

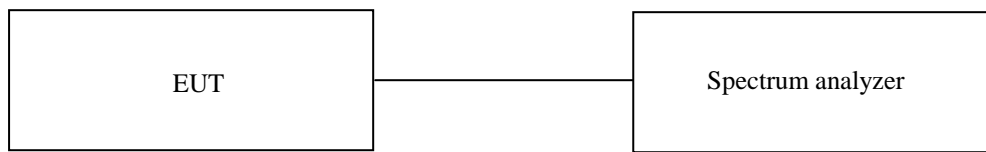
7.3 100 kHz BANDWIDTH OUTSIDE THE FREQUENCY BAND

7.3.1 Operating environment

Temperature : 21.4 °C
 Relative humidity : 45.1 % R.H.

7.3.2 Test set-up for conducted measurement

The antenna output of the EUT was connected to the spectrum analyzer. The resolution and video bandwidth is set to 100 kHz, and peak detection was used.



7.3.3 Test set-up for radiated measurement

The radiated emissions measurements were performed on the 3 m, open-field test site. The EUT was placed on a non-conductive turntable above the ground plane.

The frequency spectrum from 30 MHz to 26.5 GHz was scanned and maximum emission levels at each frequency recorded. The system was rotated 360°, and the antenna was varied in the height between 1.0 m and 4.0 m in order to determine the maximum emission levels. This procedure was performed for horizontal and vertical polarization of the receiving antenna.

7.3.4 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal.(Interval)
■ -	FSV40	Rohde & Schwarz	Signal Analyzer	101009	Jul. 30, 2014 (1Y)
■ -	ESU	Rohde & Schwarz	EMI Test Receiver	100261	Apr. 29, 2015 (1Y)
■ -	310N	Sonoma Instrument	Pre-Amplifier	312544	Apr. 29, 2015 (1Y)
■ -	SCU-18	Rohde & Schwarz	Pre-Amplifier	10041	Nov. 25, 2014 (1Y)
■ -	DT3000	Innco System	Turn Table	930611	N/A
■ -	MA4000-EP	Innco System	Antenna Master	3320611	N/A
■ -	VULB9163	Schwarzbeck	TRILOG Broadband Antenna	9163-421	Jul. 10, 2014 (2Y)
■ -	BBHA9120D	Schwarzbeck	Horn Antenna	BBHA9120D295	Sep. 05, 2013 (2Y)
■ -	BBHA9170	Schwarzbeck	Horn Antenna	BBHA9170178	Apr. 30, 2015 (2Y)

All test equipment used is calibrated on a regular basis.

