

RADIO TEST REPORT

Product	: Dual-Band Wireless AX1800 USB Adapter
Model Name	: NWD7605
FCC ID	: I88NWD7605
Test Regulation	: FCC 47 CFR Part 15 Subpart C (Section 15.247)
Received Date	: 2022/3/14
Test Date	: 2022/4/27
Issued Date	: 2022/6/29
Applicant	 Zyxel Communications Corporation No.2 Industry East RD. IX, Hsinchu Science Park, Hsinchu 30076, Taiwan, R.O.C
Issued By	: Underwriters Laboratories Taiwan Co., Ltd. Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan



The results reported herein have been performed in accordance with the laboratory's terms of accreditation. This report shall not be reproduced except in full without the written approval of the Laboratory. The results in this report are responsible of the test sample(s) provided by the client only and are not to be used to indicate applicability to other similar products.



REVISION HISTORY

Original Test Report No.: 4790327573-US-R1-V0

Rev.	Test report No.	Date	Page revised	Contents
Original	4790327573-US-R1-V0	2022/6/29	-	Initial issue



Table of Contents

1.	Atte	estation of Test Results	4
2.	Sun	nmary of Test Results	5
3.	Test	t Methodology and Reference Procedures	6
4.	Fac	ilities and Accreditation	6
5.	Mea	asurement Uncertainty	7
6.	Equ	ipment under Test	8
	6.1.	Description of EUT	8
	6.2.	Channel List	
	6.3.	Test Condition	
	6.4.	Description of Available Antennas	
	6.5.	Test Mode Applicability and Tested Channel Detail	
7.	Test	t Equipment	
8.	Des	cription of Test Setup	
9.	Test	t Results	
	9.1.	Conducted Output Power	
	9.2.	Radiated Spurious Emission	
	9.3.	AC Power Line Conducted Emission	



1. Attestation of Test Results

APPLICANT:	Zyxel Communications Corporation No.2 Industry East RD. IX, Hsinchu Science Park, Hsinchu 30076, Taiwan, R.O.C
MANUFACTURER:	Zyxel Communications Corporation No.2 Industry East RD. IX, Hsinchu Science Park, Hsinchu 30076, Taiwan, R.O.C
EUT DESCRIPTION:	Dual-Band Wireless AX1800 USB Adapter
BRAND:	ZYXEL
MODEL:	NWD7605
SAMPLE STAGE:	Identical Prototype
DATE of TESTED:	2022/4/27

APPLICABLE STANDARDSSTANDARDTest ResultsFCC 47 CFR PART 15 Subpart C (Section 15.247)PASS

Underwriters Laboratories Taiwan Co., Ltd. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by Underwriters Laboratories Taiwan Co., Ltd. based on interpretations and/or observations of test results. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by Underwriters Laboratories Taiwan Co., Ltd. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by Underwriters Laboratories Taiwan Co., Ltd. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Prepared By:

Cindy Hsin Project Handler Date : 2022/6/29

Approved and Authorized By:

Eric Lee Date : 2022/6/29 Senior Laboratory Engineer

Underwriters Laboratories Taiwan Co., Ltd. Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan Telephone :+886-2-7737-3000 Facsimile (FAX) :+886-3-583-7948 Doc No: 17-EM-F0876 / 6.0



2. Summary of Test Results

Summary of Test Results				
FCC Clause	Test Items	Result		
15.247(a)(2)	6dB Bandwidth	Note		
15.247(b)	Conducted Output Power	PASS		
15.247(e)	Power Spectral Density	Note		
15.247(d)	Antenna Port Emission	Note		
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	PASS		
15.207	AC Power Conducted Emission	PASS		
15.203	Antenna Requirement	PASS		

Note:

1. This report is as a supplementary report of UL TW report no.: 4790327571-US-R1-V0. Except that radiated emissions \ AC power conducted emission and conducted output power, others result refer to the original report.



3. Test Methodology and Reference Procedures

The tests documented in this report were performed in accordance with 47 CFR FCC Part 2, KDB558074 D01 Meas Guidance v05r02, KDB414788 D01 Radiated Test Site v01r01, ANSI C63.10-2013 and KDB 662911 D01 Multiple Transmitter Output v02r01.

