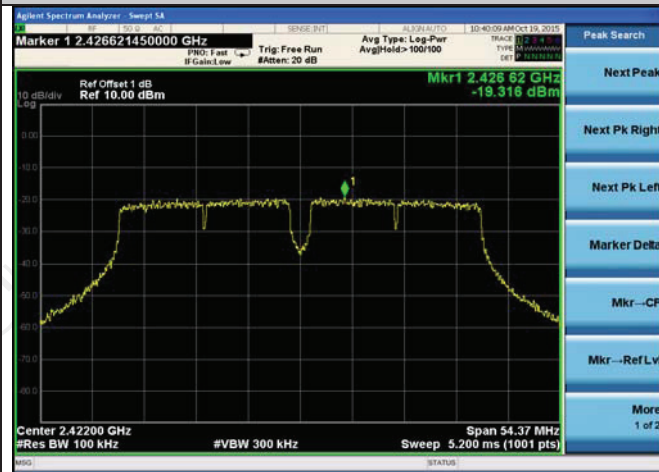


802.11n (HT40) Modulation

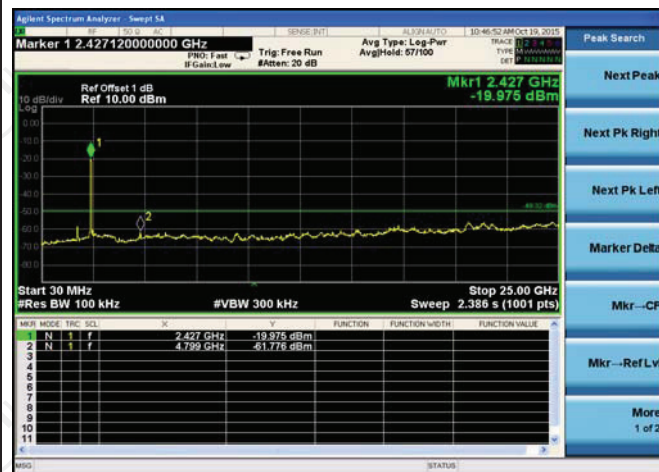
100kHz PSD reference Level



Band Edge

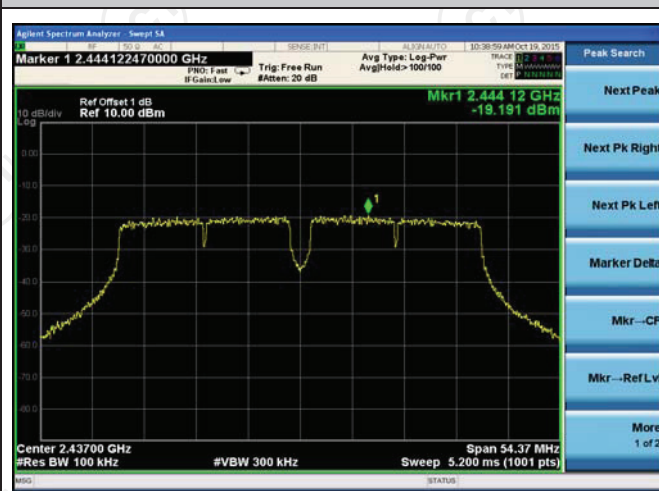


Spurious emission

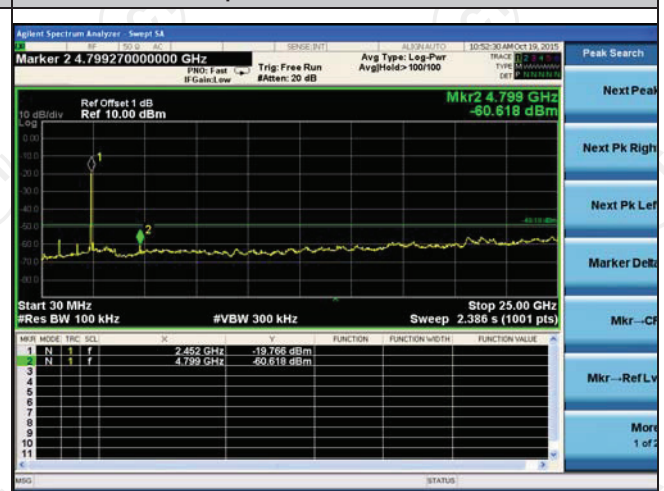


Lowest Channel

100kHz PSD reference Level

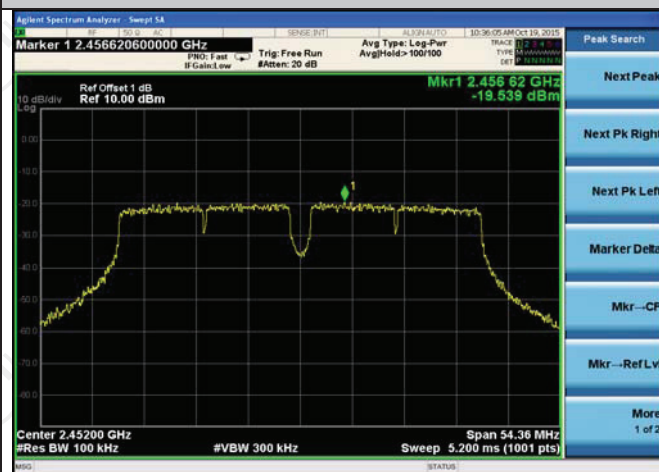


Spurious emission



Middle Channel

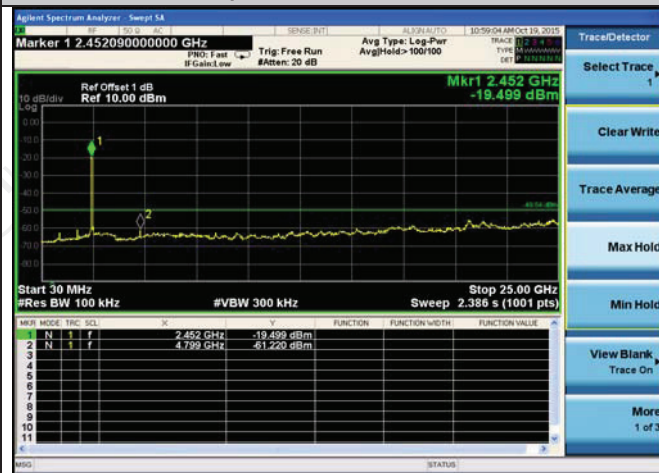
100kHz PSD reference Level



Band Edge



Spurious emission



Highest Channel

6.7. Radiated Spurious Emission Measurement

6.7.1. Test Specification

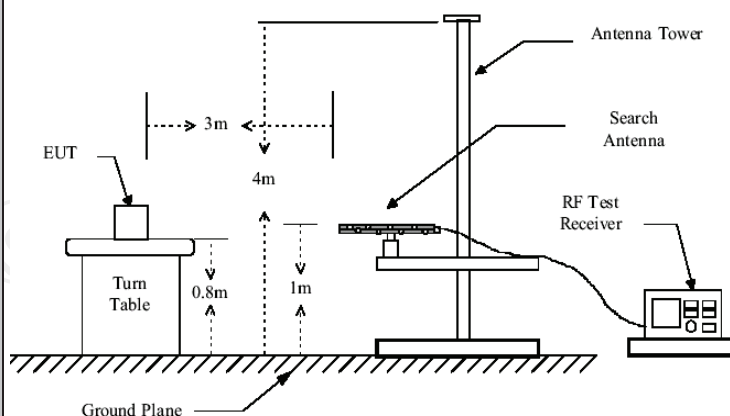
Test Requirement:	FCC Part15 C Section 15.209			
Test Method:	ANSI C63.4: 2014 and ANSI C63.10: 2013			
Frequency Range:	9 kHz to 25 GHz			
Measurement Distance:	3 m			
Antenna Polarization:	Horizontal & Vertical			
Operation mode:	Transmitting mode with modulation			
Receiver Setup:	Frequency	Detector	RBW	VBW
	9kHz- 150kHz	Quasi-peak	200Hz	1kHz
	150kHz- 30MHz	Quasi-peak	9kHz	30kHz
	30MHz-1GHz	Quasi-peak	120KHz	300KHz
	Above 1GHz	Peak	1MHz	3MHz
Limit:	Remark			
	Quasi-peak Value			
	Quasi-peak Value			
	Quasi-peak Value			
	Peak Value			
Test setup:	Average Value			

Frequency	Field Strength (microvolts/meter)	Measurement Distance (meters)
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

