TEST REPORT

Report Number: R15062163-E1

Applicant	:	SMART Technologies ULC Suite 600, 214-11 Ave SW Calgary, AB T2R 0K1, Canada
Model	:	SRXMOD1
FCC ID	:	QCI-SRXMOD1
IC	:	4302A-SRXMOD1
EUT Description	:	Radio Module
Test Standard(s)	:	FCC 47 CFR PART 15 SUBPART C: 2023 ISED RSS-247 ISSUE 3: 2023 ISED RSS-GEN ISSUE 5 + A2: 2021

Date Of Issue:
2024-04-10

Prepared by:
UL LLC
12 Laboratory Dr.
Research Triangle Park, NC 27709 U.S.A.
TEL: (919) 549-1400

CERT #0751.06

REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
V1	2024-01-30	Initial Issue	Charles Moody
V2	2024-02-20	Revised Technical Information	Charles Moody
V3	2024-04-03	Updated Model Information	Charles Moody
V4	2024-04-10	Updated EUT Description	Charles Moody

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: SMART Technologies ULC
Suite 600, 214-11 Ave SW
Calgary, AB T2R 0K1, Canada

EUT DESCRIPTION: Radio Module

MODEL: SRXMOD1

HOST MODEL: SRX-1

SERIAL NUMBER: Sample #1

SAMPLE RECEIPT DATE: 2024-01-05

DATE TESTED: 2024-01-08 TO 2024-01-10

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart C: 2023	Refer to Section 2
ISED RSS-247 Issue 3: 2023	Refer to Section 2
ISED RSS-GEN Issue 5 + A2: 2021	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.

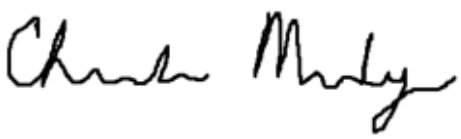
The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. 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.

Approved & Released For
UL LLC

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

Prepared By:



Charles Moody
Engineer
Consumer, Medical and IT Segment
UL LLC

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2. TEST RESULTS SUMMARY

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 6.3)
2. Supported data rates (see section 6.5)

FCC Clause	ISED Clause	Requirement	Result	Comment
See Comment		Duty Cycle	Reporting purposes only	ANSI C63.10 Section 11.6.
-	RSS-GEN 6.7	99% OBW	Reporting purposes only	ANSI C63.10 Section 6.9.3.
15.247 (a) (2)	RSS-247 5.2 (a)	6dB BW	Compliant	None.
15.247 (b) (3)	RSS-247 5.4 (d)	Output Power		
See Comment		Average power	Reporting purposes only	Per ANSI C63.10, Section 11.9.2.3.2.
15.247 (e)	RSS-247 5.2 (b)	PSD	Complies	None.
15.247 (d)	RSS-247 5.5	Conducted Spurious Emissions		
15.209, 15.205	RSS-GEN 8.9, 8.10	Radiated Emissions		
15.207	RSS-Gen 8.8	AC Mains Conducted Emissions	N/A	EUT is battery operated only.

3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC 47 CFR Part 2, FCC 47 CFR Part 15, ANSI C63.10-2013, KDB 558074 D01 15.247 Meas Guidance v05r02, KDB 414788 D01 Radiated Test Site v01r01, RSS-GEN Issue 5 + A2, and RSS-247 Issue 3.

4. FACILITIES AND ACCREDITATION

UL LLC is accredited by A2LA, certification # 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: 12 Laboratory Dr RTP, NC 27709, U.S.A	US0067	2180C	825374
☒	Building: 2800 Perimeter Park Dr. Suite B Morrisville, NC 27560, U.S.A		27265	

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:
Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)
36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

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6. EQUIPMENT UNDER TEST

6.1. EUT DESCRIPTION

The SRX-1 is an electronic stamp, integrated with the SRXMOD1 BLE radio module to be used in correspondence with the QX/RX Series interactive flat panel display. This report covers the full emissions testing of the SRXMOD1 BLE radio module.

6.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum peak conducted output power as follows:

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2402 - 2480	BLE	1.19	1.32

6.3. DESCRIPTION OF AVAILABLE ANTENNAS

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

The radio utilizes a Chip antenna, with a maximum gain of 3 dBi.

6.4. SOFTWARE AND FIRMWARE

The EUT firmware installed during testing was 5.1.0 for conducted testing and 2.9.9.180 for radiated testing.

6.5. WORST-CASE CONFIGURATION AND MODE

Radiated emissions below 1GHz and above 18GHz, were performed with the EUT set to transmit at the channel with highest power spectral density as worst-case scenario.

Band edge and radiated emissions between 1GHz and 18GHz were performed with the EUT set to transmit at the highest power on low, middle and high channels at the only supported data rate of 1Mbps.

The fundamental of the EUT was investigated in three orthogonal orientations X,Y,Z, it was determined that Y orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in Y orientation.

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6.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Laptop	HP	Elitebook 840 G6	5CG925B25F	-

I/O CABLES

I/O Cable List						
Cable No.	**Port**	**# of Identical Ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	USB	1	Mini-USB	Unshielded	<1m	USB to program EUT

TEST SETUP

For conducted testing, a support laptop was connected to the EUT to configure the radio. For radiated testing, the EUT is a preconfigured sample that allows the channel to be changed by pressing a built-in button on the device. Therefore, no support equipment was used for testing.

SETUP DIAGRAMS

Please refer to R15062163-EP1 for setup diagrams

7. MEASUREMENT METHOD

On Time and Duty Cycle: ANSI C63.10, Section 11.6 : Zero-Span Spectrum Analyzer Method.

6 dB BW: ANSI C63.10 Subclause -11.8.1

Occupied BW (99%): ANSI C63.10-2013 Section 6.9.3

Output Power: ANSI C63.10 Subclause -11.9.1.3 Method PKPM1 Peak-reading power meter
ANSI C63.10 Subclause -11.9.2.3.2 Method AVGPM-G (Measurement using a gated RF average-reading power meter)

PSD: ANSI C63.10 Subclause -11.10.2 Method PKPSD (peak PSD)

Conducted emissions non-restricted frequency bands: ANSI C63.10 Subclause -11.11 and 6.10.4

Radiated emissions restricted frequency bands: ANSI C63.10 Subclause -11.12.1, 6.3-6.6 and 6.10.5

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8. 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.
	0.009-30MHz				
135144	Active Loop Antenna	ETS-Lindgren	6502	2023-01-17	2024-01-17
	30-1000 MHz				
90629	Hybrid Broadband Antenna	Sunol Sciences Corp.	JB3	2023-01-06	2024-01-31
	1-18 GHz				
89509	Double-Ridged Waveguide Horn Antenna, 1 to 18 GHz	ETS Lindgren	3117	2023-05-23	2025-05-23
	18-40 GHz				
204704	Horn Antenna, 18-26.5GHz	Com-Power	AH-826	2023-07-20	2025-07-20
	Gain-Loss Chains				
207638	Gain-loss string: 0.009-30MHz	Various	Various	2023-09-18	2024-09-18
207639	Gain-loss string: 25-1000MHz	Various	Various	2023-09-18	2024-09-18
207640	Gain-loss string: 1-18GHz	Various	Various	2023-05-17	2024-05-17
225795	Gain-loss string: 18-40GHz	Various	Various	2023-05-17	2024-05-17
	Receiver & Software				
197955	Spectrum Analyzer	Rohde & Schwarz	ESW44	2023-04-10	2024-04-10
90416	Spectrum Analyzer	Keysight	N9030A	2023-06-09	2024-06-30
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

Test Equipment Used - Wireless Conducted Measurement Equipment

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
	Common Equipment				
90410	Spectrum Analyzer	Keysight Technologies	N9030A	2023-06-14	2024-06-14
238710	Environmental Meter	Fisher Scientific	15-077-963	2023-06-27	2024-06-27
211057	Real-Time Peak Power Sensor 50MHz to 8GHz	Boonton	RTP5000	2023-08-01	2024-08-01
SOFTEMI	Antenna Port Software	UL	Version 2022.8.16	NA	NA
Power Software	Boonton Power Analyzer	Boonton	Version 3.0.13.0	NA	NA
	Attenuators				
226560	SMA Coaxial 10dB Attenuator 25MHz-18GHz	CentricRF	C18S2-10	2023-02-16	2024-02-16
226561	SMA Coaxial 10dB Attenuator 25MHz-18GHz	CentricRF	C18S2-10	2023-02-16	2024-02-16
	Cables				
CBL030	SMA Male to SMA Male Cable Using PE-P141 Coax - 12"	Pasternack	Sucoflex 104PEA	2023-06-27	2024-06-27
CBL091	Micro-Coax UTiFLEX Cable Assembly, Low Loss,40Ghz	Carlisle Interconnect Technologies	UFA147A-2-0360-200200	2023-02-17	2024-02-17

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9. ANTENNA PORT TEST RESULTS

9.1. ON TIME AND DUTY CYCLE

LIMITS

None; for reporting purposes only.

PROCEDURE

KDB 558074 Zero-Span Spectrum Analyzer Method.

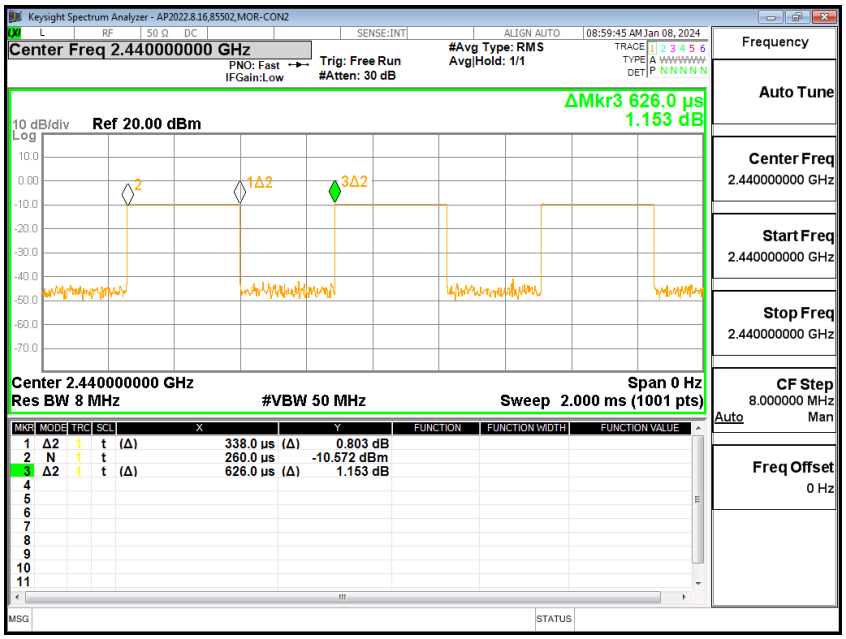
ON TIME AND DUTY CYCLE RESULTS

Mode	ON Time B (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)
2.4GHz Band				
BLE	0.338	0.626	0.540	53.99

*Note: The manufacturer has declared an operational duty cycle of 9.02% over a 100ms window for the BLE Radio. The correction factor, therefore, would be 20log(1/0.0902) = 20.90 dB. Using KDB 558074 D01 Answer 3 (a), a duty cycle correction will be subtracted from the Peak reading to derive an Average reading. See calculation below.

