

Test Report

Prepared for: Icom Incorporated

Model: IP-M60

Serial Number: 000000000025

Project No: p23b0001

Test Results: Pass

To

Host Integration KDB 996369

FCC Part 15.209/207

and

RSS-Gen (Issue 5 April 2018)

Date of Issue: December 28, 2023

On the behalf of the applicant:

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ISED Site Reg. #2044A-2

Reviewed / Authorized By:



John Michalowicz,
Test Engineer

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Test Results Summary

Specification		Test Name	Pass, Fail, N/A	Comments	Test Date
FCC	RSS				
FCC 15.207	RSS-Gen Section 8.9	A/C Powerline Conducted Emissions	N/A	EUT does not transmit while charging	NA
FCC 15.209	RSS-Gen Section 8.9	Spurious Radiated Emissions	Pass		December 20, 2023

Statements of conformity are reported as:

- Pass - the measured value is below the acceptance limit, *acceptance limit = test limit*.
- Fail - the measured value is above the acceptance limit, *acceptance limit = test limit*.

References/Methods	Description
ANSI C63.4-2014	Method and Measurements of Radio-Noise Emissions from low-Voltage Electrical and Electronic Equipment in the range 9kHz to 40GHz.
ANSI C63.10:2020	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices
ISO/IEC 17025:2017	General requirements for the Competence of Testing and Calibrations Laboratories



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Test Report Revision History

Revision	Date	Revised By	Reason for Revision
1.0	December 28, 2023	John Michalowicz	Original Document

Current revision of the test report replaces any prior versions. Only the current version of the test report is valid.

EUT Description

Model:	IP-M60
Serial:	0000000000025
Firmware:	V2.3
Software:	NA
Description:	The device is a push to talk marine radio
Additional Information:	The EUT is battery operated and is charged via cradle. It contains the following module: FCCID: UDV-201606 IC: 23761-8PYA003 And FCCID: AFJ387300 IC: 202D-387300 Testing was performed while the Cellular and BLE radio are transmitting.
Receipt of Sample(s):	December 15, 2023
EUT Condition:	Visual Damage No State of Development Engineering Sample/Prototype

EUT PHOTO



Notifications

The applicant has been cautioned as to the following:

FCC

15.21 – Information to user

The user's manual or instruction manual for an intentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

15.27(a) – Special Accessories

Equipment marketed to a consumer must be capable of complying with the necessary regulations in the configuration in which the equipment is marketed. Where special accessories such as shielded cables and/or special connectors are required to enable an unintentional or intentional radiator to comply with the emission limits in the part, the equipment must be marketed with, i.e. shipped and sold with, those special accessories. However, in lieu of shipping or packaging the special accessories with the unintentional or intentional radiator, the responsible party may employ other methods of ensuring that the special accessories are provided to the consumer without an additional charge.

Information detailing any alternative method used to supply the special accessories for a grant of equipment authorization or retained in the verification records, as appropriate. The party responsible for the equipment, as detailed in §2.909 of this chapter, shall ensure that these special accessories are provided with the equipment. The instruction manual for such devices shall include appropriate instructions on the first page of text concerned with the installation of the device that these special accessories must be used with the device. It is the responsibility of the user to use the needed special accessories supplied with the equipment.

Industry Canada

Products subject to Industry Canada ICES-003 must be labeled in English and/or French (based on the intended market and any other applicable provincial or federal regulations) as follows:

CAN ICES-003 (B)/NMB-003(B)

Test and Measurement Data

Subpart 2.1033(b)

All tests and measurement data shown were performed in accordance with FCC Rule Parts: 15.207, 15.209 (Intentional Radiators).

All tests and measurement data shown are deemed satisfactory evidence of compliance with RSS Gen Section 8.9.

Name of Test	FCC Section	RSS-Gen	Method Deviations/Additions
A/C Powerline Conducted Emissions	15.207	Section 8.9	No
Spurious Radiated Emissions	15.209	Section 8.9	No

Standard Engineering Practices

Unless otherwise indicated, the procedures contained in ANSI C63.10:2020 were observed during testing.

Prior to testing, the EUT was tuned up in accordance with the manufacturer's alignment procedures. All external gain controls were maintained at the position of maximum and/or optimum gain throughout the testing.

Measurement results, unless otherwise noted, are worst case measurement.

Standard Test Conditions and Engineering Practices

Unless otherwise indicated in the specific measurement results, the ambient temperature was maintained within the range of 10° to 40°C (50° to 104°F) and the relative humidity levels were in the range of 10% to 90%.

Environmental Conditions		
Temperature (°C)	Humidity (%)	Barometric Pressure (mbar)
17.9 – 23.9	26.0 – 35.3	961.1 – 981

Test Setup and Modes of Operation

EUT Operation during Tests

The EUT was set in a constant transmit mode during all testing. Both the BLE and Cellular radios are transmitting at the same time.

Accessories: None

Qty	Description	Manufacturer	Model	S/N
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Cables: None

Qty	Description	Length (M)	Ferrites (Y/N)	Shielding Y/N	Shielded Hood Y/N	Termination / Connection
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Modifications to EUT(s) (Y/N): N

