

## 7.6.2 Radiated Emission Method

Test Requirement:	FCC Part15 C Section 15.209 and 15.205				
Test Method:	ANSI C63.10: 2013				
Test Frequency Range:	All of the restrict bands were tested, only the worst band's (2310MHz to 2500MHz) data was showed.				
Test site:	Measurement Distance: 3m				
Receiver setup:	Frequency	Detector	RBW	VBW	Value
	Above 1GHz	Peak	1MHz	3MHz	Peak
		Average	1MHz	3MHz	Average
Limit:	Frequency		Limit (dBuV/m @3m)		Value
	Above 1GHz		54.00		Average
			74.00		Peak
Test setup:					
Test Procedure:	<ol style="list-style-type: none"> <li>1. The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.</li> <li>2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.</li> <li>3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.</li> <li>4. 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 rota table was turned from 0 degrees to 360 degrees to find the maximum reading.</li> <li>5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.</li> <li>6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.</li> <li>7. The radiation measurements are performed in X, Y, Z axis positioning. And found the Y axis positioning which it is worse case, only the test worst case mode is recorded in the report.</li> </ol>				
Test Instruments:	Refer to section 6.0 for details				
Test mode:	Refer to section 5.2 for details				
Test results:	Pass				

**Measurement data:**

Note: 802.11b/802.11g/802.11n (H20)/ 802.11n (H40) and all have been tested, only worse case 802.11b is reported

Horizontal: 802.11b Mode TX CH Low (2412MHz)

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2390	66.52	-5.68	60.84	74	-13.16	peak
2390	47.09	-5.68	41.41	54	-12.59	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Vertical: 802.11b Mode TX CH Low (2412MHz)

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2390	67.11	-5.68	61.43	74	-12.57	peak
2390	49.28	-5.68	43.6	54	-10.4	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Horizontal: 802.11b Mode TX CH HIGH (2462MHz)

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2483.5	61.36	-5.85	55.51	74	-18.49	peak
2483.5	47.28	-5.85	41.43	54	-12.57	AVG

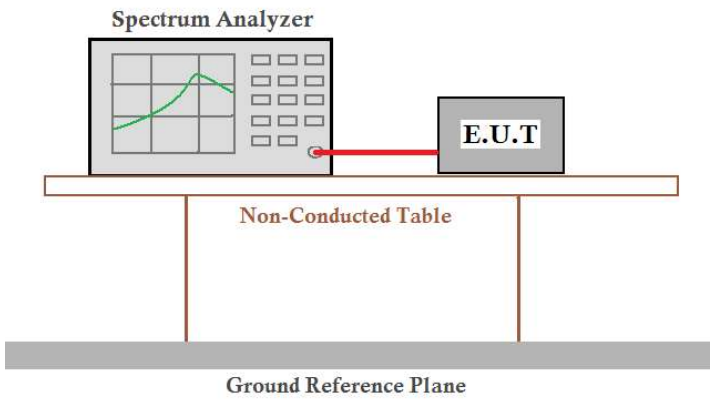
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Vertical: 802.11b Mode TX CH HIGH (2462MHz)