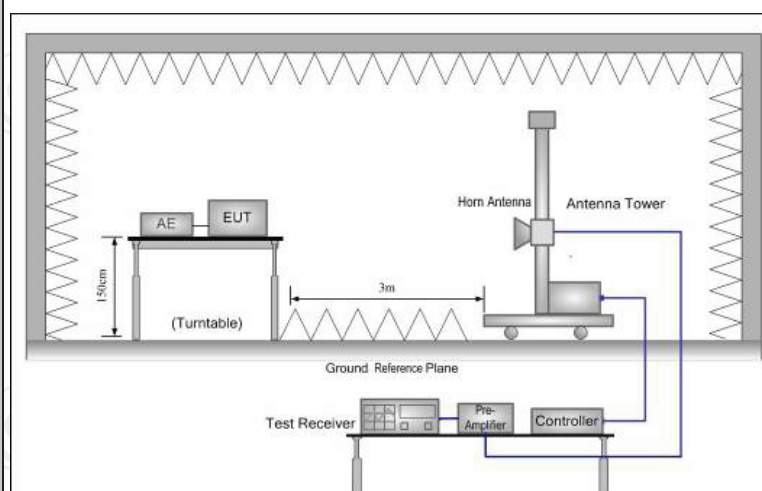
Frequency	Field Strength (microvolts/meter)	Measurement Distance (meters)	Detector
Above 1GHz	500	3	Average
	5000	3	Peak

For radiated emissions below 30MHz

30MHz to 1GHz



Above 1GHz



Test Procedure:

1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v03r02.
2. For the radiated emission test below 1GHz:
The EUT was placed on a turntable with 1.5 meter above ground. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower. 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.
- For the radiated emission test above 1GHz:
Place the measurement antenna on a turntable with 1.5 meter above ground, which is 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. 3. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level 4. For measurement below 1GHz, 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 quasi-peak detector and reported. 5. Use the following spectrum analyzer settings: (1) Span shall wide enough to fully capture the emission being measured; (2) Set RBW=100 kHz for $f < 1 \text{ GHz}$; $\text{VBW} \geq \text{RBW}$; Sweep = auto; Detector function = peak; Trace = max hold; (3) Set RBW = 1 MHz, VBW= 3MHz for $f \geq 1 \text{ GHz}$ for peak measurement. For average measurement: VBW = 10 Hz, when duty cycle is no less than 98 percent. $\text{VBW} \geq 1/T$, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.
Test results:	PASS

6.7.2. Test Instruments

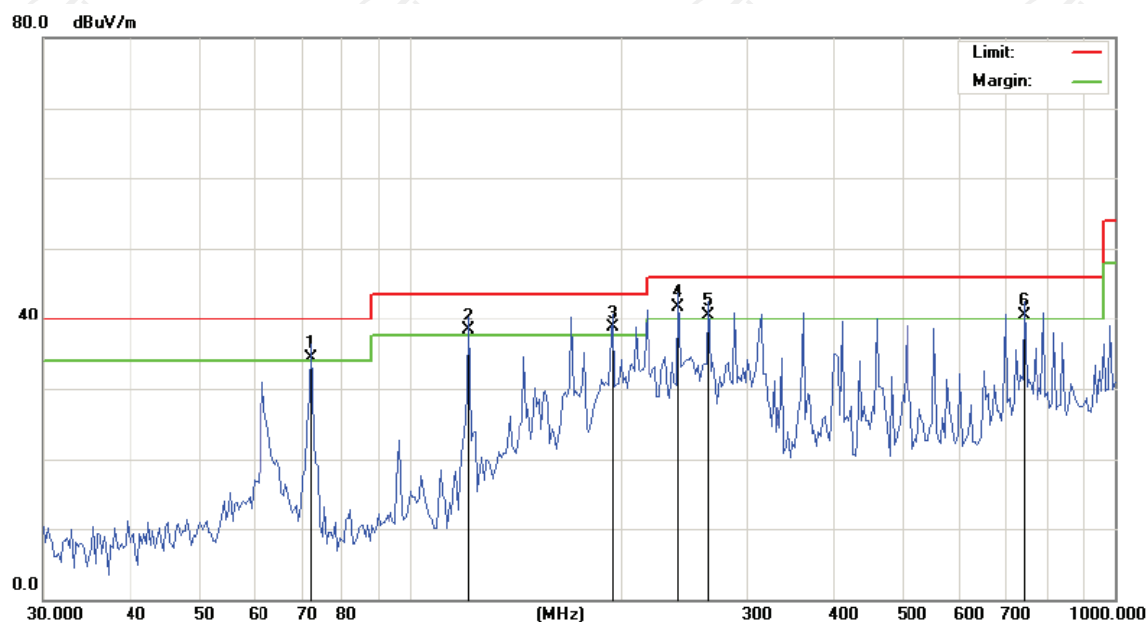
Radiated Emission Test Site (966)				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
ESPI Test Receiver	ROHDE&SCHW ARZ	ESVD	100008	Nov.16 , 2015
Spectrum Analyzer	ROHDE&SCHW ARZ	FSEM	848597/001	Nov.16 , 2015
Spectrum Analyzer	Agilent	N9020A	MY49100060	Dec. 21, 2015
Pre-amplifier	EM Electronics Corporation CO.,LTD	EM30265	07032613	Nov.16 , 2015
Pre-amplifier	HP	8447D	2727A05017	Nov.16 , 2015
Loop antenna	ZHINAN	ZN30900A	12024	Dec.14 , 2015
Broadband Antenna	Schwarzbeck	VULB9163	340	Nov.16 , 2015
Horn Antenna	Schwarzbeck	BBHA 9120D	631	Nov.16 , 2015
Horn Antenna	Schwarzbeck	BBHA 9170	373	Nov.16 , 2015
Coax cable	TCT	RE-low-01	N/A	Nov.15 , 2015
Coax cable	TCT	RE-high-02	N/A	Nov.15 , 2015
Coax cable	TCT	RE-low-03	N/A	Nov.15 , 2015
Coax cable	TCT	RE-High-04	N/A	Nov.15 , 2015
Antenna Mast	CCS	CC-A-4M	N/A	Nov.15 , 2015
EMI Test Software	Shurple Technology	EZ-EMC	N/A	N/A

