Report on the FCC Testing of the

FCS, Outstation, Model: Tri-corr Touch Pro

In accordance with FCC 47 CFR Part 15B

Prepared for: HWM-Water Ltd
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On Behalf of: Fluid Conservation Systems
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FCC ID: RUZ-068

COMMERCIAL-IN-CONFIDENCE

Document Number: 75940615-01 | Issue: 01

RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Project Management	Natalie Bennett	13 June 2018	
Authorised Signatory	Kim Archer	13 June 2018	

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.

RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Testing	Sharif Sendagire	13 June 2018	

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 for the tests detailed in section 1.3.

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Product Service

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	13 June 2018

1.2 Introduction

Applicant	HWM Water Ltd
Manufacturer	Fluid Conservation Systems (FCS)
Model Number(s)	Tri-corr Touch Pro
Serial Number(s)	Not Serialised (75940615-TSR0004)
Hardware Version(s)	B
Software Version(s)	105
Number of Samples Tested	1
Test Specification/Issue/Date	FCC 47 CFR Part 15B: 2017
Order Number Date	75593 18-October-2017
Date of Receipt of EUT	31-May-2018
Start of Test	07-June-2018
Finish of Test	07-June-2018
Name of Engineer(s)	Sharif Sendagire
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 Part 15B	Test Description	Result	Comments/Base Standard
Configuration and Mode: Idle				
2.1	15.109	Radiated Disturbance	Pass	ANSI C63.4: 2014

Product Service

1.4 Declaration of Build Status

MAIN EUT			
MANUFACTURING DESCRIPTION	High Performance Correlator		
MANUFACTURER	FCS		
MODEL NAME/NUMBER	Tri-corr Touch Pro		
PART NUMBER	MCT-US/STD		
SERIAL NUMBER	P0716-0003		
HARDWARE VERSION	v2		
SOFTWARE VERSION	v2.01 OS: 1.17		
TRANSMITTER FREQUENCY OPERATING RANGE (MHz)	Red Outstation: 467.925MHz, Blue Outstation: 467.800MHz		
RECEIVER FREQUENCY OPERATING RANGE (MHz)	As per Outstation		
COUNTRY OF ORIGIN	UK		
INTERMEDIATE FREQUENCIES	Receiver: 21.4MHz (1st IF), 455kHz (2nd IF), Transmitters: N/A		
EMISSION DESIGNATOR(S): (i.e. G1D, GXW)	Receiver: N/A, Transmitters: 12k5F3D		
MODULATION TYPES: (i.e. GMSK, QPSK)	FSK		
HIGHEST INTERNALLY GENERATED FREQUENCY	Transmitters: 467.925MHz, Receiver: 446.525MHz local oscillator		
OUTPUT POWER (W or dBm)	+27dBm (500mW) +/- 1dB		
FCC ID	RUZ-068		
INDUSTRY CANADA ID	10962A-068		
TECHNICAL DESCRIPTION (a brief description of the intended use and operation)	Accoustic Correlator for determining the location of a leak in a length of a water pipe.		
BATTERY/POWER SUPPLY			
MANUFACTURING DESCRIPTION	Li-ion Battery Pack		
MANUFACTURER	EVE Battery		
TYPE	2S2P ICR18650-30B 43.1Wh		
PART NUMBER	BAT3097		
VOLTAGE	7.56V		
COUNTRY OF ORIGIN	China		
MODULES (if applicable)			
MANUFACTURING DESCRIPTION			
MANUFACTURER			
TYPE			
POWER			
FCC ID			
COUNTRY OF ORIGIN			
INDUSTRY CANADA ID			
EMISSION DESIGNATOR			
DHSS/FHSS/COMBINED OR OTHER			
ANCILLARIES (if applicable)			
MANUFACTURING DESCRIPTION	Battery Charger/PSU		
MANUFACTURER	Stontronics		
TYPE	NBS65A120500B3		
PART NUMBER	T5994ST		
SERIAL NUMBER	N/A		
COUNTRY OF ORIGIN	China		

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

Name: Andy Earp Position held: Product Validation Manager
Date: 03/11/2017

1.5 Product Information

1.5.1 Technical Description

Acoustic Correlator for determining the location of a leak in a length of a water pipe.

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: Not Serialised (75940615-TSR0004)			
0	As supplied by the customer	Not Applicable	Not Applicable

Table 1

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: Idle		
Radiated Disturbance	Sharif Sendagire	UKAS

Table 2

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

2.1.2 Equipment Under Test and Modification State

Tri-corr Touch Pro, S/N: Not Serialised (75940615-TSR0004) – Modification State 0

2.1.3 Date of Test

07-June-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 in accordance with ANSI C63.4, clause 8.

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	21.4°C
Relative Humidity	51.9%

2.1.6 Test Results

Results for Configuration and Mode : Idle.

Performance assessment of the EUT made during this test: Pass

Detailed results are shown below.

Highest frequency generated or used within the EUT: 467.925 MHz
Which necessitates an upper frequency test limit of: 3 GHz

