

ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART E REQUIREMENT CLASS II PERMISSIVE CHANGE REPORT

OF

Applicant: Barco NV
Barco NV President Kennedypark 35, 8500 Kortrijk, Belgium

Product Name: ClickShare CSE-200+, ClickShare

Brand Name: Barco

Model No.: CSE-200+, C 5010S

Model Difference: For the detail, please refer to product diversity table in page 4.

FCC ID: ER/2019/60053

Report Number: 2AAED-R9861521

FCC Rule Part: §15.407, Cat: NII

Issue Date: Dec. 05, 2019

Date of Test: Jun. 18, 2019 ~ Nov. 11, 2019

Date of EUT Received: Jun. 18, 2019

We hereby certify that:

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

Approved By:
Jay Lin / Asst. Supervisor

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Revision History

Revision	Description	Issue Date	Remark
Rev.00	Original.	Dec. 05, 2019	Revised By: Karen Huang

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1 GENERAL INFORMATION

1.1 Product Description

Product Name:	ClickShare CSE-200+, ClickShare	
Brand Name:	Barco	
Model No.:	CSE-200+, C 5010S	
Model Difference:	For the detail, please refer to product diversity table below.	
Product SW/HW Version:	N/A / EVT2	
Scope:	The test report covers the conducted and radiated emissions requirements of the standards referenced in the report to allow system enabling UNII-2A & UNII-2C by firmware	
Class II Permissive Change:	Enabling UNII-2A & UNII-2C by firmware	
WLAN Module:	Model No.: WCBN811A	
Power Supply:	120Vac input / 12Vdc output from AC/DC adapter	
	Adapter:	1. Model No.: BA070-120417GXX Supplier: BILLION 2. Model No.: ATS050T-A121 Supplier: Adapter Technology

Product Diversity Description Table:

Product Name:	Product name for CSE-200+ is ClickShare CSE-200+; Product name for C 5010S is ClickShare.
PCB and Hardware changes:	- USB audio codec IC - Stereo class-D audio amplifier - USB2.0 hub controller IC - 1 watt speaker through wire connection

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1.2 WLAN

Wi-Fi 802.11	Frequency Range	Channels	Rated Power (Avg.) (dBm)	Modulation Technology
a	5250~5350	4	17.28	OFDM
	5470~5725	12	17.21	
n_HT ac_VHT 20M	5250~5350	4	HT: 17.13 (Worst case)	OFDM
	5470~5725	11	HT: 17.28 (Worst case)	
n_HT ac_VHT 40M	5250~5350	2	HT: 14.85 (Worst case)	OFDM
	5470~5725	5	HT: 14.81 (Worst case)	
ac_VHT 80M	5250~5350	1	10.84	OFDM
	5470~5725	2	11.00	
Modulation type		64QAM, 16QAM, QPSK, BPSK for OFDM 256QAM for OFDM in 802.11ac only		
Antenna Designation		PCB Antenna, Peak Gain: 1.16dBi (5250~5350MHz) 1.19dBi (5470~5725MHz)		
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		

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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

ANSI C63.10:2013

Note:

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

1.4 Test Facility

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

FCC Designation number: TW0001

1.5 Special Accessories

There are no special accessories used while test was conducted.

1.6 Equipment Modifications

There was no modification incorporated into the EUT.

1.7 Multiple Model numbers

The variant model numbers are assessed as identical in hardware and software to each other, hence all variants are fully covered by the test results in this test report without further verification test.

1.8 Disclaimer

Variant information between model numbers is provided by the applicant, test results of this report are applicable to the sample EUT received.

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2 SYSTEM TEST CONFIGURATION

2.1 EUT Configuration

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

2.2 EUT Exercise

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

2.3 Test Procedure

2.3.1 Conducted Emissions

The EUT is placed on a table which is 0.8 m above ground plane. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz. The CISPR Quasi-Peak and Average detector mode is employed according to §15.207. The two LISNs provide 50 μ H/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 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

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.

Note:

The spectrum analyzer offset is derived from RF cable loss and attenuator factor. Following shows an offset computation example.

2.5 Configuration of Tested System

Fig. 2-1 Radiated Emission

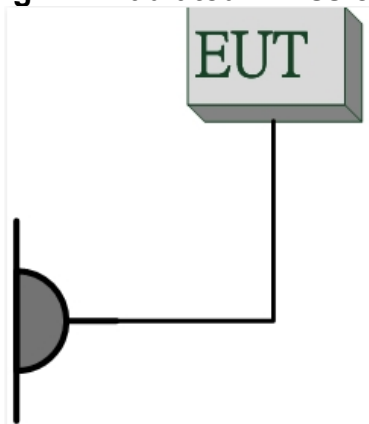


Fig. 2-2 Conducted (Antenna Port) Configuration Emission



Table 2-1 Equipment Used in Tested System

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

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3 SUMMARY OF TEST RESULT

FCC Rules	Description Of Test	Result
§15.403(i) §15.407(e)	26 dB & 6dB & 99% Emission Bandwidth	Compliant
§15.407(a)	Maximum Conducted Output Power	Compliant
§15.407(a)	Power Spectral Density	Compliant
§15.205 §15.209 §15.407(b)	Undesirable Radiated Emissions	Compliant
§15.407(c)	Transmission in case of Absence of Information	Compliant
§15.407(g)	Frequency Stability	Compliant
§15.203 §15.407(a)	Antenna Requirement	Compliant

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4 DESCRIPTION OF TEST MODES

4.1 Operated in U-NII Bands

Operated band in 5250 MHz ~5350 MHz:

802.11a / n HT20 Mode, 802.11ac VHT20 Mode	
channel	Frequency
52	5260
56	5280
60	5300
64	5320

802.11 n HT40 Mode, 802.11ac VHT40 Mode	
channel	Frequency
54	5270
62	5310

802.11ac VHT80 Mode	
Channel	Frequency
58	5290

Operated band in 5500 MHz ~5700 MHz:

802.11a / n HT20 Mode, 802.11ac VHT20 Mode	
Channel	Frequency
100	5500
104	5520
108	5540
112	5560
116	5580
120	5600
124	5620
128	5640
132	5660
136	5680
140	5700

802.11 n HT40 Mode, 802.11ac VHT40 Mode	
channel	Frequency
102	5510
110	5550
118	5590
126	5630
134	5670

802.11ac VHT80 Mode	
channel	Frequency
106	5530
122	5610

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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 gevin UE is pre-scanned among below modes.

Modulation	Transmission Chain			
☒ 802.11 a	☒ Ch0	☐ Ch1	☐ Ch2	☐ Ch3
☒ 802.11 n	☒ Ch0	☐ Ch1	☐ Ch2	☐ Ch3
☒ 802.11 ac	☒ Ch0	☐ Ch1	☐ Ch2	☐ Ch3

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.

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	5260~5320	52 to 64	60	OFDM	6	Ch0
802.11a	5500~5720	100 to 140	116	OFDM	6	Ch0
RADIATED EMISSION TEST (ABOVE 1 GHz)						
MODE	FREQUENCY BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
802.11a	5260~5320	52 to 64	52,60,64	OFDM	6	Ch0
802.11n_HT20				OFDM	MCS0	Ch0
802.11n_HT40	5270~5310	54 to 62	54,62	OFDM	MCS0	Ch0
802.11ac_VHT80	5290	58	58	OFDM	MCS0	Ch0
802.11a	5500~5720	100 to 144	100, 116, 140	OFDM	MCS0	Ch0
802.11n_HT20				OFDM	MCS0	Ch0
802.11n_HT40	5510~5710	102 to 142	102, 110, 134	OFDM	MCS0	Ch0
802.11ac_VHT80	5530~5610	106 to 122	106, 122	OFDM	MCS0	Ch0

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 WLAN Transmitter for channel Low, Mid and High, the worst case E2 position was reported.

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ANTENNA PORT CONDUCTED MEASUREMENT:

CONDUCTED TEST						
MODE	FREQUENCY BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
802.11a	5260~5320	52 to 64	52,60,64	OFDM	6	Ch0
802.11n_HT20				OFDM	MCS0	Ch0
802.11n_HT40	5270~5310	54 to 62	54,62	OFDM	MCS0	Ch0
802.11ac_VHT80	5290	58	58	OFDM	MCS0	Ch0
802.11a	5500~5700	100 to 140	100,116,140	OFDM	6	Ch0
802.11n_HT20				OFDM	MCS0	Ch0
802.11n_HT40	5510~5670	102 to 134	102,110,134	OFDM	MCS0	Ch0
802.11ac_VHT80	5530~5610	106 to 122	106,122	OFDM	MCS0	Ch0

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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	
Polarization: Vertical	9kHz~30MHz: +/-2.3dB
	30MHz - 180MHz: +/- 3.37dB
	180MHz -417MHz: +/- 3.19dB
	0.417GHz-1GHz: +/- 3.19dB
	1GHz - 18GHz: +/- 4.04dB
	18GHz - 40GHz: +/- 4.04dB
Polarization: Horizontal	9kHz~30MHz: +/-2.3dB
	30MHz - 167MHz: +/- 4.22dB
	167MHz -500MHz: +/- 3.44dB
	0.5GHz-1GHz: +/- 3.39dB
	1GHz - 18GHz: +/- 4.08dB
	18GHz - 40GHz: +/- 4.08dB

Note:

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

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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.

Formula:

$$\text{Duty Cycle} = \text{Ton} / (\text{Ton} + \text{Toff})$$

Measurement Procedure:

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

Duty Cycle:

Mode	Duty Cycle (%)	Duty Factor (dB) =10*log (1/Duty Cycle)	1/T (kHz)	VBW setting (kHz)
802.11a	95.74	0.19	0.48	1.00
802.11n_20	95.75	0.19	0.52	1.00
802.11ac_20	95.57	0.20	0.52	1.00
802.11n_40	91.51	0.39	1.05	2.00
802.11ac_40	91.12	0.40	1.05	2.00
802.11ac_80	84.05	0.75	2.16	3.00

Duty Cycle Factor: $10 * \log(1/0.9574) = 0.19$

Duty Cycle Factor: $10 * \log(1/0.9575) = 0.19$

Duty Cycle Factor: $10 * \log(1/0.9557) = 0.2$

Duty Cycle Factor: $10 * \log(1/0.9151) = 0.39$

Duty Cycle Factor: $10 * \log(1/0.9112) = 0.4$

Duty Cycle Factor: $10 * \log(1/0.8405) = 0.75$

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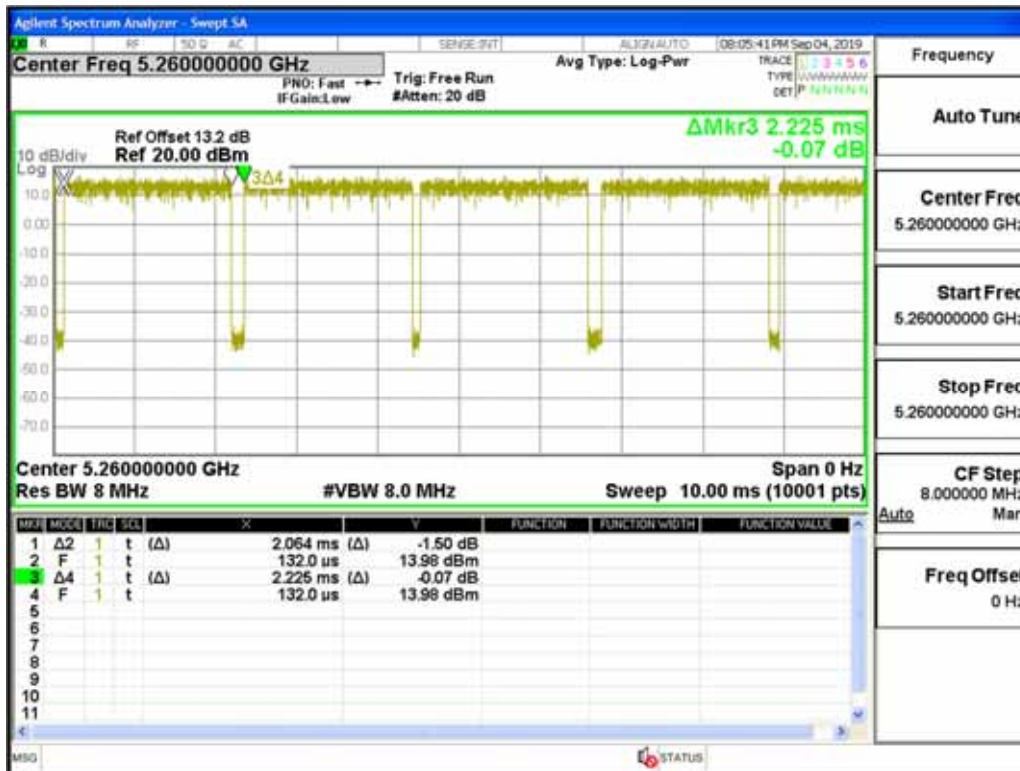
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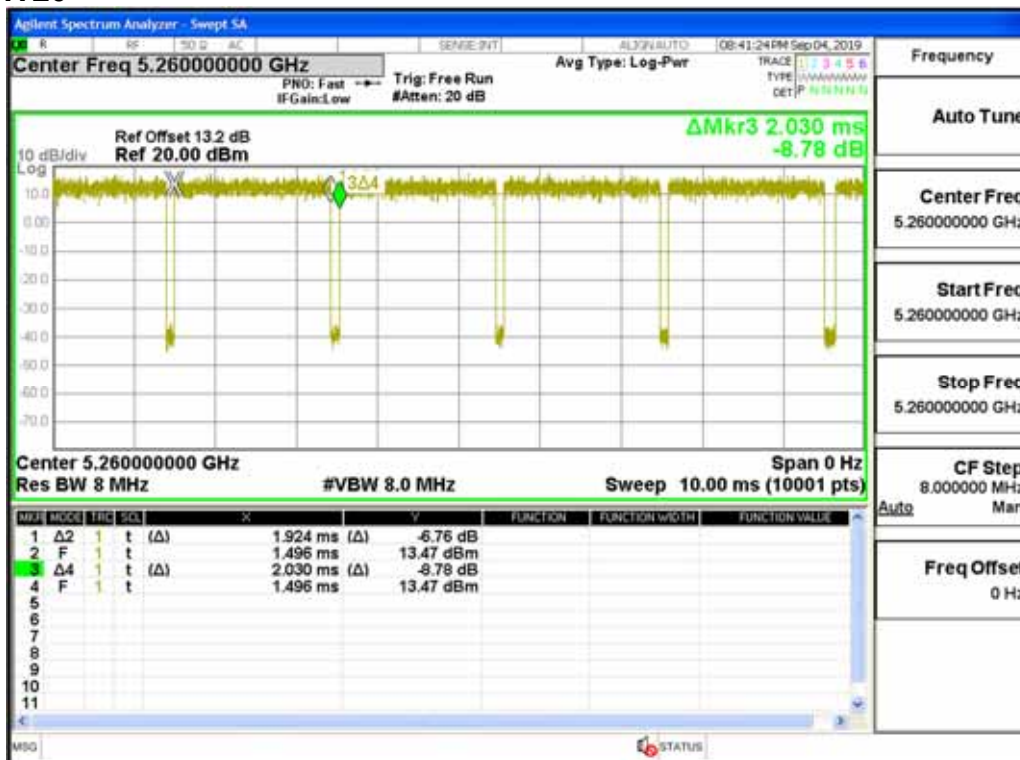
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DUTY CYCLE TEST SIGNAL MEASUREMENT RESULT

802.11a



802.11n_HT20

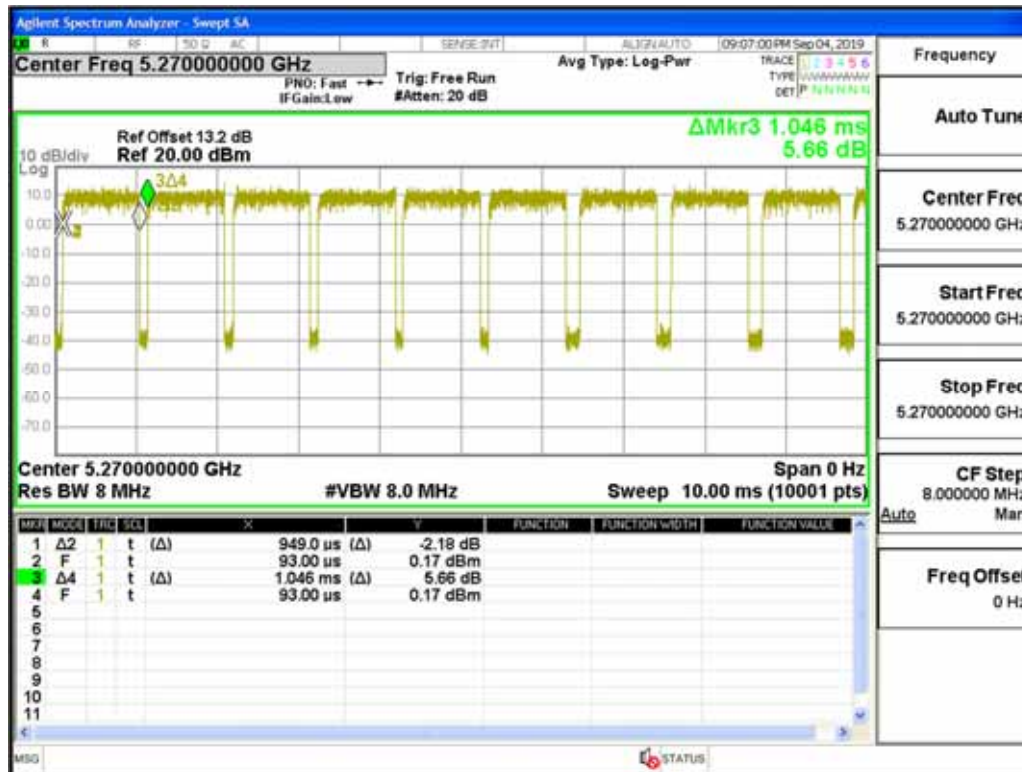


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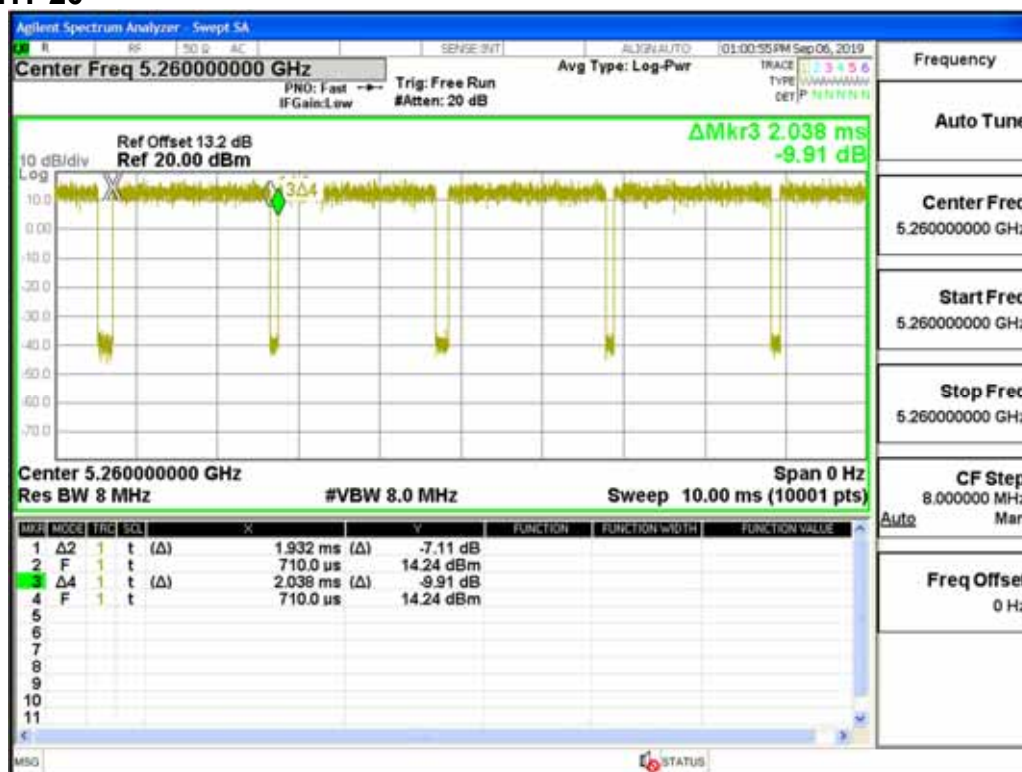
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802.11n_HT40



802.11ac_VHT 20



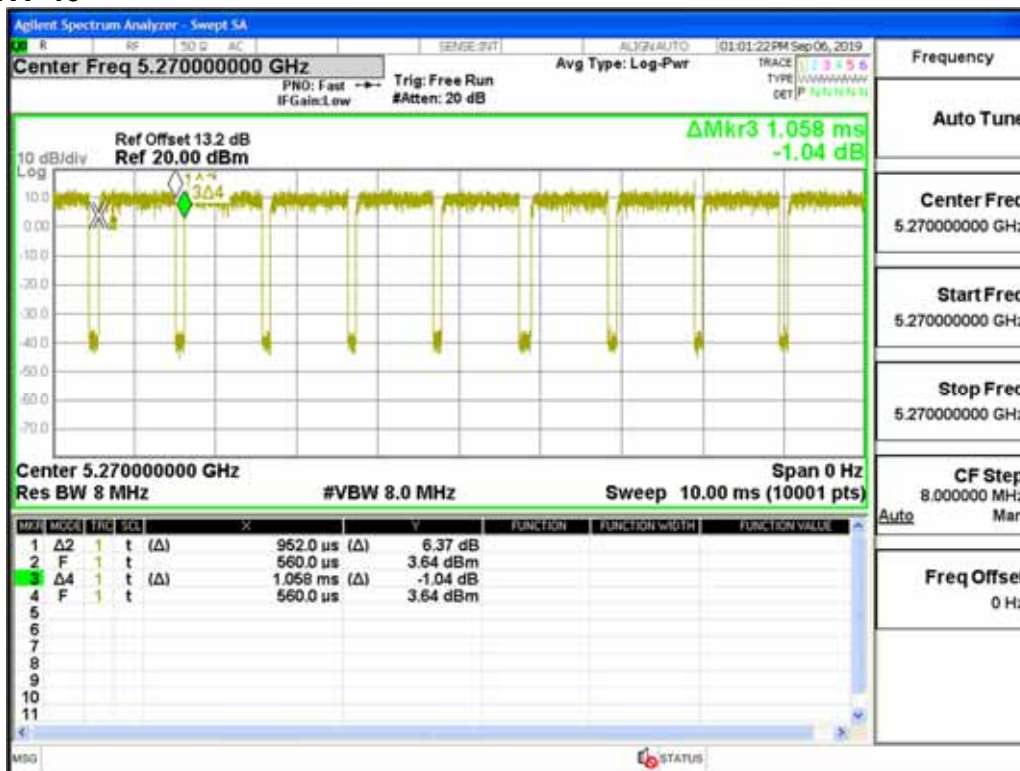
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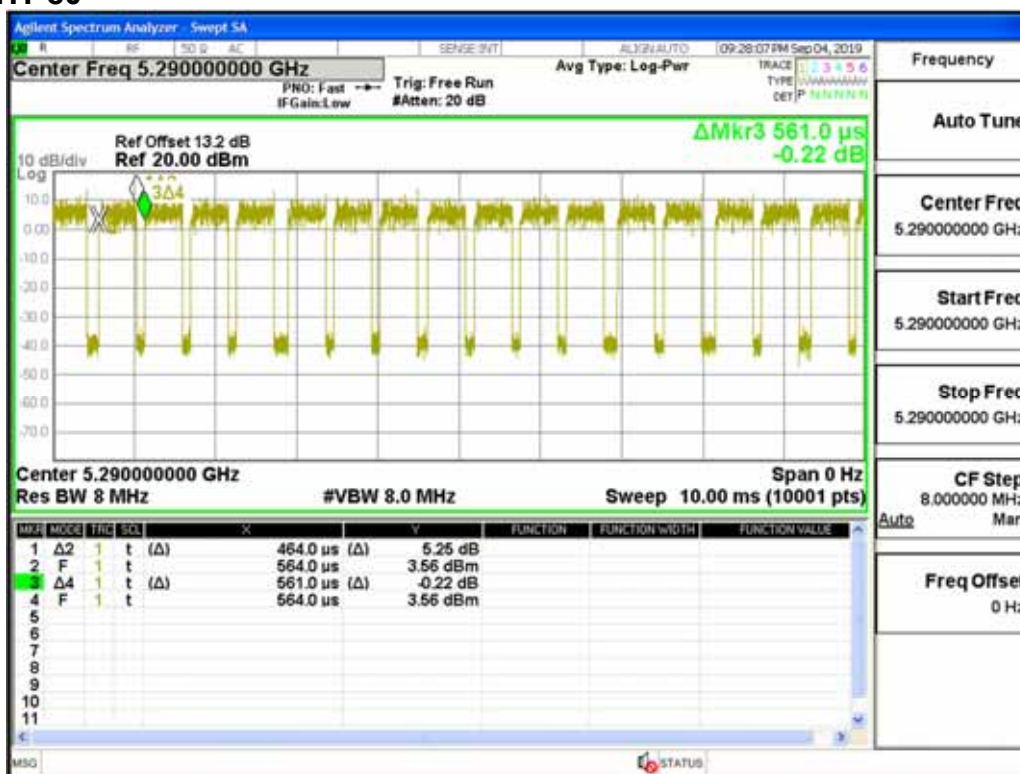
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802.11ac_VHT 40



802.11ac_VHT 80



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7 26DB & 6DB EMISSION BANDWIDTH MEASUREMENT

7.1 Standard Applicable

There is no limit bandwidth for U-NII-1, U-NII-2-A and U-NII-2-C.

The minimum of 6dB Bandwidth measurement is 0.5 MHz for U-NII-3

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 spectrum analyzer.
 - a. 26dB Band width Measurement: Set the spectrum analyzer as 1% of emission BW Sweep=auto, Detector = Peak, Trace Mode = Max Hold, Manually readjust RBW until the RBW/EBW ratio is 1% based on EBW as observed on the result of pre-sequence measurement.
 - b. Mark the peak frequency and -26dB (upper and lower) frequency.
4. Repeat the procedures as list above until all test default channels (low, middle, and high) are completed.
5. Minimum Emission Bandwidth for the band 5.725-5.850GHz.
 - a. Set the spectrum analyzer as RBW = 100 kHz, VBW = 3*RBW, Span = 30M/50MHz, Detector=Peak, Sweep=auto
 - b. Mark the peak frequency and -6dB (upper and lower) frequency.
6. For 99% Bandwidth:

Set the spectrum analyzer as RBW=1%, VBW = 3*RBW, Span = 30M/50MHz, Detector=Sample, Sweep=auto.
7. Turn on the 99% bandwidth function, max reading.
8. Repeat above procedures until all frequency of interest measured was complete.

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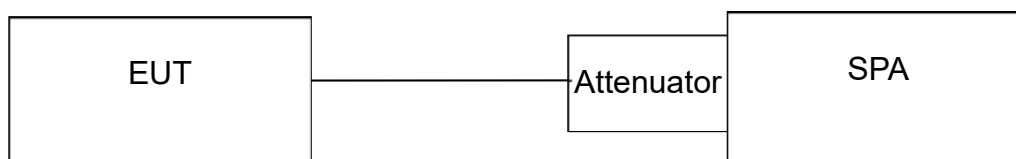
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7.3 Measurement Equipment Used

SGS Conducted Room					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
EXA Spectrum Analyzer	Agilent	N9010A	MY50420195	05/02/2019	05/01/2020
Temperature Chamber	TERCHY	MHG-120LF	911009	05/17/2019	05/16/2020
Attenuator	Mini-Circuit	BW-S10W2+	2	01/02/2019	01/01/2020
DC Block	Mini-Circuits	BLK-18-S+	1	01/02/2019	01/01/2020

7.4 Test Set-up



7.5 Measurement Result

26dB Bandwidth

802.11a_Ch0

Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5260	24.3	13.856
5300	24.06	13.813
5320	28.27	14.513
5500	18.91	12.767
5580	27.84	14.447
5700	18.94	12.774
5720	29.98	14.768

802.11n_HT20_Ch0

Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5260	27.74	14.431
5300	27.33	14.366
5320	24.28	13.852
5500	19.76	12.958
5580	30	14.771
5700	19.8	12.967
5720	30	14.771

802.11n_HT40_Ch0

Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5270	46.45	16.670
5310	39.99	16.020
5510	39.75	15.993
5550	45.42	16.572
5670	40.34	16.057
5710	40.86	16.113

802.11ac_VHT80_Ch0

Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5290	82.71	19.176
5530	81.45	19.109
5610	81.51	19.112
5690	81.53	19.113

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FCC_802.11a_20MHz_Chain0_5260MHz



FCC_802.11a_20MHz_Chain0_5500MHz



FCC_802.11a_20MHz_Chain0_5300MHz



FCC_802.11a_20MHz_Chain0_5580MHz



FCC_802.11a_20MHz_Chain0_5320MHz



FCC_802.11a_20MHz_Chain0_5700MHz



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FCC 802.11a_20MHz_Chain0_5720MHz



FCC 802.11n_20MHz_Chain0_5320MHz



FCC 802.11n_20MHz_Chain0_5260MHz



FCC 802.11n_20MHz_Chain0_5500MHz



FCC 802.11n_20MHz_Chain0_5300MHz



FCC 802.11n_20MHz_Chain0_5580MHz



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FCC_802.11n_20MHz_Chain0_5700MHz



FCC_802.11n_40MHz_Chain0_5310MHz



FCC_802.11n_20MHz_Chain0_5720MHz



FCC_802.11n_40MHz_Chain0_5510MHz



FCC_802.11n_40MHz_Chain0_5270MHz



FCC_802.11n_40MHz_Chain0_5550MHz



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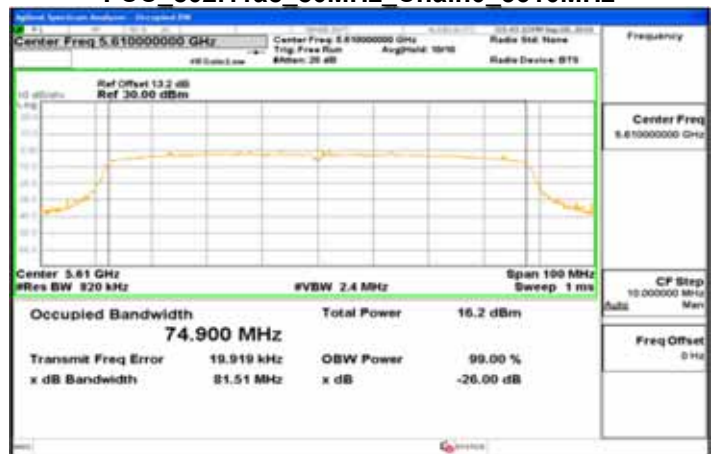
FCC_802.11ac_80MHz_Chain0_5530MHz



FCC_802.11n_40MHz_Chain0_5710MHz



FCC_802.11ac_80MHz_Chain0_5610MHz



FCC_802.11ac_80MHz_Chain0_5290MHz



FCC_802.11ac_80MHz_Chain0_5690MHz



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8 MAXIMUM CONDUCTED OUTPUT POWER MEASUREMENT

8.1 Standard Applicable

OPERZTION Band	EUT CATEGORY		LIMIT
U-NII-1		Access Point (Master device)	1 Watt(30dBm)
		Fixed point-to-point Access Ponit	1 Watt(30dBm)
		Mobile and portable client device	250mW(23.98dBm)
U-NII-2A	√		250mW(23.98dBm) or 11dBm+10 log B
U-NII-2C	√		250mW(23.98dBm) or 11dBm+10 log B
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.			

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

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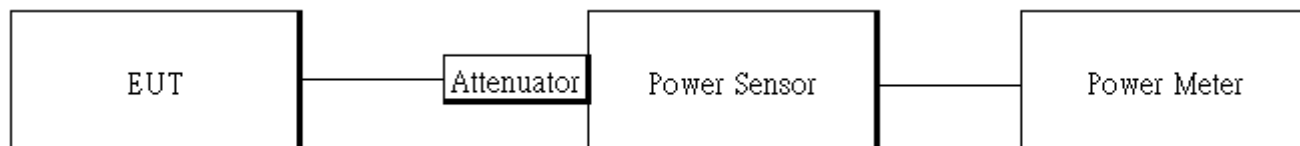
8.2 Measurement Procedure

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 SISOiliary 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.

