

ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART E REQUIREMENT $\cap E$

	UF
Applicant:	Z Com, Inc. 5F, No.8, HSIN ANN RD., HSINCH SCIENCE PARK, HSINCHU, 30078 TAIWAN
Product Name:	5GHz 11ac Wireless Bridge
Brand Name:	ZCOM
Marketing Name:	SP220-C03
Model No.:	SP220-C03
Model Difference:	N/A
Report Number:	T190516W01-RP
FCC ID:	M4Y-SP220C03
FCC Rule Part:	§15.407, Cat: NII
Issue Date:	Jan. 03, 2020
Date of Test:	May 20, 2019 ~ Jun. 19, 2019
Date of EUT Received:	May 20, 2019
Issued by	Compliance Certification Services Inc.Wugu Lab. No.11, Wugong 6th Rd., Wugu Dist., New Taipei City 24891, Taiwan. (R.O.C.) service@ccsrf.com
The test Desult was tests	d by Compliance Cartification Services Inc. The test data data avalu

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).

one Hsreh

Tested By:

Hone Hsieh / Engineer

Low Approved By:

Kevin Tsai / Deputy Manager



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Revision History

Revision	Description	Issue Date	Remark
Rev.00	Original	Jan. 03, 2020	Revised by Elle Chang

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Table of Contents

1	GENERAL INFORMATION	. 4
2	SYSTEM TEST CONFIGURATION	.7
3	SUMMARY OF TEST RESULT	.9
4	DESCRIPTION OF TEST MODES	10
5	MEASUREMENT UNCERTAINTY	14
6	CONDUCTED EMISSION TEST	15
7	DUTY CYCLE TEST SIGNAL	19
8	26dB & 6dB EMISSION BANDWIDTH MEASUREMENT	22
9	MAXIMUM CONDUCTED OUTPUT POWER MEASUREMENT	33
10	MAXIMUM POWER SPECTRAL DENSITY	36
11	UNDESIRABLE RADIATED EMISSION MEASUREMENT	42
12	TRANSMISSION IN THE ABSENCE OF DATA1	21
13	FREQUENCY STABILITY1	22
14	ANTENNA REQUIREMENT	25

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GENERAL INFORMATION 1

1.1 **Product Description**

Product Name:	5GHz 11ac Wir	eless Bridge		
Brand Name:	ZCOM			
Marketing Name:	SP220-C03	SP220-C03		
Model No.:	SP220-C03			
Model Difference:	N/A			
Hardware Version:	N/A			
Software Version:	N/A			
Dower Supply	48V by POE In	jector		
Power Supply: POE Injector:		Model No.: PSE301G, Supplier: N/A		

Wi-Fi 802.11	Frequency Range	Channels	Rated Power (Avg.) (dBm)	Modulation Technology
5150~5250		4	23.98	OFDM
а	5725-5850	5	23.99	OFDIVI
n_HT	5150~5250	4	HT: 25.34	OFDM
ac_VHT 20M	5725-5850	5	HT: 26.78	OFDIVI
n_HT	5150~5250	2	HT: 25.15	OFDM
ac_VHT 40M	5725-5850	2	HT: 26.99	OFDIVI
ac_VHT	5150~5250	1	13.13	
80M	5725~5850	1	16.47	- OFDM
Modulation type		64QAM, 16QAM, QPSK, BPSK for OFDM 256QAM for OFDM in 802.11ac only		
Transition Rate:		802.11 n_20 802.11 n_40 802.11 ac_2 802.11 ac_4	0/12/18/24/36/48/54 Mbps MHz: 6.5 – 216.7Mbps MHz: 13.5 – 450.0Mbps 0MHz: 6.5 –288.9Mbps 0MHz: 13.5 –600.0Mbps 0MHz: 29.3 – 1300.0Mbps	

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1.2 **Antenna Designation**

Antenna Type	Supplier	Antenna Part No.	Freq. (MHz)	Peak An- tenna Gain (dBi)	Worst An- tenna Gain
Patch Array	ZWA	TDJ-5800-2xPNF	5150~5250	23.80	V
Falch Anay	ZWA	1DJ-3800-2XFNF	5725~5850	25.13	V
Dual Polarization	SmartAnt	SAA08-200140	5150~5250	20	
Directional	SmartAnt	SAA08-200140	5725~5850	20	
Directional	SmartAnt	SAA12-200090	5150~5250	15.5	
Directional	SmartAnt	SAA12-200090	5725~5850	15.5	
Note: Pre-scanned was done on the above 3 antennas, the TDJ-5800-2xPNF results higher emission at 5GHz. Therefore, the completed set of measurement was done on the antenna to					

be presented on this test report.

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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

ANSI C63.10:2013

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

1.4 **Test Facility**

Compliance Certification Services Inc. Wugu Lab. No.11, Wugong 6th Rd., Wugu Dist., New Taipei City 24891, Taiwan. (R.O.C.) (TAF code 1309)

FCC Designation number: TW1309

1.5 **Special Accessories**

There are no special accessories used while test was conducted.

Equipment Modifications 1.6

There was no modification incorporated into the EUT.

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SYSTEM TEST CONFIGURATION 2

2.1 **EUT Configuration**

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

2.2 **EUT Exercise**

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

2.3 **Test Procedure**

2.3.1 **Conducted Emissions**

The EUT is a placed on a table which is 0.8 m above ground plane. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz. The CISPR Quasi-Peak and Average detector mode is employed 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.

2.4 Measurement Results Explanation Example For all conducted test items:

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

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

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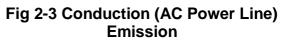


2.5 **Configuration of Tested System** Fig. 2-1 Radiated Emission



Fig 2-2 Conducted (Antenna Port) Configuration





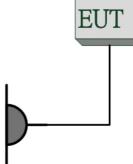


Table 2-1 Equipment Used in Tested System

ltem	Equipment	Mfr/Brand	Model/Type No.	Series No.	Data Cable	Power Cord
1.	WLAN Test Software	N/A	N/A	N/A	N/A	N/A
2.	Notebook	Lenovo	T420	S0012407	N/A	N/A
3.	Test Tool Kit	N/A	N/A	N/A	N/A	N/A

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SUMMARY OF TEST RESULT 3

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

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Report No.: T190516W01-RP Page: 10 of 125



DESCRIPTION OF TEST MODES 4

4.1 Operated in U-NII Bands

Operated band in 5150 MHz ~5250 MHz:

802.11a / n HT20 Mode, 802.11ac VHT20 Mode		
Channel	Frequency	
36	5180	
40	5200	
44	5220	
48	5240	

802.11 n HT40 Mode, 802.11ac VHT40 Mode		
channel	Frequency	
38	5190	
46	5230	

802.11ac VHT80 Mode		
channel	Frequency	
42	5210	

Operated band in 5745 MHz ~5850 MHz:

802.11a / n HT20 Mode, 802.11ac VHT20 Mode			
Channel	Frequency		
149	5745		
153	5765		
157	5785		
161	5805		
165	5825		

802.11 n HT40 Mode, 802.11ac VHT40 Mode						
channel	Frequency					
151	5755					
159	5795					

802.11ac V	HT80 Mode						
channel	Frequency						
155 5775							

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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	Transmiss	ion Chain	Multiple Transmission Spatial
⊠ 802.11 a	⊠ Ch0	⊠ Ch1	□ 2TX
⊠ 802.11 n	⊠ Ch0	⊠ Ch1	⊠ MIMO
⊠ 802.11 ac	⊠ Ch0	⊠ Ch1	⊠ MIMO

4. Therefore, below summary is the modes of test configuration that yield the highest reading and generate the highest emission chosen to carry out the relevantly mandatory test items.

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AC POWER LINE CONDUCTED EMISSION TEST:

Test Condition	AC Power line conducted emission for line and neutral
Worst Case	Operation in normal mode

RADIATED EMISSION TEST:

RADIATED EMISSION TEST (BELOW 1 GHz)										
MODE	FRE- QUENCY	OUENCY AVAILABLE TESTED MODUL		MODULA-	DATA RATE	AN- TENNA				
	BAND (MHz)	CHANNEL	CHANNEL	TION	(Mbps)	PORT				
802.11a	5180~5240	36 to 48	36,44,48	OFDM	6	Ch1				
802.11a	5745~5825	149 to 165	149,157,165	OFDM	6	Ch1				
802.11ac_VHT80	5150~5250	42	42	OFDM	MCS0	MIMO				
802.11ac_VHT80	5725-5850	155	155	OFDM	MCS0	MIMO				
	RADIA	ATED EMISSIO	N TEST (ABO	VE 1 GHz)						
MODE	FRE- QUENCY	AVAILABLE	TESTED	MODULA-	DATA RATE	AN- TENNA				
	BAND (MHz)	CHANNEL	CHANNEL	TION	(Mbps)	PORT				
802.11a	5190 5240	26 to 19	36,44,48	OFDM	6	Ch1				
802.11n_HT20	5180~5240	30~5240 36 to 48 36		OFDM	MCS8	MIMO				
802.11n_HT40	5190~5230	38 to 46	38,46	OFDM	MCS8	MIMO				
802.11ac_VHT80	5150~5250	42	42	OFDM	MCS8	MIMO				
802.11ac_VHT80	5725-5850	155	155	OFDM	MCS8	MIMO				

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 E2 position was reported.

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ANTENNA PORT CONDUCTED MEASUREMENT:

		CONDU	CTED TEST				
MODE	FRE- QUENCY	AVAILABLE	TESTED	MODULA- TION	DATA RATE	AN- TENNA	
	BAND (MHz)	CHANNEL	CHANNEL	HON	(Mbps)	PORT	
802.11a				OFDM	6	Ch1	
802.11n_HT20	5180~5240	36 to 48	36,44,48	OFDM	MCS8		
802.11ac_VHT20				OFDIVI	MCS0	MIMO	
802.11n_HT40	5190~5230	38 to 46	38,46	OFDM	MCS8	MIMO	
802.11ac_VHT40	5190~5250	30 10 40	30,40	OFDIVI	MCS8		
802.11ac_VHT80	5210	42	42	OFDM	MCS0	MIMO	
802.11a				OFDM	6	Ch1	
802.11n_HT20	5745~5825	149 to 165	149,157,165	OFDM	MCS8	MIMO	
802.11ac_VHT20				OFDIVI	MCS8		
802.11n_HT40	5755~5795	151 to 159	151 150	OFDM	MCS8	MIMO	
802.11ac_VHT40	5755~5795	151 10 159	151,159		MCS8		
802.11ac_VHT80	5775	155	155	OFDM	MCS0	MIMO	

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MEASUREMENT UNCERTAINTY 5

PARAMETER	UNCERTAINTY
AC Powerline Conducted Emission	+/- 1.2575 dB
26dB & 6dB Emission Bandwidth	+/- 147.256 Hz
The Maximum Output Power	+/- 2.128 dB
Peak Power Spectral Density	+/- 2.878 dB
Frequency Stability	+/- 147.256 Hz
3M Semi Anechoic Chamber / 30M~200M	+/- 4.12 dB
3M Semi Anechoic Chamber / 200M~1000M	+/- 4.68 dB
3M Semi Anechoic Chamber / 1G~8G	+/- 5.18 dB
3M Semi Anechoic Chamber / 8G~18G	+/- 5.47 dB
3M Semi Anechoic Chamber / 18G~26G	+/- 3.81 dB
3M Semi Anechoic Chamber / 26G~40G	+/- 3.87 dB

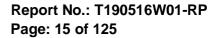
Note:

- 1. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.
- 2. ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report.
- 3. The conformity assessment statement in this report is based solely on the test results, measurement uncertainty is excluded.

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CONDUCTED EMISSION TEST 6

6.1 **Standard Applicable**

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						

1. The lower limit shall apply at the transition frequencies

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

6.2 Measurement Equipment Used

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
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
ADAPTER	POE Injector	PSE301G	N/A	N/A	N/A
Software		EZ-EMC(C	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 table top.
- 3. The LISN was connected with 120Vac/60Hz power source.

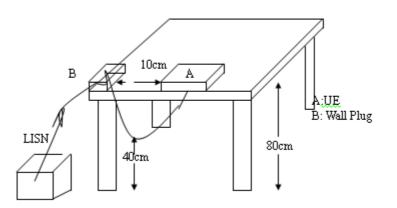
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6.4 Test SET-UP



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

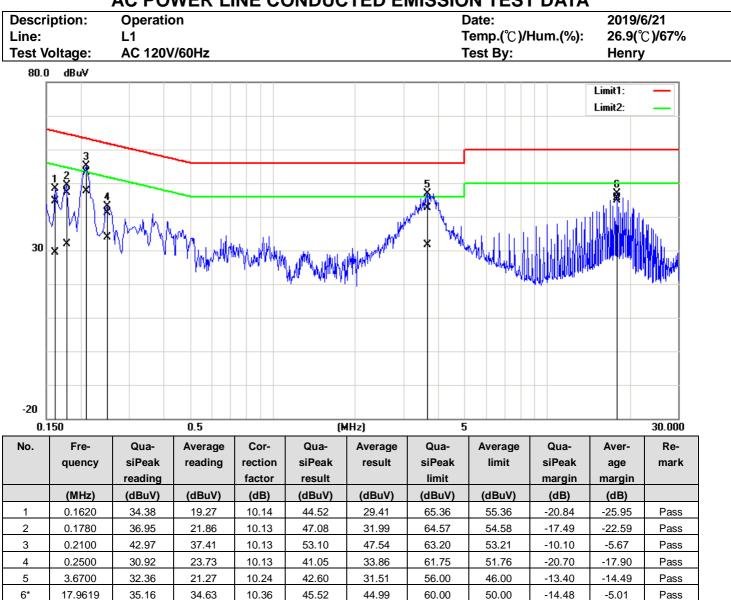
Note: Refer to next page for measurement data and plots. Note2: The * reveals the worst-case results that closet to the limit.

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AC POWER LINE CONDUCTED EMISSION TEST DATA

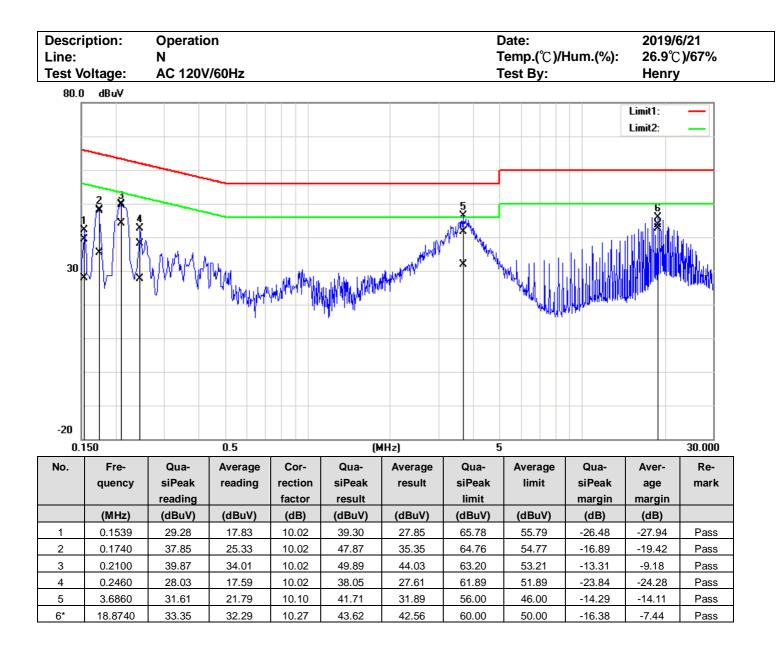
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DUTY CYCLE TEST SIGNAL 7

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	97.14	0.13	0.48	1.00
802.11n_20	97.46	0.11	0.40	1.00
802.11n_40	95.47	0.20	0.81	1.00
802.11ac_80	86.23	0.64	2.45	3.00

Duty Cycle Factor: 10 * log(1/0.9714) = 0.13 ^bDuty Cycle Factor: 10 * log(1/0.9746) = 0.11 Duty Cycle Factor: 10 * log(1/0.9547) = 0.2 ^rDuty Cycle Factor: 10 * log(1/0.8623) = 0.64

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DUTY CYCLE TEST SIGNAL MEASUREMENT RESULT 802.11a

