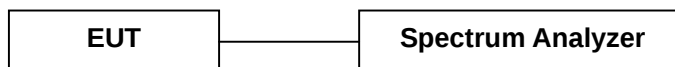


6. 26dB Bandwidth & 99% Occupied Bandwidth

6.1 Limits

No restriction limits.

6.2 Test SET-UP (Block Diagram of Configuration)



6.3 Test Procedure

The antenna port of the EUT was connected to the input of a spectrum analyzer. Analyzer was set as below according to FCC KDB789033(v01r03):

1. For 26dB bandwidth, Set the RBW = Approximately 1% of the emission bandwidth
 2. Set the VBW > RBW
 3. Detector = peak.
 4. Sweep time = auto couple.
 5. Trace mode = max hold.
 6. Allow trace to fully stabilize.
 7. 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 26 dB relative to the maximum level measured in the fundamental emission.
-
1. For 99% occupied bandwidth, Set the RBW = 1% to 5% of the OBW
 2. Set the VBW $\geq 3 \times$ RBW
 3. Detector = peak.
 4. Span = 1.5 times to 5.0 times the OBW
 5. Sweep time = auto couple.
 6. Trace mode = max hold. Allow trace to fully stabilize.
 7. Use the 99% power bandwidth function of the spectrum analyzer measure the occupied bandwidth.

6.4 Measurement Results

Pass

Please refer to following table and plots.

Band 1: 5180~5240MHz

Temperature :	23 °C	Humidity : 53 %	
Test By:	Lee	Test Date : April 12, 2019	
Test Result:	PASS		
Frequency MHz	Data Rate Mbps	26dB Bandwidth MHz	99% Occupied Bandwidth MHz
IEEE 802.11a Mode (OFDM)			
Low Channel: 5180	6	30.26	17.47
Middle Channel: 5200	6	28.49	17.17
High Channel: 5240	6	25.74	17.15
IEEE 802.11n(HT20) Mode (OFDM)			
Low Channel: 5180	MCS0	30.113	17.45
Middle Channel: 5200	MCS0	27.46	17.19
High Channel: 5240	MCS0	25.22	17.02
IEEE 802.11n(HT40) Mode (OFDM)			
Low Channel: 5190	MCS0	79.22	38.12
High Channel: 5230	MCS0	78.35	37.85
IEEE 802.11ac (VHT20) Mode (OFDM)			
Low Channel: 5180	MCS0	31.29	17.16
Middle Channel: 5200	MCS0	29.99	17.21
High Channel: 5240	MCS0	25.12	17.04
IEEE 802.11ac (VHT40) Mode (OFDM)			
Low Channel: 5190	MCS0	79.24	37.95
High Channel: 5230	MCS0	78.04	37.72

Note: Both of antennas have considered during pre-test, but only the worst case (ANT_0) was recorded.

Band 4: 5745~5825MHz

Temperature :	23 °C	Humidity : 53 %	
Test By:	Lee	Test Date : April 12, 2019	
Test Result:	PASS		
Frequency MHz	Data Rate Mbps	26dB Bandwidth MHz	99% Occupied Bandwidth MHz
IEEE 802.11a Mode (OFDM)			
Low Channel: 5745	6	30.53	16.92
Middle Channel: 5785	6	23.70	16.96
High Channel: 5825	6	22.40	16.87
IEEE 802.11n(HT20) Mode (OFDM)			
Low Channel: 5745	MCS0	25.38	16.94
Middle Channel: 5785	MCS0	24.03	16.99
High Channel: 5825	MCS0	22.42	16.86
IEEE 802.11n(HT40) Mode (OFDM)			
Low Channel: 5755	MCS0	59.98	37.22
High Channel: 5795	MCS0	60.03	37.25
IEEE 802.11ac (VHT20) Mode (OFDM)			
Low Channel: 5745	MCS0	24.70	16.97
Middle Channel: 5785	MCS0	30.41	16.97
High Channel: 5825	MCS0	22.31	16.88
IEEE 802.11ac (VHT40) Mode (OFDM)			
Low Channel: 5755	MCS0	62.02	37.21
High Channel: 5795	MCS0	56.00	37.28

Note: Both of antennas have considered during pre-test, but only the worst case (ANT_0) was recorded.

Band 5150-5250MHz IEEE 802.11a

Low Channel



Middle Channel



High Channel

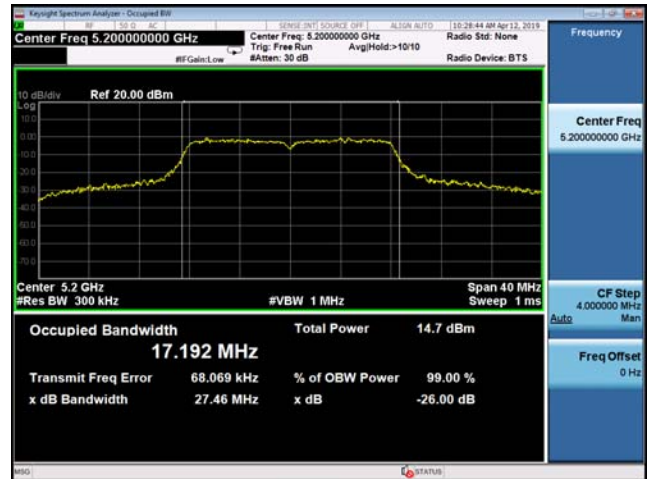


802.11n(HT20)

Low Channel



Middle Channel



High Channel



802.11ac(VHT20)

Low Channel



Middle Channel

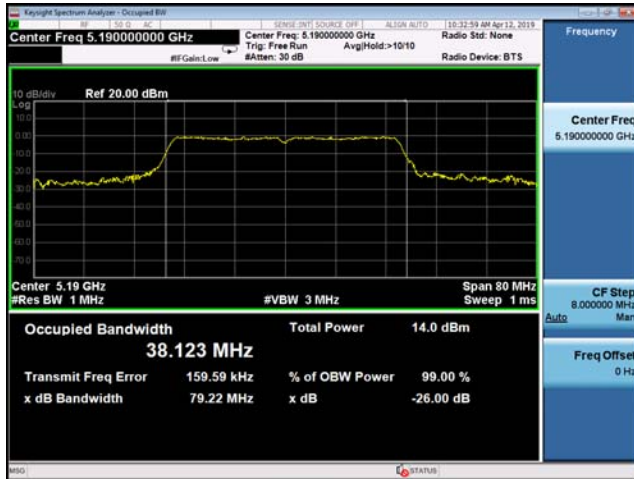


High Channel

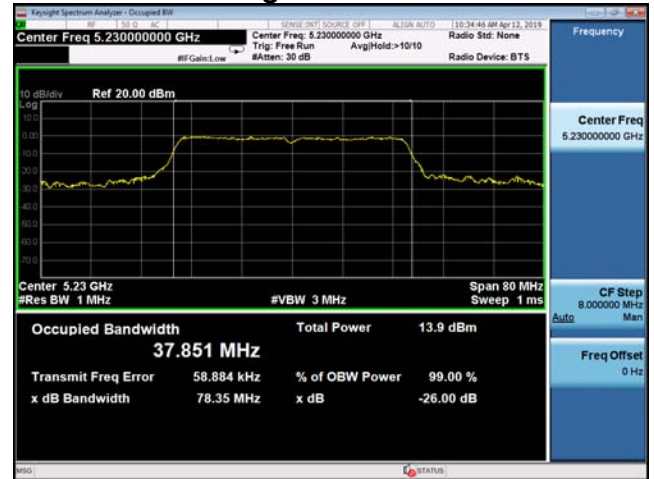


802.11n(HT40)

Low Channel

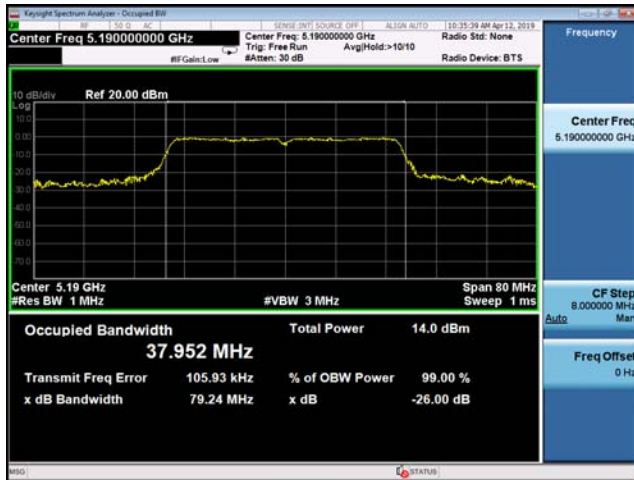


High Channel

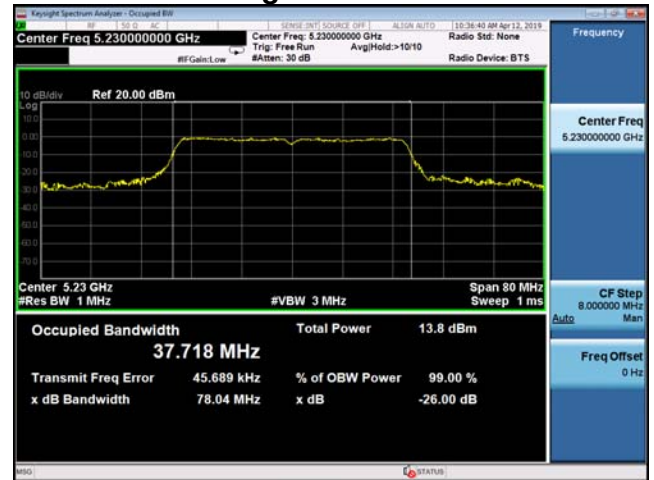


802.11ac(VHT40)

