CERTIFICATION TEST REPORT

Report Number. : 4789651209-E1V2

Applicant	:	SAMSUNG ELECTRONICS CO., LTD. 129 SAMSUNG-RO, YEONGTONG-GU, SUWON-SI, GYEONGGI-DO, 16677, KOREA
Model	:	SM-G991B/DS, SM-G991B
FCC ID	:	A3LSMG991B
EUT Description	:	GSM/WCDMA/LTE/5G NR Phone + BT/BLE, DTS/UNII a/b/g/n/ac/ax, WPT and NFC
Test Standard(s)	:	FCC 47 CFR PART 15 SUBPART B

Date Of Issue:
November 26, 2020

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

IAS ACCREDITED
Testing Laboratory
TL-637

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	11/18/20	Initial issue	Hyunsik Yun
V2	11/26/20	Updated to address TCB's question	Hyunsik Yun

UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_15B(04)
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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

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, WPT and NFC
MODEL NUMBER:	SM-G991B/DS, SM-G991B
SERIAL NUMBER:	R3CN9046PJN, R3CNA0F9HSD (RADIATED)
DATE TESTED:	OCT 20, 2020 – NOV 10, 2020;

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

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:

Junwhan Lee
Suwon Lab Engineer
UL Korea, Ltd.

Tested By:

Hyunsik Yun
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
☒ Chamber 2
☐ Chamber 3

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:

EIRP = PSA reading with EUT worst orientation (dBm) + Path loss (dB) – cable loss(between the SG and substitution antenna) + Substitution Antenna Factor (dBi)

ERP = PSA reading with EUT worst orientation (dBm) + Path loss (dB) – cable loss(between the SG and substitution antenna)

(Path loss = Signal generator output – PSA reading with substitution antenna)

4.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Radiated Disturbance, 30 MHz to 1 GHz	4.26 dB
Radiated Disturbance, 1 GHz to 18 GHz	5.90 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 1, Clause 4.4.2 in IEC Guide 115:2007.

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5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a GSM/WCDMA/LTE/5G NR Phone + BT/BLE, DTS/UNII a/b/g/n/ac/ax, WPT and NFC. This test report addresses the WWAN receiver mode.

This report covers the Samsung models SM-G991B/DS and SM-G991B.
These models are identical in hardware except SM-G991B has single SIM tray.
With some pre-scan, model SM-G991B/DS was set for final test.

5.2. TEST MODE

Mode	Description
GSM850	Communicating with Call simulator(CMW500)
WCDMA BAND 5	Communicating with Call simulator(CMW500)
LTE BAND 12	Communicating with Call simulator(CMW500)
LTE BAND 13	Communicating with Call simulator(CMW500)
LTE BAND 26	Communicating with Call simulator(CMW500)
5G NR BAND n5	Communicating with Call simulator(E7515B)

5.3. WORST-CASE ORIENTATION AND MODE

For GSM850 / WCDMA B5 / LTE B12 / LTE B13 / LTE B26 / 5G NR n5, EUT was investigated in three orthogonal orientations X, Y and Z it was determined that Z orientation was worst-case orientation.

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

LTE Band 5
LTE Band 5 (Rx Frequency range: 869-894 MHz) is covered by LTE Band 26 (Rx Frequency range: 859-894 MHz) due to overlapping frequency range, same maximum tune-up limit and same channel bandwidth.

LTE Band 17
LTE Band 17 (Rx Frequency range: 734-746 MHz) is covered by LTE Band 12 (Rx Frequency range: 729-746 MHz) due to overlapping frequency range, same maximum tune-up limit and same channel bandwidth.

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5.4. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Charger	SAMSUNG	EP-TA800	R37N8BT85J8SE3	N/A
Data Cable	SAMSUNG	EP-DN980BBE	N/A	N/A

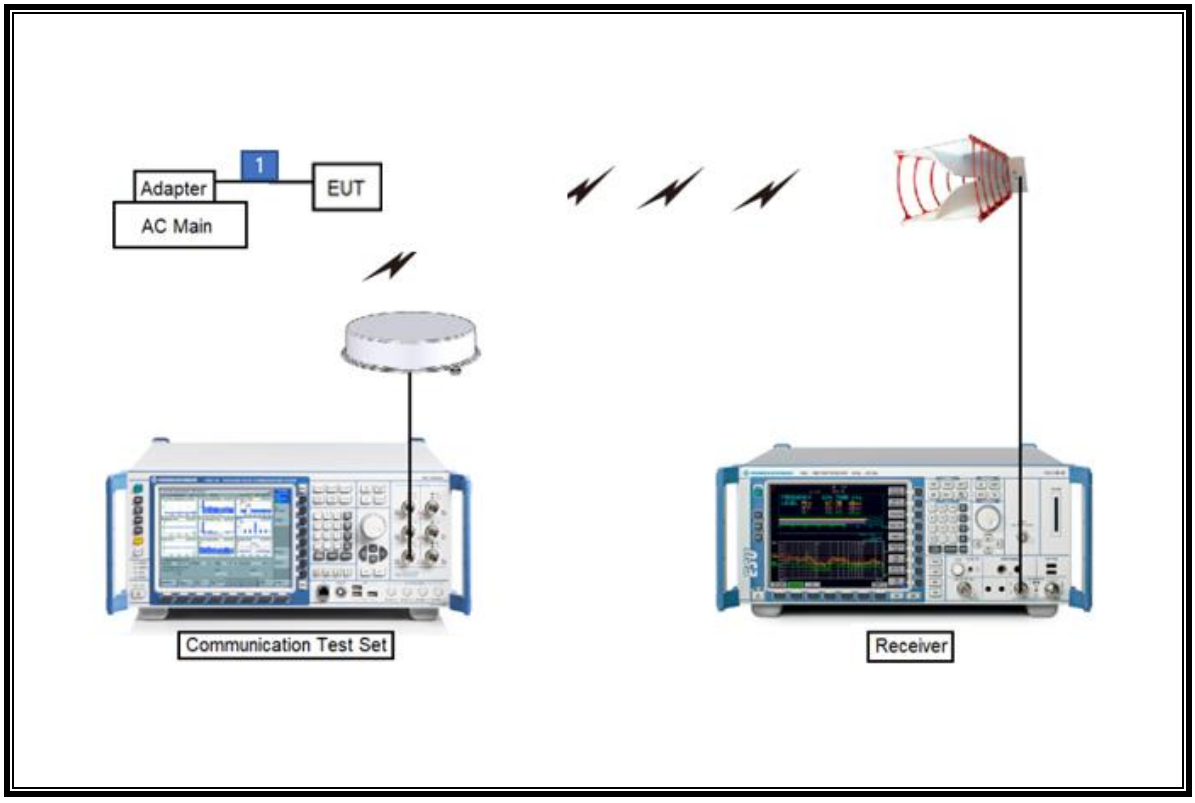
I/O CABLE

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 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	01-31-21
Antenna, Horn, 40 GHz	ETS	3116C	00166155	08-04-22
Preamplifier	ETS	3116C-PA	00168841	08-06-21
Antenna, Horn, 40 GHz	ETS	3116C	00168645	08-04-22
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	750	08-19-22
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	845	08-13-22
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	749	08-13-22
Antenna, Horn, 18 GHz	ETS	3115	00167211	07-27-22
Antenna, Horn, 18 GHz	ETS	3115	00161451	08-15-22
Antenna, Horn, 18 GHz	ETS	3117	00168724	07-27-22
Antenna, Horn, 18 GHz	ETS	3117	00168717	08-15-22
Communications Test Set	R&S	CMW500	115331	08-03-21
Preamplifier, 1000 MHz	Sonoma	310N	341282	08-03-21
Preamplifier, 1000 MHz	Sonoma	310N	370599	08-06-21
Preamplifier, 1000 MHz	Sonoma	310N	351741	08-03-21
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1876511	08-03-21
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	2029169	08-04-21
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1896138	08-03-21
EMI Test Receive, 40 GHz	R&S	ESU40	100439	08-03-21
EMI Test Receive, 40 GHz	R&S	ESU40	100457	08-03-21
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	08-05-21
High Pass Filter 1.2GHz	Micro-Tronics	HPM50108-02	G006	08-05-21
High Pass Filter 2.8GHz	Micro-Tronics	HPM50111-02	010	08-05-21
High Pass Filter 2.8GHz	Micro-Tronics	HPM50111-02	011	08-05-21
High Pass Filter 4GHz	Micro-Tronics	HPM50118-02	G001	08-05-21
High Pass Filter 4GHz	Micro-Tronics	HPM50118-02	G002	08-05-21
Attenuator	PASTERNACK	PE7087-10	A009	08-05-21
Attenuator	PASTERNACK	PE7087-10	A001	08-03-21
Attenuator	PASTERNACK	PE7087-10	A008	08-03-21
Attenuator	PASTERNACK	PE7004-10	2	08-04-21
Attenuator	PASTERNACK	PE7395-10	A011	08-05-21
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 LIMIYS AND TEST RESULTS

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.	

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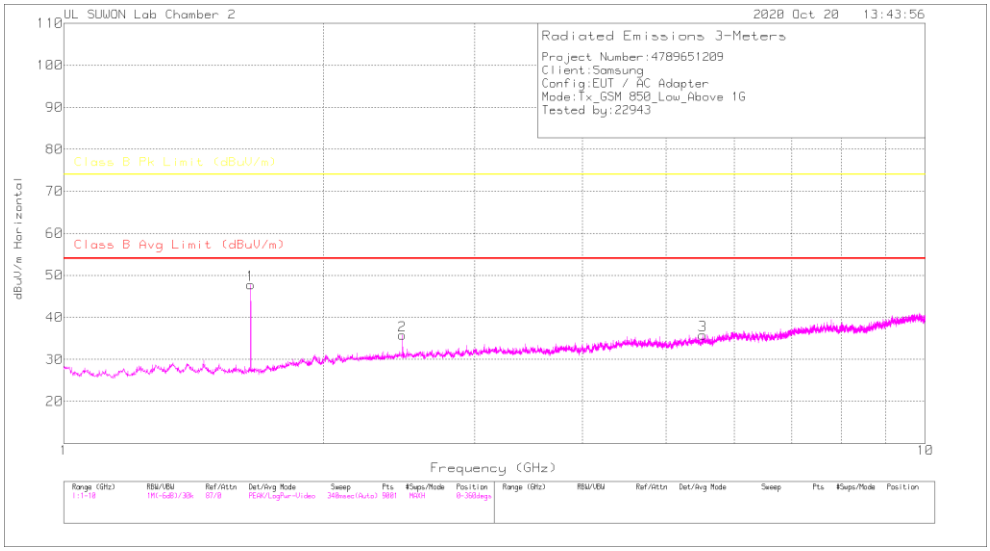
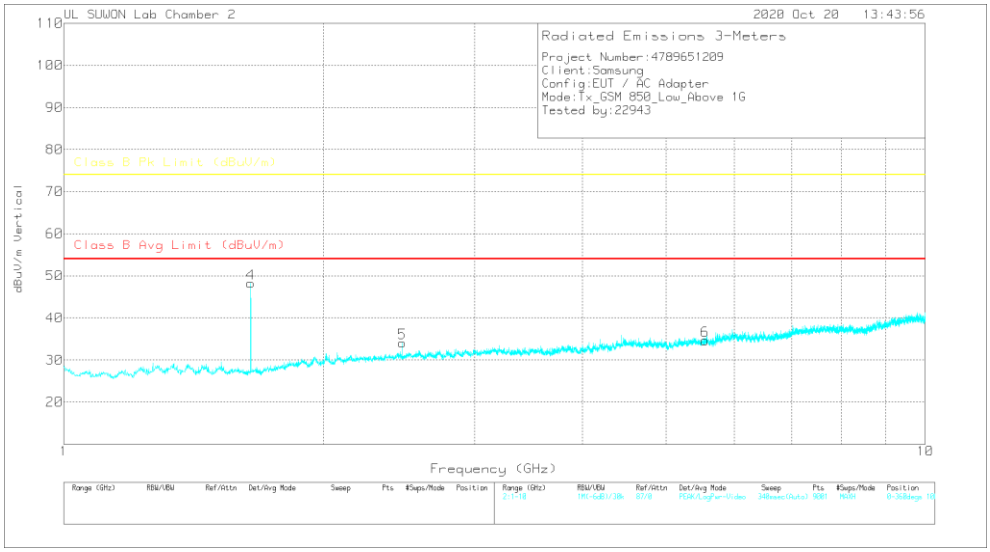
7.1. Above 1 GHz in the GSM850

