

# ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

## INTENTIONAL RADIATOR CERTIFICATION REPORT

OF

**FCC Applicant:** silex technology, Inc.  
 2-3-1 Hikaridai, Seika-cho, Soraku-gun, Kyoto 619-0237  
**Product Name:** Embedded wireless module  
**Brand Name:** Silex Technology  
**Model No.:** SX-SDMAC  
**Model Difference:** N/A  
**Report Number:** ER/2020/20130  
**FCC ID:** N6C-SDMAC  
**IC:** 4908A-SDMAC  
**FCC Rule Part:** §15.407, Cat: NII  
**ISED RSS:** RSS-247 issue 2 Feb. 2017  
**Issue Date:** Mar. 24, 2020  
**Date of Test:** Mar. 12, 2020  
**Date of EUT Re-  
 ceived:** Feb. 15, 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: \_\_\_\_\_



**Jim Chang / Manager**



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## Revision History

Report Number	Revision	Description	Issue Date	Remark
ER/2020/20130	Rev.00	Original.	Mar. 24, 2020	Revised By: Karen Huang

**Note:**

- 1、 This device is adding one new antenna, so the radiated emission spot check is performed to demonstrate compliance in this report.

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## 1 GENERAL INFORMATION

### 1.1 Product Description

Product Name:	Embedded wireless module	
Brand Name:	Silex Technology	
Model No.:	SX-SDMAC	
Model Difference:	N/A	
Hardware Version:	N/A	
Software Version:	1.0.0.12	
Model No. of BT/WLAN Module:	SX-SDMAC	
Class II Permissive change:	Adding new antenna with same type and lower gain on module.	
Power Supply:	3.3 VDC from Power supply	
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 802.11 n_40MHz: 13.5 - 150.0Mbps	802.11 ac_20MHz: 6.5 –86.7Mbps 802.11 ac_40MHz: 13.5 -200.0Mbps 802.11 ac_80MHz: 29.3 – 433.3Mbps

### 1.2 Antenna Designation

Antenna Type	Supplier	Antenna Part No.	Freq. (GHz)	Peak Antenna Gain (dBi)	Worst Antenna Gain
PCB	Laird	Mini-Nanoblade	4.9-5.875	4.8	-

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### 1.3 Test Methodology of Applied Standards

FCC Part 15, Subpart E §15.407  
FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01  
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.

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## 2 SYSTEM TEST CONFIGURATION

### 2.1 EUT Configuration

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

### 2.2 EUT Exercise

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

### 2.3 Test Procedure

#### 2.3.1 Conducted Emissions

The EUT is 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.

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## 2.4 Measurement Results Explanation Example

### 2.4.1 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.

### 2.4.2 For all conducted test items:

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

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## 2.5 Configuration of Tested System

Fig. 2-1 Radiated Emission Configuration

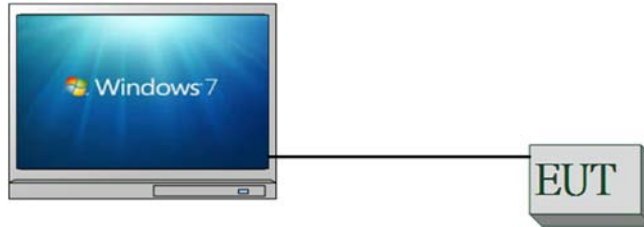


Table 2-1 Equipment Used in Tested System

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

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### 3 SUMMARY OF TEST RESULT

FCC Rules	IC Rules	Description Of Test	Result
§15.205 §15.209 §15.407(b)	RSS-Gen §8.9 RSS-247 §6.2.1~ 4 (2)	Undesirable Radiated Emissions	Compliant
§15.203	RSS- Gen §6.8	Antenna Requirement	Compliant

### 4 DESCRIPTION OF TEST MODES

#### 4.1 802.11a/n/ac operated in U-NII Bands

##### Operated band in 5150 MHz ~5250 MHz:

20 M	
CH	Freq (MHz)
36	5180
40	5200
44	5220
48	5240

40 M	
CH	Freq (MHz)
38	5190
46	5230

80 M	
CH	Freq (MHz)
42	5210

##### Operated band in 5250 MHz ~5350 MHz:

20 M	
CH	Freq (MHz)
52	5260
56	5280
60	5300
64	5320

40 M	
CH	Freq (MHz)
54	5270
62	5310

80 M	
CH	Freq (MHz)
58	5290

##### Operated band in 5470 MHz ~5725 MHz:

20 M	
CH	Freq (MHz)
100	5500
104	5520
108	5540
112	5560
116	5580
120	5600
124	5620
128	5640
132	5660
136	5680
140	5700
144	5720

40 M	
CH	Freq (MHz)
102	5510
110	5550
118	5590
126	5630
134	5670
142	5710

80 M	
CH	Freq (MHz)
106	5530
122	5610
138	5690

##### Operated band in 5725 MHz ~5850 MHz:

20 M	
CH	Freq (MHz)
149	5745
153	5765
157	5785
161	5805
165	5825

40 M	
CH	Freq (MHz)
151	5755
159	5795

80 M	
CH	Freq (MHz)
155	5775

**Note: Operating at 5600~5650MHz is prohibited in Canada for Master device.**

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#### 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
<input checked="" type="checkbox"/> 802.11 ac	<input checked="" type="checkbox"/> Ch0	<input type="checkbox"/> Ch1	<input type="checkbox"/> Ch2	<input type="checkbox"/> Ch3	<input type="checkbox"/> MIMO
<input type="checkbox"/> 802.11 ax	<input 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 (ABOVE 1 GHz)						
MODE	FREQUENCY BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	AN-TENNA PORT
802.11a	5180~5240	36 to 48	44	OFDM	6	Ch0
	5260~5320	52 to 64	60			
	5500~5720	100 to 144	116,144			
	5745~5825	149 to 165	157			
802.11n_HT20	5180~5240	36 to 48	44		MCS0	Ch0
	5260~5320	52 to 64	60			
	5500~5720	100 to 144	116,144			
	5745~5825	149 to 165	157			
802.11n_HT40	5190~5230	38 to 46	38		MCS0	Ch0
	5270~5310	54 to 62	54			
	5510~5710	102 to 142	110,142			
	5755~5795	151 to 159	151			
802.11ac_VHT80	5210	42	42		MCS0	Ch0
	5290	58	58			
	5530~5690	106 to 138	106,138			
	5775	155	155			

**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.

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## 5 MEASUREMENT UNCERTAINTY

Test Items	Uncertainty
AC Power Line Conducted Emission	+/- 2.586 dB
26dB & 6dB Emission Bandwidth	+/- 123.36 Hz
The Maximum Output Power Measurement	+/- 0.96 dB
Peak Power Spectral Density Measurement	+/- 1.67 dB
Frequency Stability	+/- 123.36 Hz
Temperature	+/- 0.65 °C
Humidity	+/- 4.6 %
DC / AC Power Source	DC= +/- 0.13%, AC= +/- 0.2%

Radiated Spurious Emission Measurement Uncertainty	
<b>Polarization: Vertical</b>	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
<b>Polarization: Horizontal</b>	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.

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## 6 UNDESIRABLE RADIATED EMISSION MEASUREMENT

### 6.1 Standard Applicable

#### 6.1.1 Band Edge

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	EIRP LIMIT	FIELD STRENGTH AT 3m
15.407(b)(1) RSS-247 §6.2.1.2	PK: -27 (dBm/MHz)	PK: 68.3 (dBµV/m)
15.407(b)(2) RSS-247 §6.2.2.2		
15.407(b)(3) RSS-247 §6.2.3.2		
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
<p>*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.</p>		

$EIRP = (E \cdot d)^2 / 30$ , 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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### 6.1.2 Spurious Emission

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 (dB $\mu$ V/m) = 20 log Emission level (dB $\mu$ V/m)

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## 6.2 Measurement Equipment Used

SGS SAC-III					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Horn Antenna	Schwarzbeck	BBHA9120D	1441	08/20/2019	08/19/2020
Horn Antenna	Schwarzbeck	BBHA9170	184	12/25/2019	12/24/2020
3m Site NSA	SGS	966 chamber	N/A	01/02/2019	01/01/2021
PXA Spectrum Analyzer	Agilent	N9030A	MY53120760	04/22/2019	04/21/2020
Pre-Amplifier	HP	8449B	3008A00578	01/02/2020	01/01/2021
Pre-Amplifier	EMC Instruments	EMC184045B	980135	01/02/2020	01/01/2021
Filter 5150-5350 MHz	Micro-Tronics	BRM50703	1	01/02/2020	01/01/2021
Filter 5470-5725 MHz	Micro-Tronics	BRM50704	1	01/02/2020	01/01/2021
Filter 5725-5875 MHz	Micro-Tronics	BRM50705	1	01/02/2020	01/01/2021
High Pass Filter	WI	WHKX7.0/18G-8SS	45	01/02/2020	01/01/2021
Low Loss Cable	Huber Suhner	966_RX	9	01/02/2020	01/01/2021

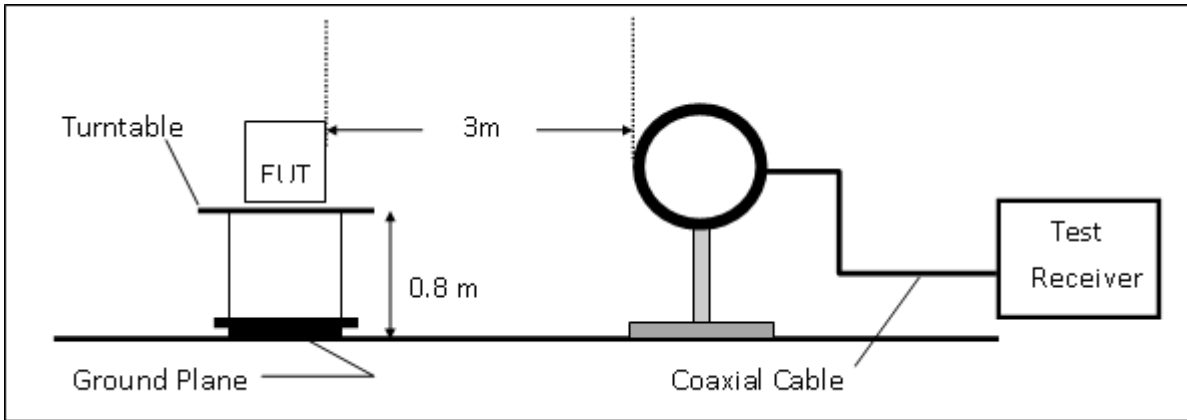
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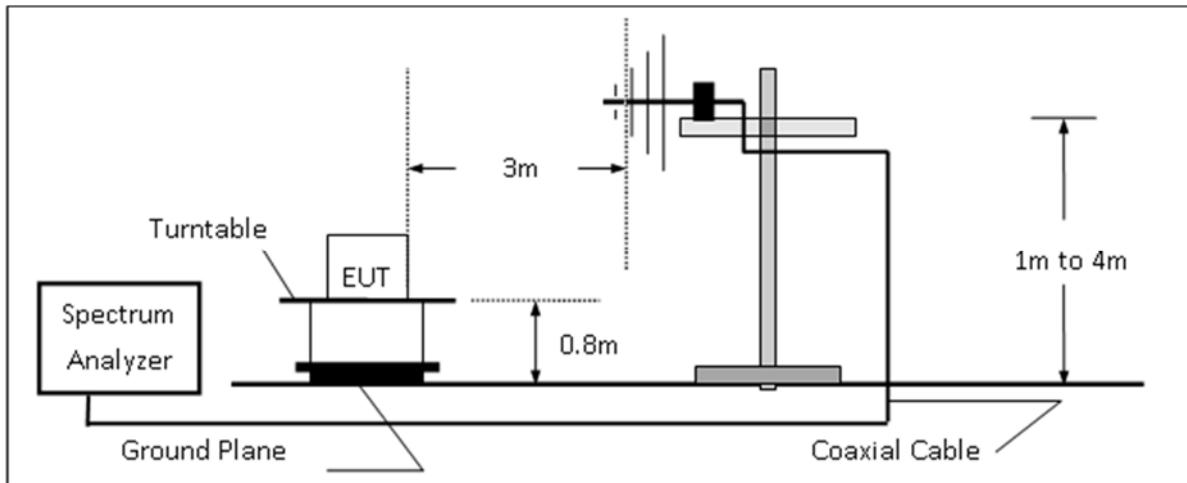
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### 6.3 Test SET-UP

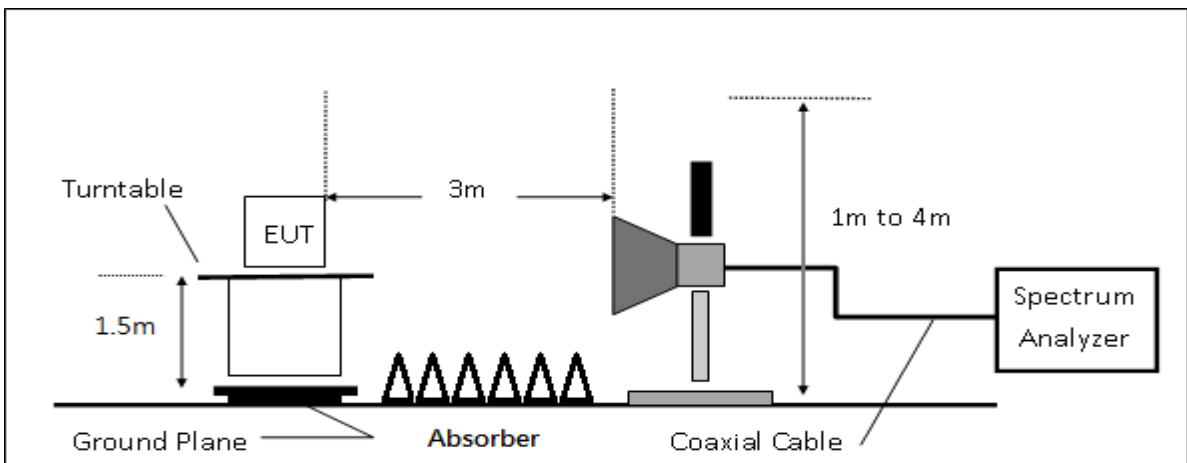
(A) Radiated Emission Test Set-UP Frequency Below 30MHz.



(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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## 6.4 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 .
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. At frequency above 1 GHz, Set the spectrum analyzer:
  - A. RBW=1 MHz, VBW=3 MHz for **Peak** Detector.
  - B. Set the spectrum analyzer as RBW=1 MHz, VBW=10 Hz (Duty cycle > 98%) or VBW ≥ 1/T (Duty cycle < 98%) for **Average** Detector.
8. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
9. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
10. Repeat above procedures until all frequency measured were complete.