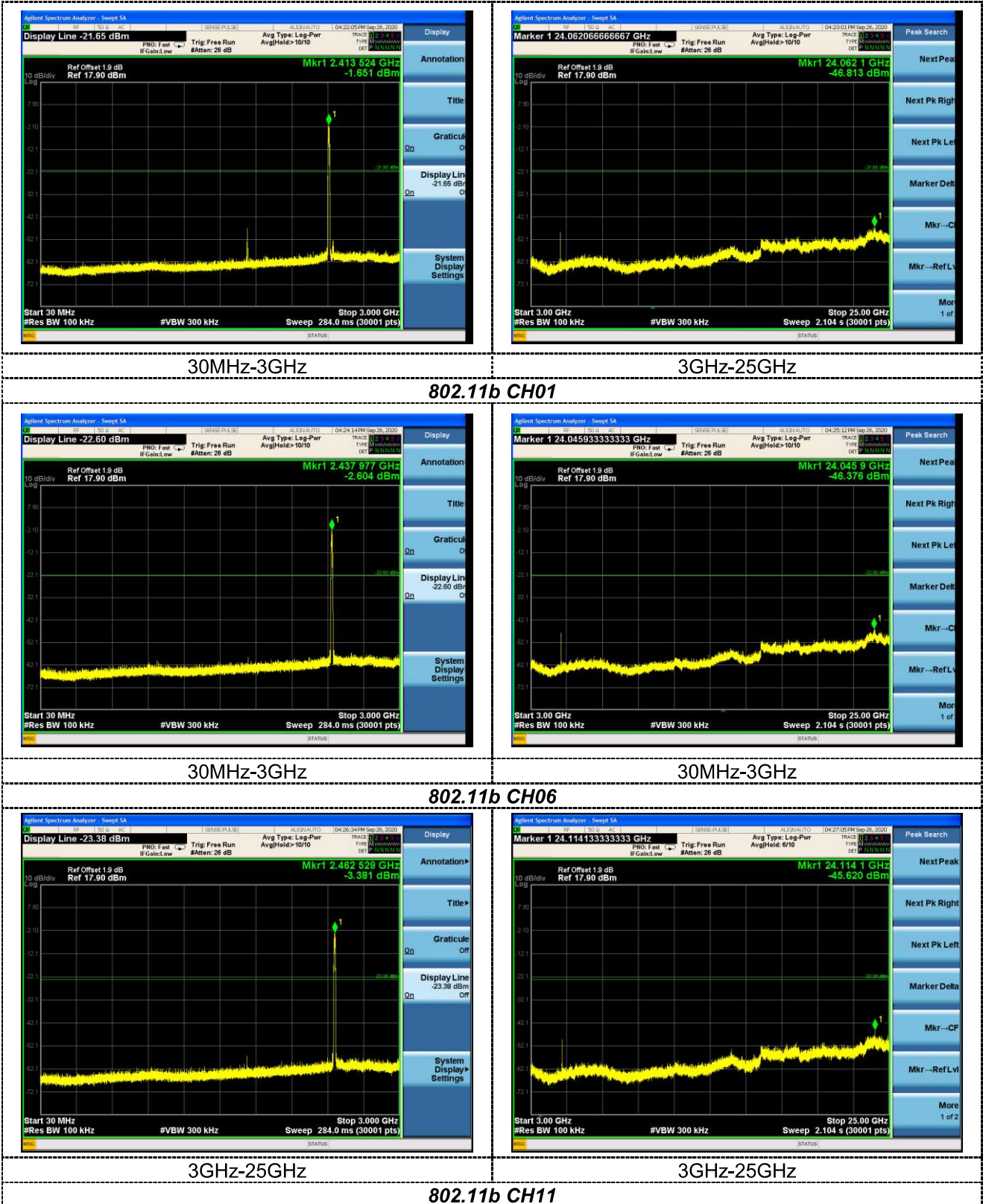
Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	
2483.5	62.53	-5.65	56.88	74	-17.12	peak
2483.5	48.07	-5.85	42.22	54	-11.78	AVG
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						
Remark: All the other emissions not reported were too low to read and deemed to comply with FCC limit.						

