

FCC Test Report

Report No.: FCC_SL19041803-SLX-007R6_2.4G Rev_1.0

FCC ID: WUW-22135255

IC: 9613A-22135255

Test Model (Host): ONX-220

Series Model: N/A

Received Date: 9/16/2019

Test Date: 9/16/2019 -9/24/2019

Issued Date: 10/14/2019

Applicant: Viavi Solutions, Inc.

Address: 6001 America Center Drive, 6th Floor San Jose, CA 95002

Issued By: Bureau Veritas Consumer Products Services, Inc.

Lab Address: 775 Montague Expressway, Milpitas, CA 95035, USA

Test Location (1): 775 Montague Expressway, Milpitas, CA 95035, USA

FCC Test Site Reg No.: 540430

IC Test Site No.: 4842D



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Report No.: FCC_SL19041803-SLX-007R6_2.4G Rev_1.0 Page No. 1 / 24

Report Format Version: 6.1.1



Table of Contents

R	eleas	se Control Record	3
1		Certificate of Conformity	4
2		Summary of Test Results	5
	2.1 2.2	Measurement Uncertainty	
3		General Information	6
	3.1 3.2 3.2.1 3.3 3.3.1 3.4	Description of Support Units	7 8 10 10
4		Test Types and Results	12
	4.1.3 4.1.4 4.1.5 4.1.6	Radiated Emission Measurement Limits of Radiated Emission Measurement Test Instruments Test Procedures Deviation from Test Standard Test Setup EUT Operating Conditions Test Results	12 13 14 14 15 17
5		Pictures of Test Arrangements	23
Α	ppen	dix – Information on the Testing Laboratories	24



Release Control Record

Issue No.	Description	Date Issued	
FCC_SL19041803-SLX-007R6_2.4G	Original release	09/30/2019	
FCC_SL19041803-SLX-007R6_2.4G Rev_1.0	Update Applicant information	10/14/2014	

Report No.: FCC_SL19041803-SLX-007R6_2.4G Rev_1.0 Page No. 3 / 24 Report Format Version: 6.1.1



1 Certificate of Conformity

Product: DSP Series Field Meter

Brand: Viavi

Test Model (Host): ONX-220

Series Model: N/A

Sample Status: Engineer Sample

Applicant: Viavi Solutions, Inc.

Test Date: 9/16/2019 – 9/24/2019

Standards: 47 CFR FCC Part 15, Subpart C (Section 15.247)

7

ANSI C63.10: 2013

The above equipment has been tested by **Bureau Veritas Consumer Products Services, Inc. Milpitas Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

Prepared by : _	Deon Dai / Test Engineer	, Date:	09/30/2019	
Approved by : _	Chen Ge / Engineer Reviewer	, Date:	10/14/2019	

Report No.: FCC_SL19041803-SLX-007R6_2.4G Rev_1.0 Page No. 4 / 24



2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (Section 15.247)						
FCC Clause	Test Item	Result	Remarks			
15.207	AC Power Conducted Emission	PASS	N/A			
15.205 / 15.209 / 15.247(d)	Radiated Emissions Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -0.39dB at 375MHz.			
15.247(d)	Antenna Port Emission	PASS	N/A			
15.247(a)(2)	6dB bandwidth	PASS	N/A			
15.247(b)	Conducted power	PASS	N/A			
15.247(e)	Power Spectral Density	PASS	N/A			
15.203	Antenna Requirement	PASS	Antenna connector is U.FL. (The device is professionally installed)			

Note:

N/A - For details, see original FCC and IC Test report No.: FCC ID: N6C-SXPCEACDB, Test Report No.: ER/2016/20013 / IC: 4908A- SXPCEACDB, Test Report No.: ER/2016/20018

2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Management	F	Expanded Uncertainty	
Measurement	Frequency	(k=2) (±)	
Conducted Emissions at mains ports	150kHz ~ 30MHz	3.51dB	
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	3.73dB	
	1GHz ~ 6GHz	4.64dB	
Radiated Emissions above 1 GHz	6GHz ~ 18GHz	4.82dB	
	18GHz ~ 40GHz	4.91dB	

2.2 Modification Record

There were no modifications required for compliance.

