

FCC and ISED Test Report

EnerSys SARL

Model: Zigbee Interface

In accordance with FCC 47 CFR Part 15B and
ICES-003 (2.4 GHz Zigbee)

Prepared for: EnerSys SARL
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FCC ID: WT5-5188

COMMERCIAL-IN-CONFIDENCE

Document 75957249-05 Issue 01

SIGNATURE

NAME	JOB TITLE	RESPONSIBLE FOR	ISSUE DATE
Andrew Lawson	EMC Chief Engineer	Authorised Signatory	13-November-2023

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

RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Testing	Callum Pennells	13-November-2023	

FCC Accreditation
90987 Octagon House, Fareham Test Laboratory

ISED 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 and ICES-003: 2021 and Issue 7: 2020 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	13-November-2023

Table 1

1.2 Introduction

Applicant	EnerSys SARL
Manufacturer	EnerSys SARL
Model Number(s)	Zigbee Interface
Part Number	6LA12230C
Hardware Version(s)	C
Software Version(s)	N3.6
Number of Samples Tested	1
Serial Number(s)	TUV#3
Test Specification/Issue/Date	FCC 47 CFR Part 15B and ICES-003: 2021 and Issue 7: 2020
Order Number	4501551273-FAL
Date	01-December-2022
Date of Receipt of EUT	13-February-2023
Start of Test	08-March-2023
Finish of Test	08-March-2023
Name of Engineer(s)	Callum Pennells
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 and ICES-003 is shown below.

Section	Specification Clause	Test Description	Result	Comments/Base Standard
Configuration and Mode: USB Powered - Idle Mode				
2.2	15.109 and 3.2	Radiated Disturbance	Pass	ANSI C63.4: 2014

Table 2



1.4 Declaration of Build Status

MAIN EUT			
MANUFACTURING DESCRIPTION			
MANUFACTURER	ENERSYS		
MODEL	Zigbee Interface		
PART NUMBER	6LA12230		
HARDWARE VERSION	C		
SOFTWARE VERSION	N3.6		
PSU VOLTAGE/FREQUENCY/CURRENT			
HIGHEST INTERNALLY GENERATED FREQUENCY	2.4 GHz		
FCC ID (if applicable)	WT5-5188		
INDUSTRY CANADA ID (if applicable)			
TECHNICAL DESCRIPTION (a brief technical description of the intended use and operation)	Zigbee interface between Chargers or PC computer and battery controllers (WiiQ)		
COUNTRY OF ORIGIN	France		
RF CHARACTERISTICS (if applicable)			
TRANSMITTER FREQUENCY OPERATING RANGE (MHz)	2315 – 2480		
RECEIVER FREQUENCY OPERATING RANGE (MHz)	2315 – 2480		
INTERMEDIATE FREQUENCIES			
EMISSION DESIGNATOR(S): https://fccid.io/Emissions-Designator/			
MODULATION TYPES: (i.e. GMSK, QPSK)	O-QPSK		
OUTPUT POWER (W or dBm)			
SEPARATE BATTERY/POWER SUPPLY (if applicable)			
MANUFACTURING DESCRIPTION			
MANUFACTURER			
TYPE			
PART NUMBER			
PSU VOLTAGE/FREQUENCY/CURRENT			
COUNTRY OF ORIGIN			
MODULES (if applicable)			
MANUFACTURING DESCRIPTION			
MANUFACTURER			
TYPE			
POWER			
FCC ID			
INDUSTRY CANADA ID			
EMISSION DESIGNATOR			
DHSS/FHSS/COMBINED OR OTHER			
COUNTRY OF ORIGIN			
ANCILLARIES (if applicable)			
MANUFACTURING DESCRIPTION			
MANUFACTURER			
TYPE			
PART NUMBER			
SERIAL NUMBER			
COUNTRY OF ORIGIN			

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

Name: François Beaucamp
Position held: Design Engineer
Date: November 07th 2023

F. Beaucamp

1.5 Product Information

1.5.1 Technical Description

The Equipment under test (EUT) was a EnerSys SARL Zigbee interface - TUV#3,

The primary function of the EUT is to communicate with Wi-iQ's using a Zigbee communication link.



Figure 1 - General View



Figure 2 - Rear View

1.5.2 Test Configuration

Configuration	Description
USB Powered	The EUT was powered through the USB-A port of a support laptop.

Table 3

1.5.3 Modes of Operation

Mode	Description
Idle Mode	The EUT was powered with all transmitters disabled.

Table 4

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: Zigbee interface, Serial Number: TUV#3			
0	As supplied by client.	N/A	N/A

Table 5

1.8 Test Location

TÜV SÜD conducted the following tests at our Octagon House Test Laboratory.

Test Name	Name of Engineer(s)	Accreditation
Configuration and Mode: USB Powered - Idle Mode		
Radiated Disturbance	Callum Pennells	UKAS

Table 6

Office Address:

TÜV SÜD
Octagon House
Concorde Way
Fareham
Hampshire
PO15 5RL
United Kingdom

2 Test Details

2.1 Radiated Disturbance

2.1.1 Specification Reference

FCC 47 CFR Part 15B and ICES-003, Clause 15.109 and 3.2

2.1.2 Equipment Under Test and Modification State

Zigbee interface, S/N: TUV#3 - Modification State 0

2.1.3 Date of Test

08-March-2023

2.1.4 Test Method

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

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

For an EUT which could reasonably be used in multiple planes, pre-scans were performed with the EUT orientated in X, Y and Z planes with reference to the ground plane.

