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EMC Test Report

Client: Garmin
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GARMIN Corporation
No.68, Zhangshu 2nd Rd., Xizhi Dist., New Taipei City
221, TAIWAN, R.O.C

EUT: A04828, GPSMAP H1i

Standards: US Code of Federal Regulations, Title 47, FCC Part 25
RSS-170

Test Report No.: R20250124-00-E18B

Approved By:

Fox Lane,
EMC Test Engineer

Date: 8 August 2025

Total Pages: 15

TESTING LABORATORY
CERTIFICATE NO. 1953.01

Revision Page

Rev. No.	Date	Description
Original	4 August 2025	Issued by FLane Prepared by FLane
A	8 August 2025	Corrected EUT details in Table 2 Added intermodulation statement in Section 3.1 – ES
B	8 August 2025	Intermod plots added – FL

Table of Contents

1 Summary of Test Results

Purpose of this test report is to show compliance of radiated spurious emissions with respect to the satellite transmitter operating at 1616MHz-1626MHz

For full radio tests such as bandwidth and power etc. please see test reports for original **FCCID: IPH-04349**

US Code of Federal Regulations, Title 47, FCC Part 25
US Code of Federal Regulations, Title 47, FCC Part 2
RSS-170 Issue 4

Table 1 - Emissions Test Results

Emissions Tests	Test Method and Limits	Result
Spurious emissions	RSS-170 Issue 4 FCC Part 25.216 FCC Part 2.1053	Complies

2 EUT Description

The Equipment Under Test (EUT) was portable device manufactured by GARMIN Inc. It has both transmit and receive capabilities.

2.1 Equipment under Test (EUT)

Table 2 - Equipment under Test (EUT)

EUT	A04828, GPSMAP H1i
EUT Received	3 July 2025
EUT Tested	3 July 2025- 16 July 2025
Serial No.	3609442863 (Radiated Sample)
Operating Frequencies	1616MHz – 1626MHz
Device Type	Iridium
Power Supply / Voltage	Internal Battery / 5VDC Charger: Garmin (Phi Hong) Model: AQ27A-59CFA GPN: 362-00118-00 (Representative Power Supply)

2.2 Testing Location

All testing was performed at the NCEE Lincoln facility, which is an A2LA accredited EMC test laboratory accredited per scope 1953.01.

2.3 EUT Setup

The EUT was powered by its internal battery and charged with a 5VDC USB-C charger.

2.4 Test Equipment

DESCRIPTION AND MANUFACTURER	MODEL NO.	SERIAL NO.	LAST CALIBRATION DATE	CALIBRATION DUE DATE
Keysight MXE Signal Analyzer (44GHz)	N9038A	MY59050109	July 17, 2024	July 18, 2026
Keysight MXE Signal Analyzer (26.5GHz)	N9038A	MY56400083	July 17, 2024	July 18, 2026
SunAR RF Motion	JB1	A082918-1	July 17, 2024	July 17, 2025
EMCO Horn Antenna	3117	29616	June 12, 2024	June 12, 2026
Agilent Preamp*	87405A	3207A01475	May 2, 2024	May 2, 2026
ETS Red Preamplifier (Orange)*	3115-PA	00218576	January 22, 2024	January 22, 2026
ETS – Lindgren- VSWR on 10m Chamber	10m Semi-anechoic chamber-VSWR	4740 Discovery Drive	May 15, 2024	May 15, 2027
NCEE Labs-NSA on 10m Chamber*	10m Semi-anechoic chamber-NSA	NCEE-001	May 22, 2024	May 22, 2026
RF Cables (3m Ant. to Control room Bulkhead)	MFR-57500	1E3874	January 20, 2024	January 20, 2026
RF Cable (antenna to 10m chamber bulkhead)*	FSCM 64639	01E3872	January 21, 2024	January 21, 2026
RF Cable (10m chamber bulkhead to control room bulkhead)*	FSCM 64639	01E3874	January 21, 2024	January 21, 2026
RF Cable (control room bulkhead to test receiver)*	FSCM 64639	01F1206	January 21, 2024	January 21, 2026
TDK Emissions Lab Software	V11.25	700307	NA	NA

*Internal Characterization.

