

CERTIFICATION TEST REPORT

Report Number. : S-4791963822-E13V2

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

Model : SM-F968U1

FCC ID : A3LSMF968U

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

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

Date Of Issue:

2025-11-27

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Revision History

Rev.	Issue Date	Revisions	Revised By
V1	2025-11-17	Initial issue	SunGeun Lee
V2	2025-11-27	Updated to address TCB's question	SunGeun Lee

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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 and UWB

MODEL NUMBER: SM-F968U1

SERIAL NUMBER: R3CY20KCFQD, R3CY20KCFYM (RADIATED);

DATE TESTED: 2025-10-17 ~ 2025-11-05

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
47 CFR Part 15 Subpart F	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. SUMMARY TABLE

FCC Part Section	Test Description	Test Limit	Test Condition	Test Result
15.503(a)	10 dB Bandwidth	> 500 MHz	Radiated	Complies
15.519(e) 15.521(g)	Maximum Peak Power Spectral Density	< 0 dBm e.i.r.p. in 50 MHz BW		Complies
15.519(c)	Radiated Emissions Above 960 MHz	Refer to the table in 15.519(c) for details		Complies
15.519(d)	Radiated Emissions in the 1164 - 1240 MHz and 1559 - 1610 MHz GPS Bands	Refer to the table in 15.519(d) for details		Complies
15.209	Radiated Emissions Below 960 MHz	Emissions in restricted bands must meet the radiated limits detailed in 15.209		Complies
15.207(a)	AC Power Line conducted emissions	< FCC Part 15.207 limits	Power Line conducted	Complies
15.519 (a)(1)	Shutdown Timing Requirements	< 10s	Radiated	Complies

3. TEST METHODOLOGY

1. FCC 47 CFR Part 2.
2. FCC 47 CFR Part 15.
3. ANSI C63.10-2020.
4. KDB 393764 D01 UWB FAQ v02r01

4. 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>.

5. CALIBRATION AND UNCERTAINTY

5.1. MEASURING INSTRUMENT CALIBRATION

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.

5.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

EIRP (dBm)

= Measured Voltage (dBuV) – 107 dB + Conversion Factor (dB) + Antenna Factor (dB/m)
+ Total Loss [Cable Loss (dB) – Preamp Gain (dB)]

EIRP (dBm)

= -1.92 dBm = 87.13 dBuV – 107 dB + 11.80 dB + 35.40 dB/m – 29.25 dB

Conversion Factor:

P (dBm EIRP) = E (dBuV/m) – 95.2 dB

P (dBm EIRP) = E (dBuV) – 107 dB

E (dBuV) - E (dBuV/m) = 11.80 dB

5.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Time	0.60 %
Occupied Bandwidth	0.04 %
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%.

5.4. DECISION RULE

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

6. EQUIPMENT UNDER TEST

6.1. 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 and UWB. This test report addresses the UWB operational mode.

The EUT is a UWB transceiver with 1 TX antenna (Ant 0) installed in a smart phone host and operates on 6.5 GHz (Channel 5) and 8 GHz (Channel 9). Three signal configurations (CONFIG SP0, SP1, SP3) are available for each ANT/CH setting. CONFIG 2 is not supported.

Preamble ID (BPRF: 9 – 24 / HPRF: 25 – 32): BPRF: 9 / HPRF: 25

ANT	Channel	CONFIG	PRF Mode	Packet Length
Ant 0	5	SP0	BPRF 9	4
			HPRF 25	127
		SP1	BPRF 9	4
			HPRF 25	127
		SP3	BPRF 9	4
			HPRF 25	127
	9	SP0	BPRF 9	4
			HPRF 25	127
		SP1	BPRF 9	4
			HPRF 25	127
		SP3	BPRF 9	4
			HPRF 25	127

6.2. 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 an internal antennas, with maximum gain of

Frequency Band [MHz]	ANT 0 Gain [dBi]
CH5 6500	-3.70
CH9 8000	-3.80

“ANT E (SUB2) ANTENNA” as indicated in antenna specification are written as ANT 0 in this report.

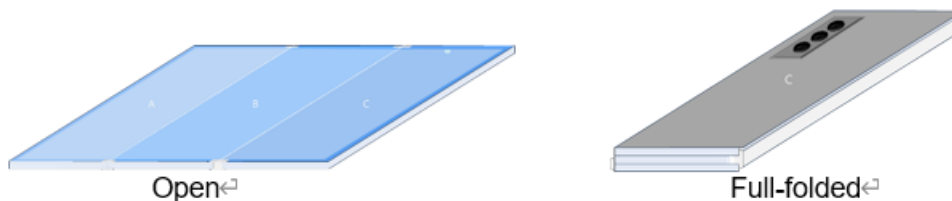
6.3. WORST-CASE CONFIGURATION AND MODE

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.

Radiated emission above 1GHz was performed with the EUT set to transmit low/mid/high channels.

- i. Worst case of antenna axis:

	ANT0
CH5	Y (Open)
CH9	Y (Open)



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

6.4. 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

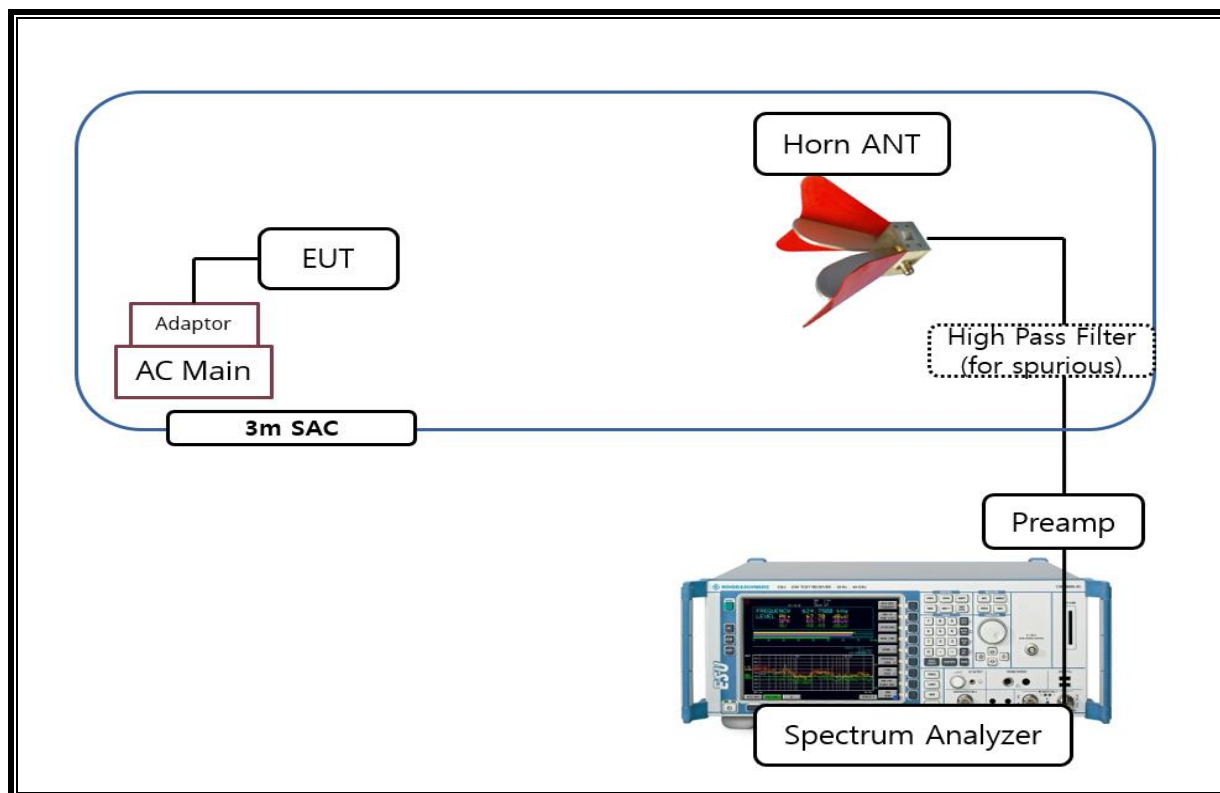
I/O CABLE

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

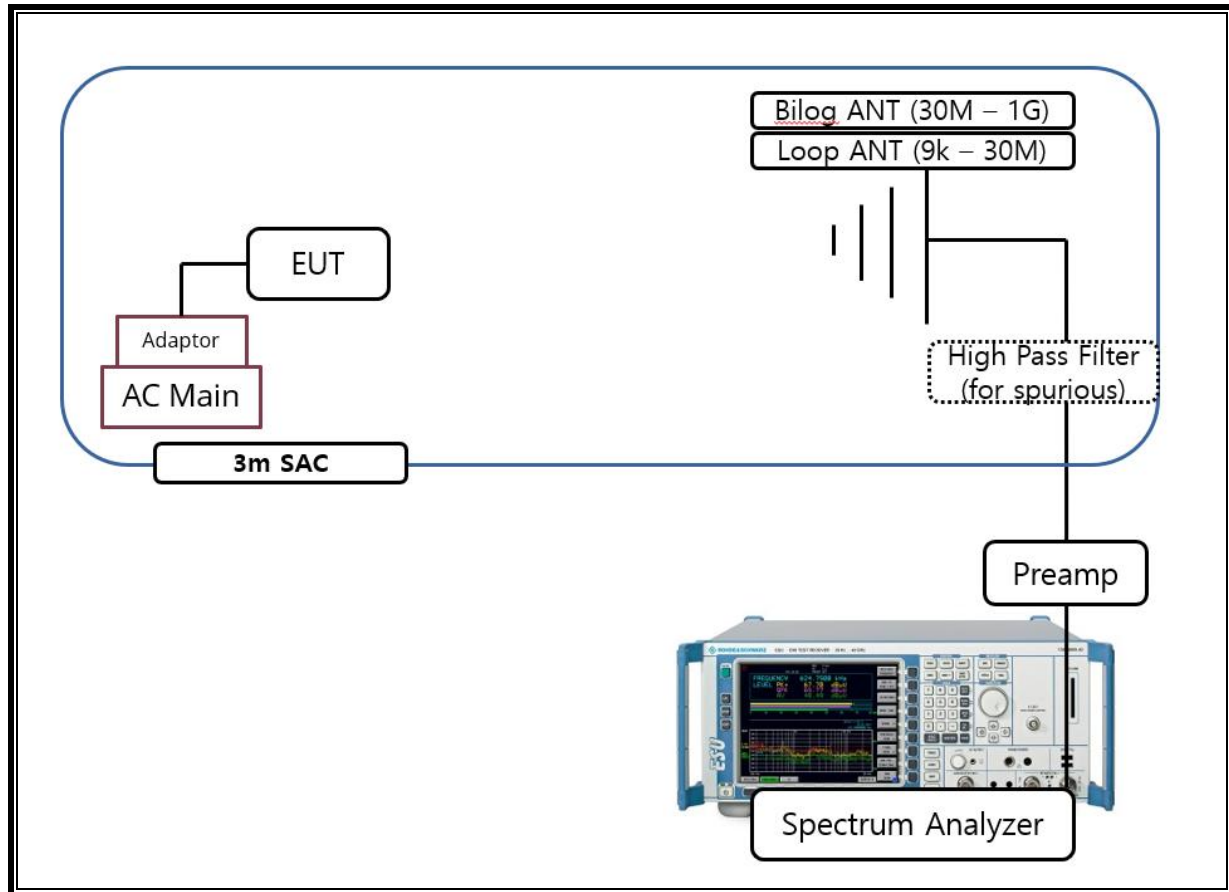
TEST SETUP

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

SETUP DIAGRAM FOR TESTS (RADIATED TEST SETUP) 50cm for Spurious, 3m for EIRP.



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



7. MEASUREMENT METHOD

10 dB BW : ANSI C63.10-2020, Section 10.1 / FCC Part §15.503(a)

Peak power and maximum average emissions: ANSI C63.10-2020 Section 10.3, 15.519(c)(e)

Cessation time: 15.519(a)(1)

Radiated measurement procedure: ANSI C63.10-2020, Section 10.3

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

8. 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, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB 9163	749	2026-08-12
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB 9163	845	2026-07-30
Antenna, Horn, 18 GHz	ETS	3115	00167211	2026-07-17
Antenna, Horn, 18 GHz	ETS	3115	00161451	2026-07-17
Antenna, Horn, 18 GHz	ETS	3117	00168724	2026-07-17
Antenna, Horn, 18 GHz	ETS	3117	00168717	2026-07-17
Antenna, Horn, 18 GHz	ETS	3117	00218957	2027-03-24
Antenna, Horn, 40 GHz	ETS	3116C	00166155	2026-07-23
Antenna, Horn, 40 GHz	ETS	3116C	00168645	2027-07-23
Preamplifier	ETS	3116C-PA	00168841	2026-07-28
Preamplifier, 1000 MHz	Sonoma	310N	341282	2026-07-21
Preamplifier, 1000 MHz	Sonoma	310N	351741	2026-07-21
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	2029169	2026-07-21
Preamplifier, 18 GHz	B&Z Technologies, LLC	BZR-01001800-231040-182020	28451	2026-07-21
Preamplifier, 18 GHz	B&Z Technologies, LLC	BZR-01001800-231040-181515	23576	2026-07-22
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54170614	2026-07-21
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54490312	2026-01-02
Spectrum Analyzer, 50 GHz	R&S	FSW 50	101538	2025-12-24
Attenuator	PASTERNAK	PE7087-10	A001	2026-07-22
Attenuator	PASTERNAK	PE7087-10	A008	2026-07-22
Attenuator	PASTERNAK	PE7004-10	2	2026-07-22
Attenuator	PASTERNAK	PE7087-10	A009	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
High Pass Filter	Wainwright Instruments GmbH	WHW2-8165-11500-21000-40CD	11	2026-01-03
High Pass Filter	Wainwright Instruments GmbH	WHW2-7100-10000-18000-40CD	2	2026-01-03
Low Pass Filter	Wainwright Instruments GmbH	WLKX12-5400-5940-18000-60ST	1	2026-01-03
Low Pass Filter	Wainwright Instruments GmbH	WLKX10-6400-7424-18000-60ST	1	2026-01-03
LISN	R&S	ENV216	101836	2026-07-22
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	

9. RADIATED BANDWIDTH & POWER & CESSATION TIME TEST RESULTS

9.1. 10 dB BANDWIDTH

LIMITS

FCC §15.503

(a) UWB bandwidth. For the purpose of this subpart, the UWB bandwidth is the frequency band bounded by the points that are 10 dB below the highest radiated emission, as based on the complete transmission system including the antenna. The upper boundary is designated f_H and the lower boundary is designated f_L . The frequency at which the highest radiated emission occurs is designated f_M .