Duty Cycle Correction Factor = 20*log(1/DC) = 20*log(1/0.0902) = 20.90 dB

DUTY CYCLE PLOTS



DUTY CYCLE BLE

9.2. 99% BANDWIDTH

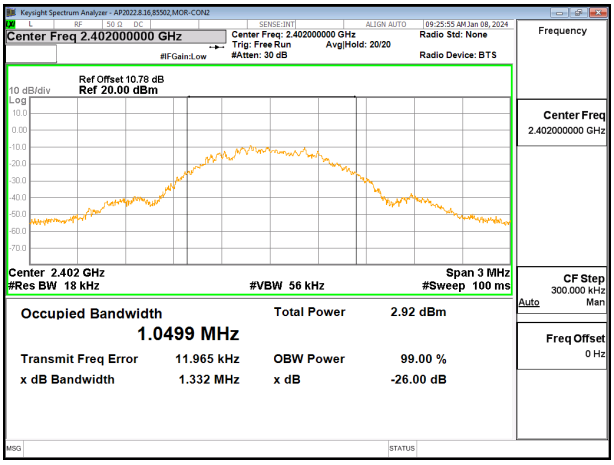
LIMITS

None; for reporting purposes only.

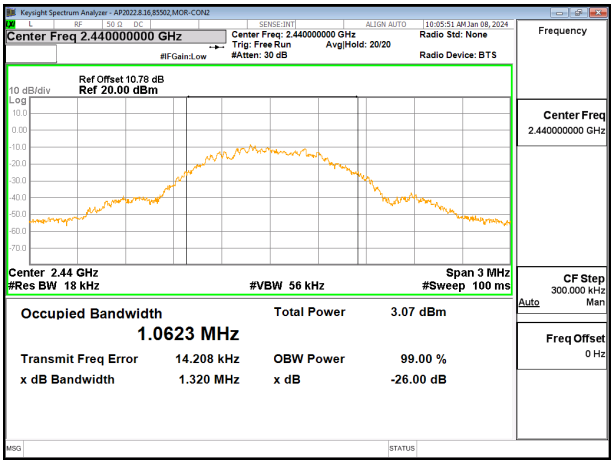
RESULTS

9.2.1. BLE (1Mbps)

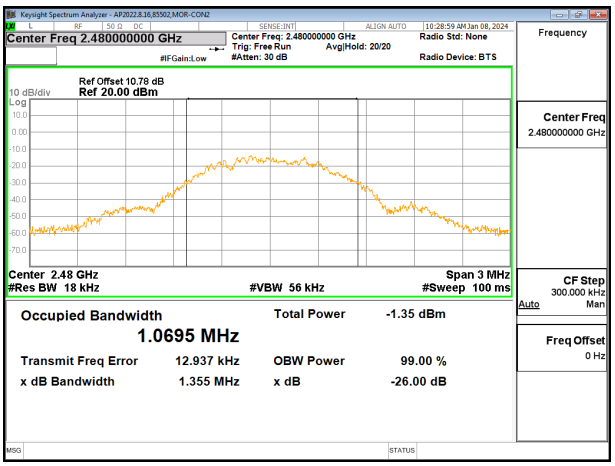
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	1.0499
Middle	2440	1.0623
High	2480	1.0695



LOW CHANNEL



MID CHANNEL



HIGH CHANNEL

9.3. 6 dB BANDWIDTH

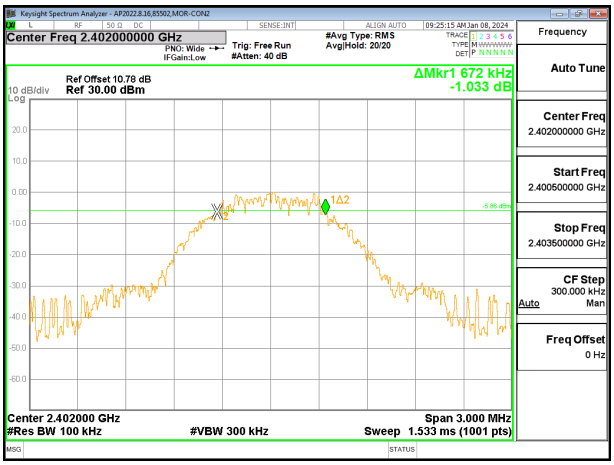
LIMITS

FCC §15.247 (a) (2)
RSS-247 5.2 (a)
The minimum 6 dB bandwidth shall be at least 500 kHz.

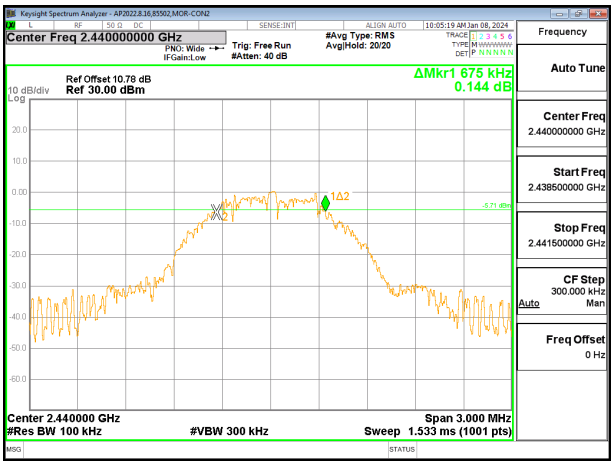
RESULTS

9.3.1. BLE (1Mbps)

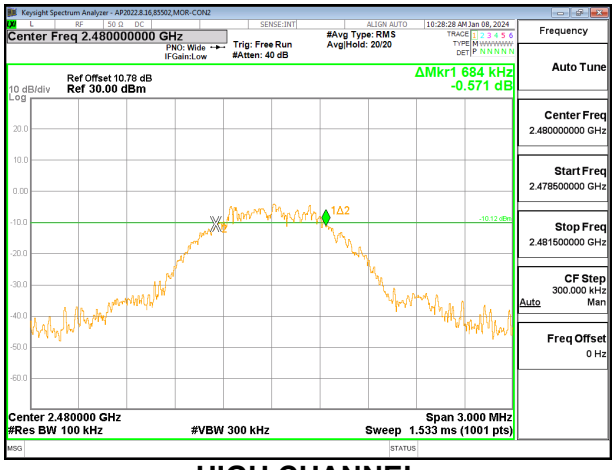
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	0.672	0.5
Middle	2440	0.675	0.5
High	2480	0.684	0.5



LOW CHANNEL



MID CHANNEL



HIGH CHANNEL

9.4. OUTPUT POWER

LIMITS

FCC §15.247 (b) (3)
RSS-247 5.4 (d)

The maximum antenna gain is less than or equal to 6 dBi, therefore the limit is 30 dBm.

TEST PROCEDURE
The transmitter output is connected to a power meter.

The cable assembly insertion loss of 10.53 dB (including a 9.71dB pad, 0.57dB test cable and 0.25 dB EUT cable) was entered as an offset in the power meter.

The power output was measured on the EUT antenna port using SMA cable with 10dB attenuator connected to a power meter via wideband average power sensor. Peak output power was read directly from power meter.

RESULTS

9.4.1. BLE (1Mbps)

Tested By:	85502
Date:	2024-01-08

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	1.10	30	-28.900
Middle	2440	1.19	30	-28.810
High	2480	-3.06	30	-33.060

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9.5. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

The cable assembly insertion loss of 10.53 dB (including a 9.71dB pad, 0.57dB test cable and 0.25 dB EUT cable) was entered as an offset in the power meter.

The power output was measured on the EUT antenna port using SMA cable with 10dB attenuator connected to a power meter via wideband average power sensor. Gated average output power was read directly from power meter.

RESULTS

9.5.1. BLE (1Mbps)

Tested By:	85502
Date:	2024-01-08

Channel	Frequency (MHz)	AV power (dBm)
Low	2402	0.76
Middle	2440	0.83
High	2480	-3.50

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9.6. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)
RSS-247 (5.2) (b)

The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

RESULTS

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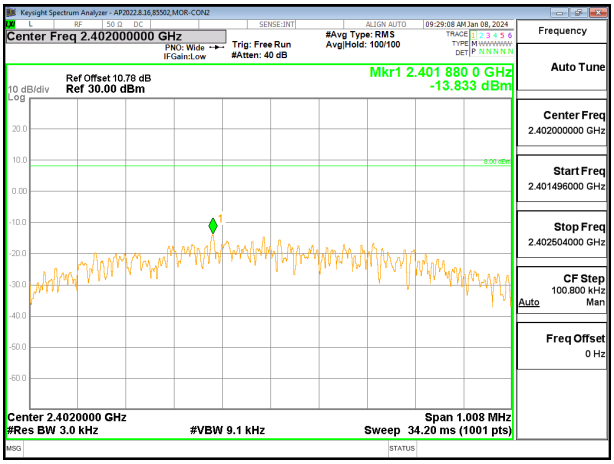
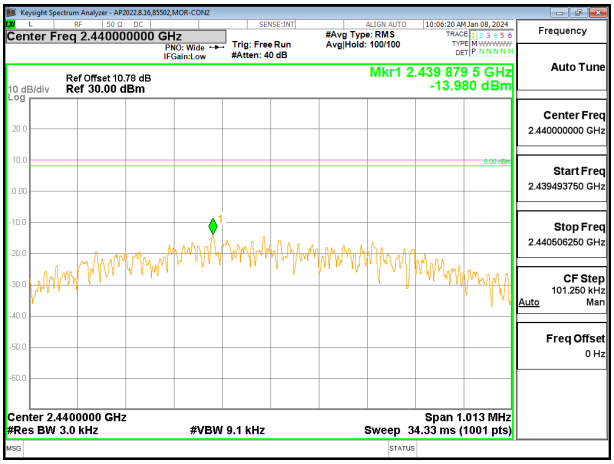
9.6.1. BLE (1Mbps)

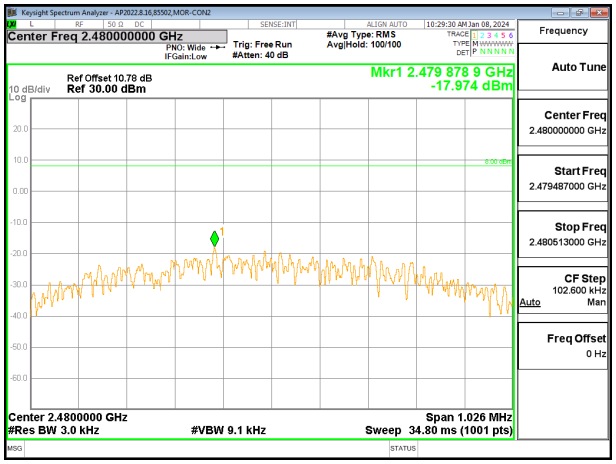
Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2402	-13.833	8	-21.83
Middle	2440	-13.980	8	-21.98
High	2480	-17.974	8	-25.97



LOW CHANNEL



MID CHANNEL



HIGH CHANNEL

9.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)
RSS-247 5.5

Output power was measured based on the use of a peak measurement, therefore the required attenuation is -20 dBc.