LOW CHANNEL(869.2 MHz)

HORIZONTAL PEAK PLOT



VERTICAL PEAK PLOT



DATA

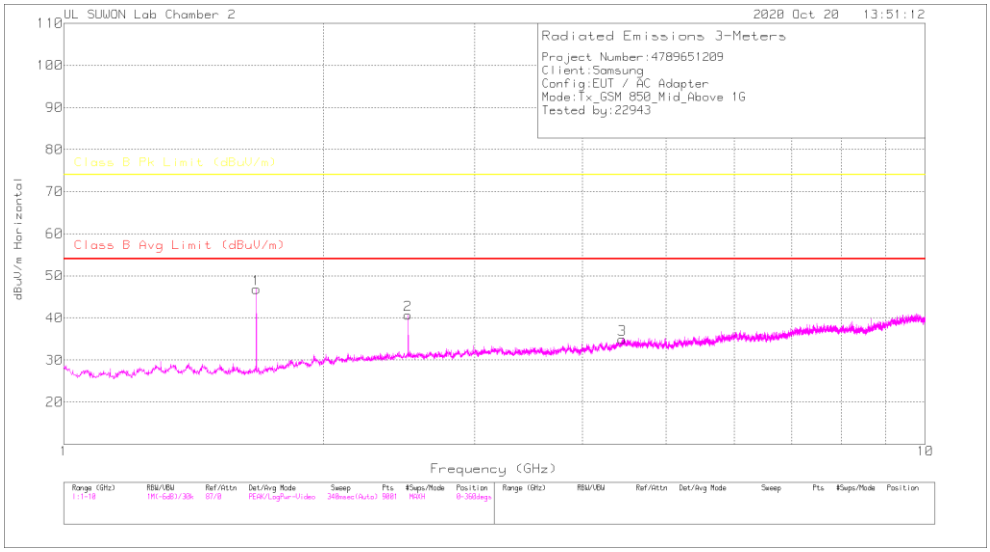
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	1-18GHz[dB]	1GHz_HP[dB]	Corrected Reading dBuV/m	Class B Avg Limit (dBuV/m)	Av(CISPR)Margin (dB)	Class B Pk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.648	49.88	PK	28.6	-31.4	.7	47.78	-	-	74	-26.22	0-360	100	H
2	2.472	33.05	PK	32	-30	.7	35.75	-	-	74	-38.25	0-360	100	H
3	5.518	28.28	PK	34.5	-27.5	.5	35.78	-	-	74	-38.22	0-360	100	H
4	1.648	50.33	PK	28.6	-31.4	.7	48.23	-	-	74	-25.77	0-360	100	V
5	2.472	31.38	PK	32	-30	.7	34.08	-	-	74	-39.92	0-360	100	V
6	5.55	27.23	PK	34.6	-27.7	.5	34.63	-	-	74	-39.37	0-360	200	V

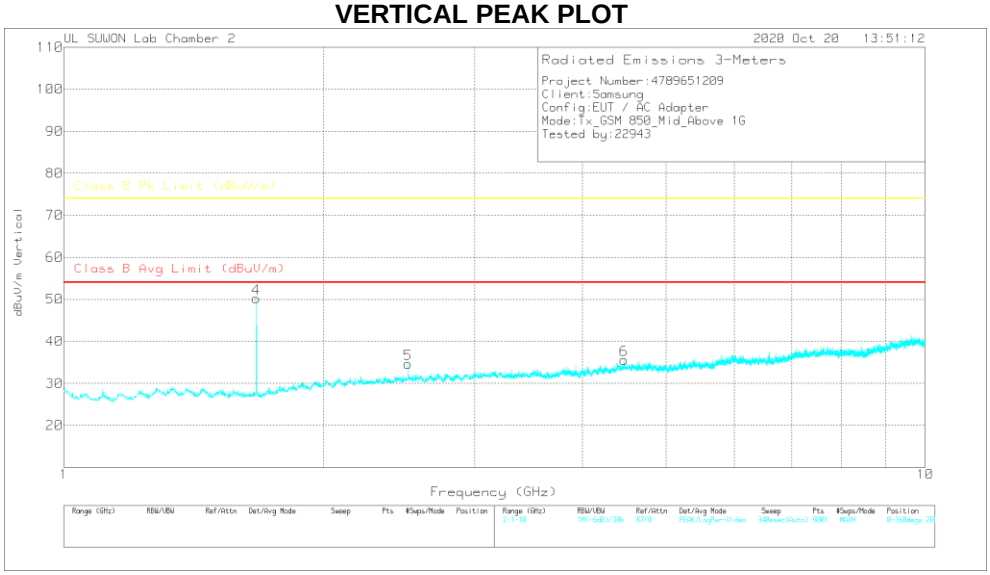
PK-Peak Detector

MID CHANNEL(881.6 MHz)

HORIZONTAL PEAK PLOT



VERTICAL PEAK PLOT



DATA

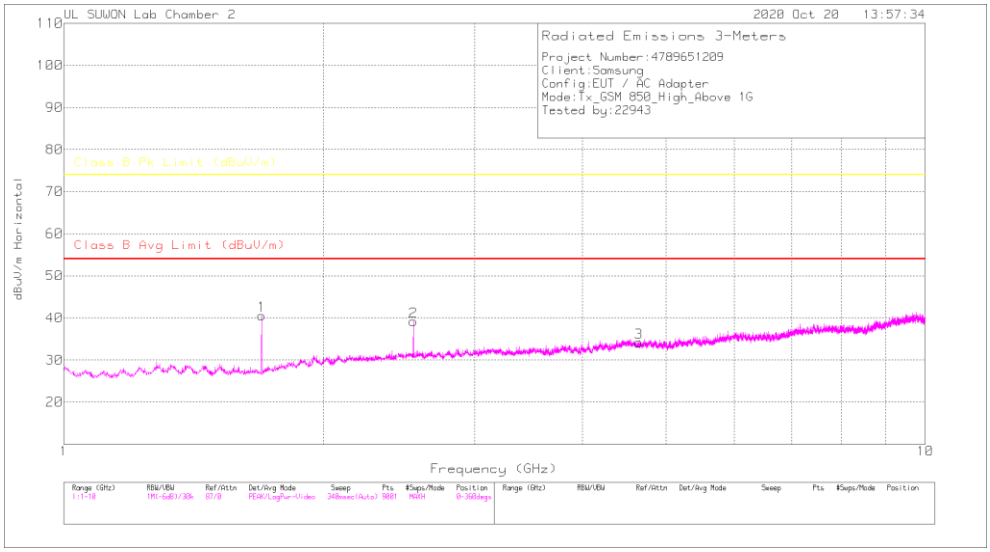
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	1-18GHz[dB]	1GHz_HP[dB]	Corrected Reading dBuV/m	Class B Avg Limit (dBuV/m)	Av(CISPR)Margin (dB)	Class B Pk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.673	48.86	PK	28.6	-31.3	.7	46.86	-	-	74	-27.14	0-360	200	H
2	2.51	38.02	PK	32.1	-30.1	.7	40.72	-	-	74	-33.28	0-360	100	H
3	4.449	28.53	PK	33.9	-28	.5	34.93	-	-	74	-39.07	0-360	100	H
4	1.673	52.22	PK	28.6	-31.3	.7	50.22	-	-	74	-23.78	0-360	200	V
5	2.509	31.94	PK	32.1	-30.1	.7	34.64	-	-	74	-39.36	0-360	100	V
6	4.468	29.3	PK	33.9	-28.1	.5	35.6	-	-	74	-38.4	0-360	200	V

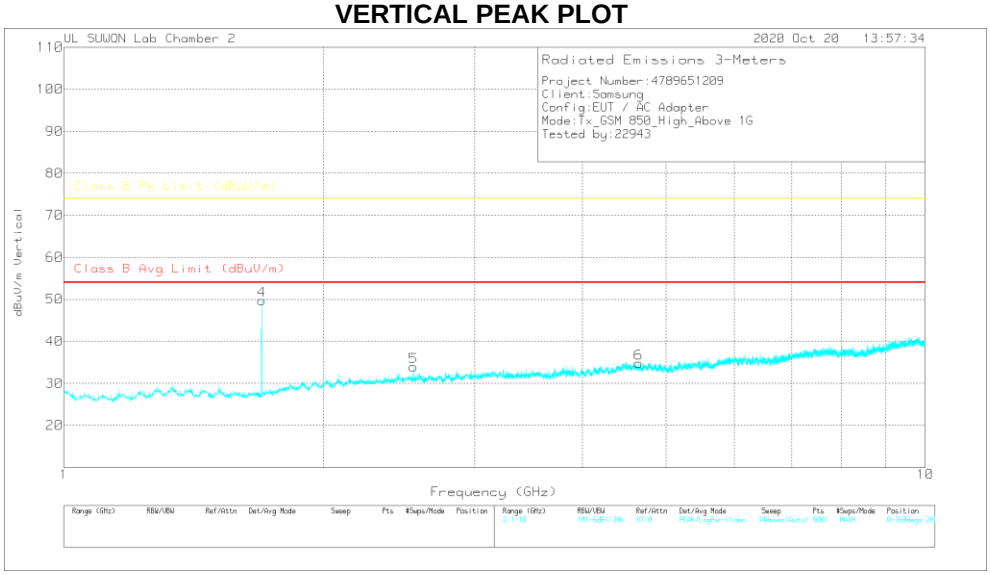
PK – Peak Detector

HIGH CHANNEL(893.8 MHz)

HORIZONTAL PEAK PLOT



VERTICAL PEAK PLOT



DATA

Trace Markers

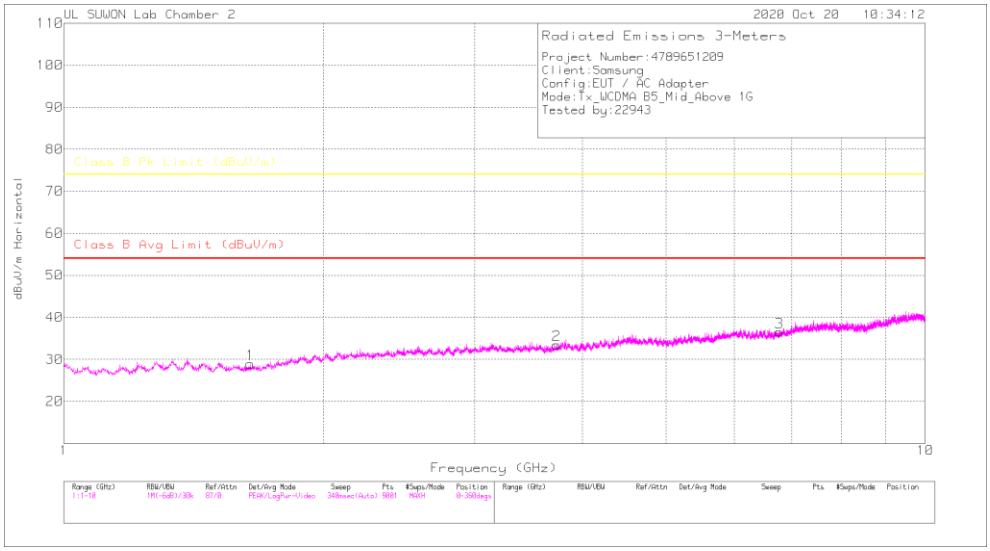
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	1-18GHz[dB]	1GHz_HP[dB]	Corrected Reading dBuV/m	Class B Avg Limit (dBuV/m)	Av(CISPR)Margin (dB)	Class B Pk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.697	42.37	PK	28.7	-31.2	.7	40.57	-	-	74	-33.43	0-360	100	H
2	2.546	36.17	PK	32.1	-29.8	.7	39.17	-	-	74	-34.83	0-360	100	H
3	4.651	28.34	PK	34.1	-28.8	.5	34.14	-	-	74	-39.86	0-360	100	H
4	1.697	51.51	PK	28.7	-31.2	.7	49.71	-	-	74	-24.29	0-360	200	V
5	2.546	30.94	PK	32.1	-29.8	.7	33.94	-	-	74	-40.06	0-360	200	V
6	4.649	28.99	PK	34.1	-28.8	.5	34.79	-	-	74	-39.21	0-360	200	V

