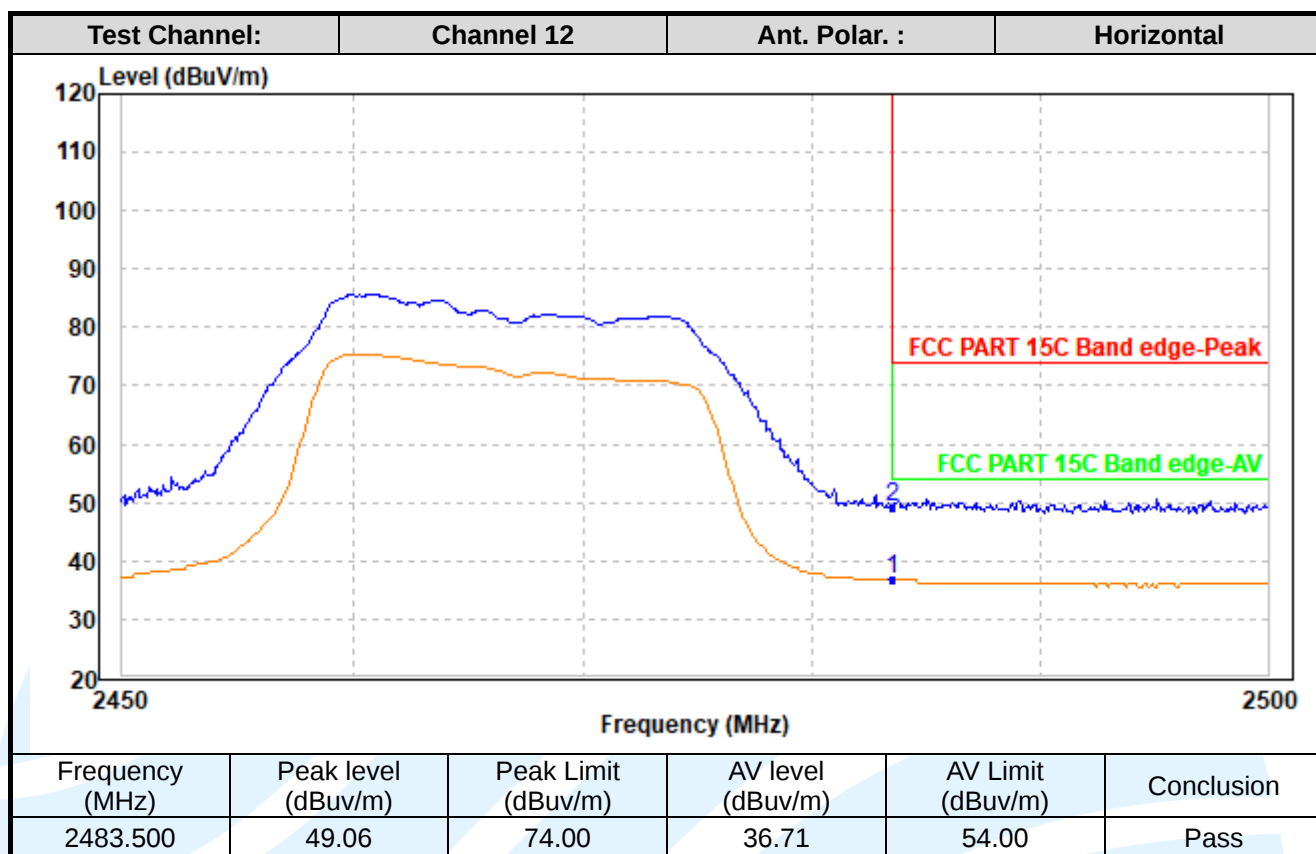
Tel: +86-755-28230888

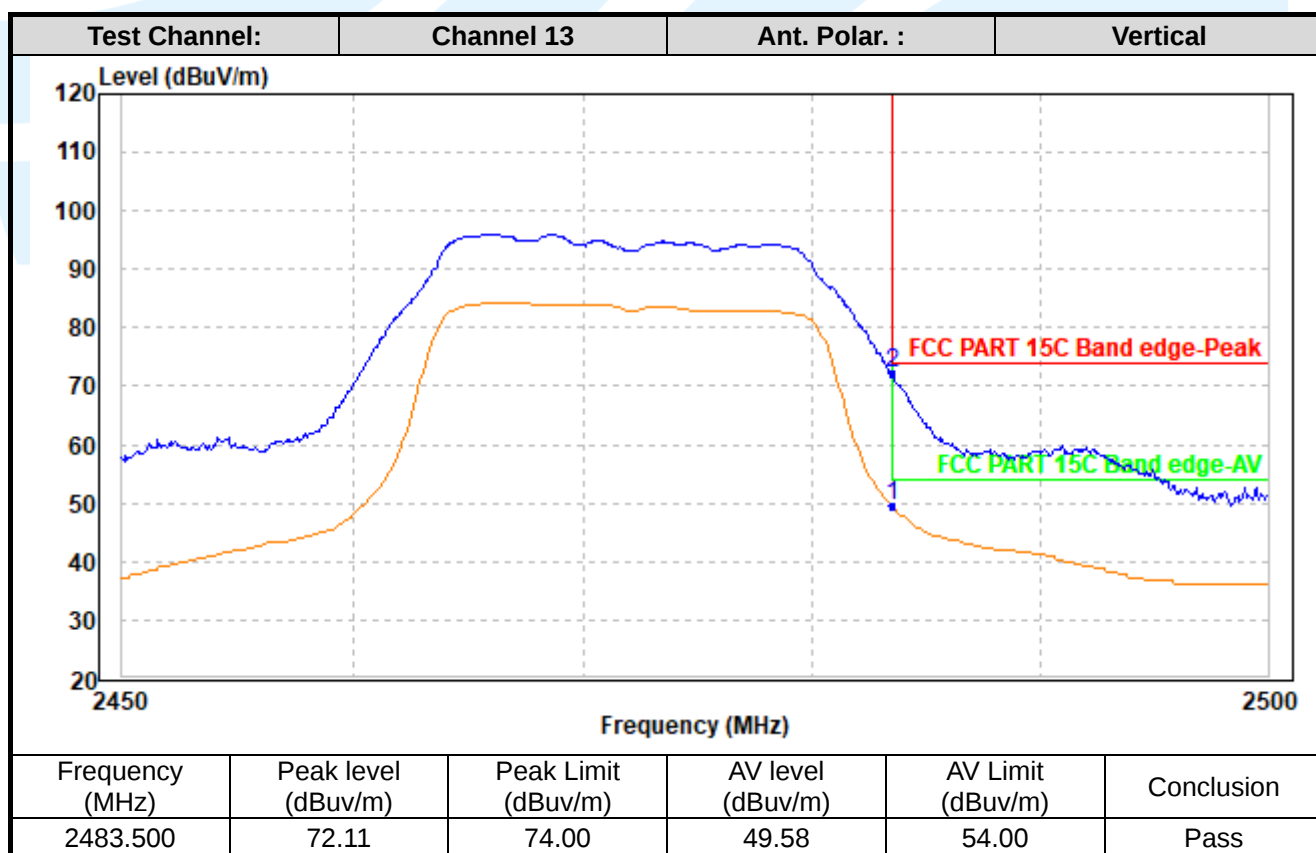
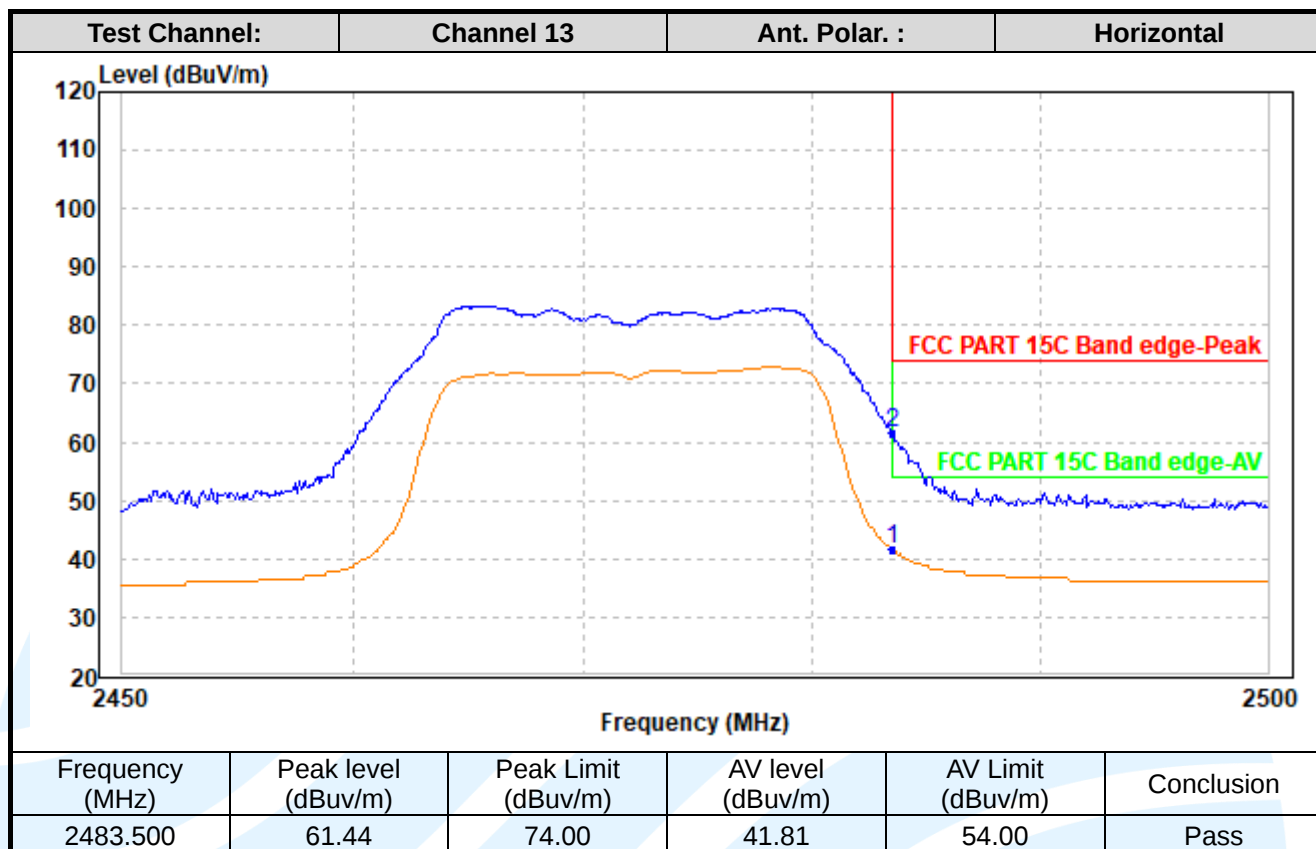
Fax: +86-755-28230886