3 Test Results

3.1 Spurious Emissions

Test:	FCC Part 25 FCC Part 2 RSS-170
Test Result:	Complies

3.1.1 Test Description

Radiated emissions measurements were made from 30MHz to 6GHz at a distance of 3m inside a semi-anechoic chamber. The EUT was rotated 360°, the antenna height varied from 1 – 4 meters and both the vertical and horizontal antenna polarizations examined. The results were compared against the limits. Measurements were made by first using a spectrum analyzer to acquire the signal spectrum; individual frequencies were then measured using a CISPR 16.1 compliant receiver with the following bandwidth setting:

30MHz – 1GHz: 120kHz IF bandwidth, 60kHz steps
1GHz – 18GHz: 1MHz IF bandwidth, 500kHz steps

3.1.2 Test Results

No radiated emissions measurements were found in excess of the limits. Test result data can be seen below.

3.1.3 Test Environment

Testing was performed at the NCEE Labs Lincoln facility in the 10m semi-anechoic chamber. Laboratory environmental conditions varied slightly throughout the test:

Relative humidity of 56 ± 5%
Temperature of 23 ±2° C

3.1.4 Test Setup

The EUT was tested while charging with a 5VDC USB-C charger. See Section 2.3 for further details. A 50ohm RF load was placed on iridium antenna for emissions testing.

3.1.5 Test Equipment Used

See section 2.4 for details.

