

ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART C REQUIREMENT AND INDUSTRY CANADA RSS 247 CLASS II & IV PC REPORT

OF

Applicant: Qualcomm Atheros, Inc.
1700 Technology Drive, San Jose, CA 95110

Product Name: 802.11a/b/g/n/ac + BT4.1 M.2 2230 Type Card

Brand Name: Qualcomm Atheros

Model No.: QCNFA344A

Model Difference: N/A

Report Number: E2/2020/10012

FCC Rule Part: §15.247, Cat: DTS

IC Rule Part: RSS-247 issue 2 Feb 2017

Issue Date: Mar. 05, 2020

Date of Test: Jan. 09, 2020 ~ Mar. 04, 2020

Date of EUT Received: Jan. 09, 2020

We hereby certify that:

The above equipment was tested by SGS Taiwan Ltd. Electronics & Communication Laboratory. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10:2013 and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits.

The test results of this report relate only to the tested sample identified in this report.

Approved By:

CHUN, CHIEH, CHEN
Chun Chieh Chen / Supervisor



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Revision History

Report Number	Revision	Description	Issue Date	Remark
E2/2020/10012	Rev.00	Original.	Mar. 05, 2020	Revised By: Susan Lin

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Contents

1	GENERAL INFORMATION.....	4
2	SYSTEM TEST CONFIGURATION.....	7
3	SUMMARY OF TEST RESULTS.....	9
4	DESCRIPTION OF TEST MODES	9
5	MEASUREMENT UNCERTAINTY	11
6	DUTY CYCLE OF TEST SIGNAL	12
7	PEAK OUTPUT POWER MEASUREMENT	14
8	RADIATED BANDEdge AND SPURIOUS EMISSION MEASUREMENT	20
9	ANTENNA REQUIREMENT.....	67

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1 GENERAL INFORMATION

1.1 Product description

General:

Product Name of Host:	Notebook Computer	
Brand Name of Host:		
Marketing Name of Host:	SF314-42	
Model No. of Host:	N19C4	
Model Difference:	N/A	
Hardware Version:	N/A	
Software Version:	N/A	
Model No. of BT/WLAN Module:	QCNFA344A	
Scope:	The test report covers the radiated emissions requirements of the standards referenced in the report to allow system level approval of the module in this specific host.	
Class II & Class IV Permissive change:	802.11a/b/g/n/ac + BT4.1 M.2 2230 Type Card INSTALLED IN Notebook Computer	
Power Supply:	11.25Vdc from Rechargeable Li-ion Battery Pack or 19V by AC/DC Power Adapter	
	Battery:	Model No.: AP18C8K, Supplier: acer
	Adapter:	Model No.: A18-065N3A, Supplier: Chicony

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WLAN 2.4GHz:

Wi-Fi	Frequency Range	Channels	Rated Power (Peak) / EIRP	Modulation Technology	Type of Emission	
11b/g	2412-2472	13	b: 23.20dBm b: 20.79dBm (EIRP) g: 26.41dBm g: 21.17dBm (EIRP)	DSSS OFDM	b: 13M9G1D g: 16M4D1D	
11n (2.4GHz)	HT20 / VHT20 2412-2472	13	HT20: 26.60dBm (MIMO) HT20: 21.13dBm (EIRP)	OFDM	17M5D1D	
11n (2.4GHz)	HT40 / VHT40 2422-2462	11	HT40: 26.15dBm (MIMO) HT40: 19.99dBm (EIRP)	OFDM	36M0D1D	
Antenna Designation:		PIFA Antenna, Supplier: Wistron Neweb Corporation, Part No.: 81EABA15.GA4 (DC33002EG10) (Main) Peak Gain: -3.22dBi Part No.: 81EABA15.GA3 (DC33002EG20) (Aux) Peak Gain: -2.26dBi				
Modulation type		CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM				
Transition Rate:		802.11 b: 1/2/5.5/11 Mbps 802.11 g: 6/9/12/18/24/36/48/54 Mbps 802.11 n_20MHz: 6.5 – 144.4Mbps 802.11 n_40MHz: 13.5 – 300.0Mbps				

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1.2 Test Methodology of Applied Standards

FCC Part 15, Subpart C §15.247

FCC KDB 558074 D01 DTS Meas. Guidance V05r02

FCC KDB 662911 D01 Multiple Transmitter Output

ANSI C63.10:2013

Canada RSS-247 issue 2 Feb. 2017

Canada RSS-Gen issue 5 Apr. 2018

Note: All test items have been performed and record as per the above standards.

1.3 Test Facility

SGS Taiwan Ltd. Electronics & Communication Laboratory No.2, Keji 1st Rd., Guishan District, Taoyuan City, Taiwan 333

1.4 Special Accessories

There is no special accessory used while test was conducted.

1.5 Equipment Modifications

There was no modification incorporated into the EUT.

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2 SYSTEM TEST CONFIGURATION

2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

2.2 EUT Exercise

An engineering test mode (software/firmware) that applicant provided was utilized to manipulate the EUT into transmit, selection of the test channel, and modulation scheme.

2.3 Test Procedure

2.3.1 Conducted Emissions

The EUT is placed on a turn table which is 0.8 m above ground plan. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz,. The CISPR Quasi-Peak and Average detector mode is employed. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

2.3.2 Radiated Emissions

The EUT is placed on a turn table. For emissions testing at or below 1 GHz, the table height shall be 0.8 m above the reference ground plan. For emission measurements above 1 GHz, the table height shall be 1.5 m. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes and measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made “while keeping the antenna in the ‘cone of radiation’ from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response.” is still within the 3dB illumination BW of the measurement antenna.

2.4 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuation factor between EUT conducted port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly EUT RF output level.

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2.5 Configuration of Tested System

Fig. 2-1 Configuration of Tested System



Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Data Cable	Power Cord
1.	WLAN Test Software	N/A	N/A	N/A	N/A	N/A

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3 SUMMARY OF TEST RESULTS

FCC Rules	IC Rules	Description Of Test	Result
§15.247(b) (3)	RSS-247 §5.4 (2)	Peak Output Power	Compliant
§15.247(d)	RSS-247 §5.5	Radiated Band Edge and Spurious Emission	Compliant
§15.203 §15.247(b)	-	Antenna Requirement	Compliant

4 DESCRIPTION OF TEST MODES

4.1 Operated in 2400 ~ 2483.5MHz Band

13 channels are provided for 802.11b, 802.11g and 802.11n_HT20

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
1	2412 MHz	8	2447 MHz
2	2417 MHz	9	2452 MHz
3	2422 MHz	10	2457 MHz
4	2427 MHz	11	2462 MHz
5	2432 MHz	12	2467 MHz
6	2437 MHz	13	2472 MHz
7	2442 MHz		

11 channels are provided for 802.11n_HT40

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
3	2422 MHz	8	2447 MHz
4	2427 MHz	9	2452 MHz
5	2432 MHz	10	2457MHz
6	2437 MHz	11	2462MHz
7	2442 MHz		

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RADIATED EMISSION TEST:

RADIATED BAND EDGE EMISSION TEST					
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
802.11b	1 to 13	1,11,12,13	DSSS	1	2TX
802.11g	1 to 13	1,11,12,13	OFDM	6	2TX
802.11ac (VHT20)	1 to 13	1,11,12,13	OFDM	MCS0	MIMO
802.11ac (VHT40)	3 to 11	3,9,10,11	OFDM	MCS0	MIMO

RADIATED EMISSION TEST (ABOVE 1 GHz)					
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
802.11b	1 to 13	1,6,11,12,13	DSSS	1	2TX

Note:

The field strength of radiation emission was measured as EUT stand-up position (H mode) and lie down position (E1, E2 mode) for 802.11a/b/g/n WLAN Transmitter for channel Low, Mid and High, the worst case H mode position was tested as resulted in pre-scanned measurement.

ANTENNA PORT CONDUCTED MEASUREMENT:

CONDUCTED TEST					
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
802.11b	1 to 13	1,6,11,12,13	DSSS	1	2TX
802.11g	1 to 13	1,6,11,12,13	OFDM	6	2TX
802.11ac (VHT20)	1 to 13	1,6,11,12,13	OFDM	MCS0	MIMO
802.11ac (VHT40)	3 to 11	3, 6, 9,10,11	OFDM	MCS0	MIMO

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5 MEASUREMENT UNCERTAINTY

Test Items	Uncertainty
AC Power Line Conducted Emission	+/- 2.586 dB
Peak Output Power	+/- 1.55dB (for Spectrum) +/- 1.42 dB (for Power Meter)
6dB Bandwidth	+/- 123.36 Hz
100 KHz Bandwidth Of Frequency Band Edges	+/- 1.55 dB
Peak Power Density	+/- 1.55 dB
99% Power Bandwidth	+/- 123.36 Hz
Temperature	+/- 0.8 °C
Humidity	+/- 4.7 %
DC / AC Power Source	DC= +/- 1%, AC=+/- 0.2%

Radiated Spurious Emission:

Measurement uncertainty (Polarization : Vertical)	9kHz-30MHz: +/- 2.87dB
	30MHz - 180MHz: +/- 3.37dB
	180MHz -417MHz: +/- 3.19dB
	0.417GHz-1GHz: +/- 3.19dB
	1GHz - 18GHz: +/- 4.04dB
	18GHz - 40GHz: +/- 4.04dB

Measurement uncertainty (Polarization : Horizontal)	9kHz-30MHz: +/- 2.87dB
	30MHz - 167MHz: +/- 4.22dB
	167MHz -500MHz: +/- 3.44dB
	0.5GHz-1GHz: +/- 3.39dB
	1GHz - 18GHz: +/- 4.08dB
	18GHz - 40GHz: +/- 4.08dB

Note:

1. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.
2. The conformity assessment statement in this report is based solely on the test results, measurement uncertainty is excluded.

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6 DUTY CYCLE OF TEST SIGNAL

Pre-analysis Check: While conducting average power measurement, duty cycle of each mode shall be checked to ensure its duty cycle in order to compensate for the loss due to insufficient ratio of duty cycle.

All duty cycle is pre-scanned, and result as obtained below shows only the most representative ones where duty cycle is conducted as the given transmission with given virtual operation that expresses the percentage.

6.1 Measurement Procedure:

1. Set span = Zero
2. RBW = 8MHz
3. VBW = 8MHz,
4. Detector = Peak

6.2 Duty Cycle:

Duty Cycle

	Duty Cycle (%) = Ton / (Ton+Toff)	Duty Factor (dB) =10*log (1/Duty Cycle)	1/T (kHz)	VBW setting (kHz)
802.11b	99.04	0.04	0.81	0.01
802.11g	94.81	0.23	0.48	1.00
802.11n_20	94.44	0.25	0.52	1.00
802.11n_40	89.51	0.48	1.05	2.00
802.11ac_20	94.62	0.24	0.52	1.00
802.11ac_40	89.06	0.50	1.05	2.00

$$b = 99.04\%, g = 94.81\%, n_{ht_20} = 94.44\%, n_{ht_40} = 89.51\%$$

$$\text{Duty Cycle Factor: } 10 * \log(1/0.9904) = 0.04$$

$$\text{Duty Cycle Factor: } 10 * \log(1/0.9481) = 0.23$$

$$\text{Duty Cycle Factor: } 10 * \log(1/0.9444) = 0.25$$

$$\text{Duty Cycle Factor: } 10 * \log(1/0.8951) = 0.48$$

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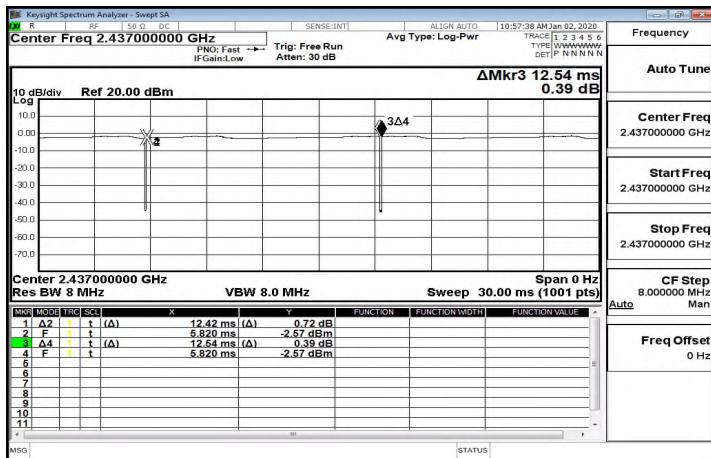
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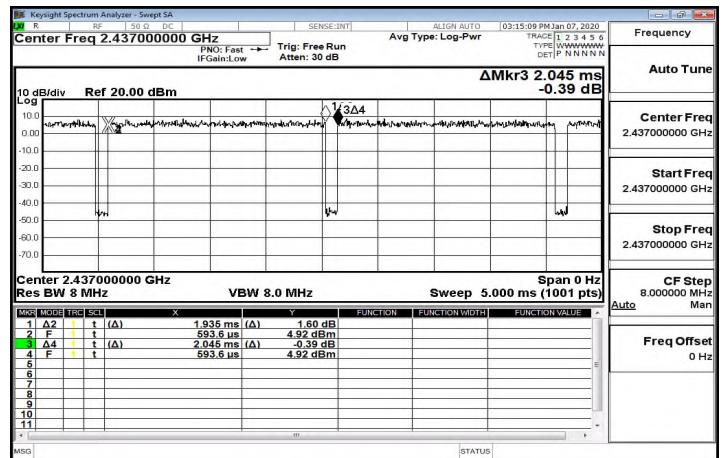
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6.3 Duty Cycle test plots

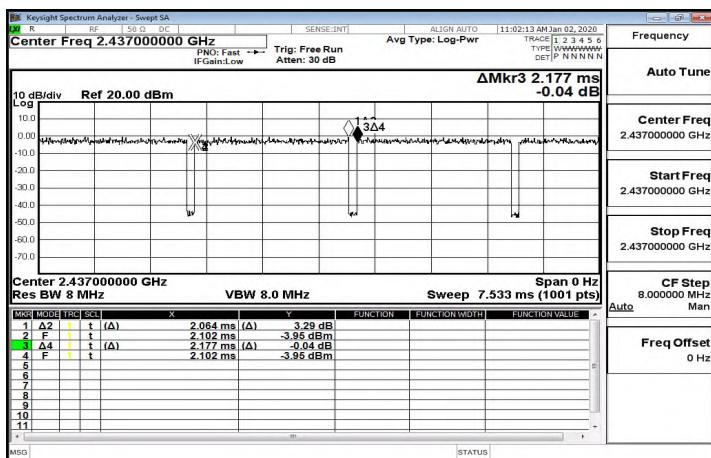
802.11 b



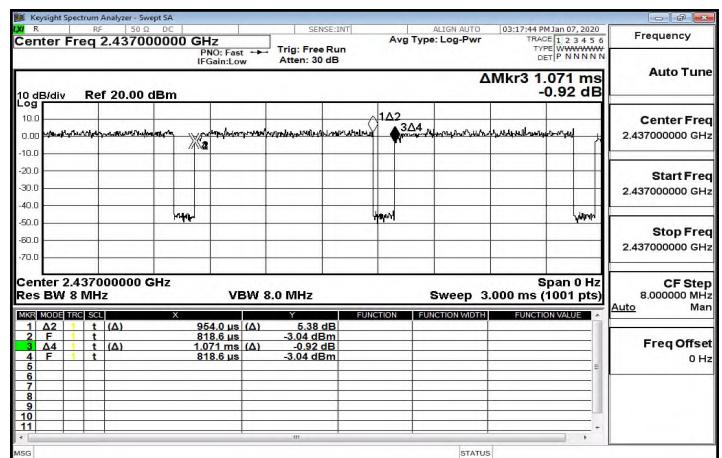
802.11 n_20 MHz



802.11 g



802.11 n_40 MHz



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7 PEAK OUTPUT POWER MEASUREMENT

7.1 Standard Applicable:

For systems using digital modulation in the 2400-2483.5 MHz bands, the limit for peak output power is 1Watt.

Per RSS-247 §5.4(d)

For DTSs employing digital modulation techniques operating in the bands 902-928 MHz and 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1 W. The e.i.r.p. shall not exceed 4 W, except as provided in section 5.4(e).

If the transmitting antenna of directional gain greater than 6dBi are used the peak output power from the intentional radiator shall be reduced below the above stated value by the amount in dB that the directional gain of the Antenna exceeds 6dBi.

In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of Antenna exceeds 6dBi.

As per FCC KDB 662911 D01

Unequal antenna gains, with equal transmit powers. For antenna gains given by G₁, G₂, ..., G_N dBi.

(i) If transmit signals are correlated, then Directional gain

$$= 10 \log[(10G_1/20 + 10G_2/20 + \dots + 10G_N/20)^2 / N_{ANT}] \text{ dB}$$

[Note the “20”s in the denominator of each exponent and the square of the sum of terms; the object is to combine the signal levels coherently.]

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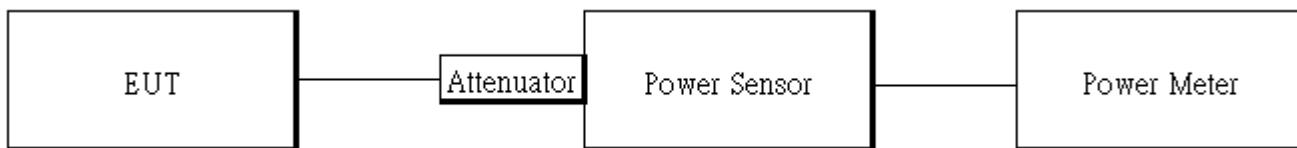
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7.2 Measurement Equipment Used:

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	KEYSIGHT	N9010A	MY57120200	03/06/2019	03/05/2020
Power Meter	Anritsu	ML2496A	1326001	08/05/2019	08/04/2020
DC Block	PASTERNACK	PE8210	RF256	11/20/2019	11/19/2020
Coaxial Cables	Woken	00100A1F1A185C	RF230	11/20/2019	11/19/2020
Attenuator	Marvelous	MVE2213-10	RF30	11/20/2019	11/19/2020
Attenuator	Marvelous	MVE2213-10	RF31	11/20/2019	11/19/2020

7.3 Test Set-up:

Power Meter:



7.4 Measurement Procedure:

1. Place the EUT on the table and set it in transmitting mode.
2. The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance.
3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power meter.

Power Meter:

It is used as the auxiliary test equipment to conduct the output power measurement.

4. Record the max. Reading as observed from Spectrum or Power Meter.
5. For MIMO operation, measurement is done per chain basis, and then sum the simultaneous transmitting output in linear.