(b) Center frequency. The center frequency, f_C , equals $(f_H + f_L)/2$.

(c) Fractional bandwidth. The fractional bandwidth equals $2(f_H - f_L) / (f_H + f_L)$.

(d) Ultra-wideband (UWB) transmitter. An intentional radiator that, at any point in time, has a fractional bandwidth equal to or greater than 0.20 or has a UWB bandwidth equal to or greater than 500 MHz, regardless of the fractional bandwidth.

FCC §15.519

(b) The UWB bandwidth of a device operating under the provisions of this section must be contained between 3100 MHz and 10,600 MHz.

Test Procedure

ANSI C63.10-2020 – Section 10.1

Test settings

1. RBW = 1MHz
2. VBW = 3MHz
3. Span was set wide enough to capture the 10dB points of the signal
4. Sweep = auto couple
5. Detector = Peak
6. Trace mode = Max hold
7. The trace was allowed to stabilize

RESULTS

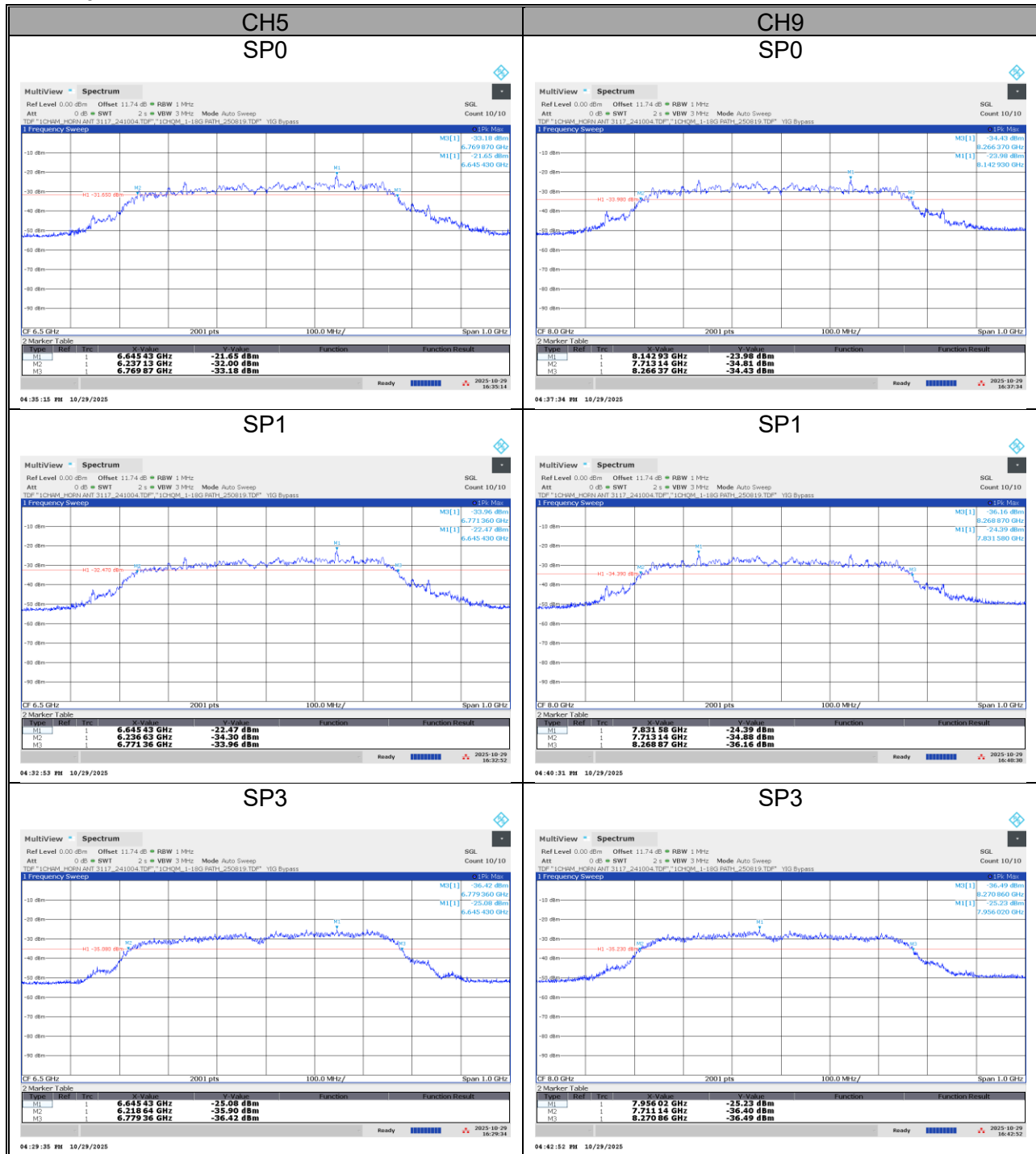
There is no significant difference in the waveform about PRF, packet length.
Worst cases were tested and reported.

9.1.1. 10dB BANDWIDTH MEASUREMENT

ANT	Channel	CONFIG	PRF Mode	Packet Length	fM (MHz)	fL (MHz)	fH (MHz)	fC (MHz)	BW (MHz)	fractional bandwidth
Ant0	CH5	SP0	BPRF9	4	6645.53	6237.13	6769.87	6503.50	532.74	0.08
		SP1	BPRF9	4	6645.43	6236.63	6771.36	6504.00	534.73	0.08
		SP3	BPRF9	4	6645.43	6218.64	6779.36	6499.00	560.72	0.09
	CH9	SP0	BPRF9	4	8142.93	7713.14	8266.37	7989.76	553.23	0.07
		SP1	BPRF9	4	7831.58	7713.14	8268.87	7991.01	555.73	0.07
		SP3	BPRF9	4	7956.02	7711.14	8270.86	7991.00	559.72	0.07

9.1.2. 10dB BANDWIDTH PLOT

- ANT0



9.2. PEAK POWER AND MAXIMUM AVERAGE EMISSIONS

LIMITS

FCC §15.519

(c) The radiated emissions at or below 960 MHz from a device operating under the provisions of this section shall not exceed the emission levels in §15.209. The radiated emissions above 960 MHz from a device operating under the provisions of this section shall not exceed the following average limits when measured using a resolution bandwidth of 1 MHz:

Frequency in MHz	EIRP in dBm
3100-10600	-41.3

(e) There is a limit on the peak level of the emissions contained within a 50 MHz bandwidth centered on the frequency at which the highest radiated emission occurs, fm. That limit is 0 dBm EIRP.

TEST PROCEDURE

ANSI C63.10 Clause 10.3.

Peak EIRP power is measured using RBW of 50 MHz.

The radiated emissions of 6 – 9 GHz frequency band are performed at 3 meter test distance.

Test Notes

The EIRP in dBm was calculated from the measurement Field Strength in dBuV/m by applying a -95.2dB correction factor to the Field Strength level.

RESULTS

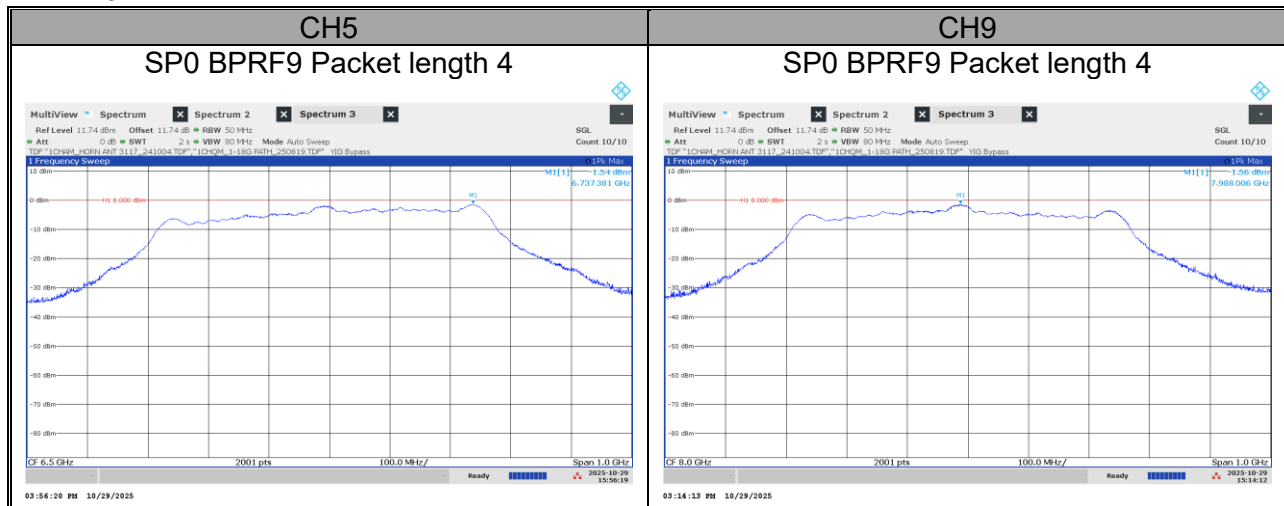
Plots: worst cases were reported.

9.2.1. MAXIMUM PEAK AND AVERAGE POWER

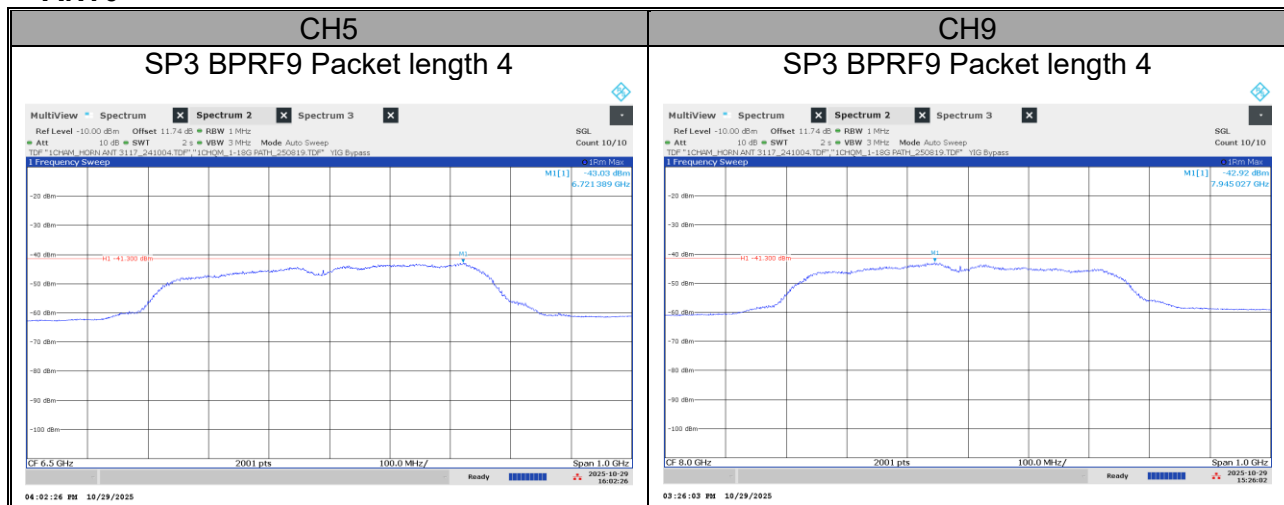
ANT	Channel	CONFIG	PRF Mode	Packet length	Peak Power (dBm/50MHz)	Peak Limit (dBm/50MHz)	Margin	AV Power (dBm/MHz)	AV Limit (dBm/MHz)	Margin
Ant0 Metal	CH5	SP0	BPRF9	4	-1.54	0	1.54	-44.14	-41.3	2.84
			BPRF9	127	-4.10	0	4.10	-43.50	-41.3	2.20
			HPRF25	127	-9.46	0	9.46	-43.11	-41.3	1.81
		SP1	BPRF9	4	-2.54	0	2.54	-43.21	-41.3	1.91
			BPRF9	127	-4.73	0	4.73	-43.30	-41.3	2.00
			HPRF25	127	-10.63	0	10.63	-43.04	-41.3	1.74
		SP3	BPRF9	4	-10.64	0	10.64	-43.03	-41.3	1.73
			BPRF9	127	-10.62	0	10.62	-43.07	-41.3	1.77
			HPRF25	127	-11.93	0	11.93	-43.15	-41.3	1.85
	CH9	SP0	BPRF9	4	-1.56	0	1.56	-44.79	-41.3	3.49
			BPRF9	127	-3.73	0	3.73	-43.48	-41.3	2.18
			HPRF25	127	-10.84	0	10.84	-43.43	-41.3	2.13
		SP1	BPRF9	4	-1.88	0	1.88	-43.09	-41.3	1.79
			BPRF9	127	-4.53	0	4.53	-43.32	-41.3	2.02
			HPRF25	127	-11.83	0	11.83	-43.32	-41.3	2.02
		SP3	BPRF9	4	-10.30	0	10.30	-42.93	-41.3	1.63
			BPRF9	127	-10.32	0	10.32	-42.92	-41.3	1.62
			HPRF25	127	-12.33	0	12.33	-43.12	-41.3	1.82

MAXIMUM PEAK AND AVERAGE POWER PLOTS

- PEAK POWER - ANT0



- AVERAGE POWER - ANT0



9.3. CESSATION TIME

LIMITS

FCC §15.519(a)(1)

A UWB device operating under the provisions of this section shall transmit only when it is sending information to an associated receiver. The UWB intentional radiator shall cease transmission within 10 seconds unless it receives an acknowledgement from the associated receiver that its transmission is being received. An acknowledgment of reception must continue to be received by the UWB intentional radiator at least every 10 seconds or the UWB device must cease transmitting.

