

CERTIFICATION TEST REPORT

Report Number. : S-4791921958-E19V1

Applicant : SAMSUNG ELECTRONICS CO., LTD.
129 SAMSUNG-RO, YEONGTONG-GU, SUWON-SI,
GYEONGGI-DO, 16677, KOREA

Model : SM-S947U, SM-S947U1

FCC ID : A3LSMS947U

EUT Description : GSM/WCDMA/LTE/5G NR Phone + BT/BLE, DTS/UNII
a/b/g/n/ac/ax/be, NFC, WPT, UWB and NB-NTN

Test Standard(s) : FCC 47 CFR PART 15 SUBPART C

Date Of Issue:

2025-12-09

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Revision History

Rev.	Issue Date	Revisions	Presented By
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TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS	5
2. TEST METHODOLOGY	6
3. FACILITIES AND ACCREDITATION	6
4. DECISION RULES AND MEASUREMENT UNCERTAINTY	7
4.1. METROLOGICAL TRACEABILITY	7
4.2. SAMPLE CALCULATION	7
4.3. MEASUREMENT UNCERTAINTY	7
4.4. DECISION RULES	7
5. EQUIPMENT UNDER TEST	8
5.1. EUT DESCRIPTION	8
5.2. MAXIMUM OUTPUT POWER	8
5.3. DESCRIPTION OF AVAILABLE ANTENNAS	9
5.4. WORST-CASE CONFIGURATION AND MODE	9
5.5. DESCRIPTION OF TEST SETUP	10
6. TEST AND MEASUREMENT EQUIPMENT	13
7. TEST RESULTS SUMMARY	14
8. MEASUREMENT METHODS	15
9. ANTENNA PORT TEST RESULTS	16
9.1. ON TIME AND DUTY CYCLE	16
9.2. 20 dB BANDWIDTH	17
9.2.1. CS_TONE_ASK MODULATION	17
9.3. HOPPING FREQUENCY SEPARATION	19
9.3.1. CS_TONE_ASK MODULATION	19
9.4. NUMBER OF HOPPING CHANNELS	20
9.4.1. CS_TONE_ASK MODULATION	20
9.5. AVERAGE TIME OF OCCUPANCY	21
9.5.1. CS_TONE_ASK MODULATION	22
9.6. OUTPUT POWER	23
9.6.1. CS_TONE_ASK MODULATION	23
9.6.2. OUTPUT POWER PLOTS	24
9.7. AVERAGE POWER	25
9.7.1. CS_TONE_ASK MODULATION	25

9.8.	CONDUCTED SPURIOUS EMISSIONS.....	26
9.8.1.	CS_TONE_ASK MODULATION	27
10.	RADIATED TEST RESULTS	31
10.1.	TRANSMITTER ABOVE 1 GHz.....	33
10.1.1.	CS_TONE_ASK MODULATION.....	33
10.2.	WORST CASE BELOW 1 GHz	37
11.	AC POWER LINE CONDUCTED EMISSIONS	38
11.1.	AC Power Line	39

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/ax/be, NFC, WPT, UWB and NB-NTN

MODEL: SM-S947U, SM-S947U1

SERIAL NUMBER: R3CY90LREJE, R3CY90LRHGA, R3CY90LRF2E (CONDUCTED); R3CY90LRNEL, R3CY90LRLRA (RADIATED);

DATE TESTED: 2025-11-10 ~ 2025-12-09

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.

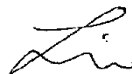
Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL KOREA LTD. and all revisions are duly noted in the revisions section. Any alteration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

Tested By:



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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. KDB 662911 D01 v02r01
5. 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:

$$\begin{aligned} \text{Field Strength (dBuV/m)} &= \text{Measured Voltage (dBuV)} + \text{Antenna Factor (dB/m)} + \\ &\text{Cable Loss (dB)} - \text{Preamplifier Gain (dB)} \\ 36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} &= 28.9 \text{ dBuV/m} \end{aligned}$$

$$\begin{aligned} \text{AC Corrected Reading (dBuV)} &= \text{Measured Voltage (dBuV)} + \text{Extension Cord} \\ &\text{Loss (dB)} + \text{Cable Loss (dB)} \\ 44.72 \text{ dBuV} &= 34.72 \text{ dBuV} + 9.9 \text{ dB} + 0.1 \text{ dB} \end{aligned}$$

4.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
RF Output Power	0.69 dB
Time	0.60 %
Occupied Bandwidth	0.04 %
Hopping Frequency Separation	2.9×10^3 Hz
Frequency Range	2.5×10^3 Hz
Conducted Spurious Emissions	1.40 dB
Conducted Disturbance, 0.15 to 30 MHz	1.84 dB
Radiated Disturbance, 9 kHz to 30 MHz	2.41 dB
Radiated Disturbance, 30 MHz to 1 GHz	3.69 dB
Radiated Disturbance, 1 GHz to 18 GHz	5.18 dB
Radiated Disturbance, 18 GHz to 40 GHz	5.07 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/ax/be, NFC, WPT, UWB and NB-NTN. This test report addresses the DSS(Bluetooth LE ASK) operational mode.

Representative model	Comparison Criteria	Derivative model
		SM-S947U1
SM-S947U	Hardware	Identical
	Software	UI modified according to Service Provider specifications

The SM-S947U model was used as the representative model for final testing. All test results in this report apply to both the representative model and its derivative variants.

5.2. MAXIMUM OUTPUT POWER

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

Frequency Range [MHz]	Mode	Power Mode	Output Power [dBm]	Output Power [mW]
2 404 ~ 2 478	CS_TONE_ASK	Peak	18.35	68.36
		Average	17.67	58.44

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:

Frequency Band[MHz]	ANT1 Gain [dBi]	ANT2 Gain [dBi]
DSS 2400 – 2483.5	-4.06	-5.91

“SUB4” and “SUB6” as indicated in antenna specification are written as ANT1 and ANT2 in this report.

5.4. WORST-CASE CONFIGURATION AND MODE

Both Bluetooth LE ASK Diversity mode have been investigated and confirmed.

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.

Worst-case		ANT1	ANT2
Axis	Band-Edge	X	Z
	Spurious	Y	Y

For conducted power test, Diversity mode was tested and reported.

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 Diversity 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 Diversity mode. All radiated and power line conducted tests were performed attached with travel adapter for the worst-case condition mode.

5.5. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Charger	SAMSUNG	EP-T2510	N/A	N/A
Data Cable	SAMSUNG	EP-DN980	N/A	N/A

I/O CABLE

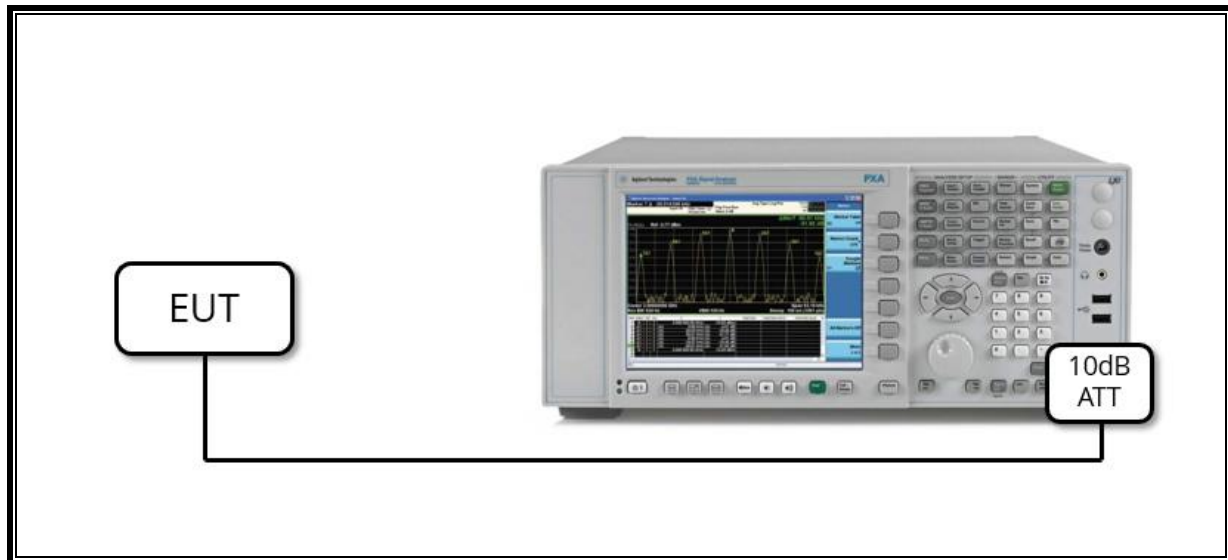
I/O Cable List						
Cable No.	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	DC Power	1	C Type	Shielded	1.0 m	N/A

TEST SETUP

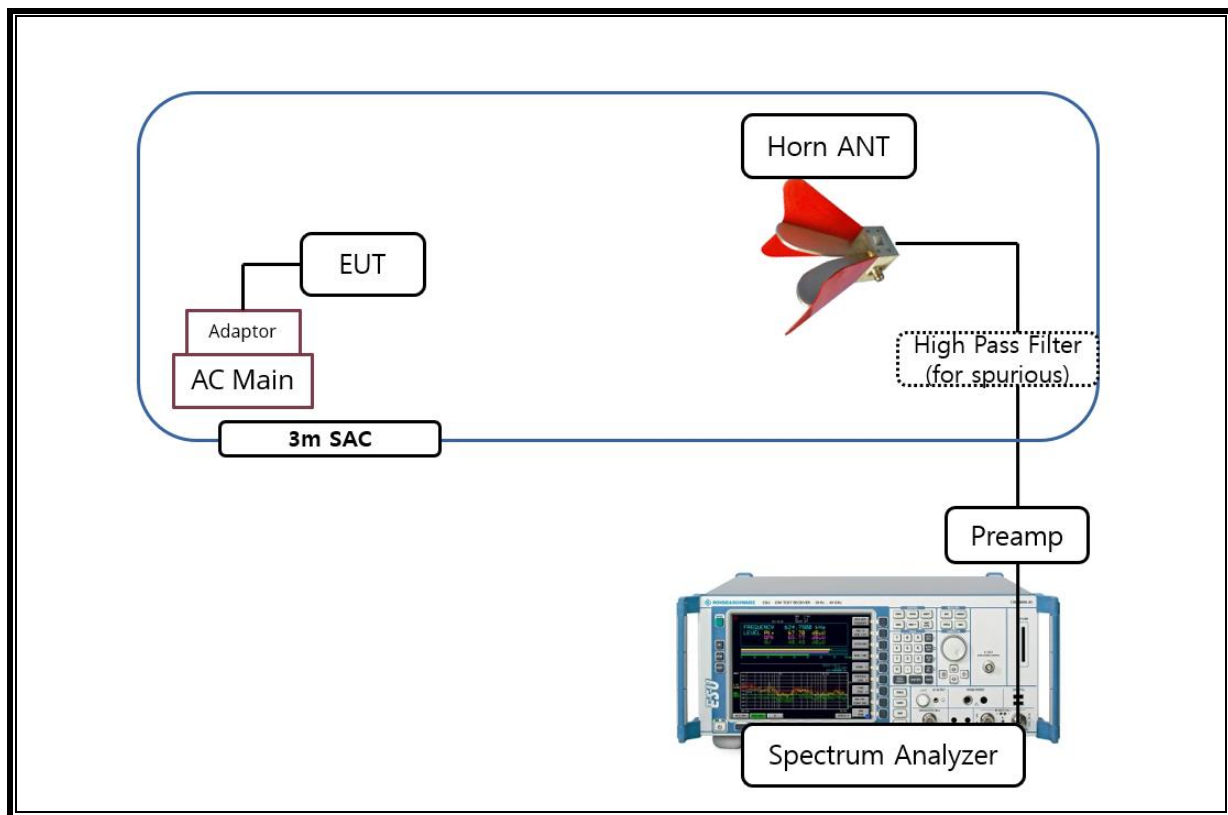
The EUT is a stand-alone unit during the tests.