8.3 Measurement Equipment Used

SGS Conducted Room					
Name of Equip-ment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Power Meter	Anritsu	ML2496A	1804001	02/13/2019	02/12/2020
Power Sensor	Anritsu	MA2411B	1726104	02/13/2019	02/12/2020
Power Sensor	Anritsu	MA2411B	1726107	02/13/2019	02/12/2020
Attenuator	Mini-Circuit	BW-S10W2+	2	01/02/2019	01/01/2020

8.4 Test Set-up



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8.5 Measurement Result

Conducted output power (FCC)

802.11a_Ch0

CH	Frequency (MHz)	Data Rate	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
52	5260	6	17.13	51.631	23.98 or 11+10log(B) = 24.86	PASS
60	5300	6	17.28	53.445	23.98 or 11+10log(B) = 24.81	PASS
64	5320	6	17.15	51.869	23.98 or 11+10log(B) = 25.51	PASS
100	5500	6	8.17	6.560	23.98 or 11+10log(B) = 23.77	PASS
116	5580	6	17.21	52.590	23.98 or 11+10log(B) = 25.45	PASS
140	5700	6	6.51	4.476	23.98 or 11+10log(B) = 23.77	PASS
144	5720(U-NII 2C)	6	15.48	35.31	23.98 or 11+10log(B) = 25.77	PASS
144	5720 (U-NII 3)	6	12.47	17.65	30	PASS

802.11n_HT20_Ch0

CH	Frequency (MHz)	Data Rate	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
52	5260	MCS0	17.13	51.625	23.98 or 11+10log(B) = 25.43	PASS
60	5300	MCS0	17.12	51.506	23.98 or 11+10log(B) = 25.37	PASS
64	5320	MCS0	14.31	26.969	23.98 or 11+10log(B) = 24.85	PASS
100	5500	MCS0	8.35	6.837	23.98 or 11+10log(B) = 23.96	PASS
116	5580	MCS0	17.28	53.439	23.98 or 11+10log(B) = 25.77	PASS
140	5700	MCS0	6.86	4.851	23.98 or 11+10log(B) = 23.97	PASS
144	5720(U-NII 2C)	MCS0	15.54	35.79	23.98 or 11+10log(B) = 25.77	PASS
144	5720 (U-NII 3)	MCS0	12.53	17.90	30	PASS

802.11n_HT40_Ch0

CH	Frequency (MHz)	Data Rate	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
54	5270	MCS0	14.85	30.516	23.98 or 11+10log(B) = 27.67	PASS
62	5310	MCS0	11.89	15.436	23.98 or 11+10log(B) = 27.02	PASS
102	5510	MCS0	5.16	3.277	23.98 or 11+10log(B) = 26.99	PASS
110	5550	MCS0	14.81	30.236	23.98 or 11+10log(B) = 27.57	PASS
134	5670	MCS0	11.06	12.751	23.98 or 11+10log(B) = 27.06	PASS
142	5710(U-NII 2C)	MCS0	14.21	26.34	23.98 or 11+10log(B) = 27.11	PASS
142	5710 (U-NII 3)	MCS0	6.06	4.04	30	PASS

802.11ac_VHT80_Ch0

CH	Frequency (MHz)	Data Rate	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
58	5290	MCS0	10.84	12.147	23.98 or 11+10log(B) = 30.18	PASS
106	5530	MCS0	11.00	12.603	23.98 or 11+10log(B) = 30.11	PASS
122	5610	MCS0	10.90	12.316	23.98 or 11+10log(B) = 30.11	PASS
138	5690(U-NII 2C)	MCS0	10.72	11.79	23.98 or 11+10log(B) = 30.11	PASS
138	5690 (U-NII 3)	MCS0	-0.47	0.90	30	PASS

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9 MAXIMUM POWER SPECTRAL DENSITY

9.1 Standard Applicable

OPERZTION Band	EUT CATEGORY		LIMIT
U-NII-1		Access Point (Master device)	17dBm/ MHz
		Fixed point-to-point Access Ponit	
		Mobile and portable client device	11dBm/ MHz
U-NII-2A	√		11dBm/ MHz
U-NII-2C	√		11dBm/ MHz
U-NII-3			30dBm/ 500kHz
If transmitting antennas of directional gain greater than 6 dBi are used, the Maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.			

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

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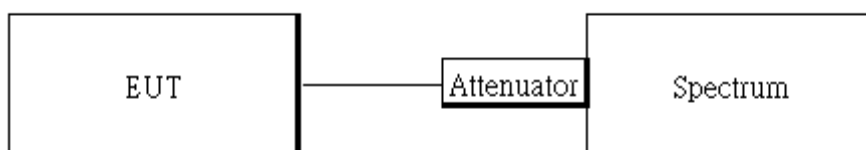
9.2 Measurement Procedure

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 Spectrum.
4. **For U-NII1, U-NII-2A, U-NII-2C Band:**
Set RBW=1MHz, VBW=3MHz, where span is enough to capture the entire bandwidth, Sweep time = Auto (601 pts), detector = sample, traces 100 sweeps of video averaging. (SA-2 with the omission of procedure x, the integration with 26dB EBW bandwidth)
For U-NII-3 Band:
Set RBW=500 kHz, VBW $\geq$ 3RBW, where span is enough to capture the entire bandwidth, Sweep time = Auto (601 pts), detector = sample, traces 100 sweeps of video averaging. (SA-2 with the omission of procedure x, the integration with 26dB EBW bandwidth)
5. User the cursor on spectrum to peak search the highest level of trace
6. Record the max. reading and add 10 log(1/duty cycle).
7. Repeat above procedures until all default test channel (low, middle, and high) was complete.

9.3 Measurement Equipment Used

SGS Conducted Room					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
EXA Spectrum Analyzer	Agilent	N9010A	MY50420195	05/02/2019	05/01/2020
Temperature Chamber	TERCHY	MHG-120LF	911009	05/17/2019	05/16/2020
Attenuator	Mini-Circuit	BW-S10W2+	2	01/02/2019	01/01/2020
DC Block	Mini-Circuits	BLK-18-S+	1	01/02/2019	01/01/2020

9.4 Test Set-up



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9.5 Measurement Result

POWER DENSITY 802.11a MODE_Ch0					
Frequency (MHz)	PSD W/O Duty Factor (dBm)	Duty Factor	PSD With Duty Factor (dBm)	Limit (dBm)	Margin (dB)
5260.00	1.93	0.19	2.12	11.00	-8.88
5300.00	2.22	0.19	2.41	11.00	-8.59
5320.00	3.07	0.19	3.26	11.00	-7.74
5500.00	-2.02	0.19	-1.83	11.00	-12.83
5580.00	3.37	0.19	3.56	11.00	-7.44
5700.00	-2.15	0.19	-1.96	11.00	-12.96
5720 (U-NII 2C)	4.19	0.19	4.38	11.00	-6.62
5720 (U-NII 3)	-0.02	0.19	0.17	30.00	-29.83
POWER DENSITY 802.11n HT20 MODE_Ch0					
Frequency (MHz)	PSD W/O Duty Factor (dBm)	Duty Factor	PSD With Duty Factor (dBm)	Limit (dBm)	Margin (dB)
5260	1.02	0.19	1.21	11	-9.79
5300	1.75	0.19	1.94	11	-9.06
5320	3.78	0.19	3.97	11	-7.03
5500	-5.26	0.19	-5.07	11	-16.07
5580	3.06	0.19	3.25	11	-7.75
5700	-3.27	0.19	-3.08	11	-14.08
5720 (U-NII 2C)	3.74	0.19	3.93	11	-7.07
5720 (U-NII 3)	-0.03	0.19	0.16	30	-29.84
POWER DENSITY 802.11n HT40 MODE_Ch0					
Frequency (MHz)	PSD W/O Duty Factor (dBm)	Duty Factor	PSD With Duty Factor (dBm)	Limit (dBm)	Margin (dB)
5270	-2.79	0.39	-2.40	11	-13.40
5310	-2.4	0.39	-2.01	11	-13.01
5510	-8.33	0.39	-7.94	11	-18.94
5550	-2.02	0.39	-1.63	11	-12.63
5670	-1.11	0.39	-0.72	11	-11.72
5710 (U-NII 2C)	-3.28	0.39	-2.89	11	-13.89
5710 (U-NII 3)	-8.88	0.39	-8.49	30	-38.49
POWER DENSITY 802.11ac VHT80 MODE_Ch0					
Frequency (MHz)	PSD W/O Duty Factor (dBm)	Duty Factor	PSD With Duty Factor (dBm)	Limit (dBm)	Margin (dB)
5290	-9.87	0.75	-9.12	11	-20.12
5530	-9.10	0.75	-8.35	11	-19.35
5610	-9.54	0.75	-8.79	11	-19.79
5690 (U-NII 2C)	-11.11	0.75	-10.36	11	-21.36
5690 (U-NII 3)	-18.17	0.75	-17.41	30	-47.41

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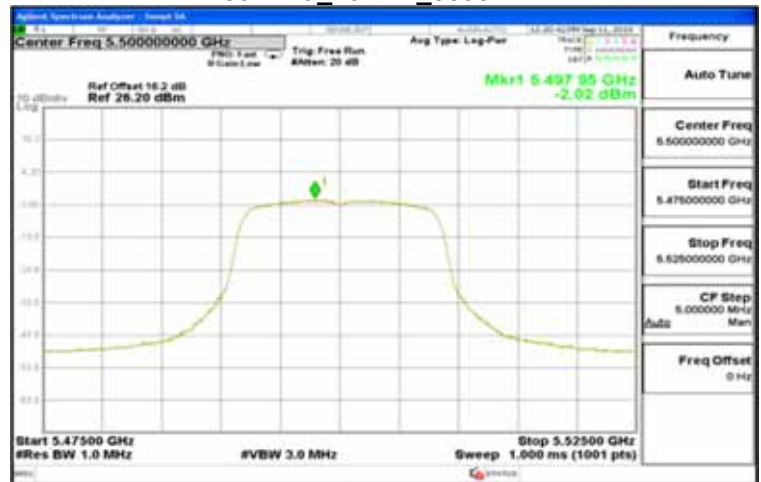
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802.11a_20MHz_5260MHz



802.11a_20MHz_5500MHz



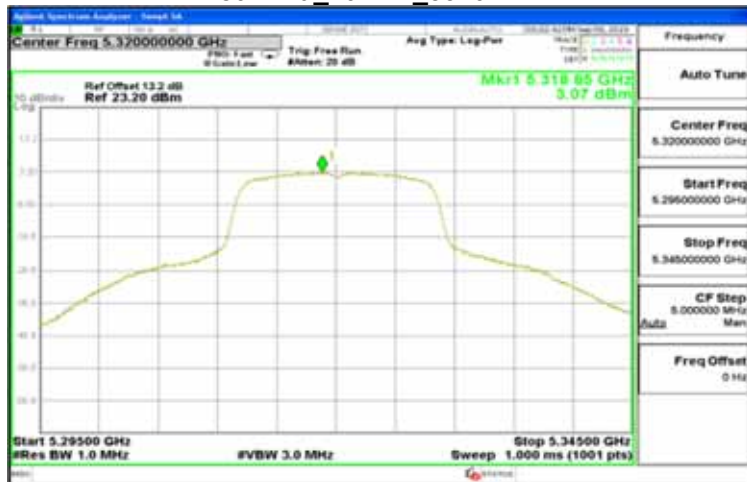
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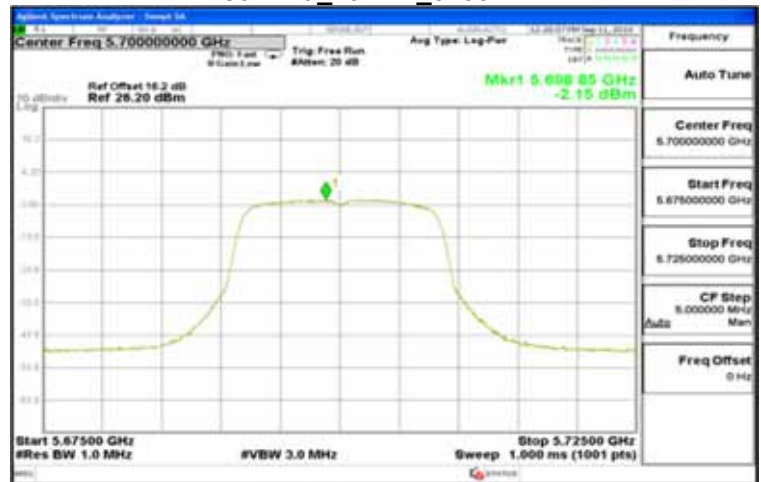
802.11a_20MHz_5580MHz



802.11a_20MHz_5320MHz



802.11a_20MHz_5700MHz



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802.11a_20MHz_5720MHz



802.11n_20MHz_5300MHz



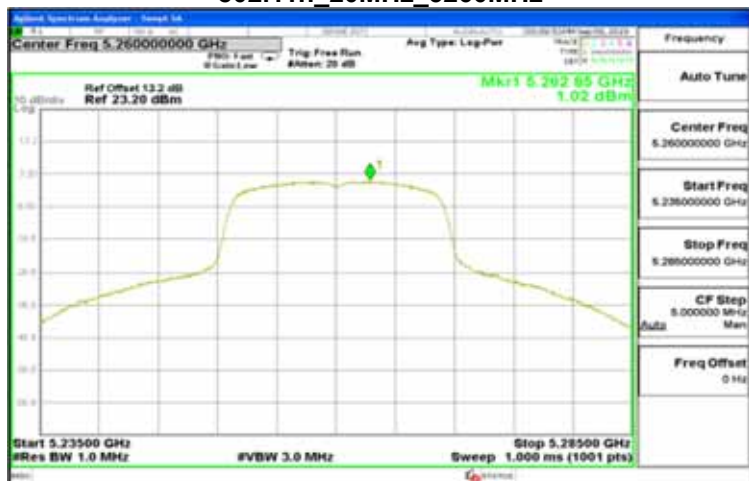
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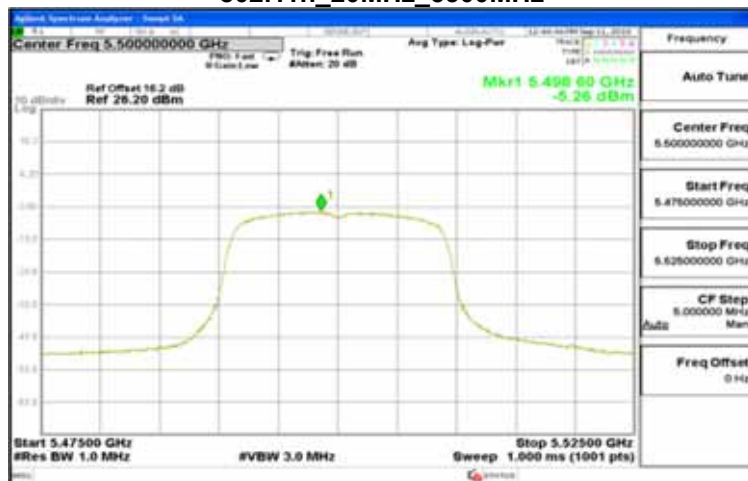
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802.11n_20MHz_5260MHz



802.11n_20MHz_5500MHz

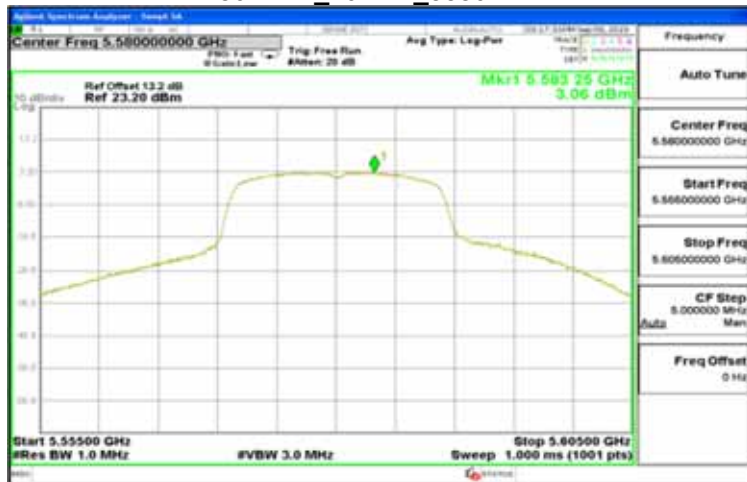


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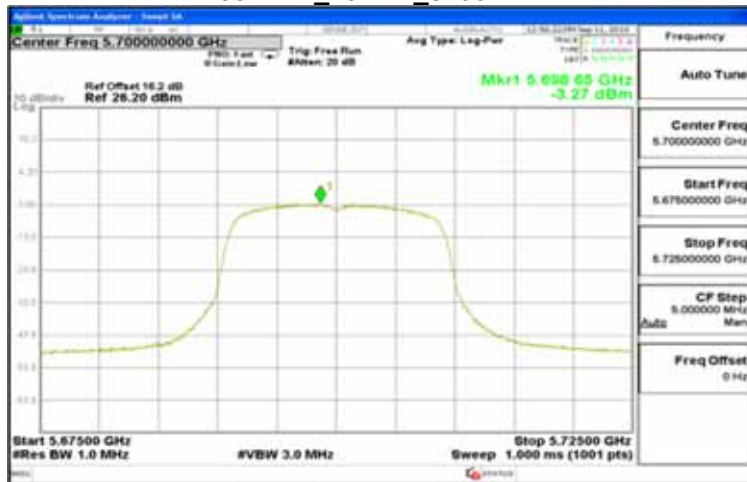
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802.11n_20MHz_5720MHz



802.11n_20MHz_5700MHz



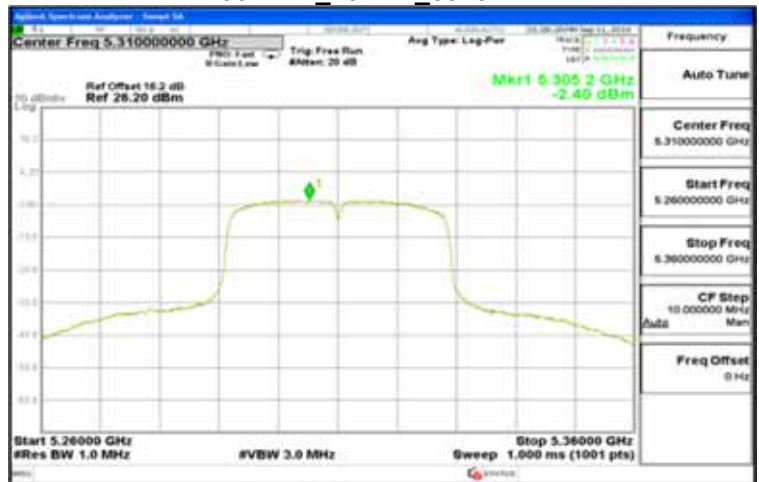
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802.11n_20MHz_5720MHz



802.11n_40MHz_5310MHz

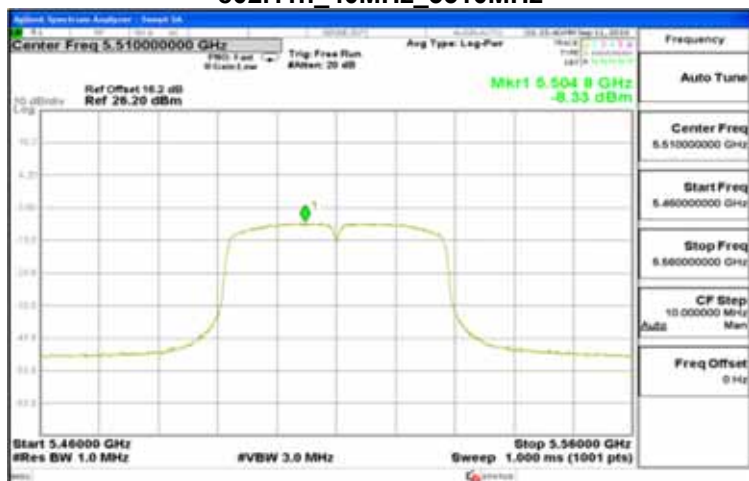


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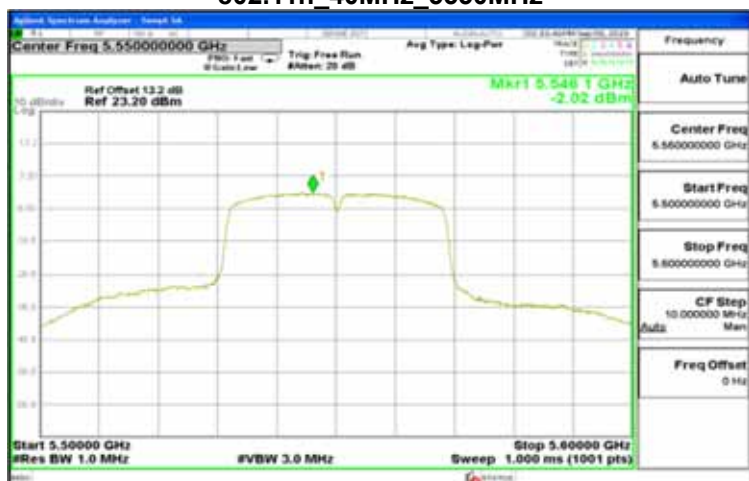
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802.11n_40MHz_5710MHz



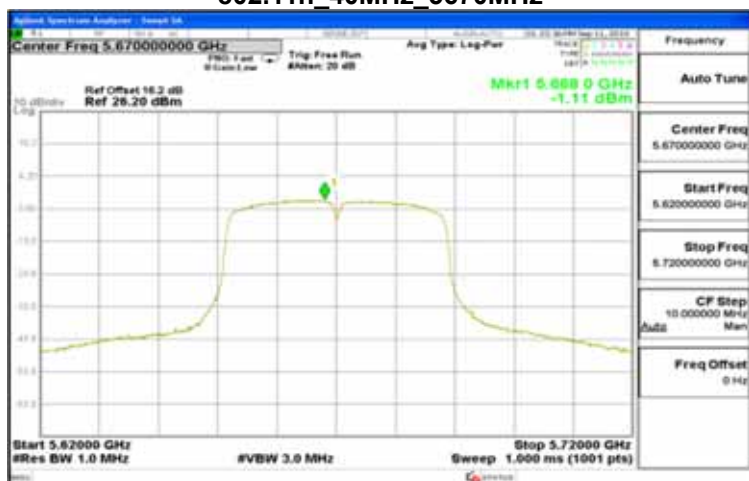
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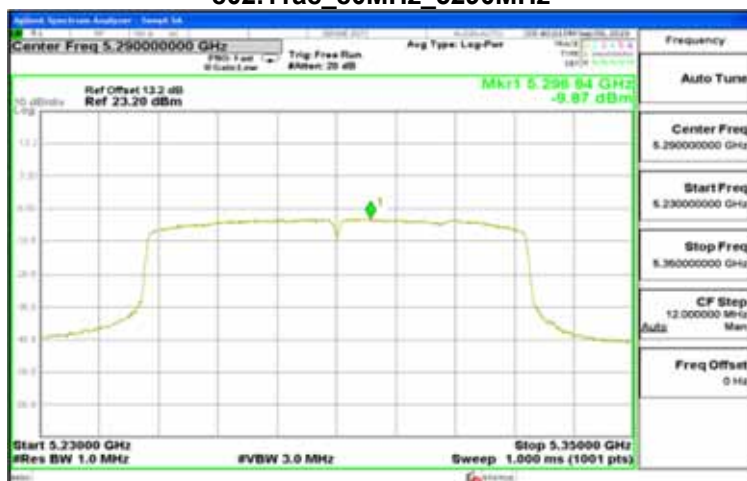
802.11n_40MHz_5710MHz



802.11n_40MHz_5670MHz



802.11ac_80MHz_5290MHz



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802.11ac_80MHz_5530MHz



802.11ac_80MHz_5690MHz



802.11ac_80MHz_5610MHz



802.11ac_80MHz_5690MHz



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10 UNDESIRABLE RADIATED EMISSION MEASUREMENT

10.1 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)(1)	PK: -27 (dBm/MHz)	PK: 68.3 (dBμV/m)
15.407(b)(2)		
15.407(b)(3)		
15.407(b)(4)(i)	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)

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SGS Taiwan Ltd.

台灣檢驗科技股份有限公司

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10.2 Measurement Equipment Used

SGS SAC-III					
Name of Equip-ment	Manufacturer	Model	Serial Num-ber	Calibration Date	Calibration Due
Bi-log Antenna	TESEO	CBL 6112D	35242 & AT-N0555	01/10/2019	01/09/2020
Horn Antenna	Schwarzbeck	BBHA9170	07/02/1900	12/27/2018	12/26/2019
Horn Antenna	Schwarzbeck	BBHA9120D	D803	12/24/2018	12/23/2019
3m Site NSA	SGS	966 chamber	N/A	01/02/2019	01/01/2020
Loop Antenna	ETS.LIND-GREN	6502	148045	10/08/2018	10/07/2019
PXA Spectrum An-alyzer	Agilent	N9030A	MY53120760	04/22/2019	04/21/2020
EMI Test Receiver	R&S	ESCI 3	100335	02/12/2019	02/11/2020
Pre-Amplifier	EMC Instru-ments	EMC184045B	980135	01/02/2019	01/01/2020
Pre-Amplifier	EMC Instru-ments	EMC051825	980152	01/02/2019	01/01/2020
Pre-Amplifier	HP	8447D	2944A09469	01/02/2019	01/01/2020
Filter 5150-5350 MHz	Micro-Tronics	BRM50703	1	01/02/2019	01/01/2020
Filter 5470-5725 MHz	Micro-Tronics	BRM50704	1	01/02/2019	01/01/2020
High Pass Filter	WI	WHKX7.0/18G-8SS	45	01/02/2019	01/01/2020
Coaxial Cable	Huber Suhner	succoflex 102	MY2622/2	01/02/2019	01/02/2020
Coaxial Cable	Huber Suhner	succoflex 104A	800086/4a	01/02/2019	01/02/2020
Coaxial Cable	Huber Suhner	EMC 104-SM-SM-2000	160123	01/02/2019	01/02/2020
Software	e3 V6.11-20180413				

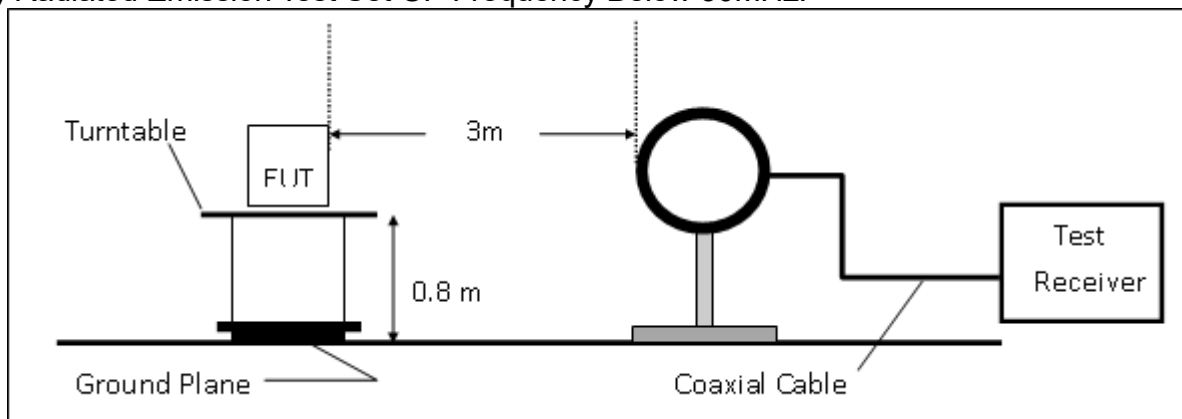
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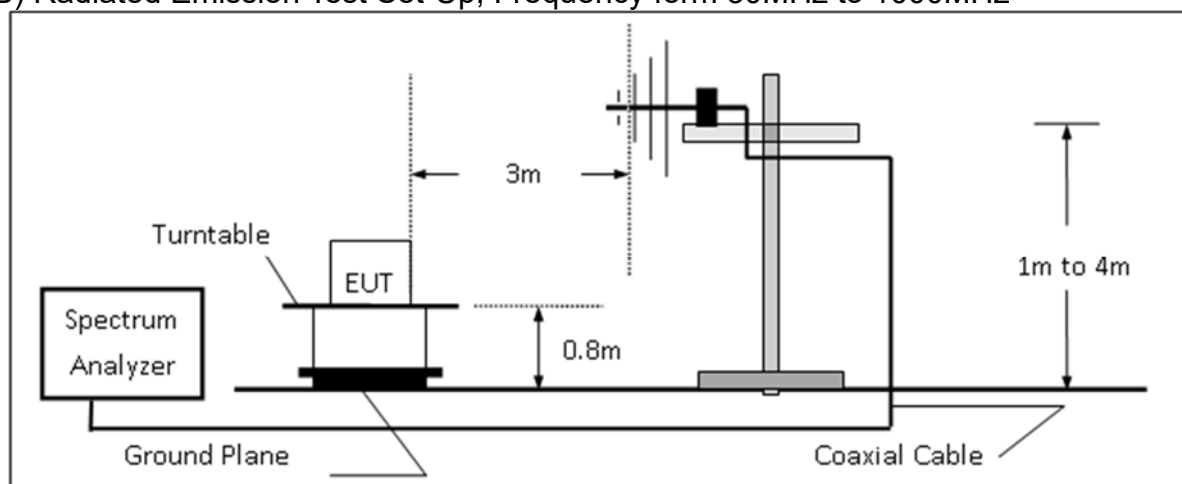
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10.3 Test SET-UP

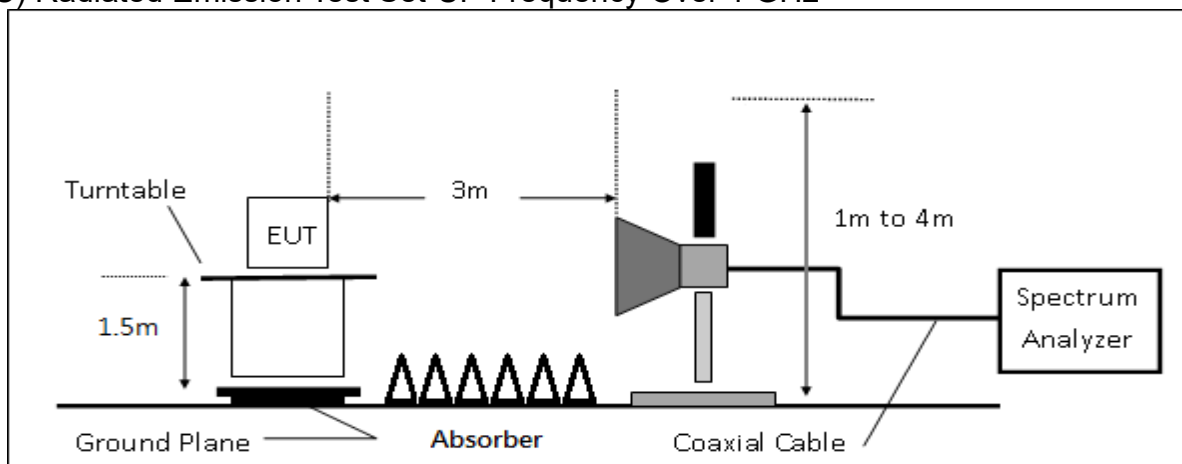
(A) Radiated Emission Test Set-UP Frequency Below 30MHz.



(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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10.4 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. 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.