TEST PROCEDURES

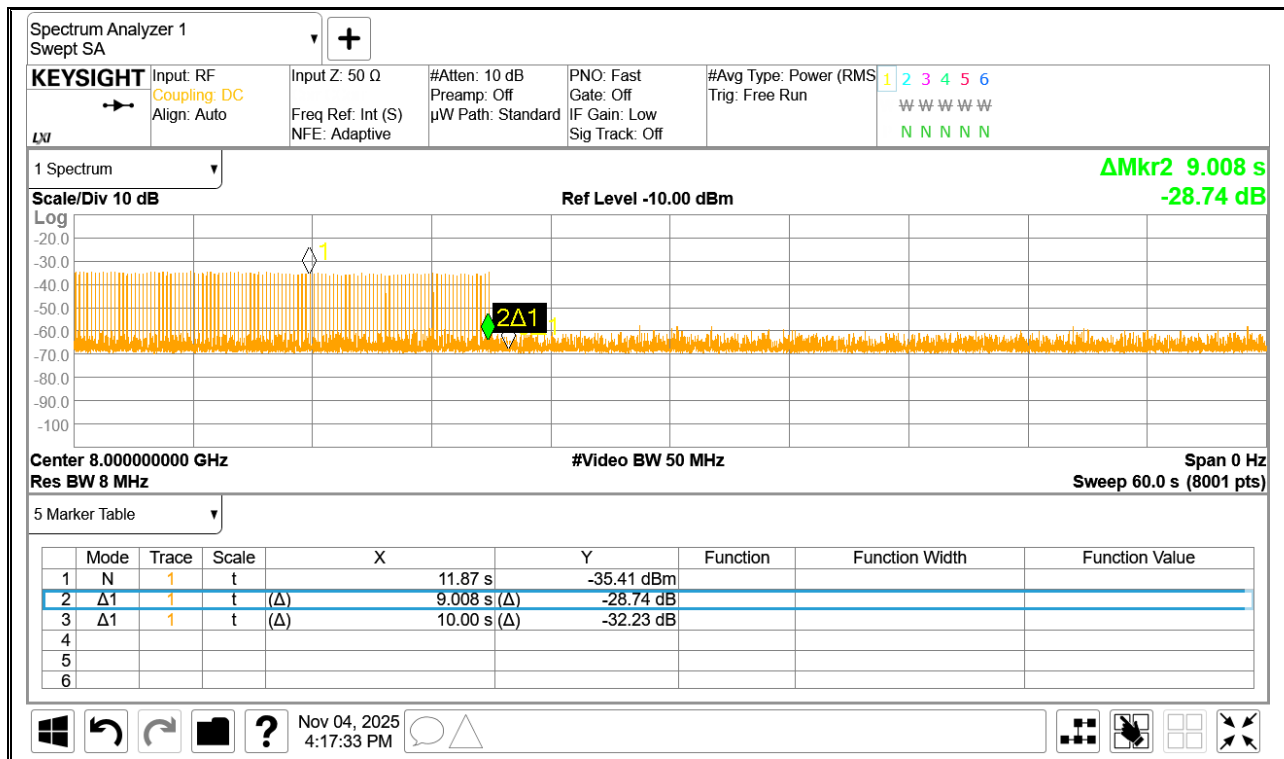
Transmissions are monitored for two cases:

1. The smart phone ends the UWB link.
2. The EUT ends the UWB link.

RESULTS

Please see the next page

Case 1: Smart Phone ends the UWB link



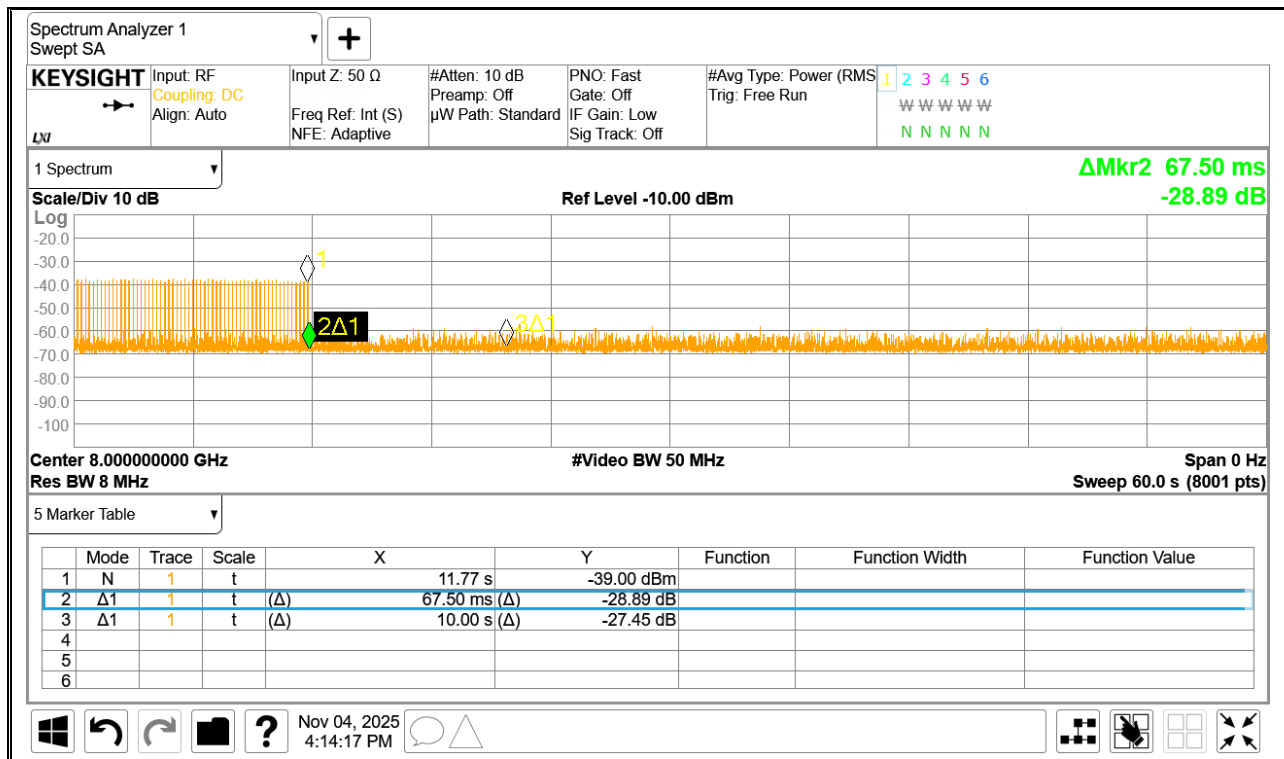
Marker 2: Smart phone ends UWB link.

Marker 1Δ2: EUT and smart phone end UWB link.

Marker 3Δ2: “10s” after EUT ends UWB link.

EUT detects “Smart Phone ends UWB link” and ceases transmitting within 10 seconds.

Case 2: EUT ends the UWB link



Marker 1: EUT ends UWB link.

Marker 2Δ1: EUT and smart phone end UWB link.

Marker 3Δ1: "10s" after EUT ends UWB link.

EUT ceases transmitting within 10 seconds.

10. RADIATED EMISSION TEST RESULTS

10.1. LIMITS AND PROCEDURE

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.

- FCC Part 15.519 (c): The radiated emissions at or below 960 MHz from a device operating under the provisions of this section shall not exceed the emission levels in §15.209. The radiated emissions above 960 MHz from a device operating under the provisions of this section shall not exceed the following average limits when measured using a resolution bandwidth of 1 MHz:

Frequency range (MHz)	EIRP in dBm
960-1610	-75.3
1610-1990	-63.3
1990-3100	-61.3
3100-10600	-41.3
Above 10600	-61.3

- FCC Part 15.519 (d): In addition to the radiated emission limits specified in the table in paragraph (c) of this section, UWB transmitters operating under the provisions of this section shall not exceed the following average limits when measured using a resolution bandwidth of no less than 1 kHz:

Frequency range (MHz)	EIRP in dBm
1164-1240	-85.3
1559-1610	-85.3

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 antenna to EUT distance is 0.5 or 3 meters. The EUT is configured in accordance with ANSI C63.10. The EUT is set to transmit in a continuous mode.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For measurements above 1 GHz the resolution bandwidth is set to 1 MHz (120kHz for emissions in the GPS), then the video bandwidth is set to 3 MHz (500kHz for emissions in the GPS)

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.

Radiated test was performed worst case as below table. (Highest Average Power)

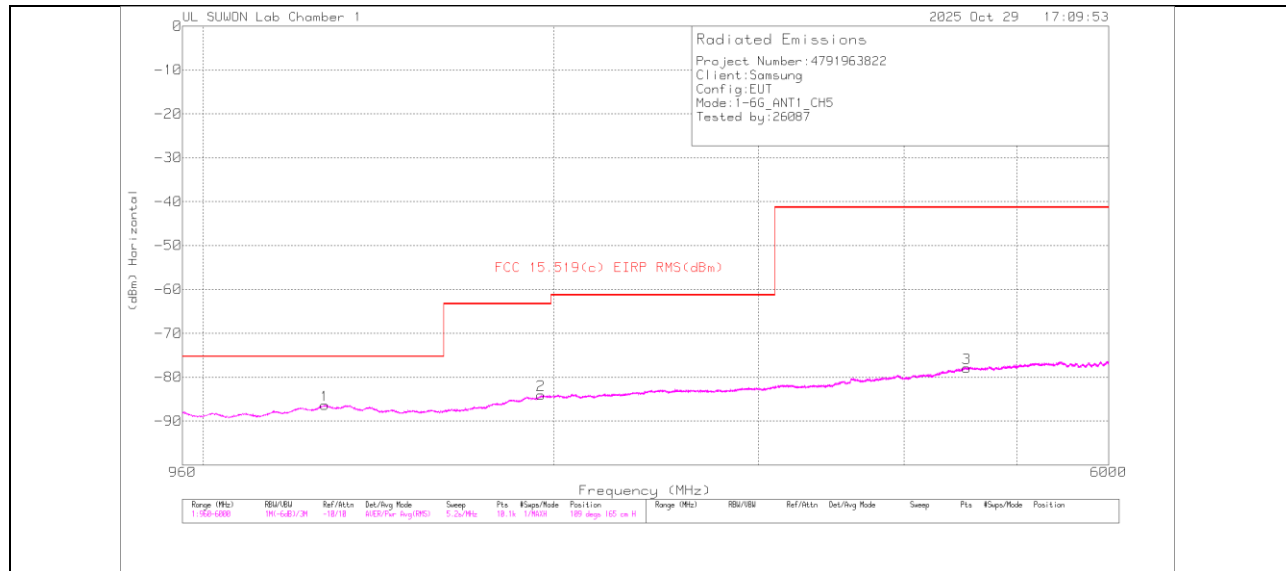
	ANT0
CH5	SP3 / BPRF9 / Packet Length 4
CH9	SP3 / BPRF9 / Packet Length 127

10.2. TRANSMITTER ABOVE 1 GHz

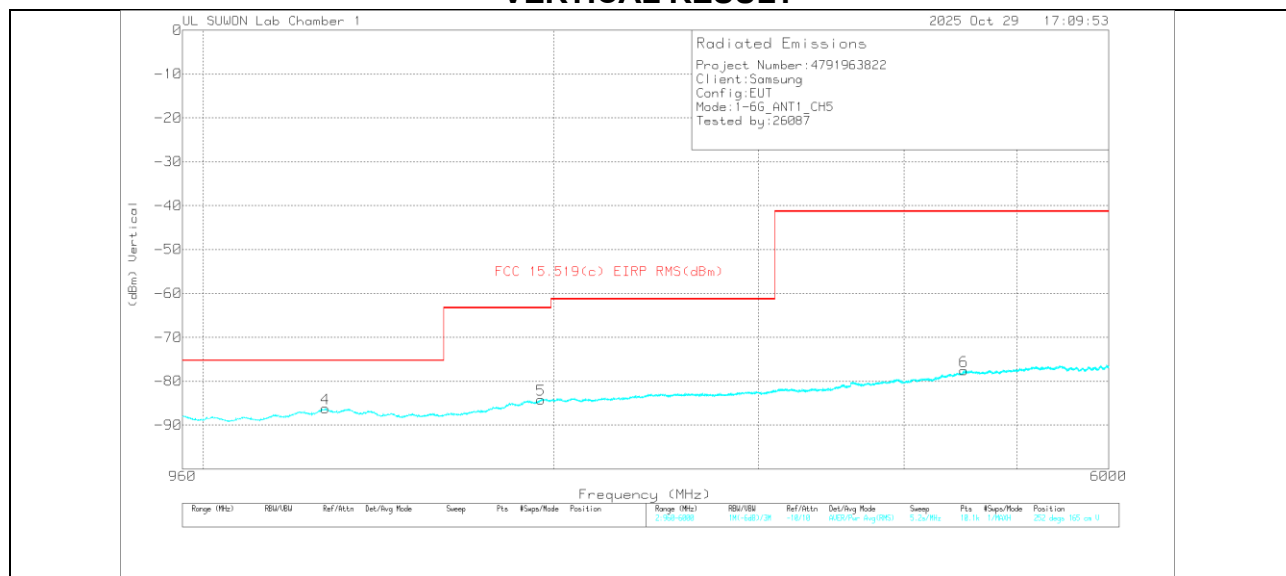
10.2.1. SPURIOUS EMISSION 1 GHz – 6 GHz TX Antenna 0