Using a list of the highest emissions detected during the pre-scan along with their bearing and associated antenna polarisation, the EUT was then 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 (dB μ V/m) = Receiver level (dB μ V) + Correction Factor (dB/m)

Margin (dB) = Quasi-Peak level (dB μ V/m) - Limit (dB μ V/m)

Above 1 GHz:

CISPR Average level (dB μ V/m) = Receiver level (dB μ V) + Correction Factor (dB/m)

Margin (dB) = CISPR Average level (dB μ V/m) - Limit (dB μ V/m)

Peak level (dB μ V/m) = Receiver level (dB μ V) + Correction Factor (dB/m)

Margin (dB) = Peak level (dB μ V/m) - Limit (dB μ V/m)

2.1.6 Example Test Setup Diagram

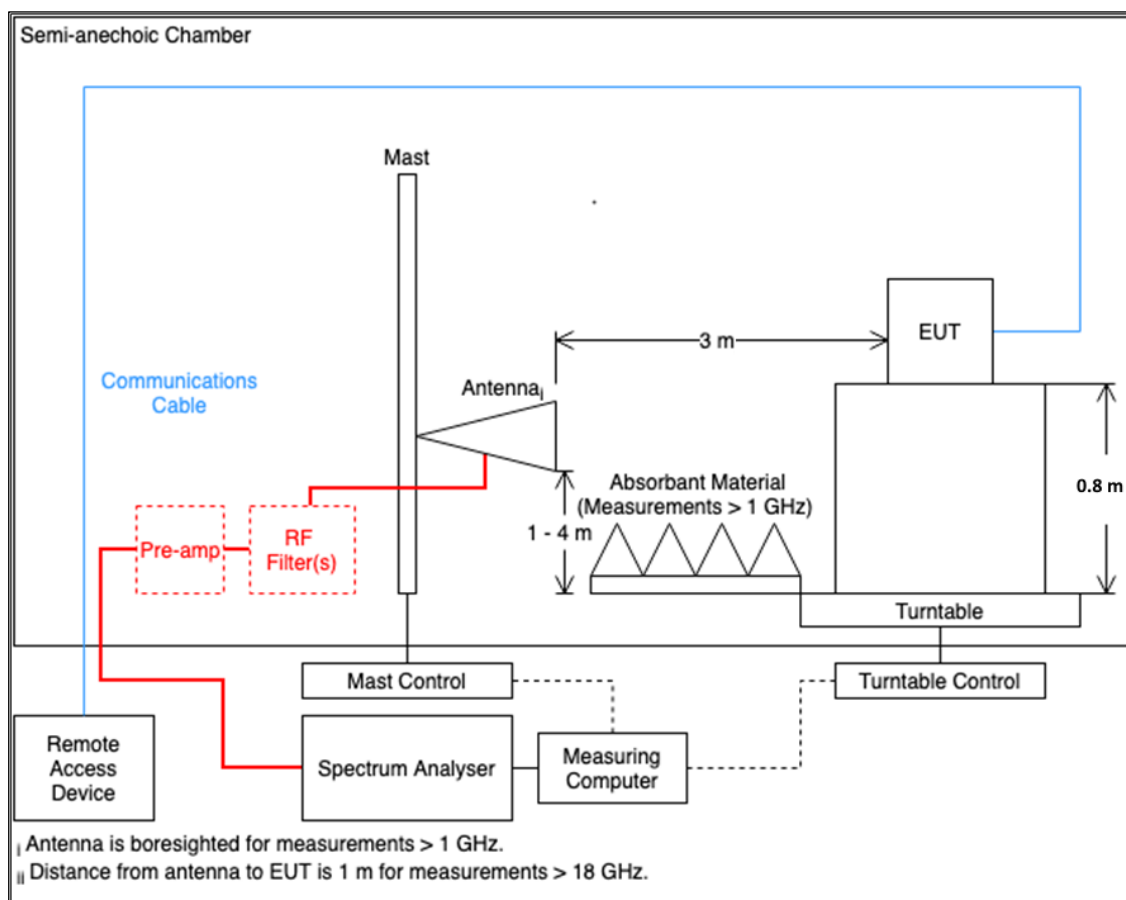


Figure 3 - Radiated Disturbance Example Test Setup

2.1.7 Environmental Conditions

Ambient Temperature	22.9 °C
Relative Humidity	25.9 %
Atmospheric Pressure	980.0 mbar



2.1.8 Specification Limits

Required Specification Limits, Field Strength - Class B Test Limit at a 3 m Measurement Distance		
Frequency Range (MHz)	Test Limit ($\mu\text{V/m}$)	Test Limit ($\text{dB}\mu\text{V/m}$)
30 to 88	100	40.0
88 to 216	150	43.5
216 to 960	200	46.0
Above 960	500	54.0
Supplementary information: Note 1. A Quasi-peak detector is to be used for measurements below 1 GHz. Note 2. A CISPR Average detector is to be used for measurements above 1 GHz. Note 3. The Peak test limit above 1 GHz is 20 dB higher than the CISPR Average test limit.		

Table 7



2.1.9 Test Results

Results for Configuration and Mode: USB Powered - Idle Mode.

This test was performed to the requirements of the Class B limits.

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

Detailed results are shown below.

Highest frequency generated or used within the EUT: 2.480 GHz
Which necessitates an upper frequency test limit of: 13 GHz

The EUT is handheld, body-worn, or ceiling-mounted equipment and has therefore been tested in three different orientations in accordance with ANSI C63.4, Clause 6.3.2.1.