Note: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).

6.7.3. Test Data

Please refer to following diagram for individual
Below 1GHz

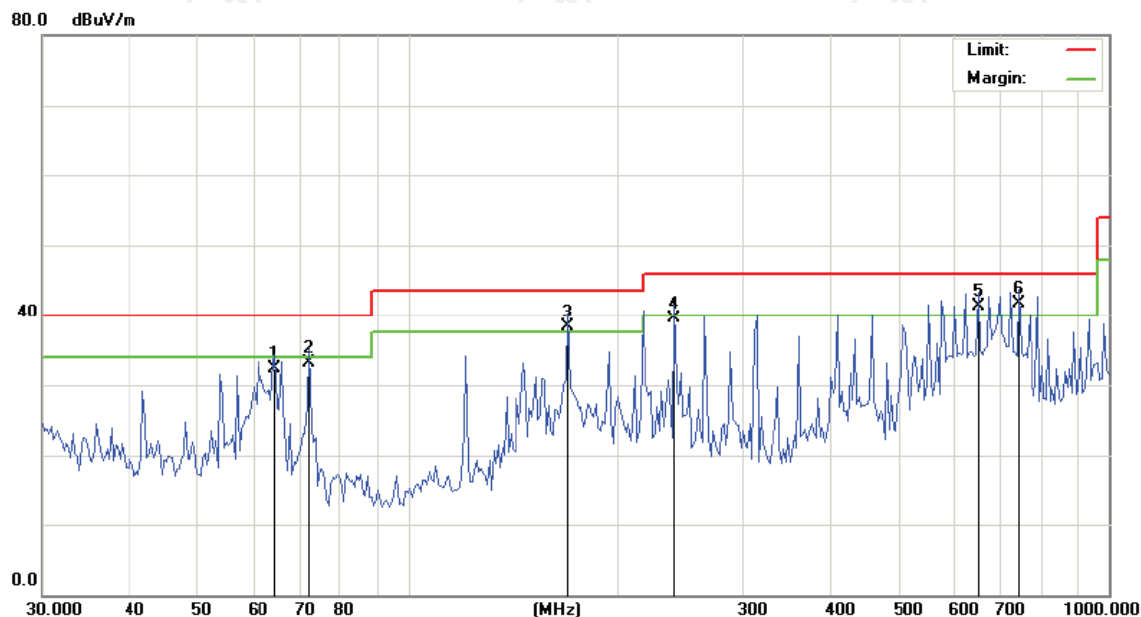
Horizontal:



Site: Polarization: **Horizontal** Temperature: 23
Limit: FCC Part 15B Class B RE_3 m Power: DC 3.7V Humidity: 54 %