CHANNEL, CH 5

HORIZONTAL RESULT



VERTICAL RESULT



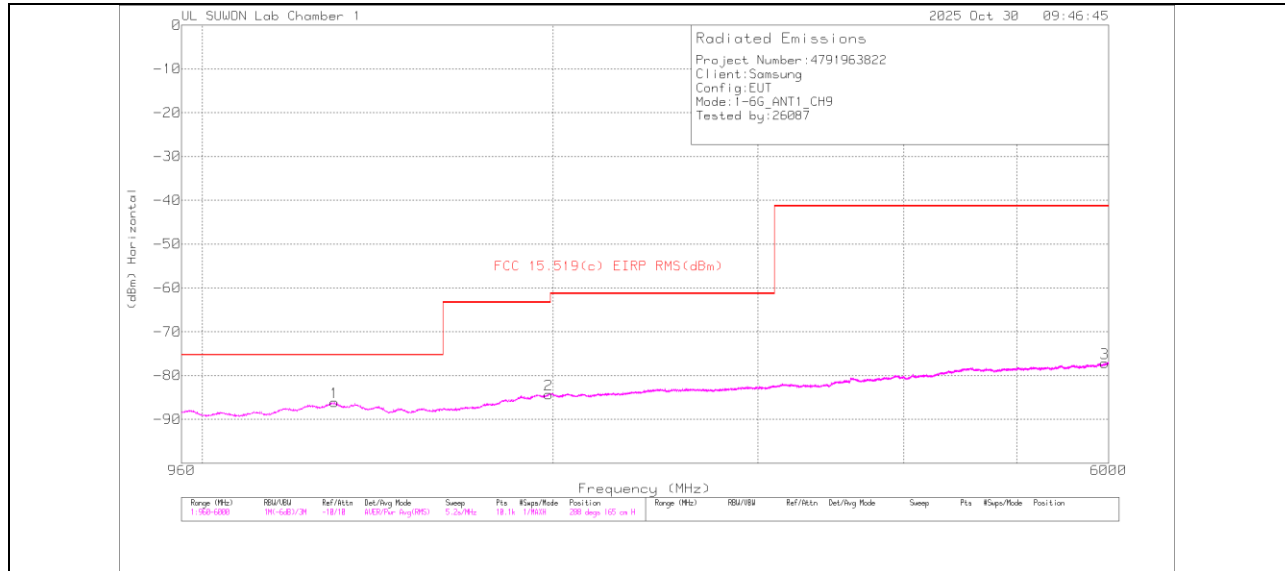
Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBm)	Det	Antenna_Factor (dBm)	0.06-18GHz_Path Loss(dB)	Dist. Corr. (dB)	Conv. Fact. (dB)	UWB_CH5_LPF	Corrected Reading (dBm)	FCC 15.519(c) EIRP RMS(dBm)	Margin (dB)	Altitude (Degs)	Height (cm)	Polarity
1	1272.3803	-75.78	RMS	29.8	-37.2	-15.6	11.8	.6	-86.38	-75.3	-11.08	36	165	H
2	1951.0339	-75.98	RMS	31.1	-36.1	-15.6	11.8	.7	-84.08	-63.3	-20.78	252	165	H
3	4531.4146	-76.05	RMS	34.1	-33.5	-15.6	11.8	1.3	-77.95	-41.3	-36.65	252	165	H
4	1273.8773	-75.59	RMS	29.8	-37.2	-15.6	11.8	.6	-86.19	-75.3	-10.89	288	165	V
5	1952.0319	-76.09	RMS	31.1	-36.1	-15.6	11.8	.7	-84.19	-63.3	-20.89	325	165	V
6	4506.9631	-75.59	RMS	34	-33.5	-15.6	11.8	1.3	-77.59	-41.3	-36.29	109	165	V

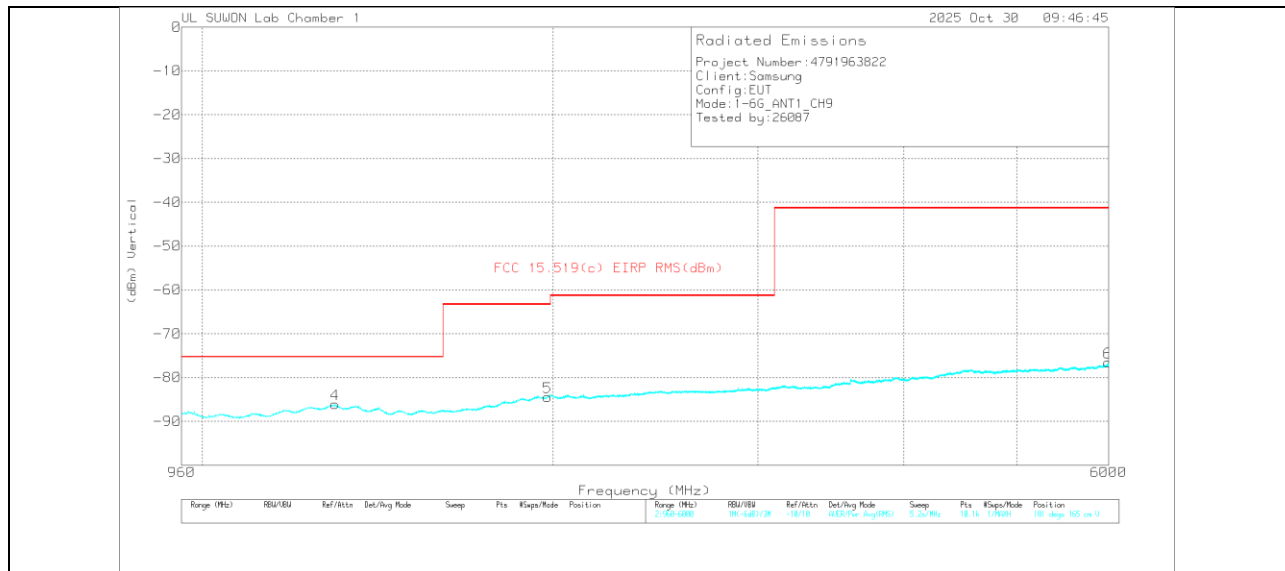
RMS - RMS detection

CHANNEL, CH 9

HORIZONTAL RESULT



VERTICAL RESULT



Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBm)	Det	Antenna_Factor (dBm)	0.96-18GHz_Path Loss(dB)	Dist. Corr. (dB)	Conv. Fact. (dB)	UWB_CH9_LPF	Corrected Reading (dBm)	FCC 15.519(c) ERP RMS(dBm)	Margin (dB)	Altitude (Degs)	Height (cm)	Polarity
1	1298.3288	-75.61	RMS	29.9	-37.2	-15.6	11.8	.6	-86.11	-75.3	-10.81	0	165	H
2	1983.4695	-76.41	RMS	31.3	-36	-15.6	11.8	.6	-84.31	-63.3	-21.01	144	165	H
3	5956.0881	-77.03	RMS	34.9	-32.5	-15.6	11.8	1.3	-77.13	-41.3	-35.83	216	165	H
4	1300.8238	-75.63	RMS	30	-37.2	-15.6	11.8	.6	-86.03	-75.3	-10.73	324	165	V
5	1979.9764	-76.52	RMS	31.3	-36	-15.6	11.8	.6	-84.42	-63.3	-21.12	108	165	V
6	5990.5198	-76.38	RMS	35	-32.6	-15.6	11.8	1.3	-76.48	-41.3	-35.18	144	165	V

RMS - RMS detection

10.2.2. SPURIOUS EMISSION 9 GHz – 18 GHz

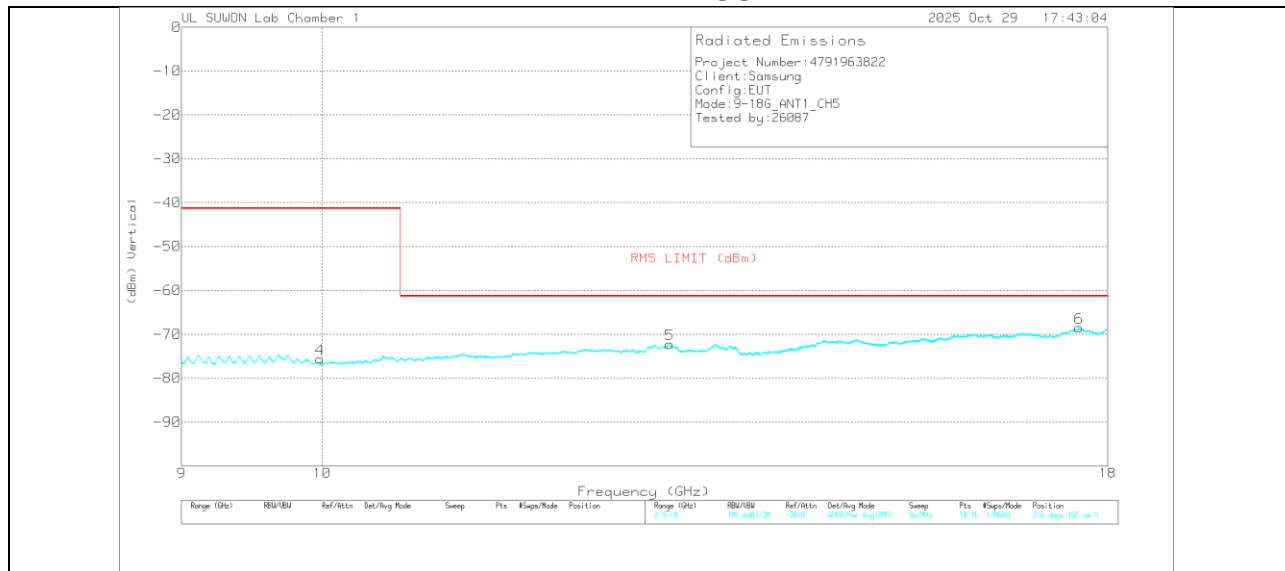
TX Antenna 0

CHANNEL, CH 5

HORIZONTAL RESULT



VERTICAL RESULT



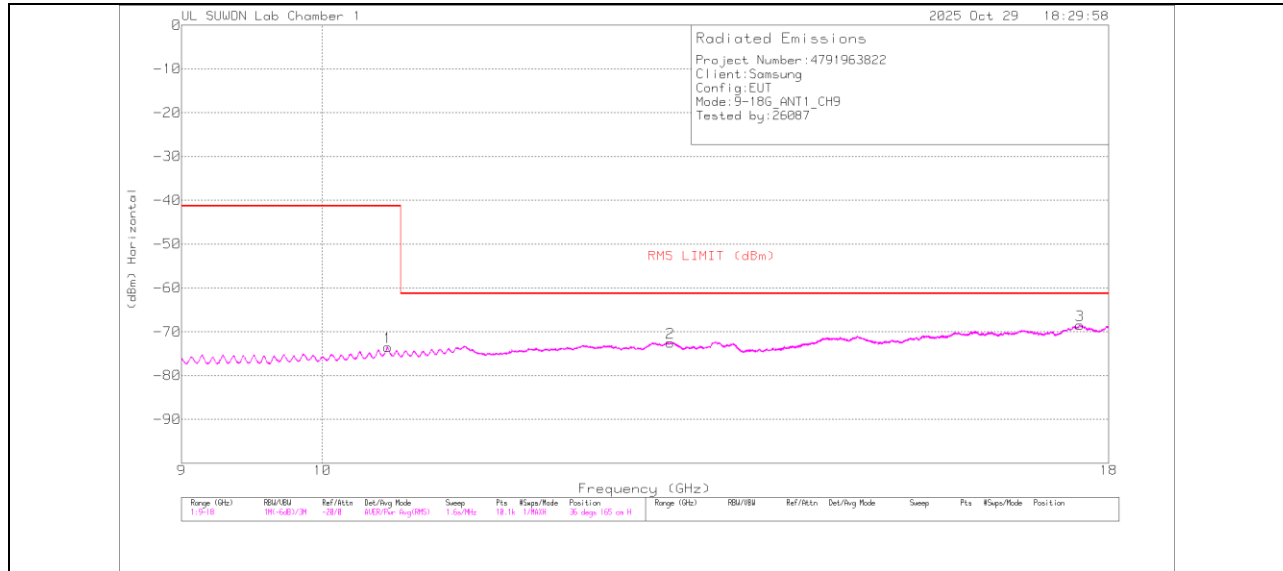
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	Antenna Factor (dBm)	0.06-18GHz Path Loss (dB)	Dist. Corr. (dB)	Conv. Fact. (dB)	UWB_CH5_HPF	Corrected Reading (dBm)	RMS LIMIT (dBm)	Margin (dB)	Altitude (Degs)	Height (cm)	Polarity
1	9.98376	-82.14	RMS	37.4	-27.3	-15.6	11.8	.4	-75.44	-41.3	-34.14	108	165	H
2	12.97247	-83.31	RMS	39	-24.3	-15.6	11.8	.1	-72.31	-61.3	-11.01	36	165	H
3	17.61327	-84.23	RMS	41.1	-21.7	-15.6	11.8	.2	-68.43	-61.3	-7.13	0	165	H
4	9.98376	-82.28	RMS	37.4	-27.3	-15.6	11.8	.4	-75.58	-41.3	-34.28	108	165	V
5	12.9698	-83.16	RMS	39	-24.4	-15.6	11.8	.1	-72.26	-61.3	-10.96	145	165	V
6	17.61505	-84.42	RMS	41.1	-21.6	-15.6	11.8	.2	-68.62	-61.3	-7.22	108	165	V

