



**REPORT OF
ELECTROMAGNETIC INTERFERENCE**
Per
ANSI C63.4 (2014) for Unintentional Radiators

Supplier's Declaration of Conformity

To show compliance with;

**United States
Canada**

**CFR 47, Chapter 1, Subchapter A, Part 15, Subpart B
ICES-003:2019 Issue 6**

EUT:

EMF modulation unit

Model No: Qi-Max (Swiss Pine)

QBZ 20-05-1-08

PREPARED FOR APPLICANT:

Waveguard GmbH
Bahnhofstrasse 16
02625 Bautzen
Germany

REPORT #

UT06136A-002

Test Completion Date:

29 June 2020

Prepared By:

DNB ENGINEERING, INC.
1100 East Chalk Creek Rd.
Coalville, Utah 84017
Tel: 1(435) 336-4433

EXECUTIVE SUMMARY

The purpose of this series of tests was to demonstrate the Electromagnetic Compatibility (EMC) characteristics of the EMF modulation unit Model No: Qi-Max (Swiss Pine) QBZ 20-05-1-08 the tests listed in the table below were used to show compliance to the requirements.

REQUIREMENTS	STATUS	COMPLIANT Yes/No/NA
CFR 47 Part 15 Subpart B ICES-003 :2019 Issue 6	Emissions	Yes
Radiated Emissions	Class B	Yes
Conducted Emissions	N/A	N/A

Signed By:



CL Payne III:

Facility Lab Manager

DNB Engineering Inc.

NVLAP Approved Signatory

This report shall not be reproduced without the written approval of

DNB ENGINEERING, INC. Results contained in this report relate only to the item tested.

Note: This report must not be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the U.S. government.

This is a statement required by NVLAP in our ISO/IEC17025 accreditation process. What this means is the testing performed does not carry any governmental sponsorship. The efforts of the Accrediting Agency relate only to documented processes and not the actual test conduct. It in no way diminishes the validity or value of the test results. It only assigns ultimate responsibility for the result of testing to the test laboratory, not the U.S. government.

DOCUMENT HISTORY

Revision Letter	Number of Pages	Init	Description	Date
001	ALL	GP	Documentation Release	30 June 2020
002	ALL	GP	Correction of contact person and removal of Qi-Technologies	13 July 2020

The latest revisions number noted above replaces all revisions issued prior to the release date indicated.

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CERTIFICATION OF TEST DATA

This report, containing electromagnetic immunity and emissions test data and evaluations, has been prepared by an independent electromagnetic compatibility laboratory, DNB ENGINEERING, Inc, in accordance with the applicable specifications and instructions required per the Introduction.

NVLAP Code: 200634-0

ISED #: 3386A - CAB #: US0090

The data evaluation and equipment configuration presented herein are a true and accurate representation of the measurements of the test sample's electromagnetic immunity and emissions characteristics as of the dates and at the times of the test under the conditions herein specified.

Equipment Tested: EMF modulation unit
 Model No: Qi-Max
 (Swiss Pine)
 QBZ 20-05-1-08

Test Completion Date: 29 June 2020

Report Written By: *Gina Perkes*

Gina Perkes
 Report Writer

30 June 2020
 Date

Report Reviewed By: *CL Payne III*

CL Payne III
 Facility Lab Manager

30 June 2020
 Date

1. INTRODUCTION

1.1 Administrative Data and Test Description

Applicant: Waveguard GmbH
Bahnhofstrasse 16
02625 Bautzen
Germany

Contact: Martin To-Da Pham, CEO

Phone: +49 (0) 35 91 59 47 543
Test Completion Date: 29 June 2020

Equipment Under Test (EUT): EMF modulation unit

Model No: Qi-Max
(Swiss Pine)
QBZ 20-05-1-08

1.2 Test Configuration

Where applicable, cables were routed consistent with the typical application by varying the configuration of the test sample. The effect of varying the position of cables was investigated to find the configuration that produced maximum emissions and susceptibility.

