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ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

Applicant: SHARP CORPORATION

2-13-1, HACHIHONMATSU-IIDA, HIGASHI-HIROSHIMA-SHI,

HIROSHIMA PREFECTURE 739-0192, JAPAN

Manufacturer: SHARP CORPORATION

1 Takumi-Cho, Sakai-Ku, Sakai-Shi, Osaka 590-8522, Japan

Product Name: Tablet Brand Name: SHARP

Report Number: ER/2020/40050
FCC ID: APYHRO00284
FCC Rule Part: §15.407, Cat: NII
Issue Date: Jun. 11, 2020

Date of Test: Apr. 14, 2020 ~ May 29, 2020

Date of EUT Received: Apr. 14, 2020

We hereby certify that:

The above equipment was tested by SGS Taiwan Ltd. Central RF Lab 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				
Report Number	Revision	Description	Issue Date	Remark
ER/2020/40050	Rev.00	Original.	Jun. 11, 2020	Revised By: Karen Huang

Note:

1 · Disclaimer

Antenna information is provided by the applicant, test results of this report are applicable to the sample EUT received.

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GENERAL INFORMATION

Product Description 1.1

Product Nan	ne:	Tablet	
Brand Name	»:	SHARP	
Hardware Ve	ersion: 2.0		
Software Ver	are Version: V1.170		
Power Suppl	Power Supply: 3.85Vdc from Rechargeable Li-polymer Battery		ole Li-polymer Battery
Modulation type 64QAM, 16QAM, QPSK, BPSK for OFDM 256QAM for OFDM in 802.11ac only			
Transition Rate:	\perp 802 11 n 201/1Hz 6 5 = 72 21/1hns		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. (MHz)	Peak An- tenna Gain (dBi)	Worst An- tenna Gain
			5150~5250	1.80	-
Monopole	N/A	N/A	5250~5350	1.40	-
			5470~5725	1.60	-

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1.3 **FCC** worst power

Wi-Fi 802.11	Frequency Range	Channels	Rated Power (Avg.) (dBm) (Worst case)	Modulation Technology
	5150~5250	4	18.98	
а	5250~5350	4	18.96	OFDM
	5470~5725	11	18.98	
	5150~5250	4	HT: 18.98	
n_HT 20M	5250~5350	4	HT: 18.94	OFDM
20111	5470~5725	11	HT: 18.99	
	5150~5250	2	HT: 18.45	
n_HT 40M	5250~5350	2	HT: 18.76	OFDM
40101	5470~5725	5	HT: 18.70	
\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	5150~5250	1	VHT: 11.49	
ac_VHT 80M	5250~5350	1	VHT: 12.66	OFDM
	5470~5725	2	VHT: 18.98	

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1.4 **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

ANSI C63.10:2013

1.5 **Test Facility**

SGS Taiwan Ltd. Central RF Lab (TAF code 3702)

No.134, Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803

FCC Designation number: TW0027

1.6 **Special Accessories**

There are no special accessories used while test was conducted.

1.7 **Equipment Modifications**

There was no modification incorporated into the EUT.

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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.

Conducted Test (RF) 2.3.2

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**

Radiated Emission Test Sites For Measurements From 9 kHz To 30 MHz 2.4.1

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

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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Configuration of Tested System 2.5

Fig. 2-1 Radiated Emission Configuration

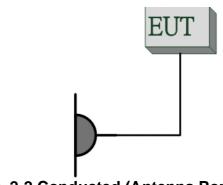


Fig. 2-2 Conducted (Antenna Port) Emission Configuration

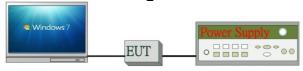


Fig. 2-3 Conducted (AC powerline) **Emission Configuration**

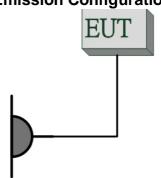


Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Data Cable	Power Cord
1.	WLAN 5G Test software	N/A	N/A	N/A	N/A	N/A
2.	Notebook	Lenovo	L430	R9-WGNK5	N/A	N/A
3.	DC Power Supply	Agilent	E3640A	MY40000811	N/A	N/A

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SUMMARY OF TEST RESULT

FCC Rules	Description Of Test	Result
§15.207	AC Power Line Conducted Emission	Compliant
§15.403(i) §15.407(e)	26 dB & 6dB 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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DESCRIPTION OF TEST MODES

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

Operated band in 5150 MHz ~5250 MHz:

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

III 3 1 30 IVII I		
40 M		
СН	Freq	
СП	(MHz)	
38	5190	
46	5230	
40	5 2 30	

ZJU IVII IZ.		
80 M		
СН	Freq (MHz)	
42	5210	

Operated band in 5250 MHz ~5350 MHz:

Operated b		
20 M		
СН	Freq	
Cii	(MHz)	
52	5260	
56	5280	
60	5300	
64	5320	

u	<u> </u>			
	40 M			
	СН	Freq		
	Сп	(MHz)		
	54	5270		
	62	5310		

JOSU MITZ.		
80 M		
СН	Freq	
G	(MHz)	
58	5290	

Operated band in 5470 MHz ~5725 MHz:

Operated b		
2	20 M	
СН	Freq (MHz)	
100	5500	
104	5520	
108	5540	
112	5560	
116	5580	
120	5600	
124	5620	
128	5640	
132	5660	
136	5680	
140	5700	

III 3470 IVID					
40	40 M				
СН	Freq (MHz)				
102	5510				
110	5550				
118	5590				
126	5630				
134	5670				

	80 M			
	СН	Freq		
СН	(MHz)			
	106	5530		
	122	5610		

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4.2 The Worst Test Modes and Channel Details

- 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	Multiple Transmission Spatial
⊠ 802.11 a	☐ Ch1 ☐ Ch2 ☐ Ch3	□ 2TX
⊠ 802.11 n	☐ Ch1 ☐ Ch2 ☐ Ch3	☐ MIMO
⊠ 802.11 ac	☑ Ch0 ☐ Ch1 ☐ Ch2 ☐ Ch3	☐ MIMO
☐ 802.11 ax	☐ Ch0 ☐ Ch1 ☐ Ch2 ☐ Ch3	☐ 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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4.2.1 **RADIATED EMISSION TEST:**

RADIATED EMISSION TEST (BELOW 1 GHz)						
MODE	FREQUENCY BAND (MHz)		TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	AN- TENNA PORT
	5180~5240	36 to 48	44			
802.11a	5260~5320	52 to 64	60	OFDM	6	Ch0
	5500~5700	100 to 140	116			

RADIATED EMISSION TEST (ABOVE 1 GHz)						
MODE	FREQUENCY BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	AN- TENNA PORT
	5180~5240	36 to 48	36,44,48			
802.11a	5260~5320	52 to 64	52,60,64		6	Ch0
	5500~5700	100 to 140	100,116,140			
	5180~5240	36 to 48	36,44,48		MCS0	
802.11n_HT20	5260~5320	52 to 64	52,60,64			Ch0
	5500~5700	100 to 140	100,116,140	OFDM		
	5190~5230	38 to 46	38,46	OFDIVI		
802.11n_HT40	5270~5310	54 to 62	54,62		MCS0	Ch0
	5510~5670	102 to 134	102,110,134			
802.11ac_VHT80	5210	42	42			
	5290	58	58		MCS0	Ch0
	5530~5610	106 to 122	106,122			

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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4.2.2 ANTENNA PORT CONDUCTED MEASUREMENT:

CONDUCTED TEST						
MODE	FREQUENCY BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	AN- TENNA PORT
802.11a	5180~5240 5260~5320	36 to 48 52 to 64	36,44,48 52,60,64		6	Ch0
002.11a	5500~5700	100 to 140	100,116,140		U	CHO
802.11n_HT20	5180~5240 5260~5320 5500~5700	36 to 48 52 to 64 100 to 140	36,44,48 52,60,64 100,116,140	OFDM	MCS0	Ch0
802.11n_HT40	5190~5230 5270~5310 5510~5670	38 to 46 54 to 62 102 to 134	38,46 54,62 102,110,134		MCS0	Ch0
802.11ac_VHT80	5210 5290 5530~5610	42 58 106 to 122	42 58 106,122		MCS0	Ch0

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MEASUREMENT UNCERTAINTY

Test Items	Uncertainty
AC Power Line Conducted Emission	+/- 2.586 dB
26dB & 6dB Emission Bandwidth	+/- 123.36 Hz
The Maximum Output Power Meas- urement	+/- 0.96 dB
Peak Power Spectral Density Meas- urement	+/- 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			
	9kHz~30MHz: +-2.3dB		
Polarization: Vertical	30MHz - 180MHz: +/- 3.37dB		
	180MHz -417MHz: +/- 3.19dB		
	0.417GHz-1GHz: +/- 3.19dB		
	1GHz - 18GHz: +/- 4.04dB		
	18GHz - 40GHz: +/- 4.04dB		
	9kHz~30MHz: +-2.3dB		
	30MHz - 167MHz: +/- 4.22dB		
Polarization: Horizontal	167MHz -500MHz: +/- 3.44dB		
Polarization: Horizontal	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 CONDUCTED EMISSION TEST

6.1 Standard Applicable

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

Frequency range	Lin dB(
MHz	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

Note

6.2 Measurement Equipment Used

Conducted Emission Test Site							
EQUIPMENT					CAL DUE.		
TYPE		NUMBER	NUMBER	CAL.			
EMI Test Receiver	R&S	ESCI 7	1166.5950.07	07/04/2019	07/03/2020		
LISN	SCHWARZBECK	NSLK 8127	8127-649	04/09/2020	04/08/2021		
Test Software	Farad	EZ-EMC	Ver. SGS- 03A2	N.C.R	N.C.R		
Coaxial Cables	N/A	WK CE Cable	N/A	01/02/2020	01/01/2021		

6.3 EUT Setup

- 1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI C63.10:2013.
- 2. The AC/DC Power adaptor of EUT was plug-in LISN. The rear of the EUT and peripherals were placed flushed with the rear of the tabletop.
- 3. The LISN was connected with 120Vac/60Hz power source.

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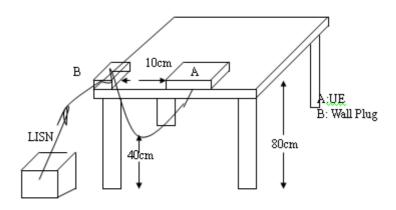
^{1.} The lower limit shall apply at the transition frequencies

^{2.} The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.



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Test SET-UP 6.4



6.5 **Measurement Procedure**

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

6.6 **Measurement Result**

Note: Refer to next page for measurement data and plots.

Note2: The * reveals the worst-case results that closet to the limit.

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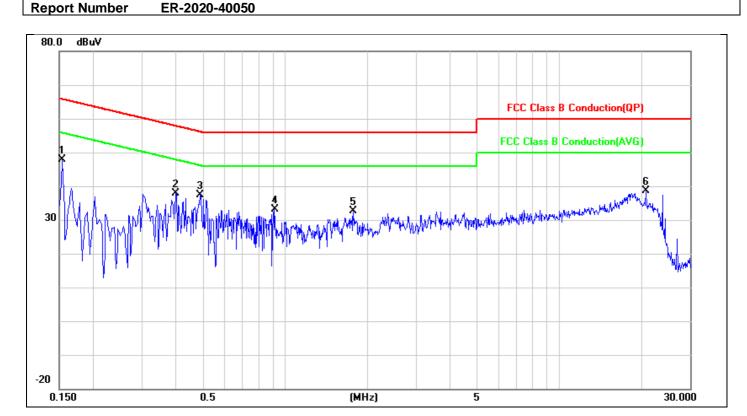


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AC POWER LINE CONDUCTED EMISSION TEST DATA

Description: Operation Date: 2020/5/13 Line:

23(°C)/56% L1 Temp.(°C)/Hum.(%): **Test Voltage:** AC 120V/60Hz Test By: **Thomas**



		Freq.	Reading	Factor	Measure-	Limit	Over		
No.	Mk.				ment			Detector	Comment
		(MHz)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dB)		
1	*	0.1540	47.94	0.00	47.94	65.78	-17.84	peak	
2		0.3980	37.83	0.01	37.84	57.90	-20.06	peak	
3		0.4900	37.35	0.01	37.36	56.17	-18.81	peak	
4		0.9180	33.15	0.02	33.17	56.00	-22.83	peak	
5		1.7740	32.59	0.04	32.63	56.00	-23.37	peak	
6		20.7700	38.23	0.41	38.64	60.00	-21.36	peak	

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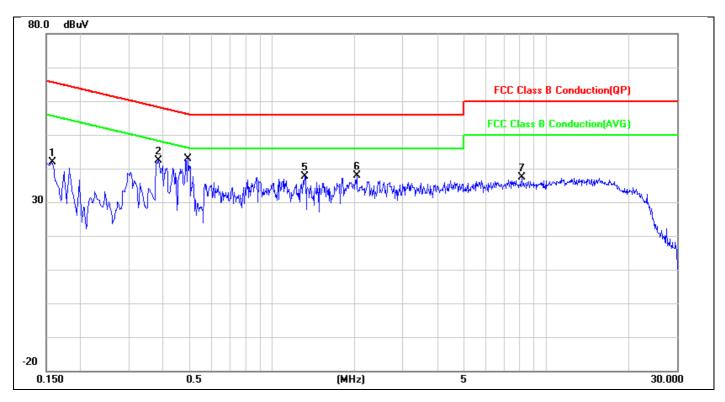


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Description: Operation 2020/5/13 Date:

Line: Temp.(°C)/Hum.(%): 23(°C)/56% AC 120V/60Hz Test By: **Thomas Test Voltage:**

Report Number ER-2020-40050



		Freq.	Reading	Factor	Measure-	Limit	Over		
No.	Mk.				ment			Detector	Comment
		(MHz)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dB)		
1		0.1580	41.93	0.00	41.93	65.57	-23.64	peak	
2		0.3860	42.39	0.01	42.40	58.15	-15.75	peak	
3	*	0.4940	40.48	0.01	40.49	56.10	-15.61	QP	
4		0.4940	27.86	0.01	27.87	46.10	-18.23	AVG	
5		1.3180	37.60	0.03	37.63	56.00	-18.37	peak	
6		2.0340	37.73	0.04	37.77	56.00	-18.23	peak	
7		8.1900	37.11	0.25	37.36	60.00	-22.64	peak	

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7 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.

7.1 Measurement Procedure:

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

Duty Cycle:

CIC.									
Mode	Duty Cycle (%) =Ton / (Ton+Toff)	Duty Factor (dB) =10*log (1/Duty Cycle)	1/T (kHz)	VBW setting (kHz)					
802.11a	98.17	0.08	0.48	1.00					
802.11n_20	97.99	0.09	0.52	1.00					
802.11ac_20	98.23	0.08	0.52	1.00					
802.11n_40	96.26	0.17	1.06	2.00					
802.11ac_40	96.36	0.16	1.05	2.00					
802.11ac_80	92.66	0.33	2.16	3.00					

Duty Cycle Factor: 10 * log(1/0.9817) = 0.08 Duty Cycle Factor: 10 * log(1/0.9799) = 0.09 Duty Cycle Factor: 10 * log(1/0.9823) = 0.08 Duty Cycle Factor: 10 * log(1/0.9626) = 0.17 Duty Cycle Factor: 10 * log(1/0.9636) = 0.16 Duty Cycle Factor: 10 * log(1/0.9266) = 0.33

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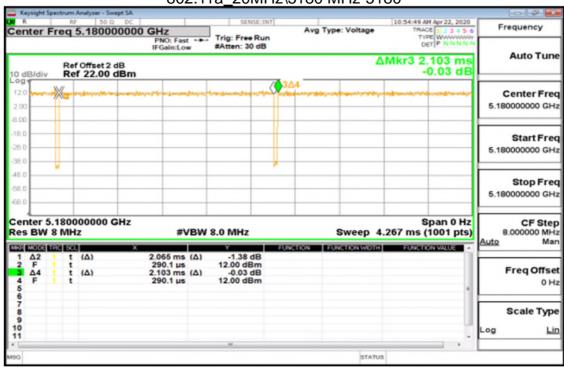
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7.2 DUTY CYCLE TEST SIGNAL MEASUREMENT RESULT

802.11a 20MHz\5180 MHz-5180





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802.11n 40MHz\5190 MHz-5190



802.11ac 80MHz\5210 MHz-5210



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26DB & 6DB EMISSION BANDWIDTH MEASUREMENT

8.1 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

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 spectrum analyzer.
 - 3.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.

- 3.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.

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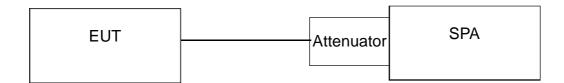


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8.3 **Measurement Equipment Used**

	SGS Conducted Room									
Name of Equip- ment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due					
EXA Spectrum Ana- lyzer	Agilent	N9010A	MY50420195	05/06/2020	05/05/2021					
DC Power Supply	Agilent	E3640A	MY40000811	12/23/2019	12/22/2020					
Temperature Cham- ber	TERCHY	MHG-120LF	911009	05/17/2019	05/16/2020					
Attenuator	Mini-Circuit	BW-S10W2+	2	01/02/2020	01/01/2021					
DC Block	Mini-Circuits	BLK-18-S+	1	01/02/2020	01/01/2021					

8.4 **Test Set-up**



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8.5 **Measurement Resultp543**

8.5.1 FCC 26dB Bandwidth

802.11a Ch0

802.11n HT20 Ch0

002.114_				_1111 20_011	
Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)	Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5180	28.42	14.536	5180	28.96	14.618
5220	21.57	13.339	5220	28.3	14.518
5240	28.34	14.524	5240	26.47	14.228
5260	24.25	13.847	5260	26.09	14.165
5300	21.05	13.233	5300	21.19	13.261
5320	22.97	13.612	5320	21.2	13.263
5500	24.78	13.941	5500	24.55	13.901
5580	23.44	13.700	5580	25.76	14.109
5700	20.69	13.158	5700	21.09	13.241

802.11n _HT40_Ch0

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)	802.11a	c _VHT80_	_Ch0	
5190	41.26	16.155		26dB		
5230	49.12	16.913	Freq. (MHz)	BW	10 Log (B) (dB)	
5270	49.91	16.982	(1411 12)	(MHz)		
5310	41.23	16.152	5210	84.71	19.279	
5510	40.93	16.120	5290	81.67	19.121	
5550	46.27	16.653	5530	84.69	19.278	
5670	45.29	16.560	5610	99.09	19.960	

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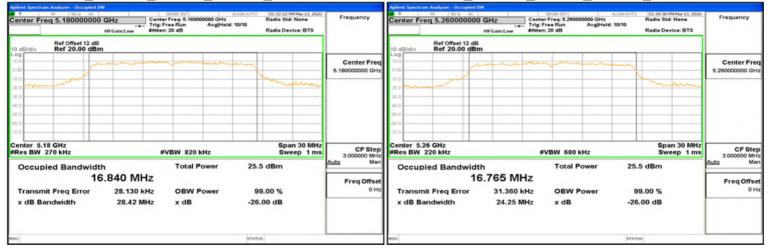
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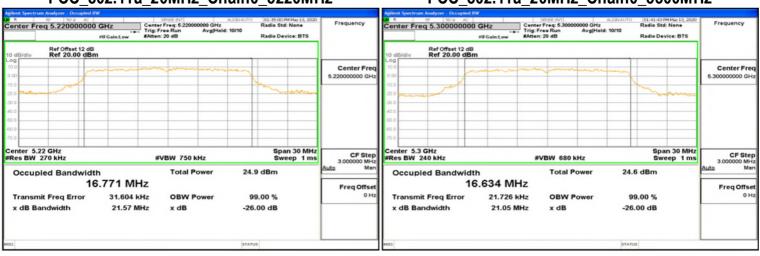
FCC 802.11a 20MHz Chain0 5180MHz

FCC 802.11a 20MHz Chain0 5260MHz



FCC 802.11a 20MHz Chain0 5220MHz

FCC_802.11a_20MHz_Chain0_5300MHz



FCC 802.11a 20MHz Chain0 5240MHz

FCC 802.11a 20MHz Chain0 5320MHz



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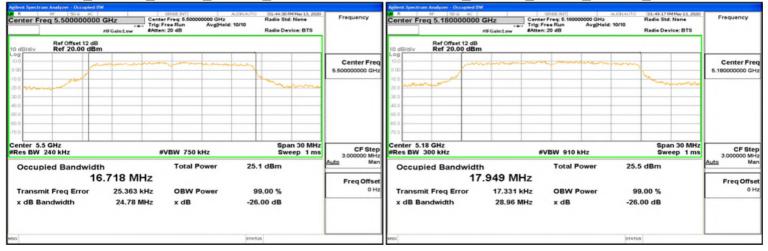
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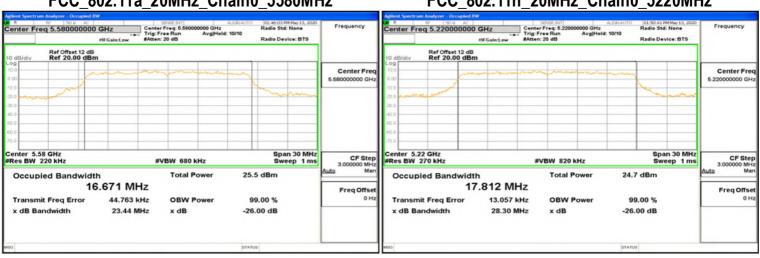
FCC 802.11a 20MHz Chain0 5500MHz

FCC 802.11n 20MHz Chain0 5180MHz



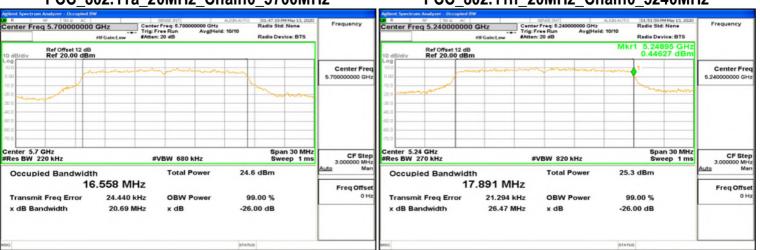
FCC 802.11a 20MHz Chain0 5580MHz

FCC_802.11n_20MHz_Chain0_5220MHz



FCC 802.11a 20MHz Chain0 5700MHz

FCC 802.11n 20MHz Chain0 5240MHz



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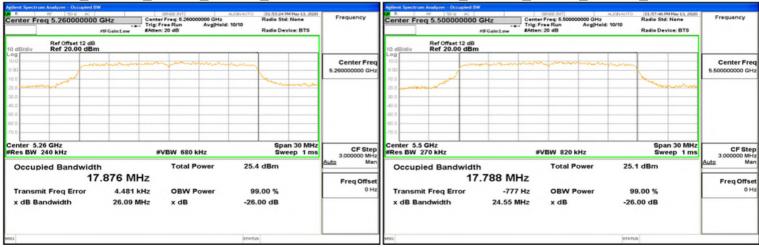
f (886-2) 2298-0488



