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# ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

# INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART E AND INDUSTRY CANADA RSS 247 REQUIREMENT

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**FCC Applicant:** Barco NV

Barco NV President Kennedypark35, 8500 Kortrijk, Belgium

**IC Applicant:** 

Barco NV President Kennedypark35, 8500 Kortrijk, Belgium

**Product Name:** ClickShare Button

**Brand Name:** Barco

Model No.: R9861500D01, R9861500D01C **Model Difference:** Difference in cable connector

T190516W02-RP1 **Report Number:** 

FCC ID: 2AAED-R9861500D01 IC: 9393B-R9861500D01

**FCC Rule Part:** §15.407, Cat:NII

IC Rule: RSS-247 issue 2 Feb. 2017

Issue Date: Aug. 29, 2019

**Date of Test:** May 20, 2019 ~ May 25, 2019

Date of EUT Re-May 20, 2019

ceived:

Note: The test Result was tested by Compliance Certification Services Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were given in ANSI C63.10: 2013 and compliance standards.

The test results of this report relate only to the tested sample (EUT) identified in this report. The test Report of full or partial shall not copy. Without written approval of Compliance Certification Services Inc. (Wugu Laboratory).

Tested By:

Hone Hsieh / Engineer

Approved By:

Kevin Tsai / Deputy Manager





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# **Revision History**

Report Number	Revision	Description	Effected Page	Issue Date	Revised By
T190516W02-RP1	Rev.00	Initial creation of docu- ment	All	Aug. 29, 2019	Elle Chang

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# **GENERAL INFORMATION**

#### 1.1 **Product Description**

•	
Product Name:	ClickShare Button
Brand Name:	Barco
Model No.:	R9861500D01, R9861500D01C
Model Difference:	Difference in cable connector
Hardware Version:	N/A
Software Version:	N/A
Power Supply:	5Vdc from USB port
Modulation type	64QAM, 16QAM, QPSK, BPSK for OFDM 256QAM for OFDM in 802.11ac only
Transition Rate:	802.11 a: 6/9/12/18/24/36/48/54 Mbps 802.11 n_20MHz: 6.5 – 72.2Mbps 802.11 ac_20MHz: 6.5 –86.7Mbps

#### 1.2 **Antenna Designation**

Antenna Type	Supplier	Antenna Part No.	Freq. (MHz)	Peak Antenna Gain (dBi)
Chin	FR05-S1-NO-	FRACTUS S.A.	5250~5350	4.9
Chip	1-004	FNAC103 3.A.	5470~5725	4.9

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## **FCC WLAN 5GHz:**

Wi-Fi	Frequency Range Channels		Avg. Power (dBm)	Modulation Technology
110 20	5250~5350	4	10.03	
11a_20	5470~5725	12	10.76	
11n_HT / ac_VHT	5250~5350	4	HT: 9.77	OFDM
20M	5470~5725	12	HT: 10.19	

### IC WLAN 5GHz:

Wi-Fi	Frequency Range	Channels	Avg. or EIRP	Rated Power(dBm) (Worst Case)	Modulation Technology
11a	5250~5350	4	Avg.	10.03	
IIa	5470~5725	12	Avg.	10.76	
11n_HT / ac_VHT	5250~5350	4	Avg.	HT: 9.77	OFDM
20M	5470~5725	12	Avg.	HT: 10.19	

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#### 1.3 Test Methodology of Applied Standards

FCC Part 15, Subpart E §15.407

FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01

FCC KDB 662911 D01 Multiple Transmitter Output v02r01

RSS-247 issue 2 Feb. 2017

RSS-Gen. issue 5 Apr. 2018

ANSI C63.10:2013

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

#### **Test Facility** 1.4

Compliance Certification Services Inc. Wugu Lab. No.11, Wugong 6th Rd.,

Wugu Dist., New Taipei City 24891, Taiwan. (R.O.C.) (TAF code 1109)

FCC Designation number: TW1309

Canada Registration number: 2324G

#### 1.5 **Special Accessories**

There are no special accessories used while test was conducted.

#### 1.6 **Equipment Modifications**

There was no modification incorporated into the EUT.

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# SYSTEM TEST CONFIGURATION

#### **EUT Configuration** 2.1

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 according to §15.207. The two LISNs provide 50uH/50 ohm of coupling impedance for the measuring instrument. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

#### 2.3.2 **Conducted Test (RF)**

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

#### 2.3.3 **Radiated Emissions**

The EUT is a placed on a turn table. For emissions testing at or below 1 GHz, the table height shall be 0.8 m above the reference ground plane. For emission measurements above 1 GHz, the table height shall be 1.5 m. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this transmitter (EUT) was rotated through three orthogonal axes and measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made "while keeping the antenna in the 'cone of radiation' from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response." is still within the 3dB illumination BW of the measurement antenna.

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#### 2.4 **Measurement Results Explanation**

### 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.

#### 2.5 **Configuration of Tested System**

Fig. 2-1 Radiated Emission Configuration



Fig.2-3 Conducted Emission (Antenna Port) Configuration



Fig. 2-2 Conducted Emission (AC Power Line) Configuration



Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Data Cable	<b>Power Cord</b>
1	WLAN Test Software	N/A	N/A	N/A	N/A	N/A
2	Notebook	Lenovo	T420	S0012483	Shielded	Un-shielded

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# SUMMARY OF TEST RESULT

FCC Rules	IC Rules	Description Of Test	Result
§15.207	RSS-Gen §8.8	AC Power Line Conducted Emission	Compliant
§15.403(i) §15.407(e)	RSS-247 §6.2.1~ 4 (1) RSS-Gen §6.7	26 dB & 6dB & 99% Emission Bandwidth	Compliant
§15.407(a)	RSS-247 §6.2.1~ 4 (1)	Maximum Conducted Output Power	Compliant
§15.407(a)	RSS-247 §6.2.1~ 4 (1)	Power Spectral Density	Compliant
§15.205 §15.209 §15.407(b)	RSS-247 §6.2.1~ 4 (2)	Undesirable Radiated Emissions	Compliant
§15.407(c)	RSS-247 §6.4	Transmission in case of Absence of Information	Compliant
§15.407(g)	RSS-Gen §6.11	Frequency Stability	Compliant
§15.203 §15.407(a)	RSS- Gen §6.7 RSS- Gen §8.3	Antenna Requirement	Compliant

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# **DESCRIPTION OF TEST MODES**

#### 4.1 **Operated in U-NII Bands**

## Operated band in 5250 MHz ~5350 MHz:

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

# Operated band in 5470 MHz ~5725 MHz:

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

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#### 4.2 The Worst Test Modes and Channel Details

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

Modulation	Transmission Chain				Multiple Transmission Spatial
⊠ 802.11 a	⊠ Ch0	⊠ Ch1	☐ Ch2	□ Ch3	□ 2TX
⊠ 802.11 n	⊠ Ch0	⊠ Ch1	□ Ch2	□ Ch3	☐ MIMO
⋈ 802.11 ac	⊠ 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.

### RADIATED EMISSION TEST:

TADIALED EMILOC								
RADIATED EMISSION TEST (BELOW 1 GHz)								
MODE	FREQUENCY	AVAILABLE	TESTED	MODULATION	DATA RATE	ANTENNA		
INIODE	BAND (MHz)	CHANNEL	CHANNEL	MODULATION	(Mbps)	PORT		
802.11a	5260~5320	52 to 64	52,60,64	OFDM	6	Ch1		
802.11a	5500~5720	100 to 140	100,116,140	OFDM	6	Ch1		
RADIATED EMISSION TEST (ABOVE 1 GHz)								
MODE	MODULATION	DATA RATE	ANTENNA					
IVIODE	BAND (MHz)	CHANNEL	CHANNEL	INODULATION	(Mbps)	PORT		
802.11a	5260~5320	52 to 64	52,60,64	OFDM	6	Ch1		
802.11ac_VHT20	5260~5320	32 10 64	52,60,64	OFDM	MCS0	Ch1		
802.11a	5500~5720	100 to 144	100, 116, 140	OFDM	6	Ch1		
802.11ac_VHT20	3500~5720	100 10 144	100, 116, 140	OFDM	MCS0	Ch1		

### Note:

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

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### ANTENNA PORT CONDUCTED MEASUREMENT:

	CONDUCTED TEST									
MODE	FREQUENCY BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT				
802.11a				OFDM	6	Ch1				
802.11n_HT20	5260~5320	52 to 64	52,60,64	OFDM	MCS0	Ch4				
802.11ac_VHT20				OFDIVI	MCS0	Ch1				
802.11a				OFDM	6	Ch1				
802.11n_HT20	5500~5700	100 to 140	100,116,140	OFDM	MCS0	Ch1				
802.11ac_VHT20				OFDIVI	MCS0	Cill				

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# **MEASUREMENT UNCERTAINTY**

PARAMETER	UNCERTAINTY
AC Powerline Conducted Emission	+/- 1.2575
Emission bandwidth, 20dB bandwidth	+/- 0.0014
RF output power, conducted	+/- 1.14
Power density, conducted	+/- 1.40
3M Semi Anechoic Chamber / 30M~200M	+/- 4.12
3M Semi Anechoic Chamber / 200M~1000M	+/- 4.68
3M Semi Anechoic Chamber / 1G~8G	+/- 5.18
3M Semi Anechoic Chamber / 8G~18G	+/- 5.47
3M Semi Anechoic Chamber / 18G~26G	+/- 3.81
3M Semi Anechoic Chamber / 26G~40G	+/- 3.87

### Note:

- 1. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.
- 2. Determination of compliance is based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

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## CONDUCTED EMISSION TEST

#### **Standard Applicable** 6.1

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

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

#### Note

#### 6.2 **Measurement Equipment Used**

	Conducted Emission Test Site								
<b>EQUIPMENT</b>	MFR	MODEL	SERIAL	LAST	CAL DUE.				
TYPE		NUMBER	NUMBER	CAL.					
CABLE	EMCI	CFD300-NL	CERF	06/29/2018	06/28/2019				
EMI Test Receiver	R&S	ESCI	100064	07/24/2018	07/23/2019				
LISN	SCHWARZBECK	NSLK 8127	8127-541	01/31/2019	01/30/2020				
LISN	SCHAFFNER	NNB 41	03/10013	02/13/2019	02/12/2020				
Software		EZ-EMC	(CCS-3A1-CE)						

#### 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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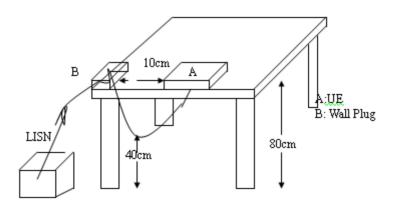
<sup>1.</sup> The lower limit shall apply at the transition frequencies

<sup>2.</sup> 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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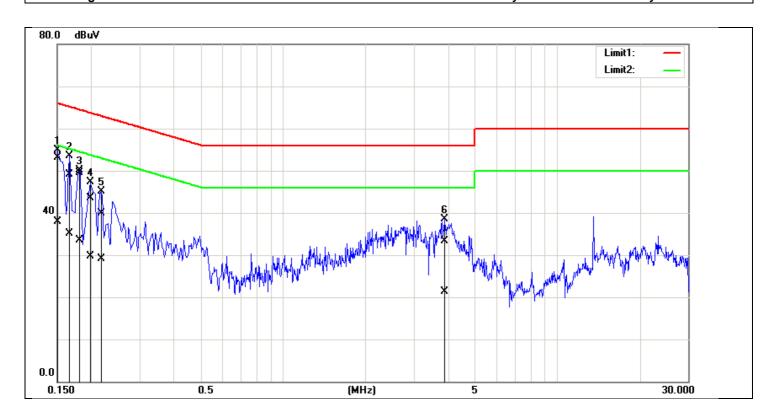
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# AC POWER LINE CONDUCTED EMISSION TEST DATA

Operation Date: 2019/5/27 **Description:** Line: Temp.(°C)/Hum.(%): 22.7(°C)/69% **Test Voltage:** AC 120V/60Hz Test By: Henry



No.	Fre- quency	Qua- siPeak reading	Average reading	Correc- tion factor	Qua- siPeak result	Average result	Qua- siPeak limit	Average limit	Qua- siPeak margin	Average margin	Remark
	(MHz)	(dBuV)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dBuV)	(dBuV)	(dB)	(dB)	
1*	0.1500	52.96	37.83	0.16	53.12	37.99	66.00	56.00	-12.88	-18.01	Pass
2	0.1660	48.85	34.92	0.16	49.01	35.08	65.16	55.16	-16.15	-20.08	Pass
3	0.1820	49.43	33.31	0.15	49.58	33.46	64.39	54.39	-14.81	-20.93	Pass
4	0.1980	43.34	29.48	0.15	43.49	29.63	63.69	53.69	-20.20	-24.06	Pass
5	0.2180	39.74	28.88	0.15	39.89	29.03	62.89	52.89	-23.00	-23.86	Pass
6	3.8900	33.02	21.13	0.27	33.29	21.40	56.00	46.00	-22.71	-24.60	Pass

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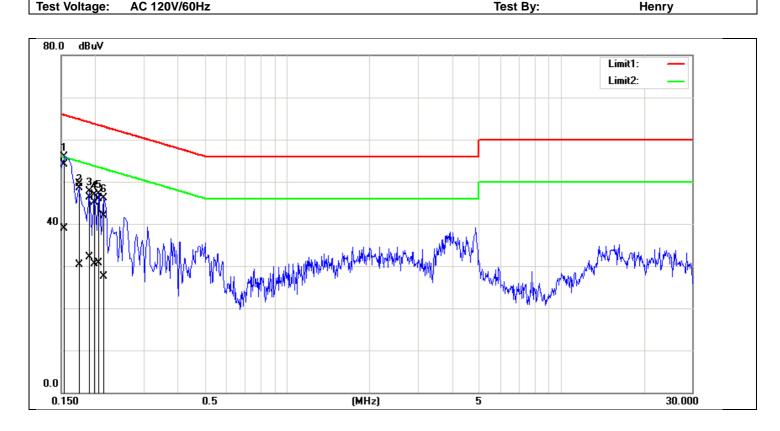
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Compliance Certification Services Inc. No.11, Wugong 6th Rd., Wugu Dist., New Taipei City 24891, Taiwan / 新北市五股區五工六路 11 號 t (886-2) 2299-9720 f (886-2) 2298-1882 www.ccsrf.com



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2019/5/27 Description: Operation Date: Line: Temp.(°C)/Hum.(%): 22.7(°C)/69% AC 120V/60Hz Test By: **Test Voltage:** 



No.	Fre- quency	Qua- siPeak reading	Average reading	Correc- tion factor	Qua- siPeak result	Average result	Qua- siPeak limit	Average limit	Qua- siPeak margin	Average margin	Remark
	(MHz)	(dBuV)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dBuV)	(dBuV)	(dB)	(dB)	
1*	0.1539	54.02	38.81	0.10	54.12	38.91	65.78	55.79	-11.66	-16.88	Pass
2	0.1740	49.45	30.15	0.10	49.55	30.25	64.76	54.77	-15.21	-24.52	Pass
3	0.1900	46.23	32.00	0.10	46.33	32.10	64.03	54.04	-17.70	-21.94	Pass
4	0.1980	44.99	30.46	0.10	45.09	30.56	63.69	53.69	-18.60	-23.13	Pass
5	0.2060	45.82	30.63	0.10	45.92	30.73	63.36	53.37	-17.44	-22.64	Pass
6	0.2140	41.88	27.35	0.10	41.98	27.45	63.04	53.05	-21.06	-25.60	Pass

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Onless otherwise stated the results shown in this test report reter only to the sample(s) tested and such sample(s) teste Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.