PK – Peak Detector

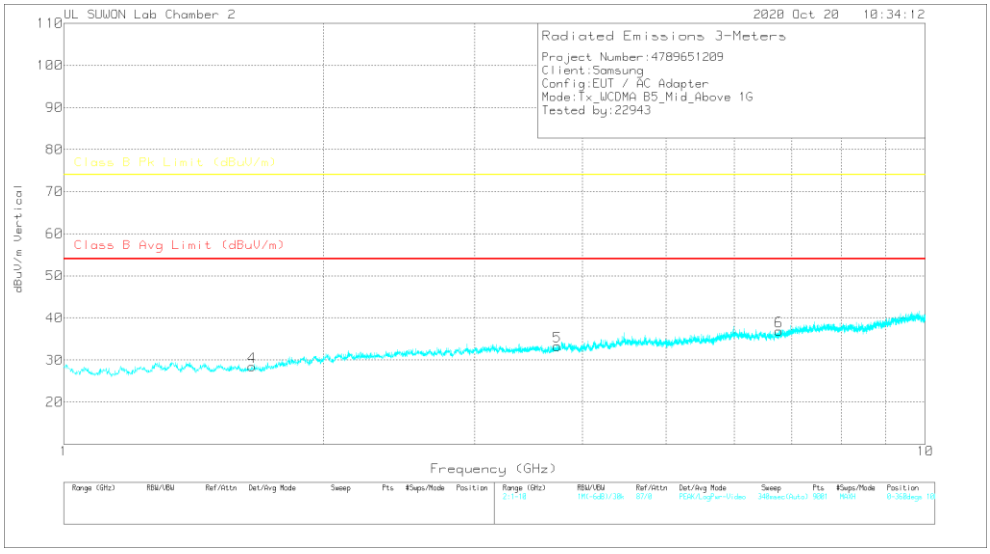
7.2. Above 1 GHz in the WCDMA Band 5

MID CHANNEL(881.6 MHz)

HORIZONTAL PEAK PLOT



VERTICAL PEAK PLOT



DATA

Trace Markers

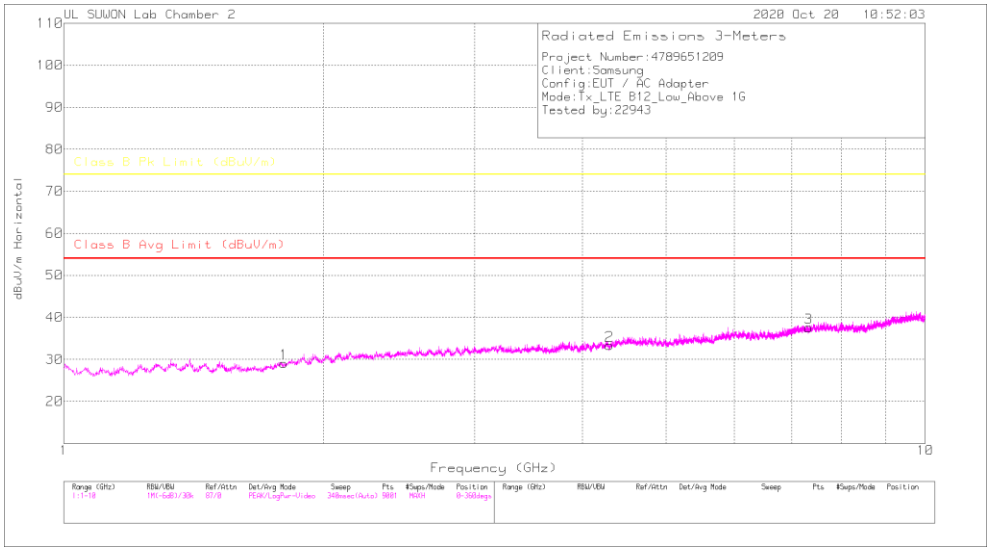
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	1-18GHz[dB]	1GHz_HP[dB]	Corrected Reading dBuV/m	Class B Avg Limit (dBuV/m)	Av(CISPR)Margin (dB)	Class B Pk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.646	31.05	PK	28.6	-31.4	.7	28.95	-	-	74	-45.05	0-360	100	H
2	3.733	29.1	PK	33.2	-29.4	.6	33.5	-	-	74	-40.5	0-360	100	H
3	6.769	25.92	PK	35.6	-25.5	.5	36.52	-	-	74	-37.48	0-360	100	H
4	1.653	30.55	PK	28.6	-31.4	.7	28.45	-	-	74	-45.55	0-360	100	V
5	3.742	28.68	PK	33.2	-29.2	.6	33.28	-	-	74	-40.72	0-360	100	V
6	6.763	26.48	PK	35.6	-25.7	.5	36.88	-	-	74	-37.12	0-360	200	V

PK – Peak Detector

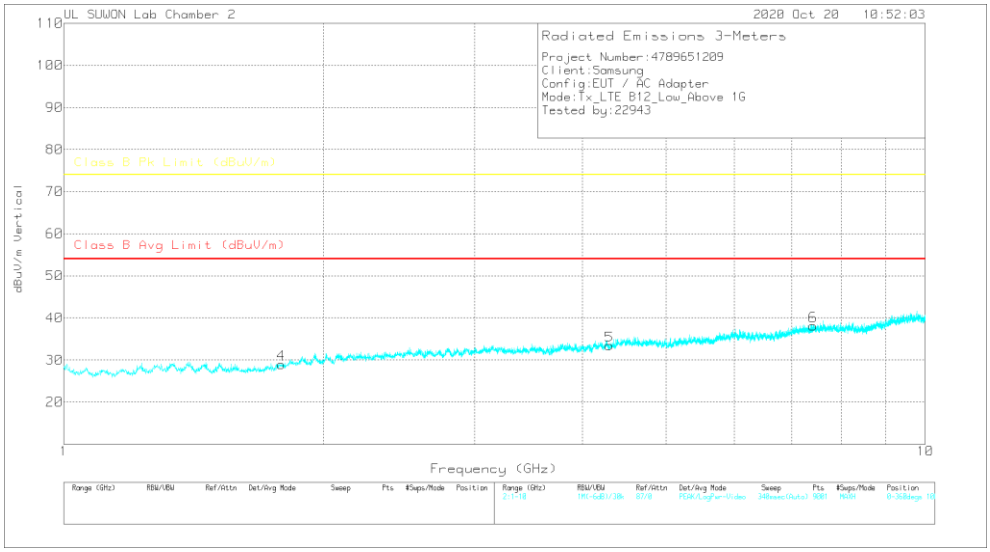
7.3. Above 1 GHz in the LTE Band 12

LOW CHANNEL(730.5 MHz)

HORIZONTAL PEAK PLOT



VERTICAL PEAK PLOT



DATA

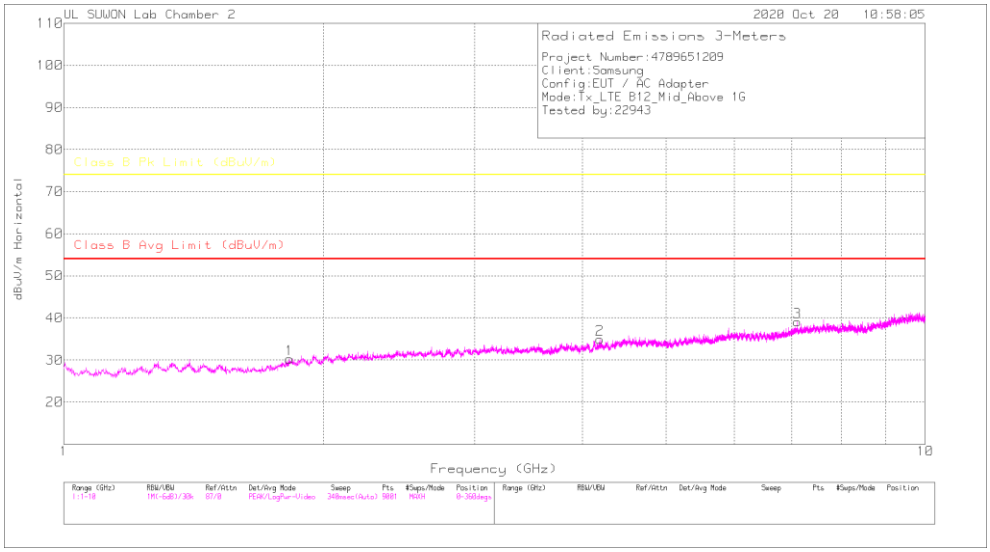
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	1-18GHz[dB]	1GHz_HP[dB]	Corrected Reading dBuV/m	Class B Avg Limit (dBuV/m)	Av(CISPR)Margin (dB)	Class B Pk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.8	29.79	PK	29.8	-31.2	.7	29.09	-	-	74	-44.91	0-360	100	H
2	4.299	28.14	PK	33.5	-28.8	.5	33.34	-	-	74	-40.66	0-360	100	H
3	7.321	26.35	PK	36.1	-25.4	.5	37.55	-	-	74	-36.45	0-360	200	H
4	1.788	29.77	PK	29.7	-31.2	.7	28.97	-	-	74	-45.03	0-360	100	V
5	4.298	28.23	PK	33.5	-28.8	.5	33.43	-	-	74	-40.57	0-360	200	V
6	7.409	26.3	PK	36.1	-24.9	.6	38.1	-	-	74	-35.9	0-360	100	V

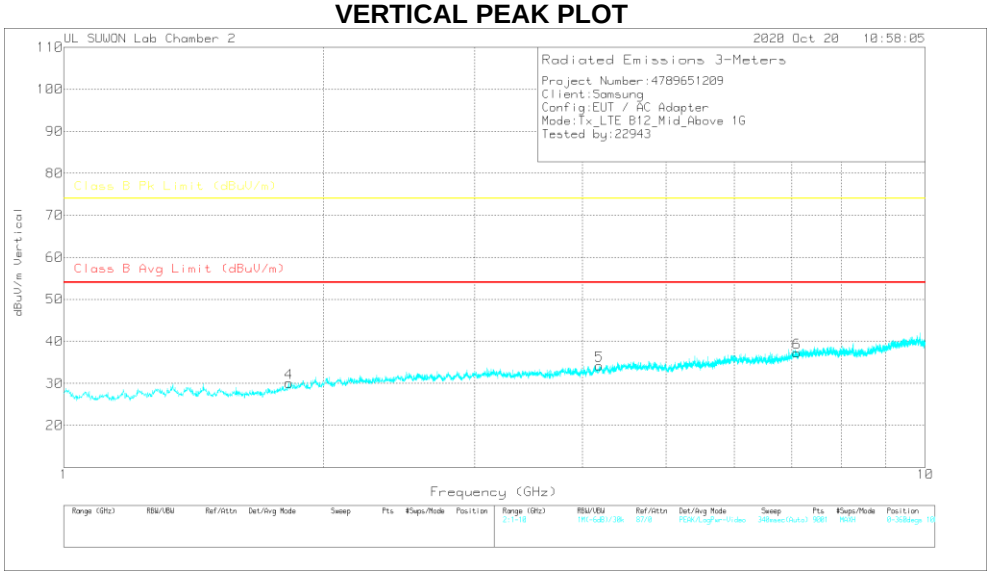
PK – Peak Detector

MID CHANNEL(737.5 MHz)