Test software in hidden menu exercised the EUT to enable BLE Channel Sounding mode.

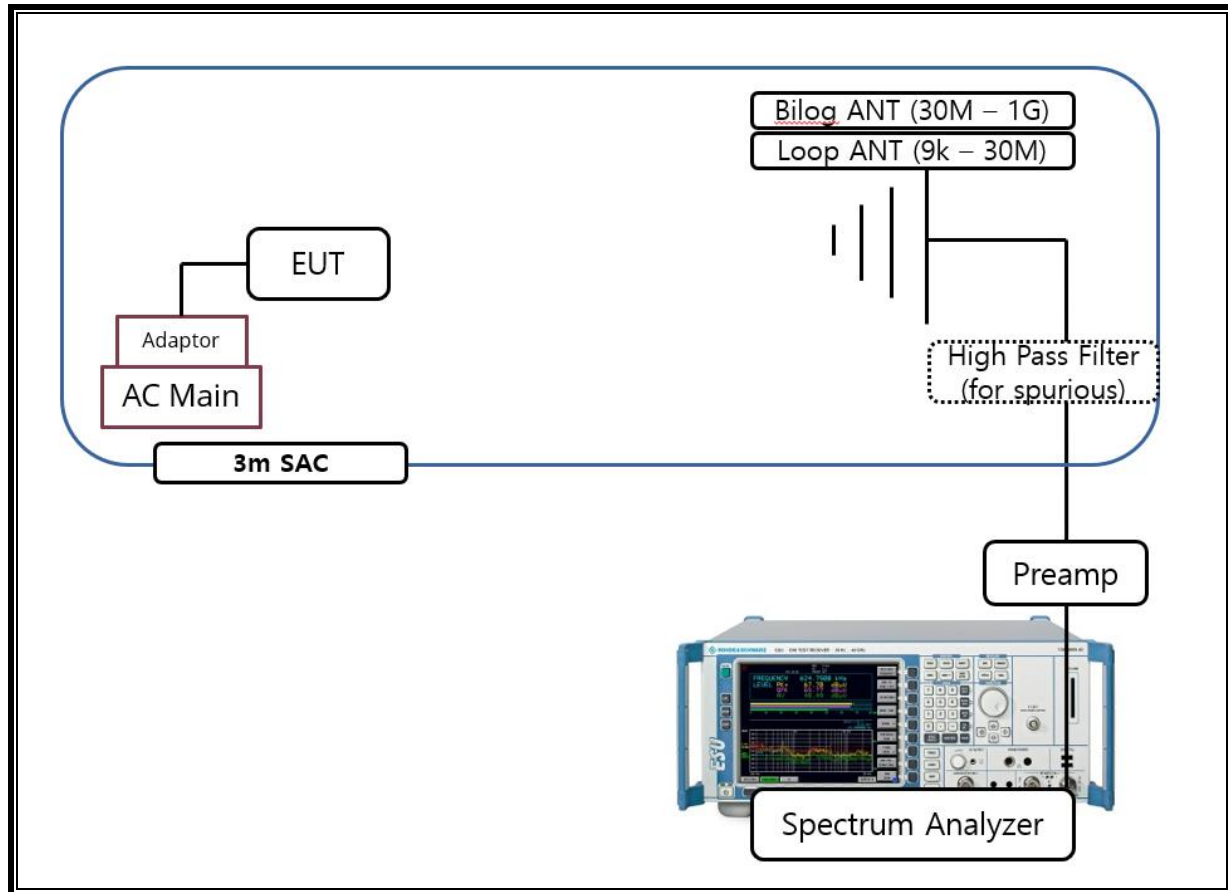
SETUP DIAGRAM FOR TESTS (CONDUCTED TEST SETUP)



SETUP DIAGRAM FOR TESTS (RADIATED TEST SETUP)



SETUP DIAGRAM FOR TESTS (RADIATED TEST SETUP) Below 1GHz



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, Horn, 18 GHz	ETS	3117	00168717	2026-07-17
Antenna, Horn, 40 GHz	ETS	3116C	00166155	2026-07-23
Preamplifier	ETS	3116C-PA	00168841	2026-07-28
Preamplifier, 1000 MHz	Sonoma	310N	341282	2026-07-21
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	2029169	2026-07-21
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54170614	2026-07-21
Spectrum Analyzer, 44 GHz	KEYSIGHT	N9030B	MY60070693	2026-01-02
RF Switching Unit	TA Engineering	TA-018S-16	SW-1	N/A
Average Power Sensor	Agilent / HP	U2000A	MY54270007	2026-07-22
Average Power Sensor	Agilent / HP	U2000A	MY54260010	2026-07-22
Attenuator	PASTERNAK	PE7087-10	A001	2026-07-22
Attenuator	PASTERNAK	PE7087-10	A008	2026-07-22
EMI Test Receive, 40 GHz	R&S	ESU40	100439	2026-07-21
EMI Test Receive, 40 GHz	R&S	ESU40	100457	2026-07-21
EMI Test Receive	R&S	ESW 8	101227	2026-07-17
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	009	2026-07-21
High Pass Filter 3GHz	Micro-Tronics	HPM17543	010	2026-07-21
High Pass Filter 6GHz	Micro-Tronics	HPS17542	21	2026-07-21
LISN	R&S	ENV216	101837	2026-07-22
Antenna, Loop, 9kHz-30MHz	R&S	HFH2-Z2E	100900	2027-07-24
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	< 0.4 s		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

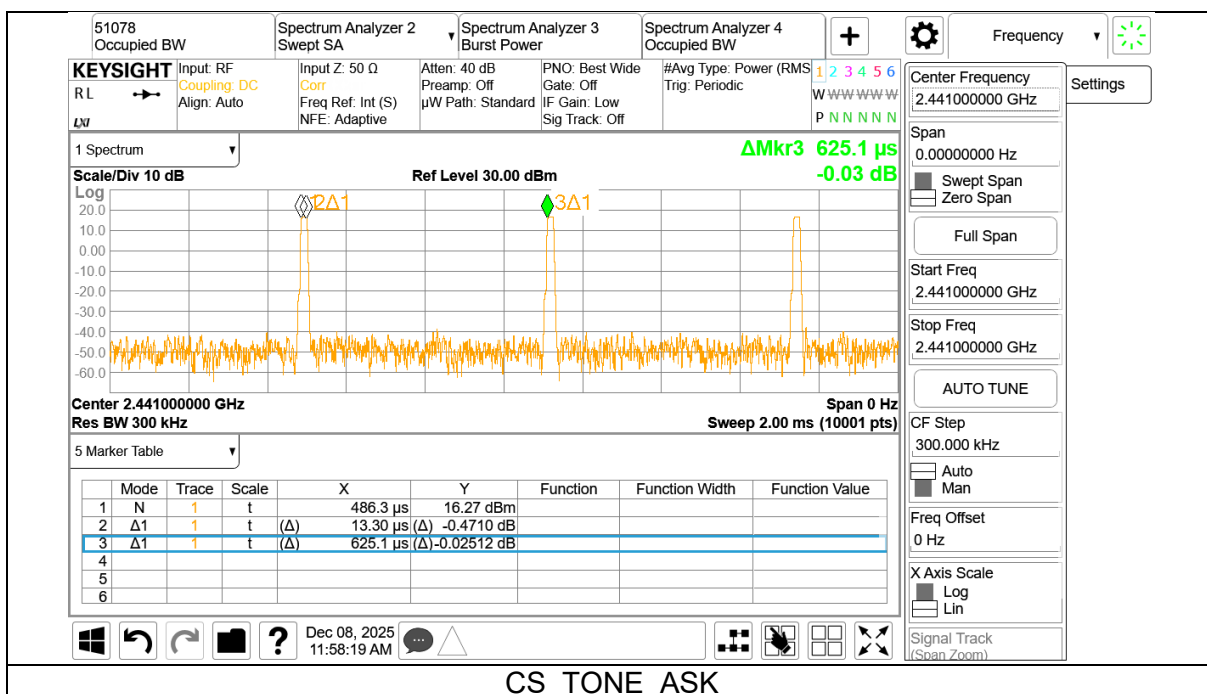
LIMITS

None; for reporting purposes only.

PROCEDURE

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

ON TIME AND DUTY CYCLE RESULTS



Mode	On time [usec]	Period [usec]	Duty Cycle [%]	1/T Minimum VBW [kHz]
2 400 ~ 2 483.5 MHz Band				
CS_TONE_ASK	13.3	625.1	2.13	75.19

Note. Radiated band-edge and spurious emissions were measured with the duty cycle reduction factor (per customer declaration) applied in accordance with FCC Part 15.35(c).

9.2. 20 dB BANDWIDTH

LIMITS

None; for reporting purposes only.