4. Facilities and Accreditation

Test Location	Underwriters Laboratories Taiwan Co., Ltd.			
Address	Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan			
Accreditation Certificate	Underwriters Laboratories Taiwan Co., Ltd. is accredited by TAF, Laboratory Code 3398.			



5. Measurement Uncertainty

For statement of conformity, accuracy method (Section 8.2.4 and 8.2.5 of ISO Guide 98-4) was applied as decision rule for measurement in this test report.

The following uncertainties have been calculated to provide a confidence level of 95 % using a coverage factor k=2.

Measurement	Frequency	Uncertainty
Conducted disturbance at mains terminals ports	150kHz ~ 30MHz	±3.1 dB
RF Conducted	9 kHz - 40GHz	±1.9 dB
Radiated disturbance below 30MHz	9 kHz - 30 MHz	±1.9 dB
Radiated disturbance below 1 GHz	30MHz ~ 1GHz	±5.4 dB
Radiated disturbance above 1 GHz	1GHz ~ 40GHz	±4.7 dB



6. Equipment under Test

6.1. Description of EUT

Product	Dual-Band Wireless AX1800 USB Adapter			
Brand Name	ZYXEL			
Model Name	NWD7605			
Operating Frequency	2412MHz ~ 2462MHz			
Modulation	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM 1024QAM, 256QAM, 64QAM, 16QAM, QPSK, BPSK for OFDMA			
Transfer Rate	802.11b: up to 11 Mbps 802.11g: up to 54 Mbps 802.11n: up to MCS 15 802.11ac: up to MCS 9 802.11ax: up to MCS 11			
Number of Channel	11 for 802.11b, 802.11g, 802.11n (HT20), 802.11ac (VHT20), 802.11ax (HE20) 7 for 802.11n (HT40), 802.11ac (VHT40), 802.11ax (HE40)			
Maximum Output Power	802.11b: 24.02 dBm 802.11g: 27.37 dBm 802.11ax (HE20): 27.14 dBm 802.11ax (HE40): 25.04 dBm			
Normal Voltage	5Vdc from host equipment			
S/N	B21A0195441			
Sample ID	Conducted Test: 4874103 Radiated Test: 4874103			



Note:

- 1. This report is prepared for FCC permissive change. The difference compared with the original design is as the following:
 - Change product housing.
 - Reduce the 802.11b and 802.11g target power
 - Added the absorber tap on the PCB board
- 2. According to the above conditions and the applicant's requirements, partial modulation and channels were execute radiated emission, AC power conducted emission and conducted output power.
- 3. The EUT incorporates a MIMO function. Physically, the EUT provides two completed transmitters and two receivers.

Modulation Mode	Tx,Rx Function
802.11b	2TX,2RX
802.11g	2TX,2RX
802.11n (HT20)	2TX,2RX
802.11n (HT40)	2TX,2RX
802.11ac (VHT20)	2TX,2RX
802.11ac (VHT40)	2TX,2RX
802.11ax (HE20)	2TX,2RX
802.11ax (HE40)	2TX,2RX

* The modulation and bandwidth are similar for 802.11n mode for HT20 / HT40 and 802.11ac mode for VHT20 / VHT40 and 802.11ax mode for HE20 / HE40, therefore investigated worst case to representative mode in test report.

4. The above EUT information is declared by manufacturer and for more detailed features description, please refer the manufacturer or user manual.



6.2. Channel List

11 channels are provided for 802.11b, 802.11g, 802.11n (HT20), 802.11ac (VHT20), 802.11ax (HE20):

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

7 channels are provided for 802.11n (HT40), 802.11ac (VHT40), 802.11ax (HE40):

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



6.3. Test Condition

Test Item	Test Site No.	Environmental Condition	Input Power	Test Date	Tested by
Antenna Port Conducted	SR4	22~25°C/	5Vdc	2022/04/27~	Mike Cai
Measurement	5174	64~69%RH	5 1 40	2022/04/27	initie Cui
Radiated Spurious Emission	966-2	22~25°C/ 64~69%RH	5Vdc	2022/04/27~ 2022/04/27	Mike Cai
AC power Line Conducted Emission	SR1	22~25°C/ 64~69%RH	5Vdc	2022/04/27~ 2022/04/27	Mike Cai

FCC Test Firm Registration Number: 498077

6.4. Description of Available Antennas

Ant. No.	Transmitter Circuit	Brand Name	Model Name	Ant. Type	Maximum Gain (dBi)
1	Chain (0)	LYNwave	7822ant-1	Printed	3.6
2	Chain (1)	LYNwave	7822ant-2	Printed	3.1

Note: The above antenna information was provided from customer and for more detailed features description, please refer the manufacturer specification or user manual.