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	!	72.2111	50.72	-16.46	34.26	40.00	-5.74	QP	0	
2	!	120.6118	52.12	-13.74	38.38	43.50	-5.12	QP	0	
3	!	193.1365	50.84	-12.15	38.69	43.50	-4.81	QP	0	
4	*	240.1442	51.95	-10.31	41.64	46.00	-4.36	QP	0	
5	!	264.9708	49.91	-9.45	40.46	46.00	-5.54	QP	0	
6	!	744.4265	39.83	0.72	40.55	46.00	-5.45	QP	0	

Vertical:



Site: Polarization: **Vertical** Temperature: 23
 Limit: FCC Part 15B Class B RE_3 m Power: DC 3.7V Humidity: 54 %

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		64.5318	46.79	-14.48	32.31	40.00	-7.69	QP	0	
2		72.2111	49.56	-16.46	33.10	40.00	-6.90	QP	0	
3	!	168.9970	52.18	-13.83	38.35	43.50	-5.15	QP	0	
4		240.1442	49.78	-10.31	39.47	46.00	-6.53	QP	0	
5	!	651.3831	42.21	-0.87	41.34	46.00	-4.66	QP	0	
6	*	744.4265	40.95	0.72	41.67	46.00	-4.33	QP	0	

Note: 1. The low frequency, which started from 9KHz~30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported

2. Measurements were conducted in all three channels (high, middle, low) and all modulation(802.11b, 802.11g, 802.11n(HT20), 802.11n(HT40)), and the worst case Mode (Highest channel and 802.11b) was submitted only.

Test Result of Radiated Spurious at Band edges

Modulation Type: 802.11b

Low channel: 2412 MHz

Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBμV)	Correction Factor (dB/m)	Peak Final Emission Level	Peak limit (dBμV/m)	AV limit (dBμV/m)
2310	H	47.22	-4.20	43.02	74.00	54.00
2377.38	H	47.88	-4.10	43.78	74.00	54.00
2390	H	53.64	-3.94	49.70	74.00	54.00
2310	V	44.38	-4.20	40.18	74.00	54.00
2377.38	V	52.96	-4.10	48.86	74.00	54.00
2390	V	54.49	-3.94	50.55	74.00	54.00

Modulation Type: 802.11b

Low channel: 2462 MHz

Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBμV)	Correction Factor (dB/m)	Peak Final Emission Level	Peak limit (dBμV/m)	AV limit (dBμV/m)
2483.5	H	50.59	-3.60	46.99	74.00	54.00
2487.09	H	47.14	-3.50	43.64	74.00	54.00
2500	H	44.39	-3.34	41.05	74.00	54.00
2483.5	V	53.40	-3.60	49.80	74.00	54.00
2487.09	V	46.72	-3.50	43.22	74.00	54.00
2500	V	42.17	-3.34	38.83	74.00	54.00

Modulation Type: 802.11g

Low channel: 2412 MHz

Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBμV)	Correction Factor (dB/m)	Peak Final Emission Level	Peak limit (dBμV/m)	AV limit (dBμV/m)
2310	H	42.40	-4.20	38.20	74.00	54.00
2388.96	H	50.44	-4.12	46.32	74.00	54.00
2390	H	52.44	-3.94	48.50	74.00	54.00
2310	V	44.89	-4.20	40.69	74.00	54.00
2388.96	V	49.00	-4.12	44.88	74.00	54.00
2390	V	53.21	-3.94	49.27	74.00	54.00

Modulation Type: 802.11g

Low channel: 2462 MHz

Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBμV)	Correction Factor (dB/m)	Peak Final Emission Level	Peak limit (dBμV/m)	AV limit (dBμV/m)
2483.5	H	52.45	-3.60	48.85	74.00	54.00
2487.59	H	50.74	-3.52	47.22	74.00	54.00
2500	H	47.16	-3.34	43.82	74.00	54.00
2483.5	V	51.90	-3.60	48.30	74.00	54.00
2487.59	V	48.15	-3.52	44.63	74.00	54.00
2500	V	47.83	-3.34	44.49	74.00	54.00

Modulation Type: 802.11n(20MHz)

