

# ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

Applicant:	ASUSTeK COMPUTER INC. 1F., No. 15, Lide Rd., Beitou Dist., Taipei City 112, Taiwan
Product Name:	ASUS Phone (Mobile Phone)
Brand Name:	ASUS
Model No.:	ASUS_I003D
Model Difference:	N/A
Report Number:	ER/2020/30079
FCC ID:	MSQI003D
IC:	3568A-1003D
FCC Rule Part:	§15.247, Cat: DTS
IC RSS:	RSS-247 issue 2 Feb 2017
Issue Date:	Aug. 17, 2020
Date of Test:	May 06, 2020 ~ Jun. 29, 2020
Date of EUT Received:	May 06, 2020

#### We hereby certify that:

The above equipment was tested by SGS Taiwan Ltd. Central RF Lab The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10:2013 and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits.

The test results of this report relate only to the tested sample identified in this report.

Jazz

Approved By:

SGS Taiwan Ltd.

Jazz Huang / Asst. Supervisor



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Revision History				
Report Number	Revision	Description	Issue Date	Remark
ER/2020/30079	Rev.00	Original.	Aug. 17, 2020	Revised By: Karen Huang

#### Note:

1 · Disclaimer

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

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<sup>(</sup>ボチカオ) 就切 「近根で結本(世界)利気(人体の資見)「同ず近後の世界が留りび、今本教育不整本公司 各世計引、不可能力検え。 This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <u>http://www.sgs.com.tw/Terms-and-Conditions</u> and for electronic format documents, subject to Terms and Conditions for Electronic Documents at <u>http://www.sgs.com.tw/Terms-and-Conditions</u>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.



## **GENERAL INFORMATION**

#### **1.1 Product description**

Product Name:	ASUS Phone (Mobile Phone)	
Brand Name:	ASUS	
Model No.:	ASUS_1003D	
Model Difference:	N/A	
Hardware Version:	R2.0B	
Software Version:	Android Q	
AJ dongle:	Model No.: F370002, Supplier: MEILU	
Fan Dongle:	Model No.: 1003, Supplier: ASUS	
USB Cable:	Model No.: LA9U2015-CS-R, Supplier: ASAP	
Power Supply:	3.85Vdc from Rechargeable Li-polymer Battery or 5V / 9V / 12V / 15V / 20V from AC/DC Adapter Battery: Model No.: C11P1903,	
	Battery:         Supplier: SCUD           Adapter:         Model No.: A299-200150U-US,           Supplier: AOHAI	

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Wi-Fi 802.11	Frequency Range	Channels	R	ated Power (dBm)	Modulation Technology
b				22.63	DSSS,
g	2412-2462	11		26.56	
n_HT20 ax_HE20			HE:	27.88 (MIMO)	OFDM, OFDMA
n_HT40 ax_HE40	2422-2452	7	HE:	26.75 (MIMO)	
Modulation type: 64QAM, 1			,	for DSSS K, BPSK for OFDM n 802.11ax only	
Transistion Rate       802.11 b: 1/2/5.5/11 Mbps         802.11 g: 6/9/12/18/24/36/48/54 Mbps         802.11 n_20MHz: 6.5 – 144.4Mbps         802.11 n_40MHz: 13.5 – 300.0Mbps         802.11 ax_HE20MHz: 8 –286.8 Mbps         802.11 ax_HE40MHz: 17.2 -573.5 Mbps					

#### **1.2 Antenna Designation**

Wi-Fi					
Antenna Type	Supplier	Antenna Part No.	Freq. (MHz)	Peak Antenna Gain (dBi)	Worst Antenna Gain
		Ant4		-1.0	V
PIFA	N/A	Ant5	2412~2462	-1.8	V
		Ant6		-2.0	

Note: Pre-scanned was done on the above 3 antennas, the peak gain -1.0dBi results higher emission. Therefore, the completed set of measurement was done on the antenna to be presented on this test report.

For MIMO mode, higher antenna gains are chosen to ensure higher directional gain is evaluated as below.

Transmission Chain	Antenna Part No.	Freq. (MHz)	Peak Antenna Gain (dBi)	Directional Gain (dBi)
Chain0	Ant4	2412~2462	-1.0	1.63
Chain1	Ant5	Z41Z~Z40Z	-1.8	1.03

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#### 1.3 Test Methodology of Applied Standards

FCC Part 15, Subpart C §15.247 FCC KDB 558074 D01 15.247 Meas Guidance v05r02 FCC KDB 662911 D01 Multiple Transmitter Output v02r01 RSS-247 issue 2 Feb. 2017 RSS-Gen. issue 5, Amendment 1, March 2019 ANSI C63.10:2013

#### **1.4 Test Facility**

SGS Taiwan Ltd. Central RF Lab (TAF code 3702) No.134, Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803

FCC Designation number: TW0027

ISED CAB identifier: TW3702

#### **1.5 Special Accessories**

There are no special accessories used while test was conducted.

#### **1.6 Equipment Modifications**

There was no modification incorporated into the EUT.

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## 2 SYSTEM TEST CONFIGURATION

#### 2.1 EUT Configuration

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

#### 2.2 EUT Exercise

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

#### 2.3 Test Procedure

#### 2.3.1 Conducted Emissions

The EUT is a placed on a table which is 0.8 m above ground plane. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz. The CISPR Quasi-Peak and Average detector mode is employed. The two LISNs provide 50uH/50 ohm of coupling impedance for the measuring instrument. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

#### 2.3.2 Conducted Test (RF)

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

#### 2.3.3 Radiated Emissions

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

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### 2.4 Measurement Results Explanation Example

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

Radiated emission below 30MHz is measured in a 9m\*9m\*6m semi-anechoic chamber, the measurements correspond to those obtained at an open-field test site. There is a comparison data of both open-field test site and semi-Anechoic chamber, and the result came out very similar.

#### 2.4.2 For all conducted test items:

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

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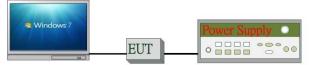


## 2.5 Configuration of Tested System

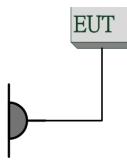
#### Fig. 2-1 Radiated Emission configuration



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



## Fig 2-3 Conduction (AC Power Line) Radiated Emission



#### **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	T440P	PB-02Y6RK	N/A	N/A
3.	DC Power Supply	Agilent	E3640A	MY40005907	N/A	N/A

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#### SUMMARY OF TEST RESULTS 3

FCC Rules	IC Rules	Description Of Test	Result
§15.207(a)	RSS-Gen §8.8	AC Power Line Conducted Emission	Compliant
§15.247(b) (3)	RSS-247 §5.4 d	Peak Output Power	Compliant
§15.247(a)(2)	RSS-247 §5.2 a RSS-Gen §6.7	6dB & 99% Emission Bandwidth	Compliant
§15.205 §15.209 §15.247(d)	RSS-247 §5.5 RSS-Gen §8.10	Conducted Band Edge and Spurious Emission	Compliant
§15.205 §15.209 §15.247(d)	RSS-247 §5.5 RSS-Gen §8.9 RSS-Gen §8.10 RSS-Gen §6.13	Radiated Band Edge and Spurious Emission	Compliant
§15.247(e)	RSS-247 §5.2 b	Power Spectral Density	Compliant
§15.203 §15.247(b)	RSS- Gen §6.8	Antenna Requirement	Compliant

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#### DESCRIPTION OF TEST MODES 4

#### 4.1 Operated in 2400 ~ 2483.5MHz Band

11 channels are provided for 802.11b/g/n/ax 20M.

CHANNEL	FREQUENCY (MHz)
1	2412
2	2417
3	2422
4	2427
5	2432
6	2437
7	2442
8	2447
9	2452
10	2457
11	2462

9 channels are provided for 802.11n/ax 40M

CHANNEL	FREQUENCY (MHz)
3	2422
4	2427
5	2432
6	2437
7	2442
8	2447
9	2452

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### 4.2 The Worst Test Modes and Channel Details

- 1. Test program used to control the EUT for staying in continuous transmitting and receiving mode is programmed.
- 2. WiFi signals can be transmitted from 4 antennas with 4 different modes, only one mode is available at any given time.
  - 1. Observations have been done for each mode and found that the *Gaming Mode* generates higher output power and emissions.
  - 2. The *Gaming Mode* is determined as the worst case scenario and the test results being demonstrated in this test report are based on the *Gaming Mode*.
  - 3. Spot check has been done on radiated spurious emissions of Calling, Normal and Camera Mode and demonstrated in section **11.7.4** to **11.7.6** in this test report.
  - 4. Please refer to Antenna Location section of this report for antenna details.

Mode	Antenna
Calling Mode	Chain0 is adapted in Ant4
	Chain1 is adapted in Ant6
Comore Made	Chain0 is adapted in Ant6
Camera Mode	Chain1 is adapted in Ant5
	Portrait:
	Chain0 is adapted in Ant4
Normal Mada	Chain1 is adapted in Ant6
Normal Mode	Landscape:
	Chain0 is adapted in Ant4
	Chain1 is adapted in Ant5
Coming Mode	Chain0 is adapted in Ant4
Gaming Mode	Chain1 is adapted in Ant5

Investigation has been done on all the possible configurations for searching the worst case.
 The gevin UE is pre-scanned among below modes.

Modulation	Transmission Chain	Single Transmission Spatial	Multiple Transmission Spatial
🛛 802.11 b	🖾 Ch0 🖾 Ch1 🗆 Ch2 🗆 Ch3	⊠ 1TX	⊠ 2TX
🛛 802.11 g	🖾 Ch0 🖂 Ch1 🗆 Ch2 🗆 Ch3	🛛 1TX	⊠ 2TX
🛛 802.11 n	🖾 Ch0 🖾 Ch1 🗆 Ch2 🗆 Ch3	⊠ SISO	🛛 MIMO
⊠ 802.11 ax	🛛 Ch0 🖾 Ch1 🗆 Ch2 🗆 Ch3	⊠ SISO	⊠ MIMO

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4. Observations have been done for 802.11 ax available RU configurations below and found that the lowest, heighest and Full RU results higher emissions.

Only	v one	RU	can	be	enabled	at	anv	aiven	time.
			van		<b>Uluniu</b>	CAL	arry	given	cirio.

