

ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

INTENTIONAL RADIATOR CERTIFICATION

Applicant: Innokas Yhtymä Oy
Vihikari 10, FI-90440 Kempele, Finland

Product Name: Vital Signs Patient Monitor

Brand Name: Innokas

Model No.: VC150

Model Difference: N/A

Report Number: E2/2020/20008

FCC ID: 2ABKEVC150

FCC Rule Part: §15.407, Cat: NII

Issue Date: Feb. 21, 2020

Date of Test: Feb. 10, 2020 ~ Feb. 18, 2020

Date of EUT Received: Feb. 10, 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
E2/2020/20008	Rev.00	Original.	Feb. 21, 2020	Revised By: Karen Huang

NOTE:

This is an addendum test report of Model No.: VC150, FCC ID: 2ABKEVC150 and original test report number: **249312A** to demonstrate compliance of FCC Rule Part 15.407 in results of rule changed.

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1 GENERAL INFORMATION

1.1 Product Description

Product Name:	Vital Signs Patient Monitor
Brand Name:	Innokas
Model No.:	VC150
Model Difference:	N/A
Hardware Version:	N/A
Software Version:	N/A
Power Supply:	11.1VDC, (power supply rated 100-240 VAC, 1.1A, 50-60 Hz, output 24VDC 2.0A)
Modulation type	64QAM, 16QAM, QPSK, BPSK for OFDM 256QAM for OFDM in 802.11ac only
Transition Rate:	802.11 a: 6/9/12/18/24/36/48/54 Mbps 802.11 n_20MHz: 6.5 – 72.2Mbps

1.2 Antenna Designation

Antenna Type	Freq. (MHz)	Peak Antenna Gain (dBi)
PCB antenna	5725~5850	2

1.3 WLAN 5GHz:

Wi-Fi 802.11	Frequency Range	Channels	Rated Power (Avg.) (dBm) (Worst case)	Modulation Technology
a	5725-5850	5	15.80	OFDM
n_HT 20M	5725-5850	5	HT: 15.72	OFDM

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1.4 Related Submittal(s) / Grant (s)

FCC Part 15, Subpart E §15.407

FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01

ANSI C63.10:2013

1.5 Test Facility

SGS Taiwan Ltd. Electronics & Communication Laboratory (TAF code 0513)

No.2, Keji 1st Rd., Guishan District, Taoyuan City, Taiwan 333

FCC Designation number: TW0002

1.6 Special Accessories

There are no special accessories used while test was conducted.

1.7 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 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.

2.3.2 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 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.

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2.4 Configuration of Tested System

Fig. 2-1 Configuration of Tested System



Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr Brand	Type	Series No.
1.	WLAN Test Software	N/A	N/A	N/A
2.	Monitor	N/A	VC150 application version v1_7_11C MSP sw 1.7	SK520060018YA
3.	Monitor	N/A	VC150 application version v1_7_11C MSP sw 1.7	SK520060016YA
4.	AC power unit	N/A	XP Power, AFM45US24	N/A
5.	Infrared Thermometer (USB)	N/A	Exergen TAT5000S-USB	N/A
6.	SpO2	N/A	DS100A	N/A
7.	Bar code reader (USB)	N/A	CR1500	N/A
8.	Temperature probe	N/A	Welch Allyn, PN 02895-000	N/A

Table 2-2 Cable Used in Tested System

Item	From	To	Type	Length (m)
1.	AC mains	AC power unit	unshielded	2.0
2.	AC power unit	EUT	unshielded	2.0
3.	SpO2	EUT	shielded	3.9
4.	Infrared Thermometer	EUT	shielded, (USB)	2.7
5.	Bar code reader	EUT	shielded, (USB)	1.3
6.	Temperature probe	EUT	shielded	3.0

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3 SUMMARY OF TEST RESULT

FCC Rules	Description Of Test	Result
§15.407(a)	Maximum Conducted Output Power	Compliant
§15.407(b)(4) (6) (7)	Undesirable Emission – Radiated Measurement	Compliant
§15.203	Antenna Requirement	Compliant

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4 DESCRIPTION OF TEST MODES

4.1 Operated in U-NII Bands

Operated band in 5745 MHz ~5850 MHz:

802.11a / n HT20 Mode	
Channel	Frequency
149	5745
153	5765
157	5785
161	5805
165	5825

4.2 The Worst Test Modes and Channel Details

1. The EUT has been tested under operating condition.
2. Test program used to control the EUT for staying in continuous transmitting mode is programmed.
3. Investigation has been done on all the possible configurations for searching the worst case.
The given UE is pre-scanned among below modes.

Modulation	Transmission Chain				Multiple Transmission Spatial
<input checked="" type="checkbox"/> 802.11 a	<input checked="" type="checkbox"/> Ch0	<input type="checkbox"/> Ch1	<input type="checkbox"/> Ch2	<input type="checkbox"/> Ch3	<input type="checkbox"/> 2TX
<input checked="" type="checkbox"/> 802.11 n	<input checked="" type="checkbox"/> Ch0	<input type="checkbox"/> Ch1	<input type="checkbox"/> Ch2	<input type="checkbox"/> Ch3	<input type="checkbox"/> MIMO

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.

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4.3 RADIATED EMISSION TEST:

RADIATED EMISSION TEST (BELOW 1 GHz)						
MODE	FREQUENCY BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
802.11a	5745~5825	149 to 165	157	OFDM	6	Chain 0
RADIATED EMISSION TEST (ABOVE 1 GHz)						
MODE	FREQUENCY BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
802.11a	5745~5825	149 to 165	149, 157, 165	OFDM	6	Chain 0
802.11n_HT20	5745~5825	149 to 165	149, 157, 165	OFDM	MCS0	Chain 0
BANDEDGE EMISSION TEST						
802.11a	5745~5825	149 to 165	149, 165	OFDM	6	Chain 0
802.11n_HT20				OFDM	MCS0	Chain 0

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/n/ac WLAN Transmitter for channel Low, Mid and High, the worst case H position was reported.

4.4 ANTENNA PORT CONDUCTED MEASUREMENT:

CONDUCTED TEST						
MODE	FREQUENCY BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
802.11a	5745~5825	149 to 165	149,157,165	OFDM	6	Chain 0
802.11n_HT20	5745~5825	149 to 165	149,157,165		MCS0	Chain 0

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5 MEASUREMENT UNCERTAINTY

Test Items	Uncertainty
AC Power Line Conducted Emission	+/- 2.586 dB
26 dB and 99% Emission Bandwidth	+/- 123.36 Hz
The Maximum Output Power Measurement	+/- 1.42 dB
Peak Power Spectral Density Measurement	+/- 1.55 dB
Peak Excursion Measurement	+/- 1.55 dB
Undesirable Emission – Conducted Measurement	+/- 1.55 dB
Transmission in case of Absence of Information	+/- 1.55 dB
Frequency Stability	+/- 123.36 Hz
TPC and DFS Measurement	+/- 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 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

Duty Cycle:

Mode	Duty Cycle (%) =Ton / (Ton+Toff)	Duty Factor (dB) =10*log (1/Duty Cycle)	1/T (kHz)	VBW setting (kHz)
802.11a	98.44	0.07	0.72	1.00
802.11n_20	98.34	0.07	0.76	1.00

Duty Cycle Factor: $10 * \log(1/0.9844) = 0.07$

Duty Cycle Factor: $10 * \log(1/0.9834) = 0.07$

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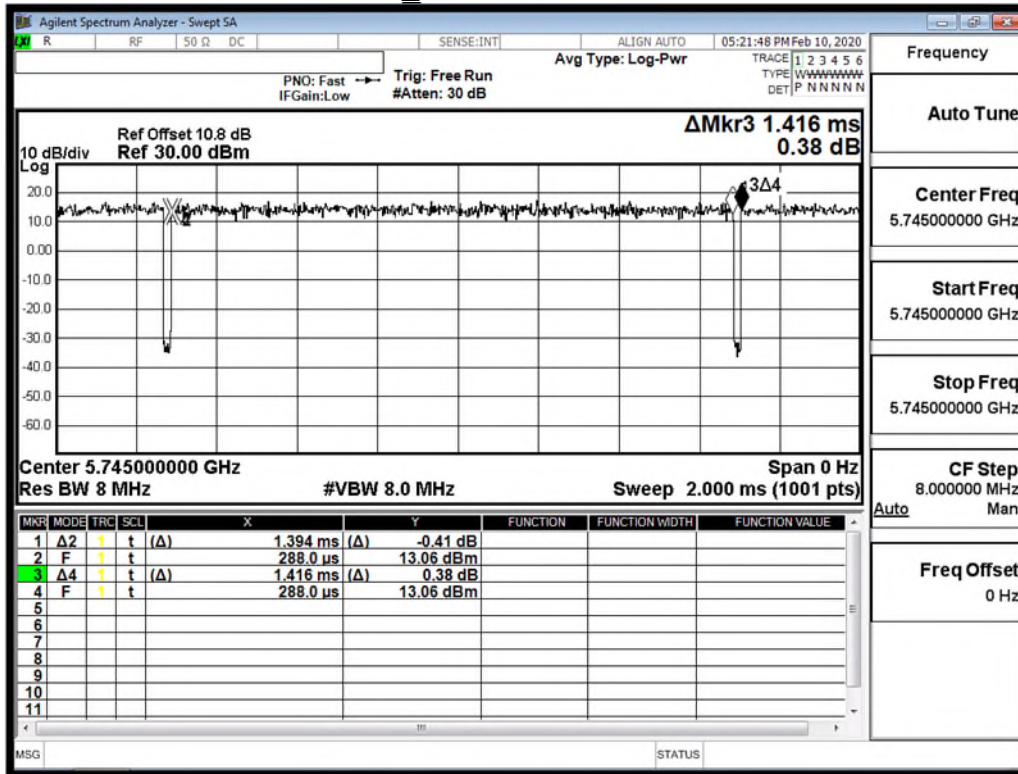
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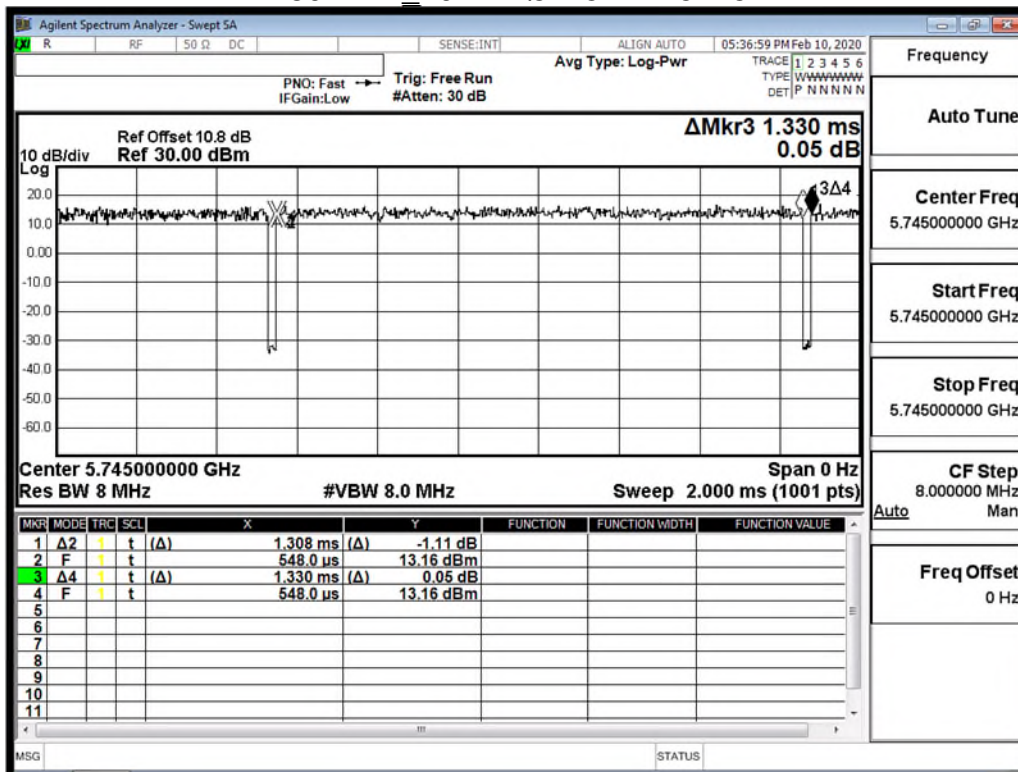
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6.2 DUTY CYCLE TEST SIGNAL MEASUREMENT RESULT

802.11a_20MHz\5745MHz-5745



802.11n_20MHz\5745MHz-5745



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7 MAXIMUM CONDUCTED OUTPUT POWER MEASUREMENT

7.1 Standard Applicable:

FCC

OPERZTION Band	LIMIT
U-NII-3	1 Watt(30dBm)
If transmitting antennas of directional gain greater than 6 dBi are used, the Maximum transmit power shall be reduced by the amount in dB that the direction-al gain of the antenna exceeds 6 dBi.	

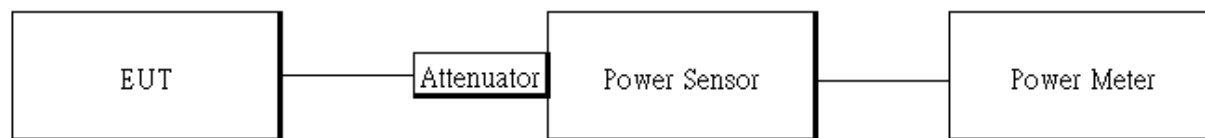
7.2 Measurement Procedure

1. Place the EUT on the table and set it in transmitting mode.
2. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules .
3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power meter
4. Power Meter is used as the auxiliary test equipment to conduct the output power measurement.
5. Record the max. reading and add 10 log(1/duty cycle).
6. Repeat above procedures until all frequency (low, middle, and high channel) measured were complete.

