

CERTIFICATION TEST REPORT

Report Number. : S-4792147575-E10V1

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

Model : SM-F971U, SM-F971U1

FCC ID : A3LSMF971U

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:

2026-04-24

Prepared by:

UL KOREA LTD.

26th floor, 152, Teheran-ro, Gangnam-gu Seoul, 06236, Korea

Suwon Test Site: UL KOREA LTD. Suwon Laboratory

218 Maeyeong-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 16675, Korea

TEL: (031) 337-9902

FAX: (031) 213-5433

Revision History

Rev.	Issue Date	Revisions	Presented By
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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/ax/be, NFC, WPT, UWB and NB-NTN

MODEL: SM-F971U, SM-F971U1

SERIAL NUMBER: 9bb3df7d5d4f7ee (CONDUCTED);
R3GL10KMYCZ, R3GL10KMFCP, R3GL10KMPTN (RADIATED);

DATE TESTED: 2026-03-03 ~ 2026-04-24

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:



Sungeun Lee
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	0.70 dB
Time	0.62 %
Occupied Bandwidth	0.04 %
Hopping Frequency Separation	2.8×10^3 Hz
Frequency Range	6.6×10^3 Hz
Conducted Spurious Emissions	2.00 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	3.78 dB
Radiated Disturbance, 1 GHz to 18 GHz	5.25 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-F971U1
SM-F971U	Hardware	Identical
	Software	The UI changed according to Service Provider.

The SM-F971U 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:

Antenna 1

Frequency Range [MHz]	Mode	Power Mode	Output Power [dBm]	Output Power [mW]
2 404 ~ 2 478	CS_TONE_ASK	Peak	20.10	102.33
		Average	19.47	88.51

Antenna 2

Frequency Range [MHz]	Mode	Power Mode	Output Power [dBm]	Output Power [mW]
2 404 ~ 2 478	CS_TONE_ASK	Peak	20.56	113.76
		Average	19.89	97.50

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:

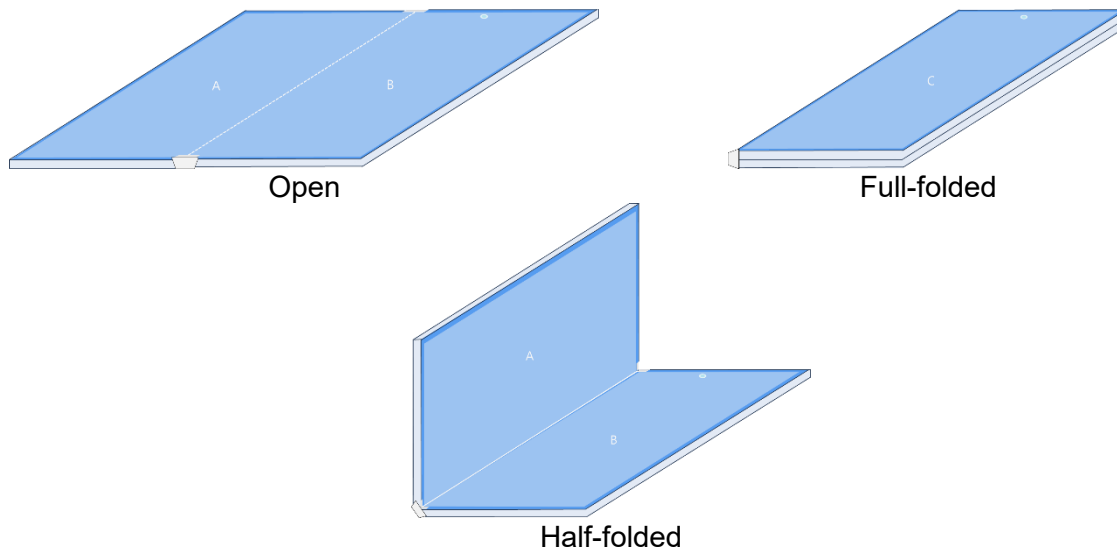
Frequency Band [MHz]	ANT1 Gain [dBi]	ANT2 Gain [dBi]
DSS 2400 – 2483.5	-6.99	-4.25

“SUB1” and “SUB5” 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	DUAL
Axis	Band-Edge	X (Half-Folded)	Z (Open)	X (Open)
	Spurious	X (Open)	Y (Open)	X (Half-Folded)

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

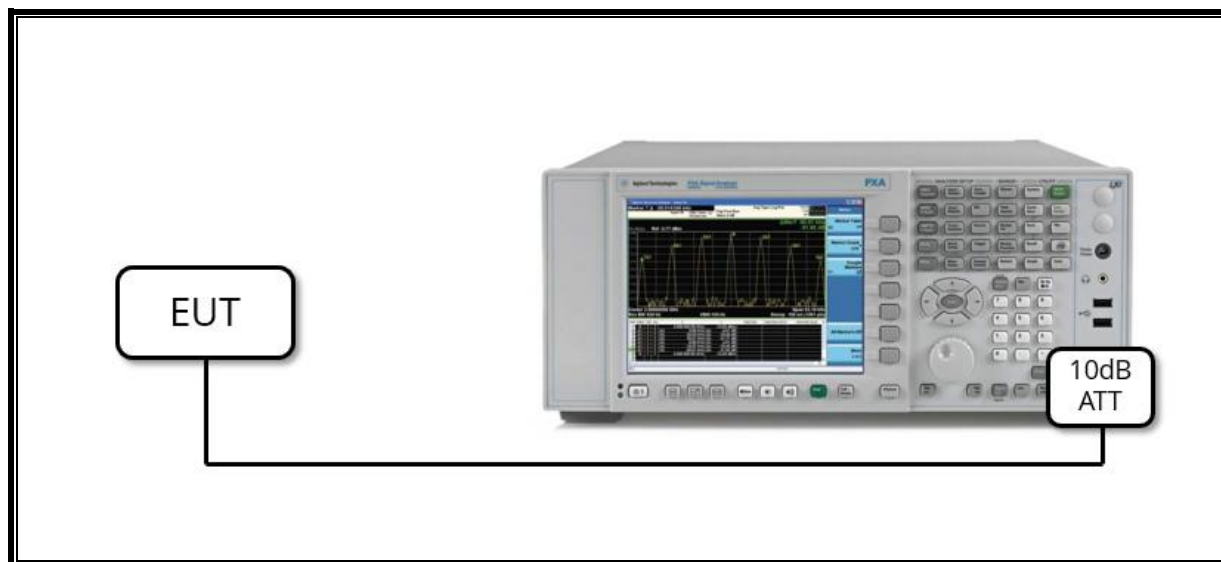
I/O CABLE

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

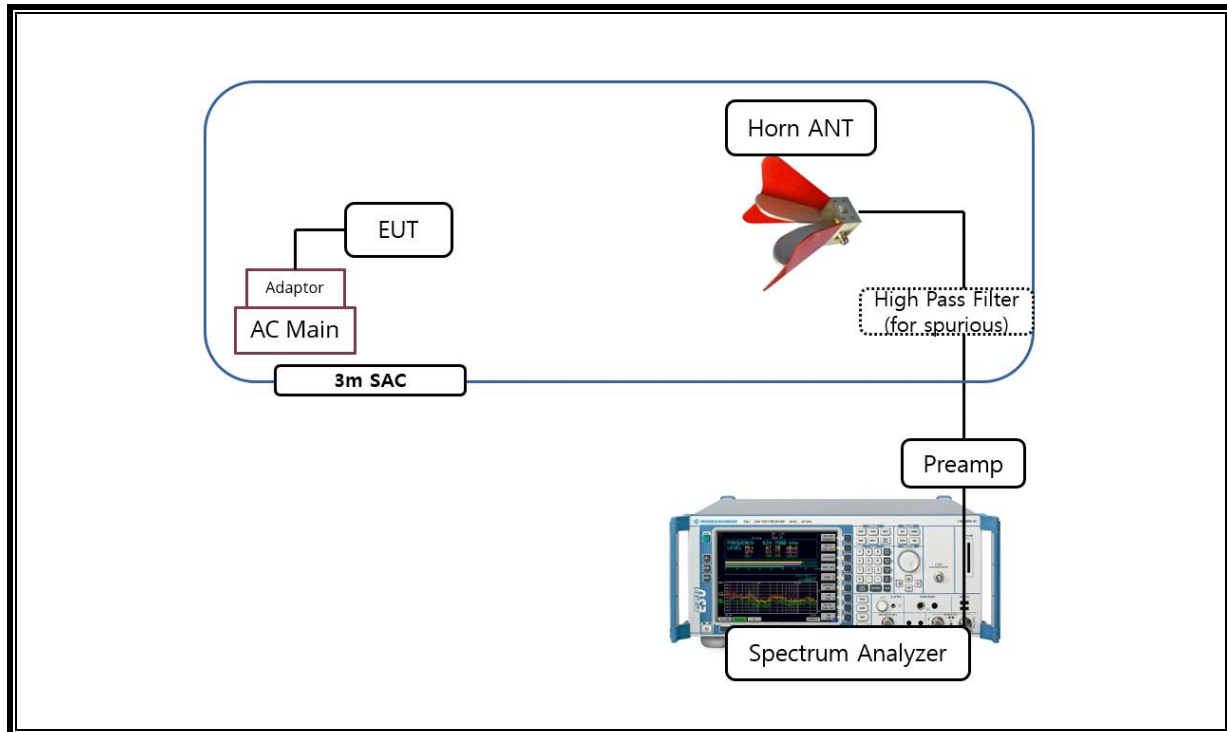
TEST SETUP

The EUT is a stand-alone unit during the tests.
Test software in hidden menu exercised the EUT to enable BLE Channel Sounding mode.