Report No.: FCC_SL19041803-SLX-007R6_2.4G Rev_1.0 Page No. 5 / 24



3 General Information

3.1 General Description of EUT

Product	DSP Series Field Meter			
Brand	Viavi			
Test Model	ONX-220			
Identification No. of EUT	TTDH0012190004			
Series Model	N/A			
Model Difference	N/A			
Status of EUT	Engineer Sample			
Power Supply Rating	100-240VAC,1.2A, 50-60Hz			
Modulation Type	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM			
Modulation Technology	DSSS,OFDM			
Transfer Rate	802.11b: up to 11Mbps 802.11g: up to 54Mbps 802.11n: up to 300Mbps			
Operating Frequency	2.412 ~ 2.462GHz			
Number of Channel	11 for 802.11b, 802.11g, 802.11n (HT20) 7 for 802.11n (HT40)			
Antenna Type	PIFA Antenna, 2.7dBi			
Antenna Connector	U.FL Connector			

Note:

1. The EUT uses following adapter.

THE LET GOOD TOHOWITH	le Le l'acce le lie Willig adaptel.				
Brand	FSP				
Model	FSP045-D3MR3				
Input Power	100-240V,1.2A, 50-60Hz				
Output Dawer	5.0V/9.0V/12.0V/15.0V 3.0A				
Output Power	20.0V 2.25A				
Power Line	1.2m				

2. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.

Report No.: FCC_SL19041803-SLX-007R6_2.4G Rev_1.0 Page No. 6 / 24



3.2 Description of Test Modes

11 channels are provided for 802.11b, 802.11g and 802.11n (HT20):

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

7 channels are provided for 802.11n (HT40):

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

Report No.: FCC_SL19041803-SLX-007R6_2.4G Rev_1.0 Page No. 7 / 24 Report Format Version: 6.1.1



3.2.1 Test Mode Applicability and Tested Channel Detail

EUT CONFIGURE		APPLIC	ABLE TO	DESCRIPTION	
MODE	RE≥1G	RE<1G	PLC	APCM	DESCRIPTION
-	V	√	-	-	-

Where

RE≥1G: Radiated Emission above 1GHz &

Bandedge Measurement

RE<1G: Radiated Emission below 1GHz

PLC: Power Line Conducted Emission

APCM: Antenna Port Conducted Measurement

NOTE: The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on Y-plane.

NOTE: "-"means no effect.

Radiated Emission Test (Above 1GHz):

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).

Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1
-	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6
-	802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	6.5
-	802.11n (HT40)	3 to 9	3, 6, 9	OFDM	BPSK	13.5

Radiated Emission Test (Below 1GHz):

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).

Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
	802.11n (20MHz)	1 to 11	6	OFDM	BPSK	6.5

Power Line Conducted Emission Test:

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).

Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11n (HT20)	1 to 11	6	OFDM	BPSK	6.5

Report No.: FCC_SL19041803-SLX-007R6_2.4G Rev_1.0 Page No. 8 / 24



Antenna Port Conducted Measurement:

Ш	This	item	includes	s all te	st value	of each	n mode	, but or	nly inclu	des spec	ctrum pl	lot of w	orst val	ue of	each
	mod	le.													
$\overline{}$															

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).

Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1
-	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6
-	802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	6.5
-	802.11n (HT40)	3 to 9	3, 6, 9	OFDM	BPSK	13.5

Test Condition:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE≥1G	25deg. C, 65%RH	120Vac, 60Hz	Deon Dai
RE<1G	RE<1G 25deg. C, 65%RH		Deon Dai
PLC	25deg. C, 68%RH	120Vac, 60Hz	-
APCM	21deg. C, 60%RH	120Vac, 60Hz	-

Report No.: FCC_SL19041803-SLX-007R6_2.4G Rev_1.0 Page No. 9 / 24 Report Format Version: 6.1.1



3.3 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.

