

TEST REPORT

Verified Code: 880037

Report No.:	E202101126468-3	Application No.:	E202101126468
Client:	GUANGZHOU LIUHUAN INFORMATION TECHNOLOGY CO., LTD.		
Address:	ROOM 1101 OF BUILDING 2, ROOM 802 OF BUILDING 1, NO.6, YUNPU FOUR ROAD, HUANGPU DISTRICT, GUANGZHOU CITY, GUANGDONG PROVINCE, CHINA		
Sample Description:	Multimedia player		
Model:	San Andres 970		
Test Specification:	CFR 47, FCC Parts Subpart E Unlicensed National Information Infrastructure Devices		
Receipt Date:	2021-01-20		
Test Date:	2021-01-28 to 2021-02-26		
Issue Date:	2021-04-14		
Test Result:	Pass		
Prepared By: Test Engineer <i>Xie Jang</i>	Reviewed By: Technical Manager <i>Jiang Tao</i>	Approved By: Manager <i>Yong Dai</i>	
Other Aspects:			
Note: Note			
Abbreviations: ok / P = passed; fail / F = failed; n.a. / N = not applicable;			
The test result in this test report refers exclusively to the presented test sample. This report shall not be reproduced except in full, without the written approval of GRGT.			



DIRECTIONS OF TEST

- 1. This station carries out test task according to the national regulation of verifications which can be traced to National Primary Standards and BIPM.**
- 2. The test report merely corresponds to the test sample. It is not permitted to copy extracts of these test result without the written permission of the test laboratory.**
- 3. If there is any objection concerning the test, the client should inform the laboratory within 15 days from the date of receiving the test report.**

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1. TEST RESULT SUMMARY

Standard	Item	Limit / Severity	Result
CFR 47, FCC Parts Subpart E (§15.407)	6dB Bandwidth & 26dB Bandwidth & 99% Occupied Bandwidth	15.407(a) 15.407(e)	PASS
	AC Power Line Conducted Emissions	15.207 15.407(b)(6)	PASS
	Unwanted Emissions and Band Edge	15.205 15.209 15.407(b)	PASS
	Output Power	15.407(a)	PASS
	Peak Power Spectral Density	15.407(a)	PASS
	Frequency Stability	15.407(g)	PASS
	Antenna Requirement	15.203	PASS ¹⁾

Note: ¹⁾The EUT has one antenna. The antenna is internal antenna.

The max gain of antenna is 4.2dBi. which accordance 15.203.is considered sufficient to comply with the provisions of this section

2. GENERAL DESCRIPTION OF EUT

2.1. APPLICANT

Name: GUANGZHOU LIUHUAN INFORMATION TECHNOLOGY CO., LTD.
Address: ROOM 1101 OF BUILDING 2, ROOM 802 OF BUILDING 1, NO.6, YUNPU FOUR ROAD, HUANGPU DISTRICT, GUANGZHOU CITY, GUANGDONG PROVINCE, CHINA

2.2. MANUFACTURER

Name: GUANGZHOU LIUHUAN INFORMATION TECHNOLOGY CO., LTD.
Address: ROOM 1101 OF BUILDING 2, ROOM 802 OF BUILDING 1, NO.6, YUNPU FOUR ROAD, HUANGPU DISTRICT, GUANGZHOU CITY, GUANGDONG PROVINCE, CHINA

2.3. FACTORY

Name: GUANGZHOU LIUHUAN INFORMATION TECHNOLOGY CO., LTD.
Address: ROOM 1101 OF BUILDING 2, ROOM 802 OF BUILDING 1, NO.6, YUNPU FOUR ROAD, HUANGPU DISTRICT, GUANGZHOU CITY, GUANGDONG PROVINCE, CHINA

2.4. BASIC DESCRIPTION OF EQUIPMENT UNDER TEST

Equipment: Multimedia player
Model No.: San Andres 970
Adding Model: /
Trade Name: /
FCC ID: 2AQZN-SA970-1
Power supply: DC12V power supplied by DC source
Operation Frequency: 5785 MHz
Modulation type: OFDM
Number Of Channel: 1 Channel
Channels Spacing: IEEE 802.11a: 20MHz
IEEE 802.11n HT20: 20MHz
IEEE 802.11ac VHT20: 20MHz
Transmit Power: 17.82dBm for IEEE 802.11a
18.82dBm for IEEE 802.11n HT20
18.99dBm for IEEE 802.11ac VHT20
Antenna Specification: Internal antenna with 4.2dBi gain (Max.)
Temperature: -20 °C ~ +70 °C

Range:

Hardware V1.0.5

Version:

Software C78_V1.0.1.0_T

Version:

Sample No: E202101126468-0002

Note: /

2.5. TEST OPERATION MODE

Mode No.	Description of the modes
1	5G wifi Transmitting

2.6. LOCAL SUPPORTIVE INSTRUMENTS

Name of Equipment	Manufacturer	Model	Serial Number	Note
Notebook	DELL	P07G	42370984117	/
Adapter (Notebook)	DELL	LA65NS1-00	N/A	/
Cable				
AC cable	/	/	/	Unshielded, 1.00m
DC cable	/	/	/	Shielded, 1.80m

Test software:

Software version	Test level
QDART-Connectivity1.0-00053	N/A

3. LABORATORY AND ACCREDITATIONS

3.1. LABORATORY

The tests & measurements refer to this report were performed by Shenzhen EMC Laboratory of Guangzhou GRG Metrology & Test Co., Ltd.

Add : Address: No.1301 Guanguang Road Xinlan Community, Guanlan Street,
Longhua District Shenzhen, 518110, People's Republic of China

P.C. : 518000

Tel : 0755-61180008

Fax : 0755-61180008

3.2. ACCREDITATIONS

Our laboratories are accredited and approved by the following approval agencies according to GB/T 27025(ISO/IEC 17025:2017)

USA A2LA(Certificate #:2861.01)

The measuring facility of laboratories has been authorized or registered by the following approval agencies.

Canada Industry Canada

USA FCC

Copies of granted accreditation certificates are available for downloading from our web site, <http://www.grgtest.com>

3.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement		Frequency	Uncertainty
Radiated Emission	Horizontal	30MHz~1000MHz	4.30dB
		1GHz~18GHz	5.60dB
		18GHz~26GHz	3.65dB
		26GHz~40GHz	4.00dB
	Vertical	30MHz~1000MHz	4.30dB
		1GHz~18GHz	5.60dB
		18GHz~26GHz	3.65dB
		26GHz~40GHz	4.00dB

This uncertainty represents an expanded uncertainty factor of k=2.

4. LIST OF USED TEST EQUIPMENT AT GRGT

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Radiated Spurious Emission& Restricted bands of operation				
Spectrum Analyzer	Agilent	N9010A	MY52221469	2021-05-16
Radio communication tester	R&S	CMW500	144611-nC	2021-07-16
Horn Antenna	Schwarzbeck	BBHA 9120D(1201)	02143	2021-12-27
Board-Band Horn Antenna	Schwarzbeck	BBHA 9170	BBHA 9170-497	2021-11-05
Amplifier	Tonscend	TAP01018048	AP20E8060075	2021-06-28
Amplifier	Tonscend	TAP037030	AP20E8060081	2021-06-28
Amplifier	Tonscend	TAP184050	AP20E806071	2021-06-15
Test receiver	R&S	ESCI	100145	2021-10-07
Amplifier	EMEC	EM330	/	2021-04-01
Bilog Antenna	Schwarzbeck	CBL6143A	26039	2021-11-25
Test S/W	EZ	CCS-2ANT		
Test S/W	Tonscend	JS36-RSE/2.5.1.5		
6DB Bandwidth & 26DB Bandwidth & 99% Occupied bandwidth				
Spectrum Analyzer	Agilent	N9010A	MY52221469	2021-05-16
Output Power				
Spectrum Analyzer	Agilent	N9010A	MY52221469	2021-05-16
Frequency Stability				
Spectrum Analyzer	Agilent	N9010A	MY52221469	2021-05-16
Peak Spectral Density Measurement				
Spectrum Analyzer	Agilent	N9010A	MY52221469	2021-05-16