RESULTS

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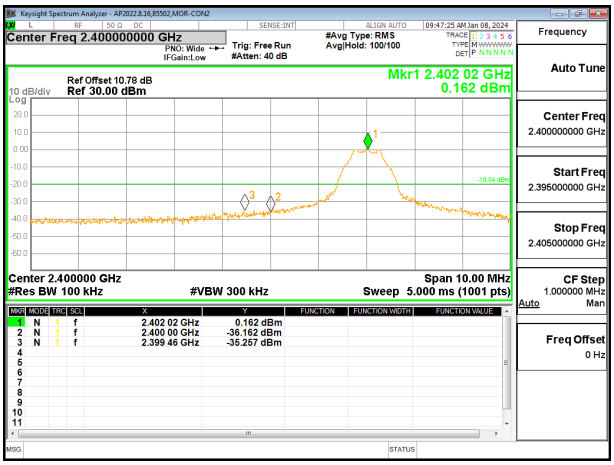
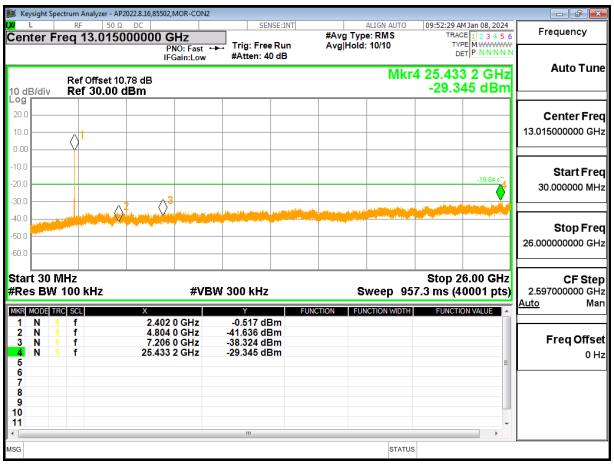
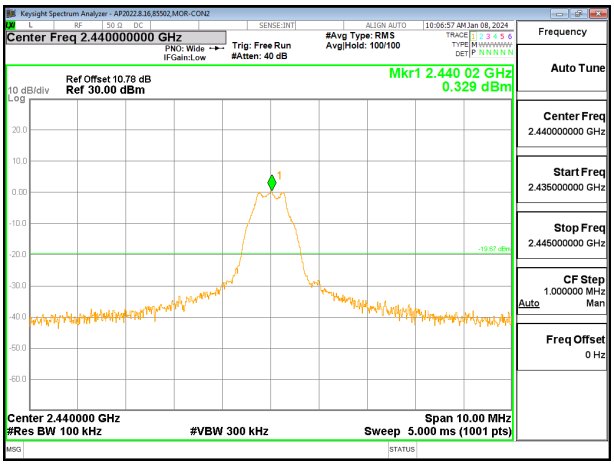
9.7.1. BLE (1Mbps)



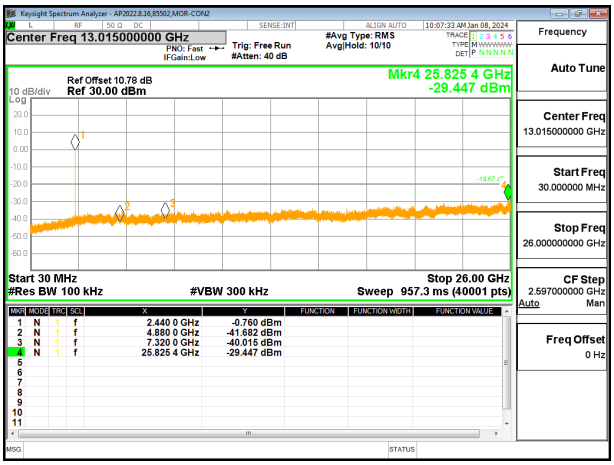
LOW CHANNEL BANDEDGE



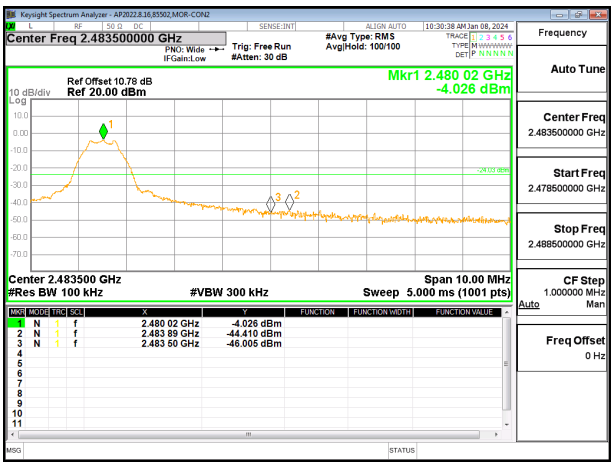
OUT-OF-BAND LOW CHANNEL



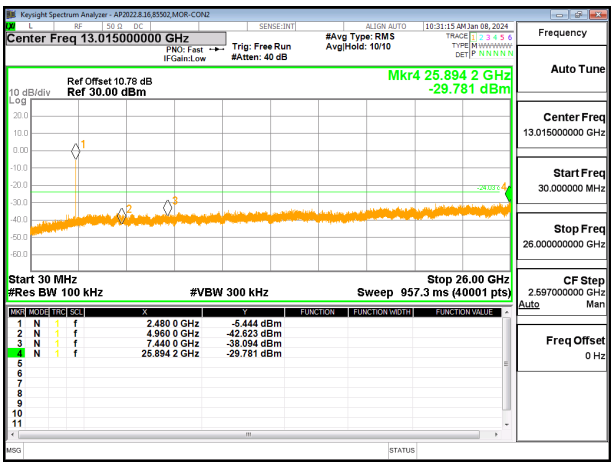
IN-BAND REFERENCE LEVEL



OUT-OF-BAND MID CHANNEL



HIGH CHANNEL BANDEDGE



OUT-OF-BAND HIGH CHANNEL

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10. RADIATED TEST RESULTS

10.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m
0.009-0.490	2400/F(kHz) @ 300 m	-
0.490-1.705	24000/F(kHz) @ 30 m	-
1.705 - 30	30 @ 30m	-
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

RSS-GEN, Section 8.9 and 8.10.

Frequency Range (MHz)	Field Strength Limit (uA/m) at 3 m	Field Strength Limit (dBuA/m) at 3 m
0.009-0.490	6.37/F(kHz) @ 300 m	-
0.490-1.705	63.7/F(kHz) @ 30 m	-
1.705 - 30	0.08 @ 30m	-
Frequency Range (MHz)	**Field Strength Limit (uV/m) at 3 m**	**Field Strength Limit (dBuV/m) at 3 m**
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane for measurement below 1GHz; 1.5 m above the ground plane for measurement above 1GHz. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.10. The EUT is set to transmit in a continuous mode.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements in the 30-1000MHz range, 9kHz for peak and/or quasi-peak detection measurements in the 0.15-30MHz range and 200Hz for peak and/or quasi-peak detection measurements in the 9 to 150kHz range. Peak detection is used unless otherwise noted as quasi-peak or average (9-90kHz and 110-490kHz).

For pre-scans above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 3MHz for peak measurements.

For final measurements above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 3 MHz for peak measurements and as applicable for average

measurements. For average measurements, the DC Correction factor was applied to peak measurements.

The spectrum from 1 GHz to 18 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band. Below 1GHz and above 18GHz emissions, the channel with the highest power spectral density was used.

The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

3D antenna use - For below 30MHz testing, investigation was done on three antenna orientations (parallel, perpendicular, and ground-parallel).

Base on FCC 15.31 (f) (2): measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field.

KDB 414788 Open Field Site(OFS) and Chamber Correlation Justification

OFS and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

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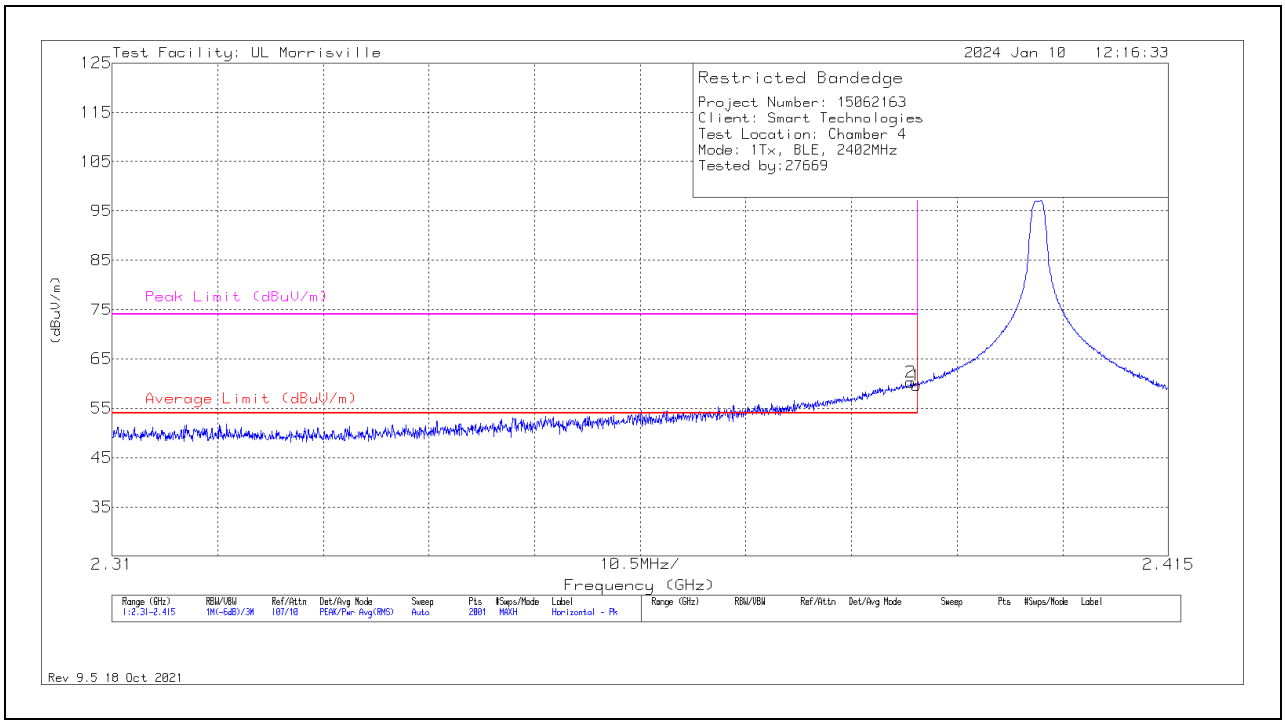
10.2. TRANSMITTER ABOVE 1 GHz

