FCC and ISEDC Test Report

LARS THRANE A/S
Global Maritime Distress and Safety System, Model: LT3100-S and LT-3140S

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

Add value.
Inspire trust.

Prepared for: LARS THRANE A/S
Skovlytoften 33
Holte
DK-2840
DENMARK

FCC ID: 2AP9E-10193100S IC: 24065-10193100S

COMMERCIAL-IN-CONFIDENCE

Document 75946681-01 Issue 01

SIGNATURE			
NAME	**JOB TITLE**	**RESPONSIBLE FOR**	**ISSUE DATE**
Matthew Russell	Senior Engineer	Authorised Signatory	06 January 2020

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, RSS-GEN and ICES-003. The sample tested was found to comply with the requirements defined in the applied rules.

RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Testing	Graeme Lawler	06 January 2020	

FCC Accreditation
90987 Octagon House, Fareham Test Laboratory

Industry Canada Accreditation
12669A 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: 2018, RSS-GEN Issue 5 (2018, Amd 1:2019) and ICES-003: 2016 for the tests detailed in section 1.3.

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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	06 January 2020

Table 1

1.2 Introduction

Applicant	LARS THRANE A/S
Manufacturer	LARS THRANE A/S
Model Number(s)	Controller: LT3100-S Interface Unit: LT-3140S
Serial Number(s)	Controller: 00006287 Interface: 00006294
Hardware Version(s)	1.00
Software Version(s)	1.00
Number of Samples Tested	One System
Test Specification/Issue/Date	FCC 47 CFR Part 15B: 2018 RSS-GEN Issue 5:2018(Amd 1:2019) ICES-003: 2016
Order Number Date	1931-001 29-July-2019
Date of Receipt of EUT	02-October-2019
Start of Test	13-October-2019
Finish of Test	13-October-2019
Name of Engineer(s)	Graeme Lawler
Related Document(s)	ANSI C63.4: 2014

1.3 Brief Summary of Results

A brief summary of the tests carried out in accordance with FCC 47 CFR Part 15B, RSS-GEN and ICES-003 is shown below.

Section	Specification Clause			Test Description	Result	Comments/Base Standard
	Part 15B	RSS-GEN	ICES-003			
Configuration and Mode: DC Powered - Receiving						
2.1	15.109	7.1	6.2	Radiated Disturbance	Pass	ANSI C63.4: 2014

Table 2

1.4 Declaration of Build Status

EQUIPMENT DESCRIPTION	
Model Name/Number	LT-3100S GMDSS System
Part Number	Control Unit: LT-3110S Handset: LT-3120 Cradle: LT-3121 Antenna Unit: LT-3130 Interface Unit: LT-3140S Alarm Panel: LT-3150S Printer Adapter: LT-3160S
Hardware Version	Control Unit: 1.00 Handset: 1.00 Cradle: 1.00 Antenna Unit: 2.00 Interface Unit1.00 Alarm Panel: 1.00 Printer Adapter: 1.00
Software Version	1.00
FCC ID (if applicable)	2AP9E-10193100S
Industry Canada ID (if applicable)	24065-10193100S
Technical Description (Please provide a brief description of the intended use of the equipment)	Voice and Data communication over the Iridium Communications Network.

INTENTIONAL RADIATORS									
Technology	Frequency Band (MHz)	Conducted Declared Output Power (dBm)	Antenna Gain (dBi)	Supported Bandwidth (s) (MHz)	Modulation Scheme(s)	ITU Emission Designator	Test Channels (MHz)		
							Bottom	Middle	Top
L-Band	1616-1626.50	38.2	1	41.7kHz	DE-QPSK/DE-BPSK	41K7Q7W	1616.020833	1,621.75	1625.979166
Bluetooth	2402-2480	8	0.5	1kHz	GFSK/DQPSK	????	2402	2441	2480

UN-INTENTIONAL RADIATOR	
Highest frequency generated or used in the device or on which the device operates or tunes	2480 MHz
Lowest frequency generated or used in the device or on which the device operates or tunes	1616.020833 MHz
Class A Digital Device (Use in commercial, industrial or business environment) ☐ Class B Digital Device (Use in residential environment only) ☒	

Power Source			
AC	Single Phase	Three Phase	Nominal Voltage
External DC	Nominal Voltage	Maximum Current	
	12 / 24 V	3.7 A	
Battery	Nominal Voltage	Battery Operating End Point Voltage	
Can EUT transmit whilst being charged?		Yes ☐ No ☐	

EXTREME CONDITIONS					
Maximum temperature	+55	°C	Minimum temperature	-40	°C

Ancillaries
Please list all ancillaries which will be used with the device.