5. RADIATED SPURIOUS EMISSIONS

5.1 LIMITS

The maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

- (1) For transmitters operating in the 5.725-5.85 GHz band: All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

The unwanted emissions which fall in Restricted bands shall not exceed the field strength levels specified in the following table:

15.209 Radiated emission limits

Frequency (MHz)	Field Strength(μ V/m)	Distance(m)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

5.2 TEST PROCEDURES

- a. EUT was placed on a turn table, which is 0.8 meter high above ground for below 1GHz test, and which is 1.5 meter high above ground for above 1GHz test.
- b. EUT is set 3 meters away from the receiving antenna, which is mounted on a antenna tower.
- c. Set the EUT transmit continuously with maximum output power.
- d. The turn table can rotate 360 degrees to determine the position of the maximum emission level.
- e. The antenna can be moved up and down between 1 meter and 4 meters to find out the maximum emission level. Both horizontal and vertical polarization of the antenna are set on test.
- f. Spectrum analyzer setting parameters please see the below table.
- g. Repeat above procedures until all channels were measured.
- h. Record the results in the test report.

For 9KHz-150KHz

Spectrum Parameters	Setting
RBW	300Hz(for Peak&AVG)/CISPR 200Hz(for QP)
VBW	300Hz(for Peak&AVG)/CISPR 200Hz(for QP)
Start frequency	9KHz
Stop frequency	150KHz
Sweep Time	Auto
Detector	PEAK/QP/AVG
Trace Mode	Max Hold

Note : For 9KHz-90KHz&110KHz-150KHz,the detector is average,other frequency is CISPR QP detector.

For 150KHz-30MHz

Spectrum Parameters	Setting
RBW	9KHz
VBW	9KHz
Start frequency	150KHz
Stop frequency	30MHz
Sweep Time	Auto
Detector	QP
Trace Mode	Max Hold

Note : For 150KHz-490KHz,the detector is average,other frequency is CISPR QP detector.

For 30MHz-1GHz

Spectrum Parameters	Setting
RBW	120KHz
VBW	300KHz
Start frequency	30MHz
Stop frequency	1GHz
Sweep Time	Auto
Detector	QP
Trace Mode	Max Hold

For Above 1GHz

Spectrum Parameters	Setting
RBW	1MHz
VBW	PEAK Measurement
	AVG Measurement Duty cycle \geq 98%,VBW=10Hz Duty cycle $<$ 98%,VBW \geq 1/T Video bandwidth mode=RMS (power averaging)
Start frequency	1GHz
Stop frequency	40GHz
Sweep Time	Auto
Detector	PEAK/AVG
Trace Mode	Max Hold

Note : T is the on-time time of the duty cycle,when EUT transmit continuously with maximum output power,unit is seconds. reference section 2.7 for the on-time time.

Note : 18-40G Limit=74+20log(3/1)=83.54 (dB μ V/m).

