TEST REPORT

Report Number: R15626916-E4

Applicant	:	Garmin International Inc. 1200 East 151st Street Olathe, KS 66062-3426, USA
FCC ID	:	IPH-05001
IC	:	1792A-05001
MODEL	:	A05001
EUT Description	:	Portable Digital Transceiver
Test Standard(s)	:	FCC CFR 47 Part 2, Part 24, and Part 27. ISED RSS-GEN ISSUE 5 + A1 + A2, RSS-133 ISSUE 7, RSS-139 ISSUE 4, RSS-130 ISSUE 2

Date Of Issue:
2025-08-22

Prepared by:
UL LLC.
12 Laboratory Drive
Durham, NC 27713 U.S.A.
TEL: (919) 549-1400

ACCREDITED
CERT #0751.06

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	2025-08-04	Initial Review	Noah Bennett
V2	2025-08-15	Updated EUT Description.	Noah Bennett
V3	2025-08-22	Removed References in Section 3.	Charles Moody

TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: Garmin International Inc.
1200 East 151st Street
Olathe, KS 66062-3426, USA

EUT DESCRIPTION: Portable Digital Transceiver

SERIAL NUMBERS: **603759983, 603763011, 603759903, 603759772, 603759842, 603759999, 603763014**

SAMPLE RECEIPT DATE: 2025-05-02; 2025-06-27

DATE TESTED: 2025-05-21 to 2025-07-22

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
FCC CFR 47 Part 2, Part 24, Part 27 ISED RSS-GEN ISSUE 5 + A1 + A2, RSS-133 ISSUE 7, RSS-139 ISSUE 4, RSS-130 ISSUE 2	Refer to Section 2

UL LLC tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. All samples tested were in good operating condition throughout the entire test program. Measurement Uncertainties are published for informational purposes only and were not taken into account unless noted otherwise.

This document may not be altered or revised in any way unless done so by UL LLC and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL LLC will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by a2La, NIST, or any agency of the U.S. government.

Approved & Released
For UL LLC By:

Jeff Moser
Operations Manager
Consumer, Medical and IT Segment
UL LLC

Prepared By:

Noah Bennett
Engineer Project Associate
Consumer, Medical, and IT Segment
UL LLC

2. SUMMARY OF TEST RESULTS

This report contains data provided by the customer which can impact the validity of results. UL LLC. is only responsible for the validity of results after the integration of the data provided by the customer.
Below is a list of the data provided by the customer:

1. Antenna gain and type (see section 6.4)
2. EUT Cable loss (see section 8)
3. Supported bands, bandwidths, modulations, power settings, and MPR configurations. (section 6.1)
4. Worst-Case Modes (6.5)

Requirement Description	Band	Requirement Clause Number (FCC)	Requirement Clause Number (IC)	Result	Remarks
Equivalent Radiated Power	12	27.50 (c) (10)	RSS130§4.6.3	See Note 1	N/A
Equivalent Isotropic Radiated Power	2	24.232 (c)	RSS133§5.5		N/A
	4	27.50 (d) (4)	RSS139§5.5		N/A

Requirement Description	Requirement Clause Number (FCC)	Requirement Clause Number (IC)	Result	Remarks
Occupied Bandwidth	2.1049	RSS-GEN§6.7, RSS133 RSS130§4.5	See Note 1	N/A
Band Edge and Emission Mask	2.1051, 24.238 (a), 27.53 (h), 27.53 (g),	RSS133§5.6 RSS139§5.6 RSS130§4.7		N/A
Out of Band Emissions				N/A
Frequency Stability	2.1055, 24.235, 27.54	RSS133§5.4 RSS139§5.4 RSS130§4.5		N/A
Peak-to-Average Ratio	24.232(d), 27.50(d)(5)	RSS133§5.5 RSS139§5.5 RSS130§4.6.1		N/A
Field Strength of Spurious Radiation	2.1051, 24.238 (a), 27.53 (h), 27.53 (g),	RSS133§5.6 RSS139§5.6 RSS130§4.7	Complies	N/A

Note 1: This report covers the full radiated testing of the WWAN radio when integrated into a host product with a different antenna than the original equipment report. Max EIRP is reported as well. OBW data is from the original certification module report.

3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with the following.
FCC published lists of measurement procedures for compliance testing.
ISED published lists of normative test standards and acceptable alternatives procedures.

- ANSI C63.26:2015
- ANSI/TIA-603-E (2016)
- FCC 47 CFR Part 2, Part 22, Part 24, Part 27
- FCC KDB 971168 D01: Power Meas License Digital Systems (ISED acceptable alternative procedure)
- FCC KDB 971168 D02: Misc Rev Approv License Devices
- FCC KDB 412172 D01: Determining ERP and EIRP
- ISED RSS-GEN ISSUE 5 + A1 + A2, RSS-133 ISSUE 7, RSS-139 ISSUE 4, RSS-130 ISSUE 2,

4. FACILITIES AND ACCREDITATION

UL LLC is accredited by A2LA, Certificate Number 0751.06, for all testing performed within the scope of this report. Testing was performed at the locations noted below.

	Address	ISED CABID	ISED Company Number	FCC Registration
☒	Building 2800 Suite Perimeter Park Dr. Suite B Morrisville, NC 27560, U.S.A.	US0067	27265	825374

5. DECISION RULES AND MEASUREMENT UNCERTAINTY

5.1. METROLOGICAL TRACEABILITY

All test and measuring equipment utilized to perform the tests documented in this report are calibrated on a regular basis, with a maximum time between calibrations of one year or the manufacturers' recommendation, whichever is less, and where applicable is traceable to recognized national standards.

5.2. DECISION RULES

The Decision Rule is based on Simple Acceptance in accordance with ISO Guide 98-4:2012 Clause 8.2. (Measurement uncertainty is not taken into account when stating conformity with a specified requirement.)

5.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	U_{Lab}
Radio Frequency (Spectrum Analyzer)	141.2 Hz
Occupied Channel Bandwidth	1.22%
RF output power, conducted	1.3 dB (PK) 0.45 dB (AV)
Power Spectral Density, conducted	2.47 dB
Unwanted Emissions, conducted	1.94 dB
All emissions, radiated	6.01 dB
Conducted Emissions (0.150-30MHz) - LISN	3.40 dB
Temperature	0.57°C
Humidity	3.39%
DC Supply voltages	1.70%

Uncertainty figures are valid to a confidence level of 95%.

5.4. SAMPLE CALCULATION

RADIATED EMISSIONS

Where relevant, the following sample calculation is provided:

EIRP (dBm) = Measured Power (dBm) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB) + Correction Factor (dB)
EIRP (dBm) = -56.5 dBm + 40.4 dB/m + 0.5 dB – 36 dB + 11.8 dB = -39.8 dBm

6. EQUIPMENT UNDER TEST

6.1. DESCRIPTION OF EUT

The EUT is an Portable Digital Transceiver.

This test report covers the WWAN radio of the EUT due to an antenna change from the original equipment test report.

The EUT supports the following Technologies:

Wireless technologies	Frequency bands	Operating mode	UE Category
LTE	LTE Band 2 LTE Band 4 LTE Band 12	QPSK 16QAM	Cat eMTC M1
Notes: A) The EUT operated in a 1x1 SISO configuration.			

6.2. MAXIMUM OUTPUT POWER

EIRP/ERP TEST PROCEDURE

ANSI C63.26:2015
KDB 971168 D01 Section 5.6

ERP/EIRP = PMeas + GT − LC
where: ERP/EIRP = effective or equivalent radiated power, respectively (expressed in the same units as PMeas, typically dBW or dBm);
PMeas = measured transmitter output power or PSD, in dBm or dBW;
GT = gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP);
LC = signal attenuation in the connecting cable between the transmitter and antenna, in dB.

For devices utilizing multiple antennas, KDB 662911 provides guidance for determining the effective array transmit antenna gain term to be used in the above equation.

EUT includes different power levels for head use configuration and body use configuration and the below tables contain the highest of all configurations average conducted and ERP/EIRP output powers as follows:

LTE BAND 2

Part 24	
EIRP Limit (W)	2.00
Antenna Gain (dBi)	-3.20

Bandwidth (MHz)	Modulation	Low Frequency	Upper Frequency	Conducted Average	EIRP Average	EIRP Average	99% BW (kHz)	Emission Designator
1.4	QPSK	1850.7	1914.3	23.2	20.00	0.100	1075.8	1M08G7W
	16QAM			22.9	19.70	0.093	1076.9	1M08D7W
3.0	QPSK	1851.5	1913.5	23.4	20.20	0.105	1075.8	1M08G7W
	16QAM			23.0	19.80	0.095	1078	1M08D7W
5.0	QPSK	1852.5	1912.5	23.3	20.10	0.102	1086.6	1M09G7W
	16QAM			23.9	20.70	0.117	1077.9	1M08D7W
10.0	QPSK	1855.0	1910.0	23.3	20.10	0.102	1086.1	1M09G7W
	16QAM			23.8	20.60	0.115	1085.7	1M09D7W
15.0	QPSK	1857.5	1907.5	23.3	20.10	0.102	1082	1M08G7W
	16QAM			23.9	20.70	0.117	1081	1M08D7W
20.0	QPSK	1860.0	1905.0	23.4	20.20	0.105	1084	1M08G7W
	16QAM			23.8	20.60	0.115	1087	1M09D7W

LTE BAND 4

Part 27	
EIRP Limit (W)	1.00
Antenna Gain (dBi)	-3.21

Bandwidth (MHz)	Modulation	Low Frequency	Upper Frequency	Conducted Average	EIRP Average	EIRP Average	99% BW (kHz)	Emission Designator
1.4	QPSK	1710.7	1779.3	23.3	20.09	0.102	1077.4	1M08G7W
	16QAM			23.0	19.79	0.095	1077.2	1M08D7W
3.0	QPSK	1711.5	1778.5	23.6	20.39	0.109	1077.3	1M08G7W
	16QAM			23.0	19.79	0.095	1077.1	1M08D7W
5.0	QPSK	1712.5	1777.5	23.3	20.09	0.102	1085.9	1M09G7W
	16QAM			24.0	20.79	0.120	1080	1M08D7W
10.0	QPSK	1715.0	1775.0	23.4	20.19	0.104	1088.2	1M09G7W
	16QAM			24.0	20.79	0.120	1086	1M09D7W
15.0	QPSK	1717.5	1772.5	23.3	20.09	0.102	1085.9	1M09G7W
	16QAM			24.0	20.79	0.120	1084.2	1M08D7W
20.0	QPSK	1720.0	1770.0	23.3	20.09	0.102	1088	1M09G7W
	16QAM			23.9	20.69	0.117	1083.6	1M08D7W

LTE BAND 12

Part 27	
ERP Limit (W)	3.00
Antenna Gain (dBi)	-9.09

Bandwidth (MHz)	Modulation	Low Frequency	Upper Frequency	Conducted Average	ERP Average	ERP Average	99% BW (kHz)	Emission Designator
1.4	QPSK	699.7	715.3	23.30	12.06	0.016	1077.2	1M08G7W
	16QAM			23.00	11.76	0.015	1077.3	1M08D7W
3.0	QPSK	700.5	714.5	23.60	12.36	0.017	1075.1	1M08G7W
	16QAM			22.80	11.56	0.014	1075.6	1M08D7W
5.0	QPSK	701.5	713.5	23.40	12.16	0.016	1081.9	1M08G7W
	16QAM			23.70	12.46	0.018	1080.6	1M08D7W
10.0	QPSK	704.0	711.0	23.30	12.06	0.016	1080.8	1M08G7W
	16QAM			23.90	12.66	0.018	1086.5	1M09D7W

6.3. SOFTWARE AND FIRMWARE

EUT FW Version: 63.23

6.4. MAXIMUM ANTENNA GAIN

The antenna(s) gain and type, as provided by the manufacturer' are as follows:

WWAN Bands	Antenna Type	Antenna Peak Gain (dBi)
LTE B12	Monopole	-9.09
LTE B4	Inverted F	-3.21
LTE B2		-3.20

6.5. WORST-CASE CONFIGURATION AND MODE

The EUT was investigated in three orthogonal orientations X/Y/Z on both Low Band (Fundamental Below 1GHz) and Mid Band (Fundamental between 1-3GHz) over all antennas to find the worst-case orientation.

The worst-case scenario for all measurements is based on an engineering evaluation made on conducted average power on different modulations found during pretesting. Output power measurements were measured QPSK, and 16QAM, modulations for LTE. *The lowest order modulations* with the highest output power were selected as worst-case, outlined below:

Mode	Worst-Case Modulation/Mode
LTE	QPSK

The EUT was tested while connected to AC Lines via charging cable and brick to represent worst case emissions.

Radiated Emission tests were performed on the lowest order modulation, at the highest BW configuration, at the lowest RB configuration to maximize emissions.

Worst Case emissions from 9kHz-30Mhz, 30-1000MHz, and 18-26.5GHz, were done on the modes with the highest conducted average power. For >30MHz, No Emissions within 20dB were observed.

Original Module IDs:
FCC ID: HSW-TY2GD
IC ID: 4492A-TY2GD

6.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Laptop	Lenovo	21AJS0KL00	PF4FKVZE	-
EUT Charging Brick	Garmin	AQ27A-59CFA	N/A	-

I/O CABLES

I/O Cable List						
Cable No.	**Port**	**# of Identical Ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	Proprietary	1	USB-C	Shielded	<3m	Program/Charge EUT

Test Setup

The EUT was connected to a base station simulator and set to transmit at max power for GSM/WCDMA/LTE testing

Setup Diagram

See R15626970-EP1 for Setup Photos and Setup Diagrams

7. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

Test Equipment Used - Radiated Disturbance Emissions Test Equipment (Morrisville – Chamber 4)

Equip. ID	Description	Manufacturer/Brand	Model Number	Last Cal.	Next Cal.
	1-18 GHz				
206211	Double-Ridged Waveguide Horn Antenna, 1 to 18 GHz	ETS Lindgren	3117	2024-04-09	2026-04-09
	18-40 GHz				
91186	Horn Antenna, 18-26.5GHz	ARA	MWH-1826/B	2024-05-16	2026-05-16
	Gain-Loss Chains				
207640	Gain-loss string: 1-18GHz	Various	Various	2025-06-13	2026-06-13
225795	Gain-loss string: 18-40GHz	Various	Various	2025-06-13	2026-06-13
	Receiver & Software				
81018	Spectrum Analyzer	Agilent	E4446A	2024-07-31	2025-07-31
197954	Spectrum Analyzer	Rohde & Schwarz	ESW44	2025-04-21	2026-04-21
SOFTEMI	EMI Software	UL	Version 9.5 (18 Oct 2021)		
	Additional Equipment used				
241204	Environmental Meter	Fisher Scientific	15-077-963	2023-09-05	2025-09-05
169106 (BRF008)	1710-1785MHz notch filter, 2W, Fhigh = 9GHz	Micro-Tronics	BRM50713-01	2025-03-13	2026-03-13
213025	Wideband Radio Communications Tester	Rohde and Schwarz	CMW500	2025-01-14	2026-01-14

Test Equipment Used - Radiated Disturbance Emissions Test Equipment (Morrisville – Chamber 1)

Equip. ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
	0.009-30MHz				
135144	Active Loop Antenna	ETS-Lindgren	6502	2024-10-02	2025-10-02
	30-1000 MHz				
90629	Hybrid Broadband Antenna	Sunol Sciences Corp.	JB3	2024-01-30	2026-01-30
	1-18 GHz				
135143	Double-Ridged Waveguide Horn Antenna, 1 to 18 GHz	ETS Lindgren	3117	2024-02-07	2026-02-07
	Gain-Loss Chains				
91976	Gain-loss string: 25-1000MHz	Various	Various	2025-05-31	2026-05-31
91979	Gain-loss string: 1-18GHz	Various	Various	2025-05-31	2026-05-31
	Receiver & Software				
206496	Spectrum Analyzer	Rohde & Schwarz	ESW44	2024-08-29	2025-08-29
SOFTEMI	EMI Software	UL	Version 9.5 (18 Oct 2021)		
	Additional Equipment used				
241205	Environmental Meter	Fisher Scientific	15-077-963	2023-09-05	2025-09-05
213025	Wideband Radio Communications Tester	Rohde and Schwarz	CMW500	2025-01-14	2026-01-14
169108 (BRF010)	1.85-1.97GHz notch filter, 2W, Fhigh = 9GHz	Micro-Tronics	BRM50714-01	2025-03-13	2026-03-13
169106 (BRF008)	1710-1785MHz notch filter, 2W, Fhigh = 9GHz	Micro-Tronics	BRM50713-01	2025-03-13	2026-03-13
198917	1GHz high-pass filter, 2W, Fhigh =18GHz	Micro-Tronics	HPM18129-02	2025-03-13	2026-03-13

NOTES:

1. Equipment listed above has a calibration due date during the testing period, the testing is completed before equipment expiration date.