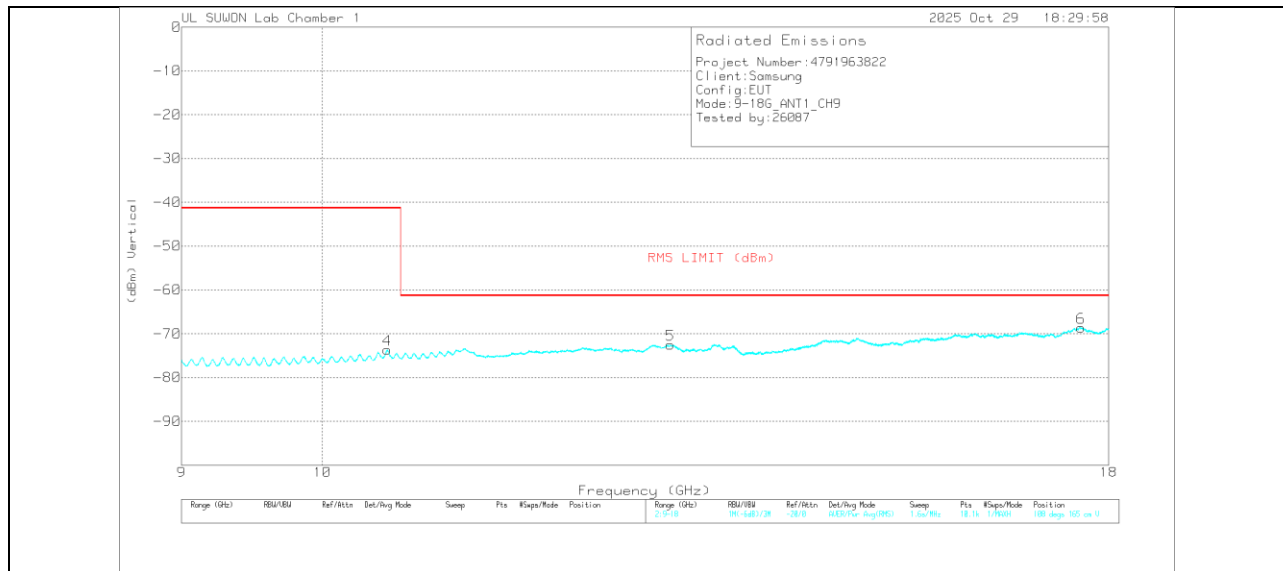
RMS - RMS detection

CHANNEL, CH 9

HORIZONTAL RESULT



VERTICAL RESULT



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	Antenna Factor (dBm)	0.06-18GHz Path Loss (dB)	Dist. Corr. (dB)	Conv. Fact. (dB)	UWB_CH#_HFF	Corrected Reading (dBm)	RMS LIMIT (dBm)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	10.50238	-82.38	RMS	37.7	-26.4	-15.6	11.8	1.4	-73.48	-41.3	-32.18	0	165	H
2	12.97114	-83.63	RMS	39	-24.3	-15.6	11.8	.2	-72.53	-61.3	-11.23	0	165	H
3	17.61594	-84.43	RMS	41.1	-21.6	-15.6	11.8	.3	-68.43	-61.3	-7.13	144	165	H
4	10.49525	-82.52	RMS	37.7	-26.4	-15.6	11.8	1.4	-73.62	-41.3	-32.32	216	165	V
5	12.96891	-83.54	RMS	39	-24.4	-15.6	11.8	.2	-72.54	-61.3	-11.24	216	165	V
6	17.63376	-84.57	RMS	41.2	-21.7	-15.6	11.8	.3	-68.57	-61.3	-7.27	288	165	V

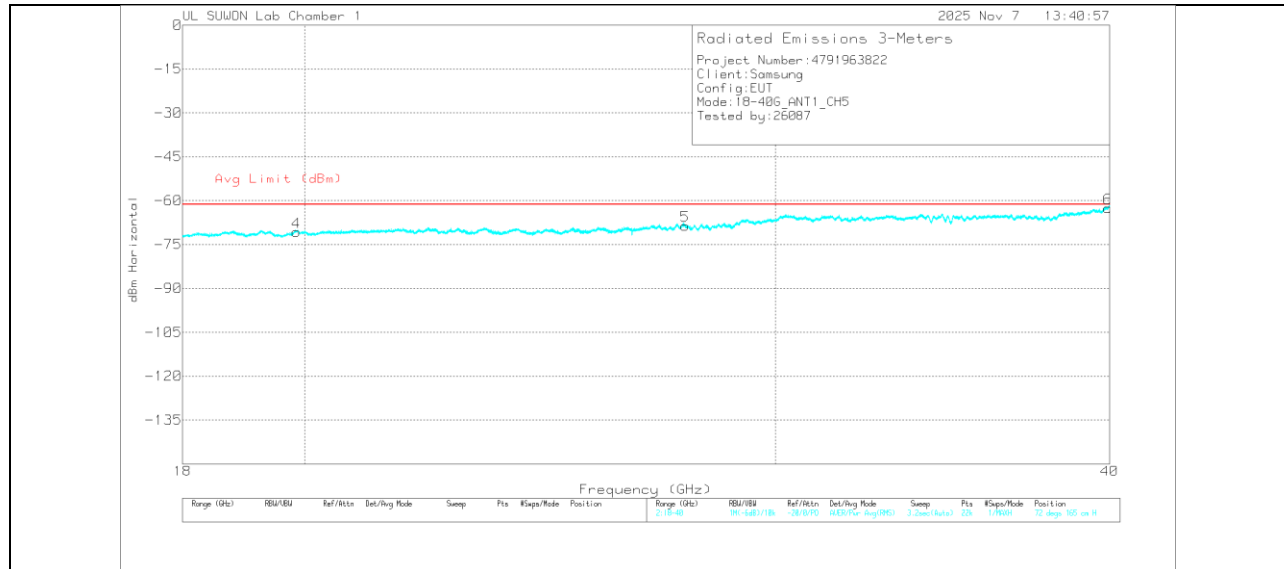
RMS - RMS detection

10.2.3. SPURIOUS EMISSION 18 GHz – 40 GHz

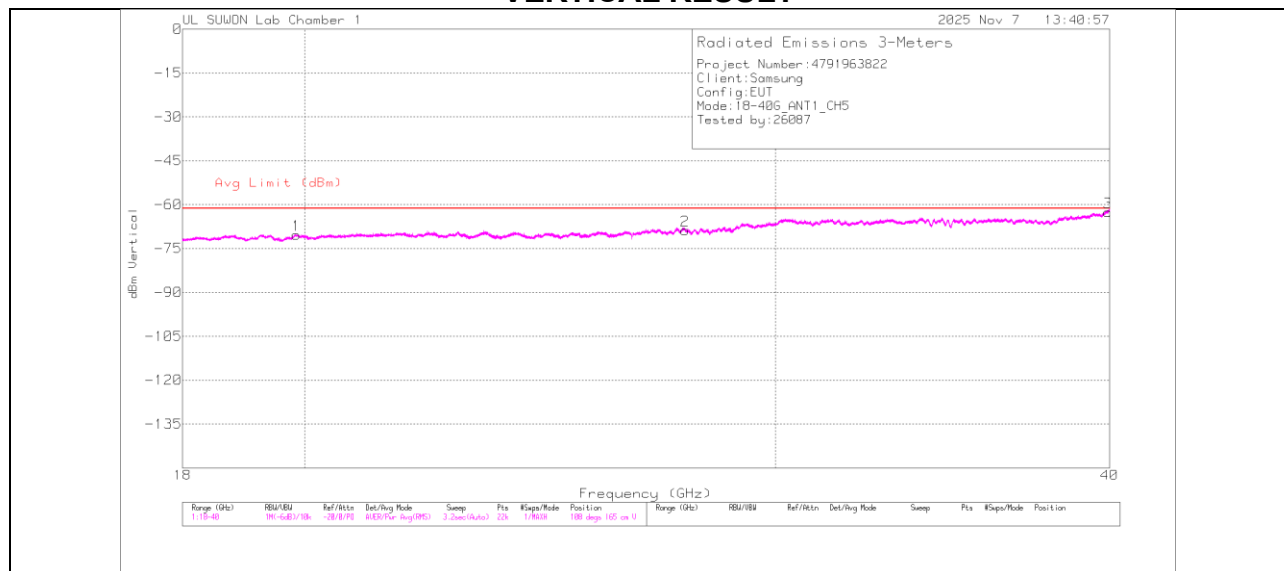
TX Antenna 0

CHANNEL, CH 5

HORIZONTAL RESULT



VERTICAL RESULT



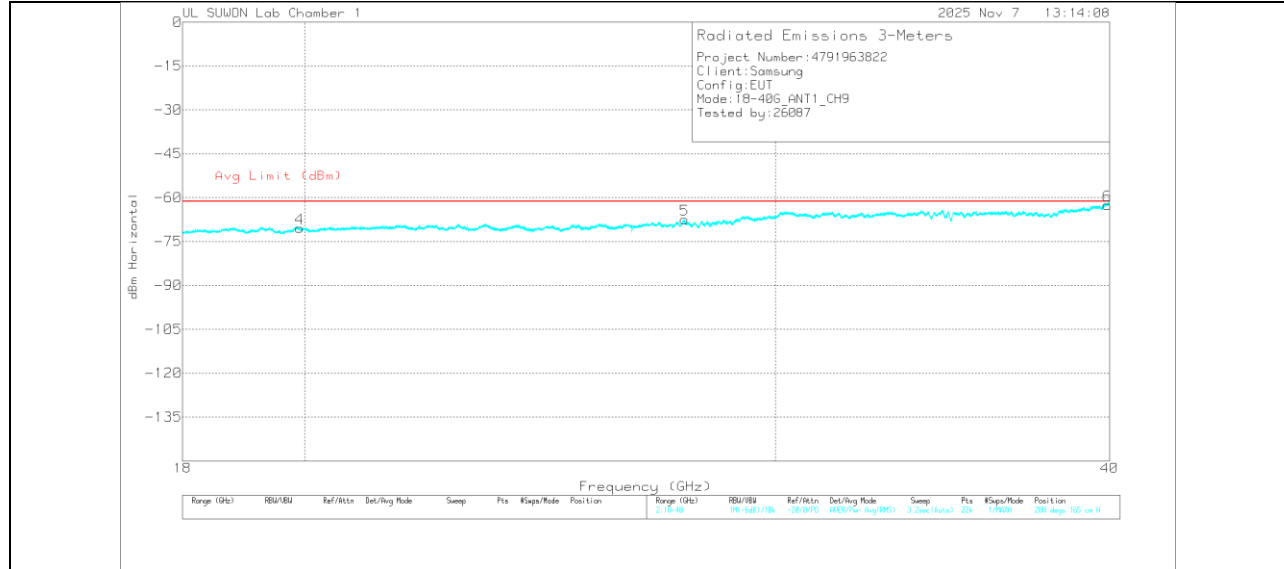
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	Antenna_Factor (dB/m)	Above_18G_Path Loss(dB)	Conv. Fact. (dB)	Dist. Corr. (dB)	Corrected Reading dBm	Avg Limit (dBm)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	19.85492	-88.52	RMS	6	16	11.8	-15.6	-70.32	-61.3	-9.02	36	165	V
2	27.74956	-94.26	RMS	9.9	19.3	11.8	-15.6	-68.86	-61.3	-7.56	144	165	V
3	39.93301	-93.48	RMS	11.4	23.3	11.8	-15.6	-62.58	-61.3	-1.28	144	165	V
4	19.85492	-88.96	RMS	6	16	11.8	-15.6	-70.76	-61.3	-9.46	360	165	H
5	27.74956	-93.95	RMS	9.9	19.3	11.8	-15.6	-68.55	-61.3	-7.25	324	165	H
6	39.93301	-93.4	RMS	11.4	23.3	11.8	-15.6	-62.5	-61.3	-1.2	180	165	H

