





# **FCC Test Report**

Report No.: AGC13525231101FR01

FCC ID : 2AATLB200T-UA

**APPLICATION PURPOSE** : Original Equipment

**PRODUCT DESIGNATION**: WIFI/BT Module

**BRAND NAME** : FN-LINK

**MODEL NAME** : B200T-UA

**APPLICANT**: FN-LINK TECHNOLOGY LIMITED

**DATE OF ISSUE** : Apr. 17, 2024

**STANDARD(S)** : FCC Part 15 Subpart C §15.247

**REPORT VERSION**: V1.0

Attestation of Global Concilance (Shenzhen) Co., Ltd



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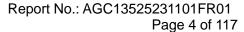
## **Report Revise Record**

Report Version	Revise Time	Issued Date	Valid Version	Notes	
V1.0	/	Apr. 17, 2024	Valid	Initial Release	



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## 1. General Information

FN-LINK TECHNOLOGY LIMITED
No.8, Litong Road, Liuyang Economic & Technical Development Zone, Changsha, Hunan, CHINA
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No.8, Litong Road, Liuyang Economic & Technical Development Zone, Changsha, Hunan, CHINA
FN-LINK TECHNOLOGY LIMITED
No.8, Litong Road, Liuyang Economic & Technical Development Zone, Changsha, Hunan, CHINA
WIFI/BT Module
FN-LINK
B200T-UA
N/A
N/A
Jan. 03, 2024
Jan. 03, 2024 – Apr. 17, 2024
No any deviation from the test method
Normal
Pass
AGCER-FCC-2.4GWLAN-V1

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

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	Alan Duan (Project Engineer)	Apr. 17, 2024
Reviewed By	Calin Lin	
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Approved By	Max Zhang	
	Max Zhang (Authorized Officer)	Apr. 17, 2024



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#### 2. Product Information

## 2.1 Product Technical Description

Equipment Type	WLAN 2.4G			
Frequency Band	2400MHz ~ 2483.5MHz			
Operation Frequency	2412MHz ~ 2462MHz			
	IEEE 802.11b:13.54dBm; IEEE 802.11g:11.31dBm;			
Output Power (Average)	IEEE 802.11n(HT20):12.23dBm; IEEE 802.11n(HT40):10.66dBm			
	IEEE 802.11ax (HE20):12.12dBm			
	IEEE 802.11b:17.26dBm; IEEE 802.11g:19.15dBm;			
Output Power (Peak)	IEEE 802.11n(HT20):20.13dBm; IEEE 802.11n(HT40):18.49dBm			
	IEEE 802.11ax (HE20):22.41dBm			
	802.11b:(DQPSK, DBPSK, CCK) DSSS			
Modulation	802.11g/n:(64-QAM,16-QAM, QPSK, BPSK) OFDM			
	802.11ax:(1024-QAM,256-QAM,64-QAM,16-QAM,QPSK,BPSK)OFDMA			
	802.11b:1/2/5.5/11Mbps			
Data Rate	802.11g: 6/9/12/18/24/36/48/54Mbps			
Data Nate	802.11n: up to 300Mbps			
	802.11ax: up to 574Mbps			
Number of channels	11			
Hardware Version	V1.0			
Software Version	V1.0.20_V1.7.5			
Antenna Designation	FPC Antenna			
Antenna Gain	Please refer to report section 2.9 description			
Number of transmit chain	1			
Power Supply	3.3V			



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## 2.2 Table of Carrier Frequency

## For 2412-2462MHz:

## 11 channels are provided for 802.11b/g/n(HT20)/ax(HE20):

Channel	Frequency	Channel	Frequency	Channel	Frequency
01	2412 MHz	02	2417 MHz	03	2422 MHz
04	2427 MHz	05	2432 MHz	06	2437 MHz
07	2442 MHz	08	2447 MHz	09	2452 MHz
10	2457 MHz	11	2462 MHz		

## 7 channels are provided for 802.11n(HT40):

Channel	Frequency	Channel	Frequency	Channel	Frequency
01		02		03	2422 MHz
04	2427 MHz	05	2432 MHz	06	2437 MHz
07	2442 MHz	08	2447 MHz	09	2452 MHz
10		11			

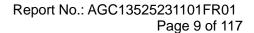


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#### 2.3 IEEE 802.11n Modulation Scheme

MCS	MCS				No	N <sub>CBPS</sub>		BPS	Data Rate(Mbps)	
Index	Nss	Modulation	R	$N_{BPSC}$	Č	ы о	D	ы о	800	nsGI
Пасх					20MHz	40MHz	20MHz	40MHz	20MHz	40MHz
0	1	BPSK	1/2	1	52	108	26	54	6.5	13.5
1	1	QPSK	1/2	2	104	216	52	108	13.0	27.0
2	1	QPSK	3/4	2	104	216	78	162	19.5	40.5
3	1	16-QAM	1/2	4	208	432	104	216	26.0	54.0
4	1	16-QAM	3/4	4	208	432	156	324	39.0	81.0
5	1	64-QAM	2/3	6	312	648	208	432	52.0	108.0
6	1	64-QAM	3/4	6	312	648	234	489	58.5	121.5
7	1	64-QAM	5/6	6	312	648	260	540	65.0	135.0

Symbol	Explanation
NSS	Number of spatial streams
R	Code rate
NBPSC	Number of coded bits per single carrier
NCBPS	Number of coded bits per symbol
NDBPS	Number of data bits per symbol
GI	Guard interval





#### 2.4 IEEE 802.11ax Modulation Scheme

## HE-MCSs for 242-tone RU, N<sub>SS</sub>=1

								Data rate (Mb/s)			
HE-MCS Index	DCM	Modulation	R	N <sub>BPSCS</sub>	N <sub>SD</sub>	N <sub>CBPS</sub>	N <sub>DBPS</sub>	0.8µsGl	1.6µsGI	3.2µsGl	
0	1	DDOK	1/2		117	117	58	4.3	4.0	3.6	
0	0	BPSK	1/2	1	234	234	117	8.6	8.1	7.3	
4	1		1/2		117	234	117	8.6	8.1	7.3	
1	0	QPSK	1/2	2	234	468	234	17.2	16.3	14.6	
2	N/A		3/4	3/4		468	351	25.8	24.4	21.9	
2	1		1/2		117	468	234	17.2	16.3	14.6	
3	0	40.044	1/2	3/4	234	936	468	34.4	32.5	29.3	
4	1	16-QAM	3/4		117	468	351	25.8	24.4	21.9	
4	0		3/4		234	936	702	51.6	48.8	43.9	
5			2/3				936	68.8	65.0	58.5	
6		64-QAM	3/4	6		1404	1053	77.4	73.1	65.8	
7			5/6				1170	86.0	81.3	73.1	
8	N/A		3/4		234	40=0	1404	103.2	97.5	87.8	
9		256-QAM	5/6	6 8		1872	1560	114.7	108.3	97.5	
10		4004 0414	3/4	40		00.46	1755	129.0	121.9	109.7	
11		1024-QAM	5/6	10		2340	1950	143.4	135.4	121.9	

Symbol	Explanation
NSS	Number of spatial streams
R	Code rate
NBPSC	Number of coded bits per single carrier
NCBPS	Number of coded bits per symbol
NDBPS	Number of data bits per symbol
GI	Guard interval



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## HE-MCSs for 484-tone RU, N<sub>SS</sub>=1

								Data rate (Mb/s)		
HE-MCS Index	DCM	Modulation	R	N <sub>BPSCS</sub>	N <sub>SD</sub>	N <sub>CBPS</sub>	N <sub>DBPS</sub>	0.8µsGl	1.6µsGI	3.2µsGl
0	1	DDOL	1/2		234	234	117	8.6	8.1	7.3
0	0	BPSK	1/2	1	468	468	234	17.2	16.3	14.6
4	1		1/2		234	468	234	17.2	16.3	14.6
1	0	QPSK	1/2	2	468	936	468	34.4	32.5	29.3
2	N/A		3/4		468	936	702	51.6	48.8	43.9
	1		1/2	4	234	936	468	34.4	32.5	29.3
3	0		1/2		468	1872	936	68.8	65.0	58.5
4	1	16-QAM	3/4		234	936	702	51.6	48.8	43.9
4	0		3/4		468	1872	1404	103.2	97.5	87.8
5			2/3				1872	137.6	130.0	117.0
6		64-QAM	3/4	6		2808	2106	154.9	146.3	131.6
7			5/6				2340	172.1	162.5	146.3
8	N/A		3/4		468		2808	206.5	195.0	175.5
9	256-QAM	256-QAM	5/6	8		3744	3120	229.4	216.7	195.0
10		4004 04:	3/4			1005	3510	258.1	243.8	219.4
11		1024-QAM	5/6	10		4680	3900	286.8	270.8	243.8

Note: EUT supports one configuration only in 802.11ax full RU mode.