802.11ax		20MHz		802.11ax			40MHz		
RU type	26	b-tone RU	5	2-tone RU	RU type	26-	tone RU	Į	52-tone RU
	RU0	[-121: -96]	RU37	[-121: -70]		RU0	[-243: -218]	RU37	[-243: -192]
	RU1	[-95: -70]	RU38	[-68: -17]		RU1	[-217: -192]	RU38	[-189: -138]
	RU2	[-68: -43]	RU39	[17: 68]		RU2	[-189: -164]	RU39	[-109: -58]
	RU3	[-42: -17]	RU40	[70: 121]		RU3	[-163: -138]	RU40	[-55: -4]
	RU4	[-16: -4, 4: 16]	RU41	N/A		RU4	[-136: -111]	RU41	[4: 55]
	RU5	[17: 42]	RU42	N/A		RU5	[-109: -84]	RU42	[58: 109]
	RU6	[43: 68]	RU43	N/A		RU6	[-83: -58]	RU43	[138: 189]
	RU7	[70: 95]	RU44	N/A		RU7	[-55: -30]	RU44	[192: 243]
	RU8	[96: 121]	RU45	N/A		RU8	[-29: -4]	RU45	N/A
	RU9	N/A	RU46	N/A		RU9	[4: 29]	RU46	N/A
	RU10	N/A	RU47	N/A		RU10	[30: 55]	RU47	N/A
	RU11	N/A	RU48	N/A		RU11	[58: 83]	RU48	N/A
	RU12	N/A	RU49	N/A		RU12	[84: 109]	RU49	N/A
	RU13	N/A	RU50	N/A		RU13	[111: 136]	RU50	N/A
	RU14	N/A	RU51	N/A		RU14	[138: 163]	RU51	N/A
	RU15	N/A	RU52	N/A		RU15	[164: 189]	RU52	N/A
	RU16	N/A				RU16	[192: 217]		
RU index	RU17	N/A	1(	06-tone RU	RU index	RU17	[218: 243]	1	06-tone RU
and subcarrier	RU18	N/A	RU53	[-122: -17]	and subcarrier	RU18	N/A	RU53	[-243: -138]
range	RU19	N/A	RU54	[17: 122]	range	RU19	N/A	RU54	[-109: -4]
	RU20	N/A	RU55	N/A		RU20	N/A	RU55	[4: 109]
	RU21	N/A	RU56	N/A		RU21	N/A	RU56	[138: 243]
	RU22	N/A	RU57	N/A		RU22	N/A	RU57	N/A
	RU23	N/A	RU58	N/A		RU23	N/A	RU58	N/A
	RU24	N/A	RU59	N/A		RU24	N/A	RU59	N/A
	RU25	N/A	RU60	N/A		RU25	N/A	RU60	N/A
	RU26	N/A				RU26	N/A		
	RU27	N/A	24	12-tone RU		RU27	N/A	2	42-tone RU
	RU28	N/A	RU61	[-122: -2, 2:122]		RU28	N/A	RU61	[-244: -3]
	RU29	N/A	RU62	N/A		RU29	N/A	RU62	[3: 244]
	RU30	N/A	RU63	N/A		RU30	N/A	RU63	N/A
	RU31	N/A	RU64	N/A		RU31	N/A	RU64	N/A
	RU32	N/A				RU32	N/A		
	RU33	N/A				RU33	N/A	4	84-tone RU
	RU34	N/A				RU34	N/A	RU65	[-244: -3, 3: 244]
	RU35	N/A				RU35	N/A	RU66	N/A
	RU36	N/A				RU36	N/A		

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5. 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.

#### 4.3 Radiated Emission Test:

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
	RADIAT	ED EMISSIO	N TEST (BELOV	V 1 GHz)	
802.11g	1 to 11	6	OFDM	6	2TX
802.11n 40M	3 to 9	6	OFDM	MCS8	MIMO
	RADIAT	ED EMISSIC	ON TEST (ABOVE	E 1 GHz)	
802.11b	1 to 11	1, 6, 11	DSSS	1	2TX
802.11g	1 to 11	1, 6, 11	OFDM	6	2TX
802.11n	1 to 11	1, 6, 11	OFDM	MCS 8	MIMO
802.11n	3 to 9	3, 6, 9	OFDM	MCS 8	MIMO

RADIATED EMISSION TEST (ABOVE 1 GHz)									
AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	RU CONFIGURA- TION	DATA RATE (Mbps)	ANTENNA PORT				
1 to 11	1, 6, 11	OFDMA	FULL RU 26/0 52/37 106/53	MCS0	ΜΙΜΟ				
3 to 9	3, 6, 9		FULL RU 242/61	MCS0	MIMO				
	CHANNEL 1 to 11	CHANNEL         CHANNEL           1 to 11         1, 6, 11	CHANNEL     CHANNEL     MODULATION       1 to 11     1, 6, 11     OFDMA	AVAILABLE CHANNELTESTED CHANNELMODULATIONCONFIGURA- TION1 to 111, 6, 11FULL RU 26/026/0 52/37 106/533 to 93, 6, 9FULL RU	AVAILABLE CHANNEL     TESTED CHANNEL     MODULATION     CONFIGURA- TION     DATA RATE (Mbps)       1 to 11     1, 6, 11     FULL RU     26/0     MCS0       3 to 9     3, 6, 9     FULL RU     MCS0				

**Note:** Observation has been done on all RU configurations, the Full RU configuration yields higher emssions and average output power, and hence the radiated emission results are demonstrated in full RU configuration in this report.

RADIATED EMISSION SPOT CHECK (ABOVE 1 GHz)										
Calling Mode, Camera Mode, Normal Mode										
MODE	AVAILABLE	TESTED	TESTED	MODU-	DATA RATE	ANTENNA				
MODE	MODE CHANNEL CHANNEL CHANNEL LATION (Mbps) PORT									
802.11b	1 to 11	1, 6, 11	1	DSSS	1	2TX				

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	RADIATED EMISSION SPOT CHECK (ABOVE 1 GHz)										
		Calling Mod	e, Camera I	Node, Norma	I Mode						
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	TESTED CHANNEL	MODULA- TION	RU CONFIGU- RATION	DATA RATE (Mbps)	AN- TENNA PORT				
802.11ax_ HE20	1 to 11	1, 6, 11	11	OFDMA	FULL RU	MCS0	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 802.11b/g/n/ax WLAN Transmitter for channel Low, Mid and High, the worst case E2 position was reported.

#### 4.4 Antenna Port Conducted Mesurement:

CONDUCTED TEST								
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT			
802.11b	1 to 11	1, 6, 11	DSSS	1	2TX			
802.11g	1 to 11	1, 6, 11	OFDM	6	2TX			
802.11n 20M	1 to 11	1, 6, 11	OFDM	MCS 8	MIMO			
802.11n 40M	3 to 9	3, 6, 9	OFDM	MCS 8	MIMO			

CONDUCTED TEST								
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODU- LATION	RU CONFIGURATION	DATA RATE (Mbps)	ANTENNA PORT		
802.11ax 20M	1 to 11	1, 6, 11	OFDMA	full 26/8 52/40 106/54	MCS 0	MIMO		
802.11ax 40M	3 to 9	3, 6, 9	A	full 242/61	MCS 0	ΜΙΜΟ		

**Note:** Observation has been done on all RU configurations, the Full RU configuration yields higher emssions and average output power, hence the conducted emssion results are demonstrated in full RU configuration in this report.

#### Note: EUT serial number is L4AIGF000585XCH.

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## 5 MEASUREMENT UNCERTAINTY

Test Items	Uncertainty		
AC Power Line Conducted Emission	+/- 2.586 dB		
Peak Output Power	+/- 0.84 dB		
6dB Bandwidth	+/- 51.33 Hz		
100 KHz Bandwidth Of Frequency Band Edges	+/- 0.84 dB		
Peak Power Density	+/- 1.3 dB		
Temperature	+/- 0.65 °C		
Humidity	+/- 4.6 %		
DC / AC Power Source	DC= +/- 0.13%, AC= +/- 0.2%		

Radiated Spurious Emission Measurement Uncertainty						
	9kHz~30MHz: +-2.3dB					
	30MHz - 180MHz: +/- 3.37dB					
	180MHz -417MHz: +/- 3.19dB					
Polarization: Vertical	0.417GHz-1GHz: +/- 3.19dB					
	1GHz - 18GHz: +/- 4.04dB					
	18GHz - 40GHz: +/- 4.04dB					
	9kHz~30MHz: +-2.3dB					
	30MHz - 167MHz: +/- 4.22dB					
Delevizeti e uz Henizentel	167MHz -500MHz: +/- 3.44dB					
Polarization: Horizontal	0.5GHz-1GHz: +/- 3.39dB					
	1GHz - 18GHz: +/- 4.08dB					
	18GHz - 40GHz: +/- 4.08dB					

#### Note:

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

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## **6 CONDUCTED EMISSION TEST**

#### 6.1 Standard Applicable

Frequency range within 150kHz to 30MHz 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 th	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

Conducted Emission Test Site									
EQUIPMENT	EQUIPMENT MFR MODEL SERIAL								
TYPE		NUMBER	NUMBER	CAL.					
EMI Test Receiver	R&S	ESCI 7	100759	07/04/2019	07/03/2020				
LISN	SCHWARZBECK	NSLK 8127	8127-465	04/09/2020	04/08/2021				
Coaxial Cables	N/A	Coaxial Cable	161207	12/07/2019	12/06/2020				
Test Software	audix	e3	Ver. 6.11- 20180413	N.C.R	N.C.R				

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

#### 6.3 EUT Setup

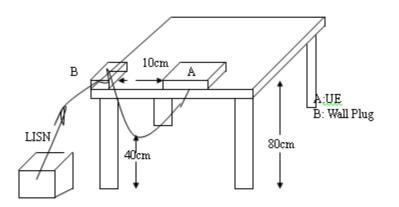
- 1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI 63.10:2013.
- 2. The AC/DC Power adaptor of EUT was plug-in LISN. The EUT was placed flushed with the rear of the table.
- 3. The LISN was connected with 120Vac/60Hz power source.

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## 6.4 Test SET-UP (Block Diagram of Configuration)



#### 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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9.40

13.55

## AC POWER LINE CONDUCTED EMISSION TEST DATA

Report Number	:ER-2020-30	079		Test Site	:Conduction 6F	
Test Mode	:WLAN 2.4G			Test Date	:2020-06-19	
Power	:AC 120V/60	Hz		Temp./Humi.	:25.6/62	
Probe	:L			Engineer	:Neo	
Note	:					
80 Level (dBuV)						
70						
60						
50				5		
401	2		- <u>-</u>	MW 316		
30 Miller Inthe States	ы. <u>А</u>	an the for the former and the second	5 Who was well wether	Unit have		
, hull i an	MANNY MUMALLANINAN	M. M. Mariner			AND I WE	
20						
10						
0.15 0.2	0.5	1 2	5	10 20	30	
		Frequency (M	Hz)			
Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
	Mode	Reading Level		FS		
MHz	PK/QP/AV	dBµV	dB	dBµV	dBµV	dB
0.23	Peak	36.03	2.14	38.17	62.52	-24.35
0.47	Peak	35.65	2.16	37.81	56.49	-18.68
1.94	Peak	33.26	2.26	35.52	56.00	-20.48
3.07	Peak	33.30	2.38	35.68	56.00	-20.32

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42.14

35.59

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Peak

Peak

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2.80

2.94

44.94

38.53

-15.06

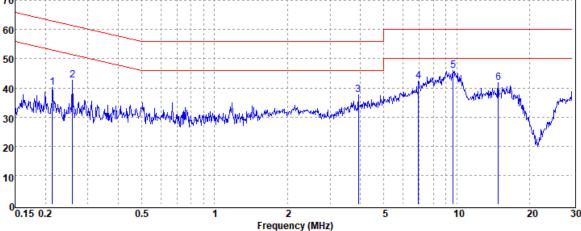
-21.47

60.00

60.00



Report Number	:ER-2020-30079	Test Site	:Conduction 6F
Test Mode	:WLAN 2.4G	Test Date	:2020-06-19
Power	:AC 120V/60Hz	Temp./Humi.	:25.6/62
Probe	:N	Engineer	:Neo
Note	:		
80 Level (dBuV)			
00			
70			



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV	dBµV	dB
0.21	Peak	37.93	2.21	40.14	63.05	-22.91
0.26	Peak	40.35	2.21	42.56	61.47	-18.91
3.92	Peak	35.14	2.40	37.54	56.00	-18.46
6.95	Peak	39.77	2.58	42.35	60.00	-17.65
9.65	Peak	43.14	2.69	45.83	60.00	-14.17
14.83	Peak	39.03	2.91	41.94	60.00	-18.06

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## 7 DUTY CYCLE OF TEST SIGNAL

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

#### 7.1 Measurement Procedure:

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

#### 7.2 Duty Cycle:

	Duty Cycle (%) = Ton / (Ton+Toff)	Duty Factor (dB) =10*log ( 1/Duty Cycle )	1/T (kHz)	VBW setting (kHz)
802.11b	97.65	0.10	1.51	2.00
802.11g	99.15	0.04	0.51	0.01
802.11n_20	99.71	0.01	0.18	0.01
802.11n_40	99.71	0.01	0.18	0.01
802.11ax_20	99.71	0.01	0.18	0.01
802.11ax_40	99.71	0.01	0.18	0.01

#### 7.3 Duty Cycle test plots

Please refer to next page.

