CERTIFICATION TEST REPORT

Report Number. : 4790716492-E1V1

Applicant	:	SAMSUNG ELECTRONICS CO., LTD. 129 SAMSUNG-RO, YEONGTONG-GU, SUWON-SI, GYEONGGI-DO, 16677, KOREA
Model	:	SM-A145FB/DS
FCC ID	:	A3LSMA145F
EUT Description	:	GSM/WCDMA/LTE Phone + BT/BLE, DTS/UNII a/b/g/n/ac.
Test Standard(s)	:	FCC 47 CFR PART 15 SUBPART B

Date Of Issue:
2023-02-10

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
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IAS ACCREDITED Testing Laboratory TL-637

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	2023-02-10	Initial issue	Yeonhee Lim

UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_15B(04)
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME:	SAMSUNG ELECTRONICS CO., LTD.
EUT DESCRIPTION:	GSM/WCDMA/LTE Phone + BT/BLE, DTS/UNII a/b/g/n/ac.
MODEL NUMBER:	SM-A145FB/DS
SERIAL NUMBER:	R38T90076XE, R38T90085AH (RADIATED)
DATE TESTED:	2022-01-26 ~ 2023-02-07;

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
FCC PART 15B	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:

Yeonhee Lim
Suwon Lab Engineer
UL Korea, Ltd.

2. TEST METHODOLOGY

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

1. FCC CFR 47 Part 2.
2. FCC CFR 47 Part 15.
3. ANSI C63.4-2014

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. CALIBRATION AND UNCERTAINTY

4.1. 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.

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)
28.9 dBuV/m = 36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB

Corrected Reading (dBuV) = Meter Reading (dBuV) + External Cable (dB) + Cableloss (dB)
46.62 dBuV + 9.8 dB + 0.1 dB = 56.52 dBuV

4.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	2.80 dB
Radiated Disturbance, 30 MHz to 1 GHz	3.92 dB
Radiated Disturbance, 1 GHz to 18 GHz	5.06 dB

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

4.4. DECISION RULE

Decision rule for statement(s) of conformity is based on Procedure 2, Clause 4.4.3 in IEC Guide 115:2021.

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5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a GSM/WCDMA/LTE Phone + BT/BLE, DTS/UNII a/b/g/n/ac.
This test report addresses the WWAN receiver mode.

5.2. TEST MODE

Mode	Description
GSM850	Communicating with Call simulator(CMW500)
WCDMA BAND 5	Communicating with Call simulator(CMW500)
LTE BAND 5	Communicating with Call simulator(CMW500)

5.3. WORST-CASE ORIENTATION AND MODE

The fundamental and radiated spurious emission were investigated in three orthogonal orientations X,Y and Z, it was determined that below orientation was worst-case orientation for each band.

i. Worst Axis Condition

Band	Worst Case		
	X	Y	Z
GSM 850	-	-	O
WCDMA B5	-	-	O
LTE B5	-	-	O

WCDMA Band5
WCDMA Band 5(Rx Frequncy range: 871.4-891.6 MHz) is covered by GSM 850(Rx Frequency range: 869-894 MHz) due to same frequency range. Therefore, only Mid channel was checked.

Note : The EUT is continuously communicated with the call box during the tests. Also attached with travel adapter for the worst case condition.

5.4. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacture	Model	Serial Number	FCC ID
Charger	SAMSUNG	EP-TA200	R37NS8Q7J35DK3	N/A
Data Cable	SAMSUNG	EP-DR140AWE	GH39-02134A	N/A
Charger	SAMSUNG	EP-TA800	R37T2H82D29SEA	N/A
Data Cable	SAMSUNG	EP-DN980BWE	GH39-02115A	N/A
Earphone	SAMSUNG	EHS61ASFBE	GH59-15063A	N/A

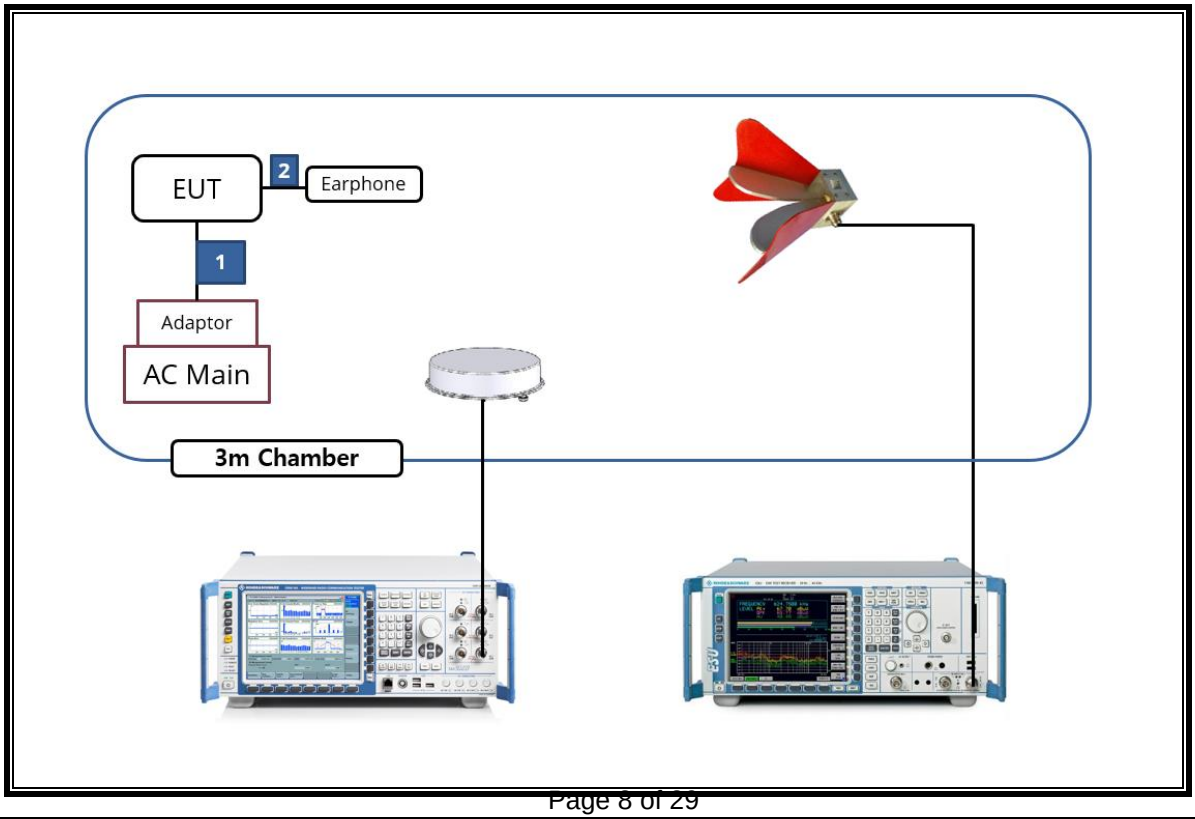
I/O CABLE

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
2	Audio	2	Mini-jack	Unshielded	0.7 m	N/A

TEST SETUP

The EUT is continuously communicated with the call box during the tests.

SETUP DIAGRAM FOR TESTS (RADIATED TEST SETUP)



6. TEST AND MEASUREMENT EQUIPMENT

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

Test Equipment List				
Description	**Manufacturer**	**Model**	**S/N**	**Cal Due**
Antenna, Tuned Dipole 400~1000 MHz	ETS	3121D DB4	00164753	2025-01-17
Antenna, Horn, 40 GHz	ETS	3116C	00166155	2024-08-02
Antenna, Horn, 40 GHz	ETS	3116C	00168645	2023-10-13
Preamplifier	ETS	3116C-PA	00168841	2023-08-04
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	750	2024-08-15
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	845	2024-08-15
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	749	2024-08-15
Communications Test Set	R&S	CMW500	169796	2024-01-05
Preamplifier, 1000 MHz	Sonoma	310N	341282	2023-08-02
Preamplifier, 1000 MHz	Sonoma	310N	351741	2023-08-02
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1876511	2023-08-02
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	2029169	2023-08-01
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1896138	2023-08-01
EMI Test Receive, 40 GHz	R&S	ESU40	100439	2023-08-02
EMI Test Receive, 40 GHz	R&S	ESU40	100457	2023-07-29
Directional Antenna	Cobham	FPA3-0.8-6.0R/1329	80108-0004	N/A
Directional Antenna	Cobham	FPA3-0.8-6.0R/1329	110367-0003	N/A
High Pass Filter 1.2GHz	Micro-Tronics	HPM50108-02	G005	2023-08-01
High Pass Filter 1.2GHz	Micro-Tronics	HPM50108-02	G006	2023-08-01
High Pass Filter 2.8GHz	Micro-Tronics	HPM50111-02	010	2023-08-01
High Pass Filter 2.8GHz	Micro-Tronics	HPM50111-02	011	2023-08-01
High Pass Filter 4GHz	Micro-Tronics	HPM50118-02	G001	2023-08-01
High Pass Filter 4GHz	Micro-Tronics	HPM50118-02	G002	2023-08-01
Attenuator	PASTERNACK	PE7087-10	A009	2023-08-03
Attenuator	PASTERNACK	PE7087-10	A001	2023-08-03
Attenuator	PASTERNACK	PE7087-10	A008	2023-08-03
Attenuator	PASTERNACK	PE7004-10	2	2023-08-01
Attenuator	PASTERNACK	PE7395-10	A011	2023-08-03
EMI Test Receive, 3 GHz	R&S	ESR3	101832	2023-08-01
LISN	R&S	ENV-216	101836	2023-08-04
LISN	R&S	ENV-216	101837	2023-08-04
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. APPLICABLE LIMITS AND TEST RESULTS

7.1. RADIATED EMISSIONS

TEST PROCEDURE

ANSI C63.4-2014

LIMIT

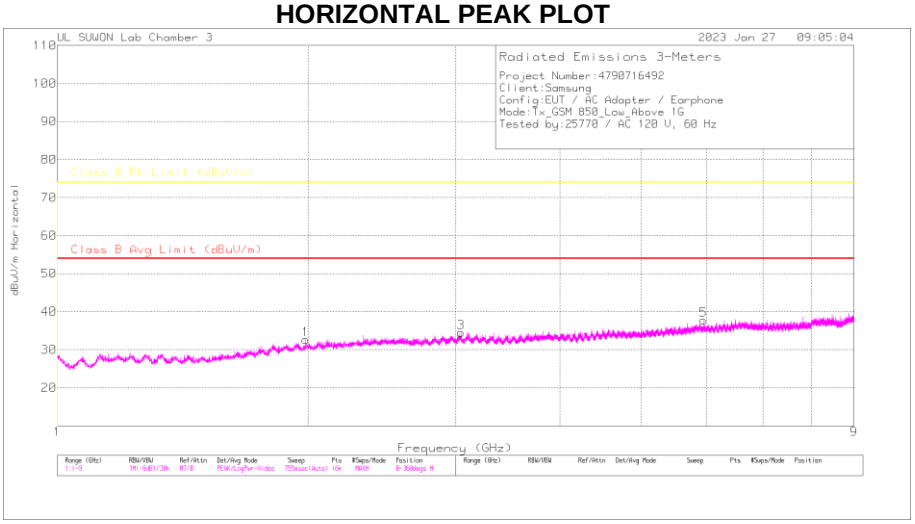
§15.109 (a) Except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Limits for radiated disturbance of Class B ITE at measuring distance of 3 m	
Frequency range (MHz)	Quasi-peak limits (dBµV/m)
30 to 88	40
88 to 216	43.5
216 to 960	46
Above 960 MHz	54
Note: The lower limit shall apply at the transition frequency.	