ANTENNA CHARACTERISTICS						
☒	Antenna connector			State impedance	50	Ohm
☐	Temporary antenna connector			State impedance		Ohm
☒	Integral antenna	Type	Helix			
☐	External antenna	Type				

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

Name: Carsten Thomsen

Position held: CTO Date: 2019-11-09

1.5 Product Information

1.5.1 Technical Description

The Equipment Under Test (EUT) is an LT-3100S GMDSS Marine Satellite Communications System.

The LT-3100 Satellite Communications System is a maritime fixed Iridium satellite phone. The system is designed for the professional marine market e.g. deep sea, fishing, and other forms of heavy marine use.

The LT-3100 system consists of a control unit, handset unit, and antenna unit. Each module connects to the control unit which in turn is connected to the marine vessels internal communications electronic systems. A single cable solution connects the control unit with the antenna unit. Using a standard coaxial cable, up to 500 meters of separation between the units can be obtained, giving freedom to mount the antenna in the best possible location, with free line of sight to the satellites.

Figure 1.5.1 Complete EUT

Figure 1.5.2 Control unit (Front)

Figure 1.5.3 Interface unit (Top)

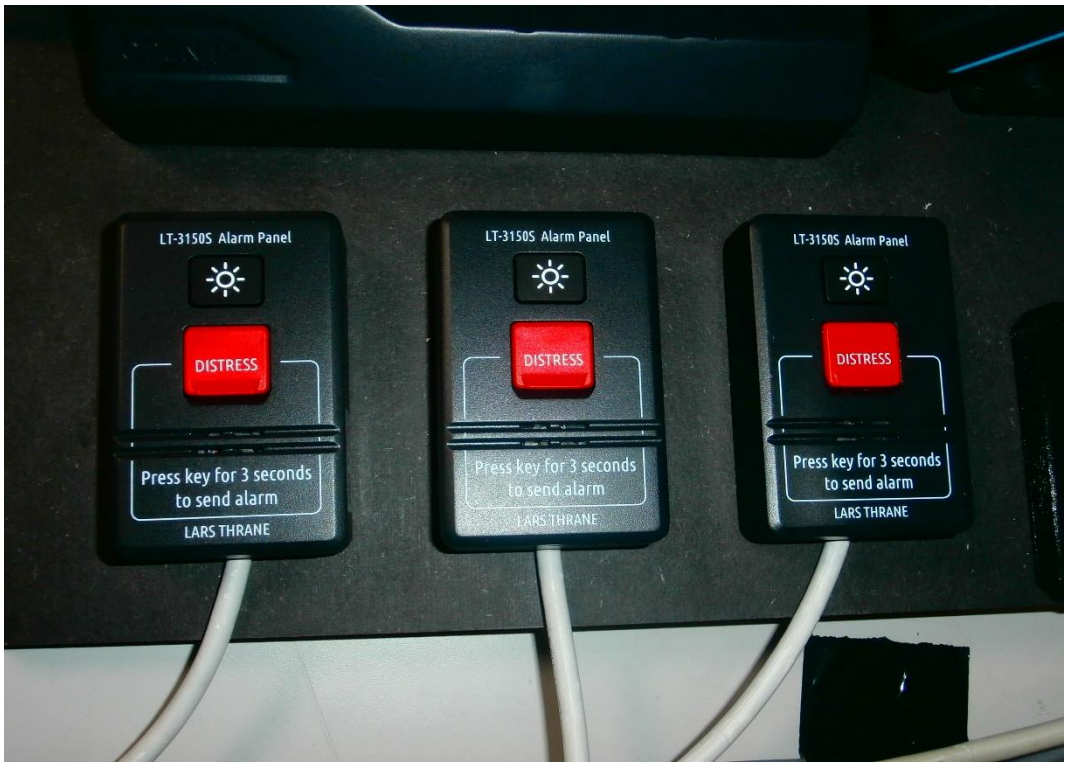

Figure 1.5.4 Alarm Units (Top)

Figure 1.5.5 Handset

1.5.2 EUT Port/Cable Identification

Port	Max Cable Length specified	Usage	Type	Screened
Configuration and Mode: DC Powered - Receiving				
S1	25 m	Power and communications	Twisted pair 0.25 mm	Yes
RS1	25 m	Power and communications	Twisted pair 0.22 mm	Yes
PA	25 m	Power and communications	Twisted pair 0.22 mm	Yes

Table 3

1.5.3 Test Configuration

Configuration	Description
DC Powered	The EUT was powered from a 12 V DC supply.