Low channel: 2412 MHz

Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBμV)	Correction Factor (dB/m)	Peak Final Emission Level	Peak limit (dBμV/m)	AV limit (dBμV/m)
2310	H	45.96	-4.20	41.76	74.00	54.00
2388.01	H	51.24	-4.10	47.14	74.00	54.00
2390	H	52.87	-3.94	48.93	74.00	54.00
2310	V	47.42	-4.20	43.22	74.00	54.00
2388.01	V	51.99	-4.10	47.89	74.00	54.00
2390	V	53.78	-3.94	49.84	74.00	54.00

Modulation Type: 802.11n(20MHz)

Low channel: 2462 MHz

Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBμV)	Correction Factor (dB/m)	Peak Final Emission Level	Peak limit (dBμV/m)	AV limit (dBμV/m)
2483.5	H	51.84	-3.60	48.24	74.00	54.00
2392.55	H	50.21	-3.50	46.71	74.00	54.00
2500	H	47.33	-3.34	43.99	74.00	54.00
2483.5	V	52.59	-3.60	48.99	74.00	54.00
2392.55	V	49.67	-3.50	46.17	74.00	54.00
2500	V	48.38	-3.34	45.04	74.00	54.00

Modulation Type: 802.11n(40MHz)

Low channel: 2422 MHz

Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBμV)	Correction Factor (dB/m)	Peak Final Emission Level	Peak limit (dBμV/m)	AV limit (dBμV/m)
2310	H	45.82	-4.20	41.62	74.00	54.00
2388.01	H	52.80	-4.10	48.70	74.00	54.00
2390	H	53.87	-3.94	49.93	74.00	54.00
2310	V	47.35	-4.20	43.15	74.00	54.00
2388.01	V	53.49	-4.10	49.39	74.00	54.00
2390	V	54.59	-3.94	50.65	74.00	54.00

Modulation Type: 802.11n(40MHz)

Low channel: 2452 MHz

Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBμV)	Correction Factor (dB/m)	Peak Final Emission Level	Peak limit (dBμV/m)	AV limit (dBμV/m)
2483.5	H	51.75	-3.60	48.15	74.00	54.00
2392.55	H	50.65	-3.50	47.15	74.00	54.00
2500	H	46.81	-3.34	43.47	74.00	54.00
2483.5	V	52.34	-3.60	48.74	74.00	54.00
2392.55	V	49.85	-3.50	46.35	74.00	54.00
2500	V	47.85	-3.34	44.51	74.00	54.00

Note:

1. Peak Final Emission Level=Peak Reading + Correction Factor;
2. Correction Factor= Antenna Factor + Cable loss – Pre-amplifier

Above 1GHz

Modulation Type: 802.11b

Low channel: 2412 MHz

Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBμV)	AV reading (dBμV)	Correction Factor (dB/m)	Emission Level		Peak limit (dBμV/m)	AV limit (dBμV/m)	Margin (dB)
					Peak (dBμV/m)	AV (dBμV/m)			
4824	H	48.40	---	0.75	49.15	---	74	54	-4.85
7236	H	39.87	---	9.87	49.74	---	74	54	-4.26
---	H	---	---	---	---	---	---	---	---
4824	V	47.90	---	0.75	48.65	---	74	54	-5.35
7236	V	40.24	---	9.87	50.11	---	74	54	-3.89
---	V	---	---	---	---	---	---	---	---

Middle channel: 2437MHz

Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBμV)	AV reading (dBμV)	Correction Factor (dB/m)	Emission Level		Peak limit (dBμV/m)	AV limit (dBμV/m)	Margin (dB)
					Peak (dBμV/m)	AV (dBμV/m)			
4874	H	48.43	---	0.97	49.40	---	74	54	-4.60
7311	H	40.23	---	9.83	50.06	---	74	54	-3.94
---	H	---	---	---	---	---	---	---	---
4874	V	48.50	---	0.97	49.47	---	74	54	-4.53
7311	V	40.19	---	9.83	50.02	---	74	54	-3.98
---	V	---	---	---	---	---	---	---	---

High channel: 2462 MHz

Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBμV)	AV reading (dBμV)	Correction Factor (dB/m)	Emission Level		Peak limit (dBμV/m)	AV limit (dBμV/m)	Margin (dB)
					Peak (dBμV/m)	AV (dBμV/m)			
4924	H	48.58	---	1.18	49.76	---	74	54	-4.24
7386	H	39.20	---	10.07	49.27	---	74	54	-4.73
---	H	---	---	---	---	---	---	---	---
4924	V	49.23	---	1.18	50.41	---	74	54	-3.59
7386	V	39.73	---	10.07	49.80	---	74	54	-4.20
---	V	---	---	---	---	---	---	---	---