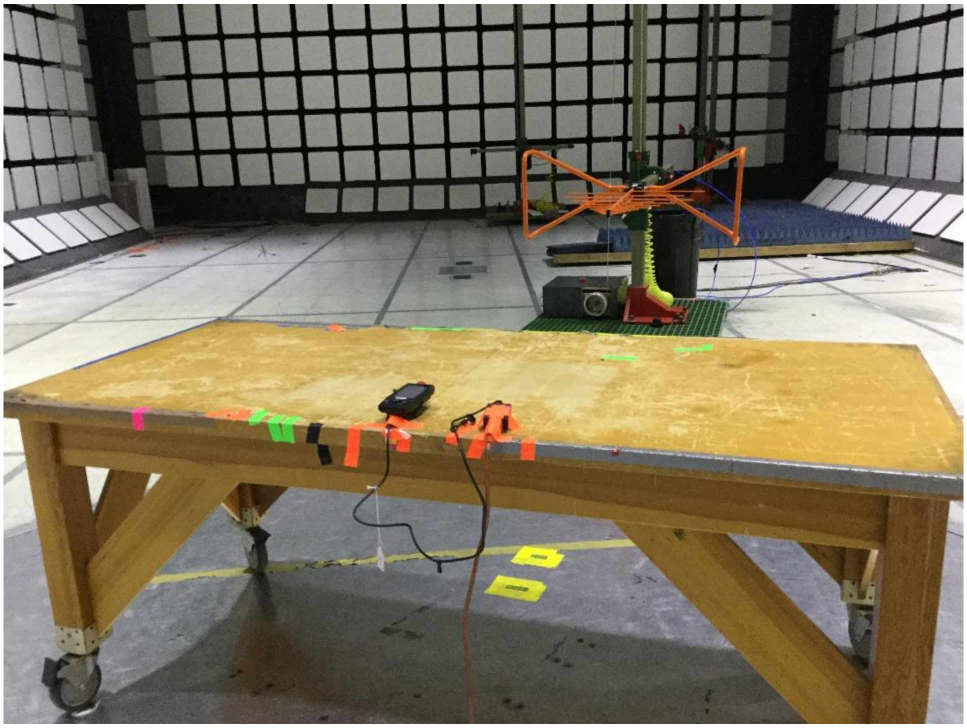

Figure 1 - Radiated Emissions Setup, 30MHz – 1GHz

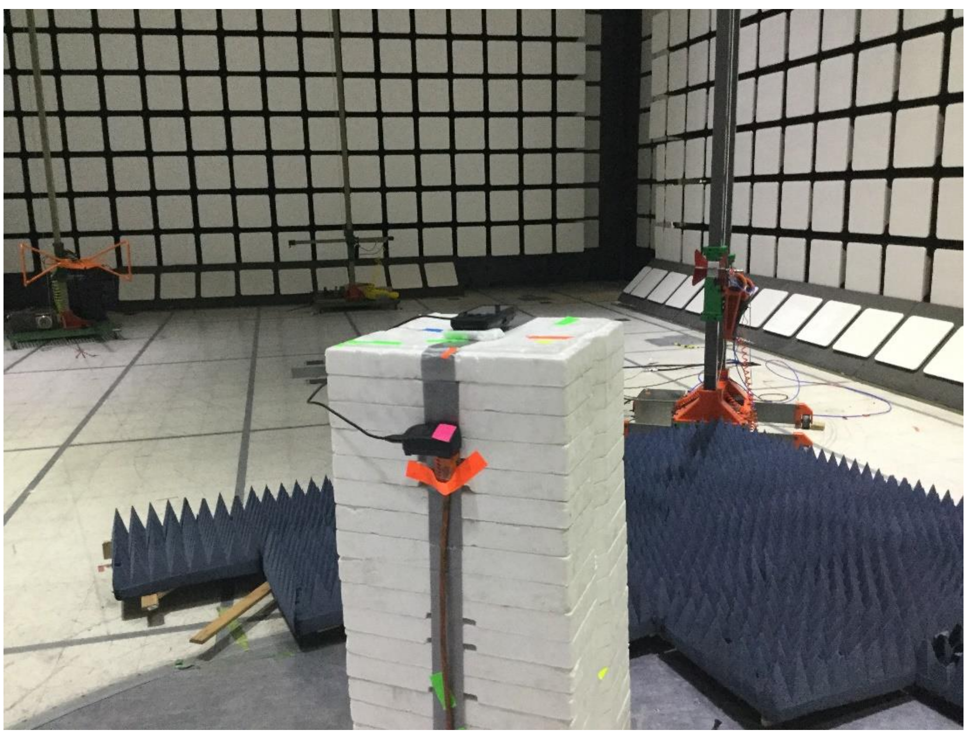

Figure 2 - Radiated Emissions Setup, >1GHz

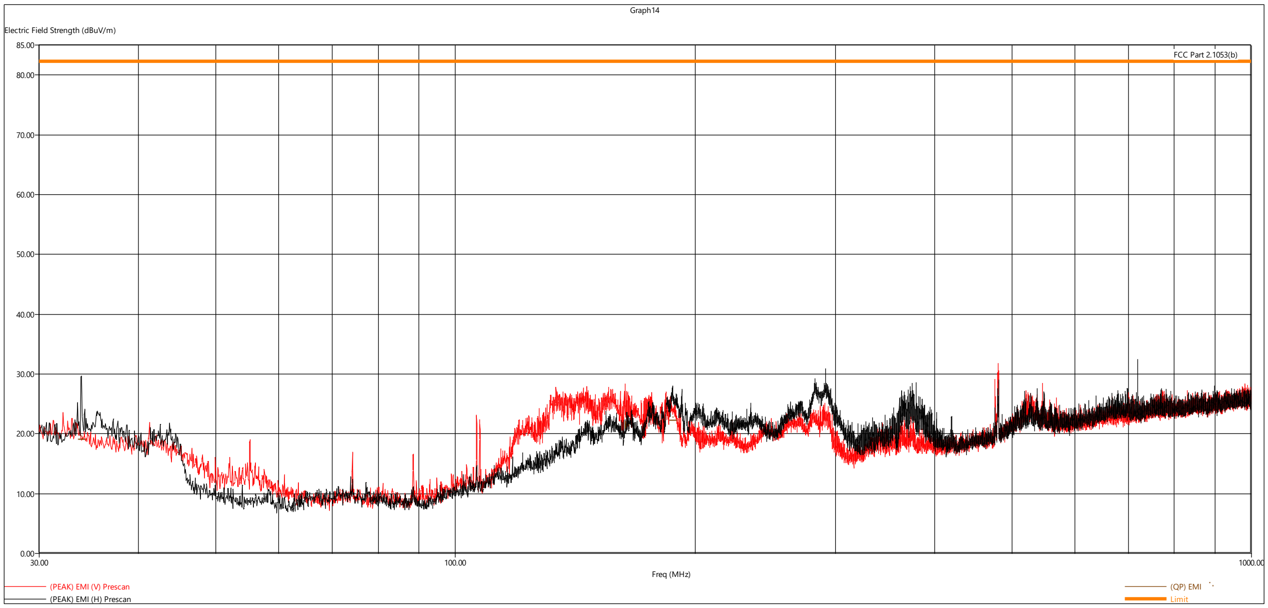

Figure 3 - Radiated Emissions Plot, Iridium

Quasi-Peak Measurements							
Frequency	**Level**	**Limit**	**Margin**	**Height**	**Angle**	**Pol**	**Modulation**
MHz	**dBµV/m**	**dBµV/m**	**dB**	**cm.**	**deg.**		
34.011360	18.98	82.23	63.25	146.07	286.75	H	B1
187.469040	22.12	82.23	60.11	111.92	273.75	H	B1
163.340400	21.34	82.23	60.89	106.55	142.00	V	B1

Emissions were investigated up to 18GHz. All other emissions were found to be at least 10dB below the limits and were not tabulated.