HORIZONTAL PEAK PLOT



VERTICAL PEAK PLOT



DATA

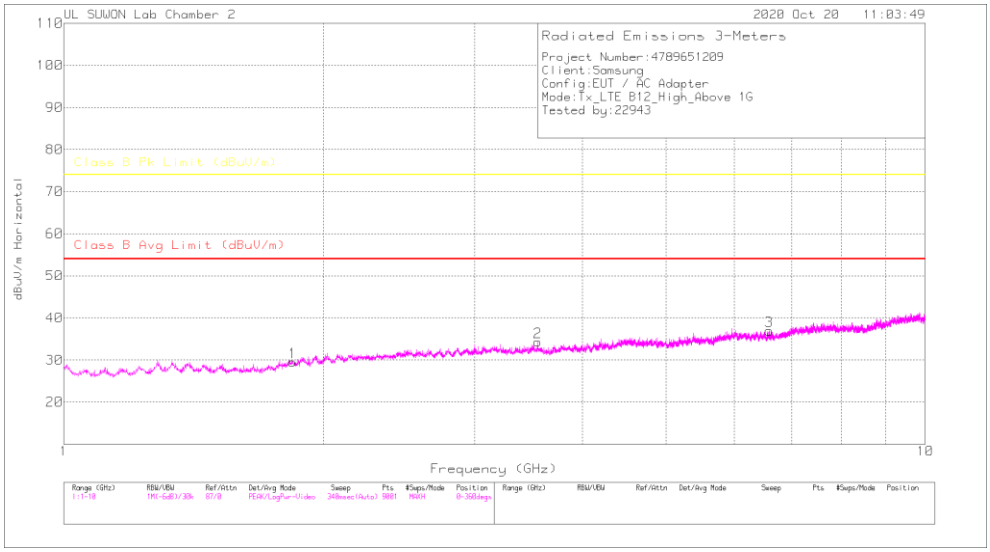
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	1-18GHz[dB]	1GHz_HP[dB]	Corrected Reading dBuV/m	Class B Avg Limit (dBuV/m)	Av(CISPR)Margin (dB)	Class B Pk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.829	30.46	PK	30.1	-31	.7	30.26	-	-	74	-43.74	0-360	200	H
2	4.191	29.16	PK	33.4	-28.1	.5	34.96	-	-	74	-39.04	0-360	200	H
3	7.105	27.67	PK	36.1	-25.2	.5	39.07	-	-	74	-34.93	0-360	200	H
4	1.825	30.3	PK	30.1	-31	.7	30.1	-	-	74	-43.9	0-360	200	V
5	4.186	28.43	PK	33.4	-28.1	.5	34.23	-	-	74	-39.77	0-360	100	V
6	7.095	25.79	PK	36.1	-25.1	.5	37.29	-	-	74	-36.71	0-360	200	V

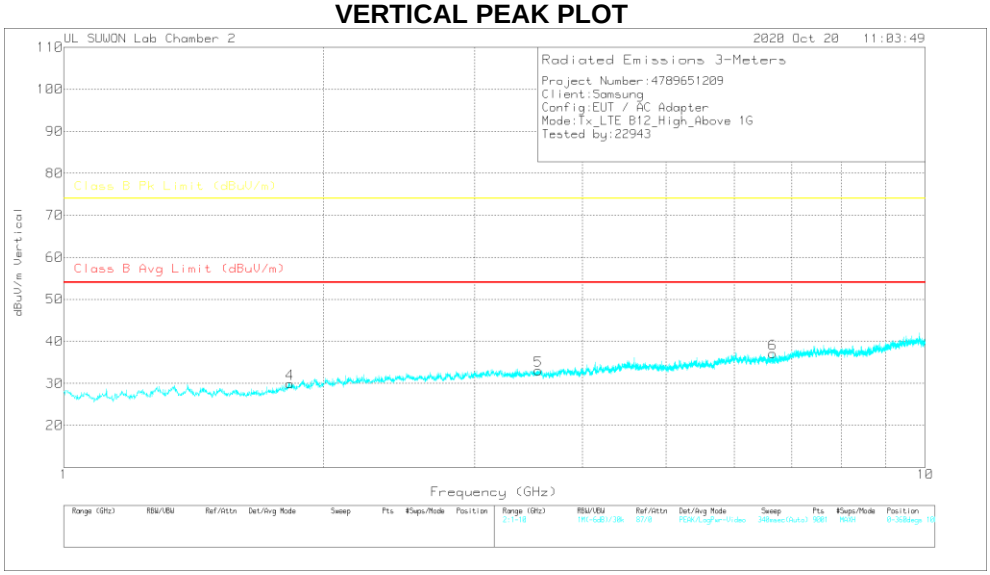
PK – Peak Detector

HIGH CHANNEL(744.5 MHz)

HORIZONTAL PEAK PLOT



VERTICAL PEAK PLOT



DATA

Trace Markers

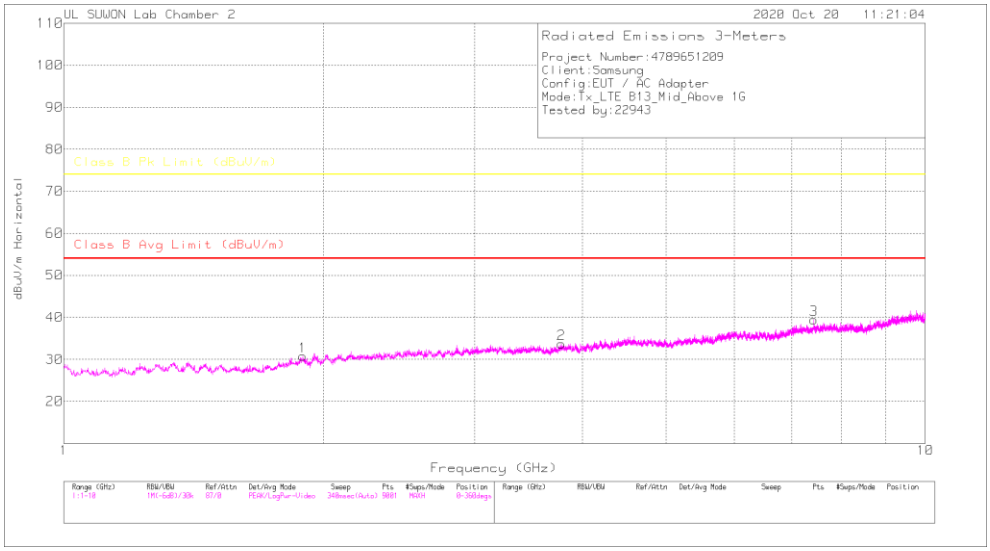
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	1-18GHz[dB]	1GHz_HP[dB]	Corrected Reading dBuV/m	Class B Avg Limit (dBuV/m)	Av(CISPR)Margin (dB)	Class B Pk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.843	29.65	PK	30.2	-31	.7	29.55	-	-	74	-44.45	0-360	100	H
2	3.551	29.91	PK	32.8	-29	.6	34.31	-	-	74	-39.69	0-360	200	H
3	6.593	27.16	PK	35.5	-26.2	.5	36.96	-	-	74	-37.04	0-360	200	H
4	1.83	30.12	PK	30.1	-31	.7	29.92	-	-	74	-44.08	0-360	100	V
5	3.554	28.75	PK	32.8	-29.1	.6	33.05	-	-	74	-40.95	0-360	200	V
6	6.653	27.3	PK	35.5	-26.2	.5	37.1	-	-	74	-36.9	0-360	200	V

PK – Peak Detector

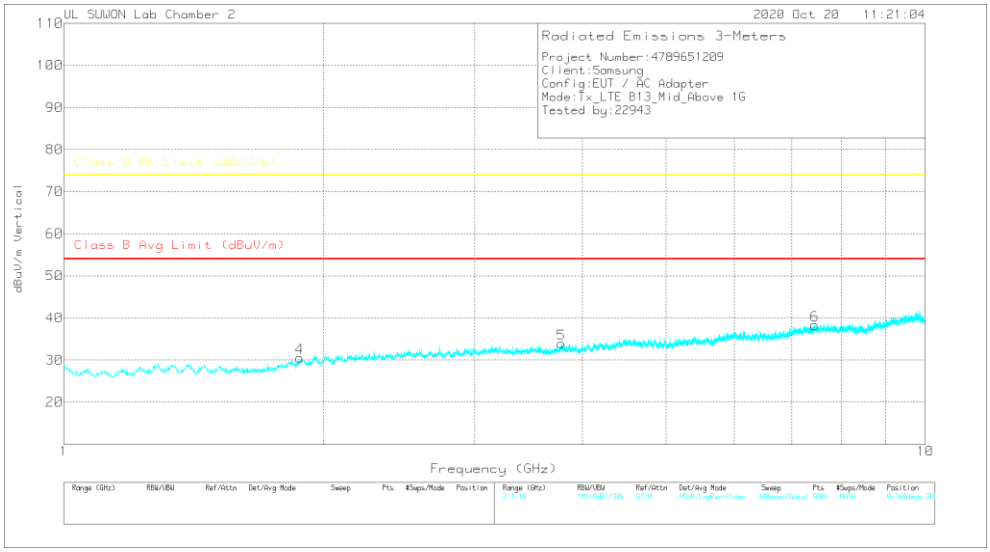
7.4. Above 1 GHz in the LTE Band 13

MID CHANNEL(751.0 MHz)

HORIZONTAL PEAK PLOT



VERTICAL PEAK PLOT



DATA

Trace Markers

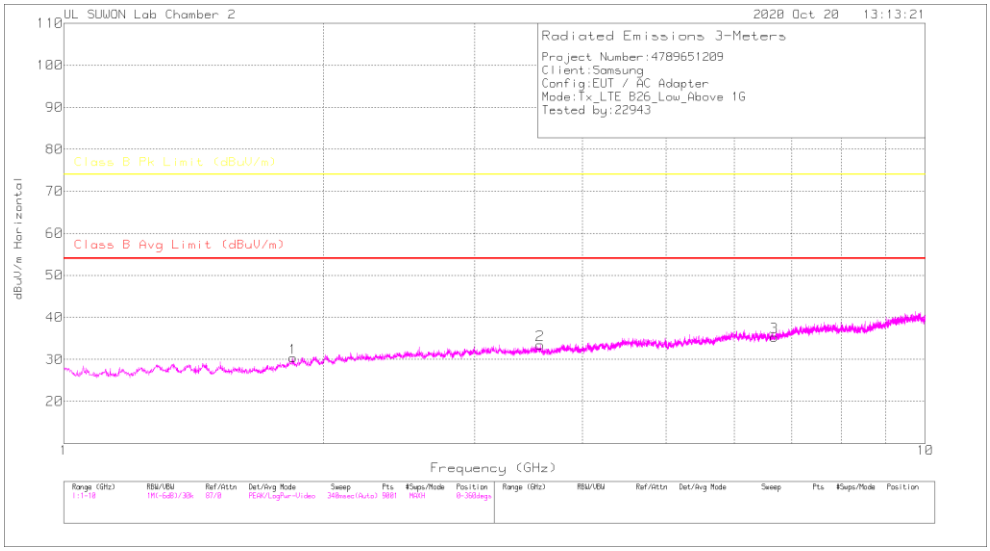
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	1-18GHz[dB]	1GHz_HP[dB]	Corrected Reading dBuV/m	Class B Avg Limit (dBuV/m)	Av(CISPR)Margin (dB)	Class B Pk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.895	30.23	PK	30.7	-30.9	.7	30.73	-	-	74	-43.27	0-360	100	H
2	3.783	28.8	PK	33.3	-29	.6	33.7	-	-	74	-40.3	0-360	200	H
3	7.427	27.25	PK	36.1	-24.5	.6	39.45	-	-	74	-34.55	0-360	100	H
4	1.879	30.22	PK	30.6	-31	.7	30.52	-	-	74	-43.48	0-360	200	V
5	3.783	29.01	PK	33.3	-29	.6	33.91	-	-	74	-40.09	0-360	200	V
6	7.446	26.2	PK	36	-24.5	.6	38.3	-	-	74	-35.7	0-360	100	V

