11.4 Test data for Service Port

11.4.1 Test data for 802.11b WLAN Mode

11.4.1.1 Test data for Antenna 0

-. Test Date : June 21, 2016

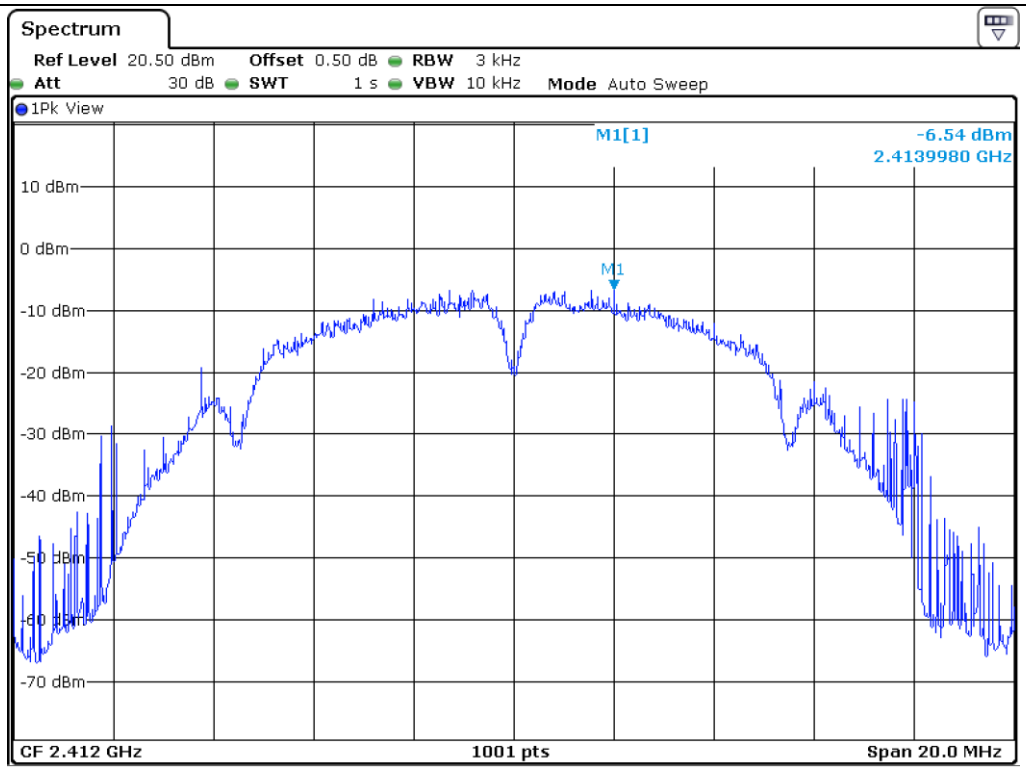
-. Test Result : Pass

-. Operating Condition : Continuous transmitting mode

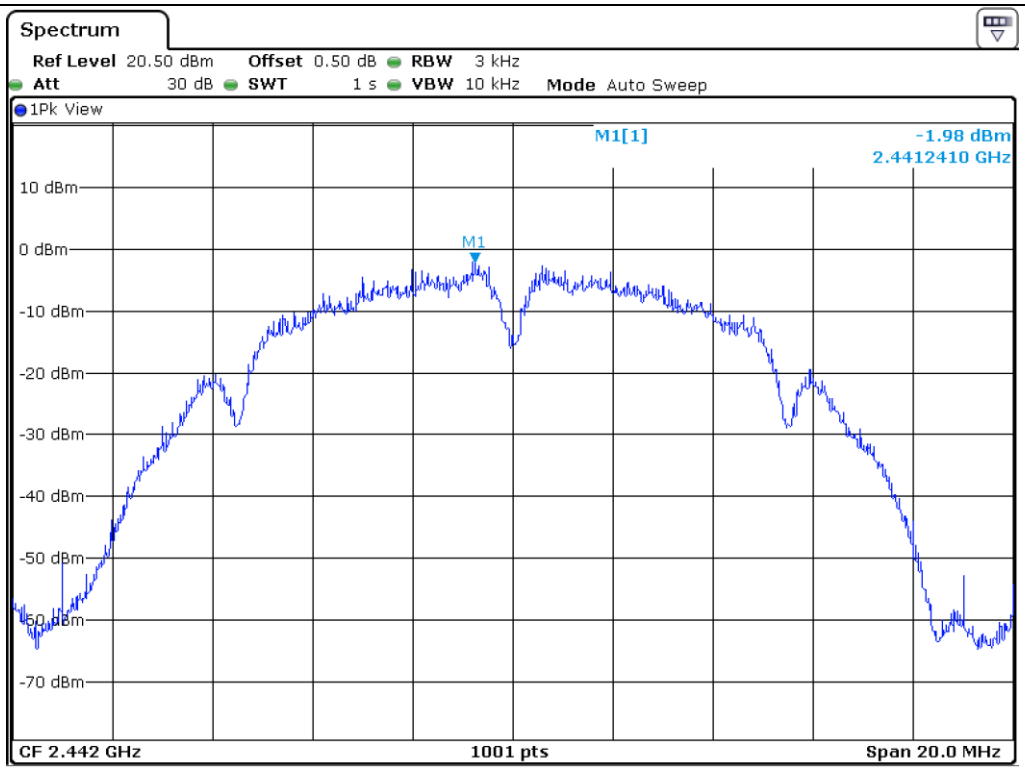
CHANNEL	FREQUENCY(MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2 412	-6.54	8.00	14.54
Middle	2 442	-1.98	8.00	9.98
High	2 462	-5.69	8.00	13.69

Remark. Margin = Limit – Measured value

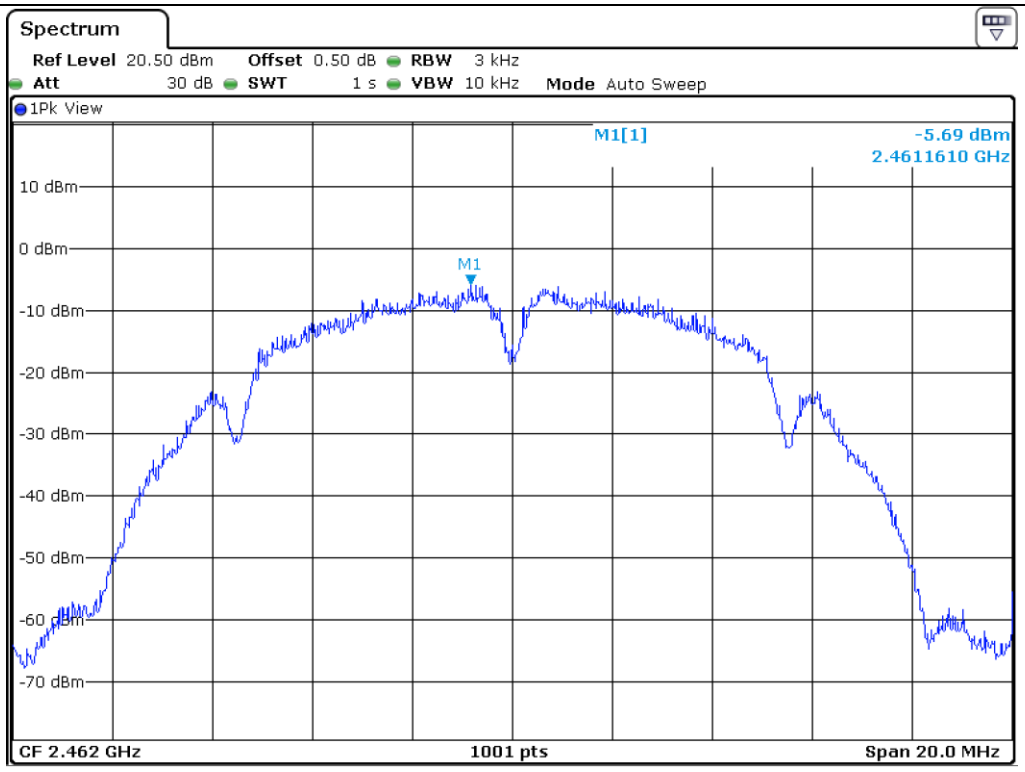
Tested by: Min-Gu, Ji / Project Engineer



Low Channel



Middle Channel



High Channel

11.4.1.2 Test data for Antenna 1

-. Test Date : June 21, 2016

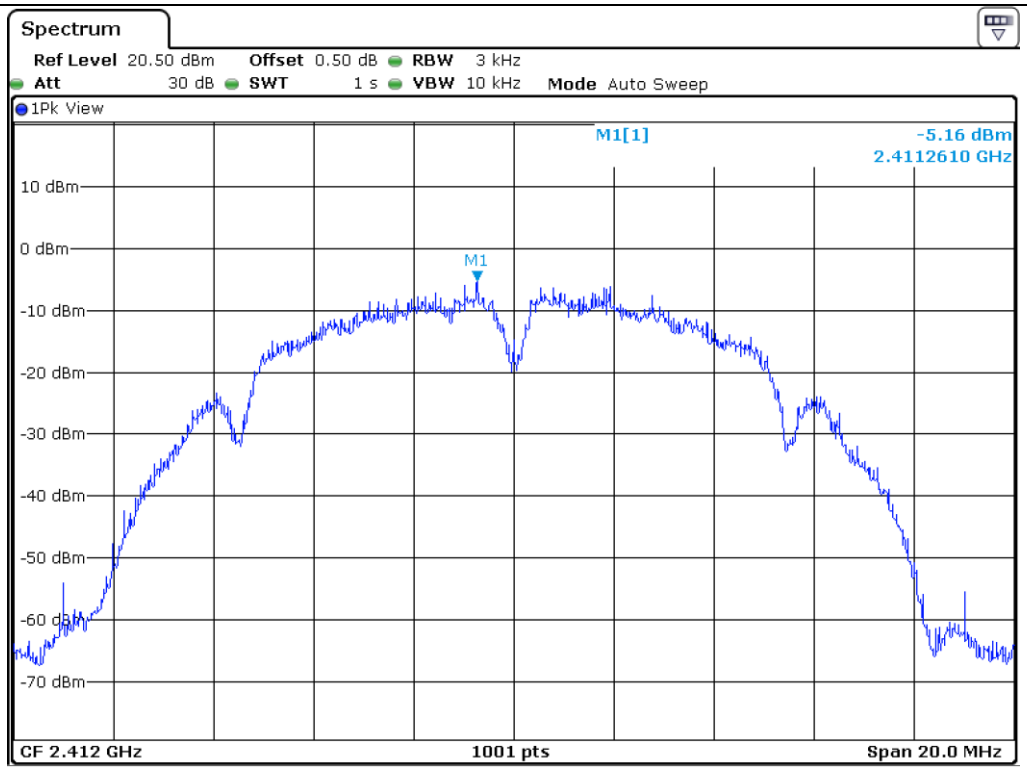
-. Test Result : Pass

-. Operating Condition : Continuous transmitting mode

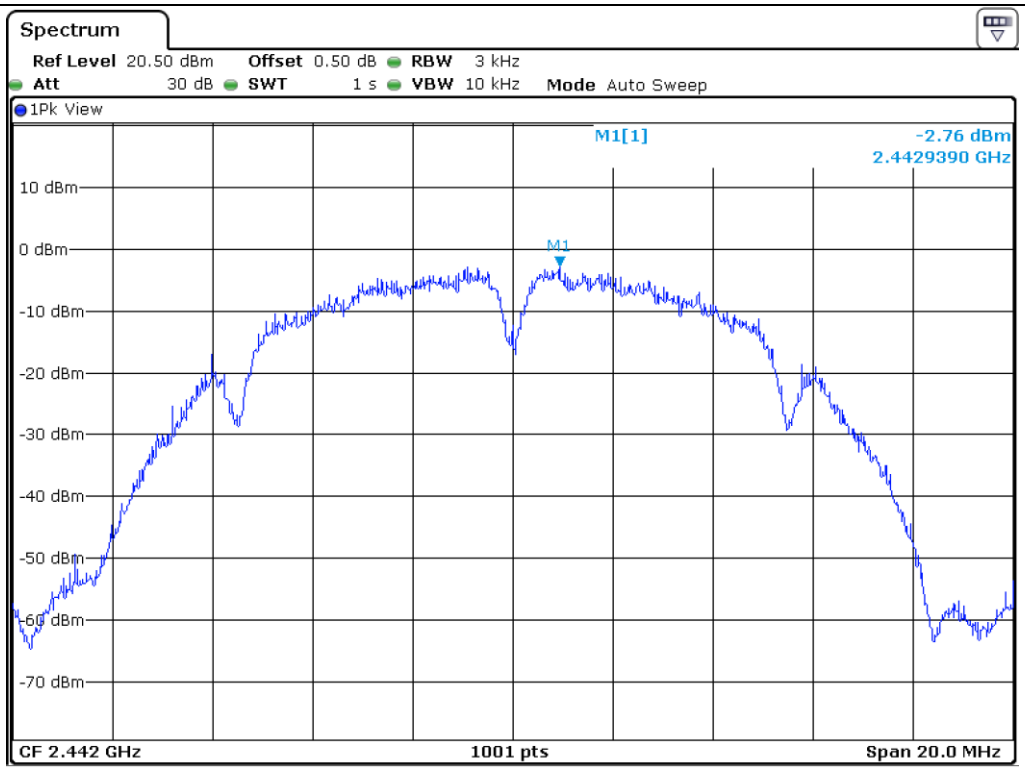
CHANNEL	FREQUENCY(MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2 412	-5.16	8.00	13.16
Middle	2 442	-2.76	8.00	10.76
High	2 462	-6.30	8.00	14.30