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10.5 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)

10.6 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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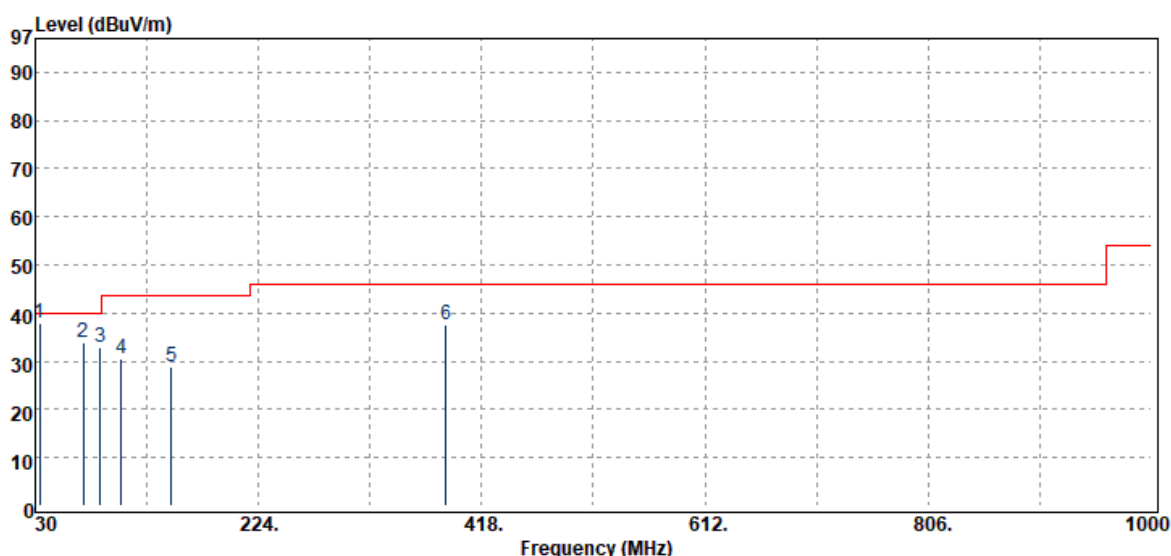
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10.7 Measurement Result

Radiated Spurious Emission Measurement Result

Report Number :ER-2019-60053
Operation Mode :802.11a
Test Channel :CH60_5300 MHz
Test Mode :Tx CH Mid
EUT Pol :E2 Plane

Test Date :2019-09-11
Temp./Humi. :23.3/61
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
33.88	Peak	44.18	-6.09	38.09	40.00	-1.91
71.71	Peak	50.64	-16.79	33.85	40.00	-6.15
86.26	Peak	48.37	-15.51	32.86	40.00	-7.14
104.69	Peak	42.45	-11.76	30.69	43.50	-12.81
148.34	Peak	40.36	-11.50	28.86	43.50	-14.64
386.96	Peak	43.60	-6.10	37.50	46.00	-8.50

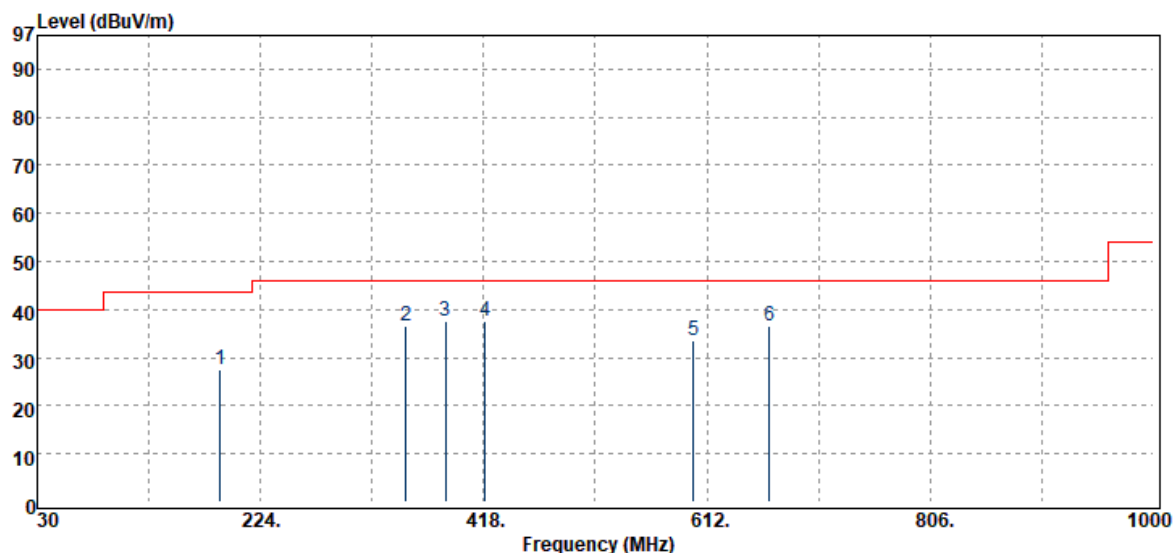
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Report Number :ER-2019-60053
 Operation Mode :802.11a
 Test Channel :CH60_5300 MHz
 Test Mode :Tx CH Mid
 EUT Pol :E2 Plane

Test Date :2019-09-11
 Temp./Humi. :23.3/61
 Antenna Pol. :HORIZONTAL
 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
189.08	Peak	40.60	-12.98	27.62	43.50	-15.88
350.10	Peak	43.36	-6.89	36.47	46.00	-9.53
385.02	Peak	43.86	-6.20	37.66	46.00	-8.34
418.97	Peak	41.97	-4.52	37.45	46.00	-8.55
600.36	Peak	36.63	-3.13	33.50	46.00	-12.50
666.32	Peak	39.50	-2.94	36.56	46.00	-9.44

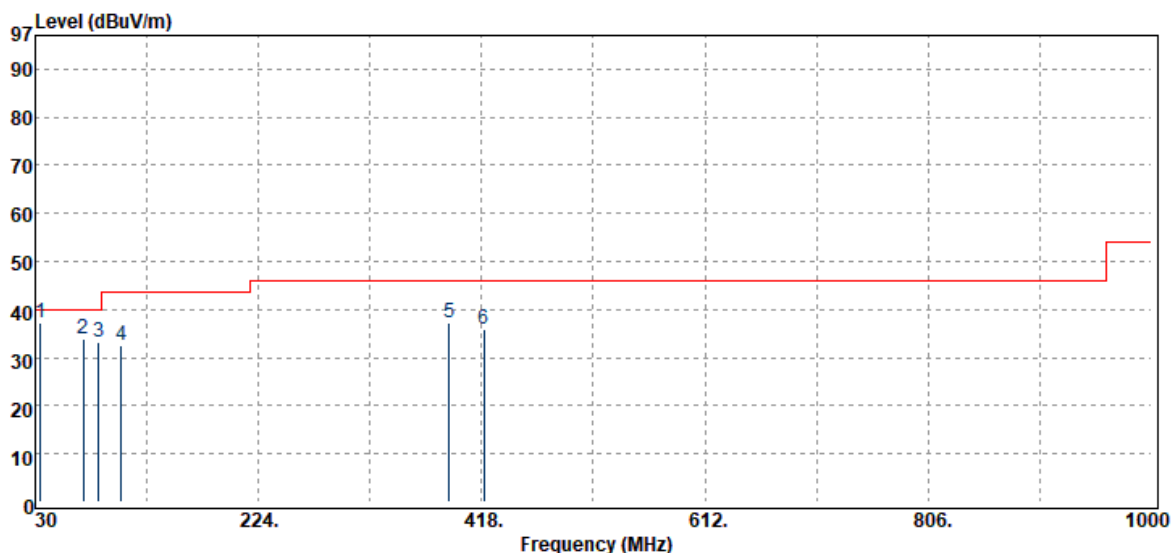
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Report Number :ER-2019-60053
 Operation Mode :802.11a
 Test Channel :CH116_5580 MHz
 Test Mode :Tx CH Mid
 EUT Pol :E2 Plane

Test Date :2019-09-11
 Temp./Humi. :23.3/61
 Antenna Pol. :VERTICAL
 Engineer :Nick



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
34.85	Peak	43.86	-6.55	37.31	40.00	-2.69
71.71	Peak	50.61	-16.79	33.82	40.00	-6.18
85.29	Peak	48.84	-15.66	33.18	40.00	-6.82
104.69	Peak	44.19	-11.76	32.43	43.50	-11.07
389.87	Peak	43.38	-5.99	37.39	46.00	-8.61
419.94	Peak	40.28	-4.45	35.83	46.00	-10.17

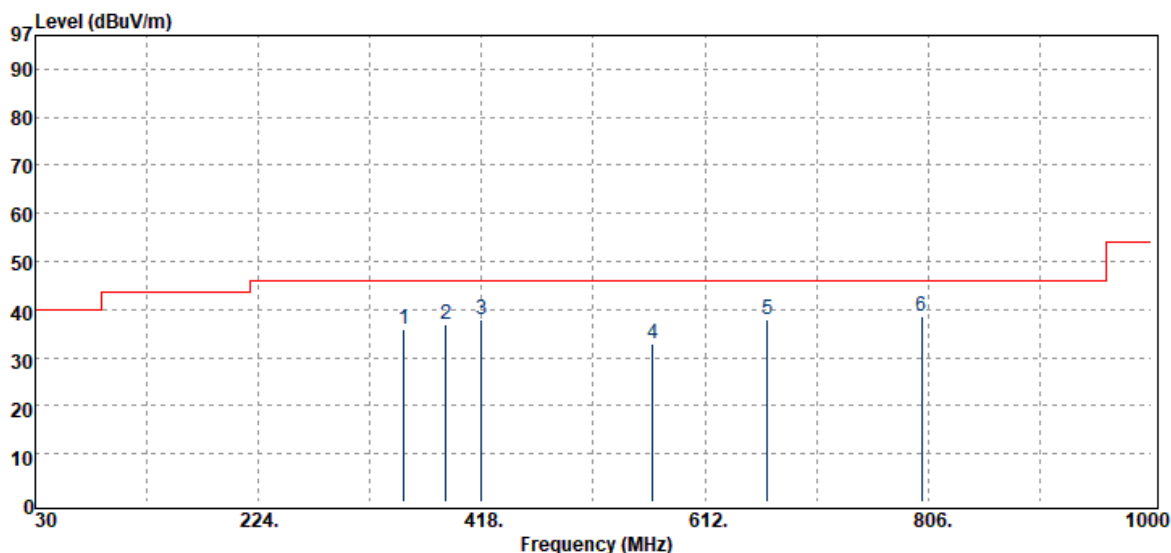
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Report Number :ER-2019-60053
 Operation Mode :802.11a
 Test Channel :CH116_5580 MHz
 Test Mode :Tx CH Mid
 EUT Pol :E2 Plane

Test Date :2019-09-11
 Temp./Humi. :23.3/61
 Antenna Pol. :HORIZONTAL
 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
350.10	Peak	42.75	-6.89	35.86	46.00	-10.14
386.96	Peak	43.06	-6.10	36.96	46.00	-9.04
418.00	Peak	42.38	-4.57	37.81	46.00	-8.19
566.41	Peak	36.68	-3.76	32.92	46.00	-13.08
666.32	Peak	40.84	-2.94	37.90	46.00	-8.10
800.18	Peak	39.08	-0.45	38.63	46.00	-7.37

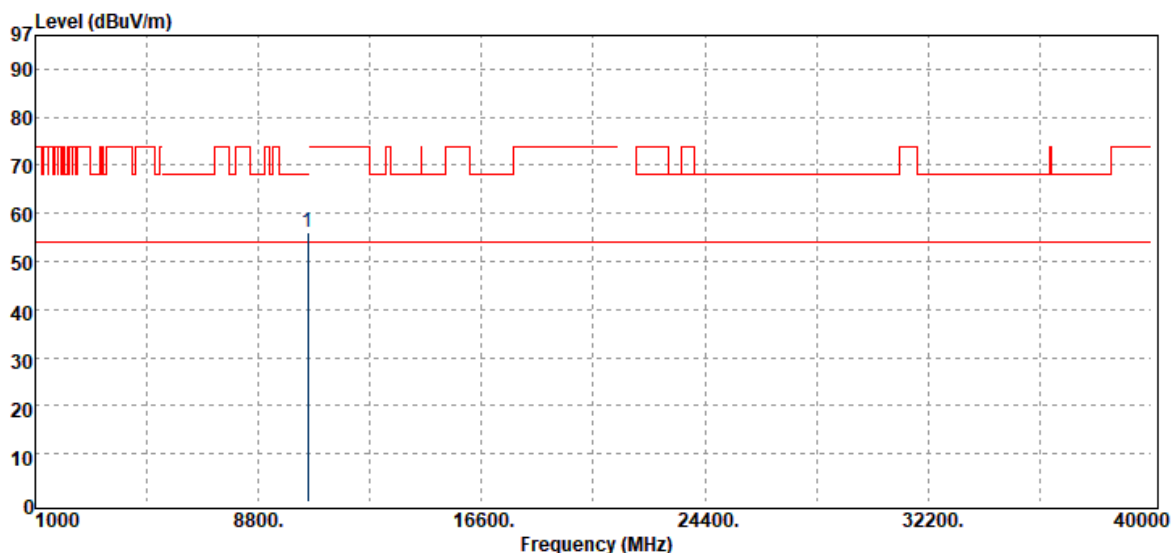
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Report Number :ER-2019-60053
 Operation Mode :802.11a
 Test Channel :CH52_5260 MHz
 Test Mode :Tx CH Low
 EUT Pol :E2 Plane

Test Date :2019-09-10
 Temp./Humi. :23.3/61
 Antenna Pol. :VERTICAL
 Engineer :Nick



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
10520.00	Peak	30.38	25.66	56.04	68.20	-12.16

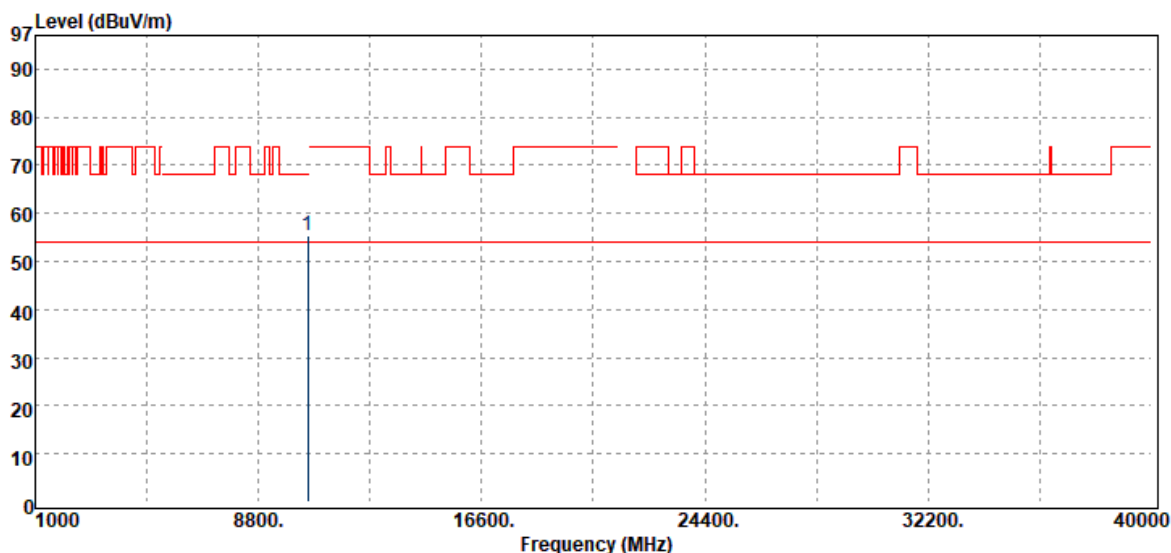
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Report Number :ER-2019-60053
 Operation Mode :802.11a
 Test Channel :CH52_5260 MHz
 Test Mode :Tx CH Low
 EUT Pol :E2 Plane

Test Date :2019-09-10
 Temp./Humi. :23.3/61
 Antenna Pol. :HORIZONTAL
 Engineer :Nick



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
10520.00	Peak	29.77	25.69	55.46	68.20	-12.74

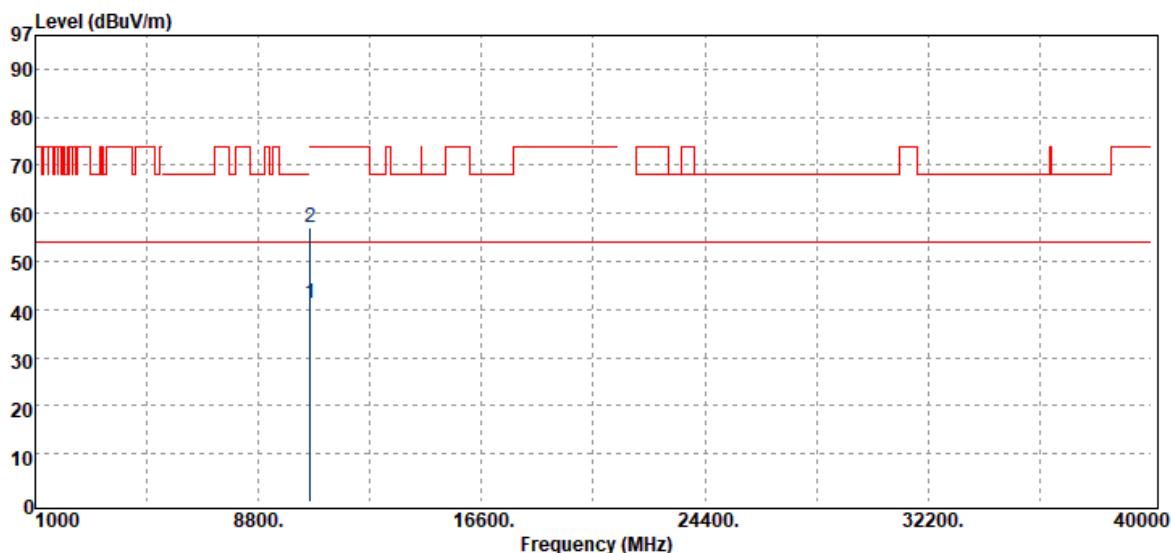
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Report Number :ER-2019-60053
 Operation Mode :802.11a
 Test Channel :CH60_5300 MHz
 Test Mode :Tx CH Mid
 EUT Pol :E2 Plane

Test Date :2019-09-11
 Temp./Humi. :23.3/61
 Antenna Pol. :VERTICAL
 Engineer :Nick



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
10600.00	Average	14.80	26.57	41.37	54.00	-12.63
10600.00	Peak	30.51	26.57	57.08	74.00	-16.92

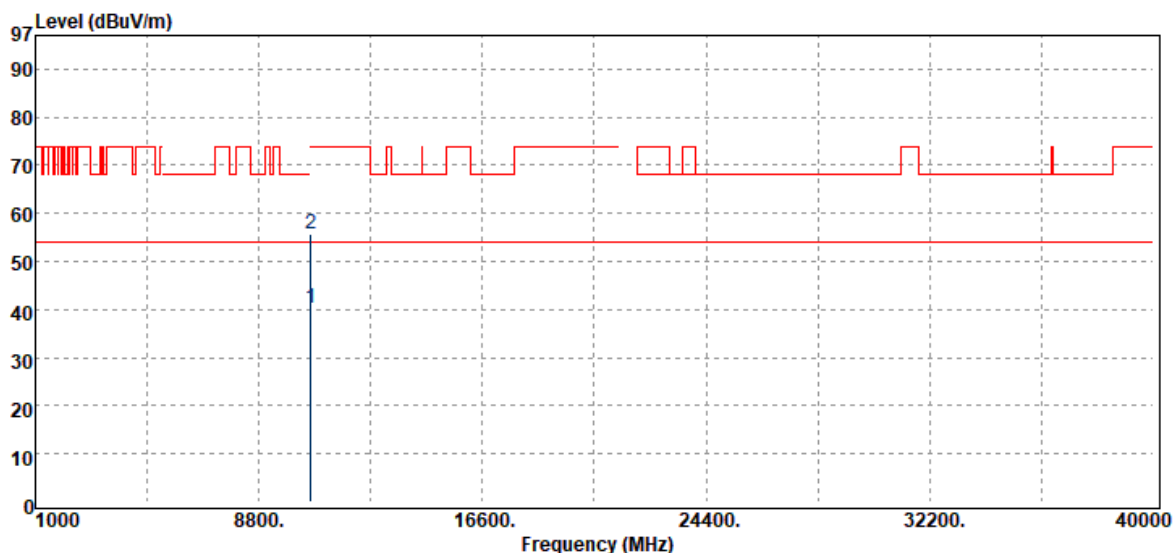
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Report Number :ER-2019-60053
 Operation Mode :802.11a
 Test Channel :CH60_5300 MHz
 Test Mode :Tx CH Mid
 EUT Pol :E2 Plane

Test Date :2019-09-11
 Temp./Humi. :23.3/61
 Antenna Pol. :HORIZONTAL
 Engineer :Nick



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
10600.00	Average	13.72	26.57	40.29	54.00	-13.71
10600.00	Peak	29.04	26.57	55.61	74.00	-18.39

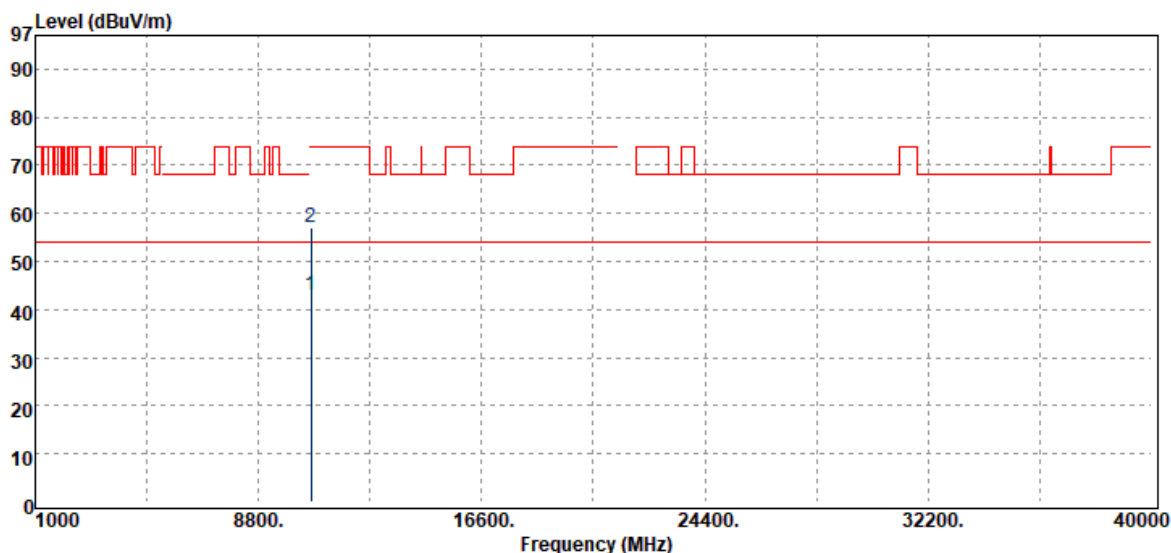
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Report Number :ER-2019-60053
 Operation Mode :802.11a
 Test Channel :CH64_5320 MHz
 Test Mode :Tx CH High
 EUT Pol :E2 Plane

Test Date :2019-09-10
 Temp./Humi. :23.3/61
 Antenna Pol. :VERTICAL
 Engineer :Nick



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
10640.00	Average	15.75	27.27	43.02	54.00	-10.98
10640.00	Peak	29.73	27.27	57.00	74.00	-17.00

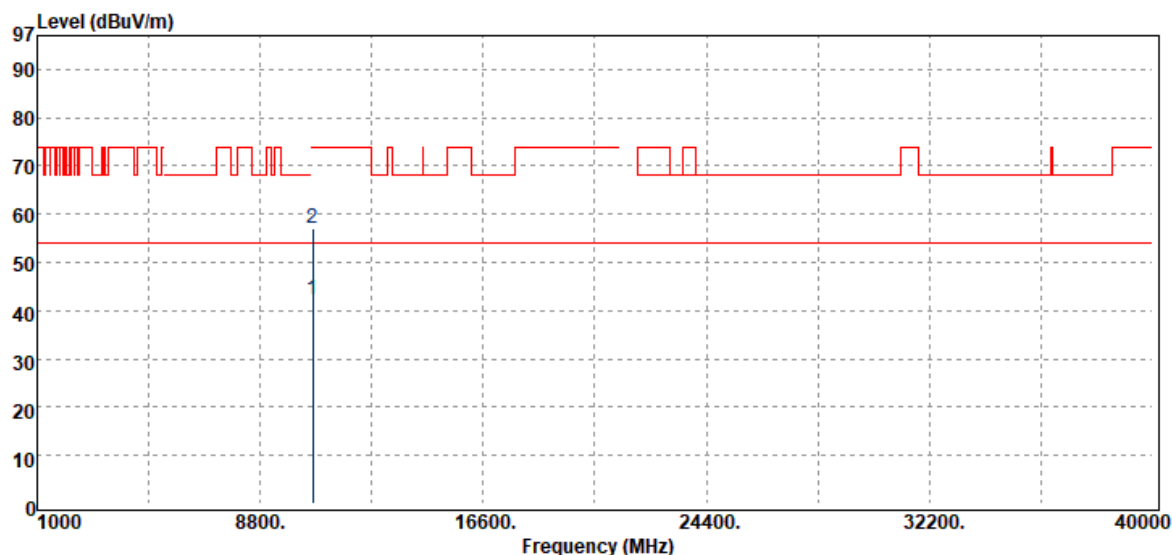
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Report Number :ER-2019-60053
 Operation Mode :802.11a
 Test Channel :CH64_5320 MHz
 Test Mode :Tx CH High
 EUT Pol :E2 Plane

Test Date :2019-09-10
 Temp./Humi. :23.3/61
 Antenna Pol. :HORIZONTAL
 Engineer :Nick



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode	Reading Level		FS	@3m	
	PK/QP/AV	dB μ V	dB	dB μ V/m	dB μ V/m	dB
10640.00	Average	14.94	27.27	42.21	54.00	-11.79
10640.00	Peak	29.80	27.27	57.07	74.00	-16.93

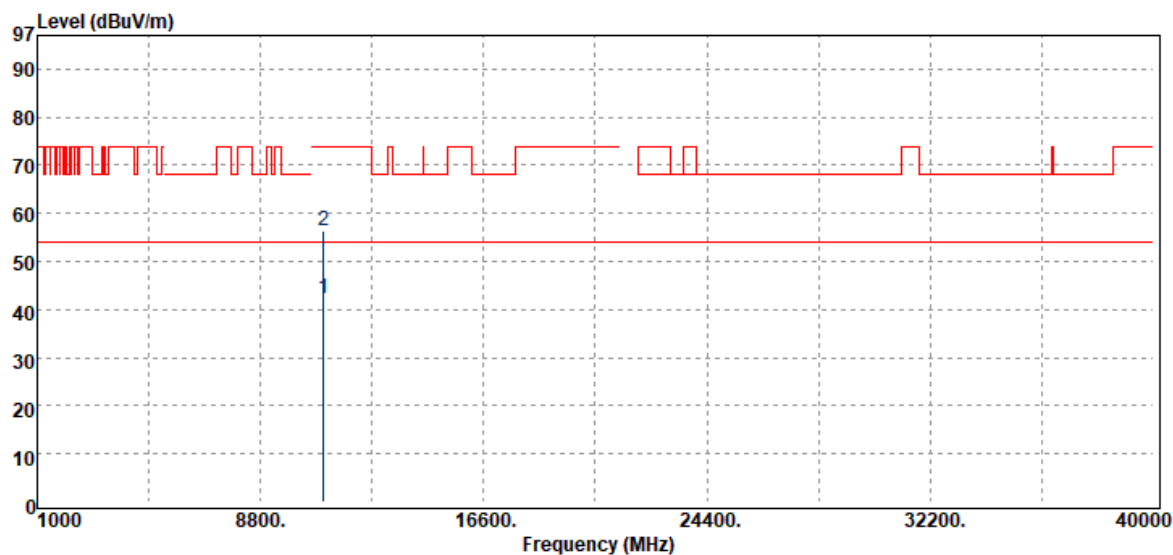
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Report Number :ER-2019-60053
 Operation Mode :802.11a
 Test Channel :CH100_5500 MHz
 Test Mode :Tx CH Low
 EUT Pol :E2 Plane

Test Date :2019-09-10
 Temp./Humi. :23.3/61
 Antenna Pol. :VERTICAL
 Engineer :Nick



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode	Reading Level		FS	@3m	
	PK/QP/AV	dB μ V	dB	dB μ V/m	dB μ V/m	dB
11000.00	Average	15.02	27.21	42.23	54.00	-11.77
11000.00	Peak	29.15	27.21	56.36	74.00	-17.64

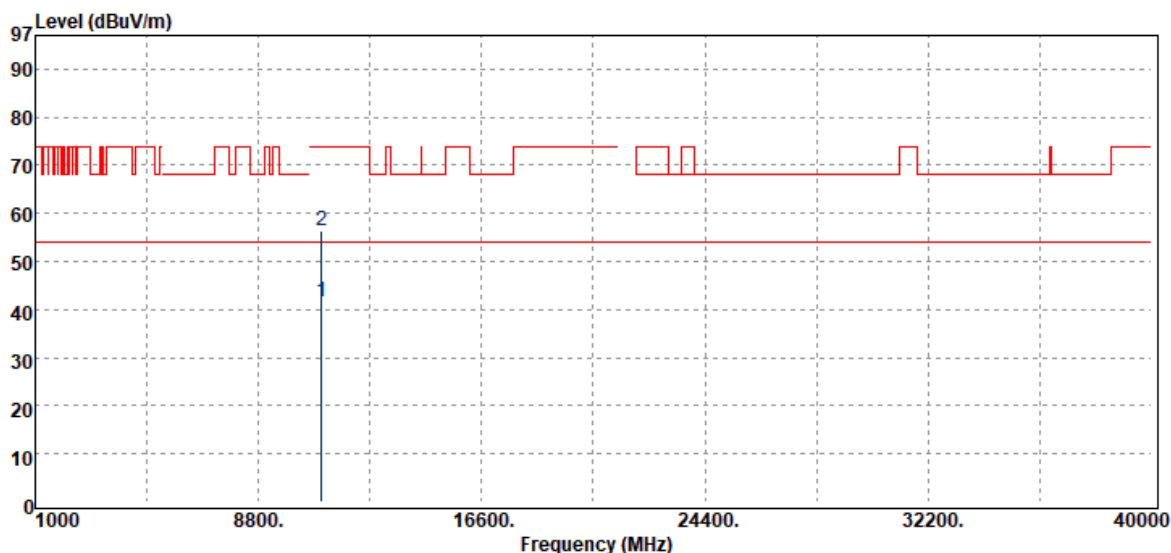
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Report Number :ER-2019-60053
 Operation Mode :802.11a
 Test Channel :CH100_5500 MHz
 Test Mode :Tx CH Low
 EUT Pol :E2 Plane

Test Date :2019-09-10
 Temp./Humi. :23.3/61
 Antenna Pol. :HORIZONTAL
 Engineer :Nick



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode	Reading Level		FS	@3m	
	PK/QP/AV	dB μ V	dB	dB μ V/m	dB μ V/m	dB
11000.00	Average	14.26	27.21	41.47	54.00	-12.53
11000.00	Peak	29.31	27.21	56.52	74.00	-17.48

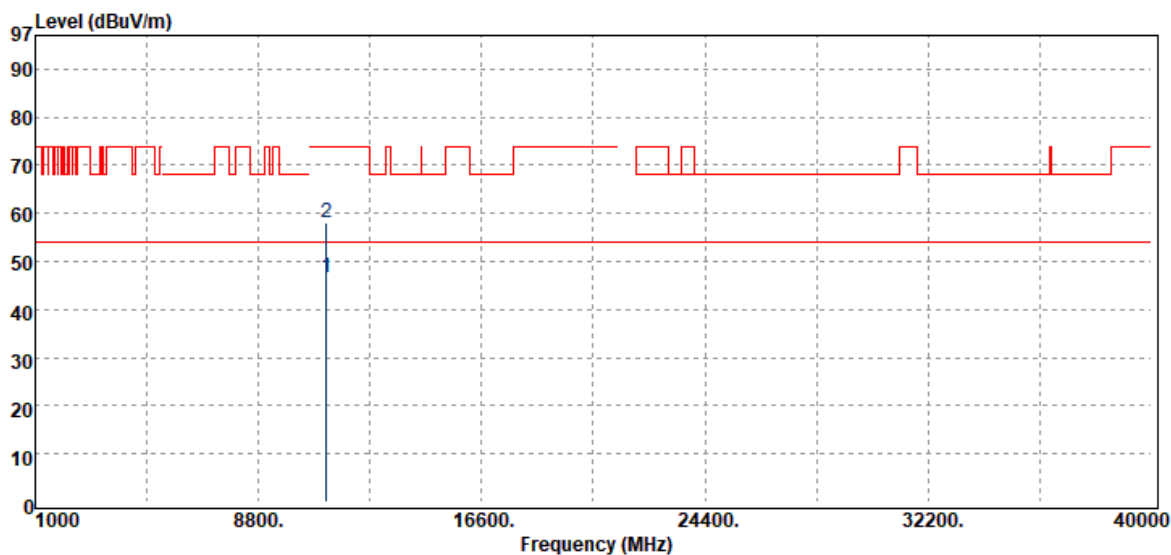
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Report Number :ER-2019-60053
 Operation Mode :802.11a
 Test Channel :CH116_5580 MHz
 Test Mode :Tx CH Mid
 EUT Pol :E2 Plane