Low Channel

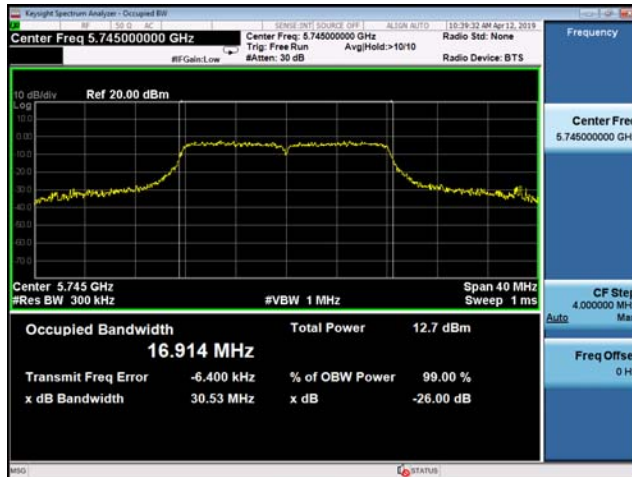


High Channel



Band 5725-5850MHz IEEE 802.11a

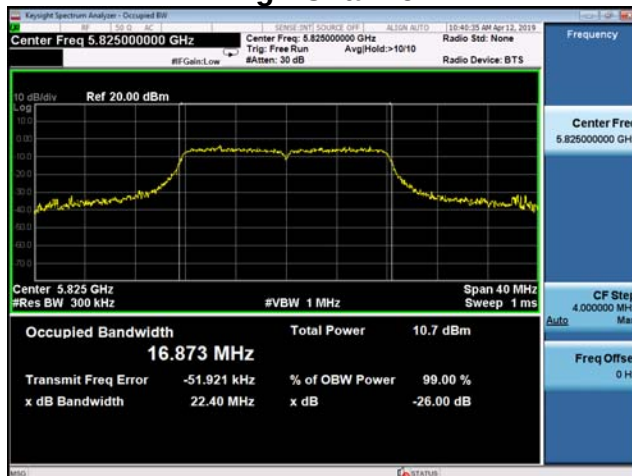
Low Channel



Middle Channel



High Channel



802.11n(HT20)

Low Channel



Middle Channel



High Channel



802.11ac(VHT20)

Low Channel



Middle Channel



High Channel



802.11n(HT40)

Low Channel



High Channel



802.11ac(VHT40)

Low Channel



High Channel

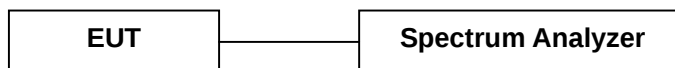


7. Power Spectral Density

7.1 Limits

Operation Band		Limit
■5180~5240MHz	□Outdoor access point	17 dBm/MHz
	□Indoor access point	17 dBm/MHz
	□Fixed point-to-point access points	17 dBm/MHz
	■Client devices	11 dBm/MHz
■5745~5825MHz		30 dBm/500kHz

7.2 Test SET-UP (Block Diagram of Configuration)

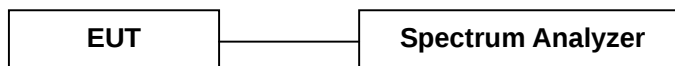


7.3 Test Procedure

The antenna port of the EUT was connected to the input of a spectrum analyzer. Analyzer was set as below according to FCC KDB789033 (v01r03):

1. Set analyzer center frequency to center frequency
2. Set the RBW to: 1MHz
3. Set the VBW to: 3MHz
4. Detector = RMS
5. Sweep time = auto couple
6. Trace Average = 100 times
7. If measured bandwidth of Maximum PSD is specified in 500kHz, add $10\log(500\text{kHz}/\text{RBW})$ to the measured result, whereas RBW (<500kHz) is the reduced resolution bandwidth of the spectrum analyzer set during measurement.

7.4 Test SET-UP (Block Diagram of Configuration)



7.5 Measurement Results

Pass

Please refer to following table and plots.

Band 1: 5180~5240MHz

Temperature :	21 °C	Humidity :	51 %
Test By:	Lee	Test Date :	February 26, 2019
Test Result:	PASS		
Frequency MHz	Data Rate Mbps	PSD dBm/MHz	Limit dBm/ MHz
IEEE 802.11a Mode (OFDM)			
Low Channel: 5180	6	8.463	11
Middle Channel: 5200	6	8.220	11
High Channel: 5240	6	7.467	11

Note: Both of antennas have been tested, but only the worst case (ANT_0) was recorded.

Frequency MHz	Data Rate Mbps	PSD dBm/MHz			Limit dBm/ MHz
IEEE 802.11n(HT20) Mode (OFDM)					
Low Channel: 5180	MCS0	ANT_0	ANT_1	Total	11
		8.240	6.228	10.361	
Middle Channel: 5200	MCS0	7.809	5.693	9.889	11
High Channel: 5240	MCS0	6.626	3.812	8.453	11
IEEE 802.11n(HT40) Mode (OFDM)					
Low Channel: 5190	MCS0	5.162	2.593	7.076	11
High Channel: 5230	MCS0	4.622	0.957	6.180	11
IEEE 802.11ac (VHT20) Mode (OFDM)					
Low Channel: 5180	MCS0	8.017	6.501	10.335	11
Middle Channel: 5200	MCS0	7.472	5.786	9.702	11
High Channel: 5240	MCS0	6.740	3.918	8.561	11
IEEE 802.11ac (VHT40) (OFDM)					
Low Channel: 5190	MCS0	5.767	2.687	7.505	11
High Channel: 5230	MCS0	3.850	1.217	5.740	11

Note: The EUT working on MIMO mode, and only the worst case was recorded.

Band 4: 5745~5825MHz

Temperature :	23 °C	Humidity :	53 %	
Test By:	Lee	Test Date :	February 26, 2019	
Test Result:	PASS			
Frequency MHz	Data Rate Mbps	PSD dBm/MHz	PSD dBm/ 500kHz	Limit dBm/ 500kHz
IEEE 802.11a Mode (OFDM)				
Low Channel: 5745	6	10.486	7.476	30
Middle Channel: 5785	6	10.496	7.486	30
High Channel: 5825	6	9.597	6.587	30

Note: 1. Both of antennas have considered during pre-test, but only the worst case (ANT_0) was recorded.
 2. $10\log(500\text{kHz}/\text{RBW})$ Factor = -3.01dB

Frequency MHz	Data Rate Mbps	PSD dBm/MHz			PSD dBm/ 500kHz	Limit dBm/ 500kHz
IEEE 802.11n(HT20) Mode (OFDM)						
Low Channel: 5745	MCS0	ANT_0	ANT_1	Total	8.468	30
		10.042	5.972	11.478		
Middle Channel: 5785	MCS0	9.556	6.742	11.383	8.373	30
High Channel: 5825	MCS0	10.341	7.286	12.087	9.077	30
IEEE 802.11n(HT40) Mode (OFDM)						
Low Channel: 5755	MCS0	6.462	3.103	8.109	5.099	30
High Channel: 5795	MCS0	6.749	3.393	8.395	5.385	30
IEEE 802.11ac (VHT20) Mode (OFDM)						
Low Channel: 5745	MCS0	10.019	6.033	11.477	8.467	30
Middle Channel: 5785	MCS0	9.882	6.742	11.600	8.590	30
High Channel: 5825	MCS0	10.091	6.679	11.720	8.710	30
IEEE 802.11ac (VHT40) (OFDM)						
Low Channel: 5755	MCS0	6.777	3.114	8.331	5.321	30
High Channel: 5795	MCS0	6.682	3.314	8.325	5.315	30

Note: 1. The EUT working on MIMO mode, and only the worst case was recorded.
2. $10\log(500\text{kHz}/\text{RBW})$ Factor = -3.01dB



Band 5180-5240MHz
IEEE 802.11a

Low Channel



Middle Channel



High Channel





802.11n(HT20)

Low Channel



Middle Channel



High Channel





802.11ac(VHT20)

Low Channel



Middle Channel



High Channel



802.11n(HT40)

Low Channel



High Channel



802.11ac(VHT40)

Low Channel



High Channel





Band 5745-5825MHz
IEEE 802.11a

Low Channel



Middle Channel



High Channel





802.11n(HT20)

Low Channel



Middle Channel



High Channel





802.11ac(VHT20)

Low Channel



Middle Channel



High Channel



8. Band Edge

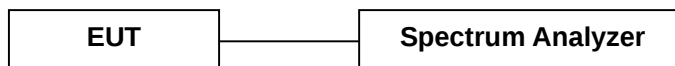
8.1 Limits

For transmitters operating in the 5.15-5.25GHz band: all emissions outside of the 5.15-5.35GHz band shall not exceed an EIRP of -27dBm

For transmitter operating in the 5.25-5.35GHz band: all emissions outside of the 5.15-5.35GHz band shall not exceed an EIRP of -27dBm/MHz. Devices operating in the 5.25-5.35GHz band generate emissions in the 5.15-5.25GHz band must meet all applicable technical requirements for operation in the 5.15-5.25 GHz band (including indoor use) or alternatively meet an out-of-band emission EIRP limit of -27dBm/MHz in the 5.15-5.25GHz band.

For transmitters operating in the 5.725-5.850GHz band: all emissions shall be limited to a level of -27dBm/MHz at 75MHz or more above or below the band edge increasing linearly to 10dBm/MHz at 25MHz above or below the band edge, and from 25MHz above or below the band edge increasing linearly to a level of 15.6dBm/MHz at 5MHz above or below the band edge, and from 5MHz above or below the band increasing linearly to a level of 27dBm/MHz at the band edge.

8.2 Test SET-UP (Block Diagram of Configuration)



8.3 Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibration or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set RBW to 1MHz and VBW to 3MHz of spectrum analyzer.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

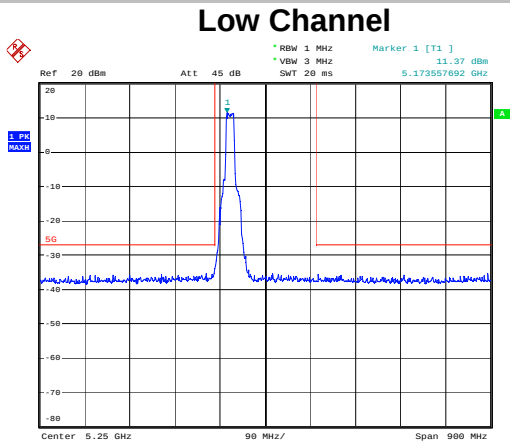
8.4 Measurement Results

Pass

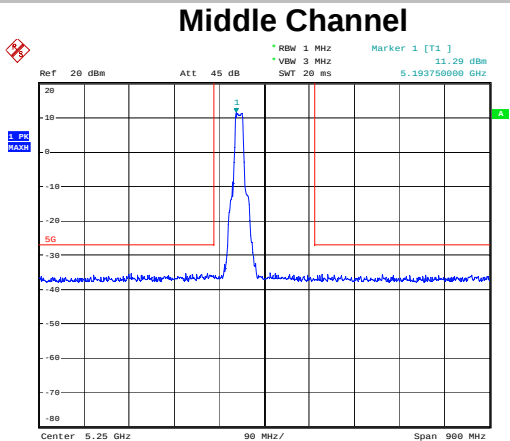
Please refer to following plots.