Remark. Margin = Limit – Measured value

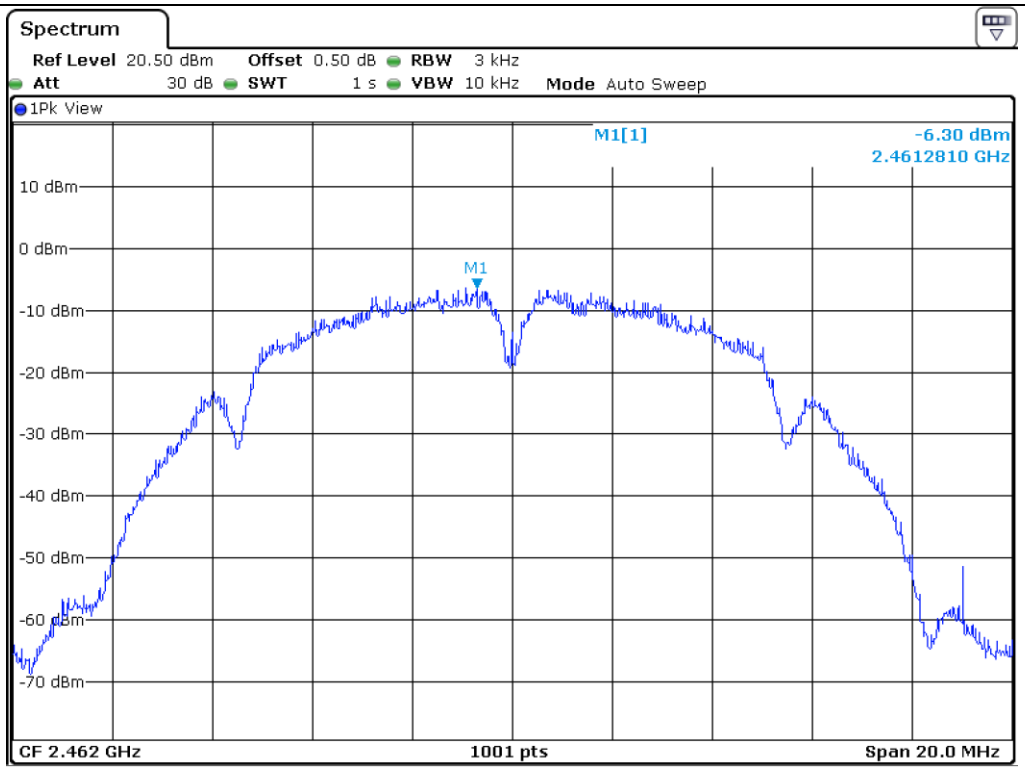
Tested by: Min-Gu, Ji / Project Engineer



Low Channel



Middle Channel



High Channel

11.4.1.3 Test data for Antenna 2

-. Test Date : June 21, 2016

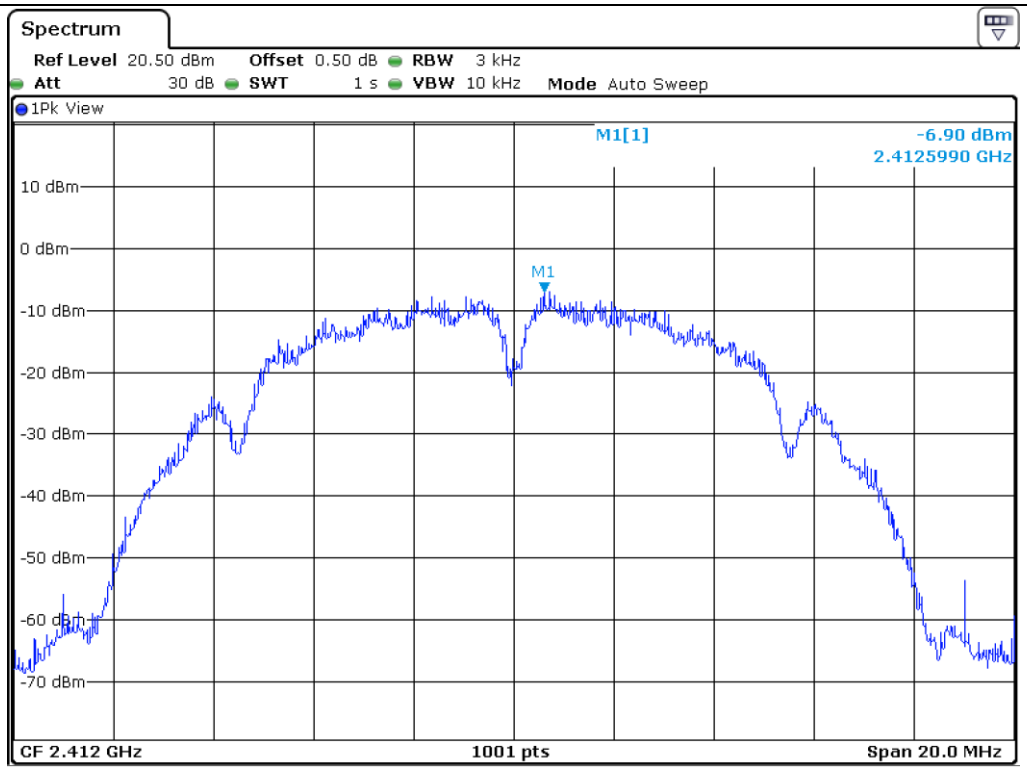
-. Test Result : Pass

-. Operating Condition : Continuous transmitting mode

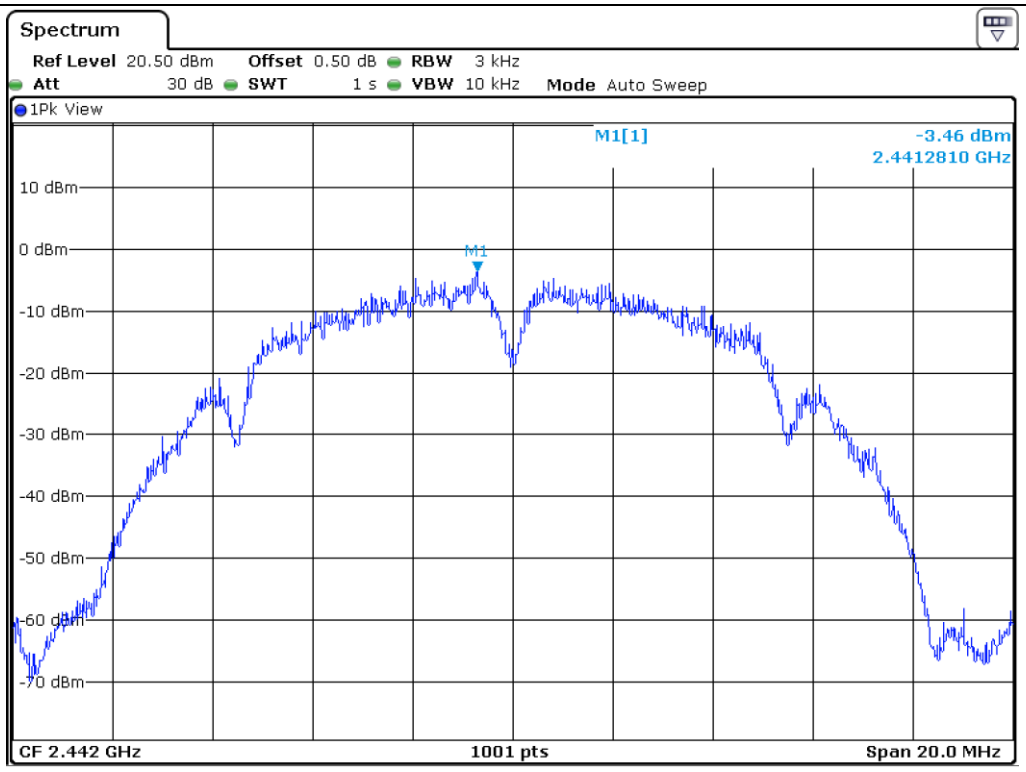
CHANNEL	FREQUENCY(MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2 412	-6.90	8.00	14.90
Middle	2 442	-3.46	8.00	11.46
High	2 462	-5.97	8.00	13.97

Remark. Margin = Limit – Measured value

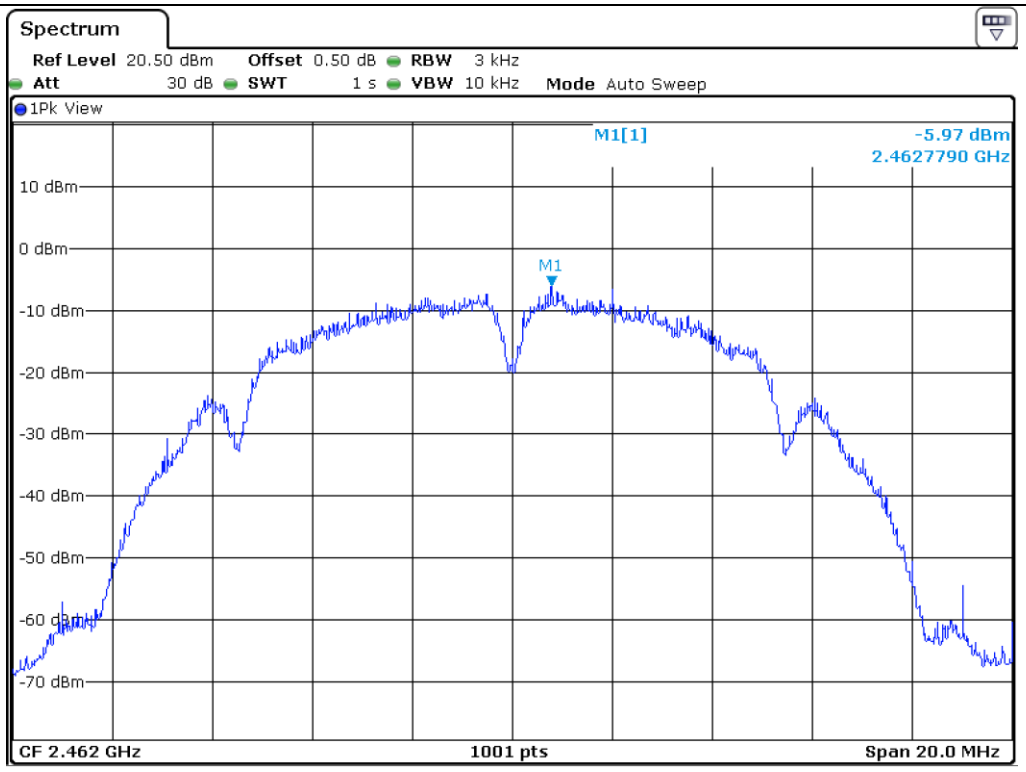
Tested by: Min-Gu, Ji / Project Engineer



