

TEST REPORT

FCC ID: 2AJTZD61

Product: inkBOOK Classic 2

Model No.: D61

Additional Model No.: N/A

Trade Mark: inkBOOK

Report No.: TCT160830E021

Issued Date: Sep. 22, 2016

Issued for:

Arta Tech Pawel Horbaczewski ul. Rybacka 9, 53-656 Wroclaw, Poland

Issued By:

Shenzhen Tongce Testing Lab.

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1. Test Certification

Product:	inkBOOK Classic 2
Model No.:	D61
Additional Model No.:	N/A (3)
Applicant:	Arta Tech Pawel Horbaczewski
Address:	ul. Rybacka 9, 53-656 Wroclaw, Poland
Manufacturer:	Arta Tech Pawel Horbaczewski
Address:	ul. Rybacka 9, 53-656 Wroclaw, Poland
Date of Test:	Aug. 30 – Sep. 21, 2016
Applicable Standards:	FCC CFR Title 47 Part 15 Subpart C Section 15.247 KDB 558074 D01 DTS Meas Guidance v03r05

The above equipment has been tested by Shenzhen Tongce Testing Lab. and found compliance with the requirements set forth in the technical standards mentioned above. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Tested By:

Beryl Zhao

Beryl Zhao

Date: Sep. 21, 2016

Beryl Zhao

Date: Sep. 22, 2016

Approved By:

Date: Sep. 22, 2016

Tomsin



2. Test Result Summary

Requirement	CFR 47 Section	Result
Antenna requirement	§15.203/§15.247 (c)	PASS
AC Power Line Conducted Emission	§15.207	PASS
Conducted Peak Output Power	§15.247 (b)(3) §2.1046	PASS
6dB Emission Bandwidth	§15.247 (a)(2) §2.1049	PASS
Power Spectral Density	§15.247 (e)	PASS
Band Edge	1§5.247(d) §2.1051, §2.1057	PASS
Spurious Emission	§15.205/§15.209 §2.1053, §2.1057	PASS

Note:

- 1. PASS: Test item meets the requirement.
- 2. Fail: Test item does not meet the requirement.
- 3. N/A: Test case does not apply to the test object.
- 4. The test result judgment is decided by the limit of test standard.



3. EUT Description

Product Name:	inkBOOK Classic 2
Model:	D61
Additional Model:	N/A
Trade Mark:	inkBOOK
Operation Frequency:	2412MHz~2462MHz (802.11b/802.11g/802.11n(HT20)) 2422MHz~2452MHz (802.11n(HT40))
Channel Separation:	5MHz
Number of Channel:	11 for 802.11b/802.11g/802.11n(HT20) 7 for 802.11n(HT40)
Modulation Technology: (IEEE 802.11b)	Direct Sequence Spread Spectrum (DSSS)
Modulation Technology: (IEEE 802.11g/802.11n)	Orthogonal Frequency Division Multiplexing(OFDM)
Data speed (IEEE 802.11b):	1Mbps, 2Mbps, 5.5Mbps, 11Mbps
Data speed (IEEE 802.11g):	6Mbps, 9Mbps, 12Mbps, 18Mbps, 24Mbps, 36Mbps, 48Mbps, 54Mbps
Data speed (IEEE 802.11n):	Up to 150Mbps
Antenna Type:	Internal Antenna
Antenna Gain:	2dBi
Power Supply:	Rechargeable Li-ion Battery DC3.7V

Operation Frequency each of channel For 802.11b/g/n(HT20)

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2412MHz	4	2427MHz	7	2442MHz	10	2457MHz
2	2417MHz	5	2432MHz	8	2447MHz	11	2462MHz
3	2422MHz	6	2437MHz	9	2452MHz	(0)	

Operation Frequency each of channel For 802.11n (HT40)

					A A 1 - 1		
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
		4	2427MHz	7	2442MHz		
		5	2432MHz	8	2447MHz		
3	2422MHz	6	2437MHz	9	2452MHz		



Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

802.11b/802.11g/802.11n (HT20)

Channel	Frequency
The lowest channel	2412MHz
The middle channel	2437MHz
The Highest channel	2462MHz

802.11n (HT40)

Channel	Frequency
The lowest channel	2422MHz
The middle channel	2437MHz
The Highest channel	2452MHz





4. Genera Information

4.1. Test environment and mode

25.0 °C
56 % RH
1010 mbar
Keep the EUT in continuous transmitting by select channel and modulations(The value of duty cycle is 98.46%)

The sample was placed (0.8m below 1GHz, 1.5m above 1GHz) above the ground plane of 3m chamber. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating the turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages.