10.2.1. BLE (1Mbps)

BANDEDGE (LOW CHANNEL)

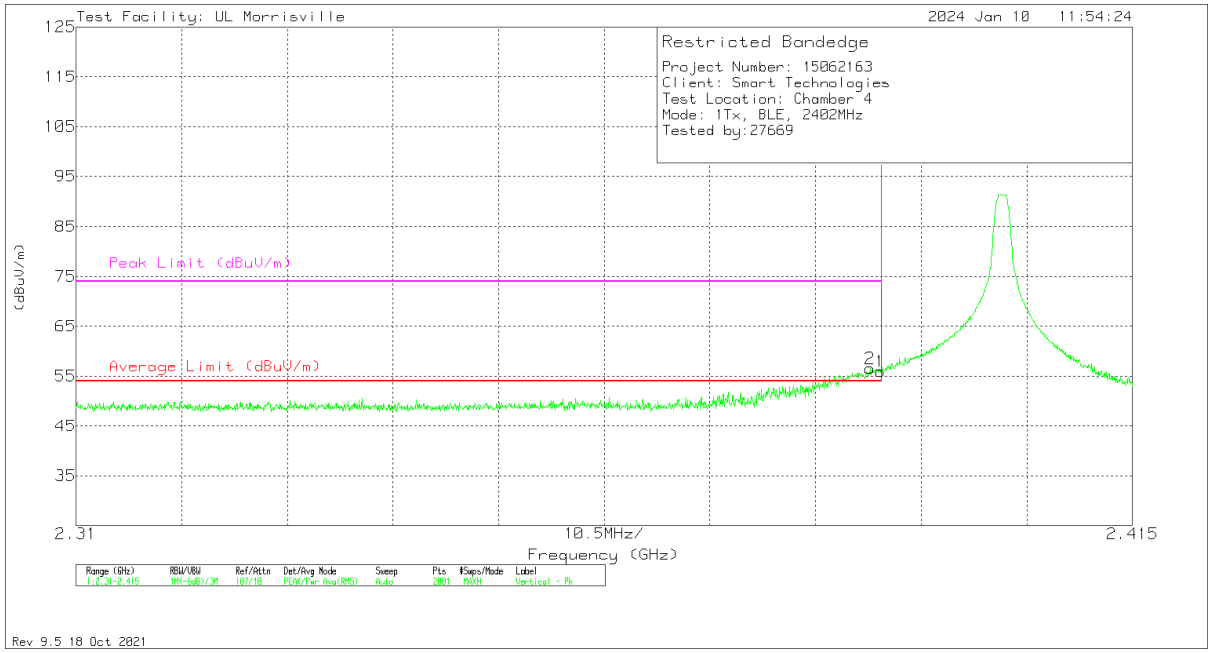
HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	89509 ACF (dB/m)	Gain/Loss (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.38996	40.84	Pk	32	-13.2	0	59.64	-	-	74	-14.36	39	140	H
1	* ** 2.38996	40.84	Pk	32	-13.2	-20.90	38.74	54	-15.26	-	-	39	140	H
2	* ** 2.38938	41.53	Pk	32	-13.2	0	60.33	-	-	74	-13.67	39	140	H
2	* ** 2.38938	41.53	Pk	32	-13.2	-20.90	39.43	54	-14.57	-	-	39	140	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector

VERTICAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	89509 ACF (dB/m)	Gain/Loss (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.38996	37.14	Pk	32	-13.2	0	55.94	-	-	74	-18.06	150	341	V
1	* ** 2.38996	37.14	Pk	32	-13.2	-20.90	35.04	54	-18.96	-	-	150	341	V
2	* ** 2.38891	37.72	Pk	32	-13.2	0	56.52	-	-	74	-17.48	150	341	V
2	* ** 2.38891	37.72	Pk	32	-13.2	-20.90	35.62	54	-18.38	-	-	150	341	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector

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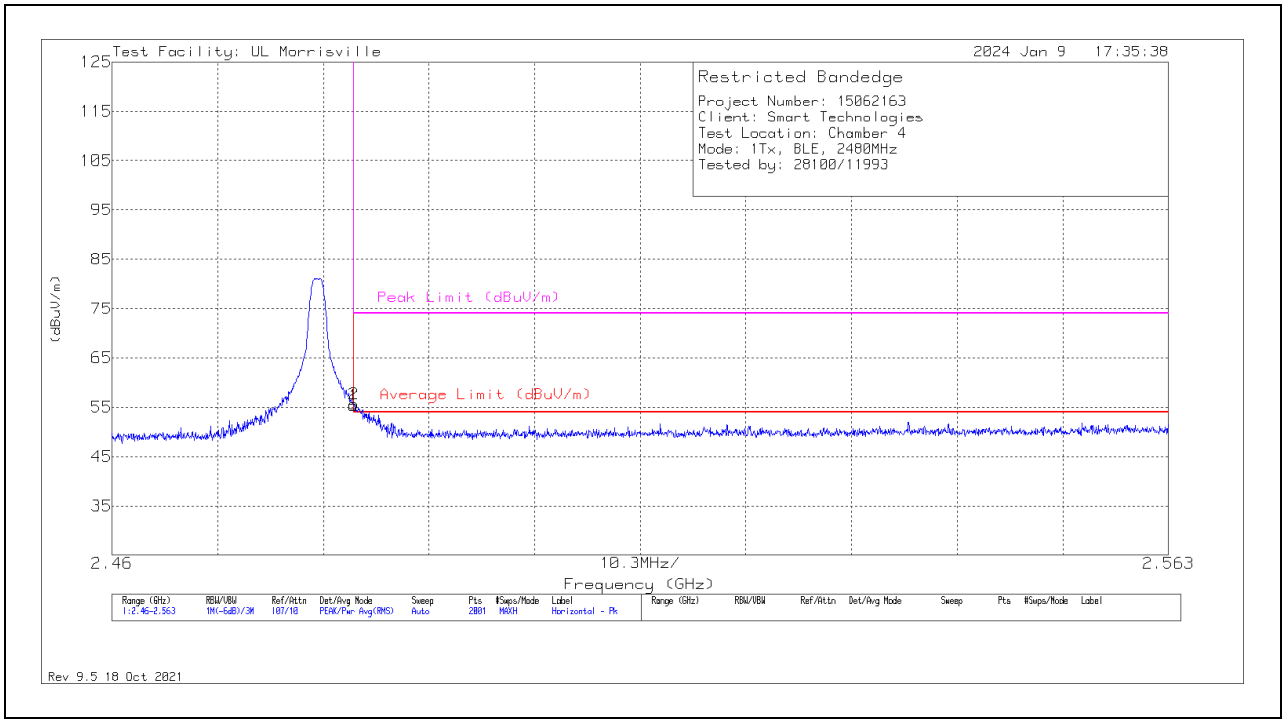
BANDEDGE (HIGH CHANNEL)

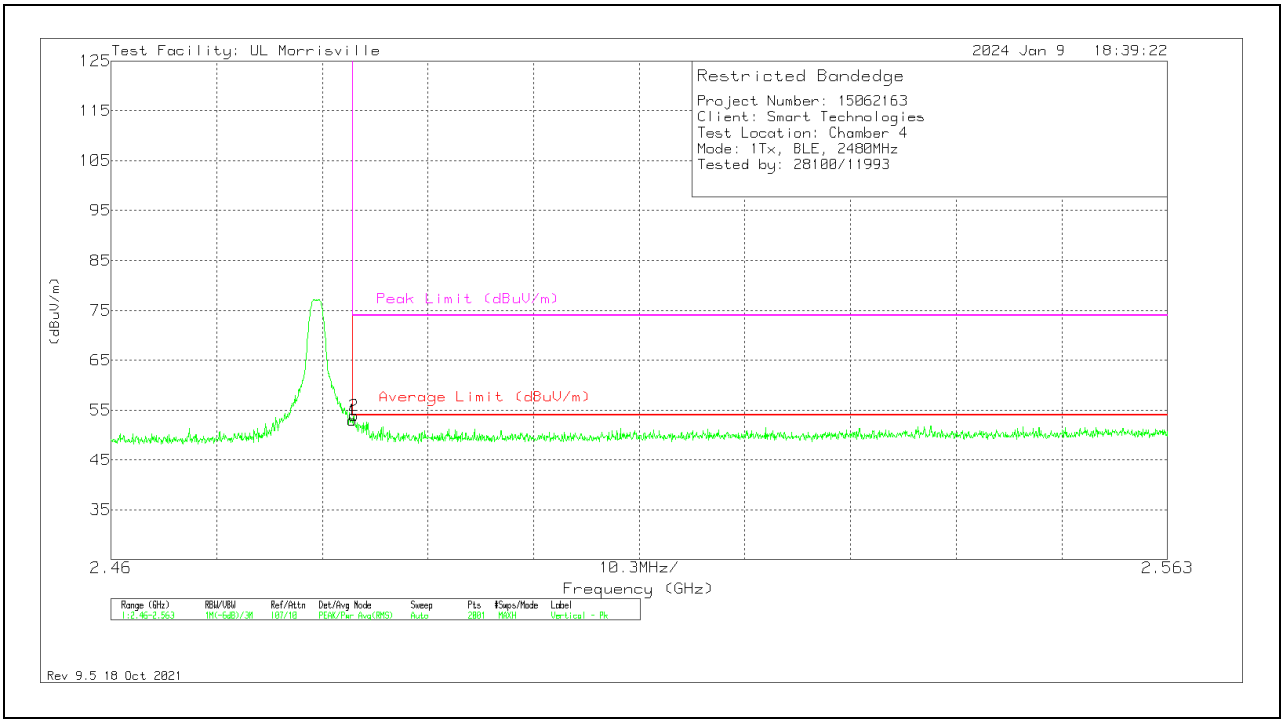
HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	89509 ACF (dB/m)	Gain/Loss (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.48354	36.01	Pk	32.3	-12.9	0	55.41	-	-	74	-18.59	222	134	H
1	* ** 2.48354	36.01	Pk	32.3	-12.9	-20.90	34.51	54	-19.49	-	-	222	134	H
2	* ** 2.48359	36.26	Pk	32.3	-12.9	0	55.66	-	-	74	-18.34	222	134	H
2	* ** 2.48359	36.26	Pk	32.3	-12.9	-20.90	34.76	54	-19.24	-	-	222	134	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector

VERTICAL RESULT

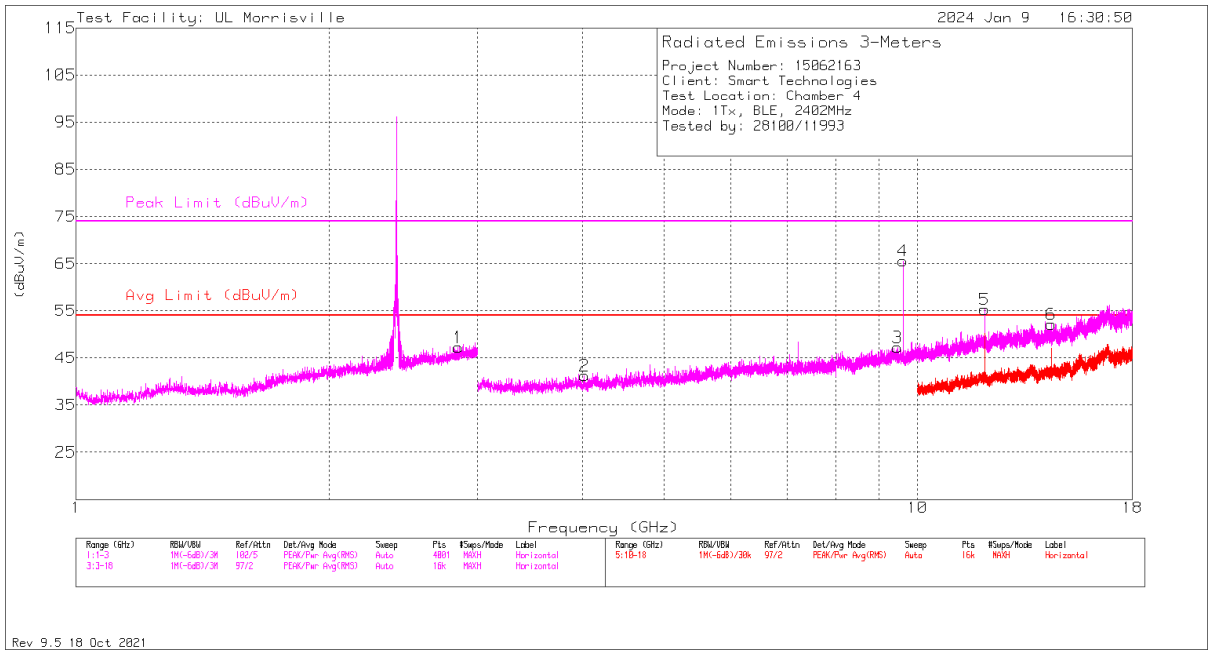


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	89509 ACF (dB/m)	Gain/Loss (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.48354	33.59	Pk	32.3	-12.9	0	52.99	-	-	74	-21.01	295	397	V
1	* ** 2.48354	33.59	Pk	32.3	-12.9	-20.90	32.09	54	-21.91	-	-	295	397	V
2	* ** 2.48369	34.52	Pk	32.3	-12.9	0	53.92	-	-	74	-20.08	295	397	V
2	* ** 2.48369	34.52	Pk	32.3	-12.9	-20.90	33.02	54	-20.98	-	-	295	397	V

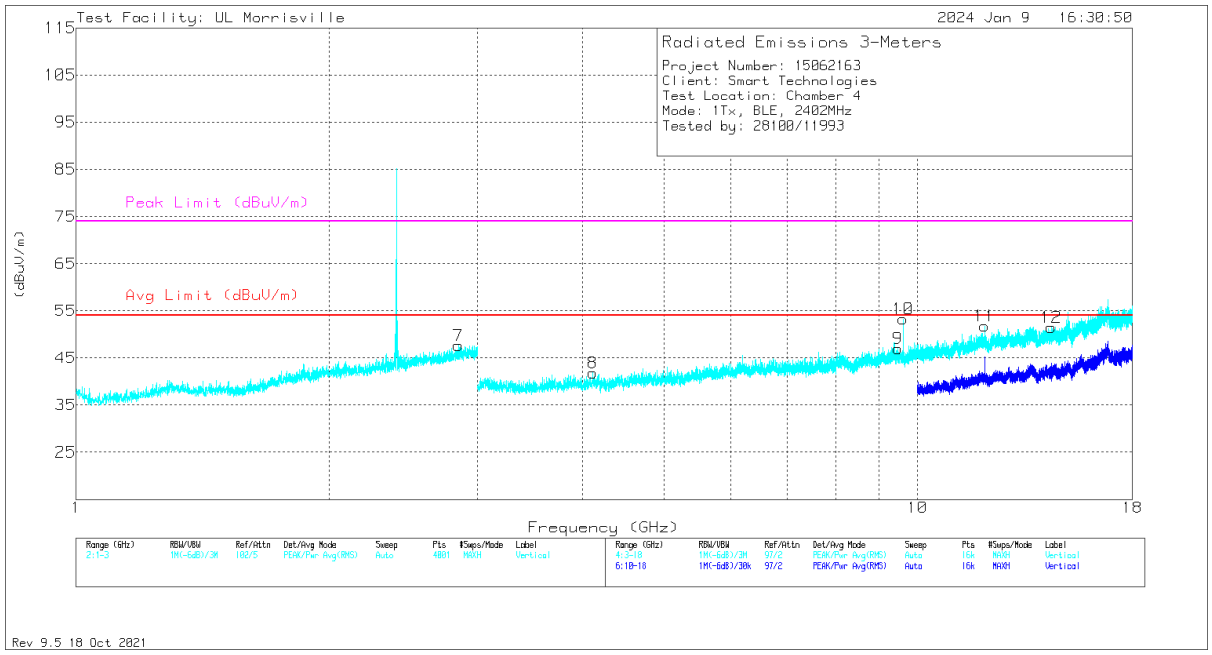
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS



HORIZONTAL



VERTICAL

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RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	89509 ACF (dB/m)	Gain/Loss (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.844	27.01	Pk	32.3	-12.1	0	47.21	54	-6.79	74	-26.79	0-360	100	H
7	* ** 2.846	27.48	Pk	32.4	-12.2	0	47.68	54	-6.32	74	-26.32	0-360	200	V
2	* ** 4.01719	40.34	Pk	33.4	-32.5	0	41.24	54	-12.76	74	-32.76	0-360	100	H
3	* ** 9.46688	35.84	Pk	36.7	-25.3	0	47.24	54	-6.76	74	-26.76	0-360	100	H
5	* ** 12.00895	43.11	PK2	38.7	-23.6	0	58.21	-	-	74	-15.79	303	102	H
5	* ** 12.00895	43.11	PK2	38.7	-23.6	-20.90	37.31	54	-16.69	-	-	303	102	H
8	* ** 4.11281	40.46	Pk	33.4	-32	0	41.86	54	-12.14	74	-32.14	0-360	200	V
9	* ** 9.47625	36.02	Pk	36.7	-25.7	0	47.02	54	-6.98	74	-26.98	0-360	200	V
11	* ** 12.01118	40.91	PK2	38.7	-23.6	0	56.01	-	-	74	-17.99	92	379	V
11	* ** 12.01118	40.91	PK2	38.7	-23.6	-20.90	35.11	54	-18.89	-	-	92	379	V
4	9.60656	53.97	Pk	36.8	-25.2	0	65.57	-	-	-	-	0-360	100	H
10	9.60938	41.78	Pk	36.8	-25.3	0	53.28	-	-	-	-	0-360	200	V
6	14.41125	34.36	Pk	39.3	-21.5	0	52.16	-	-	-	-	0-360	100	H
12	14.41313	34.18	Pk	39.3	-22	0	51.48	-	-	-	-	0-360	200	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
PK2 - Maximum Peak

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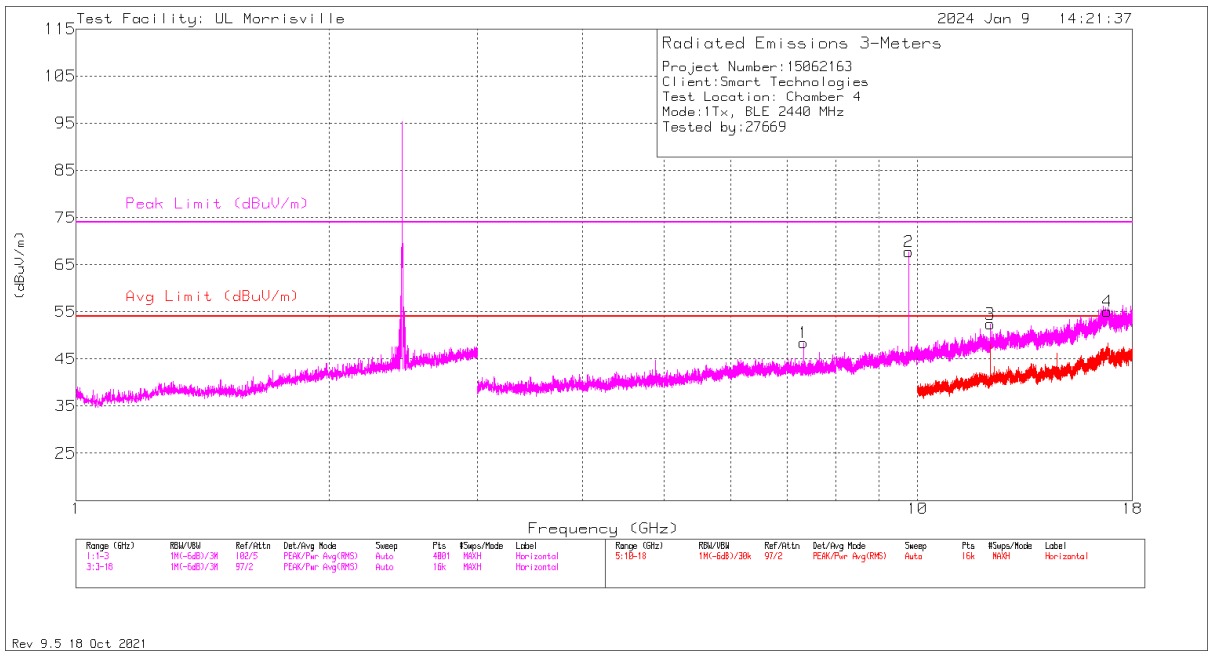
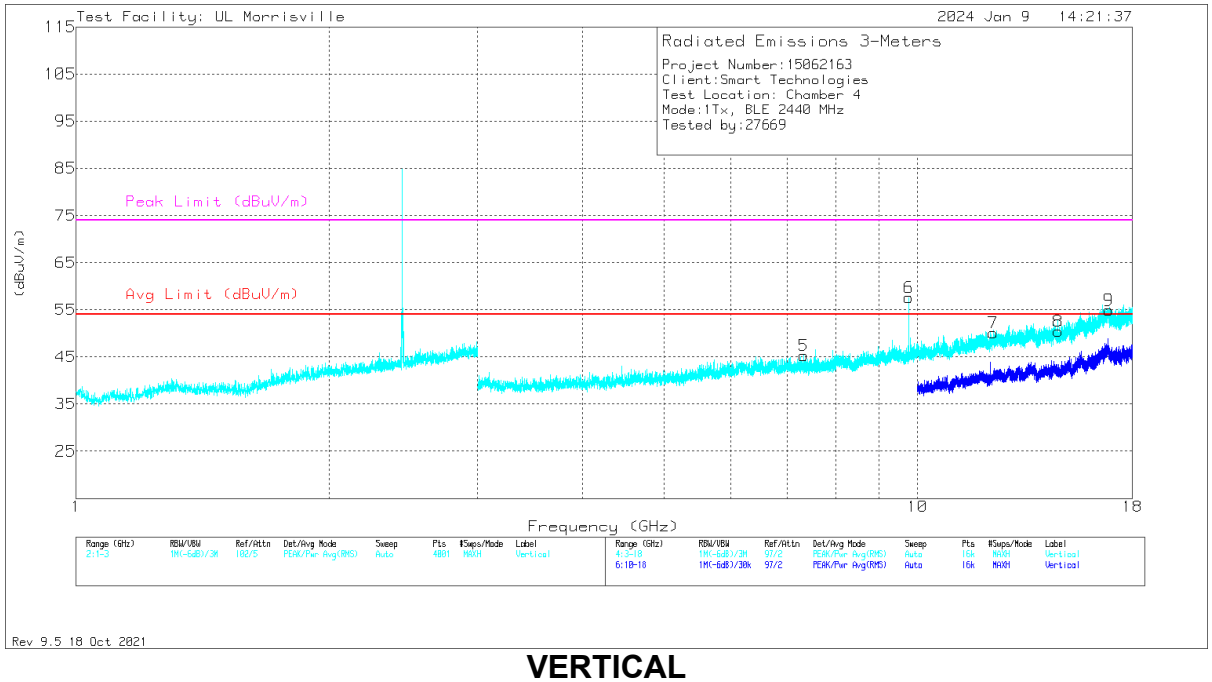
MID CHANNEL RESULTS