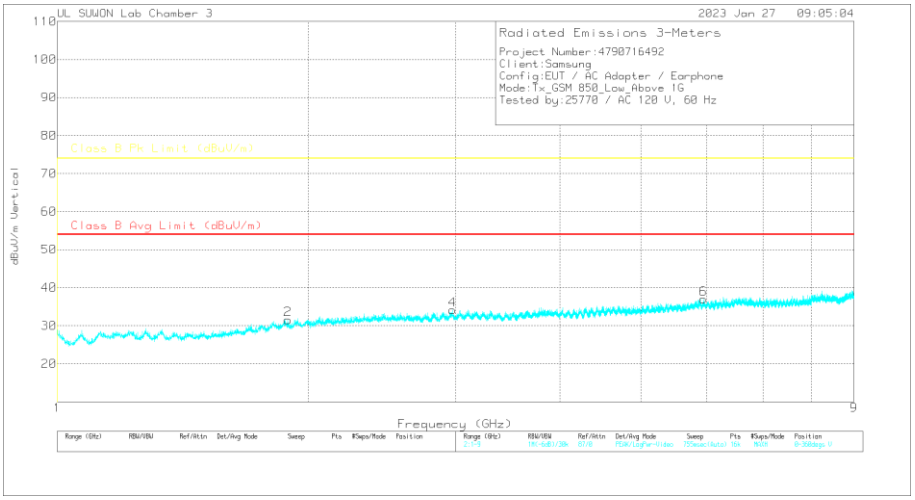
7.1.1. Above 1 GHz in the GSM850

LOW CHANNEL(869.2 MHz)

HORIZONTAL PEAK PLOT



VERTICAL PEAK PLOT



DATA

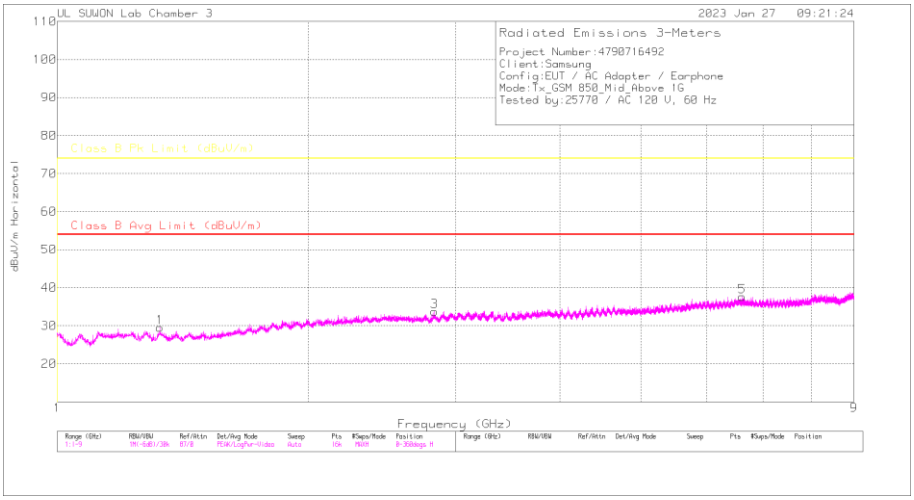
Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00218957	1-18G[dB]	1GHz_HP[dB]	Corrected Reading dBuV/m	Class B Avg Limit (dBuV/m)	Margin (dB)	Class B Pk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1.985	42.01	Pk	31.7	-34.8	.6	39.51	-	-	74	-34.49	0	100	H
1.985	29.76	Ca	31.7	-34.8	.6	27.26	54	-26.74	-	-	0	100	H
1.8895	41.59	Pk	31.4	-34.9	.7	38.79	-	-	74	-35.21	0	100	V
1.8895	29.52	Ca	31.4	-34.9	.7	26.72	54	-27.28	-	-	0	100	V
3.044	40.92	Pk	33.4	-33.5	.7	41.52	-	-	74	-32.48	0	100	H
3.044	28.81	Ca	33.4	-33.5	.7	29.41	54	-24.59	-	-	0	100	H
2.9745	41.04	Pk	33.2	-33.7	.7	41.24	-	-	74	-32.76	0	100	V
2.9745	28.99	Ca	33.2	-33.7	.7	29.19	54	-24.81	-	-	0	100	V
5.9395	37.04	Pk	36	-29.2	.5	44.34	-	-	74	-29.66	0	100	H
5.9395	24.75	Ca	36	-29.2	.5	32.05	54	-21.95	-	-	0	100	H
5.945	37.68	Pk	36	-29.2	.5	44.98	-	-	74	-29.02	0	100	V
5.945	24.86	Ca	36	-29.2	.5	32.16	54	-21.84	-	-	0	100	V

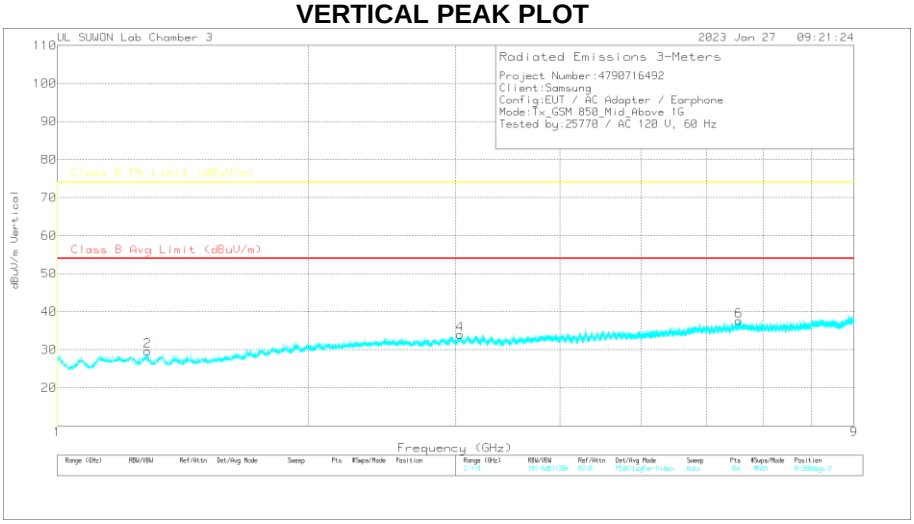
Pk - Peak detector
Ca - CISPR average detection

MID CHANNEL(881.6 MHz)

HORIZONTAL PEAK PLOT



VERTICAL PEAK PLOT



DATA

Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00218957	1-18G[dB]	1GHz_HP[dB]	Corrected Reading dBuV/m	Class B Avg Limit (dBuV/m)	Margin (dB)	Class B Pk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1.3275	43.14	Pk	28.7	-35.8	.7	36.74	-	-	74	-37.26	0	100	H
1.3275	30.87	Ca	28.7	-35.8	.7	24.47	54	-29.53	-	-	0	100	H
1.283	42.86	Pk	28.8	-35.9	.8	36.56	-	-	74	-37.44	0	100	V
1.283	30.72	Ca	28.8	-35.9	.8	24.42	54	-29.58	-	-	0	100	V
2.8295	41.52	Pk	33	-34.1	.7	41.12	-	-	74	-32.88	0	100	H
2.8295	29.17	Ca	33	-34.1	.7	28.77	54	-25.23	-	-	0	100	H
3.039	41.3	Pk	33.4	-33.6	.7	41.8	-	-	74	-32.2	0	100	V
3.039	28.88	Ca	33.4	-33.6	.7	29.38	54	-24.62	-	-	0	100	V
6.6135	34.96	Pk	36.5	-27.2	.5	44.76	-	-	74	-29.24	0	100	H
6.6135	23.01	Ca	36.5	-27.2	.5	32.81	54	-21.19	-	-	0	100	H
6.554	35.4	Pk	36.5	-27.3	.5	45.1	-	-	74	-28.9	0	100	V
6.554	23.25	Ca	36.5	-27.3	.5	32.95	54	-21.05	-	-	0	100	V

Pk - Peak detector
Ca - CISPR average detection

UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_15B(04)
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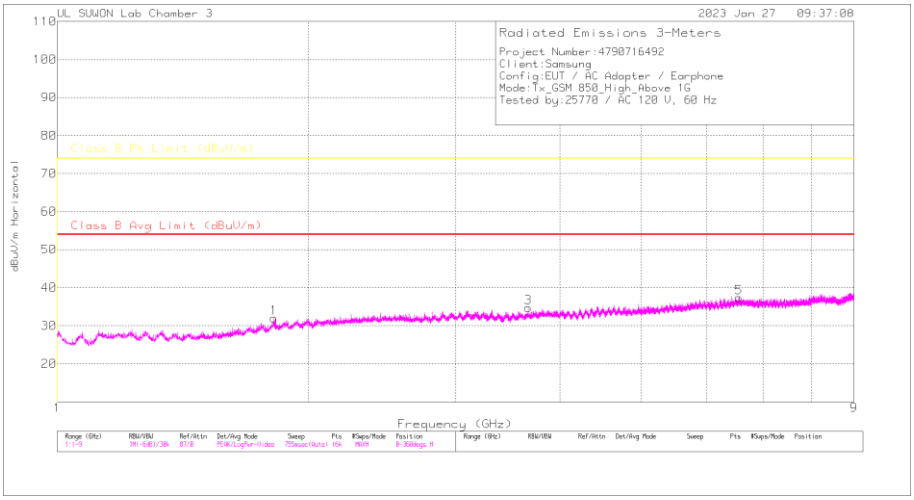
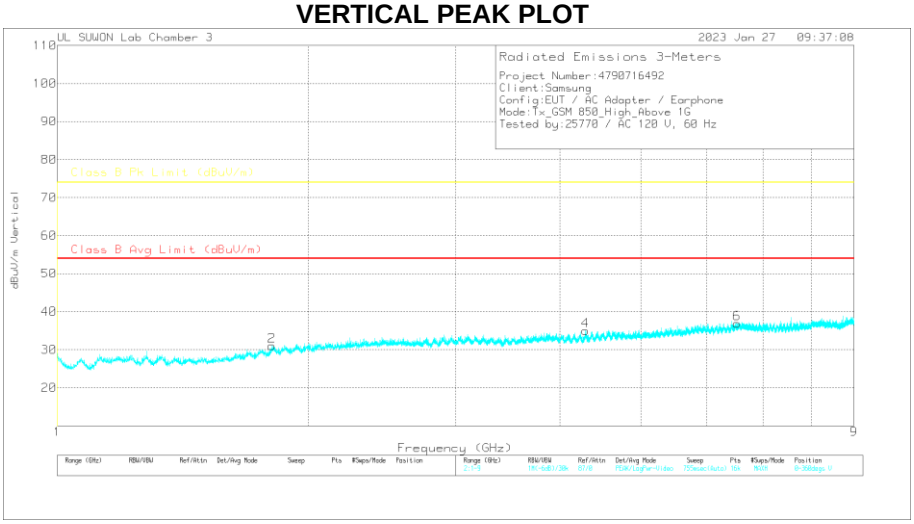
HIGH CHANNEL(893.8 MHz)