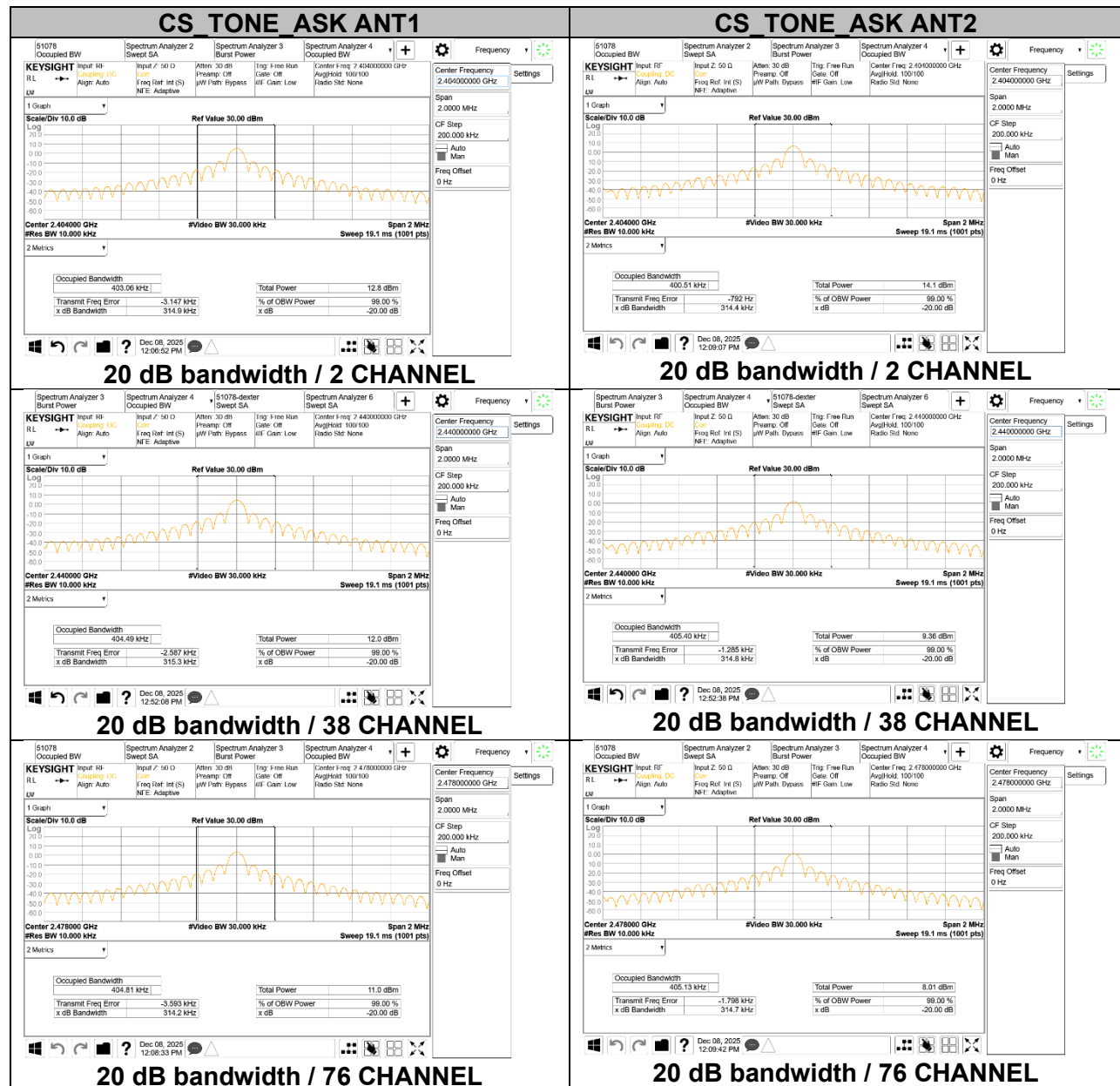
TEST PROCEDURE

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. CS_TONE_ASK MODULATION

Antenna	Channel	Frequency [MHz]	20 dB Bandwidth [kHz]
ANT1	2	2 404	314.9
	38	2 440	315.3
	76	2 478	314.2
ANT2	2	2 404	314.4
	38	2 440	314.8
	76	2 478	314.7
Worst			315.3



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 hopping channel, whichever is greater.

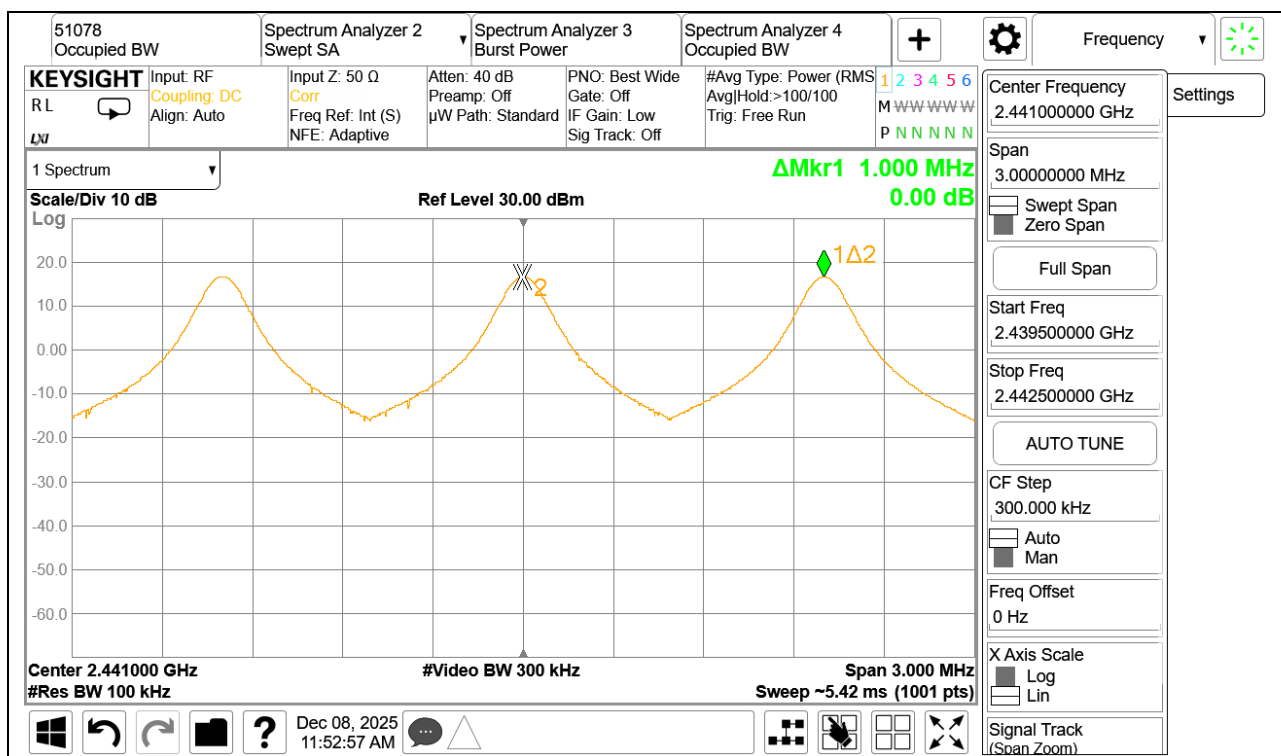
Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than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



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.

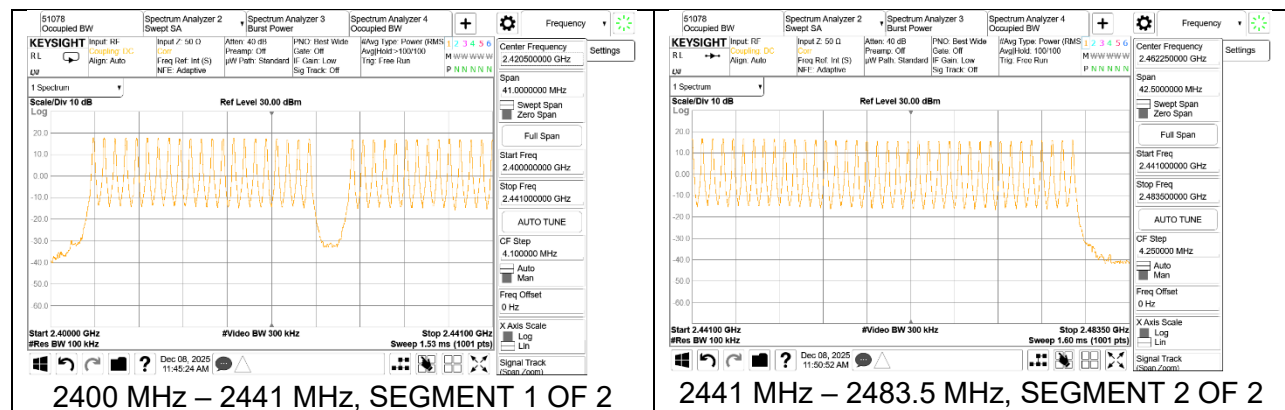
TEST PROCEDURE

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: 72 channels are observed

9.4.1. CS_TONE_ASK MODULATION



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.