5.3 TEST SETUP

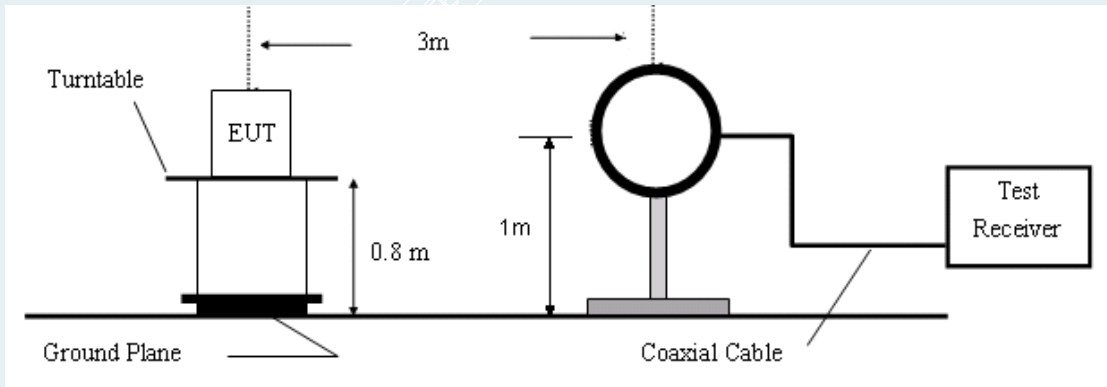


Figure 1. 9KHz to 30MHz radiated emissions test configuration

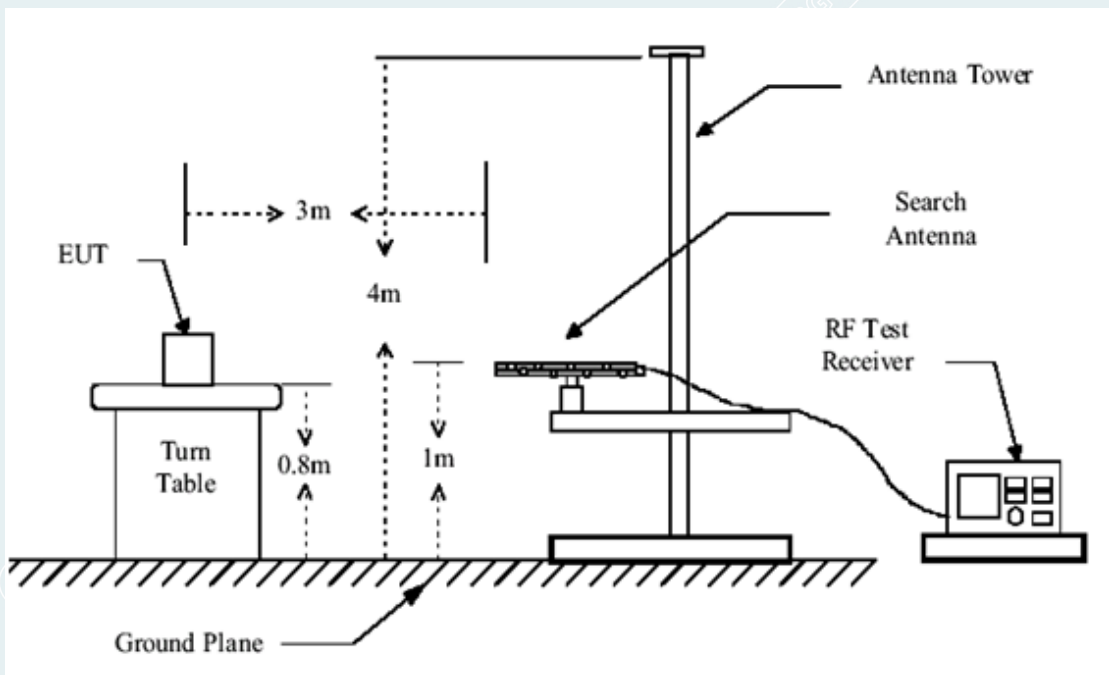


Figure 2. 30MHz to 1GHz radiated emissions test configuration

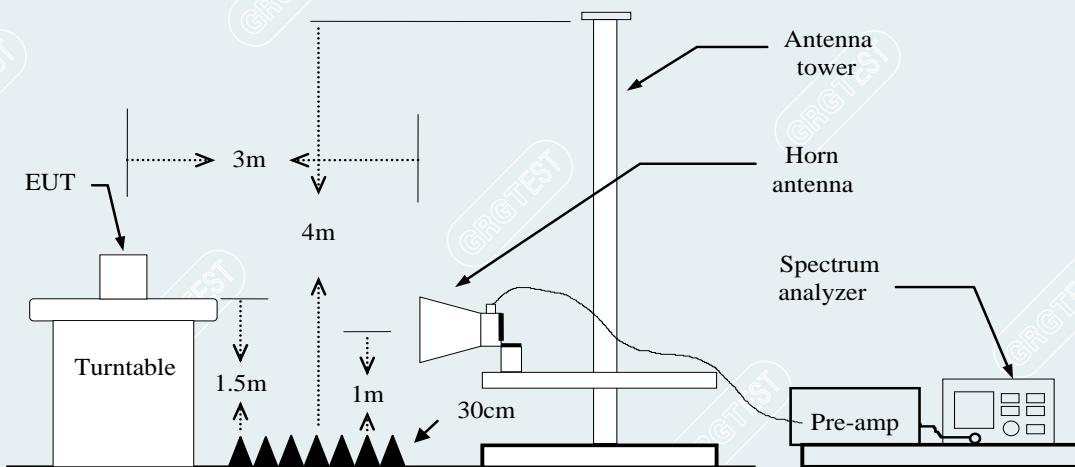


Figure 3. Above 1GHz radiated emissions test configuration

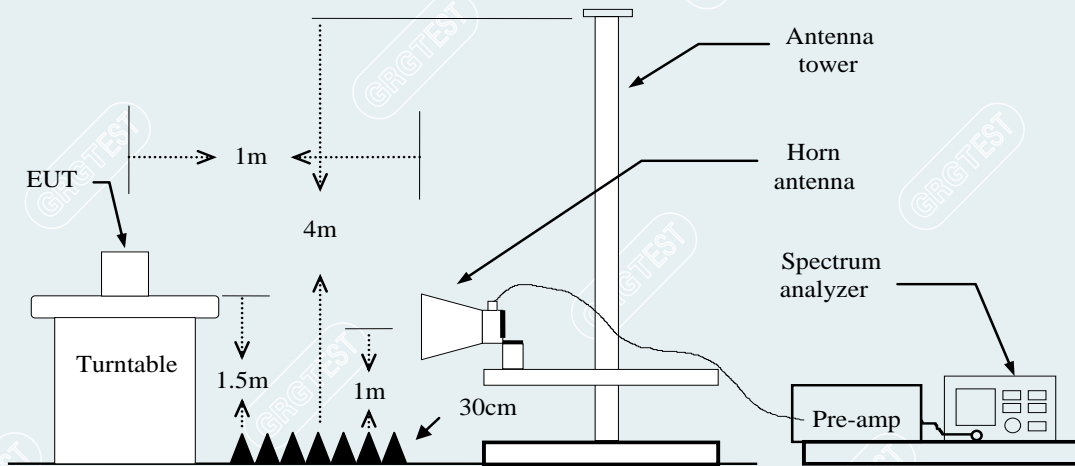


Figure 4. Above 18GHz radiated emissions test configuration

5.4 DATA SAMPLE

30MHz to 1GHz

No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark	Pole
	(MHz)	(dBuV/m)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)		
xxx	xxx	37.06	-15.48	21.58	40.00	-18.42	QP	Vertical

Above 1 GHz

No.	Frequency	Reading	Level	Factor	Limit	Margin	Remark	Pole
	(MHz)	(dBuV/m)	(dBuV/m)	(dB)	(dBuV/m)	(dB)		
xxx	xxx	49.66	53.43	3.77	74.00	20.57	peak	Vertical
xxx	xxx	34.98	38.75	3.77	54.00	15.25	AVG	Vertical

Above 18 GHz

No.	Frequency	Reading	Level	Factor	Limit	Margin	Remark	Pole
	(MHz)	(dBuV/m)	(dBuV/m)	(dB)	(dBuV/m)	(dB)		
xxx	xxx	59.22	58.58	-0.64	83.54	24.96	peak	Vertical
xxx	xxx	53.01	52.37	-0.64	63.54	11.17	AVG	Vertical

- Frequency (MHz) = Emission frequency in MHz
- Ant.Pol. (H/V) = Antenna polarization
- Reading (dBuV) = Uncorrected Analyzer / Receiver reading
- Correction Factor (dB/m) = Antenna factor + Cable loss – Amplifier gain
- Result (dBuV/m) = Reading (dBuV) + Correction Factor (dB/m)
- Limit (dBuV/m) = Limit stated in standard
- Margin (dB) = Remark Result (dBuV/m) – Limit (dBuV/m)
- Peak = Peak Reading
- QP = Quasi-peak Reading
- AVG = Average Reading

5.5 TEST RESULTS

30MHz to 1GHz

Recorded the worst case results in this report (IEEE 802.11a)

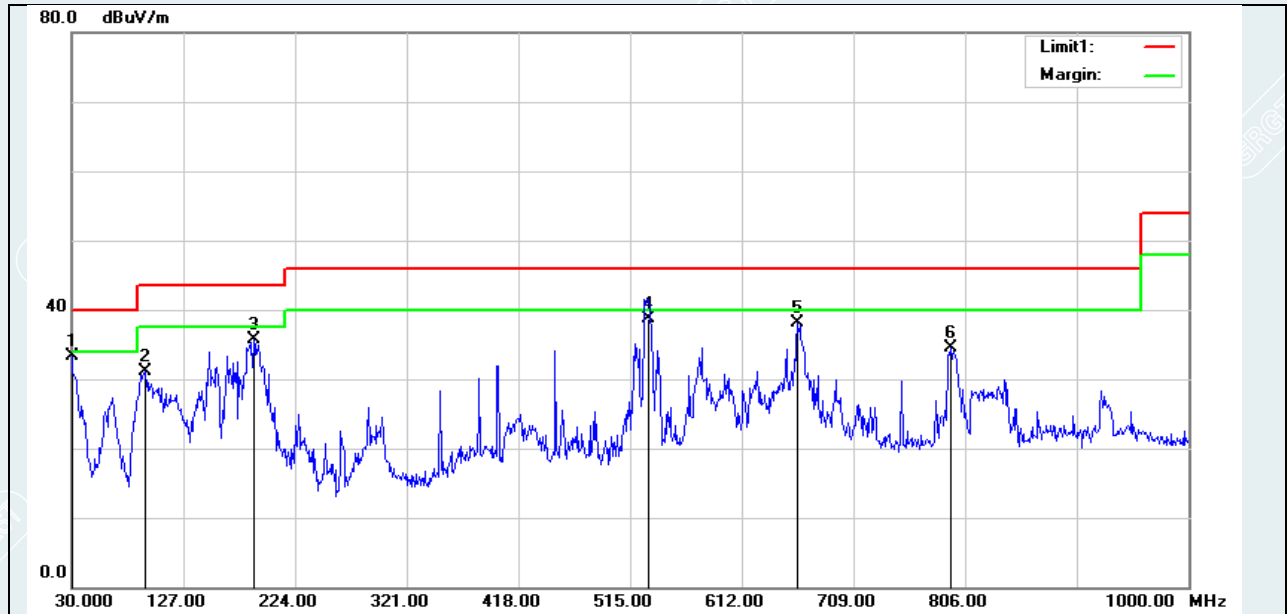
Mode: TX/ IEEE 802.11a

channel (5785MHz)