Test Date :2019-09-10
 Temp./Humi. :23.3/61
 Antenna Pol. :VERTICAL
 Engineer :Nick



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode	Reading Level		FS	@3m	
	PK/QP/AV	dB μ V	dB	dB μ V/m	dB μ V/m	dB
11160.00	Average	19.82	26.93	46.75	54.00	-7.25
11160.00	Peak	31.22	26.93	58.15	74.00	-15.85

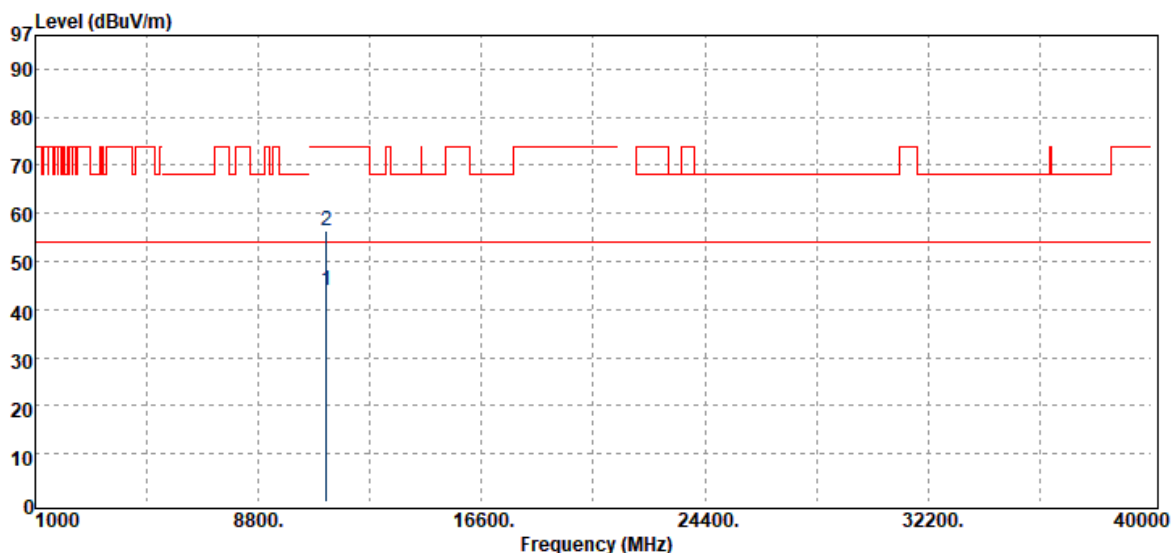
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Report Number :ER-2019-60053
 Operation Mode :802.11a
 Test Channel :CH116_5580 MHz
 Test Mode :Tx CH Mid
 EUT Pol :E2 Plane

Test Date :2019-09-10
 Temp./Humi. :23.3/61
 Antenna Pol. :HORIZONTAL
 Engineer :Nick



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
11160.00	Average	17.19	26.93	44.12	54.00	-9.88
11160.00	Peak	29.39	26.93	56.32	74.00	-17.68

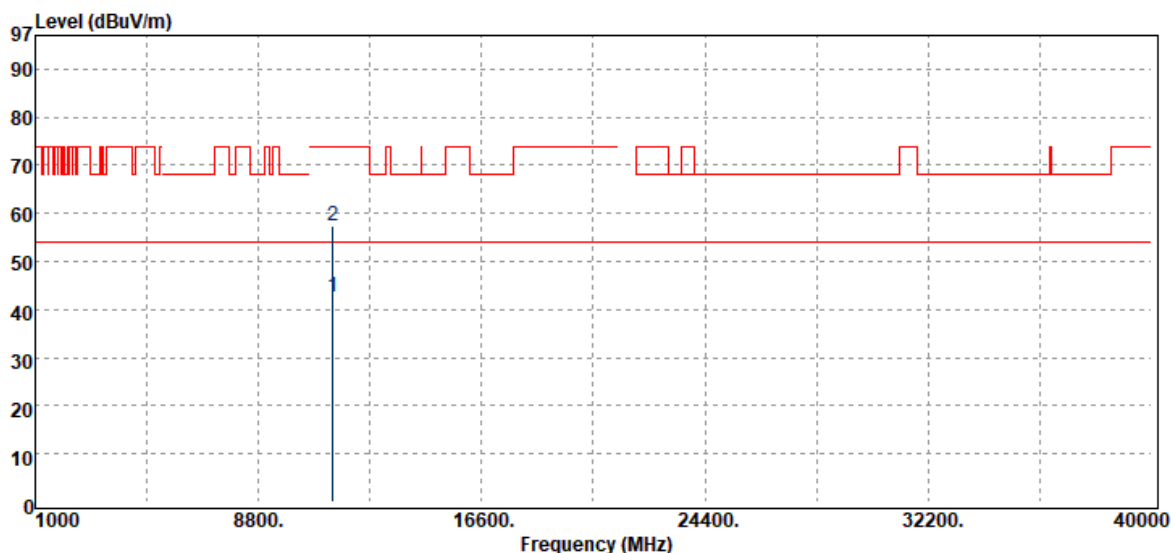
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Report Number :ER-2019-60053
 Operation Mode :802.11a
 Test Channel :CH140_5700 MHz
 Test Mode :Tx CH High
 EUT Pol :E2 Plane

Test Date :2019-09-11
 Temp./Humi. :23.3/61
 Antenna Pol. :VERTICAL
 Engineer :Nick



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode	Reading Level		FS	@3m	
	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
11400.00	Average	14.02	28.54	42.56	54.00	-11.44
11400.00	Peak	28.76	28.54	57.30	74.00	-16.70

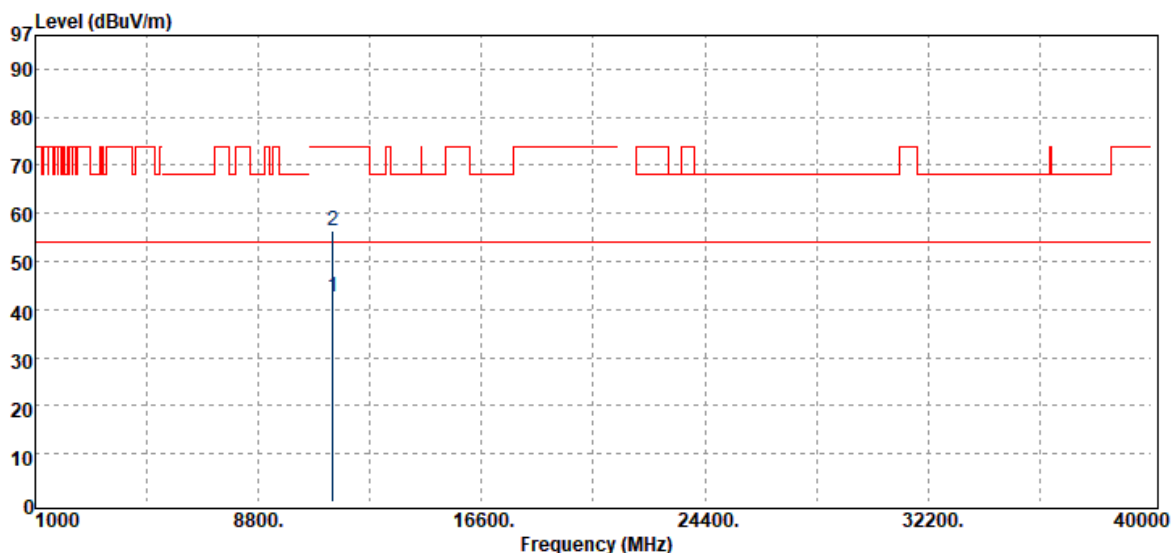
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Report Number :ER-2019-60053
 Operation Mode :802.11a
 Test Channel :CH140_5700 MHz
 Test Mode :Tx CH High
 EUT Pol :E2 Plane

Test Date :2019-09-11
 Temp./Humi. :23.3/61
 Antenna Pol. :HORIZONTAL
 Engineer :Nick



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode	Reading Level		FS	@3m	
	PK/QP/AV	dB μ V	dB	dB μ V/m	dB μ V/m	dB
11400.00	Average	13.97	28.54	42.51	54.00	-11.49
11400.00	Peak	27.77	28.54	56.31	74.00	-17.69

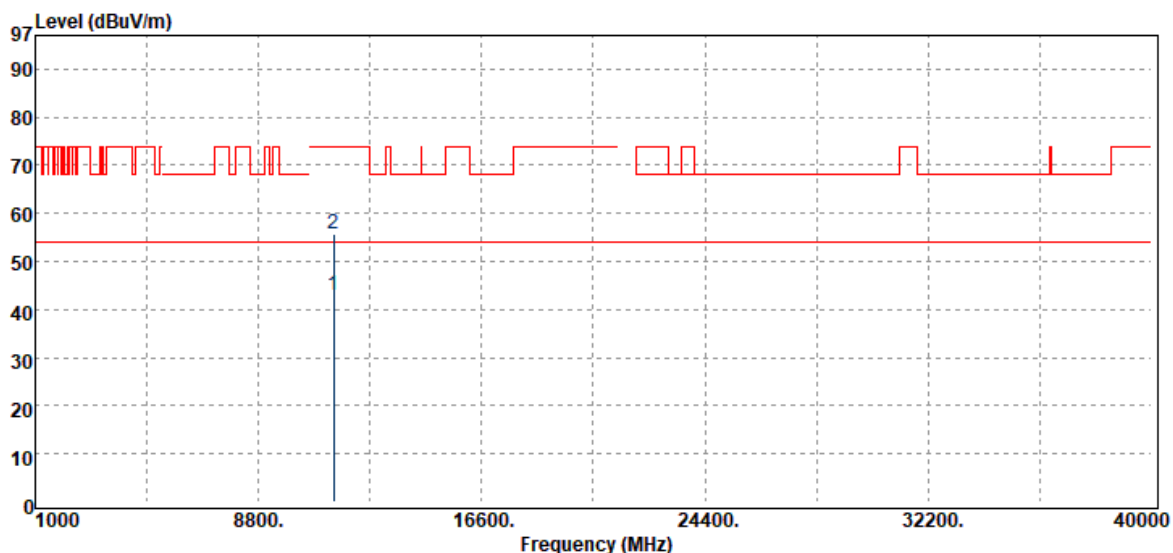
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Report Number :ER-2019-60053
 Operation Mode :802.11a
 Test Channel :CH144_5720 MHz
 Test Mode :Tx CH High
 EUT Pol :E2 Plane

Test Date :2019-09-11
 Temp./Humi. :23.3/61
 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
11440.00	Average	15.24	27.80	43.04	54.00	-10.96
11440.00	Peak	27.77	27.80	55.57	74.00	-18.43

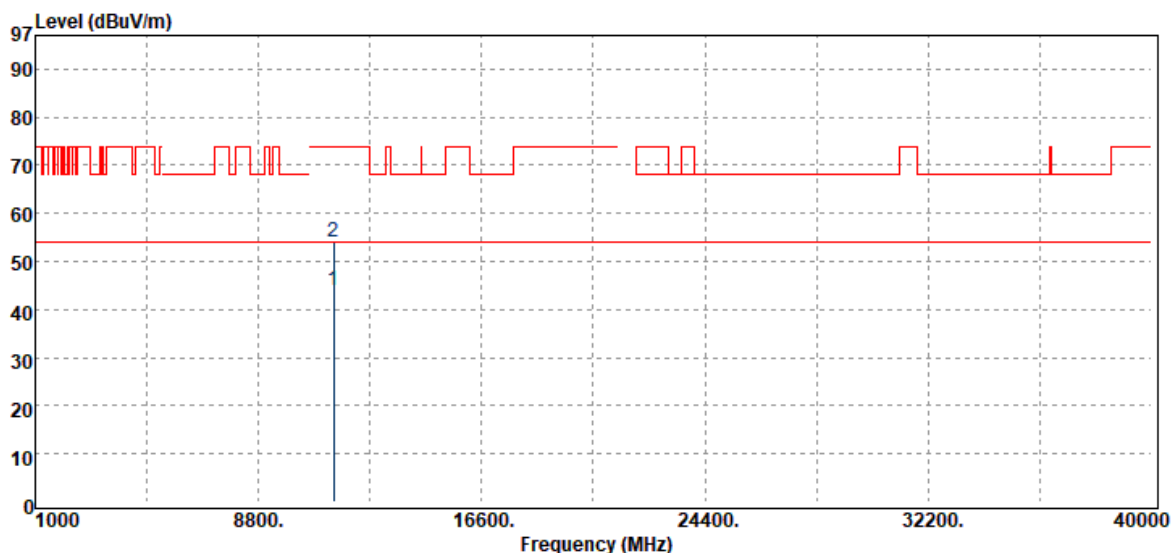
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Report Number :ER-2019-60053
 Operation Mode :802.11a
 Test Channel :CH144_5720 MHz
 Test Mode :Tx CH High
 EUT Pol :E2 Plane

Test Date :2019-09-11
 Temp./Humi. :23.3/61
 Antenna Pol. :HORIZONTAL
 Engineer :Nick



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
11440.00	Average	16.21	27.80	44.01	54.00	-9.99
11440.00	Peak	26.18	27.80	53.98	74.00	-20.02

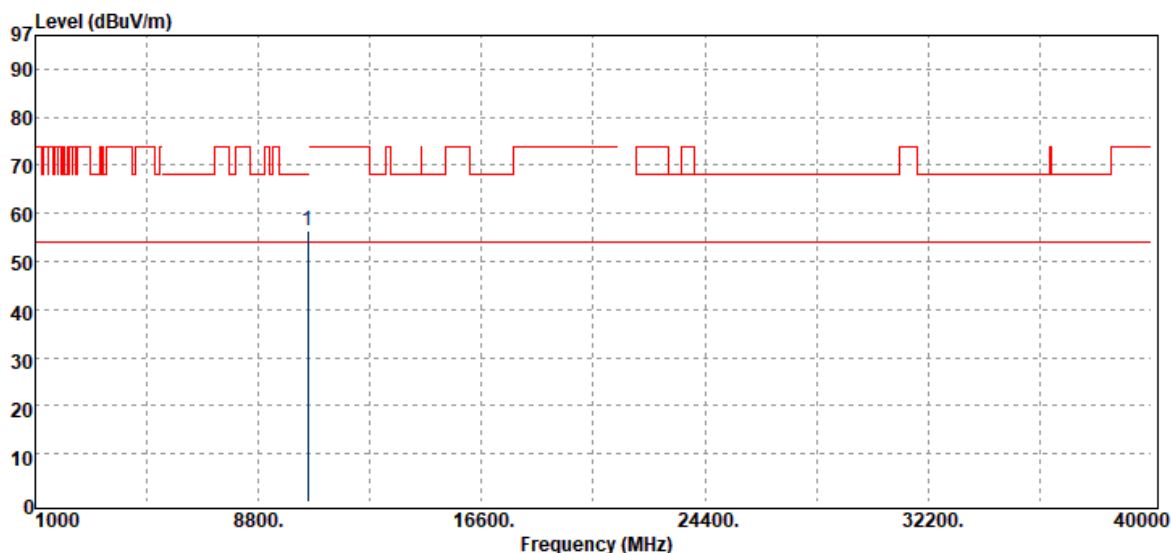
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Report Number :ER-2019-60053
 Operation Mode :802.11n20
 Test Channel :CH52_5260 MHz
 Test Mode :Tx CH Low
 EUT Pol :E2 Plane

Test Date :2019-09-10
 Temp./Humi. :23.3/61
 Antenna Pol. :VERTICAL
 Engineer :Nick



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
10520.00	Peak	30.83	25.66	56.49	68.20	-11.71

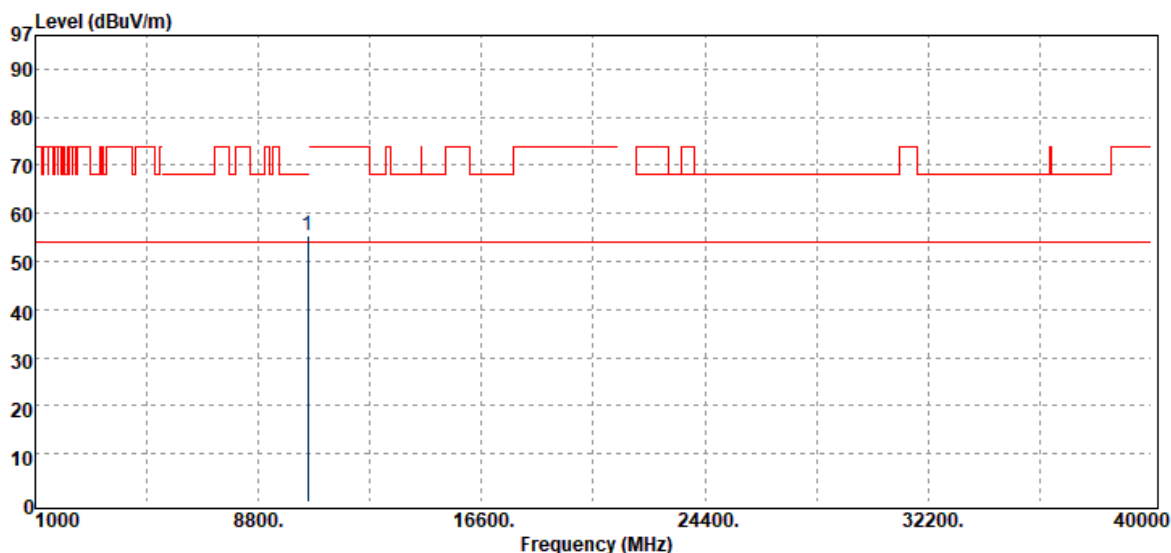
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Report Number :ER-2019-60053
 Operation Mode :802.11n20
 Test Channel :CH52_5260 MHz
 Test Mode :Tx CH Low
 EUT Pol :E2 Plane

Test Date :2019-09-10
 Temp./Humi. :23.3/61
 Antenna Pol. :HORIZONTAL
 Engineer :Nick



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode	Reading Level		FS	@3m	
	PK/QP/AV	dB μ V	dB	dB μ V/m	dB μ V/m	dB
10520.00	Peak	29.60	25.66	55.26	68.20	-12.94

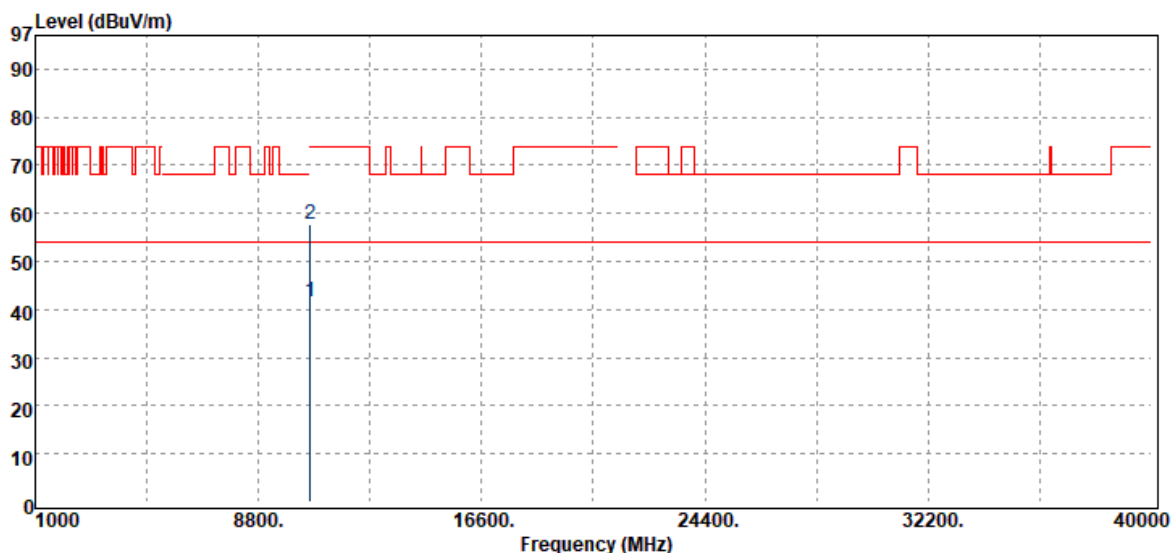
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Report Number :ER-2019-60053
 Operation Mode :802.11n20
 Test Channel :CH60_5300 MHz
 Test Mode :Tx CH Mid
 EUT Pol :E2 Plane

Test Date :2019-09-11
 Temp./Humi. :23.3/61
 Antenna Pol. :VERTICAL
 Engineer :Nick



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode	Reading Level		FS	@3m	
	PK/QP/AV	dB μ V	dB	dB μ V/m	dB μ V/m	dB
10600.00	Average	14.99	26.57	41.56	54.00	-12.44
10600.00	Peak	31.08	26.57	57.65	74.00	-16.35

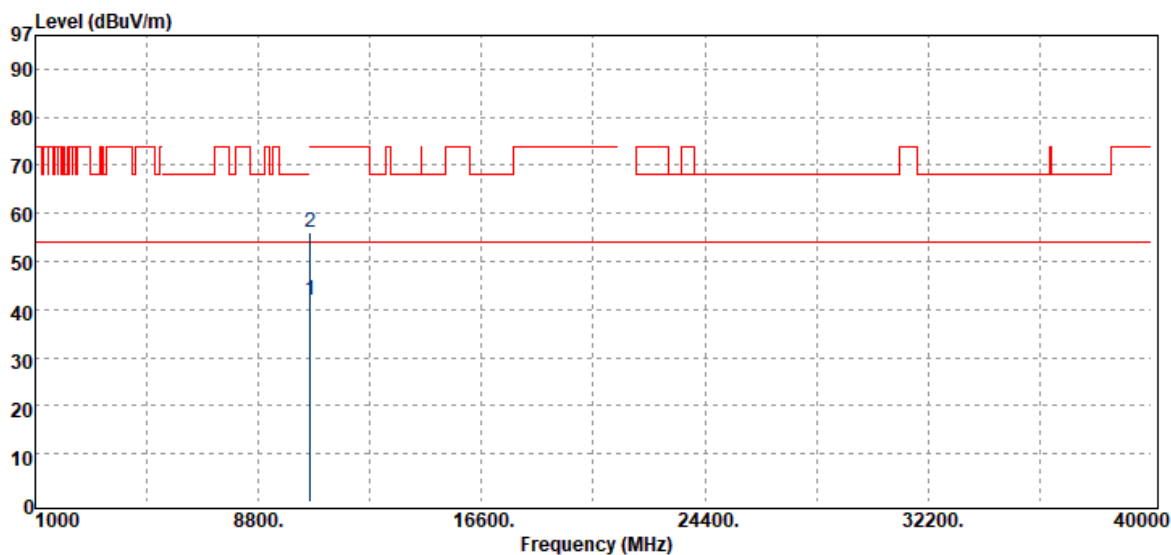
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Report Number :ER-2019-60053
 Operation Mode :802.11n20
 Test Channel :CH60_5300 MHz
 Test Mode :Tx CH Mid
 EUT Pol :E2 Plane

Test Date :2019-09-11
 Temp./Humi. :23.3/61
 Antenna Pol. :HORIZONTAL
 Engineer :Nick



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode	Reading Level		FS	@3m	
	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
10600.00	Average	15.23	26.57	41.80	54.00	-12.20
10600.00	Peak	29.47	26.57	56.04	74.00	-17.96

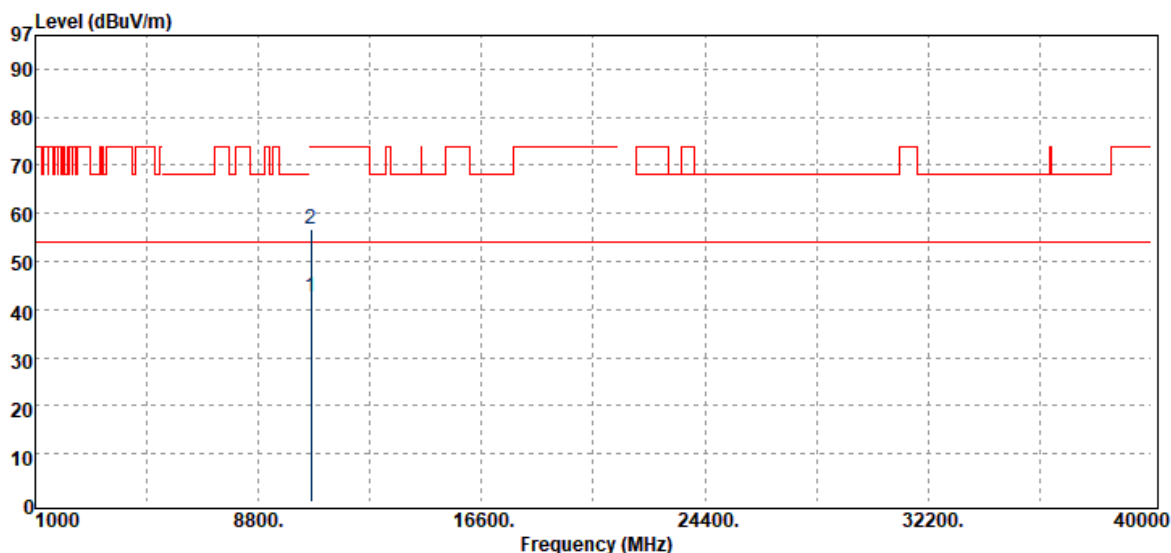
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Report Number :ER-2019-60053
 Operation Mode :802.11n20
 Test Channel :CH64_5320 MHz
 Test Mode :Tx CH High
 EUT Pol :E2 Plane

Test Date :2019-09-10
 Temp./Humi. :23.3/61
 Antenna Pol. :VERTICAL
 Engineer :Nick



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode	Reading Level		FS	@3m	
	PK/QP/AV	dB μ V	dB	dB μ V/m	dB μ V/m	dB
10640.00	Average	15.33	27.27	42.60	54.00	-11.40
10640.00	Peak	29.56	27.27	56.83	74.00	-17.17

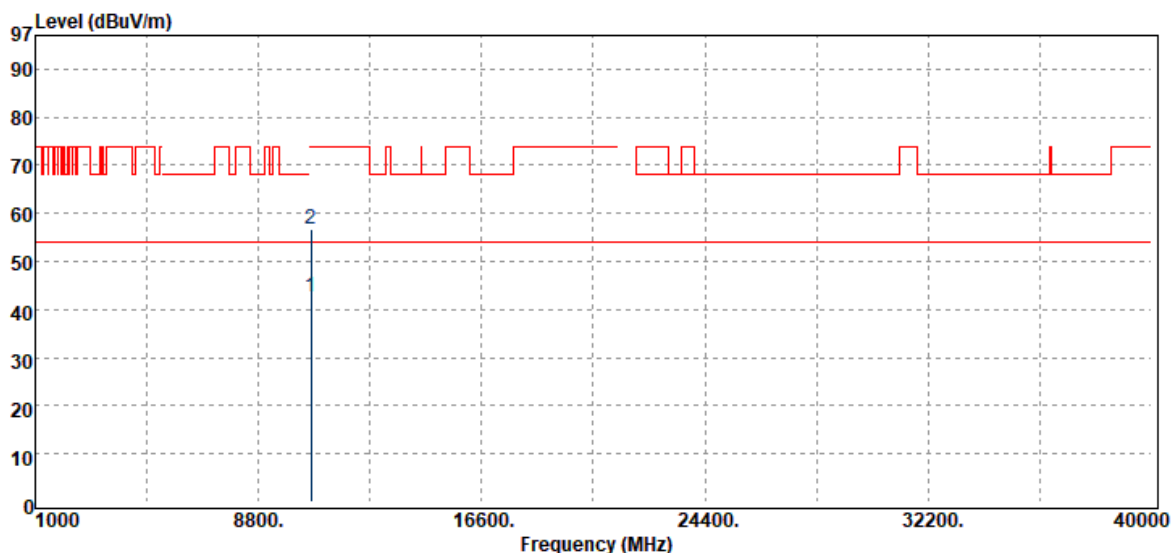
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Report Number :ER-2019-60053
 Operation Mode :802.11n20
 Test Channel :CH64_5320 MHz
 Test Mode :Tx CH High
 EUT Pol :E2 Plane

Test Date :2019-09-10
 Temp./Humi. :23.3/61
 Antenna Pol. :HORIZONTAL
 Engineer :Nick



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
10640.00	Average	15.36	27.27	42.63	54.00	-11.37
10640.00	Peak	29.39	27.27	56.66	74.00	-17.34

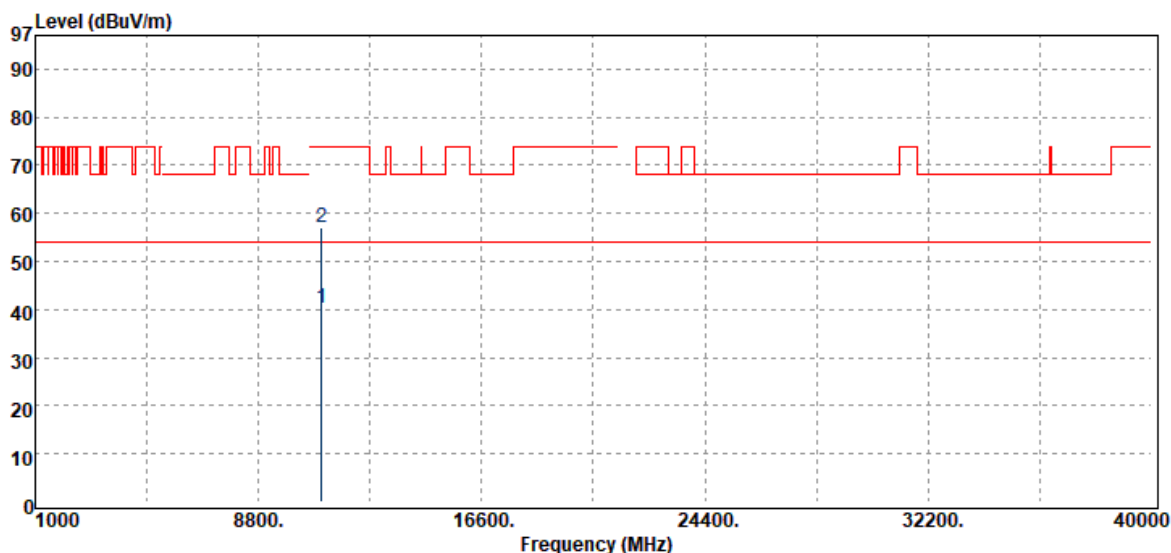
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Report Number :ER-2019-60053
 Operation Mode :802.11n20
 Test Channel :CH100_5500 MHz
 Test Mode :Tx CH Low
 EUT Pol :E2 Plane

Test Date :2019-09-11
 Temp./Humi. :23.3/61
 Antenna Pol. :VERTICAL
 Engineer :Nick



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode	Reading Level		FS	@3m	
	PK/QP/AV	dB μ V	dB	dB μ V/m	dB μ V/m	dB
11000.00	Average	13.21	27.21	40.42	54.00	-13.58
11000.00	Peak	29.89	27.21	57.10	74.00	-16.90

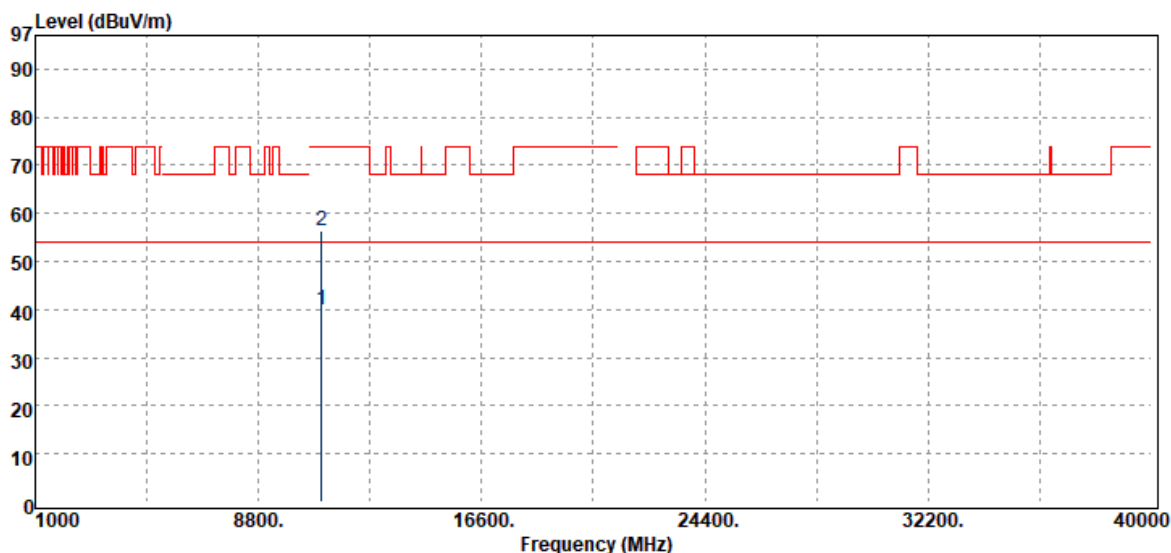
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Report Number :ER-2019-60053
 Operation Mode :802.11n20
 Test Channel :CH100_5500 MHz
 Test Mode :Tx CH Low
 EUT Pol :E2 Plane