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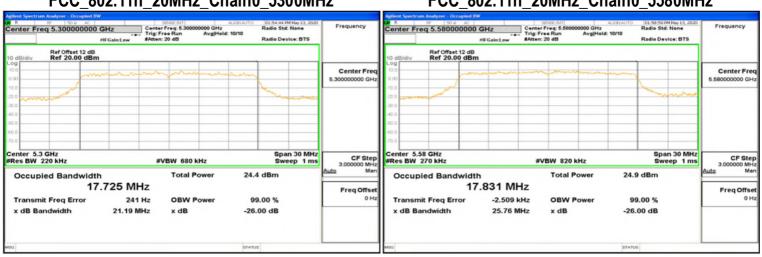
FCC_802.11n_20MHz_Chain0_5260MHz

FCC 802.11n 20MHz Chain0 5500MHz



FCC 802.11n 20MHz Chain0 5300MHz

FCC 802.11n 20MHz Chain0 5580MHz



FCC 802.11n 20MHz Chain0 5320MHz

FCC 802.11n 20MHz Chain0 5700MHz



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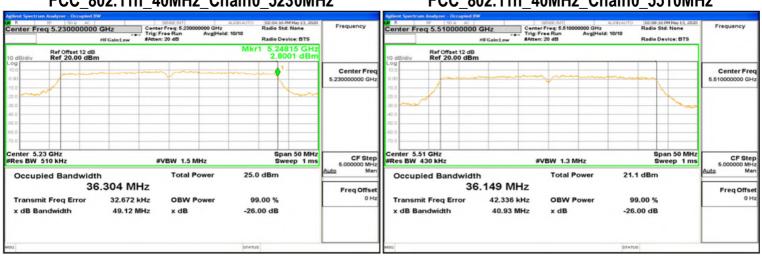
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FCC 802.11n 40MHz Chain0 5310MHz



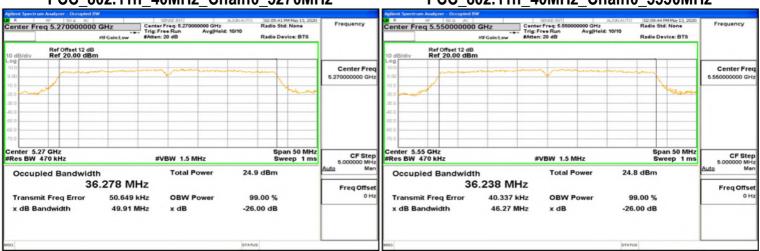
FCC 802.11n 40MHz Chain0 5230MHz

FCC 802.11n 40MHz Chain0 5510MHz



FCC 802.11n 40MHz Chain0 5270MHz

FCC 802.11n 40MHz Chain0 5550MHz



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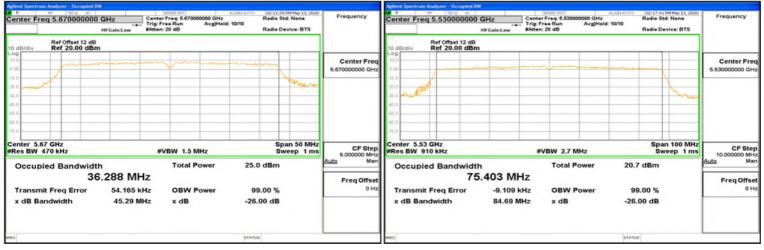
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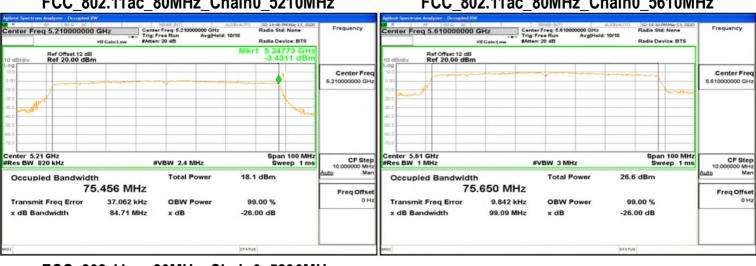
FCC 802.11n 40MHz Chain0 5670MHz

FCC_802.11ac_80MHz_Chain0_5530MHz

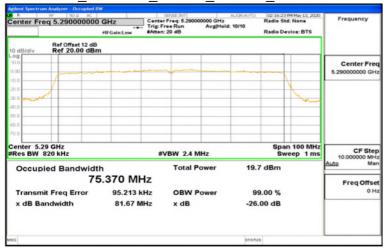


FCC 802.11ac 80MHz Chain0 5210MHz

FCC 802.11ac 80MHz Chain0 5610MHz



FCC 802.11ac 80MHz Chain0 5290MHz



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8.5.2 99% BW Verification for DFS Function

802.11a Ch0

802.11n_HT20_Ch0

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)	Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5240	5248.40	< 5250	5240	5248.95	< 5250

802.11n _HT40_Ch0

802.11ac _VHT80_Ch0

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)	Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5230	5248.15	< 5250	5210	5247.73	< 5250

Please see next page for test plots.

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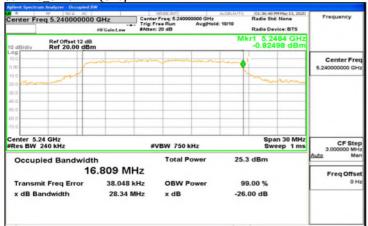
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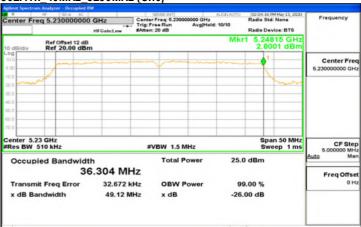


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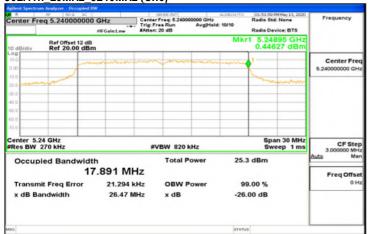
802.11a 5240MHz (Ch0)



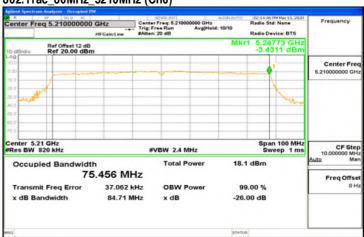
802.11n 40MHz 5230MHz (Ch0)



802.11n 20MHz 5240MHz (Ch0)



802.11ac 80MHz 5210MHz (Ch0)



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MAXIMUM CONDUCTED OUTPUT POWER MEASUREMENT

9.1 Standard Applicable

FCC

1			
OPERZTION Band		EUT CATEGORY	LIMIT
		Access Point (Master device)	1 Watt(30dBm)
U-NII-1		Fixed point-to-point Access Ponit	1 Watt(30dBm)
	V	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 granter than 6 dBi. Therefore, reduction of power is not required.

9.2 **Measurement Procedure**

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

9.3 **Measurement Equipment Used**

	SGS Conducted Room									
Name of Equipment	Manufacturer	Model	Serial Number	Calibra- tion Date	Calibra- tion Due					
Power Meter	Anritsu	ML2496A	1804001	02/20/2020	02/19/2021					
Power Sensor	Anritsu	MA2411B	1726104	02/20/2020	02/19/2021					
Power Sensor	Anritsu	MA2411B	1726107	02/20/2020	02/19/2021					
DC Power Sup- ply	Agilent	E3640A	MY40000811	12/23/2019	12/22/2020					
Attenuator	Mini-Circuit	BW-S10W2+	2	01/02/2020	01/01/2021					

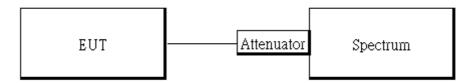
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9.4 **Test Set-up**



9.5 **Measurement Result**

Conducted output power (FCC) 9.5.1

802 11a Ch0

СН	Frequency (MHz)	Data Rate	TOTAL POWER (dBm)	TOTAL POWER (mW)		REQUIRED LIMIT (dBm)		RESULT
36	5180	6	18.98	79.072		23.98		PASS
44	5220	6	18.80	75.861		23.98		PASS
48	5240	6	18.97	78.890		23.98		PASS
52	5260	6	18.96	78.708	23.98	or 11+10log(B) =	24.85	PASS
60	5300	6	18.22	66.378	23.98	or 11+10log(B) =	24.23	PASS
64	5320	6	18.86	76.917	23.98	or 11+10log(B) =	24.61	PASS
100	5500	6	18.95	78.527	23.98	or 11+10log(B) =	24.94	PASS
116	5580	6	18.98	79.072	23.98	or 11+10log(B) =	24.70	PASS
140	5700	6	18.63	72.949	23.98	or 11+10log(B) =	24.16	PASS

802 11n HT20 Ch0

002.1111_11120_0110									
СН	Frequency (MHz)	Data Rate	TOTAL POWER (dBm)	TOTAL POWER (mW)		REQUIRED LIMIT (dBm)		RESULT	
36	5180	MCS0	18.97	78.853		23.98		PASS	
44	5220	MCS0	18.61	72.580	23.98			PASS	
48	5240	MCS0	18.98	79.035		23.98		PASS	
52	5260	MCS0	18.94	78.310	23.98	or 11+10log(B) =	25.16	PASS	
60	5300	MCS0	18.27	67.115	23.98	or 11+10log(B) =	24.26	PASS	
64	5320	MCS0	18.75	74.958	23.98	or 11+10log(B) =	24.26	PASS	
100	5500	MCS0	18.96	78.672	23.98	or 11+10log(B) =	24.90	PASS	
116	5580	MCS0	18.99	79.217	23.98	or 11+10log(B) =	25.11	PASS	
140	5700	MCS0	18.51	70.928	23.98	or 11+10log(B) =	24.24	PASS	

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802.11n HT40 Ch0

CH	Frequency (MHz)	Data Rate	TOTAL POWER (dBm)	TOTAL POWER (mW)		REQUIRED LIMIT (dBm)		RESULT
38	5190	MCS0	12.31	17.004		23.98		PASS
46	5230	MCS0	18.45	69.912		23.98		PASS
54	5270	MCS0	18.76	75.085	23.98	or 11+10log(B) =	27.98	PASS
62	5310	MCS0	14.29	26.826	23.98	or 11+10log(B) =	27.15	PASS
102	5510	MCS0	15.12	32.475	23.98	or 11+10log(B) =	27.12	PASS
110	5550	MCS0	18.70	74.055	23.98	or 11+10log(B) =	27.65	PASS
134	5670	MCS0	18.62	72.703	23.98	or 11+10log(B) =	27.56	PASS

802.11ac VHT80 Ch0

СН	Frequency (MHz)	Data Rate	TOTAL POWER (dBm)	TOTAL POWER (mW)		REQUIRED LIMIT (dBm)		RESULT
42	5210	MCS0	11.49	14.096		23.98		PASS
58	5290	MCS0	12.66	18.455	23.98	or 11+10log(B) =	30.12	PASS
106	5530	MCS0	13.54	22.600	23.98	or 11+10log(B) =	30.28	PASS
122	5610	MCS0	18.98	79.087	23.98	or 11+10log(B) =	30.96	PASS

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10 MAXIMUM POWER SPECTRAL DENSITY

10.1 Standard Applicable

FCC

OPERZTION Band		EUT CATEGORY	LIMIT		
		Access Point (Master device)	17dBm/ MHz		
U-NII-1		Fixed point-to-point Access Ponit	TADIII/ WITZ		
	√	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.

10.2 **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≥ 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.

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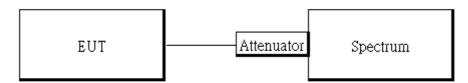


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10.3 **Measurement Equipment Used**

SGS Conducted Room										
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due					
EXA Spectrum Analyzer	Agilent	N9010A	MY50420195	05/06/2020	05/05/2021					
DC Power Sup- ply	Agilent	E3640A	MY40000811	12/23/2019	12/22/2020					
Temperature Chamber	TERCHY	MHG-120LF	911009	05/17/2019	05/16/2020					
Attenuator	Mini-Circuit	BW-S10W2+	2	01/02/2020	01/01/2021					
DC Block	Mini-Circuits	BLK-18-S+	1	01/02/2020	01/01/2021					

10.4 **Test Set-up**



10.5 **Measurement Result**

10.5.1 **Power spectral density**

POWER DENSITY 802.11a MODE										
Frequency (MHz)	PSD W/O Duty Factor (dBm)	Duty Factor	PSD With Duty Factor (dBm)	Limit (dBm)	Margin (dB)					
5180.00	8.16	-	8.16	11.00	-2.84					
5220.00	7.55	•	7.55	11.00	-3.45					
5240.00	7.77	-	7.77	11.00	-3.23					
5260.00	8.01	-	8.01	11.00	-2.99					
5300.00	7.05	•	7.05	11.00	-3.95					
5320.00	7.71	•	7.71	11.00	-3.29					
5500.00	7.84	-	7.84	11.00	-3.16					
5580.00	7.76	-	7.76	11.00	-3.24					
5700.00	7.27	-	7.27	11.00	-3.73					

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POWER DENSITY 802.11n HT20 MODE									
Frequency (MHz)	PSD W/O Duty Factor (dBm)	Duty Factor	PSD With Duty Factor (dBm)	Limit (dBm)	Margin (dB)				
5180	7.73	0.09	7.82	11	-3.18				
5220	7.04	0.09	7.13	11	-3.87				
5240	7.53	0.09	7.62	11	-3.38				
5260	7.43	0.09	7.52	11	-3.48				
5300	6.71	0.09	6.80	11	-4.20				
5320	7.25	0.09	7.34	11	-3.66				
5500	7.52	0.09	7.61	11	-3.39				
5580	7.36	0.09	7.45	11	-3.55				
5700	6.96	0.09	7.05	11	-3.95				
	POWER DENS	ITY 802.11r	HT40 MOD	E					
Frequency (MHz)	PSD W/O Duty Factor (dBm)	Duty Factor	PSD With Duty Factor (dBm)	Limit (dBm)	Margin (dB)				
5190	-2.42	0.17	-2.25	11	-13.25				
5230	3.98	0.17	4.15	11	-6.85				
5270	4.17	0.17	4.04	11					
		0.17	4.34	1.1	-6.66				
5310	-0.18	0.17	-0.01	11	-6.66 -11.01				
5310 5510	-0.18 0.53								
		0.17	-0.01	11	-11.01				
5510	0.53	0.17 0.17	-0.01 0.70	11 11	-11.01 -10.30				
5510 5550	0.53 4.54	0.17 0.17 0.17 0.17	-0.01 0.70 4.71 4.09	11 11 11 11	-11.01 -10.30 -6.29				
5510 5550	0.53 4.54 3.92	0.17 0.17 0.17 0.17	-0.01 0.70 4.71 4.09	11 11 11 11	-11.01 -10.30 -6.29				
5510 5550 5670 Frequency	0.53 4.54 3.92 POWER DENSITED PSD W/O Duty Factor	0.17 0.17 0.17 0.17 FY 802.11ac	-0.01 0.70 4.71 4.09 VHT80 MO PSD With Duty Factor	11 11 11 11 DE	-11.01 -10.30 -6.29 -6.91 Margin				
5510 5550 5670 Frequency (MHz)	0.53 4.54 3.92 POWER DENSITE PSD W/O Duty Factor (dBm)	0.17 0.17 0.17 0.17 FY 802.11ac Duty Factor	-0.01 0.70 4.71 4.09 VHT80 MO PSD With Duty Factor (dBm)	11 11 11 11 DE Limit (dBm)	-11.01 -10.30 -6.29 -6.91 Margin (dB)				
5510 5550 5670 Frequency (MHz)	0.53 4.54 3.92 POWER DENSITE PSD W/O Duty Factor (dBm) -6.07	0.17 0.17 0.17 0.17 FY 802.11ac Duty Factor	-0.01 0.70 4.71 4.09 VHT80 MO PSD With Duty Factor (dBm) -5.74	11 11 11 11 DE Limit (dBm)	-11.01 -10.30 -6.29 -6.91 Margin (dB)				

Note:

Cable Loss=

12 dB

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802.11a 20MHz 5180MHz

802.11a 20MHz 5260MHz





802.11a 20MHz 5220MHz

802.11a 20MHz 5300MHz





802.11a 20MHz 5240MHz

802.11a 20MHz 5320MHz





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802.11a 20MHz 5500MHz

802.11n 20MHz 5180MHz

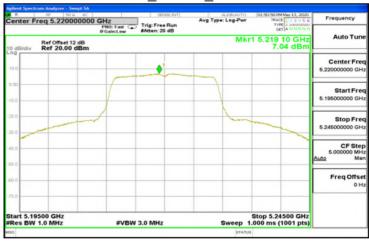




802.11a 20MHz 5580MHz

802.11n 20MHz 5220MHz





802.11a 20MHz 5700MHz

802.11n 20MHz 5240MHz





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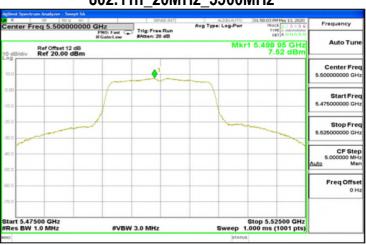


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802.11n 20MHz 5260MHz

802.11n 20MHz 5500MHz

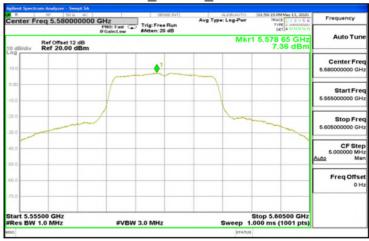




802.11n 20MHz 5300MHz

802.11n 20MHz 5580MHz





802.11n 20MHz 5320MHz

802.11n 20MHz 5700MHz





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802.11n 40MHz 5190MHz

802.11n 40MHz 5310MHz





802.11n 40MHz 5230MHz

802.11n_40MHz_5510MHz





802.11n 40MHz 5270MHz

802.11n 40MHz 5550MHz





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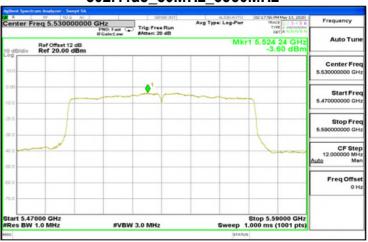


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802.11n 40MHz 5670MHz

802.11ac 80MHz 5530MHz

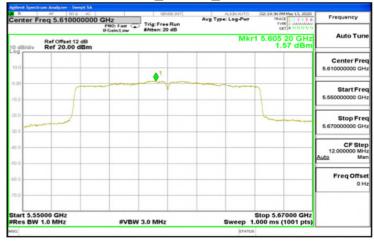




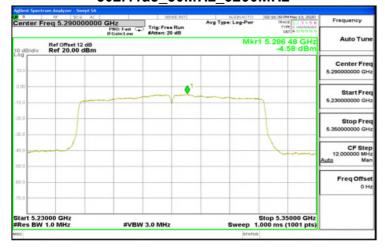
802.11ac_80MHz_5210MHz

802.11ac 80MHz_5610MHz





802.11ac 80MHz 5290MHz



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11 UNDESIRABLE RADIATED EMISSION MEASUREMENT

Standard Applicable 11.1

11.1.1 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.

EIRP LIMIT	FIELD STRENGTH AT 3m
PK: -27 (dBm/MHz)	PK: 68.3 (dBμV/m)
PK:-27 (dBm/MHz) *1	PK: 68.2(dBµV/m) *1
PK:10 (dBm/MHz) *2	PK:105.2 (dBµV/m) *2
PK:15.6 (dBm/MHz) *3	PK: 110.8(dBµV/m) *3 PK:122.2 (dBµV/m) *4
	PK: -27 (dBm/MHz) PK:-27 (dBm/MHz) *1 PK:10 (dBm/MHz) *2

^{*1} beyond 75 MHz or more above of the bandedge.

 $EIRP = ((E^*d)^2) / 30$, 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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^{*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.



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11.1.2 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 μ V/m) = 20 log Emission level (μ V/m)

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Measurement Equipment Used

	SGS SAC-III								
Name of Equip- ment	Manufacturer	Model	Serial Num- ber	Calibration Date	Calibration Due				
Horn Antenna	Schwarzbeck	BBHA9170	184	12/25/2019	12/24/2020				
Horn Antenna	Schwarzbeck	BBHA9120D	D803	12/20/2019	12/19/2020				
Bi-log Antenna	TESEO	CBL 6112D	35242 & AT- N0555	01/13/2020	01/12/2021				
Loop Antenna	ETS.LINDGREN	6502	148045	10/15/2019	10/14/2020				
Spectrum Analyzer	Agilent	E4446A	MY51100003	10/23/2019	10/22/2020				
EMI Test Receiver	R&S	ESCI 7	1166.5950.07	07/04/2019	07/03/2020				
Pre-Amplifier	EMC Instruments	EMC184045B	980135	01/02/2020	01/01/2021				
Pre-Amplifier	EMC Instruments	EMC051825	980152	01/02/2020	01/01/2021				
Pre-Amplifier	HP	8447D	2944A09469	01/02/2020	01/01/2021				
Attenuator	Mini-Circuit	BW-S10W2+	4	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	WHKX4.0/18G- 10SS	22	01/02/2020	01/01/2021				
Coaxial Cable	Huber Suhner	succoflex 102	MY2622/2	01/02/2020	01/01/2021				
Coaxial Cable	Huber Suhner	succoflex 104A	800086/4a	01/02/2020	01/01/2021				
Coaxial Cable	Huber Suhner	EMC 104-SM- SM-2000	160123	01/02/2020	01/01/2021				

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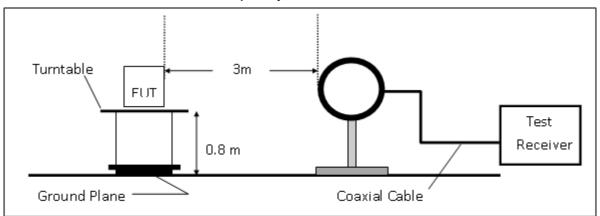
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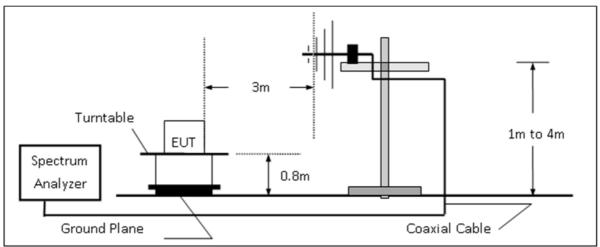
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11.3 **Test SET-UP**

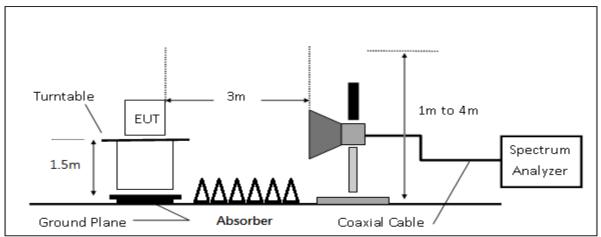
(A) Radiated Emission Test Set-UP Frequency Below 30MHz.