The EUT was evaluated to determine the “worst case” positioning of both cables and axis. Once the “worst case” configuration was determined care was used to maintain this configuration throughout the test.

Note: Because of the size and voltage requirements of the system it was evaluated at the customer’s premise’s in Coalville,UT. Antenna positions were taken from as many angles as possible to ensure that maximum emissions were recorded emanating form the EUT.

1.3 Equipment Description

EMF modulation unit

Description: EMF modulation unit interacts with ambient EM environment

Model name: Qi-Max (Swiss Pine)

Model serial number: QBZ 20-02-1-08

SIZE SPECIFICATIONS:

Length: 60 cm

Width: 60 cm

Height: 28 cm

Weight: 20 kg



1.4 Mode of Operation

EUT is a stand-alone piece of equipment. EUT was placed in operational mode.

1.5 Test Voltage

Internally Powered

1.6 Clock Frequencies

Not Applicable

1.7 Block Diagram

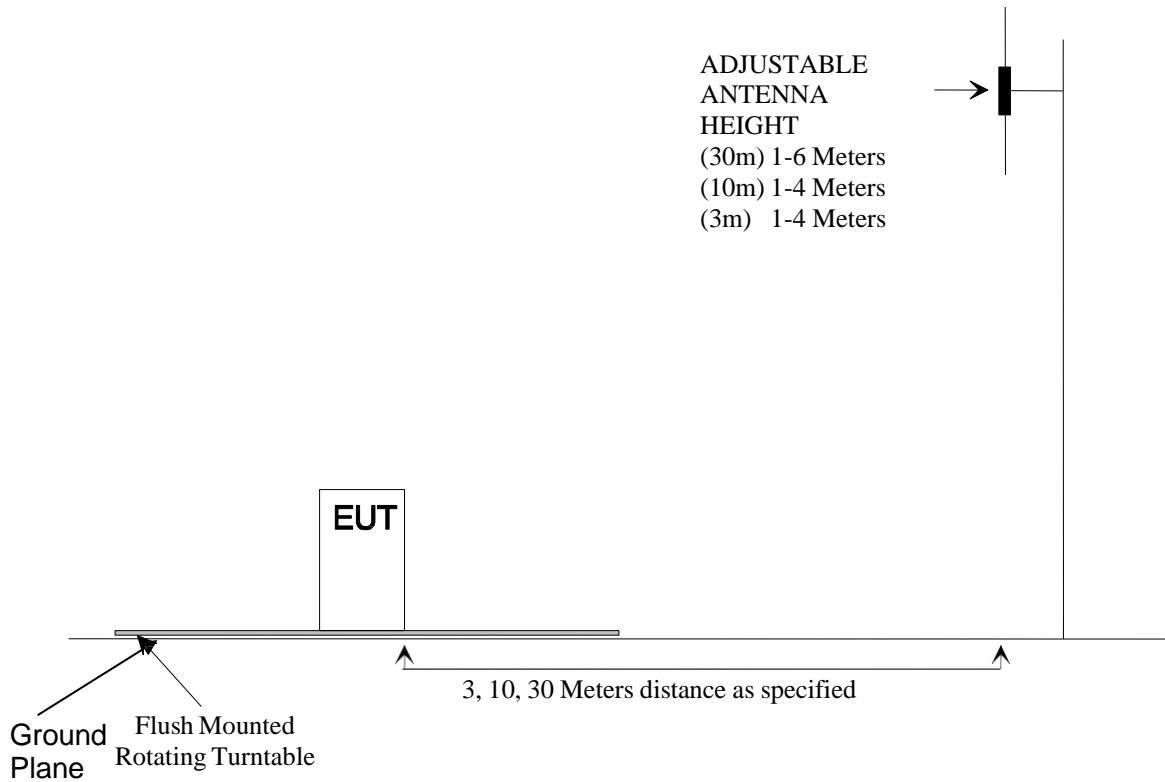
Not Provided

RADIATED EMISSIONS EN 55032 (CISPR 32) CLASS B

1.8 Test Setup and Procedure

The EUT was placed on a flush mounted, steel-top turntable on the open area test site as shown below. The turntable can be rotated 360 degrees. The Measuring antenna is set at the prescribed distance. Measurements are made with broadband antennas that have been correlated with tuned dipole antennas. The mast is 4.5 meters high and is self-supporting. The height of the antenna can be varied from 1 to 4 meters. Positioning of the antenna is controlled remotely.