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# **DUTY CYCLE TEST SIGNAL**

Pre-analysis Check: While conducting average power measurement, duty cycle of each mode shall be checked to ensure its duty cycle in order to compensate for the loss due to insufficient ratio of duty cycle. All duty cycle is pre-scanned, and result as obtained below shows only the most representative ones where duty cycle is conducted as the given transmission with given virtual operation that expresses the percentage.

### Formula:

Duty Cycle = Ton / (Ton+Toff)

### **Measurement Procedure:**

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

## **Duty Cycle:**

Mode	Duty Cycle (%)	Duty Factor (dB) =10*log (1/Duty Cycle)	1/T (kHz)	VBW setting (kHz)
802.11a	100.00	0.00	0.00	0.01
802.11n_20	100.00	0.00	0.00	0.01

Duty Cycle Factor:  $10 * \log(1/1) = 0$ Duty Cycle Factor:  $10 * \log(1/1) = 0$ 

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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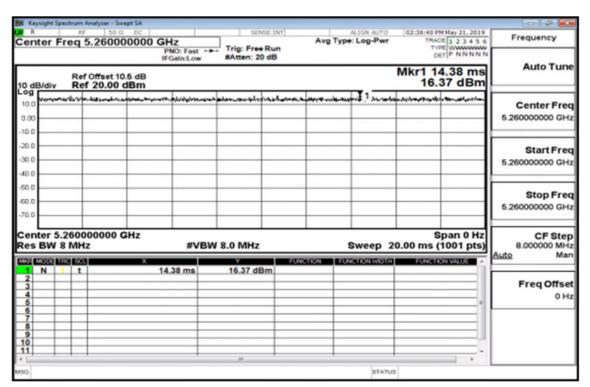
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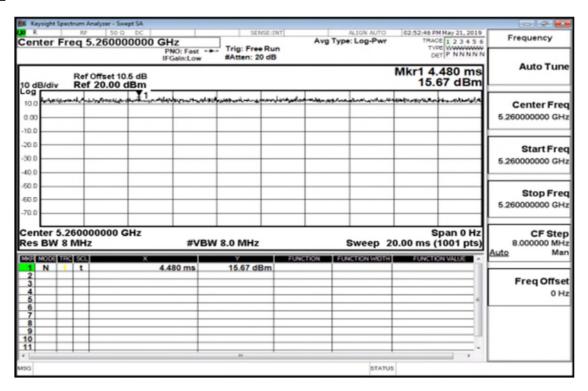


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# **DUTY CYCLE TEST SIGNAL Measurement Result** 802.11a



### 802.11n HT 20



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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Physical Ref (1904) At the sample (s) are retained for such as the sample (s) are reta Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

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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.
- The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules .
- 3. Remove the antenna from the EUT and then connect a low loss RF cable from the Antenna port to the spectrum analyzer.
  - a. 26dB Band width Measurement: Set the spectrum analyzer as 1% of emission BW Sweep=auto, Detector = Peak, Trace Mode = Max Hold, Manually readjust RBW until the RBW/EBW ratio is 1% based on EBW as observed on the result of pre-sequence measurement.
  - b. Mark the peak frequency and –26dB (upper and lower) frequency.
- 4. Repeat the procedures as list above until all test default channels (low, middle, and high) are completed.
- 5. Minimum Emission Bandwidth for the band 5.725-5.850GHz.
  - a. Set the spectrum analyzer as RBW = 100 kHz, VBW = 3\*RBW, Span = 30M/50MHz, Detector=Peak, Sweep=auto
  - b. Mark the peak frequency and -6dB (upper and lower) frequency.
- 6. For 99% Bandwidth:

Set the spectrum analyzer as RBW=1%, VBW = 3\*RBW, Span = 30M/50MHz, Detector=Sample, Sweep=auto.

- 7. Turn on the 99% bandwidth function, max reading.
- 8. Repeat above procedures until all frequency of interest measured was complete.

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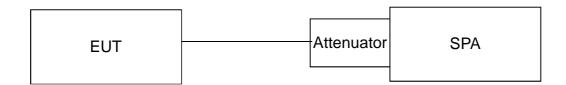


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#### 8.3 **Measurement Equipment Used**

SGS Conducted Room									
Name of Equip- ment Manufacturer Model Serial Calibration Calibration Dute Dute									
Spectrum Analyzer	Agilent	N9010A	MY53400256	11/21/2018	11/20/2019				
DC Block	PASTERNACK	PE8210	RF29	02/26/2019	02/25/2020				
Attenuator	Marvelous	MVE2213-10	RF80	02/26/2019	02/25/2020				

#### 8.4 **Test Set-up**



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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#### 8.5 **Measurement Result**

#### 26dB and 6dB Bandwidth

802.11a_Ch0			802.11a_Ch1			
Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)	Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)	
5260	31.41	14.971	5260	36.81	15.660	
5300	31.15	14.935	5300	33.67	15.272	
5320	29.28	14.666	5320	31.26	14.950	
5500	34.64	15.396	5500	32.85	15.165	
5580	34.48	15.376	5580	31.14	14.933	
5700	34.11	15.329	5700	35.61	15.516	

802.11n_HT20_Ch0	)		802.11n_HT20_Ch1				
Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)	Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)		
5260	33.13	15.202	5260	35.44	15.495		
5300	34.66	15.398	5300	35.21	15.467		
5320	33.71	15.278	5320	35.13	15.457		
5500	36.16	15.582	5500	35.78	15.536		
5580	38.25	15.826	5580	36.37	15.607		
5700	38.18	15.818	5700	37.38	15.726		

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### 99% Bandwidth

### 802.11a\_Ch0

### 802.11a\_Ch1

Frequency (MHz)	99% BW (MHz)	10 Log (B) (dB)	Frequency (MHz)	99% BW (MHz)	10 Log (B) (dB)
5260	17.268	12.372	5260	17.265	12.372
5300	17.278	12.375	5300	17.365	12.397
5320	17.251	12.368	5320	17.457	12.420
5500	17.181	12.350	5500	17.181	12.350
5580	17.248	12.367	5580	17.324	12.386
5700	17.187	12.352	5700	17.321	12.386

#### 802.11n HT20 Ch0

### 802.11n\_HT20\_Ch1

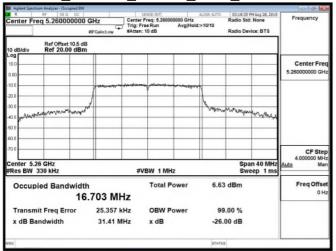
Frequency (MHz)	99% BW (MHz)	10 Log (B) (dB)	Frequency (MHz)	99% BW (MHz)	10 Log (B) (dB)
5260	18.202	12.601	5260	18.248	12.612
5300	18.245	12.611	5300	18.195	12.600
5320	18.268	12.617	5320	18.318	12.629
5500	18.23	12.608	5500	18.109	12.579
5580	18.062	12.568	5580	18.061	12.567
5700	18.102	12.577	5700	18.065	12.568

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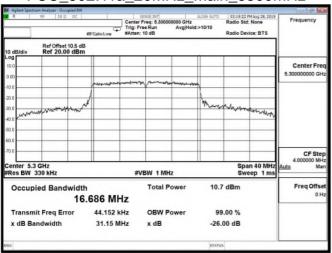


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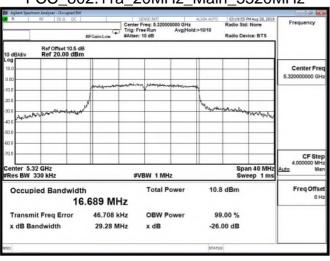
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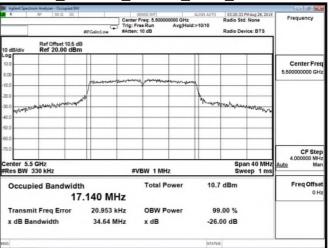
### FCC 802.11a 20MHz Main 5300MHz



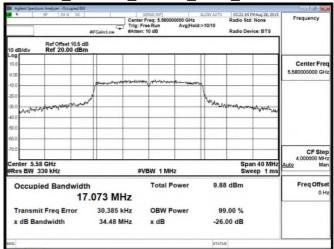
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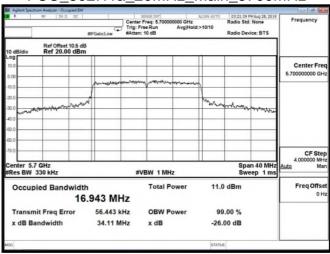
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### FCC 802.11a 20MHz Main 5580MHz



### FCC\_802.11a\_20MHz\_Main\_5700MHz

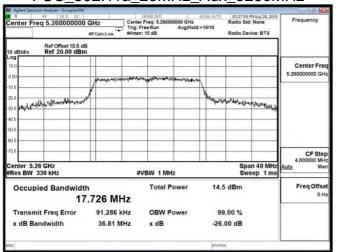


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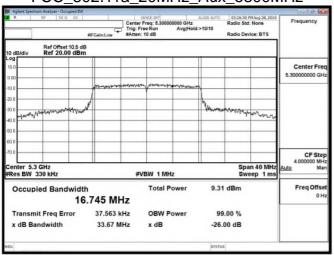


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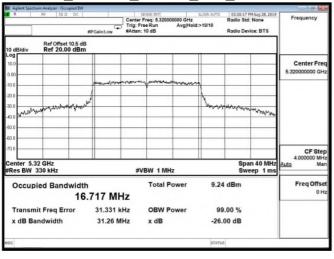
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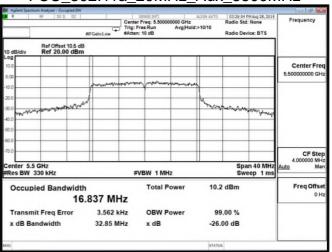
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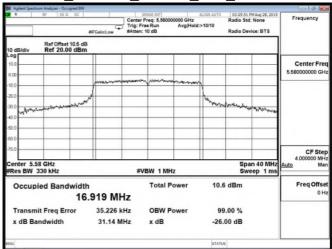
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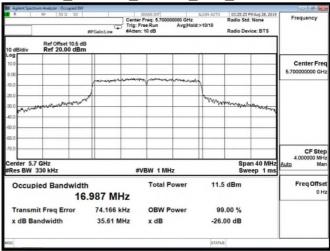
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### FCC 802.11a 20MHz Aux 5580MHz



### FCC\_802.11a\_20MHz\_Aux\_5700MHz

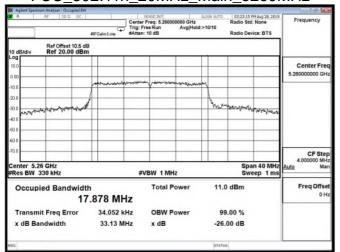


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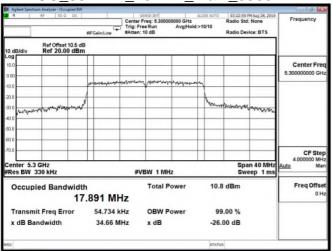


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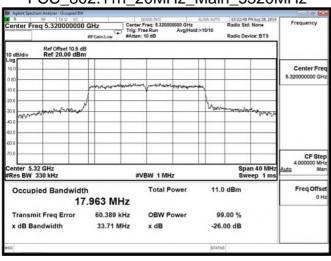
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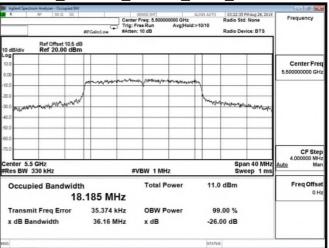
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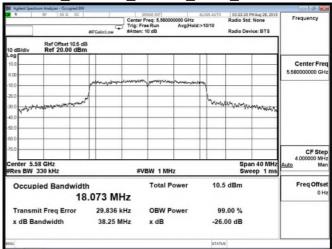
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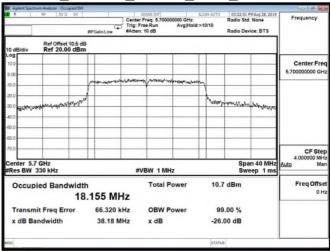
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### FCC 802.11n 20MHz Main 5580MHz



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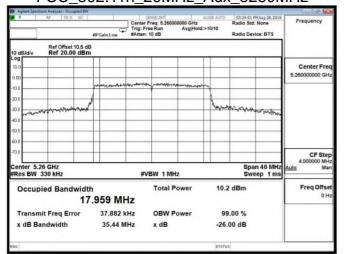


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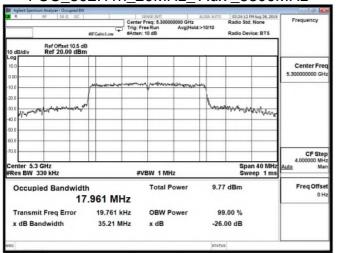


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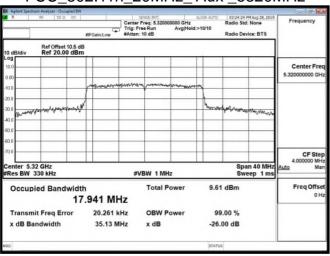
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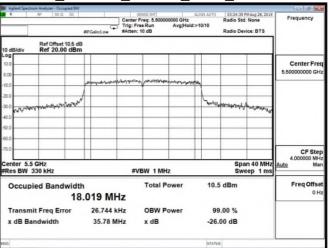
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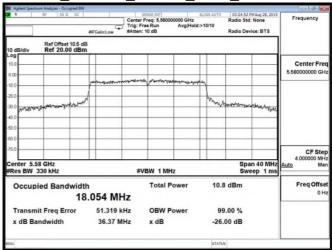
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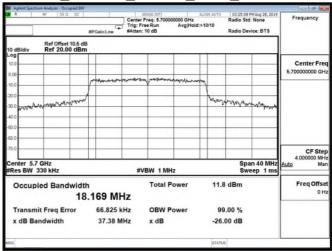
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#### FCC 802.11n 20MHz Aux 5580MHz