(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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11.4 **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.
- 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.
- 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.
- Maximum procedure was performed on the six highest emissions to ensure EUT compliance. 8.
- 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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11.5 Field Strength Calculation

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

FS = RA + AF + CL - AG

Where FS = Field Strength

CL = Cable Attenuation Factor (Cable Loss)

RA = *Reading Amplitude*

AG = Amplifier Gain

AF = Antenna Factor

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

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

 $Factor(dB) = Antenna\ Factor(dB\mu V/m) + Cable\ Loss(dB) - Pre_Amplifier\ Gain(dB)$

11.6 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.

Pre-scanned was done at frequency 5.47 GHz and 5.85 GHz for bandedge measurement of straddle channels 138, 142 and 144 which was 20dB lower than the limit per 15.31(o) was not reported.

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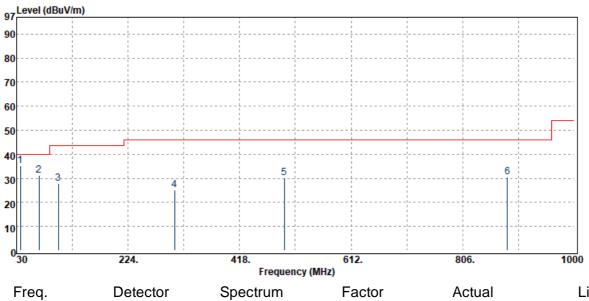
Radiated Spurious Emission Measurement Result

11.7.1 **Below 1GHz Worst-Case Data:**

Report Number :ER/2020/40050 **Test Date** :2020-05-13

Operation Mode :802.11aB1 Temp./Humi. :24.6/65 **Test Frequency** :5220 MHz Antenna Pol. :VERTICAL Test Mode :Tx CH Mid Engineer :Thomas

EUT Pol :H Plane



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμ̈V	dB	dBµV/m	dBμV/m	dB
36.79	Peak	43.30	-8.04	35.26	40.00	-4.74
68.80	Peak	48.51	-17.22	31.29	40.00	-8.71
102.75	Peak	40.17	-12.24	27.93	43.50	-15.57
304.51	Peak	33.44	-8.41	25.03	46.00	-20.97
495.60	Peak	35.65	-5.31	30.34	46.00	-15.66
883.60	Peak	29.74	0.74	30.48	46.00	-15.52

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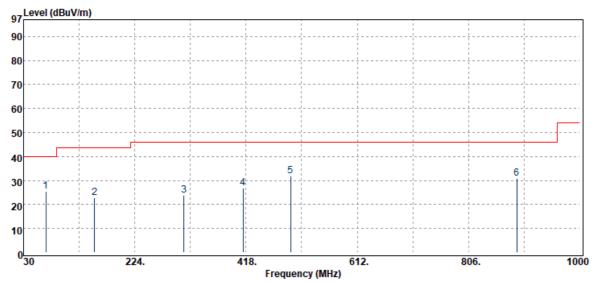
:ER/2020/40050 **Test Date** Report Number :2020-05-13

Operation Mode Temp./Humi. :802.11aB1 :24.6/65

Test Frequency Antenna Pol. :HORIZONTAL :5220 MHz

Test Mode :Tx CH Mid Engineer :Thomas

EUT Pol :H Plane



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμV	dB	dBµV/m	dBμV/m	dB
68.80	Peak	42.85	-17.22	25.63	40.00	-14.37
154.16	Peak	34.94	-12.19	22.75	43.50	-20.75
309.36	Peak	32.21	-8.24	23.97	46.00	-22.03
413.15	Peak	31.97	-5.23	26.74	46.00	-19.26
495.60	Peak	37.13	-5.31	31.82	46.00	-14.18
890.39	Peak	29.78	1.05	30.83	46.00	-15.17

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:Thomas

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Engineer

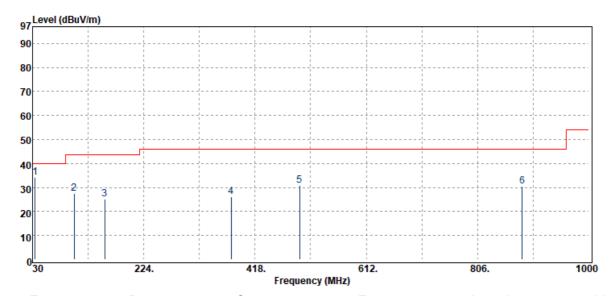
:ER/2020/40050 **Test Date** Report Number :2020-05-13

Operation Mode :802.11aB2 Temp./Humi. :24.6/65

Test Frequency :5300 MHz Antenna Pol. :VERTICAL

Test Mode :Tx CH Mid

EUT Pol :H Plane



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμV	dB	dBμV/m	dBμV/m	dB
34.85	Peak	41.17	-7.02	34.15	40.00	-5.85
102.75	Peak	39.72	-12.24	27.48	43.50	-16.02
156.10	Peak	37.45	-12.16	25.29	43.50	-18.21
376.29	Peak	33.12	-6.90	26.22	46.00	-19.78
495.60	Peak	36.35	-5.31	31.04	46.00	-14.96
883.60	Peak	29.95	0.74	30.69	46.00	-15.31

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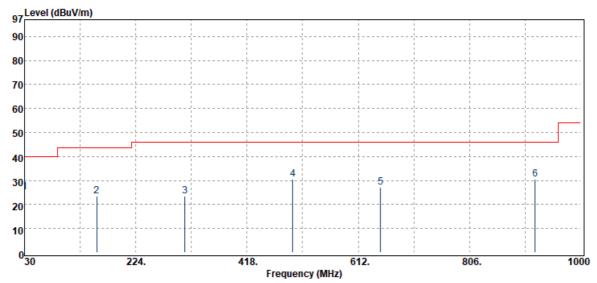
:ER/2020/40050 **Test Date** Report Number :2020-05-13

Operation Mode Temp./Humi. :802.11aB2 :24.6/65

Test Frequency :5300 MHz Antenna Pol. :HORIZONTAL

Test Mode :Tx CH Mid Engineer :Thomas

EUT Pol :H Plane



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμV	dB	dBµV/m	dBμV/m	dB
30.00	Peak	29.62	-4.56	25.06	40.00	-14.94
156.10	Peak	35.81	-12.16	23.65	43.50	-19.85
309.36	Peak	31.79	-8.24	23.55	46.00	-22.45
497.54	Peak	35.84	-5.23	30.61	46.00	-15.39
650.80	Peak	30.60	-3.44	27.16	46.00	-18.84
920.46	Peak	29.82	0.70	30.52	46.00	-15.48

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Test Mode

Report No.: ER/2020/40050

:Thomas

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Engineer

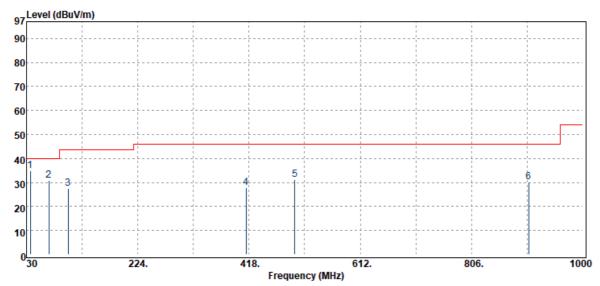
:ER/2020/40050 **Test Date** Report Number :2020-05-13

Operation Mode :802.11aB3 Temp./Humi. :24.6/65

Test Frequency Antenna Pol. :VERTICAL :5580 MHz

EUT Pol :H Plane

:Tx CH Mid



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμ̈V	dB	dBμV/m	dBμV/m	dB
36.79	Peak	42.90	-8.04	34.86	40.00	-5.14
68.80	Peak	47.95	-17.22	30.73	40.00	-9.27
102.75	Peak	39.77	-12.24	27.53	43.50	-15.97
413.15	Peak	33.11	-5.23	27.88	46.00	-18.12
497.54	Peak	36.53	-5.23	31.30	46.00	-14.70
905.91	Peak	29.15	0.94	30.09	46.00	-15.91

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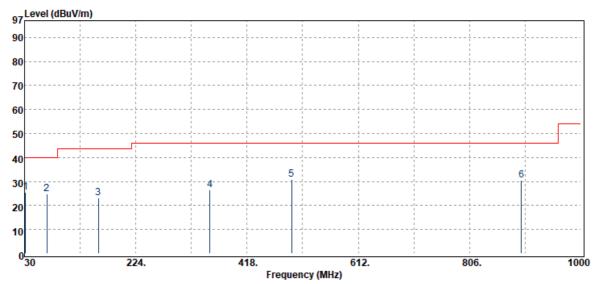
:ER/2020/40050 **Test Date** Report Number :2020-05-13

Operation Mode Temp./Humi. :802.11aB3 :24.6/65

Test Frequency Antenna Pol. :HORIZONTAL :5580 MHz

Test Mode :Tx CH Mid Engineer :Thomas

EUT Pol :H Plane



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμV	dB	dBμV/m	dBμV/m	dB
31.94	Peak	30.91	-5.32	25.59	40.00	-14.41
68.80	Peak	41.99	-17.22	24.77	40.00	-15.23
159.01	Peak	35.32	-12.27	23.05	43.50	-20.45
353.01	Peak	33.89	-7.21	26.68	46.00	-19.32
495.60	Peak	36.28	-5.31	30.97	46.00	-15.03
896.21	Peak	29.47	1.18	30.65	46.00	-15.35

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:VERTICAL

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Antenna Pol.

11.7.2 **Above 1GHz Worst-Case Data:**

:5180 MHz

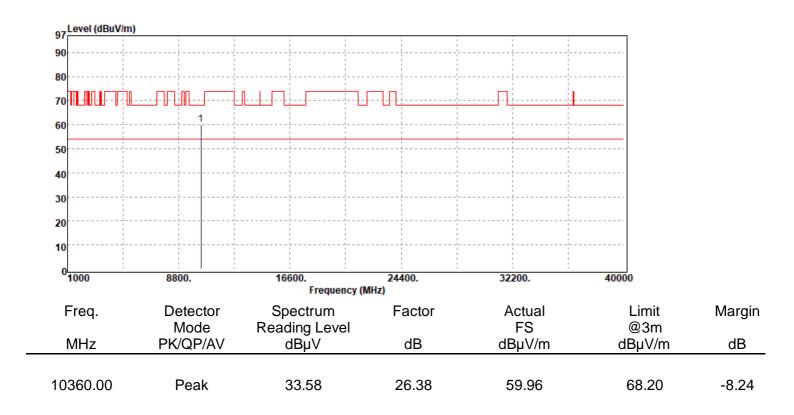
:ER/2020/40050 Report Number **Test Date** :2020-05-12

Operation Mode :802.11aB1 Temp./Humi. :25.1/66

Test Mode :Tx CH Low Engineer :Thomas

EUT Pol :H Plane

Test Frequency



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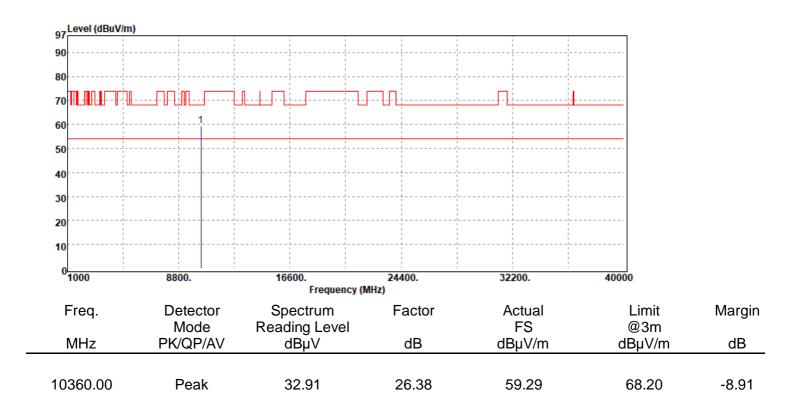
:ER/2020/40050 **Test Date** Report Number :2020-05-12

Operation Mode :802.11aB1 Temp./Humi. :25.1/66

Test Frequency :5180 MHz Antenna Pol. :HORIZONTAL

Test Mode Engineer :Tx CH Low :Thomas

EUT Pol :H Plane



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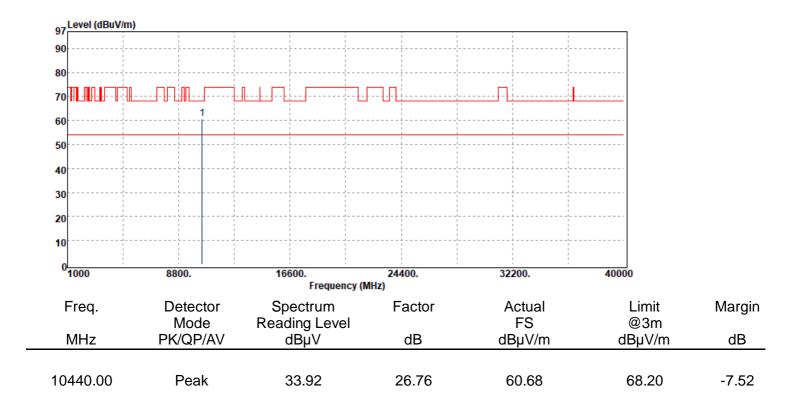
:ER/2020/40050 **Test Date** Report Number :2020-05-12

Operation Mode :802.11aB1 Temp./Humi. :25.1/66

Test Frequency Antenna Pol. :VERTICAL :5220 MHz

Test Mode Engineer :Tx CH Mid :Thomas

EUT Pol :H Plane



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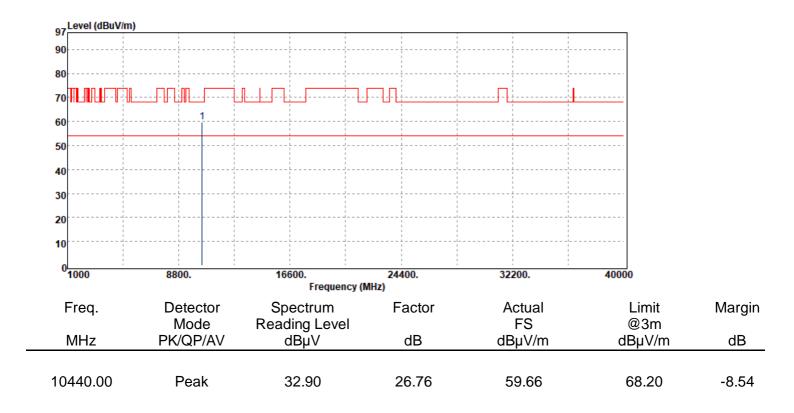
:ER/2020/40050 **Test Date** Report Number :2020-05-12

Operation Mode :802.11aB1 Temp./Humi. :25.1/66

Test Frequency Antenna Pol. :HORIZONTAL :5220 MHz

Test Mode Engineer :Tx CH Mid :Thomas

EUT Pol :H Plane



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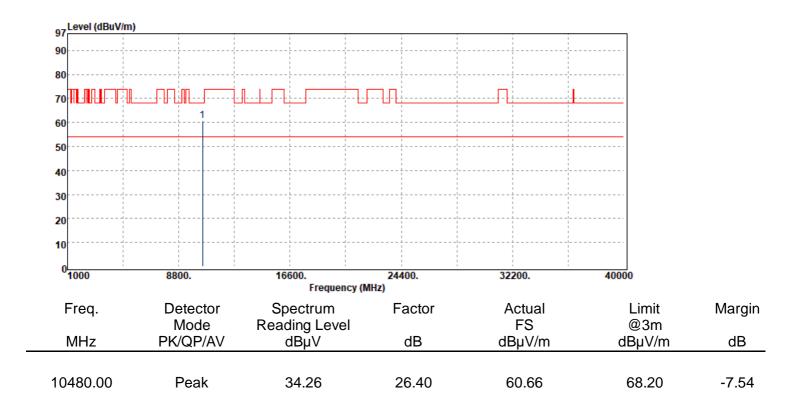
:ER/2020/40050 **Test Date** Report Number :2020-05-12

Operation Mode :802.11aB1 Temp./Humi. :25.1/66

Test Frequency :5240 MHz Antenna Pol. :VERTICAL

Test Mode Engineer :Tx CH High :Thomas

EUT Pol :H Plane



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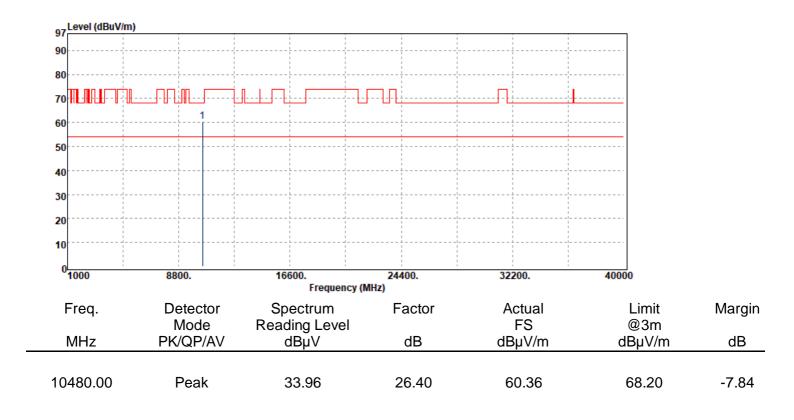
:ER/2020/40050 **Test Date** Report Number :2020-05-12

Operation Mode :802.11aB1 Temp./Humi. :25.1/66

Test Frequency :5240 MHz Antenna Pol. :HORIZONTAL

Test Mode Engineer :Tx CH High :Thomas

EUT Pol :H Plane



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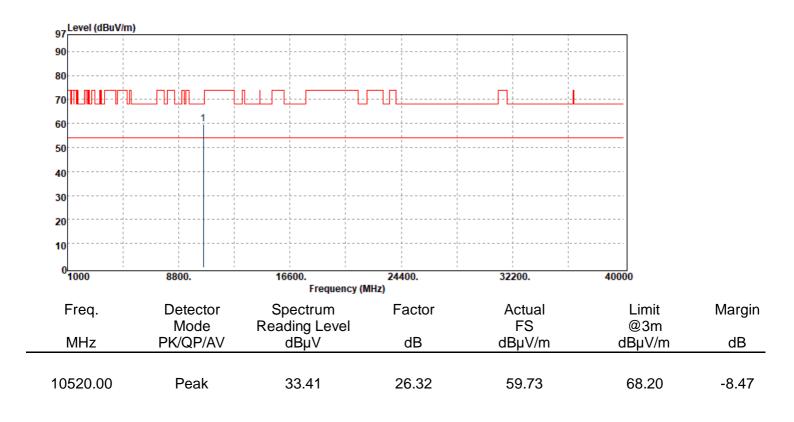
:ER/2020/40050 **Test Date** Report Number :2020-05-12

Operation Mode :802.11aB2 Temp./Humi. :25.1/66

Test Frequency :5260 MHz Antenna Pol. :VERTICAL

Test Mode Engineer :Tx CH Low :Thomas

EUT Pol :H Plane



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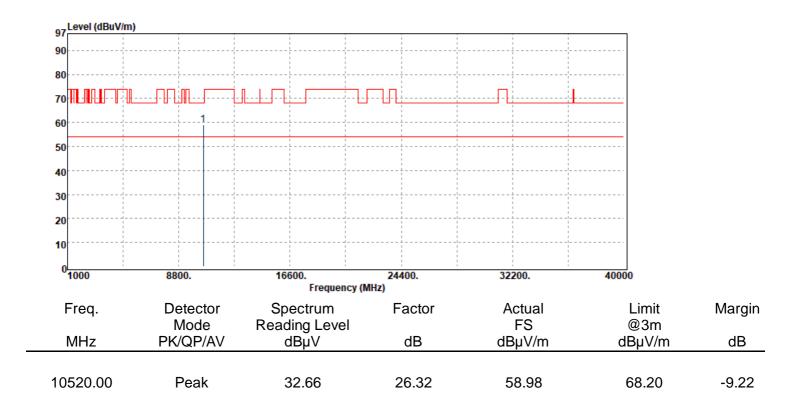
:ER/2020/40050 **Test Date** Report Number :2020-05-12

Operation Mode :802.11aB2 Temp./Humi. :25.1/66

Test Frequency :5260 MHz Antenna Pol. :HORIZONTAL

Test Mode Engineer :Tx CH Low :Thomas

EUT Pol :H Plane



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:Thomas

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Engineer

:ER/2020/40050 Report Number **Test Date** :2020-05-12

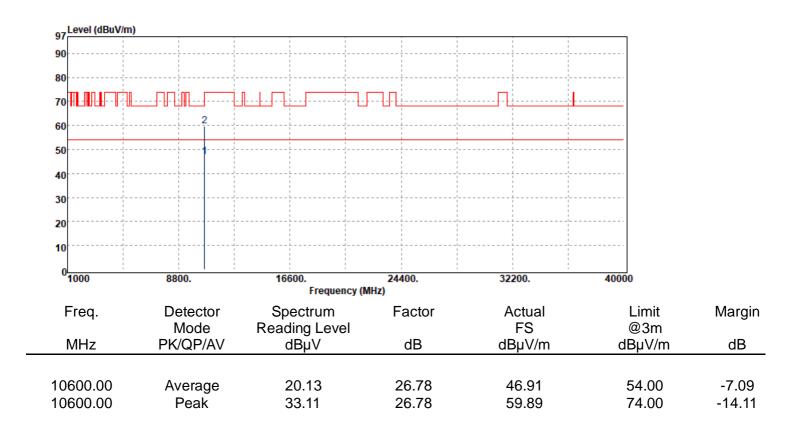
Operation Mode :802.11aB2 Temp./Humi. :25.1/66