LXI R.		000 GH7		Avg Type: Lo	g-Pwr TP	RACE 1 2 3 4 5 6	Frequer
Center F	req 5.180000	PNO: Fast	Trig: Free Run			DET P NNNN	
		IFGain:Low					Auto
10 dB/div	Ref Offset 11.2 Ref 30.00 dB				ΔMkr3	2.123 ms -0.23 dB	
Log	Ker 50.00 dB			∧13∆4			
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-50.0							5.1800000
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Res BW			BW 8.0 MHz	Swe	ep 4.333 ms		8.0000
MAR MODE T	RO SOL	×	Y I	FUNCTION FUNCTION	NW0TH EUN	TIONWALLE	Auto
1 42	t (Δ)	2.063 ms	(Δ) 1.00 dB				
2 F 3 A4	t (A)	2.123 ms	13.88 dBm (Δ) -0.23 dB				Freq
4 F 5	1 1	797.3 µs	13.88 dBm				
6							
8							
9							
11							
4							
1 HT2	ectrum Analyzer - Swept !				STATUS		
Keysight Sp R	ectrum Analyzer - Swept 3 107 50 D 1	DC	IS SENSE:3NT	Auto Avg Type: Lo	AUTO 12:37:12 a-Pwr Tr	2 PM Jun 18, 2019 WCE 1 2 3 4 5 6	
Keysight Sp R	ectrum Analyzer - Swept !	000 GHz PN0: Fast	SENSE:3NT		AUTO 12:37:12 a-Pwr Tr		
Keysight Sp R	RF 50 D 1 Freq 5.180000	000 GHz PNO: Fast IFGain:Low	SENSE:3NT		e AUTO [12:37:1] g-Pwr Tr	ACE 123456 TYPE WWWWW DET P NNNNN	Freque
K Keysight Sp UK R Center F	ectrum Analyzer - Swept 3 107 50 D 1	DOO GHz PNO: Fest IFGein:Low	SENSE:3NT		e AUTO [12:37:1] g-Pwr Tr	ACE 1 2 3 4 5 6	Freque
Center F	Ref 0ffset 11.2 0	dB m	SENSE 3KT Trig: Free Run #Atten: 30 dB	Avg Type: Lo	ΔMkr3	2.586 ms -0.05 dB	Freque
10 dB/div	Ref 0ffset 11.2 0	dB m	SENSE 3KT Trig: Free Run #Atten: 30 dB	Avg Type: Lo	ΔMkr3	2.586 ms -0.05 dB	Freque
Center F	Ref 0ffset 11.2 0	dB m	SENSE:3NT	Avg Type: Lo	ΔMkr3	2.586 ms -0.05 dB	Freque
10 dB/div 20.0 20.0 20.0 10.0 10.0	Ref 0ffset 11.2 0	dB m	SENSE 3KT Trig: Free Run #Atten: 30 dB	Avg Type: Lo	ΔMkr3	2.586 ms -0.05 dB	Freque Auto Cento 5.1800000
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Keynight Sp Center F 10 dB/div 20.0 10.0 10.0 -10.0 -20.0 -30.0	Ref 0ffset 11.2 0	dB m	SENSE 3KT Trig: Free Run #Atten: 30 dB	Avg Type: Lo	ΔMkr3	2.586 ms -0.05 dB	Freque Aut 5.1800000 Sta
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Keynight Sp R Center F Conter F 10 dB/div 20.0 10.0 -10.0 -30.0 -40.0	Ref 0ffset 11.2 0	dB m	SENSE 3KT Trig: Free Run #Atten: 30 dB	Avg Type: Lo	ΔMkr3	2.586 ms -0.05 dB	Freque Aut 5.1800000 Sta 5.1800000
Keynight Sp R Center F 10 dB/div 20.0 10.0 -10.0 -20.0 -30.0 -40.0 -60.0	Ref Offset 11.2	dB manager of the type of the	SENSE 3KT Trig: Free Run #Atten: 30 dB	Avg Type: Lo	ΔMkr3	2.586 ms -0.05 dB	Freque Auto 5.1800000 Sta 5.18000000
Keynight Sp R Center F 10 dB/div 20.0 10.0 10.0 -10.0 -20.0 -30.0 -60.0 Center 5.	Ref Offset 11.2	dB m s z z	SENSE 3KT	Avg Type: Log	AUTO [12:37:11 g-Pwr Tr AMkr3	2.586 ms -0.05 dB 4 -0.05 dB -0.05 dB -	Freque Auto 5.1800000 Sta 5.1800000 5.1800000 C
Keynight Sp R Center F 20.0 20.0 10.0 10.0 -10.0 -20.0 -30.0 -40.0 -60.0 Center 5. Res BW 3	Ref Offset 11.2	dB m s z z	SENSE INT	Avg Type: Lop	ΔMkr3 1 g-Pwr 17 ΔMkr3 1 ΔΜkr3 1 ΔΜkr3 1 Δμ τομ τομ τομ τομ τομ τομ τομ το	2.586 ms -0.05 dB -4 	Freque Auto 5.1800000 Sta 5.1800000 Sto 5.1800000
Keynight Sp R Center F 10 dB/div Log 23.0 10.3 10.3 -10.0 -20.0 -30.0 -40.0 -60.0 -60.0 Center 5. Res BW 3 11 A2	Ref Offset 11.2 (Ref 30.00 dB	Z #VI	SENSE: INT Trig: Free Run #Atten: 30 dB	Avg Type: Log	ΔMkr3 1 g-Pwr 17 ΔMkr3 1 ΔΜkr3 1 ΔΜkr3 1 Δμ τομ τομ τομ τομ τομ τομ τομ το	2.586 ms -0.05 dB 4 -0.05 dB -0.05 dB -	Freque Aut 5.1800000 Sta 5.1800000 5.1800000 Sta 5.1800000
Keynight Sp R Center F 20.0 20.0 10.0 10.0 -10.0 -20.0 -30.0 -40.0 -60.0 Center 5. Res BW 3 2025 12002 10 1 2	Ref Offset 11.2 Ref Offset 11.2 Ref 30.00 dB	z 2.520 ms 1 2.034 ms		Avg Type: Lop	ΔMkr3 1 g-Pwr 17 ΔMkr3 1 ΔΜkr3 1 ΔΜkr3 1 Δμ τομ τομ τομ τομ τομ τομ τομ το	2.586 ms -0.05 dB -4 	Freque Aut 5.1800000 5.1800000 5.1800000 5.1800000 8.0000 <u>Auto</u>
Keynight Sp R Center F 10 dB/div 20.0 10.0 -10.0 -20.0 -30.0 -40.0 -60.0 Center 5. Res BW 3 10.2 2 -2 -2 -20.0	Ref Offset 11.2 (Ref 30.00 dB	Z #VI		Avg Type: Lop	ΔMkr3 1 g-Pwr 17 ΔMkr3 1 ΔΜkr3 1 ΔΜkr3 1 Δμ τομ τομ τομ τομ τομ τομ τομ το	2.586 ms -0.05 dB -4 	Freque Aut 5.1800000 5.1800000 5.1800000 5.1800000 6.1800000 8.0000 <u>Auto</u>
Keynight Sp R Center F 10 dB/div Log 20.0 10.0 -10.0 -20.0 -20.0 -30.0 -40.0 -60.0 -60.0 Center 5. Res BW 1020000000 1 A2 2 F 3 A4 4	Ref Offset 11.2 Ref Offset 11.2 Ref 30.00 dB υν, μλημημας 1 1 1 1 1 1 1 1 1	z 2.520 ms 1 2.034 ms		Avg Type: Lop	ΔMkr3 1 g-Pwr 17 ΔMkr3 1 ΔΜkr3 1 ΔΜkr3 1 Δμ τομ τομ τομ τομ τομ τομ τομ το	2.586 ms -0.05 dB -4 	Freque Aut 5.1800000 5.1800000 5.1800000 5.1800000 6.1800000 8.0000 <u>Auto</u>
Keynight Sp R Center F 10 dB/div Cog 20.0 10.0 -0.0 -10.0 -20.0 -30.0 -40.0 -60.0 -60.0 -60.0 -60.0 -60.0 -60.0 -60.0 -60.0 -60.0 -60.0 -60.0 -60.0 -60.0 -7 3 -7	Ref Offset 11.2 Ref Offset 11.2 Ref 30.00 dB υν, μλημημας 1 1 1 1 1 1 1 1 1	z 2.520 ms 1 2.034 ms		Avg Type: Lop	ΔMkr3 1 g-Pwr 17 ΔMkr3 1 ΔΜkr3 1 ΔΜkr3 1 Δμ τομ τομ τομ τομ τομ τομ τομ το	2.586 ms -0.05 dB -4 	Freque Auto 5.1800000 5.1800000 5.1800000 5.1800000 8.0000 Auto
Keynight Sp R Center F 20.0 20.0 10.0 -10.0 -20.0 -30.0 -40.0 -60.0 Center 5. Res BW 3 Distributes 1 A2 2 3 A4 4 5 6 7 8 9	Ref Offset 11.2 Ref Offset 11.2 Ref 30.00 dB υν, μλημημας 1 1 1 1 1 1 1 1 1	z 2.520 ms 1 2.034 ms		Avg Type: Lop	ΔMkr3 1 g-Pwr 17 ΔMkr3 1 ΔΜkr3 1 ΔΜkr3 1 Δμ τομ τομ τομ τομ τομ τομ τομ το	2.586 ms -0.05 dB -4 	Frequent Auto Cente 5.1800000 Sta 5.1800000 Sto 5.1800000 Sto 8.0000 Auto
Keynight Sp R Center F 10 dB/div Log 20.0 10.3 0.03 -10.0 -20.0 -30.0 -40.0 -60.0 Center 5. Res BW 1 A2 2 3 -2 -3 -4 -5 -6 -7 -8	Ref Offset 11.2 Ref Offset 11.2 Ref 30.00 dB υν, μλημημας 1 1 1 1 1 1 1 1 1	z 2.520 ms 1 2.034 ms		Avg Type: Lop	ΔMkr3 1 g-Pwr 17 ΔMkr3 1 ΔΜkr3 1 ΔΜkr3 1 Δμ τομ τομ τομ τομ τομ τομ τομ το	2.586 ms -0.05 dB -4 	Cente 5.1800000 5.1800000 5.1800000 6.1800000 8.0000 Auto Freq

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802.11n HT 40

LUI R.			P	Analyzer - Sw 50 0 5, 1900	DC	Hz			VSE: INT	Avg Typ	ALIGN AUTO	TRA	M Jun 18, 2019 25 1 2 3 4 5 6	Frequency
	_		Re	f Offset 11		PNO: Fas IFGain:Lo		#Atten: 3				Mkr3 1	297 ms	Auto Tune
20.0 10.0				of 30.00		de ju	esper.n	merimality	megnes	entranti)	3∆4 _{dires}	e manager and an	0.73 dB	Center Freq 5.19000000 GHz
-10.0 -20.0 -30.0						W								Start Freq 5.19000000 GHz
-40.0 -60.0 -60.0														Stop Freq 5.19000000 GHz
Cen Res				000000 (Iz	GHz	#	ивw	8.0 MHz				3.267 ms (pan 0 Hz 1001 pts)	CF Step 8.000000 MHz Auto Man
3 4 5 6	Δ2 F Δ4	1	t	(A)		1.238 ms 976.7 µs 1.297 ms 976.7 µs	(4)	2.65 4.73 df 0.73 4.73 df	dB 3m dB	CTION	NCTION WOTH	FUNCT	E Strategie	Freq Offset 0 Hz
7 8 9 10 11								19			herier			
ac	V	Ή	Т	80							STATU	5		

								_	-	Analyzer - Swe		ynight
Frequency	M Jun 18, 2019 2E 1 2 3 4 5 6	TRAC	Log-Pwr	Avg Type	SE:1NT]		GHz	DC 0000	5.21000	Freq	ter
Auto Tun	72.5 µs 0.15 dB	Mkr3 4	Δ			#Atten: 3	ast	PNO: Fi IFGain:L		f Offset 11. f 30.00 d		B/div
Center Fre 5.210000000 GH	erochersporter	¹² →3∆4 17"1	militing 14	el alitera Il Alex	-	and the second	1 >>	un the starts	Velkense	naluteriterita	44-401	pieje
Start Fre 5.210000000 GH												
Stop Fre 5.210000000 GH		rvi	1041				promotion					
CF Ste 8.000000 MH			weep 1.0	5		8.0 MHz	#VBW	#	Hz	000000 G	5.2100 V 8 MH	
Auto Ma	ON VALUE	FUNCTION	CTION WOTH	TION FUN		Ý			×		TRC SC	
Freq Offse 0 H					am dB	4.75 2.11 dE -0.15 2.11 dE	μs (Δ)	407.5 µ 424.5 µ 472.5 µ 424.5 µ		(Δ) (Δ)		Δ2 F Δ4 F
			-	-	1	11	-			1	+ +	_
			STATUS									

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26DB & 6DB EMISSION BANDWIDTH MEASUREMENT 8

8.1 Standard Applicable

There is no limit bandwidth for U-NII-1, U-NII-2-A and U-NII-2-C. The minimum of 6dB Bandwidth measurement is 0.5 MHz for U-NII-3

8.2 Measurement Procedure

- 1. Place the EUT on the table and set it in transmitting mode.
- 2. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules.
- 3. Remove the antenna from the EUT and then connect a low loss RF cable from the Antenna port to the spectrum analyzer.
 - 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. Repeat above procedures until all frequency of interest measured was complete.

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8.3 **Measurement Equipment Used**

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
DC Block	PASTER- NACK	PE8210	RF256	02/26/2019	02/25/2020
Spectrum Ana- lyzer	Agilent	N9010A	MY53400256	11/21/2018	11/20/2019
TEMPERA- TURE	TEMPERA- TURE	HTC-1	EC-HY-01	04/18/2019	04/17/2020
Attenuator	Marvelous	MVE2213-10	RF80	02/26/2019	02/25/2020

8.4 **Test Set-up**



8.5 **Measurement Result**

26dB 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)
5180	19.19	12.831	5180	19.21	12.835
5220	19.31	12.858	5220	19.23	12.840
5240	19.14	12.819	5240	19.57	12.916

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)
5180	21.63	13.351	5180	21.52	13.328
5220	22.06	13.436	5220	22.3	13.483
5240	22.25	13.473	5240	23.27	13.668

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Log (B) (dB)



802.11n HT40 Ch0

802.11n _HT40_Ch1

Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)	Frequency (MHz)	26dB BW (MHz)	10 Log (E (dB)
5190	43.04	16.339	5190	42.78	16.312
5230	42.79	16.313	5230	44.06	16.440

802.11ac _VHT80_Ch0

802.11ac _VHT80_Ch1

Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)	
5210	83.87	19.236	

Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5210	83.59	19.222

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6dB Bandwidth (5725 MHz~ 5850 MHz) measure with Peak detector for FCC

802.11a Ch0

Frequency (MHz)	6dB BW (MHz)	10 Log (B) (dB)	Fr
5745	16.35	12.135	
5785	16.32	12.127	
5825	16.31	12.125	

Frequency (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5745	16.37	12.140
5785	16.34	12.133
5825	16.31	12.125

802.11n_HT20_Ch0

802.11n_HT20_Ch1

Ch1

Frequency (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5745	17.65	12.467
5785	17.78	12.499
5825	17.71	12.482

Frequency (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5745	17.61	12.458
5785	17.65	12.467
5825	17.68	12.475

802.11n_HT40_Ch0

6dB Frequency 10 Log (B) BW (MHz) (dB) (MHz) 5755 36.1 15.575 5795 35.66 15.522

802.11n_HT40_Ch1

Frequency (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5755	36.11	15.576
5795	35.47	15.499

802.11ac _VHT80_Ch0

802.11ac _VHT80_Ch1

Frequency (MHz)	6dB BW (MHz)	10 Log (B) (dB)	Frequency (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5775	75.84	18.799	5775	75.84	18.799

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Limit (MHz)

< 5250

> 5725



99% BW Verification of DFS Function

802.11a Ch0

Frequency (MHz)	Measured Frequency (MHz)	Limit (MHz)	Frequency (MHz)
5240	5248.13	< 5250	5240
5745	5736.75	> 5725	5745
	.		

Limit (MHz)

< 5250

> 5725

Measured

Frequency

(MHz)

5248.91

5736.06

802.11n_HT20_Ch0

Frequency

(MHz)

5240

5745

802.11n_HT20_Ch1

802.11a_Ch1

Frequency (MHz)	Measured Frequency (MHz)	Limit (MHz)
5240	5248.94	< 5250
5745	5736.09	> 5725

Measured

Frequency (MHz) 5248.13

5736.75

802.11n _HT40_Ch0

Frequency (MHz)	Measured Frequency (MHz)	Limit (MHz)	Freque (MH
5230	5243.10	< 5250	523
5755	5736.35	> 5725	575

802.11ac _VHT80_Ch0

802.11n _HT40_Ch1

Frequency (MHz)	Measured Frequency (MHz)	Limit (MHz)	
5230	5243.10	< 5250	
5755	5736.90	> 5725	

802.11n _HT80_Ch1

Frequency (MHz)	Measured Frequency (MHz)	Limit (MHz)	Frequency (MHz)	Measured Frequency (MHz)	Limit (MHz)
5210	5247.90	< 5250	5210	5247.80	< 5250
5775	5736.90	> 5725	5775	5737.00	> 5725

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FCC_802.11a_20MHz_Chain0_5180MHz FCC_802.11a_20MHz_Chain0_5745MHz

Center Fre	eq 5.180000000	Trig.	Freq: 5.180000000 GHz Free Run Avg Hold n: 30 dB	Radio St 60/50	rvice: BTS	Frequency
IO dB/div	Ref Offset 11.2 d Ref 30.00 dBr					
200 100 100 300 300 200 200 300 400 400 400		1835-00-1975-1975-1975-1975-1975-1975-1975-1975	the period with the second second	- And	Sales and	Center Free 5.180000000 GH
Center 5.1			VBW 620 kHz		an 30 MHz reep 1 ms	CF Step 3.000000 MH
Occupi	ied Bandwidt	th 6.428 MHz	Total Power	20.8 dBm		Auto Mar
Transmi x dB Ba	it Freq Error ndwidth	-26.260 kHz 19.19 MHz	OBW Power x dB	99.00 % -26.00 dB		0 Ha

FCC 802.11a 20MHz Chain0 5220MHz



FCC_802.11a_20MHz_Chain0_5240MHz

RL I	IN Analyzer - Occupied B		SENSE ONT	NJON AU			Frequency
Center Free	q 5.24000000	-	Center Freq: 5.240000 Trig: Free Run #Atten: 30 dB	AvgiHold: 50/50	Radio Std: N Radio Device		riequency
10 dB/div	Ref Offset 11.2 d Ref 30.00 dBr			м	kr1 5.2481 7.2488	3 GHz 8 dBm	
20.0 10.0	-			-	1		Center Free 5.240000000 GHz
-10.0	w						
30.0 MANTON					m	- Aland	
-60.0							
Center 5.24 #Res BW 2			#VBW 620 kH	łz		30 MHz p 1 ms	CF Step 3.000000 MHz
Occupie	ed Bandwid	th 6.432 MH	Total Po	wer 2	7.7 dBm		Freg Offset
Transmit x dB Bar	t Freq Error ndwidth	-19.116 kH 19.14 MH			99.00 % 6.00 dB		0 Hz
80				100	etus.		

Frequency	None	Radio Std	50/50	Avg Hold		Center Trig: Fi #Atten	GHz MFGain:Low	5000000	q 5.745	nter Fre
	375 GHz 36 dBm		Mkr					fset 11.2 di 30.00 dBm		dB/div
Center Fre 5.745000000 GH				ener and	minnet	within	responsed	¢	-	0
		~	1					M		
	West and the	nun			-	-	-		In north Cart	
			+		-	-	-		-	0
CF Ste 3.000000 MH	n 30 MHz 2.933 ms			Hz	BW 300 P	#\				nter 5,7 es BW
Freq Offse		dBm	28.3	ower	Total P	IHz	.387 M	ndwidt 16	led Bar	Occup
0 Hz		99.00 %		OBW Power		kHz	smit Freg Error -44.878 kHz		Transmit Freg Error -4	
		00 dB	-6.		x dB	MHz	16,35	th	ndwidth	dB Ba

FCC 802.11a 20MHz Chain0 5785MHz

R 8	4 5.785000000	GHz	enter Freq: 5.78500 rig: Free Run Atten: 30 dB	ALTON AUT 0000 GHz Avg Held: 50/50	Radio Sto		Frequency
10 dB/div	Ref Offset 11.2 d Ref 30.00 dBn						
20 0 10 0		wherear	notine wone work	mound			Center Free 5.785000000 GHz
10.00	1				h.		
20.0 20.0 40.0 W/h-m	www.www.				Alterity	mannen	
0.0							
enter 5.7 Res BW			#VBW 300 k	Hz		n 30 MHz 2.933 ms	CF Step 3.000000 MH
Occup	led Bandwidt 16	h 6.377 MHz	Total P	ower 2	8.2 dBm		Auto Mar
Transm	it Freq Error	-46.384 kHz	OBW P	ower	99.00 %		он
x dB Ba	ndwidth	16.32 MHz	x dB		-6.00 dB		

FCC 802.11a 20MHz Chain0 5825MHz

Center Fre	q 5.825000000	Trig	ter Freq: 5.825000000 GHz Free Run Avg/Hole en: 30 dB	Radi	a Std: None	Frequency
10 dB/div	Ref Offset 11.2 d Ref 30.00 dBr					
20.0		nato-monometre	manne	andy		Center Fred 5.82500000 GHz
0.00 -10.0	ward			1		
30.0 40.0	Verent				Wardhan and	
60.0 60.0						
Res BW 1			#VBW 300 kHz	Swe	Span 30 MHz eep 2.933 ms	CF Step 3.000000 MH
Occupi	led Bandwidt	th 6.374 MHz	Total Power	28.6 dB	m	Auto Mar
Transmi x dB Bar	it Freq Error ndwidth	-45.126 kHz 16.31 MHz	OBW Power x dB	99.00 -6.00 d		0 Ha
50				STATUS		

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FCC_802.11a_20MHz_Chain1_5180MHz FCC_802.11a_20MHz_Chain1_5745MHz

Center Fre	eq 5.180000000	Trig	Free Run Avg Hold n: 30 dB	ALISN AUTO	Radio Std Radio Dev		Frequency
I0 dB/div	Ref Offset 11.2 di Ref 30.00 dBn	B N					
20.0		mannen	- mission				Center Free 5.180000000 GH
10.0							
0.0					J.K.	www.hora	
40 0 50 0 50 0							
enter 5.1 Res BW			VBW 620 kHz			n 30 MHz eep 1 ms	CF Step 3.00000 MH <u>Auto</u> Mar Freq Offset 0 Hi
Occup	ied Bandwidt	h 5.392 MHz	Total Power	26.0	dBm		
Transm	it Freq Error	-26.905 kHz	OBW Power	99	.00 %		
x dB Ba	andwidth	19.21 MHz	x dB	-26.0	00 dB		

FCC_802.11a_20MHz_Chain1_5220MHz

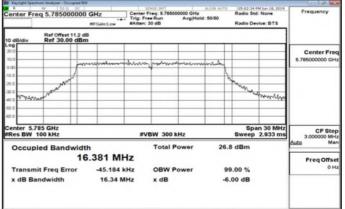


FCC 802.11a 20MHz Chain1 5240MHz

Center Fre	eq 5.24000000		er Freg: 5.240000000 GHz Free Run AvgiHold	Radio	Stat: None	Frequency
			m: 30 dB	Radio	Device: BTS	
10 dB/div	Ref Offset 11.2 d Ref 30.00 dBn				24813 GHz 6178 dBm	Center Free 5.24000000 GH 5.24000000 GH 5.24000000 GH 3.00000 MH Auto Mas
20.0		and the second	-	noncost 1		
10.0	A					
30.0 min	www.				Mary Mary	Z
60.0						
Center 5.2 Res BW			VBW 620 KHz	5	Span 30 MHz Sweep 1 ms	
Occup	led Bandwidt		Total Power	26.5 dBm		Auto Mar
	16	6.419 MHz				Freq Offset
Transm	it Freq Error	-24.259 kHz	OBW Power	99.00 %		0 H
x dB Ba	indwidth	19.57 MHz	x dB	-26.00 dE		
80				STATUS		

	Radio Std	50/50	60000 GHz Avg/Hold	e Run	Trig: Fr			eq 5.7450	Center Fre
		Mk							0 dB/div
		mah	Anum	JAN		an and a start of the start of	e.'m	-	00 200 100
	·~~	1					A		0.00 10.0 20.0
manner	- www		-			-		warden V	10.0
				-	-	-		-	60.0
2.933 ms			kHz	BW 300	#V				Res BW
	9 dBm	26,	Power	Total F	Hz	383 MI			
	9.00 %	9	Power	OBW P	kHz	-42.783	ror	it Freq E	Transm
	00 dB	-6		x dB	AHz	16.37 M		ndwidth	x dB Ba
	575 GHz 56 dBm	2.0356 dBm	Ratio Device: BTS Mkr1 5,73675 GHZ 2.0356 dBm	Mkr1 5.73675 GHz 2.0356 dBm 4 4 4 4 5 5 8 8 8 8 9 9 9 9 9	30 db Radio Device BTS Mkr1 6.73675 GHz 2.0356 dBm 0 dbmmutulen, when the state of the	RAftern 30 dB Radio Device: BTS Mkr1 5,73675 GHz 2.0356 dBm 2.0356 dBm 2.0356 dBm MMM Mark 10,73675 GHz 2.0356 dBm Span 30 MHz Span 30 MHz SVBW 300 kHz Sweep 2.933 ms Total Power 26.9 dBm Hz OBW Power 99.00 %	Angletel. 5010 Radio Device. BTS Radio Device. BTS Radio Device. BTS Radio Device. BTS Radio Device. BTS 2,0356 dBm adjuncture of the state of the state of the state adjuncture of the state of the state of the state state. The state of the state of the state of the state state. The state of the state of the state of the state state. The state of the state of the state of the state state. The state of the st	Avgifelidi 8000 Radio Device BTS Radio Device BTS Radio Device BTS Badio Device De	Bit Contract Trage Pree Non AveryPree Non Aver