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Switch	TP-LINK	TL-WR841HP	2151802000460	TE7WR841HPV1	N/A
B.	Laptop	Acer	Aspire A315-51	N/A	N/A	N/A
C.	Power Supply(Laptop)	LITEON	PA-1450-26	N/A	N/A	N/A
D.	Laptop	Acer	Aspire A315-51	N/A	N/A	N/A
E.	Switching Power Adapter for Switch	Zebra	FSP025-DYAA3	N/A	N/A	N/A
F.	Switching Power Adapter for EUT	FSP	FSP045-D3MR3	H00000093	N/A	N/A
G.	USB Drive	SanDisk	Ultra	N/A	N/A	N/A

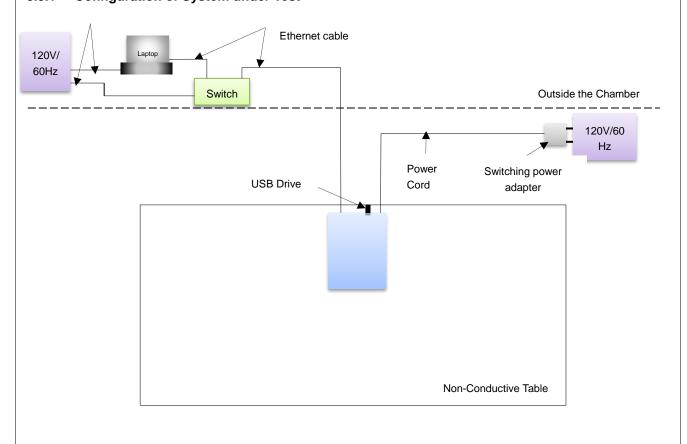
Note:

- 1. All power cords of the above support units are non-shielded (1.8m).
- 2. Items E~F acted as communication partners to transfer data.

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	Ethernet	1	3m	No	0	Connect from EUT to Switch
2.	Switching power adapter	1	2.4m	No	0	Use for power
3.						

Note: The core(s) is(are) originally attached to the cable(s).

3.3.1 Configuration of System under Test



Report No.: FCC_SL19041803-SLX-007R6_2.4G Rev_1.0 Page No. 10 / 24



3.4 General Description of Applied Standards

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

47 CFR FCC Part 15, Subpart C (Section 15.247)
RSS 247 Issue2, February 2017
RSS Gen Issue5, March 2019
KDB 558074 D01 15.247 Meas Guidance v05r01
KDB 662911 D01 Multiple Transmitter Output v02r01
ANSI C63.10-2013

All test items have been performed and recorded as per the above standards.



4 Test Types and Results

4.1 Radiated Emission Measurement

4.1.1 Limits of Radiated Emission Measurement

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 (power peak measurement) or 30dB

(power Ave.measurement) below the highest level of the desired power:

Frequencies (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.

Report No.: FCC_SL19041803-SLX-007R6_2.4G Rev_1.0 Page No. 12 / 24 Report Format Version: 6.1.1



4.1.2 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
50GHz Spectrum Analyzer	N9030B (PXA)	MY57140597	6/5/2019	6/5/2020
Biconilog Antenna Sunol	JB1	A030702	3/9/2018	3/9/2020
Pre-Amplifier RF Bay, Inc.	LPA-6-30	11170601	4/27/2019	4/27/2020
Horn Antenna ETS-Lindgren	3117	218554	11/22/2017	11/22/2019
Pre-Amplifier RF-Lambda	RAMP00M50GA	17032300048	6/18/2019	6/18/2020

Report No.: FCC_SL19041803-SLX-007R6_2.4G Rev_1.0 Page No. 13 / 24 Report Format Version: 6.1.1



4.1.3 Test Procedures

For Radiated emission below 30MHz

- 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. The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

NOTE:

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

For Radiated emission above 30MHz

- 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. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- 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:

- 1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
- 2. 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.
- 3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is ≥ 1/T (Duty cycle < 98%) or 10Hz (Duty cycle ≥ 98%) for Average detection (AV) at frequency above 1GHz.
- 4. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

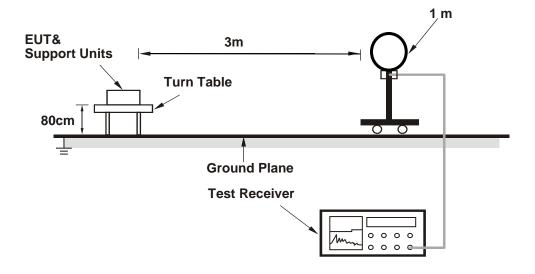
No deviation.

