CERTIFICATION TEST REPORT

Report Number. : 4791377016-E7V1

Applicant	:	SAMSUNG ELECTRONICS CO., LTD. 129 SAMSUNG-RO, YEONGTONG-GU, SUWON-SI, GYEONGGI-DO, 16677, KOREA
Model	:	SM-A166M/DS, SM-A166M
FCC ID	:	A3LSMA166M
EUT Description	:	GSM/WCDMA/LTE/5G NR Phone + BT/BLE, DTS/UNII a/b/g/n/ac and NFC
Test Standard(s)	:	FCC 47 CFR PART 15 SUBPART C

Date Of Issue:
2024-08-16

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IAS ACCREDITED
Testing Laboratory
TL-637

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	2024-08-16	Initial issue	Myeongjun Kwon

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME:	SAMSUNG ELECTRONICS CO., LTD.
EUT DESCRIPTION:	GSM/WCDMA/LTE/5G NR Phone + BT/BLE, DTS/UNII a/b/g/n/ac, and NFC.
MODEL NUMBER:	SM-A166M/DS, SM-A166M
SERIAL NUMBER:	R3CX50MNLFY (CONDUCTED); R3CX50MNK5Z, R3CX50MNJQV (RADIATED)
DATE TESTED:	2024-07-03 – 2024-08-16

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
47 CFR Part 15 Subpart C	Complies

UL KOREA LTD. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL KOREA LTD. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL KOREA LTD. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL KOREA LTD. 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 IAS, any agency of the Federal Government, or any agency of any government.

Approved & Released For
UL KOREA LTD. By:

Seokhwan Hong
Suwon Lab Engineer
UL KOREA LTD.

Tested By:

Myeongjun Kwon
Suwon Lab Engineer
UL KOREA LTD.

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with following methods.

1. FCC 47 CFR Part 2.
2. FCC 47 CFR Part 15.
3. KDB 558074 D01 15.247 Meas Guidance v05r02.
4. ANSI C63.10-2020.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea. Line conducted emissions are measured only at the 218 address. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

218 Maeyeong-ro
☒ Chamber 1(3m semi-anechoic chamber)
☒ Chamber 2(3m semi-anechoic chamber)
☒ Chamber 3(3m semi-anechoic chamber)
☐ Chamber 4(3m Full-anechoic chamber)
☐ Chamber 5(3m Full-anechoic chamber)

UL KOREA LTD. is accredited by IAS, Laboratory Code TL-637. The full scope of accreditation can be viewed at https://www.iasonline.org/wp-content/uploads/2017/05/TL-637-cert-New.pdf.

4. DECISION RULES AND MEASUREMENT UNCERTAINTY

4.1. METROLOGICAL TRACEABILITY

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. SAMPLE CALCULATION

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

AC Corrected Reading (dBuV) = Measured Voltage (dBuV) + Extension Cord Loss (dB) + Cable Loss (dB)
44.72 dBuV = 34.72 dBuV + 9.9 dB + 0.1 dB

4.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	2.79 dB
Radiated Disturbance, 9 kHz to 30 MHz	1.69 dB
Radiated Disturbance, 30 MHz to 1 GHz	4.07 dB
Radiated Disturbance, 1 GHz to 18 GHz	4.99 dB
Radiated Disturbance, Above 18 GHz	5.96 dB

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

4.4. DECISION RULES

Decision rule for statement(s) of conformity is based on Clause 4.4.3 in IEC Guide 115:2023.

5. EQUIPMENT UNDER TEST

5.1. EUT DESCRIPTION

The EUT is a GSM/WCDMA/LTE/5G NR Phone + BT/BLE, DTS/UNII a/b/g/n/ac and NFC.
This test report addresses the DSS(Bluetooth) operational mode.

Representative model	Difference	Derivative model
		SM-A166M
SM-A166M/DS	Hardware	SIM tray is single SIM
	Software	Dual SIM not supported

The model SM-A166M/DS was used for final testing and is representative of the test results in this report.

5.2. MAXIMUM OUTPUT POWER

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

Frequency Range [MHz]	Mode	Power Mode	Output Power [dBm]	Output Power [mW]
2 402 ~ 2 480	Basic GFSK	Peak	11.020	12.647
		Average	10.600	11.482
	Enhanced Pi/4-DPSK	Peak	10.420	11.015
		Average	7.712	5.904
	Enhanced 8PSK	Peak	10.960	12.474
		Average	7.743	5.947

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

The internal antenna was Permanently attached.
Therefore this E.U.T Complies with the requirement of §15.203.

The radio utilizes a internal antenna, with a maximum gain of: -4.60 dBi

“BT/WIFI _2.4GHz, 5GHz (SUB2)” as indicated in antenna specification are written as ANT1 in this report.

5.4. WORST-CASE CONFIGURATION AND MODE

The fundamentals of the EUT were investigated in three orthogonal orientations X, Y and Z.
It was determined that below table’s orientation was the worst-case orientation.

ANT1
X

Radiated and power line conducted tests were performed with EUT connected to AC power adapter as the worst-case configuration. Radiated harmonics spurious 1~18 GHz Low/Mid/High channels,18-26GHz were performed with the EUT set at the 1Tx mode. Radiated emission below 1GHz and power line conducted emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.

For Radiated band-edge and spurious test, tests were performed on 1Tx mode.
All radiated and power line conducted tests were performed attached with travel adapter for the worst-case condition mode.

GFSK, Pi/4-DQPSK, 8PSK average Power are all investigated, The GFSK & 8PSK Power are the worst case. Testing is based on this mode to showing compliance.

5.5. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Charger	SAMSUNG	EP-TA800	R37TC7A00JBDKA	N/A
Data Cable	SAMSUNG	EP-DN980	GH39-02115A	N/A

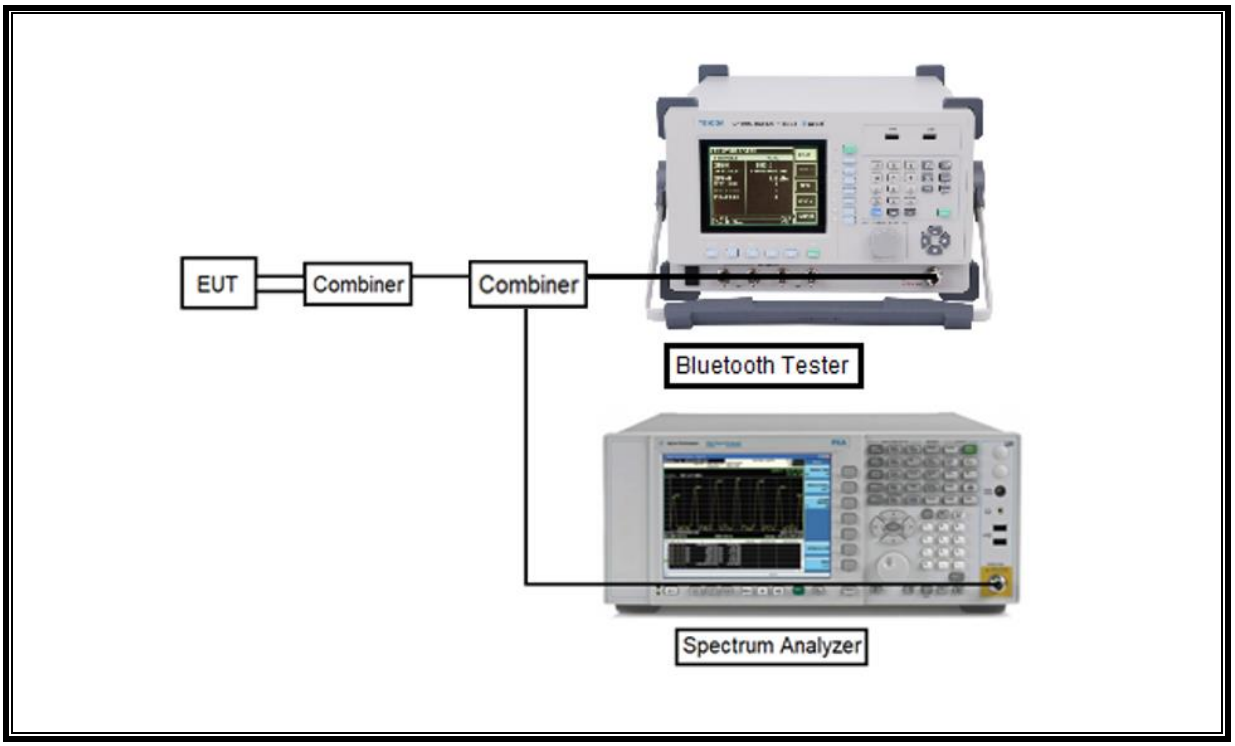
I/O CABLE

I/O Cable List						
Cable No.	**Port**	**# of identical ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	DC Power	1	C Type	Shielded	1.0 m	N/A

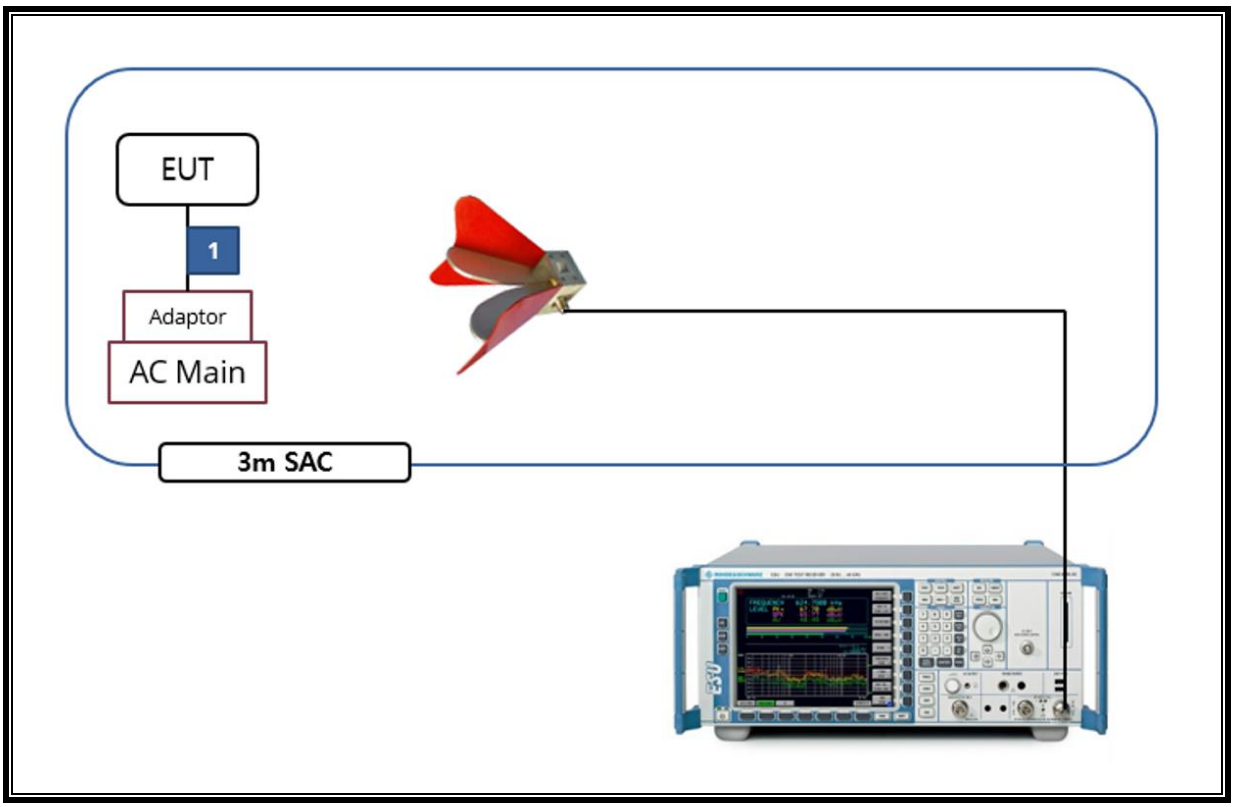
TEST SETUP

The EUT is continuously communicating to the Bluetooth tester during the tests.
Test software enable BT communications.

SETUP DIAGRAM FOR TESTS (CONDUCTED TEST SETUP)



SETUP DIAGRAM FOR TESTS (RADIATED TEST SETUP)



6. TEST AND MEASUREMENT EQUIPMENT

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

Test Equipment List				
Description	**Manufacturer**	**Model**	**S/N**	**Cal Due**
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB 9163	750	2026-07-30
Antenna, Loop, 9kHz-30MHz	R&S	HFH2-Z2	100418	2025-09-07
Antenna, Horn, 18 GHz	ETS	3117	00168724	2026-07-17
Antenna, Horn, 18 GHz	ETS	3117	00168717	2026-07-17
Antenna, Horn, 40 GHz	ETS	3116C	00166155	2026-07-23
Preamplifier	ETS	3116C-PA	00168841	2025-07-25
Directional Antenna	Cobham	FPA3-0.8-6.0R/1329	80108-0004	N/A
Directional Antenna	Cobham	FPA3-0.8-6.0R/1329	110367-0003	N/A
Preamplifier, 1000 MHz	Sonoma	310N	341282	2025-07-22
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	2029169	2025-07-23
Preamplifier, 18 GHz	B&Z Technologies, LLC	BZR-01001800-231040-182020	28451	2025-07-22
Preamplifier, 18 GHz	B&Z Technologies, LLC	BZR-01001800-231040-181515	23576	2025-07-25
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54170614	2025-07-24
Spectrum Analyzer, 44 GHz	KEYSIGHT	N9040B	MY60080268	2025-01-03
Average Power Sensor	Agilent / HP	U2000A	MY54270007	2025-07-23
Average Power Sensor	Agilent / HP	U2000A	MY54260010	2025-07-23
Bluetooth Tester	TESCOM	TC-3000C	3000C000546	2025-07-24
Power Splitter	MINI-CIRCUITS	WA1534	UL003	2025-01-03
Power Splitter	MINI-CIRCUITS	WA1534	UL004	2025-01-03
Attenuator	PASTERNACK	PE7087-10	A009	2025-07-23
Attenuator	PASTERNACK	PE7087-10	A001	2025-07-23
EMI Test Receive, 40 GHz	R&S	ESU40	100439	2025-07-23
EMI Test Receive, 40 GHz	R&S	ESU40	100457	2025-07-22
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	009	2025-07-22
High Pass Filter 3GHz	Micro-Tronics	HPM17543	010	2025-07-22
High Pass Filter 6GHz	Micro-Tronics	HPS17542	009	2025-07-22
LISN	R&S	ENV216	101836	2025-07-22
Termination	WEINSCHEL	M1406A	T09	2025-07-23

UL Software			
Description	**Manufacturer**	**Model**	**Version**
Radiated software	UL	UL EMC	Ver 9.5
AC Line Conducted software	UL	UL EMC	Ver 9.5

7. TEST RESULTS SUMMARY

FCC Part Section	Test Description	Test Limit	Test Condition	Test Result
2.1051, 15.247(d)	Band Edge / Conducted Spurious Emission	-20 dBc	Conducted	Complies
15.247 (b)(1)	TX conducted output power	< 21 dBm		Complies
15.247 (a)(1)	Hopping frequency separation	> two-thirds of the 20 dB bandwidth		Complies
15.247 (a)(1)(iii)	Number of Hopping channels	More than 15 non-overlapping channels		Complies
15.247 (a)(1)(iii)	Avg Time of Occupancy	< 8 dBm		Complies
15.207(a)	AC Power Line conducted emissions	Section 11	Power Line conducted	Complies
15.205, 15.209	Radiated Spurious Emission	< 54dBuV/m(Av)	Radiated	Complies

8. MEASUREMENT METHODS

20dB BW : ANSI C63.10, Section 6.9.2

99% BW : ANSI C63.10, Section 6.9.3

HOPPING FREQUENCY SEPARATION : ANSI C63.10, Section 7.8.2

NUMBER OF HOPPING CHANNELS : ANSI C63.10, Section 7.8.3

AVERAGE TIME OF OCCUPANCY : ANSI C63.10, Section 7.8.4

OUTPUT POWER : ANSI C63.10, Section 7.8.5.