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#### Duty Cycle\_802.11b\_20MHz\_Chain0\_2412MHz

		er - Swept SA							
Center F	RF reg 2.4	50 Q AC	GHz		NSE:INT		ALIGNAUTO e: Log-Pwr	08:12:52 PM May 18, 2020 TRACE 1 2 3 4 5 0 TYPE	Frequency
10 dB/div		fset 11 dB 0.00 dBm	PNO: Fast IFGain:Low	#Atten: 3				oer P NNNN Mkr3 680.0 µs -0.68 dB	Auto Tune
20.0 X2 10.0	34								Center Free 2.412000000 GH:
20.0									Start Free 2.412000000 GH
40.0 50.0 60.0									Stop Free 2.412000000 GH:
Center 2. Res BW 8	8 MHz	000 GHz	#VE	3W 8.0 MH2		NCTION FU		Span 0 Hz 0.00 ms (5001 pts) SUNCHION VIZUO	
1 Δ2 1 2 F 1 3 Δ4 1 4 F 1 6 7 8 9 10	t (Δ t (Δ	3	664.0 µs (/ 632.0 µs 690.0 µs (/ 632.0 µs	20.04 d	dB Bm dB				Freq Offse 0 H
sa							STATUS		

#### Duty Cycle\_802.11g\_20MHz\_Chain0\_2412MHz

enter Freq 2.412000000	GHz	SENSE:INT	ALIGN AUTO Avg Type: Log-Pwr	08:14:00 PM May 18, 2020 TRACE 1 2 3 4 5 6 TYPE	Frequency
Ref Offset 11 dB	PNO: Fast +++ IFGain:Low	#Atten: 30 dB	Δ	Mkr3 1.993 ms 1.32 dB	Auto Tun
	304				Center Fre 2.412000000 GH
0.0					Start Fre 2.412000000 GF
0.0		-		·	Stop Fro 2.412000000 Gi
enter 2.412000000 GHz es BW 8 MHz	#VBW	8.0 MHz	Sweep 10.	Span 0 Hz 00 ms (10001 pts)	CF Ste 8.000000 Mi Auto Mi
1 $\Delta 2$ 1 t ( $\Delta$ ) 2 F 1 t 3 $\Delta 4$ 1 t ( $\Delta$ ) 4 F 1 t 5 6 7	1.976 ms (Δ) 638.0 μs 1.993 ms (Δ) 638.0 μs	1.42 dB 15.16 dBm 1.32 dB 15.16 dBm			Freq Offso 0 H
8 9 0 1			STATUS		

#### ALIGNAUTO Avg Type: Log-Pwr Frequency Auto Tur ΔMkr3 5.444 ms -10.92 dE Ref Offset 11 dB Ref 30.00 dBn Center Free 2.412000000 GH Start Fre 2.412000000 GH Stop Free 2 4120000 enter 2.412000 es BW 8 ML Span 0 Hz Sweep 10.00 ms (10001 pts) CF Step 8.000000 MH #VBW 8.0 MH2 -2.17 dE 16.19 dBm -10.92 dB 16.19 dP Δ2 F Δ4 F t (Δ) Freq Offse 0 H

#### Duty Cycle\_802.11n\_20MHz\_Chain0\_2412MHz

#### Duty Cycle\_802.11n\_40MHz\_Chain0\_2422MHz

Center F		50 R AC 2000000 GH	0: Fast +++	SENSE:INT	Avg Type: Log-Pwr	08:16:48 PM May 18, 2020 TRACE 1 2 3 4 5 6 TYPE VIEW NNNN DET P NNNNN	Frequency
10 dB/div	Ref Offs Ref 30.		ain:Low	#Atten: 30 dB	4	∆Mkr3 5.444 ms 0.29 dB	Auto Tun
20.0 10.0		Xa	all geotopol Assemble all g			∧1∆2 3∆4	Center Fre 2.422000000 GH
10.0 20.0 30.0							Start Fre 2.422000000 Gi
40.0 50.0 60.0							Stop Fre 2.42200000 Gi
Center 2. Res BW 8		00 GHz	#VBW	8.0 MHz	Sweep 10	Span 0 Hz 0.00 ms (10001 pts)	CF Ste 8.000000 Mi Auto M
1 Δ2 1 2 F 1 3 Δ4 1 4 F 1 5 6 7	t (Δ) t t (Δ) t	2.68	8 ms (Δ) 9 ms 14 ms (Δ) 9 ms	8.17 dB 6,86 dBm 0.29 dB 6,86 dBm			Freq Offs 01
8 9 10							

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#### Duty Cycle\_802.11ax\_20MHz\_Chain0\_2412MHz

	rum Analyzer - S	wept SA							
RL Center F	reg 2.412		CH2	SENSE		ALIGN AUT		May 18, 2020	Frequency
Jointon P	Ref Offset		PNO: Fast IFGain:Low	. Trig:FreeR #Atten:30 d	un	.,,	ΔMkr3 5.4	PNNNNN 61 ms	Auto Tune
0 dB/div .0g 20.0 altro 10.0	Ref 30.00	) dBm			34	4	-1	.09 dB	Center Free 2.412000000 GH:
0.00									Start Free 2.412000000 GH
40.0									Stop Free 2.412000000 GH
es BW 8			#VBW	/ 8.0 MHz			10.00 ms (10		CF Ste 8.000000 MH Auto Ma
1 △2 1 2 F 1 3 △4 7 4 F 6 6 7 8 9	t (Δ) t (Δ) t (Δ)	X	5.445 ms (Δ) 651.0 μs 5.461 ms (Δ) 651.0 μs	2.17 dE 16.39 dBm -1.09 dE 16.39 dBm	3	FUNCTION W/O	TH FUNCTION	WAUE ^	Freq Offse 0 H
1				1		STA	TUS	×	

#### Duty Cycle\_802.11ax\_40MHz\_Chain0\_2422MHz

lgilent Spectrum Analyzer - Swept S					
RL RF 50 Q A		SENSE:INT	ALIGNAUTO Avg Type: Log-Pwr	08:18:32 PM May 18, 2020 TRACE 1 2 3 4 5 6	Frequency
Ref Offset 11 dB	PNO: Fast +++ IFGain:Low	Trig: Free Run #Atten: 30 dB	Δ	Mkr3 5.461 ms -0.02 dB	Auto Tune
20.0 10.0 0.00					Center Fred 2.422000000 GH:
20.0					Start Fre 2.422000000 GH
40.0 50.0 50.0					Stop Fre 2.422000000 GH
enter 2.422000000 GHz es BW 8 MHz	#VBW	8.0 MHz		Span 0 Hz .00 ms (10001 pts)	CF Ste 8.000000 MH Auto Ma
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	× 5,445 ms (Δ) 2,009 ms 5,461 ms (Δ) 2,009 ms	6.24 dB 6.16 dBm -0.02 dB 6.16 dBm	FUNCTION WOTH		Freq Offse 0 H
2			STATUS	6	

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## 8 PEAK OUTPUT POWER MEASUREMENT

## 8.1 Standard Applicable

For systems using digital modulation in the 2400-2483.5 MHz bands, the limit for peak output power is 1Watt.

If the transmitting antenna of directional gain greater than 6dBi are used the peak output power form the intentional radiator shall be reduced below the above stated value by the amount in dB that the directional gain of the Antenna exceeds 6dBi.

In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of Antenna exceeds 6dBi.

## 8.2 As per section F. 2). e). (ii) of FCC KDB 662911 D01

If antenna gains are not equal and each transmit antenna is driven by only one spatial stream, directional gain may be calculated by either of the following formulas.

• DirectionalGain = 
$$10 \cdot \log \left( \frac{\sum_{j=1}^{N_{SS}} \left\{ \sum_{k=1}^{N_{ANT}} g_{j,k} \right\}^2}{N_{ANT}} \right)$$

#### where

Each antenna is driven by no more than one spatial stream;

NSS = the number of independent spatial streams of data;

NANT = the total number of antennas

 $g_{j,k}$  = / 20 10Gk if the kth antenna is being fed by spatial stream j, or zero if it is not;

 $G_k$  is the gain in dBi of the kth antenna.

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

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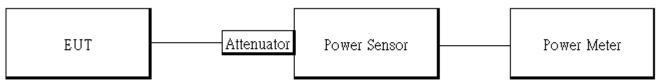


#### 8.3 Measurement Equipment Used

Conducted Emission Test Site									
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.				
Power Meter	Anritsu	ML2496A	1804001	02/20/2020	02/19/2021				
Power Sensor	Anritsu	MA2411B	1726104	02/20/2020	02/19/2021				
Power Sensor	Anritsu	MA2411B	1726107	02/20/2020	02/19/2021				
DC Power Supply	Agilent	E3640A	MY40005907	10/22/2019	10/21/2020				
Attenuator	Mini-Circuit	BW-S10W2+	2	01/02/2020	01/01/2021				

#### 8.4 Test Set-up

Power Meter:



#### 8.5 Measurement Procedure

- 1. Place the EUT on the table and set it in transmitting mode.
- 2. The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance .
- 3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power meter.

#### **Power Meter:**

It is used as the auxiliary test equipment to conduct the output power measurement.

4. Record the max. Reading as observed from Spectrum or Power Meter.

# \* Note: The duty cycle factor is compensated to obtain the maximum value of measurement in average.

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#### 8.6 Measurement Result

802.1	1b Ch0				
СН	Freq. (MHz)	Data Rate	Peak Output Power (dBm)	Limit (dBm)	RESULT
1	2412	1	22.55	30.00	PASS
6	2437	1	22.37	30.00	PASS
11	2462	1	22.52	30.00	PASS
802.1	1b Ch0				
СН	Freq. (MHz)	Data Rate	Max. Avg. Output include tune up tolerance Power	Limit (dBm)	RESULT
1	2412	1	19.85	30.00	PASS
6	2437	1	19.63	30.00	PASS
11	2462	1	19.80	30.00	PASS
802.1	1b Ch1				
СН	Freq. (MHz)	Data Rate	Peak Output Power (dBm)	Limit (dBm)	RESULT
1	2412	1	22.05	30.00	PASS
6	2437	1	22.01	30.00	PASS
11	2462	1	22.23	30.00	PASS
802.1	1b Ch1			•	
СН	Freq. (MHz)	Data Rate	Max. Avg. Output include tune up tolerance Power	Limit (dBm)	RESULT
1	2412	1	19.59	30.00	PASS
6	2437	1	19.69	30.00	PASS
11	2462	1	19.65	30.00	PASS

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802.1	1b_2TX						
СН	Freq. (MHz)	Data Rate	Peak Output Power		Total Peak Output Power	Limit (dBm)	RESULT
	. ,	Ruto	CH 0	CH 1	(dBm)	(abiii)	
1	2412	1	20.04	19.15	22.63	30.00	PASS
6	2437	1	19.94	18.72	22.38	30.00	PASS
11	2462	1	19.98	18.68	22.39	30.00	PASS
802.1	1b_2TX						
	Freq.	Data	Avg. Output		Max. Avg. Output	Limit	
СН	(MHz)		Power		include tune up	(dBm)	RESULT
	(101112)	Rate	CH 0	CH 1	tolerance Power	(ubiii)	
1	2412	1	17.15	16.36	19.89	30.00	PASS
6	2437	1	17.10	16.22	19.80	30.00	PASS
11	2462	1	17.19	16.14	19.81	30.00	PASS