8. RADIATED TEST RESULTS

Radiated measurement using the Field Strength Method

Using the test configuration shown in Figure 6 below, We measure the radiated emissions directly from the EUT and convert the measured field strength or received power to ERP or EIRP, as required, for comparison to the applicable limits. As stated in 5.5.1 of ANSI C63.26-2015, the field strength measurement method using a test site validated to the requirements of ANSI C63.4 is an alternative to the substitution measurement method.

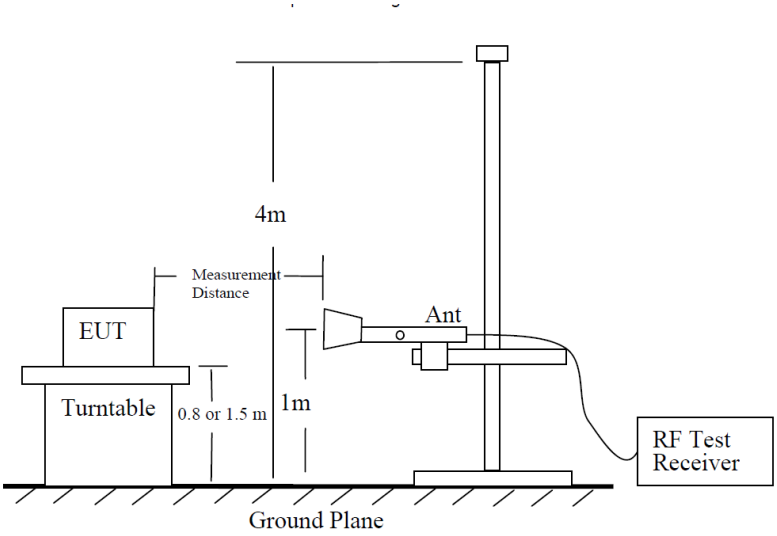


Figure 6—Test site-up for radiated ERP and/or EIRP measurements

Radiated Power Measurement Calculation According to ANSI C63.26-2015

a) E (dBμV/m) = Measured amplitude level (dBμV) + Cable Loss (dB) + Antenna Factor (dB/m).

b) E (dBμV/m) = Measured amplitude level (dBm) + 107 + Cable Loss (dB) + Antenna Factor (dB/m).

c) E (dBμV/m) = EIRP (dBm) − 20log(D) + 104.8; where D is the measurement distance (in the far field region) in m.

d) EIRP (dBm) = E (dBμV/m) + 20log(D) − 104.8; where D is the measurement distance (in the far field region) in m.

So, from d)

The measuring distance is usually at 3m, then 20*Log(3)=9.5424

Then, EIRP (dBm) = E (dBμV/m) + 9.5424 − 104.8 = E (dBμV/m) – 95.2576

Note: Confidence check of each chamber is performed daily to see if any degradation from expected/normal reading reference data. Ambient check of each chamber is performed monthly.

8.1. FIELD STRENGTH OF SPURIOUS RADIATION, ABOVE 1GHz

TEST PROCEDURE

KDB 971168 D01 v03r01/D02 v02/r01
All tests above 1GHz were done with a Resolution Bandwidth of 1MHz, and a Video Bandwidth of 3MHz

RESULTS

8.1.1. LTE BAND 2

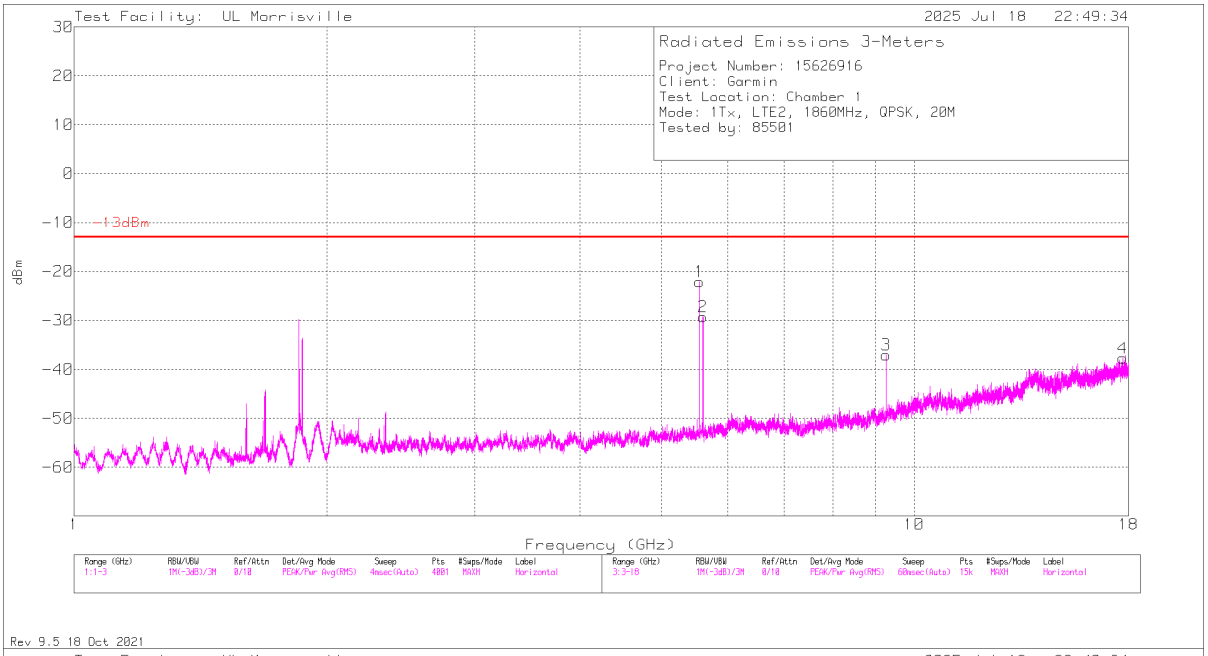
LIMITS

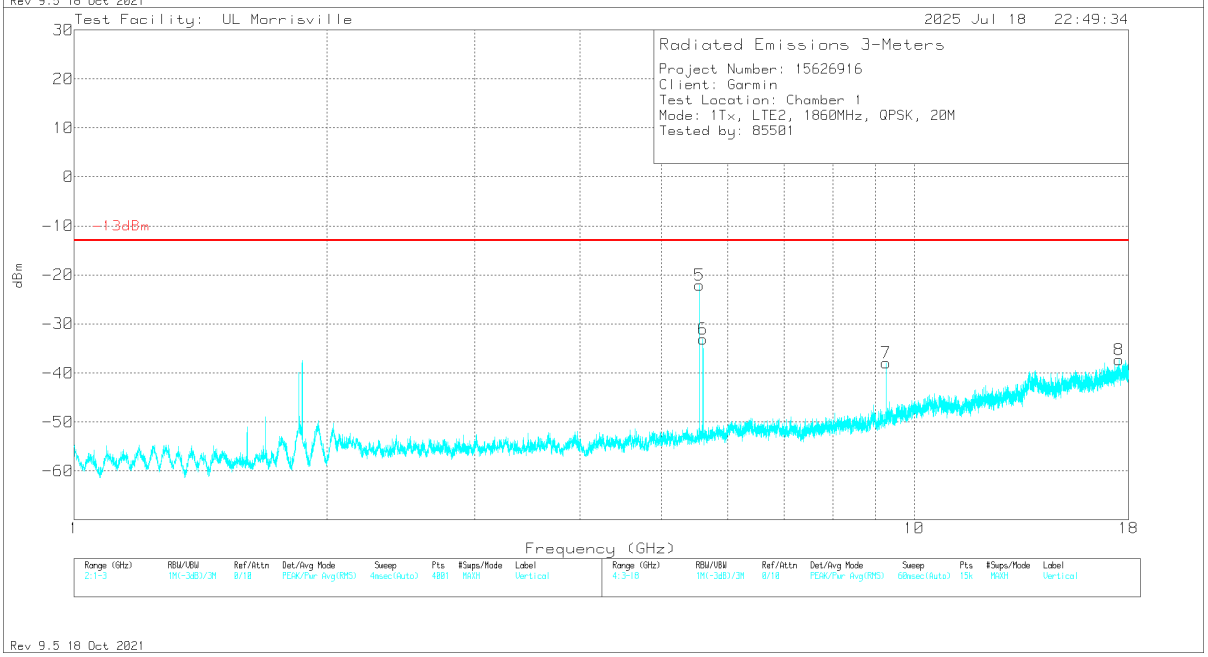
FCC: §24.238 (a)
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB.

ISED: RSS133§5.6
For all equipment, the TRP or total conducted power (sum of conducted power across all antenna connectors), where applicable, of the unwanted emissions outside the frequency block or frequency block group shall not exceed the limits shown in the table 3.

Table 3: Unwanted emission limits for all equipment	
Offset frequency from the edge of the frequency block group (MHz)	**Unwanted emission limit**
≤ 1	-13 dBm/(1% of OBW)
> 1	-13 dBm/MHz

QPSK LTE2 (20MHz, Low Channel)

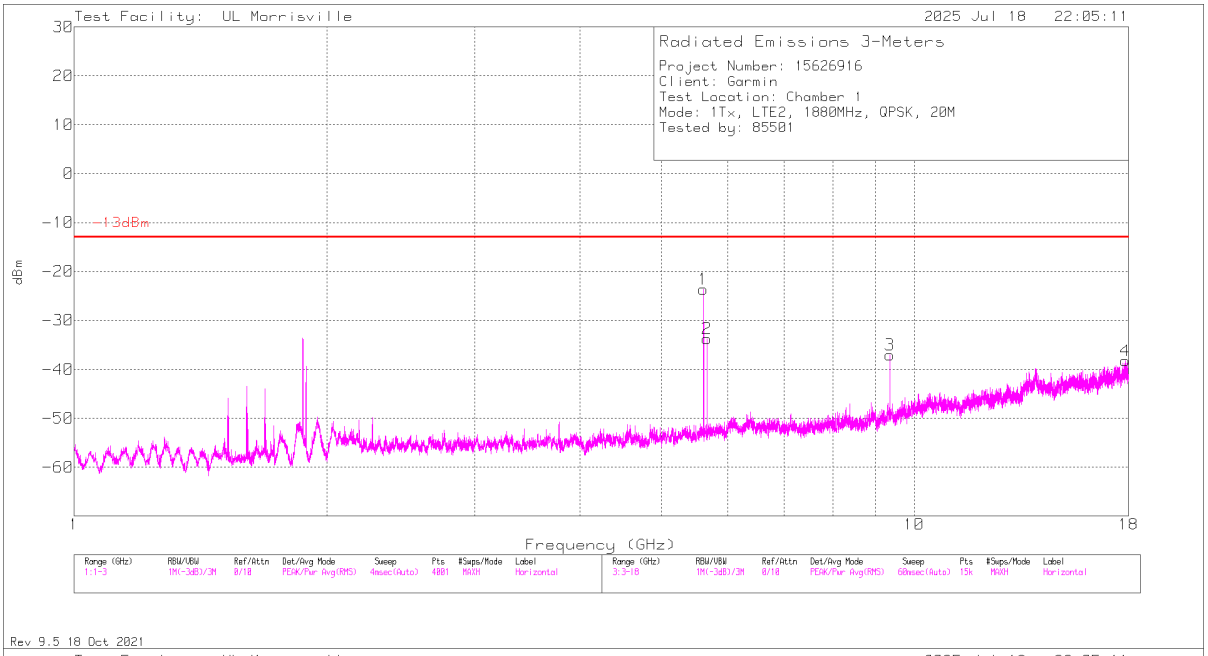


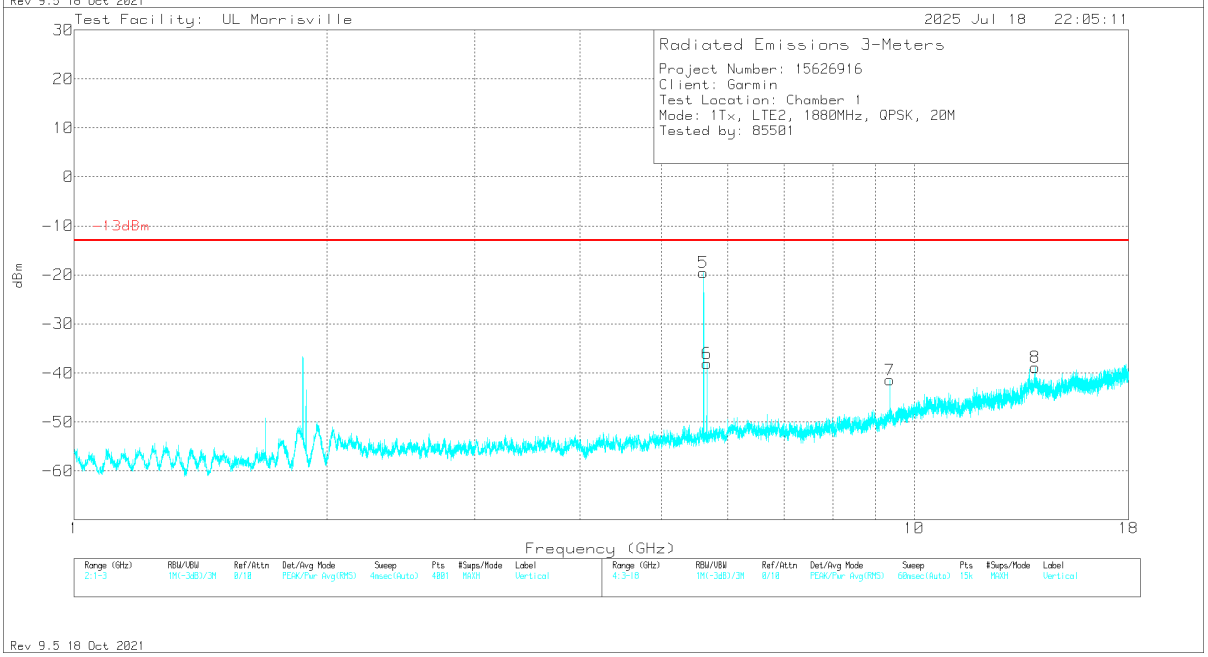


Marker	Frequency (GHz)	Meter Reading (dBm)	Det	135143 (dB/m)	Gain/Loss (dB)	CF (dB)	Filter (dB)	Corrected Reading dBm	-13dBm	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	5.555	-25	Pk	34.5	-43.4	11.8	0	-22.1	-13	-9.1	0-360	300	H
5	5.555	-24.98	Pk	34.5	-43.4	11.8	0	-22.08	-13	-9.08	0-360	101	V
2	5.606	-32.35	Pk	34.6	-43.3	11.8	0	-29.25	-13	-16.25	0-360	300	H
6	5.606	-36.14	Pk	34.6	-43.3	11.8	0	-33.04	-13	-20.04	0-360	101	V
3	9.258	-43.45	Pk	36.1	-41.5	11.8	0	-37.05	-13	-24.05	0-360	199	H
7	9.258	-44.35	Pk	36.1	-41.5	11.8	0	-37.95	-13	-24.95	0-360	300	V
8	17.54	-55.28	Pk	41.3	-35.1	11.8	0	-37.28	-13	-24.28	0-360	300	V
4	17.71	-55.95	Pk	41.4	-35	11.8	0	-37.75	-13	-24.75	0-360	199	H

Pk - Peak detector

QPSK LTE2 (20MHz, Mid Channel)