Symbol	Explanation
NSS	Number of spatial streams
R	Code rate
NBPSC	Number of coded bits per single carrier
NCBPS	Number of coded bits per symbol
NDBPS	Number of data bits per symbol
GI	Guard interval



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#### 2.5 Related Submittal(S) / Grant (S)

This submittal(s) (test report) is intended for FCC ID: 2AATLB200T-UA, filing to comply with Part 2, Part 15 of the Federal Communication Commission rules.

#### 2.6 Test Methodology

The tests were performed according to following standards:

No.	Identity	Document Title
1	FCC 47 CFR Part 2	Frequency allocations and radio treaty matters; general rules and regulations
2	FCC 47 CFR Part 15	Radio Frequency Devices
3	ANSI C63.10-2013	American National Standard for Testing Unlicensed Wireless Devices
4	KDB 558074 D01 15.247 Meas Guidance v05r02	Guidance for compliance measurements on Digital Transmission Systems, Frequency Hopping Spread Spectrum system, and Hybrid system devices operating under Section 15.247 of the FCC rules

#### 2.7 Special Accessories

Refer to section 4.4.

## 2.8 Equipment Modifications

Not available for this EUT intended for grant.

#### 2.9 Antenna Requirement

#### **Standard Requirement**

15.203 requirement:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

15.247(b) (4) requirement:

The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi

#### **EUT Antenna:**

The non-detachable antenna inside the device cannot be replaced by the user at will. For the antenna gain, please refer to the description in Chapter 3.62 of the report.



## 2.10 Description of Test Software

#### For IEEE 802.11 mode:

## Software Setting Diagram



Test Mode	Channel	Power Index
802.11b	L/M/H	0
802.11g	L/M/H	0
802.11n-HT20	L/M/H	0
802.11n-HT40	L/M/H	0
802.11ax-HE20	L/M/H	0



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#### 3. Test Environment

#### 3.1 Address of The Test Laboratory

Laboratory: Attestation of Global Compliance (Shenzhen) Co., Ltd.

Address: 1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

#### 3.2 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

## CNAS-Lab Code: L5488

Attestation of Global Compliance (Shenzhen) Co., Ltd. has been assessed and proved to follow CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC17025: 2017 General Requirements for the Competence of Testing and Calibration Laboratories).

#### A2LA-Lab Cert. No.: 5054.02

Attestation of Global Compliance (Shenzhen) Co., Ltd. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to follow ISO/IEC 17025: 2017 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

#### FCC-Registration No.: 975832

Attestation of Global Compliance (Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files with Registration 975832.

## IC-Registration No.: 24842 (CAB identifier: CN0063)

Attestation of Global Compliance (Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the Certification and Engineering Bureau of Industry Canada. The acceptance letter from the IC is maintained in our files with Registration 24842.



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#### 3.3 Environmental Conditions

	Normal Conditions
Temperature range (°C)	-40 - 105
Relative humidity range	20 % - 75 %
Pressure range (kPa)	86 - 106

## 3.4 Measurement Uncertainty

The reported uncertainty of measurement y±U, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95%.

Item	Measurement Uncertainty
Uncertainty of Conducted Emission for AC Port	$U_c = \pm 2.9 \text{ dB}$
Uncertainty of Radiated Emission below 1GHz	$U_c = \pm 3.9 \text{ dB}$
Uncertainty of Radiated Emission above 1GHz	$U_c = \pm 4.9 \text{ dB}$
Uncertainty of total RF power, conducted	$U_c = \pm 0.8 \text{ dB}$
Uncertainty of RF power density, conducted	$U_c = \pm 2.6 \text{ dB}$
Uncertainty of spurious emissions, conducted	$U_c = \pm 2 \%$
Uncertainty of Occupied Channel Bandwidth	$U_c = \pm 2 \%$



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## 3.5 List of Equipment Used

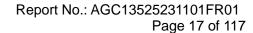
• R	RF Conducted Test System							
Used	Equipment No.	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)	
$\boxtimes$	AGC-ER-E036	Spectrum Analyzer	Agilent	N9020A	MY49100060	2023-06-01	2024-05-31	
	AGC-ER-E062	Power Sensor	Agilent	U2021XA	MY54110007	2023-03-03	2024-03-02	
$\boxtimes$	AGC-ER-E062	Power Sensor	Agilent	U2021XA	MY54110007	2024-02-01	2025-01-31	
$\boxtimes$	AGC-ER-E063	Power Sensor	Agilent	U2021XA	MY54110009	2023-03-03	2024-03-02	
$\boxtimes$	AGC-ER-E063	Power Sensor	Agilent	U2021XA	MY54110009	2024-02-01	2025-01-31	
$\boxtimes$	AGC-EM-A152	6dB Attenuator	Eeatsheep	LM-XX-6-5W	N/A	2023-06-09	2024-06-08	
$\boxtimes$	AGC-ER-E083	Signal Generator	Agilent	E4421B	US39340815	2023-06-01	2024-05-31	
$\boxtimes$	N/A	RF Connection Cable	N/A	1#	N/A	Each time	N/A	
	N/A	RF Connection Cable	N/A	2#	N/A	Each time	N/A	

• F	Radiated Spurious Emission							
Used	Equipment No.	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)	
	AGC-EM-E046	EMI Test Receiver	R&S	ESCI	10096	2024-02-01	2025-01-31	
	AGC-EM-E116	EMI Test Receiver	R&S	ESCI	100034	2023-06-03	2024-06-02	
$\boxtimes$	AGC-EM-E061	Spectrum Analyzer	Agilent	N9010A	MY53470504	2023-06-01	2024-05-31	
$\boxtimes$	AGC-EM-E086	Loop Antenna	ZHINAN	ZN30900C	18051	2022-03-12	2024-03-11	
$\boxtimes$	AGC-EM-E086	Loop Antenna	ZHINAN	ZN30900C	18051	2024-03-05	2026-03-04	
$\boxtimes$	AGC-EM-E001	Wideband Antenna	SCHWARZBECK	VULB9168	D69250	2023-05-11	2025-05-10	
$\boxtimes$	AGC-EM-E029	Broadband Ridged Horn Antenna	ETS	3117	00034609	2023-03-23	2024-03-22	
$\boxtimes$	AGC-EM-E029	Broadband Ridged Horn Antenna	ETS	3117	00034609	2024-03-31	2025-03-30	
	AGC-EM-E082	Horn Antenna	SCHWARZBECK	BBHA 9170	#768	2023-09-24	2025-09-23	
$\boxtimes$	AGC-EM-E146	Pre-amplifier	ETS	3117-PA	00246148	2022-08-04	2024-08-03	
$\boxtimes$	AGC-EM-A119	2.4G Filter	SongYi	N/A	N/A	2023-06-01	2024-05-31	
$\boxtimes$	AGC-EM-A138	6dB Attenuator	Eeatsheep	LM-XX-6-5W	N/A	2023-06-09	2024-06-08	
	AGC-EM-A139	6dB Attenuator	Eeatsheep	LM-XX-6-5W	N/A	2023-06-09	2024-06-08	