Test Date :2019-09-11
 Temp./Humi. :23.3/61
 Antenna Pol. :HORIZONTAL
 Engineer :Nick



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
11000.00	Average	12.84	27.21	40.05	54.00	-13.95
11000.00	Peak	29.01	27.21	56.22	74.00	-17.78

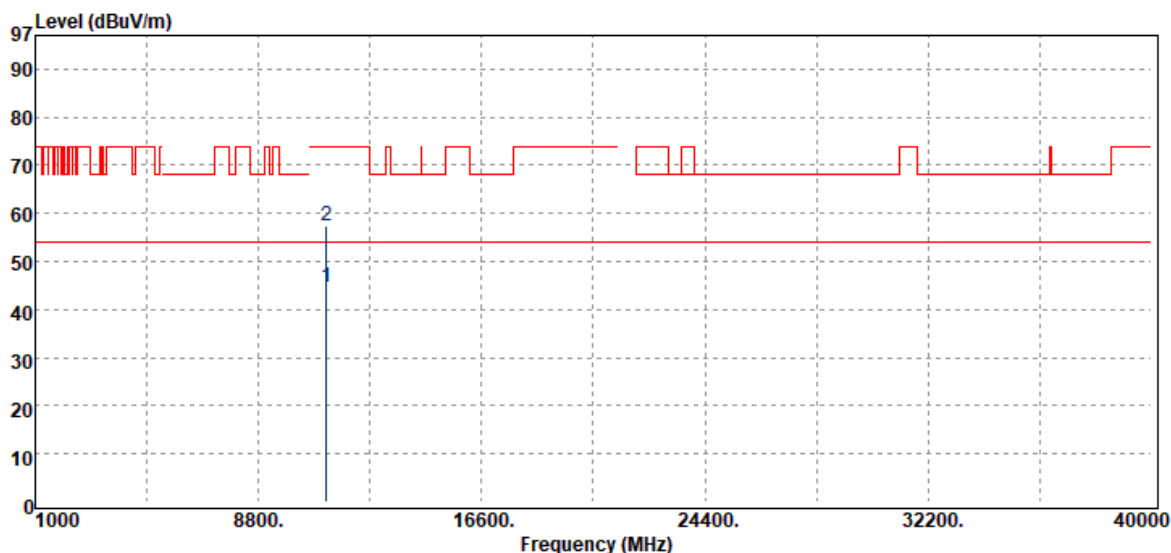
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Report Number :ER-2019-60053
 Operation Mode :802.11n20
 Test Channel :CH116_5580 MHz
 Test Mode :Tx CH Mid
 EUT Pol :E2 Plane

Test Date :2019-09-11
 Temp./Humi. :23.3/61
 Antenna Pol. :VERTICAL
 Engineer :Nick



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
11160.00	Average	17.72	26.93	44.65	54.00	-9.35
11160.00	Peak	30.62	26.93	57.55	74.00	-16.45

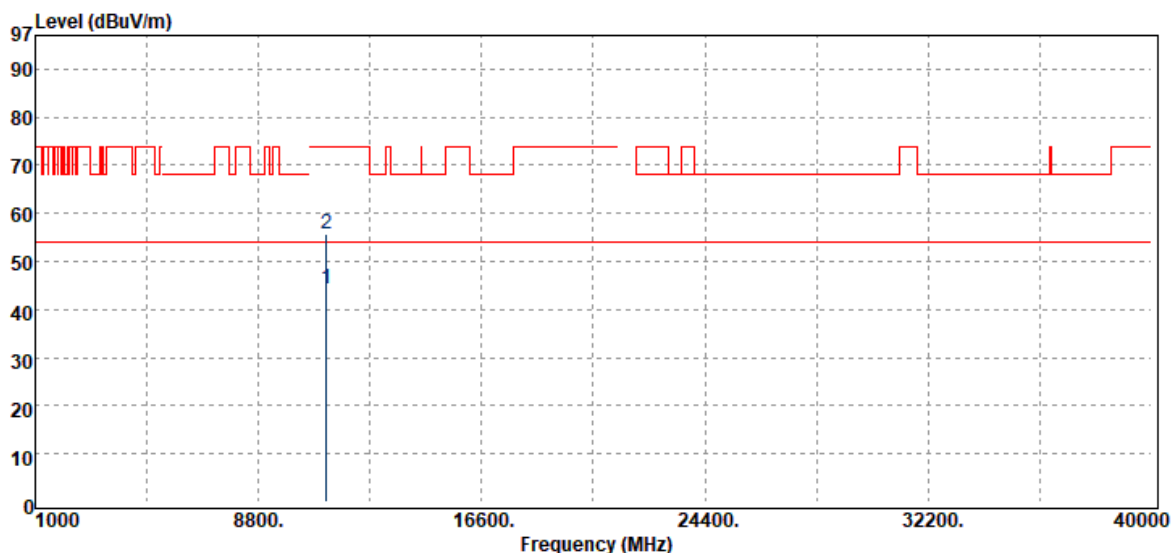
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Report Number :ER-2019-60053
 Operation Mode :802.11n20
 Test Channel :CH116_5580 MHz
 Test Mode :Tx CH Mid
 EUT Pol :E2 Plane

Test Date :2019-09-11
 Temp./Humi. :23.3/61
 Antenna Pol. :HORIZONTAL
 Engineer :Nick



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
11160.00	Average	17.42	26.93	44.35	54.00	-9.65
11160.00	Peak	28.72	26.93	55.65	74.00	-18.35

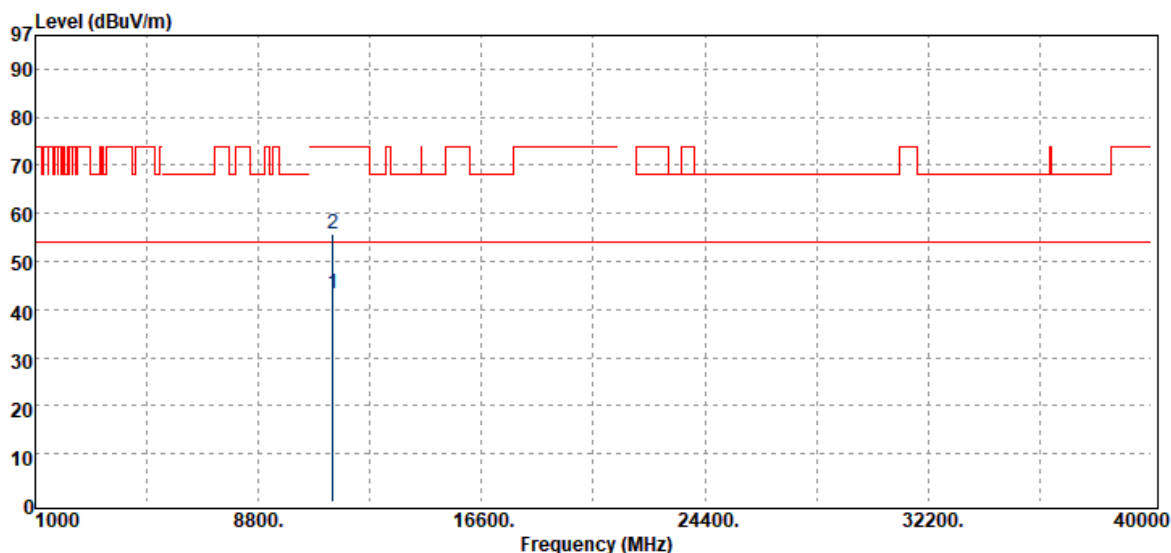
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Report Number :ER-2019-60053
 Operation Mode :802.11n20
 Test Channel :CH140_5700 MHz
 Test Mode :Tx CH High
 EUT Pol :E2 Plane

Test Date :2019-09-11
 Temp./Humi. :23.3/61
 Antenna Pol. :VERTICAL
 Engineer :Nick



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode	Reading Level		FS	@3m	
	PK/QP/AV	dB μ V	dB	dB μ V/m	dB μ V/m	dB
11400.00	Average	14.84	28.54	43.38	54.00	-10.62
11400.00	Peak	27.12	28.54	55.66	74.00	-18.34

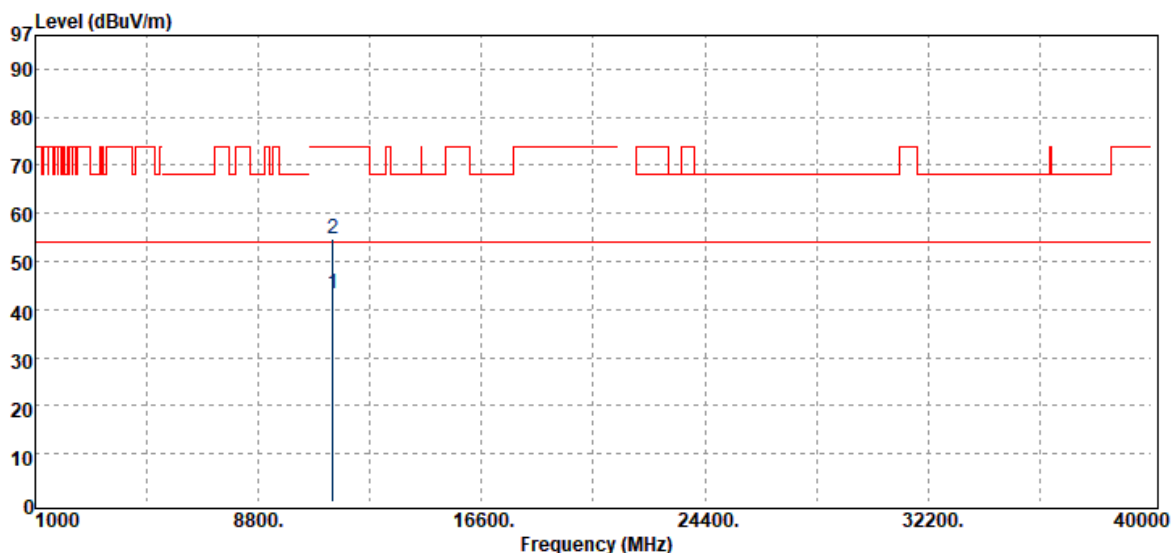
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Report Number :ER-2019-60053
 Operation Mode :802.11n20
 Test Channel :CH140_5700 MHz
 Test Mode :Tx CH High
 EUT Pol :E2 Plane

Test Date :2019-09-11
 Temp./Humi. :23.3/61
 Antenna Pol. :HORIZONTAL
 Engineer :Nick



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode	Reading Level		FS	@3m	
	PK/QP/AV	dB μ V	dB	dB μ V/m	dB μ V/m	dB
11400.00	Average	14.75	28.54	43.29	54.00	-10.71
11400.00	Peak	26.34	28.54	54.88	74.00	-19.12

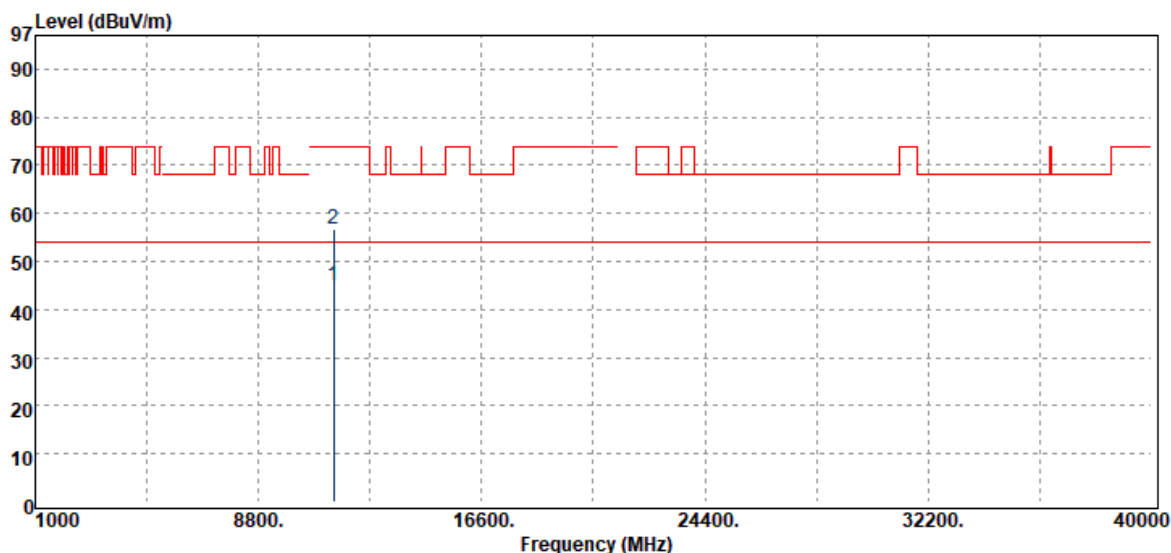
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Report Number :ER-2019-60053
 Operation Mode :802.11n20
 Test Channel :CH144_5720 MHz
 Test Mode :Tx CH High
 EUT Pol :E2 Plane

Test Date :2019-09-11
 Temp./Humi. :23.3/61
 Antenna Pol. :VERTICAL
 Engineer :Nick



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
11440.00	Average	17.02	27.80	44.82	54.00	-9.18
11440.00	Peak	28.83	27.80	56.63	74.00	-17.37

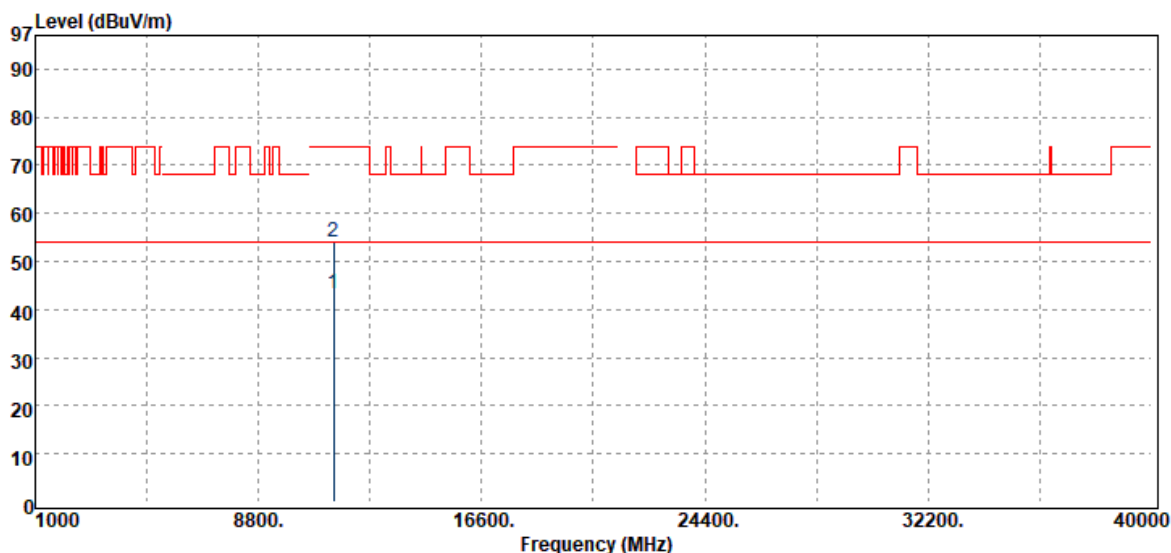
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Report Number :ER-2019-60053
 Operation Mode :802.11n20
 Test Channel :CH144_5720 MHz
 Test Mode :Tx CH High
 EUT Pol :E2 Plane

Test Date :2019-09-11
 Temp./Humi. :23.3/61
 Antenna Pol. :HORIZONTAL
 Engineer :Nick



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode	Reading Level		FS	@3m	
	PK/QP/AV	dB μ V	dB	dB μ V/m	dB μ V/m	dB
11440.00	Average	15.34	27.80	43.14	54.00	-10.86
11440.00	Peak	26.15	27.80	53.95	74.00	-20.05

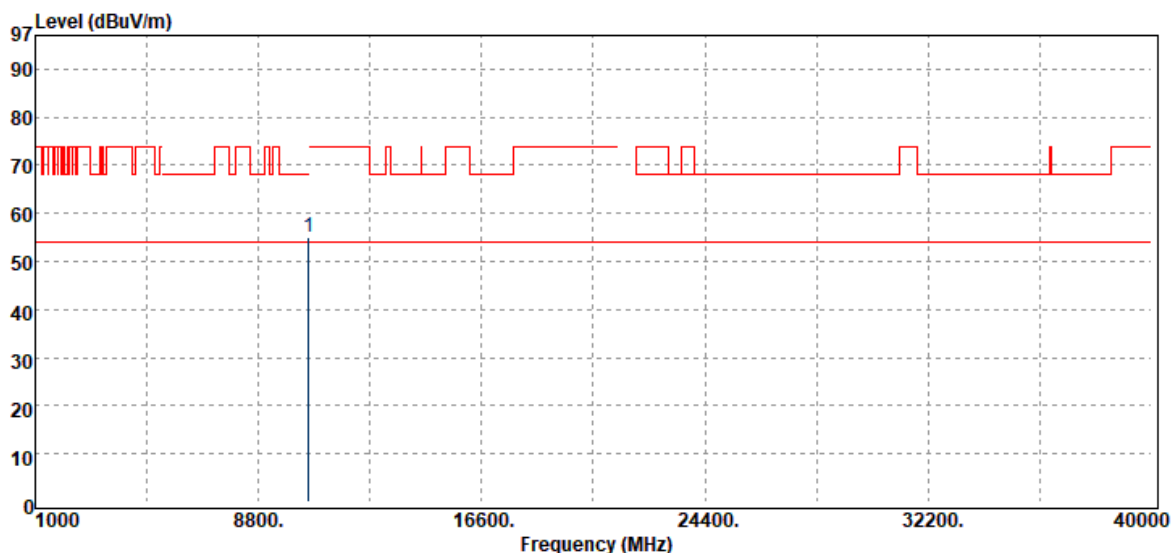
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Report Number :ER-2019-60053
 Operation Mode :802.11n40
 Test Channel :CH54_5270 MHz
 Test Mode :Tx CH Low
 EUT Pol :E2 Plane

Test Date :2019-09-11
 Temp./Humi. :23.3/61
 Antenna Pol. :VERTICAL
 Engineer :Nick



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
10540.00	Peak	29.04	25.93	54.97	68.20	-13.23

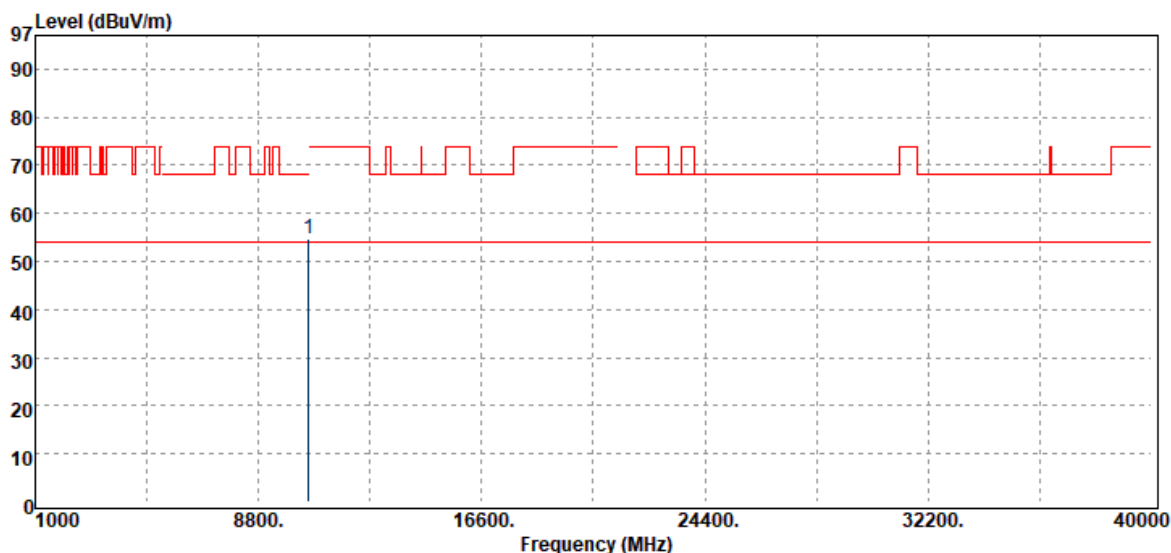
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Report Number :ER-2019-60053
 Operation Mode :802.11n40
 Test Channel :CH54_5270 MHz
 Test Mode :Tx CH Low
 EUT Pol :E2 Plane

Test Date :2019-09-11
 Temp./Humi. :23.3/61
 Antenna Pol. :HORIZONTAL
 Engineer :Nick



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
10540.00	Peak	28.67	25.93	54.60	68.20	-13.60

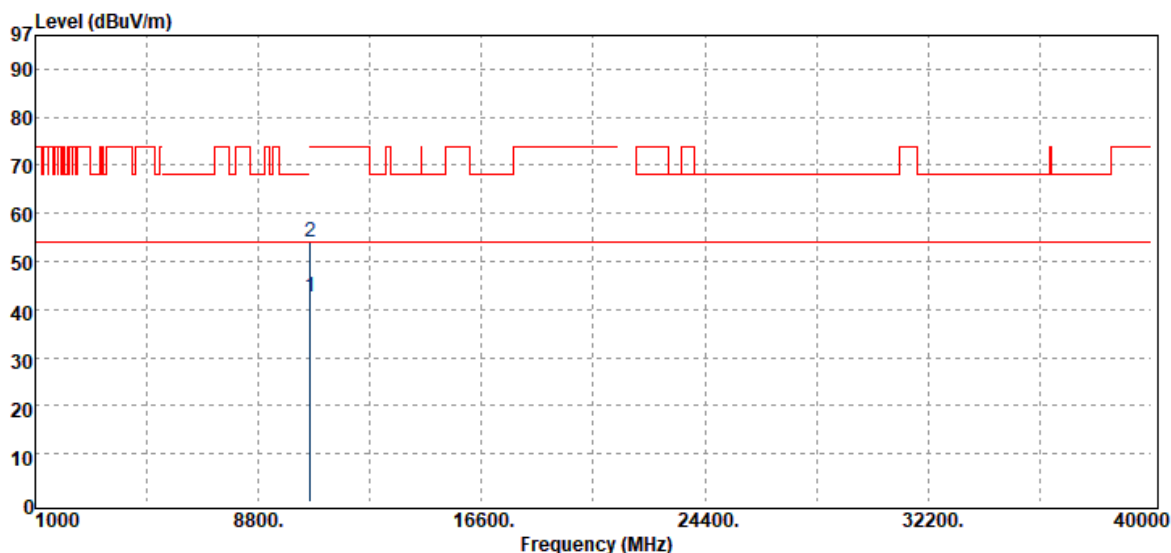
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Report Number :ER-2019-60053
 Operation Mode :802.11n40
 Test Channel :CH62_5310 MHz
 Test Mode :Tx CH High
 EUT Pol :E2 Plane

Test Date :2019-09-11
 Temp./Humi. :23.3/61
 Antenna Pol. :VERTICAL
 Engineer :Nick



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
10620.00	Average	15.82	26.91	42.73	54.00	-11.27
10620.00	Peak	27.29	26.91	54.20	74.00	-19.80

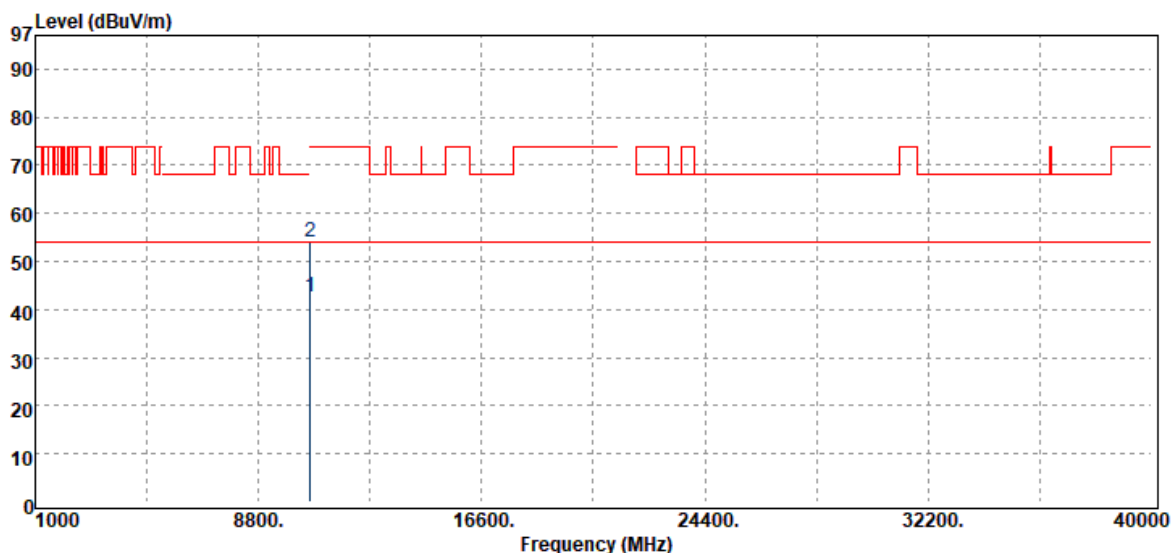
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Report Number :ER-2019-60053
 Operation Mode :802.11n40
 Test Channel :CH62_5310 MHz
 Test Mode :Tx CH High
 EUT Pol :E2 Plane

Test Date :2019-09-11
 Temp./Humi. :23.3/61
 Antenna Pol. :HORIZONTAL
 Engineer :Nick



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
10620.00	Average	15.69	26.91	42.60	54.00	-11.40
10620.00	Peak	27.10	26.91	54.01	74.00	-19.99

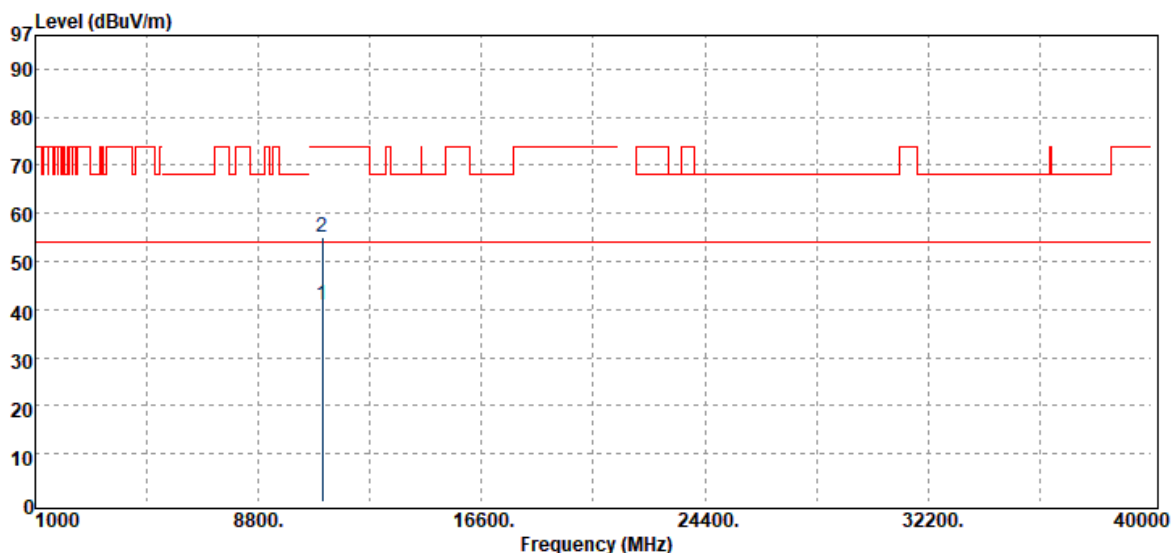
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Report Number :ER-2019-60053
 Operation Mode :802.11n40
 Test Channel :CH102_5510 MHz
 Test Mode :Tx CH Low
 EUT Pol :E2 Plane

Test Date :2019-09-11
 Temp./Humi. :23.3/61
 Antenna Pol. :VERTICAL
 Engineer :Nick



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
11020.00	Average	13.42	27.62	41.04	54.00	-12.96
11020.00	Peak	27.29	27.62	54.91	74.00	-19.09

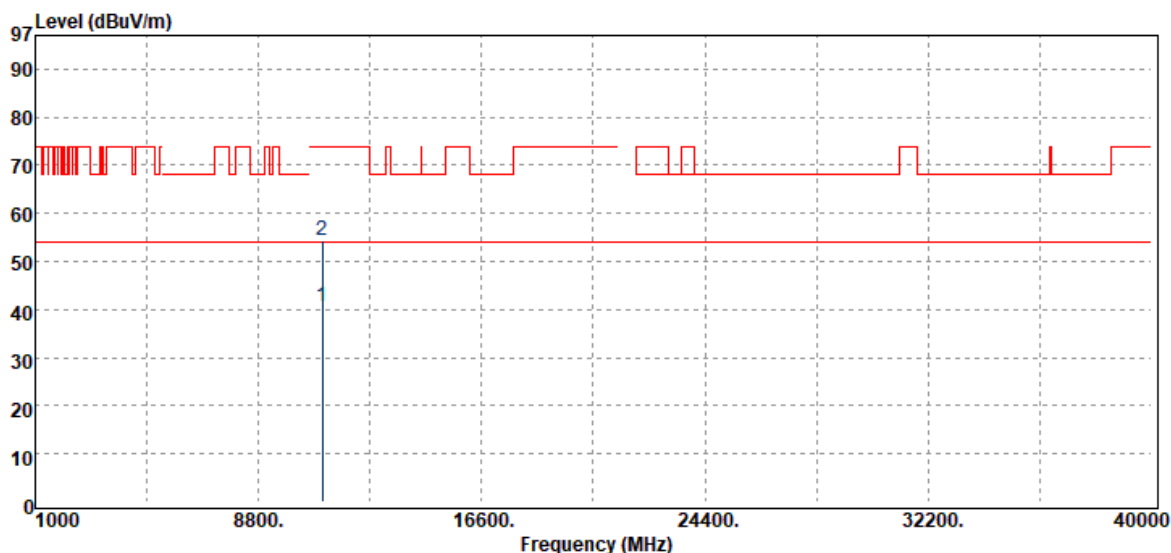
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Report Number :ER-2019-60053
 Operation Mode :802.11n40
 Test Channel :CH102_5510 MHz
 Test Mode :Tx CH Low
 EUT Pol :E2 Plane

Test Date :2019-09-11
 Temp./Humi. :23.3/61
 Antenna Pol. :HORIZONTAL
 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
11020.00	Average	13.04	27.62	40.66	54.00	-13.34
11020.00	Peak	26.83	27.62	54.45	74.00	-19.55