Out-of-band EMISSIONS (Conducted) : ANSI C63.10, Section 7.8.7

Out-of-band EMISSIONS IN NON-RESTRICTED BANDS: ANSI C63.10, Section 7.8.8

Out-of-band EMISSIONS IN RESTRICTED BANDS : ANSI C63.10, Section 7.8.8

AC Power Line Conducted Emission : ANSI C63.10-2020, Section 6.2.

9. ANTENNA PORT TEST RESULTS

9.1. ON TIME AND DUTY CYCLE

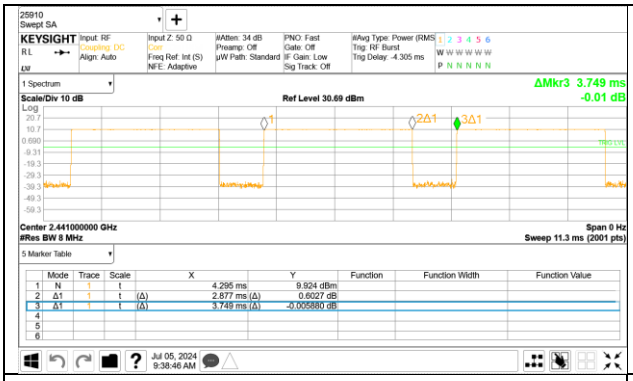
LIMITS

None; for reporting purposes only.

PROCEDURE

ANSI C63.10, Section 11.6 : Zero-Span Spectrum Analyzer Method.

ON TIME AND DUTY CYCLE RESULTS



1-DH5 | 3-DH5

Mode	On time [msec]	Period [msec]	Duty Cycle [%]	1/T Minimum VBW [kHz]
2 400 ~ 2 483.5 MHz Band				
BDR	2.877	3.749	76.736	0.348
EDR	2.889	3.749	77.040	0.346

9.2. 20 dB BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW and video bandwidth (VBW) shall be approximately three times RBW, unless otherwise specified by the applicable requirement. The sweep time is coupled.

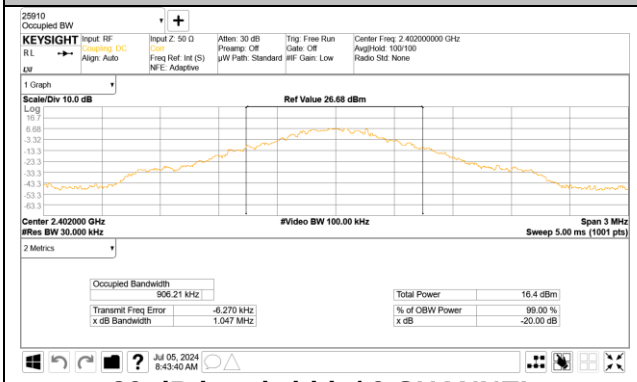
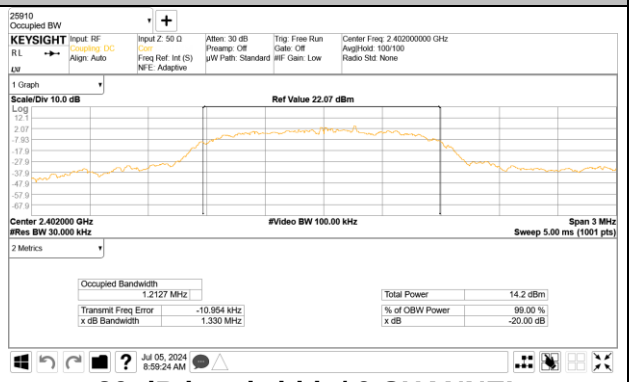
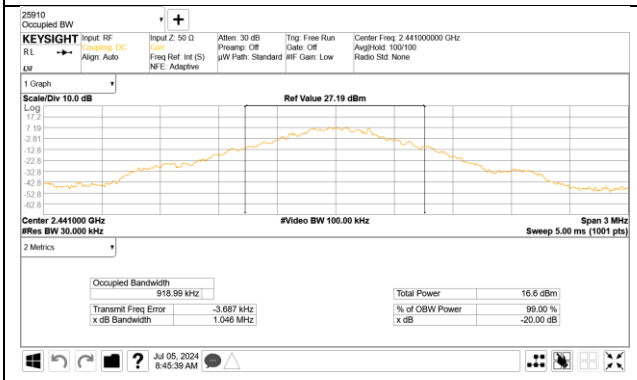
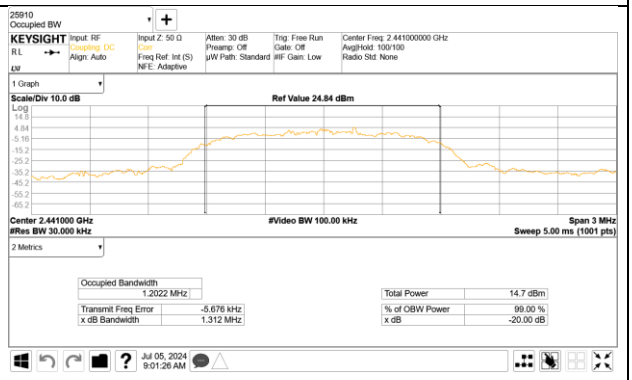
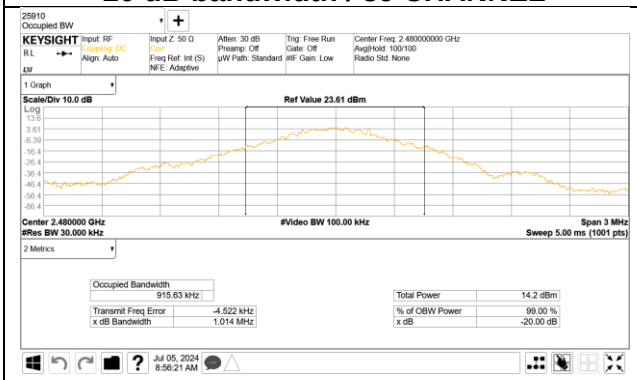
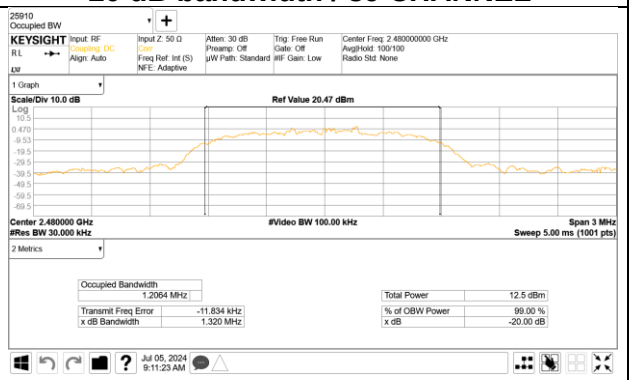
RESULTS

9.2.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

Antenna	Channel	Frequency [MHz]	20 dB Bandwidth [kHz]
ANT1	0	2 402	1 047.0
	39	2 441	1 046.0
	78	2 480	1 014.0
Worst			**1 047.0**

9.2.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION

Antenna	Channel	Frequency [MHz]	20 dB Bandwidth [kHz]
ANT1	0	2 402	1 330.0
	39	2 441	1 312.0
	78	2 480	1 320.0
Worst			**1 330.0**

BDR ANT1	EDR ANT1
	
20 dB bandwidth / 0 CHANNEL	20 dB bandwidth / 0 CHANNEL
	
20 dB bandwidth / 39 CHANNEL	20 dB bandwidth / 39 CHANNEL
	
20 dB bandwidth / 78 CHANNEL	20 dB bandwidth / 78 CHANNEL

9.3. HOPPING FREQUENCY SEPARATION

LIMITS

FCC §15.247 (a) (1)

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hoping channel, whichever is greater.

Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

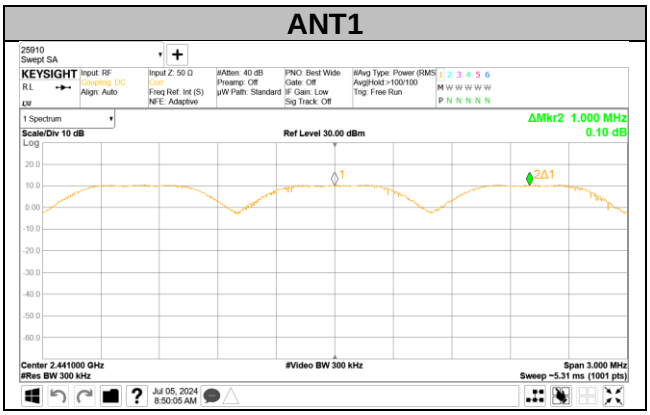
TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. Start with the RBW set to approximately 30% of the channel spacing; adjust as necessary to best identify the center of each individual channel. The VBW is set to VBW >= RBW. The sweep time is coupled.

RESULTS

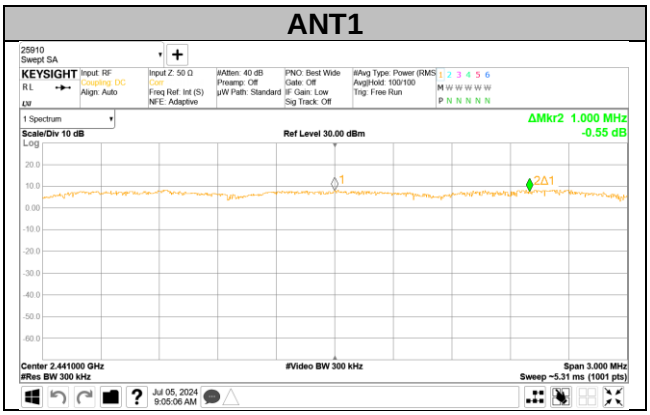
9.3.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

ANT1



9.3.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION

ANT1



9.4. NUMBER OF HOPPING CHANNELS

LIMITS

FCC §15.247 (a) (1) (iii)

Frequency hopping systems in the 2400 – 2483.5 MHz band shall use at least 15 non-overlapping channels.

TEST PROCEDURE

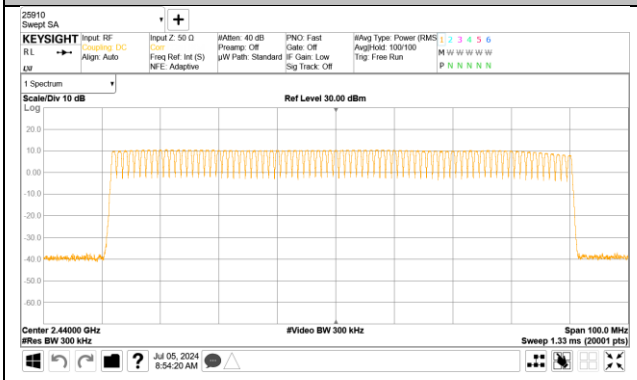
The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. To identify clearly the individual channels, set the RBW to less than 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller. The analyzer is set to Max Hold.

RESULTS

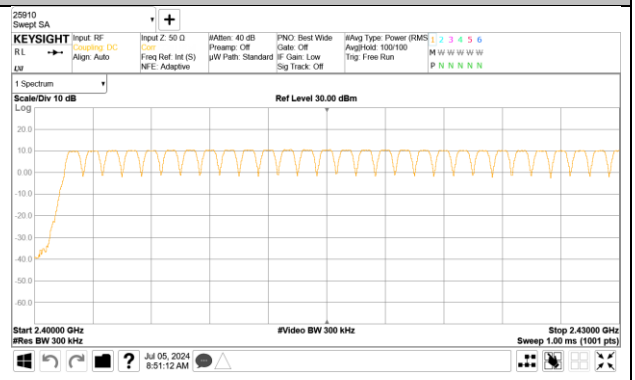
Normal Mode: All Channels Observed

9.4.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

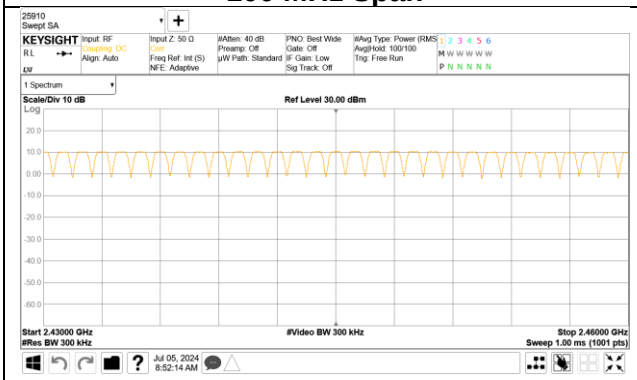
ANT1



100 MHz Span



30MHz SPAN, SEGMENT 1 OF 3

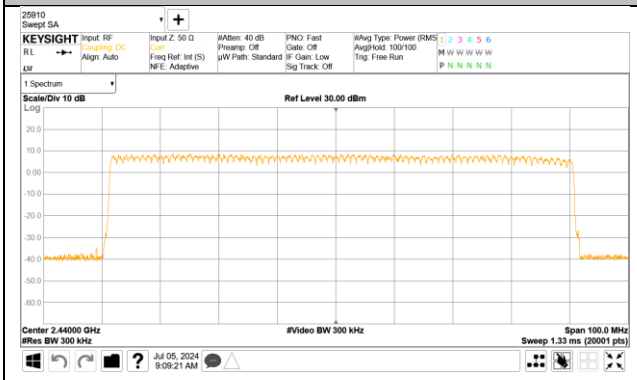


30MHz SPAN, SEGMENT 2 OF 3

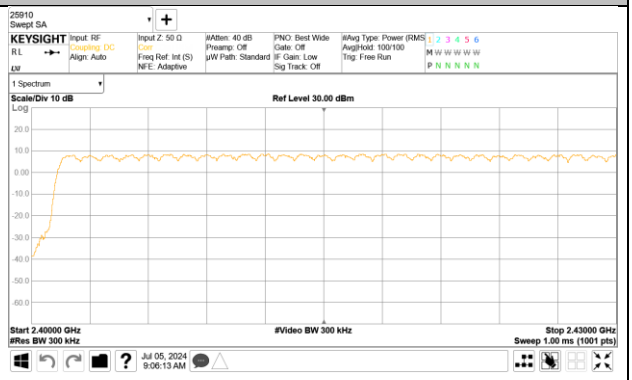
30MHz SPAN, SEGMENT 3 OF 3

9.4.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION

ANT1

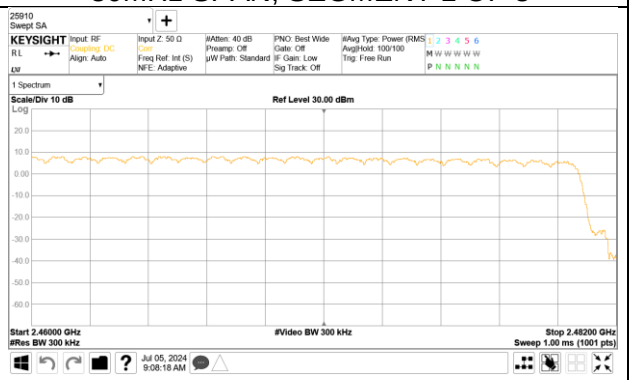


100 MHz Span



30MHz SPAN, SEGMENT 1 OF 3

30MHz SPAN, SEGMENT 2 OF 3



30MHz SPAN, SEGMENT 3 OF 3

9.5. AVERAGE TIME OF OCCUPANCY

LIMITS

FCC §15.247 (a) (1) (iii)

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The span is set to 0 Hz, centered on a single, selected hopping channel. The width of a single pulse is measured in a fast scan. The number of pulses is measured in a 3.16 second scan, to enable resolution of each occurrence.

The average time of occupancy in the specified 31.6 second period (79 channels * 0.4 s) is equal to 10 * (# of pulses in 3.16 s) * pulse width.

For AFH mode, the average time of occupancy in the specified 8 second period (20 channels * 0.4 seconds) is equal to 10 * (# of pulses in 0.8 s) * pulse width.