Open Area Test Site



2. RADIATED TEST SETUP AND PROCEDURE

The EUT is put into the operational test mode as stated in Section 1.4 it is then started.

The spectrum analyzer is setup to store the peak emission over the band of the antenna. Peak EUT and ambient emissions are stored while the turntable is rotated 360°. The Peak spectrum analyzer trace is then plotted with the addition of antenna and cable correction factors. The limit is plotted on the same graph. A receiver with CISPR Quasi Peak capabilities is then used on the frequencies identified as the highest with respect to the plotted limit. Ambients are noted on the graph along with EUT emissions. The highest EUT frequencies, with respect to the limit, are maximized.

To maximize emissions levels, the turntable is rotated, and the antenna is raised and lowered to determine the point of maximum emanations. The cables are then manipulated at that point to maximize emissions. Measurements are made with the antennas in each horizontal and vertical polarization separately. The data obtained from these tests is corrected with the proper cable, preamplifier and antenna factors. The results are then transcribed onto tables that show the maximum emission levels. The highest emissions are listed in a Radiated Emissions Summary table.

If no emissions can be found, the lowest Harmonics Emissions of the EUT clocks within the bands of the standard are tuned into with the receiver. If no emissions are found, the noise floor will be entered into the table and noted. Summary results will reflect only actual emissions from the EUT.

The field intensity measurements are made using standard techniques with a spectrum analyzer or EMI receiver as the calibrated Field Intensity Meter (FIM). Preamplifiers and filters are used when required.

When using the Hewlett Packard Model 8568B Spectrum Analyzer as the FIM, the Analyzer is calibrated to read signal level in dBm. Where:

$$0 \text{ dBm (50 ohms)} = 107 \text{ dB}\mu\text{V (50 ohms)}$$

The signal level (dB μ V) = indicated signal level (dBm) + 107 dB. To obtain the signal level in dB μ V/m it is necessary to add the antenna factor in dB.

Example of Typical Calculation

Measurement Distance = 10 Meter

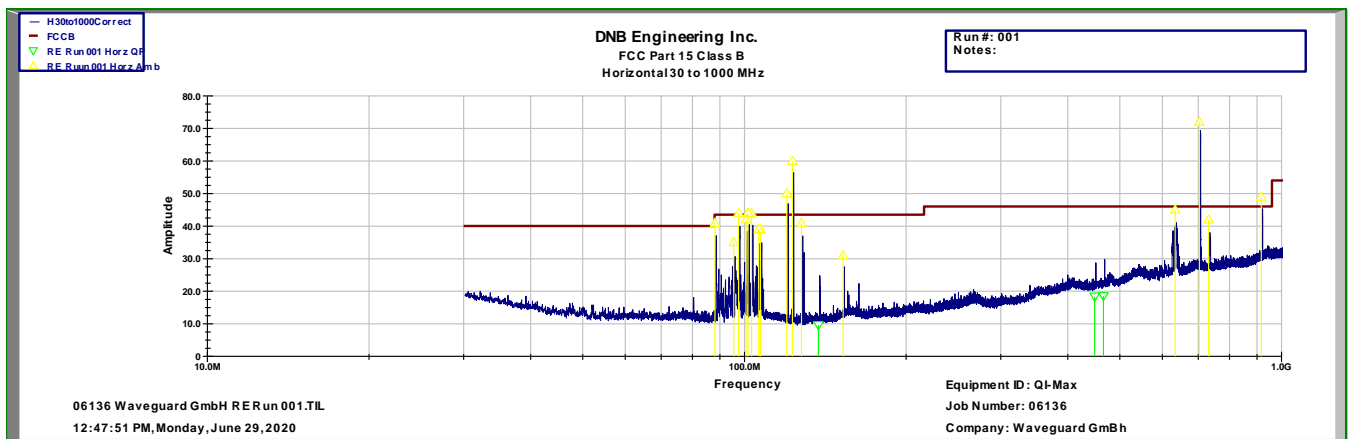
Rohde and Schwarz reading @ 60 MHz	49.0	dB μ V
Antenna Factor	+7.5	dB/m
Cable Loss	+2.0	dB
Preamplifier	-25.5	dB
Total Factors	-16.0	dB/m
Field Strength dB μ V/m at 10 Meter =	33.0	dB μ V/m