Test Frequency :5300 MHz Antenna Pol. :VERTICAL

EUT Pol :H Plane

:Tx CH Mid

Test Mode



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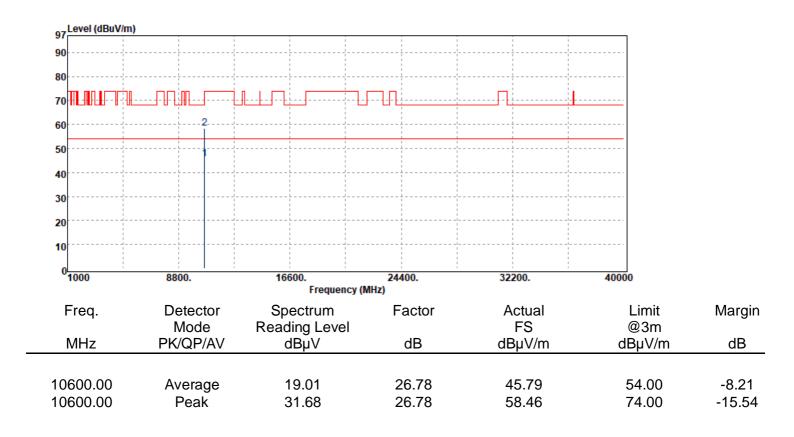
:ER/2020/40050 Report Number **Test Date** :2020-05-12

Operation Mode :802.11aB2 Temp./Humi. :25.1/66

Test Frequency :5300 MHz Antenna Pol. :HORIZONTAL

Test Mode :Tx CH Mid Engineer :Thomas

EUT Pol :H Plane



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:H Plane

EUT Pol

Report No.: ER/2020/40050

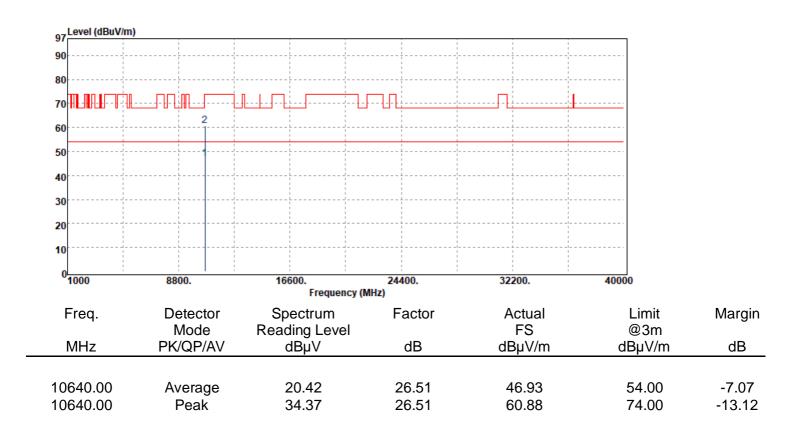
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:ER/2020/40050 Report Number **Test Date** :2020-05-12

Operation Mode :802.11aB2 Temp./Humi. :25.1/66

Test Frequency Antenna Pol. :VERTICAL :5320 MHz

Test Mode :Tx CH High Engineer :Thomas



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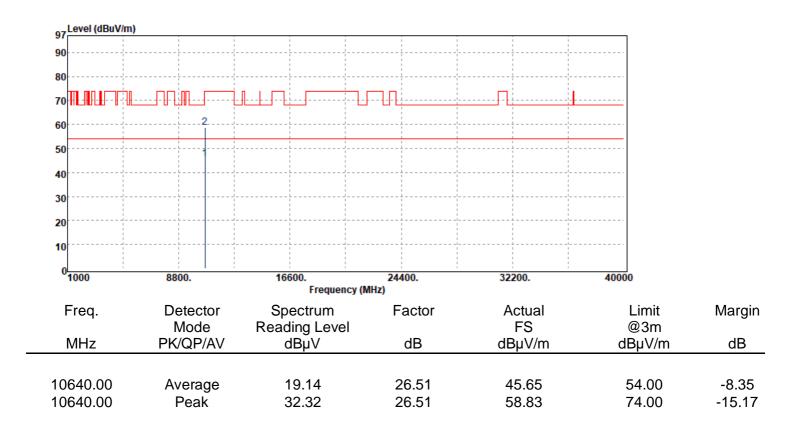
:ER/2020/40050 Report Number **Test Date** :2020-05-12

Operation Mode :802.11aB2 Temp./Humi. :25.1/66

Test Frequency Antenna Pol. :HORIZONTAL :5320 MHz

Test Mode :Tx CH High Engineer :Thomas

EUT Pol :H Plane



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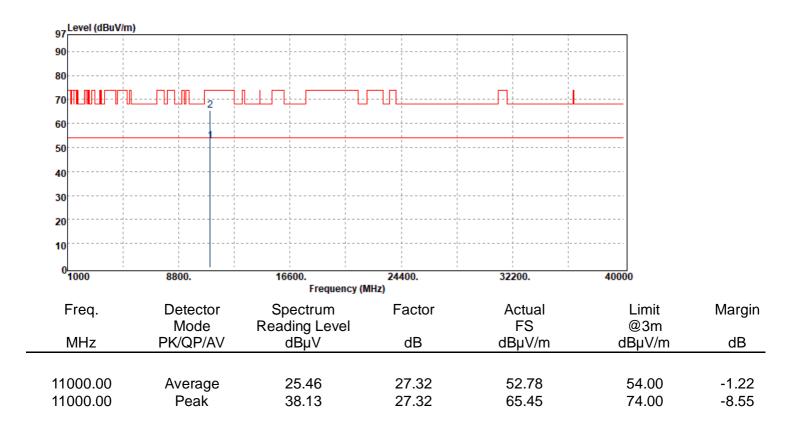
:ER/2020/40050 Report Number **Test Date** :2020-05-12

Operation Mode :802.11aB3 Temp./Humi. :25.1/66

Test Frequency :5500 MHz Antenna Pol. :VERTICAL

Test Mode :Tx CH Low Engineer :Thomas

EUT Pol :H Plane



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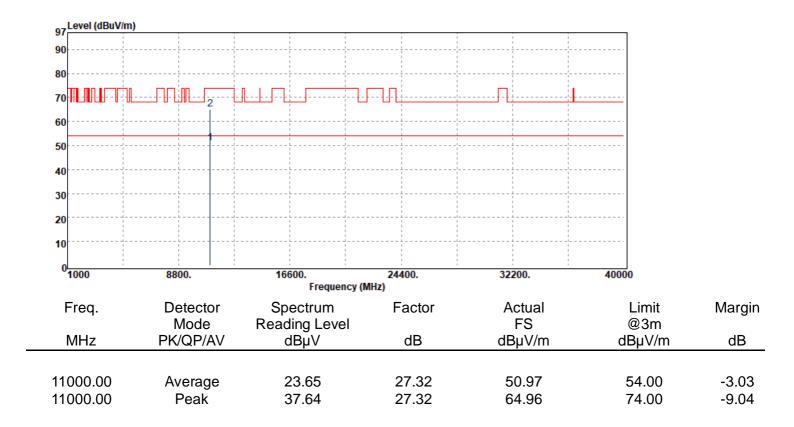
:ER/2020/40050 Report Number **Test Date** :2020-05-12

Operation Mode :802.11aB3 Temp./Humi. :25.1/66

Test Frequency :5500 MHz Antenna Pol. :HORIZONTAL

Test Mode :Tx CH Low Engineer :Thomas

EUT Pol :H Plane



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Engineer

:ER/2020/40050 Report Number **Test Date** :2020-05-12

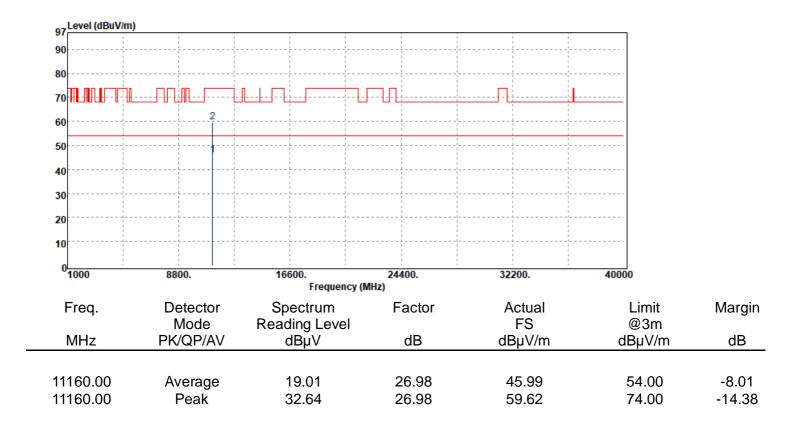
Operation Mode :802.11aB3 Temp./Humi. :25.1/66

Test Frequency Antenna Pol. :VERTICAL :5580 MHz

EUT Pol :H Plane

:Tx CH Mid

Test Mode



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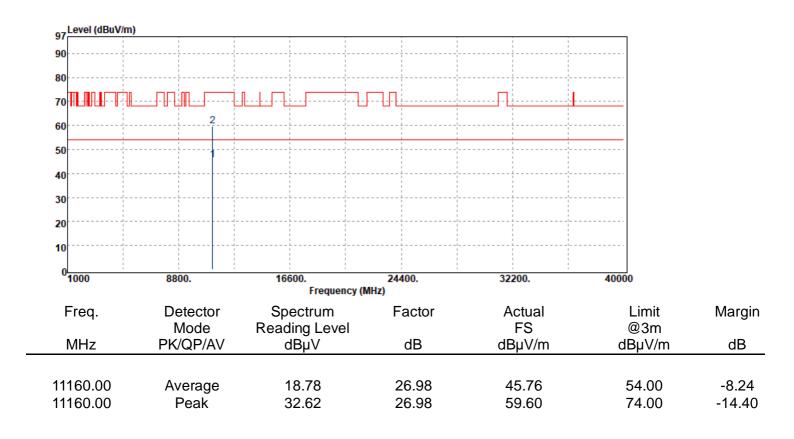
:ER/2020/40050 **Test Date** Report Number :2020-05-12

Operation Mode :802.11aB3 Temp./Humi. :25.1/66

Test Frequency Antenna Pol. :HORIZONTAL :5580 MHz

Test Mode :Tx CH Mid Engineer :Thomas

EUT Pol :H Plane



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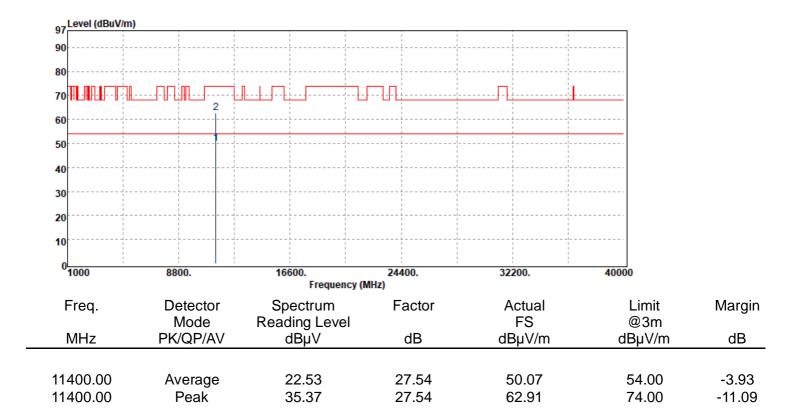
:ER/2020/40050 Report Number **Test Date** :2020-05-12

Operation Mode :802.11aB3 Temp./Humi. :25.1/66

Test Frequency :5700 MHz Antenna Pol. :VERTICAL

Test Mode :Tx CH High Engineer :Thomas

EUT Pol :H Plane



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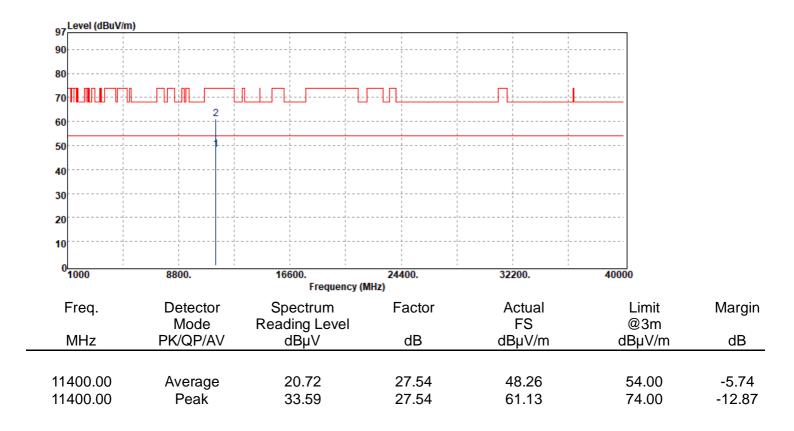
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Operation Mode :802.11aB3 Temp./Humi. :25.1/66

Test Frequency :5700 MHz Antenna Pol. :HORIZONTAL

Test Mode :Tx CH High Engineer :Thomas

EUT Pol :H Plane



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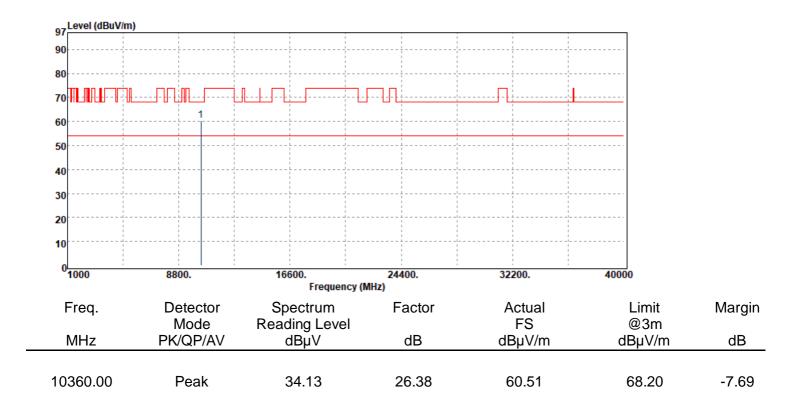
:ER/2020/40050 **Test Date** Report Number :2020-05-13

Operation Mode :802.11n20B1 Temp./Humi. :24.6/65

Test Frequency :5180 MHz Antenna Pol. :VERTICAL

Test Mode Engineer :Tx CH Low :Thomas

EUT Pol :H Plane



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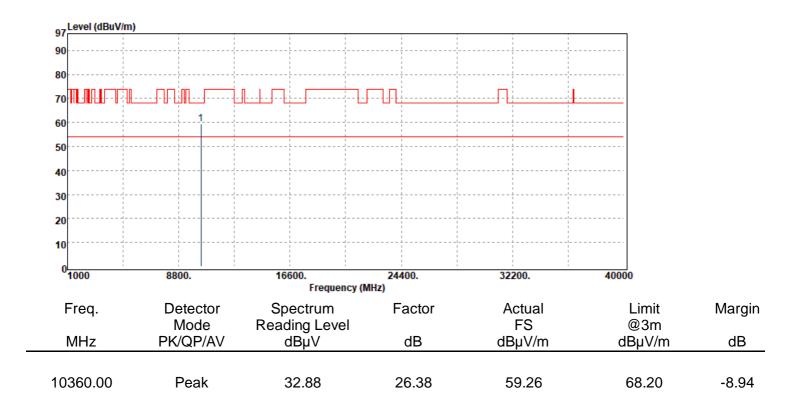
:ER/2020/40050 **Test Date** Report Number :2020-05-13

Operation Mode :802.11n20B1 Temp./Humi. :24.6/65

Test Frequency :5180 MHz Antenna Pol. :HORIZONTAL

Test Mode Engineer :Tx CH Low :Thomas

EUT Pol :H Plane



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:Thomas

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Engineer

:ER/2020/40050 **Test Date** Report Number :2020-05-13

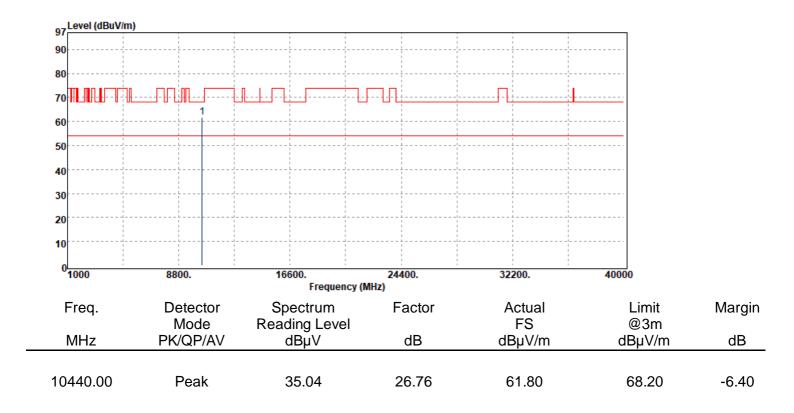
Operation Mode :802.11n20B1 Temp./Humi. :24.6/65

Test Frequency Antenna Pol. :VERTICAL :5220 MHz

EUT Pol :H Plane

:Tx CH Mid

Test Mode



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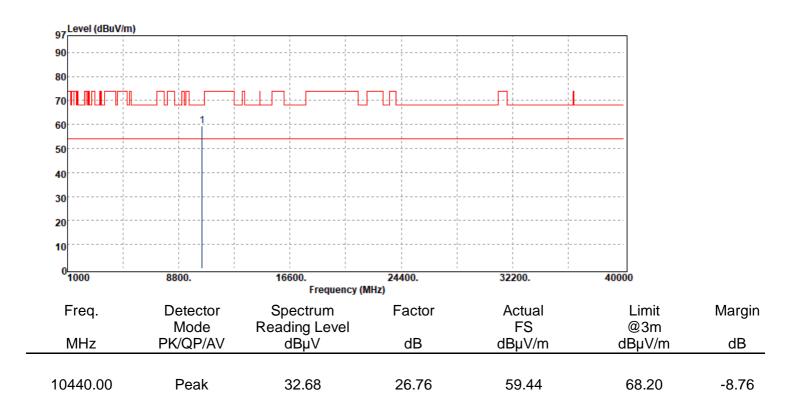
:ER/2020/40050 **Test Date** Report Number :2020-05-13

Operation Mode :802.11n20B1 Temp./Humi. :24.6/65

Test Frequency Antenna Pol. :HORIZONTAL :5220 MHz

Test Mode Engineer :Tx CH Mid :Thomas

EUT Pol :H Plane



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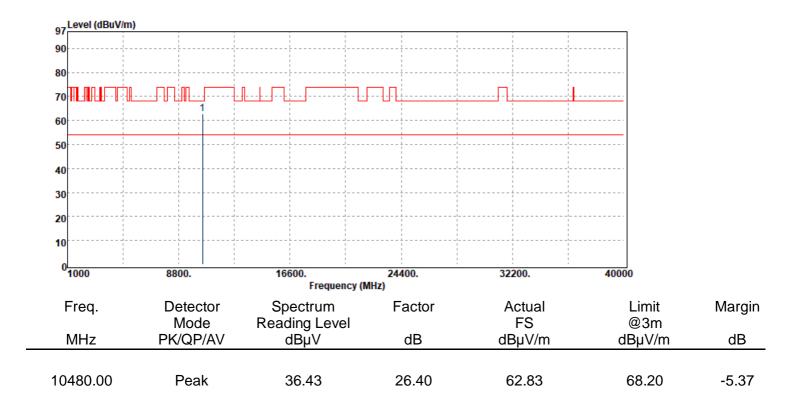
:ER/2020/40050 **Test Date** Report Number :2020-05-13

Operation Mode :802.11n20B1 Temp./Humi. :24.6/65

Test Frequency Antenna Pol. :VERTICAL :5240 MHz

Test Mode Engineer :Tx CH High :Thomas

EUT Pol :H Plane



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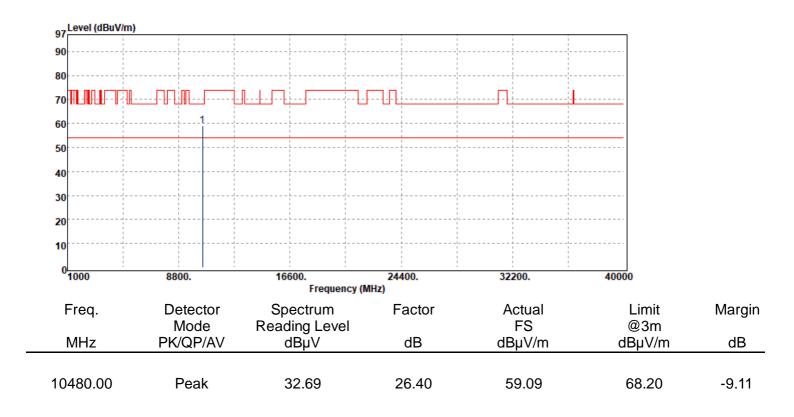
:ER/2020/40050 **Test Date** Report Number :2020-05-13

Operation Mode :802.11n20B1 Temp./Humi. :24.6/65

Test Frequency Antenna Pol. :HORIZONTAL :5240 MHz

Test Mode Engineer :Tx CH High :Thomas

EUT Pol :H Plane



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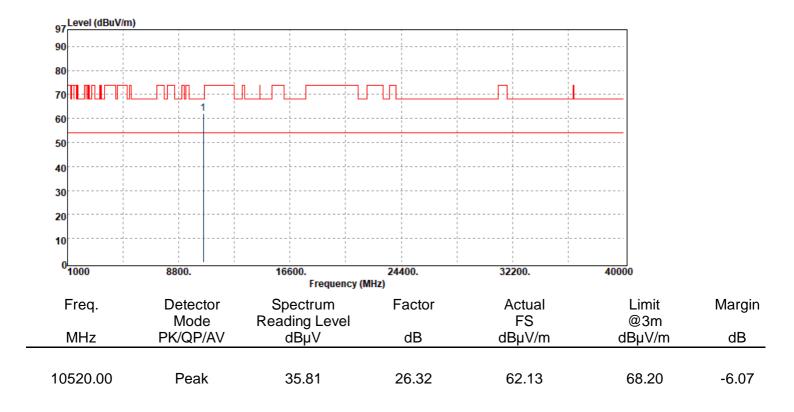
:ER/2020/40050 **Test Date** Report Number :2020-05-13