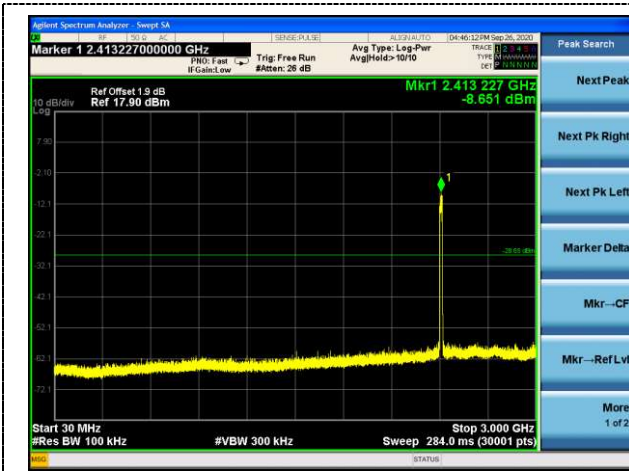
## 7.7 Spurious Emission

### 7.7.1 Conducted Emission Method

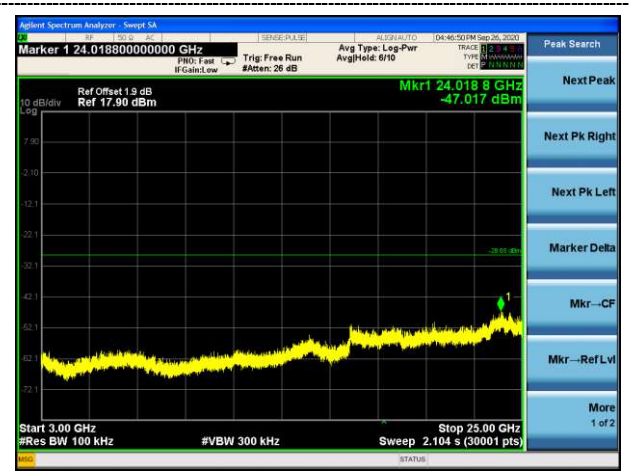
Test Requirement:	FCC Part15 C Section 15.247 (d)
Test Method:	KDB558074 D01 DTS Meas Guidance v05or02
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.
Test setup:	 <p>The diagram illustrates the test setup. A Spectrum Analyzer is connected to an E.U.T. (Equipment Under Test) via a red cable. Both are placed on a Non-Conducted Table, which is supported by two legs. Below the table is a Ground Reference Plane.</p>
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Test plot as follows:





