

# CTC Laboratories, Inc.

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# TEST REPORT

Report No. ....: CTC20231771E09

FCC ID.....: 2AKXB-W3211800

IC .....: 28651-W3211800

Applicant .....: Woan Technology (Shenzhen) Co., Ltd.

Room 1101, Qiancheng Commercial Center, No. 5 Haicheng Address....:

Road, Mabu Community, Xixiang Sub-district, Bao'an District,

Shenzhen, Guangdong, P.R.China, 518100

Manufacturer....: Woan Technology (Shenzhen) Co., Ltd.

Room 1101, Qiancheng Commercial Center, No. 5 Haicheng Address....:

Road, Mabu Community, Xixiang Sub-district, Bao'an District,

Shenzhen, Guangdong, P.R.China, 518100

Product Name .....: **SwitchBot Floor Cleaning Robot S10** 

Trade Mark .....: SwitchBot

Model/Type reference....: W3211800

Listed Model(s) ....:: W3211801, W3211802, W3211803, W3211804, W3211805

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

RSS-247 Issue 3

Date of receipt of test sample.....: Aug. 28, 2023

Date of testing..... Aug. 28, 2023 to Nov. 20, 2023

Date of issue..... Nov. 20, 2023

**PASS** Result....:

Compiled by:

(Printed name+signature) Jim Jiang

Supervised by:

(Printed name+signature) Eric Zhang

Approved by:

Totti Zhao (Printed name+signature)

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# 1. TEST SUMMARY

# 1.1. Test Standards

The tests were performed according to following standards:

FCC Rules Part 15.247: Operation within the bands 902-928MHz, 2400-2483.5MHz, and 5725-5850MHz.

RSS-247 Issue 3: Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices.

RSS-Gen Issue 5: General Requirements for Compliance of Radio Apparatus.

ANSI C63.10-2013: American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

# 1.2. Report Version

Revised No.	Date of issue	Description
01	Nov. 20, 2023	Original

# 1.3. Test Description

FCC Part 15 Subpart C (15.247) / RSS-247 Issue 2						
Took Itom	Standard	Section	Desville	Test		
Test Item	FCC	IC Result		Engineer		
Antenna Requirement	15.203	RSS-Gen 6.8	Pass	Jim Jiang		
Conducted Emission	15.207	RSS-Gen 8.8	Pass	Jim Jiang		
Conducted Band Edge and Spurious Emissions	15.247(d)	RSS-247 5.5 Pass		Jim Jiang		
Radiated Band Edge and Spurious Emissions	15.205&15.209& 15.247(d)	RSS-247 5.5	Pass	Jim Jiang		
6dB Bandwidth	15.247(a)(2)	RSS-247 5.2 (a)	Pass	Jim Jiang		
Conducted Max Output Power	15.247(b)(3)	RSS-247 5.4 (d)	Pass	Jim Jiang		
Power Spectral Density	15.247(e)	RSS-247 5.2 (b)	Pass	Jim Jiang		
Transmitter Radiated Spurious	15.209&15.247(d)	RSS-247 5.5& RSS-Gen 8.9	Pass	Jim Jiang		

## Note:

- 1. The measurement uncertainty is not included in the test result.
- N/A: means this test item is not applicable for this device according to the technology characteristic of 2. device.

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# 1.4. Test Facility

## Address of the report laboratory

#### CTC Laboratories, Inc.

Add: 2/F., Building 1 and 1-2/F., Building 2, Jiaquan Building, Guanlan High-Tech Park, Longhua District, Shenzhen, Guangdong, China

## Laboratory accreditation

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

#### A2LA-Lab Cert. No.: 4340.01

CTC Laboratories, Inc. 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 17025:2017 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

## Industry Canada (Registration No.: 9783A, CAB Identifier: CN0029)

CTC Laboratories, Inc. EMC Laboratory has been registered by Certification and Engineer Bureau of Industry Canada for the performance of with Registration NO.: 9783A on Jan, 2016.

# FCC (Registration No.: 951311, Designation Number CN1208)

CTC Laboratories, Inc. 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 951311, Aug 26, 2017.





# 1.5. Measurement Uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. 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 CTC Laboratories, Inc. quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Below is the best measurement capability for CTC Laboratories, Inc.

Test Items	Measurement Uncertainty	Notes
DTS Bandwidth	±0.0196%	(1)
Maximum Conducted Output Power	±0.686 dB	(1)
Maximum Power Spectral Density Level	±0.743 dB	(1)
Band-edge Compliance	±1.328 dB	(1)
Unwanted Emissions In Non-restricted Freq Bands	9kHz-1GHz: ±0.746dB 1GHz-26GHz: ±1.328dB	(1)
Conducted Emissions 9kHz~30MHz	±3.08 dB	(1)
Radiated Emissions 30~1000MHz	±4.51 dB	(1)
Radiated Emissions 1~18GHz	±5.84 dB	(1)
Radiated Emissions 18~40GHz	±6.12 dB	(1)

Note (1): This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

## 1.6. Environmental Conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	15 °C to 35 °C
Relative Humidity:	20 % to 75 %
Air Pressure:	101 kPa

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2. GENERAL INFORMATION

# 2.1. Client Information

Applicant:	Woan Technology (Shenzhen) Co., Ltd.
Address:	Room 1101, Qiancheng Commercial Center, No. 5 Haicheng Road, Mabu Community, Xixiang Sub-district, Bao'an District, Shenzhen, Guangdong, P.R.China, 518100
Manufacturer:	Woan Technology (Shenzhen) Co., Ltd.
Address:	Room 1101, Qiancheng Commercial Center, No. 5 Haicheng Road, Mabu Community, Xixiang Sub-district, Bao'an District, Shenzhen, Guangdong, P.R.China, 518100