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7.5 Measurement Result (Worst Case Data Rate):

802.11b_2TX							
CH	Freq. (MHz)	Data Rate	Peak Output Power		Total Peak Output Power (dBm)	Limit (dBm)	RESULT
			CH 0	CH 1			
1	2412	1	20.02	20.21	23.13	30.00	PASS
6	2437	1	20.51	19.85	23.20	30.00	PASS
11	2462	1	20.04	20.01	23.04	30.00	PASS
12	2467	1	13.07	13.39	16.24	30.00	PASS
13	2472	1	12.07	12.44	15.27	30.00	PASS
802.11b_2TX							
CH	Freq. (MHz)	Data Rate	Avg. Output Power (dBm)		Max. Avg. Output include tune up tolerance Power (dBm)	Limit (dBm)	RESULT
			CH 0	CH 1			
1	2412	1	17.42	17.41	20.47	30.00	PASS
6	2437	1	17.83	17.01	20.49	30.00	PASS
11	2462	1	17.54	17.23	20.44	30.00	PASS
12	2467	1	10.50	10.91	13.76	30.00	PASS
13	2472	1	9.45	9.94	12.75	30.00	PASS
802.11g_2TX							
CH	Freq. (MHz)	Data Rate	Peak Output Power		Total Peak Output Power (dBm)	Limit (dBm)	RESULT
			CH 0	CH 1			
1	2412	6	22.58	22.31	25.46	30.00	PASS
6	2437	6	23.62	23.16	26.41	30.00	PASS
11	2462	6	22.50	22.24	25.38	30.00	PASS
12	2467	6	7.91	7.85	10.89	30.00	PASS
13	2472	6	7.90	7.85	10.89	30.00	PASS
802.11g_2TX							
CH	Freq. (MHz)	Data Rate	Avg. Output Power (dBm)		Max. Avg. Output include tune up tolerance Power (dBm)	Limit (dBm)	RESULT
			CH 0	CH 1			
1	2412	6	16.44	16.02	19.48	30.00	PASS
6	2437	6	17.88	17.36	20.87	30.00	PASS
11	2462	6	16.25	16.08	19.41	30.00	PASS
12	2467	6	1.28	1.12	4.44	30.00	PASS
13	2472	6	1.28	1.21	4.49	30.00	PASS

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802.11ac_VHT20M MIMO

CH	Freq. (MHz)	Data Rate	Peak Output Power		Total Peak Output Power (dBm)	Limit (dBm)	RESULT
			CH 0	CH 1			
1	2412	MCS0	20.77	22.52	24.74	30.00	PASS
6	2437	MCS0	23.12	24.02	26.60	30.00	PASS
11	2462	MCS0	20.84	21.41	24.14	30.00	PASS
12	2467	MCS0	6.91	7.60	10.28	30.00	PASS
13	2472	MCS0	6.91	7.72	10.34	30.00	PASS

802.11ac_VHT20M MIMO

CH	Freq. (MHz)	Data Rate	Avg. Output Power (dBm)		Max. Avg. Output include tune up tolerance Power (dBm)	Limit (dBm)	RESULT
			CH 0	CH 1			
1	2412	MCS0	14.01	15.67	18.18	30.00	PASS
6	2437	MCS0	17.23	17.90	20.84	30.00	PASS
11	2462	MCS0	13.92	14.38	17.41	30.00	PASS
12	2467	MCS0	-0.04	0.43	3.46	30.00	PASS
13	2472	MCS0	0.05	0.41	3.49	30.00	PASS

802.11ac_VHT40M MIMO

CH	Freq. (MHz)	Data Rate	Peak Output Power		Total Peak Output Power (dBm)	Limit (dBm)	RESULT
			CH 0	CH 1			
3	2422	MCS0	17.88	18.93	21.45	30.00	PASS
6	2437	MCS0	22.59	23.62	26.15	30.00	PASS
9	2452	MCS0	16.23	17.01	19.65	30.00	PASS
10	2457	MCS0	15.77	16.38	19.10	30.00	PASS
11	2462	MCS0	7.49	8.27	10.91	30.00	PASS

802.11ac_VHT40M MIMO

CH	Freq. (MHz)	Data Rate	Avg. Output Power (dBm)		Max. Avg. Output include tune up tolerance Power (dBm)	Limit (dBm)	RESULT
			CH 0	CH 1			
3	2422	MCS0	10.15	11.25	14.23	30.00	PASS
6	2437	MCS0	15.68	16.67	19.69	30.00	PASS
9	2452	MCS0	8.72	9.18	12.45	30.00	PASS
10	2457	MCS0	8.75	9.22	12.48	30.00	PASS
11	2462	MCS0	0.11	0.61	3.86	30.00	PASS

*** Note: The duty cycle factor is compensated back to obtain the maximum value of the measurement in average.**

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EIRP Measurement:

802.11b_2TX									
CH	Freq. (MHz)	Data Rate	Avg. Output Power (dBm)		Total Avg. Output Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	RESULT
			CH 0	CH 1					
1	2412	1	17.42	17.41	20.47	0.30	20.76	36	PASS
6	2437	1	17.83	17.01	20.49	0.30	20.79	36	PASS
11	2462	1	17.54	17.23	20.44	0.30	20.74	36	PASS
12	2467	1	10.50	10.91	13.76	0.30	14.06	36	PASS
13	2472	1	9.45	9.94	12.75	0.30	13.05	36	PASS

802.11g_2TX									
CH	Freq. (MHz)	Data Rate	Avg. Output Power (dBm)		Total Avg. Output Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	RESULT
			CH 0	CH 1					
1	2412	6	16.44	16.02	19.48	0.30	19.77	36	PASS
6	2437	6	17.88	17.36	20.87	0.30	21.17	36	PASS
11	2462	6	16.25	16.08	19.41	0.30	19.70	36	PASS
12	2467	6	1.28	1.12	4.44	0.30	4.74	36	PASS
13	2472	6	1.28	1.21	4.49	0.30	4.78	36	PASS

802.11ac_VHT20M MIMO									
CH	Freq. (MHz)	Data Rate	Avg. Output Power (dBm)		Total Avg. Output Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Limit	RESULT
			CH 0	CH 1					
1	2412	MCS0	14.01	15.67	18.18	0.30	18.47	36	PASS
6	2437	MCS0	17.23	17.90	20.84	0.30	21.13	36	PASS
11	2462	MCS0	13.92	14.38	17.41	0.30	17.71	36	PASS
12	2467	MCS0	-0.04	0.43	3.46	0.30	3.76	36	PASS
13	2472	MCS0	0.05	0.41	3.49	0.30	3.79	36	PASS

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802.11ac_VHT40M MIMO

CH	Freq. (MHz)	Data Rate	Avg. Output Power (dBm)		Total Avg. Output Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Limit	RESULT
			CH 0	CH 1					
3	2422	MCS0	10.15	11.25	14.23	0.30	14.52	36	PASS
6	2437	MCS0	15.68	16.67	19.69	0.30	19.99	36	PASS
9	2452	MCS0	8.72	9.18	12.45	0.30	12.74	36	PASS
10	2457	MCS0	8.75	9.22	12.48	0.30	12.78	36	PASS
11	2462	MCS0	0.11	0.61	3.86	0.30	4.16	36	PASS

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8 RADIATED BANDEDGE AND SPURIOUS EMISSION MEASUREMENT

8.1 Standard Applicable:

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. In addition, radiated emissions which fall in the restricted bands must also comply with the §15.209 limit as below.

And according to §15.33(a) (1), for an intentional radiator operates below 10GHz, the frequency range of measurements: to the tenth harmonic of the highest fundamental frequency or to 40GHz, whichever is lower.

Frequency (MHz)	Field strength (microvolts/meter)	Distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Note:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dB μ V/m) = 20 log Emission level (dB μ V/m)

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8.2 Measurement Equipment Used:

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Broadband Antenna	SCHWAZBECK	VULB 9168	9168-617	11/04/2019	11/03/2020
Horn Antenna	Schwarzbeck	BBHA9170	185	08/07/2019	08/06/2020
Horn Antenna	Schwarzbeck	BBHA9120D	1341	06/12/2019	06/11/2020
Loop Antenna	ETS.LINDGREN	6502	143303	04/25/2019	04/24/2020
3m Site NSA	SGS	966 chamber D	N/A	07/12/2019	07/11/2020
Spectrum Analyzer	KEYSIGHT	N9010A	MY51440113	07/15/2019	07/14/2020
Pre-Amplifier	EMC Instruments	EMC184045B	980135	11/20/2019	11/19/2020
Pre-Amplifier	EMC Instruments	EMC9135	980234	11/20/2019	11/19/2020
Pre-Amplifier	EMC Instruments	EMC12630SE	980271	11/20/2019	11/19/2020
Attenuator	Woken	WATT-218FS-10	RF25	11/20/2019	11/19/2020
High Pass Filter	R&S	F13 HPF 3GHz	RF64	11/20/2019	11/19/2020
Low Pass Filter	EWT	EWT-56-0019	RF46	11/20/2019	11/19/2020
Notch Filter	EWT	EWT-54-0038	RF55	11/20/2019	11/19/2020
Coaxial Cable	Huber Suhner	SUCOFLEX 104	MY17388/4	11/20/2019	11/19/2020
Coaxial Cable	Huber Suhner	RG 214/U	W22.03	11/20/2019	11/19/2020
Coaxial Cable	Huber Suhner	SUCOFLEX 104	MY17413/4	11/20/2019	11/19/2020

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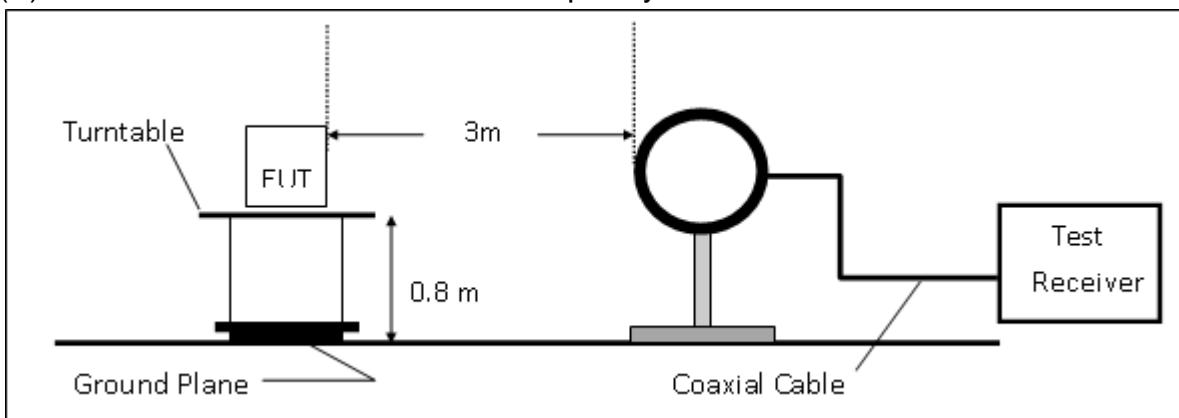
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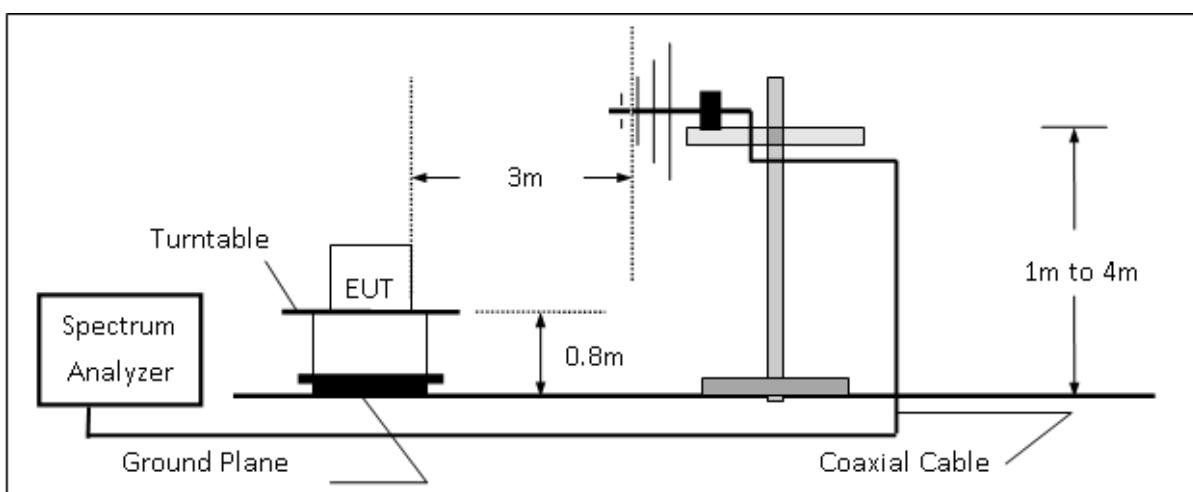
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8.3 Test SET-UP:

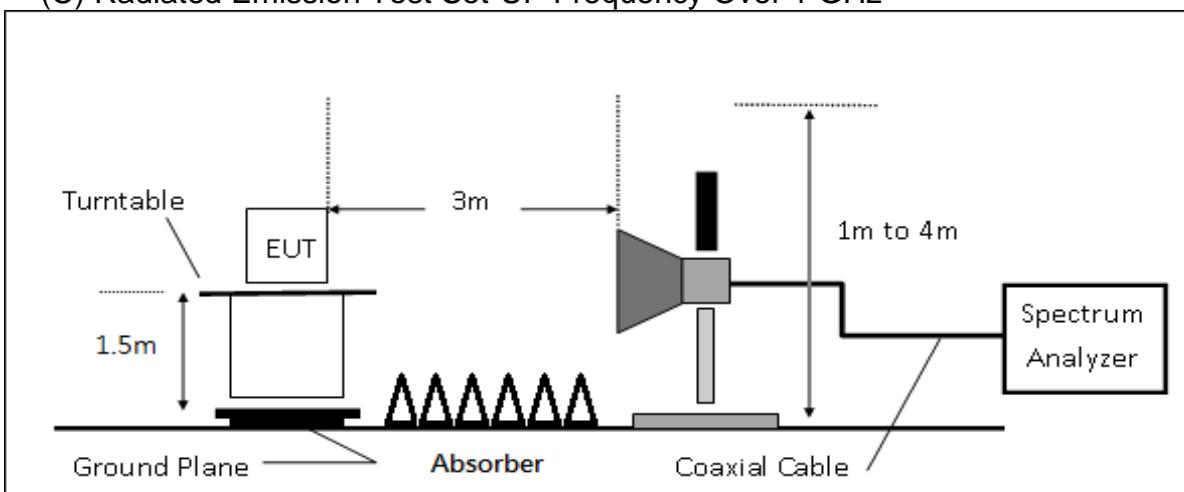
(A) Radiated Emission Test Set-UP Frequency Below 30MHz.



(B) Radiated Emission Test Set-UP, Frequency form 30MHz to 1000MHz



(C) Radiated Emission Test Set-UP Frequency Over 1 GHz



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8.4 Measurement Procedure:

1. The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance.
2. The EUT was placed on a turn table with 0.8m for frequency < 1GHz and 1.5m for frequency > 1GHz above ground plane.
3. The turn table shall rotate 360 degrees to determine the position of maximum emission level.
4. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emissions.
5. When measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made “while keeping the antenna in the ‘cone of radiation’ from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response.” is still within the 3dB illumination BW of the measurement antenna.
6. Set the spectrum analyzer as RBW=120 kHz and VBW=300 kHz for Peak Detector (PK) and Quasi-peak (QP) at frequency below 1 GHz.
7. Set the spectrum analyzer as RBW=1 MHz, VBW=3 MHz for Peak Detector at frequency above 1 GHz.
8. Set the spectrum analyzer as RBW=1 MHz, VBW=10 Hz (Duty cycle > 98%) or VBW \geq 1/T (Duty cycle < 98%) for Average Detector at frequency above 1 GHz.
9. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
10. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
11. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. On spectrum, change spectrum mode in linear display mode, and reduce VBW = 10Hz if average reading is measured.
12. Repeat above procedures until all default test channel measured were complete.

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8.5 Field Strength Calculation:

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF - CL - AG$$

Where	FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
	RA = Reading Amplitude	AG = Amplifier Gain
	AF = Antenna Factor	

Actual FS(dB μ V/m) = SPA. Reading level(dB μ V) + Factor(dB)

Factor(dB) = Antenna Factor(dB μ V/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

8.6 Test Results of Radiated Spurious Emissions form 9 kHz to 30 MHz

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit per 15.31(o) was not reported.

8.7 Measurement Result:

Note: Refer to next page tabular data sheets.

Note: There is a comparison data of both open-field test site and semi-Anechoic, and test result came out very similar.