HORIZONTAL PEAK PLOT



VERTICAL PEAK PLOT



DATA

Radiated Emissions

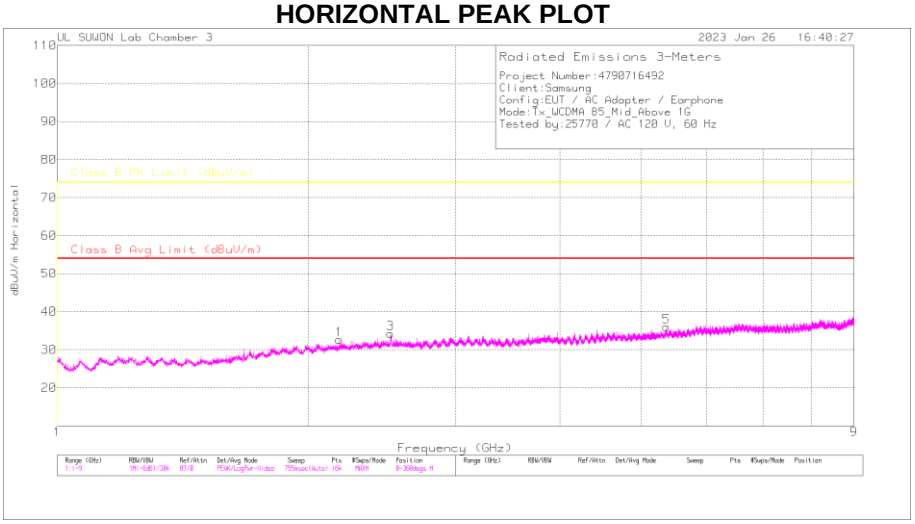
Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00218957	1-18G[dB]	1GHz_HP[dB]	Corrected Reading dBuV/m	Class B Avg Limit (dBuV/m)	Margin (dB)	Class B Pk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1.8185	42.41	Pk	31	-35.1	.7	39.01	-	-	74	-34.99	0	100	H
1.8185	30.04	Ca	31	-35.1	.7	26.64	54	-27.36	-	-	0	100	H
1.8075	42.52	Pk	30.9	-35.1	.7	39.02	-	-	74	-34.98	0	100	V
1.8075	29.94	Ca	30.9	-35.1	.7	26.44	54	-27.56	-	-	0	100	V
3.6635	40.37	Pk	33.6	-32.6	.6	41.97	-	-	74	-32.03	0	100	H
3.6635	27.69	Ca	33.6	-32.6	.6	29.29	54	-24.71	-	-	0	100	H
4.295	39.46	Pk	34.1	-31.3	.5	42.76	-	-	74	-31.24	0	100	V
4.295	26.91	Ca	34.1	-31.3	.5	30.21	54	-23.79	-	-	0	100	V
6.5505	34.85	Pk	36.5	-27.4	.5	44.45	-	-	74	-29.55	0	100	H
6.5505	23.1	Ca	36.5	-27.4	.5	32.7	54	-21.3	-	-	0	100	H
6.516	35.22	Pk	36.5	-27.6	.5	44.62	-	-	74	-29.38	0	100	V
6.516	22.99	Ca	36.5	-27.6	.5	32.39	54	-21.61	-	-	0	100	V

Pk - Peak detector
Ca - CISPR average detection

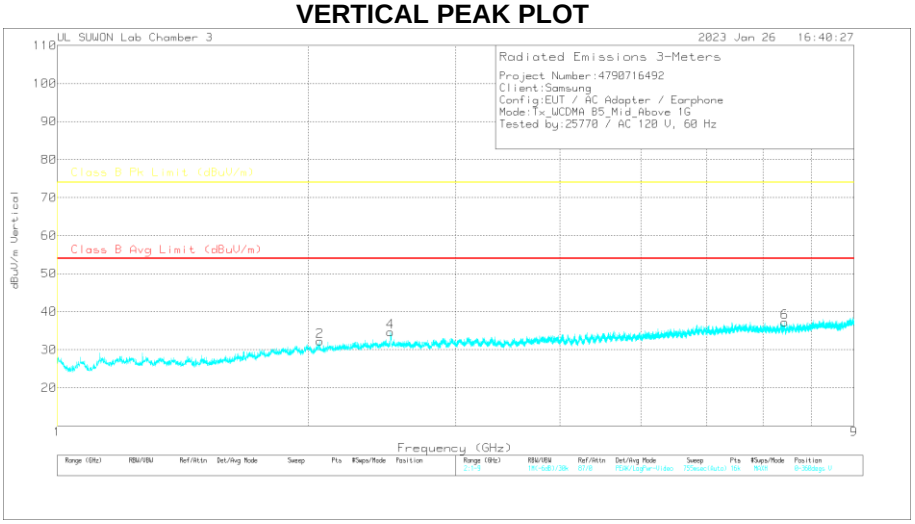
7.1.2. Above 1 GHz in the WCDMA Band 5

MID CHANNEL(881.6 MHz)

HORIZONTAL PEAK PLOT



VERTICAL PEAK PLOT



DATA

Radiated Emissions

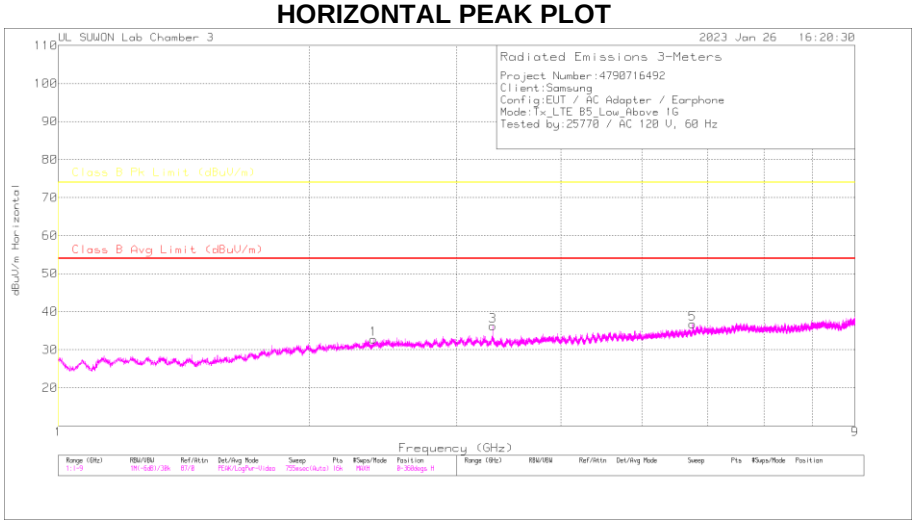
Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00218957	1-18G[dB]	1GHz_HP[dB]	Corrected Reading dBuV/m	Class B Avg Limit (dBuV/m)	Margin (dB)	Class B Pk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2.178	42.76	Pk	32.1	-34.5	.7	41.06	-	-	74	-32.94	360	100	H
2.178	28.78	Ca	32.1	-34.5	.7	27.08	54	-26.92	-	-	360	100	H
2.063	41.66	Pk	31.9	-34.7	.6	39.46	-	-	74	-34.54	360	100	V
2.063	29.31	Ca	31.9	-34.7	.6	27.11	54	-26.89	-	-	360	100	V
2.5065	42.68	Pk	32.9	-34.3	.7	41.98	-	-	74	-32.02	360	100	H
2.5065	30.46	Ca	32.9	-34.3	.7	29.76	54	-24.24	-	-	360	100	H
2.506	43.07	Pk	32.9	-34.2	.7	42.47	-	-	74	-31.53	360	100	V
2.506	29.41	Ca	32.9	-34.2	.7	28.81	54	-25.19	-	-	360	100	V
5.364	37.08	Pk	35.1	-30.1	.5	42.58	-	-	74	-31.42	360	100	H
5.364	25.24	Ca	35.1	-30.1	.5	30.74	54	-23.26	-	-	360	100	H
7.435	33.63	Pk	36	-25.5	.6	44.73	-	-	74	-29.27	360	100	V
7.435	21.12	Ca	36	-25.5	.6	32.22	54	-21.78	-	-	360	100	V

Pk - Peak detector
Ca - CISPR average detection

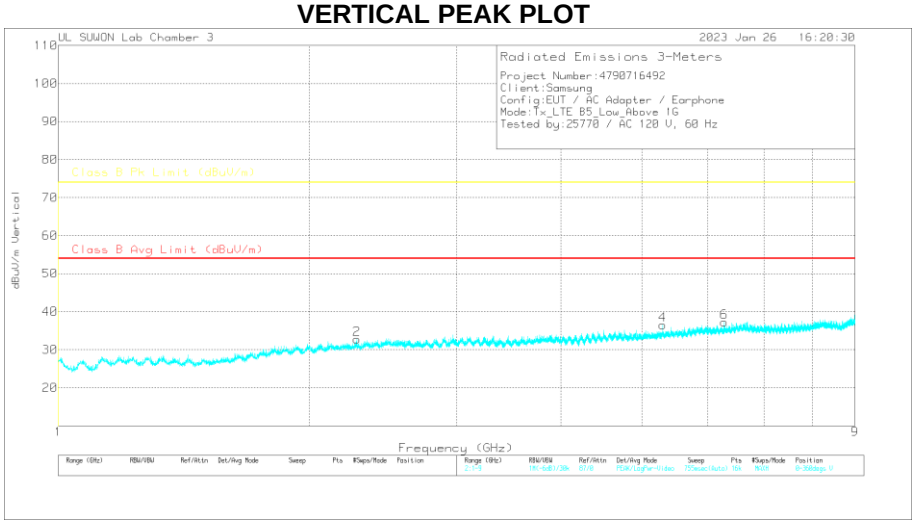
7.1.3. Above 1 GHz in the LTE Band 5

LOW CHANNEL(874 MHz)

HORIZONTAL PEAK PLOT



VERTICAL PEAK PLOT



DATA

Radiated Emissions

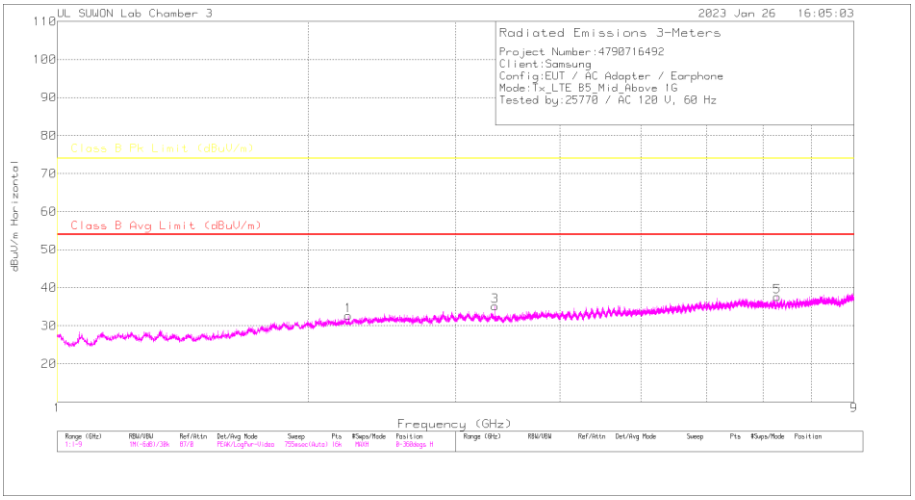
Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00218957	1-18G[dB]	1GHz_HP[dB]	Corrected Reading dBuV/m	Class B Avg Limit (dBuV/m)	Margin (dB)	Class B Pk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2.386	41.37	Pk	32.7	-34.5	.7	40.27	-	-	74	-33.73	0	100	H
2.386	28.73	Ca	32.7	-34.5	.7	27.63	54	-26.37	-	-	0	100	H
2.278	42.65	Pk	32.3	-34.3	.7	41.35	-	-	74	-32.65	0	100	V
2.278	28.97	Ca	32.3	-34.3	.7	27.67	54	-26.33	-	-	0	100	V
3.316	40.25	Pk	33.4	-33.2	.7	41.15	-	-	74	-32.85	0	100	H
3.316	28.28	Ca	33.4	-33.2	.7	29.18	54	-24.82	-	-	0	100	H
5.2955	37.47	Pk	35	-30.2	.5	42.77	-	-	74	-31.23	0	100	V
5.2955	25.33	Ca	35	-30.2	.5	30.63	54	-23.37	-	-	0	100	V
5.7525	37.08	Pk	35.7	-29.3	.5	43.98	-	-	74	-30.02	0	100	H
5.7525	24.5	Ca	35.7	-29.3	.5	31.4	54	-22.6	-	-	0	100	H
6.2775	35.41	Pk	36.2	-28.5	.5	43.61	-	-	74	-30.39	0	100	V
6.2775	23.52	Ca	36.2	-28.5	.5	31.72	54	-22.28	-	-	0	100	V