Low Channel



Middle Channel



High Channel

11.4.1.4 Test data for Antenna 3

-. Test Date : June 21, 2016

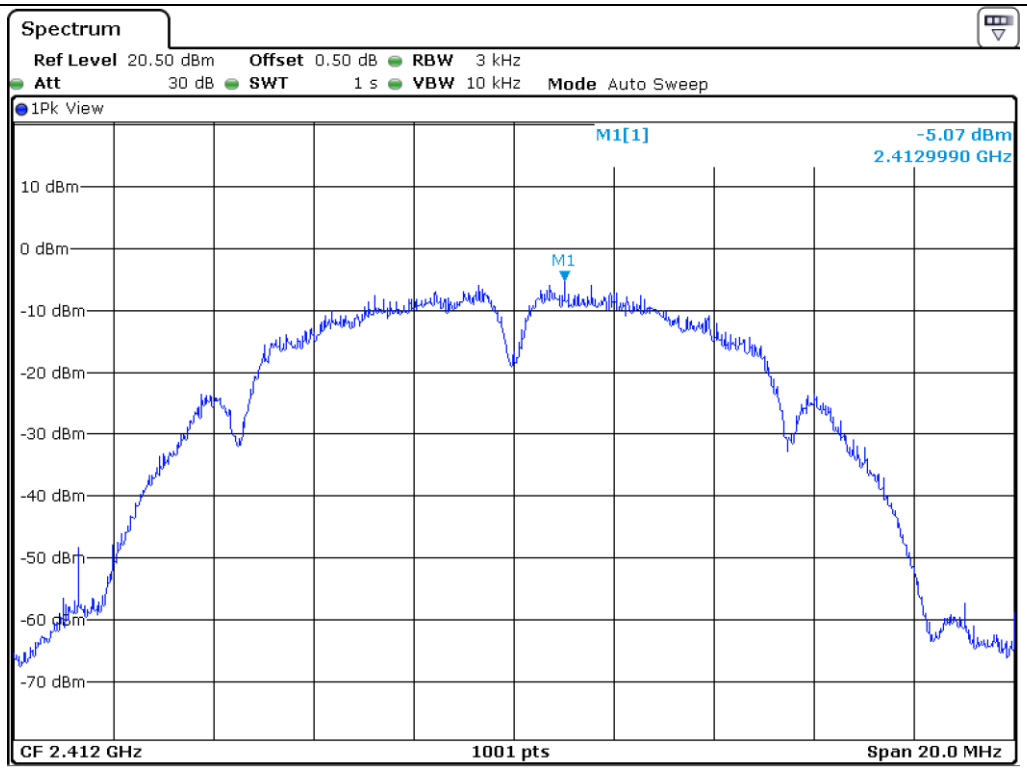
-. Test Result : Pass

-. Operating Condition : Continuous transmitting mode

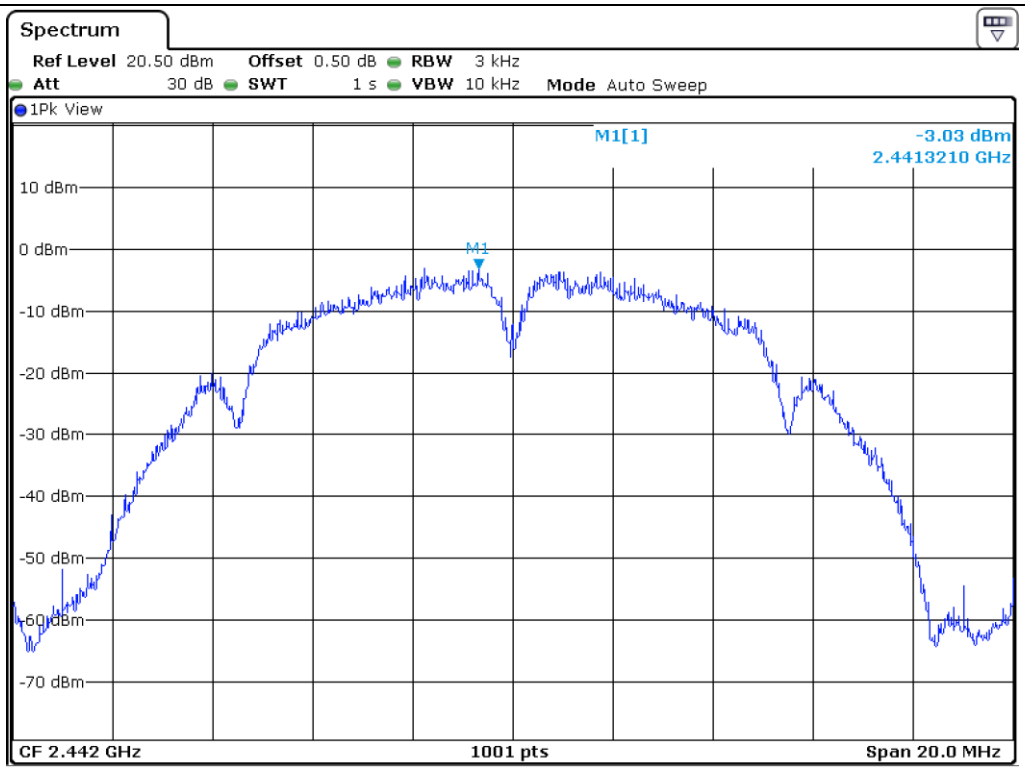
CHANNEL	FREQUENCY(MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2 412	-5.07	8.00	13.07
Middle	2 442	-3.03	8.00	11.03
High	2 462	-4.27	8.00	12.27

Remark. Margin = Limit – Measured value

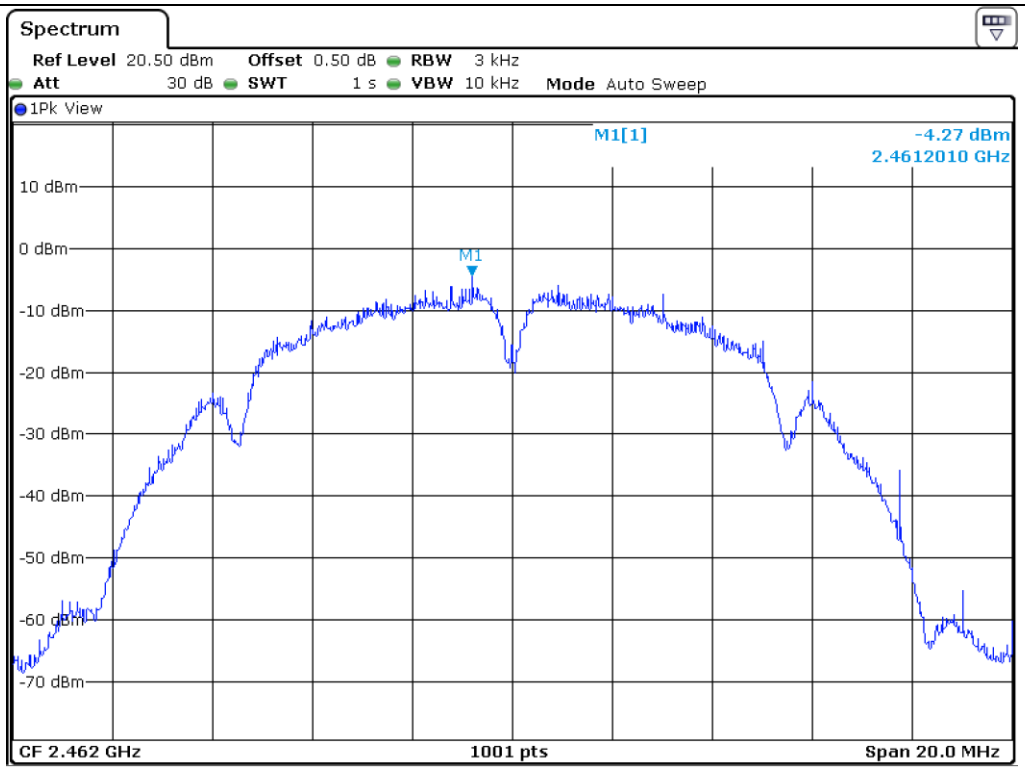
Tested by: Min-Gu, Ji / Project Engineer



Low Channel



Middle Channel



High Channel

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11.4.1.5 data for Multiple transmit

-. Test Date : June 21, 2016

-. Test Result : Pass

-. Operating Condition : Continuous transmitting mode

CHANNEL	FREQUENCY(MHz)	CALCULATED POWER (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2 412	0.18	5.33	5.15
Middle	2 442	3.25	5.33	2.08
High	2 462	0.54	5.33	4.79

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: Min-Gu, Ji / Project Engineer

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11.4.2 Test data for 802.11g WLAN Mode

11.4.2.1 Test data for Antenna 0

-. Test Date : June 21, 2016

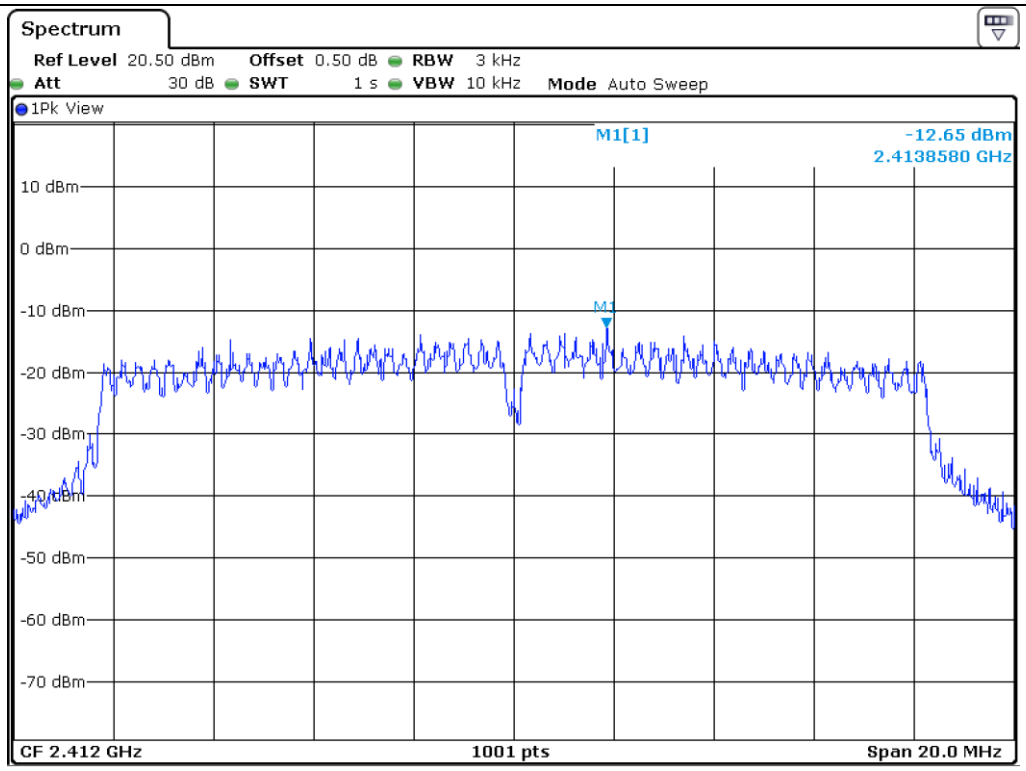
-. Test Result : Pass

-. Operating Condition : Continuous transmitting mode

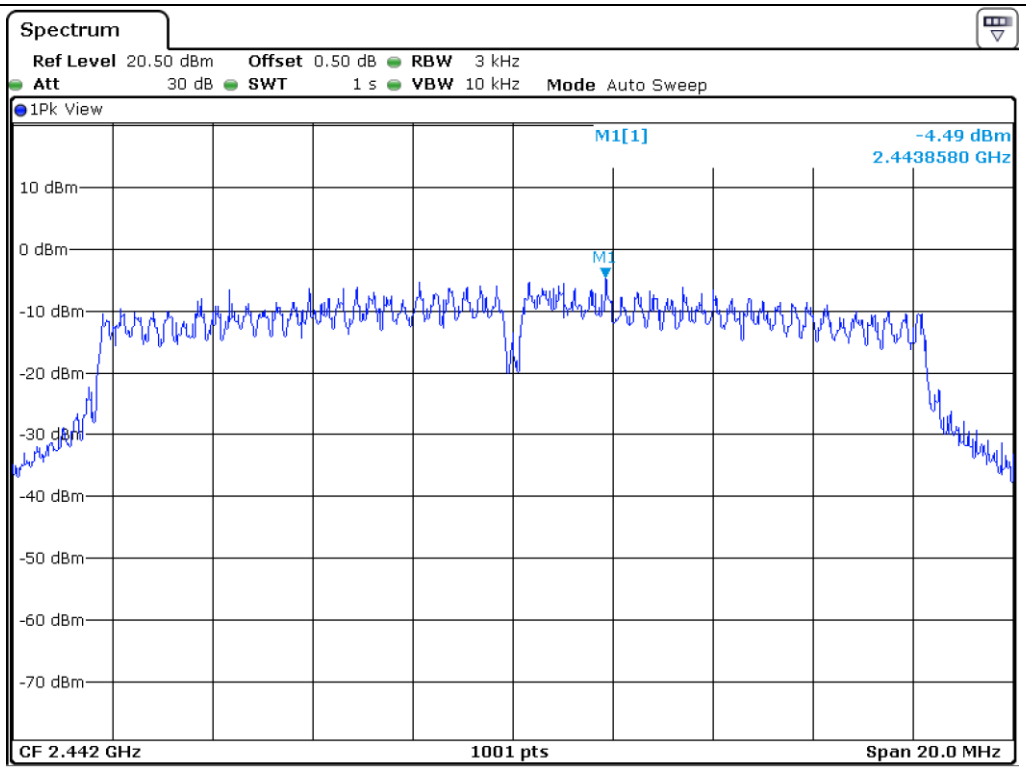
CHANNEL	FREQUENCY(MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2 412	-12.65	8.00	20.65
Middle	2 442	-4.49	8.00	12.49
High	2 462	-12.81	8.00	20.81

Remark. Margin = Limit – Measured value

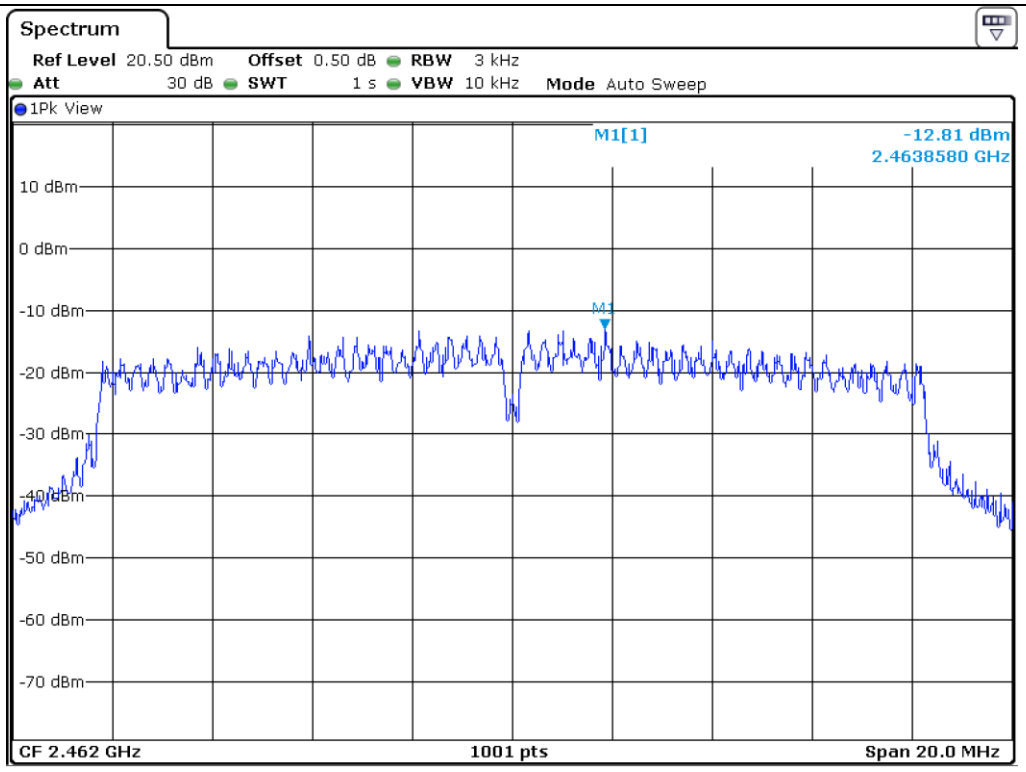
Tested by: Min-Gu, Ji / Project Engineer