RESULTS

9.5.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

DH Packet	Pulse Width [msec]	Number of Pulses in 3.16 seconds	Average Time of Occupancy [sec]	Limit [sec]	Margin [sec]
GFSK Normal ANT1					
DH1	0.375	32	0.120	0.400	-0.280
DH3	1.631	16	0.261	0.400	-0.139
DH5	2.879	11	0.317	0.400	-0.083
DH Packet	**Pulse Width [msec]**	**Number of Pulses in 0.8 seconds**	**Average Time of Occupancy [sec]**	**Limit [sec]**	**Margin [sec]**
GFSK AFH ANT1					
DH1	0.375	8	0.030	0.400	-0.370
DH3	1.631	4	0.065	0.400	-0.335
DH5	2.879	3	0.086	0.400	-0.314

ANT1

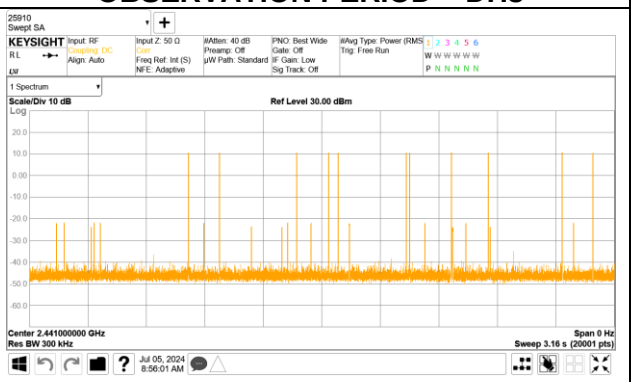
PULSE WIDTH – DH1

NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH1

PULSE WIDTH – DH3

NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH3

PULSE WIDTH – DH5



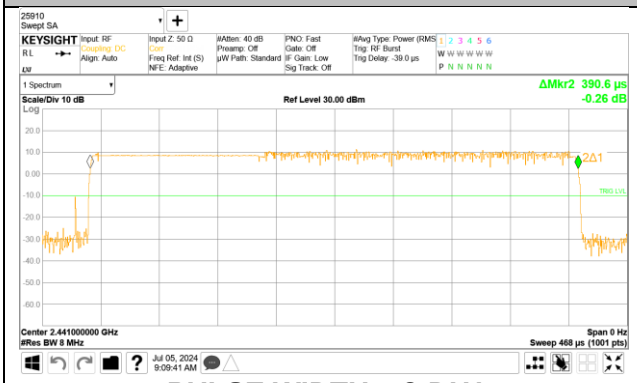
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH5

9.5.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION

DH Packet	Pulse Width [msec]	Number of Pulses in 3.16 seconds	Average Time of Occupancy [sec]	Limit [sec]	Margin [sec]
8PSK Normal ANT1					
DH1	0.391	32	0.125	0.400	-0.275
DH3	1.640	18	0.295	0.400	-0.105
DH5	2.892	9	0.260	0.400	-0.140
DH Packet	**Pulse Width [msec]**	**Number of Pulses in 0.8 seconds**	**Average Time of Occupancy [sec]**	**Limit [sec]**	**Margin [sec]**
8PSK AFH ANT1					
DH1	0.391	8	0.031	0.400	-0.369
DH3	1.640	5	0.082	0.400	-0.318
DH5	2.892	2	0.058	0.400	-0.342

.

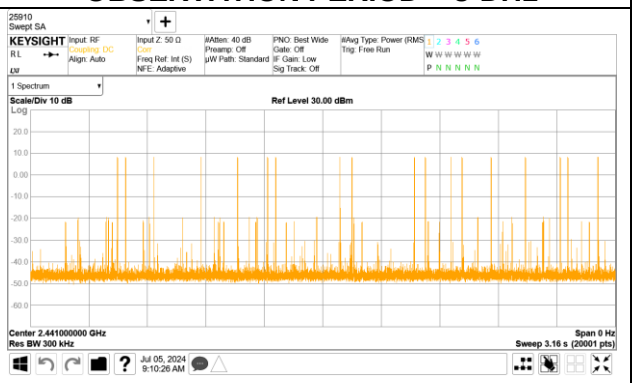
ANT1



PULSE WIDTH – 3-DH1

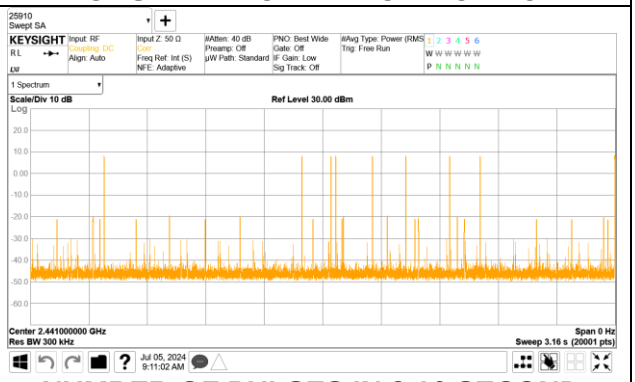
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – 3-DH1

PULSE WIDTH – 3-DH3



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – 3-DH3

PULSE WIDTH – 3-DH5



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – 3-DH5

9.6. OUTPUT POWER

LIMITS

§15.247 (b) (1)
The correlated maximum antenna gain + Beamforming gain is less than 6 dBi, therefore the limit is 21 dBm.

TEST PROCEDURE
The transmitter output is connected to a spectrum analyzer the analyzer bandwidth is set to a value greater than the 20 dB bandwidth of the EUT.

RESULTS

9.6.1. BASIC DATA RATE GFSK MODULATION

Antenna	Channel	Frequency [MHz]	Peak Output Power [dBm]	Limit [dBm]	Margin [dB]
ANT1	0	2 402	10.54	21.00	-10.46
	39	2 441	11.02		-9.98
	78	2 480	8.52		-12.48
Worst			**11.02**		**-9.98**

9.6.2. ENHANCED DATA RATE Pi/4-DPSK MODULATION

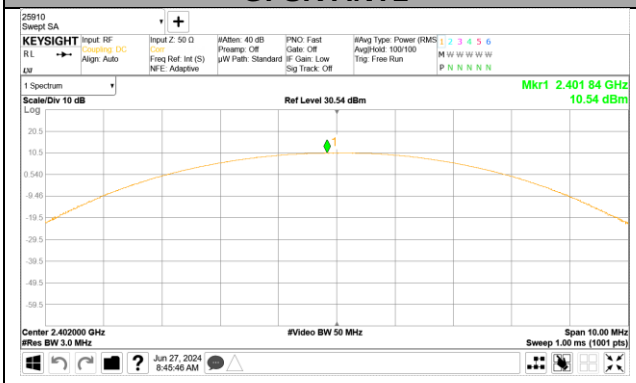
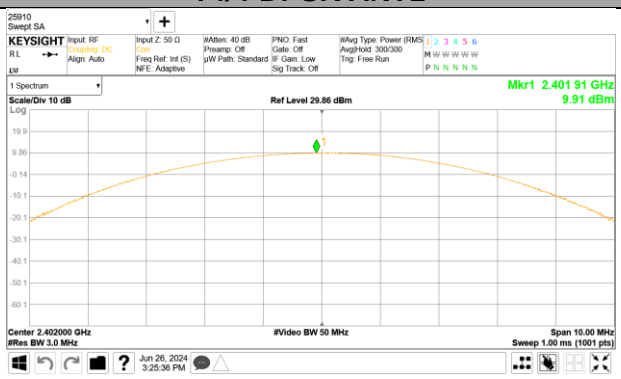
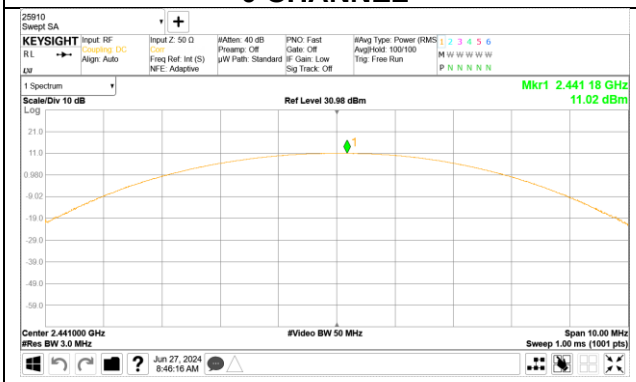
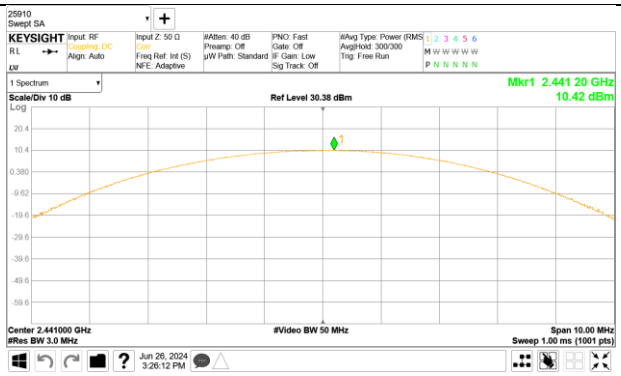
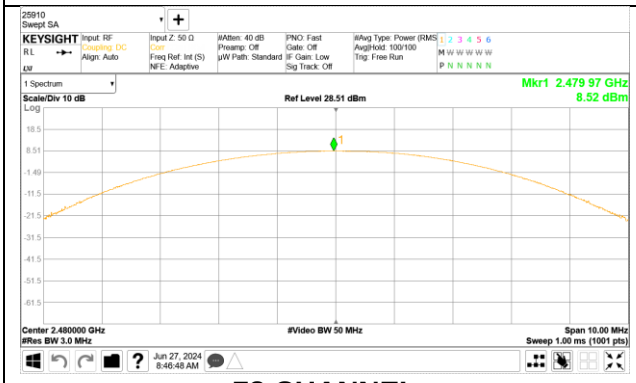
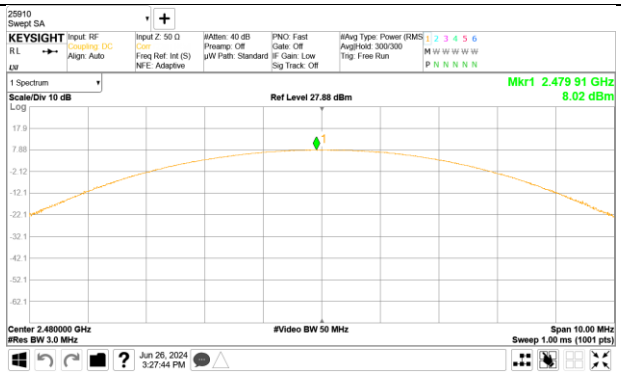
Antenna	Channel	Frequency [MHz]	Peak Output Power [dBm]	Limit [dBm]	Margin [dB]
ANT1	0	2 402	9.91	21.00	-11.09
	39	2 441	10.42		-10.58
	78	2 480	8.02		-12.98
Worst			**10.42**		**-10.58**

9.6.3. ENHANCED DATA RATE 8PSK MODULATION

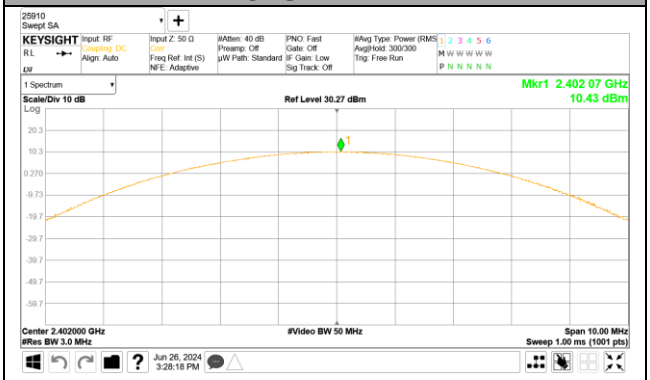
Antenna	Channel	Frequency [MHz]	Peak Output Power [dBm]	Limit [dBm]	Margin [dB]
ANT1	0	2 402	10.43	21.00	-10.57
	39	2 441	10.96		-10.04
	78	2 480	8.50		-12.50
Worst			**10.96**		**-10.04**

9.6.4. OUTPUT POWER PLOTS

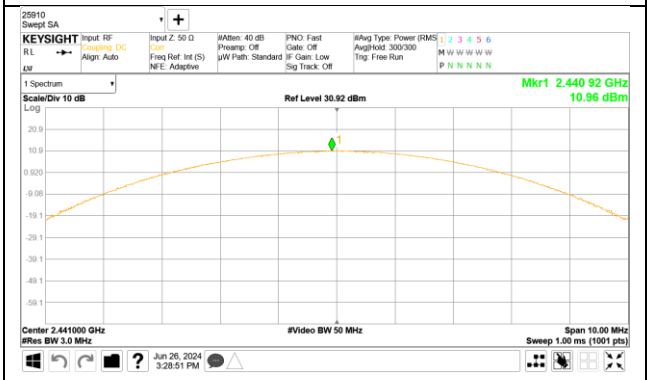
PEAK OUTPUT POWER

GFSK ANT1	Pi/4-DPSK ANT1
	
0 CHANNEL	**0 CHANNEL**
	
39 CHANNEL	**39 CHANNEL**
	
78 CHANNEL	**78 CHANNEL**

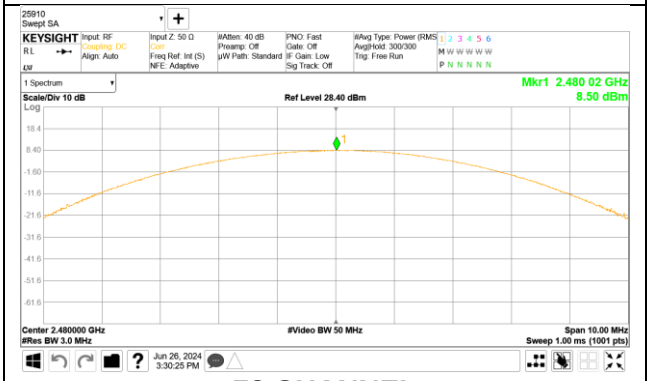
8PSK ANT1



0 CHANNEL



39 CHANNEL



78 CHANNEL

9.7. AVERAGE POWER

LIMITS

None; for reporting purposes only

TEST PROCEDURE

Measurements perform using a wideband gated RF power meter.
The cable assembly insertion loss was entered as an offset in the power meter to allow for direct reading of power.

RESULTS

9.7.1. BASIC DATA RATE GFSK MODULATION

Antenna	Channel	Frequency [MHz]	Average Output Power [dBm]	Average Output Power [mW]
ANT1	0	2 402	10.135	10.317
	39	2 441	10.600	11.482
	78	2 480	8.100	6.457

9.7.2. ENHANCED DATA RATE PI/4-DQPSK MODULATION

Antenna	Channel	Frequency [MHz]	Average Output Power [dBm]	Average Output Power [mW]
ANT1	0	2 402	7.189	5.235
	39	2 441	7.712	5.904
	78	2 480	5.395	3.463

9.7.3. ENHANCED DATA RATE 8PSK MODULATION

Antenna	Channel	Frequency [MHz]	Average Output Power [dBm]	Average Output Power [mW]
ANT1	0	2 402	7.220	5.273
	39	2 441	7.743	5.947
	78	2 480	5.426	3.488

9.8. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

Limit = -20 dBc

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

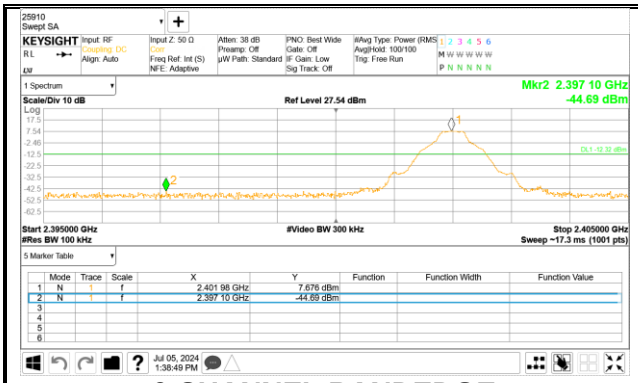
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

The band-edges at 2.4 and 2.4835 GHz are investigated with the transmitter set to the normal hopping mode.

