ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

PARTIAL REPORT

OF

Applicant:	CALAMP WIRELESS NETWORKS CORPORATION 2200 Faraday Ave, Suite 220, Carlsbad, CA 92008
Product Name:	LMU5541 Broadband Router/Tracker
Brand Name:	CalAmp
Model No.:	LMU5541LW
Model Difference:	N/A
Report Number:	ER/2019/C0115
FCC ID:	APV-5541LW
IC:	5843C-5541LW
FCC Rule Part:	§15.247, Cat: DTS
IC RSS:	RSS-247 issue 2 Feb 2017
Issue Date:	Jan. 15, 2020
Date of Test:	Dec. 13, 2019 ~ Jan. 07, 2020
Date of EUT Received:	Dec. 13, 2019

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: _____

Vito Pei / Asst. Supervisor

Testing Laboratory
0513

Revision History				
Report Number	**Revision**	**Description**	**Issue Date**	**Remark**
ER/2019/C0115	Rev.00	Original.	Jan. 15, 2020	Revised By: Stefanie Yu

Note:

Test data is referenced from cross authorization(s)

Measurement results in the original test report 2323ERM.005A1 under FCC ID: RI7WE866C3 / IC: 5131A-WE866C3 are partially leveraged in this test report with Radiated Emission Test to demonstrate compliance.

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1 GENERAL INFORMATION

1.1 Product description

Product Name:	LMU5541 Broadband Router/Tracker	
Brand Name:	CalAmp	
Model No.:	LMU5541LW	
Model Difference:	N/A	
Hardware Version:	Rev E	
Software Version:	LMU,166 V4.1a	
Power Supply:	12Vdc from Car Battery & 3.7Vdc from Rechargeable Li-ion Battery	
	Battery:	Model No.: GSP633248, Supplier: N/A

Wi-Fi 802.11	Frequency Range	Channels	Rated Power (dBm)	Modulation Technology
b	2412-2462	11	16.24	DSSS,
g			17.70	OFDM
n_HT20 ax_HEW20			HT: 19.49	
n_HT40 n_HEW40	2422-2452	7	HT: 16.67	
Modulation type:	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM			
Transistion 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_HT20MHz: 6.5 – 72.2 Mbps 802.11 n_HT40MHz: 13.5 - 150.0 Mbps 802.11 ax_HEW20MHz: 8 –143.4 Mbps			

WLAN Modular Report

WLAN:	Test Lab: DEKRA Certification. Inc. Applicant: Telit Communication s.p.a Model Number: WE866C3-P Report Number: 2323ERM.005A

1.2 Antenna Designation

Type	Supplier	Antenna Part No.	Freq. (MHz)	Peak Antenna Gain (dBi)
PIFA	TAOGLAS	MA284.LBIC.001	2402-2480	-2.21

1.3 Test Methodology of Applied Standards

FCC Part 15, Subpart C §15.247
FCC KDB 558074 D01 DTS Meas. Guidance v05r01
FCC KDB 662911 D01 Multiple Transmitter Output v02r01
RSS-247 issue 2 Feb. 2017
RSS-Gen. issue 5, Amendment 1, March 2019
ANSI C63.10:2013

1.4 Test Facility

SGS Taiwan Ltd. Electronics & Communication Laboratory (TAF code 0513)
No.134, Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803

FCC Designation number: TW0001

ISED CAB identifier: TW0513

1.5 Special Accessories

There are no special accessories used while test was conducted.

1.6 Equipment Modifications

There was no modification incorporated into the EUT.

1.7 Radiated Emission Test Sites For Measurements From 9 kHz To 30 MHz

Radiated emission below 30MHz is measured in a 9m*9m*6m semi-anechoic chamber, the measurements correspond to those obtained at an open-field test site.
There is a comparison data of both open-field test site and semi-Anechoic chamber, and the result came out very similar.

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 a placed on a table which is 0.8 m above ground plane. 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 50uH/50 ohm 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 Conducted Test (RF)

The active antenna port of the unlicensed wireless device is connected to the spectrum analyzer with attenuator to protect the instrumentation. If a second antenna port is available, it is tested at one operating frequency, with other port(s) appropriately terminated, to verify it has similar output characteristics as the fully tested port.

2.3.3 Radiated Emissions

The EUT is a 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 plane. 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 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 Configuration of Tested System

Fig. 2-1 Radiated Emission configuration

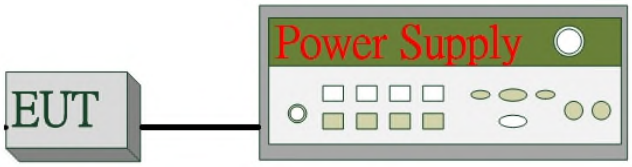


Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Data Cable	Power Cord
1	DC Power Supply	Agilent	E3640A	MY52410006	N/A	N/A

3 SUMMARY OF TEST RESULTS

FCC Rules	IC Rules	Description Of Test	Result
§15.247(b) (3)	RSS-247 §5.4(4)	Peak Output Power	Compliant
§15.205 §15.209 §15.247(d)	RSS-247 §5.5 RSS-Gen §8.9 RSS-Gen §8.10 RSS-Gen §6.13	Radiated Band Edge and Spurious Emission	N/A, Refer to modular report.
§15.203 §15.247(b)	RSS- Gen §6.8	Antenna Requirement	Compliant

4 DESCRIPTION OF TEST MODES

4.1 Operated in 2400 ~ 2483.5MHz Band

11 channels are provided for 802.11b/g/n 20M.

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

9 channels are provided for 802.11n 40M

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

4.2 The Worst Test Modes and Channel Details

1. The EUT has been tested under operating condition.
2. aTest program used to control the EUT for staying in continuous transmitting and receiving mode is programmed.
3. Investigation has been done on all the possible configurations for searching the worst case. The gevin UE is pre-scanned among below modes.
4. Therefore, below summary is the modes of test configuration that yield the highest reading and generate the highest emission chosen to carry out the relevantly mandatory test items.

4.3 Radiated Emission Test:

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
RADIATED EMISSION TEST (BELOW 1 GHz)					
802.11g	1 to 11	1, 6, 11	OFDM	6	Ch0
RADIATED EMISSION TEST (ABOVE 1 GHz)					
802.11b	1 to 11	1, 6, 11	DSSS	1	Ch0
802.11g	1 to 11	1, 6, 11	OFDM	6	Ch0
802.11n 20M	1 to 11	1, 6, 11	OFDM	MCS 0	MIMO
802.11n 40M	3 to 9	3, 6, 9	OFDM	MCS 0	MIMO

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

5 MEASUREMENT UNCERTAINTY

Test Items	Uncertainty
AC Power Line Conducted Emission	+/- 2.586 dB
Peak Output Power	+/- 0.84 dB
6dB Bandwidth	+/- 51.33 Hz
100 KHz Bandwidth Of Frequency Band Edges	+/- 0.84 dB
Peak Power Density	+/- 1.3 dB
Temperature	+/- 0.65 °C
Humidity	+/- 4.6 %
DC / AC Power Source	DC= +/- 0.13%, AC= +/- 0.2%

Radiated Spurious Emission Measurement Uncertainty	
Polarization: Vertical	9kHz~30MHz: +-2.3dB
	30MHz - 180MHz: +/- 3.37dB
	180MHz -417MHz: +/- 3.19dB
	0.417GHz-1GHz: +/- 3.19dB
	1GHz - 18GHz: +/- 4.04dB
	18GHz - 40GHz: +/- 4.04dB
Polarization: Horizontal	9kHz~30MHz: +-2.3dB
	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.

6 CONDUCTED EMISSION TEST

6.1 Standard Applicable

Frequency range within 150kHz to 30MHz shall not exceed the Limit table as below.

Frequency range	Limits dB(uV)	
MHz	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50
Note 1.The lower limit shall apply at the transition frequencies 2.The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.		

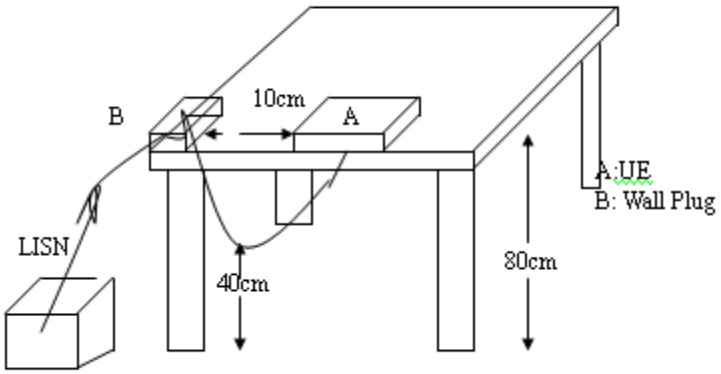
6.2 Measurement Equipment Used

N/A

6.3 EUT Setup

1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI 63.10:2013.
2. The AC/DC Power adaptor of EUT was plug-in LISN. The EUT was placed flushed with the rear of the table.
3. The LISN was connected with 120Vac/60Hz power source.

6.4 Test SET-UP (Block Diagram of Configuration)



6.5 Measurement Procedure

1. The EUT was placed on a table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all phases of power being supplied by given UE are completed

6.6 Measurement Result

N/A, powered from car battery.

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.

If the transmitting antenna of directional gain greater than 6dBi are used the peak output power form 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.

Note:

As per FCC KDB 662911 D01

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

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

$=10 \log[(10^{G1/20} + 10^{G2/20} + \ldots + 10^{GN/20})^2 / N_{ANT}]$ dBi

[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.]

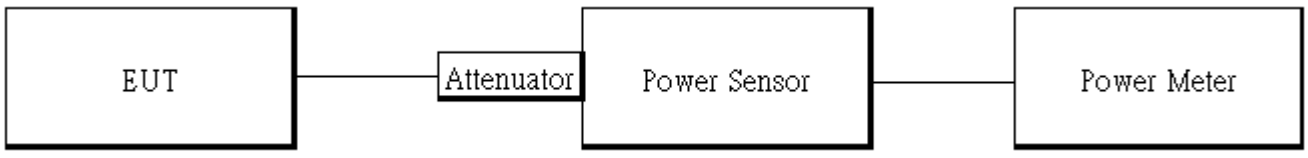
The antenna gain is not grater than 6 dBi. Therefore, reduction of power is not required.

7.2 Measurement Equipment Used

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Power Meter	Anritsu	ML2496A	1804001	02/13/2019	02/12/2020
Power Sensor	Anritsu	MA2411B	1726104	02/13/2019	02/12/2020
Power Sensor	Anritsu	MA2411B	1726107	02/13/2019	02/12/2020
Attenuator	Mini-Circuit	BW-S10W2+	4	01/02/2019	01/01/2020
Attenuator	Mini-Circuit	BW-S10W2+	4	01/02/2020	01/01/2021

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.

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

7.5 Measurement Result

802.11b Ch0					
CH	Freq. (MHz)	Data Rate	Peak Output Power (dBm)	Limit (dBm)	RESULT
1	2412	1	15.24	30.00	PASS
2	2417	1	16.13	30.00	PASS
6	2437	1	**16.24**	30.00	PASS
10	2457	1	16.23	30.00	PASS
11	2462	1	15.37	30.00	PASS
802.11b Ch0					
CH	Freq. (MHz)	Data Rate	Max. Avg. Output include tune up tolerance Power (dBm)	Limit (dBm)	RESULT
1	2412	1	12.73	30.00	PASS
2	2417	1	13.83	30.00	PASS
6	2437	1	**13.85**	30.00	PASS
10	2457	1	13.78	30.00	PASS
11	2462	1	12.80	30.00	PASS

802.11g Ch0					
CH	Freq. (MHz)	Data Rate	Peak Output Power (dBm)	Limit (dBm)	RESULT
1	2412	6	16.38	30.00	PASS
2	2417	6	**17.70**	30.00	PASS
6	2437	6	17.11	30.00	PASS
10	2457	6	17.31	30.00	PASS
11	2462	6	17.05	30.00	PASS
802.11g Ch0					
CH	Freq. (MHz)	Data Rate	Max. Avg. Output include tune up tolerance Power (dBm)	Limit (dBm)	RESULT
1	2412	6	10.19	30.00	PASS
2	2417	6	**11.39**	30.00	PASS
6	2437	6	11.15	30.00	PASS
10	2457	6	11.16	30.00	PASS
11	2462	6	10.70	30.00	PASS

802.11n_HT20M Ch0					
CH	Freq. (MHz)	Data Rate	Peak Output Power (dBm)	Limit (dBm)	RESULT
1	2412	MCS0	18.60	30.00	PASS
2	2417	MCS0	**19.49**	30.00	PASS
6	2437	MCS0	19.26	30.00	PASS
10	2457	MCS0	19.37	30.00	PASS
11	2462	MCS0	18.76	30.00	PASS
802.11n_HT20M Ch0					
CH	Freq. (MHz)	Data Rate	Max. Avg. Output include tune up tolerance Power (dBm)	Limit (dBm)	RESULT
1	2412	MCS0	11.93	30.00	PASS
2	2417	MCS0	12.73	30.00	PASS
6	2437	MCS0	**12.84**	30.00	PASS
10	2457	MCS0	12.76	30.00	PASS
11	2462	MCS0	11.98	30.00	PASS

802.11n_HT40M Ch0					
CH	Freq. (MHz)	Data Rate	Peak Output Power (dBm)	Limit (dBm)	RESULT
3	2422	MCS0	**16.67**	30.00	PASS
4	2427	MCS0	16.26	30.00	PASS
6	2437	MCS0	16.18	30.00	PASS
8	2447	MCS0	16.15	30.00	PASS
9	2452	MCS0	16.03	30.00	PASS
802.11n_HT40M Ch0					
CH	Freq. (MHz)	Data Rate	Max. Avg. Output include tune up tolerance Power (dBm)	Limit (dBm)	RESULT
3	2422	MCS0	8.86	30.00	PASS
4	2427	MCS0	**9.01**	30.00	PASS
6	2437	MCS0	8.96	30.00	PASS
8	2447	MCS0	8.77	30.00	PASS
9	2452	MCS0	8.82	30.00	PASS

EIRP

802.11b Ch0							
CH	Freq. (MHz)	Data Rate	Avg. Output Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	RESULT
1	2412	1	12.73	-2.21	10.52	36	PASS
2	2417	1	13.83	-2.21	11.62	36	PASS
6	2437	1	13.85	-2.21	**11.64**	36	PASS
10	2457	1	13.78	-2.21	11.57	36	PASS
11	2462	1	12.80	-2.21	10.59	36	PASS

802.11g Ch0							
CH	Freq. (MHz)	Data Rate	Avg. Output Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	RESULT
1	2412	6	10.19	-2.21	7.98	36	PASS
2	2417	6	11.39	-2.21	**9.18**	36	PASS
6	2437	6	11.15	-2.21	8.94	36	PASS
10	2457	6	11.16	-2.21	8.95	36	PASS
11	2462	6	10.70	-2.21	8.49	36	PASS

802.11n_HT20M Ch0							
CH	Freq. (MHz)	Data Rate	Avg. Output Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	RESULT
1	2412	MCS0	11.93	-2.21	9.72	36	PASS
2	2417	MCS0	12.73	-2.21	10.52	36	PASS
6	2437	MCS0	12.84	-2.21	**10.63**	36	PASS
10	2457	MCS0	12.76	-2.21	10.55	36	PASS
11	2462	MCS0	11.98	-2.21	9.77	36	PASS

802.11n_HT40M Ch0							
CH	Freq. (MHz)	Data Rate	Avg. Output Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	RESULT
3	2422	MCS0	8.86	-2.21	6.65	36	PASS
4	2427	MCS0	9.01	-2.21	**6.80**	36	PASS
6	2437	MCS0	8.96	-2.21	6.75	36	PASS
8	2447	MCS0	8.77	-2.21	6.56	36	PASS
9	2452	MCS0	8.82	-2.21	6.61	36	PASS

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 (dBμV/m) = 20 log Emission level (dBμV/m)

8.2 Measurement Equipment Used:

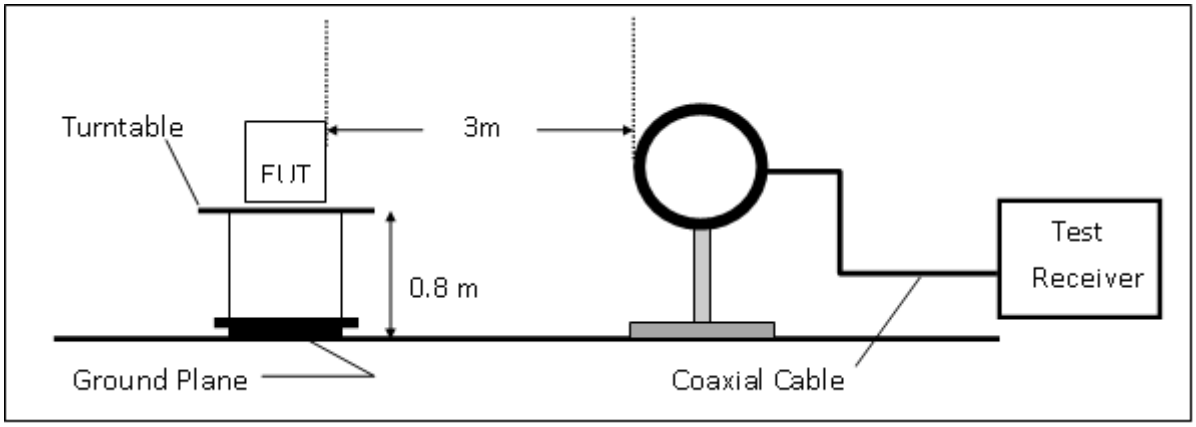
966 Chamber					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Horn Antenna	Schwarzbeck	BBHA9170	184	12/25/2019	12/24/2020
Horn Antenna	Schwarzbeck	BBHA9120D	D803	12/20/2019	12/19/2020
Bi-log Antenna	TESEO	CBL 6112D	35242 & AT-N0555	01/10/2019	01/09/2020
Loop Antenna	ETS.LINDGREN	6502	148045	10/15/2019	10/14/2020
DC Power Supply	Agilent	E3640A	MY52410006	12/10/2019	12/09/2020
EMI Test Receiver	R&S	ESCI 7	1166.5950.07	07/04/2019	07/03/2020
EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY51440113	07/15/2019	07/14/2020
Pre-Amplifier	EMC Instruments	EMC184045B	980135	01/02/2019	01/01/2020
Pre-Amplifier	EMC Instruments	EMC184045B	980135	01/02/2020	01/01/2021
Pre-Amplifier	EMC Instruments	EMC051825	980152	01/02/2019	01/01/2020
Pre-Amplifier	EMC Instruments	EMC051825	980152	01/02/2020	01/01/2021
Pre-Amplifier	HP	8447D	2944A09469	01/02/2019	01/01/2020
Pre-Amplifier	HP	8447D	2944A09469	01/02/2020	01/01/2021
Attenuator	Mini-Circuit	BW-S10W2+	4	01/02/2019	01/01/2020
Attenuator	Mini-Circuit	BW-S10W2+	4	01/02/2020	01/01/2021
Filter 2400-2483.5 MHz	EWT	EWT-14-0166	M1	01/02/2019	01/01/2020
Filter 2400-2483.5 MHz	EWT	EWT-14-0166	M1	01/02/2020	01/01/2021
High Pass Filter	WI	WHKX4.0/18G-10SS	22	01/02/2019	01/01/2020
High Pass Filter	WI	WHKX4.0/18G-10SS	22	01/02/2020	01/01/2021
Coaxial Cable	Huber Suhner	succoflex 102	MY2622/2	01/02/2019	01/01/2020