We have verified the construction and function in typical operation. All the test modes were carried out with the EUT in transmitting operation, which was shown in this test report and defined as follows:

Per-scan all kind of data rate in lowest channel, and found the follow list which it was worst case.

Data rate		
1Mbps		
6Mbps		
6.5Mbps		
13.5Mbps		

Final Test Mode:

Operation mode:	Keep the EUT in continuous transmitting	
	with modulation	

According to ANSI C63.4 standards, the test results are both the "worst case" and "worst setup" 1Mbps for 802.11b, 6Mbps for 802.11g, 6.5Mbps for 802.11n(H20), 13.5Mbps for 802.11(H40). Duty cycle setting during the transmission is 98.5% with maximum power setting for all modulations.



4.2. Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Equipment	Model No.	Serial No.	FCC ID	Trade Name
Notebook	G485	1	1	Lenovo

Note:

- 1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
- 2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.
- 3. For conducted measurements (Output Power, 6dB Emission Bandwidth, Power Spectral Density, Spurious Emissions), the antenna of EUT is connected to the test equipment via temporary antenna connector, the antenna connector is soldered on the antenna port of EUT, and the temporary antenna connector is listed in the Test Instruments.



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5. Facilities and Accreditations

5.1. Facilities

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

• FCC - Registration No.: 572331

Shenzhen Tongce Testing Lab

The 3m Semi-anechoic chamber has been registered and fully described in a report with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files.

IC - Registration No.: 10668A-1

The 3m Semi-anechoic chamber of Shenzhen TCT Testing Technology Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing

CNAS - Registration No.: CNAS L6165
 Shenzhen TCT Testing Technology Co., Ltd. is accredited to ISO/IEC 17025:2005
 General Requirements for the Competence of Testing and Calibration laboratories for

the competence of testing. The Registration No. is CNAS L6165.

5.2. Location

Shenzhen Tongce Testing Lab

Address: 1F, Leinuo Watch Building, Fuyong Town, Baoan Dist, Shenzhen, China

Tel: 86-755-36638142

5.3. Measurement Uncertainty

The reported uncertainty of measurement $y \pm U$, 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 %.

No.	Item	MU
1	Conducted Emission	±2.56dB
2	RF power, conducted	±0.12dB
3	Spurious emissions, conducted	±0.11dB
4	All emissions, radiated(<1G)	±3.92dB
5	All emissions, radiated(>1G)	±4.28dB
6	Temperature	±0.1°C
7	Humidity	±1.0%





6. Test Results and Measurement Data

6.1. Antenna requirement

Standard requirement: FCC Part15 C Section 15.203 /247(c)

15.203 requirement:

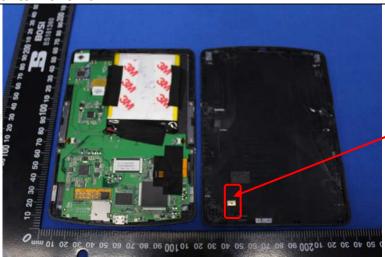
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit 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(c) (1)(i) requirement:

(i) Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.

E.U.T Antenna:

The EUT antenna is an internal antenna which permanently attached, and the best case gain of the antenna is 2dBi.



Antenna

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6.2. Conducted Emission

6.2.1. Test Specification

Test Requirement:	FCC Part15 C Section	15.207				
Test Method:	ANSI C63.10:2013					
Frequency Range:	150 kHz to 30 MHz					
Receiver setup:	RBW=9 kHz, VBW=30 kHz, Sweep time=auto					
Limits:	Frequency range (MHz) 0.15-0.5 0.5-5 5-30	Limit (d Quasi-peak 66 to 56* 56 60	BuV) Average 56 to 46* 46 50			
Test Setup:	Reference Plane 40cm 80cm Filter AC power E.U.T AC power EMI Receiver Remark: E.U.T. Equipment Under Test LISN: Line Impedence Stabilization Network Test table height=0.8m					
Test Mode:	Charging + transmitting	g with modulation				
Test Procedure:	 The E.U.T and simulation power through a line (L.I.S.N.). This proimpedance for the m The peripheral device power through a LI-coupling impedance refer to the block photographs). Both sides of A.C. conducted interference emission, the relative the interface cables ANSI C63.10: 2013 	e impedance stability in the stability impedance stability in the stabilit	lization network (50uH coupling ent. cted to the main a 50ohm/50uH ination. (Please test setup and d for maximum d the maximum pment and all of ed according to			
Test Result:	PASS					