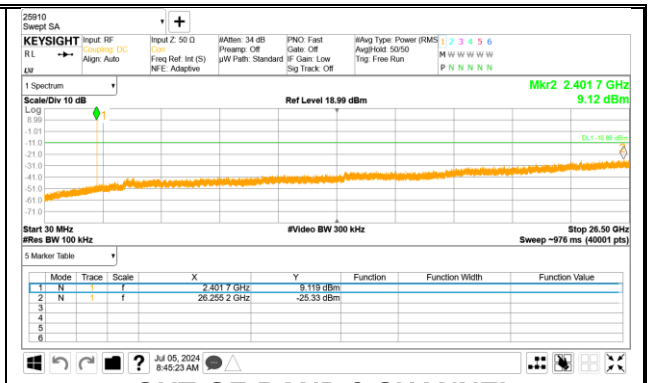
RESULTS

9.8.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

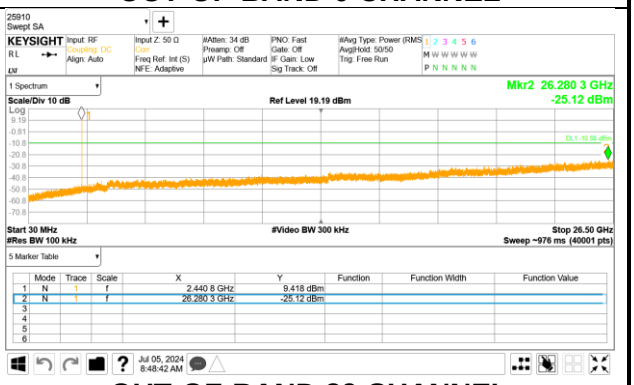
SPURIOUS EMISSIONS, NON-HOPPING – ANT1



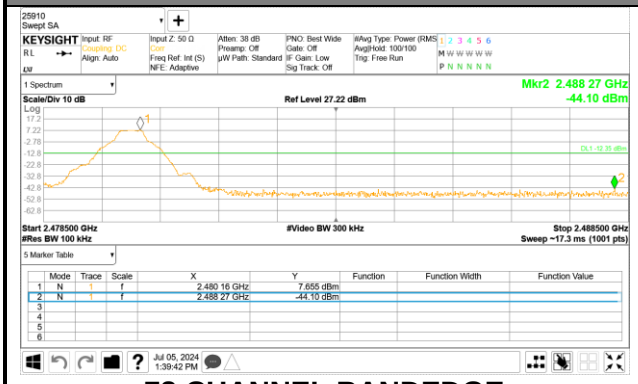
0 CHANNEL BANDEDGE



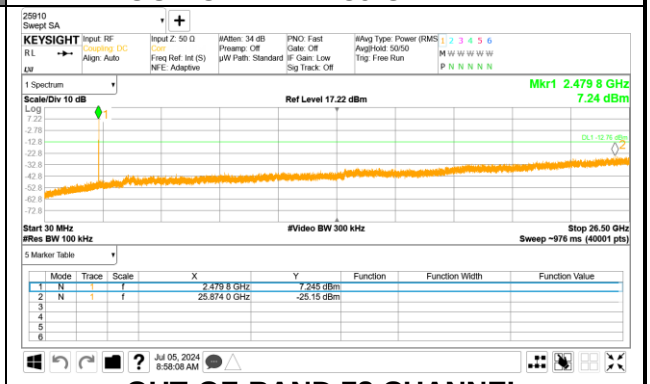
OUT-OF-BAND 0 CHANNEL



OUT-OF-BAND 39 CHANNEL

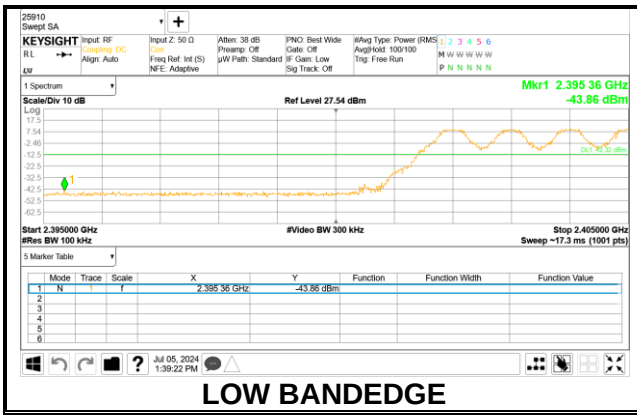


78 CHANNEL BANDEDGE

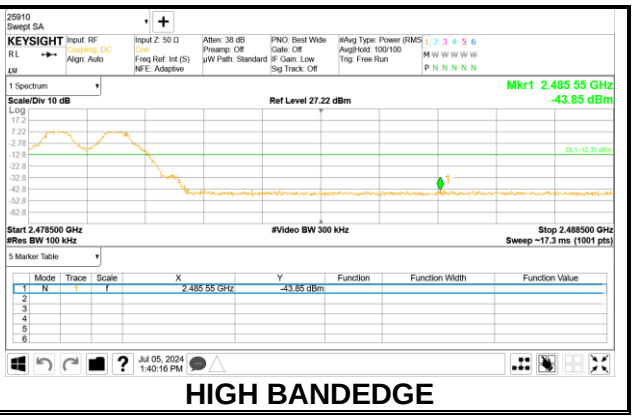


OUT-OF-BAND 78 CHANNEL

SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON – ANT1



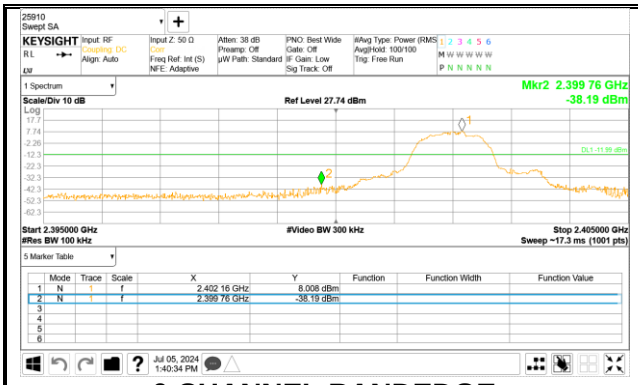
LOW BANDEDGE



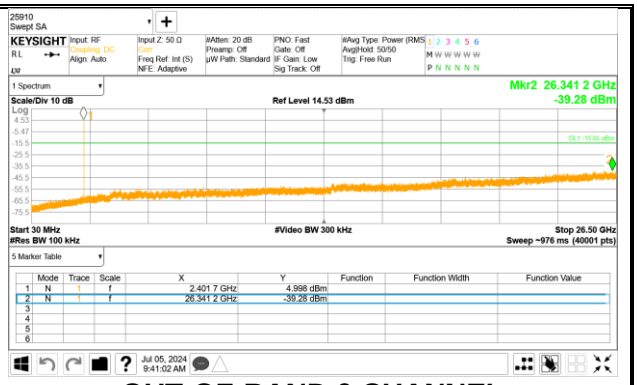
HIGH BANDEDGE

9.8.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION

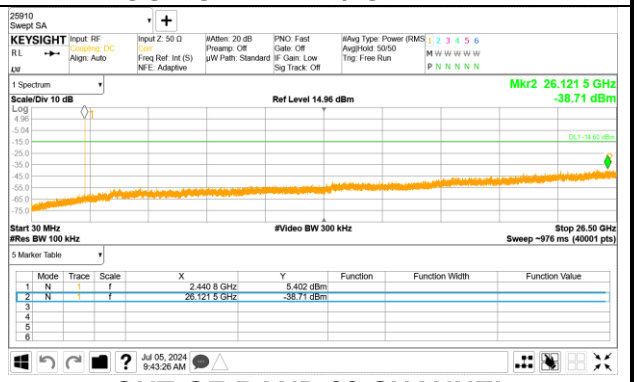
SPURIOUS EMISSIONS, NON-HOPPING – ANT1



0 CHANNEL BANDEDGE

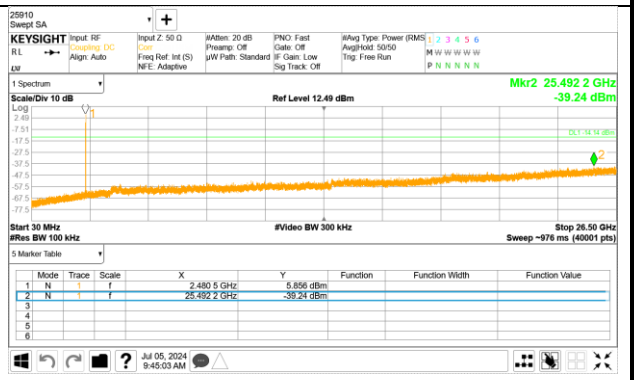


OUT-OF-BAND 0 CHANNEL



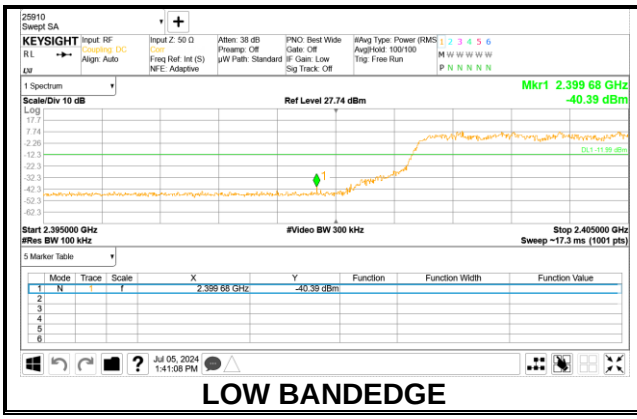
OUT-OF-BAND 39 CHANNEL

78 CHANNEL BANDEDGE

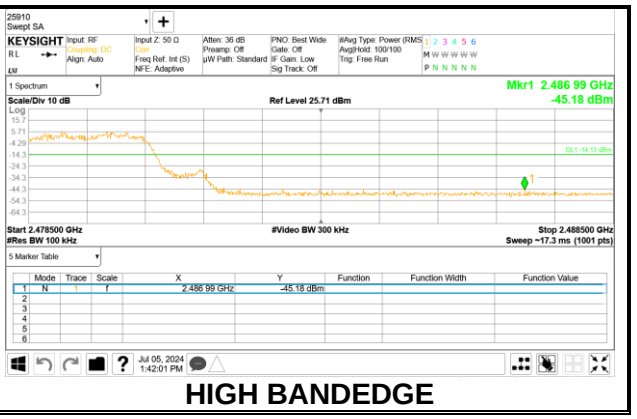


OUT-OF-BAND 78 CHANNEL

SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON – ANT1



LOW BANDEDGE



HIGH BANDEDGE

10. RADIATED TEST RESULTS

LIMITS

FCC §15.205 and §15.209

Limits for radiated disturbance of an intentional radiator		
Frequency range (MHz)	Limits (μV/m)	Measurement Distance (m)
0.009 – 0.490	2400 / F (kHz)	300
0.490 – 1.705	24000 / F (kHz)	30
1.705 – 30.0	30	30
30 – 88	100**	3
88 - 216	150**	3
216 – 960	200**	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g. §§ 15.231 and 15.241.

FCC Part 15.205 (a) : Only spurious emissions are permitted in any of the frequency bands listed below :

MHz	MHz	MHz	MHz	GHz	GHz
0.009 ~ 0.110	8.41425 ~ 8.41475	108 ~ 121.94	1300 ~ 1427	4.5 ~ 5.15	14.47 ~ 14.5
0.495 ~ 0.505	12.29 ~ 12.293	123 ~ 138	1435 ~ 1626.5	5.35 ~ 5.46	15.35 ~ 16.2
2.1735 ~ 2.1905	12.51975 ~ 12.52025	149.9 ~ 150.05	1645.5 ~ 1646.5	7.25 ~ 7.75	17.7 ~ 21.4
4.125 ~ 4.128	12.57675 ~ 12.57725	156.52475 ~	1660 ~ 1710	8.025 ~ 8.5	22.01 ~ 23.12
4.17725 ~ 4.17775	13.36 ~ 13.41	156.52525	1718.8 ~ 1722.2	9.0 ~ 9.2	23.6 ~ 24.0
4.20725 ~ 4.20775	16.42 ~ 16.423	156.7 ~ 156.9	2200 ~ 2300	9.3 ~ 9.5	31.2 ~ 31.8
6.215 ~ 6.218	16.69475 ~ 16.69525	162.0125 ~	2310 ~ 2390	10.6 ~ 12.7	36.43 ~ 36.5
6.26775 ~ 6.26825	16.80425 ~ 16.80475	167.17	2483.5 ~ 2500	13.25 ~ 13.4	Above 38.6
6.31175 ~ 6.31225	25.5 ~ 25.67	167.72 ~ 173.2	2655 ~ 2900		
8.291 ~ 8.294	37.5 ~ 38.25	240 ~ 285	3260 ~ 3267		
8.362 ~ 8.366	73 ~ 74.6	322 ~ 335.4	3332 ~ 3339		
8.37625 ~ 8.38675	74.8 ~ 75.2	399.90 ~ 410	3345.8 ~ 3358		
		608 ~ 614	3600 ~ 4400		
		960 ~ 1240			

▪ FCC Part 15.205(b) : The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in §15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in §15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in §15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in §15.35 apply to these measurements.

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane for below 1GHz and 150 cm for above 1GHz. 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. Peak detection is used unless otherwise noted as quasi-peak.

For measurements above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 3 MHz for peak measurements. (Pre-scans to detect harmonic and spurious emissions, the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 30 kHz for peak measurements.)

For band edge measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 3 MHz for peak measurements and 1/T (on time) for average measurement.

GFSK = 1/T = 1 / 0.00288s = 348Hz.

The minimum VBW was 348Hz, but test receiver(ESU40) couldn't set value 348Hz. Due to this reason, testing VBW was set to 500Hz(Worst cases).

The spectrum from 1GHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.
(From 30MHz to 1GHz, test was performed with the EUT set to transmit at the channel with highest output power)

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.

Note : Emission was pre-scanned from 9kHz to 30MHz; No emissions were detected which was at least 20dB below the specification limit (consider distance correction factor).
Per FCC part 15.31(o), test results were not reported.

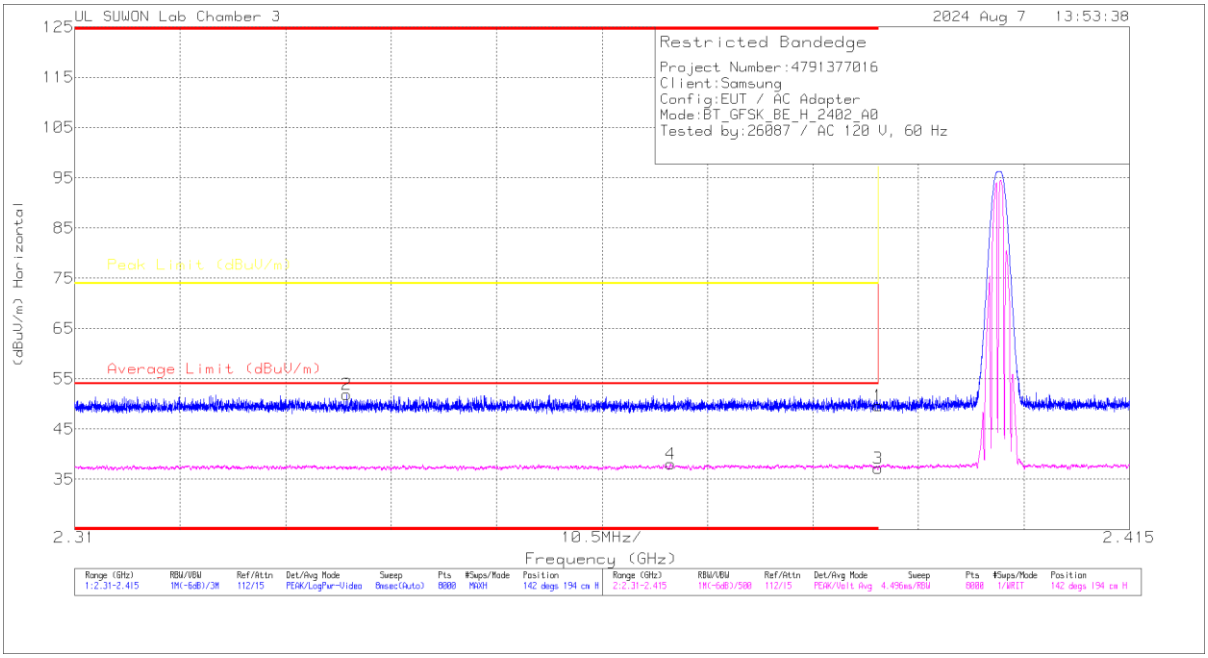
Although these tests were performed other than open field test site, adequate comparison measurements were confirmed against 30 m open are test site.
Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the one of tests made in an open field based on KDB 414788.