802.1	1g Ch0				
СН	Freq. (MHz)	Data Rate	Peak Output Power (dBm)	Limit (dBm)	RESULT
1	2412	6	24.01	30.00	PASS
6	2437	6	24.77	30.00	PASS
11	2462	6	23.95	30.00	PASS
802.1	1g Ch0			•	
СН	Freq. (MHz)	Data Rate	Max. Avg. Output include tune up tolerance Power (dBm)	Limit (dBm)	RESULT
1	2412	6	17.92	30.00	PASS
6	2437	6	19.52	30.00	PASS
11	2462	6	17.51	30.00	PASS

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	802.1	lg Ch1									
	СН	Freq. (MHz)	Data Rate		P	Output ower IBm)		₋imit dBm)	RES	ULT	
	1	2412	6		24.02		30.00		PA	SS	
	6	2437	6		2	4.11	3	30.00	PA	SS	
	11	2462	6		2	3.83	3	30.00	PA	SS	
	802.1	lg Ch1									
	СН	Freq. (MHz)	Data Rate		includ tolerar	/g. Output e tune up nce Power		₋imit dBm)	RES	ULT	
	1	2412	6		(dBm) 17.59			30.00	DA	SS	
	6		6								
	0 11	2437 2462	6		19.51 17.32		30.00 30.00		PASS PASS		
		2102			•	1.02					
02.1	1g_2T	Х									
СН	Frec (MHz		Data Rate		Output ower CH 1	Total Pea Output Po (dBm)		Limi (dBm		RESI	JLT
1	2412	2	6 23.76 23.26 26.53			30.00	)	PAS	SS		
6	243	7	6	23.66	23.17	26.43		30.00	)	PAS	SS
11	2462	2	6	23.85	23.23	26.56		30.00	C	PAS	SS
)2.1	1g_2T	X			•	•		•			

			Avg. C	Dutput	Max. Avg. Output		
СН	Freq.	Data	Po	wer	include tune up	Limit	RESULT
	(MHz)	Rate	(dE	3m)	tolerance Power	(dBm)	RESULI
			CH 0	CH 1	(dBm)		
1	2412	6	17.05	16.26	19.72	30.00	PASS
6	2437	6	17.07	16.06	19.64	30.00	PASS
11	2462	6	17.22	16.18	19.78	30.00	PASS

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802.1	1n_HT20N	I Ch0			
СН	Freq. (MHz)	Data Rate	Peak Output Power (dBm)	Limit (dBm)	RESULT
1	2412	MCS0	24.15	30.00	PASS
6	2437	MCS0	24.81	30.00	PASS
11	2462	MCS0	23.60	30.00	PASS
802.1	1n_HT20N	I Ch0	· · · · ·		
СН	Freq. (MHz)	Data Rate	Max. Avg. Output include tune up tolerance Power (dBm)	Limit (dBm)	RESULT
1	2412	MCS0	17.72	30.00	PASS
6	2437	MCS0	19.51	30.00	PASS
11	2462	MCS0	16.46	30.00	PASS
802.1	1n_HT201 Freq. (MHz)	Data Rate	Peak Output Power (dBm)	Limit (dBm)	RESULT
1	2412	MCS0	24.11	30.00	PASS
6	2437	MCS0	24.18	30.00	PASS
11	2462	MCS0	23.21	30.00	PASS
802.1	1n_HT20	V Ch1			
СН	Freq. (MHz)	Data Rate	Max. Avg. Output include tune up tolerance Power (dBm)	Limit (dBm)	RESULT
1	2412	MCS0	17.48	30.00	PASS
6	2437	MCS0	19.50	30.00	PASS
11	2462	MCS0	16.16	30.00	PASS

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802.1	802.11n_HT20M MIMO										
СН	Freq. (MHz)	Data Rate	Peak Output Power CH 0 CH 1		Total Peak Output Power (dBm)	Limit (dBm)	RESULT				
1	2412	MCS8	24.05	24.00	27.04	30.00	PASS				
6	2437	MCS8	24.01	22.89	26.50	30.00	PASS				
11	2462	MCS8	23.85	23.21	26.55	30.00	PASS				
802.1	1n_HT20	M MIMO									
СН	Freq. (MHz)	Data Rate	Avg. Output Power (dBm) CH 0 CH 1		Max. Avg. Output include tune up tolerance Power (dBm)	Limit (dBm)	RESULT				
1	2412	MCS8	17.21	16.42	19.86	30.00	PASS				
6	2437	MCS8	17.07	16.09	19.63	30.00	PASS				
11	2462	MCS8	17.27	16.10	19.75	30.00	PASS				

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802.1	1ax_HE20	OM Ch0				
СН	Freq. (MHz)	Data Rate	RU Config	Peak Output Power (dBm)	Limit (dBm)	RESULT
			full	24.21	30.00	PASS
1	2412	MCS0	26/0	24.84	30.00	PASS
I	2412	101000	52/37	24.86	30.00	PASS
			106/53	24.93	30.00	PASS
6	2437	MCS0	full	25.06	30.00	PASS
			full	22.58	30.00	PASS
11	2462	2462 MCS0	26/8	24.82	30.00	PASS
11	2402		52/40	24.73	30.00	PASS
			106/54	23.32	30.00	PASS
802.1	1ax_HE20	OM Ch0				
СН	Freq. (MHz)	Data Rate	RU Config	Max. Avg. Output include tune up tolerance Power	Limit (dBm)	RESULT
				(dBm)		
			full	(dBm) 16.99	30.00	PASS
1	2412	MCS0	full 26/0	1 1	30.00 30.00	PASS PASS
1	2412	MCS0		16.99		
1	2412	MCS0	26/0	16.99 16.38	30.00	PASS PASS PASS
1	2412 2437	MCS0 MCS0	26/0 52/37	16.99 16.38 16.62	30.00 30.00	PASS PASS
			26/0 52/37 106/53	16.99 16.38 16.62 16.45	30.00 30.00 30.00	PASS PASS PASS
6	2437	MCS0	26/0 52/37 106/53 full	16.99 16.38 16.62 16.45 19.54	30.00 30.00 30.00 30.00	PASS PASS PASS PASS
			26/0 52/37 106/53 full full	16.99 16.38 16.62 16.45 19.54 15.87	30.00 30.00 30.00 30.00 30.00	PASS PASS PASS PASS PASS
6	2437	MCS0	26/0 52/37 106/53 full full 26/8	16.99 16.38 16.62 16.45 19.54 15.87 15.78	30.00 30.00 30.00 30.00 30.00 30.00	PASS PASS PASS PASS PASS PASS

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802.1	1ax_HE20	)M Ch1				
СН	Freq. (MHz)	Data Rate	RU Config	Peak Output Power (dBm)	Limit (dBm)	RESULT
			full	24.15	30.00	PASS
1	2412	MCS0	26/0	24.97	30.00	PASS
1	2412	10000	52/37	24.93	30.00	PASS
			106/53	25.02	30.00	PASS
6	2437	MCS0	full	24.32	30.00	PASS
			full	23.24	30.00	PASS
11	11 2462	MCS0	26/8	24.85	30.00	PASS
11		402 1010-30	52/40	24.82	30.00	PASS
			106/54	23.51	30.00	PASS
802.1	1ax_HE20	M Ch1				
				Max. Avg. Output		
СН	Freq.	req. Data	RU	include tune up	Limit	RESULT
CII	(MHz)	Rate	Config	tolerance Power	(dBm)	RESULT
				(dBm)		
			full	16.67	30.00	PASS
1	2412	MCS0	26/0	16.41	30.00	PASS
1	2712	10000	52/37	16.57	30.00	PASS
			106/53	16.53	30.00	PASS
6	2437	MCS0	full	19.51	30.00	PASS
			full	15.79	30.00	PASS
44 0400		MOOD		15.00	20.00	PASS
11	2462	MCSO	26/8	15.69	30.00	
11	2462	MCS0	26/8 52/40	15.69 15.72	30.00	PASS

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802.1	1ax_HE20	OM MIMC	)					
СН	Freq. (MHz)	Data Rate	RU Config		Dutput wer CH 1	Total Peak Output Power	Limit (dBm)	RESULT
			6.11			(dBm)	20.00	DACO
			full	24.07	23.94	27.02	30.00	PASS
1	2412	MCS0	26/0	24.80	24.91	27.87	30.00	PASS
			52/37	24.76	24.85	27.82	30.00	PASS
			106/53	24.83	24.91	27.88	30.00	PASS
6	2437	MCS0	full	24.07	23.12	26.63	30.00	PASS
	11 2462 MCS		full	24.20	23.92	27.07	30.00	PASS
11		MCSO	26/8	24.66	24.47	27.58	30.00	PASS
		10030	52/40	24.57	24.35	27.47	30.00	PASS
			106/54	24.62	24.67	27.66	30.00	PASS
802.1	1ax_HE20	ОМ МІМО	)					
				Avg. C	Dutput	Max. Avg. Output		
СН	Freq.	Data	RU	Power (dBm)		include tune up	Limit	RESULT
Сп	(MHz)	Rate	Config			tolerance Power	(dBm)	RESULT
				CH 0	CH 1	(dBm)		
			full	17.11	16.19	19.70	30.00	PASS
1	2412	MCS0	26/0	16.45	16.27	19.38	30.00	PASS
I	2412	1000	52/37	16.54	16.37	19.48	30.00	PASS
			106/53	16.45	16.22	19.36	30.00	PASS
6	2437	MCS0	full	17.06	16.09	19.62	30.00	PASS
			full	17.32	16.11	19.78	30.00	PASS
11	2462	MCS0	26/8	16.50	16.59	19.57	30.00	PASS
11	2402	10000	52/40	16.38	16.45	19.44	30.00	PASS
			106/54	16.43	16.38	19.43	30.00	PASS

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802.1	1n_HT40N	1 Ch0			
СН	Freq. (MHz)	Data Rate	Peak Output Power (dBm)	Limit (dBm)	RESULT
3	2422	MCS0	23.87	30.00	PASS
6	2437	MCS0	24.07	30.00	PASS
9	2452	MCS0	21.82	30.00	PASS
802.1	1n_HT40N	1 Ch0	· · ·		
СН	Freq. (MHz)	Data Rate	Max. Avg. Output include tune up tolerance Power (dBm)	Limit (dBm)	RESULT
3	2422	MCS0	16.75	30.00	PASS
6	2437	MCS0	17.39	30.00	PASS
9	2452	MCS0	14.42	30.00	PASS
CH	1n_HT40/ Freq. (MHz)	Data Rate	Peak Output Power (dBm)	Limit (dBm)	RESULT
3	2422	MCS0	23.02	30.00	PASS
6	2437	MCS0	23.40	30.00	PASS
9	2452	MCS0	21.10	30.00	PASS
802.1	1n_HT40	M Ch1			
СН	Freq. (MHz)	Data Rate	Max. Avg. Output include tune up tolerance Power (dBm)	Limit (dBm)	RESULT
3	2422	MCS0	16.47	30.00	PASS
6	2437	MCS0	17.35	30.00	PASS
9	2452	MCS0	14.08	30.00	PASS