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## 6.5 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  $20 \cdot \log(uV/m)$

Actual FS(dB $\mu$ V/m) = SPA. Reading level(dB $\mu$ V) + Factor(dB)

Factor(dB) = Antenna Factor(dB $\mu$ V/m) + Cable Loss(dB) – Pre\_Amplifier Gain(dB)

## 6.6 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.

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台灣檢驗科技股份有限公司 t (886-2) 2299-3279

f (886-2) 2298-0488

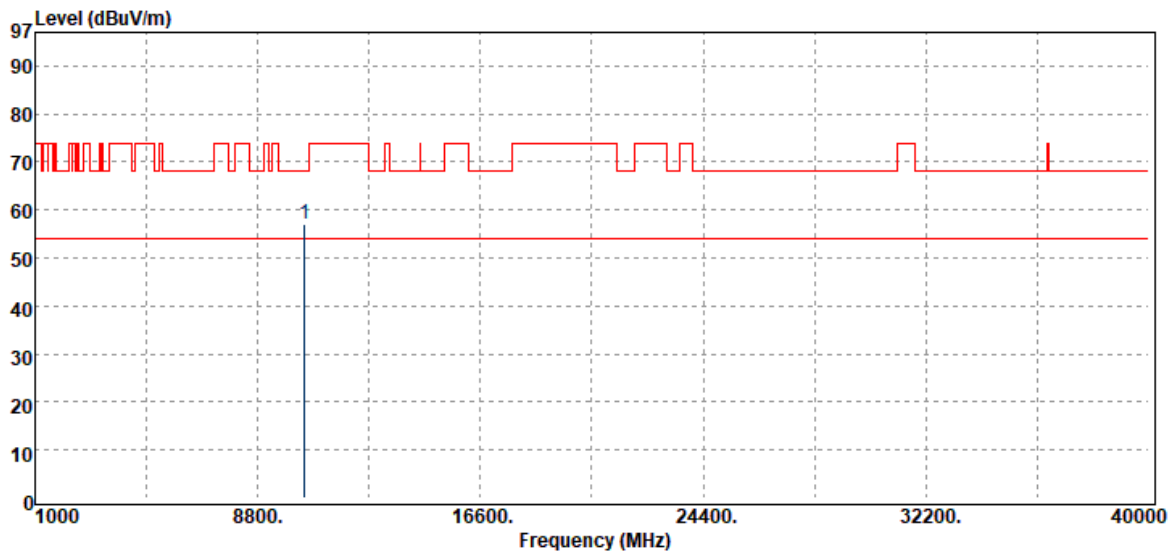
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## 6.7 Radiated Spurious Emission Measurement Result

### 6.7.1 Above 1GHz Worst-Case Data:

Report Number	:ER/2020/20130	Test Date	:2020-03-12
Operation Mode	:802.11a	Temp./Humi.	:20.8/64
Test Frequency	:5220 MHz	Antenna Pol.	:VERTICAL
Test Mode	:Tx CH Mid	Engineer	:Nick
EUT Pol	:H Plane		



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
10440.00	Peak	35.89	21.08	56.97	68.20	-11.23

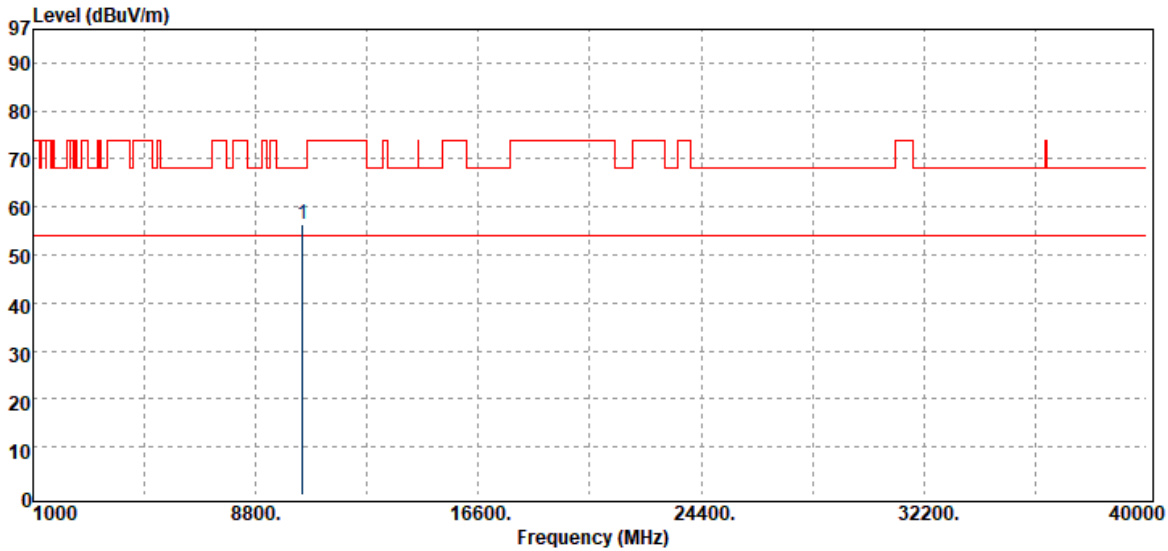
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Report Number :ER/2020/20130  
 Operation Mode :802.11a  
 Test Frequency :5220 MHz  
 Test Mode :Tx CH Mid  
 EUT Pol :H Plane

Test Date :2020-03-12  
 Temp./Humi. :20.8/64  
 Antenna Pol. :HORIZONTAL  
 Engineer :Nick



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
10440.00	Peak	35.36	21.08	56.44	68.20	-11.76

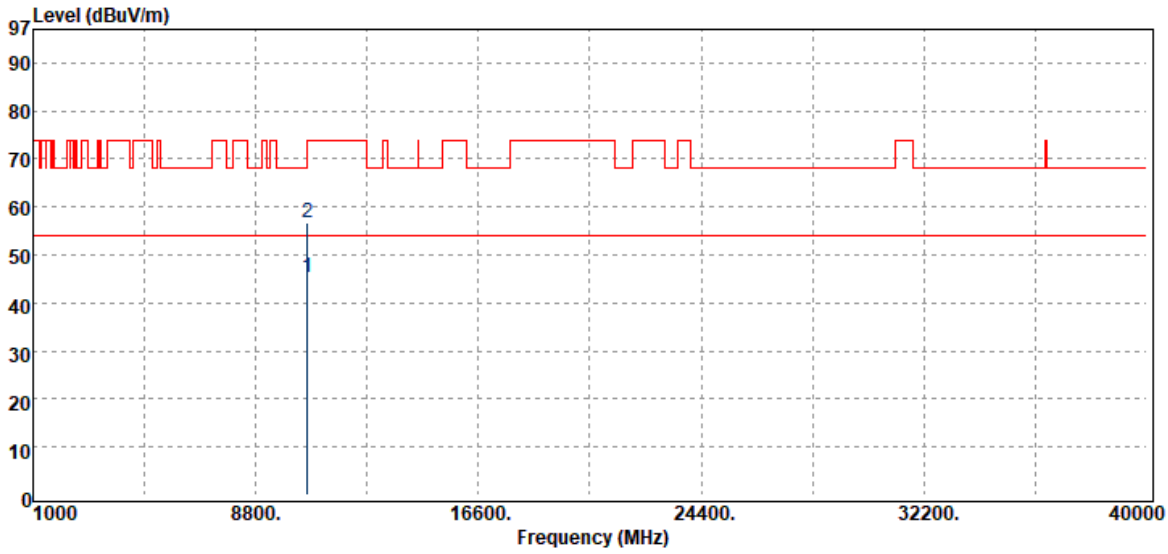
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Report Number :ER/2020/20130  
 Operation Mode :802.11a  
 Test Frequency :5300 MHz  
 Test Mode :Tx CH Mid  
 EUT Pol :H Plane

Test Date :2020-03-12  
 Temp./Humi. :20.8/64  
 Antenna Pol. :VERTICAL  
 Engineer :Nick



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
10600.00	Average	23.89	21.27	45.16	54.00	-8.84
10600.00	Peak	35.29	21.27	56.56	74.00	-17.44

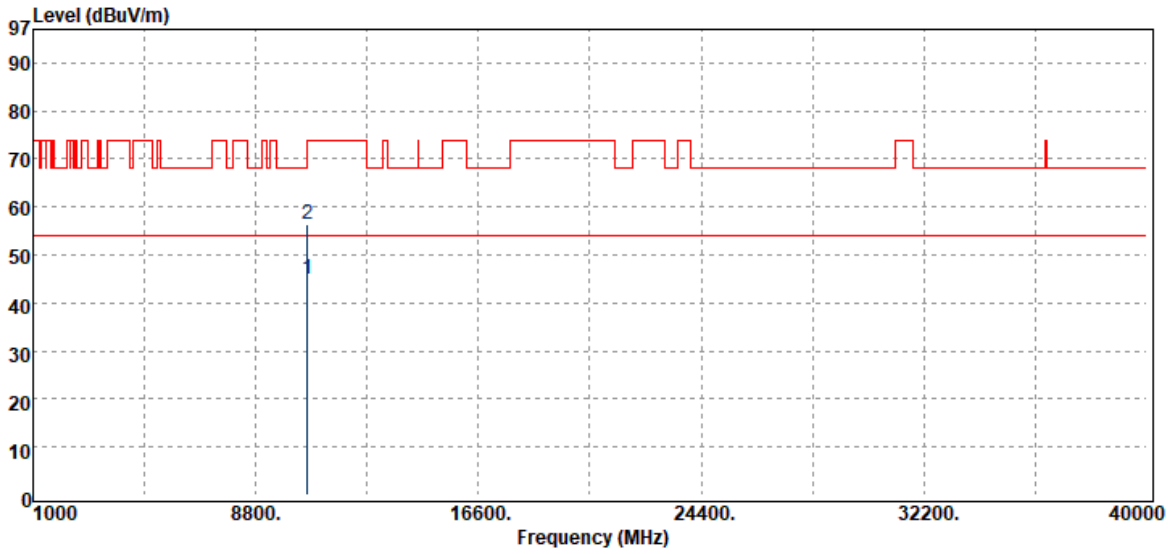
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Report Number :ER/2020/20130  
 Operation Mode :802.11a  
 Test Frequency :5300 MHz  
 Test Mode :Tx CH Mid  
 EUT Pol :H Plane

Test Date :2020-03-12  
 Temp./Humi. :20.8/64  
 Antenna Pol. :HORIZONTAL  
 Engineer :Nick



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
10600.00	Average	23.70	21.27	44.97	54.00	-9.03
10600.00	Peak	35.10	21.27	56.37	74.00	-17.63

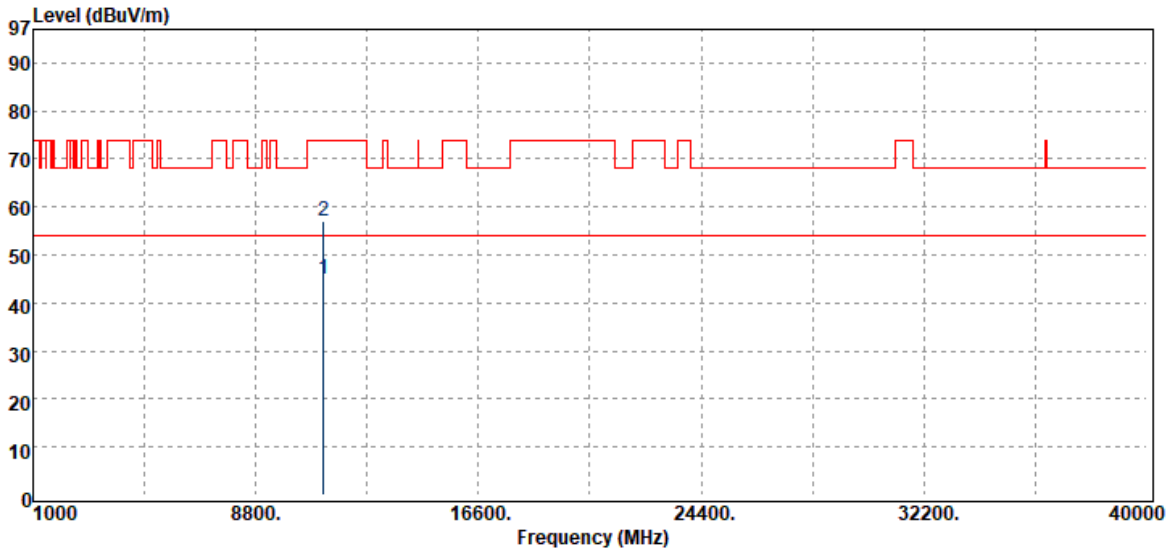
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Report Number :ER/2020/20130  
 Operation Mode :802.11a  
 Test Frequency :5580 MHz  
 Test Mode :Tx CH Mid  
 EUT Pol :H Plane

Test Date :2020-03-12  
 Temp./Humi. :20.8/64  
 Antenna Pol. :VERTICAL  
 Engineer :Nick



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
11160.00	Average	22.81	22.20	45.01	54.00	-8.99
11160.00	Peak	35.01	22.20	57.21	74.00	-16.79

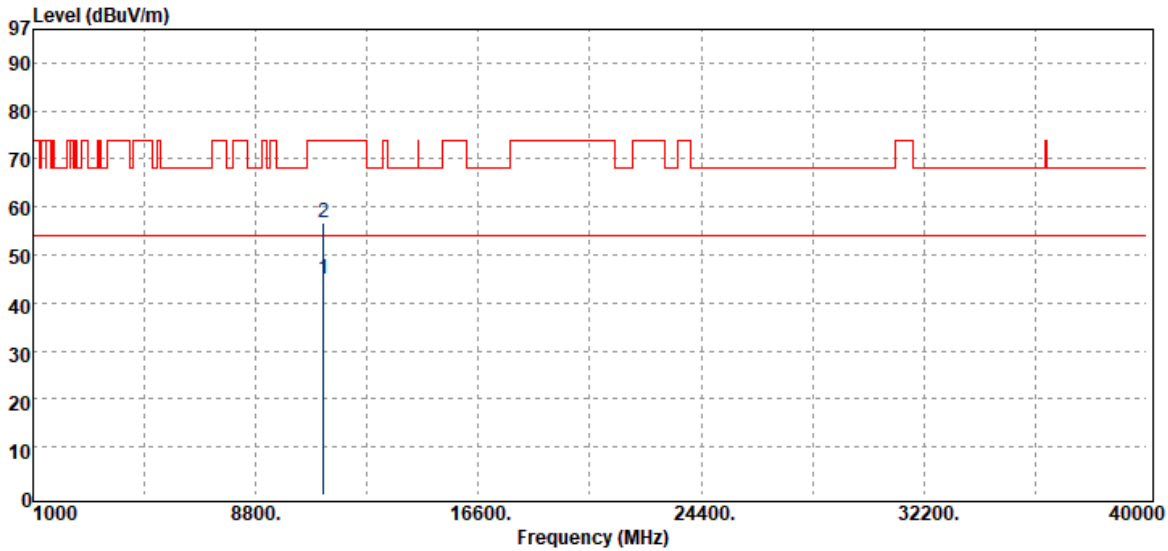
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 Operation Mode :802.11a  
 Test Frequency :5580 MHz  
 Test Mode :Tx CH Mid  
 EUT Pol :H Plane