15.209 Radiated Emissions

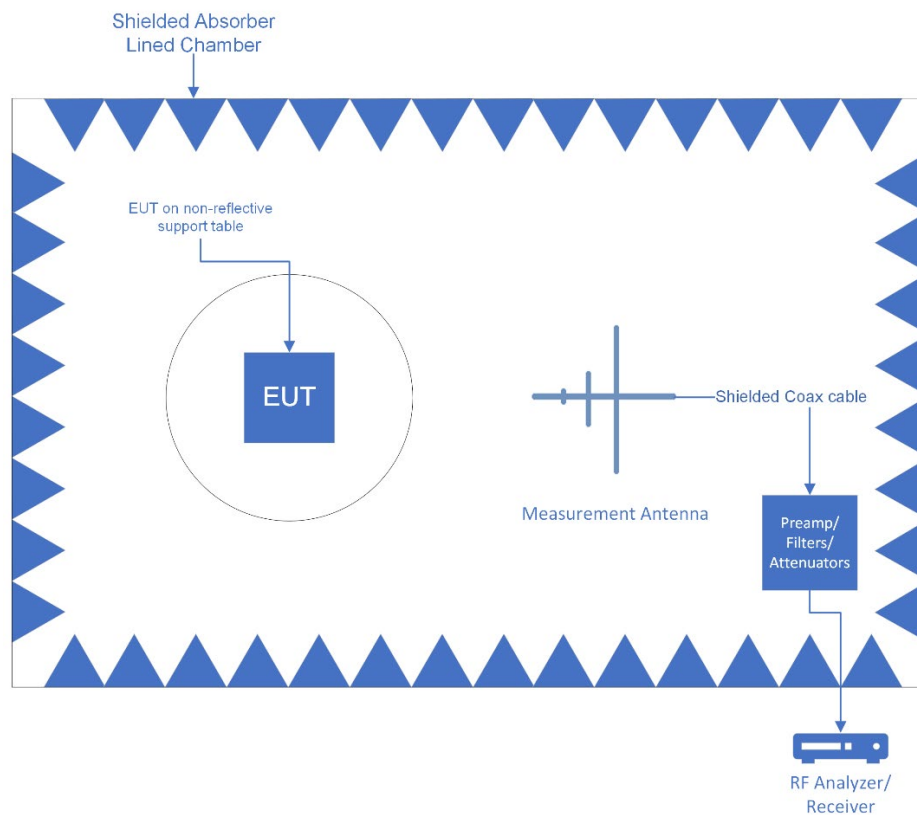
Engineer: John Michalowicz

Test Date: December 20 2023

Test Procedure

The EUT was tested in a semi-anechoic chamber with the turntable set 3m from the receiving antenna. A spectrum analyzer was used to verify that the EUT met the requirements for Radiated Emissions. The EUT was tested by rotating it 360 degrees with the antennas in both the vertical and horizontal orientation while raised from 1 to 4 meters to ensure the signal levels were maximized. All emissions from 30 MHz to 1 GHz were examined.

Basic Test Setup



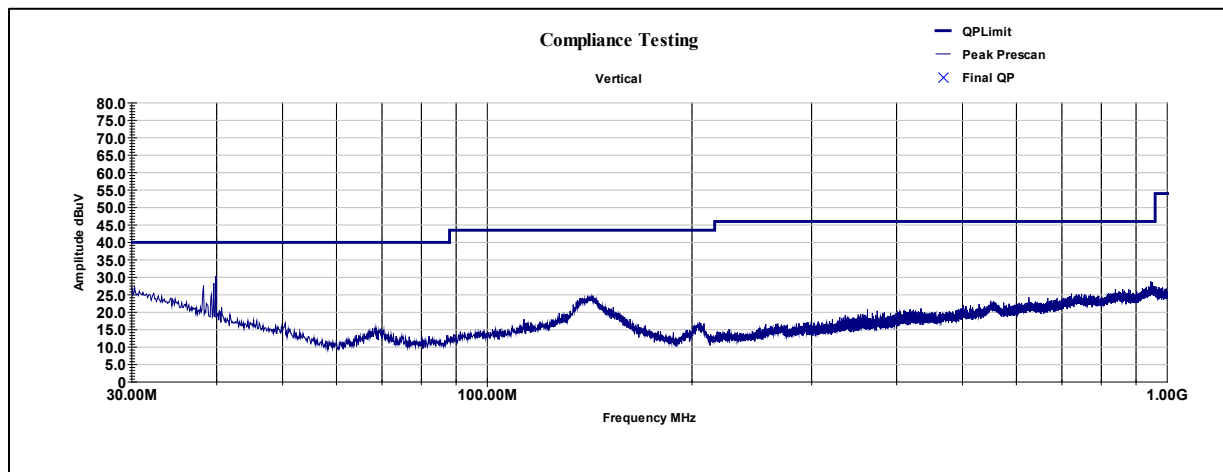
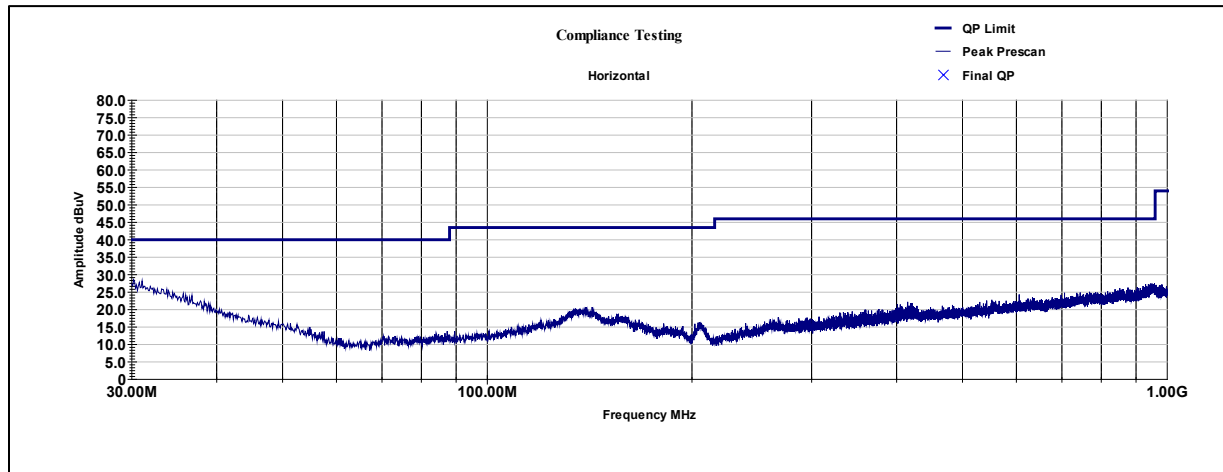
	Settings Below 1GHz	Settings Above 1GHz
RBW	120 kHz	1 MHz
VBW	300 kHz	3 MHz
Detector	Quasi Peak	Peak / Average