Table 4

1.5.4 Modes of Operation

Mode	Description
Receiving	The EUT was configured to GNSS Receive. All transmitters were idle.

Table 5

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
Model: LT3100-S: Serial Number: 00006287			
0	As supplied by the customer	Not Applicable	Not Applicable
Model: LT-3140S: Serial Number: 00006294			
0	As supplied by the customer	Not Applicable	Not Applicable

Table 6

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: DC Powered - Receiving		
Radiated Disturbance	Graeme Lawler	UKAS

Table 7

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
RSS-GEN, Clause 7.1
ICES-003, Clause 6.2

2.1.2 Equipment Under Test and Modification State

LT3100-S, S/N: 00006287 - Modification State 0
LT-3140S, S/N: 00006294 - Modification State 0

2.1.3 Date of Test

13-October-2019

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.

Pre-scans were performed with the EUT orientated in X and Y planes as discussed with the client as this represents normal installation.

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

Using a list of the highest emissions detected during the pre-scan along with their bearing and associated antenna polarisation, the EUT was formally measured using a Quasi-Peak, Peak or CISPR 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 Example Calculation

Below 1 GHz:

Quasi-Peak level (dBµV/m) = Receiver level (dBµV) + Correction Factor (dB/m)
Margin (dB) = Limit (dBµV/m) – Quasi-Peak level (dBµV/m)

Above 1 GHz:

CISPR Average level (dBµV/m) = Receiver level (dBµV) + Correction Factor (dB/m)
Margin (dB) = Limit (dBµV/m) – CISPR Average level (dBµV/m)

Peak level (dBµV/m) = Receiver level (dBµV) + Correction Factor (dB/m)
Margin (dB) = Limit (dBµV/m) – Peak level (dBµV/m)

2.1.6 Example Test Setup Diagram

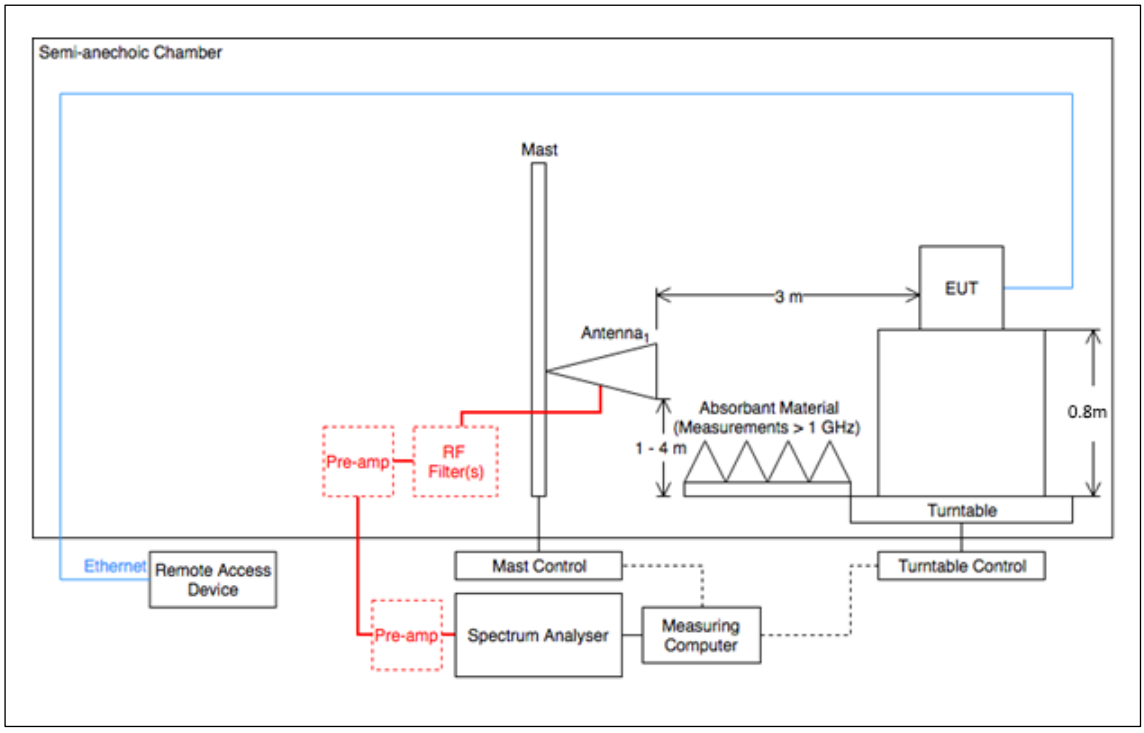

Figure 1 - Example Test Setup

2.1.7 Environmental Conditions

Ambient Temperature	20.0 °C
Relative Humidity	44.0 %

2.1.8 Specification Limits

Required Specification Limits, Field Strength (Class A @ 10m)		
Frequency Range (MHz)	(µV/m)	(dBµV/m)
30 to 88	90	39.1
88 to 216	150	43.5
216 to 960	210	46.4
Above 960	300	49.5
Supplementary information: Quasi-peak detector to be used for measurements below 1 GHz CISPR Average detector to be used for measurements above 1 GHz Peak test limit above 1 GHz is 20 dB higher than the CISPR Average test limit.		