Operation Mode :802.11n20B2 Temp./Humi. :24.6/65

Test Frequency :5260 MHz Antenna Pol. :VERTICAL

Test Mode Engineer :Tx CH Low :Thomas

EUT Pol :H Plane



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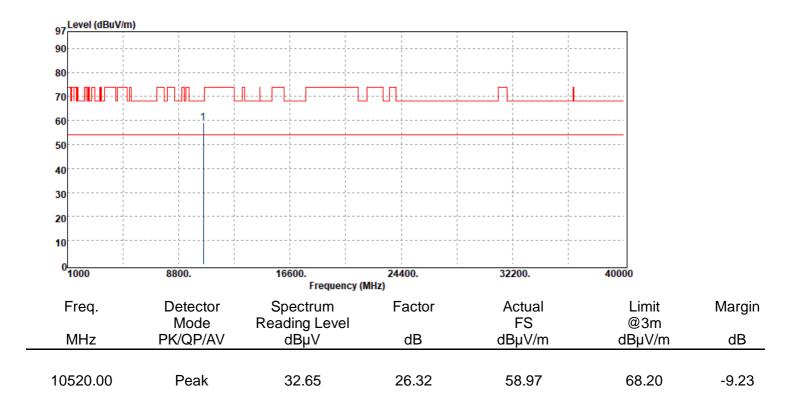
:ER/2020/40050 **Test Date** Report Number :2020-05-13

Operation Mode :802.11n20B2 Temp./Humi. :24.6/65

Test Frequency :5260 MHz Antenna Pol. :HORIZONTAL

Test Mode Engineer :Tx CH Low :Thomas

EUT Pol :H Plane



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:Thomas

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Engineer

:ER/2020/40050 **Test Date** Report Number :2020-05-13

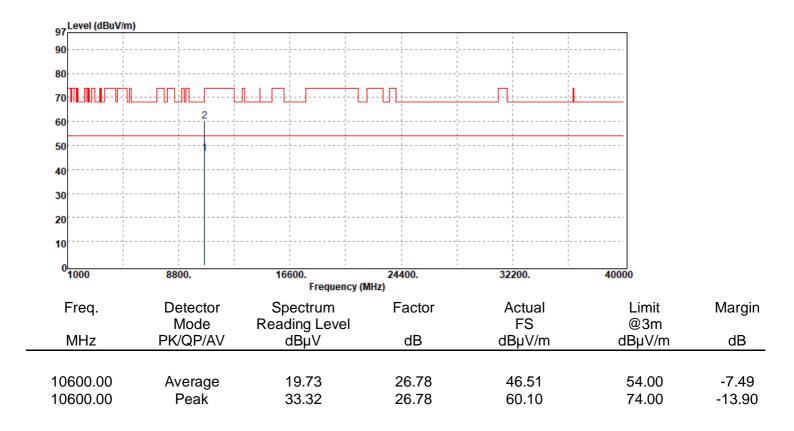
Operation Mode :802.11n20B2 Temp./Humi. :24.6/65

Test Frequency :5300 MHz Antenna Pol. :VERTICAL

EUT Pol :H Plane

:Tx CH Mid

Test Mode



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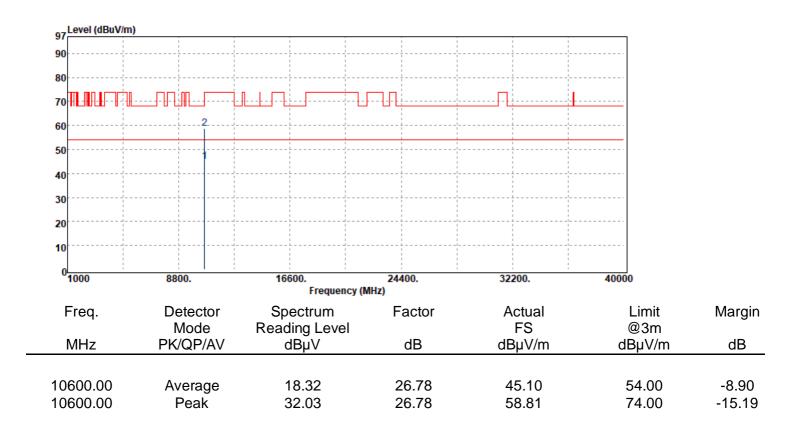
:ER/2020/40050 Report Number **Test Date** :2020-05-13

Operation Mode :802.11n20B2 Temp./Humi. :24.6/65

Test Frequency :5300 MHz Antenna Pol. :HORIZONTAL

Test Mode :Tx CH Mid Engineer :Thomas

EUT Pol :H Plane



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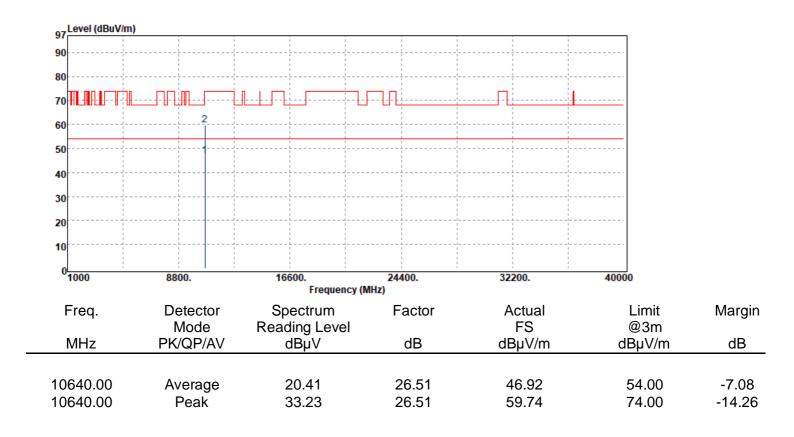
:ER/2020/40050 Report Number **Test Date** :2020-05-13

Operation Mode :802.11n20B2 Temp./Humi. :24.6/65

Test Frequency Antenna Pol. :VERTICAL :5320 MHz

Test Mode :Tx CH High Engineer :Thomas

EUT Pol :H Plane



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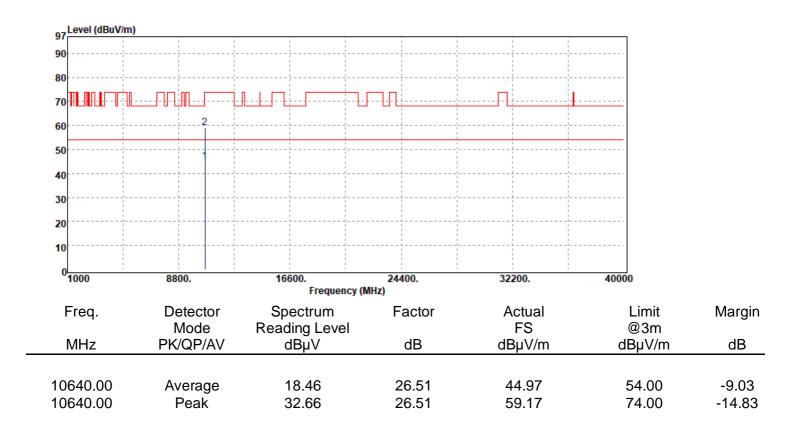
:ER/2020/40050 Report Number **Test Date** :2020-05-13

Operation Mode :802.11n20B2 Temp./Humi. :24.6/65

Test Frequency Antenna Pol. :HORIZONTAL :5320 MHz

Test Mode :Tx CH High Engineer :Thomas

EUT Pol :H Plane



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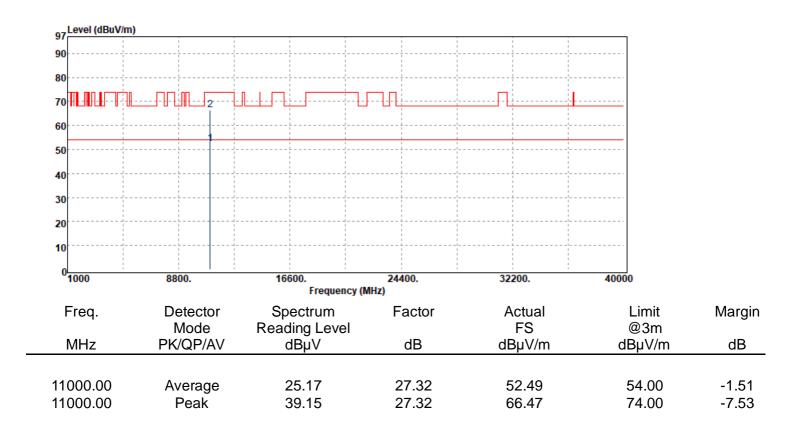
:ER/2020/40050 **Test Date** Report Number :2020-05-13

Operation Mode :802.11n20B3 Temp./Humi. :24.6/65

Test Frequency :5500 MHz Antenna Pol. :VERTICAL

Test Mode :Tx CH Low Engineer :Thomas

EUT Pol :H Plane



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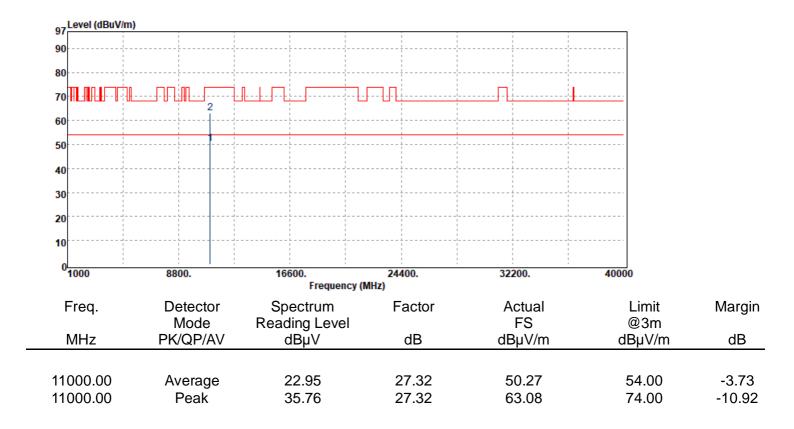
:ER/2020/40050 Report Number **Test Date** :2020-05-13

Operation Mode :802.11n20B3 Temp./Humi. :24.6/65

Test Frequency :5500 MHz Antenna Pol. :HORIZONTAL

Test Mode :Tx CH Low Engineer :Thomas

EUT Pol :H Plane



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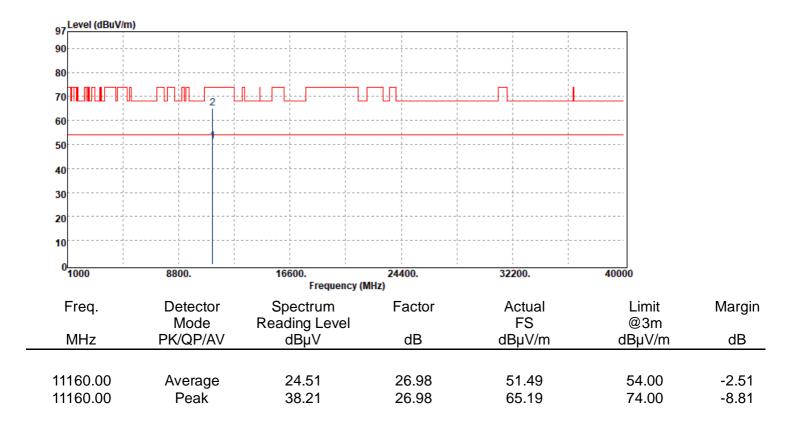
:ER/2020/40050 **Test Date** Report Number :2020-05-13

Operation Mode :802.11n20B3 Temp./Humi. :24.6/65

Test Frequency Antenna Pol. :VERTICAL :5580 MHz

Test Mode :Tx CH Mid Engineer :Thomas

EUT Pol :H Plane



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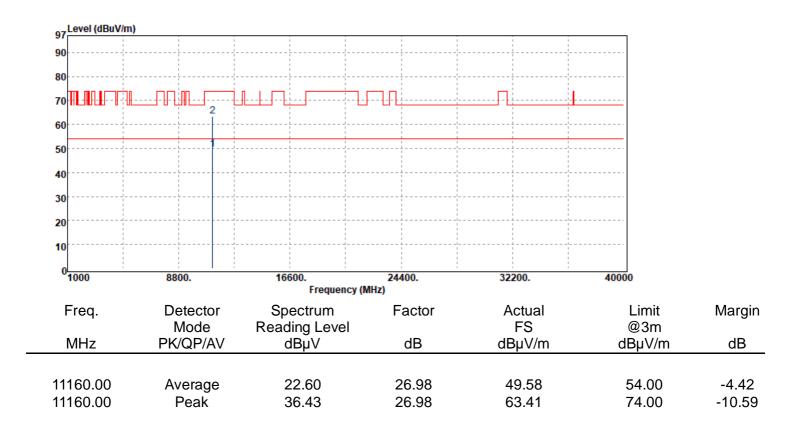
:ER/2020/40050 Report Number **Test Date** :2020-05-13

Operation Mode :802.11n20B3 Temp./Humi. :24.6/65

Test Frequency Antenna Pol. :HORIZONTAL :5580 MHz

Test Mode Engineer :Tx CH Mid :Thomas

EUT Pol :H Plane



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:Thomas

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Engineer

:ER/2020/40050 Report Number **Test Date** :2020-05-13

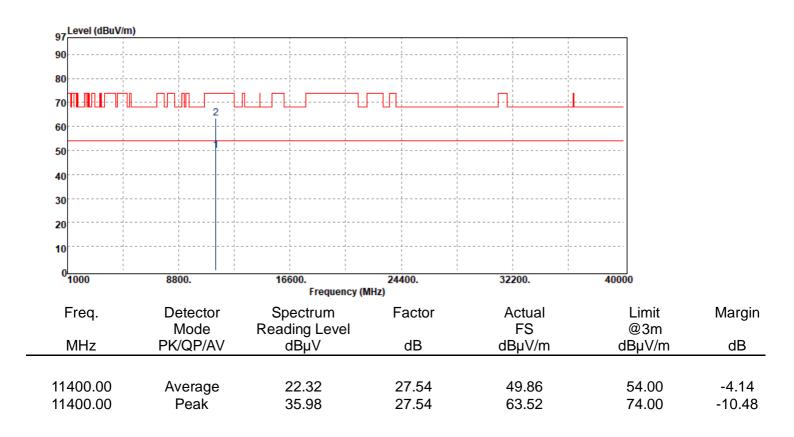
Operation Mode :802.11n20B3 Temp./Humi. :24.6/65

Test Frequency :5700 MHz Antenna Pol. :VERTICAL

EUT Pol :H Plane

:Tx CH High

Test Mode



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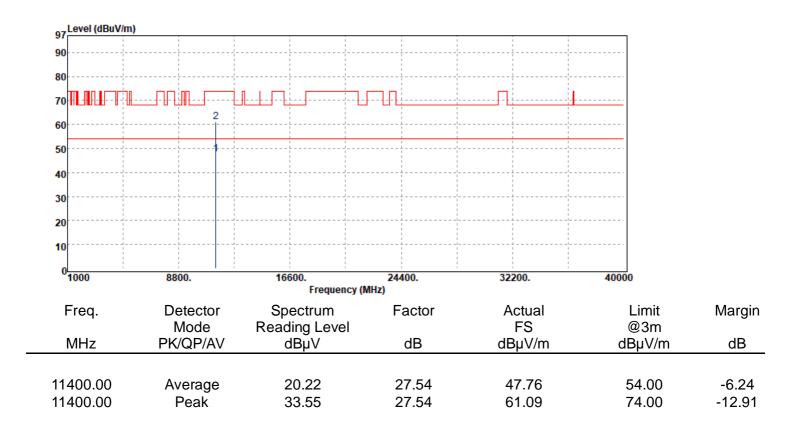
:ER/2020/40050 Report Number **Test Date** :2020-05-13

Operation Mode :802.11n20B3 Temp./Humi. :24.6/65

Test Frequency :5700 MHz Antenna Pol. :HORIZONTAL

Test Mode :Tx CH High Engineer :Thomas

EUT Pol :H Plane



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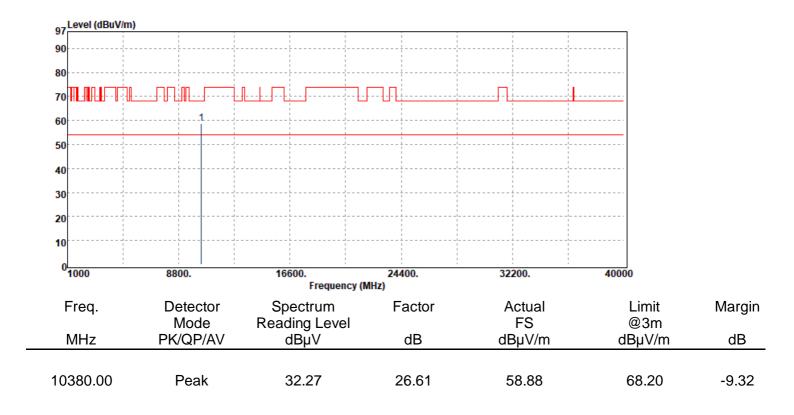
:ER/2020/40050 **Test Date** Report Number :2020-05-13

Operation Mode :802.11n40B1 Temp./Humi. :24.6/65

Test Frequency :5190 MHz Antenna Pol. :VERTICAL

Test Mode Engineer :Tx CH Low :Thomas

EUT Pol :H Plane



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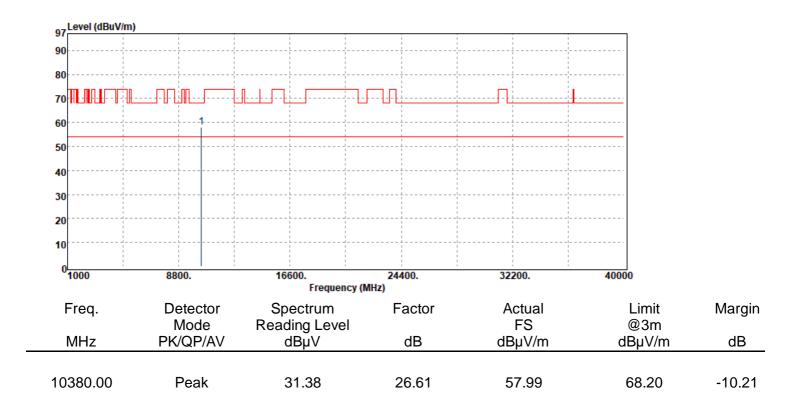
:ER/2020/40050 **Test Date** Report Number :2020-05-13

Operation Mode :802.11n40B1 Temp./Humi. :24.6/65

Test Frequency :5190 MHz Antenna Pol. :HORIZONTAL

Test Mode :Tx CH Low Engineer :Thomas

EUT Pol :H Plane



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:Thomas

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Engineer

:ER/2020/40050 **Test Date** Report Number :2020-05-13

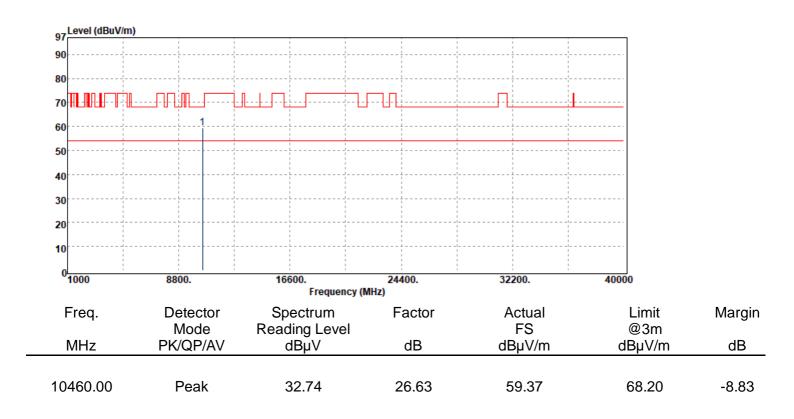
Operation Mode :802.11n40B1 Temp./Humi. :24.6/65

Test Frequency Antenna Pol. :VERTICAL :5230 MHz

EUT Pol :H Plane

:Tx CH High

Test Mode



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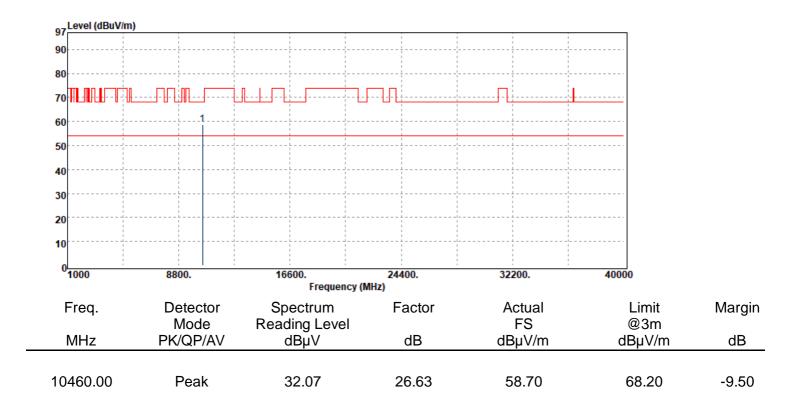
:ER/2020/40050 **Test Date** Report Number :2020-05-13

Operation Mode :802.11n40B1 Temp./Humi. :24.6/65

Test Frequency Antenna Pol. :HORIZONTAL :5230 MHz

Test Mode Engineer :Tx CH High :Thomas

EUT Pol :H Plane



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:H Plane

EUT Pol

Report No.: ER/2020/40050

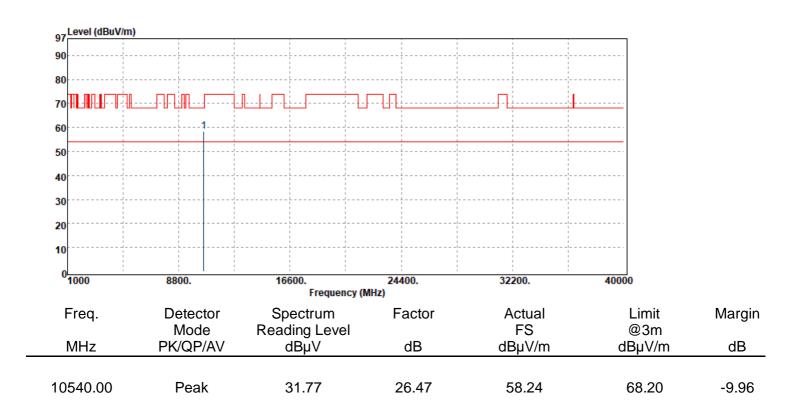
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:ER/2020/40050 **Test Date** Report Number :2020-05-13