# 2.2. General Description of EUT

SwitchBot Floor Cleaning Robot S10			
SwitchBot			
W3211800			
W3211801, W3211802, W3211803, W3211804, W3211805			
All these models are identical in the same PCB, layout, electrical circuit and enclosure. The difference is model name.			
Battery Voltage: 21.6V, Rated Power: 85W, Rated Input: DC24V 1.5A			
2.7.10.3080			
1.372.230804			
CTC230721-047-S001			
802.11b: DSSS (CCK, DQPSK, DBPSK) 802.11g/ n: OFDM (BPSK, QPSK, 16QAM, 64QAM)			
802.11b/ g/ n(HT20): 2412MHz~2462MHz			
802.11b/ g/ n(HT20): 11 channels			
5MHz			
FPC Antenna			
2.97dBi			

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2.3. Accessory Equipment Information

Equipment Information						
Name	Model	S/N	Manufacturer			
Notebook	ThinkPad T460s	/	Lenovo			
Cable Information						
Name	Shielded Type	Ferrite Core	Length			
USB Cable	Unshielded	NO	150cm			
Test Software Information						
Name	Version	/	1			
SecureCRTPortable	7.1.1	/	1			

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# 2.4. Operation State

Operation Frequency List: The EUT has been tested under typical operating condition. The Applicant provides communication tools software to control the EUT for staying in continuous transmitting and receiving mode for testing.

Operation Frequency List:

Channel	Frequency (MHz)
01	2412
02	2417
03	2422
04	2427
05	2432
06	2437
07	2442
08	2447
09	2452
10	2457
11	2462

#### Data Rated:

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

Test Mode	Data Rate (worst mode)	
802.11b	1Mbps	
802.11g	6Mbps	
802.11n(HT20)	HT-MCS0	

#### Test Mode:

For RF test items:

The engineering test program was provided and enabled to make EUT continuous transmit.

For AC power line conducted emissions:

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

For Radiated spurious emissions test item:

The engineering test program was provided and enabled to make EUT continuous transmit. The EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report.

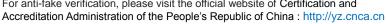
FN 中国国家认证认可监督管理委员会

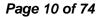


# 2.5. Measurement Instruments List

Tonscend RF Test System						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated Until	
1	Spectrum Analyzer	R&S	FSV40-N	101331	Mar. 14, 2024	
2	Spectrum Analyzer	R&S	FSV40-N	101654	Aug. 07, 2024	
3	Spectrum Analyzer	R&S	FSU26	100105	Dec. 16, 2023	
4	MXA Signal Analyzer	Keysight	N9020A	MY46471737	Dec. 16, 2023	
5	MXA Signal Analyzer	Keysight	N9020A	MY52091402	Aug. 22, 2024	
6	MXG Vector Signal Generator	Agilent	N5182A	MY47420864	Dec. 16, 2023	
7	PSG Analog Signal Generator	Agilent	E8257D	MY46521908	Dec. 16, 2023	
8	EXG Analog Signal Generator	Keysight	N5173B	MY59100842	Dec. 16, 2023	
9	MXG Vector Signal Generator	Keysight	N5182B	MY59100212	Dec. 16, 2023	
10	Wideband Radio Communication Tester	R&S	CMW500	102257	May 25, 2024	
11	Wideband Radio Communication Tester	R&S	CMW500	102414	Dec. 16, 2023	
12	High and low temperature test chamber	ESPEC	MT3035	/	Mar. 24, 2024	
13	USB Wideband Power Sensor	Keysight	U2021XA	MY55130004	Mar. 14, 2024	
14	USB Wideband Power Sensor	Keysight	U2021XA	MY55130006	Mar. 14, 2024	
15	Test Software	Tonscend	JS1120-3	V2.6.88.0346	/	

Radiated Emission						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated Until	
1	Trilog-Broadband Antenna	Schwarzbeck	VULB 9163	01026	Dec. 18, 2024	
2	Horn Antenna	Schwarzbeck	BBHA 9120D	9120D-647	Dec. 01, 2024	
3	Test Receiver	Keysight	N9038A	MY56400071	Dec. 16, 2023	
4	Broadband Amplifier	SCHWARZBECK	BBV9743B	259	Dec. 16, 2023	
5	Mirowave Broadband Amplifier	SCHWARZBECK	BBV9718C	111	Dec. 16, 2023	
6	3m chamber 3	YIHENG	EE106	/	Aug. 28, 2026	
7	Test Software	FARA	EZ-EMC	FA-03A2	1	



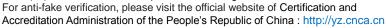




Conduc	Conducted Emission							
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated Until			
1	LISN	R&S	ENV216	101112	Dec. 16, 2023			
2	LISN	R&S	ENV216	101113	Dec. 16, 2023			
3	EMI Test Receiver	R&S	ESCS30	100353	Dec. 16, 2023			
4	ISN CAT6	Schwarzbeck	NTFM 8158	CAT6-8158-0046	Dec. 16, 2023			
5	ISN CAT5	Schwarzbeck	NTFM 8158	CAT5-8158-0046	Dec. 16, 2023			
6	Test Software	R&S	EMC32	6.10.10	/			

Note: 1. The Cal. Interval was one year.

- 2. The Cal. Interval was three years of the antenna.
- 3. The cable loss has been calculated in test result which connection between each test instruments.