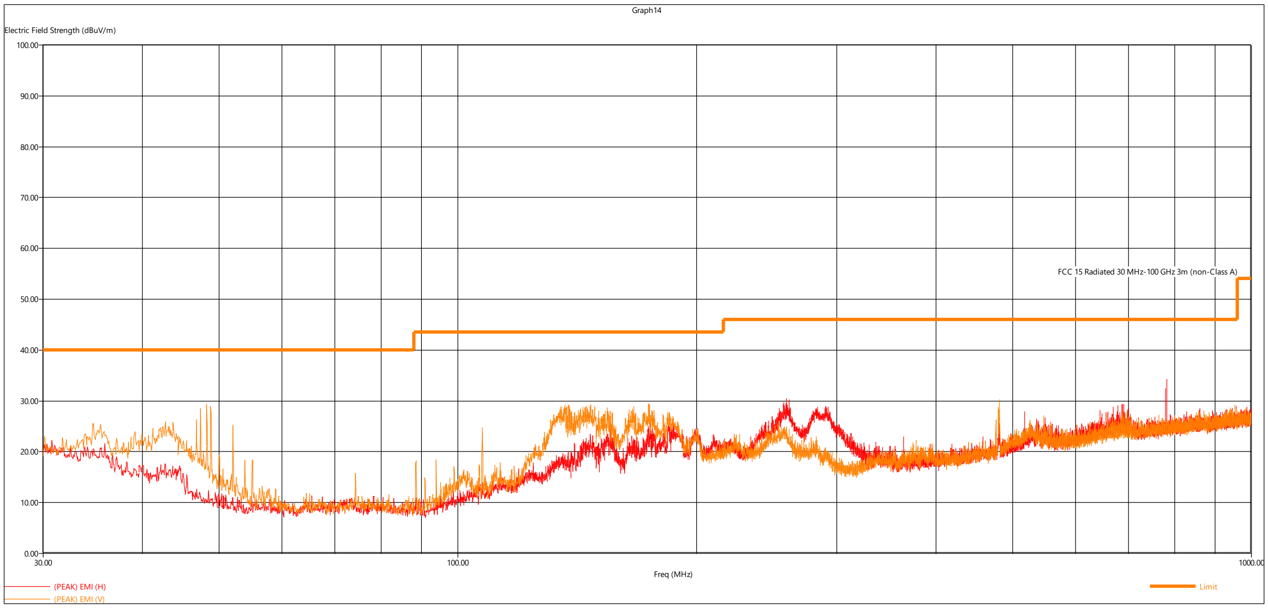

Figure 4 - Radiated Emissions Plot, Intermodulation Iridium Low channel, Wifi Low channel, 30MHz – 1GHz