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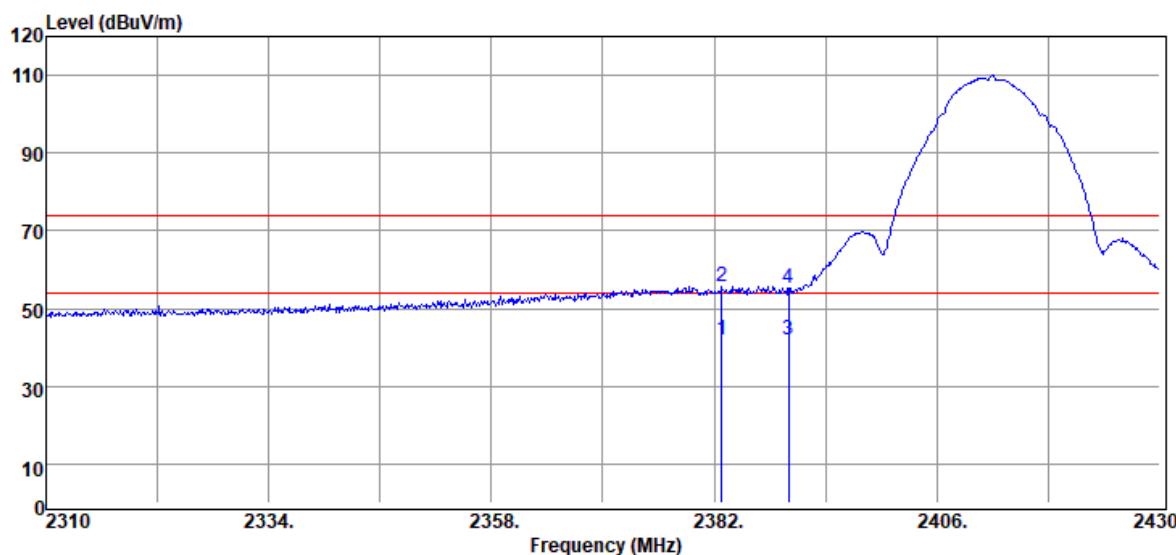
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Radiated Band Edge Measurement Result:

Report Number :E2/2020/10012 Test Date :2020-01-21
 Operation Mode :802.11b Temp./Humi. :18.9/53
 Test Channel :2412 MHz Antenna Pol. :VERTICAL
 Test Mode :BE CH LOW Engineer :Kailin
 EUT Pol :H Plan



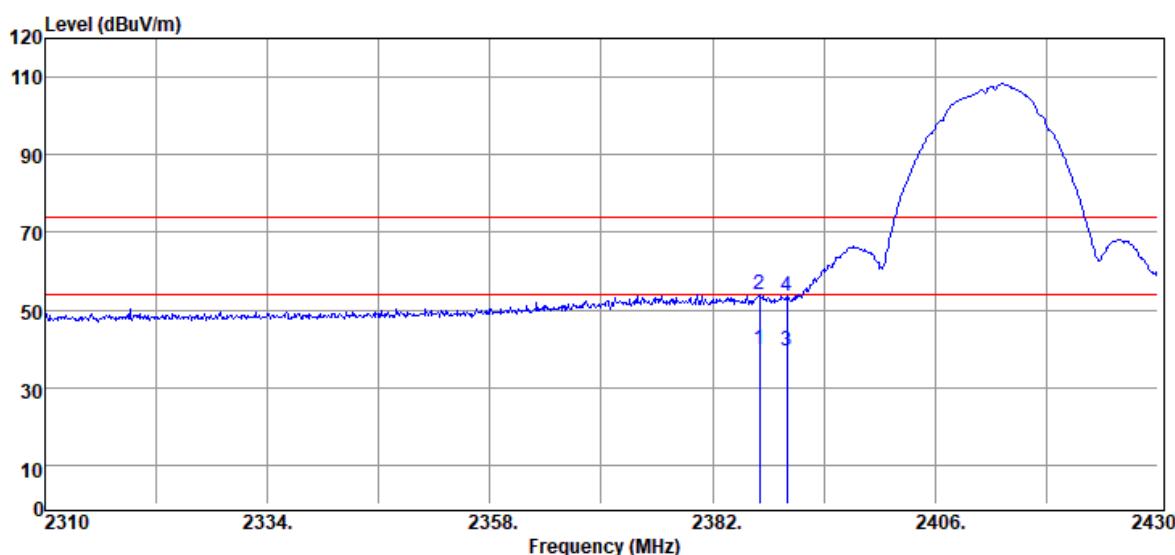
Freq. MHz	Detector Mode	Spectrum Reading Level dB μ V	Factor dB	Actual		Limit @3m dB μ V/m	Margin dB
				FS	dB μ V/m		
2382.84	Average	47.56	-5.56	42.00	54.00	54.00	-12.00
2382.84	Peak	61.38	-5.56	55.82	74.00	74.00	-18.18
2390.00	Average	47.34	-5.52	41.82	54.00	54.00	-12.18
2390.00	Peak	60.62	-5.52	55.10	74.00	74.00	-18.90

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Report Number :E2/2020/10012 Test Date :2020-01-21
 Operation Mode :802.11b Temp./Humi. :18.9/53
 Test Channel :2412 MHz Antenna Pol. :HORIZONTAL
 Test Mode :BE CH LOW Engineer :Kailin
 EUT Pol :H Plan



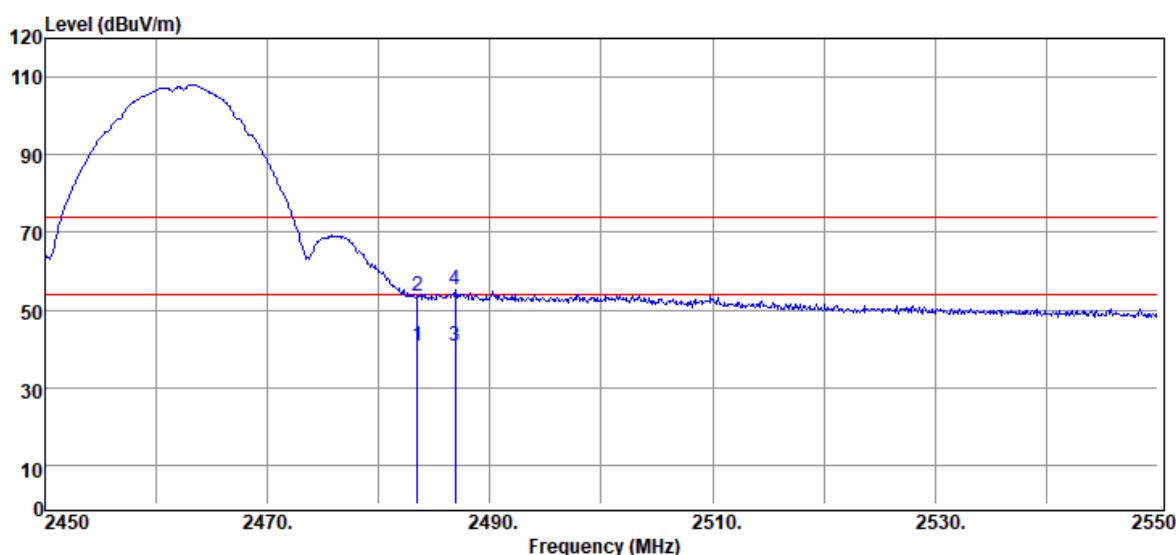
Freq. MHz	Detector Mode	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
					Limit @3m dB μ V/m	Margin dB
2387.04	Average	45.32	-5.52	39.80	54.00	-14.20
2387.04	Peak	59.70	-5.52	54.18	74.00	-19.82
2390.00	Average	44.90	-5.52	39.38	54.00	-14.62
2390.00	Peak	58.99	-5.52	53.47	74.00	-20.53

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Report Number :E2/2020/10012 Test Date :2020-01-21
Operation Mode :802.11b Temp./Humi. :18.9/53
Test Channel :2462 MHz Antenna Pol. :VERTICAL
Test Mode :BE CH HIGH Engineer :Kailin
EUT Pol :H Plan



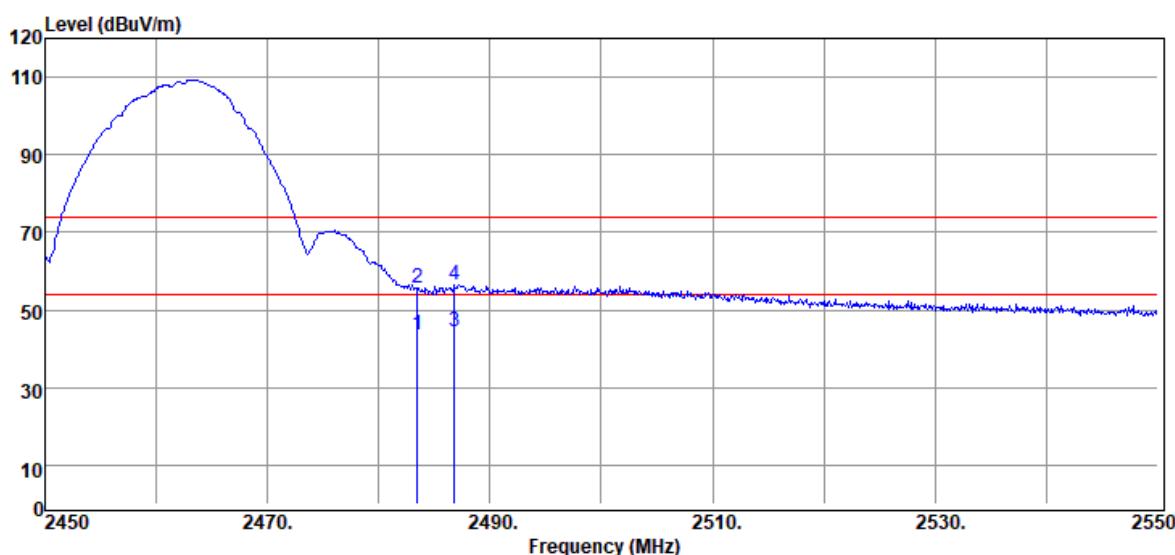
Freq. MHz	Detector Mode	Spectrum Reading Level dB μ V	Factor dB	Actual		Limit @3m dB μ V/m	Margin dB
				FS	dB μ V/m		
2483.50	Average	46.00	-5.42	40.58	54.00	54.00	-13.42
2483.50	Peak	58.90	-5.42	53.48	74.00	74.00	-20.52
2486.90	Average	46.11	-5.42	40.69	54.00	54.00	-13.31
2486.90	Peak	60.70	-5.42	55.28	74.00	74.00	-18.72

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Report Number :E2/2020/10012 Test Date :2020-01-21
Operation Mode :802.11b Temp./Humi. :18.9/53
Test Channel :2462 MHz Antenna Pol. :HORIZONTAL
Test Mode :BE CH HIGH Engineer :Kailin
EUT Pol :H Plan



Freq. MHz	Detector Mode	Spectrum Reading Level dB μ V	Factor dB	Actual		Limit @3m dB μ V/m	Margin dB
				FS	dB μ V/m		
2483.50	Average	49.22	-5.42	43.80	54.00	54.00	-10.20
2483.50	Peak	61.16	-5.42	55.74	74.00	74.00	-18.26
2486.80	Average	49.86	-5.42	44.44	54.00	54.00	-9.56
2486.80	Peak	61.95	-5.42	56.53	74.00	74.00	-17.47

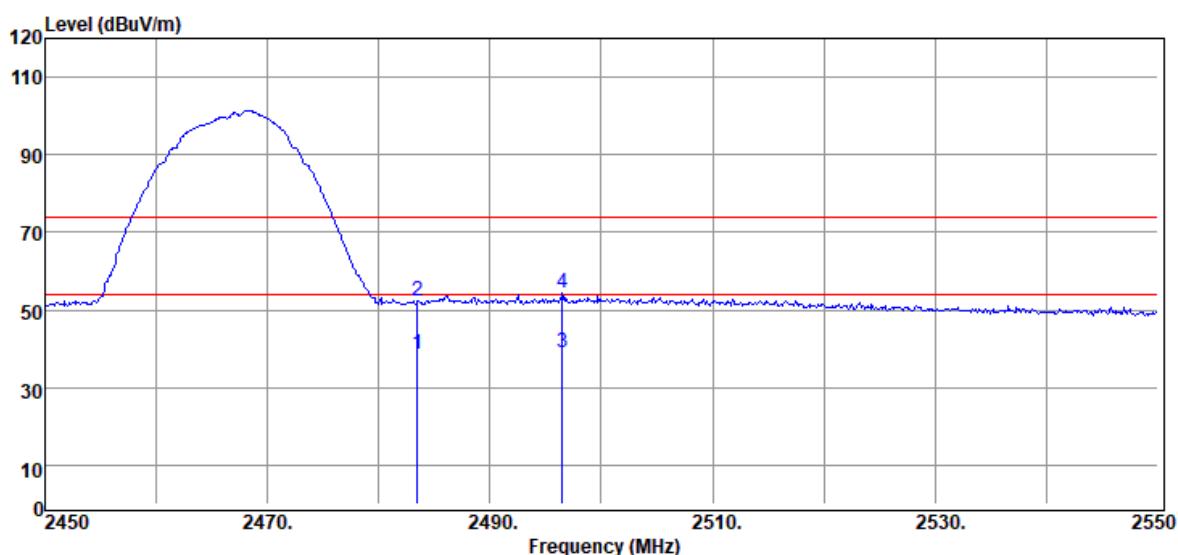
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Report Number :E2/2020/10012 Test Date :2020-01-21
Operation Mode :802.11b Temp./Humi. :18.8/58
Test Channel :2467 MHz Antenna Pol. :VERTICAL
Test Mode :BE CH 12 Engineer :Kailin
EUT Pol :H Plan



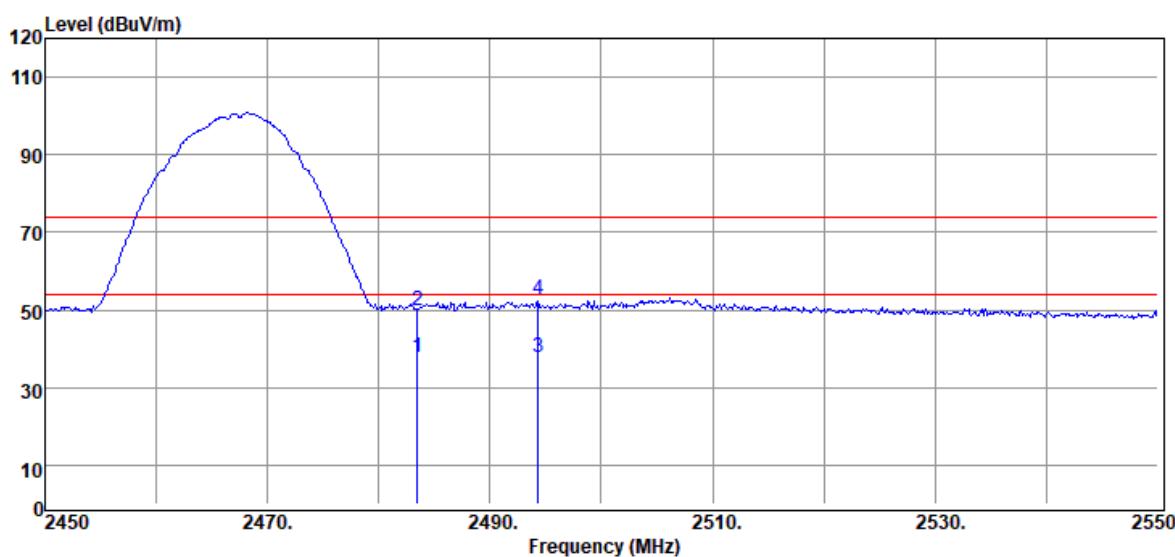
Freq. MHz	Detector Mode	Spectrum Reading Level dB μ V	Factor dB	Actual	Limit	Margin
				FS dB μ V/m	@3m dB μ V/m	dB
2483.50	Average	44.14	-5.42	38.72	54.00	-15.28
2483.50	Peak	57.79	-5.42	52.37	74.00	-21.63
2496.50	Average	44.32	-5.39	38.93	54.00	-15.07
2496.50	Peak	59.61	-5.39	54.22	74.00	-19.78

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 Operation Mode :802.11b Temp./Humi. :18.8/58
 Test Channel :2467 MHz Antenna Pol. :HORIZONTAL
 Test Mode :BE CH 12 Engineer :Kailin
 EUT Pol :H Plan



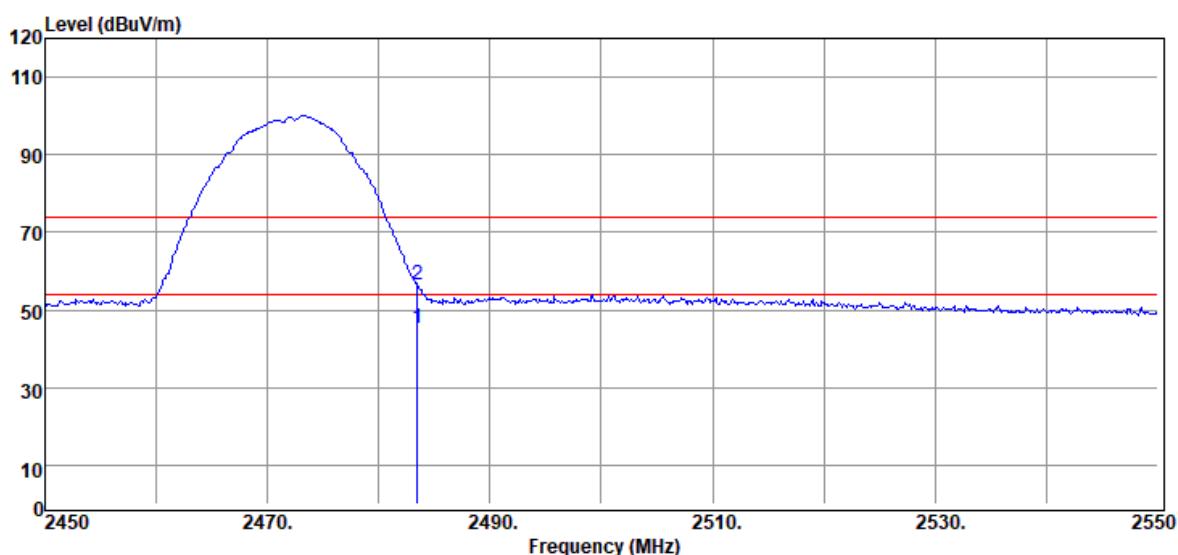
Freq. MHz	Detector Mode	Spectrum Reading Level dB μ V	Factor dB	Actual		Limit @3m dB μ V/m	Margin dB
				FS	dB μ V/m		
2483.50	Average	43.21	-5.42	37.79	54.00	54.00	-16.21
2483.50	Peak	55.44	-5.42	50.02	74.00	74.00	-23.98
2494.30	Average	43.22	-5.39	37.83	54.00	54.00	-16.17
2494.30	Peak	57.92	-5.39	52.53	74.00	74.00	-21.47

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Test Channel :2472 MHz Antenna Pol. :VERTICAL
Test Mode :BE CH 13 Engineer :Kailin
EUT Pol :H Plan



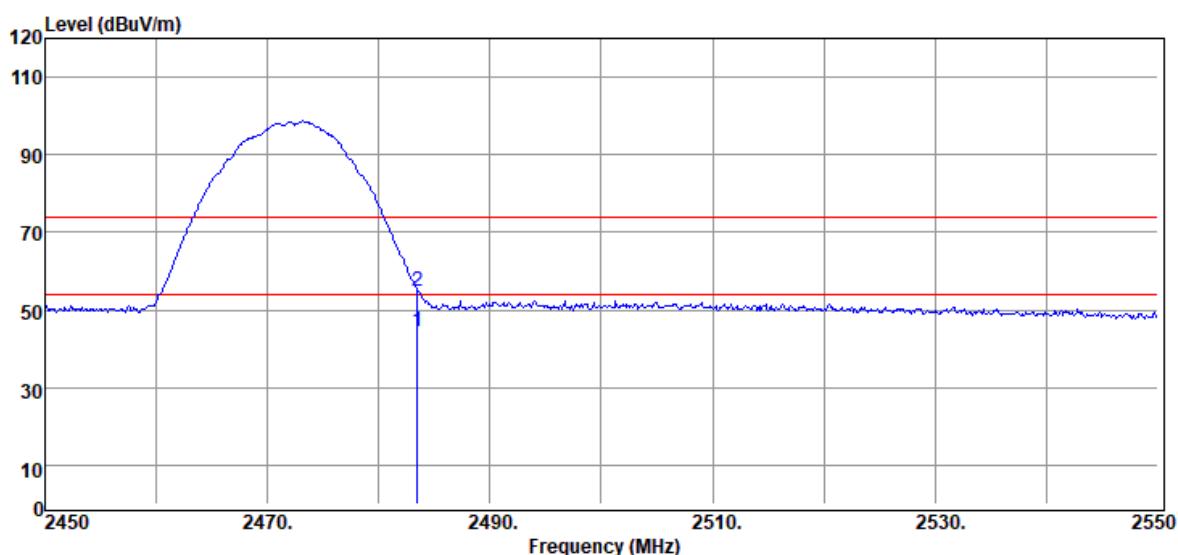
Freq. MHz	Detector Mode	Spectrum Reading Level dB μ V	Factor dB	Actual	Limit @3m	Margin
				FS dB μ V/m	dB μ V/m	dB
2483.50	Average	50.87	-5.42	45.45	54.00	-8.55
2483.50	Peak	62.06	-5.42	56.64	74.00	-17.36