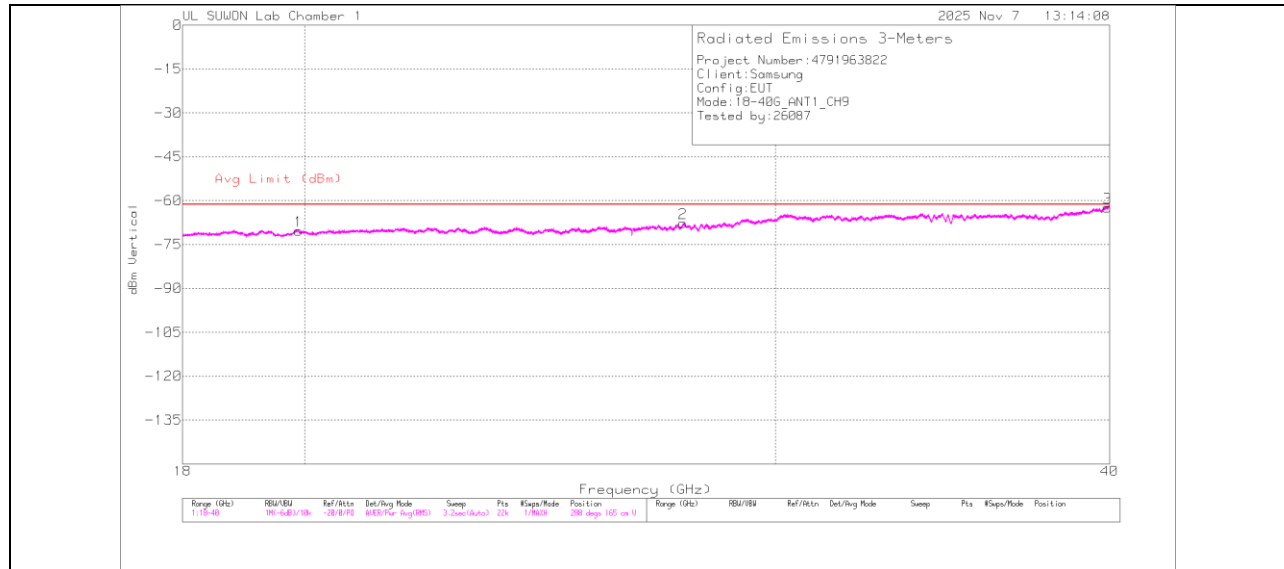
RMS - RMS detection

CHANNEL, CH 9

HORIZONTAL RESULT



VERTICAL RESULT



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	Antenna_Factor (dB/m)	Above_18G_Path Loss (dB)	Conv. Fact. (dB)	Dist. Corr. (dB)	Corrected Reading (dBm)	Avg Limit (dBm)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	19.89391	-88.66	RMS	6.1	16.1	11.8	-15.6	-70.26	-61.3	-8.96	36	165	V
2	27.69256	-93.02	RMS	9.8	19.3	11.8	-15.6	-67.72	-61.3	-6.42	288	165	V
3	39.92201	-93.35	RMS	11.3	23.4	11.8	-15.6	-62.45	-61.3	-1.15	72	165	V
4	19.90791	-88.8	RMS	6.2	16	11.8	-15.6	-70.4	-61.3	-9.1	252	165	H
5	27.73156	-92.99	RMS	9.9	19.4	11.8	-15.6	-67.49	-61.3	-6.19	288	165	H
6	39.92201	-93.39	RMS	11.3	23.4	11.8	-15.6	-62.49	-61.3	-1.19	324	165	H

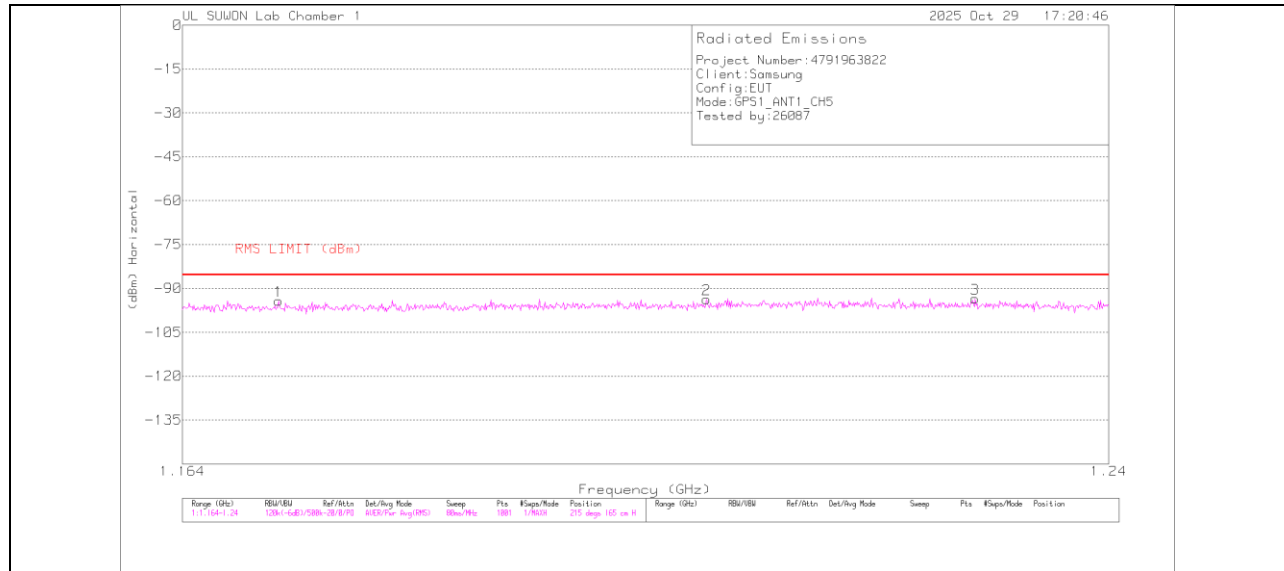
RMS - RMS detection

10.2.4. SPURIOUS EMISSION 1164 MHz – 1240 MHz

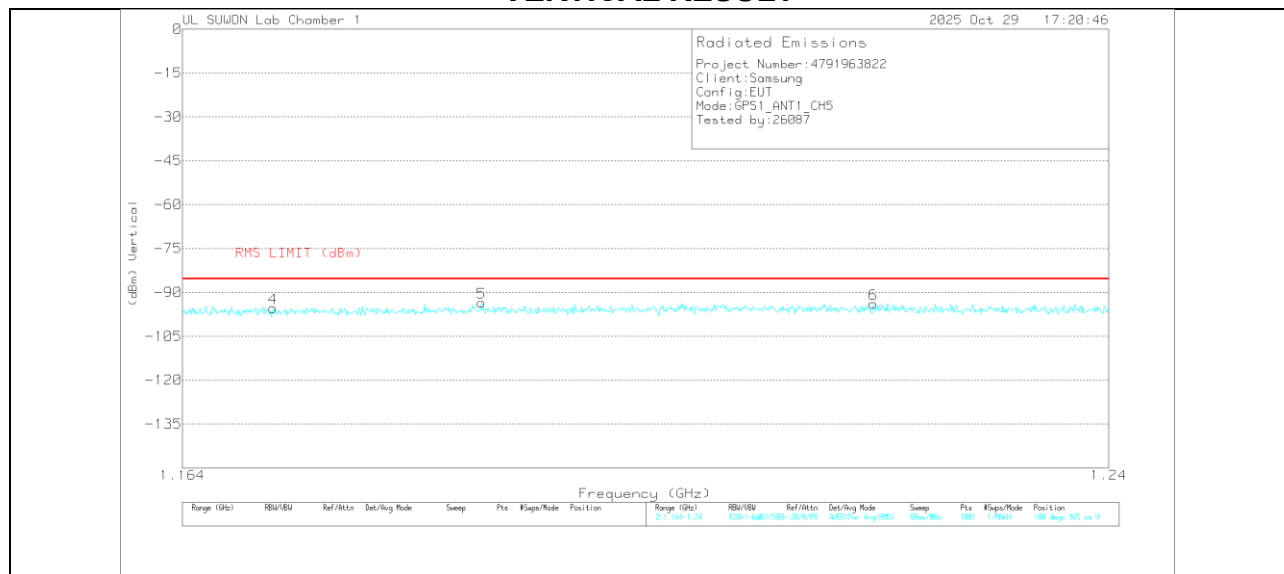
TX Antenna 0

CHANNEL, CH 5

HORIZONTAL RESULT



VERTICAL RESULT



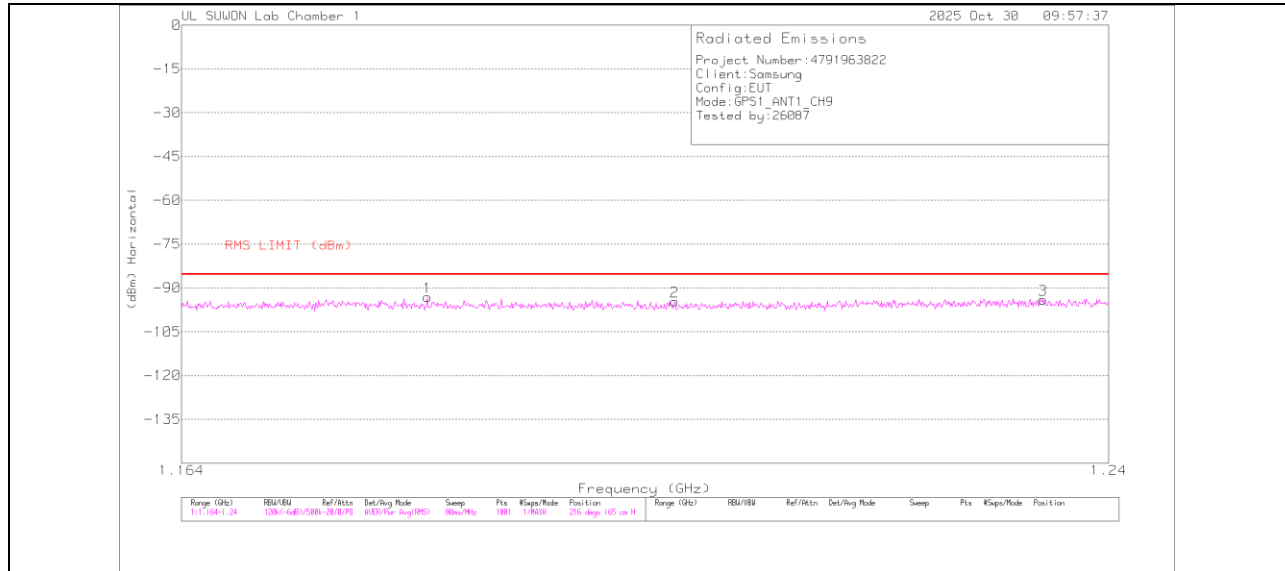
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	Antenna Factor (dB/m)	0.98-1.6GHz Path Loss (dB)	Dist. Corr. (dB)	Conv. Fact. (dB)	UWB_CH5_LPF	Corrected Reading (dBm)	RMS LIMIT (dBm)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.17168	-81.69	RMS	28.6	-37.5	-15.6	11.8	2	-94.19	-85.3	-8.89	72	165	H
2	1.20641	-81.9	RMS	29.1	-37.3	-15.6	11.8	2	-93.7	-85.3	-8.4	108	165	H
3	1.22875	-81.93	RMS	29.4	-37.4	-15.6	11.8	2	-93.53	-85.3	-8.23	288	165	H
4	1.17122	-82.82	RMS	28.6	-37.5	-15.6	11.8	2	-95.32	-85.3	-10.02	73	165	V
5	1.18802	-81.3	RMS	28.8	-37.4	-15.6	11.8	2	-93.6	-85.3	-8.2	325	165	V
6	1.22024	-82.14	RMS	29.3	-37.4	-15.6	11.8	2	-93.84	-85.3	-8.54	288	165	V

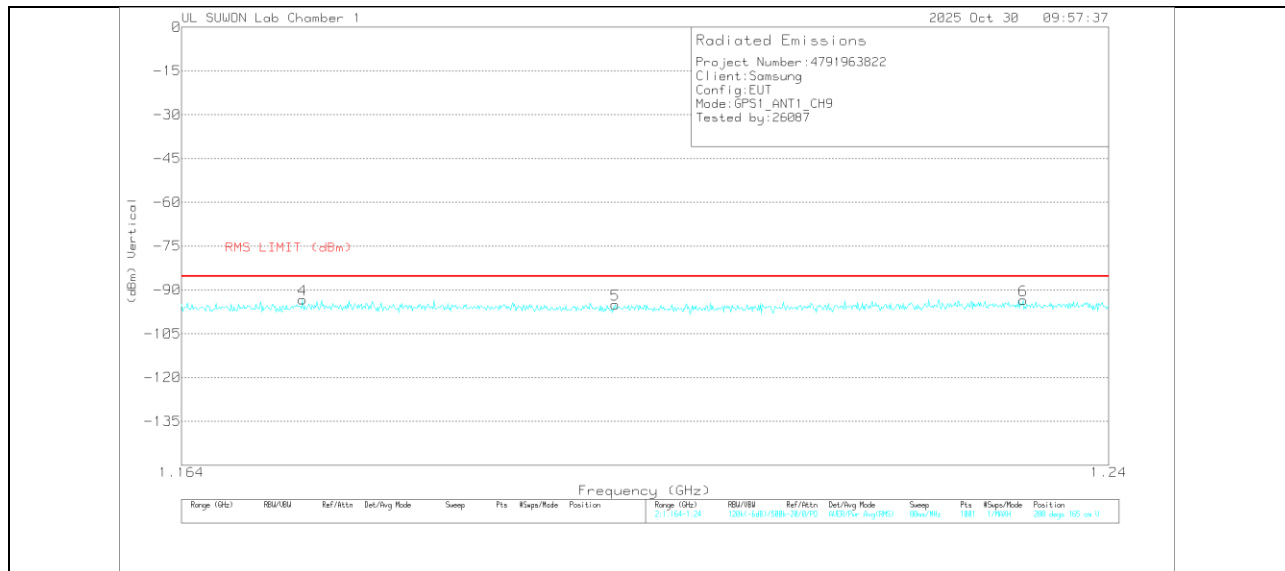
RMS - RMS detection

CHANNEL, CH 9

HORIZONTAL RESULT



VERTICAL RESULT



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	Antenna Factor (dB/m)	0.06-18GHz Path Loss (dB)	Dist. Corr. (dB)	Conv. Fact. (dB)	UWB_CH9_LPF	Corrected Reading (dBm)	RMS LIMIT (dBm)	Margin (dB)	Altitude (Dega)	Height (cm)	Polarity
1	1.18368	-80.74	RMS	28.8	-37.5	-15.6	11.8	-2	-93.04	-85.3	-7.74	252	165	H
2	1.20382	-82.66	RMS	29.1	-37.4	-15.6	11.8	-2	-94.56	-85.3	-9.26	0	165	H
3	1.23445	-82.47	RMS	29.4	-37.3	-15.6	11.8	-2	-93.97	-85.3	-8.67	108	165	H
4	1.17365	-80.9	RMS	28.6	-37.4	-15.6	11.8	-2	-93.3	-85.3	-8	217	165	V
5	1.19896	-82.98	RMS	29	-37.4	-15.6	11.8	-2	-94.98	-85.3	-9.68	253	165	V
6	1.23278	-81.96	RMS	29.4	-37.3	-15.6	11.8	-2	-93.46	-85.3	-8.16	36	165	V