# 3. TEST ITEM AND RESULTS

## 3.1. Conducted Emission

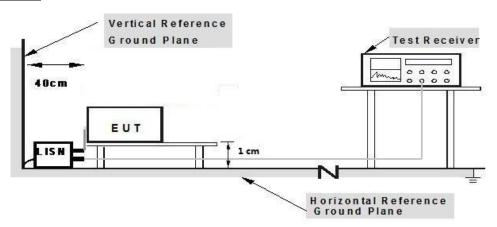
## **Limit**

## FCC CFR Title 47 Part 15 Subpart C Section 15.207 / RSS-Gen 8.8

Fraguerou (MILIF)	Conducted Limit (dBµV)				
Frequency (MHz)	Quasi-peak	Average			
0.15 - 0.5	66 to 56 *	56 to 46 *			
0.5 - 5	56	46			
5 - 30	60	50			

<sup>\*</sup> Decreases with the logarithm of the frequency.

## **Test Configuration**



Note: 1.Support units were connected to second LISM.

2.Both of LISMs (AMM) are 80 cm from EUT and at least 80 from other units and other metal planes

## **Test Procedure**

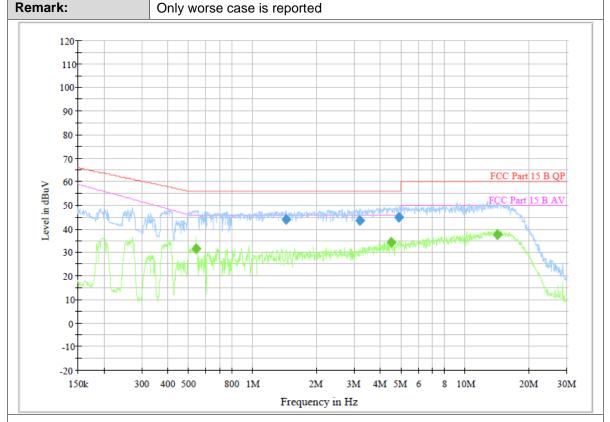
- 1. The EUT was setup according to ANSI C63.10:2013 requirements.
- 2. The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface.
- 3. The EUT and simulators are connected to the main power through a line impedance stabilization network (LISN). The LISN provides a 50 ohm / 50 µH 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 2.4.

**Test Result** 

Test Voltage:	AC 120V/60Hz
Terminal:	Line
<b>D</b> 1	



# **Final Measurement Detector 1**

Frequency (MHz)	QuasiPeak (dB μ V)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dB µ V)	Comment
1.436720	44.1	1000.00	9.000	On	L1	9.5	11.9	56.0	
3.192390	43.5	1000.00	9.000	On	L1	9.5	12.5	56.0	
4.874040	45.1	1000.00	9.000	On	L1	9.5	10.9	56.0	

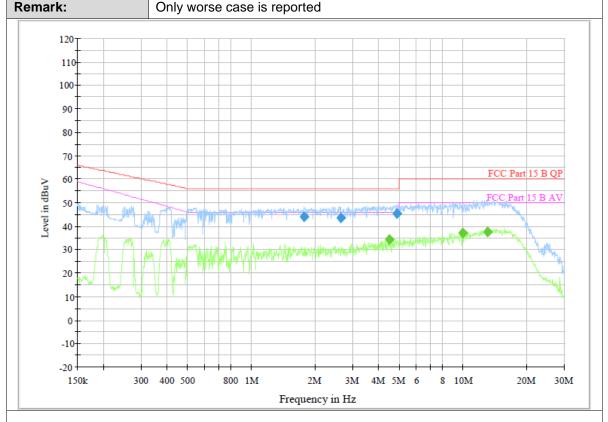
# Final Measurement Detector 2

Frequency (MHz)	Average (dB μ V)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dB µ V)	Comment
0.540270	31.5	1000.00	9.000	On	L1	9.5	14.5	46.0	
4.464240	34.2	1000.00	9.000	On	L1	9.5	11.8	46.0	
14.094730	37.6	1000.00	9.000	On	L1	9.8	12.4	50.0	

Emission Level = Read Level + Correct Factor



Test Voltage: AC 120V/60Hz
Terminal: Neutral



# **Final Measurement Detector 1**

	Frequency (MHz)	QuasiPeak (dB µ V)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dB µ V)	Comment
Г	1.768180	43.8	1000.00	9.000	On	N	9.4	12.2	56.0	
Γ	2.635710	43.7	1000.00	9.000	On	N	9.4	12.3	56.0	
	4.874040	45.2	1000.00	9.000	On	N	9.5	10.8	56.0	

# Final Measurement Detector 2

	Frequency	Average	Meas.	Bandwidth	Filter	Line	Corr.	Margin	Limit	Comment
	(MHz)	(dB $\mu$ V)	Time	(kHz)			(dB)	(dB)	(dB μ	
		,	(ms)						`V)	
Γ	4.464240	34.3	1000.00	9.000	On	N	9.4	11.7	46.0	
	9.959180	37.0	1000.00	9.000	On	N	9.6	13.0	50.0	
	13.013150	37.6	1000.00	9.000	On	N	9.6	12.4	50.0	