Report No.: FCC_SL19041803-SLX-007R6_2.4G Rev_1.0 Page No. 14 / 24

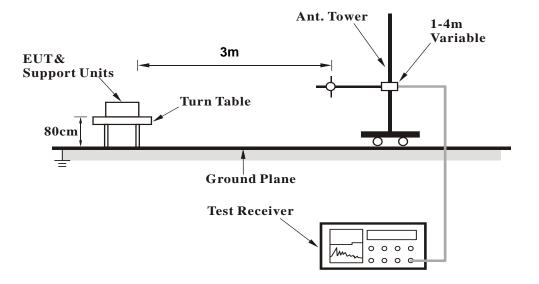


4.1.5 Test Setup

For Radiated emission below 30MHz



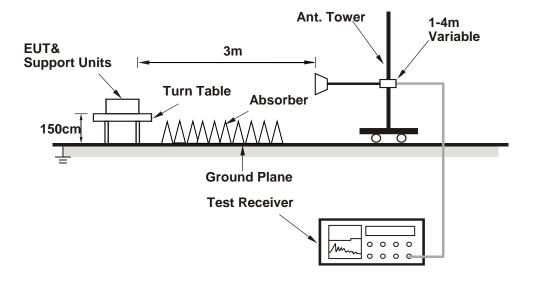
For Radiated emission 30MHz to 1GHz



Report No.: FCC_SL19041803-SLX-007R6_2.4G Rev_1.0 Page No. 15 / 24



For Radiated emission above 1GHz



For the actual test configuration, please refer to the attached file (Test Setup Photo).



4.1.6 EUT Operating Conditions

- a. Placed the EUT on the testing table.
- b. Prepared notebooks to act as communication partner and placed it outside of testing area.
- c. The communication partner connected with EUT via a RJ45 cable and ran a test program (provided by manufacturer) to enable EUT under transmission condition continuously at specific channel frequency.
- d. The communication partner sent data to EUT by command "PING".
- e. The necessary accessories enable the system in full functions.

Report No.: FCC_SL19041803-SLX-007R6_2.4G Rev_1.0 Page No. 17 / 24



4.1.7 Test Results

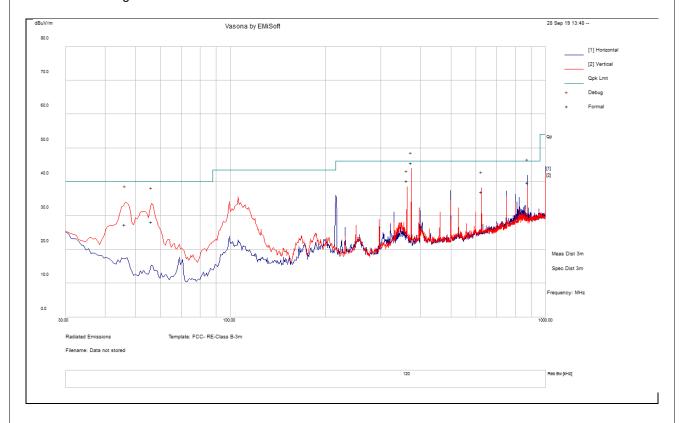
BELOW 1GHz WORST-CASE DATA:

CHANNEL	802.11n Channel 7	DETECTOR	
FREQUENCY RANGE		FUNCTION	Quasi Peak

	ANTENNA POLARITY & test distance: HORIZONTAL& VERTICAL at 3 m													
No	Freq.	Raw	Cale Loss	AF	Level	Measurement Type	Pol	Hgt	Azt	Limit	Margin	Pass /Fail		
	[MHz]	(dBuV)	(dB)	(dB/m)	(dBuV/m)			(cm)	Deg	(dBuV/m)	(dB)	/I all		
1	375.00	52.68	13.65	-20.72	45.61	Quasi Max	V	131	293	46	-0.39	Pass		
2	875.00	37.55	15.79	-13.55	39.79	Quasi Max	Н	101	190	46	-6.21	Pass		
3	46.19	39.95	11.42	-23.97	27.4	Quasi Max	V	165	262	40	-12.6	Pass		
4	56.20	43.69	11.48	-27	28.17	Quasi Max	V	116	112	40	-11.83	Pass		
5	362.99	47.71	13.58	-20.97	40.32	Quasi Max	V	149	292	46	-5.68	Pass		
6	624.98	39.04	14.6	-16.6	37.04	Quasi Max	V	175	223	46	-8.96	Pass		

REMARKS:

- 1. Emission level (dBuV/m) = Raw Value (dBuV) + Cable Loss (dB) + AF (dB)
- 2. AF (dB/m) = Antenna Factor (dB/m) Preamplifier Gain (dB).
- 3. The emission levels of other frequencies were less than 20dB margin against the limit.
- 4. Margin value = Emission level Limit value.



