

# Electromagnetic Compatibility Test Report

Prepared in accordance with

# EN 55032: 2015/A11: 2020, EN 55035: 2017, CISPR 32: 2015, AS/NZS CISPR 32: 2015

On

# Blues, Inc.

# NOTE WBGLW, NBGLW, NBNAW, WBNAW, WBEXW

Prepared for:

Blues, Inc. 50 Harbor St Manchester, MA 01944

Prepared by:

Bureau Veritas Consumer Products Services, Inc. 775 Montague Expressway Milpitas, CA 95035 U.S.A.

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# Revisions

Revision No.	Date	Reason for Change	Author
0	October 4, 2023	Original	Brandon Quan
1	June 24, 2024	Update model names	Izabela Marinovic- Adolphson

Note: Latest revision report will replace all previous reports.



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ΑΤΤΕΩΤΑΤΙΟΝ ΟΕ ΤΕΩΤ ΔΕΩΙΗ ΤΩ										
Client:	Blues, Inc. 50 Harbor S Manchester,	Blues, Inc. 50 Harbor St Manchester, MA 01944								
Model Name:	NOTE			Serial Number:	N/A					
Model Numbers:	WBGLW, N WBEXW	IBGLW, NBNAW, V	WBNAW,	Date(s) Tested:	August 18 to August 23, 2023					
Test Location:	<ul> <li>Bureau Veritas Consumer Products Services, Inc.</li> <li>775 Montague Expressway, Milpitas, CA 95035 Tel: (408) 526-1188</li> </ul>									
	Emissions:	EN 55032: 2015/A EN 61000-3-2: 20 EN 301 908-1: 201	5/A11: 2020, CISPR 32: 2015, AS/NZS CISPR 32: 2015, 2014, EN 61000-3-3: 2013 2016							
Test Specifications:	Immunity:         EN 55035: 2017/A11: 2020, EN 61000-4-2: 2009, EN 61000-4-3: 2006 + A1: 2008 + A2: 2010, EN 61000-4-4: 2012, EN 61000-4-5: 2014/A1: 2017, EN 61000-4-6: 2014 EN 61000-4-8: 2010, EN 61000-4-11: 2020				008 + A2: 2010, 7, EN 61000-4-6: 2014,					
Test Result:	The abov	e product was foun	d to be Com	pliant to the above	e test standard(s)					
Prepared by: Brand	on Quan		Reviewed by: Suresh Kondapalii							
	And			M	Jour .					
October 4, 2023			October 4, 2023							
Date Other aspects:	Date Name Signature			INUME	Signuture					
other uspects.		MILP	ITAS							
CE	Testin	g Cert #2742-01	L	JK A	<b>VCI</b> A-0133					

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.



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# **General Information**

# 1.1 Scope

This report is intended to document the status of conformance with the listed standards based on the results of testing performed on August 9 to August 14, 2023 on the Blues NOTE Model WBNAW. This report only applies to the specific samples tested under the stated test conditions. It is the responsibility of the manufacturer to ensure that additional production units of this model are manufactured with identical or EMI equivalent electrical and mechanical components. This report is further intended to document changes and modifications to the EUT throughout its life cycle. All documentation will be included as a supplement.

## 1.2 Purpose

Testing was performed to evaluate the EMC performance of the EUT (Equipment Under Test) in accordance with the applicable requirements, procedures, and criteria defined in the application of regulations and application of standards listed in this report.



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1.3 Summary of Test Results									
Applicant	Blue 50 H Man	slues, Inc. 0 Harbor St Janchester, MA 01944							
Model Name	NOT	Έ							
Model Numbers	WW	XD/WBGL, NBGLV	V, NBNAW, WBNAW, WBEXW						
Power Supply Rating	2.5V	2.5VDC to 5.5VDC							
Test Date(s)	August 9 to 14, 2023								
Environment	Environment E2 - E4								
Standards		Description	Severity Level or Limit	Criteria	Test Result				
EN 55032:2015/A11: 2020 Product Family Standard Emissions		Electromagnetic compatibility of multimedia equipment – Emission requirements	See called out basic standards below	See Below	Complies				
EN 55035:2017/A11: 20 Product Family Standar	)20 d	Electromagnetic compatibility of multimedia	See called out basic standards	See	Complies				

Product Family Standard Immunity	multimedia equipment - Immunity requirements	See called out basic standards below	See Below	Complies
EN 55032:2015/A11: 2020, CISPR 32:2015, AS/NZS CISPR 32:2015	Radiated Emissions	Class A 30 MHz – 6 GHz	Limit	Complies
EN 61000-4-2:2009 Basic test standard	Electrostatic Discharge	±8 kV Air Discharge ±4 kV Contact Discharge, VCP, HCP	В	Complies
EN 61000-4- 3:2006+A1:2008+A2:2010 Basic test standard	Radiated Electromagnetic Field Immunity	3 V/m 80-1000 MHz + Spot Frequencies 80%, 1 kHz, AM	А	Complies
EN 61000-4-8:2010 Basic test standard	Power Frequency Magnetic Field Immunity test.	1 A/m 50 Hz 3 Axis	А	Complies