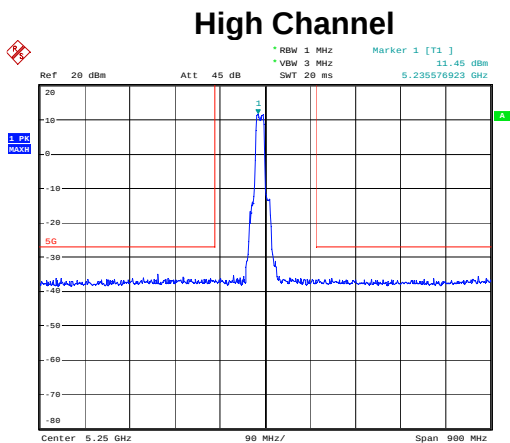
Band 5180-5240MHz
IEEE 802.11a



Date: 27.FEB.2019 09:08:36



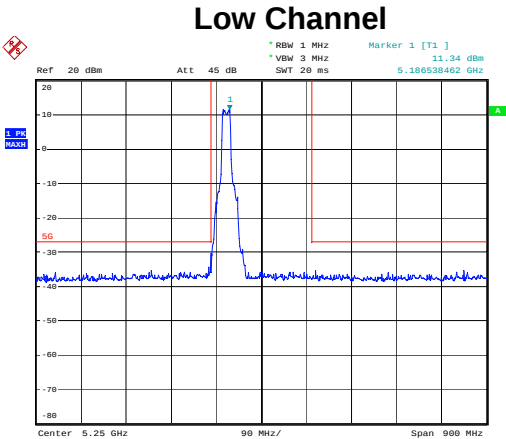
Date: 27.FEB.2019 09:09:50



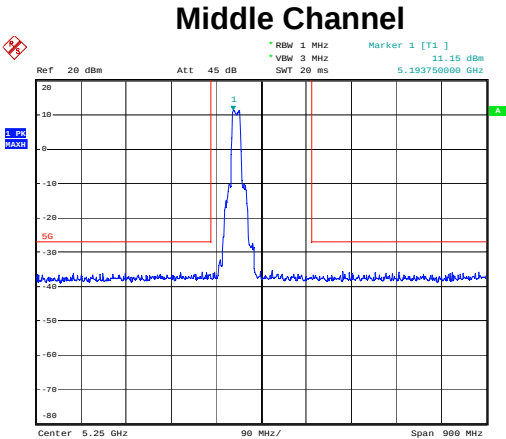
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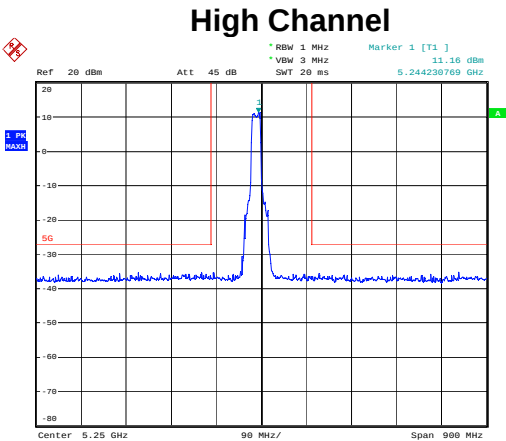
802.11n(HT20)



Date: 27.FEB.2019 09:12:58



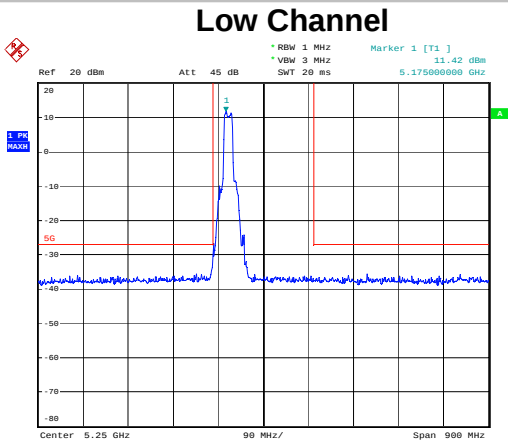
Date: 27.FEB.2019 09:14:50



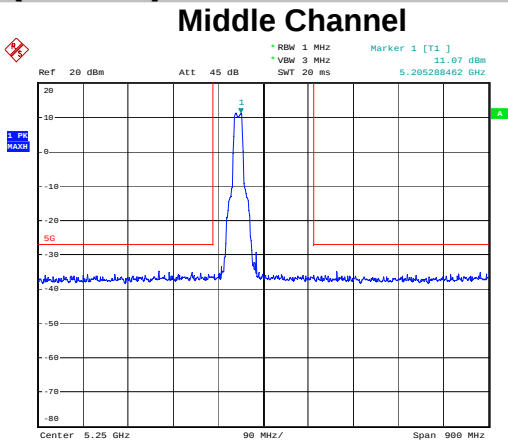
Date: 27.FEB.2019 09:18:35



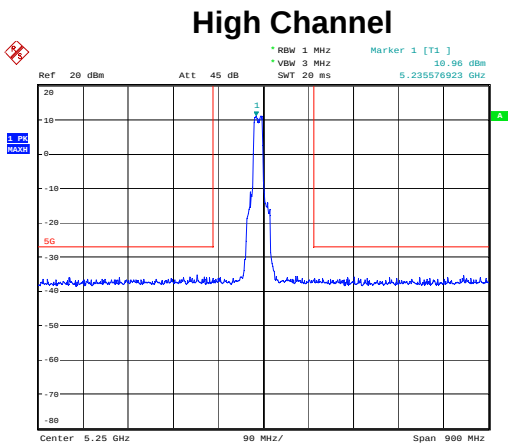
802.11ac(VHT20)



Date: 27.FEB.2019 09:19:17



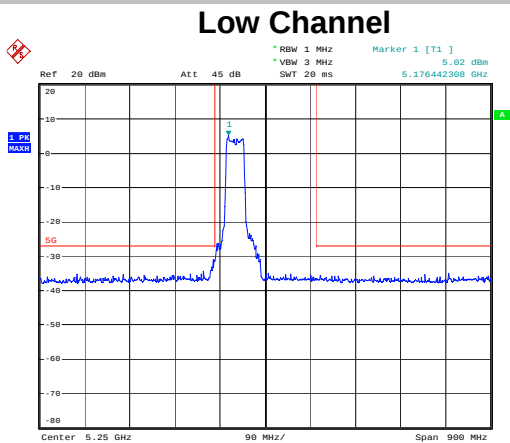
Date: 27.FEB.2019 09:20:06



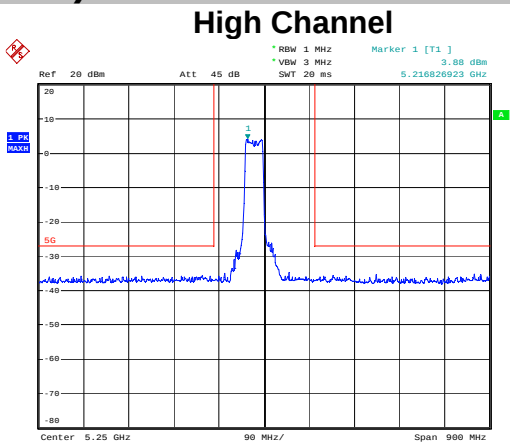
Date: 27.FEB.2019 09:20:47



802.11n(HT40)

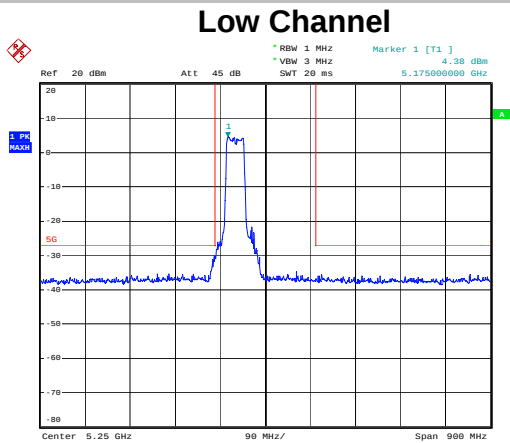


Date: 27.FEB.2019 09:23:06

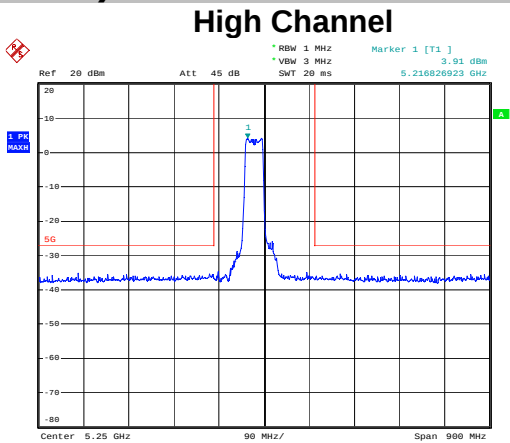


Date: 27.FEB.2019 09:25:06

802.11ac(VHT40)

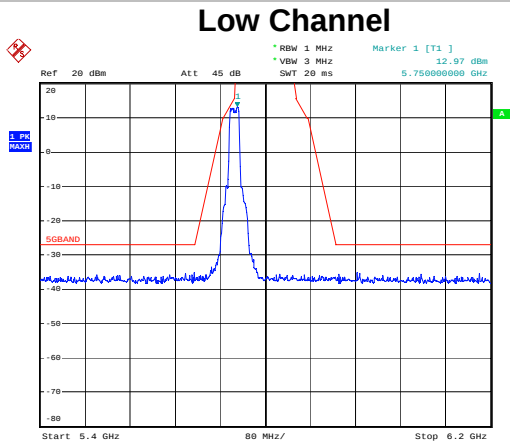


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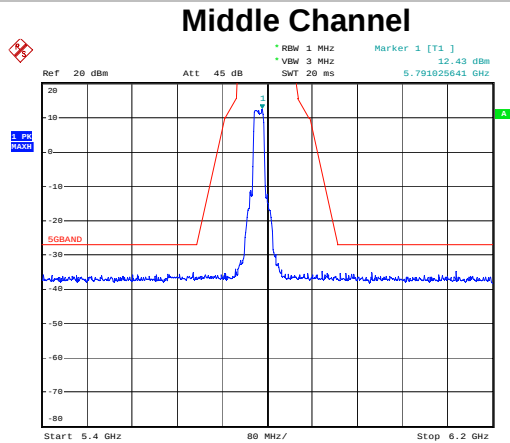