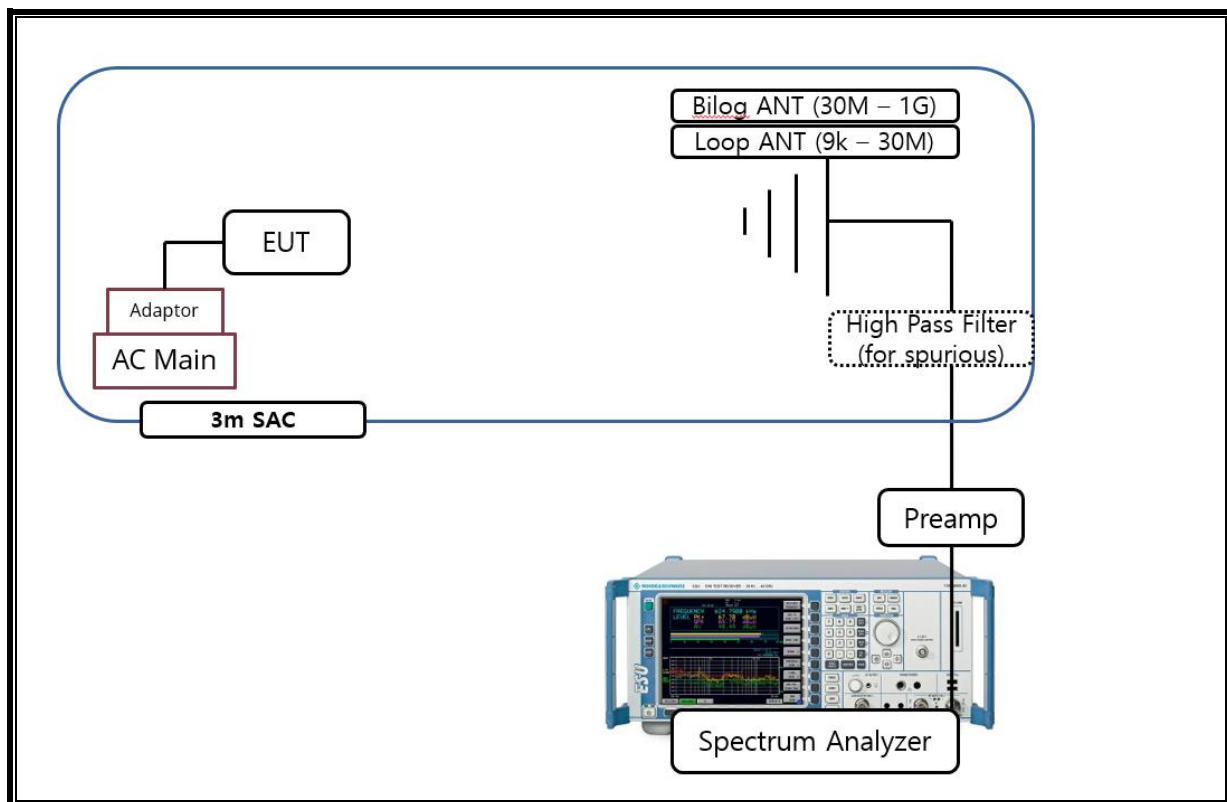
SETUP DIAGRAM FOR TESTS (CONDUCTED TEST SETUP)



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	Agilent / HP	N9030A	MY54490312	2026-12-29
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

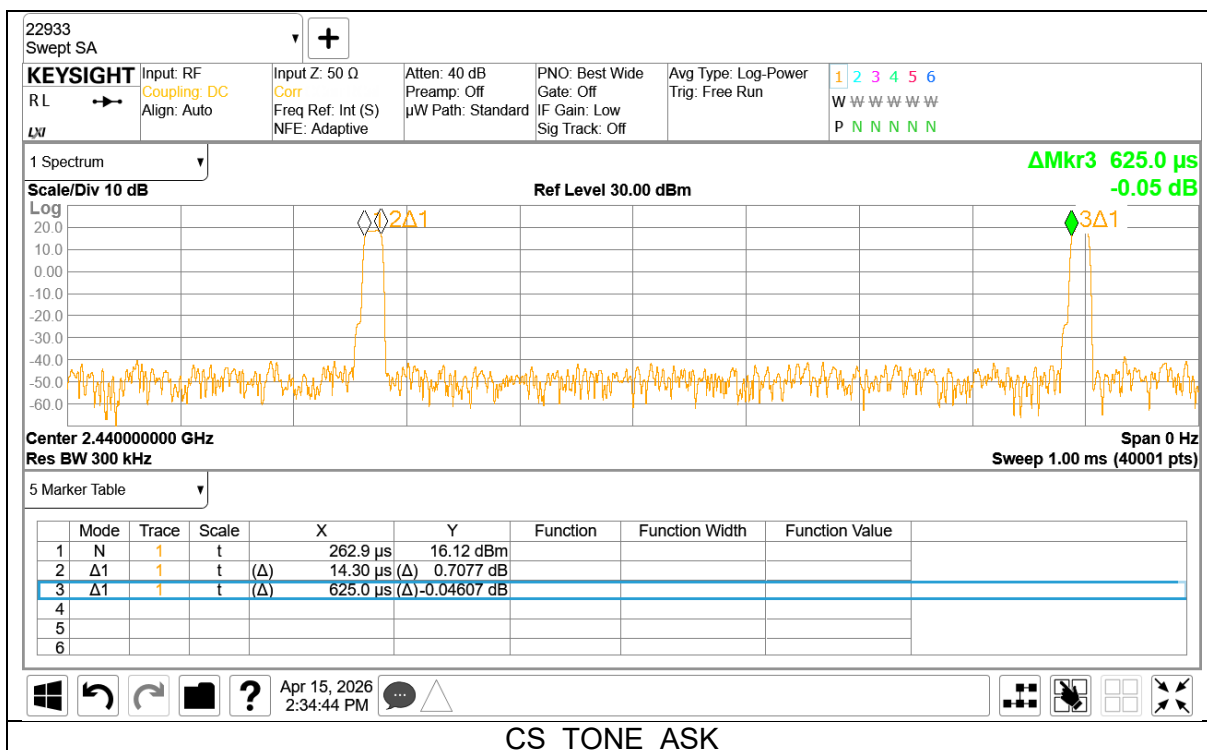
LIMITS

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	14.3	625.0	2.29	69.93

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.

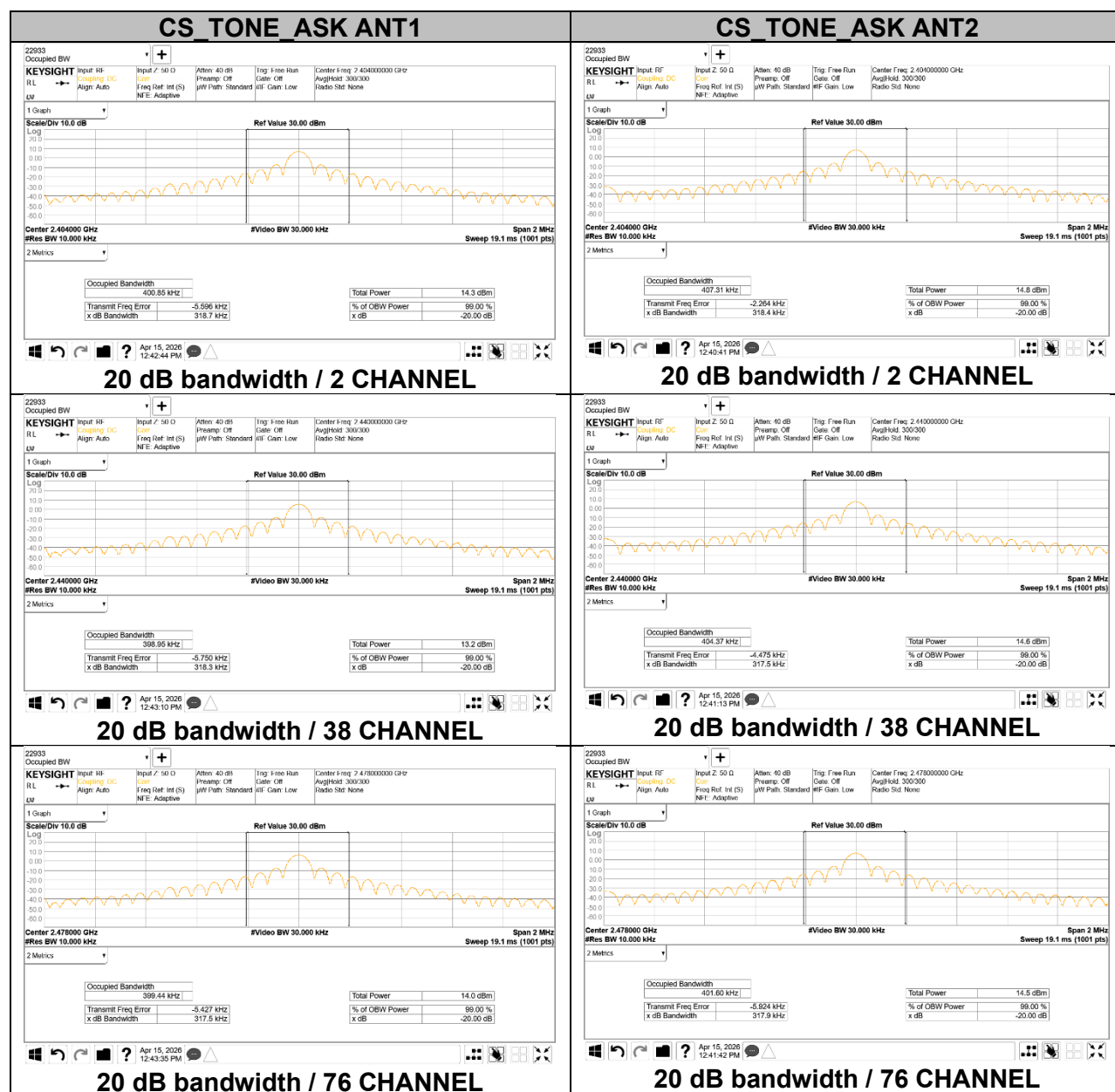
TEST PROCEDURE

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	318.7
	38	2 440	318.3
	76	2 478	317.5
ANT2	2	2 404	318.4
	38	2 440	317.5
	76	2 478	317.9
Worst			318.7



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.