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# 2 Laboratory Information

#### 2.1 Accreditations & Endorsements

#### 2.1.1 US Federal Communications Commission

**FC** Bureau Veritas Consumer Products Services, Inc. at 775 Montague Expressway, Milpitas CA 95035, is recognized by the Commission for performing testing services for the general public on a fee basis. These laboratory test facilities have been fully described in reports submitted to and accepted by the FCC (Registration No. 540430). The laboratory Scopes of Accreditation include Title 47 CFR Parts 15, 18, 20, 22, 24, 25, 27, 90, 95, 95, 97 and 101. The accreditations are updated every three years.

#### 2.1.2 A2LA



Bureau Veritas Consumer Products Services, Inc., EMC test facilities are accredited by the American Association for Laboratory Accreditation (A2LA). The laboratories have been assessed and accredited by A2LA in accordance with ISO Standard 17025:2017 (Testing Certificate #2742-01). The Scope of Laboratory Accreditation includes emission and immunity testing. The

accreditations are updated annually.

#### 2.1.3 Canada

Government Gouvernement of Canada du Canada

Bureau Veritas Consumer Products Services, Inc. at the 775 Montague Expressway, Milpitas, CA 95035 address is testing services for the general public on a fee basis. This

accredited by Industry Canada for performing testing services for the general public on a fee basis. This laboratory test facilities have been fully described in reports submitted to and accepted (ISED#: 4842D). The accreditation is updated every 3 years.

#### 2.1.4 Japan – VCCI



The Voluntary Control Council for Interference by Information Technology Equipment (VCCI) is a group that consists of Information Technology Equipment (ITE) manufacturers and EMC test laboratories. The purpose of the Council is to take voluntary control measures against electromagnetic interference from Information Technology

Equipment, and thereby contribute to the development of a socially beneficial and responsible state of affairs in the realm of Information Technology Equipment in Japan. Bureau Veritas Consumer Products Services, Inc. at 775 Montague Expressway, Milpitas, CA 95035, has been assessed and approved in accordance with the Regulations for Voluntary Control Measures.

VCCI Registration No. for Milpitas: A-0133



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# 2.2 Test Facilities and EMC Software

Test facilities are located at 775 Montague Expressway, Milpitas, California, 95035, USA.

# 2.2.1 Emission Test Facility

The Semi-Anechoic Chambers and AC Line Conducted measurement facilities used to collect radiated and conducted emissions data have been constructed in accordance with ANSI C63.7:1992. The 10 meter semianechoic chamber has been measured in accordance with and verified to comply with the theoretical volumetric normalized site attenuation of ANSI C63.4:2014 and SVSWR requirements of CISPR 16-1-4 Consol. Ed. 3.0 (2010-04), at test distances of 3 and 10 meters. This site has been described in reports submitted to the FCC. The site is listed with the FCC and accredited by A2LA (Testing Certificate #2742-01).

# 2.2.2 Immunity Test Facility

ESD: This test is performed in an environmentally controlled room with a 4.48 m x 2.44 m x 0.5 mm thick aluminum floor connected to PE ground. For ESD testing, tabletop equipment is placed on an insulated mat with a surface resistivity of  $10^9$  Ohms/square on a 1.6 m x 0.8 m x 0.5 mm high non-conductive table with a 3.175 mm aluminum top (Horizontal Coupling Plane). The HCP is connected to the main ground plane via a low impedance ground strap through two 470 k $\Omega$  resistors. The Vertical Coupling Plane consists of an aluminum plate 50 cm x 50 cm x 0.5 mm thick. The VCP is connected to the main ground plane via a low impedance ground strap through two 470 k $\Omega$  resistors.

EFT, Surge, POE, RF Conducted, and Magnetic Field Immunity testing is performed on a 4.6m x 3.05 x 0.5mm thick aluminum ground plane.

RF Field Immunity testing is performed in a 3m semi-anechoic chamber with absorber added to floor.

All test areas allow a minimum distance of 1 meter from the EUT to walls or conducting objects.

## 2.3 Measurement Uncertainty

Two types of measurement uncertainty are expressed in this report, per *ISO Guide To The Expression Of Uncertainty In Measurement*, 1<sup>st</sup> Edition, 1995.