30 MHz to 1 GHz

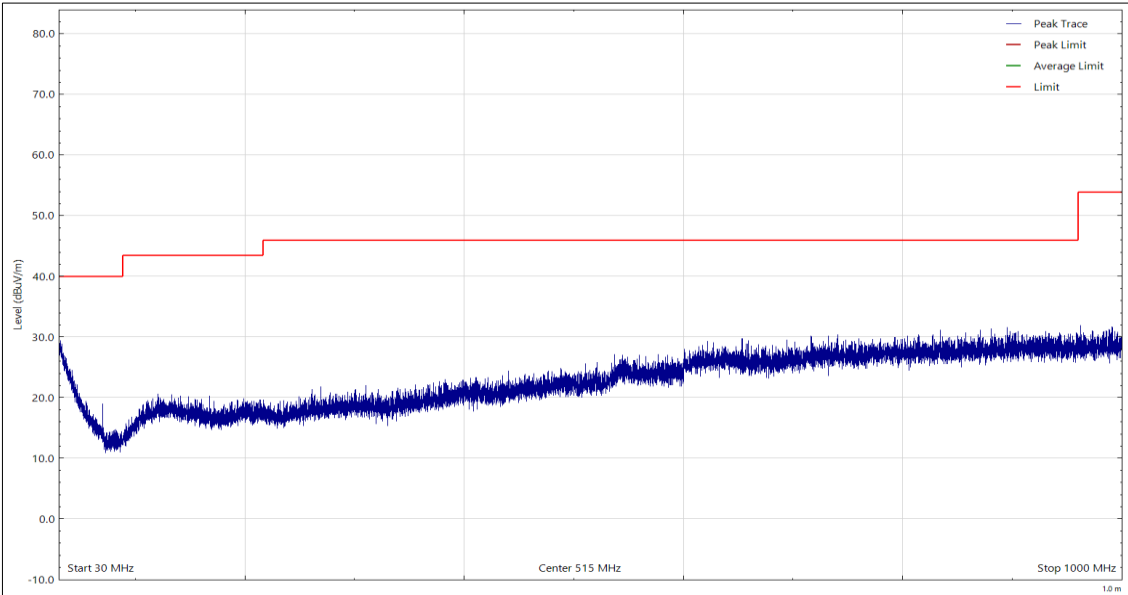


Figure 4 - 30 MHz to 1 GHz - Horizontal - X Orientation

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

Table 8

*No final measurements were made as all peak emissions seen above the measurement system noise floor during the pre-scan were greater than 10 dB below the test limit.

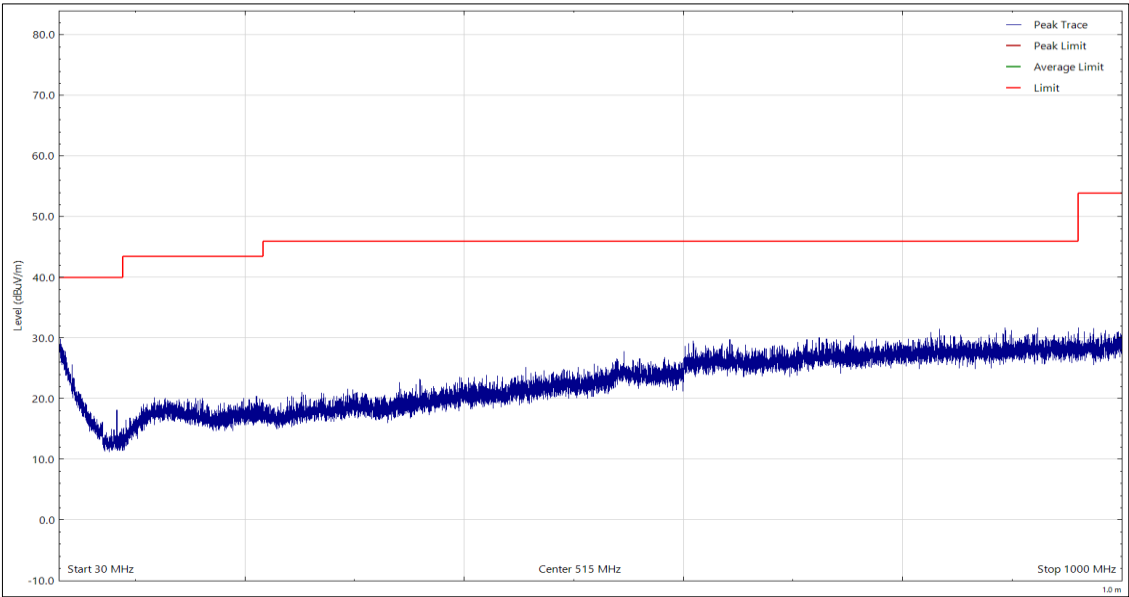


Figure 5 - 30 MHz to 1 GHz - Vertical - X Orientation

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

Table 9

*No final measurements were made as all peak emissions seen above the measurement system noise floor during the pre-scan were greater than 10 dB below the test limit.