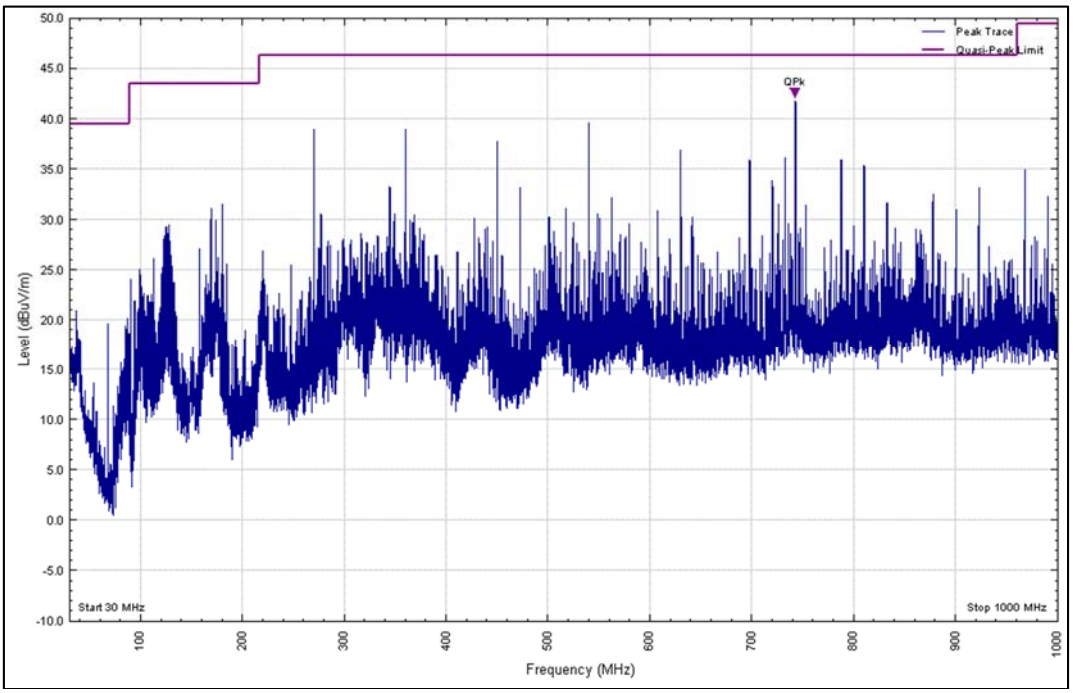

Figure 1 - 30 MHz to 1 GHz – Polarity: Horizontal, EUT Orientation: X

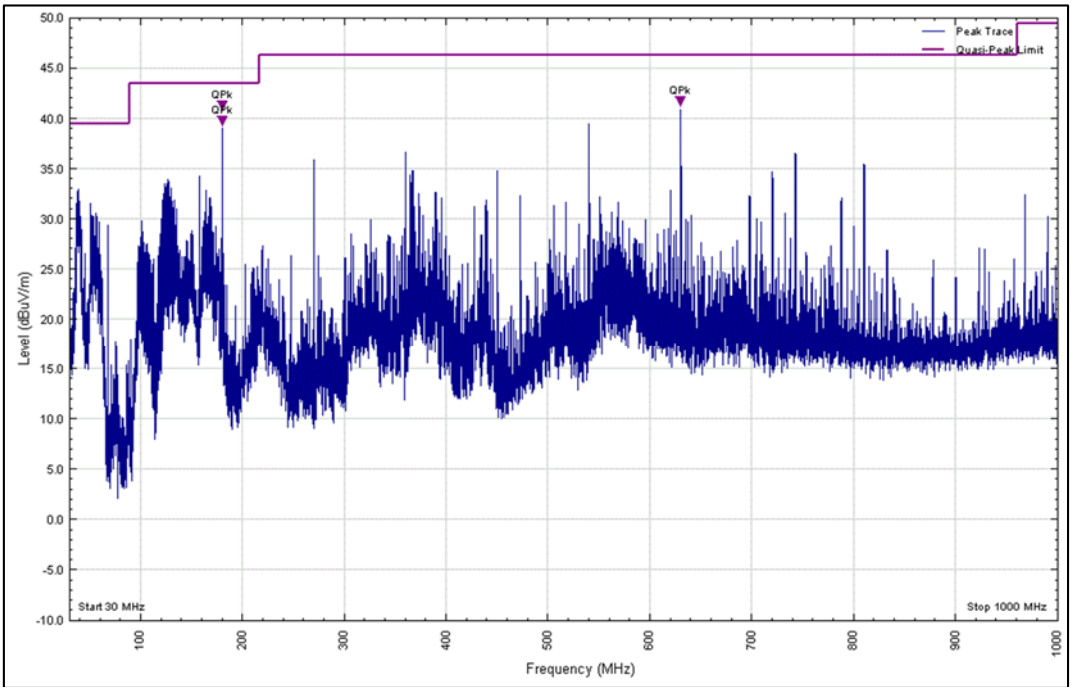

Figure 2 - 30 MHz to 1 GHz - Polarity: Vertical, EUT Orientation: X

Frequency (MHz)	QP Level (dBuV/m)	QP Limit (dBuV/m)	QP Margin (dBuV/m)	Angle(Deg)	Height(m)	Polarity
179.987	40.5	43.5	-3.0	243	100	Vertical
179.995	39.0	43.5	-4.5	186	107	Vertical
629.957	40.9	46.4	-5.5	120	100	Vertical
742.454	41.8	46.4	-4.6	24	112	Horizontal