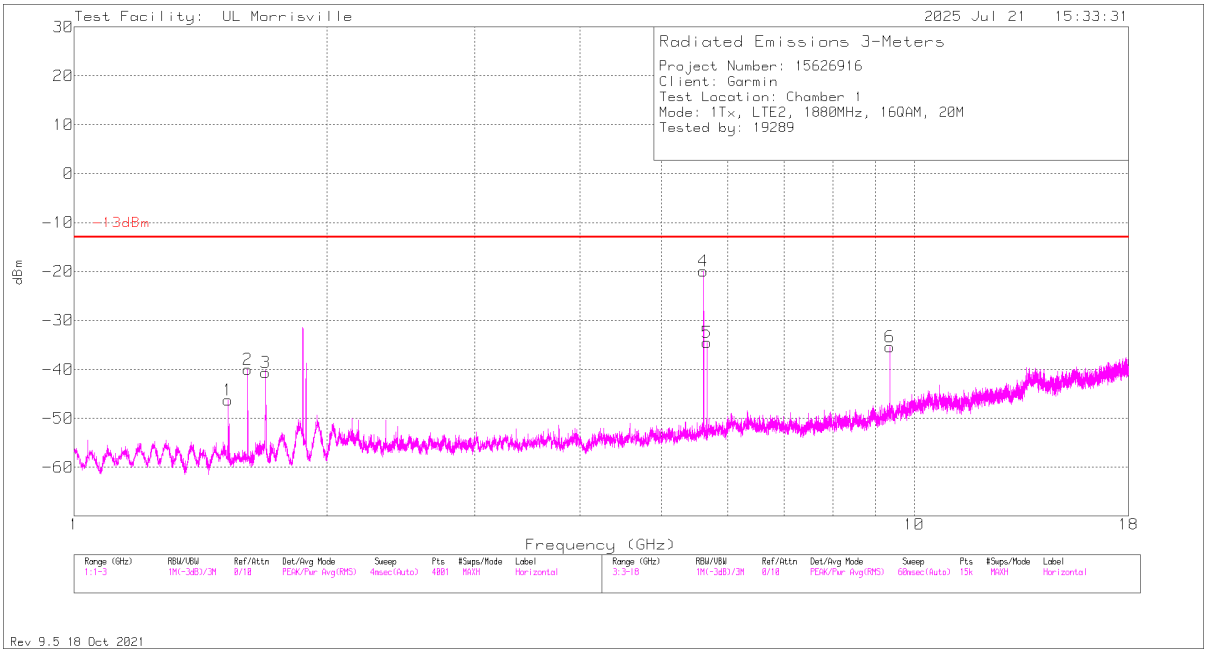


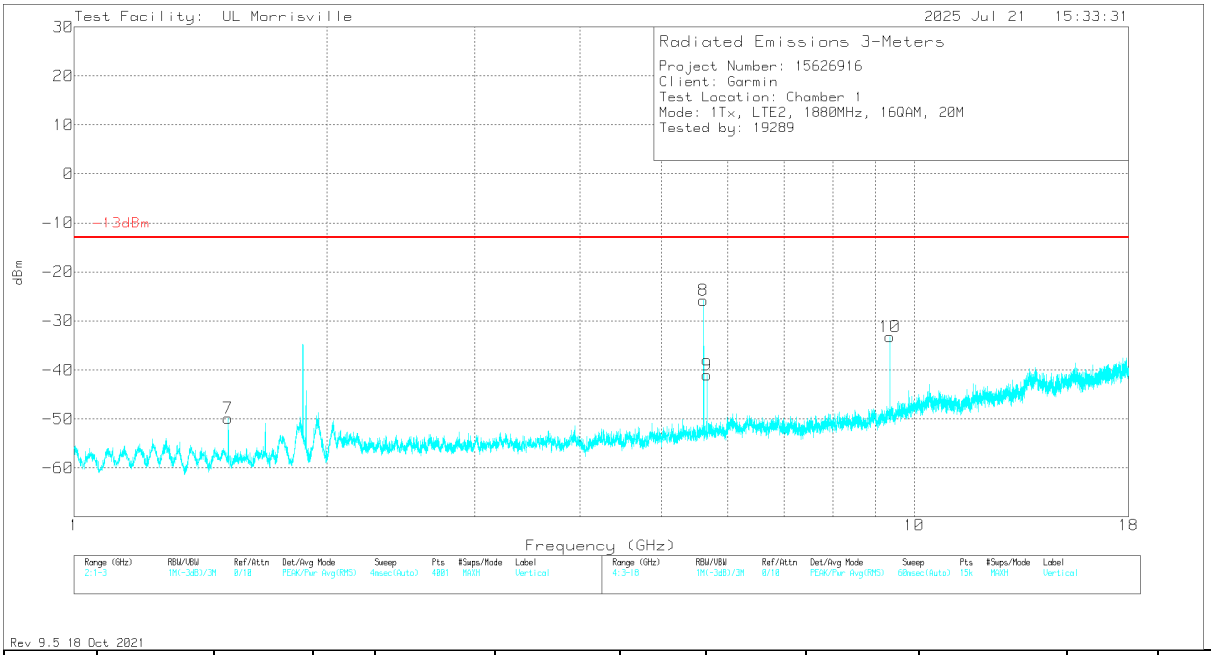


Marker	Frequency (GHz)	Meter Reading (dBm)	Det	135143 (dB/m)	Gain/Loss (dB)	CF (dB)	Filter (dB)	Corrected Reading dBm	-13dBm	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	5.614	-26.74	Pk	34.6	-43.3	11.8	0	-23.64	-13	-10.64	0-360	100	H
5	5.615	-22.54	Pk	34.6	-43.4	11.8	0	-19.54	-13	-6.54	0-360	101	V
2	5.667	-36.23	Pk	34.7	-44	11.8	0	-33.73	-13	-20.73	0-360	100	H
6	5.667	-40.6	Pk	34.7	-44	11.8	0	-38.1	-13	-25.1	0-360	101	V
3	9.358	-43.61	Pk	36.2	-41.4	11.8	0	-37.01	-13	-24.01	0-360	200	H
7	9.358	-48.06	Pk	36.2	-41.4	11.8	0	-41.46	-13	-28.46	0-360	200	V
8	13.928	-55.19	Pk	39.1	-34.6	11.8	0	-38.89	-13	-25.89	0-360	101	V
4	17.841	-56.16	Pk	41.4	-35.3	11.8	0	-38.26	-13	-25.26	0-360	100	H

Pk - Peak detector

16QAM LTE2 (20MHz, Mid Channel)

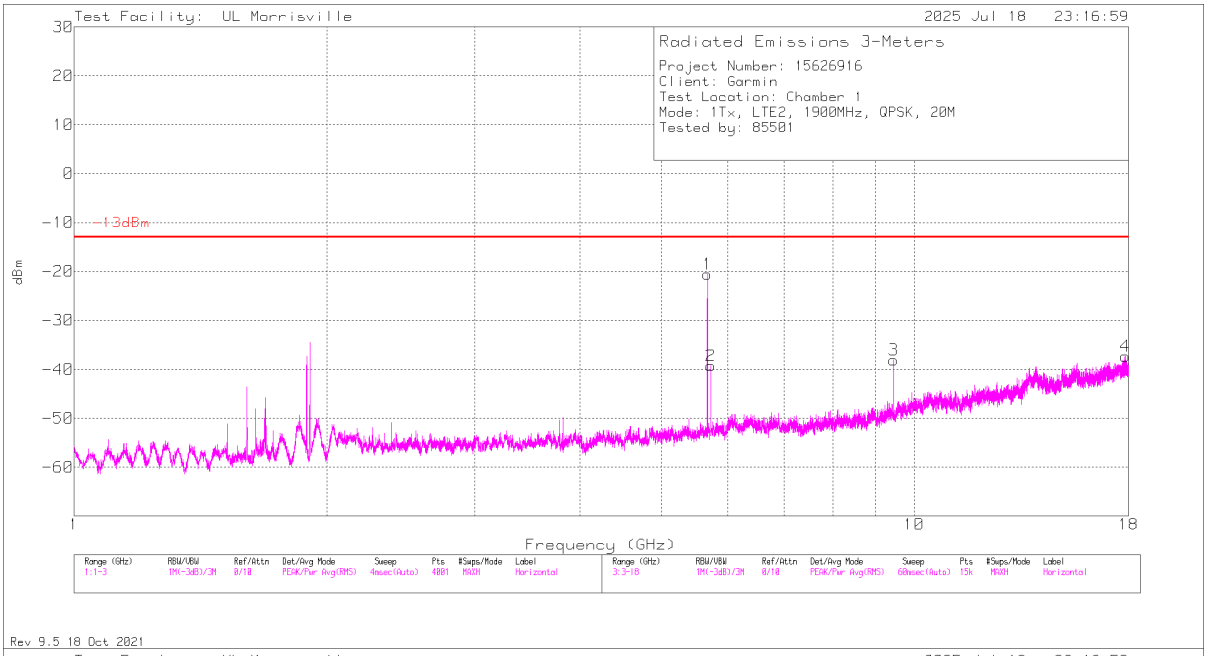


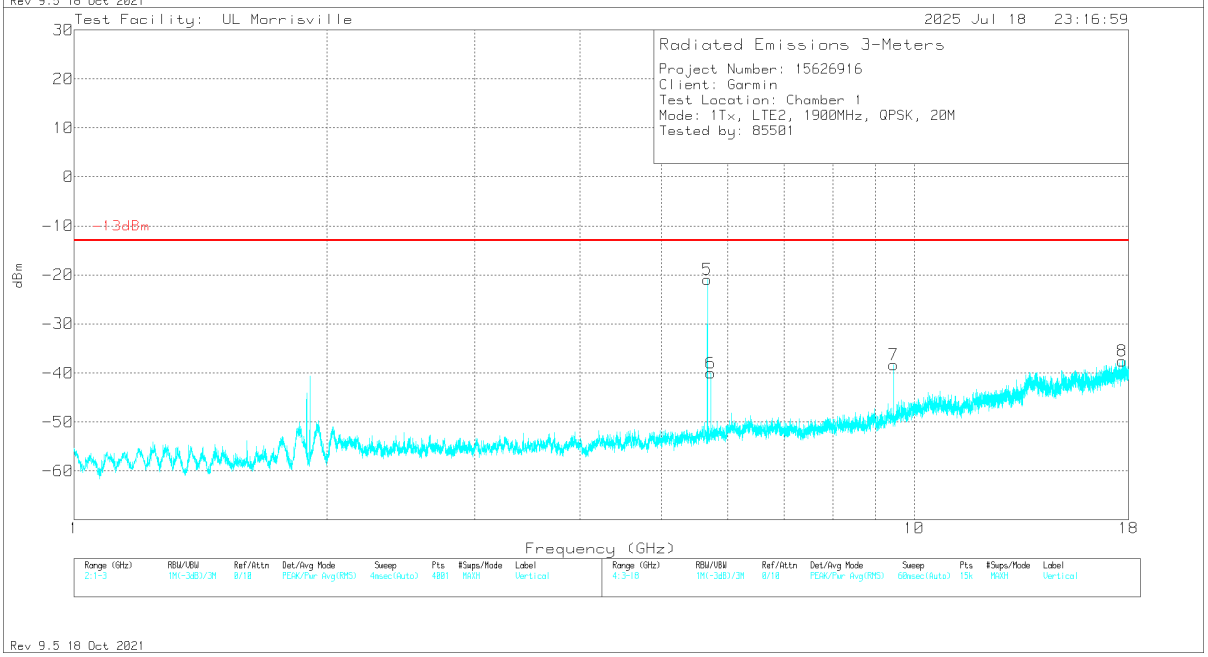


Marker	Frequency (GHz)	Meter Reading (dBm)	Det	135143 (dB/m)	Gain/Loss (dB)	CF (dB)	Filter (dB)	Corrected Reading dBm	-13dBm	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.5245	-39.85	Pk	28.1	-47.2	11.8	.9	-46.25	-13	-33.25	0-360	300	H
7	1.526	-43.6	Pk	28.1	-47.1	11.8	.9	-49.9	-13	-36.9	0-360	300	V
2	1.6095	-33.05	Pk	28.1	-48.1	11.8	1.3	-39.95	-13	-26.95	0-360	200	H
3	1.691	-34.84	Pk	28.7	-48.3	11.8	2	-40.64	-13	-27.64	0-360	101	H
4	5.614	-22.98	Pk	34.6	-43.3	11.8	0	-19.88	-13	-6.88	0-360	101	H
8	5.614	-28.9	Pk	34.6	-43.3	11.8	0	-25.8	-13	-12.8	0-360	200	V
5	5.666	-37.04	Pk	34.7	-43.9	11.8	0	-34.44	-13	-21.44	0-360	200	H
9	5.666	-43.57	Pk	34.7	-43.9	11.8	0	-40.97	-13	-27.97	0-360	101	V
6	9.358	-42.04	Pk	36.2	-41.4	11.8	0	-35.44	-13	-22.44	0-360	200	H
10	9.358	-39.83	Pk	36.2	-41.4	11.8	0	-33.23	-13	-20.23	0-360	200	V

Pk - Peak detector

QPSK LTE2 (20MHz, High Channel)





Marker	Frequency (GHz)	Meter Reading (dBm)	Det	135143 (dB/m)	Gain/Loss (dB)	CF (dB)	Filter (dB)	Corrected Reading dBm	-13dBm	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	5.674	-22.96	Pk	34.7	-44.1	11.8	0	-20.56	-13	-7.56	0-360	101	H
5	5.674	-23.34	Pk	34.7	-44.1	11.8	0	-20.94	-13	-7.94	0-360	101	V
2	5.726	-42.98	Pk	34.7	-42.8	11.8	0	-39.28	-13	-26.28	0-360	300	H
6	5.727	-43.75	Pk	34.7	-42.8	11.8	0	-40.05	-13	-27.05	0-360	101	V
3	9.458	-44.57	Pk	36.4	-41.7	11.8	0	-38.07	-13	-25.07	0-360	101	H
7	9.458	-44.87	Pk	36.4	-41.7	11.8	0	-38.37	-13	-25.37	0-360	101	V
8	17.683	-54.08	Pk	41.3	-36.6	11.8	0	-37.58	-13	-24.58	0-360	300	V
4	17.851	-55.13	Pk	41.4	-35.4	11.8	0	-37.33	-13	-24.33	0-360	300	H

Pk - Peak detector

8.1.1. LTE BAND 4

LIMITS

FCC: §27.53(h)
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB.

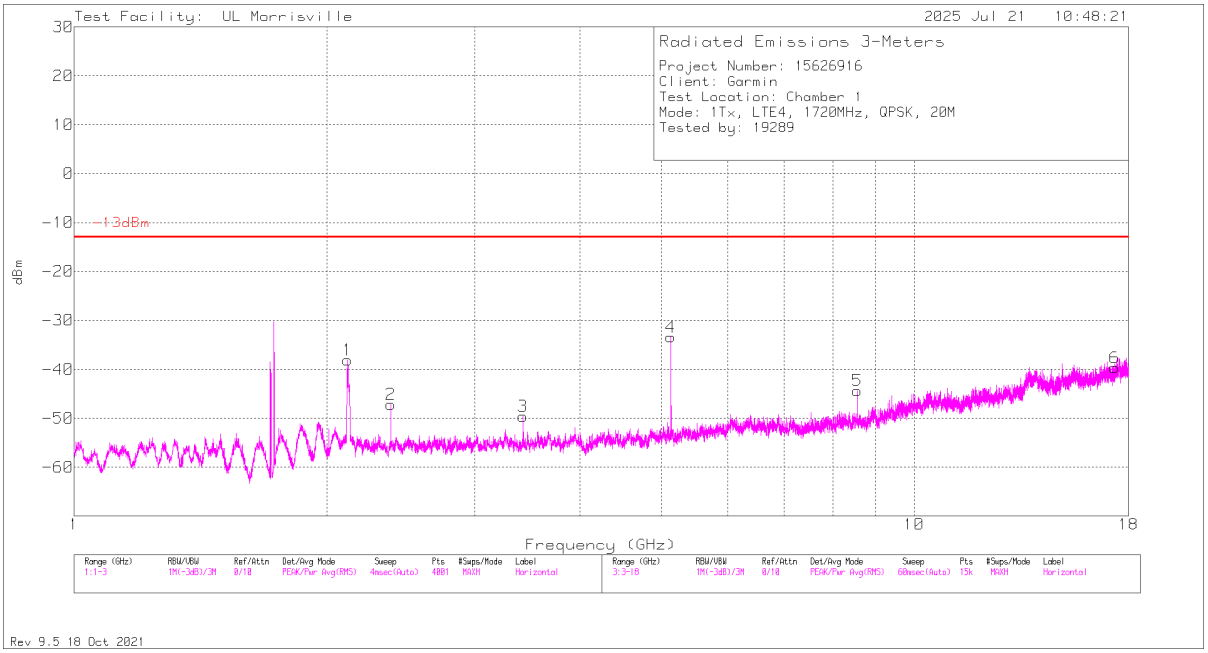
ISED: RSS139§5.6
Unwanted emissions shall be measured in terms of average values.
For all equipment, the TRP or total conducted power (sum of conducted power across all antenna connectors) of the unwanted emissions outside the frequency block or frequency block group shall not exceed the limits shown in table 4.