Polarity

Date: 2021-02-26

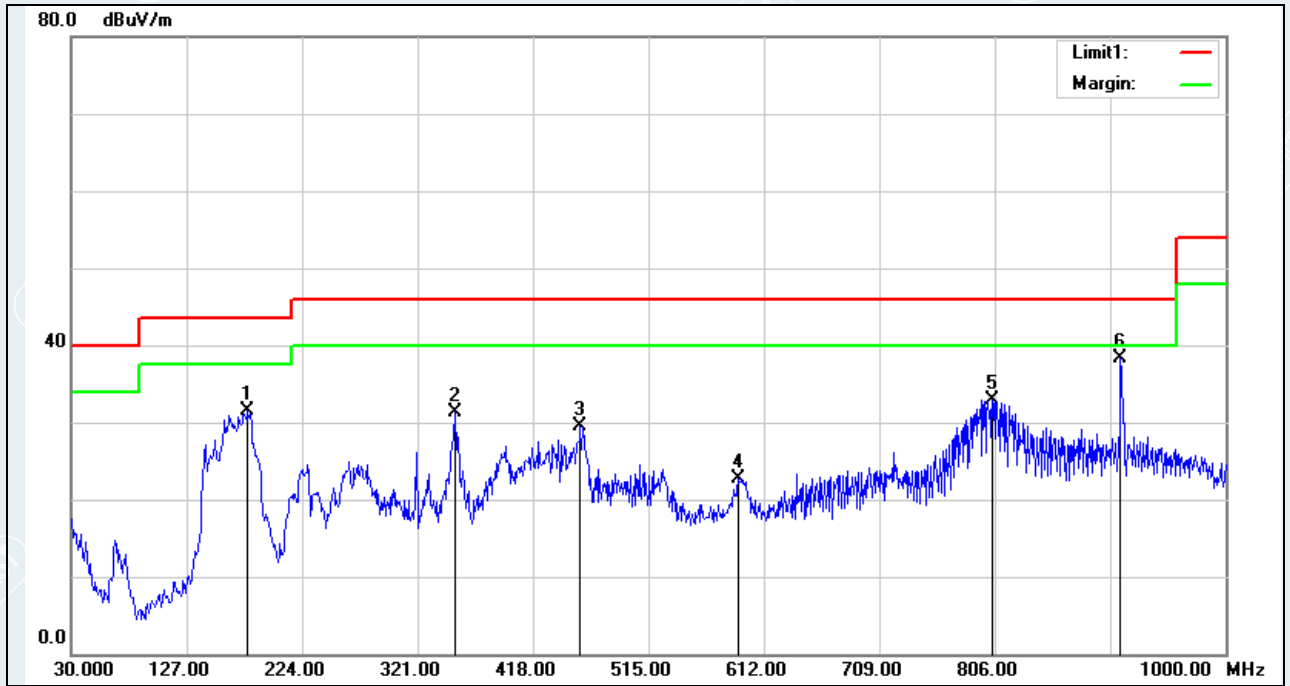
Vertical



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg)	Remark
1*	30.0000	50.27	-16.96	33.31	40.00	-6.69	100	14	QP
2	94.0200	61.25	-30.16	31.09	43.50	-12.41	100	253	QP
3	188.1100	63.29	-27.68	35.61	43.50	-7.89	100	9	QP
4	531.4900	56.99	-18.30	38.69	46.00	-7.31	100	356	QP
5	660.5000	55.28	-17.17	38.11	46.00	-7.89	100	359	QP
6	793.3900	50.15	-15.64	34.51	46.00	-11.49	100	26	QP

Mode: TX/ IEEE 802.11a
 channel (5785MHz)
 Polarity

Date: 2021-02-26
 Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	178.4100	59.36	-27.93	31.43	43.50	-12.07	100	54	QP
2	353.0100	53.70	-22.47	31.23	46.00	-14.77	100	286	QP
3	457.7700	49.35	-19.94	29.41	46.00	-16.59	100	153	QP
4	590.6600	40.52	-17.74	22.78	46.00	-23.22	100	9	QP
5	804.0600	48.44	-15.45	32.99	46.00	-13.01	100	143	QP
6*	911.7300	53.05	-14.65	38.40	46.00	-7.60	100	340	QP

Above 1 GHz

Recorded the worst case results in this report

Mode: TX / IEEE 802.11a

channel (5785MHz)

Date: 2021-01-29

Suspected Data List									
NO.	Freq. [MHz]	Reading [dB μ V/m]	Level [dB μ V/m]	Factor [dB]	Limit [dB μ V/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1324.6325	77.69	53.71	-23.98	74.00	20.29	100	274	Horizontal
2	1589.2589	79.03	55.96	-23.07	74.00	18.04	100	274	Horizontal
3	2392.1392	70.07	49.44	-20.63	68.30	18.86	200	235	Horizontal
4	2986.7987	66.59	47.97	-18.62	68.30	20.33	100	267	Horizontal
5	3856.2856	63.23	49.13	-14.10	74.00	24.87	200	274	Horizontal
6	7713.2261	54.18	50.53	-3.65	74.00	23.47	200	338	Horizontal

PK Final Data List					
NO.	Freq. [MHz]	Factor [dB]	Height [cm]	Angle [°]	Polarity
1	1324.6325	-23.98	100	274	Horizontal
2	1589.2589	-23.07	100	274	Horizontal

AV Final Data List									
NO.	Freq. [MHz]	Factor [dB]	AV Reading [dB μ V/m]	AV Value [dB μ V/m]	AV Limit [dB μ V/m]	AV Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1324.6325	-23.98	51.36	27.38	54.00	26.62	100	274	Horizontal
2	1589.2589	-23.07	46.83	23.76	54.00	30.24	100	274	Horizontal

Suspected Data List									
NO.	Freq. [MHz]	Reading [dB μ V/m]	Level [dB μ V/m]	Factor [dB]	Limit [dB μ V/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1319.8320	78.14	54.15	-23.99	74.00	19.85	200	274	Vertical
2	1584.4584	78.51	55.45	-23.06	74.00	18.55	200	274	Vertical
3	2387.9388	70.67	50.00	-20.67	74.00	24.00	100	236	Vertical
4	2989.7990	67.92	49.32	-18.60	68.30	18.98	200	237	Vertical
5	3856.8857	63.15	49.05	-14.10	74.00	24.95	200	274	Vertical
6	7713.2261	54.32	50.67	-3.65	74.00	23.33	100	338	Vertical

Mode: TX / IEEE 802.11n HT20
channel (5785MHz)

Date: 2021-01-29

Suspected Data List									
NO.	Freq. [MHz]	Reading [dB μ V/m]	Level [dB μ V/m]	Factor [dB]	Limit [dB μ V/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1583.2583	80.50	57.44	-23.06	74.00	16.56	200	86	Horizontal
2	2383.7384	67.85	47.14	-20.71	74.00	26.86	200	86	Horizontal
3	3712.8713	65.08	49.47	-15.61	74.00	24.53	200	278	Horizontal
4	5789.0789	57.20	47.27	-9.93	68.30	21.03	200	301	Horizontal
5	7713.2261	57.57	53.92	-3.65	74.00	20.08	100	274	Horizontal
6	17715.8097	41.84	53.61	11.77	74.00	20.39	100	118	Horizontal

PK Final Data List					
NO.	Freq. [MHz]	Factor [dB]	Height [cm]	Angle [°]	Polarity
1	1583.2583	-23.06	200	86	Horizontal
2	7713.3032	-3.65	149	4	Horizontal

AV Final Data List									
NO.	Freq. [MHz]	Factor [dB]	AV Reading [dB μ V/m]	AV Value [dB μ V/m]	AV Limit [dB μ V/m]	AV Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1583.2583	-23.06	47.54	24.48	54.00	29.52	200	86	Horizontal
2	7713.3032	-3.65	55.21	51.56	54.00	2.44	149	4	Horizontal

Suspected Data List									
NO.	Freq. [MHz]	Reading [dB μ V/m]	Level [dB μ V/m]	Factor [dB]	Limit [dB μ V/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1324.6325	79.45	55.47	-23.98	74.00	18.53	100	345	Vertical
2	1586.2586	79.93	56.86	-23.07	74.00	17.14	100	86	Vertical
3	2392.1392	68.94	48.31	-20.63	68.30	19.99	200	301	Vertical
4	3700.8701	66.61	50.94	-15.67	74.00	23.06	200	86	Vertical
5	7713.2261	56.17	52.52	-3.65	74.00	21.48	100	274	Vertical
6	17719.4766	41.79	53.48	11.69	74.00	20.52	100	85	Vertical

PK Final Data List					
NO.	Freq. [MHz]	Factor [dB]	Height [cm]	Angle [°]	Polarity
1	1324.6325	-23.98	100	345	Vertical
2	1586.2586	-23.07	100	86	Vertical
3	7713.3032	-3.65	200	33	Vertical