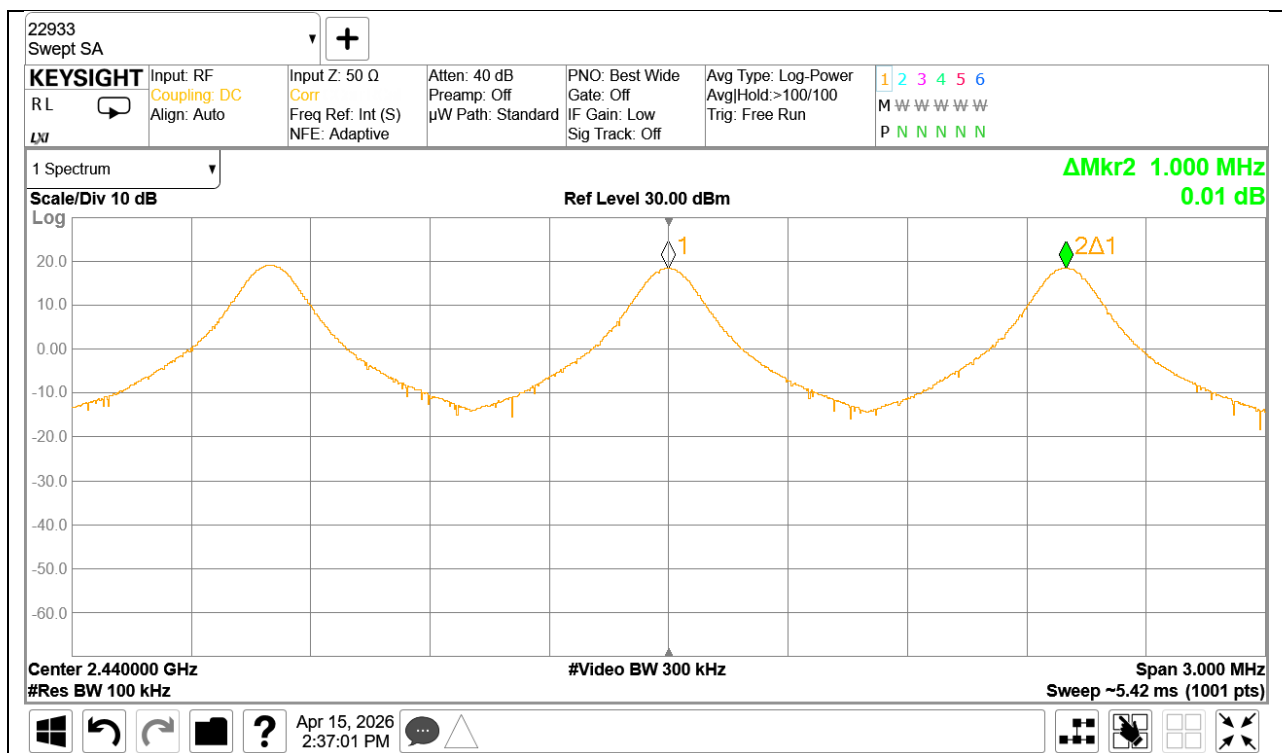
Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than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

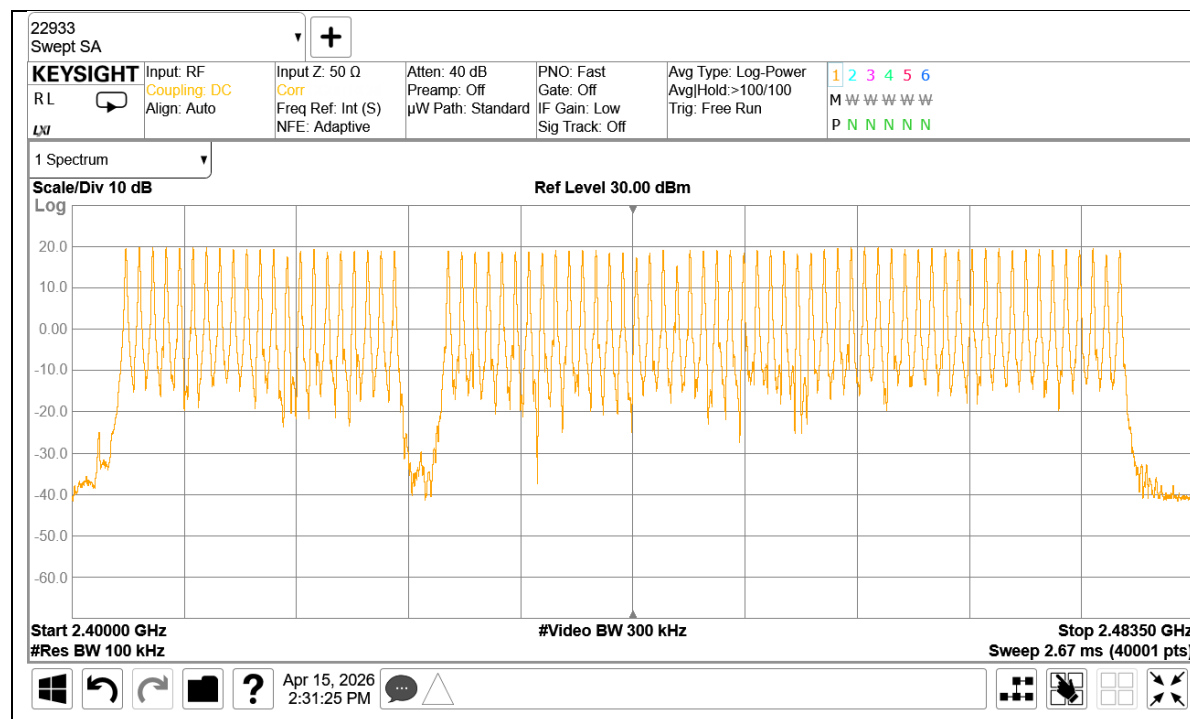
TEST PROCEDURE

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.

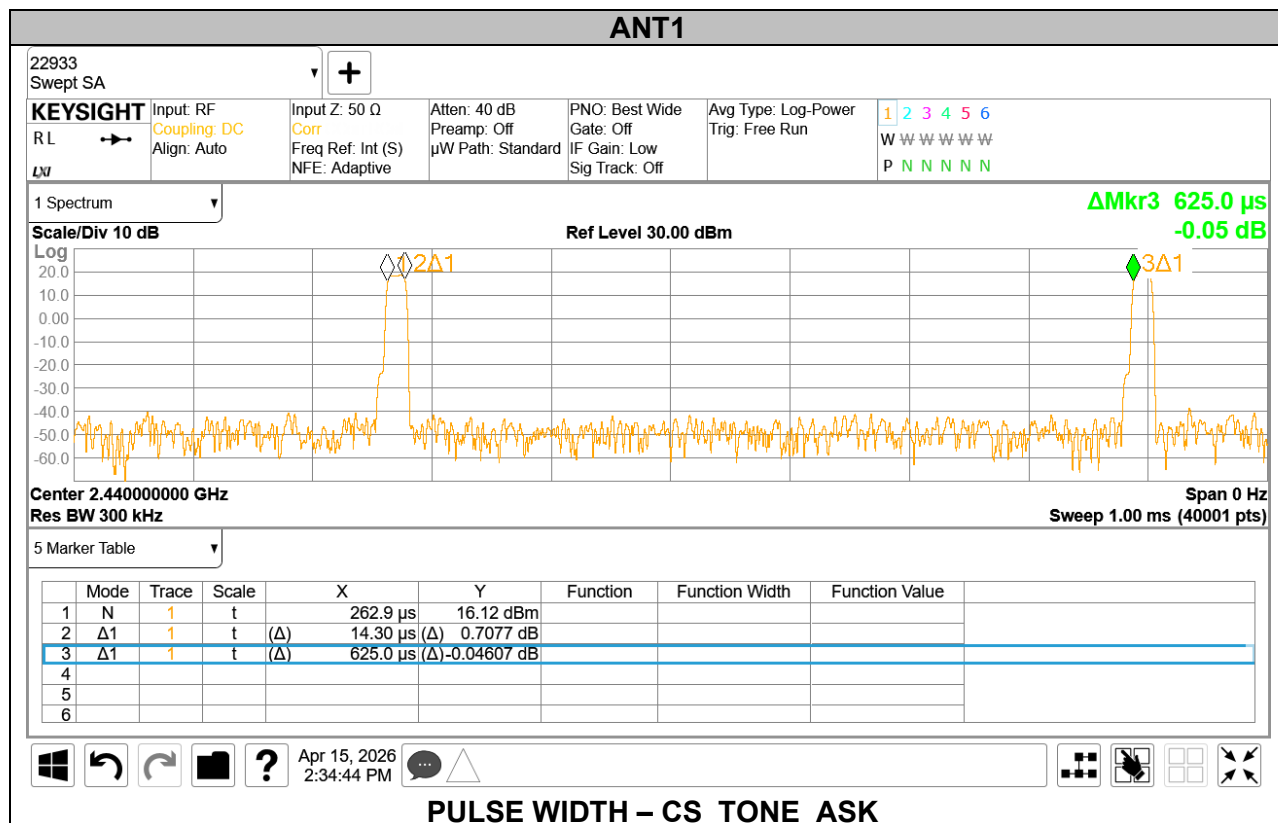
The number of pulses is calculated based on the customer's declared operational cycle, in which CS_TONE_ASK operates twice per 205 ms period on a single channel.