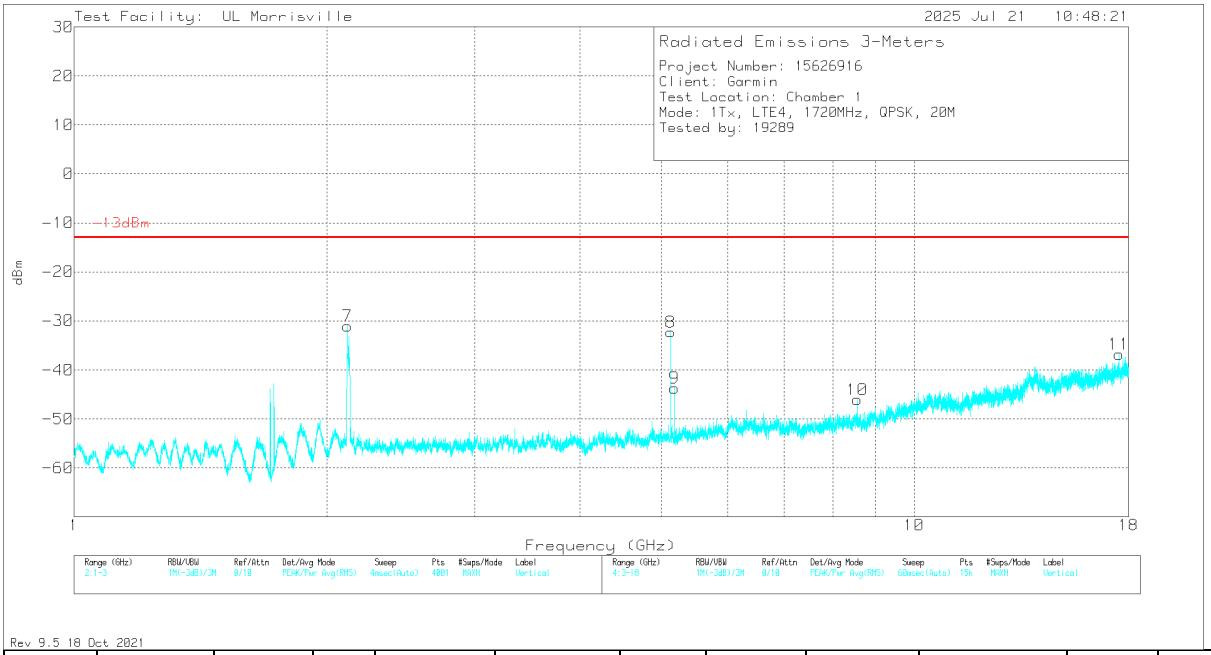
Table 6: Unwanted emission limits

Offset from the edge of the frequency block or frequency block group	Unwanted emission limits
≤1 MHz	-13 dBm/(1% of B*)
>1 MHz	-13 dBm/MHz

*B is the frequency block or frequency block group.

QPSK LTE4 (20MHz, Low Channel)

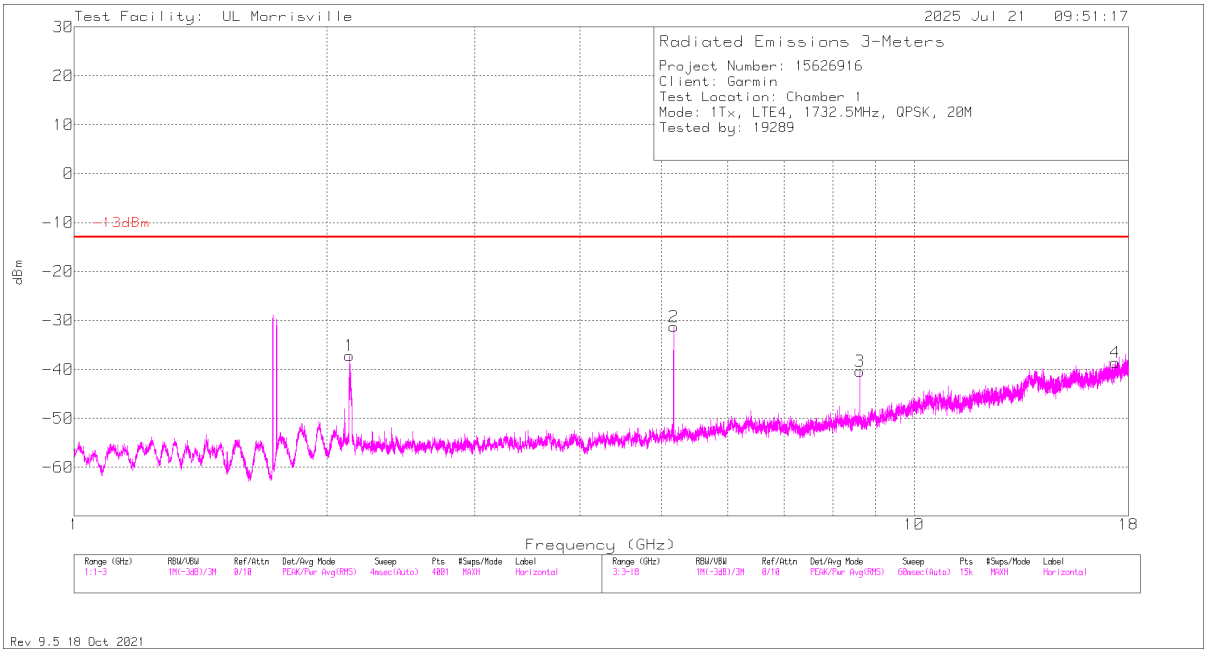


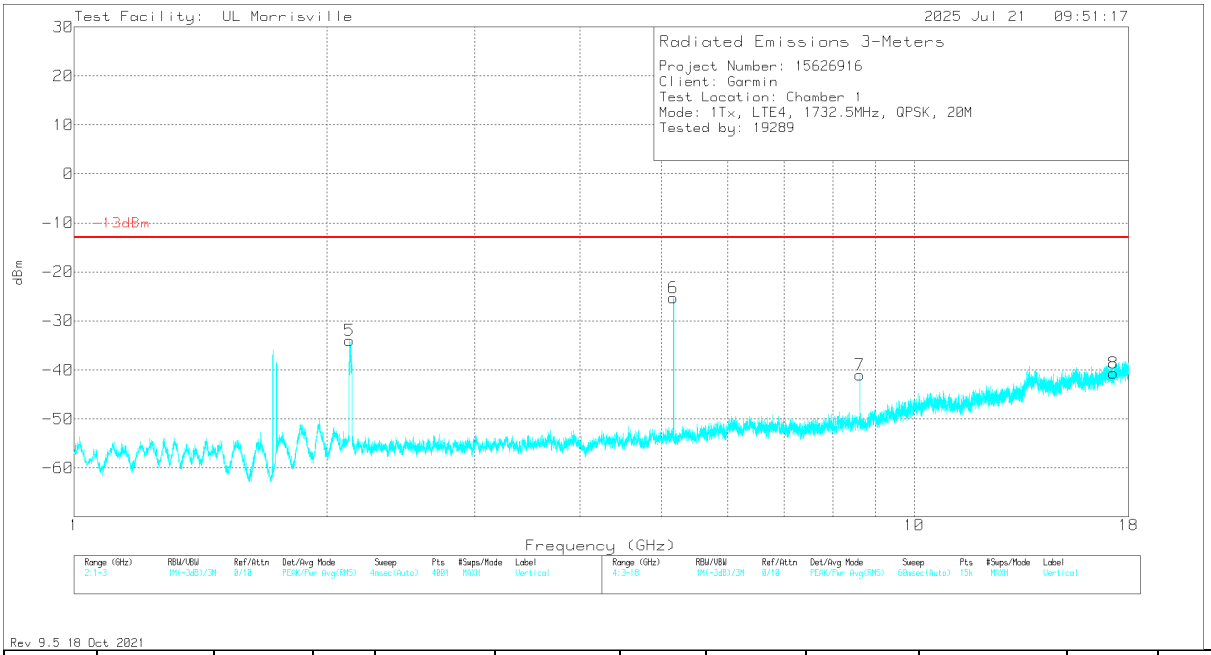


Marker	Frequency (GHz)	Meter Reading (dBm)	Det	135143 (dB/m)	Gain/Loss (dB)	CF (dB)	Filter (dB)	Corrected Reading dBm	-13dBm	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1*	2.1165	-35.21	Pk	31.7	-47.8	11.8	1.4	-38.11	-	-	0-360	100	H
7*	2.1165	-28.11	Pk	31.7	-47.8	11.8	1.4	-31.01	-	-	0-360	101	V
2	2.384	-42.53	Pk	31.9	-48.9	11.8	.6	-47.13	-13	-34.13	0-360	100	H
3	3.422	-49.96	Pk	32.8	-44.2	11.8	0	-49.56	-13	-36.56	0-360	101	H
4	5.134	-34.51	Pk	34.3	-45	11.8	0	-33.41	-13	-20.41	0-360	200	H
8	5.134	-33.36	Pk	34.3	-45	11.8	0	-32.26	-13	-19.26	0-360	300	V
9	5.187	-44.94	Pk	34.3	-44.9	11.8	0	-43.74	-13	-30.74	0-360	101	V
5	8.558	-50.2	Pk	35.8	-41.7	11.8	0	-44.3	-13	-31.3	0-360	101	H
10	8.558	-51.97	Pk	35.8	-41.7	11.8	0	-46.07	-13	-33.07	0-360	300	V
6	17.318	-57.37	Pk	41.2	-35.3	11.8	0	-39.67	-13	-26.67	0-360	299	H
11	17.548	-55.07	Pk	41.3	-34.8	11.8	0	-36.77	-13	-23.77	0-360	300	V

Pk - Peak detector *- Downlink

QPSK LTE4 (20MHz, Mid Channel)



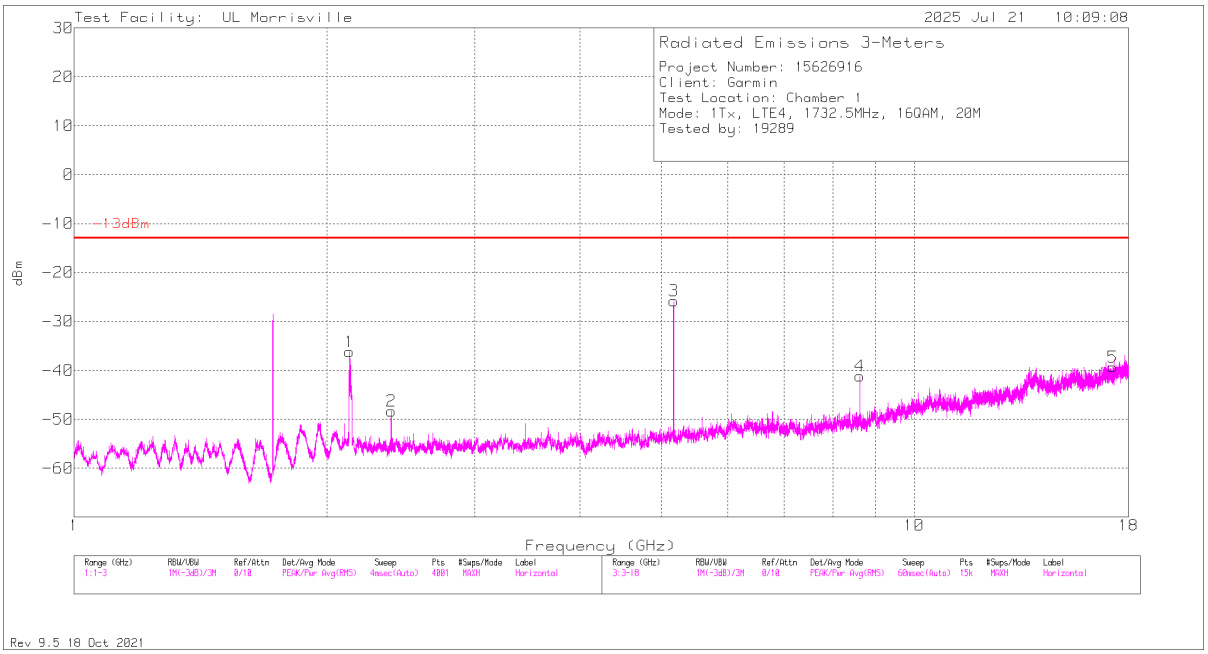


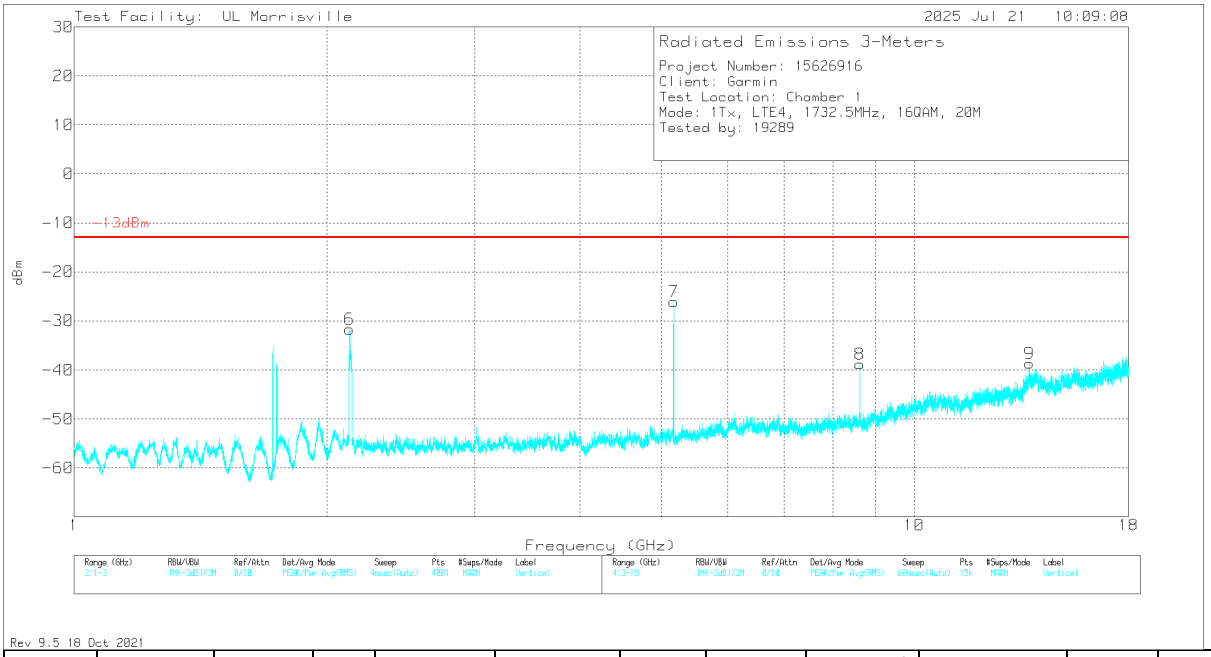
Marker	Frequency (GHz)	Meter Reading (dBm)	Det	135143 (dB/m)	Gain/Loss (dB)	CF (dB)	Filter (dB)	Corrected Reading dBm	-13dBm	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1*	2.129	-34	Pk	31.7	-48	11.8	1.3	-37.2	-	-	0-360	300	H
5*	2.129	-30.75	Pk	31.7	-48	11.8	1.3	-33.95	-	-	0-360	100	V
6	5.171	-26.33	Pk	34.3	-45.1	11.8	0	-25.33	-13	-12.33	0-360	101	V
2	5.172	-32.04	Pk	34.3	-45.3	11.8	0	-31.24	-13	-18.24	0-360	300	H
3	8.62	-46.28	Pk	35.7	-41.6	11.8	0	-40.38	-13	-27.38	0-360	101	H
7	8.62	-46.89	Pk	35.7	-41.6	11.8	0	-40.99	-13	-27.99	0-360	101	V
8	17.274	-57.63	Pk	41.2	-36	11.8	0	-40.63	-13	-27.63	0-360	199	V
4	17.372	-55.71	Pk	41.2	-35.9	11.8	0	-38.61	-13	-25.61	0-360	101	H