PK – Peak Dector

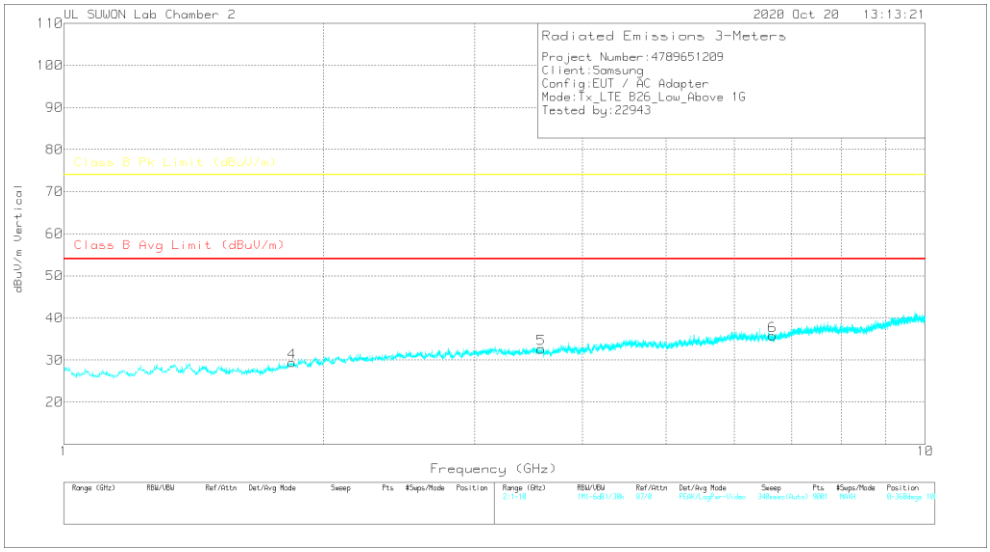
7.5. Above 1 GHz in the LTE Band 26

LOW CHANNEL(860.5 MHz)

HORIZONTAL PEAK PLOT



VERTICAL PEAK PLOT



DATA

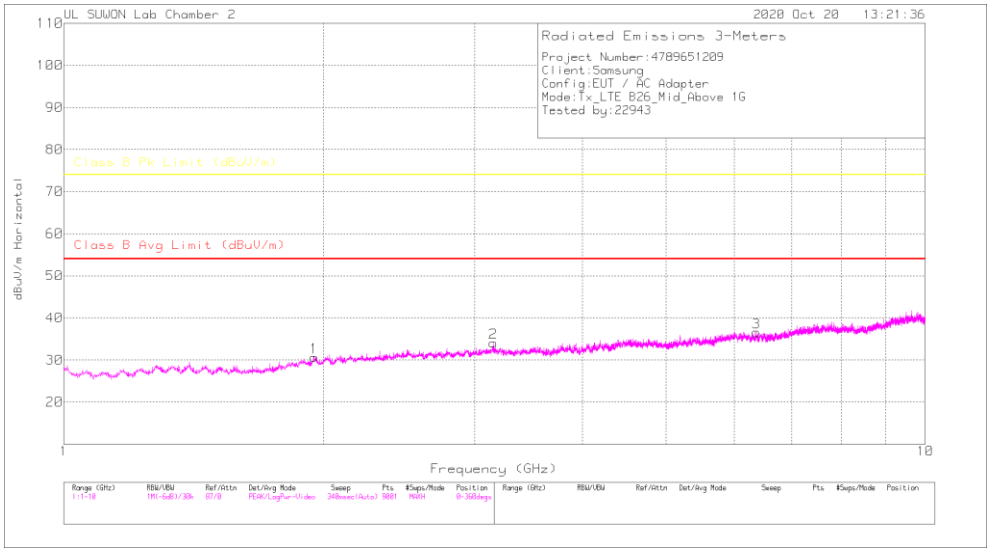
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	1-18GHz[dB]	1GHz_HP[dB]	Corrected Reading dBuV/m	Class B Avg Limit (dBuV/m)	Av(CISPR)Margin (dB)	Class B Pk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.845	30.38	PK	30.3	-31	.7	30.38	-	-	74	-43.62	0-360	200	H
2	3.572	29.38	PK	32.8	-29.3	.6	33.48	-	-	74	-40.52	0-360	100	H
3	6.678	25.42	PK	35.5	-26.1	.5	35.32	-	-	74	-38.68	0-360	100	H
4	1.84	29.49	PK	30.2	-31	.7	29.39	-	-	74	-44.61	0-360	200	V
5	3.582	28.56	PK	32.8	-29.3	.6	32.66	-	-	74	-41.34	0-360	100	V
6	6.648	26.06	PK	35.5	-26.3	.5	35.76	-	-	74	-38.24	0-360	100	V

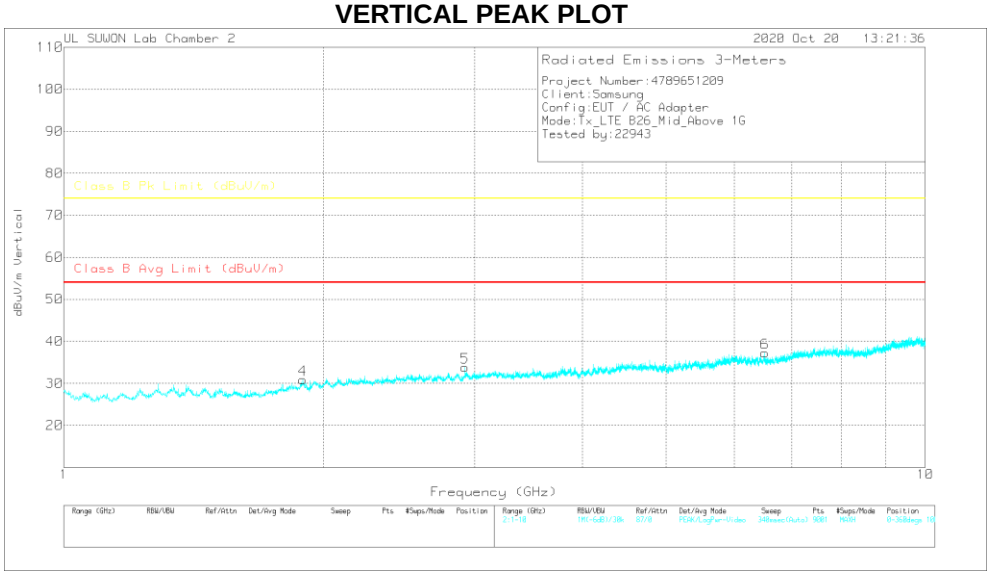
Pk - Peak detector

MID CHANNEL(876.5 MHz)

HORIZONTAL PEAK PLOT



VERTICAL PEAK PLOT



DATA

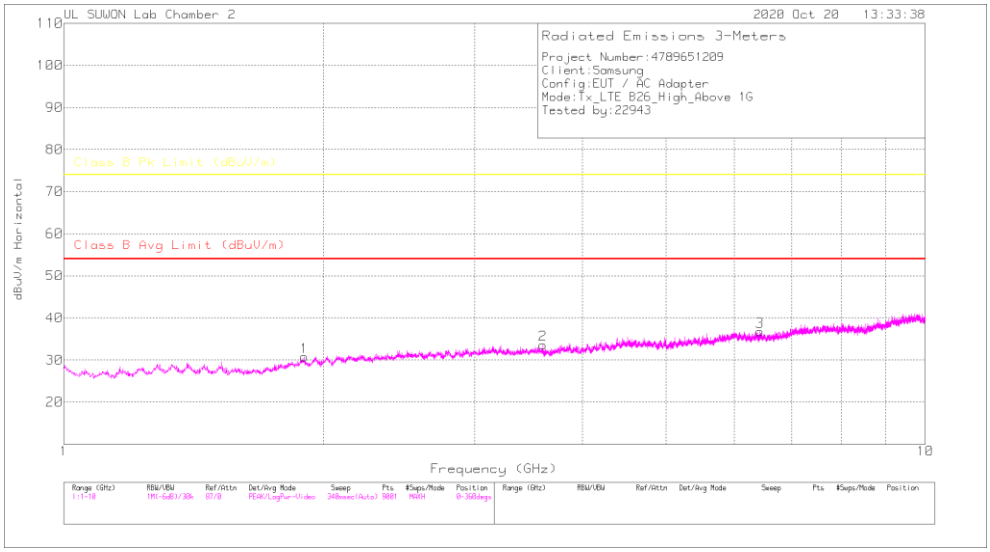
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	1-18GHz[dB]	1GHz_HP[dB]	Corrected Reading dBuV/m	Class B Avg Limit (dBuV/m)	Av(CISPR)Margin (dB)	Class B Pk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.953	29.98	PK	31	-30.9	.6	30.68	-	-	74	-43.32	0-360	100	H
2	3.153	30.32	PK	33	-29.9	.7	34.12	-	-	74	-39.88	0-360	200	H
3	6.3675	27.08	PK	35.4	-26.4	.5	36.58	-	-	74	-37.42	0-360	100	H
4	1.895	30.42	PK	30.7	-30.9	.7	30.92	-	-	74	-43.08	0-360	200	V
5	2.923	30.66	PK	32.4	-29.9	.7	33.86	-	-	74	-40.14	0-360	200	V
6	6.513	27.5	PK	35.4	-26.1	.5	37.3	-	-	74	-36.7	0-360	100	V

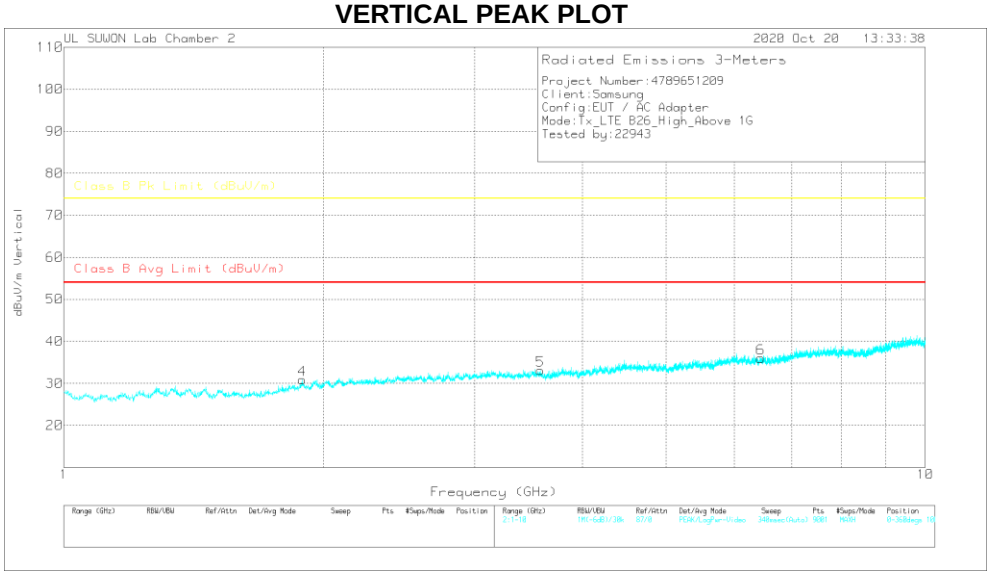
PK – Peak Detector

HIGH CHANNEL(892.5 MHz)

HORIZONTAL PEAK PLOT



VERTICAL PEAK PLOT



DATA

Trace Markers

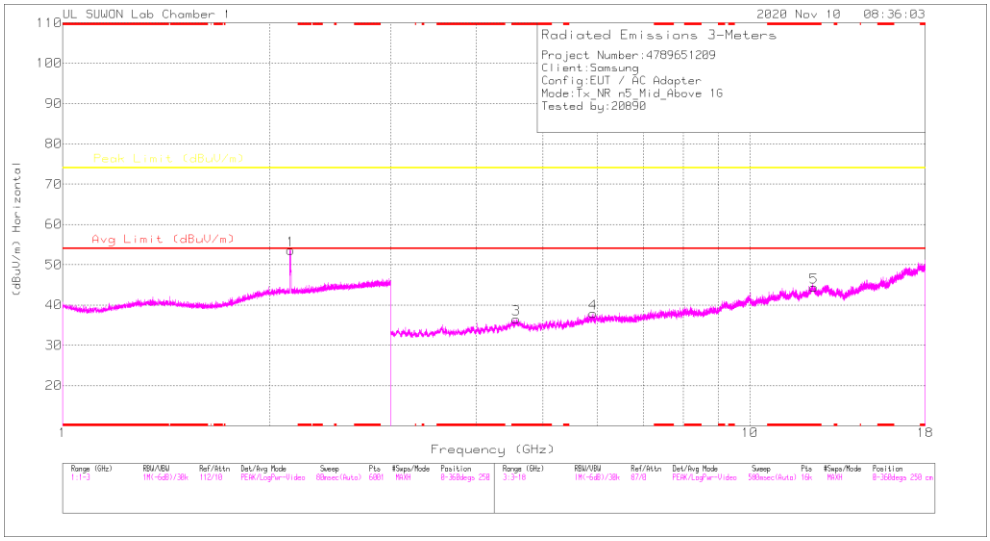
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	1-18GHz[dB]	1GHz_HP[dB]	Corrected Reading dBuV/m	Class B Avg Limit (dBuV/m)	Av(CISPR)Margin (dB)	Class B Pk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.902	30.16	PK	30.8	-30.8	.6	30.76	-	-	74	-43.24	0-360	100	H
2	3.6	29.53	PK	32.8	-29.3	.6	33.63	-	-	74	-40.37	0-360	100	H
3	6.428	27.07	PK	35.4	-26.2	.5	36.77	-	-	74	-37.23	0-360	100	H
4	1.891	30.37	PK	30.7	-30.9	.7	30.87	-	-	74	-43.13	0-360	100	V
5	3.574	29	PK	32.8	-29.3	.6	33.1	-	-	74	-40.9	0-360	100	V
6	6.442	26.27	PK	35.4	-26.2	.5	35.97	-	-	74	-38.03	0-360	200	V