Low Channel



Middle Channel



High Channel

11.4.2.2 Test data for Antenna 1

-. Test Date : June 21, 2016

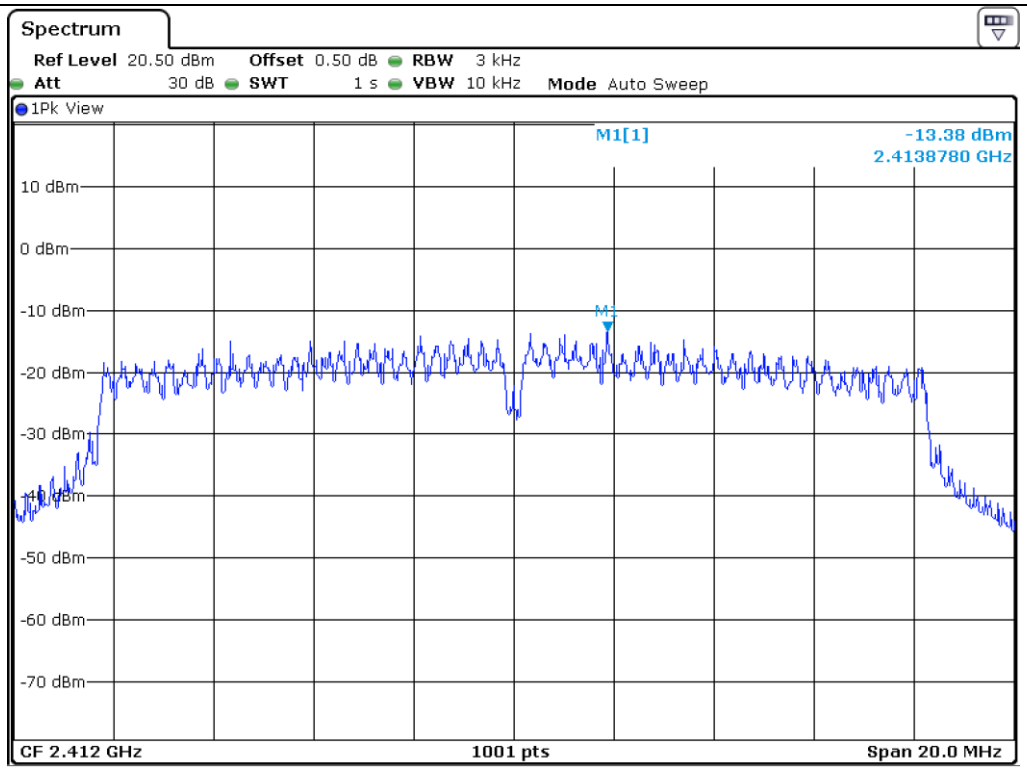
-. Test Result : Pass

-. Operating Condition : Continuous transmitting mode

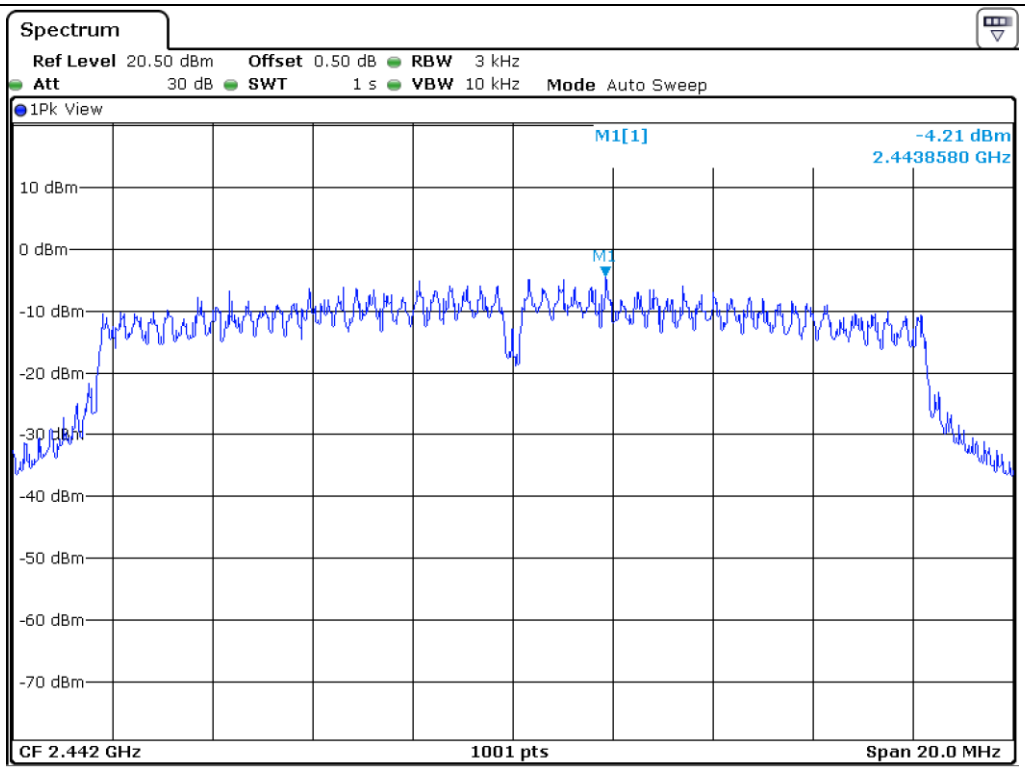
CHANNEL	FREQUENCY(MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2 412	-13.38	8.00	21.38
Middle	2 442	-4.21	8.00	12.21
High	2 462	-13.36	8.00	21.36

Remark. Margin = Limit – Measured value

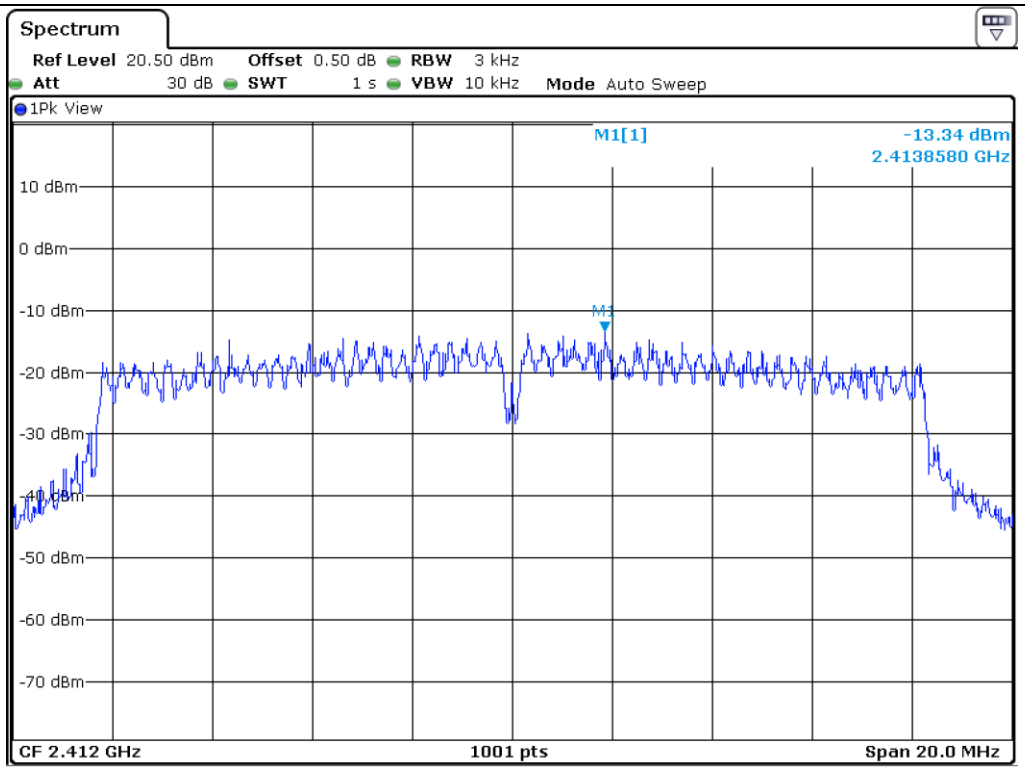
Tested by: Min-Gu, Ji / Project Engineer



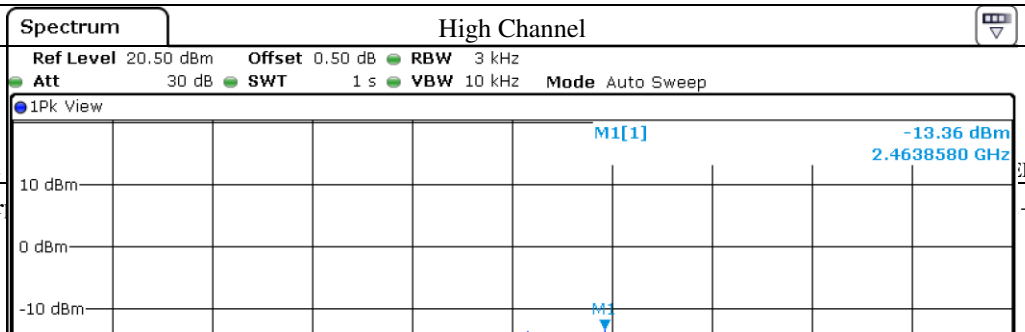
Low Channel



Middle Channel



High Channel



11.4.2.3 Test data for Antenna 2

-. Test Date : June 21, 2016

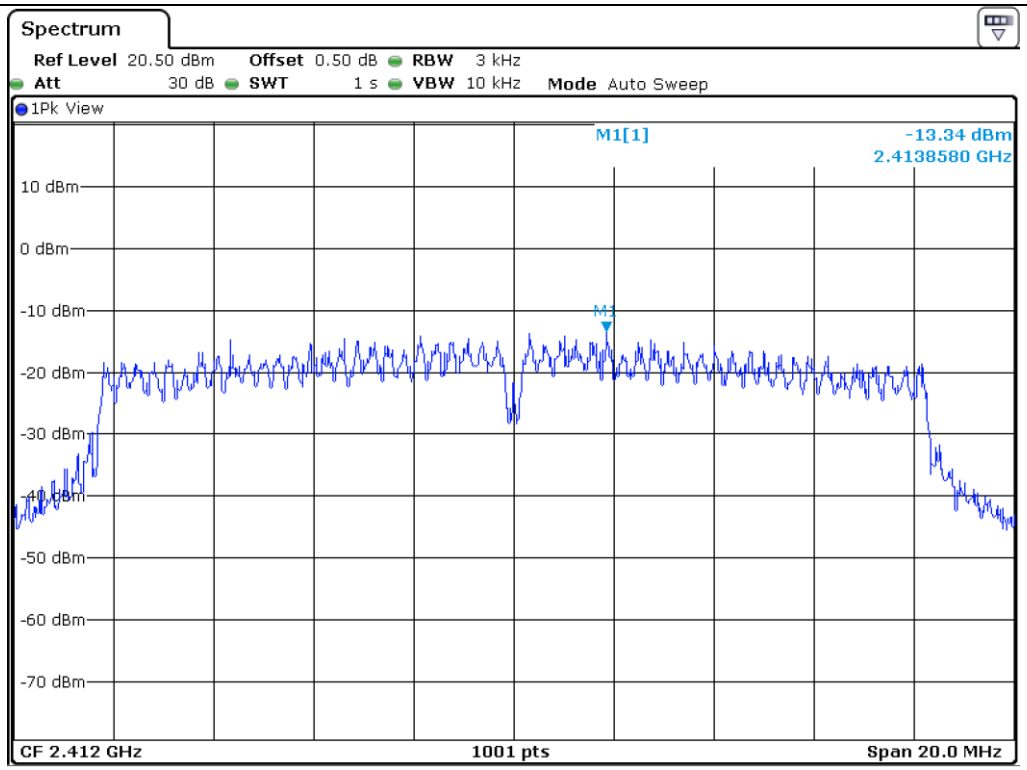
-. Test Result : Pass

-. Operating Condition : Continuous transmitting mode

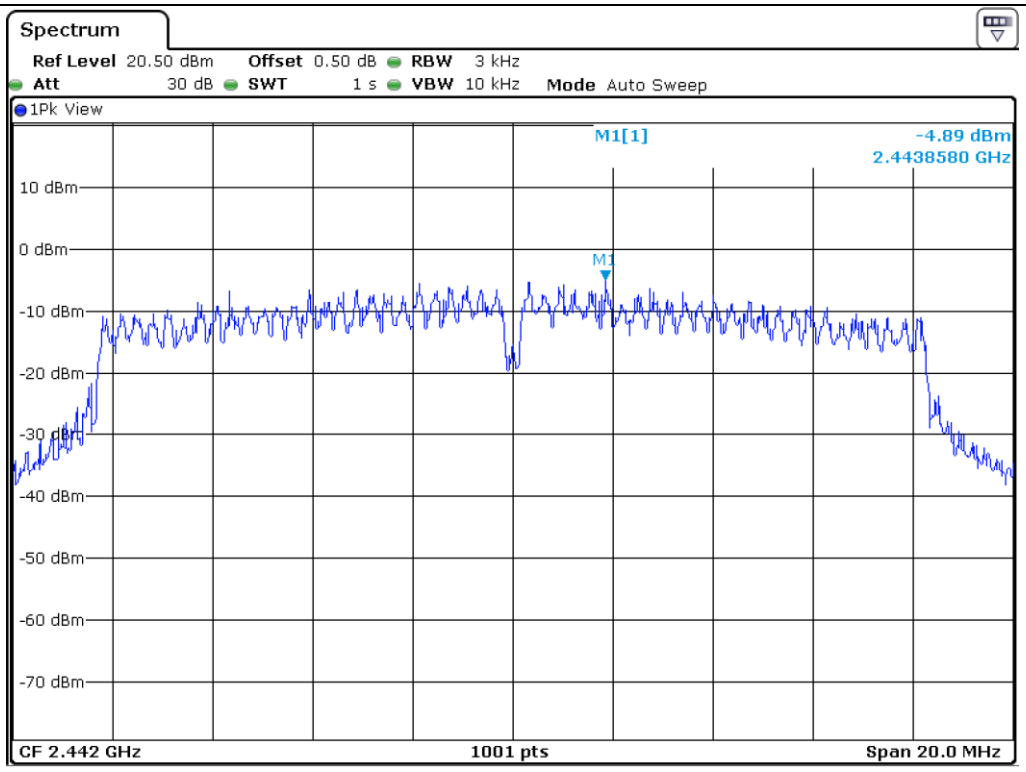
CHANNEL	FREQUENCY(MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2 412	-13.34	8.00	21.34
Middle	2 442	-4.89	8.00	12.89
High	2 462	-13.52	8.00	21.52