Pk - Peak detector

*- Downlink

16QAM LTE4 (20MHz, Mid Channel)



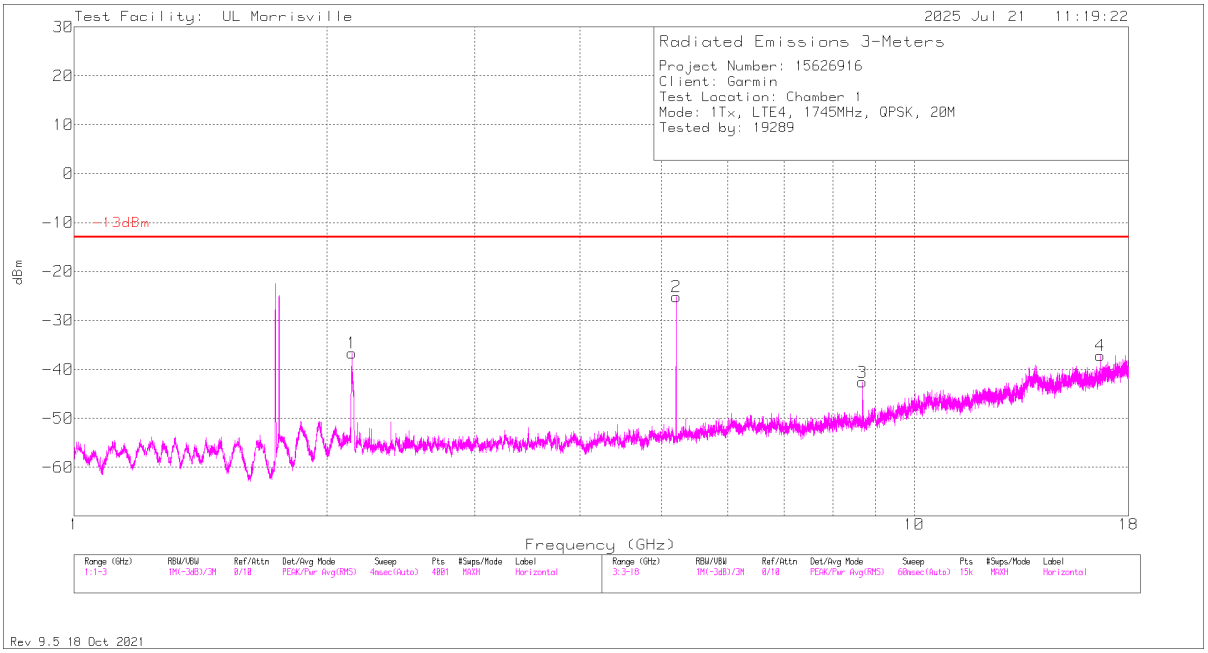


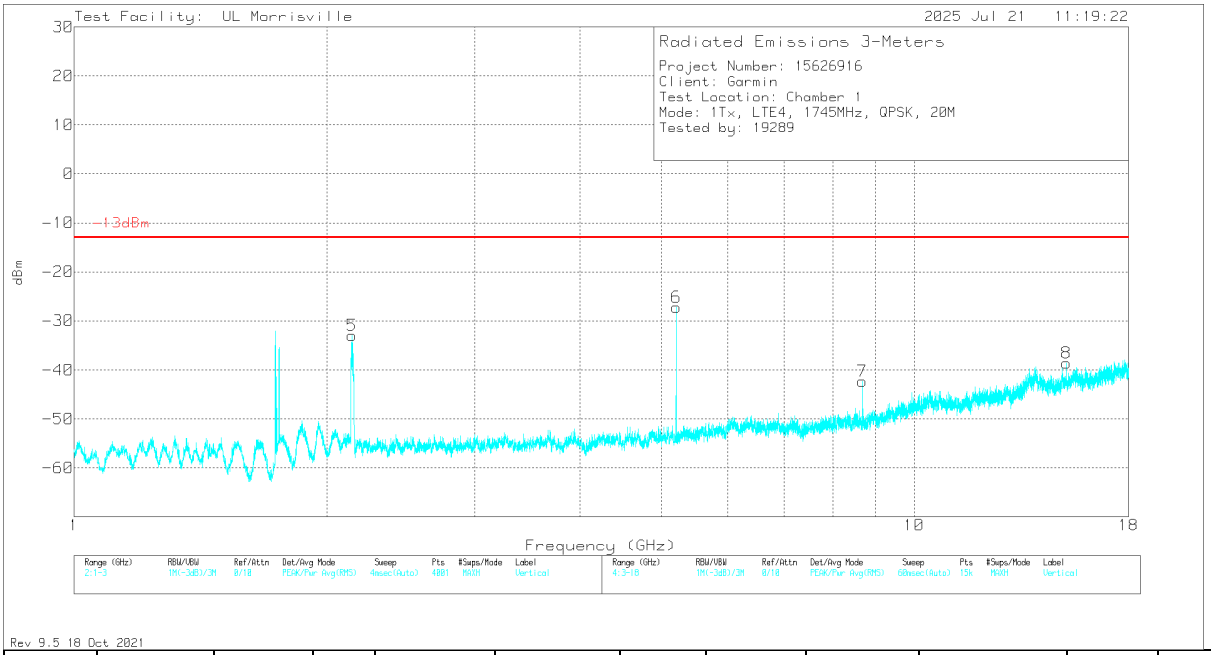
Marker	Frequency (GHz)	Meter Reading (dBm)	Det	135143 (dB/m)	Gain/Loss (dB)	CF (dB)	Filter (dB)	Corrected Reading dBm	-13dBm	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1*	2.129	-33.01	Pk	31.7	-48	11.8	1.3	-36.21	-	-	0-360	100	H
6*	2.129	-28.44	Pk	31.7	-48	11.8	1.3	-31.64	-	-	0-360	101	V
2	2.385	-43.75	Pk	31.9	-48.9	11.8	.6	-48.35	-13	-35.35	0-360	100	H
3	5.172	-26.55	Pk	34.3	-45.3	11.8	0	-25.75	-13	-12.75	0-360	101	H
7	5.172	-26.85	Pk	34.3	-45.3	11.8	0	-26.05	-13	-13.05	0-360	300	V
4	8.62	-47	Pk	35.7	-41.6	11.8	0	-41.1	-13	-28.1	0-360	300	H
8	8.62	-44.69	Pk	35.7	-41.6	11.8	0	-38.79	-13	-25.79	0-360	101	V
9	13.713	-54.16	Pk	39	-35.3	11.8	0	-38.66	-13	-25.66	0-360	200	V
5	17.23	-56.2	Pk	41.2	-36.1	11.8	0	-39.3	-13	-26.3	0-360	101	H

Pk - Peak detector

*- Downlink

QPSK LTE4 (20MHz, High Channel)





Marker	Frequency (GHz)	Meter Reading (dBm)	Det	135143 (dB/m)	Gain/Loss (dB)	CF (dB)	Filter (dB)	Corrected Reading dBm	-13dBm	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
5*	2.141	-29.17	Pk	31.6	-48.5	11.8	1.3	-32.97	-	-	0-360	101	V
1*	2.1415	-32.98	Pk	31.6	-48.4	11.8	1.3	-36.68	-	-	0-360	300	H
2	5.21	-26.4	Pk	34.3	-44.8	11.8	0	-25.1	-13	-12.1	0-360	101	H
6	5.21	-28.45	Pk	34.3	-44.8	11.8	0	-27.15	-13	-14.15	0-360	300	V
7	8.683	-48.05	Pk	35.7	-41.8	11.8	0	-42.35	-13	-29.35	0-360	101	V
3	8.684	-48.42	Pk	35.7	-41.7	11.8	0	-42.62	-13	-29.62	0-360	101	H
8	15.194	-53.32	Pk	40.2	-37.3	11.8	0	-38.62	-13	-25.62	0-360	200	V
4	16.653	-53.31	Pk	40.7	-36.4	11.8	0	-37.21	-13	-24.21	0-360	299	H

Pk - Peak detector

*- Downlink

8.1.2. LTE BAND 12

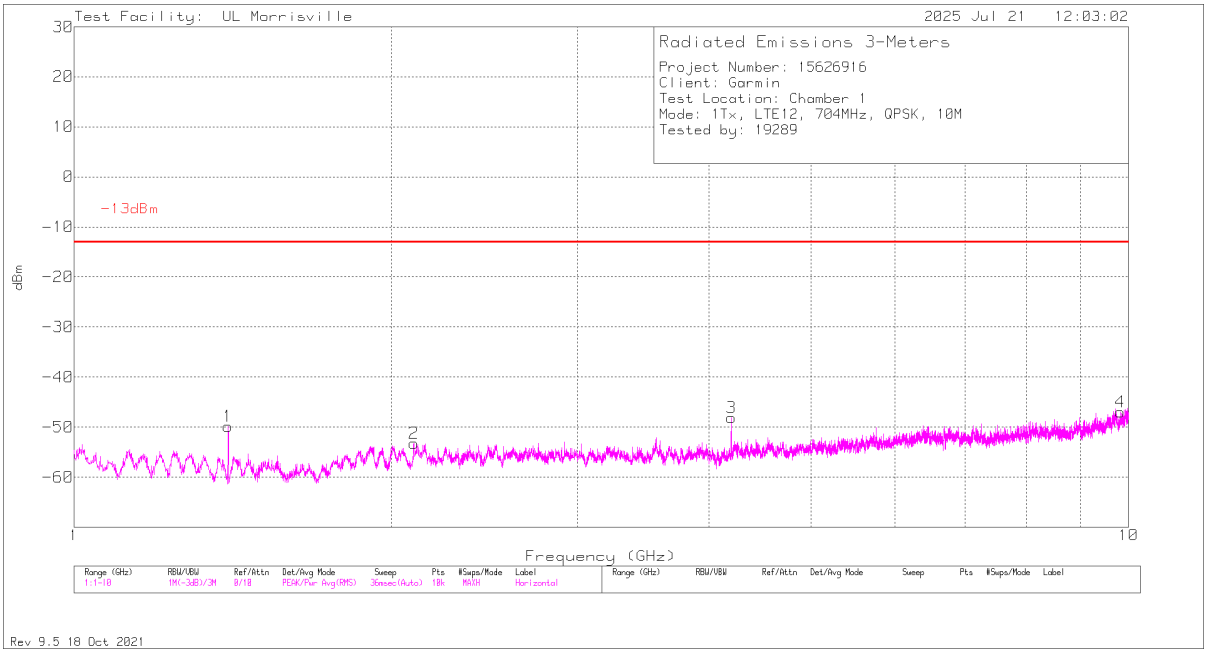
LIMITS

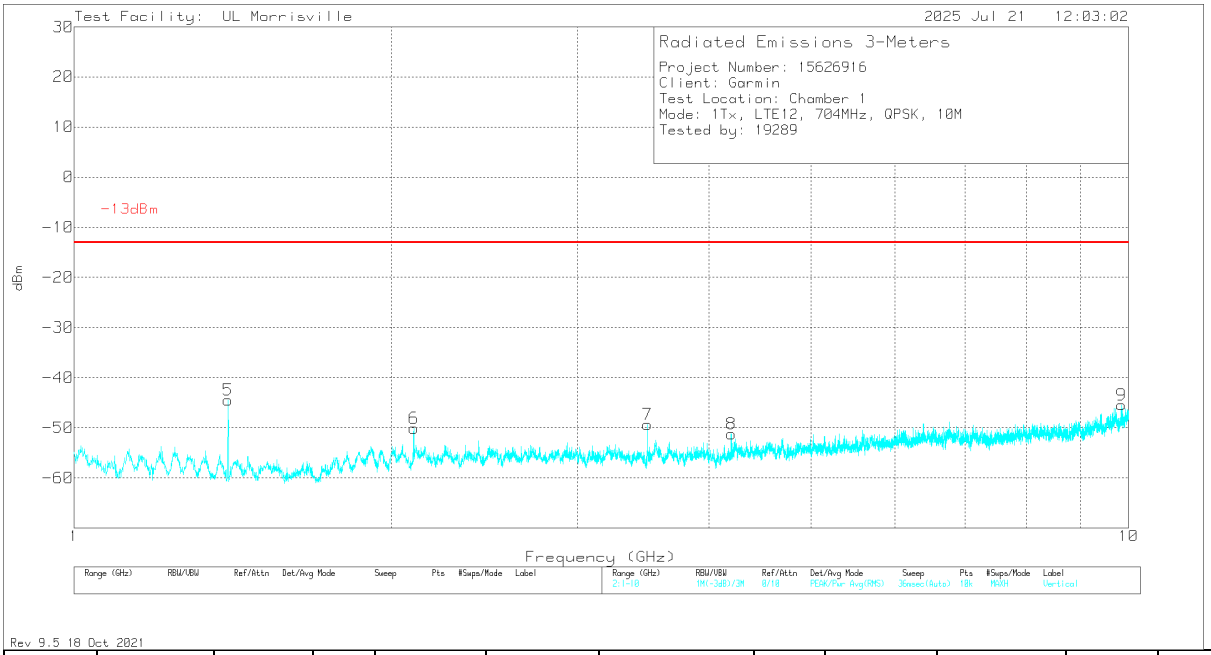
FCC: §27.53 (g)
The power of any emissio outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB.

ISED: RSS130§4.7

The minimum permissible attenuation level of any spurious emissions is 43 + 10 log (P) dB where transmitting power (P) in Watts.