Pk - Peak detector
Ca - CISPR average detection

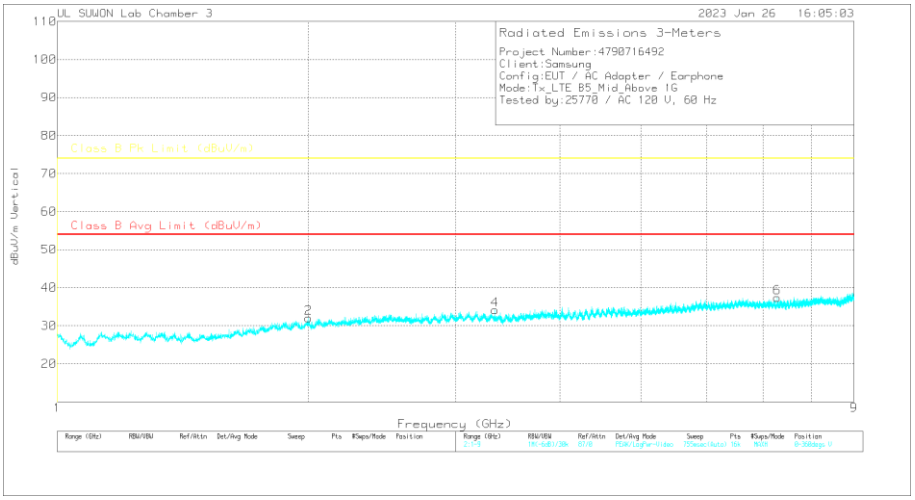
UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_15B(04)
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

MID CHANNEL(881.5 MHz)

HORIZONTAL PEAK PLOT



VERTICAL PEAK PLOT



DATA

Radiated Emissions

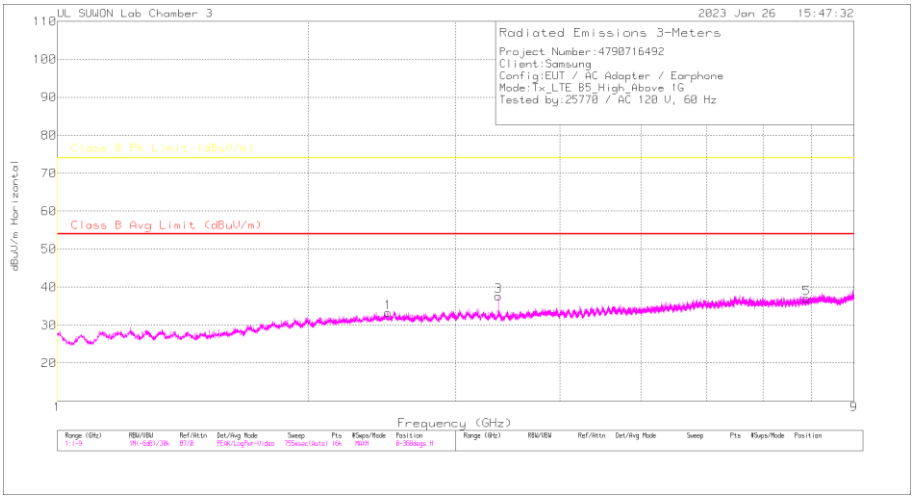
Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00218957	1-18G[dB]	1GHz_HP[dB]	Corrected Reading dBuV/m	Class B Avg Limit (dBuV/m)	Margin (dB)	Class B Pk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2.232	42.11	Pk	32.2	-34.4	.7	40.61	-	-	74	-33.39	360	100	H
2.232	28.84	Ca	32.2	-34.4	.7	27.34	54	-26.66	-	-	360	100	H
1.9995	41.84	Pk	31.7	-34.9	.6	39.24	-	-	74	-34.76	360	100	V
1.9995	29.56	Ca	31.7	-34.9	.6	26.96	54	-27.04	-	-	360	100	V
3.346	40.75	Pk	33.3	-33.2	.7	41.55	-	-	74	-32.45	360	100	H
3.346	27.45	Ca	33.3	-33.2	.7	28.25	54	-25.75	-	-	360	100	H
3.346	40.6	Pk	33.3	-33.2	.7	41.4	-	-	74	-32.6	360	100	V
3.346	27.87	Ca	33.3	-33.2	.7	28.67	54	-25.33	-	-	360	100	V
7.2795	33.8	Pk	36	-25.9	.5	44.4	-	-	74	-29.6	360	100	H
7.2795	21.63	Ca	36	-25.9	.5	32.23	54	-21.77	-	-	360	100	H
7.287	34.38	Pk	36	-25.9	.5	44.98	-	-	74	-29.02	360	100	V
7.287	21.81	Ca	36	-25.9	.5	32.41	54	-21.59	-	-	360	100	V

Pk - Peak detector
Ca - CISPR average detection

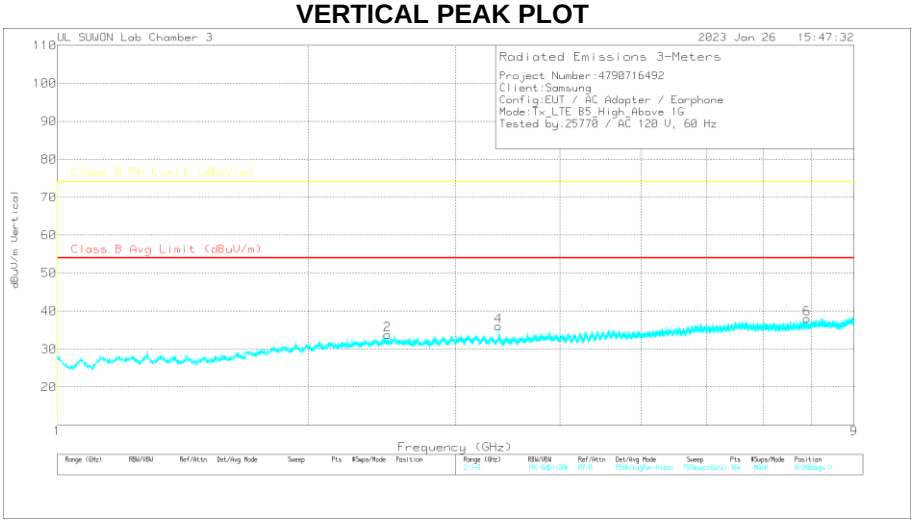
UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_15B(04)
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

HIGH CHANNEL(889 MHz)

HORIZONTAL PEAK PLOT



VERTICAL PEAK PLOT



DATA

Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00218957	1-18G[dB]	1GHz_HP[dB]	Corrected Reading dBuV/m	Class B Avg Limit (dBuV/m)	Margin (dB)	Class B Pk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2.49	41.75	Pk	32.9	-34.3	.7	41.05	-	-	74	-32.95	0	100	H
2.49	28.85	Ca	32.9	-34.3	.7	28.15	54	-25.85	-	-	0	100	H
2.488	41.15	Pk	32.9	-34.3	.7	40.45	-	-	74	-33.55	0	100	V
2.488	28.84	Ca	32.9	-34.3	.7	28.14	54	-25.86	-	-	0	100	V
3.376	40.62	Pk	33.1	-33.2	.7	41.22	-	-	74	-32.78	0	100	H
3.376	28.67	Ca	33.1	-33.2	.7	29.27	54	-24.73	-	-	0	100	H
3.376	41.25	Pk	33.1	-33.2	.7	41.85	-	-	74	-32.15	0	100	V
3.376	29.58	Ca	33.1	-33.2	.7	30.18	54	-23.82	-	-	0	100	V
7.9005	32.56	Pk	36.3	-24.7	.6	44.76	-	-	74	-29.24	0	100	H
7.9005	20.7	Ca	36.3	-24.7	.6	32.9	54	-21.1	-	-	0	100	H
7.9045	32.34	Pk	36.3	-24.7	.6	44.54	-	-	74	-29.46	0	100	V
7.9045	20.66	Ca	36.3	-24.7	.6	32.86	54	-21.14	-	-	0	100	V

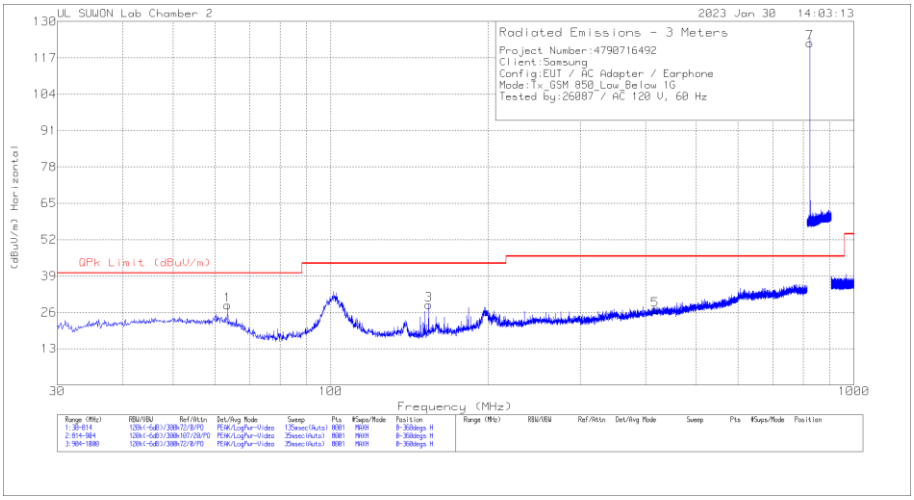
Pk - Peak detector
Ca - CISPR average detection

UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_15B(04)
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

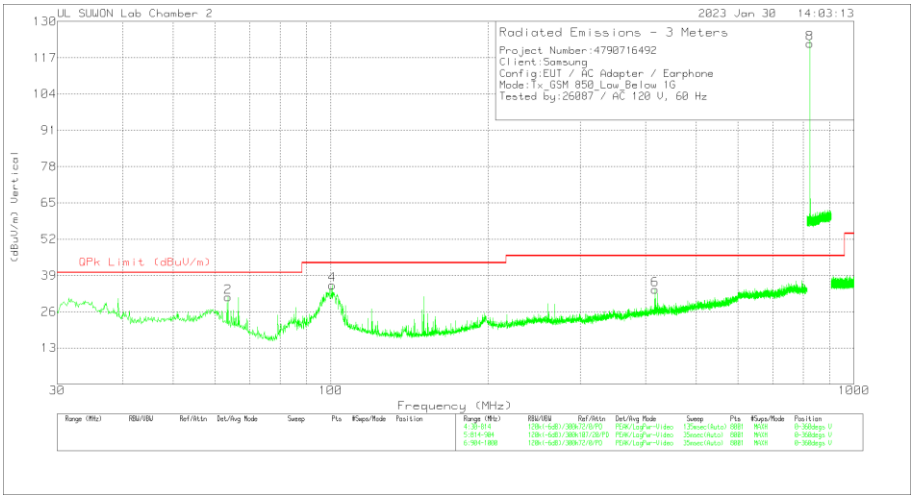
7.1.4. Below 1 GHz in the GSM850

LOW CHANNEL(869.2 MHz)

HORIZONTAL PEAK PLOT



VERTICAL PEAK PLOT



DATA

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	VULB9163_749	Below 1G_Bypass[dB]	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	63.516	9.87	Pk	17.7	.9	28.47	40	-11.53	0-360	300	H
3	153.872	13.11	Pk	14.2	1.4	28.71	43.52	-14.81	0-360	100	H
5	416.61	2.98	Pk	21.6	2.3	26.88	46.02	-19.14	0-360	100	H
7	824.2263	92.53	Pk	26.5	3.3	122.33	**46.02**	**76.31**	0-360	100	H
2	63.614	12.65	Pk	17.7	.9	31.25	40	-8.75	0-360	200	V
4	100.56	16.87	Pk	17.5	1.2	35.57	43.52	-7.95	0-360	200	V
6	416.414	10.03	Pk	21.6	2.3	33.93	46.02	-12.09	0-360	200	V
8	824.2263	92.33	Pk	26.5	3.3	122.13	**46.02**	**76.11**	0-360	300	V

Pk - Peak detector

Note: Unwanted emissions captured from 824MHz to 849MHz and from 869MHz to 894MHz were the TX and RX signals generated from the call-simulator.