30MHz-3GHz

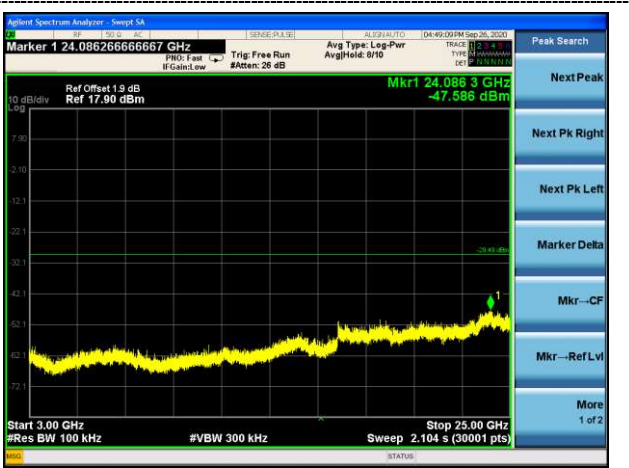


30MHz-3GHz

802.11g CH0

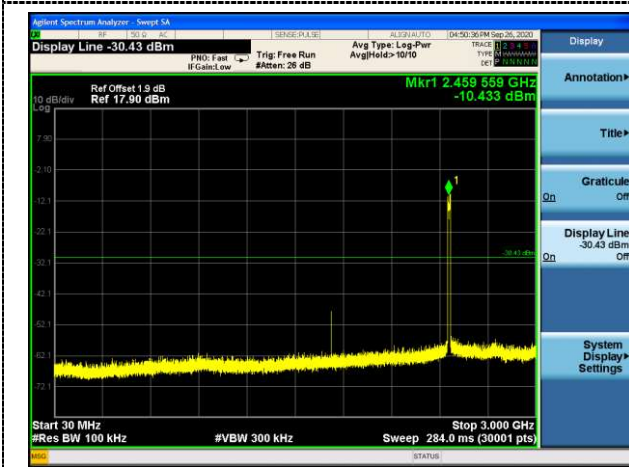


30MHz-3GHz

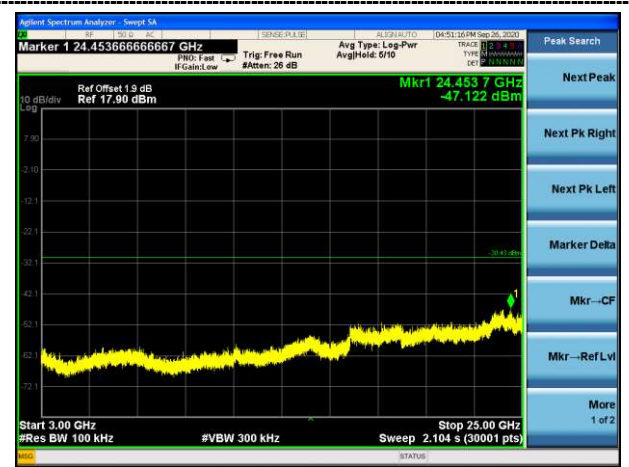


30MHz-3GHz

802.11g CH06



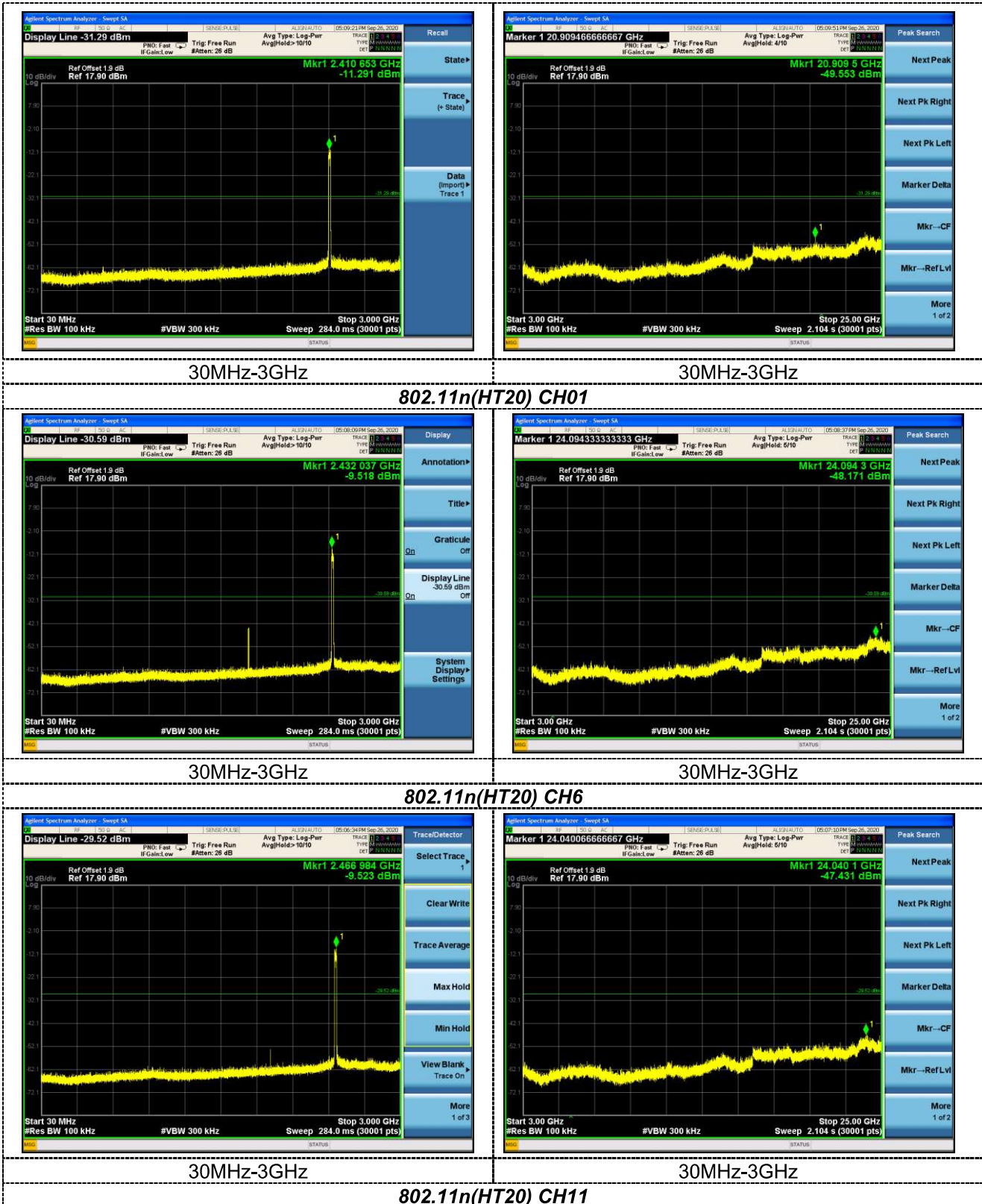
30MHz-3GHz

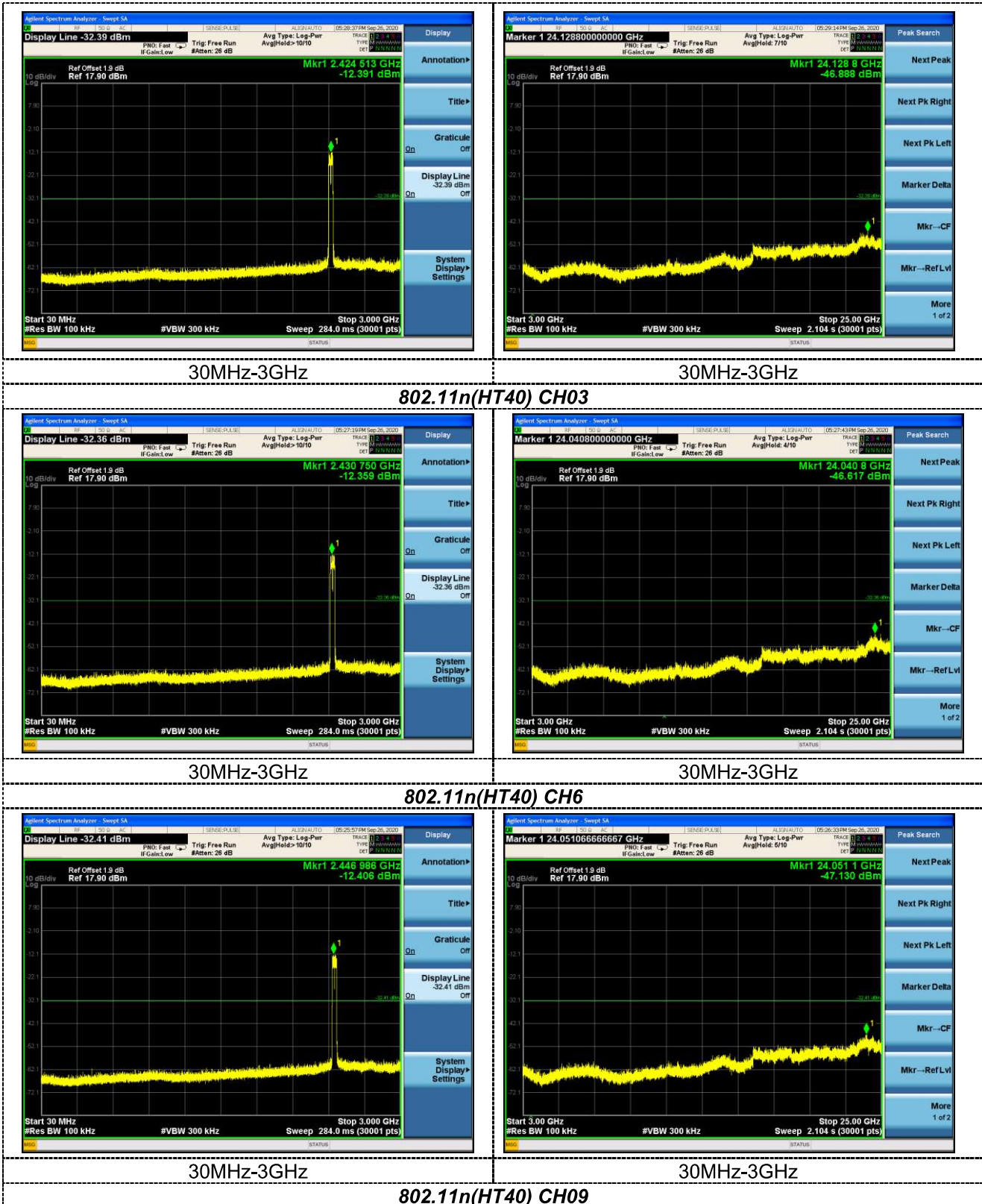


30MHz-3GHz

802.11g CH11

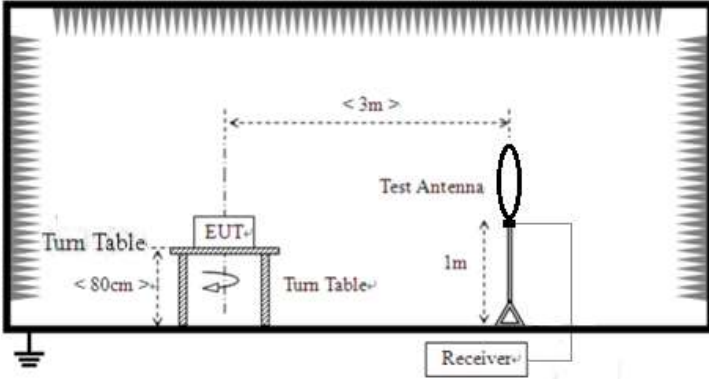


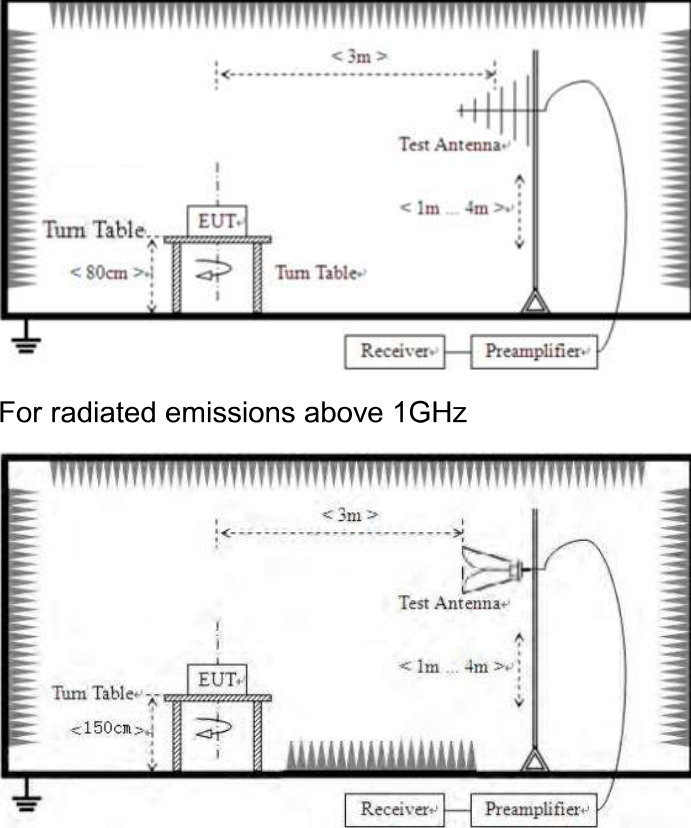






## 7.7.2 Radiated Emission Method

Test Requirement:	FCC Part15 C Section 15.209				
Test Method:	ANSI C63.10: 2013				
Test Frequency Range:	9kHz to 25GHz				
Test site:	Measurement Distance: 3m				
Receiver setup:	Frequency	Detector	RBW	VBW	Value
	9KHz-150KHz	Quasi-peak	200Hz	600Hz	Quasi-peak
	150KHz-30MHz	Quasi-peak	9KHz	30KHz	Quasi-peak
	30MHz-1GHz	Quasi-peak	100KHz	300KHz	Quasi-peak
	Above 1GHz	Peak	1MHz	3MHz	Peak
Peak		1MHz	10Hz	Average	
Limit:	Frequency	Limit (uV/m)	Value	Measurement Distance	