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	0.0143	281	0.040	0.4000	-0.360



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.

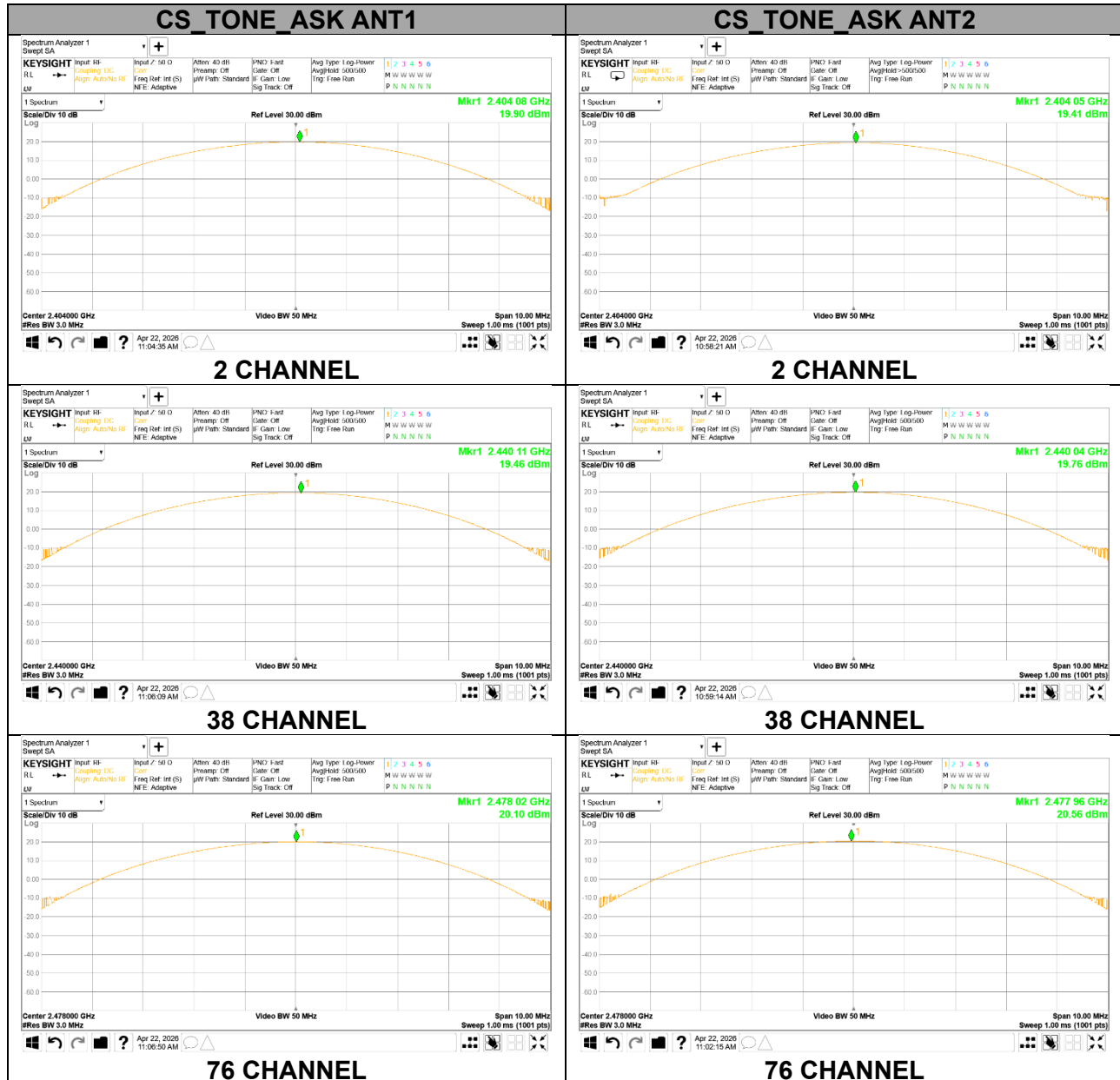
RESULTS

9.6.1. CS TONE ASK MODULATION

Antenna	Channel	Frequency [MHz]	Peak Output Power [dBm]	Limit [dBm]	Margin [dB]
ANT1	2	2 404	19.90	21.00	-1.10
	38	2 440	19.46		-1.54
	76	2 478	20.10		-0.90
ANT2	2	2 404	19.41		-1.59
	38	2 440	19.76		-1.24
	76	2 478	20.56		-0.44
Worst			20.56		-0.44

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	19.223	83.618
	38	2 440	18.849	76.718
	76	2 478	19.467	88.450
ANT2	2	2 404	18.723	74.525
	38	2 440	19.122	81.696
	76	2 478	19.891	97.521

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.

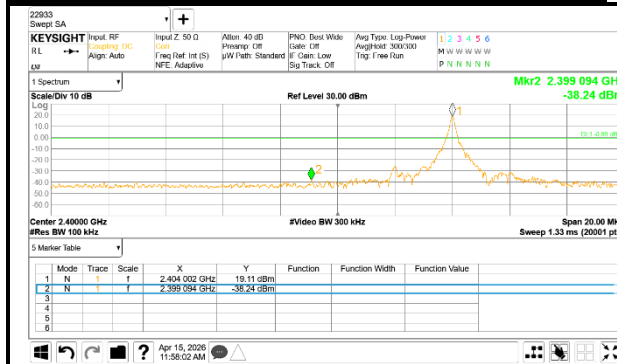
The band-edges at 2.4 and 2.4835 GHz are investigated with the transmitter set to the normal hopping mode.

