Report on the FCC and Industry Canada Testing of:

Alphatron Marine USA Inc

25kW X-Band Marine Radar Scanner/Tx/Rx, Model: NKE 2255

In accordance with FCC 47 CFR Part 15B, ICES-003 and Industry Canada RSS-GEN

Prepared for: Alphatron Marine USA Inc
1205, Butler Road, League City, TEXAS, 77573
UNITED STATES

FCC ID: 2ADJKNKE2255 IC: 12477A-NKE2255

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Document Number: 75942754-02 | Issue: 02

SIGNATURE			
			
NAME	**JOB TITLE**	**RESPONSIBLE FOR**	**ISSUE DATE**
Kim Archer	Sales Manager	Authorised Signatory	27 March 2019

Signatures in this approval box have checked this document in line with the requirements of TÜV SÜD document control rules.

ENGINEERING STATEMENT

The measurements shown in this report were made in accordance with the procedures described on test pages. All reported testing was carried out on a sample equipment to demonstrate limited compliance with FCC 47 CFR Part 15B, ICES-003 and Industry Canada RSS-GEN. The sample tested was found to comply with the requirements defined in the applied rules for the tests detailed in section 1.3.

SIGNATURE			
			
NAME	**JOB TITLE**	**RESPONSIBLE FOR**	**ISSUE DATE**
Graeme Lawler	Test Engineer	Testing	27 March 2019

FCC Accreditation
90987 Octagon House, Fareham Test Laboratory

Industry Canada Accreditation
IC2932B-1 Octagon House, Fareham Test Laboratory

EXECUTIVE SUMMARY

A sample of this product was tested and found to be compliant with FCC 47 CFR Part 15B, ICES-003: 2016 and Industry Canada RSS-GEN: 2017 and Issue 05 (2018-04).

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Contents

1 Report Summary

1.1 Report Modification Record

Alterations and additions to this report will be issued to the holders of each copy in the form of a complete document.

Issue	Description of Change	Date of Issue
1	First Issue	30 January 2019
2	FCC ID and IC ID amended	

Table 1

1.2 Introduction

Applicant	Alphatron Marine USA Inc
Manufacturer	Alphatron Marine USA Inc
Model Number(s)	NKE-2255
Serial Number(s)	LC30003 (75942754-TSR0015)
Hardware Version(s)	Issue 01 (07-2013)
Software Version(s)	v00.00.01.00
Number of Samples Tested	1
Test Specification/Issue/Date	FCC 47 CFR Part 15B: 2017 ICES-003: 2016 Industry Canada RSS-GEN: Issue 05 (04-2018)
Order Number Date	JRC UK: QAF / JRC US 16-May-2018
Date of Receipt of EUT	11-June-2018
Start of Test	29-July-2018
Finish of Test	18-December-2018
Name of Engineer(s)	Graeme Lawler
Related Document(s)	ANSI C63.4: 2014

1.3 Brief Summary of Results

A summary of the tests carried out in accordance with FCC 47 CFR Part 15B and Industry Canada RSS-GEN is shown below.

Section	Specification Clause			Test Description	Result	Comments/Base Standard
	Part 15b	ICES-003	RSS-GEN			
Configuration and Mode: Tx Idle, Rx Operating, Motor not Powered						
2.1	15.109	6.2	7.3	Radiated Disturbance, 30MHz to 40GHz	Pass	ANSI C63.4: 2014

Table 2

Section	Specification Clause			Test Description	Result	Comments/Base Standard
	Part 15b	ICES-003	RSS-GEN			
Configuration and Mode: Tx Idle, Rx Operating, Motor Powered and Rotating						
2.1	15.109	6.2	7.3	Radiated Disturbance, 30MHz to 1000MHz	Pass	ANSI C63.4: 2014
2.2	15.107	6.1	8.8	Conducted Disturbance at Mains Terminals	Pass	ANSI C63.4: 2014

Table 3

1.4 Application Form

MAIN EUT			
MANUFACTURING DESCRIPTION	NKE-2255 X-Band Marine Radar scanner/Tx-Rx		
MANUFACTURER	Japan Radio Co., Ltd.,		
MODEL NAME/NUMBER	NKE-2255		
PART NUMBER	N/A		
SERIAL NUMBER			
HARDWARE VERSION	Production sample.		
SOFTWARE VERSION			
PSU VOLTAGE/FREQUENCY/CURRENT	220/240v 50Hz/60Hz		
HIGHEST INTERNALLY GENERATED / USED FREQUENCY	9.440Ghz		
FCC ID (if applicable)			
INDUSTRY CANADA ID (if applicable)			
TECHNICAL DESCRIPTION (a brief description of the intended use and operation)	Marine Radar scanner turning unit for use on high seas vessel.		
COUNTRY OF ORIGIN	Japan		
RF CHARACTERISTICS (if applicable)			
TRANSMITTER FREQUENCY OPERATING RANGE (MHz)	9.380Ghz - 9.440Ghz (9.410Ghz +/-30Mhz).		
RECEIVER FREQUENCY OPERATING RANGE (MHz)	9.380Ghz - 9.440Ghz		
INTERMEDIATE FREQUENCIES	60Mhz		
EMISSION DESIGNATOR(S): (i.e. G1D, GXW)	79M50PON		
MODULATION TYPES: (i.e. GMSK, QPSK)	Pulse		
OUTPUT POWER (W or dBm)	25kW (peak).		
SEPARATE BATTERY/POWER SUPPLY (if applicable)			
MANUFACTURING DESCRIPTION	Not Applicable		
MANUFACTURER			
TYPE			
PART NUMBER			
PSU VOLTAGE/FREQUENCY/CURRENT			
COUNTRY OF ORIGIN			
MODULES (if applicable)			
MANUFACTURING DESCRIPTION	Not Applicable		
MANUFACTURER			
TYPE			
POWER			
FCC ID			
INDUSTRY CANADA ID			
EMISSION DESIGNATOR			
DHSS/FHSS/COMBINED OR OTHER			
COUNTRY OF ORIGIN			
ANCILLARIES (if applicable)			
MANUFACTURING DESCRIPTION	Not Applicable		
MANUFACTURER			
TYPE			
PART NUMBER			
SERIAL NUMBER			
COUNTRY OF ORIGIN			