Emission Level = Read Level + Correct Factor



# 3.2. Radiated Emission

# <u>Limit</u>

# FCC CFR Title 47 Part 15 Subpart C Section 15.209 / RSS-Gen 8.9

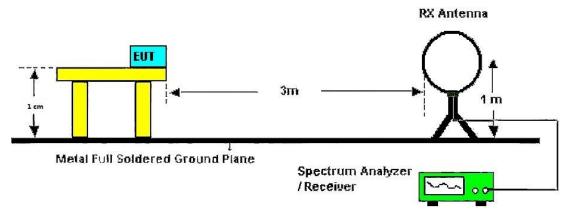
Frequency	Field Strength	Measurement Distance
(MHz)	(microvolts/meter)	(meters)
0.009~0.490	2400/F (kHz)	300
0.490~1.705	24000/F (kHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
960~1000	500	3

Eroguanov Pango (MHz)	dBµV/m (at 3 meters)				
Frequency Range (MHz)	Peak	Average			
Above 1000	74	54			

#### Note:

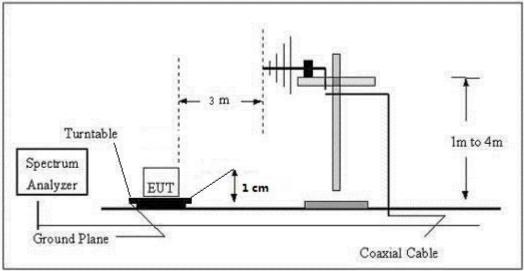
- (1) The tighter limit applies at the band edges.
- (2) Emission Level (dBμV/m)=20log Emission Level (μV/m).

# **Test Configuration**

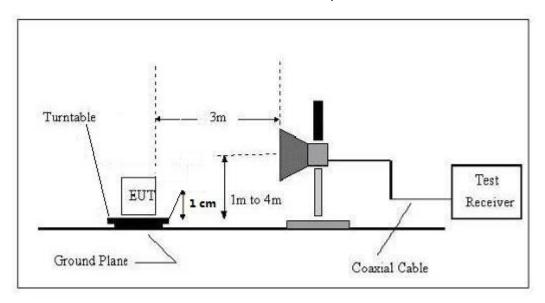


Below 30MHz Test Setup





30-1000MHz Test Setup



Above 1GHz Test Setup

## **Test Procedure**

- 1. The EUT was setup and tested according to ANSI C63.10:2013.
- 2. The EUT is placed on a turn table which is 0.8 meter above ground for below 1 GHz, and 1.5 m for above 1 GHz. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
- 3. The EUT was set 3 meters from the receiving antenna, which was mounted on the top of a variable height antenna tower.
- 4. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.
- 5. Set to the maximum power setting and enable the EUT transmit continuously.
- 6. Use the following spectrum analyzer settings
- (1) Span shall wide enough to fully capture the emission being measured;
- (2) Below 1 GHz:

RBW=120 kHz, VBW=300 kHz, Sweep=auto, Detector function=peak, Trace=max hold;

If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the



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quasi-peak detector and reported.

(3) From 1 GHz to 10<sup>th</sup> harmonic:

RBW=1MHz, VBW=3MHz Peak detector for Peak value.

RBW=1MHz, VBW see note 1 with Peak Detector for Average Value.

Note 1: For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 3 MHz for peak measurements and 1 MHz resolution bandwidth with 1/T video bandwidth with peak detector for average measurements. For the Duty Cycle please refer to clause 3.8 Duty Cycle.

## **Test Mode**

Please refer to the clause 2.4.

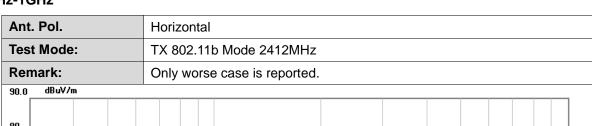
## **Test Result**

#### 9 kHz~30 MHz

From 9 kHz to 30 MHz: The conclusion is PASS.

## Note:

- 1. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.
- 2. Pre-scan all antenna, only show the test data for worse case antenna on the test report.





No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	97.5764	49.22	-16.36	32.86	43.50	-10.64	QP
2	207.5100	49.95	-15.74	34.21	43.50	-9.29	QP
3	310.9766	50.15	-13.12	37.03	46.00	-8.97	QP
4	443.2200	48.97	-10.41	38.56	46.00	-7.44	QP
5	514.6766	47.63	-9.03	38.60	46.00	-7.40	QP
6 *	593.8931	48.80	-7.30	41.50	46.00	-4.50	QP

#### Remarks

- 1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
- 2.Margin value = Level -Limit value

1000.000



Ant. Pol. Vertical **Test Mode:** TX 802.11b Mode 2412MHz Remark: Only worse case is reported. dBuV/m 90.0 80 70 60 FCC Part15 RE-Class B 30-1000M 50 Margin -6 dB 40 30 20 10 0

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	96.6066	51.43	-16.49	34.94	43.50	-8.56	QP
2	104.6900	49.85	-15.76	34.09	43.50	-9.41	QP
3	205.5700	46.80	-15.81	30.99	43.50	-12.51	QP
4	308.7133	51.40	-13.20	38.20	46.00	-7.80	QP
5	489.7800	49.33	-9.50	39.83	46.00	-6.17	QP
6 *	593.8931	47.74	-7.30	40.44	46.00	-5.56	QP

(MHz)

300.00

#### Remarks

30.000

- 1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
- 2.Margin value = Level -Limit value

60.00



Ant. Pol.	Horizontal
Test Mode:	TX 802.11b Mode 2412MHz
Remark:	No report for the emission which more than 20 dB below the prescribed limit.

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)		Margin (dB)	Detector
1 *	4823.879	45.74	2.11	47.85	54.00	-6.15	AVG
2	4823.958	51.86	2.11	53.97	74.00	-20.03	peak

## Remarks:

1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor

2.Margin value = Level -Limit value

Ant. Pol.	Vertical
Test Mode:	TX 802.11b Mode 2412MHz
Remark:	No report for the emission which more than 20 dB below the prescribed limit.