RESULTS

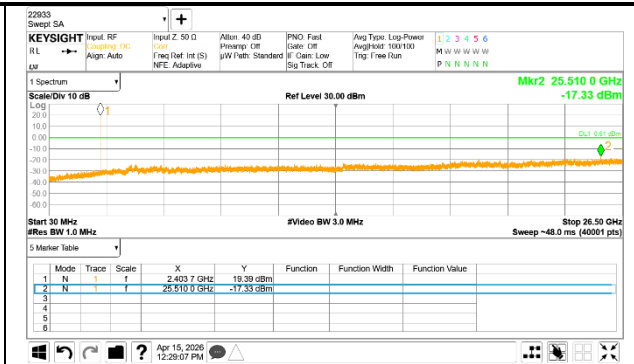
See the next page

9.8.1. CS_TONE_ASK MODULATION

SPURIOUS EMISSIONS, NON-HOPPING – ANT1



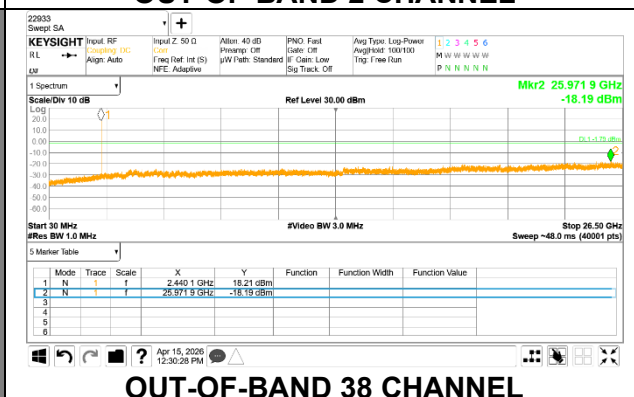
2 CHANNEL BANDEDGE



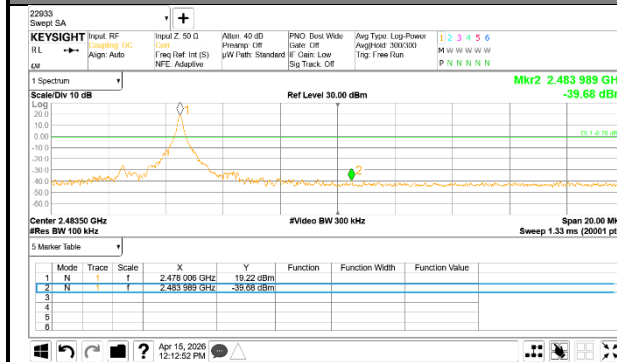
OUT-OF-BAND 2 CHANNEL



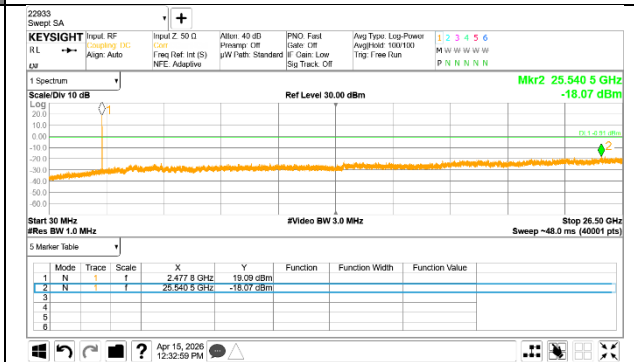
76 CHANNEL BANDEDGE



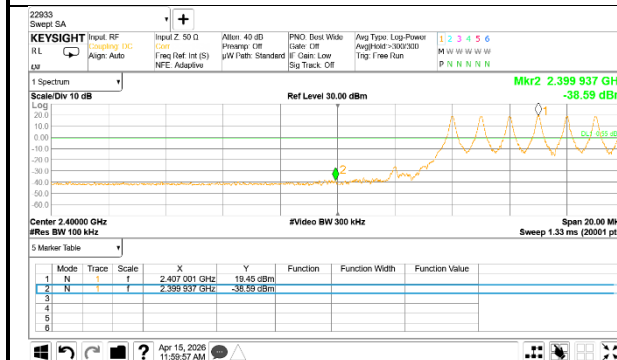
OUT-OF-BAND 38 CHANNEL



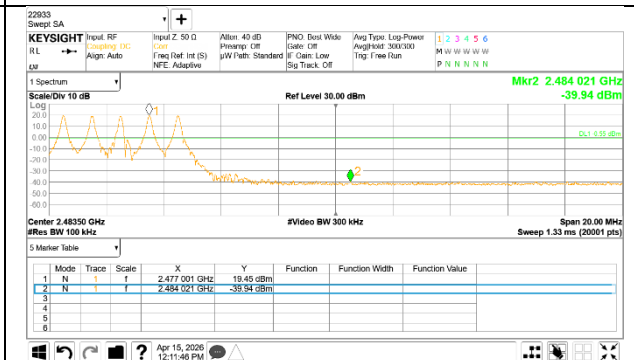
76 CHANNEL BANDEDGE



OUT-OF-BAND 76 CHANNEL

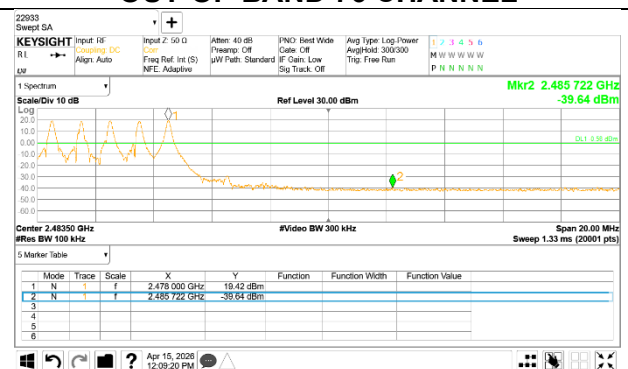
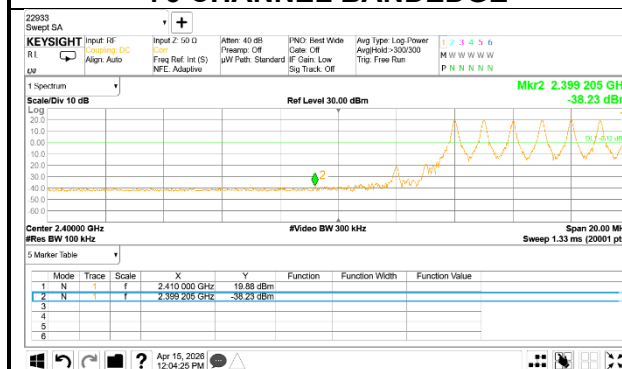
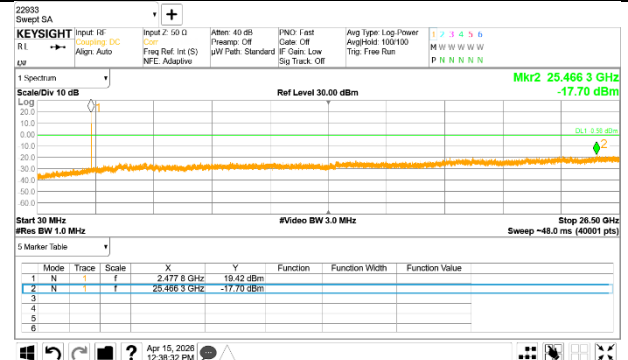
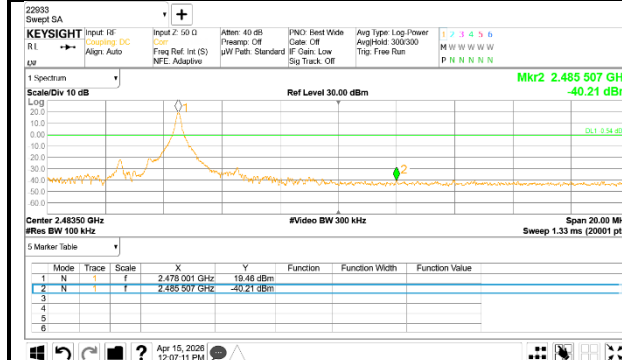
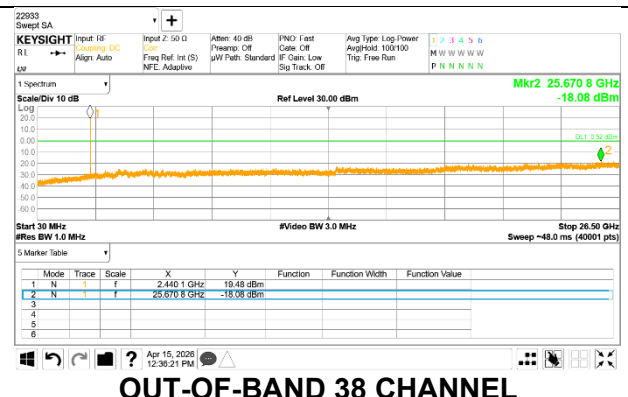
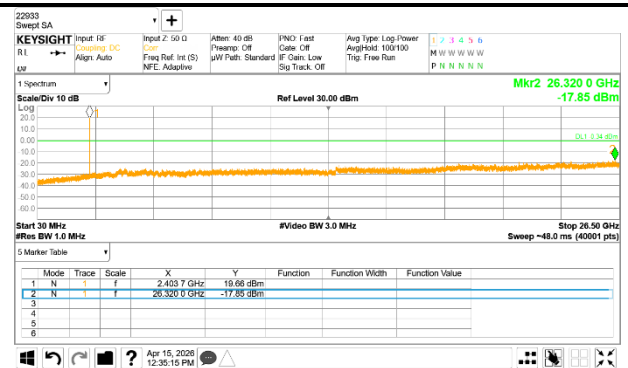
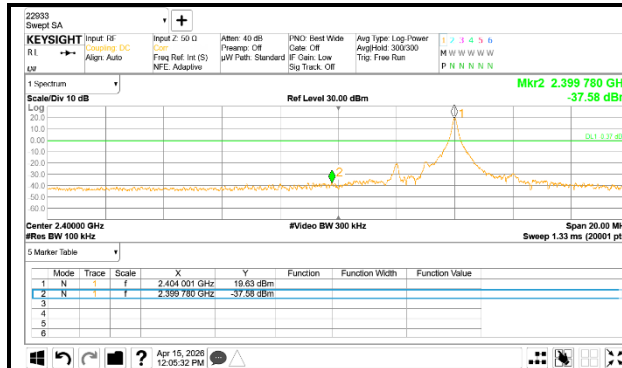


HOPPING MODE - LOW BANDEDGE



HOPPING MODE - LOW BANDEDGE

SPURIOUS EMISSIONS, NON-HOPPING – 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

$$20 \cdot \log(0.000143) = -76.89 \text{ dB}$$

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.