Coaxial Cable	Huber Suhner	succoflex 102	MY2622/2	01/02/2020	01/01/2021
Coaxial Cable	Huber Suhner	succoflex 104A	800086/4a	01/02/2019	01/01/2020
Coaxial Cable	Huber Suhner	succoflex 104A	800086/4a	01/02/2020	01/01/2021
Coaxial Cable	Huber Suhner	EMC 104-SM-SM-2000	160123	01/02/2019	01/01/2020
Coaxial Cable	Huber Suhner	EMC 104-SM-SM-2000	160123	01/02/2020	01/01/2021

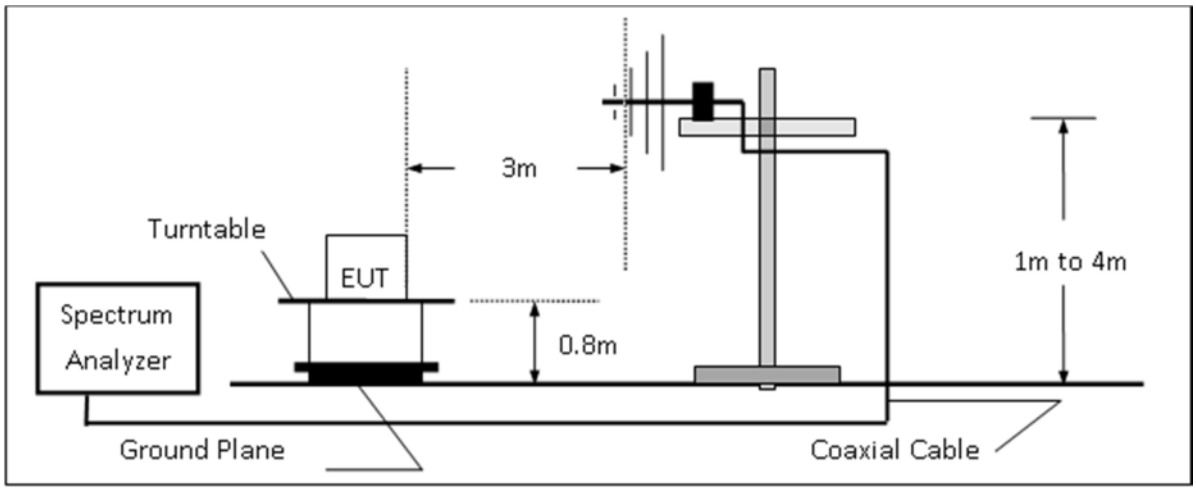
NOTE: N.C.R refers to Not Calibrated Required.

8.3 Test SET-UP

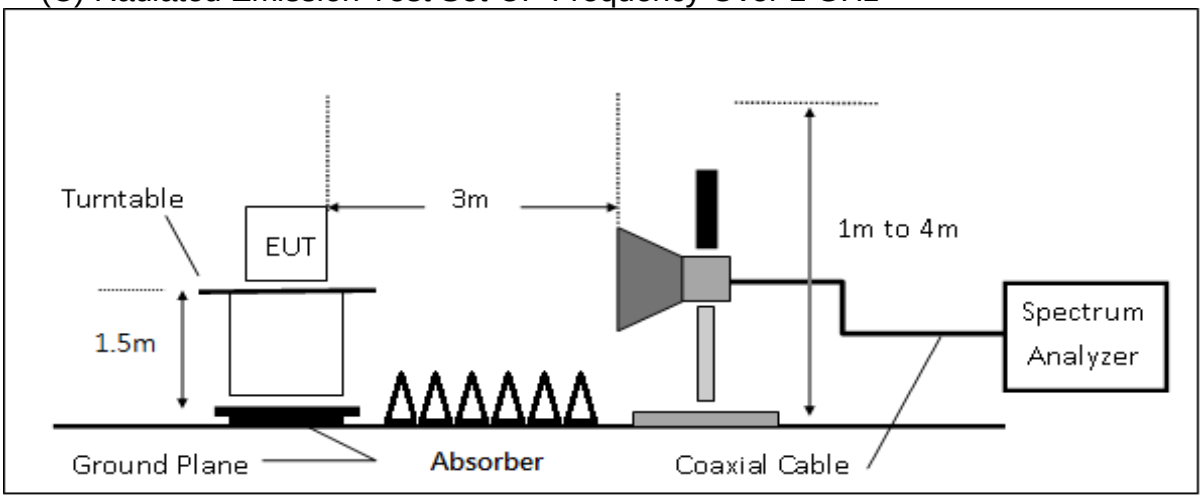
(A) Radiated Emission Test Set-UP Frequency Below 30MHz.



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



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



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 ≥ 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.

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

*The limit of the emission level is expressed in dBuV/m, which converts 20*log(uV/m)*

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

Factor(dB) = Antenna Factor(dBμV/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) & RSS-GEN §6.13.2 was not reported.

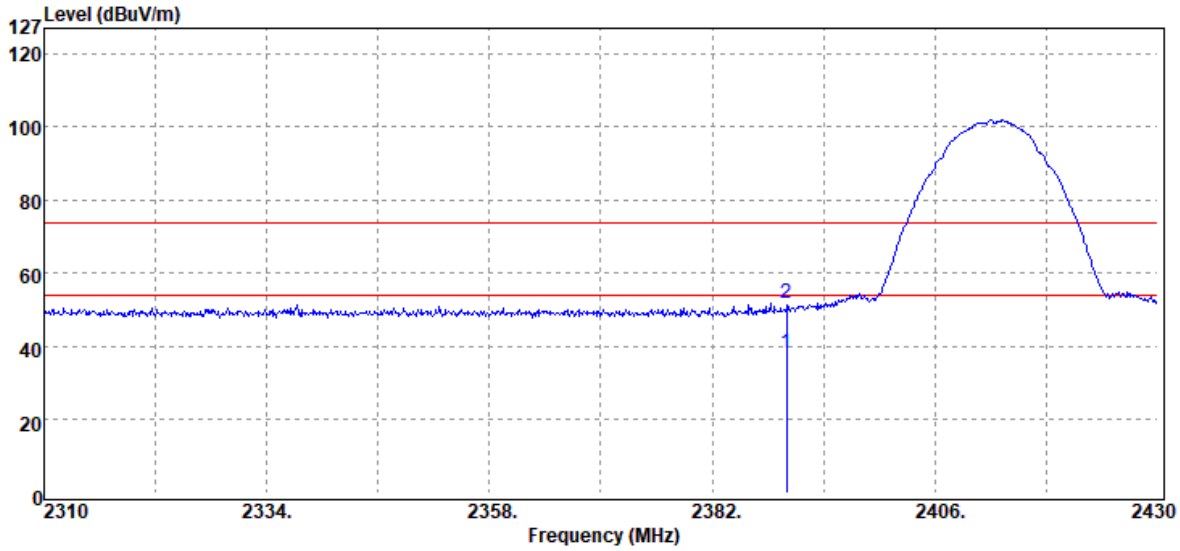
8.7 Measurement Result

Note:

1. *Refer to next page spectrum analyzer data chart and tabular data sheets.*
2. *Measurements are completed at peak and average level, the mark of average is the highest emission in restricted bands*

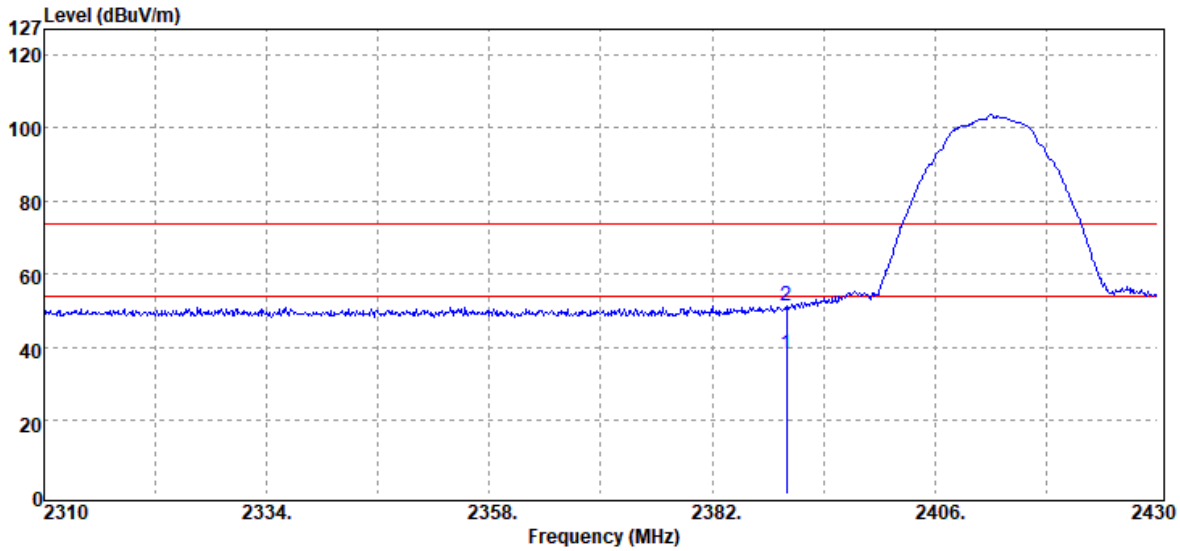
8.7.1 Radiated Band Edge Measurement Result

Report Number	:ER/2019/C0115	Test Date	:2020-01-06
Operation Mode	:802.11b	Temp./Humi.	:22.6/64
Test Channel	:2412 MHz	Antenna Pol.	:VERTICAL
Test Mode	:Bandedge CH Low	Engineer	:Thomas
EUT Pol	:E2 Plane		



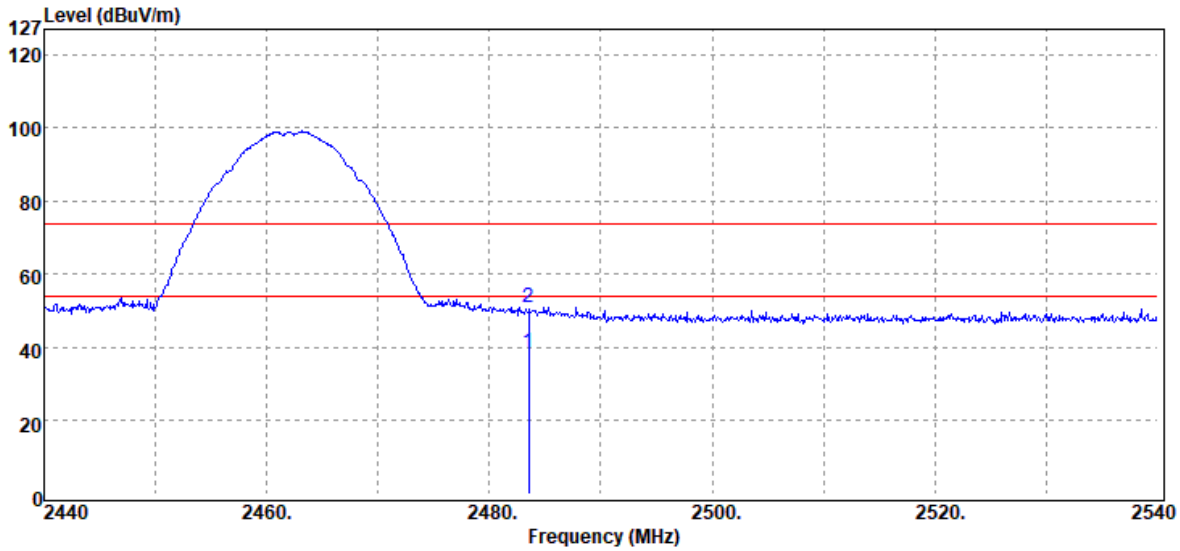
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2390.00	Average	30.71	7.57	38.28	54.00	-15.72
2390.00	Peak	44.37	7.57	51.94	74.00	-22.06

Report Number	:ER/2019/C0115	Test Date	:2020-01-06
Operation Mode	:802.11b	Temp./Humi.	:22.6/64
Test Channel	:2412 MHz	Antenna Pol.	:HORIZONTAL
Test Mode	:Bandedge CH Low	Engineer	:Thomas
EUT Pol	:E2 Plane		



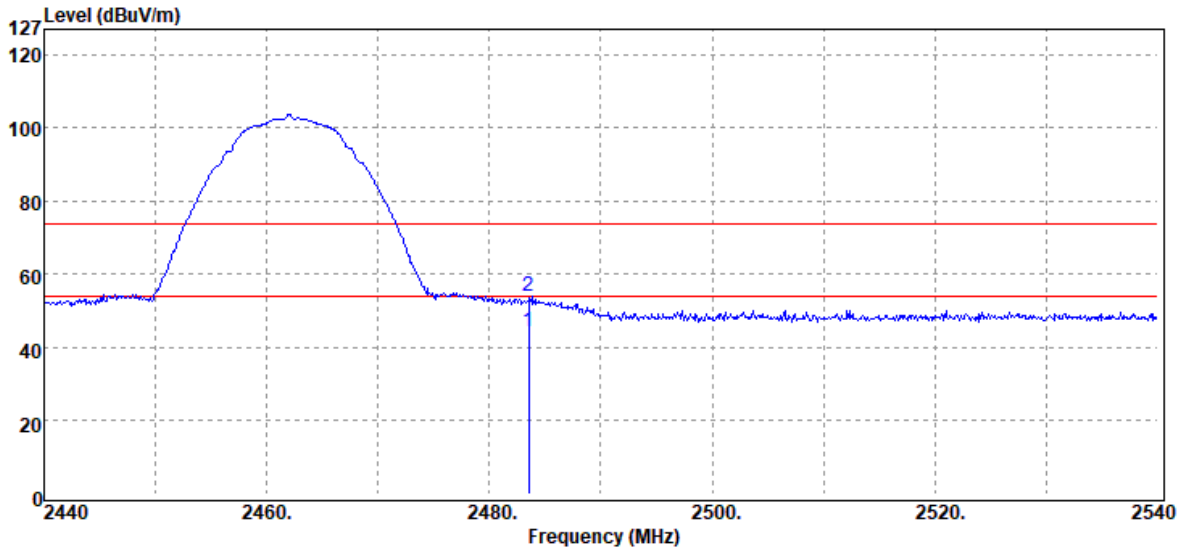
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2390.00	Average	30.61	7.57	38.18	54.00	-15.82
2390.00	Peak	43.95	7.57	51.52	74.00	-22.48

Report Number	:ER/2019/C0115	Test Date	:2020-01-06
Operation Mode	:802.11b	Temp./Humi.	:22.6/64
Test Channel	:2462 MHz	Antenna Pol.	:VERTICAL
Test Mode	:Bandedge CH High	Engineer	:Thomas
EUT Pol	:E2 Plane		



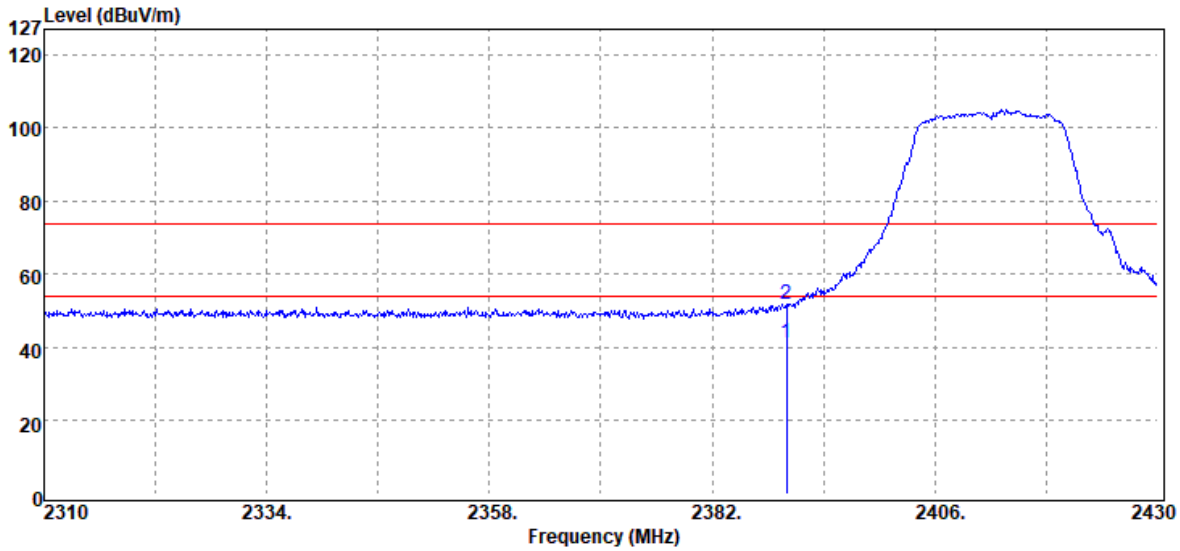
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2483.50	Average	31.77	6.94	38.71	54.00	-15.29
2483.50	Peak	44.16	6.94	51.10	74.00	-22.90