Table 3 - 30 MHz to 1 GHz - EUT Orientation: X

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

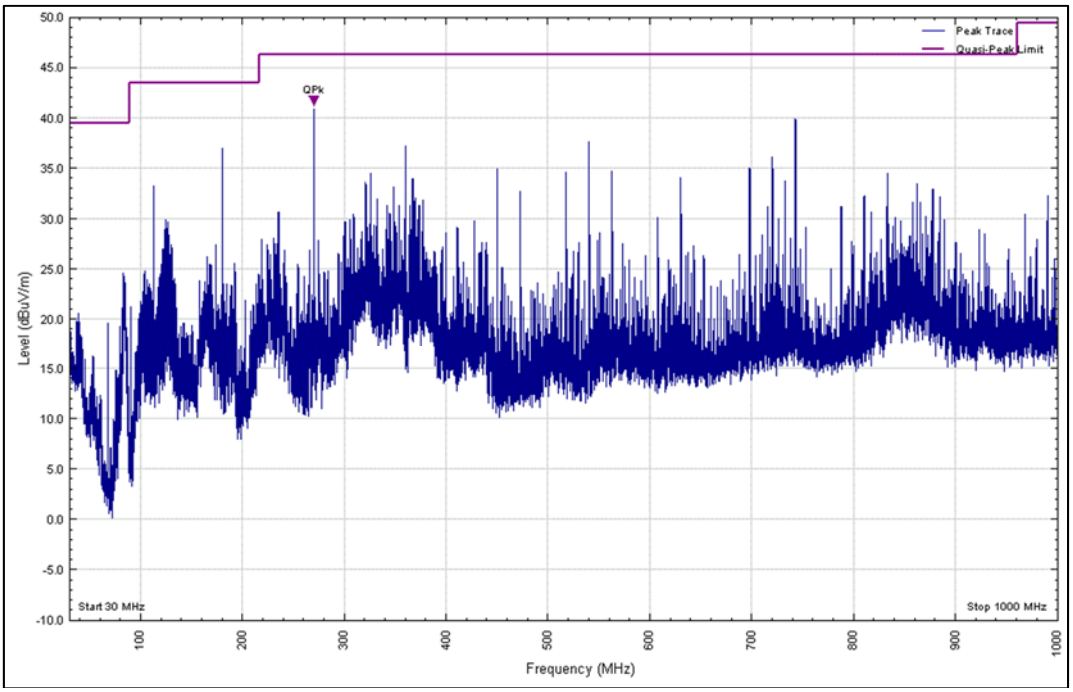

Figure 3 - 30 MHz to 1 GHz - Polarity: Horizontal, EUT Orientation: Y

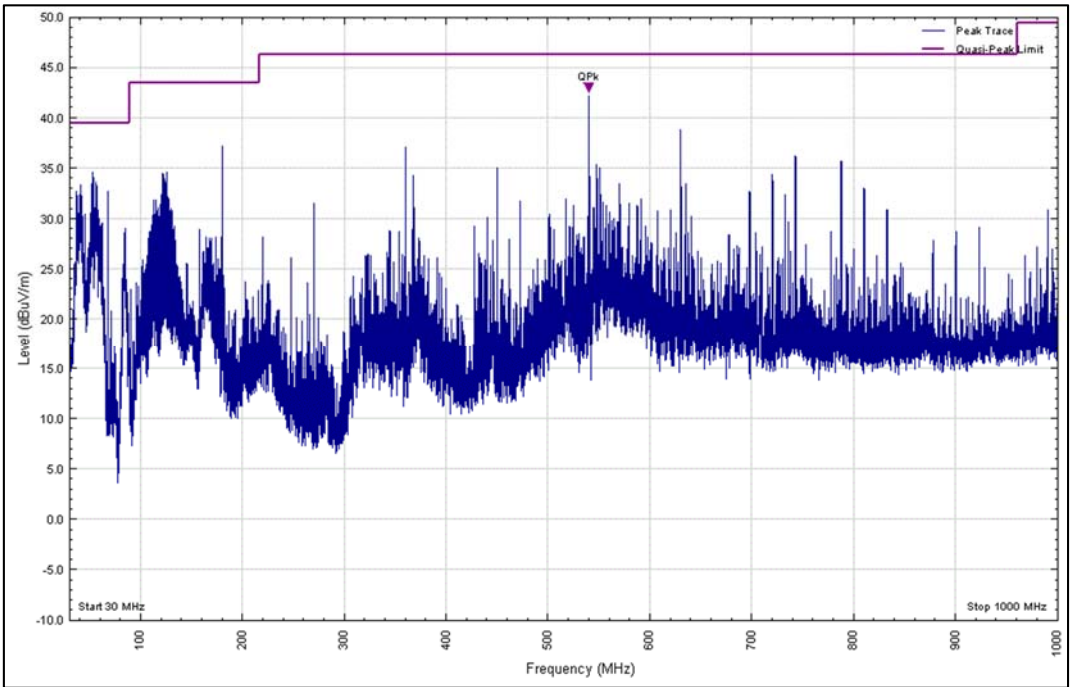

Figure 4 - 30 MHz to 1 GHz - Polarity: Vertical, EUT Orientation: Y

Frequency (MHz)	QP Level (dBuV/m)	QP Limit (dBuV/m)	QP Margin (dBuV/m)	Angle(Deg)	Height(m)	Polarity
269.975	40.9	46.4	-5.5	335	110	Horizontal
539.976	42.2	46.4	-4.2	326	113	Vertical