Operation Mode :802.11n40B2 Temp./Humi. :24.6/65

Test Frequency Antenna Pol. :VERTICAL :5270 MHz

Test Mode Engineer :Tx CH Low :Thomas



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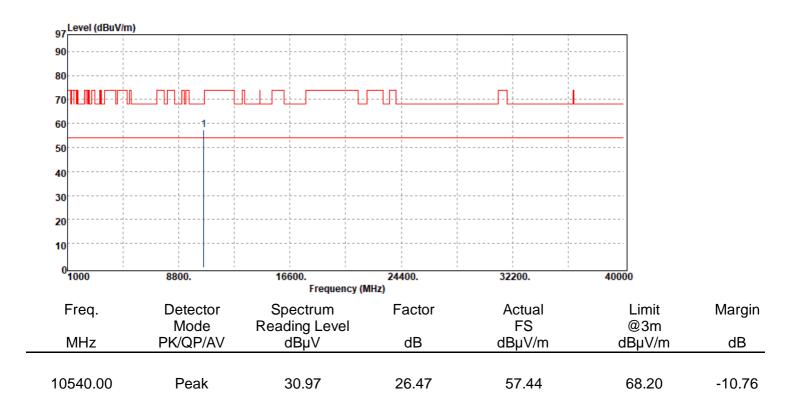
:ER/2020/40050 **Test Date** Report Number :2020-05-13

Operation Mode :802.11n40B2 Temp./Humi. :24.6/65

Test Frequency :5270 MHz Antenna Pol. :HORIZONTAL

Test Mode :Tx CH Low Engineer :Thomas

EUT Pol :H Plane



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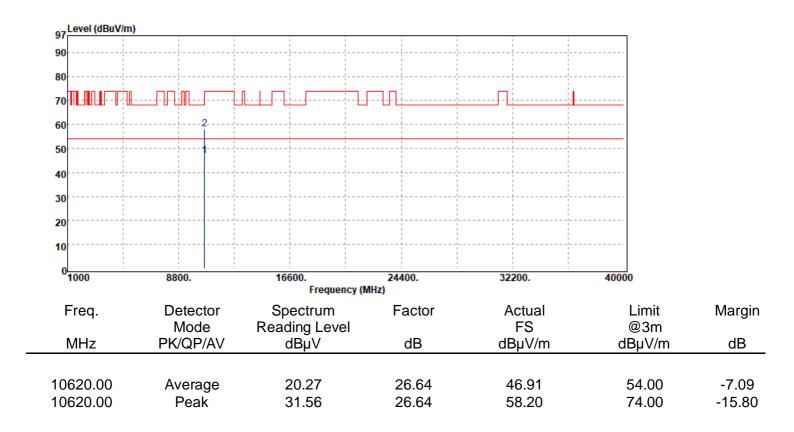
:ER/2020/40050 Report Number **Test Date** :2020-05-13

Operation Mode :802.11n40B2 Temp./Humi. :24.6/65

Test Frequency Antenna Pol. :VERTICAL :5310 MHz

Engineer Test Mode :Tx CH High :Thomas

EUT Pol :H Plane



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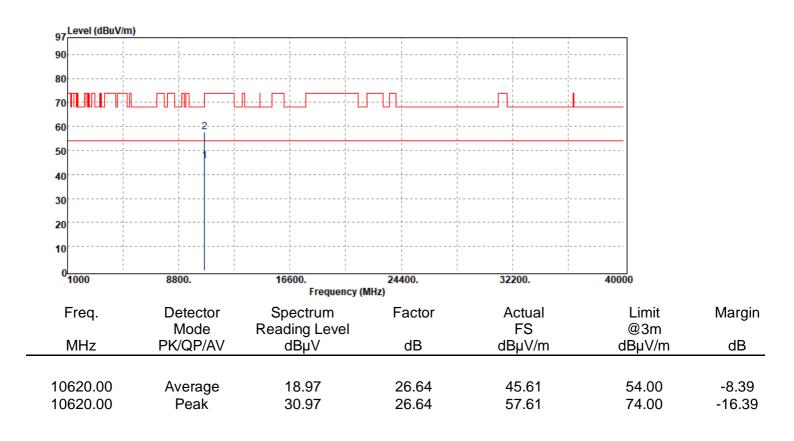
:ER/2020/40050 Report Number **Test Date** :2020-05-13

Operation Mode :802.11n40B2 Temp./Humi. :24.6/65

Test Frequency Antenna Pol. :HORIZONTAL :5310 MHz

Test Mode :Tx CH High Engineer :Thomas

EUT Pol :H Plane



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:Thomas

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Engineer

:ER/2020/40050 **Test Date** Report Number :2020-05-13

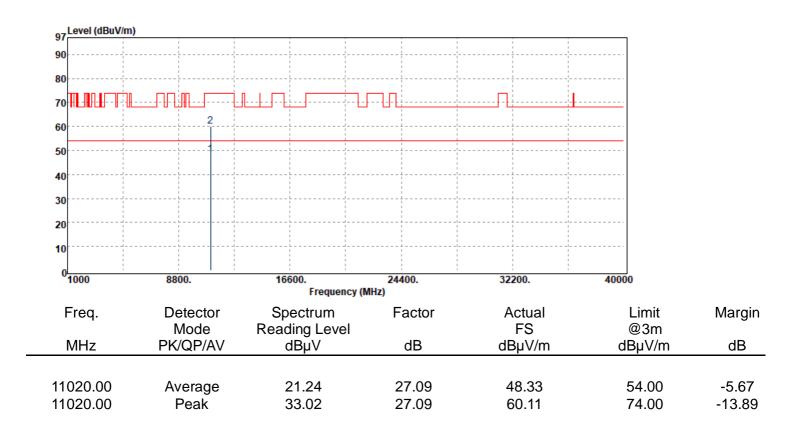
Operation Mode :802.11n40B3 Temp./Humi. :24.6/65

Test Frequency Antenna Pol. :VERTICAL :5510 MHz

EUT Pol :H Plane

:Tx CH Low

Test Mode



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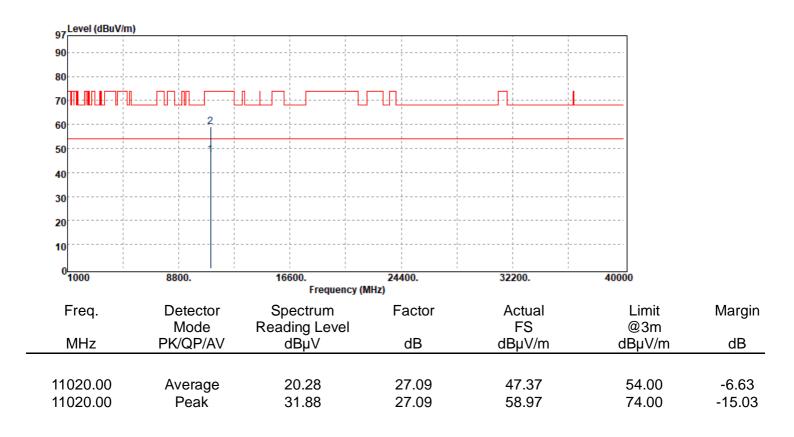
Report Number :ER/2020/40050 Test Date :2020-05-13

Operation Mode :802.11n40B3 Temp./Humi. :24.6/65

Test Frequency :5510 MHz Antenna Pol. :HORIZONTAL

Test Mode :Tx CH Low Engineer :Thomas

EUT Pol :H Plane



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:H Plane

EUT Pol

Report No.: ER/2020/40050

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:ER/2020/40050 Report Number **Test Date** :2020-05-13

Operation Mode :802.11n40B3 Temp./Humi. :24.6/65

Test Frequency Antenna Pol. :VERTICAL :5550 MHz

Test Mode :Tx CH Mid Engineer :Thomas



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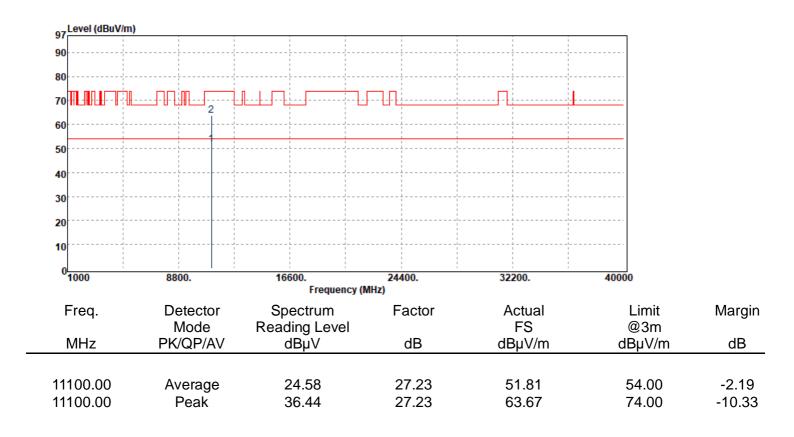
:ER/2020/40050 **Test Date** Report Number :2020-05-13

Operation Mode :802.11n40B3 Temp./Humi. :24.6/65

Test Frequency Antenna Pol. :HORIZONTAL :5550 MHz

Test Mode :Tx CH Mid Engineer :Thomas

EUT Pol :H Plane



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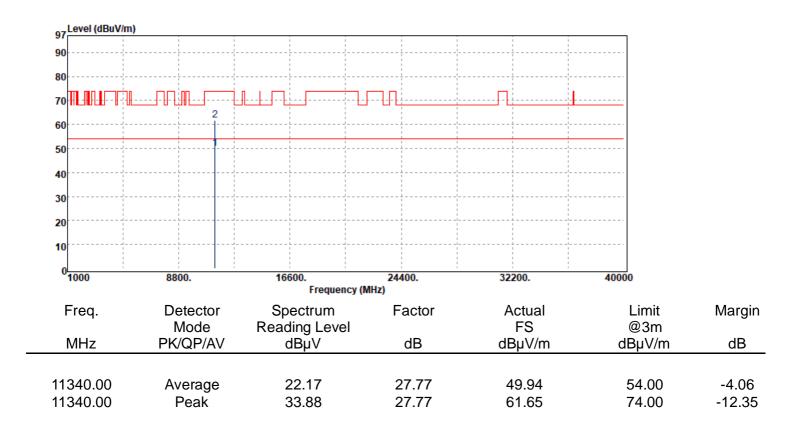
:ER/2020/40050 Report Number **Test Date** :2020-05-13

Operation Mode :802.11n40B3 Temp./Humi. :24.6/65

Test Frequency Antenna Pol. :VERTICAL :5670 MHz

Test Mode :Tx CH High Engineer :Thomas

EUT Pol :H Plane



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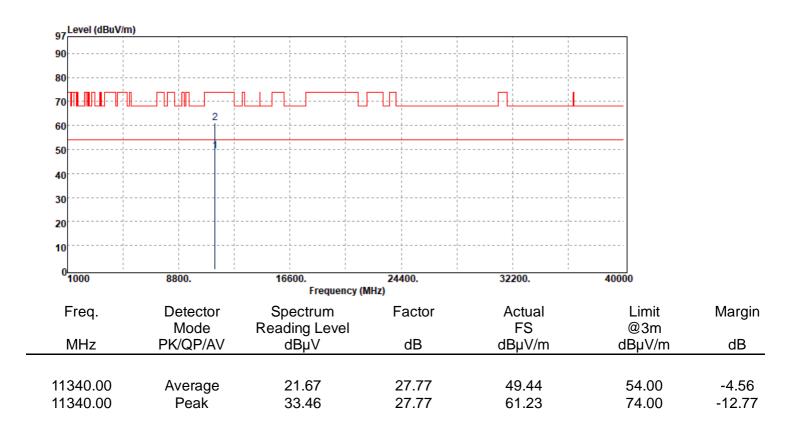
Report Number :ER/2020/40050 Test Date :2020-05-13

Operation Mode :802.11n40B3 Temp./Humi. :24.6/65

Test Frequency :5670 MHz Antenna Pol. :HORIZONTAL

Test Mode :Tx CH High Engineer :Thomas

EUT Pol :H Plane



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:Thomas

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Engineer

:ER/2020/40050 **Test Date** Report Number :2020-05-12

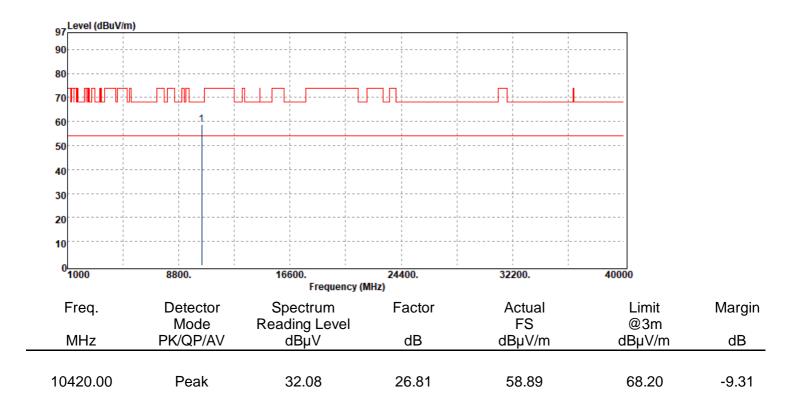
Operation Mode :802.11ac80B1 Temp./Humi. :25.1/66

Test Frequency Antenna Pol. :VERTICAL :5210 MHz

EUT Pol :H Plane

:Tx CH Low

Test Mode



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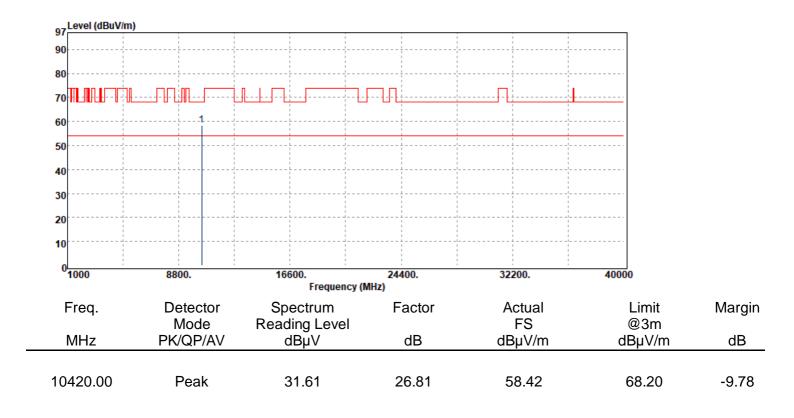
:ER/2020/40050 **Test Date** Report Number :2020-05-12

Operation Mode :802.11ac80B1 Temp./Humi. :25.1/66

Test Frequency Antenna Pol. :HORIZONTAL :5210 MHz

Test Mode Engineer :Tx CH Low :Thomas

EUT Pol :H Plane



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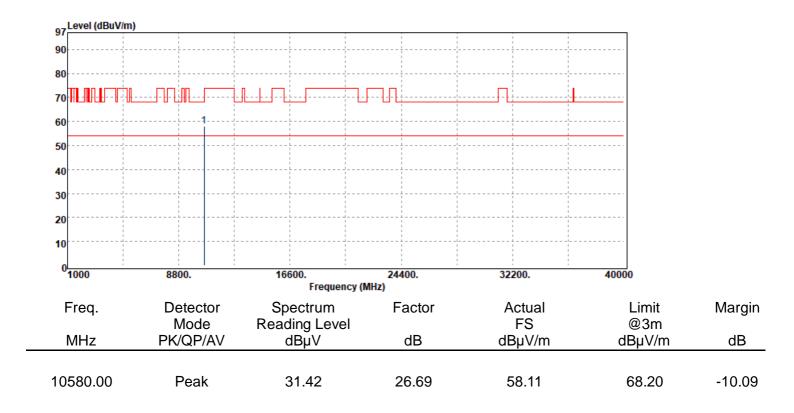
:ER/2020/40050 **Test Date** Report Number :2020-05-12

Operation Mode :802.11ac80B2 Temp./Humi. :25.1/66

Test Frequency :5290 MHz Antenna Pol. :VERTICAL

Test Mode Engineer :Tx CH High :Thomas

EUT Pol :H Plane



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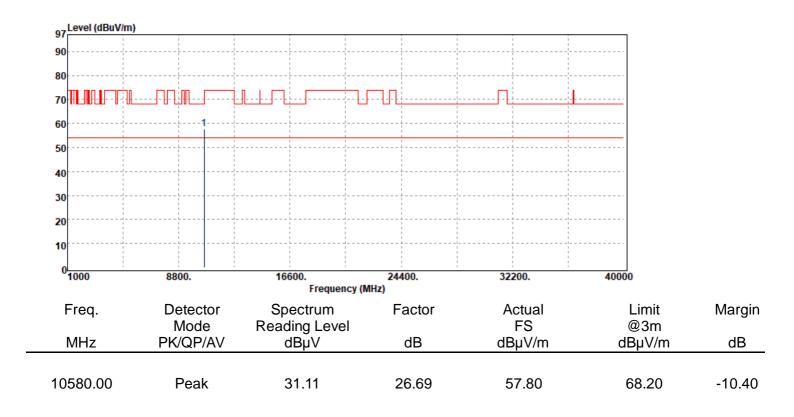
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Operation Mode :802.11ac80B2 Temp./Humi. :25.1/66

Test Frequency :5290 MHz Antenna Pol. :HORIZONTAL

Test Mode Engineer :Tx CH High :Thomas

EUT Pol :H Plane



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Member of SGS Group



:Thomas

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Engineer

:ER/2020/40050 Report Number **Test Date** :2020-05-12

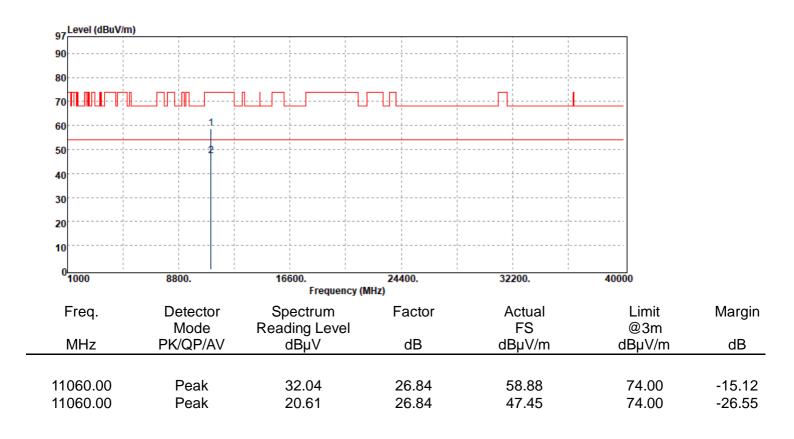
Operation Mode :802.11ac80B3 Temp./Humi. :25.1/66

Test Frequency Antenna Pol. :VERTICAL :5530 MHz

EUT Pol :H Plane

:Tx CH Low

Test Mode



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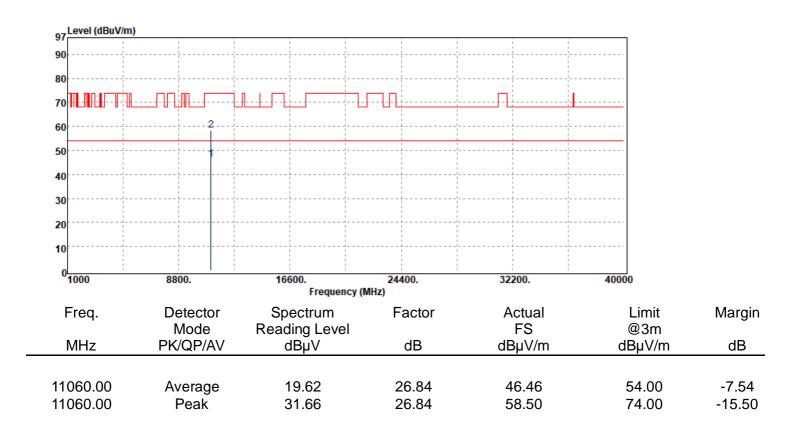
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Operation Mode :802.11ac80B3 Temp./Humi. :25.1/66

Test Frequency Antenna Pol. :HORIZONTAL :5530 MHz

Test Mode :Tx CH Low Engineer :Thomas

EUT Pol :H Plane



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:H Plane

EUT Pol

Report No.: ER/2020/40050

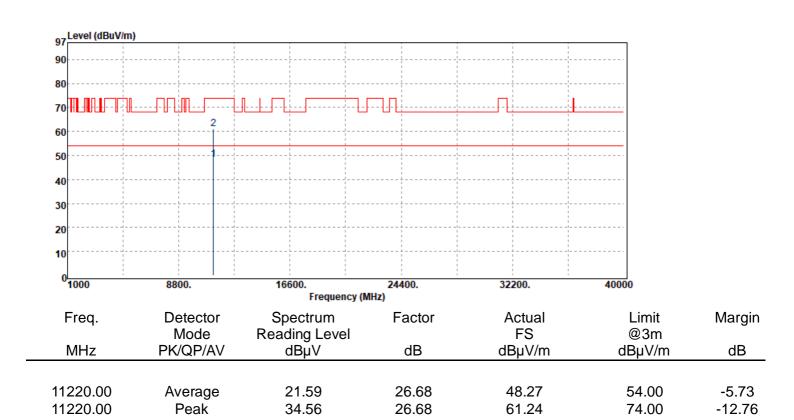
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:ER/2020/40050 **Test Date** Report Number :2020-05-12

Operation Mode :802.11ac80B3 Temp./Humi. :25.1/66

Test Frequency Antenna Pol. :VERTICAL :5610 MHz

Test Mode :Tx CH Mid Engineer :Thomas



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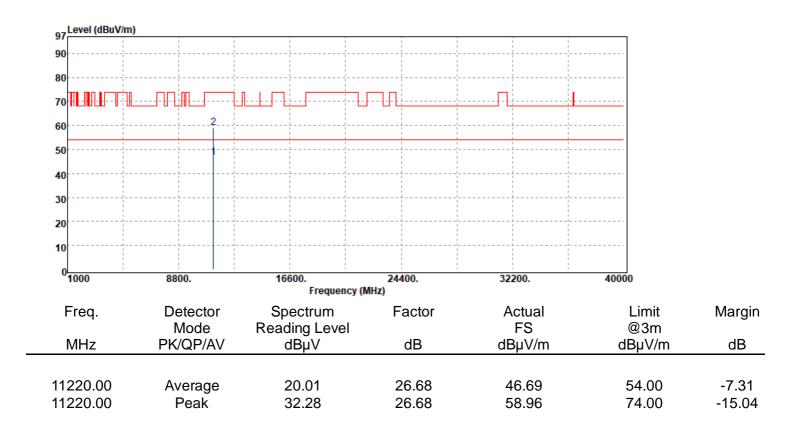
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Operation Mode :802.11ac80B3 Temp./Humi. :25.1/66

Test Frequency Antenna Pol. :HORIZONTAL :5610 MHz

Test Mode :Tx CH Mid Engineer :Thomas

EUT Pol :H Plane



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11.7.3 Band edge falling to restricted band

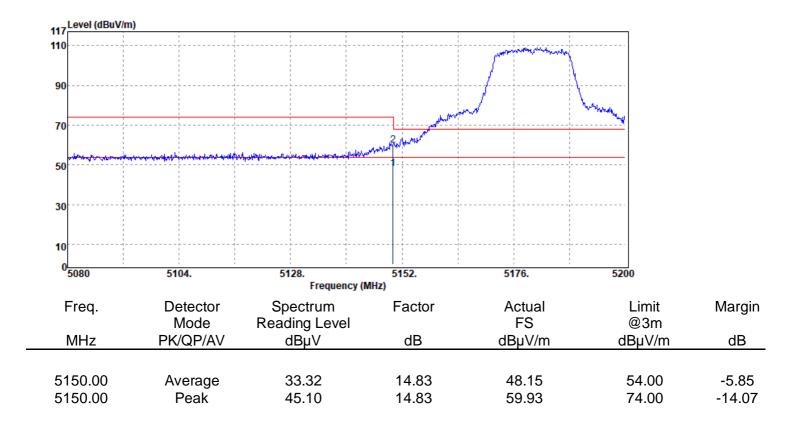
Report Number :ER/2020/40050 **Test Date** :2020-05-11

Operation Mode Temp./Humi. :26.3/74 :802.11aB1

:VERTICAL **Test Frequency** :5180 MHz Antenna Pol.