AV Final Data List

NO.	Freq. [MHz]	Factor [dB]	AV Reading [dB μ V/m]	AV Value [dB μ V/m]	AV Limit [dB μ V/m]	AV Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1324.6325	-23.98	53.21	29.23	54.00	24.77	100	345	Vertical
2	1586.2586	-23.07	46.87	23.80	54.00	30.20	100	86	Vertical
3	7713.3032	-3.65	54.62	50.97	54.00	3.03	200	33	Vertical

Mode: TX / IEEE 802.11ac VHT20
channel (5785MHz)

Date: 2021-01-29

Suspected Data List									
NO.	Freq. [MHz]	Reading [dB μ V/m]	Level [dB μ V/m]	Factor [dB]	Limit [dB μ V/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1329.4329	76.99	53.03	-23.96	74.00	20.97	200	86	Horizontal
2	1582.6583	80.88	57.82	-23.06	74.00	16.18	200	86	Horizontal
3	2392.7393	68.78	48.16	-20.62	68.30	20.14	100	243	Horizontal
4	3697.8698	64.92	49.22	-15.70	74.00	24.78	200	86	Horizontal
5	5780.6781	57.41	47.55	-9.86	68.30	20.75	200	301	Horizontal
6	7713.2261	56.76	53.11	-3.65	74.00	20.89	100	274	Horizontal

PK Final Data List					
NO.	Freq. [MHz]	Factor [dB]	Height [cm]	Angle [°]	Polarity
1	1329.4329	-23.96	200	86	Horizontal
2	1586.2984	-23.06	150	15	Horizontal
3	7713.3804	-3.65	148	4	Horizontal

AV Final Data List									
NO.	Freq. [MHz]	Factor [dB]	AV Reading [dB μ V/m]	AV Value [dB μ V/m]	AV Limit [dB μ V/m]	AV Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1329.4329	-23.96	52.31	28.35	54.00	25.65	200	86	Horizontal
2	1586.2984	-23.06	47.09	24.03	54.00	29.97	150	15	Horizontal
3	7713.3804	-3.65	55.18	51.53	54.00	2.47	148	4	Horizontal

Suspected Data List									
NO.	Freq. [MHz]	Reading [dB μ V/m]	Level [dB μ V/m]	Factor [dB]	Limit [dB μ V/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1322.8323	81.08	57.10	-23.98	74.00	16.90	100	346	Vertical
2	1584.4584	79.95	56.89	-23.06	74.00	17.11	100	86	Vertical
3	2396.9397	67.70	47.12	-20.58	68.30	21.18	200	307	Vertical
4	3450.6451	67.86	50.40	-17.46	68.30	17.90	200	86	Vertical
5	5781.2781	56.61	46.74	-9.87	68.30	21.56	100	346	Vertical
6	7713.2261	56.31	52.66	-3.65	74.00	21.34	200	31	Vertical

PK Final Data List					
NO.	Freq. [MHz]	Factor [dB]	Height [cm]	Angle [°]	Polarity
1	7713.3032	-3.65	150	67	Vertical
2	1320.0544	-23.98	188	353	Vertical

AV Final Data List

NO.	Freq. [MHz]	Factor [dB]	AV Reading [dB μ V/m]	AV Value [dB μ V/m]	AV Limit [dB μ V/m]	AV Margin [dB]	Height [cm]	Angle [°]	Polarity
1	7713.3032	-3.65	51.13	47.48	54.00	6.52	150	67	Vertical
2	1320.0544	-23.98	47.24	23.26	54.00	30.74	188	353	Vertical

Above 18 GHz

Recorded the worst case results in this report

Mode: TX / IEEE 802.11a

channel (5785MHz)

Date: 2021-01-30

Suspected Data List									
NO.	Freq. [MHz]	Reading [dB μ V/m]	Level [dB μ V/m]	Factor [dB]	Limit [dB μ V/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	19171.5000	61.37	50.29	-11.08	83.50	33.21	100	305	Horizontal
2	23140.3000	61.69	52.82	-8.87	83.50	30.68	100	15	Horizontal
3	26437.0000	55.57	48.08	-7.49	83.50	35.42	100	359	Horizontal
4	30002.1000	58.46	50.27	-8.19	83.50	33.23	100	64	Horizontal
5	34550.6000	60.18	51.11	-9.07	83.50	32.39	100	215	Horizontal
6	39788.8000	56.39	55.21	-1.18	83.50	28.29	100	292	Horizontal

Suspected Data List									
NO.	Freq. [MHz]	Reading [dB μ V/m]	Level [dB μ V/m]	Factor [dB]	Limit [dB μ V/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	19172.6000	64.65	53.57	-11.08	83.50	29.93	100	355	Vertical
2	23140.3000	62.31	53.44	-8.87	83.50	30.06	100	43	Vertical
3	26679.0000	55.86	48.23	-7.63	83.50	35.27	100	31	Vertical
4	30108.8000	58.30	49.95	-8.35	83.50	33.55	100	321	Vertical
5	34549.5000	60.30	51.23	-9.07	83.50	32.27	100	43	Vertical
6	39565.5000	55.98	54.55	-1.43	83.50	28.95	100	209	Vertical

Mode: TX / IEEE 802.11n HT20

channel (5785MHz)

Date: 2021-01-30

Suspected Data List									
NO.	Freq. [MHz]	Reading [dB μ V/m]	Level [dB μ V/m]	Factor [dB]	Limit [dB μ V/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	19171.5000	61.09	50.01	-11.08	83.50	33.49	100	18	Horizontal
2	23140.3000	62.13	53.26	-8.87	83.50	30.24	100	18	Horizontal
3	26654.8000	55.05	47.43	-7.62	83.50	36.07	100	231	Horizontal
4	29950.4000	58.76	50.62	-8.14	83.50	32.88	100	333	Horizontal
5	31214.3000	59.03	50.64	-8.39	83.50	32.86	100	132	Horizontal
6	39648.0000	56.71	55.39	-1.32	83.50	28.11	100	270	Horizontal

Suspected Data List									
NO.	Freq. [MHz]	Reading [dB μ V/m]	Level [dB μ V/m]	Factor [dB]	Limit [dB μ V/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	19172.6000	64.82	53.74	-11.08	83.50	29.76	100	342	Vertical
2	23140.3000	63.55	54.68	-8.87	83.50	28.82	100	330	Vertical
3	26660.3000	55.47	47.85	-7.62	83.50	35.65	100	154	Vertical
4	30568.6000	58.79	50.14	-8.65	83.50	33.36	100	278	Vertical
5	33396.7000	60.13	50.76	-9.37	83.50	32.74	100	178	Vertical
6	40000.0000	55.17	54.20	-0.97	83.50	29.30	100	166	Vertical

Mode: TX / IEEE 802.11ac VHT20
channel (5785MHz)

Date: 2021-01-30

Suspected Data List									
NO.	Freq. [MHz]	Reading [dB μ V/m]	Level [dB μ V/m]	Factor [dB]	Limit [dB μ V/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	19170.4000	61.85	50.77	-11.08	83.50	32.73	100	25	Horizontal
2	23140.3000	61.37	52.50	-8.87	83.50	31.00	100	4	Horizontal
3	26406.2000	55.57	48.10	-7.47	83.50	35.40	100	151	Horizontal
4	30166.0000	58.81	50.37	-8.44	83.50	33.13	100	88	Horizontal
5	32866.5000	60.39	51.20	-9.19	83.50	32.30	100	291	Horizontal
6	39494.0000	56.55	54.99	-1.56	83.50	28.51	100	278	Horizontal