I hereby declare that the information supplied is correct and complete.

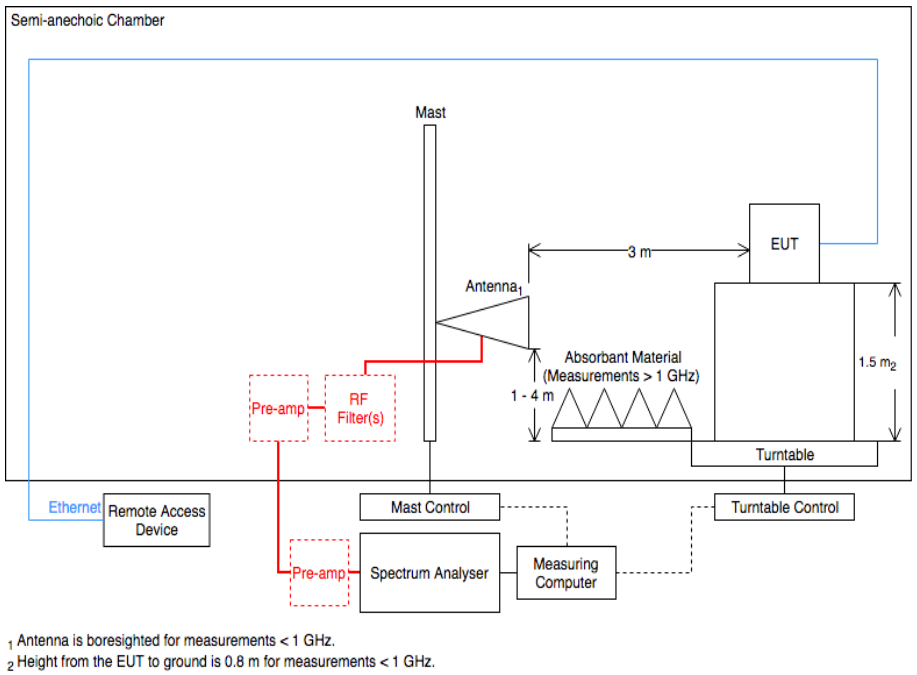
Name: James Moon Position held: Compliance Manager
Date: 21.June.2018

1.5 Product Information

1.5.1 Technical Description

25kW scanner/Turning unit for radar on high seas vessel.

1.5.2 Test Setup Diagram(s)



1 Antenna is boresighted for measurements < 1 GHz.
2 Height from the EUT to ground is 0.8 m for measurements < 1 GHz.

Figure 1 - Setup Diagram for Radiated Emissions Testing

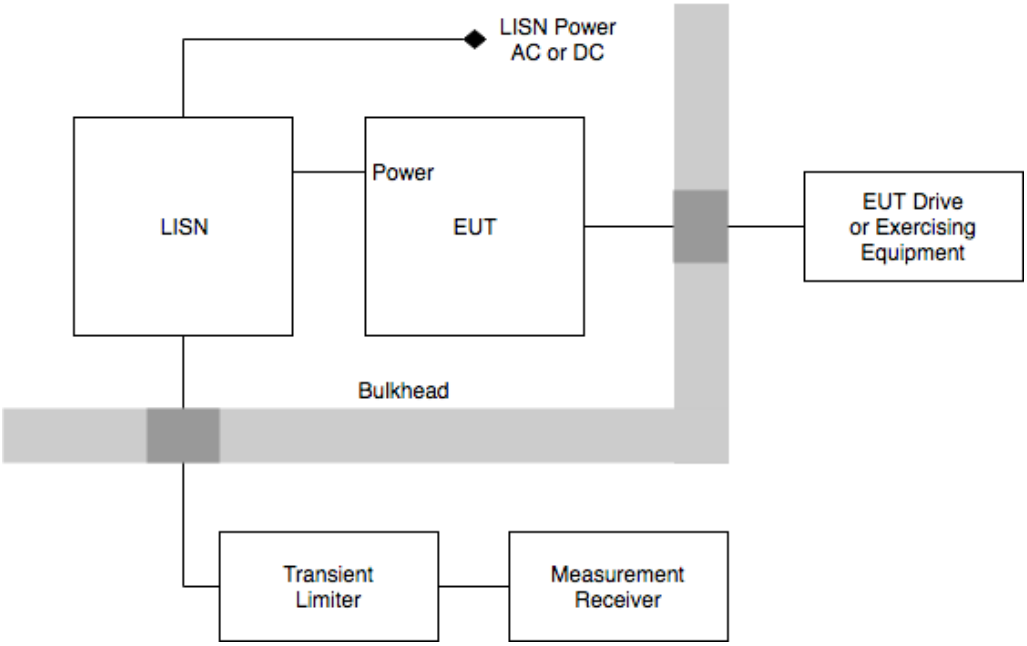


Figure 2 - AC Line Conducted Emissions Test Setup

1.5.3 EUT Configuration and Rationale for Radiated Spurious Emissions

The EUT was placed on the non-conducting platform in a manner typical of a normal installation.