Date: 27.FEB.2019 09:28:53

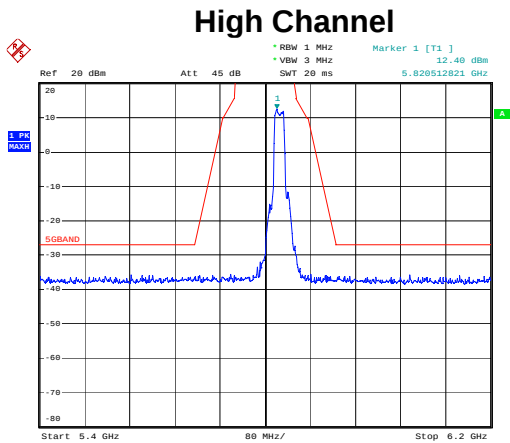
Band 5745-5825MHz
IEEE 802.11a



Date: 27.FEB.2019 09:34:49



Date: 27.FEB.2019 09:36:49

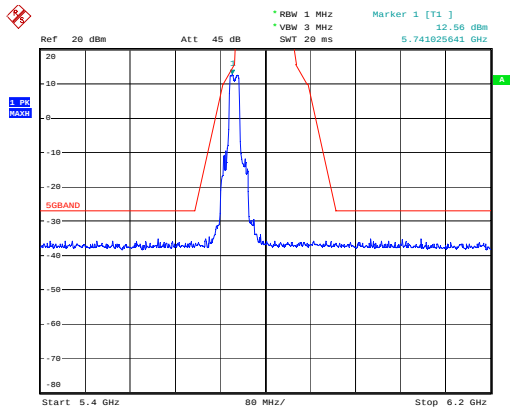


Date: 27.FEB.2019 09:38:32



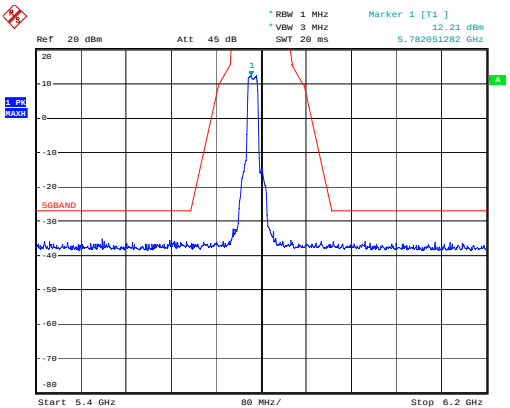
802.11n(HT20)

Low Channel



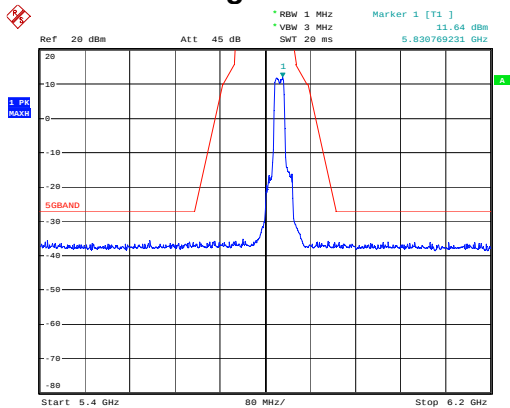
Date: 27.FEB.2019 09:39:43

Middle Channel



Date: 27.FEB.2019 09:40:19

High Channel

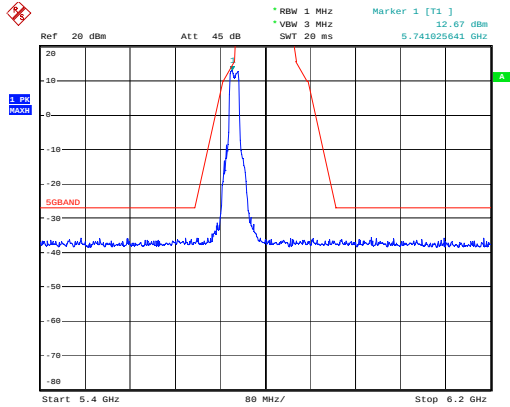


Date: 27.FEB.2019 09:41:53



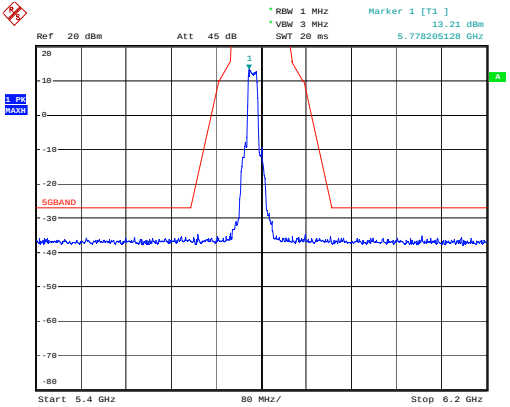
802.11ac(VHT20)

Low Channel



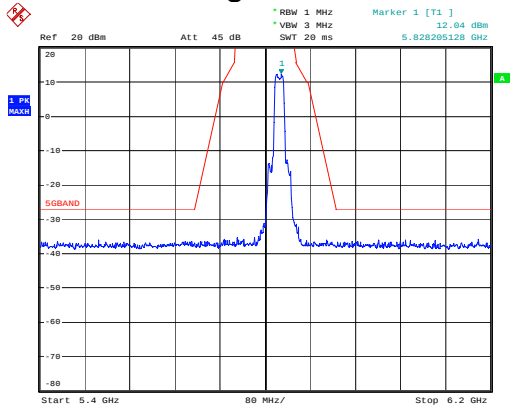
Date: 27.FEB.2019 09:43:05

Middle Channel



Date: 27.FEB.2019 09:44:50

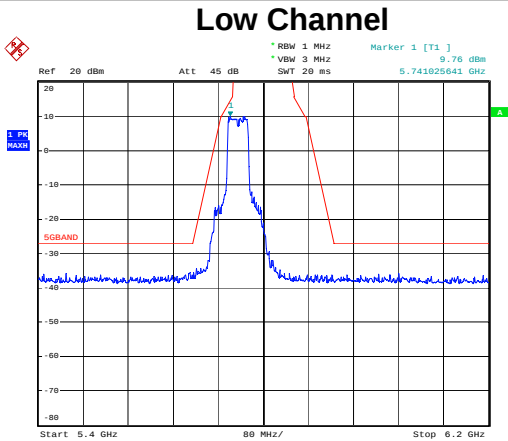
High Channel



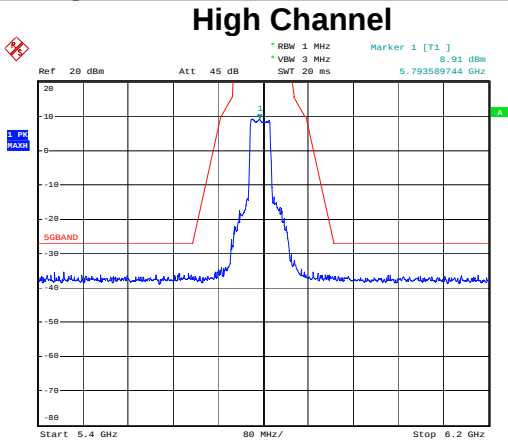
Date: 27.FEB.2019 09:45:35



802.11n(HT40)

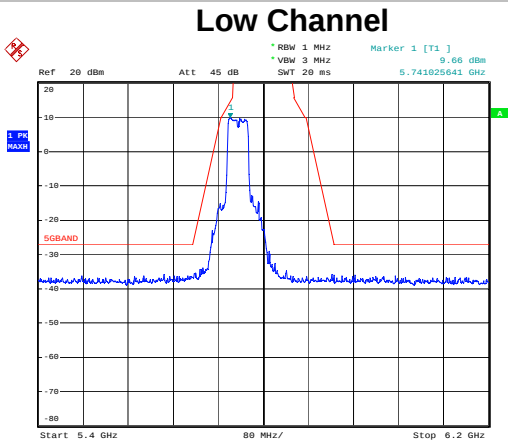


Date: 27.FEB.2019 09:46:19

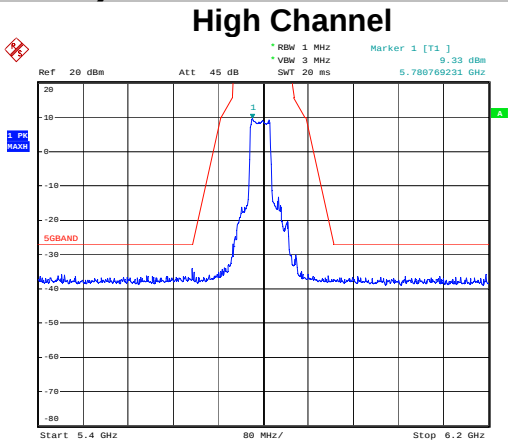


Date: 27.FEB.2019 09:48:11

802.11ac(VHT40)



Date: 27.FEB.2019 09:48:52



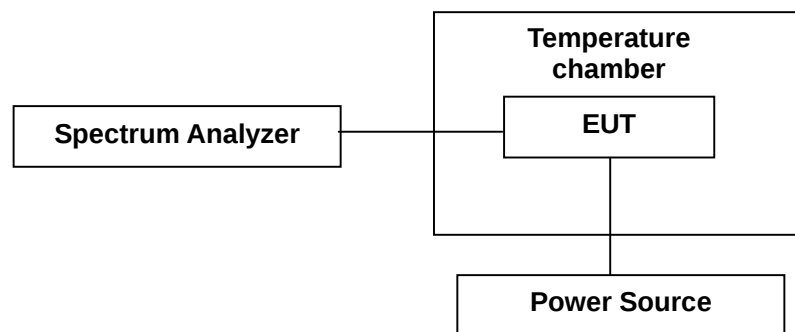
Date: 27.FEB.2019 09:49:21

9. Frequency Stability

9.1 Limits

Manufactures 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 SET-UP (Block Diagram of Configuration)



9.3 Test Procedure

1. The EUT was placed inside the environmental test chamber and powered by Power source.
2. Turn the EUT on and couple its output to a spectrum analyzer.
3. Turn the EUT off and set the chamber to the highest temperature specified.
4. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT on and measure the operating frequency after 2, 5, and 10 minutes.
5. Repeat step 2 and 3 with the temperature chamber set to the lowest temperature.
6. The chamber was allowed to stabilize at +20 degree C for a minimum of 30 minutes. The supply voltage was then adjusted on the EUT from 85% to 115% and the frequency record.

Note: The EUT set at un-modulation mode during frequency stability test.

9.4 Measurement Results

Pass

Please refer to following tables.