Sample Calculations

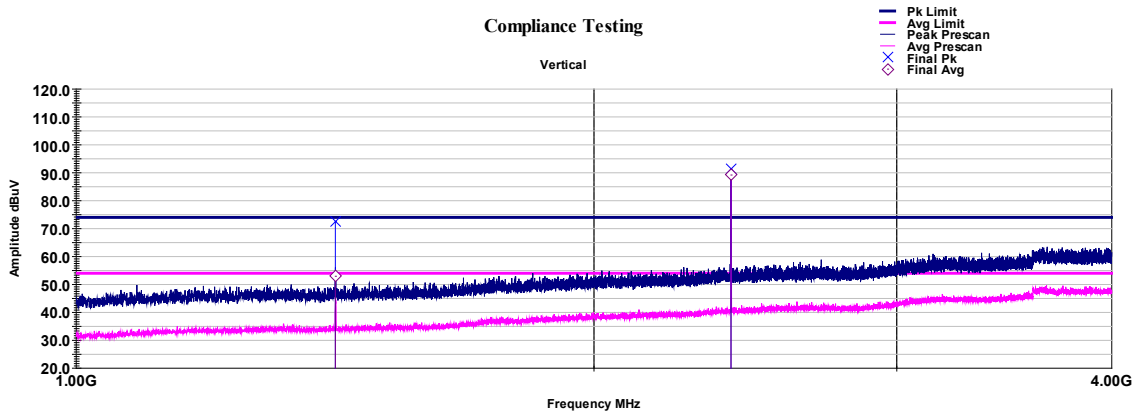
Corrected Value = Measured Value + Correction factor

Correction factor = Antenna Correction Factor + Cable loss + Preamp/Attenuator Factor

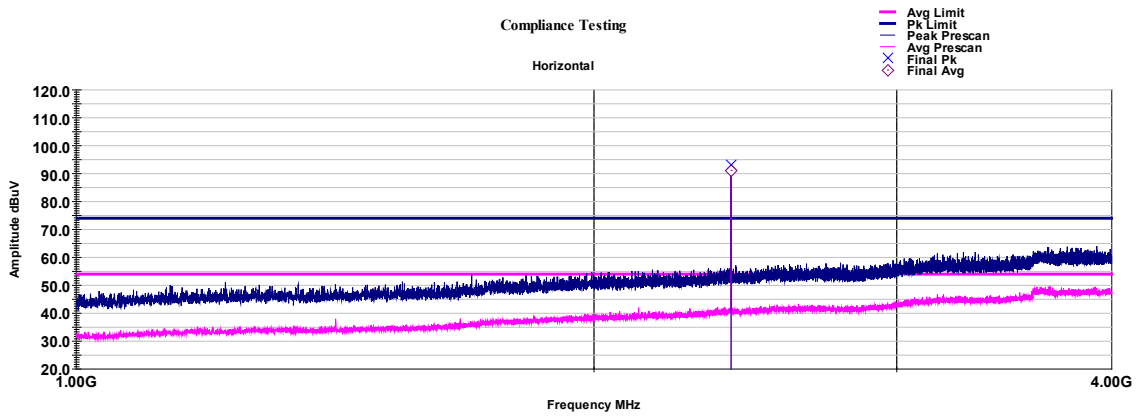
Low Channel BLE, Band 4 Cellular



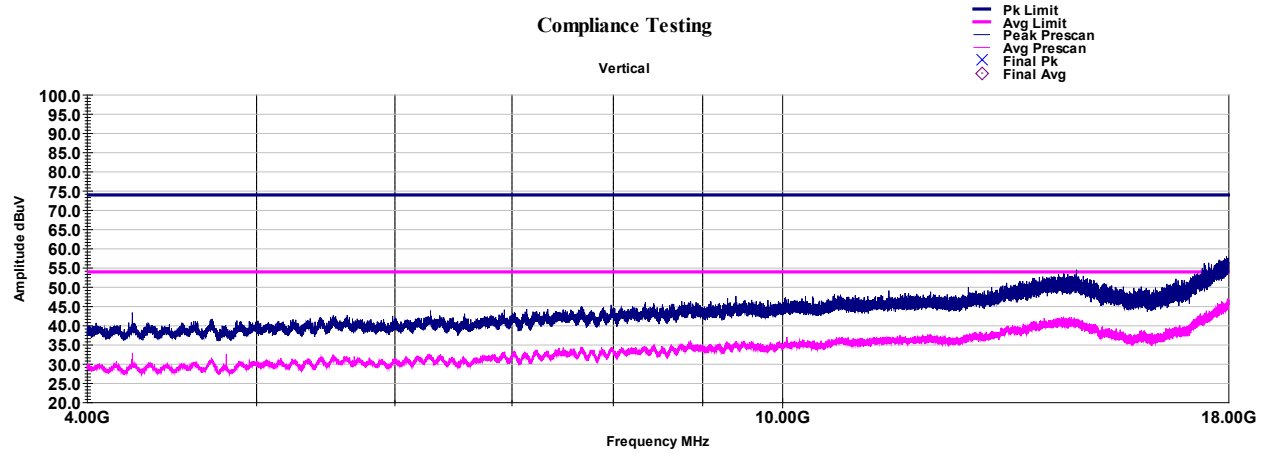
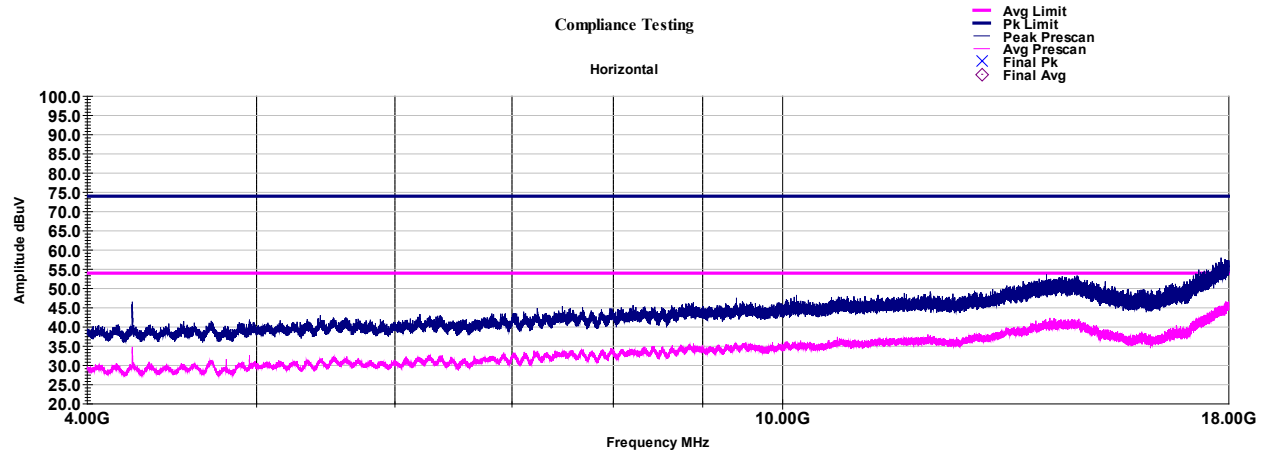
Low BLE_Band 12_1 - 18 GHz