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802.1	1n_HT40	M MIMO					
СН	Freq. (MHz)	Data Rate	Peak Output Power CH 0   CH 1		Total Peak Output Power (dBm)	Limit (dBm)	RESULT
3	2422	MCS8	24.03	23.14	26.62	30.00	PASS
6	2437	MCS8	23.81	22.74	26.32	30.00	PASS
9	2452	MCS8	24.05	23.11	26.62	30.00	PASS
802.1	1n_HT40	M MIMO					
СН	Freq. (MHz)	Data Rate	Avg. Output Power (dBm) CH 0 CH 1		Max. Avg. Output include tune up tolerance Power (dBm)	Limit (dBm)	RESULT
3	2422	MCS8	17.22	16.23	19.78	30.00	PASS
6	2437	MCS8	17.06	16.08	19.62	30.00	PASS
9	2452	MCS8	17.37	16.03	19.77	30.00	PASS

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802.1	1ax_HE40	M Ch0				
СН	Freq. (MHz)	Data Rate	RU Config	Peak Output Power (dBm)	Limit (dBm)	RESULT
3	2422	MCS0	full	24.05	30.00	PASS
Ŭ			242/61	23.75	30.00	PASS
6	2437	MCS0	full	24.47	30.00	PASS
9	2452	MCS0	full	21.97	30.00	PASS
			242/62	22.74	30.00	PASS
802.1 <sup>-</sup>	1ax_HE40	M Ch0				
СН	Freq. (MHz)	Data Rate	RU Config	Max. Avg. Output include tune up tolerance Power (dBm)	Limit (dBm)	RESULT
<u>_</u>	0400	M000	full	16.62	30.00	PASS
3	2422	MCS0	242/61	16.03	30.00	PASS
6	2437	MCS0	full	17.27	30.00	PASS
9	2452	MCS0	full	14.26	30.00	PASS
9	2452	NICSU -	242/62	13.86	30.00	PASS
802.1	1ax_HE4	0M Ch1				
СН	Freq. (MHz)	Data Rate	RU Config	Peak Output Power (dBm)	Limit (dBm)	RESULT
_	0.400		full	23.52	30.00	PASS
3	2422	MCS0	242/61	23.68	30.00	PASS
6	2437	MCS0	full	23.72	30.00	PASS
0	0450	MOCO	full	21.31	30.00	PASS
9	2452	MCS0	242/62	22.62	30.00	PASS
802.1	1ax_HE4	OM Ch1	<b>ļ</b>	ł	4	
СН	Freq. (MHz)	Data Rate	RU Config	Max. Avg. Output include tune up tolerance Power (dBm)	Limit (dBm)	RESULT
3	2422	MCS0	full	16.28	30.00	PASS
3	2422	1010-50	242/61	15.97	30.00	PASS
	2437	MCS0	full	17.27	30.00	PASS
6	2701					
			full	13.88	30.00	PASS
6 9	2452	MCS0	full 242/62	13.88 13.81	30.00 30.00	PASS PASS

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802.1	1ax_HE40	OM MIMC	)					
СН	Freq. (MHz)	Data Rate	RU Config		Dutput wer	Total Peak Output Power	Limit (dBm)	RESULT
	(1112)	Nute	ooning	CH 0	CH 1	(dBm)	(dBh)	
3	2422	MCS0	full	24.23	22.85	26.60	30.00	PASS
Ŭ		WICCO	242/61	23.72	23.43	26.59	30.00	PASS
6	2437	MCS0	full	24.22	22.74	26.55	30.00	PASS
9	2452	MCS0	full	24.34	23.04	26.75	30.00	PASS
J	2402	WICCO	242/62	22.82	22.79	25.82	30.00	PASS
802.1	1ax_HE40	OM MIMC	)					
				Avg. C	Output	Max. Avg. Output		
СН	Freq.	Data	RU	Po	wer	include tune up	Limit	RESULT
	(MHz)	Rate	Config	(dE	Bm)	tolerance Power	(dBm)	RESOLI
				CH 0	CH 1	(dBm)		
3	2422	MCS0	full	17.08	16.07	19.63	30.00	PASS
Ŭ		10000	242/61	16.55	16.41	19.50	30.00	PASS
6	2437	MCS0	full	16.93	15.99	19.51	30.00	PASS
9	2452	MCS0	full	17.17	16.02	19.66	30.00	PASS
Ŭ	2102	101000	242/62	16.61	16.63	19.64	30.00	PASS

\* Note: The duty cycle factor is compensated to obtain the maximum value of measurement in average.

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# 9 6DB & 99% BANDWIDTH MEASUREMENT

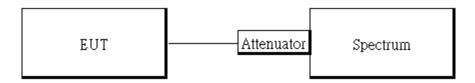
# 9.1 Standard Applicable

The minimum 6 dB bandwidth shall be at least 500 kHz.

# 9.2 Measurement Equipment Used

Conducted Emission Test Site											
EQUIPMENT	MFR	MFR MODEL		LAST	CAL DUE.						
TYPE		NUMBER	NUMBER	CAL.							
EXA Spectrum Analyzer	Agilent	N9010A	MY50420195	05/06/2020	05/05/2021						
DC Power Supply	Agilent	E3640A	MY40005907	10/22/2019	10/21/2020						
Attenuator	Mini-Circuit	BW-S10W2+	2	01/02/2020	01/01/2021						
DC Block	Mini-Circuits	BLK-18-S+	1	01/02/2020	01/01/2021						

# 9.3 Test Set-up



# 9.4 Measurement Procedure

- 1. Place the EUT on the table and set it in transmitting mode.
- 2. The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance .
- 3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
- Set the spectrum analyzer as RBW= 1 % to 5% of OBW , VBW = 3 X RBW, Span= 2 to 5 times of the OBW, Sweep=auto, Detector = Peak, and Max hold for 20dB Bandwidth test.
- 5. Mark the peak frequency and –20dB (upper and lower) frequency
- 6. Set the spectrum analyzer as

RBW= 1 % to 5% of 99% Bandwidth,

VBW  $\geq$  3 X RBW,

Span= large enough to capture all products of the modulation process,

Sweep=auto,

Detector = Peak, and Max hold for 99% Bandwidth test.

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

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# 9.5 6dB Bandwidth

Freq.	6dB BW	Limit	
(MHz)	(kHz)	(kHz)	Resu
2412	8098.00	> 500	PASS
2437	8105.00	> 500	PASS
2462	8111.00	> 500	PASS
802.11b Ch1			
Freq.	6dB BW	Limit	Result
(MHz)	(kHz)	(kHz)	Resul
2412	8087.00	> 500	PASS
2437	8111.00	> 500	PASS
2462	8114.00	> 500	PASS
802.11g Ch0			
Freq.	6dB BW	Limit	Resu
(MHz)	(kHz)	(kHz)	Resu
2412	16040.00	> 500	PASS
2437	16050.00	> 500	PASS
2462	15750.00	> 500	PASS
802.11g Ch1			
Freq.	6dB BW	Limit	Result
(MHz)	(kHz)	(kHz)	Resul
2412	15150.00	> 500	PASS
2437	15720.00	> 500	PASS
2462	15150.00	> 500	PASS
802.11_n_HT20 Cł			
Freq.	6dB BW	Limit	Resu
(MHz)	(kHz)	(kHz)	
2412	17160.00	> 500	PASS
2437	16940.00	> 500	PASS
2462	16180.00	> 500	PASS

#### 802.11\_n\_HT20 Ch1

Freq.	6dB BW	Limit	Result	
(MHz)	(kHz)	(kHz)		
2412	15090.00	> 500	PASS	
2437	16370.00	> 500	PASS	
2462	15730.00	> 500	PASS	

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#### 802.11\_ax\_HE20 Ch0

Freq.	RU	RU 6dB BW		Result	
(MHz)	Config	(kHz)	(kHz)	Result	
2412	full	18190.00	> 500	PASS	
2437	full	18260.00	> 500	PASS	
2462	full	18460.00	> 500	PASS	

#### 802.11\_ax\_HE20 Ch1

Freq.	RU 6dB BW		Limit	Result	
(MHz)	Config	(kHz)	(kHz)	Result	
2412	full	17990.00	> 500	PASS	
2437	full	18080.00	> 500	PASS	
2462	full	17840.00	> 500	PASS	

#### 802.11\_n\_HT40 Ch0

Freq.	6dB BW	Limit	Result	
(MHz)	(kHz)	(kHz)		
2422	35350.00	> 500	PASS	
2437	35310.00	> 500	PASS	
2452	35520.00	> 500	PASS	

#### 802.11\_n\_HT40 Ch1

Freq.	6dB BW	Limit	Result
(MHz)	(kHz)	(kHz)	
2422	34780.00	> 500	PASS
2437	35460.00	> 500	PASS
2452	35460.00	> 500	PASS

#### 802.11\_ax\_HE40 Ch0

Freq.	RU	RU 6dB BW		Result	
(MHz)	Config	(kHz)	(kHz)	Result	
2422	full	37400.00	> 500	PASS	
2437	full	37310.00	> 500	PASS	
2452	full	37480.00	> 500	PASS	

#### 802.11\_ax\_HE40 Ch1

Freq.	RU	RU 6dB BW		Result	
(MHz)	Config	(kHz)	(kHz)	Result	
2422	full	35900.00	> 500	PASS	
2437	full	37330.00	> 500	PASS	
2452	full	36650.00	> 500	PASS	

#### \*Refer to next page for plots

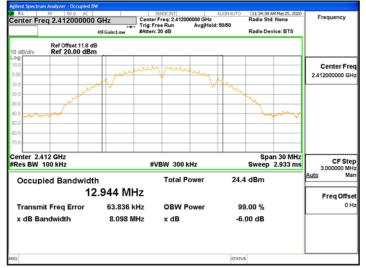
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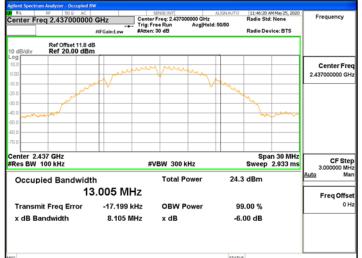
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#### OBW 6dB\_802.11b\_20MHz\_Chain0\_2412MHz



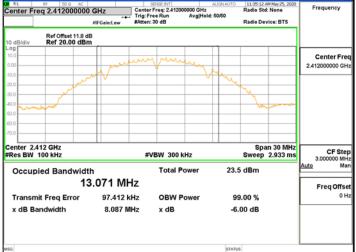
#### OBW 6dB\_802.11b\_20MHz\_Chain0\_2437MHz



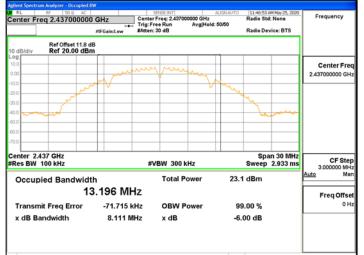
### OBW 6dB 802.11b 20MHz Chain0 2462MHz



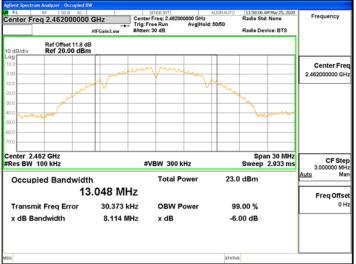
# OBW 6dB 802.11b 20MHz Chain1 2412MHz



#### OBW 6dB 802.11b 20MHz Chain1 2437MHz



#### OBW 6dB\_802.11b\_20MHz\_Chain1\_2462MHz



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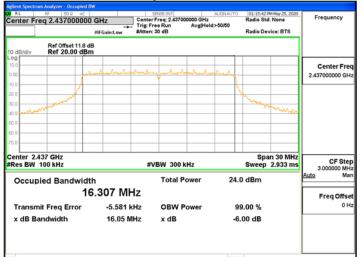
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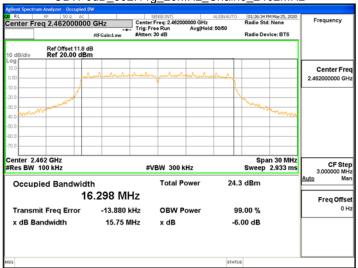
#### OBW 6dB 802.11g 20MHz Chain0 2412MHz