Ports on the EUT were terminated with loads as described in ANSI C63.4 clause 6.2.4. Pre-scans were performed to determine whether the level of the emissions was increased by >2 dB when additional connectors of the same type and interconnecting cables were connected to determine the arrangement of the EUT during the test.

1.6 Deviations from the Standard

No deviations from the applicable test standard were made during testing.

1.7 EUT Modification Record

The table below details modifications made to the EUT during the test programme.
The modifications incorporated during each test are recorded on the appropriate test pages.

Modification State	Description of Modification still fitted to EUT	Modification Fitted By	Date Modification Fitted
Serial Number: LC30003			
0	As supplied by the customer	Not Applicable	Not Applicable

Table 3

1.8 Test Location

TÜV SÜD conducted the following tests at our Fareham Test Laboratory.

Test Name	Name of Engineer(s)	Accreditation
Configuration and Mode: Tx Idle, Rx Operating, Motor not Powered and /or Powered		
Radiated Disturbance	Graeme Lawler	UKAS
Conducted Disturbance at Mains Terminals	Graeme Lawler	UKAS

Table 4

Office Address:

Octagon House
Concorde Way
Segensworth North
Fareham
Hampshire
PO15 5RL
United Kingdom

2 Test Details

2.1 Radiated Disturbance

2.1.1 Specification Reference

FCC 47 CFR Part 15B, Clause 15.109
ICES-003, Clause 6.2
Industry Canada RSS-GEN, Clause 7.1

2.1.2 Equipment Under Test and Modification State

Model: NKE 2255, Serial number LC30003, Modification State 0

2.1.3 Date of Test

29-July-2018

2.1.4 Test Method

The EUT was set up in a semi-anechoic chamber on a remotely controlled turntable and placed on a non-conductive table 0.8m above a reference ground plane.

A pre-scan of the EUT emissions profile was made while varying the antenna-to-EUT azimuth and antenna-to-EUT polarisation using a peak detector; measurements were taken at a 3m distance.

Using the pre-scan list of the highest emissions detected, their bearing and associated antenna polarisation, the EUT was then formally measured using a Quasi-Peak, Peak, Average detector as appropriate. The readings were maximised by adjusting the antenna height, polarisation and turntable azimuth, in accordance with the specification.

2.1.5 Environmental Conditions

Ambient Temperature	19.8 °C
Relative Humidity	66.1 %

2.1.6 Test Results

Results for Configuration and Mode: Tx Idle, Rx Operating, Motor not Powered

Performance assessment of the EUT made during this test: Pass (Class A).

Detailed results are shown below.

Highest frequency generated or used within the EUT: 9.44 GHz
Which necessitates an upper frequency test limit of: 40 GHz