2.1 Radiated Emissions Compliance Data

Radiated Emissions Summary Test Data Per EN 55032 (CISPR 32) Class B, at 3 meters

HORIZONTAL READINGS												
Freq. (MHz)	Meas'd (dBuV)	Amp Factors (dB)	Cable Factors (dB)	Antenna Factors (dB)	Total Factors (dBuV/m)	Total (dBuV/m)	Limit (dBuV/m)	Delta (dB)	Azimuth (degree)	Height (m)	Hor/Vert	Meas Type QP / PK
1018.565	12.3	26	2.4	23.4	-0.2	12.06	54	-41.94	0	1	H	Ave
1018.565	24	26	2.4	23.4	-0.2	23.72	74	-50.28	0	1	H	PK
1024.855	12.1	26	2.4	23.4	-0.2	11.93	54	-42.07	0	1	H	Ave
1024.855	25.3	26	2.4	23.4	-0.2	25.09	74	-48.91	0	1	H	PK
1335.071	12.5	26.1	2.8	24.2	0.9	13.39	54	-40.61	0	1	H	Ave
1335.071	24.8	26.1	2.8	24.2	0.9	25.73	74	-48.27	0	1	H	PK
1626.138	13.1	26.2	3.1	25.7	2.6	15.68	54	-38.32	0	1	H	Ave
1626.138	27	26.2	3.1	25.7	2.6	29.6	74	-44.4	0	1	H	PK
1942.216	12.6	26.2	3.4	28.2	5.4	18	54	-36	0	1	H	Ave
1942.216	26.8	26.2	3.4	28.2	5.4	32.15	74	-41.85	0	1	H	PK
2333.667	15.9	26.1	3.8	29.3	7	22.94	54	-31.06	0	1	H	Ave
2333.667	27.3	26.1	3.8	29.3	7	34.33	74	-39.67	0	1	H	PK
1018.565	12.3	26	2.4	23.4	-0.2	12.06	54	-41.94	0	1	H	Ave
1018.565	24	26	2.4	23.4	-0.2	23.72	74	-50.28	0	1	H	PK