#### Aux FCC\_802.11n\_20MHz 5700MHz



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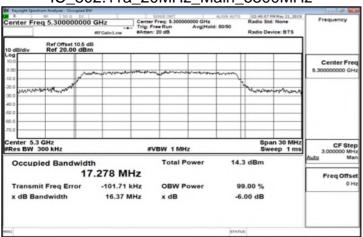
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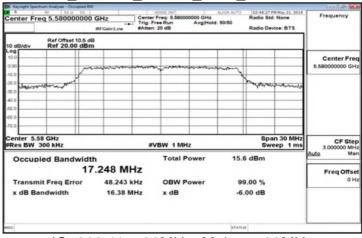
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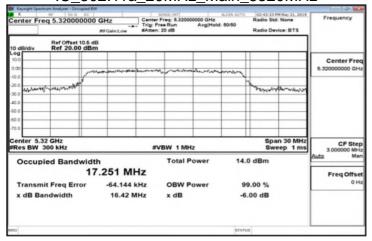
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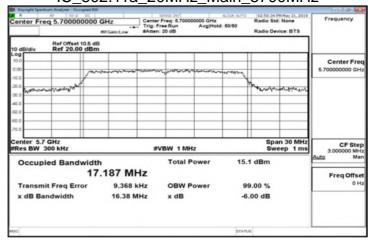
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IC 802.11a 20MHz Main 5700MHz

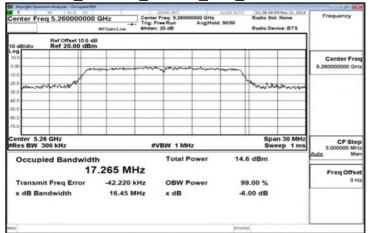


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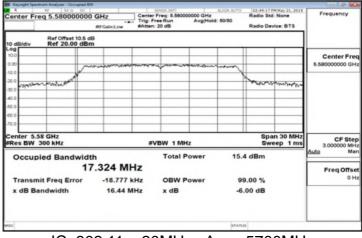
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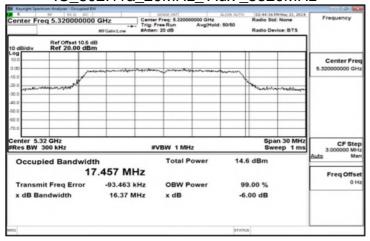
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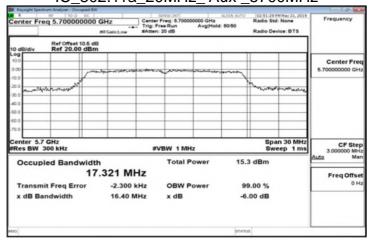
IC\_802.11a\_20MHz\_ Aux



#### IC 802.11a 20MHz Aux 5320MHz



IC 802.11a 20MHz Aux 5700MHz

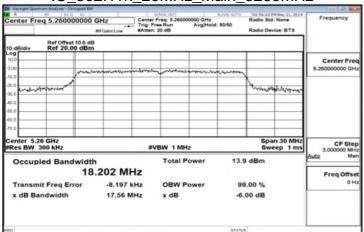


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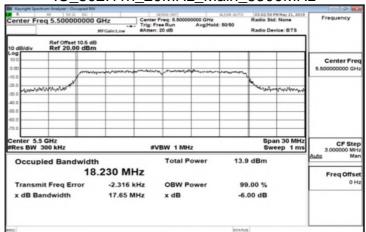


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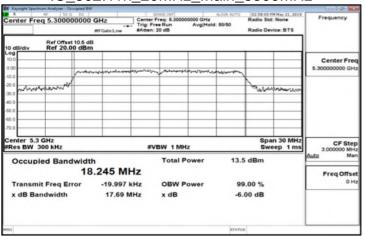
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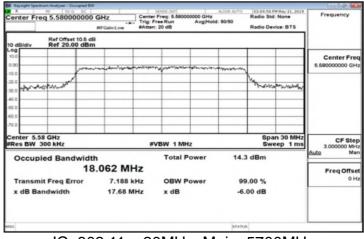
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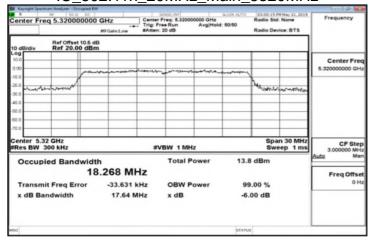
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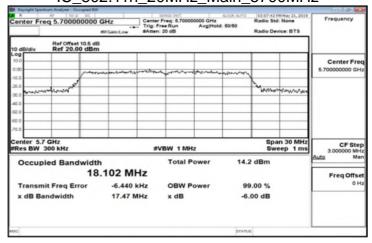
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# IC 802.11n 20MHz Main 5320MHz



IC 802.11n 20MHz Main 5700MHz

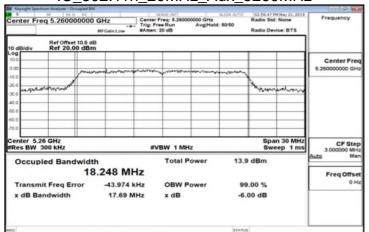


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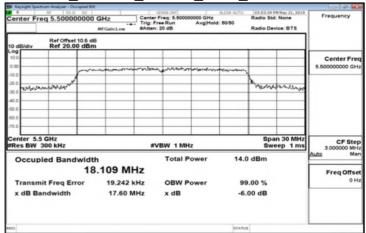


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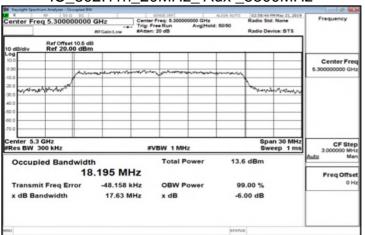
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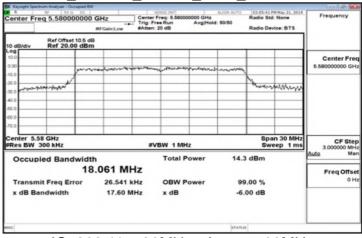
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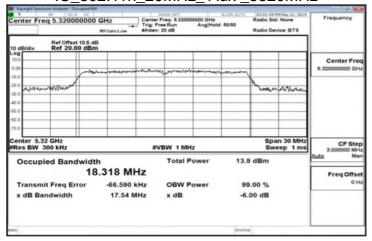
#### IC\_802.11n\_20MHz\_ Aux \_ 5300MHz



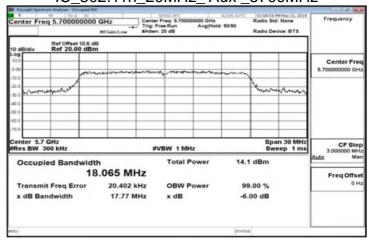
# IC\_802.11n\_20MHz\_ Aux



#### IC 802.11n 20MHz Aux 5320MHz



IC 802.11n 20MHz Aux 5700MHz



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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# MAXIMUM CONDUCTED OUTPUT POWER MEASUREMENT

#### **Standard Applicable** 9.1

### **FCC**

OPERZTION Band		EUT CATEGORY	LIMIT
		Access Point (Master device)	1 Watt(30dBm)
U-NII-1		Fixed point-to-point Access Ponit	1 Watt(30dBm)
		Mobile and portable client device	250mW(23.98dBm)
U-NII-2A	√		250mW(23.98dBm) or 11dBm+10 log B
U-NII-2C	√		250mW(23.98dBm) or 11dBm+10 log B
U-NII-3			1 Watt(30dBm)

If transmitting antennas of directional gain greater than 6 dBi are used, the Maximum transmit power shall be reduced by the amount in dB that the direction-al gain of the antenna exceeds 6 dBi.

#### **ISED**

OPERZTION FREQUENCY BAND	LIMIT
5150~5250 MHz	EIRP shall not exceed 200 mW or 10 + 10 log <sub>10</sub> B, dBm
5250~5350 MHz	Conducted output power shall not exceed 250 mW or 11 +10 log <sub>10</sub> B EIRP shall not exceed 1.0 W or 17 + 10 log <sub>10</sub> B, dBm
5470-5600 MHz and	Conducted output power shall not exceed 250 mW or 11 +10 log <sub>10</sub> B
5650-5725 MHz	EIRP shall not exceed 1.0 W or 17 + 10 log10B, dBm
5725~5850 MHz	Conducted output power shall not exceed 1 W

For equipment operating in the band 5725-5850 MHz, 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 directional gain of the antenna exceeds 6 dBi.

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### Note:

As per FCC KDB 662911 D01

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

- (i) If transmit signals are correlated, then Directional gain
- =  $10 \log[(10^{G1/20} + 10^{G2/20} + ... + 10^{GN/20})^2/N_{ANT}] dBi$

[Note the "20"s in the denominator of each exponent and the square of the sum of terms; the object is to combine the signal levels coherently.]

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

#### 9.2 **Measurement Procedure**

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

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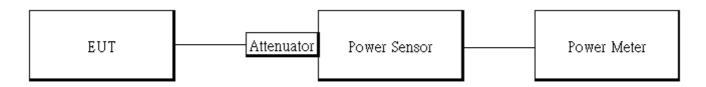


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#### 9.3 **Measurement Equipment Used**

	SGS Conducted Room										
Name of Equip- ment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due						
Power Meter	Anritsu	ML2496A	1326001	08/03/2018	08/02/2019						
Power Sensor	Anritsu	MA2411B	1315048	08/03/2018	08/02/2019						
Power Sensor	Anritsu	MA2411B	1315049	08/03/2018	08/02/2019						
Attenuator	Marvelous	MVE2213-10	RF80	02/26/2019	02/25/2020						

#### 9.4 **Test Set-up**



#### 9.5 **Measurement Result**

# Conducted output power (FCC)

### 802.11a Ch0

СН	Frequency (MHz)	Data Rate	TOTAL POWER (dBm)	TOTAL POWER (mW)		REQUIRED LIMIT (dBm)		RESULT
52	5260	6	9.38	8.670	23.98	or $11+10\log(B) =$	25.77	PASS
60	5300	6	9.34	8.590	23.98	or 11+10log(B) =	25.76	PASS
64	5320	6	9.32	8.551	23.98	or 11+10log(B) =	25.77	PASS
100	5500	6	6.12	4.093	23.98	or 11+10log(B) =	25.77	PASS
116	5580	6	9.35	8.610	23.98	or 11+10log(B) =	25.77	PASS
140	5700	6	6.65	4.624	23.98	or 11+10log(B) =	25.77	PASS

### 802.11a Ch1

СН	Frequency (MHz)	Data Rate	TOTAL POWER (dBm)	TOTAL POWER (mW)		REQUIRED LIMIT (dBm)		RESULT
52	5260	6	10.03	10.069	23.98	or 11+10log(B) =	25.76	PASS
60	5300	6	9.83	9.616	23.98	or 11+10log(B) =	25.77	PASS
64	5320	6	9.77	9.484	23.98	or 11+10log(B) =	25.77	PASS
100	5500	6	6.31	4.276	23.98	or 11+10log(B) =	25.75	PASS
116	5580	6	10.76	11.912	23.98	or 11+10log(B) =	25.76	PASS
140	5700	6	6.98	4.989	23.98	or 11+10log(B) =	25.74	PASS

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### 802.11n\_HT20\_Ch0

СН	Frequency (MHz)	Data Rate	TOTAL POWER (dBm)	TOTAL POWER (mW)		REQUIRED LIMIT (dBm)		RESULT
52	5260	MCS0	9.62	9.162	23.98	or $11+10\log(B) =$	25.77	PASS
60	5300	MCS0	9.58	9.078	23.98	or 11+10log(B) =	25.77	PASS
64	5320	MCS0	9.53	8.974	23.98	or 11+10log(B) =	25.77	PASS
100	5500	MCS0	7.38	5.470	23.98	or 11+10log(B) =	25.77	PASS
116	5580	MCS0	9.55	9.016	23.98	or 11+10log(B) =	25.73	PASS
140	5700	MCS0	6.74	4.721	23.98	or 11+10log(B) =	25.76	PASS

### 802.11n\_HT20\_Ch1

СН	Frequency (MHz)	Data Rate	TOTAL POWER (dBm)	TOTAL POWER (mW)		REQUIRED LIMIT (dBm)		RESULT
52	5260	MCS0	9.77	9.484	23.98	or $11+10\log(B) =$	25.77	PASS
60	5300	MCS0	9.73	9.397	23.98	or $11+10\log(B) =$	25.77	PASS
64	5320	MCS0	9.03	7.998	23.98	or 11+10log(B) =	25.77	PASS
100	5500	MCS0	7.64	5.808	23.98	or 11+10log(B) =	25.77	PASS
116	5580	MCS0	10.19	10.447	23.98	or 11+10log(B) =	25.75	PASS
140	5700	MCS0	7.02	5.035	23.98	or 11+10log(B) =	25.77	PASS

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# Conducted output power (IC)

### 802.11a Ch0

<u></u>	<u> </u>						
СН	Frequency (MHz)	TOTAL POWER (dBm)	TOTAL POWER (mW)		REQUIRED LIMIT (dBm)		RESULT
52	5260	9.38	8.670	23.98	or 11+10log(B) =	23.37	PASS
60	5300	9.34	8.590	23.98	or 11+10log(B) =	23.37	PASS
64	5320	9.32	8.551	23.98	or 11+10log(B) =	23.37	PASS
100	5500	6.12	4.093	23.98	or 11+10log(B) =	23.35	PASS
116	5580	9.35	8.610	23.98	or 11+10log(B) =	23.37	PASS
140	5700	6.65	4.624	23.98	or 11+10log(B) =	23.35	PASS

### 802.11a Ch1

СН	Frequency (MHz)	TOTAL POWER (dBm)	TOTAL POWER (mW)		REQUIRED LIMIT (dBm)		RESULT
52	5260	10.03	10.069	23.98	or 11+10log(B) =	23.37	PASS
60	5300	9.83	9.616	23.98	or 11+10log(B) =	23.40	PASS
64	5320	9.77	9.484	23.98	or 11+10log(B) =	23.42	PASS
100	5500	6.31	4.276	23.98	or 11+10log(B) =	23.35	PASS
116	5580	10.76	11.912	23.98	or 11+10log(B) =	23.39	PASS
140	5700	6.98	4.989	23.98	or 11+10log(B) =	23.39	PASS

### 802.11n\_HT20\_Ch0

СН	Frequency (MHz)	TOTAL POWER (dBm)	TOTAL POWER (mW)		REQUIRED LIMIT (dBm)		RESULT
52	5260	9.62	9.162	23.98	or 11+10log(B) =	23.60	PASS
60	5300	9.58	9.078	23.98	or 11+10log(B) =	23.61	PASS
64	5320	9.53	8.974	23.98	or 11+10log(B) =	23.62	PASS
100	5500	7.38	5.470	23.98	or 11+10log(B) =	23.61	PASS
116	5580	9.55	9.016	23.98	or 11+10log(B) =	23.57	PASS
140	5700	6.74	4.721	23.98	or 11+10log(B) =	23.58	PASS

# 802.11n\_HT20\_Ch1

СН	Frequency (MHz)	TOTAL POWER (dBm)	TOTAL POWER (mW)		REQUIRED LIMIT (dBm)		RESULT
52	5260	9.77	9.484	23.98	or 11+10log(B) =	23.61	PASS
60	5300	9.73	9.397	23.98	or 11+10log(B) =	23.60	PASS
64	5320	9.03	7.998	23.98	or 11+10log(B) =	23.63	PASS
100	5500	7.64	5.808	23.98	or 11+10log(B) =	23.58	PASS
116	5580	10.19	10.447	23.98	or 11+10log(B) =	23.57	PASS
140	5700	7.02	5.035	23.98	or 11+10log(B) =	23.57	PASS