PK – Peak Detector

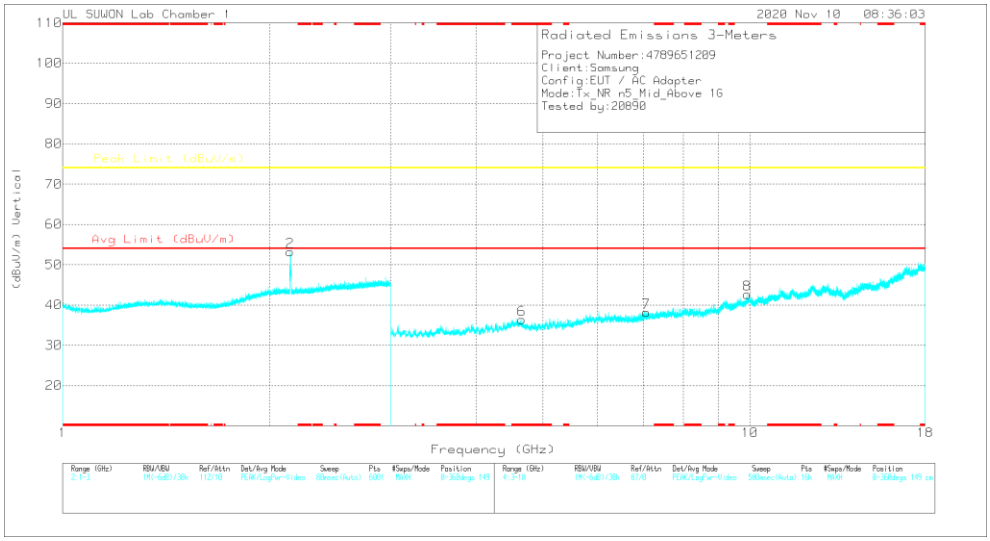
7.6. Above 1 GHz in the 5G NR Band 5

MID CHANNEL(881.5MHz)

HORIZONTAL PEAK PLOT



VERTICAL PEAK PLOT



DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168717	10dB_ATT[dB]	1GHz_HP[dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	2.14533	47.18	PK	31.6	-25.9	.7	53.58	-	-	74	-20.42	0-360	150	H
2	2.145	46.81	PK	31.6	-25.9	.7	53.21	-	-	74	-20.79	0-360	250	V

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168717	3GHz_HP[dB]	1GHz_HP[dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
3	* 4.56834	33.06	PK	34.2	-31.3	.5	36.46	-	-	74	-37.54	0-360	149	H
4	5.91825	31.7	PK	35.1	-29.4	.5	37.9	-	-	74	-36.1	0-360	149	H
5	* 12.40347	25.48	PK	38.9	-21	1	44.38	-	-	74	-29.62	0-360	149	H
6	* 4.65552	33.1	PK	34.2	-31.4	.5	36.4	-	-	74	-37.6	0-360	149	V
7	7.07318	29.62	PK	35.8	-27.7	.5	38.22	-	-	74	-35.78	0-360	250	V
8	9.92488	25.79	PK	37.7	-21.6	.7	42.59	-	-	74	-31.41	0-360	149	V

PK – Peak Detector

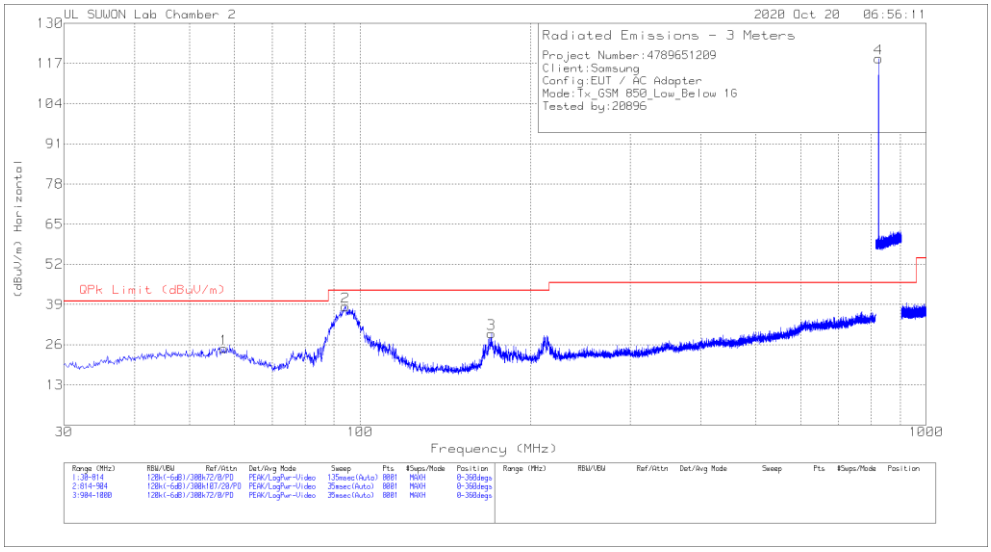
Note1: Unwanted emissions on the harmonic frequency were generated from the call-simulator with the TX and RX signals.

Note2: The signal of marker 1&2 is the LTE signal of the EN-DC combination.

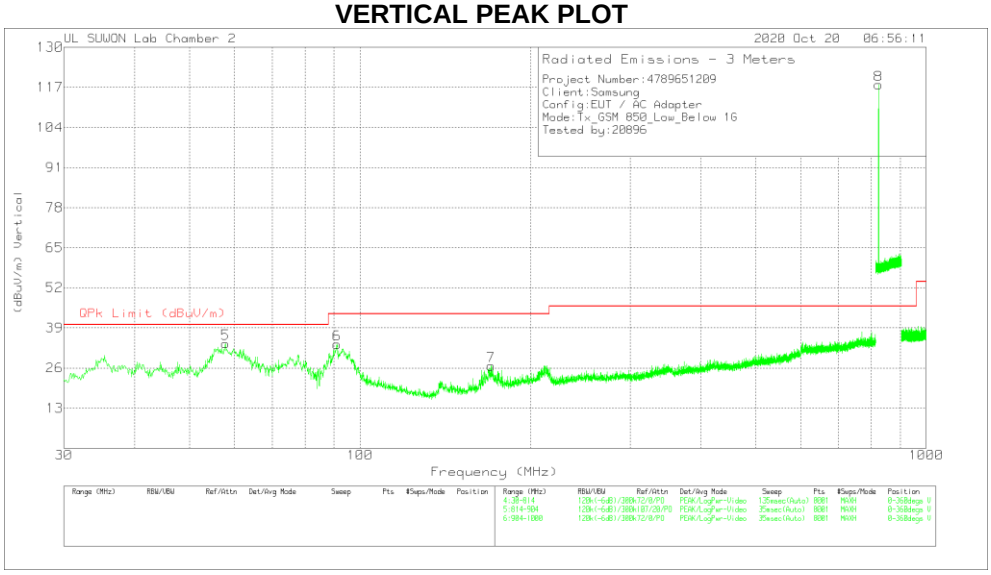
7.7. Below 1 GHz in the GSM850

LOW CHANNEL(869.2 MHz)

HORIZONTAL PEAK PLOT



VERTICAL PEAK PLOT



DATA

Trace Markers

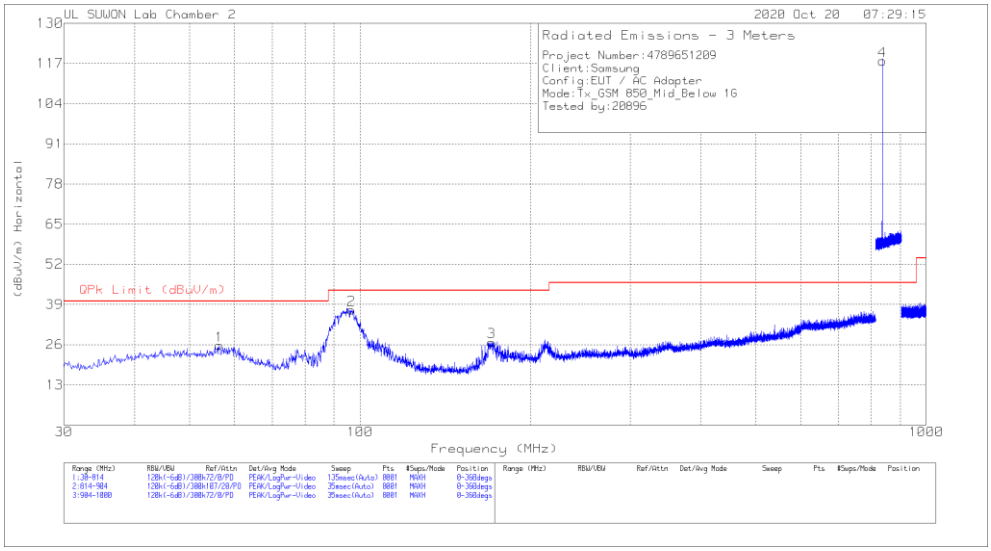
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	VULB9163_749	Below_1G_Bypass [dB]	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	57.538	4.95	Pk	19	.8	24.75	40	-15.25	0-360	200	H
2	94.288	20.84	Pk	16.4	1.1	38.34	43.52	-5.18	0-360	300	H
3	170.63	13.7	Pk	14.5	1.4	29.6	43.52	-13.92	0-360	100	H
4	824.1813	88.6	Pk	26.7	3.3	118.6	**46.02**	**72.58**	0-360	100	H
5	57.93	14.22	Pk	18.9	.8	33.92	40	-6.08	0-360	100	V
6	91.054	16.67	Pk	15.9	1.1	33.67	43.52	-9.85	0-360	100	V
7	170.532	10.68	Pk	14.5	1.5	26.68	43.52	-16.84	0-360	100	V
8	824.215	87.93	Pk	26.7	3.2	117.83	**46.02**	**71.81**	0-360	200	V

Pk - Peak detector

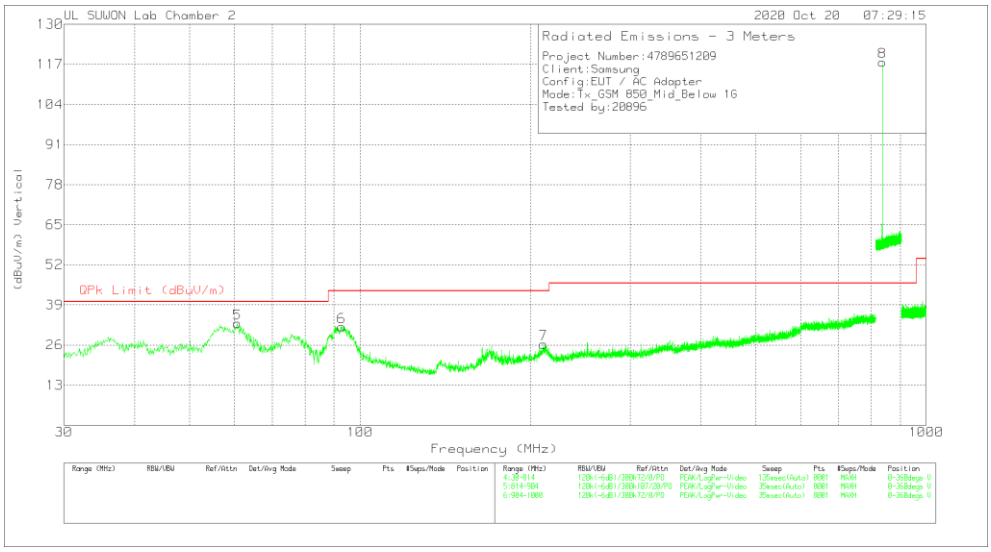
Note: Unwanted emissions captured from 824MHz to 849MHz and from 869MHz to 894MHz were the TX and RX signals generated from the call-simulator.