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<ul><li>A</li></ul>	AC Power Line Conducted Emission								
Used	Equipment No.	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)		
$\boxtimes$	AGC-EM-E045	EMI Test Receiver	R&S	ESPI	101206	2023-06-03	2024-06-02		
$\boxtimes$	AGC-EM-A130	6dB Attenuator	Eeatsheep	LM-XX-6-5W	DC-6GZ	2023-06-09	2024-06-08		
$\boxtimes$	AGC-EM-E023	AMN	R&S	100086	ESH2-Z5	2023-06-03	2024-06-02		





• Te	Test Software							
Used	Equipment No.	Test Equipment	Manufacturer	Model No.	Version Information			
$\boxtimes$	AGC-EM-S001	CE Test System	R&S	ES-K1	V1.71			
	AGC-EM-S003	RE Test System	FARA	EZ-EMC	VRA-03A			
$\boxtimes$	AGC-ER-S012	BT/WIFI Test System	Tonscend	JS1120-2	2.6			
$\boxtimes$	AGC-EM-S011	RSE Test System	Tonscend	TS+-Ver2.1(JS36-RSE)	4.0.0.0			



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## **4.System Test Configuration**

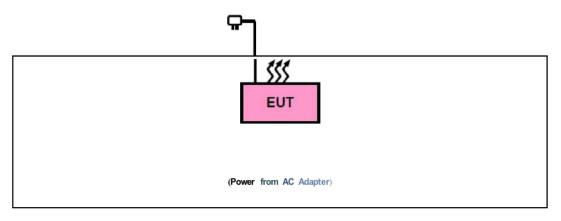
## 4.1 EUT Configuration

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

#### 4.2 EUT Exercise

The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

### 4.3 Configuration of Tested System



#### 4.4 Equipment Used in Tested System

The following peripheral devices and interface cables were connected during the measurement:

□ Test Accessories Come From The Laboratory

No.	Equipment	Model No.	Manufacturer	Specification Information	Cable
1	Redmi Notebook Adapter	AD100G	Redmi		
2	Redmi Notebook PC	XMA2002-AB	Redmi		
3	Control Box	USB-TTL			

Test Accessories Come From The Manufacturer

No.	Equipment	Model No.	Manufacturer	Specification Information	Cable
1			-		



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## 4.5 Summary of Test Results

Item	FCC Rules	Description of Test	Result
1	§15.203&15.247(b)(4)	Antenna Equipment	Pass
2	§15.247 (b)(1)	RF Output Power	Pass
3	§15.247 (a)(1)	6 dB Bandwidth	Pass
4	§15.247 (e)	Power Spectral Density	Pass
5	§15.247 (d)	Conducted Band Edge and Out-of-Band Emissions	Pass
6	§15.247 (d)&15.209	Radiated Spurious Emission	Pass
7	§15.207	AC Power Line Conducted Emission	Pass



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## 5. Description of Test Modes

Summary table of Test Cases					
	Data Rate / Modulation				
Test Item	2.4G WLAN – 802.11b/g/n/ax (DSSS/OFDM/OFDMA)				
	Mode 1: 802.11b_TX CH01_2412 MHz_1 Mbps				
	Mode 2: 802.11b_TX CH06_2437 MHz_1 Mbps				
	Mode 3: 802.11b_TX CH11_2462 MHz_1 Mbps				
	Mode 4: 802.11g_TX CH01_2412 MHz_6 Mbps				
	Mode 5: 802.11g_TX CH06_2437 MHz_6 Mbps				
	Mode 6: 802.11g_TX CH11_2462 MHz_6 Mbps				
	Mode 7: 802.11n-HT20_TX CH01_2412 MHz_MCS0 Mbps				
Radiated & Conducted	Mode 8: 802.11n-HT20_TX CH06_2437 MHz_ MCS0 Mbps				
Test Cases	Mode 9: 802.11n-HT20_TX CH11_2462 MHz_ MCS0 Mbps				
	Mode 10: 802.11ax-HE20_TX CH01_2412 MHz_MCS0 Mbps				
	Mode 11: 802.11ax-HE20_TX CH06_2437 MHz_ MCS0 Mbps				
	Mode 12: 802.11ax-HE20_TX CH11_2462 MHz_ MCS0 Mbps				
	Mode 13: 802.11n-HT40_TX CH03_2422 MHz_MCS0 Mbps				
	Mode 14: 802.11n-HT40_TX CH06_2437 MHz_ MCS0 Mbps				
	Mode 15: 802.11n-HT40_TX CH09_2452 MHz_ MCS0 Mbps				
AC Conducted Emission	Mode 1: 2.4G WLAN Link + Battery + USB Cable (Charging from AC Adapter)				

#### Note:

<sup>1.</sup> For Radiated Emission, 3axis were chosen for testing for each applicable mode.

<sup>2.</sup> For Conducted Test method, a temporary antenna connector is provided by the manufacture.



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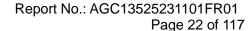
## 6. Duty Cycle Measurement

2.4GHz WLAN (DTS) operation is possible in 20MHz, and 40MHz channel bandwidths. The maximum achievable duty cycles for all modes were determined based on measurements performed on a spectrum analyzer in zero-span mode with RBW = 8MHz, VBW = 50MHz, and detector = Peak. The RBW and VBW were both greater than 50/T, where T is the minimum transmission duration, and the number of sweep points across T was greater than 100. The duty cycles are as follows:

Operating mode	Data rates (Mbps)	Duty Cycle (%)	Duty Cycle Factor (dB)	1/ T Minimum VBW (kHz)	Average Factor (dB)
IEEE 802.11b	1	93.37	0.3	3.1	-0.6
IEEE 802.11g	6	100			
IEEE 802.11n-HT20	MCS0	100			
IEEE 802.11n-HT40	MCS0	100			
IEEE 802.11ax-HE20	MCS0	100			

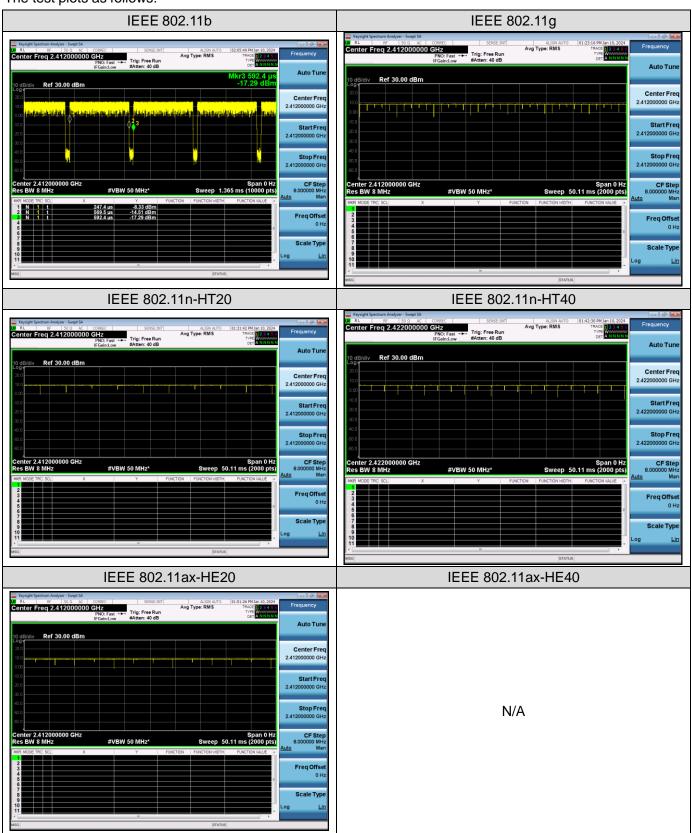
#### Remark:

- 1. Duty Cycle factor = 10 \* log (1/ Duty cycle)
- 2. Average factor = 20 log10 Duty Cycle
- 3. The duty cycle of each frequency band mode reflects the determination requirements of the low channel measurement value.





## The test plots as follows:



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## 7. RF Output Power Measurement

#### 7.1 Provisions Applicable

For DTSs employing digital modulation techniques operating in the bands 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1 W.