1 GHz to 13 GHz

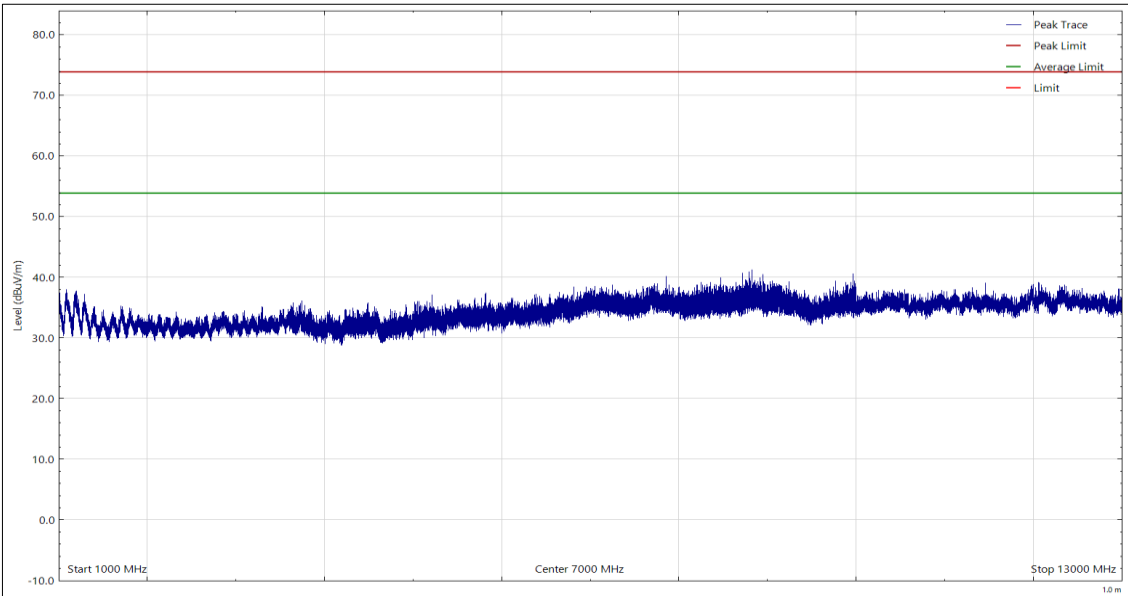


Figure 6 - 1 GHz to 13 GHz - Horizontal - X Orientation

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

Table 10

*No final measurements were made as all peak emissions seen above the measurement system noise floor during the pre-scan were greater than 10 dB below the test limit.

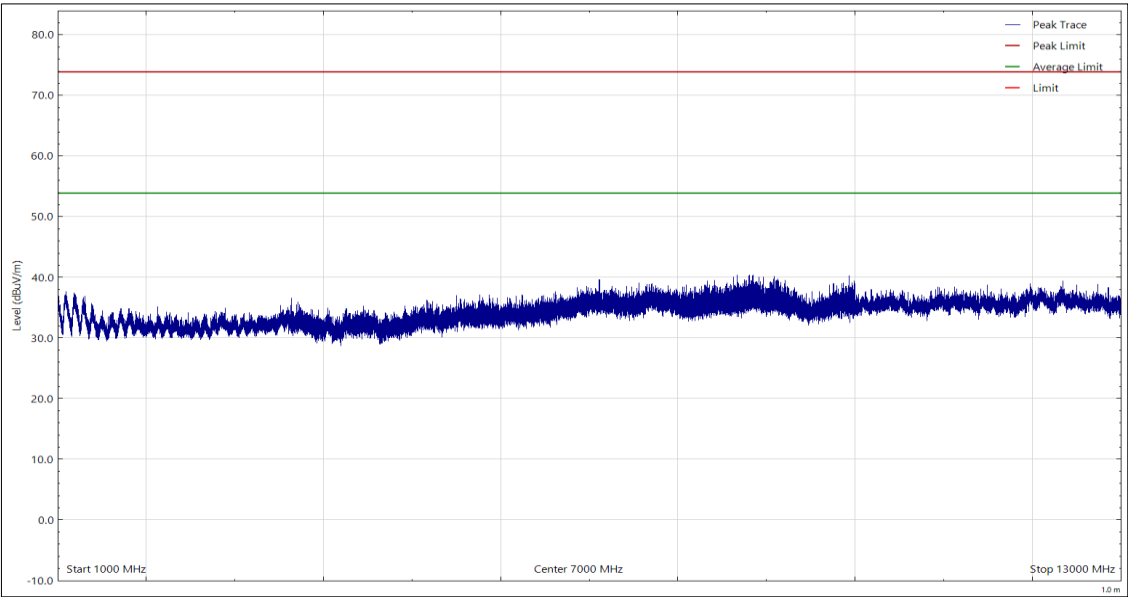


Figure 7 - 1 GHz to 13 GHz - Vertical - X Orientation

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

Table 11

*No final measurements were made as all peak emissions seen above the measurement system noise floor during the pre-scan were greater than 10 dB below the test limit.



30 MHz to 1 GHz

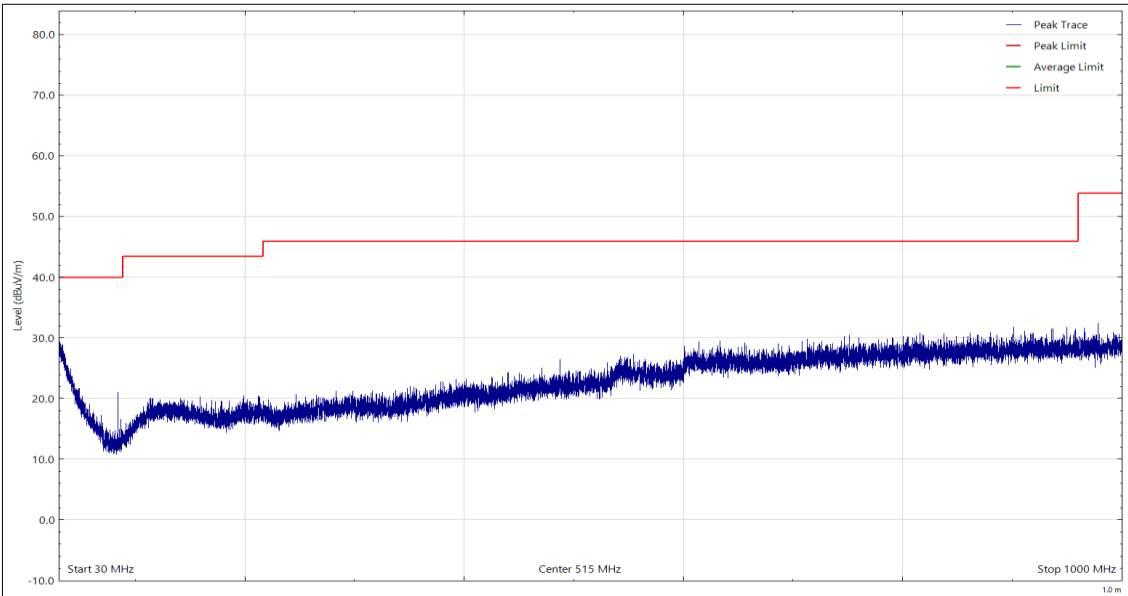


Figure 8 - 30 MHz to 1 GHz - Horizontal - Y Orientation

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

Table 12

*No final measurements were made as all peak emissions seen above the measurement system noise floor during the pre-scan were greater than 10 dB below the test limit.