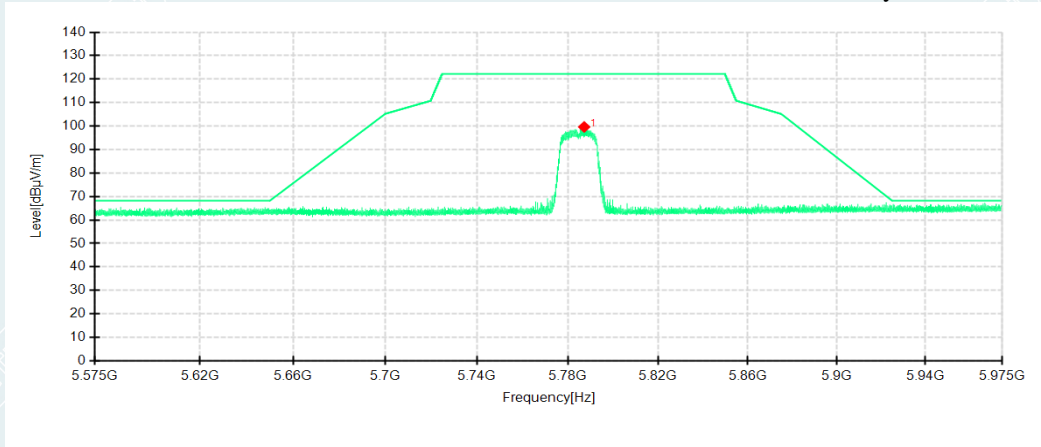
Suspected Data List									
NO.	Freq. [MHz]	Reading [dB μ V/m]	Level [dB μ V/m]	Factor [dB]	Limit [dB μ V/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	19171.5000	65.45	54.37	-11.08	83.50	29.13	100	353	Vertical
2	23140.3000	61.30	52.43	-8.87	83.50	31.07	100	343	Vertical
3	26670.2000	55.82	48.19	-7.63	83.50	35.31	100	281	Vertical
4	30124.2000	58.79	50.41	-8.38	83.50	33.09	100	118	Vertical
5	32825.8000	60.51	51.35	-9.16	83.50	32.15	100	353	Vertical
6	39618.3000	56.29	54.94	-1.35	83.50	28.56	100	256	Vertical

Conducted undesirable emission

802.11a mode/5785MHz

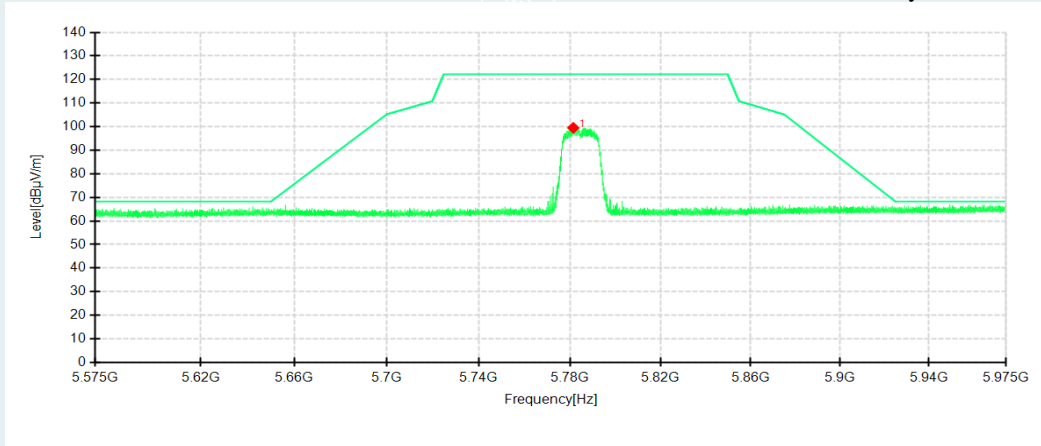
Detector mode: Peak

Polarity: Horizontal



Detector mode: Peak

Polarity: Vertical

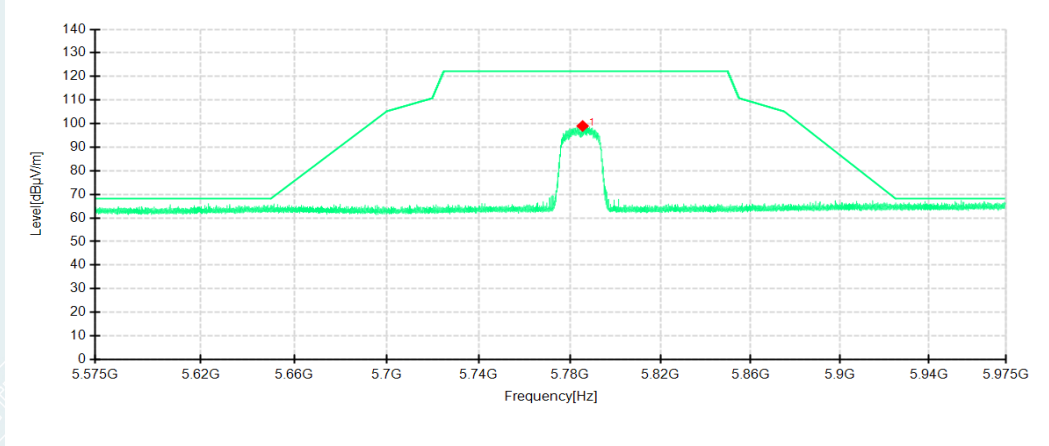


No.	Frequency MHz	Reading dB μ V/m	Level dB μ V/m	Factor dB	Limit dBuV/m	Margin dB	Height cm	Angle °	Pole
1	5787.2800	83.65	99.64	15.99	122.20	22.56	150	294	Horizontal
1	5781.5200	83.47	99.49	16.02	122.20	22.71	150	312	Vertical

802.11n HT20 mode/5785MHz

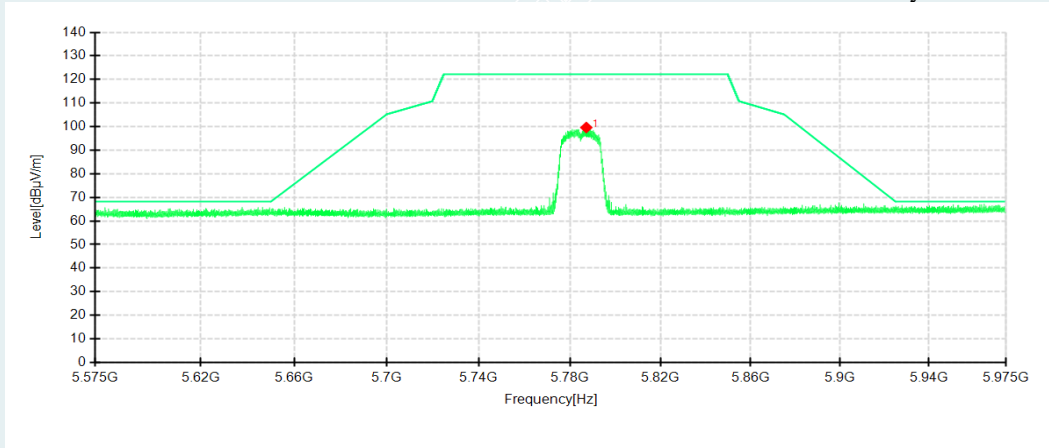
Detector mode: Peak

Polarity: Horizontal



Detector mode: Peak

Polarity: Vertical

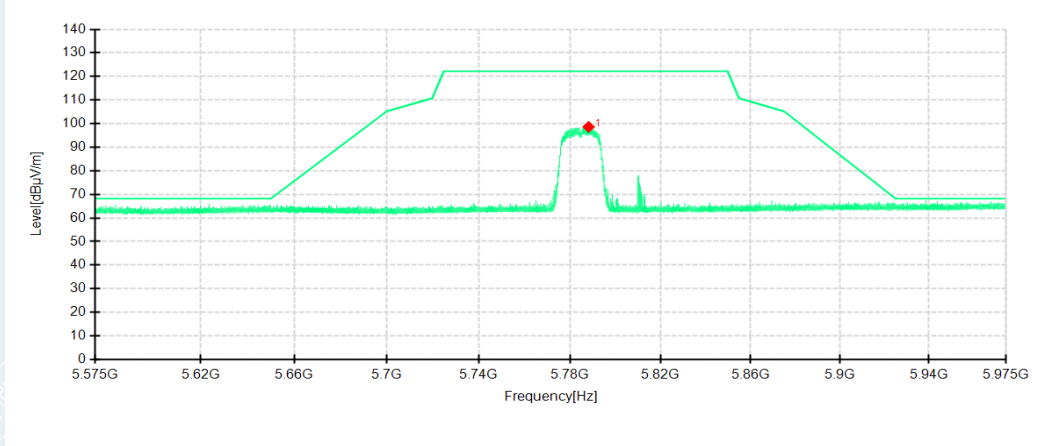


No.	Frequency MHz	Reading dBµV/m	Level dBµV/m	Factor dB	Limit dBµV/m	Margin dB	Height cm	Angle °	Pole
1	5785.6200	82.99	98.99	16.00	122.20	23.21	150	58	Horizontal
1	5787.2400	83.64	99.63	15.99	122.20	22.57	150	321	Vertical