Report Number	:ER/2019/C0115	Test Date	:2020-01-06
Operation Mode	:802.11b	Temp./Humi.	:22.6/64
Test Channel	:2462 MHz	Antenna Pol.	:HORIZONTAL
Test Mode	:Bandedge CH High	Engineer	:Thomas
EUT Pol	:E2 Plane		



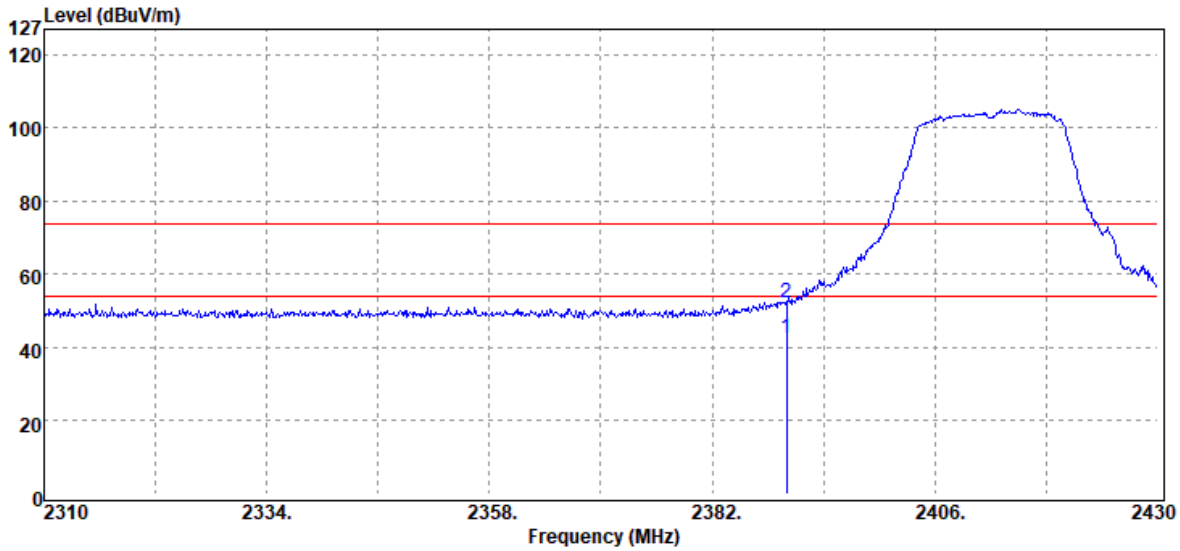
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2483.50	Average	37.25	6.94	44.19	54.00	-9.81
2483.50	Peak	47.28	6.94	54.22	74.00	-19.78

Report Number	:ER/2019/C0115	Test Date	:2020-01-06
Operation Mode	:802.11g	Temp./Humi.	:22.6/64
Test Channel	:2412 MHz	Antenna Pol.	:VERTICAL
Test Mode	:Bandedge CH Low	Engineer	:Thomas
EUT Pol	:E2 Plane		



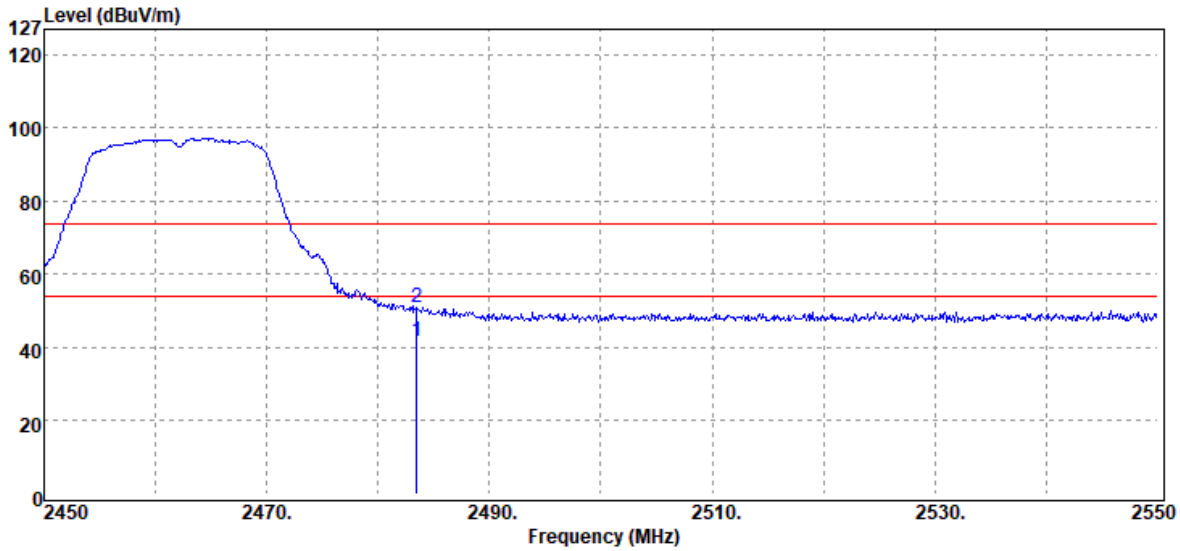
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2390.00	Average	33.85	7.57	41.42	54.00	-12.58
2390.00	Peak	44.10	7.57	51.67	74.00	-22.33

Report Number	:ER/2019/C0115	Test Date	:2020-01-06
Operation Mode	:802.11g	Temp./Humi.	:22.6/64
Test Channel	:2412 MHz	Antenna Pol.	:HORIZONTAL
Test Mode	:Bandedge CH Low	Engineer	:Thomas
EUT Pol	:E2 Plane		



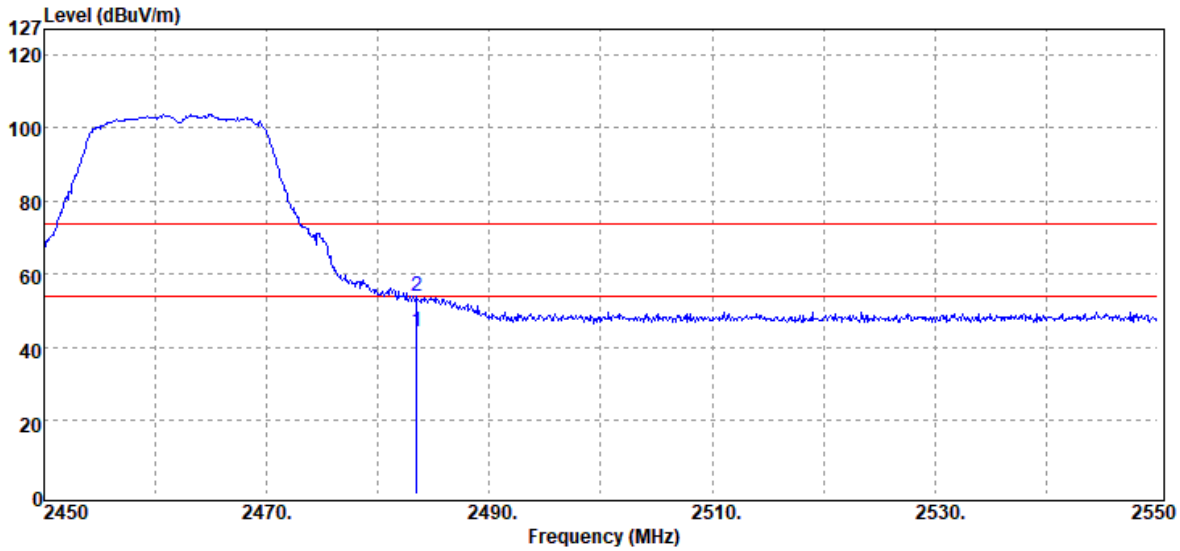
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2390.00	Average	35.27	7.57	42.84	54.00	-11.16
2390.00	Peak	44.93	7.57	52.50	74.00	-21.50

Report Number	:ER/2019/C0115	Test Date	:2020-01-06
Operation Mode	:802.11g	Temp./Humi.	:22.6/64
Test Channel	:2462 MHz	Antenna Pol.	:VERTICAL
Test Mode	:Bandedge CH High	Engineer	:Thomas
EUT Pol	:E2 Plane		



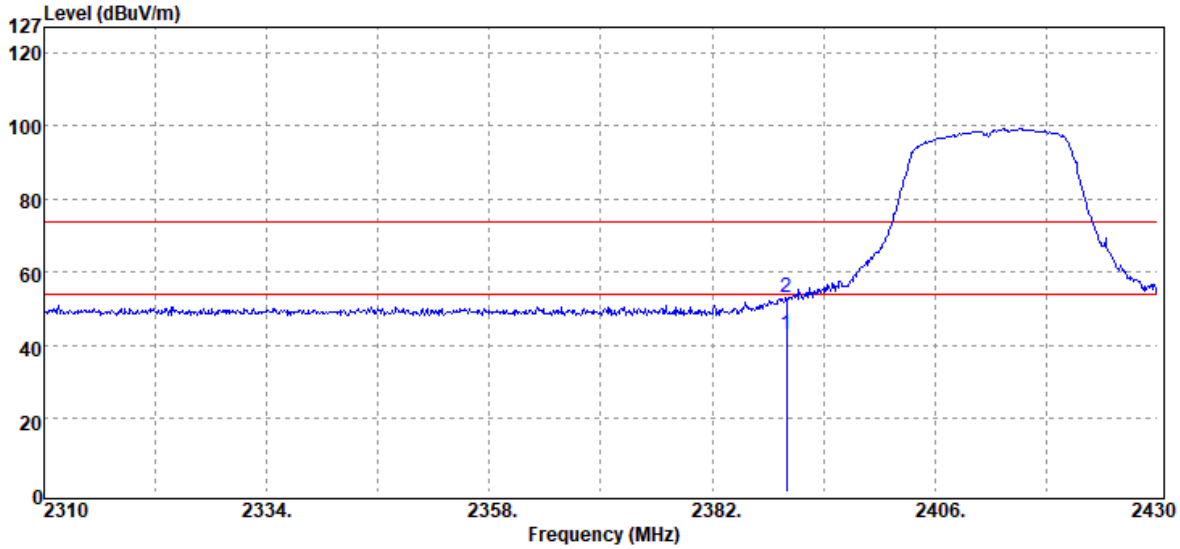
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2483.50	Average	34.61	6.94	41.55	54.00	-12.45
2483.50	Peak	44.13	6.94	51.07	74.00	-22.93

Report Number	:ER/2019/C0115	Test Date	:2020-01-06
Operation Mode	:802.11g	Temp./Humi.	:22.6/64
Test Channel	:2462 MHz	Antenna Pol.	:HORIZONTAL
Test Mode	:Bandedge CH High	Engineer	:Thomas
EUT Pol	:E2 Plane		



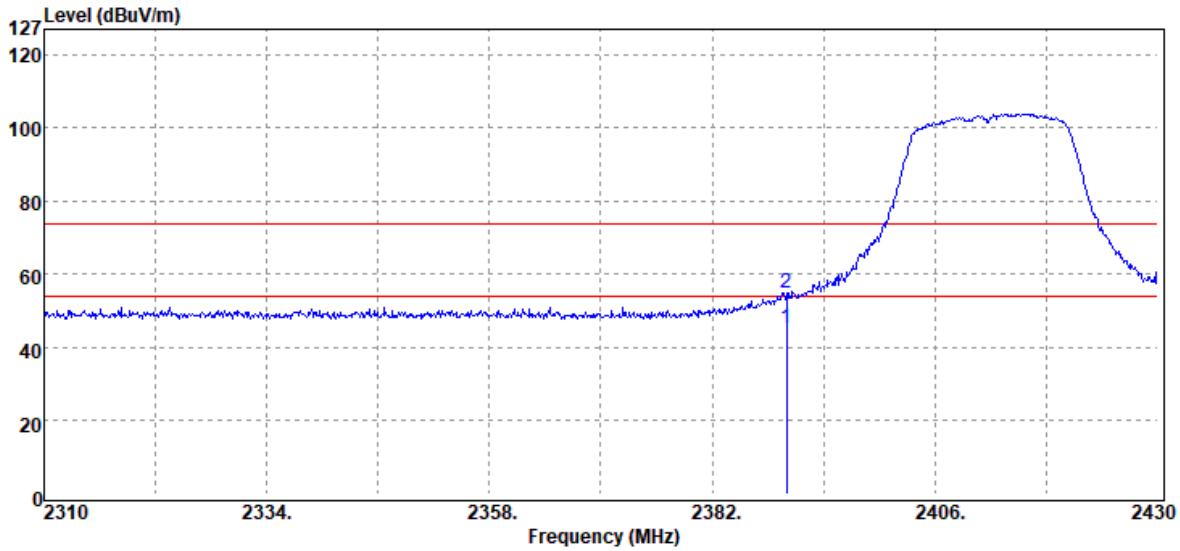
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2483.50	Average	37.55	6.94	44.49	54.00	-9.51
2483.50	Peak	47.04	6.94	53.98	74.00	-20.02

Report Number	:ER/2019/C0115	Test Date	:2020-01-06
Operation Mode	:802.11n20	Temp./Humi.	:22.6/64
Test Channel	:2412 MHz	Antenna Pol.	:VERTICAL
Test Mode	:Bandedge CH Low	Engineer	:Thomas
EUT Pol	:E2 Plane		



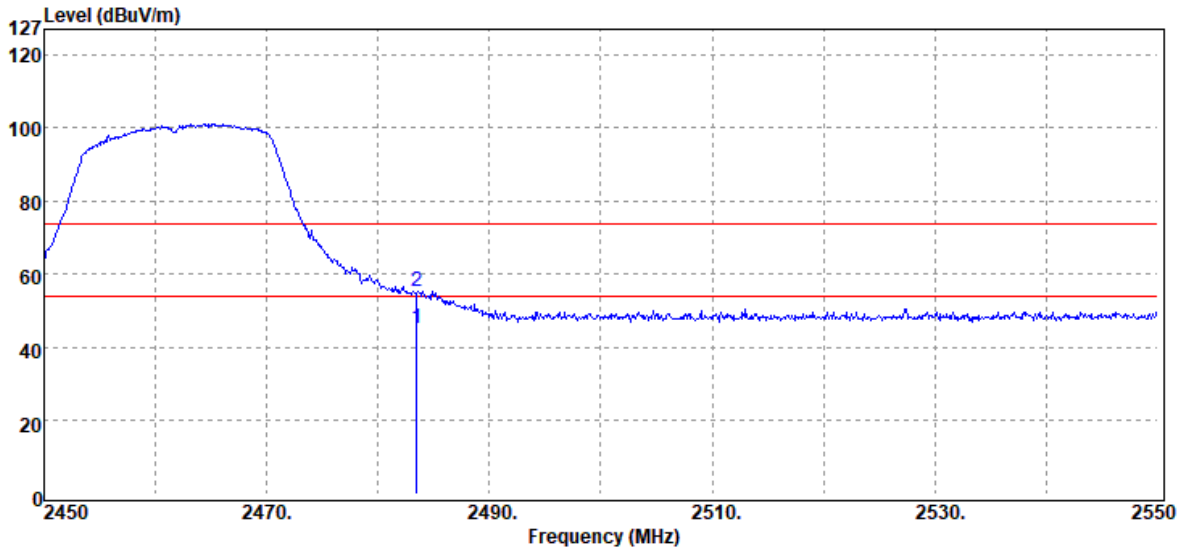
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2390.00	Average	35.52	7.57	43.09	54.00	-10.91
2390.00	Peak	45.55	7.57	53.12	74.00	-20.88

Report Number	:ER/2019/C0115	Test Date	:2020-01-06
Operation Mode	:802.11n20	Temp./Humi.	:22.6/64
Test Channel	:2412 MHz	Antenna Pol.	:HORIZONTAL
Test Mode	:Bandedge CH Low	Engineer	:Thomas
EUT Pol	:E2 Plane		



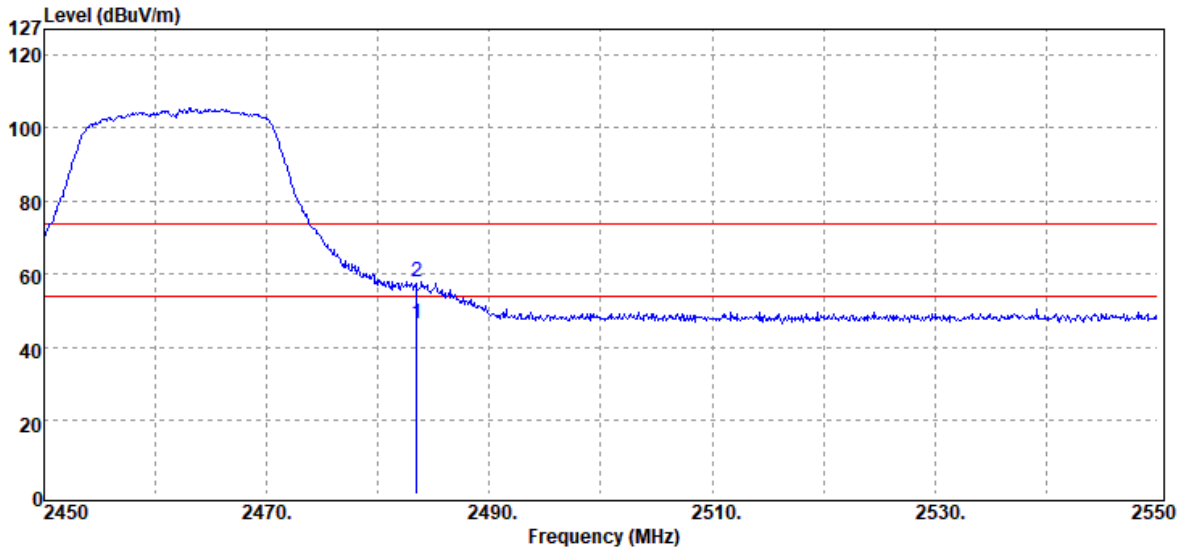
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2390.00	Average	37.70	7.57	45.27	54.00	-8.73
2390.00	Peak	47.54	7.57	55.11	74.00	-18.89