HORIZONTAL



VERTICAL

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RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	89509 ACF (dB/m)	Gain/Loss (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 7.32062	43.09	PK2	35.6	-28.1	0	50.59	-	-	74	-23.41	27	107	H
1	* ** 7.32062	43.09	PK2	35.6	-28.1	-20.90	29.69	54	-24.31	-	-	27	107	H
3	* ** 12.20115	39.61	PK2	38.9	-23.4	0	55.11	-	-	74	-18.89	175	103	H
3	* ** 12.20115	39.61	PK2	38.9	-23.4	-20.90	34.21	54	-19.79	-	-	175	103	H
5	* ** 7.32	37.82	Pk	35.6	-28.1	0	45.32	54	-8.68	74	-28.68	0-360	200	V
7	* ** 12.29975	35.06	PK2	38.9	-23.5	0	50.46	-	-	74	-23.54	276	281	V
7	* ** 12.29975	35.06	PK2	38.9	-23.5	-20.90	29.56	54	-24.44	-	-	276	281	V
2	9.75938	56.46	Pk	36.9	-25.6	0	67.76	-	-	-	-	0-360	100	H
6	9.75938	46.28	Pk	36.9	-25.6	0	57.58	-	-	-	-	0-360	200	V
8	14.68594	32.83	Pk	39.6	-22	0	50.43	-	-	-	-	0-360	200	V
4	16.80188	32.17	Pk	41.9	-19	0	55.07	-	-	-	-	0-360	100	H
9	16.87594	33.46	Pk	41.8	-20.4	0	54.86	-	-	-	-	0-360	200	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
PK2 - Maximum Peak

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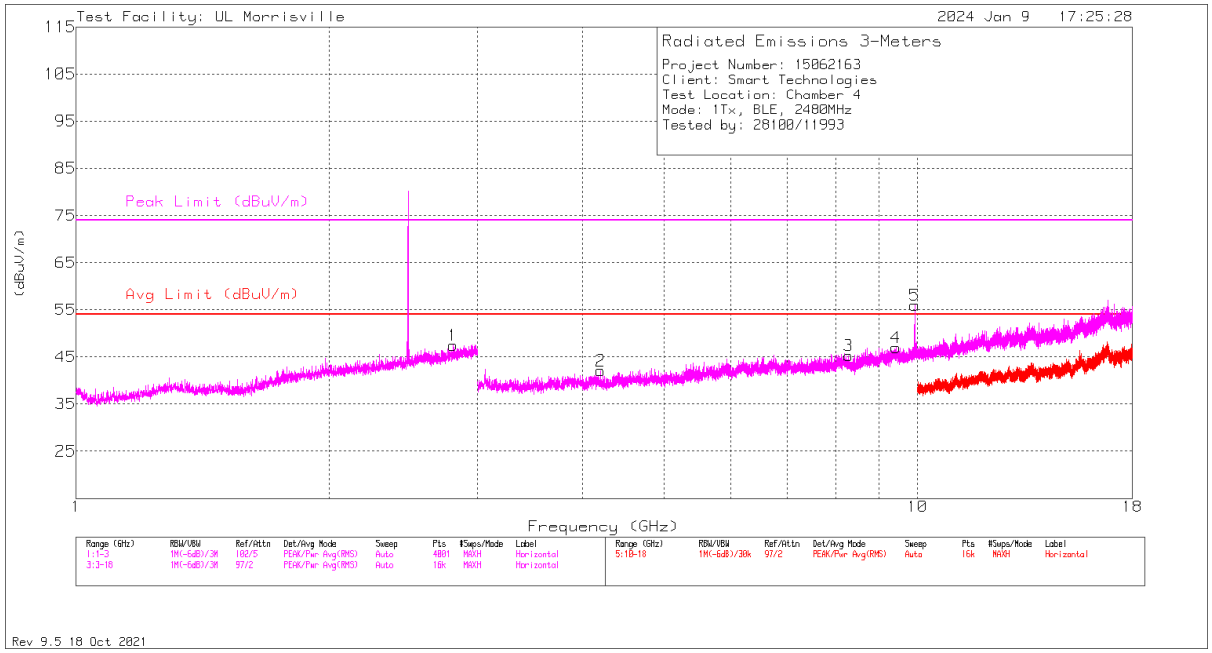
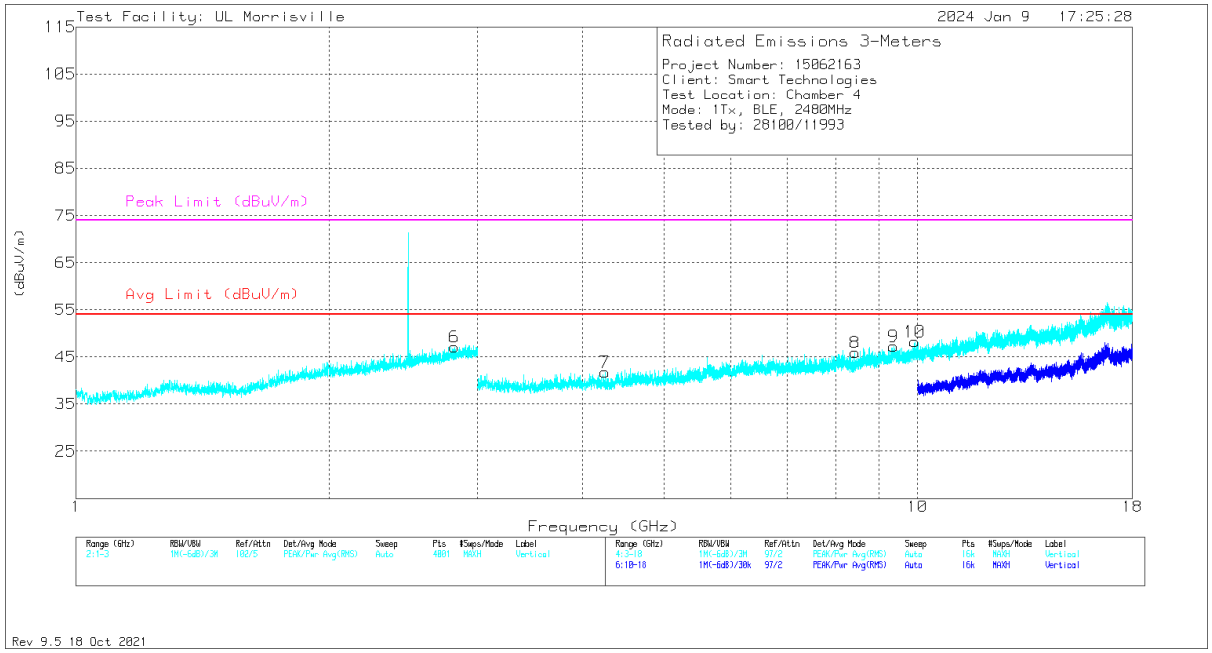
HIGH CHANNEL RESULTS



HORIZONTAL



VERTICAL

RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	89509 ACF (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.8045	27.17	Pk	32.6	-12.3	47.47	54	-6.53	74	-26.53	0-360	100	H
6	* ** 2.815	26.83	Pk	32.5	-12.2	47.13	54	-6.87	74	-26.87	0-360	200	V
2	* ** 4.20094	40.05	Pk	33.4	-31.4	42.05	54	-11.95	74	-31.95	0-360	100	H
3	* ** 8.27813	36.26	Pk	35.8	-26.8	45.26	54	-8.74	74	-28.74	0-360	100	H
4	* ** 9.42563	35.9	Pk	36.7	-25.6	47	54	-7	74	-27	0-360	100	H
7	* ** 4.24969	39.84	Pk	33.4	-31.5	41.74	54	-12.26	74	-32.26	0-360	200	V
8	* ** 8.42344	36.56	Pk	35.8	-26.4	45.96	54	-8.04	74	-28.04	0-360	200	V
9	* ** 9.36375	35.44	Pk	36.5	-24.7	47.24	54	-6.76	74	-26.76	0-360	200	V
5	9.91875	44.58	Pk	37	-25.6	55.98	-	-	-	-	0-360	100	H
10	9.92063	37.02	Pk	37	-25.8	48.22	-	-	-	-	0-360	200	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector

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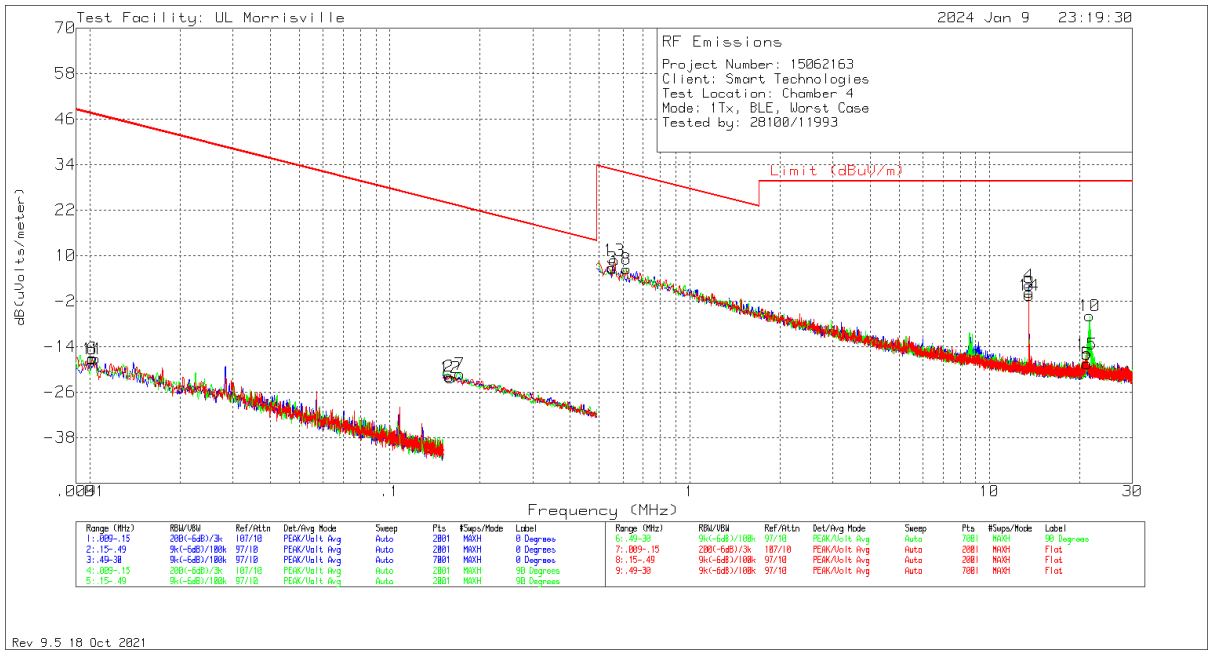
10.3. WORST CASE BELOW 30MHZ