Test Mode :Bandedge CH Low Engineer :Thomas

EUT Pol :H Plane



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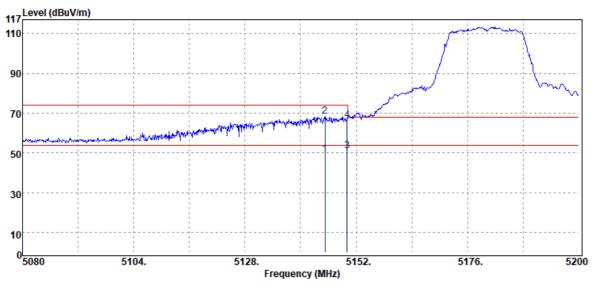
:ER/2020/40050 **Test Date** Report Number :2020-05-11

Operation Mode Temp./Humi. :802.11aB1 :26.3/74

Test Frequency :5180 MHz Antenna Pol. :HORIZONTAL

Test Mode :Bandedge CH Low Engineer :Thomas

EUT Pol :H Plane



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
5145.28	Average	34.51	14.83	49.34	54.00	-4.66
5145.28	Peak	53.47	14.83	68.30	74.00	-5.70
5150.00	Average	36.33	14.83	51.16	54.00	-2.84
5150.00	Peak	51.74	14.83	66.57	74.00	-7.43

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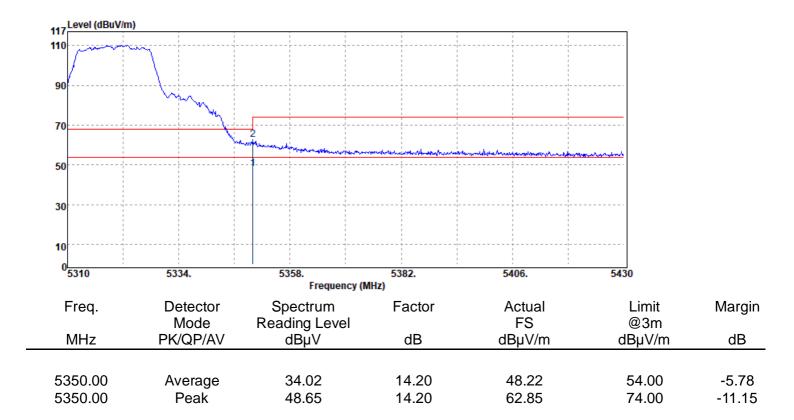
:ER/2020/40050 Report Number **Test Date** :2020-05-11

Operation Mode :802.11aB2 Temp./Humi. :26.3/74

Test Frequency :5320 MHz Antenna Pol. :VERTICAL

Engineer Test Mode :Bandedge CH High :Thomas

EUT Pol :H Plane



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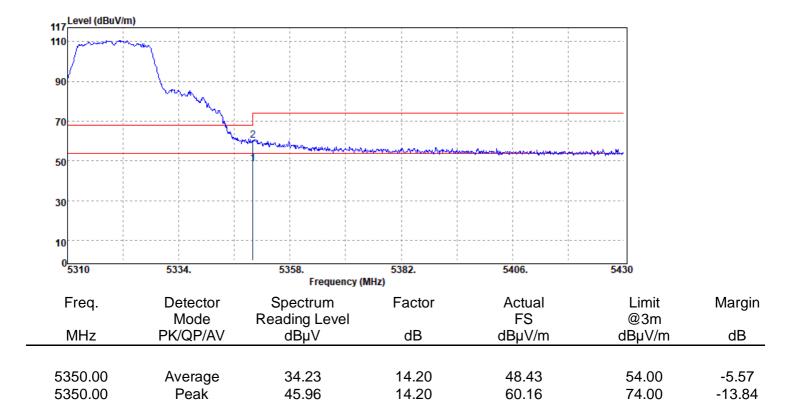
:ER/2020/40050 **Test Date** Report Number :2020-05-11

Operation Mode :802.11aB2 Temp./Humi. :26.3/74

Test Frequency :5320 MHz Antenna Pol. :HORIZONTAL

Engineer Test Mode :Bandedge CH High :Thomas

EUT Pol :H Plane



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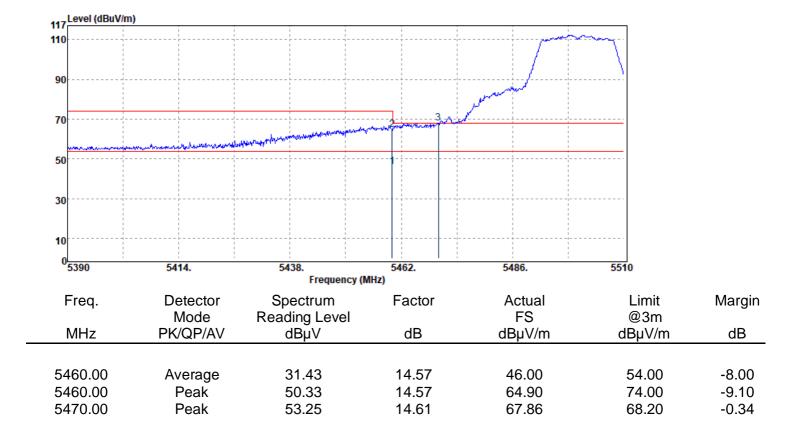
:ER/2020/40050 **Test Date** Report Number :2020-05-11

Operation Mode :802.11aB3 Temp./Humi. :26.3/74

Test Frequency :5500 MHz Antenna Pol. :VERTICAL

Test Mode :Bandedge CH Low Engineer :Thomas





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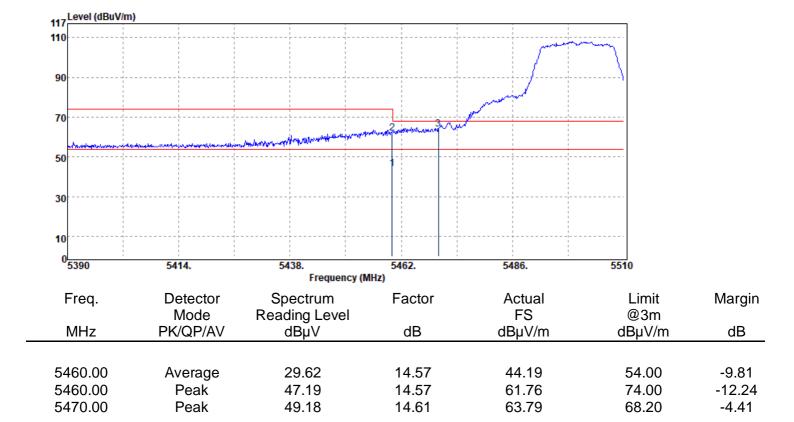
:ER/2020/40050 **Test Date** Report Number :2020-05-11

Temp./Humi. **Operation Mode** :802.11aB3 :26.3/74

Test Frequency :5500 MHz Antenna Pol. :HORIZONTAL

Test Mode :Bandedge CH Low Engineer :Thomas

EUT Pol :H Plane



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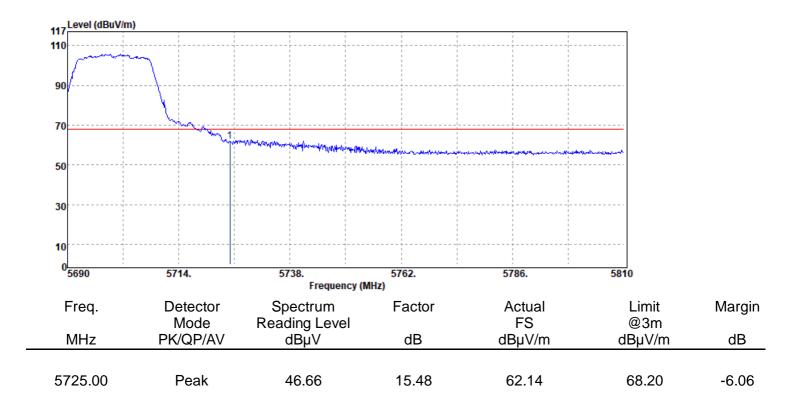
:ER/2020/40050 **Test Date** Report Number :2020-05-11

Operation Mode :802.11aB3 Temp./Humi. :26.3/74

Test Frequency :5700 MHz Antenna Pol. :VERTICAL

Test Mode Engineer :Bandedge CH High :Thomas

EUT Pol :H Plane



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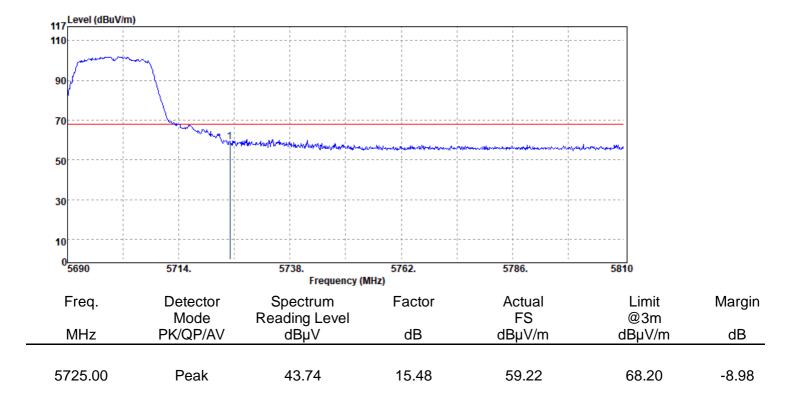
:ER/2020/40050 **Test Date** Report Number :2020-05-11

Operation Mode :802.11aB3 Temp./Humi. :26.3/74

Test Frequency :5700 MHz Antenna Pol. :HORIZONTAL

Test Mode Engineer :Bandedge CH High :Thomas

EUT Pol :H Plane



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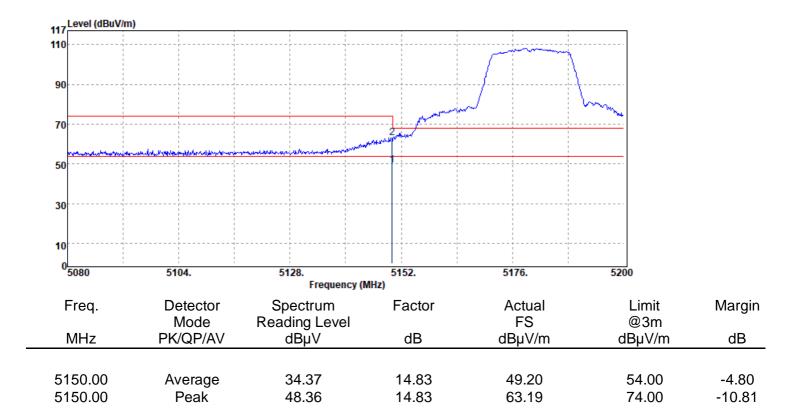
:ER/2020/40050 **Test Date** Report Number :2020-05-11

Operation Mode :802.11n20B1 Temp./Humi. :26.3/74

Test Frequency :5180 MHz Antenna Pol. :VERTICAL

Engineer Test Mode :Bandedge CH Low :Thomas

EUT Pol :H Plane



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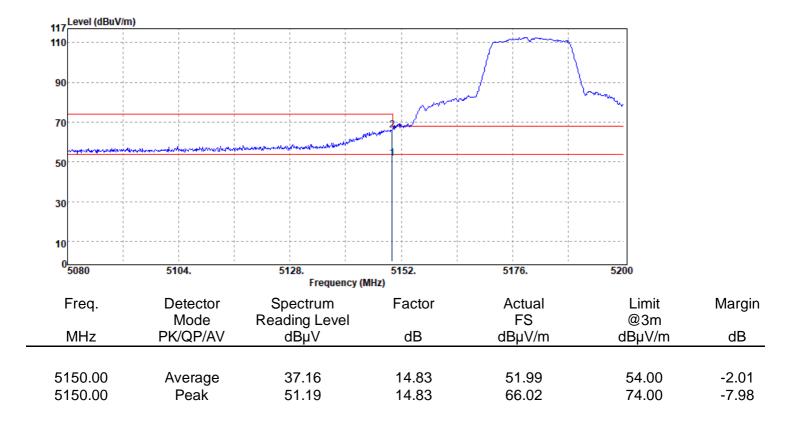
:ER/2020/40050 **Test Date** Report Number :2020-05-11

Operation Mode :802.11n20B1 Temp./Humi. :26.3/74

Test Frequency :5180 MHz Antenna Pol. :HORIZONTAL

Test Mode Engineer :Bandedge CH Low :Thomas

EUT Pol :H Plane



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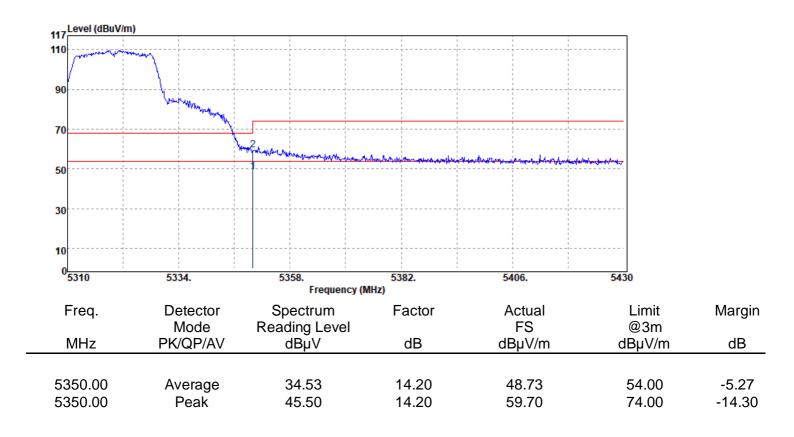
:ER/2020/40050 Report Number **Test Date** :2020-05-11

Operation Mode :802.11n20B2 Temp./Humi. :26.3/74

Test Frequency :5320 MHz Antenna Pol. :VERTICAL

Engineer Test Mode :Bandedge CH High :Thomas

EUT Pol :H Plane



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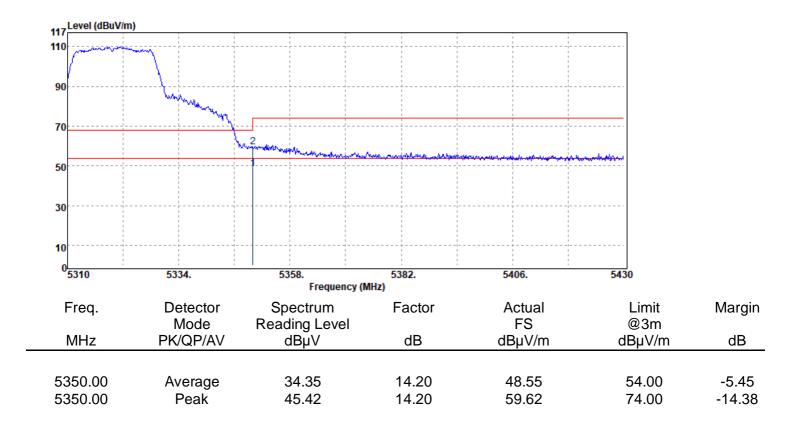
:ER/2020/40050 Report Number **Test Date** :2020-05-11

Operation Mode :802.11n20B2 Temp./Humi. :26.3/74

Test Frequency :5320 MHz Antenna Pol. :HORIZONTAL

Engineer Test Mode :Bandedge CH High :Thomas

EUT Pol :H Plane



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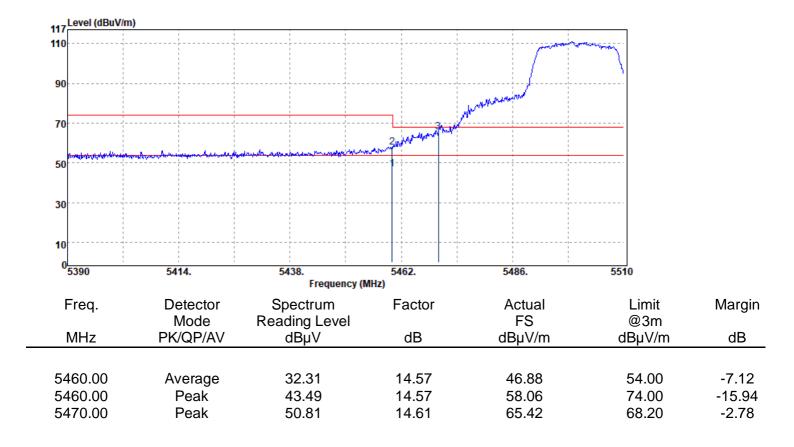
:ER/2020/40050 **Test Date** Report Number :2020-05-11

Operation Mode :802.11n20B3 Temp./Humi. :26.3/74

Test Frequency :5500 MHz Antenna Pol. :VERTICAL

Test Mode :Bandedge CH Low Engineer :Thomas

EUT Pol :H Plane



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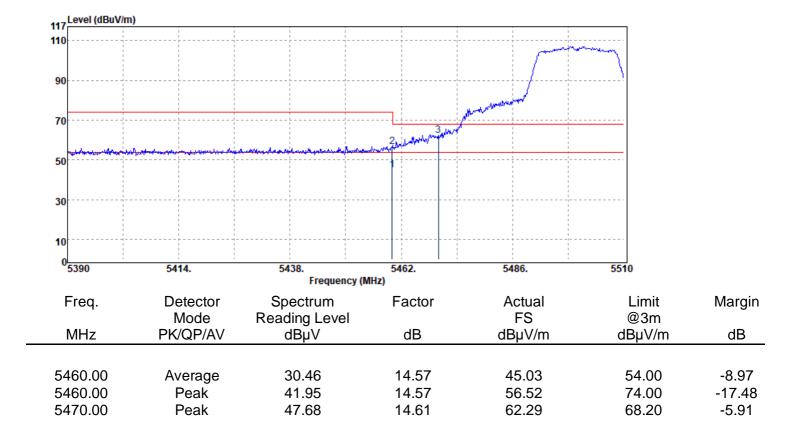
:ER/2020/40050 **Test Date** Report Number :2020-05-11

Temp./Humi. **Operation Mode** :802.11n20B3 :26.3/74

Test Frequency :5500 MHz Antenna Pol. :HORIZONTAL

Test Mode :Bandedge CH Low Engineer :Thomas

EUT Pol :H Plane



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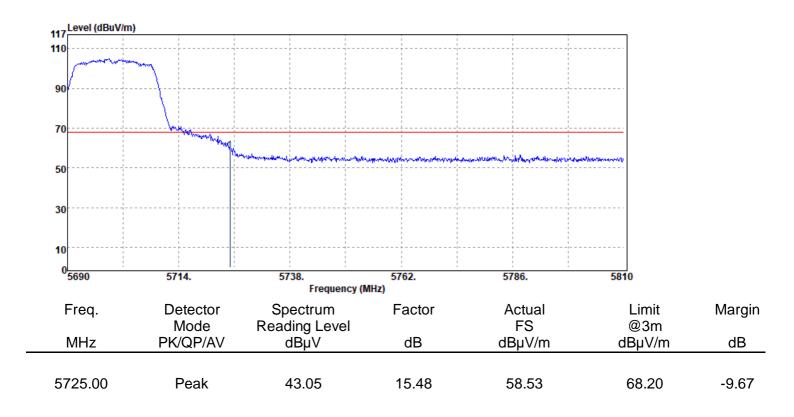
:ER/2020/40050 **Test Date** Report Number :2020-05-11

Operation Mode :802.11n20B3 Temp./Humi. :26.3/74

Test Frequency :5700 MHz Antenna Pol. :VERTICAL

Test Mode Engineer :Bandedge CH High :Thomas

EUT Pol :H Plane



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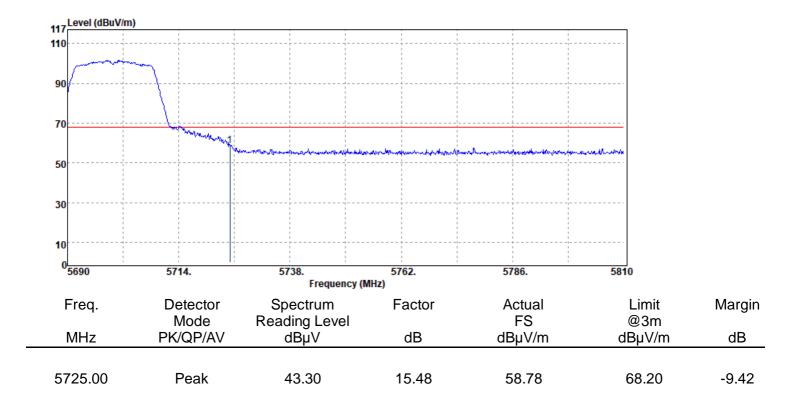
:ER/2020/40050 **Test Date** Report Number :2020-05-11

Operation Mode :802.11n20B3 Temp./Humi. :26.3/74

Test Frequency :5700 MHz Antenna Pol. :HORIZONTAL

Test Mode Engineer :Bandedge CH High :Thomas

EUT Pol :H Plane



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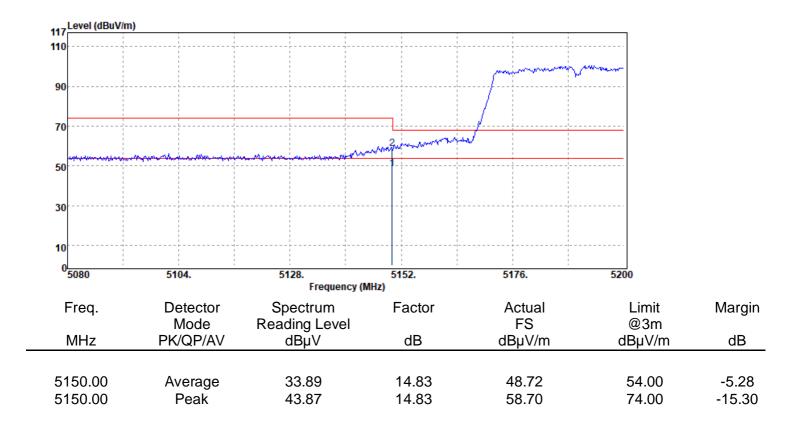
:ER/2020/40050 **Test Date** Report Number :2020-05-11