QPSK LTE12 (10MHz, Low Channel)

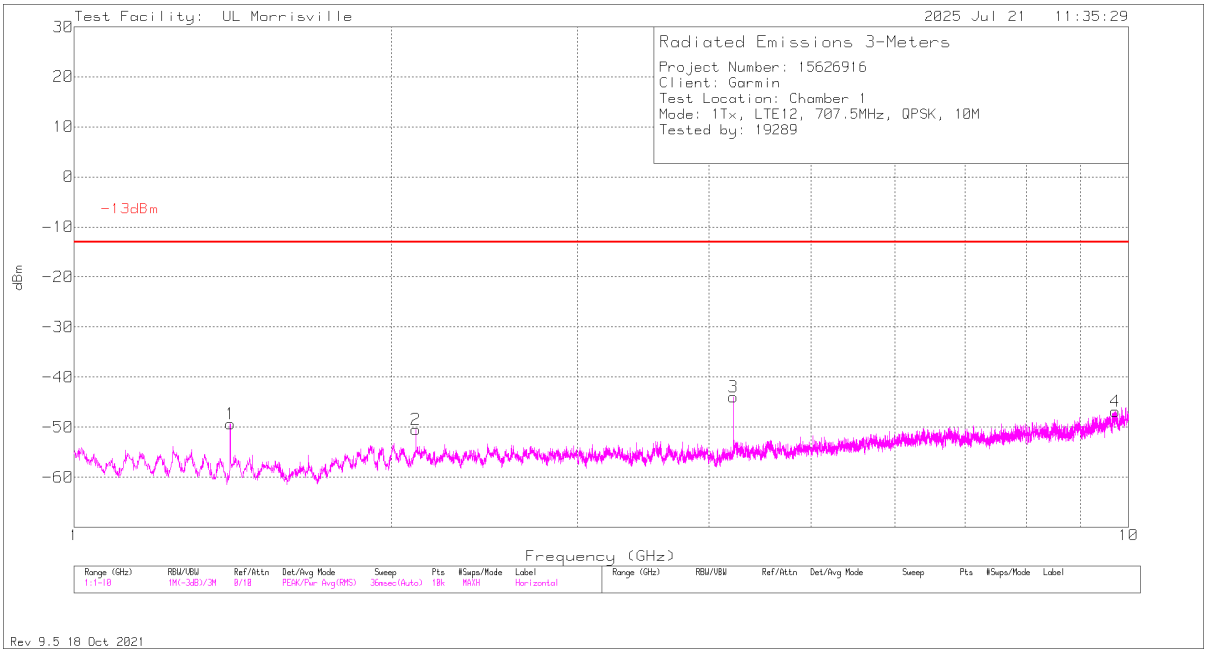


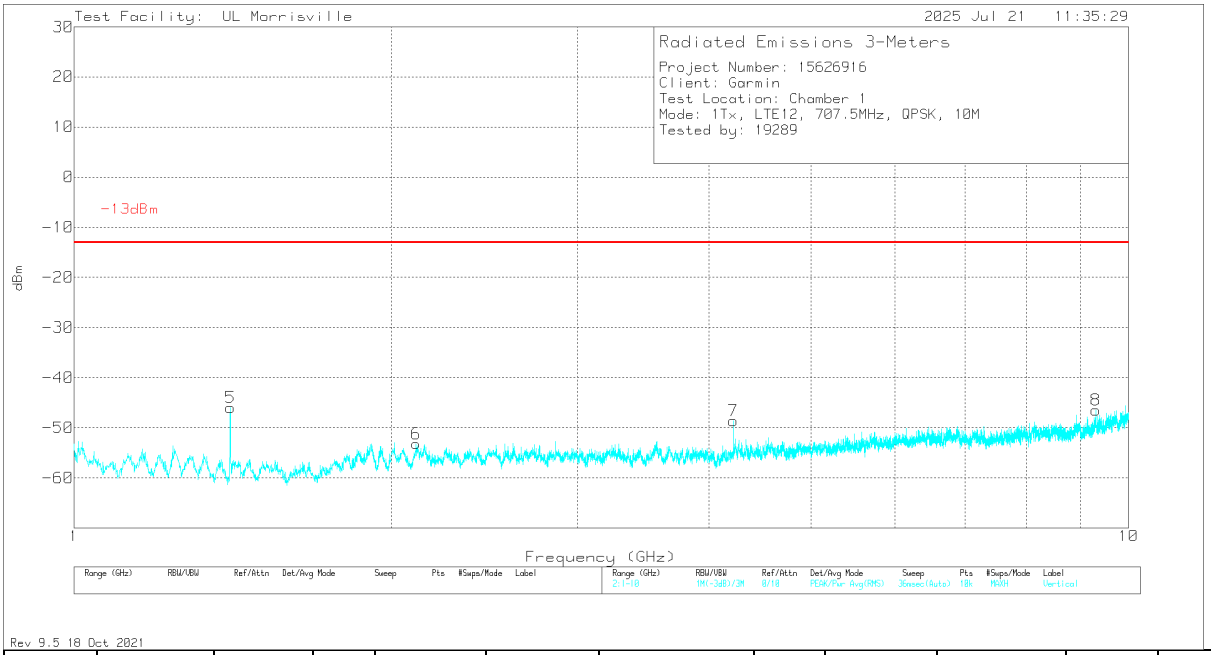


Marker	Frequency (GHz)	Meter Reading (dBm)	Det	135143 (dB/m)	Gain/Loss (dB)	Filter (dB)	CF (dB)	Corrected Reading dBm	-13dBm	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
5	1.3987	-37.29	Pk	28.7	-48.2	.5	11.8	-44.49	-13	-31.49	0-360	101	V
1	1.3996	-42.57	Pk	28.7	-48.3	.5	11.8	-49.87	-13	-36.87	0-360	200	H
2	2.0998	-48.19	Pk	31.7	-48.9	.4	11.8	-53.19	-13	-40.19	0-360	101	H
6	2.0998	-45.08	Pk	31.7	-48.9	.4	11.8	-50.08	-13	-37.08	0-360	101	V
7	3.4993	-49.26	Pk	32.9	-45	.2	11.8	-49.36	-13	-36.36	0-360	101	V
3	4.1995	-46.61	Pk	33.6	-47.2	.3	11.8	-48.11	-13	-35.11	0-360	101	H
8	4.1995	-49.72	Pk	33.6	-47.2	.3	11.8	-51.22	-13	-38.22	0-360	101	V
4	9.8272	-54.68	Pk	37.3	-42.1	.7	11.8	-46.98	-13	-33.98	0-360	200	H
9	9.8524	-54.12	Pk	37.3	-41	.6	11.8	-45.42	-13	-32.42	0-360	300	V

Pk - Peak detector

QPSK LTE12 (10MHz, Mid Channel)

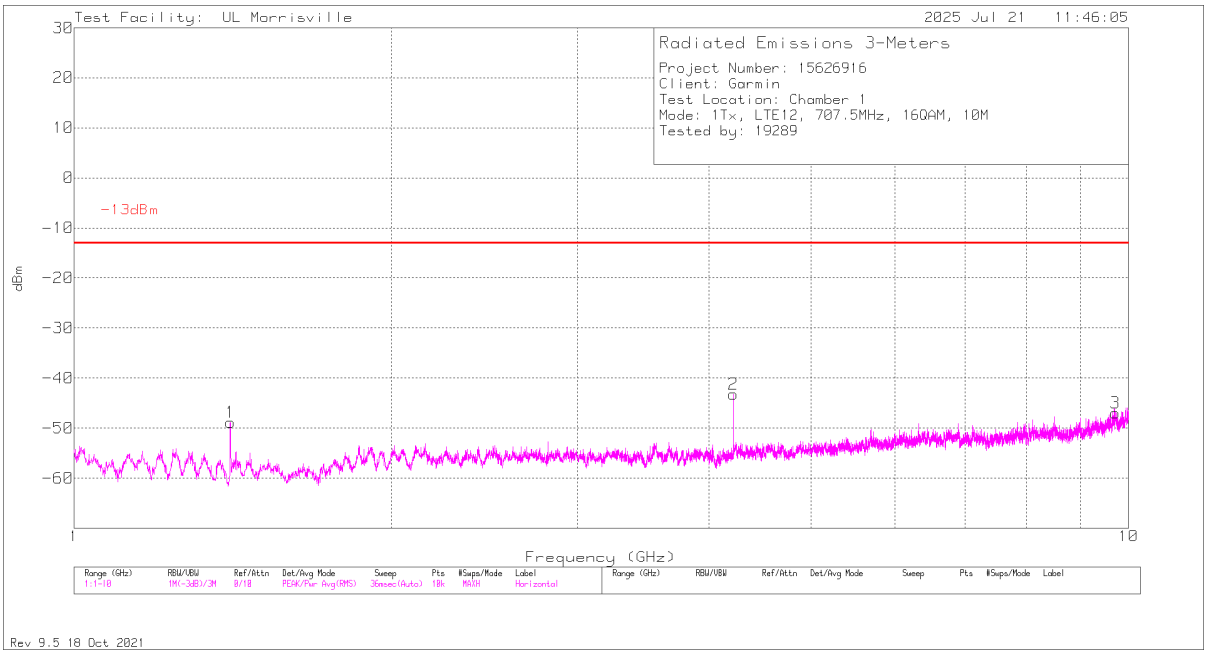


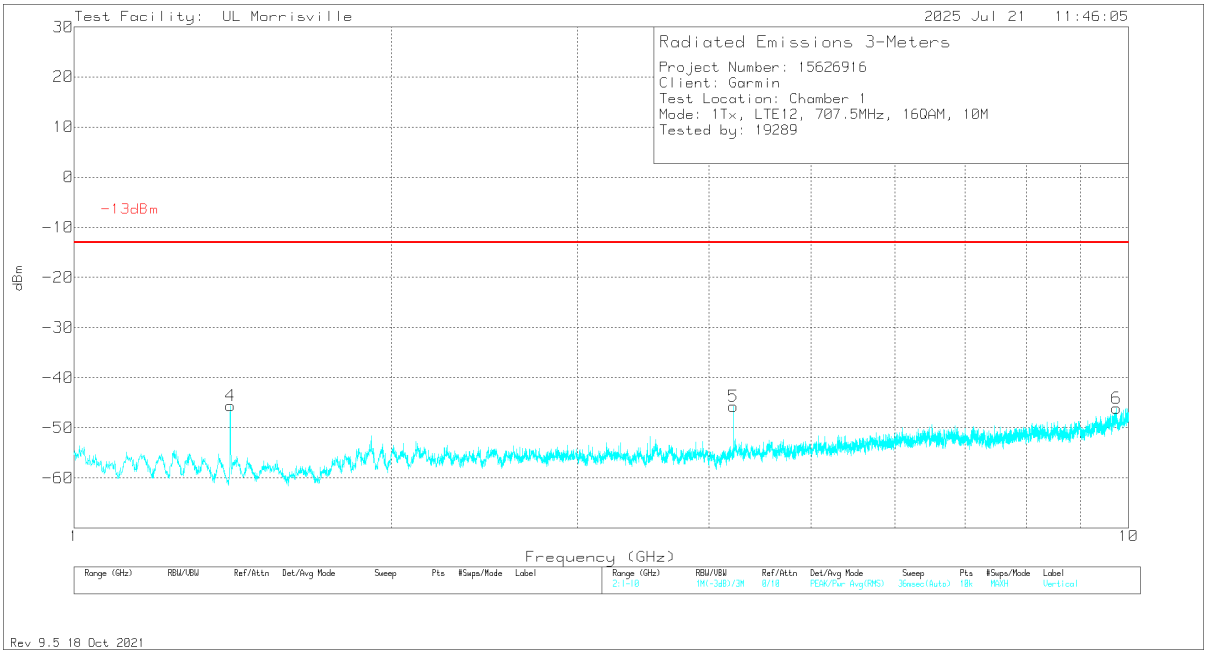


Marker	Frequency (GHz)	Meter Reading (dBm)	Det	135143 (dB/m)	Gain/Loss (dB)	Filter (dB)	CF (dB)	Corrected Reading dBm	-13dBm	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.4068	-42.45	Pk	28.7	-47.9	.5	11.8	-49.35	-13	-36.35	0-360	101	H
5	1.4068	-39.03	Pk	28.7	-47.9	.5	11.8	-45.93	-13	-32.93	0-360	300	V
2	2.1097	-46.13	Pk	31.7	-48.2	.4	11.8	-50.43	-13	-37.43	0-360	299	H
6	2.1106	-48.88	Pk	31.7	-48.2	.4	11.8	-53.18	-13	-40.18	0-360	200	V
3	4.2202	-42.89	Pk	33.6	-46.8	.3	11.8	-43.99	-13	-30.99	0-360	101	H
7	4.2202	-47.54	Pk	33.6	-46.8	.3	11.8	-48.64	-13	-35.64	0-360	101	V
8	9.3097	-54.38	Pk	36.1	-40.5	.5	11.8	-46.48	-13	-33.48	0-360	300	V
4	9.7102	-55.58	Pk	36.9	-40.7	.7	11.8	-46.88	-13	-33.88	0-360	199	H

Pk - Peak detector

16QAM LTE12 (10MHz, Mid Channel)

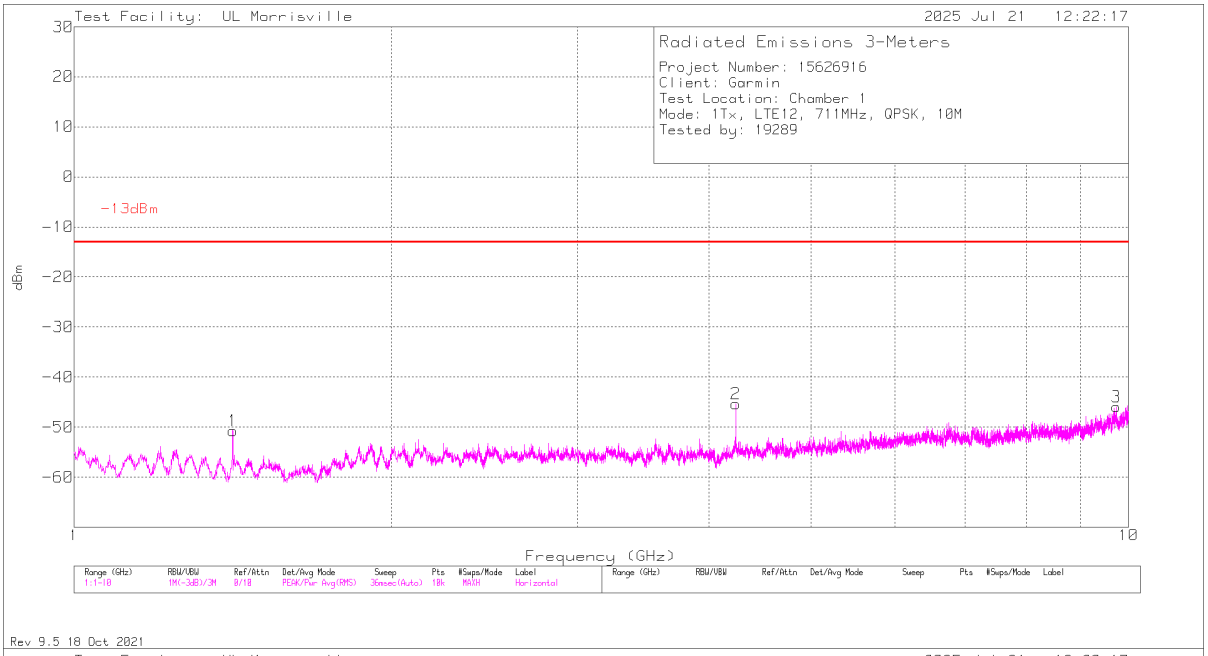


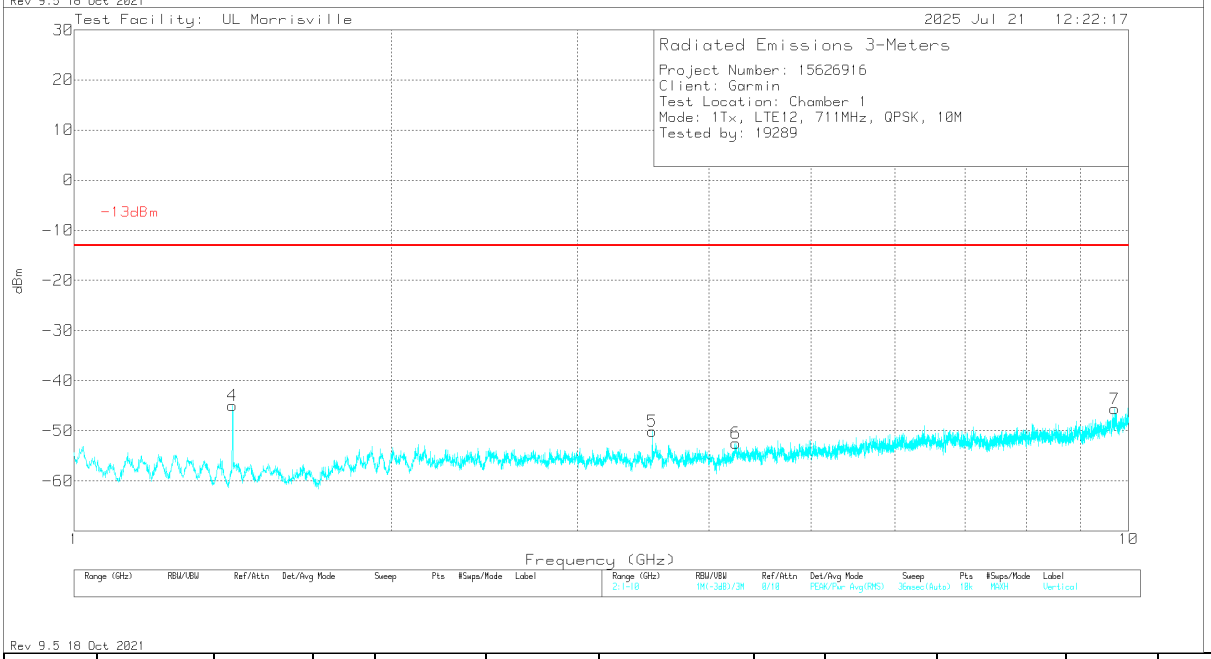


Marker	Frequency (GHz)	Meter Reading (dBm)	Det	135143 (dB/m)	Gain/Loss (dB)	Filter (dB)	CF (dB)	Corrected Reading dBm	-13dBm	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.4068	-42	Pk	28.7	-47.9	.5	11.8	-48.9	-13	-35.9	0-360	200	H
4	1.4068	-38.69	Pk	28.7	-47.9	.5	11.8	-45.59	-13	-32.59	0-360	299	V
5	4.2202	-44.61	Pk	33.6	-46.8	.3	11.8	-45.71	-13	-32.71	0-360	201	V
2	4.2211	-42.15	Pk	33.6	-46.8	.3	11.8	-43.25	-13	-30.25	0-360	101	H
3	9.7201	-55.35	Pk	36.9	-40.8	.5	11.8	-46.95	-13	-33.95	0-360	299	H
6	9.7372	-54.86	Pk	37	-40.5	.5	11.8	-46.06	-13	-33.06	0-360	299	V