FCC_802.11a_20MHz_Chain1_5785MHz



FCC 802.11a 20MHz Chain1 5825MHz

Contor From	5.82500000	CHr Cen	sense Int		15:91-43 PH Jun 18, 2019 adio Std: None	Frequency
Contor Freq	0.02000000		: Free Run Avg Hold en: 30 dB		adio Device: BTS	
10 dB/div	Ref Offset 11.2 c Ref 30.00 dBr					
20.0						CE Step
0.00	1	and the second second second second	mannen	renering		
0.0	M			2		
an manhar	1				anner al	12 CF Ste 15 3.00000 MH
0.0					11111/05	
60.0						
Res BW 10			#VBW 300 kHz	s	Span 30 MHz weep 2.933 ms	
Occupie	d Bandwid	th	Total Power	27.3 d	Bm	Auto Mar
	1	6.366 MHz				FreqOffse
Transmit	Freq Error	-46.770 kHz	OBW Power	99.0	0 %	0 H
x dB Ban	dwidth	16.31 MHz	x dB	-6.00	dB	
60				STATUS		

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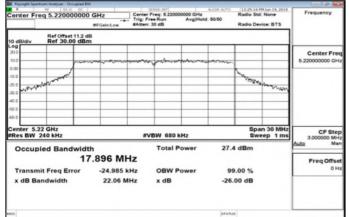
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Center Fre	q 5.18000000	Trig I	r Freq: 5.180000000 GHz Free Run Avg/Hold: 1: 30 dB	Radio Stal: No Radio Device:	ne Frequency
0 dB/div	Ref Offset 11.2 di Ref 30.00 dBn				
20.0			-	home	Center Free 5.180000000 GH
20.0 20.0 20.0 20.0					No.
20.0 Center 5.1	9 CH+			Span 3	0.544
Res BW			VBW 680 kHz	Sweep	1 ms 3.000000 MH
Occup	ed Bandwidt 17	h 7.877 MHz	Total Power	21.0 dBm	Auto Mar Freq Offse
	it Freq Error ndwidth	-17.185 kHz 21.63 MHz	OBW Power x dB	99.00 % -26.00 dB	OH

FCC_802.11n_20MHz_Chain0_5220MHz



FCC_802.11n_20MHz_Chain0_5240MHz

RL	N/ DOC			SENSE INT	AUSN AUTO		M Jun 19, 2019	Frequency
Center Fre	aq 5.240000	10000000 GHz Center Freq 5 34000000 GHz Radio Std: Non Trig: Free Run Avg Hold: 50/50 Radio Device: 8 #REGainLow #Atter: 30 dB Radio Device: 8					Frequency	
10 dB/div	Ref Offset 11 Ref 30.00				Mk	r1 5.248 6.81	91 GHz 20 dBm	
20.0 10.0		man	***********************	- Anoral and	-	¢'		Center Free 5.240000000 GHz
0.00 -10.0 -20.0	and the second					Transa with	and the second	
-30.0 -40.0 -50.0								CF Ster 3.00000 MH
-60.0								
Center 5.2 #Res BW			#VBW 750 kHz				eep 1 ms	CF Step 3.000000 MHz
Occupi	ied Bandw	idth 17.932	MHz	Total Power	27.	5 dBm		Auto Mar Freq Offse
	it Freq Erro Indwidth		24 kHz 5 MHz	OBW Power x dB		9.00 % 5.00 dB		01
66					BTAD	ure .		

FCC_802.11n_20MHz_Chain0_5180MHz FCC_802.11n_20MHz_Chain0_5745MHz

fiset 11.2 dB 10.00 dBm	source of the second	anapri	probactor	ใหร า หะาร ² ช _า สา	antornal	3.02	606 GHz 261 dBm	
d	so which the	mantan	puntinuro	1-1		-	or which	
~						mar	-	5.745000000 GH
ter 5.745 GHz Span 30 MHz Spae 30 MHz Sweep 2.933 ms								CF St 3.000000 M
				ower	28.2	2 dBm		Auto M
Error			OBW P	ower				0)
	ndwidth 17. Error	ndwidth 17.728 MH Error -55.713	ndwidth 17.728 MHz Error -55.713 kHz	ndwidth Total P 17.728 MHz Error -55.713 kHz OBW P	ndwidth Total Power 17.728 MHz Error -55.713 kHz OBW Power	ndwidth Total Power 28.2 17.728 MHz Error -55.713 kHz OBW Power 99	#VBW 300 kHz Sweep indwidth Total Power 28.2 dBm 17.728 MHz Error -55.713 kHz OBW Power 99.00 %	#VBW 300 kHz Sweep 2.933 ms indwidth Total Power 28.2 dBm 17.728 MHz Error -55.713 kHz OBW Power 99.00 %

FCC 802.11n 20MHz Chain0 5785MHz

Center Fre	q 5.78500000	MFGain:Low	Center Fr			ALTEN AL/TO	Radio Sto Radio De		Frequency
10 dB/div	Ref Offset 11.2 d Ref 30.00 dBr								
20.0	-	monorman	monthing	motoria	windy	nuttern			FreqOffset
20.0	mant						man	muu	
30.0 40.0									
60.0									
Res BW			#VE	300 k	Hz			2.933 ms	3.000000 MHz
Occup	ied Bandwidt 17	th 7.793 MH	Iz	Total P	ower	28.2	dBm		Freg Offset
Transm	it Freq Error	16.962 k	Hz	OBW P	ower	99	.00 %		0 Hz
x dB Ba	ndwidth	17.78 M	Hz	x dB		-6.	00 dB		

FCC_802.11n_20MHz_Chain0_5825MHz

R	NF 50 G DC		Center Freq: 6.8250		ALISN AUTO	Radie Ste	PH Jun 18, 2019	Frequency
Center Fre	eq 5.825000000	-	Center Freq: 5.8250 Trig: Free Run #Atten: 30 dB	Avg Hold	60/60	Radio De		, requirey
10 dB/div	Ref Offset 11.2 d Ref 30.00 dBn	B						
.0g 20.0 10.0		260 per alla and a second	werkness presidence	montown	****			CESten
0.00 (0.0 20.0	- Marrison					man	an Maria	
10.0			_	-			- and officers	
50.0 60.0			_					
	5.825 GHz Span 30 MHz Sweep 2.933 ms							
Occup	led Bandwidt 17	h 7.732 MH		Power	28.3	dBm		
	it Freq Error Indwidth	-49.406 kH 17.71 MH	z OBW	Power		00 %		
50					ETATU			

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FCC_802.11n_20MHz_Chain1_5180MHz FCC_802.11n_20MHz_Chain1_5745MHz

RL	eq 5.180000000	GHz Cente	r Freq: 5.180000000 GHz Free Run Avg/Hold h: 30 dB	ALIGN AUTO	Radio Sta		Frequency
10 dB/div	Ref Offset 11.2 di Ref 30.00 dBm						
200 100 300 300 300 400	-	yawaana ana	10. atolinetic anestre		k	ant most at man	Center Free 5.18000000 GH
Center 5.1	8 GHz		VBW 680 kHz			n 30 MHz eep 1 ms	CF Step
Occup	ied Bandwidt 17	^h 7.873 MHz	Total Power	20.3	2 dBm		S.000000 MHz <u>Auto</u> Man Freq Offset 0 Hz
	it Freq Error ndwidth	-25.643 kHz 21.52 MHz	OBW Power x dB		9.00 % 00 dB		

FCC 802.11n 20MHz Chain1 5220MHz



FCC_802.11n_20MHz_Chain1_5240MHz

Kaynight Sperk	NF 50.0						NJSN AUTO		PH 3un 19, 2019	Frequency
Center Fre	eq 5.24000		dz Geintow	Center F Trig Fre #Atten: 3	reg: 5.24000 • Run 0 dB	Avg Hold	60/50	Radio St	t: None vice: BTS	Frequency
10 dB/div	Ref Offset Ref 30.0						Mkr		894 GHz 270 dBm	
20.0 10.0		-	horache		Jones	-	montangan	1		Center Free 5 240000000 GHz
10.0 -10.0 -20.0 Amore	14 Martin	[Mari	A. mart	
40.0										
Center 5.2					5W 750 k	Hz			an 30 MHz eep 1 ms	CF Step 3.00000 MHz
Occup	led Bandwidth 17.956			Total Power 56 MHz			27.7	dBm		Auto Mar Freq Offse
	it Freq En Indwidth	ror	11.000 I 23.27 N		OBW P	ower		00 %		OH
80							STATUS			

Frequency		Radio Std	50/50		req: 5.74500 e Run 10 dB		GHz MFGain:Low	q 5.745000000	Center Fre	
Center Fre 5.74500000 GH	309 GHz 26 dBm		Mkr					Ref Offset 11.2 dl Ref 30.00 dBm	10 dB/div	
CF Ste 3.00000 MH			wanne		-	montry	al reare	ein.	20.0	
	No hand and a	a more					_	and when	10.0 20.0 30.0	
						-	-		40.0 60.0 60.0	
3.000000 MH	n 30 MHz 2.933 ms			Hz	BW 300 H	#V			Center 5.7 Res BW	
Freq Offse 0 H		dBm	28.3	ower	Total Power			ed Bandwidth 17.704 M		
		0.00 % 00 dB		ower	OBW P x dB		-54.036 17.61	t Freq Error ndwidth		

FCC 802.11n 20MHz Chain1 5785MHz

Center Fre	rq 5.78500000	MFGain:Low	Trig: Fre	Center Freq: 5.785000000 GHz Trig: Free Run Avg Hold: 50/50 #Atten: 30 dB		ALIEN ALTO	Radio Std: None Radio Device: BTS		Frequency		
0 dB/div	Ref Offset 11.2 d Ref 30.00 dBr				_						
10.0	المريبي	water motor	nutro	, walter lit	where where	Rooman			Center Freq 5.785000000 GHz		
0.0 0.0 0.0 0.0	warman						aren	Array and			
0.0											
0.0											
enter 5.7 Res BW			#VE	3W 300 k	Hz			2.933 ms	CF Step 3.000000 MH		
Occup	ied Bandwidt 17	h 7.799 MH	Iz	Total Po	ower	28.9	dBm		Auto Mar		
Transmit Freq Error 8.969 k		Hz OBW Power		99	.00 %		0 H				
x dB Ba	ndwidth	17.65 M	Hz	x dB		-6.	00 dB				

FCC_802.11n_20MHz_Chain1_5825MHz

R	AF 50 G 0C			SENSE INF		ALIS/R AUTO		PH Jun 18, 2019	Frequency
Center Fre	eq 5.82500000	MFGain:1.ew	Trig: F	Freq: 5.82500 Tree Run :: 30 dB	Avg Hol	1: 50/50	Radio Std: None Radio Device: BTS		Frequency
10 dB/div	Ref Offset 11.2 dB Ref 30.00 dBm								
200 100			man	- proving	1.mayerray	-			Center Free 5.825000000 GH
0.00 tū ū 20.0	mananan	_		-			and and	-	
30.0								. MARING	
60.0 60.0		-		-					
Center 5.8 Res BW		-		VBW 300 k	Hz			an 30 MHz 2.933 ms	CF Step 3.000000 MHz Auto Man
Occup	ied Bandwid	th 7.724 M	H 7	Total P	ower	28.1	dBm		
Transmit Freq Error -52.08		-52.084	kHz				99.00 %		Freq Offset 0 Hz
x dB Ba	ndwidth	17.68	MHZ	x dB		-6.	00 dB		
0						STATU			

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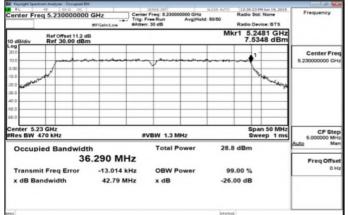
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Center Fre	eq 5.190000000	Trig	ter Freq: 5.190000000 GHz Free Run AvgiHolo en: 30 dB	ALISN AUTO	Radio Device: 8TS	Frequency
10 dB/div	Ref Offset 11.2 dB Ref 30.00 dBm					
20.0						Center Free 5.190000000 GH
10.0	pontantes	an and a second and the	- Anne more	how	my	
0.0 0.0 0.0	Card and a second se			-	mary with	
0.0						
enter 5.1 Res BW 4			#VBW 1.3 MHz	-	Span 50 MH Sweep 1 m	
Occup	ied Bandwidt 36	.297 MHz			2 dBm	Auto Ma
Transmit Freq Error -18.828 k		-18.828 kHz	Hz OBW Power S		.00 %	OH
x dB Ba	andwidth	43.04 MHz	x dB	-26.	00 dB	

FCC_802.11n_40MHz_Chain0_5230MHz



FCC_802.11n_40MHz_Chain0_5755MHz

A Contor Fra	eg 5.75500000	Chira Canto	SENSE 317	AUSN AUTO	Radio St	PH 3un 18, 2019	Frequency
center Pre	eq 5.75500000	Trig:	Free Run Avg Hold n: 30 dB	60/60		vice: BTS	
10 dB/div	Ref Offset 11.2 d Ref 30.00 dBn		Mkr		685 GHz 61 dBm		
20.0	anner pan	gala	a monthe man	ara-ala	n Maning		Center Free 5.755000000 GH
10 0 20 0 30 0			*		1	and the statestic	
60.0 60.0							
Center 5.7 Res BW			VBW 300 KHz			an 50 MHz ap 4.8 ms	CF Step 5.000000 MHz
Occup	ied Bandwidt 36	h 6.123 MHz	Total Power 28				Auto Man Freg Offset
		-78.884 kHz 36.10 MHz			99.00 % -6.00 dB		0 H
60				BTATM			

FCC_802.11n_40MHz_Chain0_5190MHz FCC_802.11n_40MHz_Chain0_5795MHz

Center Fre	q 5.795000000	Trig I	r Freq: 5.795000000 GHz Free Run AvgiHa 1: 30 dB	ALTER ALTO	Radio Sto Radio De		Frequency
10 dB/div							
20.0		al and the second second					Center Free 5.795000000 GH
10.00		a children and the second shows	- management	2 Marcal Street			
30.0 m (1-4)-4	P			-	1 P	Winteren	
40.0				-			
Center 5.79			VBW 300 kHz			n 50 MHz p 4.8 ms	CF Ste
Occupied Bandwidth 36.130 MHz Transmit Freq Error -73.208 kHz			Total Power	28	.3 dBm		Auto Mar
		-73.208 kHz	OBW Power	9	9.00 %		он
x dB Bar	ndwidth	35.66 MHz	x dB	-4	5.00 dB		

FCC 802.11n 40MHz Chain1 5190MHz

Center Fre	nq 5.190000000	Trig	er Freq: 5.190000000 GHz Free Run Avg Hala en: 30 dB			ne	Frequency
10 dB/div	Ref Offset 11.2 di Ref 30.00 dBm						
20.0							Center Freq 5.190000000 GHz
10.00	personan	mannana	man	A-anne	in		
20.0 30.0 40.0	1			-	m	Same	
60.0 60.0							
enter 5.1 Res BW			VBW 1.3 MHz		Span 5 Sweep		CF Step
Occupied Bandwidth 36.338 MH Transmit Freq Error 20.758 kH			z		dBm		Auto Man
		20.758 kHz			.00 %		0 Hz
x dB Ba	ndwidth	42.78 MHz	x dB	-26.	00 dB	- [

FCC 802.11n 40MHz Chain1 5230MHz

Keysight Spect	trum Analyzer - Occupied B	WP				1010 E
Center Fre	eq 5.23000000	Trig	r Freq: 5.230000000 GHz	Radie	Std: None Device: BTS	Frequency
10 dB/div	Ref Offset 11.2 o Ref 30.00 dB			Mkr1 5. 6.		
20.0 10.0 0.00	1					Center Free 5.230000000 GH
10.0 20.0 30.0	No.				Jane - Clark	
60.0						
Res BW			WBW 1.3 MHz		pan 50 MHz weep 1 ms	CF Step 5.000000 MH
Transmit Freq Error -24.842 k		th 6.332 MHz	Total Power	28.6 dBm		Auto Mar Freq Offset
		-24.842 kHz 44.06 MHz	OBW Power x dB	99.00 % -26.00 dB		он
eo.				EFATUS		

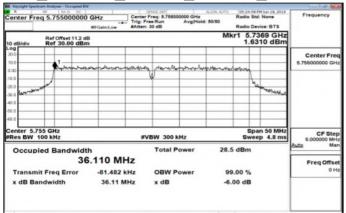
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FCC_802.11n_40MHz_Chain1_5755MHz



FCC_802.11n_40MHz_Chain1_5795MHz



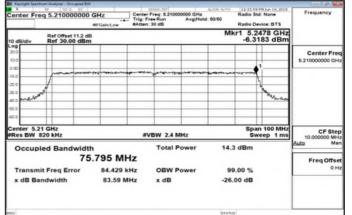
FCC_802.11ac_80MHz_Chain0_5210MHz

Center Fr	eq 5.210000000		enter Freq: 5.2100 rig: Free Run		Radio	Stal: None	Frequency			
		#FGainLow #	Atten: 30 dB			Device: BTS				
10 dB/div	Ref Offset 11.2 de Ref 30.00 dBm					2479 GHz 0630 dBm				
20.0							Center Freq 5.21000000 GHz			
10.0	man	waterspectures	****	****	*****					
30.0 40.0	***					1 mar				
50.0										
Center 5.3 Res BW			#VBW 2.41	VIHz		an 100 MHz weep 1 ms	CF Step 10.000000 MHz Auto Man			
Occup	led Bandwidt		Total	Power	14.5 dBm					
	75	5.849 MHz					Freq Offset			
		84.782 kHz 83.87 MHz			99.00 % -26.00 dB		0 Hz			
eia					STATUS					

FCC_802.11ac_80MHz_Chain0_5775MHz

Center Fre	q 5.775000000	Trig.	r Freq: 5.775000000 GHz FreeRun AvgiHold h: 30 dB	Radio Std: None 50/50 Radio Device: BTS	Frequency			
10 dB/div								
200 10.0	1				Center Free 5.775000000 GH			
0.00 .10.0	Franciscologicalizated	hiter and the second section and	her manufictory with the	minologia manale				
20.0 30.0 40.0				and and a second				
Center 5.7	75 GH2			Span 100 MH				
Res BW 1			VBW 300 kHz	Sweep 9.6 ms	10.000000 MH			
Occupi	ed Bandwidt 75	h 5.703 MHz	Total Power	23.7 dBm	Auto Mar Freq Offset			
		-186.46 kHz	OBW Power	99.00 %	0 H			
x dB Ba	ndwidth	75.84 MHz	x dB	-6,00 dB				

FCC_802.11ac_80MHz_Chain1_5210MHz



FCC_802.11ac_80MHz_Chain1_5775MHz

Center Fre	eq 5.775000000	Trig	r Freq: 5.775000000 GHz	Radio Std: None 50 Radio Device: BTS	Frequency			
10 dB/div	Ref Offset 11.2 di Ref 30.00 dBm			Mkr1 5.737 GHz -3.9708 dBm				
20.0 10.0					Center Free 5.775000000 GH			
0.00 18.8 20.0	Hundermant	امتناءلي وداديرية امتحمدت	ren printer, n. de . de la la la de secondo	ml-mandelship				
10.0 40.0 Jack Mark	, and the second			M. Marci				
60.0 60.0	++							
Center 5.7 Res BW			VBW 300 kHz	Span 100 MHz Sweep 9.6 ms	CF Step 10.000000 MHz Auto Man			
Occup	led Bandwidt 75	h 5.669 MHz	Total Power	23.8 dBm				
		-153.03 kHz 75.84 MHz	OBW Power x dB	99.00 % -6.00 dB	он			
90				STATUS				

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 www.ccsrf.com



MAXIMUM CONDUCTED OUTPUT POWER MEASUREMENT 9

9.1 **Standard Applicable**

OPERZTION Band		EUT CATEGORY	LIMIT
		Access Point (Master device)	1 Watt(30dBm)
U-NII-1	\checkmark	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	\checkmark		1 Watt(30dBm)
16			

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.

Note:

As per FCC KDB 662911 D01

(f)Cyclic Delay Diversity (CDD) [also known as cyclic shift diversity (CSD)]. CDD signals are correlated and create unintended array gain that varies with signal bandwidth, antenna geometry, and cyclic delay values. Consequently, depending on system parameters, it may be appropriate to use different values of array gain for compliance with power limits versus compliance with power spectral density limits.

(i) For power measurements on IEEE 802.11 devices, 1,2

Array Gain = 0 dB (i.e., no array gain) for NANT \leq 4;

Array Gain = 0 dB (i.e., no array gain) for channel widths \geq 40 MHz for any NANT;

Array Gain = 5 log(NANT/NSS) dB or 3 dB, whichever is less, for 20-MHz channel widths with NANT \geq 5.