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Test Channel :2472 MHz Antenna Pol. :HORIZONTAL
Test Mode :BE CH 13 Engineer :Kailin
EUT Pol :H Plan



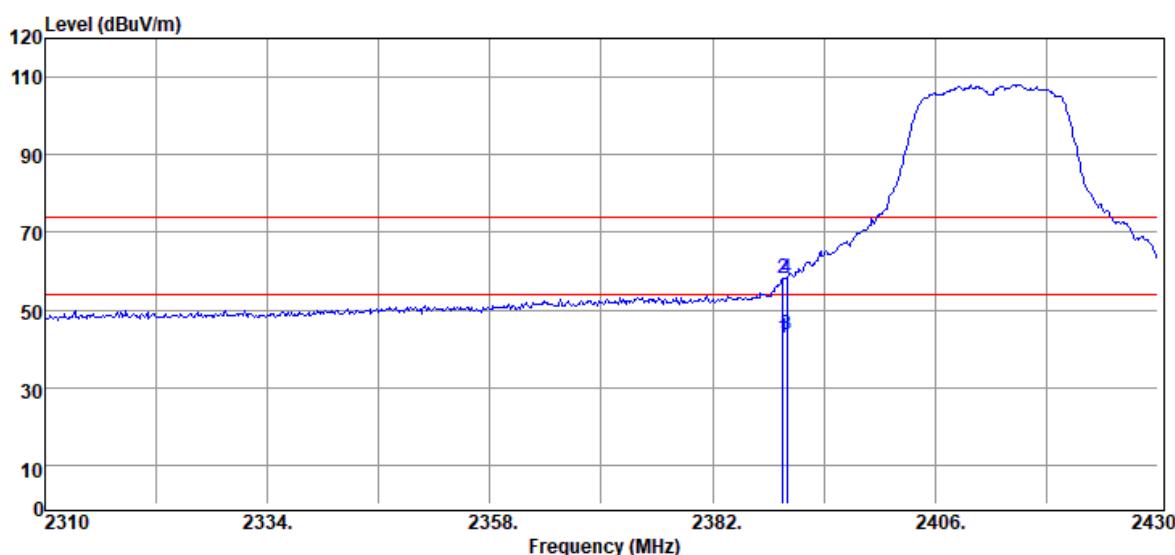
Freq. MHz	Detector Mode	Spectrum Reading Level dB μ V	Factor dB	Actual	Limit @3m	Margin
				FS dB μ V/m	dB μ V/m	dB
2483.50	Average	50.00	-5.42	44.58	54.00	-9.42
2483.50	Peak	60.32	-5.42	54.90	74.00	-19.10

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Report Number :E2/2020/10012 Test Date :2020-01-11
Operation Mode :802.11g Temp./Humi. :21.4/59
Test Channel :2412 MHz Antenna Pol. :VERTICAL
Test Mode :BE CH LOW Engineer :Enzo
EUT Pol :H Plan



Freq. MHz	Detector Mode	Spectrum Reading Level dB μ V	Factor dB	Actual		Limit @3m dB μ V/m	Margin dB
				FS	dB μ V/m		
2389.56	Average	48.16	-5.52	42.64	54.00	54.00	-11.36
2389.56	Peak	63.77	-5.52	58.25	74.00	74.00	-15.75
2390.00	Average	48.91	-5.52	43.39	54.00	54.00	-10.61
2390.00	Peak	63.73	-5.52	58.21	74.00	74.00	-15.79

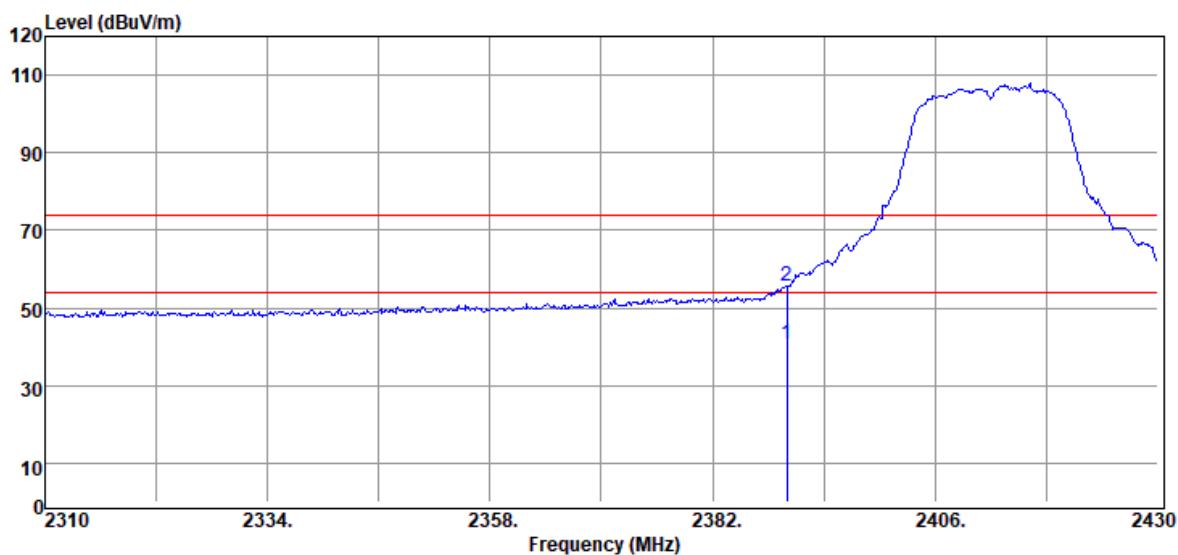
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Report Number :E2/2020/10012 Test Date :2020-01-11
Operation Mode :802.11g Temp./Humi. :21.4/59
Test Channel :2412 MHz Antenna Pol. :HORIZONTAL
Test Mode :BE CH LOW Engineer :Enzo
EUT Pol :H Plan



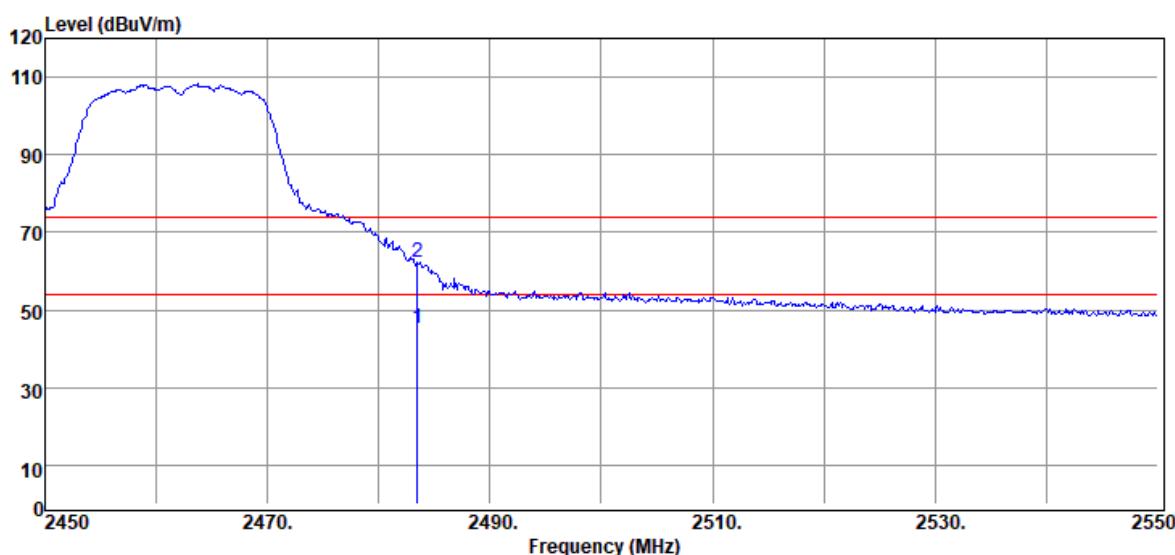
Freq. MHz	Detector Mode	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
					54.00	-13.27
2390.00	Average	46.25	-5.52	40.73	54.00	-13.27
2390.00	Peak	60.98	-5.52	55.46	74.00	-18.54

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Report Number :E2/2020/10012 Test Date :2020-01-13
 Operation Mode :802.11g Temp./Humi. :21.4/57
 Test Channel :2462 MHz Antenna Pol. :VERTICAL
 Test Mode :BE CH HIGH Engineer :Kailin
 EUT Pol :H Plan



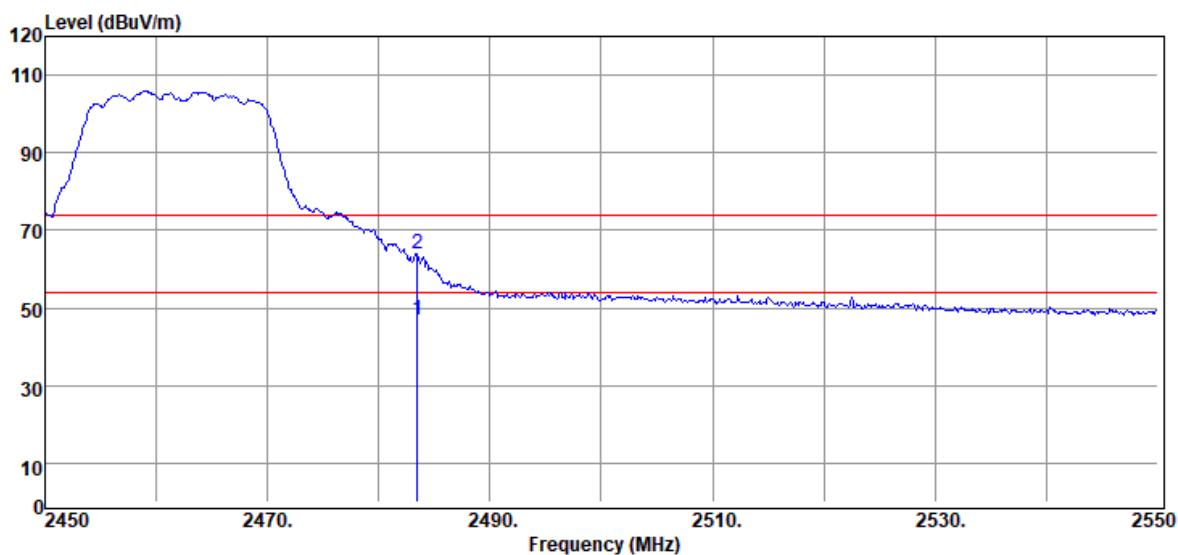
Freq. MHz	Detector Mode	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
					dB μ V/m	
2483.50	Average	50.52	-5.42	45.10	54.00	-8.90
2483.50	Peak	67.56	-5.42	62.14	74.00	-11.86

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Report Number :E2/2020/10012 Test Date :2020-01-13
Operation Mode :802.11g Temp./Humi. :21.4/57
Test Channel :2462 MHz Antenna Pol. :HORIZONTAL
Test Mode :BE CH HIGH Engineer :Kailin
EUT Pol :H Plan



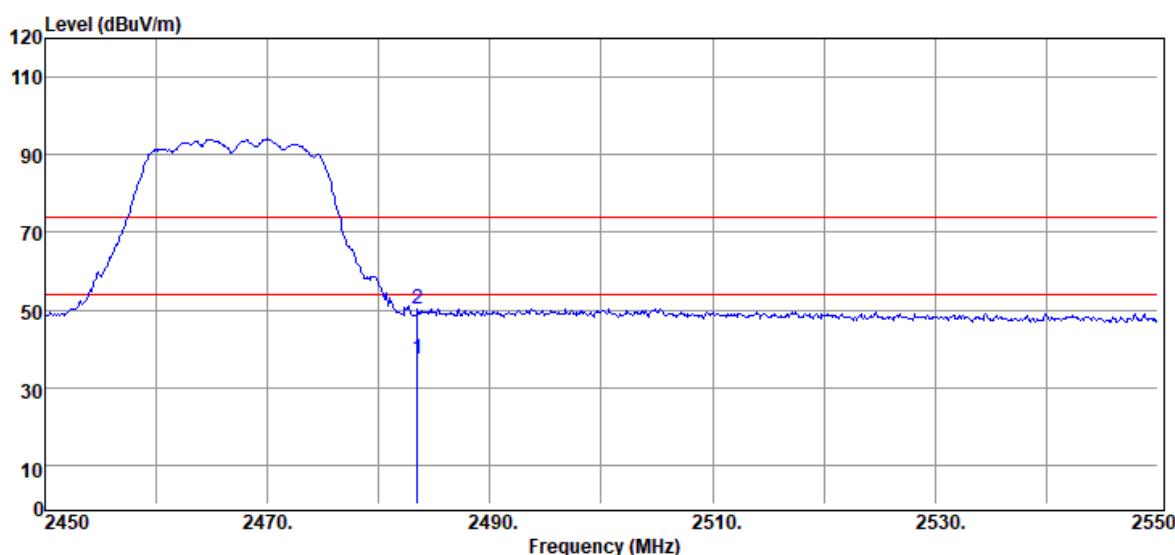
Freq. MHz	Detector Mode	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
					dB	dB
2483.50	Average	52.38	-5.42	46.96	54.00	-7.04
2483.50	Peak	69.25	-5.42	63.83	74.00	-10.17

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Report Number :E2/2020/10012 Test Date :2020-01-13
Operation Mode :802.11g Temp./Humi. :21.4/57
Test Channel :2467 MHz Antenna Pol. :VERTICAL
Test Mode :BE CH 12 Engineer :Kailin
EUT Pol :H Plan



Freq. MHz	Detector Mode	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
					dB μ V/m	dB
2483.50	Average	42.74	-5.42	37.32	54.00	-16.68
2483.50	Peak	55.48	-5.42	50.06	74.00	-23.94

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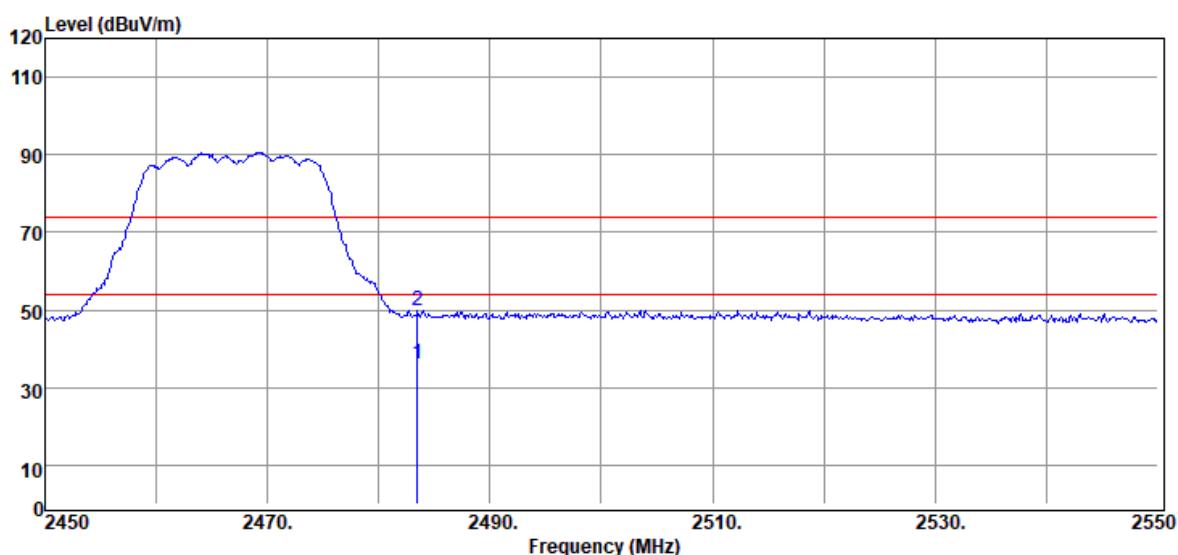
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Report Number	:E2/2020/10012	Test Date	:2020-01-13
Operation Mode	:802.11g	Temp./Humi.	:21.4/57
Test Channel	:2467 MHz	Antenna Pol.	:HORIZONTAL
Test Mode	:BE CH 12	Engineer	:Kailin
EUT Pol	:H Plan		



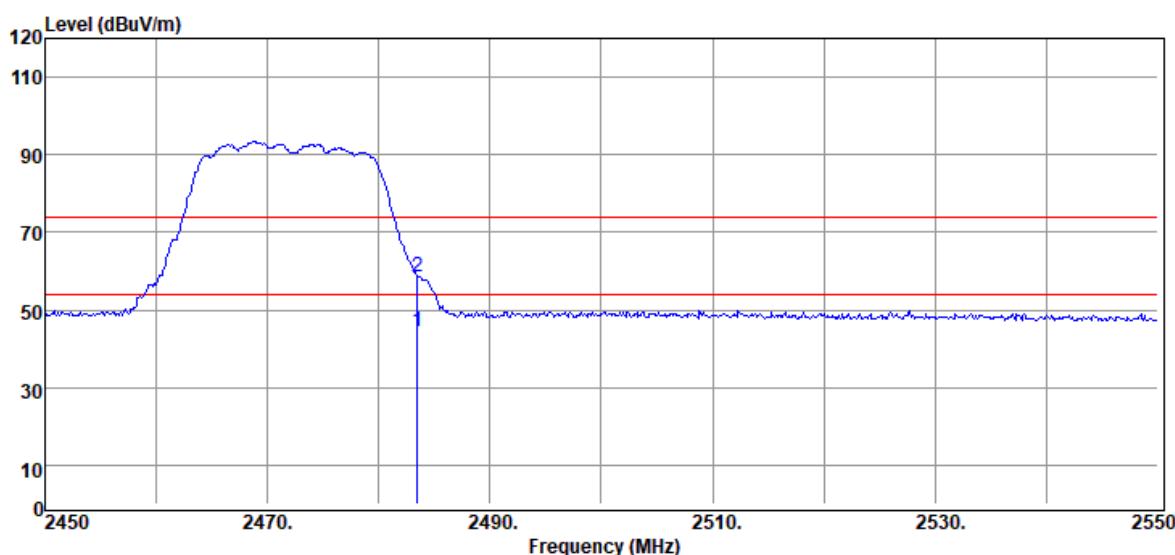
Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
					FS	@3m
MHz	PK/QP/AV	dB μ V	dB	dB μ V/m	dB μ V/m	dB
2483.50	Average	41.65	-5.42	36.23	54.00	-17.77
2483.50	Peak	55.08	-5.42	49.66	74.00	-24.34