	0.009MHz-0.490MHz	2400/F(KHz)	QP	300m	
	0.490MHz-1.705MHz	24000/F(KHz)	QP	300m	
	1.705MHz-30MHz	30	QP	30m	
	30MHz-88MHz	100	QP	3m	
	88MHz-216MHz	150	QP		
	216MHz-960MHz	200	QP		
	960MHz-1GHz	500	QP		
	Above 1GHz	500	Average		
		5000	Peak		
Test setup:	For radiated emissions from 9kHz to 30MHz				
	 <p>The diagram illustrates the test setup for radiated emissions from 9kHz to 30MHz. It shows an Equipment Under Test (EUT) placed on a turn table. A test antenna is positioned 1m above the ground plane. The measurement distance between the EUT and the antenna is 3m. The turn table has a diameter of less than 80cm. A receiver is connected to the test antenna.</p>				
For radiated emissions from 30MHz to 1GHz					

	 <p>For radiated emissions above 1GHz</p>
<p>Test Procedure:</p>	<ol style="list-style-type: none"> <li>1. The EUT was placed on the top of a rotating table (0.8m for below 1G and 1.5m for above 1G) above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.</li> <li>2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.</li> <li>3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.</li> <li>4. 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 rota table was turned from 0 degrees to 360 degrees to find the maximum reading.</li> <li>5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.</li> <li>6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.</li> </ol>
<p>Test Instruments:</p>	<p>Refer to section 6.0 for details</p>

Test mode:	Refer to section 5.2 for details					
Test voltage:	AC120V 60Hz					
Test environment:	Temp.:	25 °C	Humid.:	52%	Press.:	1012mbar
Test voltage:	AC 120V, 60Hz					
Test results:	Pass					

*Remarks:*

1. Only the worst case Main Antenna test data.
2. Pre-scan all kind of the place mode (X-axis, Y-axis, Z-axis), and found the Y-axis which it is worse case.