7.3 Measurement Equipment Used:

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUM-BER	LAST CAL.	CAL DUE.
DC Block	PASTERNAK	PE8210	RF32	11/20/2019	11/19/2020
Spectrum Analyzer	Agilent	N9010A	MY57120200	03/06/2019	03/05/2020
Attenuator	Marvelous	MVE2213-10	RF31	11/20/2019	11/19/2020

7.4 Test Set-up:



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7.5 Measurement Result

Conducted output power (FCC)

802.11a_Ch0

CH	Frequency (MHz)	Data Rate	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
149	5745	6	15.76	37.655	30	PASS
157	5785	6	15.78	37.829	30	PASS
165	5825	6	15.80	38.004	30	PASS

802.11n_HT20_Ch0

CH	Frequency (MHz)	Data Rate	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
149	5745	MCS0	15.72	37.348	30	PASS
157	5785	MCS0	15.70	37.177	30	PASS
165	5825	MCS0	15.68	37.006	30	PASS

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8 UNDESIRABLE EMISSION - RADIATED MEASUREMENT

8.1 Standard Applicable

The maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

1. For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
2. For transmitters operating in the 5.725-5.85 GHz band: All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

APPLICABLE TO	LIMIT	
FCC KDB 789033 D02 General UNII Test Procedures New Rules	FIELD STRENGTH AT 3m	
	PK: 74 (dBμV/m)	AV 54 (dBμV/m)
APPLICABLE TO	EIRP LIMIT	FIELD STRENGTH AT 3m
15.407(b)(4)(i) RSS-247 6.2.4.2	PK:-27 (dBm/MHz) *1 PK:10 (dBm/MHz) *2 PK:15.6 (dBm/MHz) *3 PK:27 (dBm/MHz) *4	PK: 68.2(dBμV/m) *1 PK:105.2 (dBμV/m) *2 PK: 110.8(dBμV/m) *3 PK:122.2 (dBμV/m) *4
*1 beyond 75 MHz or more above of the bandedge. *2 below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above. *3 below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above. *4 from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.		

EIRP = $(E \cdot d)^2 / 30$, where E is the field in V/m, d is the measurement distance (3m), EIRP is the equivalent isotropically radiated power in Watts..

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Unwanted spurious emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table:

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:

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Broadband Antenna	TESEQ	CBL 6112D	35240	09/09/2019	09/08/2020
Horn Antenna	Schwarzbeck	BBHA9170	185	08/07/2019	08/06/2020
Horn Antenna	Schwarzbeck	BBHA9120D	1187	01/10/2020	01/09/2021
Loop Antenna	ETS.LINDGREN	6502	143303	04/25/2019	04/24/2020
EMI Test Receiver	R&S	ESU 40	100363	04/15/2019	04/14/2020
Pre-Amplifier	EMC Instruments	EMC330	980096	11/20/2019	11/19/2020
Pre-Amplifier	EMC Instruments	EMC0011830	980199	11/20/2019	11/19/2020
Pre-Amplifier	EMC Instruments	EMC184045B	980135	11/20/2019	11/19/2020
Attenuator	Woken	WATT-218FS-10	RF25	11/20/2019	11/19/2020
Band Rejection Filter	Micro-Tronics	G015	RF100	11/20/2019	11/19/2020
Band Rejection Filter	Micro-Tronics	G016	RF101	11/20/2019	11/19/2020
Band Rejection Filter	Micro-Tronics	G021	RF102	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

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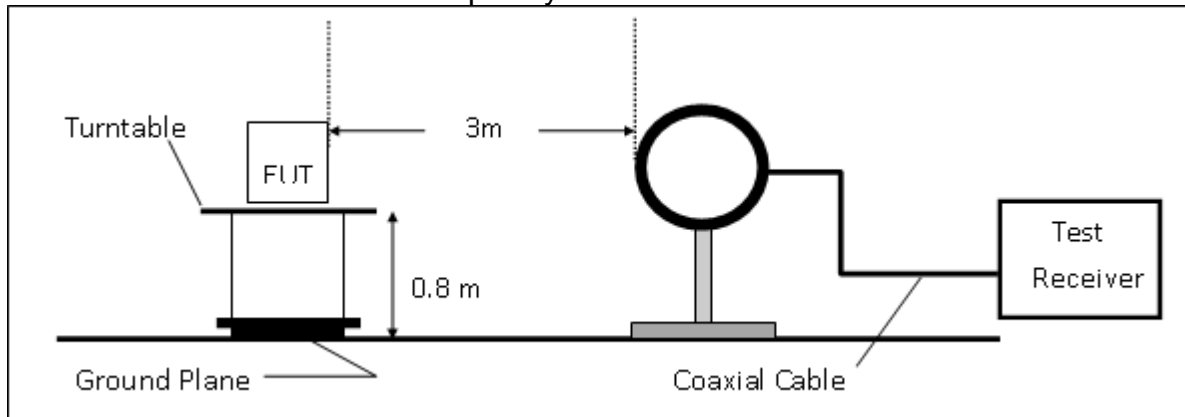
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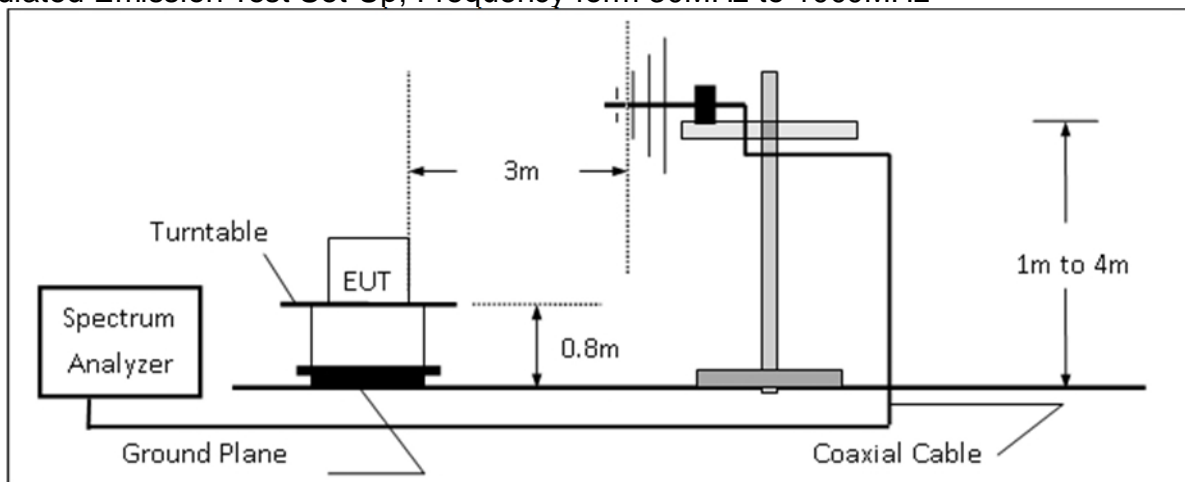
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8.3 Test SET-UP

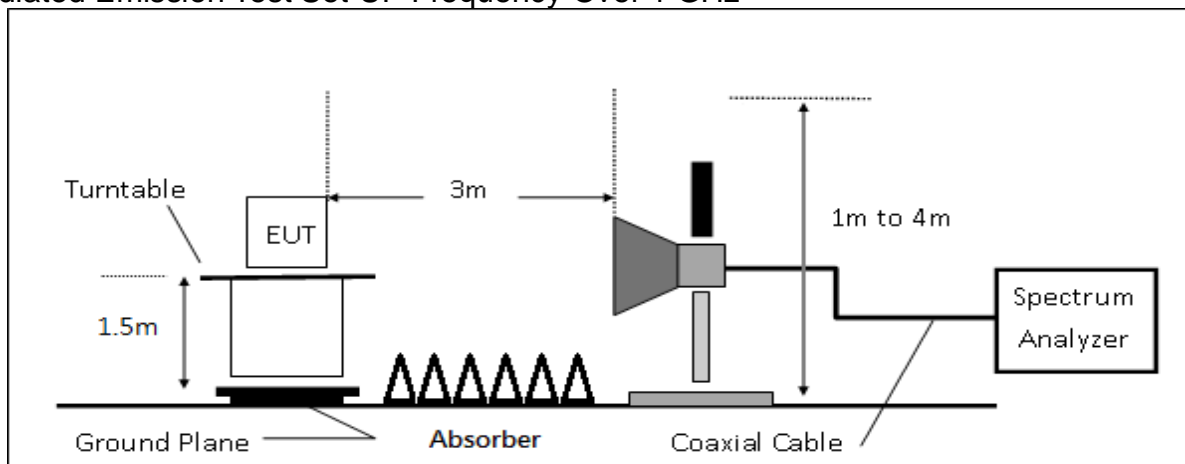
(A) Radiated Emission Test Set-UP Frequency Below 30MHz.



(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 EUT was placed on a turn table which is 0.8m above ground plane.
2. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v01.
3. The EUT was placed on a turn table with 0.8m for frequency < 1GHz and 1.5m for frequency > 1GHz above ground plane.
4. The turn table shall rotate 360 degrees to determine the position of maximum emission level.
5. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emissions.
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. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
10. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
11. Repeat above procedures until all frequency 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	

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) was not reported.

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8.7 Measurement Result

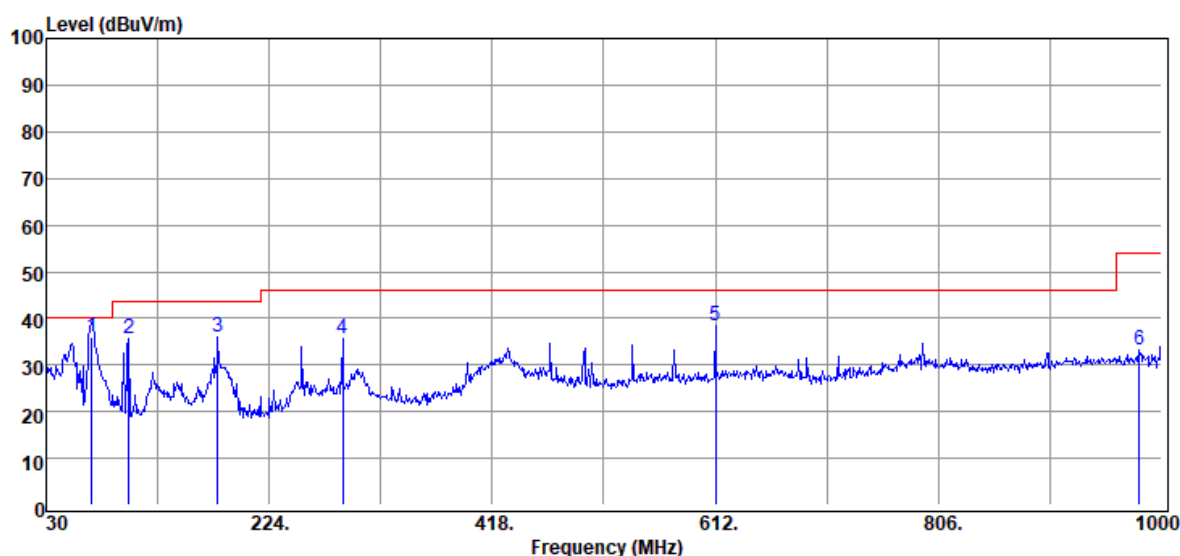
Radiated Spurious Emission Measurement Result

Below 1GHz Worst-Case Data:

802.11a, 5725~5850 MHz

Report Number :E2/2020/20008
Operation Mode :802.11a / Band 4
Test Channel :5785 MHz
Test Mode :TX CH MID
EUT Pol :H Plan

Test Date :2020-02-10
Temp./Humi. :22.1/49
Antenna Pol. :VERTICAL
Engineer :Ashton



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
69.77	QP	55.00	-18.90	36.10	40.00	-3.90
101.78	Peak	50.94	-15.21	35.73	43.50	-7.77
179.38	Peak	51.51	-15.53	35.98	43.50	-7.52
288.02	Peak	46.46	-10.80	35.66	46.00	-10.34
612.00	Peak	41.32	-2.89	38.43	46.00	-7.57
980.60	Peak	31.48	1.87	33.35	54.00	-20.65

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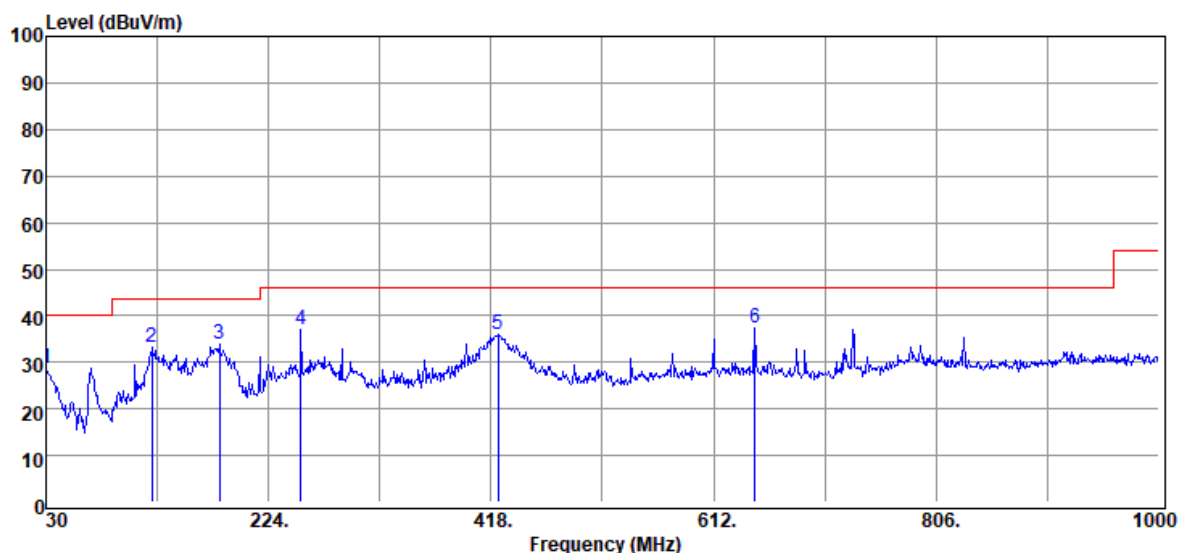
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Report Number :E2/2020/20008
Operation Mode :802.11a / Band 4
Test Channel :5785 MHz
Test Mode :TX CH MID
EUT Pol :H Plan