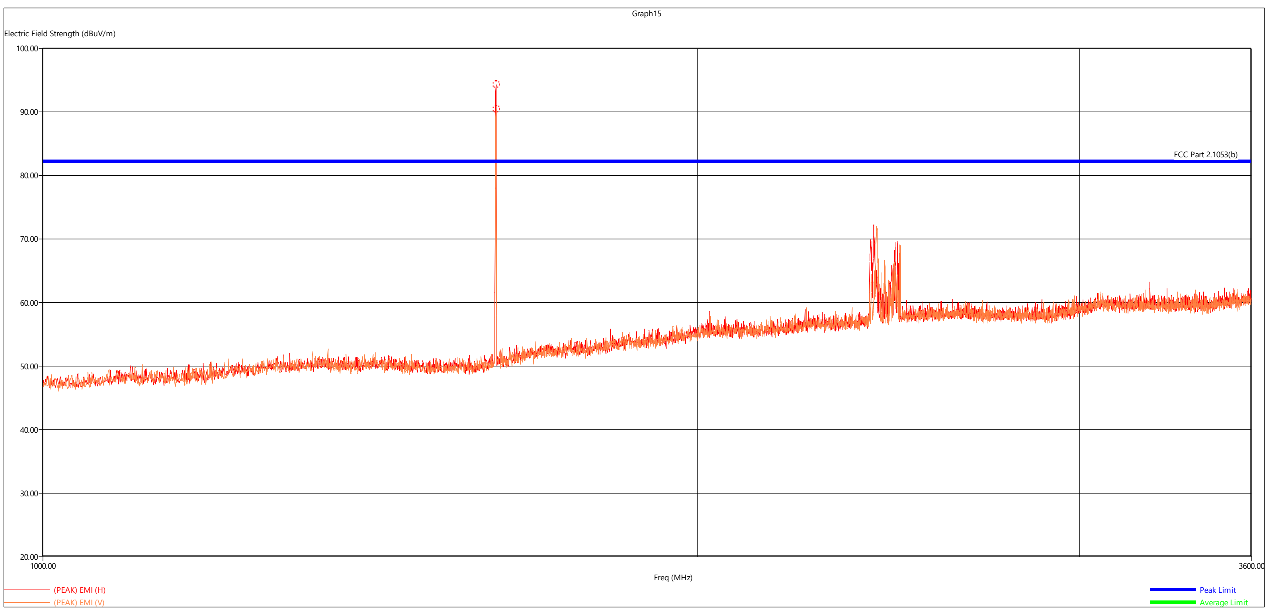

Figure 5 - Radiated Emissions Plot, Iridium, 1GHz – 3.6GHz

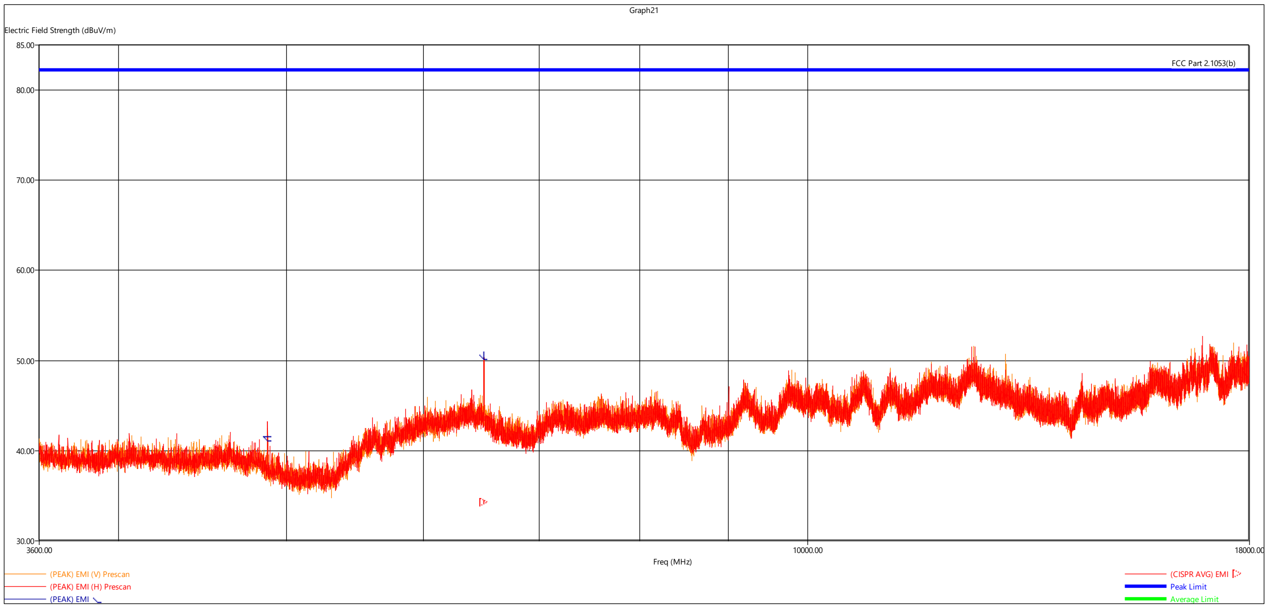

Figure 6 - Radiated Emissions Plot, Iridium, 3.6GHz – 12.75GHz

Emissions were investigated up to 18GHz. All other emissions were found to be at least 10dB below the limits and were not tabulated.

