TEST REPORT

Report Number. : R14565032-E1

Applicant	:	Braun GMBH T-QTA Frankfurter Strasse 145 Kronberg, TS, 61476, DE
Model	:	3786
Brand	:	Braun
FCC ID	:	USQ3786
IC	:	6856A-3786
EUT Description	:	Power Toothbrush Charger
Test Standard(s)	:	FCC 47 CFR PART 15 SUBPART C:2022 ISED RSS-247 ISSUE 2:2017 ISED RSS-GEN ISSUE 5 + A1 + A2:2021

Date Of Issue:
2023-02-07

Prepared by:
UL LLC
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CERT #0751.06

REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
V1	2023-01-27	Initial Issue	Noah Bennett
V2	2023-02-07	TCB Feedback changes	Noah Bennett

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: Braun GMBH
T-QTA Frankfurter Strasse 145
Kronberg, TS, 61476, DE

EUT DESCRIPTION: Power Toothbrush Charger

MODEL: 3786

BRAND: Braun

SERIAL NUMBER: Non-Serialized

SAMPLE RECEIPT DATE: 2022-09-12

DATE TESTED: 2022-09-13 to 2022-12-01

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart C	Complies
ISED RSS-247 Issue 2	Complies
ISED RSS-GEN Issue 5 + A1 + A2	Complies

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
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Consumer, Medical, and IT Segment
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Prepared By:

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2. TEST RESULTS SUMMARY

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	Complies	None.
15.247 (b) (3)	RSS-247 5.4 (d)	Output Power	Complies	None.
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	Complies	None.
15.209, 15.205	RSS-GEN 8.9, 8.10	Radiated Emissions	Complies	None.
15.207	RSS-Gen 8.8	AC Mains Conducted Emissions	Complies	None.

This Report contains data provided by the applicant which can impact the validity of the results. UL LLC is only responsible for the validity of results after the integrations of the data provided by the customer. The following information was provided by the client:

1. Antenna Gain and type (see section 6.3)
2. Supported Data rates and power settings (see section 6.5)
3. Cable Loss (see section 9)

3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, FCC CFR 47 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 + A1 + A2, and RSS-247 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

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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%

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

MAINS CONDUCTED EMISSIONS
Where relevant, the following sample calculation is provided:
Final Voltage (dBuV) = Measured Voltage (dBuV) + Cable Loss (dB) + Limiter Factor (dB) + LISN Insertion Loss.
36.5 dBuV + 0 dB +10.1 dB+ 0 dB = 46.6 dBuV

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6. EQUIPMENT UNDER TEST

6.1. EUT DESCRIPTION

The EUT is a portable toothbrush charger that contains BLE and 2.4 WLAN radios. This Report covers the full testing of the BLE radio.

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	3.39	2.18

6.3. DESCRIPTION OF AVAILABLE ANTENNAS

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

Frequency Range (MHz)	Type	Gain (dBi)
2402-2480	PCB trace	3.42

6.4. SOFTWARE AND FIRMWARE

The EUT firmware installed during testing was v0.2.9.
The test utility software used during testing was ESP_RF_TestTool_v2.8.

6.5. WORST-CASE CONFIGURATION AND MODE

Radiated emissions below 1GHz, above 18GHz, and power line conducted emission were performed with the EUT set to transmit at the channel with highest output power 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.

The EUT is only meant to operate in one orientation, X. Therefore, all testing was performed in this X orientation.

The EUT only supports data rates of 1Mbps for BLE. Therefore, all testing was done at this data rate.

Power taken using power setting 5, all other testing run at higher power setting of 8.

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6.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Power Supply	Braun	492-5218	NA	NA
Laptop(programming)	Asus	X515J	M8N0CX14J687338	PD99461NG
Laptop Power Supply	Asus	W19-045n3a	NA	NA

I/O CABLES

I/O Cable List						
Cable No.	**Port**	**# of Identical Ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	Power	1	Barrel	Power	<3m	Used to connect EUT to power.

TEST SETUP

The EUT is connected to a test laptop before the tests. Test software programmed the radio to transmit as applicable for the entire duration of testing.

SETUP DIAGRAMS

Please refer to R14565032-EP1 for setup diagrams

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7. MEASUREMENT METHOD

Duty Cycle: ANSI C63.10 Section 11.6.

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
Output Power: 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)

Emissions in 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 and 6.10.5

AC Power Line Conducted Emissions: ANSI C63.10-2013, Section 6.2.

General Radiated Spurious Emissions: ANSI C63.10-2013 Section 6.3 to 6.6

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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 - Line-Conducted Emissions – Voltage (Morrisville – Conducted 1)

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
CBL087	Coax cable, RG223, N-male to BNC-male, 20-ft.	Pasternack	PE3W06143-240	2022-04-05	2023-04-05
HI0091	Environmental Meter	Fisher Scientific	15-077-963	2022-07-20	2023-07-20
LISN003	LISN, 50-ohm/50-uH, 250uH 2-conductor, 25A	Fischer Custom Com.	FCC-LISN-50/250-25-2-01	2022-08-01	2023-08-01
75141	EMI Test Receiver 9kHz-7GHz	Rohde & Schwarz	ESCI 7	2022-08-03	2023-08-03
ATA222	Transient Limiter, 0.009-100MHz	Electro-Metrics	EM-7600	2022-04-05	2023-04-05
PS215	AC Power Source	Elgar	CW2501M (s/n 1523A02397)	NA	NA
SOFTEMI	EMI Software	UL	Version 9.5 (18 Oct 2021)		
CDECABLE001	ANSI C63.4 1m extension cable.	UL	Per Annex B of ANSI C63.4	2022-09-12	2023-09-12

Test Equipment Used - Wireless Conducted Measurement Equipment

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
SA0025	Spectrum Analyzer	Keysight Technologies	N9030A	2022-05-02	2023-05-02
HI0091	Environmental Meter	Fisher Scientific	15-077-963	2022-07-20	2023-07-20
SOFTEMI	Antenna Port Software	UL	Version 2022.8.16		
HI0090	Environmental Meter	Fisher Scientific	15-077-963	2022-07-20	2023-07-20
226559	SMA Coaxial 10dB Attenuator 25MHz-18GHz	CentricRF	C18S2-10	2022-05-03	2023-05-03
PWM005	RF Power Meter	Keysight Technologies	N1912A	2022-09-02	2023-09-02
PWS005	Peak and Avg Power Sensor, 50MHz to 18GHz	Keysight Technologies	N1921A	2022-06-15	2023-06-15

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

Equip. ID	Description	Manufacturer/Brand	Model Number	Last Cal.	Next Cal.
	0.009-30MHz				
AT0059	Active Loop Antenna	ETS-Lindgren	6502	2021-09-24	2022-09-24
	30-1000 MHz				
AT0066	Hybrid Broadband Antenna	Sunol Sciences Corp.	JB1	2022-03-01	2023-03-01
	1-18 GHz				
AT0072	Double-Ridged Waveguide Horn Antenna, 1 to 18 GHz	ETS Lindgren	3117	2022-05-11	2023-05-11
	18-40 GHz				
AT0063	Horn Antenna, 18-26.5GHz	ARA	MWH-1826/B	2021-11-04	2022-11-04
	Gain-Loss Chains				
C1-SAC01	Gain-loss string: 0.009-30MHz	Various	Various	2022-05-05	2023-05-05
C1-SAC02	Gain-loss string: 25-1000MHz	Various	Various	2022-05-05	2023-05-05
C1-SAC03	Gain-loss string: 1-18GHz	Various	Various	2022-05-05	2023-05-05
C1-SAC04	Gain-loss string: 18-40GHz	Various	Various	2022-05-05	2023-05-05
	Receiver & Software				
197954	Spectrum Analyzer	Rohde & Schwarz	ESW44	2022-04-14	2023-04-14
SA0026	Spectrum Analyzer	Agilent	N9030A	2022-08-02	2023-08-02
SOFTEMI	EMI Software	UL	Version 9.5 (18 Oct 2021)		
	Additional Equipment used				
200539	Environmental Meter	Fisher Scientific	15-077-963 (s/n 181474341)	2021-09-27	2022-09-27

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Test Equipment Used - Radiated Disturbance Emissions Test Equipment (Morrisville – Chamber 2)

Equip. ID	Description	Manufacturer/Brand	Model Number	Last Cal.	Next Cal.
	30-1000 MHz				
AT0074	Hybrid Broadband Antenna	Sunol Sciences Corp.	JB3	2022-09-07	2023-09-07
	Gain-Loss Chains				
C2-SAC02	Gain-loss string: 25-1000MHz	Various	Various	2022-05-10	2023-05-10
	Receiver & Software				
197955	Spectrum Analyzer	Rohde & Schwarz	ESW44	2022-03-08	2023-03-08
SOFTEMI	EMI Software	UL	Version 9.5 (18 Oct 2021)		
	Additional Equipment used				
200540	Environmental Meter	Fisher Scientific	15-077-963 (s/n 181474409)	2021-09-27	2022-09-27

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9. ANTENNA PORT TEST RESULTS

Note: For all antenna port testing, a client declared cable loss of 0.5dB was used.

9.1. ON TIME AND DUTY CYCLE

LIMITS

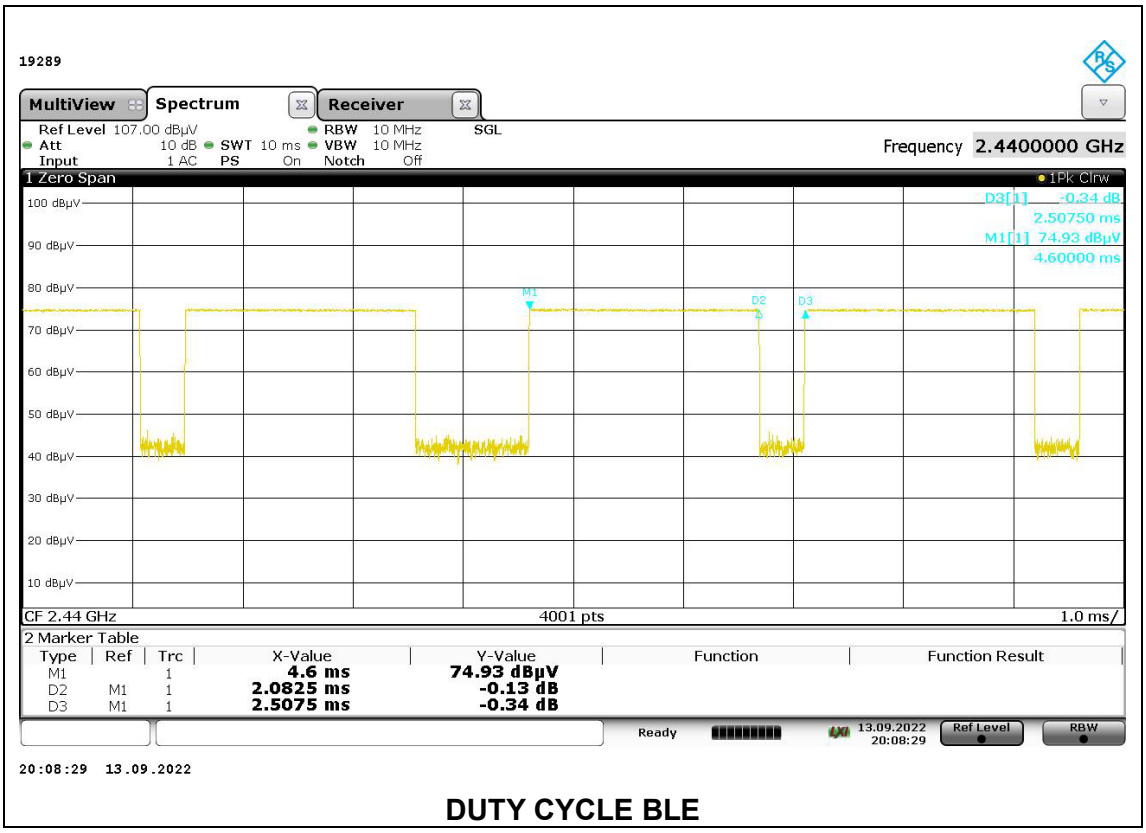
None; for reporting purposes only.