10.1. TRANSMITTER ABOVE 1 GHz

10.1.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

ANT1
BANDEDGE (0 CHANNEL)

HORIZONTAL RESULT

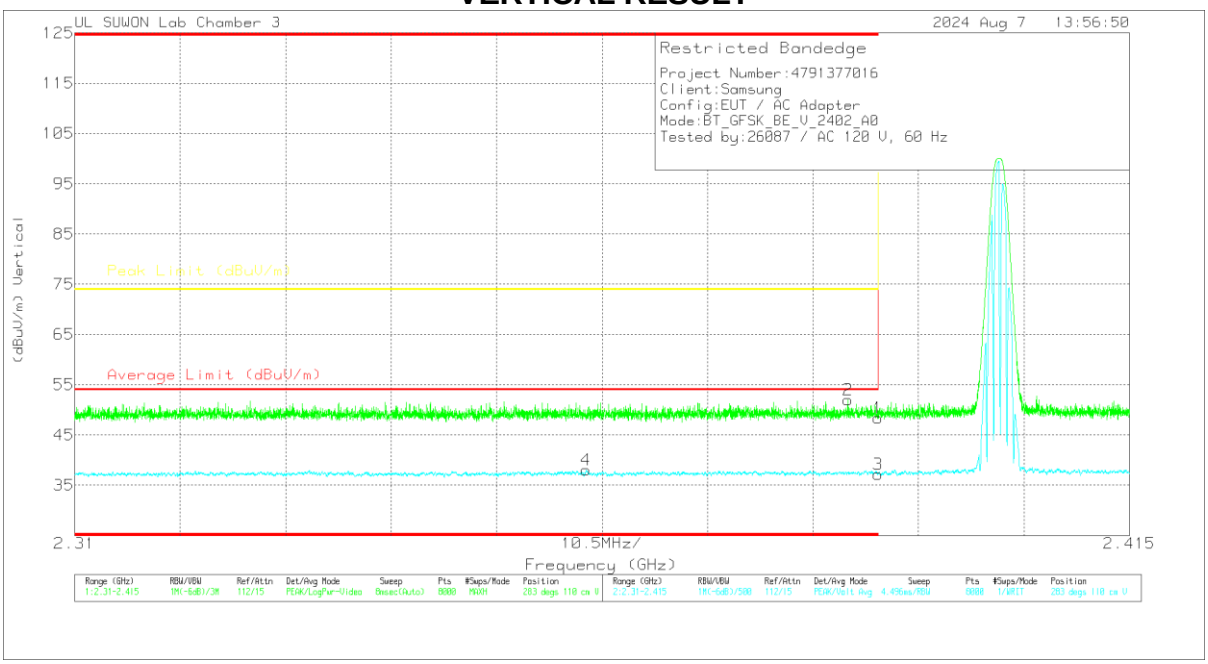


Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	Antenna Correction Factor(dB/m)	Loss(dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	42.34	Pk	32.1	-24.8	49.64	-	-	74	-24.36	142	194	H
2	* 2.33707	44.85	Pk	31.9	-24.9	51.85	-	-	74	-22.15	142	194	H
3	* 2.39	29.91	VA1T	32.1	-24.8	37.21	54	-16.79	-	-	142	194	H
4	* 2.36931	30.84	VA1T	32	-24.8	38.04	54	-15.96	-	-	142	194	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

VERTICAL RESULT



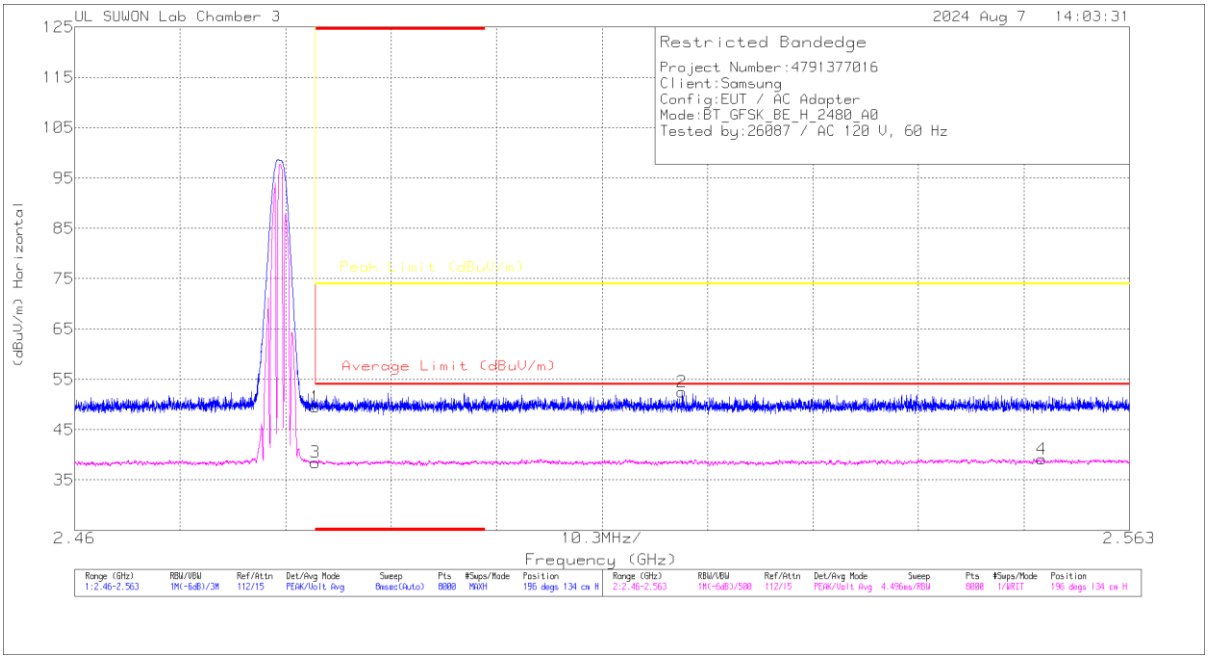
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	Antenna Correction Factor(dB/m)	Loss(dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	41.11	Pk	32.1	-24.8	48.41	-	-	74	-25.59	283	110	V
2	* 2.38698	44.74	Pk	32.1	-24.8	52.04	-	-	74	-21.96	283	110	V
3	* 2.39	29.84	VA1T	32.1	-24.8	37.14	54	-16.86	-	-	283	110	V
4	* 2.36092	30.91	VA1T	32	-24.9	38.01	54	-15.99	-	-	283	110	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

BANDEDGE (78 CHANNEL)

HORIZONTAL RESULT

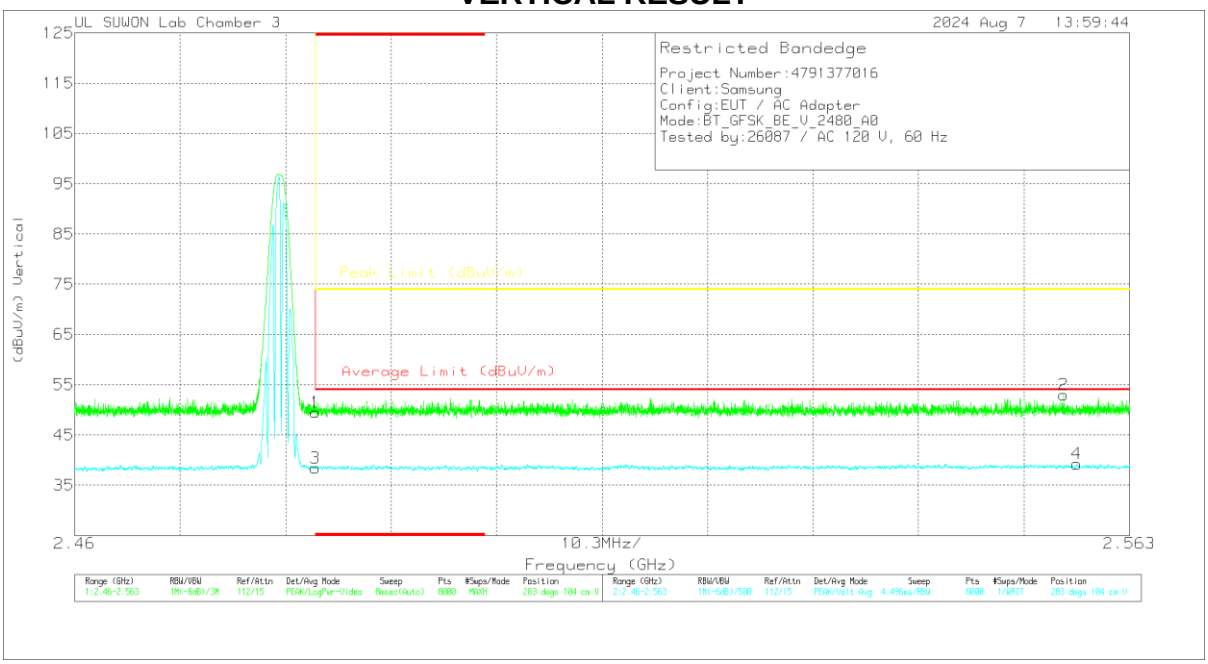


Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	Antenna Correction Factor(dB/m)	Loss(dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.4835	41.95	Pk	32.4	-24.8	49.55	-	-	74	-24.45	196	134	H
2	2.5193	44.92	Pk	32.4	-24.8	52.52	-	-	74	-21.48	196	134	H
3	* 2.4835	30.88	VA1T	32.4	-24.8	38.48	54	-15.52	-	-	196	134	H
4	2.55445	31.41	VA1T	32.4	-24.6	39.21	54	-14.79	-	-	196	134	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

VERTICAL RESULT



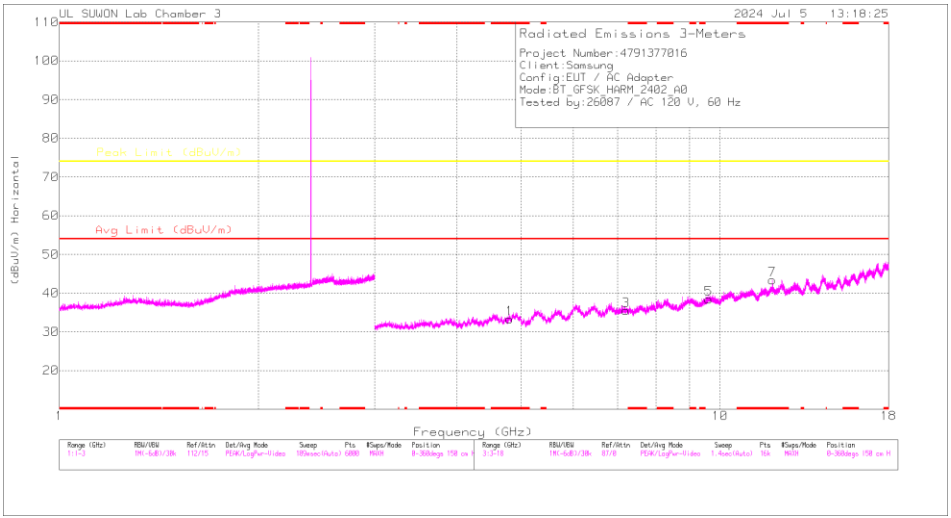
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	Antenna Correction Factor(dB/m)	Loss(dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.4835	41.93	Pk	32.4	-24.8	49.53	-	-	74	-24.47	283	104	V
2	2.55659	45.35	Pk	32.4	-24.7	53.05	-	-	74	-20.95	283	104	V
3	* 2.4835	30.8	VA1T	32.4	-24.8	38.4	54	-15.6	-	-	283	104	V
4	2.55784	31.53	VA1T	32.4	-24.7	39.23	54	-14.77	-	-	283	104	V

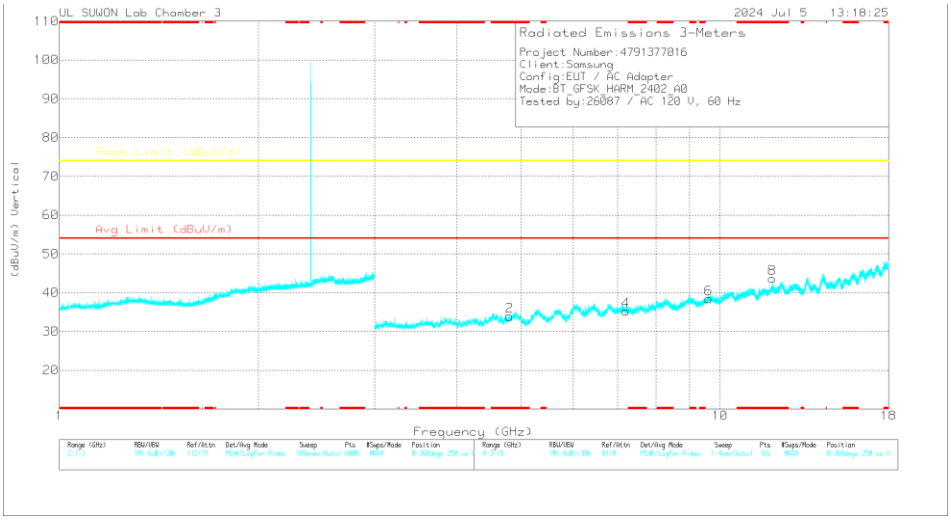
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

HARMONICS AND SPURIOUS EMISSIONS

0 CHANNEL RESULTS



HORIZONTAL



VERTICAL

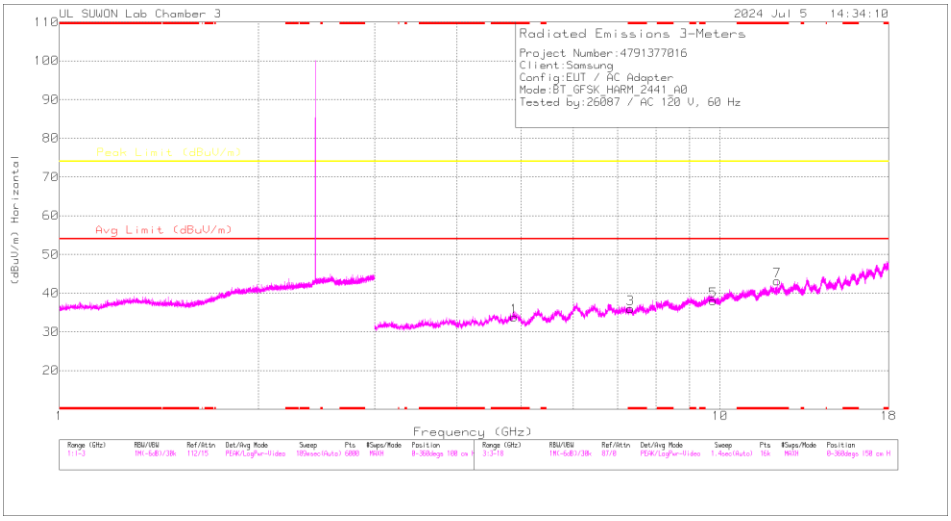
Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

Radiated Emissions

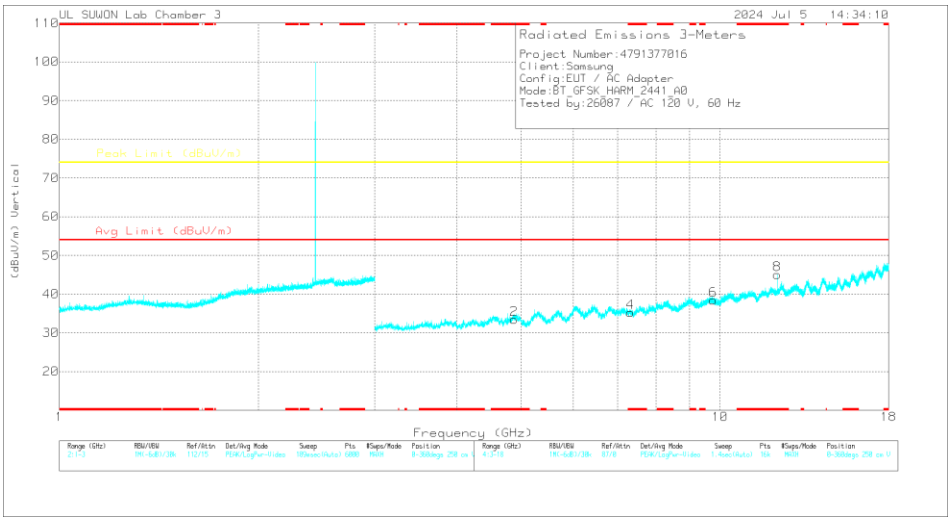
Frequency (GHz)	Meter Reading (dBuV)	Det	Antenna Correction Factor(dB/m)	Loss(dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.80406	38.83	PKFH	34.3	-30.1	43.03	-	-	74	-30.97	173	134	H
* 4.80399	27.1	VA1T	34.3	-30.1	31.3	54	-22.7	-	-	173	134	H
* 4.80375	38.08	PKFH	34.3	-30.1	42.28	-	-	74	-31.72	291	107	V
* 4.80399	25.15	VA1T	34.3	-30.1	29.35	54	-24.65	-	-	291	107	V
7.206	34.61	PKFH	35.8	-25.9	44.51	-	-	74	-29.49	250	109	H
7.206	34.2	PKFH	35.8	-25.9	44.1	-	-	74	-29.9	280	103	V
9.60741	32.24	PKFH	36.7	-21.7	47.24	-	-	74	-26.76	96	108	H
9.61185	31.71	PKFH	36.7	-21.8	46.61	-	-	74	-27.39	0	100	V
* 12.00919	35.42	PKFH	38.7	-21.5	52.62	-	-	74	-21.38	136	100	H
* 12.00938	22.04	VA1T	38.7	-21.5	39.24	54	-14.76	-	-	136	100	H
* 12.00993	34.98	PKFH	38.7	-21.4	52.28	-	-	74	-21.72	185	196	V
* 12.00946	22.69	VA1T	38.7	-21.5	39.89	54	-14.11	-	-	185	196	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PKFH FHSS/BT RB=100k for Frequencies<1GHz / RB=1MHz for Frequencies>1GHz, VB=3 x RB, Peak
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration
Mkr1 and 2, 3, 4 in above pre-scan graph were confirmed as in-band emissions.