Table 8

2.1.9 Test Results

Results for Configuration and Mode: DC Powered - Receiving.

The test was performed in accordance with the Class A limits.

Performance assessment of the EUT made during this test: Pass.

Detailed results are shown below.

Highest frequency generated or used within the EUT: 2480 MHz
Which necessitates an upper frequency test limit of: 13 GHz

Frequency Range of Test: 30 MHz to 1 GHz - X Orientation

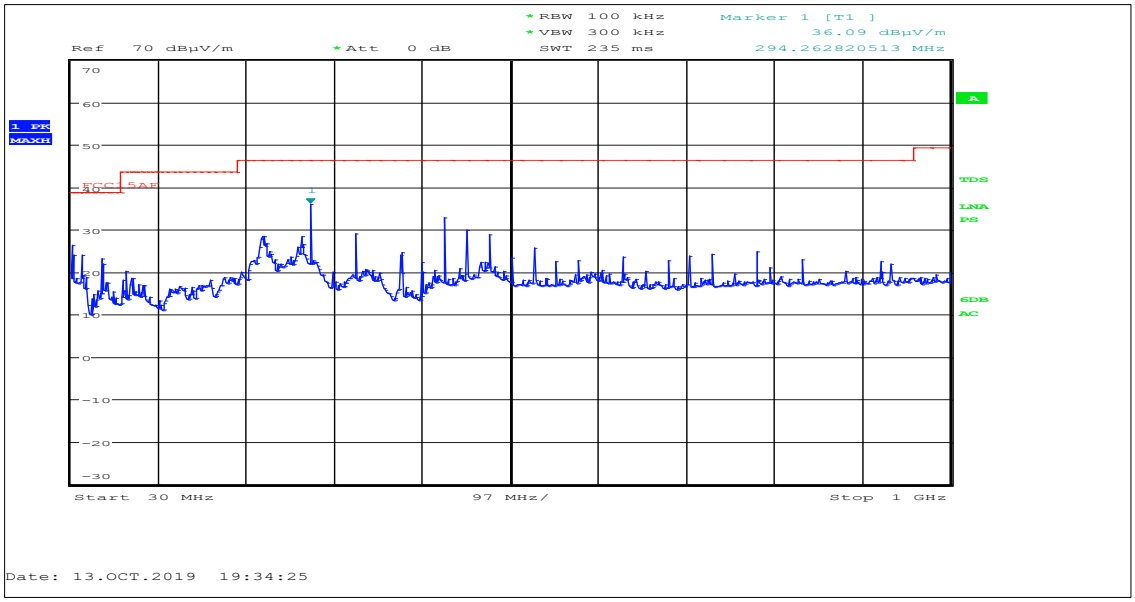

Figure 2 - Graphical Results - Horizontal and Vertical Polarity

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation	Orientation
*								

Table 9

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

Frequency Range of Test: 1 GHz to 8 GHz - X Orientation

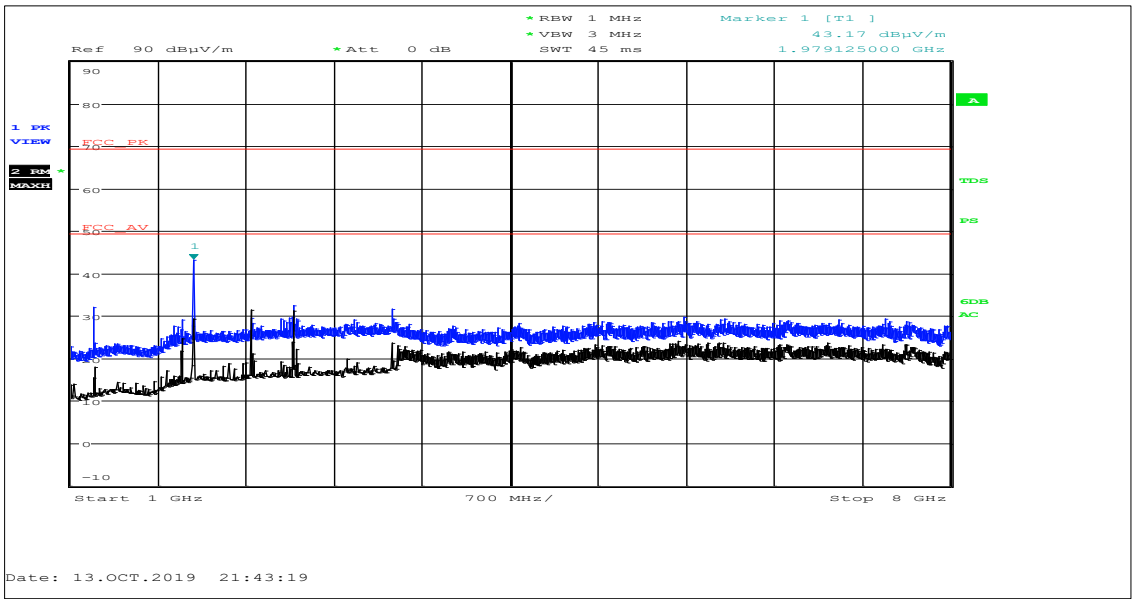