6.2.2. Test Instruments

Conducted Emission Shielding Room Test Site (843)						
Equipment Manufacturer Model Serial Number Calibration						
EMI Test Receiver	R&S	ESCS30	100139	Aug. 11, 2017		
LISN	Schwarzbeck	NSLK 8126	8126453	Aug. 16, 2017		
Coax cable	ТСТ	CE-05	N/A	Aug. 11, 2017		
EMI Test Software	Shurple Technology	EZ-EMC	N/A	N/A		

Note: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).



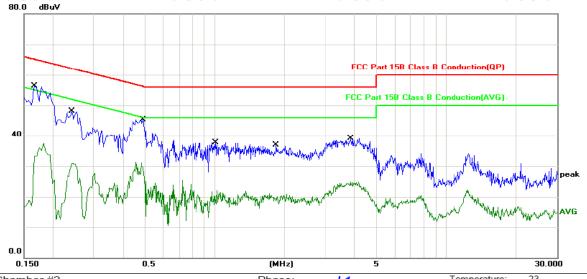




6.2.3. Test data

Please refer to following diagram for individual

Conducted Emission on Line Terminal of the power line (150 kHz to 30MHz)



Site Chamber #2	Phase:	L1	remperature:	23
Limit: FCC Part 15B Class B Conduction(QP)	Power:		Humidity: 54	1 %

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBu∀	dB	Detector	Comment
1	*	0.1660	39.01	11.49	50.50	65.15	-14.65	QP	
2		0.1660	17.81	11.49	29.30	55.15	-25.85	AVG	
3		0.2420	32.18	11.45	43.63	62.02	-18.39	QP	
4		0.2420	17.27	11.45	28.72	52.02	-23.30	AVG	
5		0.4900	29.55	11.31	40.86	56.17	-15.31	QP	
6		0.4900	15.31	11.31	26.62	46.17	-19.55	AVG	
7		1.0100	20.59	11.21	31.80	56.00	-24.20	QP	
8		1.0100	6.45	11.21	17.66	46.00	-28.34	AVG	
9		1.8420	18.59	11.63	30.22	56.00	-25.78	QP	
10		1.8420	7.14	11.63	18.77	46.00	-27.23	AVG	
11		3.8780	21.57	11.02	32.59	56.00	-23.41	QP	
12		3.8780	12.42	11.02	23.44	46.00	-22.56	AVG	

Note:

Freq. = Emission frequency in MHz

Reading level $(dB\mu V)$ = Receiver reading

Corr. Factor (dB) = Antenna factor + Cable loss

Measurement $(dB\mu V)$ = Reading level $(dB\mu V)$ + Corr. Factor (dB)

Limit (dBµV) = Limit stated in standard

 $Margin (dB) = Measurement (dB\mu V) - Limits (dB\mu V)$

Q.P. =Quasi-Peak

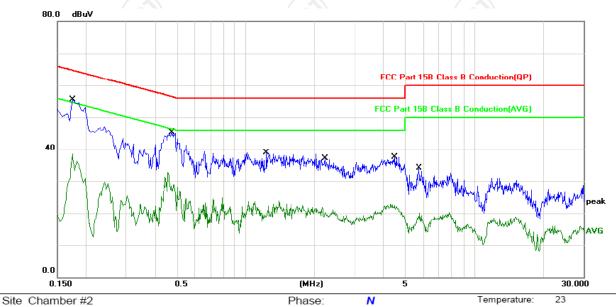
AVG =average

^{*} is meaning the worst frequency has been tested in the frequency range 150 kHz to 30MHz.