Report No.: FCC_SL19041803-SLX-007R6_2.4G Rev_1.0 Page No. 18 / 24



Above 1GHz Test Data:

Above 1GHz-25GHz - 802.11b - 2412MHz

		ANT	ENNA	POLAR	ITY & test	distance: HO	RIZO	NTAL&	VERTIC	AL at 3 m		
No	Freq.	Raw	Cale Loss	AF	Level	Measurement Type	Pol	Hgt	Azt	Limit	Margin	Pass /Fail
	[MHz]	(dBuV)	(dB)	(dB/m)	(dBuV/m)			(cm)	Deg	(dBuV/m)	(dB)	/I dii
1	3107.56	48.02	3.36	-13.84	37.54	Peak Max	>	208	296	74	-36.46	Pass
2	4824.45	48.65	4.12	-10.92	41.85	Peak Max	>	219	26	74	-32.15	Pass
3	8326.33	49.57	5.4	-7.04	47.93	Peak Max	Ι	169	152	74	-26.07	Pass
4	3107.56	33.08	3.36	-13.84	22.6	Average Max	٧	208	296	54	-31.4	Pass
5	4824.45	33.96	4.12	-10.92	27.16	Average Max	V	219	26	54	-26.84	Pass
6	8326.33	35.16	5.4	-7.04	33.52	Average Max	Η	169	152	54	-20.48	Pass

Above 1GHz-25GHz- 802.11b - 2437MHz

	ANTENNA POLARITY & test distance: HORIZONTAL& VERTICAL at 3 m													
No	Freq.	Raw	Cale Loss	AF	Level	Measurement Type	Pol	Hgt	Azt	Limit	Margin	Pass /Fail		
	[MHz]	(dBuV)	(dB)	(dB/m)	(dBuV/m)			(cm)	Deg	(dBuV/m)	(dB)	/I all		
1	3560.35	47.4	3.58	-13.64	37.34	Peak Max	٧	207	294	74	-36.66	Pass		
2	4873.47	48.36	4.17	-11.01	41.52	Peak Max	Τ	220	26	74	-32.48	Pass		
3	8493.82	49.05	5.53	-6.86	47.72	Peak Max	Η	165	154	74	-26.28	Pass		
4	3560.35	32.42	3.58	-13.64	22.36	Average Max	V	207	294	54	-31.64	Pass		
5	4873.47	33.73	4.17	-11.01	26.89	Average Max	Н	220	26	54	-27.11	Pass		
6	8493.82	34.96	5.53	-6.86	33.63	Average Max	Н	165	154	54	-20.37	Pass		

Above 1GHz-25GHz - 802.11b - 2462MHz

		ANT	ENNA	POLAR	ITY & test	distance: HO	RIZO	NTAL&	VERTIC	AL at 3 m		
No	Freq.	Raw	Cale Loss	AF	Level	Measurement Type	Pol	Hgt	Azt	Limit	Margin	Pass /Fail
	[MHz]	(dBuV)	(dB)	(dB/m)	(dBuV/m)	Туре		(cm)	Deg	(dBuV/m)	(dB)	/I all
1	3789.85	47.57	3.61	-13	38.18	Peak Max	٧	205	294	74	-35.82	Pass
2	4924.94	48.3	4.22	-11.11	41.41	Peak Max	٧	218	31	74	-32.59	Pass
3	8435.38	49.44	5.48	-6.92	48	Peak Max	Η	165	147	74	-26	Pass
4	3789.85	32.61	3.61	-13	23.22	Average Max	٧	205	294	54	-30.78	Pass
5	4924.94	34.26	4.22	-11.11	27.37	Average Max	٧	218	31	54	-26.63	Pass
6	8435.38	35.14	5.48	-6.92	33.7	Average Max	Н	165	147	54	-20.3	Pass