#### 7.2 Measurement Procedure

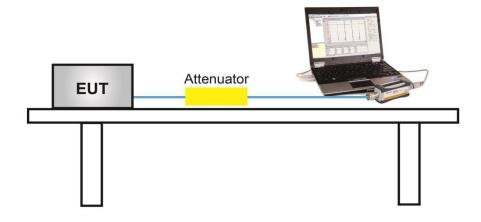
Method PM is Measurement using an RF Peak power meter. The procedure for this method is as follows:

- 1. The testing follows the ANSI C63.10 Section 11.9.1.3
- The maximum peak conducted output power may be measured using a broadband peak RF power meter.
   The power meter shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall use a fast-responding diode detector.

Method PM is Measurement using an RF average power meter. The procedure for this method is as follows:

- 1. The testing follows the ANSI C63.10 Section 11.9.2.3
- 2. Measurements may be performed using a wideband RF power meter with a thermocouple detector or equivalent if all of the following conditions are satisfied:
- 3. The EUT is configured to transmit continuously, or to transmit with a constant duty cycle.
- 4. At all times when the EUT is transmitting, it shall be transmitting at its maximum power control level.
- 5. The integration period of the power meter exceeds the repetition period of the transmitted signal by at least a factor of five.
- 6. Determine according to the duty cycle of the equipment: when it is less than 98%, follow the steps below.
- 7. Measure the average power of the transmitter. This measurement is an average over both the ON and OFF periods of the transmitter.
- 8. Adjust the measurement in dBm by adding [10 log (1 / D)], where D is the duty cycle {e.g., [10 log (1 / 0.25)], if the duty cycle is 25%}.
- 9. Record the test results in the report.

#### 7.3 Measurement Setup (Block Diagram of Configuration)





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#### 7.4 Measurement Result

Test Data of Conducted Output Power					
Test Mode	Test Frequency (MHz)	Average Power (dBm)	Peak Power (dBm)	Limits (dBm)	Pass or Fail
	2412	13.54	17.26	≤30	Pass
802.11b	2437	12.98	16.71	≤30	Pass
	2462	12.91	16.65	≤30	Pass
	2412	11.31	19.15	≤30	Pass
802.11g	2437	10.82	18.67	≤30	Pass
	2462	11.15	18.98	≤30	Pass
	2412	12.23	20.13	≤30	Pass
802.11n20	2437	10.79	18.70	≤30	Pass
	2462	11.07	19.05	≤30	Pass
	2422	10.66	18.48	≤30	Pass
802.11n40	2437	10.58	18.49	≤30	Pass
	2452	10.34	18.16	≤30	Pass
	2412	12.12	22.41	≤30	Pass
802.11ax20	2437	10.73	21.01	≤30	Pass
	2462	11.01	21.20	≤30	Pass



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#### 8. 6dB Bandwidth Measurement

#### 8.1 Provisions Applicable

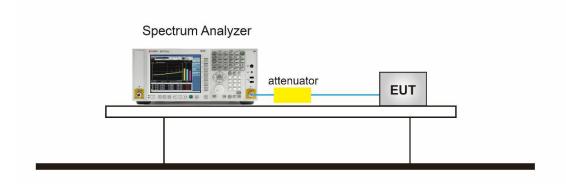
The minimum 6dB bandwidth shall be 500 kHz.

#### **8.2 Measurement Procedure**

The testing follows the ANSI C63.10 Section 6.9.3 (OBW) and 11.8.1 (6dB BW).

- The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss
  was compensated to the results for each measurement.
- 2. Set to the maximum power setting and enable the EUT transmit continuously.
- 3. For 6dB Bandwidth Measurement, the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. Set the Video bandwidth (VBW) = 300 kHz. In order to make an accurate measurement.
- For 99% Bandwidth Measurement, the spectrum analyzer's resolution bandwidth (RBW) is set 1-5% of the OBW and set the Video bandwidth (VBW) ≥ 3 \* RBW.
- 5. Detector = peak
- 6. Trace mode = max hold.
- 7. Sweep = auto couple.
- 8. Allow the trace to stabilize.
- 9. Measure and record the results in the test report.

#### 8.3 Measurement Setup (Block Diagram of Configuration)

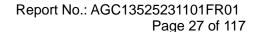




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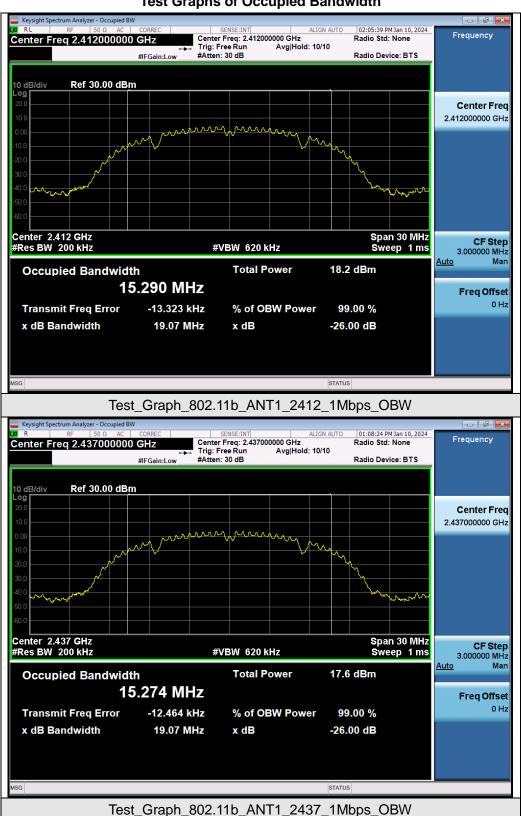
#### 8.4 Measurement Result

Test Data of Occupied Bandwidth and DTS Bandwidth						
Test Mode	Test Frequency (MHz)	99% Occupied Bandwidth (MHz)	DTS Bandwidth (MHz)	DTS Bandwidth Limits (MHz)	Pass or Fail	
	2412	15.290	10.009	≥0.5	Pass	
802.11b	2437	15.274	10.021	≥0.5	Pass	
	2462	15.263	10.028	≥0.5	Pass	
	2412	16.476	16.302	≥0.5	Pass	
802.11g	2437	16.476	16.076	≥0.5	Pass	
	2462	16.472	16.297	≥0.5	Pass	
	2412	17.642	16.915	≥0.5	Pass	
802.11n20	2437	17.633	16.928	≥0.5	Pass	
	2462	17.634	17.298	≥0.5	Pass	
	2422	35.800	33.819	≥0.5	Pass	
802.11n40	2437	35.804	35.033	≥0.5	Pass	
	2452	35.806	33.817	≥0.5	Pass	
	2412	18.867	18.608	≥0.5	Pass	
802.11ax20	2437	18.865	18.642	≥0.5	Pass	
	2462	18.860	17.985	≥0.5	Pass	