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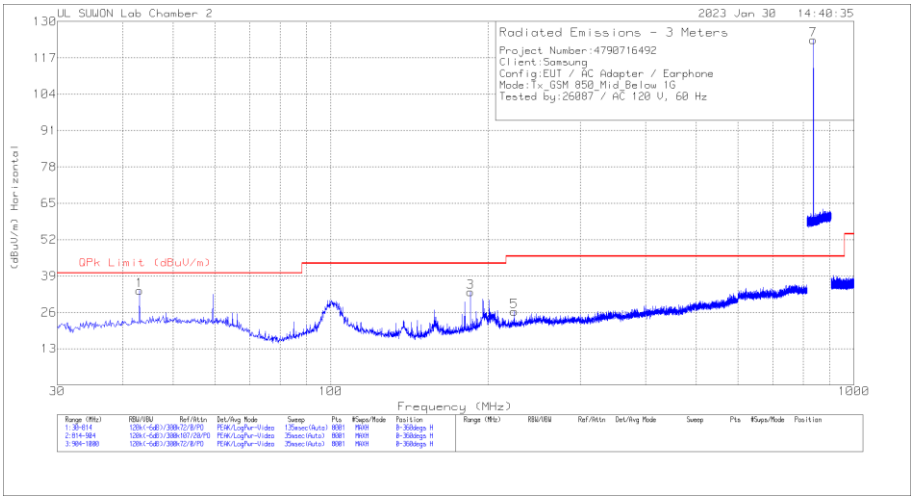
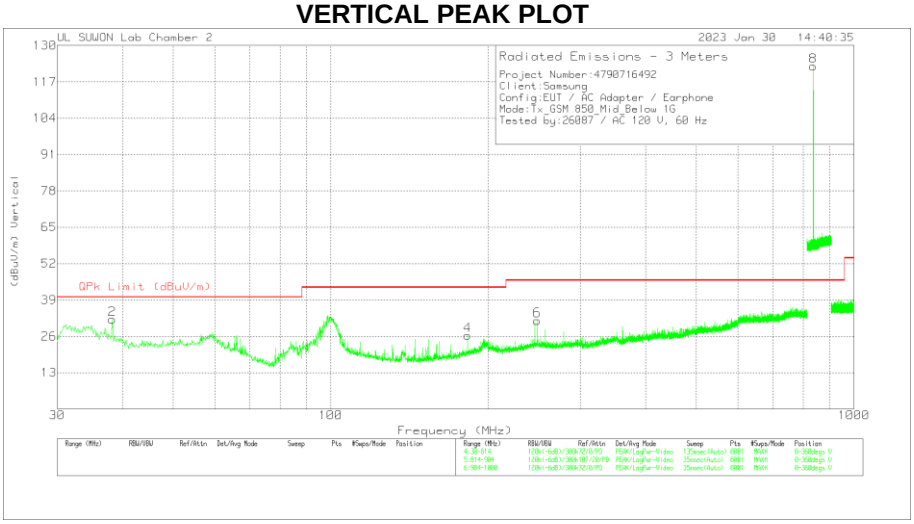
MID CHANNEL(881.6 MHz)

HORIZONTAL PEAK PLOT



VERTICAL PEAK PLOT



DATA

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	VULB9163_749	Below 1G_Bypass[dB]	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	43.132	13.42	Pk	19.5	.8	33.72	40	-6.28	0-360	300	H
3	184.938	15.71	Pk	15.9	1.6	33.21	43.52	-10.31	0-360	100	H
5	224.236	7.21	Pk	17.4	1.7	26.31	46.02	-19.71	0-360	200	H
7	836.6013	93.5	Pk	26.6	3.3	123.4	**46.02**	**77.38**	0-360	100	H
2	38.232	13.26	Pk	18.1	.7	32.06	40	-7.94	0-360	200	V
4	182.586	9.09	Pk	15.7	1.6	26.39	43.52	-17.13	0-360	300	V
6	248.148	11.37	Pk	18.5	1.8	31.67	46.02	-14.35	0-360	400	V
8	836.6013	92.72	Pk	26.6	3.3	122.62	**46.02**	**76.6**	0-360	100	V

Pk - Peak detector

Radiated Emissions

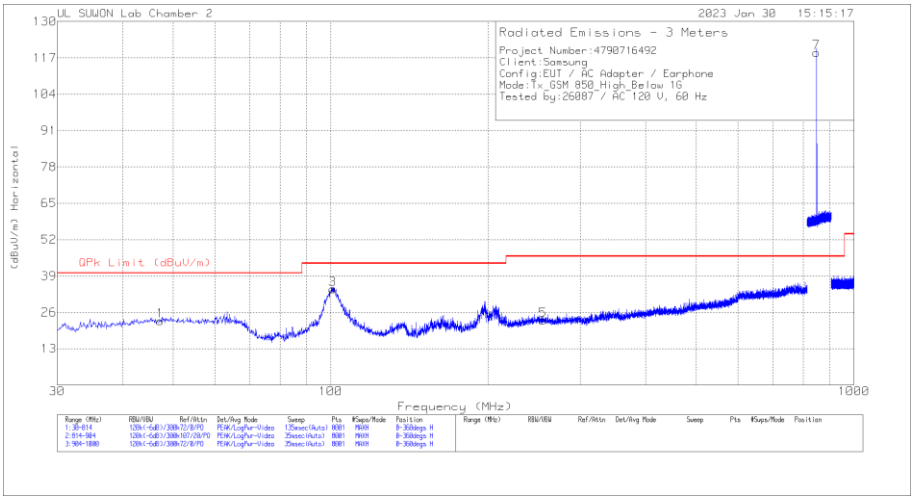
Frequency (MHz)	Meter Reading (dBuV)	Det	VULB9163_74 9	Below 1G_Bypass[dB]	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
43.132	-2.02	Qp	19.5	.8	18.28	40	-21.72	328	305	H

Qp - Quasi-Peak detector

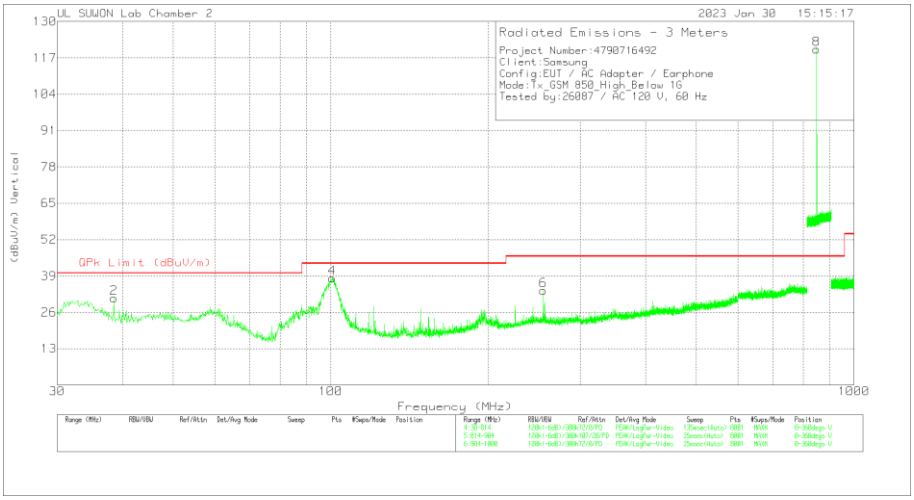
Note: Unwanted emissions captured from 824MHz to 849MHz and from 869MHz to 894MHz were the TX and RX signals generated from the call-simulator.

HIGH CHANNEL(893.8 MHz)

HORIZONTAL PEAK PLOT



VERTICAL PEAK PLOT



DATA

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	VULB9163_749	Below 1G_Bypass[dB]	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	47.248	2.12	Pk	20	.8	22.92	40	-17.08	0-360	200	H
3	100.756	15.56	Pk	17.5	1.2	34.26	43.52	-9.26	0-360	100	H
5	254.518	2.55	Pk	18.7	1.8	23.05	46.02	-22.97	0-360	100	H
7	848.8188	88.73	Pk	26.9	3.3	118.93	**46.02**	**72.91**	0-360	300	H
2	38.526	12.13	Pk	18.2	.7	31.03	40	-8.97	0-360	200	V
4	100.56	19.51	Pk	17.5	1.2	38.21	43.52	-5.31	0-360	200	V
6	255.106	13.26	Pk	18.7	1.8	33.76	46.02	-12.26	0-360	300	V
8	848.8188	89.79	Pk	26.9	3.3	119.99	**46.02**	**73.97**	0-360	100	V

Pk - Peak detector

Radiated Emissions

Frequency (MHz)	Meter Reading (dBuV)	Det	VULB9163_749	Below 1G_Bypass[dB]	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
100.56	14.75	Qp	17.5	1.2	33.45	43.52	-10.07	238	100	V

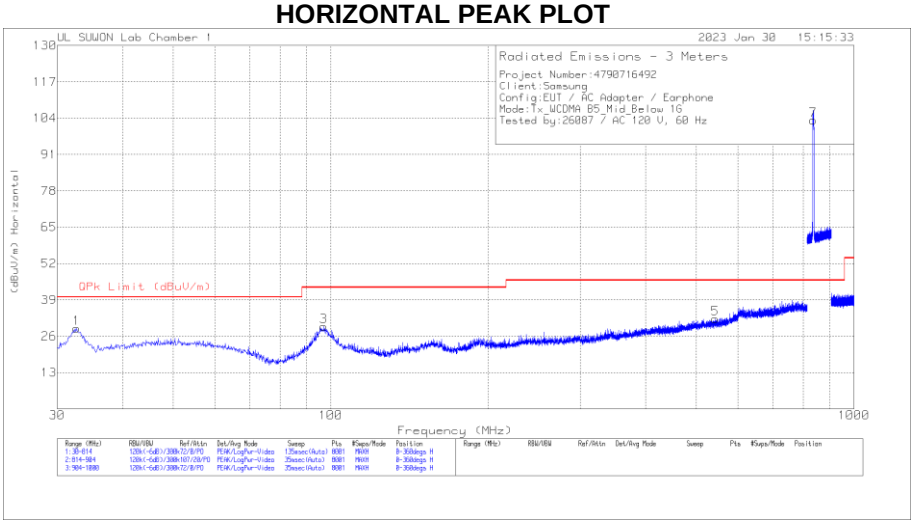
Qp - Quasi-Peak detector

Note: Unwanted emissions captured from 824MHz to 849MHz and from 869MHz to 894MHz were the TX and RX signals generated from the call-simulator.