6.5. Test Mode Applicability and Tested Channel Detail

- The EUT power source types: 5Vdc from Host. Therefore the test data of the 5Vdc was recorded in this report.
- For AC power line conducted emissions, the pre-scan has been determined by AC power 120Vac/60Hz (worst case)
- The fundamental of the EUT was investigated in three orthogonal axes X-Y/Y-Z/X-Z, it was determined that X-Y plane was worst-case. Therefore, all final radiated testing was performed with the EUT in X-Y plane.
- For Antenna Port Conducted Measurement, this item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.
- For below 30MHz testing, investigation was done on three antenna orientations (parallel, perpendicular, and ground-parallel), parallel and perpendicular are the worst orientations, therefore testing was performed on these two orientations only.
- For below 1 GHz radiated emission and AC power line conducted emission have performed all modes of operation were investigated and the worst-case emissions are reported.
- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

Test item	Mode	Modulation Technology	Modulation Type	Available Channel	Test Channel	Data Rate
Radiated	802.11b	DSSS	DBPSK	1 to 11	1,6,11	1 Mbps
Emissions (Above 1GHz)	802.11g	OFDM	BPSK	1 to 11	1,6,11	6 Mbps
Radiated Emissions (Below 1GHz)	802.11g	OFDM	BPSK	1 to 11	6	6 Mbps
AC Power Line Conducted Emission	802.11g	OFDM	BPSK	1 to 11	6	6 Mbps
	802.11b	DSSS	DBPSK	1 to 11	1,6,11	1 Mbps
Conducted	802.11g	OFDM	BPSK	1 to 11	1,6,11	6 Mbps
Output Power	802.11ax20	OFDMA	BPSK	1 to 11	1,6,11	HE0
	802.11ax40	OFDMA	BPSK	3 to 9	3,6,9	HE0



7. Test Equipment

	Test Equipment List							
Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Expired date			
	R	adiated Spurious	Emission					
Spectrum Analyzer	Keysight	N9010A	MY56070827	2021/11/9	2022/11/8			
EMI Test Receiver	Rohde & Schwarz	ESR7	101754	2021/12/10	2022/12/9			
Loop Antenna	ETS lindgren	6502	00213440	2021/12/23	2022/12/22			
Trilog- Broadband Antenna with 5dB Attenuator	Schwarzbeck & EMCI	VULB 9168 & N-6-05	774 & AT- N0538	2022/2/8	2023/2/7			
Horn Antenna (1-18 GHz)	Schwarzbeck	BBHA 9120 D	01690	2021/12/13	2022/12/12			
Horn Antenna (18-40 GHz)	Schwarzbeck	BBHA 9170	781	2021/12/17	2022/12/16			
Preamplifier (30-1000 MHz)	EMCI	EMC330E	980405	2021/6/8	2022/6/7			
Preamplifier (1-18 GHz)	EMCI	EMC051835BE	980406	2022/2/16	2023/2/15			
Preamplifier (18-40GHz)	EMCI	EMC184040SEE	980426	2021/5/19	2022/5/18			
Cables	Hanyitek	K1K50-UP0264- K1K50-2500	170214-4 & 170425-2	2021/12/3	2022/12/2			
Cables	Hanyitek	K1K50-UP0264- K1K50-2500	170214-1 & 170214-2	2021/12/3	2022/12/2			