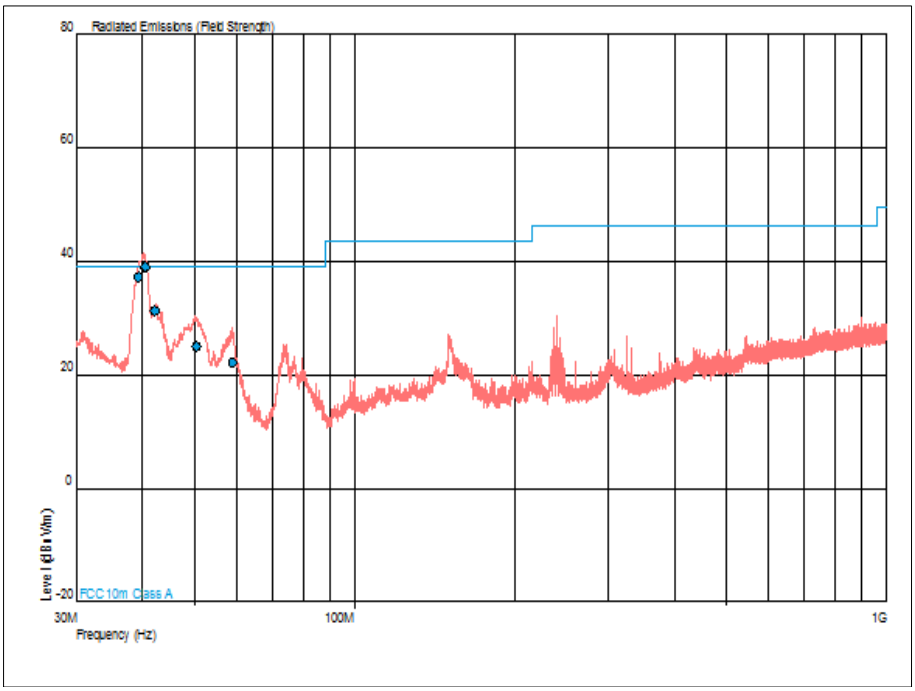


Figure 3 - Graphical Results, 30 MHz to 1 GHz, Combined Polarity

Frequency (MHz)	QP Level (dBuV/m)	QP Limit (dBuV/m)	QP Margin (dBuV/m)	Angle(Deg)	Height(m)	Polarity
39.294	37.2	39.1	-1.9	332	3.29	Vertical
40.438	38.9	39.1	-0.2	253	2.95	Vertical
40.456	39.0	39.1	-0.1	18	2.64	Vertical
42.245	31.3	39.1	-7.8	77	3.11	Vertical
50.625	25.1	39.1	-14.0	75	1.00	Vertical
59.072	22.2	39.1	-16.9	89	1.00	Vertical

Table 5 - Emission Results, 30 MHz to 1 GHz, Combined Polarity

Frequency (GHz)	Peak Level (dBuV/m)	Peak Limit (dBuV/m)	Peak Margin (dBuV/m)	Average Level (dBuV/m)	Average Limit (dBuV/m)	Average Margin (dBuV/m)	Angle (Deg)	Height (m)	Polarity
*									

Table 6 - Emission Results, 1 GHz to 40 GHz, Combined Polarity

*No emissions were detected within 10 dB of the limit.