802.11ac VHT20 mode/5785MHz

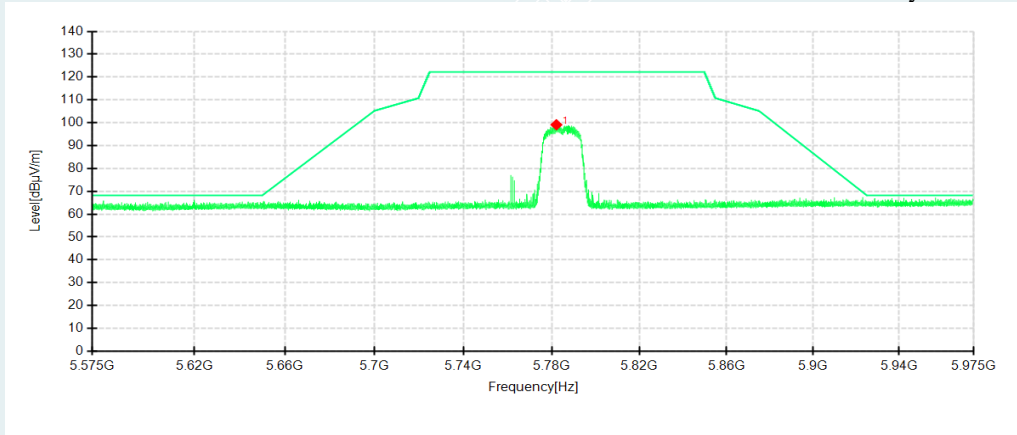
Detector mode: Peak

Polarity: Horizontal



Detector mode: Peak

Polarity: Vertical



No.	Frequency MHz	Reading dBµV/m	Level dBµV/ m	Factor dB	Limit dBµV/m	Margin dB	Height cm	Angle °	Pole
1	5788.2800	82.63	98.62	15.99	122.20	23.58	150	49	Horizontal
1	5782.1800	83.11	99.12	16.01	122.20	23.08	150	321	Vertical

Remark: Max field strength in 3m distance. No any other emission which falls in restricted bands can be detected and be reported.

6. 6DB BANDWIDTH & 26DB BANDWIDTH & 99% OCCUPIED BANDWIDTH

6.1 LIMITS

Band	Frequency (MHz)	Test Item	Limit
U-NII-3	5725-5850	6dB Bandwidth & 99% Occupied Bandwidth	6dB Bandwidth \geq 500KHz

6.2 TEST PROCEDURES

For 6dB Bandwidth Measurement :

- Connect EUT antenna terminal to the spectrum analyzer with RF cable.
- Spectrum analyzer setting parameters in accordance with table 2.
- Set the EUT transmit continuously with maximum output power.
- Allow trace to stabilize, 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.
- Repeat above procedures until all modes and channels were measured.
- Record the results in the test report.

Table 1:

6dB Bandwidth	
Spectrum Parameters	Setting
RBW	100KHz
VBW	300KHz
Span	40MHz(20MHz Bandwidth mode) 60MHz(40MHz Bandwidth mode) 120MHz(80MHz Bandwidth mode)
Sweep Time	Auto
Detector	Peak
Trace Mode	Max Hold

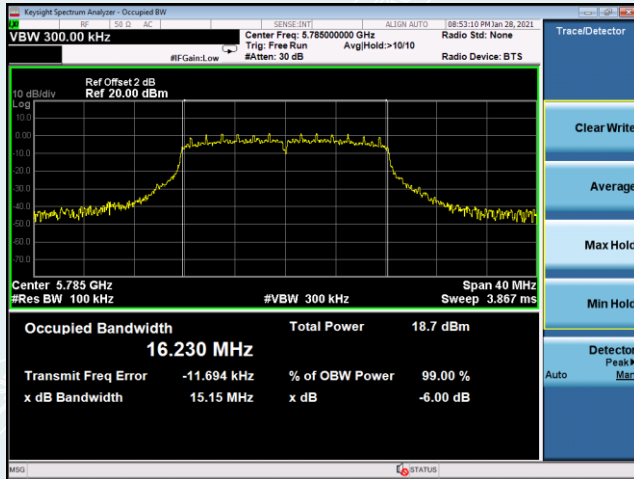
6.3 TEST SETUP



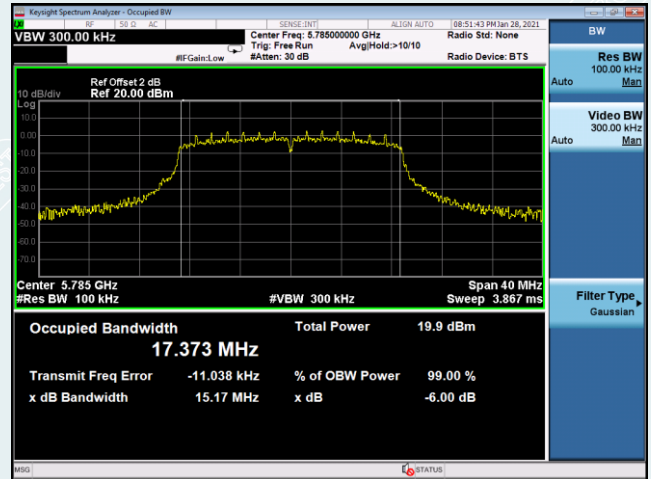
6.4 TEST RESULTS

Test Mode	Band	Test Frequency (MHz)	6dB Bandwidth (MHz)	Limit (kHz)	Result
802.11a	U-NII-3	5785	15.15	>500	PASS
802.11n HT20	U-NII-3	5785	15.17	>500	PASS
802.11ac VHT20	U-NII-3	5785	15.15	>500	PASS

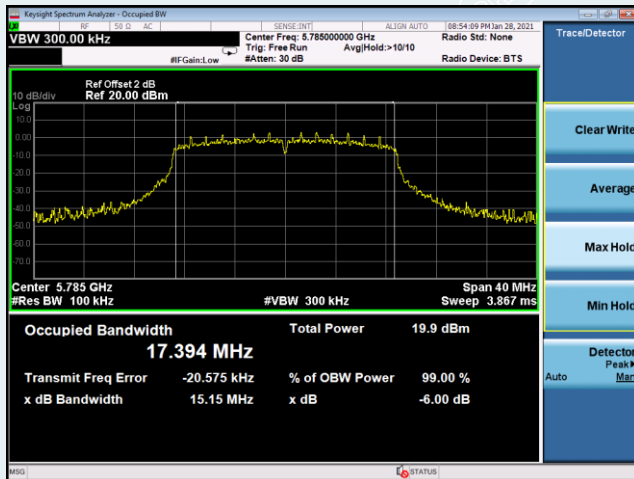
802.11a mode
Channel 5785MHz



802.11n HT20 mode
Channel 5785MHz



802.11ac VHT20 mode
Channel 5785MHz



7. OUTPUT POWER

7.1. LIMITS

The FCC 15.407(a), The maximum conducted output power should not exceed:

Band	EUT Type	Limit
U-NII-3	All Device	1W(30dBm)

7.2. TEST PROCEDURES

- 1) The RF output of EUT was connected to the broadband average RF power meter by RF cable and attenuator. The path loss was compensated to the results for each measurement.
- 2) Set to the maximum power setting and enable the EUT transmit continuously.
- 3) Measure the conducted output power and record the results in the test report.