Pk - Peak detector

QPSK LTE12 (10MHz, High Channel)





Marker	Frequency (GHz)	Meter Reading (dBm)	Det	135143 (dB/m)	Gain/Loss (dB)	Filter (dB)	CF (dB)	Corrected Reading dBm	-13dBm	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	1.4131	-38.45	Pk	28.7	-47.5	.5	11.8	-44.95	-13	-31.95	0-360	200	V
1	1.414	-44.11	Pk	28.7	-47.6	.5	11.8	-50.71	-13	-37.71	0-360	101	H
5	3.5344	-49.49	Pk	32.9	-45.7	.4	11.8	-50.09	-13	-37.09	0-360	101	V
2	4.2409	-44.95	Pk	33.7	-46.2	.3	11.8	-45.35	-13	-32.35	0-360	101	H
6	4.2409	-52.09	Pk	33.7	-46.2	.3	11.8	-52.49	-13	-39.49	0-360	200	V
7	9.7039	-53.85	Pk	36.9	-41.1	.6	11.8	-45.65	-13	-32.65	0-360	300	V
3	9.7363	-54.62	Pk	37	-40.6	.5	11.8	-45.92	-13	-32.92	0-360	101	H

Pk - Peak detector

8.2. WORST CASE EMISSIONS

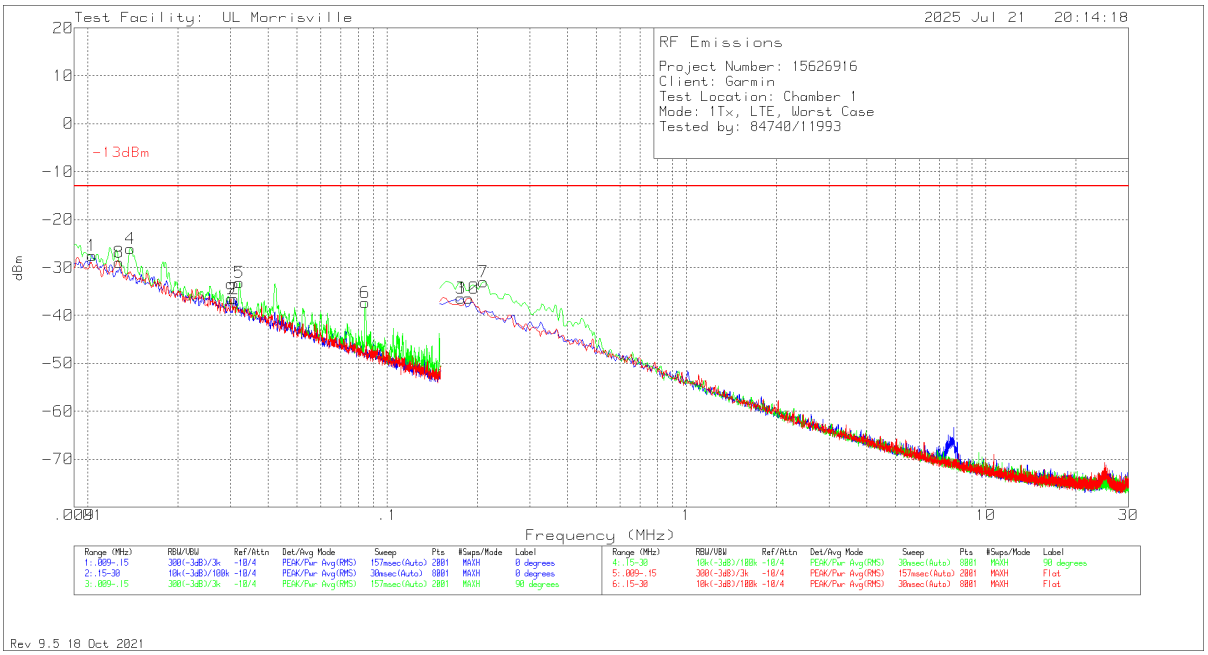
RULE PART(S)
FCC: §2.1053, FCC: §27.53 (g)

LIMITS
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB.

TEST PROCEDURE
KDB 971168 D01 v02r02/D02 v01

RESULTS

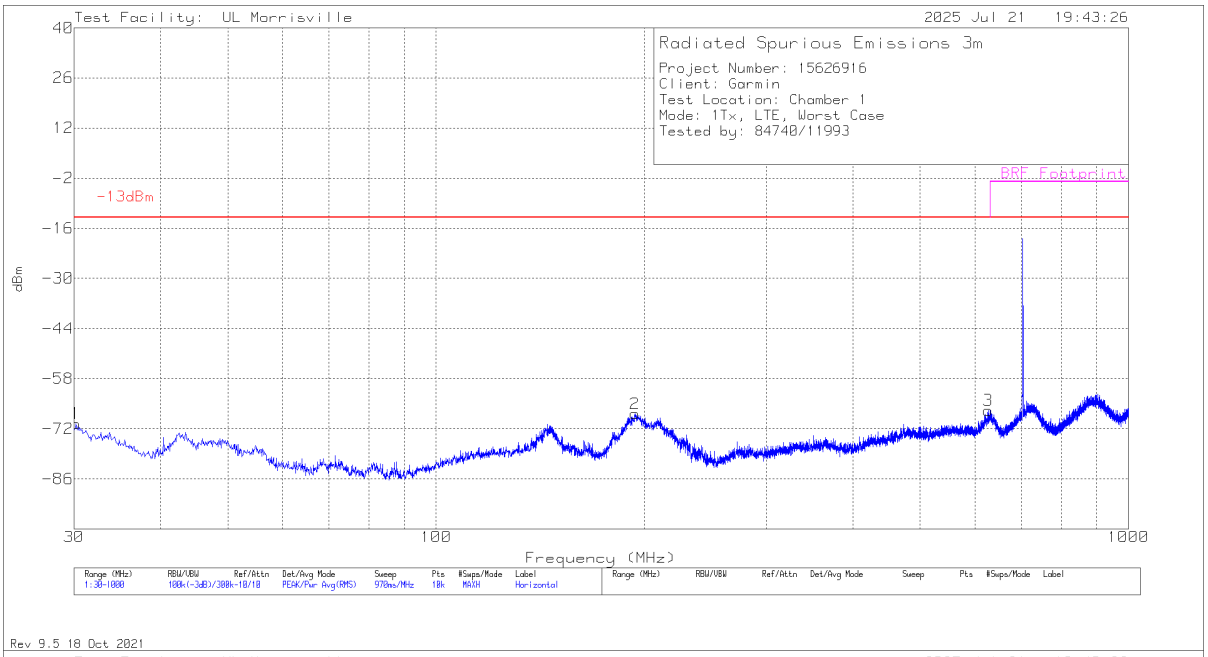
8.2.1. 9kHz – 30MHz Worst-Case Emissions

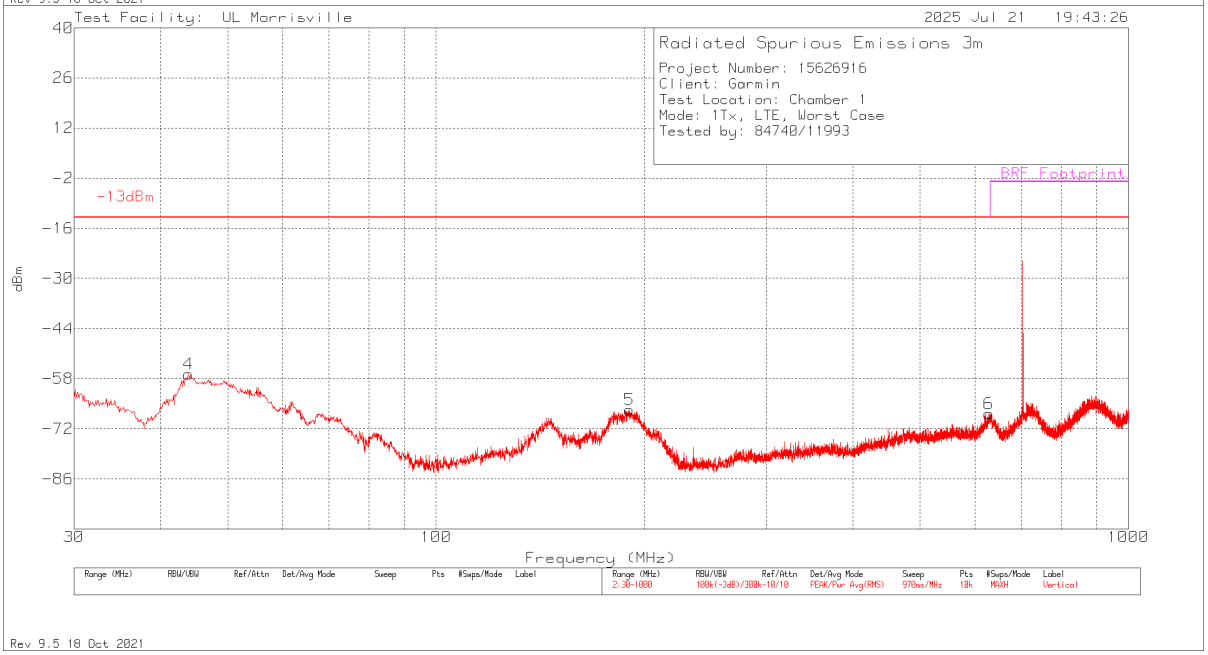


Marker	Frequency (MHz)	Meter Reading (dBm)	Det	ANT (dB/m)	Gain/Loss (dB)	Conversion Factor (dB)	Corrected Reading dBm	-13dBm	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Loop Angle
1	.01035	-58.24	Pk	18.8	.1	11.8	-27.54	-13	-14.54	0-360	404	0 degs
8	.01269	-58.41	Pk	17.6	.1	11.8	-28.91	-13	-15.91	0-360	404	Flat
4	.0139	-54.92	Pk	17	.1	11.8	-26.02	-13	-13.02	0-360	404	90 degs
9	.03009	-61.58	Pk	13.1	.1	11.8	-36.58	-13	-23.58	0-360	404	Flat
2	.0308	-61.5	Pk	13.1	.1	11.8	-36.5	-13	-23.5	0-360	404	0 degs
5	.03208	-58.01	Pk	13	.1	11.8	-33.11	-13	-20.11	0-360	404	90 degs
6	.08433	-60.39	Pk	11.2	.1	11.8	-37.29	-13	-24.29	0-360	404	90 degs
3	.17612	-59.28	Pk	11	.1	11.8	-36.38	-13	-23.38	0-360	404	0 degs
10	.18731	-59.29	Pk	11	.1	11.8	-36.39	-13	-23.39	0-360	404	Flat
7	.2097	-55.76	Pk	10.9	.1	11.8	-32.96	-13	-19.96	0-360	404	90 degs

Pk - Peak detector

8.2.2. 30MHz – 1000MHz Worst-Case Emissions

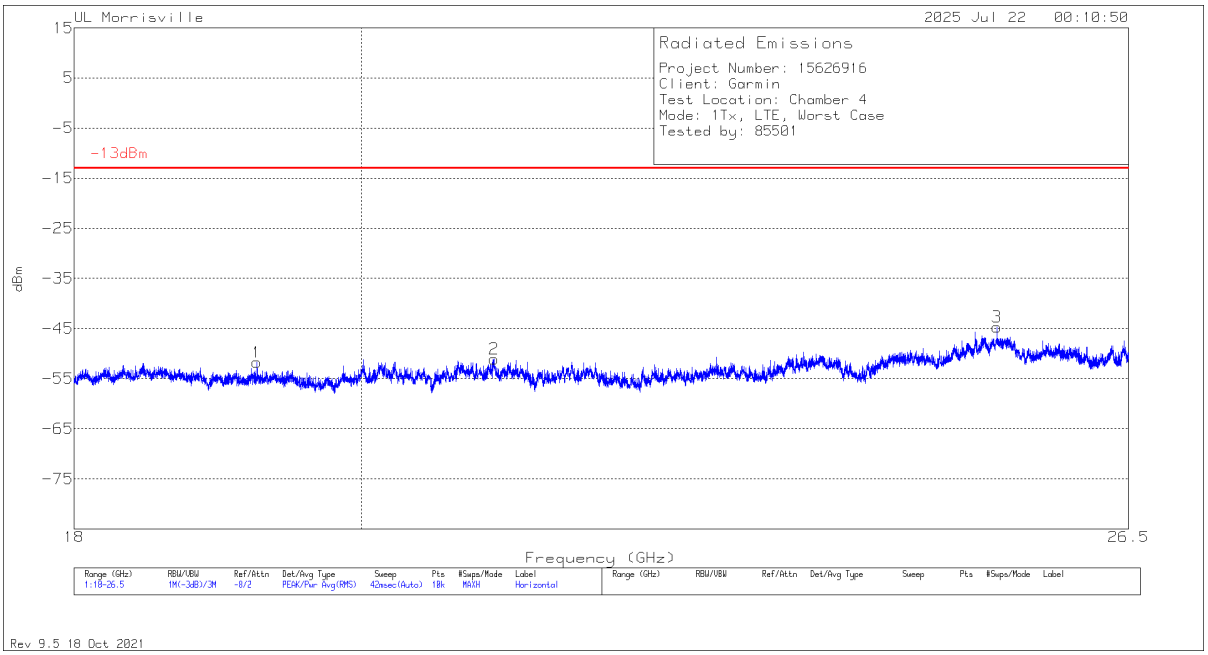


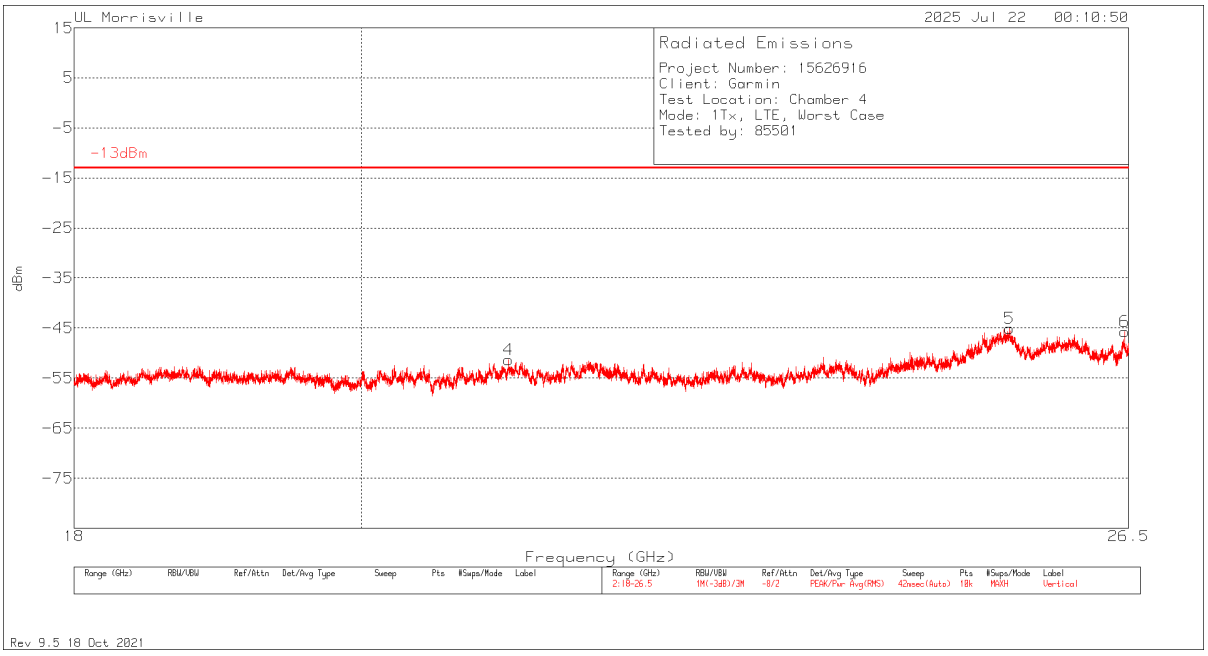


Marker	Frequency (MHz)	Meter Reading (dBm)	Det	90629 (dB/m)	Gain/Loss (dB)	Filter (dB)	Conversion Factor (dB)	Corrected Reading dBm	-13dBm	Margin (dB)	BRF Footprint	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	30.194	-77.88	Pk	26.8	-31.4	.1	11.8	-70.58	-13	-57.58	-	-	0-360	199	H
4	43.871	-54.4	Pk	17	-31.3	.2	11.8	-56.7	-13	-43.7	-	-	0-360	100	V
5	190.341	-66.46	Pk	17.9	-30.3	.3	11.8	-66.76	-13	-53.76	-	-	0-360	100	V
2	193.833	-68.74	Pk	18.3	-29.5	.3	11.8	-67.84	-13	-54.84	-	-	0-360	99	H
3	627.617	-77.92	Pk	25.7	-28.4	2	11.8	-66.82	-13	-53.82	-	-	0-360	199	H
6	628.005	-79	Pk	25.7	-28.3	2	11.8	-67.8	-13	-54.8	-	-	0-360	100	V