39 CHANNEL RESULTS



HORIZONTAL



VERTICAL

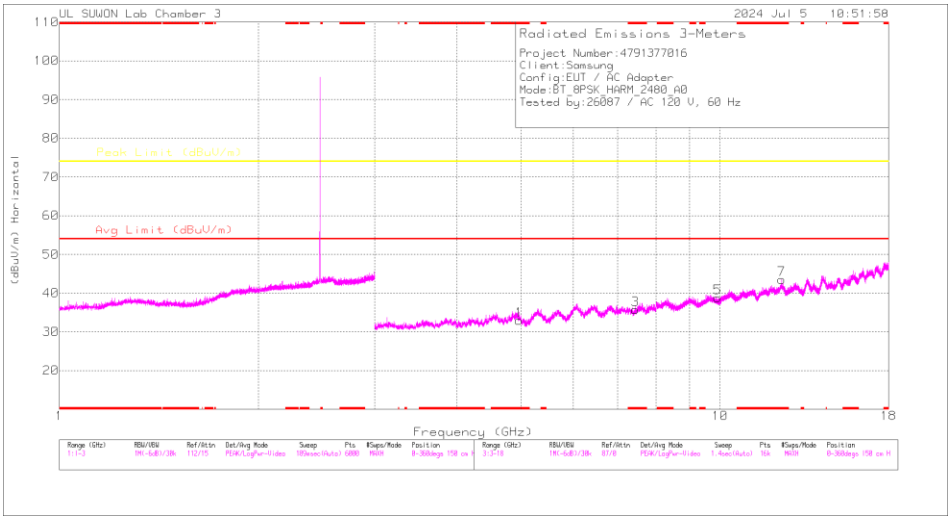
Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

Radiated Emissions

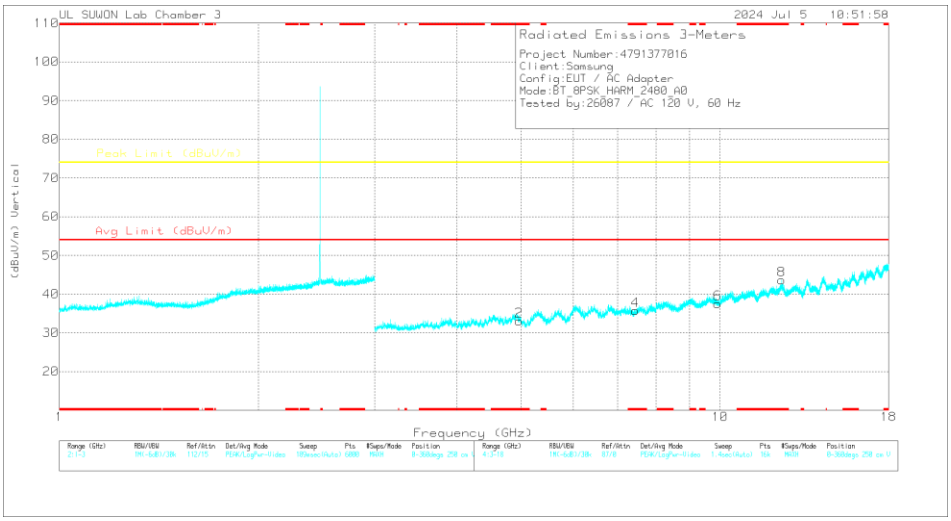
Frequency (GHz)	Meter Reading (dBuV)	Det	Antenna Correction Factor(dB/m)	Loss(dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.88193	38.5	PKFH	34.2	-30	42.7	-	-	74	-31.3	178	103	H
* 4.88199	25.28	VA1T	34.2	-30	29.48	54	-24.52	-	-	178	103	H
* 4.8817	37.69	PKFH	34.2	-29.9	41.99	-	-	74	-32.01	0	100	V
* 7.32323	34.75	PKFH	35.8	-25.5	45.05	-	-	74	-28.95	245	103	H
* 7.32307	22.27	VA1T	35.8	-25.5	32.57	54	-21.43	-	-	245	103	H
* 7.323	33.34	PKFH	35.8	-25.5	43.64	-	-	74	-30.36	278	101	V
9.76616	30.81	PKFH	36.9	-21.5	46.21	-	-	74	-27.79	130	103	H
9.76156	31.47	PKFH	36.9	-21.5	46.87	-	-	74	-27.13	157	120	V
* 12.20477	35.13	PKFH	39	-21.7	52.43	-	-	74	-21.57	94	103	H
* 12.20566	22.24	VA1T	39	-21.7	39.54	54	-14.46	-	-	94	103	H
* 12.20576	35.96	PKFH	39	-21.7	53.26	-	-	74	-20.74	185	199	V
* 12.20555	23.51	VA1T	39	-21.7	40.81	54	-13.19	-	-	185	199	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PKFH FHSS/BT RB=100k for Frequencies<1GHz / RB=1MHz for Frequencies>1GHz, VB=3 x RB, Peak
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

78 CHANNEL RESULTS



HORIZONTAL



VERTICAL

Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

Radiated Emissions

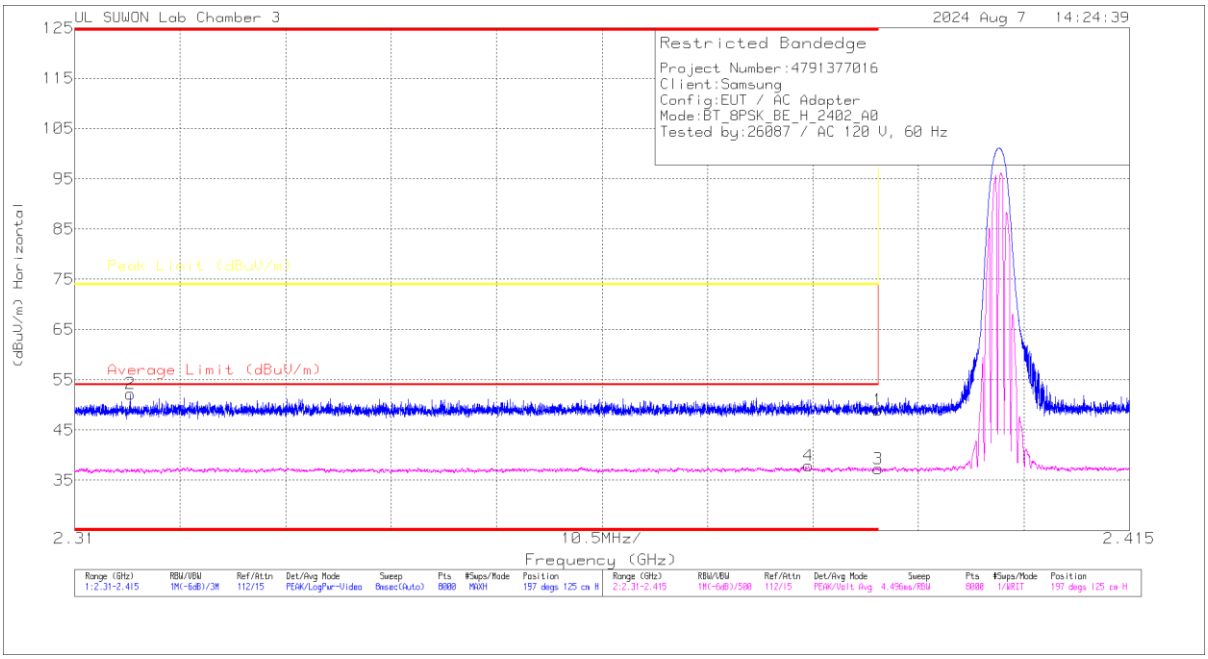
Frequency (GHz)	Meter Reading (dBuV)	Det	Antenna Correction Factor(dB/m)	Loss(dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.95998	38.49	PKFH	34.3	-30	42.79	-	-	74	-31.21	172	104	H
* 4.95996	24.88	VA1T	34.3	-30	29.18	54	-24.82	-	-	172	104	H
* 4.96476	37.43	PKFH	34.3	-30.1	41.63	-	-	74	-32.37	255	101	V
* 4.96005	24.57	VA1T	34.3	-30	28.87	54	-25.13	-	-	255	101	V
* 7.44431	33.98	PKFH	35.7	-25.2	44.48	-	-	74	-29.52	192	120	H
* 7.44026	21.13	VA1T	35.7	-25.2	31.63	54	-22.37	-	-	192	120	H
* 7.43618	34.04	PKFH	35.7	-25.2	44.54	-	-	74	-29.46	279	100	V
* 7.44012	20.47	VA1T	35.7	-25.2	30.97	54	-23.03	-	-	279	100	V
9.91702	29.62	PKFH	37.1	-21.3	45.42	-	-	74	-28.58	0	100	H
9.9193	30.35	PKFH	37.1	-21.4	46.05	-	-	74	-27.95	0	100	V
* 12.40022	33.73	PKFH	39.2	-21.9	51.03	-	-	74	-22.97	186	100	H
* 12.40001	21.04	VA1T	39.2	-21.9	38.34	54	-15.66	-	-	186	100	H
* 12.39952	34.11	PKFH	39.2	-21.9	51.41	-	-	74	-22.59	148	205	V
* 12.39924	19.36	VA1T	39.2	-21.9	36.66	54	-17.34	-	-	148	205	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PKFH FHSS/BT RB=100k for Frequencies<1GHz / RB=1MHz for Frequencies>1GHz, VB=3 x RB, Peak
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration.
Mkr1 and 2 in above pre-scan graph were confirmed as in-band emissions.

10.1.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION

ANT1
BANDEDGE (0 CHANNEL)

HORIZONTAL RESULT

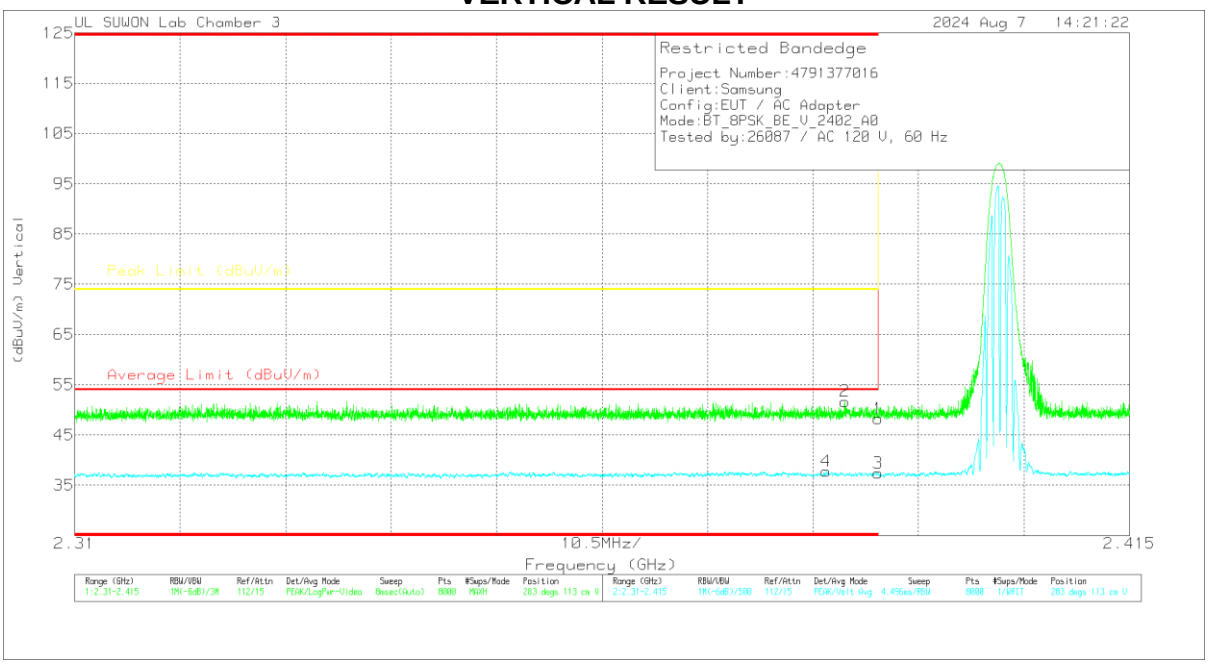


Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	Antenna Correction Factor(dB/m)	Loss(dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	41.72	Pk	32.1	-24.8	49.02	-	-	74	-24.98	197	125	H
2	* 2.31554	45.09	Pk	31.9	-24.8	52.19	-	-	74	-21.81	197	125	H
3	* 2.39	29.95	VA1T	32.1	-24.8	37.25	54	-16.75	-	-	197	125	H
4	* 2.38305	30.68	VA1T	32.1	-24.9	37.88	54	-16.12	-	-	197	125	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

