

# Report on the FCC Testing of:

Neology UK Ltd  
ANPR Camera. Model: P500

In accordance with FCC 47 CFR Part 15B

Prepared for: Neology UK Ltd  
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FCC ID: N/A

**COMMERCIAL-IN-CONFIDENCE**

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## SIGNATURE

NAME	JOB TITLE	RESPONSIBLE FOR	ISSUE DATE
Andy Lawson	Senior Engineer	Authorised Signatory	22 January 2019

Signatures in this approval box have checked this document in line with the requirements of TÜV SÜD Product Service 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. The sample tested was found to comply with the requirements defined in the applied rules.

## SIGNATURE

NAME	JOB TITLE	RESPONSIBLE FOR	ISSUE DATE
Matthew Dawkins	Technician	Testing	22 January 2019
Colin McKean	Senior Engineer	Testing	22 January 2019
Jack Tuckwell	Supervisor	Testing	22 January 2019

FCC Accreditation

90987 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: 2017.



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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	22 January 2019

**Table 1**

### 1.2 Introduction

Applicant	Neology UK Ltd
Manufacturer	Neology UK Ltd
Model Number(s)	P500
Serial Number(s)	166
Hardware Version(s)	P3
Software Version(s)	5.0.2962
Number of Samples Tested	1
Test Specification/Issue/Date	FCC 47 CFR Part 15B: 2017
Order Number	25538-00
Date	23-November-2018
Date of Receipt of EUT	20-December-2018
Start of Test	20-December-2018
Finish of Test	21-December-2018
Name of Engineer(s)	Colin McKean, Matthew Dawkins and Jack Tuckwell
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 is shown below.

Section	Specification Clause	Test Description	Result	Comments/Base Standard
Configuration and Mode: AC Powered – Operating with Wi-Fi Idle.				
2.1	15.107	Conducted Disturbance at Mains Terminals	Pass	ANSI C63.4: 2014
2.2	15.109	Radiated Disturbance	Pass	ANSI C63.4: 2014

**Table 2**

#### 1.4 Declaration of Build Status

MAIN EUT			
MANUFACTURING DESCRIPTION	P500 ANPR Camera		
MANUFACTURER	Neology UK Ltd		
MODEL NAME/NUMBER	P500		
PART NUMBER			
SERIAL NUMBER	166		
HARDWARE VERSION	P3		
SOFTWARE VERSION	5.0.2962		
PSU VOLTAGE/FREQUENCY/CURRENT	48V DC 2A		
HIGHEST INTERNALLY GENERATED / USED FREQUENCY	5GHz		
FCC ID (if applicable)			
INDUSTRY CANADA ID (if applicable)			
TECHNICAL DESCRIPTION (a brief description of the intended use and operation)	ANPR Camera for number plate recognition and capture		
COUNTRY OF ORIGIN	UK		
RF CHARACTERISTICS (if applicable)			
TRANSMITTER FREQUENCY	2400-5000		
OPERATING RANGE (MHz)			
RECEIVER FREQUENCY OPERATING RANGE (MHz)	2400-5000		
INTERMEDIATE FREQUENCIES			
EMISSION DESIGNATOR(S): (i.e. G1D, GXW)			
MODULATION TYPES: (i.e. GMSK, QPSK)			
OUTPUT POWER (W or dBm)	17dBm		
SEPARATE BATTERY/POWER SUPPLY (if applicable)			
MANUFACTURING DESCRIPTION	External 48V power supply		
MANUFACTURER	Meanwell		
TYPE	SMPS		
PART NUMBER	CLG-100-48		
PSU VOLTAGE/FREQUENCY/CURRENT	48V		
COUNTRY OF ORIGIN	Taiwan		
MODULES (if applicable)			
MANUFACTURING DESCRIPTION	Bluetooth/WLAN		
MANUFACTURER	Redpine Signals		
TYPE	RS9113		
POWER	17dBm		
FCC ID	XF6RS9113SB		
INDUSTRY CANADA ID			
EMISSION DESIGNATOR			
DHSS/FHSS/COMBINED OR OTHER	USA		
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: Neill Arnell  
Date: 11/12/18

Position held: Senior Hardware Engineer

## 1.5 Product Information

### 1.5.1 Technical Description

The EUT was a Neology UK Ltd, ANPR camera system.

The primary function of the EUT is as an Automatic Number Plate Recognition (ANPR) camera. It reads the number plates of vehicles and then transmits the information over a network.

It is part of a system that uses cameras to monitor a road and detects the number plates going through the field of view. It then performs OCR on the portion of the image with the number plate to read the characters, and then packages this information up for transmission over the network.