		Test Equipm	nent List		
Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Expired date
	Antenna	a Port Conduc	ted Measuremen	t	
Spectrum Analyzer	Keysight	N9010A	MY56070834	2021/10/29	2022/10/28
Pulse Power Sensor	Anritsu	MA2411B	1531202	2021/12/22	2022/12/21
Power Meter	Anritsu	ML2495A	1645002	2021/12/22	2022/12/21
	AC po	wer Line Con	ducted Emission		
EMI Test Receiver	Rohde & Schwarz	ESR7	101753	2021/11/15	2022/11/14
Two-Line V- Network	Rohde & Schwarz	ENV216	102136	2021/8/30	2022/8/29
Impuls-Begrenzer Pulse Limiter	Rohde & Schwarz	ESH3-Z2	102219-Qt	2021/8/26	2022/8/25
Cables	TITAN	CFD200	T0732ACFD20 020A300-1	2022/3/16	2023/3/15

UL Software					
Description	Name	Version			
Radiated measurement	e3	6.191211 (V6)			
Conducted measurement	RF Conducted Test Tools	ver 2.4.0.620b			
AC power Line Conducted Emission	EZ_EMC	UL-3A1.2			



8. Description of Test Setup

<u>Support Equipment</u>

ID	Equipment	Brand Name	Model Name	S/N	Remark
Α	Laptop	Lenovo	T430	PB-8XTN7	Provide by lab

I/O Cables

ID	Equipment	Brand Name	Model Name	Length (m)	Remark
1	USB Cable	fujiei	Z08145	1m	Provide by lab

Test Setup

Controlled using a bespoke application (AX Series MP Toolkit_vesion: mp_v1.0.35) on a test Notebook. The application was used to enable a continuous transmission mode and to select the test channels, data rates, modulation schemes and power setting as required.



Setup Diagram for Test



Remote Site



9. Test Results

9.1. Conducted Output Power

Requirements

For systems using digital modulation in the 2400-2483.5 MHz bands: 1 Watt.

Note:

1. Directional Gain = $10 \log[(10^{G1/20} + 10^{G2/20} + ... + 10^{Gn/20})^2 / \text{Nant}] \text{dBi}.$

Nant: Number of Transmit Antennas G1, G2,..., Gn: Gain of Individual Antennas

2. Per KDB 662911 Method of conducted output power measurement on IEEE 802.11 devices,

Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \le 4$; Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any N_{ANT} ; Array Gain = 5 log(N_{ANT}/N_{SS}) dB or 3 dB, whichever is less for 20-MHz channel widths with $N_{ANT} \ge 5$.

Test Procedure

A peak power sensor was used on the output port of the EUT. A power meter was used to read the response of the peak power sensor. Record the power level.

Test Setup



The loss between RF output port of the EUT and the input port of the Power Meter has been taken into consideration.



Test Data

Peak Power

802.11b

Channel	Frequency	Peak Power (dBm)		Total	Total	Limit	Pass /
	(MHz)	Chain 0	Chain 1	(mW)	(dBm)	(dBm)	Fail
1	2412	20.94	20.93	248.313	23.95	30	PASS
6	2437	20.97	21.04	252.348	24.02	30	PASS
11	2462	18.50	18.48	141.254	21.50	30	PASS

802.11g

Channel	Frequency	Peak Pov	ver (dBm)	Total	Total	Limit	Pass /
	(MHz)	Chain 0	Chain 1	(mW)	(dBm)	(dBm)	Fail
1	2412	24.34	24.24	537.032	27.30	30	PASS
6	2437	24.37	24.34	545.758	27.37	30	PASS
11	2462	21.92	21.85	309.03	24.90	30	PASS

802.11ax (HE20)

Channel	Frequency	Peak Pov	Peak Power (dBm) Total To Barner Barner Barner Barner		Total	Limit	Pass /
	(MHz)	Chain 0	Chain 1	(mW)	(dBm)	(dBm)	Fail
1	2412	24.40	23.80	515.229	27.12	30	PASS
6	2437	24.54	23.67	517.607	27.14	30	PASS
11	2462	22.58	22.61	363.915	25.61	30	PASS

802.11ax (HE40)

Channel	Frequency	Peak Pov	ver (dBm)	Total	Total	Limit	Pass /
	(MHz)	Chain 0	Chain 1	Power (mW)	Power (dBm)	(dBm)	Fail
3	2422	22.20	21.85	319.154	25.04	30	PASS
6	2437	20.71	20.72	236.048	23.73	30	PASS
9	2452	18.92	19.05	158.489	22.00	30	PASS

Underwriters Laboratories Taiwan Co., Ltd.