PROCEDURE

ANSI C63.10 Section 11.6
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 (%)	Duty Cycle Correction Factor (dB)	1/B Minimum VBW (kHz)
2.4GHz Band						
BLE	2.08	2.51	0.830	82.99	1.62	0.480



DUTY CYCLE BLE

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9.2. 99% BANDWIDTH

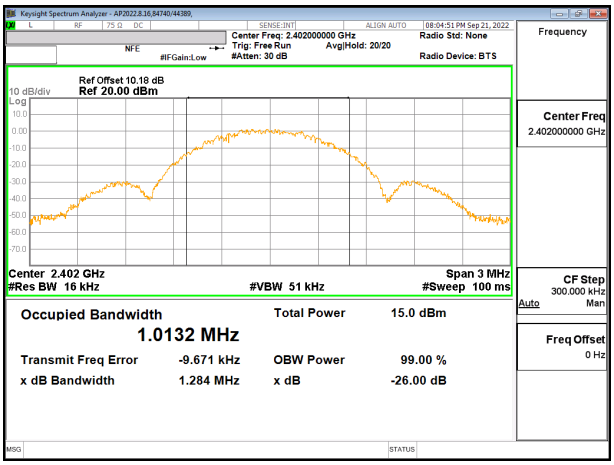
LIMITS

None; for reporting purposes only.

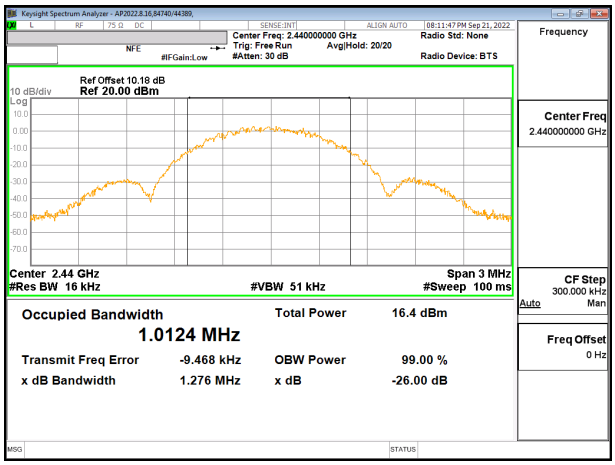
RESULTS

9.2.1. BLE (1Mbps)

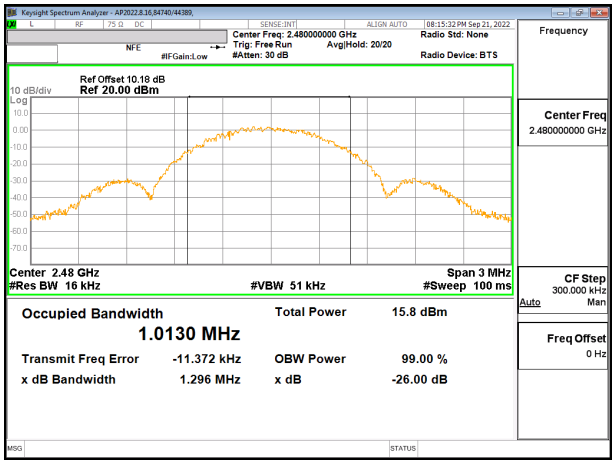
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	1.0132
Middle	2440	1.0124
High	2480	1.0130



LOW CHANNEL



MID CHANNEL



HIGH CHANNEL

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9.3. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

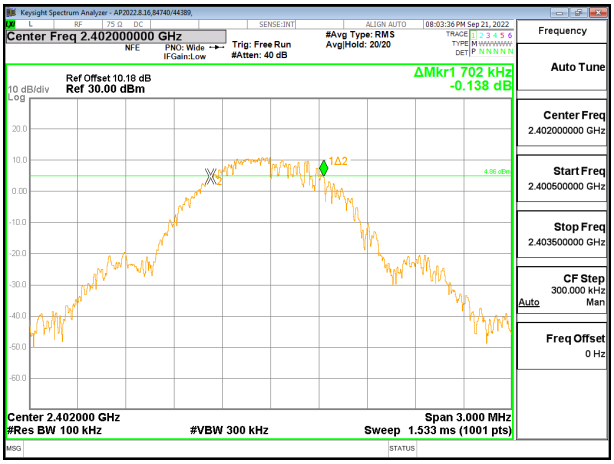
RSS-247 5.2 (a)

The minimum 6 dB bandwidth shall be at least 500 kHz.

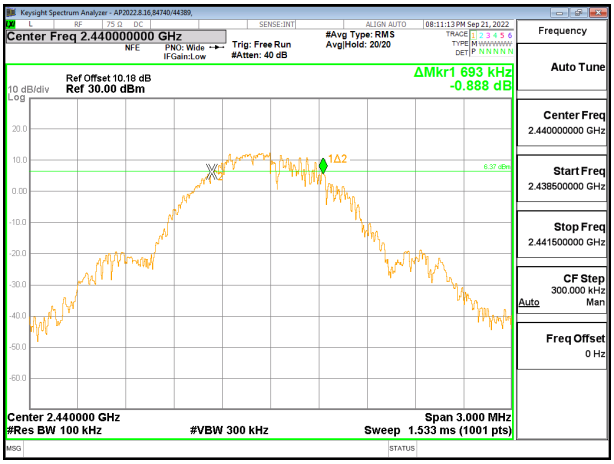
RESULTS

9.3.1. BLE (1Mbps)

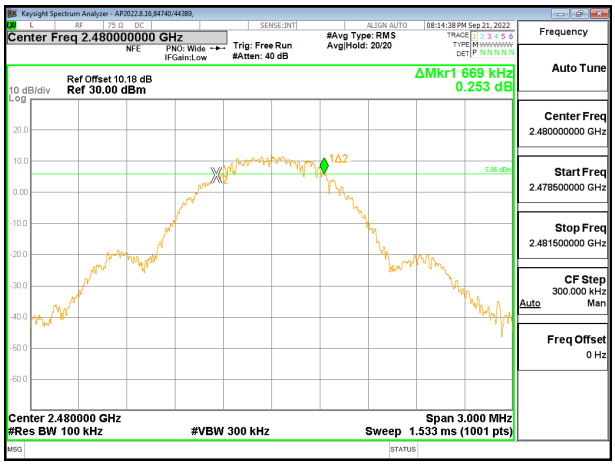
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	0.702	0.5
Middle	2440	0.693	0.5
High	2480	0.669	0.5



LOW CHANNEL



MID CHANNEL



HIGH CHANNEL

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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 10.15 dB (including 9.65 dB pad and 0.5 dB cable) was entered as an offset in the power meter. Note: Actual cable loss was unavailable at the time of testing, therefore a loss of 0.5dB was assumed as worst case

RESULTS

9.4.1. BLE (1Mbps)

Tested By:	85502/44389
Date:	2022-12-01

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	2.02	30	-27.980
Middle	2440	2.78	30	-27.220
High	2480	3.39	30	-26.610

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9.5. AVERAGE POWER

LIMITS

None; for reporting purposes only.

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

The cable assembly insertion loss of 10.15 dB (including 9.65 dB pad and 0.5 dB cable) was entered as an offset in the power meter. Note: Actual cable loss was unavailable at the time of testing, therefore a loss of 0.5dB was assumed as worst case

RESULTS

9.5.1. BLE (1Mbps)

Tested By:	85502/44389
Date:	2022-12-01

Channel	Frequency (MHz)	AV power (dBm)
Low	2402	1.67
Middle	2440	2.42
High	2480	3.05

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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. Note: Actual cable loss was unavailable at the time of testing, therefore a loss of 0.5dB was assumed as worst case

RESULTS

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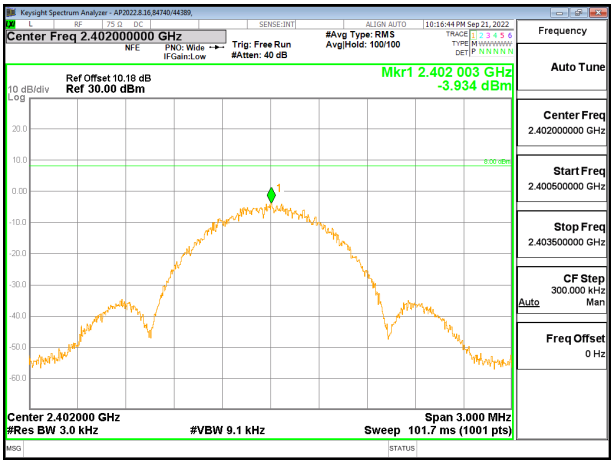
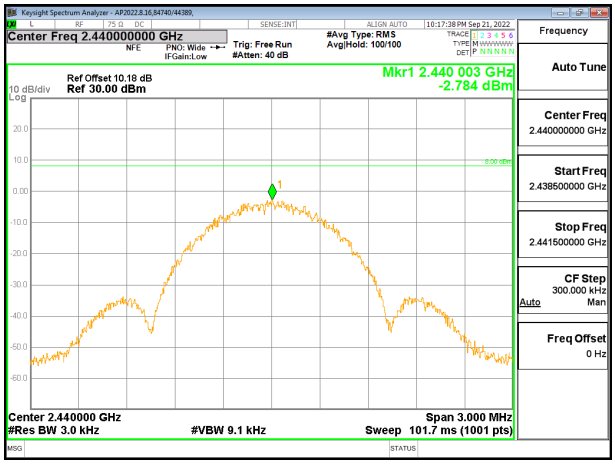
9.6.1. BLE (1Mbps)

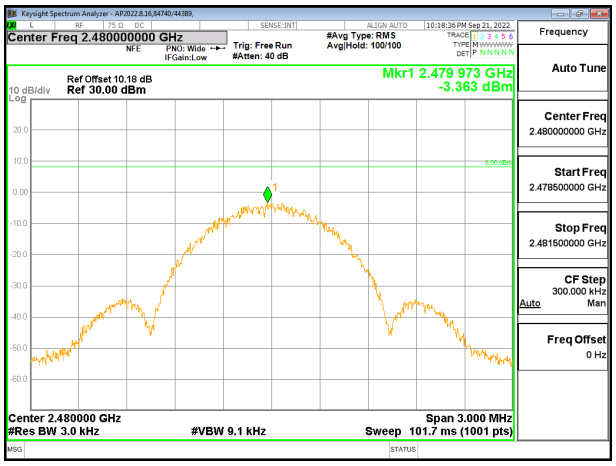
Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2402	-3.93	8	-11.93
Middle	2440	-2.78	8	-10.78
High	2480	-3.36	8	-11.36