VERTICAL RESULT



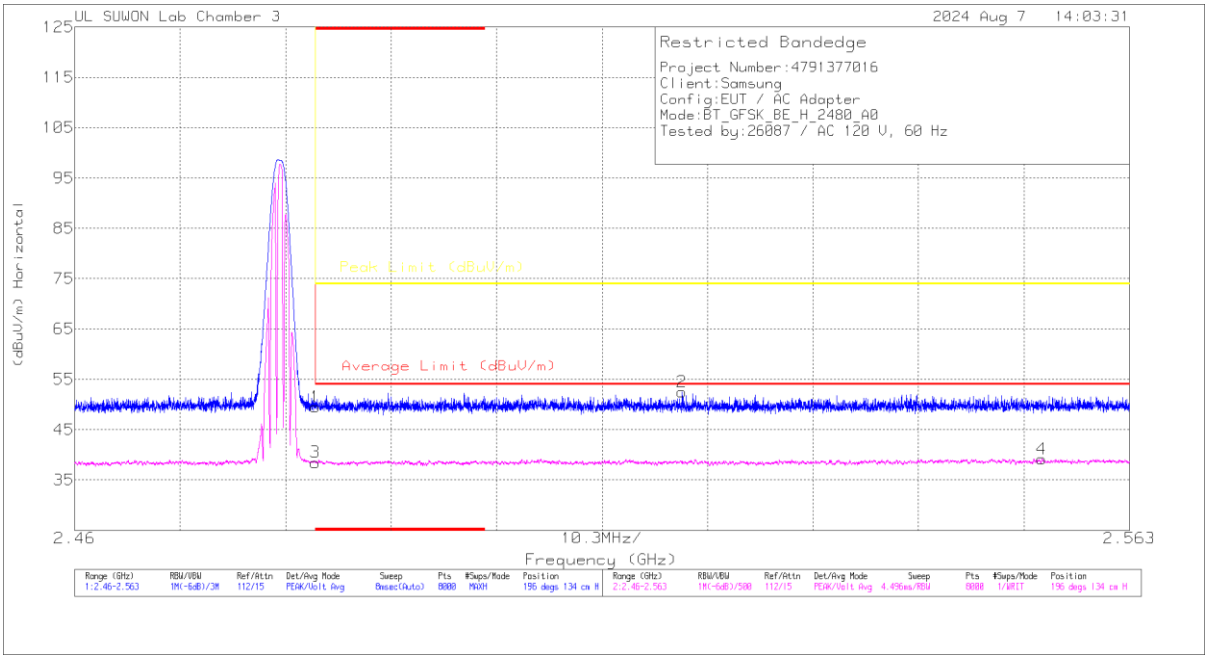
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	Antenna Correction Factor(dB/m)	Loss(dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	40.96	Pk	32.1	-24.8	48.26	-	-	74	-25.74	283	113	V
2	* 2.3867	44.39	Pk	32.1	-24.8	51.69	-	-	74	-22.31	283	113	V
3	* 2.39	30.13	VA1T	32.1	-24.8	37.43	54	-16.57	-	-	283	113	V
4	* 2.38482	30.6	VA1T	32.1	-24.9	37.8	54	-16.2	-	-	283	113	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

BANDEDGE (78 CHANNEL)

HORIZONTAL RESULT

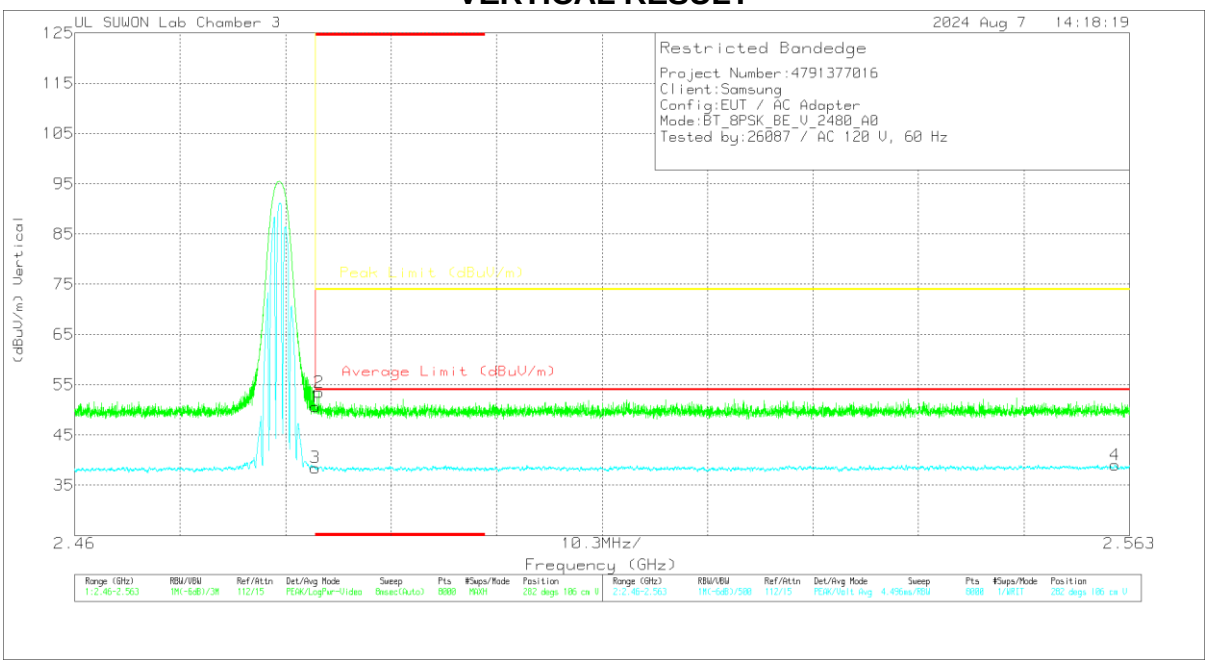


Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	Antenna Correction Factor(dB/m)	Loss(dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.4835	44.43	Pk	32.4	-24.8	52.03	-	-	74	-21.97	197	134	H
2	* 2.48362	46.71	Pk	32.4	-24.8	54.31	-	-	74	-19.69	197	134	H
3	* 2.4835	30.64	VA1T	32.4	-24.8	38.24	54	-15.76	-	-	197	134	H
4	2.54968	31.44	VA1T	32.4	-24.7	39.14	54	-14.86	-	-	197	134	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

VERTICAL RESULT



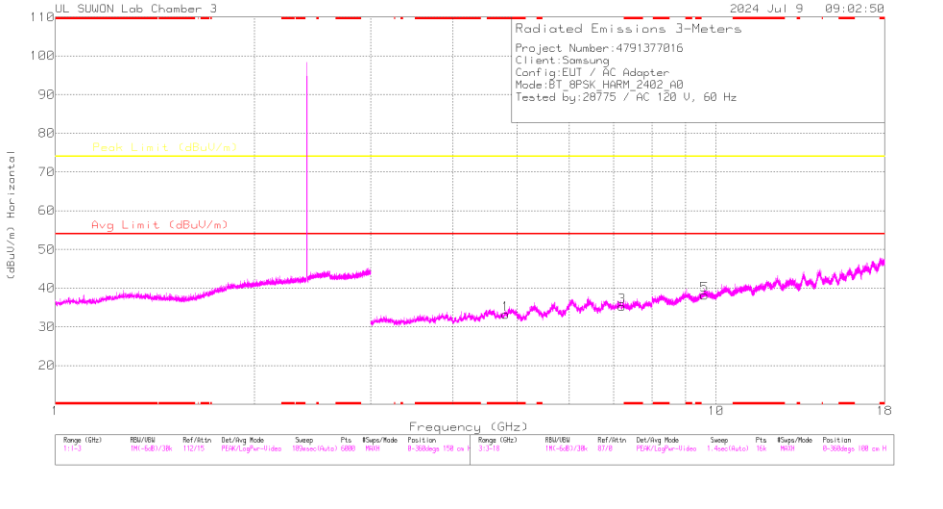
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	Antenna Correction Factor(dB/m)	Loss(dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.4835	43.06	Pk	32.4	-24.8	50.66	-	-	74	-23.34	282	106	V
2	* 2.48387	45.85	Pk	32.4	-24.8	53.45	-	-	74	-20.55	282	106	V
3	* 2.4835	30.88	VA1T	32.4	-24.8	38.48	54	-15.52	-	-	282	106	V
4	2.56159	31.34	VA1T	32.4	-24.7	39.04	54	-14.96	-	-	282	106	V

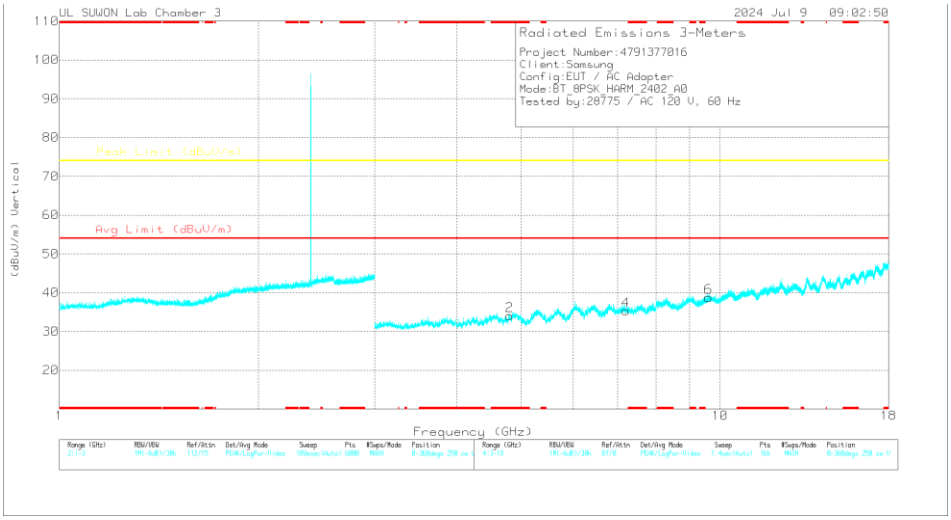
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

HARMONICS AND SPURIOUS EMISSIONS

0 CHANNEL RESULTS



HORIZONTAL



VERTICAL

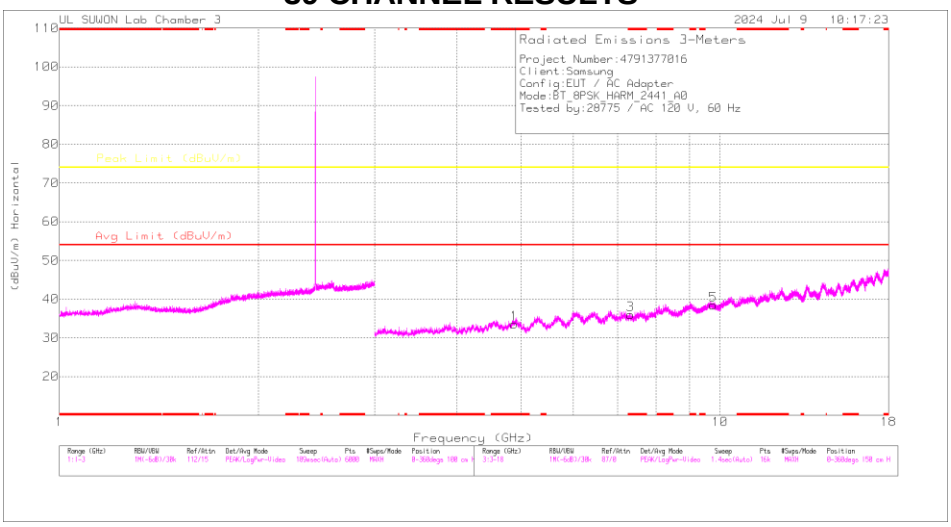
Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

Radiated Emissions

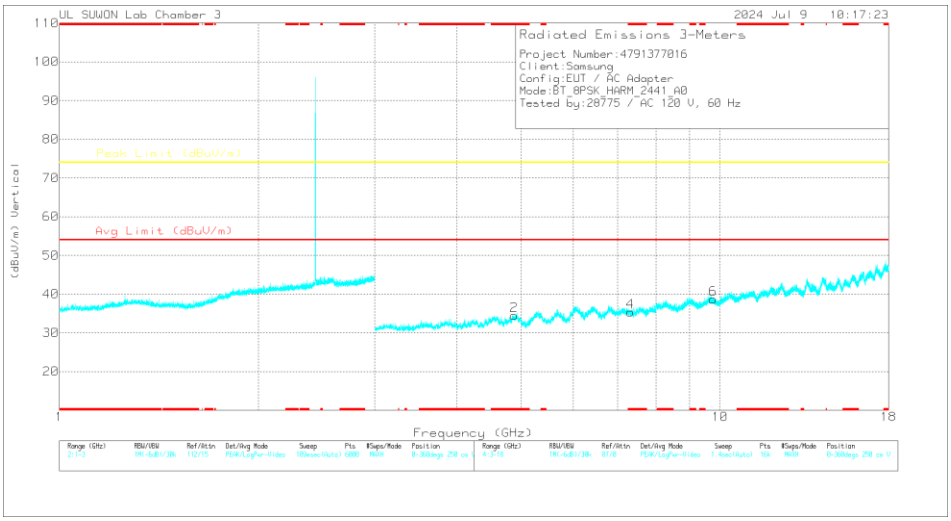
Frequency (GHz)	Meter Reading (dBuV)	Det	Antenna Correction Factor(dB/m)	Loss(dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.80489	38.4	PKFH	34.3	-30.1	42.6	-	-	74	-31.4	175	122	H
* 4.80391	25.62	VA1T	34.3	-30.1	29.82	54	-24.18	-	-	175	122	H
* 4.80337	38.37	PKFH	34.3	-30.1	42.57	-	-	74	-31.43	267	101	V
* 4.80399	24.8	VA1T	34.3	-30.1	29	54	-25	-	-	267	101	V
7.20763	34.12	PKFH	35.8	-25.9	44.02	-	-	74	-29.98	251	106	H
7.20281	33.34	PKFH	35.8	-25.8	43.34	-	-	74	-30.66	267	101	V
9.61087	31.74	PKFH	36.7	-21.8	46.64	-	-	74	-27.36	0	100	H
9.61123	31.64	PKFH	36.7	-21.8	46.54	-	-	74	-27.46	0	100	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PKFH FHSS/BT RB=100k for Frequencies<1GHz / RB=1MHz for Frequencies>1GHz, VB=3 x RB, Peak
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

39 CHANNEL RESULTS



HORIZONTAL



VERTICAL

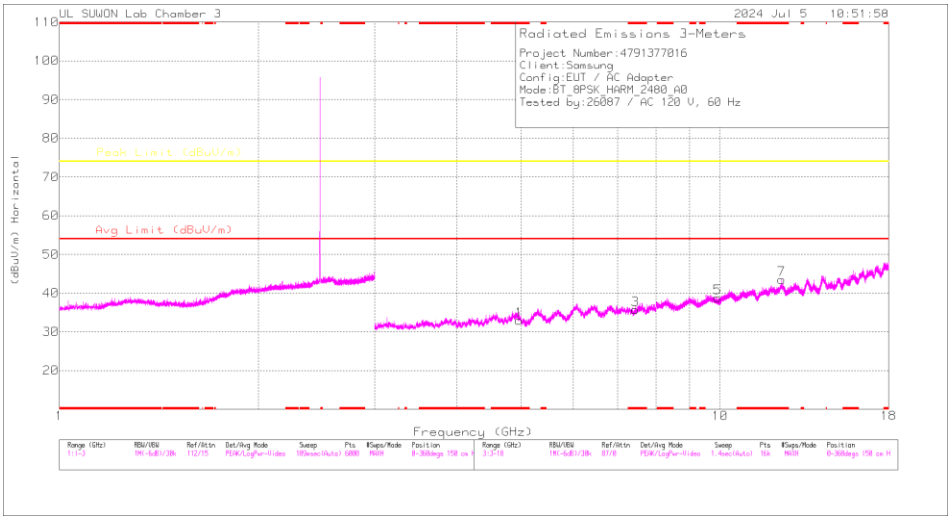
Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

Radiated Emissions

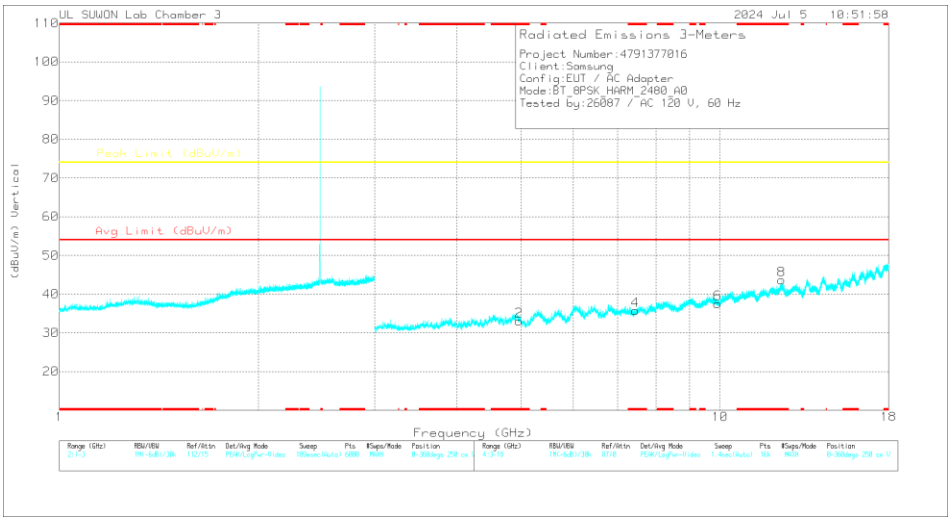
Frequency (GHz)	Meter Reading (dBuV)	Det	Antenna Correction Factor(dB/m)	Loss(dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.88164	38.71	PKFH	34.2	-29.9	43.01	-	-	74	-30.99	219	100	H
* 4.88198	25.02	VA1T	34.2	-30	29.22	54	-24.78	-	-	219	100	H
* 4.8816	38.48	PKFH	34.2	-29.9	42.78	-	-	74	-31.22	281	108	V
* 4.88192	24.77	VA1T	34.2	-30	28.97	54	-25.03	-	-	281	108	V
* 7.31993	33.75	PKFH	35.8	-25.5	44.05	-	-	74	-29.95	250	113	H
* 7.32297	21.02	VA1T	35.8	-25.5	31.32	54	-22.68	-	-	250	113	H
* 7.31959	33.09	PKFH	35.8	-25.5	43.39	-	-	74	-30.61	280	113	V
* 7.32315	20.44	VA1T	35.8	-25.5	30.74	54	-23.26	-	-	280	113	V
9.75899	31.97	PKFH	36.9	-21.5	47.37	-	-	74	-26.63	0	100	H
9.76175	31.4	PKFH	36.9	-21.5	46.8	-	-	74	-27.2	0	100	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PKFH FHSS/BT RB=100k for Frequencies<1GHz / RB=1MHz for Frequencies>1GHz, VB=3 x RB, Peak
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