Test Date :2020-02-10
Temp./Humi. :22.1/49
Antenna Pol. :HORIZONTAL
Engineer :Ashton



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
30.00	Peak	32.06	-3.33	28.73	40.00	-11.27
122.15	Peak	46.21	-12.83	33.38	43.50	-10.12
181.32	Peak	49.70	-15.63	34.07	43.50	-9.43
252.13	Peak	48.33	-11.26	37.07	46.00	-8.93
423.82	Peak	42.37	-6.22	36.15	46.00	-9.85
647.89	Peak	39.44	-2.11	37.33	46.00	-8.67

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Above 1GHz Worst-Case Data:

802.11a, 5725~5850 MHz

Report Number :E2/2020/20008

Test Date :2020-02-18

Operation Mode :802.11a / Band 4

Temp./Humi. :22.0/49

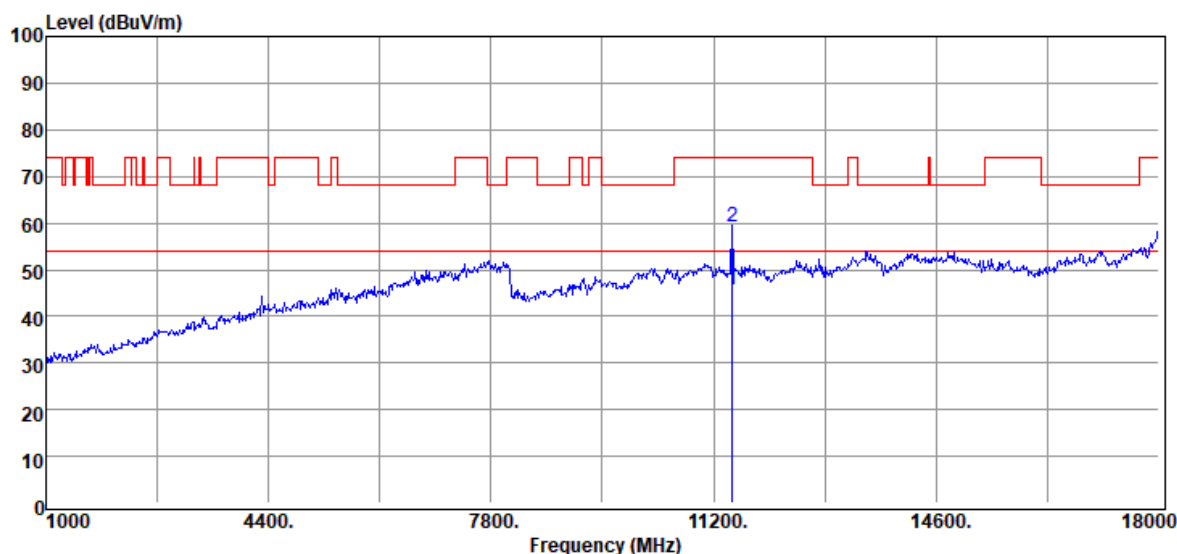
Test Channel :5745 MHz

Antenna Pol. :VERTICAL

Test Mode :TX CH LOW

Engineer :Ashton

EUT Pol :H Plan



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
11490.00	Average	18.36	27.44	45.80	54.00	-8.20
11490.00	Peak	31.89	27.44	59.33	74.00	-14.67

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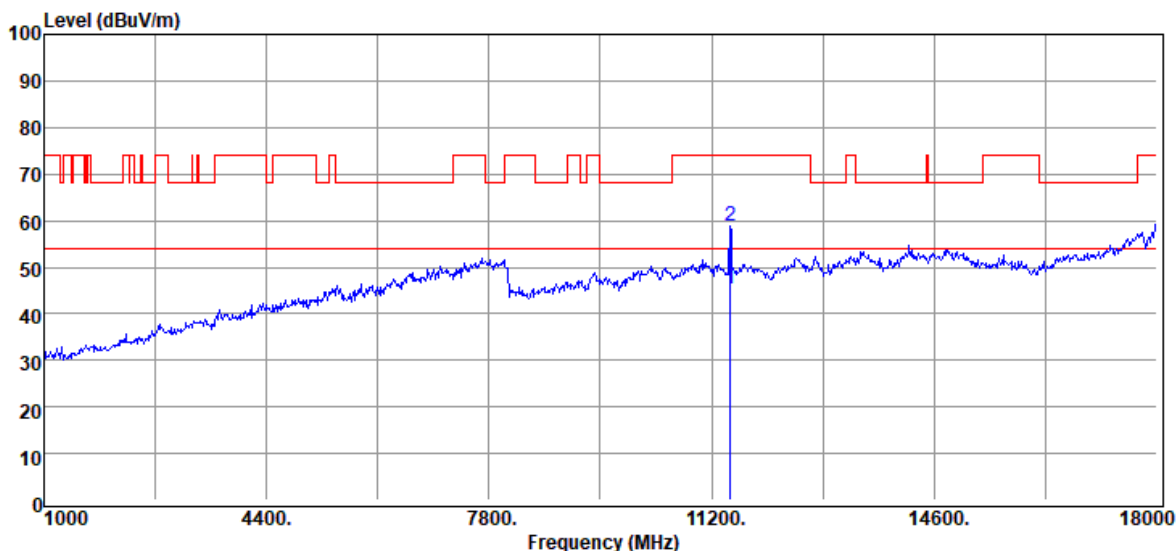
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Report Number :E2/2020/20008
 Operation Mode :802.11a / Band 4
 Test Channel :5745 MHz
 Test Mode :TX CH LOW
 EUT Pol :H Plan

Test Date :2020-02-18
 Temp./Humi. :22.0/49
 Antenna Pol. :HORIZONTAL
 Engineer :Ashton



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
11490.00	Average	17.73	27.44	45.17	54.00	-8.83
11490.00	Peak	31.40	27.44	58.84	74.00	-15.16

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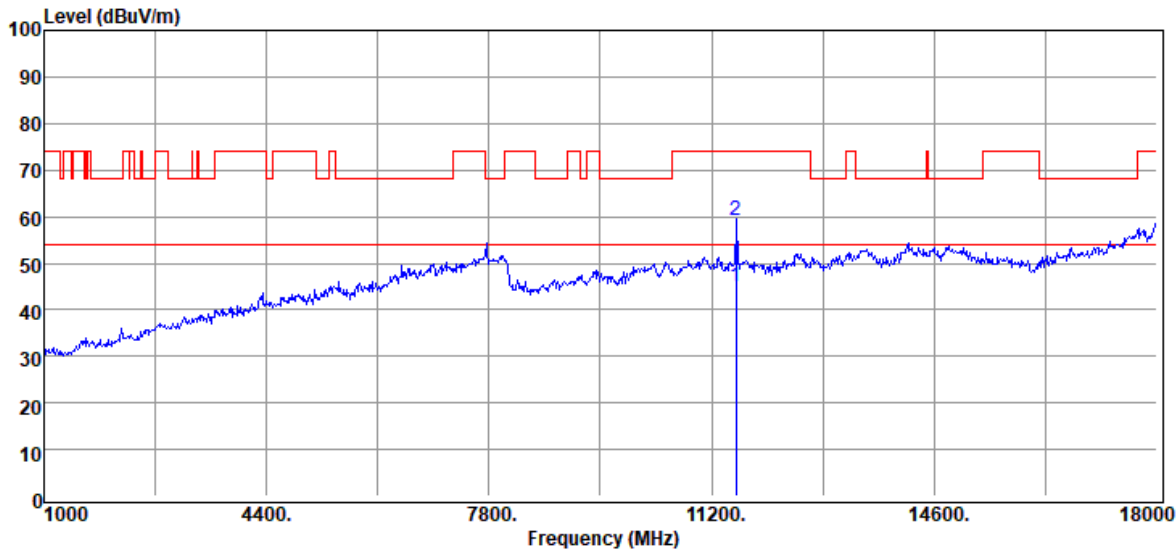
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Report Number :E2/2020/20008
 Operation Mode :802.11a / Band 4
 Test Channel :5785 MHz
 Test Mode :TX CH MID
 EUT Pol :H Plan

Test Date :2020-02-18
 Temp./Humi. :22.1/49
 Antenna Pol. :VERTICAL
 Engineer :Ashton



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
11570.00	Average	18.19	26.95	45.14	54.00	-8.86
11570.00	Peak	32.20	26.95	59.15	74.00	-14.85

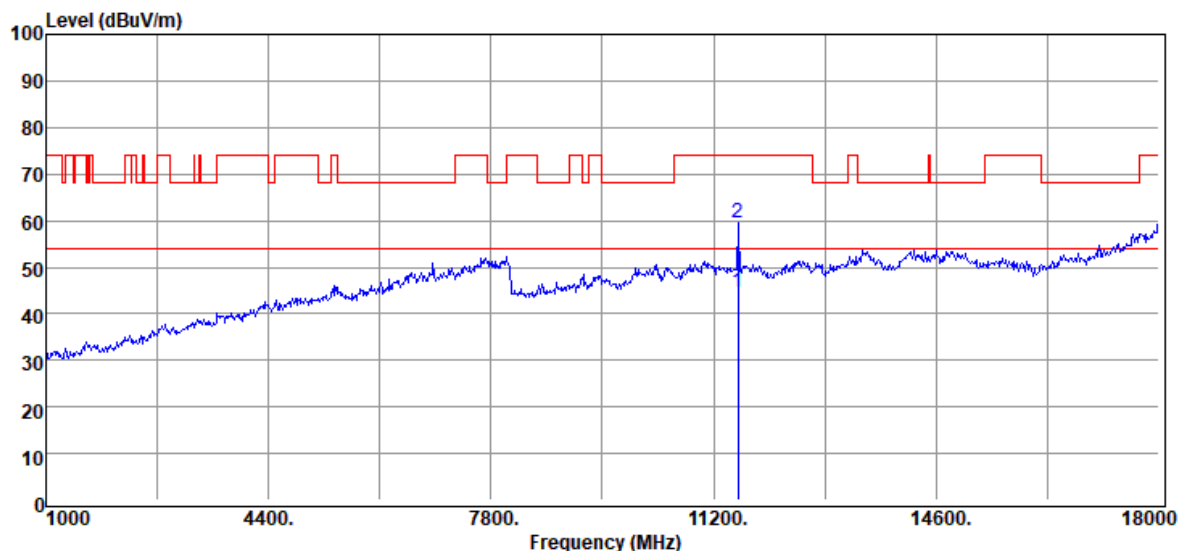
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Report Number :E2/2020/20008
Operation Mode :802.11a / Band 4
Test Channel :5785 MHz
Test Mode :TX CH MID
EUT Pol :H Plan

Test Date :2020-02-18
Temp./Humi. :22.1/49
Antenna Pol. :HORIZONTAL
Engineer :Ashton



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
11570.00	Average	17.63	26.95	44.58	54.00	-9.42
11570.00	Peak	32.49	26.95	59.44	74.00	-14.56

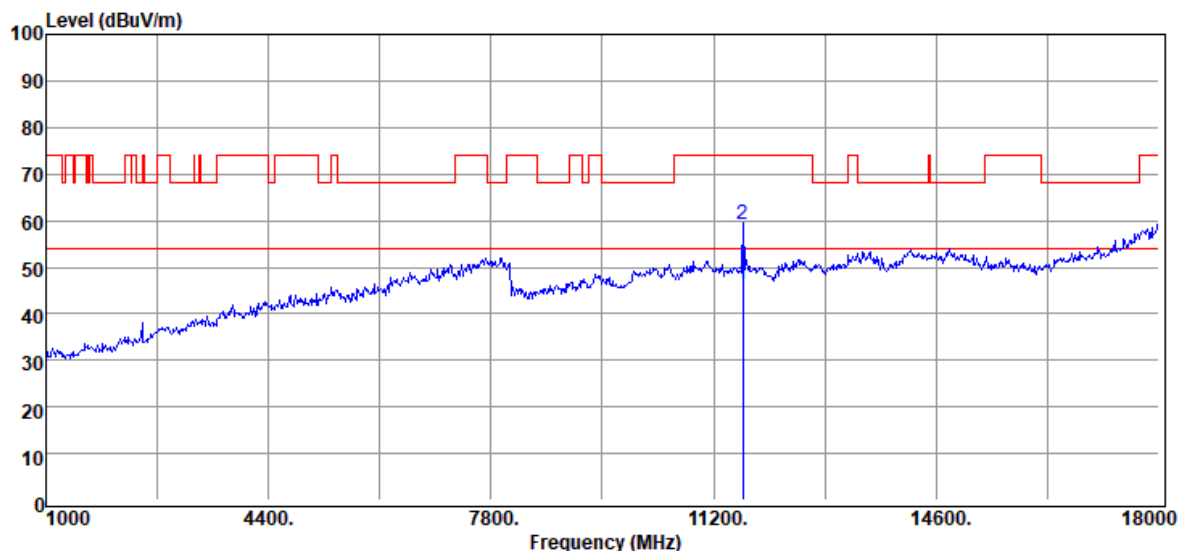
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Report Number :E2/2020/20008
Operation Mode :802.11a / Band 4
Test Channel :5825 MHz
Test Mode :TX CH HIGH
EUT Pol :H Plan

Test Date :2020-02-18
Temp./Humi. :22.1/49
Antenna Pol. :VERTICAL
Engineer :Ashton