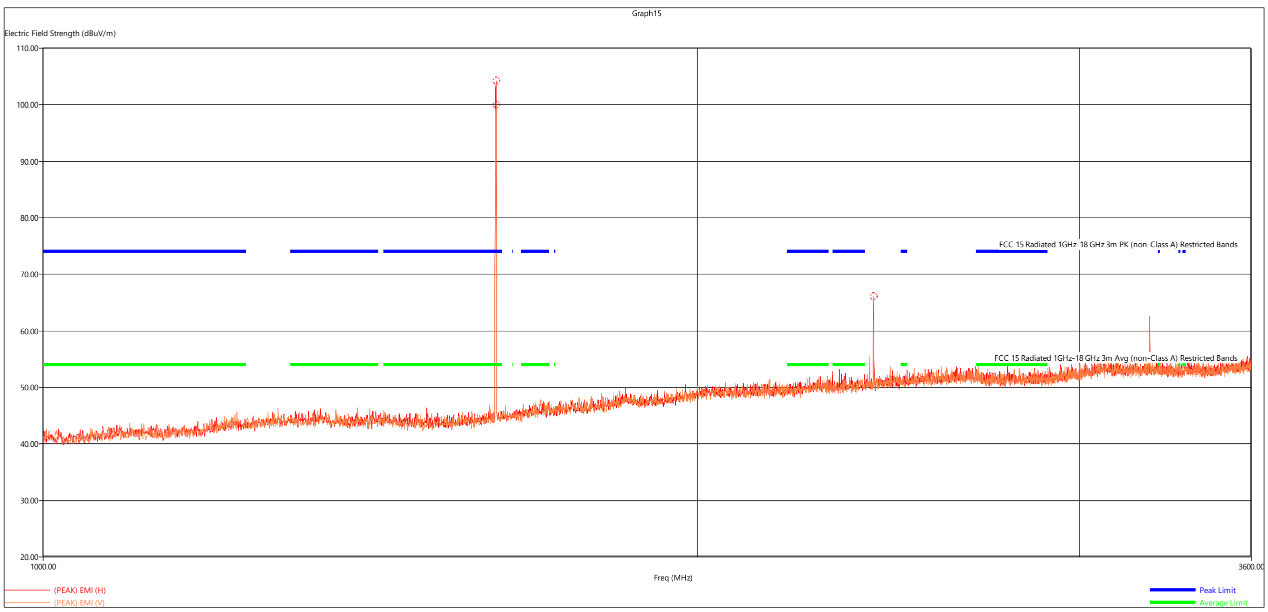

Figure 7 - Radiated Emissions Plot, Intermodulation Iridium Low channel, Wifi Low channel, 1GHz – 3.6GHz, Loads on Antenna ports

Emissions at potential intermodulation frequencies were investigated. No intermodulation emissions were found above noise floor and were not tabulated. Multiple channels for both transmitters were investigated and no substantial difference was noted. Worst case plots reported.