Report Number	:ER/2019/C0115	Test Date	:2020-01-06
Operation Mode	:802.11n20	Temp./Humi.	:22.6/64
Test Channel	:2462 MHz	Antenna Pol.	:VERTICAL
Test Mode	:Bandedge CH High	Engineer	:Thomas
EUT Pol	:E2 Plane		



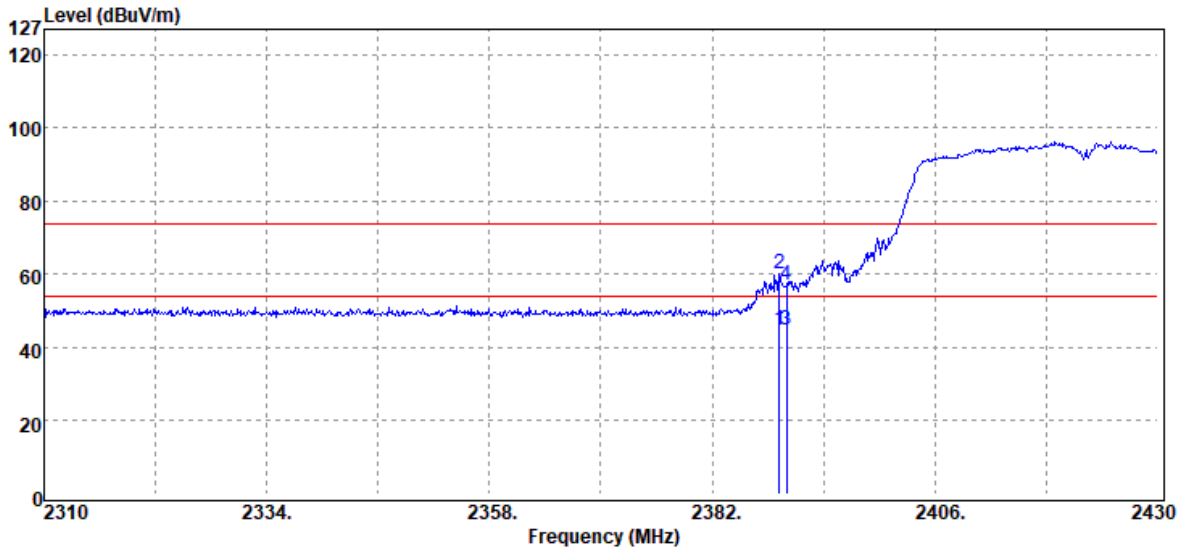
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2483.50	Average	38.22	6.94	45.16	54.00	-8.84
2483.50	Peak	48.53	6.94	55.47	74.00	-18.53

Report Number	:ER/2019/C0115	Test Date	:2020-01-06
Operation Mode	:802.11n20	Temp./Humi.	:22.6/64
Test Channel	:2462 MHz	Antenna Pol.	:HORIZONTAL
Test Mode	:Bandedge CH High	Engineer	:Thomas
EUT Pol	:E2 Plane		



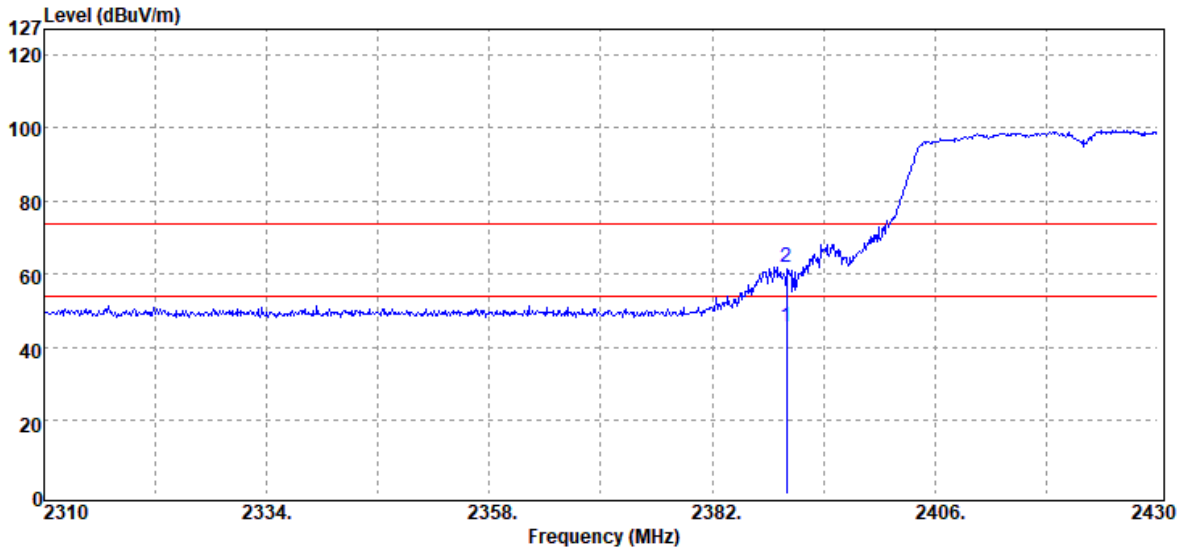
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2483.50	Average	39.79	6.94	46.73	54.00	-7.27
2483.50	Peak	51.26	6.94	58.20	74.00	-15.80

Report Number	:ER/2019/C0115	Test Date	:2020-01-06
Operation Mode	:802.11n40	Temp./Humi.	:22.6/64
Test Channel	:2422 MHz	Antenna Pol.	:VERTICAL
Test Mode	:Bandedge CH Low	Engineer	:Thomas
EUT Pol	:E2 Plane		



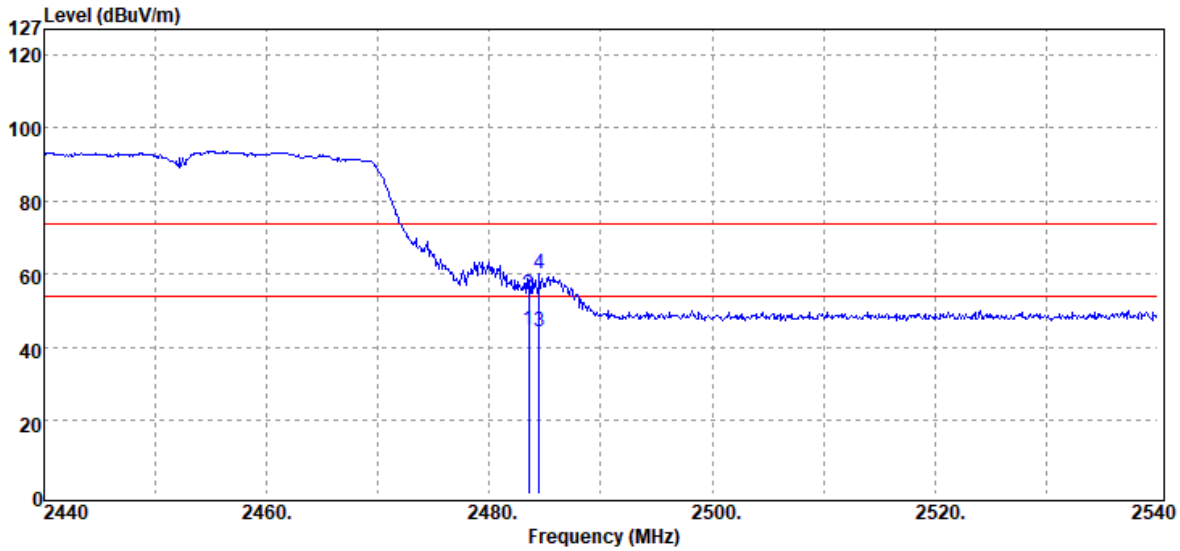
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2389.20	Average	37.10	7.57	44.67	54.00	-9.33
2389.20	Peak	52.49	7.57	60.06	74.00	-13.94
2390.04	Average	37.25	7.57	44.82	54.00	-9.18
2390.04	Peak	49.34	7.57	56.91	74.00	-17.09

Report Number	:ER/2019/C0115	Test Date	:2020-01-06
Operation Mode	:802.11n40	Temp./Humi.	:22.6/64
Test Channel	:2422 MHz	Antenna Pol.	:HORIZONTAL
Test Mode	:Bandedge CH Low	Engineer	:Thomas
EUT Pol	:E2 Plane		



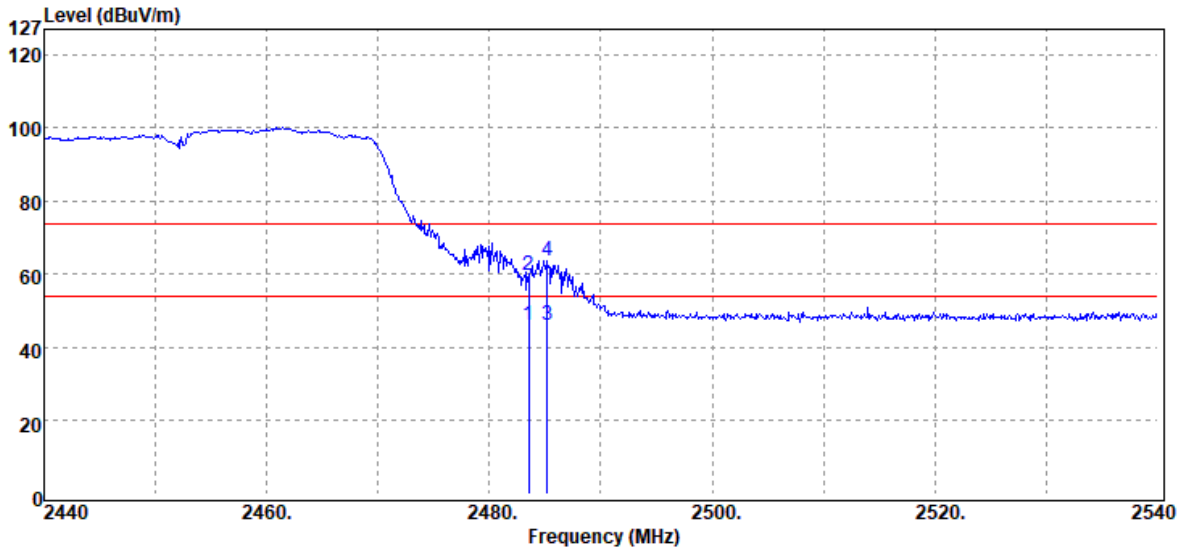
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2390.00	Average	38.03	7.57	45.60	54.00	-8.40
2390.00	Peak	54.40	7.57	61.97	74.00	-12.03

Report Number	:ER/2019/C0115	Test Date	:2020-01-06
Operation Mode	:802.11n40	Temp./Humi.	:22.6/64
Test Channel	:2452 MHz	Antenna Pol.	:VERTICAL
Test Mode	:Bandedge CH High	Engineer	:Thomas
EUT Pol	:E2 Plane		



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2483.50	Average	37.69	6.94	44.63	54.00	-9.37
2483.50	Peak	47.64	6.94	54.58	74.00	-19.42
2484.50	Average	37.51	6.93	44.44	54.00	-9.56
2484.50	Peak	53.28	6.93	60.21	74.00	-13.79

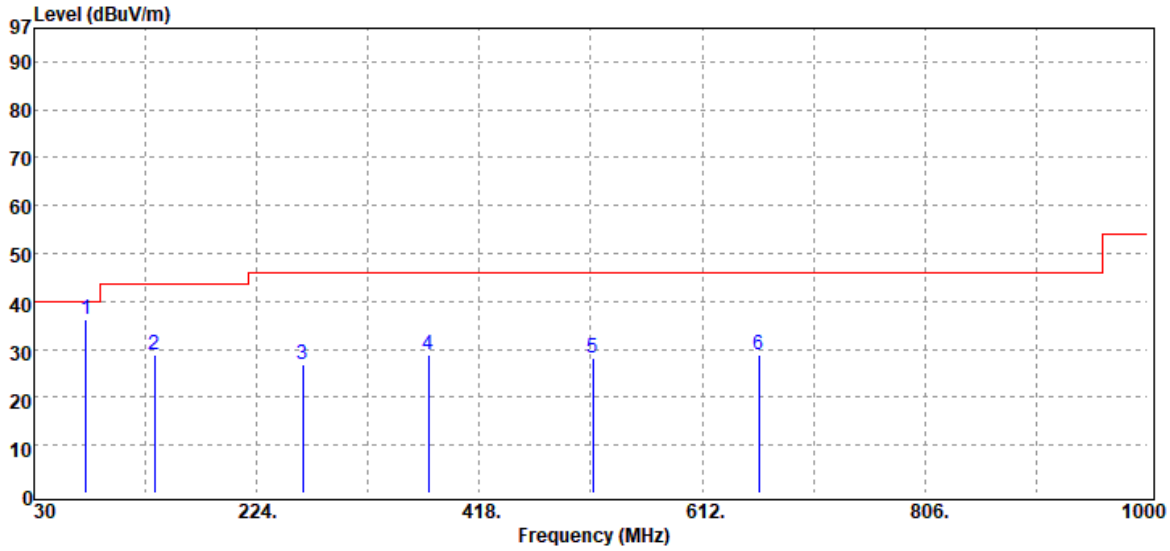
Report Number	:ER/2019/C0115	Test Date	:2020-01-06
Operation Mode	:802.11n40	Temp./Humi.	:22.6/64
Test Channel	:2452 MHz	Antenna Pol.	:HORIZONTAL
Test Mode	:Bandedge CH High	Engineer	:Thomas
EUT Pol	:E2 Plane		



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2483.50	Average	39.38	6.94	46.32	54.00	-7.68
2483.50	Peak	53.01	6.94	59.95	74.00	-14.05
2485.20	Average	39.02	6.93	45.95	54.00	-8.05
2485.20	Peak	56.98	6.93	63.91	74.00	-10.09

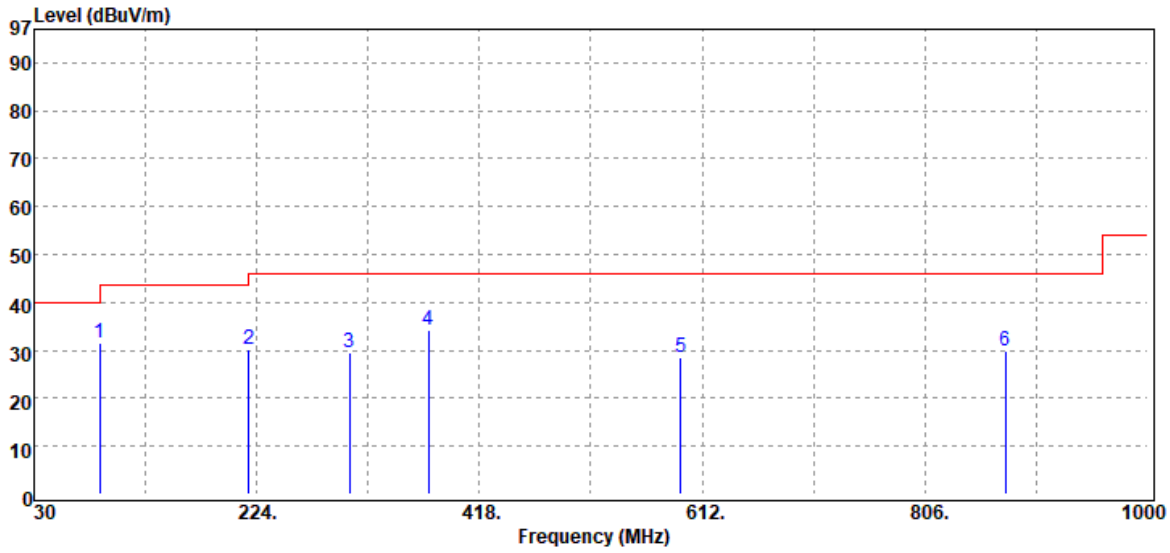
8.7.2 Below 1GHz Worst-Case Emission:

Report Number	:ER/2019/C0115	Test Date	:2020-01-07
Operation Mode	:802.11g	Temp./Humi.	:22.6/64
Test Channel	:2437 MHz	Antenna Pol.	:VERTICAL
Test Mode	:Tx CH Mid	Engineer	:Thomas
EUT Pol	:E2 Plane		



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
75.59	Peak	52.82	-16.74	36.08	40.00	-3.92
134.76	Peak	40.36	-11.60	28.76	43.50	-14.74
263.77	Peak	35.14	-8.43	26.71	46.00	-19.29
373.38	Peak	35.78	-6.97	28.81	46.00	-17.19
516.94	Peak	32.59	-4.40	28.19	46.00	-17.81
661.47	Peak	31.61	-2.66	28.95	46.00	-17.05