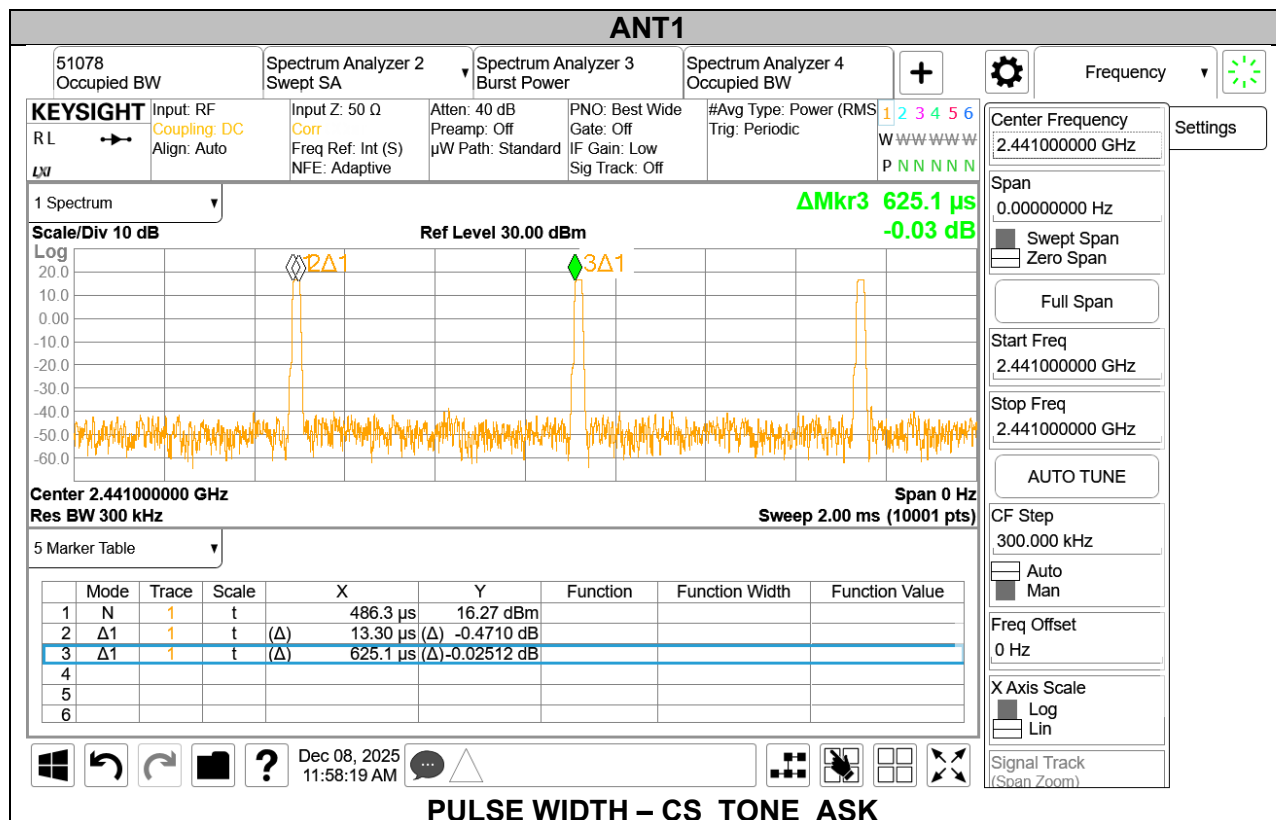
The number of pulses is calculated based on the customer's declared operational cycle, in which CS_TONE_ASK operates twice per 205 ms period on a single channel.

The observation occupancy time is hopping channel $72 \times 400 \text{ ms} = 28.8 \text{ sec}$.
Since CS_TONE_ASK operates twice per 205 ms on a single channel, there are 281 occurrences (calculated as 280.98) within the 28.8-second period

RESULTS

9.5.1. CS_TONE_ASK MODULATION

Modulation	Pulse Width [msec]	Number of Pulses in 28.8 seconds	Average Time of Occupancy [sec]	Limit [sec]	Margin [sec]
ASK	0.0133	281	0.0037	0.4000	-0.3963



9.6. OUTPUT POWER

LIMITS

§15.247 (b) (1)

The peak conducted output power limit is 0.125 W (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.

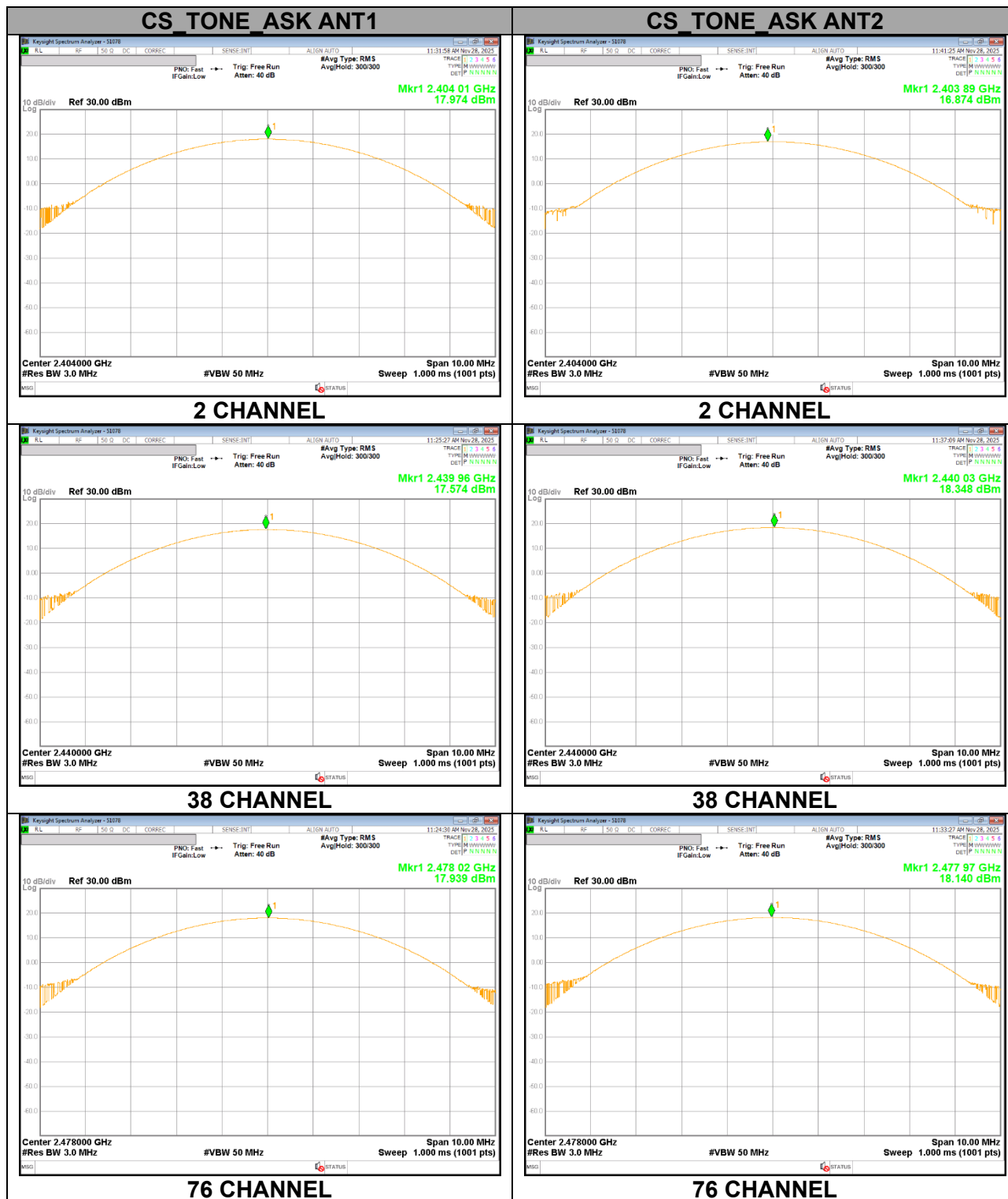
RESULTS

9.6.1. CS TONE ASK MODULATION

Antenna	Channel	Frequency [MHz]	Peak Output Power [dBm]	Limit [dBm]	Margin [dB]
ANT1	2	2 404	17.97	21.00	-3.03
	38	2 440	17.57		-3.43
	76	2 478	17.94		-3.06
ANT2	2	2 404	16.87		-4.13
	38	2 440	18.35		-2.65
	76	2 478	18.14		-2.86
Worst			18.35		-2.65

9.6.2. OUTPUT POWER PLOTS

PEAK OUTPUT POWER



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. CS_TONE_ASK MODULATION

Antenna	Channel	Frequency [MHz]	Average Output Power [dBm]	Average Output Power [mW]
ANT1	2	2 404	17.328	54.051
	38	2 440	16.926	49.272
	76	2 478	17.199	52.469
ANT2	2	2 404	16.435	44.005
	38	2 440	17.667	58.439
	76	2 478	17.521	56.507

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.

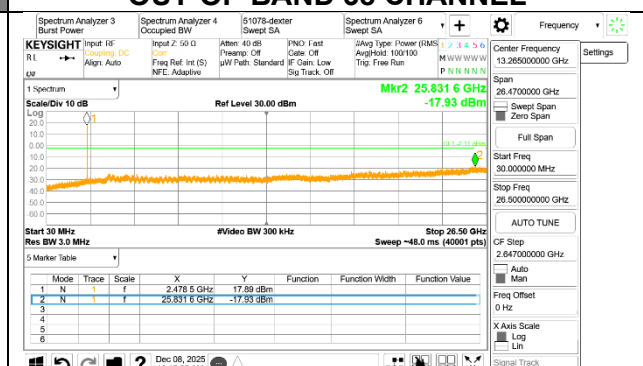
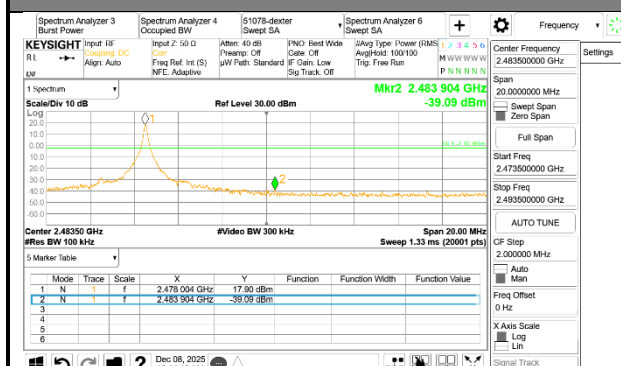
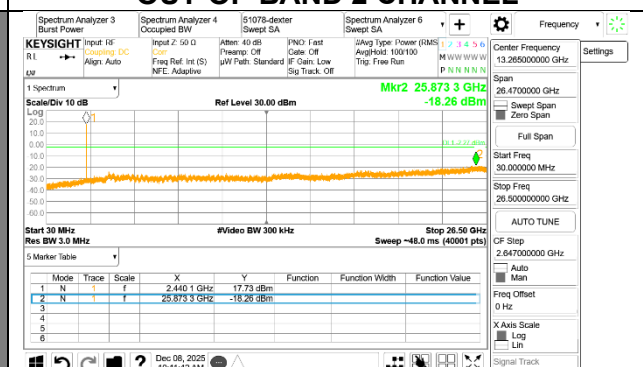
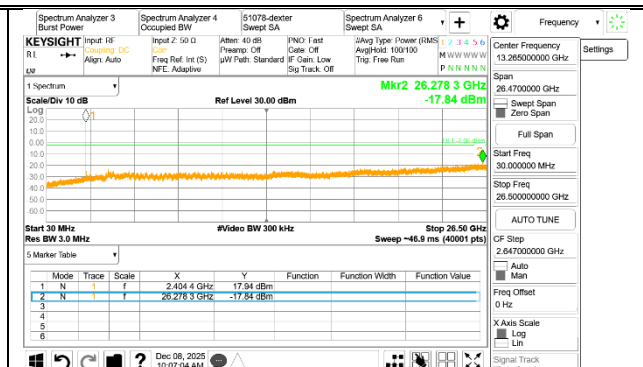
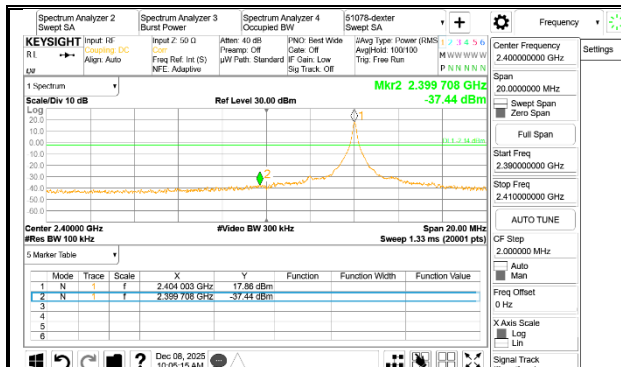
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