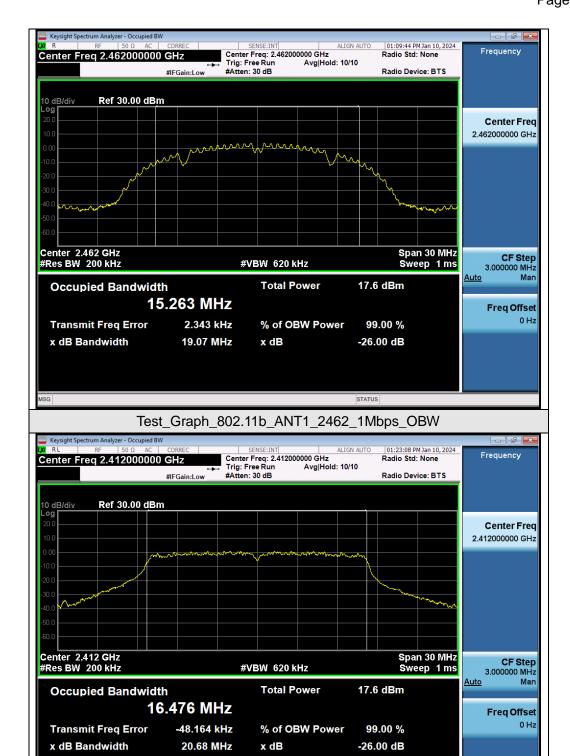




## **Test Graphs of Occupied Bandwidth**

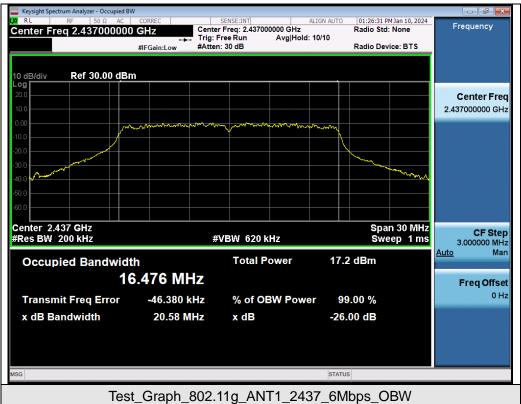






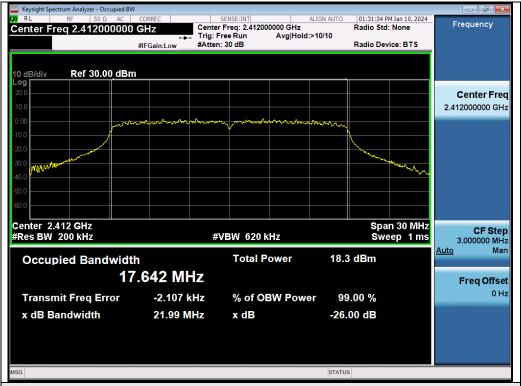
Test\_Graph\_802.11g\_ANT1\_2412\_6Mbps\_OBW

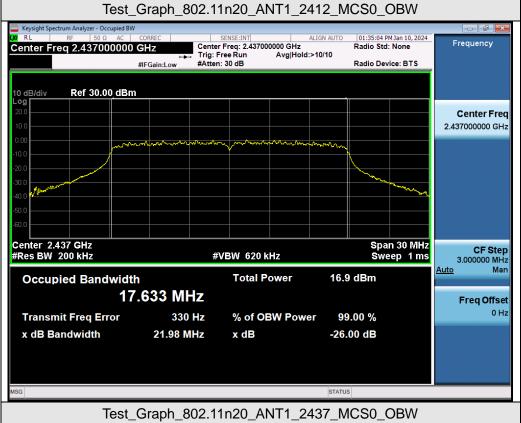




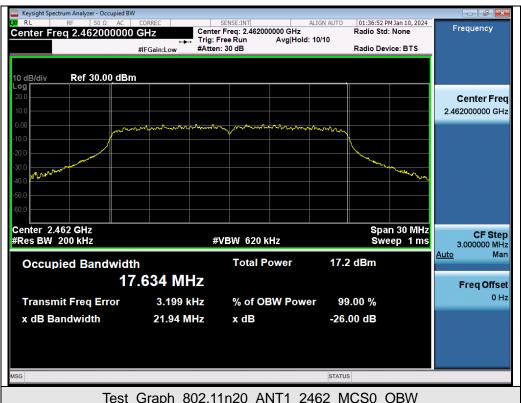


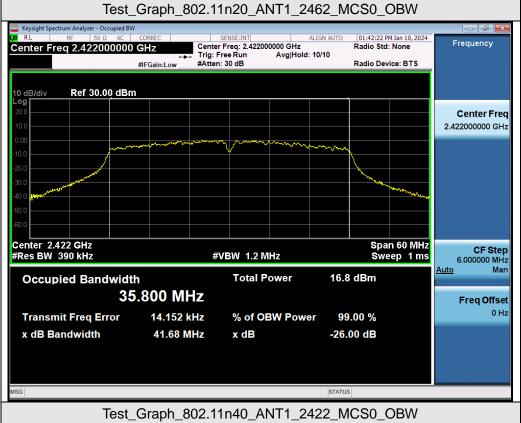


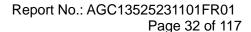




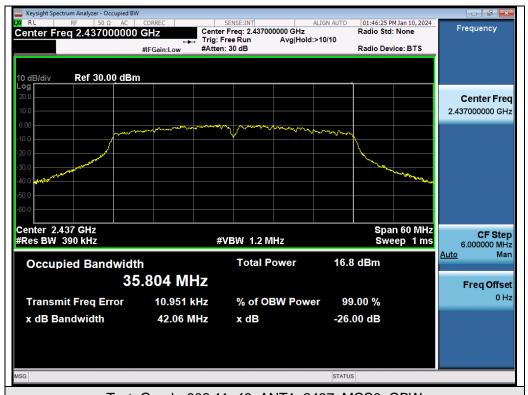






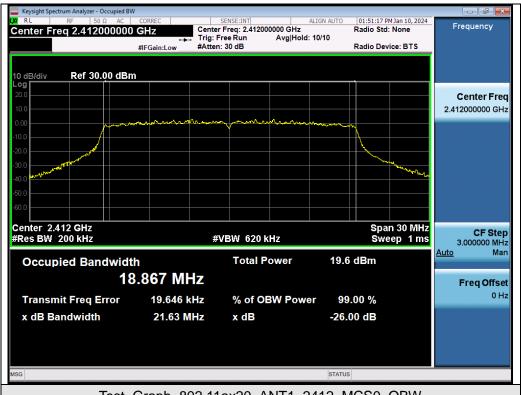


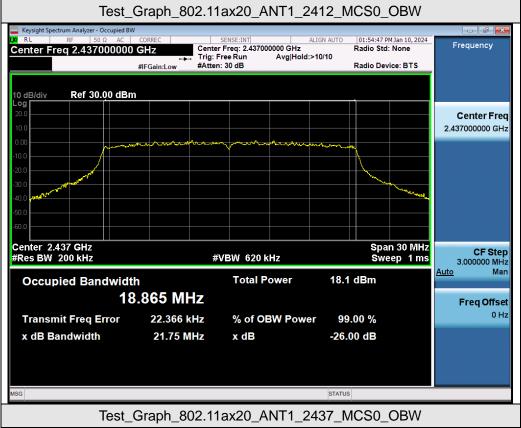




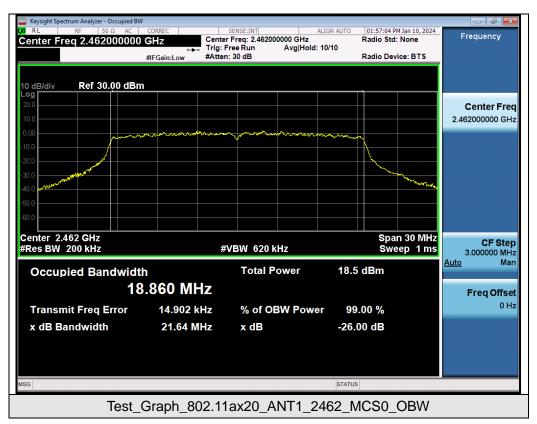












## Test Graphs of DTS Bandwidth



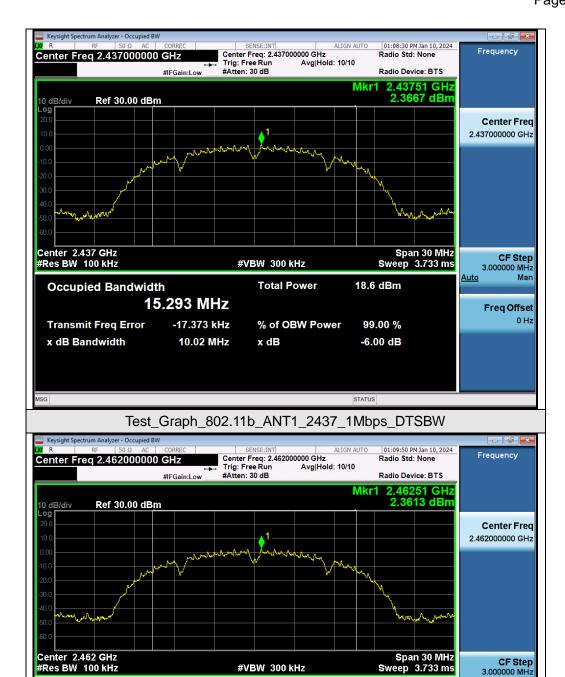
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<u>Auto</u>