7.3.5 Test data for conducted emission

7.3.5.1 Test data for WLAN 2.4 G

7.3.5.1.1 Test data for 802.11b

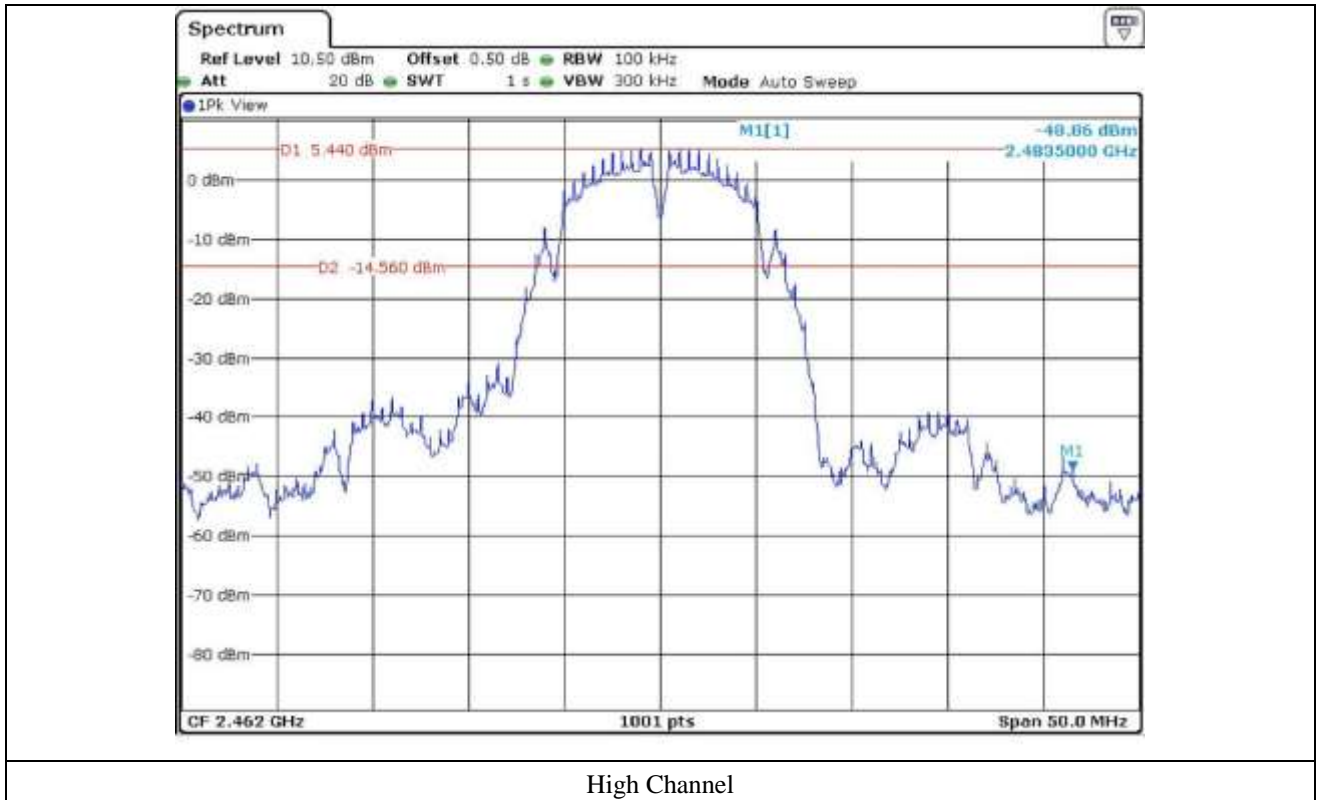
7.3.5.1.1.1 Test data for Antenna 0



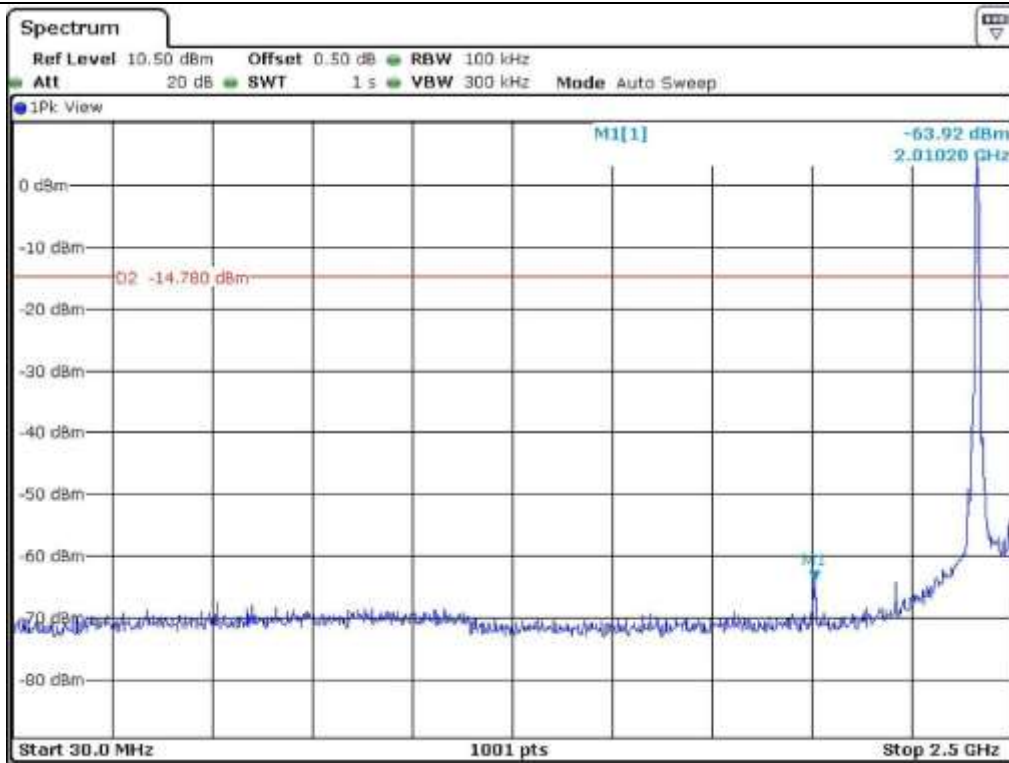
Low Channel



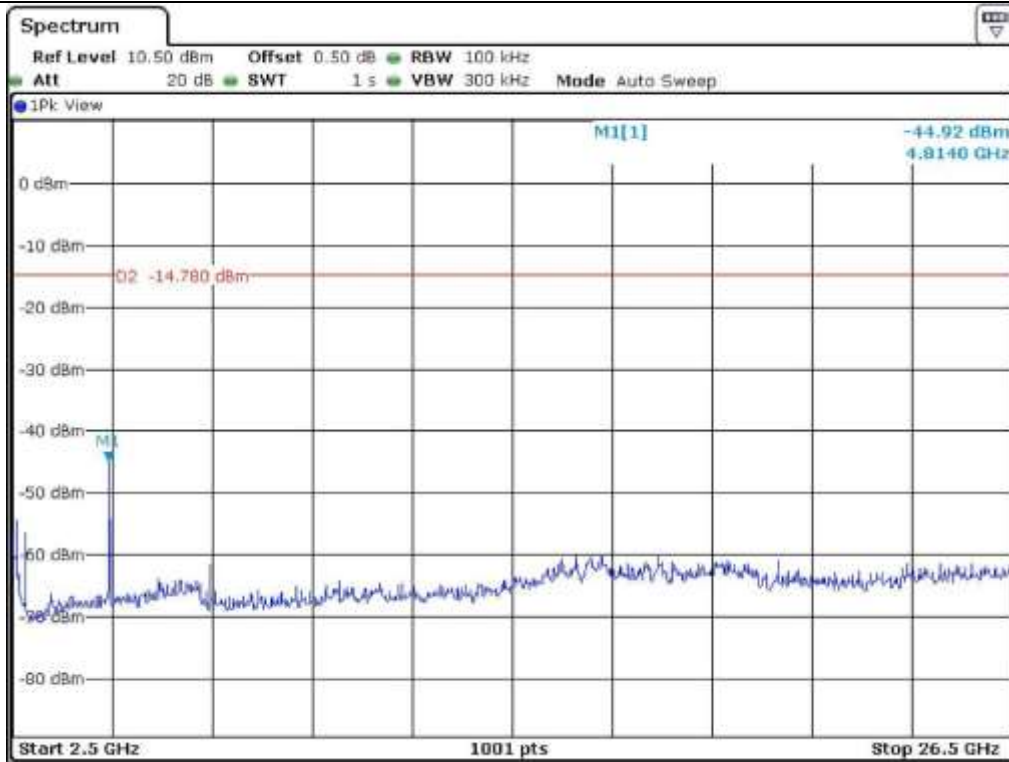
Middle Channel



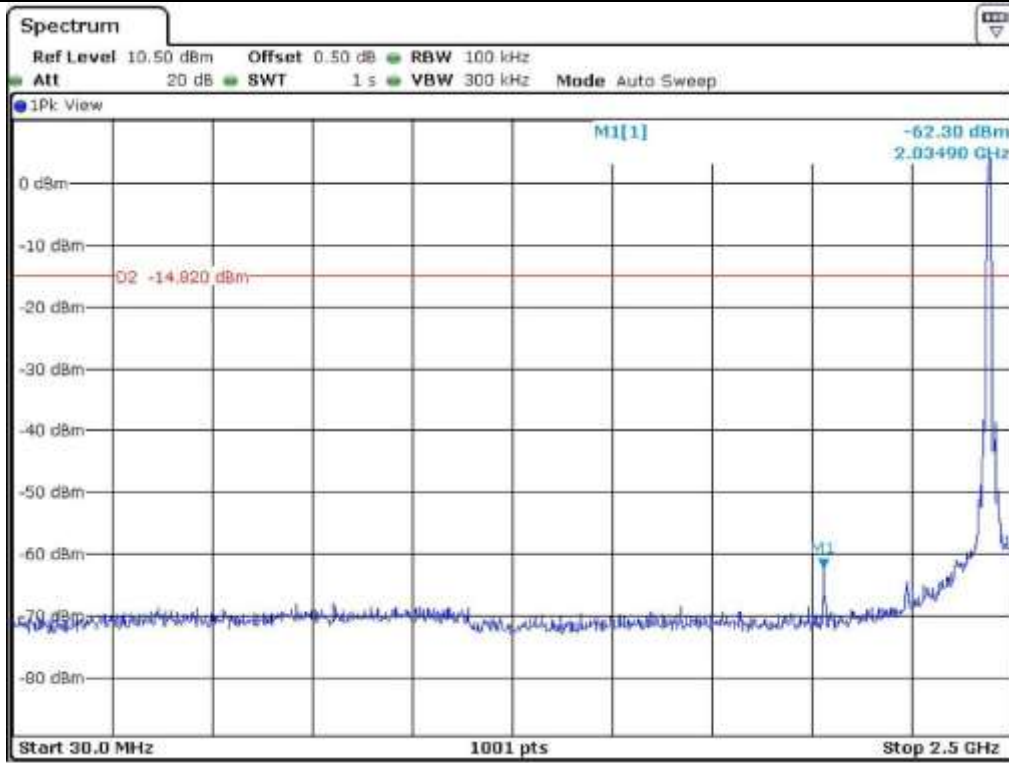
High Channel



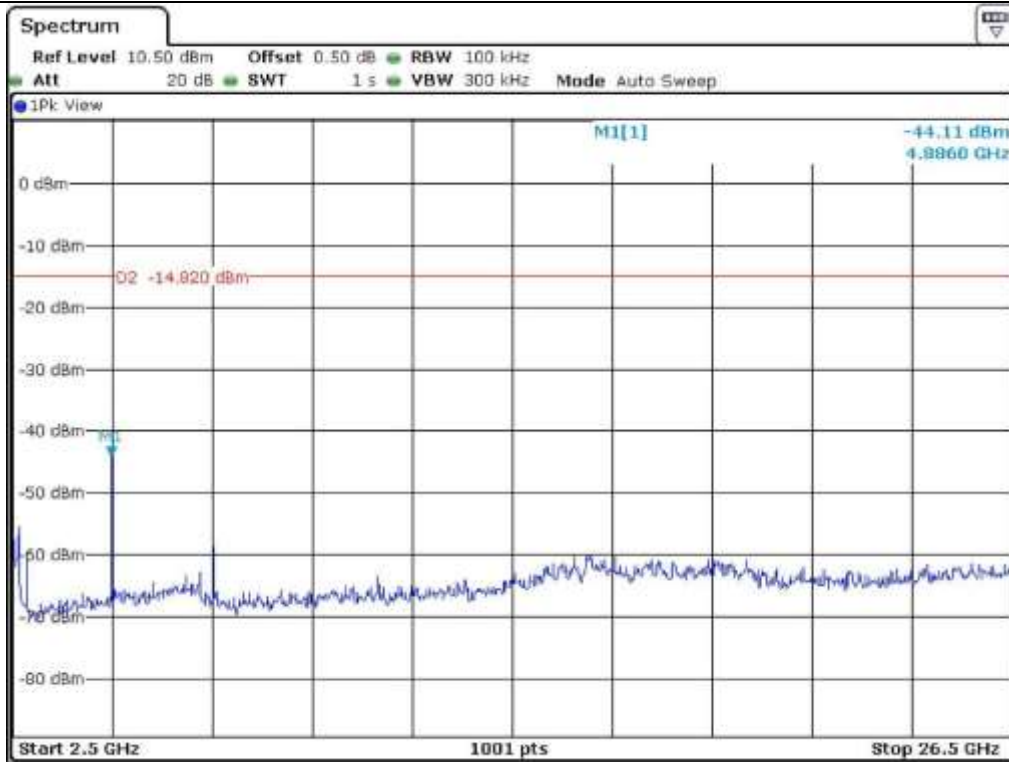
Low Channel



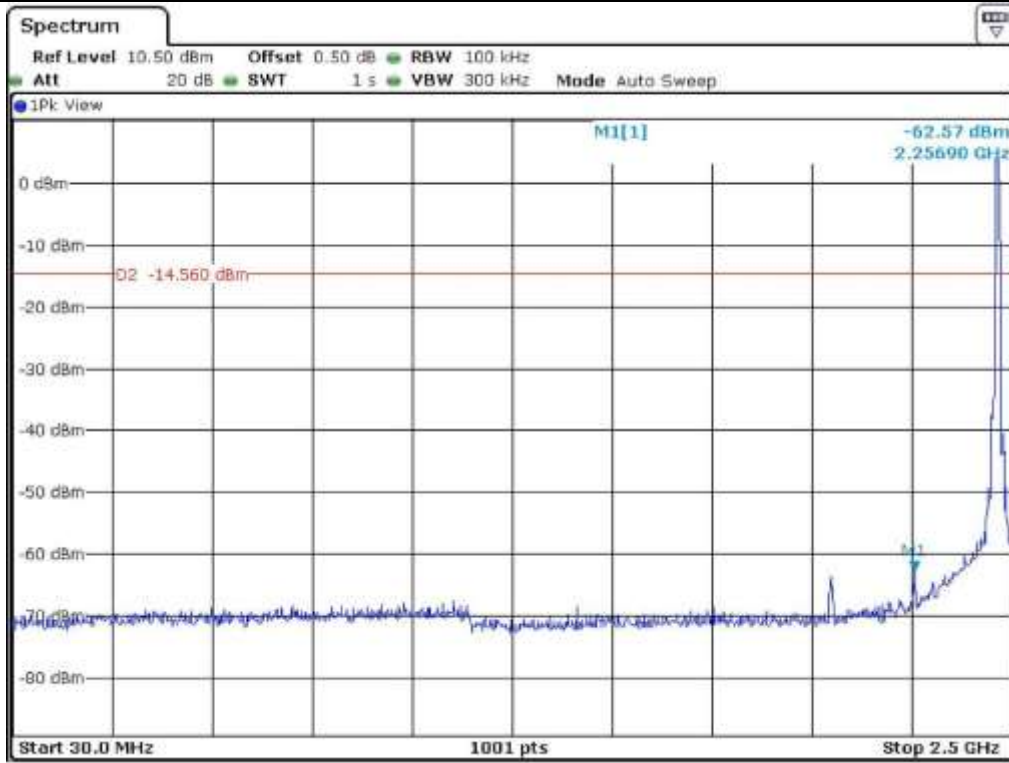
Low Channel



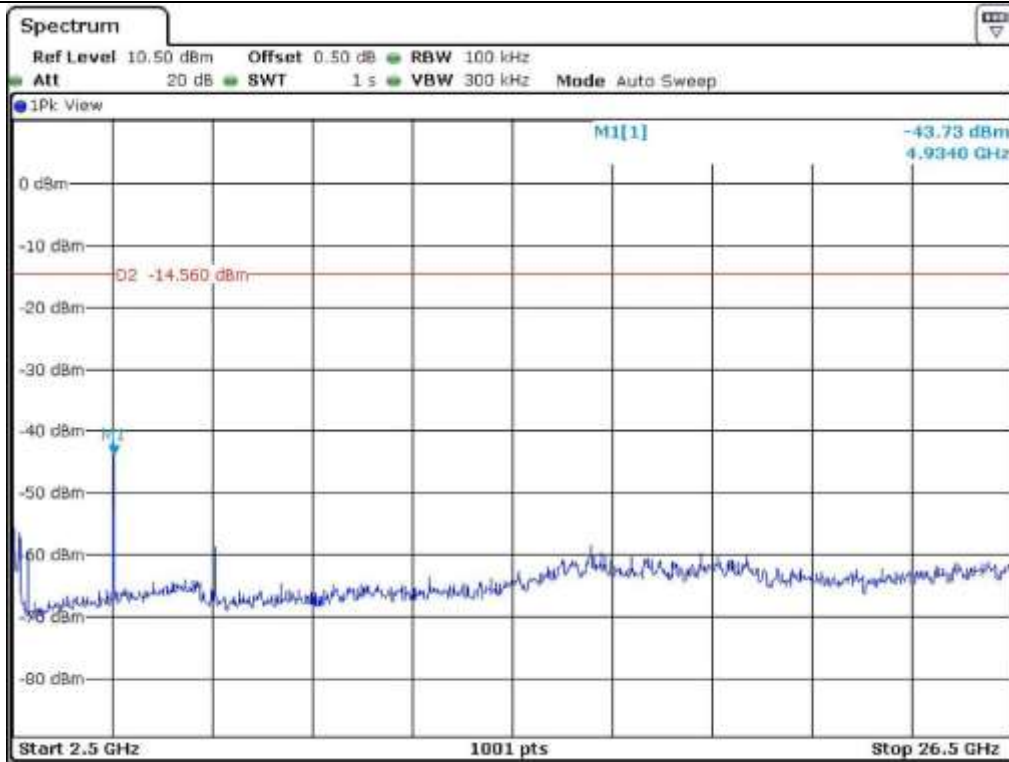
Middle Channel



Middle Channel



High Channel



High Channel

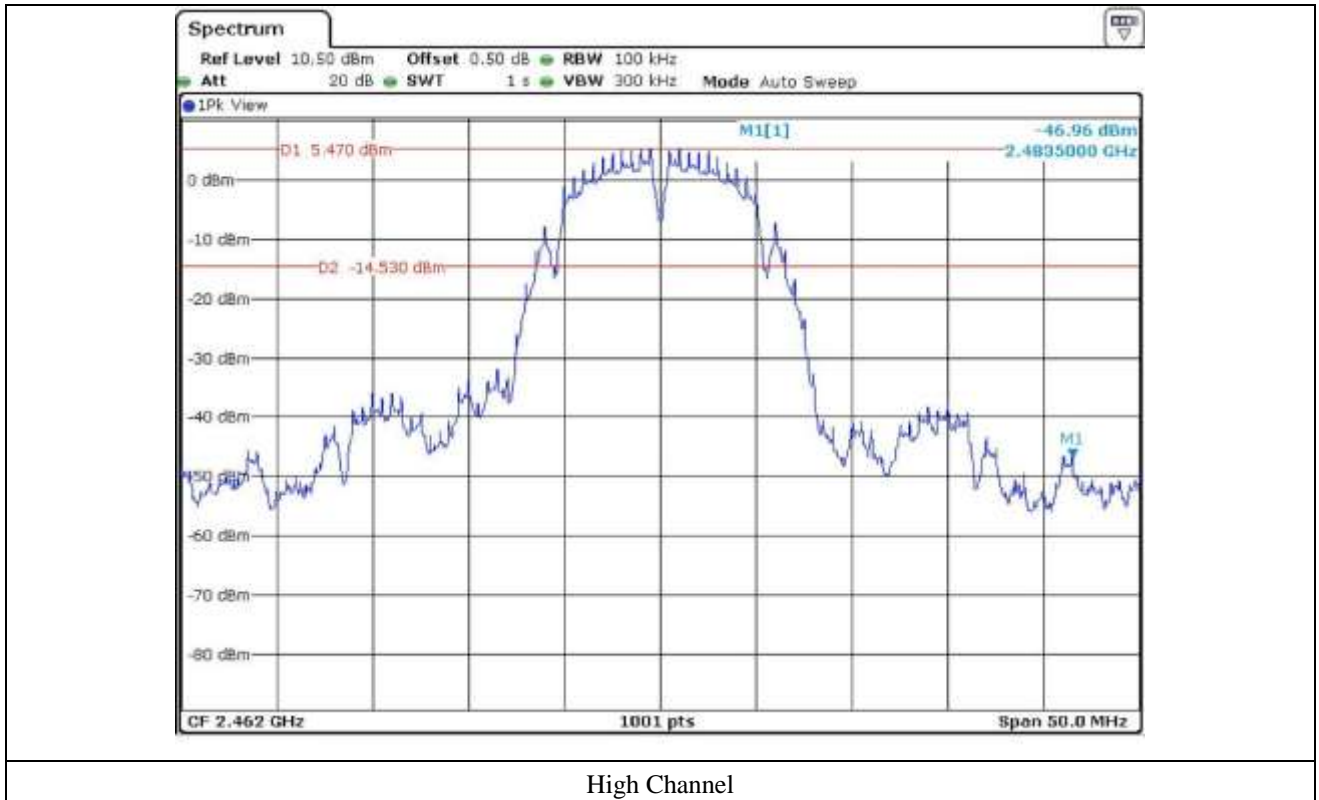
7.3.5.1.1.2 Test data for Antenna 1



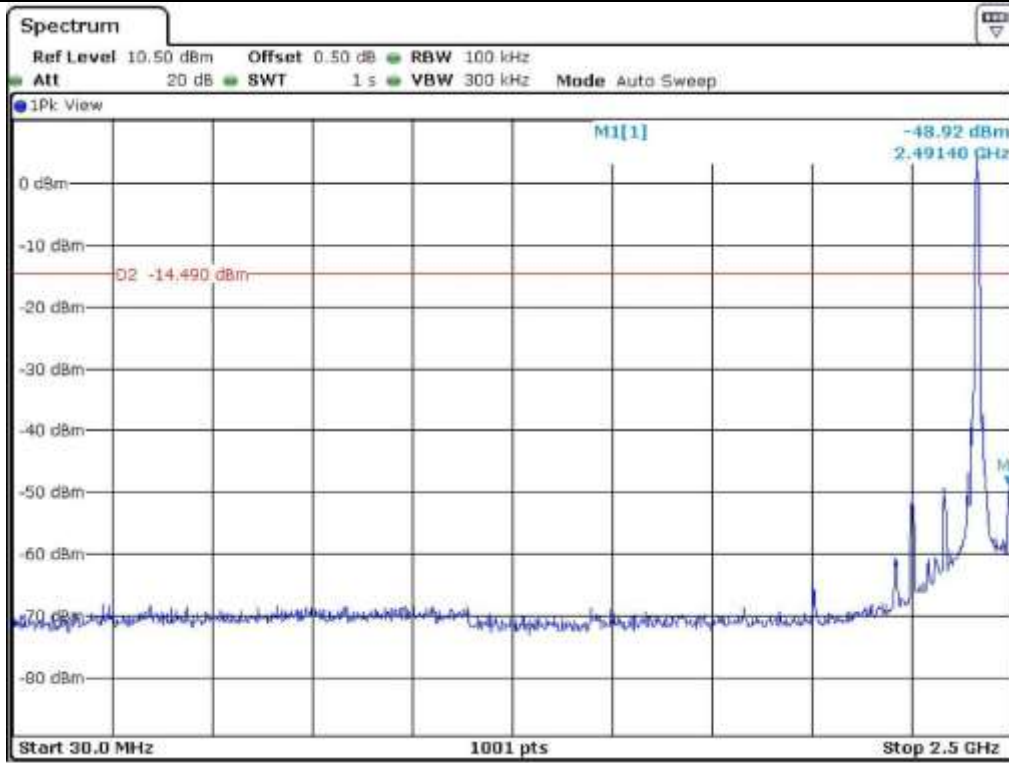
Low Channel



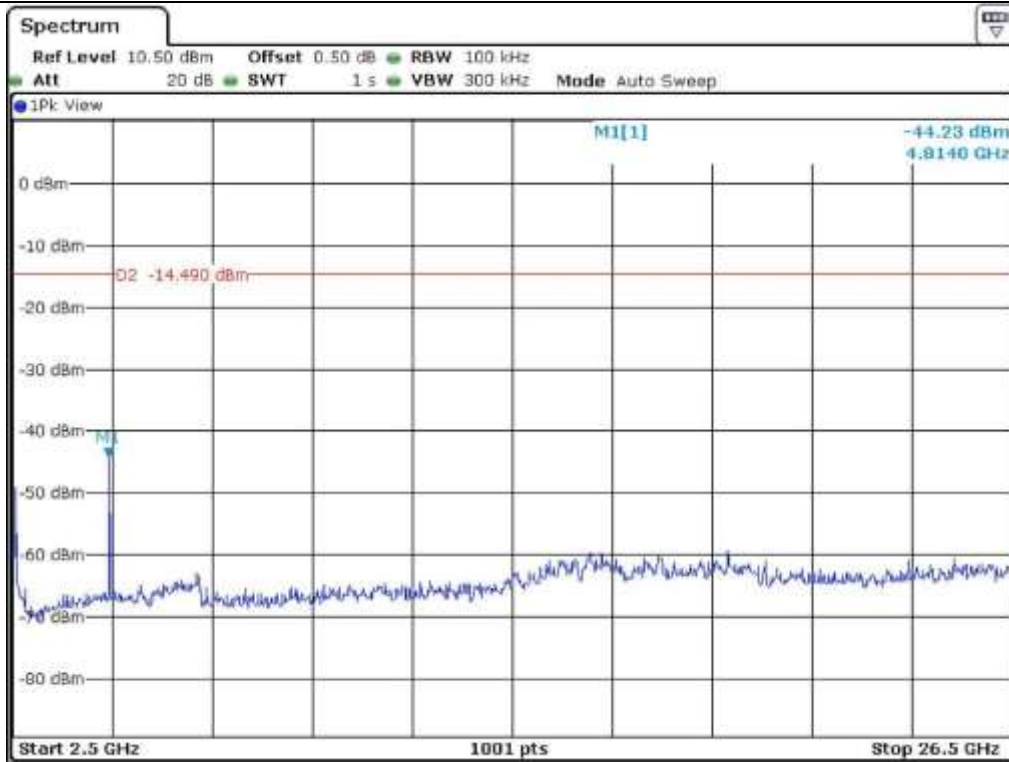
Middle Channel



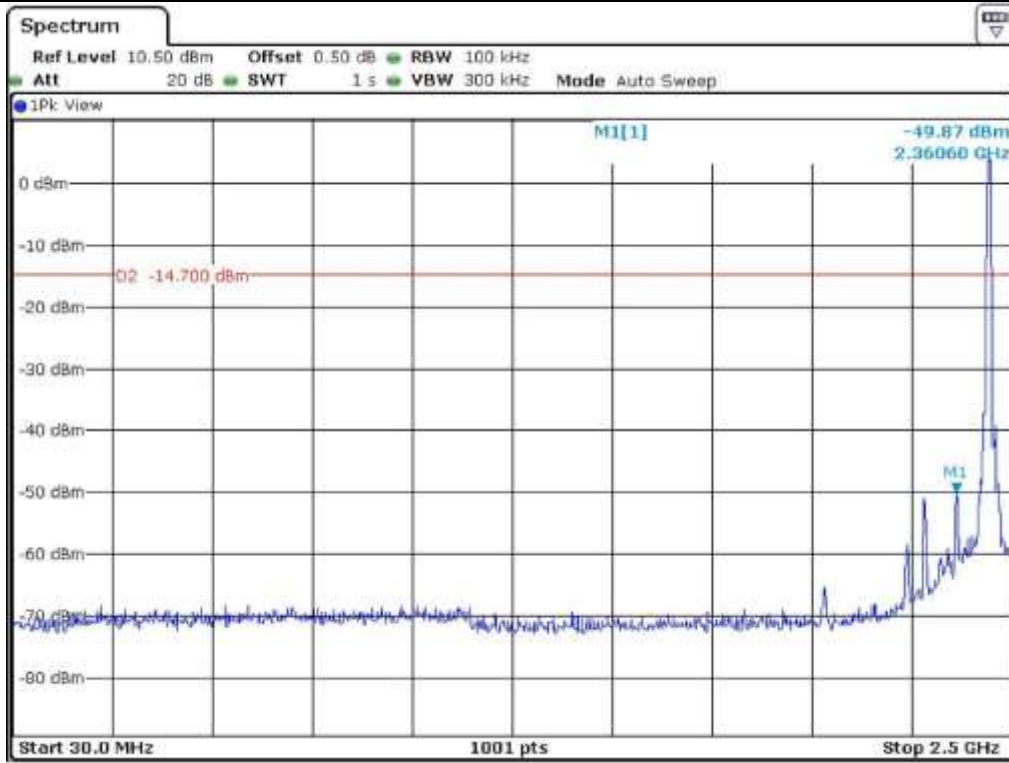
High Channel



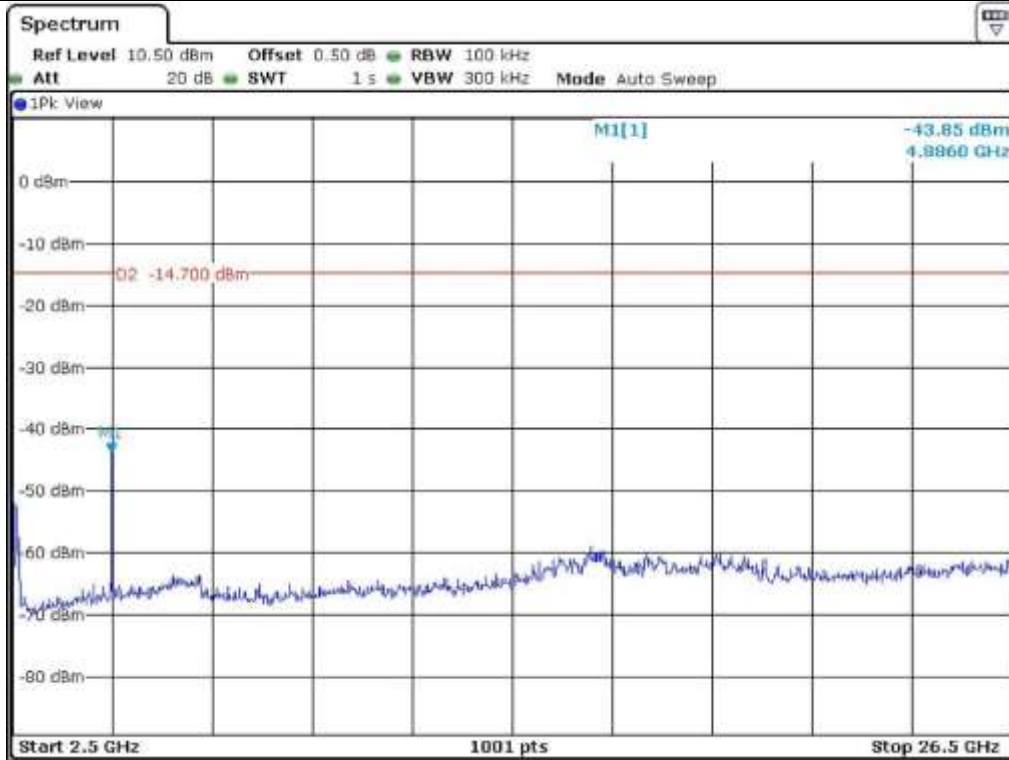
Low Channel



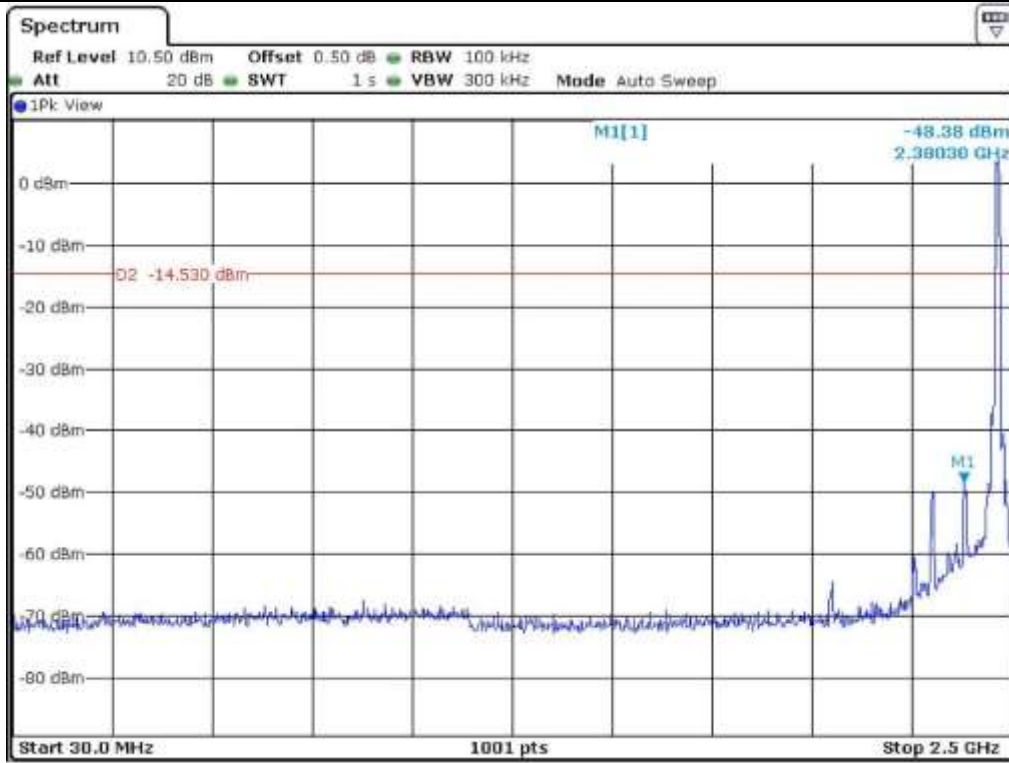
Low Channel



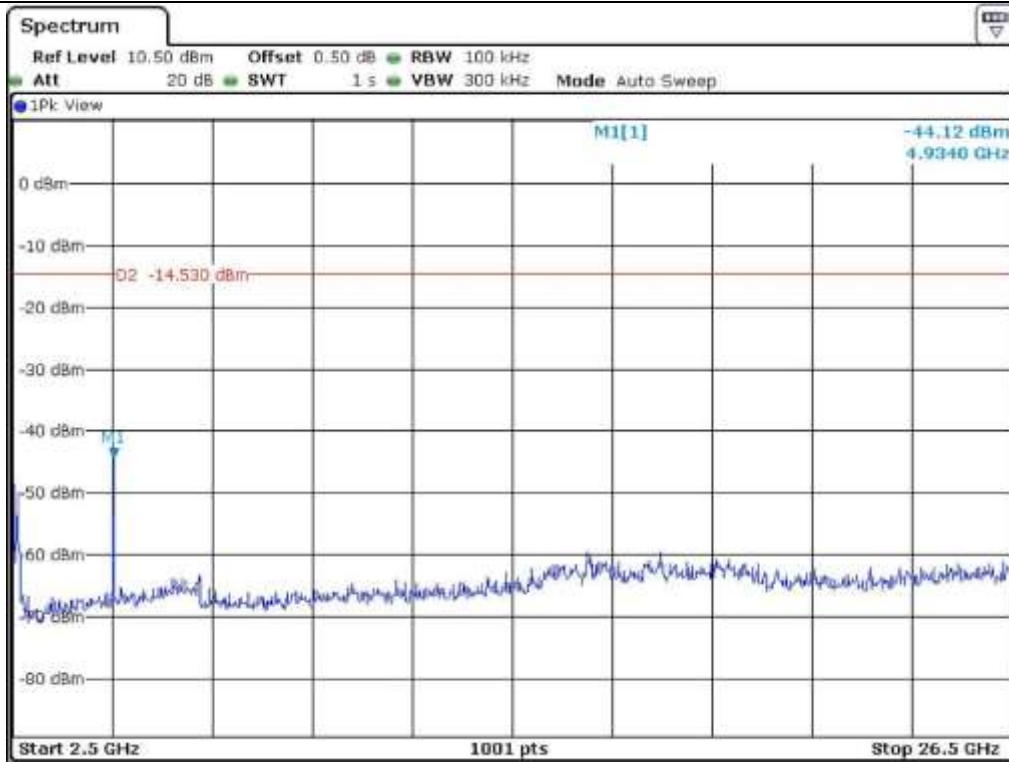
Middle Channel



Middle Channel



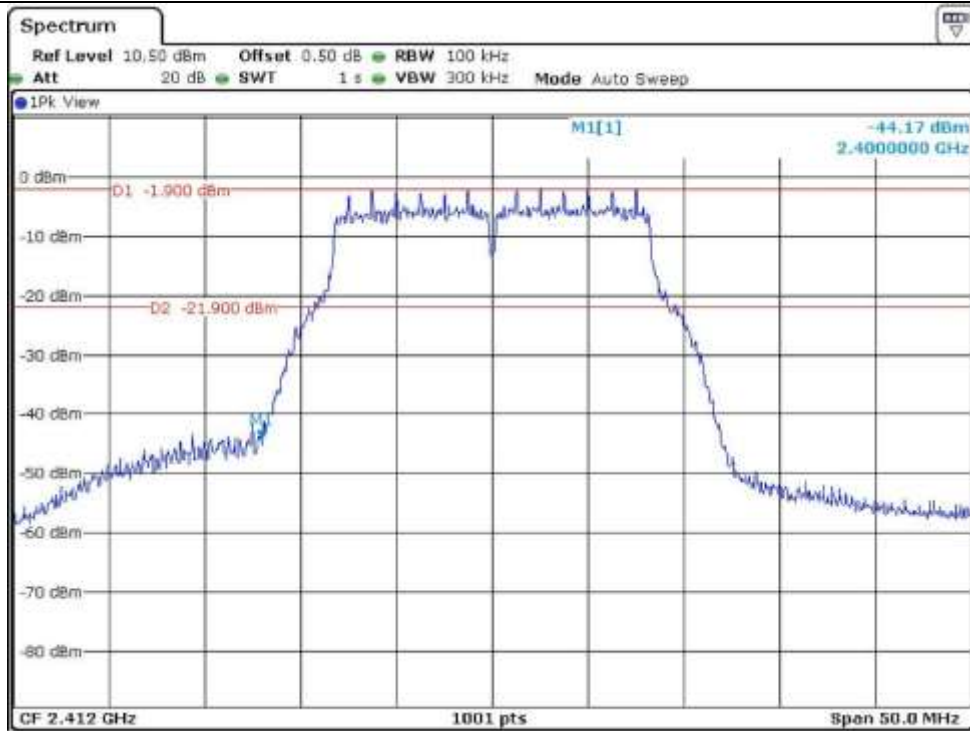
High Channel



High Channel

7.3.5.1.2 Test data for 802.11g

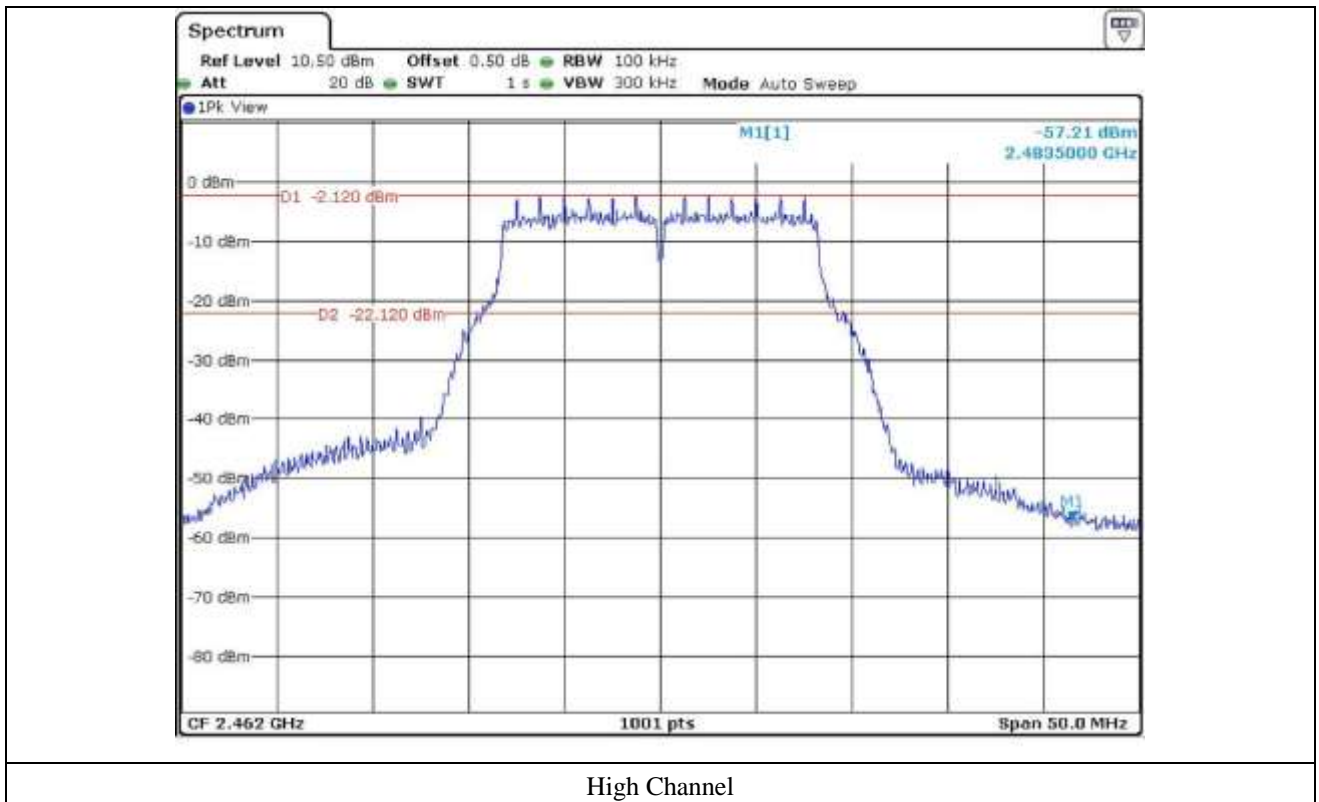
7.3.5.1.2.1 Test data for Antenna 0



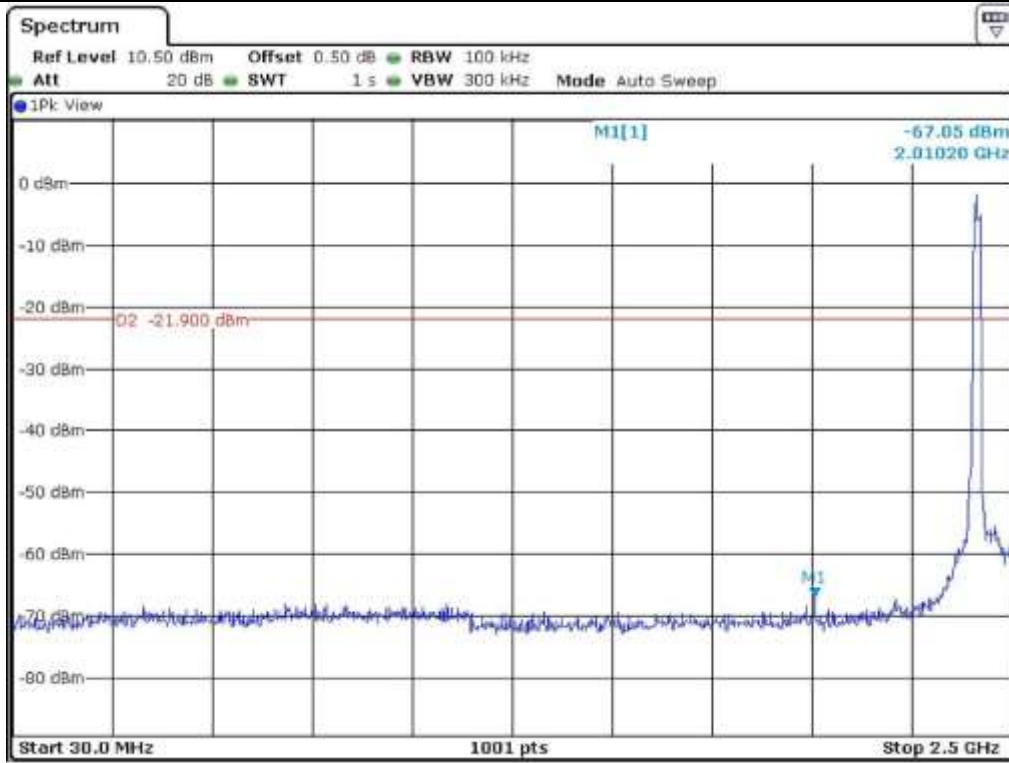
Low Channel



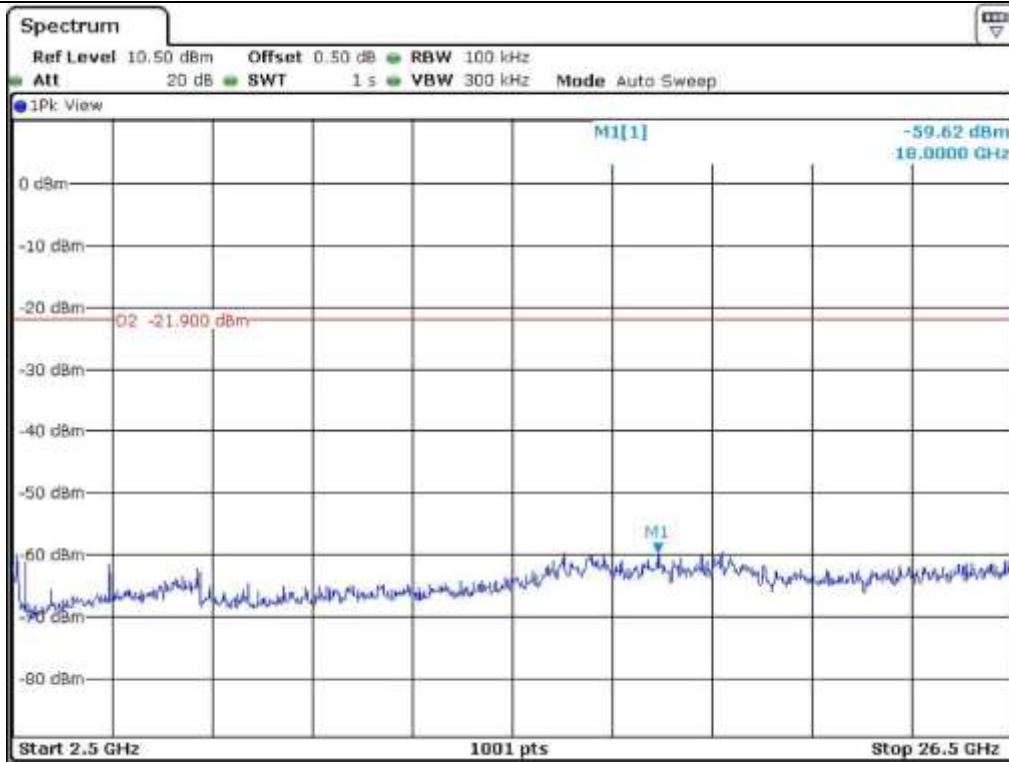
Middle Channel



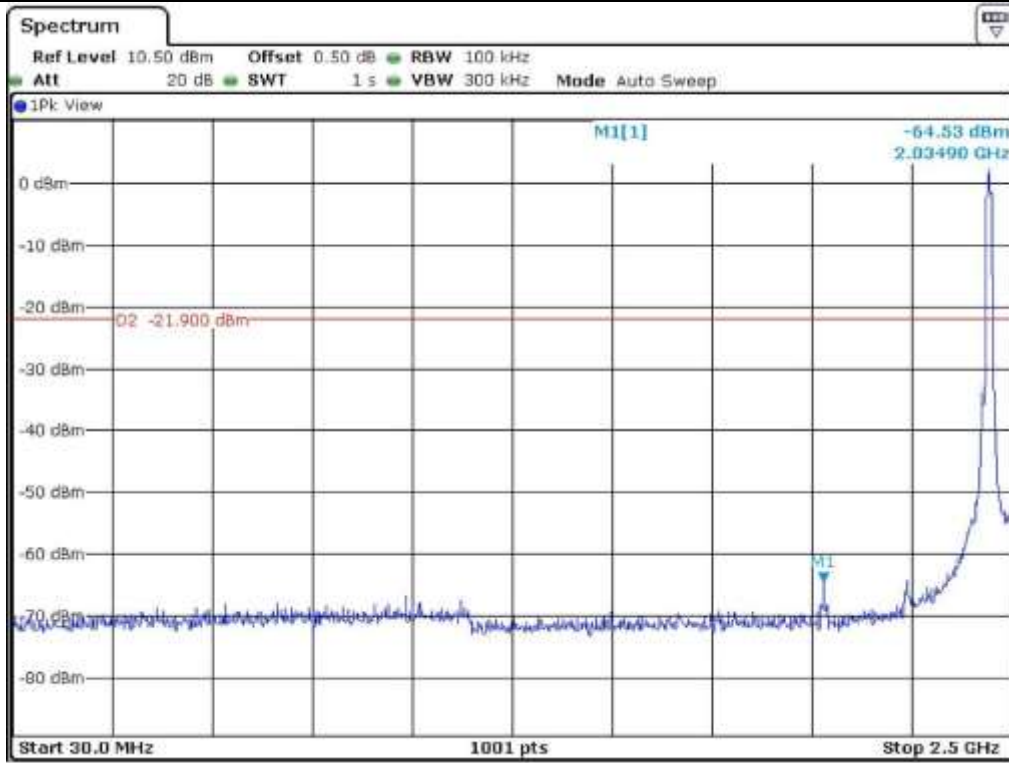
High Channel



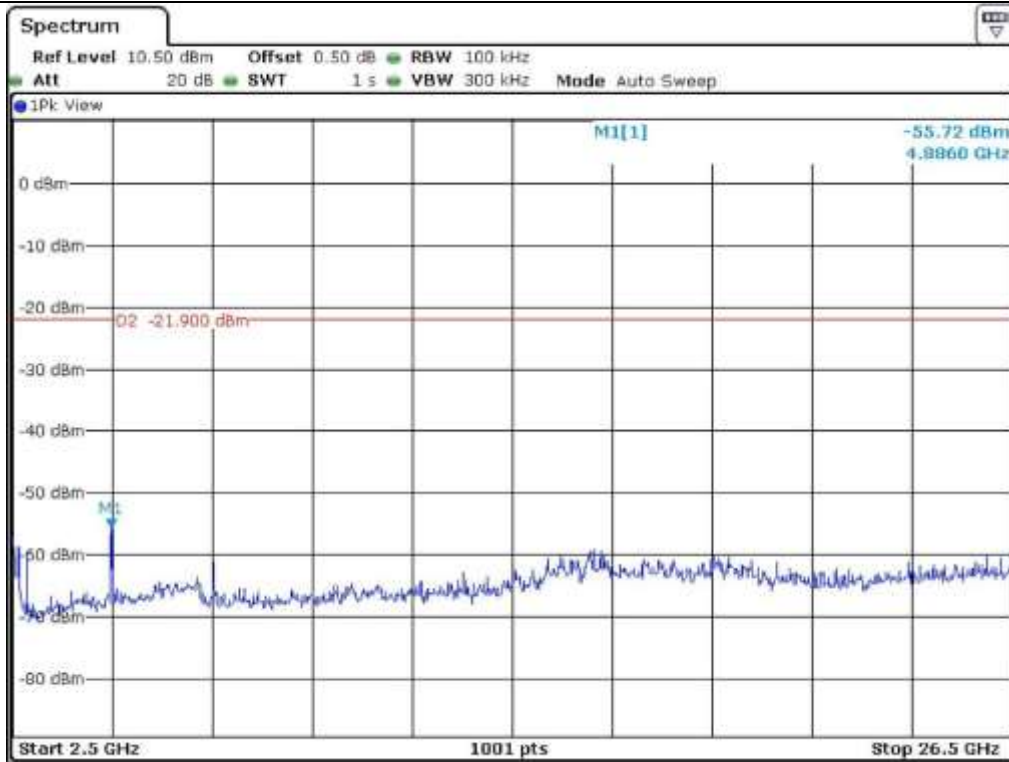
Low Channel



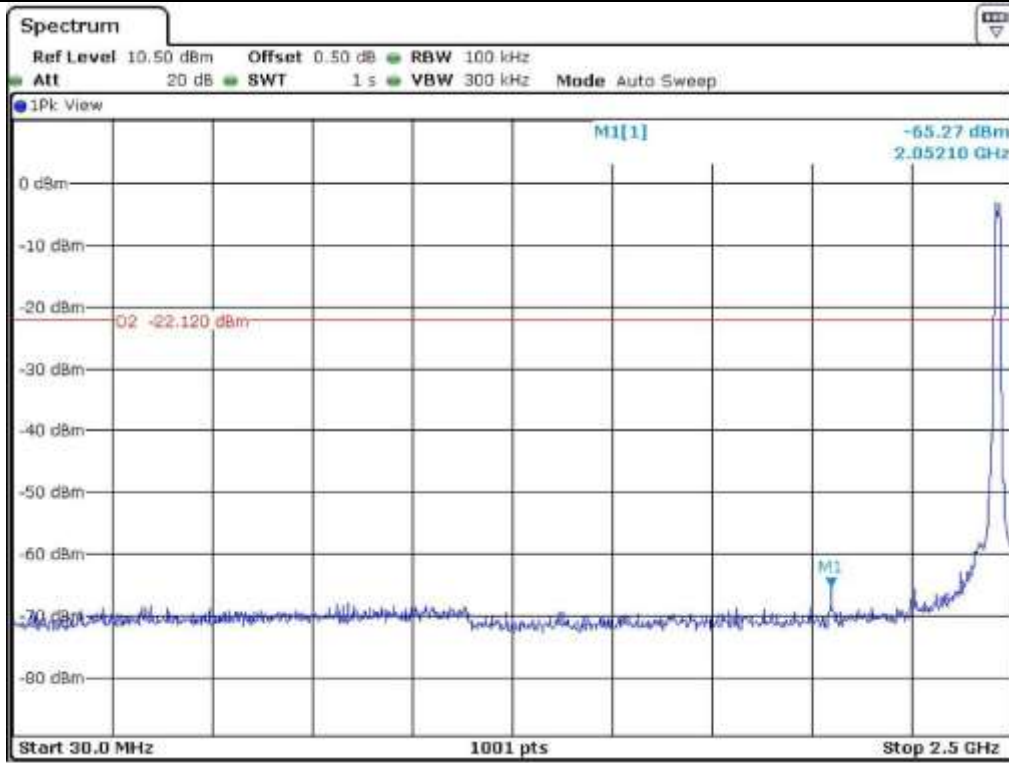
Low Channel



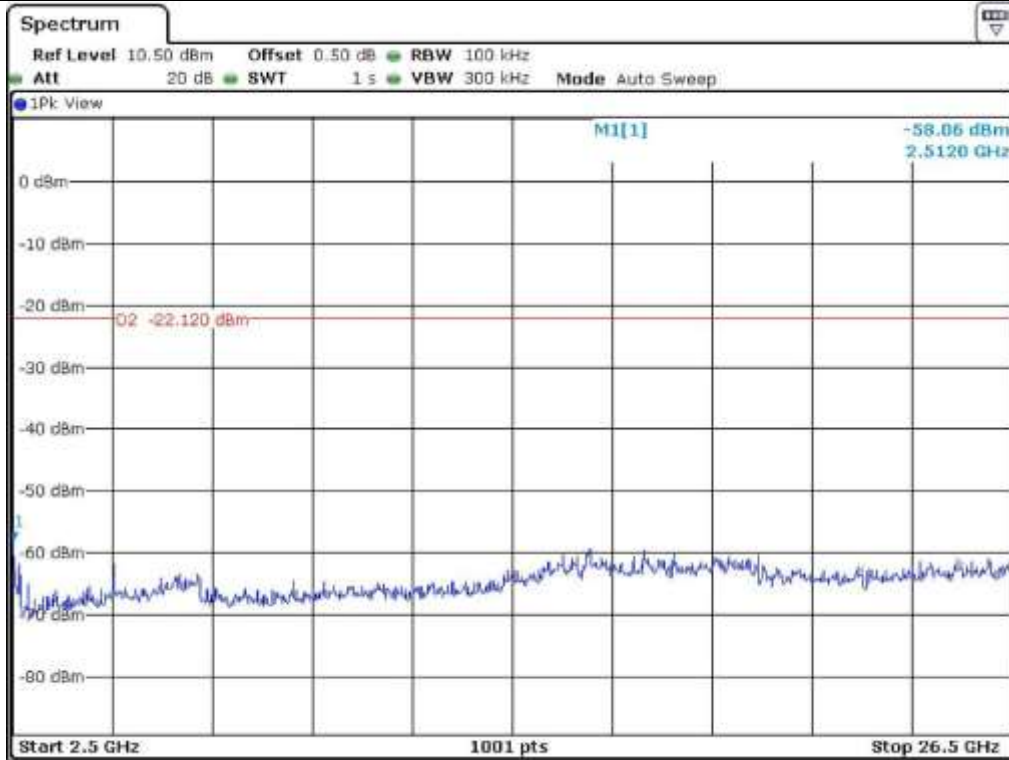
Middle Channel



Middle Channel

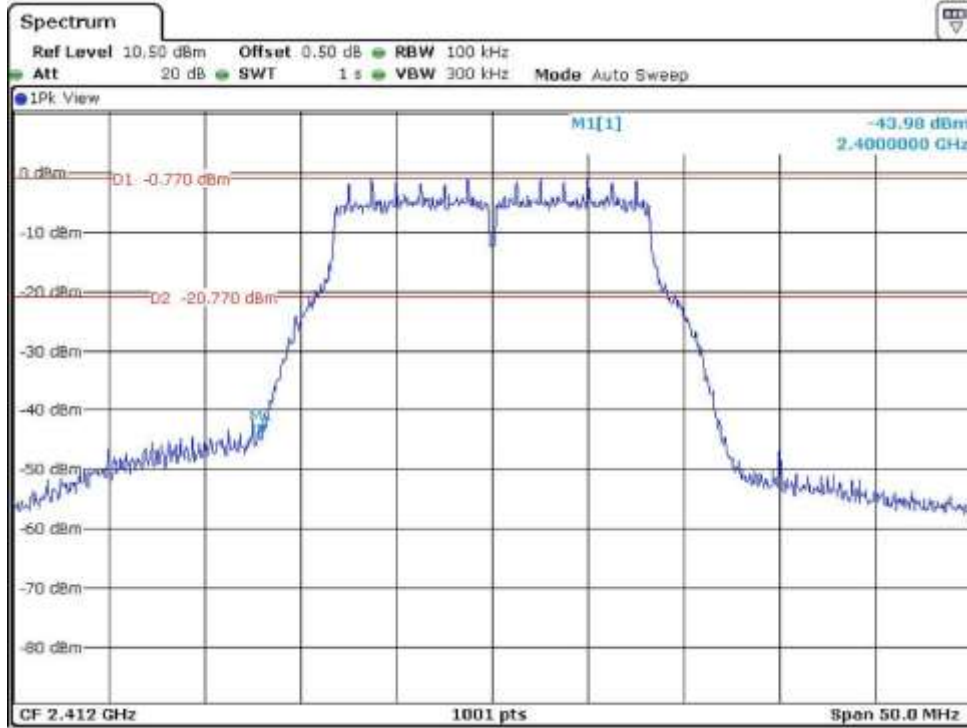


High Channel

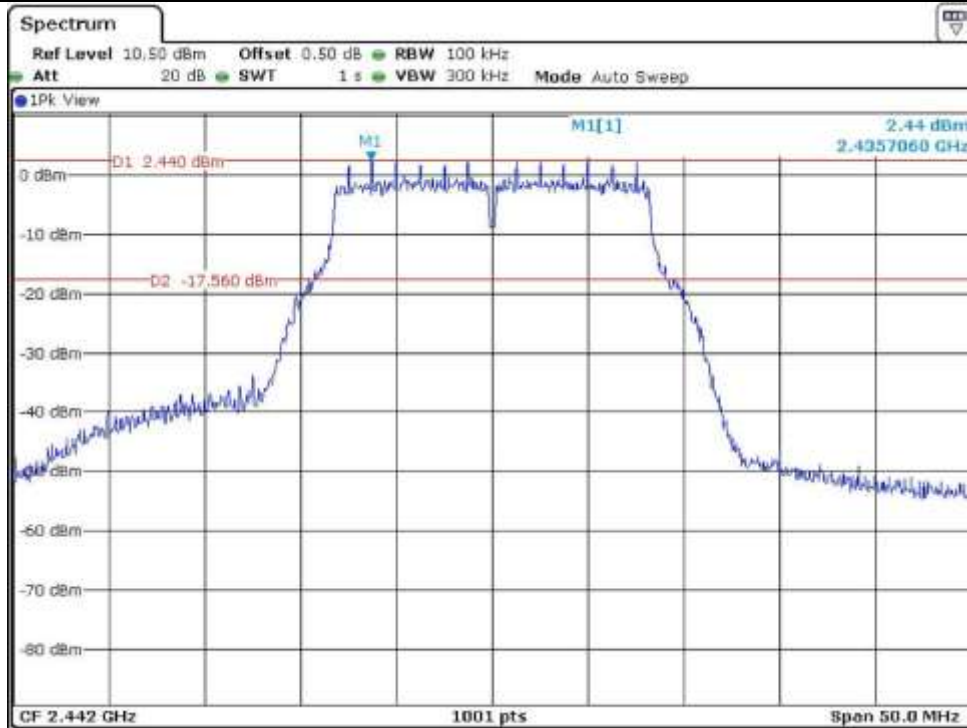


High Channel

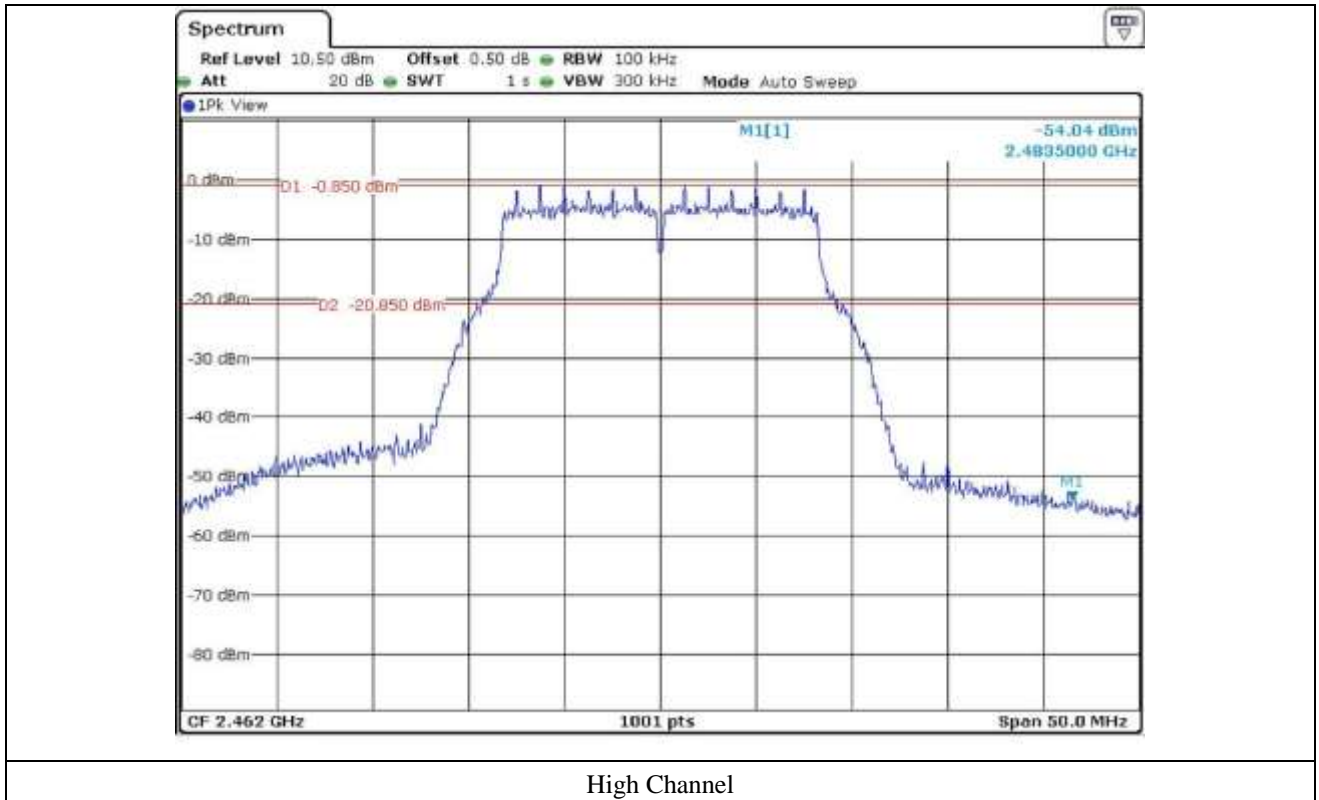
7.3.5.1.2.2 Test data for Antenna 1



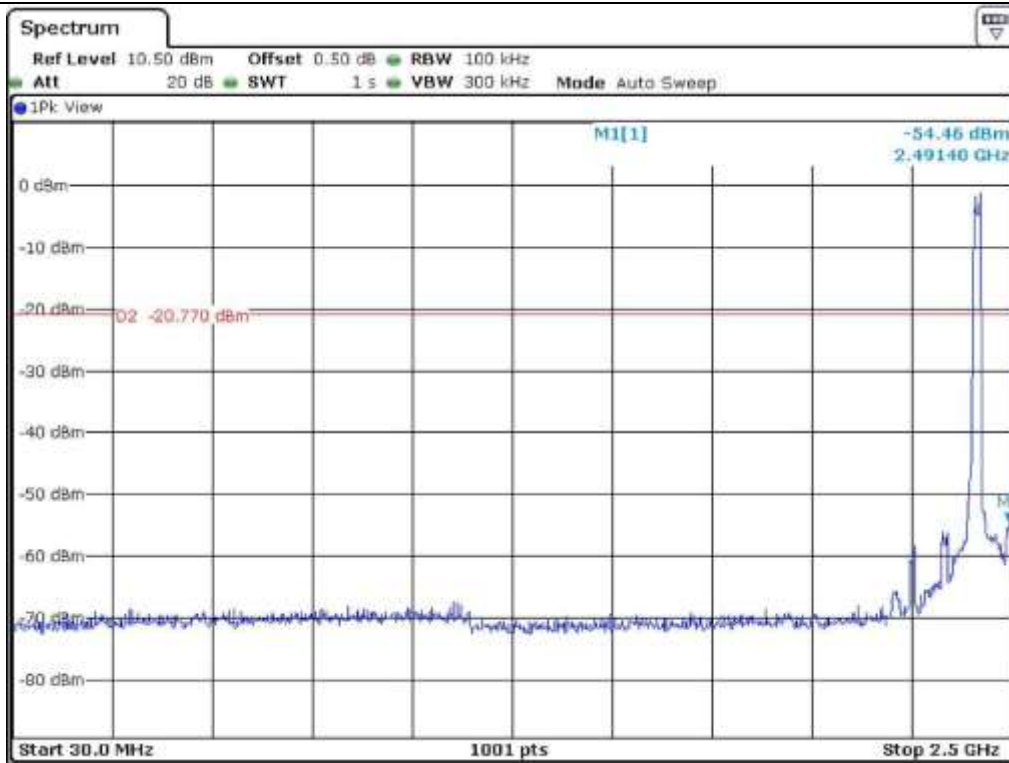
Low Channel



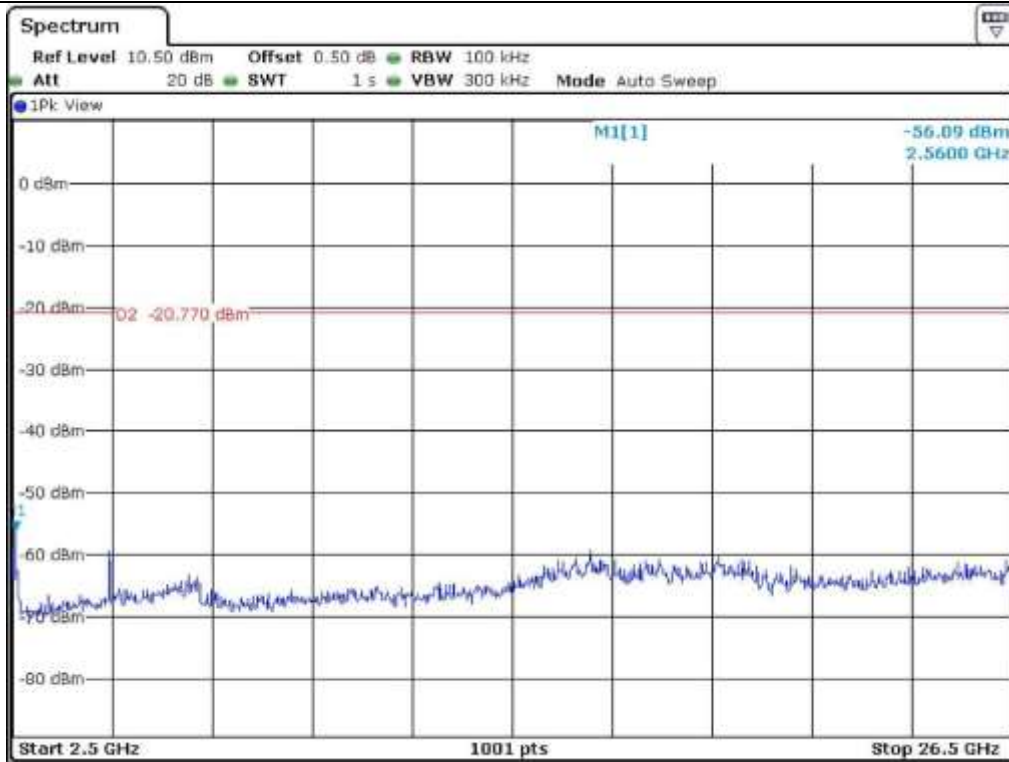
Middle Channel



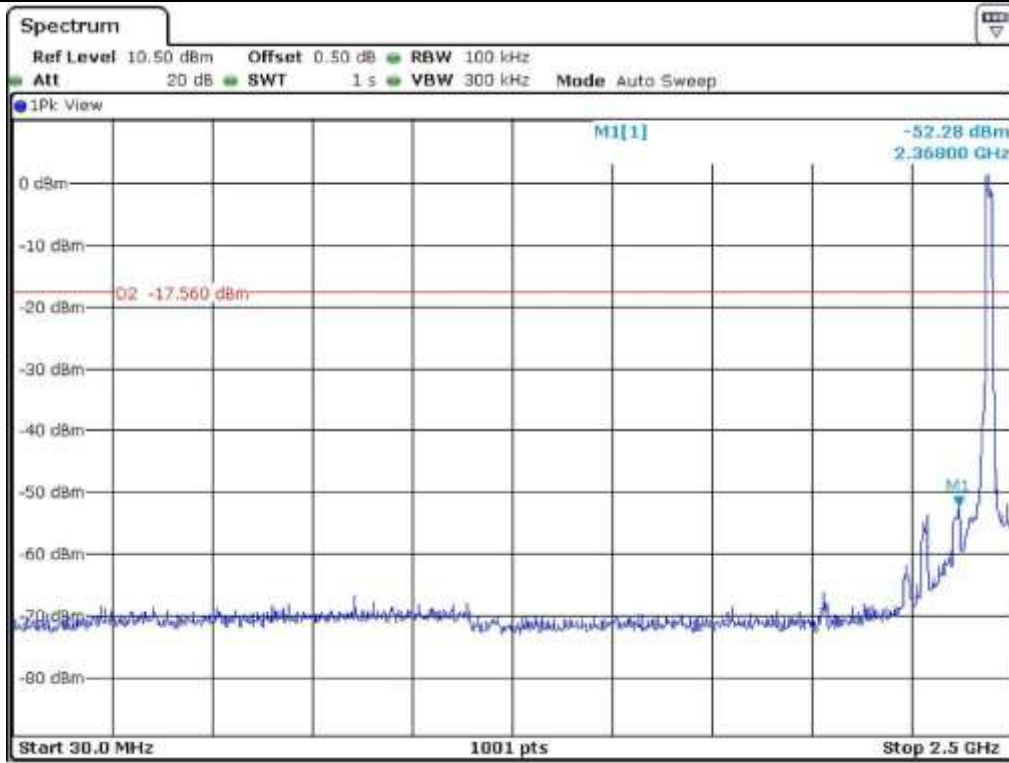
High Channel



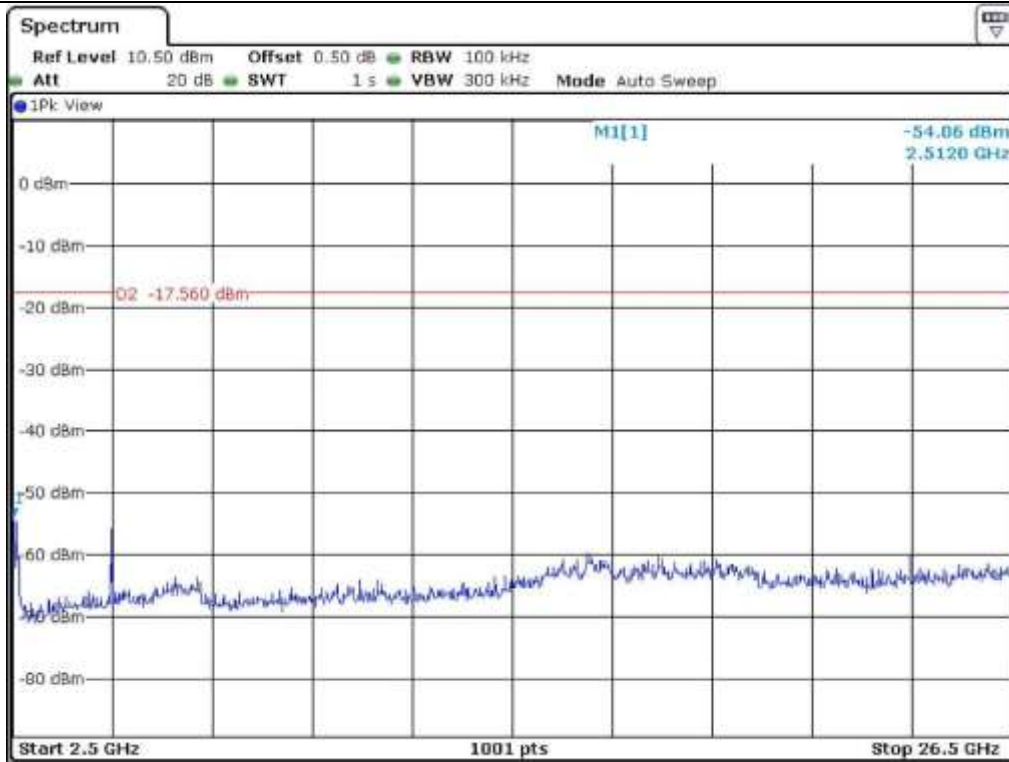
Low Channel



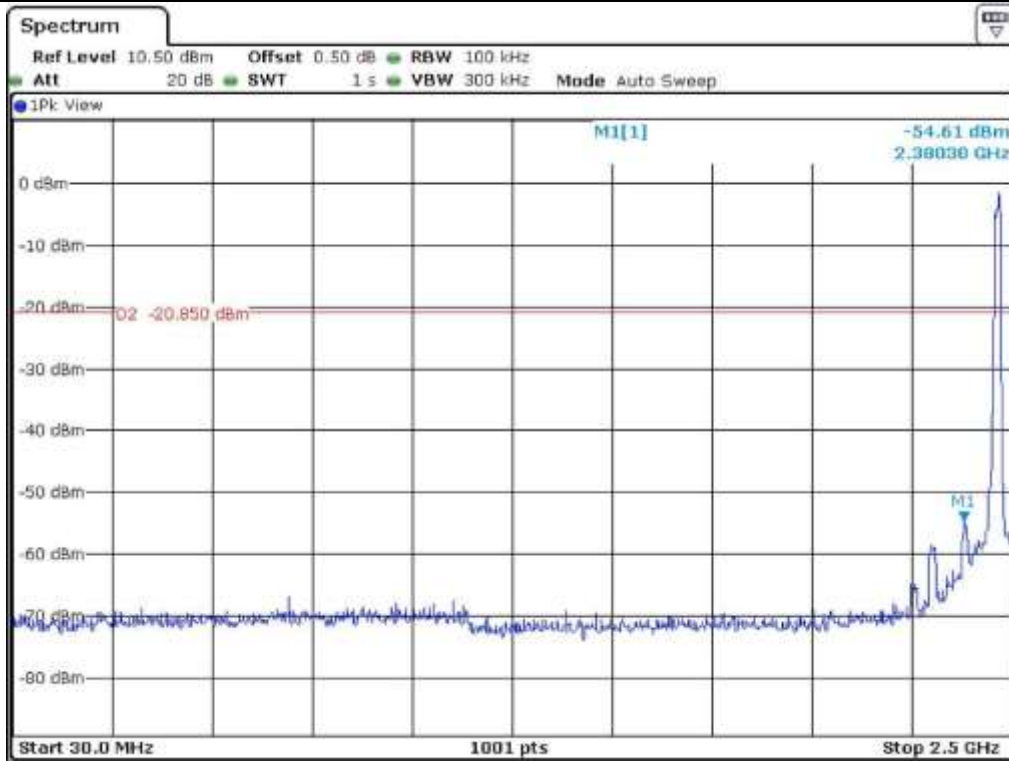
Low Channel



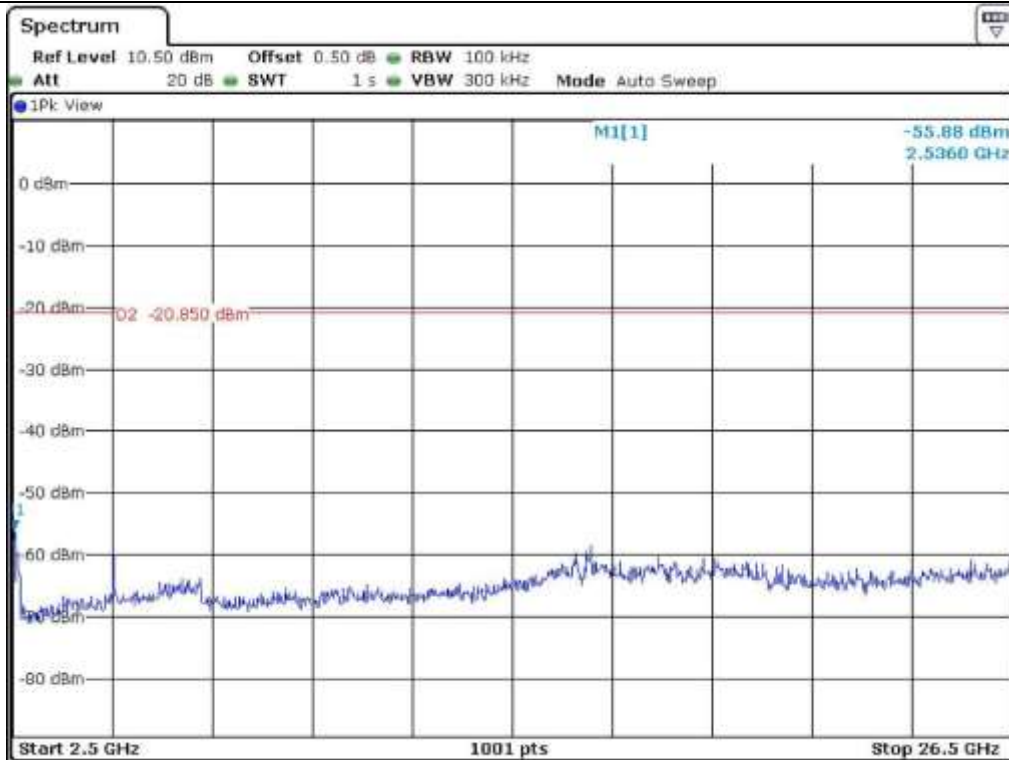
Middle Channel



Middle Channel



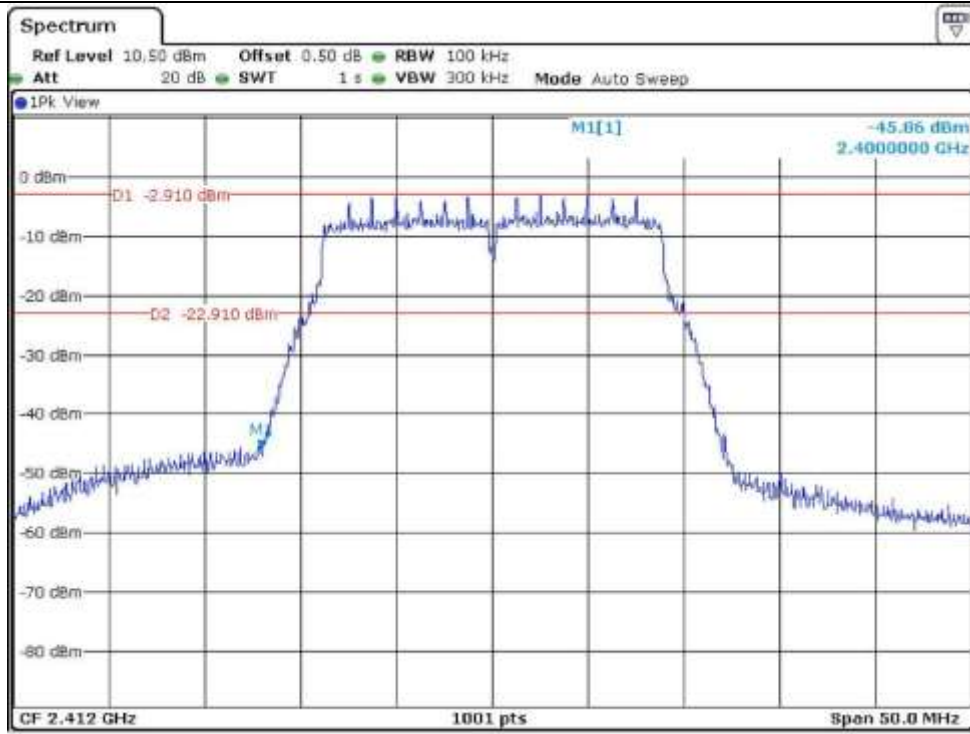
High Channel



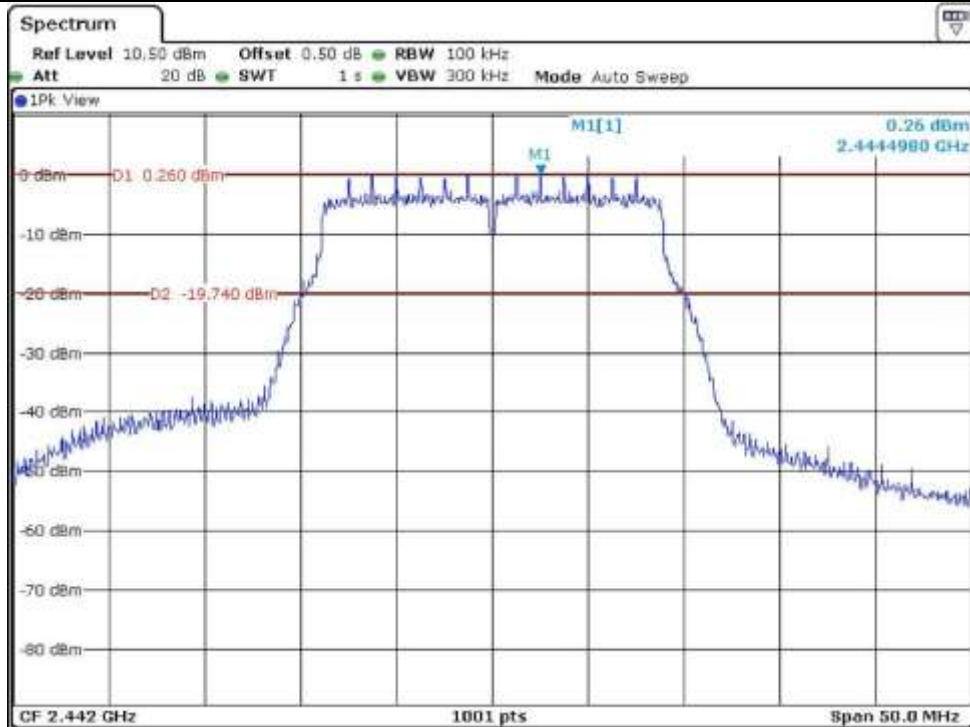
High Channel

7.3.5.1.3 Test data for 802.11n_HT20

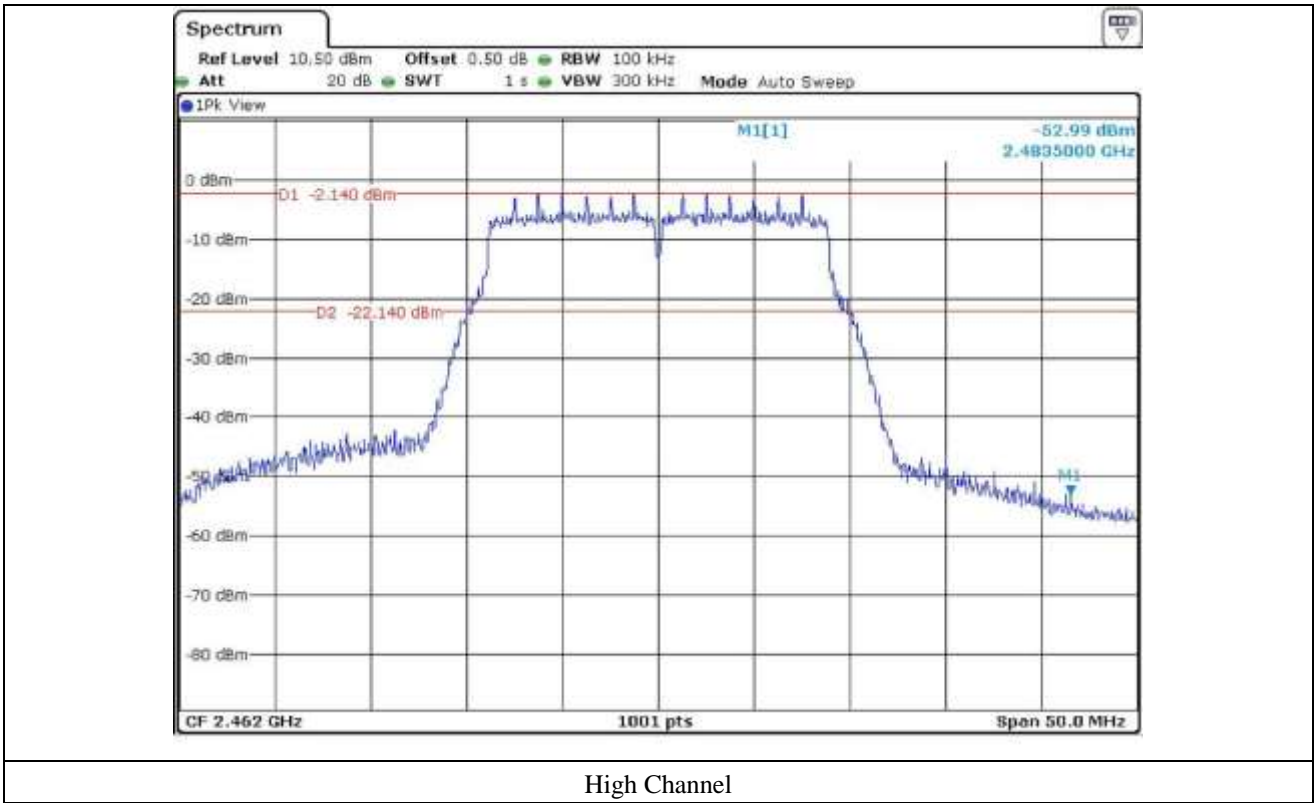
7.3.5.1.3.1 Test data for Antenna 0

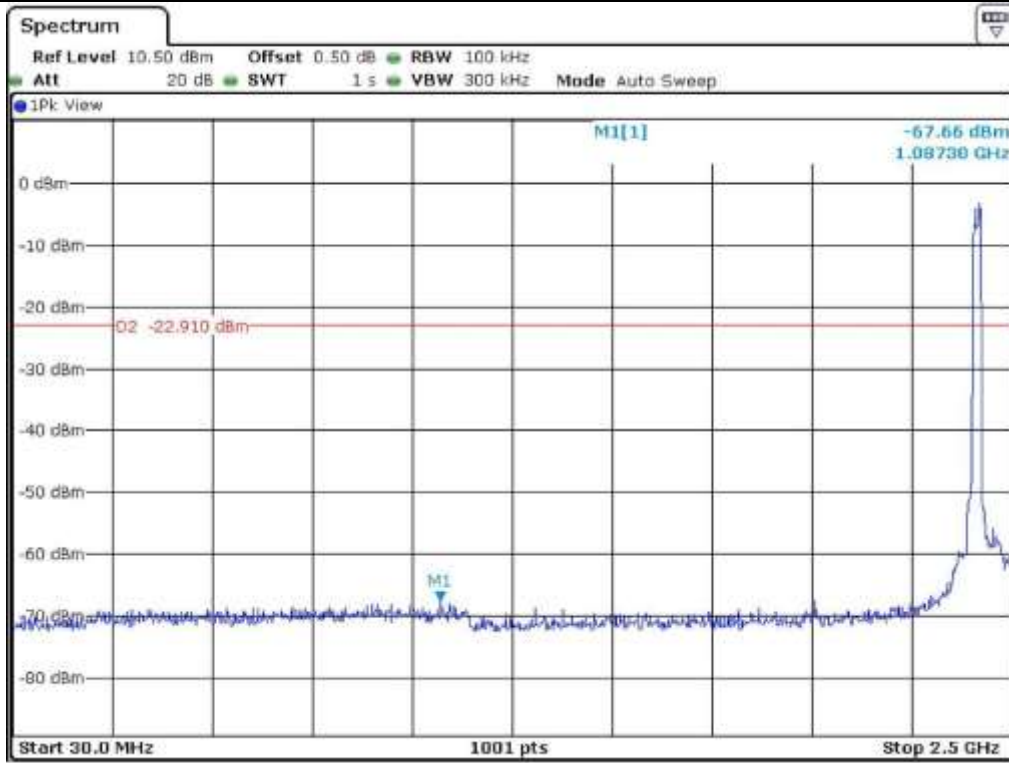


Low Channel

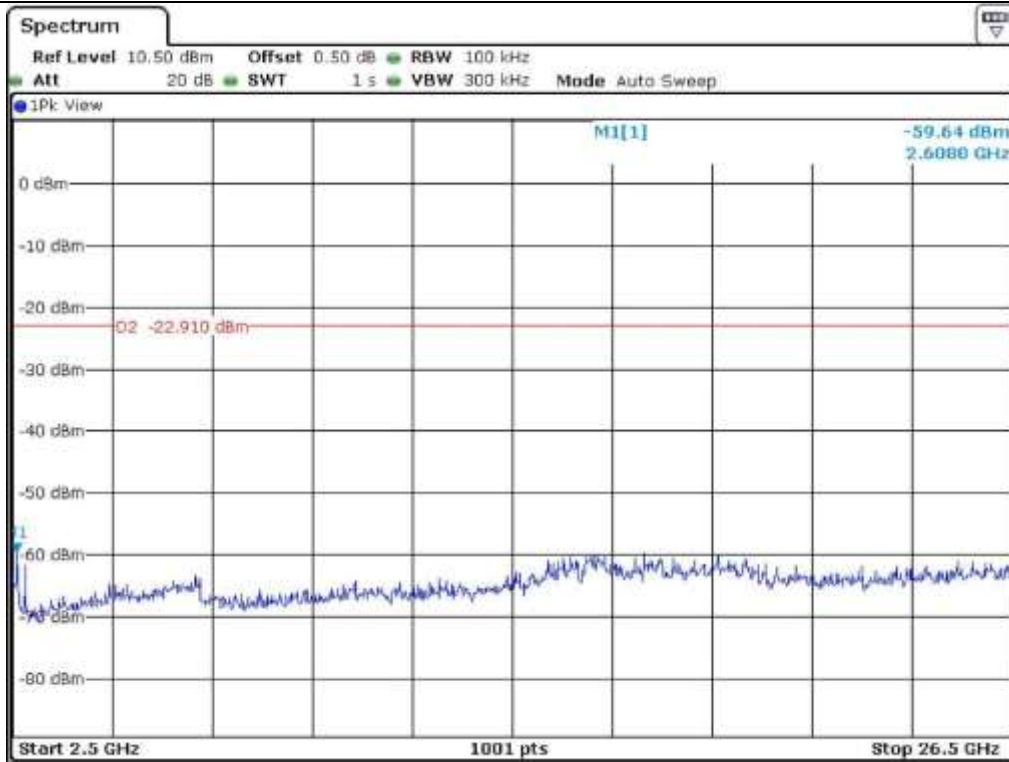


Middle Channel

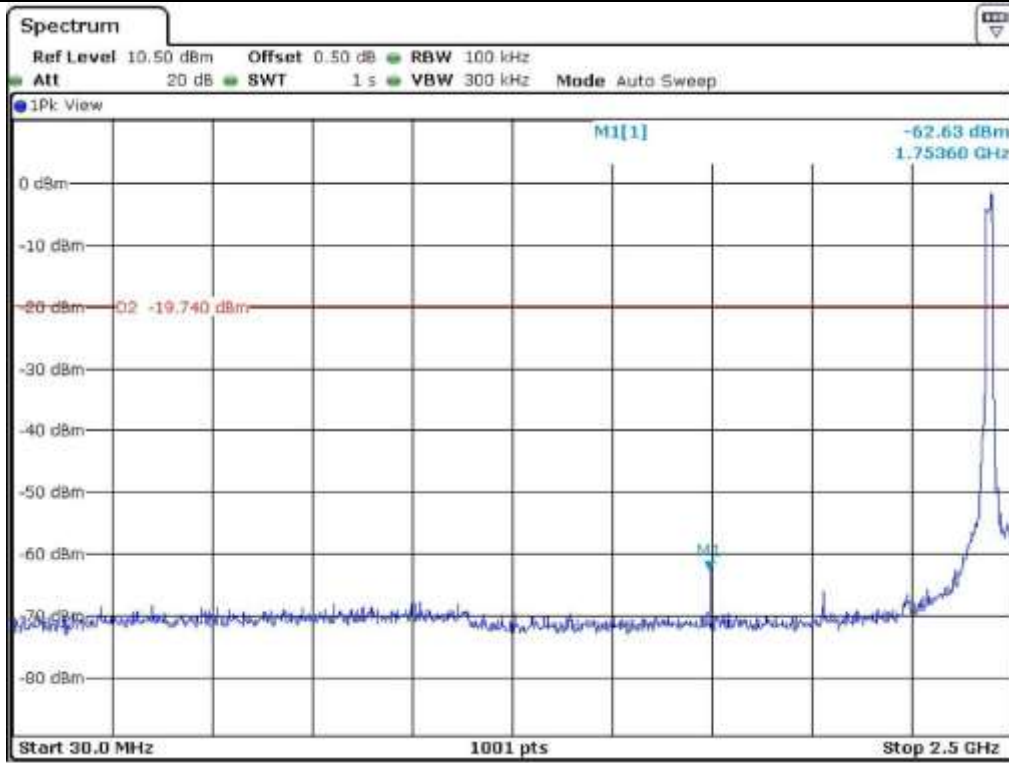




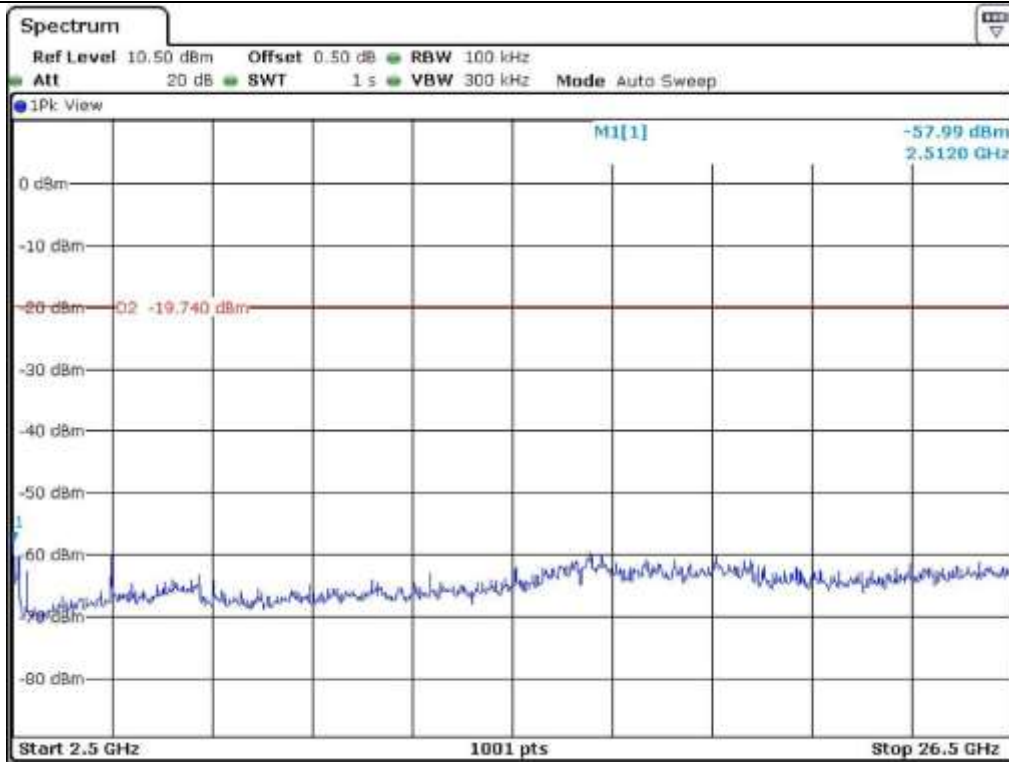
Low Channel



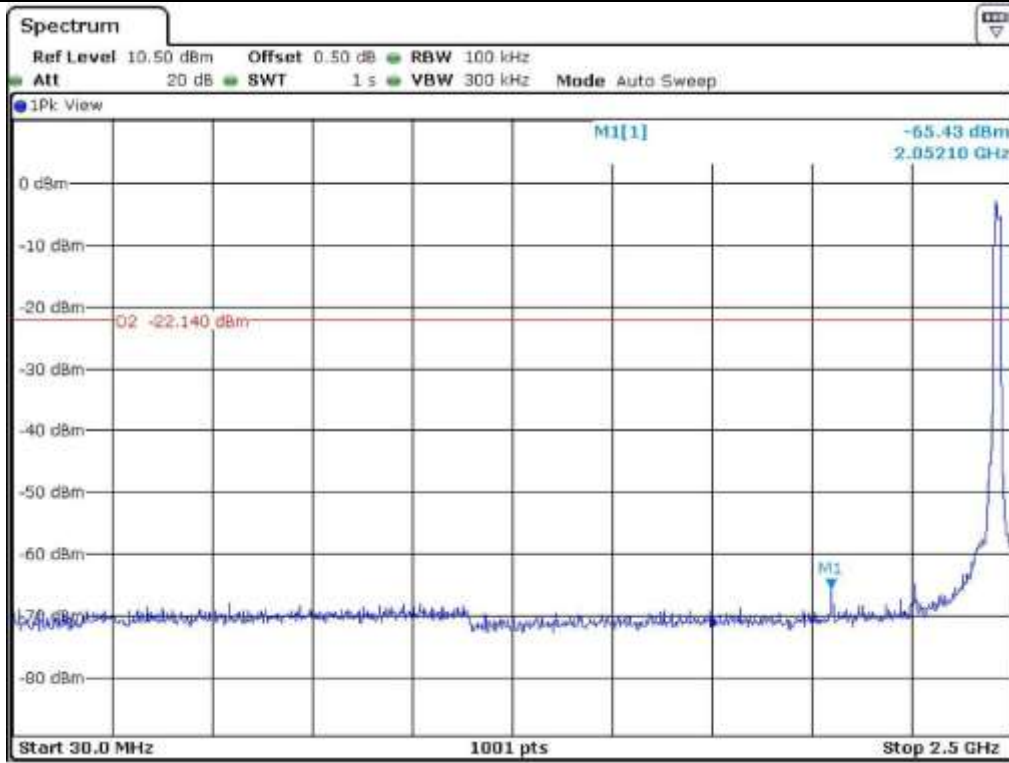
Low Channel



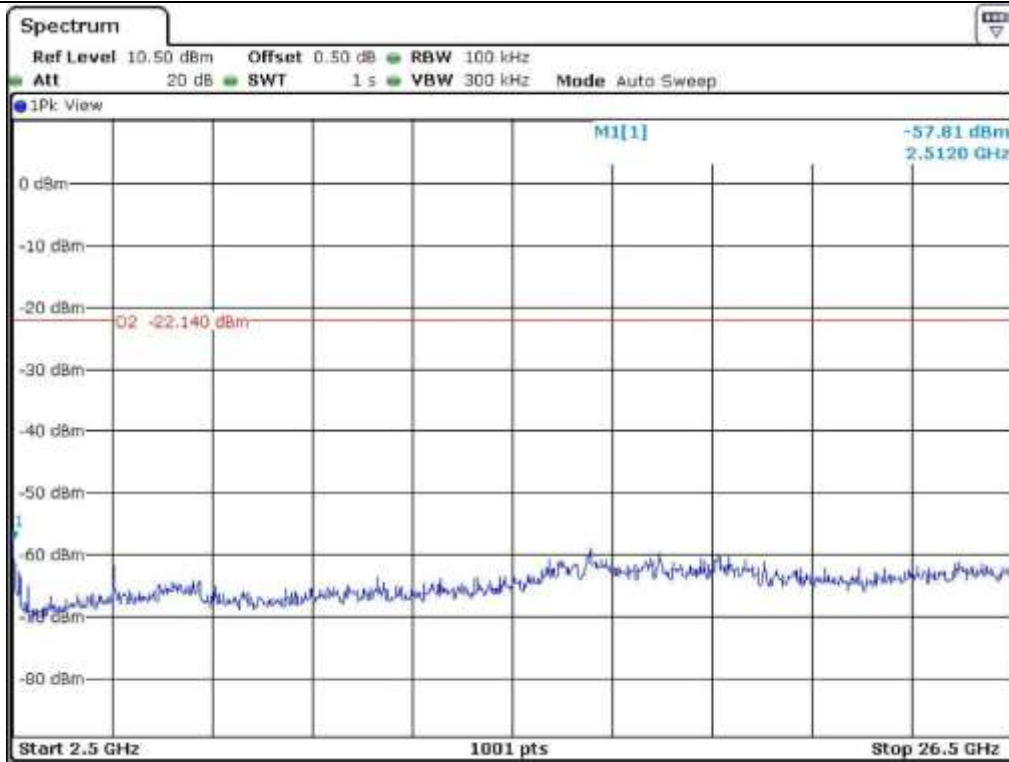
Middle Channel



Middle Channel

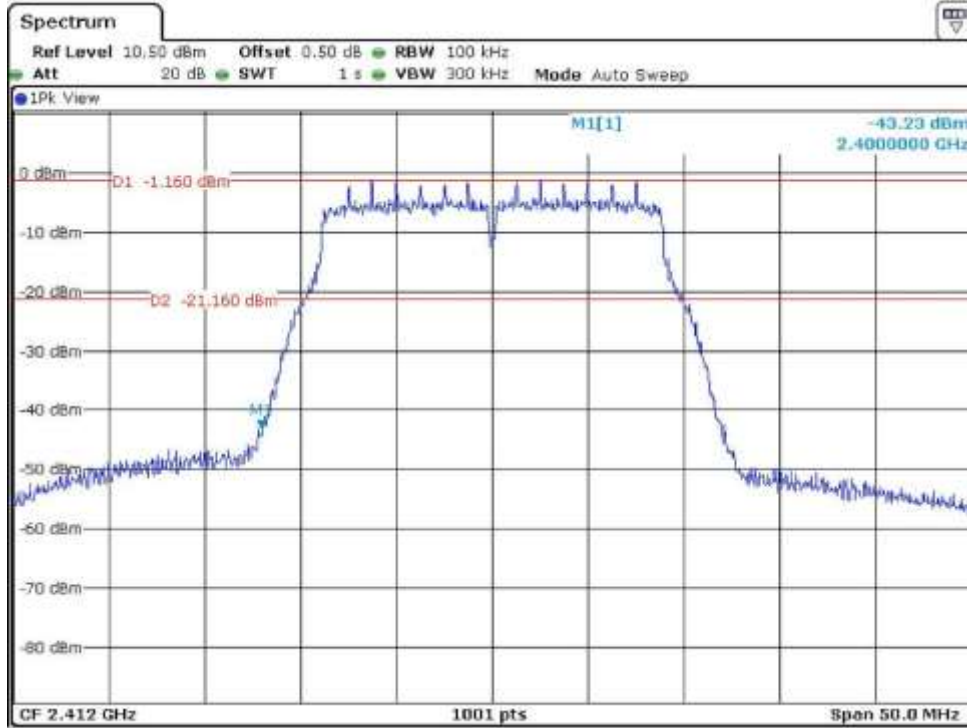


High Channel

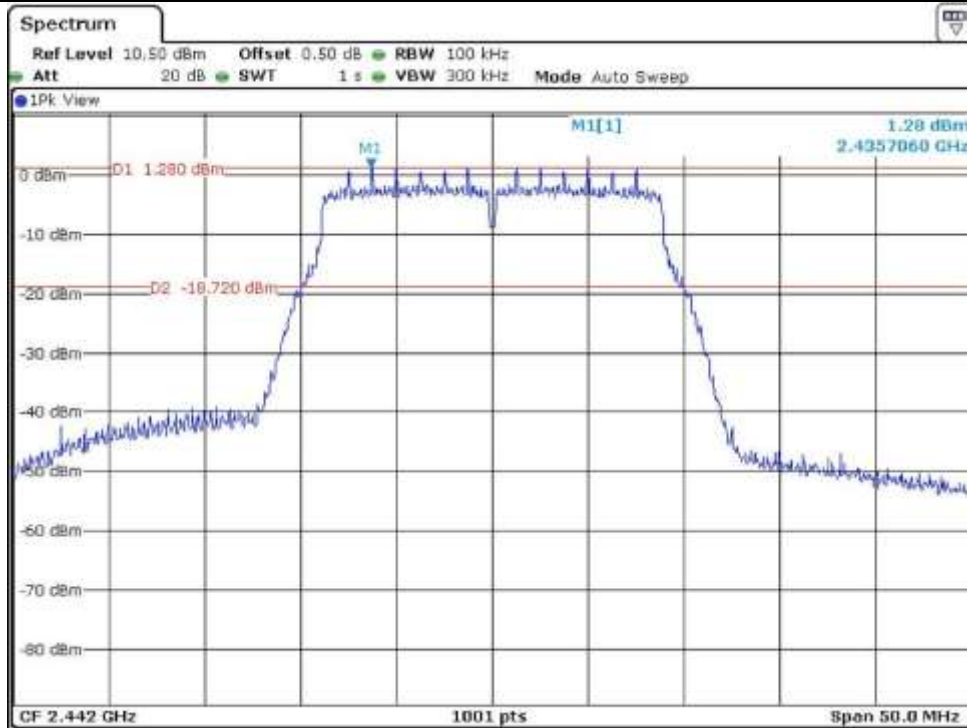


High Channel

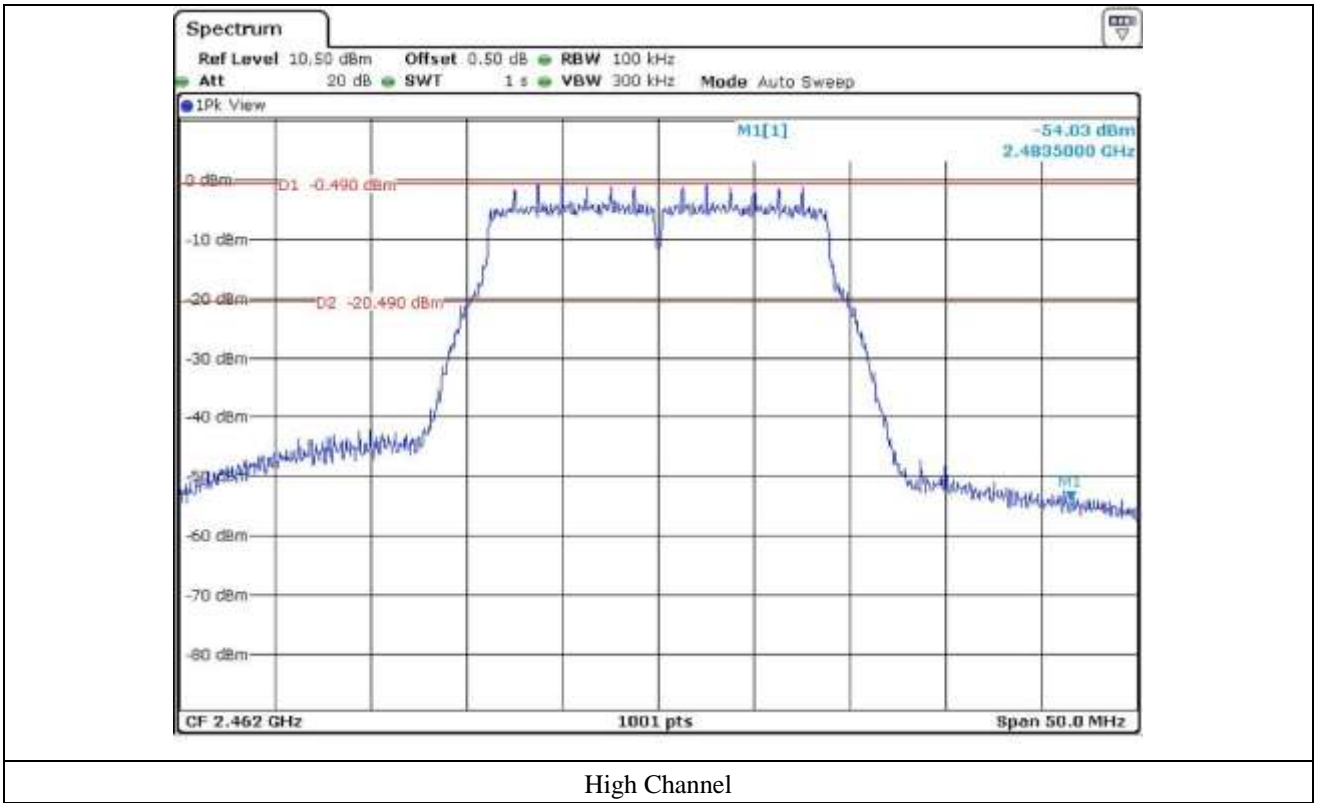
7.3.5.1.3.2 Test data for Antenna 1



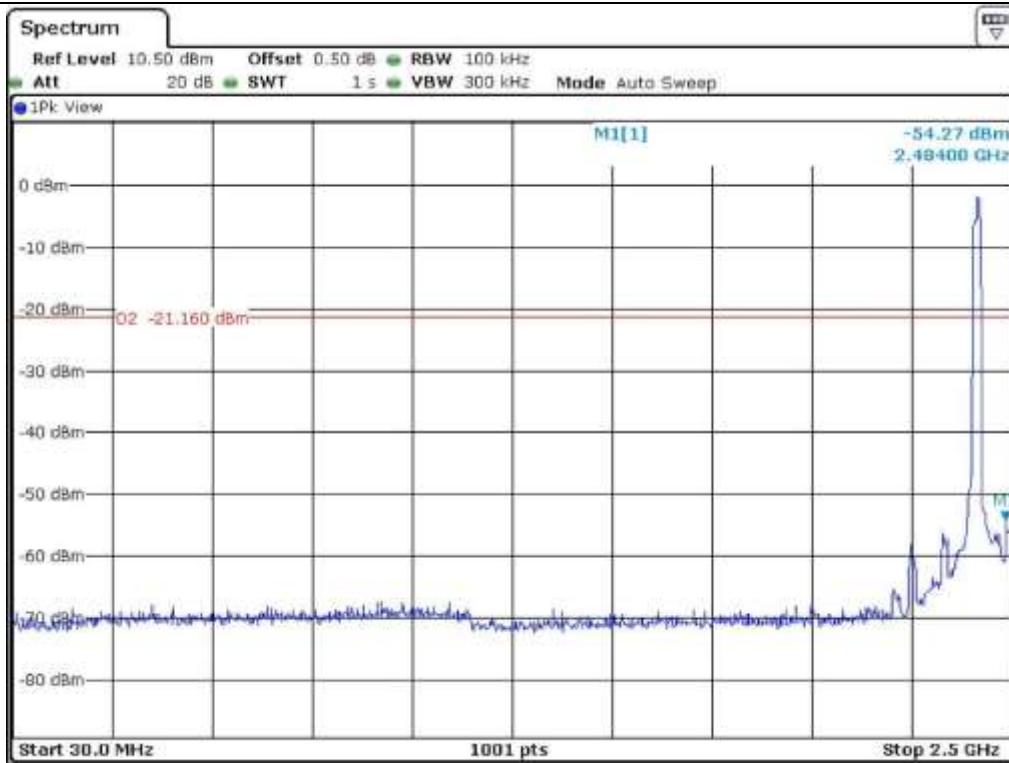
Low Channel



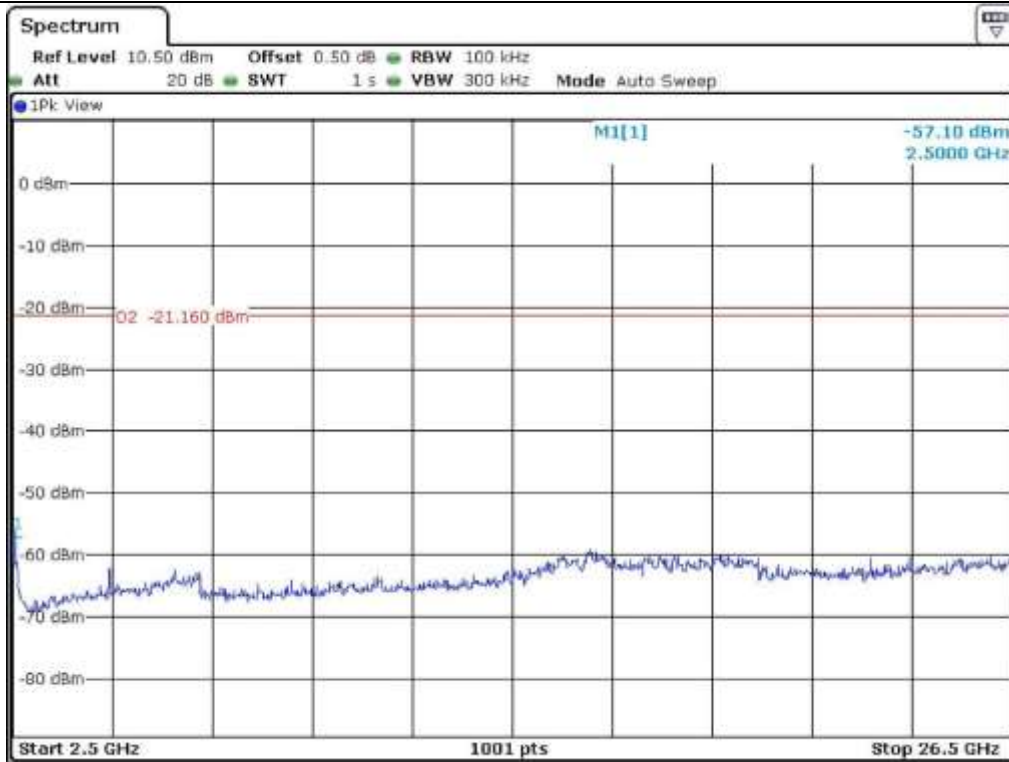
Middle Channel



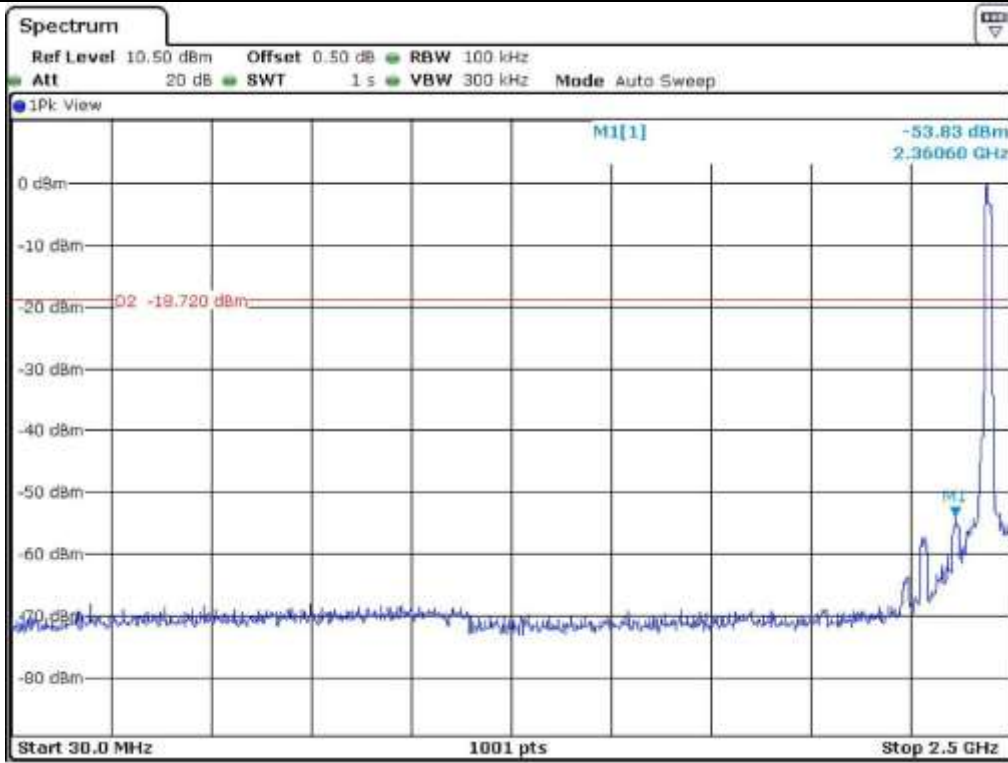
High Channel



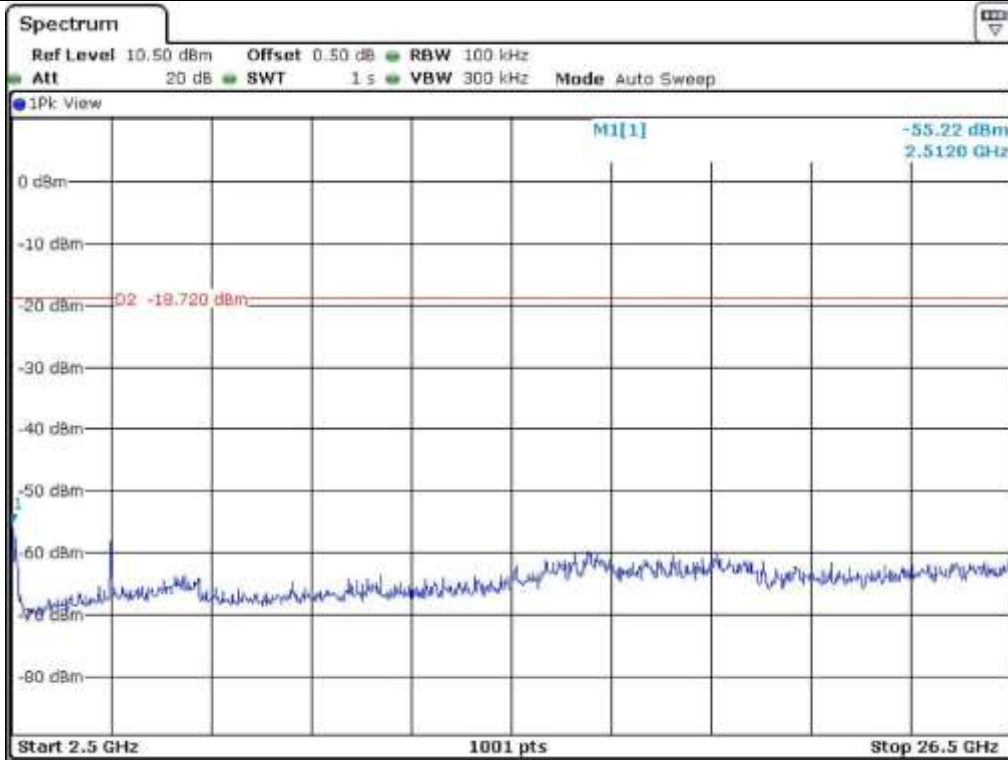
Low Channel



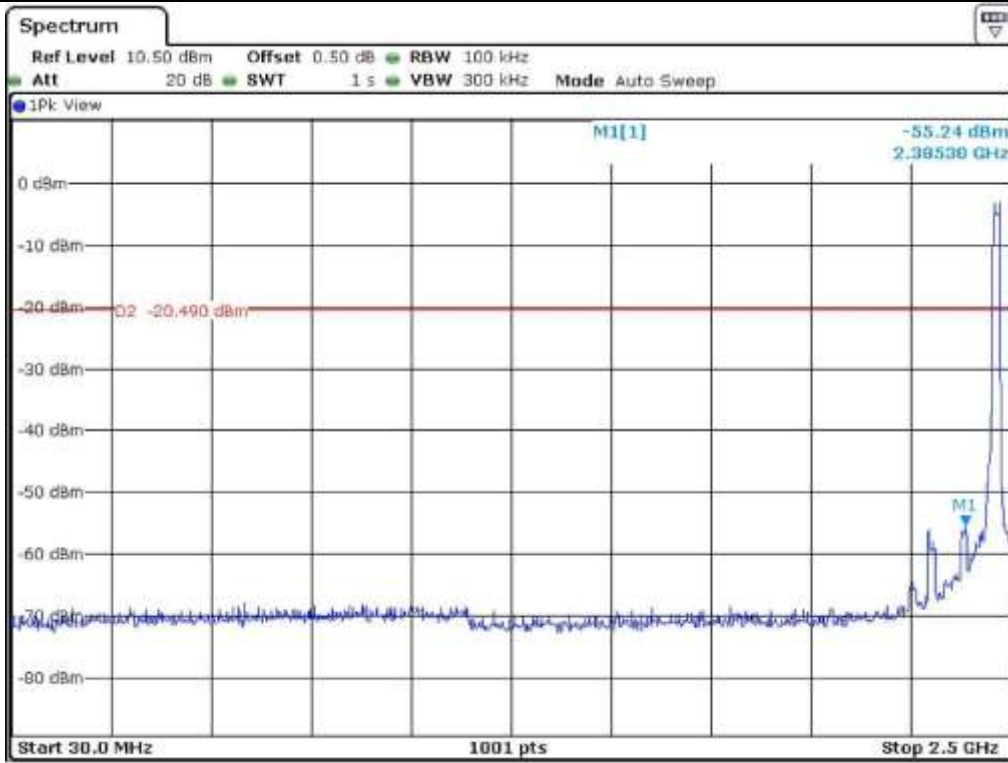
Low Channel



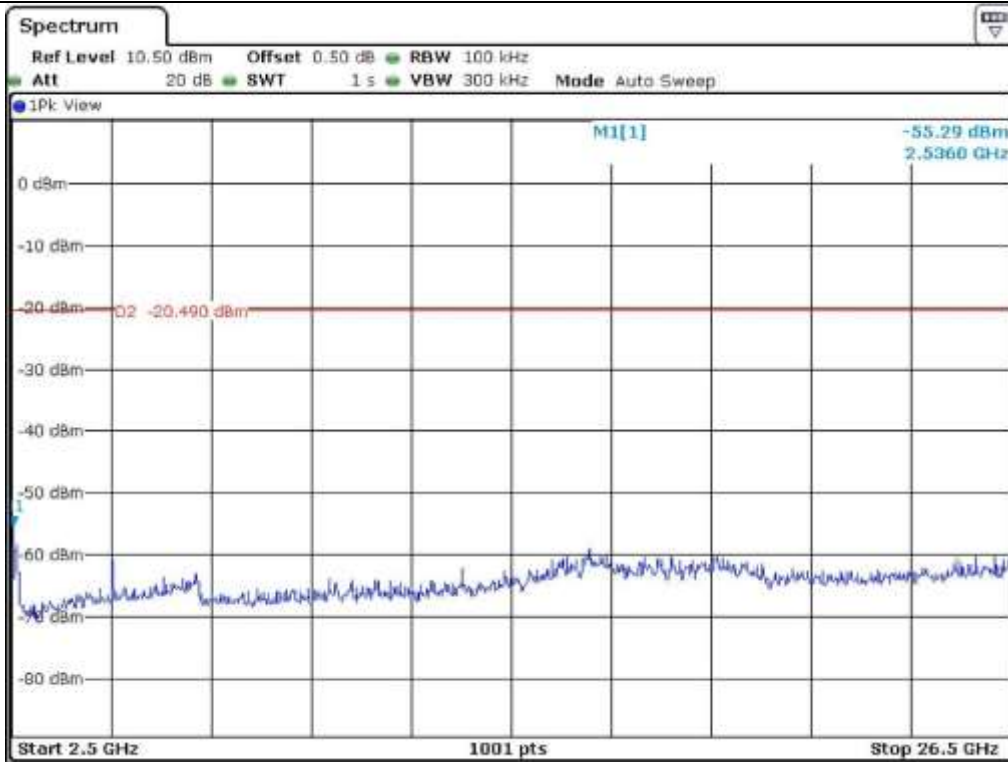
Middle Channel



Middle Channel



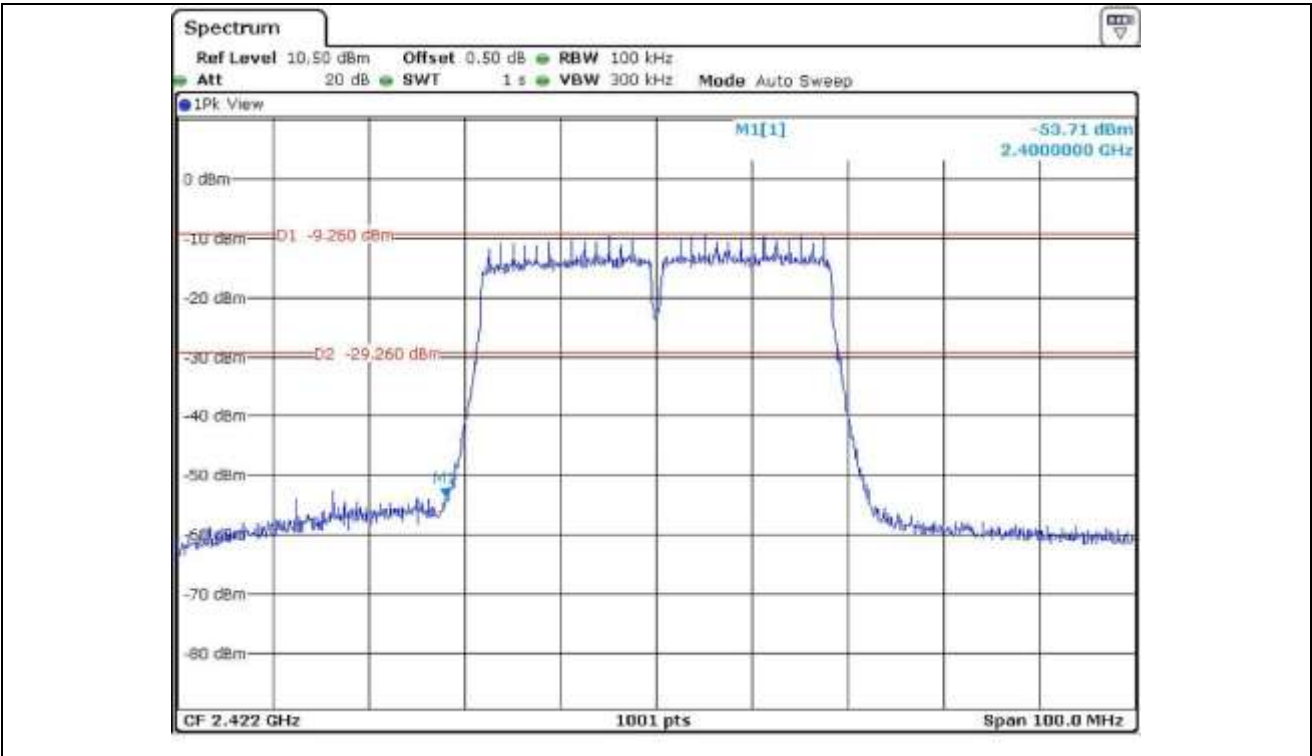
High Channel



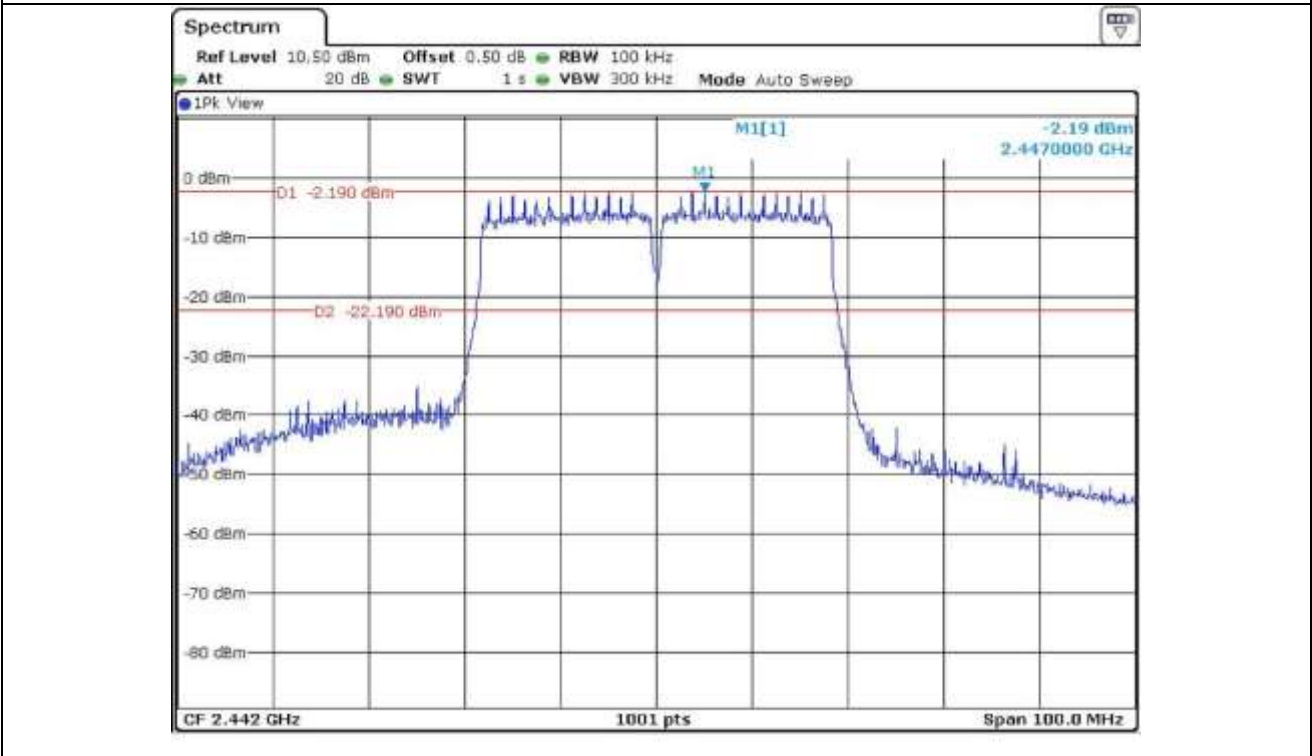
High Channel

7.3.5.1.4 Test data for 802.11n_HT40

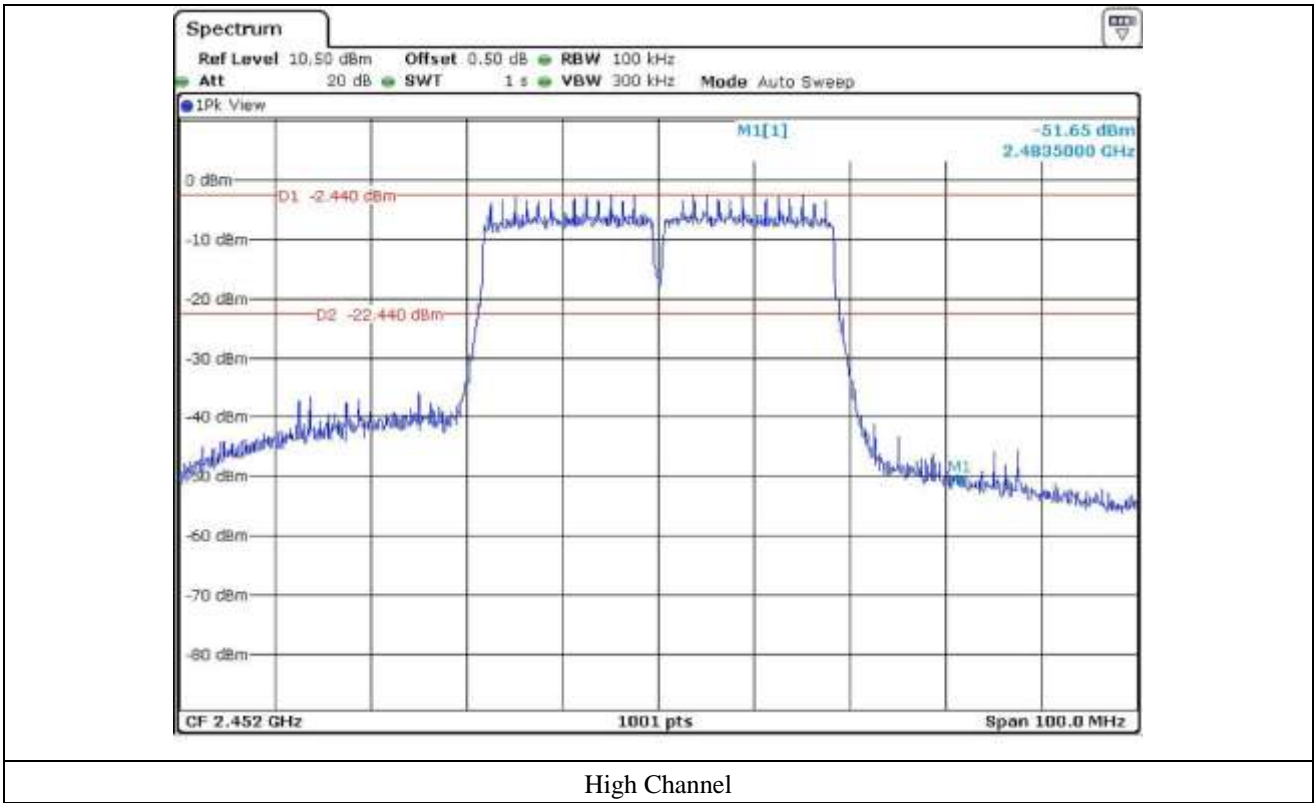
7.3.5.1.4.1 Test data for Antenna 0

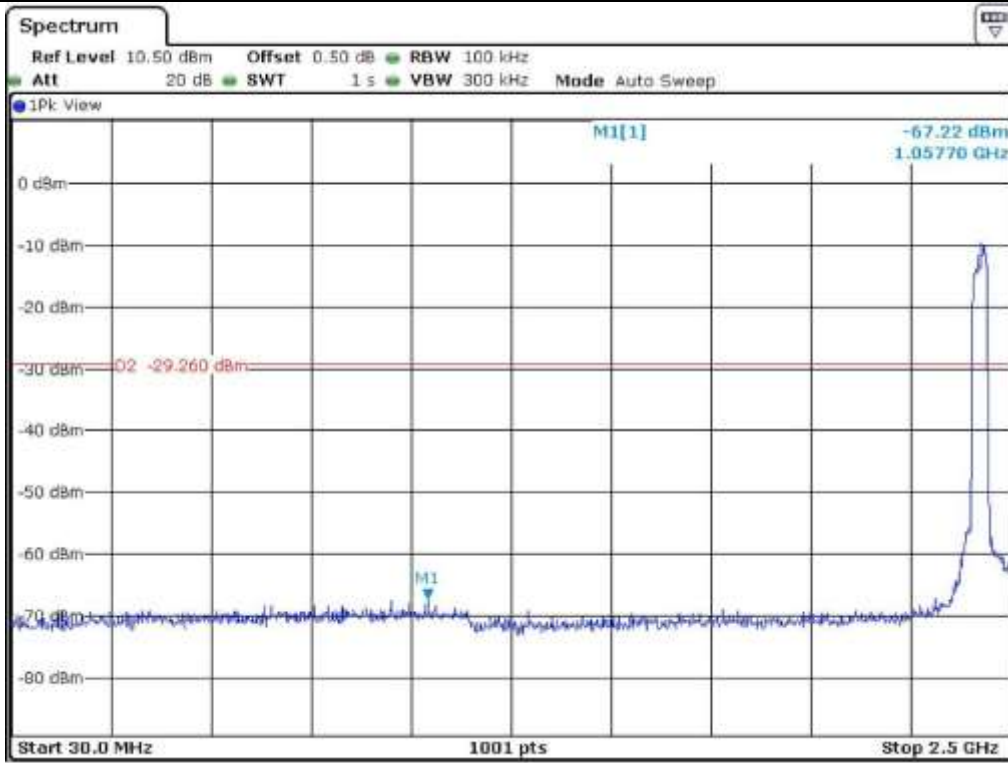


Low Channel

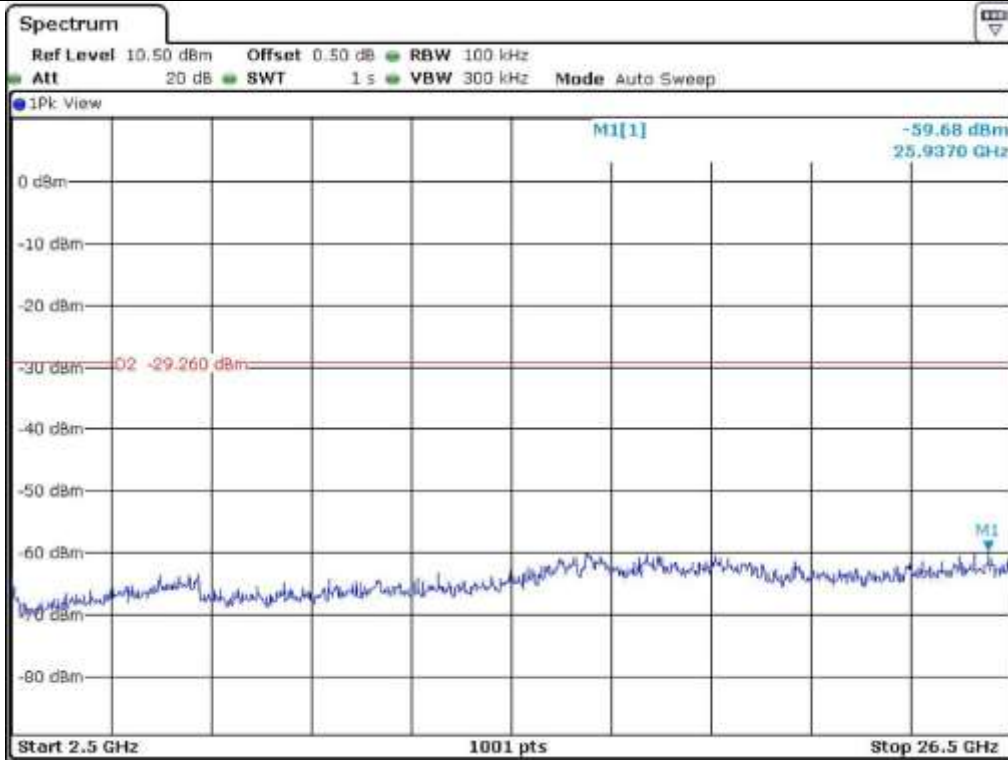


Middle Channel

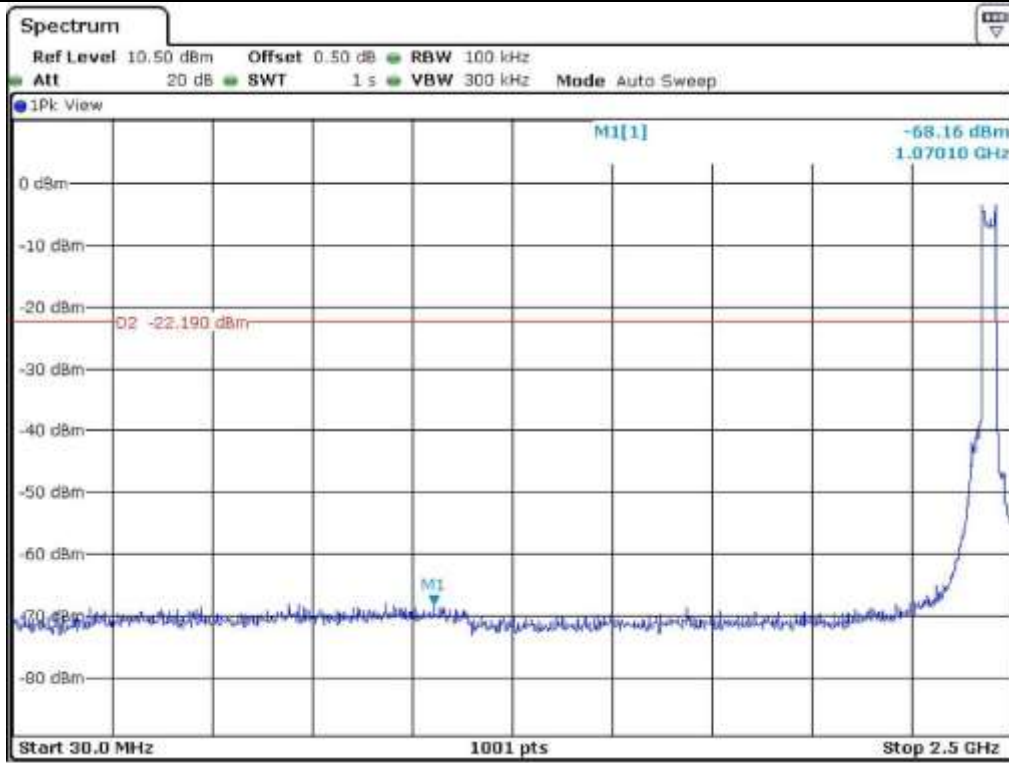




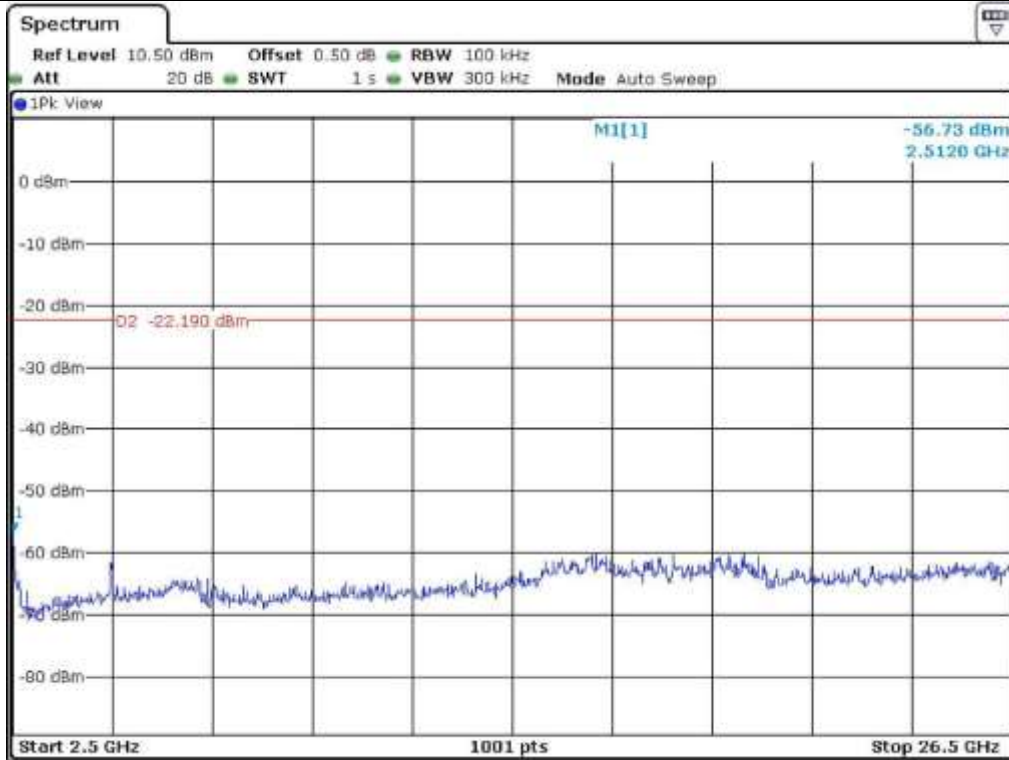
Low Channel



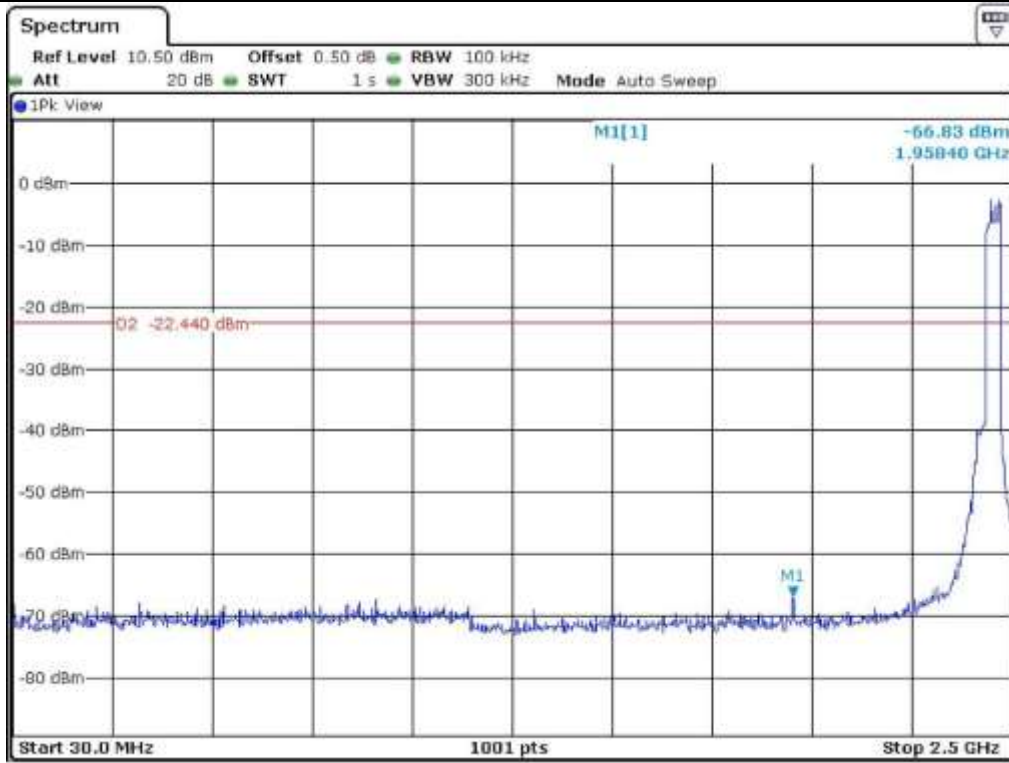
Low Channel



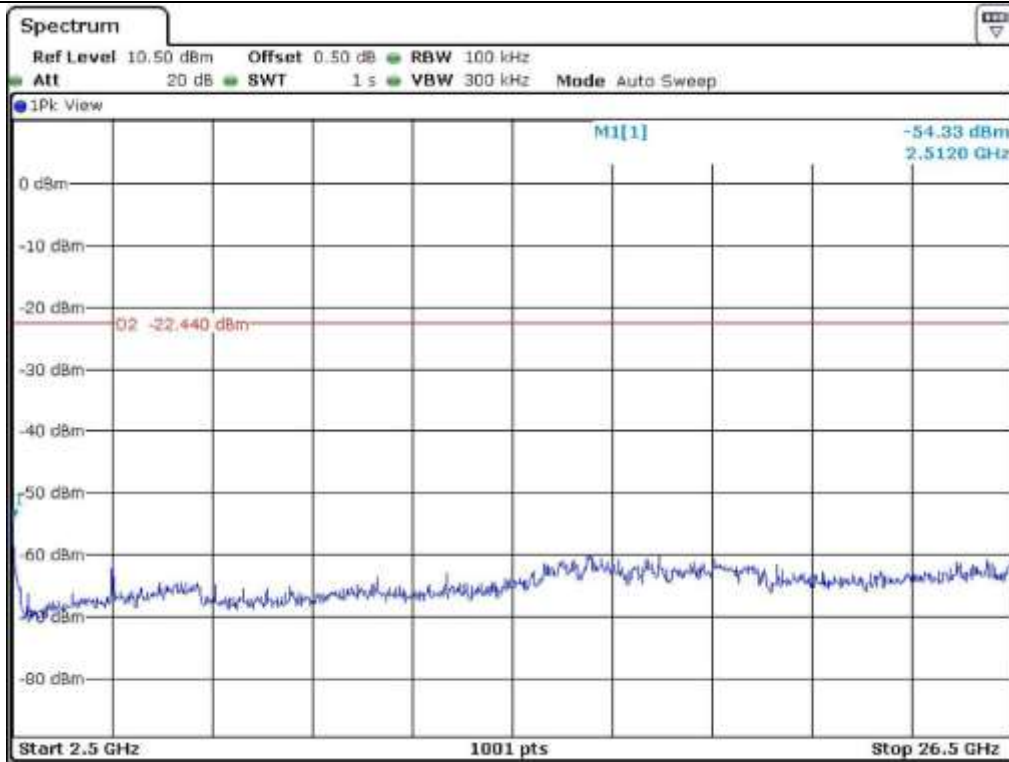
Middle Channel



Middle Channel

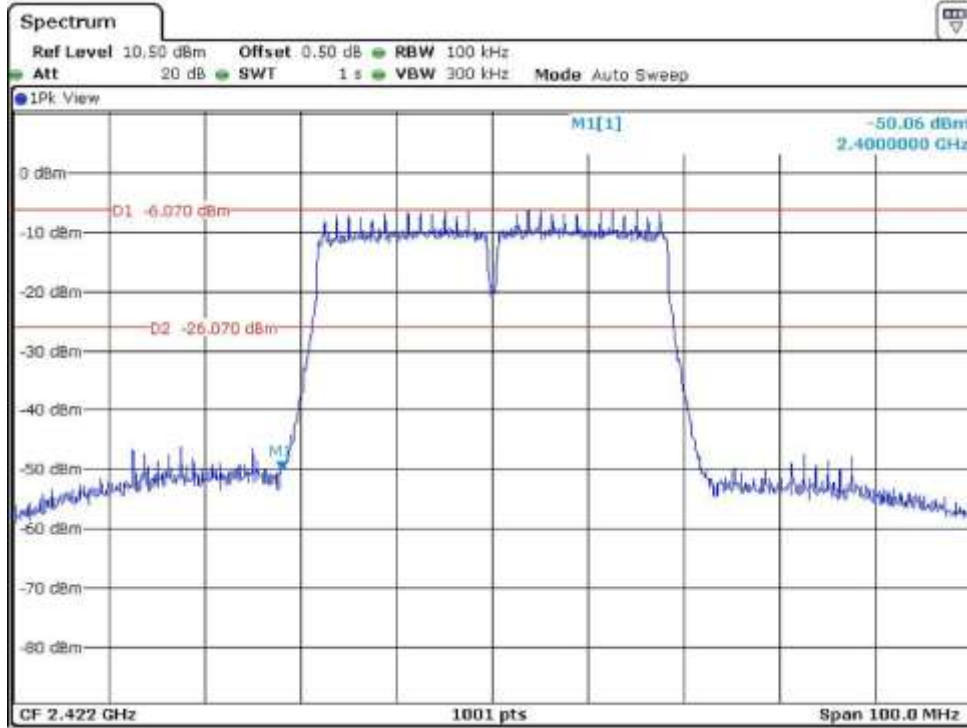


High Channel

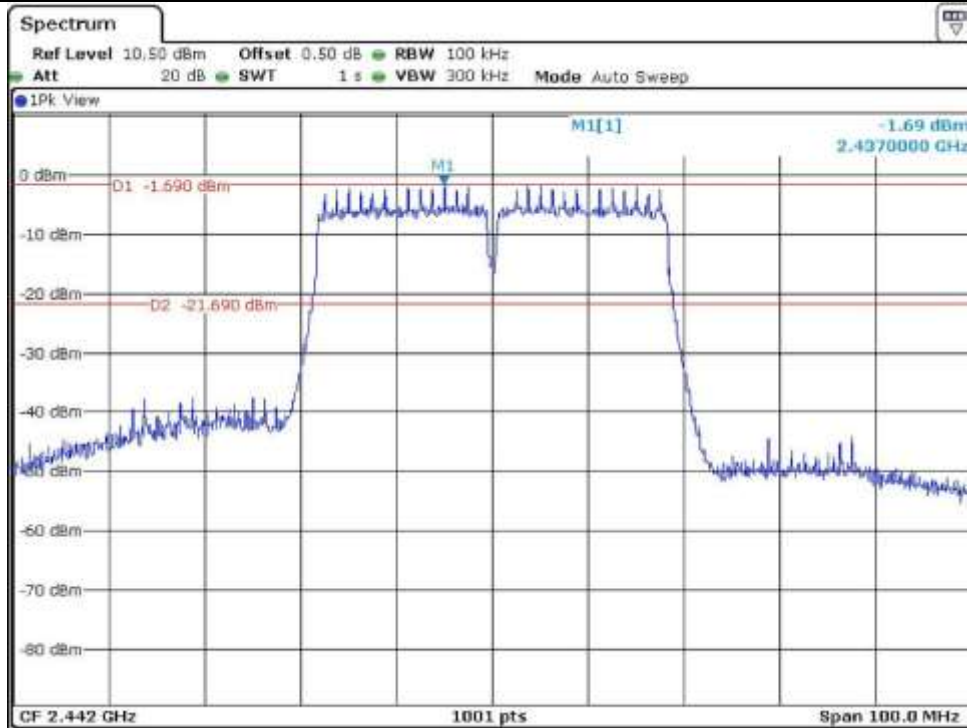


High Channel

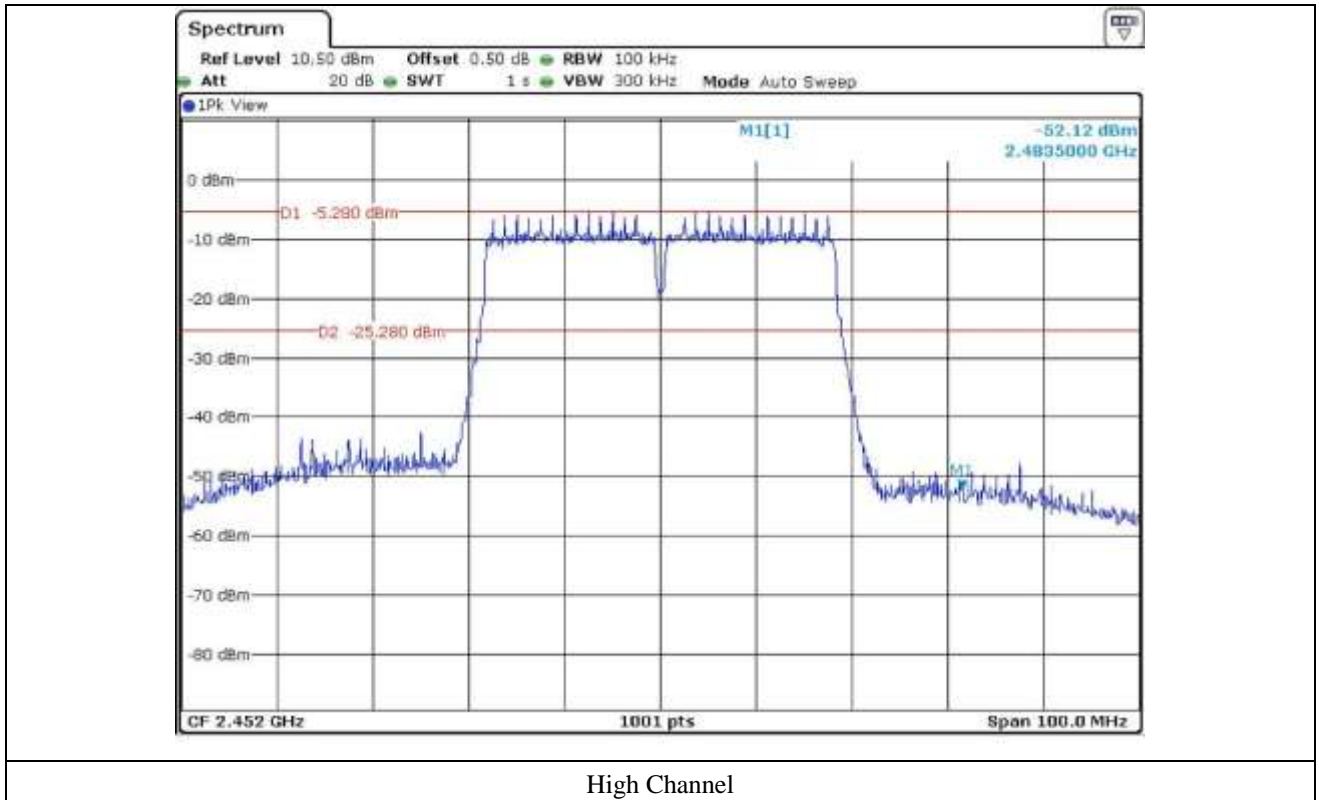
7.3.5.1.4.2 Test data for Antenna 1



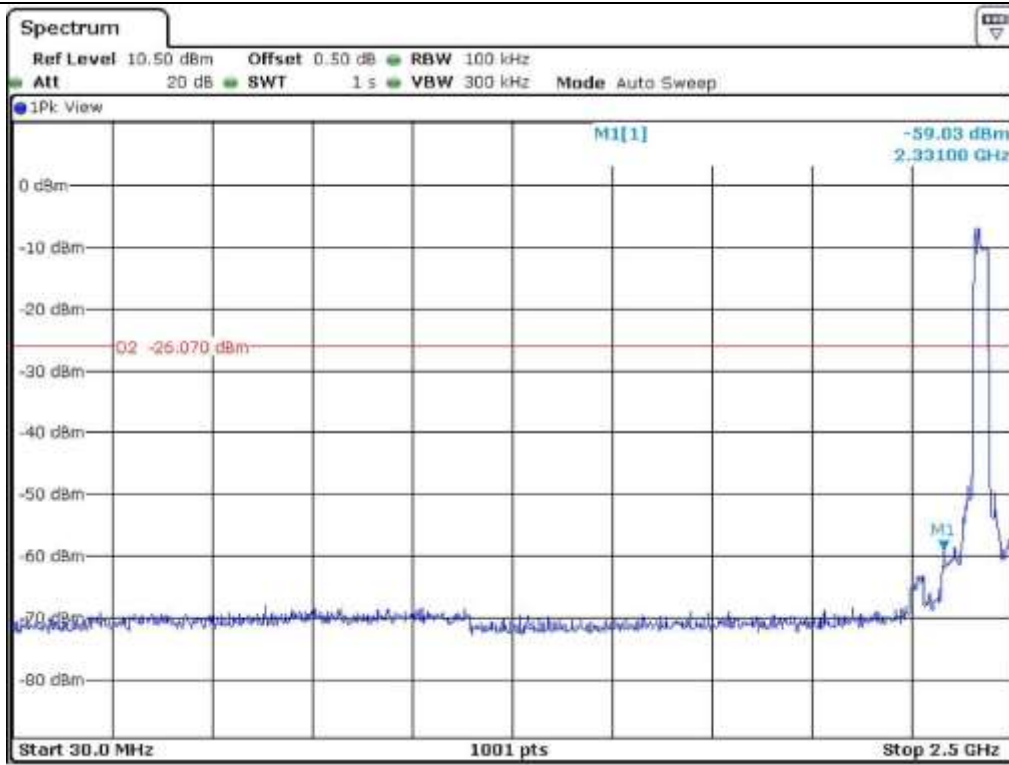
Low Channel



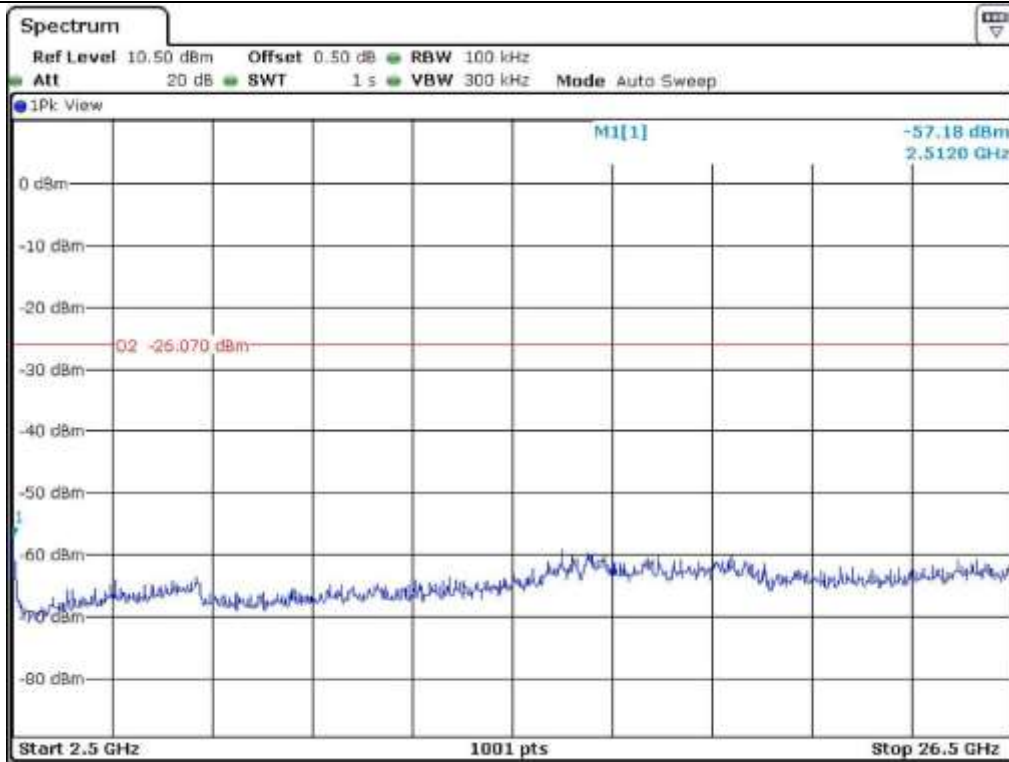
Middle Channel



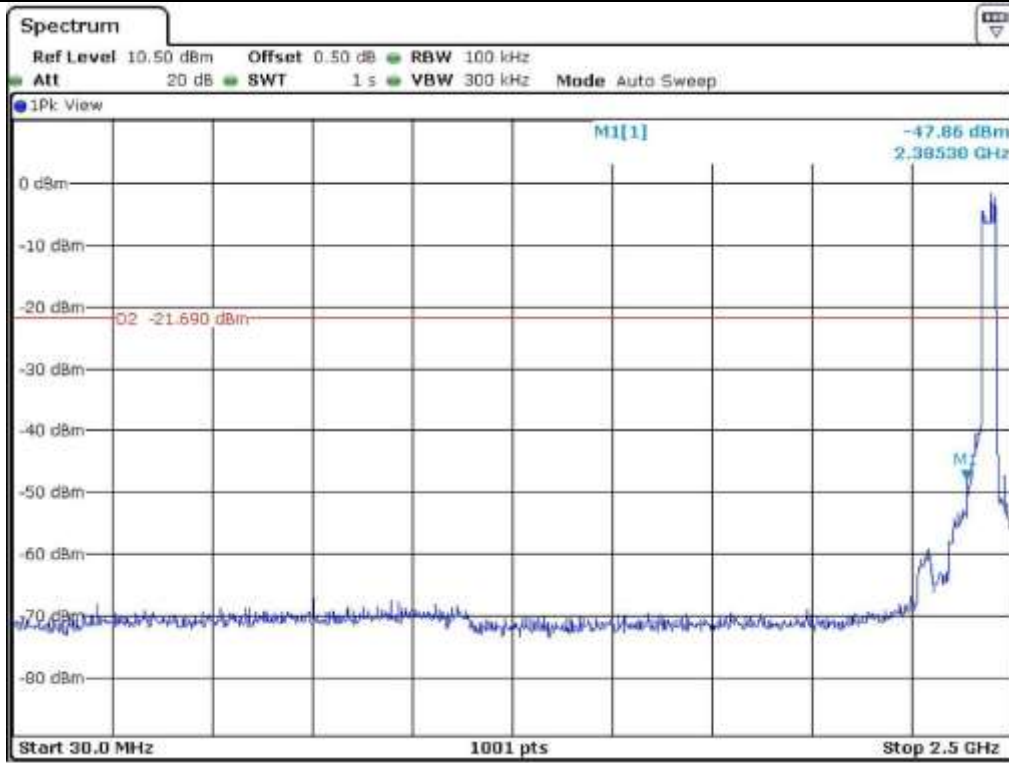
High Channel



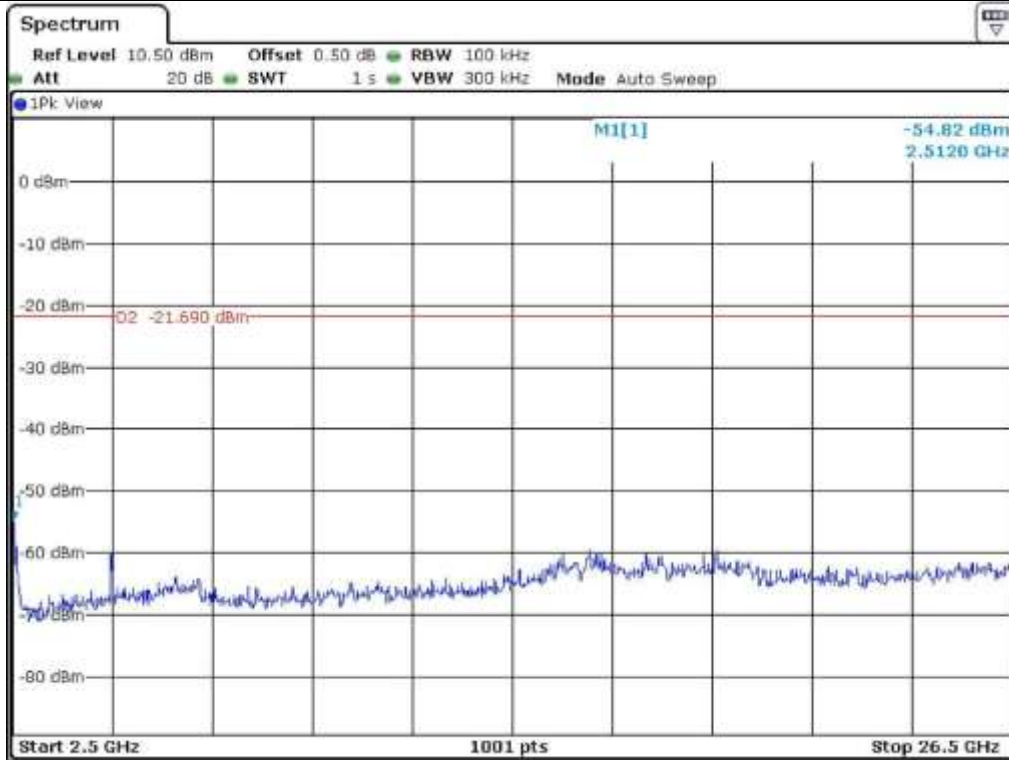
Low Channel



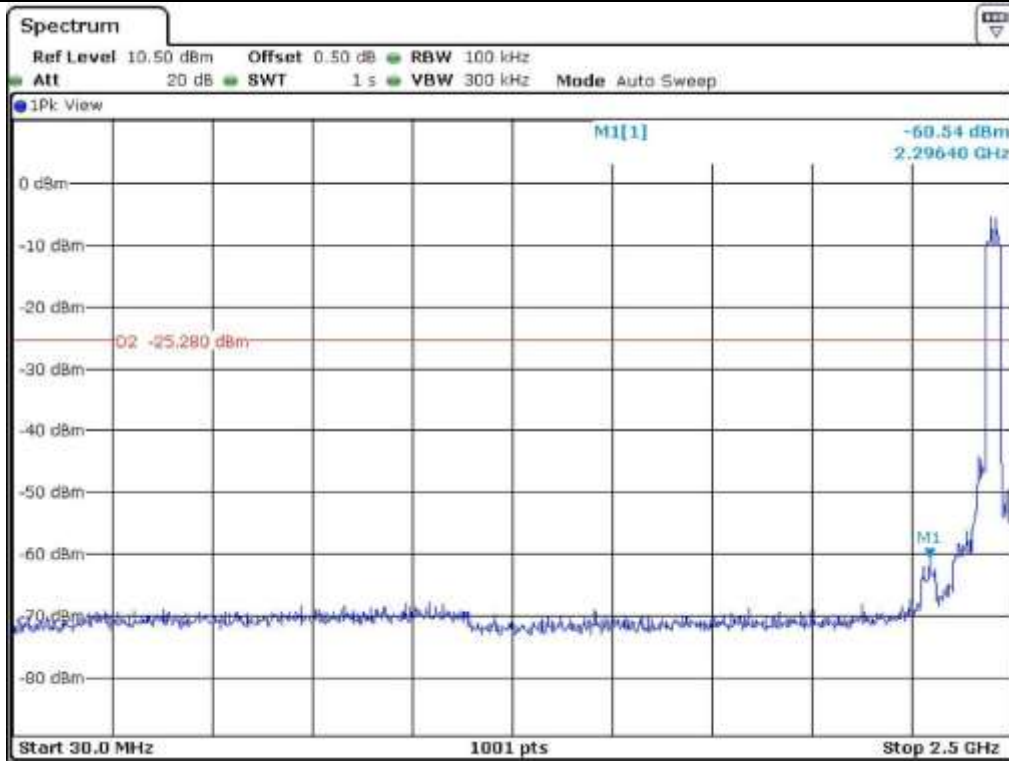
Low Channel



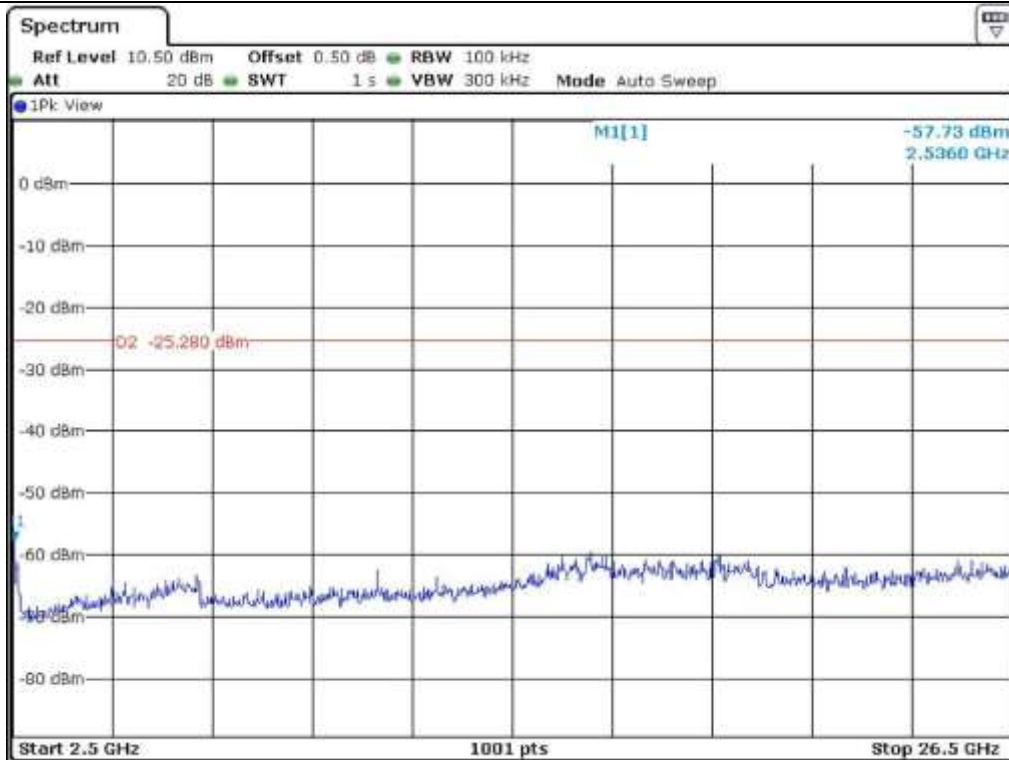
Middle Channel



Middle Channel



High Channel



High Channel

7.3.6 Test data for radiated emission

7.3.6.1 Radiated Emission which fall in the Restricted Band

7.3.6.1.1 Test data for WLAN 2.4 g

7.3.6.1.1.1 Test data for 802.11b

7.3.6.1.1.1.1 Test data for Antenna 0

- . Test Date : May 20, 2015
- . Resolution bandwidth : 1 MHz for Peak and Average Mode
- . Video bandwidth : 1 MHz for Peak Mode, 10 Hz for Average Mode
- . Frequency range : 30 MHz ~ 26.5 GHz
- . Measurement distance : 3 m
- . Result : PASSED

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for Low Channel									
2 390.00	54.77	Peak	H	27.10	7.50	43.00	46.37	74.00	27.63
	49.05	Average	H				40.65	54.00	13.35
	47.82	Peak	V				39.42	74.00	34.58
	37.12	Average	V				28.72	54.00	25.28
Test Data for High Channel									
2 483.50	46.92	Peak	H	27.10	7.50	43.00	38.52	74.00	35.48
	37.27	Average	H				28.87	54.00	25.13
	46.88	Peak	V				38.48	74.00	35.52
	37.21	Average	V				28.81	54.00	25.19

Tabulated test data for Restricted Band

Remark: "H": Horizontal, "V": Vertical

$$\text{Margin (dB)} = \text{Limits (dB}\mu\text{V/m)} - \text{Total Level (dB}\mu\text{V/m)}$$

$$\text{Total Level} = \text{Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Pre-Amplifier Gain}$$



Tested by: Tae-Ho, Kim / Senior Engineer

7.3.6.1.1.1.2 Test data for Antenna 1

- Test Date : May 20, 2015
- Resolution bandwidth : 1 MHz for Peak and Average Mode
- Video bandwidth : 1 MHz for Peak Mode, 10 Hz for Average Mode
- Frequency range : 30 MHz ~ 26.5 GHz
- Measurement distance : 3 m
- Result : PASSED

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for Low Channel									
2 390.00	55.21	Peak	H	27.10	7.50	43.00	46.81	74.00	27.19
	49.54	Average	H				41.14	54.00	12.86
	48.62	Peak	V				40.22	74.00	33.78
	38.00	Average	V				29.60	54.00	24.40
Test Data for High Channel									
2 483.50	46.57	Peak	H	27.10	7.50	43.00	38.17	74.00	35.83
	37.06	Average	H				28.66	54.00	25.34
	47.25	Peak	V				38.85	74.00	35.15
	38.01	Average	V				29.61	54.00	24.39

Tabulated test data for Restricted Band

Remark: “H”: Horizontal, “V”: Vertical

$$\text{Margin (dB)} = \text{Limits (dB}\mu\text{V/m)} - \text{Total Level (dB}\mu\text{V/m)}$$

$$\text{Total Level} = \text{Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Pre-Amplifier Gain}$$



Tested by: Tae-Ho, Kim / Senior Engineer

7.3.6.1.1.2 Test data for 802.11g

7.3.6.1.1.2.1 Test data for Antenna 0

- Test Date : May 20, 2015
- Resolution bandwidth : 1 MHz for Peak and Average Mode
- Video bandwidth : 1 MHz for Peak Mode, 10 Hz for Average Mode
- Frequency range : 30 MHz ~ 26.5 GHz
- Measurement distance : 3 m
- Result : PASSED

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for Low Channel									
2 390.00	66.24	Peak	H	27.00	7.50	43.00	57.74	74.00	16.26
	54.74	Average	H				46.24	54.00	7.76
	53.21	Peak	V				44.71	74.00	29.29
	41.77	Average	V				33.27	54.00	20.73
Test Data for High Channel									
2 483.50	62.45	Peak	H	27.40	7.70	43.00	54.55	74.00	19.45
	47.83	Average	H				39.93	54.00	14.07
	46.99	Peak	V				39.09	74.00	34.91
	35.88	Average	V				27.98	54.00	26.02

Tabulated test data for Restricted Band

Remark: "H": Horizontal, "V": Vertical

$$\text{Margin (dB)} = \text{Limits (dB}\mu\text{V/m)} - \text{Total Level (dB}\mu\text{V/m)}$$

$$\text{Total Level} = \text{Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Pre-Amplifier Gain}$$



Tested by: Tae-Ho, Kim / Senior Engineer

7.3.6.1.1.2.2 Test data for Antenna 1

- Test Date : May 20, 2015
- Resolution bandwidth : 1 MHz for Peak and Average Mode
- Video bandwidth : 1 MHz for Peak Mode, 10 Hz for Average Mode
- Frequency range : 30 MHz ~ 26.5 GHz
- Measurement distance : 3 m
- Result : PASSED

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for Low Channel									
2 390.00	67.21	Peak	H	27.00	7.50	43.00	58.71	74.00	15.29
	55.28	Average	H				46.78	54.00	7.22
	54.55	Peak	V				46.05	74.00	27.95
	42.39	Average	V				33.89	54.00	20.11
Test Data for High Channel									
2 483.50	63.48	Peak	H	27.40	7.70	43.00	55.58	74.00	18.42