Table 4 - 30 MHz to 1 GHz - EUT Orientation: Y

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

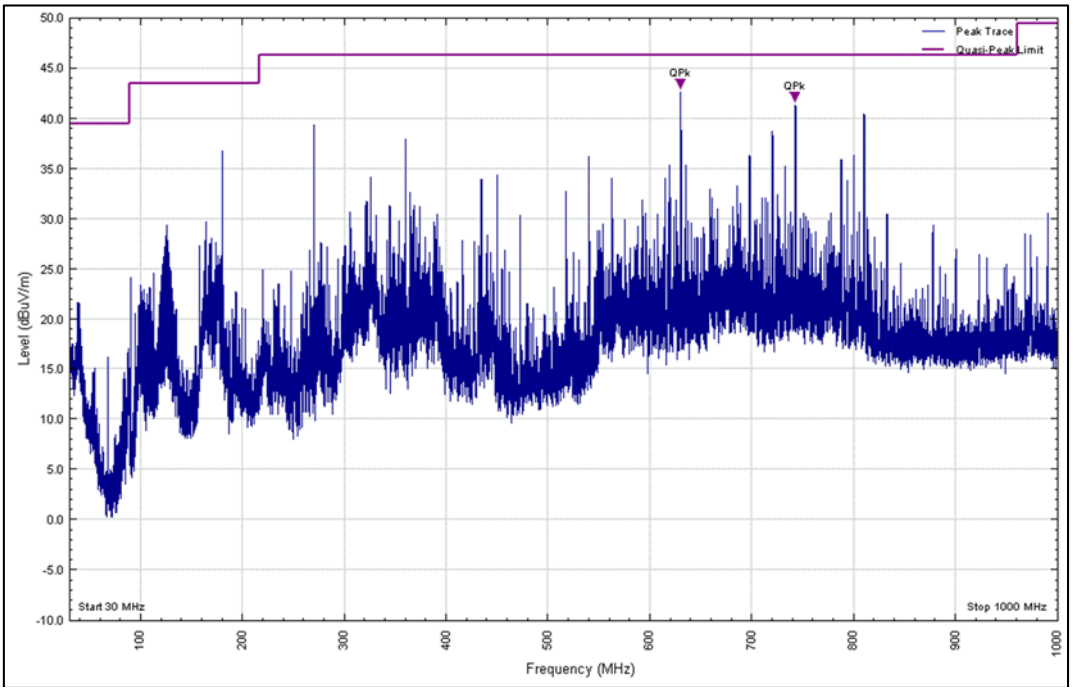

Figure 5 - 30 MHz to 1 GHz- Polarity: Horizontal, EUT Orientation: Z

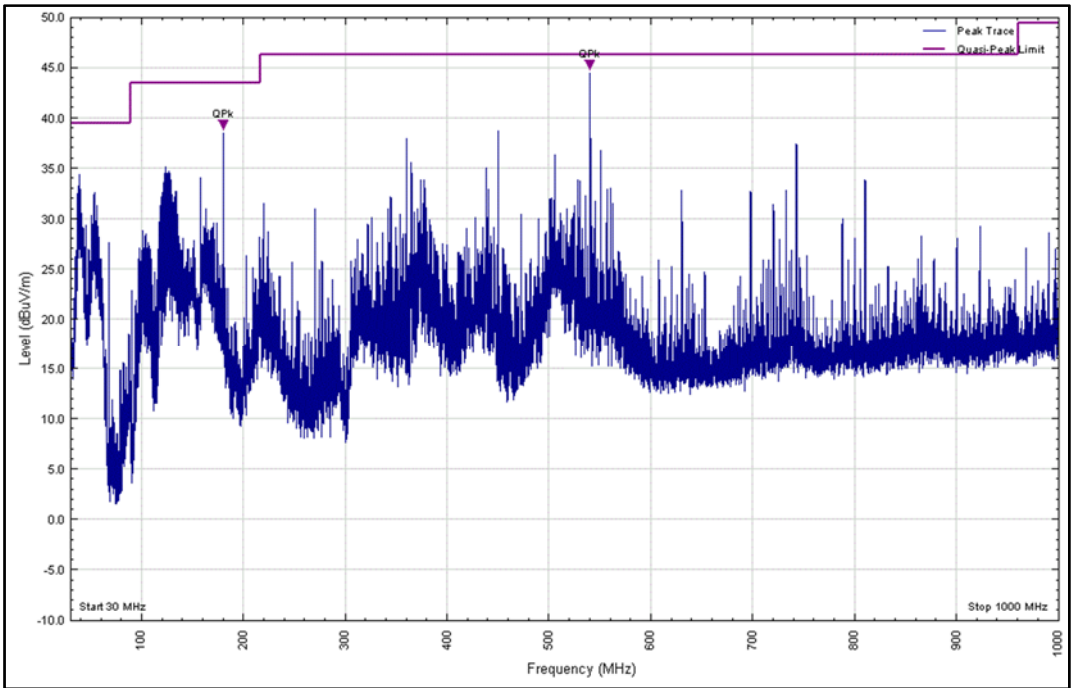

Figure 6 - 30 MHz to 1 GHz - Polarity: Vertical, EUT Orientation: Z

Frequency (MHz)	QP Level (dBuV/m)	QP Limit (dBuV/m)	QP Margin (dBuV/m)	Angle(Deg)	Height(m)	Polarity
179.989	38.6	43.5	-5.0	282	108	Vertical
539.965	44.5	46.4	-1.9	243	100	Vertical
629.965	42.7	46.4	-3.7	272	123	Horizontal
742.464	41.4	46.4	-5.0	19	103	Horizontal