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)		Margin (dB)	Detector
1	4823.869	46.52	2.11	48.63	74.00	-25.37	peak
2 *	4823.873	38.09	2.11	40.20	54.00	-13.80	AVG

# Remarks:

1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor



Ant. Pol.	Horizontal			
Test Mode:	TX 802.11b Mode 2437MHz			
Remark:	No report for the emission which more than 20 dB below the prescribed limit.			

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1 *	4873.758	44.58	2.18	46.76	54.00	-7.24	AVG
2	4873.828	51.17	2.18	53.35	74.00	-20.65	peak

#### Remarks:

1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor

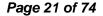
2.Margin value = Level -Limit value

Ant. Pol.	Vertical
Test Mode:	TX 802.11b Mode 2437MHz
Remark:	No report for the emission which more than 20 dB below the prescribed limit.

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)		Margin (dB)	Detector
1	4873.817	45.80	2.18	47.98	74.00	-26.02	peak
2 *	4873.882	37.49	2.18	39.67	54.00	-14.33	AVG

# Remarks:

1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor





Ant. Pol.	Horizontal
Test Mode:	TX 802.11b Mode 2462MHz
Remark:	No report for the emission which more than 20 dB below the prescribed limit.

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)		Margin (dB)	Detector
1	4923.865	51.42	2.26	53.68	74.00	-20.32	peak
2 *	4923.873	44.57	2.26	46.83	54.00	-7.17	AVG

#### Remarks:

1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor

2.Margin value = Level -Limit value

Ant. Pol.	Vertical
Test Mode:	TX 802.11b Mode 2462MHz
Remark:	No report for the emission which more than 20 dB below the prescribed limit.

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)		Margin (dB)	Detector
1	4923.747	44.91	2.26	47.17	74.00	-26.83	peak
2 *	4923.803	36.68	2.26	38.94	54.00	-15.06	AVG

# Remarks:

1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor



Ant. Pol.	Horizontal				
Test Mode:	TX 802.11g Mode 2412MHz				
Remark:	No report for the emission which more than 20 dB below the prescribed limit.				

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)		Margin (dB)	Detector
1 *	4824.935	32.28	2.11	34.39	54.00	-19.61	AVG
2	4824.983	43.17	2.11	45.28	74.00	-28.72	peak

## Remarks:

1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor

2.Margin value = Level -Limit value

Ant. Pol.	Vertical
Test Mode:	TX 802.11g Mode 2412MHz
Remark:	No report for the emission which more than 20 dB below the prescribed limit.

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)		Margin (dB)	Detector
1 *	4824.127	30.58	2.11	32.69	54.00	-21.31	AVG
2	4824.136	41.91	2.11	44.02	74.00	-29.98	peak

# Remarks:

1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor



Ant. Pol.	Horizontal			
Test Mode:	TX 802.11g Mode 2437MHz			
Remark:	No report for the emission which more than 20 dB below the prescribed limit.			

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)		Margin (dB)	Detector
1	4874.061	42.96	2.18	45.14	74.00	-28.86	peak
2 *	4874.140	31.84	2.18	34.02	54.00	-19.98	AVG

#### Remarks:

1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor

2.Margin value = Level -Limit value

Ant. Pol.	Vertical
Test Mode:	TX 802.11g Mode 2437MHz
Remark:	No report for the emission which more than 20 dB below the prescribed limit.

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)		Margin (dB)	Detector
1	4873.927	41.30	2.18	43.48	74.00	-30.52	peak
2 *	4874.190	29.60	2.18	31.78	54.00	-22.22	AVG

# Remarks:

1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor



Ant. Pol.	Horizontal				
Test Mode:	TX 802.11g Mode 2462MHz				
Remark:	No report for the emission which more than 20 dB below the prescribed limit.				

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)		Margin (dB)	Detector
1 *	4924.108	31.68	2.26	33.94	54.00	-20.06	AVG
2	4924.252	42.55	2.26	44.81	74.00	-29.19	peak

#### Remarks:

1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor

2.Margin value = Level -Limit value

Ant. Pol.	Vertical
Test Mode:	TX 802.11g Mode 2462MHz
Remark:	No report for the emission which more than 20 dB below the prescribed limit.

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)		Margin (dB)	Detector
1	4923.816	41.66	2.26	43.92	74.00	-30.08	peak
2 *	4923.953	29.95	2.26	32.21	54.00	-21.79	AVG

# Remarks:

1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor



Ant. Pol.	Horizontal
Test Mode:	TX 802.11n(HT20) Mode 2412MHz
Remark:	No report for the emission which more than 20 dB below the prescribed limit.

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)		Margin (dB)	Detector
1 *	4824.127	31.49	2.11	33.60	54.00	-20.40	AVG
2	4824.167	43.07	2.11	45.18	74.00	-28.82	peak

## Remarks:

1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor

2.Margin value = Level -Limit value

Ant. Pol.	Vertical
Test Mode:	TX 802.11n(HT20) Mode 2412MHz
Remark:	No report for the emission which more than 20 dB below the prescribed limit.

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)		Margin (dB)	Detector
1	4824.154	41.76	2.11	43.87	74.00	-30.13	peak
2 *	4824.211	30.04	2.11	32.15	54.00	-21.85	AVG

# Remarks:

1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor



Ant. Pol.	Horizontal
Test Mode:	TX 802.11n(HT20) Mode 2437MHz
Remark:	No report for the emission which more than 20 dB below the prescribed limit.