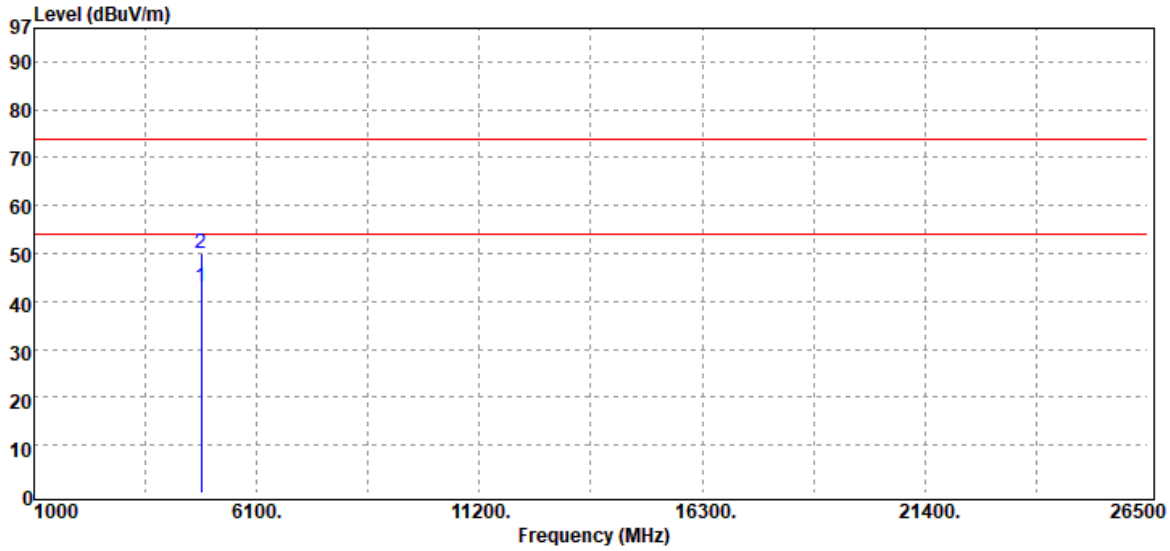
Report Number	:ER/2019/C0115	Test Date	:2020-01-07
Operation Mode	:802.11g	Temp./Humi.	:22.6/64
Test Channel	:2437 MHz	Antenna Pol.	:HORIZONTAL
Test Mode	:Tx CH Mid	Engineer	:Thomas
EUT Pol	:E2 Plane		



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
87.23	Peak	46.93	-15.33	31.60	40.00	-8.40
217.21	Peak	42.60	-12.29	30.31	46.00	-15.69
304.51	Peak	37.20	-7.82	29.38	46.00	-16.62
373.38	Peak	41.28	-6.97	34.31	46.00	-11.69
593.57	Peak	32.16	-3.54	28.62	46.00	-17.38
875.84	Peak	29.41	0.60	30.01	46.00	-15.99

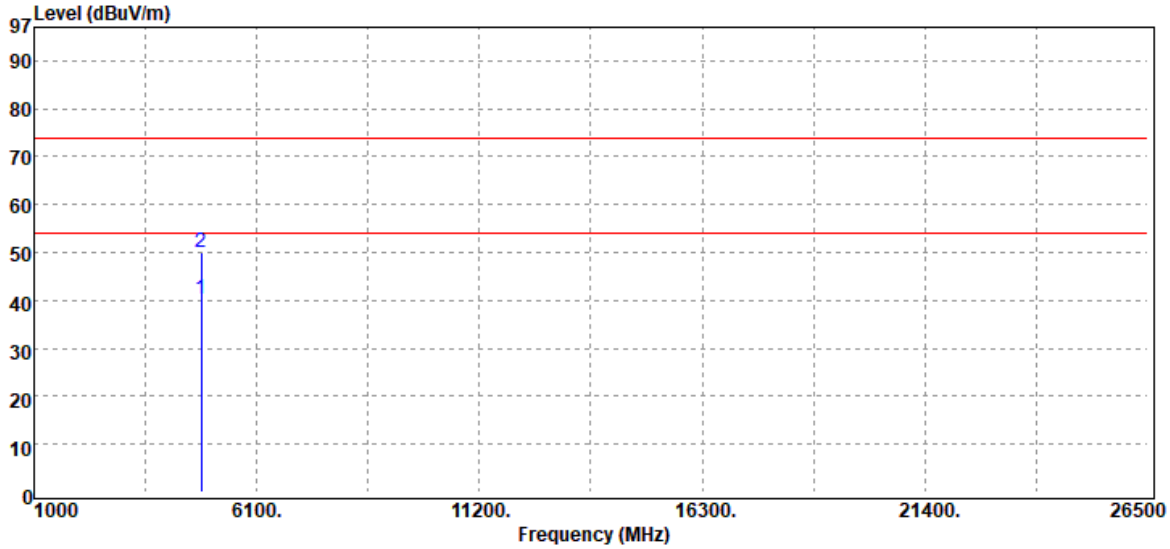
8.7.3 Above 1GHz Emission:

Report Number	:ER/2019/C0115	Test Date	:2020-01-06
Operation Mode	:802.11b	Temp./Humi.	:22.6/64
Test Channel	:2412 MHz	Antenna Pol.	:VERTICAL
Test Mode	:Tx CH Low	Engineer	:Thomas
EUT Pol	:E2 Plane		



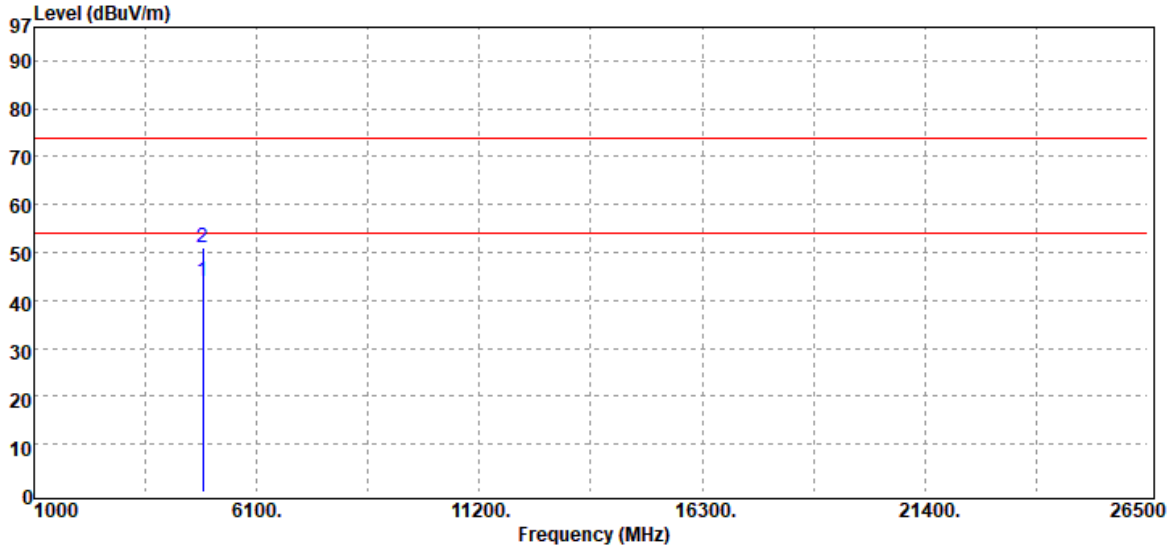
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4824.00	Average	28.23	14.74	42.97	54.00	-11.03
4824.00	Peak	35.31	14.74	50.05	74.00	-23.95

Report Number	:ER/2019/C0115	Test Date	:2020-01-06
Operation Mode	:802.11b	Temp./Humi.	:22.6/64
Test Channel	:2412 MHz	Antenna Pol.	:HORIZONTAL
Test Mode	:Tx CH Low	Engineer	:Thomas
EUT Pol	:E2 Plane		



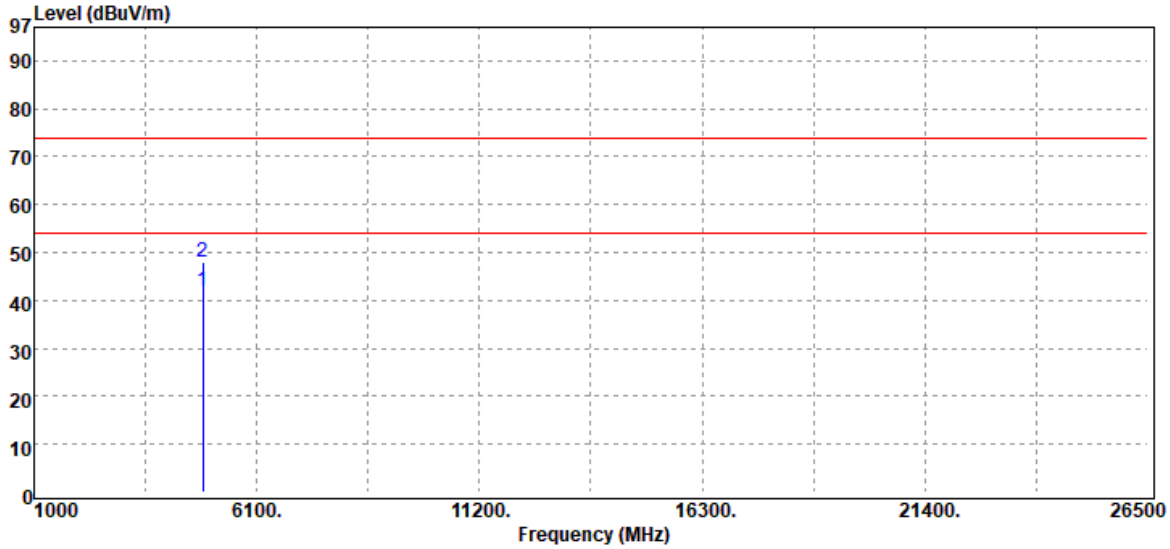
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4824.00	Average	25.66	14.74	40.40	54.00	-13.60
4824.00	Peak	35.41	14.74	50.15	74.00	-23.85

Report Number	:ER/2019/C0115	Test Date	:2019-12-31
Operation Mode	:802.11b	Temp./Humi.	:22.5/61
Test Channel	:2437 MHz	Antenna Pol.	:VERTICAL
Test Mode	:Tx CH Mid	Engineer	:Thomas
EUT Pol	:E2 Plane		



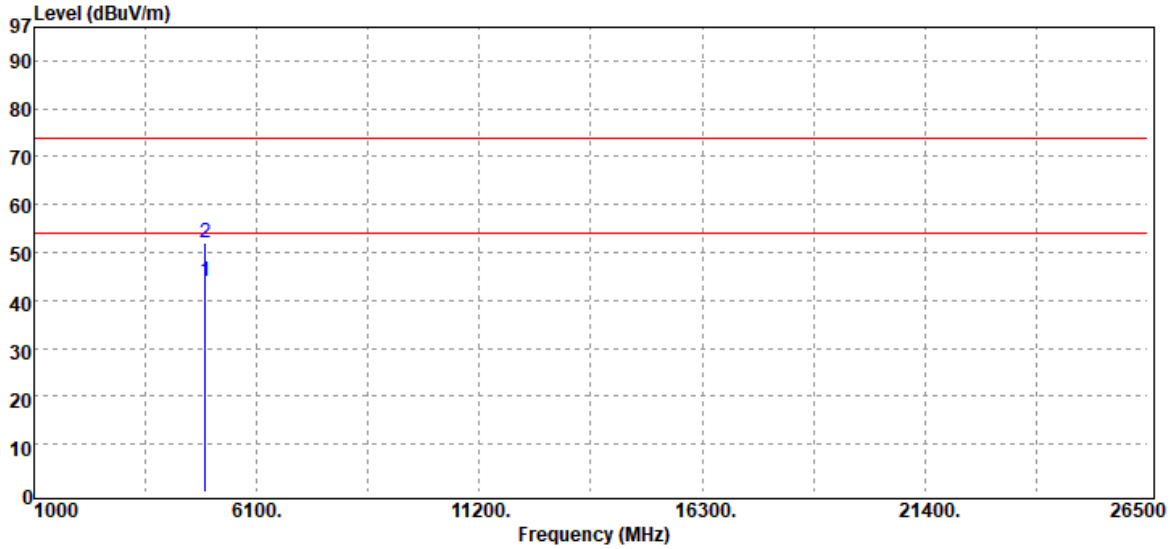
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4874.00	Average	28.99	15.04	44.03	54.00	-9.97
4874.00	Peak	36.09	15.04	51.13	74.00	-22.87

Report Number	:ER/2019/C0115	Test Date	:2019-12-31
Operation Mode	:802.11b	Temp./Humi.	:22.5/61
Test Channel	:2437 MHz	Antenna Pol.	:HORIZONTAL
Test Mode	:Tx CH Mid	Engineer	:Thomas
EUT Pol	:E2 Plane		



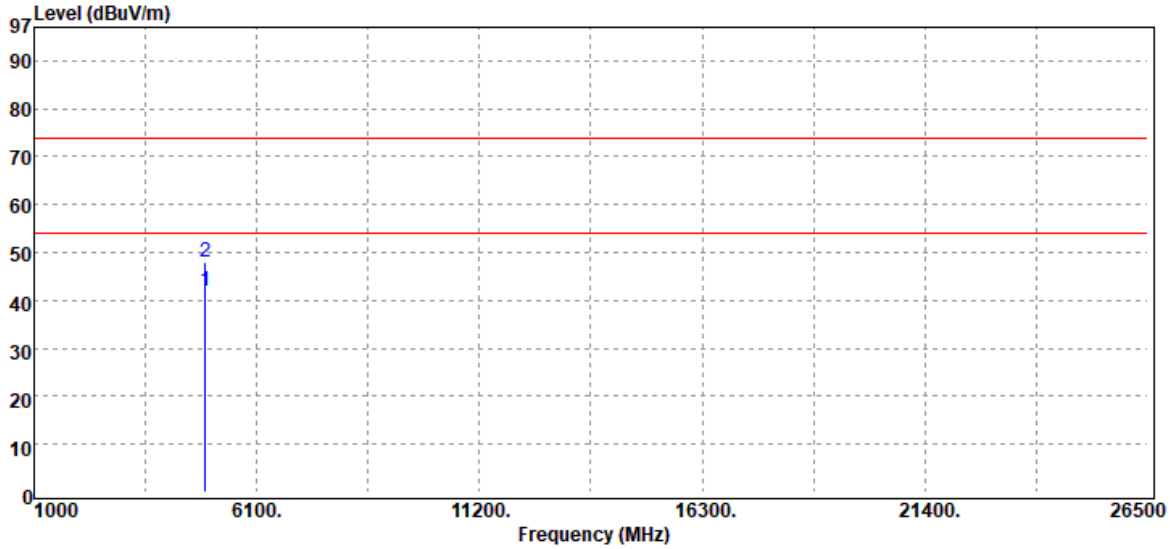
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4874.00	Average	26.99	15.04	42.03	54.00	-11.97
4874.00	Peak	32.93	15.04	47.97	74.00	-26.03

Report Number	:ER/2019/C0115	Test Date	:2020-01-07
Operation Mode	:802.11b	Temp./Humi.	:22.6/64
Test Channel	:2462 MHz	Antenna Pol.	:VERTICAL
Test Mode	:Tx CH High	Engineer	:Thomas
EUT Pol	:E2 Plane		



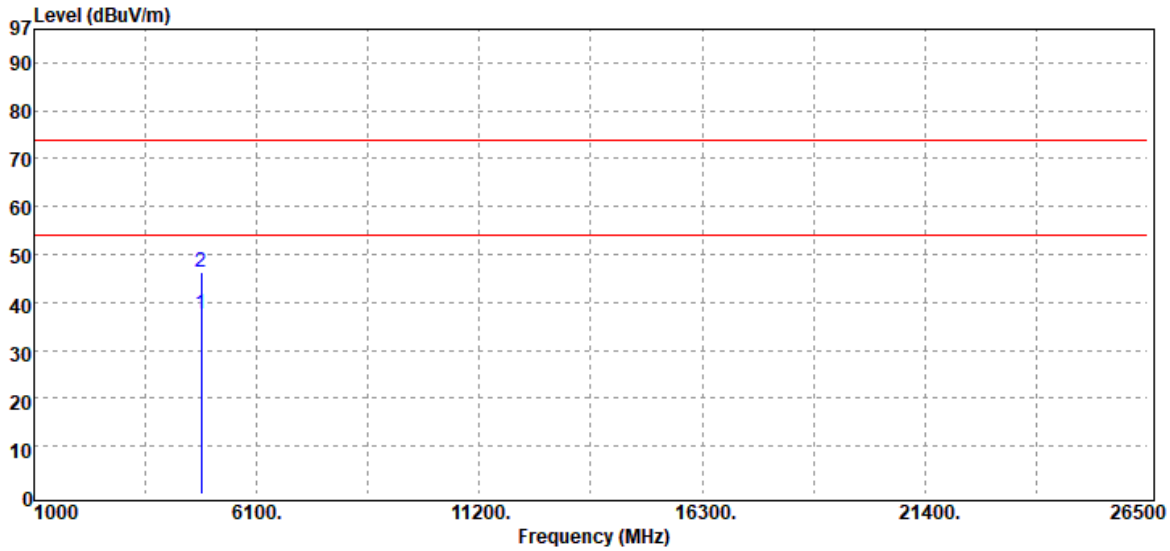
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4924.00	Average	28.85	15.17	44.02	54.00	-9.98
4924.00	Peak	36.97	15.17	52.14	74.00	-21.86

Report Number	:ER/2019/C0115	Test Date	:2020-01-06
Operation Mode	:802.11b	Temp./Humi.	:22.6/64
Test Channel	:2462 MHz	Antenna Pol.	:HORIZONTAL
Test Mode	:Tx CH High	Engineer	:Thomas
EUT Pol	:E2 Plane		