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#### **EIRP**

802.11a Ch0

СН	Frequency (MHz)	TOTAL POWER (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP (mW)	REQUIRED LIMIT (dBm)		RESULT	
52	5260	9.38	4.900	14.28	26.792	30	or 17+10log(B)=	29.37	PASS
60	5300	9.34	4.900	14.24	26.546	30	or 17+10log(B)=	29.37	PASS
64	5320	9.32	4.900	14.22	26.424	30	or 17+10log(B)=	29.37	PASS
100	5500	6.12	4.900	11.02	12.647	30	or 17+10log(B)=	29.35	PASS
116	5580	9.35	4.900	14.25	26.607	30	or 17+10log(B)=	29.37	PASS
140	5700	6.65	4.900	11.55	14.289	30	or 17+10log(B)=	29.35	PASS

802.11a Ch1

СН	Frequency (MHz)	TOTAL POWER (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP (mW)	REQUIRED LIMIT (dBm)		RESULT	
52	5260	10.03	4.900	14.93	31.117	30	or 17+10log(B)=	29.37	PASS
60	5300	9.83	4.900	14.73	29.717	30	or 17+10log(B)=	29.40	PASS
64	5320	9.77	4.900	14.67	29.309	30	or 17+10log(B)=	29.42	PASS
100	5500	6.31	4.900	11.21	13.213	30	or 17+10log(B)=	29.35	PASS
116	5580	10.76	4.900	15.66	36.813	30	or 17+10log(B)=	29.39	PASS
140	5700	6.98	4.900	11.88	15.417	30	or 17+10log(B)=	29.39	PASS

802 11n HT20 Ch0

002.11II_	_H12U_CHU								
СН	Frequency (MHz)	TOTAL POWER (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP (mW)	REQUIRED LIMIT (dBm)		RESULT	
52	5260	9.62	4.900	14.52	28.314	30	or 17+10log(B)=	29.60	PASS
60	5300	9.58	4.900	14.48	28.054	30	or 17+10log(B)=	29.61	PASS
64	5320	9.53	4.900	14.43	27.733	30	or 17+10log(B)=	29.62	PASS
100	5500	7.38	4.900	12.28	16.904	30	or 17+10log(B)=	29.61	PASS
116	5580	9.55	4.900	14.45	27.861	30	or 17+10log(B)=	29.57	PASS
140	5700	6.74	4.900	11.64	14.588	30	or 17+10log(B)=	29.58	PASS

802.11n\_HT20\_Ch1

СН	Frequency (MHz)	TOTAL POWER (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP (mW)	REQUIRED LIMIT (dBm)		RESULT	
52	5260	9.77	4.900	14.67	29.309	30	or 17+10log(B)=	29.61	PASS
60	5300	9.73	4.900	14.63	29.040	30	or 17+10log(B)=	29.60	PASS
64	5320	9.03	4.900	13.93	24.717	30	or 17+10log(B)=	29.63	PASS
100	5500	7.64	4.900	12.54	17.947	30	or 17+10log(B)=	29.58	PASS
116	5580	10.19	4.900	15.09	32.285	30	or 17+10log(B)=	29.57	PASS
140	5700	7.02	4.900	11.92	15.560	30	or 17+10log(B)=	29.57	PASS

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## 10 MAXIMUM POWER SPECTRAL DENSITY

#### **Standard Applicable** 10.1

#### **FCC**

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

#### **ISED**

OPERZTION FREQUENCY BAND	LIMIT
5150~5250 MHz	EIRP spectral density 10 dBm / MHz
5250~5350 MHz	11dBm / MHz
5470-5600 MHz and 5650-5725 MHz	11dBm / MHz
5725~5850 MHz	30dBm / 500 kHz

For equipment operating in the band 5725-5850 MHz, 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.

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#### Note:

As per FCC KDB 662911 D01

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

- (i) If transmit signals are correlated, then Directional gain
- =  $10 \log[(10^{G1/20} + 10^{G2/20} + ... + 10^{GN/20})^2/N_{ANT}] dBi$

[Note the "20"s in the denominator of each exponent and the square of the sum of terms; the object is to combine the signal levels coherently.]

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

#### 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.
- 8. 802.11n MIMO mode: offset is set following "measure and add 10 Log (N)" on spectrum to measure the PSD for MIMO mode. Offset = cable loss + 10 log (N), where N is number of transmitting antenna. N=2 for this given application.

Note: For the test of PSD at MIMO mode, the highest emission of worst case employing Measure and add 10 log (N) technical is reported on this report after the comparison between Main Antenna at single transmitting mode and Aux that yields the higher value. The MIMO transmitting mode produces higher value of outcome

#### 10.3 **Measurement Equipment Used**

SGS Conducted Room								
Name of Equip- ment	Manufacturer	Model	Serial Num- ber	Calibration Date	Calibration Due			
Spectrum Analyzer	Agilent	N9010A	MY53400256	11/21/2018	11/20/2019			
DC Block	PASTERNACK	PE8210	RF29	02/26/2019	02/25/2020			
Attenuator	Marvelous	MVE2213-10	RF80	02/26/2019	02/25/2020			

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#### 10.4 Test Set-up



#### 10.5 **Measurement Result**

POWER DENSITY 802.11a MODE_Ch1							
Frequency (MHz)	PSD W/O Duty Factor (dBm)	Duty Factor	PSD With Duty Factor (dBm)	Limit (dBm)	Margin (dB)		
5260	-2.69	0.00	-2.69	11	-13.69		
5300	-3.47	0.00	-3.47	11	-14.47		
5320	-3.82	0.00	-3.82	11	-14.82		
5500	-3.67	0.00	-3.67	11	-14.67		
5580	-2.74	0.00	-2.74	11	-13.74		
5700	-3.00	0.00	-3.00	11	-14.00		

POWER DENSITY 802.11n HT20 MODE_Ch1							
Frequency (MHz)	PSD W/O Duty Factor (dBm)	Duty Factor	PSD With Duty Factor (dBm)	Limit (dBm)	Margin (dB)		
5260	-3.70	0.00	-3.70	11	-14.70		
5300	-4.38	0.00	-4.38	11	-15.38		
5320	-4.50	0.00	-4.50	11	-15.50		
5500	-4.77	0.00	-4.77	11	-15.77		
5580	-3.77	0.00	-3.77	11	-14.77		
5700	-3.73	0.00	-3.73	11	-14.73		

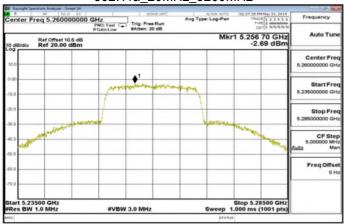
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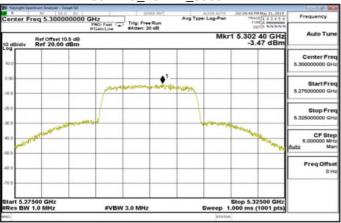


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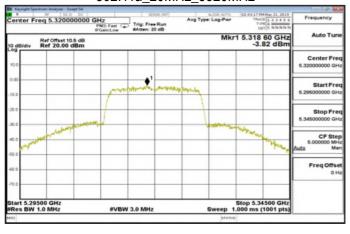
### 802.11a 20MHz 5260MHz



#### 802.11a 20MHz 5300MHz



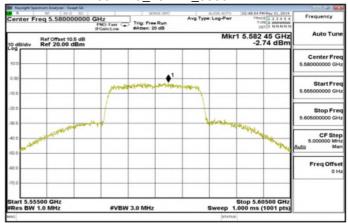
# 802.11a\_20MHz\_5320MHz



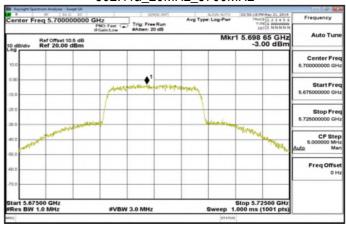
#### 802.11a 20MHz 5500MHz



### 802.11a\_20MHz\_5580MHz



### 802.11a\_20MHz\_5700MHz



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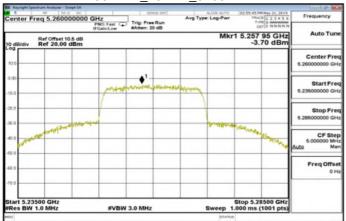
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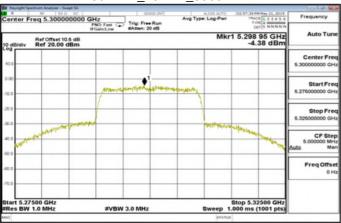


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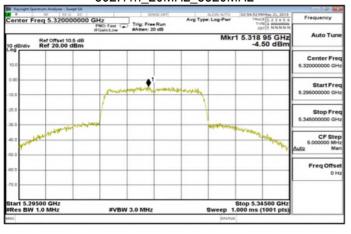
#### 802.11n 20MHz 5260MHz



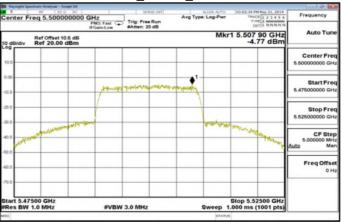
#### 802.11n 20MHz 5300MHz



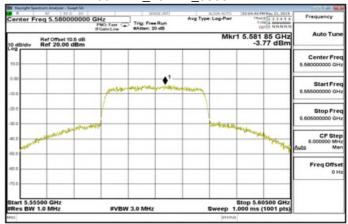
### 802.11n\_20MHz\_5320MHz



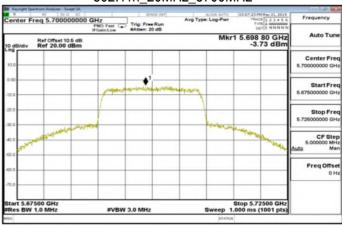
#### 802.11n 20MHz 5500MHz



#### 802.11n 20MHz 5580MHz



#### 802.11n\_20MHz\_5700MHz



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### 11 UNDESIRABLE RADIATED EMISSION MEASUREMENT

#### 11.1 **Standard Applicable**

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

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

APPLICABLE TO	LI	MIT		
FCC KDB 789033 D02 General UNII Test Procedures New Rules	FIELD STRENGTH AT 3m			
	PK: 74 (dBμV/m)	AV 54 (dBµV/m)		
APPLICABLE TO	EIRP LIMIT	FIELD STRENGTH AT 3m		
15.407(b)(1) RSS-247 6.2.1.2				
15.407(b)(2) RSS-247 6.2.2.2	PK: -27 (dBm/MHz)	PK: 68.3 (dBµV/m)		
15.407(b)(3) RSS-247 6.2.3.2				
	PK:-27 (dBm/MHz) *1	PK: 68.2(dBµV/m) *1		
15.407(b)(4)(i)	PK:10 (dBm/MHz) *2	PK:105.2 (dBµV/m) *2		
RSS-247 6.2.4.2	PK:15.6 (dBm/MHz) *3 PK:27 (dBm/MHz) *4	PK: 110.8(dBµV/m) *3 PK:122.2 (dBµV/m) *4		

<sup>\*1</sup> 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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<sup>\*2</sup> below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above.

<sup>\*3</sup> below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above.

<sup>\*4</sup> 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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Unwanted spurious emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table:

Frequency (MHz)	Field strength (microvolts/meter)	Distance (meters)
0.009-0.490	2400/F(KHz)	300
0.490-1.705	24000/F(KHz)	30
1.705-30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

#### Note:

- 1. The lower limit shall apply at the transition frequencies.
- 2. Emission level  $(dB\mu V/m) = 20 \log Emission level (dB\mu V/m)$

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#### 11.2 **Measurement Equipment Used**

		SGS SAC-II	l		
Name of Equip- ment	Manufacturer	Model	Serial Num- ber	Calibration Date	Calibration Due
Bilog Antenna	Sunol Sciences	JB3	A030105	07/13/2018	07/12/2019
Cable	HUBER SU- HNER	SUCOFLEX 104PEA	25157	02/26/2019	02/25/2020
Cable	HUBER SU- HNER	SUCOFLEX 104PEA	20995	02/26/2019	02/25/2020
Digital Thermo-Hygro Meter	WISEWIND	1206	D07	01/30/2019	01/29/2020
double Ridged Guide Horn Antenna	ETC	MCTD 1209	DRH13M02003	08/20/2018	08/19/2019
High Pass Filter	WI	WHKX7.0/18G- 8SS	45	02/26/2019	02/25/2020
Horn Antenna	ETS LIND- GREN	3116	00026370	12/26/2018	12/25/2019
Loop Antenna	COM-POWER	AL-130	121051	03/22/2019	03/21/2020
Pre-Amplifier	EMEC	EM330	060609	02/26/2019	02/25/2020
Pre-Amplifier	MITEQ	AMF-6F- 260400-40-8P	985646	02/26/2019	02/25/2020
Pre-Amplifier	HP	8449B	3008A00965	02/26/2019	02/25/2020
PSA Series Spectrum Analyzer	Agilent	E4446A	MY46180323	05/31/2018	05/30/2019
Antenna Tower	ccs	CC-A-1F	N/A	N.C.R	N.C.R
Controller	CCS	CC-C-1F	N/A	N.C.R	N.C.R
Turn Table	CCS	CC-T-1F	N/A	N.C.R	N.C.R
Software		e3 V	6.11-20180413		

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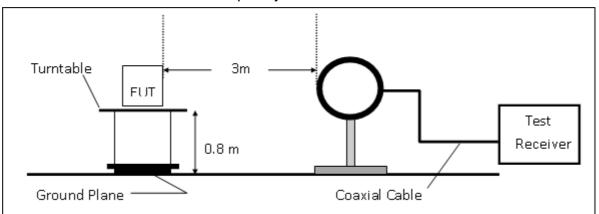


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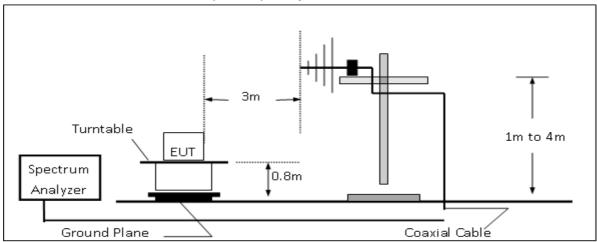


### 11.3 Test SET-UP

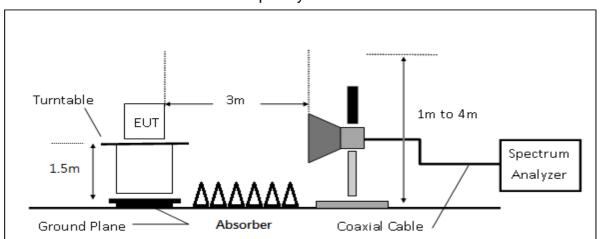
(A) Radiated Emission Test Set-UP Frequency Below 30MHz.