E-mail: info@uttlab.com

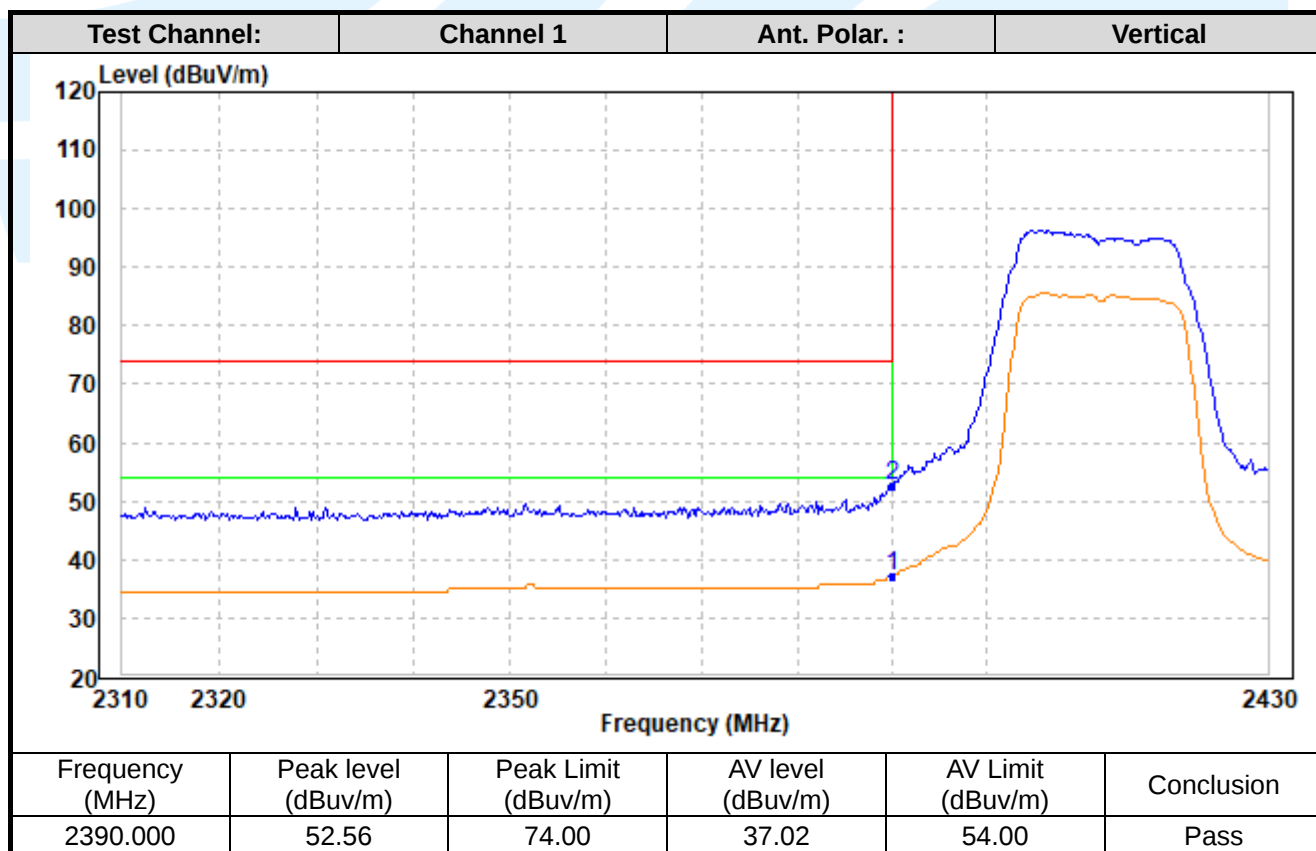
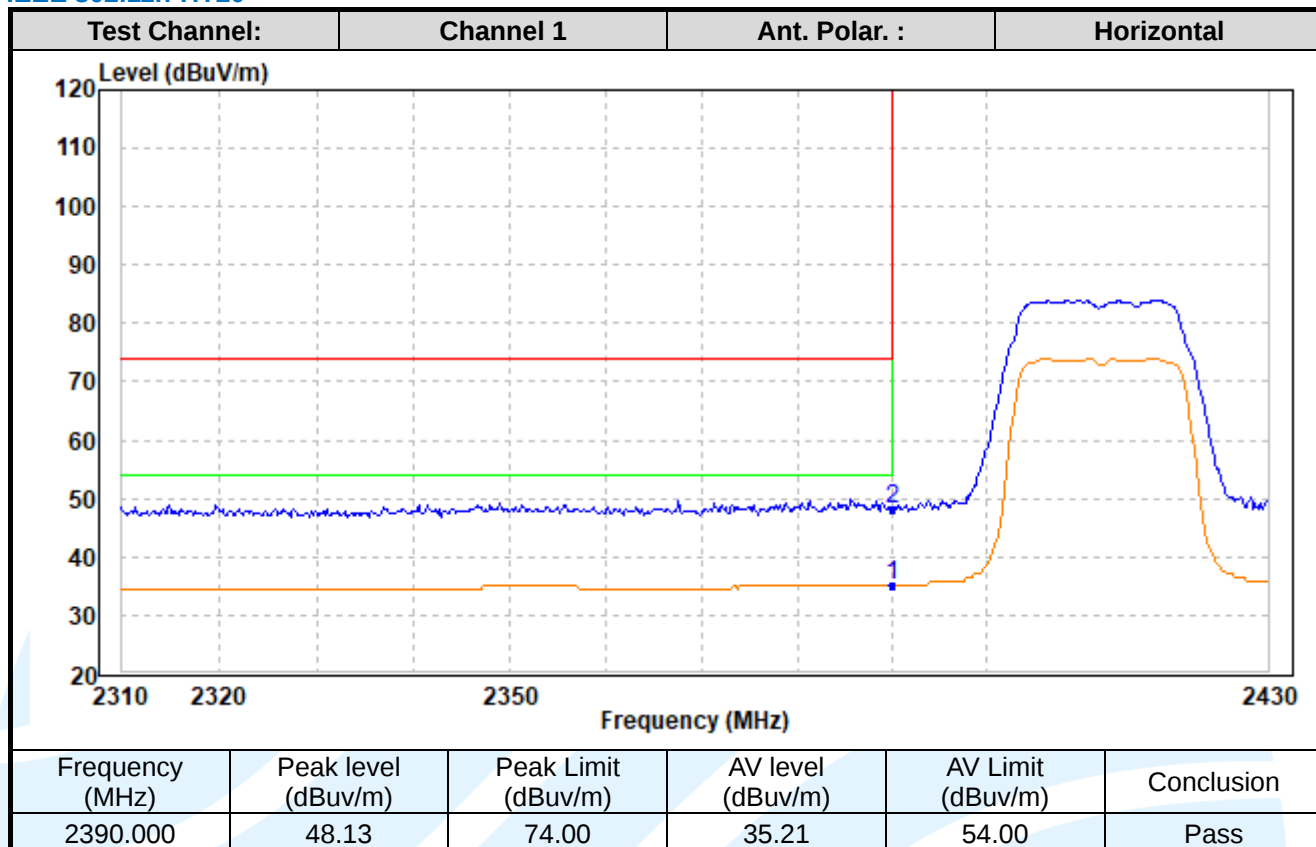
<http://www.uttlab.com>

UTTR-RF-FCCPART15.247-V1.1





IEEE 802.11n-HT20



Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: 16/F, Block A, Building 6th, Baoneng Science and Technology Park, Longhua Street, Longhua District, Shenzhen, China

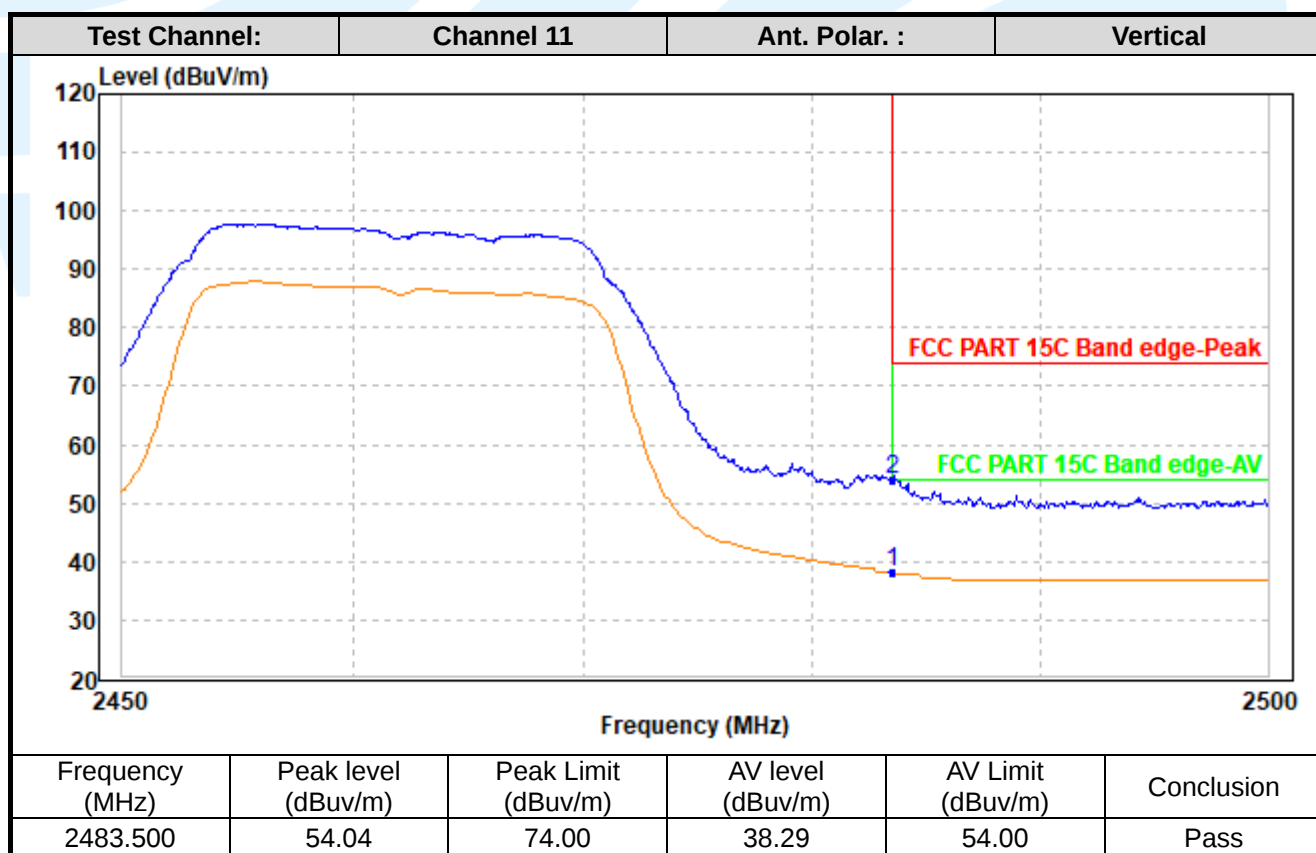
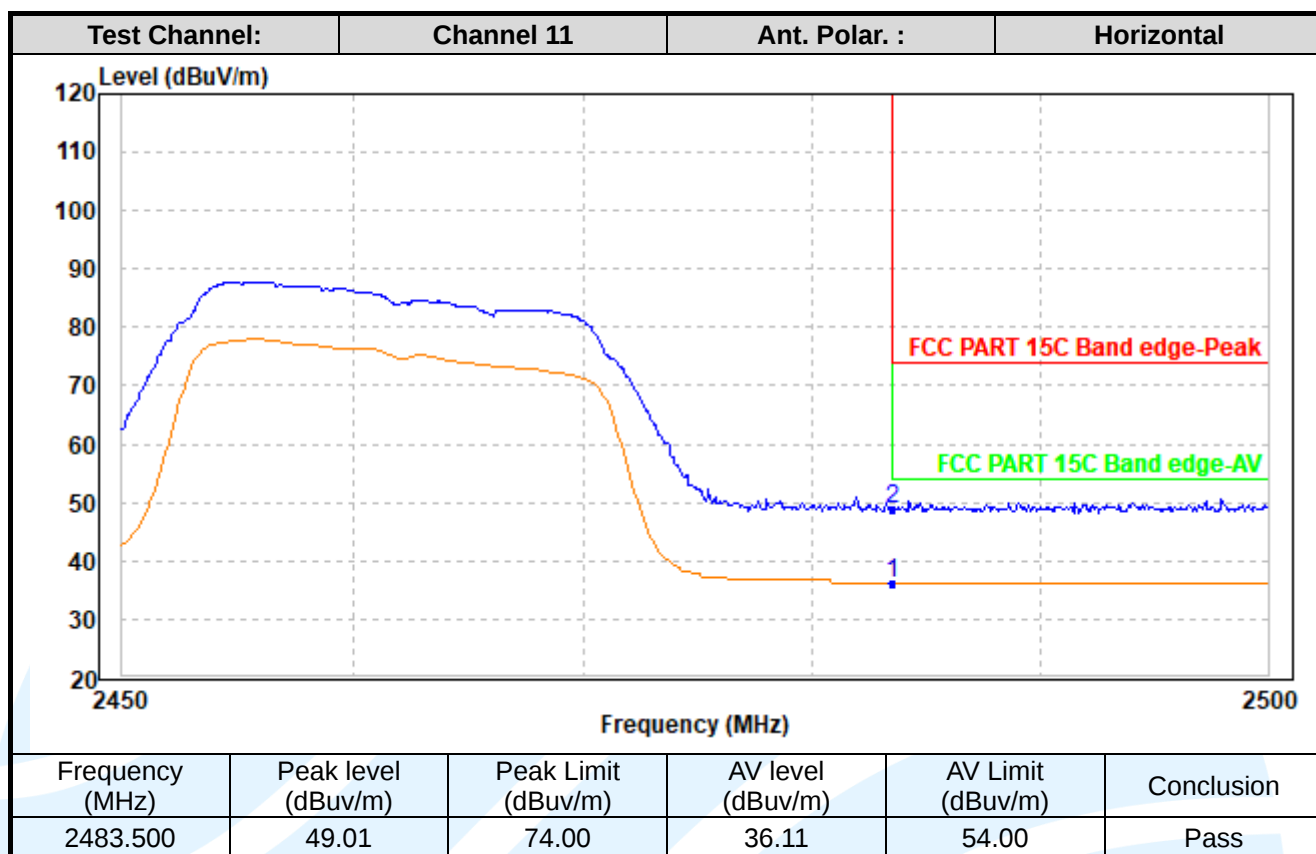
Tel: +86-755-28230888