*The Combined Standard Uncertainty* is the standard uncertainty of the result of a measurement when that result is obtained from the values of a number of other quantities, equal to the positive square root of a sum of terms, the terms being the variances or co-variances of these other quantities weighted according to how the measurement result varies with changes in these quantities. The term standard uncertainty is the result of a measurement expressed as a standard deviation.

*The Expanded Uncertainty* defines an interval about the result of a measurement that may be expected to encompass a large fraction of the distribution of values that could reasonably be attributed to the measurand. The fraction may be viewed as the coverage probability or level of confidence of the interval.



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#### 2.3.1 Sample Calculation – radiated & conducted emissions

The field strength is calculated by subtracting the Amplifier Gain and adding the Cable Loss and Antenna Correction Factor to the measured reading. The basic equation is as follows:

Field Strength  $(dB\mu V/m) = RAW - AMP + CBL + ACF$ 

Where: RAW = Measured level before correction  $(dB\mu V/m)$ 

AMP = Amplifier Gain (dB)

CBL = Cable Loss (dB)

ACF = Antenna Correction Factor (dB/m)

 $\mu V/m = 10^{\frac{dB\mu V/m}{20}}$ 

Sample radiated emissions calculation @ 30 MHz

#### Measurement +Antenna Factor-Amplifier Gain+Cable loss=Radiated Emissions (dBuV/m)

25 dBuV/m + 17.5 dB - 20 dB + 1.0 dB = 23.5 dBuV/m



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### 2.3.2 Measurement Uncertainty Emissions

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

MEASUREMENT	FREOUENCY	UNCERTAINTY
Conducted emissions	0.15 MHz ~ 30 MHz	2.70 dB
	9 kHz ~ 30 MHz	2.16 dB
	30 MHz ~ 1 GHz	3.60 dB
Radiated emissions	1 GHz ~ 18 GHz	4.82 dB
	18 GHz ~ 40 GHz	5.00 dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k = 2.

## 2.4 Calibration Traceability

All measurement instrumentation is traceable to the National Institute of Standards and Technology (NIST). Measurement method complies with ANSI/NCSL Z540-1-1994 and ISO Standard 17025:2017. Equipment calibration records are kept on file at the test facility.



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# 2.5 Measurement Equipment Used

Equipment	Manufacturer	Model #	Serial/Inst #	Last Cal mm/dd/vv	Next Cal mm/dd/vv	Test
EMI Receiver	Rhode&Schwarz	ESIB	100179	01/05/2023	01/05/2025	CE
Transient Limiter	Electro-Metrics	EM-7600-5	106	09/28/2022	09/28/2024	CE
LISN	EMCO	3816/2NM	0214372	01/05/2023	01/05/2025	CE
EMI Receiver	Rhode&Schwarz	ESW44	1328.4100K- 101662-MH	09/20/2022	09/20/2024	RE
1-18GHz Preamplifier	EMC Shop	PA18G	1320	07/12/2022	07/12/2024	RE
18-40GHz Preamplifier	EMC Shop	PA40G	17610-01	07/08/2022	07/08/2024	RE
Bilog Antenna	Sunol Sciences	JB6	A111717	09/22/2022	09/22/2024	RE
Horn Ant. (1-18GHz)	ETS-Lindgren	3117	218553	04/24/2023	04/24/2025	RE
Horn Ant. (18-40GHz)	A.H System, Inc	SAS-574	579	09/22/2022	09/22/2024	RE
AC Power Source	California Instr.	5001 iX-208-411	100006700086	05/18/2023	05/18/2025	H&F
Spectrum Analyzer	California Instr.	PACS-1	IG121/9690	05/18/2023	05/18/2025	H&F
ESD Simulator	Haefely	ONYX30	184684	01/06/2023	01/06/2025	ESD
Signal Generator	Agilent	N5182A	MY47071065	09/27/2022	09/27/2024	RI
Bilog Antenna	EMCO	3141	1203	NCR	NCR	RI
Antenna, Horn	A.H. Systems	SAS-571	411	NCR	NCR	RI
Wide Band Amplifier	AR	250W1000C	353461	NCR	NCR	RI
Wide Band Amplifier	Ophir RF Inc.	5293RE	1035	NCR	NCR	RI
RF Power Meter	Agilent	E4418B	GB41298766	08/11/2022	08/11/2024	RI
RF Power Sensor	Agilent	N8482A CFT	MY50430016	08/11/2022	08/11/2024	RI
E-Field Probe	ETS-Lindgren	HI-6005	00156327	07/20/2022	07/20/2024	RI
Immunity Test System	EMC-Partner	IMU3000 F5-S6-D	105684-2032	07/20/2022	07/20/2024	EFT/SI/VD SI
Capacitive Clamp	EMC-Partner	CN-EFT1000	103468-1736	07/20/2022	07/20/2024	EFT
Signal Generator	Hewlett Packard	8648C	3642U01282	08/11/2022	08/11/2024	CI
RF Power Amplifier	AR	150A100D	353606	07/20/2022	07/22/2024	CI
6 DB RF Attenuator	JFW	50FHA0-006-250	None	07/20/2022	07/20/2024	CI
CDN	Compower	M225E	34070020	07/20/2022	07/20/2024	CI
Injection Probe	Teseq Inc.	CIP 9136A	55295	07/20/2022	07/20/2024	CI
RF Current Prob	Solar Electronics	9123-N	912315007	07/20/2022	07/20/2024	CI
Magnetic Field Test System	Haefely Hipotronics	MFS-100	182898	07/20/2022	07/20/2024	MF
RMS Clamp Meter	Fluke	335	S95560168	NCR	NCR	MF
Guass Meter	Wave Control	SMP2	19SN0981	07/19/2022	07/19/2024	MF