SPURIOUS EMISSIONS BELOW 30 MHz (WORST-CASE CONFIGURATION)

Note: All measurements were made at a test distance of 3 m. The measured data was extrapolated from the test distance (3m) to the specification distance (300 m from 9-490 kHz and 30 m from 490 kHz – 30 MHz) to clearly show the relative levels of fundamental and spurious emissions and demonstrate compliance with the requirement that the level of any spurious emissions be below the level of the intentionally transmitted signal. The extrapolation factor for the limits were 40*Log (test distance / specification distance).



ANTENNA- THREE ORIENTATIONS – E FIELD

Below 30MHz Data

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	135144 (dB/m)	Gain/Loss (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uVolts/meter)	QP/AV Limit (dBuV/m)	Pk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Loop Angle
6	.01021	43.64	Pk	19.2	0	-80	-17.16	47.43	67.43	-64.59	0-360	90 degs
11	.01021	43.54	Pk	19.2	0	-80	-17.26	47.43	67.43	-64.69	0-360	Flat
1	.01042	43.67	Pk	19.1	0	-80	-17.23	47.25	67.25	-64.48	0-360	0 degs
2	.15808	45.9	Pk	12.2	0	-80	-21.9	23.63	43.63	-45.53	0-360	0 degs
12	.15944	45.59	Pk	12.2	0	-80	-22.21	23.55	43.55	-45.76	0-360	Flat
7	.17108	46.48	Pk	12.2	0	-80	-21.32	22.94	42.94	-44.26	0-360	90 degs
3	.55324	34.48	Pk	12.2	.1	-40	6.78	32.75	-	-25.97	0-360	0 degs
13	.56167	36.42	Pk	12.2	.1	-40	8.72	32.61	-	-23.89	0-360	Flat
8	.61648	34.09	Pk	12.2	.1	-40	6.39	31.81	-	-25.42	0-360	90 degs
4	13.5596	31.14	Pk	10.6	.4	-40	2.14	29.54	-	-27.4	0-360	0 degs
9	13.5596	29.22	Pk	10.6	.4	-40	.22	29.54	-	-29.32	0-360	90 degs
14	13.5596	28.45	Pk	10.6	.4	-40	-.55	29.54	-	-30.09	0-360	Flat
15	21.11467	13.82	Pk	9.6	.6	-40	-15.98	29.54	-	-45.52	0-360	Flat
5	21.20321	11.21	Pk	9.6	.6	-40	-18.59	29.54	-	-48.13	0-360	0 degs
10	21.60794	23.98	Pk	9.5	.6	-40	-5.92	29.54	-	-35.46	0-360	90 degs

Pk - Peak detector

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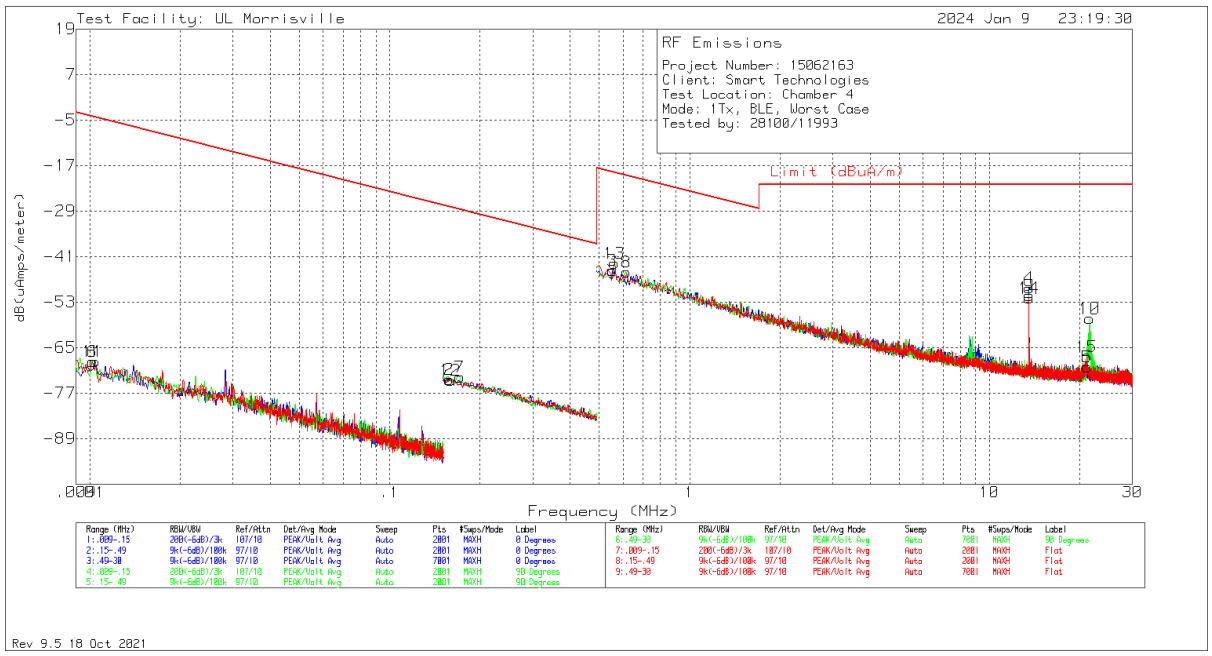


ANTENNA- THREE ORIENTATIONS – H FIELD

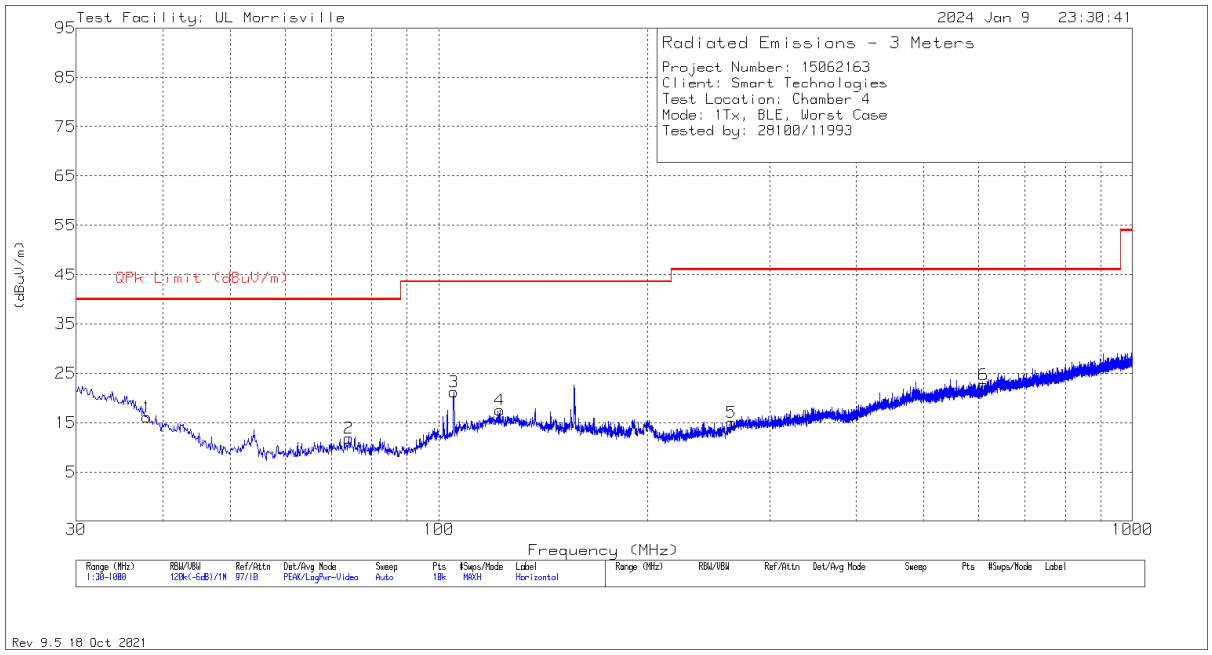
Below 30MHz Data

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	135144 (dB/m)	Gain/Loss (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uAmps/meter)	QP/AV Limit (dBuA/m)	PK Limit (dBuA/m)	Margin (dB)	Azimuth (Degs)	Loop Angle
6	.01021	43.64	Pk	-32.3	0	-80	-68.66	-4.07	15.93	-64.59	0-360	90 degs
11	.01021	43.54	Pk	-32.3	0	-80	-68.76	-4.07	15.93	-64.69	0-360	Flat
1	.01042	43.67	Pk	-32.4	0	-80	-68.73	-4.25	15.75	-64.48	0-360	0 degs
2	.15808	45.9	Pk	-39.3	0	-80	-73.4	-27.87	-7.87	-45.53	0-360	0 degs
12	.15944	45.59	Pk	-39.3	0	-80	-73.71	-27.95	-7.95	-45.76	0-360	Flat
7	.17108	46.48	Pk	-39.3	0	-80	-72.82	-28.56	-8.56	-44.26	0-360	90 degs
3	.55324	34.48	Pk	-39.3	.1	-40	-44.72	-18.75	-	-25.97	0-360	0 degs
13	.56167	36.42	Pk	-39.3	.1	-40	-42.78	-18.89	-	-23.89	0-360	Flat
8	.61648	34.09	Pk	-39.3	.1	-40	-45.11	-19.69	-	-25.42	0-360	90 degs
4	13.5596	31.14	Pk	-40.9	.4	-40	-49.36	-21.96	-	-27.4	0-360	0 degs
9	13.5596	29.22	Pk	-40.9	.4	-40	-51.28	-21.96	-	-29.32	0-360	90 degs
14	13.5596	28.45	Pk	-40.9	.4	-40	-52.05	-21.96	-	-30.09	0-360	Flat
15	21.11467	13.82	Pk	-41.9	.6	-40	-67.48	-21.96	-	-45.52	0-360	Flat
5	21.20321	11.21	Pk	-41.9	.6	-40	-70.09	-21.96	-	-48.13	0-360	0 degs
10	21.60794	23.98	Pk	-42	.6	-40	-57.42	-21.96	-	-35.46	0-360	90 degs