Table 5 - 30 MHz to 1 GHz - EUT Orientation: Z

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

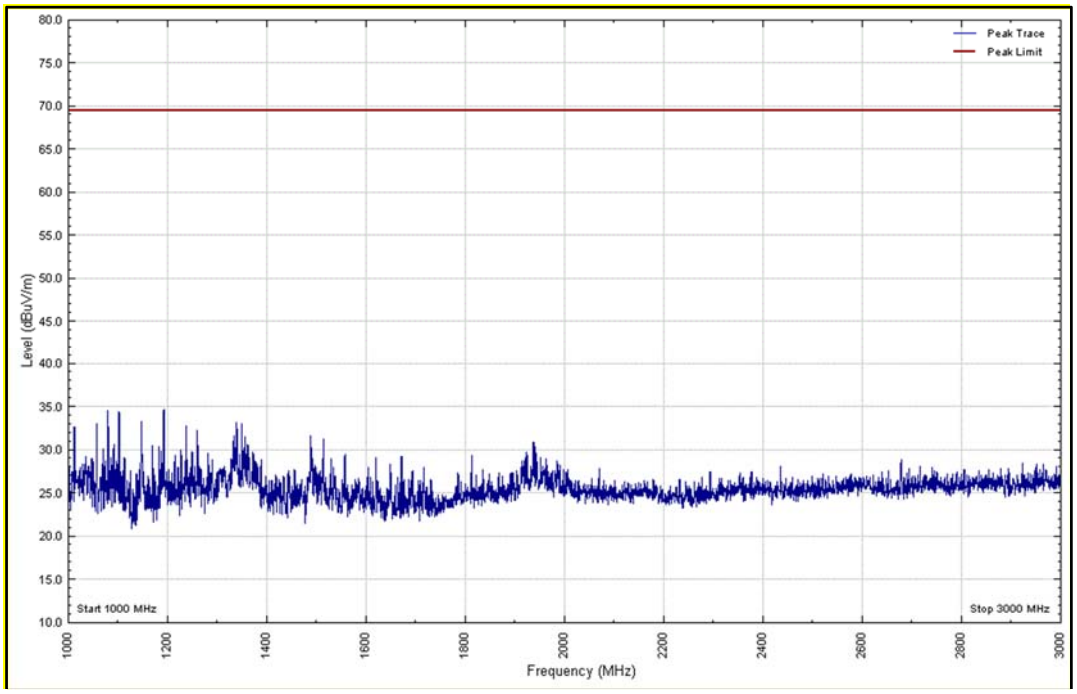

Figure 7 - 1 GHz to 3 GHz – Polarity: Horizontal, EUT Orientation: X - Peak

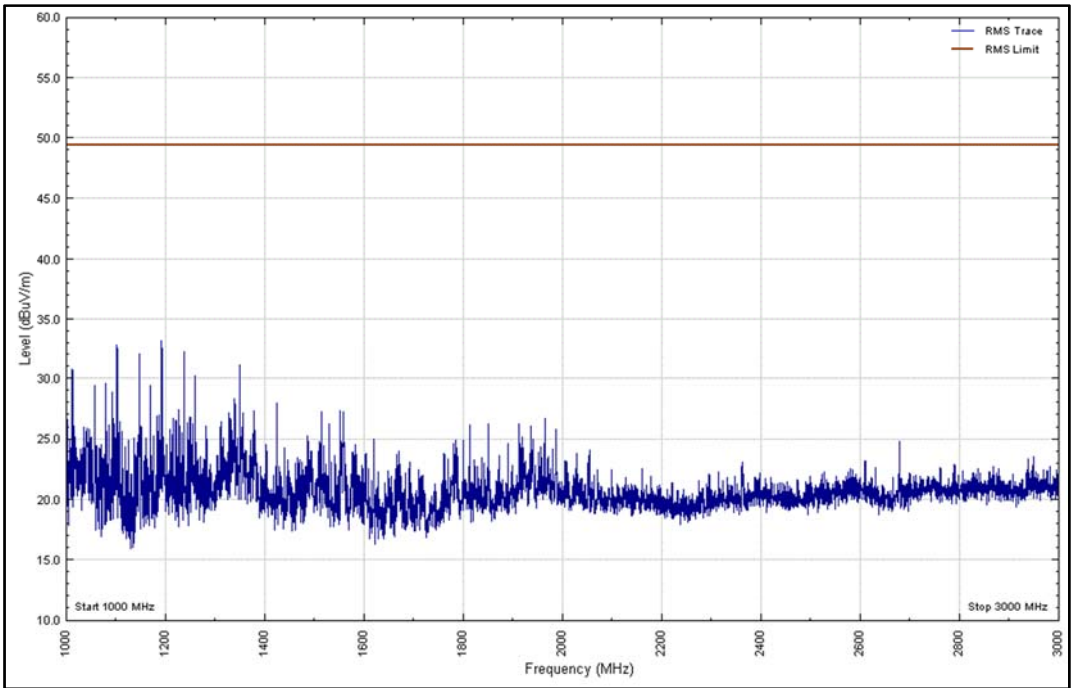

Figure 8 - 1 GHz to 3 GHz – Polarity: Horizontal, EUT Orientation: X - Average

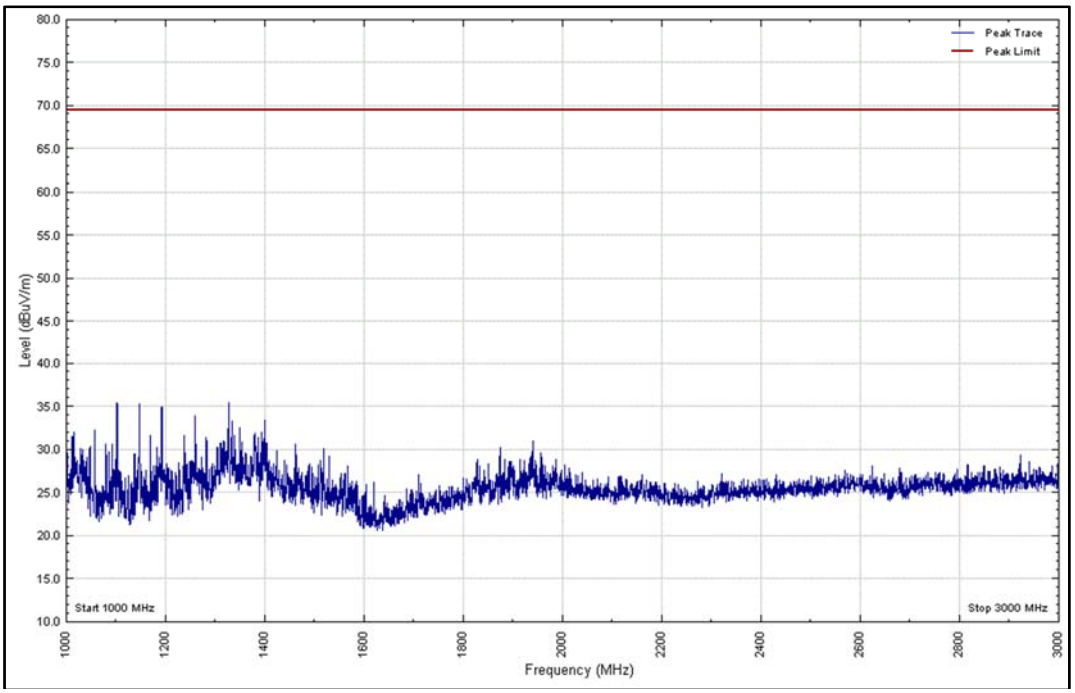

Figure 9 - 1 GHz to 3 GHz – Polarity: Vertical, EUT Orientation: X - Peak

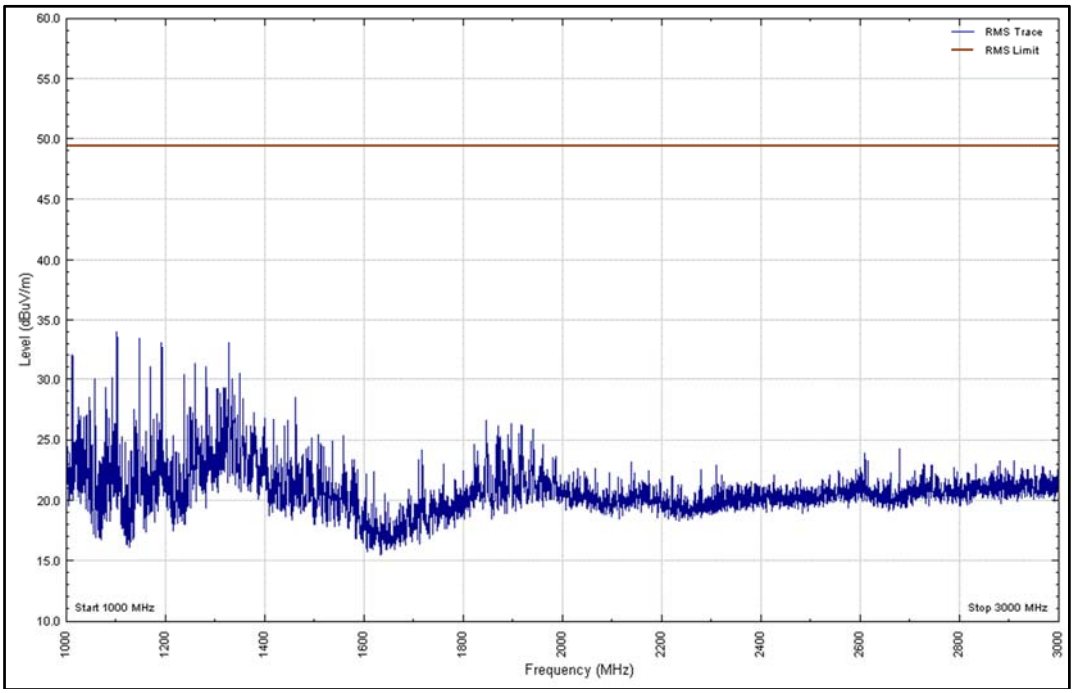

Figure 10 - 1 GHz to 3 GHz – Polarity: Vertical, EUT Orientation: X - Average

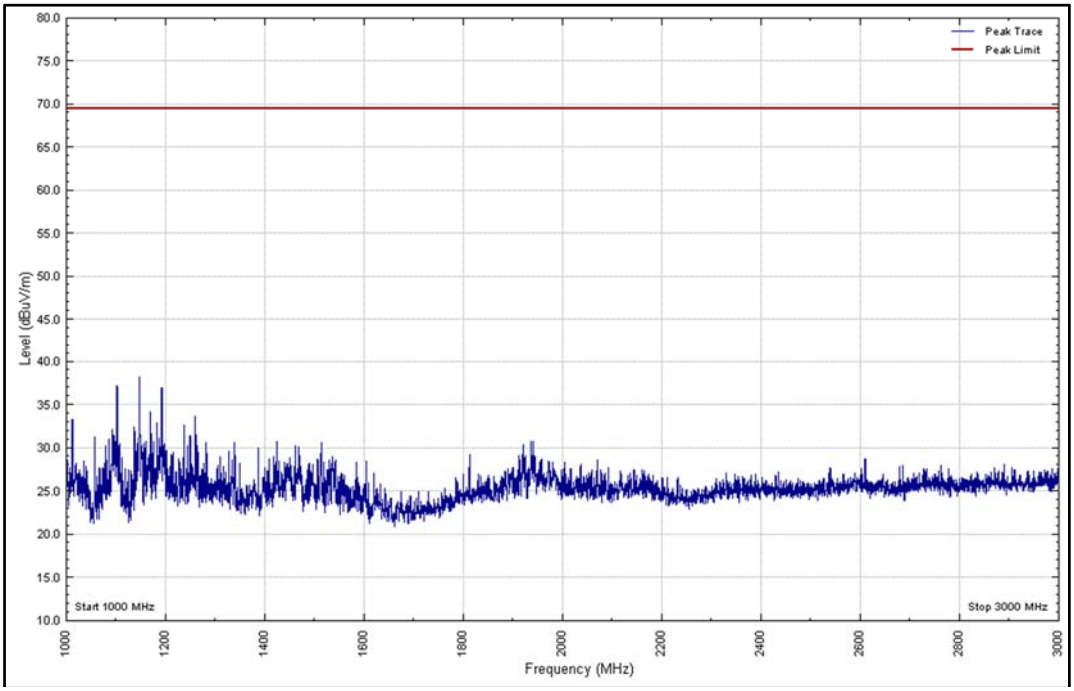