Remark. Margin = Limit – Measured value

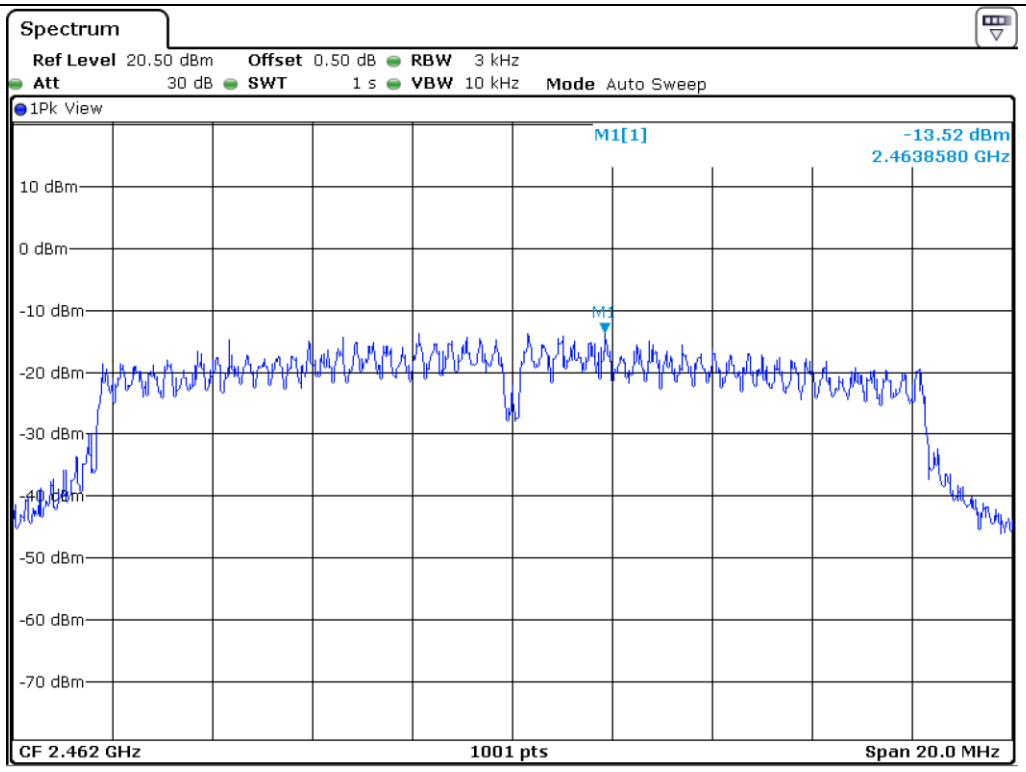
Tested by: Min-Gu, Ji / Project Engineer



Low Channel



Middle Channel



High Channel

11.4.2.4 Test data for Antenna 3

-. Test Date : June 21, 2016

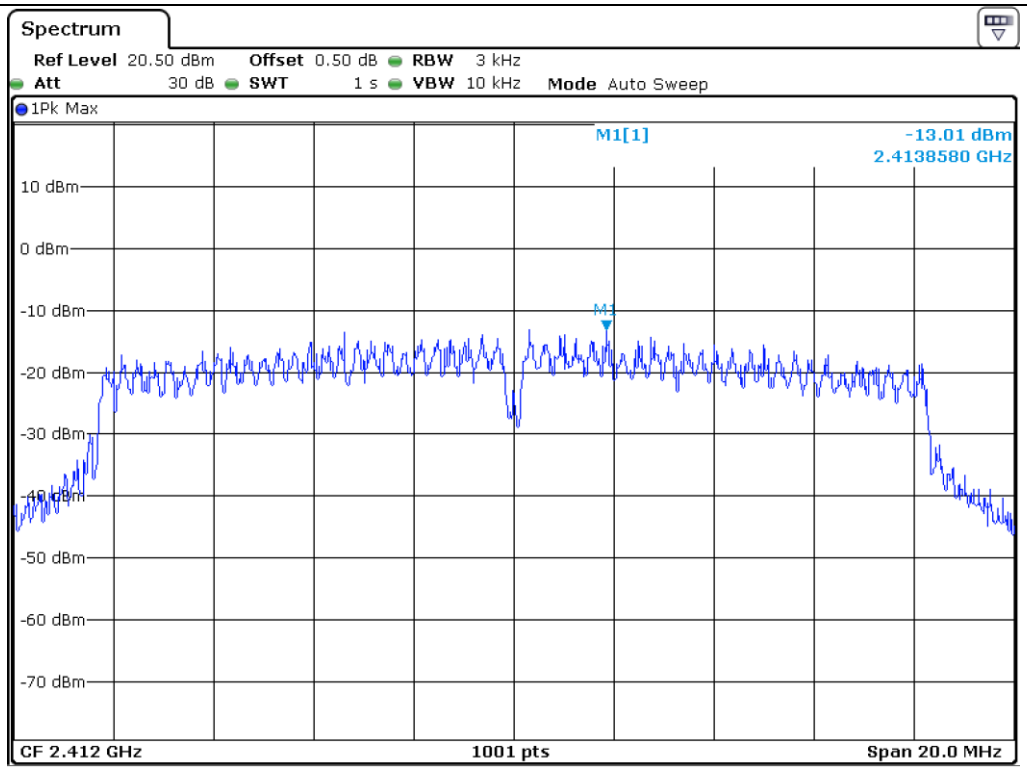
-. Test Result : Pass

-. Operating Condition : Continuous transmitting mode

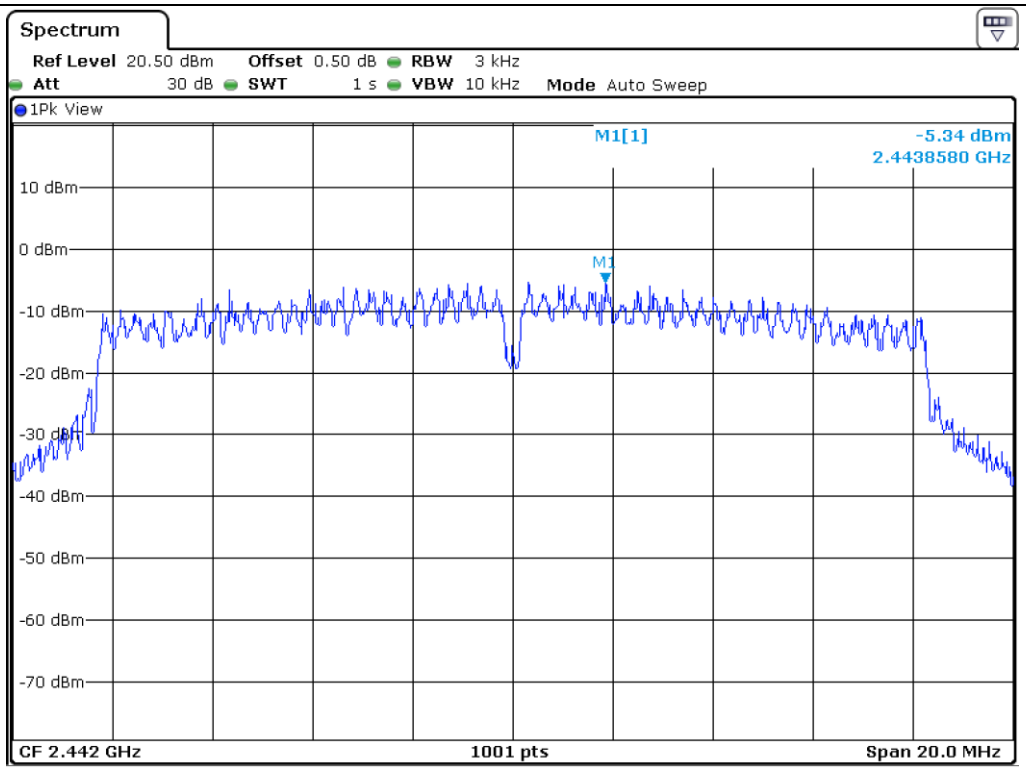
CHANNEL	FREQUENCY(MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2 412	-13.01	8.00	21.01
Middle	2 442	-5.34	8.00	13.34
High	2 462	-12.94	8.00	20.94

Remark. Margin = Limit – Measured value

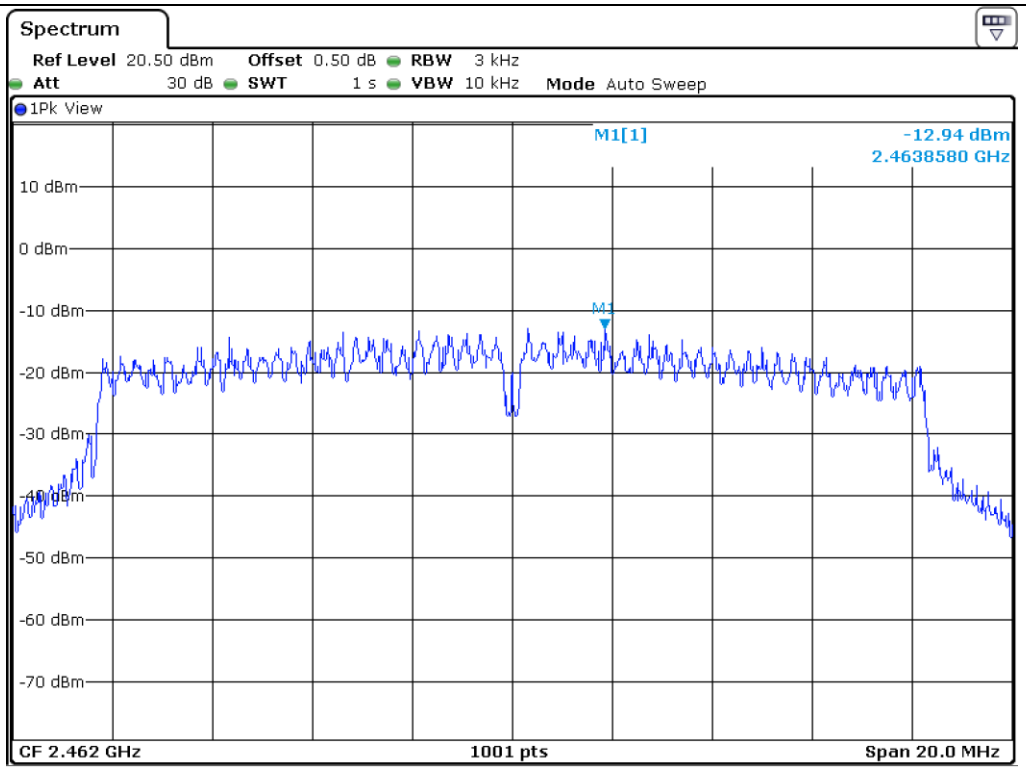
Tested by: Min-Gu, Ji / Project Engineer



Low Channel



Middle Channel



High Channel

11.4.2.5 data for Multiple transmit

-. Test Date : June 21, 2016

-. Test Result : Pass

-. Operating Condition : Continuous transmitting mode

CHANNEL	FREQUENCY(MHz)	CALCULATED POWER (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2 412	-7.06	5.33	12.39
Middle	2 442	1.31	5.33	4.02
High	2 462	-7.13	5.33	12.46

Remark 1 : Margin = Limit – Measured value

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

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11.4.3 Test data for 802.11n_HT20 WLAN Mode