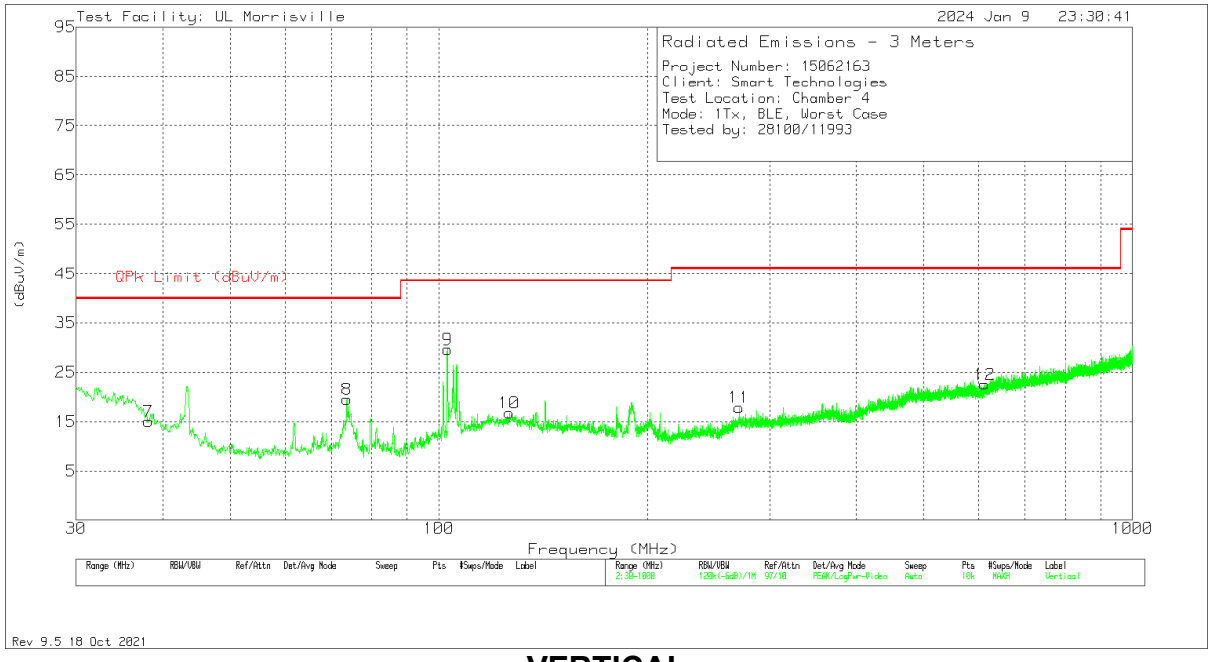
Pk - Peak detector

10.4. WORST CASE BELOW 1 GHZ

SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION)



HORIZONTAL



VERTICAL

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Below 1GHz Data

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	90629 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 37.954	27.05	Pk	21.2	-32.1	16.15	40	-23.85	0-360	200	H
2	* ** 74.135	29.16	Pk	14.4	-31.7	11.86	40	-28.14	0-360	100	H
4	* ** 122.441	28.73	Pk	20.1	-31.3	17.53	43.52	-25.99	0-360	100	H
5	* ** 264.158	26.96	Pk	18.6	-30.5	15.06	46.02	-30.96	0-360	200	H
6	* ** 610.351	27.24	Pk	24.7	-29.3	22.64	46.02	-23.38	0-360	300	H
7	* ** 38.148	26.08	Pk	21.1	-32.1	15.08	40	-24.92	0-360	200	V
8	* ** 73.747	36.83	Pk	14.4	-31.7	19.53	40	-20.47	0-360	100	V
10	* ** 126.321	27.97	Pk	20.1	-31.3	16.77	43.52	-26.75	0-360	100	V
11	* ** 270.948	29.05	Pk	19.3	-30.5	17.85	46.02	-28.17	0-360	100	V
12	* ** 612.291	26.97	Pk	24.8	-29.2	22.57	46.02	-23.45	0-360	100	V
9	102.944	43.98	Pk	17.1	-31.5	29.58	-	-	0-360	100	V
3	105.175	34.94	Pk	17.7	-31.4	21.24	-	-	0-360	200	H

Pk - Peak detector

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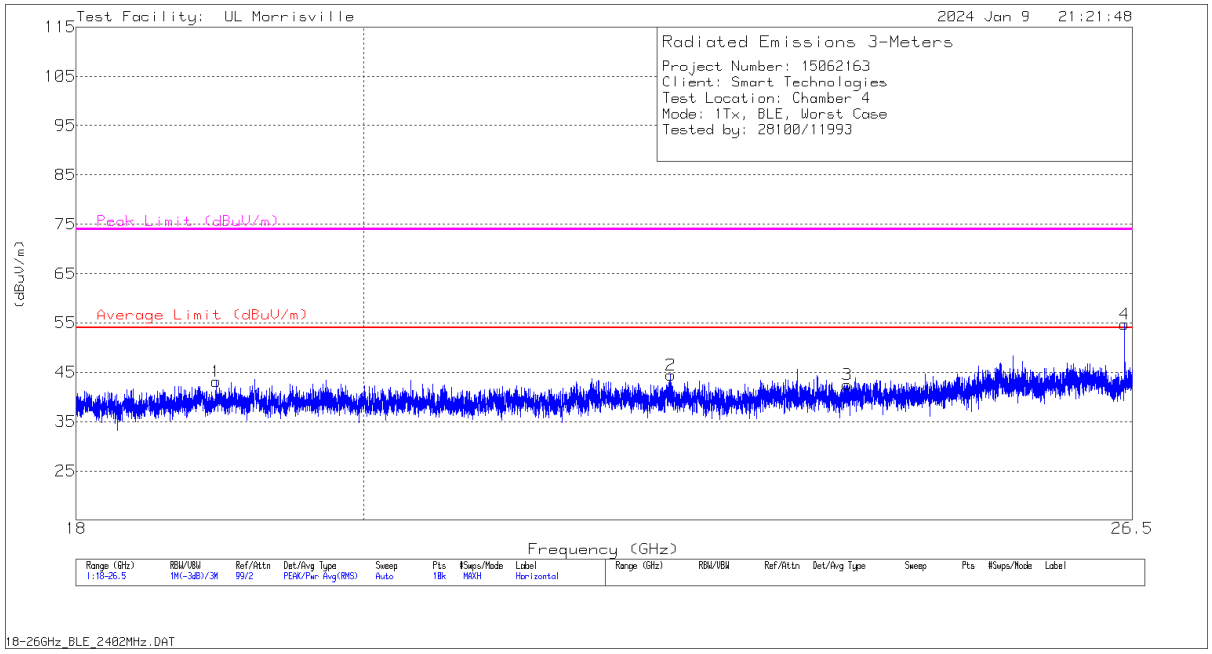
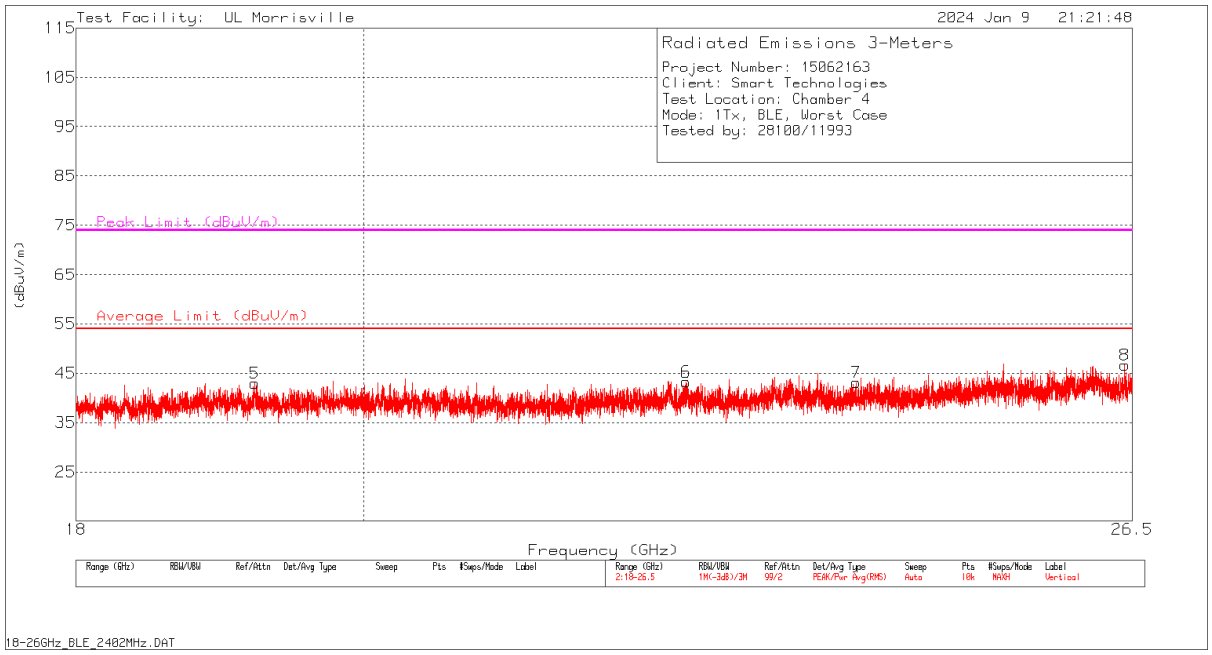
10.5. WORST CASE 18-26 GHZ

SPURIOUS EMISSIONS 18-26 GHz (WORST-CASE CONFIGURATION)



HORIZONTAL



VERTICAL

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18 – 26GHz Data

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	204704 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 18.94699	49.35	Pk	33.5	-39.7	43.15	54	-10.85	74	-30.85	0-360	200	H
2	* ** 22.37794	47.94	Pk	34.1	-37.6	44.44	54	-9.56	74	-29.56	0-360	150	H
3	* ** 23.87154	45.07	Pk	34.4	-37	42.47	54	-11.53	74	-31.53	0-360	100	H
5	* ** 19.21732	49.11	Pk	33.5	-39.6	43.01	54	-10.99	74	-30.99	0-360	250	V
6	* ** 22.50375	48.35	Pk	34.2	-39.3	43.25	54	-10.75	74	-30.75	0-360	150	V
7	* ** 23.95145	45.92	Pk	34.5	-37.3	43.12	54	-10.88	74	-30.88	0-360	250	V
4	26.42179	53.56	Pk	35.3	-34.1	54.76	-	-	-	-	0-360	100	H
8	26.42519	45.68	Pk	35.3	-34.3	46.68	-	-	-	-	0-360	150	V

Pk - Peak detector

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11. SETUP PHOTOS

Please refer to R15062163-EP1 for setup photos

END OF TEST REPORT

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