Test Date :2020-03-12  
 Temp./Humi. :20.8/64  
 Antenna Pol. :HORIZONTAL  
 Engineer :Nick



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
11160.00	Average	22.78	22.20	44.98	54.00	-9.02
11160.00	Peak	34.67	22.20	56.87	74.00	-17.13

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

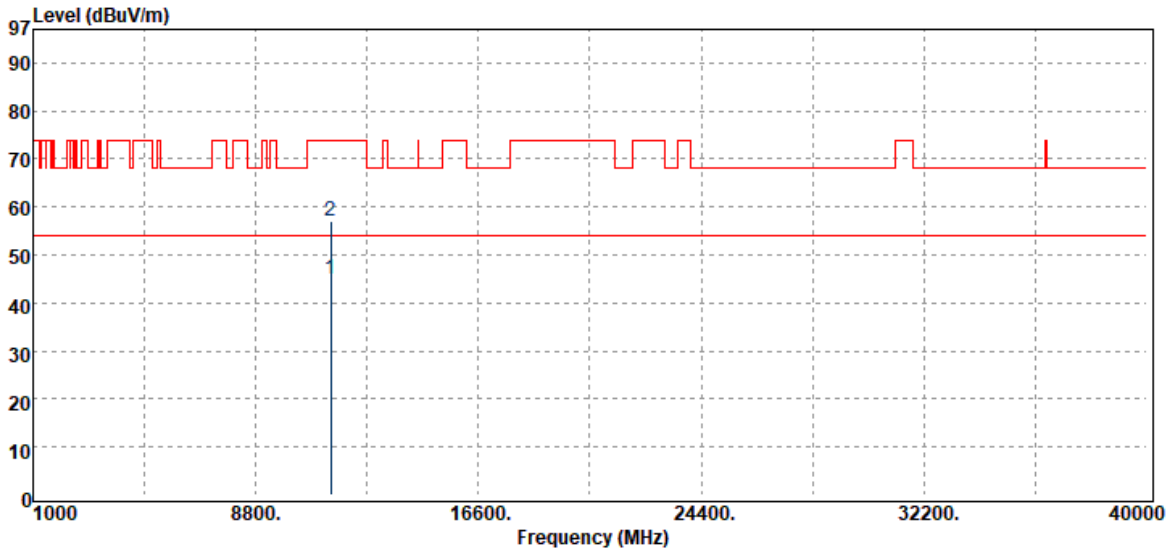
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Report Number :ER/2020/20130  
 Operation Mode :802.11a  
 Test Frequency :5720 MHz  
 Test Mode :Tx CH Low  
 EUT Pol :H Plane

Test Date :2020-03-12  
 Temp./Humi. :20.8/64  
 Antenna Pol. :VERTICAL  
 Engineer :Nick



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
11440.00	Average	22.44	22.66	45.10	54.00	-8.90
11440.00	Peak	34.33	22.66	56.99	74.00	-17.01

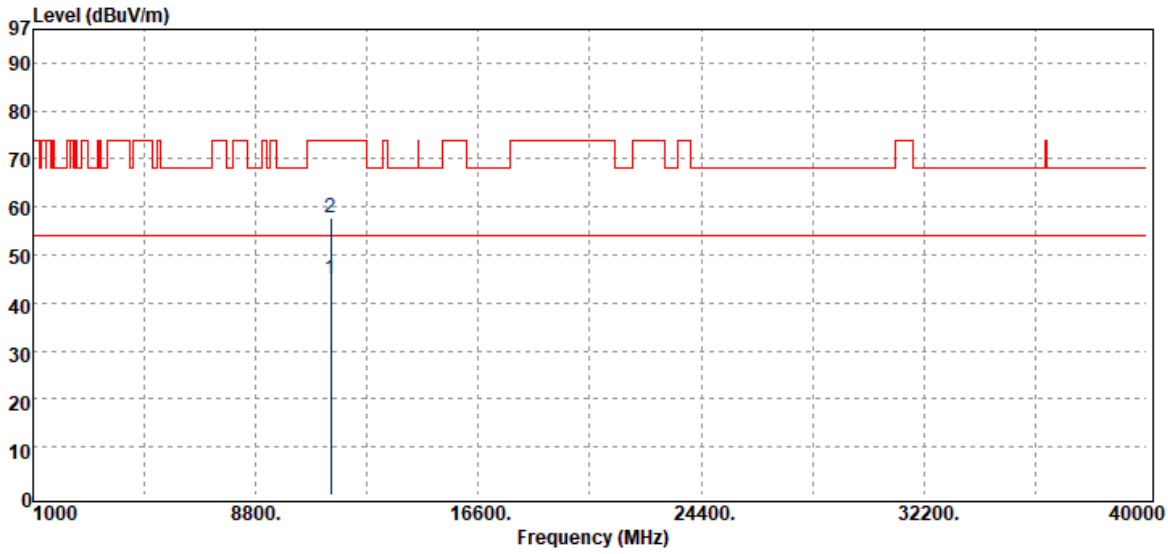
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Report Number :ER/2020/20130  
 Operation Mode :802.11a  
 Test Frequency :5720 MHz  
 Test Mode :Tx CH Low  
 EUT Pol :H Plane

Test Date :2020-03-12  
 Temp./Humi. :20.8/64  
 Antenna Pol. :HORIZONTAL  
 Engineer :Nick



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
11440.00	Average	22.42	22.66	45.08	54.00	-8.92
11440.00	Peak	35.07	22.66	57.73	74.00	-16.27

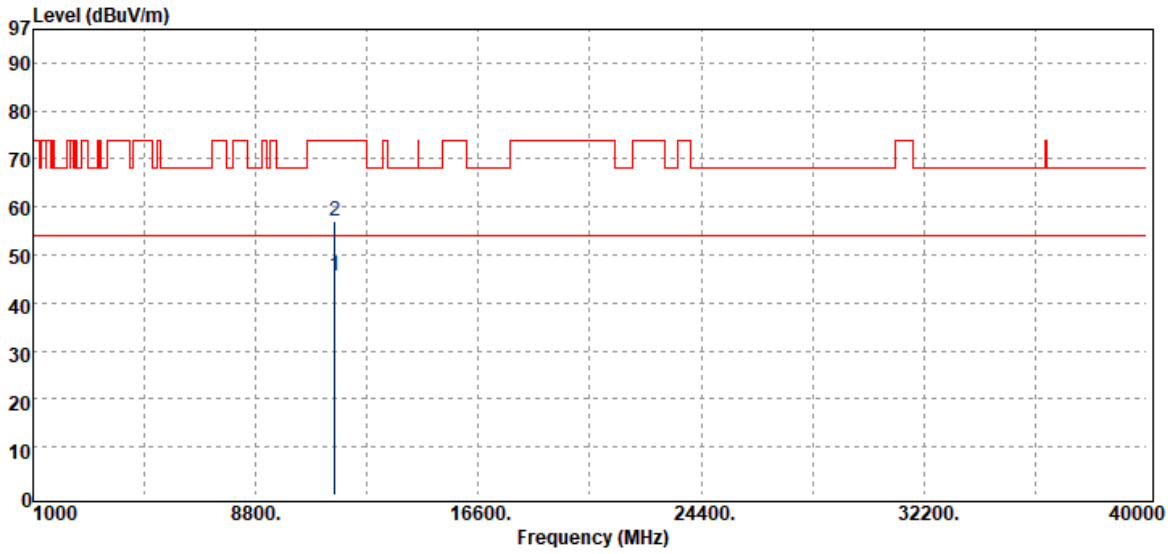
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Report Number :ER/2020/20130  
 Operation Mode :802.11a  
 Test Frequency :5785 MHz  
 Test Mode :Tx CH Mid  
 EUT Pol :H Plane

Test Date :2020-03-12  
 Temp./Humi. :20.8/64  
 Antenna Pol. :VERTICAL  
 Engineer :Nick



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
11570.00	Average	23.62	22.01	45.63	54.00	-8.37
11570.00	Peak	35.16	22.01	57.17	74.00	-16.83

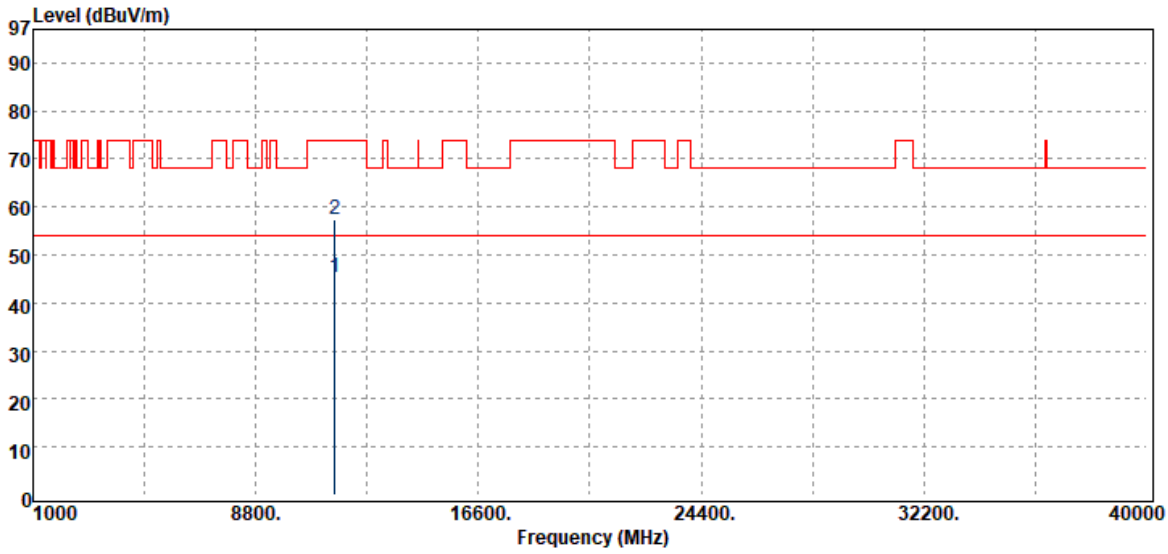
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Report Number :ER/2020/20130  
 Operation Mode :802.11a  
 Test Frequency :5785 MHz  
 Test Mode :Tx CH Mid  
 EUT Pol :H Plane

Test Date :2020-03-12  
 Temp./Humi. :20.8/64  
 Antenna Pol. :HORIZONTAL  
 Engineer :Nick



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
11570.00	Average	23.14	22.01	45.15	54.00	-8.85
11570.00	Peak	35.42	22.01	57.43	74.00	-16.57

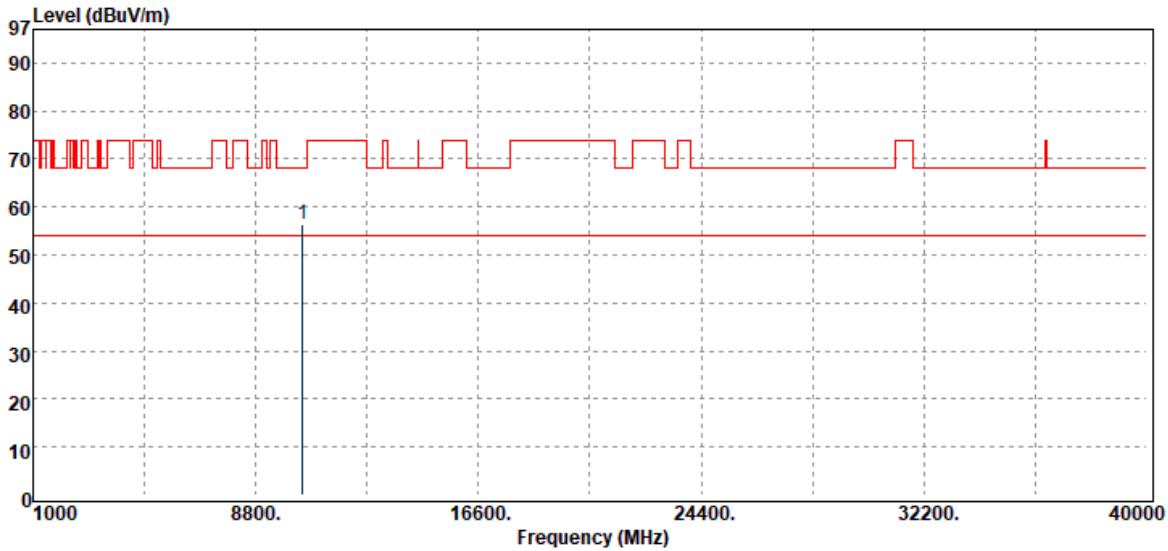
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Report Number :ER/2020/20130  
Operation Mode :802.11n20  
Test Frequency :5220 MHz  
Test Mode :Tx CH Mid  
EUT Pol :H Plane

Test Date :2020-03-12  
Temp./Humi. :20.8/64  
Antenna Pol. :VERTICAL  
Engineer :Nick



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
10440.00	Peak	35.25	21.08	56.33	68.20	-11.87