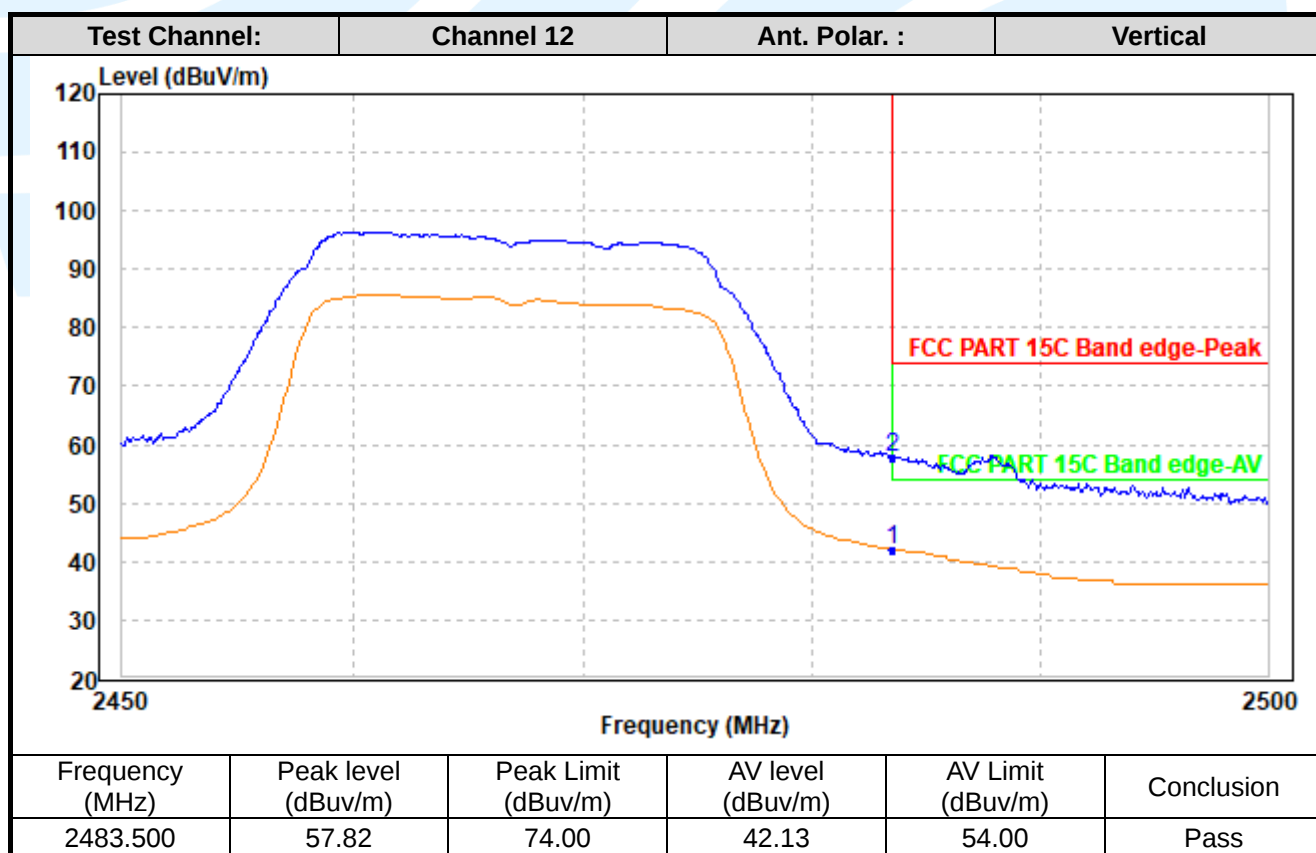
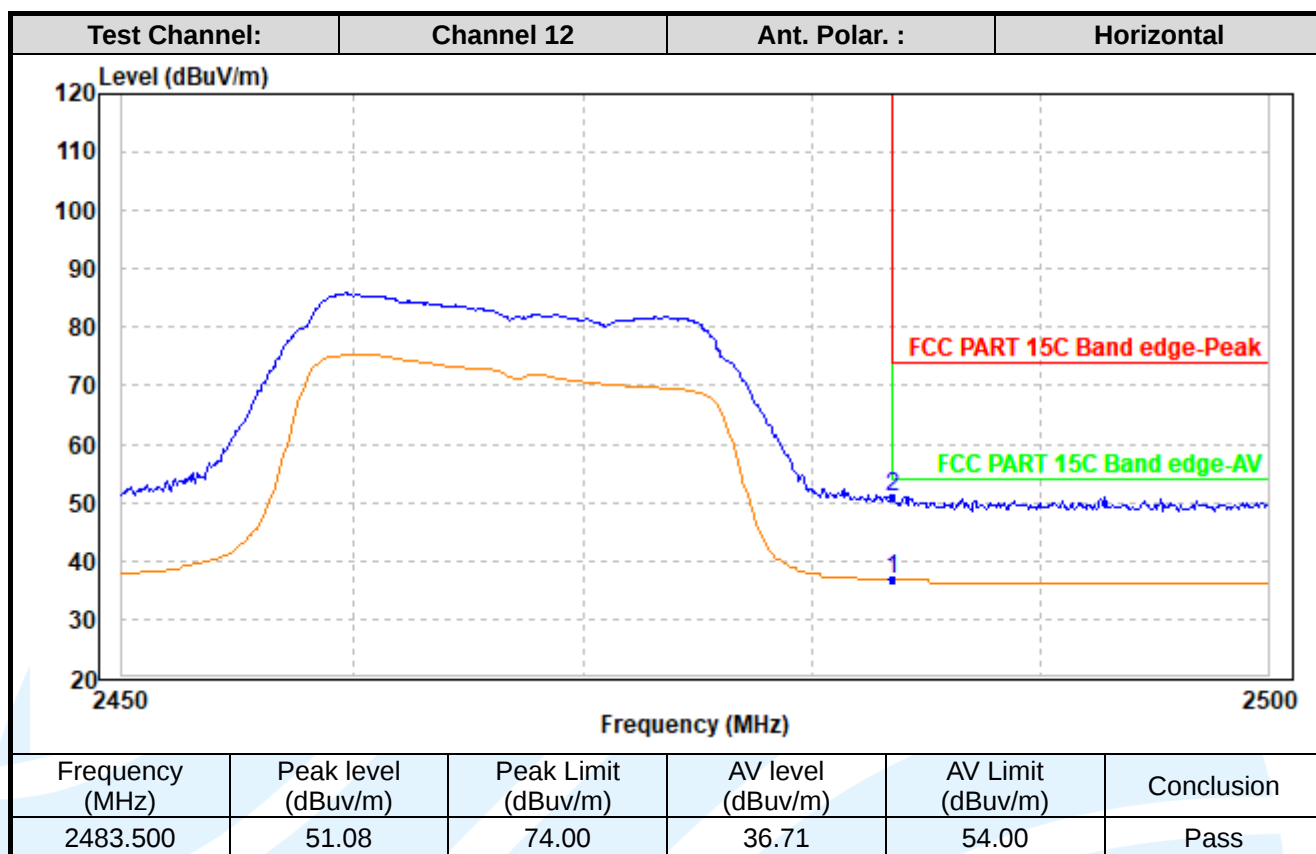
Fax: +86-755-28230886

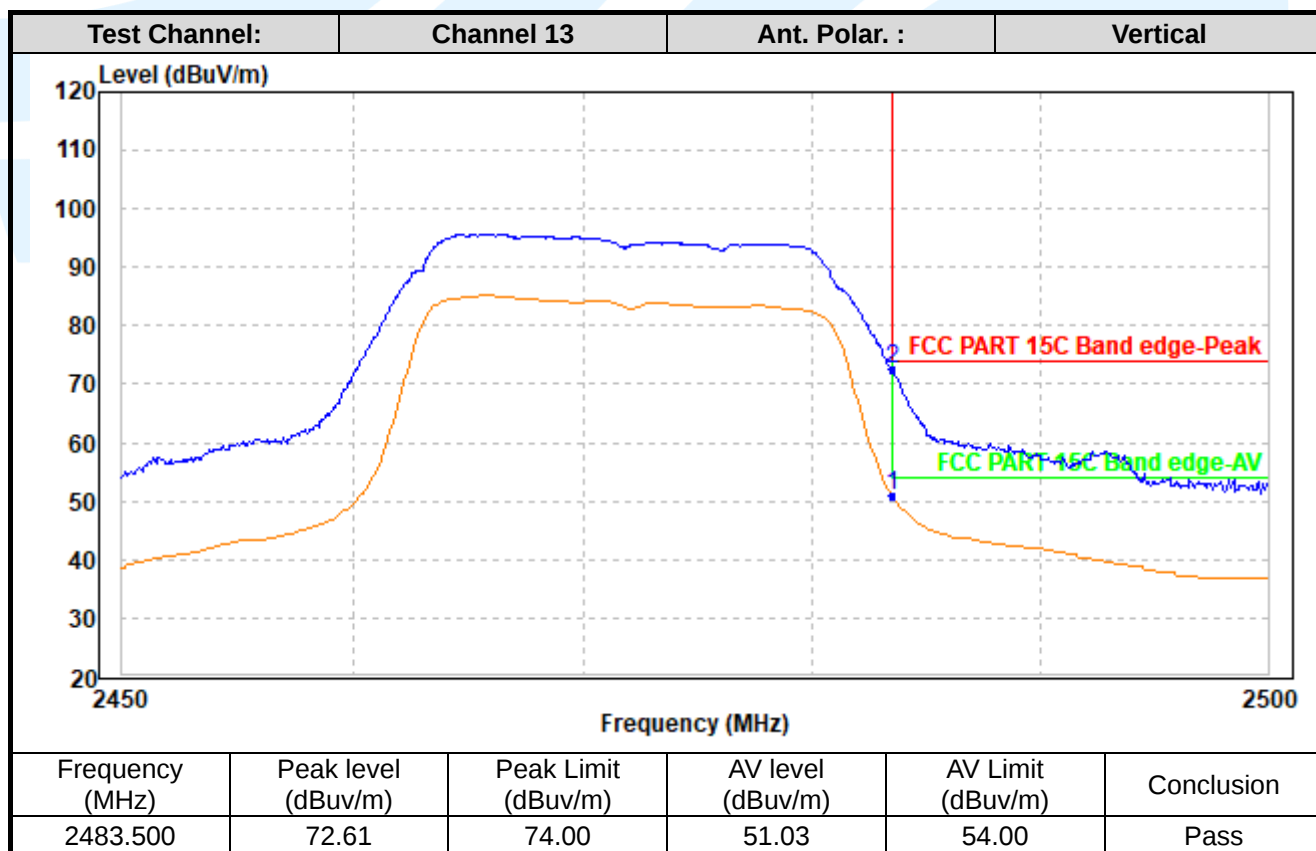
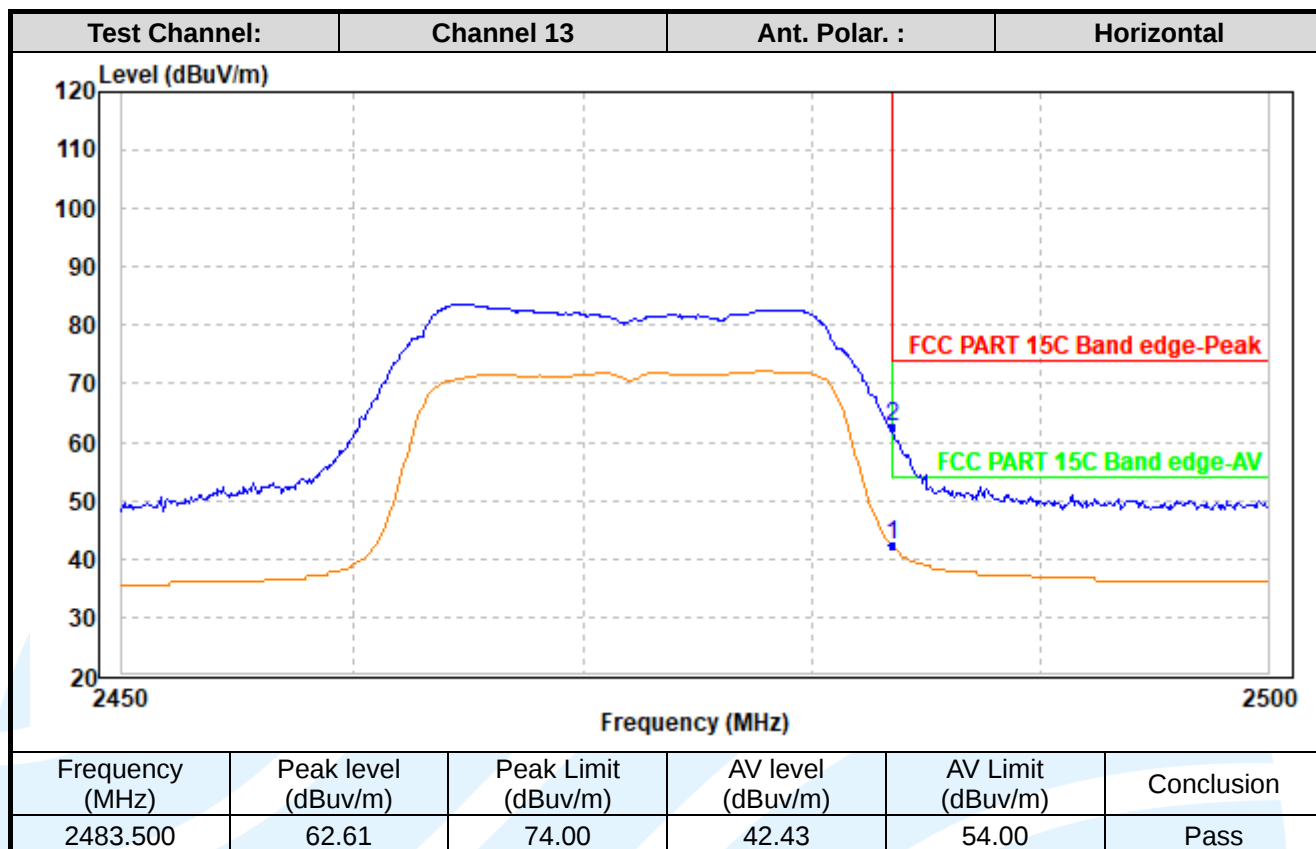
E-mail: info@uttlab.com

<http://www.uttlab.com>

UTTR-RF-FCCPART15.247-V1.1







Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: 16/F, Block A, Building 6th, Baoneng Science and Technology Park, Longhua Street, Longhua District, Shenzhen, China