Note: CE=Conducted Emissions, CI=Conducted Immunity, DP=Disturbance Power, EFT=Electrical Fast Transients, ESD=Electrostatic Discharge, FLI=Flicker, HAR=Harmonics, MF=Magnetic Field Immunity, NCR=No Calibration Required, RE=Radiated Emissions, RI=Radiated Immunity, SI=Surge Immunity, VDSI=Voltage Dips and Short Interruptions



# **3** Product Information

# 3.1 Product Description

See Section 6.4.

# 3.2 Equipment Modifications

None.

## 3.3 Test Plan

The EUT product information, test configuration, mode of operation, test types, test procedures, test levels, pass/failure criteria, in this report were carried out per the product test plan located in Appendix A of this report.



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# 3.4 EUT Photos



Figure 1: Notecard with Test Board (Top)



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Figure 2: Notecard with Test Board (Bottom)



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Figure 3: WBNAW (Top)



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Figure 4: WBNAW (Bottom)



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Figure 5: WBEXW (Top)



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Figure 8: WBGLW (Bottom)



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Figure 9: NBNAW (Top)







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Figure 12: NBGLW (Bottom)





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Figure 13: Molex 213353



Figure 14: Molex 209142



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#### 4 **Emissions**

#### 4.1 **Radiated Emissions**

This test measures the electromagnetic levels of spurious signals generated by the EUT that radiated from the EUT and may affect the performance of other nearby electronic equipment.

	1 1 050							
Results	Complies (as tested p	Test Date(s	)	08/09/2023 - 08/14/2023				
Standard	EN 55032:2015/A11:2 EN 301 908: 2016	EN 55032:2015/A11:2020, CISPR 32:2015, AS/NZS CISPR 32:2015 EN 301 908: 2016						
Model Number	WBNAW, WBGLW, WBEXW, NBGLW			Serial # N		J/A		
Configuration	See test plan for detail	ls.						
Test Setup	Tested in the 10-meter	r chambe	r, placed	on turntable:	see test	plan for deta	ils.	
Environmental Conditions	08/10/2023	Temp	23° C	Humidity	35%	Pressure	1017 mbar	
<b>Frequency Range</b>	30 - 6000 MHz							

## 4.1.1 Overview of Test

Perf. Criteria	Class A	Perf. Verification	Readings Under Limit
Mod. to EUT	None	Test Performed By	Brandon Quan

# 4.1.2 Test Procedure

Radiated emissions tests were performed using the procedures of CISPR 32:2019 including methods for signal maximizations and EUT configuration. The photos included with the report show the EUT in its maximized configuration.

The frequency range from 30 - 1000 MHz was investigated for radiated emissions.

## 4.1.3 Deviations

There were no deviations from the test methodology listed in the test plan for the radiated emission test.

## 4.1.4 Final Test

All final radiated emissions measurements were below the specification limits.



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# 4.1.5 Plots





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# 4.1.6 Final Tabulated Data – 30 - 1000 MHz

WBNAW CISPR Class B									
							TT	QP	QP
Freq.	Raw	Corrd'	Level	Meas	Ant	Ant	Azt	Limit	Margin
MHz	dBuV	dB	dBuV	Туре	Pol	Hgt cm	Deg	dBuV	dB
29.709	-22.4	1.3	-21.1	QP	V	189.9	29.3	40.5	61.6
83.673	11.8	13.3	25.1	QP	Н	230.8	213.5	40.5	15.4
228.979	2.3	18.3	20.6	QP	Н	397.8	138.4	40.5	19.9
263.407	2.8	20.1	22.9	QP	Н	100.1	22	47.5	24.6
484.891	-1.4	26.4	25	QP	Н	100.1	151.5	47.5	22.5
983.159	-8.8	34.3	25.5	QP	V	364.2	18.1	47.5	22