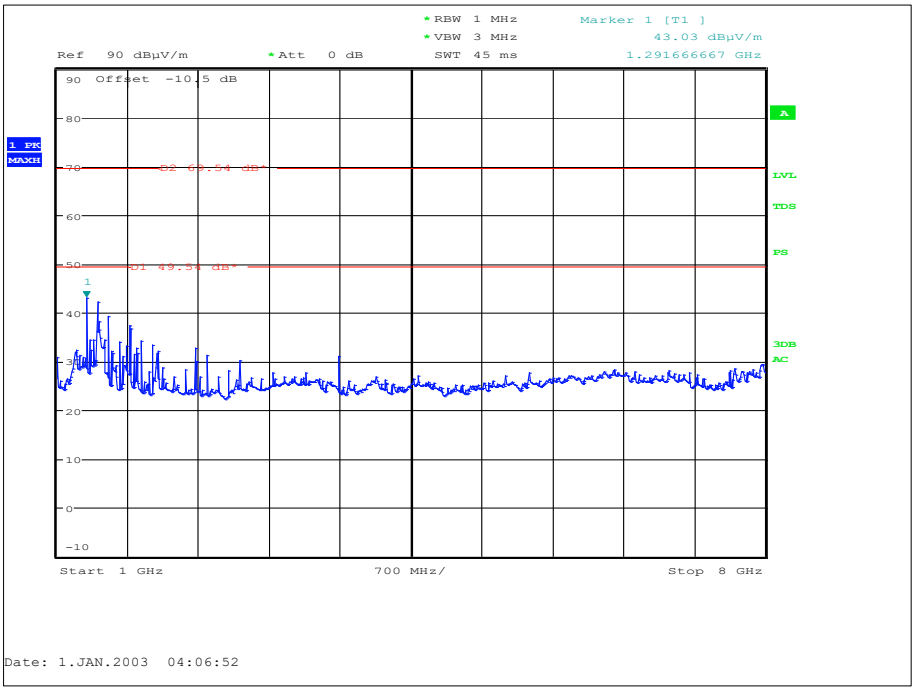


Figure 4 - Graphical Results - 1 GHz to 8 GHz - Combined Polarity

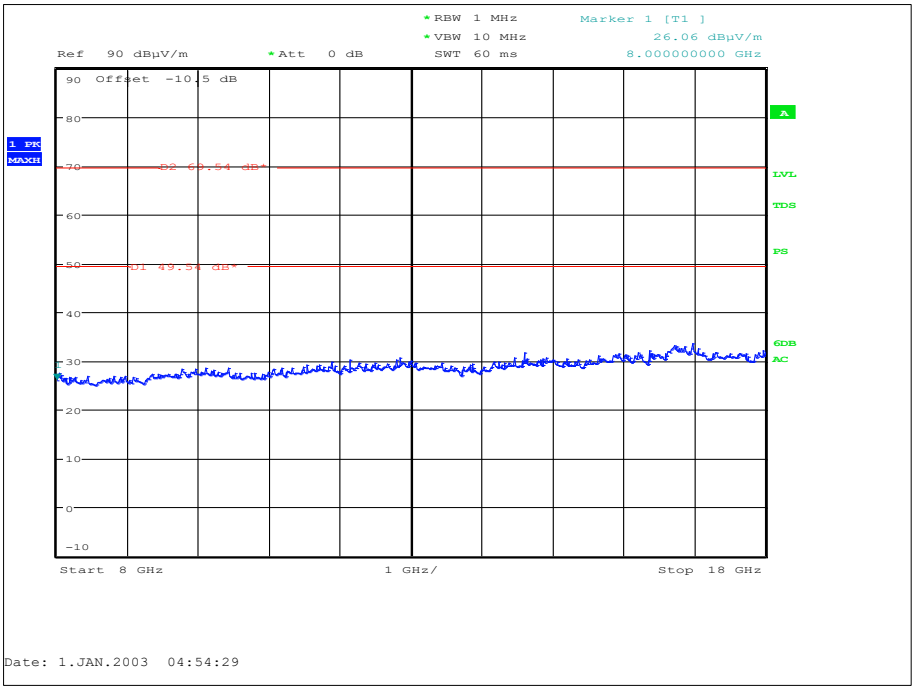


Figure 5 - Graphical Results - 8 GHz to 18 GHz - Combined Polarity

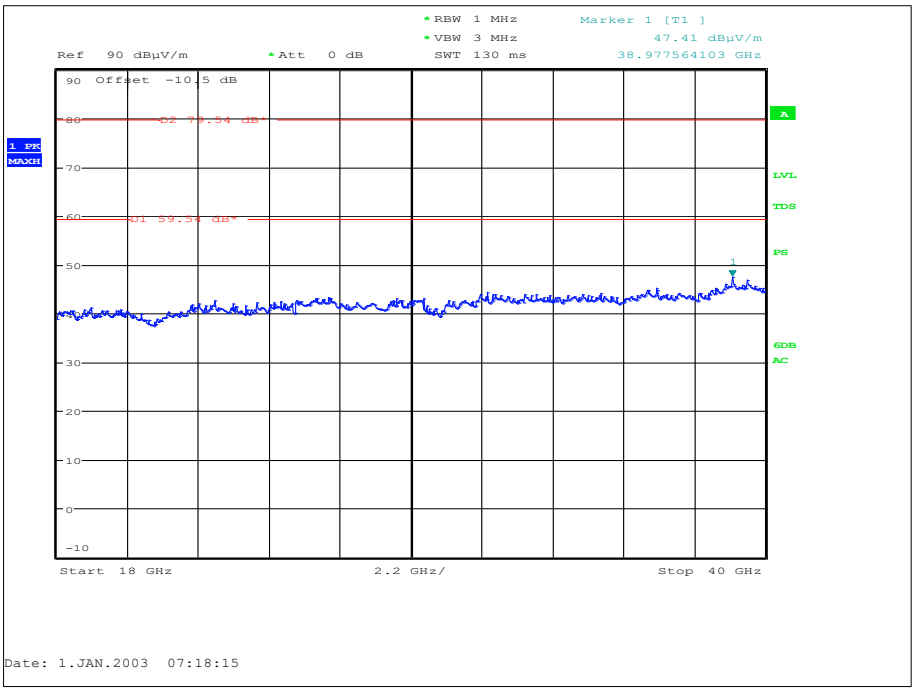


Figure 6 - Graphical Results - 18 GHz to 40 GHz - Combined Polarity

Results for Configuration and Mode: Tx Idle, Rx Operating, Motor Powered, Antenna Rotating

Performance assessment of the EUT made during this test: Pass (Class A).

Detailed results are shown below.