	50.15	Average	H				42.25	54.00	11.75
	48.28	Peak	V				40.38	74.00	33.62
	39.84	Average	V				31.94	54.00	22.06

Tabulated test data for Restricted Band

Remark: “H”: Horizontal, “V”: Vertical

$$\text{Margin (dB)} = \text{Limits (dB}\mu\text{V/m)} - \text{Total Level (dB}\mu\text{V/m)}$$

$$\text{Total Level} = \text{Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Pre-Amplifier Gain}$$



Tested by: Tae-Ho, Kim / Senior Engineer

7.3.6.1.1.2.3 Test data for Multiple transmit

- Test Date : May 20, 2015
- Resolution bandwidth : 1 MHz for Peak and Average Mode
- Video bandwidth : 1 MHz for Peak Mode, 10 Hz for Average Mode
- Frequency range : 30 MHz ~ 26.5 GHz
- Measurement distance : 3 m
- Result : PASSED

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for Low Channel									
2 390.00	67.15	Peak	H	27.00	7.50	43.00	58.65	74.00	15.35
	55.84	Average	H				47.34	54.00	6.66
	54.22	Peak	V				45.72	74.00	28.28
	41.57	Average	V				33.07	54.00	20.93
Test Data for High Channel									
2 483.50	62.18	Peak	H	27.40	7.70	43.00	54.28	74.00	19.72
	47.25	Average	H				39.35	54.00	14.65
	47.84	Peak	V				39.94	74.00	34.06
	35.94	Average	V				28.04	54.00	25.96

Tabulated test data for Restricted Band

Remark: “H”: Horizontal, “V”: Vertical

$$\text{Margin (dB)} = \text{Limits (dB}\mu\text{V/m)} - \text{Total Level (dB}\mu\text{V/m)}$$

$$\text{Total Level} = \text{Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Pre-Amplifier Gain}$$



Tested by: Tae-Ho, Kim / Senior Engineer

7.3.6.1.1.3 Test data for 802.11n_HT20

7.3.6.1.1.3.1 Test data for Antenna 0

- Test Date : May 20, 2015
- Resolution bandwidth : 1 MHz for Peak and Average Mode
- Video bandwidth : 1 MHz for Peak Mode, 10 Hz for Average Mode
- Frequency range : 30 MHz ~ 26.5 GHz
- Measurement distance : 3 m
- Result : PASSED

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for Low Channel									
2 390.00	70.15	Peak	H	27.00	7.50	43.00	61.65	74.00	12.35
	54.31	Average	H				45.81	54.00	8.19
	58.60	Peak	V				50.10	74.00	23.90
	43.48	Average	V				34.98	54.00	19.02
Test Data for High Channel									
2 483.50	65.11	Peak	H	27.40	7.70	43.00	57.21	74.00	16.79
	51.27	Average	H				43.37	54.00	10.63
	51.51	Peak	V				43.61	74.00	30.39
	38.71	Average	V				30.81	54.00	23.19

Tabulated test data for Restricted Band

Remark: "H": Horizontal, "V": Vertical

$$\text{Margin (dB)} = \text{Limits (dB}\mu\text{V/m)} - \text{Total Level (dB}\mu\text{V/m)}$$

$$\text{Total Level} = \text{Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Pre-Amplifier Gain}$$



Tested by: Tae-Ho, Kim / Senior Engineer

7.3.6.1.1.3.2 Test data for Antenna 1

- Test Date : May 20, 2015
- Resolution bandwidth : 1 MHz for Peak and Average Mode
- Video bandwidth : 1 MHz for Peak Mode, 10 Hz for Average Mode
- Frequency range : 30 MHz ~ 26.5 GHz
- Measurement distance : 3 m
- Result : PASSED

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for Low Channel									
2 390.00	72.25	Peak	H	27.00	7.50	43.00	63.75	74.00	10.25
	56.01	Average	H				47.51	54.00	6.49
	59.55	Peak	V				51.05	74.00	22.95
	44.87	Average	V				36.37	54.00	17.63
Test Data for High Channel									
2 483.50	65.68	Peak	H	27.40	7.70	43.00	57.78	74.00	16.22
	51.84	Average	H				43.94	54.00	10.06
	52.33	Peak	V				44.43	74.00	29.57
	39.48	Average	V				31.58	54.00	22.42

Tabulated test data for Restricted Band

Remark: "H": Horizontal, "V": Vertical

$$\text{Margin (dB)} = \text{Limits (dB}\mu\text{V/m)} - \text{Total Level (dB}\mu\text{V/m)}$$

$$\text{Total Level} = \text{Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Pre-Amplifier Gain}$$



Tested by: Tae-Ho, Kim / Senior Engineer

7.3.6.1.1.3.3 Test data for Multiple transmit

- Test Date : May 20, 2015
- Resolution bandwidth : 1 MHz for Peak and Average Mode
- Video bandwidth : 1 MHz for Peak Mode, 10 Hz for Average Mode
- Frequency range : 30 MHz ~ 26.5 GHz
- Measurement distance : 3 m
- Result : PASSED

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for Low Channel									
2 390.00	70.28	Peak	H	27.00	7.50	43.00	61.78	74.00	12.22
	55.31	Average	H				46.81	54.00	7.19
	60.21	Peak	V				51.71	74.00	22.29
	46.21	Average	V				37.71	54.00	16.29
Test Data for High Channel									
2 483.50	66.21	Peak	H	27.40	7.70	43.00	58.31	74.00	15.69
	52.55	Average	H				44.65	54.00	9.35
	51.68	Peak	V				43.78	74.00	30.22
	39.11	Average	V				31.21	54.00	22.79

Tabulated test data for Restricted Band

Remark: “H”: Horizontal, “V”: Vertical

$$\text{Margin (dB)} = \text{Limits (dB}\mu\text{V/m)} - \text{Total Level (dB}\mu\text{V/m)}$$

$$\text{Total Level} = \text{Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Pre-Amplifier Gain}$$



Tested by: Tae-Ho, Kim / Senior Engineer

7.3.6.1.1.4 Test data for 802.11n_HT40

7.3.6.1.1.4.1 Test data for Antenna 0

- . Test Date : May 20, 2015
- . Resolution bandwidth : 1 MHz for Peak and Average Mode
- . Video bandwidth : 1 MHz for Peak Mode, 10 Hz for Average Mode
- . Frequency range : 30 MHz ~ 26.5 GHz
- . Measurement distance : 3 m
- . Result : PASSED

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for Low Channel									
2 390.00	61.10	Peak	H	27.00	7.50	43.00	52.60	74.00	21.40
	50.14	Average	H				41.64	54.00	12.36
	48.24	Peak	V				39.74	74.00	34.26
	36.98	Average	V				28.48	54.00	25.52
Test Data for High Channel									
2 483.50	65.86	Peak	H	27.40	7.70	43.00	57.96	74.00	16.04
	52.95	Average	H				45.05	54.00	8.95
	49.26	Peak	V				41.36	74.00	32.64
	37.86	Average	V				29.96	54.00	24.04

Tabulated test data for Restricted Band

Remark: “H”: Horizontal, “V”: Vertical

$$\text{Margin (dB)} = \text{Limits (dB}\mu\text{V/m)} - \text{Total Level (dB}\mu\text{V/m)}$$

$$\text{Total Level} = \text{Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Pre-Amplifier Gain}$$



Tested by: Tae-Ho, Kim / Senior Engineer

7.3.6.1.1.4.2 Test data for Antenna 1

- Test Date : May 20, 2015
- Resolution bandwidth : 1 MHz for Peak and Average Mode
- Video bandwidth : 1 MHz for Peak Mode, 10 Hz for Average Mode
- Frequency range : 30 MHz ~ 26.5 GHz
- Measurement distance : 3 m
- Result : PASSED

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for Low Channel									
2 390.00	62.51	Peak	H	27.00	7.50	43.00	54.01	74.00	19.99
	51.58	Average	H				43.08	54.00	10.92
	49.68	Peak	V				41.18	74.00	32.82
	38.56	Average	V				30.06	54.00	23.94
Test Data for High Channel									
2 483.50	66.94	Peak	H	27.40	7.70	43.00	59.04	74.00	14.96
	53.14	Average	H				45.24	54.00	8.76
	50.25	Peak	V				42.35	74.00	31.65
	38.94	Average	V				31.04	54.00	22.96

Tabulated test data for Restricted Band

Remark: “H”: Horizontal, “V”: Vertical

$$\text{Margin (dB)} = \text{Limits (dB}\mu\text{V/m)} - \text{Total Level (dB}\mu\text{V/m)}$$

$$\text{Total Level} = \text{Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Pre-Amplifier Gain}$$



Tested by: Tae-Ho, Kim / Senior Engineer

7.3.6.1.1.4.3 Test data for Multiple transmit

- Test Date : May 20, 2015
- Resolution bandwidth : 1 MHz for Peak and Average Mode
- Video bandwidth : 1 MHz for Peak Mode, 10 Hz for Average Mode
- Frequency range : 30 MHz ~ 26.5 GHz
- Measurement distance : 3 m
- Result : PASSED

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for Low Channel									
2 390.00	61.25	Peak	H	27.00	7.50	43.00	52.75	74.00	21.25
	50.25	Average	H				41.75	54.00	12.25
	48.98	Peak	V				40.48	74.00	33.52
	37.58	Average	V				29.08	54.00	24.92
Test Data for High Channel									
2 483.50	65.11	Peak	H	27.40	7.70	43.00	57.21	74.00	16.79
	52.84	Average	H				44.94	54.00	9.06
	50.25	Peak	V				42.35	74.00	31.65
	38.94	Average	V				31.04	54.00	22.96

Tabulated test data for Restricted Band

Remark: “H”: Horizontal, “V”: Vertical

$$\text{Margin (dB)} = \text{Limits (dB}\mu\text{V/m)} - \text{Total Level (dB}\mu\text{V/m)}$$

$$\text{Total Level} = \text{Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Pre-Amplifier Gain}$$



Tested by: Tae-Ho, Kim / Senior Engineer

7.3.6.2 Spurious & Harmonic Radiated Emission

7.3.6.2.1 Test data for WLAN 2.4 G

7.3.6.2.1.1 Test data for 802.11b

7.3.6.2.1.1.1 Test data for Antenna 0

- Test Date : May 20, 2015
- Resolution bandwidth : 1 MHz for Peak and Average Mode for the emissions fall in restricted band,
100 kHz for Peak Mode for the emissions outside restricted band
- Video bandwidth : 1 MHz for Peak Mode, 10 Hz for Average Mode
- Frequency range : 1 GHz ~ 26.5 GHz