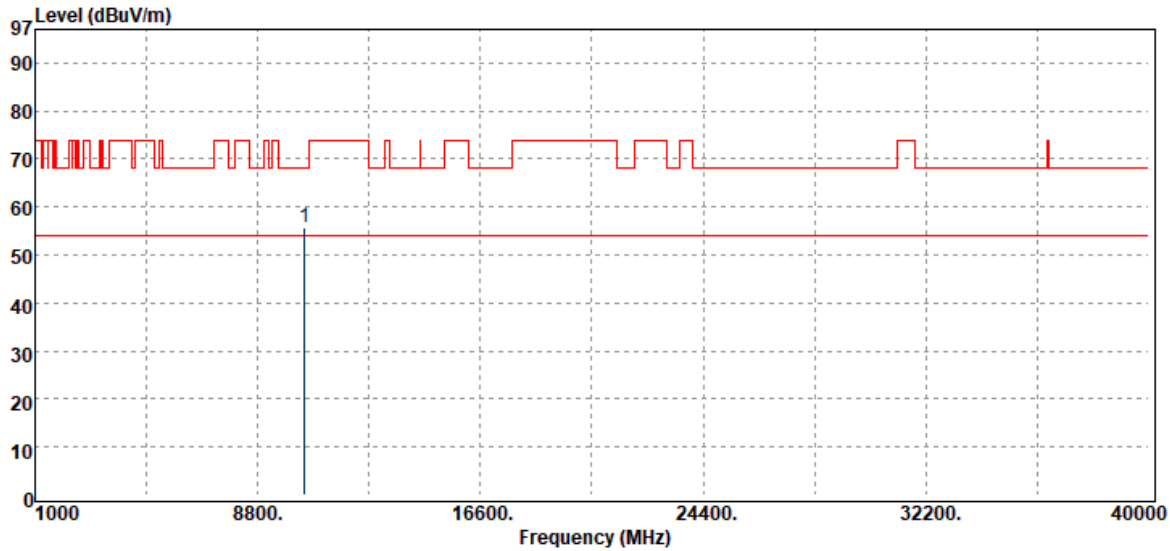
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Report Number :ER/2020/20130  
Operation Mode :802.11n20  
Test Frequency :5220 MHz  
Test Mode :Tx CH Mid  
EUT Pol :H Plane

Test Date :2020-03-12  
Temp./Humi. :20.8/64  
Antenna Pol. :HORIZONTAL  
Engineer :Nick



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
10440.00	Peak	34.47	21.08	55.55	68.20	-12.65

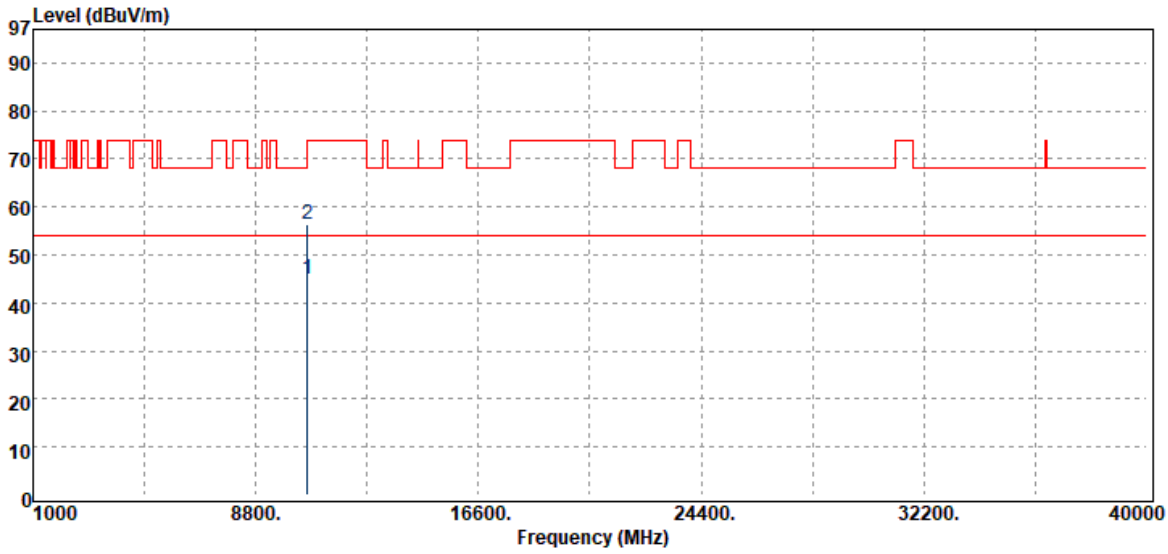
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Report Number :ER/2020/20130  
 Operation Mode :802.11n20  
 Test Frequency :5300 MHz  
 Test Mode :Tx CH Mid  
 EUT Pol :H Plane

Test Date :2020-03-12  
 Temp./Humi. :20.8/64  
 Antenna Pol. :VERTICAL  
 Engineer :Nick



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
10600.00	Average	23.69	21.27	44.96	54.00	-9.04
10600.00	Peak	34.97	21.27	56.24	74.00	-17.76

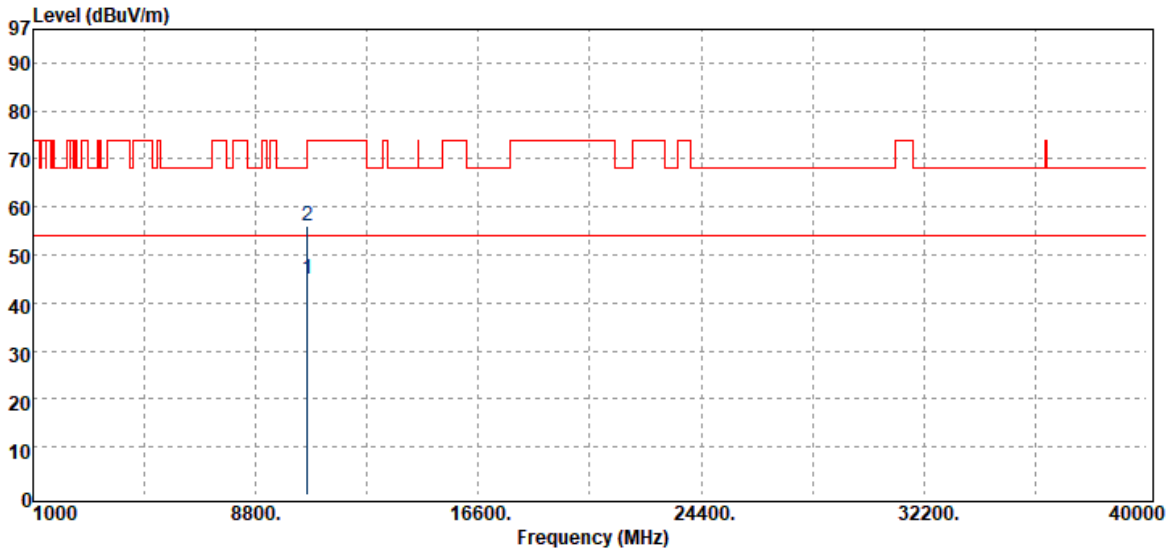
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Report Number :ER/2020/20130  
 Operation Mode :802.11n20  
 Test Frequency :5300 MHz  
 Test Mode :Tx CH Mid  
 EUT Pol :H Plane

Test Date :2020-03-12  
 Temp./Humi. :20.8/64  
 Antenna Pol. :HORIZONTAL  
 Engineer :Nick



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
10600.00	Average	23.77	21.27	45.04	54.00	-8.96
10600.00	Peak	34.84	21.27	56.11	74.00	-17.89

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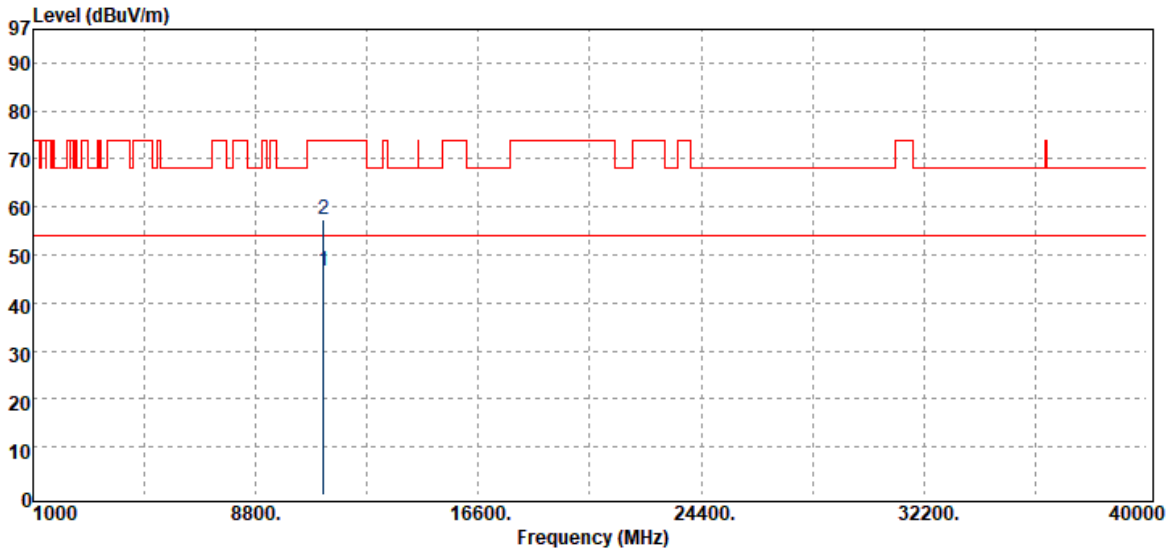
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Report Number :ER/2020/20130  
 Operation Mode :802.11n20  
 Test Frequency :5580 MHz  
 Test Mode :Tx CH Mid  
 EUT Pol :H Plane

Test Date :2020-03-12  
 Temp./Humi. :20.8/64  
 Antenna Pol. :VERTICAL  
 Engineer :Nick



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
11160.00	Average	24.32	22.20	46.52	54.00	-7.48
11160.00	Peak	35.04	22.20	57.24	74.00	-16.76

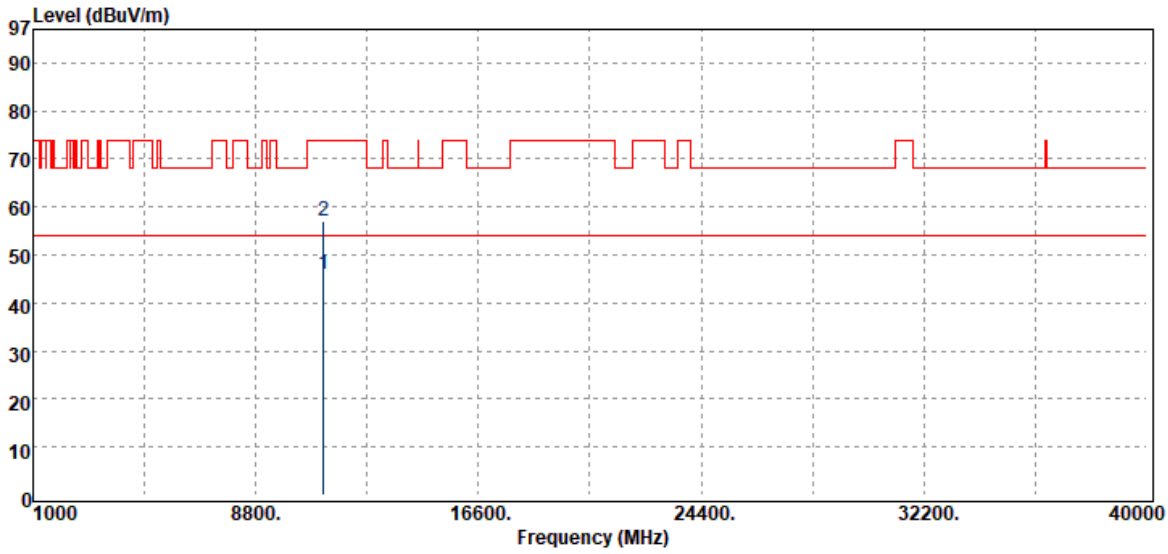
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Report Number :ER/2020/20130  
 Operation Mode :802.11n20  
 Test Frequency :5580 MHz  
 Test Mode :Tx CH Mid  
 EUT Pol :H Plane

Test Date :2020-03-12  
 Temp./Humi. :20.8/64  
 Antenna Pol. :HORIZONTAL  
 Engineer :Nick



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
11160.00	Average	23.65	22.20	45.85	54.00	-8.15
11160.00	Peak	34.78	22.20	56.98	74.00	-17.02

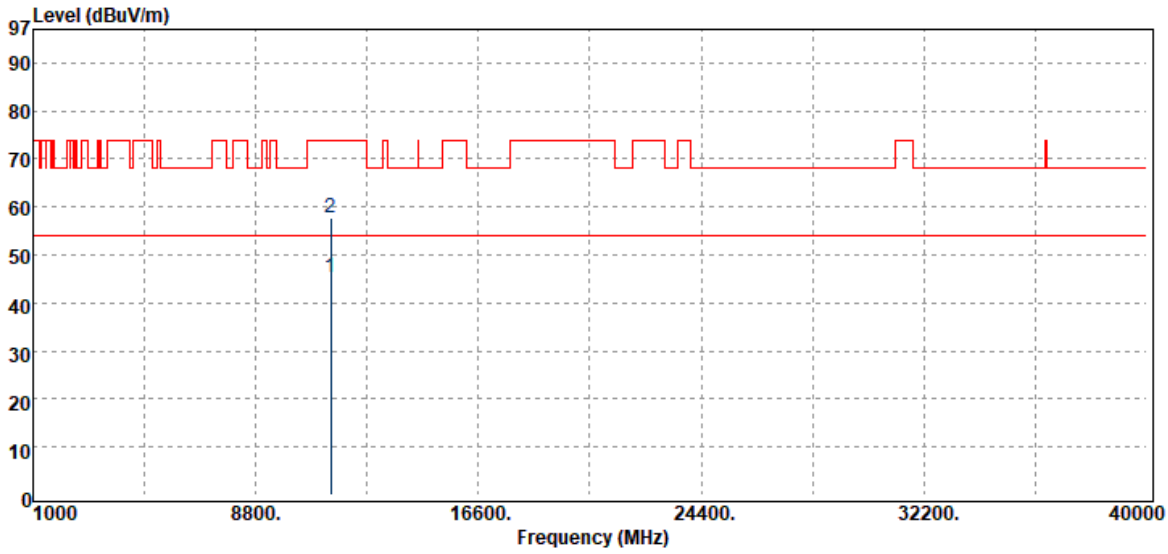
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Report Number :ER/2020/20130  
 Operation Mode :802.11n20  
 Test Frequency :5720 MHz  
 Test Mode :Tx CH Low  
 EUT Pol :H Plane

Test Date :2020-03-12  
 Temp./Humi. :20.8/64  
 Antenna Pol. :VERTICAL  
 Engineer :Nick



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
11440.00	Average	22.56	22.66	45.22	54.00	-8.78
11440.00	Peak	35.03	22.66	57.69	74.00	-16.31