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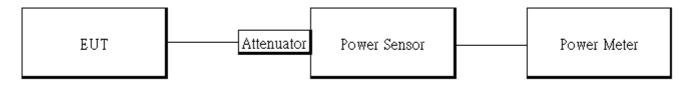
9.2 **Measurement Procedure**

- Place the EUT on the table and set it in transmitting mode. 1.
- The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules . 2.
- Remove the antenna from the EUT and then connect a low loss RF cable from the antenna 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).
- Repeat above procedures until all frequency (low, middle, and high channel) measured were 6. complete.
- 7. The path loss was compensated to the results of each measurement.
- Limit: a mode: 23.80-23=0.8, 30-0.8=29.2, n20, n40, ac80: 29.2-3.01=26.19 8.

Measurement Equipment Used 9.3

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL 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



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9.5 **Measurement Result**

802.11a Ch0

СН	Frequency (MHz)	Data Rate	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
36	5180	6	17.28	53.514	29.2	PASS
44	5220	6	23.97	249.728	29.2	PASS
48	5240	6	23.98	250.304	29.2	PASS
149	5745	6	23.72	235.759	30	PASS
157	5785	6	23.99	250.881	30	PASS
165	5825	6	23.86	243.483	30	PASS

802.11n_HT20_MIMO

	Frequency (MHz)	Data Rate	Avg. POWER (dBm)		TOTAL	TOTAL	REQUIRED	DEOUNT
СН			CH 0	CH 1	POWER (dBm)	POWER (mW)	LIMIT (dBm)	RESULT
36	5180	MCS8	15.96	17.15	19.72	93.725	26.18970004	PASS
44	5220	MCS8	21.57	22.68	25.28	337.543	26.18970004	PASS
48	5240	MCS8	21.54	22.8	25.34	341.858	26.18970004	PASS
149	5745	MCS8	22.29	22.96	25.76	376.776	30	PASS
157	5785	MCS8	23.27	24.02	26.78	476.881	30	PASS
165	5825	MCS8	22.99	24.13	26.72	469.919	30	PASS

802.11n_HT40_MIMO

СН	Frequency	uency Data	Avg. POWER (dBm)		TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
Ch	(MHz)		CH 0	CH 1				
38	5190	MCS8	9.65	11.04	13.61	22.977	26.18970004	PASS
46	5230	MCS8	21.35	22.45	25.15	327.135	26.18970004	PASS
151	5755	MCS8	22.02	22.51	25.48	353.545	30	PASS
159	5795	MCS8	23.45	24.09	26.99	500.532	30	PASS

802.11ac_VHT80_MIMO

СН	Frequency (MHz)	Data Rate	Avg. POWER (dBm)		TOTAL POWER	TOTAL POWER	REQUIRED LIMIT	RESULT
			CH 0	CH 1	(dBm)	(mW)	(dBm)	REGOLI
42	5210	MCS0	8.61	9.88	13.13	20.557	26.18970004	PASS
155	5775	MCS0	12.85	12.4	16.47	44.353	30	PASS

Off set: 11.2dB

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10 MAXIMUM POWER SPECTRAL DENSITY

10.1 Standard Applicable

OPERZTION Band		EUT CATEGORY	LIMIT				
		Access Point (Master device)	17dBm/ MHz				
U-NII-1	\checkmark	Fixed point-to-point Access Ponit					
		Mobile and portable client device	11dBm/ MHz				
U-NII-2A			11dBm/ MHz				
U-NII-2C			11dBm/ MHz				
U-NII-3	\checkmark		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.

Note:

As per FCC KDB 662911 D01

(f)Cyclic Delay Diversity (CDD) [also known as cyclic shift diversity (CSD)]. CDD signals are correlated and create unintended array gain that varies with signal bandwidth, antenna geometry, and cyclic delay values. Consequently, depending on system parameters, it may be appropriate to use different values of array gain for compliance with power limits versus compliance with power spectral density limits.

- If all antennas have the same gain, GANT, Directional gain = GANT + Array (i) Gain, where Array Gain is as follows.
 - For power spectral density (PSD) measurements on all devices,

Array Gain = 10 log(NANT/NSS) dB.

The antenna gain is grater than 6 dBi in MIMO mode, therefore the limit needs to be reduced as below:

	Effective Legacy Gain (dBi)	PSD Limit		
UNII-1	26.81	-3.81	dBm/MHz	
U-NII-3	28.14	7.86	dBm/500 kHz	

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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
- 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.
- 9. Limit: a mode: 23.80-23=0.8, 17-0.8=16.2, n20, n40, ac80: 16.2-3.01=13.19

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

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
DC Block	PASTER- NACK	PE8210	RF256	02/26/2019	02/25/2020
Spectrum Ana- lyzer	Agilent	N9010A	MY53400256	11/21/2018	11/20/2019
TEMPERA- TURE		HTC-1	EC-HY-01	04/18/2019	04/17/2020
Attenuator	Marvelous	MVE2213-10	RF80	02/26/2019	02/25/2020

10.3 Measurement Equipment Used

10.4 Test Set-up



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10.5 **Measurement Result**

POWER DENSITY 802.11a MODE								
Frequency (MHz)	PSD W/O Duty Factor (dBm)	Duty Factor	PSD With Duty Factor (dBm)	Limit (dBm)	Margin (dB)			
5180.00	5.14	0.13	5.27	16.20	-10.93			
5220.00	11.84	0.13	11.97	16.20	-4.23			
5240.00	11.69	0.13	11.82	16.20	-4.38			
5745.00	8.63	0.13	8.76	30.00	-21.24			
5785.00	9.06	0.13	9.19	30.00	-20.81			
5825.00	8.70	0.13	8.83	30.00	-21.17			
	POWER DENS	ITY 802.11ı	n HT20 MOD	E	I			
Frequency (MHz)	PSD W/O Duty Factor (dBm)	Duty Factor	PSD With Duty Factor (dBm)	Limit (dBm)	Margin (dB)			
5180	6.82	0.11	6.93	13.1897	-6.26			
5220	12.49	0.11	12.60	13.1897	-0.59			
5240	12.65	0.11	12.76	13.1897	-0.43			
5745	11.40	0.11	11.51	30	-18.49			
5785	11.02	0.11	11.13	30	-18.87			
5825	10.82	0.11	10.93	30	-19.07			
	POWER DENS	ITY 802.11ı	n HT40 MOD	ЭE				
Frequency (MHz)	PSD W/O Duty Factor (dBm)	Duty Factor	PSD With Duty Factor (dBm)	Limit (dBm)	Margin (dB)			
5190	-2.94	0.20	-2.74	13.1897	-15.93			
5230	9.42	0.20	9.62	13.1897	-3.57			
5755	7.19	0.20	7.39	30	-22.61			
5795	8.22	0.20	8.42	30	-21.58			
	POWER DENSI	FY 802.11a	c VHT80 MO	DE				
Frequency (MHz)	PSD W/O Duty Factor (dBm)	Duty Factor	PSD With Duty Factor (dBm)	Limit (dBm)	Margin (dB)			
		0.04	0.00	40.4007	10 55			
5210	-7.00	0.64	-6.36	13.1897	-19.55			

Note: Cable Loss=

11.2 dB

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802.11a_20MHz_5180MHz



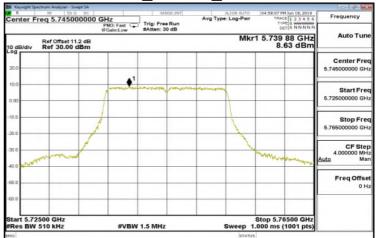
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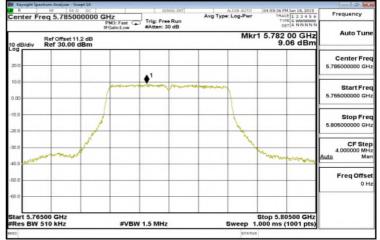
802.11a_20MHz_5240MHz



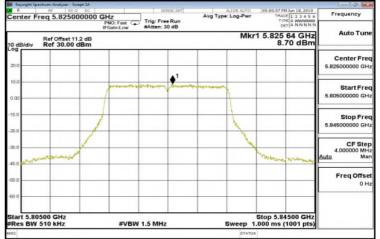
802.11a_20MHz_5745MHz



802.11a_20MHz_5785MHz



802.11a_20MHz_5825MHz



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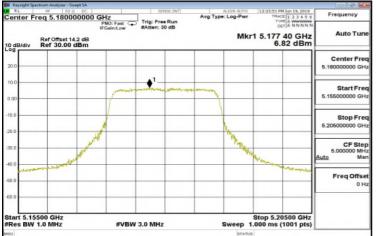
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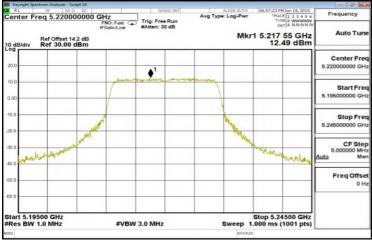
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802.11n_20MHz_5180MHz



802.11n_20MHz_5220MHz



802.11n_20MHz_5240MHz



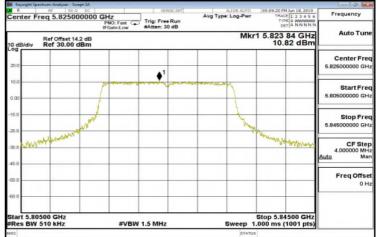
R IF 50 DC Stretcov enter Freq 5.745000000 GHz PNO: Fest Stretcol ov #Atten: 30 dB Frequency Auto Tur Mkr1 5.742 72 GHz 11.40 dBm Ref Offset 14.2 dB Ref 30.00 dBm Center Free •1 Start Fred 5 725000000 G Stop Free 5.765000000 GH Ring CF Step Freq Offse Stop 5.76500 GHz Sweep 1.000 ms (1001 pts 5.72500 GHz BW 510 kHz #VBW 1.5 MHz

802.11n_20MHz_5745MHz

802.11n_20MHz_5785MHz



802.11n_20MHz_5825MHz



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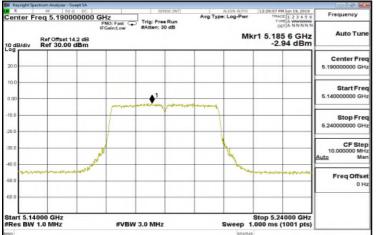
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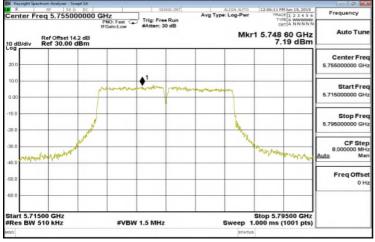
802.11n_40MHz_5190MHz



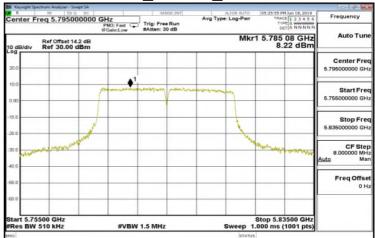
802.11n_40MHz_5230MHz



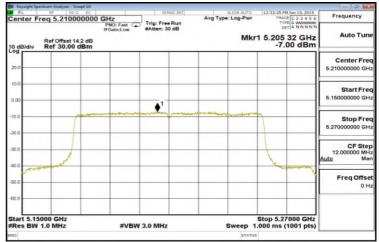
802.11n_40MHz_5755MHz



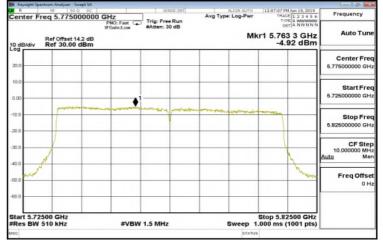
802.11n 40MHz 5795MHz



802.11ac_80MHz_5210MHz



802.11ac_80MHz_5775MHz



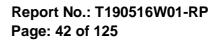
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11 UNDESIRABLE RADIATED EMISSION MEASUREMENT

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 5 MHz above or below the band edge.

APPLICABLE TO	LIMIT					
FCC KDB 789033 D02 General UNII Test Procedures New Rules	FIELD STRENGTH AT 3m					
	ΡΚ: 74 (dBμV/m)	AV 54 (dBµV/m)				
APPLICABLE TO	EIRP LIMIT	FIELD STRENGTH AT 3m				
15.407(b)(1)						
15.407(b)(2)	PK: -27 (dBm/MHz)	PK: 68.3 (dBµV/m)				
15.407(b)(3)						
	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				
	PK:15.6 (dBm/MHz) *3	PK: 110.8(dBµV/m) *3				
*1 boyond 75 MHz or more aboye o	PK:27 (dBm/MHz) *4	PK:122.2 (dBµV/m) *4				

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

*2 below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above.

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

*4 from 5 MHz above or below the band edge increasing linearly to a level of 27

dBm/MHz at the band edge.

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

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

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

Note:

1. The lower limit shall apply at the transition frequencies.

Emission level (dBµV/m) = 20 log Emission level (dBµV/m)

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11.2Measurement Equipment Used

		966A Chambe	er			
EQUIPMENT	MFR	MODEL	SERIAL	LAST	CAL DUE.	
TYPE		NUMBER	NUMBER	CAL.		
Horn Antenna	ETS LINDGREN	3116	00026370	12/26/2018	12/25/2019	
Bilog Antenna	Sunol Sciences	JB3	A030105	07/13/2018	07/12/2019	
Cable	HUBER SU- HNER	SUCOFLEX 104PEA	25157	06/29/2018	06/28/2019	
Cable	HUBER SU- HNER	SUCOFLEX 104PEA	20995	06/29/2018	06/28/2019	
Digital Thermo-Hy- gro Meter	WISEWIND	1206	D07	01/30/2019	01/29/2020	
double Ridged Guide Horn An- tenna	ETC	MCTD 1209	DRH13M02003	08/20/2018	08/19/2019	
High Pass Filters	MICRO TRON- ICS	HPM13195	003	05/14/2018	05/13/2019	
Horn Antenna	ETS LINDGREN	3116	00026370	12/26/2018	12/25/2019	
Loop Ant	COM-POWER	AL-130	121051	03/22/2019	03/21/2020	
Pre-Amplifier	EMEC	EM330	060609	06/29/2018	06/28/2019	
Pre-Amplifier	MITEQ	AMF-6F- 260400-40-8P	985646	06/21/2018	06/20/2019	
Pre-Amplifier	HP	8449B	3008A00965	06/29/2018	06/28/2019	
PSA Series Spec- trum Analyzer	Agilent	E4446A	MY46180323	05/29/2019	05/28/2020	
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	
Software						

NOTE: N.C.R refers to Not Calibrated Required.

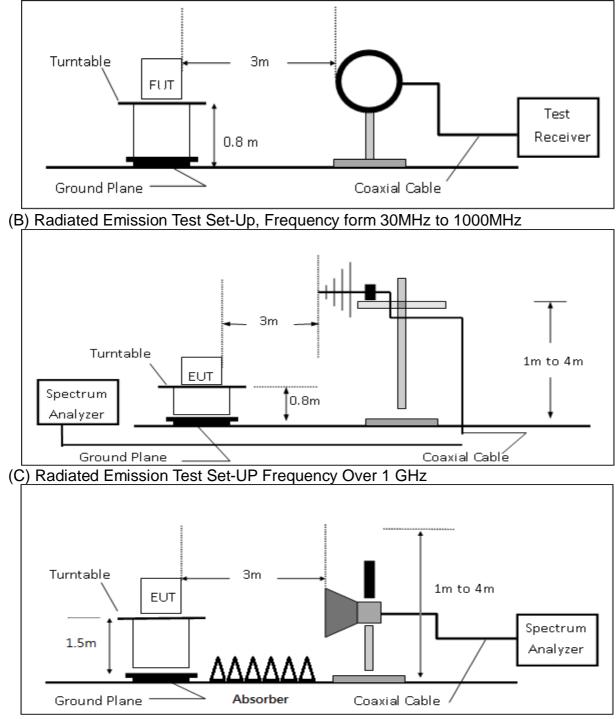
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11.3Test SET-UP

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



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11.4Measurement Procedure

- 1. 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.
- 3. The EUT was placed on a turn table with 0.8m for frequency< 1GHz and 1.5m for frequency> 1GHz above ground plane.
- 4. The turn table shall rotate 360 degrees to determine the position of maximum emission level.
- 5. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emissions.
- 6. Set the spectrum analyzer as RBW=120 kHz and VBW=300 kHz for Peak Detector (PK) and Quasi-peak (QP) at frequency below 1 GHz.
- Set the spectrum analyzer as RBW=1 MHz, VBW=3 MHz for Peak Detector at frequency 7. above 1 GHz.
- 8. Set the spectrum analyzer as RBW=1 MHz, VBW=10 Hz (Duty cycle > 98%) or VBW ≥ 1/T (Duty cycle < 98%) for Average Detector at frequency above 1 GHz.
- 9. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
- 10. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
- 11. Repeat above procedures until all frequency measured were complete.

11.5Field 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:

	FJ = RA T AF T CL - AG	
Where	FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
		2000)
	RA = Reading Amplitude	AG = Amplifier Gain
	AF = Antenna Factor	

FS = RA + AF + CI - AG

Actual FS(dB μ V/m) = SPA. Reading level(dB μ V) + Factor(dB)

Factor(dB) = Antenna Factor(dB μ V/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

11.6Test Results of Radiated Spurious Emissions form 9 kHz to 30 MHz

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit per 15.31(o) was not reported.

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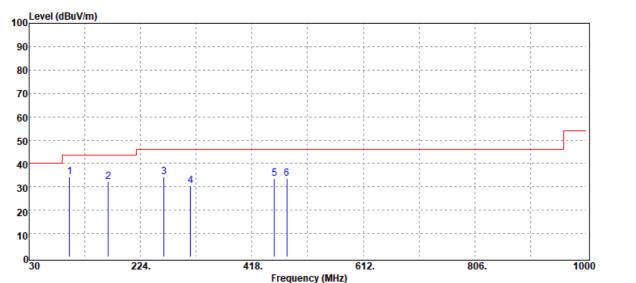
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Report No.: T190516W01-RP Page: 47 of 125



11.7Measurement Result Radiated Spurious Emission Measurement Result Below 1GHz Worst-Case Data:

Project Number	:T190516W01	Test Date	:2019-05-23
Operation Band	:802.11a/Band1	Temp./Humi.	:21/55
Frequency	:5220 MHz	Antenna Pol.	:VERTICAL
Operation Mode	:Tx CH Mid	Engineer	:Jerry
EUT Pol.	:E2 Plan		



				,				
	Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin	
_	MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB	_
	100.81	Peak	46.54	-12.44	34.10	43.50	-9.40	
	167.74	Peak	42.76	-10.56	32.20	43.50	-11.30	
	264.74	Peak	43.23	-8.95	34.28	46.00	-11.72	
	311.30	Peak	38.39	-7.86	30.53	46.00	-15.47	
	456.80	Peak	37.45	-3.76	33.69	46.00	-12.31	
	479.11	Peak	36.68	-2.98	33.70	46.00	-12.30	

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Project Number Operation Band Frequency Operation Mode EUT Pol.	:5220 MH: Tx CH Mi :E2 Plan	3and1 z		Test Date Temp./Hum Antenna Po Engineer		
100 Level (dBuV/m)			i		1
90						
80						
70	 					
60						
50	·					
40 1	2 3 4	5				
30				6		
20	· · · · · · · · · · · · · · · · · · ·					
10						
0 <mark></mark> 30	224.	418.	612.	806.	10	oo
_			ency (MHz)	A		
Freq.	Detector	Spectrum	Factor	Actual FS	Limit	Margin
MHz	Mode PK/QP/AV	Reading Level dBµV	dB	dBµV/m	@3m dBµV/m	dB
95.96		<u>авру</u> 47.29		33.34		
	Peak		-13.95		43.50	-10.16
167.74 240.49	Peak	46.06 49.69	-10.56 -10.25	35.50 39.44	43.50 46.00	-8.00 -6.56
240.49 264.74	Peak Peak	49.69 48.00	-10.25 -8.95	39.44 39.05	46.00 46.00	-6.95
264.74 432.55	Peak	48.00 38.58	-8.95 -4.32	39.05 34.26	46.00 46.00	-6.95 -11.74
432.55 665.35	Peak	32.75	-4.32 -0.09	32.66	46.00	-13.34
000.00	i oun	0EII 0	0.00	02.00	10.00	10.01

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Project Number Operation Band Frequency Operation Mode EUT Pol.	:E2 Plan	3and4 z		Test Date Temp./Hun Antenna Pe Engineer		
100 Level (dBuV/m)						
90						
80						
70						
60						
50						
40 1	2 3	⊿ 5			6	
30			·			
20						
10	·····					
0 <mark></mark>	224.	418.	612.	806.	100	
50	224.		ency (MHz)	800.	1000	,
Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
	Mode	Reading Level		FS	@3m	
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
104.69	Peak	44.66	-11.18	33.48	43.50	-10.02
216.24	Peak	47.94	-11.45	36.49	46.00	-9.51
264.74	Peak	41.51	-8.95	32.56	46.00	-13.44
311.30	Peak	38.80	-7.86	30.94	46.00	-15.06
432.55	Peak	36.50	-4.32	32.18	46.00	-13.82
958.29	Peak	27.60	4.42	32.02	46.00	-13.98