LOW CHANNEL



MID CHANNEL



HIGH CHANNEL

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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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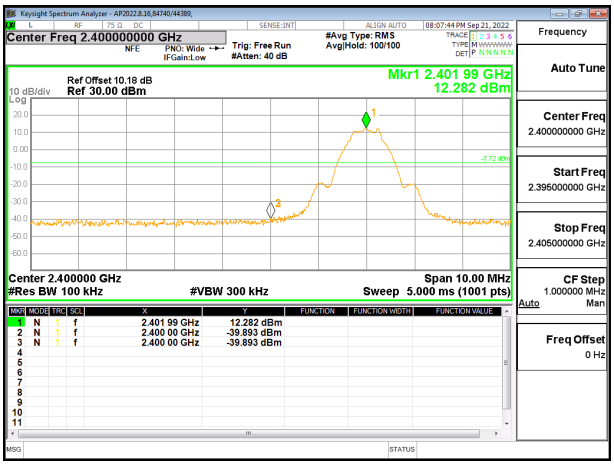
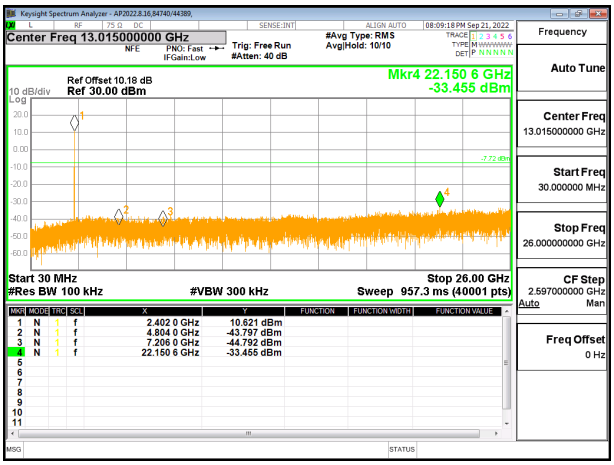
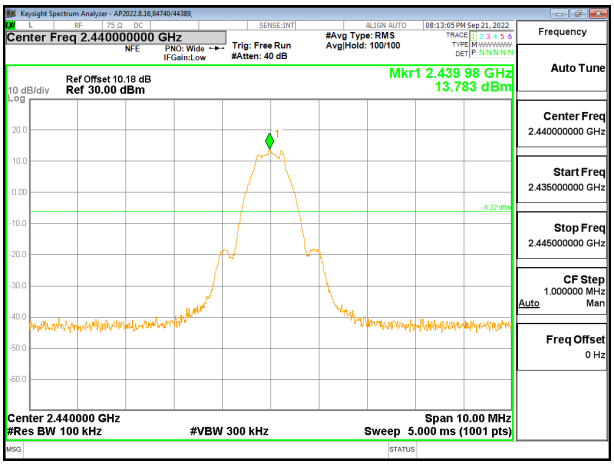
9.7.1. BLE (1Mbps)



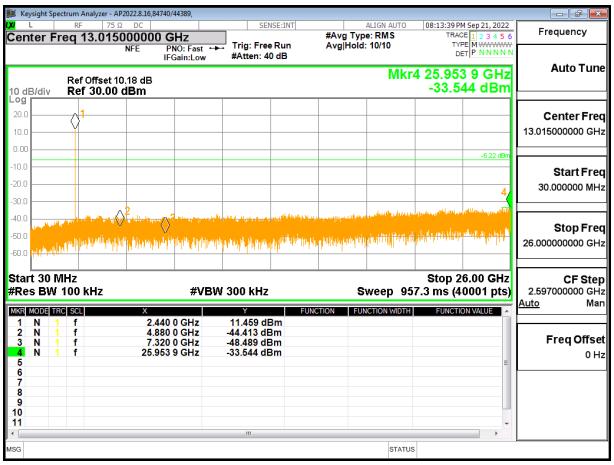
LOW CHANNEL BANDEDGE



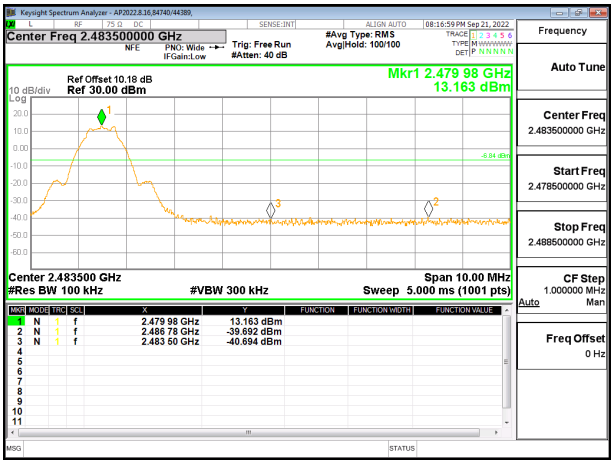
OUT-OF-BAND LOW CHANNEL



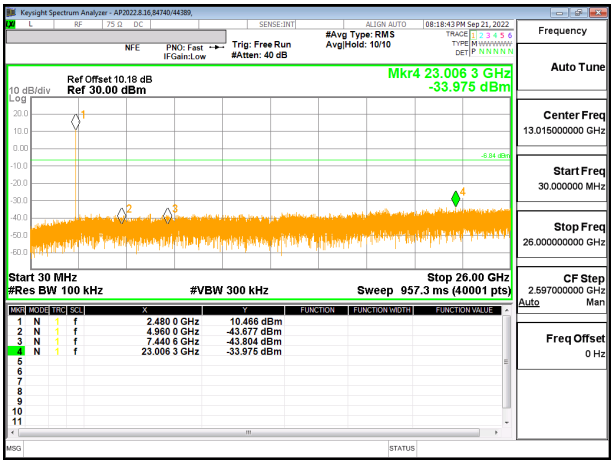
IN-BAND REFERENCE LEVEL



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	.08 @ 30m	-
Frequency Range (MHz)	**Field Strength Limit (uV/m) at 3m**	**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 3 MHz 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. Linear Voltage averaging was used.

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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 output power was tested.

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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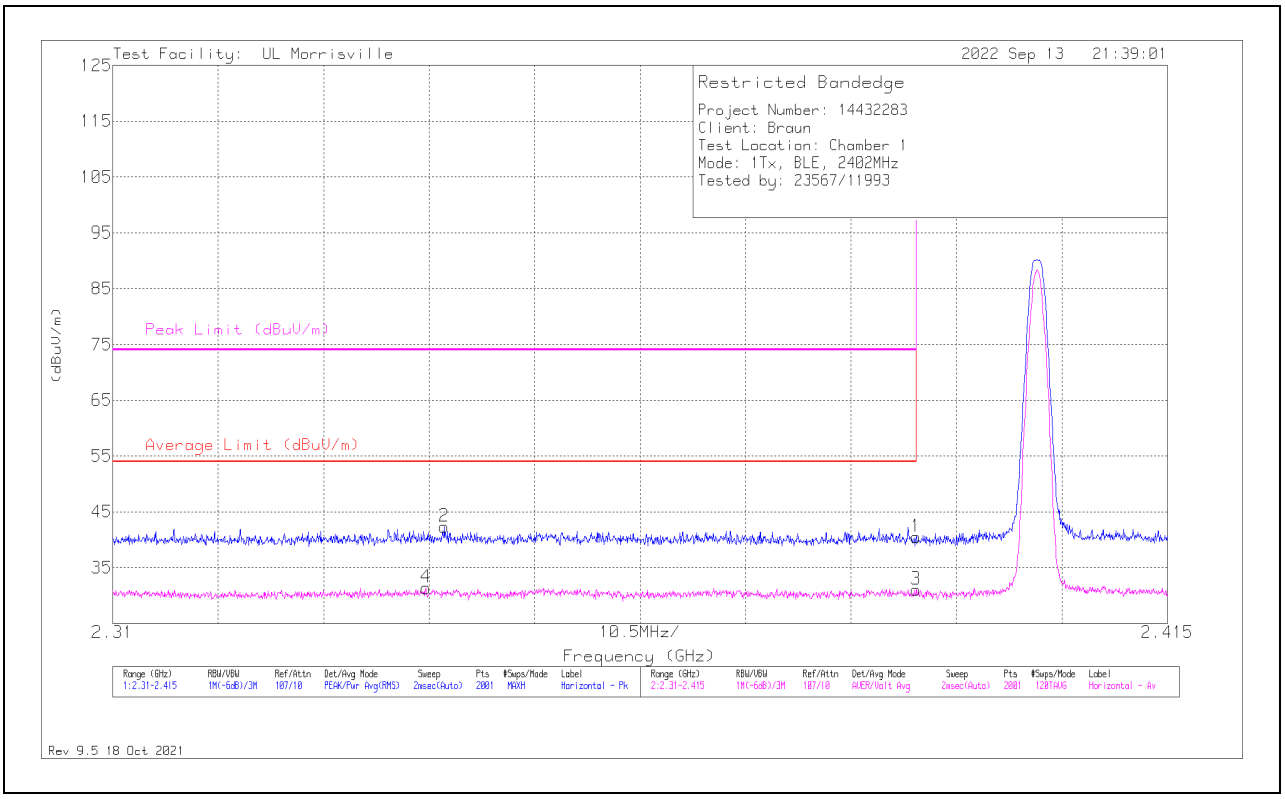
10.2. TRANSMITTER ABOVE 1 GHz

10.2.1. BLE (1Mbps)

Antenna 1

BANDEDGE (LOW CHANNEL)

HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 (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	33.32	Pk	32	-24.8	0	40.52	-	-	74	-33.48	222	191	H
2	* ** 2.34302	34.9	Pk	31.9	-24.5	0	42.3	-	-	74	-31.7	222	191	H
3	* ** 2.38996	22.2	ADV	32	-24.8	1.62	31.02	54	-22.98	-	-	222	191	H
4	* ** 2.34119	22.34	ADV	31.9	-24.5	1.62	31.36	54	-22.64	-	-	222	191	H