### 1.5.2 EUT Port/Cable Identification

Port	Max Cable Length specified	Usage	Type	Screened
Configuration and Mode: AC Powered – Operating with Wi-Fi Idle.				
AC Power	>1m	AC power Port	Twin and Earth	No
Ethernet Port	100m	Data	BELDEN 7929A	Yes

**Table 3**

### 1.5.3 Test Configuration

Configuration	Description
AC Powered	The EUT was powered from a 110 V 60 Hz supply. The EUT was connected via an ethernet cable to a test laptop which was running customer supplied test software.

**Table 4**

### 1.5.4 Modes of Operation

Mode	Description
Operating with Wi-Fi Idle	The EUT was reading number plates which were displayed on the test software on the laptop. The EUT's transmitters were in an idle state

**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
Serial Number: 166			
0	As supplied by the customer	Not Applicable	Not Applicable

**Table 6**

### 1.8 Test Location

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

Test Name	Name of Engineer(s)	Accreditation
Configuration and Mode: AC Powered – Operating with Wi-Fi Idle		
Conducted Disturbance at Mains Terminals	Colin McKean	Not UKAS
Radiated Disturbance	Matthew Dawkins and Jack Tuckwell	Not UKAS

**Table 7**

Office Address:

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

## 2 Test Details

### 2.1 Conducted Disturbance at Mains Terminals

#### 2.1.1 Specification Reference

FCC 47 CFR Part 15B, Clause 15.107

#### 2.1.2 Equipment Under Test and Modification State

ANPR Camera, Model No. P500, S/N: 166 - Modification State 0

#### 2.1.3 Date of Test

21-December-2018

#### 2.1.4 Test Method

The EUT was placed on a non-conductive table 0.8m above a reference ground 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.

#### 2.1.5 Environmental Conditions

Ambient Temperature 22.0 °C

Relative Humidity 46.0 %

#### 2.1.6 Specification Limits

Required Specification Limits (Class A)			
Line Under Test	Frequency Range (MHz)	Quasi-peak (dB $\mu$ V)	Average (dB $\mu$ V)
AC Power Port	0.15 to 0.5	79	66
	0.5 to 30	73	60

Table 8

### 2.1.7 Test Results

#### Results for Configuration and Mode: AC Powered - Operating with Wi-Fi Idle.

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

Detailed results are shown below.