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)		Margin (dB)	Detector
1	4873.853	42.13	2.18	44.31	74.00	-29.69	peak
2 *	4873.945	31.72	2.18	33.90	54.00	-20.10	AVG

#### Remarks:

1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor

2.Margin value = Level -Limit value

Ant. Pol.	Vertical
Test Mode:	TX 802.11n(HT20) Mode 2437MHz
Remark:	No report for the emission which more than 20 dB below the prescribed limit.

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)		Margin (dB)	Detector
1	4873.892	40.89	2.18	43.07	74.00	-30.93	peak
2 *	4874.125	29.72	2.18	31.90	54.00	-22.10	AVG

# Remarks:

1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor



Ant. Pol.	Horizontal
Test Mode:	TX 802.11n(HT20) Mode 2462MHz
Remark:	No report for the emission which more than 20 dB below the prescribed limit.

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)		Margin (dB)	Detector
1 *	4923.975	31.55	2.26	33.81	54.00	-20.19	AVG
2	4924.147	41.98	2.26	44.24	74.00	-29.76	peak

#### Remarks:

1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor

2.Margin value = Level -Limit value

Ant. Pol.	Vertical
Test Mode:	TX 802.11n(HT20) Mode 2462MHz
Remark:	No report for the emission which more than 20 dB below the prescribed limit.

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)		Margin (dB)	Detector
1	4924.228	41.65	2.26	43.91	74.00	-30.09	peak
2 *	4924.238	30.39	2.26	32.65	54.00	-21.35	AVG

# Remarks:

1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor



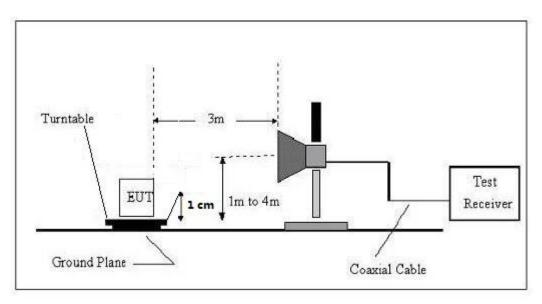
# 3.3. Band Edge Emissions (Radiated)

#### Limit

## FCC CFR Title 47 Part 15 Subpart C Section 15.247 (d) / RSS-247 5.5

Restricted Frequency Band	(dBµV/m) (at 3m)			
(MHz)	Peak	Average		
2310 ~ 2390	74	54		
2483.5 ~ 2500	74	54		

# **Test Configuration**



# **Test Procedure**

- 1. The EUT was setup and tested according to ANSI C63.10:2013 requirements.
- 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.
- The EUT was positioned such that the distance from antenna to the EUT was 3 meters. 3.
- 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.
- The receiver set as follow:

RBW=1MHz, VBW=3MHz Peak detector for Peak value.

RBW=1MHz, VBW see note 1 with Peak Detector for Average Value.

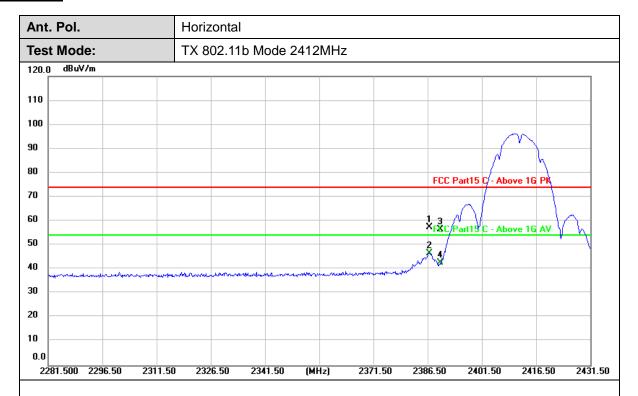
Note 1: For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 3 MHz for peak measurements and 1 MHz resolution bandwidth with 1/T video bandwidth with peak detector for average measurements. For the Duty Cycle please refer to clause 3.8 Duty Cycle.

## **Test Mode**

Please refer to the clause 2.4.



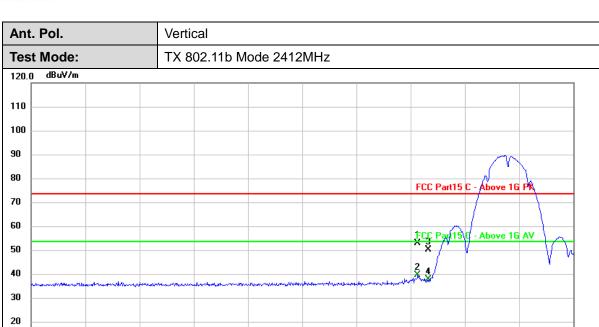
## **Test Result**



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	2386.950	26.01	31.31	57.32	74.00	-16.68	peak
2 *	2386.950	15.33	31.31	46.64	54.00	-7.36	AVG
3	2390.000	25.22	31.31	56.53	74.00	-17.47	peak
4	2390.000	11.52	31.31	42.83	54.00	-11.17	AVG

## Remarks:

1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	2387.000	22.15	31.31	53.46	74.00	-20.54	peak
2 *	2387.000	8.92	31.31	40.23	54.00	-13.77	AVG
3	2390.000	19.55	31.31	50.86	74.00	-23.14	peak
4	2390.000	7.19	31.31	38.50	54.00	-15.50	AVG

(MHz)