Report No.: FCC_SL19041803-SLX-007R6_2.4G Rev_1.0 Page No. 19 / 24 Report Format Version: 6.1.1



Above 1GHz-25GHz- 802.11g - 2412MHz

		ANT	ENNA	POLAR	ITY & test	distance: HO	RIZO	NTAL&	VERTIC	AL at 3 m		
No	Freq.	Raw	Cale Loss	AF	Level	Measurement Type	Pol	Hgt	Azt	Limit	Margin	Pass /Fail
	[MHz]	(dBuV)	(dB)	(dB/m)	(dBuV/m)	Туре		(cm)	Deg	(dBuV/m)	(dB)	/I all
1	3980.32	48.03	3.83	-12.67	39.19	Peak Max	Η	208	296	74	-34.81	Pass
2	4824.15	48.68	4.12	-10.92	41.88	Peak Max	V	224	33	74	-32.12	Pass
3	8706.70	49.16	5.61	-6.52	48.25	Peak Max	Η	164	147	74	-25.75	Pass
4	3980.32	33.38	3.83	-12.67	24.54	Average Max	Η	208	296	54	-29.46	Pass
5	4824.15	34.28	4.12	-10.92	27.48	Average Max	٧	224	33	54	-26.52	Pass
6	8706.70	34.88	5.61	-6.52	33.97	Average Max	Η	164	147	54	-20.03	Pass

Above 1GHz-25GHz - 802.11g - 2437MHz

		ANT	ENNA	POLAR	ITY & test	distance: HO	RIZO	NTAL&	VERTIC	AL at 3 m		
No	Freq.	Raw	Cale Loss	AF	Level	Measurement Type	Pol	Hgt	Azt	Limit	Margin	Pass /Fail
	[MHz]	(dBuV)	(dB)	(dB/m)	(dBuV/m)	Туре		(cm)	Deg	(dBuV/m)	(dB)	/I all
1	3698.75	49.16	3.57	-13.24	39.49	Peak Max	Η	212	296	74	-34.51	Pass
2	4873.05	48.37	4.17	-11.01	41.53	Peak Max	٧	219	32	74	-32.47	Pass
3	8858.40	50.33	5.63	-6.21	49.75	Peak Max	Н	162	150	74	-24.25	Pass
4	3698.75	34.82	3.57	-13.24	25.15	Average Max	Н	212	296	54	-28.85	Pass
5	4873.05	34.3	4.17	-11.01	27.46	Average Max	٧	219	32	54	-26.54	Pass
6	8858.40	35.88	5.63	-6.21	35.3	Average Max	Н	162	150	54	-18.7	Pass

Above 1GHz-25GHz- 802.11g - 2462MHz

		ANT	ENNA	POLAR	ITY & test	distance: HO	RIZO	NTAL&	VERTIC	AL at 3 m		
No	Freq.	Raw	Cale Loss	AF	Level	Measurement Type	Pol	Hgt	Azt	Limit	Margin	Pass /Fail
	[MHz]	(dBuV)	(dB)	(dB/m)	(dBuV/m)	Туре		(cm)	Deg	(dBuV/m)	(dB)	/I all
1	3494.81	47.46	3.58	-13.72	37.32	Peak Max	Ι	206	296	74	-36.68	Pass
2	4924.20	48.26	4.22	-11.11	41.37	Peak Max	Τ	221	25	74	-32.63	Pass
3	8249.26	49.37	5.35	-7.13	47.59	Peak Max	>	165	153	74	-26.41	Pass
4	3494.81	32.47	3.58	-13.72	22.33	Average Max	Ι	206	296	54	-31.67	Pass
5	4924.20	33.7	4.22	-11.11	26.81	Average Max	Ι	221	25	54	-27.19	Pass
6	8249.26	34.42	5.35	-7.13	32.64	Average Max	V	165	153	54	-21.36	Pass

Report No.: FCC_SL19041803-SLX-007R6_2.4G Rev_1.0 Page No. 20 / 24 Report Format Version: 6.1.1