Pk - Peak detector

8.2.3. 18GHz – 26.5GHz Worst-Case Emissions



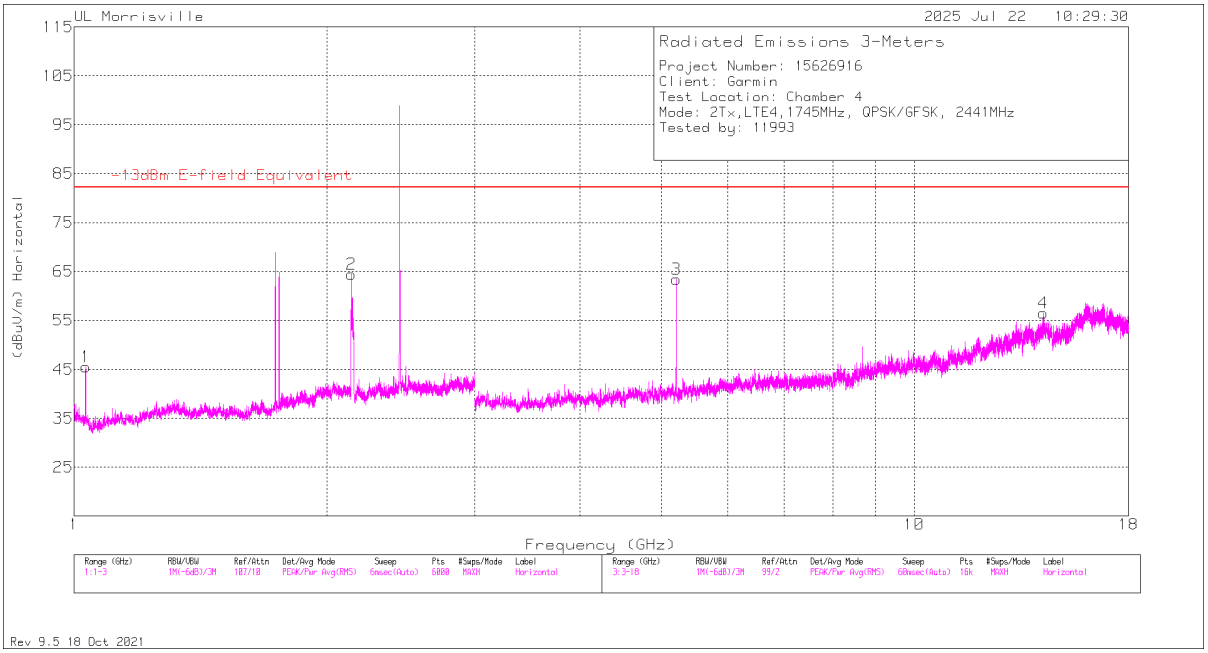


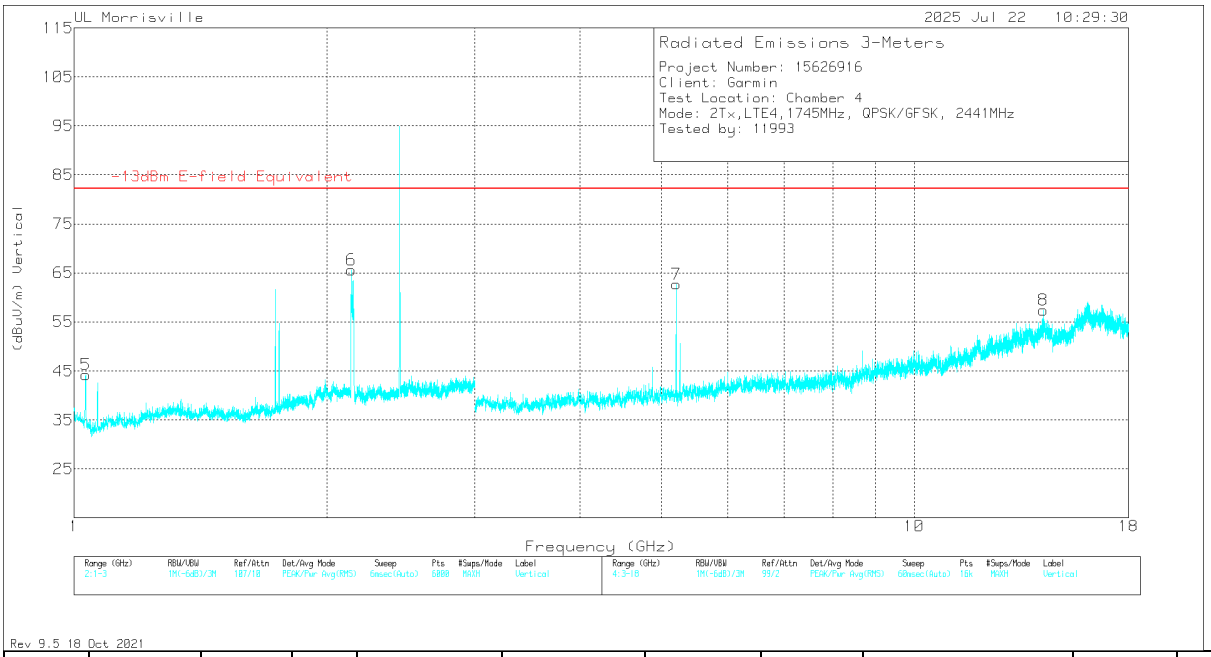
Marker	Frequency (GHz)	Meter Reading (dBm)	Det	91186 (dB/m)	Gain/Loss (dB)	Conversion Factor (dB)	Corrected Reading dBm	-13dBm	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	19.24853	-56.67	Pk	32.6	-39.5	11.8	-51.77	-13	-38.77	0-360	150	H
2	20.9985	-57.27	Pk	32.9	-38.5	11.8	-51.07	-13	-38.07	0-360	200	H
4	21.10984	-56.92	Pk	32.8	-39	11.8	-51.32	-13	-38.32	0-360	300	V
3	25.25317	-57.53	Pk	34.3	-33.3	11.8	-44.73	-13	-31.73	0-360	250	H
5	25.36536	-59.31	Pk	34.1	-31.7	11.8	-45.11	-13	-32.11	0-360	200	V
6	26.46515	-59.14	Pk	34.7	-33.1	11.8	-45.74	-13	-32.74	0-360	250	V

Pk - Peak detector

8.3. SIMULTANEOUS TRANSMISSION

SCAN 1: LTE4_1745_QPSK_20M_RB2_+ BT BDR GFSK_2441

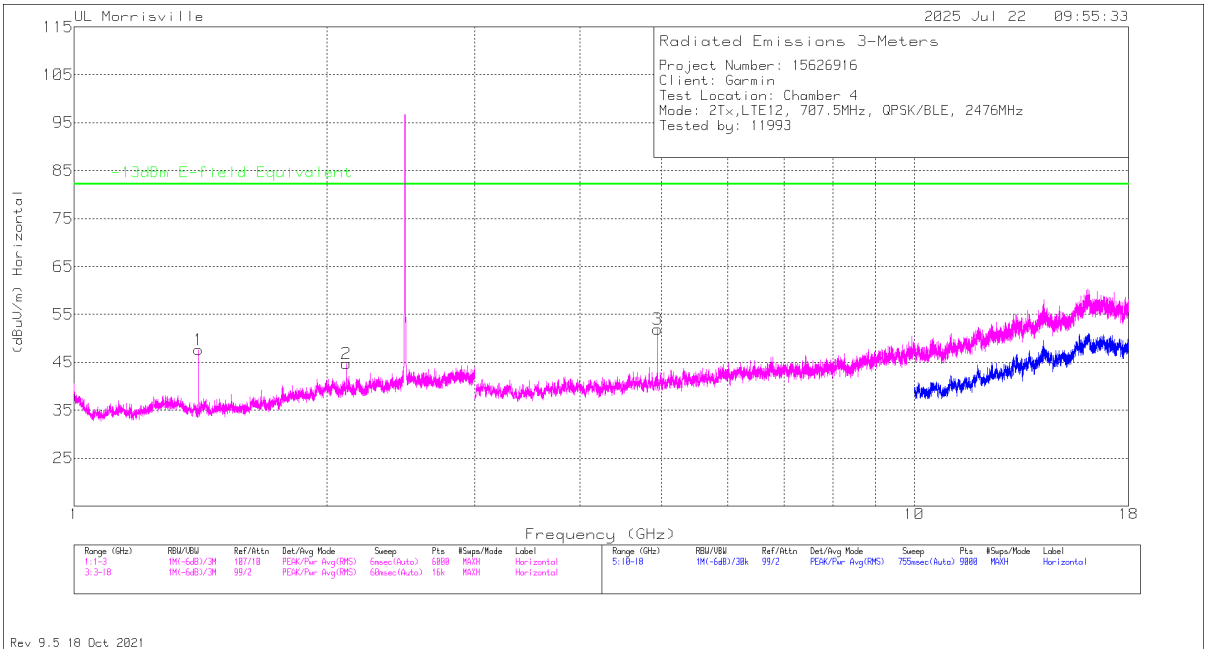


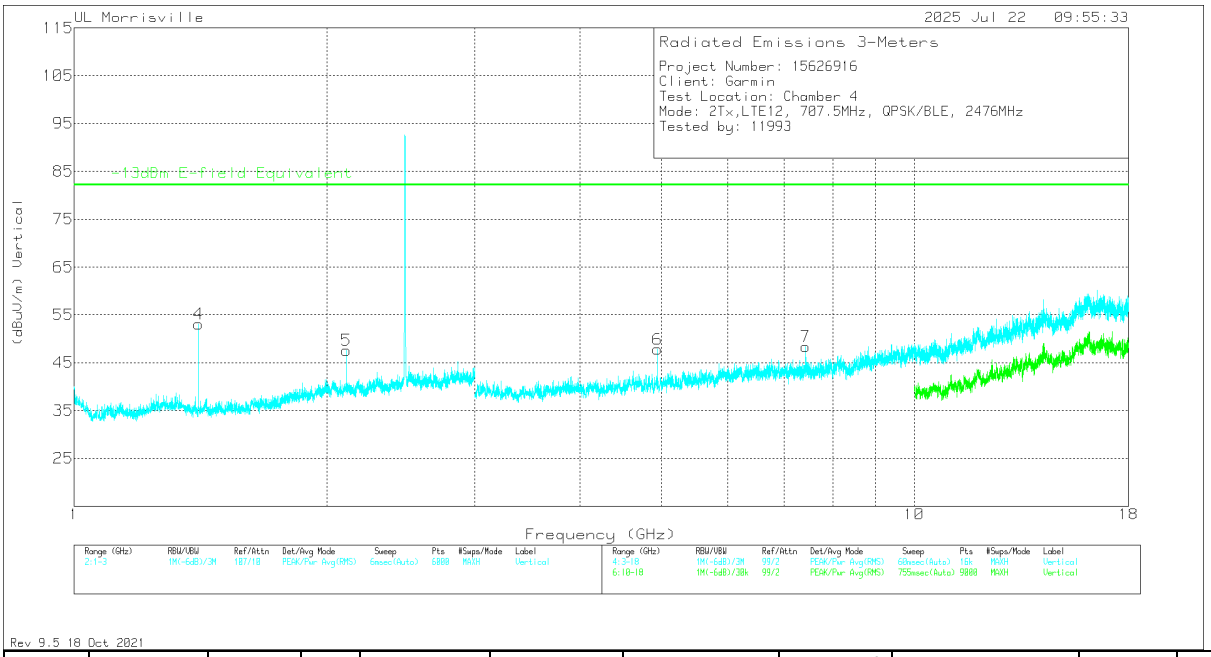


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	206211 (dB/m)	Gain/Loss (dB)	Filter (dB)	Corrected Reading (dBuV/m)	-13dBm E-field Equivalent	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.03201	43	Pk	26.8	-25.1	.8	45.5	82.2	-36.7	0-360	100	H
5	1.03234	41.71	Pk	26.8	-25.1	.8	44.21	82.2	-37.99	0-360	200	V
6 (DL)	2.13686	56.83	Pk	31.4	-23.9	1.3	65.63	-	-	0-360	200	V
2 (DL)	2.13719	55.64	Pk	31.4	-23.9	1.3	64.44	-	-	0-360	100	H
7	5.20875	59.92	Pk	34.2	-31.4	0	62.72	82.2	-19.48	0-360	200	V
3	5.20969	60.59	Pk	34.2	-31.4	0	63.39	82.2	-18.81	0-360	100	H
8	14.25	33.1	Pk	38.8	-14.5	0	57.4	82.2	-24.8	0-360	200	V
4	14.25094	32.47	Pk	38.8	-14.7	0	56.57	82.2	-25.63	0-360	100	H

Pk - Peak detector

SCAN 2: LTE12_707.5_QPSK_10M_RB2-3_+_BLE_2476_1Mbps





Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	206211 (dB/m)	Gain/Loss (dB)	Filter (dB)	Corrected Reading (dBuV/m)	-13dBm E-field Equivalent	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.40673	44.15	Pk	28.4	-25.4	.5	47.65	82.2	-34.55	0-360	100	H
4	1.40673	49.63	Pk	28.4	-25.4	.5	53.13	82.2	-29.07	0-360	200	V
2	2.11019	36.23	Pk	31.6	-23.5	.4	44.73	82.2	-37.47	0-360	100	H
5	2.11019	39.04	Pk	31.6	-23.5	.4	47.54	82.2	-34.66	0-360	200	V
3	4.95094	49.96	Pk	33.8	-32.2	.4	51.96	82.2	-30.24	0-360	100	H
6	4.95094	45.79	Pk	33.8	-32.2	.4	47.79	82.2	-34.41	0-360	200	V
7	7.42875	39.97	Pk	35.6	-27.6	.4	48.37	82.2	-33.83	0-360	200	V

Pk - Peak detector

9. SETUP PHOTOS

See R15626916-EP1 for Setup Photos and Setup Diagrams

END OF REPORT