7.3. TEST SETUP



7.4. TEST RESULTS

Duty Cycle Calculation					
duty cycle<98%	Mode	ON Time	Total Time	Duty Cycle	Duty Factor
	802.11a	2.060	2.190	94.064%	0.27
	802.11n HT20	1.920	2.040	94.118%	0.26
	802.11ac VHT20	1.930	2.110	91.469%	0.39

Test Mode	Band	Frequency (MHz)	AVG Conducted Output Power (dBm)	Duty Factor	Total AVG Conducted Output Power with Duty Factor (dBm)	Limit (dBm)	Result
802.11a	U-NII-3	5785	17.55	0.27	17.82	30	Pass
802.11n HT20	U-NII-3	5785	18.56	0.26	18.82	30	Pass
IEEE 802.11ac VHT20	U-NII-3	5785	18.60	0.39	18.99	30	Pass

8. POWER SPECTRAL DENSITY

8.1. LIMITS

FCC 15.407(a)

The maximum power spectral density should not exceed:

Band	EUT Type	Limit
U-NII-3	All Device	30dBm/500KHz

If transmitting antennas of directional gain greater than 6dBi are used, both the peak transmits power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

8.2. TEST PROCEDURES

Spectrum Parameters	Setting
RBW	1MHz(For U-NII-1&U-NII-2A&U-NII-2C) 500KHz(For U-NII-3)
VBW	3MHz(For U-NII-1&U-NII-2A&U-NII-2C) 2MHz(For U-NII-3)
Span	encompass the entire 26 dB EBW or 99% OBW of the signal
Sweep Time	Auto
Number of Sweep Point	$\geq 2 \times \text{SPAN/RBW}$
Detector	RMS(power averaging)
Trace Average	≥ 100 traces

8.3. TEST SETUP



8.4. TEST RESULTS

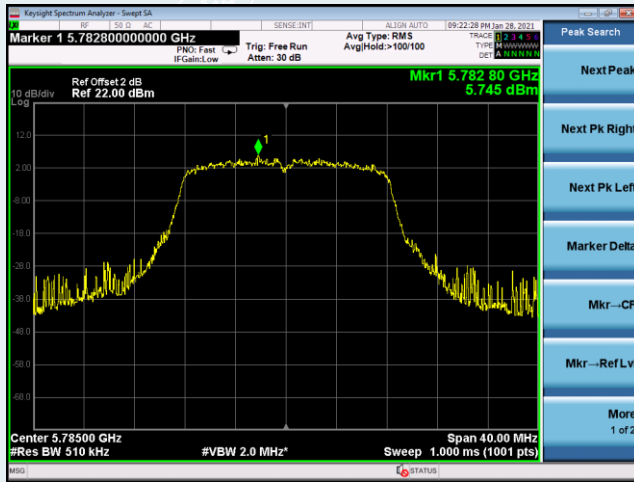
Duty Cycle Calculation					
duty cycle<98%	Mode	ON Time	Total Time	Duty Cycle	Duty Factor
	802.11a	2.060	2.190	94.064%	0.27
	802.11n HT20	1.920	2.040	94.118%	0.26
	802.11ac VHT20	1.930	2.110	91.469%	0.39

Power Spectral Density

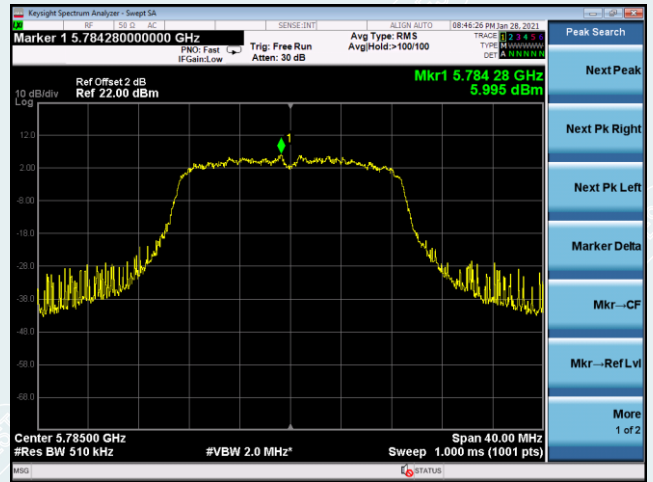
Test Mode	Band	Frequency (MHz)	PSD (dBm)	Duty Factor	Total PSD with Duty Factor (dBm)	Limit	Result
802.11a	U-NII-3	5785	5.745	0.27	6.015	30dBm /500kHz	Pass
802.11n HT20	U-NII-3	5785	5.995	0.26	6.255		Pass
802.11ac VHT20	U-NII-3	5785	5.886	0.39	6.276		Pass

Test Results (plots) of PSD

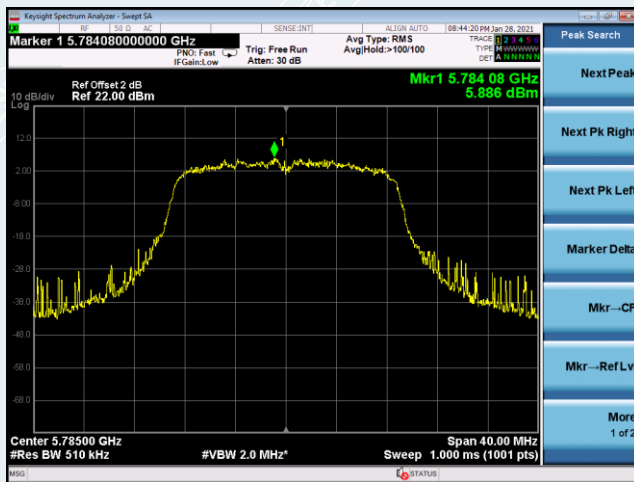
802.11a mode
Channel 5785MHz



802.11n HT20 mode
Channel 5785MHz



802.11ac VHT20 mode
Channel 5785MHz



9. FREQUENCY STABILITY

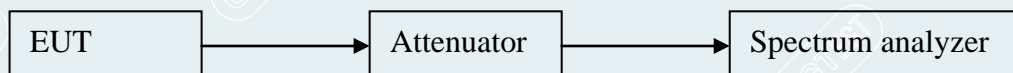
9.1 LIMITS

According to §15.407(g), manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the users manual.

9.2 TEST PROCEDURES

The equipment under test was connected to an external AC or DC power supply and input rated voltage. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators. The EUT was placed inside the temperature chamber. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 20°C operating frequency as reference frequency. Turn EUT off and set the chamber temperature to -20°C. After the temperature stabilized for approximately 30 minutes recorded the frequency. Repeat step measure with 10°C increased per stage until the highest temperature of +50°C reached.

9.3 TEST SETUP



9.4 TEST RESULTS

Voltage	Measurement Frequency (MHz)
(V)	5785.0000
132	5785.0088
120	5785.0080
108	5785.0072
Max. Deviation (MHz)	0.0088
Max. Deviation (ppm)	1.5212

Voltage	Measurement Frequency (MHz)
(°C)	5785.0000
-5	5784.9942
5	5785.0002
15	5784.9990
25	5784.9994
35	5785.0046
45	5785.0058
50	5785.0050
Max. Deviation (MHz)	0.0058
Max. Deviation (ppm)	1.0026

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