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Project Number Operation Band Frequency Operation Mode EUT Pol.	:802.11a/E :5785 MH: :Tx CH Mi :E2 Plan	3and4 z		Test Date Temp./Hun Antenna Pe Engineer		
100		i i				1
90						
80						
70						
60	 					
50						
40 1	3					
	2	4		5 6		
30						
20					·	
10						
0 <mark></mark> 30	224.	418.	612.	806.	10	 DO
		Frequ	ency (MHz)			
Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
	Mode	Reading Level		FS	@3m	
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
102.75	Peak	49.06	-11.87	37.19	43.50	-6.31
167.74	Peak	46.22	-10.56	35.66	43.50	-7.84
240.49	Peak	48.51	-10.25	38.26	46.00	-7.74
432.55	Peak	38.12	-4.32	33.80	46.00	-12.20
663.41	Peak	29.56	0.05	29.61	46.00	-16.39
818.61	Peak	27.91	2.92	30.83	46.00	-15.17

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:2019-05-23

Test Date



:T190516W01

Project Number

				Test Date	.2019-00-	20
Operation Band	:802.11ac8	80/Band1		Temp./Humi	. :21/55	
Frequency	:5210 MH	7		Antenna Po	I. :VERTICA	AI.
Operation Mode	:Tx CH Lo			Engineer	:Jerry	
•		vv		LIIGIIIEEI	Jeny	
EUT Pol.	:E2 Plan					
100 Level (dBuV/m)						
100]
90						
80		· · · · · · · · · · · · · · · · · · ·				
70		1 1 1 1 1 1	· · · · · · · · · · · · · · · · · · ·			
60				· · · · · · · · · · · · · · · · · · ·		
50						•
40 1	2 3	4	5		6	
30						
20						
10				· · · · · · · · · · · · · · · · · · ·		
0 <mark></mark>	224.	418.	612.	806.	10	00
		-	iency (MHz)			
Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode	Reading Level	dB	FS	@3m dBu\//m	٩D
	PK/QP/AV	<u>dBµV</u>		dBµV/m	dBµV/m	dB
83.35	Peak	47.98	-15.52	32.46	40.00	-7.54
216.24	Peak	47.57	-11.45	36.12	46.00	-9.88
264.74 479.11	Peak Peak	43.57 36.38	-8.95 -2.98	34.62 33.40	46.00 46.00	-11.38 -12.60
527.61	Peak	33.71	-2.98	31.33	46.00	-12.60
958.29	Peak	29.18	4.42	33.60	46.00	-12.40
000.20			=	00.00		

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Project Number Operation Band Frequency		80/Band1		Test Date Temp./Hum Antenna Po		
Operation Mode	:Tx CH Lo	w		Engineer	:Jerry	
EUT Pol.	:E2 Plan			-	-	
Level (dBuV/m	`					
100	,					1
90						
80						
70						
60						
50						
40 -1	3.4					
	2	5 6				
30						
20						
10						
0 <mark></mark>	224.	418.	612.	806.	:	 DO
			ency (MHz)			
Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode PK/QP/AV	Reading Level dBµV	dB	FS dBµV/m	@3m dBµV/m	dB
104.69	Peak	<u>46.79</u>	-11.18	35.61	43.50	-7.89
167.74	Peak	45.77	-10.56	35.21	43.50	-8.29
240.49	Peak	48.64	-10.25	38.39	46.00	-7.61
264.74	Peak	48.11	-8.95	39.16	46.00	-6.84
432.55	Peak	38.26	-4.32	33.94	46.00	-12.06
479.11	Peak	34.57	-2.98	31.59	46.00	-14.41

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程智科技股份有限公司

:2019-05-23

Test Date



:T190516W01

Project Number

				Test Date	.2019-00-2	.0
Operation Band :802.11ac80/Band4		Temp./Hum	i. :21/55			
Frequency	:5775 MHz	2		Antenna Po	. :VERTICA	L
Operation Mode	:Tx CH Lo			Engineer	:Jerry	
•		•••		Engineer	Joeny	
EUT Pol.	:E2 Plan					
100 Level (dBuV/m)						
90						
80						
70		· · · · · · · · · · · · · · · · · · ·		·		
60						
50						
40	2 3	4 5			6	
30						
20						
10	·····	· · · · · · · · · · · · · · · · · · ·		·		
0 <mark></mark> 30	224.	418. Freque	612. ency (MHz)	806.	100	0
Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
ricq.	Mode	Reading Level	1 actor	FS	@3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
105.66	Peak	41.12	-11.02	30.10	43.50	-13.40
216.24	Peak	47.80	-11.45	36.35	46.00	-9.65
264.74	Peak	41.71	-8.95	32.76	46.00	-13.24
432.55	Peak	36.14	-4.32	31.82	46.00	-14.18
479.11	Peak	35.12	-2.98	32.14	46.00	-13.86
959.26	Peak	28.53	4.48	33.01	46.00	-12.99

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:2019-05-23

Test Date



:T190516W01

Project Number

	.11000101			Test Date	.2019-05-2	23
Operation Band	:802.11ac8	80/Band4		Temp./Humi.	:21/55	
Frequency	:5775 MHz	Z		Antenna Pol	. :HORIZON	NTAL
Operation Mode	:Tx CH Lo	W		Engineer	:Jerry	
EUT Pol.	:E2 Plan			C	-	
	12211011					
100 Level (dBuV/m)						1
90						
80				· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·	
70						
60	· · · · · · · · · · · · · · · · · · ·					
50						
40						
30	Ĩ	5	6			
20						
10						
030	224.	418.	612.	806.	100]
30	227.		ency (MHz)	000.	100	
Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
	Mode	Reading Level		FS	@3m	
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
104.69	Peak	45.40	-11.18	34.22	43.50	-9.28
167.74	Peak	46.43	-10.56	35.87	43.50	-7.63
240.49	Peak	48.55	-10.25	38.30	46.00	-7.70
264.74 432.55	Peak Peak	48.12 37.85	-8.95 -4.32	39.17 33.53	46.00 46.00	-6.83 -12.47
432.55 619.76	Peak Peak	31.26	-4.32 -0.75	30.53 30.51	46.00 46.00	-12.47 -15.49
013.70	i can	51.20	-0.75	50.51	TU.UU	10.40

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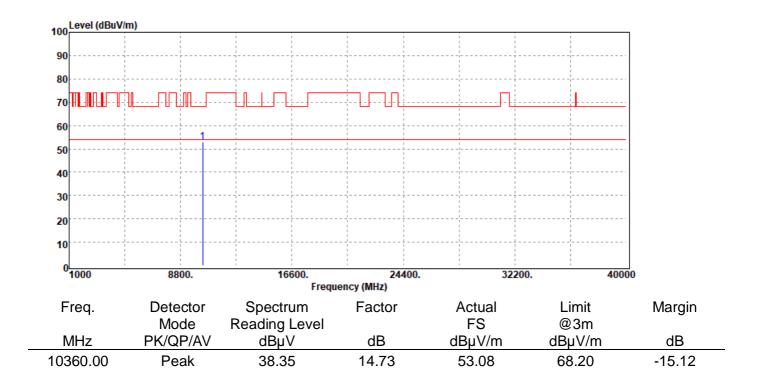
程智科技股份有限公司



Above 1GHz Data:

Project Number	:T190516W01
Operation Band	:802.11a/Band1
Frequency	:5180 MHz
Operation Mode	:Tx CH Low
EUT Pol.	:E2 Plan

Test Date	:2019-05-22
Temp./Humi.	:21/55
Antenna Pol.	:VERTICAL
Engineer	:Jerry



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·2019-05-22

Test Date



:T190516W01

Project Number

i iojecti iun		100001		Test Date	.2019-05	-22
Operation B Frequency	and :802.11 :5180 M	a/Band1 /Hz		Temp./Hur Antenna P		NTAL
Operation M	lode :Tx CH	Low		Engineer	:Jerry	
EUT Pol.	:E2 Pla	n				
100 Level (dE	BuV/m)		; ;	i i	1	_
90	· · · · · · · · · · · · · · · · · · ·		· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·		
80						
70					1	
70+++12-++1++-12+	╴╴╢╶┊╢╫╼╼╼╼╶╛╸╞╝╸╂┊╢╢╂╼╼ ┆	<u></u>	<u></u> <u></u> <u></u>	<u></u>	<u></u>	<u></u>
60						- •
50						
40						
30						
20						
10	J					
0	8800.	16600.	24400.	32200	. 40	000
			equency (MHz)			
Freq.	Detector	r Spectrum	Factor	Actual	Limit	Margin
	Mode	Reading Leve		FS	@3m	
MHz	PK/QP/A	V dBµV	dB	dBµV/m	dBµV/m	dB
10360.00	Peak	37.23	14.73	51.96	68.20	-16.24

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Project Number:T190516Operation Band:802.11a/Frequency:5220 MHOperation Mode:Tx CH MEUT Pol.:E2 Plan	Band1 Iz		Test Date Temp./Hur Antenna P Engineer		
100 Level (dBuV/m)					-
90	· · · · · · · · · · · · · · · · · · ·				
80					
70		 			
60	·····				
50	· · · · · · · · · · · · · · · · · · ·		 		
40					
30					
20	· · · · · · · · · · · · · · · · · · ·				
10	·····				
0 <mark></mark>	16600. Frequ	24400. ency (MHz)	32200). 400 0	00
Freq. Detector	Spectrum	Factor	Actual	Limit	Margin
Mode MHz PK/QP/AV	Reading Level dBµV	dB	FS dBµV/m	@3m dBµV/m	dB
MHz PK/QP/AV 10440.00 Peak		UD			UD

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Project Number Operation Band Frequency Operation Mode EUT Pol.	:T190516V :802.11a/E :5220 MHz :Tx CH Mic :E2 Plan	Band1 z		Test Date Temp./Humi. Antenna Pol Engineer		
100 Level (dBuV/m)						
90						
80						
70				_		
60	1					
50						
40						
30						
20						
10						
0 <mark></mark>	8800.	16600. Freque	24400. ency (MHz)	32200.	4000	0
Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode PK/QP/AV	Reading Level dBµV	dB	FS dBµV/m	@3m dBµV/m	dB
10440.00	Peak	41.36	15.66	57.02	68.20	-11.18

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:2019-05-22

Test Date



:T190516W01

Project Number

•	eration Band				Temp./Humi.		
	quency	:5240 MH			Antenna Pol.		
Ор	eration Mode	:Tx CH Hi	gh		Engineer	:Jerry	
EU	T Pol.	:E2 Plan					
	100 Level (dBuV/m))					
	90						
	80						
	70 <mark>-111-11-1-1-1-1</mark> -	<u></u>	· · · · · · · · · · · · · · · · · · ·		·····		
	60	1					
	50	· · · · · · · · · · · · · · · · · · ·			· · · · · · · · · · · · · · · · · · ·		
	40						
	30						
	20						
	10	L !			· · · · · · · · · · · · · · · · · · ·		
	0 <mark></mark>	8800.	16600.	24400.	32200.	40000	
				ency (MHz)			
	Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
	MHz	Mode PK/QP/AV	Reading Level dBµV	dB	FS dBµV/m	@3m dBµV/m	dB
	10480.00	Peak	42.19	16.48	58.67	<u>абрулп</u> 68.20	-9.53
	10400.00	r ean	42.13	10.40	30.07	00.20	-9.00

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Project Number Operation Band Frequency Operation Mode EUT Pol.	:T190516V :802.11a/B :5240 MHz :Tx CH Hig :E2 Plan	Band1 z		Test Date Temp./Humi Antenna Po Engineer		
100 Level (dBuV/m)						_
90					 	
80						
70 <mark> _ </mark>			 			
60	1					
50	· · · · · · · · · · · · · · · · · · ·				 	
40						
30						
20						
10						
0 <mark></mark> 1000	8800.	16600. Frequ	24400. ency (MHz)	32200.	400	 00
Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode PK/QP/AV	Reading Level dBµV	dB	FS dBµV/m	@3m dBµV/m	dB
10480.00	Peak	41.05	16.48	57.53	68.20	-10.67

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:2019-05-22

Test Date



:T190516W01

Project Number

Frequ Opera EUT F	tion Mode Pol.	:802.11a/B :5745 MHz :Tx CH Lov :E2 Plan					Temp./H Antenna Enginee	Pol.	:21/55 :VERTICA :Jerry	L
100	Level (dBuV/m)									1
90										
80										
70	┲╻╴╢╴╻╴╻╴						<u>_</u>			
60										
50										
40								, , , ,		
30						, , , , ,		, , , , ,		
20						, , , , ,		 		
10								 		
0	1000	8800.	166	600.	244	400.	32	200.	4000	0
					icy (MHz)					-
F	req.	Detector	Spectru		Factor		Actual		_imit	Margin
Ν	ЛНz	Mode PK/QP/AV	Reading L dBµV		dB	h	FS BµV/m		@3m 3µV/m	dB
	90.00	Average	27.32		15.95		43.27		54.00	-10.73
114	90.00	Peak	35.23	}	15.95		51.18	7	4.00	-22.82

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·2019-05-22

Test Date



:T190516W01

Project Number

FIOJECI NUITIDEI	.11905100	VUI		lest Date	:2019-05-22	
Operation Band	:802.11a/B	Band4		Temp./Humi.	:21/55	
Frequency	:5745 MHz	2		Antenna Pol.	:HORIZONTA	\L
Operation Mode	:Tx CH Lo	W		Engineer	:Jerry	
EUT Pol.	:E2 Plan			5	,	
100 Level (dBuV/m)						
90						
80						
70 <mark>11 11 11 11 11 11 11 11 11 11 11 11 11 </mark>						
	<u>d</u> -U- <u>t</u> :///td					
60			- J			
50						
40						
30						
20						
10						
0 <mark>1000</mark>	8800.	16600. Freque	24400. ency (MHz)	32200.	40000	
Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
	Mode	Reading Level		FS	@3m	Ū.
MHz	PK/QP/AV	dBµV	dB		dBµV/m	dB
11490.00	Average	26.11	15.95	42.06	54.00	-11.94
11490.00	Peak	34.22	15.95	50.17	74.00	-23.83

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Project Number Operation Band Frequency Operation Mode EUT Pol.	:T190516W :802.11a/Ba :5785 MHz :Tx CH Mid :E2 Plan	and4			Test Date Temp./Hu Antenna Engineer	ımi. Pol.	:2019-05-2 :21/55 :VERTICA :Jerry	
100 Level (dBuV/m)								_
90								
80								
70 					П		1	
60	2							
50	1							
40								
30					+-			
20								
10								
0 <mark></mark>	8800.	16600.	2440	00.	322	00.	4000])0
		-	ncy (MHz)					
Freq.	Detector	Spectrum	Factor		Actual		Limit	Margin
MHz	Mode PK/QP/AV	Reading Level dBµV	dB	ſ	FS IBµV/m		@3m 3µV/m	dB
11570.00	Average	27.21	16.41		43.62		54.00	-10.38
11570.00	Peak	35.67	16.41		52.08		4.00	-21.92

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Project Number Operation Band Frequency Operation Mode EUT Pol.	:T190516\ :802.11a/E :5785 MHz :Tx CH Mid :E2 Plan	3and4 z		Test Date Temp./Humi Antenna Pol Engineer		
100 Level (dBuV/m)					
90						
80						
70-HL-HLHHHHH	<u></u> - <u>U-t:</u> <u>t</u>]					
60		2				
50						
40						
30						
20						
10			 			
0 <mark></mark>	: 8800.	16600.	24400.	32200.	: 40000	
		Freque	ency (MHz)			
Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode PK/QP/AV	Reading Level dBµV	dB	FS dBµV/m	@3m dBµV/m	dB
11570.00	Average	26.09	16.41	42.50	54.00	-11.50
11570.00	Peak	34.12	16.41	50.53	74.00	-23.47

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Project Number Operation Band Frequency Operation Mode EUT Pol.	:T190516V :802.11a/B :5825 MHz :Tx CH Hig :E2 Plan	and4		Test Date Temp./Humi. Antenna Pol. Engineer	:2019-05-22 :21/55 :VERTICAL :Jerry	
100 Level (dBuV/m)						
90						
70	d-U-tal#td	<u></u>	· · · · · · · · · · · · · · · · · · ·			
60	2					
50						
40						
30						
20						
10						
0	8800.	16600.	24400	. 32200.	40000	
1000	0000.		ency (MHz)	. 52200.	40000	
Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
	Mode	Reading Level		FS	@3m	
MHz	PK/QP/AV	dBµV	dB		dBµV/m	dB
11650.00	Average	27.05	16.21	43.26	54.00	-10.74
11650.00	Peak	35.29	16.21	51.50	74.00	-22.50

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:2019-05-22

Test Date



:T190516W01

Project Number

Ol Fr Ol	peration Band equency peration Mode JT Pol.	:802.11a/E :5825 MHz :Tx CH Hig :E2 Plan	Z		Temp./Humi. Antenna Pol. Engineer	:2019-03-22 :21/55 :HORIZONT :Jerry	AL
	100 Level (dBuV/m)						
	90						
	80						
	70						
	60	 				 	
	50		2		· · · · · · · · · · · · · · · · · · ·	 	
	40						
	30						
	20						
	10						
	0		40000	24400	22220	40000	
	0 <mark></mark> 1000	8800.	16600. Freque	24400. ency (MHz)	32200.	40000	
	Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
	MHz	Mode PK/QP/AV	Reading Level	dB	FS dBuV/m	@3m dBu\//m	dB
	11650.00	Average	<u>d</u> BµV 26.09	<u>ив</u> 16.21	dBµV/m 42.30	dBµV/m 54.00	-11.70
	11650.00	Peak	34.58	16.21	50.79	74.00	-23.21

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Project Number Operation Band Frequency Operation Mode EUT Pol.	:T190516W01 :802.11n20/Band1 :5180 MHz :Tx CH Low :E2 Plan			Test Date Temp./Humi Antenna Po Engineer		
100 Level (dBuV/m)						
90 80						
70				F		
60 50	1					
40 30						
20						
10						
⁰ 1000	8800.	16600. Freque	24400. ency (MHz)	32200.	40000	
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
10360.00	Peak	38.50	14.73	53.23	68.20	-14.97

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Project Number Operation Band Frequency Operation Mode EUT Pol.	:T190516W :802.11n20 :5180 MHz :Tx CH Low :E2 Plan	/Band1		Test Date Temp./Hum Antenna Po Engineer		
100 Level (dBuV/m)	,				·····	
90						
80			· · · · · · · · · · · · · · · · · · ·			
70			 ·	F		
60	 		·		 	
50			· · · · · · · · · · · · · · · · · · ·			
40					 	
30					 	
20			·			
10						
0 <mark></mark> 1000	8800.	16600. Freque	24400. ncy (MHz)	32200.	4000	0
Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz I	Mode PK/QP/AV	Reading Level dBµV	dB	FS dBµV/m	@3m dBµV/m	dB
10360.00	Peak	37.29	14.73	52.02	68.20	-16.18

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Project Number Operation Band Frequency Operation Mode EUT Pol.	:T190516V :802.11n20 :5220 MHz :Tx CH Mic :E2 Plan)/Band1		Test Date Temp./Hum Antenna Po Engineer		
100 Level (dBuV/m)						
90						
80						
70				·····		
60	1					
50						
40						
30						
20						
0						
°1000	8800.	16600. Freque	24400. ency (MHz)	32200.	40000	
Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode PK/QP/AV	Reading Level dBµV	dB	FS dBµV/m	@3m dBµV/m	dB
10440.00	Peak	42.09	15.66	57.75	68.20	-10.45

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Project Number Operation Band Frequency Operation Mode EUT Pol.	:T190516W :802.11n20 :5220 MHz :Tx CH Mic :E2 Plan	/Band1		Test Date Temp./Hun Antenna P Engineer		
100 Level (dBuV/m)						_
90	1					
80	, , , , , ,		· · · · · · · · · · · · · · · · · · ·		 	
70 11 - 1 - 1 - 1 - 1			 			
60						
50						-
40						
30						
20						
10						
0		10000				
0 ¹ 1000	8800.	16600. Frequ	2440 iency (MHz)	0. 32200	. 400	100
Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz F	Mode PK/QP/AV	Reading Level dBµV	dB	FS dBµV/m	@3m dBµV/m	dB
10440.00	Peak	41.35	15.66	57.01	68.20	-11.19

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·2019-06-18

Test Date



:T190516W01

Project Number

i iojec		.11505100	VOI		Test Date	.2019-00-10	
Opera Frequ	ntion Band ency	:802.11n2(:5240 MHz			Temp./Humi. Antenna Pol.	:21/55 :VERTICAL	
Opera	tion Mode	:Tx CH Hig	gh		Engineer	:Jerry	
EUT F		:E2 Plan	-		C C	ŗ	
100	Level (dBuV/m)						
90							
80							
70							
60		1					
50		I I I I I					
40							
30		·					
20							
10							
0	1000	8800.	16600. Frequ	24400. ency (MHz)	32200.	40000	
F	req.	Detector	Spectrum	Factor	Actual	Limit	Margin
N	ЛНz	Mode PK/QP/AV	Reading Level	dB	FS dBu)//m	@3m dBu\//m	dB
	180.00	PR/QP/AV	<u>d</u> BµV 41.65	16.48	dBµV/m 58.13	<u>dBµV/m</u> 68.20	ив -10.07
104	100.00	I Can	41.05	10.40	30.13	00.20	-10.07