Average Power (Reference Only)

802.11b

Channel	Frequency	Average Po	Total	Total	
	(MHz)	Chain 0	Chain 1	(mW)	(dBm)
1	2412	18.77	18.82	151.705	21.81
6	2437	18.86	18.84	153.462	21.86
11	2462	16.58	16.78	93.111	19.69

802.11g

Channal	Frequency	Average P	Total	Total		
Channel	(MHz)	Chain 0	Chain 1	(mW)	(dBm)	
1	2412	18.89	18.43	147.231	21.68	
6	2437	18.94	18.49	148.936	21.73	
11	2462	16.53	16.63	90.991	19.59	

802.11ax (HE20)

Channal	Frequency	Average P	Total	Total	
Channel	(MHz)	Chain 0	Chain 1	(mW)	(dBm)
1	2412	18.62	17.54	129.42	21.12
6	2437	18.59	17.52	128.825	21.10
11	2462	15.58	15.75	73.79	18.68

802.11ax (HE40)

	Frequency	Average P	Total	Total		
Channel	(MHz)	Chain 0	Chain 1	Power (mW)	(dBm)	
3	2422	17.53	16.60	102.329	20.10	
6	2437	15.54	15.51	71.45	18.54	
9	2452	14.04	14.14	51.286	17.10	

Underwriters Laboratories Taiwan Co., Ltd. Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan Telephone :+886-2-7737-3000 Facsimile (FAX) :+886-3-583-7948 Doc No: 17-EM-F0876 / 6.0



9.2. Radiated Spurious Emission

Requirements

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 20dB below the highest level of the desired power:

Frequency(MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

NOTE:

- 1. The lower limit shall apply at the transition frequencies.
- 2. Emission level $(dBuV/m) = 20 \log Emission level (uV/m)$.
- 3. For frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.



Test Procedures

[For 9 kHz ~ 30 MHz]

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. Parallel, perpendicular, and ground-parallel orientations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. For measurement below 30MHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured. If the emission level of the EUT measured by the peak detector is lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.

NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9kHz at frequency below 30MHz.

[For above 30 MHz]

Facsimile (FAX) :+886-3-583-7948

- a. The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. For measurement below 1GHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured. If the emission level of the EUT measured by the peak detector is lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
- f. The test-receiver system was set to peak and average detects function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.



Note:

- a. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
- b. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
- c. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is $\geq 1/T$ (Duty cycle < 98%) or 10Hz (Duty cycle $\geq 98\%$) for Average detection (AV) at frequency above 1GHz.

Configuration	Average			
Comiguration	RBW	VBW		
802.11b		10Hz		
802.11g		1kHz		
802.11n (HT20)	IMHz	2kHz		
802.11n (HT40)		2kHz		

Note: Refer to section 6.6 for duty cycle.

- d. All modes of operation were investigated (includes all external accessories) and the worst-case emissions are reported, the other emission levels were low against the limit.
- e. Test data of Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
- f. Test data of Margin(dB) = Result value (dBuV/m) Limit value (dBuV/m).
- g. Test data of Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) Preamp Factor (dB).
- h. Test data of Notation "@" = Fundamental Frequency
- i. Test data of Notation " * " = The peak result under 20 dB above and complies with AVG limit, AVG result is deemed to comply with AVG limit.



Test Setup

<Frequency Range 9 kHz ~ 30 MHz>



<Frequency Range 30 MHz ~ 1 GHz >





<Frequency Range above 1 GHz>



For the actual test configuration, please refer to the Setup Configurations.



Test Data

Above 1 GHz

Mode	802.11b			Channel	Channel 1				
Delemization	Natation	Frequency	Reading	Correct	Result	Limit	Margin	Domorit	
Polarization	Notation	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Remark	
		2386.38	43.13	15.82	58.95	74	-15.05	PK	
		2386.76	36.84	15.82	52.66	54	-1.34	AVG	
Horizontal	a	2412	95.9	15.83	111.73	N/A	N/A	PK	
	a	2412	92.14	15.83	107.97	N/A	N/A	AVG	
	*	4824	51.2	2.35	53.55	74	-20.45	PK	
		2386.19	41.19	15.83	57.02	74	-16.98	PK	
		2387.71	34.4	15.82	50.22	54	-3.78	AVG	
Vertical	a	2412	94.91	15.83	110.74	N/A	N/A	PK	
	a	2412	92.09	15.83	107.92	N/A	N/A	AVG	
	*	4824	49.13	2.35	51.48	74	-22.52	PK	