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Report Number :E2/2020/10012 Test Date :2020-01-13
Operation Mode :802.11g Temp./Humi. :21.4/57
Test Channel :2472 MHz Antenna Pol. :VERTICAL
Test Mode :BE CH 13 Engineer :Kailin
EUT Pol :H Plan



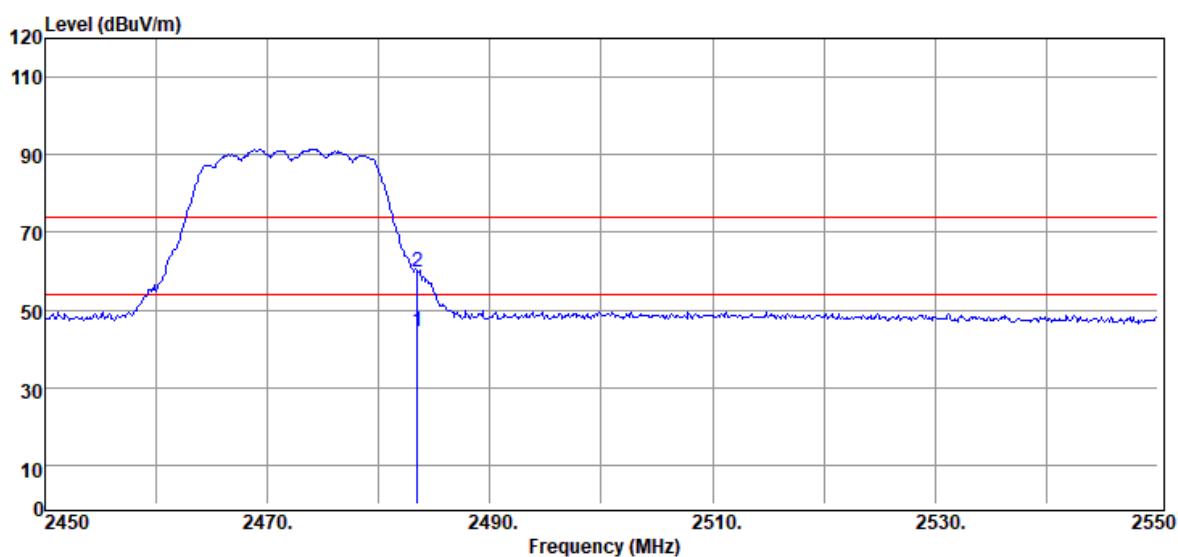
Freq. MHz	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit	Margin
					@3m	
MHz	PK/QP/AV	dB μ V	dB	dB μ V/m	dB μ V/m	dB
2483.50	Average	49.65	-5.42	44.23	54.00	-9.77
2483.50	Peak	63.77	-5.42	58.35	74.00	-15.65

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Report Number :E2/2020/10012 Test Date :2020-01-13
Operation Mode :802.11g Temp./Humi. :21.4/57
Test Channel :2472 MHz Antenna Pol. :HORIZONTAL
Test Mode :BE CH 13 Engineer :Kailin
EUT Pol :H Plan



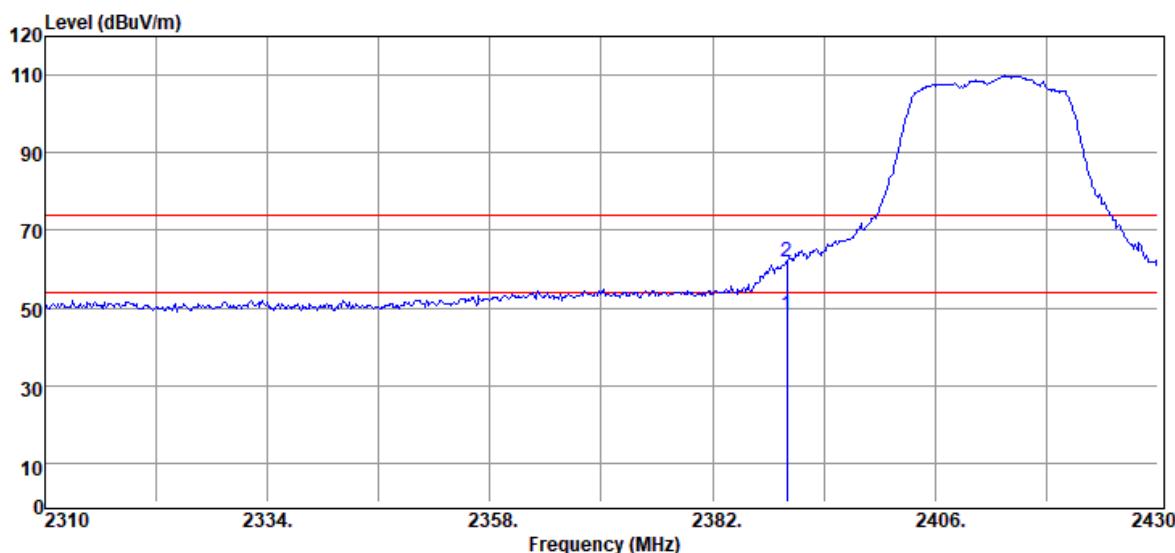
Freq. MHz	Detector Mode	Spectrum Reading Level dB μ V	Factor dB	Actual	Limit @3m	Margin
				FS dB μ V/m	dB μ V/m	dB
2483.50	Average	50.05	-5.42	44.63	54.00	-9.37
2483.50	Peak	65.35	-5.42	59.93	74.00	-14.07

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Report Number :E2/2020/10012 Test Date :2020-01-13
Operation Mode :802.11ac20 Temp./Humi. :21.3/58
Test Channel :2412 MHz Antenna Pol. :VERTICAL
Test Mode :BE CH LOW Engineer :Kailin
EUT Pol :H Plan



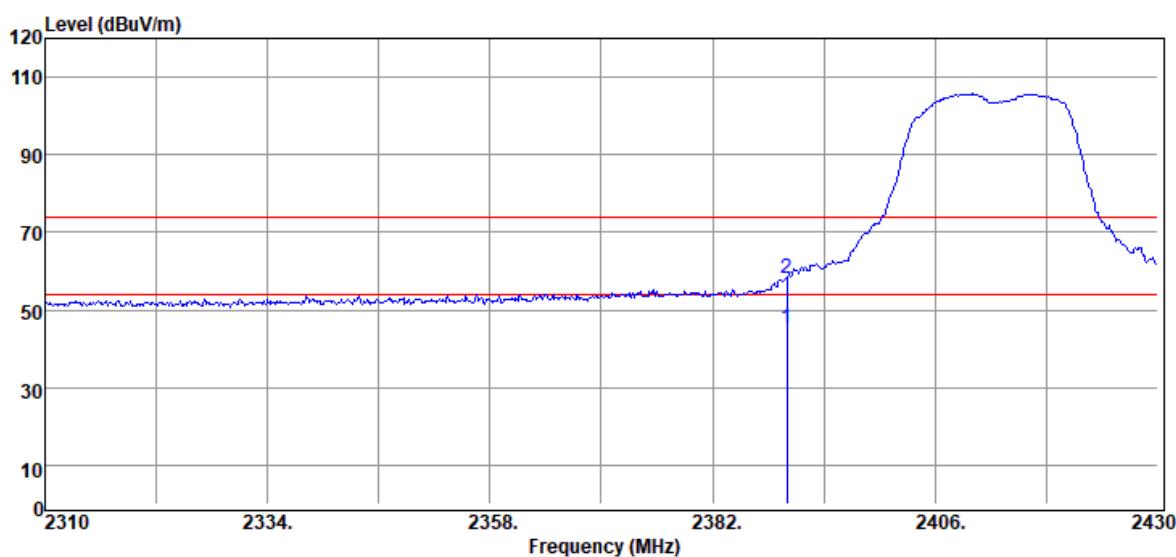
Freq. MHz	Detector Mode	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
					dB μ V/m	dB
2390.00	Average	53.73	-5.52	48.21	54.00	-5.79
2390.00	Peak	67.41	-5.52	61.89	74.00	-12.11

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Report Number :E2/2020/10012 Test Date :2020-01-13
Operation Mode :802.11ac20 Temp./Humi. :21.3/58
Test Channel :2412 MHz Antenna Pol. :HORIZONTAL
Test Mode :BE CH LOW Engineer :Kailin
EUT Pol :H Plan



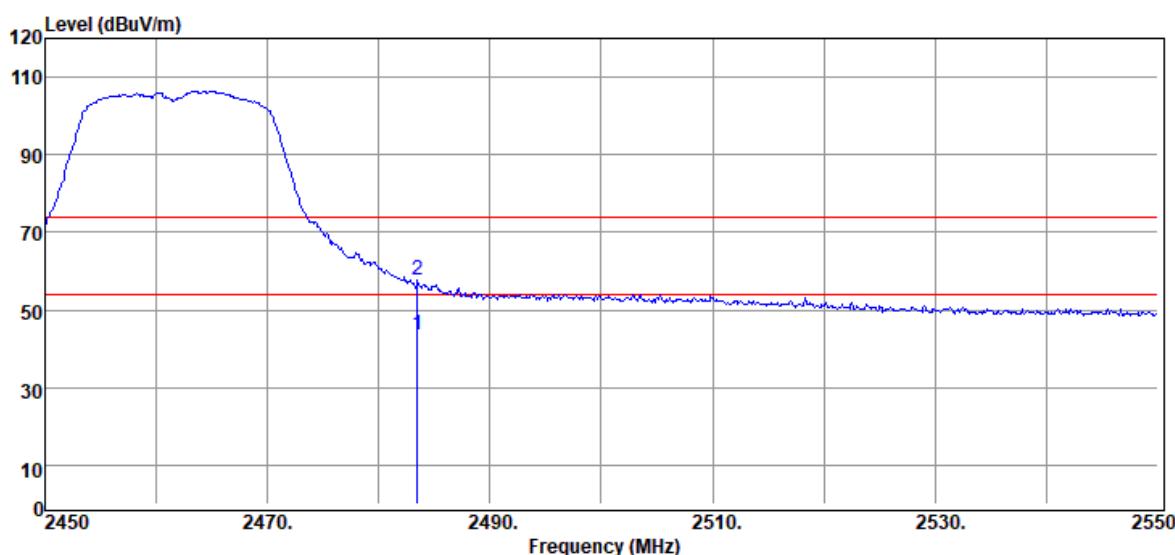
Freq. MHz	Detector Mode	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m	Margin
					dB μ V/m	dB
2390.00	Average	50.65	-5.52	45.13	54.00	-8.87
2390.00	Peak	63.57	-5.52	58.05	74.00	-15.95

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Report Number :E2/2020/10012 Test Date :2020-01-13
Operation Mode :802.11ac20 Temp./Humi. :21.3/58
Test Channel :2462 MHz Antenna Pol. :VERTICAL
Test Mode :BE CH HIGH Engineer :Kailin
EUT Pol :H Plan



Freq. MHz	Detector Mode	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
					dB μ V/m	dB
2483.50	Average	49.21	-5.42	43.79	54.00	-10.21
2483.50	Peak	62.99	-5.42	57.57	74.00	-16.43

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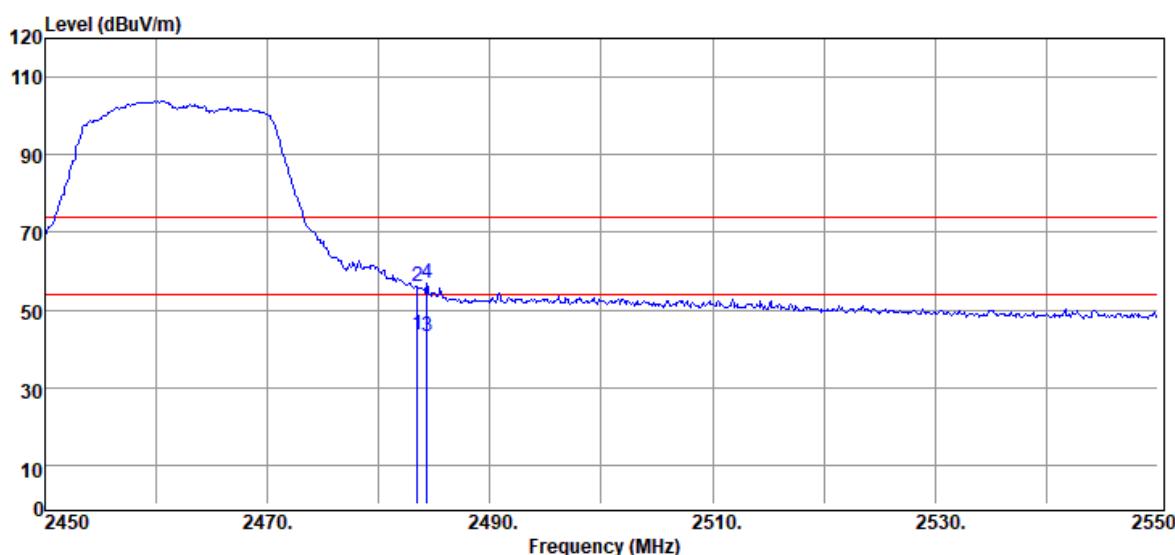
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Report Number :E2/2020/10012 Test Date :2020-01-13
Operation Mode :802.11ac20 Temp./Humi. :21.3/58
Test Channel :2462 MHz Antenna Pol. :HORIZONTAL
Test Mode :BE CH HIGH Engineer :Kailin
EUT Pol :H Plan



Freq. MHz	Detector Mode	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
					Limit @3m dB μ V/m	Margin dB
PK/QP/AV	Limit @3m dB μ V/m	Margin dB				
2483.50	Average	48.94	-5.42	43.52	54.00	-10.48
2483.50	Peak	61.40	-5.42	55.98	74.00	-18.02
2484.30	Average	48.54	-5.42	43.12	54.00	-10.88
2484.30	Peak	62.31	-5.42	56.89	74.00	-17.11

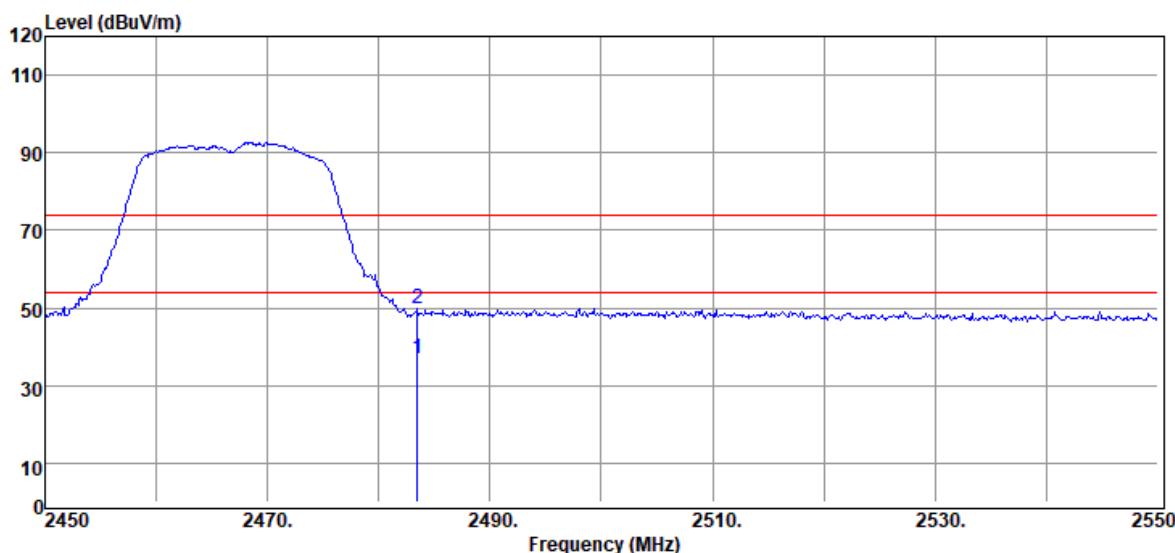
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Report Number :E2/2020/10012 Test Date :2020-01-13
Operation Mode :802.11ac20 Temp./Humi. :21.3/58
Test Channel :2467 MHz Antenna Pol. :VERTICAL
Test Mode :BE CH 12 Engineer :Kailin
EUT Pol :H Plan



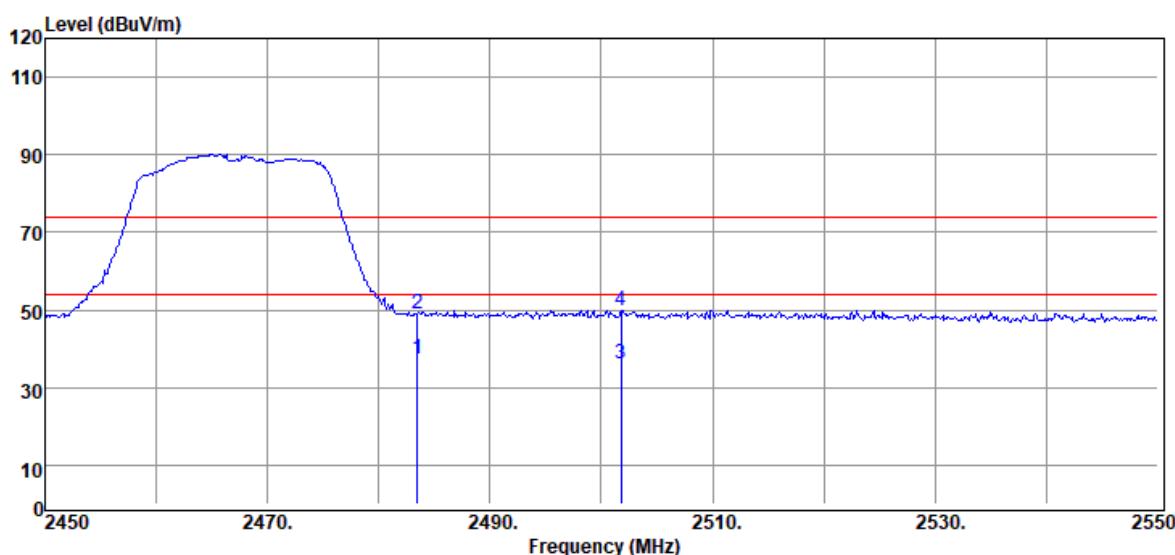
Freq. MHz	Detector Mode	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
2483.50	Average	42.58	-5.42	37.16	54.00	-16.84
2483.50	Peak	55.33	-5.42	49.91	74.00	-24.09