	WBNAW LTE									
							TT	QP	QP	
Freq.	Raw	Corrd'	Level	Meas	Ant	Ant	Azt	Limit	Margin	
MHz	dBuV	dB	dBuV	Туре	Pol	Hgt cm	Deg	dBuV	dB	
888.496	13.7	32.4	46.1	QP	Н	106.4	359.8	59.2	13.1	
276.324	12.9	20.9	33.8	QP	Н	228.3	136.7	59.2	25.4	
83.139	12.8	13.3	26.1	QP	Н	216.2	63	59.2	33.1	
103.813	8.5	17.5	26	QP	V	106.7	198.1	59.2	33.2	
786.301	-4.1	31	26.9	QP	Н	100	287.2	59.2	32.3	
977.905	-8.8	34.4	25.6	QP	V	170.1	359.8	59.2	33.6	

# WBNAW WCDMA

							TT	QP	QP
Freq.	Raw	Corrd'	Level	Meas	Ant	Ant	Azt	Limit	Margin
MHz	dBuV	dB	dBuV	Туре	Pol	Hgt cm	Deg	dBuV	dB
35.257	36.6	0.2	36.8	QP	V	150	259	59.2	22.4
83.329	37.9	-7.1	30.8	QP	Н	207.4	293.4	59.2	28.4
110.137	27.6	-5.8	21.8	QP	V	153.1	225.3	59.2	37.4
242.653	41.5	-7.3	34.2	QP	V	149.3	204.5	59.2	25
247.685	43.1	-8.5	34.6	QP	Н	246.8	134.7	59.2	24.6
360.27	27.7	-4.2	23.5	QP	V	149.3	281.4	59.2	35.7

WBNAW GSM													
							TT	QP	QP				
Freq.	Raw	Corrd'	Level	Meas	Ant	Ant	Azt	Limit	Margin				
MHz	dBuV	dB	dBuV	Type	Pol	Hgt cm	Deg	dBuV	dB				
43.466	37.5	-2.5	35	QP	V	162	148.7	59.2	24.2				
81.678	37.1	-7.4	29.7	QP	Н	209.7	305.6	59.2	29.5				
194.083	39.2	-9.7	29.5	QP	Н	156.6	196.2	59.2	29.7				
243.753	40.7	-7.2	33.5	QP	V	149.1	215.9	59.2	25.7				
342.159	36.4	-4.8	31.6	QP	Н	182.3	276.3	59.2	27.6				
938.93	42.7	4.3	47	QP	V	165.5	264.1	59.2	12.2				



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WBGLW WCDMA												
							TT	QP	QP			
Freq.	Raw	Corrd'	Level	Meas	Ant	Ant	Azt	Limit	Margin			
MHz	dBuV	dB	dBuV	Туре	Pol	Hgt cm	Deg	dBuV	dB			
35.438	33.6	0.2	33.8	QP	V	149.5	275	59.2	25.4			
79.014	40.1	-7	33.1	QP	Н	220.1	125.3	59.2	26.1			
193.998	39.2	-9.7	29.5	QP	Н	149.2	155.7	59.2	29.7			
239.628	38.5	-7.5	31	QP	V	157.7	0	59.2	28.2			
333.459	26.8	-4.6	22.2	QP	Н	198.9	264.1	59.2	37			
387.104	31.3	-4.5	26.8	QP	Н	172.5	209.4	59.2	32.4			

WBGLW LTE												
							TT	QP	QP			
Freq.	Raw	Corrd'	Level	Meas	Ant	Ant	Azt	Limit	Margin			
MHz	dBuV	dB	dBuV	Туре	Pol	Hgt cm	Deg	dBuV	dB			
879.27	51.2	2.6	53.8	QP	V	149.7	338.8	59.2	5.4			
627.931	21.6	-0.4	21.2	QP	Н	266.1	194.3	59.2	38			
366.25	22.8	-4.2	18.6	QP	Н	175.9	150.4	59.2	40.6			
358.977	23.4	-4.2	19.2	QP	V	165.1	254.1	59.2	40			
32.196	36.7	1.7	38.4	QP	Н	149.5	37	59.2	20.8			
488.936	22.2	-2.5	19.7	QP	Н	167.1	198.6	59.2	39.5			

WBGLW GSM												
							TT	QP	QP			
Freq.	Raw	Corrd'	Level	Meas	Ant	Ant	Azt	Limit	Margin			
MHz	dBuV	dB	dBuV	Туре	Pol	Hgt cm	Deg	dBuV	dB			
34.832	37.9	0.2	38.1	QP	V	149.4	145.5	59.2	21.1			
83.944	48.9	-7.1	41.8	QP	Н	206.1	324.3	59.2	17.4			
312	42.1	-4.2	37.9	QP	Н	132.1	202.8	59.2	21.3			
352.319	27.8	-4.5	23.3	QP	Н	250.7	183.1	59.2	35.9			
359.988	42.6	-4.2	38.4	QP	V	149.9	165.7	59.2	20.8			
713.326	21.1	0.1	21.2	QP	Н	173.7	159	59.2	38			