Horizontal

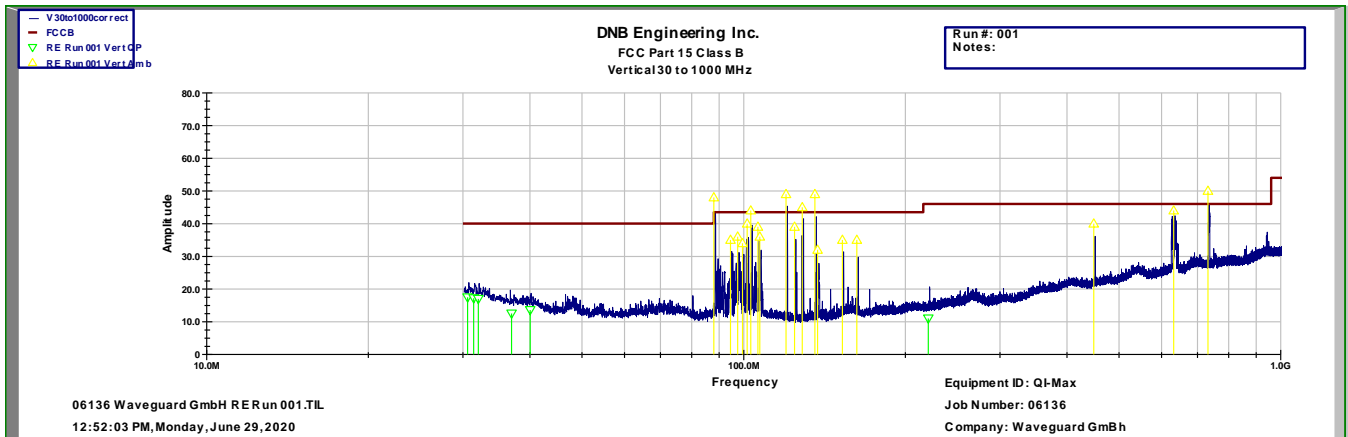


2.2 Radiated Emissions Compliance Data

Radiated Emissions Summary Test Data Per EN 55032 (CISPR 32) Class B, at 3 meters

VERTICAL READINGS												
Freq. (MHz)	Meas'd (dBuV)	Amp Factors (dB)	Cable Factors (dB)	Antenna Factors (dB)	Total Factors (dBuV/m)	Total (dBuV/m)	Limit (dBuV/m)	Delta (dB)	Azimuth (degree)	Height (m)	Hor/Vert	Meas Type QP / PK
1089.98	12.5	26	2.5	23.6	0	12.5	54	-41.5	0	1	V	Ave
1089.98	28.7	26	2.5	23.6	0	28.76	74	-45.24	0	1	V	PK
1128.55	11.8	26.1	2.6	23.7	0.2	11.92	54	-42.08	0	1	V	Ave
1128.558	28.4	26.1	2.6	23.7	0.2	28.53	74	-45.47	0	1	V	PK
1546.781	12.3	26.2	3	25.1	1.9	14.17	54	-39.83	0	1	V	Ave
1546.78	24.7	26.2	3	25.1	1.9	26.59	74	-47.41	0	1	V	PK
1930.43	32.3	26.2	3.4	28.1	5.3	37.57	74	-36.43	0	1	V	PK
1930.43	26.5	26.2	3.4	28.1	5.3	31.76	54	-22.24	0	1	V	Ave
2331.13	14.8	26.1	3.8	29.3	7	21.82	54	-32.18	0	1	V	Ave
2331.13	26.2	26.1	3.8	29.3	7	33.23	74	-40.77	0	1	V	PK
2774.52	12	26.2	4.3	30.2	8.3	20.25	54	-33.75	0	1	V	Ave
2774.52	24.1	26.2	4.3	30.2	8.3	32.33	74	-41.67	0	1	V	PK

Vertical



2.3 Radiated Emissions Compliance Data

**Radiated Emissions Summary Test Data
Per FCC Part 15 Subpart B Class B, at 10
meters**

VERTICAL READINGS												
Freq. (MHz)	Meas'd (dBuV)	Amp Factor s (dB)	Cable Factor s (dB)	Antenn a Factors (dB)	Total Factors (dBuV/ m)	Total (dBuV/ m)	Limit (dBu V/m)	Delta (dB)	Azimuth (degree)	Height (m)	Hor/ Vert	Meas Type AVE/
30.607	23.6	26.6	0.5	19.9	-6.1	17.46	30	-12.09	0	1	Vert	QP
31.427	23.8	26.6	0.6	19.5	-6.6	17.19	30	-12.36	0	1	Vert	QP
32.046	23.9	26.6	0.6	19.1	-6.9	17	30	-12.55	0	1	Vert	QP
36.971	22	26.6	0.8	16.3	-9.5	12.51	30	-17.04	0	1	Vert	QP
40.03	24.7	26.5	0.9	14.5	-11.1	13.6	30	-15.95	0	1	Vert	QP
220.706	19.1	26	2.6	15.3	-8.1	11.01	36	-24.54	0	1	Vert	QP