Tel: +86-755-28230888

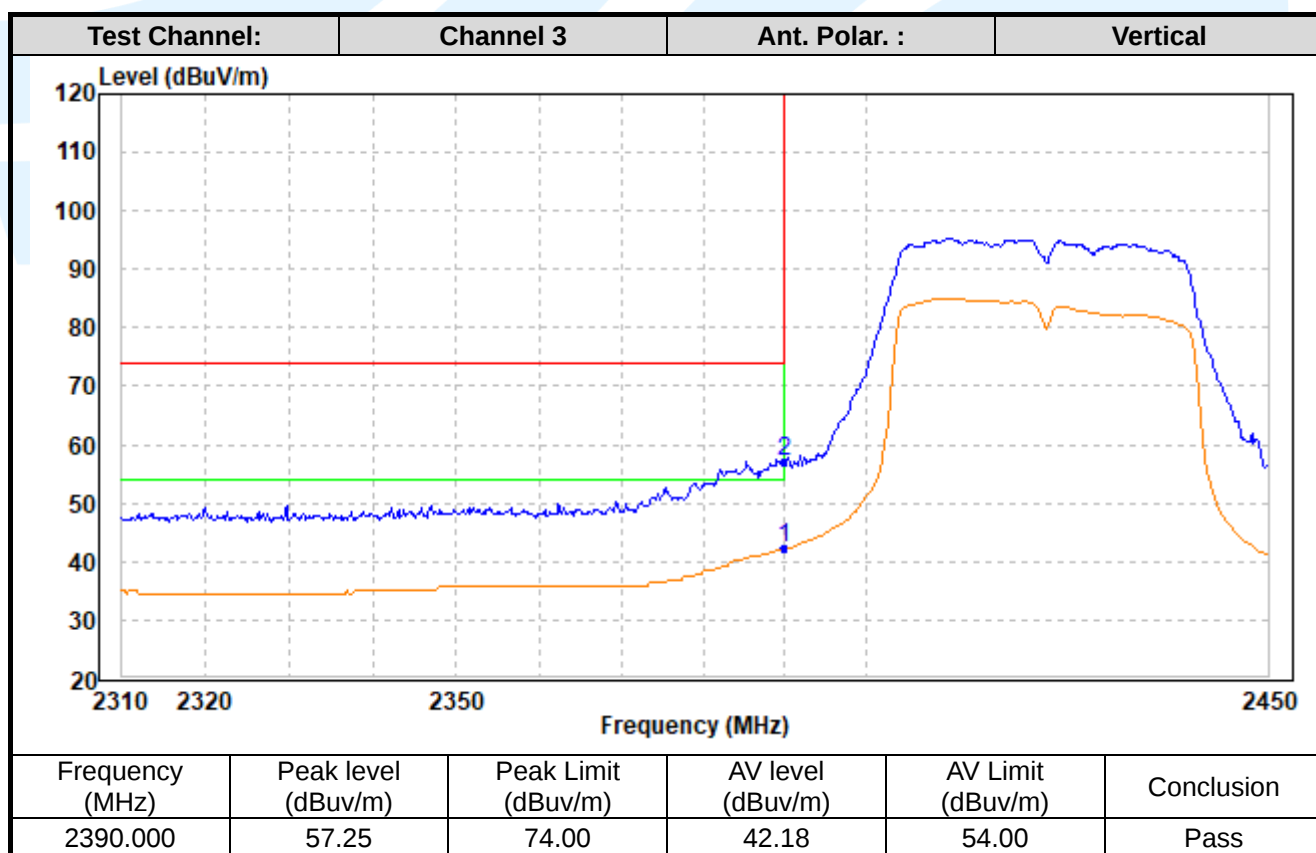
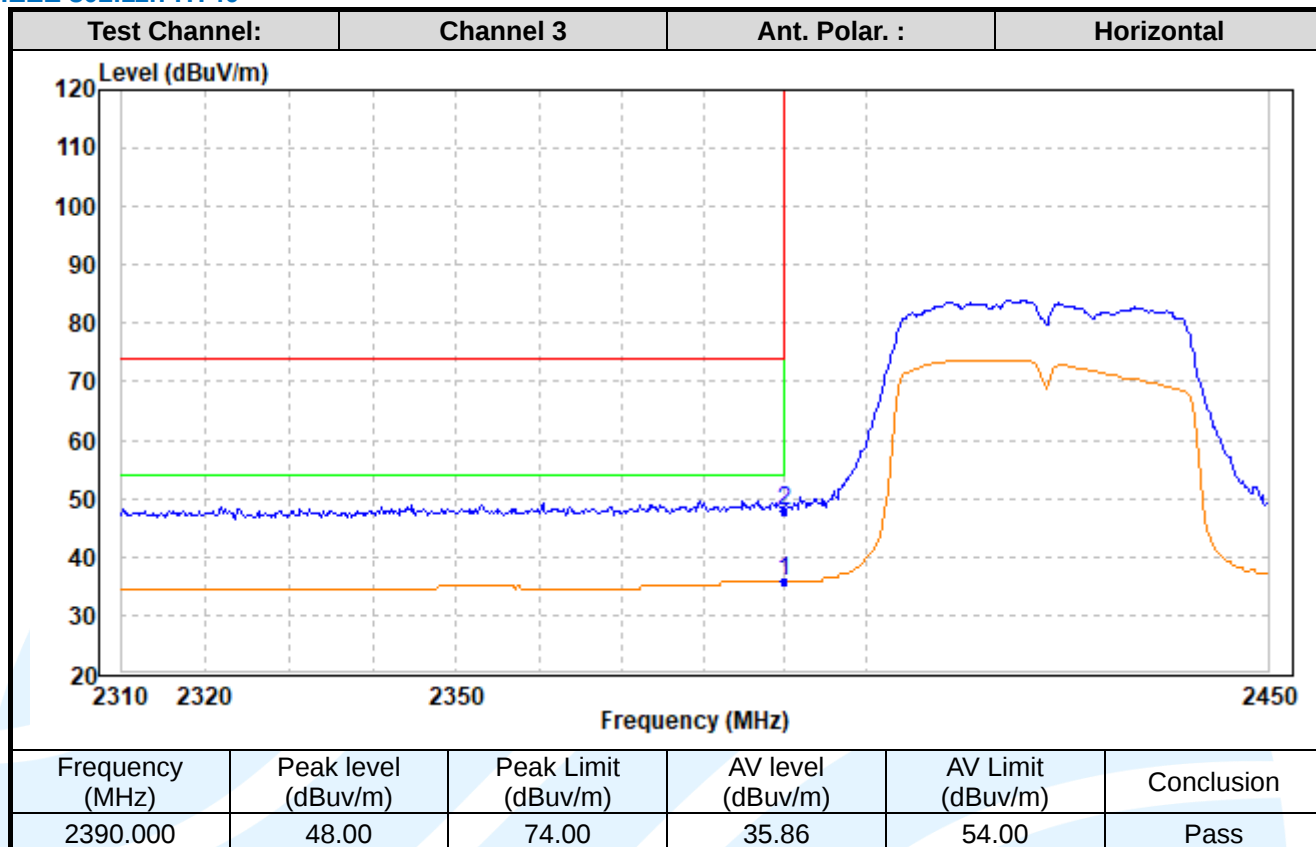
Fax: +86-755-28230886

E-mail: info@uttlab.com

<http://www.uttlab.com>

UTTR-RF-FCCPART15.247-V1.1

IEEE 802.11n-HT40



Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: 16/F, Block A, Building 6th, Baoneng Science and Technology Park, Longhua Street, Longhua District, Shenzhen, China

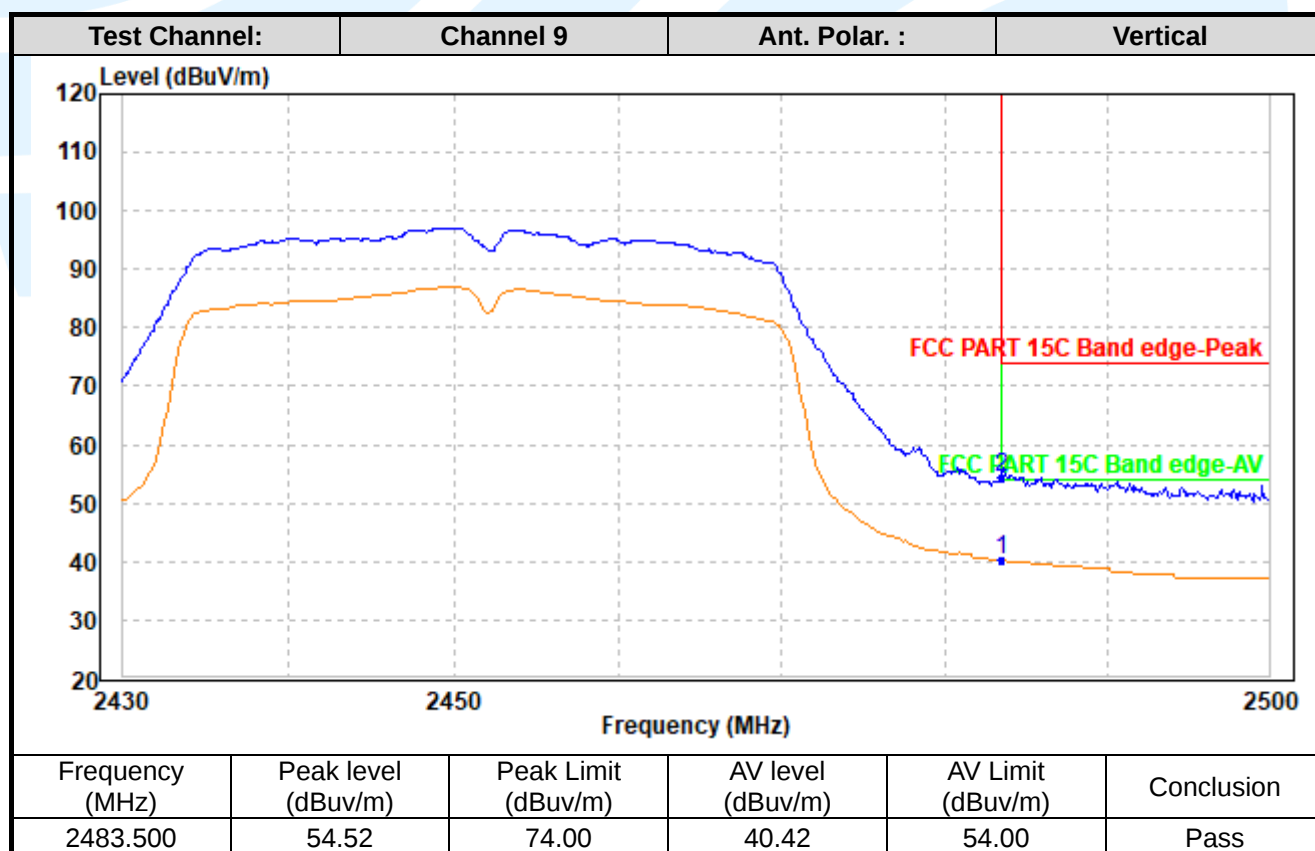
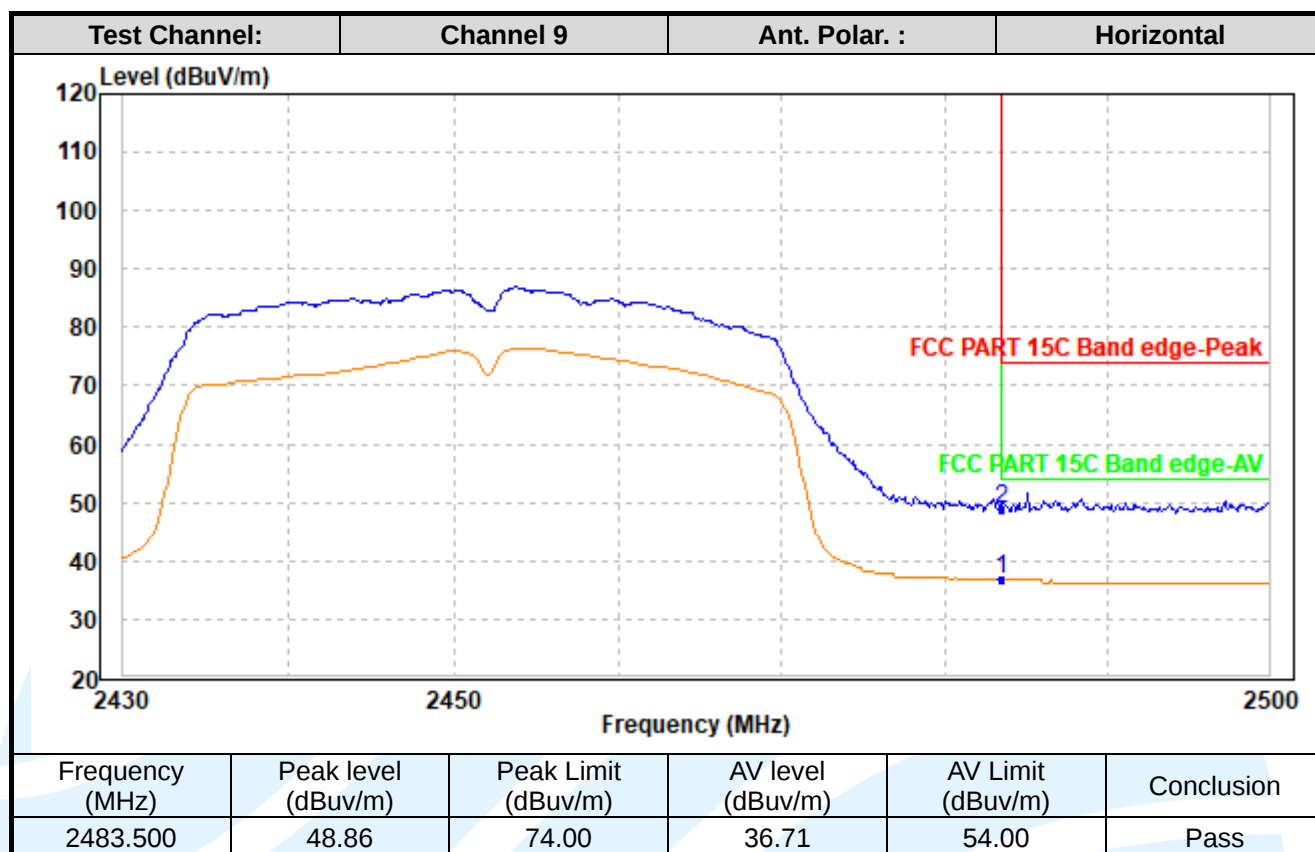
Tel: +86-755-28230888