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100 Level (dBuV/m)						
90						
80						
70						
60						
50						
40						
30						
20						
10	·					
0 <mark></mark>						
1000	8800.	16600. Freque	24400. ency (MHz)	32200.	40000	
Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
	Mode	Reading Level	dD	FS dBul//m	@3m dBu)//m	٩D
	PK/QP/AV	<u>dBµV</u>	dB	dBµV/m	dBµV/m	dB
10480.00	Peak	40.39	16.48	56.87	68.20	-11.33

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Project Number Operation Band Frequency Operation Mode EUT Pol.	:T190516V :802.11n20 :5745 MHz :Tx CH Lov :E2 Plan)/Band4		Test Date Temp./Hu Antenna Engineer	umi. :21/55 Pol. :VERTI	
100 Level (dBuV/m)						
90						
80						
70 1 1 1 1 - 1 - 1 - 1 - 1					F	
60						
50	2					
40						
30						
20						
10						
0 <mark>1000</mark>	8800.	16600. Frequ	24400 Jency (MHz)	. 322	200.	40000
Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
	Mode	Reading Level		FS	@3m	
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
11490.00	Average	27.63	15.95	43.58	54.00	-10.42
11490.00	Peak	36.82	15.95	52.77	74.00	-21.23

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Project Number Operation Band Frequency Operation Mode EUT Pol.	:T190516W :802.11n20 :5745 MHz :Tx CH Lov :E2 Plan	I/Band4		Test Date Temp./Humi. Antenna Pol. Engineer	:2019-06-14 :21/55 :HORIZONT/ :Jerry	AL
100 Level (dBuV/m)		· · · · · ·				
90				· · · · · · · · · · · · · · · · · · ·		
80						
70						
60						
50						
40	1			· · · · · · · · · · · · · · · · · · ·		
30						
20						
10						
0 <mark>1000</mark>	8800.	16600. Freque	24400. ency (MHz)	32200.	40000	
Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
	Mode	Reading Level		FS	@3m	10
	PK/QP/AV	dBµV	dB		dBµV/m	dB
11490.00	Average	26.71	15.95	42.66	54.00	-11.34
11490.00	Peak	35.22	15.95	51.17	74.00	-22.83

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Project Number Operation Band Frequency Operation Mode EUT Pol.	:T190516W :802.11n20/ :5785 MHz :Tx CH Mid :E2 Plan			Test Date Temp./Humi Antenna Pol Engineer		
100 Level (dBuV/m)						
90						
80						
70						
60						
50	2					
40						
30						
20						
10						
0 ^L 1000	8800.	16600. Freque	24400. ency (MHz)	32200.	40000	
Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
		Reading Level	dD	FS	@3m	٩D
	PK/QP/AV	<u>dBµV</u>	dB	<u>dBµV/m</u>	dBµV/m	dB
11570.00	Average	30.56	16.41	46.97	54.00	-7.03
11570.00	Peak	39.21	16.41	55.62	74.00	-18.38

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Project Number Operation Band Frequency Operation Mode EUT Pol.	:T190516W :802.11n20 :5785 MHz :Tx CH Mid :E2 Plan	/Band4		Test Date Temp./Humi. Antenna Pol. Engineer		
100 Level (dBuV/m)						
90						
80						
70 - - - - - - - - - - - - - - - - - - - - - - -	·					
60	2					
50						
40					· · · · · · · · · · · · · · · · · · ·	
30						
20						
10						
0		40000	24400	22200	40000	
1000	8800.	16600. Freque	24400. ncy (MHz)	32200.	40000	
Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
	Mode	Reading Level		FS	@3m	
	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
11570.00	Average	29.12	16.41	45.53	54.00	-8.47
11570.00	Peak	38.09	16.41	54.50	74.00	-19.50

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Project Number Operation Band Frequency Operation Mode EUT Pol.	:T190516W :802.11n20 :5825 MHz :Tx CH Hig :E2 Plan	/Band4		-	./Humi. na Pol.	:2019-06-14 :21/55 :VERTICAL :Jerry	
100 Level (dBuV/m)							
90	, , , ,						
80							
70							
] - [
60	2				1	1	
50					1		
40							
30							
20							
10					 I I I		
0 ^L 1000	8800.	16600. Freque	2440 ency (MHz)	0.	32200.	40000	
Freq.	Detector	Spectrum	Factor	Actual		Limit	Margin
	Mode	Reading Level	٩D	FS		@3m	ЧD
	PK/QP/AV	dBµV	dB	dBµV/n	<u>1 (</u>	dBµV/m	dB
11650.00	Average	30.05	16.21	46.26		54.00	-7.74
11650.00	Peak	39.63	16.21	55.84		74.00	-18.16

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Project Number Operation Band Frequency Operation Mode EUT Pol.	:T190516W :802.11n20 :5825 MHz :Tx CH Hig :E2 Plan)/Band4		Test Date Temp./Humi. Antenna Pol. Engineer	:2019-06-14 :21/55 :HORIZONT/ :Jerry	AL
100 Level (dBuV/m)						
90						
80						
70						
60						
50	2					
40						
30						
20						
10						
0 <mark>.</mark> 1000	8800.	16600. Freque	24400. ency (MHz)	32200.	40000	
Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
	Mode	Reading Level		FS	@3m	
	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
11650.00	Average	29.38	16.21	45.59	54.00	-8.41
11650.00	Peak	38.26	16.21	54.47	74.00	-19.53

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:2019-05-23

Test Date



:T190516W01

Project Number

Op Fre Op	peration Band equency peration Mode IT Pol.	d :802.11n4 :5190 MH:	0/Band1 z		Temp./Humi. Antenna Pol. Engineer	:2019-03-23 :21/55 :VERTICAL :Jerry	
	100 Level (dBuV/n	n)					
	90						
	80						
	70				_		
	60						
	50		1 1 1 1 1 1 1 1				
	40					1 1 1 1 1	
	30						
	20						
	10						
	0 <mark></mark>	8800.	16600. Frequ	24400. ency (MHz)	32200.	40000	
	Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
	MHz	Mode PK/QP/AV	Reading Level dBµV	dB	FS dBµV/m	@3m dBµV/m	dB
	10380.00	Peak	<u>37.23</u>	14.82	52.05	68.20	-16.15

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Project Number Operation Band Frequency Operation Mode EUT Pol.	:T190516W :802.11n40 :5190 MHz :Tx CH Low :E2 Plan	/Band1		Test Date Temp./Hum Antenna Po Engineer		
100 Level (dBuV/m)						
90						
80						
70		<u></u>				
60						
50						
40			· · · · · · · · · · · · · · · · · · ·			
30						
20						
10						
0	0000	40000	24400.	22200	4000	
1000	8800.	16600. Freque	24400. ency (MHz)	32200.	4000	U
Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz I	Mode PK/QP/AV	Reading Level dBµV	dB	FS dBµV/m	@3m dBµV/m	dB
10380.00	Peak	36.22	14.82	<u>0.0</u> 51.04	68.20	-17.16

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:2019-06-18

Test Date



:T190516W01

Project Number

Operation Band:802.11Frequency:5230 MOperation Mode:Tx CHEUT Pol.:E2 Pla	High		Temp./Humi. Antenna Pol. Engineer	:21/55 :VERTICAL :Jerry	
100 Level (dBuV/m)	: :			· · · · · · · · · · · · · · · · · · ·	
90					
80		, , , , , , , , , , , , , , , , , , ,			
70 11 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1		<u> </u>			
	1				
60				1	
50					
40			· · · · · · · · · · · · · · · · · · ·		
30					
20					
10					
0 <mark></mark>	16600.	24400.	32200.	40000	
		Jency (MHz)			
Freq. Detecto		Factor	Actual	Limit	Margin
Mode MHz PK/QP/A	Reading Level V dBµV	dB	FS dBµV/m	@3m dBµV/m	dB
10460.00 Peak	41.69	16.01	57.70	68.20	-10.50

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Project Number Operation Band Frequency Operation Mode EUT Pol.	:T190516V :802.11n4(:5230 MHz :Tx CH Hig :E2 Plan	D/Band1 z		Test Date Temp./Humi Antenna Pol Engineer		
100 Level (dBuV/m)						
90	1					
80						
70						
60	U []U[]U[]					
50					 	
40					 	
30						
20						
10						
0 <mark>1000</mark>	8800.	16600. Freque	24400. ency (MHz)	32200.	4000	0
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
10460.00	Peak	40.17	16.01	56.18	68.20	-12.02

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Project Number Operation Band Frequency Operation Mode EUT Pol.	:T190516W :802.11n40 :5795 MHz :Tx CH Hig :E2 Plan)/Band4		Test Date Temp./Humi Antenna Pol Engineer		
100 Level (dBuV/m)						
90						
80						
70						
60						
50	2					
40						
30			· · · · · · · · · · · · · · · · · · ·			
20			· · · · · · · · · · · · · · · · · · ·			
10						
0 <mark>1000</mark>	8800.	16600. Frequ	24400. ency (MHz)	32200.	40000	
Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
	Mode	Reading Level		FS	@3m	
<u>MHz</u>	PK/QP/AV	dBµV	dB	<u>dBµV/m</u>	dBµV/m	dB
11590.00	Average	28.72	16.74	45.46	54.00	-8.54
11590.00	Peak	38.31	16.74	55.05	74.00	-18.95

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Project Number Operation Band Frequency Operation Mode EUT Pol.	:T190516W :802.11n40 :5795 MHz :Tx CH Hig :E2 Plan	/Band4		Test Date Temp./Humi Antenna Po Engineer		
100 Level (dBuV/m)					······	
90						
80						
70	╶╴┥╴╽╴┟┊╢╂╴╴┥╴╴╴╴	- <u> - </u>	╶┽╴╸╂╼┠╶╶╸┨┛╴┠ <u>╪╶╴╴</u> ╸╸			
60	2					
50						
40						
30						
20						
10						
0 <mark>1000</mark>	8800.	16600. Freque	24400. ency (MHz)	32200.	40000	
Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
	Mode	Reading Level		FS	@3m	
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
11590.00	Average	27.55	16.74	44.29	54.00	-9.71
11590.00	Peak	37.64	16.74	54.38	74.00	-19.62

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:2019-05-23

Test Date



:T190516W01

Project Number

Operation Band Frequency Operation Mode EUT Pol.	:802.11ac8 :5210 MHz :Tx CH Lov :E2 Plan			Temp./Hum Antenna Po Engineer		
100 Level (dBuV/m)						
90						
80						
70				·····		
60	1					
50						
40						
30						
20						
10						
0 <mark></mark>	8800.	16600. Free	24400. quency (MHz)	32200	. 40000	
Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode PK/QP/AV	Reading Level dBµV	dB	FS dBµV/m	@3m dBµV/m	dB
10420.00	Peak	38.93	15.31	54.24	68.20	-13.96

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.2010-05-23

Tast Data



:T190516W01

Project Number

Fiojec	st number	.1190510			Test Date	:2019-05-23	
Opera	ation Band	:802.11ac	80/Band1		Temp./Humi.	:21/55	
Frequ	encv	:5210 MH	Z		Antenna Pol.	:HORIZONTA	۸L
-	ation Mode				Engineer	:Jerry	
EUTF		:E2 Plan			Linginicor	leeny	
LUII	01.						
100	Level (dBuV/m)						
90							
80							
70	╺┠┨┠╌╛╢┫┝╘╼╊╛╴╴╴╢╶╡┥╢┽╴ ┆	<u></u>	<mark>↓∦</mark> <mark>↓</mark>			'- <mark>-</mark>	
60		1					
50							
40	·						
30							
				· · · · · · · · · · · · · · · · · · ·			
20							
10							
0	1000	8800.	16600.	24400.	32200.	40000	
Frequency (MHZ)							
F	req.	Detector	Spectrum	Factor	Actual	Limit	Margin
N	ЛНz	Mode PK/QP/AV	Reading Level	dB	FS dBu\//m	@3m dBu\//m	dB
		Peak	<u>dBμV</u> 37.65		dBµV/m 52.96	dBµV/m 68.20	
104	120.00	Peak	57.05	15.31	52.90	00.20	-15.24

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·2019-05-23

Test Date



:T190516W01

Peak

11550.00

Project Number

Tiojet	stinumber	.11303100	VOT		Test Date	:2019-05-23	
Opera Frequ	ation Band ency	:802.11ac8 :5775 MHz			Temp./Humi. Antenna Pol.	:21/55 :VERTICAL	
Opera	ation Mode	:Tx CH Lo	W		Engineer	:Jerry	
EUT F		:E2 Plan			C C		
100	Level (dBuV/m)						
90			· · · · · · · · · · · · · · · · · · ·				
80		 					
70		רורז מו רד		<u> </u>			
60		2					
50							
40							
30							
20							
10							
0	1000	8800.	16600. Frequ	24400. ency (MHz)	32200.	± 40000	
F	req.	Detector	Spectrum	Factor	Actual	Limit	Margin
	41.1_	Mode	Reading Level		FS	@3m	
	MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
115	550.00	Average	27.63	16.09	43.72	54.00	-10.28

16.09

51.92

74.00

-22.08

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35.83

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·2019-05-23

Test Date



:T190516W01

Project Number

	roject Number	.11303100			Test Date	:2019-05-23	1
F	Deration Band requency	:802.11ac8 :5775 MHz	2		Temp./Humi. Antenna Pol.	:21/55 :HORIZONT	AL
	Operation Mode	:Tx CH Lo	W		Engineer	:Jerry	
E	UT Pol.	:E2 Plan					
	Louol (dBu)//m)						
	100 Level (dBuV/m)						
	90						
	80						
	70						
	70-#12-#11-12	╶──╛╴ध╴╂╝╫╂──╛╴╴╴	· <u> - </u> <u> </u>				
	60						
	50	2					
	40	1			· · · · · · · · · · · · · · · · · · ·		
	30						
	20						
	10						
	0					1	
	0 <mark></mark>	8800.	16600. Frequ	24400. ency (MHz)	32200.	40000	
	Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
	•	Mode	Reading Level		FS	@3m	U
	MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
	11550.00	Average	26.28	16.09	42.37	54.00	-11.63
	11550.00	Peak	34.26	16.09	50.35	74.00	-23.65

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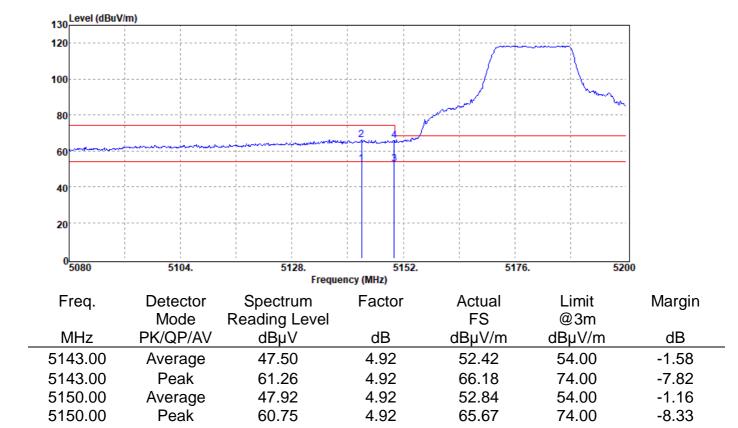
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Band edge falling to restricted band

Project Number	:T190516W01
Operation Band	:802.11a/Band1
Frequency	:5180 MHz
Operation Mode	:BE CH Low
EUT Pol.	:E2 Plan

Test Date :2019-05-22 Temp./Humi. :21/55 Antenna Pol. :VERTICAL Engineer :Jerry



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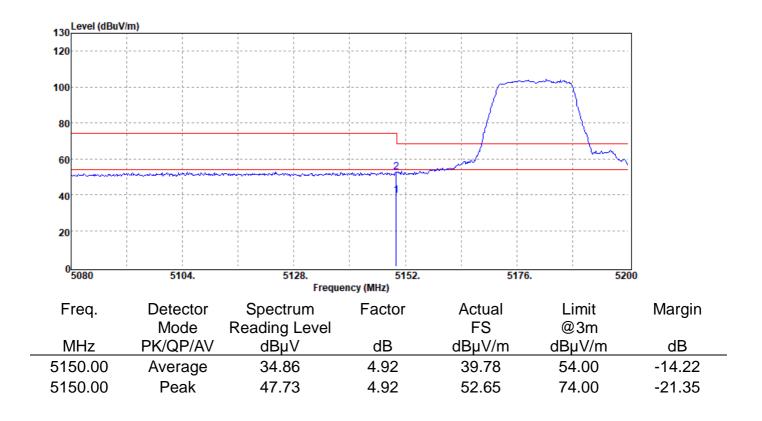
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Report No.: T190516W01-RP Page: 90 of 125



Project Number:T190516W01Operation Band:802.11a/Band1Frequency:5180 MHzOperation Mode:BE CH LowEUT Pol.:E2 Plan

Test Date :2019-05-22 Temp./Humi. :21/55 Antenna Pol. :HORIZONTAL Engineer :Jerry



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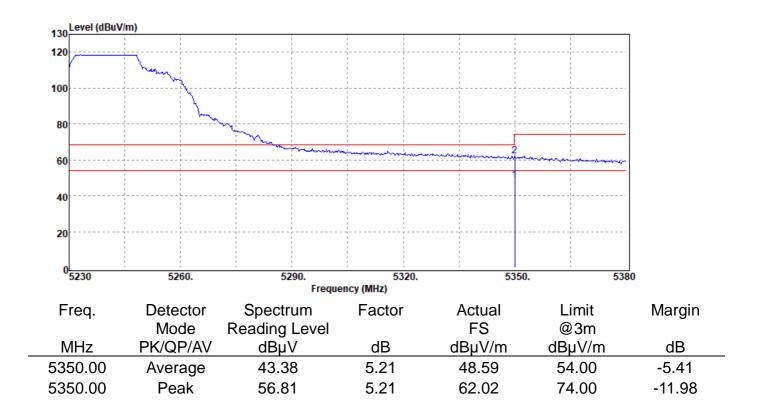
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Report No.: T190516W01-RP Page: 91 of 125



Project Number:T190516W01Operation Band:802.11a/Band1Frequency:5240 MHzOperation Mode:BE CH HighEUT Pol.:E2 Plan

Test Date :2019-05-22 Temp./Humi. :21/55 Antenna Pol. :VERTICAL Engineer :Jerry



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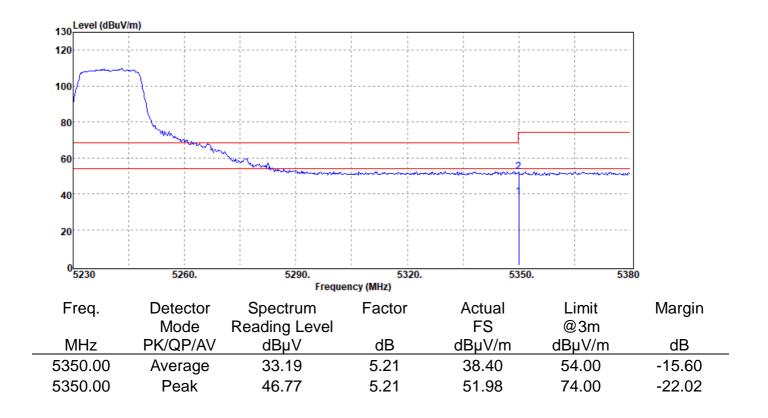
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Report No.: T190516W01-RP Page: 92 of 125



Project Number:T190516W01Operation Band:802.11a/Band1Frequency:5240 MHzOperation Mode:BE CH HighEUT Pol.:E2 Plan

Test Date :2019-05-22 Temp./Humi. :21/55 Antenna Pol. :HORIZONTAL Engineer :Jerry



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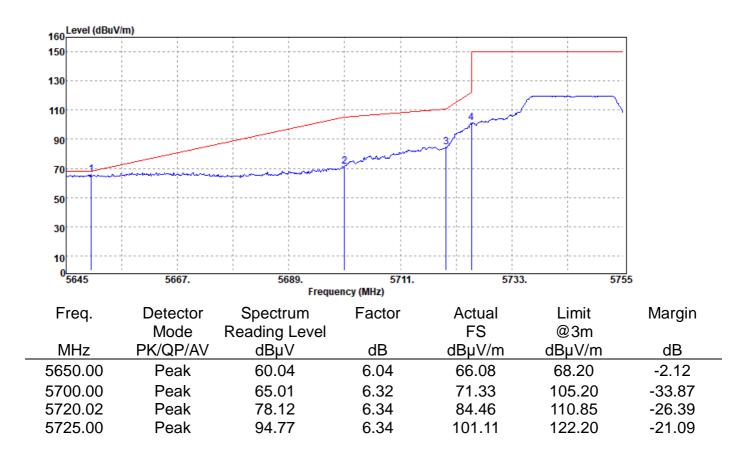
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Report No.: T190516W01-RP Page: 93 of 125



Project Number:T190516W01Operation Band:802.11a/Band4Frequency:5745 MHzOperation Mode:BE CH LowEUT Pol.:E2 Plan