Highest frequency generated or used within the EUT: < 108 MHz (Motor Evaluation)
Which necessitates an upper frequency test limit of: 1GHz

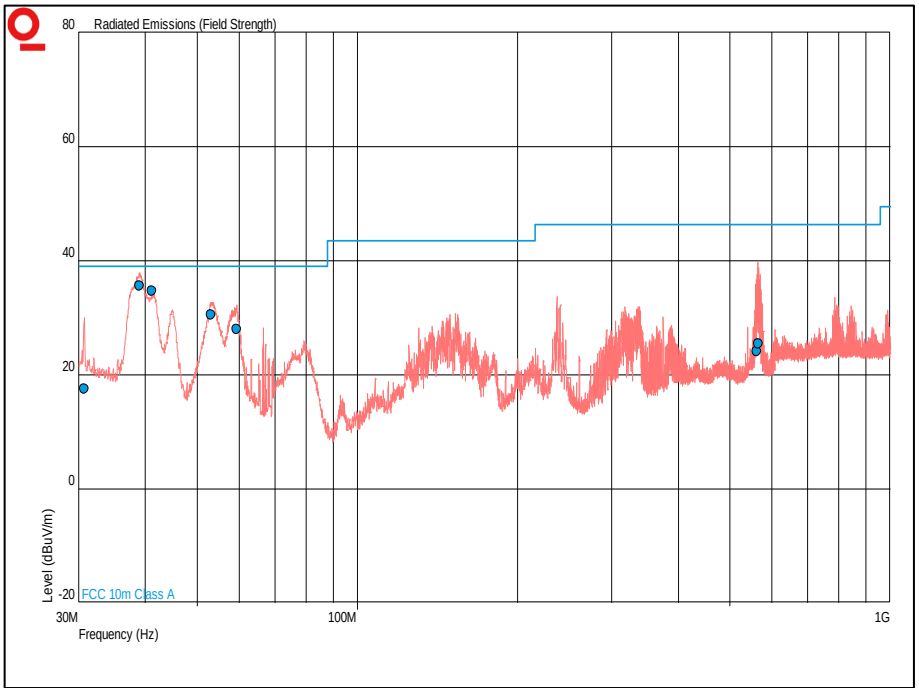


Figure 7 - Graphical Results, 30 MHz to 1 GHz, Combined Polarity

Frequency (MHz)	QP Level (dBuV/m)	QP Limit (dBuV/m)	QP Margin (dBuV/m)	Angle(Deg)	Height(m)	Polarity
30.780	17.5	39.1	-21.6	188	1.00	Vertical
39.115	35.6	39.1	-3.5	32	1.00	Vertical
41.274	34.6	39.1	-4.5	67	1.58	Vertical
53.250	30.5	39.1	-8.6	75	1.08	Vertical
59.346	28.0	39.1	-11.1	68	1.00	Vertical
562.585	24.2	46.4	-22.2	349	1.00	Vertical