MID CHANNEL(881.6 MHz)

HORIZONTAL PEAK PLOT



VERTICAL PEAK PLOT



DATA

Trace Markers

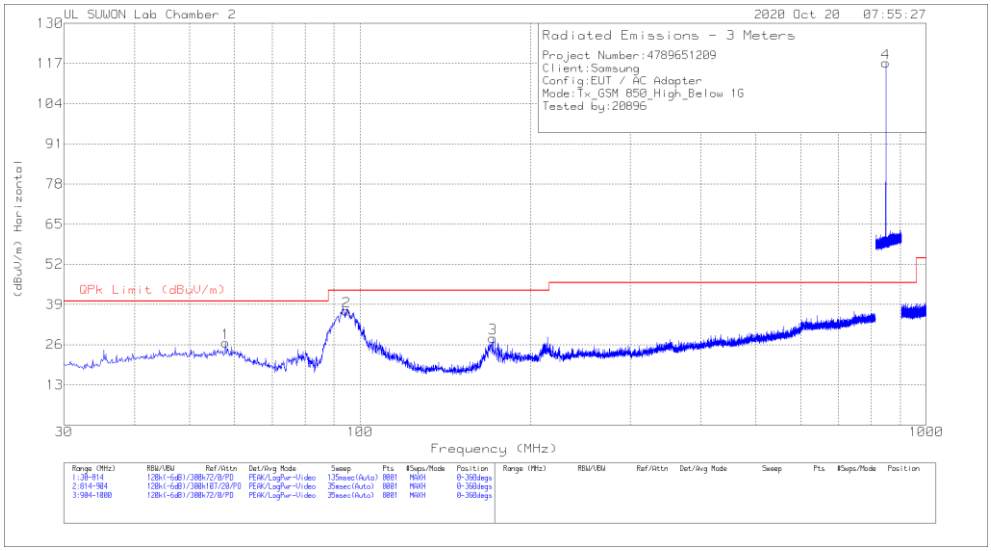
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	VULB9163_749	Below_1G_Bypass [dB]	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	56.46	5.71	Pk	19.2	.8	25.71	40	-14.29	0-360	400	H
2	96.64	19.24	Pk	16.9	1.1	37.24	43.52	-6.28	0-360	300	H
3	170.924	10.92	Pk	14.5	1.4	26.82	43.52	-16.7	0-360	100	H
4	836.6013	87.7	Pk	26.9	3.2	117.8	**46.02**	**71.78**	0-360	100	H
5	60.772	13.82	Pk	18.3	.9	33.02	40	-6.98	0-360	100	V
6	92.818	14.48	Pk	16.2	1.2	31.88	43.52	-11.64	0-360	100	V
7	210.81	8.11	Pk	16.6	1.6	26.31	43.52	-17.21	0-360	100	V
8	836.68	87.56	Pk	26.9	3.3	117.76	**46.02**	**71.74**	0-360	100	V

Pk - Peak detector

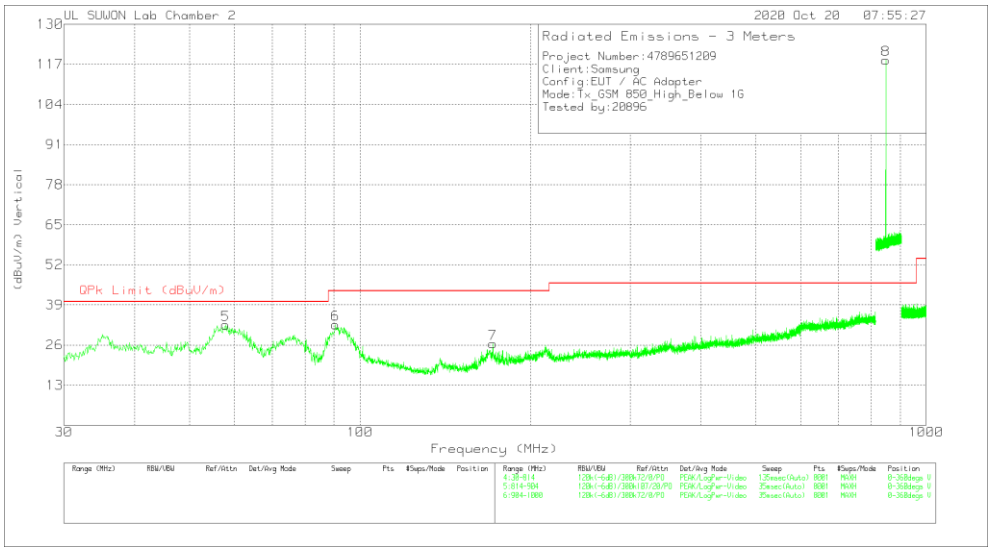
Note: Unwanted emissions captured from 824MHz to 849MHz and from 869MHz to 894MHz were the TX and RX signals generated from the call-simulator.

HIGH CHANNEL(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	57.93	6.89	Pk	18.9	.8	26.59	40	-13.41	0-360	400	H
2	94.68	19.28	Pk	16.5	1.1	36.88	43.52	-6.64	0-360	300	H
3	171.708	11.99	Pk	14.6	1.5	28.09	43.52	-15.43	0-360	100	H
4	848.7963	86.54	Pk	27.3	3.3	117.14	**46.02**	**71.12**	0-360	100	H
5	57.93	12.82	Pk	18.9	.8	32.52	40	-7.48	0-360	100	V
6	90.564	15.75	Pk	15.8	1.1	32.65	43.52	-10.87	0-360	100	V
7	171.708	10.28	Pk	14.6	1.5	26.38	43.52	-17.14	0-360	100	V
8	848.8188	87.82	Pk	27.3	3.3	118.42	**46.02**	**72.4**	0-360	200	V

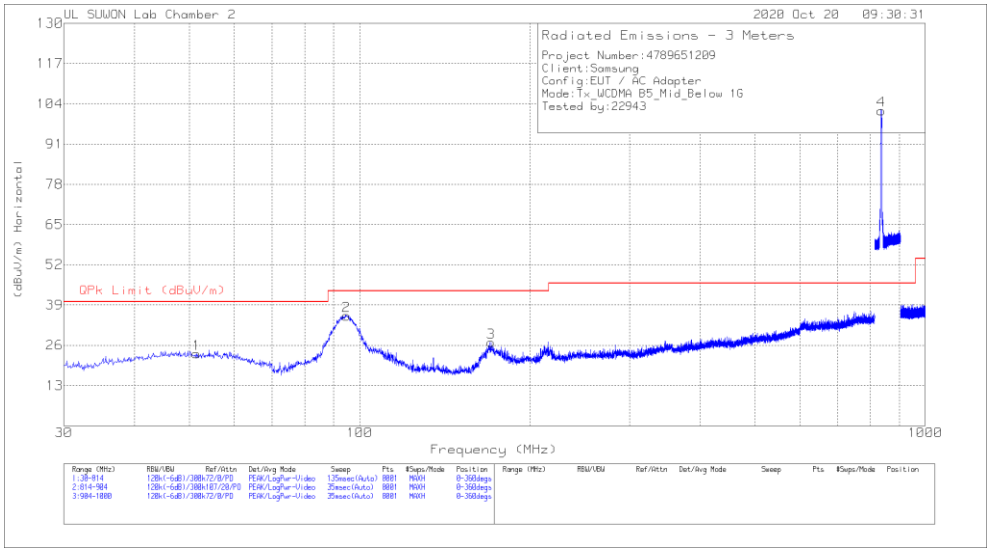
Pk - Peak detector

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

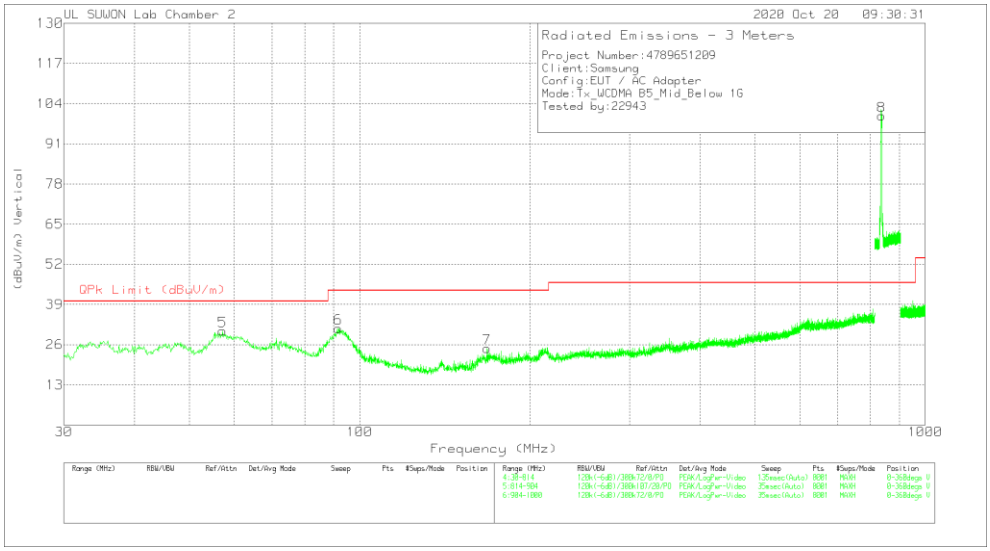
7.8. Below 1 GHz in the WCDMA Band 5

MID CHANNEL(881.6 MHz)

HORIZONTAL PEAK PLOT



VERTICAL PEAK PLOT



DATA

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	VULB9163_749	Below_1G_Bypass [dB]	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	51.462	2.63	Pk	19.8	.8	23.23	40	-16.77	0-360	200	H
2	94.778	17.8	Pk	16.5	1.2	35.5	43.52	-8.02	0-360	300	H
3	170.924	11	Pk	14.5	1.4	26.9	43.52	-16.62	0-360	100	H
4	836.5113	71.59	Pk	26.9	3.3	101.79	**46.02**	**55.77**	0-360	100	H
5	57.244	10.45	Pk	19.1	.9	30.45	40	-9.55	0-360	100	V
6	91.74	14.29	Pk	16	1	31.29	43.52	-12.23	0-360	100	V
7	168.082	8.84	Pk	14.5	1.5	24.84	43.52	-18.68	0-360	100	V
8	836.7588	69.83	Pk	26.9	3.3	100.03	**46.02**	**54.01**	0-360	200	V