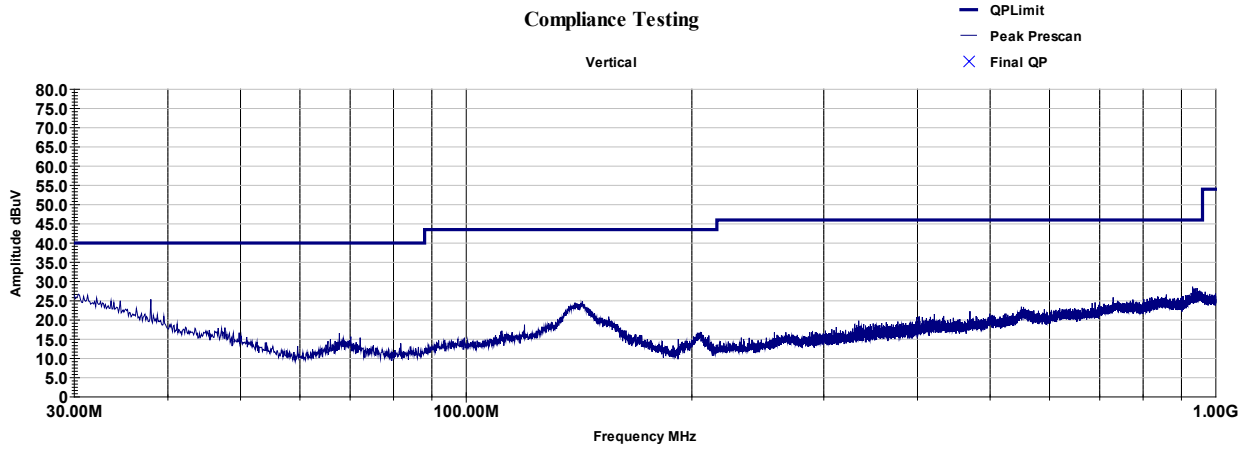
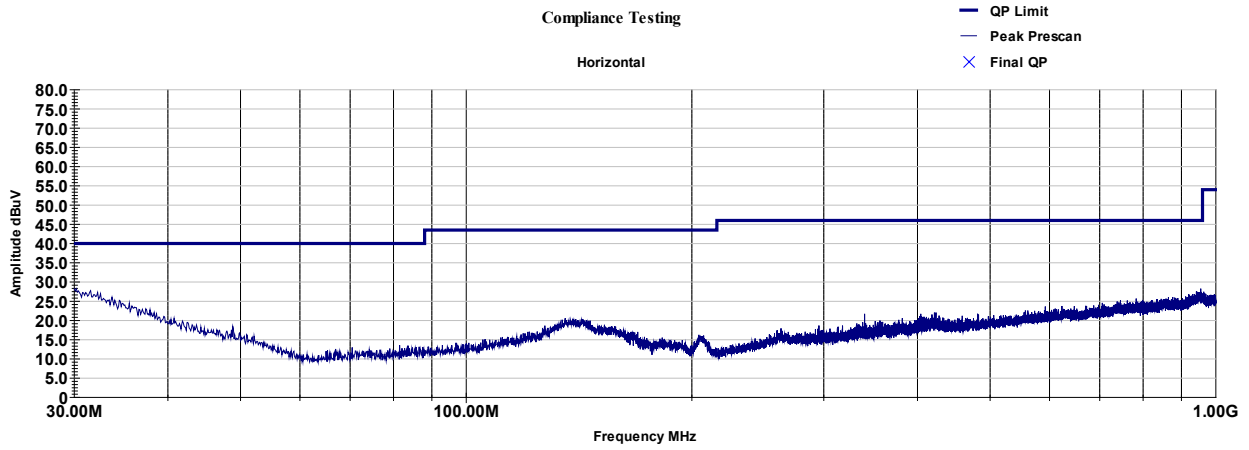
Frequency	Azimuth	Height	Raw Pk	Raw Avg	Correction	Final Pk	Pk Limit	Pk Margin	Final Avg	Avg Limit	Avg Margin
MHz	deg	cm	dBuV	dBuV	dB	dBuV/m	dBuV/m	dB	dBuV/m	dBuV/m	dB
1414.81	3.00	100.00	42.93	23.36	29.57	72.50	74.00	-1.50	52.93	53.98	-1.06
2402.89	359.00	100.00	56.93	54.78	34.38	91.31	NA	NA	89.16	NA	NA
Final = Raw + Path Loss											
Margin = Final - Limit											



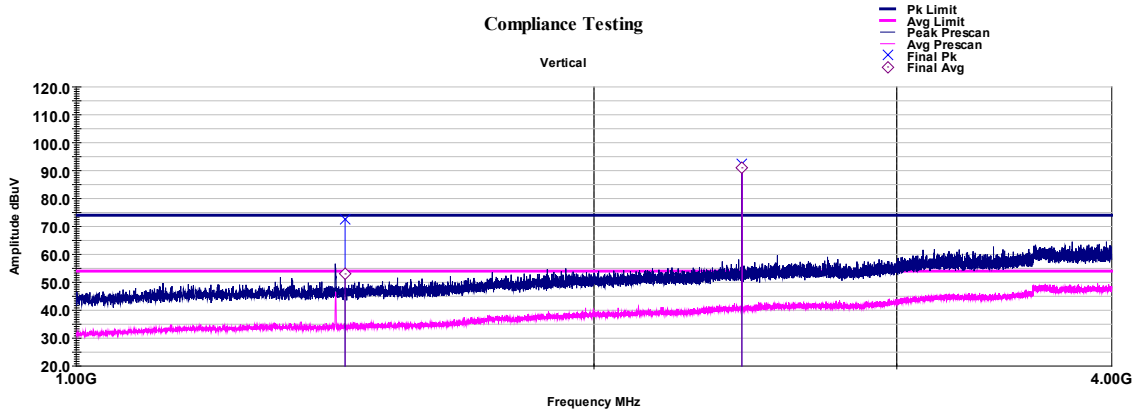
Frequency	Azimuth	Height	Raw Pk	Raw Avg	Correction	Final Pk	Pk Limit	Pk Margin	Final Avg	Avg Limit	Avg Margin
MHz	deg	cm	dBuV	dBuV	dB	dBuV/m	dBuV/m	dB	dBuV/m	dBuV/m	dB
2403.011	62.00	162.00	58.65	56.77	34.38	93.03	NA	NA	91.16	NA	NA
Final = Raw + Path Loss											
Margin = Final - Limit											