2370.00

2385.00

2400.00

2415.00

2430.00

## Remarks:

10 0.0

2280.000 2295.00

2310.00

2325.00

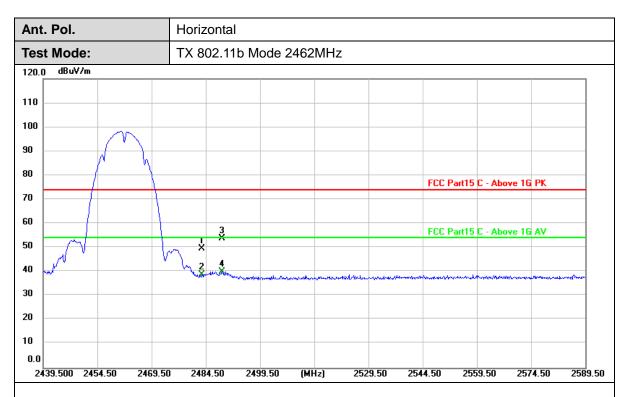
1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor

2340.00

2.Margin value = Level -Limit value

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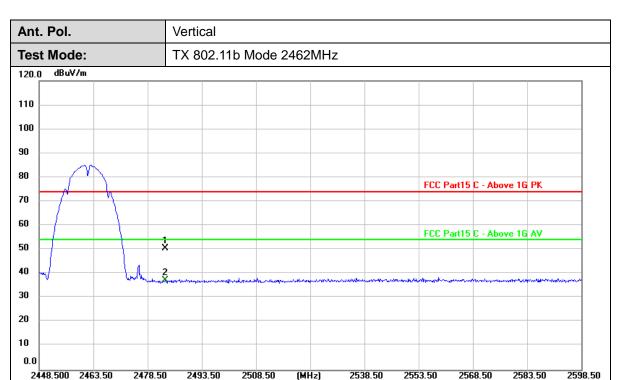


No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	2483.500	18.30	31.48	49.78	74.00	-24.22	peak
2	2483.500	7.23	31.48	38.71	54.00	-15.29	AVG
3	2489.050	22.48	31.49	53.97	74.00	-20.03	peak
4 *	2489.050	8.57	31.49	40.06	54.00	-13.94	AVG

## Remarks:

1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor





No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)		Margin (dB)	Detector
1	2483.500	19.00	31.48	50.48	74.00	-23.52	peak
2 *	2483.500	5.88	31.48	37.36	54.00	-16.64	AVG

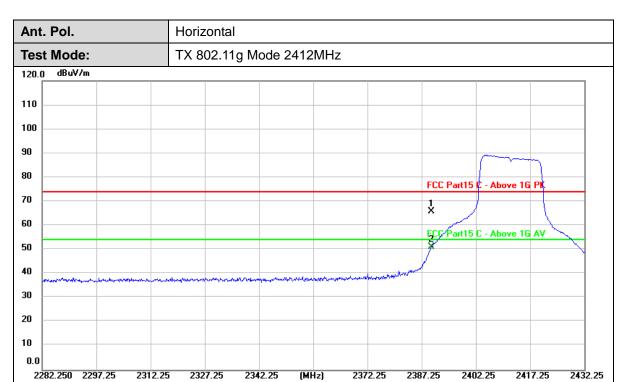
## Remarks:

1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor

2.Margin value = Level -Limit value

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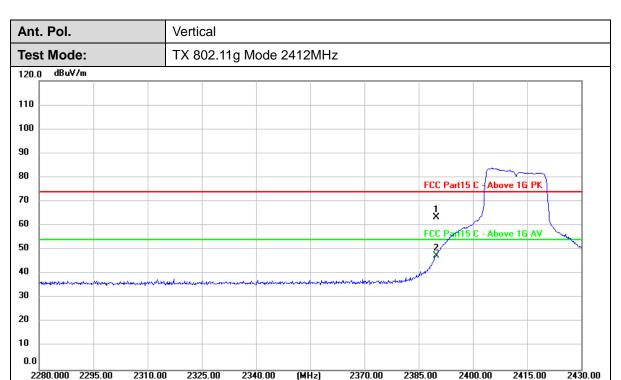


No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)		Margin (dB)	Detector
1	2390.000	34.48	31.31	65.79	74.00	-8.21	peak
2 *	2390.000	19.83	31.31	51.14	54.00	-2.86	AVG

## Remarks:

1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor



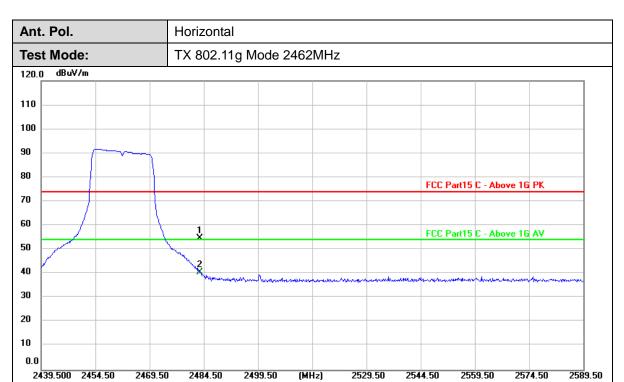


No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)		Margin (dB)	Detector
1	2390.000	32.21	31.31	63.52	74.00	-10.48	peak
2 *	2390.000	16.38	31.31	47.69	54.00	-6.31	AVG

## Remarks:

1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor





No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)		Margin (dB)	Detector
1	2483.500	23.30	31.48	54.78	74.00	-19.22	peak
2 *	2483.500	9.04	31.48	40.52	54.00	-13.48	AVG