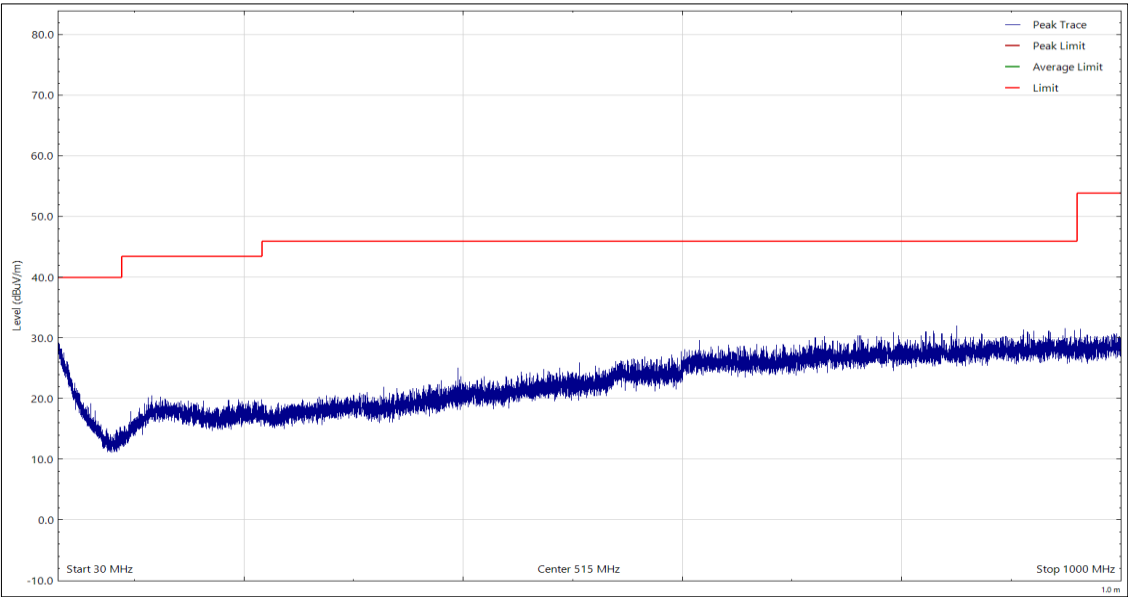


Figure 9 - 30 MHz to 1 GHz - Vertical - Y Orientation

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

Table 13

*No final measurements were made as all peak emissions seen above the measurement system noise floor during the pre-scan were greater than 10 dB below the test limit.



1 GHz to 13 GHz

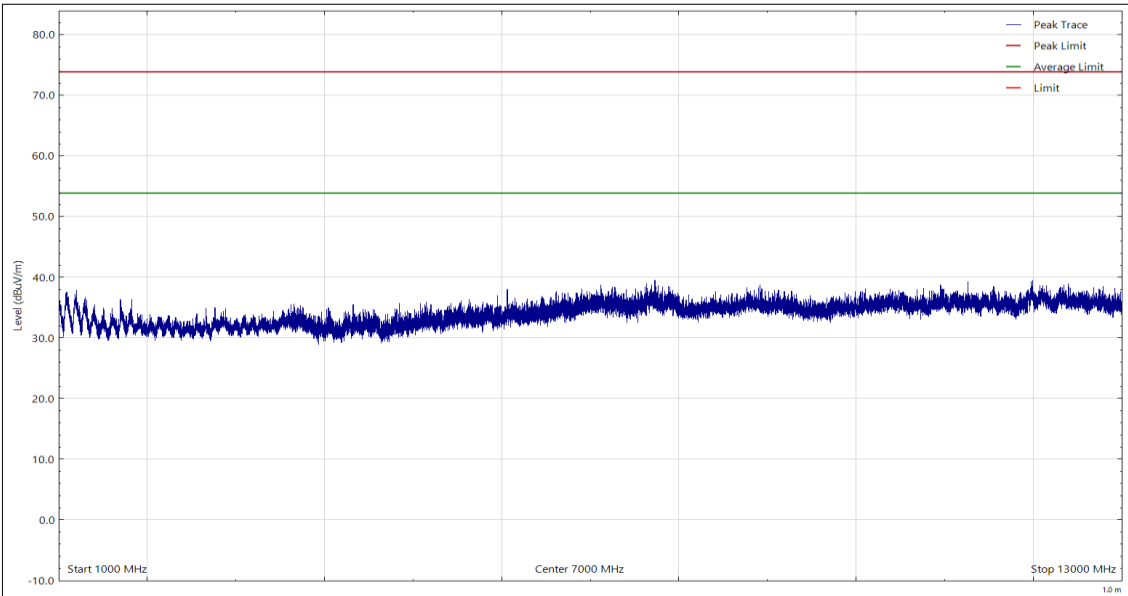


Figure 10 - 1 GHz to 13 GHz - Horizontal - Y Orientation

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

Table 14

*No final measurements were made as all peak emissions seen above the measurement system noise floor during the pre-scan were greater than 10 dB below the test limit.