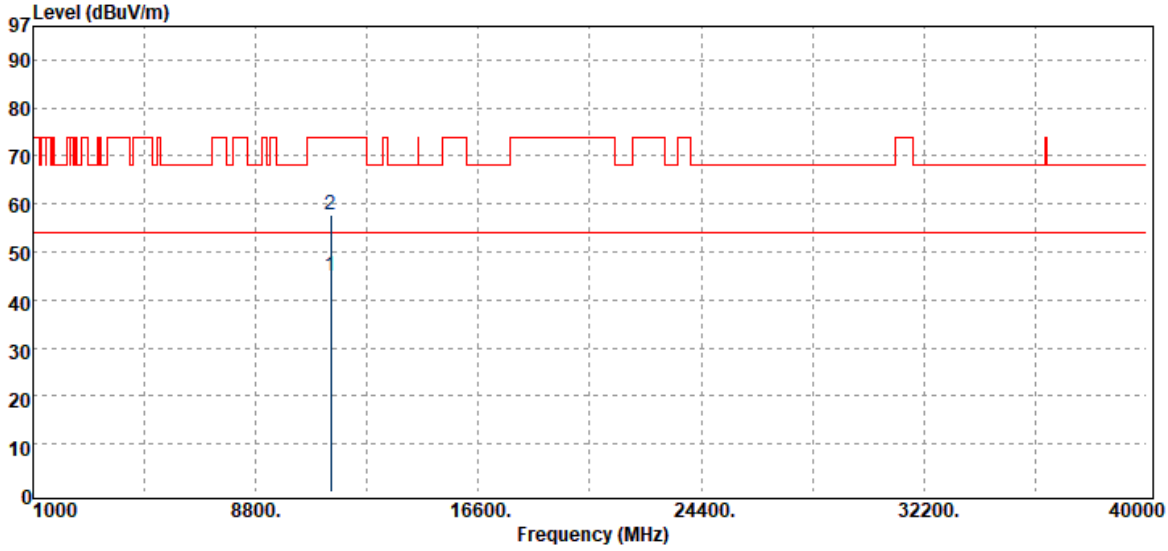
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Report Number :ER/2020/20130  
 Operation Mode :802.11n20  
 Test Frequency :5720 MHz  
 Test Mode :Tx CH Low  
 EUT Pol :H Plane

Test Date :2020-03-12  
 Temp./Humi. :20.8/64  
 Antenna Pol. :HORIZONTAL  
 Engineer :Nick



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
11440.00	Average	22.44	22.66	45.10	54.00	-8.90
11440.00	Peak	35.07	22.66	57.73	74.00	-16.27

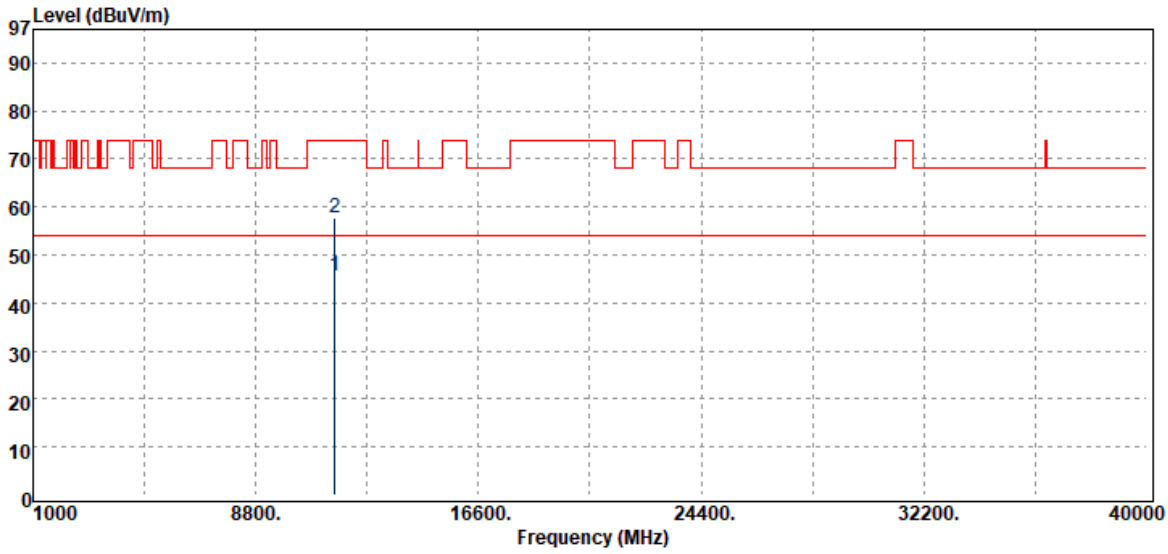
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Report Number :ER/2020/20130  
Operation Mode :802.11n20  
Test Frequency :5785 MHz  
Test Mode :Tx CH Mid  
EUT Pol :H Plane

Test Date :2020-03-12  
Temp./Humi. :20.8/64  
Antenna Pol. :VERTICAL  
Engineer :Nick



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
11570.00	Average	23.51	22.01	45.52	54.00	-8.48
11570.00	Peak	35.60	22.01	57.61	74.00	-16.39

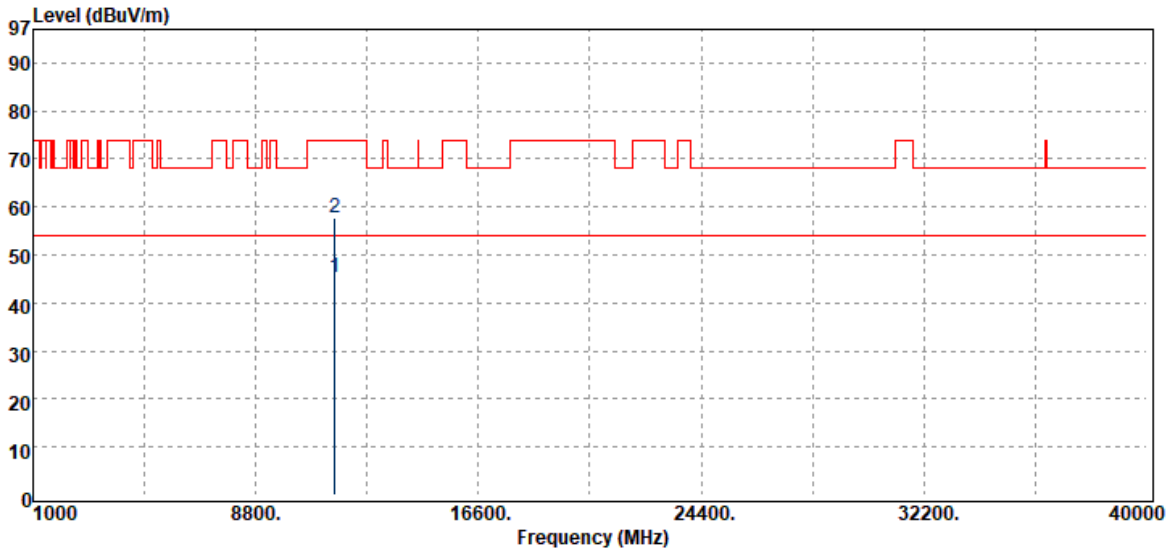
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Report Number :ER/2020/20130  
Operation Mode :802.11n20  
Test Frequency :5785 MHz  
Test Mode :Tx CH Mid  
EUT Pol :H Plane

Test Date :2020-03-12  
Temp./Humi. :20.8/64  
Antenna Pol. :HORIZONTAL  
Engineer :Nick



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
11570.00	Average	23.20	22.01	45.21	54.00	-8.79
11570.00	Peak	35.62	22.01	57.63	74.00	-16.37

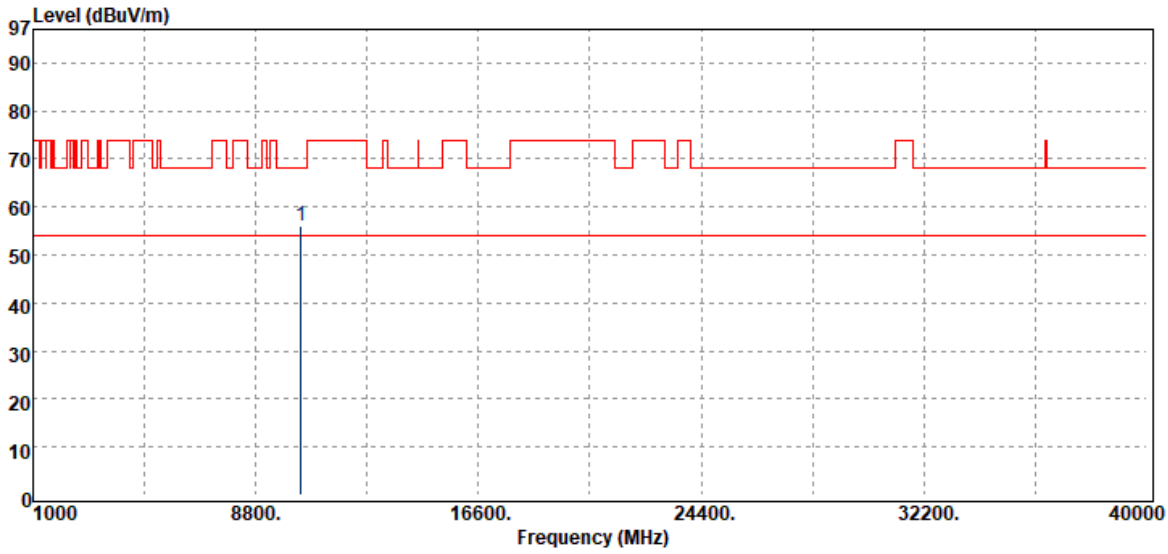
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Report Number :ER/2020/20130  
Operation Mode :802.11n40  
Test Frequency :5190 MHz  
Test Mode :Tx CH Low  
EUT Pol :H Plane

Test Date :2020-03-12  
Temp./Humi. :20.8/64  
Antenna Pol. :VERTICAL  
Engineer :Nick



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
10380.00	Peak	35.46	20.61	56.07	68.20	-12.13

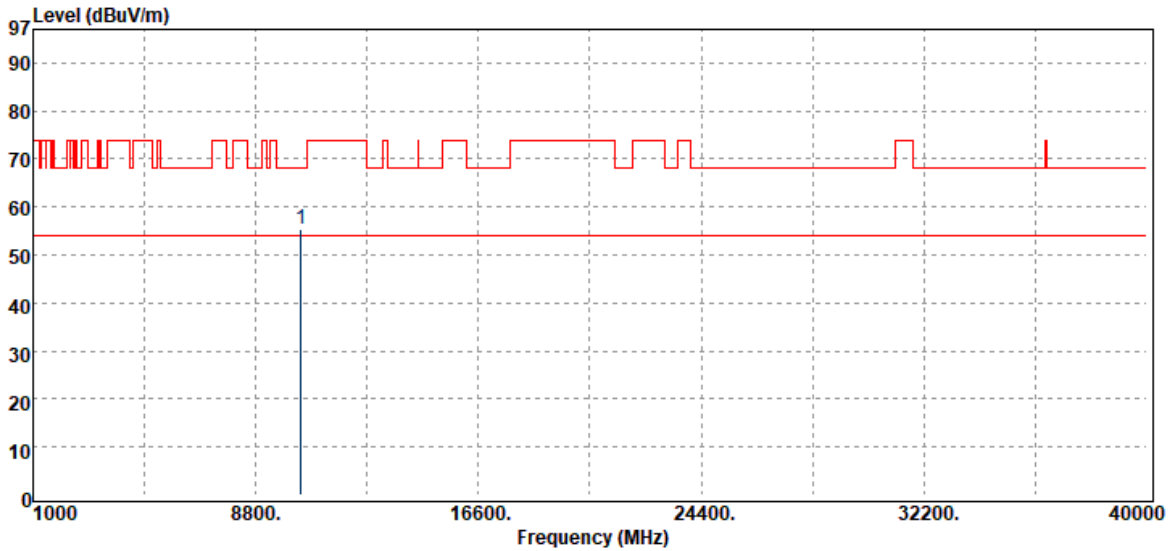
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Report Number :ER/2020/20130  
 Operation Mode :802.11n40  
 Test Frequency :5190 MHz  
 Test Mode :Tx CH Low  
 EUT Pol :H Plane

Test Date :2020-03-12  
 Temp./Humi. :20.8/64  
 Antenna Pol. :HORIZONTAL  
 Engineer :Nick



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
10380.00	Peak	34.66	20.61	55.27	68.20	-12.93

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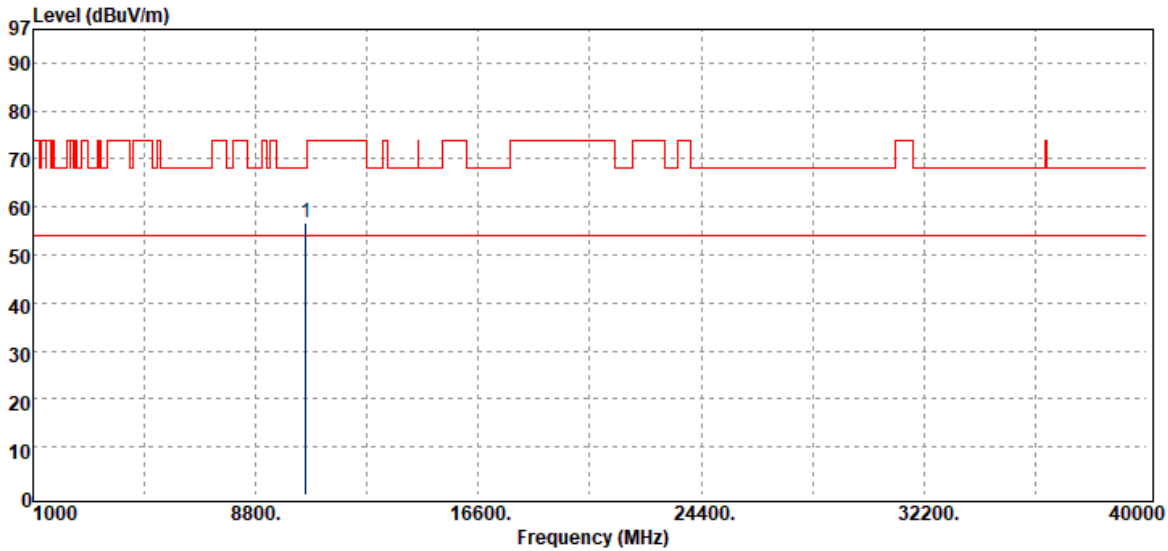
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Report Number :ER/2020/20130  
 Operation Mode :802.11n40  
 Test Frequency :5270 MHz  
 Test Mode :Tx CH Low  
 EUT Pol :H Plane