Figure 11 - 1 GHz to 3 GHz – Polarity: Horizontal, EUT Orientation: Y - Peak

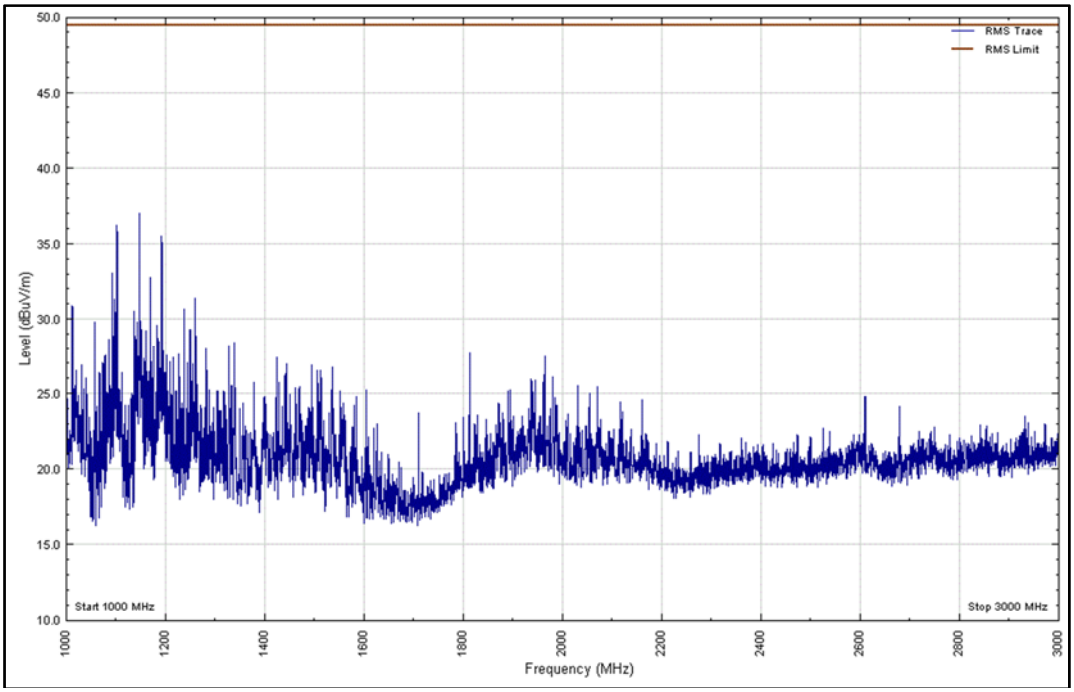

Figure 12 - 1 GHz to 3 GHz – Polarity: Horizontal, EUT Orientation: Y - Average

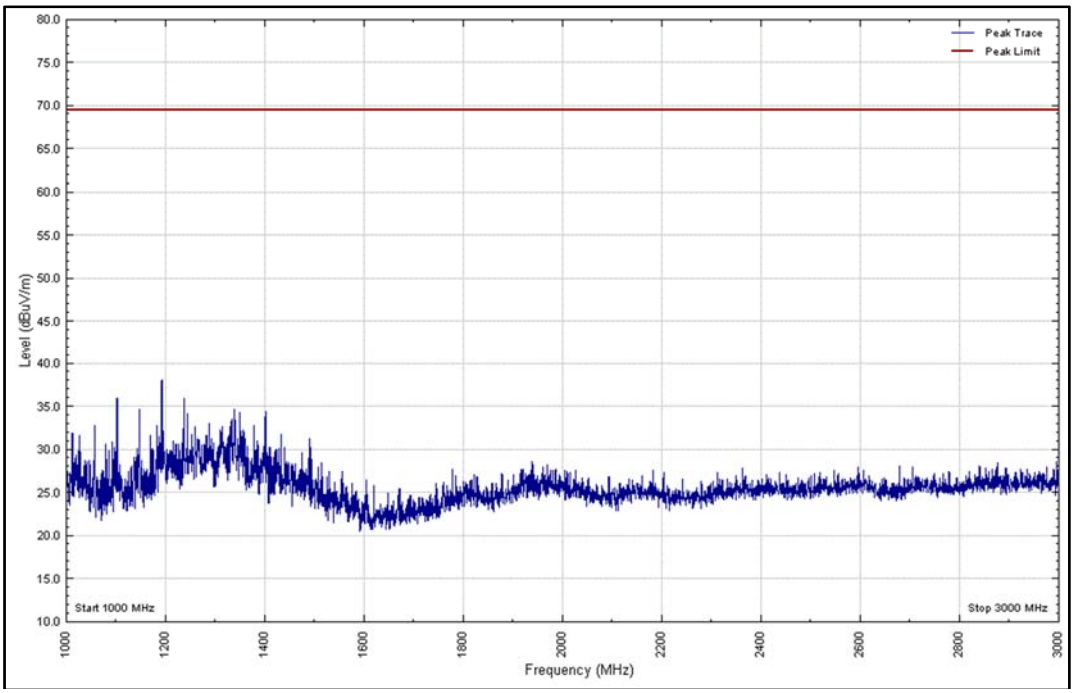

Figure 13 - 1 GHz to 3 GHz – Polarity: Vertical, EUT Orientation: Y - Peak

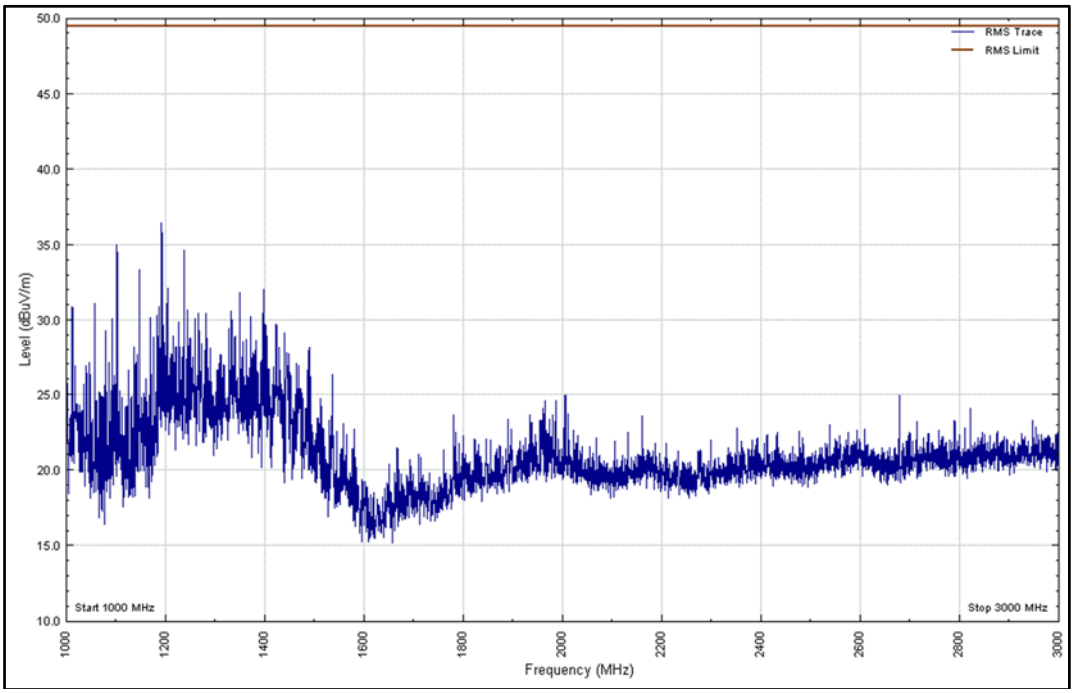

Figure 14 - 1 GHz to 3 GHz – Polarity: Vertical, EUT Orientation: Y - Average

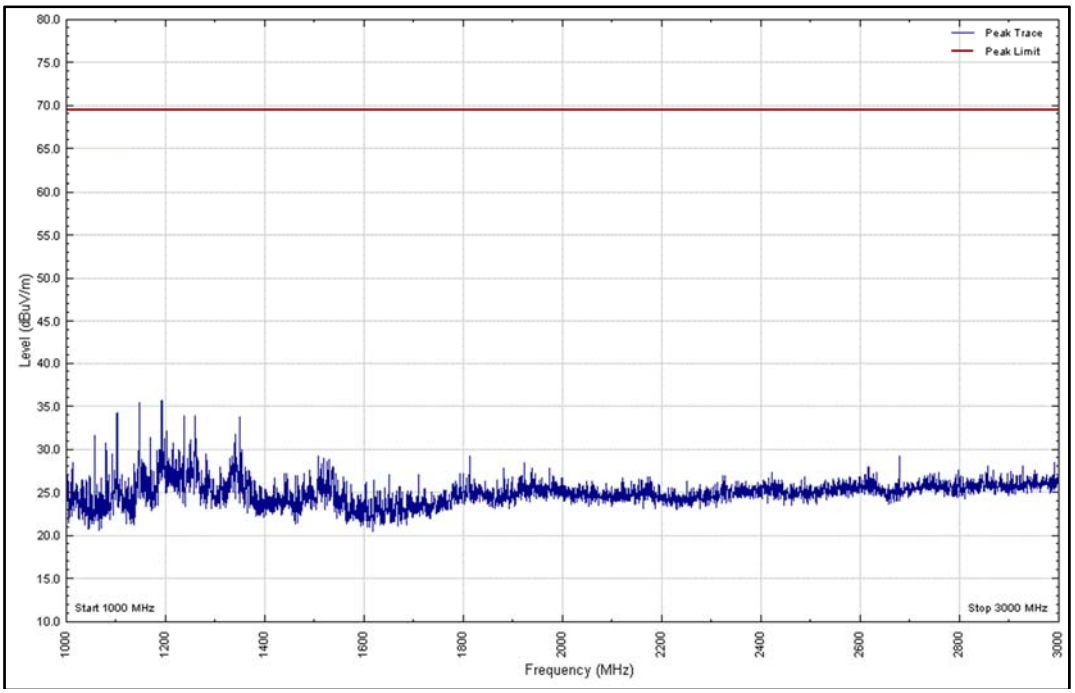

Figure 15 - 1 GHz to 3 GHz – Polarity: Horizontal, EUT Orientation: Z - Peak

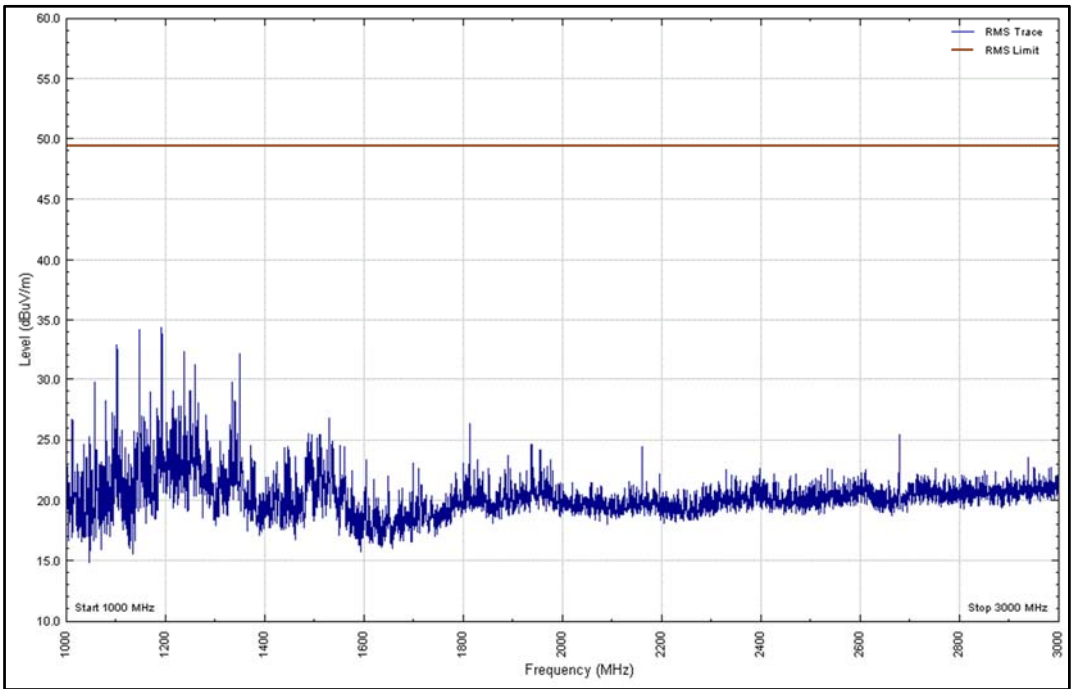