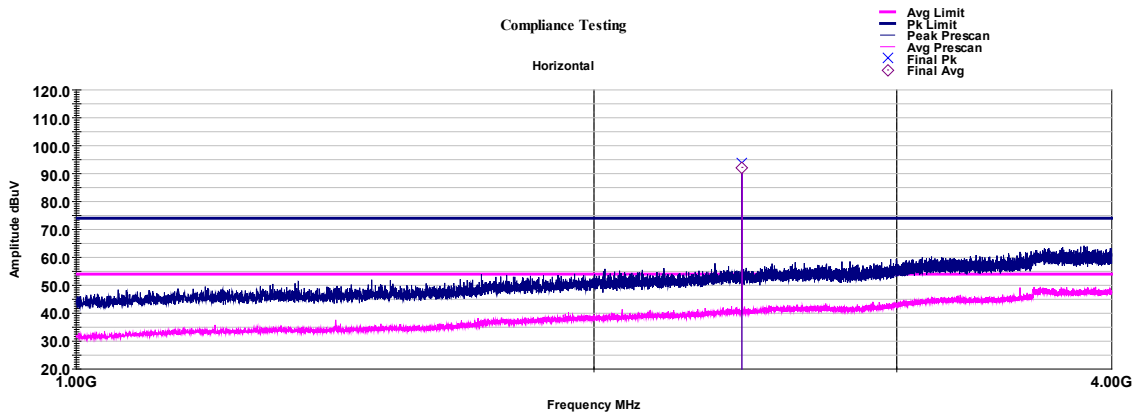
Middle Channel BLE and Band 4 Cellular



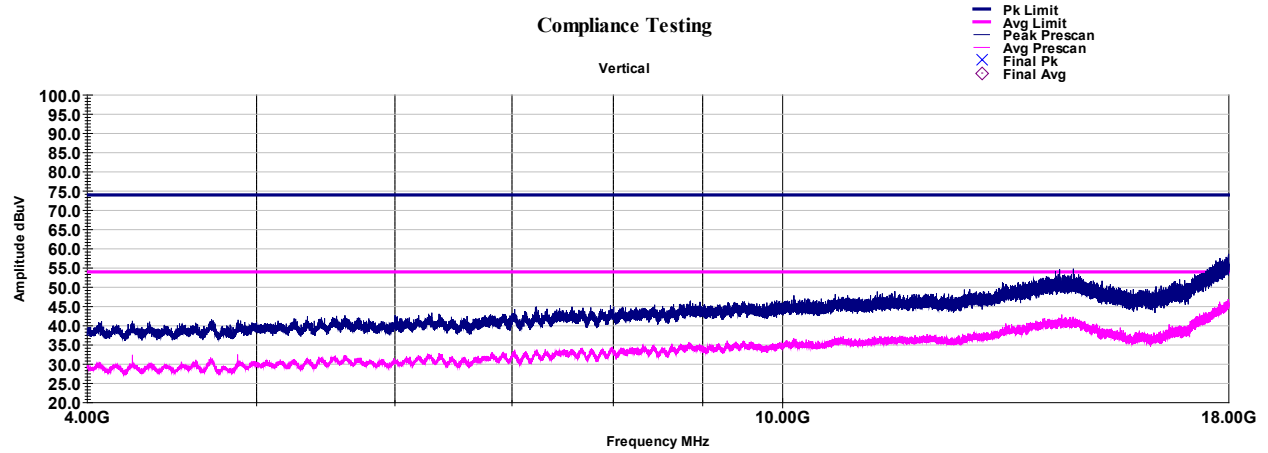
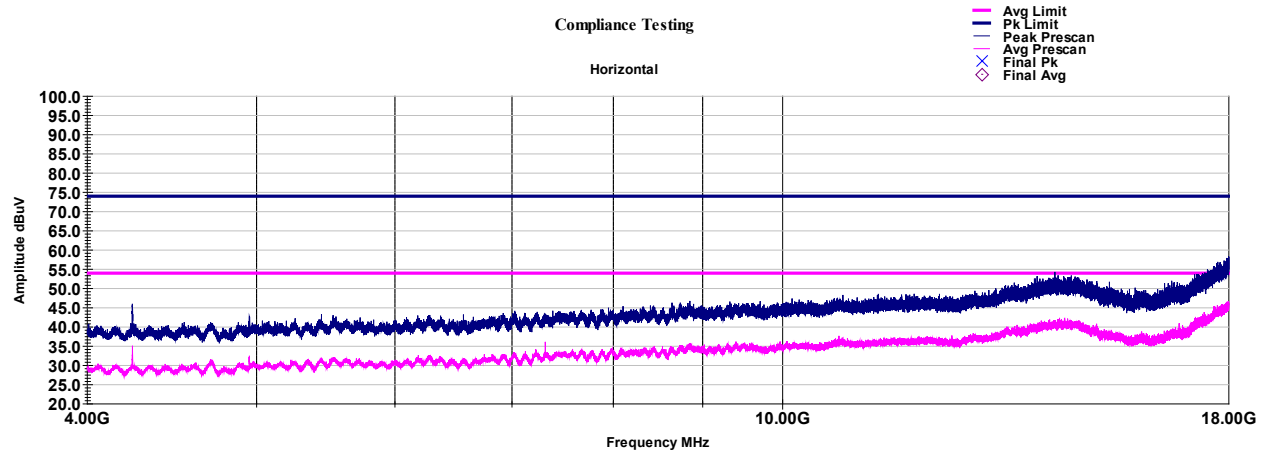
Mid BLE_Band 12_1 - 18 GHz