Test Date :2020-03-12  
 Temp./Humi. :20.8/64  
 Antenna Pol. :VERTICAL  
 Engineer :Nick



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
10540.00	Peak	35.37	21.31	56.68	68.20	-11.52

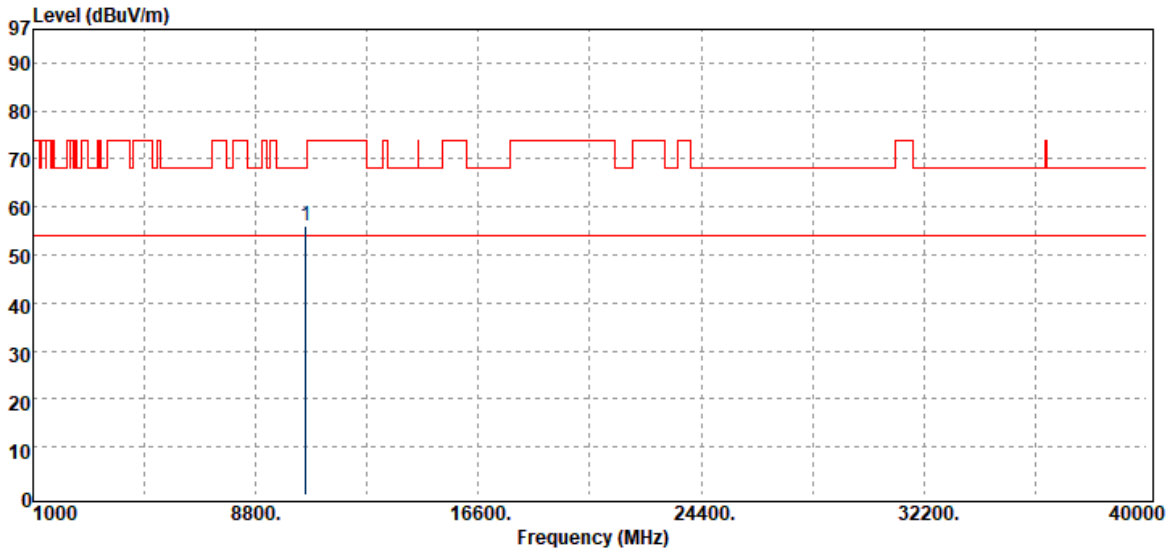
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Report Number :ER/2020/20130  
Operation Mode :802.11n40  
Test Frequency :5270 MHz  
Test Mode :Tx CH Low  
EUT Pol :H Plane

Test Date :2020-03-12  
Temp./Humi. :20.8/64  
Antenna Pol. :HORIZONTAL  
Engineer :Nick



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
10540.00	Peak	34.65	21.31	55.96	68.20	-12.24

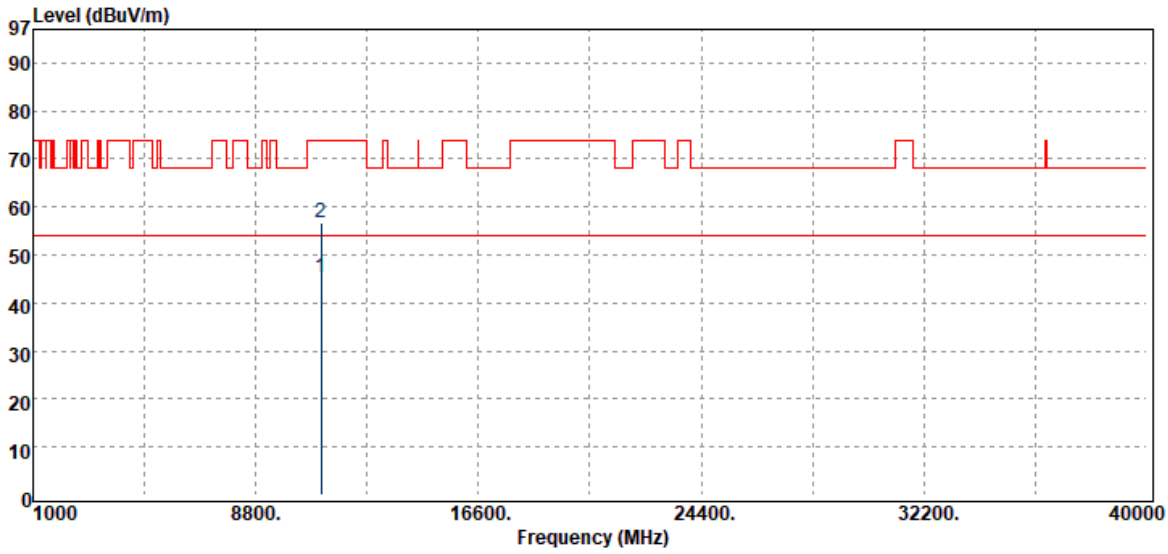
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Report Number :ER/2020/20130  
 Operation Mode :802.11n40  
 Test Frequency :5550 MHz  
 Test Mode :Tx CH Mid  
 EUT Pol :H Plane

Test Date :2020-03-12  
 Temp./Humi. :20.8/64  
 Antenna Pol. :VERTICAL  
 Engineer :Nick



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
11100.00	Average	23.55	21.82	45.37	54.00	-8.63
11100.00	Peak	35.07	21.82	56.89	74.00	-17.11

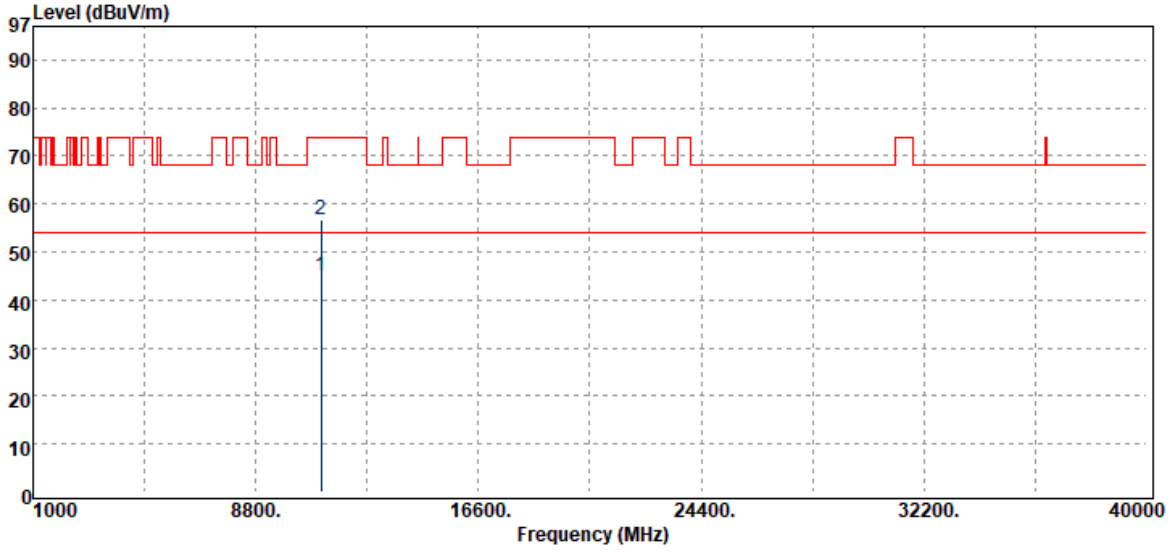
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Report Number :ER/2020/20130  
 Operation Mode :802.11n40  
 Test Frequency :5550 MHz  
 Test Mode :Tx CH Mid  
 EUT Pol :H Plane

Test Date :2020-03-12  
 Temp./Humi. :20.8/64  
 Antenna Pol. :HORIZONTAL  
 Engineer :Nick



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
11100.00	Average	23.02	21.82	44.84	54.00	-9.16
11100.00	Peak	34.96	21.82	56.78	74.00	-17.22

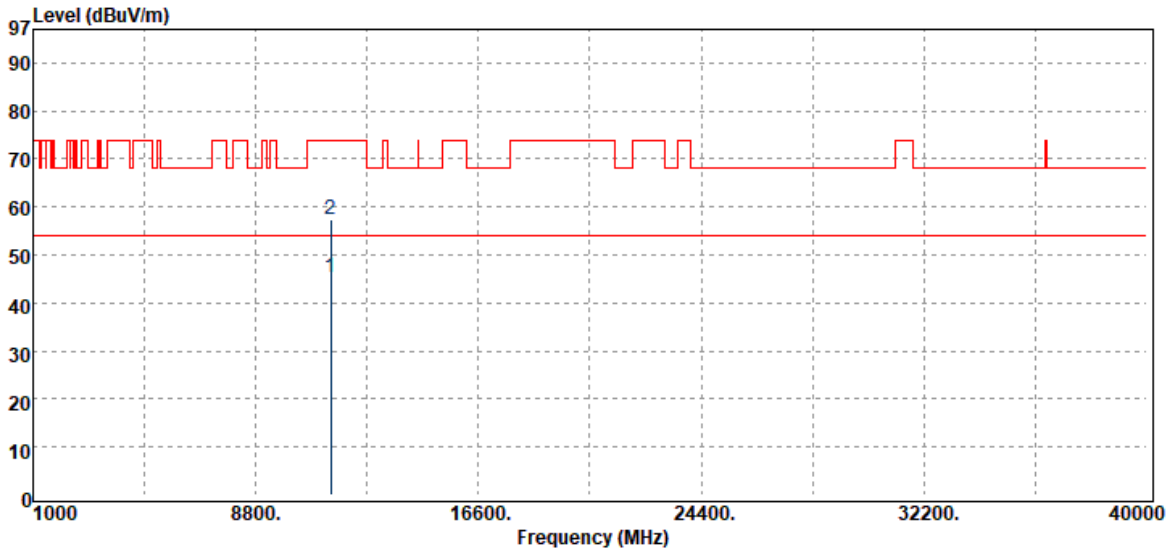
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Report Number :ER/2020/20130  
 Operation Mode :802.11n40  
 Test Frequency :5710 MHz  
 Test Mode :Tx CH Low  
 EUT Pol :H Plane

Test Date :2020-03-12  
 Temp./Humi. :20.8/64  
 Antenna Pol. :VERTICAL  
 Engineer :Nick



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
11420.00	Average	22.73	22.44	45.17	54.00	-8.83
11420.00	Peak	34.96	22.44	57.40	74.00	-16.60

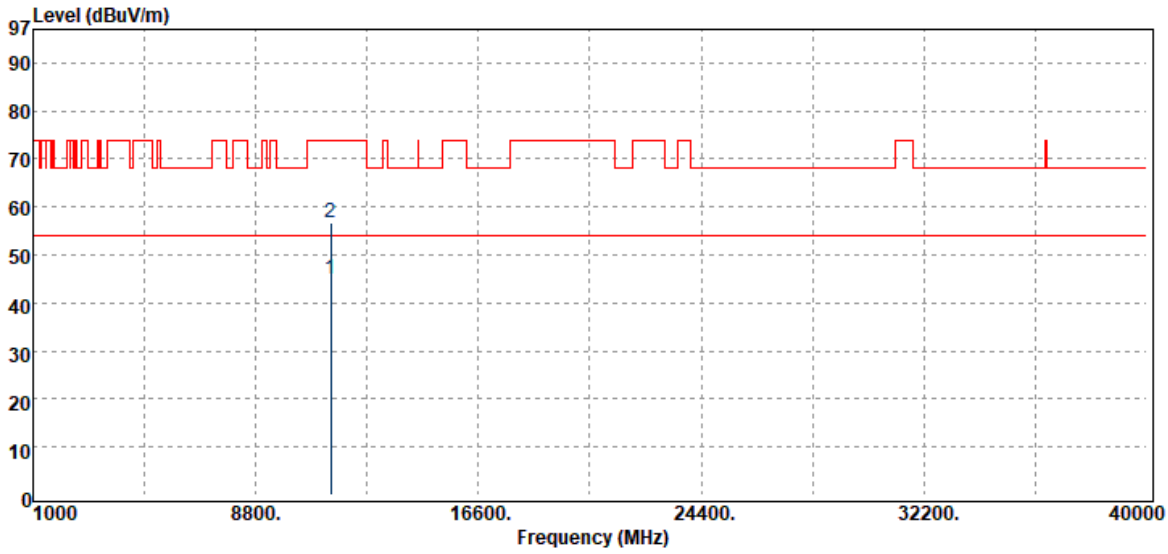
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Report Number :ER/2020/20130  
 Operation Mode :802.11n40  
 Test Frequency :5710 MHz  
 Test Mode :Tx CH Low  
 EUT Pol :H Plane

Test Date :2020-03-12  
 Temp./Humi. :20.8/64  
 Antenna Pol. :HORIZONTAL  
 Engineer :Nick



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
11420.00	Average	22.64	22.44	45.08	54.00	-8.92
11420.00	Peak	34.43	22.44	56.87	74.00	-17.13

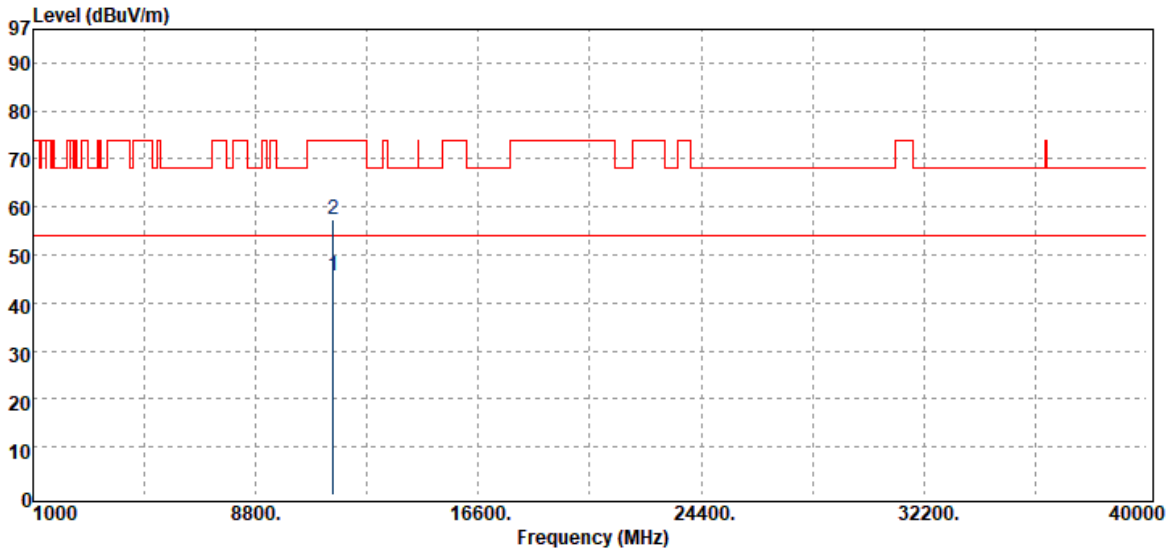
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Report Number :ER/2020/20130  
 Operation Mode :802.11n40  
 Test Frequency :5755 MHz  
 Test Mode :Tx CH Low  
 EUT Pol :H Plane