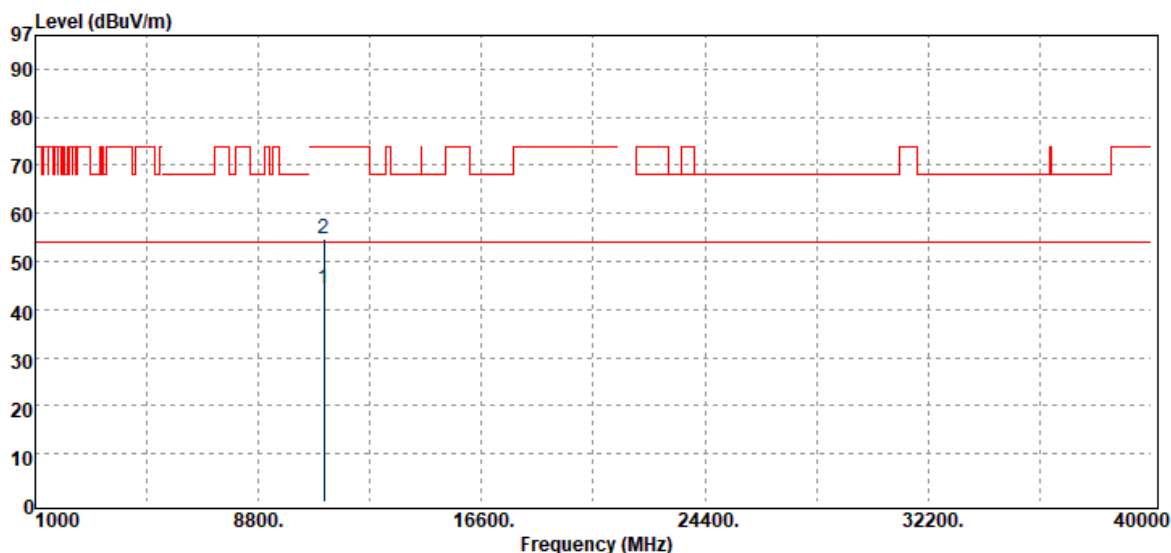
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Report Number :ER-2019-60053
 Operation Mode :802.11n40
 Test Channel :CH110_5550 MHz
 Test Mode :Tx CH Mid
 EUT Pol :E2 Plane

Test Date :2019-09-11
 Temp./Humi. :23.3/61
 Antenna Pol. :VERTICAL
 Engineer :Nick



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
11100.00	Average	16.84	27.54	44.38	54.00	-9.62
11100.00	Peak	27.02	27.54	54.56	74.00	-19.44

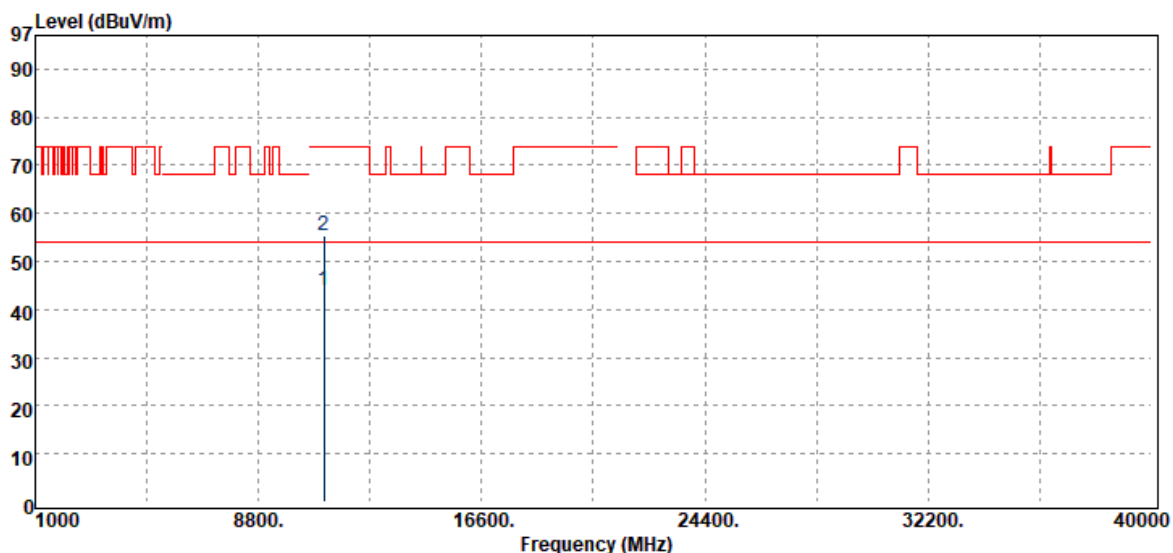
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Report Number :ER-2019-60053
 Operation Mode :802.11n40
 Test Channel :CH110_5550 MHz
 Test Mode :Tx CH Mid
 EUT Pol :E2 Plane

Test Date :2019-09-11
 Temp./Humi. :23.3/61
 Antenna Pol. :HORIZONTAL
 Engineer :Nick



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
11100.00	Average	16.52	27.54	44.06	54.00	-9.94
11100.00	Peak	27.69	27.54	55.23	74.00	-18.77

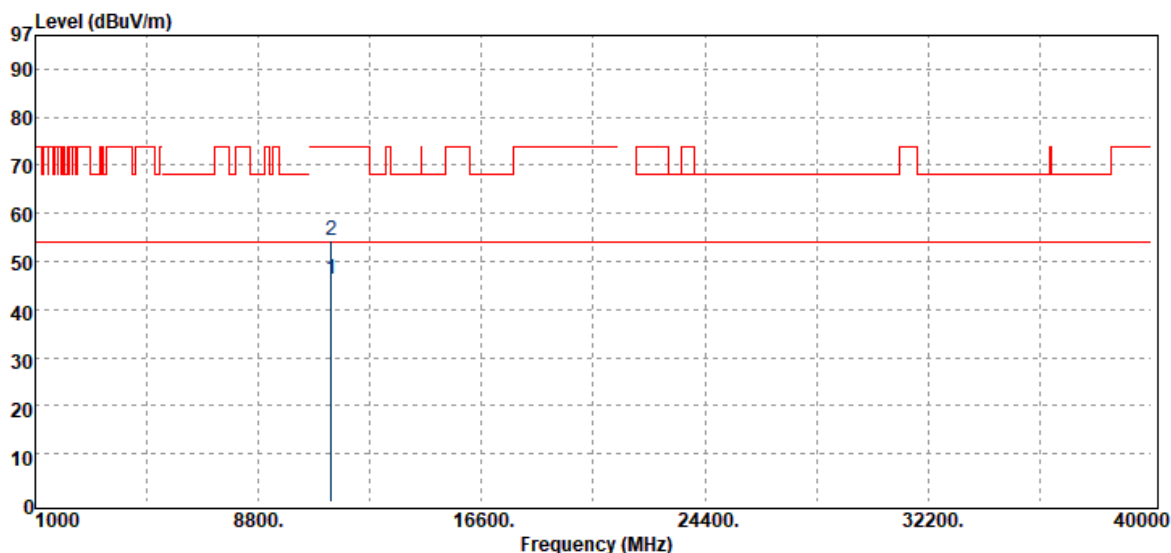
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Report Number :ER-2019-60053
 Operation Mode :802.11n40
 Test Channel :CH134_5670 MHz
 Test Mode :Tx CH High
 EUT Pol :E2 Plane

Test Date :2019-09-11
 Temp./Humi. :23.3/61
 Antenna Pol. :VERTICAL
 Engineer :Nick



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode	Reading Level		FS	@3m	
	PK/QP/AV	dB μ V	dB	dB μ V/m	dB μ V/m	dB
11340.00	Average	18.84	27.52	46.36	54.00	-7.64
11340.00	Peak	26.87	27.52	54.39	74.00	-19.61

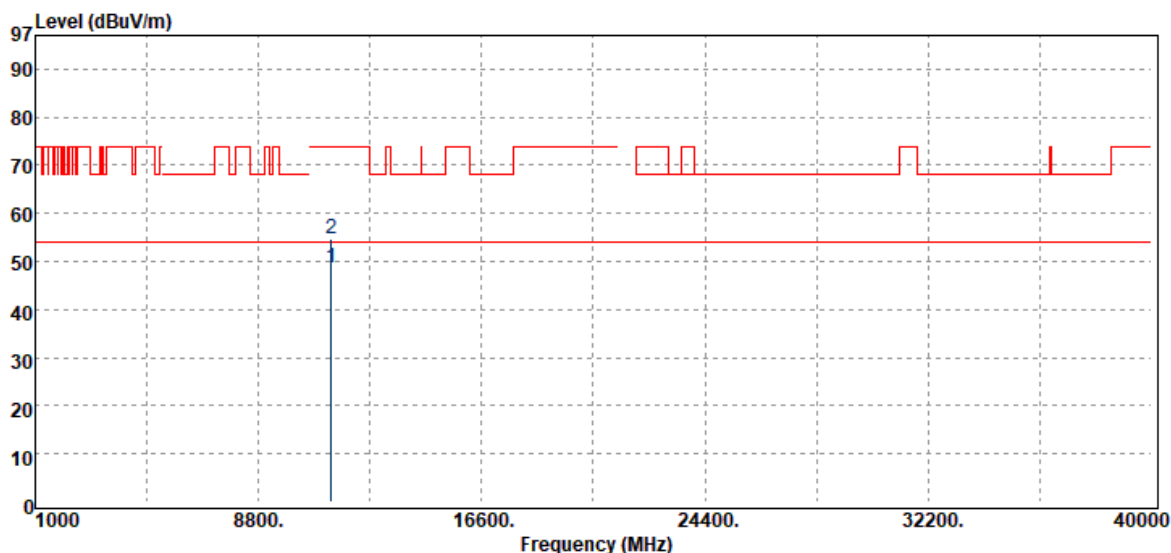
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Report Number :ER-2019-60053
 Operation Mode :802.11n40
 Test Channel :CH134_5670 MHz
 Test Mode :Tx CH High
 EUT Pol :E2 Plane

Test Date :2019-09-11
 Temp./Humi. :23.3/61
 Antenna Pol. :HORIZONTAL
 Engineer :Nick



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode	Reading Level		FS	@3m	
	PK/QP/AV	dB μ V	dB	dB μ V/m	dB μ V/m	dB
11340.00	Average	21.08	27.52	48.60	54.00	-5.40
11340.00	Peak	27.03	27.52	54.55	74.00	-19.45

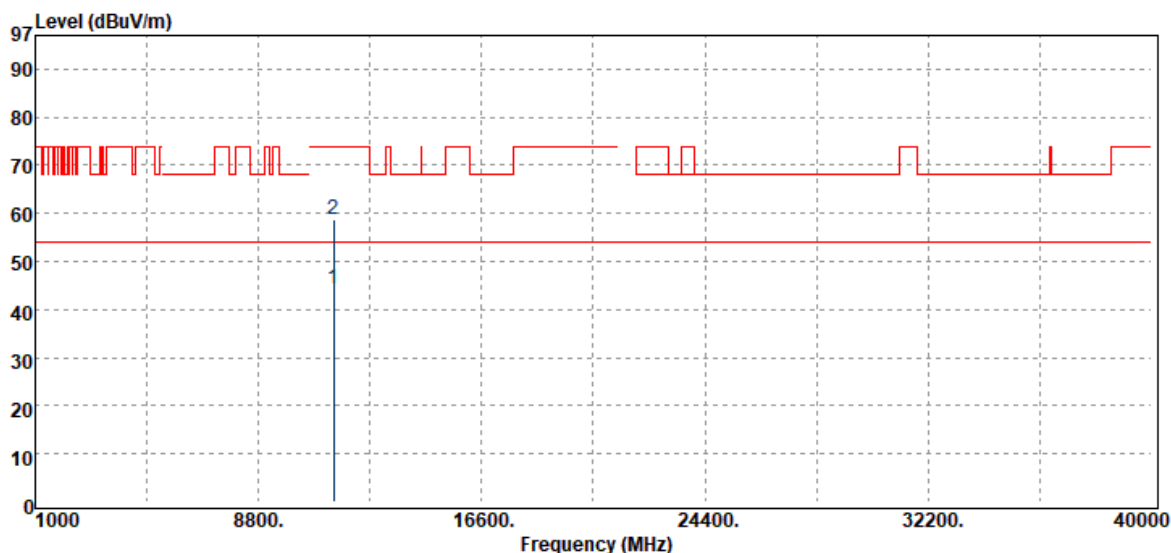
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Report Number :ER-2019-60053
 Operation Mode :802.11n40
 Test Channel :CH142_5710 MHz
 Test Mode :Tx CH High
 EUT Pol :E2 Plane

Test Date :2019-09-11
 Temp./Humi. :23.3/61
 Antenna Pol. :VERTICAL
 Engineer :Nick



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
11420.00	Average	16.00	28.25	44.25	54.00	-9.75
11420.00	Peak	30.35	28.25	58.60	74.00	-15.40

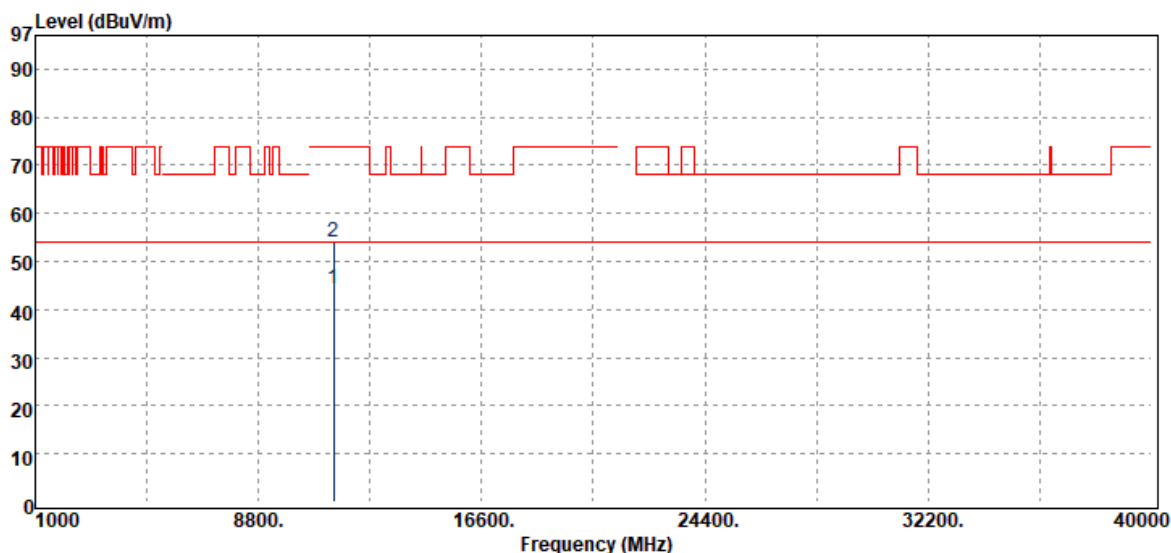
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Report Number :ER-2019-60053
 Operation Mode :802.11n40
 Test Channel :CH142_5710 MHz
 Test Mode :Tx CH High
 EUT Pol :E2 Plane

Test Date :2019-09-11
 Temp./Humi. :23.3/61
 Antenna Pol. :HORIZONTAL
 Engineer :Nick



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
11420.00	Average	16.03	28.25	44.28	54.00	-9.72
11420.00	Peak	25.81	28.25	54.06	74.00	-19.94

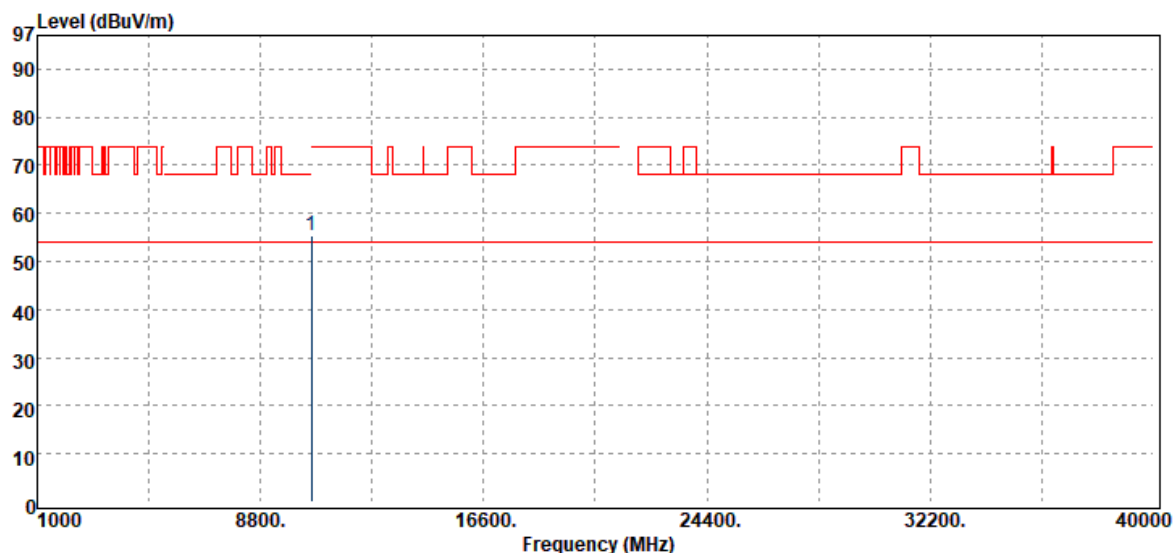
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Report Number :ER-2019-60053
 Operation Mode :802.11ac80
 Test Channel :CH58_5290 MHz
 Test Mode :Tx CH High
 EUT Pol :E2 Plane

Test Date :2019-09-11
 Temp./Humi. :23.3/61
 Antenna Pol. :VERTICAL
 Engineer :Nick



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
10580.00	Peak	29.12	26.29	55.41	68.20	-12.79

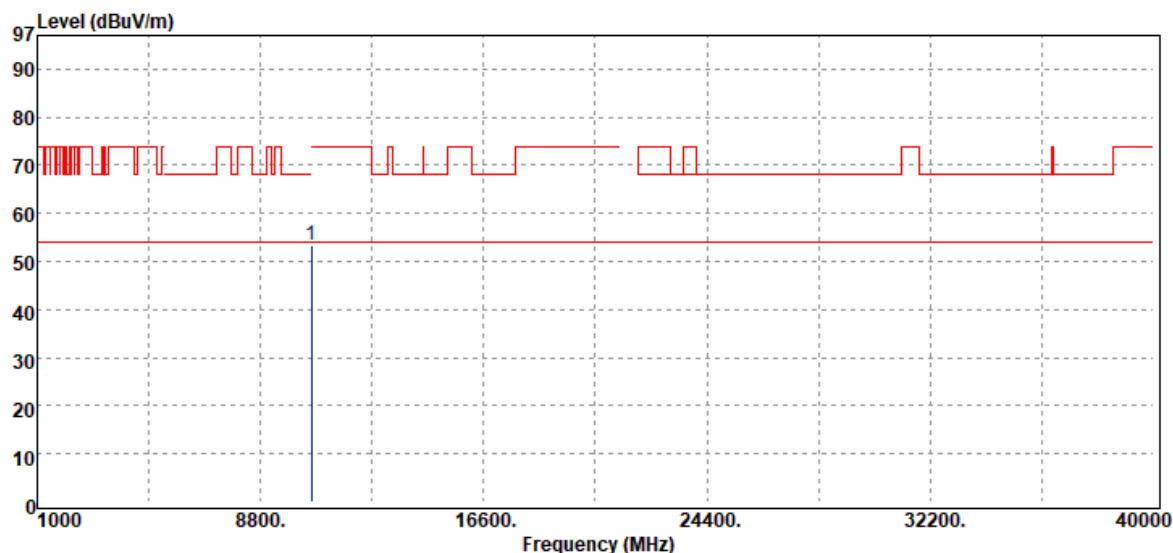
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Report Number :ER-2019-60053
 Operation Mode :802.11ac80
 Test Channel :CH58_5290 MHz
 Test Mode :Tx CH High
 EUT Pol :E2 Plane

Test Date :2019-09-11
 Temp./Humi. :23.3/61
 Antenna Pol. :HORIZONTAL
 Engineer :Nick



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
10580.00	Peak	27.19	26.29	53.48	68.20	-14.72

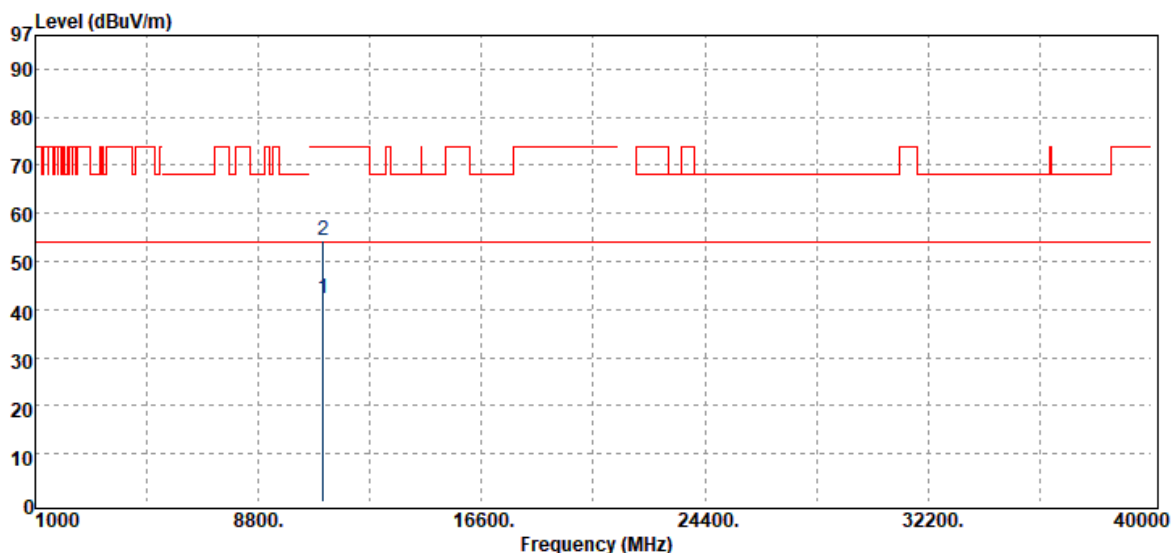
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Report Number :ER-2019-60053
 Operation Mode :802.11ac80
 Test Channel :CH106_5530 MHz
 Test Mode :Tx CH Low
 EUT Pol :E2 Plane

Test Date :2019-09-11
 Temp./Humi. :23.3/61
 Antenna Pol. :VERTICAL
 Engineer :Nick



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode	Reading Level		FS	@3m	
	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
11060.00	Average	14.68	27.55	42.23	54.00	-11.77
11060.00	Peak	26.83	27.55	54.38	74.00	-19.62

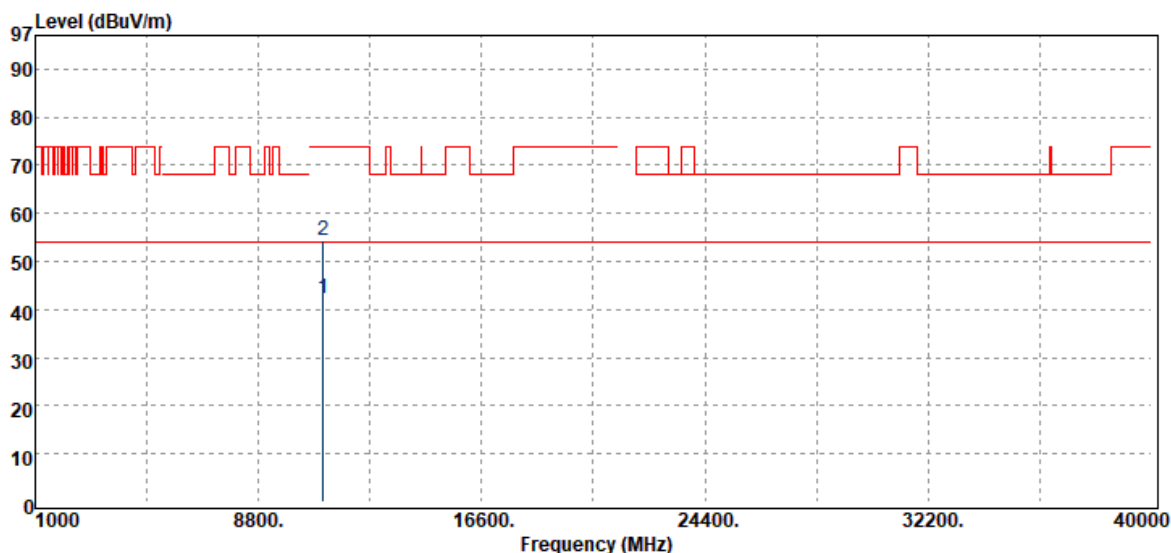
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Report Number :ER-2019-60053
 Operation Mode :802.11ac80
 Test Channel :CH106_5530 MHz
 Test Mode :Tx CH Low
 EUT Pol :E2 Plane

Test Date :2019-09-11
 Temp./Humi. :23.3/61
 Antenna Pol. :HORIZONTAL
 Engineer :Nick



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode	Reading Level		FS	@3m	
	PK/QP/AV	dB μ V	dB	dB μ V/m	dB μ V/m	dB
11060.00	Average	14.75	27.55	42.30	54.00	-11.70
11060.00	Peak	26.74	27.55	54.29	74.00	-19.71

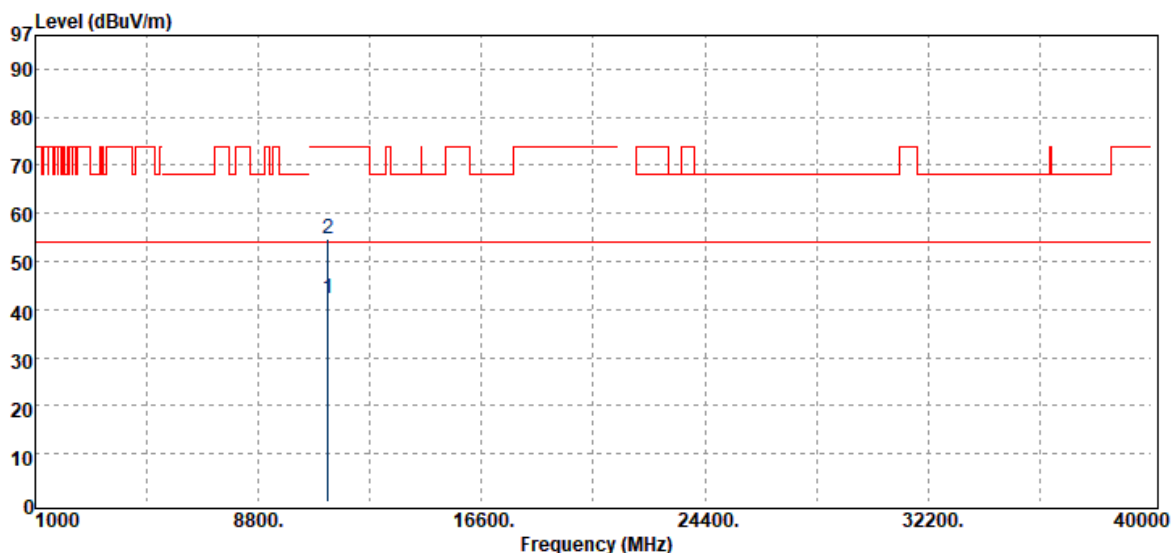
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Report Number :ER-2019-60053
 Operation Mode :802.11ac80
 Test Channel :CH122_5610 MHz
 Test Mode :Tx CH Mid
 EUT Pol :E2 Plane

Test Date :2019-09-11
 Temp./Humi. :23.3/61
 Antenna Pol. :VERTICAL
 Engineer :Nick



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode	Reading Level		FS	@3m	
	PK/QP/AV	dB μ V	dB	dB μ V/m	dB μ V/m	dB
11220.00	Average	15.35	26.91	42.26	54.00	-11.74
11220.00	Peak	27.66	26.91	54.57	74.00	-19.43

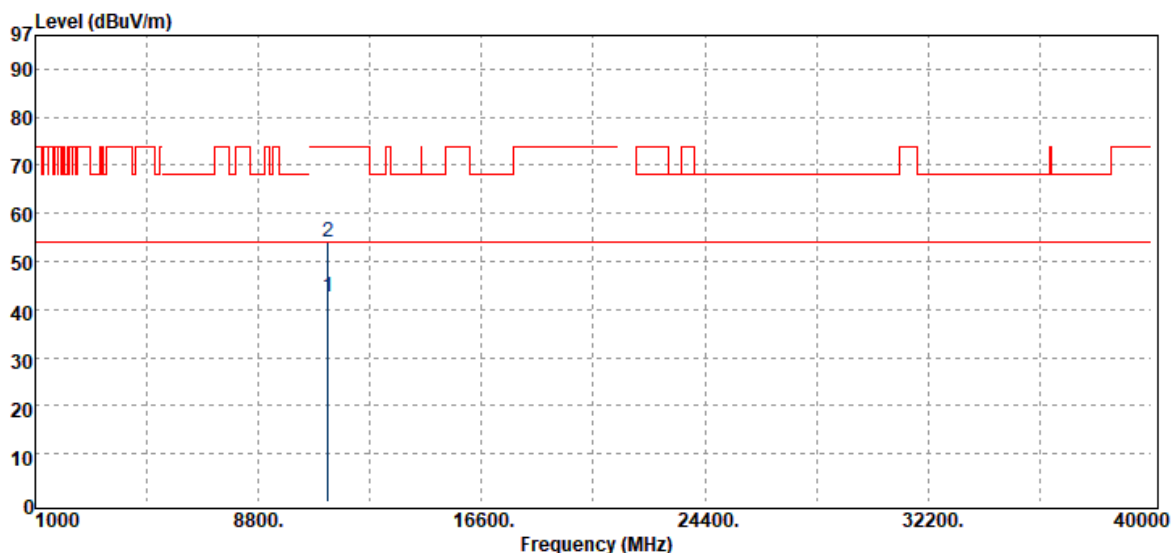
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Report Number :ER-2019-60053
 Operation Mode :802.11ac80
 Test Channel :CH122_5610 MHz
 Test Mode :Tx CH Mid
 EUT Pol :E2 Plane

Test Date :2019-09-11
 Temp./Humi. :23.3/61
 Antenna Pol. :HORIZONTAL
 Engineer :Nick



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
11220.00	Average	15.79	26.91	42.70	54.00	-11.30
11220.00	Peak	27.00	26.91	53.91	74.00	-20.09

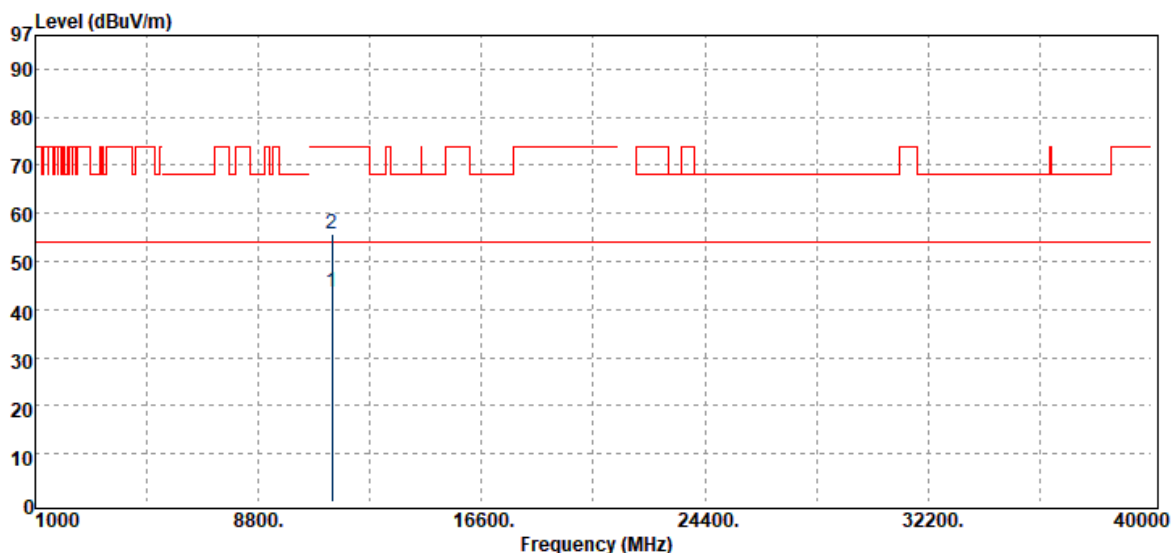
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Report Number :ER-2019-60053
 Operation Mode :802.11ac80
 Test Channel :CH138_5690 MHz
 Test Mode :Tx CH High
 EUT Pol :E2 Plane

Test Date :2019-09-11
 Temp./Humi. :23.3/61
 Antenna Pol. :VERTICAL
 Engineer :Nick



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode	Reading Level		FS	@3m	
	PK/QP/AV	dB μ V	dB	dB μ V/m	dB μ V/m	dB
11380.00	Average	15.42	28.30	43.72	54.00	-10.28
11380.00	Peak	27.41	28.30	55.71	74.00	-18.29