11.4.3.1 Test data for Antenna 0

-. Test Date : June 21, 2016

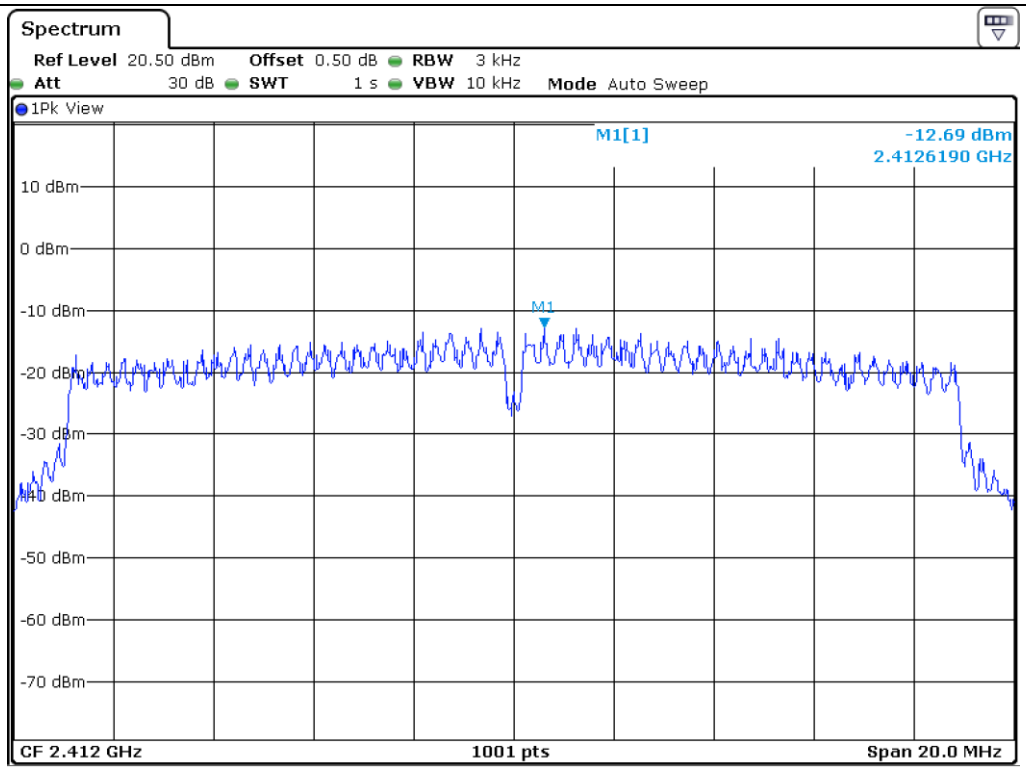
-. Test Result : Pass

-. Operating Condition : Continuous transmitting mode

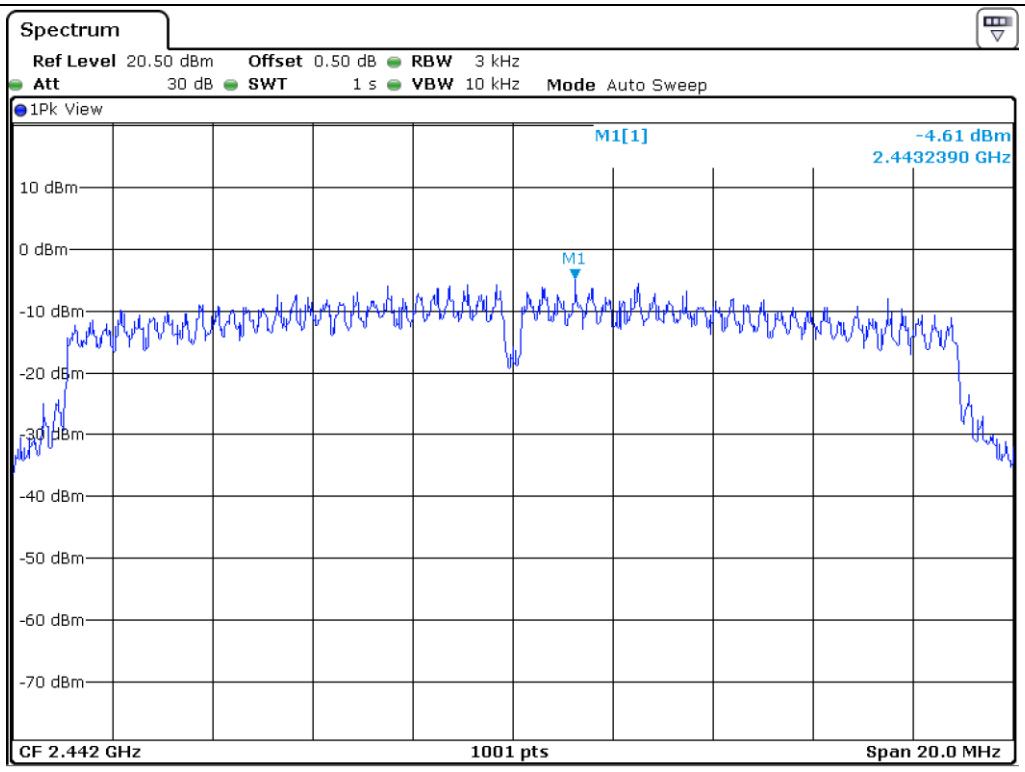
CHANNEL	FREQUENCY(MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2 412	-12.69	8.00	20.69
Middle	2 442	-4.61	8.00	12.61
High	2 462	-14.16	8.00	22.16

Remark. Margin = Limit – Measured value

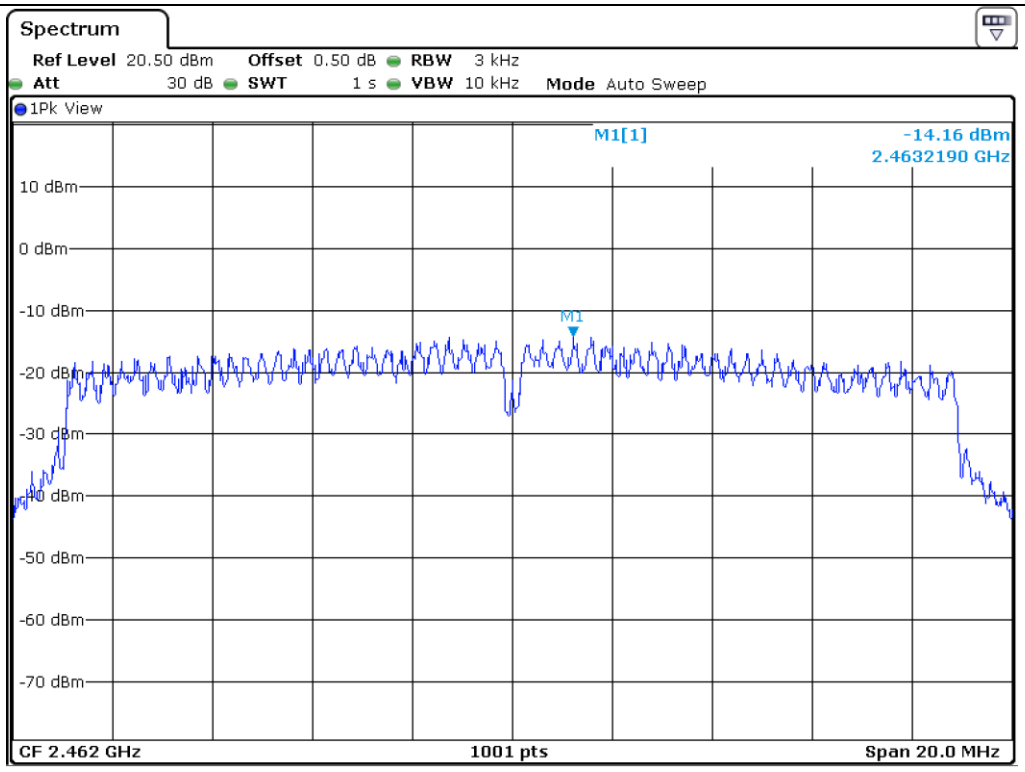
Tested by: Min-Gu, Ji / Project Engineer



Low Channel



Middle Channel



High Channel

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11.4.3.2 Test data for Antenna 1

-. Test Date : June 21, 2016

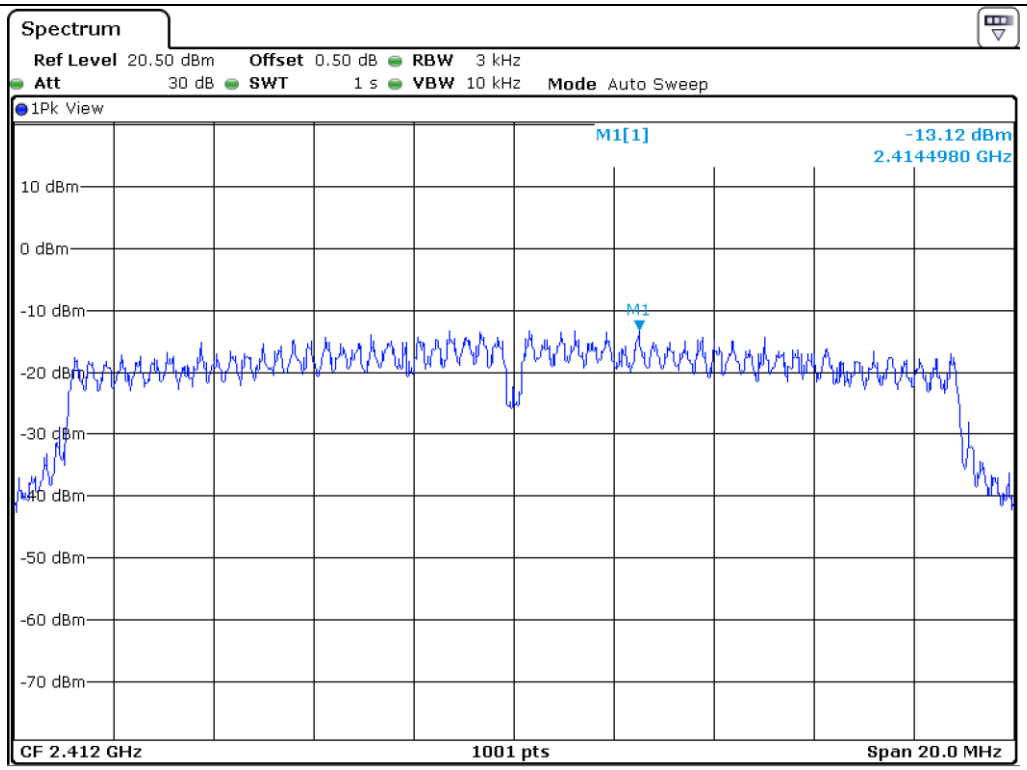
-. Test Result : Pass

-. Operating Condition : Continuous transmitting mode

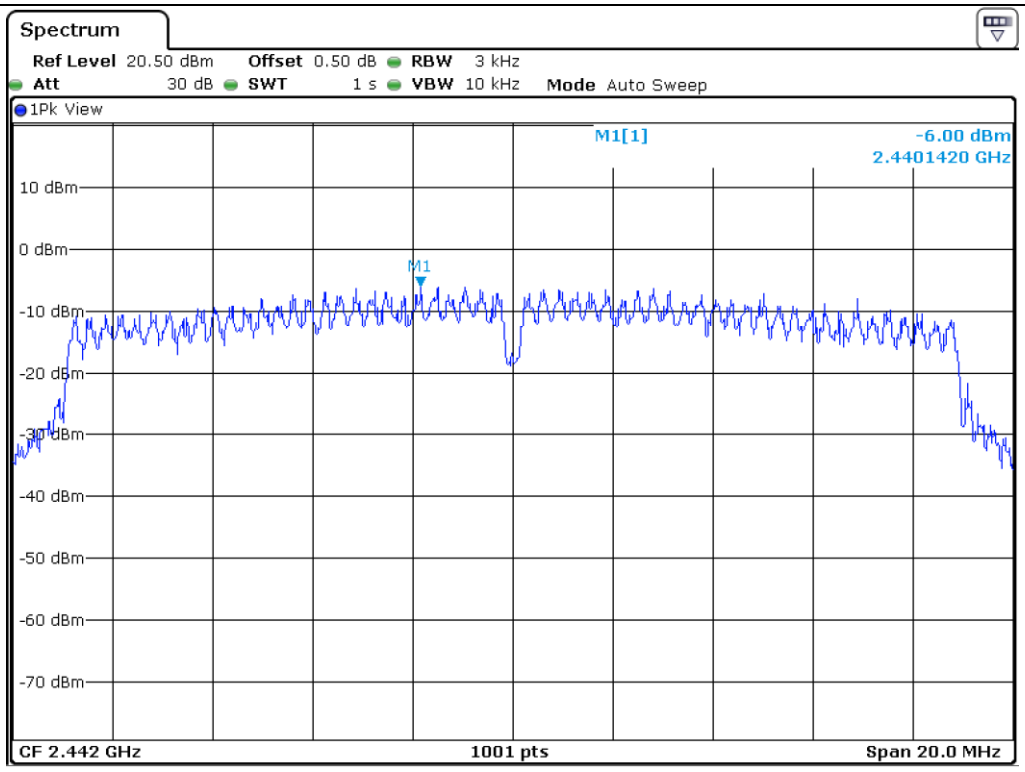
CHANNEL	FREQUENCY(MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2 412	-13.12	8.00	21.12
Middle	2 442	-6.00	8.00	14.00
High	2 462	-13.47	8.00	21.47

Remark. Margin = Limit – Measured value

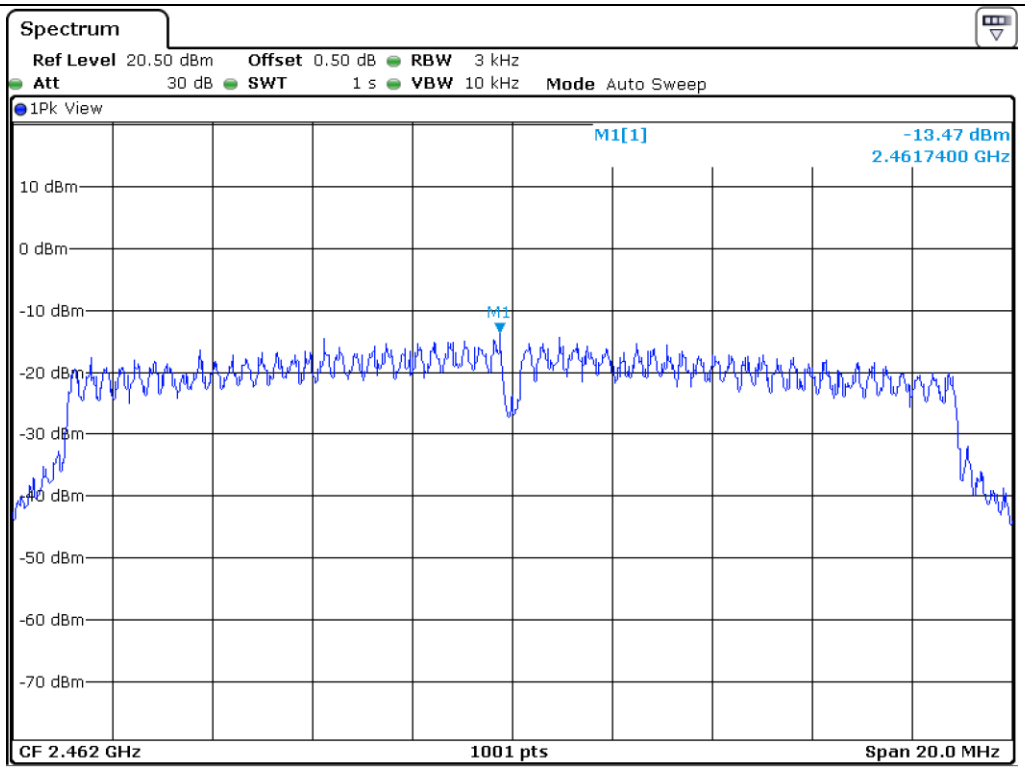
Tested by: Min-Gu, Ji / Project Engineer