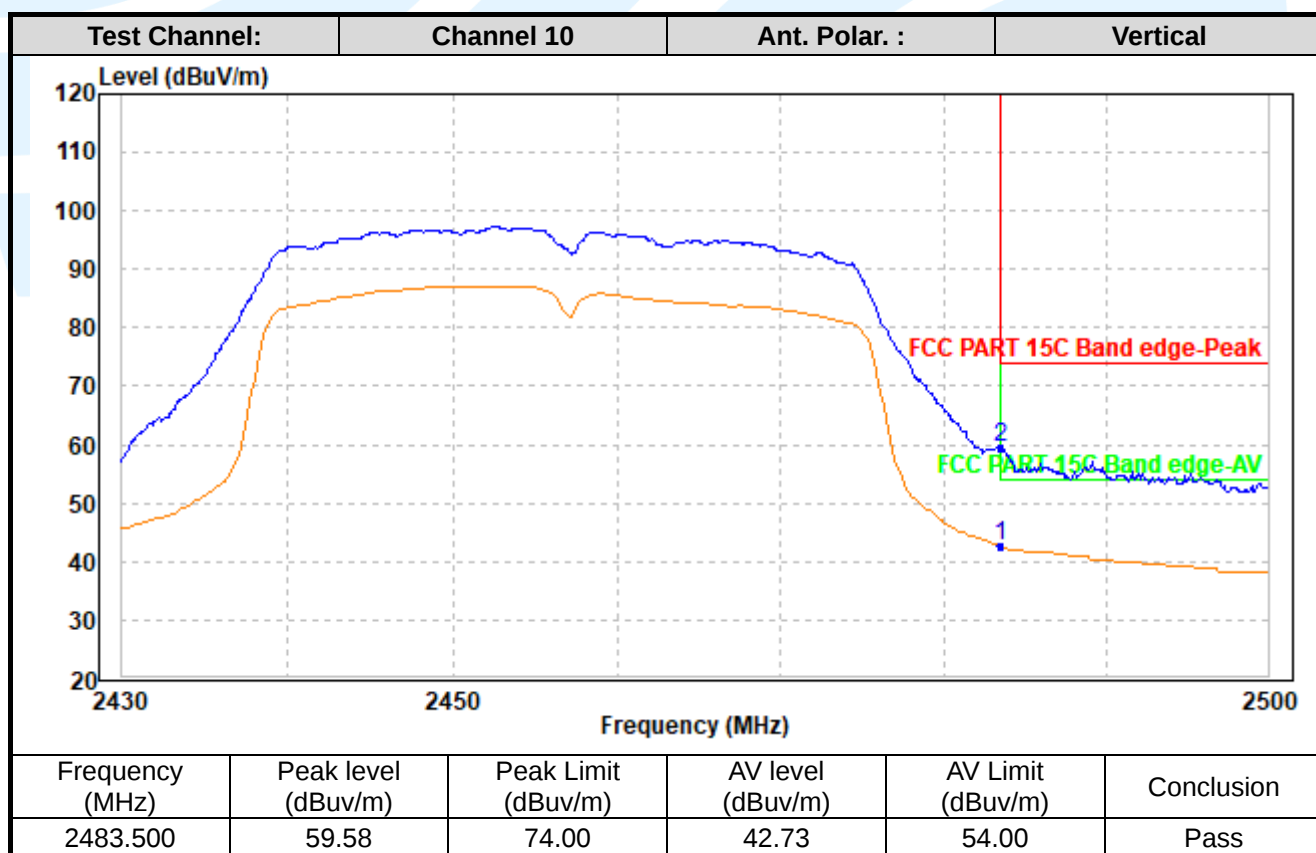
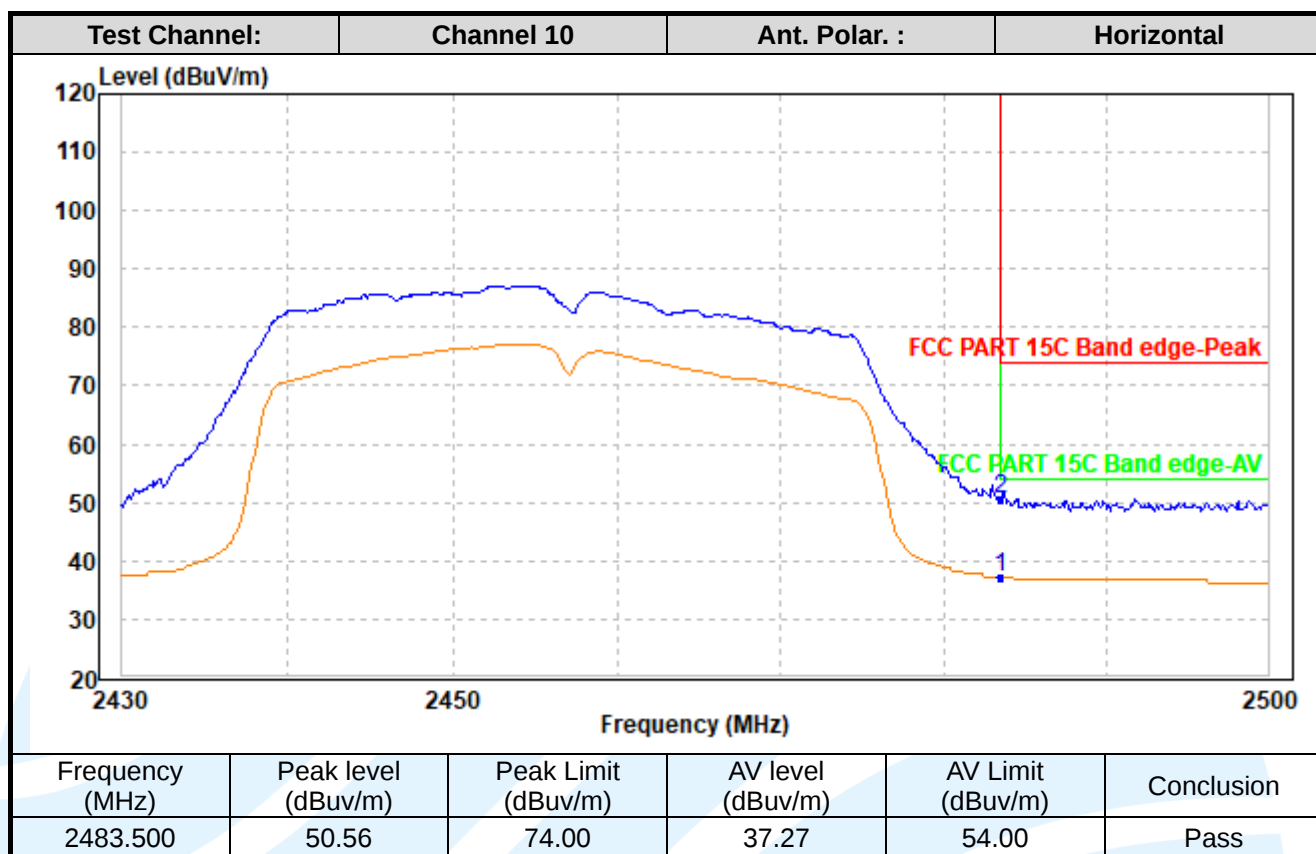
Fax: +86-755-28230886

E-mail: info@uttlab.com

<http://www.uttlab.com>

UTTR-RF-FCCPART15.247-V1.1





Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: 16/F, Block A, Building 6th, Baoneng Science and Technology Park, Longhua Street, Longhua District, Shenzhen, China

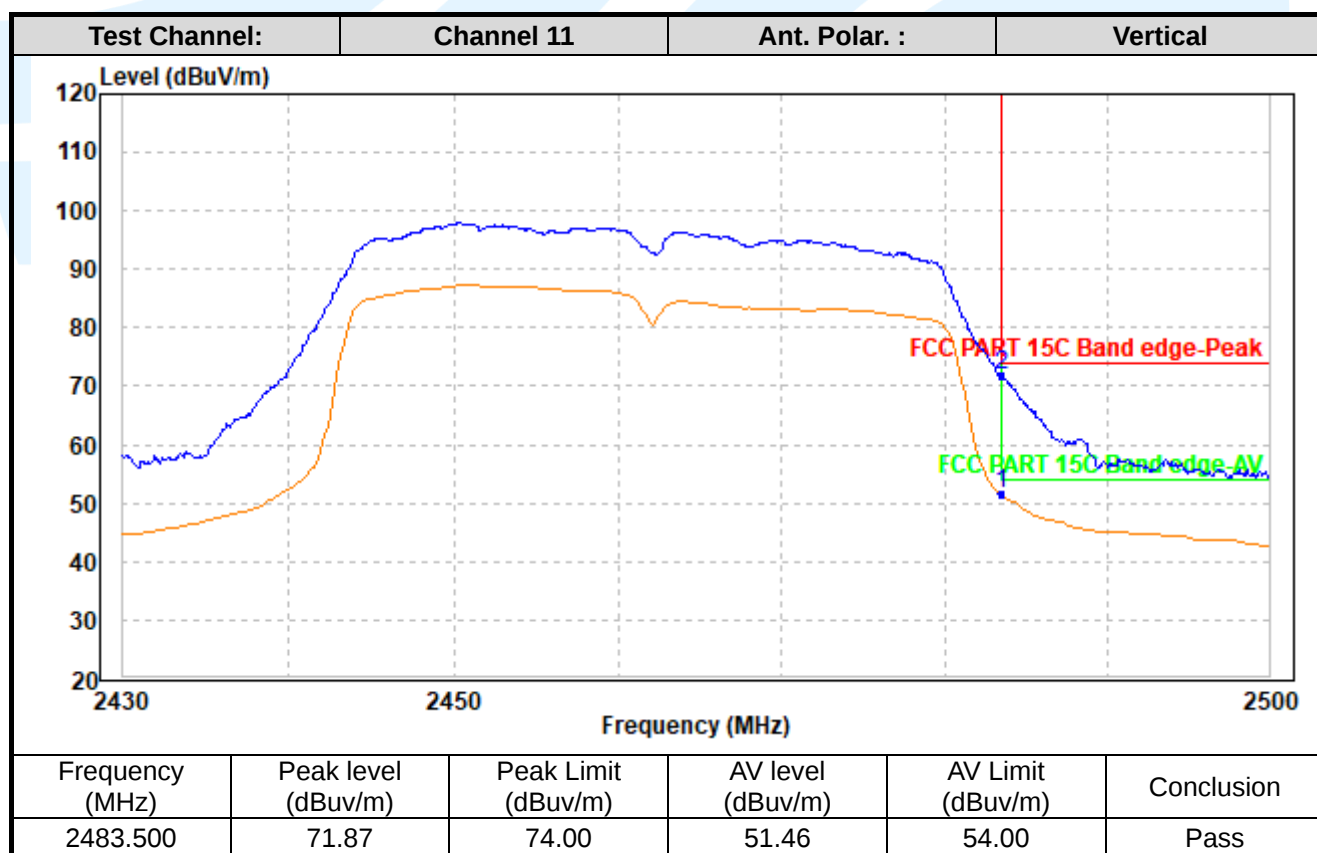
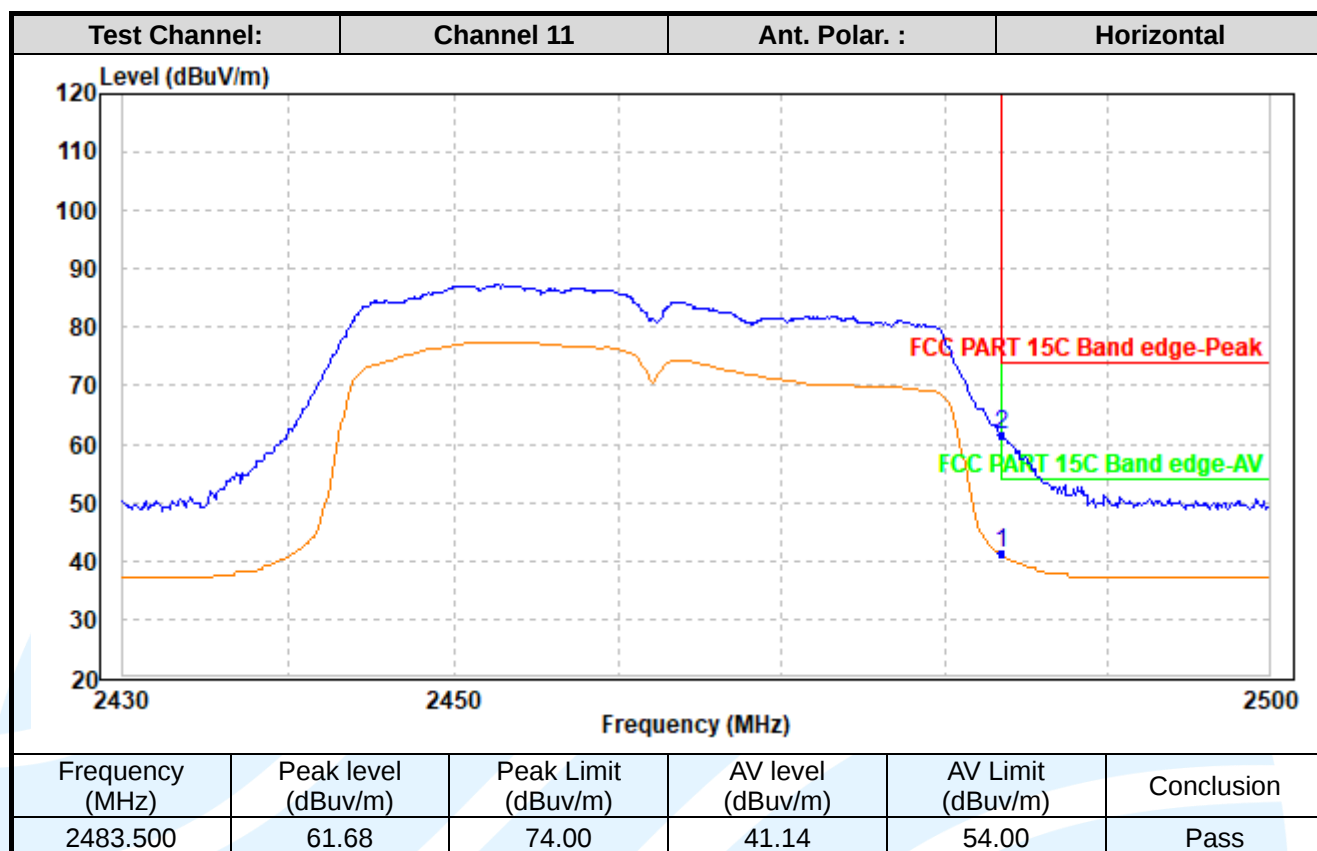
Tel: +86-755-28230888