RL NF	50 9 /		la la		NSE:INT reg: 2,41200	0000 GH7	ALIGNAUT		12:10:02 Radio St	PM May 25, 2020	Frequency
enter Freq 2.	4120000		1∠ Gain:Low		e Run	Avg Hold	1: 50/50			evice: BTS	
0 dB/div Re	f Offset 11. f 20.00 c										
og 10.0		and	mm	whenhay	سمعماسيم	mul	men				Center Fre
0.0					Y						2.41200000 01
0.0	- Marine							F	man	mm	
0.0											
0.0											
enter 2.412 G Res BW 100 k				#VE	3W 300 k	Hz		;		an 30 MHz 2.933 ms	CF Ste 3.000000 M
Occupied I	Bandw	idth		Total Power			23.9 dBm				Auto Man
		16.2	98 MI	Ηz							Freq Offs
Transmit Fre	q Error		8.091 I	kHz	OBW P	ower		99.	00 %		01
x dB Bandwi	idth		16.04 N	AHz	x dB			6.0	0 dB		
a								TUS			

#### OBW 6dB\_802.11g\_20MHz\_Chain0\_2437MHz



### OBW 6dB\_802.11g\_20MHz\_Chain0\_2462MHz



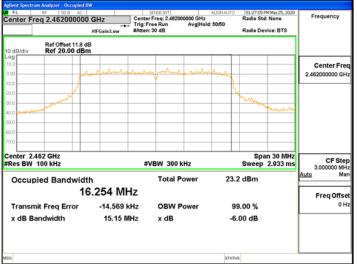
#### OBW 6dB 802.11g 20MHz Chain1 2412MHz

	m Analyzer - Occu	pied BW						
RL	eq 2.412000		SENSE:INT	12000000 GHz	ALIGNAUTO	12:10:33 P Radio Std	M May 25, 2020	Frequency
	eq 2.412000	#IFGain:Low	Trig: Free Run #Atten: 30 dB	Avg Hold	: 50/50	Radio Der		
10 dB/div	Ref Offset 1 Ref 20.00							
.og 10.0 0.00		amanna	manny mark	man	ma			Center Fre 2.412000000 GH
0.0			V					
0.0	www.www					man	much	
0.0								
0.0								
enter 2.4 Res BW			#VBW 3	00 kHz			n 30 MHz 2.933 ms	CF Ste 3.000000 MH
Occup	ccupied Bandwidth		Tota	Total Power				Auto Man
		16.270 M	Hz					Freq Offs
Transm	it Freq Erro	r 2.830	kHz OBV	V Power	99	.00 %		01
x dB Ba	andwidth	15.15	MHz xdE	1	-6.	00 dB		
9G					STATUS	5		

#### OBW 6dB\_802.11g\_20MHz\_Chain1\_2437MHz



#### OBW 6dB\_802.11g\_20MHz\_Chain1\_2462MHz



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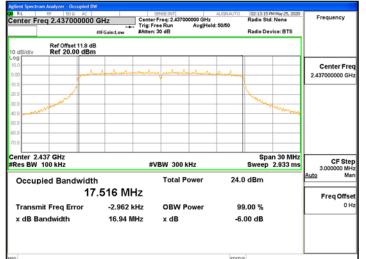
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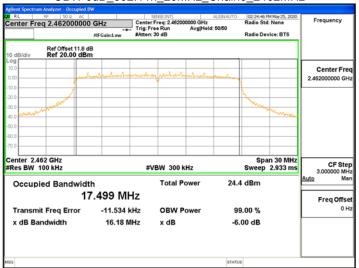
#### OBW 6dB 802.11n 20MHz Chain0 2412MHz

RL	m Analyzer - Occupied B RF 50 Q AC			NSE:INT		ALIGNAUTO		M May 25, 2020	C
Center Fre	eq 2.41200000	GHz		req: 2.41200 e Run	0000 GHz AvalHold	50/50	Radio Std: None		Frequency
		#IFGain:Low	#Atten: 3				Radio Dev	rice: BTS	
0 dB/div	Ref Offset 11.8 d Ref 20.00 dBr								
10.0									Center Fre
0.00		- marken and	monthy	mont	aland	mhu	· · · · · ·		2.412000000 GH
10.0									
30.0	- Marth						- warm		
0.0	ward and a second s							mm	
50.0									
50.0									
70.0									
Center 2.4 Res BW			#VE	3W 300 k	Hz			in 30 MHz 2.933 ms	CF Ste 3.000000 MH
Occup	ied Bandwidt	h		Total P	ower	24.7	7 dBm		Auto Ma
	17	7.511 Mł	Ηz						Freq Offse
Transmit Freq Error		14.917 H	кHz	OBW P	ower	99	9.00 %		он
x dB Ba	andwidth	17.16 N	1Hz	x dB		-6.	00 dB		
						STATU			

#### OBW 6dB 802.11n 20MHz Chain0 2437MHz



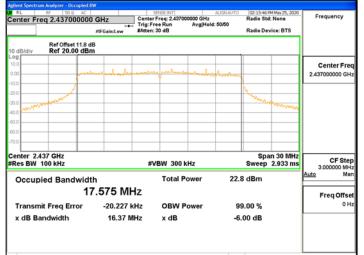
### OBW 6dB\_802.11n\_20MHz\_Chain0\_2462MHz



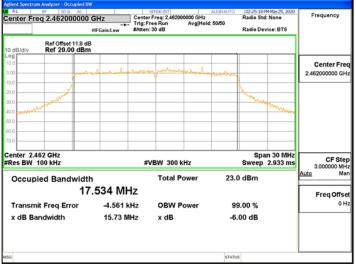
#### OBW 6dB 802.11n 20MHz Chain1 2412MHz

gilent Spectrum Analy			000000000				
Center Freq 2.	50 R AC	Hz	SENSE:INT Center Freq: 2.4120	ALIGN AUT	© 02:02:43 PM Radio Std: 1		Frequency
Jenker Freq 2.		1FGain:Low	Trig: Free Run #Atten: 30 dB	Avg Hold: 50/50	Radio Devic	e: BTS	
0 dB/div Re	f Offset 11.8 dB						
og 0.0			han antron	manhand	-	——[	Center Fre
.00	have	al a construction of the state			~		2.412000000 G
0.0	/				λ		
	www.				North Martin	~	
0.0 menter						more	
0.0							
0.0							
0.0							
enter 2.412 G Res BW 100 F			-			30 MHz	CF Ste
Res BW 100 P	HZ		#VBW 300	KHZ	Sweep 2		3.000000 M
Occupied	Bandwidth		Total P	ower 2	3.6 dBm	ľ	AULO M
	17.	520 MH	z			ſ	Freq Offs
Transmit Fr	eq Error	1.173 kł	Hz OBW F	ower	99.00 %		0
x dB Bandw	idth	15.09 M	Hz xdB		-6.00 dB	- F	
G				ST	ATUS		

#### OBW 6dB 802.11n 20MHz Chain1 2437MHz



### OBW 6dB\_802.11n\_20MHz\_Chain1\_2462MHz



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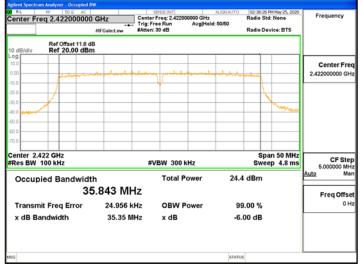
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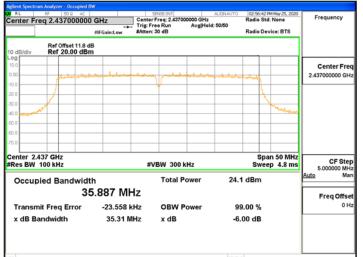
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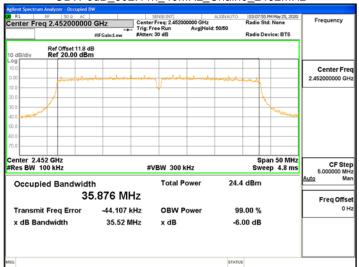
#### OBW 6dB 802.11n 40MHz Chain0 2422MHz



#### OBW 6dB 802.11n 40MHz Chain0 2437MHz



### OBW 6dB\_802.11n\_40MHz\_Chain0\_2452MHz



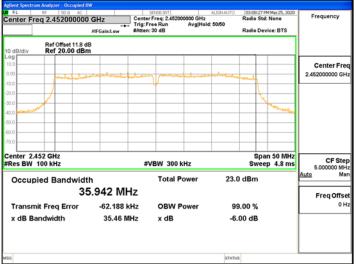
#### OBW 6dB 802.11n 40MHz Chain1 2422MHz

	im Analyzer - Occupied B	W				
RL	eq 2.422000000	CH7	SENSE:INT Center Freg: 2.4220	ALIGN AUTO	02:43:25 PM May Radio Std: Non	
	eq 2.42200000	#IFGain:Low		Avg Hold: 50/50	Radio Device: E	ITS
0 dB/div	Ref Offset 11.8 d Ref_20.00 dBn					
0.0						Center Fre
00	mound	and a start and a start and	many partice	and the property and the second	mahahuly	2.422000000 G
0.0			Ť			
0.0					-	*****
).0 <b></b>		_				100-0-0
0.0						
0.0						
enter 2.4	422 GHz				Span 50	MHz
Res BW	100 kHz		#VBW 300	kHz	Sweep 4	5.000000 MR
Occup	ied Bandwidt	h	Total F	Power 23	.1 dBm	Auto Ma
	35	5.828 MH	Ηz			Freq Offs
Transm	nit Freq Error	-47.965 H	KHZ OBW I	Power	99.00 %	01
x dB Ba	andwidth	34.78 N	1Hz xdB	-	6.00 dB	

#### OBW 6dB 802.11n 40MHz Chain1 2437MHz



## OBW 6dB\_802.11n\_40MHz\_Chain1\_2452MHz



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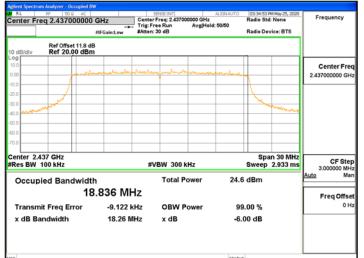
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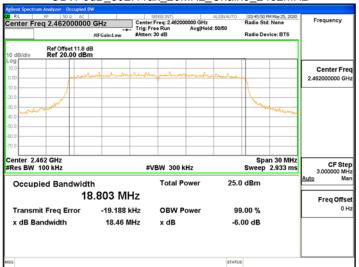
#### OBW 6dB 802.11ax 20MHz Chain0 2412MHz

Center Freq 2	50 Q 2.41200		-lz	Center F	NSE:INT req: 2.41200		ALIGNAUTO	Radio Sto	M May 25, 2020 I: None	Frequency
		AIF	Gain:Low	#Atten: 3		Anglinoid		Radio De	vice: BTS	
0 dB/div	tef Offset Ref 20.0									
.og 10.0										Center Fre
.00		a solar	henden	metre	mun	- Margler	man			2.412000000 GH
0.0	1							1		
0.0	1							- Tray		
0.0 2 10 10 10 10 10 10									mound	
0.0										
0.0										
enter 2.412 Res BW 100				#VE	3W 300 k	Hz			an 30 MHz 2.933 ms	CF Ste 3.000000 MH
Occupied	Band	width			Total P	ower	24.7	dBm		<u>Auto</u> Ma
		18.8	38 MI	Ηz						Freq Offs
Transmit F	req Err	or	26.706	Hz	OBW P	ower	99	.00 %		01
x dB Band	width		18.19 N	1Hz	x dB		-6.	00 dB		
G							STATUS	1		