- Measurement distance : 3 m
- Result : PASSED

Frequency (GHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for Low Channel									
4 824.00	44.26	Peak	H	30.70	11.10	42.50	43.56	73.98	30.42
	35.61	Average	H				34.91	53.98	19.07
	44.74	Peak	V				44.04	73.98	29.94
	35.74	Average	V				35.04	53.98	18.94
Test Data for Middle Channel									
4 884.00	44.38	Peak	H	30.70	11.20	42.40	43.88	73.98	30.10
	35.25	Average	H				34.75	53.98	19.23
	43.98	Peak	V				43.48	73.98	30.50
	34.84	Average	V				34.34	53.98	19.64
Test Data for High Channel									
4 924.00	44.08	Peak	H	30.80	11.80	42.30	44.38	73.98	29.60
	35.28	Average	H				35.58	53.98	18.40
	44.22	Peak	V				44.52	73.98	29.46
	34.76	Average	V				35.06	53.98	18.92

Tabulated test data for Restricted Band

Remark: "H": Horizontal, "V": Vertical

$$\text{Margin (dB)} = \text{Limits (dB}\mu\text{V/m)} - \text{Total Level (dB}\mu\text{V/m)}$$

$$\text{Total Level} = \text{Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Pre-Amplifier Gain}$$

Tested by: Tae-Ho, Kim / Senior Engineer

7.3.6.2.1.1.2 Test data for Antenna 1

- Test Date : May 20, 2015
- Resolution bandwidth : 1 MHz for Peak and Average Mode for the emissions fall in restricted band,
100 kHz for Peak Mode for the emissions outside restricted band
- Video bandwidth : 1 MHz for Peak Mode, 10 Hz for Average Mode
- Frequency range : 1 GHz ~ 26.5 GHz
- Measurement distance : 3 m
- Result : PASSED

Frequency (GHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for Low Channel									
4 824.00	44.06	Peak	H	30.70	11.10	42.50	43.36	73.98	30.62
	35.81	Average	H				35.11	53.98	18.87
	44.91	Peak	V				44.21	73.98	29.77
	36.41	Average	V				35.71	53.98	18.27
Test Data for Middle Channel									
4 884.00	44.79	Peak	H	30.70	11.20	42.40	44.29	73.98	29.69
	36.00	Average	H				35.50	53.98	18.48
	44.79	Peak	V				44.29	73.98	29.69
	35.13	Average	V				34.63	53.98	19.35
Test Data for High Channel									
4 924.00	44.04	Peak	H	30.80	11.80	42.30	44.34	73.98	29.64
	36.18	Average	H				36.48	53.98	17.50
	44.49	Peak	V				44.79	73.98	29.19
	34.68	Average	V				34.98	53.98	19.00

Tabulated test data for Restricted Band

Remark: "H": Horizontal, "V": Vertical

$$\text{Margin (dB)} = \text{Limits (dB}\mu\text{V/m)} - \text{Total Level (dB}\mu\text{V/m)}$$

$$\text{Total Level} = \text{Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Pre-Amplifier Gain}$$



Tested by: Tae-Ho, Kim / Senior Engineer

7.3.6.2.1.2 Test data for 802.11g

7.3.6.2.1.2.1 Test data for Antenna 0

- Test Date : May 20, 2015
- Resolution bandwidth : 1 MHz for Peak and Average Mode for the emissions fall in restricted band,
100 kHz for Peak Mode for the emissions outside restricted band
- Video bandwidth : 1 MHz for Peak Mode, 10 Hz for Average Mode
- Frequency range : 1 GHz ~ 26.5 GHz
- Measurement distance : 3 m
- Result : PASSED

Frequency (GHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for Low Channel									
4 824.00	42.28	Peak	H	30.70	11.10	42.50	41.58	73.98	32.40
	34.38	Average	H				33.68	53.98	20.30
	42.32	Peak	V				41.62	73.98	32.36
	34.41	Average	V				33.71	53.98	20.27
Test Data for Middle Channel									
4 884.00	42.28	Peak	H	30.70	11.20	42.40	41.78	73.98	32.20
	34.84	Average	H				34.34	53.98	19.64
	43.21	Peak	V				42.71	73.98	31.27
	34.58	Average	V				34.08	53.98	19.90
Test Data for High Channel									
4 924.00	42.55	Peak	H	30.80	11.80	42.30	42.85	73.98	31.13
	34.34	Average	H				34.64	53.98	19.34
	42.84	Peak	V				43.14	73.98	30.84
	34.28	Average	V				34.58	53.98	19.40

Tabulated test data for Restricted Band

Remark: "H": Horizontal, "V": Vertical

$$\text{Margin (dB)} = \text{Limits (dB}\mu\text{V/m)} - \text{Total Level (dB}\mu\text{V/m)}$$

$$\text{Total Level} = \text{Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Pre-Amplifier Gain}$$



Tested by: Tae-Ho, Kim / Senior Engineer

7.3.6.2.1.2.2 Test data for Antenna 1

- Test Date : May 20, 2015
- Resolution bandwidth : 1 MHz for Peak and Average Mode for the emissions fall in restricted band,
100 kHz for Peak Mode for the emissions outside restricted band
- Video bandwidth : 1 MHz for Peak Mode, 10 Hz for Average Mode
- Frequency range : 1 GHz ~ 26.5 GHz
- Measurement distance : 3 m
- Result : PASSED

Frequency (GHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for Low Channel									
4 824.00	42.52	Peak	H	30.70	11.10	42.50	41.82	73.98	32.16
	34.33	Average	H				33.63	53.98	20.35
	43.15	Peak	V				42.45	73.98	31.53
	34.32	Average	V				33.62	53.98	20.36
Test Data for Middle Channel									
4 884.00	42.88	Peak	H	30.70	11.20	42.40	42.38	73.98	31.60
	35.11	Average	H				34.61	53.98	19.37
	43.17	Peak	V				42.67	73.98	31.31
	34.33	Average	V				33.83	53.98	20.15
Test Data for High Channel									
4 924.00	42.92	Peak	H	30.80	11.80	42.30	43.22	73.98	30.76
	34.25	Average	H				34.55	53.98	19.43
	43.79	Peak	V				44.09	73.98	29.89
	34.65	Average	V				34.95	53.98	19.03

Tabulated test data for Restricted Band

Remark: "H": Horizontal, "V": Vertical

$$\text{Margin (dB)} = \text{Limits (dB}\mu\text{V/m)} - \text{Total Level (dB}\mu\text{V/m)}$$

$$\text{Total Level} = \text{Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Pre-Amplifier Gain}$$



Tested by: Tae-Ho, Kim / Senior Engineer

7.3.6.2.1.2.3 Test data for Multiple transmit

- Test Date : May 20, 2015
- Resolution bandwidth : 1 MHz for Peak and Average Mode for the emissions fall in restricted band,
100 kHz for Peak Mode for the emissions outside restricted band
- Video bandwidth : 1 MHz for Peak Mode, 10 Hz for Average Mode
- Frequency range : 1 GHz ~ 26.5 GHz
- Measurement distance : 3 m
- Result : PASSED

Frequency (GHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for Low Channel									
4 824.00	43.00	Peak	H	30.70	11.10	42.50	42.30	73.98	31.68
	35.22	Average	H				34.52	53.98	19.46
	42.40	Peak	V				41.70	73.98	32.28
	34.39	Average	V				33.69	53.98	20.29
Test Data for Middle Channel									
4 884.00	42.98	Peak	H	30.70	11.20	42.40	42.48	73.98	31.50
	35.53	Average	H				35.03	53.98	18.95
	43.36	Peak	V				42.86	73.98	31.12
	34.93	Average	V				34.43	53.98	19.55
Test Data for High Channel									
4 924.00	42.32	Peak	H	30.80	11.80	42.30	42.62	73.98	31.36
	35.13	Average	H				35.43	53.98	18.55
	43.51	Peak	V				43.81	73.98	30.17
	34.07	Average	V				34.37	53.98	19.61

Tabulated test data for Restricted Band

Remark: "H": Horizontal, "V": Vertical

$$\text{Margin (dB)} = \text{Limits (dB}\mu\text{V/m)} - \text{Total Level (dB}\mu\text{V/m)}$$

$$\text{Total Level} = \text{Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Pre-Amplifier Gain}$$



Tested by: Tae-Ho, Kim / Senior Engineer

7.3.6.2.1.3 Test data for 802.11n_HT20

7.3.6.2.1.3.1 Test data for Antenna 0

- Test Date : May 20, 2015
- Resolution bandwidth : 1 MHz for Peak and Average Mode for the emissions fall in restricted band,
100 kHz for Peak Mode for the emissions outside restricted band
- Video bandwidth : 1 MHz for Peak Mode, 10 Hz for Average Mode
- Frequency range : 1 GHz ~ 26.5 GHz
- Measurement distance : 3 m
- Result : PASSED

Frequency (GHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for Low Channel									
4 824.00	42.85	Peak	H	30.70	11.10	42.50	42.15	73.98	31.83
	34.82	Average	H				34.12	53.98	19.86
	42.11	Peak	V				41.41	73.98	32.57
	35.04	Average	V				34.34	53.98	19.64
Test Data for Middle Channel									
4 884.00	41.98	Peak	H	30.70	11.20	42.40	41.48	73.98	32.50
	34.94	Average	H				34.44	53.98	19.54
	43.99	Peak	V				43.49	73.98	30.49
	35.33	Average	V				34.83	53.98	19.15
Test Data for High Channel									
4 924.00	42.25	Peak	H	30.80	11.80	42.30	42.55	73.98	31.43
	35.00	Average	H				35.30	53.98	18.68
	42.92	Peak	V				43.22	73.98	30.76
	34.61	Average	V				34.91	53.98	19.07

Tabulated test data for Restricted Band

Remark: "H": Horizontal, "V": Vertical

$$\text{Margin (dB)} = \text{Limits (dB}\mu\text{V/m)} - \text{Total Level (dB}\mu\text{V/m)}$$

$$\text{Total Level} = \text{Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Pre-Amplifier Gain}$$



Tested by: Tae-Ho, Kim / Senior Engineer

7.3.6.2.1.3.2 Test data for Antenna 1

- Test Date : May 20, 2015
- Resolution bandwidth : 1 MHz for Peak and Average Mode for the emissions fall in restricted band,
100 kHz for Peak Mode for the emissions outside restricted band
- Video bandwidth : 1 MHz for Peak Mode, 10 Hz for Average Mode
- Frequency range : 1 GHz ~ 26.5 GHz
- Measurement distance : 3 m