WBEXW WCDMA												
							TT	QP	QP			
Freq.	Raw	Corrd'	Level	Meas	Ant	Ant	Azt	Limit	Margin			
MHz	dBuV	dB	dBuV	Туре	Pol	Hgt cm	Deg	dBuV	dB			
42.997	35.6	-2.2	33.4	QP	V	163.1	179.2	59.2	25.8			
83.968	51.1	-7.1	44	QP	Н	193.5	193.3	59.2	15.2			
311.996	45.4	-4.2	41.2	QP	Н	210.8	194.4	59.2	18			
351.388	25.1	-4.6	20.5	QP	Н	216.5	201.6	59.2	38.7			
530.843	24.3	-2	22.3	QP	Н	149.3	205.6	59.2	36.9			
713.34	21	0.1	21.1	QP	Н	232.6	212.2	59.2	38.1			



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WBEXW LTE												
							TT	QP	QP			
Freq.	Raw	Corrd'	Level	Meas	Ant	Ant	Azt	Limit	Margin			
MHz	dBuV	dB	dBuV	Туре	Pol	Hgt cm	Deg	dBuV	dB			
783.18	54	1.2	55.2	QP	V	149.6	27.5	59.2	4			
340.784	25.1	-4.8	20.3	QP	Н	238.1	71.3	59.2	38.9			
30.889	39.5	1.6	41.1	QP	Н	182.3	24.7	59.2	18.1			
600.002	35.4	-1.1	34.3	QP	V	238.4	65.8	59.2	24.9			
817.38	21.1	2	23.1	QP	Н	226.4	212.5	59.2	36.1			
79.764	37.9	-7.4	30.5	QP	Н	212.7	333.4	59.2	28.7			

WBEXW GSM												
							TT	QP	QP			
Freq.	Raw	Corrd'	Level	Meas	Ant	Ant	Azt	Limit	Margin			
MHz	dBuV	dB	dBuV	Туре	Pol	Hgt cm	Deg	dBuV	dB			
43.015	30.7	-2.2	28.5	QP	V	149.5	126.5	59.2	30.7			
83.628	41	-7.1	33.9	QP	Н	198.4	333.5	59.2	25.3			
231.399	40.8	-7.1	33.7	QP	V	149.8	300.1	59.2	25.5			
328.98	24.7	-4.5	20.2	QP	Н	211.8	236.6	59.2	39			
691.188	32.5	-0.7	31.8	QP	Н	149.5	343.3	59.2	27.4			
940.492	20.3	4.4	24.7	QP	V	234.2	326.6	59.2	34.5			

NBNAW LTE												
							TT	QP	QP			
Freq.	Raw	Corrd'	Level	Meas	Ant	Ant	Azt	Limit	Margin			
MHz	dBuV	dB	dBuV	Туре	Pol	Hgt cm	Deg	dBuV	dB			
783.843	22.6	1.9	24.5	QP	Н	222.1	142.7	59.2	34.7			
692.131	23.5	-0.7	22.8	QP	Н	187.1	129.9	59.2	36.4			
408.047	29.5	-4.2	25.3	QP	Н	168.8	137.7	59.2	33.9			
408.068	25.1	-3	22.1	QP	V	149.2	259.6	59.2	37.1			
383.355	25.8	-4.6	21.2	QP	Н	186.4	133.6	59.2	38			
544.069	21.1	-1.7	19.4	QP	Н	133.3	133.5	59.2	39.8			

NBGLW LTE												
							TT	QP	QP			
Freq.	Raw	Corrd'	Level	Meas	Ant	Ant	Azt	Limit	Margin			
MHz	dBuV	dB	dBuV	Туре	Pol	Hgt cm	Deg	dBuV	dB			
783.845	25.1	1.9	27	QP	Н	149.5	139.3	59.2	32.2			
689.615	23.6	-0.7	22.9	QP	Н	152.8	117.7	59.2	36.3			
408.044	29.2	-4.2	25	QP	Н	249.5	114.4	59.2	34.2			
382.848	21.9	-4.7	17.2	QP	Н	195	124	59.2	42			
544.061	21.7	-1.6	20.1	QP	V	130.6	214.8	59.2	39.1			
261.403	22.6	-6.6	16	QP	Н	263.1	110.2	59.2	43.2			