Test report No.	: 4790327573-US-R1-V0
Page	: 27 of 42
Issued date	: 2022/6/29
FCC ID	: I88NWD7605

Mode	802.11b			Channel	l 6			
Delegization	Natation	Frequency	Reading	Correct	Result	Limit	Margin	Domonir
Polarization	Inotation	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Kemark
		2346.48	40.83	15.9	56.73	74	-17.27	PK
		2387.52	29.6	15.82	45.42	54	-8.58	AVG
	@	2437	96.9	15.92	112.82	N/A	N/A	PK
Hamirtantal	@	2437	93.13	15.92	109.05	N/A	N/A	AVG
Horizontai		2486.51	29.81	15.66	45.47	54	-8.53	AVG
		2489.36	41.06	15.64	56.7	74	-17.3	PK
	*	4874	49.25	2.4	51.65	74	-22.35	PK
	*	7311	41.34	10.28	51.62	74	-22.38	PK
		2369.09	41.65	15.86	57.51	74	-16.49	PK
		2389.99	29.22	15.82	45.04	54	-8.96	AVG
	@	2437	96.4	15.92	112.32	N/A	N/A	PK
Vartical	@	2437	92.55	15.92	108.47	N/A	N/A	AVG
vertical		2486.13	29.52	15.67	45.19	54	-8.81	AVG
		2488.98	41.52	15.64	57.16	74	-16.84	PK
	*	4874	47.83	2.4	50.23	74	-23.77	PK
	*	7311	41.85	10.28	52.13	74	-21.87	PK







Test report No.	: 4790327573-US-R1-V0
Page	: 29 of 42
Issued date	: 2022/6/29
FCC ID	: I88NWD7605

Mode	802.11b	Channel 11						
Delegization	Notation	Frequency	Reading	Correct	Result	Limit	Margin	Domork
Folalization	Notation	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Kennark
	a	2462	95.83	15.87	111.7	N/A	N/A	PK
	a	2462	92.09	15.87	107.96	N/A	N/A	AVG
Horizontal		2487.84	42.99	15.65	58.64	74	-15.36	PK
Horizontai		2488.03	35.64	15.65	51.29	54	-2.71	AVG
	*	4924	50.56	2.4	52.96	74	-21.04	PK
	*	7386	40.48	10.46	50.94	74	-23.06	РК
	a	2462	91.88	15.87	107.75	N/A	N/A	PK
	a	2462	88.03	15.87	103.9	N/A	N/A	AVG
Vartical		2487.65	42.88	15.65	58.53	74	-15.47	РК
vertical		2487.84	34.09	15.65	49.74	54	-4.26	AVG
	*	4924	48.91	2.4	51.31	74	-22.69	PK
	*	7386	39.28	10.46	49.74	74	-24.26	PK







Test report No.	: 4790327573-US-R1-V0
Page	: 31 of 42
Issued date	: 2022/6/29
FCC ID	: I88NWD7605

Mode	802.11g			Channel	1 1			
	·				·			
Delegization	Natation	Frequency	Reading	Correct	Result	Limit	Margin	Domonit
Polarization	Notation	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Kemark
		2389.99	50.19	15.82	66.01	74	-7.99	PK
		2389.99	35.87	15.82	51.69	54	-2.31	AVG
	a	2412	98.69	15.83	114.52	N/A	N/A	PK
Horizontal	a	2412	90.54	15.83	106.37	N/A	N/A	AVG
	*	4824	42.82	2.35	45.17	74	-28.83	PK
		7236	48.22	10.32	58.54	74	-15.46	PK
		7236	33.19	10.32	43.51	54	-10.49	AVG
		2389.61	44.68	15.82	60.5	74	-13.5	PK
		2389.99	32.32	15.82	48.14	54	-5.86	AVG
	a	2412	95.67	15.83	111.5	N/A	N/A	PK
Vertical	a	2412	87.14	15.83	102.97	N/A	N/A	AVG
	*	4824	44.14	2.35	46.49	74	-27.51	PK
		7236	44.21	10.32	54.53	74	-19.47	PK
		7236	30.74	10.32	41.06	54	-12.94	AVG