Mar

Freq Offset 0 Hz





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Test\_Graph\_802.11b\_ANT1\_2462\_1Mbps\_DTSBW

#VBW 300 kHz

x dB

**Total Power** 

% of OBW Power

18.6 dBm

99.00 %

-6.00 dB

**Occupied Bandwidth** 

**Transmit Freq Error** x dB Bandwidth

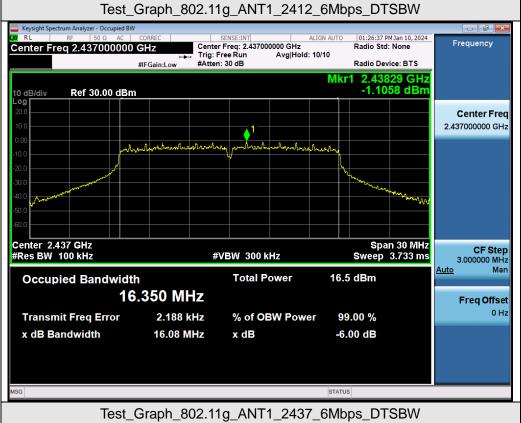
15.282 MHz

-1.170 kHz

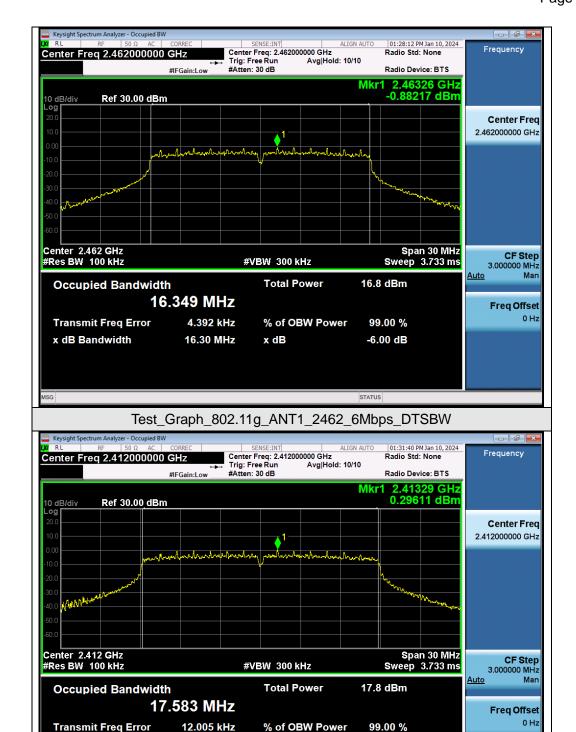
10.03 MHz











Test\_Graph\_802.11n20\_ANT1\_2412\_MCS0\_DTSBW

x dB

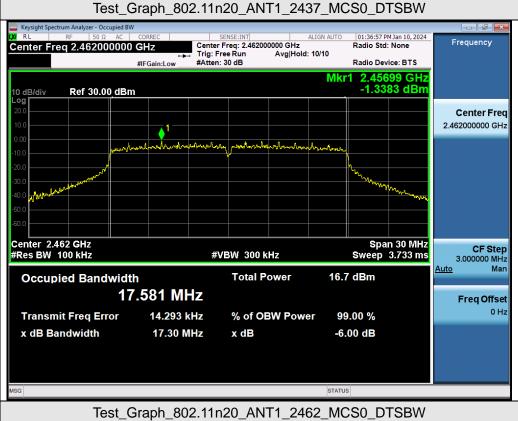
-6.00 dB

16.91 MHz

x dB Bandwidth







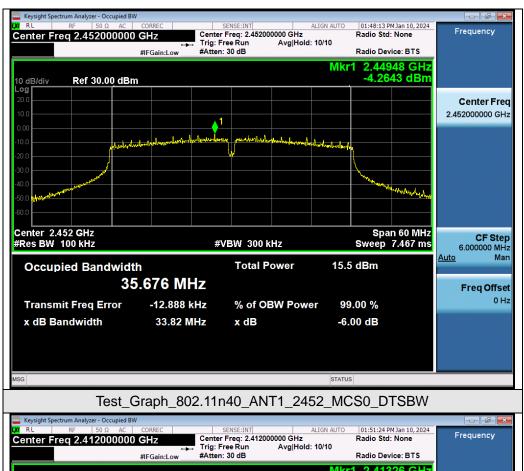
Tel: +86-755 2523 4088 E-mail: agc@agccert.com Web: http://www.agccert.com/

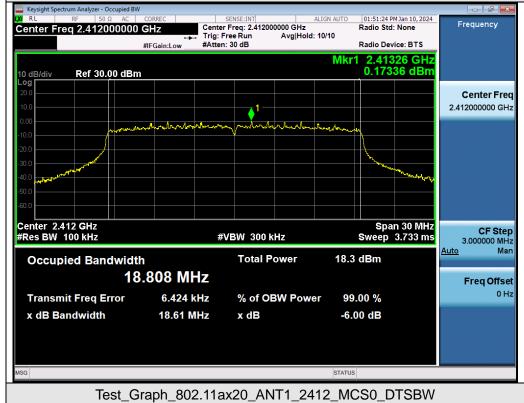








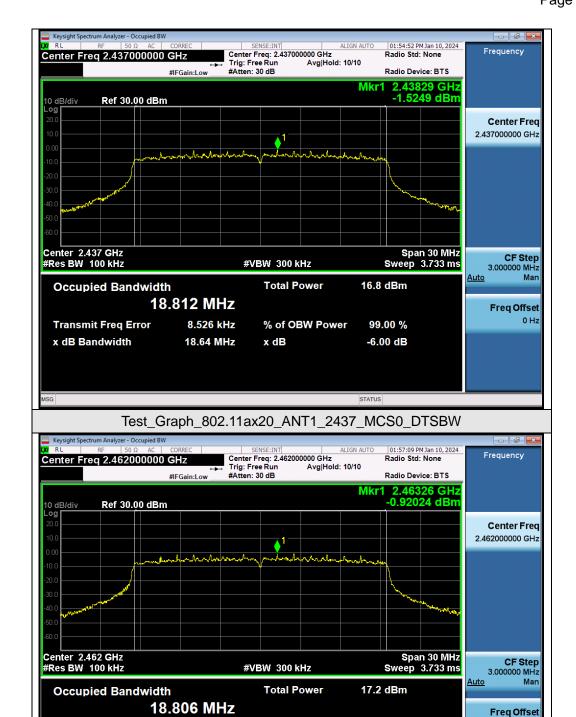




Tel: +86-755 2523 4088 E-mail: agc@agccert.com Web: http://www.agccert.com/

0 Hz





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Test\_Graph\_802.11ax20\_ANT1\_2462\_MCS0\_DTSBW

% of OBW Power

x dB

99.00 %

-6.00 dB

13.829 kHz

17.98 MHz

Transmit Freq Error x dB Bandwidth



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9. Power Spectral Density Measurement

### 9.1 Provisions Applicable

The transmitter power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

#### 9.2 Measurement Procedure

⊠For Peak power spectral density test:

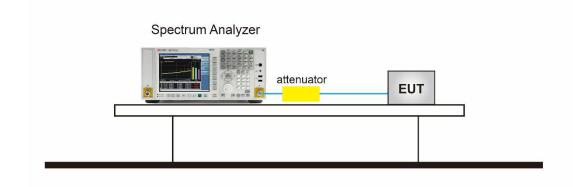
- 1. The testing follows the ANSI C63.10 Section 11.10.2 Method PKPSD.
- 2. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
- 3. Set the RBW = 20 kHz.
- 4. Set the VBW  $\geq$  [3 × RBW].
- 5. Set the Span ≥ [1.5 × DTS bandwidth].
- 6. Sweep time=Auto couple.
- 7. Detector function=Peak.
- 8. Trace Mode=Max hold.
- When the measurement bandwidth of Maximum PSD is specified in 3 kHz, add a constant factor 10\*log(3kHz/20kHz) = -8.23 dB to the measured result.
- 10. Allow trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission.
- 11. The indicated level is the peak output power, after any corrections for external attenuators and cables.
- For Average power spectral density test:
- 1. The testing follows the ANSI C63.10 Section 11.10.5 Method AVPSD.
- 2. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator.
- Set Span to at least 1.5 times the OBW.
- 4. Set RBW to:3 kHz ≤ RBW ≤ 100 kHz.
- 5. Set VBW≥[3×RBW].
- 6. Sweep Time=Auto couple.
- 7. Detector function=RMS (i.e., power averaging).
- 8. Trace average at least 100 traces in power averaging (rms) mode.
- 9. When the measurement bandwidth of Maximum PSD is specified in 3 kHz, add a constant factor 10\*log(3kHz/20kHz) = -8.23 dB to the measured result.
- 10. Determine according to the duty cycle of the equipment: when it is less than 98%, follow the steps below.
- 11. Add [10 log (1 / D)], where D is the duty cycle, to the measured power to compute the average power during the actual transmission times (because the measurement represents an average over both the ON and OFF times of the transmission). For example, add [10 log (1/0.25)] = 6 dB if the duty cycle is 25%.
- 12. Record the test results in the report.