Temperature :	21 °C	Humidity :	51 %			
Test By:	Lee	Test Date :	February 26, 2019			
5180~5240MHz Band						
Lowest channel 5180MHz						
Temperature (°C)	Power Supplied (AC)	Measured Frequency (MHz)				Test Result
		0 Minute	2 Minute	5 Minute	10 Minute	
0	120.0	5180.0172	5180.0142	5180.0159	5180.0132	Pass
10		5180.0133	5180.0169	5180.0140	5180.0145	Pass
20		5180.0140	5180.0164	5180.0165	5180.0139	Pass
30		5180.0169	5180.0135	5180.0149	5180.0142	Pass
45		5180.0126	5180.0145	5180.0177	5180.0152	Pass
60		5180.0165	5180.0135	5180.0139	5180.0130	Pass
20	138.0	5180.0182	5180.0174	5180.0143	5180.0135	Pass
	102.0	5180.0125	5180.0186	5180.0169	5180.0145	Pass

Note: EUT temperature working range is 0 to 46.

Temperature :		21 °C		Humidity :		51 %	
Test By:		Lee		Test Date :		February 26, 2019	
5180~5240MHz Band							
Highest channel 5240MHz							
Temperature (°C)	Power Supplied (Vdc)	Measured Frequency (MHz)				Test Result	
		0 Minute	2 Minute	5 Minute	10 Minute		
0	120.0	5240.0121	5240.0227	5240.0170	5240.0135	Pass	
10		5240.0154	5240.0132	5240.0135	5240.0144	Pass	
20		5240.0137	5240.0149	5240.0151	5240.0136	Pass	
30		5240.0175	5240.0127	5240.0156	5240.0159	Pass	
45		5240.0139	5240.0135	5240.0135	5240.0141	Pass	
60		5240.0144	5240.0130	5240.0147	5240.0130	Pass	
20	138.0	5240.0133	5240.0135	5240.0137	5240.0164	Pass	
	102.0	5240.0135	5240.0129	5240.0112	5240.0155	Pass	

Note: EUT temperature working range is 0 to 60.

Temperature :		21 °C		Humidity :		51 %	
Test By:		Lee		Test Date :		February 26, 2019	
5745~5825MHz Band							
Lowest channel 5745MHz							
Temperature (°C)	Power Supplied (Vdc)	Measured Frequency (MHz)				Test Result	
		0 Minute	2 Minute	5 Minute	10 Minute		
0	120.0	5745.0144	5745.0132	5745.0164	5745.0134	Pass	
10		5745.0132	5745.0147	5745.0138	5745.0148	Pass	
20		5745.0129	5745.0148	5745.0174	5745.0159	Pass	
30		5745.0125	5745.0132	5745.0135	5745.0134	Pass	
45		5745.0141	5745.0125	5745.0153	5745.0181	Pass	
60		5745.0138	5745.0126	5745.0150	5745.0146	Pass	
20	138.0	5745.0158	5745.0128	5745.0142	5745.0146	Pass	
	102.0	5745.0139	5745.0166	5745.0170	5745.0145	Pass	

Note: EUT temperature working range is 0 to 60.

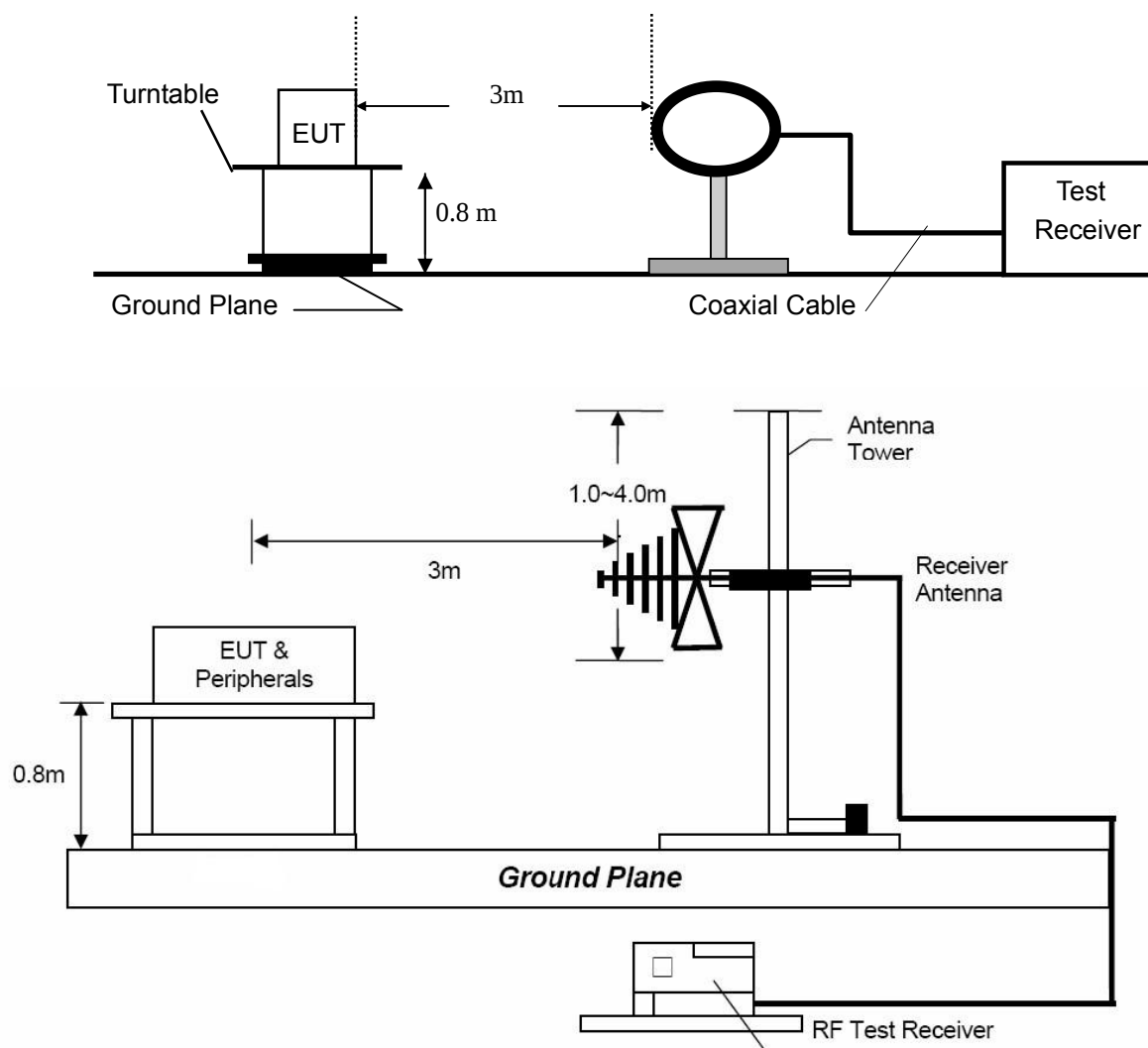
Temperature :	21 °C	Humidity :	51 %			
Test By:	Lee	Test Date :	February 26, 2019			
5745~5825MHz Band						
Highest channel 5825MHz						
Temperature (°C)	Power Supplied (Vdc)	Measured Frequency (MHz)				Test Result
		0 Minute	2 Minute	5 Minute	10 Minute	
0	120.0	5825.0139	5825.0141	5825.0139	5825.0175	Pass
10		5825.0155	5825.0165	5825.0177	5825.0123	Pass
20		5825.0133	5825.0160	5825.0134	5825.0139	Pass
30		5825.0145	5825.0138	5825.0142	5825.0176	Pass
45		5825.0159	5825.0143	5825.0154	5825.0175	Pass
60		5825.0168	5825.0124	5825.0165	5825.0160	Pass
20	138.0	5825.0162	5825.0153	5825.0140	5825.0156	Pass
	102.0	5825.0134	5825.0145	5825.0169	5825.0175	Pass

Note: EUT temperature working range is 0 to 60.

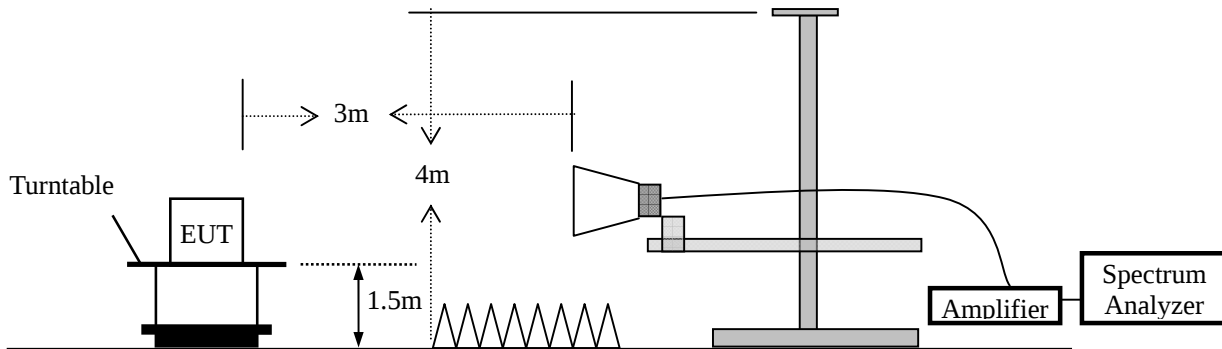
10. Radiated Spurious Emissions and Restricted Bands

10.1 Test SET-UP (Block Diagram of Configuration)

10.1.1 Radiated Emission Test Set-Up, Frequency Below 30MHz



10.1.2 Radiated Emission Test Set-Up, Frequency above 1GHz



10.2 Measurement Procedure

- Blow 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi- anechoic chamber room.
- For the radiated emission test above 1GHz:
The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter full anechoic chamber room. The table was rotated 360 degrees to determine the position of the highest radiation. Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
- 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 height of antenna 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 and the rotatable 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.
- A Quasi-peak measurement was then made for that frequency point for below 1GHz test. PK and AV for above 1GHz emission test.

During the radiated emission test, the spectrum analyzer was set with the following configurations:

Frequency Band (MHz)	Level	Resolution Bandwidth	Video Bandwidth
30 to 1000	QP	120 kHz	300 kHz
Above 1000	Peak	1 MHz	3 MHz
	Average	1 MHz	1/T

10.3 Limit

Frequency range MHz	Distance Meters	Field Strengths Limit (15.209)
		$\mu\text{V/m}$
0.009 ~ 0.490	300	$2400/F(\text{kHz})$
0.490 ~ 1.705	30	$24000/F(\text{kHz})$
1.705 ~ 30	30	30
30 ~ 88	3	100
88 ~ 216	3	150
216 ~ 960	3	200
Above 960	3	500

- Remark:
- (1) Emission level $(\text{dB})\mu\text{V} = 20 \log \text{Emission level } \mu\text{V/m}$
 - (2) The smaller limit shall apply at the cross point between two frequency bands.
 - (3) As shown in 15.35(b), for frequencies above 1000MHz, 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 20dB under any condition of modulation.
 - (4) The frequency range scanned is 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 40 GHz, whichever is lower.
 - (5) §15.247(d) specifies that emissions which fall in the restricted bands, as defined in §15.205 comply with radiated emission limits specified in §15.209.