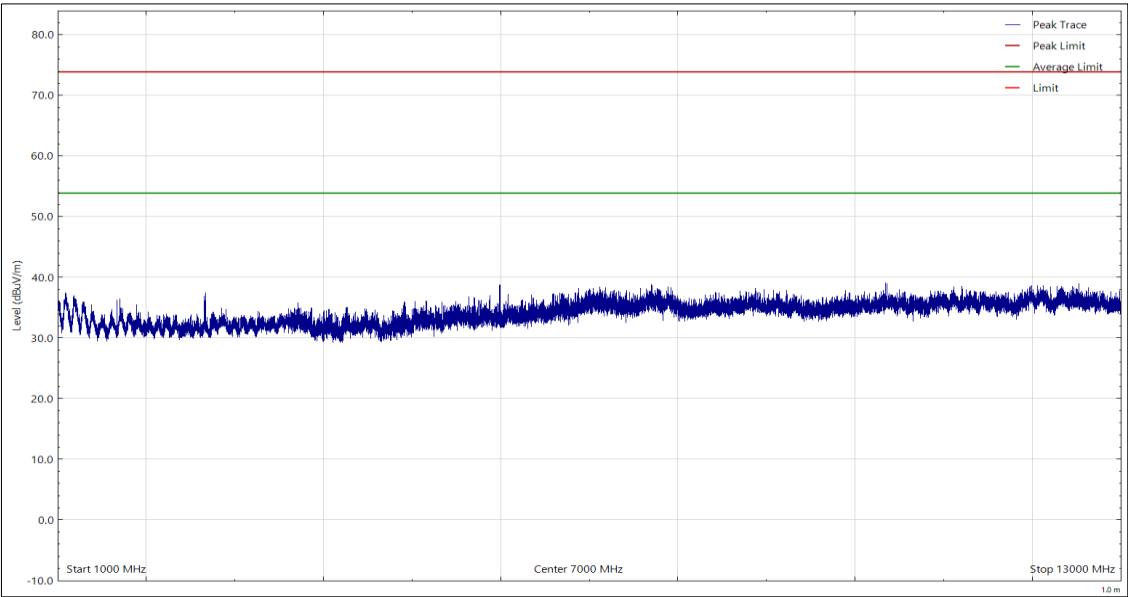


Figure 11 - 1 GHz to 13 GHz - Vertical - Y Orientation

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

Table 15

*No final measurements were made as all peak emissions seen above the measurement system noise floor during the pre-scan were greater than 10 dB below the test limit.



30 MHz to 1 GHz

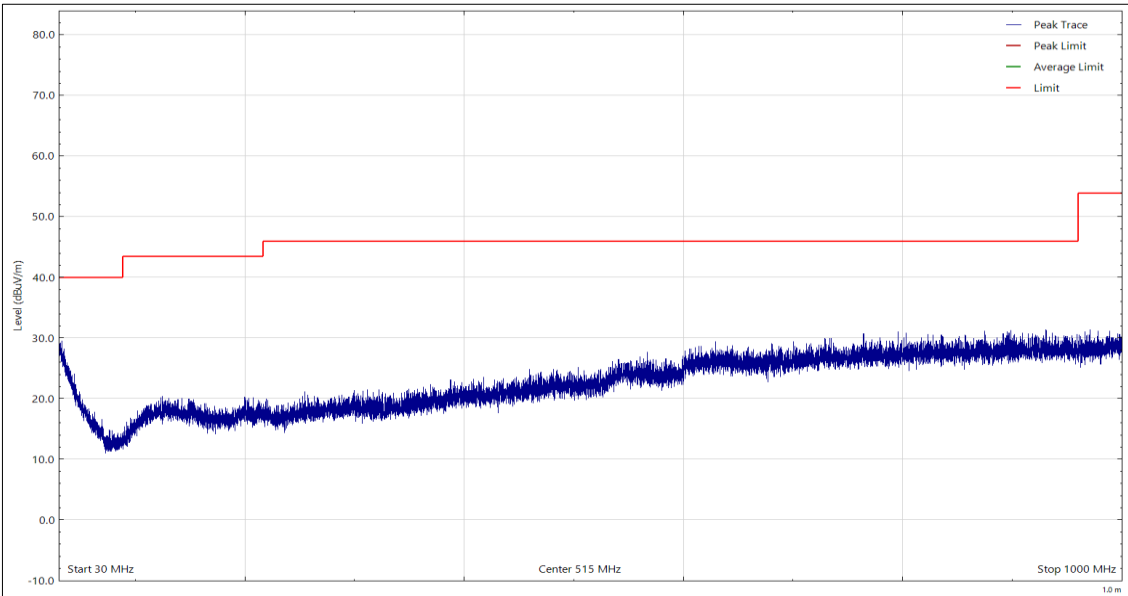


Figure 12 - 30 MHz to 1 GHz - Horizontal - Z Orientation

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

Table 16

*No final measurements were made as all peak emissions seen above the measurement system noise floor during the pre-scan were greater than 10 dB below the test limit.