Test Date :2020-03-12  
 Temp./Humi. :20.8/64  
 Antenna Pol. :VERTICAL  
 Engineer :Nick



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
11510.00	Average	22.44	23.13	45.57	54.00	-8.43
11510.00	Peak	34.15	23.13	57.28	74.00	-16.72

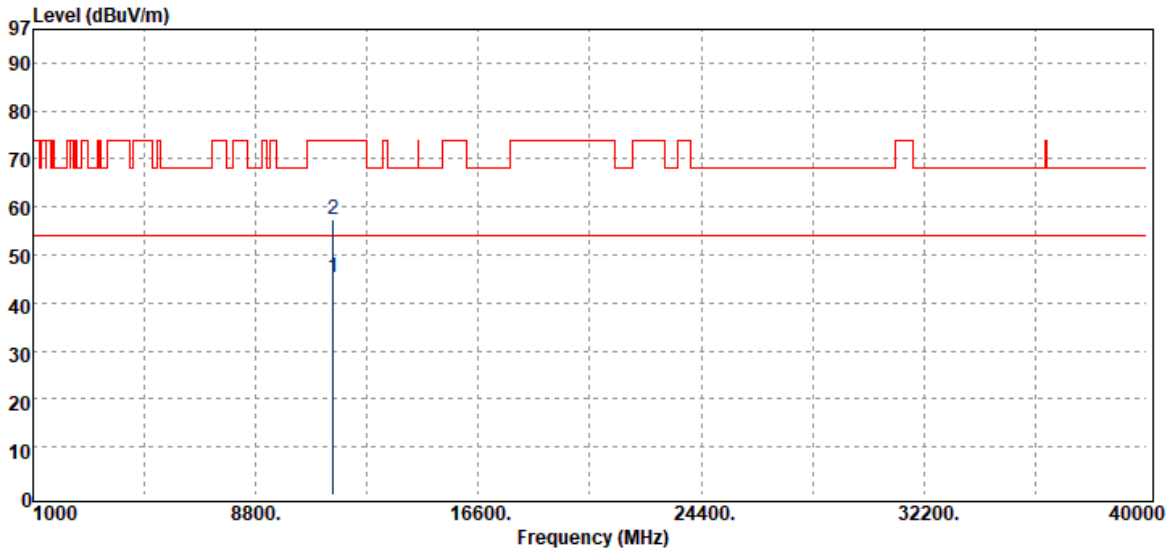
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Report Number :ER/2020/20130  
 Operation Mode :802.11n40  
 Test Frequency :5755 MHz  
 Test Mode :Tx CH Low  
 EUT Pol :H Plane

Test Date :2020-03-12  
 Temp./Humi. :20.8/64  
 Antenna Pol. :HORIZONTAL  
 Engineer :Nick



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
11510.00	Average	22.35	23.13	45.48	54.00	-8.52
11510.00	Peak	34.21	23.13	57.34	74.00	-16.66

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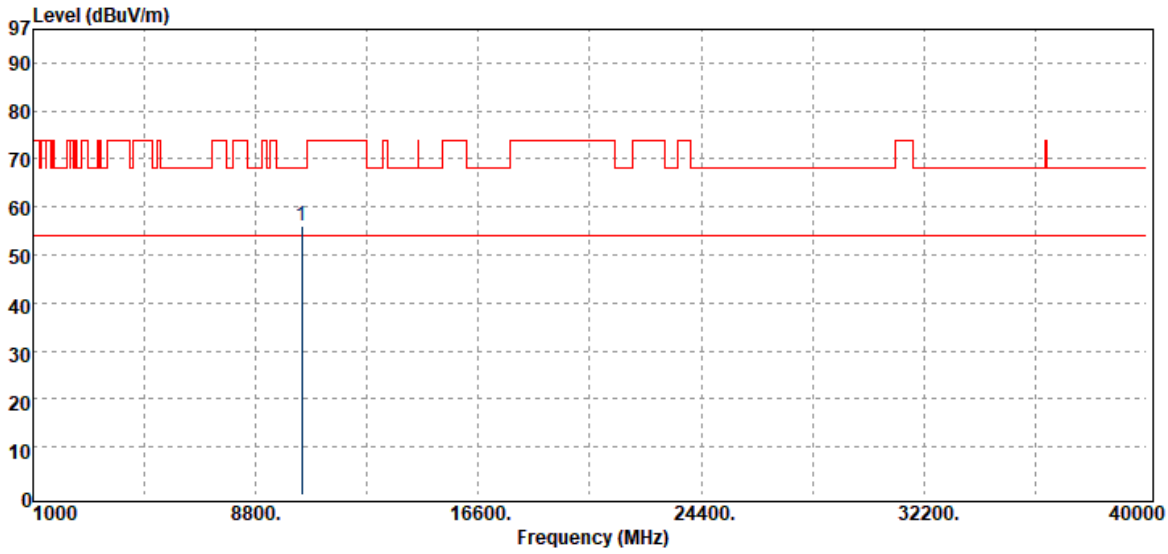
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Report Number :ER/2020/20130  
 Operation Mode :802.11ac80  
 Test Frequency :5210 MHz  
 Test Mode :Tx CH Low  
 EUT Pol :H Plane

Test Date :2020-03-12  
 Temp./Humi. :20.8/64  
 Antenna Pol. :VERTICAL  
 Engineer :Nick



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
10420.00	Peak	35.19	20.87	56.06	68.20	-12.14

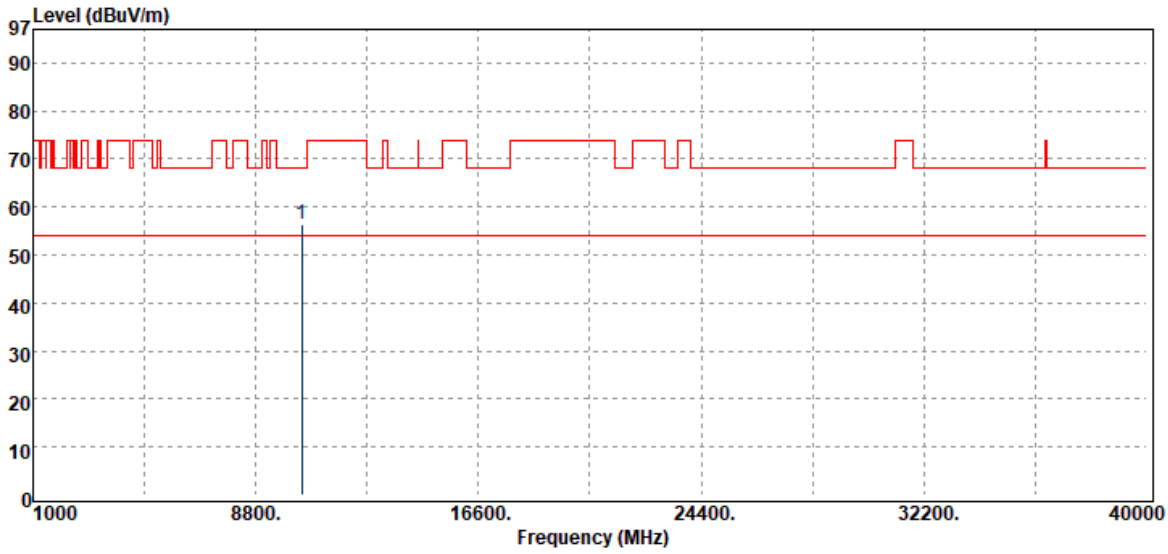
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Report Number :ER/2020/20130  
 Operation Mode :802.11ac80  
 Test Frequency :5210 MHz  
 Test Mode :Tx CH Low  
 EUT Pol :H Plane

Test Date :2020-03-12  
 Temp./Humi. :20.8/64  
 Antenna Pol. :HORIZONTAL  
 Engineer :Nick



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
10420.00	Peak	35.39	20.87	56.26	68.20	-11.94

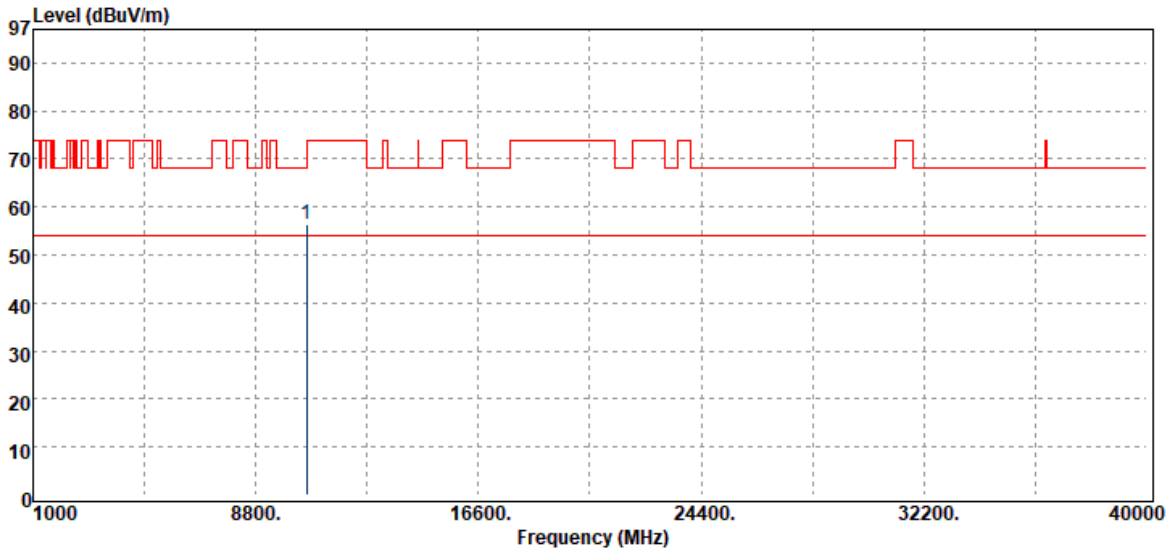
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Report Number :ER/2020/20130  
 Operation Mode :802.11ac80  
 Test Frequency :5290 MHz  
 Test Mode :Tx CH High  
 EUT Pol :H Plane

Test Date :2020-03-12  
 Temp./Humi. :20.8/64  
 Antenna Pol. :VERTICAL  
 Engineer :Nick



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
10580.00	Peak	35.09	21.30	56.39	68.20	-11.81

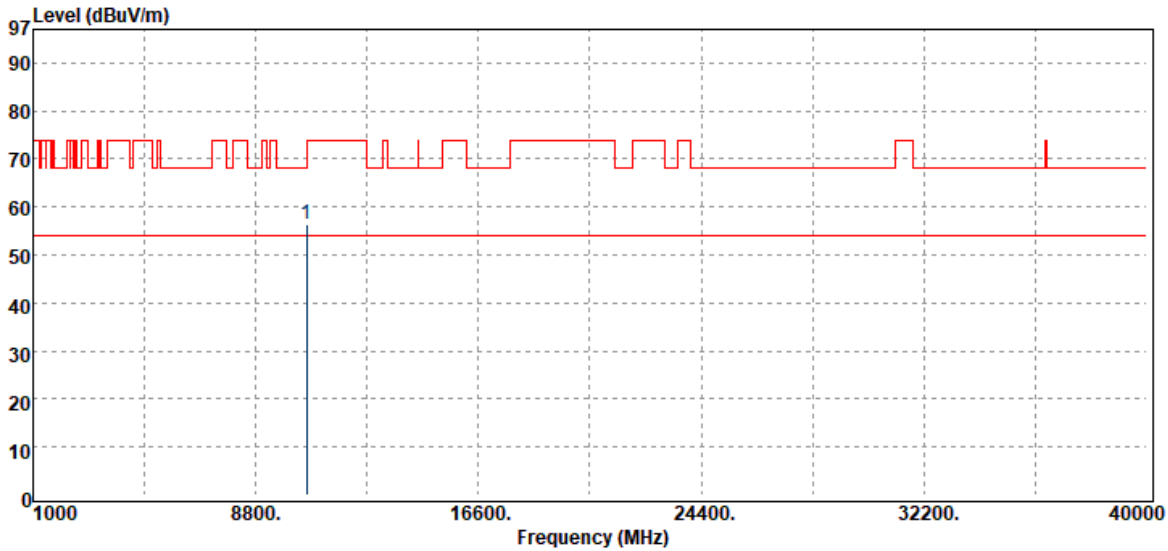
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Report Number :ER/2020/20130  
 Operation Mode :802.11ac80  
 Test Frequency :5290 MHz  
 Test Mode :Tx CH High  
 EUT Pol :H Plane

Test Date :2020-03-12  
 Temp./Humi. :20.8/64  
 Antenna Pol. :HORIZONTAL  
 Engineer :Nick



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
10580.00	Peak	35.23	21.30	56.53	68.20	-11.67