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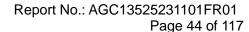
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# 9.3 Measurement Setup (Block Diagram of Configuration)



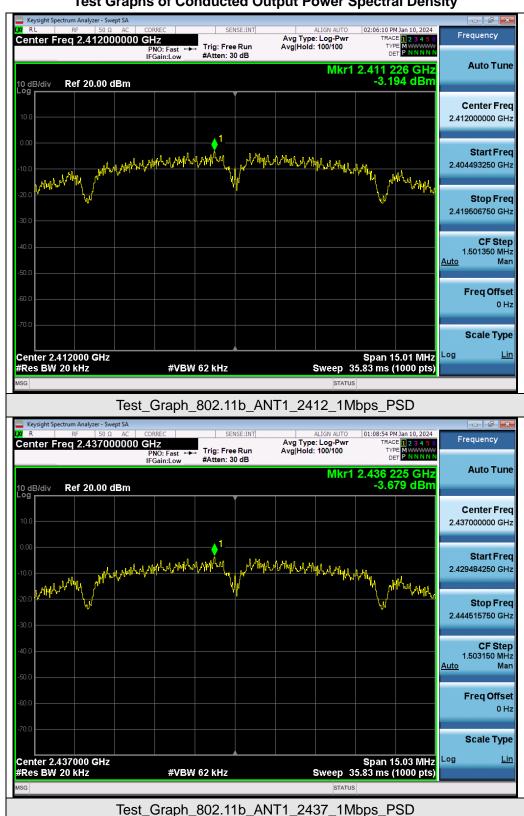
### 9.4 Measurement Result

Test Data of Conducted Output Power Spectral Density						
Test Mode	Test Frequency (MHz)	Power Spectral density (dBm/20kHz)	Power Spectral density (dBm/3kHz)	Limit (dBm/3kHz)	Pass or Fail	
	2412	-3.194	-11.433	≤8	Pass	
802.11b	2437	-3.679	-11.918	≪8	Pass	
	2462	-3.846	-12.085	≤8	Pass	
802.11g	2412	-7.364	-15.603	≤8	Pass	
	2437	-7.821	-16.06	≤8	Pass	
	2462	-7.448	-15.687	≤8	Pass	
802.11n20	2412	-5.269	-13.508	≤8	Pass	
	2437	-7.061	-15.3	≤8	Pass	
	2462	-6.417	-14.656	≤8	Pass	
	2422	-8.445	-16.684	≤8	Pass	
802.11n40	2437	-8.423	-16.662	≤8	Pass	
	2452	-8.908	-17.147	≤8	Pass	
802.11ax20	2412	-5.084	-13.323	≤8	Pass	
	2437	-6.313	-14.552	≤8	Pass	
	2462	-6.129	-14.368	≤8	Pass	



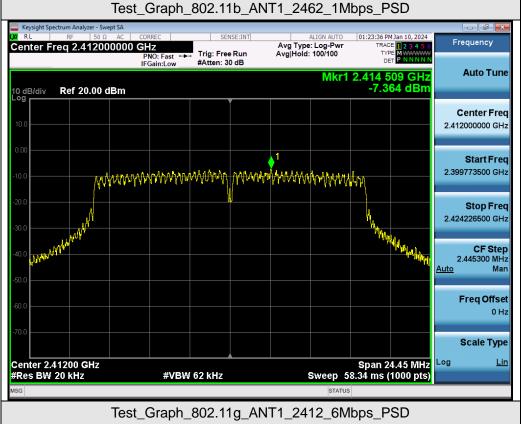


# **Test Graphs of Conducted Output Power Spectral Density**

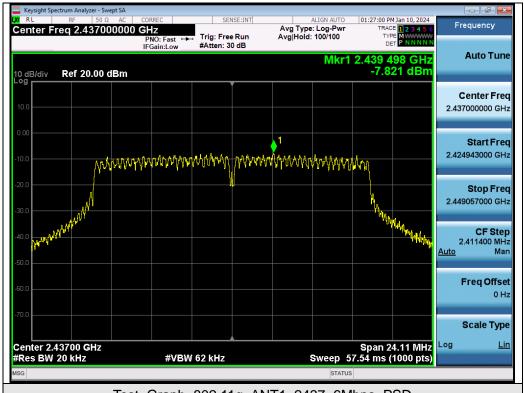


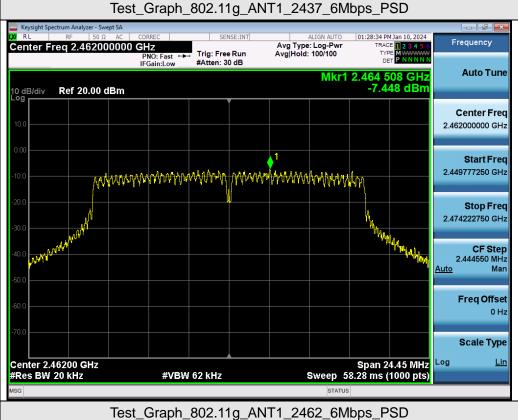




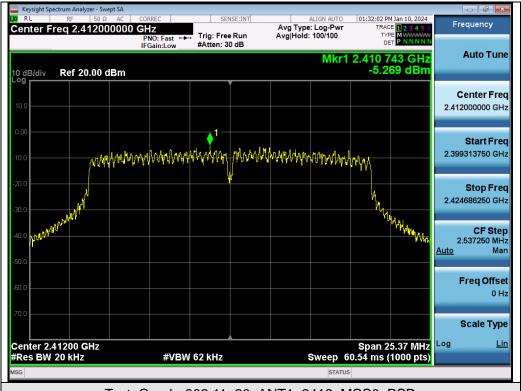


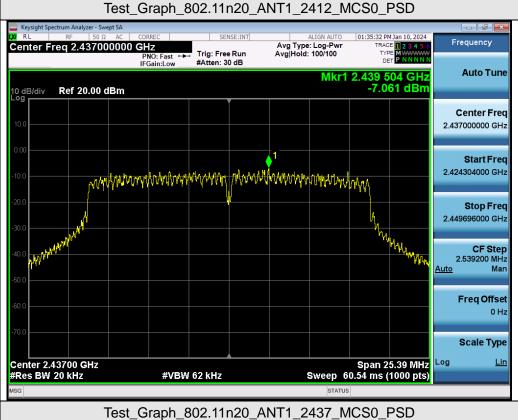










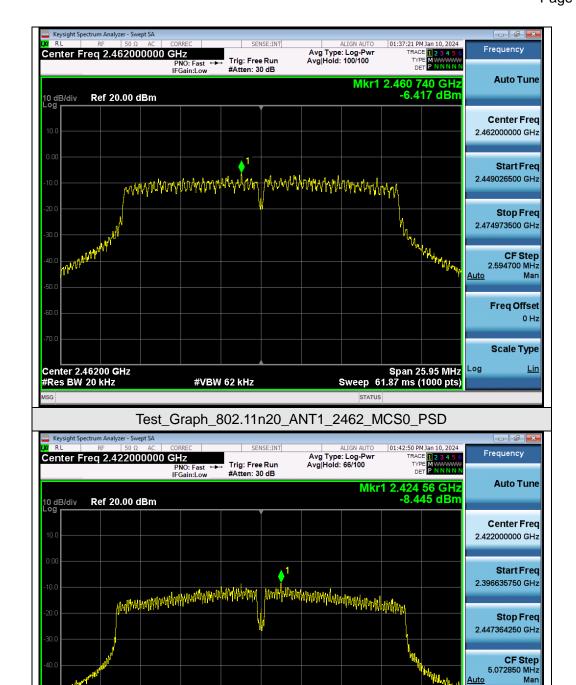


Freq Offset 0 Hz

Scale Type

Span 50.73 MHz Sweep 120.9 ms (1000 pts)