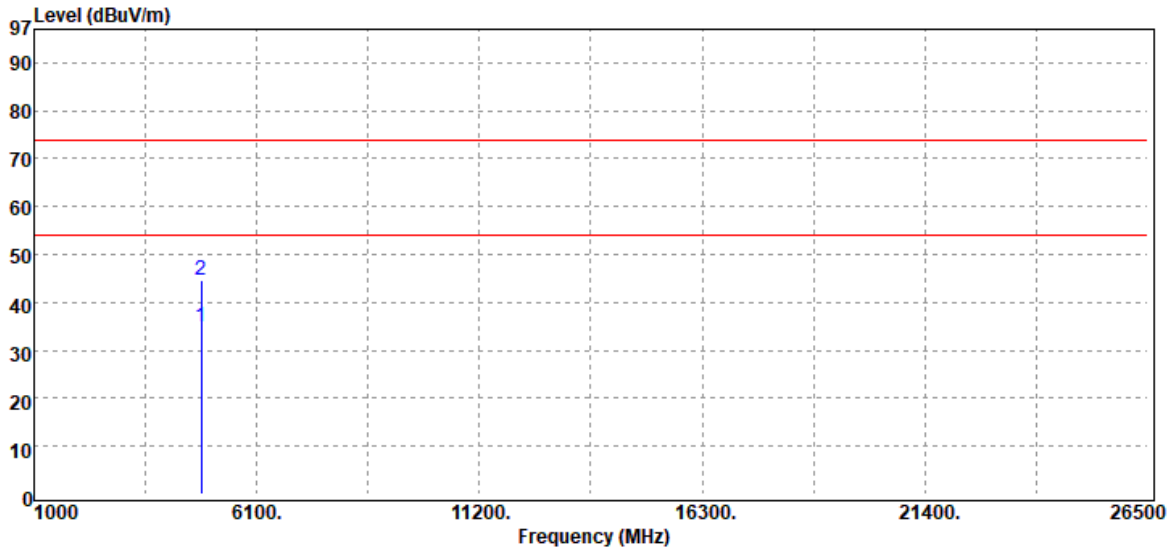
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4924.00	Average	26.78	15.17	41.95	54.00	-12.05
4924.00	Peak	32.78	15.17	47.95	74.00	-26.05

Report Number	:ER/2019/C0115	Test Date	:2020-01-06
Operation Mode	:802.11g	Temp./Humi.	:22.6/64
Test Channel	:2412 MHz	Antenna Pol.	:VERTICAL
Test Mode	:Tx CH Low	Engineer	:Thomas
EUT Pol	:E2 Plane		



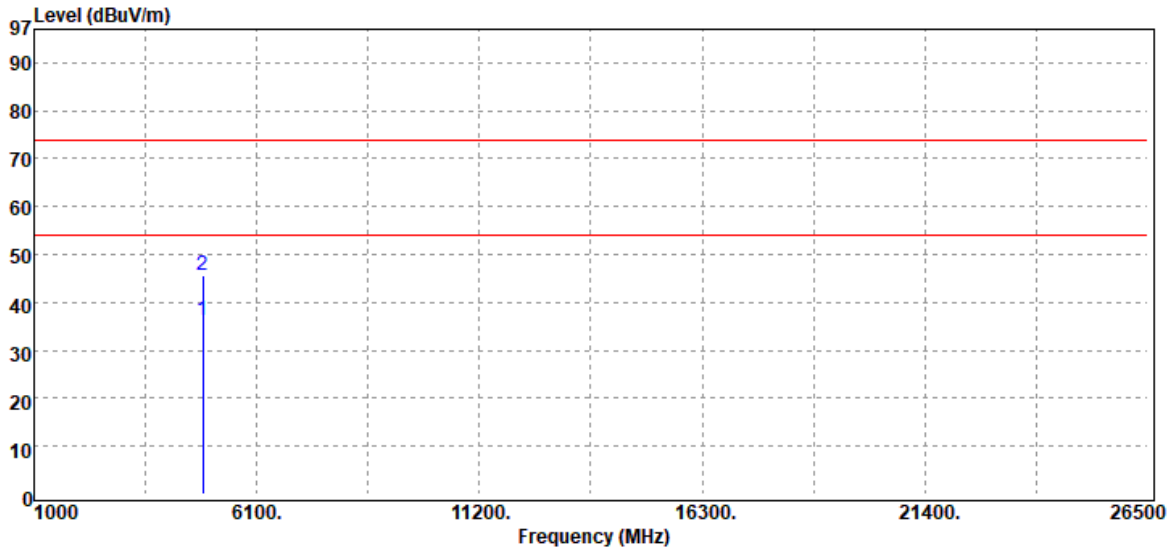
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4824.00	Average	22.79	14.74	37.53	54.00	-16.47
4824.00	Peak	31.65	14.74	46.39	74.00	-27.61

Report Number	:ER/2019/C0115	Test Date	:2020-01-06
Operation Mode	:802.11g	Temp./Humi.	:22.6/64
Test Channel	:2412 MHz	Antenna Pol.	:HORIZONTAL
Test Mode	:Tx CH Low	Engineer	:Thomas
EUT Pol	:E2 Plane		



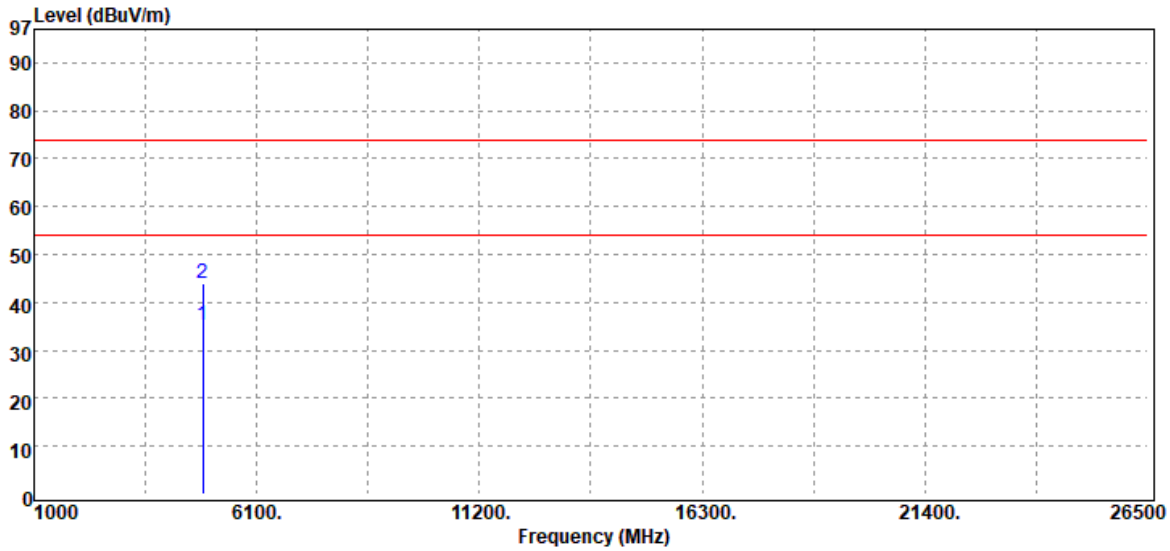
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4824.00	Average	20.08	14.74	34.82	54.00	-19.18
4824.00	Peak	29.73	14.74	44.47	74.00	-29.53

Report Number	:ER/2019/C0115	Test Date	:2020-01-06
Operation Mode	:802.11g	Temp./Humi.	:22.6/64
Test Channel	:2437 MHz	Antenna Pol.	:VERTICAL
Test Mode	:Tx CH Mid	Engineer	:Thomas
EUT Pol	:E2 Plane		



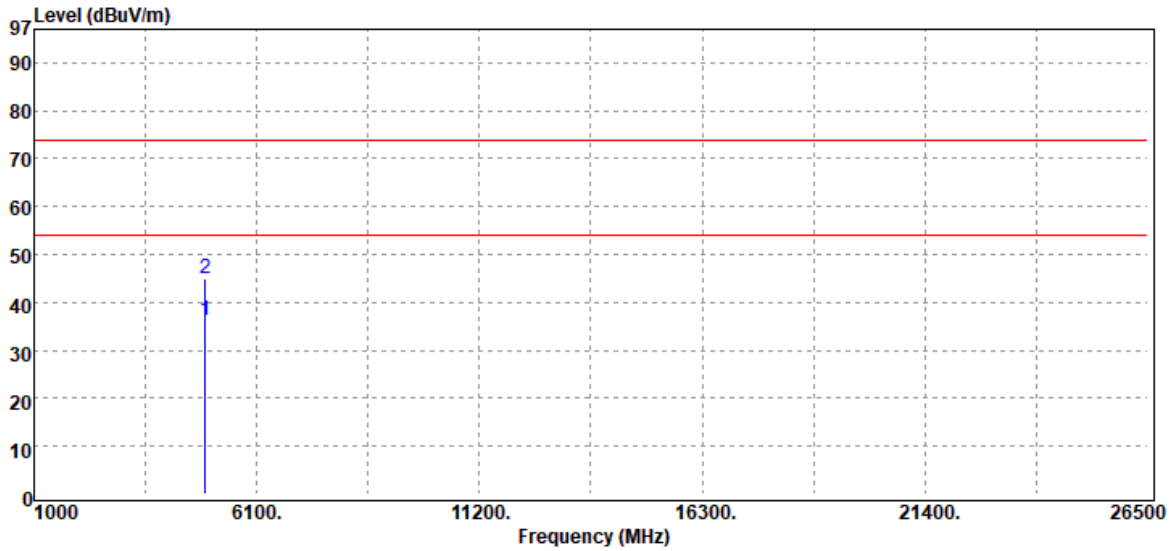
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4874.00	Average	21.32	15.04	36.36	54.00	-17.64
4874.00	Peak	30.63	15.04	45.67	74.00	-28.33

Report Number	:ER/2019/C0115	Test Date	:2020-01-06
Operation Mode	:802.11g	Temp./Humi.	:22.6/64
Test Channel	:2437 MHz	Antenna Pol.	:HORIZONTAL
Test Mode	:Tx CH Mid	Engineer	:Thomas
EUT Pol	:E2 Plane		



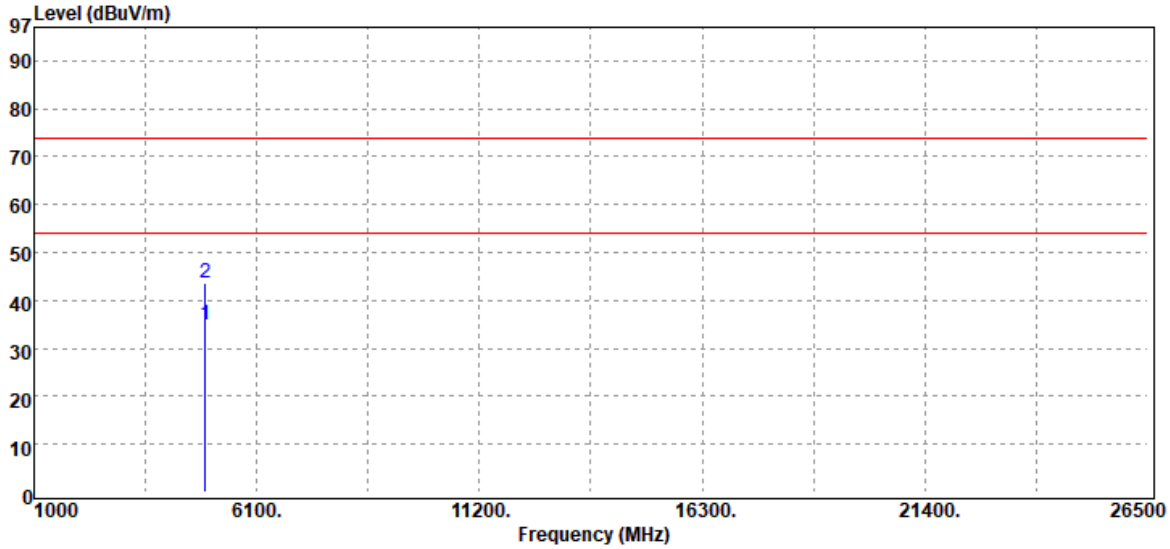
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4874.00	Average	20.16	15.04	35.20	54.00	-18.80
4874.00	Peak	28.78	15.04	43.82	74.00	-30.18

Report Number	:ER/2019/C0115	Test Date	:2020-01-06
Operation Mode	:802.11g	Temp./Humi.	:22.6/64
Test Channel	:2462 MHz	Antenna Pol.	:VERTICAL
Test Mode	:Tx CH High	Engineer	:Thomas
EUT Pol	:E2 Plane		



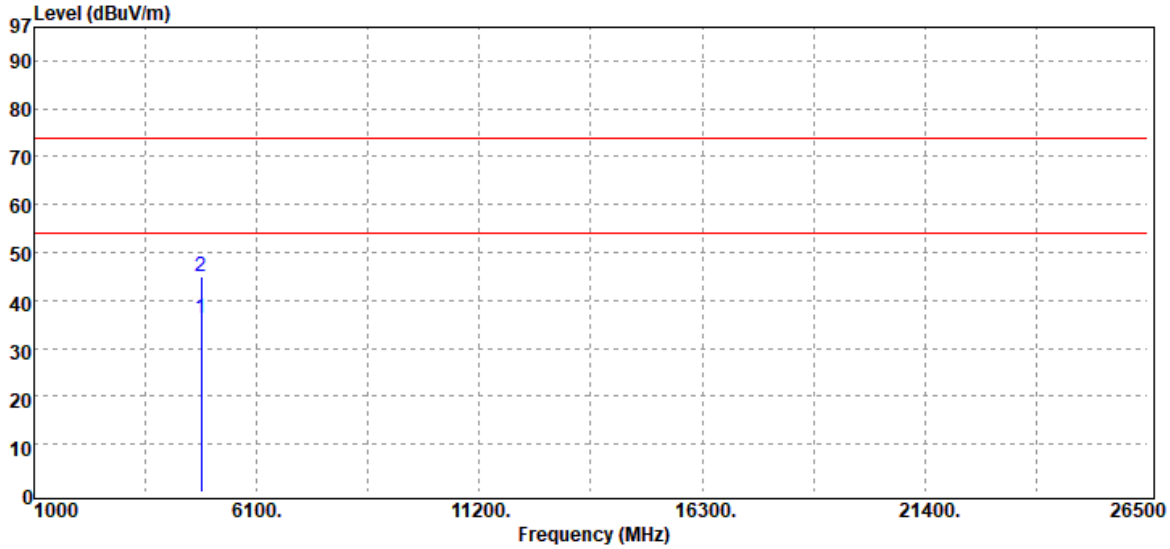
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4924.00	Average	20.95	15.17	36.12	54.00	-17.88
4924.00	Peak	29.69	15.17	44.86	74.00	-29.14

Report Number	:ER/2019/C0115	Test Date	:2020-01-06
Operation Mode	:802.11g	Temp./Humi.	:22.6/64
Test Channel	:2462 MHz	Antenna Pol.	:HORIZONTAL
Test Mode	:Tx CH High	Engineer	:Thomas
EUT Pol	:E2 Plane		



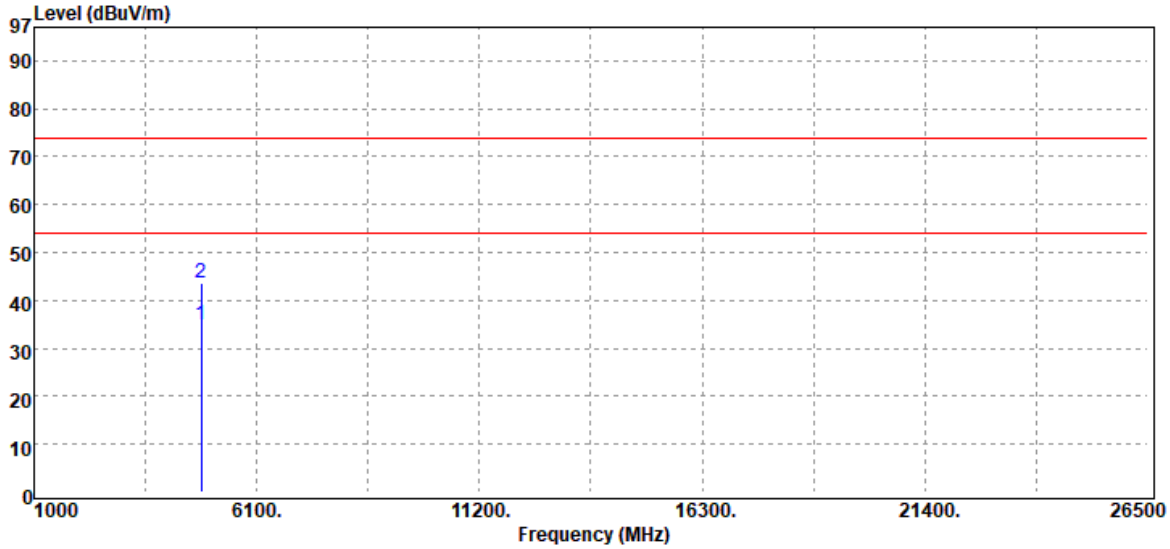
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4924.00	Average	19.69	15.17	34.86	54.00	-19.14
4924.00	Peak	28.59	15.17	43.76	74.00	-30.24

Report Number	:ER/2019/C0115	Test Date	:2020-01-06
Operation Mode	:802.11n20	Temp./Humi.	:22.6/64
Test Channel	:2412 MHz	Antenna Pol.	:VERTICAL
Test Mode	:Tx CH Low	Engineer	:Thomas
EUT Pol	:E2 Plane		