**Measurement data:**

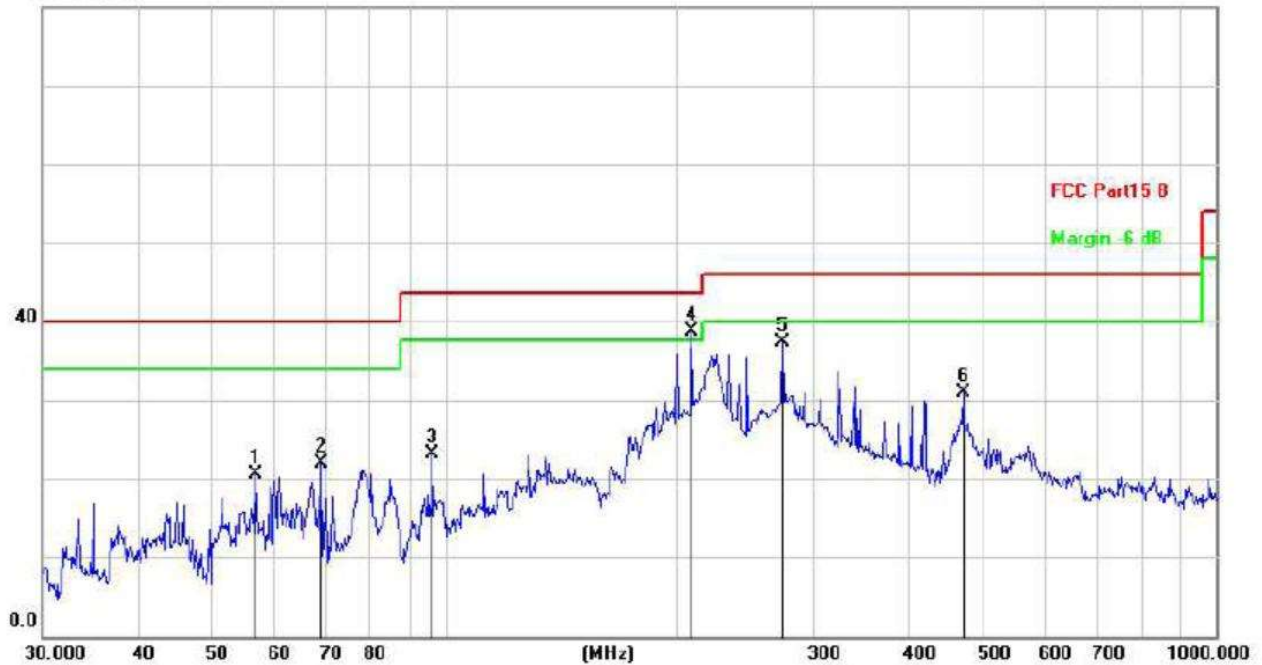
■ **9kHz~30MHz**

The emission from 9 kHz to 30MHz was pre-tested and found the result was 20dB lower than the limit, and according to 15.31(o) & RSS-Gen 6.13, the test result no need to reported.

■ Below 1GHz

Horizontal:

90.0 dBuV/m

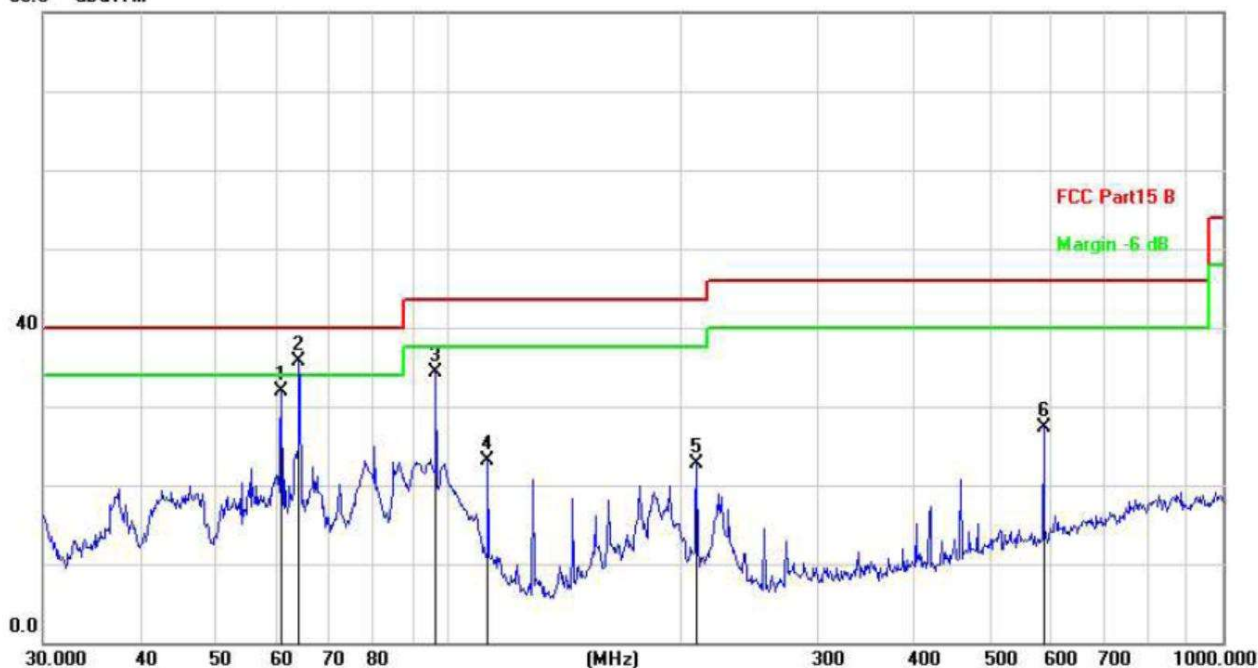


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dB/m	Over dB	Detector
1		56.7916	39.14	-18.66	20.48	40.00	-19.52	QP
2		69.1140	41.77	-19.82	21.95	40.00	-18.05	QP
3		96.4360	43.90	-20.80	23.10	43.50	-20.40	QP
4	*	209.3129	58.58	-19.82	38.76	43.50	-4.74	QP
5		273.2341	56.31	-19.01	37.30	46.00	-8.70	QP
6		468.8761	46.80	-15.97	30.83	46.00	-15.17	QP

Final Level =Receiver Read level + Correct Factor

Vertical:

80.0 dBuV/m



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dB/m	Over dB	Detector
1		60.9176	50.84	-18.86	31.98	40.00	-8.02	QP
2	*	64.2074	54.97	-19.25	35.72	40.00	-4.28	QP
3		96.4360	55.14	-20.80	34.34	43.50	-9.16	QP
4		112.5242	43.29	-20.13	23.16	43.50	-20.34	QP
5		209.3129	42.47	-19.82	22.65	43.50	-20.85	QP
6		586.8437	40.91	-13.52	27.39	46.00	-18.61	QP

Final Level = Receiver Read level + Correct Factor



■ Above 1GHz

Note: 802.11b/802.11g/802.11n (H20)/ 802.11n (H40) and all have been tested, only worse case 802.11n (H20) MIMO is reported

Horizontal: LOW CH1 (802.11b Mode)/2412

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
4824	63.22	-3.67	59.55	74	-14.45	peak
4824	46.17	-3.64	42.53	54	-11.47	AVG
7236	58.35	-0.9	57.45	74	-16.55	peak
7236	42.78	-0.9	41.88	54	-12.12	AVG
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Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Vertical: LOW CH1 (802.11b Mode)/2412

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
4824	62.52	-3.67	58.85	74	-15.15	peak
4824	45.67	-3.64	42.03	54	-11.97	AVG
7236	57.28	-0.9	56.38	74	-17.62	peak
7236	43.85	-0.9	42.95	54	-11.05	AVG
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Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Horizontal: MID CH6 (802.11b Mode)/2437

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
4874	62.59	-3.53	59.06	74	-14.94	peak
4874	45.36	-3.53	41.83	54	-12.17	AVG
7311	58.32	-0.85	57.47	74	-16.53	peak
7311	42.89	-0.85	42.04	54	-11.96	AVG
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Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Vertical: MID CH6 (802.11b Mode)/2437

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
4874	61.08	-3.53	57.55	74	-16.45	peak
4874	44.72	-3.53	41.19	54	-12.81	AVG
7311	57.84	-0.85	56.99	74	-17.01	peak
7311	44.33	-0.85	43.48	54	-10.52	AVG
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Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Horizontal: HIGH CH11 (802.11b Mode)/2462

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	
4924	62.95	-3.49	59.46	74	-14.54	peak
4924	45.71	-3.49	42.22	54	-11.78	AVG
7386	58.86	-0.78	58.08	74	-15.92	peak
7386	43.98	-0.78	43.2	54	-10.8	AVG
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Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Vertical: HIGH CH11 (802.11b Mode)/2462

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	
4924	63.51	-3.49	60.02	74	-13.98	peak
4924	44.9	-3.49	41.41	54	-12.59	AVG
7386	58.59	-0.78	57.81	74	-16.19	peak
7386	43.27	-0.78	42.49	54	-11.51	AVG
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Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Remark:

- (1) Data of measurement within this frequency range shown “--- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (2) When the test results of Peak Detected below the limits of Average Detected, the Average Detected is not need completed.

## 8 Test Setup Photo

Reference to the **appendix I** for details.

## 9 EUT Constructional Details

Reference to the **appendix II** for details.

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