Fax: +86-755-28230886

E-mail: info@uttlab.com

<http://www.uttlab.com>

UTTR-RF-FCCPART15.247-V1.1

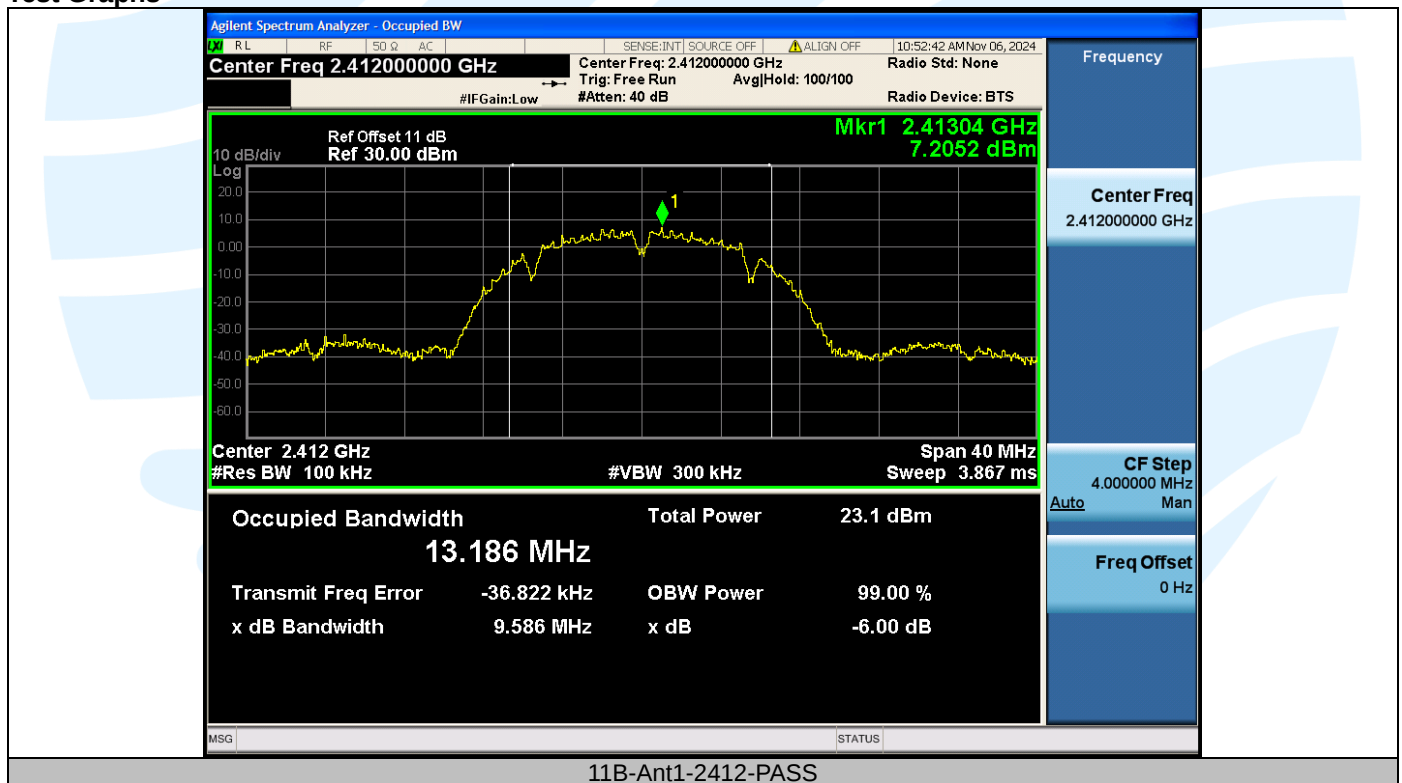


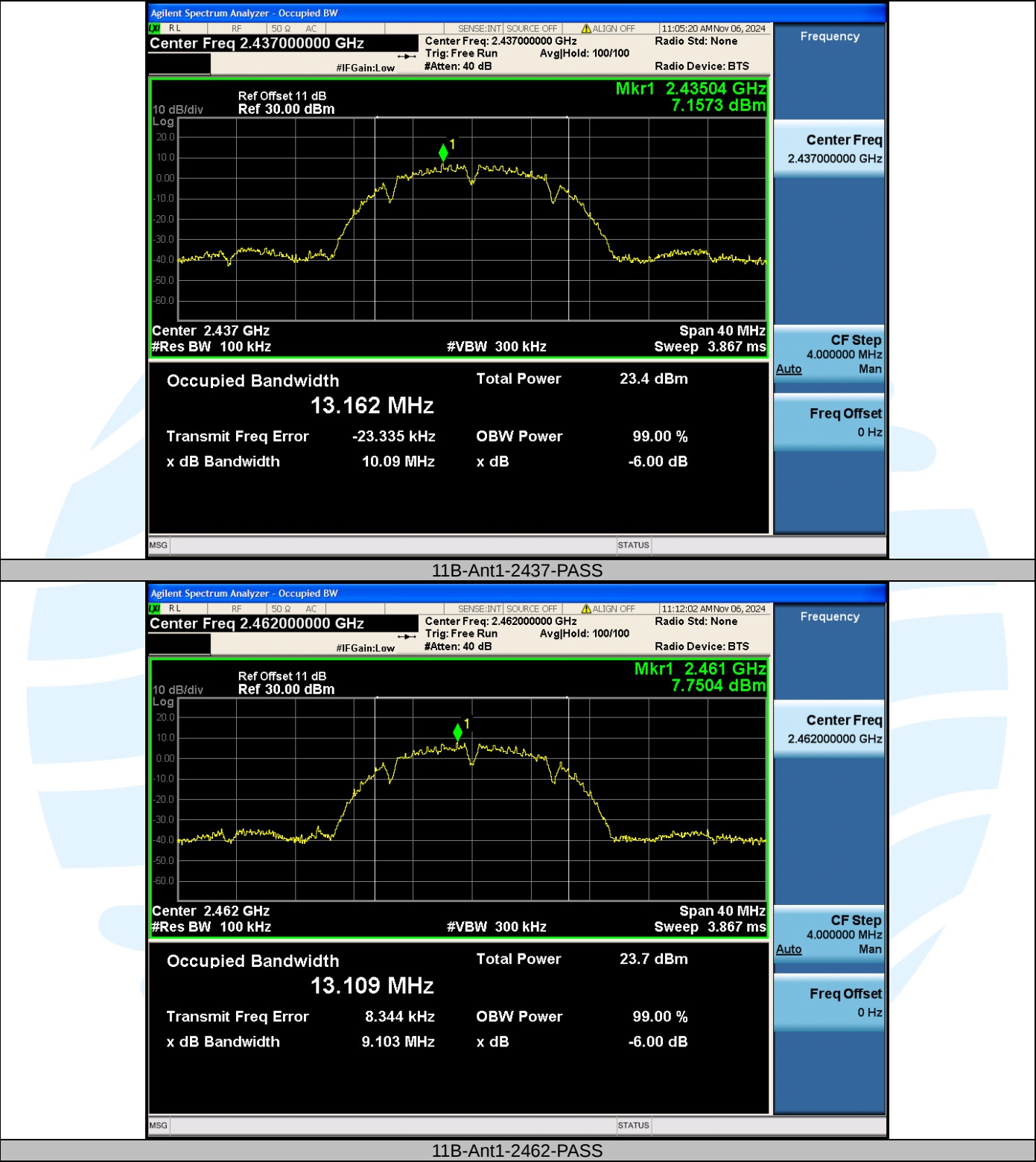
APPENDIX A RF TEST DATA

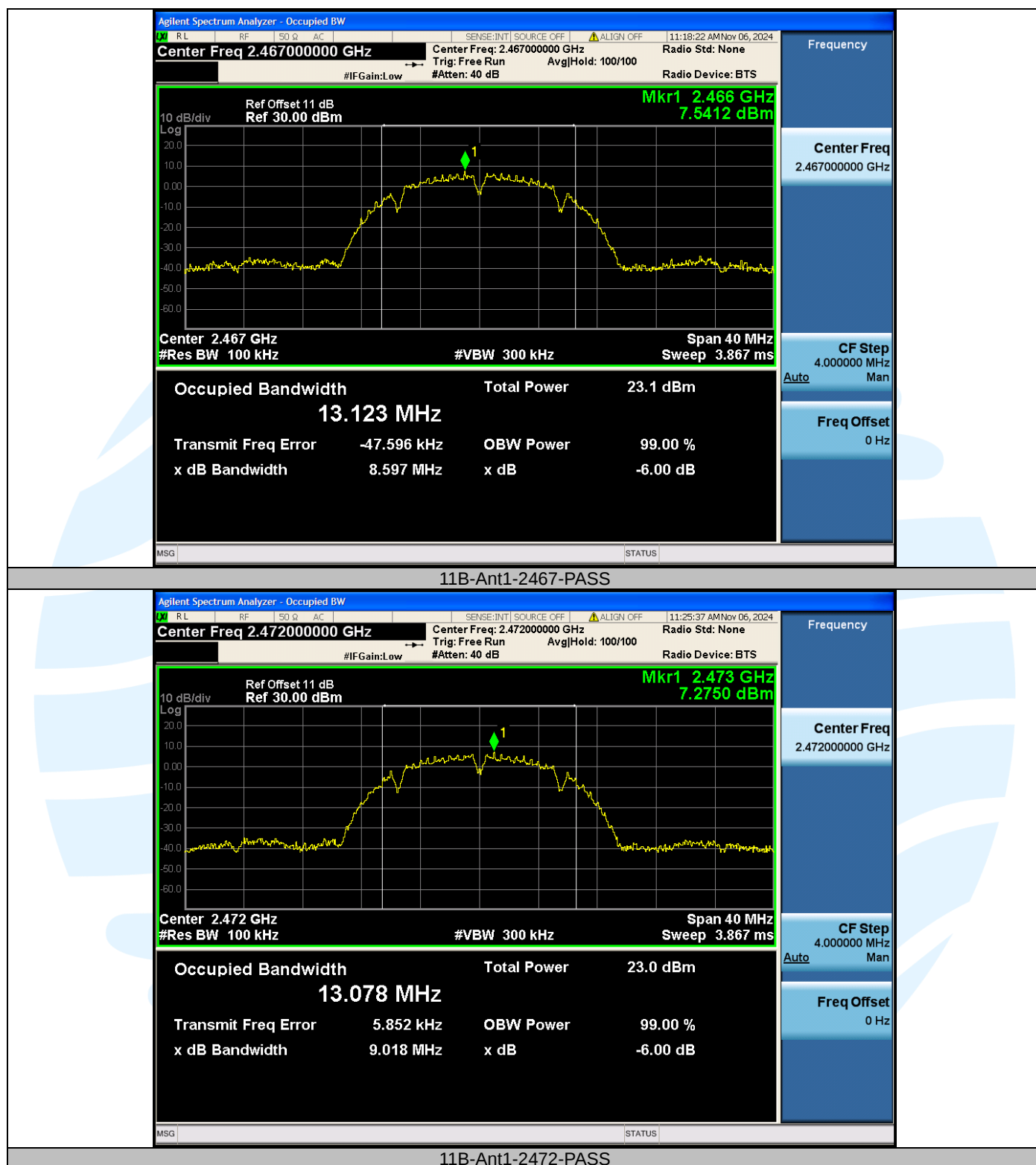
A.1 6DB BANDWIDTH

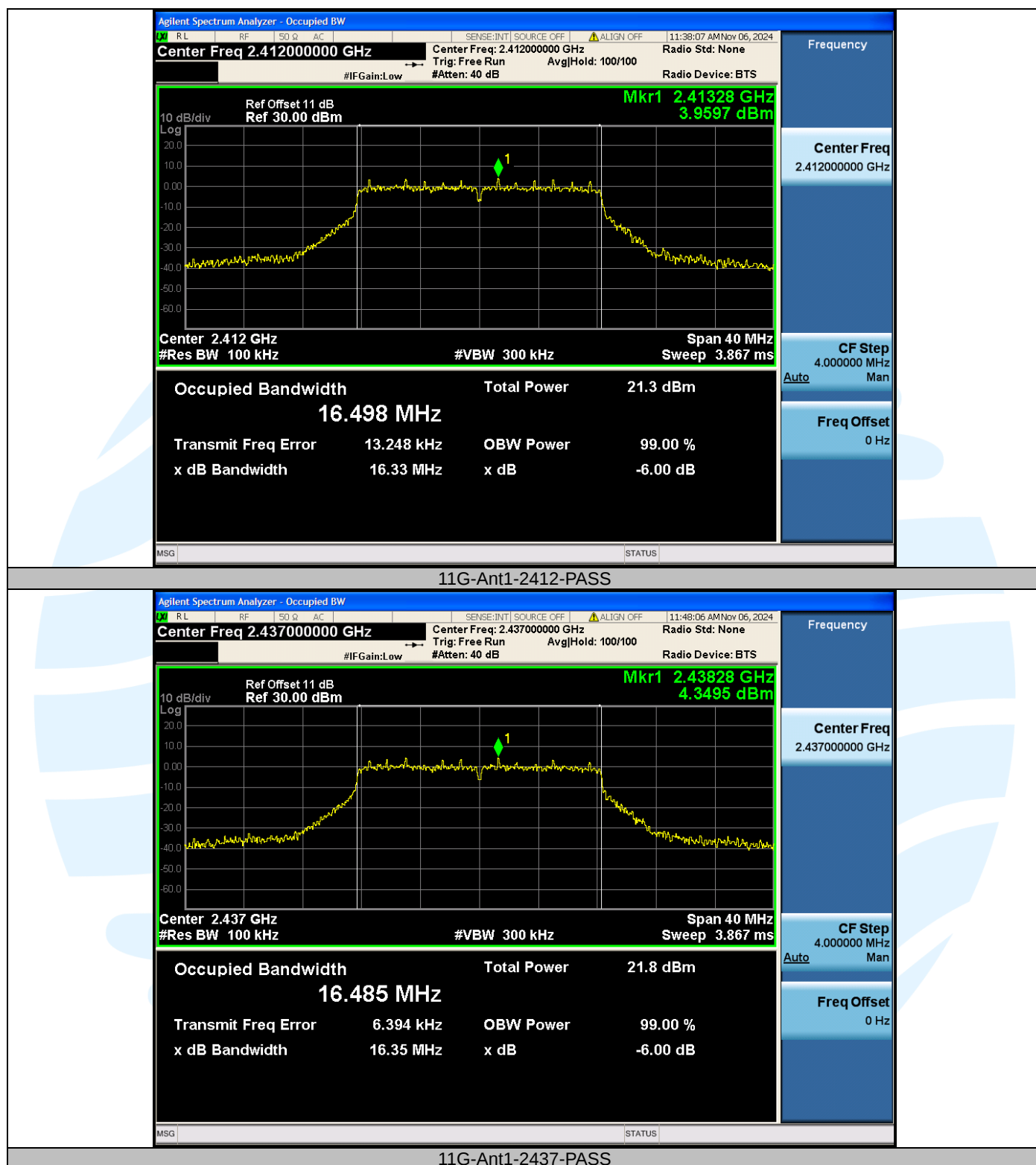
Test Mode	Antenna	Frequency [MHz]	DTS BW [MHz]	Limit [MHz]	Verdict
11B	Ant1	2412	9.586	0.5	PASS
11B	Ant1	2437	10.09	0.5	PASS
11B	Ant1	2462	9.103	0.5	PASS
11B	Ant1	2467	8.597	0.5	PASS
11B	Ant1	2472	9.018	0.5	PASS
11G	Ant1	2412	16.33	0.5	PASS
11G	Ant1	2437	16.35	0.5	PASS
11G	Ant1	2462	16.35	0.5	PASS
11G	Ant1	2467	16.37	0.5	PASS
11G	Ant1	2472	16.36	0.5	PASS
11N20SISO	Ant1	2412	16.96	0.5	PASS
11N20SISO	Ant1	2437	17.26	0.5	PASS
11N20SISO	Ant1	2462	17.54	0.5	PASS
11N20SISO	Ant1	2467	17.18	0.5	PASS
11N20SISO	Ant1	2472	16.77	0.5	PASS
11N40SISO	Ant1	2422	35.54	0.5	PASS
11N40SISO	Ant1	2437	35.78	0.5	PASS
11N40SISO	Ant1	2452	35.74	0.5	PASS
11N40SISO	Ant1	2457	35.74	0.5	PASS
11N40SISO	Ant1	2462	35.51	0.5	PASS