#### OBW 6dB 802.11ax 20MHz Chain0 2437MHz



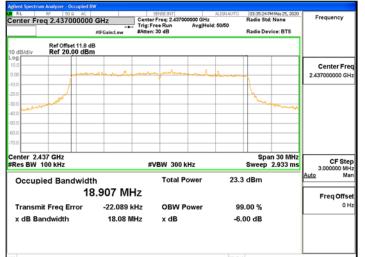
#### OBW 6dB\_802.11ax\_20MHz\_Chain0\_2462MHz



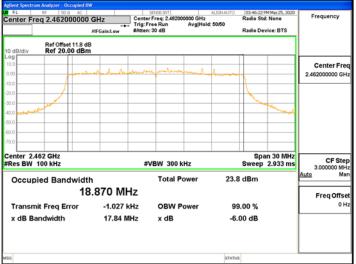
# OBW 6dB 802.11ax 20MHz Chain1 2412MHz

RL # 500 Center Freq 2.412000			2.412000000 GHz in Avg[Hol	aLIGN AUTO d>50/50	Radio De		Frequency
Ref Offset 11 0 dB/div Ref 20.00	.8 dB	printen: ev de	,				
•g 10.0 0.00	, al and a start of the	ulum	mont	-h-h-m			Center Fre 2.412000000 GH
10.0 20.0 30.0					how		
0.0							
0.0							
enter 2.412 GHz Res BW 100 kHz		#VBW	300 kHz			in 30 MHz 2.933 ms	CF Ste 3.000000 MH
Occupied Bandw	idth 18.861 MH		otal Power	23.7	/ dBm		Auto Ma
Transmit Freq Error x dB Bandwidth	4.784 k 17.99 N		BW Power dB		9.00 % 00 dB		01
sg.				STATU	5		L

#### OBW 6dB 802.11ax 20MHz Chain1 2437MHz



### OBW 6dB\_802.11ax\_20MHz\_Chain1\_2462MHz



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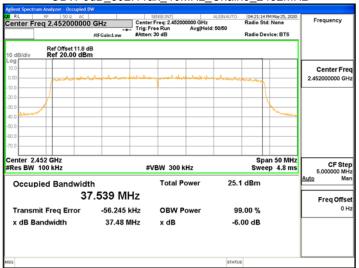
#### OBW 6dB 802.11ax 40MHz Chain0 2422MHz

RL         RF         SO R         AC           Center Freq 2.422000000         Image: Action of the second secon	Trig:	sense:mt er Freq: 2.422000000 GHz Free Run Avg Hole n: 30 dB	Radio Std	None	Frequency
Ref Offset 11.8 dB					
			- Andrewenter Mary	2.4	Center Fre
20.0					
40.0				~~~~~~	
70.0					
Center 2.422 GHz Res BW 100 kHz	#	≠VBW 300 kHz		n 50 MHz p 4.8 ms	CF Ste 5.000000 MH
Occupied Bandwidth 37	545 MHz	Total Power	24.8 dBm	Auto	Ma Freq Offse
Transmit Freq Error	3.663 kHz	OBW Power	99.00 %		0 H
x dB Bandwidth	37.40 MHz	x dB	-6.00 dB		
			STATUS		

#### OBW 6dB\_802.11ax\_40MHz\_Chain0\_2437MHz

RL Center Fr	RF 50 Q AC eq 2.437000000	Trig:	sense:INT] er Freq: 2.437000000 GHz Free Run Avg Hole n: 30 dB	ALIGNAUTO [04:09:03 PM May 25, 202 Radio Std: None d:>50/50 Radio Device: BTS	Frequency
0 dB/div	Ref Offset 11.8 dl Ref 20.00 dBn				
0.00	Jundum	ىمىسان <del>ا</del> ھولاساندىۋېر يىرۇس			Center Free 2.437000000 GH
0.0					-
0.0					
0.0					
enter 2.4 Res BW	437 GHz 100 kHz		VBW 300 kHz	Span 50 MH Sweep 4.8 m	
Occup	oied Bandwidt 37	<sup>h</sup> 1.600 MHz	Total Power	24.6 dBm	Auto Ma
Transm	nit Freq Error	-39.896 kHz	OBW Power	99.00 %	он
x dB B	andwidth	37.31 MHz	x dB	-6.00 dB	

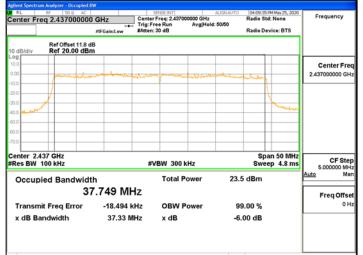
#### OBW 6dB\_802.11ax\_40MHz\_Chain0\_2452MHz



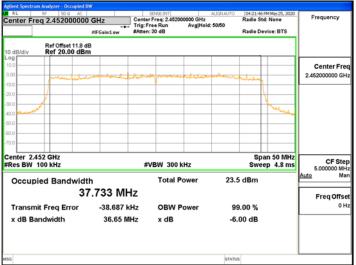
#### OBW 6dB 802.11ax 40MHz Chain1 2422MHz

RL	RF 50 9 AC		SENSE:INT			PM May 25, 2020	E
Center Fre	eq 2.422000000	GHz	Center Freq: 2.422 Trig: Free Run	Radio Std: None		Frequency	
		#1FGain:Low	#Atten: 30 dB	Avg Held: 50/5		vice: BTS	
I0 dB/div	Ref Offset 11.8 dE Ref 20.00 dBm						
10.0							Center Fre
0.00	mensionher	mont	whether many many and	halvernt	much haber		2.422000000 GH
10.0							
20.0							
0.0						mar war	
0.0							
0.0							
0.0							
enter 2.4 Res BW		_	#VBW 300	kHz		an 50 MHz ap 4.8 ms	CF Ste
Occup	ied Bandwidt	า	Total	Power	23.7 dBm		5.000000 MH: Auto Mar
	37	.610 MH	z				Freq Offs
Transm	nit Freq Error	-3.883 k	Hz OBW	Power	99.00 %		01
x dB Ba	andwidth	35.90 M	Hz xdB		-6.00 dB		
G					STATUS		

#### OBW 6dB 802.11ax 40MHz Chain1 2437MHz



#### OBW 6dB\_802.11ax\_40MHz\_Chain1\_2452MHz



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# 9.6 99% Bandwidth

802.11b Ch0		802.11b Ch1			
Freq.	99% BW	Freq.	99% BW		
(MHz)	(MHz)	(MHz)	(MHz)		
2412	12.984	2412	13.083		
2437	13.066	2437	13.244		
2462	12.972	2462	13.085		

802.11g Ch0		802.11g Ch1				
Freq.	99% BW	Freq.	99% BW			
(MHz)	(MHz)	(MHz)	(MHz)			
2412	16.357	2412	16.293			
2437	16.374	2437	16.34			
2462	16.362	2462	16.268			

802.11n_HT20M Ch0		802.11n_HT20M Ch1	
Freq.	99% BW	Freq.	99% BW
(MHz)	(MHz)	(MHz)	(MHz)
2412	17.51	2412	17.524
2437	17.516	2437	17.604
2462	17.485	2462	17.551

802.11ax_HE	20M Ch0		802.11ax_HE20M Ch1			
Freq.	RU Config	99% BW	Freq.	RU Config	99% BW	
(MHz)	KU CUIIIg	(MHz)	(MHz)	RU Coning	(MHz)	
2412	full	18.867	2412	full	18.902	
2437	full	18.869	2437	full	18.962	
2462	full	18.857	2462	full	18.926	

802.11n_HT40M Ch0		802.11n_HT40M Ch1	
Freq.	99% BW	Freq.	99% BW
(MHz)	(MHz)	(MHz)	(MHz)
2422	35.921	2422	35.853
2437	35.985	2437	36.099
2452	35.936	2452	35.996

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802.11ax_HE	40M Ch0		802.11ax_HE40M Ch1				
Freq.	DIL Config	99% BW	Freq.	DIL Config	99% BW		
(MHz)	RU Config	(MHz)	(MHz)	RU Config	(MHz)		
2422	full	37.624	2422	full	37.645		
2437	full	37.678	2437	full	37.777		
2452	full	37.626	2452	full	37.737		

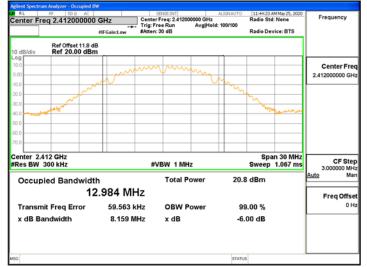
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#### IC OBW 99%\_802.11b\_20MHz\_Chain0\_2412MHz



#### IC OBW 99%\_802.11b\_20MHz\_Chain0\_2437MHz



### IC OBW 99%\_802.11b\_20MHz\_Chain0\_2462MHz



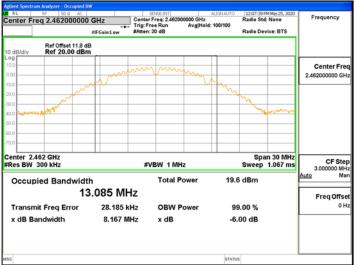
#### IC OBW 99% 802.11b 20MHz Chain1 2412MHz



#### IC OBW 99% 802.11b 20MHz Chain1 2437MHz



### IC OBW 99%\_802.11b\_20MHz\_Chain1\_2462MHz



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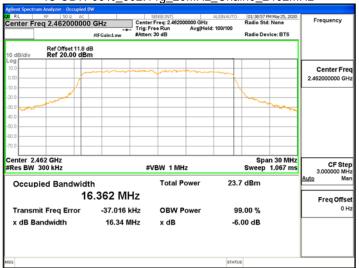
#### IC OBW 99% 802.11g 20MHz Chain0 2412MHz

RL	RF 50 Q				NSE:INT		ALIGNAUT			PM May 25, 2020	Frequency
Center Fr	eq 2.41200	0000 G	Hz		req: 2.41200 e Run	Avg Hold	100/100	R	adio Sto	l: None	Frequency
		A1	FGain:Low	#Atten: 3	0 dB			R	adio De	vice: BTS	
0 dB/div	Ref Offset Ref 20.00										
10.0			-					_			Center Fre
								+			2.412000000 GH
0.0		/						X			
0.0										A	
0.0										- market	
0.0											
0.0								-			
0.0	_	_									
enter 2.										an 30 MHz	CF Ste
Res BW	300 KHZ			#VE	SW 1 MH	z		5	weep	1.067 ms	3.000000 MHz
Occup	ied Band	width			Total P	ower	23	8.5 d	Bm		<u>Auto</u> Ma
		16.3	357 MI	Ηz							Freq Offse
Transm	Transmit Freq Error 7.895		7.895 I	Hz	OBW P	ower	1	99.0	0 %		0 H
x dB Ba	andwidth		16.31 N	IHz	x dB		-	6.00	dB		