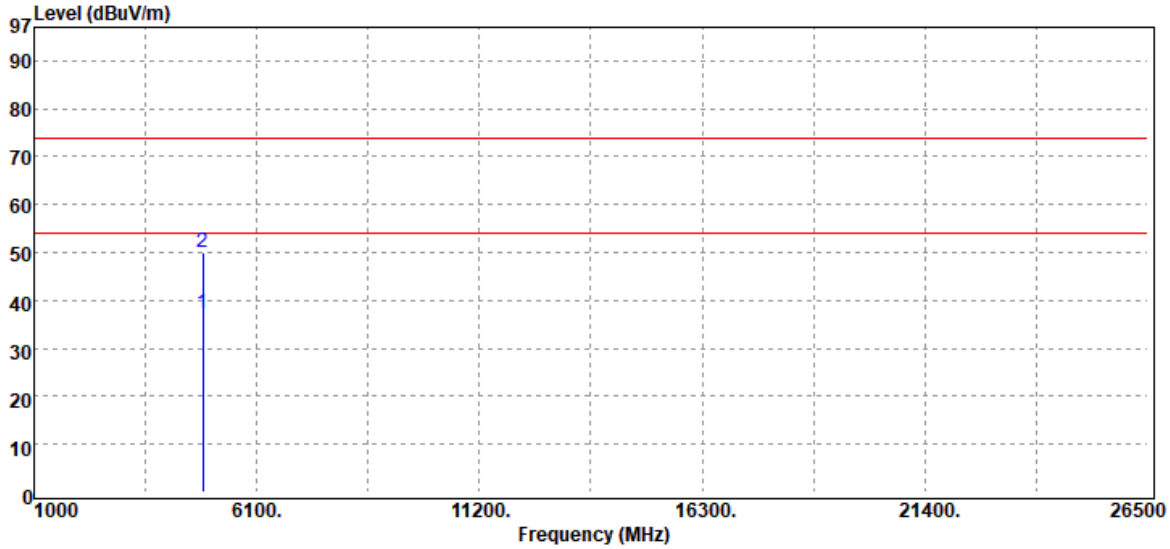
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4824.00	Average	21.67	14.74	36.41	54.00	-17.59
4824.00	Peak	30.15	14.74	44.89	74.00	-29.11

Report Number	:ER/2019/C0115	Test Date	:2020-01-06
Operation Mode	:802.11n20	Temp./Humi.	:22.6/64
Test Channel	:2412 MHz	Antenna Pol.	:HORIZONTAL
Test Mode	:Tx CH Low	Engineer	:Thomas
EUT Pol	:E2 Plane		



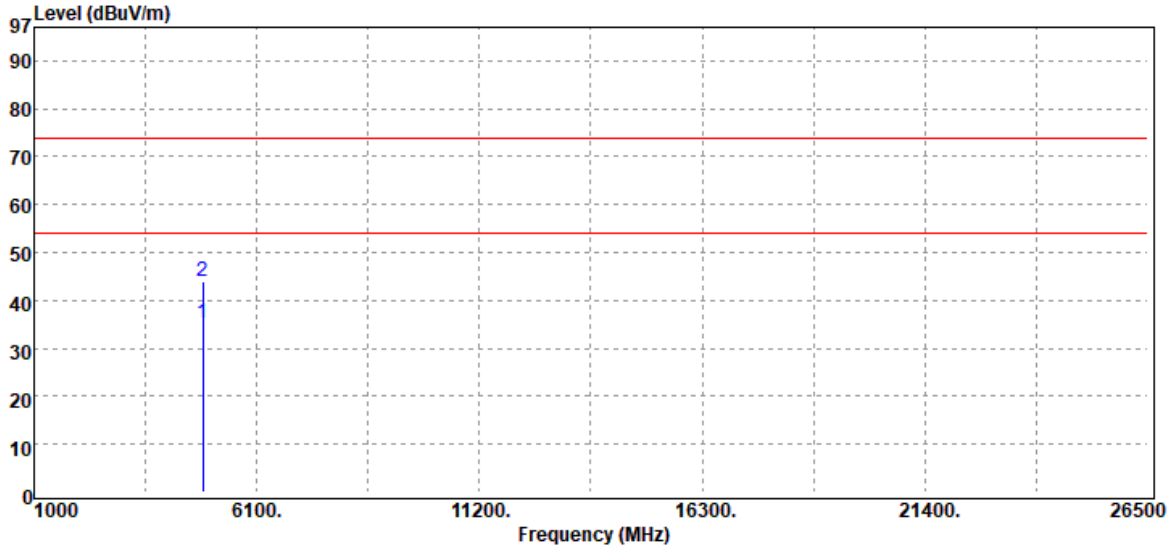
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4824.00	Average	20.08	14.74	34.82	54.00	-19.18
4824.00	Peak	29.03	14.74	43.77	74.00	-30.23

Report Number	:ER/2019/C0115	Test Date	:2020-01-06
Operation Mode	:802.11n20	Temp./Humi.	:22.6/64
Test Channel	:2437 MHz	Antenna Pol.	:VERTICAL
Test Mode	:Tx CH Mid	Engineer	:Thomas
EUT Pol	:E2 Plane		



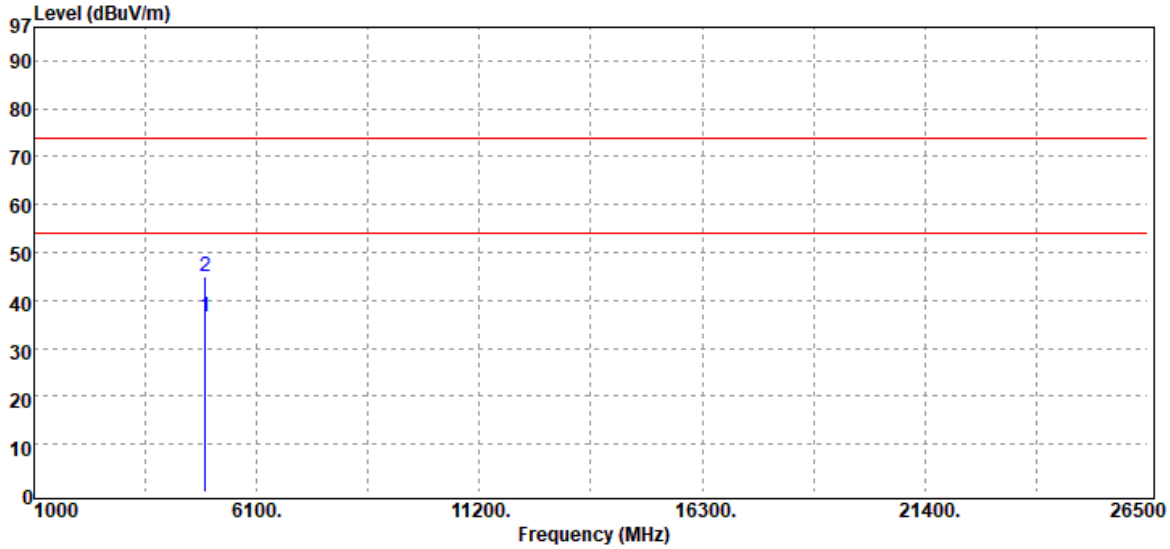
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4874.00	Average	22.18	15.04	37.22	54.00	-16.78
4874.00	Peak	35.10	15.04	50.14	74.00	-23.86

Report Number	:ER/2019/C0115	Test Date	:2020-01-06
Operation Mode	:802.11n20	Temp./Humi.	:22.6/64
Test Channel	:2437 MHz	Antenna Pol.	:HORIZONTAL
Test Mode	:Tx CH Mid	Engineer	:Thomas
EUT Pol	:E2 Plane		



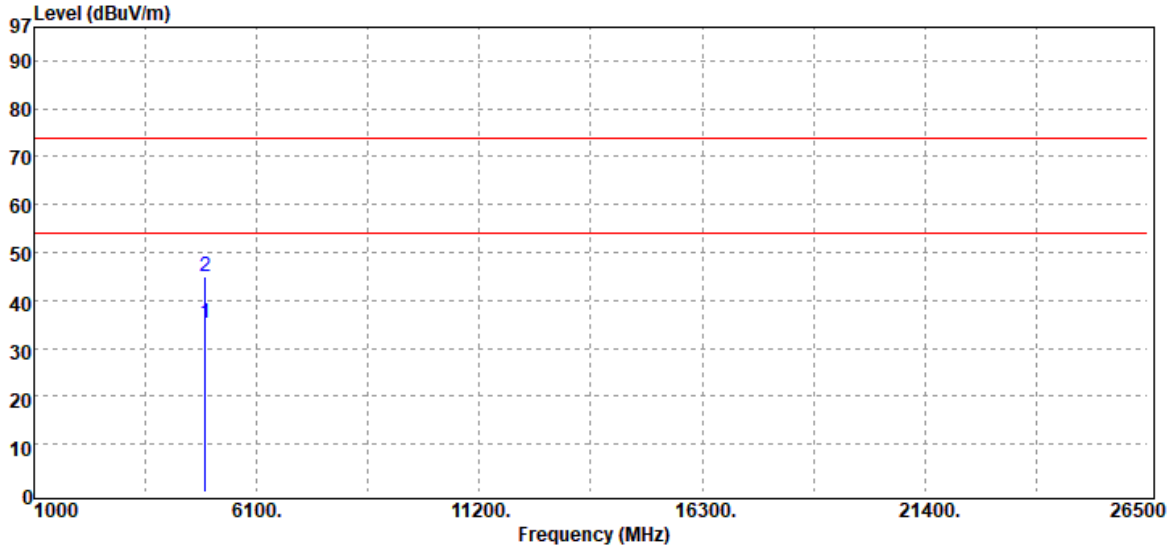
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4874.00	Average	20.34	15.04	35.38	54.00	-18.62
4874.00	Peak	29.06	15.04	44.10	74.00	-29.90

Report Number	:ER/2019/C0115	Test Date	:2020-01-06
Operation Mode	:802.11n20	Temp./Humi.	:22.6/64
Test Channel	:2462 MHz	Antenna Pol.	:VERTICAL
Test Mode	:Tx CH High	Engineer	:Thomas
EUT Pol	:E2 Plane		



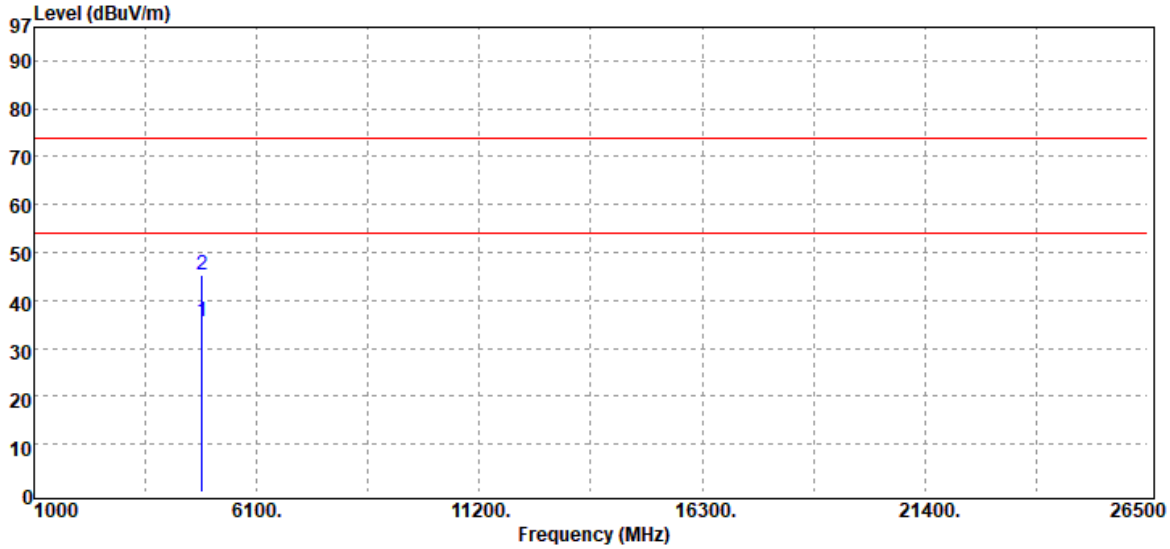
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4924.00	Average	21.32	15.17	36.49	54.00	-17.51
4924.00	Peak	29.94	15.17	45.11	74.00	-28.89

Report Number	:ER/2019/C0115	Test Date	:2020-01-06
Operation Mode	:802.11n20	Temp./Humi.	:22.6/64
Test Channel	:2462 MHz	Antenna Pol.	:HORIZONTAL
Test Mode	:Tx CH High	Engineer	:Thomas
EUT Pol	:E2 Plane		



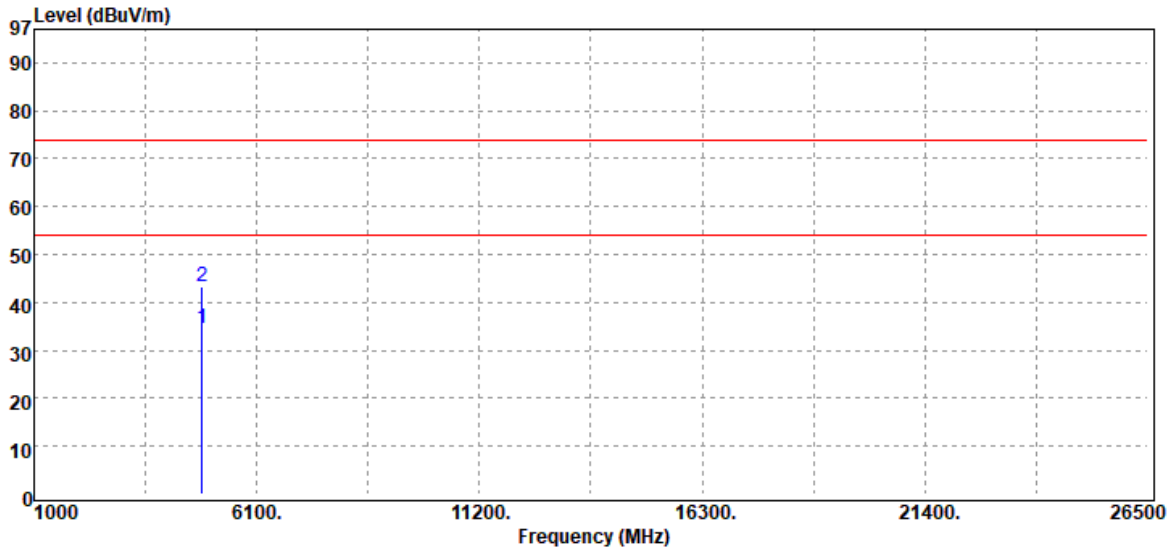
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4924.00	Average	19.98	15.17	35.15	54.00	-18.85
4924.00	Peak	29.73	15.17	44.90	74.00	-29.10

Report Number	:ER/2019/C0115	Test Date	:2020-01-06
Operation Mode	:802.11n40	Temp./Humi.	:22.6/64
Test Channel	:2422 MHz	Antenna Pol.	:VERTICAL
Test Mode	:Tx CH Low	Engineer	:Thomas
EUT Pol	:E2 Plane		



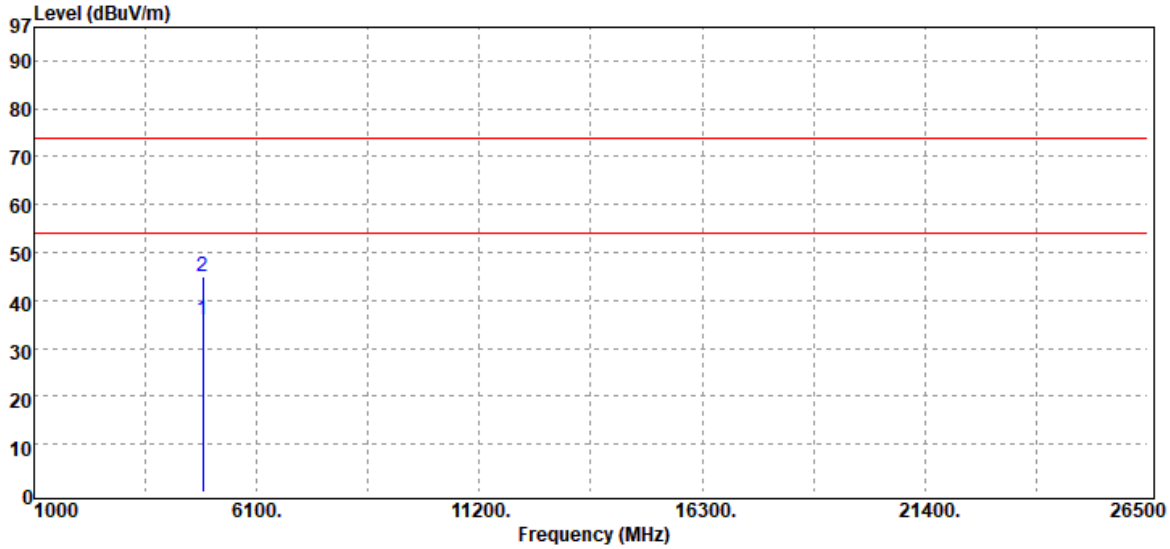
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4844.00	Average	20.83	14.87	35.70	54.00	-18.30
4844.00	Peak	30.51	14.87	45.38	74.00	-28.62

Report Number	:ER/2019/C0115	Test Date	:2020-01-06
Operation Mode	:802.11n40	Temp./Humi.	:22.6/64
Test Channel	:2422 MHz	Antenna Pol.	:HORIZONTAL
Test Mode	:Tx CH Low	Engineer	:Thomas
EUT Pol	:E2 Plane		



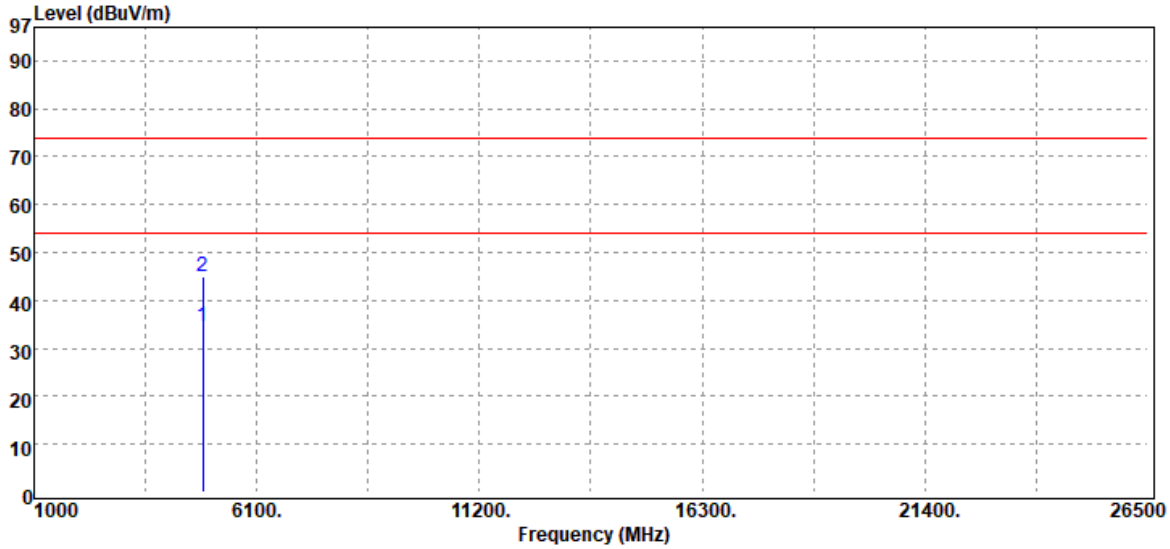
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4844.00	Average	19.62	14.87	34.49	54.00	-19.51
4844.00	Peak	28.45	14.87	43.32	74.00	-30.68