- Result : PASSED

Frequency (GHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for Low Channel									
4 824.00	42.56	Peak	H	30.70	11.10	42.50	41.86	73.98	32.12
	35.26	Average	H				34.56	53.98	19.42
	43.04	Peak	V				42.34	73.98	31.64
	34.33	Average	V				33.63	53.98	20.35
Test Data for Middle Channel									
4 884.00	42.52	Peak	H	30.70	11.20	42.40	42.02	73.98	31.96
	34.75	Average	H				34.25	53.98	19.73
	43.54	Peak	V				43.04	73.98	30.94
	34.50	Average	V				34.00	53.98	19.98
Test Data for High Channel									
4 924.00	42.77	Peak	H	30.80	11.80	42.30	43.07	73.98	30.91
	34.96	Average	H				35.26	53.98	18.72
	43.49	Peak	V				43.79	73.98	30.19
	34.06	Average	V				34.36	53.98	19.62

Tabulated test data for Restricted Band

Remark: "H": Horizontal, "V": Vertical

$$\text{Margin (dB)} = \text{Limits (dB}\mu\text{V/m)} - \text{Total Level (dB}\mu\text{V/m)}$$

$$\text{Total Level} = \text{Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Pre-Amplifier Gain}$$



Tested by: Tae-Ho, Kim / Senior Engineer

7.3.6.2.1.3.3 Test data for Multiple transmit

- Test Date : May 20, 2015
- Resolution bandwidth : 1 MHz for Peak and Average Mode for the emissions fall in restricted band,
100 kHz for Peak Mode for the emissions outside restricted band
- Video bandwidth : 1 MHz for Peak Mode, 10 Hz for Average Mode
- Frequency range : 1 GHz ~ 26.5 GHz
- Measurement distance : 3 m
- Result : PASSED

Frequency (GHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for Low Channel									
4 824.00	42.93	Peak	H	30.70	11.10	42.50	42.23	73.98	31.75
	34.86	Average	H				34.16	53.98	19.82
	42.03	Peak	V				41.33	73.98	32.65
	34.95	Average	V				34.25	53.98	19.73
Test Data for Middle Channel									
4 884.00	42.23	Peak	H	30.70	11.20	42.40	41.73	73.98	32.25
	35.37	Average	H				34.87	53.98	19.11
	43.24	Peak	V				42.74	73.98	31.24
	35.19	Average	V				34.69	53.98	19.29
Test Data for High Channel									
4 924.00	43.51	Peak	H	30.80	11.80	42.30	43.81	73.98	30.17
	35.01	Average	H				35.31	53.98	18.67
	42.54	Peak	V				42.84	73.98	31.14
	34.77	Average	V				35.07	53.98	18.91

Tabulated test data for Restricted Band

Remark: “H”: Horizontal, “V”: Vertical

$$\text{Margin (dB)} = \text{Limits (dB}\mu\text{V/m)} - \text{Total Level (dB}\mu\text{V/m)}$$

$$\text{Total Level} = \text{Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Pre-Amplifier Gain}$$



Tested by: Tae-Ho, Kim / Senior Engineer

7.3.6.2.1.4 Test data for 802.11n_HT40

7.3.6.2.1.4.1 Test data for Antenna 0

- Test Date : May 20, 2015
- Resolution bandwidth : 1 MHz for Peak and Average Mode for the emissions fall in restricted band,
100 kHz for Peak Mode for the emissions outside restricted band
- Video bandwidth : 1 MHz for Peak Mode, 10 Hz for Average Mode
- Frequency range : 1 GHz ~ 26.5 GHz
- Measurement distance : 3 m
- Result : PASSED

Frequency (GHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for Low Channel									
4 844.00	43.18	Peak	H	31.10	11.80	42.50	43.58	73.98	30.40
	34.33	Average	H				34.73	53.98	19.25
	43.18	Peak	V				43.58	73.98	30.40
	34.80	Average	V				35.20	53.98	18.78
Test Data for Middle Channel									
4 884.00	43.26	Peak	H	31.20	11.70	42.50	43.66	73.98	30.32
	34.83	Average	H				35.23	53.98	18.75
	43.59	Peak	V				43.99	73.98	29.99
	35.43	Average	V				35.83	53.98	18.15
Test Data for High Channel									
4 904.00	43.32	Peak	H	31.30	11.80	42.50	43.92	73.98	30.06
	34.76	Average	H				35.36	53.98	18.62
	42.72	Peak	V				43.32	73.98	30.66
	34.26	Average	V				34.86	53.98	19.12

Tabulated test data for Restricted Band

Remark: "H": Horizontal, "V": Vertical

$$\text{Margin (dB)} = \text{Limits (dB}\mu\text{V/m)} - \text{Total Level (dB}\mu\text{V/m)}$$

$$\text{Total Level} = \text{Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Pre-Amplifier Gain}$$



Tested by: Tae-Ho, Kim / Senior Engineer

7.3.6.2.1.4.2 Test data for Antenna 1

- Test Date : May 20, 2015
- Resolution bandwidth : 1 MHz for Peak and Average Mode for the emissions fall in restricted band,
100 kHz for Peak Mode for the emissions outside restricted band
- Video bandwidth : 1 MHz for Peak Mode, 10 Hz for Average Mode
- Frequency range : 1 GHz ~ 26.5 GHz
- Measurement distance : 3 m
- Result : PASSED

Frequency (GHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for Low Channel									
4 844.00	43.20	Peak	H	31.10	11.80	42.50	43.60	73.98	30.38
	34.18	Average	H				34.58	53.98	19.40
	42.76	Peak	V				43.16	73.98	30.82
	34.23	Average	V				34.63	53.98	19.35
Test Data for Middle Channel									
4 884.00	42.04	Peak	H	31.20	11.70	42.50	42.44	73.98	31.54
	35.09	Average	H				35.49	53.98	18.49
	43.42	Peak	V				43.82	73.98	30.16
	35.47	Average	V				35.87	53.98	18.11
Test Data for High Channel									
4 904.00	42.90	Peak	H	31.30	11.80	42.50	43.50	73.98	30.48
	34.16	Average	H				34.76	53.98	19.22
	43.42	Peak	V				44.02	73.98	29.96
	35.02	Average	V				35.62	53.98	18.36

Tabulated test data for Restricted Band

Remark: "H": Horizontal, "V": Vertical

$$\text{Margin (dB)} = \text{Limits (dB}\mu\text{V/m)} - \text{Total Level (dB}\mu\text{V/m)}$$

$$\text{Total Level} = \text{Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Pre-Amplifier Gain}$$



Tested by: Tae-Ho, Kim / Senior Engineer

7.3.6.2.1.4.3 Test data for Multiple transmit

- Test Date : May 20, 2015
- Resolution bandwidth : 1 MHz for Peak and Average Mode for the emissions fall in restricted band,
100 kHz for Peak Mode for the emissions outside restricted band
- Video bandwidth : 1 MHz for Peak Mode, 10 Hz for Average Mode
- Frequency range : 1 GHz ~ 26.5 GHz
- Measurement distance : 3 m
- Result : PASSED

Frequency (GHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for Low Channel									
4 844.00	42.44	Peak	H	31.10	11.80	42.50	42.84	73.98	31.14
	34.57	Average	H				34.97	53.98	19.01
	43.25	Peak	V				43.65	73.98	30.33
	35.04	Average	V				35.44	53.98	18.54
Test Data for Middle Channel									
4 884.00	42.16	Peak	H	31.20	11.70	42.50	42.56	73.98	31.42
	35.53	Average	H				35.93	53.98	18.05
	43.35	Peak	V				43.75	73.98	30.23
	34.66	Average	V				35.06	53.98	18.92
Test Data for High Channel									
4 904.00	42.87	Peak	H	31.30	11.80	42.50	43.47	73.98	30.51
	34.54	Average	H				35.14	53.98	18.84
	43.09	Peak	V				43.69	73.98	30.29
	34.94	Average	V				35.54	53.98	18.44

Tabulated test data for Restricted Band

Remark: "H": Horizontal, "V": Vertical

$$\text{Margin (dB)} = \text{Limits (dB}\mu\text{V/m)} - \text{Total Level (dB}\mu\text{V/m)}$$

$$\text{Total Level} = \text{Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Pre-Amplifier Gain}$$



Tested by: Tae-Ho, Kim / Senior Engineer

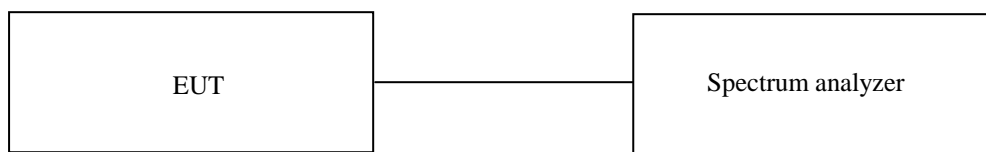
7.4 SPURIOUS EMISSION - RECEIVER

7.4.1 Operating environment

Temperature : 21.4 °C
 Relative humidity : 45.1 % R.H.

7.4.2 Test set-up for conducted measurement

The antenna output of the EUT was connected to the spectrum analyzer. The resolution and video bandwidth is set to 100 kHz, and peak detection was used.



7.4.3 Test set-up for radiated measurement

The radiated emissions measurements were on the 3 m semi anechoic chamber. The EUT and other support equipment were placed on a non-conductive turntable above the ground plane. The interconnecting cables from outside test site were inserted into ferrite clamps at the point where the cables reach the turntable.

The frequency spectrum from 30 MHz to 26.5 GHz was scanned and maximum emission levels at each frequency recorded. The system was rotated 360°, and the antenna was varied in the height between 1.0 m and 4.0 m in order to determine the maximum emission levels. This procedure was performed for horizontal and vertical polarization of the receiving antenna.

7.4.4 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal.(Interval)
■ -	FSV40	Rohde & Schwarz	Signal Analyzer	101009	Jul. 30, 2014 (1Y)
■ -	ESCI	Rohde & Schwarz	Test Receiver	101012	Nov. 03, 2014 (1Y)
■ -	310N	Sonoma Instrument	Pre-Amplifier	312544	Apr. 29, 2015 (1Y)
■ -	SCU-18	Rohde & Schwarz	Pre-Amplifier	10041	Nov. 25, 2014 (1Y)
■ -	DT3000	Innco System	Turn Table	930611	N/A
■ -	MA4000-EP	Innco System	Antenna Master	3320611	N/A
■ -	VULB9163	Schwarzbeck	TRILOG Broadband Antenna	9163-421	Jul. 10, 2014 (2Y)
■ -	BBHA9120D	Schwarzbeck	Horn Antenna	BBHA9120D295	Sep. 05, 2013 (2Y)
■ -	BBHA9170	Schwarzbeck	Horn Antenna	BBHA9170178	Apr. 30, 2015 (2Y)

All test equipment used is calibrated on a regular basis.