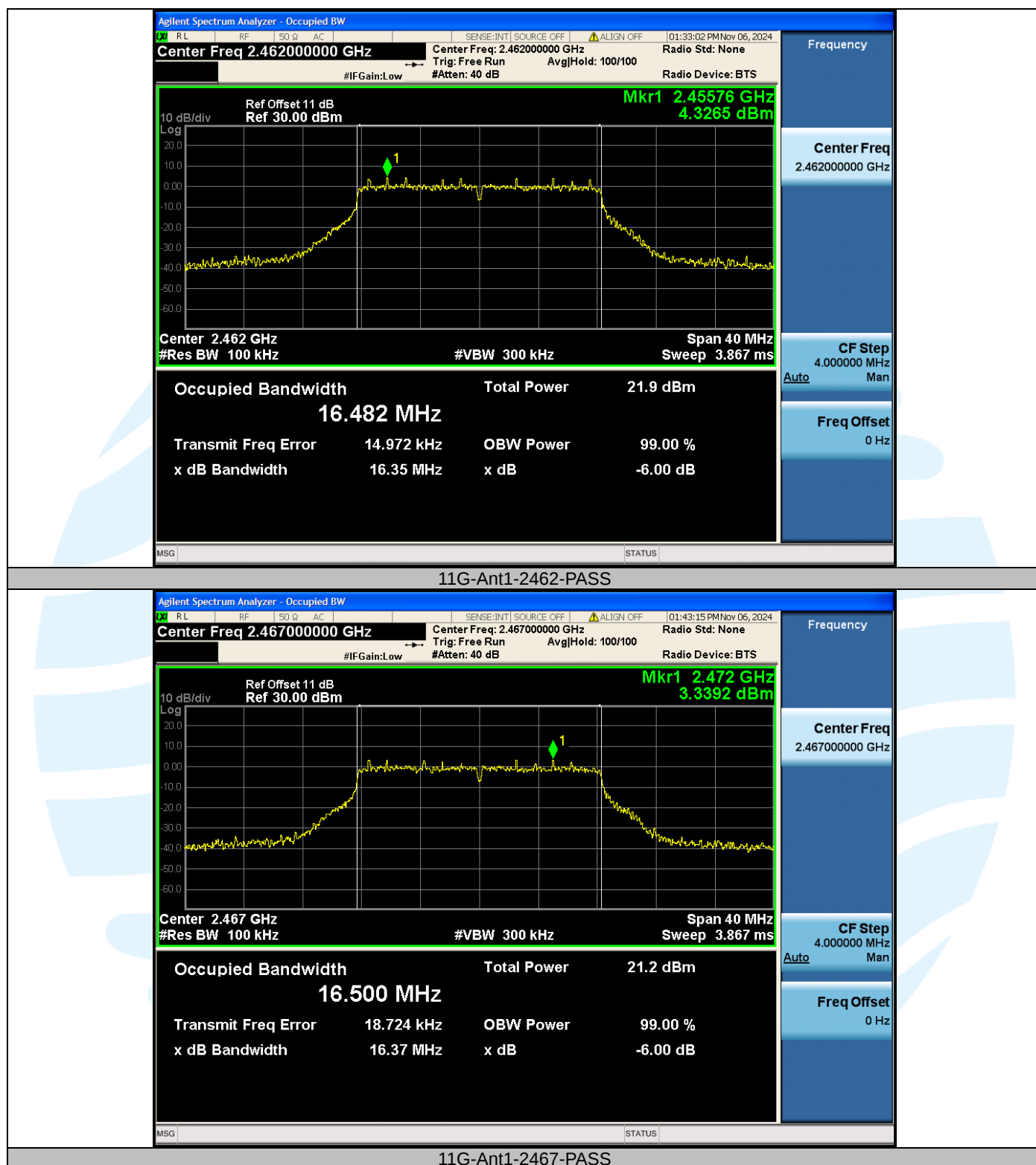
Test Graphs

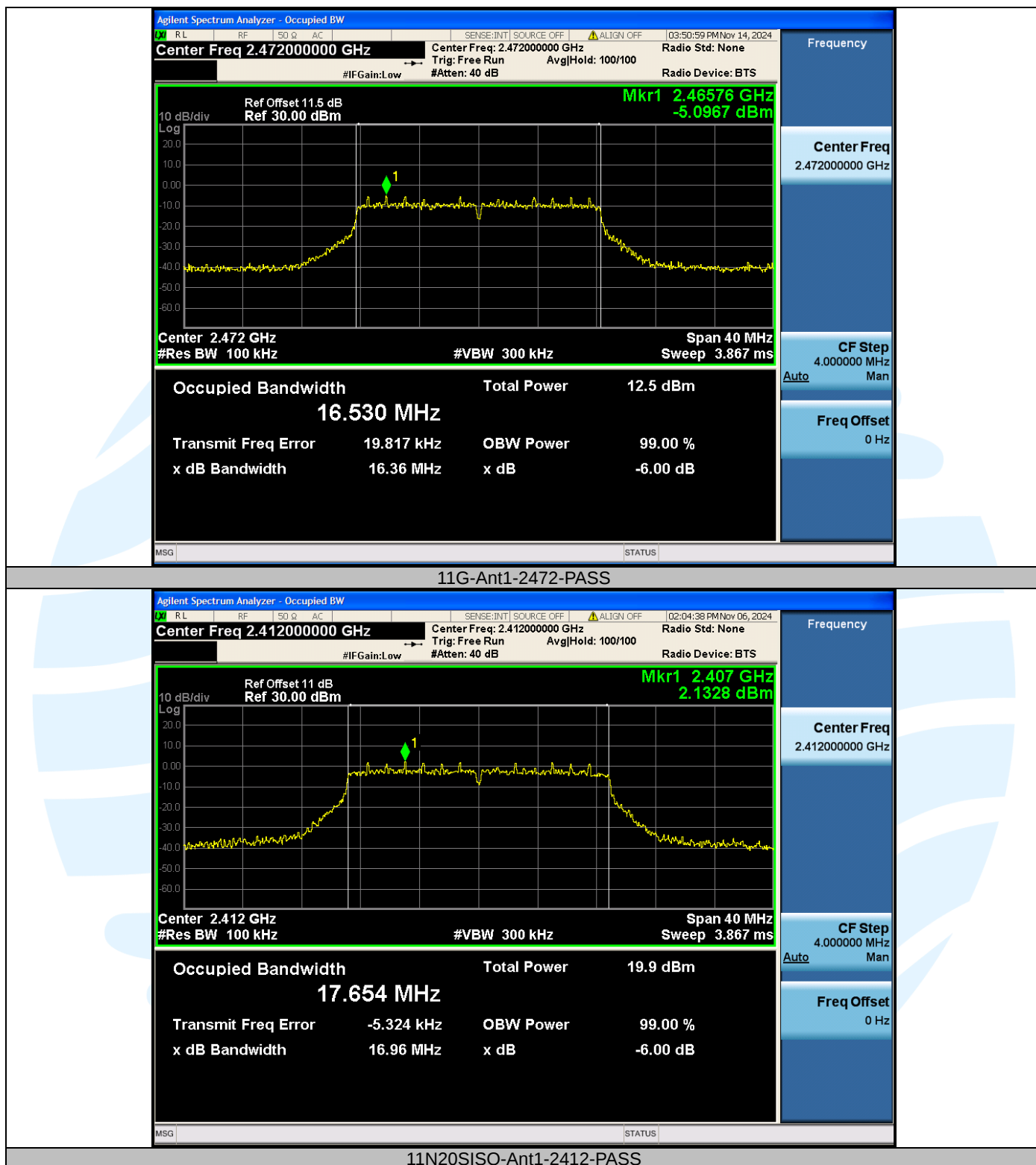












Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: 16/F, Block A, Building 6th, Baoneng Science and Technology Park, Longhua Street, Longhua District, Shenzhen, China