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

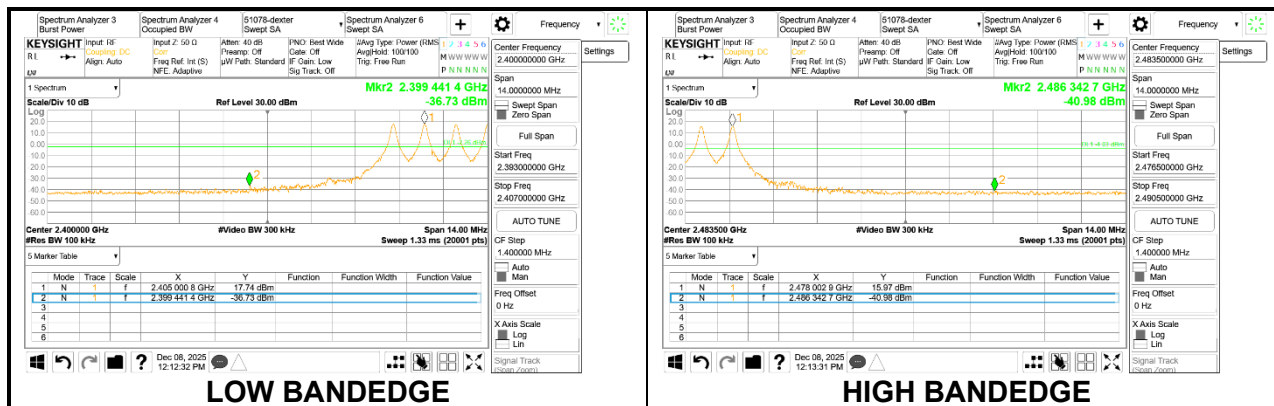
RESULTS

9.8.1. CS_TONE_ASK MODULATION

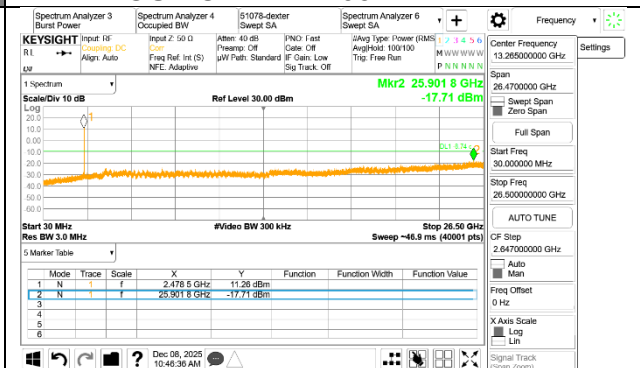
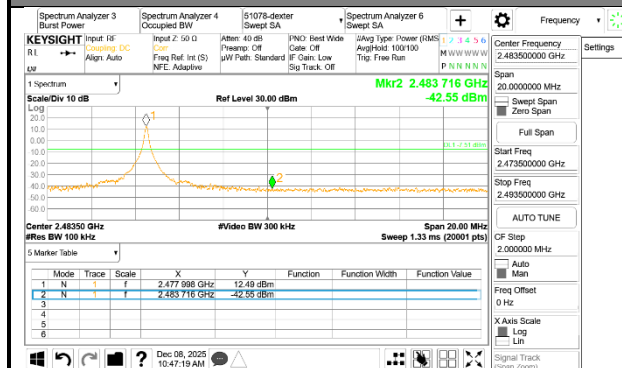
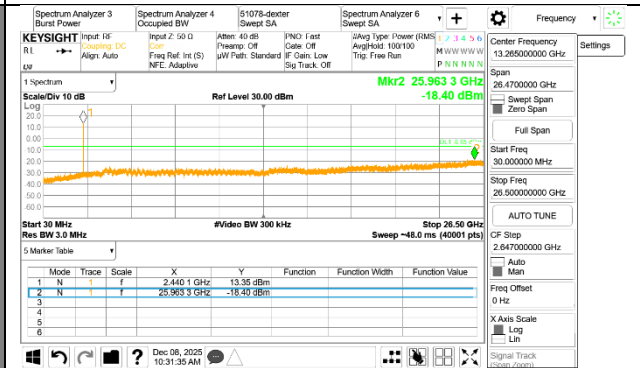
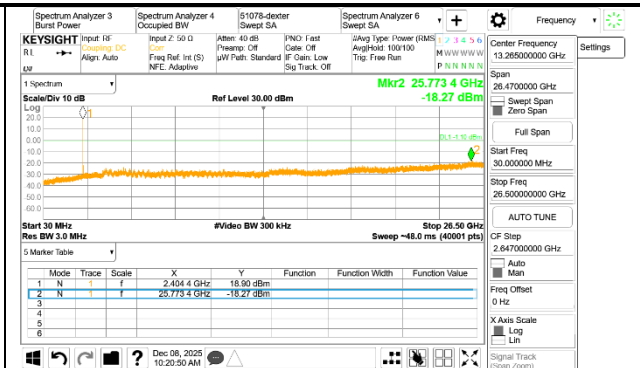
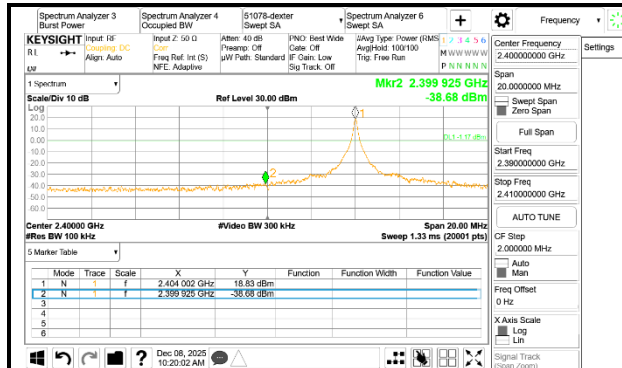
SPURIOUS EMISSIONS, NON-HOPPING – ANT1



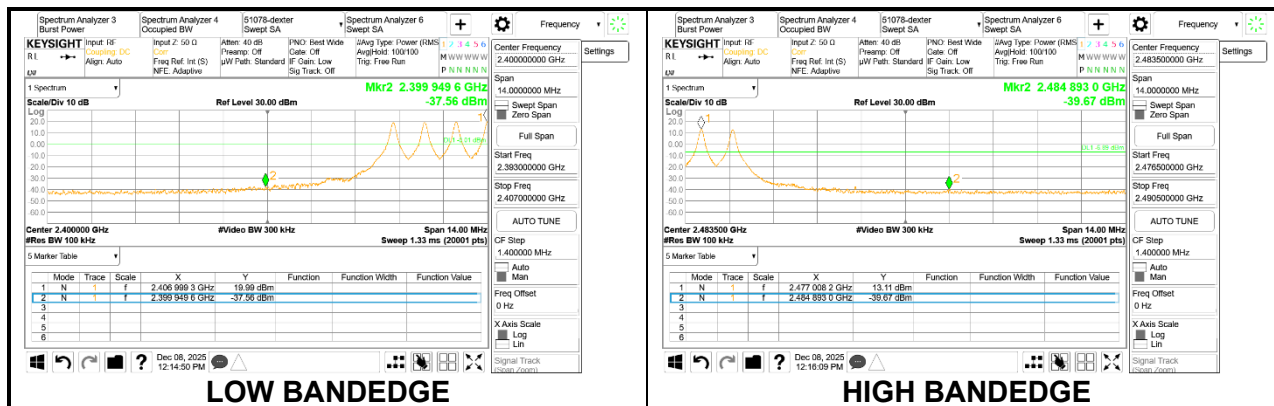
SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON – ANT1



SPURIOUS EMISSIONS, NON-HOPPING – ANT2



SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON – ANT2



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 and spurious measurements above 1 GHz, the resolution bandwidth is set to 1 MHz, and the video bandwidth is set to 3 MHz for peak measurements. Radiated spurious emissions were measured with the duty cycle reduction factor (per customer declaration) applied in accordance with FCC Part 15.35(c).

Since CS_TONE_ASK operates twice per 205 ms on a single channel, this corresponds to approximately one occurrence (0.9756) per 100 ms. Accordingly, the duty cycle reduction factor is calculated as

$$20\log(0.000133) = -38.76 \text{ dB}$$

Because the reduction factor is greater than the 20 dB difference between the peak and average limits, average measurements were omitted.

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.