Figure 3 - Graphical Results - Horizontal and Vertical Polarity

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation	Orientation
*								

Table 10

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

Frequency Range of Test: 8 GHz to 13 GHz - X Orientation

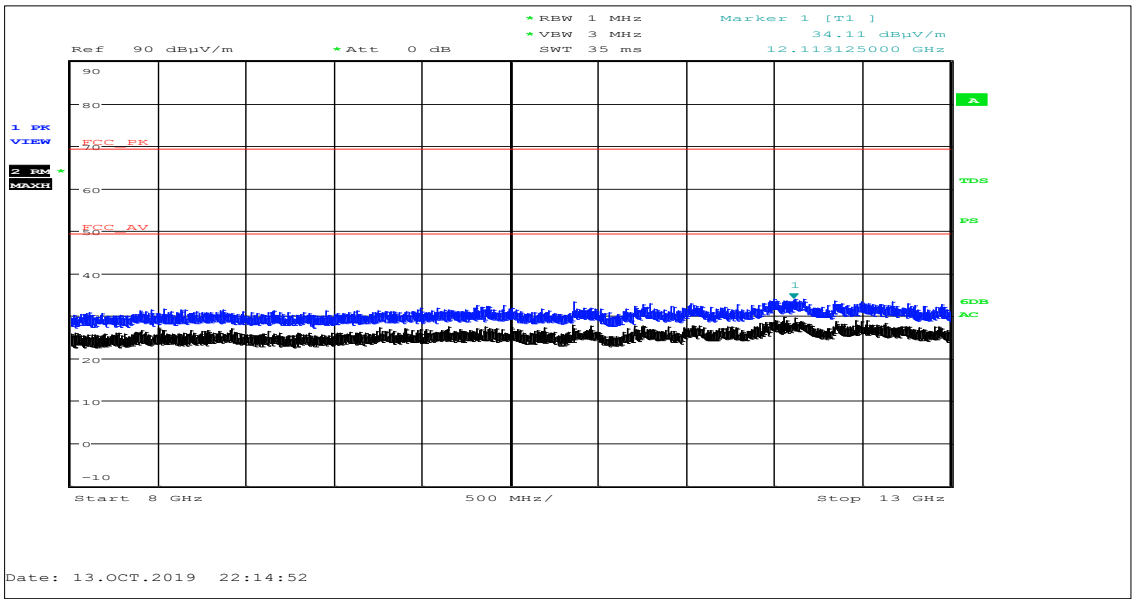

Figure 4 - Graphical Results - Horizontal and Vertical Polarity

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation	Orientation
*								

Table 11

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

Frequency Range of Test: 30 MHz to 1 GHz - Y Orientation

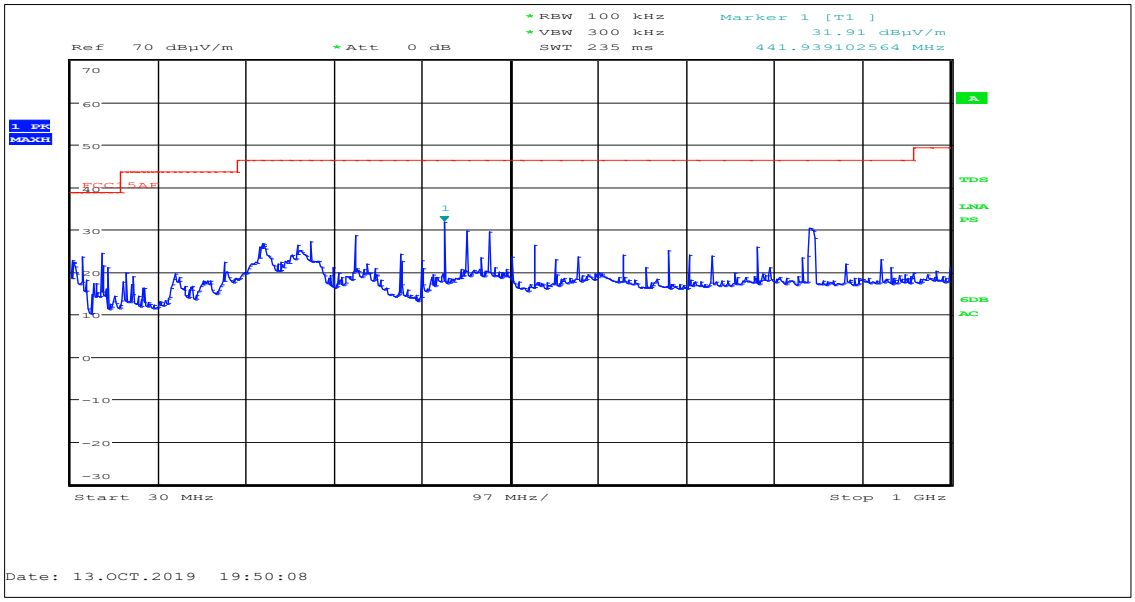

Figure 5 - Graphical Results - Horizontal and Vertical Polarity

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation	Orientation
*								

Table 12

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