2.4 Radiated Emissions Compliance Data

**Radiated Emissions Summary Test Data
Per FCC Part 15 Subpart B Class B, at 10
meters**

HORIZONTAL READINGS												
Freq. (MHz)	Meas'd (dBuV)	Amp Factor s (dB)	Cable Factor s (dB)	Antenn a Factors (dB)	Total Factors (dBuV/ m)	Total (dBuV/ m)	Limit (dBu V/m)	Delta (dB)	Azimuth (degree)	Height (m)	Hor/ Vert	Meas Type AVE/ PK
137.366	22	26.3	1.8	12.1	-12.4	9.62	33	-23.43	0	4	Horz	QP
448.823	19.1	26.8	3.8	22.2	-0.8	18.34	36	-17.21	120	4	Horz	QP
466.079	19.1	26.9	3.9	22.4	-0.6	18.52	36	-17.03	0	4	Horz	QP

2.7 Climatic Conditions

The climatic conditions during the Radiated Emissions tests were recorded as follows:

	Measured Value
Ambient Temperature	21.2°C
Relative Humidity	34%

2.8 Compliant Statement

The EUT is compliant with ANSI C63.4:2014 and EN55032 (CISPR 32) @ 3 meters and is compliant with the standards listed below:

CFR 47, Chapter 1, Subchapter A, Part 15, Subpart B
ICES-003:2019 Issue 6

YES	NO
YS	

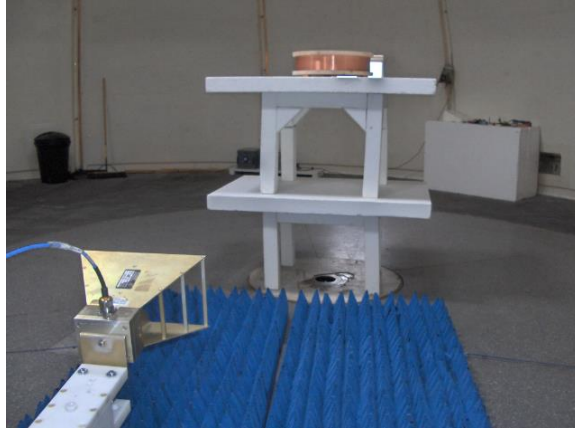
YS Test Engineer's Initials

2.8 Photographs of Test Setup for Radiated Emissions

EUT: EMF modulation unit

View: Qi-Max (Swiss Pine)
Model serial number:
QBZ 20-02-1-08





2.10 Measurement uncertainty

Contributor	Distribution	Value	Comments
Expanded uncertainty U(E) for Horizontally polarized radiated disturbances from 30 MHz to 200 MHz using a biconical antenna at a distance of 10 m	k=2	4.22	Calculated per CISPR 16-4-2
Expanded uncertainty U(E) for Vertically polarized radiated disturbances from 30 MHz to 200 MHz using a biconical antenna at a distance of 10 m	k=2	4.17	Calculated per CISPR 16-4-2
Expanded uncertainty U(E) for Horizontally polarized radiated disturbances from 200 MHz to 1 GHz using an LPDA antenna at a distance of 10 m	k=2	4.79	Calculated per CISPR 16-4-2
Expanded uncertainty U(E) for Vertically polarized radiated disturbances from 200 MHz to 1 GHz using an LPDA antenna at a distance of 10 m	k=2	4.92	Calculated per CISPR 16-4-2
Expanded uncertainty U(E) for Radiated disturbance measurements from 1 GHz to 6 GHz in a FAR (FSOATS) at a distance of 3 m	k=2	N/A	Calculated per CISPR 16-4-2
Expanded uncertainty U(E) for Radiated disturbance measurements from 6 GHz to 18 GHz in a FAR (FSOATS) at a distance of 3 m	k=2	N/A	Calculated per CISPR 16-4-2