Note:

1. Emission Level=Peak Reading + Correction Factor; Correction Factor= Antenna Factor + Cable loss – Pre-amplifier
2. Margin (dB) = Emission Level (Peak) (dBμV/m)-Average limit (dBμV/m)
3. The emission levels of other frequencies are very lower than the limit and not show in test report.
4. Measurements were conducted from 1 GHz to the 10th harmonic of highest fundamental frequency. The highest test frequency is 25GHz.
5. Data of measurement shown "—" in the above table mean that the reading of emissions is attenuated more than 20 dB below the limits or the field strength is too small to be measured.

Modulation Type: 802.11g

Low channel: 2412 MHz

Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBμV)	AV reading (dBμV)	Correction Factor (dB/m)	Emission Level		Peak limit (dBμV/m)	AV limit (dBμV/m)	Margin (dB)
					Peak (dBμV/m)	AV (dBμV/m)			
4824	H	48.70	---	0.75	49.45	---	74	54	-4.55
7236	H	40.03	---	9.87	49.90	---	74	54	-4.10
---	H	---	---	---	---	---	---	---	---
4824	V	47.73	---	0.75	48.48	---	74	54	-5.52
7236	V	40.39	---	9.87	50.26	---	74	54	-3.74
---	V	---	---	---	---	---	---	---	---

Middle channel: 2437MHz

Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBμV)	AV reading (dBμV)	Correction Factor (dB/m)	Emission Level		Peak limit (dBμV/m)	AV limit (dBμV/m)	Margin (dB)
					Peak (dBμV/m)	AV (dBμV/m)			
4874	H	48.40	---	0.97	49.37	---	74	54	-4.63
7311	H	39.81	---	9.83	49.64	---	74	54	-4.36
---	H	---	---	---	---	---	---	---	---
4874	V	47.81	---	0.97	48.78	---	74	54	-5.22
7311	V	40.36	---	9.83	50.19	---	74	54	-3.81
---	V	---	---	---	---	---	---	---	---

High channel: 2462 MHz

Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBμV)	AV reading (dBμV)	Correction Factor (dB/m)	Emission Level		Peak limit (dBμV/m)	AV limit (dBμV/m)	Margin (dB)
					Peak (dBμV/m)	AV (dBμV/m)			
4924	H	48.19	---	1.18	49.37	---	74	54	-4.63
7386	H	39.39	---	10.07	49.46	---	74	54	-4.54
---	H	---	---	---	---	---	---	---	---
4924	V	47.33	---	1.18	48.51	---	74	54	-5.49
7386	V	39.59	---	10.07	49.66	---	74	54	-4.34
---	V	---	---	---	---	---	---	---	---

Note:

- Emission Level=Peak Reading + Correction Factor; Correction Factor= Antenna Factor + Cable loss – Pre-amplifier
- Margin (dB) = Emission Level (Peak) (dBμV/m)-Average limit (dBμV/m)
- The emission levels of other frequencies are very lower than the limit and not show in test report.
- Measurements were conducted from 1 GHz to the 10th harmonic of highest fundamental frequency. The highest test frequency is 25GHz.
- Data of measurement shown “---“in the above table mean that the reading of emissions is attenuated more than 20 dB below the limits or the field strength is too small to be measured.

Modulation Type: 802.11n (HT20)

Low channel: 2412 MHz

Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBμV)	AV reading (dBμV)	Correction Factor (dB/m)	Emission Level		Peak limit (dBμV/m)	AV limit (dBμV/m)	Margin (dB)
					Peak (dBμV/m)	AV (dBμV/m)			
4824	H	48.73	---	0.75	49.48	---	74	54	-4.52
7236	H	40.31	---	9.87	50.18	---	74	54	-3.82
---	H	---	---	---	---	---	---	---	---
4824	V	48.10	---	0.75	48.85	---	74	54	-5.15
7236	V	39.36	---	9.87	49.23	---	74	54	-4.77
---	V	---	---	---	---	---	---	---	---