Table 7 - Emission Results, 30 MHz to 1 GHz, Combined Polarity

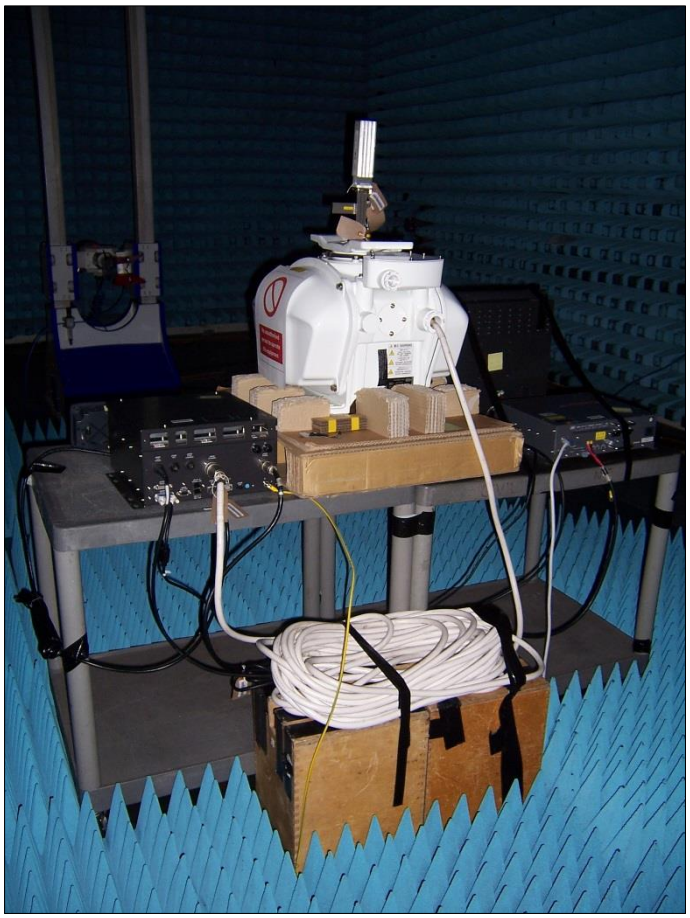


Figure 8 - Test Setup

Figure 9 - Test Setup

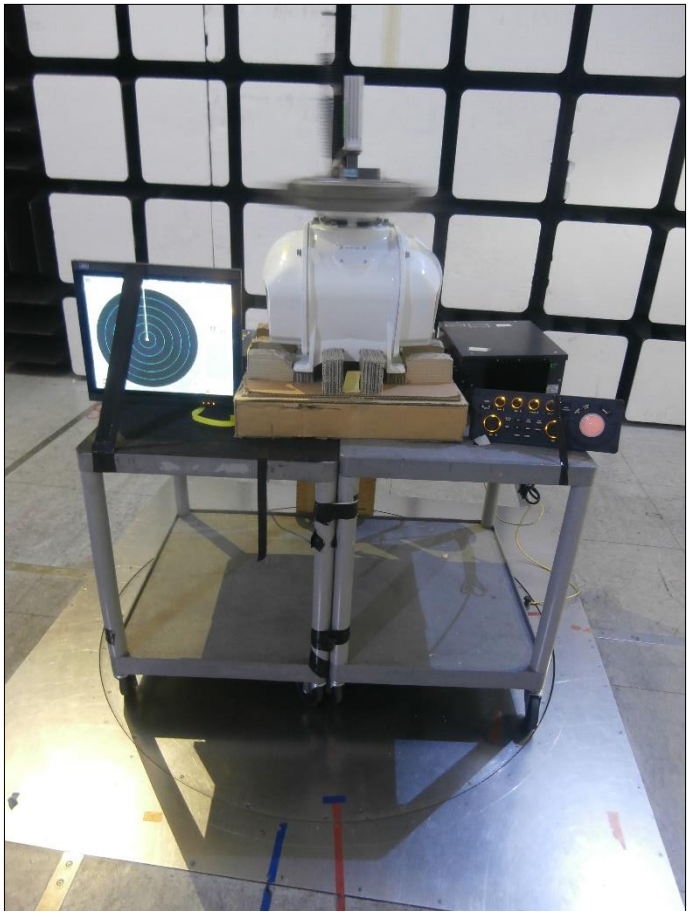


Figure 10 - Test Setup – Antenna Rotating

2.1.7 Test Location and Test Equipment Used

This test was carried out in EMC Chamber 5 and EMC Chamber 7.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Antenna 18-40GHz (Double Ridge Guide)	Link Microtek Ltd	AM180HA-K-TU2	230	24	02-May-2020
Turntable Controller	Heinrich Diesel	HD 050	280	-	TU
Antenna with permanent attenuator (Bilog)	Schaffner	CBL6143	287	24	15-May-2020
Pre-Amplifier	Phase One	PS04-0086	1533	12	12-Jan-2019
18GHz - 40GHz Pre-Amplifier	Phase One	PSO4-0087	1534	12	02-Feb-2019
Screened Room (5)	Rainford	Rainford	1545	36	18-Jul-2019
Screened Room (7)	Siemens	S M	1547	36	18-Jul-2019
Turntable Controller	Inn-Co GmbH	CO 1000	1606	-	TU
Multimeter	Iso-tech	IDM 101	2118	12	08-Feb-2019
Antenna with permanent attenuator (Bilog)	Chase	CBL6143	2904	24	08-Aug-2019
Comb Generator	Schaffner	RSG1000	3034	-	TU
Signal Generator	Rohde & Schwarz	SMR40	3171	12	17-Nov-2018
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	22-Nov-2018
Cable (2m, N type)	Teledyne	239-0195-2000	3567	12	31-Jan-2019
Tilt Antenna Mast	Maturo Gmbh	TAM 4.0-P	3916	-	TU
Mast Controller	Maturo Gmbh	NCD	3917	-	TU
1GHz to 8GHz Low Noise Amplifier	Wright Technologies	APS04-0085	4365	12	18-Oct-2018
Cable (Rx, Km-Km 2m)	Scott Cables	KPS-1501-2000-KPS	4526	6	31-Aug-2018
Cable (Yellow, Rx, Km-Km 2m)	Scott Cables	KPS-1501-2000-KPS	4527	6	15-Aug-2018
Cable (Rx, SMAm-SMAm 0.5m)	Scott Cables	SLSLL18-SMSM-00.50M	4528	6	15-Aug-2018
Double Ridged Waveguide Horn Antenna	ETS-Lindgren	3117	4722	12	01-Mar-2019
Mast Controller	Maturo Gmbh	NCD	4810	-	TU
Tilt Antenna Mast	Maturo Gmbh	TAM 4.0-P	4811	-	TU
9m N type RF cable	Rosenberger	2303-0 9.0m PNm	4827	6	04-Jan-2019
N to N cable, 4m	Rhophase	2303-002-TUVS	4849	12	18-Dec-2018
N to N cable, 4m	Rhophase	2303-002-TUVS	4850	12	18-Dec-2018
4dB Attenuator	Pasternack	PE7047-4	4935	24	28-Nov-2019
Hygrometer	Rotronic	HP21	4989	12	26-Apr-2019

Table 8

TU- Traceability Unscheduled

2.2 Conducted Disturbance at Mains Terminals

2.2.1 Specification Reference

FCC 47 CFR Part 15B, Clause 15.107
ICES-003, Clause 6.1
Industry Canada RSS-GEN, Clause 8.8.

2.2.2 Equipment Under Test and Modification State

Model: NKE 2255, Serial number LC30003, Modification State 0

2.2.3 Date of Test

04-December-2018

2.2.4 Test Method

The EUT was placed on a non-conductive table 0.8m above a reference ground plane and 0.4m away from a vertical coupling plane.

All power was connected to the EUT through an Artificial Mains Network (AMN). Conducted disturbance voltage measurements on mains lines were made at the output of the AMN. The AMN was placed 0.8m from the boundary of the EUT and bonded to the reference ground plane.

2.2.5 Environmental Conditions

Ambient Temperature	20.0 °C
Relative Humidity	49.0 %

2.2.6 Test Results

Results for Configuration and Mode: Tx Idle, Rx Operating, Motor Powered, Antenna Rotating

Performance assessment of the EUT made during this test: Pass (Class A).

Detailed results are shown below.