7.4.5 Test data for 802.11b

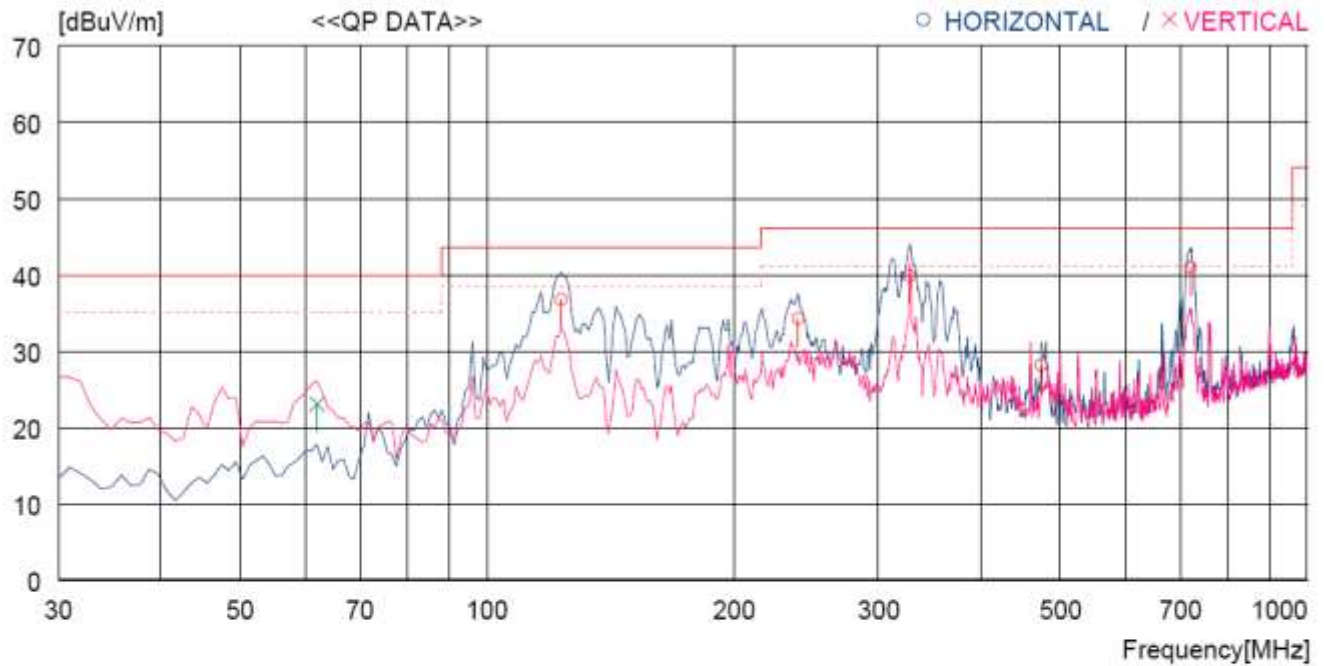
7.4.5.1 Test data for 30 MHz ~ 1 000 MHz

Humidity Level : 45.1 % R.H. Temperature: 21.4 °C
 Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.247
 Result : PASSED

EUT : Wi-Fi module Date: May 20, 2015

Detector : CISPR Quasi-Peak (6 dB Bandwidth: 120 kHz)

-Ant0, Ant1 with Low, Middle and High Channels were tested, but the worst data were recorded.



No.	FREQ [MHz]	READING QP [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal -----										
1	123.120	56.3	11.1	2.4	33.1	36.7	43.5	6.8	200	167
2	239.520	50.7	13.3	3.2	33.0	34.2	46.0	11.8	100	208
3	327.790	53.6	15.4	3.8	33.0	39.8	46.0	6.2	100	187
4	474.261	38.7	18.0	4.5	33.1	28.1	46.0	17.9	200	138
5	720.634	47.5	21.1	5.6	33.3	40.9	46.0	5.1	100	131
----- Vertical -----										
6	62.010	41.1	13.3	1.7	33.1	23.0	40.0	17.0	100	110

7.4.5.2 Test data for Below 30 MHz

- Test Date : May 20, 2015
- Resolution bandwidth : 200 Hz (from 9 kHz to 0.15 MHz), 9 kHz (from 0.15 MHz to 30 MHz)
- Frequency range : 9 kHz ~ 30 MHz
- Measurement distance : 3 m

Frequency (MHz)	Reading (dBμV)	Ant. Pol. (H/V)	Ant. Factor (dB/m)	Cable Loss	Amp Gain	Emission Level(dBμV/m)	Limits (dBμV/m)	Margin (dB)
It was not observed any emissions from the EUT.								

7.4.5.3 Test data for above 1 GHz

- Test Date : May 20, 2015
- Resolution bandwidth : 1 MHz for Peak and Average Mode
- Video bandwidth : 1 MHz for Peak Mode, 10 Hz for Average Mode
- Frequency range : 1 GHz ~ 26.5 GHz
- Measurement distance : 3 m

Frequency (MHz)	Reading (dBμV)	Ant. Pol. (H/V)	Ant. Factor (dB/m)	Cable Loss	Amp Gain	Emission Level(dBμV/m)	Limits (dBμV/m)	Margin (dB)
It was not observed any emissions from the EUT.								



Tested by: Tae-Ho, Kim / Project Engineer

7.4.6 Test data for 802.11g

7.4.6.1 Test data for 30 MHz ~ 1 000 MHz

Humidity Level : 45.1 % R.H. Temperature: 21.4 °C

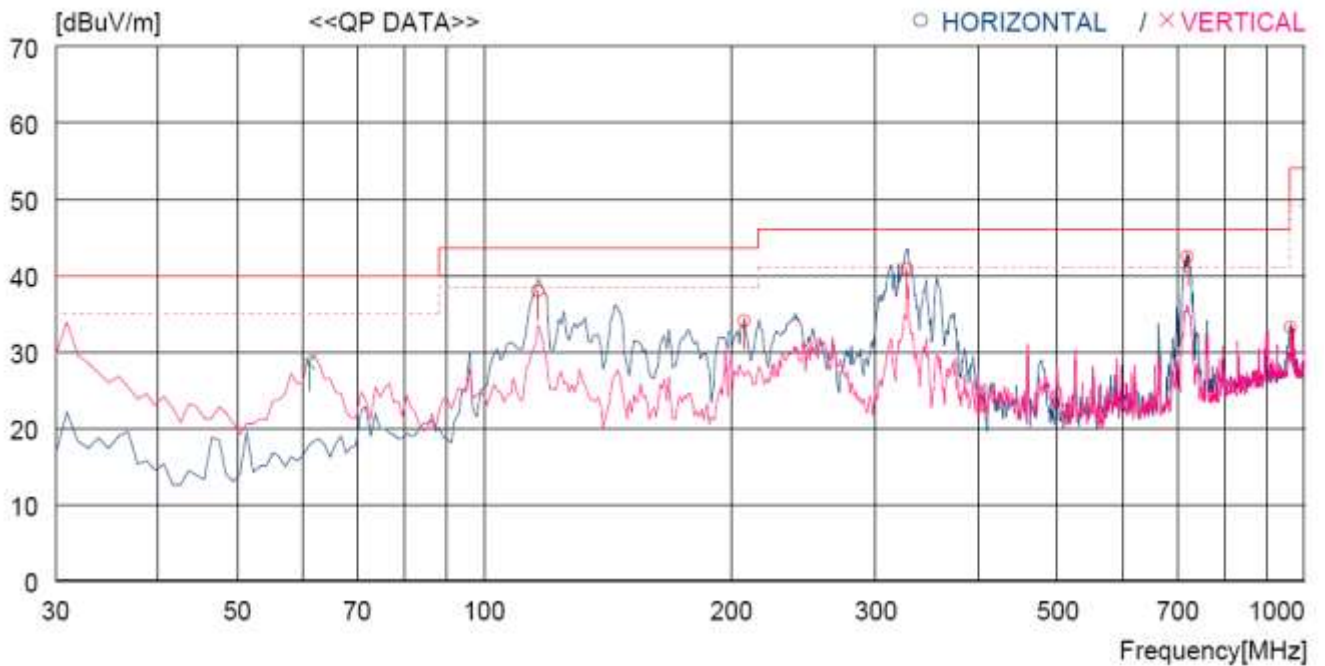
Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.247

Result : PASSED

EUT : Wi-Fi module Date: May 20, 2015

Detector : CISPR Quasi-Peak (6 dB Bandwidth: 120 kHz)

-Ant0, Ant1 and Multiple transmit with Low, Middle and High Channels were tested, but the worst data were recorded.



No.	FREQ [MHz]	READING QP [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal -----										
1	116.330	57.3	10.6	3.1	33.1	37.9	43.5	5.6	200	0
2	207.510	51.7	11.0	4.2	32.9	34.0	43.5	9.5	100	359
3	327.790	54.2	14.2	5.3	32.9	40.8	46.0	5.2	100	159
4	719.664	47.5	19.9	8.2	33.2	42.4	46.0	3.6	100	130
5	960.217	33.1	22.5	9.5	31.9	33.2	54.0	20.8	100	272
----- Vertical -----										
6	61.040	46.5	12.9	2.3	33.1	28.6	40.0	11.4	100	0

7.4.6.2 Test data for Below 30 MHz

- Test Date : May 20, 2015
- Resolution bandwidth : 200 Hz (from 9 kHz to 0.15 MHz), 9 kHz (from 0.15 MHz to 30 MHz)
- Frequency range : 9 kHz ~ 30 MHz
- Measurement distance : 3 m

Frequency (MHz)	Reading (dBμV)	Ant. Pol. (H/V)	Ant. Factor (dB/m)	Cable Loss	Amp Gain	Emission Level(dBμV/m)	Limits (dBμV/m)	Margin (dB)
It was not observed any emissions from the EUT.								

7.4.6.3 Test data for above 1 GHz

- Test Date : May 20, 2015
- Resolution bandwidth : 1 MHz for Peak and Average Mode
- Video bandwidth : 1 MHz for Peak Mode, 10 Hz for Average Mode
- Frequency range : 1 GHz ~ 26.5 GHz
- Measurement distance : 3 m

Frequency (MHz)	Reading (dBμV)	Ant. Pol. (H/V)	Ant. Factor (dB/m)	Cable Loss	Amp Gain	Emission Level(dBμV/m)	Limits (dBμV/m)	Margin (dB)
It was not observed any emissions from the EUT.								



Tested by: Tae-Ho, Kim / Project Engineer

7.4.7 Test data for 802.11n_HT20

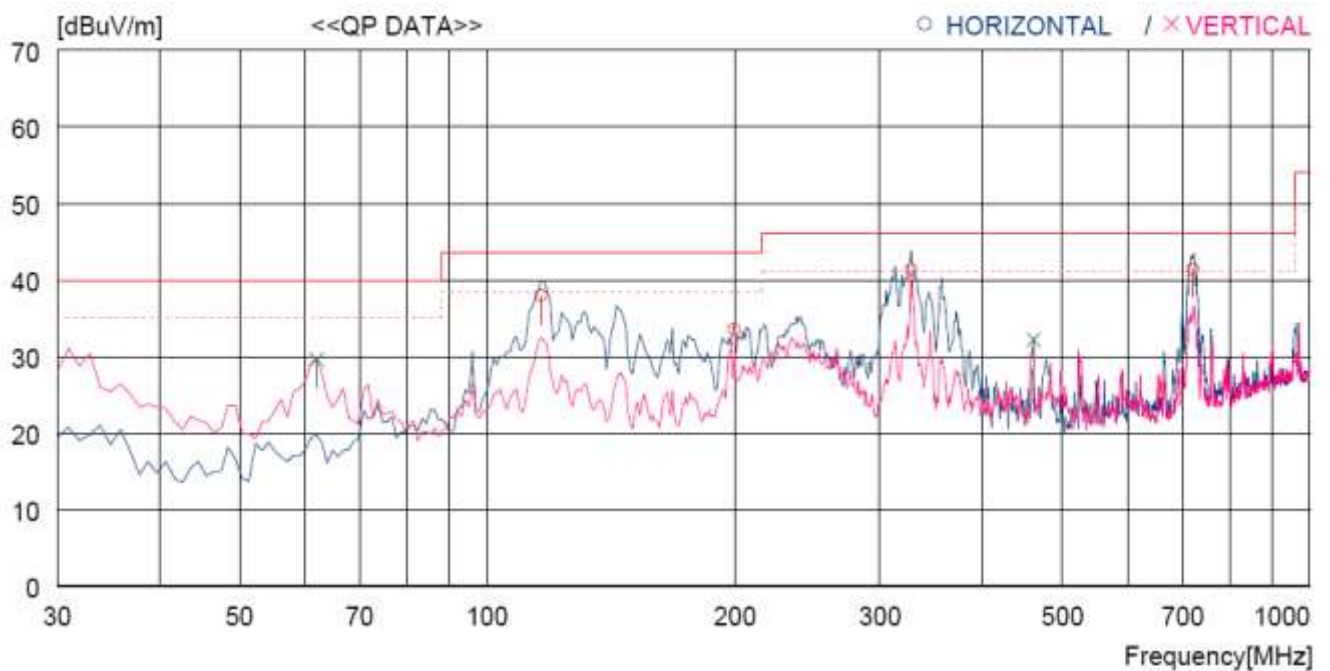
7.4.7.1 Test data for 30 MHz ~ 1 000 MHz

Humidity Level : 45.1 % R.H. Temperature: 21.4 °C
 Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.247
 Result : PASSED

EUT : Wi-Fi module Date: May 20, 2015

Detector : CISPR Quasi-Peak (6 dB Bandwidth: 120 kHz)

-Ant0, Ant1 and Multiple transmit with Low, Middle and High Channels were tested, but the worst data were recorded.



No.	FREQ [MHz]	READING QP [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal -----										
1	116.330	57.3	10.6	3.1	33.1	37.9	43.5	5.6	300	359
2	199.750	51.6	10.7	4.1	32.9	33.5	43.5	10.0	100	359
3	327.790	54.7	14.2	5.3	32.9	41.3	46.0	4.7	100	359
4	721.604	46.5	19.9	8.2	33.2	41.4	46.0	4.6	100	359
----- Vertical -----										
5	62.010	47.8	12.6	2.3	33.1	29.6	40.0	10.4	100	110
6	461.651	42.0	16.8	6.4	33.1	32.1	46.0	13.9	100	95

7.4.7.2 Test data for Below 30 MHz

- Test Date : May 20, 2015
- Resolution bandwidth : 200 Hz (from 9 kHz to 0.15 MHz), 9 kHz (from 0.15 MHz to 30 MHz)
- Frequency range : 9 kHz ~ 30 MHz
- Measurement distance : 3 m

Frequency (MHz)	Reading (dBμV)	Ant. Pol. (H/V)	Ant. Factor (dB/m)	Cable Loss	Amp Gain	Emission Level(dBμV/m)	Limits (dBμV/m)	Margin (dB)
It was not observed any emissions from the EUT.								

7.4.7.3 Test data for above 1 GHz

- Test Date : May 20, 2015
- Resolution bandwidth : 1 MHz for Peak and Average Mode
- Video bandwidth : 1 MHz for Peak Mode, 10 Hz for Average Mode
- Frequency range : 1 GHz ~ 26.5 GHz
- Measurement distance : 3 m

Frequency (MHz)	Reading (dBμV)	Ant. Pol. (H/V)	Ant. Factor (dB/m)	Cable Loss	Amp Gain	Emission Level(dBμV/m)	Limits (dBμV/m)	Margin (dB)
It was not observed any emissions from the EUT.								



Tested by: Tae-Ho, Kim / Project Engineer

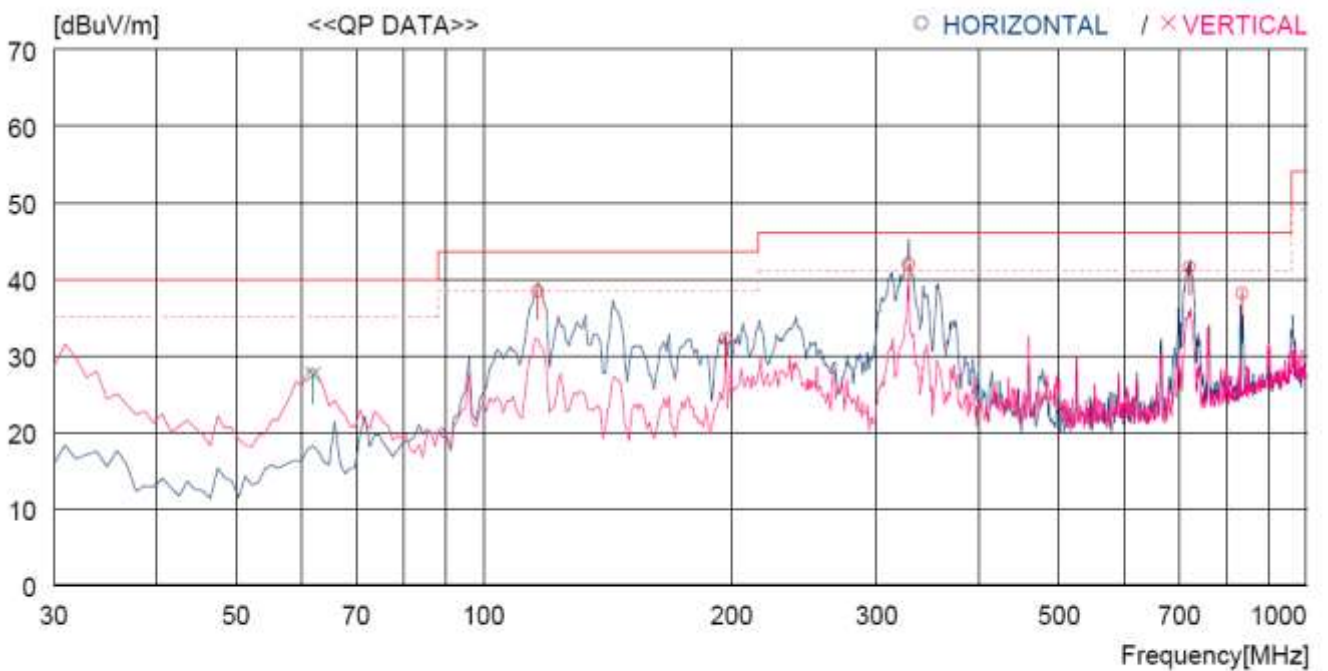
7.4.8 Test data for 802.11n_HT40

7.4.8.1 Test data for 30 MHz ~ 1 000 MHz

Humidity Level : 45.1 % R.H. Temperature: 21.4 °C
 Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.247
 Result : PASSED

EUT : Wi-Fi module Date: May 20, 2015
 Detector : CISPR Quasi-Peak (6 dB Bandwidth: 120 kHz)

-Ant0, Ant1 and Multiple transmit with Low, Middle and High Channels were tested, but the worst data were recorded.



No.	FREQ [MHz]	READING QP [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal -----										
1	116.330	57.6	10.6	3.3	33.1	38.4	43.5	5.1	200	166
2	196.840	50.7	10.6	3.8	32.9	32.2	43.5	11.3	200	0
3	328.760	55.8	14.2	4.8	32.9	41.9	46.0	4.1	100	359
4	721.604	47.5	19.9	7.4	33.2	41.6	46.0	4.4	100	359
5	835.091	41.6	21.3	8.0	32.8	38.1	46.0	7.9	200	0
----- Vertical -----										
6	62.010	45.8	12.6	2.2	33.1	27.5	40.0	12.5	100	82

7.4.8.2 Test data for Below 30 MHz

- Test Date : May 20, 2015
- Resolution bandwidth : 200 Hz (from 9 kHz to 0.15 MHz), 9 kHz (from 0.15 MHz to 30 MHz)
- Frequency range : 9 kHz ~ 30 MHz
- Measurement distance : 3 m

Frequency (MHz)	Reading (dBμV)	Ant. Pol. (H/V)	Ant. Factor (dB/m)	Cable Loss	Amp Gain	Emission Level(dBμV/m)	Limits (dBμV/m)	Margin (dB)
It was not observed any emissions from the EUT.								

7.4.8.3 Test data for above 1 GHz

- Test Date : May 20, 2015
- Resolution bandwidth : 1 MHz for Peak and Average Mode
- Video bandwidth : 1 MHz for Peak Mode, 10 Hz for Average Mode
- Frequency range : 1 GHz ~ 26.5 GHz
- Measurement distance : 3 m

Frequency (MHz)	Reading (dBμV)	Ant. Pol. (H/V)	Ant. Factor (dB/m)	Cable Loss	Amp Gain	Emission Level(dBμV/m)	Limits (dBμV/m)	Margin (dB)
It was not observed any emissions from the EUT.								



Tested by: Tae-Ho, Kim / Project Engineer

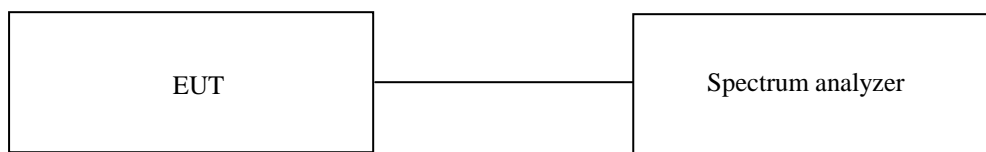
7.5 PEAK POWER SPECTRUL DENSITY

7.5.1 Operating environment

Temperature : 21.4 °C
 Relative humidity : 45.1 % R.H.

7.5.2 Test set-up

The antenna output of the EUT was connected to the spectrum analyzer. The resolution bandwidth is set to 3 kHz, the video bandwidth is set to 3 times the resolution bandwidth.



7.5.3 Test equipment used

Model Number	Manufacturer	Description	Serial Number	Last Cal.
■ - FSV40	Rohde & Schwarz	Signal Analyzer	101009	Jul. 30, 2014 (1Y)

All test equipment used is calibrated on a regular basis.

7.5.4 Test data for 802.11b

7.5.4.1 Test data for Antenna 0

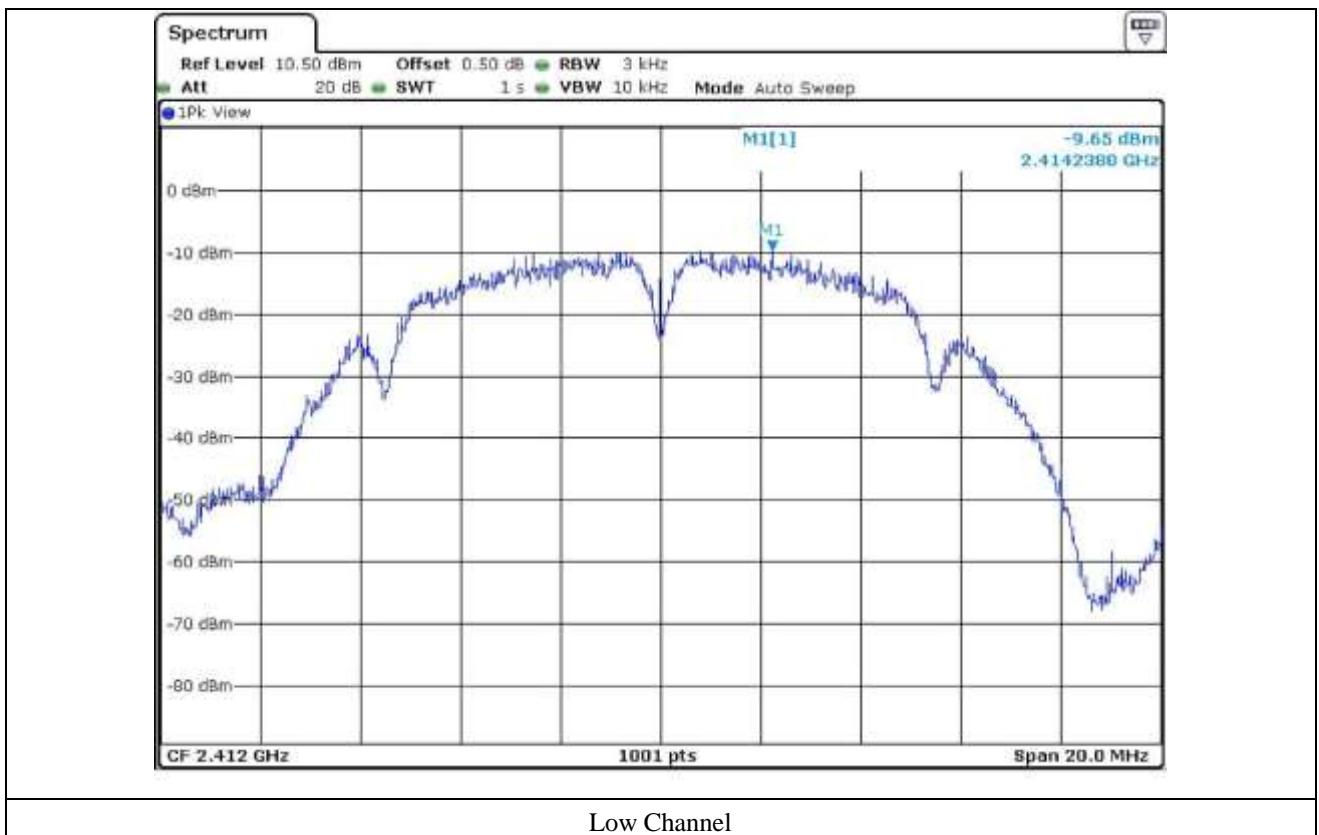
- Test Date : May 20, 2015
- Test Result : Pass
- Operating Condition : Continuous transmitting mode

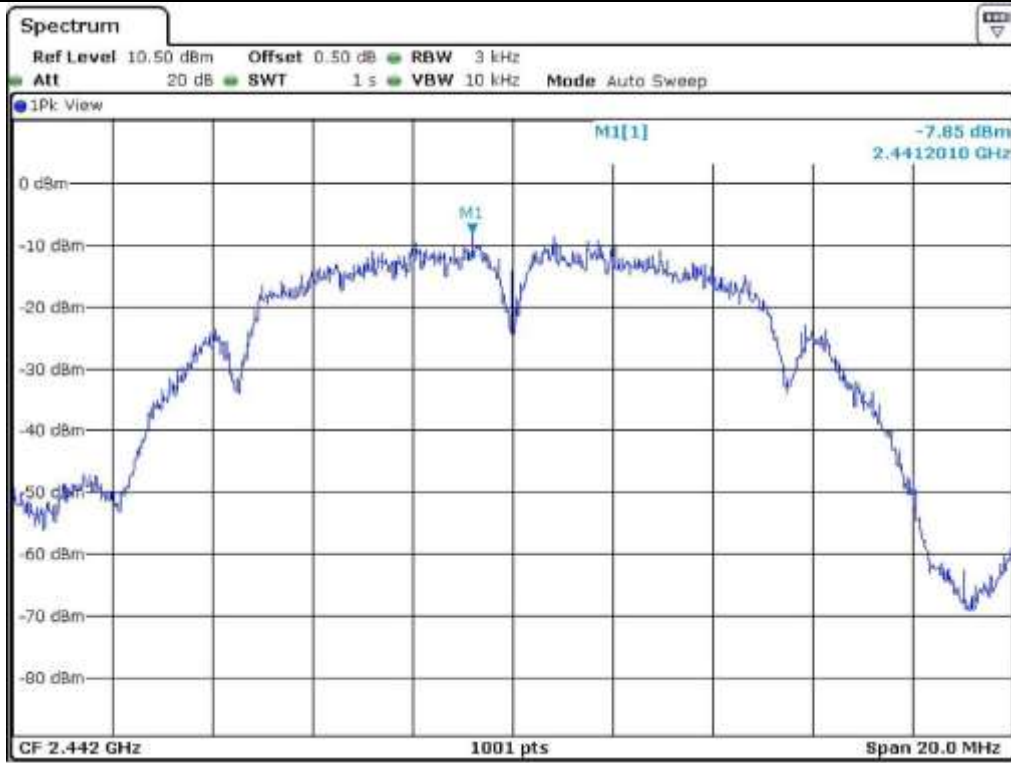
CHANNEL	FREQUENCY(MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2 412	-9.65	8.00	17.65
Middle	2 442	-7.85	8.00	15.85
High	2 462	-7.53	8.00	15.53

Remark. Margin = Limit – Measured value

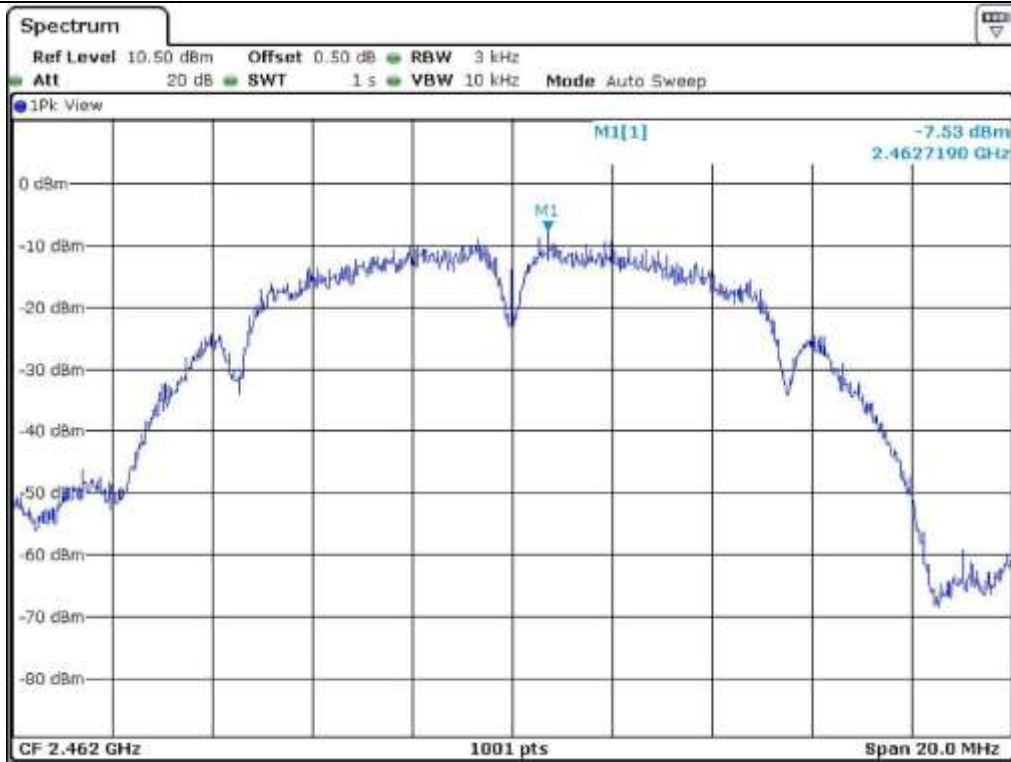


Tested by: Tae-Ho, Kim / Senior Engineer





Middle Channel



High Channel

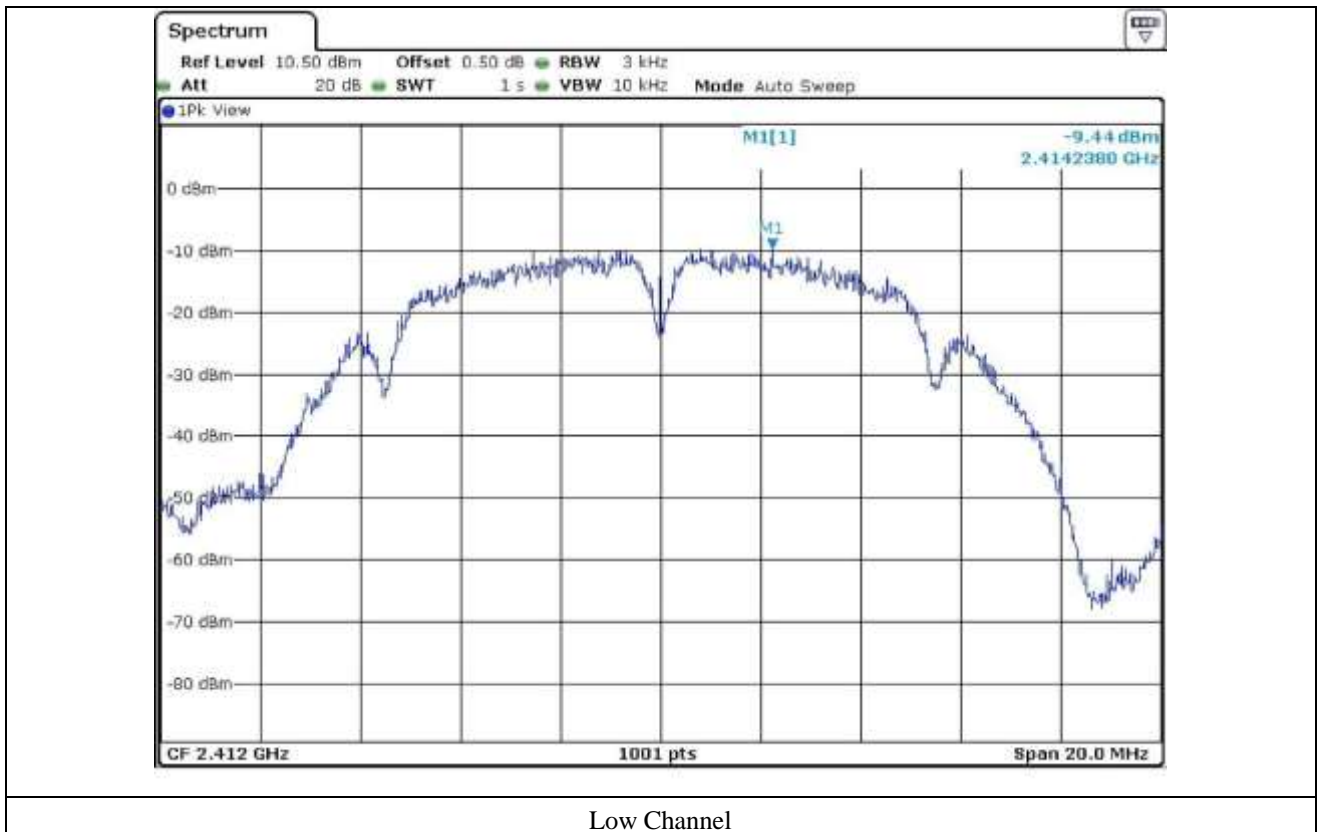
7.5.4.2 Test data for Antenna 1

- Test Date : May 20, 2015
- Test Result : Pass
- Operating Condition : Continuous transmitting mode

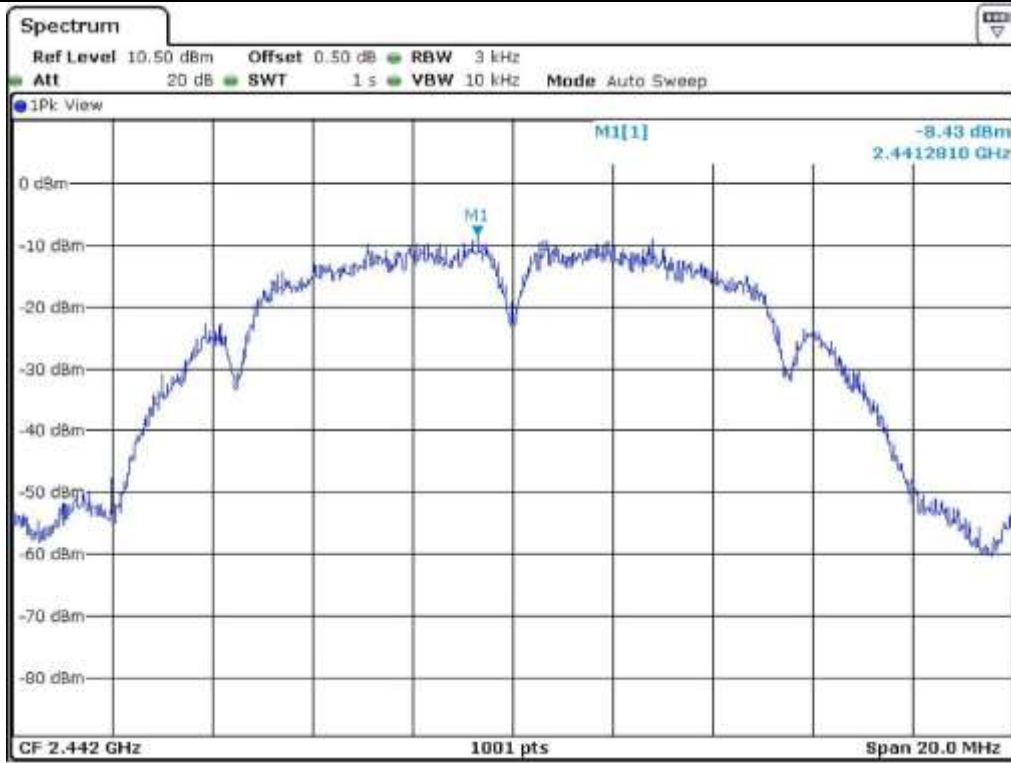
CHANNEL	FREQUENCY(MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2 412	-9.44	8.00	17.44
Middle	2 442	-8.43	8.00	16.43
High	2 462	-9.11	8.00	17.11

Remark. Margin = Limit – Measured value

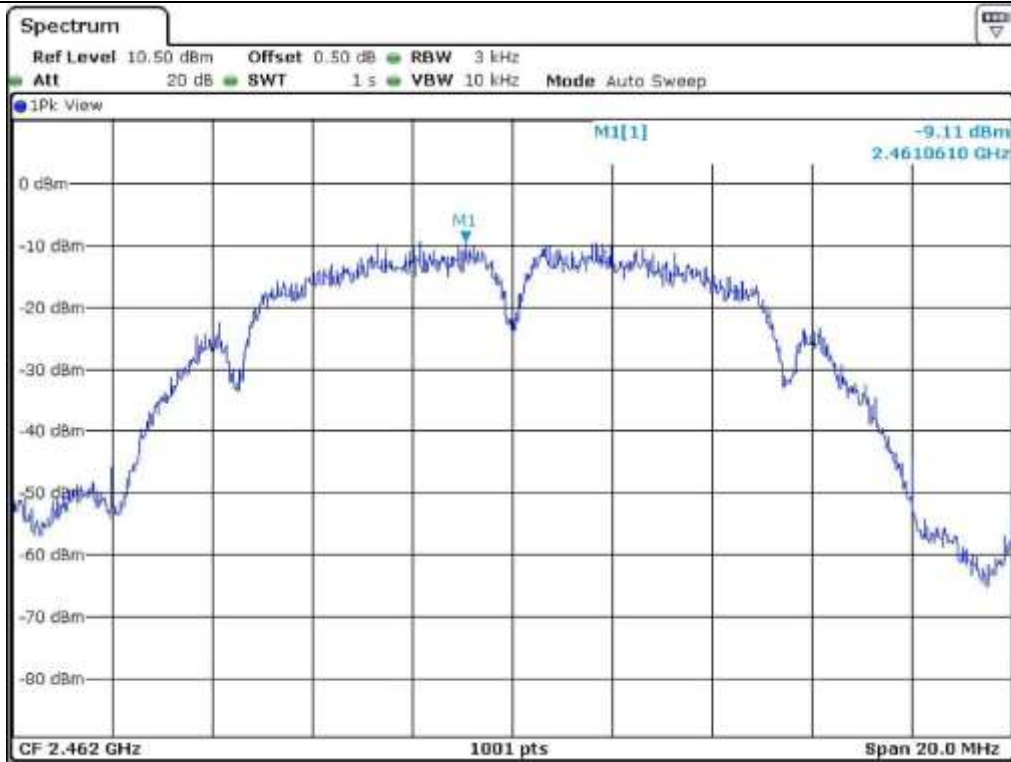
Tested by: Tae-Ho, Kim / Senior Engineer



Low Channel



Middle Channel



High Channel

7.5.5 Test data for 802.11g

7.5.5.1 Test data for Antenna 0

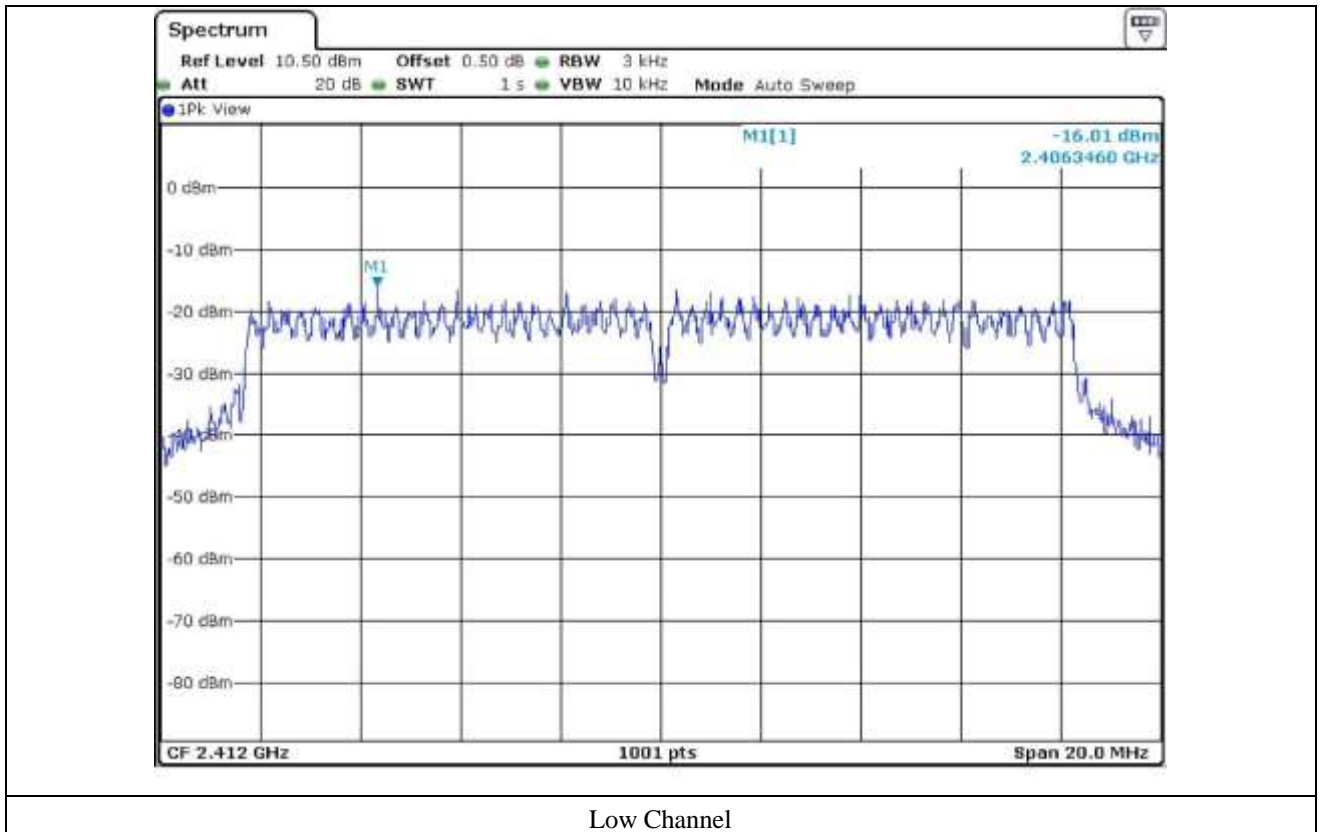
- Test Date : May 20, 2015
- Test Result : Pass
- Operating Condition : Continuous transmitting mode