Line Under Test: 115V AC Live Line

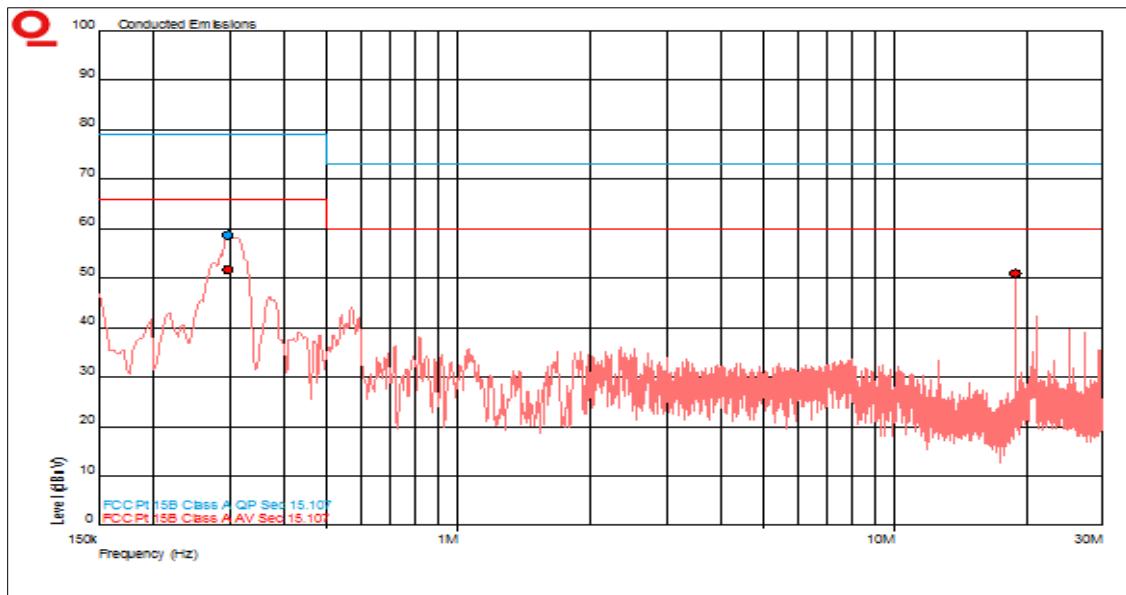


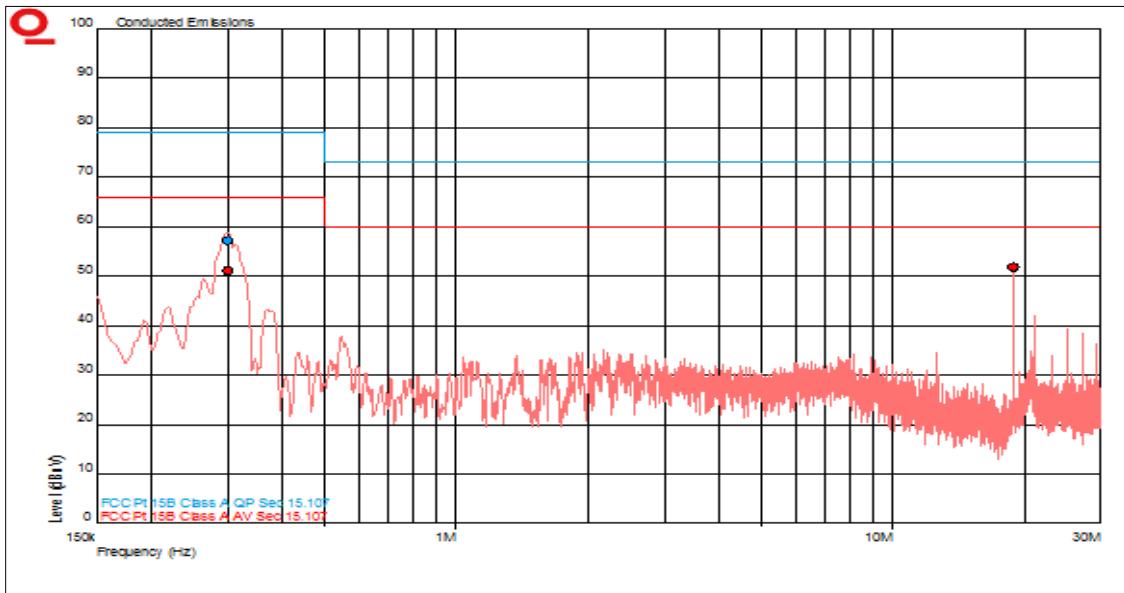
Figure 1 - Graphical Results - 115V AC Live Line

Frequency (MHz)	QP Level (dB $\mu$ V)	QP Limit (dB $\mu$ V)	QP Margin (dB $\mu$ V)	CISPR AV Level (dB $\mu$ V)	CISPR AV Limit (dB $\mu$ V)	CISPR AV Margin (dB $\mu$ V)
0.297	58.7	79.0	-20.3	51.8	66.0	-14.2
18.962	51.0	73.0	-22.0	51.0	60.0	-9.0

Table 9

All other emissions were greater than 10dB below the CISPR Average test limit.

Line Under Test: 115V AC Neutral Line



**Figure 2 - Graphical Results - 115V AC Neutral Line**

Frequency (MHz)	QP Level (dBµV)	QP Limit (dBµV)	QP Margin (dBµV)	CISPR AV Level (dBµV)	CISPR AV Limit (dBµV)	CISPR AV Margin (dBµV)
0.300	57.2	79.0	-21.8	51.1	66.0	-14.9
18.962	51.7	73.0	-21.3	51.8	60.0	-8.2

**Table 10**

All other emissions were greater than 10dB below the CISPR Average test limit.



**Figure 3 – Test Setup**

#### **2.1.8 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 (Single 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	3275	-	Software
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	17-Dec-2019
Cable (Rx, Km-Km 2m)	Scott Cables	KPS-1501-2000-KPS	4526	6	26-Apr-2019

**Table 11**

## 2.2 Radiated Disturbance

### 2.2.1 Specification Reference

FCC 47 CFR Part 15B, Clause 15.109

### 2.2.2 Equipment Under Test and Modification State

ANPR Camera, Model No. P500, S/N: 166 - Modification State 0

### 2.2.3 Date of Test

20-December-2018 to 21-December-2018

### 2.2.4 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 or CISPR Average detector as appropriate. The readings were maximised by adjusting the antenna height, polarisation and turntable azimuth, in accordance with the specification.

### 2.2.5 Environmental Conditions

Ambient Temperature 19.0 °C

Relative Humidity 44.0 %

### 2.2.6 Specification Limits

Required Specification Limits, Field Strength (Class A @ 10m)		
Frequency Range (MHz)	( $\mu$ V/m)	(dB $\mu$ V/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 < 1GHz  
Average detector to be used for measurements > 1GHz

Table 12

## 2.2.7 Test Results

### Results for Configuration and Mode: AC Powered - Operating with Wi-Fi Idle.

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

Detailed results are shown below.