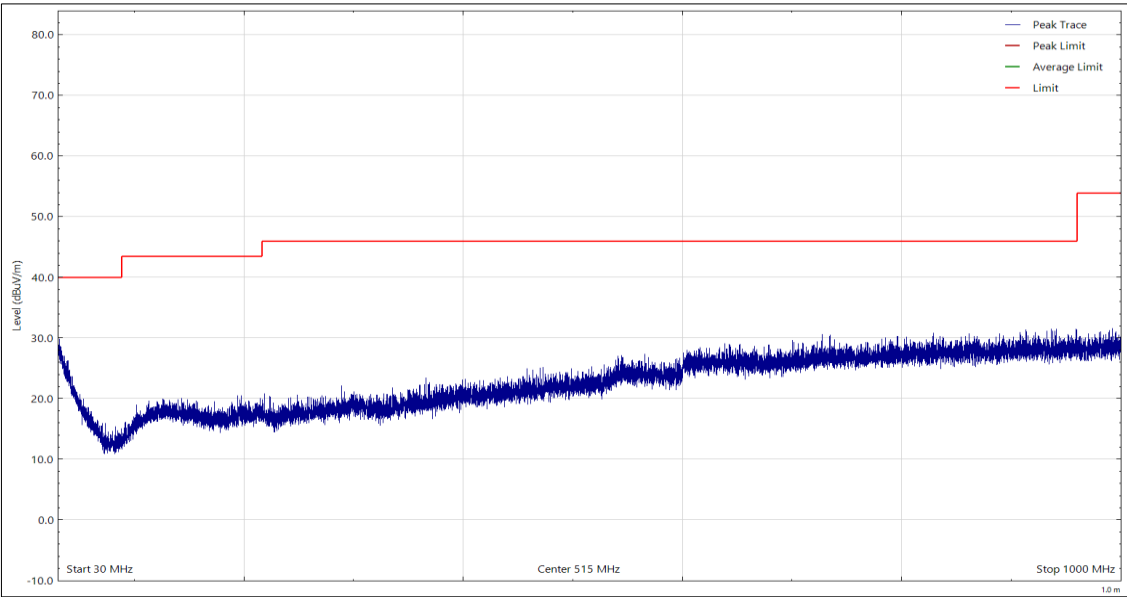


Figure 13 - 30 MHz to 1 GHz - Vertical - Z Orientation

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

Table 17

*No final measurements were made as all peak emissions seen above the measurement system noise floor during the pre-scan were greater than 10 dB below the test limit.



1 GHz to 13 GHz

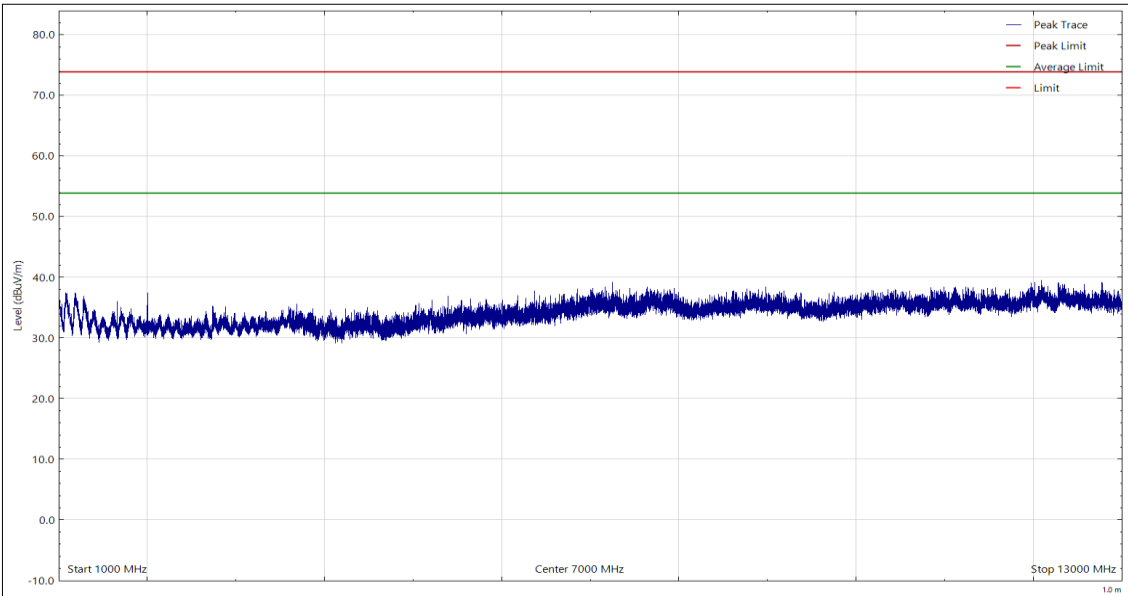


Figure 14 - 1 GHz to 13 GHz - Horizontal - Z Orientation

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

Table 18

*No final measurements were made as all peak emissions seen above the measurement system noise floor during the pre-scan were greater than 10 dB below the test limit.

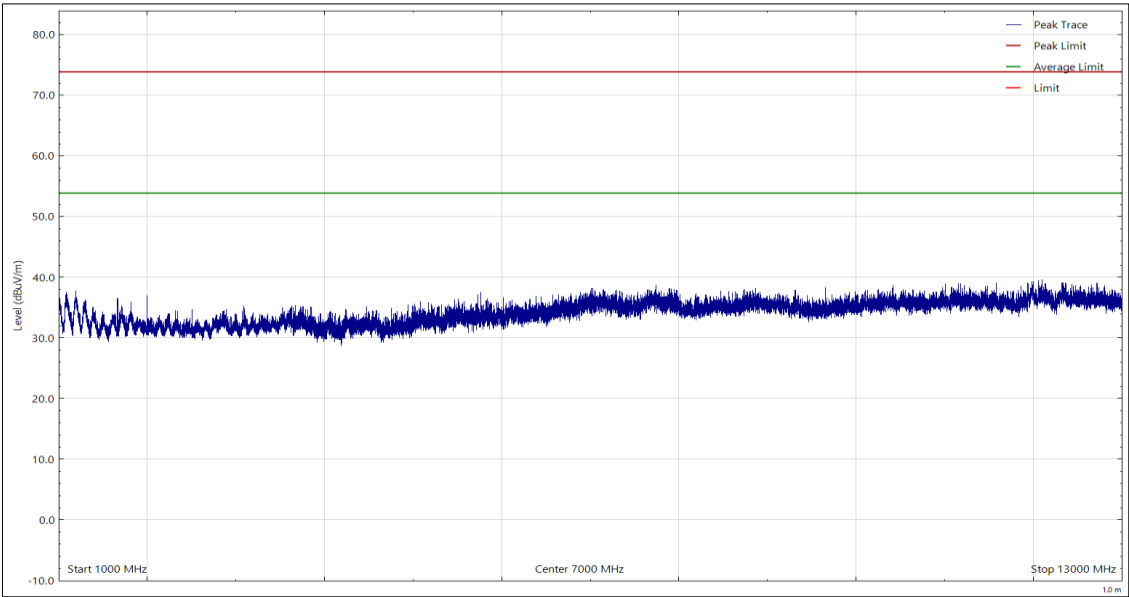


Figure 15 - 1 GHz to 13 GHz - Vertical - Z Orientation

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

Table 19

*No final measurements were made as all peak emissions seen above the measurement system noise floor during the pre-scan were greater than 10 dB below the test limit.