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Report Number :E2/2020/10012 Test Date :2020-01-13
Operation Mode :802.11ac20 Temp./Humi. :21.3/58
Test Channel :2467 MHz Antenna Pol. :HORIZONTAL
Test Mode :BE CH 12 Engineer :Kailin
EUT Pol :H Plan



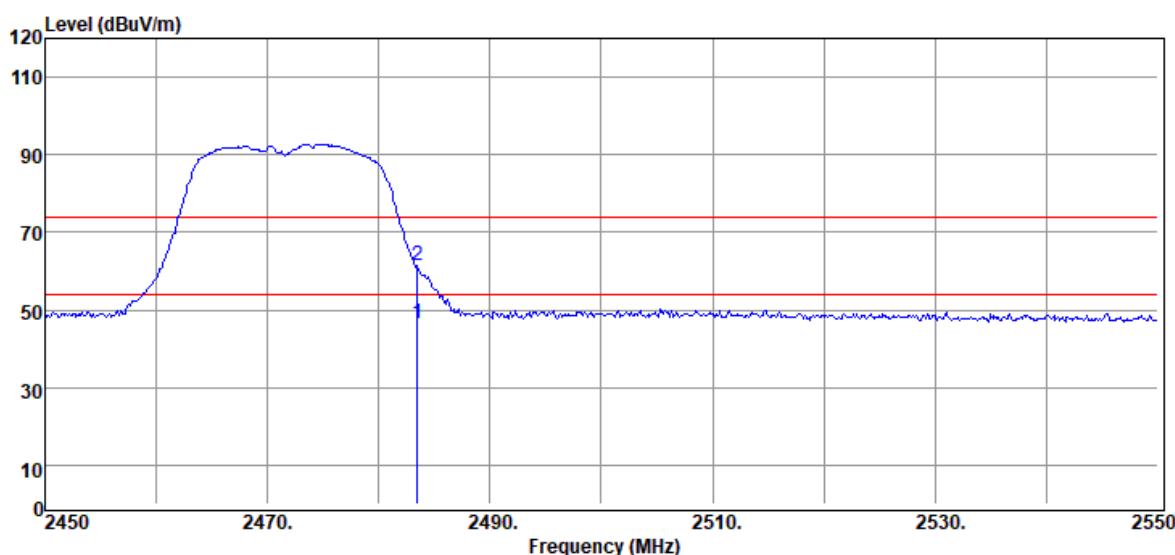
Freq. MHz	Detector Mode	Spectrum Reading Level dB μ V	Factor dB	Actual		Limit @3m dB μ V/m	Margin dB
				FS	dB μ V/m		
2483.50	Average	42.73	-5.42	37.31	54.00	-16.69	
2483.50	Peak	54.48	-5.42	49.06	74.00	-24.94	
2501.80	Average	41.62	-5.38	36.24	54.00	-17.76	
2501.80	Peak	55.35	-5.38	49.97	74.00	-24.03	

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Report Number :E2/2020/10012 Test Date :2020-01-13
Operation Mode :802.11ac20 Temp./Humi. :21.3/58
Test Channel :2472 MHz Antenna Pol. :VERTICAL
Test Mode :BE CH 13 Engineer :Kailin
EUT Pol :H Plan



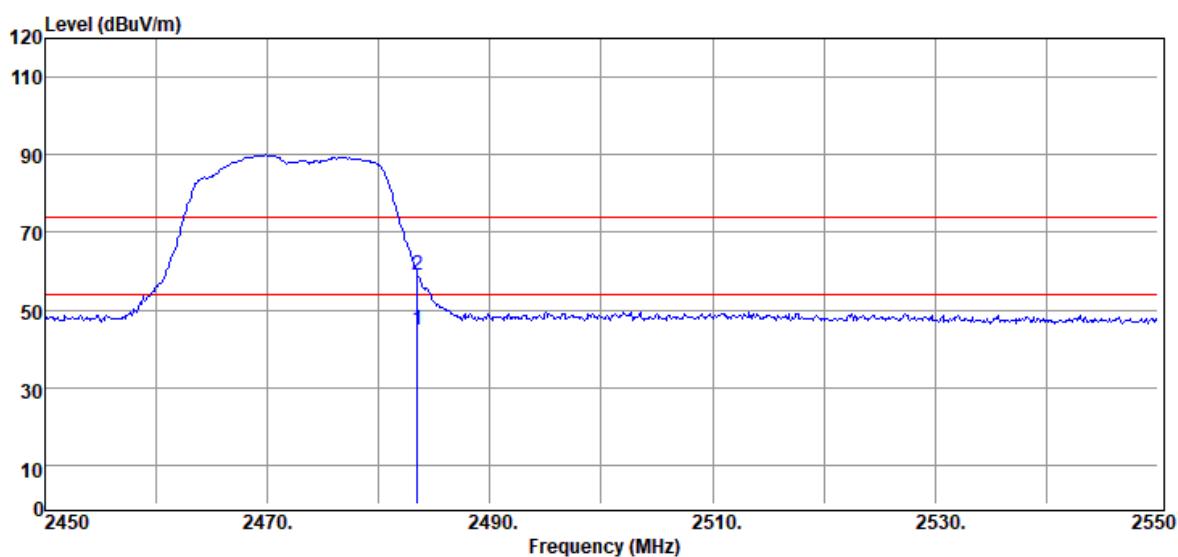
Freq. MHz	Detector Mode	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
					dB μ V/m	dB
2483.50	Average	51.98	-5.42	46.56	54.00	-7.44
2483.50	Peak	67.05	-5.42	61.63	74.00	-12.37

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Report Number :E2/2020/10012 Test Date :2020-01-13
Operation Mode :802.11ac20 Temp./Humi. :21.3/58
Test Channel :2472 MHz Antenna Pol. :HORIZONTAL
Test Mode :BE CH 13 Engineer :Kailin
EUT Pol :H Plan



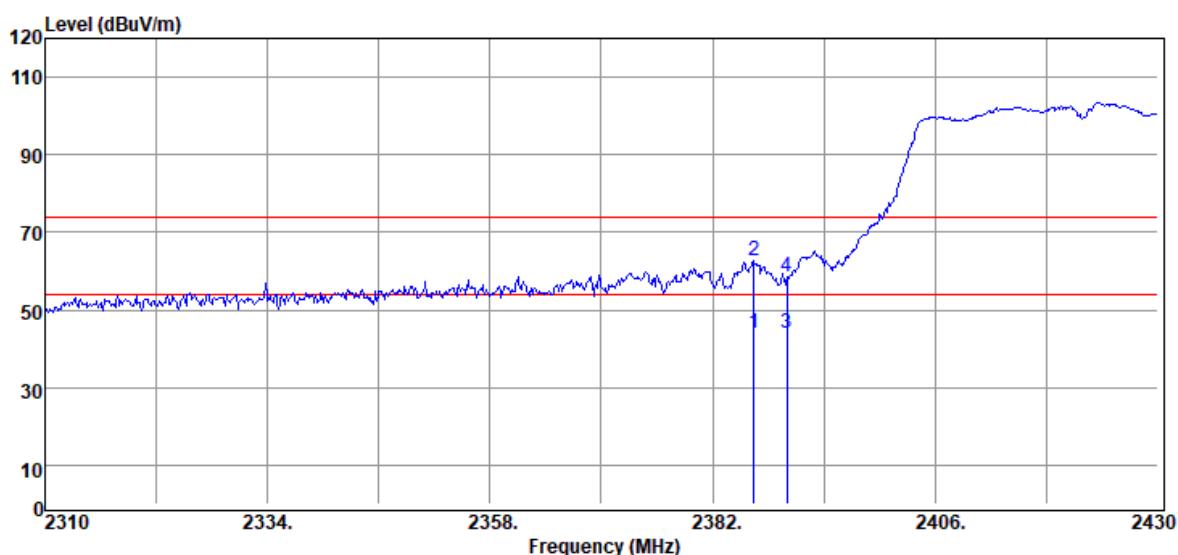
Freq. MHz	Detector Mode	Spectrum Reading Level	Factor dB	Actual		Limit @3m dB μ V/m	Margin dB
				FS	dB μ V/m		
2483.50	Average	50.21	-5.42	44.79	54.00	54.00	-9.21
2483.50	Peak	64.55	-5.42	59.13	74.00	74.00	-14.87

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Report Number :E2/2020/10012 Test Date :2020-01-13
 Operation Mode :802.11ac40 Temp./Humi. :21.3/58
 Test Channel :2422 MHz Antenna Pol. :VERTICAL
 Test Mode :BE CH LOW Engineer :Kailin
 EUT Pol :H Plan



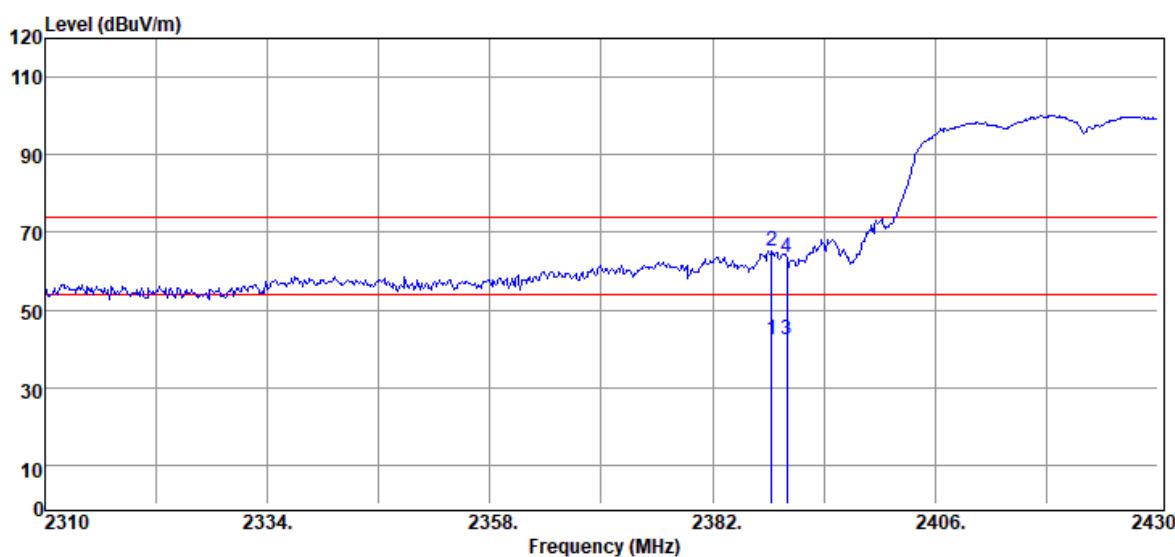
Freq. MHz	Detector Mode	Spectrum Reading Level dB μ V	Factor dB	Actual		Limit @3m dB μ V/m	Margin dB
				FS	dB μ V/m		
2386.44	Average	49.65	-5.53	44.12	54.00	54.00	-9.88
2386.44	Peak	68.02	-5.53	62.49	74.00	74.00	-11.51
2390.00	Average	49.65	-5.52	44.13	54.00	54.00	-9.87
2390.00	Peak	64.14	-5.52	58.62	74.00	74.00	-15.38

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Report Number :E2/2020/10012 Test Date :2020-01-13
 Operation Mode :802.11ac40 Temp./Humi. :21.3/58
 Test Channel :2422 MHz Antenna Pol. :HORIZONTAL
 Test Mode :BE CH LOW Engineer :Kailin
 EUT Pol :H Plan



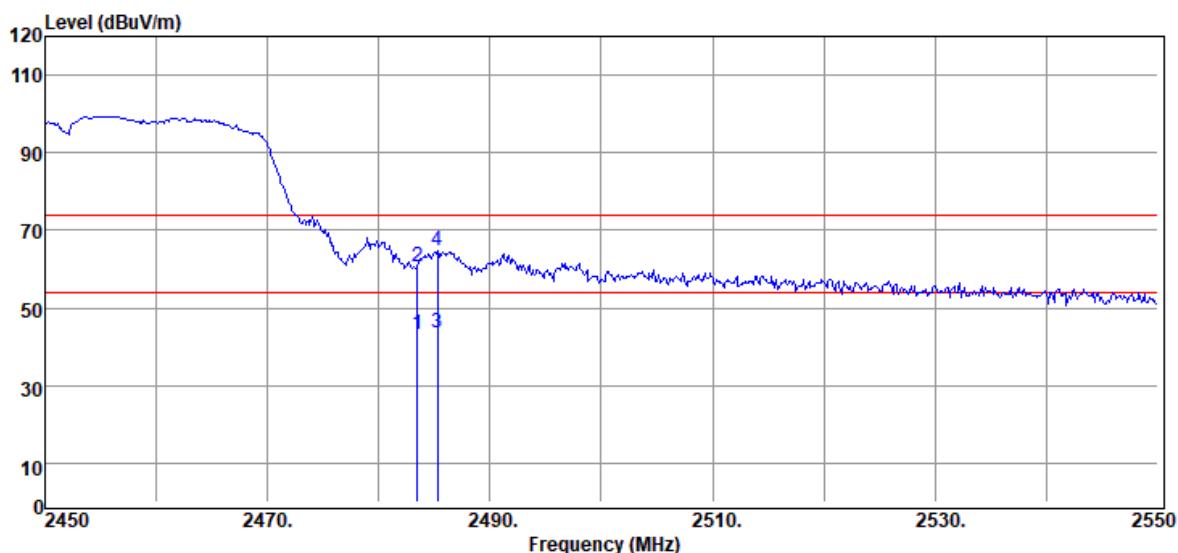
Freq. MHz	Detector Mode	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
2388.36	Average	47.82	-5.53	42.29	54.00	-11.71
2388.36	Peak	70.89	-5.53	65.36	74.00	-8.64
2390.00	Average	47.85	-5.52	42.33	54.00	-11.67
2390.00	Peak	68.99	-5.52	63.47	74.00	-10.53

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Report Number :E2/2020/10012 Test Date :2020-01-13
Operation Mode :802.11ac40 Temp./Humi. :21.3/58
Test Channel :2452 MHz Antenna Pol. :VERTICAL
Test Mode :BE CH HIGH Engineer :Kailin
EUT Pol :H Plan



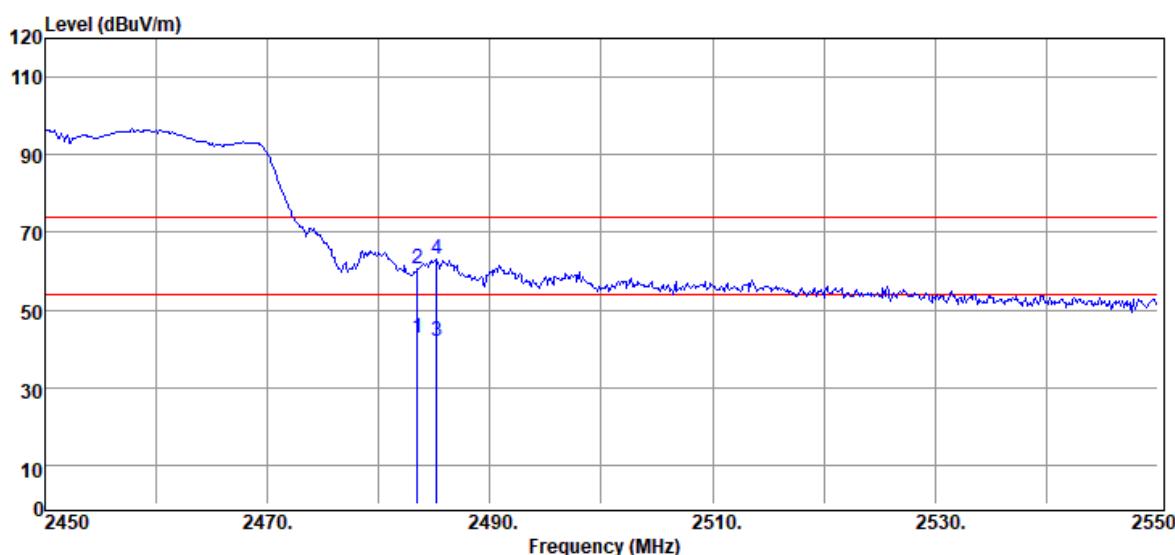
Freq. MHz	Detector Mode	Spectrum Reading Level	Factor dB	Actual		Limit @3m	Margin
				PK	Q μ V		
2483.50	Average	48.80	-5.42	43.38	54.00	54.00	-10.62
2483.50	Peak	66.11	-5.42	60.69	74.00	74.00	-13.31
2485.30	Average	48.94	-5.42	43.52	54.00	54.00	-10.48
2485.30	Peak	70.12	-5.42	64.70	74.00	74.00	-9.30

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Report Number :E2/2020/10012 Test Date :2020-01-13
Operation Mode :802.11ac40 Temp./Humi. :21.3/58
Test Channel :2452 MHz Antenna Pol. :HORIZONTAL
Test Mode :BE CH HIGH Engineer :Kailin
EUT Pol :H Plan