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

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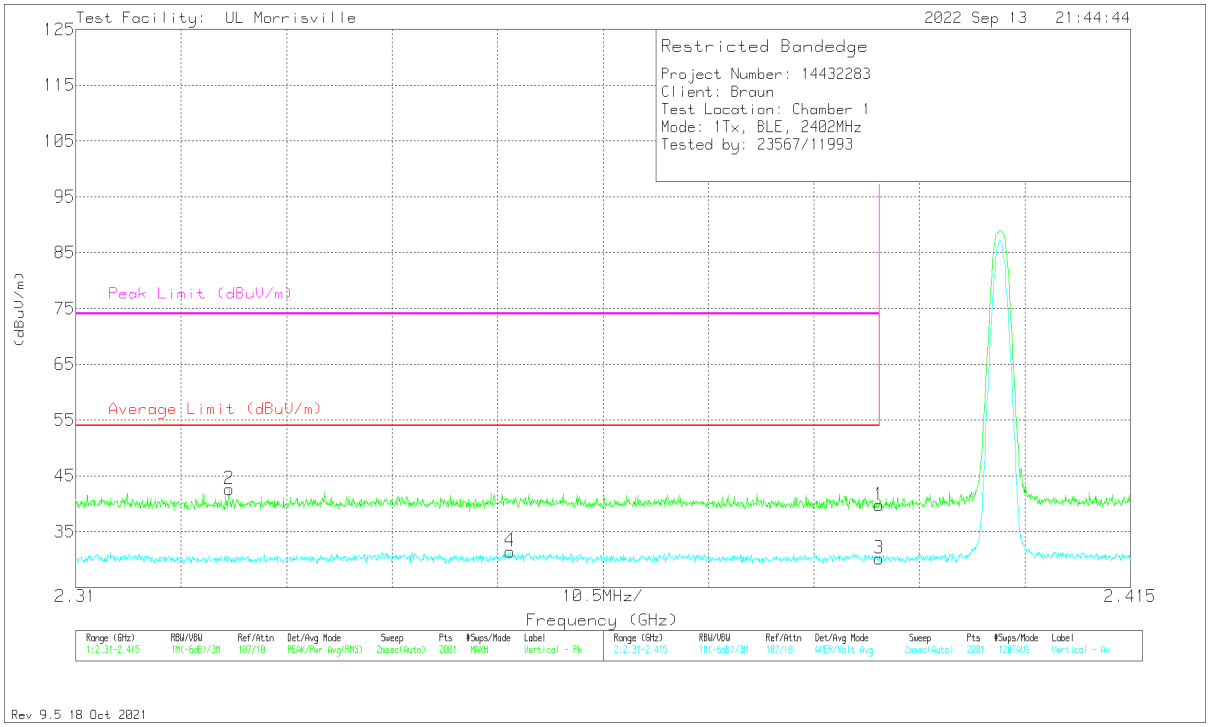
VERTICAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 (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	32.55	Pk	32	-24.8	0	39.75	-	-	74	-34.25	195	312	V
2	* ** 2.32528	35.58	Pk	31.8	-24.8	0	42.58	-	-	74	-31.42	195	312	V
3	* ** 2.38996	21.37	ADV	32	-24.8	1.62	30.19	54	-23.81	-	-	195	312	V
4	* ** 2.35321	22.46	ADV	31.9	-24.5	1.62	31.48	54	-22.52	-	-	195	312	V

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

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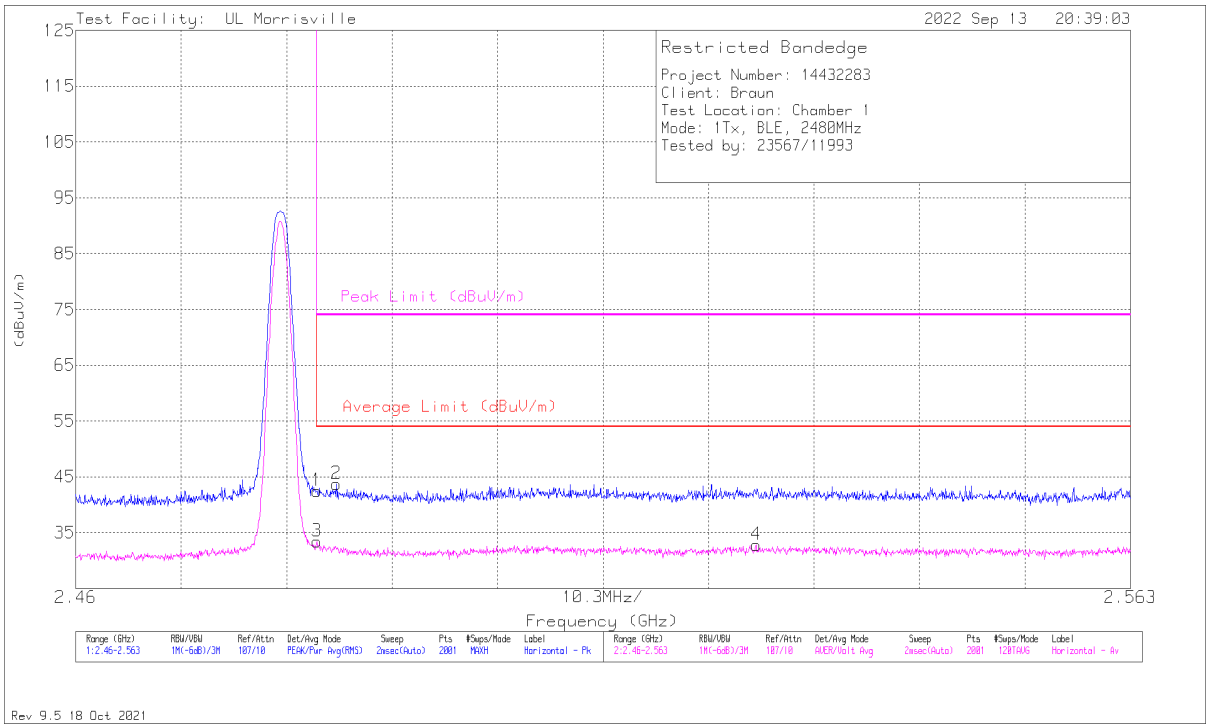
BANDEDGE (HIGH CHANNEL)

HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 (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	34.39	Pk	32.5	-24.4	0	42.49	-	-	74	-31.51	223	136	H
2	* ** 2.48544	35.59	Pk	32.4	-24.3	0	43.69	-	-	74	-30.31	223	136	H
3	* ** 2.48354	23.74	ADV	32.5	-24.4	1.62	33.46	54	-20.54	-	-	223	136	H
4	** 2.52644	23.05	ADV	32.5	-24.4	1.62	32.77	54	-21.23	-	-	223	136	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
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ADV - Linear Voltage Average

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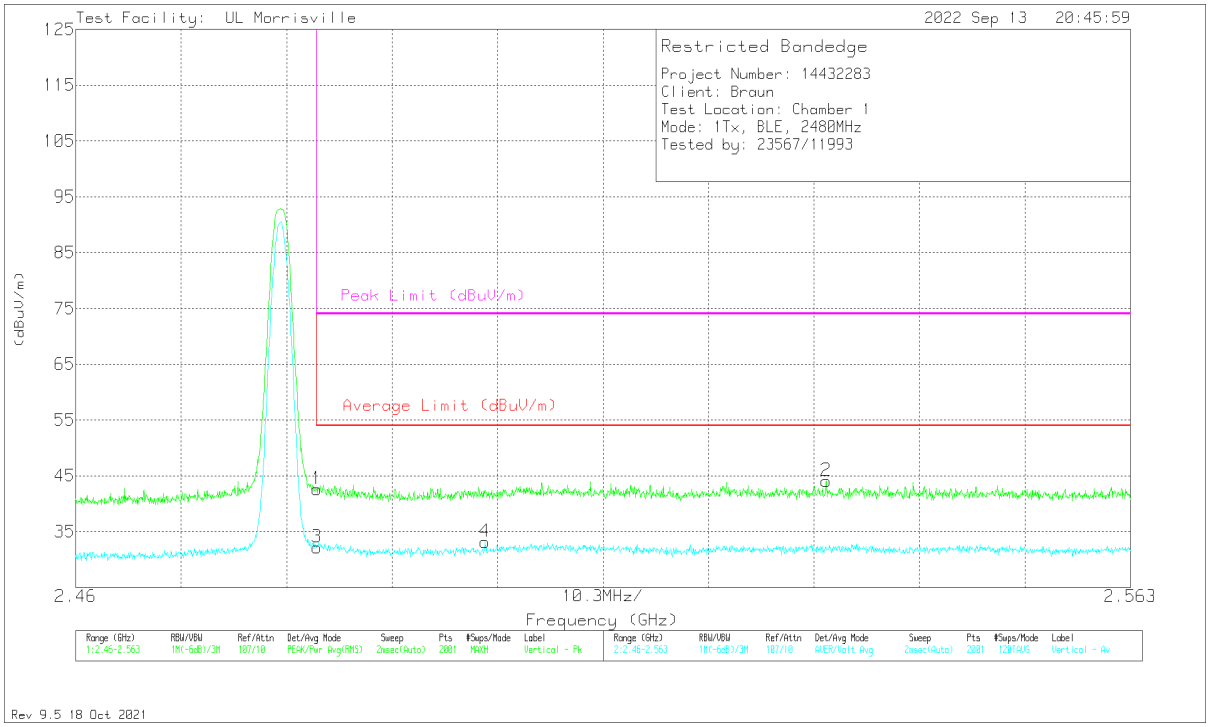
VERTICAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 (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	34.54	Pk	32.5	-24.4	0	42.64	-	-	74	-31.36	310	124	V
2	** 2.53328	35.85	Pk	32.6	-24.4	0	44.05	-	-	74	-29.95	310	124	V
3	* ** 2.48354	22.44	ADV	32.5	-24.4	1.62	32.16	54	-21.84	-	-	310	124	V
4	* ** 2.49996	23.59	ADV	32.5	-24.5	1.62	33.21	54	-20.79	-	-	310	124	V