#### IC OBW 99%\_802.11g\_20MHz\_Chain0\_2437MHz



#### IC OBW 99%\_802.11g\_20MHz\_Chain0\_2462MHz



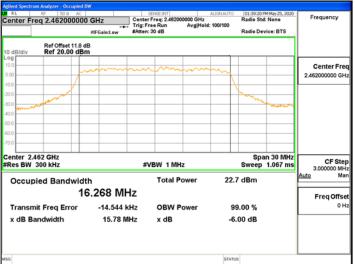
#### IC OBW 99% 802.11g 20MHz Chain1 2412MHz

Center Fred	n= 50 x <b>q 2.41200</b> 0		Hz	Center F	req: 2.41200		ALIGN AUT		12:20:04 P adio Std	M May 25, 2020 : None	Frequency
		#1F	Gain:Low	#Atten: 3		Anglineia	. 100/100	R	adio Der	vice: BTS	
10 dB/div	Ref Offset 1 Ref 20.00										
.og 10.0				~~~	m		m				Center Fre
.00		/~~~									2.412000000 GH
0.0	1										
0.0	mark								and the second		
0.0								_			
1.0								-			
0.0		-									
0.0											
enter 2.41 Res BW 30				#VE	SW 1 MH	z		s		n 30 MHz 1.067 ms	CF Ste 3.00000 Mi
Occupie	ed Bandv	vidth			Total Power 22.7 dBm				Auto Mi		
		16.2	293 MI	Ηz							Freq Offs
Transmit Freq Error		14.974 I	Hz	OBW P	ower	1	99.0	0 %		. 01	
x dB Ban	dwidth		16.19 N	1Hz	x dB		-	6.00	dB		
G							STA	TUS			t

#### IC OBW 99%\_802.11g\_20MHz\_Chain1\_2437MHz



#### IC OBW 99%\_802.11g\_20MHz\_Chain1\_2462MHz



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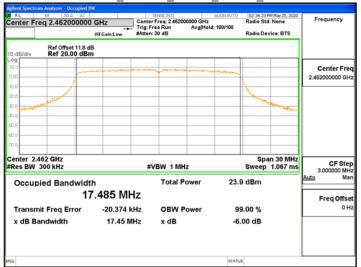
#### IC OBW 99% 802.11n 20MHz Chain0 2412MHz

Agilent Spectru RL	RF 50.0 AC	w	CEN	SE:INT		ALIGNAUTO	02:11:49.5	M May 25, 2020	
	eq 2.41200000	GHz	Center Fr	eq: 2.41200	0000 GHz		Radio Sto		Frequency
	-	#IFGain:Low	Trig: Free #Atten: 30		Avg Hold	: 100/100	Radio De	vice: BTS	
10 dB/div	Ref Offset 11.8 di Ref 20.00 dBn								
10.0		تحمد ومعالي المراجع المراجع		-	-				Center Free
0.00							<		2.412000000 GH
10.0									
30.0	same and a second						- Arte	mana	
40.0									
50.0									
60.0									
-70.0									
Center 2.4 #Res BW			#VB	#VBW 1 MHz				n 30 MHz 1.067 ms	CF Step 3.000000 MH
Occup	oied Bandwidt	h		Total P	ower	24.3	3 dBm		Auto Mar
	17	.510 MH	z						Freq Offse
Transmit Freq Error		25.374 kl	Hz	OBW P	ower	99	9.00 %		. он
x dB Ba	andwidth	17.46 M	Ηz	x dB		-6.	00 dB		
sg						STATU			
						SIAIO	"		

#### IC OBW 99% 802.11n 20MHz Chain0 2437MHz



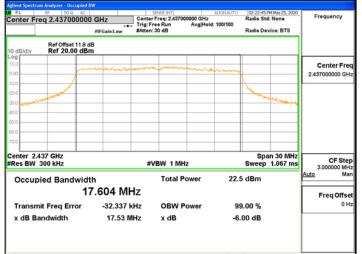
#### IC OBW 99%\_802.11n\_20MHz\_Chain0\_2462MHz



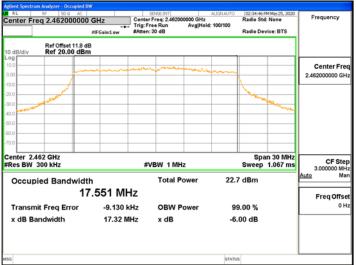
#### IC OBW 99% 802.11n 20MHz Chain1 2412MHz

Center Fre	eq 2.412000000		SENSE:INT nter Freq: 2.412000		02:12:12 PM May 25, 2020 Radio Std: None	Frequency
			g:FreeRun ten:30 dB	Avg Hold: 100/100	Radio Device: BTS	
10 dB/div	Ref Offset 11.8 dB Ref 20.00 dBm					
10.0			and	Martin L. D.		Center Fre
0.00						2.412000000 GH
10.0						
30.0	1 and a low of the second				Carlos Carlos	
40.0						
50.0						
0.0						
70.0						
Center 2.4 Res BW			#VBW 1 MHz		Span 30 MHz Sweep 1.067 ms	
Occup	ied Bandwidth	n	Total Po	Auto		
	17	.524 MHz				Freq Offs
Transmit Freq Error 3.		3.871 kHz	2 OBW Power 99.00 %			01
x dB Ba	andwidth	17.39 MHz	x dB	-6	.00 dB	
9G				STATU	5	

#### IC OBW 99% 802.11n 20MHz Chain1 2437MHz



#### IC OBW 99%\_802.11n\_20MHz\_Chain1\_2462MHz



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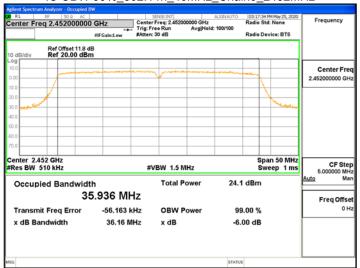
#### IC OBW 99% 802.11n 40MHz Chain0 2422MHz

RL         RF         SO R         AC           Center Freq 2.422000000         Context         Context <thcontext< th=""> <thcontext< th="">         Context&lt;</thcontext<></thcontext<>		sense:INT enter Freq: 2.4220 rig: Free Run Atten: 30 dB		100/100	Radio Std: N	one	Frequency
Ref Offset 11.8 dE 10 dB/div Ref 20.00 dBm							
-og 10.0 0.00				******	~		Center Fre 2.422000000 GH
20.0						Wender	
40.0 50.0							
70.0							
enter 2.422 GHz Res BW 510 kHz		#VBW 1.5 N			50 MHz p 1 ms	CF Ste 5.000000 MH	
Occupied Bandwidtl 35	921 MHz		Total Power 23.9				Auto Ma
Transmit Freq Error	29.082 kH	z OBW Power 99.00 %		00 %		0 H	
x dB Bandwidth	36.21 MH	z xdB		-6.0	0 dB		
ig i				STATUS			

#### IC OBW 99% 802.11n 40MHz Chain0 2437MHz



### IC OBW 99%\_802.11n\_40MHz\_Chain0\_2452MHz



#### IC OBW 99% 802.11n 40MHz Chain1 2422MHz

	m Analyzer - Occupied B	aw					
RL	eq 2.422000000	I GHz	SENSE:INT Center Freg: 2.42200	ALIGN AUTO	02:54:41 PM May 25, 20 Radio Std: None	Frequency	
	5q 2.42200000		Frig: Free Run Atten: 30 dB	Avg Hold: 100/100	Radio Device: BTS		
0 dB/div	Ref Offset 11.8 d Ref 20.00 dBr						
0.0						Center Fre	
.00	monan	, a characteristic	man	and a second a second and a second and a second	man	2.422000000 GH	
0.0					+ 1		
0.0	/				Nu.		
1.0						~	
0.0							
0.0							
0.0							
enter 2.4 Res BW			#VBW 1.5 N	IHz	Span 50 MH Sweep 1 m		
Occupi	ied Bandwidt	h	Total P	ower 23.	23.1 dBm		
	35	5.853 MHz	z			Freq Offs	
Transmit Freq Error		-56.117 kH	z OBW P	ower 9	9.00 %	01	
x dB Ba	ndwidth	35.57 MH	z xdB	-6	.00 dB		
G				STAT			
·				alkin			

#### IC OBW 99% 802.11n 40MHz Chain1 2437MHz



## IC OBW 99%\_802.11n\_40MHz\_Chain1\_2452MHz

RL	m Analyzer - Occupied B RF 50 x AC eq 2.452000000	GHz Cent	SENSE INT er Freq: 2.452000000 GHz Free Run Avg Hol m: 30 dB	03:17:57 PM May 25, 2020 Radio Std: None Radio Device: BTS	Frequency	
10 dB/div	Ref Offset 11.8 d Ref 20.00 dBr					
10.0		and a star of the second s				Center Freq 2.452000000 GHz
20.0 30.0					- Connector	
0.0						
enter 2.4	52 GHz				Span 50 MHz	
Res BW		-	#VBW 1.5 MHz	Sweep 1 ms		
Occup	ccupied Bandwidth 35.996 MH		Total Power	22.8	dBm	Auto Mar Freq Offse
	it Freq Error Indwidth	-54.643 kHz 35.84 MHz	OBW Power x dB		00 % 0 dB	он
a				STATUS		

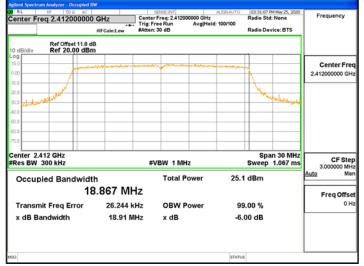
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#### IC OBW 99% 802.11ax 20MHz Chain0 2412MHz



#### IC OBW 99% 802.11ax 20MHz Chain0 2437MHz



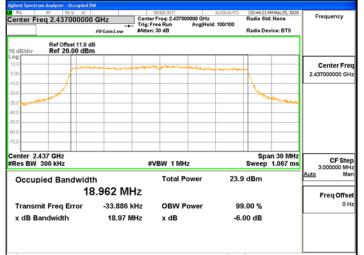
IC OBW 99%\_802.11ax\_20MHz\_Chain0\_2462MHz



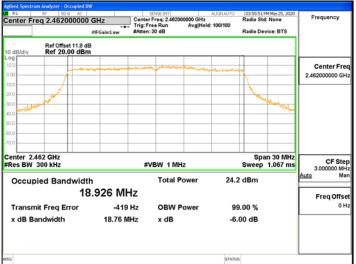
# IC OBW 99% 802.11ax 20MHz Chain1 2412MHz

Center Freq 2.	50 x 412000		2	Center F	reg: 2.4120		ALIGNAUTO	Radio Std	M May 25, 2020 : None	Frequency
		#1FGa	ain:Low	#Atten: 3	0 dB	Avginoi	1>100/100	Radio Dev	vice: BTS	
0 dB/div Re	f Offset 11 f 20.00									
0.0	_		وحربه ومعران	وربينهم	ستفعم	m				Center Fre
.00	-1				[			1		2.412000000 GH
0.0	A.							N.		
0.0	M							140	an and the	
0.0										
0.0										
0.0										
enter 2.412 G	<u> </u>							- Ena	n 30 MHz	
Res BW 300 k				#VE	#VBW 1 MHz S				1.067 ms	CF Ste 3.000000 MH
Occupied I	Bandw	ridth			Total P	ower	24.2	dBm		<u>Auto</u> Ma
			02 MH	lz						Freq Offs
Transmit Freq Error		3.118 k	Hz	OBW P	ower	99	.00 %		01	
x dB Bandw	idth		18.71 M	Hz	x dB		-6.	00 dB		
							STATUS			

#### IC OBW 99% 802.11ax 20MHz Chain1 2437MHz



#### IC OBW 99%\_802.11ax\_20MHz\_Chain1\_2462MHz



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

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