Humidity:

Conducted Emission on Neutral Terminal of the power line (150 kHz to 30MHz)



Limit: FCC Part 15B Class B Conduction(QP) Power:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	*	0.1740	39.70	11.48	51.18	64.76	-13.58	QP	
2		0.1740	21.04	11.48	32.52	54.76	-22.24	AVG	
3		0.4780	31.45	11.32	42.77	56.37	-13.60	QP	
4		0.4780	17.71	11.32	29.03	46.37	-17.34	AVG	
5		1.2300	20.57	11.32	31.89	56.00	-24.11	QP	
6		1.2300	7.43	11.32	18.75	46.00	-27.25	AVG	
7		2.2139	20.10	11.62	31.72	56.00	-24.28	QP	
8		2.2139	7.85	11.62	19.47	46.00	-26.53	AVG	
9		4.4899	19.44	10.81	30.25	56.00	-25.75	QP	
10		4.4899	10.48	10.81	21.29	46.00	-24.71	AVG	
11		5.7220	15.85	10.74	26.59	60.00	-33.41	QP	
12		5.7220	8.22	10.74	18.96	50.00	-31.04	AVG	

Note:

Freq. = Emission frequency in MHz

Reading level $(dB\mu V)$ = Receiver reading

Corr. Factor (dB) = Antenna factor + Cable loss

Measurement $(dB\mu V)$ = Reading level $(dB\mu V)$ + Corr. Factor (dB)

Limit (dBµV) = Limit stated in standard

 $Margin (dB) = Measurement (dB\mu V) - Limits (dB\mu V)$

Q.P. =Quasi-Peak

AVG =average

^{*} is meaning the worst frequency has been tested in the frequency range 150 kHz to 30MHz.



6.3. Maximum Conducted (Average) Output Power

6.3.1. Test Specification

Test Requirement:	FCC Part15 C Section 15.247 (b)(3), CFR part 2.1046
rest Requirement.	1 CC 1 att 13 C Section 13.247 (b)(3), Cl 13 part 2.1040
Test Method:	KDB 558074 D01 DTS Meas Guidance v03r05
Limit:	30dBm
Test Setup:	Spectrum Analyzer EUT
Test Mode:	Transmitting mode with modulation
Test Procedure:	 The testing follows the Measurement Procedure of FCC KDB No. 558074 DTS D01 Meas. Guidance v03r05. 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. Set to the maximum power setting and enable the EUT transmit continuously. Measure the conducted output power and record the results in the test report.
Test Result:	PASS

6.3.2. Test Instruments

Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	N9020A	MY49100060	Aug. 12, 2017
RF cable	TCT	RE-06	N/A	Aug. 12, 2017
Antenna Connector	тст	RFC-01	N/A	Aug. 12, 2017

Note: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).

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6.3.3. Test Data

802.11b mode							
Test channel	Maximum Conducted (Average) Output Power (dBm)	Limit (dBm)	Result				
Lowest	9.28	30.00	PASS				
Middle	9.67	30.00	PASS				
Highest	9.73	30.00	PASS				

802.11g mode						
Test channel	Maximum Conducted (Average) Output Power (dBm)	Limit (dBm)	Result			
Lowest	7.61	30.00	PASS			
Middle	7.81	30.00	PASS			
Highest	7.97	30.00	PASS			

802.11n(H20) mode						
Test channel	Maximum Conducted (Average) Output Power (dBm)	Limit (dBm)	Result			
Lowest	7.92	30.00	PASS			
Middle	7.54	30.00	PASS			
Highest	9.10	30.00	PASS			

802.11n(H40) mode						
Test channel	Maximum Conducted (Average) Output Power (dBm)	Limit (dBm)	Result			
Lowest	6.19	30.00	PASS			
Middle	6.33	30.00	PASS			
Highest	6.86	30.00	PASS			

Test plots as follows:



802.11b Modulation

Lowest channel



Middle channel



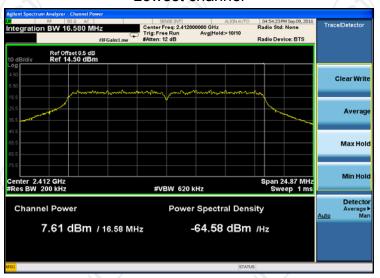
Highest channel





802.11g Modulation

Lowest channel



Middle channel



Highest channel





802.11n (HT20) Modulation

Lowest channel



Middle channel



Highest channel





802.11n (HT40) Modulation

Lowest channel



Middle channel



Highest channel





6.4. Emission Bandwidth

6.4.1. Test Specification

Test Requirement:	FCC Part15 C Section 15.247 (a)(2), CFR part 2.1049			
Test Method:	KDB 558074 D01 DTS Meas Guidance v03r05			
Limit:	>500kHz			
Test Setup:				
	Spectrum Analyzer EUT			
Test Mode:	Transmitting mode with modulation			
Test Procedure:	 The testing follows FCC KDB Publication No. 558074 DTS D01 Meas. Guidance v03r05. Set to the maximum power setting and enable the EUT transmit continuously. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. Set the Video bandwidth (VBW) = 300 kHz. In order to make an accurate measurement. The 6dB bandwidth must be greater than 500 kHz. Measure and record the results in the test report. 			
Test Result:	PASS			