(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**

- The EUT was placed on a turn table which is 0.8m above ground plane.
- The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules. 2.
- The EUT was placed on a turn table with 0.8m for frequency< 1GHz and 1.5m for frequency> 1GHz above ground plane.
- The turn table shall rotate 360 degrees to determine the position of maximum emission level. 4.
- 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.
- Set the spectrum analyzer as RBW=1 MHz, VBW=3 MHz for Peak Detector at frequency above 7. 1 GHz.
- Set the spectrum analyzer as RBW=1 MHz, VBW=10 Hz (Duty cycle > 98%) or VBW ≥ 1/T 8. (Duty cycle < 98%) for Average Detector at frequency above 1 GHz.
- Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
- 10. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
- 11. Repeat above procedures until all frequency measured were complete.

### 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:

TC	$\mathbf{D}$	- 4	<b>\</b>		~I		$\sim$
FS =	KA	+ /	٩r	+ (	JL	- A	U

Where	<u> </u>	CL = Cable Attenuation Factor (Cable Loss)
	RA = Reading Amplitude	AG = Amplifier Gain
	AF = Antenna Factor	

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

Factor(dB) = Antenna Factor(dBµV/m) + Cable Loss(dB) - Pre\_Amplifier Gain(dB)

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# 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.

#### 11.7 **Measurement Result**

Refer to next page for tabular data sheets.

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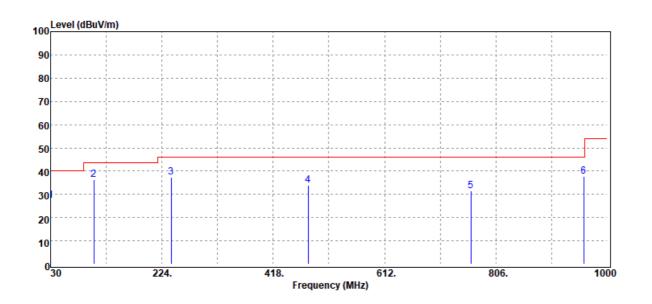
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# **Radiated Spurious Emission Measurement Result**

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

**Project Number** :T190516W02 **Operation Band** :802.11a/Band2 **Fundamental Frequency** :5300 MHz **Operation Mode** :Tx CH Mid EUT Pol. :E1 Plan

**Test Date** :2019-05-25 Temp./Humi. :20/53.5 Engineer :Jerry :VERTICAL Measurement Antenna Pol.



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	28.70	-1.51	27.19	40.00	-12.81
105.66	Peak	47.42	-11.02	36.40	43.50	-7.10
240.49	Peak	47.53	-10.25	37.28	46.00	-8.72
479.11	Peak	36.76	-2.98	33.78	46.00	-12.22
762.35	Peak	29.73	1.75	31.48	46.00	-14.52
959.26	Peak	33.09	4.48	37.57	46.00	-8.43

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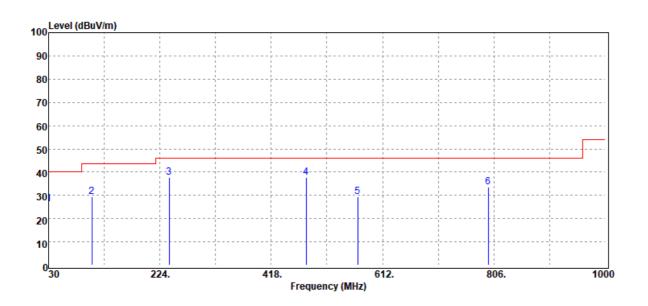
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**Project Number** Operation Band **Fundamental Frequency Operation Mode** EUT Pol.

:T190516W02 :802.11a/Band2 :5300 MHz :Tx CH Mid :E1 Plan

**Test Date** :2019-05-25 Temp./Humi. :20/53.5 Engineer :Jerry

:HORIZONTAL Measurement Antenna Pol.



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
	Mode	Reading Level		FS	@3m	
MHz	PK/QP/AV	dΒμV	dB	dBμV/m	dBμV/m	dB
30.00	Peak	27.81	-1.51	26.30	40.00	-13.70
105.66	Peak	40.30	-11.02	29.28	43.50	-14.22
240.49	Peak	47.94	-10.25	37.69	46.00	-8.31
479.11	Peak	40.76	-2.98	37.78	46.00	-8.22
568.35	Peak	31.40	-1.94	29.46	46.00	-16.54
796.30	Peak	32.25	1.47	33.72	46.00	-12.28

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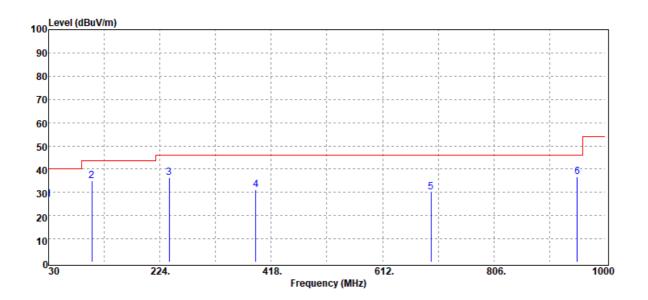


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**Project Number** Operation Band **Fundamental Frequency Operation Mode** EUT Pol.

:T190516W02 :802.11a/Band3 :5580 MHz :Tx CH Mid :E1 Plan

**Test Date** :2019-05-25 Temp./Humi. :20/53.5 Engineer :Jerry :VERTICAL Measurement Antenna Pol.



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	28.66	-1.51	27.15	40.00	-12.85
105.66	Peak	46.05	-11.02	35.03	43.50	-8.47
240.49	Peak	46.46	-10.25	36.21	46.00	-9.79
390.84	Peak	37.03	-5.96	31.07	46.00	-14.93
696.39	Peak	30.18	-0.16	30.02	46.00	-15.98
951.50	Peak	32.48	4.19	36.67	46.00	-9.33

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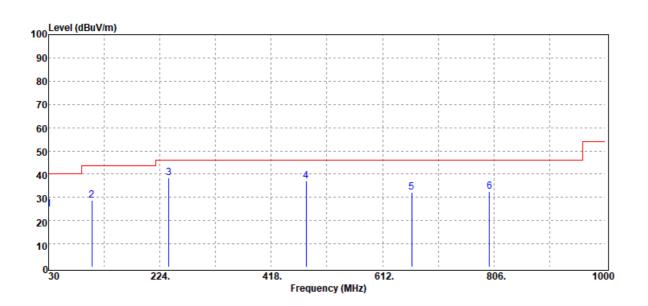
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**Project Number** Operation Band **Fundamental Frequency Operation Mode** EUT Pol.

:T190516W02 :802.11a/Band3 :5580 MHz :Tx CH Mid :E1 Plan

**Test Date** :2019-05-25 Temp./Humi. :20/53.5 Engineer :Jerry

:HORIZONTAL Measurement Antenna Pol.



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	26.42	-1.51	24.91	40.00	-15.09
105.66	Peak	39.80	-11.02	28.78	43.50	-14.72
239.52	Peak	48.62	-10.29	38.33	46.00	-7.67
479.11	Peak	39.92	-2.98	36.94	46.00	-9.06
662.44	Peak	32.00	0.01	32.01	46.00	-13.99
798.24	Peak	31.02	1.50	32.52	46.00	-13.48

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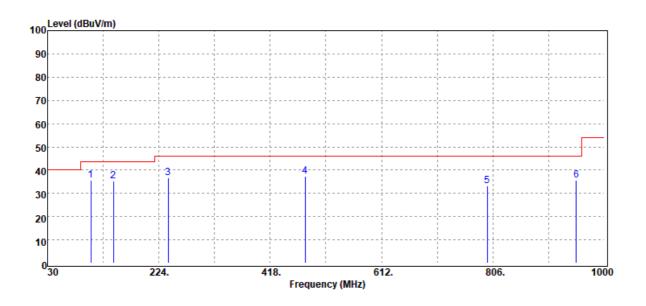
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**Project Number** Operation Band **Fundamental Frequency Operation Mode** EUT Pol.

:T190516W02 :802.11n20/Band2 :5300 MHz

:Tx CH Mid :E1 Plan

**Test Date** :2019-05-25 Temp./Humi. :20/53.5 Engineer :Jerry :VERTICAL Measurement Antenna Pol.



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
	Mode	Reading Level		FS	@3m	
MHz	PK/QP/AV	dΒμV	dB	dBμV/m	dBμV/m	dB
105.66	Peak	46.49	-11.02	35.47	43.50	-8.03
144.46	Peak	45.18	-9.92	35.26	43.50	-8.24
240.49	Peak	46.83	-10.25	36.58	46.00	-9.42
479.11	Peak	40.35	-2.98	37.37	46.00	-8.63
796.30	Peak	31.70	1.47	33.17	46.00	-12.83
951.50	Peak	31.36	4.19	35.55	46.00	-10.45

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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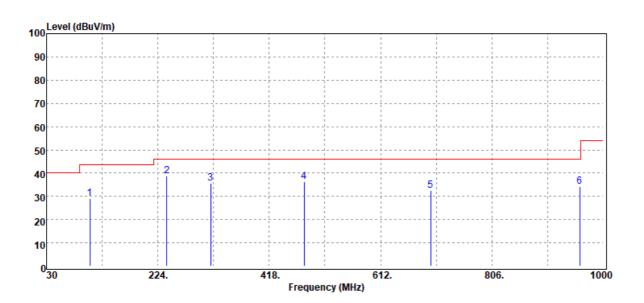
**Project Number** Operation Band **Fundamental Frequency Operation Mode** EUT Pol.

:T190516W02 :802.11n20/Band2

:5300 MHz :Tx CH Mid :E1 Plan

**Test Date** :2019-05-25 Temp./Humi. :20/53.5 Engineer :Jerry

:HORIZONTAL Measurement Antenna Pol.



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBμV	dB	dBμV/m	dBµV/m	dB
105.66	Peak	40.00	-11.02	28.98	43.50	-14.52
239.52	Peak	48.94	-10.29	38.65	46.00	-7.35
316.15	Peak	43.25	-7.59	35.66	46.00	-10.34
479.11	Peak	39.16	-2.98	36.18	46.00	-9.82
699.30	Peak	32.63	-0.04	32.59	46.00	-13.41
959.26	Peak	29.92	4.48	34.40	46.00	-11.60

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.



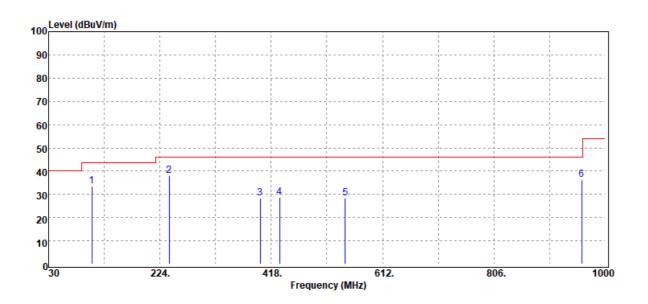
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**Project Number** Operation Band **Fundamental Frequency Operation Mode** EUT Pol.

:T190516W02 :802.11n20/Band3 :5580 MHz :Tx CH Mid

:E1 Plan

**Test Date** :2019-05-25 Temp./Humi. :20/53.5 Engineer :Jerry :VERTICAL Measurement Antenna Pol.



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBμ̈V	dB	dBμV/m	dBµV/m	dB
105.66	Peak	44.73	-11.02	33.71	43.50	-9.79
240.49	Peak	48.23	-10.25	37.98	46.00	-8.02
398.60	Peak	33.96	-5.65	28.31	46.00	-17.69
432.55	Peak	33.08	-4.32	28.76	46.00	-17.24
547.01	Peak	30.68	-2.25	28.43	46.00	-17.57
959.26	Peak	31.99	4.48	36.47	46.00	-9.53

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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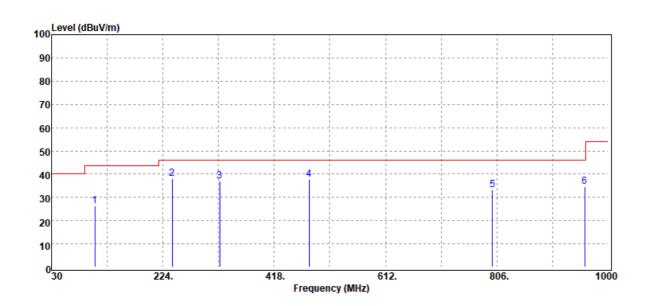
**Project Number** Operation Band **Fundamental Frequency Operation Mode** EUT Pol.

:T190516W02 :802.11n20/Band3

:5580 MHz :Tx CH Mid :E1 Plan

**Test Date** :2019-05-25 Temp./Humi. :20/53.5 Engineer :Jerry

:HORIZONTAL Measurement Antenna Pol.



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
105.66	Peak	37.48	-11.02	26.46	43.50	-17.04
240.49	Peak	48.15	-10.25	37.90	46.00	-8.10
322.94	Peak	44.52	-7.37	37.15	46.00	-8.85
479.11	Peak	40.79	-2.98	37.81	46.00	-8.19
798.24	Peak	31.60	1.50	33.10	46.00	-12.90
959.26	Peak	30.16	4.48	34.64	46.00	-11.36

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.

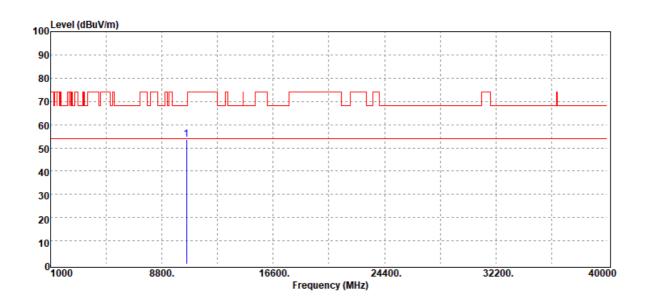


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### **Above 1GHz Worst-Case Data:**

**Project Number** :T190516W02 **Test Date** :2019-05-24 **Operation Band** :802.11a/Band2 Temp./Humi. :20/53.5 **Fundamental Frequency** :5260 MHz Engineer :Jerry **Operation Mode** :Tx CH Low :VERTICAL Measurement Antenna Pol.

EUT Pol. :E1 Plan



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBμV/m	dBµV/m	dB
10520.00	Peak	37.72	15.99	53.71	68.20	-14.49

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.



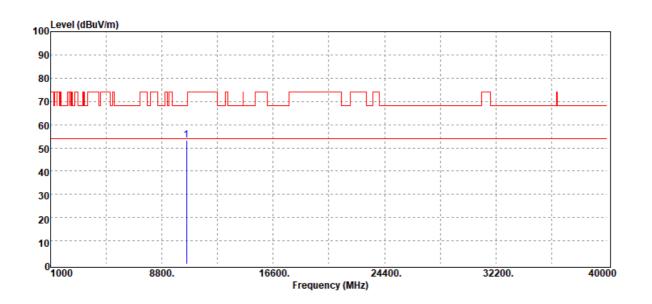
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**Project Number** Operation Band **Fundamental Frequency Operation Mode** EUT Pol.

:T190516W02 :802.11a/Band2 :5260 MHz :Tx CH Low :E1 Plan

**Test Date** :2019-05-24 Temp./Humi. :20/53.5 Engineer :Jerry

:HORIZONTAL Measurement Antenna Pol.