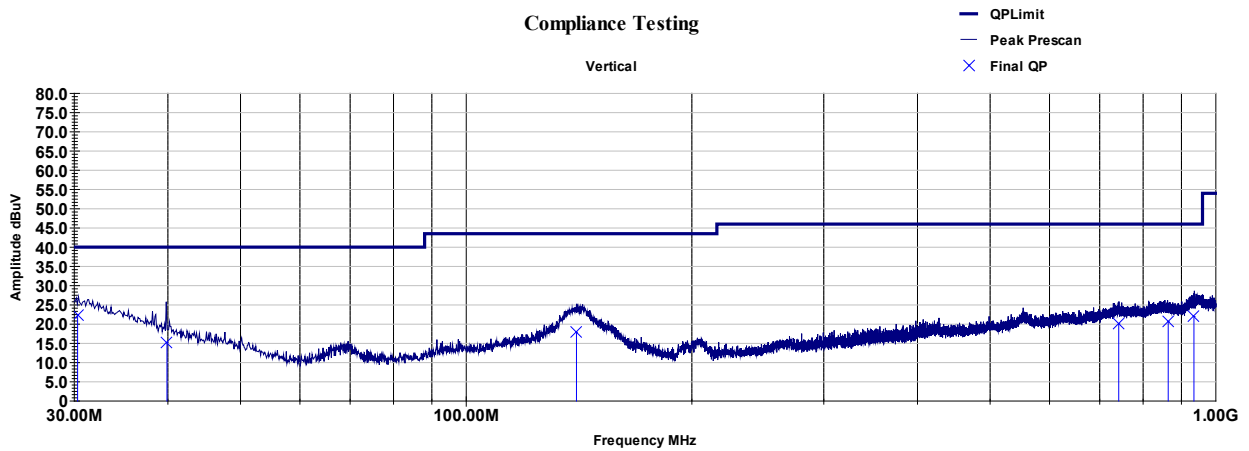
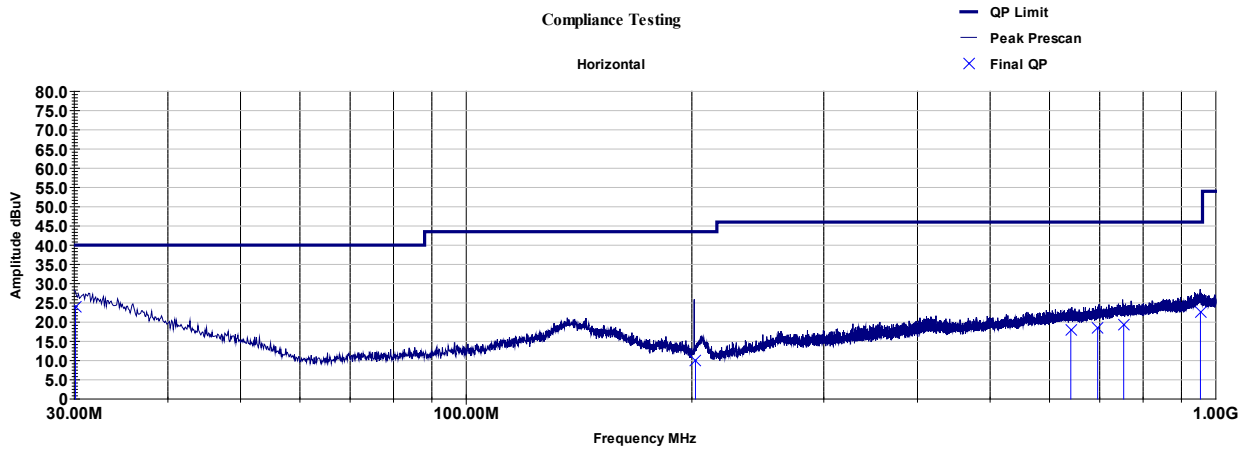
Frequency	Azimuth	Height	Raw Pk	Raw Avg	Correction	Final Pk	Pk Limit	Pk Margin	Final Avg	Avg Limit	Avg Margin
MHz	deg	cm	dBuV	dBuV	dB	dBuV/m	dBuV/m	dB	dBuV/m	dBuV/m	dB
1433.313	330.00	132.00	43.03	23.40	29.58	72.61	74.00	-1.39	52.98	53.98	-1.00
2437.918	191.00	132.00	58.19	56.60	34.37	92.56	NA	NA	90.97	NA	NA
Final = Raw + Path Loss											
Margin = Final - Limit											



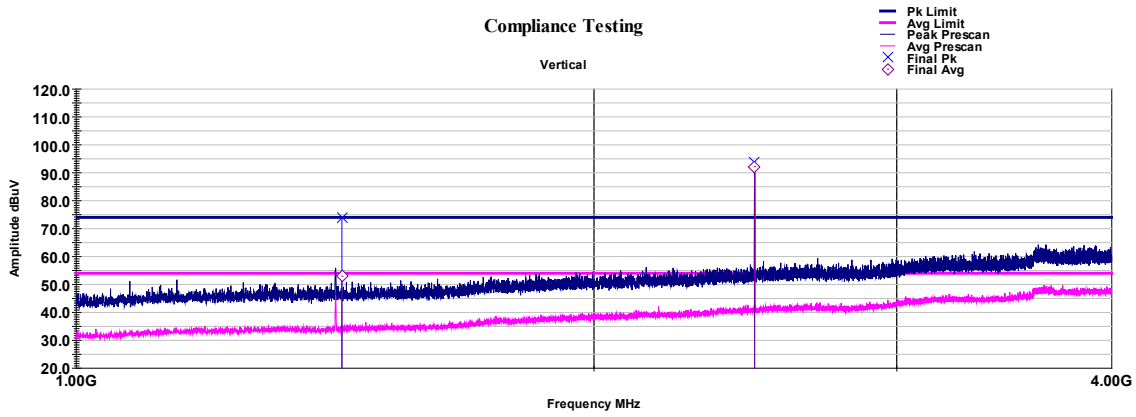
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MHz	deg	cm	dBuV	dBuV	dB	dBuV/m	dBuV/m	dB	dBuV/m	dBuV/m	dB
2437.961	244.00	142.00	59.22	57.84	34.37	93.59	NA	NA	92.21	NA	NA
Final = Raw + Path Loss											
Margin = Final - Limit											