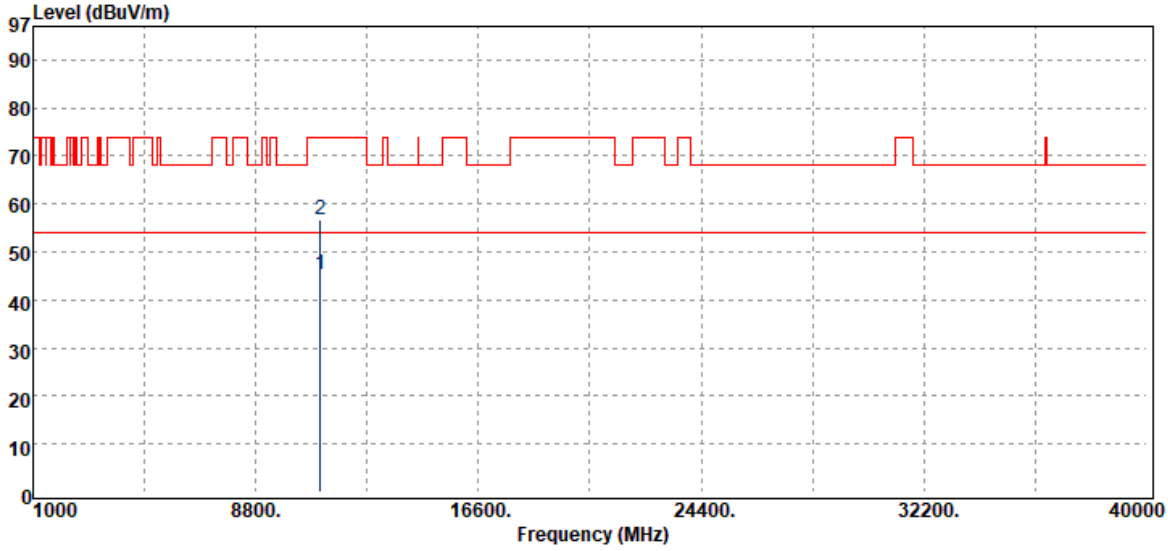
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Report Number :ER/2020/20130  
 Operation Mode :802.11ac80  
 Test Frequency :5530 MHz  
 Test Mode :Tx CH Low  
 EUT Pol :H Plane

Test Date :2020-03-12  
 Temp./Humi. :20.8/64  
 Antenna Pol. :VERTICAL  
 Engineer :Nick



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
11060.00	Average	23.34	22.01	45.35	54.00	-8.65
11060.00	Peak	34.58	22.01	56.59	74.00	-17.41

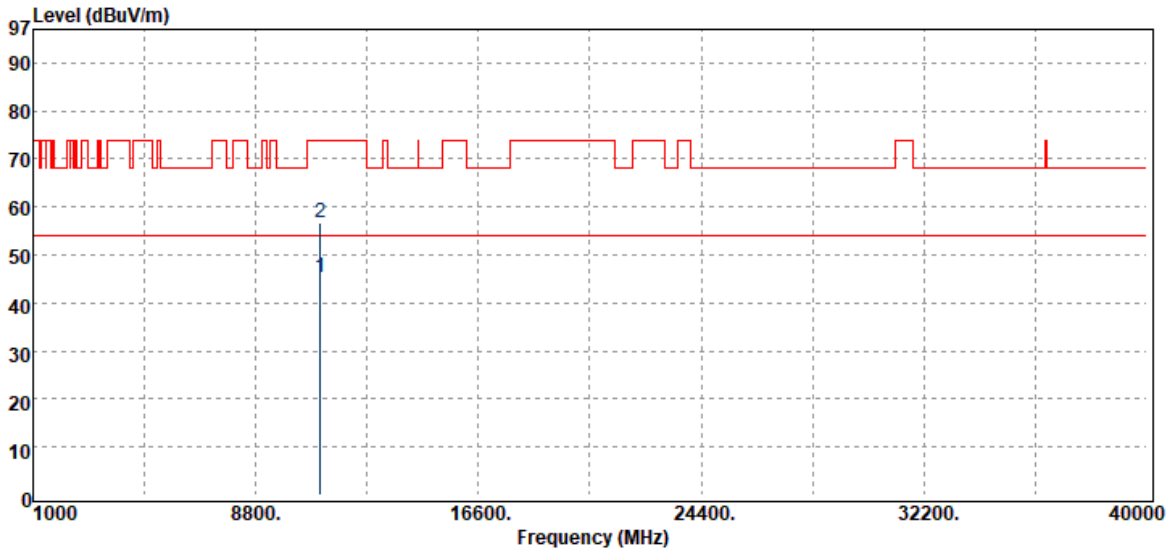
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Report Number :ER/2020/20130  
 Operation Mode :802.11ac80  
 Test Frequency :5530 MHz  
 Test Mode :Tx CH Low  
 EUT Pol :H Plane

Test Date :2020-03-12  
 Temp./Humi. :20.8/64  
 Antenna Pol. :HORIZONTAL  
 Engineer :Nick



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
11060.00	Average	23.30	22.01	45.31	54.00	-8.69
11060.00	Peak	34.55	22.01	56.56	74.00	-17.44

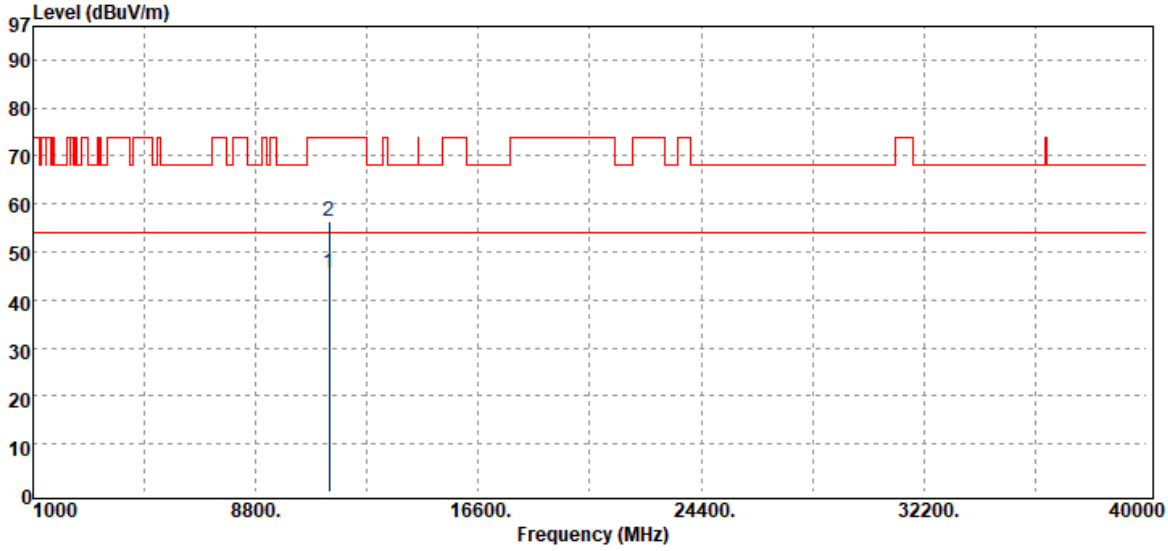
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Report Number :ER/2020/20130  
 Operation Mode :802.11ac80  
 Test Frequency :5690 MHz  
 Test Mode :Tx CH Low  
 EUT Pol :H Plane

Test Date :2020-03-12  
 Temp./Humi. :20.8/64  
 Antenna Pol. :VERTICAL  
 Engineer :Nick



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
11380.00	Average	23.23	22.28	45.51	54.00	-8.49
11380.00	Peak	34.24	22.28	56.52	74.00	-17.48

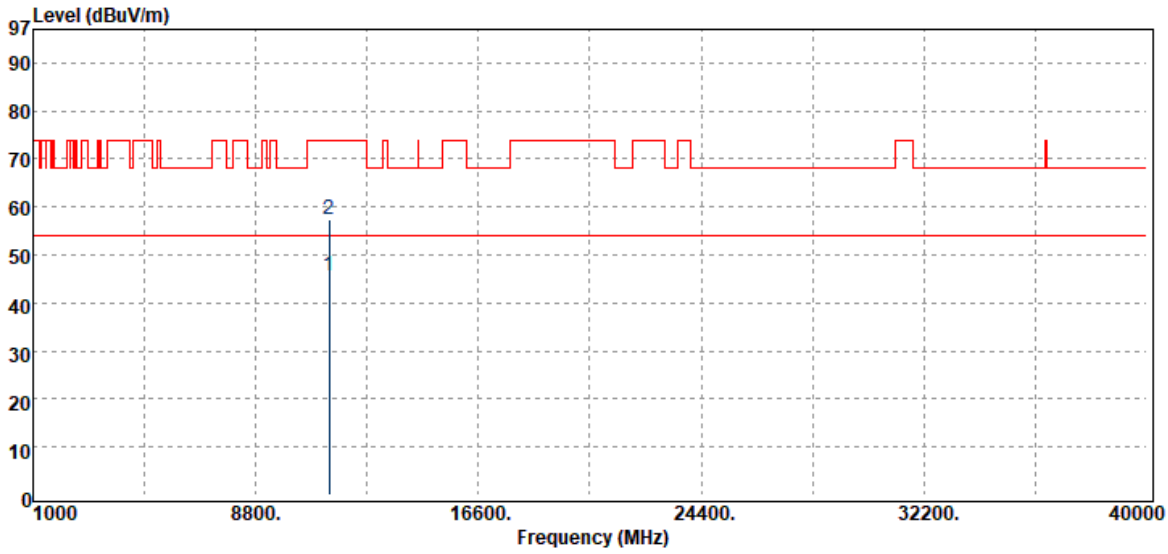
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Report Number :ER/2020/20130  
 Operation Mode :802.11ac80  
 Test Frequency :5690 MHz  
 Test Mode :Tx CH Low  
 EUT Pol :H Plane

Test Date :2020-03-12  
 Temp./Humi. :20.8/64  
 Antenna Pol. :HORIZONTAL  
 Engineer :Nick



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
11380.00	Average	23.38	22.28	45.66	54.00	-8.34
11380.00	Peak	35.23	22.28	57.51	74.00	-16.49

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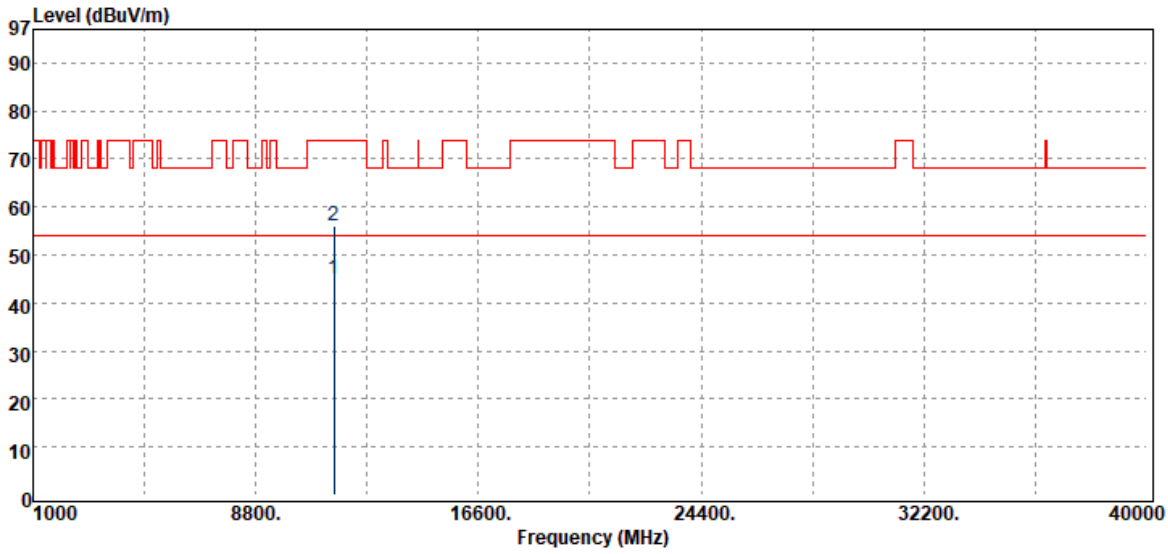
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Report Number :ER/2020/20130  
 Operation Mode :802.11ac80  
 Test Frequency :5775 MHz  
 Test Mode :Tx CH Low  
 EUT Pol :H Plane

Test Date :2020-03-12  
 Temp./Humi. :20.8/64  
 Antenna Pol. :VERTICAL  
 Engineer :Nick



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
11550.00	Average	22.91	22.18	45.09	54.00	-8.91
11550.00	Peak	33.79	22.18	55.97	74.00	-18.03

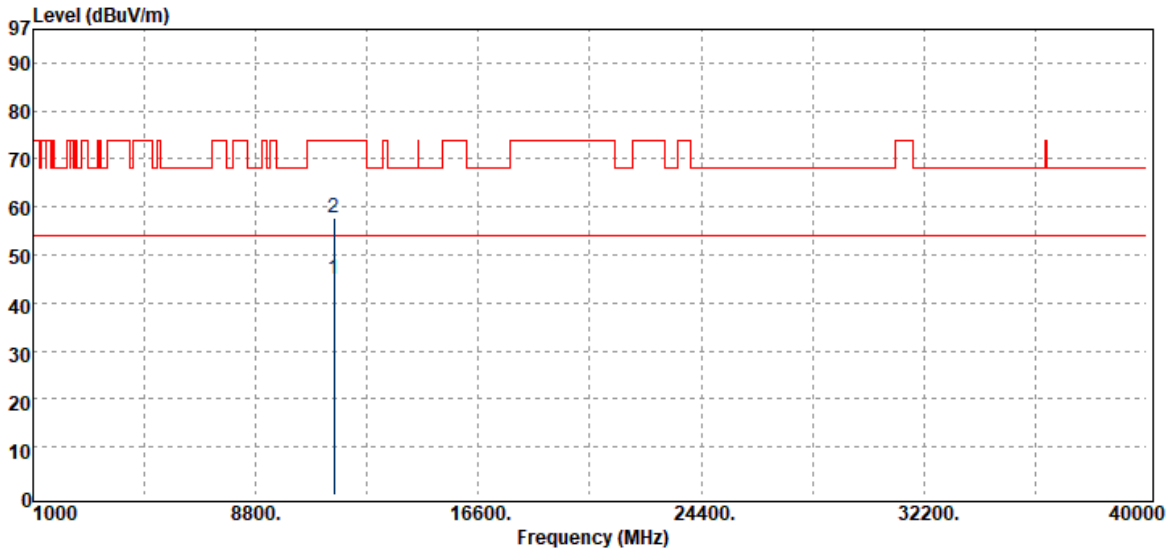
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Report Number :ER/2020/20130  
 Operation Mode :802.11ac80  
 Test Frequency :5775 MHz  
 Test Mode :Tx CH Low  
 EUT Pol :H Plane

Test Date :2020-03-12  
 Temp./Humi. :20.8/64  
 Antenna Pol. :HORIZONTAL  
 Engineer :Nick



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
11550.00	Average	22.93	22.18	45.11	54.00	-8.89
11550.00	Peak	35.61	22.18	57.79	74.00	-16.21

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## 7 ANTENNA REQUIREMENT

### 7.1 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.

### 7.2 Antenna Connected Construction

The antenna is designed with unique RF connector and no consideration of replacement. Please see EUT photo for details.

*~ End of Report ~*

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