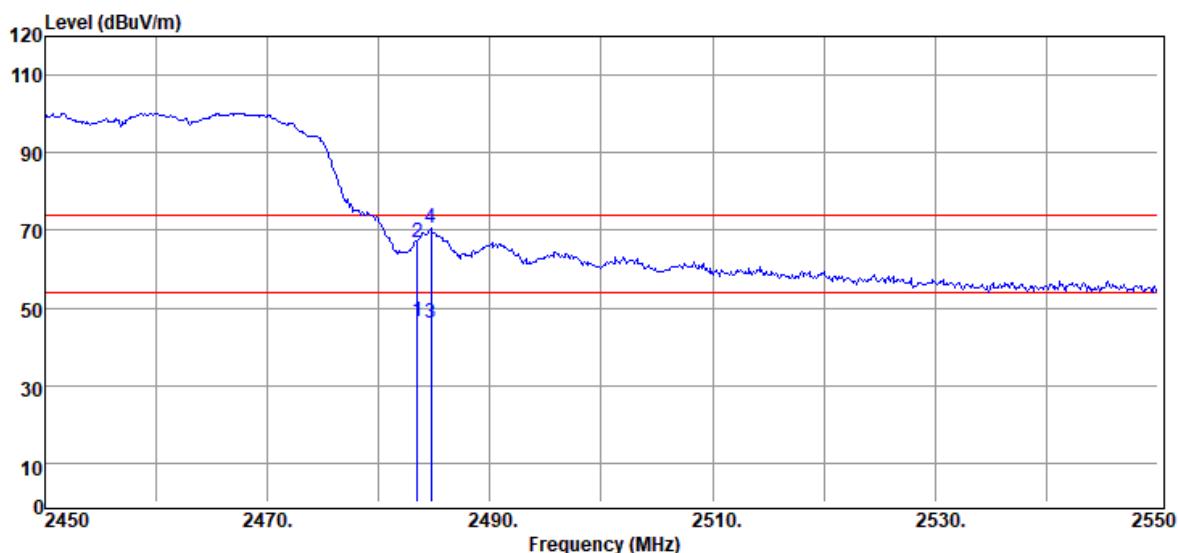
Freq. MHz	Detector Mode	Spectrum Reading Level	Factor	Actual		Limit @3m	Margin
				PK/QP/AV	dB μ V	FS	dB μ V/m
2483.50	Average	48.21	-5.42	42.79	54.00	54.00	-11.21
2483.50	Peak	65.90	-5.42	60.48	74.00	74.00	-13.52
2485.20	Average	47.38	-5.42	41.96	54.00	54.00	-12.04
2485.20	Peak	68.46	-5.42	63.04	74.00	74.00	-10.96

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Report Number :E2/2020/10012 Test Date :2020-01-13
Operation Mode :802.11ac40 Temp./Humi. :21.3/58
Test Channel :2457 MHz Antenna Pol. :VERTICAL
Test Mode :BE CH 10 Engineer :Kailin
EUT Pol :H Plan



Freq. MHz	Detector Mode	Spectrum Reading Level dB μ V	Factor dB	Actual		Margin dB
				FS	@3m dB μ V/m	
2483.50	Average	51.91	-5.42	46.49	54.00	-7.51
2483.50	Peak	72.45	-5.42	67.03	74.00	-6.97
2484.70	Average	51.62	-5.42	46.20	54.00	-7.80
2484.70	Peak	75.84	-5.42	70.42	74.00	-3.58

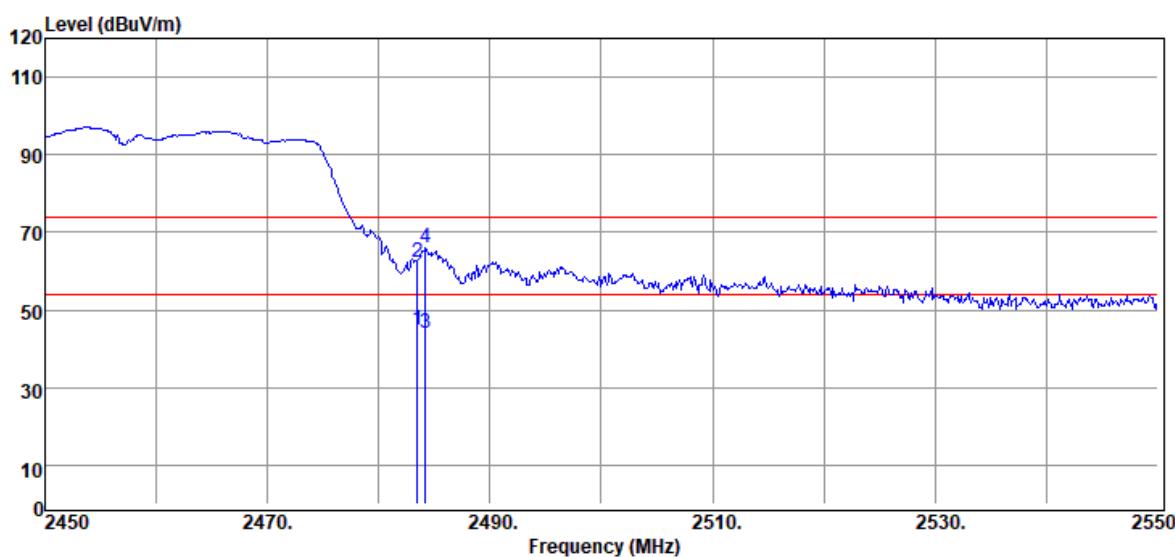
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Report Number :E2/2020/10012 Test Date :2020-01-13
Operation Mode :802.11ac40 Temp./Humi. :21.3/58
Test Channel :2457 MHz Antenna Pol. :HORIZONTAL
Test Mode :BE CH 10 Engineer :Kailin
EUT Pol :H Plan



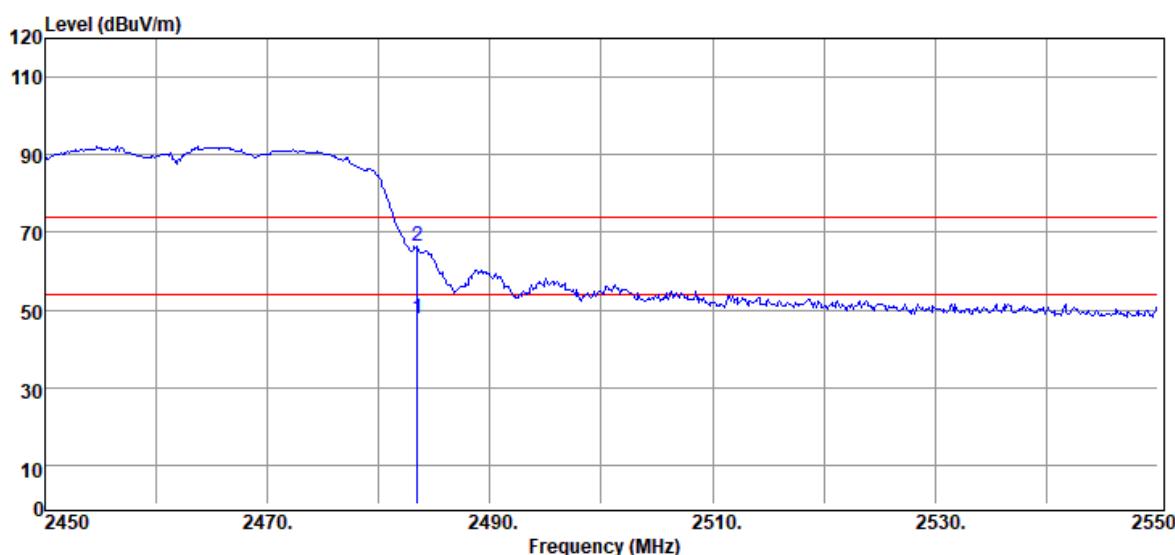
Freq. MHz	Detector Mode	Spectrum Reading Level dB μ V	Factor dB	Actual		Limit @3m dB μ V/m	Margin dB
				FS	dB μ V/m		
2483.50	Average	50.30	-5.42	44.88	54.00	-9.12	
2483.50	Peak	67.79	-5.42	62.37	74.00	-11.63	
2484.20	Average	49.26	-5.42	43.84	54.00	-10.16	
2484.20	Peak	71.43	-5.42	66.01	74.00	-7.99	

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Report Number :E2/2020/10012 Test Date :2020-01-13
 Operation Mode :802.11ac40 Temp./Humi. :21.3/58
 Test Channel :2462 MHz Antenna Pol. :VERTICAL
 Test Mode :BE CH 11 Engineer :Kailin
 EUT Pol :H Plan



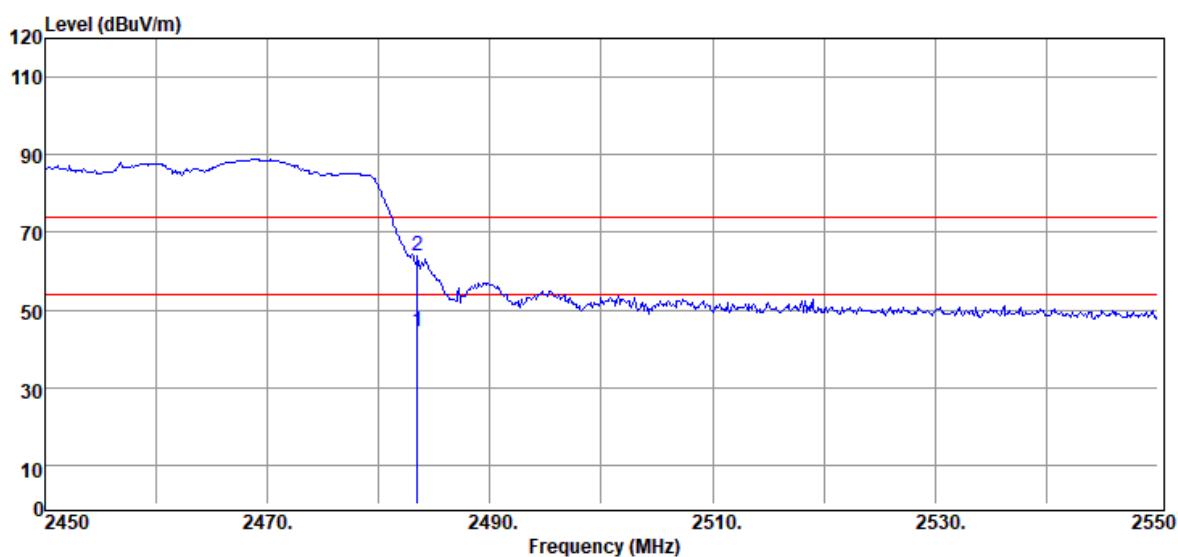
Freq. MHz	Detector Mode	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
					54.00	-6.21
2483.50	Average	53.21	-5.42	47.79	54.00	-6.21
2483.50	Peak	71.73	-5.42	66.31	74.00	-7.69

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Report Number :E2/2020/10012 Test Date :2020-01-13
Operation Mode :802.11ac40 Temp./Humi. :21.3/58
Test Channel :2462 MHz Antenna Pol. :HORIZONTAL
Test Mode :BE CH 11 Engineer :Kailin
EUT Pol :H Plan



Freq. MHz	Detector Mode	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
2483.50	Average	49.98	-5.42	44.56	54.00	-9.44
2483.50	Peak	69.27	-5.42	63.85	74.00	-10.15

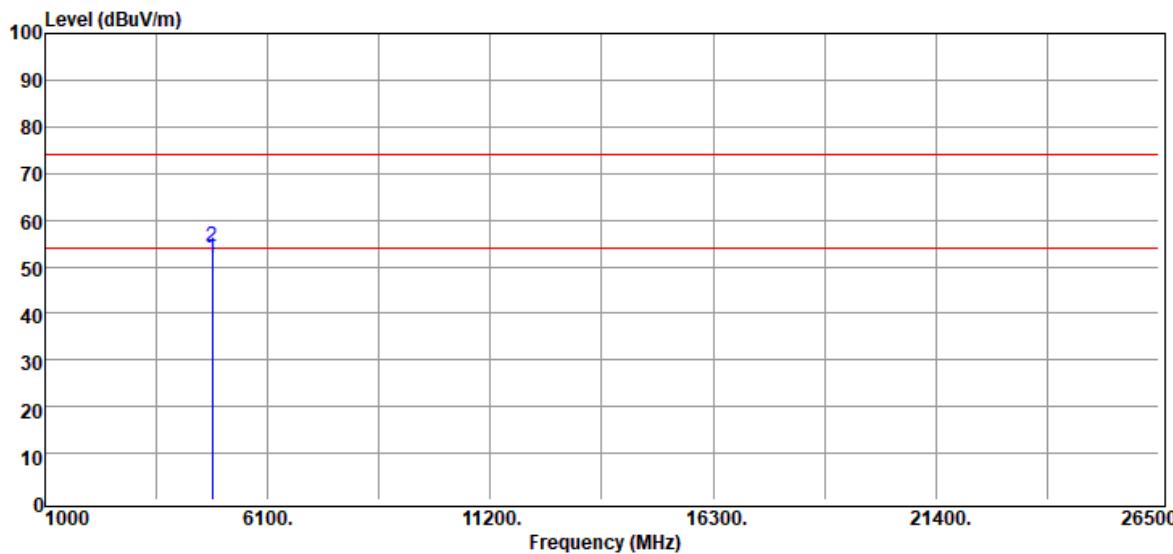
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Radiated Spurious Emission Measurement Result (802.11 b)**Above 1GHz Data:**

Report Number	:E2/2020/10012	Test Date	:2020-01-21
Operation Mode	:802.11b	Temp./Humi.	:18.5/52
Test Channel	:2412 MHz	Antenna Pol.	:VERTICAL
Test Mode	:TX CH LOW	Engineer	:Kailin
EUT Pol	:H Plan		



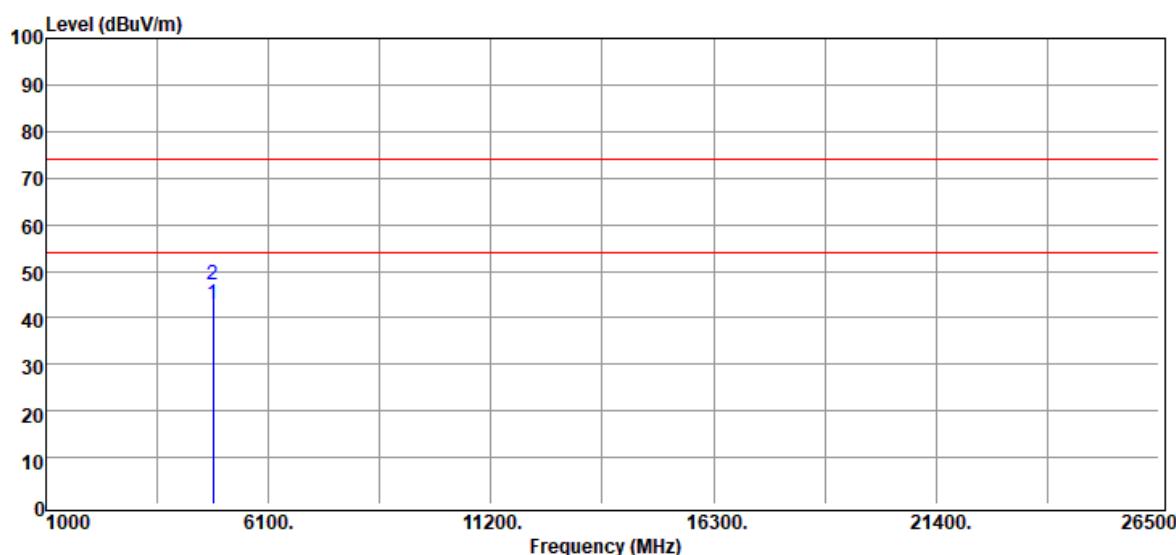
Freq. MHz	Detector Mode	Spectrum Reading	Factor dB	Actual	Limit	Margin dB
				FS dB μ V	@3m dB μ V/m	
4824.00	Average	52.08	-0.34	51.74	54.00	-2.26
4824.00	Peak	54.66	-0.34	54.32	74.00	-19.68

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Report Number :E2/2020/10012 Test Date :2020-01-21
Operation Mode :802.11b Temp./Humi. :18.5/52
Test Channel :2412 MHz Antenna Pol. :HORIZONTAL
Test Mode :TX CH LOW Engineer :Kailin
EUT Pol :H Plan



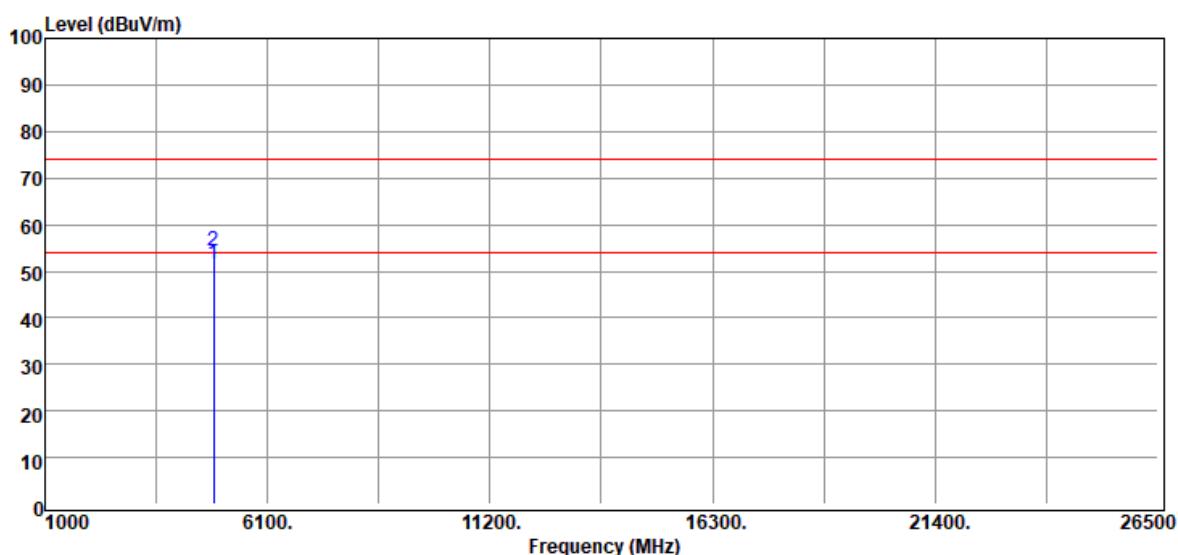
Freq. MHz	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit	Margin
					@3m	
PK/QP/AV	dB μ V	dB		dB μ V/m	dB μ V/m	dB
4824.00	Average	43.26	-0.34	42.92	54.00	-11.08
4824.00	Peak	47.41	-0.34	47.07	74.00	-26.93

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Report Number :E2/2020/10012 Test Date :2020-01-21
Operation Mode :802.11b Temp./Humi. :18.5/52
Test Channel :2437 MHz Antenna Pol. :VERTICAL
Test Mode :TX CH MID Engineer :Kailin
EUT Pol :H Plan