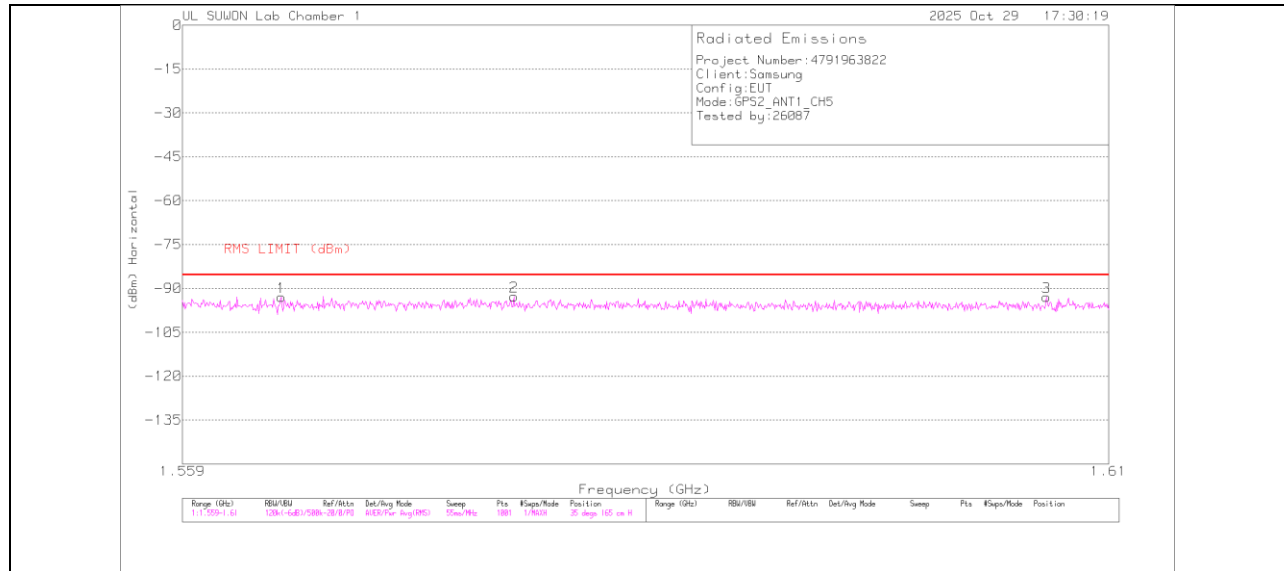
RMS - RMS detection

10.2.5. SPURIOUS EMISSION 1559 MHz – 1610 MHz

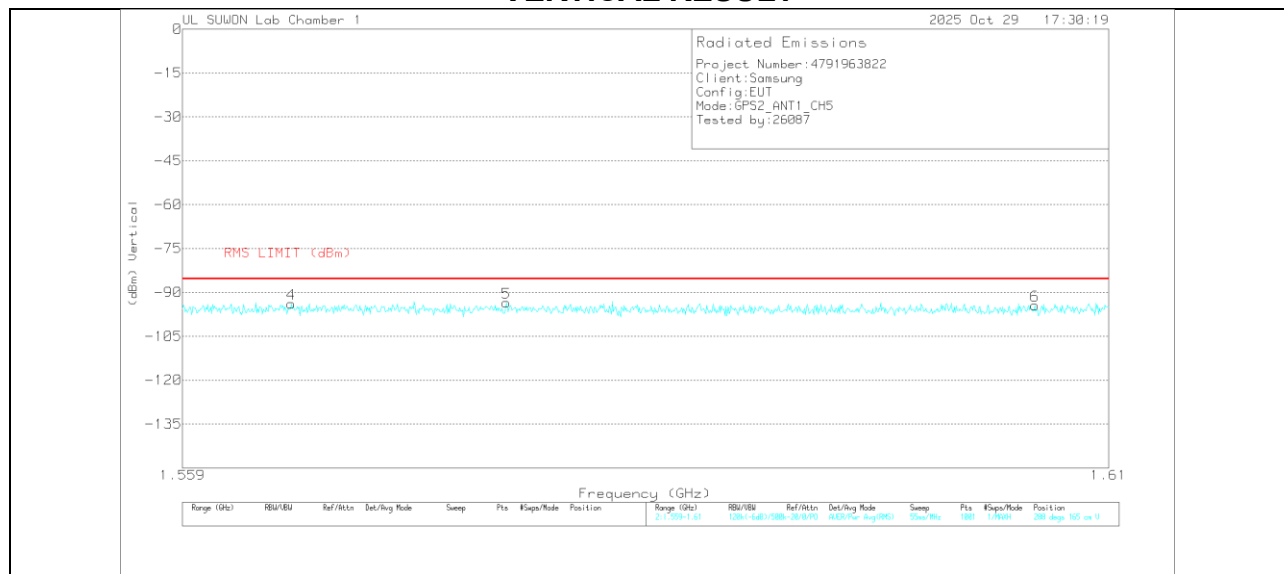
TX Antenna 0

CHANNEL, CH 5

HORIZONTAL RESULT



VERTICAL RESULT



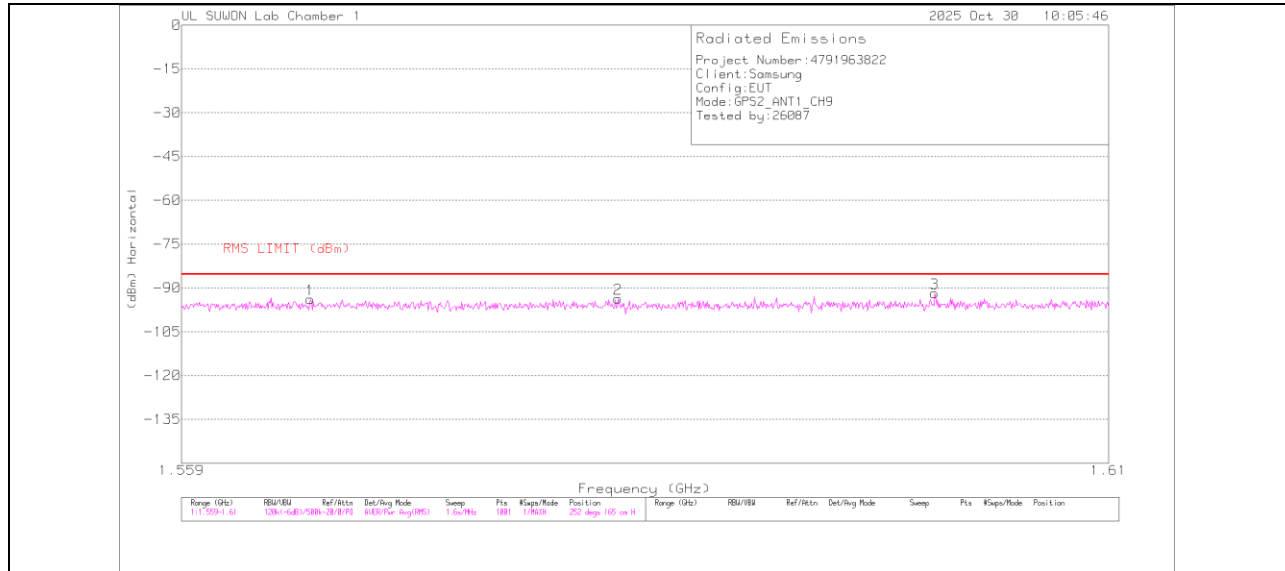
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	Antenna Factor (dBm)	0.96-180Hz Path Loss (dB)	Dist. Corr. (dB)	Conv. Fact. (dB)	UWB_CH5_LPF	Corrected Reading (dBm)	RMS LIMIT (dBm)	Margin (dB)	Altitude (Degs)	Height (cm)	Polarity
1	1.56436	-80.75	RMS	28.1	-36.7	-15.6	11.8	.3	-92.85	-85.3	-7.55	0	165	H
2	1.57705	-80.56	RMS	28.1	-36.7	-15.6	11.8	.3	-92.66	-85.3	-7.36	72	165	H
3	1.60653	-80.9	RMS	28.2	-36.7	-15.6	11.8	.3	-92.9	-85.3	-7.6	107	165	H
4	1.56492	-81.81	RMS	28.1	-36.7	-15.6	11.8	.3	-93.91	-85.3	-8.61	325	165	V
5	1.57665	-81.4	RMS	28.1	-36.7	-15.6	11.8	.3	-93.5	-85.3	-8.2	180	165	V
6	1.60587	-82.45	RMS	28.2	-36.7	-15.6	11.8	.3	-94.45	-85.3	-9.15	108	165	V