3. DEVICE LABEL

3.1 FCC Title 47 Chapter I Subchapter A Part 15 Subpart A Clause 15.19 - Labeling requirements.

(a) In addition to the requirements in part 2 of this chapter, a device subject to certification, or Supplier's Declaration of Conformity shall be labeled as follows:

(1) Receivers associated with the operation of a licensed radio service, *e.g.*, FM broadcast under part 73 of this chapter, land mobile operation under part 90 of this chapter, etc., shall bear the following statement in a conspicuous location on the device:

This device complies with part 15 of the FCC Rules. Operation is subject to the condition that this device does not cause harmful interference.

(2) A stand-alone cable input selector switch, shall bear the following statement in a conspicuous location on the device:

This device complies with part 15 of the FCC Rules for use with cable television service.

(3) All other devices shall bear the following statement in a conspicuous location on the device:

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

(4) Where a device is constructed in two or more sections connected by wires and marketed together, the statement specified under paragraph (a) of this section is required to be affixed only to the main control unit.

(5) When the device is so small or for such use that it is impracticable to label it with the statement specified under paragraph (a) of this section in a font that is four-point or larger, and the device does not have a display that can show electronic labeling, then the information required by this paragraph shall be placed in the user manual and must also either be placed on the device packaging or on a removable label attached to the device.

(b)-(c) [Reserved]

(d) Consumer electronics TV receiving devices, including TV receivers, videocassette recorders, and similar devices, that incorporate features intended to be used with cable television service, but do not fully comply with the technical standards for cable ready equipment set forth in §15.118, shall not be marketed with terminology that describes the device as "cable ready" or "cable compatible," or that otherwise conveys the impression that the device is fully compatible with cable service. Factual statements about the various features of a device that are intended for use with cable service or the quality of such features are acceptable so long as such statements do not imply that the device is fully compatible with cable service. Statements relating to product features are generally acceptable where they are limited to one or more specific features of a device, rather than the device as a whole. This requirement applies to consumer TV receivers, videocassette recorders and similar devices manufactured or imported for sale in this country on or after October 31, 1994.

3.2 CANADA – ICES-003:2016 Updated 2019 – Issue 6 - Clause 8 - Labeling requirements.

The manufacturer, importer or supplier shall meet the labelling requirements set out in this section and in Notice 2014-DRS1003 for electronic labelling for every unit:

- (i) prior to marketing in Canada, for ITE manufactured in Canada and
- (ii) prior to importation into Canada, for imported ITE.

Each unit of an ITE model shall bear a label (see below) that represents the manufacturer's or the importer's SDoC with Innovation, Science and Economic Development Canada's ICES-003. This label shall be permanently affixed to the ITE or displayed electronically and its text must be clearly legible. If the dimensions of the device are too small or if it is not practical to place the label on the ITE and electronic labelling has not been implemented, the label shall be, upon agreement with Innovation, Science and Economic Development Canada, placed in a prominent location in the user manual supplied with the ITE. The user manual may be in an electronic format and must be readily available.

Innovation, Science and Economic Development Canada ICES-003 Compliance Label:

CAN ICES-3 ()/NMB-3(*)*

* Insert either "A" or "B" but not both to identify the applicable Class of ITE.

4. INFORMATION TO THE USER

4.1 FCC Title 47 Chapter I Subchapter A Part 15 Subpart A Clause 15.21

The users manual or instruction manual for an intentional or unintentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. In cases where the manual is provided only in a form other than paper, such as on a computer disk or over the Internet, the information required by this section may be included in the manual in that alternative form, provided the user can reasonably be expected to have the capability to access information in that form.