10.4 Measurement Results

For 5G WIFI Band 1

Please refer to following plots of the worst case: 802.11n(HT20) high channel.

For 5G WIFI Band 4

Please refer to following plots of the worst case: 802.11n (HT40) middle channel.



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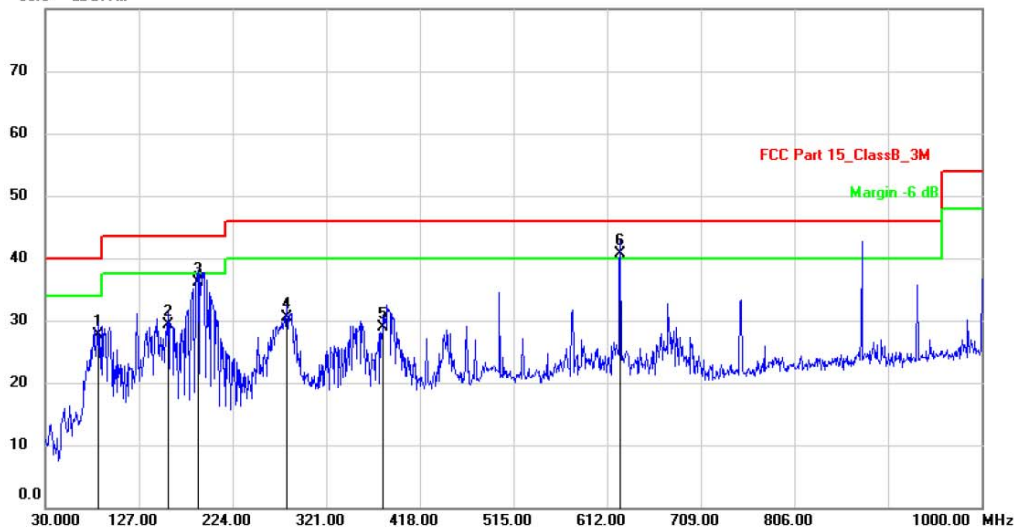
Radiated Emission Measurement

File : PB0340i1
80.0 dBuV/m

Data : #117

Date: 2019/4/28

Time: 11:30:29



Site: 3m Chamber

Polarization: **Horizontal**

Temperature: 26

Limit: FCC Part 15_ClassB_3M

Power: AC120V/60Hz

Humidity: 47 %

EUT: PHIIMAX3D PANORAMIC CAMERA

Distance: 3m

M/N: PB342

Mode: TX (5G Band 1)

Note: adapter 2

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	cm	degree
1		85.2900	42.81	-15.11	27.70	40.00	-12.30	QP		
2		157.0700	44.67	-15.27	29.40	43.50	-14.10	QP		
3		188.1100	49.78	-13.68	36.10	43.50	-7.40	QP		
4		280.2600	41.47	-10.97	30.50	46.00	-15.50	QP		
5		380.1700	38.11	-9.21	28.90	46.00	-17.10	QP		
6	*	625.5800	45.89	-5.09	40.80	46.00	-5.20	QP		

*:Maximum data x:Over limit !:over margin

(Reference Only)

Note: Below 30MHz, the emissions are lower than 20dB below the allowable limit.



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Radiated Emission Measurement

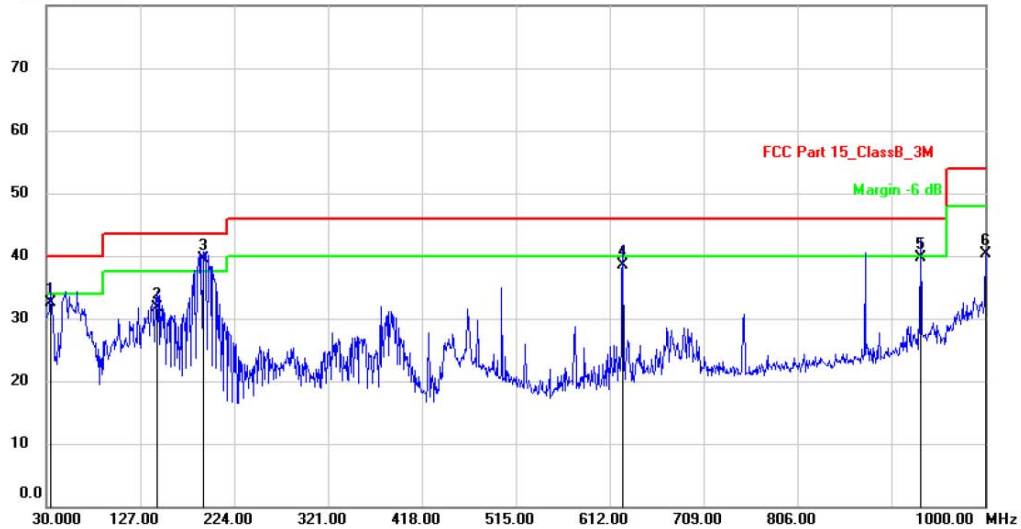
File : PB0340i1

Data : #116

Date: 2019/4/28

Time: 11:22:08

80.0 dBuV/m



Site: 3m Chamber

Polarization: **Vertical**

Temperature: 26

Limit: FCC Part 15_ClassB_3M

Power: AC120V/60Hz

Humidity: 47 %

EUT: PHIIMAX3D PANORAMIC CAMERA

Distance: 3m

M/N: PB342

Mode: TX (5G Band 1)

Note: adapter 2

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	cm	degree
1		33.8800	48.07	-15.57	32.50	40.00	-7.50	QP		
2		144.4600	50.40	-18.60	31.80	43.50	-11.70	QP		
3	*	191.9900	56.11	-16.51	39.60	43.50	-3.90	QP		
4		625.5800	45.41	-6.81	38.60	46.00	-7.40	QP		
5		933.0700	40.26	-0.56	39.70	46.00	-6.30	QP		
6		1000.0000	40.65	-0.25	40.40	54.00	-13.60	QP		

*:Maximum data x:Over limit !:over margin

(Reference Only)

Note: Below 30MHz, the emissions are lower than 20dB below the allowable limit.



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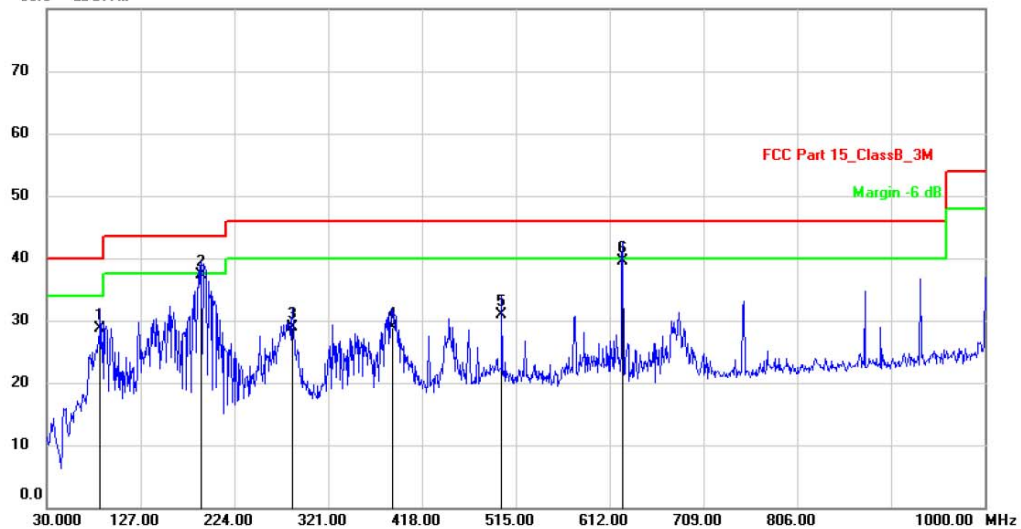
Radiated Emission Measurement

File: PB0340i1
80.0 dBuV/m

Data: #114

Date: 2019/4/28

Time: 11:10:12



Site
Limit: FCC Part 15_ClassB_3M
EUT: PHIIMAX3D PANORAMIC CAMERA
M/N: PB342
Mode: TX (5G Band 4)
Note: adapter 2

Polarization: **Horizontal** Temperature: 26
Power: AC120V/60Hz Humidity: 47 %
Distance: 3m

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Antenna Height cm	Table Degree	Comment
1		85.2900	43.91	-15.11	28.80	40.00	-11.20	QP			
2	*	190.0500	50.97	-13.57	37.40	43.50	-6.10	QP			
3		284.1400	39.79	-10.89	28.90	46.00	-17.10	QP			
4		387.9300	38.06	-9.16	28.90	46.00	-17.10	QP			
5		500.4500	37.76	-6.76	31.00	46.00	-15.00	QP			
6		625.5800	44.69	-5.09	39.60	46.00	-6.40	QP			

*:Maximum data x:Over limit !:over margin

(Reference Only)

Note: Below 30MHz, the emissions are lower than 20dB below the allowable limit.