Low Channel



Middle Channel



High Channel

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11.4.3.3 Test data for Antenna 2

-. Test Date : June 21, 2016

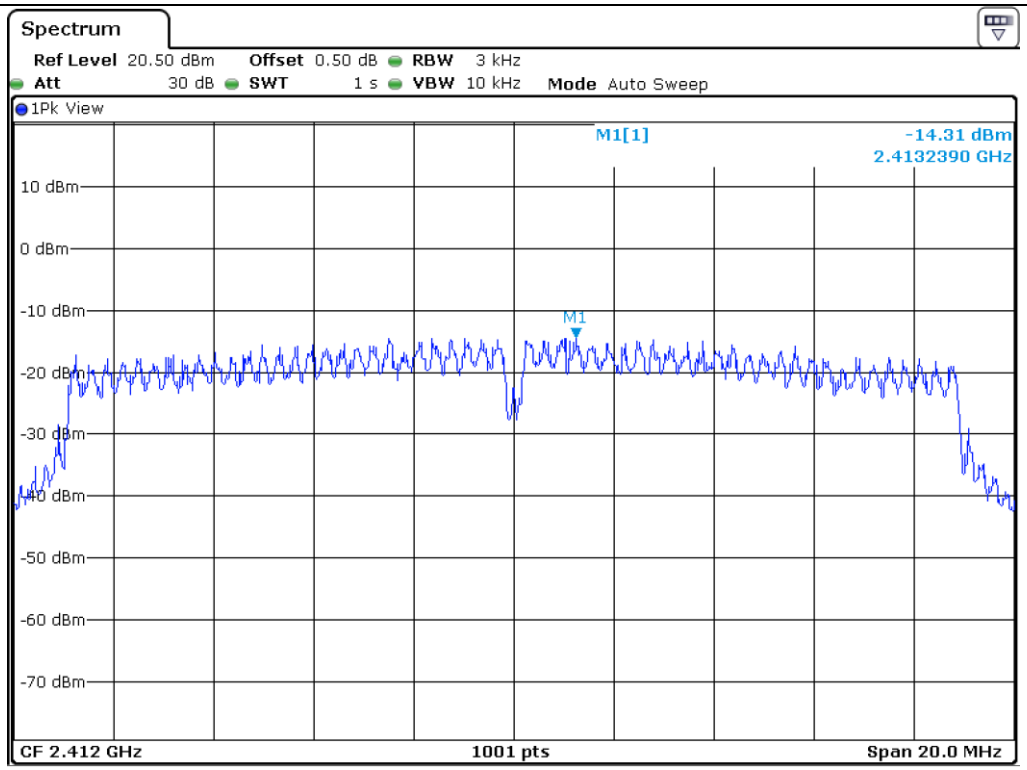
-. Test Result : Pass

-. Operating Condition : Continuous transmitting mode

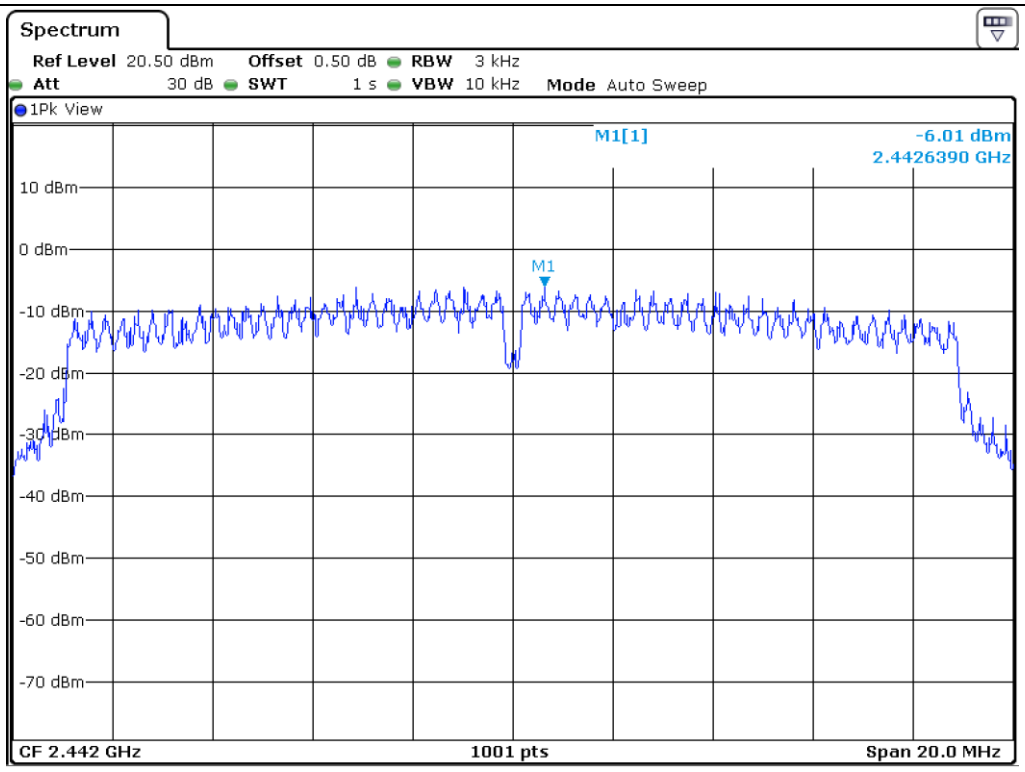
CHANNEL	FREQUENCY(MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2 412	-14.31	8.00	22.31
Middle	2 442	-6.01	8.00	14.01
High	2 462	-14.53	8.00	22.53

Remark. Margin = Limit – Measured value

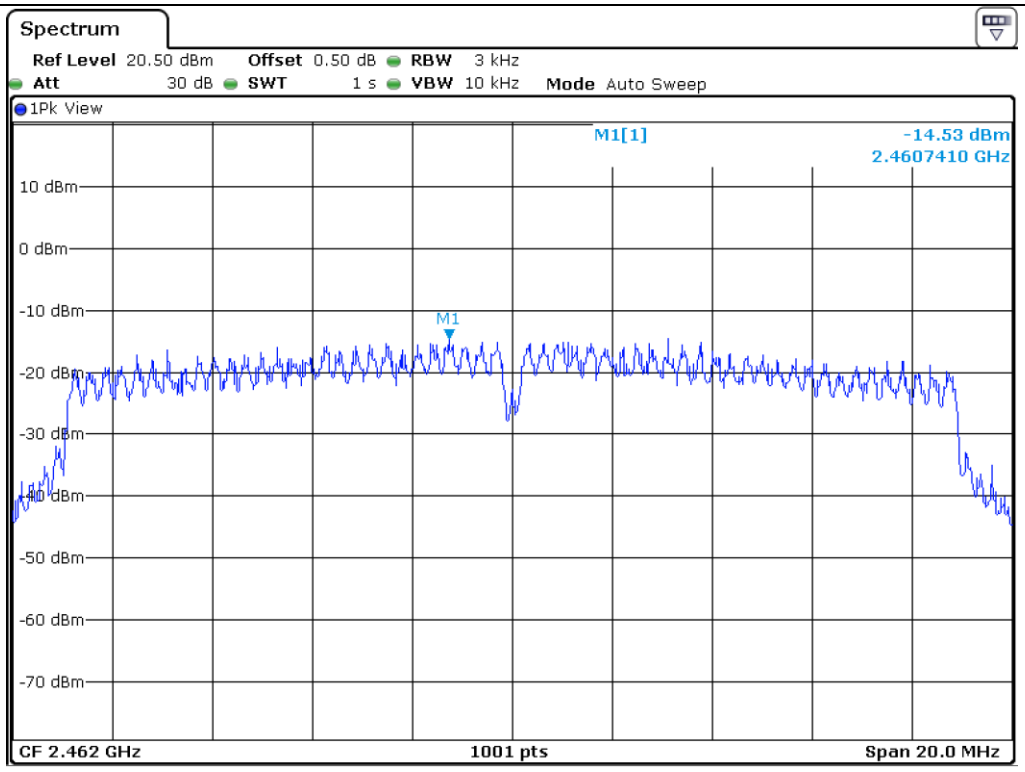
Tested by: Min-Gu, Ji / Project Engineer



Low Channel



Middle Channel



High Channel

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11.4.3.4 Test data for Antenna 3

-. Test Date : June 21, 2016

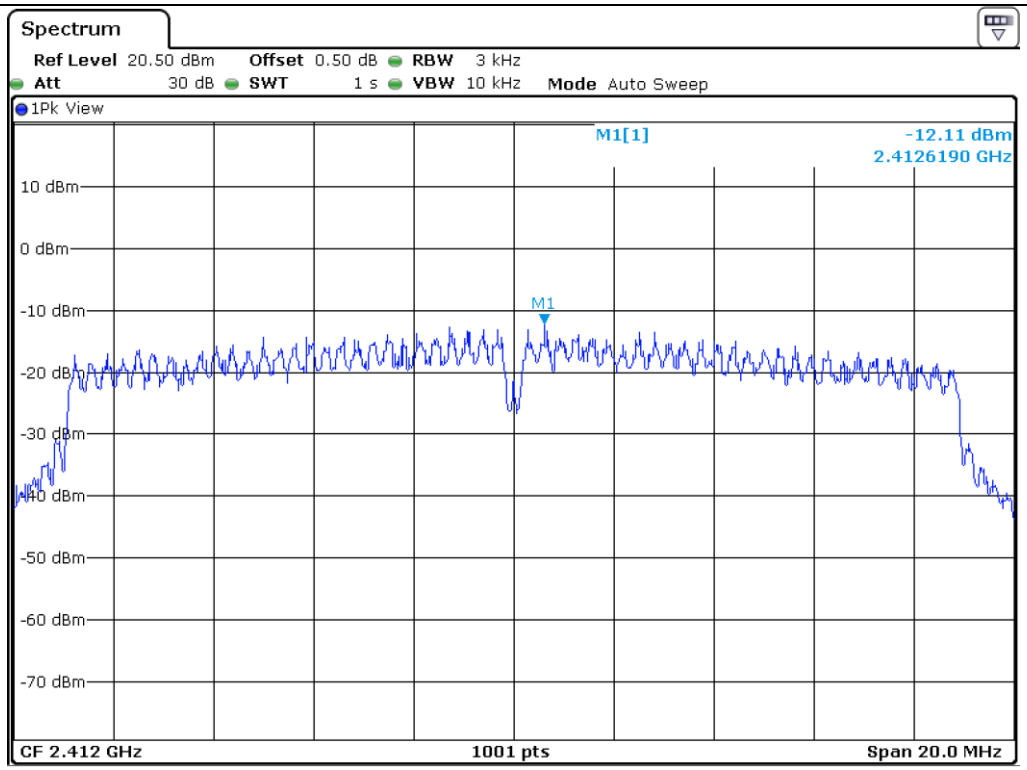
-. Test Result : Pass

-. Operating Condition : Continuous transmitting mode

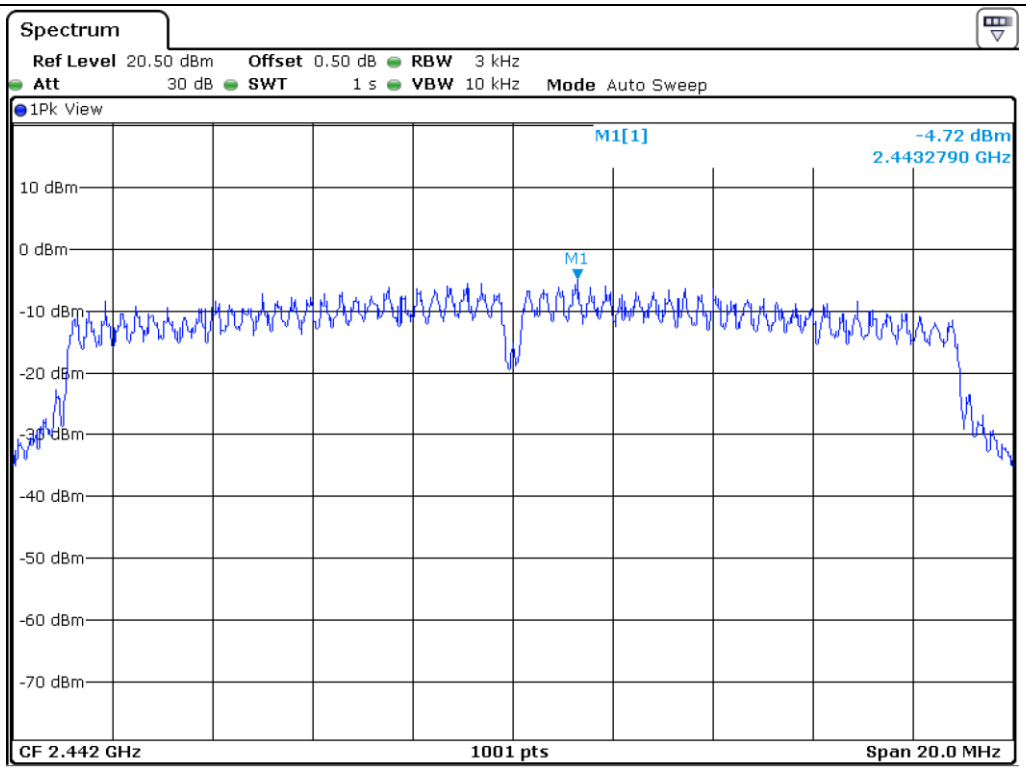
CHANNEL	FREQUENCY(MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2 412	-12.11	8.00	20.11
Middle	2 442	-4.72	8.00	12.72
High	2 462	-12.72	8.00	20.72