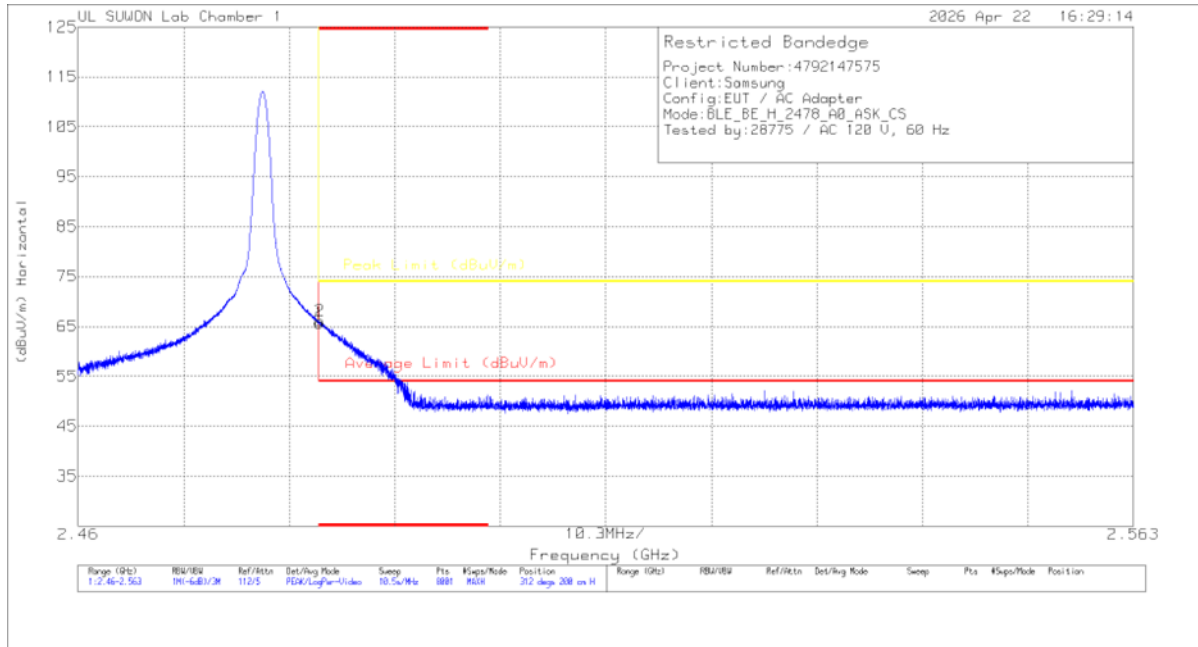
Although these tests were performed other than open field test site, adequate comparison measurements were confirmed against 30 m open are test site.
Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the one of tests made in an open field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

10.1. TRANSMITTER ABOVE 1 GHz

10.1.1. CS_TONE_ASK MODULATION

BANDEDGE (WORST CASE: 76 CHANNEL, ANT 1)

HORIZONTAL RESULT



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	Antenna_Factor (dB/m)	10dB_Path 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	* 2.48351	59.94	Pk	32	-26.2	65.74	-	-	74	-8.26	312	200	H
2	* 2.48361	60.32	Pk	32	-26.2	66.12	-	-	74	-7.88	312	200	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]	Result [dBuV/m]	AV Limit [dBuV/m]	AV Margin [dB]	PK Limit [dBuV/m]	PK Margin [dB]	Azimuth [Degs]	Height [cm]	Polarity
2404	ANT1	* 2.39	48.77	Pk	31.70	-26.20	54.27	-	-	74.00	-19.73	247	167	H
		* 2.38988	50.13	Pk	31.70	-26.20	55.63	-	-	74.00	-18.37	247	167	H
		* 2.39	47.57	Pk	31.70	-26.20	53.07	-	-	74.00	-20.93	216	254	V
		* 2.38886	49.75	Pk	31.70	-26.20	55.25	-	-	74.00	-18.75	216	254	V
2478	ANT1	* 2.48351	59.94	Pk	32.00	-26.20	65.74	-	-	74.00	-8.26	312	200	H
		* 2.48361	60.32	Pk	32.00	-26.20	66.12	-	-	74.00	-7.88	312	200	H
		* 2.48351	58.77	Pk	32.00	-26.20	64.57	-	-	74.00	-9.43	249	264	V
		* 2.48357	59.30	Pk	32.00	-26.20	65.10	-	-	74.00	-8.90	249	264	V

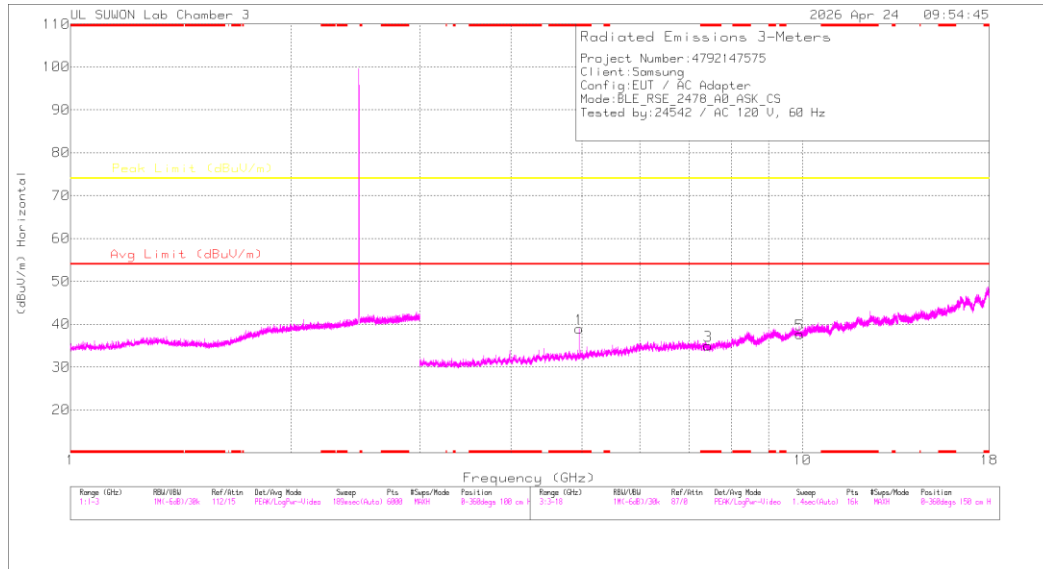
Freq. [MHz]	Antenna	Frequency [GHz]	Reading [dBuV]	Detector Mode	ANT Factor [dB/m]	Loss [dB]	Result [dBuV/m]	AV Limit [dBuV/m]	AV Margin [dB]	PK Limit [dBuV/m]	PK Margin [dB]	Azimuth [Degs]	Height [cm]	Polarity
2404	ANT2	* 2.39	51.48	Pk	31.70	-26.20	56.98	-	-	74.00	-17.02	227	220	H
		* 2.38997	52.71	Pk	31.70	-26.20	58.21	-	-	74.00	-15.79	227	220	H
		* 2.39	50.54	Pk	31.70	-26.20	56.04	-	-	74.00	-17.96	264	351	V
		* 2.38988	53.05	Pk	31.70	-26.20	58.55	-	-	74.00	-15.45	264	351	V
2478	ANT2	* 2.48351	55.74	Pk	32.00	-26.20	61.54	-	-	74.00	-12.46	144	253	H
		* 2.4836	56.11	Pk	32.00	-26.20	61.91	-	-	74.00	-12.09	144	253	H
		* 2.48351	55.06	Pk	32.00	-26.20	60.86	-	-	74.00	-13.14	132	374	V
		* 2.48356	56.12	Pk	32.00	-26.20	61.92	-	-	74.00	-12.08	132	374	V

Note1. Pk - Peak detector

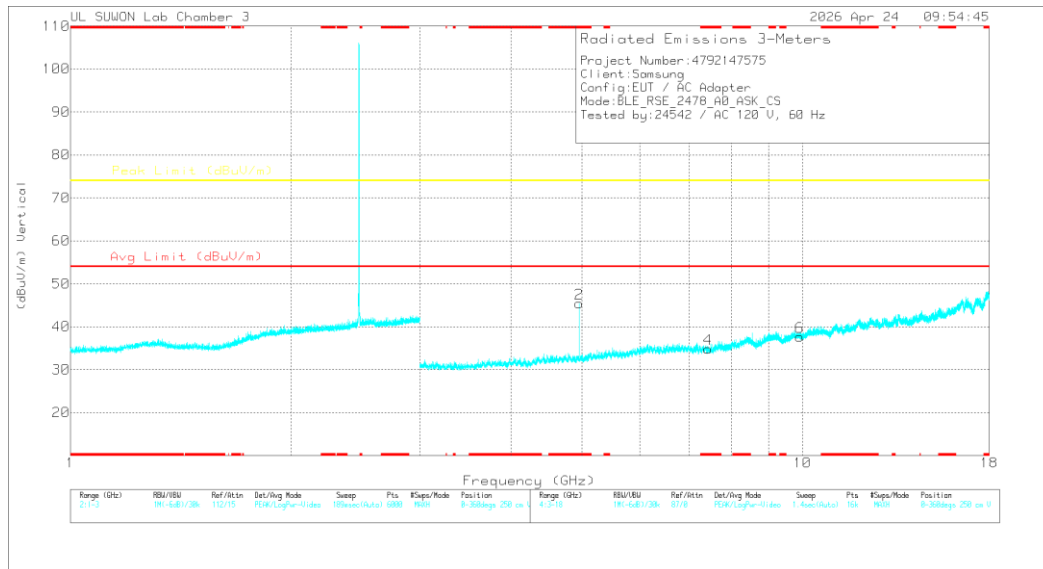
Note2. * - indicates frequency in 47 CFR Pt 15 / IC RSS-Restricted Band

HARMONICS AND SPURIOUS EMISSIONS (WORST CASE – ANT 1)

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 (dBm)	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
* 4.95612	44.73	PK2	34.3	-30.5	0	48.53	-	-	74	-25.47	337	118	H
* 4.95602	46.91	PK2	34.3	-30.5	0	50.71	-	-	74	-23.29	178	125	V
* 7.43447	34.07	PK2	35.7	-25	0	44.77	-	-	74	-29.23	0	100	H
* 7.43309	34.15	PK2	35.7	-24.9	0	44.95	-	-	74	-29.05	0	100	V
9.91078	32.7	PK2	37.1	-21.4	0	48.4	-	-	74	-25.6	0	100	H
9.91169	32.84	PK2	37.1	-21.4	0	48.54	-	-	74	-25.46	0	100	V