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
11650.00	Average	19.03	27.38	46.41	54.00	-7.59
11650.00	Peak	31.73	27.38	59.11	74.00	-14.89

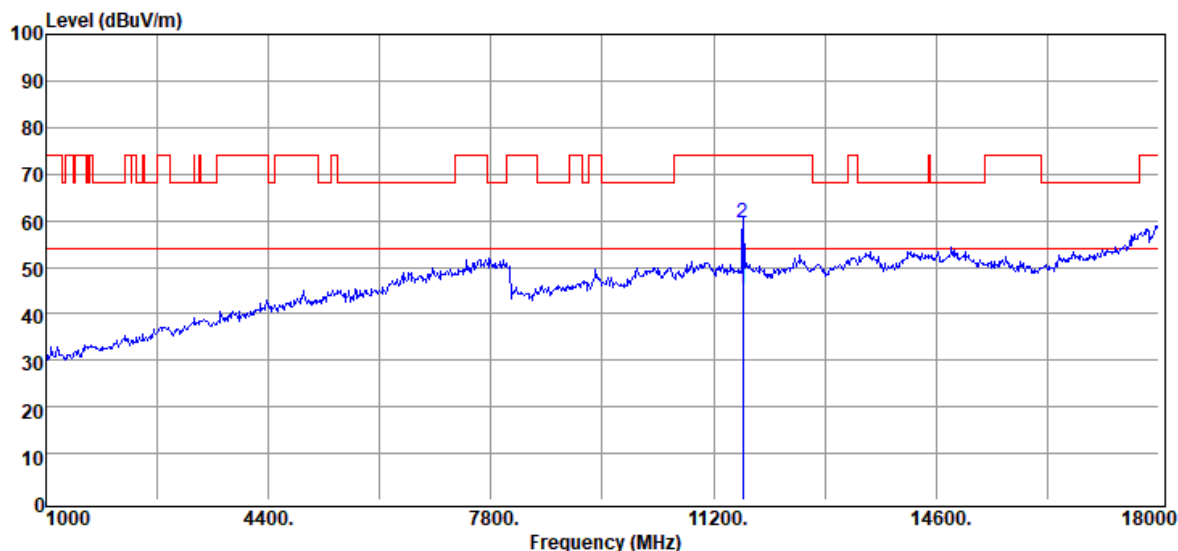
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Report Number :E2/2020/20008
 Operation Mode :802.11a / Band 4
 Test Channel :5825 MHz
 Test Mode :TX CH HIGH
 EUT Pol :H Plan

Test Date :2020-02-18
 Temp./Humi. :22.1/49
 Antenna Pol. :HORIZONTAL
 Engineer :Ashton



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
11650.00	Average	17.81	27.38	45.19	54.00	-8.81
11650.00	Peak	32.27	27.38	59.65	74.00	-14.35

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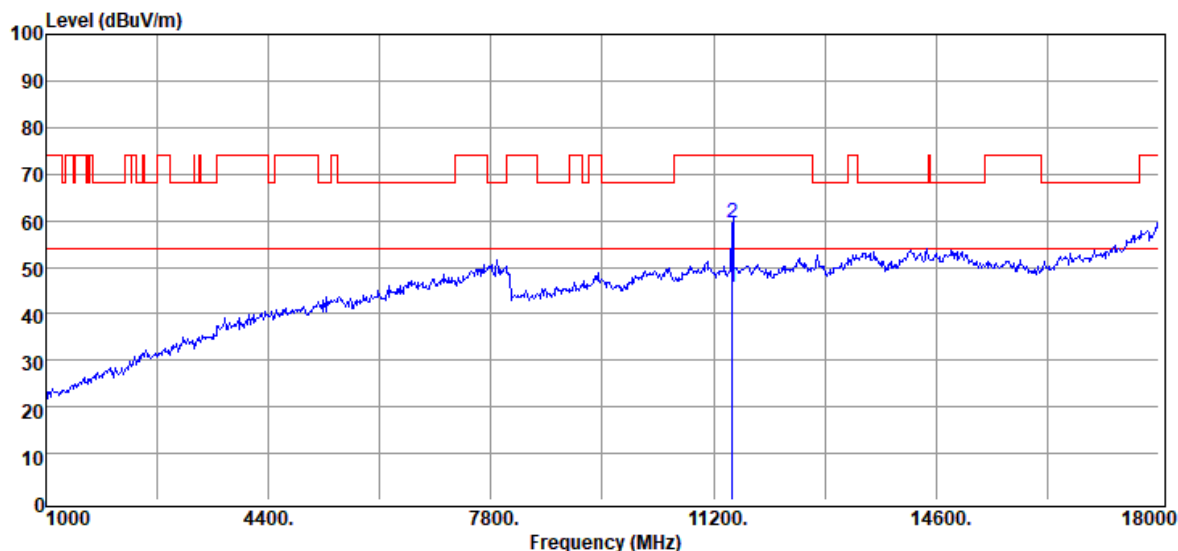
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Report Number :E2/2020/20008
 Operation Mode :802.11n20 / Band 4
 Test Channel :5745 MHz
 Test Mode :TX CH LOW
 EUT Pol :H Plan

Test Date :2020-02-18
 Temp./Humi. :21.6/47
 Antenna Pol. :VERTICAL
 Engineer :Ashton



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
11490.00	Average	18.31	27.44	45.75	54.00	-8.25
11490.00	Peak	32.04	27.44	59.48	74.00	-14.52

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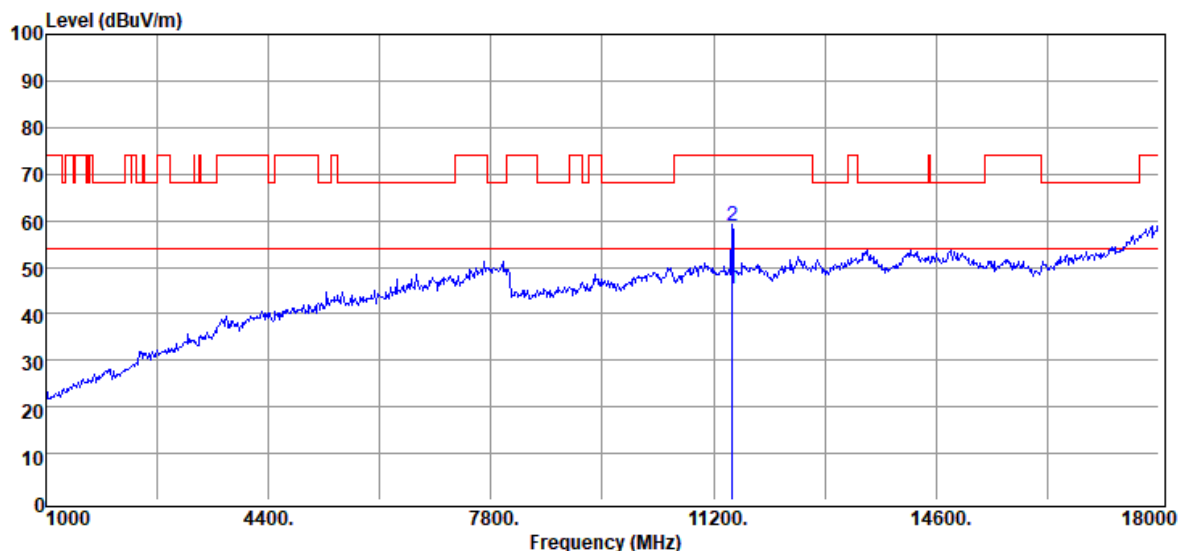
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Report Number :E2/2020/20008
 Operation Mode :802.11n20 / Band 4
 Test Channel :5745 MHz
 Test Mode :TX CH LOW
 EUT Pol :H Plan

Test Date :2020-02-18
 Temp./Humi. :21.6/47
 Antenna Pol. :HORIZONTAL
 Engineer :Ashton



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
11490.00	Average	17.72	27.44	45.16	54.00	-8.84
11490.00	Peak	31.48	27.44	58.92	74.00	-15.08

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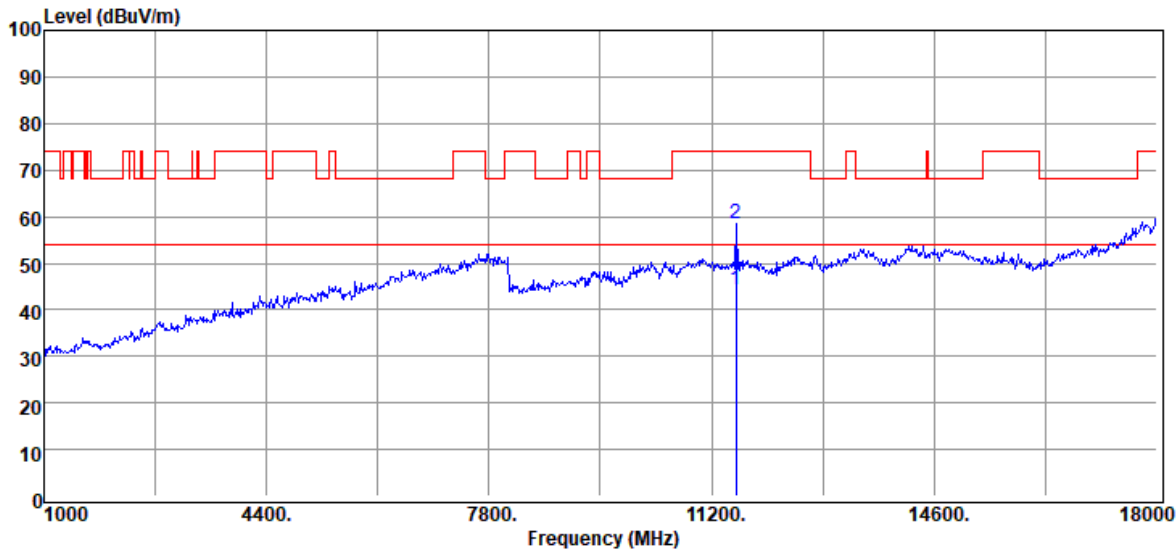
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Report Number :E2/2020/20008
 Operation Mode :802.11n20 / Band 4
 Test Channel :5785 MHz
 Test Mode :TX CH MID
 EUT Pol :H Plan

Test Date :2020-02-18
 Temp./Humi. :21.6/47
 Antenna Pol. :VERTICAL
 Engineer :Ashton



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
11570.00	Average	17.31	26.95	44.26	54.00	-9.74
11570.00	Peak	31.44	26.95	58.39	74.00	-15.61

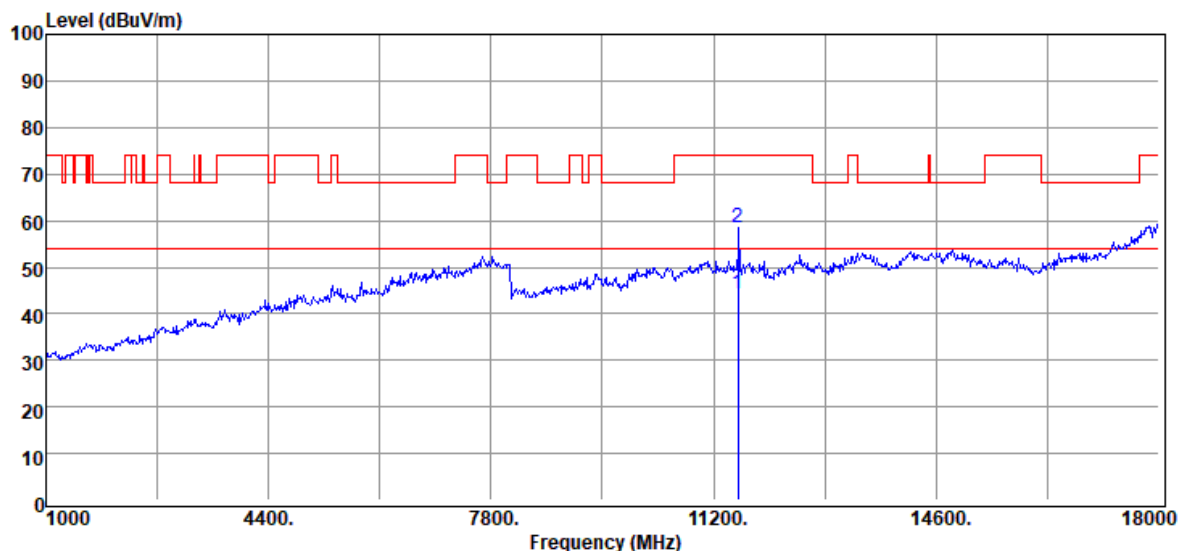
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Report Number :E2/2020/20008
 Operation Mode :802.11n20 / Band 4
 Test Channel :5785 MHz
 Test Mode :TX CH MID
 EUT Pol :H Plan

Test Date :2020-02-18
 Temp./Humi. :21.6/47
 Antenna Pol. :HORIZONTAL
 Engineer :Ashton



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
11570.00	Average	17.31	26.95	44.26	54.00	-9.74
11570.00	Peak	31.55	26.95	58.50	74.00	-15.50