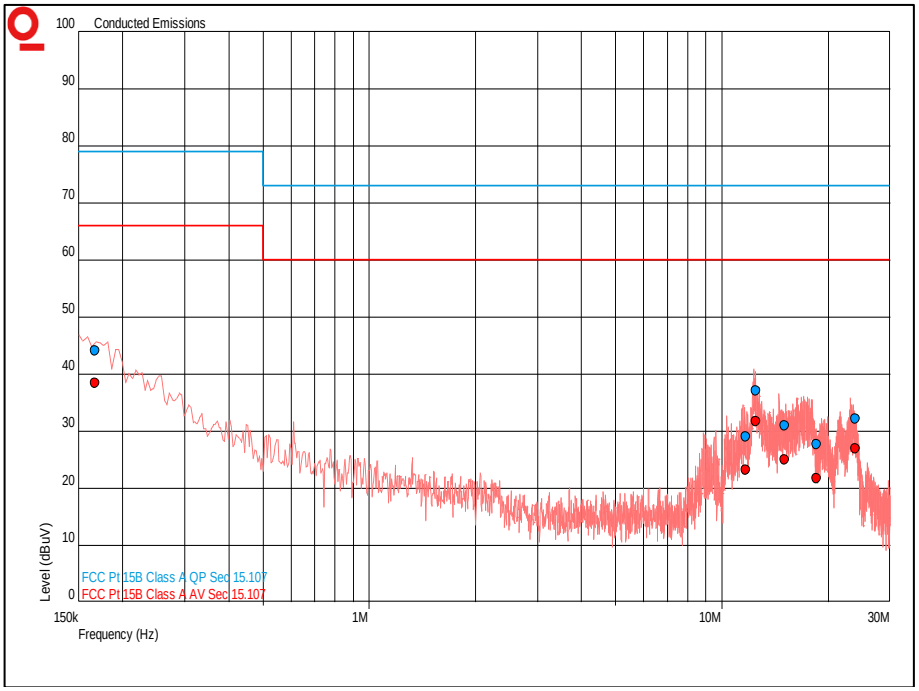


Figure 11 - Graphical Results - Live Line

Frequency (MHz)	QP Level (dBuV)	QP Limit (dBuV)	QP Margin (dBuV)	AV Level (dBuV)	AV Limit (dBuV)	AV Margin (dBuV)
0.167	44.1	79.0	-34.9	38.4	66.0	-27.6
11.714	29.0	73.0	-44.0	23.2	60.0	-36.8
12.528	37.1	73.0	-35.9	31.7	60.0	-28.3
15.069	31.0	73.0	-42.0	25.1	60.0	-34.9
18.589	27.7	73.0	-45.3	21.7	60.0	-38.3
23.915	32.1	73.0	-40.9	27.0	60.0	-33.0

Table 9 - Live Line

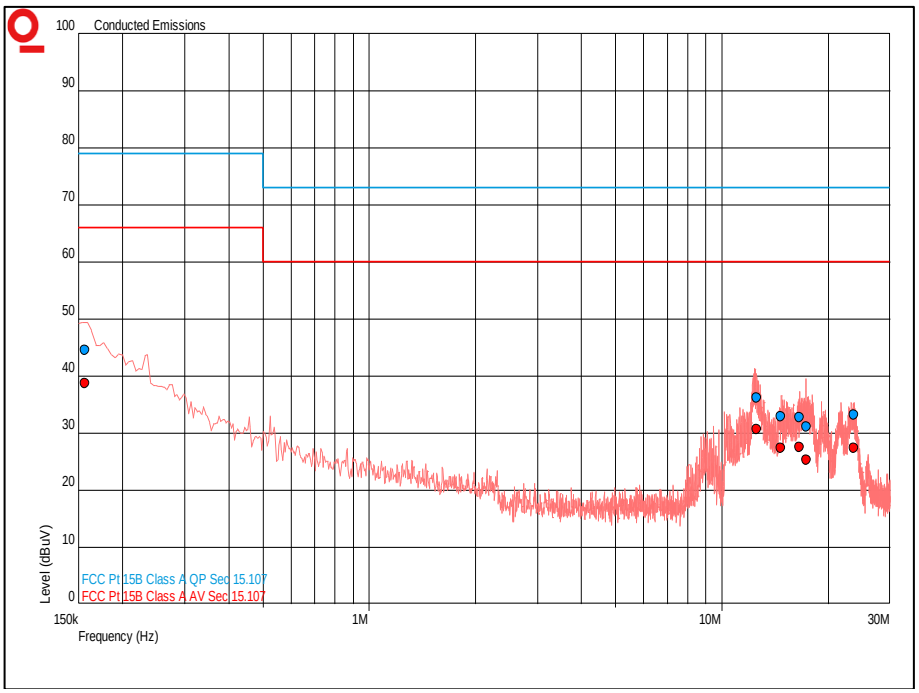


Figure 10 - Graphical Results - Neutral Line

Frequency (MHz)	QP Level (dBuV)	QP Limit (dBuV)	QP Margin (dBuV)	AV Level (dBuV)	AV Limit (dBuV)	AV Margin (dBuV)
0.156	44.6	79.0	-34.4	38.7	66.0	-27.3
12.535	36.2	73.0	-36.8	30.6	60.0	-29.4
14.740	32.9	73.0	-40.1	27.4	60.0	-32.6
16.607	32.7	73.0	-40.3	27.5	60.0	-32.5
17.382	31.1	73.0	-41.9	25.2	60.0	-34.8
0.156	44.6	79.0	-34.4	38.7	66.0	-27.3

Table 10 - Neutral Line

Figure 11 - Test Setup for Conducted Emissions at Mains Terminals

Figure 12 - Test Setup for Conducted Emissions at Mains Terminals

Figure 13 - Test Setup for Conducted Emissions at Mains Terminals

2.2.7 Test Location and Test Equipment Used

This test was carried out in EMC Chamber 5.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Transient Limiter	Hewlett Packard	11947A	15	12	26-Jul-2019
LISN (1 Phase)	Chase	MN 2050	336	12	10-Apr-2019
Screened Room (5)	Rainford	Rainford	1545	36	23-Jan-2021
Compliance 5 Emissions	Teseq	V5.26.51 V.5.00.00	3275	-	Software
Receiver	Keysight Technologies	N9038A MXE	4629	12	04-Jul-2019
9m N type RF cable	Rosenberger	2303-0 9.0m PNm	4827	6	04-Jan-2019
Hygrometer	Rotronic	HP21	4989	12	26-Apr-2019

Table 11

3 Measurement Uncertainty

For a 95% confidence level, the measurement uncertainties for defined systems are:

Test Name	Measurement Uncertainty
Conducted Disturbance at Mains Terminals	150 kHz to 30 MHz, LISN, ±3.7 dB
Radiated Disturbance	30 MHz to 1 GHz, Bilog Antenna, ±5.2 dB 1 GHz to 40 GHz, Horn Antenna, ±6.3 dB

Table 12