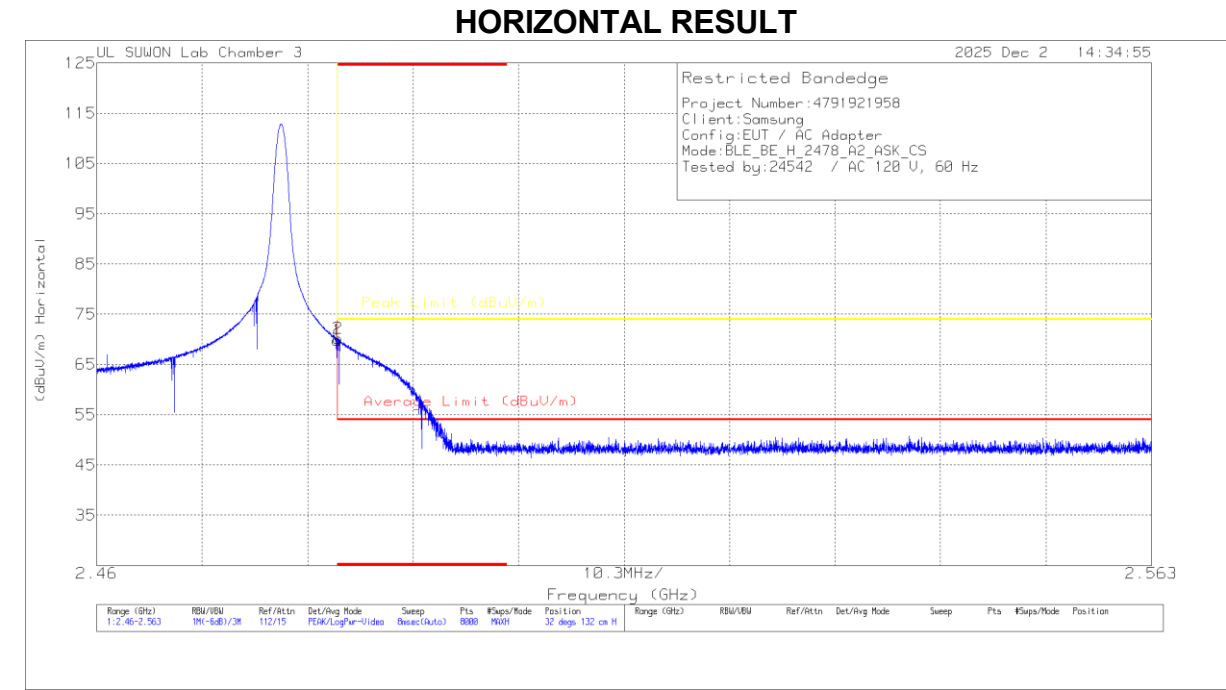
Note : Emission was pre-scanned from 9kHz to 30MHz; No emissions were detected which was at least 20dB below the specification limit (consider distance correction factor).
Per FCC part 15.31(o), test results were not reported.

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. CS_TONE_ASK MODULATION

BANDEDGE (WORST CASE: 76 CHANNEL, ANT2)



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	Antenna_Factor (dBm)	10dB_Path Loss(dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Acimuth (Degs)	Height (cm)	Polarity
1	* 2.4835	62.36	Pk	32.4	-24.9	0	69.86	-	-	74	-4.14	32	132	H
2	* 2.48355	62.65	Pk	32.4	-24.9	0	70.15	-	-	74	-3.85	32	132	H

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

BANDEDGE TEST DATA

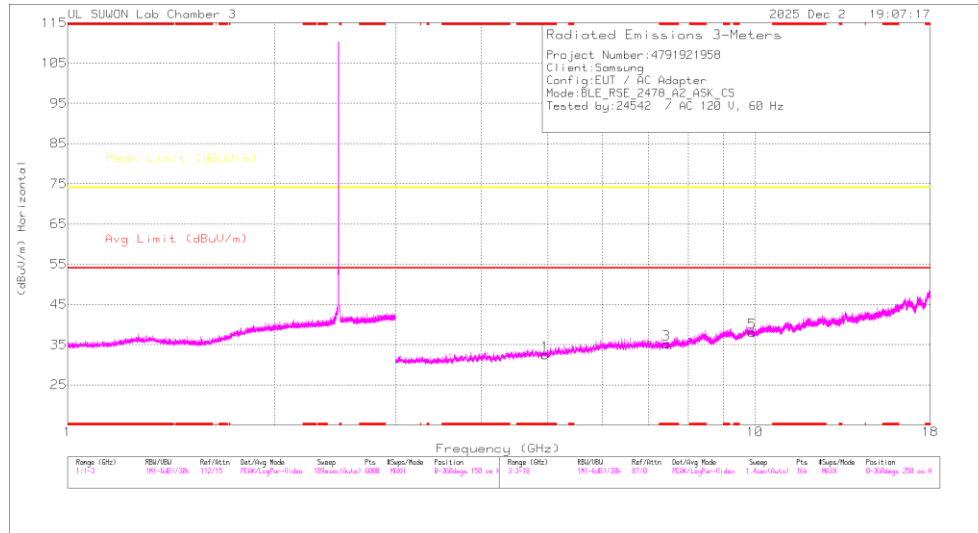
Freq. [MHz]	Antenna	Frequency [GHz]	Reading [dBuV]	Detector Mode	ANT Factor [dB/m]	Loss [dB]	DC Corr [dB]	Result [dBuV/m]	AV Limit [dBuV/m]	AV Margin [dB]	PK Limit [dBuV/m]	PK Margin [dB]	Azimuth [Degs]	Height [cm]	Polarity
2404	ANT 1	* 2.39	52.01	Pk	32.10	-24.90	0.00	59.21	-	-	74.00	-14.79	128	164	H
		* 2.38992	52.42	Pk	32.10	-24.90	0.00	59.62	-	-	74.00	-14.38	128	164	H
		* 2.39	52.01	Pk	32.10	-24.90	-38.76	20.45	54.00	-33.55	-	-	128	164	H
		* 2.38992	52.42	Pk	32.10	-24.90	-38.76	20.86	54.00	-33.14	-	-	128	164	H
		* 2.39	52.37	Pk	32.10	-24.90	0.00	59.57	-	-	74.00	-14.43	80	100	V
		* 2.38885	52.76	Pk	32.10	-24.90	0.00	59.96	-	-	74.00	-14.04	80	100	V
		* 2.39	52.37	Pk	32.10	-24.90	-38.76	20.81	54.00	-33.19	-	-	80	100	V
		* 2.38885	52.76	Pk	32.10	-24.90	-38.76	21.20	54.00	-32.80	-	-	80	100	V
2478	ANT 1	* 2.4835	57.42	Pk	32.40	-24.90	0.00	64.92	-	-	74.00	-9.08	204	100	H
		* 2.48355	57.78	Pk	32.40	-24.90	0.00	65.28	-	-	74.00	-8.72	204	100	H
		* 2.4835	57.42	Pk	32.40	-24.90	-38.76	26.16	54.00	-27.84	-	-	204	100	H
		* 2.48355	57.78	Pk	32.40	-24.90	-38.76	26.52	54.00	-27.48	-	-	204	100	H
		* 2.4835	61.12	Pk	32.40	-24.90	0.00	68.62	-	-	74.00	-5.38	82	104	V
		* 2.48355	61.39	Pk	32.40	-24.90	0.00	68.89	-	-	74.00	-5.11	82	104	V
		* 2.4835	61.12	Pk	32.40	-24.90	-38.76	29.86	54.00	-24.14	-	-	82	104	V
		* 2.48355	61.39	Pk	32.40	-24.90	-38.76	30.13	54.00	-23.87	-	-	82	104	V
Freq. [MHz]	Antenna	Frequency [GHz]	Reading [dBuV]	Detector Mode	ANT Factor [dB/m]	Loss [dB]	DC Corr [dB]	Result [dBuV/m]	AV Limit [dBuV/m]	AV Margin [dB]	PK Limit [dBuV/m]	PK Margin [dB]	Azimuth [Degs]	Height [cm]	Polarity
2404	ANT2	* 2.39	49.35	Pk	32.10	-24.90	0.00	56.55	-	-	74.00	-17.45	144	137	H
		* 2.38968	50.85	Pk	32.10	-24.90	0.00	58.05	-	-	74.00	-15.95	144	137	H
		* 2.39	49.35	Pk	32.10	-24.90	-38.76	17.79	54.00	-36.21	-	-	144	137	H
		* 2.38968	50.85	Pk	32.10	-24.90	-38.76	19.29	54.00	-34.71	-	-	144	137	H
		* 2.39	41.04	Pk	32.10	-24.90	0.00	48.24	-	-	74.00	-25.76	261	294	V
		* 2.38973	43.40	Pk	32.10	-24.90	0.00	50.60	-	-	74.00	-23.40	261	294	V
		* 2.39	41.04	Pk	32.10	-24.90	-38.76	9.48	54.00	-44.52	-	-	261	294	V
		* 2.38973	43.40	Pk	32.10	-24.90	-38.76	11.84	54.00	-42.16	-	-	261	294	V
2478	ANT2	* 2.4835	62.36	Pk	32.40	-24.90	0.00	69.86	-	-	74.00	-4.14	32	132	H
		* 2.48355	62.65	Pk	32.40	-24.90	0.00	70.15	-	-	74.00	-3.85	32	132	H
		* 2.4835	62.36	Pk	32.40	-24.90	-38.76	31.10	54.00	-22.90	-	-	32	132	H
		* 2.48355	62.65	Pk	32.40	-24.90	-38.76	31.39	54.00	-22.61	-	-	32	132	H
		* 2.4835	58.10	Pk	32.40	-24.90	0.00	65.60	-	-	74.00	-8.40	37	366	V
		* 2.48353	58.07	Pk	32.40	-24.90	0.00	65.57	-	-	74.00	-8.43	37	366	V
		* 2.4835	58.10	Pk	32.40	-24.90	-38.76	26.84	54.00	-27.16	-	-	37	366	V
		* 2.48353	58.07	Pk	32.40	-24.90	-38.76	26.81	54.00	-27.19	-	-	37	366	V

Note1. Pk - Peak detector

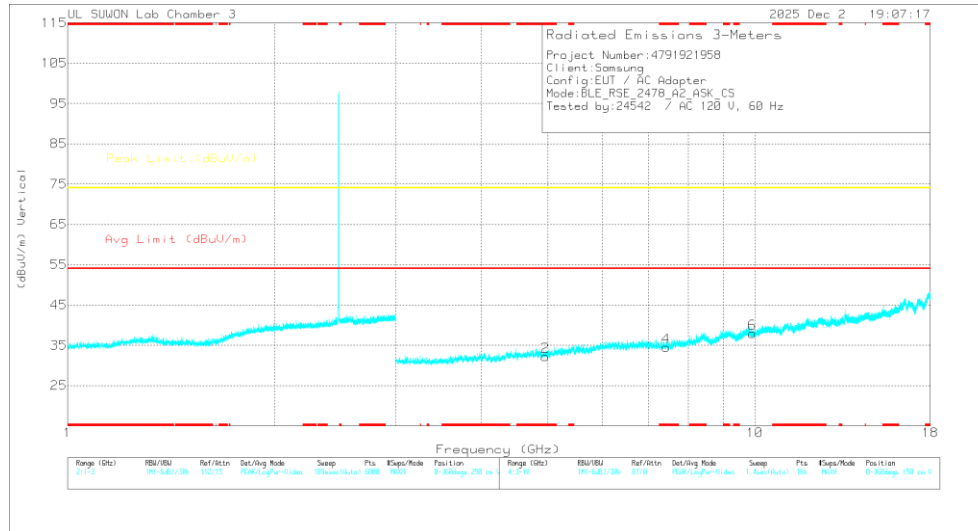
Note2. * - indicates frequency in 47 CFR Pt 15 / IC RSS-Restricted Band