Test Date :2019-05-29 Temp./Humi. :21/55 Antenna Pol. :VERTICAL Engineer :Jerry



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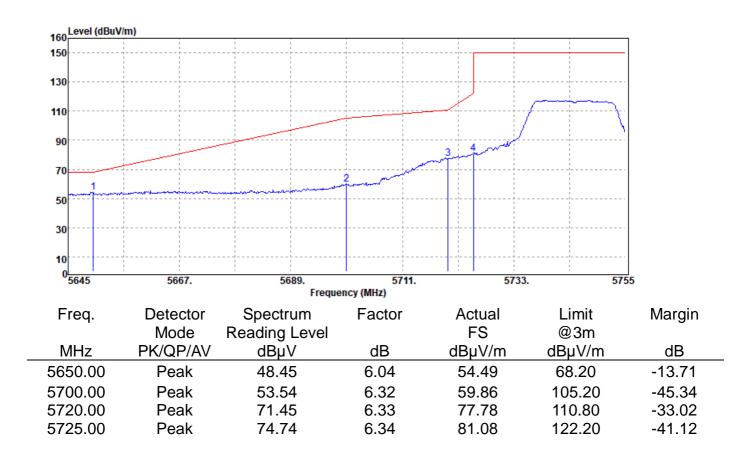
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Report No.: T190516W01-RP Page: 94 of 125



Project Number:T190516W01Operation Band:802.11a/Band4Frequency:5745 MHzOperation Mode:BE CH LowEUT Pol.:E2 Plan

Test Date :2019-05-29 Temp./Humi. :21/55 Antenna Pol. :HORIZONTAL Engineer :Jerry



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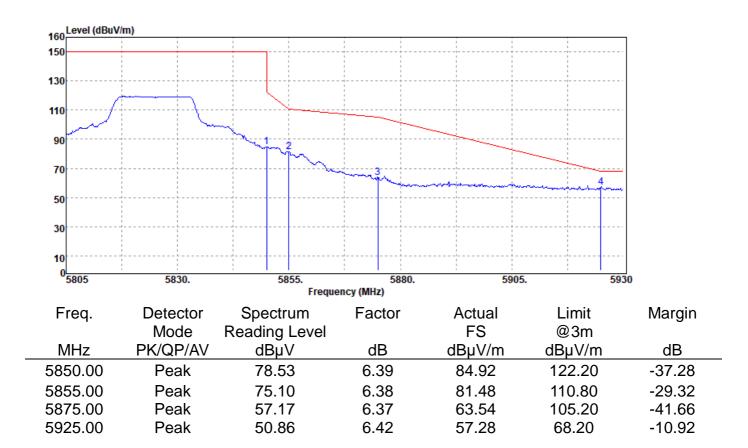
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Report No.: T190516W01-RP Page: 95 of 125



Project Number:T190516W01Operation Band:802.11a/Band4Frequency:5825 MHzOperation Mode:BE CH HighEUT Pol.:E2 Plan

Test Date :2019-05-29 Temp./Humi. :21/55 Antenna Pol. :VERTICAL Engineer :Jerry



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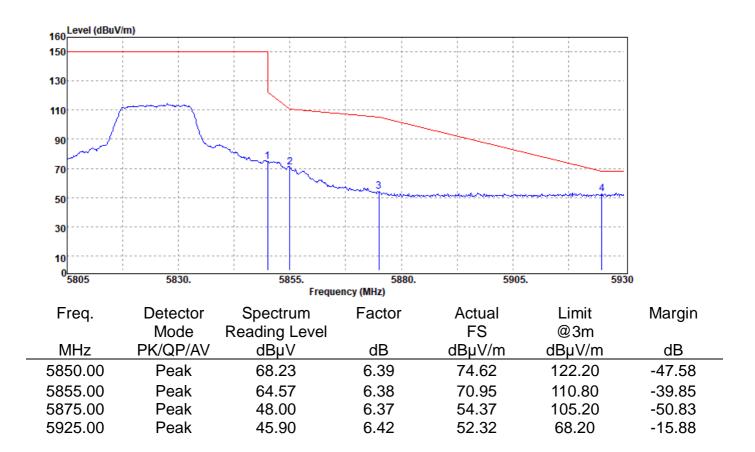
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Report No.: T190516W01-RP Page: 96 of 125



Project Number:T190516W01Operation Band:802.11a/Band4Frequency:5825 MHzOperation Mode:BE CH HighEUT Pol.:E2 Plan

Test Date :2019-05-29 Temp./Humi. :21/55 Antenna Pol. :HORIZONTAL Engineer :Jerry



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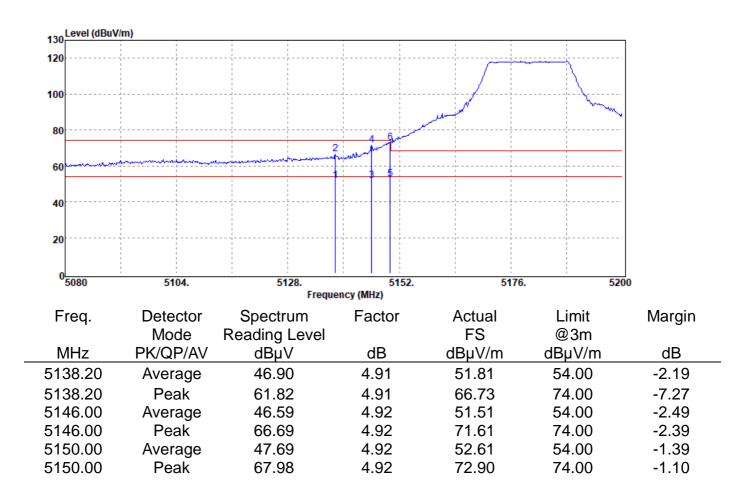
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Report No.: T190516W01-RP Page: 97 of 125



Project Number:T190516W01Operation Band:802.11n20/Band1Frequency:5180 MHzOperation Mode:BE CH LowEUT Pol.:E2 Plan

Test Date :2019-05-22 Temp./Humi. :21/55 Antenna Pol. :VERTICAL Engineer :Jerry



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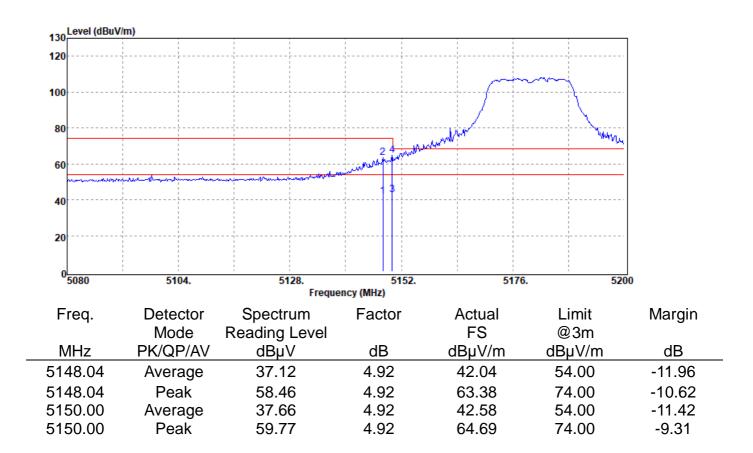
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Report No.: T190516W01-RP Page: 98 of 125



Project Number:T190516W01Operation Band:802.11n20/Band1Frequency:5180 MHzOperation Mode:BE CH LowEUT Pol.:E2 Plan

Test Date :2019-05-22 Temp./Humi. :21/55 Antenna Pol. :HORIZONTAL Engineer :Jerry



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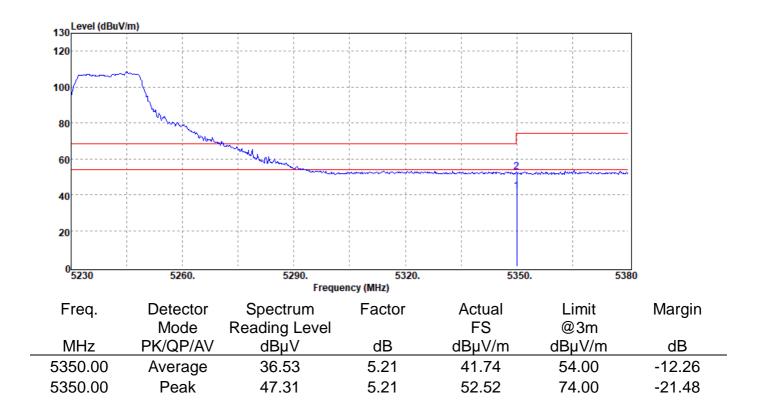
程智科技股份有限公司

Report No.: T190516W01-RP Page: 99 of 125



Project Number:T190516W01Operation Band:802.11n20/Band1Frequency:5240 MHzOperation Mode:BE CH HighEUT Pol.:E2 Plan

Test Date :2019-06-18 Temp./Humi. :21/55 Antenna Pol. :HORIZONTAL Engineer :Jerry



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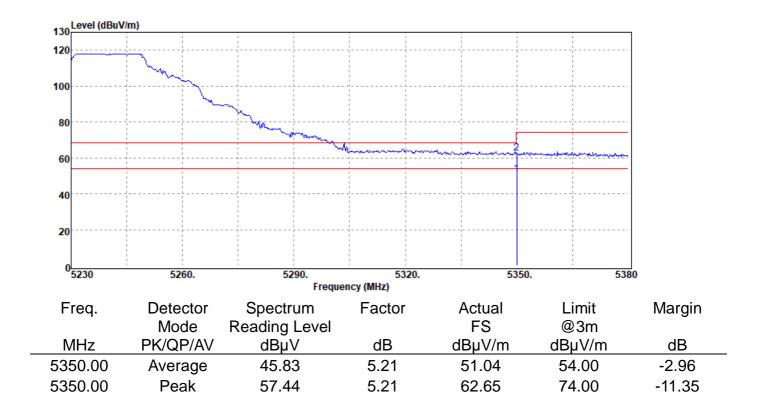
程智科技股份有限公司

Report No.: T190516W01-RP Page: 100 of 125



Project Number:T190516W01Operation Band:802.11n20/Band1Frequency:5240 MHzOperation Mode:BE CH HighEUT Pol.:E2 Plan

Test Date :2019-06-18 Temp./Humi. :21/55 Antenna Pol. :VERTICAL Engineer :Jerry



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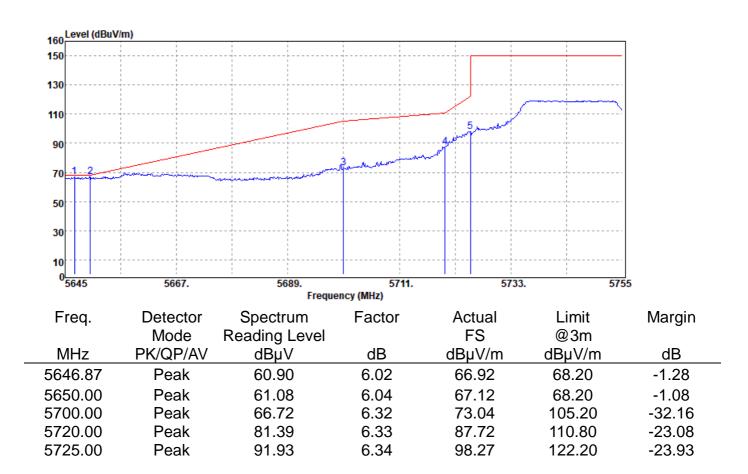
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Report No.: T190516W01-RP Page: 101 of 125



Project Number:T190516W01Operation Band:802.11n20/Band4Frequency:5745 MHzOperation Mode:BE CH LowEUT Pol.:E2 Plan

Test Date :2019-06-14 Temp./Humi. :21/55 Antenna Pol. :VERTICAL Engineer :Jerry



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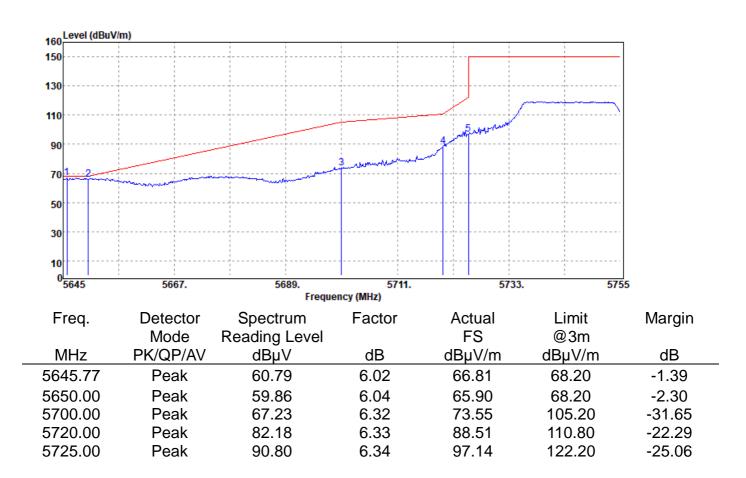
程智科技股份有限公司

Report No.: T190516W01-RP Page: 102 of 125



Project Number:T190516W01Operation Band:802.11n20/Band4Frequency:5745 MHzOperation Mode:BE CH LowEUT Pol.:E2 Plan

Test Date :2019-06-14 Temp./Humi. :21/55 Antenna Pol. :HORIZONTAL Engineer :Jerry



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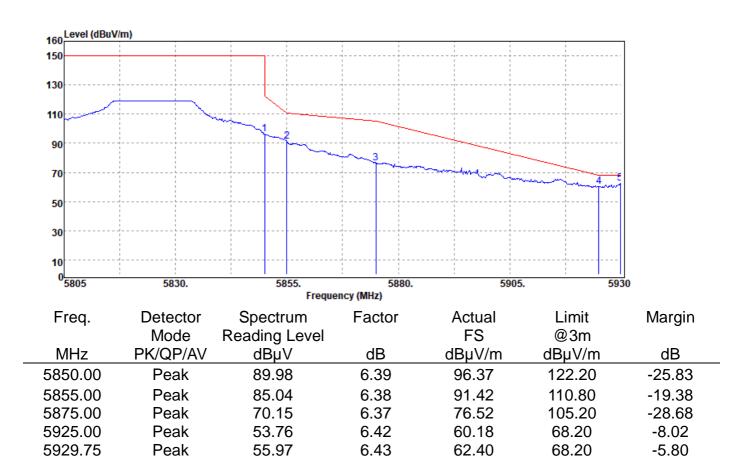
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Report No.: T190516W01-RP Page: 103 of 125



Project Number:T190516W01Operation Band:802.11n20/Band4Frequency:5825 MHzOperation Mode:BE CH HighEUT Pol.:E2 Plan

Test Date :2019-06-14 Temp./Humi. :21/55 Antenna Pol. :VERTICAL Engineer :Jerry



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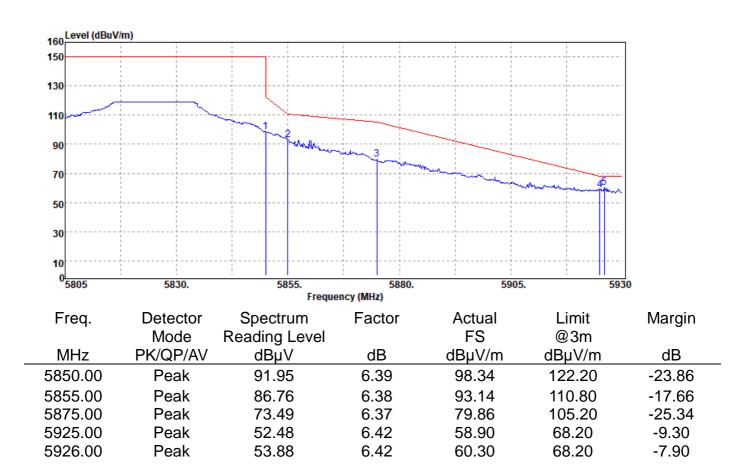
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Report No.: T190516W01-RP Page: 104 of 125



Project Number:T190516W01Operation Band:802.11n20/Band4Frequency:5825 MHzOperation Mode:BE CH HighEUT Pol.:E2 Plan

Test Date :2019-06-14 Temp./Humi. :21/55 Antenna Pol. :HORIZONTAL Engineer :Jerry



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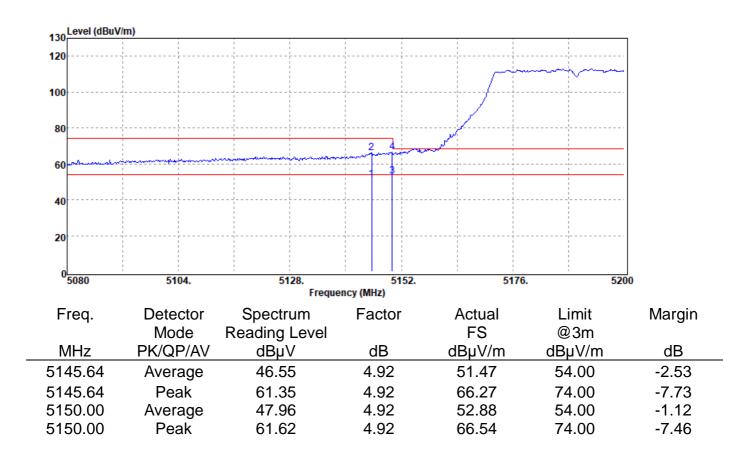
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Report No.: T190516W01-RP Page: 105 of 125



Project Number:T190516W01Operation Band:802.11n40/Band1Frequency:5190 MHzOperation Mode:BE CH LowEUT Pol.:E2 Plan

Test Date :2019-05-22 Temp./Humi. :21/55 Antenna Pol. :VERTICAL Engineer :Jerry



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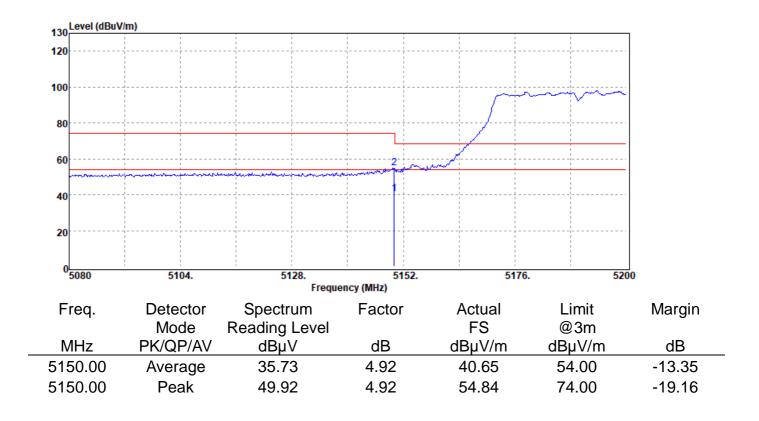
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Report No.: T190516W01-RP Page: 106 of 125



Project Number:T190516W01Operation Band:802.11n40/Band1Frequency:5190 MHzOperation Mode:BE CH LowEUT Pol.:E2 Plan

Test Date :2019-05-22 Temp./Humi. :21/55 Antenna Pol. :HORIZONTAL Engineer :Jerry



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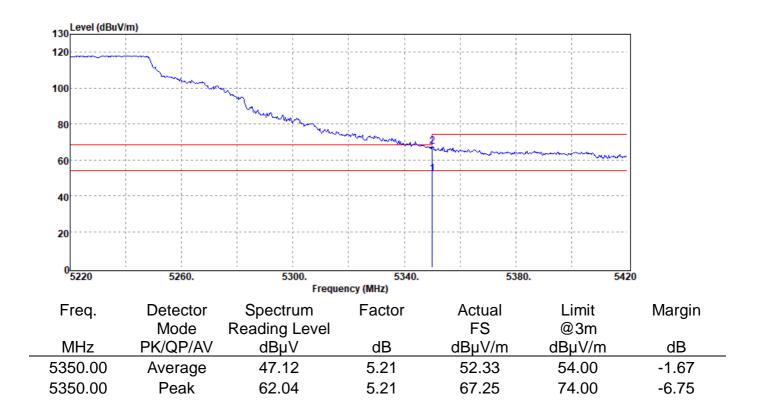
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Report No.: T190516W01-RP Page: 107 of 125



Project Number:T190516W01Operation Band:802.11n40/Band1Frequency:5230 MHzOperation Mode:BE CH HighEUT Pol.:E2 Plan

Test Date :2019-06-18 Temp./Humi. :21/55 Antenna Pol. :VERTICAL Engineer :Jerry



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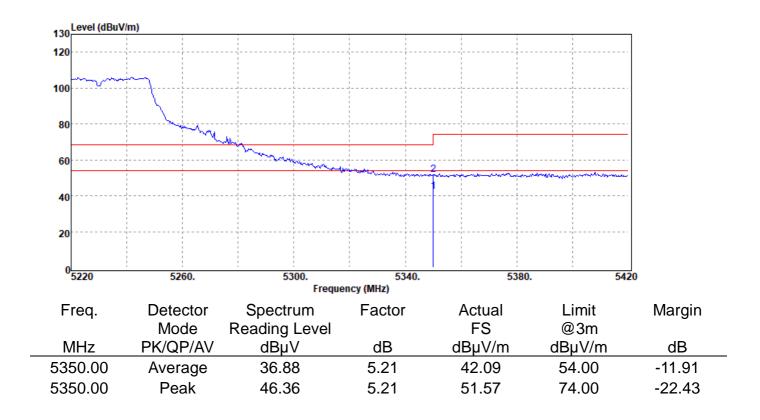
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Report No.: T190516W01-RP Page: 108 of 125