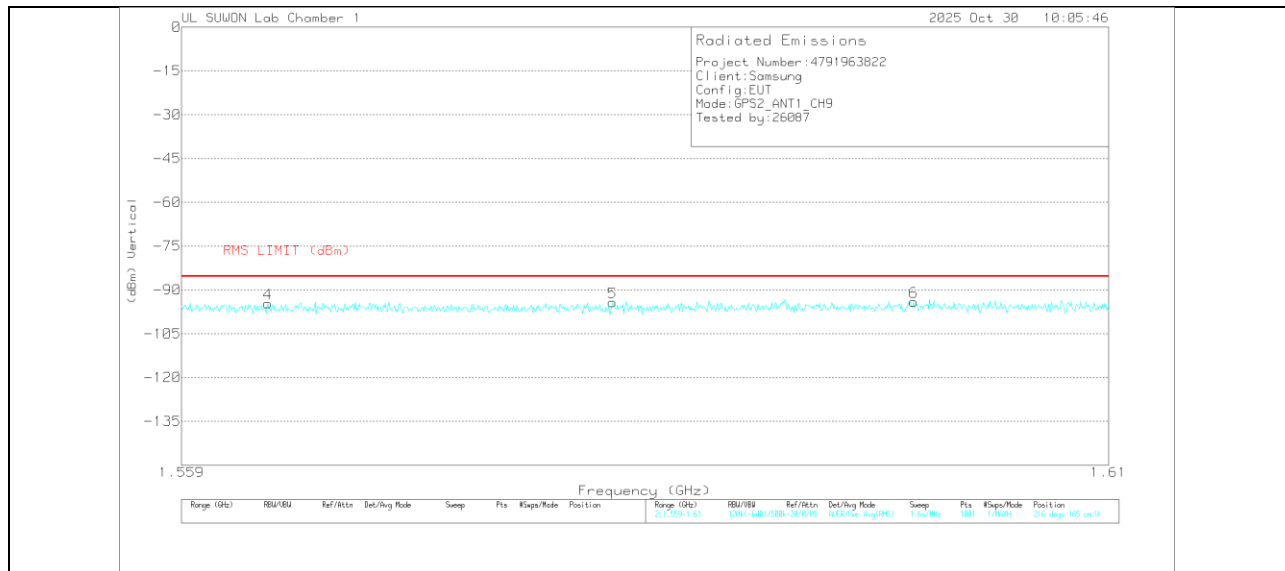
RMS - RMS detection

CHANNEL, CH 9

HORIZONTAL RESULT



VERTICAL RESULT



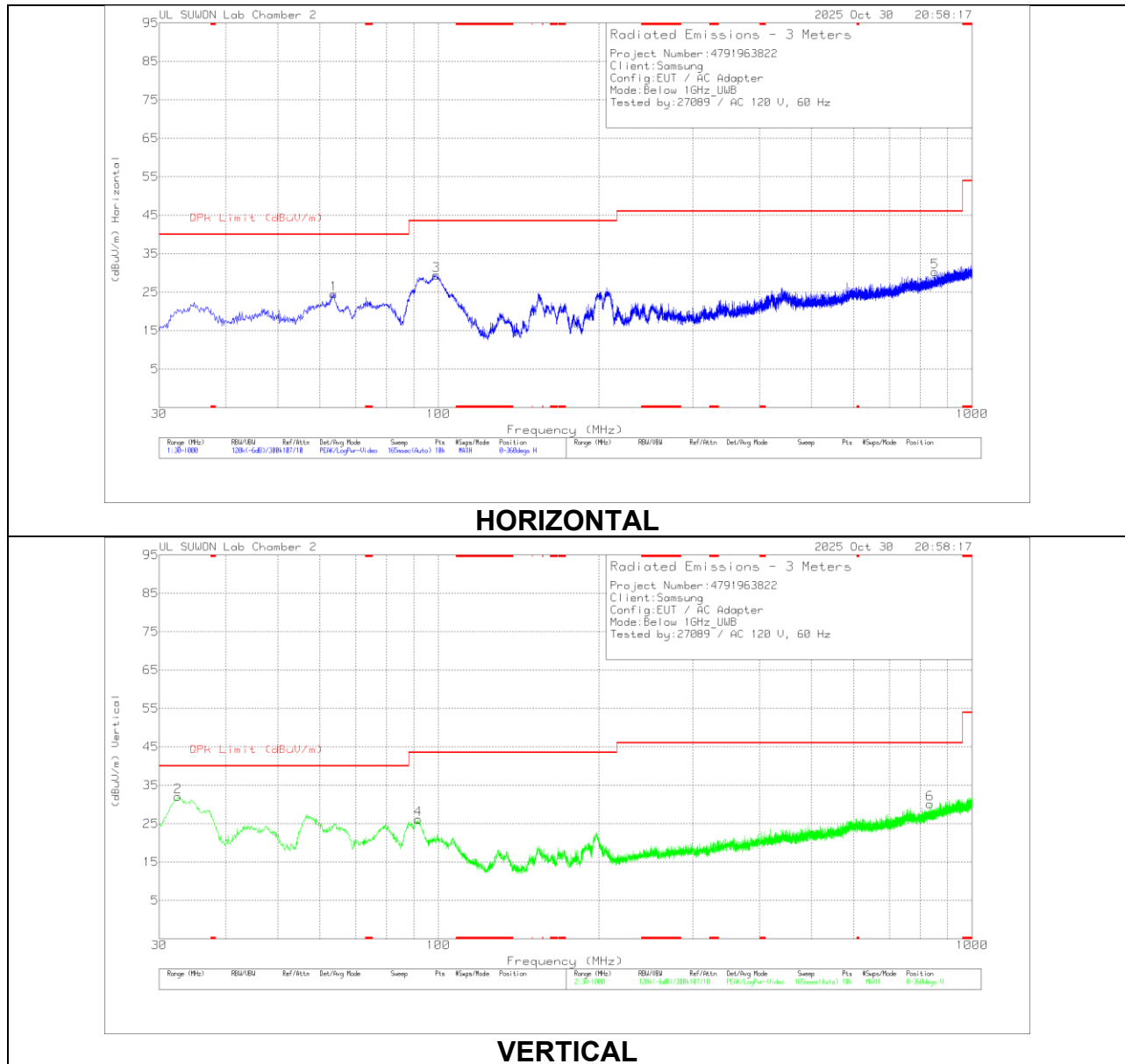
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	Antenna Factor (dB/m)	0.00-18GHz Path Loss (dB)	Dist. Corr. (dB)	Conv. Fact. (dB)	UWB_CH9_LPF	Corrected Reading (dBm)	RMS LIMIT (dBm)	Margin (dB)	Altitude (Degs)	Height (cm)	Polarity
1	1.56599	-81.81	RMS	28.1	-36.7	-15.6	11.8	.3	-93.91	-85.3	-8.61	72	165	H
2	1.58282	-81.54	RMS	28.1	-36.7	-15.6	11.8	.3	-93.64	-85.3	-8.34	180	165	H
3	1.60031	-79.66	RMS	28.1	-36.7	-15.6	11.8	.3	-91.76	-85.3	-6.46	288	165	H
4	1.56369	-82.53	RMS	28.1	-36.7	-15.6	11.8	.3	-94.63	-85.3	-9.33	180	165	V
5	1.58251	-82.14	RMS	28.1	-36.7	-15.6	11.8	.3	-94.24	-85.3	-8.94	216	165	V
6	1.59914	-81.97	RMS	28.1	-36.7	-15.6	11.8	.3	-94.07	-85.3	-8.77	325	165	V

RMS - RMS detection

10.3. WORST CASE BELOW 1 GHZ

SPURIOUS EMISSIONS 30 TO 1000 MHz



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	63.756	38.48	Pk	17.6	-31.6	24.48	40	-15.52	0-360	300	H
2	32.522	48.24	Pk	15.7	-31.9	32.04	40	-7.96	0-360	100	V
3	99.064	43.62	Pk	17.3	-31.5	29.42	43.52	-14.1	0-360	200	H
4	91.789	41.2	Pk	16.3	-31.4	26.1	43.52	-17.42	0-360	100	V
5	851.59	31.56	Pk	27.2	-28.5	30.26	46.02	-15.76	0-360	100	H
6	834.421	31.85	Pk	26.9	-28.6	30.15	46.02	-15.87	0-360	300	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

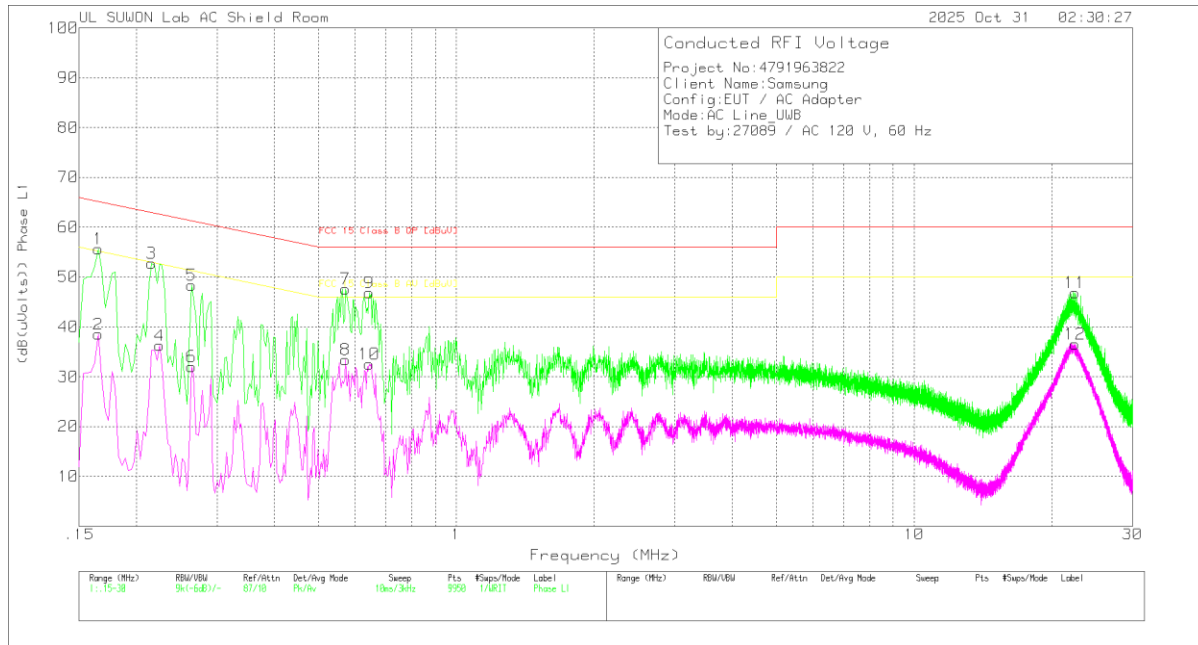
* Decreases with the logarithm of the frequency.

RESULTS

AC Line test was performed worst case. (Highest Power)
ANT0 / CH5 / SP0 / BPRF9 / Packet Length 4

11.1.1. 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 (dB(uVolts))	FCC 15 Class B QP [dBuV]	Margin (dB)	FCC 15 Class B AV [dBuV]	Margin (dB)
1	.165	45.67	Pk	9.9	.1	55.67	65.21	-9.54	-	-
2	.165	28.5	Av	9.9	.1	38.5	-	-	55.21	-16.71
3	.216	42.89	Pk	9.8	.1	52.79	62.97	-10.18	-	-
4	.225	26.44	Av	9.7	.1	36.24	-	-	52.63	-16.39
5	.264	38.65	Pk	9.6	.1	48.35	61.3	-12.95	-	-
6	.264	22.32	Av	9.6	.1	32.02	-	-	51.3	-19.28
7	.573	37.75	Pk	9.8	.1	47.65	56	-8.35	-	-
8	.573	23.52	Av	9.8	.1	33.42	-	-	46	-12.58
9	.645	36.9	Pk	9.8	.1	46.8	56	-9.2	-	-
10	.645	22.67	Av	9.8	.1	32.57	-	-	46	-13.43
11	22.425	36.21	Pk	10.3	.3	46.81	60	-13.19	-	-
12	22.425	25.91	Av	10.3	.3	36.51	-	-	50	-13.49

Pk - Peak detector

Qp - Quasi-Peak detector

Av - Average detection

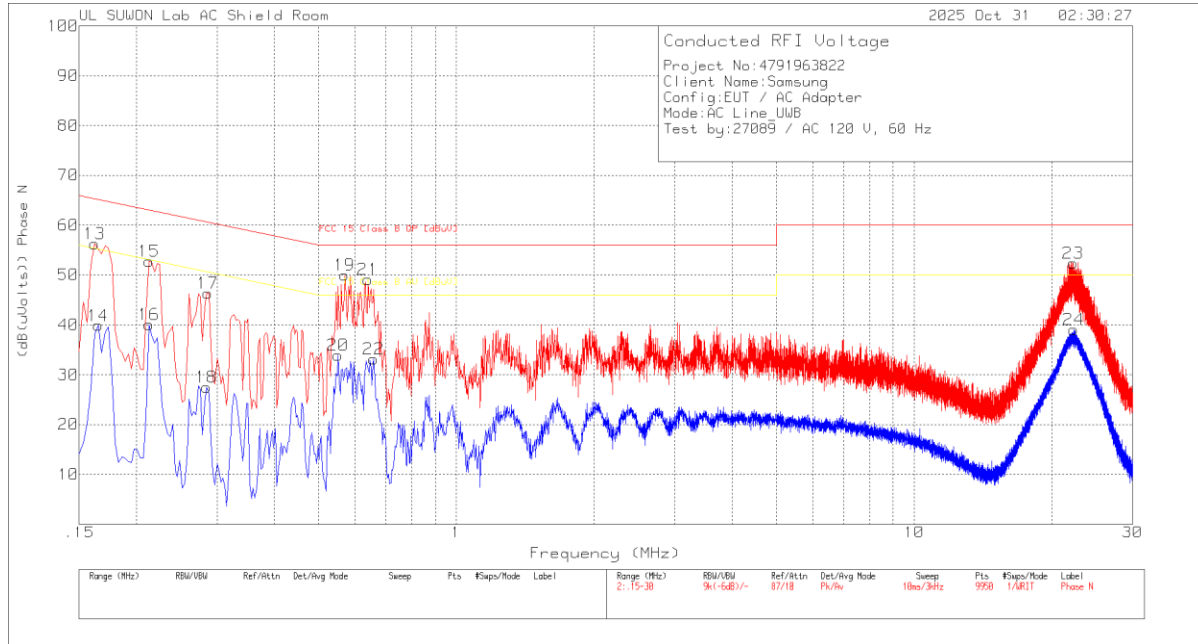
Quasi-Peak Emissions

Range 1: Phase L1 .15 - 30MHz

Frequency (MHz)	Meter Reading (dBuV)	Det	101836_With 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)
.16425	45.63	Qp	9.9	.1	55.63	65.25	-9.62	-	-
.57315	34.31	Qp	9.8	.1	44.21	56	-11.79	-	-
.64575	33.8	Qp	9.8	.1	43.7	56	-12.3	-	-

Qp - Quasi-Peak detector

LINE 2 RESULTS



Trace Markers

Range 2: Phase N .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	101836_With 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	.162	46.25	Pk	9.9	.1	56.25	65.36	-9.11	-	-
14	.165	29.88	Av	9.9	.1	39.88	-	-	55.21	-15.33
15	.213	42.86	Pk	9.8	.1	52.76	63.09	-10.33	-	-
16	.213	30.2	Av	9.8	.1	40.1	-	-	53.09	-12.99
17	.2865	36.59	Pk	9.7	.1	46.39	60.63	-14.24	-	-
18	.285	17.73	Av	9.7	.1	27.53	-	-	50.67	-23.14
19	.57	40.11	Pk	9.8	.1	50.01	56	-5.99	-	-
20	.552	23.97	Av	9.8	.1	33.87	-	-	46	-12.13
21	.642	39.17	Pk	9.8	.1	49.07	56	-6.93	-	-
22	.66	23.29	Av	9.8	.1	33.19	-	-	46	-12.81
23	22.239	41.73	Pk	10.4	.3	52.43	60	-7.57	-	-
24	22.335	28.36	Av	10.4	.3	39.06	-	-	50	-10.94

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_With 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)
.16215	45.99	Qp	9.9	.1	55.99	65.35	-9.36	-	-
.57015	32	Qp	9.8	.1	41.9	56	-14.1	-	-
.64275	32.67	Qp	9.8	.1	42.57	56	-13.43	-	-
22.2398	35.06	Qp	10.4	.3	45.76	60	-14.24	-	-

Qp - Quasi-Peak detector

END OF TEST REPORT