HARMONICS AND SPURIOUS EMISSIONS(WORST CASE – ANT2)

76 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_Factor (dB/m)	3GHz_HP_Path Loss(dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.59683	39.73	PK2	34.2	-31.1	0	42.83	-	-	74	-31.17	0	100	H
* 4.95367	39.83	PK2	34.3	-30.5	0	43.63	-	-	74	-30.37	0	100	V
* 7.43386	34.53	PK2	35.7	-25	0	45.23	-	-	74	-28.77	0	100	H
* 7.43063	34.32	PK2	35.7	-24.9	0	45.12	-	-	74	-28.88	0	100	V
9.91081	32.62	PK2	37.1	-21.4	0	48.32	-	-	74	-25.68	0	100	H
9.90845	32.86	PK2	37.1	-21.4	0	48.56	-	-	74	-25.44	0	100	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PK2 - KDB558074 Method: Maximum Peak

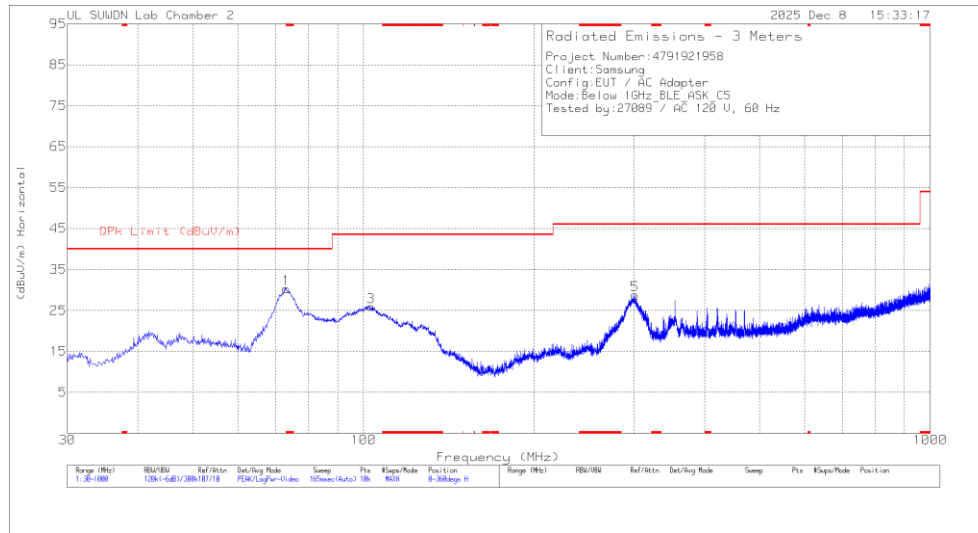
HARMONICS AND SPURIOUS EMISSIONS TEST DATA

Freq. [MHz]	Antenna	Frequency [GHz]	Reading [dBuV]	Detector Mode	ANT Factor [dB/m]	Loss [dB]	DC Corr [dB]	Result dBuV/m	AV Limit dBuV/m	AV Margin [dB]	PK Limit dBuV/m	PK Margin [dB]	Azimuth [Degs]	Height [cm]	Polarity
2404	ANT1	* 4.80349	39.49	PK2	34.30	-30.10	0.00	43.69	-	-	74.00	-30.31	360	150	H
		* 4.80349	39.49	PK2	34.30	-30.10	-38.76	4.93	54.00	-49.07	-	-	360	150	H
		7.214	35.08	PK2	35.80	-25.70	0.00	45.18	-	-	74.00	-28.82	360	150	H
		9.618	33.16	PK2	36.70	-21.70	0.00	48.16	-	-	74.00	-25.84	360	150	H
		* 4.80783	39.06	PK2	34.30	-30.10	0.00	43.26	-	-	74.00	-30.74	0	150	V
		* 4.80783	39.06	PK2	34.30	-30.10	-38.76	4.50	54.00	-49.50	-	-	0	150	V
		7.212	34.78	PK2	35.80	-25.80	0.00	44.78	-	-	74.00	-29.22	0	150	V
		9.613	32.54	PK2	36.70	-21.70	0.00	47.54	-	-	74.00	-26.46	0	150	V
		* 4.8782	39.44	PK2	34.20	-30.70	0.00	42.94	-	-	74.00	-31.06	0	100	H
		* 4.8782	39.44	PK2	34.20	-30.70	-38.76	4.18	54.00	-49.82	-	-	0	100	H
2440	ANT1	* 4.87754	39.77	PK2	34.20	-30.70	0.00	43.27	-	-	74.00	-30.73	0	100	V
		* 4.87754	39.77	PK2	34.20	-30.70	-38.76	4.51	54.00	-49.49	-	-	0	100	V
		* 7.32499	34.66	PK2	35.80	-25.30	0.00	45.16	-	-	74.00	-28.84	0	100	H
		* 7.32499	34.66	PK2	35.80	-25.30	-38.76	6.40	54.00	-47.60	-	-	0	100	H
		* 7.3179	35.07	PK2	35.80	-25.30	0.00	45.57	-	-	74.00	-28.43	0	100	V
		* 7.3179	35.07	PK2	35.80	-25.30	-38.76	6.81	54.00	-47.19	-	-	0	100	V
		9.762	32.41	PK2	36.90	-21.40	0.00	47.91	-	-	74.00	-26.09	0	100	H
		9.758	33.30	PK2	36.90	-21.30	0.00	48.90	-	-	74.00	-25.10	0	100	V
		* 4.9585	39.15	PK2	34.30	-30.40	0.00	43.05	-	-	74.00	-30.95	0	100	H
		* 4.9585	39.15	PK2	34.30	-30.40	-38.76	4.29	54.00	-49.71	-	-	0	100	H
2478	ANT1	* 4.96076	38.89	PK2	34.30	-30.30	0.00	42.89	-	-	74.00	-31.11	0	100	V
		* 4.96076	38.89	PK2	34.30	-30.30	-38.76	4.13	54.00	-49.87	-	-	0	100	V
		* 7.43898	34.47	PK2	35.70	-24.90	0.00	45.27	-	-	74.00	-28.73	0	100	H
		* 7.43898	34.47	PK2	35.70	-24.90	-38.76	6.51	54.00	-47.49	-	-	0	100	H
		* 7.43422	34.43	PK2	35.70	-25.00	0.00	45.13	-	-	74.00	-28.87	0	100	V
		* 7.43422	34.43	PK2	35.70	-25.00	-38.76	6.37	54.00	-47.63	-	-	0	100	V
		9.909	32.42	PK2	37.10	-21.40	0.00	48.12	-	-	74.00	-25.88	0	100	H
		9.911	32.42	PK2	37.10	-21.40	0.00	48.12	-	-	74.00	-25.88	0	100	V
															H
Freq. [MHz]	Antenna	Frequency [GHz]	Reading [dBuV]	Detector Mode	ANT Factor [dB/m]	Loss [dB]	DC Corr [dB]	Result dBuV/m	AV Limit dBuV/m	AV Margin [dB]	PK Limit dBuV/m	PK Margin [dB]	Azimuth [Degs]	Height [cm]	Polarity
2404	ANT2	* 4.81064	38.91	PK2	34.30	-30.10	0.00	43.11	-	-	74.00	-30.89	0	100	H
		* 4.81064	38.91	PK2	34.30	-30.10	-38.76	4.35	54.00	-49.65	-	-	0	100	H
		* 4.804	39.15	PK2	34.30	-30.10	0.00	43.35	-	-	74.00	-30.65	0	100	V
		* 4.804	39.15	PK2	34.30	-30.10	-38.76	4.59	54.00	-49.41	-	-	0	100	V
		7.212	35.11	PK2	35.80	-25.80	0.00	45.11	-	-	74.00	-28.89	0	100	H
		7.213	35.31	PK2	35.80	-25.70	0.00	45.41	-	-	74.00	-28.59	0	100	V
		9.616	32.75	PK2	36.70	-21.70	0.00	47.75	-	-	74.00	-26.25	0	100	H
		9.620	33.12	PK2	36.70	-21.60	0.00	48.22	-	-	74.00	-25.78	0	100	V
2440	ANT2	* 4.87993	39.83	PK2	34.20	-30.80	0.00	43.23	-	-	74.00	-30.77	0	100	H
		* 4.87993	39.83	PK2	34.20	-30.80	-38.76	4.47	54.00	-49.53	-	-	0	100	H
		* 4.8798	39.79	PK2	34.20	-30.80	0.00	43.19	-	-	74.00	-30.81	0	100	V
		* 4.8798	39.79	PK2	34.20	-30.80	-38.76	4.43	54.00	-49.57	-	-	0	100	V
		* 7.31505	35.09	PK2	35.80	-25.30	0.00	45.59	-	-	74.00	-28.41	0	100	H
		* 7.31505	35.09	PK2	35.80	-25.30	-38.76	6.83	54.00	-47.17	-	-	0	100	H
		* 7.31862	35.32	PK2	35.80	-25.30	0.00	45.82	-	-	74.00	-28.18	0	100	V
		* 7.31862	35.32	PK2	35.80	-25.30	-38.76	7.06	54.00	-46.94	-	-	0	100	V
		9.759	32.17	PK2	36.90	-21.30	0.00	47.77	-	-	74.00	-26.23	0	100	H
		9.762	32.43	PK2	36.90	-21.40	0.00	47.93	-	-	74.00	-26.07	0	100	V
2478	ANT2	* 4.59683	39.73	PK2	34.20	-31.10	0.00	42.83	-	-	74.00	-31.17	0	100	H
		* 4.59683	39.73	PK2	34.20	-31.10	-38.76	4.07	54.00	-49.93	74.00	-31.17	0	100	H
		* 4.95367	39.83	PK2	34.30	-30.50	0.00	43.63	-	-	74.00	-30.37	0	100	V
		* 4.95367	39.83	PK2	34.30	-30.50	-38.76	4.87	54.00	-49.13	74.00	-30.37	0	100	V
		* 7.43386	34.53	PK2	35.70	-25.00	0.00	45.23	-	-	74.00	-28.77	0	100	H
		* 7.43386	34.53	PK2	35.70	-25.00	-38.76	6.47	54.00	-47.53	74.00	-28.77	0	100	H
		* 7.43063	34.32	PK2	35.70	-24.90	0.00	45.12	-	-	74.00	-28.88	0	100	V
		* 7.43063	34.32	PK2	35.70	-24.90	-38.76	6.36	54.00	-47.64	74.00	-28.88	0	100	V
		9.911	32.62	PK2	37.10	-21.40	0.00	48.32	-	-	74.00	-25.68	0	100	H
		9.908	32.86	PK2	37.10	-21.40	0.00	48.56	-	-	74.00	-25.44	0	100	V