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

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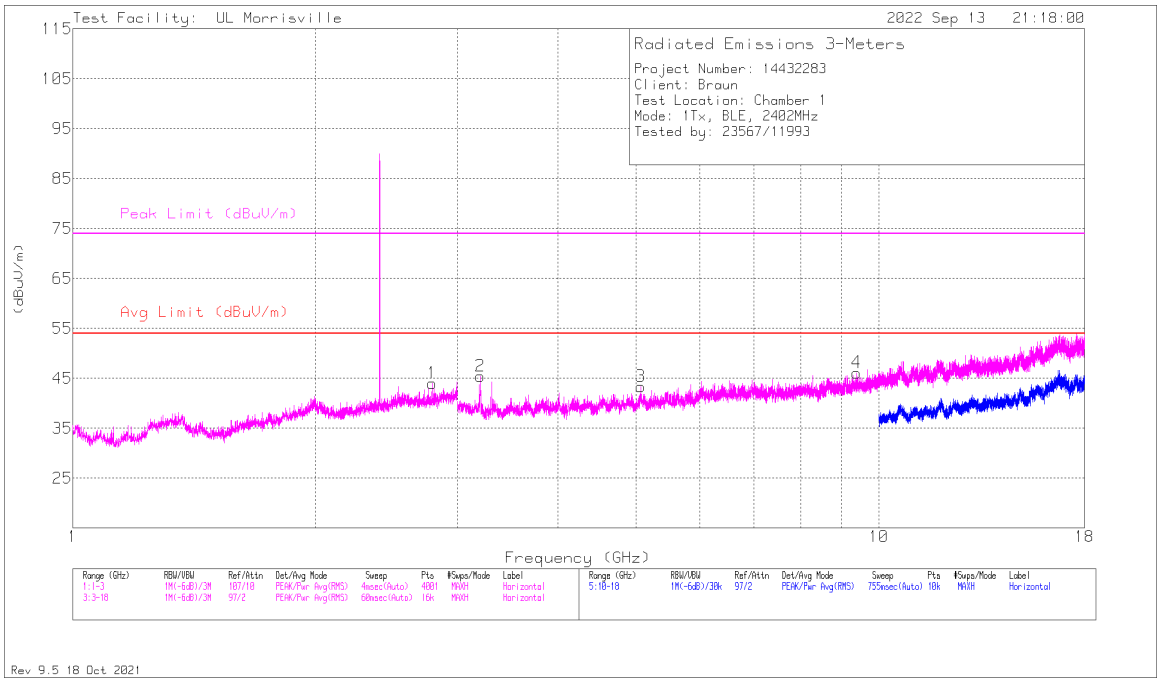
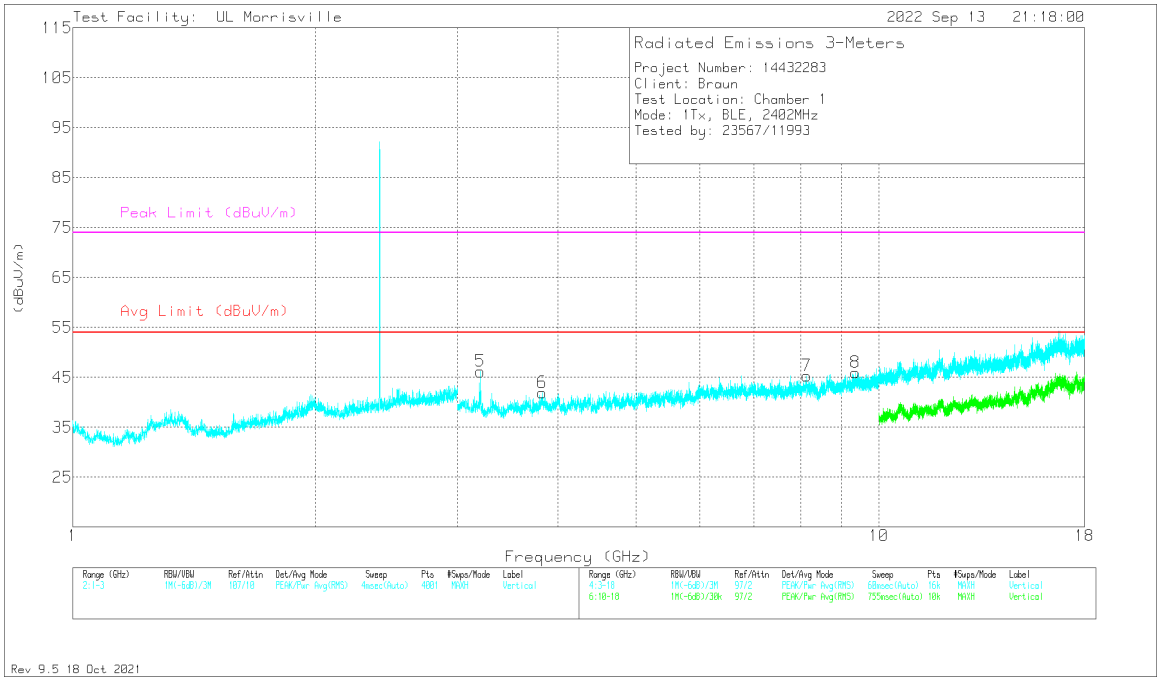
HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS



HORIZONTAL



VERTICAL

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RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 (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	* ** 2.79	35.48	Pk	32.6	-24.1	43.98	54	-10.02	74	-30.02	0-360	101	H
3	* ** 5.06438	41.17	Pk	34.1	-31.9	43.37	54	-10.63	74	-30.63	0-360	200	H
4	* ** 9.38531	38.15	Pk	36.6	-28.6	46.15	54	-7.85	74	-27.85	0-360	101	H
6	* ** 3.82406	41.19	Pk	33.4	-32.6	41.99	54	-12.01	74	-32.01	0-360	101	V
7	* ** 8.14125	38.88	Pk	35.8	-29.4	45.28	54	-8.72	74	-28.72	0-360	200	V
8	* ** 9.3525	37.82	Pk	36.5	-28.4	45.92	54	-8.08	74	-28.08	0-360	101	V
2	3.2025	45.2	Pk	33	-32.7	45.5	-	-	-	-	0-360	101	H
5	3.2025	45.86	Pk	33	-32.7	46.16	-	-	-	-	0-360	101	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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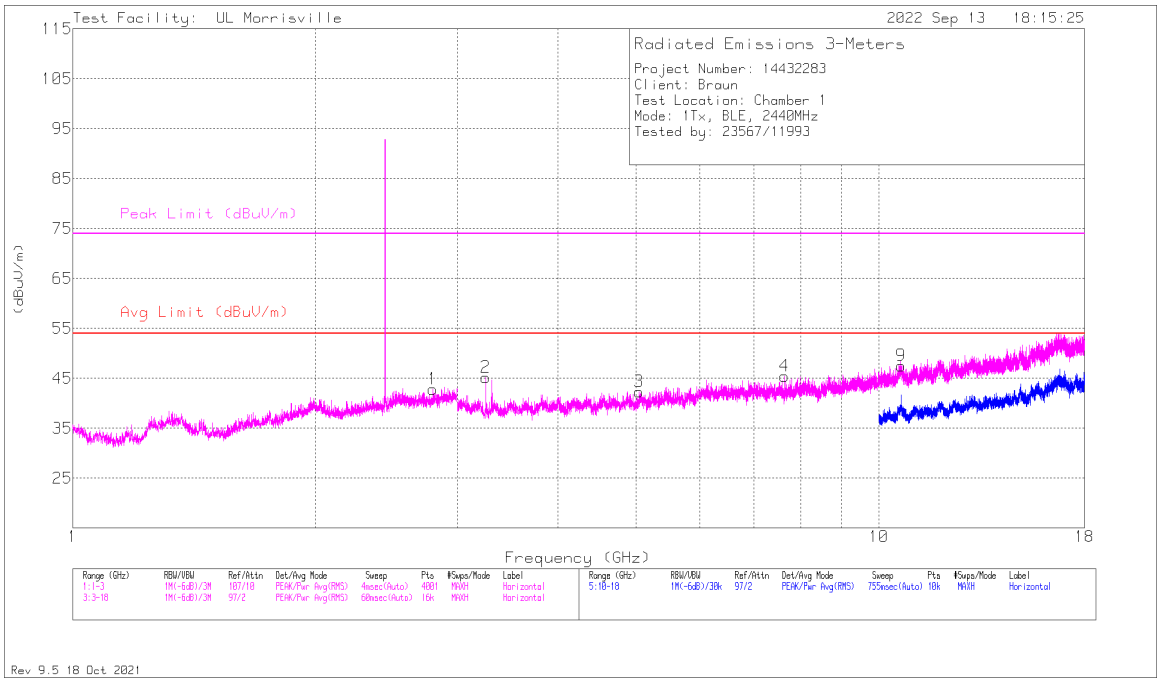
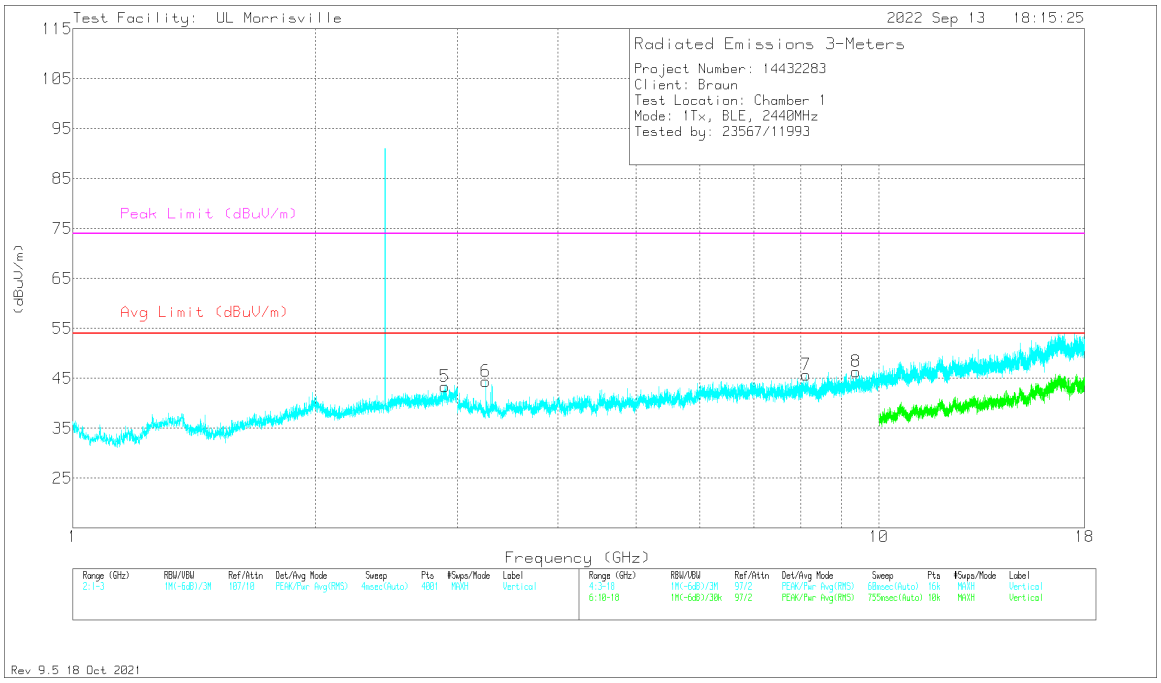
MID CHANNEL RESULTS