6.4.2. Test Instruments

RF Test Room				
Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	N9020A	MY49100060	Aug. 12, 2017
RF cable	тст	RE-06	N/A	Aug. 12, 2017
Antenna Connector	тст	RFC-01	N/A	Aug. 12, 2017

Note: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).

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6.4.3. Test data

Test channel	6dB Emission Bandwidth (MHz)			
	802.11b	802.11g	802.11n(H20)	802.11n(H40)
Lowest	9.56	16.39	17.62	36.01
Middle	10.07	16.44	17.63	36.06
Highest	10.05	16.43	17.61	35.98
Limit:	>500k			
Test Result:	PASS			



802.11b Modulation

Lowest channel



Middle channel



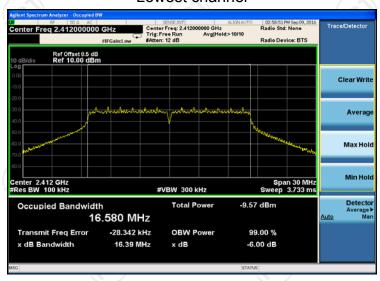
Highest channel



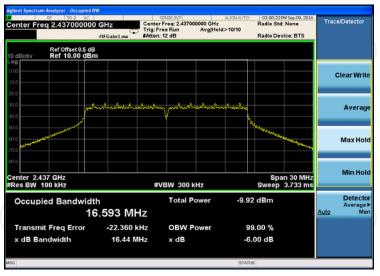


802.11g Modulation

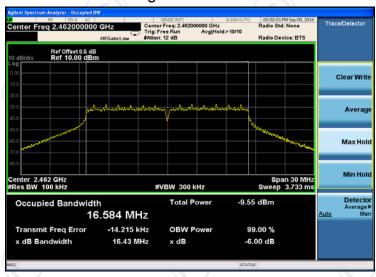
Lowest channel



Middle channel



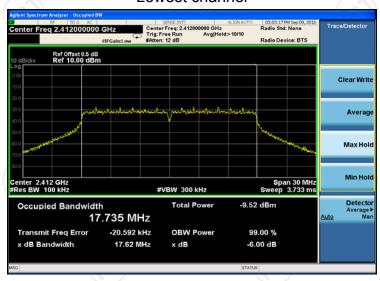
Highest channel



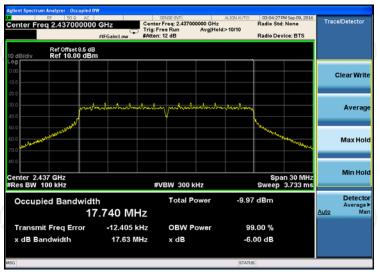


802.11n (HT20) Modulation

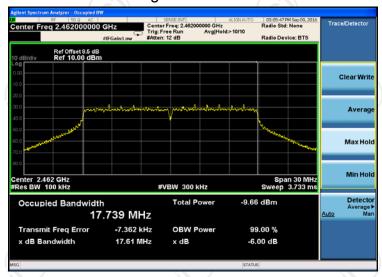
Lowest channel



Middle channel



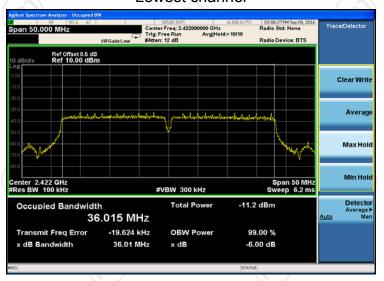
Highest channel



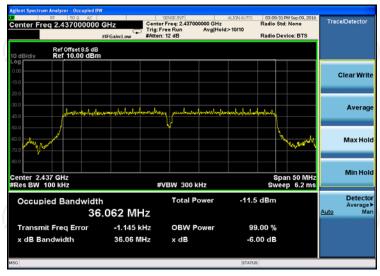


802.11n (HT40) Modulation

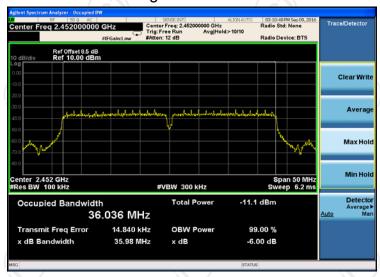
Lowest channel



Middle channel



Highest channel





6.5. Power Spectral Density

6.5.1. Test Specification

FCC Part15 C Section 15.247 (e)			
KDB 558074 D01 DTS Meas Guidance v03r05			
The Average power spectral density shall not be greater than 8dBm in any 3kHz band at any time interval of continuous transmission.			
Spectrum Analyzer EUT			
Transmitting mode with modulation			