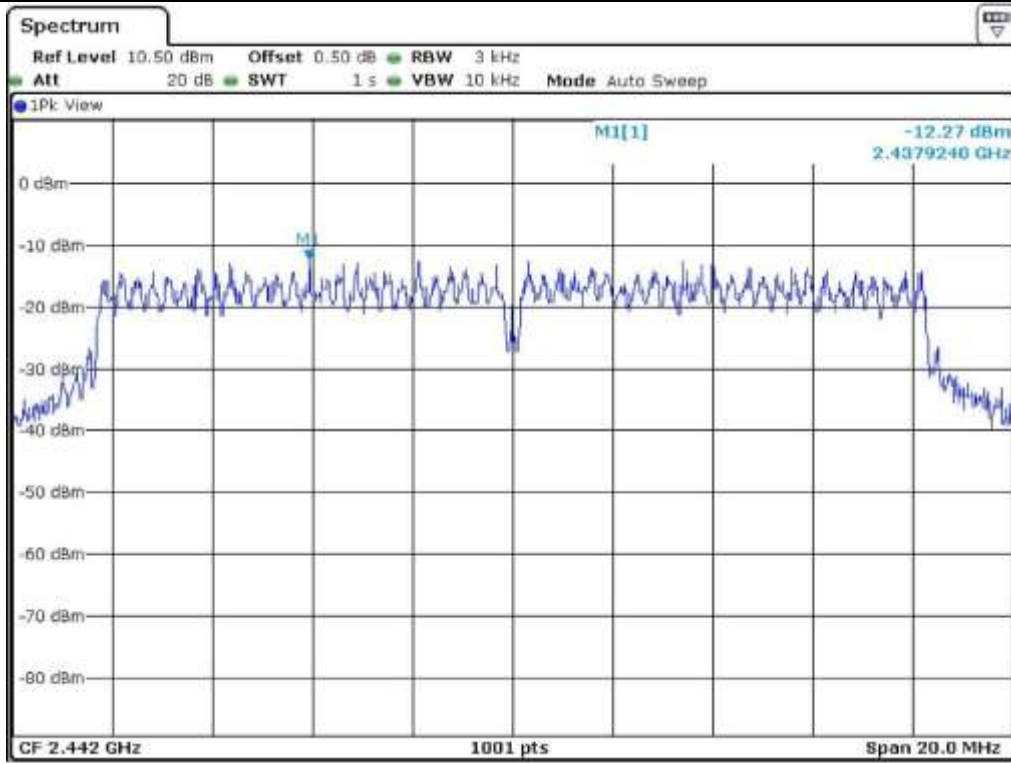
CHANNEL	FREQUENCY(MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2 412	-16.01	8.00	24.01
Middle	2 442	-12.27	8.00	20.27
High	2 462	-16.32	8.00	24.32

Remark. Margin = Limit – Measured value

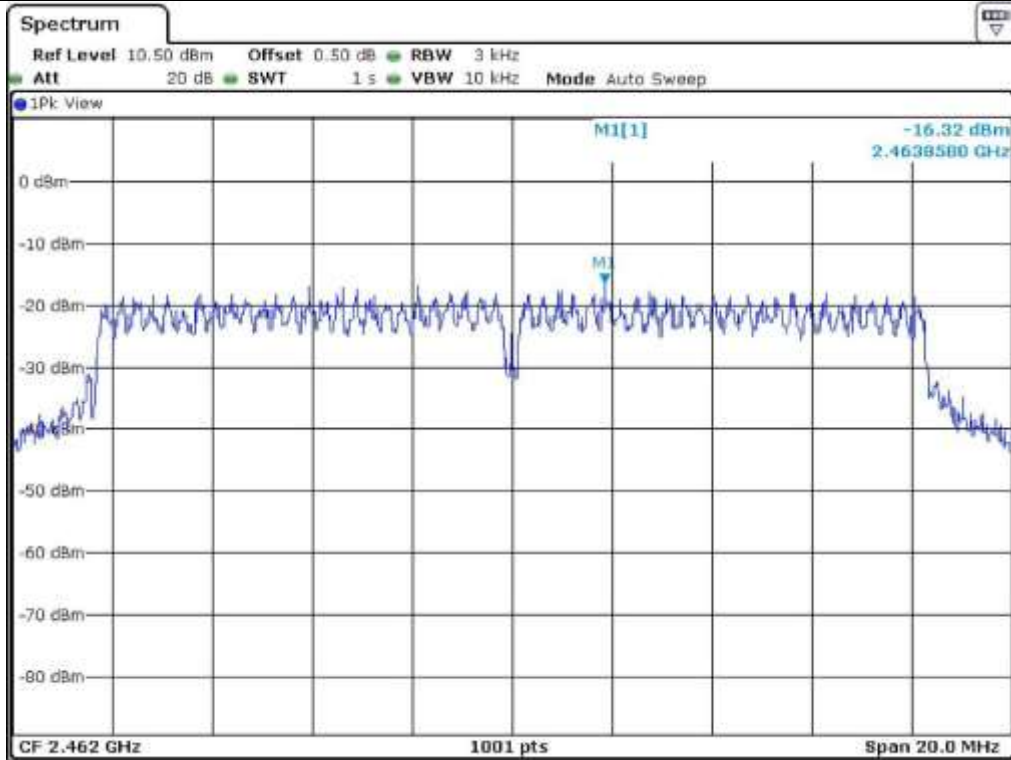


Tested by: Tae-Ho, Kim / Senior Engineer





Middle Channel



High Channel

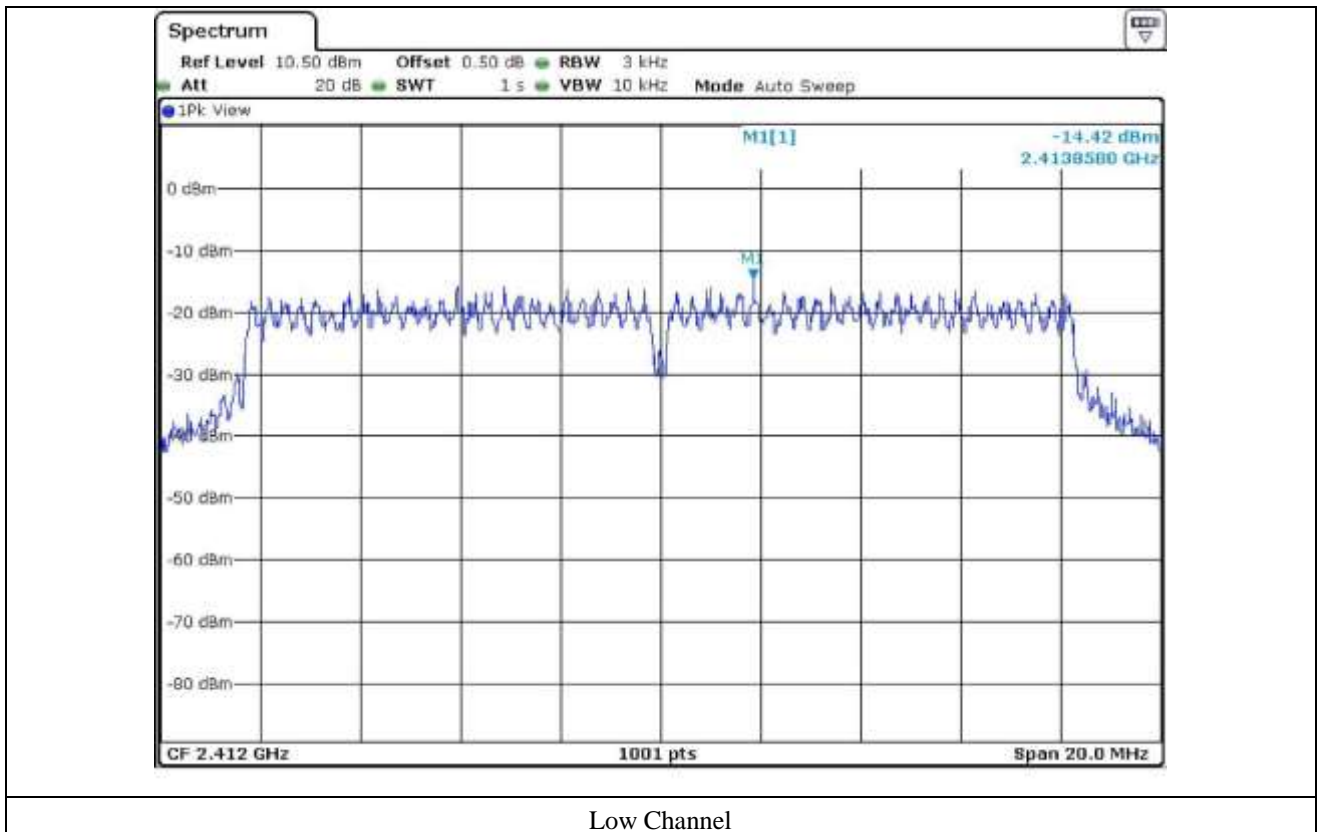
7.5.5.2 Test data for Antenna 1

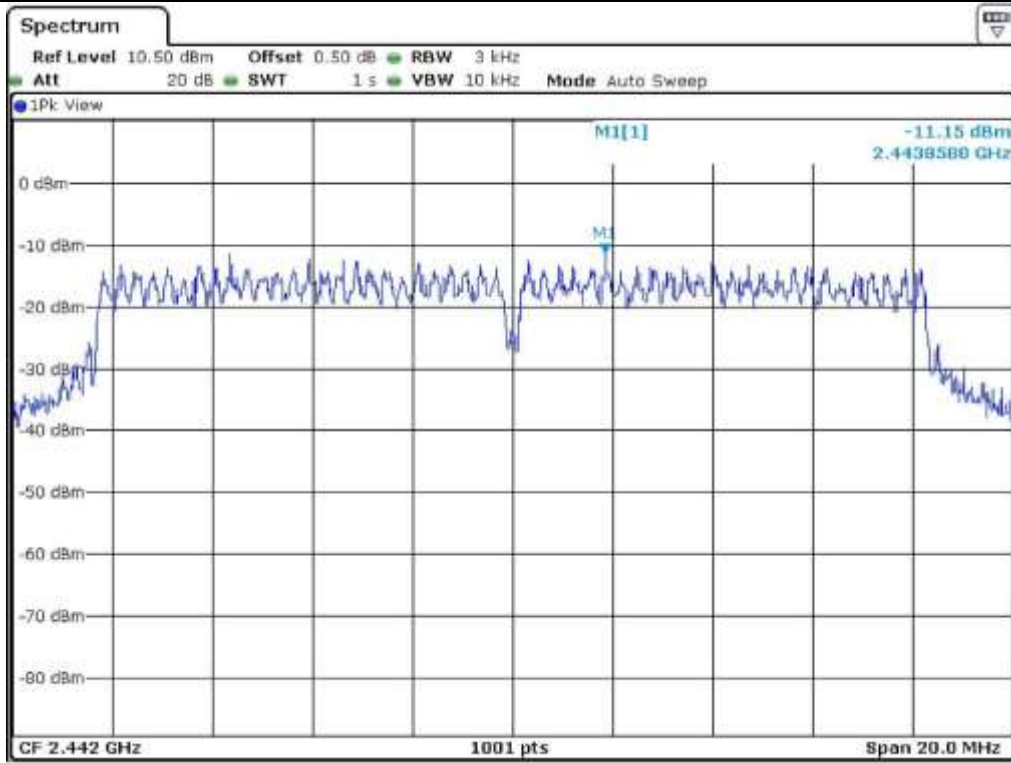
- Test Date : May 20, 2015
- Test Result : Pass
- Operating Condition : Continuous transmitting mode

CHANNEL	FREQUENCY(MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2 412	-14.42	8.00	22.42
Middle	2 442	-11.15	8.00	19.15
High	2 462	-14.65	8.00	22.65

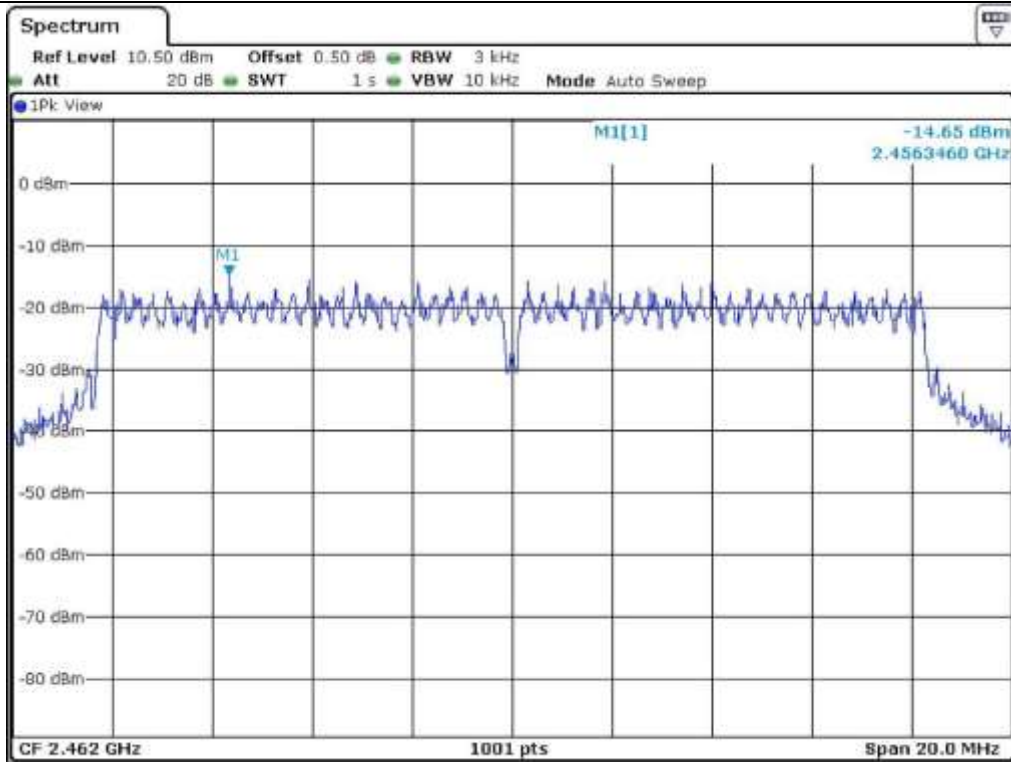
Remark. Margin = Limit – Measured value

Tested by: Tae-Ho, Kim / Senior Engineer





Middle Channel



High Channel

7.5.5.3 Test data for Multiple transmit

- Test Date : May 20, 2015
- Test Result : Pass
- Operating Condition : Continuous transmitting mode

CHANNEL	FREQUENCY(MHz)	CALCULATED POWER (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2 412	-12.13	8.00	20.13
Middle	2 442	-8.66	8.00	16.66
High	2 462	-12.39	8.00	20.39

Remark 1 : Margin = Limit – Measured value

Remark 2 : Calculated Power Density = $10\log (10^{(\text{Antenna1 Power Density}/10)} + 10^{(\text{Antenna2 Power Density}/10)})$



Tested by: Tae-Ho, Kim / Senior Engineer

7.5.6 Test data for 802.11n_HT20

7.5.6.1 Test data for Antenna 0

-. Test Date : May 20, 2015

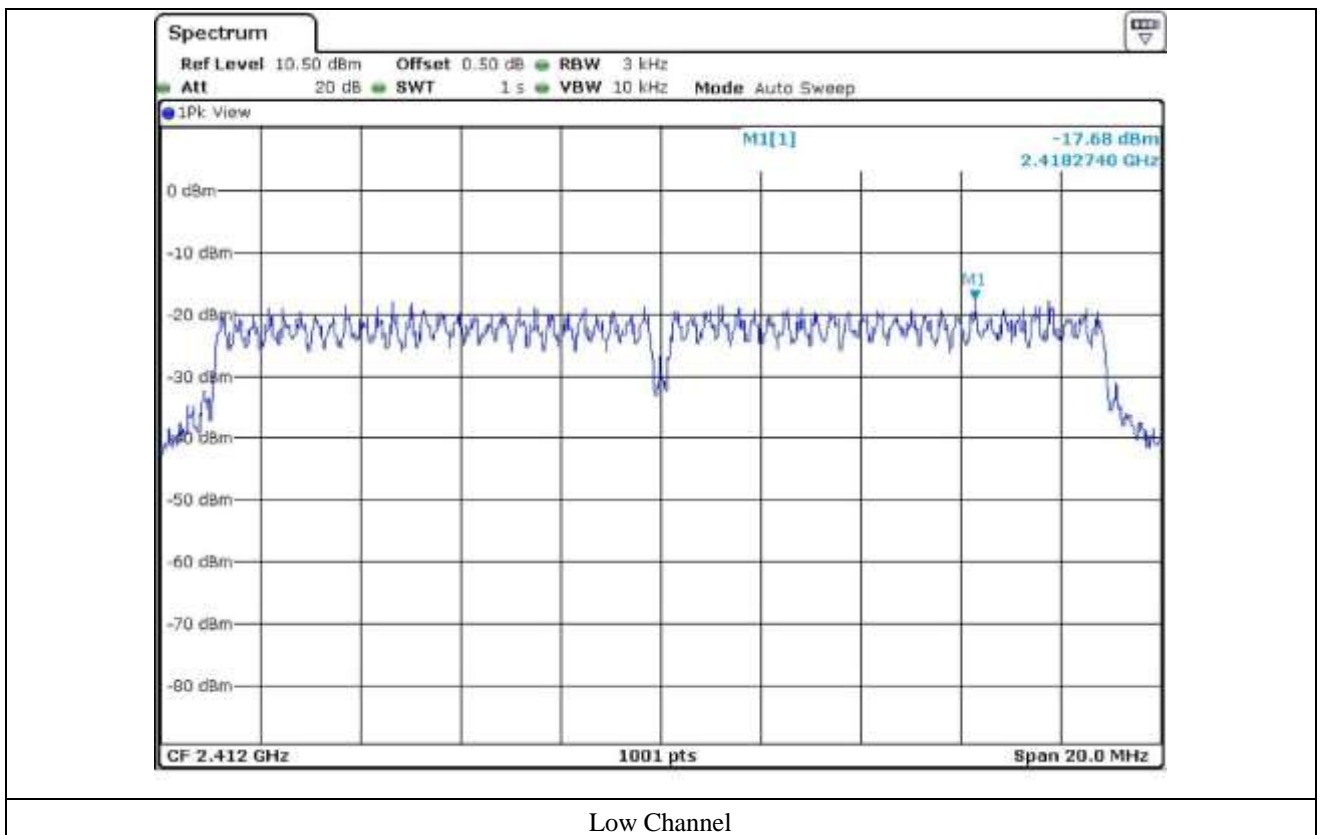
-. Test Result : Pass

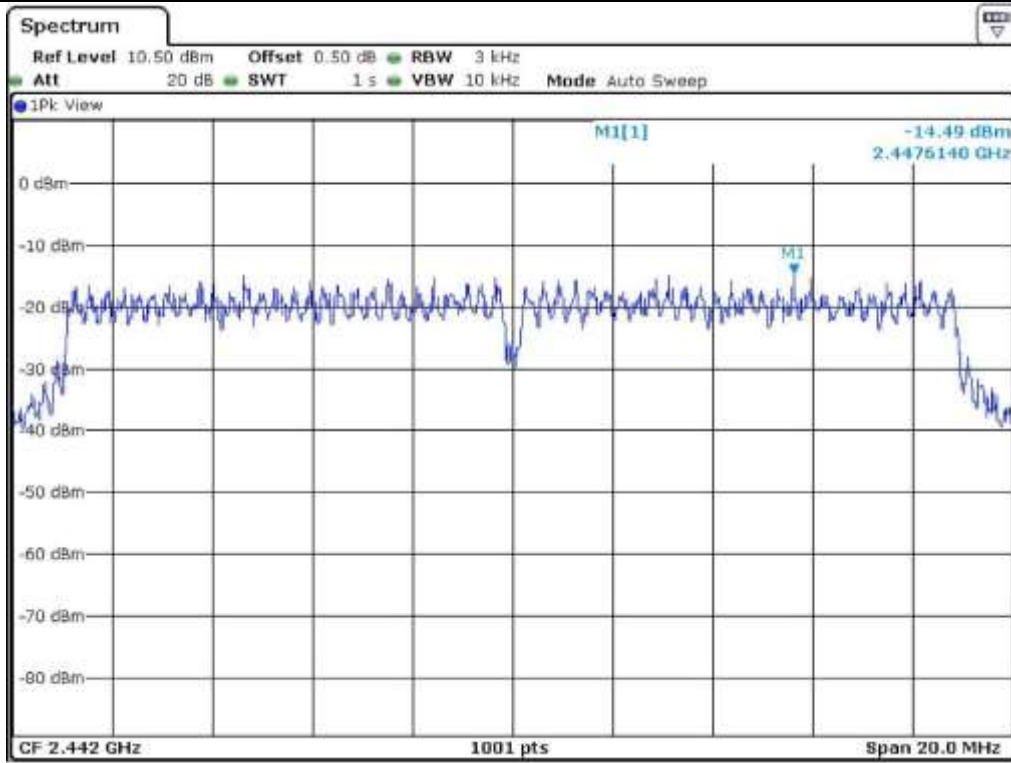
-. Operating Condition : Continuous transmitting mode

CHANNEL	FREQUENCY(MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2 412	-17.68	8.00	25.68
Middle	2 442	-14.49	8.00	22.49
High	2 462	-15.77	8.00	23.77

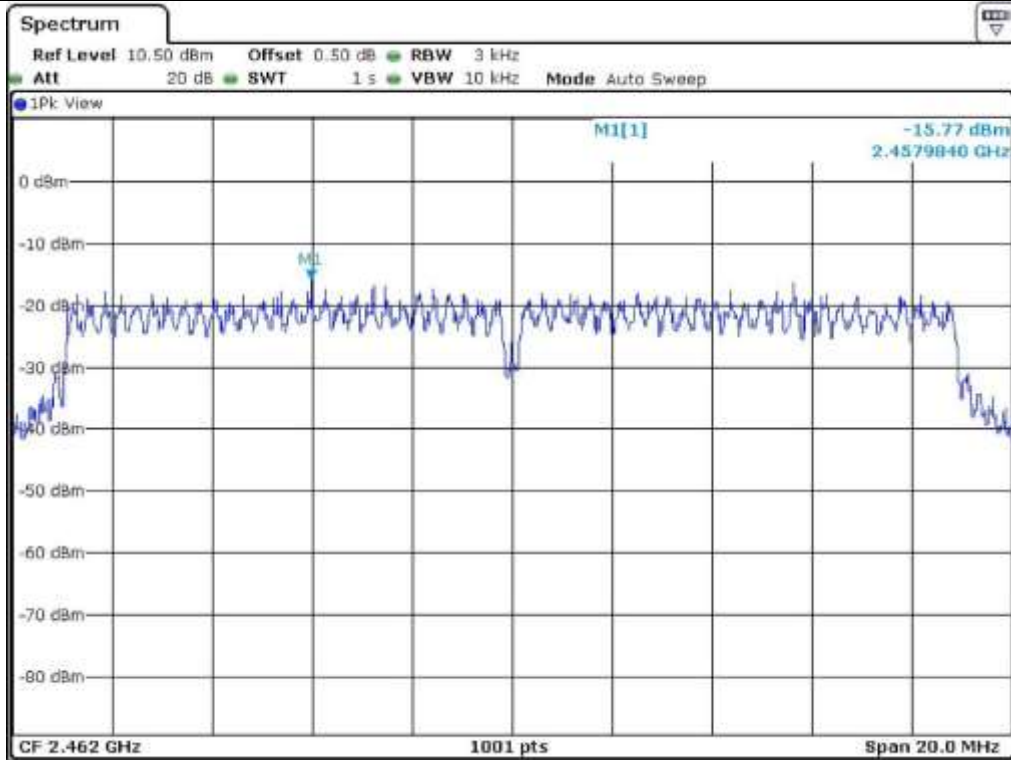
Remark. Margin = Limit – Measured value

Tested by: Tae-Ho, Kim / Senior Engineer





Middle Channel



High Channel

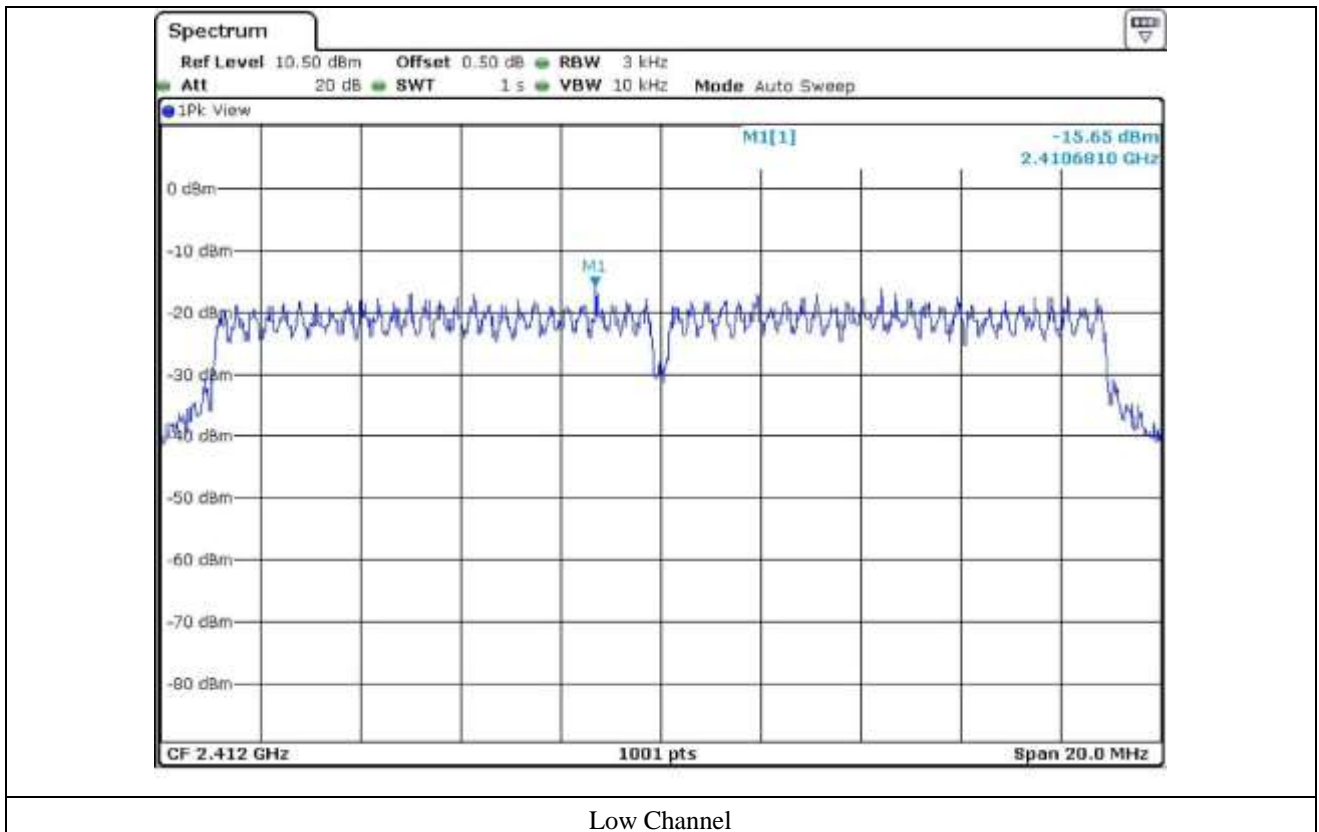
7.5.6.2 Test data for Antenna 1

- Test Date : May 20, 2015
- Test Result : Pass
- Operating Condition : Continuous transmitting mode

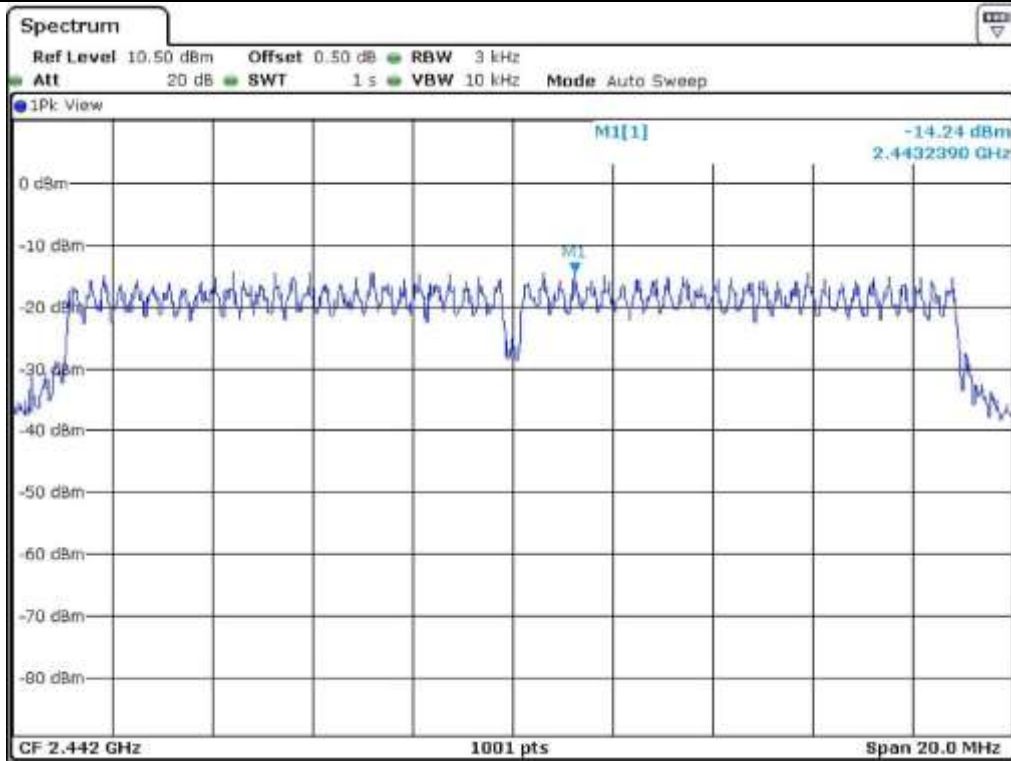
CHANNEL	FREQUENCY(MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2 412	-15.65	8.00	23.65
Middle	2 442	-14.24	8.00	22.24
High	2 462	-14.08	8.00	22.08

Remark. Margin = Limit – Measured value

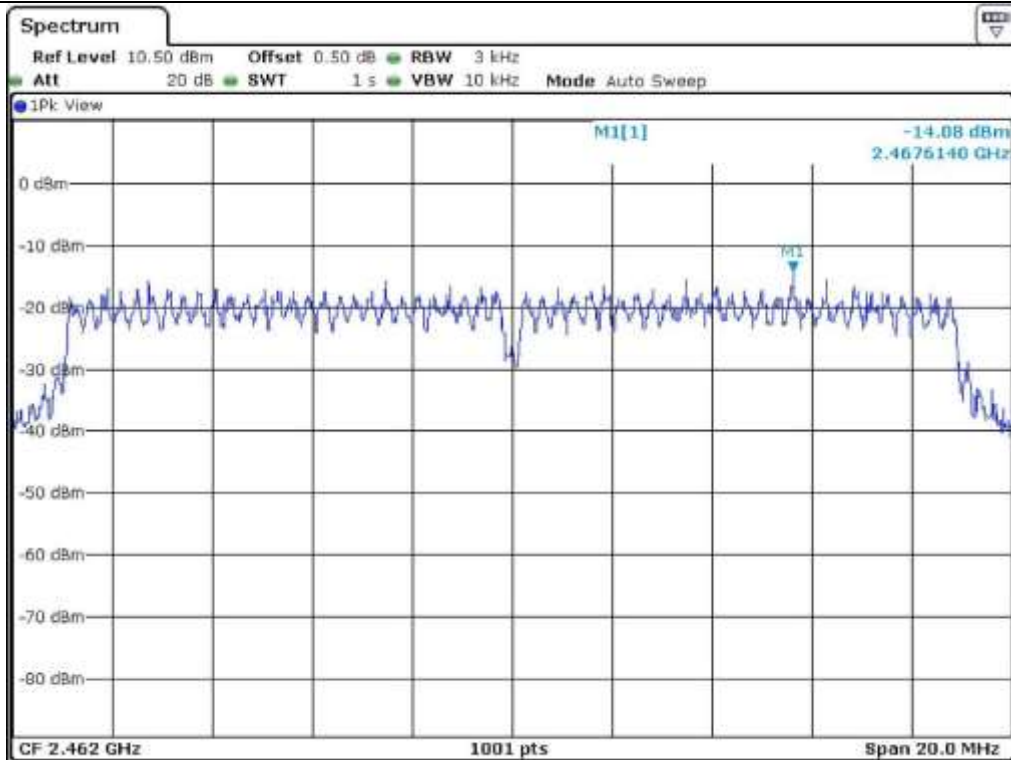
Tested by: Tae-Ho, Kim / Senior Engineer



Low Channel



Middle Channel



High Channel

7.5.6.3 Test data for Multiple transmit

- Test Date : May 20, 2015
- Test Result : Pass
- Operating Condition : Continuous transmitting mode

CHANNEL	FREQUENCY(MHz)	CALCULATED POWER (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2 412	-13.54	8.00	21.54
Middle	2 442	-11.35	8.00	19.35
High	2 462	-11.83	8.00	19.83

Remark 1 : Margin = Limit – Measured value

Remark 2 : Calculated Power Density = $10\log (10^{(\text{Antenna1 Power Density}/10)} + 10^{(\text{Antenna2 Power Density}/10)})$



Tested by: Tae-Ho, Kim / Senior Engineer

7.5.7 Test data for 802.11n_HT40

7.5.7.1 Test data for Antenna 0

-. Test Date : May 20, 2015

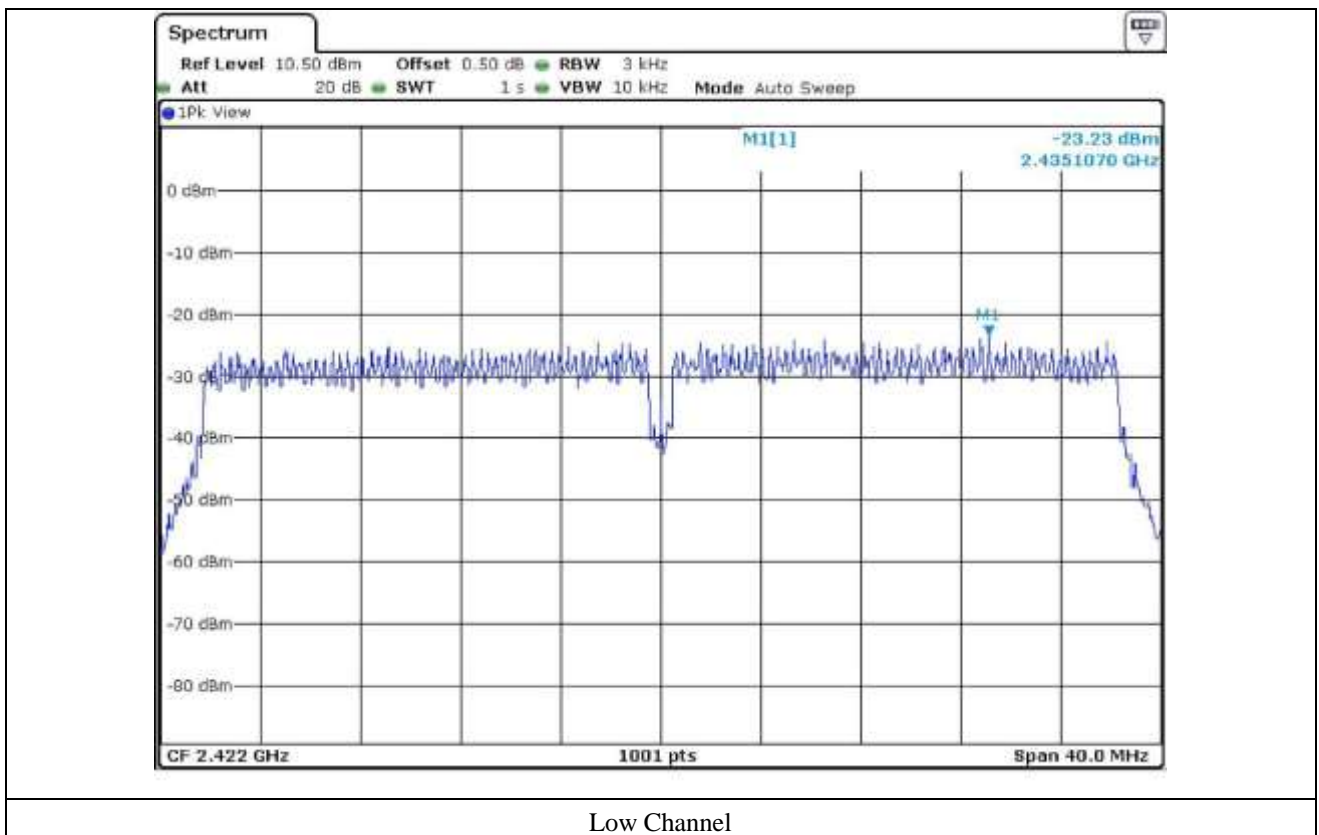
-. Test Result : Pass

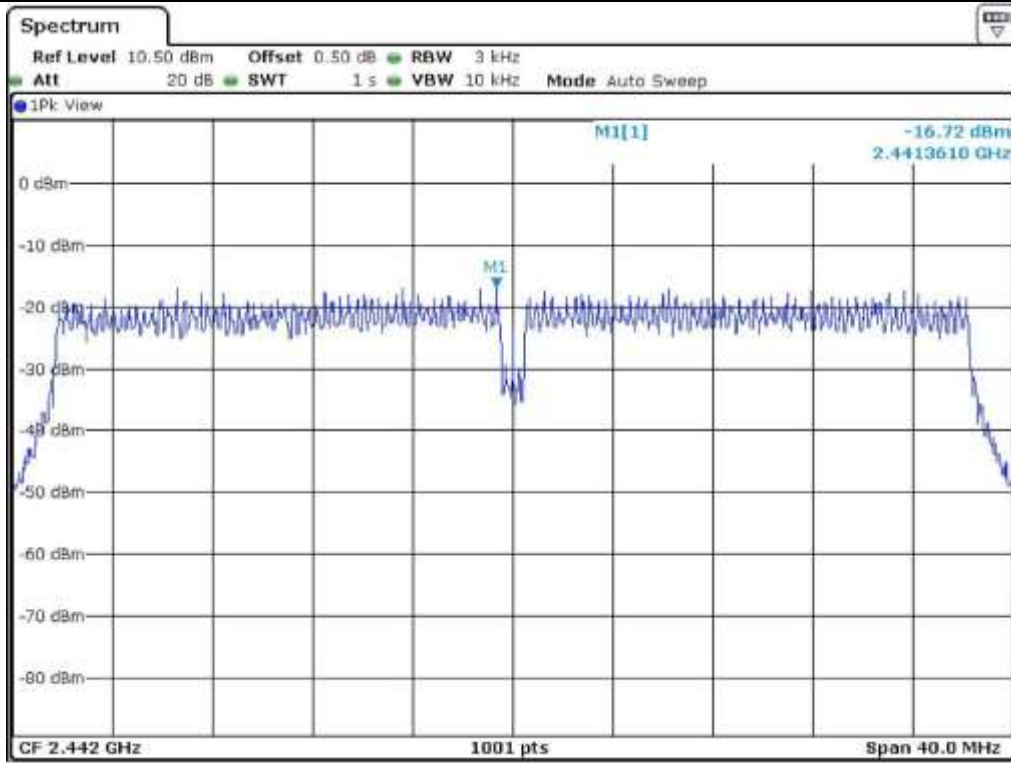
-. Operating Condition : Continuous transmitting mode

CHANNEL	FREQUENCY(MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2 422	-23.23	8.00	31.23
Middle	2 442	-16.72	8.00	24.72
High	2 452	-21.49	8.00	29.49