HORIZONTAL



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RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 (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	* ** 2.7955	34.35	Pk	32.6	-24.1	42.85	54	-11.15	74	-31.15	0-360	101	H
5	* ** 2.8925	34.33	Pk	32.7	-23.7	43.33	54	-10.67	74	-30.67	0-360	200	V
3	* ** 5.03906	40.47	Pk	34.1	-32.2	42.37	54	-11.63	74	-31.63	0-360	101	H
4	* ** 7.635	38.8	Pk	35.7	-29	45.5	54	-8.5	74	-28.5	0-360	200	H
9	* ** 10.65375	34.36	Pk	37.7	-24.6	47.46	54	-6.54	74	-26.54	0-360	101	H
7	* ** 8.12063	39.27	Pk	35.8	-29.4	45.67	54	-8.33	74	-28.33	0-360	200	V
8	* ** 9.375	37.99	Pk	36.6	-28.2	46.39	54	-7.61	74	-27.61	0-360	101	V
2	3.25313	45.22	Pk	33	-33	45.22	-	-	-	-	0-360	200	H
6	3.25313	44.36	Pk	33	-33	44.36	-	-	-	-	0-360	101	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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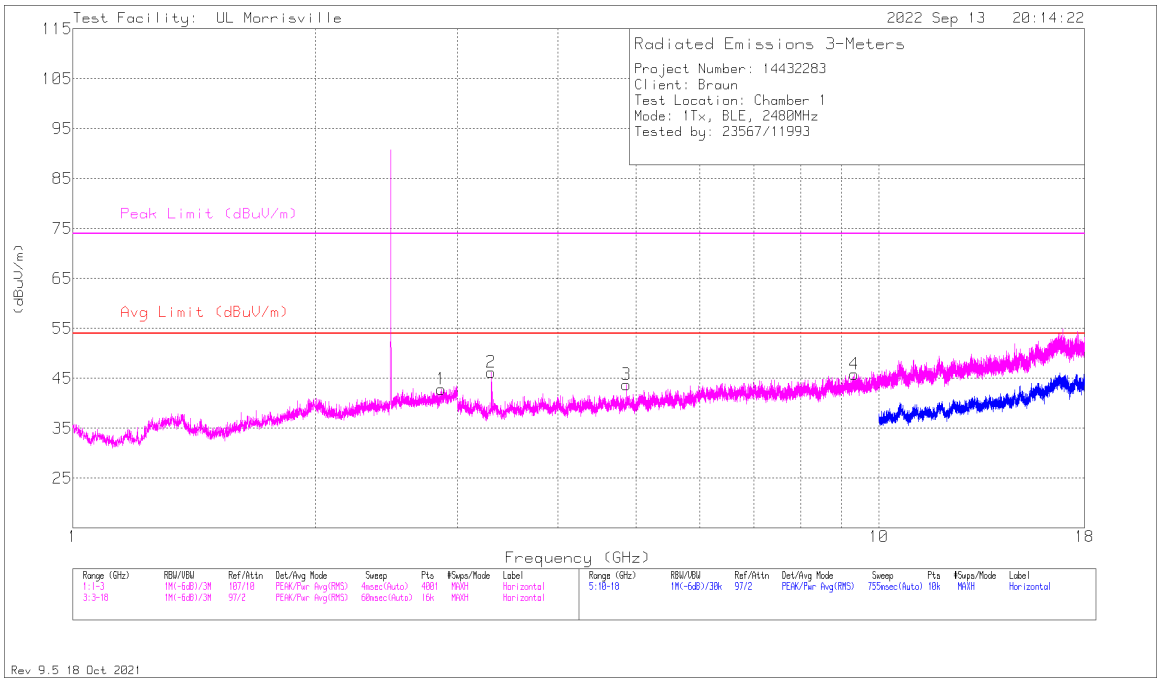
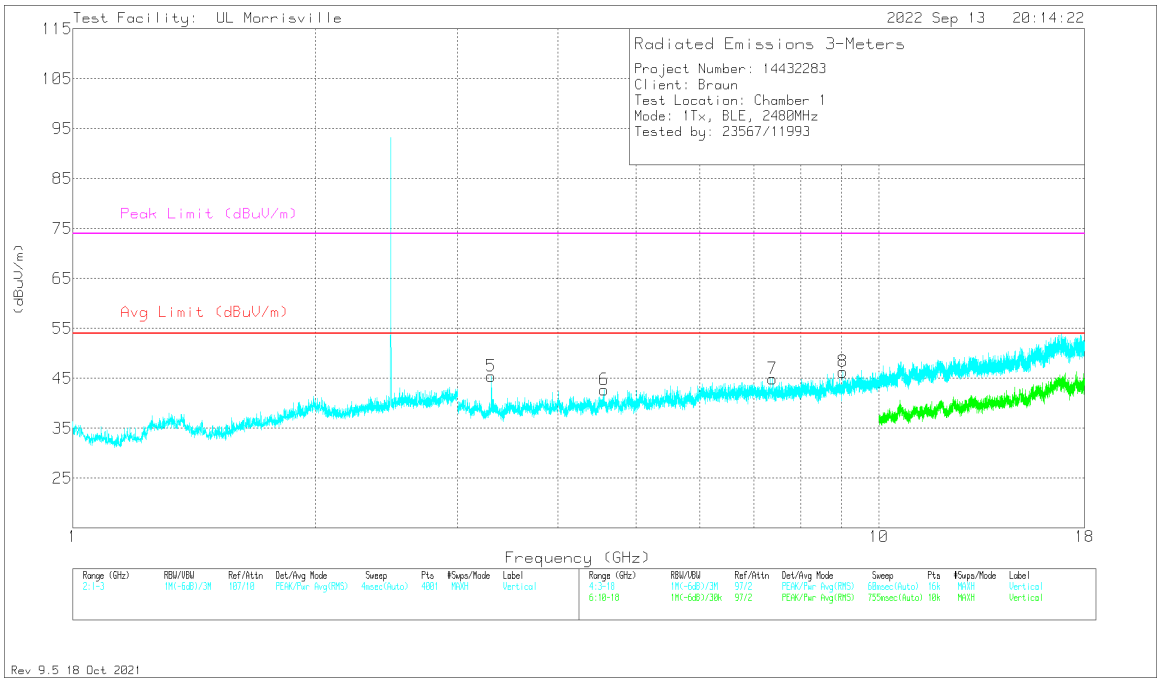
HIGH CHANNEL RESULTS



HORIZONTAL



VERTICAL

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RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 (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	* ** 2.8645	34.13	Pk	32.6	-23.9	42.83	54	-11.17	74	-31.17	0-360	101	H
3	* ** 4.86094	41.48	Pk	34.1	-31.8	43.78	54	-10.22	74	-30.22	0-360	101	H
4	* ** 9.32344	38.31	Pk	36.5	-29	45.81	54	-8.19	74	-28.19	0-360	199	H
6	* ** 4.56469	40.58	Pk	34	-31.9	42.68	54	-11.32	74	-31.32	0-360	200	V
7	* ** 7.38	38.09	Pk	35.6	-28.8	44.89	54	-9.11	74	-29.11	0-360	101	V
8	* ** 9.02344	38.59	Pk	36.2	-28.5	46.29	54	-7.71	74	-27.71	0-360	200	V
2	3.30656	45.88	Pk	32.9	-32.6	46.18	-	-	-	-	0-360	199	H
5	3.30656	45.16	Pk	32.9	-32.6	45.46	-	-	-	-	0-360	101	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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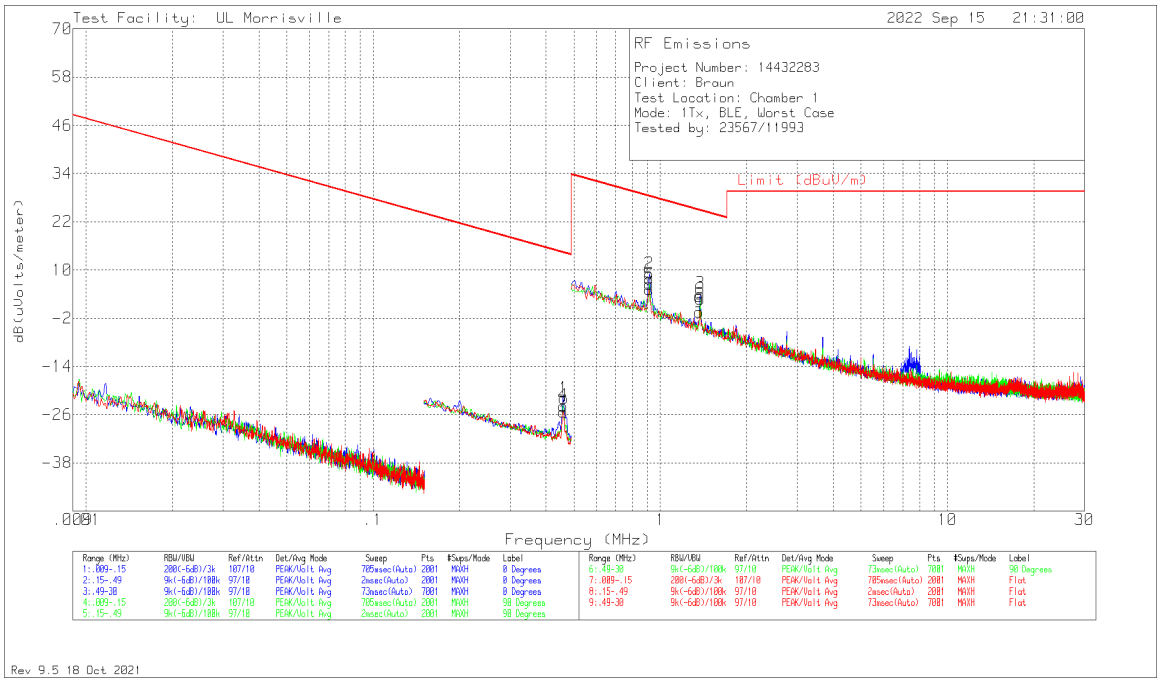
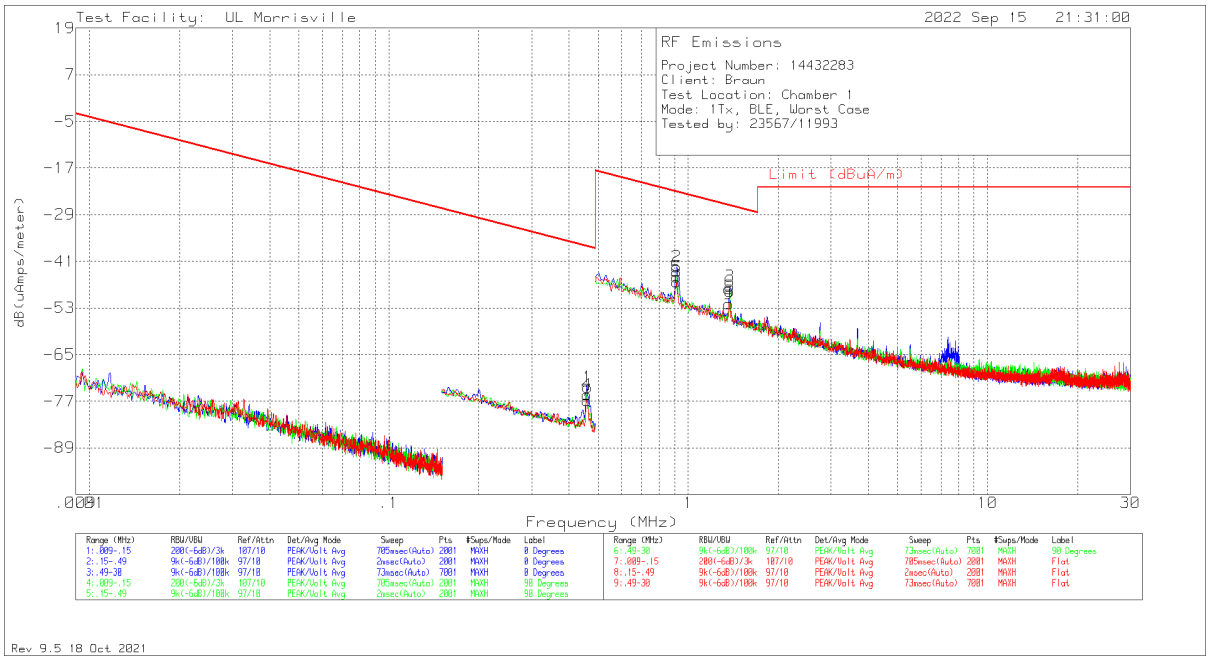
10.3. WORST CASE BELOW 30MHZ

SPURIOUS EMISSIONS BELOW 30 MHz (WORST-CASE CONFIGURATION)



ANTENNA- THREE ORIENTATIONS – E FIELD



ANTENNA- THREE ORIENTATIONS – H FIELD

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Below 30MHz Data – E FIELD

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0059 (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
7	.45864	44.45	Pk	10.1	.2	-80	-25.25	14.37	34.37	-19.62	0-360	Flat
4	.45872	45.92	Pk	10.1	.2	-80	-23.78	14.37	34.37	-18.15	0-360	90 degs
1	.46076	47.73	Pk	10.1	.2	-80	-21.97	14.33	34.33	-16.3	0-360	0 degs
2	.91582	38.7	Pk	10.2	.2	-40	9.1	28.37	-	-19.27	0-360	0 degs
5	.91582	36.07	Pk	10.2	.2	-40	6.47	28.37	-	-21.9	0-360	90 degs
8	.91582	34.82	Pk	10.2	.2	-40	5.22	28.37	-	-23.15	0-360	Flat
9	1.36693	29.01	Pk	10.4	.2	-40	-.39	24.89	-	-25.28	0-360	Flat
3	1.37536	33.53	Pk	10.4	.2	-40	4.13	24.84	-	-20.71	0-360	0 degs
6	1.37536	32.11	Pk	10.4	.2	-40	2.71	24.84	-	-22.13	0-360	90 degs

Pk - Peak detector

Below 30MHz Data – H FIELD

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0059 (dB/m)	Gain/Loss (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uAmps/meter)	QP/AV Limit (dBuA/m)	PK Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Loop Angle
7	.45864	44.45	Pk	-41.4	.2	-80	-76.75	-37.13	-17.13	-19.62	0-360	Flat
4	.45872	45.92	Pk	-41.4	.2	-80	-75.28	-37.13	-17.13	-18.15	0-360	90 degs
1	.46076	47.73	Pk	-41.4	.2	-80	-73.47	-37.17	-17.17	-16.3	0-360	0 degs
2	.91582	38.7	Pk	-41.3	.2	-40	-42.4	-23.13	-	-19.27	0-360	0 degs
5	.91582	36.07	Pk	-41.3	.2	-40	-45.03	-23.13	-	-21.9	0-360	90 degs
8	.91582	34.82	Pk	-41.3	.2	-40	-46.28	-23.13	-	-23.15	0-360	Flat
9	1.36693	29.01	Pk	-41.1	.2	-40	-51.89	-26.61	-	-25.28	0-360	Flat
3	1.37536	33.53	Pk	-41.1	.2	-40	-47.37	-26.66	-	-20.71	0-360	0 degs
6	1.37536	32.11	Pk	-41.1	.2	-40	-48.79	-26.66	-	-22.13	0-360	90 degs

Pk - Peak detector

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).