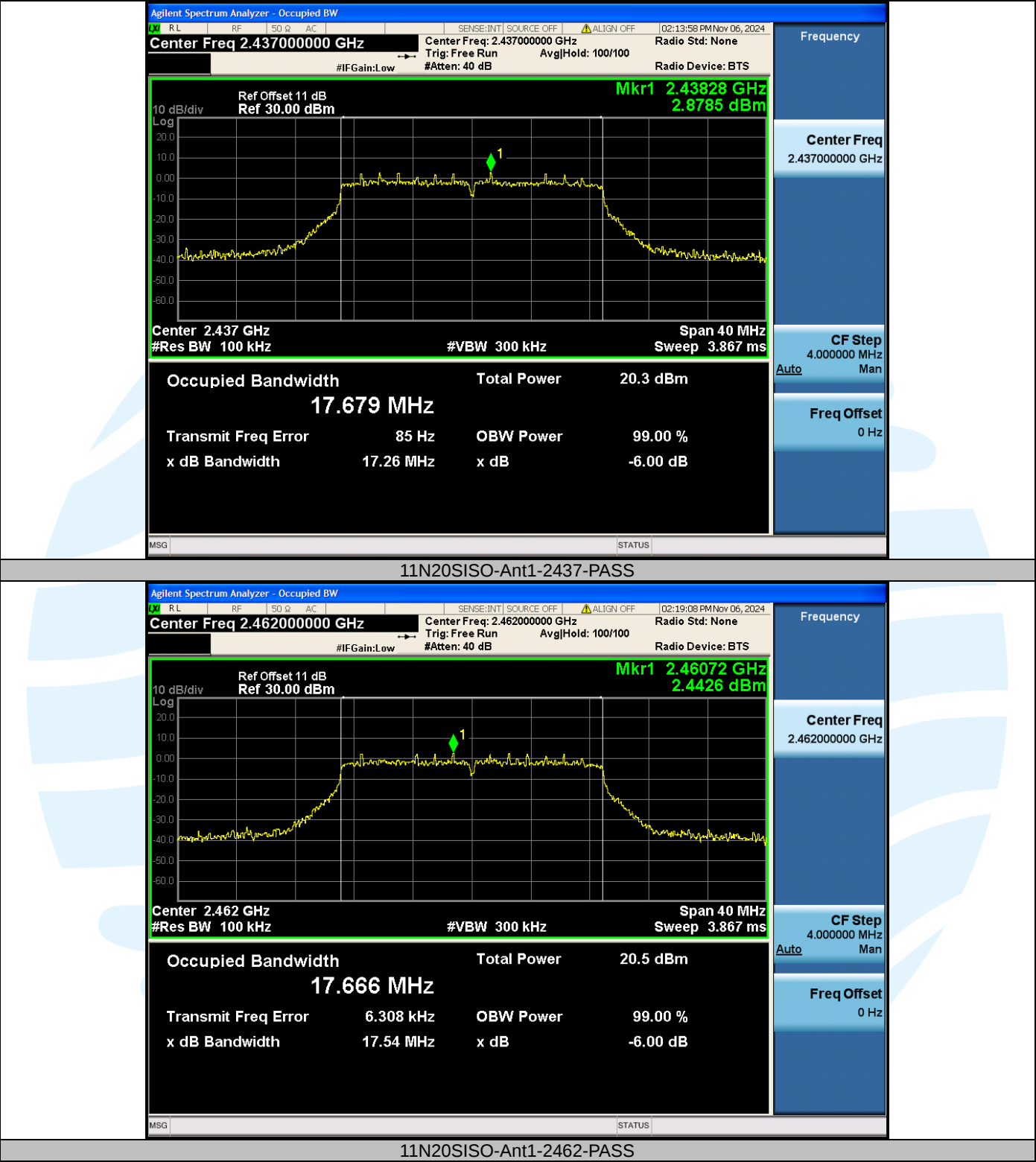
Tel: +86-755-28230888

Fax: +86-755-28230886

E-mail: info@uttlab.com

<http://www.uttlab.com>

UTTR-RF-FCCPART15.247-V1.1



Frequency

Center Freq

2.462000000 GHz

CF Step

4.000000 MHz

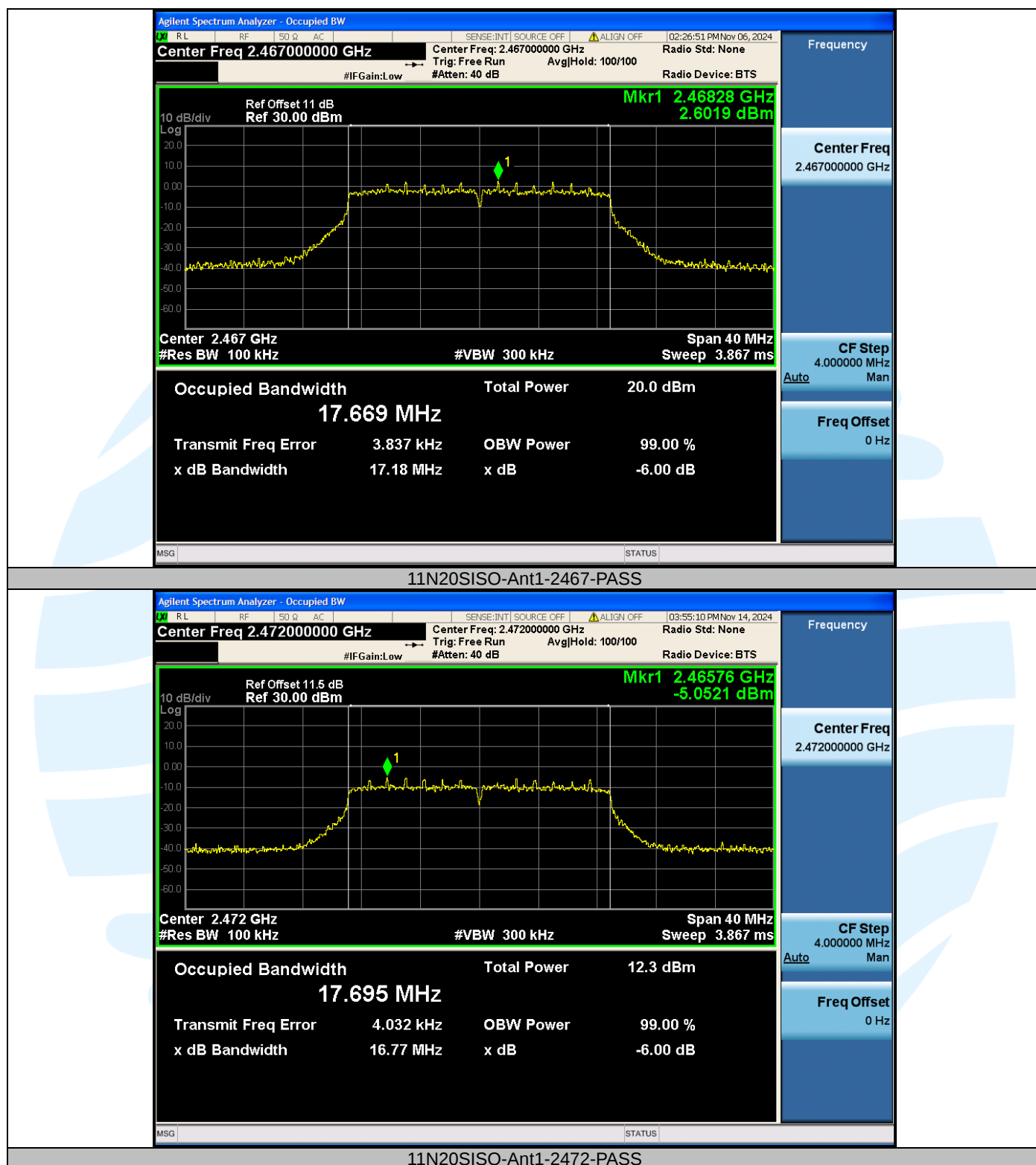
Auto

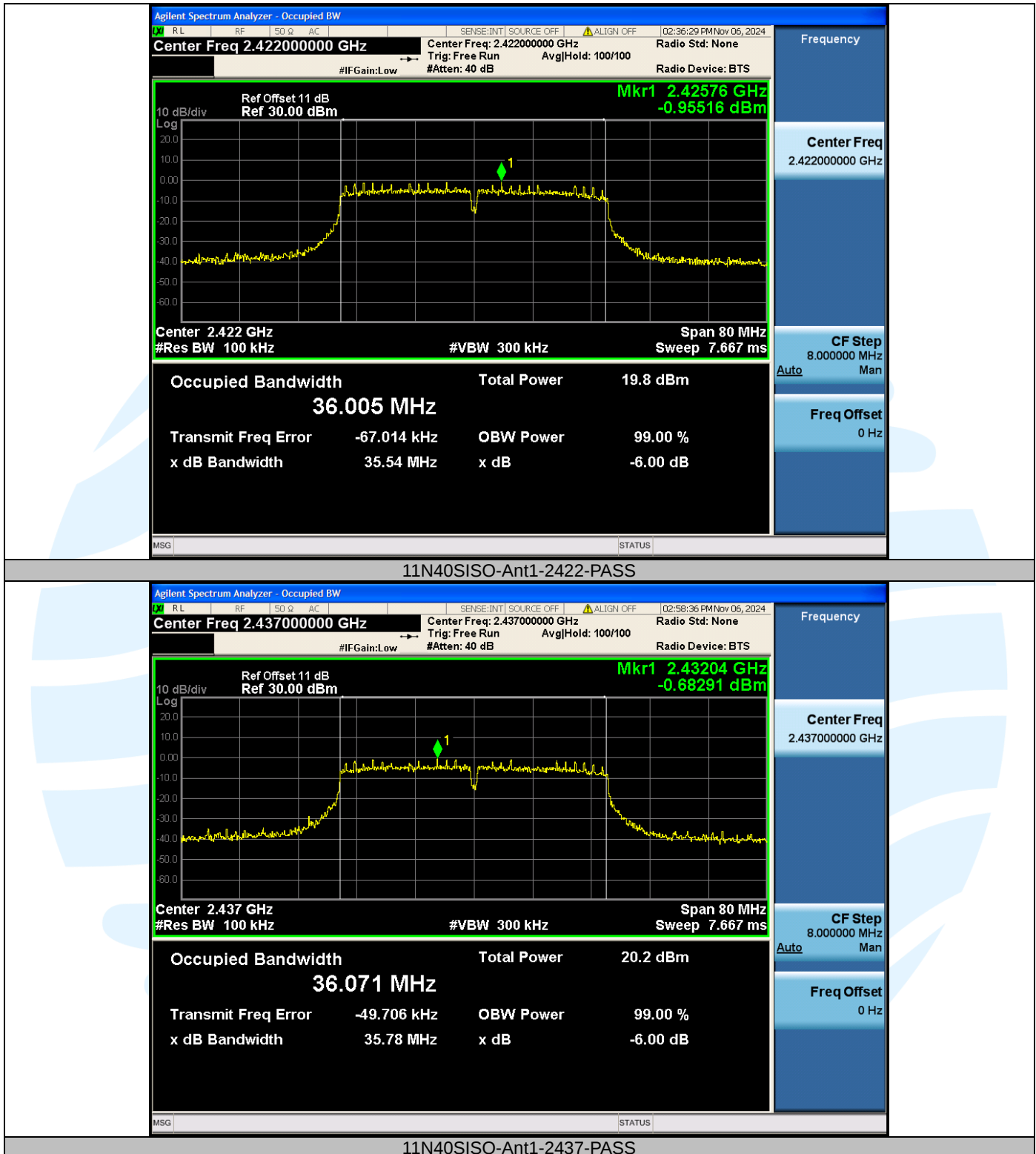
Man

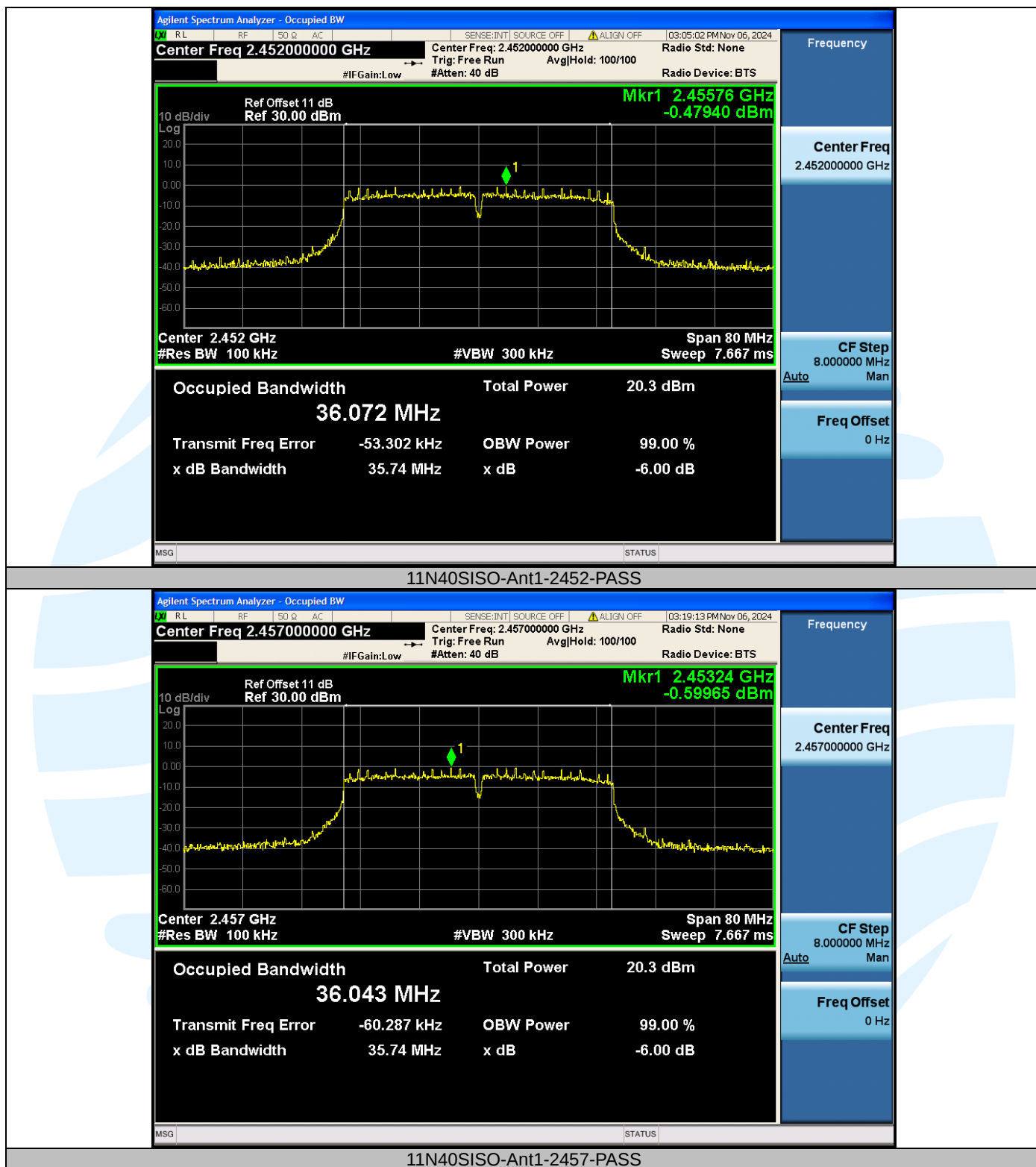
Freq Offset

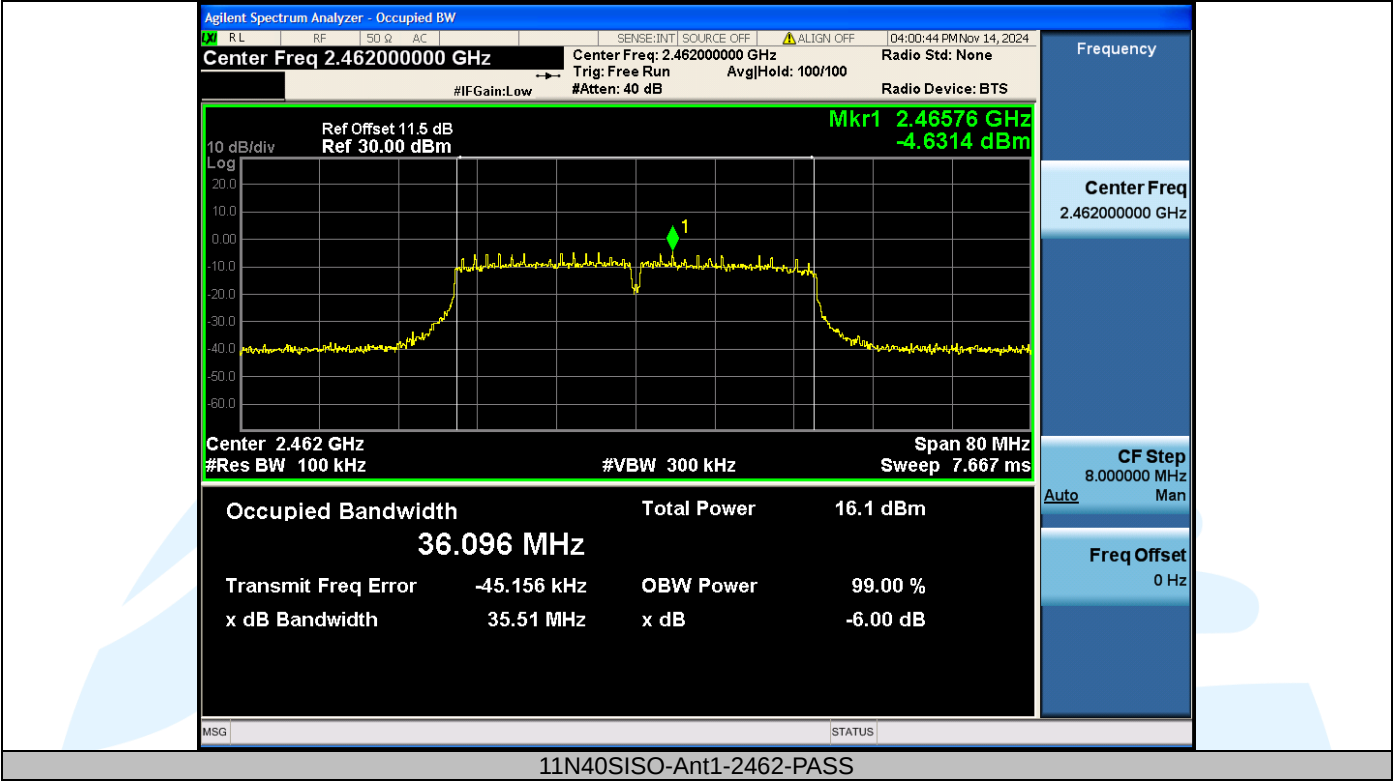
0 Hz

11N20SiSO-Ant1-2462-PASS









A.2 OCCUPIED CHANNEL BANDWIDTH

Test Mode	Antenna	Channel Frequency [MHz]	OCB [MHz]
11B	Ant1	2412	13.285
11B	Ant1	2437	13.246
11B	Ant1	2462	13.208
11B	Ant1	2467	13.205
11B	Ant1	2472	13.207
11G	Ant1	2412	17.188
11G	Ant1	2437	17.231
11G	Ant1	2462	17.278
11G	Ant1	2467	17.184
11G	Ant1	2472	17.276
11N20SISO	Ant1	2412	18.319
11N20SISO	Ant1	2437	18.284
11N20SISO	Ant1	2462	18.274
11N20SISO	Ant1	2467	18.288
11N20SISO	Ant1	2472	18.356
11N40SISO	Ant1	2422	36.591
11N40SISO	Ant1	2437	36.519
11N40SISO	Ant1	2452	36.504
11N40SISO	Ant1	2457	36.571
11N40SISO	Ant1	2462	36.489

Test Graphs