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBμV/m	dBµV/m	dB
10520.00	Peak	37.28	15.99	53.27	68.20	-14.93

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.

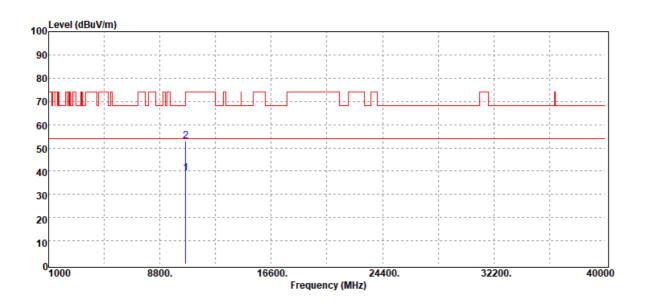


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**Project Number** Operation Band **Fundamental Frequency Operation Mode** EUT Pol.

:T190516W02 :802.11a/Band2 :5300 MHz :Tx CH Mid :E1 Plan

**Test Date** :2019-05-24 Temp./Humi. :20/53.5 Engineer :Jerry :VERTICAL Measurement Antenna Pol.



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμ̈V	dB	dBµV/m	dBµV/m	dB
10600.00	Average	23.91	15.27	39.18	54.00	-14.82
10600.00	Peak	37.83	15.27	53.10	74.00	-20.90

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.



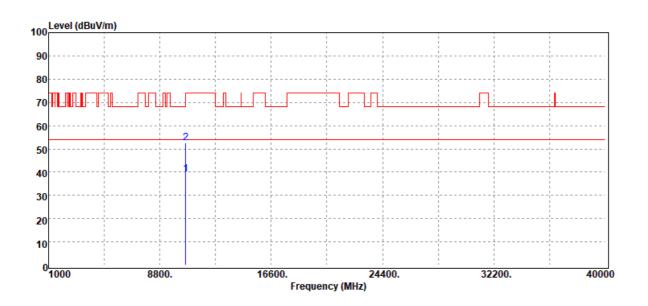
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**Project Number** Operation Band **Fundamental Frequency Operation Mode** EUT Pol.

:T190516W02 :802.11a/Band2 :5300 MHz :Tx CH Mid :E1 Plan

**Test Date** :2019-05-24 Temp./Humi. :20/53.5 Engineer :Jerry

:HORIZONTAL Measurement Antenna Pol.



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμV	dB	dBμV/m	dBμV/m	dB
10600.00	Average	23.71	15.27	38.98	54.00	-15.02
10600.00	Peak	37.39	15.27	52.66	74.00	-21.34

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.

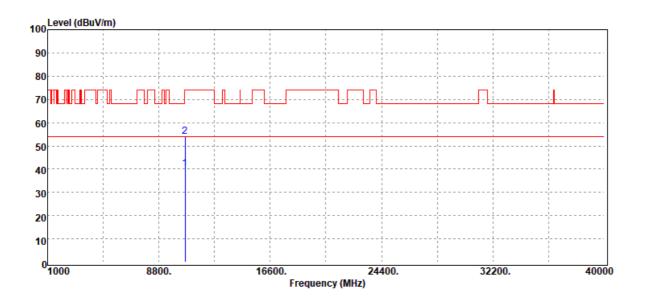


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**Project Number** Operation Band **Fundamental Frequency Operation Mode** EUT Pol.

:T190516W02 :802.11a/Band2 :5320 MHz :Tx CH High :E1 Plan

**Test Date** :2019-05-24 Temp./Humi. :20/53.5 Engineer :Jerry :VERTICAL Measurement Antenna Pol.



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμV	dB	dBµV/m	dBμV/m	dB
10640.00	Average	24.05	16.05	40.10	54.00	-13.90
10640.00	Peak	37.82	16.05	53.87	74.00	-20.13

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



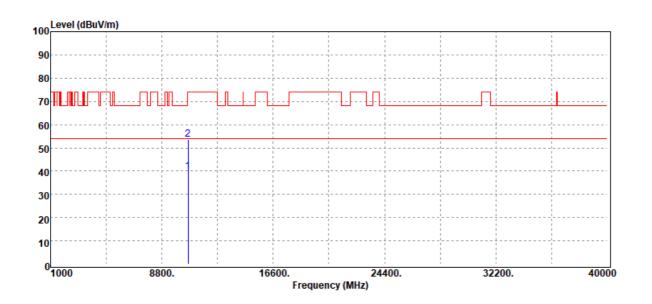
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**Project Number** Operation Band **Fundamental Frequency Operation Mode** EUT Pol.

:T190516W02 :802.11a/Band2 :5320 MHz :Tx CH High :E1 Plan

**Test Date** :2019-05-24 Temp./Humi. :20/53.5 Engineer :Jerry

:HORIZONTAL Measurement Antenna Pol.



	Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
	MHz	PK/QP/AV	dΒμ̈V	dB	dBµV/m	dBμV/m	dB
1	0640.00	Average	23.89	16.05	39.94	54.00	-14.06
1	0640.00	Peak	37.52	16.05	53.57	74.00	-20.43

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.

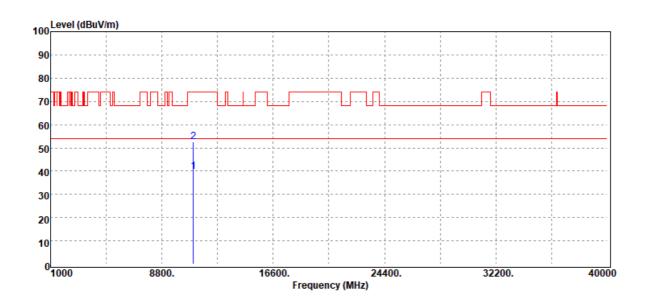


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**Project Number** Operation Band **Fundamental Frequency Operation Mode** EUT Pol.

:T190516W02 :802.11a/Band3 :5500 MHz :Tx CH Low :E1 Plan

**Test Date** :2019-05-24 Temp./Humi. :20/53.5 Engineer :Jerry :VERTICAL Measurement Antenna Pol.



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμ̈V	dB	dBμV/m	dBµV/m	dB
11000.00	Average	22.25	17.44	39.69	54.00	-14.31
11000.00	Peak	35.28	17.44	52.72	74.00	-21.28

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.



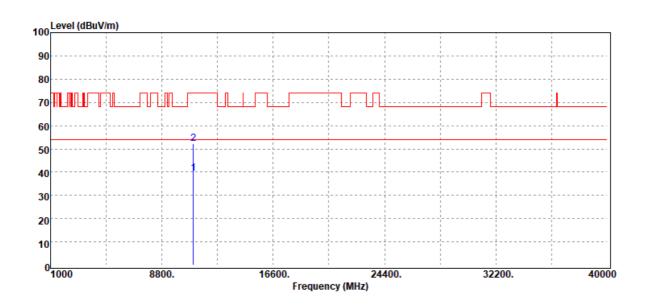
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**Project Number** Operation Band **Fundamental Frequency Operation Mode** EUT Pol.

:T190516W02 :802.11a/Band3 :5500 MHz :Tx CH Low :E1 Plan

**Test Date** :2019-05-24 Temp./Humi. :20/53.5 Engineer :Jerry

:HORIZONTAL Measurement Antenna Pol.



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμV	dB	dBμV/m	dBμV/m	dB
11000.00	Average	21.97	17.44	39.41	54.00	-14.59
11000.00	Peak	34.91	17.44	52.35	74.00	-21.65

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.

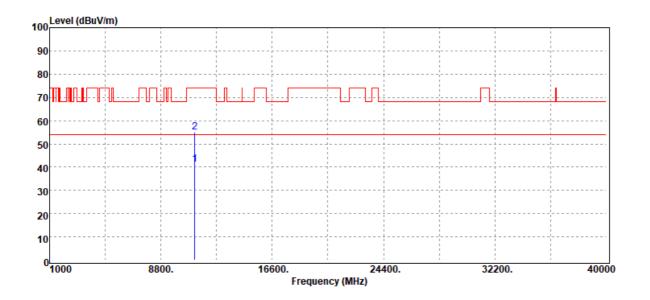


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**Project Number Operation Band Fundamental Frequency Operation Mode** EUT Pol.

:T190516W02 :802.11a/Band3 :5580 MHz :Tx CH Mid :E1 Plan

**Test Date** :2019-05-24 Temp./Humi. :20/53.5 Engineer :Jerry :VERTICAL Measurement Antenna Pol.



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμV	dB	dBµV/m	dBμV/m	dB
11160.00	Average	24.22	16.85	41.07	54.00	-12.93
11160.00	Peak	38.23	16.85	55.08	74.00	-18.92

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.



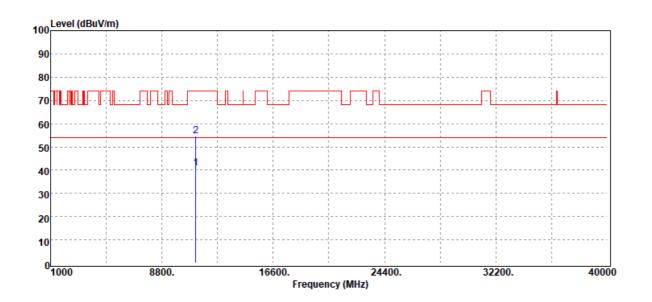
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**Project Number Operation Band Fundamental Frequency Operation Mode** EUT Pol.

:T190516W02 :802.11a/Band3 :5580 MHz :Tx CH Mid :E1 Plan

**Test Date** :2019-05-24 Temp./Humi. :20/53.5 Engineer :Jerry

:HORIZONTAL Measurement Antenna Pol.



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμV	dB	dBμV/m	dBµV/m	dB
11160.00	Average	23.98	16.85	40.83	54.00	-13.17
11160.00	Peak	37.93	16.85	54.78	74.00	-19.22

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.

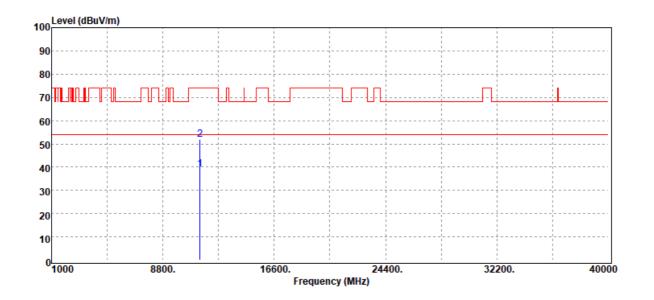


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**Project Number Operation Band Fundamental Frequency Operation Mode** EUT Pol.

:T190516W02 :802.11a/Band3 :5700 MHz :Tx CH High :E1 Plan

**Test Date** :2019-05-24 Temp./Humi. :20/53.5 Engineer :Jerry :VERTICAL Measurement Antenna Pol.



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμ̈V	dB	dBμV/m	dBµV/m	dB
11400.00	Average	22.31	16.89	39.20	54.00	-14.80
11400.00	Peak	35.11	16.89	52.00	74.00	-22.00

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.



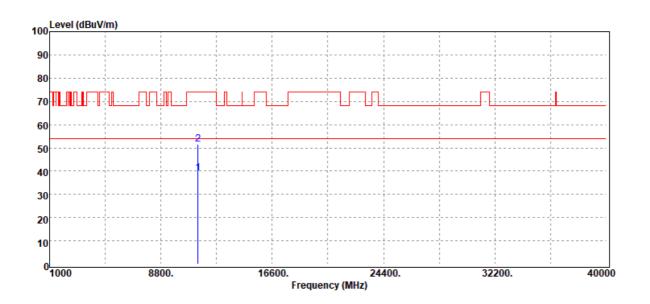
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**Project Number Operation Band Fundamental Frequency Operation Mode** EUT Pol.

:T190516W02 :802.11a/Band3 :5700 MHz :Tx CH High :E1 Plan

**Test Date** :2019-05-24 Temp./Humi. :20/53.5 Engineer :Jerry

:HORIZONTAL Measurement Antenna Pol.



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμV	dB	dBµV/m	dBμV/m	dB
11400.00	Average	22.05	16.89	38.94	54.00	-15.06
11400.00	Peak	34.82	16.89	51.71	74.00	-22.29

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.



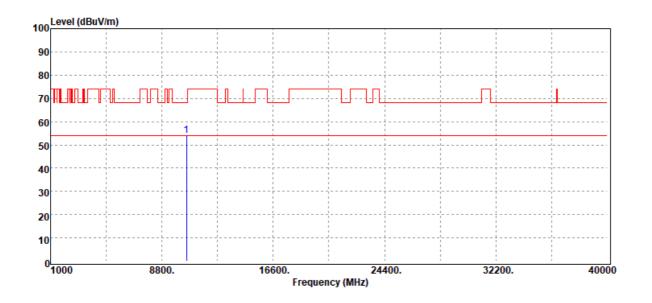
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**Project Number Operation Band Fundamental Frequency Operation Mode** EUT Pol.

:T190516W02 :802.11n20/Band2 :5260 MHz

:Tx CH Low :E1 Plan

**Test Date** :2019-05-24 Temp./Humi. :20/53.5 Engineer :Jerry :VERTICAL Measurement Antenna Pol.



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
	Mode	Reading Level		FS	@3m	-
MHz	PK/QP/AV	dΒμV	dB	dBμV/m	dBµV/m	dB
10520.00	Peak	37.94	15.99	53.93	68.20	-14.27

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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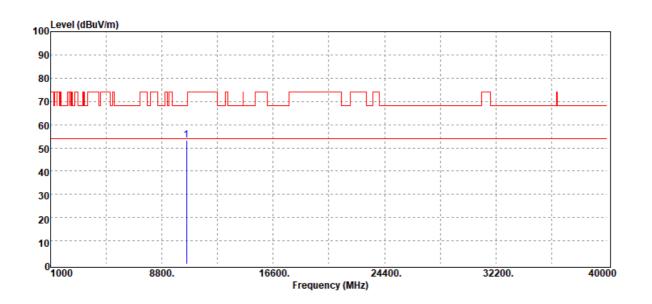
**Project Number Operation Band Fundamental Frequency Operation Mode** EUT Pol.

:T190516W02 :802.11n20/Band2 :5260 MHz

:Tx CH Low :E1 Plan

**Test Date** :2019-05-24 Temp./Humi. :20/53.5 Engineer :Jerry

:HORIZONTAL Measurement Antenna Pol.



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
	Mode	Reading Level		FS	@3m	_
MHz	PK/QP/AV	dΒμV	dB	dBμV/m	dBµV/m	dB
10520.00	Peak	37.36	15.99	53.35	68.20	-14.85

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.



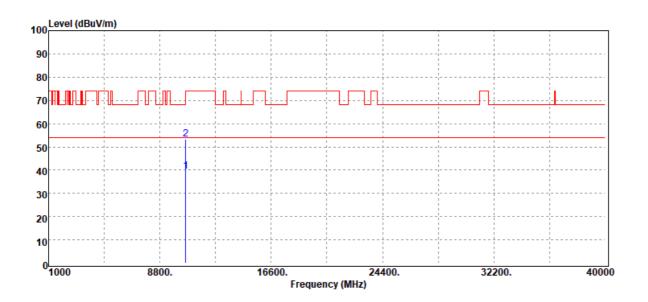
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**Project Number Operation Band Fundamental Frequency Operation Mode** EUT Pol.