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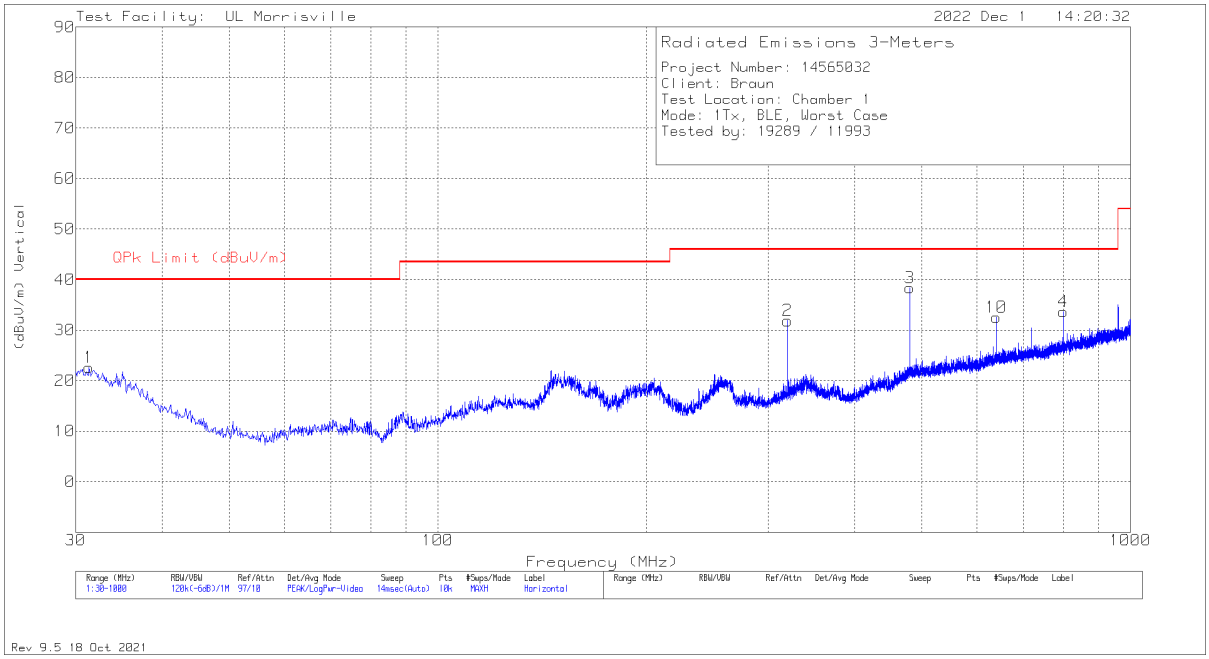
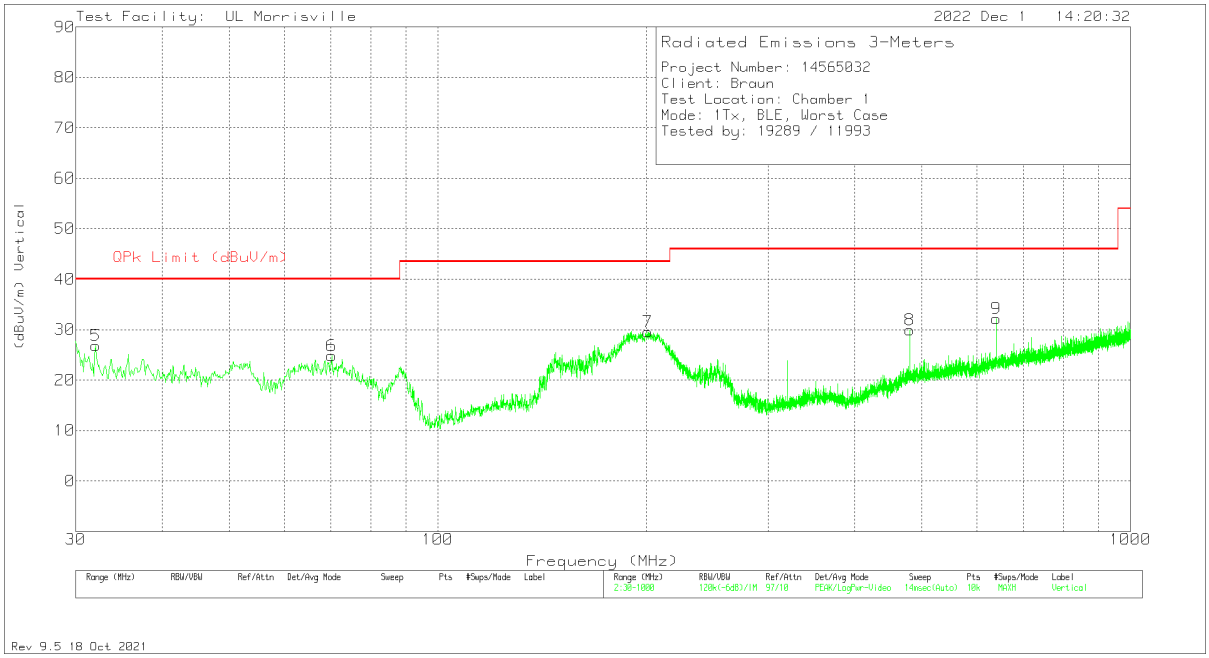
10.4. WORST CASE BELOW 1 GHZ

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	AT0066 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	31.358	27.53	Pk	26.3	-31.2	22.63	40	-17.37	0-360	299	H
5	32.037	32.46	Pk	25.7	-31.3	26.86	40	-13.14	0-360	100	V
6	70.255	41.3	Pk	14.3	-30.8	24.8	40	-15.2	0-360	100	V
7	201.011	40.52	Pk	18.3	-29.3	29.52	43.52	-14	0-360	100	V
2	320.03	40.77	Pk	19.7	-28.6	31.87	46.02	-14.15	0-360	100	H
3	479.983	42.57	Pk	23.4	-27.6	38.37	46.02	-7.65	0-360	100	H
8	479.983	34.1	Pk	23.4	-27.6	29.9	46.02	-16.12	0-360	100	V
10	640.033	33.99	Pk	25.4	-26.8	32.59	46.02	-13.43	0-360	299	H
9	640.033	33.63	Pk	25.4	-26.8	32.23	46.02	-13.79	0-360	100	V
4	800.083	32.12	Pk	27.2	-25.7	33.62	46.02	-12.4	0-360	100	H

Pk - Peak detector
QP- Quasi-Peak detector

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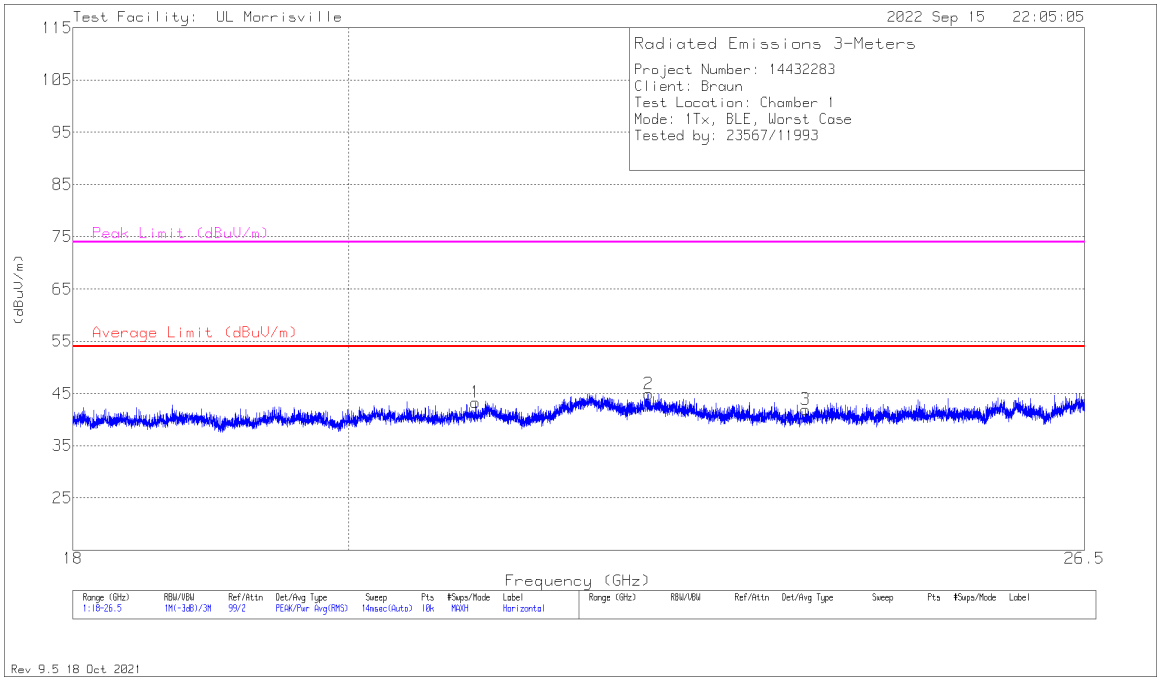
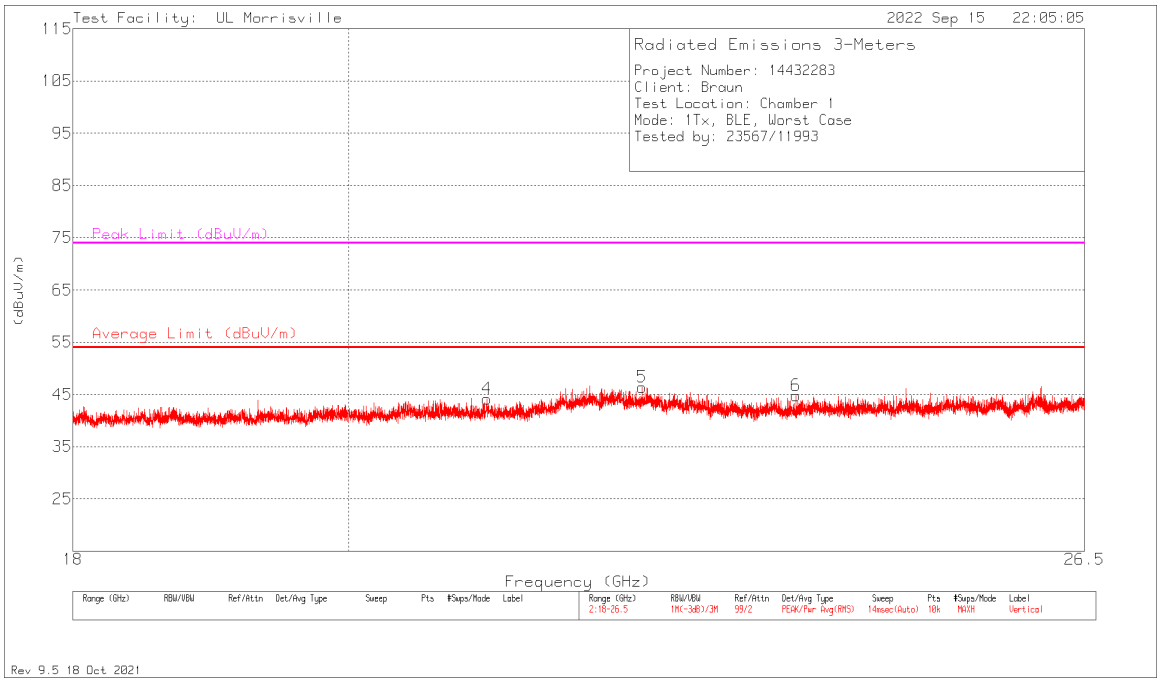
10.5. WORST CASE 18-26 GHZ