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Test\_Graph\_802.11n40\_ANT1\_2422\_MCS0\_PSD

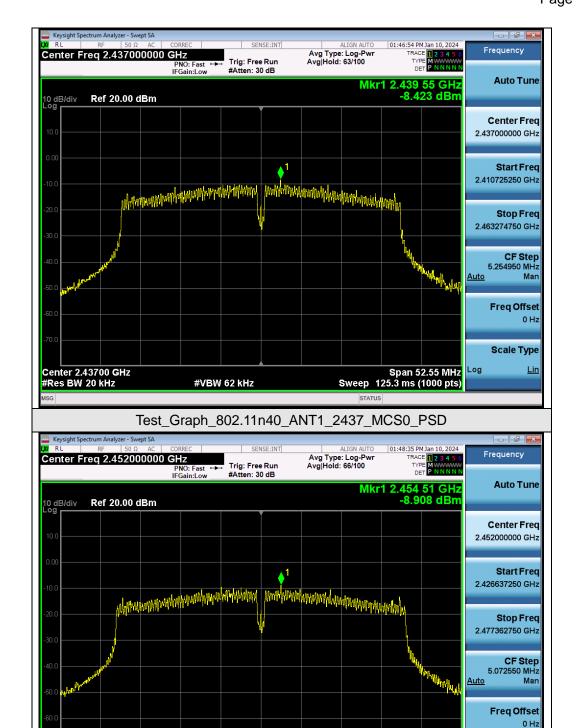
#VBW 62 kHz

Center 2.42200 GHz #Res BW 20 kHz

Scale Type

Span 50.73 MHz Sweep 120.9 ms (1000 pts)





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Test\_Graph\_802.11n40\_ANT1\_2452\_MCS0\_PSD

**#VBW** 62 kHz

Center 2.45200 GHz #Res BW 20 kHz

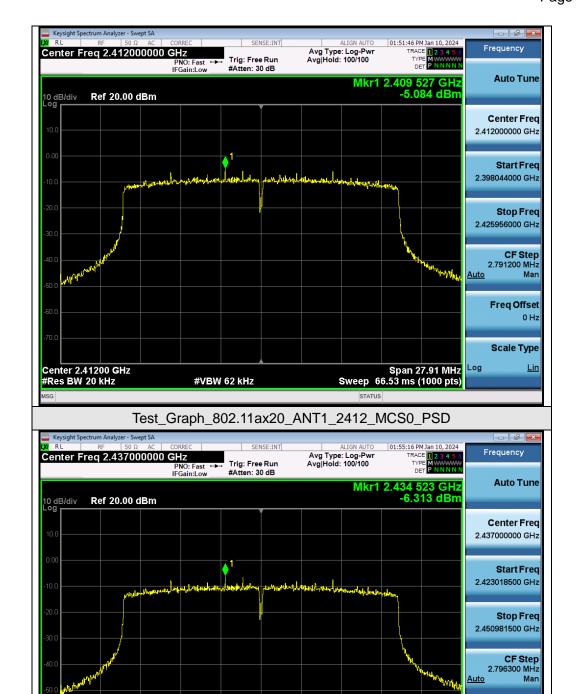
Freq Offset 0 Hz

Scale Type

Log

Span 27.96 MHz Sweep 66.67 ms (1000 pts)





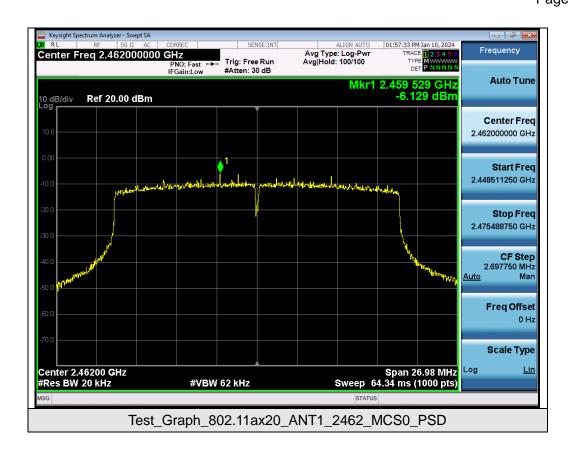
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Test\_Graph\_802.11ax20\_ANT1\_2437\_MCS0\_PSD

**#VBW** 62 kHz

Center 2.43700 GHz #Res BW 20 kHz







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# 10. Conducted Band Edge and Out-of-Band Emissions

### 10.1 Provisions Applicable

In any 100kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator in operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power.

#### 10.2 Measurement Procedure

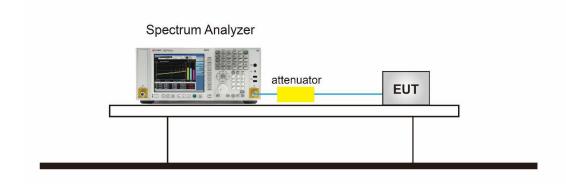
Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

Use the following spectrum analyzer settings:

- Step 1: Measurement Procedure In-Band Reference Level
  - 1. Set instrument center frequency to DTS channel center frequency.
  - 2. Set the span to ≥ 1.5 times the DTS bandwidth.
  - 3. Set the  $\overrightarrow{RBW} = 100 \text{ kHz}$ .
  - 4. Set the VBW  $\geq$  3 x RBW.
  - 5. Detector = peak.
  - 6. Sweep time = auto couple.
  - 7. Trace mode = max hold.
  - 8. Allow trace to fully stabilize.
  - 9. Use the peak marker function to determine the maximum PSD level.
  - 10. Note that the channel found to contain the maximum PSD level can be used to establish the reference level.
- Step 2: Measurement Procedure Out of Band Emission
  - 1. Set RBW = 100 kHz.
  - 2. Set VBW ≥ 300 kHz.
  - 3. Detector = peak.
  - 4. Sweep = auto couple.
  - 5. Trace Mode = max hold.
  - 6. Allow trace to fully stabilize.
  - Use the peak marker function to determine the maximum amplitude level.

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

## 10.3 Measurement Setup (Block Diagram of Configuration)





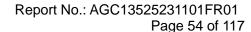
Report No.: AGC13525231101FR01

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## 10.4 Measurement Result

Test Mode	Test Frequency (MHz)	Reference level (dBm)	-20dB Limits (dBm)	
	2412	2.9459	-17.05	
IEEE 802.11b	2437	2.3667	-17.63	
	2462	2.3613	-17.64	
	2412	-0.75259	-20.75	
IEEE 802.11g	2437	-1.1058	-21.11	
	2462	-0.88217	-20.88	
	2412	0.29611	-19.70	
IEEE 802.11n-HT20	2437	-1.4679	-21.47	
	2462	-1.3383	-21.34	
	2422	-3.8801	-23.88	
IEEE 802.11n-HT40	2437	-4.1077	-24.11	
	2452	-4.2643	-24.26	
	2412	0.17336	-19.83	
IEEE 802.11ax-HE20	2437	-1.5249	-21.52	
	2462	-0.92024	-20.92	

Note: The reference level please see the power of DTS Bandwidth.





## Test Graphs of Spurious Emissions in Non-Restricted Frequency Bands