:T190516W02 :802.11n20/Band2 :5300 MHz

:Tx CH Mid :E1 Plan

**Test Date** :2019-05-24 Temp./Humi. :20/53.5 Engineer :Jerry :VERTICAL Measurement Antenna Pol.



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμ̈V	dB	dBµV/m	dBµV/m	dB
10600.00	Average	24.02	15.27	39.29	54.00	-14.71
10600.00	Peak	37.89	15.27	53.16	74.00	-20.84

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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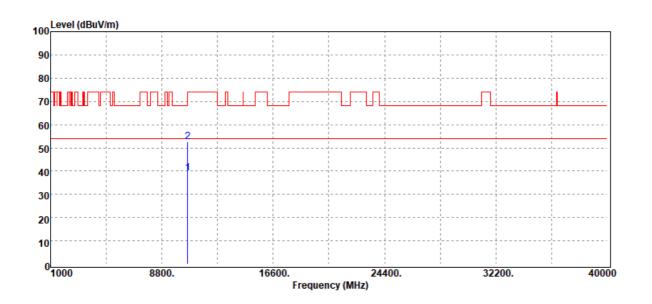
**Project Number Operation Band Fundamental Frequency Operation Mode** EUT Pol.

:T190516W02 :802.11n20/Band2 :5300 MHz

:Tx CH Mid :E1 Plan

**Test Date** :2019-05-24 Temp./Humi. :20/53.5 Engineer :Jerry

:HORIZONTAL Measurement Antenna Pol.



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμ̈V	dB	dBμV/m	dBµV/m	dB
10600.00	Average	23.86	15.27	39.13	54.00	-14.87
10600.00	Peak	37.38	15.27	52.65	74.00	-21.35

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.



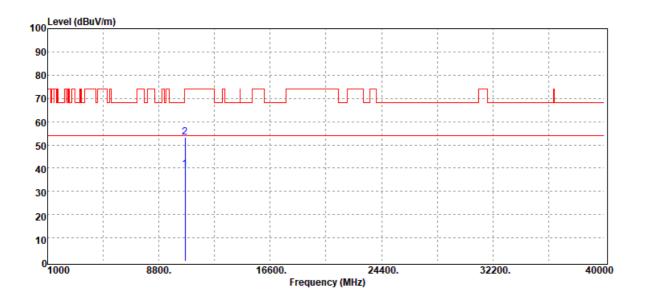
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**Project Number Operation Band Fundamental Frequency Operation Mode** EUT Pol.

:T190516W02 :802.11n20/Band2 :5320 MHz :Tx CH High

:E1 Plan

**Test Date** :2019-05-24 Temp./Humi. :20/53.5 Engineer :Jerry :VERTICAL Measurement Antenna Pol.



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμ̈V	dB	dBμV/m	dBµV/m	dB
10640.00	Average	23.52	16.05	39.57	54.00	-14.43
10640.00	Peak	37.31	16.05	53.36	74.00	-20.64

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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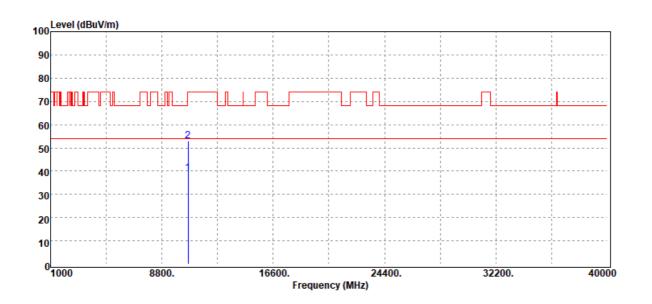
**Project Number Operation Band Fundamental Frequency Operation Mode** EUT Pol.

:T190516W02 :802.11n20/Band2 :5320 MHz

:Tx CH High :E1 Plan

**Test Date** :2019-05-24 Temp./Humi. :20/53.5 Engineer :Jerry

:HORIZONTAL Measurement Antenna Pol.



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμ̈V	dB	dBμV/m	dBµV/m	dB
10640.00	Average	23.11	16.05	39.16	54.00	-14.84
10640.00	Peak	36.89	16.05	52.94	74.00	-21.06

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.

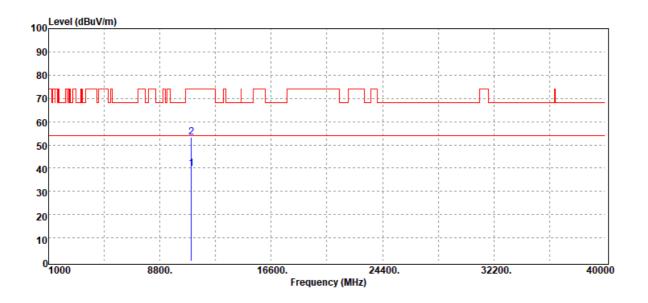


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**Project Number Operation Band Fundamental Frequency Operation Mode** EUT Pol.

:T190516W02 :802.11n20/Band3 :5500 MHz :Tx CH Low :E1 Plan

**Test Date** :2019-05-24 Temp./Humi. :20/53.5 Engineer :Jerry :VERTICAL Measurement Antenna Pol.



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμ̈V	dB	dBμV/m	dBµV/m	dB
11000.00	Average	22.37	17.44	39.81	54.00	-14.19
11000.00	Peak	35.69	17.44	53.13	74.00	-20.87

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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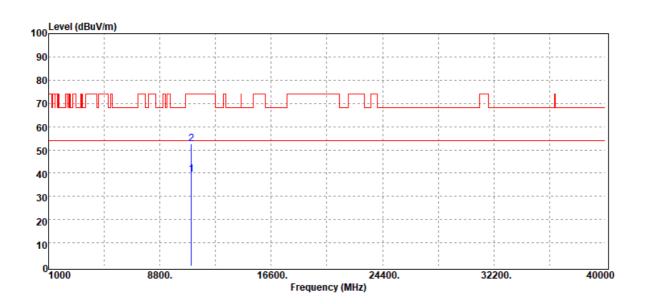
**Project Number Operation Band Fundamental Frequency Operation Mode** EUT Pol.

:T190516W02 :802.11n20/Band3 :5500 MHz

:Tx CH Low :E1 Plan

**Test Date** :2019-05-24 Temp./Humi. :20/53.5 Engineer :Jerry

:HORIZONTAL Measurement Antenna Pol.



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμ̈V	dB	dBμV/m	dBµV/m	dB
11000.00	Average	22.09	17.44	39.53	54.00	-14.47
11000.00	Peak	35.02	17.44	52.46	74.00	-21.54

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.



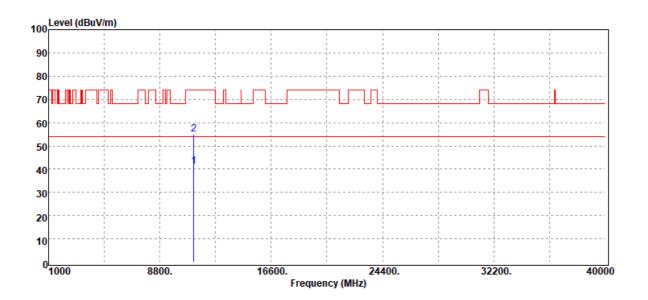
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**Project Number Operation Band Fundamental Frequency Operation Mode** EUT Pol.

:T190516W02 :802.11n20/Band3 :5580 MHz :Tx CH Mid

:E1 Plan

**Test Date** :2019-05-24 Temp./Humi. :20/53.5 Engineer :Jerry :VERTICAL Measurement Antenna Pol.



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμ̈V	dB	dBμV/m	dBµV/m	dB
11160.00	Average	24.32	16.85	41.17	54.00	-12.83
11160.00	Peak	38.19	16.85	55.04	74.00	-18.96

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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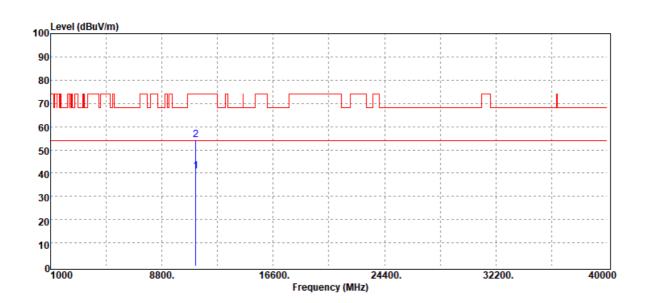
**Project Number Operation Band Fundamental Frequency Operation Mode** EUT Pol.

:T190516W02 :802.11n20/Band3 :5580 MHz

:Tx CH Mid :E1 Plan

**Test Date** :2019-05-24 Temp./Humi. :20/53.5 Engineer :Jerry

:HORIZONTAL Measurement Antenna Pol.



Fred	η. Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MH	z PK/QP/AV	dΒμ̈V	dB	dBµV/m	dBμV/m	dB
11160	.00 Average	23.99	16.85	40.84	54.00	-13.16
11160	.00 Peak	37.52	16.85	54.37	74.00	-19.63

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.



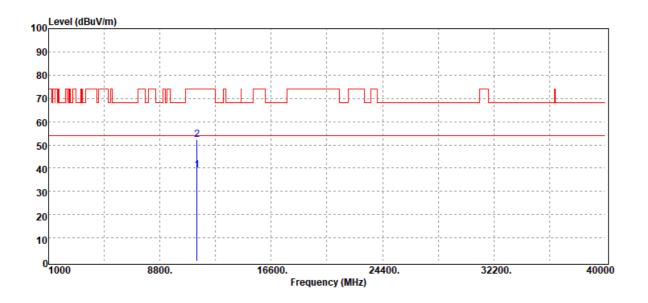
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**Project Number Operation Band Fundamental Frequency Operation Mode** EUT Pol.

:T190516W02 :802.11n20/Band3 :5700 MHz :Tx CH High

:E1 Plan

**Test Date** :2019-05-24 Temp./Humi. :20/53.5 Engineer :Jerry :VERTICAL Measurement Antenna Pol.



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμ̈V	dB	dBμV/m	dBµV/m	dB
11400.00	Average	22.36	16.89	39.25	54.00	-14.75
11400.00	Peak	35.32	16.89	52.21	74.00	-21.79

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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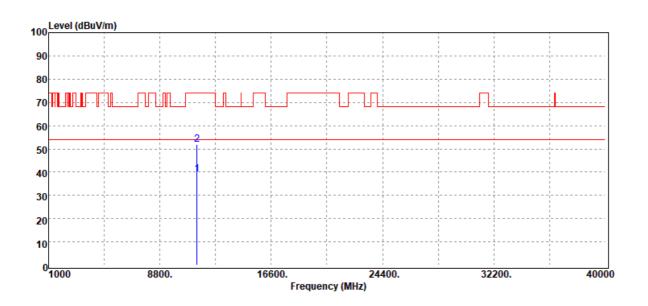
**Project Number Operation Band Fundamental Frequency Operation Mode** EUT Pol.

:T190516W02 :802.11n20/Band3 :5700 MHz

:Tx CH High :E1 Plan

**Test Date** :2019-05-24 Temp./Humi. :20/53.5 Engineer :Jerry

:HORIZONTAL Measurement Antenna Pol.



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμV	dB	dBµV/m	dBμV/m	dB
11400.00	Average	22.09	16.89	38.98	54.00	-15.02
11400.00	Peak	35.13	16.89	52.02	74.00	-21.98

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.



EUT Pol.

Report No.: T190516W02-RP1

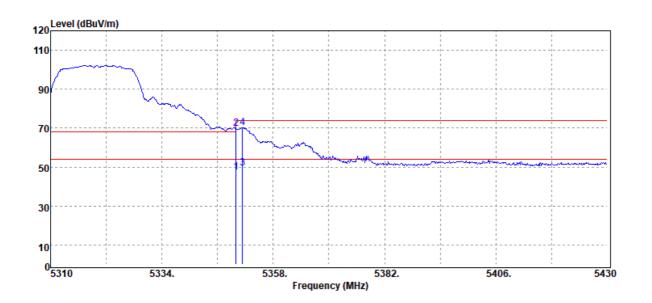
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# Band edge falling to restricted band

**Project Number** :T190516W02 **Operation Band** :802.11a/Band2 **Fundamental Frequency** :5320 MHz **Operation Mode** :BE CH High

:E1 Plan

**Test Date** :2019-05-24 Temp./Humi. :20/53.5 Engineer :Jerry :VERTICAL Measurement Antenna Pol.



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμV	dB	dBμV/m	dBμV/m	dB
5350.00	Average	42.01	5.21	47.22	54.00	-6.78
5350.00	Peak	64.58	5.21	69.79	74.00	-4.21
5351.40	Average	44.12	5.22	49.34	54.00	-4.66
5351.40	Peak	64.87	5.22	70.09	74.00	-3.91

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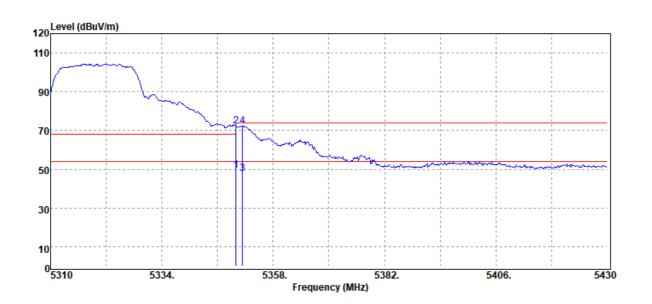
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**Project Number** Operation Band **Fundamental Frequency Operation Mode** EUT Pol.

:T190516W02 :802.11a/Band2 :5320 MHz :BE CH High :E1 Plan

**Test Date** :2019-05-24 Temp./Humi. :20/53.5 Engineer :Jerry

:HORIZONTAL Measurement Antenna Pol.



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBμV/m	dBµV/m	dB
5350.00	Average	44.03	5.21	49.24	54.00	-4.76
5350.00	Peak	66.84	5.21	72.05	74.00	-1.95
5351.40	Average	42.61	5.22	47.83	54.00	-6.17
5351.40	Peak	67.05	5.22	72.27	74.00	-1.73

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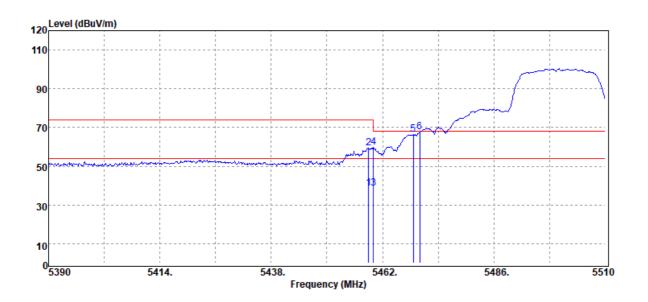


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**Project Number** Operation Band **Fundamental Frequency Operation Mode** EUT Pol.