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

HARMONICS AND SPURIOUS EMISSIONS TEST DATA

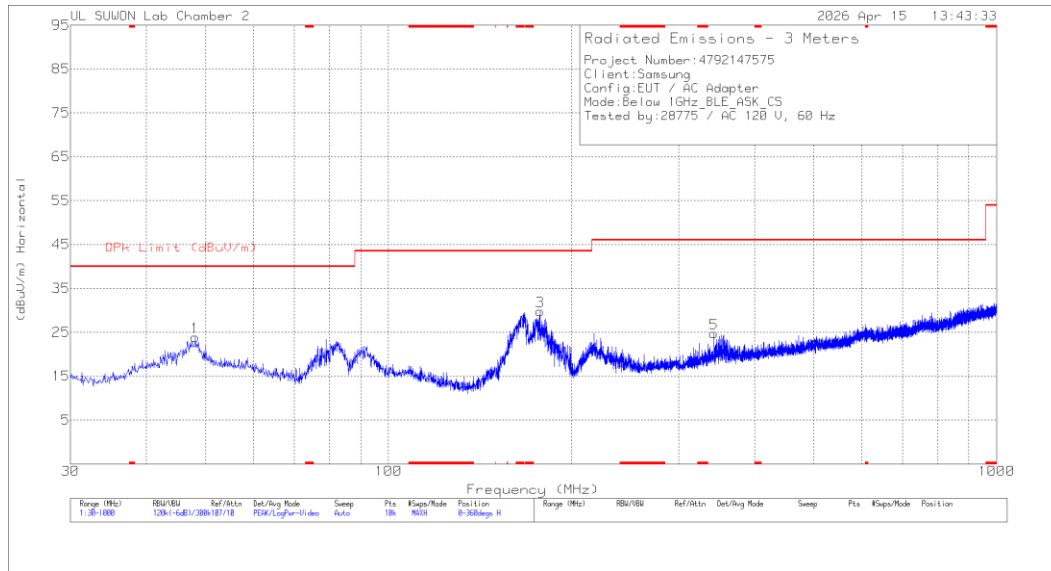
Freq. [MHz]	Antenna	Frequency [GHz]	Reading [dBuV]	Detector Mode	ANT Factor [dB/m]	Loss [dB]	DC Corr [dB]	Result [dBuV/m]	AV Limit [dBuV/m]	AV Margin [dB]	PK Limit [dBuV/m]	PK Margin [dB]	Azimuth [Degs]	Height [cm]	Polarity
2404	ANT1	* 4.80805	41.82	PK2	34.30	-30.10	0.00	46.02	-	-	74.00	-27.98	303	282	H
		* 4.80791	44.77	PK2	34.30	-30.10	0.00	48.97	-	-	74.00	-25.03	157	100	V
		7.213	35.27	PK2	35.80	-25.70	0.00	45.37	-	-	74.00	-28.63	0	100	H
		7.214	34.44	PK2	35.80	-25.70	0.00	44.54	-	-	74.00	-29.46	0	100	V
		9.615	32.68	PK2	36.70	-21.70	0.00	47.68	-	-	74.00	-26.32	0	100	H
		9.615	32.60	PK2	36.70	-21.70	0.00	47.60	-	-	74.00	-26.40	0	100	V
2440	ANT1	* 4.87995	42.76	PK2	34.20	-30.80	0.00	46.16	-	-	74.00	-27.84	0	150	H
		* 4.88005	46.43	PK2	34.20	-30.80	0.00	49.83	-	-	74.00	-24.17	163	108	V
		* 7.31925	34.65	PK2	35.80	-25.30	0.00	45.15	-	-	74.00	-28.85	0	100	H
		* 7.31768	34.87	PK2	35.80	-25.30	0.00	45.37	-	-	74.00	-28.63	0	100	V
		9.760	32.22	PK2	36.90	-21.30	0.00	47.82	-	-	74.00	-26.18	0	100	H
		9.760	32.86	PK2	36.90	-21.30	0.00	48.46	-	-	74.00	-25.54	0	100	V
2478	ANT1	* 4.95612	44.73	PK2	34.30	-30.50	0.00	48.53	-	-	74.00	-25.47	337	118	H
		* 4.95602	46.91	PK2	34.30	-30.50	0.00	50.71	-	-	74.00	-23.29	178	125	V
		* 7.43447	34.07	PK2	35.70	-25.00	0.00	44.77	-	-	74.00	-29.23	0	100	H
		* 7.43309	34.15	PK2	35.70	-24.90	0.00	44.95	-	-	74.00	-29.05	0	100	V
		9.911	32.70	PK2	37.10	-21.40	0.00	48.40	-	-	74.00	-25.60	0	100	H
		9.912	32.84	PK2	37.10	-21.40	0.00	48.54	-	-	74.00	-25.46	0	100	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	* 4.80659	38.82	PK2	34.30	-30.10	0.00	43.02	-	-	74.00	-30.98	119	109	H
		* 4.80429	39.23	PK2	34.30	-30.10	0.00	43.43	-	-	74.00	-30.57	156	255	V
		7.211	34.54	PK2	35.80	-25.80	0.00	44.54	-	-	74.00	-29.46	0	100	H
		7.216	34.64	PK2	35.80	-25.80	0.00	44.64	-	-	74.00	-29.36	0	100	V
		9.617	33.14	PK2	36.70	-21.70	0.00	48.14	-	-	74.00	-25.86	0	100	H
		9.614	32.80	PK2	36.70	-21.70	0.00	47.80	-	-	74.00	-26.20	0	100	V
2440	ANT2	* 4.88066	39.20	PK2	34.20	-30.80	0.00	42.60	-	-	74.00	-31.40	136	128	H
		* 4.88092	39.33	PK2	34.20	-30.80	0.00	42.73	-	-	74.00	-31.27	181	263	V
		* 7.31902	34.50	PK2	35.80	-25.30	0.00	45.00	-	-	74.00	-29.00	0	100	H
		* 7.31753	35.15	PK2	35.80	-25.30	0.00	45.65	-	-	74.00	-28.35	0	100	V
		9.762	32.58	PK2	36.90	-21.40	0.00	48.08	-	-	74.00	-25.92	0	100	H
		9.760	32.98	PK2	36.90	-21.30	0.00	48.58	-	-	74.00	-25.42	0	100	V
2478	ANT2	* 4.95654	38.90	PK2	34.30	-30.40	0.00	42.80	-	-	74.00	-31.20	127	196	H
		* 4.95621	38.78	PK2	34.30	-30.50	0.00	42.58	-	-	74.00	-31.42	176	121	V
		* 7.43819	34.97	PK2	35.70	-24.90	0.00	45.77	-	-	74.00	-28.23	0	100	H
		* 7.4358	34.65	PK2	35.70	-24.90	0.00	45.45	-	-	74.00	-28.55	0	100	V
		9.912	33.22	PK2	37.10	-21.40	0.00	48.92	-	-	74.00	-25.08	0	100	H
		9.911	33.09	PK2	37.10	-21.40	0.00	48.79	-	-	74.00	-25.21	0	100	V

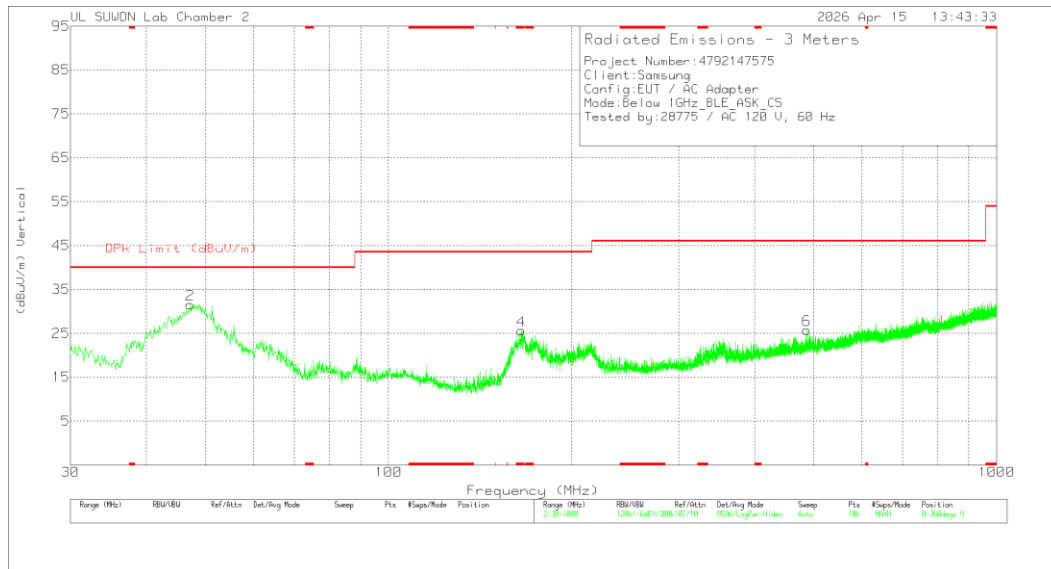
* - indicates frequency in 47 CFR Pt 15 / IC RSS-Restricted Band

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)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	48.139	35.74	Pk	19.8	-31.7	23.84	40	-16.16	0-360	200	H
3	177.44	45.61	Pk	15	-30.8	29.81	43.52	-13.71	0-360	100	H
5	342.631	34.41	Pk	20.5	-30.2	24.71	46.02	-21.31	0-360	100	H
2	47.169	43.62	Pk	19.7	-31.8	31.52	40	-8.48	0-360	100	V
4	* 165.412	42.09	Pk	14.4	-30.9	25.59	43.52	-17.93	0-360	100	V
6	486.967	32.81	Pk	22.7	-29.7	25.81	46.02	-20.21	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.