Above 1GHz-25GHz- 802.11n20 - 2412MHz

		ANT	ENNA	POLAR	ITY & test	distance: HO	RIZO	NTAL&	VERTIC	AL at 3 m		
No	Freq.	Raw	Cale Loss	AF	Level	Measurement Type	Pol	Hgt	Azt	Limit	Margin	Pass /Fail
	[MHz]	(dBuV)	(dB)	(dB/m)	(dBuV/m)	Туре		(cm)	Deg	(dBuV/m)	(dB)	/I all
1	3517.40	47.7	3.58	-13.7	37.58	Peak Max	٧	205	301	74	-36.42	Pass
2	4824.81	48.62	4.12	-10.92	41.82	Peak Max	Н	219	26	74	-32.18	Pass
3	8896.77	51.22	5.62	-6.14	50.7	Peak Max	V	167	151	74	-23.3	Pass
4	3517.40	33.25	3.58	-13.7	23.13	Average Max	٧	205	301	54	-30.87	Pass
5	4824.81	33.94	4.12	-10.92	27.14	Average Max	Η	219	26	54	-26.86	Pass
6	8896.77	36.99	5.62	-6.14	36.47	Average Max	٧	167	151	54	-17.53	Pass

Above 1GHz-25GHz - 802.11n20 - 2437MHz

		ANT	ENNA	POLAR	ITY & test	distance: HO	RIZO	NTAL&	VERTIC	AL at 3 m		
No	Freq.	Raw	Cale Loss	AF	Level	Measurement Type	Pol	Hgt	Azt	Limit	Margin	Pass /Fail
	[MHz]	(dBuV)	(dB)	(dB/m)	(dBuV/m)	Туре		(cm)	Deg	(dBuV/m)	(dB)	/I all
1	3559.82	47.46	3.58	-13.64	37.4	Peak Max	Ι	210	298	74	-36.6	Pass
2	4873.87	48.35	4.17	-11.01	41.51	Peak Max	V	219	25	74	-32.49	Pass
3	8532.13	49.72	5.54	-6.83	48.43	Peak Max	V	169	147	74	-25.57	Pass
4	3559.82	32.96	3.58	-13.64	22.9	Average Max	Н	210	298	54	-31.1	Pass
5	4873.87	33.76	4.17	-11.01	26.92	Average Max	V	219	25	54	-27.08	Pass
6	8532.13	35.23	5.54	-6.83	33.94	Average Max	٧	169	147	54	-20.06	Pass

Above 1GHz-25GHz- 802.11n20 - 2462MHz

		ANT	ENNA	POLAR	ITY & test	distance: HO	RIZO	NTAL&	VERTIC	AL at 3 m		
No	Freq.	Raw	Cale Loss	AF	Level	Measurement Type	Pol	Hgt	Azt	Limit	Margin	Pass /Fail
	[MHz]	(dBuV)	(dB)	(dB/m)	(dBuV/m)	Турс		(cm)	Deg	(dBuV/m)	(dB)	71 all
1	3887.24	47.53	3.72	-12.78	38.47	Peak Max	Η	209	296	74	-35.53	Pass
2	4924.19	48.26	4.22	-11.11	41.37	Peak Max	Η	222	33	74	-32.63	Pass
3	8872.56	49.81	5.63	-6.18	49.26	Peak Max	Η	163	153	74	-24.74	Pass
4	3887.24	33.33	3.72	-12.78	24.27	Average Max	I	209	296	54	-29.73	Pass
5	4924.19	34	4.22	-11.11	27.11	Average Max	Н	222	33	54	-26.89	Pass
6	8872.56	35.31	5.63	-6.18	34.76	Average Max	Н	163	153	54	-19.24	Pass

Report No.: FCC_SL19041803-SLX-007R6_2.4G Rev_1.0 Page No. 21 / 24 Report Format Version: 6.1.1