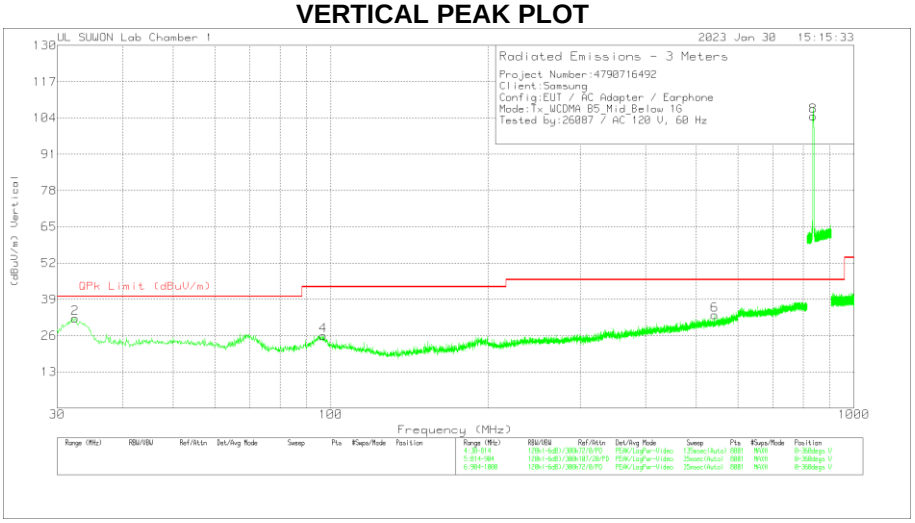
7.1.5. Below 1 GHz in the WCDMA Band 5

MID CHANNEL(881.6 MHz)

HORIZONTAL PEAK PLOT



VERTICAL PEAK PLOT



DATA

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	VULB9163_750	Below_1G_Bypass [dB]	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	32.646	11.98	Pk	15.7	1.2	28.88	40	-11.12	0-360	100	H
3	96.934	10.52	Pk	16.9	2.1	29.52	43.52	-14	0-360	200	H
5	542.932	4.45	Pk	23	4.8	32.25	46.02	-13.77	0-360	300	H
7	836.6013	70.97	Pk	26.3	6	103.27	**46.02**	**57.25**	0-360	300	H
2	32.45	15.36	Pk	15.6	1.3	32.26	40	-7.74	0-360	200	V
4	96.738	7	Pk	16.9	2.1	26	43.52	-17.52	0-360	200	V
6	542.05	5.6	Pk	23	4.9	33.5	46.02	-12.52	0-360	300	V
8	836.6125	72.4	Pk	26.3	6	104.7	**46.02**	**58.68**	0-360	100	V

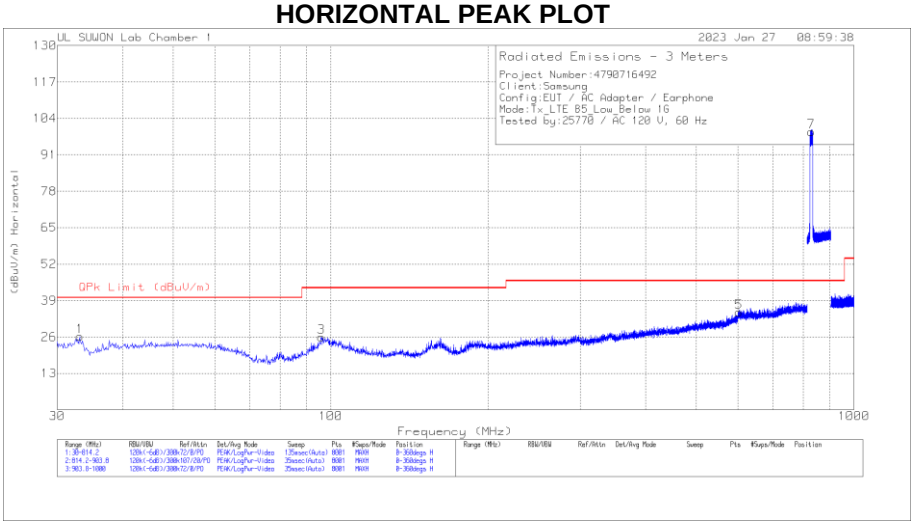
Pk - Peak detector

Note: Unwanted emissions captured from 824MHz to 849MHz and from 869MHz to 894MHz were the TX and RX signals generated from the call-simulator.

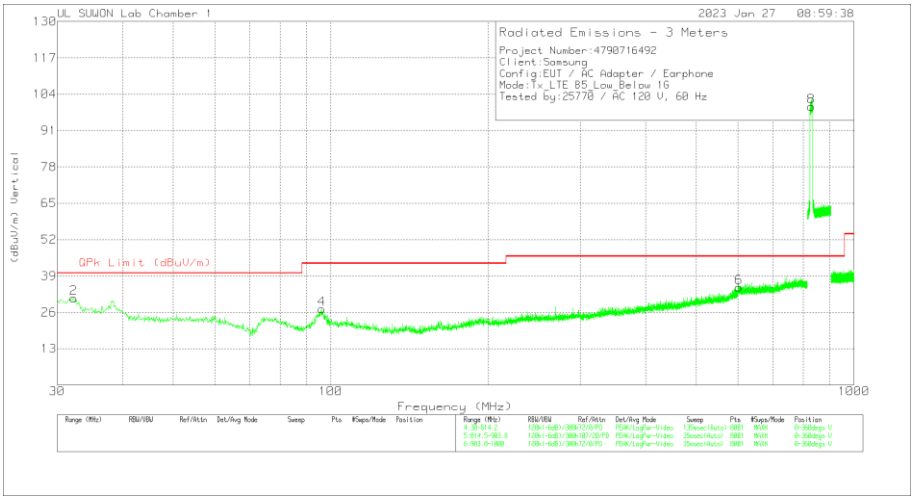
7.1.6. Below 1 GHz in the LTE Band 5

LOW CHANNEL(874 MHz)

HORIZONTAL PEAK PLOT



VERTICAL PEAK PLOT



DATA

Trace Markers

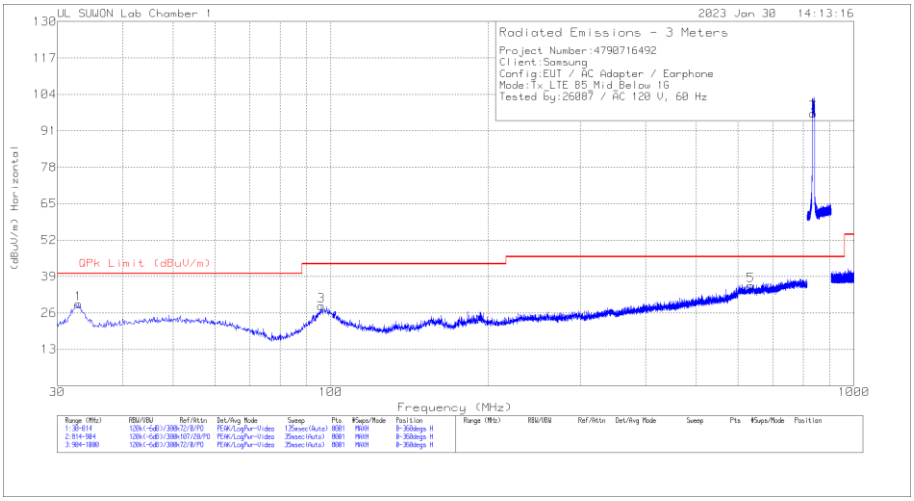
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	VULB9163_750	Below_1G_Bypass[dB]	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	33.1368	9.08	Pk	15.8	1.3	26.18	40	-13.82	0-360	100	H
3	95.9708	7.02	Pk	16.8	2.1	25.92	43.52	-17.6	0-360	200	H
5	602.1719	5.35	Pk	24.4	5.1	34.85	46.02	-11.17	0-360	300	H
7	828.9952	66.96	Pk	26.2	6	99.16	**46.02**	**53.14**	0-360	200	H
2	32.2546	14.25	Pk	15.6	1.3	31.15	40	-8.85	0-360	200	V
4	96.0689	8.31	Pk	16.8	2	27.11	43.52	-16.41	0-360	200	V
6	602.27	5.52	Pk	24.4	5.1	35.02	46.02	-11	0-360	200	V
8	829.0119	67.28	Pk	26.2	6	99.48	**46.02**	**53.46**	0-360	100	V

Pk - Peak detector

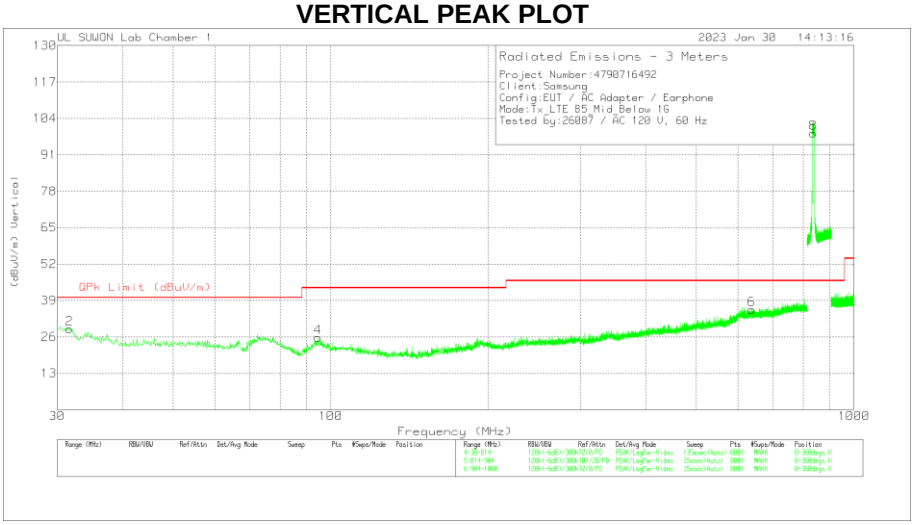
Note: Unwanted emissions captured from 824MHz to 849MHz and from 869MHz to 894MHz were the TX and RX signals generated from the call-simulator.