Highest frequency generated or used within the EUT: 5 GHz  
Which necessitates an upper frequency test limit of: 30 GHz

Frequency Range of Test: 30 MHz to 1 GHz

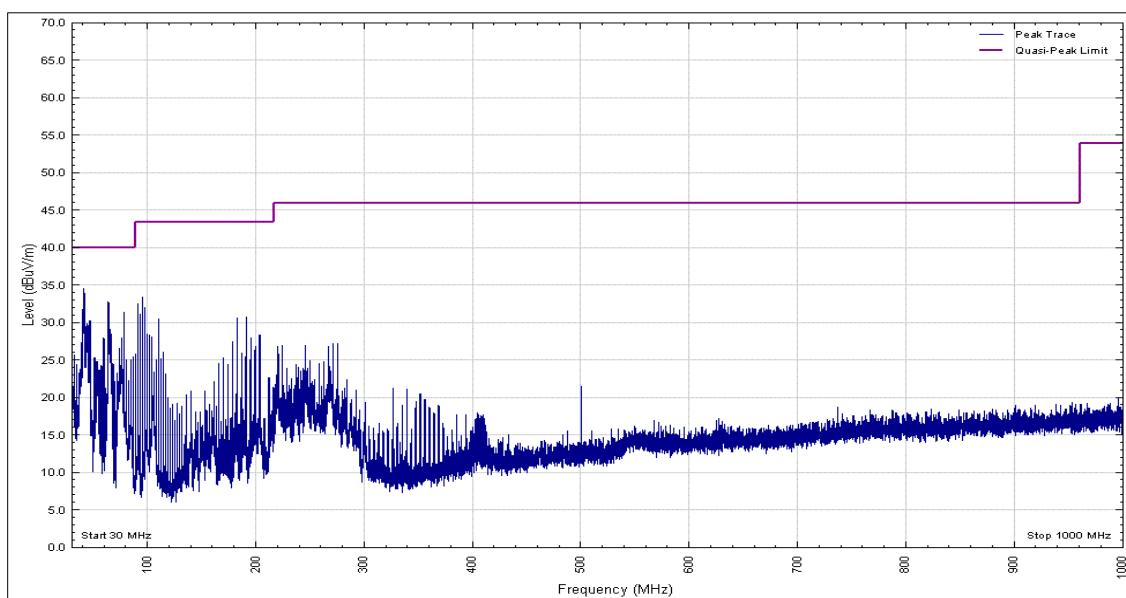


Figure 4 - Graphical Results - Horizontal Polarity

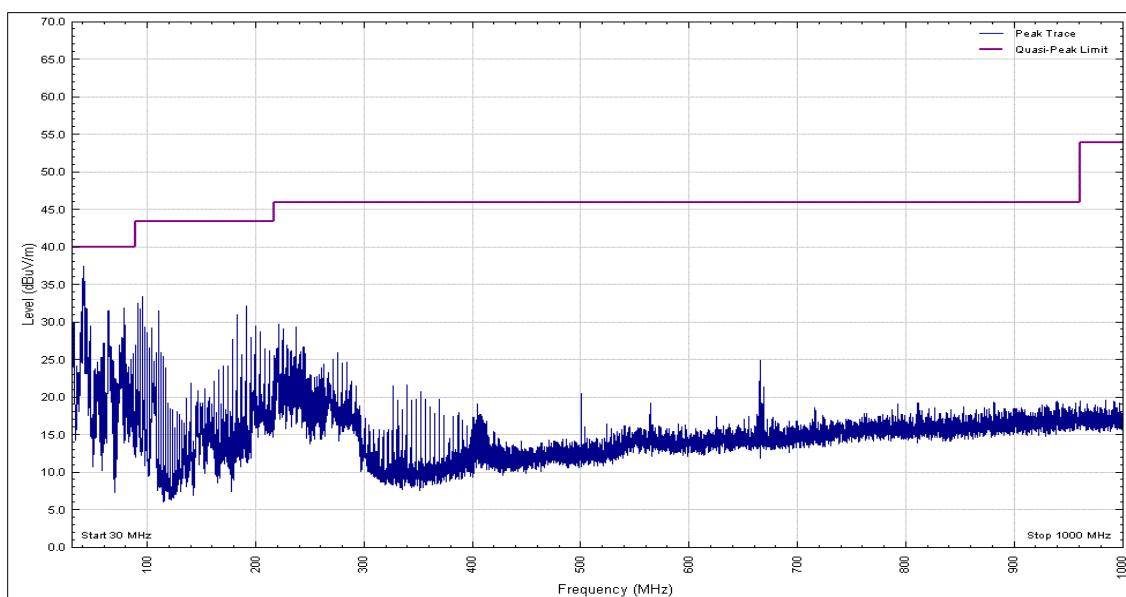
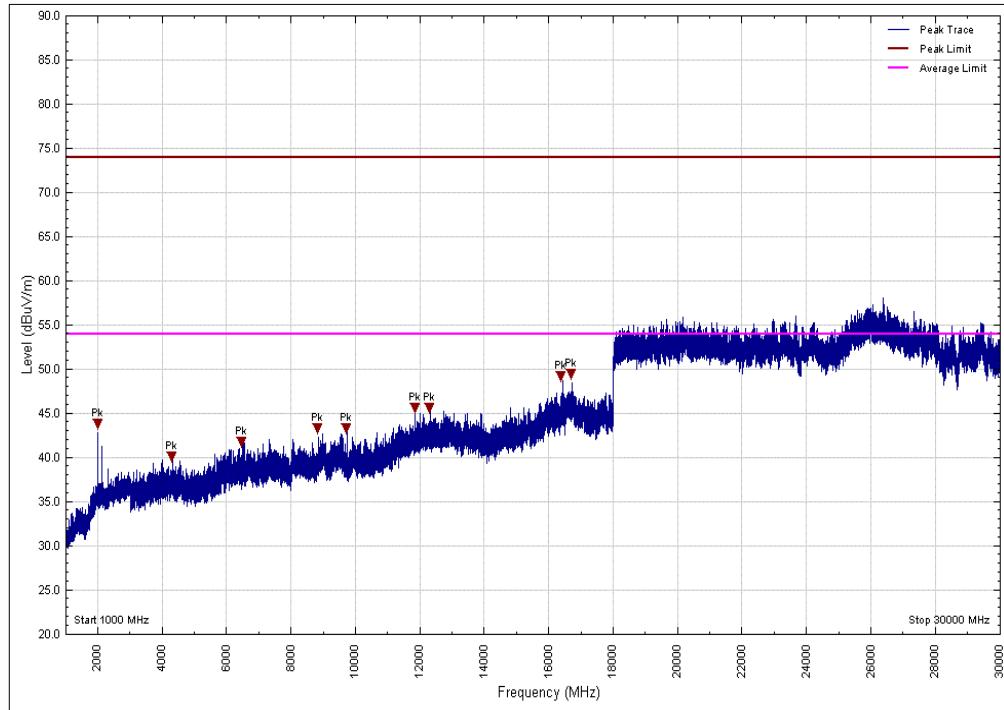


Figure 5 - Graphical Results - Vertical Polarity

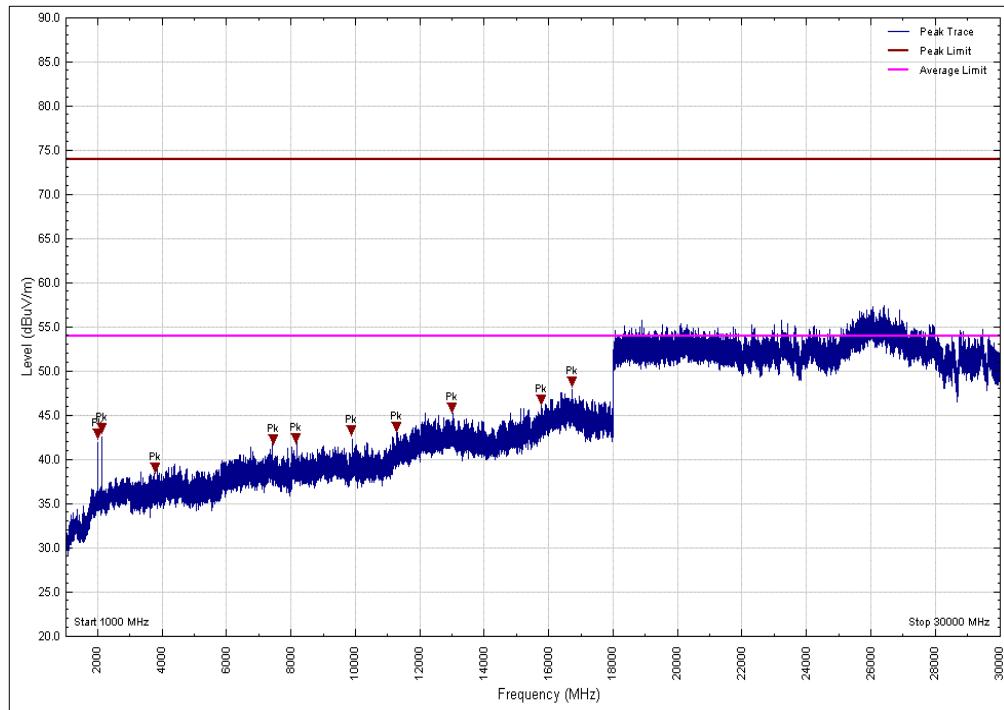
Frequency (MHz)	Level	Limit	Margin	Detector	Unit	Angle (°)	Height (cm)	Polarisation
41.066	32.3	40.0	-7.7	Q-Peak	dB $\mu$ V/m	11	112	Vertical
41.465	28.5	40.0	-11.5	Q-Peak	dB $\mu$ V/m	326	139	Horizontal
95.249	33.4	43.5	-10.1	Q-Peak	dB $\mu$ V/m	21	100	Horizontal
95.331	33.5	43.5	-10.0	Q-Peak	dB $\mu$ V/m	35	105	Vertical
110.143	30.3	43.5	-13.2	Q-Peak	dB $\mu$ V/m	350	100	Vertical
182.004	30.2	43.5	-13.3	Q-Peak	dB $\mu$ V/m	11	105	Horizontal
190.618	30.0	43.5	-13.5	Q-Peak	dB $\mu$ V/m	65	100	Vertical
275.090	27.3	46.0	-18.7	Q-Peak	dB $\mu$ V/m	184	141	Horizontal
499.996	21.4	46.0	-24.6	Q-Peak	dB $\mu$ V/m	313	100	Horizontal
668.723	11.8	46.0	-34.2	Q-Peak	dB $\mu$ V/m	314	103	Vertical