4.2 FCC Title 47 Chapter I Subchapter A Part 15 Subpart A Clause 15.105

(a) For a Class A digital device or peripheral, the instructions furnished the user shall include the following or similar statement, placed in a prominent location in the text of the manual:

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

(b) For a Class B digital device or peripheral, the instructions furnished the user shall include the following or similar statement, placed in a prominent location in the text of the manual:

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

(c) The provisions of paragraphs (a) and (b) of this section do not apply to digital devices exempted from the technical standards under the provisions of §15.103.

(d) For systems incorporating several digital devices, the statement shown in paragraph (a) or (b) of this section needs to be contained only in the instruction manual for the main control unit.

(e) In cases where the manual is provided only in a form other than paper, such as on a computer disk or over the Internet, the information required by this section may be included in the manual in that alternative form, provided the user can reasonably be expected to have the capability to access information in that form.

5. APPENDIX SECTION

5.1 APPENDIX A: UNCERTAINTY TOLERANCE

DNB Engineering's Utah Facility is within acceptable uncertainty tolerances per ANSI C63.4 sections 5.4.6.1 and 5.4.6.2 as well as CISPR 16-1 Annex M, section M.2.

ANSI C63.4

5.4.6.1 Site Attenuation. A measurement site shall be considered acceptable for radiated electromagnetic field measurements if the horizontal and vertical NSA derived from measurements, i.e., the "measured NSA," are within ± 4 dB of the theoretical NSA (5.4.6.3) for an ideal site.

5.4.6.1 NSA Tolerance. The ± 4 -dB tolerance in 5.4.6.1 includes instrumentation calibration errors, measurement technique errors, and errors due to site anomalies. These errors are analyzed in ANSI C63.6, wherein it is shown that the performance of a well-built site contributes only 1 dB of the total allowable tolerance.

CISPR 16-1

M.2 Error analysis

The total estimated errors are the basis for the ± 4 -dB site acceptability criterion consisting of approximately 3-dB measurement uncertainty and an additional allowable 1 dB for site imperfections.

5.2 APPENDIX B: SITE CHARACTERISTICS CHALK CREEK EMI TEST SITE

The DNB Engineering test facility is located in Chalk Creek Canyon near Coalville, Utah. Site characteristics were measured according to the procedures outlined in ANSI C63.4 "Characteristics of Open Field Test Site". The results of these characterizations indicate that the Chalk Creek site is an outstanding facility to perform accurate and repeatable EMI tests.

5.3 Ambient Emissions

Ambient Emission measurements were made to determine the level of the ambient emanations at the DNB test facility. The results indicate that all ambient signals are below the FCC Radiated Emission limits or that each can easily be identified as an ambient signal.

6. NVLAP ACCREDITATION

**United States Department of Commerce
National Institute of Standards and Technology**



Certificate of Accreditation to ISO/IEC 17025:2017

NVLAP LAB CODE: 200634-0

DNB Engineering, Inc.
Coalville, UT

*is accredited by the National Voluntary Laboratory Accreditation Program for specific services,
listed on the Scope of Accreditation, for:*

Electromagnetic Compatibility & Telecommunications

*This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017.
This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality
management system (refer to joint ISO-ILAC-IAF Communique dated January 2009).*

2019-07-02 through 2020-06-30
Effective Dates





For the National Voluntary Laboratory Accreditation Program

7. APPENDIX C: EMC INSTRUMENTATION AND MEASUREMENT EQUIPMENT

Calibration of test and measurement equipment is performed by an approved commercial facility, whose standards are traceable to the National Institute of Standards and Technology.

Radiated Emissions Equipment

Description	Manufacturer/MN	Asset #	Serial #	Cal Due
Amplifier	HP/8447D	U-065	2727A06180	06 May 21
BiConiLog	ETS/3142E	U-265	166322	Refence Only
Signal Analyzer	R&S/FSV30	U-248	101367	17 Sept 20
TILE Software	ETS- Lindgern/ 3.4.11.13	U-317	8112006	07 Mar 21

8. END OF TEST REPORT UT06136A-002