:T190516W02 :802.11a/Band3 :5500 MHz :BE CH Low :E1 Plan

**Test Date** :2019-05-24 Temp./Humi. :20/53.5 Engineer :Jerry :VERTICAL Measurement Antenna Pol.



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
	Mode	Reading Level		FS	@3m	
MHz	PK/QP/AV	dΒμV	dB	dBμV/m	dBµV/m	dB
5459.00	Average	32.92	5.63	38.55	54.00	-15.45
5459.00	Peak	53.72	5.63	59.35	74.00	-14.65
5460.00	Average	33.04	5.63	38.67	54.00	-15.33
5460.00	Peak	53.99	5.63	59.62	74.00	-14.38
5468.60	Peak	60.60	5.64	66.24	68.20	-1.96
5470.00	Peak	61.87	5.65	67.52	68.20	-0.68

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.



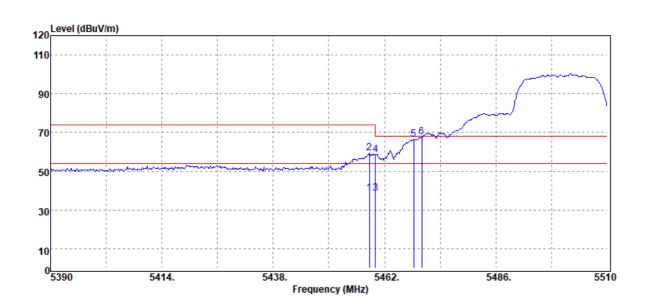
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**Project Number** Operation Band **Fundamental Frequency Operation Mode** EUT Pol.

:T190516W02 :802.11a/Band3 :5500 MHz :BE CH Low :E1 Plan

**Test Date** :2019-05-24 Temp./Humi. :20/53.5 Engineer :Jerry

:HORIZONTAL Measurement Antenna Pol.



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode PK/QP/AV	Reading Level dBµV	dB	FS dBµV/m	@3m dBµV/m	dB
5458.76	Average	32.90	5.63	38.53	54.00	-15.47
5458.76	Peak	53.58	5.63	59.21	74.00	-14.79
5460.00	Average	33.11	5.63	38.74	54.00	-15.26
5460.00	Peak	53.08	5.63	58.71	74.00	-15.29
5468.24	Peak	60.86	5.64	66.50	68.20	-1.70
5470.00	Peak	61.98	5.65	67.63	68.20	-0.57

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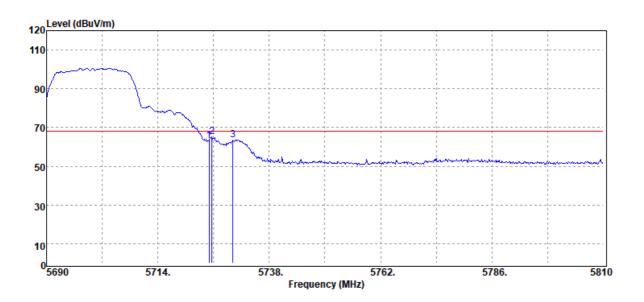


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**Project Number** Operation Band **Fundamental Frequency Operation Mode** EUT Pol.

:T190516W02 :802.11a/Band3 :5700 MHz :BE CH High :E1 Plan

**Test Date** :2019-05-24 Temp./Humi. :20/53.5 Engineer :Jerry :VERTICAL Measurement Antenna Pol.



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμ̈V	dB	dBµV/m	dBµV/m	dB
5725.00	Peak	56.92	6.34	63.26	68.20	-4.94
5725.64	Peak	58.76	6.34	65.10	68.20	-3.10
5730.20	Peak	57.20	6.34	63.54	68.20	-4.66

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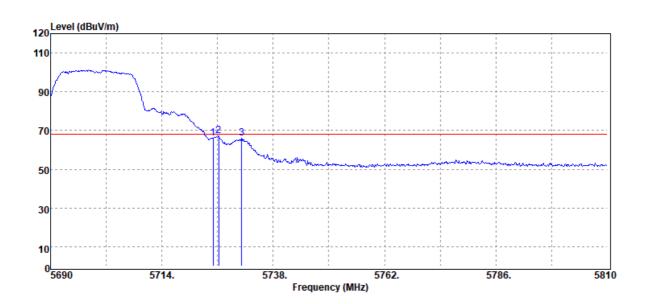
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**Project Number** Operation Band **Fundamental Frequency Operation Mode** EUT Pol.

:T190516W02 :802.11a/Band3 :5700 MHz :BE CH High :E1 Plan

**Test Date** :2019-05-24 Temp./Humi. :20/53.5 Engineer :Jerry

:HORIZONTAL Measurement Antenna Pol.



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
	Mode	Reading Level		FS	@3m	
MHz	PK/QP/AV	dΒμV	dB	dBµV/m	dBμV/m	dB
5725.00	Peak	59.86	6.34	66.20	68.20	-2.00
5726.24	Peak	60.94	6.34	67.28	68.20	-0.92
5731.16	Peak	59.62	6.34	65.96	68.20	-2.24

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.

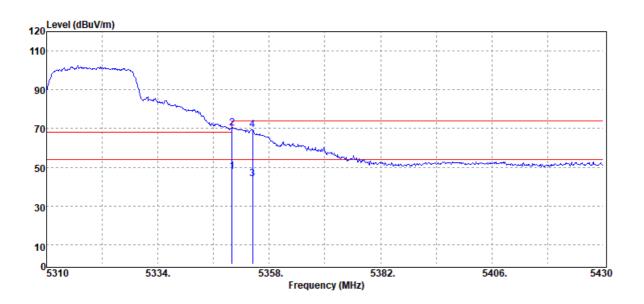


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**Project Number** Operation Band **Fundamental Frequency Operation Mode** EUT Pol.

:T190516W02 :802.11n20/Band2 :5320 MHz :BE CH High :E1 Plan

**Test Date** :2019-05-24 Temp./Humi. :20/53.5 Engineer :Jerry :VERTICAL Measurement Antenna Pol.



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBμV/m	dBµV/m	dB
5350.00	Average	42.71	5.21	47.92	54.00	-6.08
5350.00	Peak	65.00	5.21	70.21	74.00	-3.79
5354.40	Average	38.96	5.23	44.19	54.00	-9.81
5354.40	Peak	64.15	5.23	69.38	74.00	-4.62

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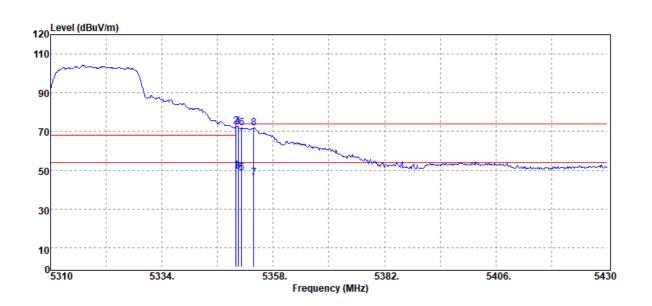
**Project Number** Operation Band **Fundamental Frequency Operation Mode** EUT Pol.

:T190516W02 :802.11n20/Band2 :5320 MHz

:BE CH High :E1 Plan

**Test Date** :2019-05-24 Temp./Humi. :20/53.5 Engineer :Jerry

:HORIZONTAL Measurement Antenna Pol.



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
B 41 1	Mode	Reading Level	ID.	FS ID V/	@3m	ID
MHz	PK/QP/AV	dΒμV	dB	dBμV/m	dBμV/m	dB
5350.00	Average	44.53	5.21	49.74	54.00	-4.26
5350.00	Peak	67.37	5.21	72.58	74.00	-1.42
5350.44	Average	44.11	5.22	49.33	54.00	-4.67
5350.44	Peak	67.50	5.22	72.72	74.00	-1.28
5351.16	Average	43.38	5.22	48.60	54.00	-5.40
5351.16	Peak	66.73	5.22	71.95	74.00	-2.05
5353.80	Average	40.69	5.23	45.92	54.00	-8.08
5353.80	Peak	66.57	5.23	71.80	74.00	-2.20

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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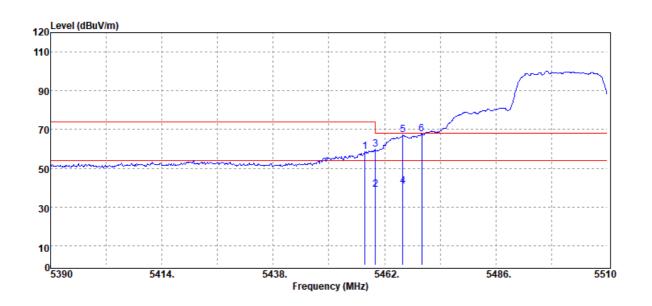
**Project Number** Operation Band **Fundamental Frequency Operation Mode** EUT Pol.

:T190516W02 :802.11n20/Band3 :5500 MHz

:BE CH Low :E1 Plan

**Test Date** :2019-05-24 Temp./Humi. :20/53.5 Engineer :Jerry

:HORIZONTAL Measurement Antenna Pol.



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBμ̈V	dB	dBμV/m	dBµV/m	dB
5457.80	Peak	52.99	5.62	58.61	74.00	-15.39
5460.00	Average	33.20	5.63	38.83	54.00	-15.17
5460.00	Peak	54.10	5.63	59.73	74.00	-14.27
5465.96	Average	35.22	5.64	40.86	54.00	-13.14
5465.96	Peak	61.51	5.64	67.15	68.20	-1.05
5470.00	Peak	62.00	5.65	67.65	68.20	-0.55

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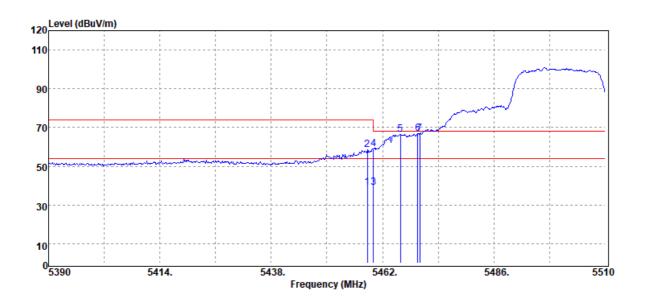


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**Project Number Operation Band Fundamental Frequency Operation Mode** EUT Pol.

:T190516W02 :802.11n20/Band3 :5500 MHz :BE CH Low :E1 Plan

**Test Date** :2019-05-24 Temp./Humi. :20/53.5 Engineer :Jerry :VERTICAL Measurement Antenna Pol.



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin	
MHz	PK/QP/AV	dΒμ̈V	dB	dBμV/m	dBµV/m	dB	
5458.76	Average	33.38	5.63	39.01	54.00	-14.99	
5458.76	Peak	52.83	5.63	58.46	74.00	-15.54	
5460.00	Average	33.52	5.63	39.15	54.00	-14.85	
5460.00	Peak	53.48	5.63	59.11	74.00	-14.89	
5465.84	Peak	60.99	5.64	66.63	68.20	-1.57	
5469.56	Peak	61.21	5.65	66.86	68.20	-1.34	
5470.00	Peak	61.24	5.65	66.89	68.20	-1.31	

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.

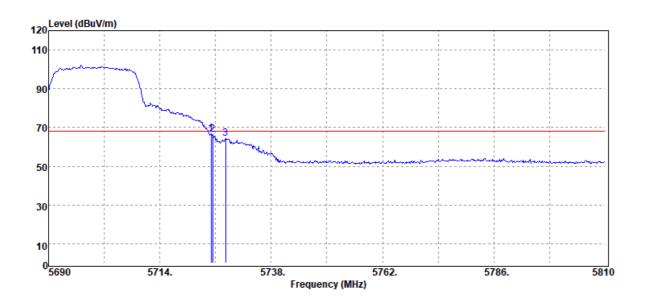


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**Project Number Operation Band Fundamental Frequency Operation Mode** EUT Pol.

:T190516W02 :802.11n20/Band3 :5700 MHz :BE CH High :E1 Plan

**Test Date** :2019-05-24 Temp./Humi. :20/53.5 Engineer :Jerry :VERTICAL Measurement Antenna Pol.



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
	Mode	Reading Level		FS	@3m	
MHz	PK/QP/AV	dΒμV	dB	dBμV/m	dBμV/m	dB
5725.00	Peak	60.40	6.34	66.74	68.20	-1.46
5725.40	Peak	60.17	6.34	66.51	68.20	-1.69
5728.16	Peak	57.91	6.35	64.26	68.20	-3.94

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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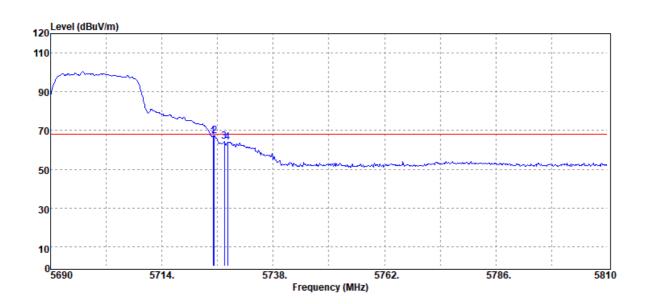
**Project Number Operation Band Fundamental Frequency Operation Mode** EUT Pol.

:T190516W02 :802.11n20/Band3 :5700 MHz

:BE CH High :E1 Plan

**Test Date** :2019-05-24 Temp./Humi. :20/53.5 Engineer :Jerry

:HORIZONTAL Measurement Antenna Pol.



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
5725.00	Peak	60.48	6.34	66.82	68.20	-1.38
5725.28	Peak	60.76	6.34	67.10	68.20	-1.10
5727.44	Peak	57.87	6.34	64.21	68.20	-3.99
5728.16	Peak	57.75	6.35	64.10	68.20	-4.10

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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# 12 TRANSMISSION IN THE ABSENCE OF DATA

### **Standard Applicable** 12.1

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.

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and source of the sample(s) tested and source of the sample(s) that sample(s) therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.



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# 13 FREQUENCY STABILITY

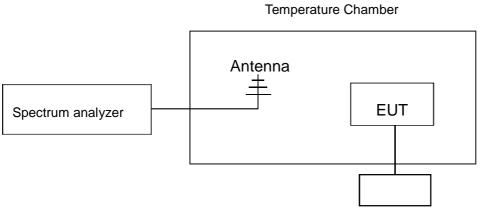
### 13.1 **Standard Applicable**

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

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

### 13.3 Test SET-UP



Variable AC Power Supply

### **Measurement Equipment Used:** 13.4

SGS Conducted Room								
Name of Equip- ment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due			
Spectrum Analyzer	Agilent	N9010A	MY53400256	11/21/2018	11/20/2019			
DC Block	PASTERNACK	PE8210	RF29	02/26/2019	02/25/2020			
Attenuator	Marvelous	MVE2213-10	RF80	02/26/2019	02/25/2020			

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### 13.5 **Measurement Result**

N/A, the device only support U-NII-2A & U-NII-2C.

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.

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

### **Standard Applicable** 14.1

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.

#### **Antenna Connected Construction** 14.2

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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