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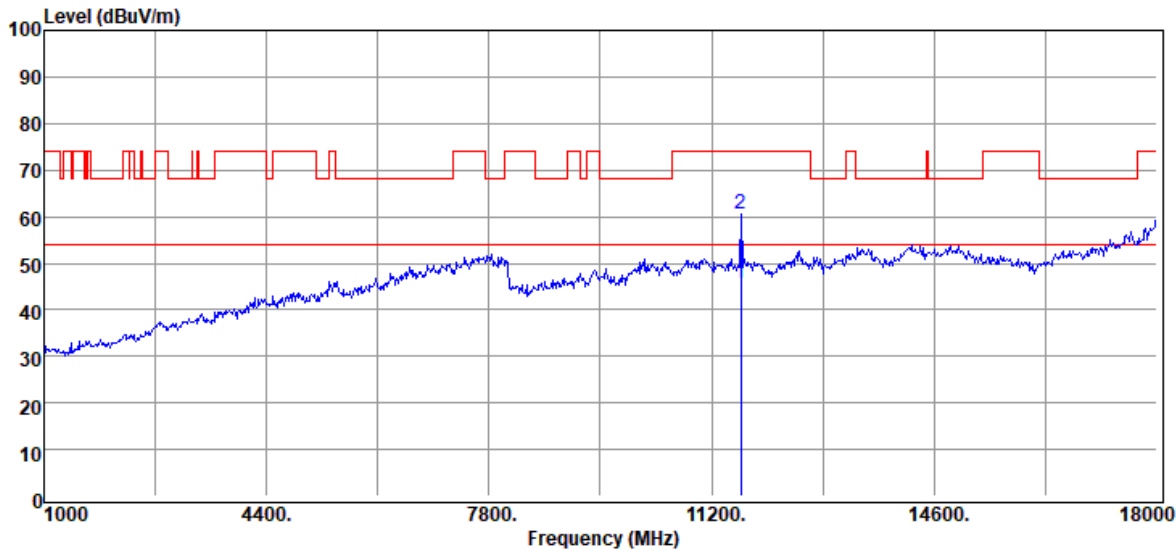
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Report Number :E2/2020/20008
 Operation Mode :802.11n20 / Band 4
 Test Channel :5825 MHz
 Test Mode :TX CH HIGH
 EUT Pol :H Plan

Test Date :2020-02-18
 Temp./Humi. :21.5/47
 Antenna Pol. :VERTICAL
 Engineer :Ashton



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
11650.00	Average	18.43	27.38	45.81	54.00	-8.19
11650.00	Peak	33.05	27.38	60.43	74.00	-13.57

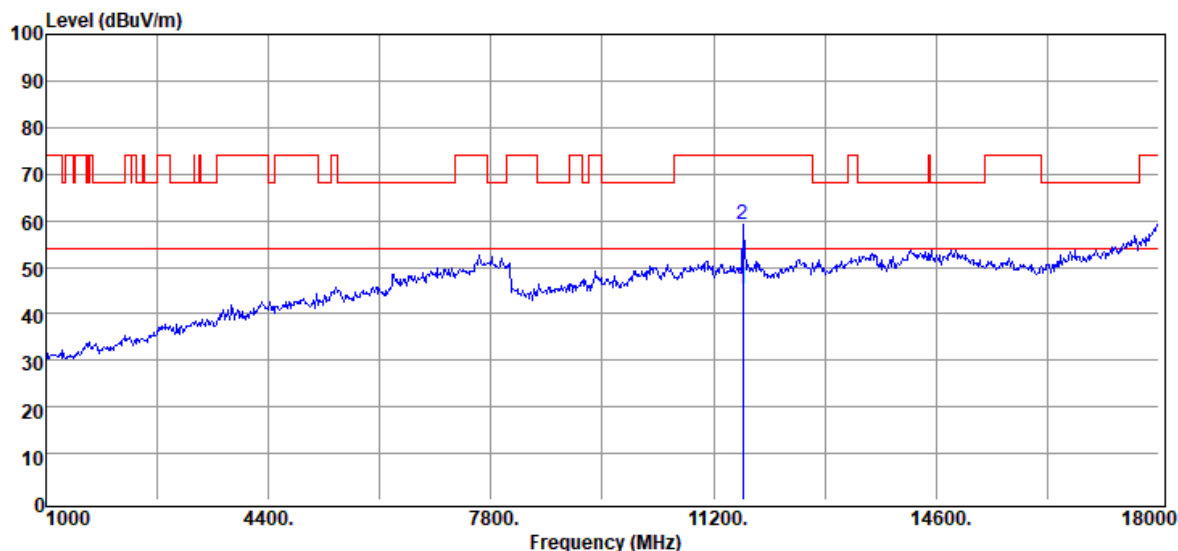
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Report Number :E2/2020/20008
Operation Mode :802.11n20 / Band 4
Test Channel :5825 MHz
Test Mode :TX CH HIGH
EUT Pol :H Plan

Test Date :2020-02-18
Temp./Humi. :21.5/47
Antenna Pol. :HORIZONTAL
Engineer :Ashton



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
11650.00	Average	17.78	27.38	45.16	54.00	-8.84
11650.00	Peak	31.73	27.38	59.11	74.00	-14.89

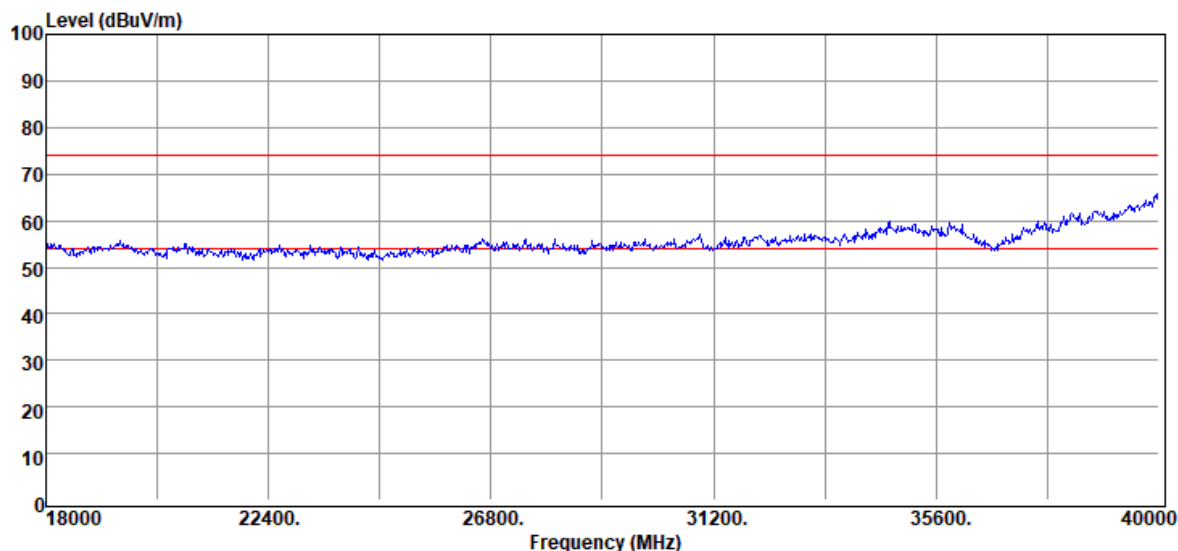
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Report Number :E2/2020/20008
Operation Mode :802.11a / Band 4
Test Channel :5745 MHz
Test Mode :TX CH LOW
EUT Pol :H Plan

Test Date :2020-02-18
Temp./Humi. :22.0/49
Antenna Pol. :VERTICAL
Engineer :Ashton



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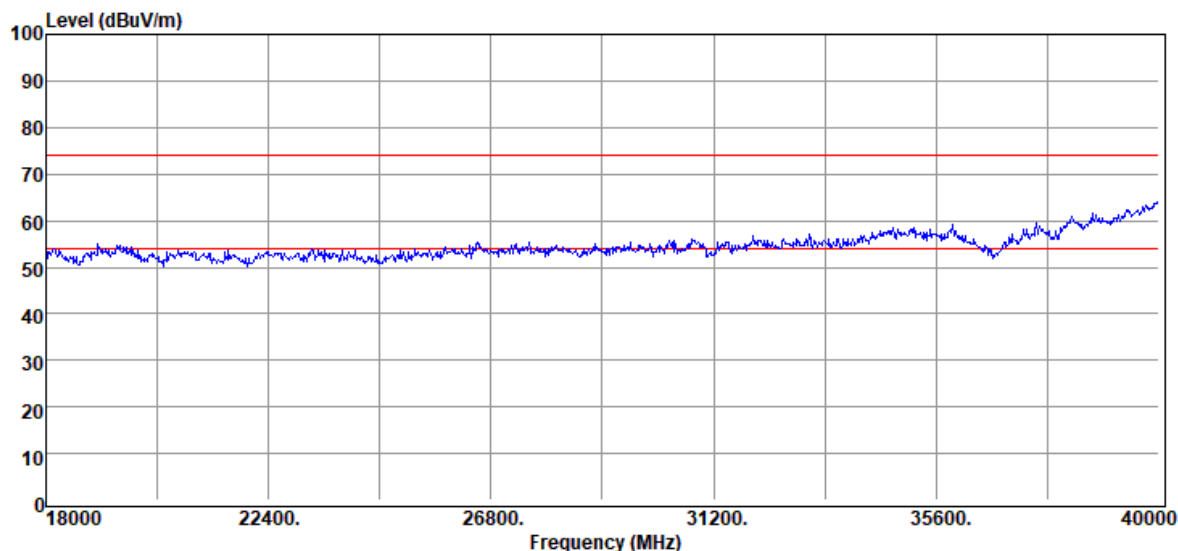
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Member of SGS Group

Report Number :E2/2020/20008
Operation Mode :802.11a / Band 4
Test Channel :5745 MHz
Test Mode :TX CH LOW
EUT Pol :H Plan

Test Date :2020-02-18
Temp./Humi. :22.0/49
Antenna Pol. :HORIZONTAL
Engineer :Ashton



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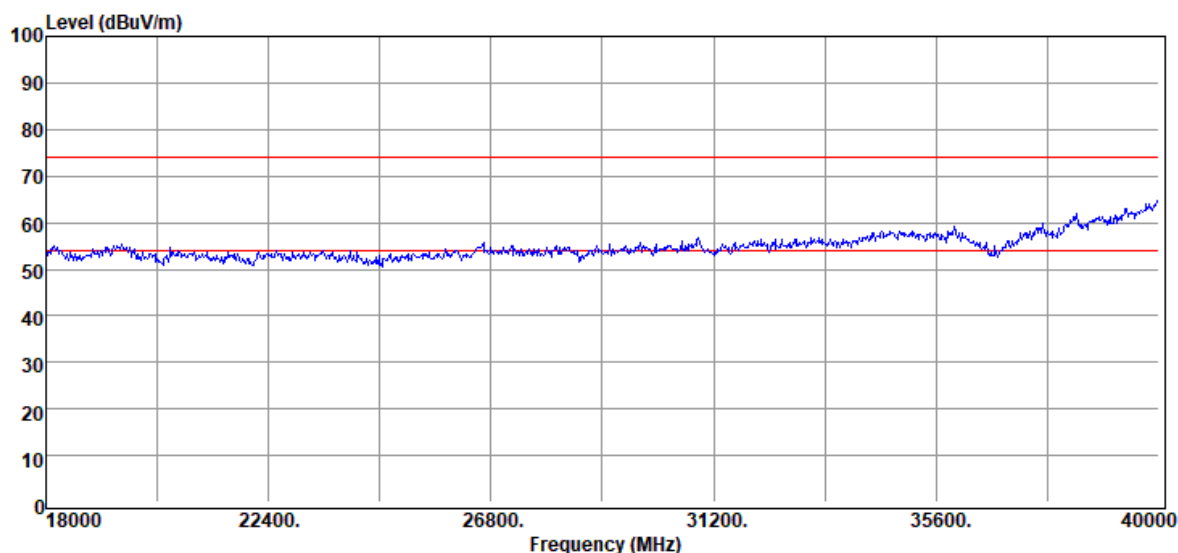
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Report Number :E2/2020/20008
Operation Mode :802.11a / Band 4
Test Channel :5785 MHz
Test Mode :TX CH MID
EUT Pol :H Plan

Test Date :2020-02-18
Temp./Humi. :22.1/49
Antenna Pol. :VERTICAL
Engineer :Ashton



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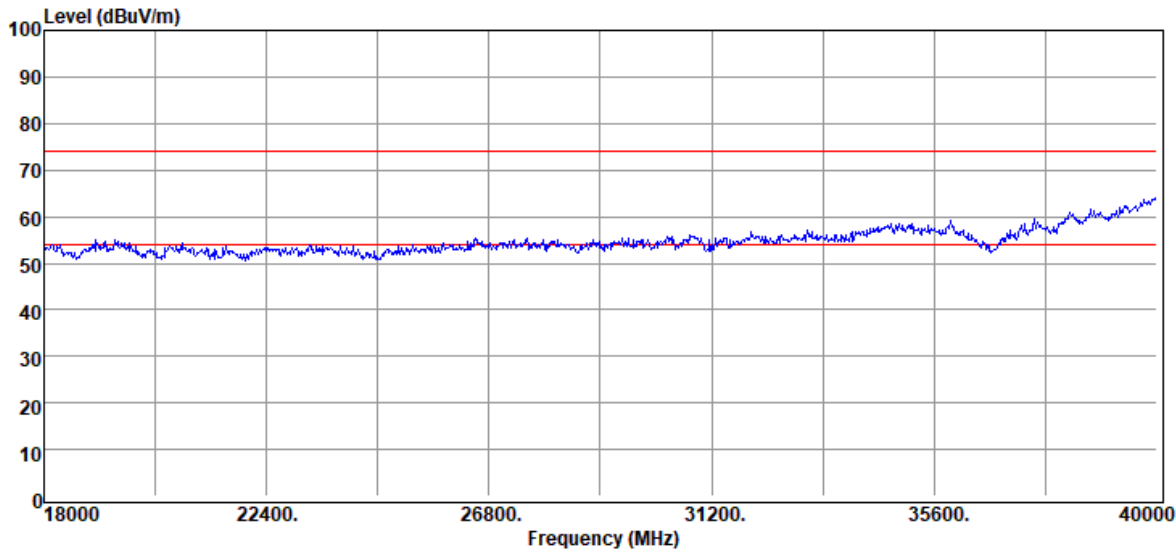
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Report Number :E2/2020/20008
Operation Mode :802.11a / Band 4
Test Channel :5785 MHz
Test Mode :TX CH MID
EUT Pol :H Plan