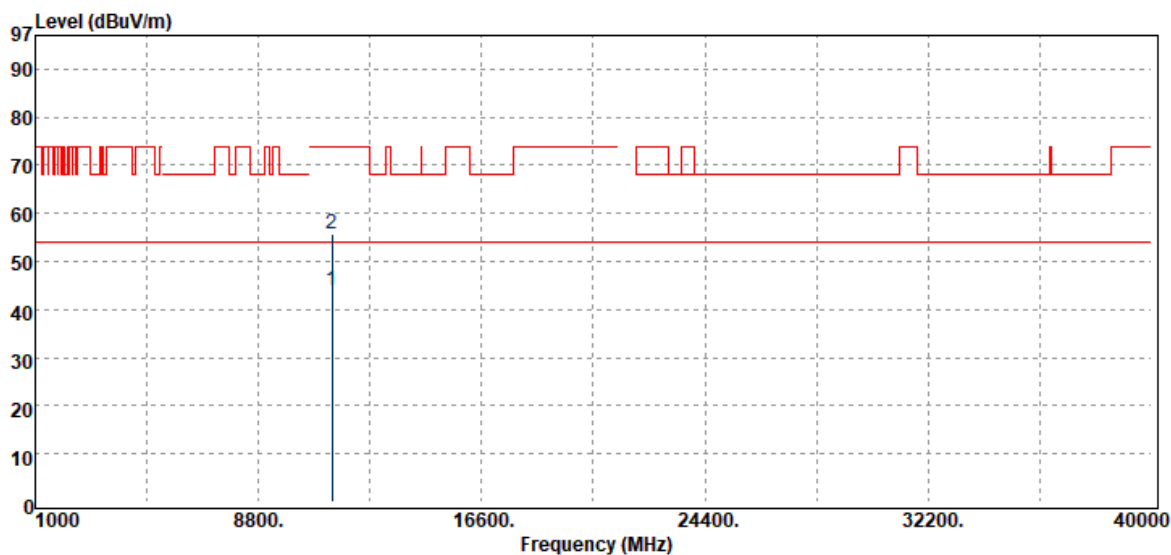
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Report Number :ER-2019-60053
 Operation Mode :802.11ac80
 Test Channel :CH138_5690 MHz
 Test Mode :Tx CH High
 EUT Pol :E2 Plane

Test Date :2019-09-11
 Temp./Humi. :23.3/61
 Antenna Pol. :HORIZONTAL
 Engineer :Nick



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
11380.00	Average	15.54	28.30	43.84	54.00	-10.16
11380.00	Peak	27.38	28.30	55.68	74.00	-18.32

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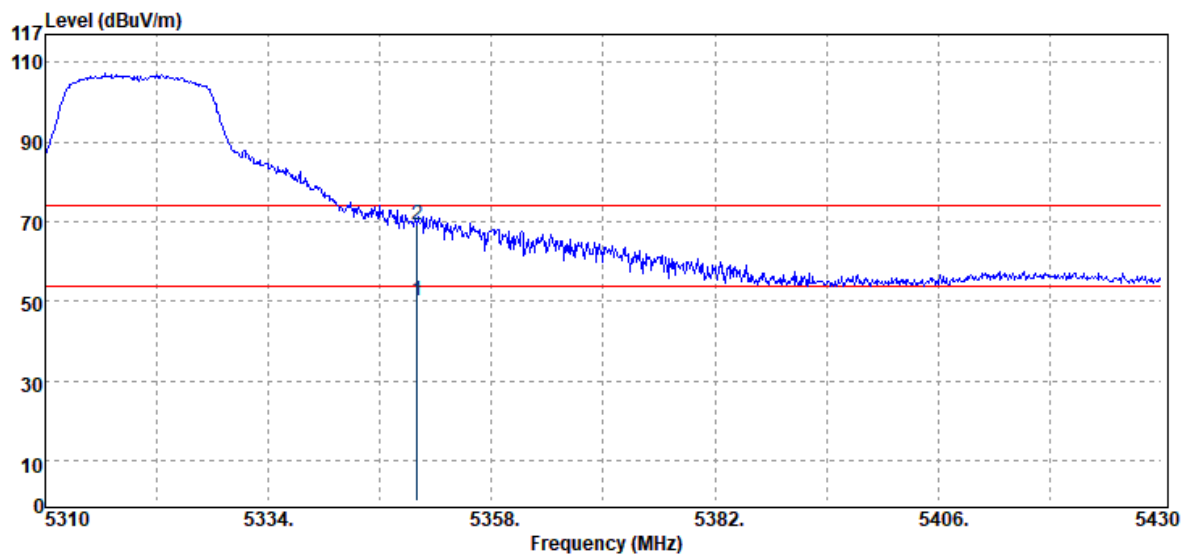
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Band edge falling to restricted band

Report Number :ER-2019-60053
 Operation Mode :802.11a
 Test Channel :CH64_5320 MHz
 Test Mode :Bandedge CH High
 EUT Pol :E2 Plane

Test Date :2019-09-10
 Temp./Humi. :23.3/61
 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
5350.00	Average	35.79	14.28	50.07	54.00	-3.93
5350.00	Peak	54.80	14.28	69.08	74.00	-4.92

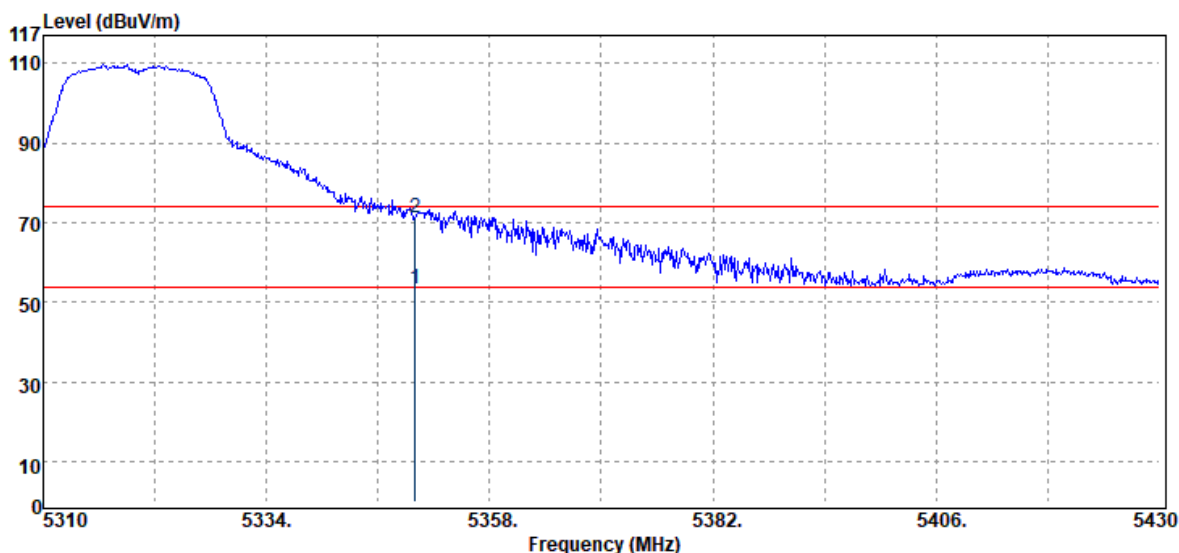
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Report Number :ER-2019-60053
 Operation Mode :802.11a
 Test Channel :CH64_5320 MHz
 Test Mode :Bandedge CH High
 EUT Pol :E2 Plane

Test Date :2019-09-10
 Temp./Humi. :23.3/61
 Antenna Pol. :HORIZONTAL
 Engineer :Nick



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode	Reading Level		FS	@3m	
	PK/QP/AV	dB μ V	dB	dB μ V/m	dB μ V/m	dB
5350.00	Average	38.99	14.28	53.27	54.00	-0.73
5350.00	Peak	57.03	14.28	71.31	74.00	-2.69

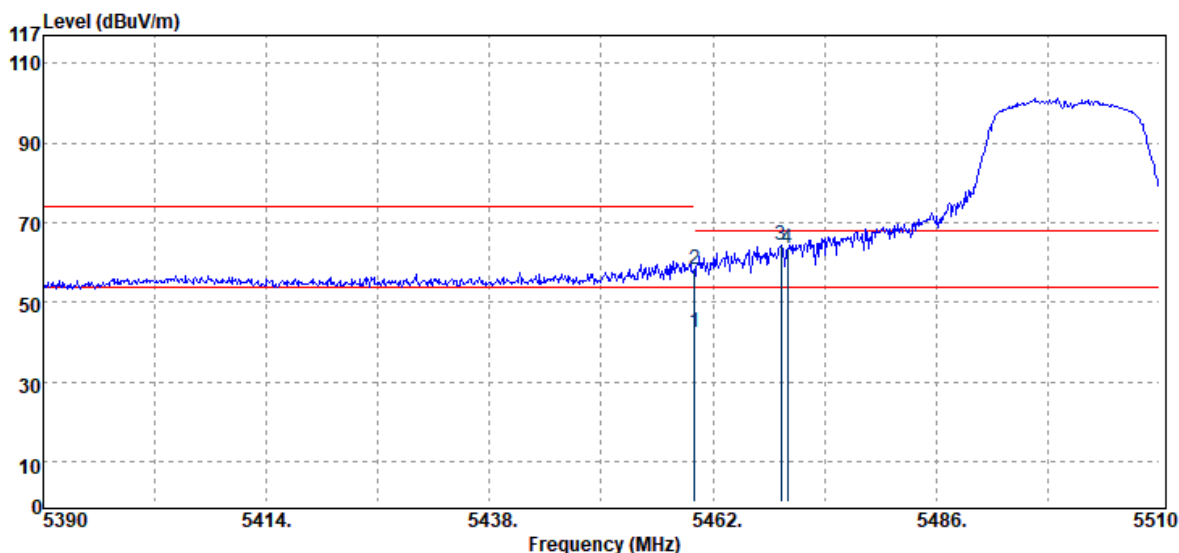
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Report Number :ER-2019-60053
 Operation Mode :802.11a
 Test Channel :CH100_5500 MHz
 Test Mode :Bandedge CH Low
 EUT Pol :E2 Plane

Test Date :2019-09-10
 Temp./Humi. :23.3/61
 Antenna Pol. :VERTICAL
 Engineer :Nick



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
5460.00	Average	27.76	14.61	42.37	54.00	-11.63
5460.00	Peak	43.74	14.61	58.35	74.00	-15.65
5469.32	Peak	49.49	14.70	64.19	68.20	-4.01
5470.00	Peak	48.95	14.70	63.65	68.20	-4.55

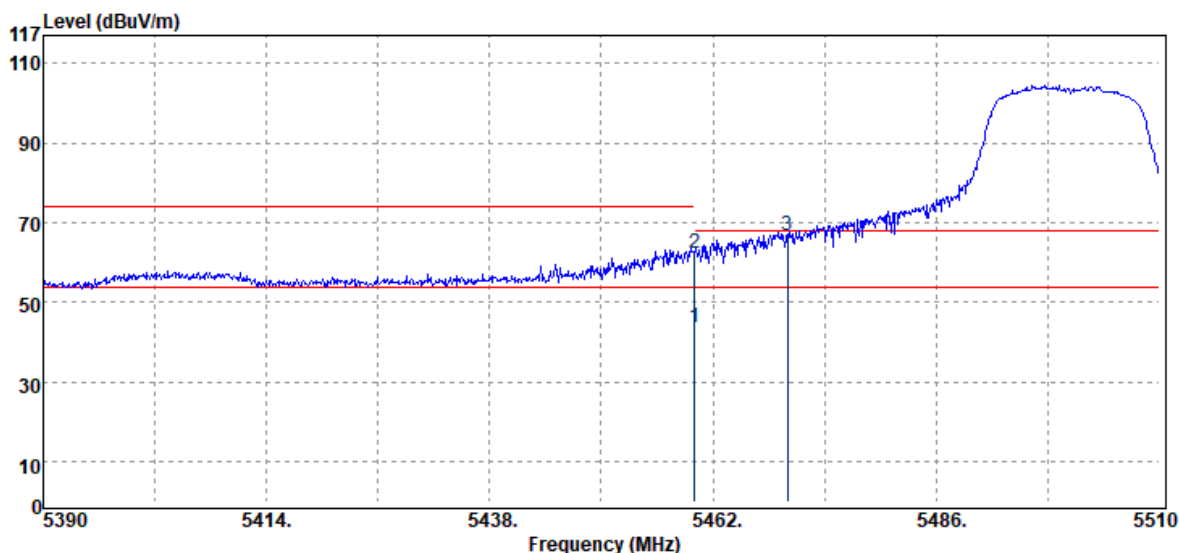
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Report Number :ER-2019-60053
 Operation Mode :802.11a
 Test Channel :CH100_5500 MHz
 Test Mode :Bandedge CH Low
 EUT Pol :E2 Plane

Test Date :2019-09-10
 Temp./Humi. :23.3/61
 Antenna Pol. :HORIZONTAL
 Engineer :Nick



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
5460.00	Average	28.97	14.61	43.58	54.00	-10.42
5460.00	Peak	47.92	14.61	62.53	74.00	-11.47
5470.00	Peak	52.28	14.70	66.98	68.20	-1.22

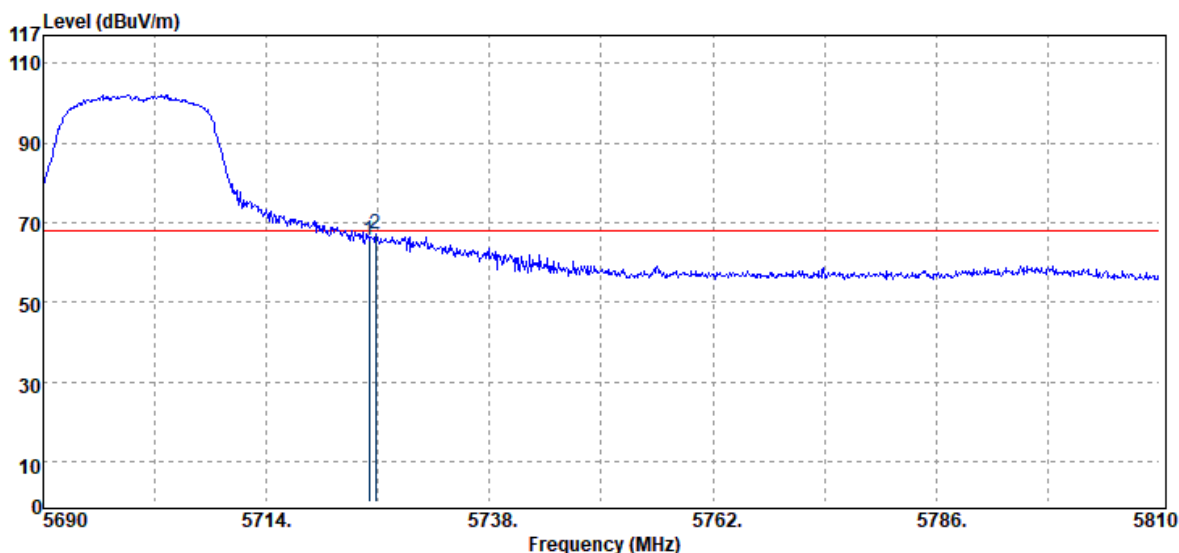
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Report Number :ER-2019-60053
 Operation Mode :802.11a
 Test Channel :CH140_5700 MHz
 Test Mode :Bandedge CH High
 EUT Pol :E2 Plane

Test Date :2019-09-10
 Temp./Humi. :23.3/61
 Antenna Pol. :VERTICAL
 Engineer :Nick



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
5725.00	Peak	50.19	15.42	65.61	68.20	-2.59
5725.76	Peak	51.68	15.43	67.11	68.20	-1.09

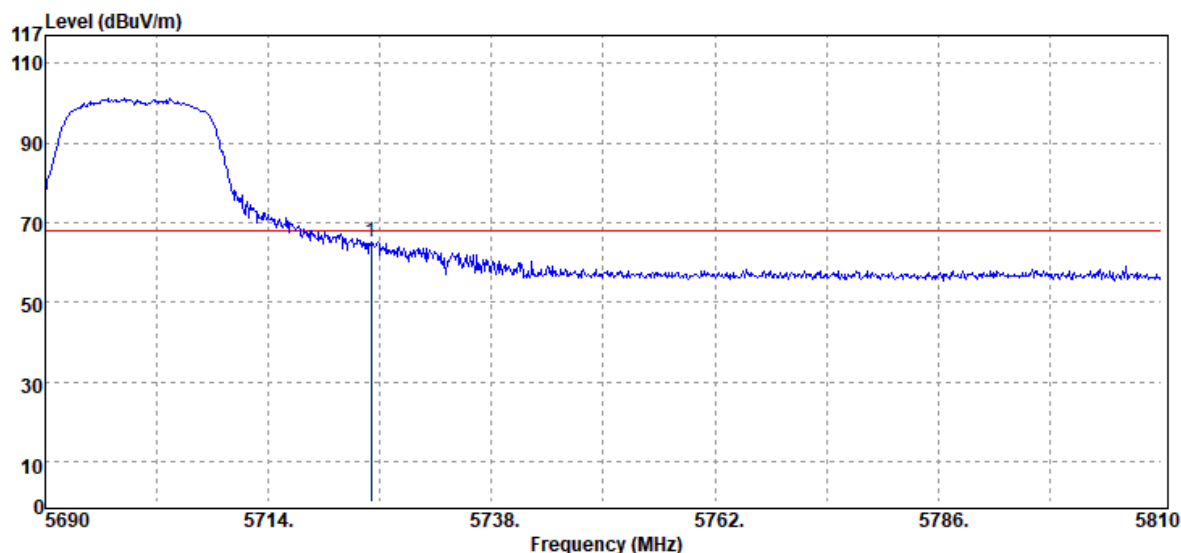
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Report Number :ER-2019-60053
 Operation Mode :802.11a
 Test Channel :CH140_5700 MHz
 Test Mode :Bandedge CH High
 EUT Pol :E2 Plane

Test Date :2019-09-10
 Temp./Humi. :23.3/61
 Antenna Pol. :HORIZONTAL
 Engineer :Nick



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode	Reading Level		FS	@3m	
	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
5725.00	Peak	49.79	15.42	65.21	68.20	-2.99

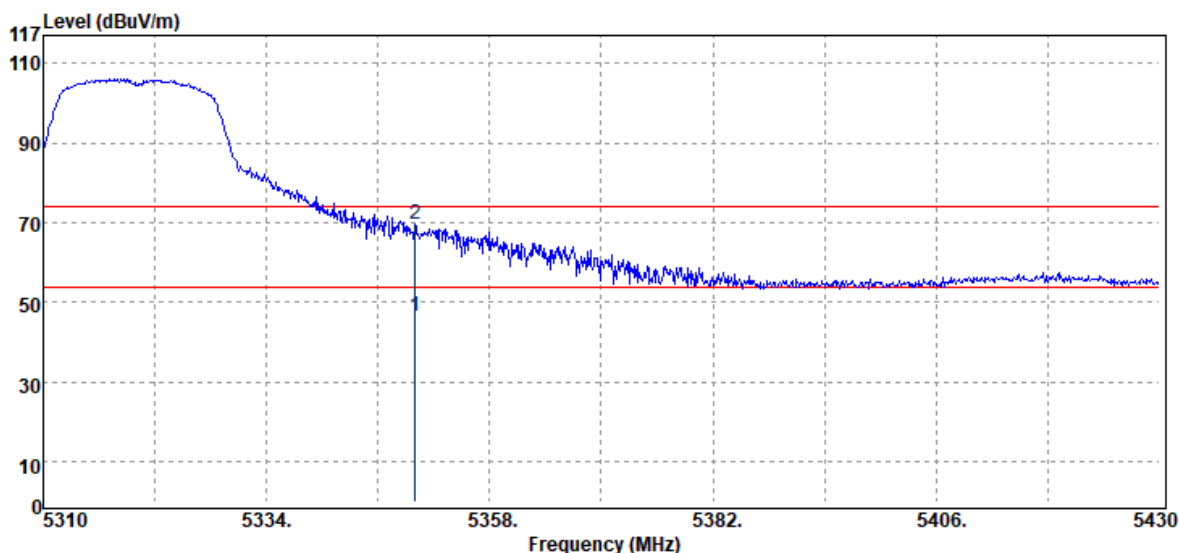
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Report Number :ER-2019-60053
 Operation Mode :802.11n20
 Test Channel :CH64_5320 MHz
 Test Mode :Bandedge CH High
 EUT Pol :E2 Plane

Test Date :2019-09-10
 Temp./Humi. :23.3/61
 Antenna Pol. :VERTICAL
 Engineer :Nick



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode	Reading Level		FS	@3m	
	PK/QP/AV	dB μ V	dB	dB μ V/m	dB μ V/m	dB
5350.00	Average	32.20	14.28	46.48	54.00	-7.52
5350.00	Peak	55.16	14.28	69.44	74.00	-4.56

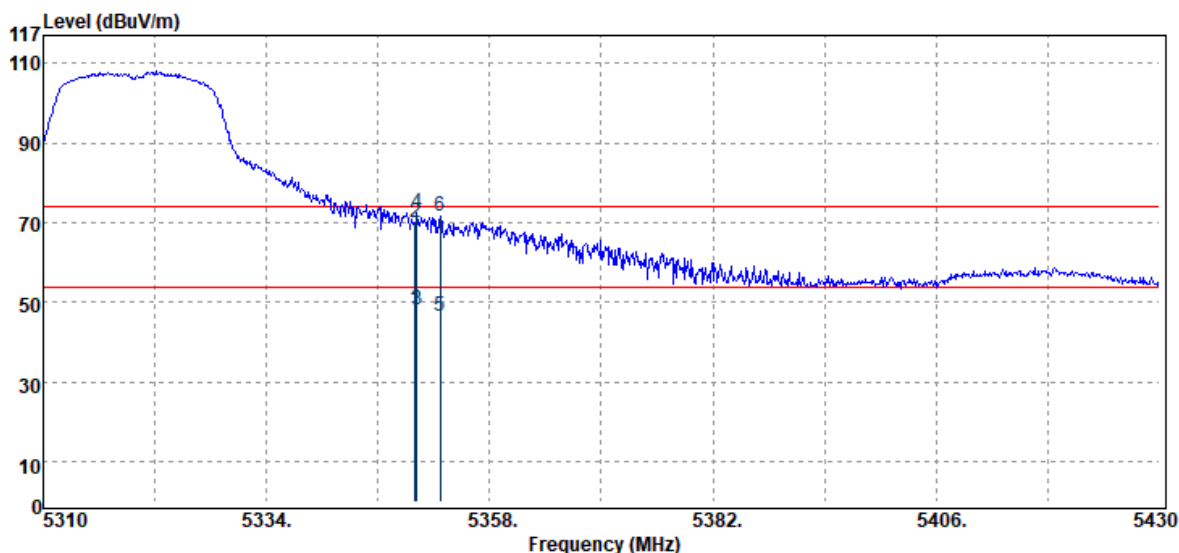
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Report Number :ER-2019-60053
 Operation Mode :802.11n20
 Test Channel :CH64_5320 MHz
 Test Mode :Bandedge CH High
 EUT Pol :E2 Plane

Test Date :2019-09-10
 Temp./Humi. :23.3/61
 Antenna Pol. :HORIZONTAL
 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
5350.00	Average	33.82	14.28	48.10	54.00	-5.90
5350.00	Peak	55.91	14.28	70.19	74.00	-3.81
5350.20	Average	33.90	14.28	48.18	54.00	-5.82
5350.20	Peak	58.34	14.28	72.62	74.00	-1.38
5352.72	Average	32.19	14.29	46.48	54.00	-7.52
5352.72	Peak	57.17	14.29	71.46	74.00	-2.54

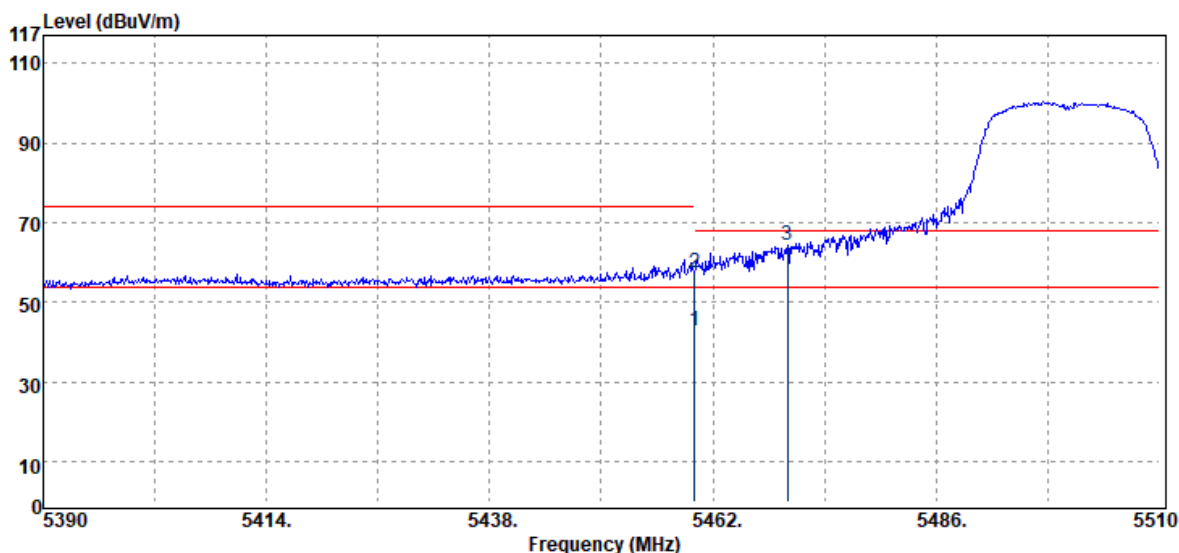
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Report Number :ER-2019-60053
 Operation Mode :802.11n20
 Test Channel :CH100_5500 MHz
 Test Mode :Bandedge CH Low
 EUT Pol :E2 Plane

Test Date :2019-09-10
 Temp./Humi. :23.3/61
 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
5460.00	Average	28.22	14.61	42.83	54.00	-11.17
5460.00	Peak	42.91	14.61	57.52	74.00	-16.48
5470.00	Peak	49.49	14.70	64.19	68.20	-4.01

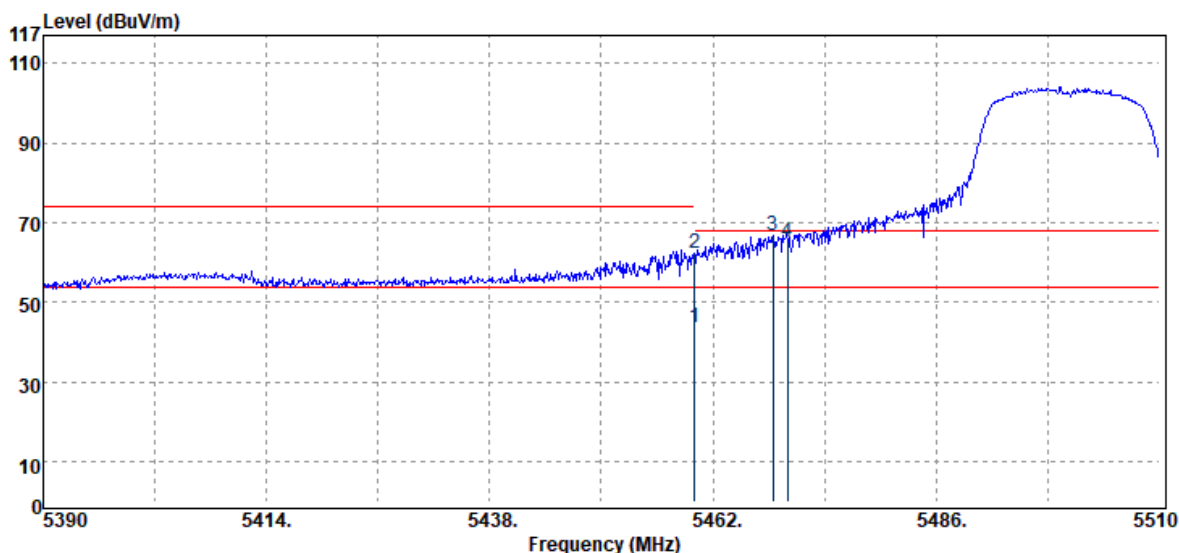
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Report Number :ER-2019-60053
 Operation Mode :802.11n20
 Test Channel :CH100_5500 MHz
 Test Mode :Bandedge CH Low
 EUT Pol :E2 Plane

Test Date :2019-09-10
 Temp./Humi. :23.3/61
 Antenna Pol. :HORIZONTAL
 Engineer :Nick



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
5460.00	Average	29.05	14.61	43.66	54.00	-10.34
5460.00	Peak	47.63	14.61	62.24	74.00	-11.76
5468.48	Peak	52.26	14.68	66.94	68.20	-1.26
5470.00	Peak	50.66	14.70	65.36	68.20	-2.84

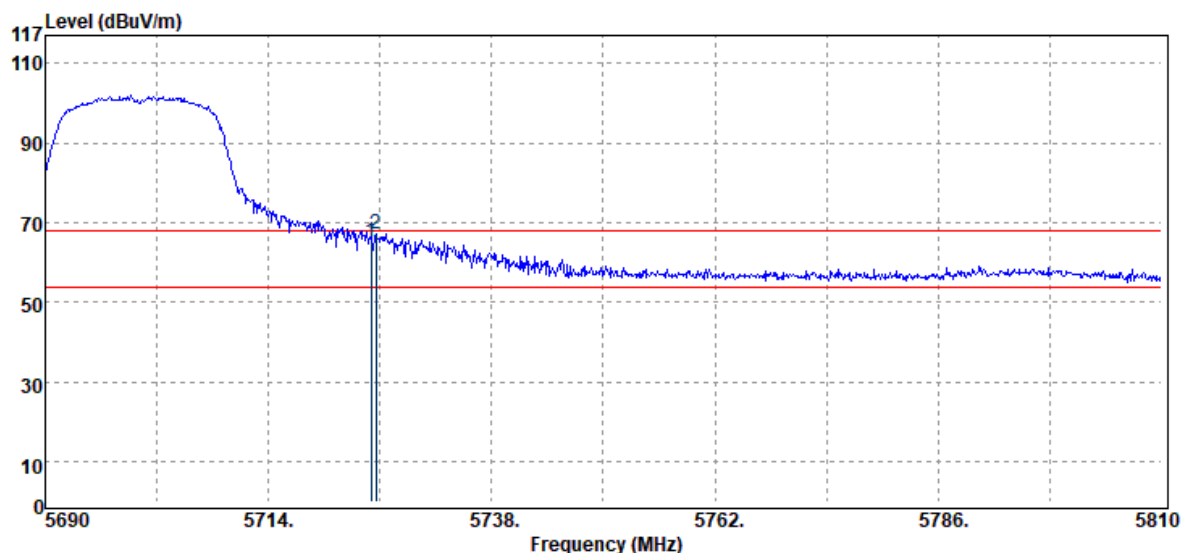
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Report Number :ER-2019-60053
 Operation Mode :802.11n20
 Test Channel :CH140_5700 MHz
 Test Mode :Bandedge CH High
 EUT Pol :E2 Plane

Test Date :2019-09-10
 Temp./Humi. :23.3/61
 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
5725.00	Peak	49.77	15.42	65.19	68.20	-3.01
5725.52	Peak	51.78	15.42	67.20	68.20	-1.00

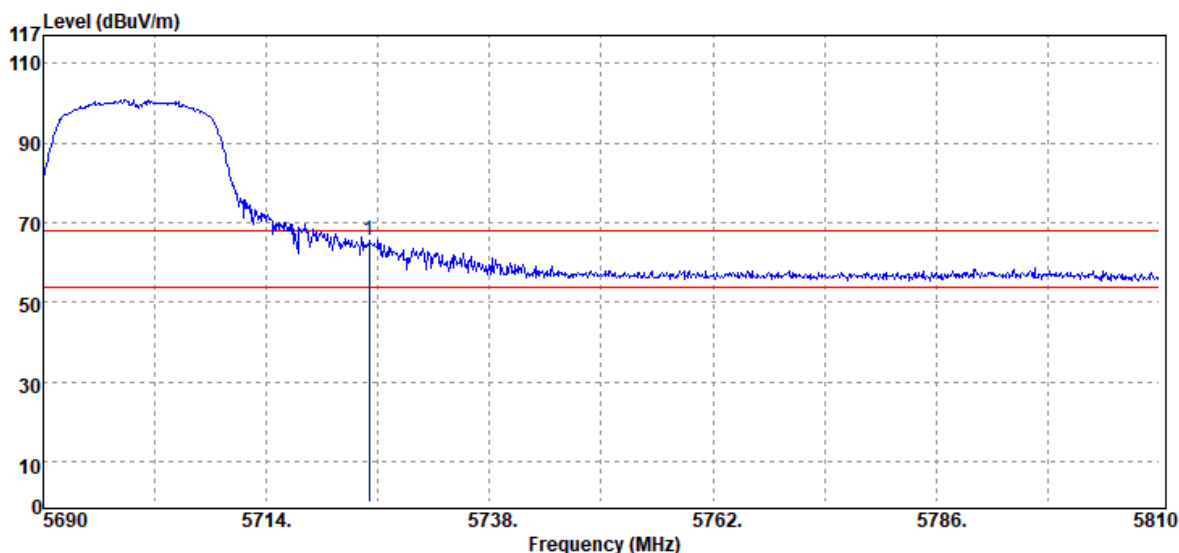
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Report Number :ER-2019-60053
 Operation Mode :802.11n20
 Test Channel :CH140_5700 MHz
 Test Mode :Bandedge CH High
 EUT Pol :E2 Plane