Operation Mode :802.11n40B1 Temp./Humi. :26.3/74

Test Frequency :5190 MHz Antenna Pol. :VERTICAL

Test Mode Engineer :Bandedge CH Low :Thomas

EUT Pol :H Plane



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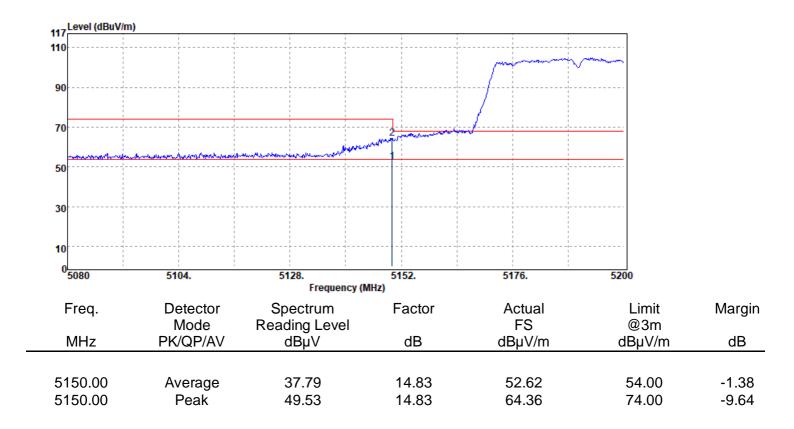
:ER/2020/40050 **Test Date** Report Number :2020-05-11

Operation Mode :802.11n40B1 Temp./Humi. :26.3/74

Test Frequency :5190 MHz Antenna Pol. :HORIZONTAL

Test Mode Engineer :Bandedge CH Low :Thomas

EUT Pol :H Plane



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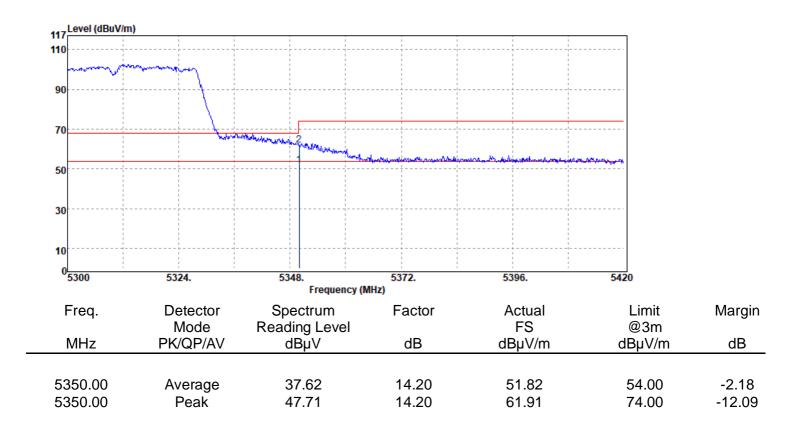
:ER/2020/40050 Report Number **Test Date** :2020-05-11

Operation Mode :802.11n40B2 Temp./Humi. :26.3/74

Test Frequency Antenna Pol. :VERTICAL :5310 MHz

Engineer Test Mode :Bandedge CH High :Thomas

EUT Pol :H Plane



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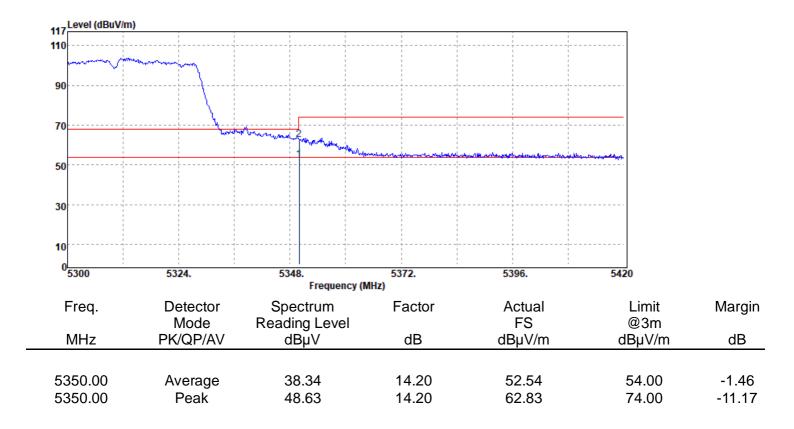
:ER/2020/40050 Report Number **Test Date** :2020-05-11

Operation Mode :802.11n40B2 Temp./Humi. :26.3/74

Test Frequency Antenna Pol. :HORIZONTAL :5310 MHz

Engineer Test Mode :Bandedge CH High :Thomas

EUT Pol :H Plane



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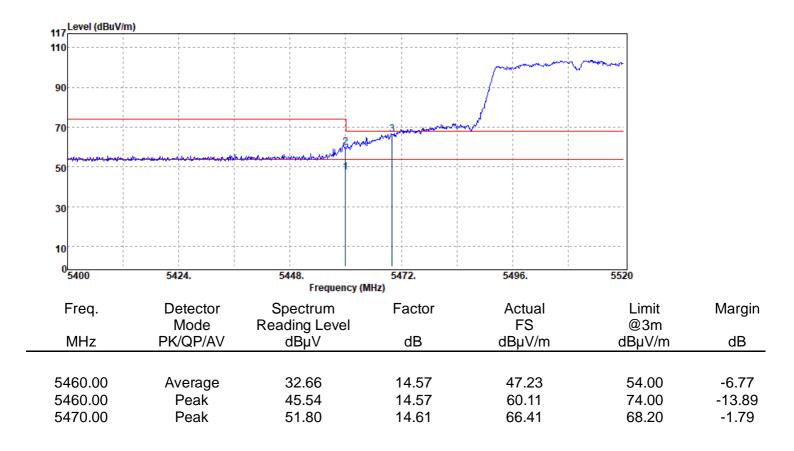
:ER/2020/40050 **Test Date** Report Number :2020-05-11

Operation Mode :802.11n40B3 Temp./Humi. :26.3/74

Test Frequency Antenna Pol. :VERTICAL :5510 MHz

Test Mode :Bandedge CH Low Engineer :Thomas

EUT Pol :H Plane



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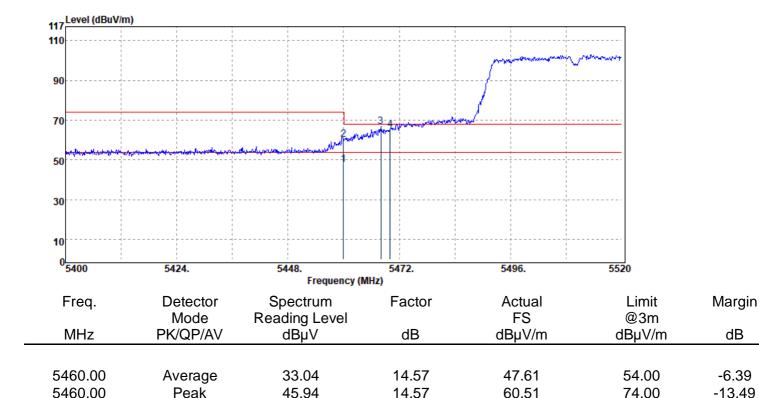
:ER/2020/40050 Report Number **Test Date** :2020-05-11

Temp./Humi. **Operation Mode** :802.11n40B3 :26.3/74

Test Frequency Antenna Pol. :HORIZONTAL :5510 MHz

Test Mode :Bandedge CH Low Engineer :Thomas

EUT Pol :H Plane



14.60

14.61

66.88

65.37

68.20

68.20

-1.32

-2.83

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52.28

50.76

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5468.04

5470.00

Peak

Peak



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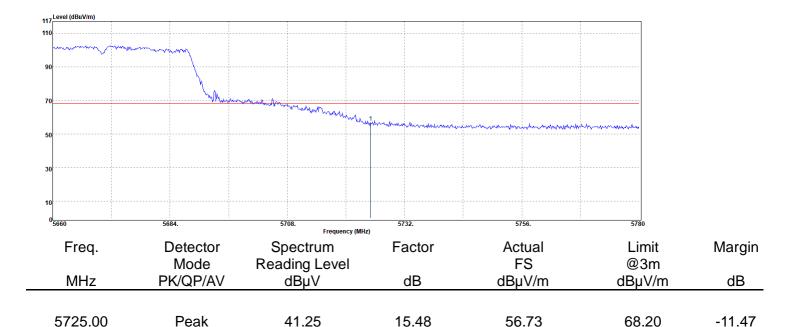
:ER/2020/40050 **Test Date** Report Number :2020-05-12

Operation Mode :802.11n40B3 Temp./Humi. :25.1/66

Test Frequency :5670 MHz Antenna Pol. :VERTICAL

Test Mode :Bandedge CH High :Thomas Engineer

EUT Pol :H Plane



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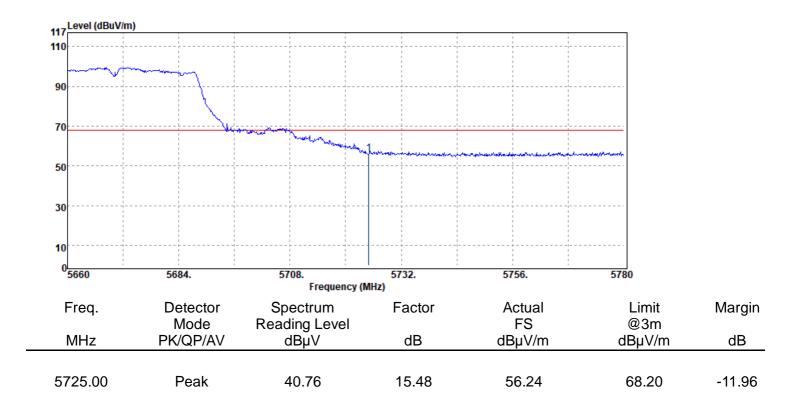
:ER/2020/40050 **Test Date** Report Number :2020-05-12

Operation Mode :802.11n40B3 Temp./Humi. :25.1/66

Test Frequency :5670 MHz Antenna Pol. :HORIZONTAL

Test Mode Engineer :Bandedge CH High :Thomas

EUT Pol :H Plane



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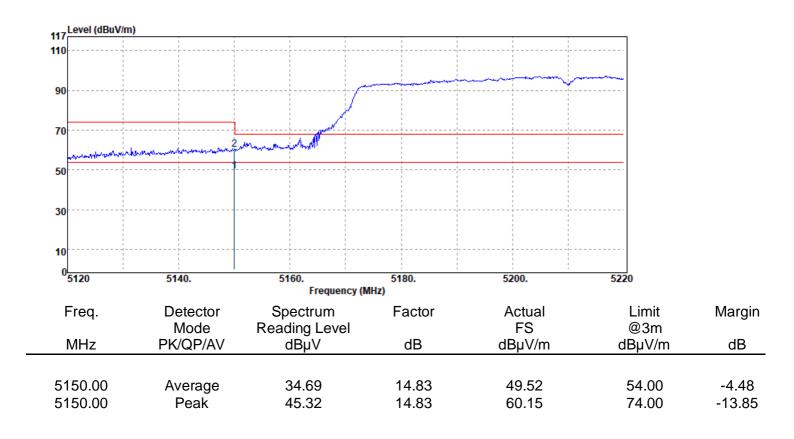
:ER/2020/40050 Report Number **Test Date** :2020-05-11

Operation Mode :802.11ac80B1 Temp./Humi. :26.3/74

Test Frequency Antenna Pol. :VERTICAL :5210 MHz

Engineer Test Mode :Bandedge CH Low :Thomas

EUT Pol :H Plane



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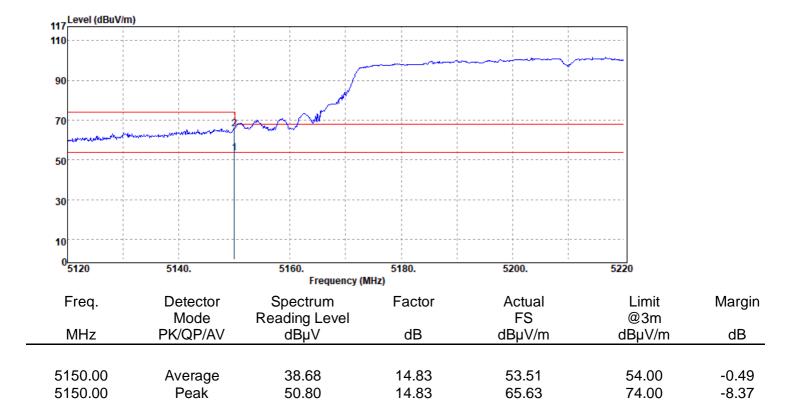
:ER/2020/40050 **Test Date** Report Number :2020-05-11

Operation Mode :802.11ac80B1 Temp./Humi. :26.3/74

Test Frequency Antenna Pol. :HORIZONTAL :5210 MHz

Test Mode Engineer :Bandedge CH Low :Thomas

EUT Pol :H Plane



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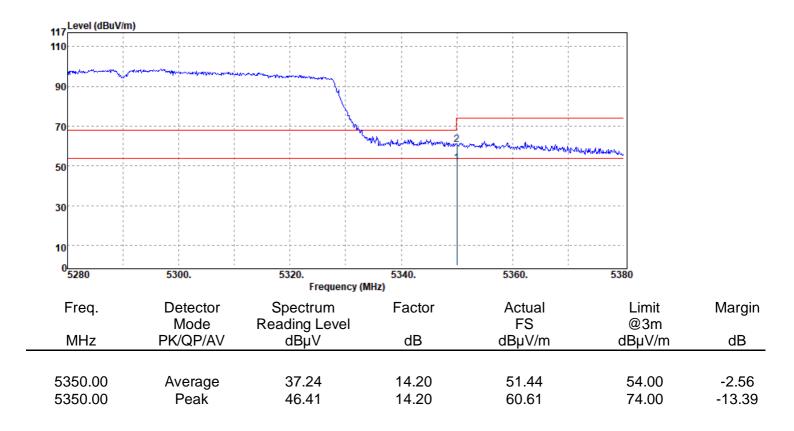
:ER/2020/40050 Report Number **Test Date** :2020-05-11

Operation Mode :802.11ac80B2 Temp./Humi. :26.3/74

Test Frequency :5290 MHz Antenna Pol. :VERTICAL

Engineer Test Mode :Bandedge CH High :Thomas

EUT Pol :H Plane



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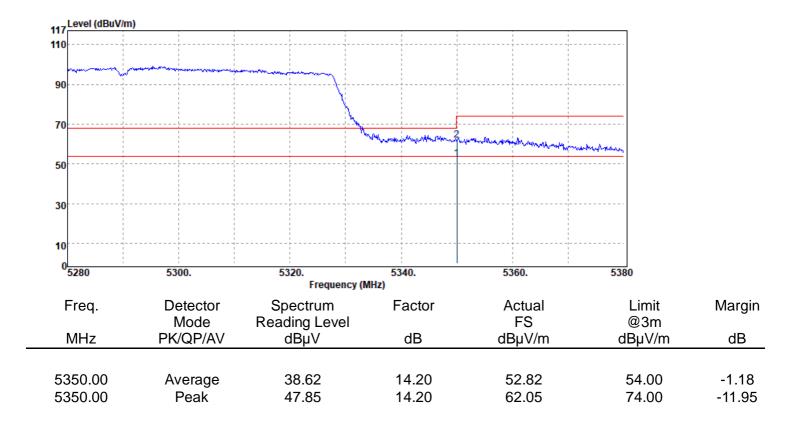
:ER/2020/40050 Report Number **Test Date** :2020-05-11

Operation Mode :802.11ac80B2 Temp./Humi. :26.3/74

Test Frequency :5290 MHz Antenna Pol. :HORIZONTAL

Engineer Test Mode :Bandedge CH High :Thomas

EUT Pol :H Plane



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74.00

68.20

-4.30

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:ER/2020/40050 **Test Date** Report Number :2020-05-12

Operation Mode :802.11ac80B3 Temp./Humi. :25.1/66

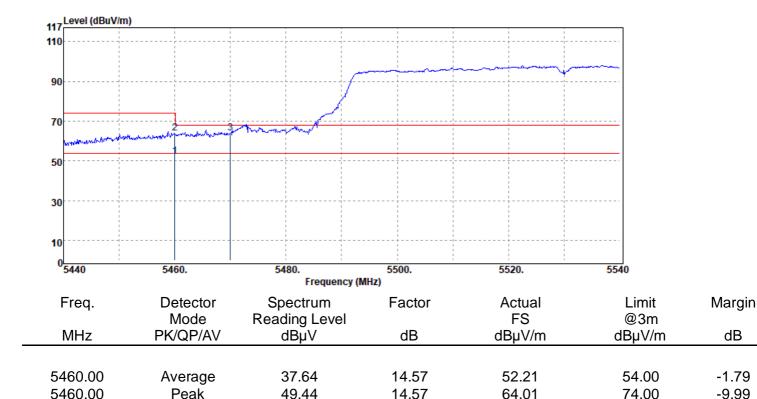
Test Frequency Antenna Pol. :VERTICAL :5530 MHz

Test Mode :Bandedge CH Low Engineer :Thomas

EUT Pol :H Plane

5470.00

Peak



14.61

63.90

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49.29

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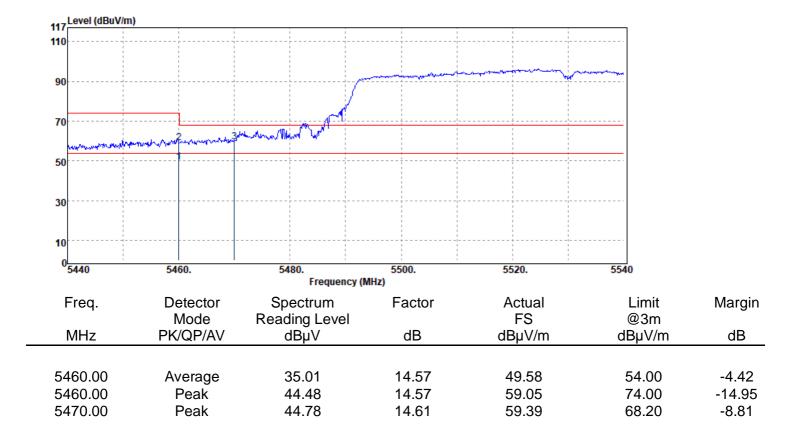
:ER/2020/40050 **Test Date** Report Number :2020-05-12

Temp./Humi. **Operation Mode** :802.11ac80B3 :25.1/66

Test Frequency :5530 MHz Antenna Pol. :HORIZONTAL

Test Mode :Bandedge CH Low Engineer :Thomas

EUT Pol :H Plane



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12 TRANSMISSION IN THE ABSENCE OF DATA

12.1 **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.

12.2 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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13 FREQUENCY STABILITY

13.1 **Standard Applicable**

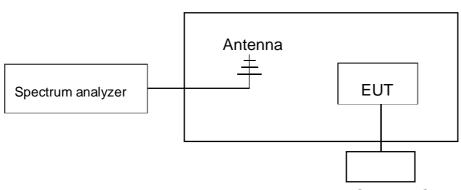
Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

13.2 **Measurement Procedure**

- 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.

13.3 **Test SET-UP**

Temperature Chamber



Variable AC Power Supply

13.4 **Measurement Equipment Used:**

SGS Conducted Room							
Name of Equip- ment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due		
EXA Spectrum An- alyzer	Agilent	N9010A	MY50420195	05/06/2020	05/05/2021		
DC Power Supply	Agilent	E3640A	MY40000811	12/23/2019	12/22/2020		
Temperature Chamber	TERCHY	MHG-120LF	911009	05/17/2019	05/16/2020		
Attenuator	Mini-Circuit	BW-S10W2+	2	01/02/2020	01/01/2021		
DC Block	Mini-Circuits	BLK-18-S+	1	01/02/2020	01/01/2021		

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13.5 **Measurement Result**

Start up

Operation Mode	802.11 a	Test Date	2020.05.13
Temperature	: 23.8°C	Test By	Tom
Humidity	: 57%		

Test Temp.(℃)	Test Voltage(V)	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
5	4.2	36	5180	5,180.03100	-0.00000598
3	3.5	36	5180	5,180.06800	-0.00001313
25	3.85	36	5180	5,180.07100	-0.00001371
35	4.2	36	5180	5,180.02600	-0.00000502
35	3.5	36	5180	5,180.06800	-0.00001313

2 minutes

Operation Mode	802.11 a	Test Date	2020.05.13
Temperature	: 23.8℃	Test By	Tom
Humidity	: 57%		

Test Temp.(°C)	Test Voltage(V)	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
5	4.2	36	5180	5,180.06100	-0.00001178
3	3.5	36	5180	5,179.91600	0.00001622
25	3.85	36	5180	5,179.91000	0.00001737
35	4.2	36	5180	5,179.95200	0.00000927
33	3.5	36	5180	5,179.91300	0.00001680

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5 minutes

Operation Mode	802.11 a	Test Date	2020.05.13
Temperature	: 23.8℃	Test By	Tom
Humidity	: 57%		

Test Temp.(°C)	Test Voltage(V)	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
5	4.2	36	5180	5,180.05400	-0.00001042
3	3.5	36	5180	5,180.04600	-0.00000888
25	3.85	36	5180	5,179.97000	0.00000579
35	4.2	36	5180	5,179.99200	0.00000154
33	3.5	36	5180	5,180.03800	-0.00000734

10 minutes

Operation Mode	802.11 a	Test Date	2020.05.13
Temperature	: 23.8°C	Test By	Tom
Humidity	: 57%		

Test Temp.(°C)	Test Voltage(V)	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
5	4.2	36	5180	5,180.02000	-0.00000386
3	3.5	36	5180	5,180.05700	-0.00001100
25	3.85	36	5180	5,179.97500	0.00000483
25	4.2	36	5180	5,179.91000	0.00001737
35	3.5	36	5180	5,180.01700	-0.00000328

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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14 ANTENNA REQUIREMENT

14.1 **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.

14.2 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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