Test Date :2020-02-18
Temp./Humi. :22.1/49
Antenna Pol. :HORIZONTAL
Engineer :Ashton



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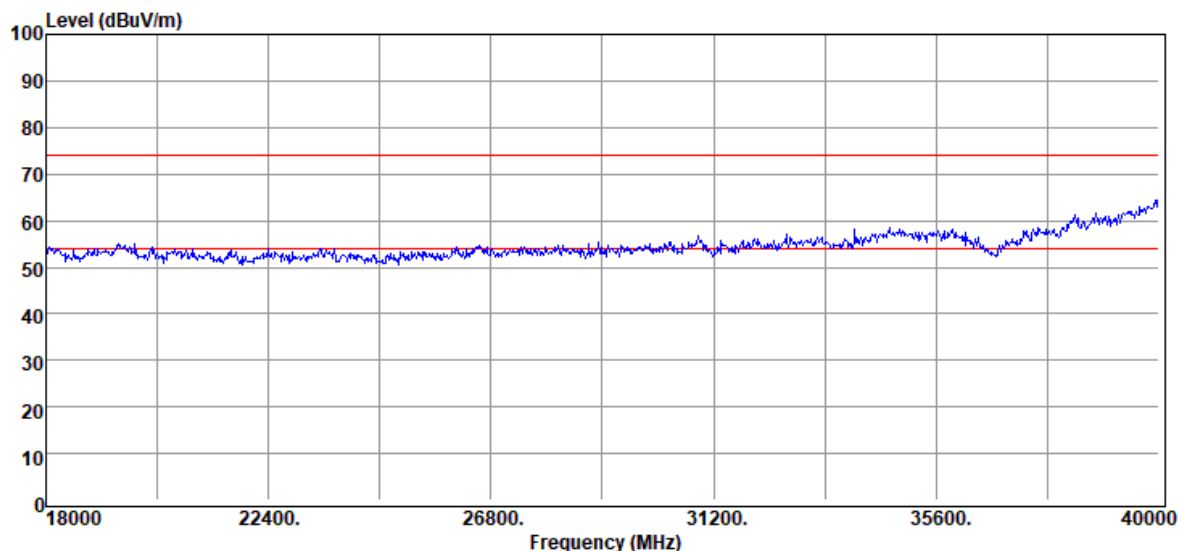
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Report Number :E2/2020/20008
Operation Mode :802.11a / Band 4
Test Channel :5825 MHz
Test Mode :TX CH HIGH
EUT Pol :H Plan

Test Date :2020-02-18
Temp./Humi. :22.1/49
Antenna Pol. :VERTICAL
Engineer :Ashton



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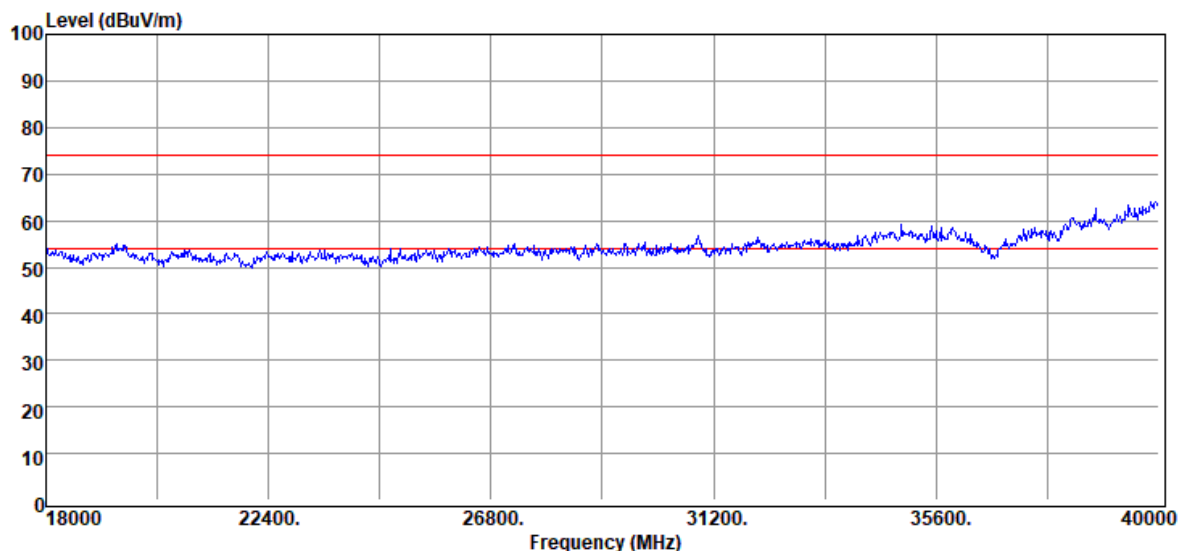
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Report Number :E2/2020/20008
Operation Mode :802.11a / Band 4
Test Channel :5825 MHz
Test Mode :TX CH HIGH
EUT Pol :H Plan

Test Date :2020-02-18
Temp./Humi. :22.1/49
Antenna Pol. :HORIZONTAL
Engineer :Ashton



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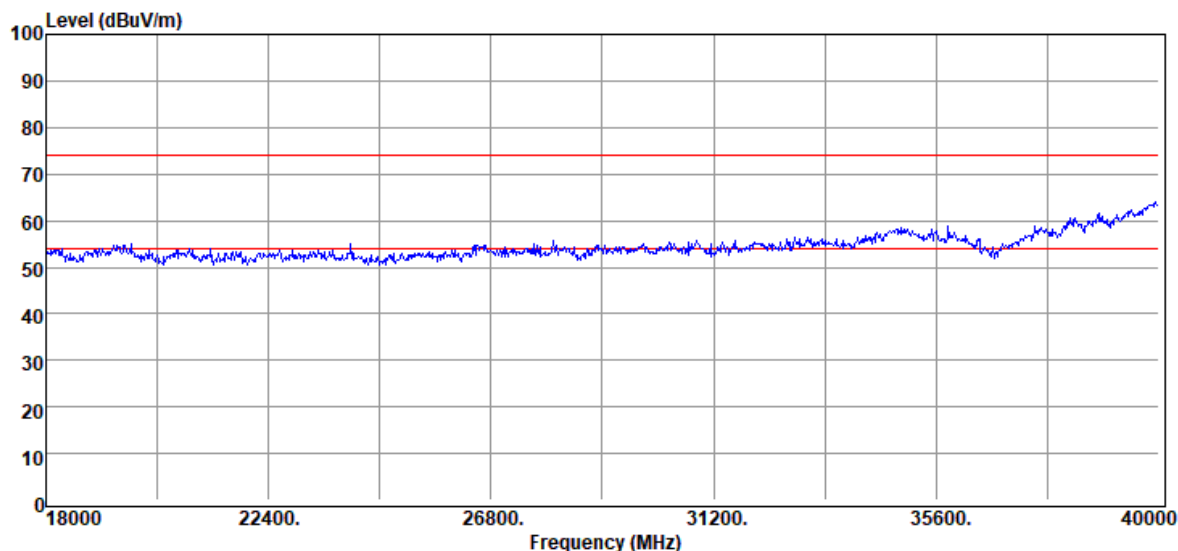
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Report Number :E2/2020/20008
Operation Mode :802.11n20 / Band 4
Test Channel :5745 MHz
Test Mode :TX CH LOW
EUT Pol :H Plan

Test Date :2020-02-18
Temp./Humi. :21.6/47
Antenna Pol. :VERTICAL
Engineer :Ashton



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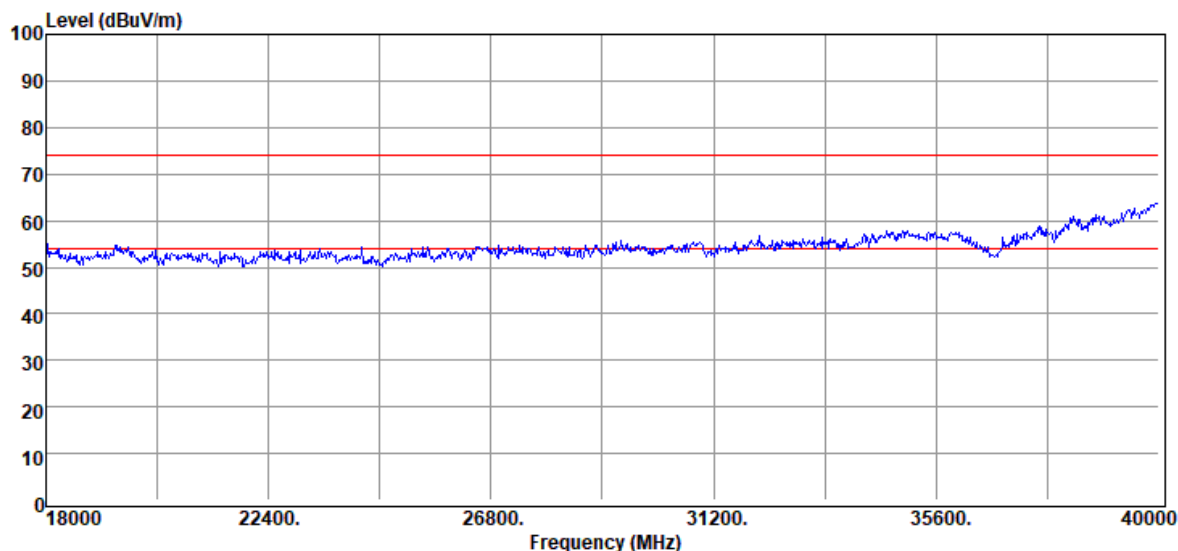
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Report Number :E2/2020/20008
Operation Mode :802.11n20 / Band 4
Test Channel :5745 MHz
Test Mode :TX CH LOW
EUT Pol :H Plan

Test Date :2020-02-18
Temp./Humi. :21.6/47
Antenna Pol. :HORIZONTAL
Engineer :Ashton



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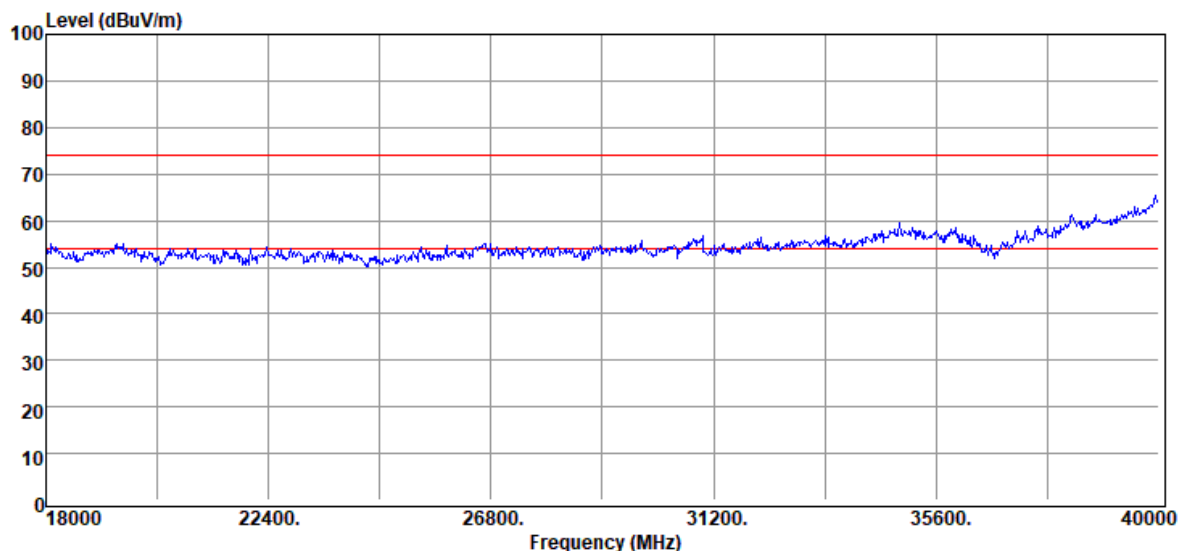
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Report Number :E2/2020/20008
Operation Mode :802.11n20 / Band 4
Test Channel :5785 MHz
Test Mode :TX CH MID
EUT Pol :H Plan

Test Date :2020-02-18
Temp./Humi. :21.6/47
Antenna Pol. :VERTICAL
Engineer :Ashton



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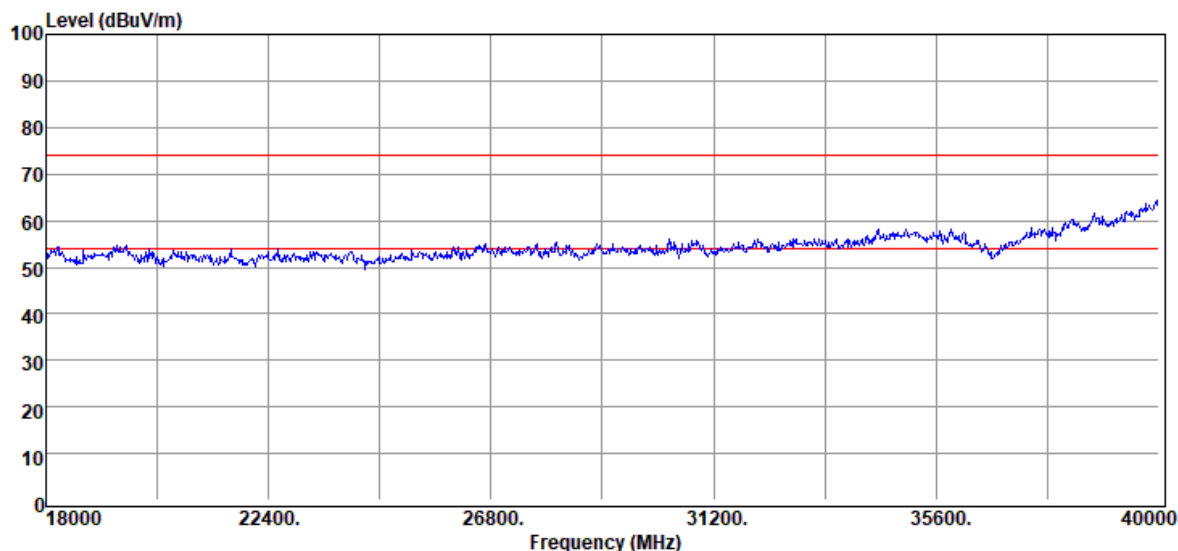
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Report Number :E2/2020/20008
Operation Mode :802.11n20 / Band 4
Test Channel :5785 MHz
Test Mode :TX CH MID
EUT Pol :H Plan