Above 1GHz-25GHz- 802.11n40 - 2422MHz

		ANT	ENNA	POLAR	ITY & test	distance: HO	RIZO	NTAL&	VERTIC	AL at 3 m		
No	Freq.	Raw	Cale Loss	AF	Level	Measurement Type	Pol	Hgt	Azt	Limit	Margin	Pass /Fail
	[MHz]	(dBuV)	(dB)	(dB/m)	(dBuV/m)	Туре		(cm)	Deg	(dBuV/m)	(dB)	/I all
1	3539.79	47.37	3.58	-13.68	37.27	Peak Max	Н	206	295	74	-36.73	Pass
2	4843.97	49.37	4.14	-10.94	42.57	Peak Max	V	217	27	74	-31.43	Pass
3	8217.83	49.99	5.36	-7.12	48.23	Peak Max	V	165	145	74	-25.77	Pass
4	3539.79	32.43	3.58	-13.68	22.33	Average Max	I	206	295	54	-31.67	Pass
5	4843.97	34.41	4.14	-10.94	27.61	Average Max	V	217	27	54	-26.39	Pass
6	8217.83	35.29	5.36	-7.12	33.53	Average Max	V	165	145	54	-20.47	Pass

Above 1GHz-25GHz - 802.11n40 - 2437MHz

		ANT	ENNA	POLAR	ITY & test	distance: HO	RIZO	NTAL&	VERTIC	AL at 3 m		
No	Freq.	Raw	Cale Loss	AF	Level	Measurement Type	Pol	Hgt	Azt	Limit	Margin	Pass /Fail
	[MHz]	(dBuV)	(dB)	(dB/m)	(dBuV/m)	Туре		(cm)	Deg	(dBuV/m)	(dB)	/I all
1	3158.03	47.83	3.4	-13.81	37.42	Peak Max	Ι	204	301	74	-36.58	Pass
2	4873.26	48.36	4.17	-11.01	41.52	Peak Max	Ι	217	32	74	-32.48	Pass
3	8324.29	49.53	5.4	-7.05	47.88	Peak Max	٧	168	153	74	-26.12	Pass
4	3158.03	33.09	3.4	-13.81	22.68	Average Max	Н	204	301	54	-31.32	Pass
5	4873.26	33.93	4.17	-11.01	27.09	Average Max	Τ	217	32	54	-26.91	Pass
6	8324.29	34.76	5.4	-7.05	33.11	Average Max	٧	168	153	54	-20.89	Pass

Above 1GHz-25GHz- 802.11n40 - 2452MHz

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		ANT	ENNA	POLAR	ITY & test	distance: HO	RIZO	NTAL&	VERTIC	AL at 3 m		
No	Freq.	Raw	Cale Loss	AF	Level	Measurement Type	Pol	Hgt	Azt	Limit	Margin	Pass /Fail
	[MHz]	(dBuV)	(dB)	(dB/m)	(dBuV/m)	Турс		(cm)	Deg	(dBuV/m)	(dB)	/I all
1	3689.34	47.02	3.57	-13.27	37.32	Peak Max	Н	213	301	74	-36.68	Pass
2	4904.65	48.64	4.2	-11.09	41.75	Peak Max	Τ	221	26	74	-32.25	Pass
3	8164.84	50.82	5.38	-7.1	49.1	Peak Max	٧	169	152	74	-24.9	Pass
4	3689.34	32.97	3.57	-13.27	23.27	Average Max	Н	213	301	54	-30.73	Pass
5	4904.65	34.26	4.2	-11.09	27.37	Average Max	Η	221	26	54	-26.63	Pass
6	8164.84	36.42	5.38	-7.1	34.7	Average Max	V	169	152	54	-19.3	Pass

Report No.: FCC_SL19041803-SLX-007R6_2.4G Rev_1.0 Page No. 22 / 24 Report Format Version: 6.1.1



5 Pictures of Test Arrangements
Please refer to the attached file (Test Setup Photo).

Report No.: FCC_SL19041803-SLX-007R6_2.4G Rev_1.0 Page No. 23 / 24



Appendix - Information on the Testing Laboratories

Bureau Veritas is a global leader in testing, inspection and certification (TIC) services. We help businesses improve safety, sustainability and productivity; and our clients include the majority of leading brands in retail, manufacturing and other industries. With a presence in every major country around the world, our quality assurance and compliance solutions are vital in helping our customers enhance product quality and concept-to-consumer journeys. We also assist with increasing speed to market, profitability and brand equity throughout the supply chain. Bureau Veritas is a leading wireless/IoT testing, inspection, audit and certification provider, with a global network of test laboratories to support the IoT industry in areas of connectivity, security, interoperability as well as quality, health & safety, and environmental/chemical requirements.

If you have any comments, please feel free to contact us at the following:

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The address and road map of all our labs can be found in our web site also.

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