Frequency Range of Test: 1 GHz to 8 GHz - Y Orientation

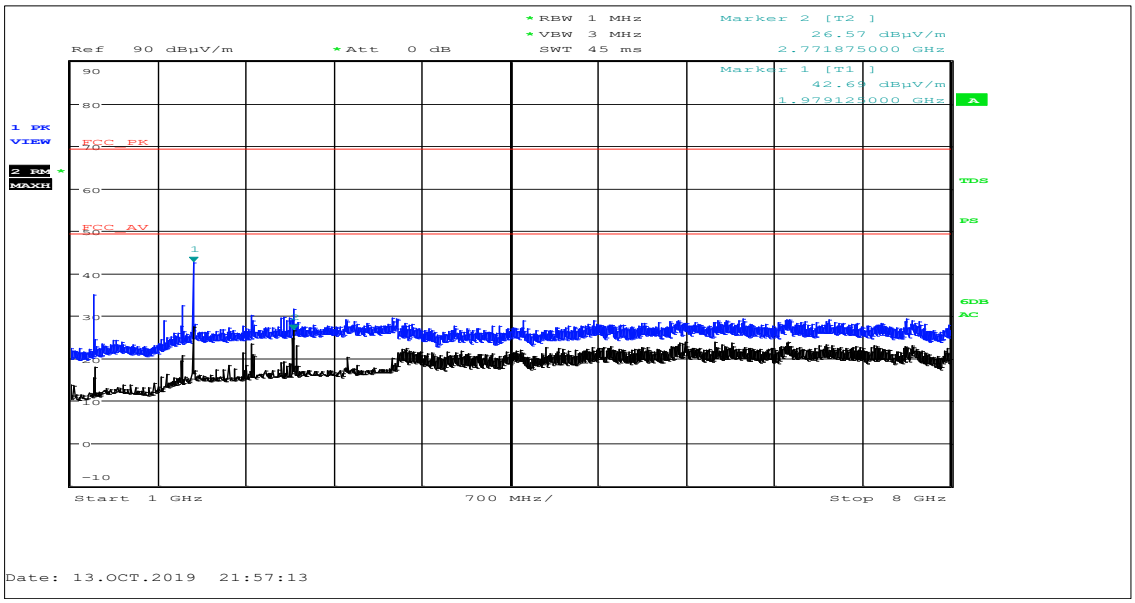

Figure 6 - Graphical Results - Horizontal and Vertical Polarity

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation	Orientation
*								

Table 13

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

Frequency Range of Test: 8 GHz to 13 GHz - Y Orientation

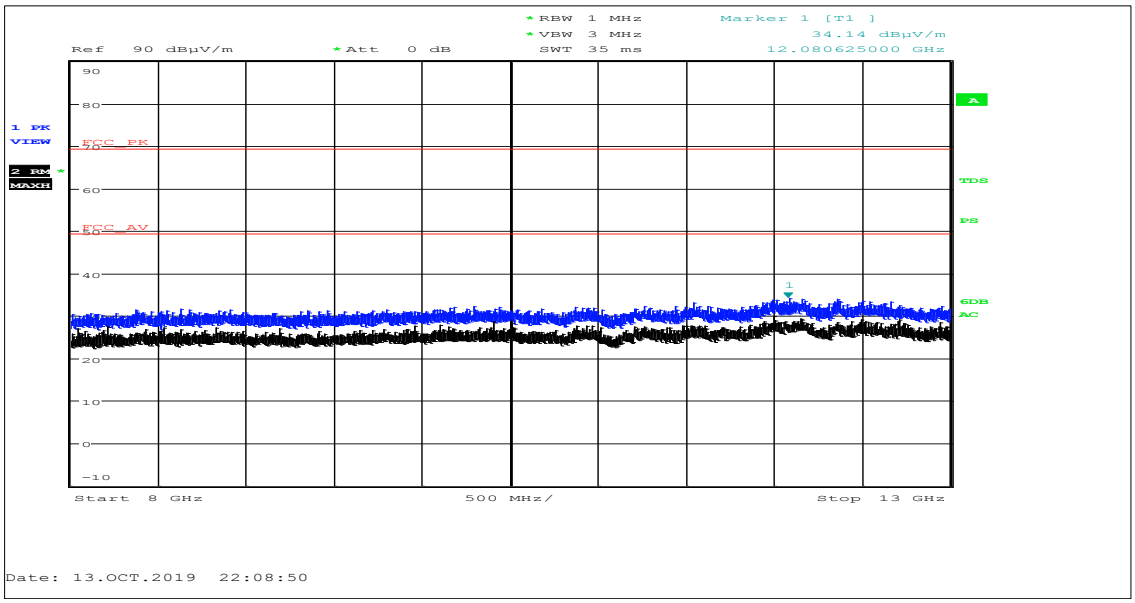

Figure 7 - Graphical Results - Horizontal and Vertical Polarity

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation	Orientation
*								

Table 14

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

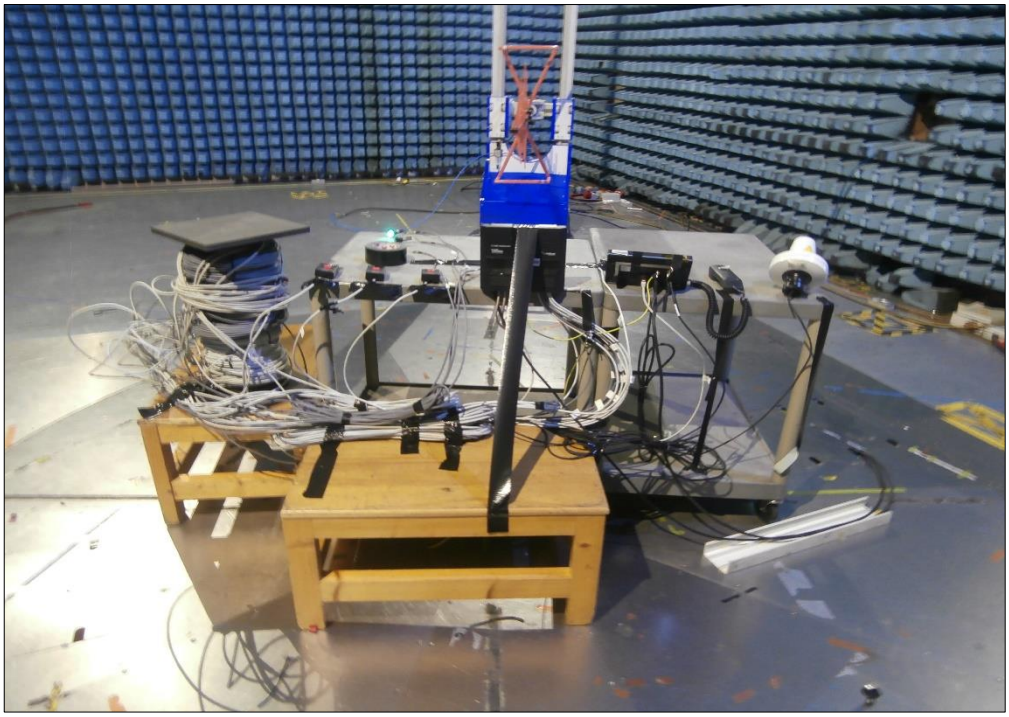

Figure 8 - Test Setup - 30 MHz to 1 GHz

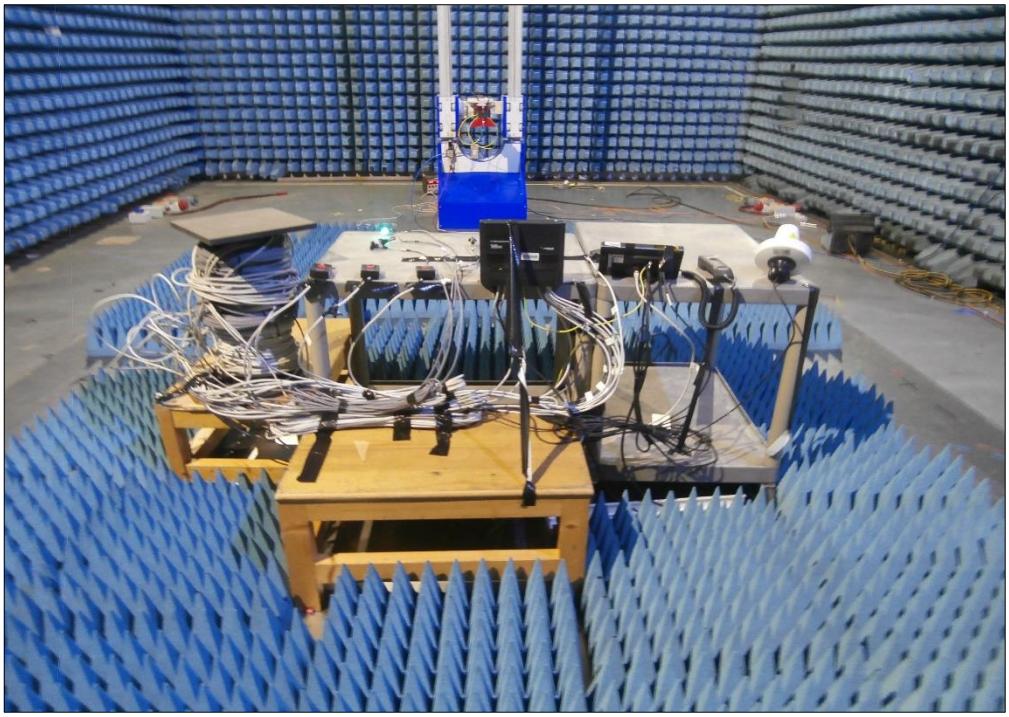

Figure 9 - Test Setup - 1 GHz to 13 GHz