MID CHANNEL(881.5 MHz)

HORIZONTAL PEAK PLOT



VERTICAL PEAK PLOT



DATA

Trace Markers

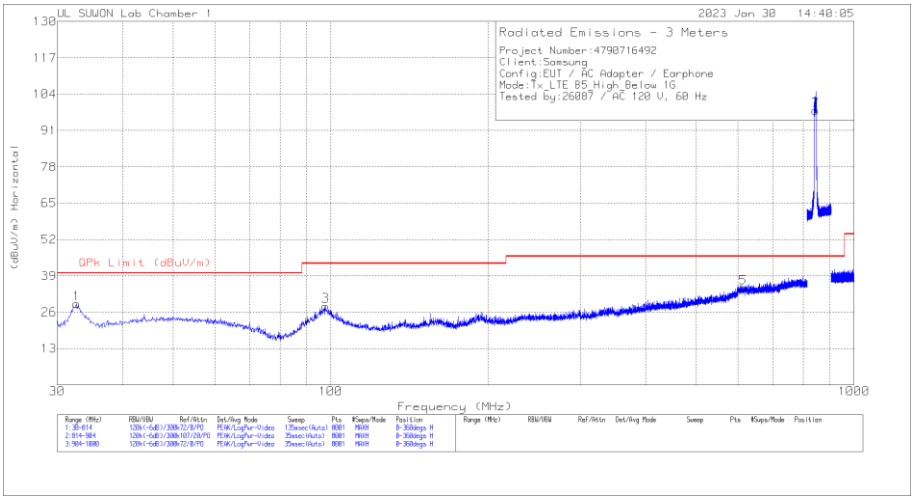
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	VULB9163_750	Below_1G_Bypass[dB]	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	32.94	12.21	Pk	15.8	1.2	29.21	40	-10.79	0-360	200	H
3	95.856	9.79	Pk	16.8	2	28.59	43.52	-14.93	0-360	200	H
5	634.954	6.22	Pk	24.3	5.3	35.82	46.02	-10.2	0-360	300	H
7	836.5113	64.88	Pk	26.3	6	97.18	**46.02**	**51.16**	0-360	300	H
2	31.666	12.22	Pk	15.5	1.1	28.82	40	-11.18	0-360	100	V
4	94.582	7.05	Pk	16.7	2	25.75	43.52	-17.77	0-360	100	V
6	637.306	6.39	Pk	24.3	5.2	35.89	46.02	-10.13	0-360	100	V
8	836.5338	66.42	Pk	26.3	6	98.72	**46.02**	**52.7**	0-360	100	V

Pk - Peak detector

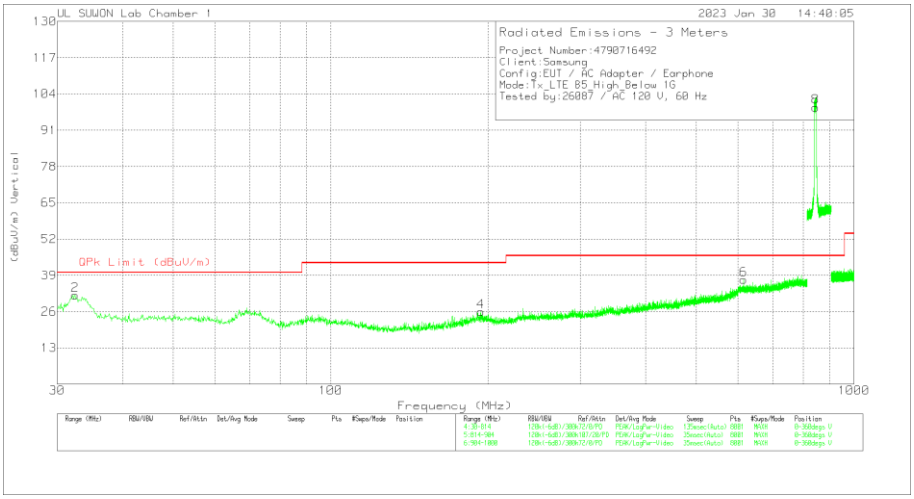
Note: Unwanted emissions captured from 824MHz to 849MHz and from 869MHz to 894MHz were the TX and RX signals generated from the call-simulator.

HIGH CHANNEL(889 MHz)

HORIZONTAL PEAK PLOT



VERTICAL PEAK PLOT



DATA

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	VULB9163_750	Below_1G_Bypass [dB]	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	32.646	12.17	Pk	15.7	1.2	29.07	40	-10.93	0-360	200	H
3	97.718	9.08	Pk	17	2.2	28.28	43.52	-15.24	0-360	200	H
5	614.668	5.37	Pk	24.3	5.2	34.87	46.02	-11.15	0-360	200	H
7	844.0263	65.78	Pk	26.4	6	98.18	**46.02**	**52.16**	0-360	300	H
2	32.45	15.08	Pk	15.6	1.3	31.98	40	-8.02	0-360	200	V
4	193.758	6.15	Pk	16.9	2.9	25.95	43.52	-17.57	0-360	200	V
6	615.06	8.12	Pk	24.3	5.1	37.52	46.02	-8.5	0-360	400	V
8	844.015	66.89	Pk	26.4	6	99.29	**46.02**	**53.27**	0-360	100	V

Pk - Peak detector

Note: Unwanted emissions captured from 824MHz to 849MHz and from 869MHz to 894MHz were the TX and RX signals generated from the call-simulator.

7.2. CONDUCTED EMISSIONS

TEST PROCEDURE

ANSI C63.4-2014

LIMIT

§15.107 (a) Except for Class A digital devices, for equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the band edges.

Frequency range (MHz)	Limits (dBμV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50
Notes: 1. The lower limit shall apply at the transition frequencies 2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.		

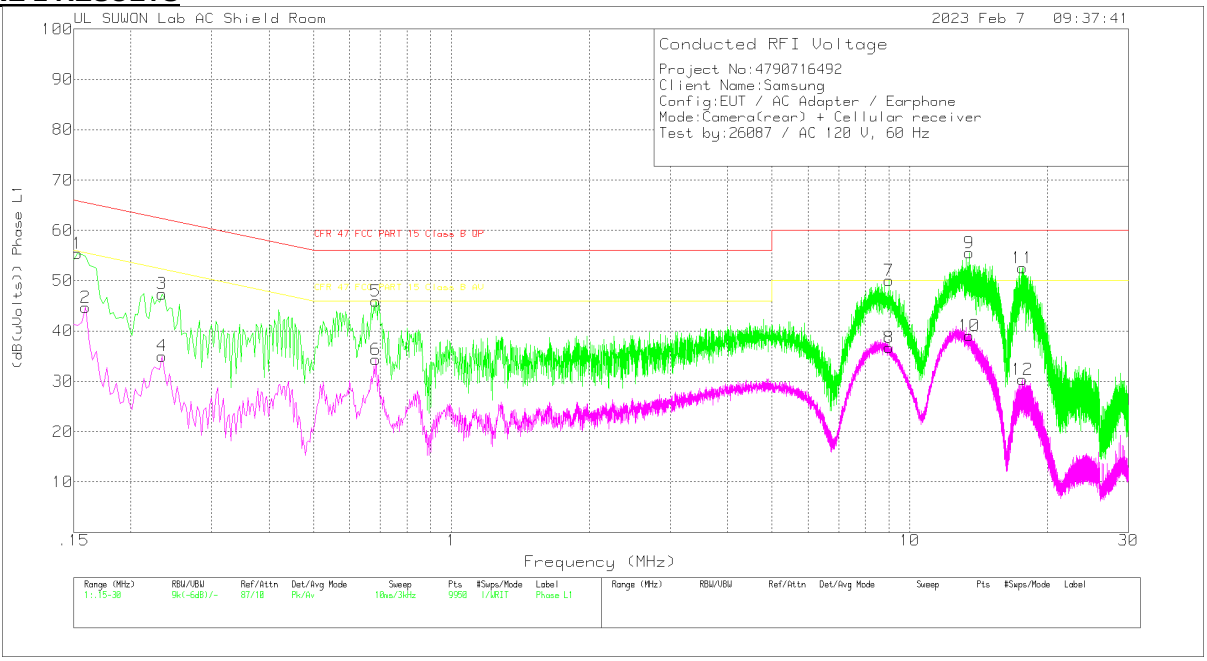
7.2.1 CONDUCTED EMISSIONS

1. USB A to C Cable

6 WORST EMISSIONS(GSM850 + Rear camera on)

Line-L1 .15 – 30 MHz

LINE 1 RESULTS



Trace Markers

Range 1: Phase L1 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	101836_With EX_L1[dB]	CABLELOSS(dB)	Corrected Reading (dB(uVolts))	CFR 47 FCC PART 15 Class B QP	Margin (dB)	CFR 47 FCC PART 15 Class B AV	Margin (dB)
1	.153	45.48	Pk	9.8	.1	55.38	65.84	-10.46	-	-
2	.159	34.8	Av	9.8	.1	44.7	-	-	55.52	-10.82
3	.234	37.48	Pk	9.7	.2	47.38	62.31	-14.93	-	-
4	.234	25.14	Av	9.7	.2	35.04	-	-	52.31	-17.27
5	.684	35.98	Pk	9.8	.2	45.98	56	-10.02	-	-
6	.684	24.36	Av	9.8	.2	34.36	-	-	46	-11.64
7	9.021	39.84	Pk	9.8	.4	50.04	60	-9.96	-	-
8	9.021	26.55	Av	9.8	.4	36.75	-	-	50	-13.25
9	13.47	45.18	Pk	10	.4	55.58	60	-4.42	-	-
10	13.473	28.67	Av	10	.4	39.07	-	-	50	-10.93
11	17.61	42.02	Pk	10.1	.4	52.52	60	-7.48	-	-
12	17.628	19.89	Av	10.1	.4	30.39	-	-	50	-19.61

Pk - Peak detector
Av - Average detection

Quasi-Peak Emissions

Range 1: Phase L1 .15 - 30MHz

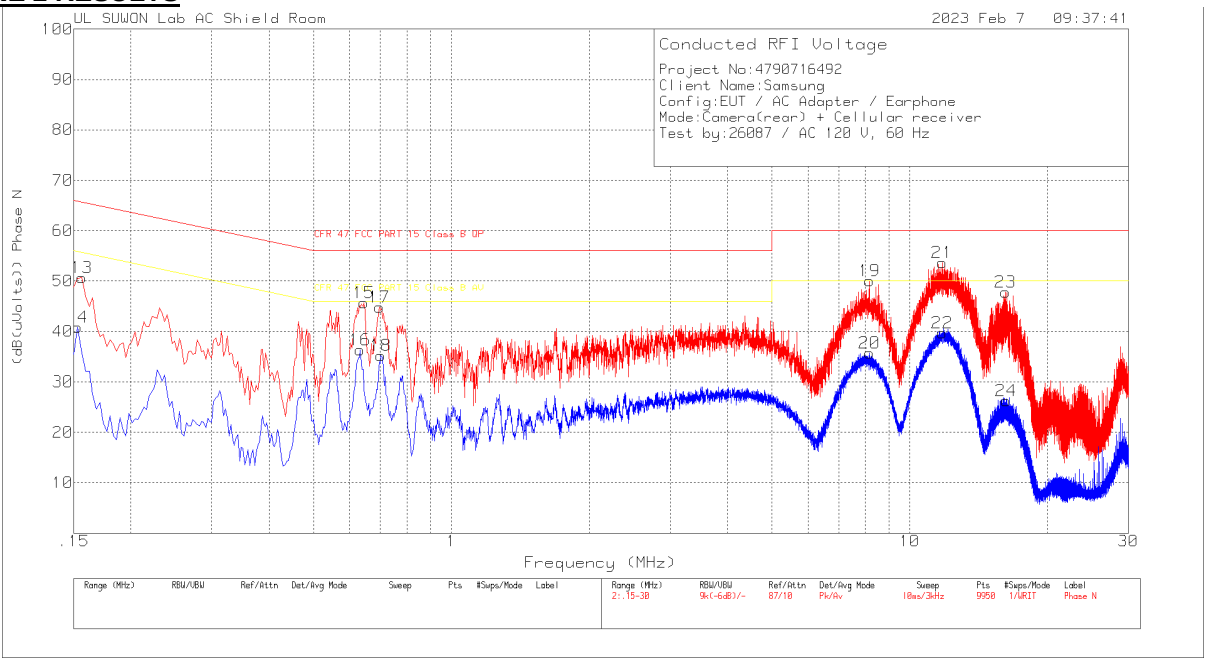
Frequency (MHz)	Meter Reading (dBuV)	Det	101836_With EX_L1[dB]	CABLELOSS(dB)	Corrected Reading (dB(uVolts))	CFR 47 FCC PART 15 Class B QP	Margin (dB)	CFR 47 FCC PART 15 Class B AV	Margin (dB)
9.02115	25.77	Qp	9.8	.4	35.97	60	-24.03	-	-
13.4708	29	Qp	10	.4	39.4	60	-20.6	-	-
17.6102	13.99	Qp	10.1	.4	24.49	60	-35.51	-	-