Figure 16 - 1 GHz to 3 GHz – Polarity: Horizontal, EUT Orientation: Z - Average

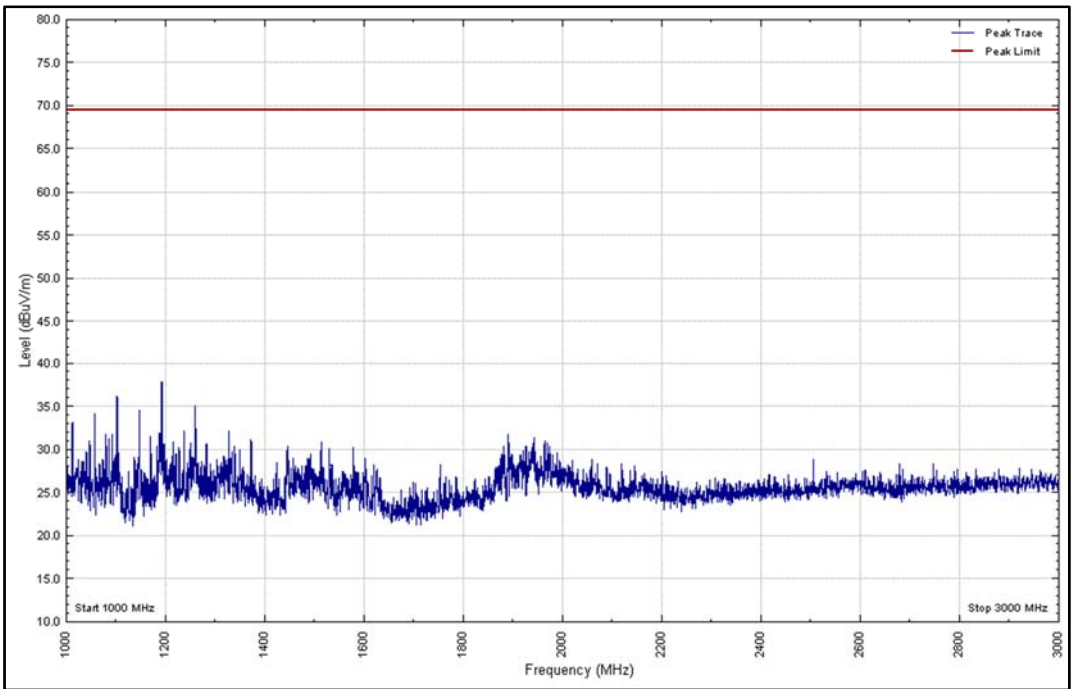

Figure 17 - 1 GHz to 3 GHz – Polarity: Vertical, EUT Orientation: Z - Peak

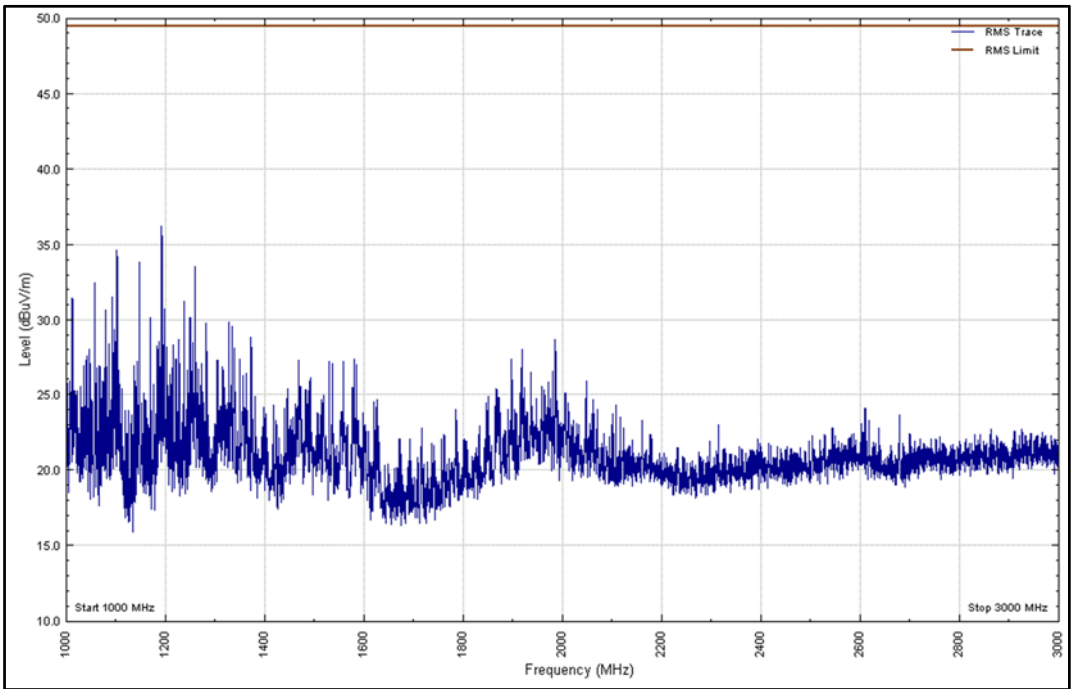

Figure 18 - 1 GHz to 3 GHz – Polarity: Vertical, EUT Orientation: Z - Average

Frequency (GHz)	Result (dBµV/m)		Limit (dBµV/m)		Margin (dBµV/m)	
	Peak	Average	Peak	Average	Peak	Average
*						

Table 6 - 1 GHz to 3 GHz

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

FCC 47 CFR Part 15, Limit Clause 15.109

Frequency of Emission (MHz)	Field Strength (µV/m)
30 to 88	100.0
88 to 216	150.0
216 to 960	200.0
Above 960	500.0

Table 7

2.1.7 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
Turntable Controller	Inn-Co GmbH	CO 1000	1606	-	TU
Antenna (Bilog)	Chase	CBL6143	2904	24	8-Aug-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, Nm-Nm, 7m)	Scott Cables	SLU18-NMNM-07.00M	4498	6	19-Jun-2018
Cable (Rx, Km-Km 2m)	Scott Cables	KPS-1501-2000-KPS	4526	6	2-Jul-2018
Cable (Rx, SMAm-SMAm 0.5m)	Scott Cables	SLSLL18-SMSM-00.50M	4528	6	15-Aug-2018
4dB Attenuator	Pasternack	PE7047-4	4935	12	28-Nov-2018

Table 8

TU – Traceability Unscheduled

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, ±5.2 dB 1 GHz to 40 GHz, Horn Antenna, ±6.3 dB

Table 9