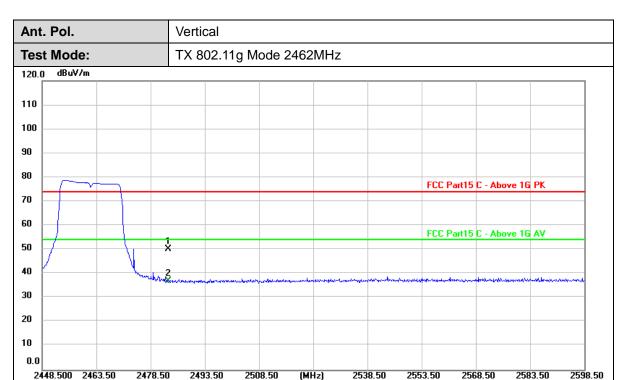
## Remarks:

1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor

2.Margin value = Level -Limit value

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No.	Frequency (MHz)	Reading (dBuV)		Level (dBuV/m)	l	Margin (dB)	Detector
1	2483.500	18.75	31.48	50.23	74.00	-23.77	peak
2 *	2483.500	5.65	31.48	37.13	54.00	-16.87	AVG

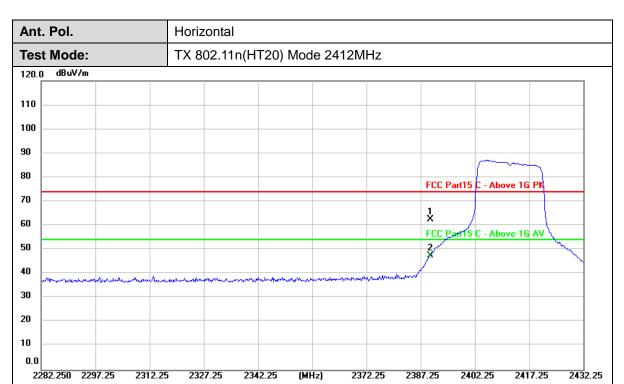
## Remarks:

1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor

2.Margin value = Level -Limit value

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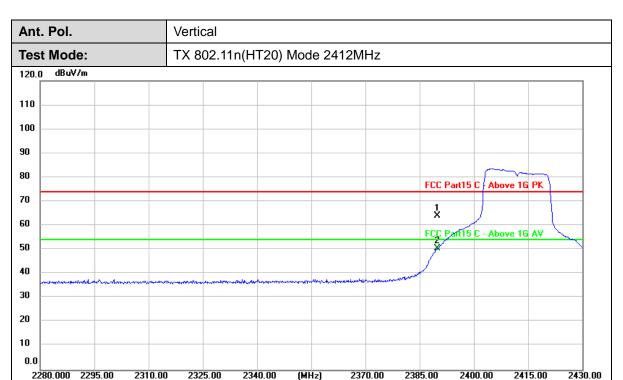


No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)		Margin (dB)	Detector
1	2390.000	31.26	31.31	62.57	74.00	-11.43	peak
2 *	2390.000	16.32	31.31	47.63	54.00	-6.37	AVG

## Remarks:

1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor



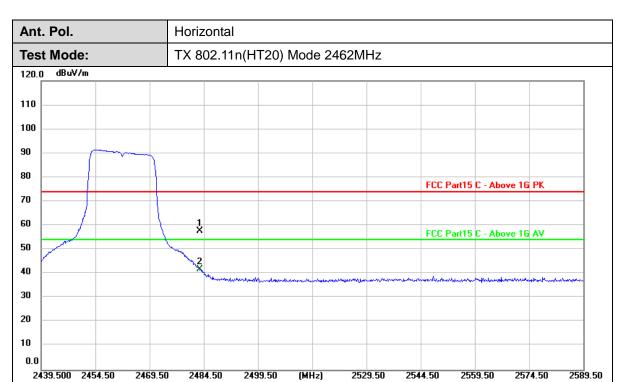


No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)		Margin (dB)	Detector
1	2390.000	32.77	31.31	64.08	74.00	-9.92	peak
2 *	2390.000	19.15	31.31	50.46	54.00	-3.54	AVG

# Remarks:

1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor





No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)		Margin (dB)	Detector
1	2483.500	26.24	31.48	57.72	74.00	-16.28	peak
2 *	2483.500	10.24	31.48	41.72	54.00	-12.28	AVG

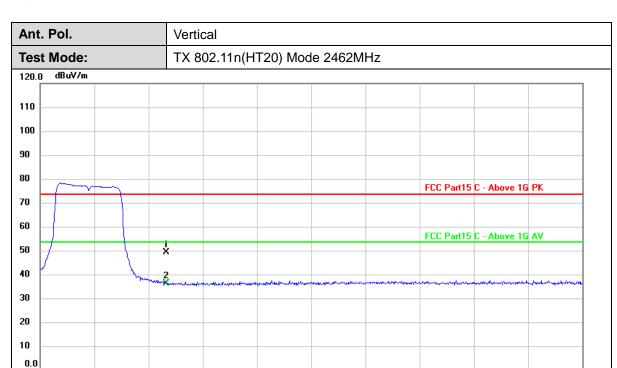
## Remarks:

1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor

2583.50

2598.50





No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)		Margin (dB)	Detector
1	2483.500	18.41	31.48	49.89	74.00	-24.11	peak
2 *	2483.500	5.54	31.48	37.02	54.00	-16.98	AVG

(MHz)

2553.50

# Remarks:

2448.500 2463.50

1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor

2493.50