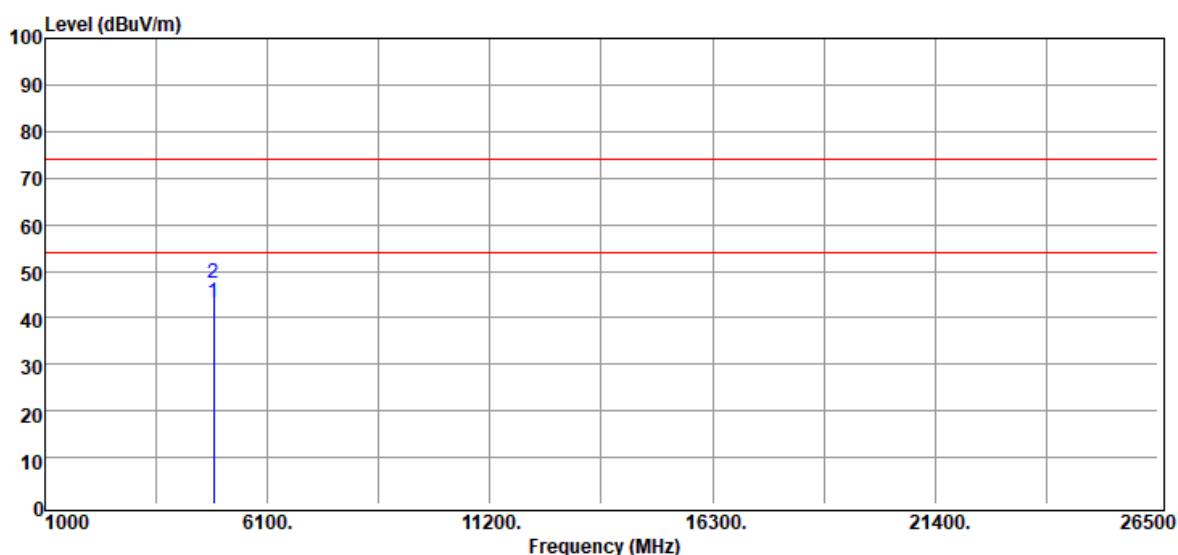
Freq. MHz	Detector Mode	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
					Factor dB	
4874.00	Average	51.97	-0.42	51.55	54.00	-2.45
4874.00	Peak	54.61	-0.42	54.19	74.00	-19.81

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Report Number :E2/2020/10012 Test Date :2020-01-21
Operation Mode :802.11b Temp./Humi. :18.5/52
Test Channel :2437 MHz Antenna Pol. :HORIZONTAL
Test Mode :TX CH MID Engineer :Kailin
EUT Pol :H Plan



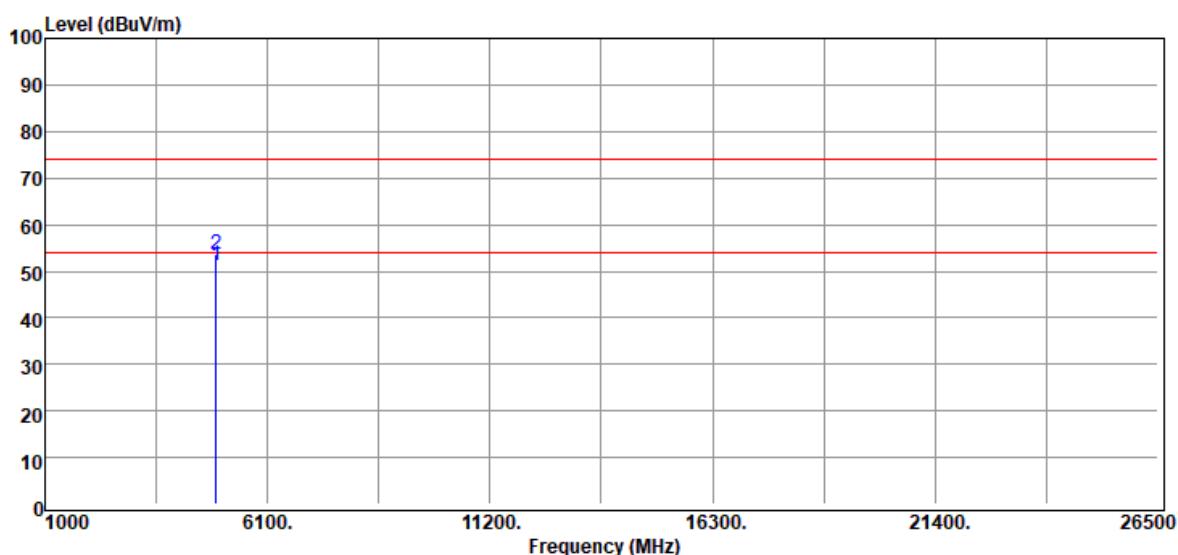
Freq. MHz	Detector Mode	Spectrum Reading Level	Factor	Actual	Limit	Margin
				FS	@3m	dB
4874.00	Average	43.66	-0.42	43.24	54.00	-10.76
4874.00	Peak	47.68	-0.42	47.26	74.00	-26.74

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Report Number :E2/2020/10012 Test Date :2020-01-21
Operation Mode :802.11b Temp./Humi. :18.5/52
Test Channel :2462 MHz Antenna Pol. :VERTICAL
Test Mode :TX CH HIGH Engineer :Kailin
EUT Pol :H Plan



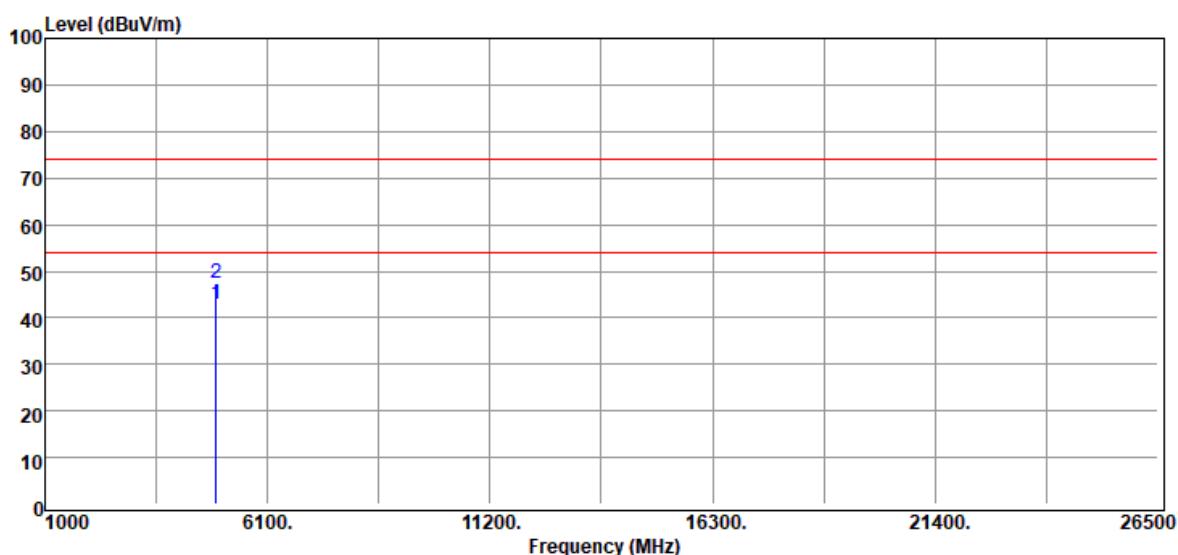
Freq. MHz	Detector Mode	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
					dB μ V/m	dB
4924.00	Average	51.89	-0.61	51.28	54.00	-2.72
4924.00	Peak	54.12	-0.61	53.51	74.00	-20.49

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Report Number :E2/2020/10012 Test Date :2020-01-21
Operation Mode :802.11b Temp./Humi. :18.5/52
Test Channel :2462 MHz Antenna Pol. :HORIZONTAL
Test Mode :TX CH HIGH Engineer :Kailin
EUT Pol :H Plan



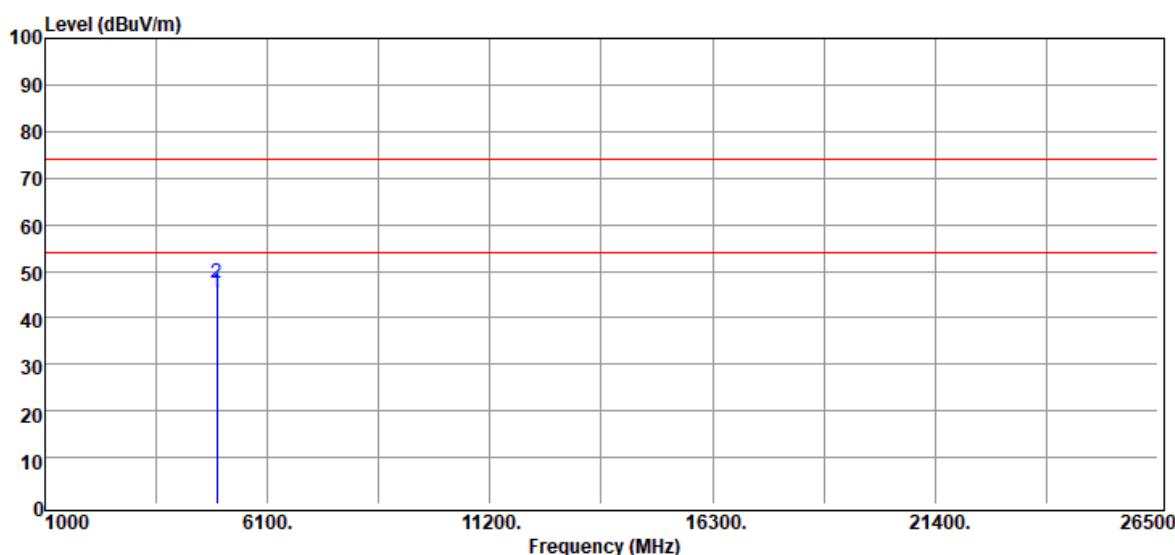
Freq. MHz	Detector Mode	Spectrum Reading Level	Factor	Actual	Limit	Margin
				FS	@3m	dB
4924.00	Average	43.65	-0.61	43.04	54.00	-10.96
4924.00	Peak	47.87	-0.61	47.26	74.00	-26.74

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Report Number :E2/2020/10012 Test Date :2020-01-21
Operation Mode :802.11b Temp./Humi. :18.8/58
Test Channel :2467 MHz Antenna Pol. :VERTICAL
Test Mode :TX CH 12 Engineer :Kailin
EUT Pol :H Plan



Freq. MHz	Detector Mode	Spectrum Reading Level	Factor dB	Actual		Limit @3m dB μ V/m	Margin dB
				FS	dB μ V/m		
4934.00	Average	45.95	-0.65	45.30	54.00	54.00	-8.70
4934.00	Peak	48.03	-0.65	47.38	74.00	74.00	-26.62

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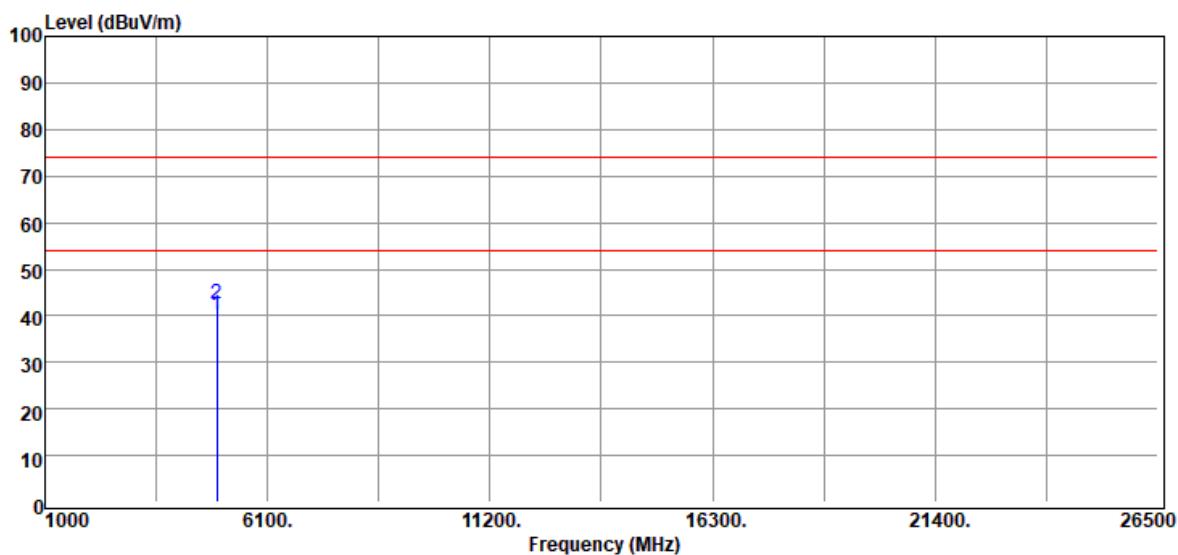
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Report Number :E2/2020/10012 Test Date :2020-01-21
Operation Mode :802.11b Temp./Humi. :18.8/58
Test Channel :2467 MHz Antenna Pol. :HORIZONTAL
Test Mode :TX CH 12 Engineer :Kailin
EUT Pol :H Plan



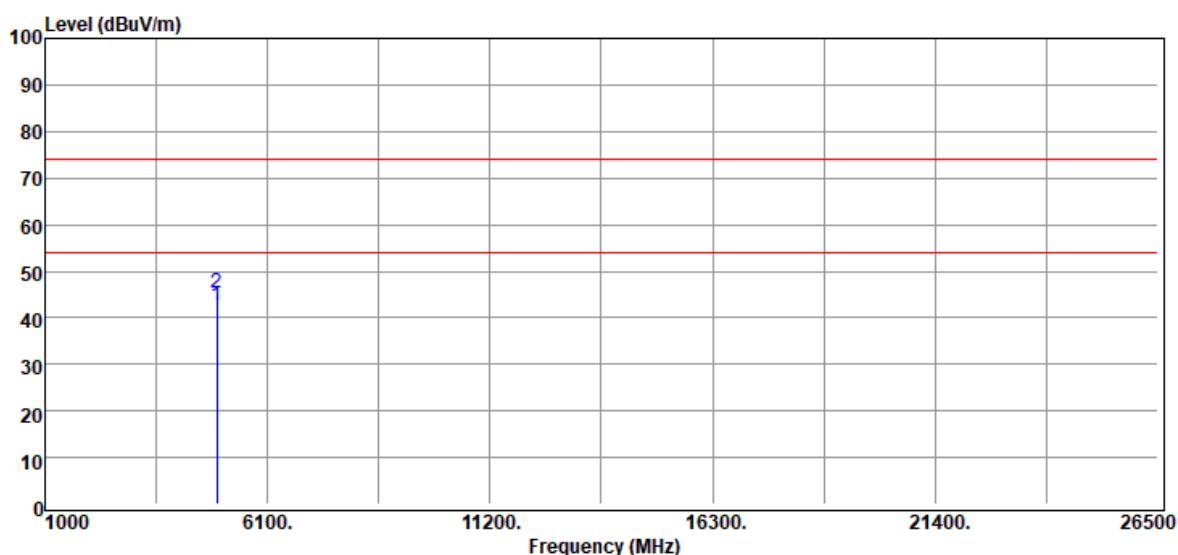
Freq. MHz	Detector Mode	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
					54.00	-13.99
4934.00	Average	40.66	-0.65	40.01	54.00	-13.99
4934.00	Peak	43.32	-0.65	42.67	74.00	-31.33

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Report Number :E2/2020/10012 Test Date :2020-01-21
Operation Mode :802.11b Temp./Humi. :18.8/58
Test Channel :2472 MHz Antenna Pol. :VERTICAL
Test Mode :TX CH 13 Engineer :Kailin
EUT Pol :H Plan



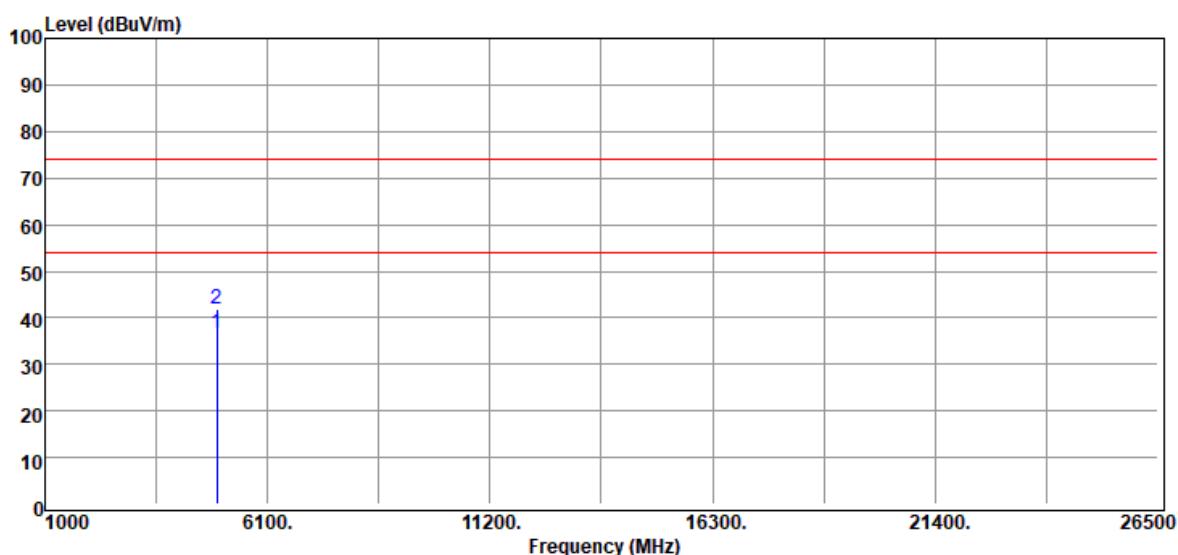
Freq. MHz	Detector Mode	Spectrum Reading Level dB μ V	Factor dB	Actual	Limit @3m	Margin
				FS dB μ V/m	dB μ V/m	dB
4944.00	Average	43.33	-0.70	42.63	54.00	-11.37
4944.00	Peak	46.18	-0.70	45.48	74.00	-28.52

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Report Number :E2/2020/10012 Test Date :2020-01-21
Operation Mode :802.11b Temp./Humi. :18.8/58
Test Channel :2472 MHz Antenna Pol. :HORIZONTAL
Test Mode :TX CH 13 Engineer :Kailin
EUT Pol :H Plan



Freq. MHz	Detector Mode	Spectrum Reading Level	Factor dB	Actual FS dB μ V/m	Limit @3m	Margin
					dB μ V/m	dB
4944.00	Average	37.33	-0.70	36.63	54.00	-17.37
4944.00	Peak	42.67	-0.70	41.97	74.00	-32.03

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9 ANTENNA REQUIREMENT

9.1 Standard Applicable:

For intentional device, according to §15.203, an intentional radiator shall be designed to ensure that no antenna other than furnished by the responsible party shall be used with the device.

If the transmitting antenna is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi.

9.2 Antenna Connected Construction:

The antenna is designed as permanently attached and no consideration of replacement. Please see EUT photo for details.

~ End of Report ~

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