Remark. Margin = Limit – Measured value

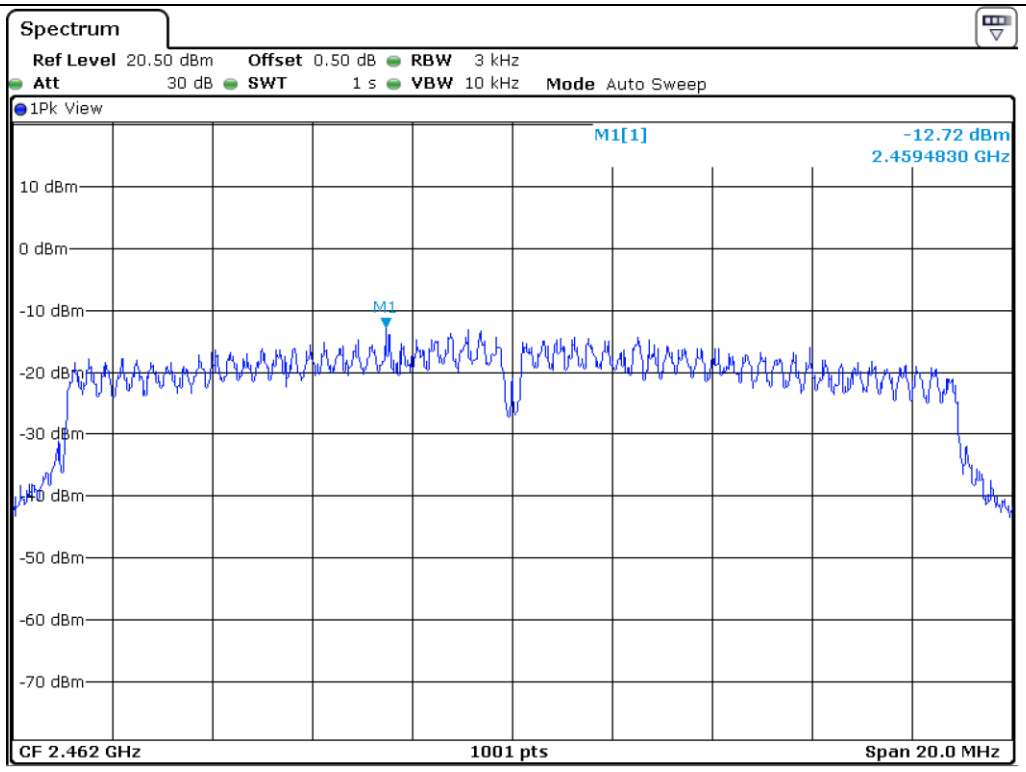
Tested by: Min-Gu, Ji / Project Engineer



Low Channel



Middle Channel



High Channel

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11.4.3.5 data for Multiple transmit

-. Test Date : June 21, 2016

-. Test Result : Pass

-. Operating Condition : Continuous transmitting mode

CHANNEL	FREQUENCY(MHz)	CALCULATED POWER (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2 412	-6.96	5.33	12.29
Middle	2 442	0.74	5.33	4.59
High	2 462	-7.64	5.33	12.97

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: Min-Gu, Ji / Project Engineer

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12. RADIATED EMISSION TEST

12.1 Operating environment

Temperature : (24 ~ 25) °C

Relative humidity : (46 ~ 47) % R.H.

12.2 Test set-up

The radiated emissions measurements were on the 3 m, open-field test site. 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.

12.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal.(Interval)
■ -	FSV40	Rohde & Schwarz	Signal Analyzer	101009	May. 31, 2016 (1Y)
■ -	ESCI	Rohde & Schwarz	Test Receiver	101012	Nov. 02, 2015 (1Y)
■ -	310N	Sonoma Instrument	Pre-Amplifier	312544	Apr. 05, 2016 (1Y)
■ -	SCU-18	Rohde & Schwarz	Pre-Amplifier	10041	Nov. 23, 2015 (1Y)
■ -	DT3000	Innco System	Turn Table	930611	N/A
■ -	MA-4000XPET	Innco System	Antenna Master	MA4000/509/37211215/L	N/A
■ -	VULB9163	Schwarzbeck	TRILOG Broadband Antenna	9163-421	Apr. 15, 2016 (2Y)
■ -	BBHA9120D	Schwarzbeck	Horn Antenna	BBHA9120D295	Aug. 31, 2015 (2Y)
■ -	BBHA9170	Schwarzbeck	Horn Antenna	BBHA9170178	Aug. 31, 2015 (2Y)

All test equipment used is calibrated on a regular basis.

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12.4 Test data

12.4.1 Test data for Below 30 MHz

-. Test Date : July 01, 2016

-. 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)
Any emissions were not observed from the EUT.									

12.4.2 Test data for 30 MHz ~ 1 000 MHz

-. Test Date : July 01, 2016

-. 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)
Any emissions were not observed from the EUT.									

12.4.3 Test data for above 1 GHz

-. Test Date : July 01, 2016

-. 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)
Any emissions were not observed from the EUT.									

Tested by: Min-Gu, Ji / Project Engineer

13. CONDUCTED EMISSION TEST

13.1 Operating environment

Temperature : 25 °C

Relative humidity : 46 % R.H.

13.2 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.

13.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal. (Interval)
■ -	ESPI	Rohde & Schwarz	Test Receiver	101012	Nov. 02, 2015 (1Y)
□ -	ESHS10	Rohde & Schwarz	Test Receiver	834467/007	Apr. 05, 2016 (1Y)
□ -	NSLK8128	Schwarzbeck	AMN	8128-216	Apr. 06, 2016 (1Y)
■ -	NSLK8126	Schwarzbeck	AMN	8126-404	Apr. 05, 2016 (1Y)
□ -	3825/2	EMCO	AMN	9109-1869	Apr. 06, 2016 (1Y)
■ -	3825/2	EMCO	AMN	9109-1867	Apr. 06, 2016 (1Y)

All test equipment used is calibrated on a regular basis.

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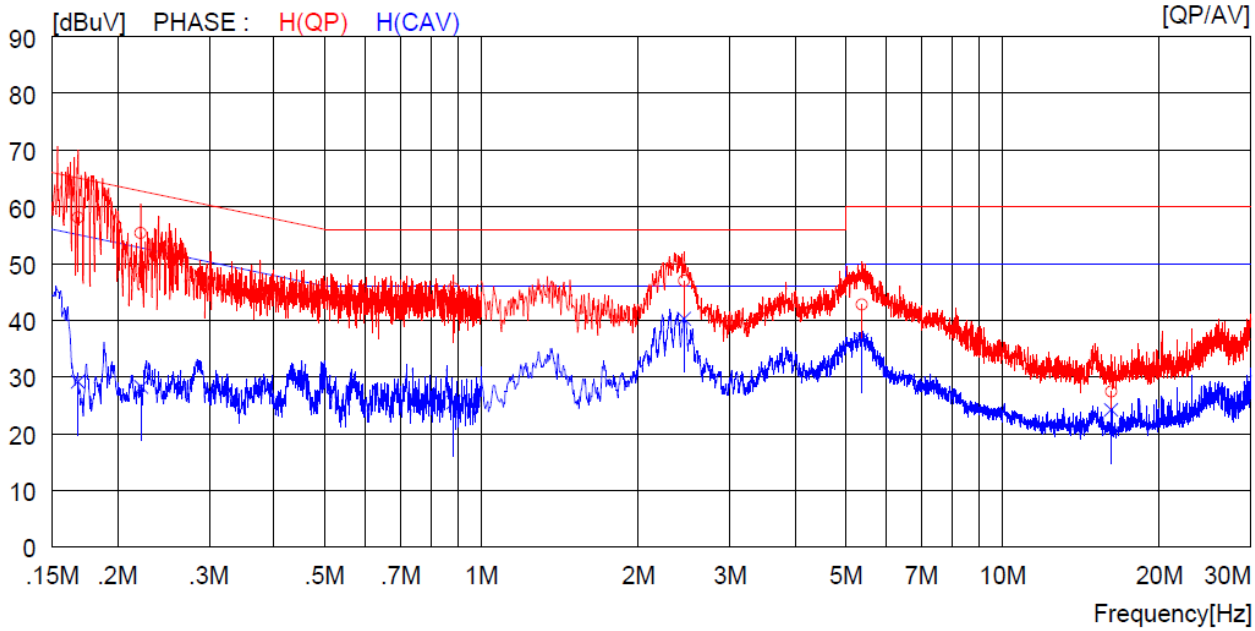
13.4 Test data

-. Test Date : April 28, 2016

-. Resolution bandwidth : 9 kHz

-. Frequency range : 0.15 MHz ~ 30 MHz

-. Tested Line : HOT LINE



NO	FREQ [MHz]	READING QP [dBuV]	READING AV [dBuV]	C.FACTOR [dB]	RESULT QP [dBuV]	RESULT AV [dBuV]	LIMIT QP [dBuV]	LIMIT AV [dBuV]	MARGIN QP [dBuV]	MARGIN AV [dBuV]	PHASE
1	0.16800	48.0	----	10.1	58.1	----	65.1	----	7.0	----	H(QP)
2	0.22200	45.2	----	10.1	55.3	----	62.7	----	7.4	----	H(QP)
3	0.88300	35.5	----	10.1	45.6	----	56.0	----	10.4	----	H(QP)
4	2.44800	36.9	----	10.1	47.0	----	56.0	----	9.0	----	H(QP)
5	5.37000	32.5	----	10.2	42.7	----	60.0	----	17.3	----	H(QP)
6	16.17000	17.0	----	10.4	27.4	----	60.0	----	32.6	----	H(QP)
7	0.16800	----	19.0	10.1	----	29.1	----	55.1	----	26.0	H(CAV)
8	0.22200	----	18.1	10.1	----	28.2	----	52.7	----	24.5	H(CAV)
9	0.88300	----	15.4	10.1	----	25.5	----	46.0	----	20.5	H(CAV)
10	2.44800	----	30.2	10.1	----	40.3	----	46.0	----	5.7	H(CAV)
11	5.37000	----	26.4	10.2	----	36.6	----	50.0	----	13.4	H(CAV)
12	16.17000	----	13.8	10.4	----	24.2	----	50.0	----	25.8	H(CAV)

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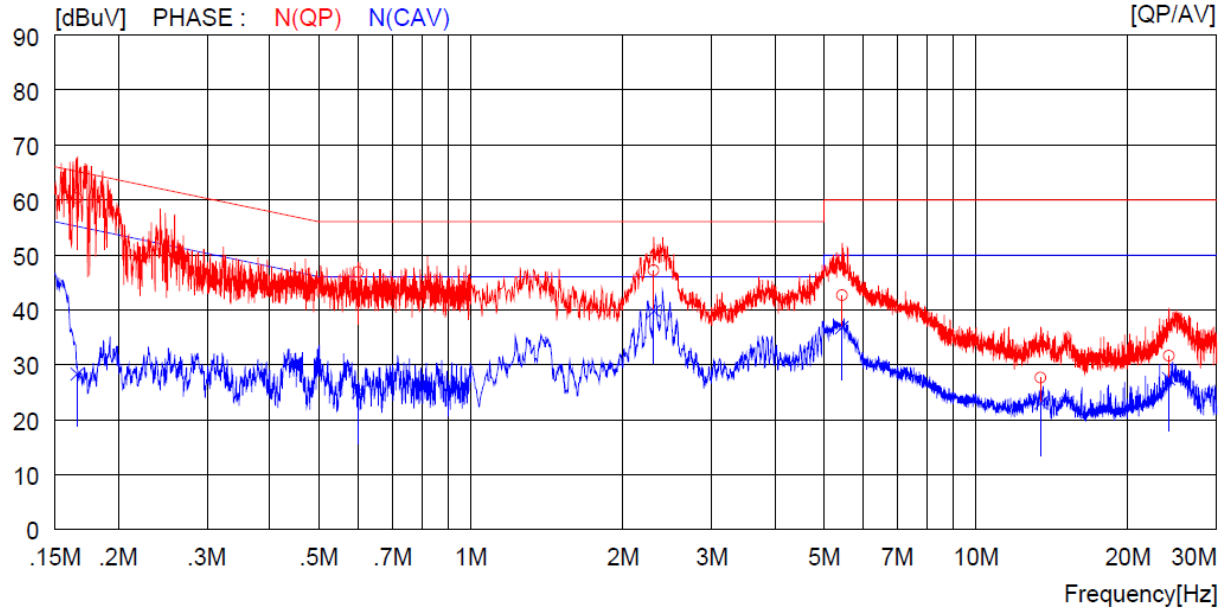
-. Tested Line : NEUTRAL LINE



NO	FREQ [MHz]	READING QP [dBuV]	READING AV [dBuV]	C.FACTOR [dB]	RESULT QP [dBuV]	RESULT AV [dBuV]	LIMIT QP [dBuV]	LIMIT AV [dBuV]	MARGIN QP [dBuV]	MARGIN AV [dBuV]	PHASE
1	0.16600	50.3	----	10.1	60.4	----	65.2	----	4.8	----	N(QP)
2	0.59800	36.7	----	10.1	46.8	----	56.0	----	9.2	----	N(QP)
3	2.30400	37.1	----	10.1	47.2	----	56.0	----	8.8	----	N(QP)
4	5.43000	32.4	----	10.2	42.6	----	60.0	----	17.4	----	N(QP)
5	13.46000	17.2	----	10.4	27.6	----	60.0	----	32.4	----	N(QP)
6	24.11000	21.0	----	10.6	31.6	----	60.0	----	28.4	----	N(QP)
7	0.16600	----	18.2	10.1	----	28.3	----	55.2	----	26.9	N(CAV)
8	0.59800	----	15.0	10.1	----	25.1	----	46.0	----	20.9	N(CAV)
9	2.30400	----	29.7	10.1	----	39.8	----	46.0	----	6.2	N(CAV)
10	5.43000	----	26.6	10.2	----	36.8	----	50.0	----	13.2	N(CAV)
11	13.46000	----	12.6	10.4	----	23.0	----	50.0	----	27.0	N(CAV)
12	24.11000	----	16.8	10.6	----	27.4	----	50.0	----	22.6	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: Min-Gu, Ji / Project Engineer

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