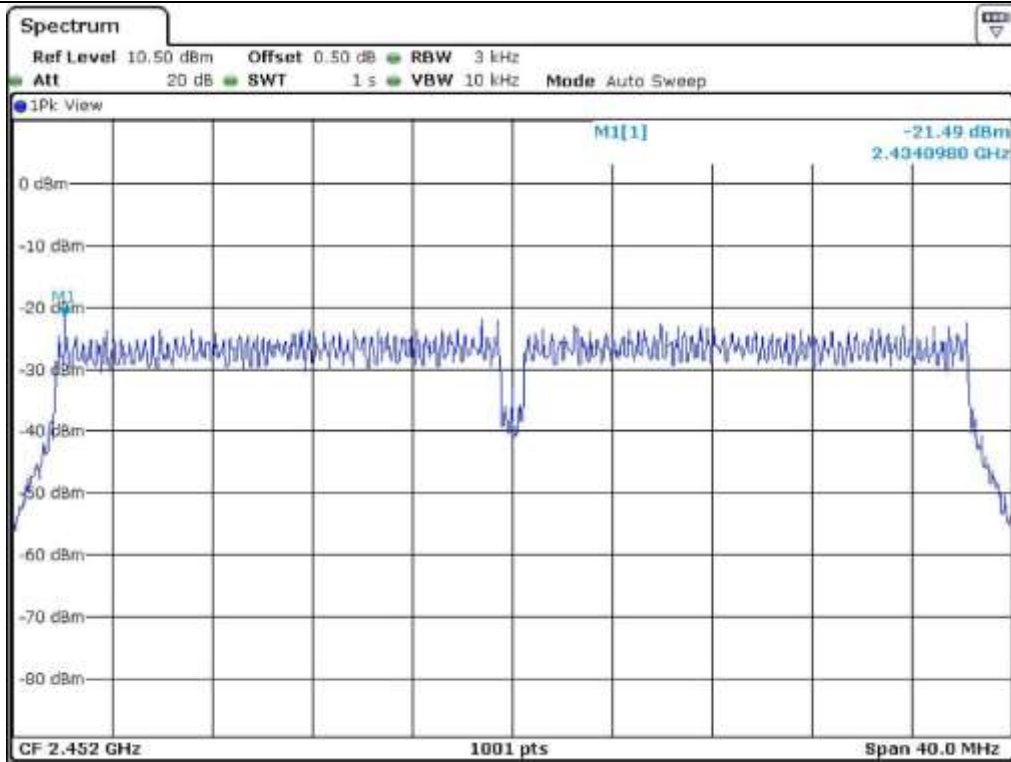
Remark. Margin = Limit – Measured value

Tested by: Tae-Ho, Kim / Senior Engineer





Middle Channel



High Channel

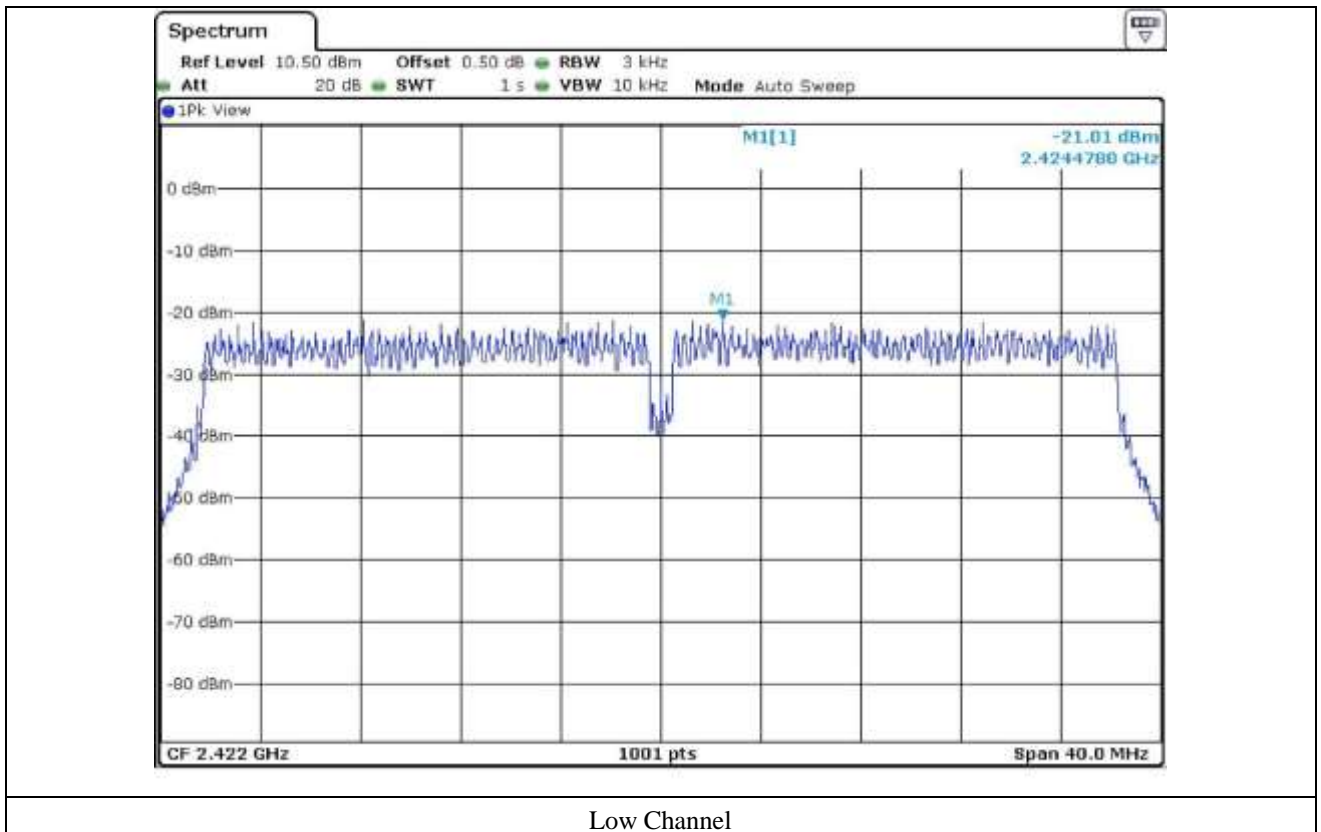
7.5.7.2 Test data for Antenna 1

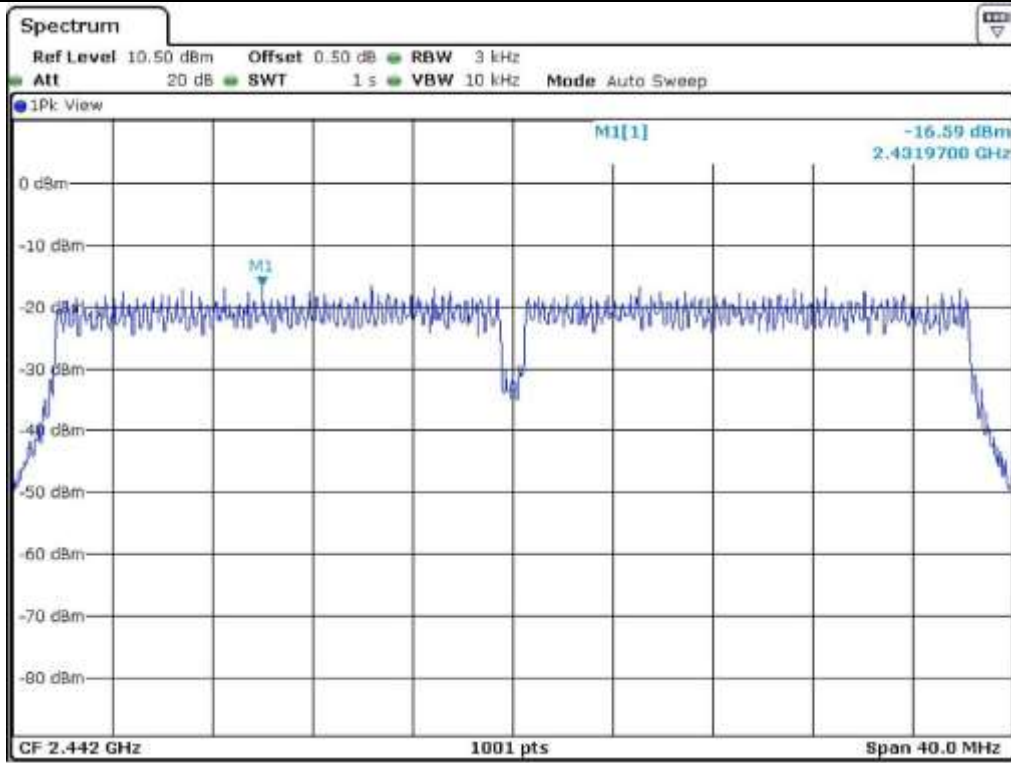
- Test Date : May 20, 2015
- Test Result : Pass
- Operating Condition : Continuous transmitting mode

CHANNEL	FREQUENCY(MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2 422	-21.01	8.00	29.01
Middle	2 442	-16.59	8.00	24.59
High	2 452	-19.76	8.00	27.76

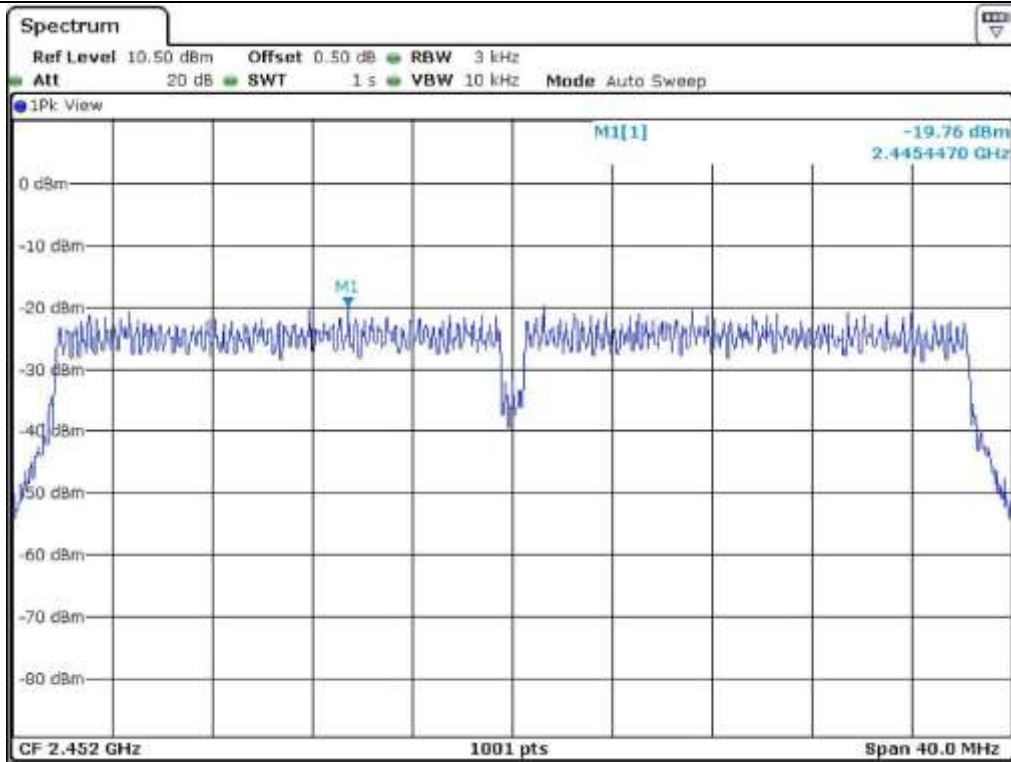
Remark. Margin = Limit – Measured value

Tested by: Tae-Ho, Kim / Senior Engineer





Middle Channel



High Channel

7.5.7.3 Test data for Multiple transmit

- Test Date : May 20, 2015
- Test Result : Pass
- Operating Condition : Continuous transmitting mode

CHANNEL	FREQUENCY(MHz)	CALCULATED POWER (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2 422	-18.97	8.00	26.97
Middle	2 442	-13.64	8.00	21.64
High	2 452	-17.53	8.00	25.53

Remark 1 : Margin = Limit – Measured value

Remark 2 : Calculated Power Density = $10\log (10^{(\text{Antenna1 Power Density}/10)} + 10^{(\text{Antenna2 Power Density}/10)})$



Tested by: Tae-Ho, Kim / Senior Engineer

7.6 RADIATED EMISSION TEST

7.6.1 Operating environment

Temperature : 21.4 °C
 Relative humidity : 45.1 % R.H.

7.6.2 Test set-up

The radiated emissions measurements were on the 3 m semi anechoic chamber. The EUT and other support equipment were placed on a non-conductive turntable above the ground plane. The interconnecting cables from outside test site were inserted into ferrite clamps at the point where the cables reach the turntable.

The frequency spectrum from 30 MHz to 26.5 GHz was scanned and emission levels maximized at each frequency recorded. The system was rotated 360°, and the antenna was varied in height between 1.0 m and 4.0 m in order to determine the maximum emission levels. This procedure was performed for both horizontal and vertical polarization of the receiving antenna.

7.6.3 Test equipment used

Model Number	Manufacturer	Description	Serial Number	Last Cal.(Interval)
■ - FSV40	Rohde & Schwarz	Signal Analyzer	101009	Jul. 30, 2014 (1Y)
■ - ESCI	Rohde & Schwarz	Test Receiver	101012	Nov. 03, 2014 (1Y)
■ - 310N	Sonoma Instrument	Pre-Amplifier	312544	Apr. 29, 2015 (1Y)
■ - SCU-18	Rohde & Schwarz	Pre-Amplifier	10041	Nov. 25, 2014 (1Y)
■ - DT3000	Innco System	Turn Table	930611	N/A
■ - MA4000-EP	Innco System	Antenna Master	3320611	N/A
■ - VULB9163	Schwarzbeck	TRILOG Broadband Antenna	9163-421	Jul. 10, 2014 (2Y)
■ - BBHA9120D	Schwarzbeck	Horn Antenna	BBHA9120D295	Sep. 05, 2013 (2Y)
■ - BBHA9170	Schwarzbeck	Horn Antenna	BBHA9170178	Apr. 30, 2015 (2Y)

All test equipment used is calibrated on a regular basis.

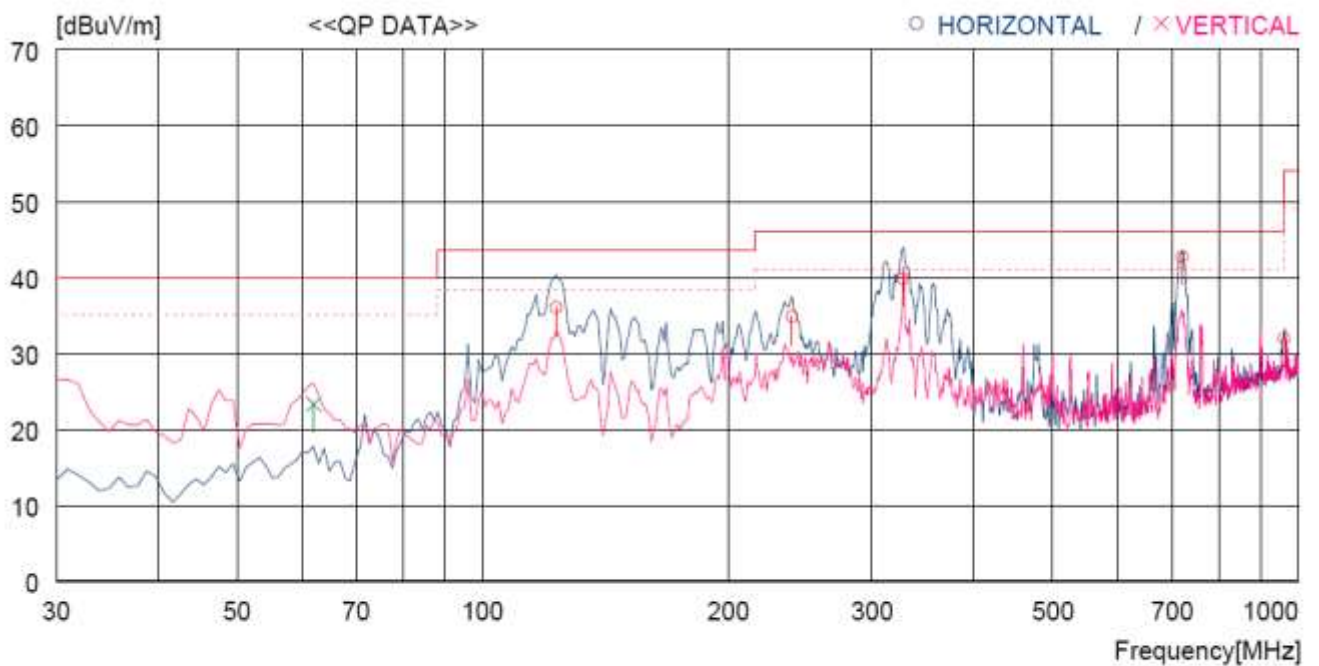
7.6.4 Test data for 802.11b

7.6.4.1 Test data for 30 MHz ~ 1 000 MHz

Humidity Level : 45.1 % R.H. Temperature: 21.4 °C
 Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.247
 Result : PASSED

EUT : Wi-Fi module Date: May 20, 2015
 Detector : CISPR Quasi-Peak (6 dB Bandwidth: 120 kHz)

-Ant0, Ant1 with Low, Middle and High Channels were tested, but the worst data were recorded.



No.	FREQ [MHz]	READING QP [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal -----										
1	123.120	56.0	9.9	3.2	33.1	36.0	43.5	7.5	200	167
2	239.520	51.1	12.1	4.5	32.9	34.8	46.0	11.2	100	208
3	327.790	53.2	14.2	5.3	32.9	39.8	46.0	6.2	100	187
4	720.634	47.8	19.9	8.2	33.2	42.7	46.0	3.3	100	131
5	961.187	31.8	22.5	9.5	31.9	31.9	54.0	22.1	100	359
----- Vertical -----										
6	62.010	41.5	12.6	2.3	33.1	23.3	40.0	16.7	100	110

7.6.4.2 Test data for Below 30 MHz

- Test Date : May 20, 2015
- Resolution bandwidth : 200 Hz (from 9 kHz to 0.15 MHz), 9 kHz (from 0.15 MHz to 30 MHz)
- Frequency range : 9 kHz ~ 30 MHz
- Measurement distance : 3 m
- Operating mode : Transmitting mode

Frequency (MHz)	Reading (dB μ V)	Ant. Pol. (H/V)	Ant. Height (m)	Angle (°)	Ant. Factor (dB/m)	Cable Loss	Emission Level(dB μ V/m)	Limits (dB μ V/m)	Margin (dB)
It was not observed any emissions from the EUT.									

7.6.4.3 Test data for above 1 GHz

- Test Date : May 20, 2015
- Resolution bandwidth : 1 MHz for Peak and Average Mode
- Video bandwidth : 1 MHz for Peak Mode, 10 Hz for Average Mode
- Frequency range : 1 GHz ~ 26.5 GHz
- Measurement distance : 3 m
- Operating mode : Transmitting mode

Frequency (MHz)	Reading (dB μ V)	Ant. Pol. (H/V)	Ant. Height (m)	Angle (°)	Ant. Factor (dB/m)	Cable Loss	Emission Level(dB μ V/m)	Limits (dB μ V/m)	Margin (dB)
It was not observed any emissions from the EUT.									



Tested by: Tae-Ho, Kim / Project Engineer

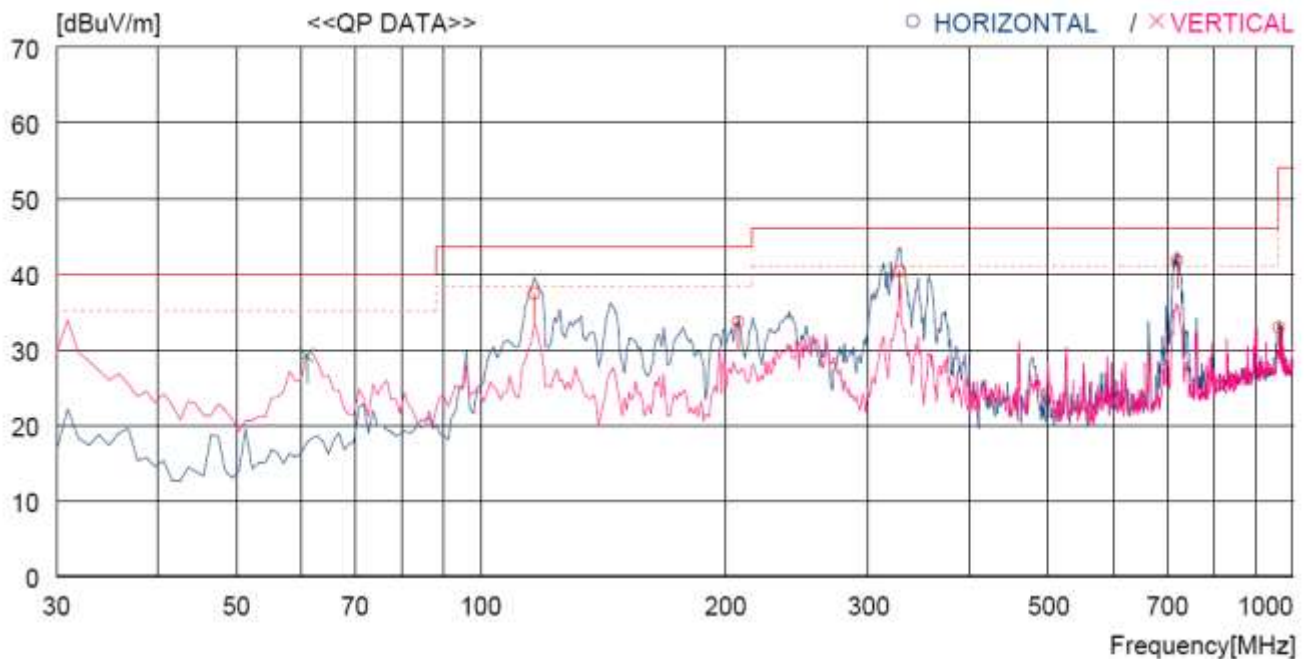
7.6.5 Test data for 802.11g

7.6.5.1 Test data for 30 MHz ~ 1 000 MHz

Humidity Level : 45.1 % R.H. Temperature: 21.4 °C
 Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.247
 Result : PASSED

EUT : Wi-Fi module Date: May 20, 2015
 Detector : CISPR Quasi-Peak (6 dB Bandwidth: 120 kHz)

-Ant0, Ant1 and Multiple transmit with Low, Middle and High Channels were tested, but the worst data were recorded.



No.	FREQ [MHz]	READING QP [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal -----										
1	116.330	56.8	10.6	3.1	33.1	37.4	43.5	6.1	200	0
2	207.510	51.3	11.0	4.2	32.9	33.6	43.5	9.9	100	359
3	327.790	53.7	14.2	5.3	32.9	40.3	46.0	5.7	100	159
4	719.664	46.8	19.9	8.2	33.2	41.7	46.0	4.3	100	130
5	960.217	32.8	22.5	9.5	31.9	32.9	54.0	21.1	100	272
----- Vertical -----										
6	61.040	47.1	12.9	2.3	33.1	29.2	40.0	10.8	100	0

7.6.5.2 Test data for Below 30 MHz

- Test Date : May 20, 2015
- Resolution bandwidth : 200 Hz (from 9 kHz to 0.15 MHz), 9 kHz (from 0.15 MHz to 30 MHz)
- Frequency range : 9 kHz ~ 30 MHz
- Measurement distance : 3 m
- Operating mode : Transmitting mode

Frequency (MHz)	Reading (dBμV)	Ant. Pol. (H/V)	Ant. Height (m)	Angle (°)	Ant. Factor (dB/m)	Cable Loss	Emission Level(dBμV/m)	Limits (dBμV/m)	Margin (dB)
It was not observed any emissions from the EUT.									

7.6.5.3 Test data for above 1 GHz

- Test Date : May 20, 2015
- Resolution bandwidth : 1 MHz for Peak and Average Mode
- Video bandwidth : 1 MHz for Peak Mode, 10 Hz for Average Mode
- Frequency range : 1 GHz ~ 26.5 GHz
- Measurement distance : 3 m
- Operating mode : Transmitting mode

Frequency (MHz)	Reading (dBμV)	Ant. Pol. (H/V)	Ant. Height (m)	Angle (°)	Ant. Factor (dB/m)	Cable Loss	Emission Level(dBμV/m)	Limits (dBμV/m)	Margin (dB)
It was not observed any emissions from the EUT.									



Tested by: Tae-Ho, Kim / Project Engineer

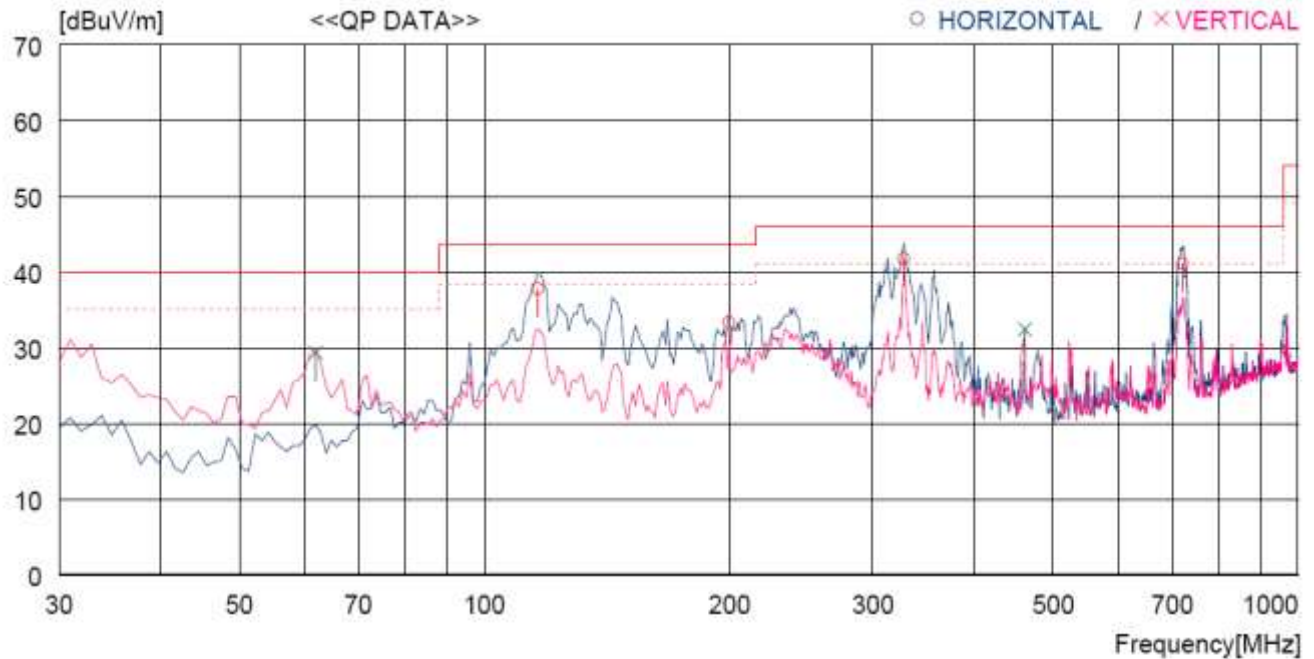
7.6.6 Test data for 802.11n_HT20

7.6.6.1 Test data for 30 MHz ~ 1 000 MHz

Humidity Level : 45.1 % R.H. Temperature: 21.4 °C
 Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.247
 Result : PASSED

EUT : Wi-Fi module Date: May 20, 2015
 Detector : CISPR Quasi-Peak (6 dB Bandwidth: 120 kHz)

-Ant0, Ant1 and Multiple transmit with Low, Middle and High Channels were tested, but the worst data were recorded.



No.	FREQ [MHz]	READING QP [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal -----										
1	116.330	57.1	10.6	3.1	33.1	37.7	43.5	5.8	300	359
2	199.750	51.4	10.7	4.1	32.9	33.3	43.5	10.2	100	359
3	327.790	55.1	14.2	5.3	32.9	41.7	46.0	4.3	100	359
4	721.604	46.1	19.9	8.2	33.2	41.0	46.0	5.0	100	359
----- Vertical -----										
5	62.010	47.5	12.6	2.3	33.1	29.3	40.0	10.7	100	110
6	461.651	42.3	16.8	6.4	33.1	32.4	46.0	13.6	100	95

7.6.6.2 Test data for Below 30 MHz

- . Test Date : May 20, 2015
- . Resolution bandwidth : 200 Hz (from 9 kHz to 0.15 MHz), 9 kHz (from 0.15 MHz to 30 MHz)
- . Frequency range : 9 kHz ~ 30 MHz
- . Measurement distance : 3 m
- . Operating mode : Transmitting mode

Frequency (MHz)	Reading (dBμV)	Ant. Pol. (H/V)	Ant. Height (m)	Angle (°)	Ant. Factor (dB/m)	Cable Loss	Emission Level(dBμV/m)	Limits (dBμV/m)	Margin (dB)
It was not observed any emissions from the EUT.									

7.6.6.3 Test data for above 1 GHz

- . Test Date : May 20, 2015
- . Resolution bandwidth : 1 MHz for Peak and Average Mode
- . Video bandwidth : 1 MHz for Peak Mode, 10 Hz for Average Mode
- . Frequency range : 1 GHz ~ 26.5 GHz
- . Measurement distance : 3 m
- . Operating mode : Transmitting mode

Frequency (MHz)	Reading (dBμV)	Ant. Pol. (H/V)	Ant. Height (m)	Angle (°)	Ant. Factor (dB/m)	Cable Loss	Emission Level(dBμV/m)	Limits (dBμV/m)	Margin (dB)
It was not observed any emissions from the EUT.									



Tested by: Tae-Ho, Kim / Project Engineer

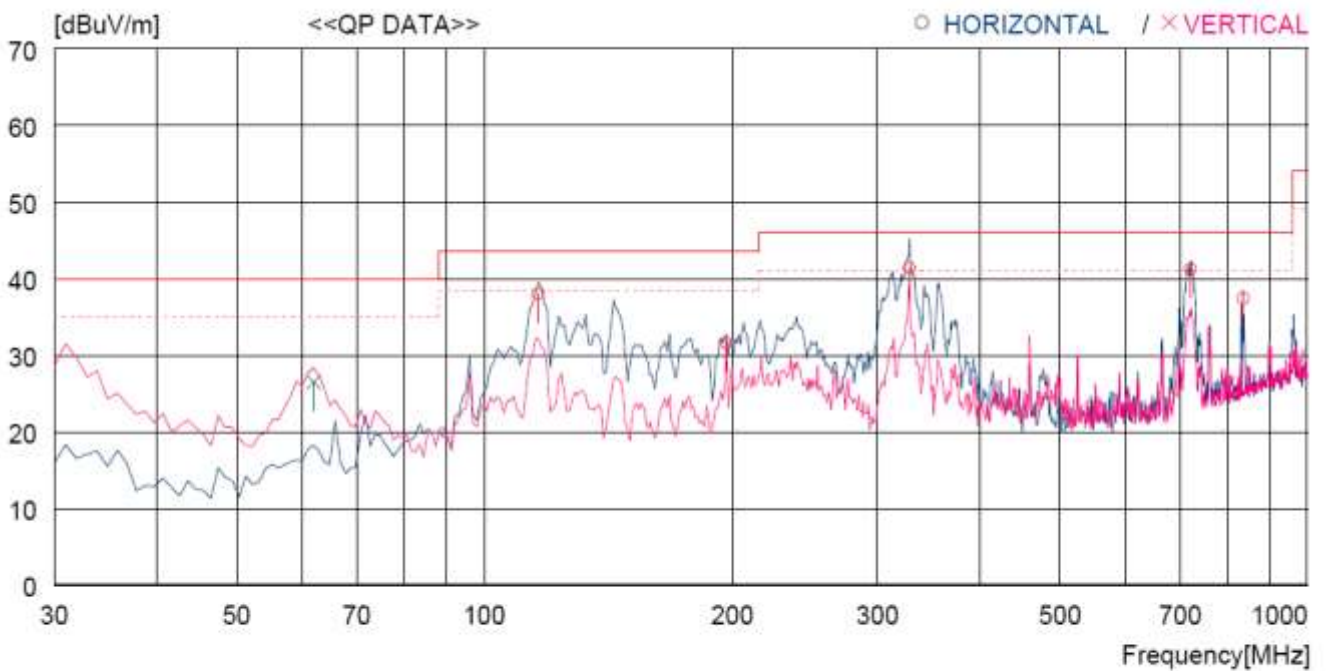
7.6.7 Test data for 802.11n_HT40

7.6.7.1 Test data for 30 MHz ~ 1 000 MHz

Humidity Level : 45.1 % R.H. Temperature: 21.4 °C
 Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.247
 Result : PASSED

EUT : Wi-Fi module Date: May 20, 2015
 Detector : CISPR Quasi-Peak (6 dB Bandwidth: 120 kHz)

-Ant0, Ant1 and Multiple transmit with Low, Middle and High Channels were tested, but the worst data were recorded.



No.	FREQ [MHz]	READING QP [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal -----										
1	116.330	57.2	10.6	3.3	33.1	38.0	43.5	5.5	200	166
2	196.840	50.1	10.6	3.8	32.9	31.6	43.5	11.9	200	0
3	328.760	55.3	14.2	4.8	32.9	41.4	46.0	4.6	100	359
4	721.604	47.1	19.9	7.4	33.2	41.2	46.0	4.8	100	359
5	835.091	40.9	21.3	8.0	32.8	37.4	46.0	8.6	200	0
----- Vertical -----										
6	62.010	44.8	12.6	2.2	33.1	26.5	40.0	13.5	100	82

7.6.7.2 Test data for Below 30 MHz

- . Test Date : May 20, 2015
- . Resolution bandwidth : 200 Hz (from 9 kHz to 0.15 MHz), 9 kHz (from 0.15 MHz to 30 MHz)
- . Frequency range : 9 kHz ~ 30 MHz
- . Measurement distance : 3 m
- . Operating mode : Transmitting mode

Frequency (MHz)	Reading (dBμV)	Ant. Pol. (H/V)	Ant. Height (m)	Angle (°)	Ant. Factor (dB/m)	Cable Loss	Emission Level(dBμV/m)	Limits (dBμV/m)	Margin (dB)
It was not observed any emissions from the EUT.									

7.6.7.3 Test data for above 1 GHz

- . Test Date : May 20, 2015
- . Resolution bandwidth : 1 MHz for Peak and Average Mode
- . Video bandwidth : 1 MHz for Peak Mode, 10 Hz for Average Mode
- . Frequency range : 1 GHz ~ 26.5 GHz
- . Measurement distance : 3 m
- . Operating mode : Transmitting mode

Frequency (MHz)	Reading (dBμV)	Ant. Pol. (H/V)	Ant. Height (m)	Angle (°)	Ant. Factor (dB/m)	Cable Loss	Emission Level(dBμV/m)	Limits (dBμV/m)	Margin (dB)
It was not observed any emissions from the EUT.									



Tested by: Tae-Ho, Kim / Project Engineer

7.7 CONDUCTED EMISSION TEST

7.7.1 Operating environment

Temperature : 21.4 °C
 Relative humidity : 45.1 % R.H.

7.7.2 Test set-up

The EUT was placed on a wooden table, 0.8 m height above the floor. Power was fed to the EUT through a 50 Ω / 50 μH + 5 Ω Artificial Mains Network (AMN). The ground plane was electrically bonded to the reference ground system and all power lines were filtered from ambient.

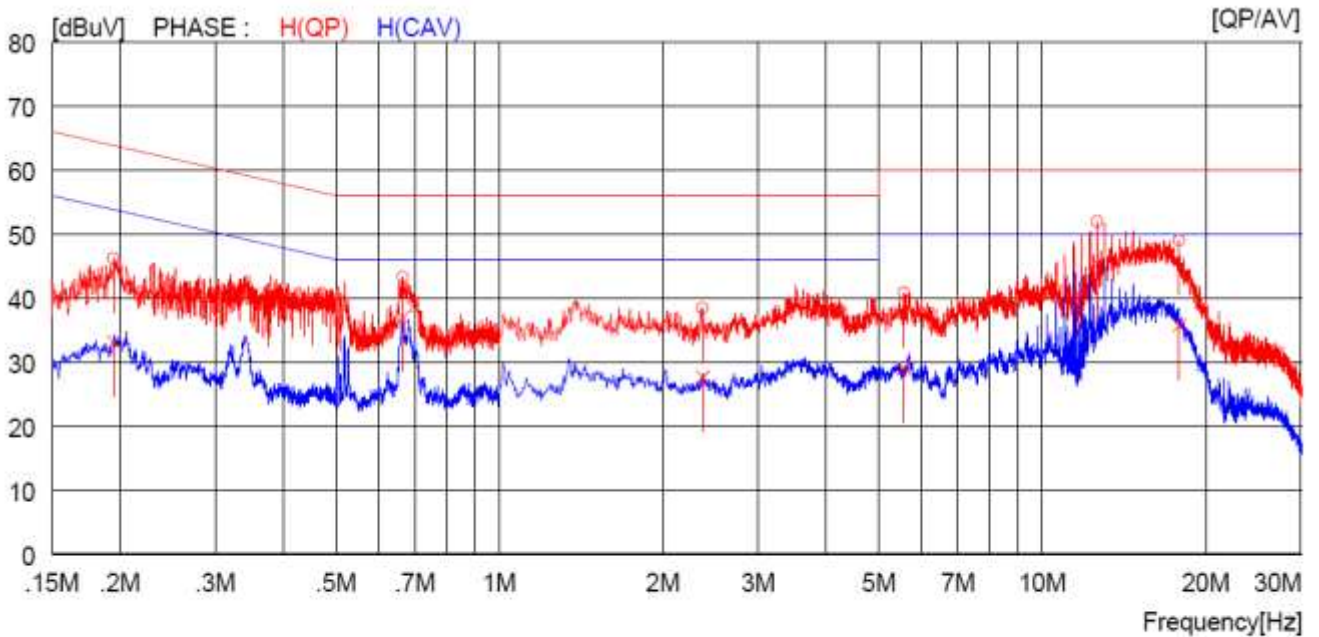
7.7.3 Test equipment used

Model Number	Manufacturer	Description	Serial Number	Last Cal. (Interval)
■ - ESPI	Rohde & Schwarz	EMI Test Receiver	101278	Nov. 03, 2014 (1Y)
□ - ESHS10	Rohde & Schwarz	EMI Test Receiver	834467/007	Apr. 29, 2015 (1Y)
□ - NSLK8128	Schwarzbeck	AMN	8128-216	Apr. 06, 2015 (1Y)
■ - NSLK8126	Schwarzbeck	AMN	8126-404	Apr. 29, 2015 (1Y)
□ - 3825/2	EMCO	AMN	9109-1869	Apr. 29, 2015 (1Y)
■ -- 3825/2	EMCO	AMN	9109-1867	Apr. 29, 2015 (1Y)

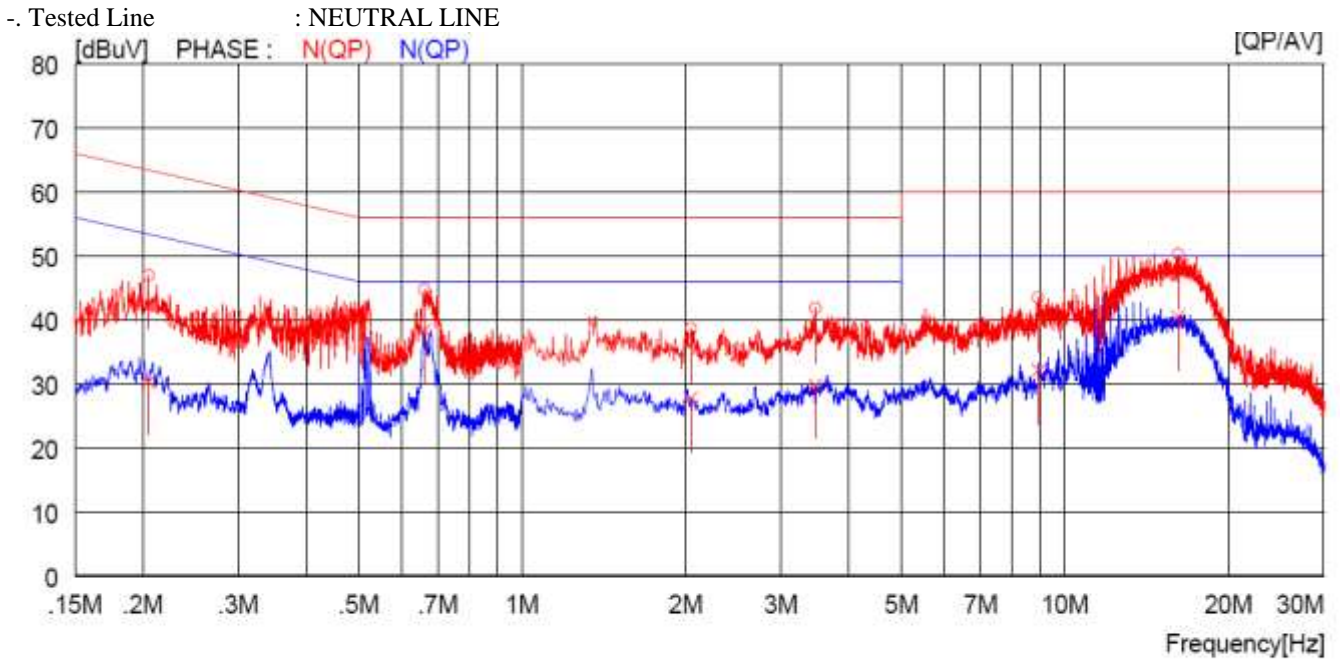
All test equipment used is calibrated on a regular basis.

7.7.4 Test data

- Test Date : May 20, 2015
- Resolution bandwidth : 9 kHz
- Frequency range : 0.15 MHz ~ 30 MHz
- Tested Line : HOT LINE



NO	FREQ		READING		C.FACTOR	RESULT		LIMIT	MARGIN	PHASE		
	QP	AV	QP	AV		QP	AV					QP
	[MHz]	[dBuV]	[dBuV]	[dB]		[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]		
1	0.19500	36.2	---	10.0	---	46.2	---	63.8	---	17.6	---	H(QP)
2	0.66500	33.1	---	10.1	---	43.2	---	56.0	---	12.8	---	H(QP)
3	2.37200	28.3	---	10.1	---	38.4	---	56.0	---	17.6	---	H(QP)
4	5.56000	30.6	---	10.2	---	40.8	---	60.0	---	19.2	---	H(QP)
5	12.65000	41.5	---	10.4	---	51.9	---	60.0	---	8.1	---	H(QP)
6	17.89000	38.3	---	10.7	---	49.0	---	60.0	---	11.0	---	H(QP)
7	0.19500	---	23.1	10.0	---	33.1	---	53.8	---	20.7	---	H(CAV)
8	0.66500	---	26.8	10.1	---	36.9	---	46.0	---	9.1	---	H(CAV)
9	2.37200	---	17.5	10.1	---	27.6	---	46.0	---	18.4	---	H(CAV)
10	5.56000	---	18.8	10.2	---	29.0	---	50.0	---	21.0	---	H(CAV)
11	12.65000	---	34.9	10.4	---	45.3	---	50.0	---	4.7	---	H(CAV)
12	17.89000	---	25.0	10.7	---	35.7	---	50.0	---	14.3	---	H(CAV)



NO	FREQ [MHz]	READING		C.FACTOR [dB]	RESULT		LIMIT	MARGIN	PHASE		
		QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]					
1	0.20500	36.9	---	10.0	46.9	---	63.4	---	16.5	N(QP)	
2	0.66100	34.7	---	10.1	44.8	---	56.0	---	11.2	N(QP)	
3	2.04800	28.5	---	10.1	38.6	---	56.0	---	17.4	N(QP)	
4	3.47600	31.7	---	10.1	41.8	---	56.0	---	14.2	N(QP)	
5	8.94500	33.2	---	10.2	43.4	---	60.0	---	16.6	N(QP)	
6	16.18000	39.6	---	10.6	50.2	---	60.0	---	9.8	N(QP)	
7	0.20500	---	20.4	10.0	---	30.4	---	53.4	---	23.0	N(CAV)
8	0.66100	---	28.3	10.1	---	38.4	---	46.0	---	7.6	N(CAV)
9	2.04800	---	17.6	10.1	---	27.7	---	46.0	---	18.3	N(CAV)
10	3.47600	---	19.7	10.1	---	29.8	---	46.0	---	16.2	N(CAV)
11	8.94500	---	21.9	10.2	---	32.1	---	50.0	---	17.9	N(CAV)
12	16.18000	---	29.9	10.6	---	40.5	---	50.0	---	9.5	N(CAV)

Remark: Margin (dB) = Limit – Level (Result)

The emission level in above table is included the transducer factor that means insertion loss (LISN), cable loss and attenuator.

Tested by: Tae-Ho, Kim / Project Engineer