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



HORIZONTAL



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18 – 26GHz Data

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	ANT (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	* ** 20.9957	48.13	Pk	34.2	-39.1	43.23	54	-10.77	74	-30.77	0-360	299	H
2	* ** 22.43149	47.7	Pk	36.5	-39.3	44.9	54	-9.1	74	-29.1	0-360	101	H
3	* ** 23.82053	46.02	Pk	34.9	-39	41.92	54	-12.08	74	-32.08	0-360	149	H
4	* ** 21.08581	49.29	Pk	34.1	-39.2	44.19	54	-9.81	74	-29.81	0-360	150	V
5	* ** 22.37709	48.95	Pk	36.6	-39.2	46.35	54	-7.65	74	-27.65	0-360	150	V
6	* ** 23.73127	48.99	Pk	34.9	-39.1	44.79	54	-9.21	74	-29.21	0-360	101	V

Pk - Peak detector

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11. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 8.8

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56 *	56 to 46 *
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

TEST PROCEDURE

The EUT is placed on a non-conducting table 40 cm from the vertical ground place and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.10.

The receiver is set to a resolution bandwidth of 9 kHz. Peak Detection is used unless otherwise noted as quasi-peak or average.

Line conduced data is recorded for both lines.

RESULTS

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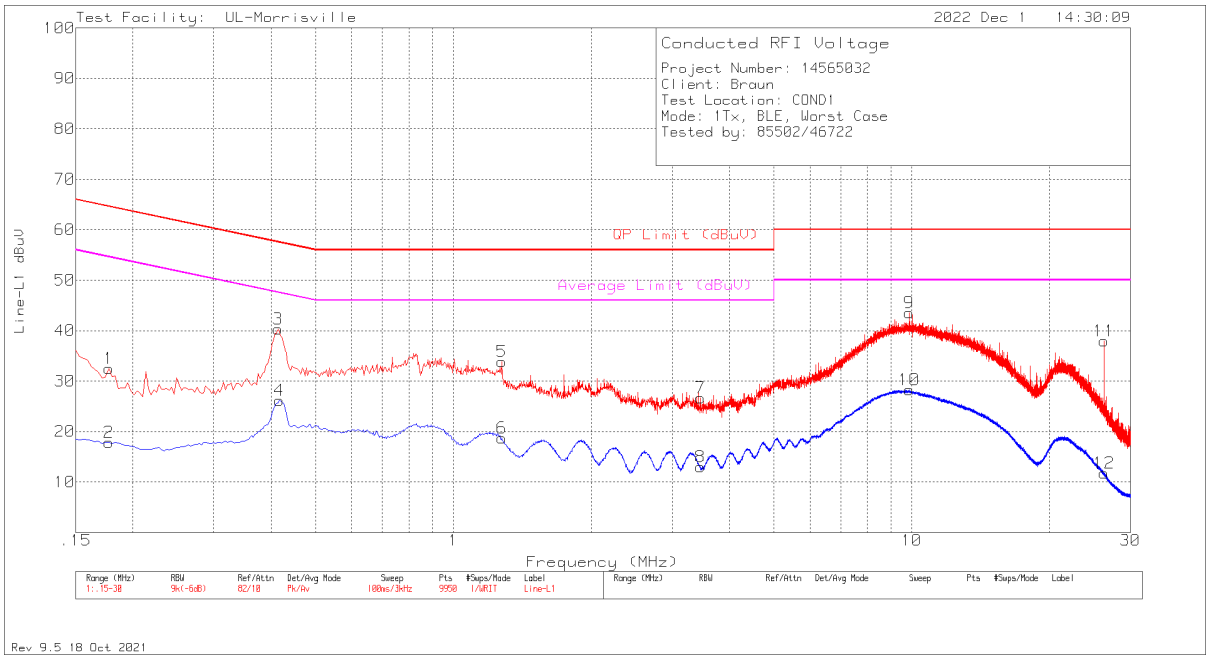
11.1.1. AC Power Line Host

LINE 1 RESULTS



Range 1: Line-L1 .15 - 30MHz										
Marker	**Frequency (MHz)**	**Meter Reading (dBuV)**	**Det**	**LISN VCF (dB)**	**Cbl/Limiter (dB)**	**Corrected Reading dBuV**	**QP Limit (dBuV)**	**Margin (dB)**	**Average Limit (dBuV)**	**Margin (dB)**
1	.177	22.53	Pk	.2	9.8	32.53	64.63	-32.1	-	-
2	.177	7.88	Av	.2	9.8	17.88	-	-	54.63	-36.75
3	.414	30.46	Pk	0	9.8	40.26	57.57	-17.31	-	-
4	.417	16.34	Av	0	9.8	26.14	-	-	47.51	-21.37
5	1.275	24.04	Pk	0	9.8	33.84	56	-22.16	-	-
6	1.275	8.86	Av	0	9.8	18.66	-	-	46	-27.34
7	3.465	16.72	Pk	0	9.9	26.62	56	-29.38	-	-
8	3.465	3.08	Av	0	9.9	12.98	-	-	46	-33.02
9	9.867	33.49	Pk	.1	10	43.59	60	-16.41	-	-
10	9.867	18.18	Av	.1	10	28.28	-	-	50	-21.72
11	26.277	27.47	Pk	.3	10.2	37.97	60	-22.03	-	-
12	26.277	1.26	Av	.3	10.2	11.76	-	-	50	-38.24

Pk – Peak Detector
Av – Average Detector

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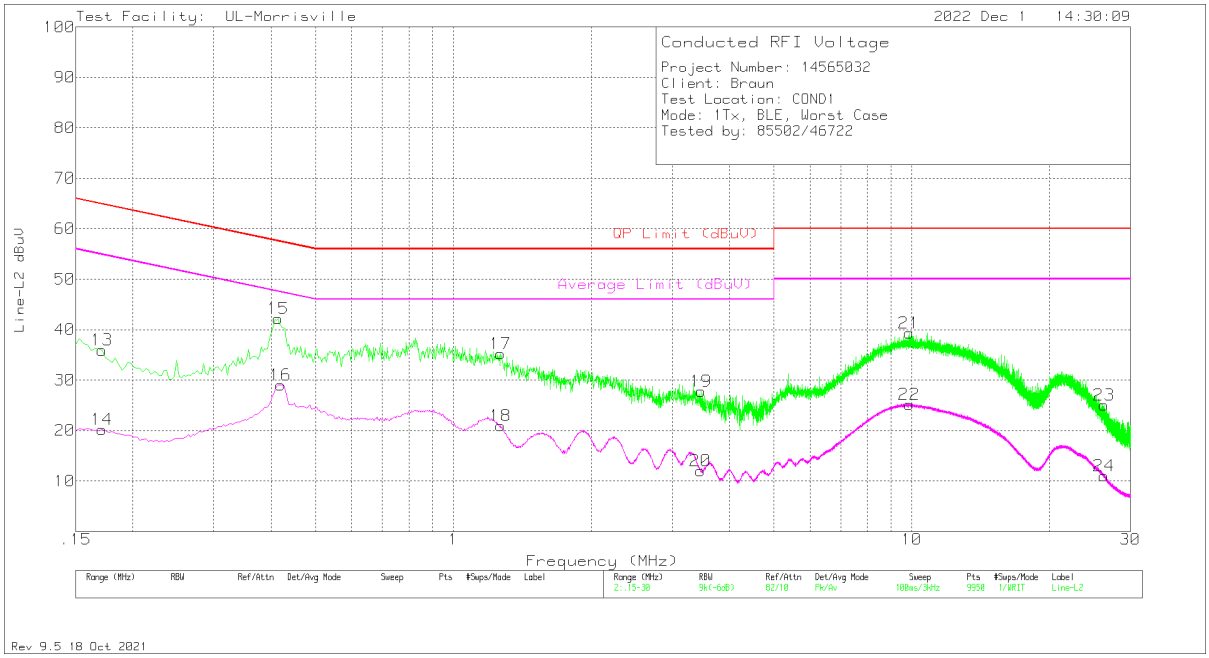
LINE 2 RESULTS



Range 2: Line-L2 .15 - 30MHz										
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VCF (dB)	Cbl/Limiter (dB)	Corrected Reading dBuV	QP Limit (dBuV)	Margin (dB)	Average Limit (dBuV)	Margin (dB)
13	.171	25.91	Pk	.2	9.8	35.91	64.91	-29	-	-
14	.171	10.23	Av	.2	9.8	20.23	-	-	54.91	-34.68
15	.414	32.43	Pk	0	9.8	42.23	57.57	-15.34	-	-
16	.42	19.24	Av	0	9.8	29.04	-	-	47.45	-18.41
17	1.266	25.47	Pk	0	9.8	35.27	56	-20.73	-	-
18	1.266	11.1	Av	0	9.8	20.9	-	-	46	-25.1
19	3.471	17.83	Pk	0	9.9	27.73	56	-28.27	-	-
20	3.465	2.15	Av	0	9.9	12.05	-	-	46	-33.95
21	9.882	29.2	Pk	.1	10	39.3	60	-20.7	-	-
22	9.882	15.02	Av	.1	10	25.12	-	-	50	-24.88
23	26.307	14.52	Pk	.3	10.2	25.02	60	-34.98	-	-
24	26.304	.52	Av	.3	10.2	11.02	-	-	50	-38.98

Pk – Peak Detector
Av – Average Detector

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12. SETUP PHOTOS

Please refer to R14565032-EP1 for setup photos

END OF TEST REPORT

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