Project Number:T190516W01Operation Band:802.11n40/Band1Frequency:5230 MHzOperation Mode:BE CH HighEUT Pol.:E2 Plan

Test Date :2019-06-18 Temp./Humi. :21/55 Antenna Pol. :HORIZONTAL Engineer :Jerry



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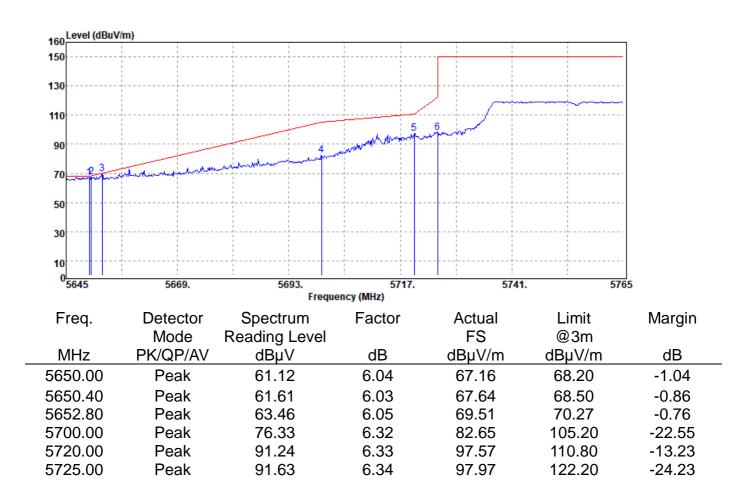
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Report No.: T190516W01-RP Page: 109 of 125



Project Number:T190516W01Operation Band:802.11n40/Band4Frequency:5755 MHzOperation Mode:BE CH LowEUT Pol.:E2 Plan

Test Date :2019-05-29 Temp./Humi. :21/55 Antenna Pol. :VERTICAL Engineer :Jerry



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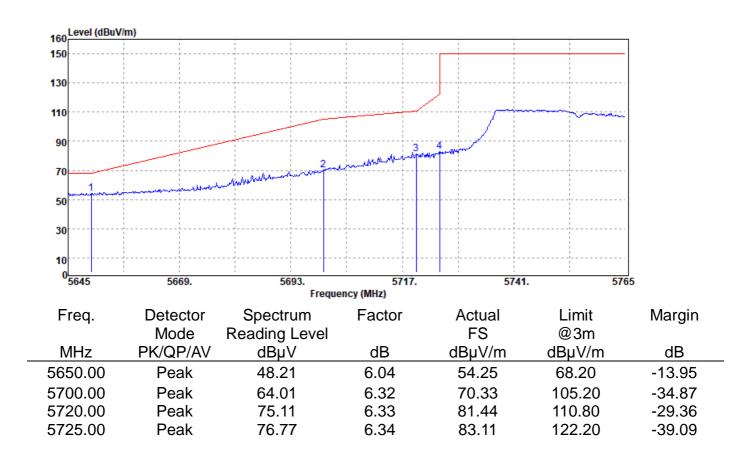
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Report No.: T190516W01-RP Page: 110 of 125



Project Number:T190516W01Operation Band:802.11n40/Band4Frequency:5755 MHzOperation Mode:BE CH LowEUT Pol.:E2 Plan

Test Date :2019-05-29 Temp./Humi. :21/55 Antenna Pol. :HORIZONTAL Engineer :Jerry



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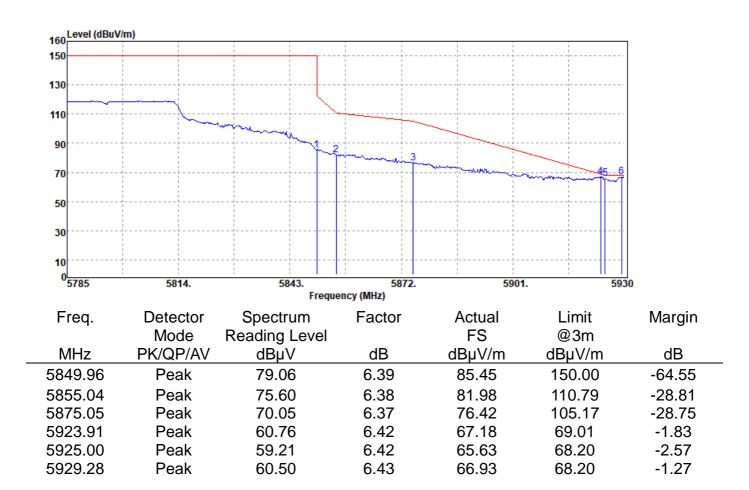
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Report No.: T190516W01-RP Page: 111 of 125



Project Number:T190516W01Operation Band:802.11n40/Band4Frequency:5795 MHzOperation Mode:BE CH HighEUT Pol.:E2 Plan

Test Date :2019-06-14 Temp./Humi. :21/55 Antenna Pol. :VERTICAL Engineer :Jerry



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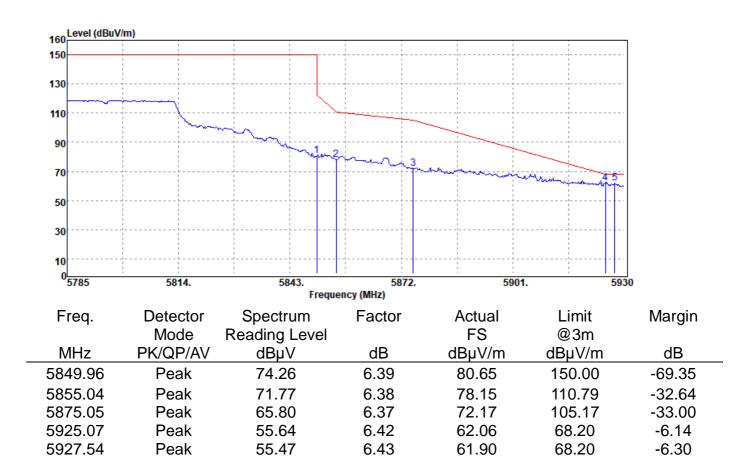
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Report No.: T190516W01-RP Page: 112 of 125



Project Number:T190516W01Operation Band:802.11n40/Band4Frequency:5795 MHzOperation Mode:BE CH HighEUT Pol.:E2 Plan

Test Date :2019-06-14 Temp./Humi. :21/55 Antenna Pol. :HORIZONTAL Engineer :Jerry



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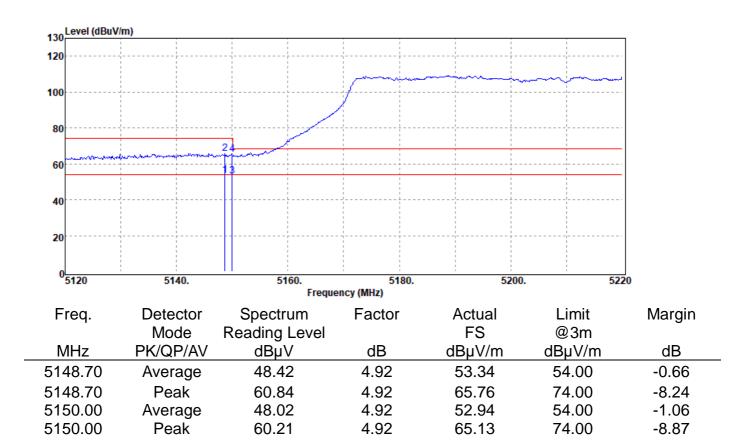
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Report No.: T190516W01-RP Page: 113 of 125



Project Number:T190516W01Operation Band:802.11ac80/Band1Frequency:5210 MHzOperation Mode:BE CH LowEUT Pol.:E2 Plan

Test Date :2019-05-22 Temp./Humi. :21/55 Antenna Pol. :VERTICAL Engineer :Jerry



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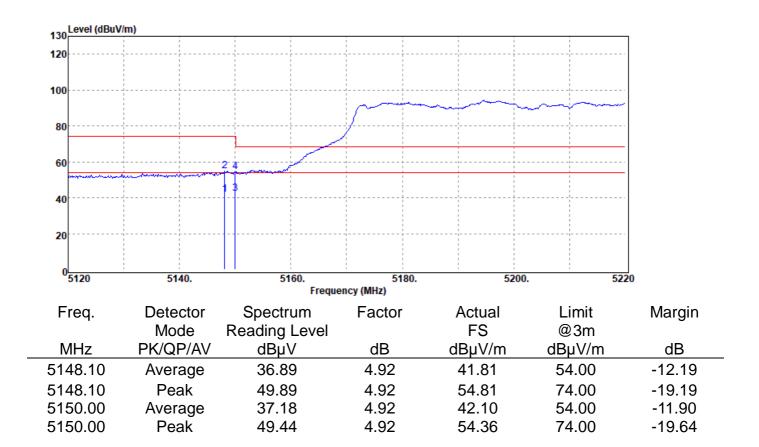
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Report No.: T190516W01-RP Page: 114 of 125



Project Number:T190516W01Operation Band:802.11ac80/Band1Frequency:5210 MHzOperation Mode:BE CH LowEUT Pol.:E2 Plan

Test Date :2019-05-22 Temp./Humi. :21/55 Antenna Pol. :HORIZONTAL Engineer :Jerry



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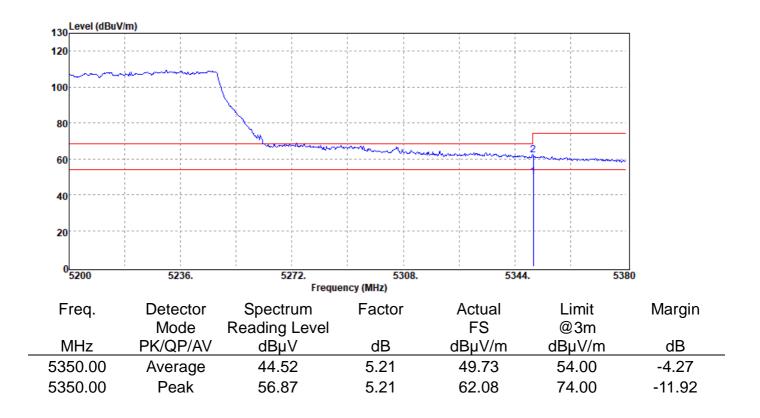
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Report No.: T190516W01-RP Page: 115 of 125



Project Number:T190516W01Operation Band:802.11ac80/Band1Frequency:5210 MHzOperation Mode:BE CH HighEUT Pol.:E2 Plan

Test Date :2019-05-22 Temp./Humi. :21/55 Antenna Pol. :VERTICAL Engineer :Jerry



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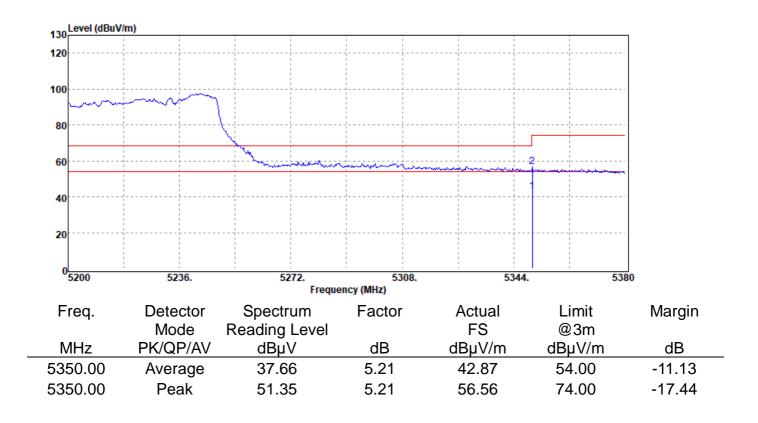
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Report No.: T190516W01-RP Page: 116 of 125



Project Number:T190516W01Operation Band:802.11ac80/Band1Frequency:5210 MHzOperation Mode:BE CH HighEUT Pol.:E2 Plan

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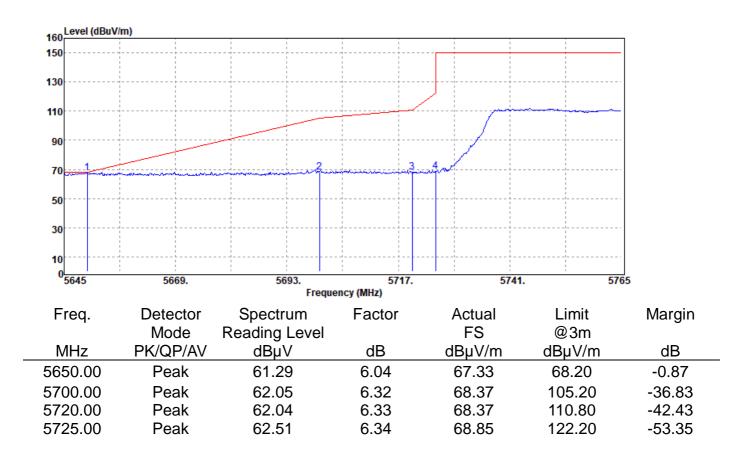
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Report No.: T190516W01-RP Page: 117 of 125



Project Number:T190516W01Operation Band:802.11ac80/Band4Frequency:5775 MHzOperation Mode:BE CH LowEUT Pol.:E2 Plan

Test Date :2019-05-29 Temp./Humi. :21/55 Antenna Pol. :VERTICAL Engineer :Jerry



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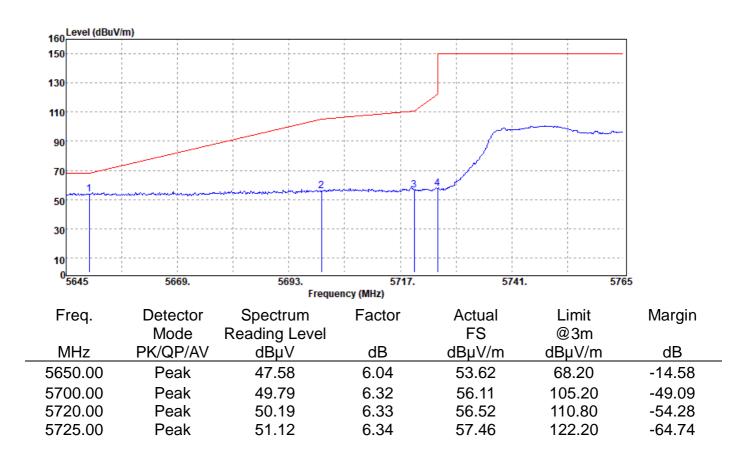
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Report No.: T190516W01-RP Page: 118 of 125



Project Number:T190516W01Operation Band:802.11ac80/Band4Frequency:5775 MHzOperation Mode:BE CH LowEUT Pol.:E2 Plan

Test Date :2019-05-29 Temp./Humi. :21/55 Antenna Pol. :HORIZONTAL Engineer :Jerry



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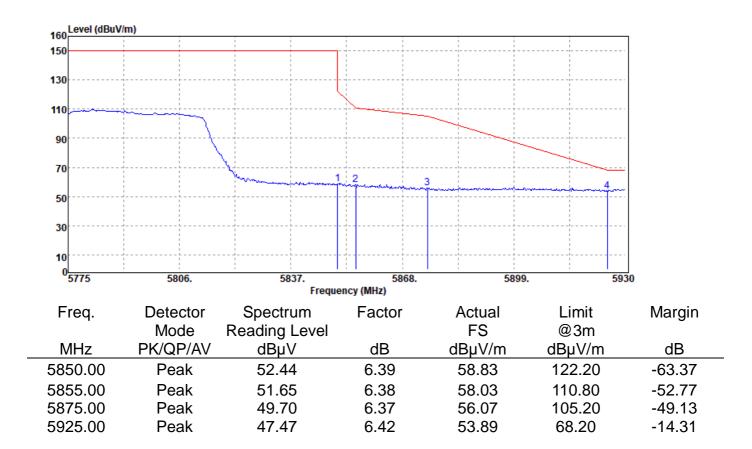
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Report No.: T190516W01-RP Page: 119 of 125



Project Number:T190516W01Operation Band:802.11ac80/Band4Frequency:5775 MHzOperation Mode:BE CH HighEUT Pol.:E2 Plan

Test Date :2019-05-29 Temp./Humi. :21/55 Antenna Pol. :VERTICAL Engineer :Jerry



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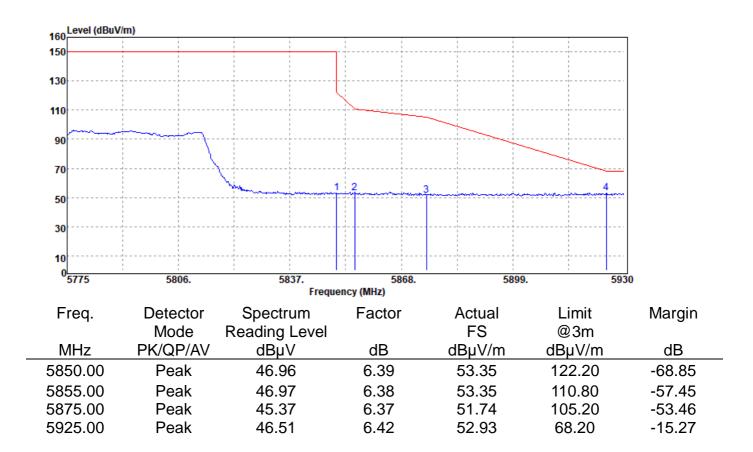
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Report No.: T190516W01-RP Page: 120 of 125



Project Number:T190516W01Operation Band:802.11ac80/Band4Frequency:5775 MHzOperation Mode:BE CH HighEUT Pol.:E2 Plan

Test Date :2019-05-29 Temp./Humi. :21/55 Antenna Pol. :HORIZONTAL Engineer :Jerry



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12 TRANSMISSION IN THE ABSENCE OF DATA

12.1 Standard Applicable

According to §15.407(c)

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

12.2Result

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

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13 FREQUENCY STABILITY

13.1 Standard Applicable

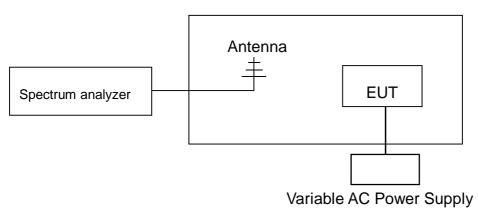
Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

13.2Measurement 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.

13.3Test SET-UP

Temperature Chamber



13.4Measurement Equipment Used:

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
DC Block	PASTER- NACK	PE8210	RF256	02/26/2019	02/25/2020
Spectrum Ana- lyzer	Agilent	N9010A	MY53400256	11/21/2018	11/20/2019
TEMPERA- TURE	TEMPERA- TURE	HTC-1	EC-HY-01	04/18/2019	04/17/2020
Attenuator	Marvelous	MVE2213-10	RF80	02/26/2019	02/25/2020

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13.5Measurement Result

Startup:

Operation Mode	802.11 a	Test Date	2019.06.19
Temperature	: 23.9°C	Test By	Hone
Humidity	: 58%		

Test Temp.(℃)	Test Voltage(V)	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
40	48	36	5180	5,179.99210	0.00000153
-40	48	36	5180	5,809.98950	-0.12161959
25	48	36	5180	5,179.98460	0.00000297
70	48	36	5180	5,179.99130	0.00000168
70	48	36	5180	5,179.98150	0.00000357

2 minutes:

Operation Mode	802.11 a	Test Date	2019.06.19
Temperature	: 23.9°C	Test By	Hone
Humidity	: 58%		

Test Temp.(°C)	Test Voltage(V)	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
-40	48	36	5180	5,179.98720	0.00000247
-40	48	36	5180	5,809.98920	-0.12161954
25	48	36	5180	5,179.99410	0.00000114
70	48	36	5180	5,179.98400	0.00000309
70	48	36	5180	5,179.98710	0.00000249

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5 minutes:

Operation Mode	802.11 a	Test Date	2019.06.19
Temperature	: 23.9°C	Test By	Hone
Humidity	: 58%		

Test Temp.(°C)	Test Voltage(V)	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
-40	48	36	5180	5,179.99620	0.0000073
-40	48	36	5180	5,809.98230	-0.12161820
25	48	36	5180	5,179.99070	0.00000180
70	48	36	5180	5,179.99710	0.00000056
70	48	36	5180	5,179.99830	0.0000033

10 minutes:

Operation Mode	802.11 a	Test Date	2019.06.19
Temperature	: 23.9 ℃	Test By	Hone
Humidity	: 58%		

Test Temp.(℃)	Test Voltage(V)	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
-40	48	36	5180	5,179.99720	0.00000054
	48	36	5180	5,809.99650	-0.12162095
25	48	36	5180	5,179.99570	0.0000083
70	48	36	5180	5,179.98140	0.00000359
70	48	36	5180	5,179.98270	0.00000334

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14 ANTENNA REQUIREMENT

14.1 **Standard Applicable**

According to §15.203, an intentional radiator shall be designed to ensure that no antenna other than furnished by the responsible party shall be used with the device. According to §15.407, If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

14.2 **Antenna Connected Construction**

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

~ End of Report ~

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