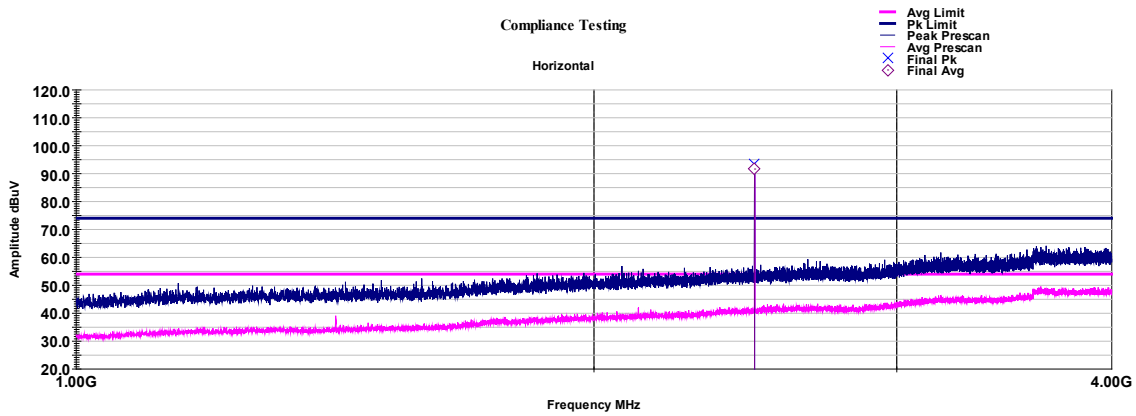
High Channel BLE and Band 4 Cellular



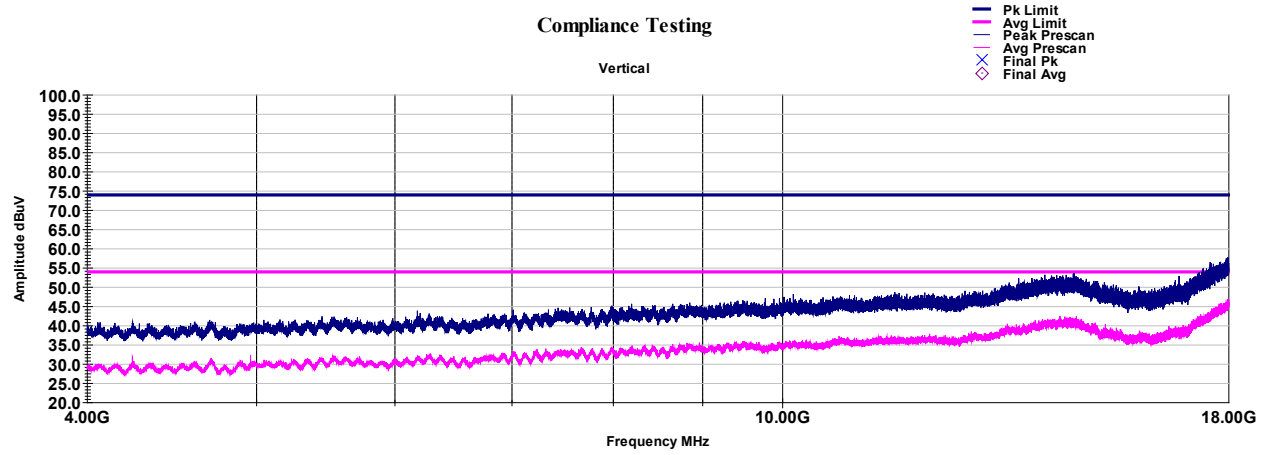
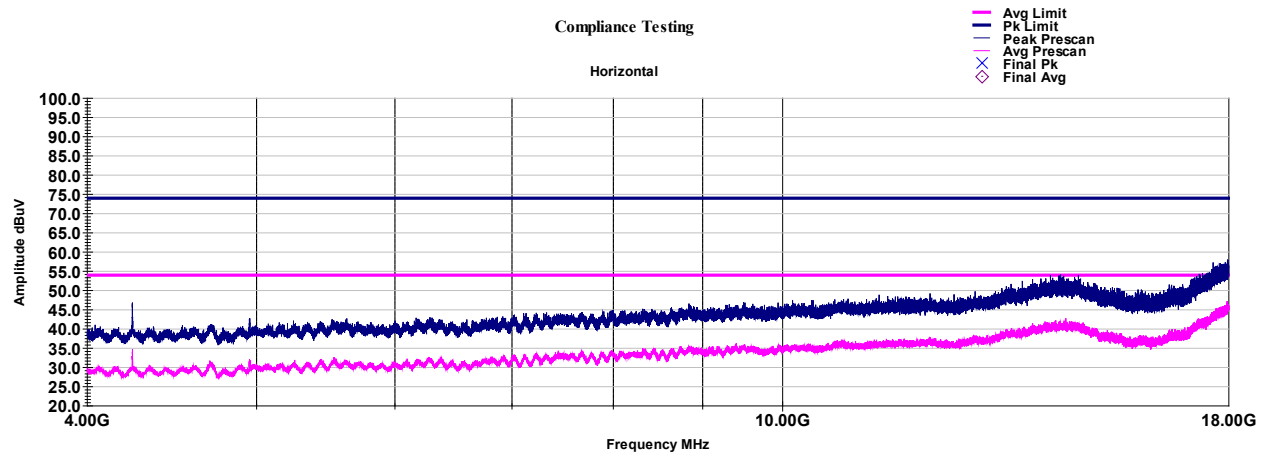
High BLE_Band 12_1 - 18 GHz



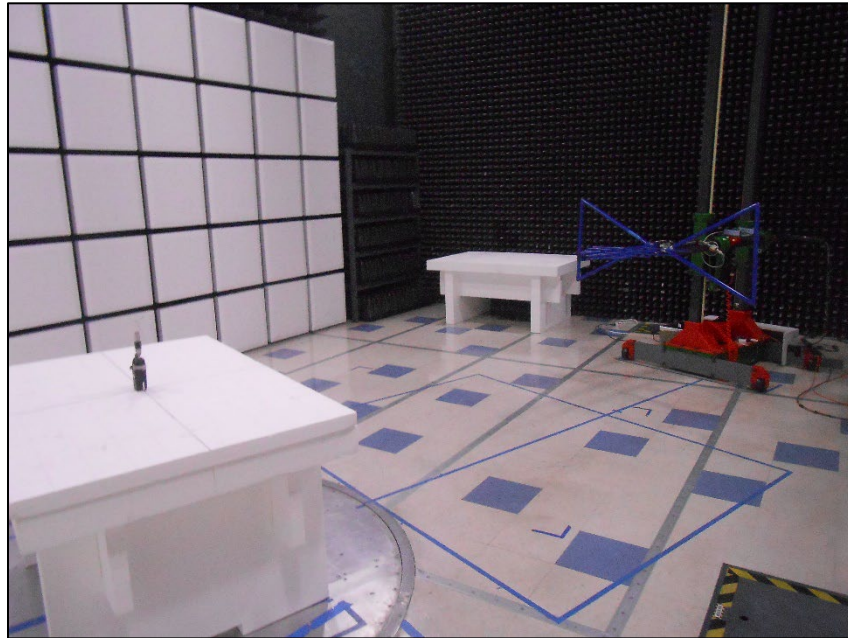
Frequency	Azimuth	Height	Raw Pk	Raw Avg	Correction	Final Pk	Pk Limit	Pk Margin	Final Avg	Avg Limit	Avg Margin
MHz	deg	cm	dBuV	dBuV	dB	dBuV/m	dBuV/m	dB	dBuV/m	dBuV/m	dB
1427.136	3.00	105.00	44.42	23.34	29.56	73.99	74.00	-0.01	52.91	53.98	-1.07
2479.938	94.00	117.00	59.24	57.81	34.36	93.60	NA	NA	92.17	NA	NA
Final = Raw + Path Loss											
Margin = Final - Limit											