Report Number	:ER/2019/C0115	Test Date	:2020-01-06
Operation Mode	:802.11n40	Temp./Humi.	:22.6/64
Test Channel	:2437 MHz	Antenna Pol.	:VERTICAL
Test Mode	:Tx CH Mid	Engineer	:Thomas
EUT Pol	:E2 Plane		



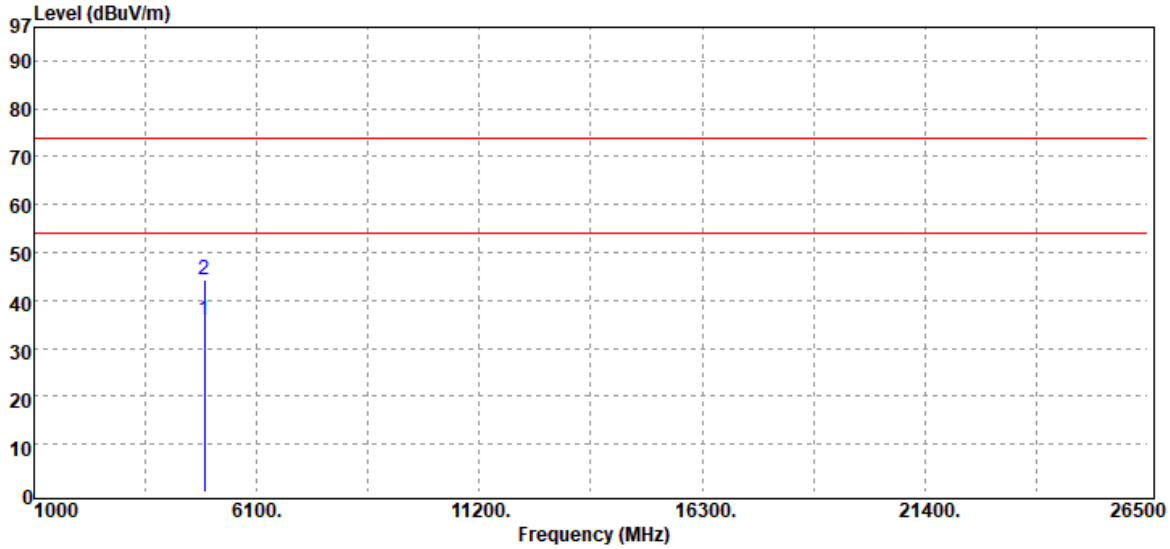
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4874.00	Average	20.95	15.04	35.99	54.00	-18.01
4874.00	Peak	29.93	15.04	44.97	74.00	-29.03

Report Number	:ER/2019/C0115	Test Date	:2020-01-06
Operation Mode	:802.11n40	Temp./Humi.	:22.6/64
Test Channel	:2437 MHz	Antenna Pol.	:HORIZONTAL
Test Mode	:Tx CH Mid	Engineer	:Thomas
EUT Pol	:E2 Plane		



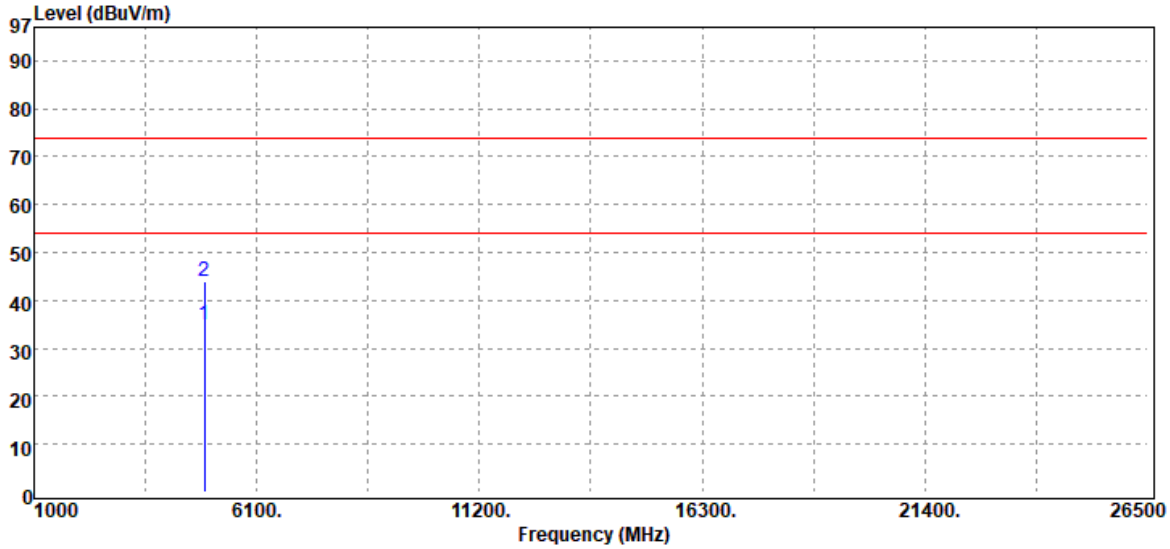
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4874.00	Average	19.51	15.04	34.55	54.00	-19.45
4874.00	Peak	29.91	15.04	44.95	74.00	-29.05

Report Number	:ER/2019/C0115	Test Date	:2020-01-06
Operation Mode	:802.11n40	Temp./Humi.	:22.6/64
Test Channel	:2452 MHz	Antenna Pol.	:VERTICAL
Test Mode	:Tx CH High	Engineer	:Thomas
EUT Pol	:E2 Plane		



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4904.00	Average	20.88	15.19	36.07	54.00	-17.93
4904.00	Peak	29.08	15.19	44.27	74.00	-29.73

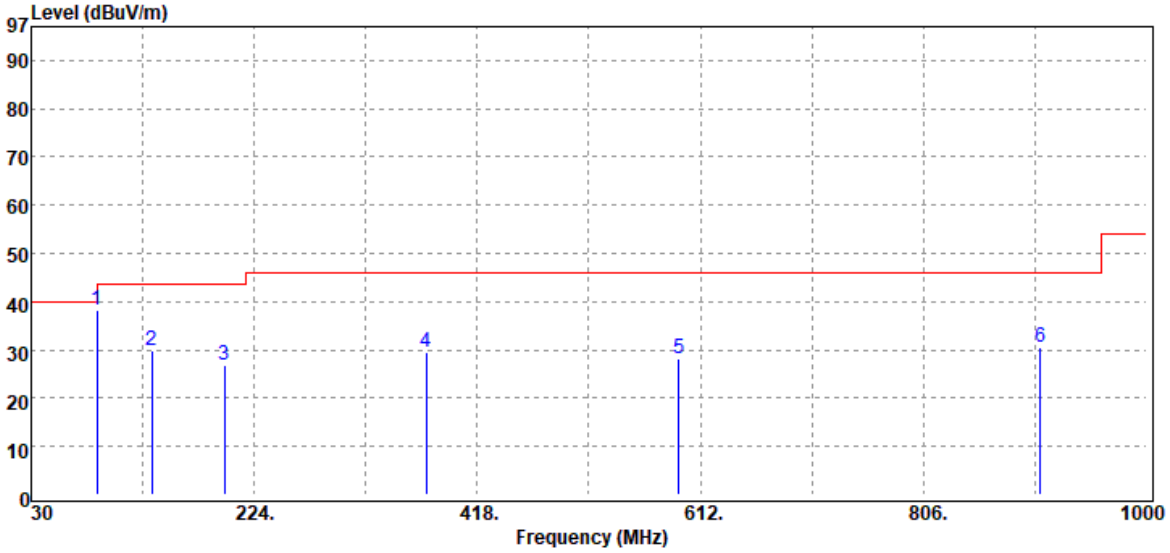
Report Number	:ER/2019/C0115	Test Date	:2020-01-06
Operation Mode	:802.11n40	Temp./Humi.	:22.6/64
Test Channel	:2452 MHz	Antenna Pol.	:HORIZONTAL
Test Mode	:Tx CH High	Engineer	:Thomas
EUT Pol	:E2 Plane		



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4904.00	Average	19.76	15.19	34.95	54.00	-19.05
4904.00	Peak	28.68	15.19	43.87	74.00	-30.13

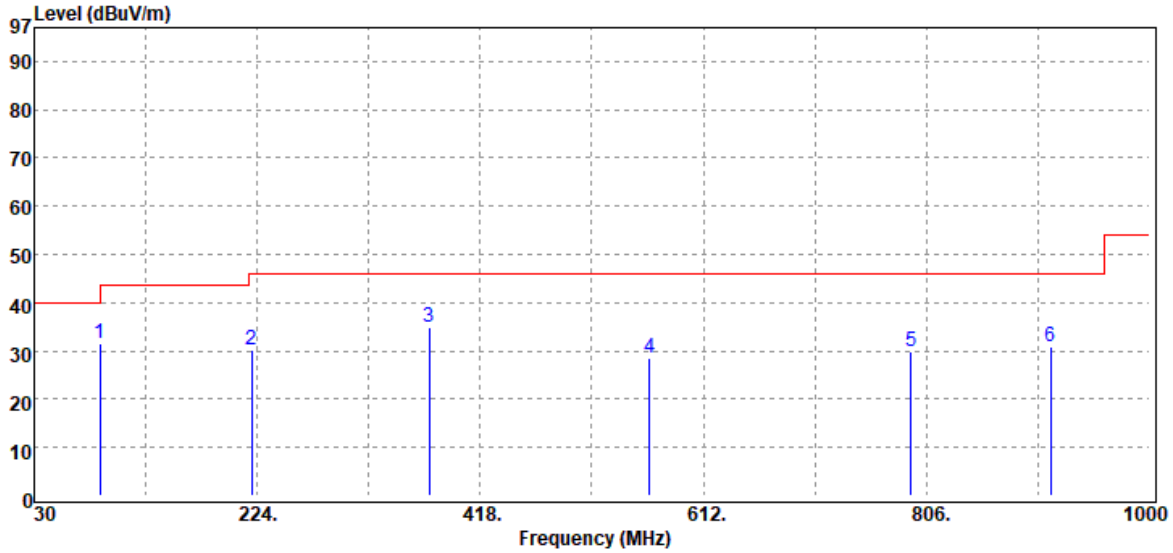
Co-location (BT+WLAN 2.4G)

Report Number	:ER/2019/C0115	Test Date	:2020-01-07
Operation Mode	:BR(1M)/802.11b	Temp./Humi.	:22.5/61
Test Channel	:2441 MHz/2437 MHz	Antenna Pol.	:VERTICAL
Test Mode	:Tx CH Mid/Tx CH Mid	Engineer	:Thomas
EUT Pol	:E2 Plane		



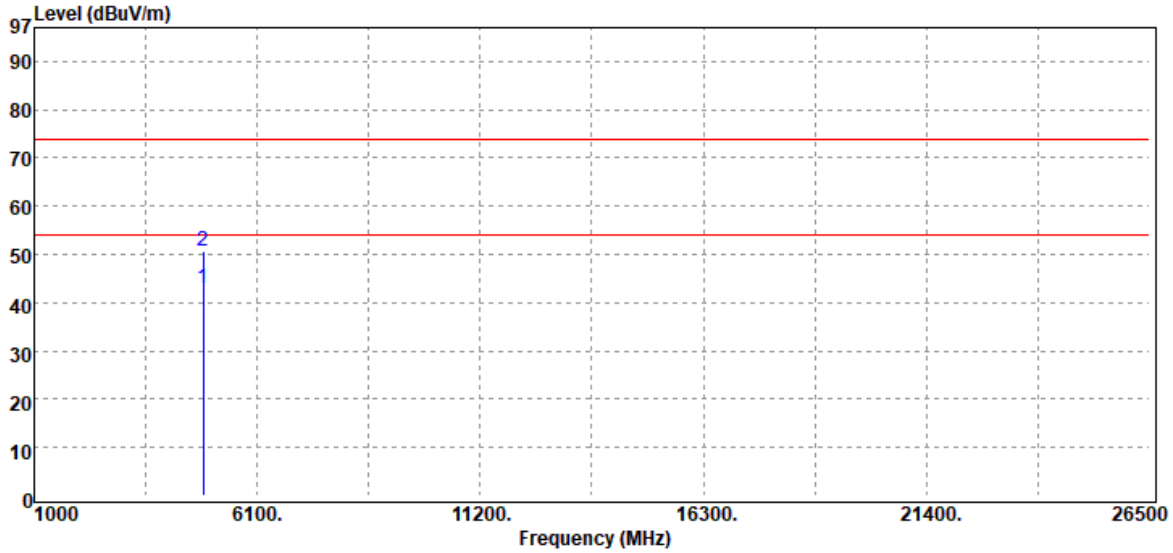
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
87.23	Peak	53.74	-15.33	38.41	40.00	-1.59
134.76	Peak	41.54	-11.60	29.94	43.50	-13.56
197.81	Peak	39.52	-12.59	26.93	43.50	-16.57
373.38	Peak	36.37	-6.97	29.40	46.00	-16.60
593.57	Peak	31.81	-3.54	28.27	46.00	-17.73
907.85	Peak	29.46	1.08	30.54	46.00	-15.46

Report Number	:ER/2019/C0115	Test Date	:2020-01-07
Operation Mode	:BR(1M)/802.11b	Temp./Humi.	:22.5/61
Test Channel	:2441 MHz/2437 MHz	Antenna Pol.	:HORIZONTAL
Test Mode	:Tx CH Mid/Tx CH Mid	Engineer	:Thomas
EUT Pol	:E2 Plane		



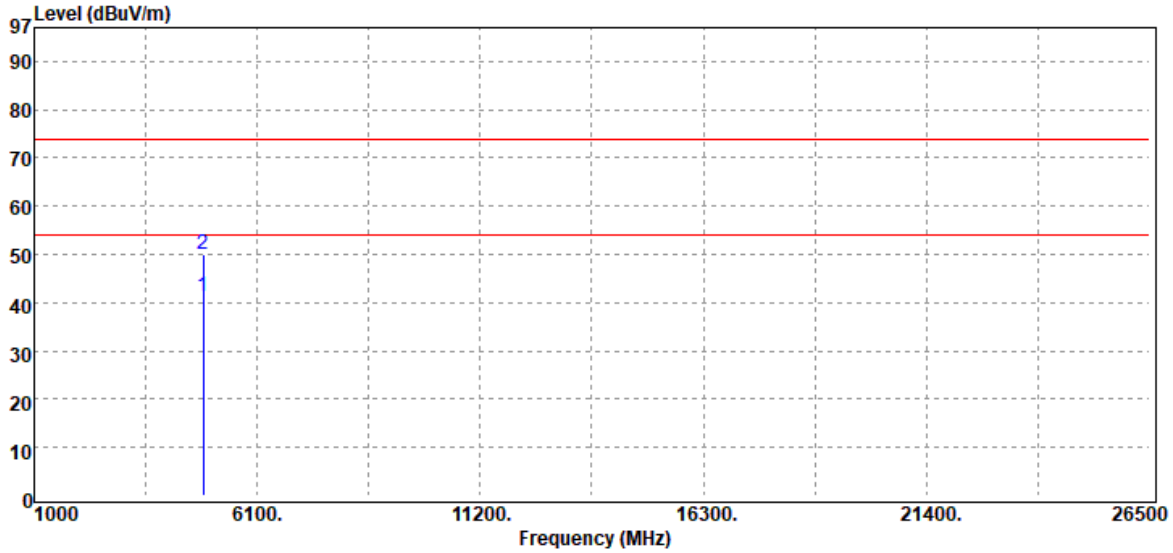
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
87.23	Peak	46.73	-15.33	31.40	40.00	-8.60
219.15	Peak	42.50	-12.24	30.26	46.00	-15.74
373.38	Peak	41.88	-6.97	34.91	46.00	-11.09
565.44	Peak	32.54	-4.15	28.39	46.00	-17.61
792.42	Peak	30.95	-1.08	29.87	46.00	-16.13
913.67	Peak	29.85	0.92	30.77	46.00	-15.23

Report Number	:ER/2019/C0115	Test Date	:2020-01-07
Operation Mode	:BR(1M)/802.11b	Temp./Humi.	:22.5/61
Test Channel	:2441 MHz/2437 MHz	Antenna Pol.	:VERTICAL
Test Mode	:Tx CH Mid/Tx CH Mid	Engineer	:Thomas
EUT Pol	:E2 Plane		



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
4874.00	Average	28.02	15.04	43.06	54.00	-10.94
4874.00	Peak	35.59	15.04	50.63	74.00	-23.37

Report Number	:ER/2019/C0115	Test Date	:2020-01-07
Operation Mode	:BR(1M)/802.11b	Temp./Humi.	:22.5/61
Test Channel	:2441 MHz/2437 MHz	Antenna Pol.	:HORIZONTAL
Test Mode	:Tx CH Mid/Tx CH Mid	Engineer	:Thomas
EUT Pol	:E2 Plane		



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
4874.00	Average	26.36	15.04	41.40	54.00	-12.60
4874.00	Peak	34.99	15.04	50.03	74.00	-23.97

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 unique RF connector and no consideration of replacement. Please see EUT photo for details.

~ End of Report ~