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NBGLW GSM												
							TT	QP	QP			
Freq.	Raw	Corrd'	Level	Meas	Ant	Ant	Azt	Limit	Margin			
MHz	dBuV	dB	dBuV	Туре	Pol	Hgt cm	Deg	dBuV	dB			
83.962	50.1	-7.1	43	QP	Н	210.9	179.8	59.2	16.2			
312	44.6	-4.2	40.4	QP	Н	134.8	203.1	59.2	18.8			
351.366	23.1	-4.6	18.5	QP	V	150.5	173.3	59.2	40.7			
352.246	28.9	-4.5	24.4	QP	Н	250.7	212.7	59.2	34.8			
532.316	23.5	-1.9	21.6	QP	Н	162.4	201.6	59.2	37.6			
706.789	21.2	0	21.2	QP	Н	168.6	193.2	59.2	38			



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# 4.1.7 Photos



Figure 15: 30 to 1000 MHz Radiated Emissions Test Setup - Front



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Figure 16: 30 to 1000 MHz Radiated Emissions Test Setup - Rear



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# 5 Immunity

# 5.1 Electrostatic Discharge (ESD)

This test is concerned with the EUT performance when subjected to electrostatic events from operator directly and to adjacent objects.

	1										
Results	Complies (as tested p	per this r	eport)	Test Dat	e(s)	08/14/2023					
Standard	EN 61000-4-2:2009	EN 61000-4-2:2009									
Model Number	WWXD/WBGL, NBC WBNAW, WBEXW	WWXD/WBGL, NBGLW, NBNAW, WBNAW, WBEXW Serial # N/A									
Configuration	See test plan for detail	ls.									
Test Setup	Tested in ESD Station	n, EUT p	laced on	table, see tes	t plan f	for details.					
Environmental Conditions	08/14/2023	Temp	24º C	Humidity	38%	Pressure	1018 mbar				
Air Discharges	$\pm 8 \text{ kV}$		Contact Dischar	ges	±4 k	V					
HCP Discharges	±4 kV		VCP Di	scharges	±4 k	V					
Perf. Criteria	A <b>Perf. Verification</b> See test plan										
Mod to EUT	None		Test Per	formed By	Bran	don Quan					

# 5.1.1 Test Overview

## 5.1.2 Test Procedure

Discharges were made to each of the points shown in the photograph section of this report. Ten of each polarity was made to each point specified. Test voltages were also applied using the Vertical Coupling Plane (VCP) and Horizontal Coupling Plane (HCP). Acceptable Climatic Conditions (Air Discharge) Relative Humidity 30% to 60%.

## 5.1.3 Deviations

There were no deviations from the test methodology listed in the test plan for the Electrostatic Discharge (ESD) Immunity test.

## 5.1.4 Final Test

The EUT met the performance criteria requirement as specified in the test plan of this report and in the standards.



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# 5.1.5 Final Data

Report Date: October 4, 2023

BUREAU VERITAS

Type of Discharge:		Performan				
AD – Alt Discharge CD = Contact Discharge VCP = Vertical Coupling Plane HCP = Horizontal Coupling Plane	Voltage: ±2 kV	Voltage: ±4 kV	Voltage: ±6 kV	Voltage: ±8 kV	Test Result: Complies or Not Compliant	
AD	NDP	NDP	NR	NDP	Complies	
CD	NDP	NDP	NR	NR	Complies	
VCP	NDP	NDP	NR	NR	Complies	
НСР	NDP	NDP	NR	NR	Complies	

**NDP** = No degradation of performance observed

**DP-B** = **Degradation of performance to Criteria B.** 

NR = Not Required

NT = Not Tested



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# 5.1.6 Photos



Figure 17: Electrostatic Discharge Immunity (ESD) Test Setup



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# 5.2 Radiated Immunity

This test is to evaluate the performance of the EUT when subjected to radiated electromagnetic fields.

## 5.2.1 Test Overview

Results	<b>Complies</b> (as tested per this report)				Test Date(s)		08/13/2023		
Standard	EN 61000-4-3:2006+A1:2008+A2:2010								
Model Number	WWXD/WBGL, NBGLW, NBNAW, WBNAW, WBEXW				Serial #	N/A			
Configuration	See test plan for details.								
Test Setup	Tested in Radiated Immunity Chamber. EUT placed on table: see test plan for details.					for details.			
Environmental Conditions	08/13/2023	Temp	23º C	H	Iumidity	35%	Pressure	1018 mbar	
Frequency Range	80-1000 MHz + Spot Frequencies		Level			3 V/m			
Modulation	80%, 1 kHz, AM	Orientations			0°, 90°, 180°, 270°				
Step Size	1%	Dwell			3 Sec				
Perf. Criteria	А	Perf. Verification			See test plan				
Mod to EUT	None Test P			rfo	ormed By Brandon Quan				

## 5.2.2 Test Procedure

Testing was performed according to the test plan. The EUT was placed on a table 3 meters from the fieldgenerating antenna. The field strength was set prior to placing the EUT in the chamber at the specified level with no modulation applied. The isotropic field probe was placed adjacent to the EUT to monitor the presence of field during the test. The tests were performed in 1% steps, from 80-1000 MHz + Spot Frequencies for each of vertical and horizontal polarizations. The test was performed by rotating the table in the clockwise direction in successive steps of 90°, subsequent exposures being designated as 0°, 90°, 180° and 270°.