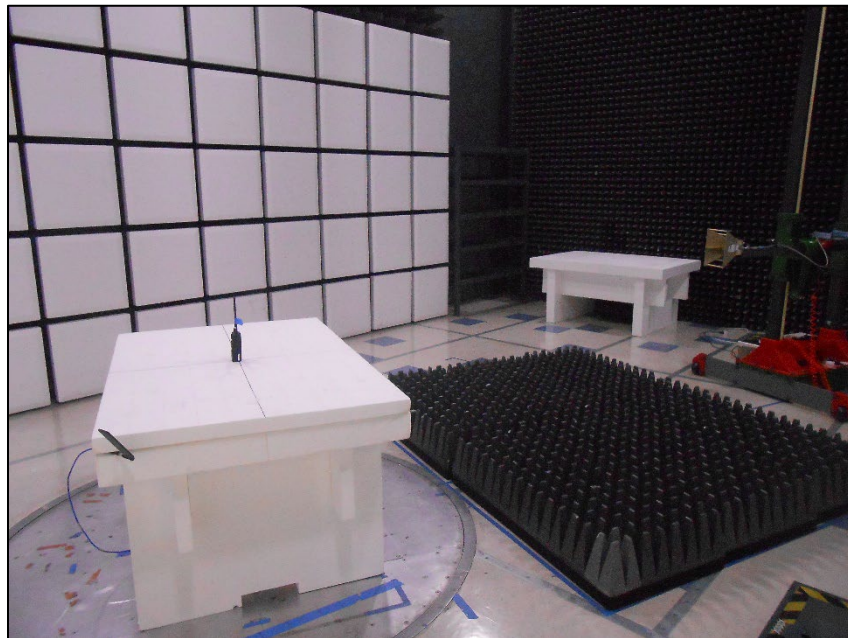
Frequency	Azimuth	Height	Raw Pk	Raw Avg	Correction	Final Pk	Pk Limit	Pk Margin	Final Avg	Avg Limit	Avg Margin
MHz	deg	cm	dBuV	dBuV	dB	dBuV/m	dBuV/m	dB	dBuV/m	dBuV/m	dB
2480.007	261.00	169.00	59.01	57.25	34.36	93.37	NA	NA	91.62	NA	NA
Final = Raw + Path Loss											
Margin = Final - Limit											



Radiated Emissions Test Setup Photos
30 – 1000 MHz



1 – 18 GHz



Test Equipment Utilized

Description	Manufacturer	Model #	CT Asset #	Last Cal Date	Cal Due Date
Bilog Antenna 0.030-1.0GHz	Schaffner	CBL6111C	I00349	02/07/23	02/06/25
RF Amplifier 10MHz-50GHz, 40dB gain amp.	Eravant	SBB-0115034018-2F2F-E3	I00646	Verified on 07/28/23	Next Verification 07/28/24
9kHz-44GHz CISPR comp. receiver	Keysight/Agilent	N9038A	i00552	02/23/23	02/23/24
1-18GHz Horn Antenna	Antenna Research	DRG-118/A	I00271	08/11/22	08/10/24
temperature/humidity/pressure probe	Omega Engineering, Inc.	iBTHX-W	i00686	01/05/23	01/05/24
3.4GHz high pass filter	Trilithic	23042	I00177	NCR	
low pass filter 1GHz	K&L Microwave	4L120-1100-OP/00	I00699	NCR	

In addition to the above listed equipment standard RF connectors and cables were utilized in the testing of the described equipment. Prior to testing these components were tested to verify proper operation.

Measurement Uncertainty

Measurement Uncertainty for Compliance Testing is listed in the table below.

Measurement Type	Measurement Unit	Frequency Range	Expanded Uncertainty
Conducted Emissions	dBuV	0.15 - 30 MHz	± 3.27 dB
Radiated Emissions	dBuV/m	30 - 1000 MHz	± 3.29 dB
Radiated Emissions	dBuV/m	1 - 6 GHz	± 3.71 dB
Radiated Emissions	dBuV/m	6 – 18 GHz	± 3.91 dB
Disturbance Power	dBuV	30 - 300 MHz	± 3.6 dB
Harmonic current emissions	Amps	50 – 2000Hz	+/- 2.3 %
Voltage fluctuations (flicker)	Volts	n/a	+/-6.2 %
Radiated Immunity	V/m	80 – 6000 MHz	+/- 2.1 dB
ESD	KV	n/a	+/- 2.6%
Fast Transients	Voltage	n/a	+/- 2.5%
	Timing	n/a	+/- 0.94%
Surge	Voltage	n/a	+/- 2.5%
RF Common Mode (CDN method)	Vrms	0.15 - 80 MHz	+/- 2.6 dB
RF Common Mode (BCI method)	Vrms	0.15 - 80 MHz	+/- 3.5 dB
Voltage Dips	Voltage	n/a	+/- 2.5%
	Timing	n/a	+/- 1.2%

The reported expanded uncertainty $\pm U_{\text{lab}}(\text{dB})$ has been estimated at a 95% confidence level ($k=2$)
 U_{lab} is less than or equal to U_{EMC} therefore;

- Compliance is deemed to occur if no measured disturbance exceeds the disturbance limit.
- Non-Compliance is deemed to occur if any measured disturbance exceeds the disturbance limit.

END OF TEST REPORT