**Table 13**

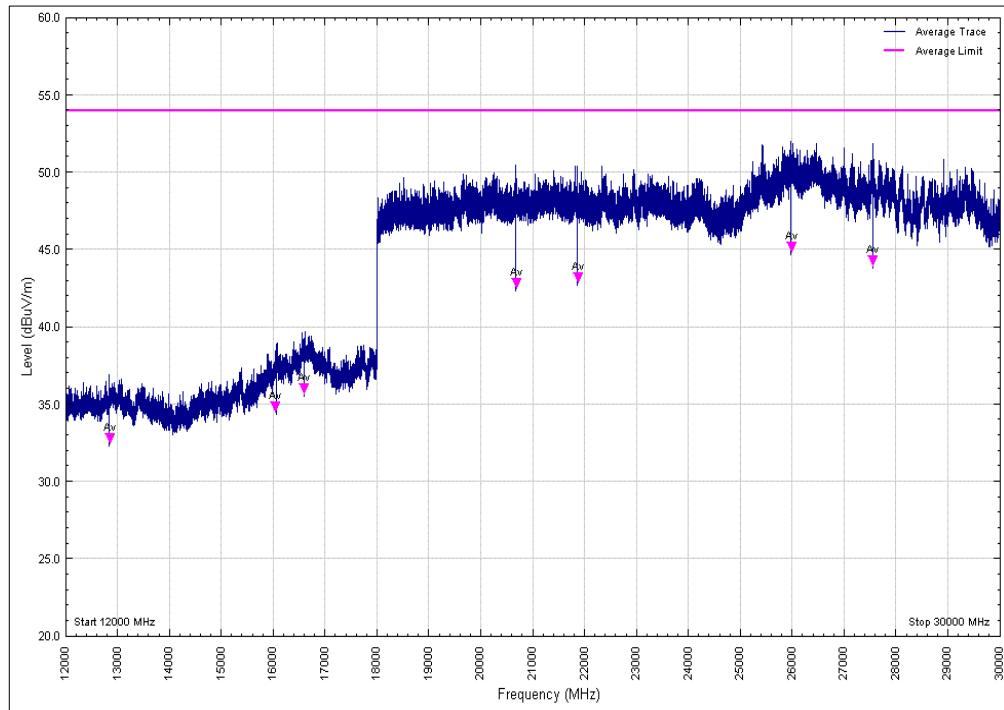
Frequency Range of Test: 1 GHz to 30 GHz