Qp - Quasi-Peak detector

6 WORST EMISSIONS(GSM850 + Rear camera on)

Line-L2 .15 – 30 MHz

LINE 2 RESULTS



Trace Markers

Range 2: Phase N .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	101836_With EX_N[dB]	CABLELOSS(dB)	Corrected Reading (dB(uVolts))	CFR 47 FCC PART 15 Class B QP	Margin (dB)	CFR 47 FCC PART 15 Class B AV	Margin (dB)
13	.156	40.79	Pk	9.8	.1	50.69	65.67	-14.98	-	-
14	.153	30.99	Av	9.8	.1	40.89	-	-	55.84	-14.95
15	.645	35.7	Pk	9.8	.2	45.7	56	-10.3	-	-
16	.633	26.38	Av	9.8	.2	36.38	-	-	46	-9.62
17	.696	34.82	Pk	9.8	.2	44.82	56	-11.18	-	-
18	.702	25.25	Av	9.8	.2	35.25	-	-	46	-10.75
19	8.163	39.98	Pk	9.8	.3	50.08	60	-9.92	-	-
20	8.166	25.59	Av	9.8	.3	35.69	-	-	50	-14.31
21	11.769	43.46	Pk	9.9	.3	53.66	60	-6.34	-	-
22	11.781	29.46	Av	9.9	.3	39.66	-	-	50	-10.34
23	16.197	37.35	Pk	10.1	.4	47.85	60	-12.15	-	-
24	16.239	15.78	Av	10.1	.4	26.28	-	-	50	-23.72

Pk - 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]	CABLELOSS(dB)	Corrected Reading (dB(uVolts))	CFR 47 FCC PART 15 Class B QP	Margin (dB)	CFR 47 FCC PART 15 Class B AV	Margin (dB)
.63225	22.16	Qp	9.8	.2	32.16	56	-23.84	-	-
8.16375	31.47	Qp	9.8	.3	41.57	60	-18.43	-	-
11.7692	34.43	Qp	9.9	.3	44.63	60	-15.37	-	-

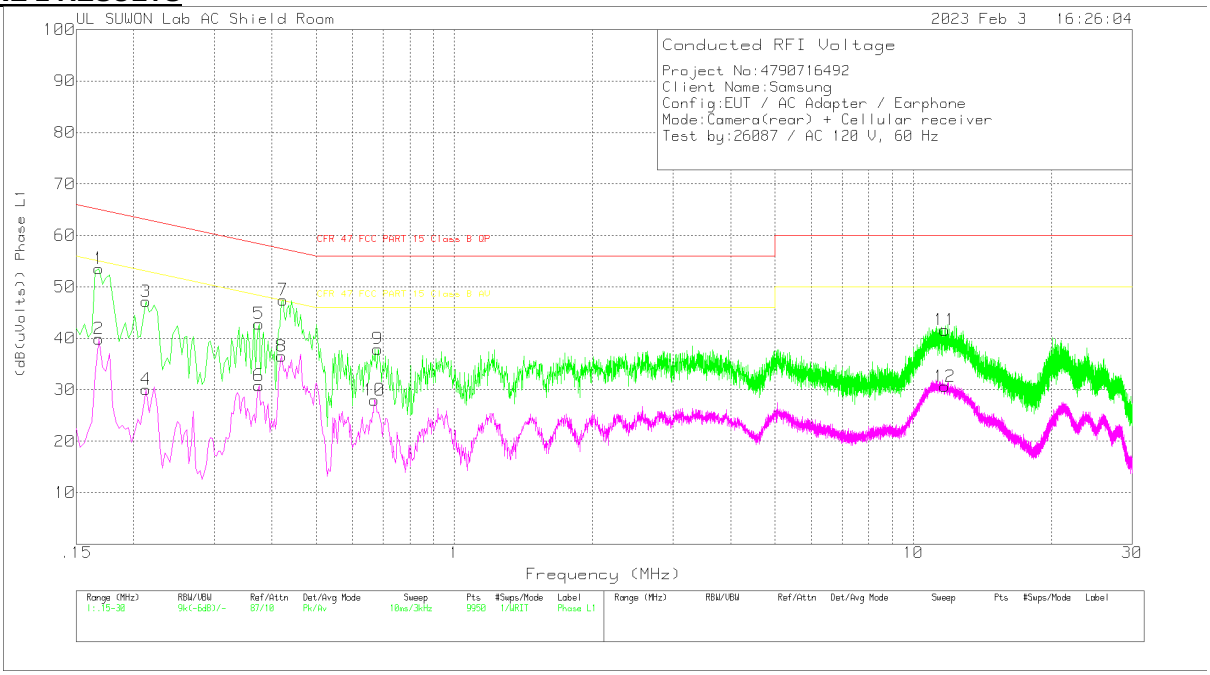
Qp - Quasi-Peak detector

2. USB C to C Cable

6 WORST EMISSIONS(GSM850 + Rear camera on)

Line-L1 .15 – 30 MHz

LINE 1 RESULTS



Trace Markers

Range 1: Phase L1 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	101836_With EX_L1[dB]	CABLELOSS(dB)	Corrected Reading (dB(uVolts))	CFR 47 FCC PART 15 Class B QP	Margin (dB)	CFR 47 FCC PART 15 Class B AV	Margin (dB)
1	.168	43.44	Pk	10	.1	53.54	65.06	-11.52	-	-
2	.168	29.8	Av	10	.1	39.9	-	-	55.06	-15.16
3	.213	37.16	Pk	9.8	.2	47.16	63.09	-15.93	-	-
4	.213	20.06	Av	9.8	.2	30.06	-	-	53.09	-23.03
5	.375	32.72	Pk	9.9	.2	42.82	58.39	-15.57	-	-
6	.375	20.71	Av	9.9	.2	30.81	-	-	48.39	-17.58
7	.423	37.32	Pk	9.9	.2	47.42	57.39	-9.97	-	-
8	.42	26.42	Av	9.9	.2	36.52	-	-	47.45	-10.93
9	.681	27.84	Pk	9.9	.2	37.94	56	-18.06	-	-
10	.669	17.88	Av	9.9	.2	27.98	-	-	46	-18.02
11	11.712	31.32	Pk	10	.3	41.62	60	-18.38	-	-
12	11.706	20.36	Av	10	.3	30.66	-	-	50	-19.34

Pk - Peak detector
Av - Average detection

Quasi-Peak Emissions

Range 1: Phase L1 .15 - 30MHz

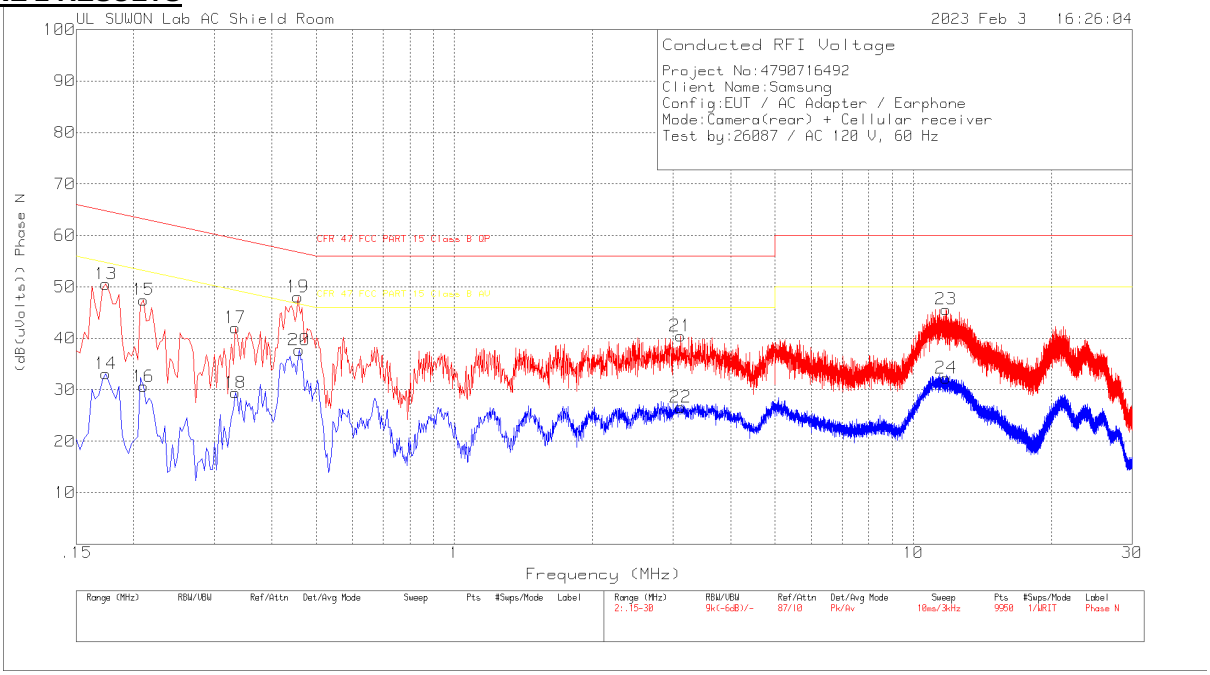
Frequency (MHz)	Meter Reading (dBuV)	Det	101836_With EX_L1[dB]	CABLELOSS(dB)	Corrected Reading (dB(uVolts))	CFR 47 FCC PART 15 Class B QP	Margin (dB)	CFR 47 FCC PART 15 Class B AV	Margin (dB)
.42375	29.36	Qp	9.9	.2	39.46	57.37	-17.91	-	-

Qp - Quasi-Peak detector

6 WORST EMISSIONS(GSM850 + Rear camera on)

Line-L2 .15 – 30 MHz

LINE 2 RESULTS



Trace Markers

Range 2: Phase N .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	101836_With EX_N[dB]	CABLELOSS(dB)	Corrected Reading (dB(uVolts))	CFR 47 FCC PART 15 Class B QP	Margin (dB)	CFR 47 FCC PART 15 Class B AV	Margin (dB)
13	.174	40.25	Pk	10.1	.2	50.55	64.77	-14.22	-	-
14	.174	22.82	Av	10.1	.2	33.12	-	-	54.77	-21.65
15	.21	37.37	Pk	9.9	.2	47.47	63.21	-15.74	-	-
16	.21	20.54	Av	9.9	.2	30.64	-	-	53.21	-22.57
17	.333	32.06	Pk	9.8	.2	42.06	59.38	-17.32	-	-
18	.333	19.44	Av	9.8	.2	29.44	-	-	49.38	-19.94
19	.456	37.95	Pk	9.9	.2	48.05	56.77	-8.72	-	-
20	.459	27.62	Av	9.9	.2	37.72	-	-	46.71	-8.99
21	3.108	30.35	Pk	9.8	.3	40.45	56	-15.55	-	-
22	3.111	16.48	Av	9.8	.3	26.58	-	-	46	-19.42
23	11.784	35.34	Pk	10	.3	45.64	60	-14.36	-	-
24	11.793	21.99	Av	10	.3	32.29	-	-	50	-17.71

Pk - 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]	CABLELOSS(dB)	Corrected Reading (dB(uVolts))	CFR 47 FCC PART 15 Class B QP	Margin (dB)	CFR 47 FCC PART 15 Class B AV	Margin (dB)
.45525	26.17	Qp	9.9	.2	36.27	56.78	-20.51	-	-
.45975	26.47	Qp	9.9	.2	36.57	56.7	-20.13	-	-

Qp - Quasi-Peak detector

END OF TEST REPORT