Test report No.	: 4790327573-US-R1-V0
Page	: 33 of 42
Issued date	: 2022/6/29
FCC ID	: I88NWD7605

Mode	802.11g Channel 6							
Delevization	Matation	Frequency	Reading	Correct	Result	Limit	Margin	Domork
Folalization	Inotation	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Kennark
		2340.97	41.59	15.9	57.49	74	-16.51	PK
		2389.23	30.14	15.82	45.96	54	-8.04	AVG
	a	2437	97.05	15.92	112.97	N/A	N/A	РК
	a	2437	88.8	15.92	104.72	N/A	N/A	AVG
Horizontal		2484.04	41.32	15.68	57	74	-17	РК
		2484.99	30.09	15.67	45.76	54	-8.24	AVG
	*	4874	46.18	2.4	48.58	74	-25.42	РК
		7311	43.72	10.28	54	74	-20	РК
		7311	31.64	10.28	41.92	54	-12.08	AVG
		2357.31	29.15	15.89	45.04	54	-8.96	AVG
		2364.53	41.01	15.87	56.88	74	-17.12	РК
	a	2437	92.96	15.92	108.88	N/A	N/A	РК
Vartical	a	2437	85.74	15.92	101.66	N/A	N/A	AVG
vertical		2484.61	29.53	15.67	45.2	54	-8.8	AVG
		2495.82	40.32	15.58	55.9	74	-18.1	РК
	*	4874	41.56	2.4	43.96	74	-30.04	РК
	*	7311	41.12	10.28	51.4	74	-22.6	РК







Test report No.	: 4790327573-US-R1-V0
Page	: 35 of 42
Issued date	: 2022/6/29
FCC ID	: I88NWD7605

Mode	802.11g			Channel 11					
Delegization	Notation	Frequency	Reading	Correct	Result	Limit	Margin	Domork	
Polarization	Inotation	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Kennark	
Horizontal	a	2462	98.7	15.87	114.57	N/A	N/A	PK	
	a	2462	89.96	15.87	105.83	N/A	N/A	AVG	
		2483.66	49.09	15.68	64.77	74	-9.23	PK	
		2483.66	35.94	15.68	51.62	54	-2.38	AVG	
	*	4924	40.57	2.4	42.97	74	-31.03	PK	
Vertical	@	2462	95.18	15.87	111.05	N/A	N/A	PK	
	@	2462	89.27	15.87	105.14	N/A	N/A	AVG	
		2483.66	34.75	15.68	50.43	54	-3.57	AVG	
		2484.8	44.2	15.67	59.87	74	-14.13	PK	
	*	4924	39.27	2.4	41.67	74	-32.33	PK	







9 kHz ~ 30 MHz Data:

For 9 kHz to 30 MHz radiated emission have performed all modes of operation were investigated. The amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required to be report.

No non-compliance noted: KDB 414788 D01 OATS and Chamber Correlation Justification

- Base on FCC 15.31 (f) (2): measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field.

- OATs and chamber correlation testing had been performed and chamber measured test results is the worst case test result.

Although these tests were performed other than open area test site, adequate comparison measurements were confirmed against 30m open area test site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788.



Below 1 GHz

Mode	802.11g			Channel	Channel 6					
Polarization	Nut	Frequency	Reading	Correct	Result	Limit	Margin	Domork		
	Inotation	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Kelliark		
		78.5	37.43	-16.03	21.4	40	-18.6	PK		
		159.98	38.18	-11.11	27.07	43.5	-16.43	PK		
Horizontal		232.73	38.27	-12.44	25.83	46	-20.17	PK		
		323.91	38.44	-9.23	29.21	46	-16.79	PK		
		483.96	41.09	-5.08	36.01	46	-9.99	PK		
		590.66	34	-2.32	31.68	46	-14.32	PK		
		75.59	37.26	-15.22	22.04	40	-17.96	PK		
		142.52	36.11	-11.95	24.16	43.5	-19.34	PK		
Vartical		196.84	36.32	-13.74	22.58	43.5	-20.92	PK		
Vertical		317.12	33.4	-9.48	23.92	46	-22.08	PK		
		380.17	32.15	-7.65	24.5	46	-21.5	PK		
		482.99	40.98	-5.13	35.85	46	-10.15	PK		