Test Date :2020-02-18
Temp./Humi. :21.6/47
Antenna Pol. :HORIZONTAL
Engineer :Ashton



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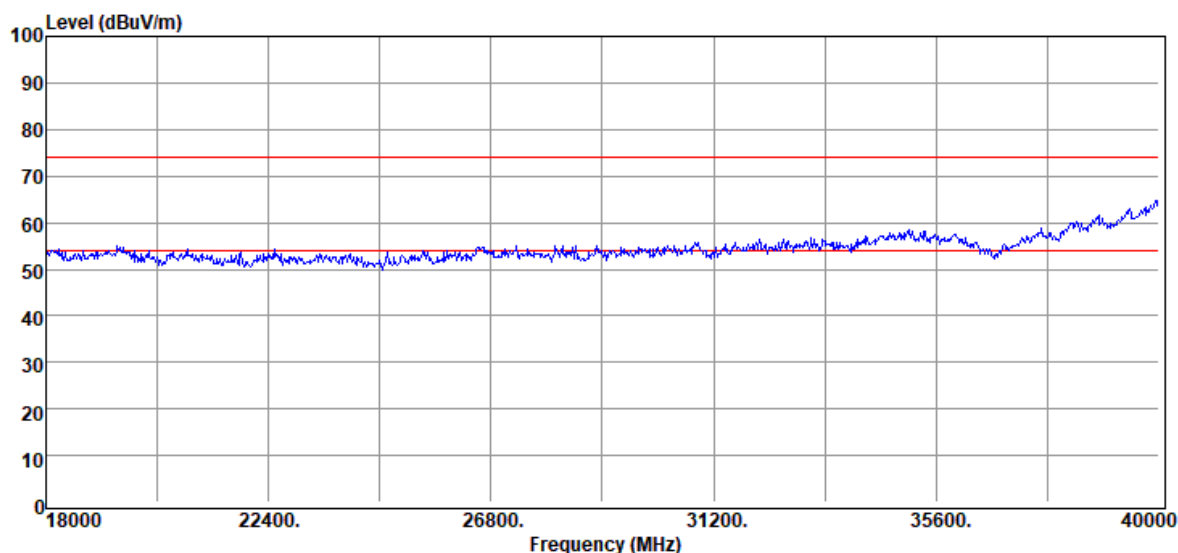
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Report Number :E2/2020/20008
Operation Mode :802.11n20 / Band 4
Test Channel :5825 MHz
Test Mode :TX CH HIGH
EUT Pol :H Plan

Test Date :2020-02-18
Temp./Humi. :21.5/47
Antenna Pol. :VERTICAL
Engineer :Ashton



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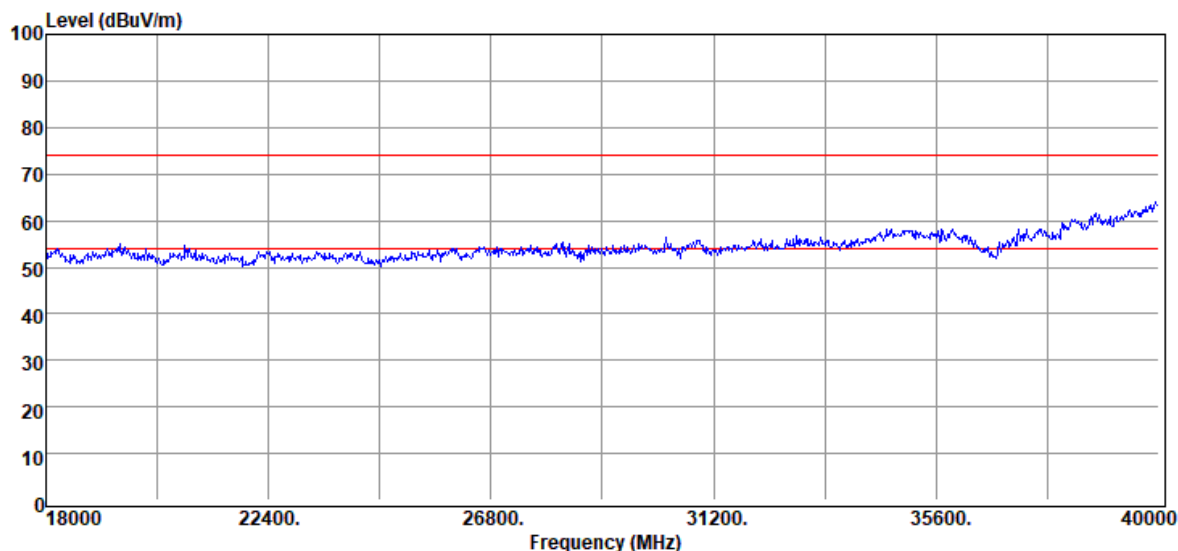
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Report Number :E2/2020/20008
Operation Mode :802.11n20 / Band 4
Test Channel :5825 MHz
Test Mode :TX CH HIGH
EUT Pol :H Plan

Test Date :2020-02-18
Temp./Humi. :21.5/47
Antenna Pol. :HORIZONTAL
Engineer :Ashton



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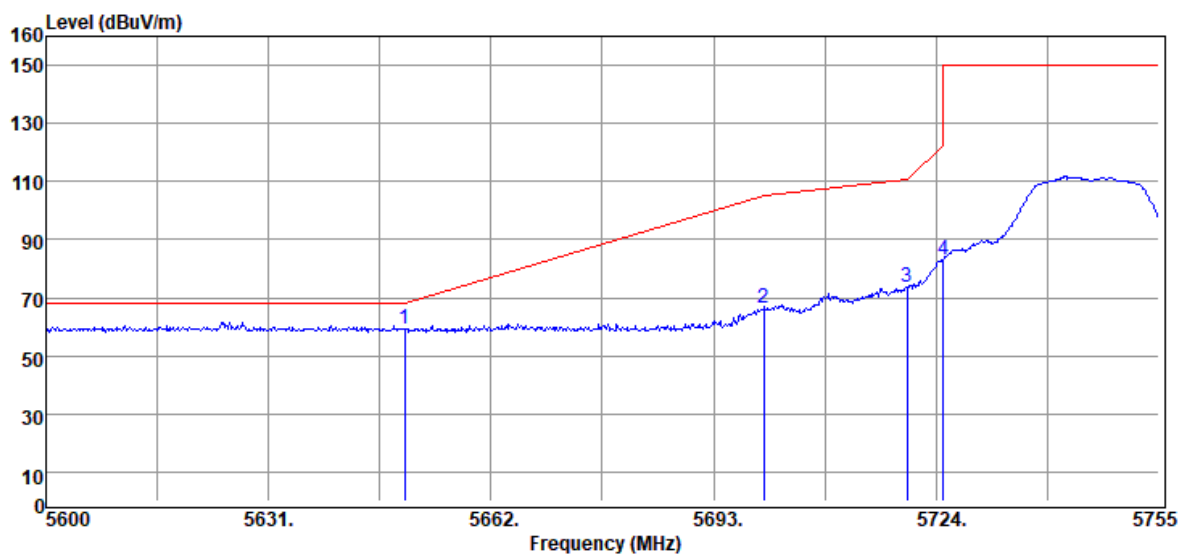
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Band edge falling to restricted band 802.11a mode

Report Number :E2/2020/20008
Operation Mode :802.11a / Band 4
Test Channel :5745 MHz
Test Mode :BE CH LOW
EUT Pol :H Plan

Test Date :2020-02-10
Temp./Humi. :21.7/48
Antenna Pol. :VERTICAL
Engineer :Ashton



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
5650.00	Peak	43.09	16.08	59.17	68.20	-9.03
5700.00	Peak	50.41	16.23	66.64	105.20	-38.56
5720.00	Peak	57.32	16.39	73.71	110.80	-37.09
5725.00	Peak	66.68	16.44	83.12	122.20	-39.08

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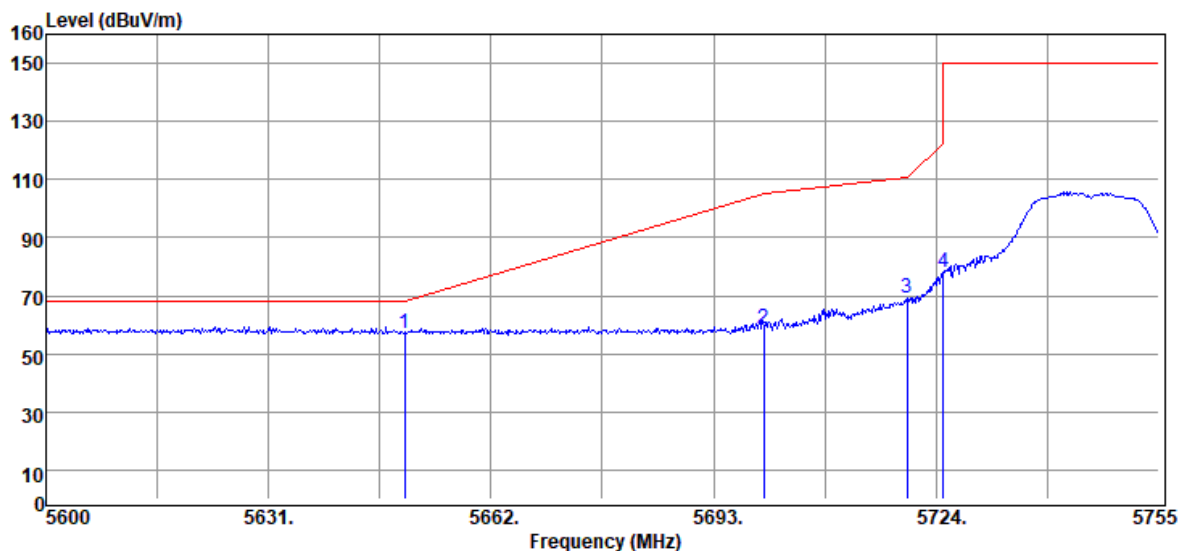
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Report Number :E2/2020/20008
Operation Mode :802.11a / Band 4
Test Channel :5745 MHz
Test Mode :BE CH LOW
EUT Pol :H Plan

Test Date :2020-02-10
Temp./Humi. :21.7/48
Antenna Pol. :HORIZONTAL
Engineer :Ashton



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
5650.00	Peak	40.67	16.08	56.75	68.20	-11.45
5700.00	Peak	42.27	16.23	58.50	105.20	-46.70
5720.00	Peak	52.76	16.39	69.15	110.80	-41.65
5725.00	Peak	61.58	16.44	78.02	122.20	-44.18

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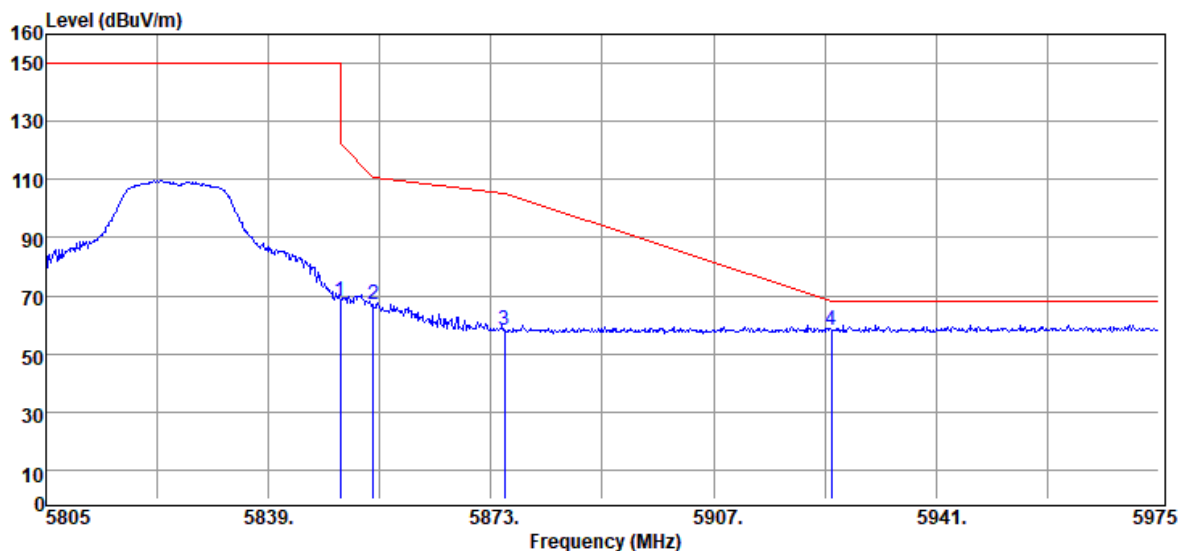
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Report Number :E2/2020/20008
 Operation Mode :802.11a / Band 4
 Test Channel :5825 MHz
 Test Mode :BE CH HIGH
 EUT Pol :H Plan

Test Date :2020-02-10
 Temp./Humi. :21.7/48
 Antenna Pol. :VERTICAL
 Engineer :Ashton



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
5850.00	Peak	51.39	16.85	68.24	122.20	-53.96
5855.00	Peak	49.92	16.84	66.76	110.80	-44.04
5875.00	Peak	41.62	16.77	58.39	105.20	-46.81
5925.00	Peak	41.12	16.94	58.06	68.20	-10.14