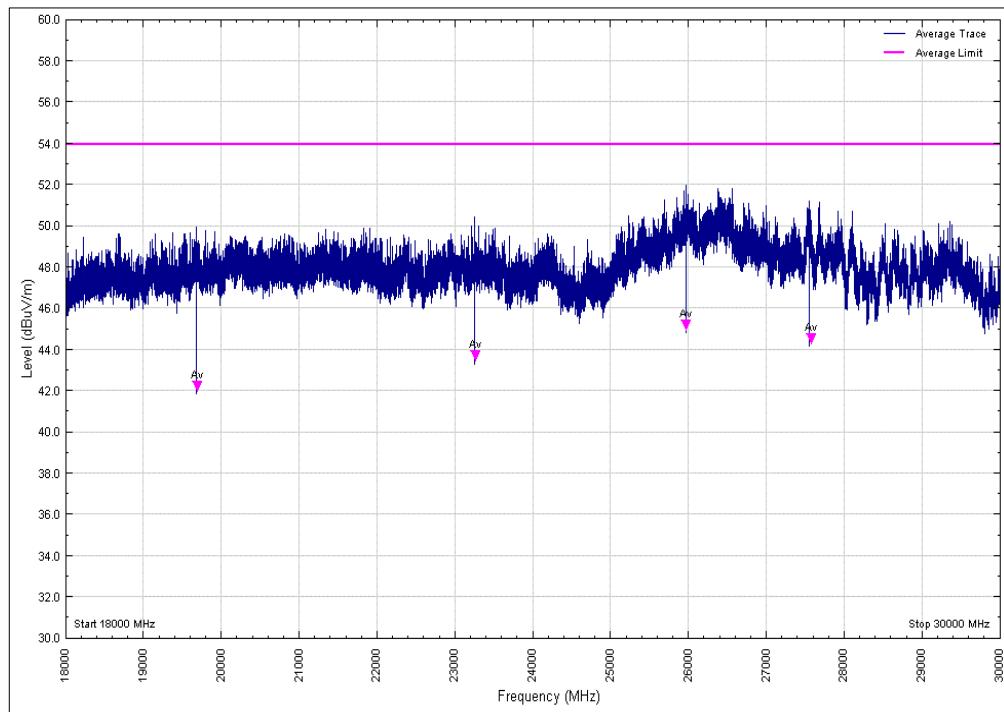
**Figure 6 - Graphical Results - 1 GHz to 30 GHz – Peak - Horizontal Polarity**



**Figure 7 - Graphical Results - 1 GHz to 30 GHz – Peak - Vertical Polarity**



**Figure 8 - Graphical Results - 12 GHz to 30 GHz – CISPR Average - Horizontal Polarity**



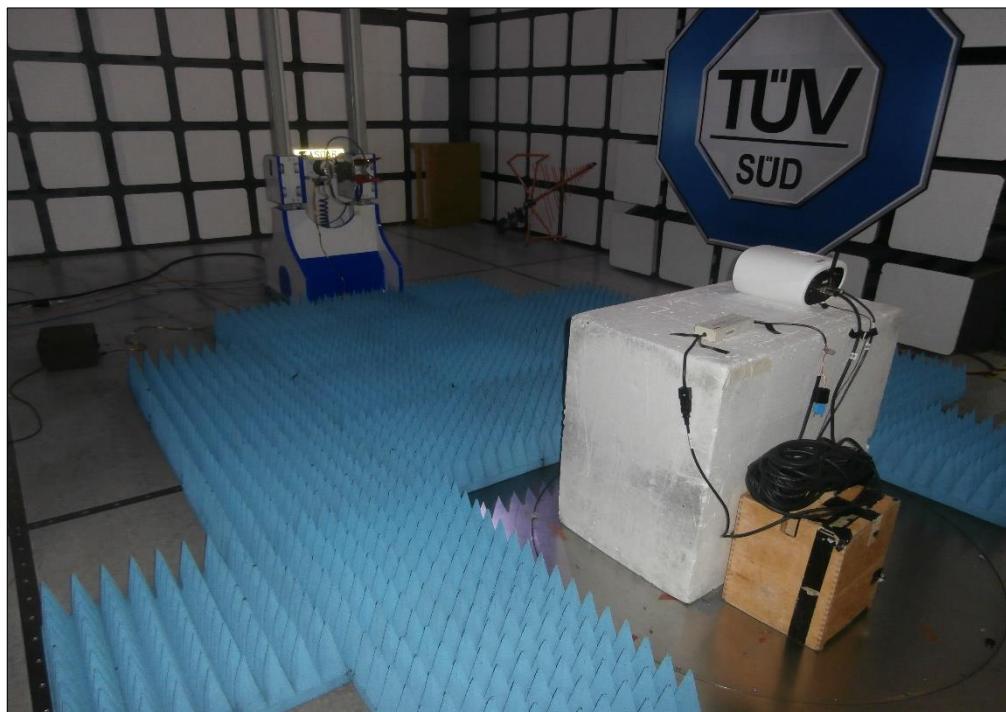
**Figure 9 - Graphical Results - 18 GHz to 30 GHz – CISPR Average - Vertical Polarity**