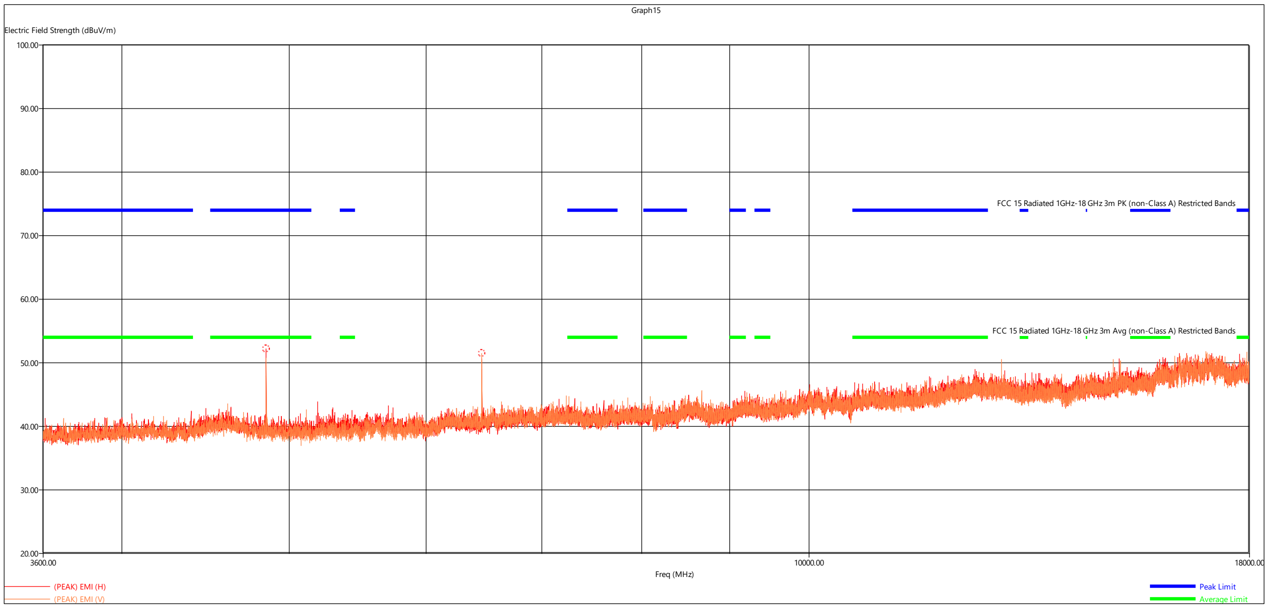

Figure 8 - Radiated Emissions Plot, Intermodulation Iridium Low channel, Wifi Low channel, 3.6GHz – 18GHz, Loads on Antenna ports

Emissions were investigated up to 18GHz. All other emissions were found to be at least 10dB below the limits and were not tabulated.

Emissions at potential intermodulation frequencies were investigated. No intermodulation emissions were found above noise floor and were not tabulated. Multiple channels for both transmitters were investigated and no substantial difference was noted. Worst case plots reported.

Annex A: Measurement Uncertainty

NCEE Labs does not add uncertainty to measured levels
Where relevant, the following measurement uncertainty levels have been for tests performed in this test report:

Test	Frequency Range	Uncertainty Value (dB)
Radiated Emissions, 3m	30MHz - 1GHz	±4.31
Radiated Emissions, 3m	1GHz - 18GHz	±5.08

Expanded uncertainty values are calculated to a confidence level of 95%.
Per ETSI TR 100 028-2 V1.4.1:

Parameter	NCEE Uncertainty (dB)
Co-channel rejection	0.42
Adjacent channel selectivity	0.42
Intermodulation immunity	0.42
Blocking immunity or degradation	0.42
Spurious response immunity to radiated fields	1.87
Radiated - Anechoic chamber	2.63
radiated, transform factor	1.96
radiated, EUT measurement	1.75

Annex B: Sample Field Strength Calculation

Radiated Emissions

The field strength is calculated in decibels (dB) by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = R + AF – (-CF + AG)

where FS = Field Strength
R = Receiver Amplitude Receiver reading in dBµV
AF = Antenna Factor
CF = Cable Attenuation Factor
AG = Preamplifier Amplifier Gain

Assume a receiver reading of 55.00 dBµV is obtained. The Antenna Factor of 12.00 and a Cable Factor of 1.10 is added. The Amplifier Gain of 20 dB is subtracted, giving a field strength of 48.10 dBµV/m.

FS = 55.00 + 12.00 – (-1.10 + 20.00) = 48.1 dBµV/m

The 48.1 dBµV/m value can be mathematically converted to its corresponding level in µV/m.
Level in µV/m = Common Antilogarithm [(48.1 dBµV/m)/20]= 254.1 µV/m

Conducted Emissions

Receiver readings are compared directly to the conducted emissions limits in decibels (dB) by adding the cable loss and LISN insertion loss to the receiver reading. The basic equations with a sample calculation is as follows;

FS = R + IL – (-CF)

where V = Conducted Emissions Voltage Measurement
R = Receiver reading in dBµV
IL = LISN Insertion Loss
CF = Cable Attenuation Factor

Assume a receiver reading of 52.00 dBµV is obtained. The LISN insertion loss of 0.80 dB and a Cable Factor of 1.10 is added. The Amplifier Gain of 20 dB is subtracted, giving a field strength of 48.1 dBµV/m.

V = 52.00 + 0.80 – (-1.10) = 53.90 dBµV/m

The 53.90 dBµV/m value can be mathematically converted to its corresponding level in µV/m.
Level in µV/m = Common Antilogarithm [(48.1 dBµV/m)/20]= 495.45 µV/m
Margin is calculated by taking the limit and subtracting the Field Level

REPORT END