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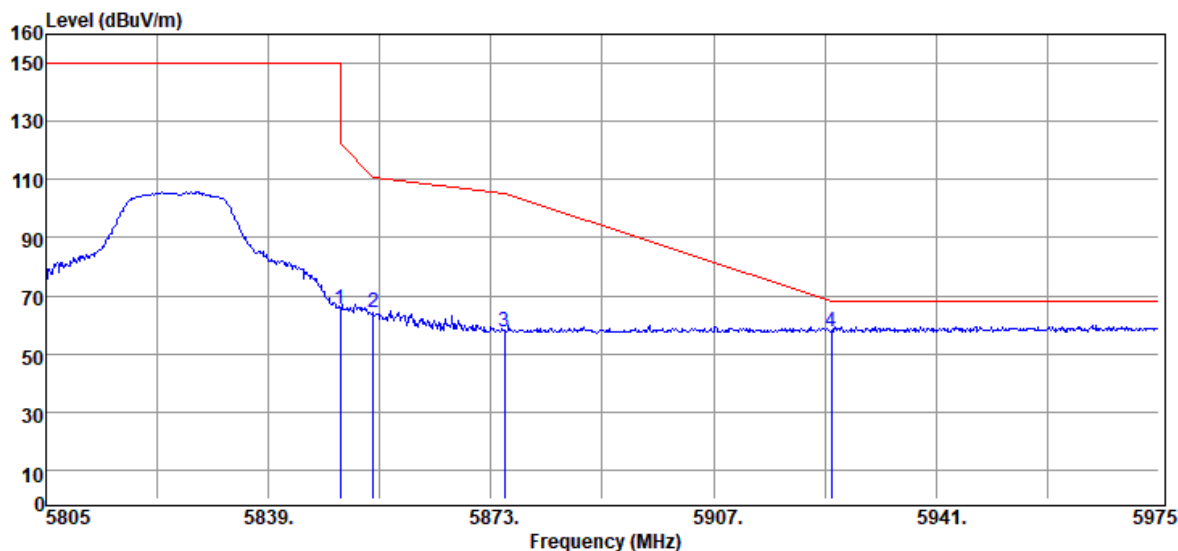
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Report Number :E2/2020/20008
 Operation Mode :802.11a / Band 4
 Test Channel :5825 MHz
 Test Mode :BE CH HIGH
 EUT Pol :H Plan

Test Date :2020-02-10
 Temp./Humi. :21.7/48
 Antenna Pol. :HORIZONTAL
 Engineer :Ashton



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
5850.00	Peak	48.50	16.85	65.35	122.20	-56.85
5855.00	Peak	47.46	16.84	64.30	110.80	-46.50
5875.00	Peak	40.95	16.77	57.72	105.20	-47.48
5925.00	Peak	40.57	16.94	57.51	68.20	-10.69

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Band edge falling to restricted band 802.11 n_HT20 mode

Report Number :E2/2020/20008

Test Date :2020-02-10

Operation Mode :802.11n20 / Band 4

Temp./Humi. :21.6/47

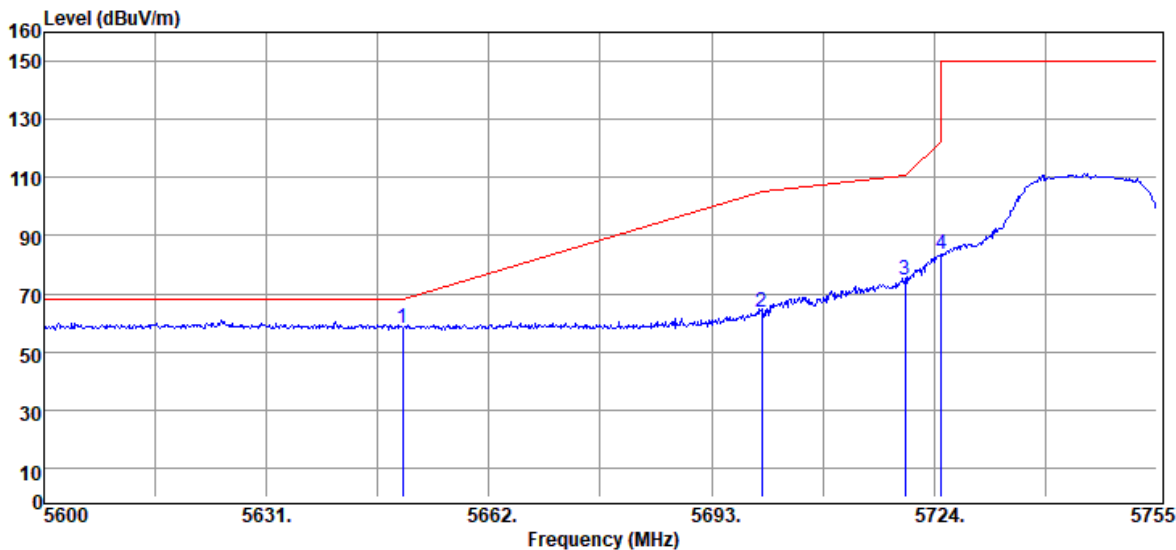
Test Channel :5745 MHz

Antenna Pol. :VERTICAL

Test Mode :BE CH LOW

Engineer :Ashton

EUT Pol :H Plan



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
5650.00	Peak	42.04	16.08	58.12	68.20	-10.08
5700.00	Peak	47.43	16.23	63.66	105.20	-41.54
5720.00	Peak	58.20	16.39	74.59	110.80	-36.21
5725.00	Peak	66.89	16.44	83.33	122.20	-38.87

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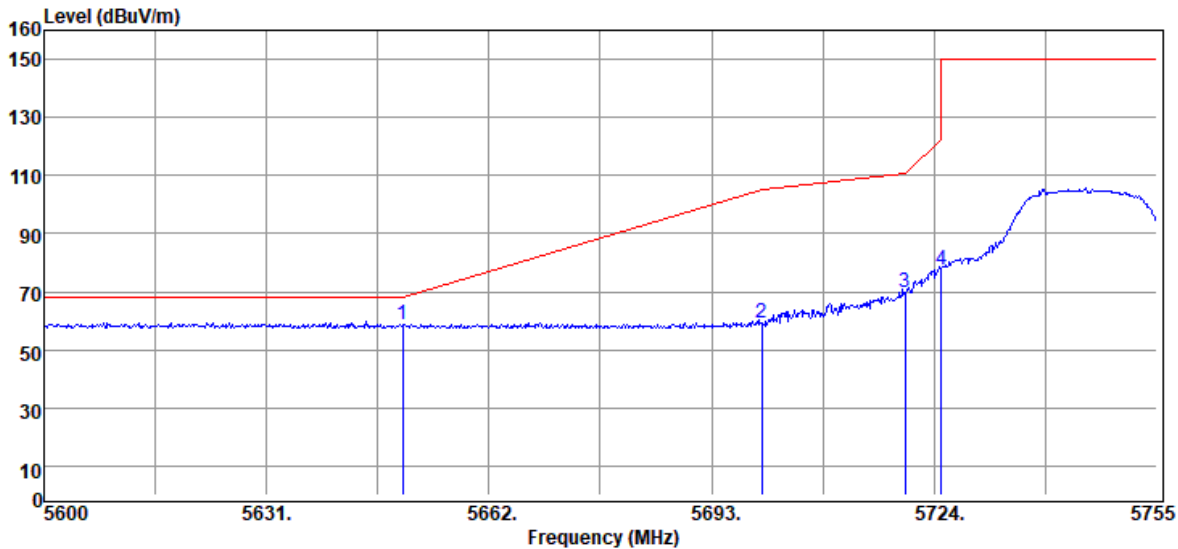
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Report Number :E2/2020/20008
Operation Mode :802.11n20 / Band 4
Test Channel :5745 MHz
Test Mode :BE CH LOW
EUT Pol :H Plan

Test Date :2020-02-10
Temp./Humi. :21.6/47
Antenna Pol. :HORIZONTAL
Engineer :Ashton



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
5650.00	Peak	42.34	16.08	58.42	68.20	-9.78
5700.00	Peak	43.00	16.23	59.23	105.20	-45.97
5720.00	Peak	53.44	16.39	69.83	110.80	-40.97
5725.00	Peak	61.19	16.44	77.63	122.20	-44.57

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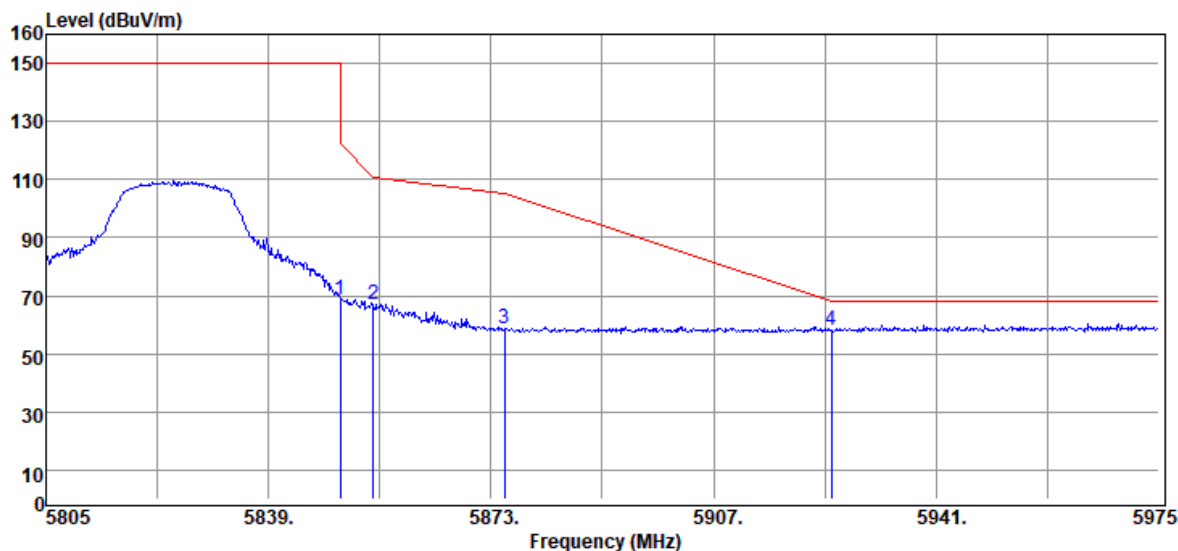
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Report Number :E2/2020/20008
Operation Mode :802.11n20 / Band 4
Test Channel :5825 MHz
Test Mode :BE CH HIGH
EUT Pol :H Plan

Test Date :2020-02-10
Temp./Humi. :21.6/47
Antenna Pol. :VERTICAL
Engineer :Ashton



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
5850.00	Peak	51.94	16.85	68.79	122.20	-53.41
5855.00	Peak	50.06	16.84	66.90	110.80	-43.90
5875.00	Peak	41.82	16.77	58.59	105.20	-46.61
5925.00	Peak	41.16	16.94	58.10	68.20	-10.10

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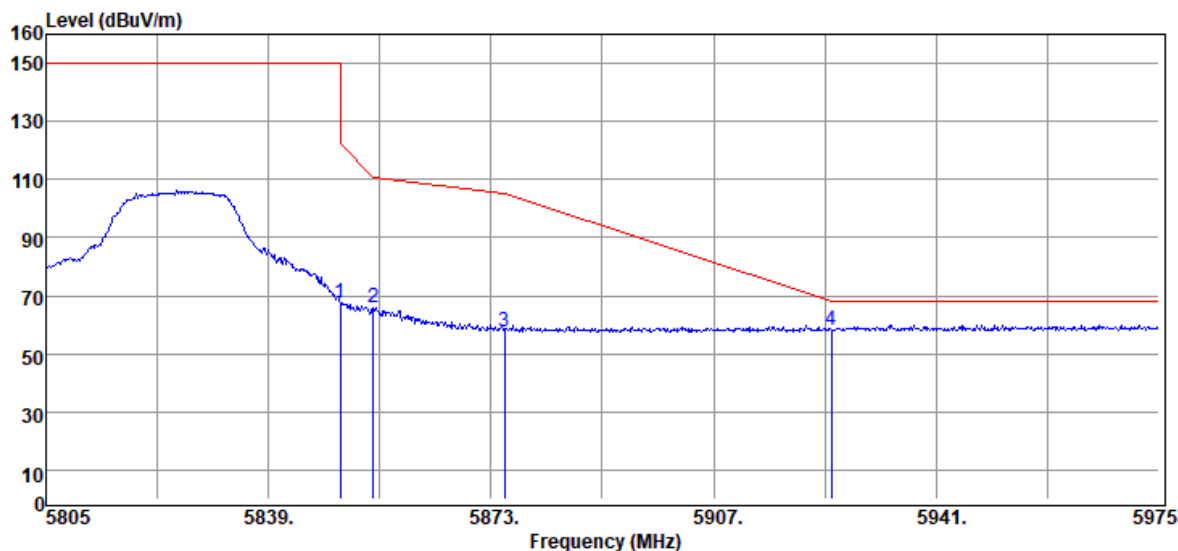
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Report Number :E2/2020/20008
Operation Mode :802.11n20 / Band 4
Test Channel :5825 MHz
Test Mode :BE CH HIGH
EUT Pol :H Plan

Test Date :2020-02-10
Temp./Humi. :21.6/47
Antenna Pol. :HORIZONTAL
Engineer :Ashton



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
5850.00	Peak	50.86	16.85	67.71	122.20	-54.49
5855.00	Peak	48.85	16.84	65.69	110.80	-45.11
5875.00	Peak	41.06	16.77	57.83	105.20	-47.37
5925.00	Peak	41.24	16.94	58.18	68.20	-10.02

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9 ANTENNA REQUIREMENT

9.1 Standard Applicable

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.

9.2 Antenna Connected Construction

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

~ End of Report ~

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