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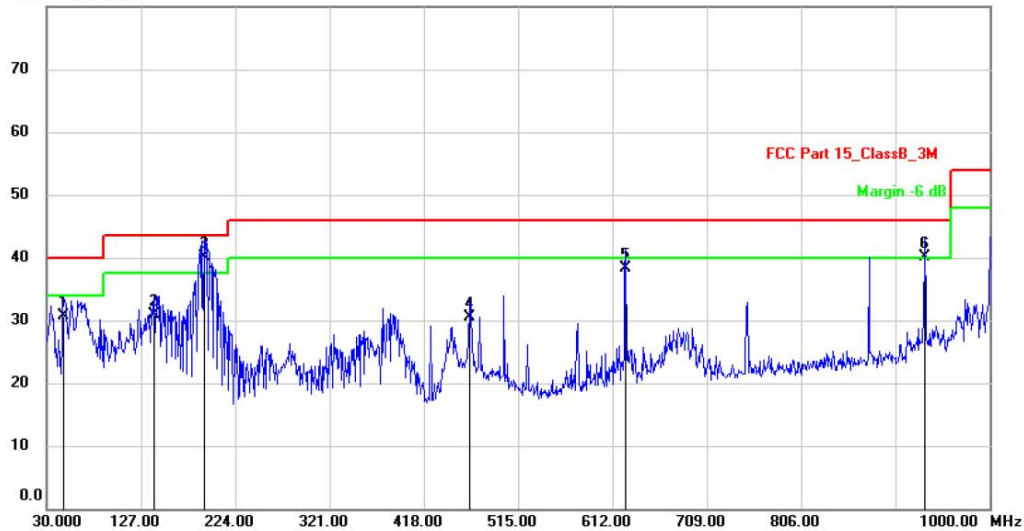
Radiated Emission Measurement

File : PB0340i1
80.0 dBuV/m

Data : #115

Date: 2019/4/28

Time: 11:19:41



Site
Limit: FCC Part 15_ClassB_3M
EUT: PHIIMAX3D PANORAMIC CAMERA
M/N: PB342
Mode: TX (5G Band 4)
Note: adapter 2

Polarization: **Vertical**
Power: AC120V/60Hz
Distance: 3m
Temperature: 26
Humidity: 47 %

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Antenna Height cm	Table Degree	Comment
1		47.4600	44.30	-13.50	30.80	40.00	-9.20	QP			
2		140.5800	49.50	-18.60	30.90	43.50	-12.60	QP			
3	*	191.9900	56.61	-16.51	40.10	43.50	-3.40	QP			
4		465.5300	40.18	-9.58	30.60	46.00	-15.40	QP			
5		625.5800	45.21	-6.81	38.40	46.00	-7.60	QP			
6	!	933.0700	40.66	-0.56	40.10	46.00	-5.90	QP			

*:Maximum data x:Over limit !:over margin

(Reference Only)

Note: Below 30MHz, the emissions are lower than 20dB below the allowable limit.



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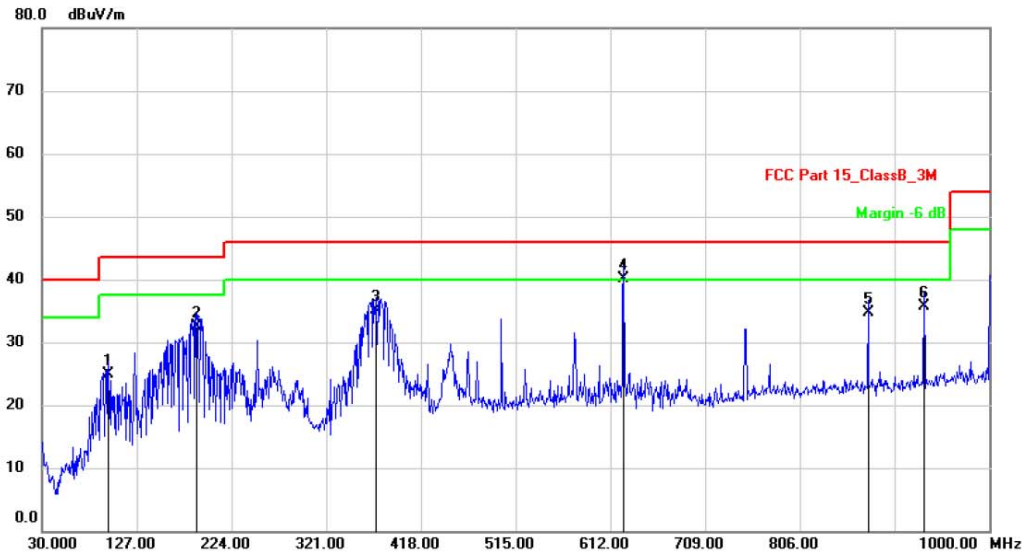
Radiated Emission Measurement

File : PB0340i1

Data : #110

Date: 2019/4/28

Time: 10:24:10



Site
Limit: FCC Part 15_ClassB_3M
EUT: PHIIMAX3D PANORAMIC CAMERA
M/N: PB342
Mode: TX(5G Band 4)
Note: adapter 1

Polarization: **Horizontal** Temperature: 26
Power: AC120V/60Hz Humidity: 47 %
Distance: 3m

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		97.9000	37.30	-12.40	24.90	43.50	-18.60	QP		
2		188.1100	46.28	-13.68	32.60	43.50	-10.90	QP		
3		372.4100	44.38	-9.18	35.20	46.00	-10.80	QP		
4	*	625.5800	45.19	-5.09	40.10	46.00	-5.90	QP		
5		875.8400	35.85	-1.15	34.70	46.00	-11.30	QP		
6		933.0700	36.26	-0.56	35.70	46.00	-10.30	QP		

*:Maximum data x:Over limit !:over margin

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Note: Below 30MHz, the emissions are lower than 20dB below the allowable limit.



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Radiated Emission Measurement

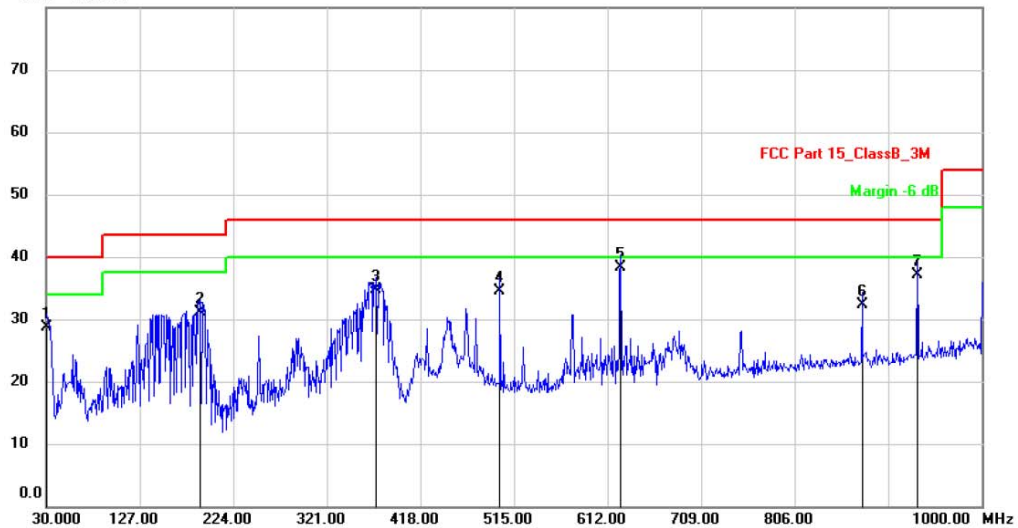
File: PB0340i1

Data: #111

Date: 2019/4/28

Time: 10:31:48

80.0 dBuV/m



Site
Limit: FCC Part 15_ClassB_3M
EUT: PHIIMAX3D PANORAMIC CAMERA
M/N: PB342
Mode: TX(5G Band 4)
Note: adapter 1

Polarization: **Vertical**
Power: AC120V/60Hz
Distance: 3m

Temperature: 26
Humidity: 47 %

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		30.9700	44.63	-15.83	28.80	40.00	-11.20	QP		
2		190.0500	47.67	-16.57	31.10	43.50	-12.40	QP		
3		372.4100	45.88	-11.18	34.70	46.00	-11.30	QP		
4		500.4500	43.26	-8.76	34.50	46.00	-11.50	QP		
5	*	625.5800	45.11	-6.81	38.30	46.00	-7.70	QP		
6		875.8400	33.45	-1.15	32.30	46.00	-13.70	QP		
7		933.0700	37.66	-0.56	37.10	46.00	-8.90	QP		

*:Maximum data x:Over limit !:over margin

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Note: Below 30MHz, the emissions are lower than 20dB below the allowable limit.



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Radiated Emission Measurement

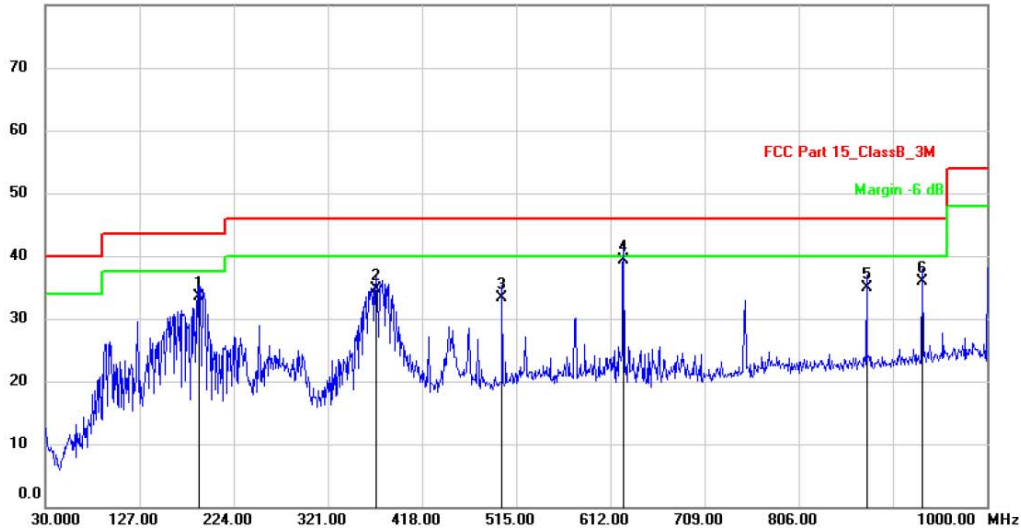
File: PB0340i1

Data: #113

Date: 2019/4/28

Time: 10:45:55

80.0 dBuV/m



Site
Limit: FCC Part 15_ClassB_3M
EUT: PHIIMAX3D PANORAMIC CAMERA
M/N: PB342
Mode: TX(5G Band 1)
Note: adapter 1

Polarization: **Horizontal** Temperature: 26
Power: AC120V/60Hz Humidity: 47 %
Distance: 3m

No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Over	Antenna	Table	
		MHz	Level	Factor	ment			Height	Degree	
			dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		188.1100	47.18	-13.68	33.50	43.50	-10.00	QP		
2		370.4700	43.96	-9.16	34.80	46.00	-11.20	QP		
3		500.4500	40.06	-6.76	33.30	46.00	-12.70	QP		
4	*	625.5800	44.39	-5.09	39.30	46.00	-6.70	QP		
5		875.8400	36.15	-1.15	35.00	46.00	-11.00	QP		
6		933.0700	36.46	-0.56	35.90	46.00	-10.10	QP		

*:Maximum data x:Over limit !:over margin

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Note: Below 30MHz, the emissions are lower than 20dB below the allowable limit.