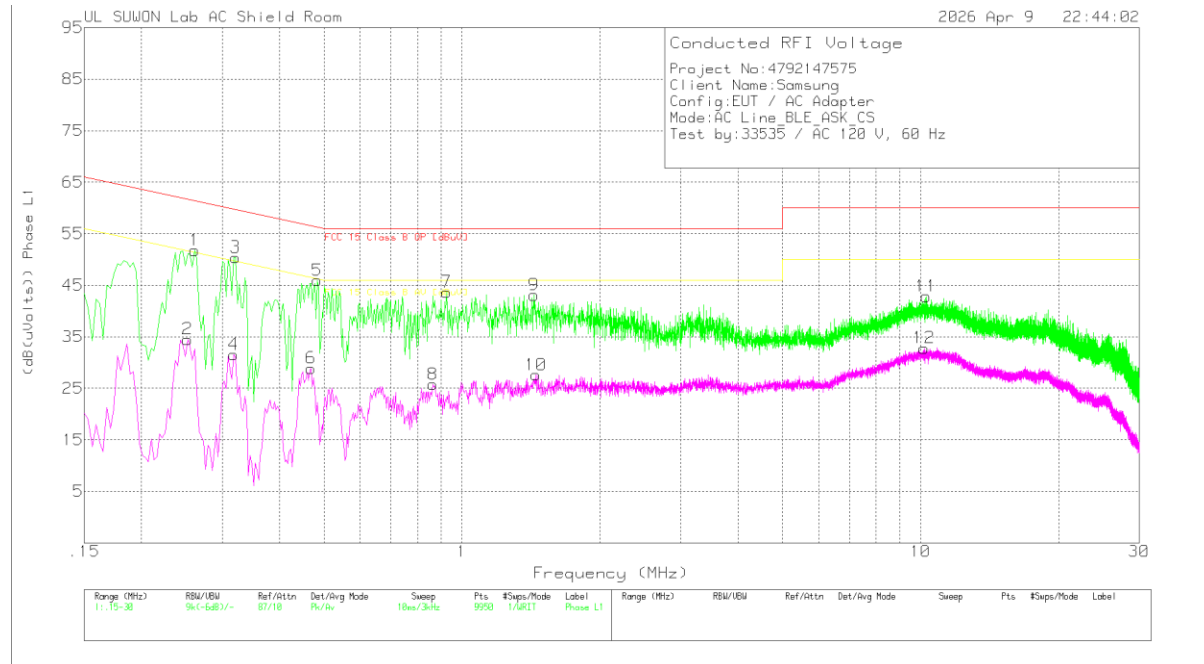
The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

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_Wit h EX_L1 [dB]	Cable Loss [dB]	Corrected Reading (dB(uVolts))	FCC 15 Class B QP [dBuV]	Margin (dB)	FCC 15 Class B AV [dBuV]	Margin (dB)
1	.261	42.08	Pk	9.6	.1	51.78	61.4	-9.62	-	-
2	.252	24.82	Av	9.6	.1	34.52	-	-	51.69	-17.17
3	.321	40.61	Pk	9.7	.1	50.41	59.68	-9.27	-	-
4	.318	21.76	Av	9.7	.1	31.56	-	-	49.76	-18.2
5	.483	35.96	Pk	9.9	.1	45.96	56.29	-10.33	-	-
6	.468	18.9	Av	9.9	.1	28.9	-	-	46.55	-17.65
7	.927	33.74	Pk	9.8	.1	43.64	56	-12.36	-	-
8	.864	15.86	Av	9.8	.1	25.76	-	-	46	-20.24
9	1.437	33.31	Pk	9.7	.1	43.11	56	-12.89	-	-
10	1.449	17.8	Av	9.7	.1	27.6	-	-	46	-18.4
11	10.293	32.75	Pk	9.9	.2	42.85	60	-17.15	-	-
12	10.179	22.71	Av	9.9	.2	32.81	-	-	50	-17.19

Pk - Peak detector

Qp - Quasi-Peak detector

Av - Average detection

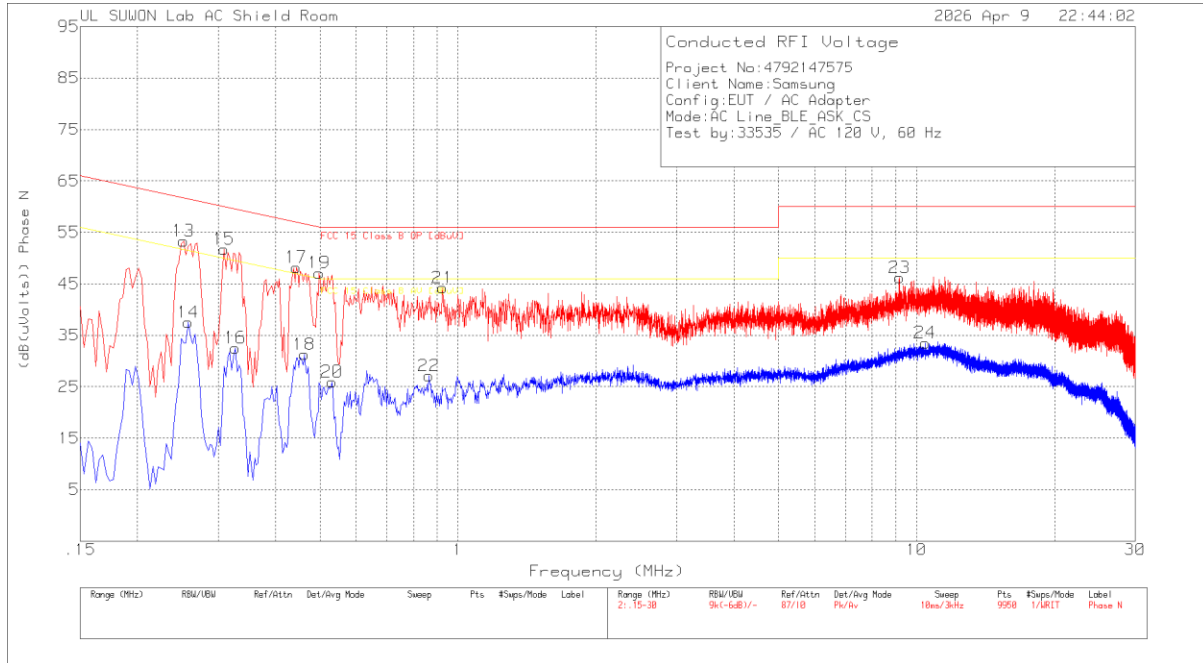
Quasi-Peak Emissions

Range 1: Phase L1 .15 - 30MHz

Frequency (MHz)	Meter Reading (dBuV)	Det	101836_Wit h EX_L1 [dB]	Cable Loss [dB]	Corrected Reading (dB(uVolts))	FCC 15 Class B QP [dBuV]	Margin (dB)	FCC 15 Class B AV [dBuV]	Margin (dB)
.26025	35.7	Qp	9.6	.1	45.4	61.42	-16.02	-	-
.32025	26.41	Qp	9.7	.1	36.21	59.7	-23.49	-	-

Qp - Quasi-Peak detector

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 (dB(uVolts))	FCC 15 Class B QP [dBuV]	Margin (dB)	FCC 15 Class B AV [dBuV]	Margin (dB)
13	.252	43.61	Pk	9.6	.1	53.31	61.69	-8.38	-	-
14	.258	27.8	Av	9.6	.1	37.5	-	-	51.5	-14
15	.309	41.94	Pk	9.7	.1	51.74	60	-8.26	-	-
16	.327	22.74	Av	9.7	.1	32.54	-	-	49.53	-16.99
17	.444	38.28	Pk	9.8	.1	48.18	56.99	-8.81	-	-
18	.462	21.36	Av	9.8	.1	31.26	-	-	46.66	-15.4
19	.498	37.11	Pk	9.9	.1	47.11	56.03	-8.92	-	-
20	.531	15.92	Av	9.9	.1	25.92	-	-	46	-20.08
21	.927	34.33	Pk	9.8	.1	44.23	56	-11.77	-	-
22	.864	17.23	Av	9.8	.1	27.13	-	-	46	-18.87
23	9.186	36.08	Pk	9.9	.2	46.18	60	-13.82	-	-
24	10.446	23.43	Av	9.9	.2	33.53	-	-	50	-16.47

Pk - Peak detector

Qp - Quasi-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 (dB(uVolts))	FCC 15 Class B QP [dBuV]	Margin (dB)	FCC 15 Class B AV [dBuV]	Margin (dB)
.25275	39.71	Qp	9.6	.1	49.41	61.67	-12.26	-	-
.30825	39.19	Qp	9.7	.1	48.99	60.02	-11.03	-	-
.44475	18.36	Qp	9.8	.1	28.26	56.97	-28.71	-	-
.49815	28.1	Qp	9.9	.1	38.1	56.03	-17.93	-	-

Qp - Quasi-Peak detector

END OF TEST REPORT