Figure 16 - Test Setup - 30 MHz to 1 GHz



Figure 17 - Test Setup - 1 GHz to 8 GHz

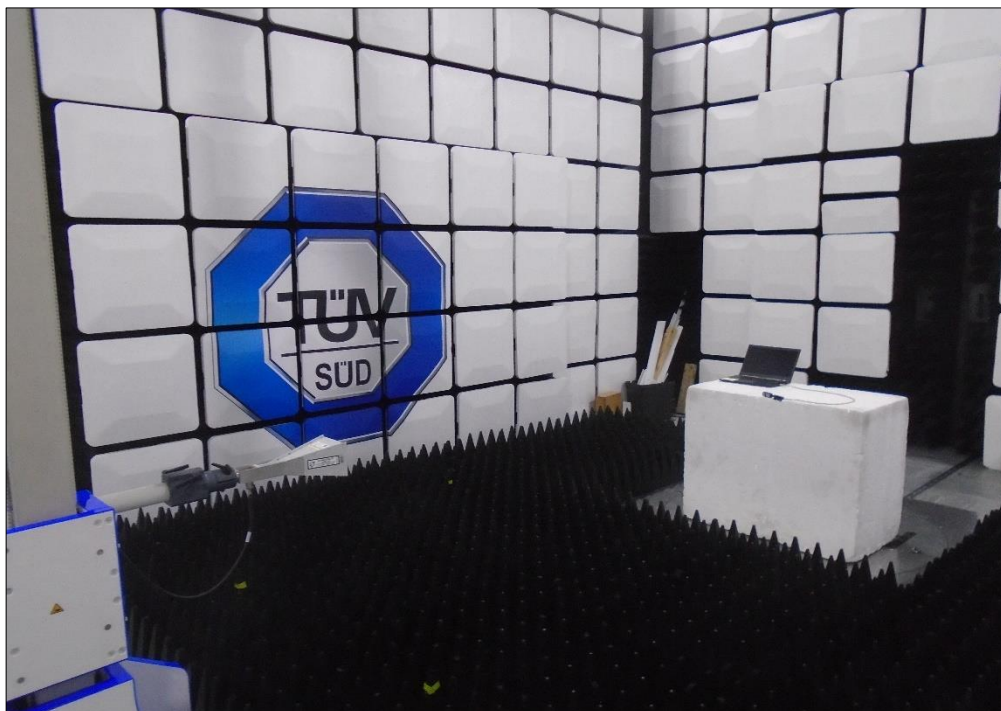


Figure 18 - Test Setup - 8 GHz to 13 GHz



Figure 19 - X Orientation



Figure 20 - Y Orientation



Figure 21 - Z Orientation



2.1.10 Test Location and Test Equipment Used

This test was carried out in EMC Chamber 12.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Expires
Screened Room (12)	MVG	EMC-3	5621	36	11-Aug-2023
Emissions Software	TUV SUD	EmX V3.1.10	5125	-	Software
Test Receiver	Rohde & Schwarz	ESU40	3506	12	25-Mar-2023
Turntable & Mast Controller	Maturo Gmbh	NCD/498/2799.01	5612	-	TU
Tilt Antenna Mast	Maturo Gmbh	TAM 4.0-P	5613	-	TU
Cable (N-Type to N-Type, 8 m)	Teledyne	PR90-088-8MTR	5450	6	23-Apr-2023
Cable (K-Type to K-Type, 1 m)	Junkosha	MWX241-01000KMSKMS/A	5511	12	14-Apr-2023
Cable (SMA to N-Type, 2 m)	Junkosha	MWX241/B	5817	6	04-Aug-2023
Pre-Amplifier (1 GHz to 18 GHz)	Schwarzbeck	BBV 9718 C	5350	12	20-Oct-2023
Pre-Amplifier (8 GHz to 18 GHz)	Phase One	PS04-0086	1533	12	20-Feb-2024
Antenna with attenuator (Bilog, 30 MHz to 3 GHz)	Schaffner	CBL6143	287	24	02-Dec-2024
Antenna (DRG, 1 GHz to 10.5 GHz)	Schwarzbeck	BBHA9120B	5611	12	16-Oct-2023
Antenna (DRG, 7.5 GHz to 18 GHz)	Schwarzbeck	HWRD750	5348	12	16-Oct-2023

Table 20

TU - Traceability Unscheduled



3 Test Equipment Information

3.1 General Test Equipment Used

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Expires
Thermo-Hygro-Barometer	PCE Instruments	R084606	5472	12	25-Mar-2023

Table 21



4 Incident Reports

No incidents reports were raised.



5 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 22

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 115:2021, Clause 4.4.3 (Procedure 2). The measurement results are directly compared with the test limit to determine conformance with the requirements of the standard.

Risk: The uncertainty of measurement about the measured result is negligible with regard to the final pass/fail decision. The measurement result can be directly compared with the test limit to determine conformance with the requirement (compare IEC Guide 115). The level of risk to falsely accept and falsely reject items is further described in ILAC-G8.