Frequency (MHz)	Level	Limit	Margin	Detector	Unit	Angle (°)	Height (cm)	Polarisation
1999.935	41.9	74.0	-32.1	Peak	dB $\mu$ V/m	334	106	Vertical
1999.965	42.9	74.0	-31.1	Peak	dB $\mu$ V/m	332	109	Horizontal
2124.891	42.6	74.0	-31.4	Peak	dB $\mu$ V/m	336	101	Vertical
3799.635	38.2	74.0	-35.9	Peak	dB $\mu$ V/m	283	107	Vertical
4311.781	39.1	74.0	-34.9	Peak	dB $\mu$ V/m	130	107	Horizontal
6474.332	40.8	74.0	-33.2	Peak	dB $\mu$ V/m	315	100	Horizontal
7461.531	41.3	74.0	-32.7	Peak	dB $\mu$ V/m	353	320	Vertical
8142.678	41.4	74.0	-32.6	Peak	dB $\mu$ V/m	229	102	Vertical
8825.063	42.4	74.0	-31.6	Peak	dB $\mu$ V/m	359	108	Horizontal
9704.128	42.4	74.0	-31.6	Peak	dB $\mu$ V/m	67	107	Horizontal
9882.270	42.4	74.0	-31.6	Peak	dB $\mu$ V/m	352	100	Vertical
11273.314	42.8	74.0	-31.2	Peak	dB $\mu$ V/m	353	395	Vertical
11843.485	44.7	74.0	-29.3	Peak	dB $\mu$ V/m	94	107	Horizontal
12295.325	44.7	74.0	-29.4	Peak	dB $\mu$ V/m	288	107	Horizontal
12851.468	32.3	54.0	-21.8	CISPR Average	dB $\mu$ V/m	42	109	Horizontal
13010.104	44.9	74.0	-29.1	Peak	dB $\mu$ V/m	208	101	Vertical
15757.908	45.9	74.0	-28.1	Peak	dB $\mu$ V/m	1	108	Vertical
16050.890	34.3	54.0	-19.7	CISPR Average	dB $\mu$ V/m	256	108	Horizontal
16383.355	48.3	74.0	-25.8	Peak	dB $\mu$ V/m	325	103	Horizontal
16595.965	35.5	54.0	-18.5	CISPR Average	dB $\mu$ V/m	153	107	Horizontal
16699.467	48.5	74.0	-25.5	Peak	dB $\mu$ V/m	6	163	Horizontal
16742.665	47.9	74.0	-26.2	Peak	dB $\mu$ V/m	359	102	Vertical
19700.300	41.9	54.0	-12.1	CISPR Average	dB $\mu$ V/m	130	100	Vertical
20700.715	42.3	54.0	-11.7	CISPR Average	dB $\mu$ V/m	315	100	Horizontal
21880.480	42.7	54.0	-11.4	CISPR Average	dB $\mu$ V/m	22	100	Horizontal
23262.540	17.1	54.0	-37.0	CISPR Average	dB $\mu$ V/m	215	100	Horizontal
23271.475	43.3	54.0	-10.7	CISPR Average	dB $\mu$ V/m	160	100	Vertical
25969.220	44.8	54.0	-9.2	CISPR Average	dB $\mu$ V/m	98	100	Vertical
25985.190	44.7	54.0	-9.4	CISPR Average	dB $\mu$ V/m	263	100	Horizontal
27552.200	43.8	54.0	-10.2	CISPR Average	dB $\mu$ V/m	278	100	Horizontal
27577.165	44.2	54.0	-9.9	CISPR Average	dB $\mu$ V/m	141	100	Vertical

**Table 14**



**Figure 10 - Test Setup for radiated disturbance 30MHz to 1GHz**



**Figure 11 - Test Setup for radiated disturbance 1GHz to 30GHz**

## 2.2.8 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
Screened Room (5)	Rainford	Rainford	1545	36	23-Jan-2021
Antenna with permanent attenuator (Bilog)	Chase	CBL6143	2904	24	08-Aug-2019
1GHz to 8GHz Low Noise Amplifier	Wright Technologies	APS04-0085	4365	12	25-Oct-2019
Cable (Rx, Km-Km 2m)	Scott Cables	KPS-1501-2000-KPS	4526	6	26-Apr-2019
Cable (Rx, SMAX-SMAX 0.5m)	Scott Cables	SLSLL18-SMSM-00.50M	4528	6	26-Apr-2019
EMI Receiver	Keysight Technologies	N9038A MXE	4629	12	09-Oct-2019
Double Ridged Waveguide Horn Antenna	ETS-Lindgren	3117	4722	12	01-Mar-2019
9m N type RF cable	Rosenberger	2303-0 9.0m PNm PNm	4827	6	04-Jan-2019
EmX Software	TUV SUD Product Service	V 1.3.30	5125	-	Software

**Table 15**

### 3 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, $\pm 5.2$ dB* 1 GHz to 40 GHz, Horn Antenna, $\pm 6.3$ dB*
Conducted Disturbance at Mains Terminals	150 kHz to 30 MHz, LISN, $\pm 3.7$ dB*

**Table 16**

Worst case error for both Time and Frequency measurement 12 parts in 106.

\*In accordance with CISPR 16-4