2.1.10 Test Location and Test Equipment Used

This test was carried out in EMC Chamber 7.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Screened Room (7)	Siemens	S M	1547	36	24-Jan-2021
Hygromer	Rotronic	A1	2677	12	20-Feb-2020
Comb Generator	Schaffner	RSG1000	3034	-	TU
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	17-Dec-2019
Turntable Controller	Heinrich Diesel	HD 050	280	-	TU
Tilt Antenna Mast	Maturo Gmbh	TAM 4.0-P	3916	-	TU
Mast Controller	Maturo Gmbh	NCD	3917	-	TU
Antenna with permanent attenuator (Bilog)	Schaffner	CBL6143	287	24	15-May-2020
Double Ridged Waveguide Horn Antenna	ETS-Lindgren	3117	4722	12	05-Mar-2020
Pre-Amplifier	Phase One	PS04-0086	1533	12	08-Feb-2020
1GHz to 8GHz Low Noise Amplifier	Wright Technologies	APS04-0085	4365	12	25-Oct-2019
3 GHz High pass filter	Wainwright	WHKX12-2580-3000-18000-80SS	5220	12	15-Feb-2020
Cable (Rx, Km-Km 2m)	Scott Cables	KPS-1501-2000-KPS	4526	6	11-Dec-2019
2 Meter Cable	Teledyne	PR90-088-2MTR	5198	12	29-Jul-2020
8 Meter Cable	Teledyne	PR90-088-8MTR	5213	12	30-Aug-2020

Table 15

TU - Traceability Unscheduled

3 Incident Reports

No incidents reports were raised.

4 Measurement Uncertainty

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

Test Name	Measurement Uncertainty
Radiated Disturbance	30 MHz to 1 GHz, Bilog Antenna, ±5.2 dB 1 GHz to 40 GHz, Horn Antenna, ±6.3 dB

Table 16

Worst case error for both Time and Frequency measurement 12 parts in 10^6.

Measurement Uncertainty Decision Rule

Determination of conformity with the specification limits is based on the decision rule according to IEC Guide 115: 2007, clause 4.4.3 and 4.5.1.