Middle channel: 2437MHz

Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBμV)	AV reading (dBμV)	Correction Factor (dB/m)	Emission Level		Peak limit (dBμV/m)	AV limit (dBμV/m)	Margin (dB)
					Peak (dBμV/m)	AV (dBμV/m)			
4874	H	47.78	---	0.97	48.75	---	74	54	-5.25
7311	H	39.72	---	9.83	49.55	---	74	54	-4.45
---	H	---	---	---	---	---	---	---	---
4874	V	47.85	---	0.97	48.82	---	74	54	-5.18
7311	V	39.67	---	9.83	49.50	---	74	54	-4.50
---	V	---	---	---	---	---	---	---	---

High channel: 2462 MHz

Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBμV)	AV reading (dBμV)	Correction Factor (dB/m)	Emission Level		Peak limit (dBμV/m)	AV limit (dBμV/m)	Margin (dB)
					Peak (dBμV/m)	AV (dBμV/m)			
4924	H	47.38	---	1.18	48.56	---	74	54	-5.44
7386	H	39.83	---	10.07	49.90	---	74	54	-4.10
---	H	---	---	---	---	---	---	---	---
4924	V	47.11	---	1.18	48.29	---	74	54	-5.71
7386	V	39.53	---	10.07	49.60	---	74	54	-4.40
---	V	---	---	---	---	---	---	---	---

Note:

1. Emission Level=Peak Reading + Correction Factor; Correction Factor= Antenna Factor + Cable loss – Pre-amplifier
2. Margin (dB) = Emission Level (Peak) (dBμV/m)-Average limit (dBμV/m)
3. The emission levels of other frequencies are very lower than the limit and not show in test report.
4. Measurements were conducted from 1 GHz to the 10th harmonic of highest fundamental frequency. The highest test frequency is 25GHz.
5. Data of measurement shown “---“in the above table mean that the reading of emissions is attenuated more than 20 dB below the limits or the field strength is too small to be measured.

Modulation Type: 802.11n (HT40)

Low channel: 2422 MHz

Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBμV)	AV reading (dBμV)	Correction Factor (dB/m)	Emission Level		Peak limit (dBμV/m)	AV limit (dBμV/m)	Margin (dB)
					Peak (dBμV/m)	AV (dBμV/m)			
4844.00	H	46.77	---	0.75	47.52	---	74	54	-6.48
7266.00	H	39.35	---	9.87	49.22	---	74	54	-4.78
---	H	---	---	---	---	---	---	---	---
4844.00	V	47.20	---	0.75	47.95	---	74	54	-6.05
7266.00	V	39.21	---	9.87	49.08	---	74	54	-4.92
---	V	---	---	---	---	---	---	---	---

Middle channel: 2437MHz

Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBμV)	AV reading (dBμV)	Correction Factor (dB/m)	Emission Level		Peak limit (dBμV/m)	AV limit (dBμV/m)	Margin (dB)
					Peak (dBμV/m)	AV (dBμV/m)			
4874.00	H	47.00	---	0.97	47.97	---	74	54	-6.03
7311.00	H	39.42	---	9.83	49.25	---	74	54	-4.75
---	H	---	---	---	---	---	---	---	---
4874.00	V	46.48	---	0.97	47.45	---	74	54	-6.55
7311.00	V	39.44	---	9.83	49.27	---	74	54	-4.73
---	V	---	---	---	---	---	---	---	---

High channel: 2452 MHz

Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBμV)	AV reading (dBμV)	Correction Factor (dB/m)	Emission Level		Peak limit (dBμV/m)	AV limit (dBμV/m)	Margin (dB)
					Peak (dBμV/m)	AV (dBμV/m)			
4904.00	H	46.67	---	1.18	47.85	---	74	54	-6.15
7356.00	H	39.15	---	10.07	49.22	---	74	54	-4.78
---	H	---	---	---	---	---	---	---	---
4904.00	V	47.29	---	1.18	48.47	---	74	54	-5.53
7356.00	V	39.76	---	10.07	49.83	---	74	54	-4.17
---	V	---	---	---	---	---	---	---	---

Note:

- Emission Level=Peak Reading + Correction Factor; Correction Factor= Antenna Factor + Cable loss – Pre-amplifier
- Margin (dB) = Emission Level (Peak) (dBμV/m)-Average limit (dBμV/m)
- The emission levels of other frequencies are very lower than the limit and not show in test report.
- Measurements were conducted from 1 GHz to the 10th harmonic of highest fundamental frequency.
- Data of measurement shown “---“in the above table mean that the reading of emissions is attenuated more than 20 dB below the limits or the field strength is too small to be measured.

*******END OF REPORT*******