 The testing follows Measurement Procedure 10.3 Method AVGPSD of FCC KDB Publication No.558074 D01 DTS Meas. Guidance v03r05 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. Set to the maximum power setting and enable the EUT transmit continuously. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW): 3 kHz ≤ RBW ≤ 100 kHz. Video bandwidth VBW ≥ 3 x RBW. Set the span to at least 1.5 times the OBW. Detector = RMS, Sweep time = auto couple. Employ trace averaging (RMS) mode over a minimum of 100 traces. Use the peak marker function to determine the maximum power level. Measure and record the results in the test report. 			
PASS			

6.5.2. Test Instruments

RF Test Room					
Equipment	Manufacturer	Model	Serial Number	Calibration Due	
Spectrum Analyzer	Agilent	N9020A	MY49100060	Aug. 12, 2017	
RF cable	TCT	RE-06	N/A	Aug. 12, 2017	
Antenna Connector	ТСТ	RFC-01	N/A	Aug. 12, 2017	

Note: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to



international system unit (SI).

6.5.3. Test data

Test channel	Power Spectral Density (dBm/3kHz)			
	802.11b	802.11g	802.11n(H20)	802.11n(H40)
Lowest	-10.80	-25.01	-25.97	-26.33
Middle	-11.01	-25.75	-25.97	-26.93
Highest	-9.46	-24.51	-25.36	-25.91
Limit:	8dBm/3kHz			
Test Result:	PASS			

Test plots as follows:





802.11b Modulation

Lowest channel



Middle channel



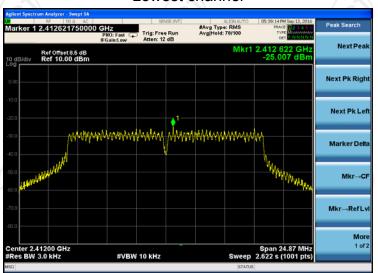
Highest channel



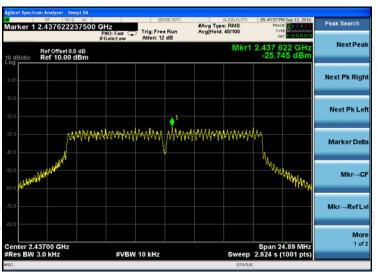


802.11g Modulation

Lowest channel



Middle channel



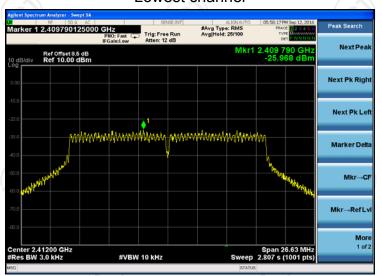
Highest channel



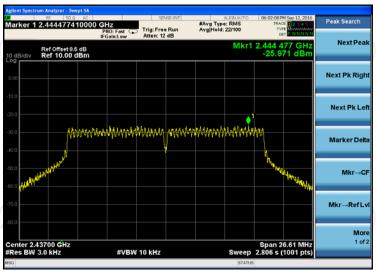


802.11n (HT20) Modulation

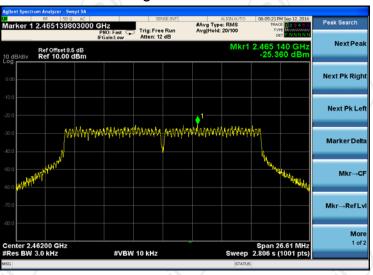
Lowest channel



Middle channel



Highest channel





802.11n (HT40) Modulation

Lowest channel



Middle channel



Highest channel