TX, 802.	11g (Ch 6)		TX, 802.11g (Ch 6)	
Radiated	Spurious Emission, Horizontal		Radiated Spurious Emission, Vertical	
Data: 79	File: D:E3 Test DatalProject/BTL/4790327573_BTL_NWD7605I2.4G_Confirm.EM6 (82)		Data: 80 File: DtE3 Test Data/Project/BTL/4790327573_BTL_NVD760512.46_Confirm.EM6 (82)	
80 Level (dBuV/m)		Date: 05-06-2022	80,Level (dBuV/m)	Date: 05-06-2022
70			70	
60			60	
50		-648-	50	-648
40	5		40 6	
	6			
30	2 3		30 2 4 5	
. 1				
20			20	
10			10	
10				
0				
30 100.	200. 300. 400. 500. 600. 700. 800. Frequency (NHz)	900. 1000	30 100. 200. 300. 400. 500. 600. 700. 800. Frequency (NHz)	900. 1000
			require (min)	



9.3. AC Power Line Conducted Emission

Requirements

Enguanov (MHz)	Conducted limit (dBµV)					
Frequency (MIRZ)	Quasi-peak	Average				
0.15 - 0.5	66 - 56	56 - 46				
0.50 - 5.0	56	46				
5.0 - 30	60	50				

Note:

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

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

Test Procedures

- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit 20dB) was not recorded.

NOTE:

- 1. The resolution bandwidth and video bandwidth of test receiver is 9kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15MHz-30MHz.
- 2. All modes of operation were investigated (includes all external accessories) and the worst-case emissions are reported, the other emission levels were low against the limit.
- 3. Test data of Result value (dBuV) = Reading value (dBuV) + Correction Factor (dB).
- 4. Test data of Margin(dB) = Result value (dBuV) Limit value (dBuV).
- 5. Test data of Correction Factor (dB) = Insertion loss(dB) + Cable loss(dB).



Test Setup



Note: 1.Support units were connected to second LISN.

For the actual test configuration, please refer to the Setup Configurations.



Test Data



2	0.5340	26.18	19.49	45.67	46.00	-0.33	AVG
3	3.0900	15.69	19.55	35.24	56.00	-20.76	QP
4	3.0900	5.24	19.55	24.79	46.00	-21.21	AVG
5	3.4260	16.30	19.55	35.85	56.00	-20.15	QP
6	3.4260	5.03	19.55	24.58	46.00	-21.42	AVG
7	3.4980	22.53	19.55	42.08	56.00	-13.92	QP
8	3.4980	12.00	19.55	31.55	46.00	-14.45	AVG
9	3.7700	21.33	19.56	40.89	56.00	-15.11	QP
10	3.7700	10.05	19.56	29.61	46.00	-16.39	AVG
11	3.9020	22.21	19.57	41.78	56.00	-14.22	QP
12	3.9020	10.94	19.57	30.51	46.00	-15.49	AVG



Mode

11g TX2437

Channel

6



No.	Frequency	Reading	Correct	Result	Limit	Margin	Denvente
	(MHz)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dB)	Remark
1	0.1980	29.21	19.47	48.68	63.69	-15.01	QP
2	0.1980	18.97	19.47	38.44	53.69	-15.25	AVG
3	0.5340	28.27	19.49	47.76	56.00	-8.24	QP
4	0.5340	26.08	19.49	45.57	46.00	-0.43	AVG
5	3.4340	24.34	19.54	43.88	56.00	-12.12	QP
6	3.4340	14.71	19.54	34.25	46.00	-11.75	AVG
7	3.4980	22.23	19.54	41.77	56.00	-14.23	QP
8	3.4980	13.31	19.54	32.85	46.00	-13.15	AVG
9	3.7020	23.68	19.56	43.24	56.00	-12.76	QP
10	3.7020	12.67	19.56	32.23	46.00	-13.77	AVG
11	3.9740	17.96	19.57	37.53	56.00	-18.47	QP
12	3.9740	8.76	19.57	28.33	46.00	-17.67	AVG

END OF REPORT