78 CHANNEL RESULTS



HORIZONTAL



VERTICAL

Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

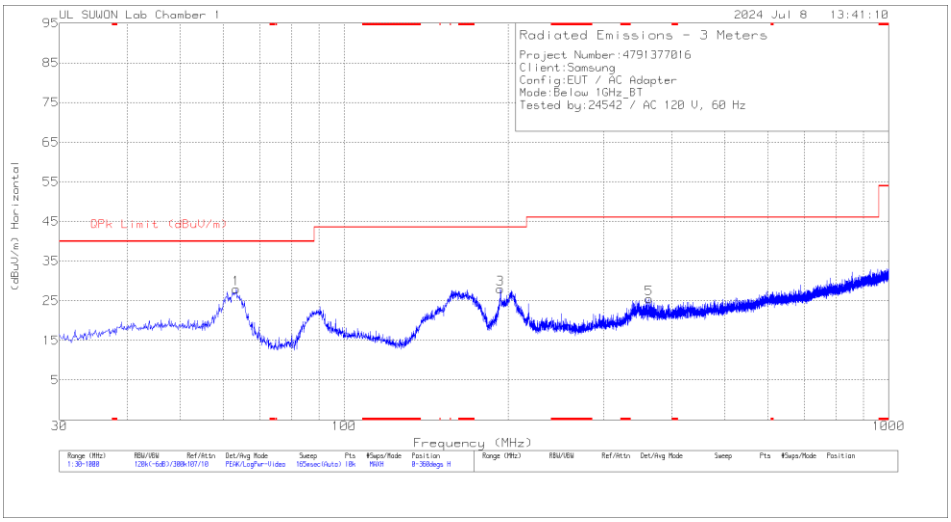
Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	Antenna Correction Factor(dB/m)	Loss(dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.95998	38.49	PKFH	34.3	-30	42.79	-	-	74	-31.21	172	104	H
* 4.95996	24.88	VA1T	34.3	-30	29.18	54	-24.82	-	-	172	104	H
* 4.96476	37.43	PKFH	34.3	-30.1	41.63	-	-	74	-32.37	255	101	V
* 4.96005	24.57	VA1T	34.3	-30	28.87	54	-25.13	-	-	255	101	V
* 7.44431	33.98	PKFH	35.7	-25.2	44.48	-	-	74	-29.52	192	120	H
* 7.44026	21.13	VA1T	35.7	-25.2	31.63	54	-22.37	-	-	192	120	H
* 7.43618	34.04	PKFH	35.7	-25.2	44.54	-	-	74	-29.46	279	100	V
* 7.44012	20.47	VA1T	35.7	-25.2	30.97	54	-23.03	-	-	279	100	V
9.91702	29.62	PKFH	37.1	-21.3	45.42	-	-	74	-28.58	0	100	H
9.9193	30.35	PKFH	37.1	-21.4	46.05	-	-	74	-27.95	0	100	V
* 12.40022	33.73	PKFH	39.2	-21.9	51.03	-	-	74	-22.97	186	100	H
* 12.40001	21.04	VA1T	39.2	-21.9	38.34	54	-15.66	-	-	186	100	H
* 12.39952	34.11	PKFH	39.2	-21.9	51.41	-	-	74	-22.59	148	205	V
* 12.39924	19.36	VA1T	39.2	-21.9	36.66	54	-17.34	-	-	148	205	V

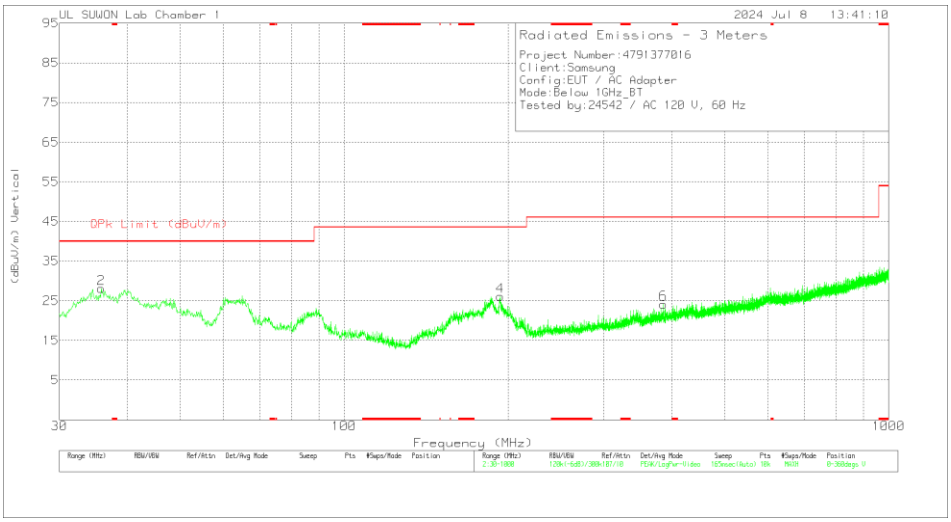
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PKFH FHSS/BT RB=100k for Frequencies<1GHz / RB=1MHz for Frequencies>1GHz, VB=3 x RB, Peak
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration
Mkr1 and 2 in above pre-scan graph were confirmed as in-band emissions.

10.2. WORST CASE BELOW 1 GHz

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



HORIZONTAL



VERTICAL

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Antenna Correction Factor(dB/m)	Loss(dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	63.368	41.27	Pk	17.4	-30.7	27.97	40	-12.03	0-360	300	H
3	193.639	40.3	Pk	16.9	-29.2	28	43.52	-15.52	0-360	100	H
5	363.486	33.45	Pk	20.2	-28.2	25.45	46.02	-20.57	0-360	100	H
2	35.82	42.4	Pk	16.8	-31.1	28.1	40	-11.9	0-360	300	V
4	193.639	38.38	Pk	16.9	-29.2	26.08	43.52	-17.44	0-360	200	V
6	385.99	31.58	Pk	20.7	-28.1	24.18	46.02	-21.84	0-360	200	V

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

11. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

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 plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.10:2020.

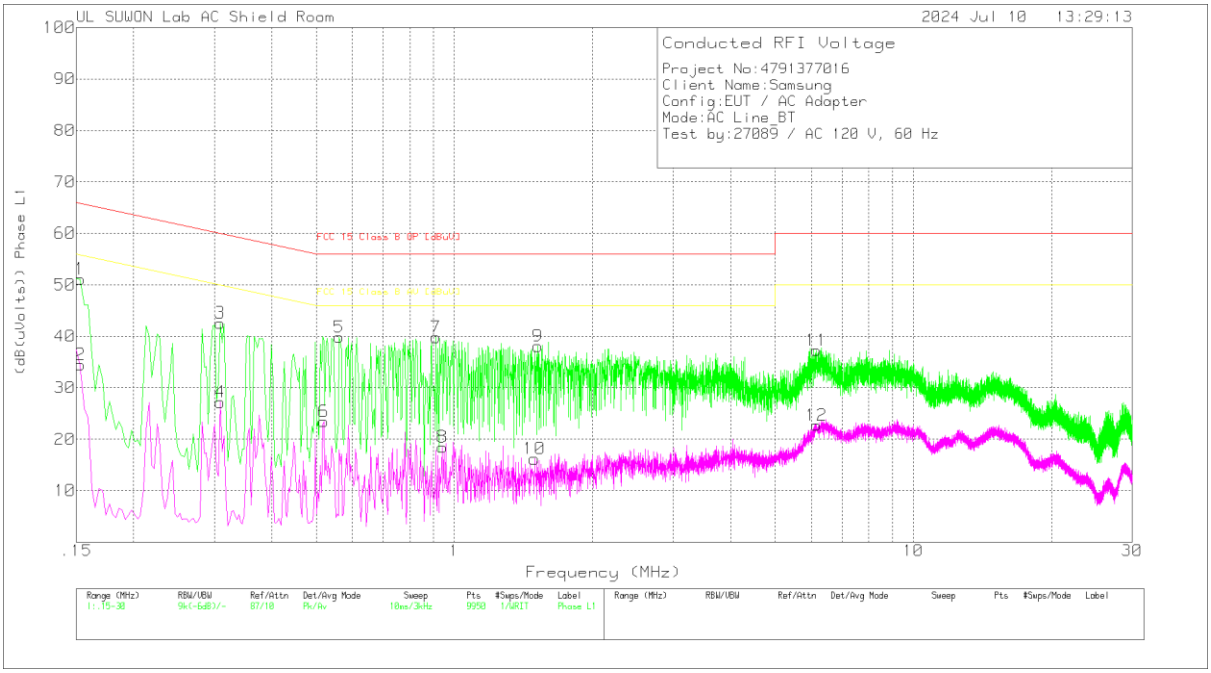
The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

Line conducted data is recorded for both NEUTRAL and HOT lines.

RESULTS

11.1. AC Power Line

LINE 1 RESULTS



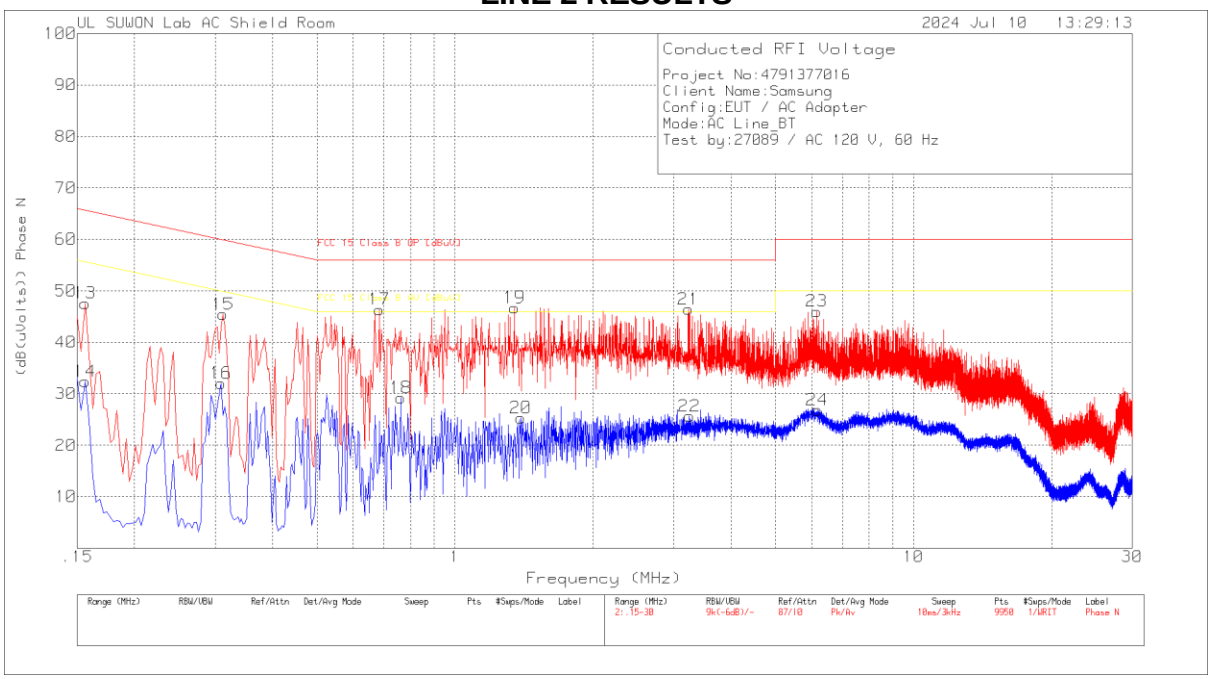
Trace Markers

Range 1: Phase L1 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	101836_With EX_L1 [dB]	Cable Loss [dB]	Corrected Reading [dBuV]	FCC 15 Class B QP [dBuV]	Margin (dB)	FCC 15 Class B AV [dBuV]	Margin (dB)
1	.153	41.21	Pk	9.8	.1	51.11	65.84	-14.73	-	-
2	.153	24.56	Av	9.8	.1	34.46	-	-	55.84	-21.38
3	.309	32.77	Pk	9.7	.1	42.57	60	-17.43	-	-
4	.309	17.4	Av	9.7	.1	27.2	-	-	50	-22.8
5	.561	29.93	Pk	9.8	.1	39.83	56	-16.17	-	-
6	.519	13.42	Av	9.9	.1	23.42	-	-	46	-22.58
7	.912	29.9	Pk	9.8	.1	39.8	56	-16.2	-	-
8	.942	8.57	Av	9.8	.1	18.47	-	-	46	-27.53
9	1.521	28.28	Pk	9.7	.1	38.08	56	-17.92	-	-
10	1.494	6.39	Av	9.7	.1	16.19	-	-	46	-29.81
11	6.153	27.26	Pk	9.8	.2	37.26	60	-22.74	-	-
12	6.153	12.71	Av	9.8	.2	22.71	-	-	50	-27.29

Pk - Peak detector
Av - Average detection

LINE 2 RESULTS



Trace Markers

Range 2: Phase N .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	101836_Wit h EX_N [dB]	Cable Loss [dB]	Corrected Reading [dBuV]	FCC 15 Class B QP [dBuV]	Margin (dB)	FCC 15 Class B AV [dBuV]	Margin (dB)
13	.156	37.7	Pk	9.8	.1	47.6	65.67	-18.07	-	-
14	.156	22.45	Av	9.8	.1	32.35	-	-	55.67	-23.32
15	.312	35.64	Pk	9.7	.1	45.44	59.92	-14.48	-	-
16	.309	22.24	Av	9.7	.1	32.04	-	-	50	-17.96
17	.684	36.47	Pk	9.8	.1	46.37	56	-9.63	-	-
18	.762	19.31	Av	9.8	.1	29.21	-	-	46	-16.79
19	1.347	36.9	Pk	9.7	.1	46.7	56	-9.3	-	-
20	1.392	15.49	Av	9.7	.1	25.29	-	-	46	-20.71
21	3.234	36.61	Pk	9.7	.1	46.41	56	-9.59	-	-
22	3.246	15.85	Av	9.7	.1	25.65	-	-	46	-20.35
23	6.153	36	Pk	9.8	.2	46	60	-14	-	-
24	6.165	16.84	Av	9.8	.2	26.84	-	-	50	-23.16

Pk - Peak detector
Av - Average detection

Quasi-Peak Emissions

Range 2: Phase N .15 - 30MHz

Frequency (MHz)	Meter Reading (dBuV)	Det	101836_Wit h EX_N [dB]	Cable Loss [dB]	Corrected Reading [dBuV]	FCC 15 Class B QP [dBuV]	Margin (dB)	FCC 15 Class B AV [dBuV]	Margin (dB)
.68325	28.99	Qp	9.8	.1	38.89	56	-17.11	-	-
1.34715	28.25	Qp	9.7	.1	38.05	56	-17.95	-	-
3.23475	26.43	Qp	9.7	.1	36.23	56	-19.77	-	-

Qp - Quasi-Peak detector

END OF TEST REPORT