Test Date :2019-09-10
 Temp./Humi. :23.3/61
 Antenna Pol. :HORIZONTAL
 Engineer :Nick



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
5725.00	Peak	50.35	15.42	65.77	68.20	-2.43

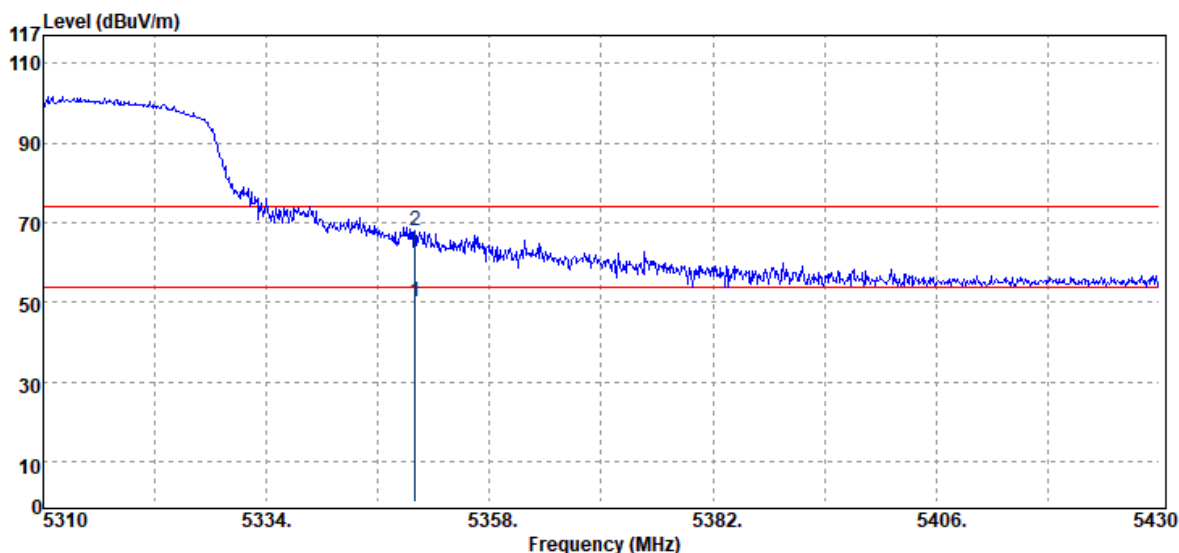
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Report Number :ER-2019-60053
 Operation Mode :802.11n40
 Test Channel :CH62_5310 MHz
 Test Mode :Bandedge CH High
 EUT Pol :E2 Plane

Test Date :2019-09-10
 Temp./Humi. :23.3/61
 Antenna Pol. :VERTICAL
 Engineer :Nick



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
5350.00	Average	35.89	14.28	50.17	54.00	-3.83
5350.00	Peak	53.66	14.28	67.94	74.00	-6.06

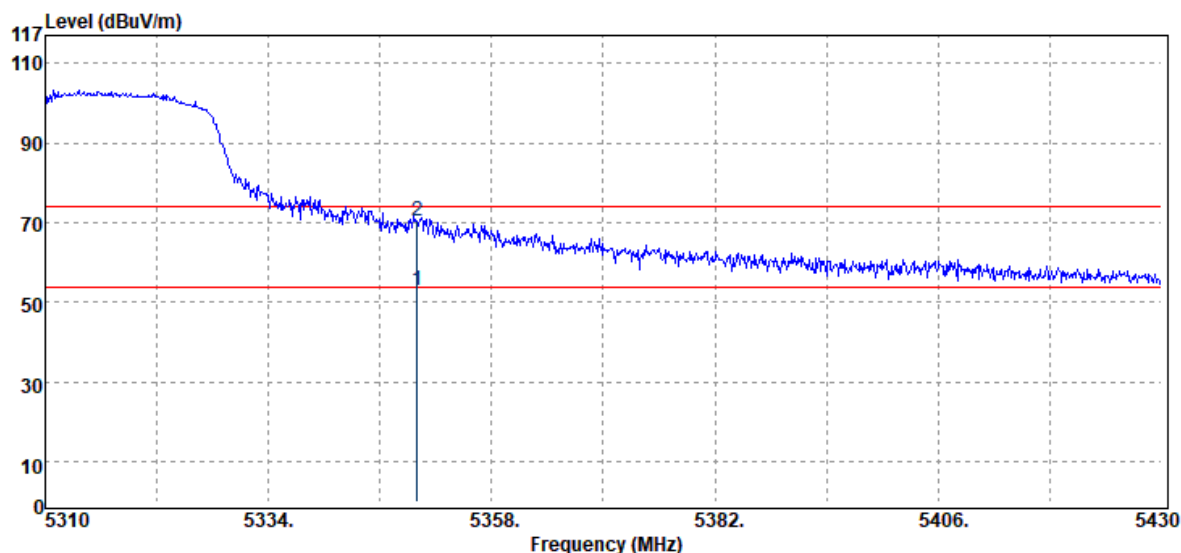
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Report Number :ER-2019-60053
 Operation Mode :802.11n40
 Test Channel :CH62_5310 MHz
 Test Mode :Bandedge CH High
 EUT Pol :E2 Plane

Test Date :2019-09-10
 Temp./Humi. :23.3/61
 Antenna Pol. :HORIZONTAL
 Engineer :Nick



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode	Reading Level		FS	@3m	
	PK/QP/AV	dB μ V	dB	dB μ V/m	dB μ V/m	dB
5350.00	Average	38.86	14.28	53.14	54.00	-0.86
5350.00	Peak	56.26	14.28	70.54	74.00	-3.46

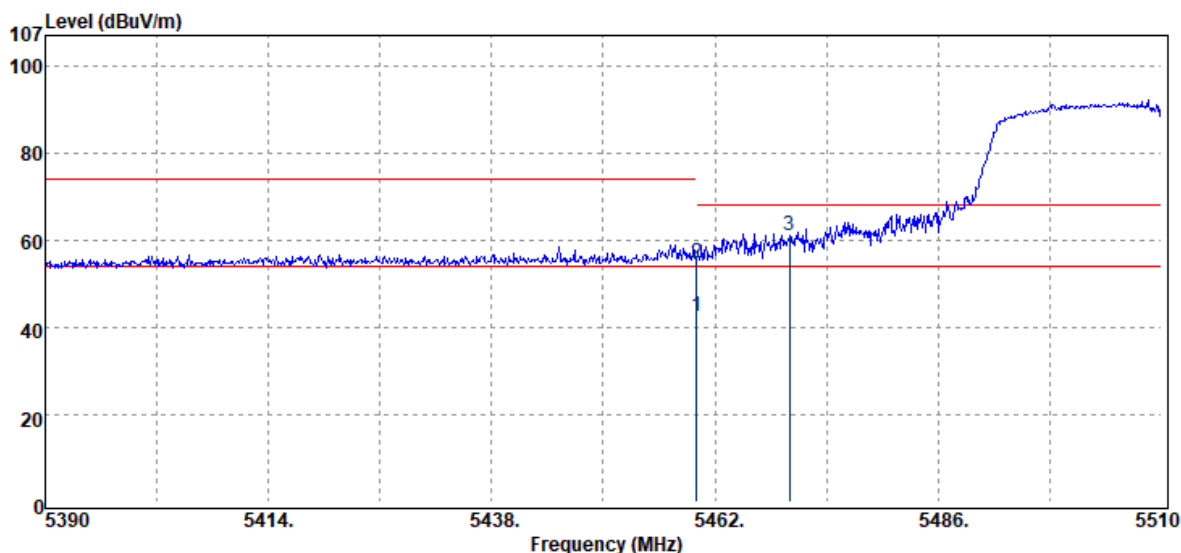
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Report Number :ER-2019-60053
 Operation Mode :802.11n40
 Test Channel :CH102_5510 MHz
 Test Mode :Bandedge CH Low
 EUT Pol :E2 Plane

Test Date :2019-09-10
 Temp./Humi. :23.3/61
 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
5460.00	Average	27.98	14.61	42.59	54.00	-11.41
5460.00	Peak	40.12	14.61	54.73	74.00	-19.27
5470.00	Peak	46.30	14.70	61.00	68.20	-7.20

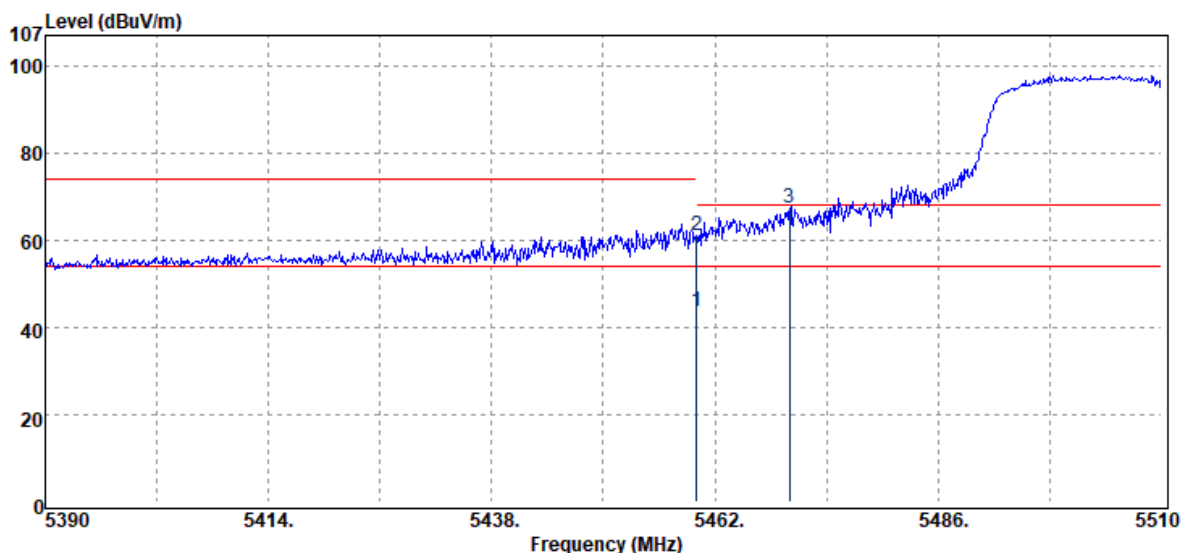
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Report Number :ER-2019-60053
 Operation Mode :802.11n40
 Test Channel :CH102_5510 MHz
 Test Mode :Bandedge CH Low
 EUT Pol :E2 Plane

Test Date :2019-09-10
 Temp./Humi. :23.3/61
 Antenna Pol. :HORIZONTAL
 Engineer :Nick



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode	Reading Level		FS	@3m	
	PK/QP/AV	dB μ V	dB	dB μ V/m	dB μ V/m	dB
5460.00	Average	29.14	14.61	43.75	54.00	-10.25
5460.00	Peak	46.42	14.61	61.03	74.00	-12.97
5470.00	Peak	52.76	14.70	67.46	68.20	-0.74

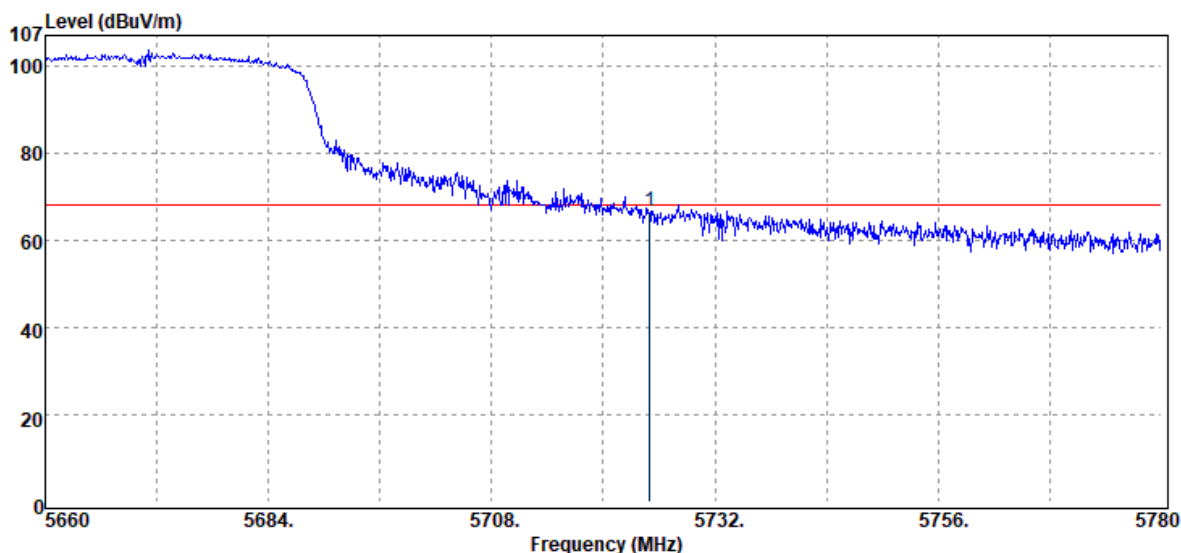
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Report Number :ER-2019-60053
 Operation Mode :802.11n40
 Test Channel :CH134_5670 MHz
 Test Mode :Bandedge CH High
 EUT Pol :E2 Plane

Test Date :2019-09-10
 Temp./Humi. :23.3/61
 Antenna Pol. :VERTICAL
 Engineer :Nick



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode	Reading Level		FS	@3m	
	PK/QP/AV	dB μ V	dB	dB μ V/m	dB μ V/m	dB
5725.00	Peak	51.26	15.42	66.68	68.20	-1.52

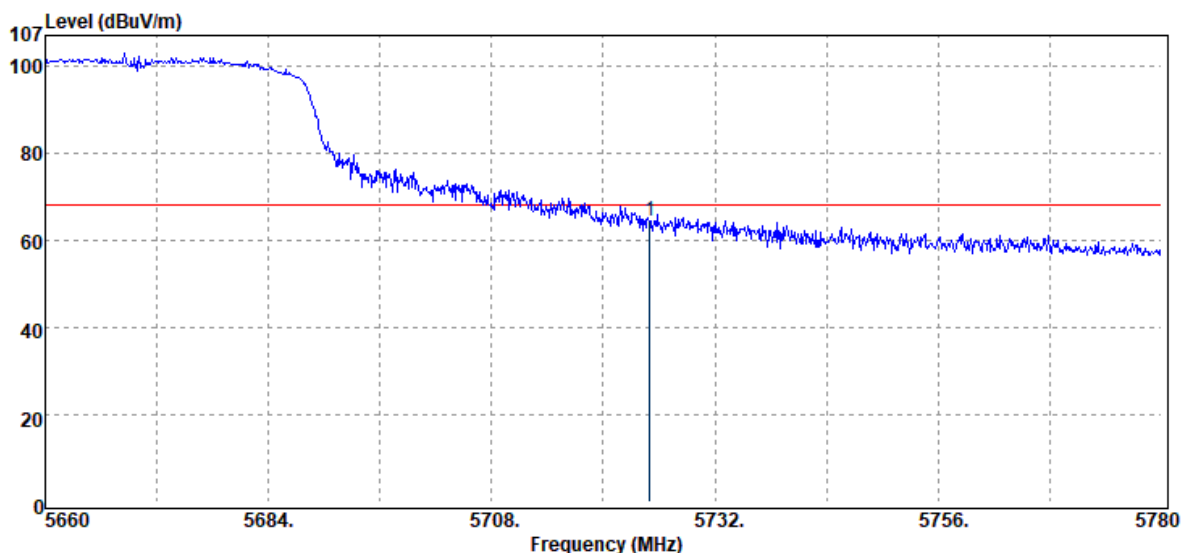
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Report Number :ER-2019-60053
 Operation Mode :802.11n40
 Test Channel :CH134_5670 MHz
 Test Mode :Bandedge CH High
 EUT Pol :E2 Plane

Test Date :2019-09-10
 Temp./Humi. :23.3/61
 Antenna Pol. :HORIZONTAL
 Engineer :Nick



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode	Reading Level		FS	@3m	
	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
5725.00	Peak	49.05	15.42	64.47	68.20	-3.73

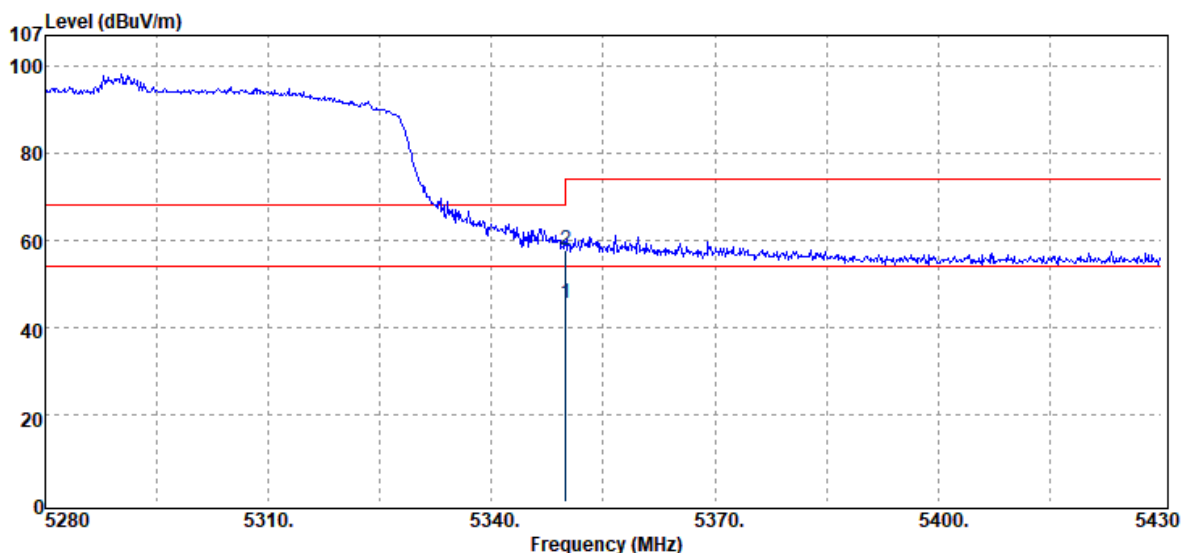
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Report Number :ER-2019-60053
 Operation Mode :802.11ac80
 Test Channel :CH58_5290 MHz
 Test Mode :Bandedge CH High
 EUT Pol :E2 Plane

Test Date :2019-09-10
 Temp./Humi. :23.3/61
 Antenna Pol. :VERTICAL
 Engineer :Nick



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
5350.00	Average	31.17	14.28	45.45	54.00	-8.55
5350.00	Peak	43.51	14.28	57.79	68.20	-10.41

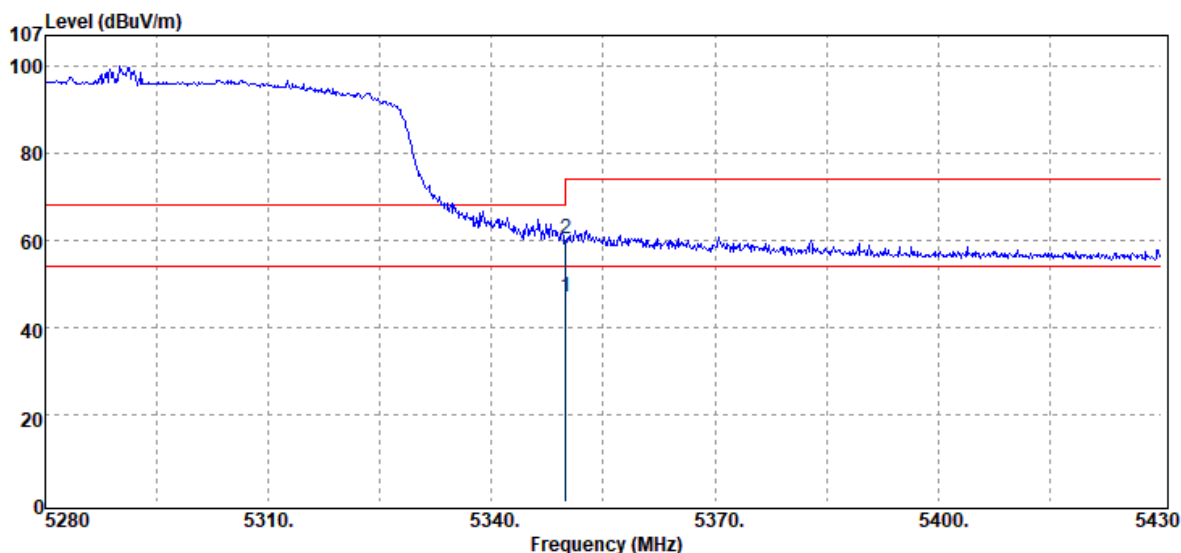
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Report Number :ER-2019-60053
 Operation Mode :802.11ac80
 Test Channel :CH58_5290 MHz
 Test Mode :Bandedge CH High
 EUT Pol :E2 Plane

Test Date :2019-09-10
 Temp./Humi. :23.3/61
 Antenna Pol. :HORIZONTAL
 Engineer :Nick



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
5350.00	Average	32.69	14.28	46.97	54.00	-7.03
5350.00	Peak	45.98	14.28	60.26	68.20	-7.94

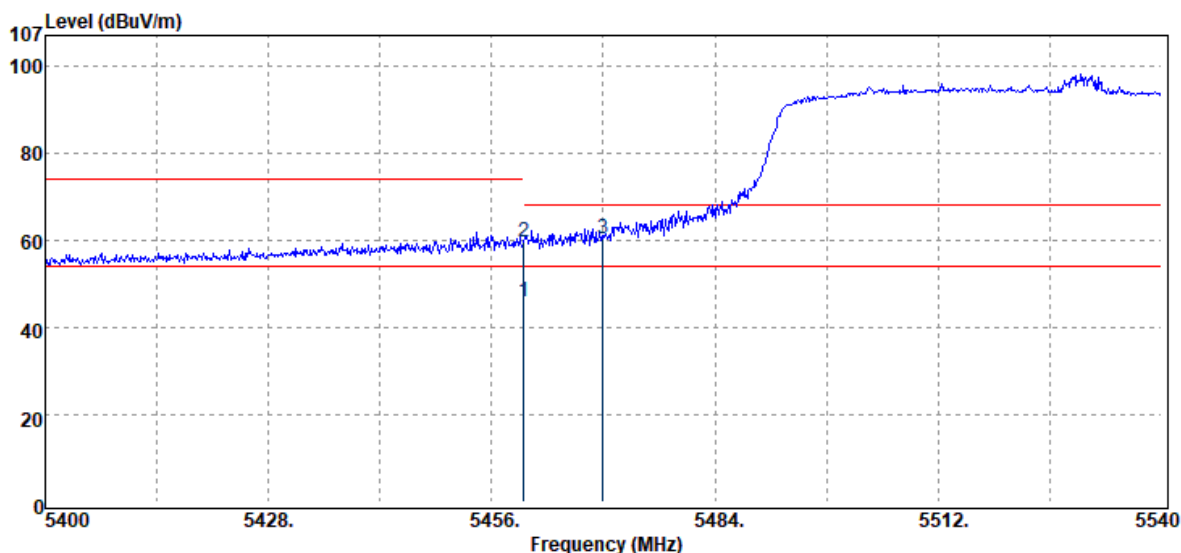
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Report Number :ER-2019-60053
 Operation Mode :802.11ac80
 Test Channel :CH106_5530 MHz
 Test Mode :Bandedge CH Low
 EUT Pol :E2 Plane

Test Date :2019-09-10
 Temp./Humi. :23.3/61
 Antenna Pol. :VERTICAL
 Engineer :Nick



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
5460.00	Average	31.47	14.61	46.08	54.00	-7.92
5460.00	Peak	45.11	14.61	59.72	74.00	-14.28
5470.00	Peak	45.81	14.70	60.51	68.20	-7.69

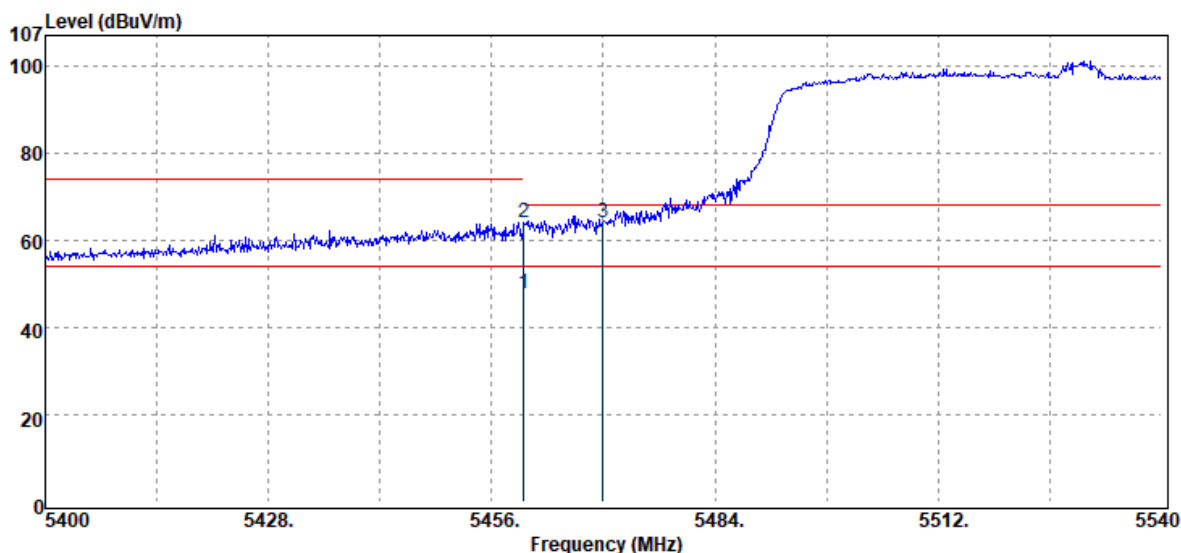
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Report Number :ER-2019-60053
 Operation Mode :802.11ac80
 Test Channel :CH106_5530 MHz
 Test Mode :Bandedge CH Low
 EUT Pol :E2 Plane

Test Date :2019-09-10
 Temp./Humi. :23.3/61
 Antenna Pol. :HORIZONTAL
 Engineer :Nick



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode	Reading Level		FS	@3m	
	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
5460.00	Average	32.98	14.61	47.59	54.00	-6.41
5460.00	Peak	49.31	14.61	63.92	74.00	-10.08
5470.00	Peak	49.38	14.70	64.08	68.20	-4.12

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11 TRANSMISSION IN THE ABSENCE OF DATA

11.1 Standard Applicable

According to §15.407(c)

The device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. These provisions are not intended to preclude the transmission of control or signaling information or the use of repetitive codes used by certain digital technologies to complete frame or burst intervals. Applicants shall include in their application for equipment authorization a description of how this requirement is met.

11.2 Result

While the EUT is not transmitting any information, the EUT can automatically discontinue transmission and become standby mode for power saving. The EUT can detect the controlling signal of ASK message transmitting from remote device and verify whether it shall resend or discontinue transmission.

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12 FREQUENCY STABILITY

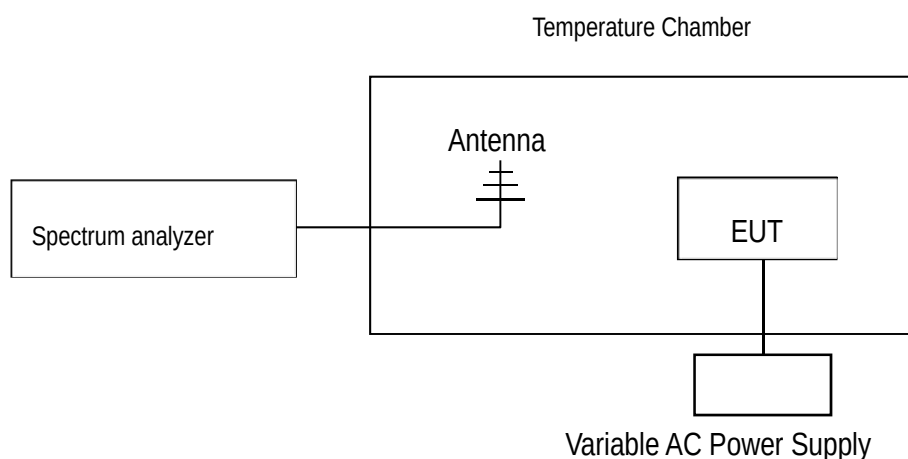
12.1 Standard Applicable

Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

12.2 Measurement Procedure

1. The EUT was placed inside temperature chamber and powered and powered by nominal DC voltage.
2. Set EUT as normal operation.
3. Turn the EUT on and couple its output to spectrum.
4. Turn the EUT off and set the chamber to the highest temperature specified.
5. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT and measure the operating frequency.
6. Repeat step with the temperature chamber set to the lowest temperature.

12.3 Test SET-UP



12.4 Measurement Equipment Used:

SGS Conducted Room					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
EXA Spectrum Analyzer	Agilent	N9010A	MY50420195	05/02/2019	05/01/2020
Temperature Chamber	TERCHY	MHG-120LF	911009	05/17/2019	05/16/2020
Attenuator	Mini-Circuit	BW-S10W2+	2	01/02/2019	01/01/2020
DC Block	Mini-Circuits	BLK-18-S+	1	01/02/2019	01/01/2020

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12.5 Measurement Result

Startup

Operation Mode	802.11 a	Test Date	2019.09.09
Temperature	: 27.7°C	Test By	Tom
Humidity	: 53%		

Test Temp.(°C)	Test Voltage(V)	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
-10	133.2	52	5260	5,260.01607	-0.00000306
	106.8	52	5260	5,260.01264	-0.00000240
25	120	52	5260	5,260.02476	-0.00000471
55	133.2	52	5260	5,260.03004	-0.00000571
	106.8	52	5260	5,260.02937	-0.00000558

2 Minutes

Operation Mode	802.11 a	Test Date	2019.09.09
Temperature	: 27.7°C	Test By	Tom
Humidity	: 53%		

Test Temp.(°C)	Test Voltage(V)	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
-10	133.2	52	5260	5,260.02364	-0.00000449
	106.8	52	5260	5,260.01700	-0.00000323
25	120	52	5260	5,260.01696	-0.00000322
55	133.2	52	5260	5,260.01390	-0.00000264
	106.8	52	5260	5,260.03051	-0.00000580

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5 Minutes

Operation Mode	802.11 a	Test Date	2019.09.09
Temperature	: 27.7°C	Test By	Tom
Humidity	: 53%		

Test Temp.(°C)	Test Voltage(V)	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
-10	133.2	52	5260	5,260.02950	-0.00000561
	106.8	52	5260	5,260.02065	-0.00000393
25	120	52	5260	5,260.02688	-0.00000511
55	133.2	52	5260	5,260.01850	-0.00000352
	106.8	52	5260	5,260.02098	-0.00000399

10 Minutes

Operation Mode	802.11 a	Test Date	2019.09.09
Temperature	: 27.7°C	Test By	Tom
Humidity	: 53%		

Test Temp.(°C)	Test Voltage(V)	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
-10	133.2	52	5260	5,260.02367	-0.00000450
	106.8	52	5260	5,260.01885	-0.00000358
25	120	52	5260	5,260.01480	-0.00000281
55	133.2	52	5260	5,260.01239	-0.00000236
	106.8	52	5260	5,260.01452	-0.00000276

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13 ANTENNA REQUIREMENT

13.1 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.

According to §15.407, If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

13.2 Antenna Connected Construction

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

~ End of Report ~

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