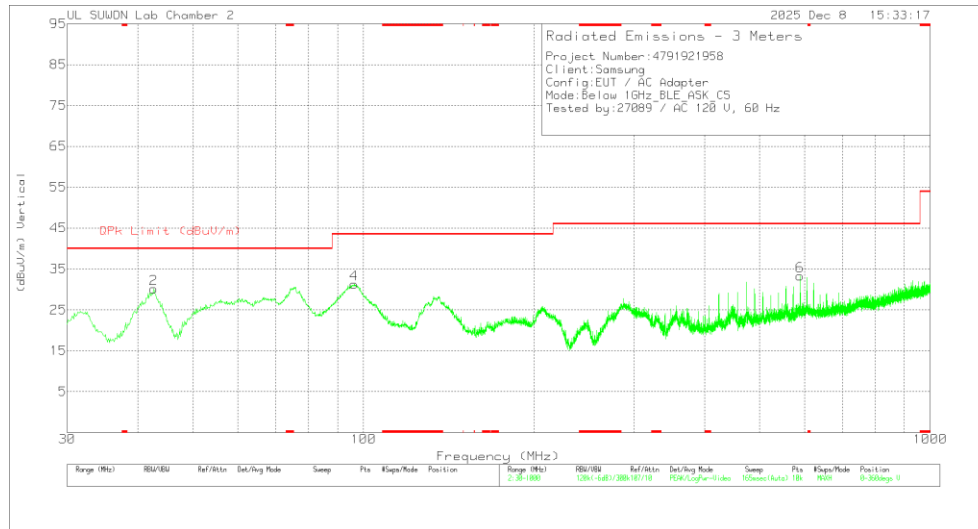
* - indicates frequency in 47 CFR Pt 15 / IC RSS-Restricted Band

PK2 - KDB558074 Method: Maximum Peak

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 Factor (dB/m)	Below_1G_Path Loss(dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	OPK Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 73.068	47.47	Pk	14.3	-31.5	0	30.27	40	-9.73	0-360	100	H
3	103.138	39.65	Pk	17.6	-31.3	0	25.95	43.52	-17.57	0-360	200	H
5	301.309	40.04	Pk	19.1	-30.4	0	28.74	46.02	-17.28	0-360	100	H
2	42.61	42.7	Pk	19.2	-31.7	0	30.2	40	-9.8	0-360	100	V
4	96.251	45.95	Pk	16.8	-31.4	0	31.35	43.52	-12.17	0-360	100	V
6	589.496	38.01	Pk	24.8	-29.5	0	33.31	46.02	-12.71	0-360	100	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.

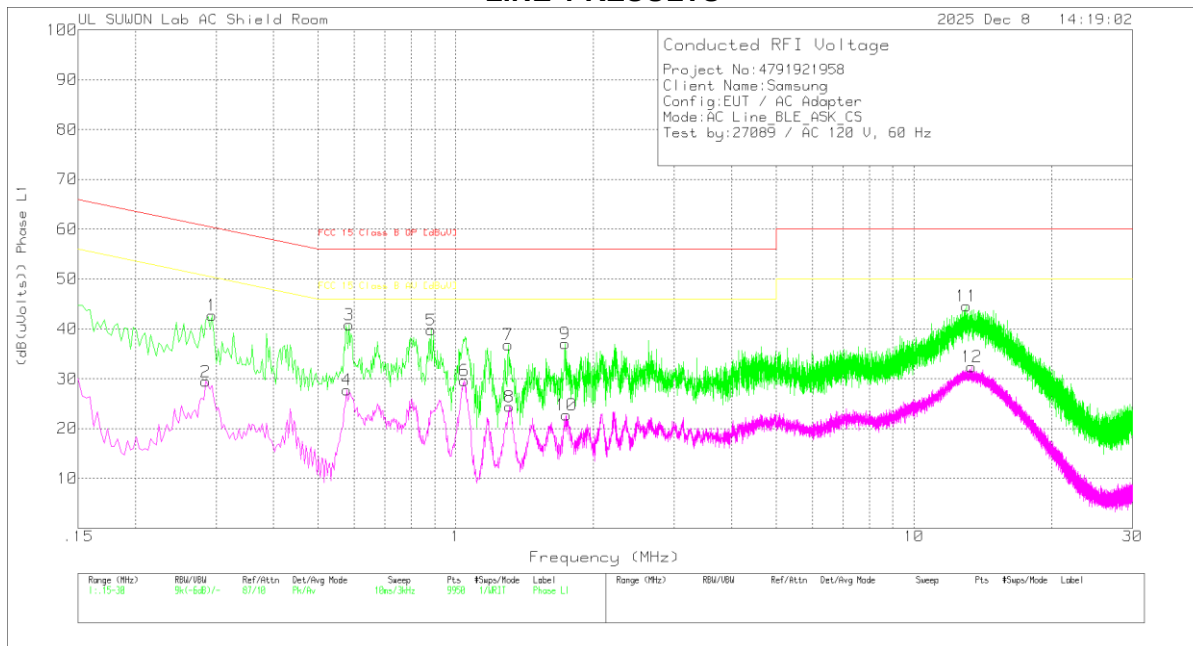
The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

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

RESULTS

11.1. AC Power Line

LINE 1 RESULTS



Trace Markers

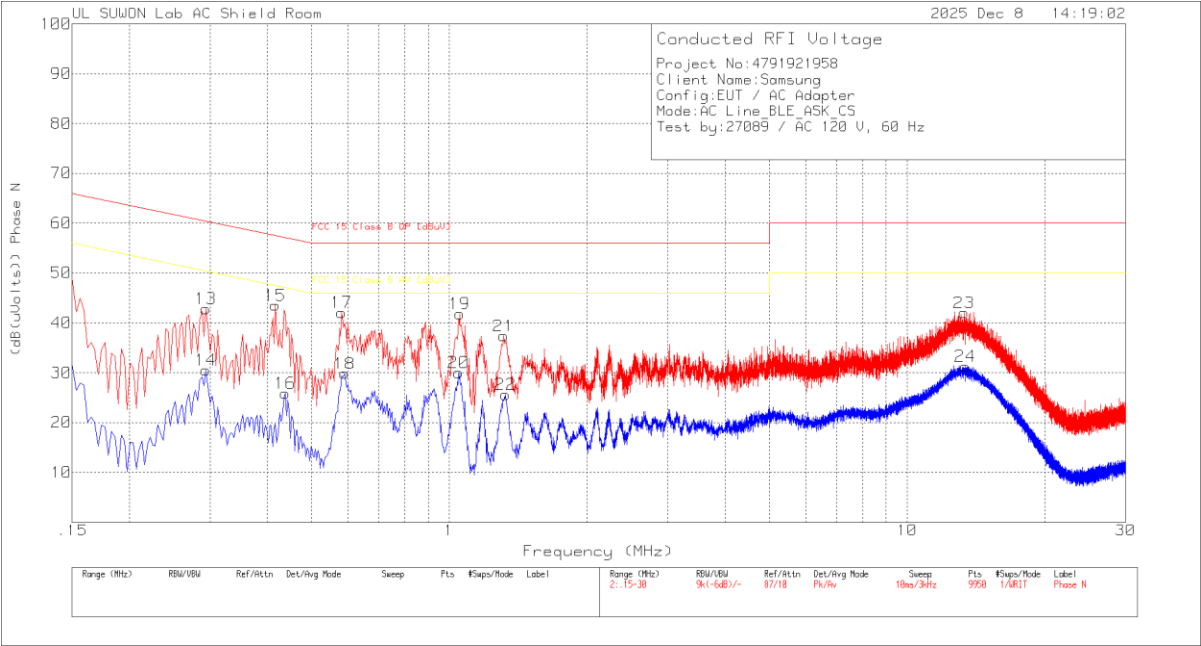
Range 1: Phase L1 .15 - 30MHz

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	.294	32.92	Pk	9.7	.1	42.72	60.41	-17.69	-	-
2	.285	19.65	Av	9.7	.1	29.45	-	-	50.67	-21.22
3	.585	30.93	Pk	9.8	.1	40.83	56	-15.17	-	-
4	.579	17.86	Av	9.8	.1	27.76	-	-	46	-18.24
5	.885	29.86	Pk	9.8	.1	39.76	56	-16.24	-	-
6	1.044	19.84	Av	9.7	.1	29.64	-	-	46	-16.36
7	1.302	27.01	Pk	9.7	.1	36.81	56	-19.19	-	-
8	1.311	14.62	Av	9.7	.1	24.42	-	-	46	-21.58
9	1.731	27.29	Pk	9.7	.1	37.09	56	-18.91	-	-
10	1.743	12.98	Av	9.7	.1	22.78	-	-	46	-23.22
11	13.038	34.29	Pk	10	.3	44.59	60	-15.41	-	-
12	13.38	22.12	Av	10	.3	32.42	-	-	50	-17.58

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_L1 [dB]	Cable Loss [dB]	Corrected Reading [dBuV]	FCC 15 Class B QP [dBuV]	Margin [dB]	FCC 15 Class B AV [dBuV]	Margin [dB]
13	.294	33.05	Pk	9.7	.1	42.85	60.41	-17.56	-	-
14	.294	20.76	Av	9.7	.1	30.56	-	-	50.41	-19.85
15	.417	33.62	Pk	9.8	.1	43.52	57.51	-13.99	-	-
16	.438	15.98	Av	9.8	.1	25.88	-	-	47.1	-21.22
17	.582	32.17	Pk	9.8	.1	42.07	56	-13.93	-	-
18	.591	19.93	Av	9.8	.1	29.83	-	-	46	-16.17
19	1.053	32.03	Pk	9.7	.1	41.83	56	-14.17	-	-
20	1.047	20.24	Av	9.7	.1	30.04	-	-	46	-15.96
21	1.314	27.57	Pk	9.7	.1	37.37	56	-18.63	-	-
22	1.326	15.86	Av	9.7	.1	25.66	-	-	46	-20.34
23	13.311	31.72	Pk	10	.3	42.02	60	-17.98	-	-
24	13.395	20.97	Av	10	.3	31.27	-	-	50	-18.73

Pk - Peak detector
Av - Average detection

END OF TEST REPORT