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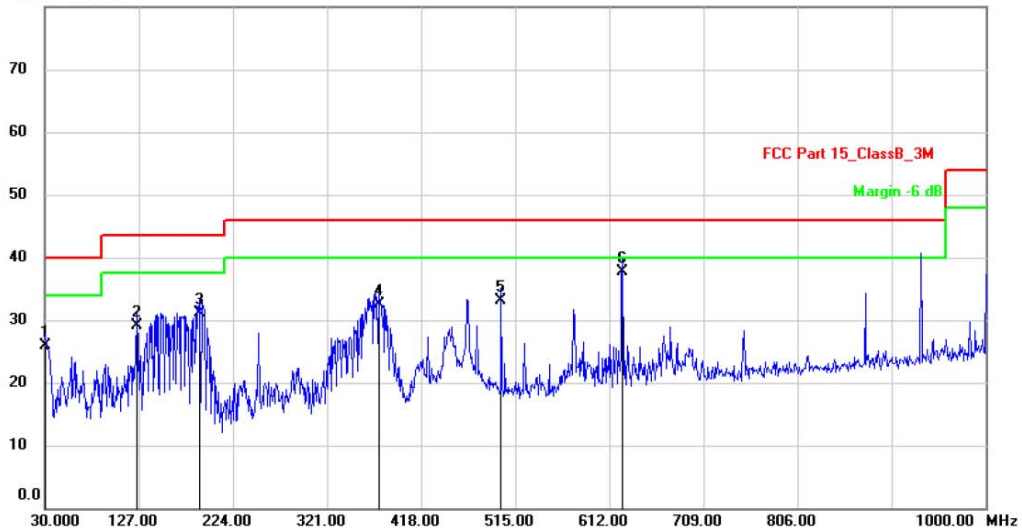
Radiated Emission Measurement

File : PB0340i1
80.0 dBuV/m

Data : #112

Date: 2019/4/28

Time: 10:38:32



Site
Limit: FCC Part 15_ClassB_3M
EUT: PHIIMAX3D PANORAMIC CAMERA
M/N: PB342
Mode: TX(5G Band 1)
Note: adapter 1

Polarization: **Vertical**
Power: AC120V/60Hz
Distance: 3m
Temperature: 26
Humidity: 47 %

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Antenna Height cm	Table Degree	Comment
1		30.9700	41.73	-15.83	25.90	40.00	-14.10	QP		
2		125.0600	46.72	-17.62	29.10	43.50	-14.40	QP		
3		190.0500	47.77	-16.57	31.20	43.50	-12.30	QP		
4		374.3500	43.68	-11.18	32.50	46.00	-13.50	QP		
5		500.4500	41.86	-8.76	33.10	46.00	-12.90	QP		
6	*	625.5800	44.51	-6.81	37.70	46.00	-8.30	QP		

*:Maximum data x:Over limit !:over margin

<Reference Only

Note: Below 30MHz, the emissions are lower than 20dB below the allowable limit.

Test Mode: The worst case: 802.11n(HT20) Test Date : April 08, 2019
Frequency Range: Above 1GHz Temperature : 24℃
Test Result: PASS Humidity : 47 %
Measured Distance: 3m Test By: Lee
Band 1(5180-5240 MHz)

Freq. (MHz)	Ant.Pol. (H/V)	Reading Level(dBuV)		Factor (dB/m)	Emission Level (dBuV)		Limit 3m (dBuV/m)		Margin (dB)	
		PK	AV		PK	AV	PK	AV	PK	AV
Operation Mode: TX Mode (Low)										
10360	V	49.49	33.86	14.04	63.53	47.90	74.00	54.00	-10.47	-6.10
15540	V	47.09	31.81	19.00	66.09	50.81	74.00	54.00	-7.91	-3.19

10360	H	49.25	33.70	14.04	63.29	47.74	74.00	54.00	-10.71	-6.26
15540	H	46.85	32.00	19.00	67.97	50.12	74.00	54.00	-6.03	-3.88

Operation Mode: TX Mode (Mid)										
10400	V	48.07	32.73	14.12	62.19	46.85	74.00	54.00	-11.81	-7.15
15600	V	49.31	33.43	20.20	68.37	52.49	74.00	54.00	-5.63	-1.51

10400	H	47.75	32.88	14.12	61.87	47.00	74.00	54.00	-12.13	-7.00
15600	H	47.91	31.64	20.20	68.73	52.46	74.00	54.00	-5.27	-1.54

Operation Mode: TX Mode (High)										
10480	V	46.51	31.84	14.29	60.80	46.13	74.00	54.00	-13.20	-7.87
15720	V	49.21	33.22	20.82	68.37	52.38	74.00	54.00	-5.63	-1.62

10480	H	47.05	32.16	14.29	61.34	46.45	74.00	54.00	-12.66	-7.55
15720	H	46.22	31.09	20.82	66.42	51.29	74.00	54.00	-7.58	-2.71

- Note:** (1) All Readings are Peak Value and AV.
(2) Emission Level= Reading Level + Factor
(3) Factor= Antenna Gain + Cable Loss – Amplifier Gain
(4) Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 10dB below the permissible limits.
(5) Measurement uncertainty : ±3.7dB.
(6) Horn antenna used for the emission over 1000MHz.
(7) Both of adapter have been tested, but only the worst case (adapter 1) was recorded.

Test Mode: The worst case: 802.11n(HT40) Test Date : April 08, 2019
Frequency Range: Above 1GHz Temperature : 24°C
Test Result: PASS Humidity : 47 %
Measured Distance: 3m Test By: Lee
Band4 (5745-5825 MHz)

Freq. (MHz)	Ant.Pol. (H/V)	Reading Level(dBuV)		Factor (dB/m)	Emission Level (dBuV)		Limit 3m (dBuV/m)		Margin (dB)	
		PK	AV		PK	AV	PK	AV	PK	AV
Operation Mode: TX Mode (Low)										
11510	V	46.68	31.50	17.04	63.72	48.54	74.00	54.00	-10.28	-5.46
17265	V	45.95	27.37	22.31	68.26	49.68	74.00	54.00	-5.74	-4.32

11510	H	46.65	31.57	17.04	63.69	48.61	74.00	54.00	-10.31	-5.39
17265	H	47.04	26.21	22.31	69.35	48.52	74.00	54.00	-4.65	-5.48

Operation Mode: TX Mode (High)										
11590	V	47.18	31.92	16.91	64.09	48.83	74.00	54.00	-9.91	-5.17
17385	V	46.40	27.8	22.72	69.12	50.52	74.00	54.00	-4.88	-3.48

11590	H	46.80	31.79	16.91	63.71	48.70	74.00	54.00	-10.29	-5.30
17385	H	47.64	27.80	22.72	70.36	50.52	74.00	54.00	-3.64	-3.48

- Note:** (1) All Readings are Peak Value and AV.
(2) Emission Level= Reading Level + Factor
(3) Factor= Antenna Gain + Cable Loss – Amplifier Gain
(4) Data of measurement within this frequency range shown “ ---” in the table above means the reading of emissions are attenuated more than 10dB below the permissible limits.
(5) Measurement uncertainty : ± 3.7 dB.
(6) Horn antenna used for the emission over 1000MHz.
(7) Both of adapter have been tested, but only the worst case (adapter 1) was recorded.

11. Antenna Application

11.1 Antenna requirement

According to of FCC part 15C section 15.203:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine compliance with section 15.203 of the rules.

And according to 47 CFR section 15.407(a), if the transmitting antennas of directional gain greater than 6dBi are used, the transmit power and power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

11.2 Measurement Results

The EUT has two external antennas, which are:

Ant.	Brand	Model No.	Product Number	Antenna Type	Connector	Gain (dBi)
0	kinghelm	KH0WF-01-J	C252178	External plastic rod antenna	SMA in needle	3
1	kinghelm	KH0WF-01-J	C252178	External plastic rod antenna	SMA in needle	3

As the antenna connectors of EUT are non-standard and the antennas are specified above by manufacturer; it is considered to meet the standard requirements.

12. Test Equipment List

Description	Manufacturer	Model Number	Serial Number	Characteristics	Calibration Date	Calibration Due Date
Test Receiver	Rohde & Schwarz	ESCI7	100837	9KHz~7GHz	Mar. 14, 2019	Mar. 13, 2020
Antenna	Schwarzbeck	VULB9162	9162-010	30MHz~7GHz	Mar. 23, 2019	Mar. 22, 2020
Spectrum Analyzer	Rohde & Schwarz	FSU26	200409/026	20Hz~26.5GHz	Mar. 14, 2019	Mar. 13, 2020
Spectrum Analyzer	Keysight	N9020A	MY54200831	20Hz~26.5GHz	Apr. 24, 2019	Apr. 23, 2020
Spectrum Analyzer	Rohde & Schwarz	FSV40	101003	10Hz~40GHz	Apr. 24, 2019	Apr. 23, 2020
Horn Antenna	Schwarzbeck	BBHA9170	9170-372	15GHz~40GHz	Mar. 23, 2019	Mar. 22, 2020
Pre-Amplifier	EMCI	EMC 184045	980102	18GHz~40GHz	Apr. 24, 2019	Apr. 23, 2020
Power Sensor	DARE	RPR3006W	15I00041SN O64	100MHz~6GHz	Mar. 14, 2019	Mar. 13, 2020
Communication Tester	Rohde & Schwarz	CMW500	149004	70MHz~6GHz	Mar. 14, 2019	Mar. 13, 2020
Horn Antenna	COM-Power	AH-118	071078	500MHz~18GHz	Mar. 23, 2019	Mar. 22, 2020
Pre-Amplifier	HP	HP 8449B	3008A00964	1GHz~26.5GHz	Mar. 14, 2019	Mar. 13, 2020
Pre-Amplifier	HP	HP 8447D	1145A00203	100KHz~1.3GHz	Mar. 14, 2019	Mar. 13, 2020
Loop Antenna	Schwarzbeck	FMZB 1513	1513-272	9KHz~30MHz	Apr. 24, 2019	Apr. 23, 2020
Temperature & Humidity Chamber	REMAFEE	SYHR225L	N/A	-40~150℃	Apr. 24, 2019	Apr. 23, 2020
DC Source	MY	MY8811	N/A	0~30V	N/A	N/A
Temporary antenna connector	TESCOM	SS402	N/A	9KHz~25GHz	N/A	N/A
Power Meter	Anritsu	ML2495A	1139001	100k-65GHz	Apr. 24, 2019	Apr. 23, 2020
Power Sensor	Anritsu	MA2411B	100345	300M-40GHz	Apr. 24, 2019	Apr. 23, 2020
Test Software	EZ	EZ_EMC	N/A	N/A	N/A	N/A

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

---End---