## 5.2.3 Acceptable Climatic Conditions

Unless otherwise specified by the committee responsible for the generic or product standard, the climatic conditions in the laboratory shall be within any limits specified for the operation of the EUT and the test equipment by their respective manufacturers.

Tests shall not be performed if the relative humidity is so high as to cause condensation on the EUT or the test equipment.

#### 5.2.4 Deviations

There were no deviations from the test methodology listed in the test plan for the Radiated Immunity test.



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## 5.2.5 Final Test

The EUT met the performance criteria requirement as specified in the test plan of this report and in the standards.

#### 5.2.6 Final Data

EUT Side	Antenna Polarization Horizontal (H) or Vertical (V)	Performance Criteria	Test Result: Complies or Not Compliant		
Front	Н	NDP	Complies		
Front	V	NDP	Complies		
Rear	Н	NDP	Complies		
Rear	V	NDP	Complies		
Right	Н	NDP	Complies		
Right	V	NDP	Complies		
Left	Н	NDP	Complies		
Left	V	NDP	Complies		

**NDP** = No degradation of performance observed

**DP-X** = Degradation of performance to criteria X.

NT = Not Tested



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# 5.2.7 Photos



Figure 18: 80 MHz to 1 GHz Radiated Immunity Test Setup - Front



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Figure 19: 80 MHz to 1 GHz Radiated Immunity Test Setup – Rear



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Figure 20: 1 to 6 GHz Radiated Immunity Test Setup - Front



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Figure 21: 1 to 6 GHz Radiated Immunity Test Setup - Rear



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# 5.3 Magnetic Field Immunity

This test is to evaluate the performance of the EUT when subjected to magnetic fields at power line frequencies.

# 5.3.1 Overview of Test

Results	Complies (as tested per this report)			Test Dat	te(s)	i) 08/12/2023				
Standard	EN 61000-4-8:2010									
Model Number	WWXD/WBGL, NBGLW, NBNAW, WBNAW, WBEXW				Serial #		N/A			
Configuration	See test plan for details.									
Test Setup	Tested in EMC Immunity Lab, see test plans for details.									
Environmental Conditions	08/12/2023 <b>Temp</b> 23° C <b>Humidity</b> 3				37	%	Pressure	1016 mbar		
Test Level	1 A/m			Frequency			50 Hz			
Perf. Criteria	A Pe			Perf. Verification			See test plan			
Mod to EUT	None	Test	Test Performed By			Brandon Quan				

## 5.3.2 Test Procedure

Testing was performed according to the test plan. The EUT was placed on a wooden table. The EUT was placed in the center of the loop antenna. Testing was performed by placing the EUT in three orthogonal axis with respect to the loop antenna.

## 5.3.3 Acceptable Climatic Conditions

Unless otherwise specified by the committee responsible for the generic or product standard, the climatic conditions in the laboratory shall be within any limits specified for the operation of the EUT and the test equipment by their respective manufacturers.

Tests shall not be performed if the relative humidity is so high as to cause condensation on the EUT or the test equipment.

## 5.3.4 Deviations

There were no deviations from the test methodology listed in the test plan for the Power Frequency Magnetic Field Immunity test.

## 5.3.5 Final Test

The EUT met the performance criteria requirement as specified in the test plan of this report and in the standards.



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# 5.3.6 Final Data

Orientation	Test Level	Frequency	Performance Criteria	Test Results: Complies or Not Compliant	
X - Orientation	1 A/m	50 Hz	NDP	Complies	
Y - Orientation	1 A/m	50 Hz	NDP	Complies	
Z - Orientation	1 A/m	50 Hz	NDP	Complies	

**NDP** = No degradation of performance observed

**DP-X** = **Degradation** of performance to criteria X.

NT = Not Tested



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# 5.3.7 Photos



Figure 22: Power Frequency Magnetic Field Immunity Test Setup on X-Axis



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Figure 23: Power Frequency Magnetic Field Immunity Test Setup on Y-Axis



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Figure 24: Power Frequency Magnetic Field Immunity Test Setup on Z-Axis

# **END OF REPORT**