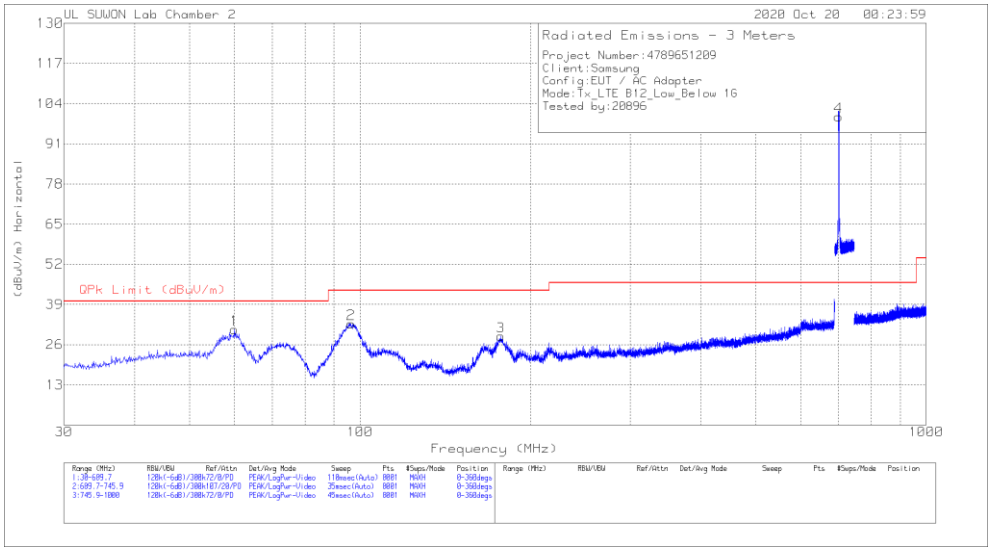
Pk - Peak detector

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

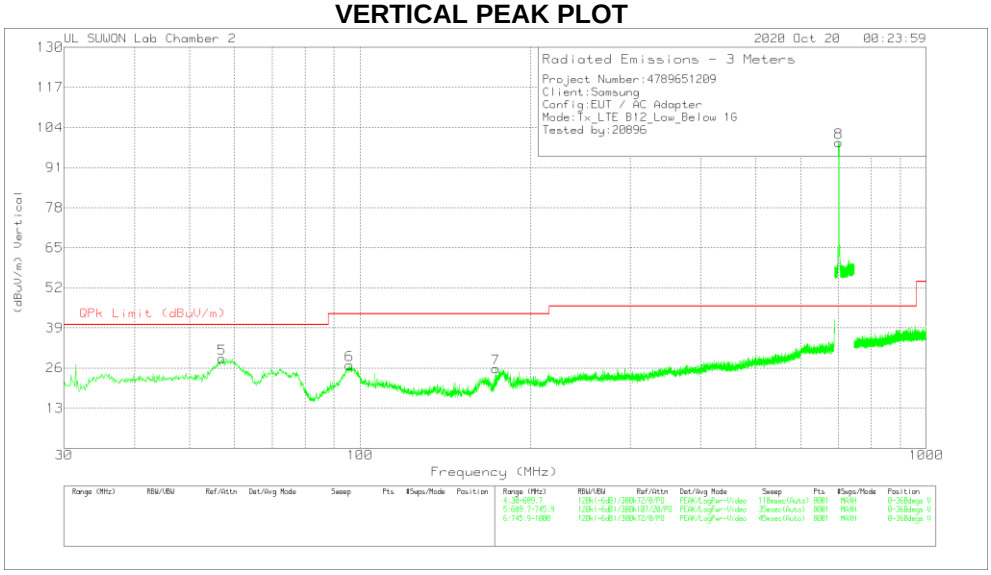
7.9. Below 1 GHz in the LTE Band 12

LOW CHANNEL(730.5 MHz)

HORIZONTAL PEAK PLOT



VERTICAL PEAK PLOT



DATA

Trace Markers

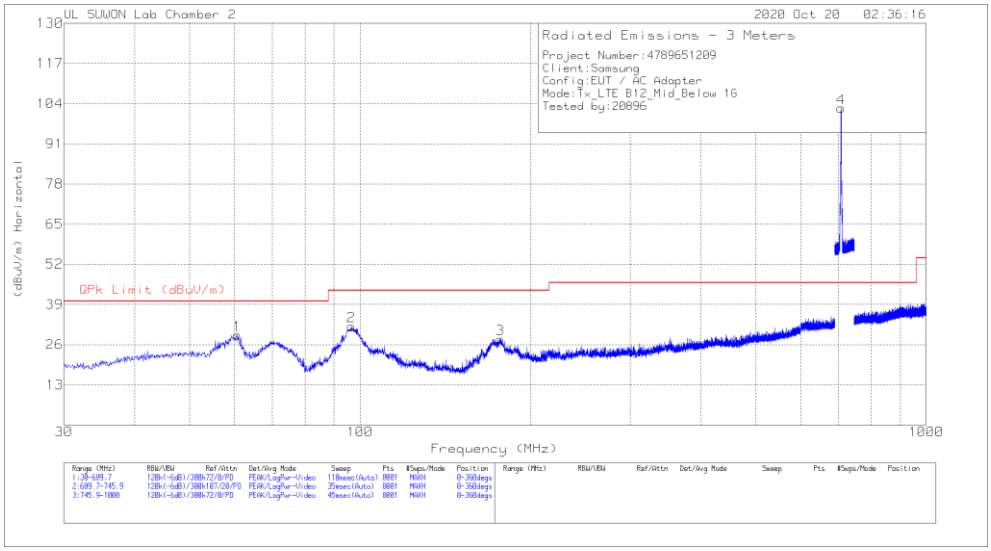
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	VULB9163_749	Below_1G_Bypass [dB]	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	60.0165	11.73	Pk	18.5	.7	30.93	40	-9.07	0-360	400	H
2	96.4652	14.89	Pk	16.9	1	32.79	43.52	-10.73	0-360	300	H
3	177.4438	12.3	Pk	15	1.4	28.7	43.52	-14.82	0-360	200	H
4	700.4061	71.36	Pk	25.4	3	99.76	**46.02**	**53.74**	0-360	100	H
5	57.0479	9.16	Pk	19.1	.8	29.06	40	-10.94	0-360	200	V
6	95.8879	9.2	Pk	16.8	1	27	43.52	-16.52	0-360	300	V
7	173.8155	9.62	Pk	14.7	1.5	25.82	43.52	-17.7	0-360	100	V
8	700.5466	70.71	Pk	25.4	3	99.11	**46.02**	**53.09**	0-360	100	V

Pk - Peak detector

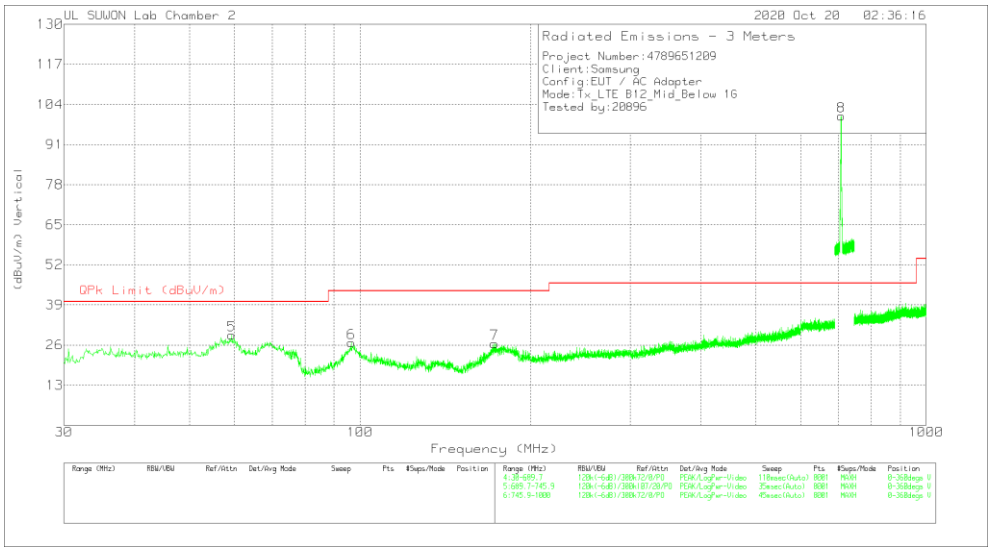
Note: Unwanted emissions captured from 699MHz to 716MHz and from 729MHz to 746MHz were the TX and RX signals generated from the call-simulator.

MID CHANNEL(737.5 MHz)

HORIZONTAL PEAK PLOT



VERTICAL PEAK PLOT



DATA

Trace Markers

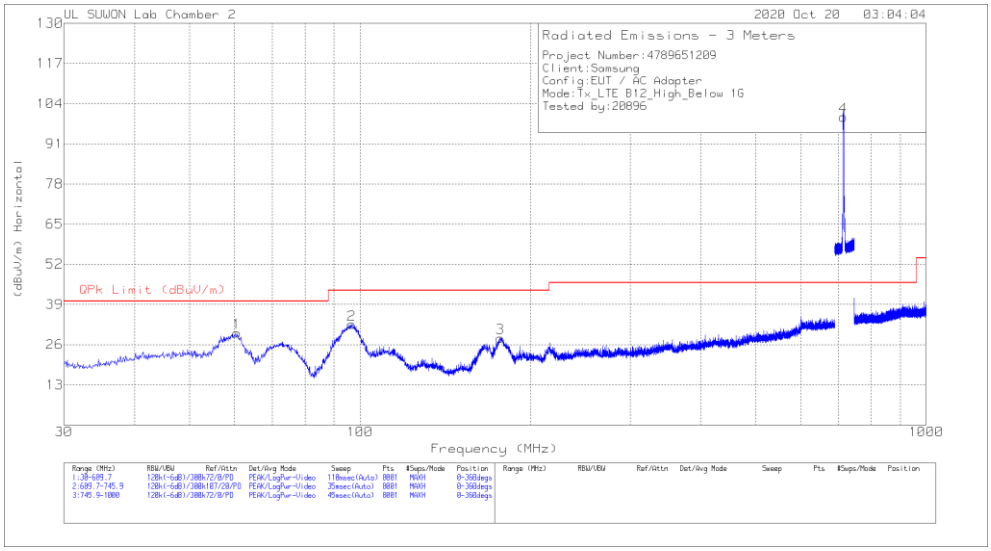
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	VULB9163_749	Below_1G_Bypass [dB]	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	60.7587	9.92	Pk	18.3	.9	29.12	40	-10.88	0-360	400	H
2	96.5476	14.07	Pk	16.9	1	31.97	43.52	-11.55	0-360	300	H
3	176.9491	11.33	Pk	15	1.5	27.83	43.52	-15.69	0-360	200	H
4	707.5997	73.95	Pk	25.6	3	102.55	**46.02**	**56.53**	0-360	100	H
5	59.3568	9.74	Pk	18.6	.9	29.24	40	-10.76	0-360	100	V
6	96.5476	8.81	Pk	16.9	1	26.71	43.52	-16.81	0-360	300	V
7	172.8259	10.44	Pk	14.6	1.4	26.44	43.52	-17.08	0-360	100	V
8	707.9369	71.7	Pk	25.6	2.9	100.2	**46.02**	**54.18**	0-360	100	V

Pk - Peak detector

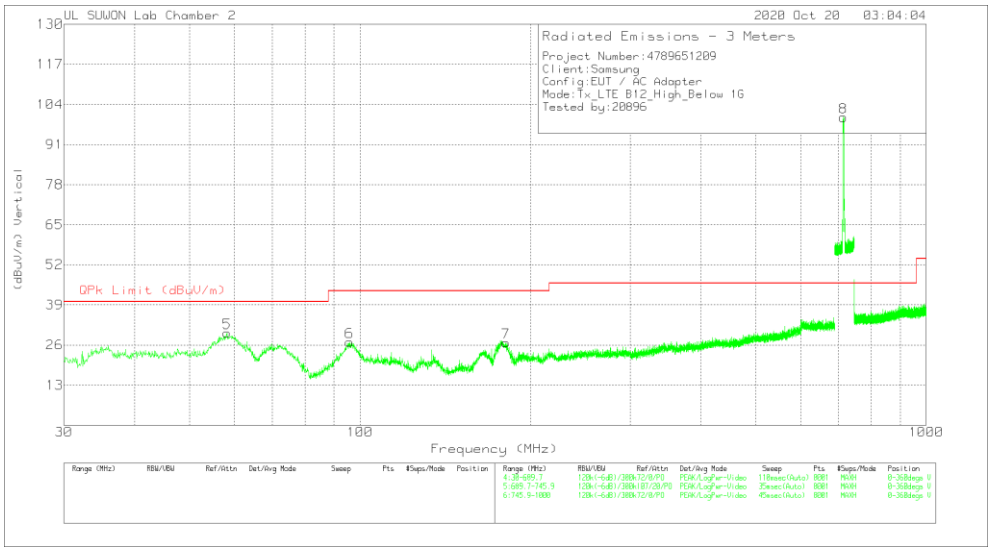
Note: Unwanted emissions captured from 699MHz to 716MHz and from 729MHz to 746MHz were the TX and RX signals generated from the call-simulator.

HIGH CHANNEL(744.5 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	60.6762	10.52	Pk	18.4	.9	29.82	40	-10.18	0-360	400	H
2	96.7126	14.55	Pk	16.9	1.1	32.55	43.52	-10.97	0-360	300	H
3	176.8666	11.65	Pk	15	1.5	28.15	43.52	-15.37	0-360	200	H
4	714.154	71.05	Pk	25.6	3	99.65	**46.02**	**53.63**	0-360	100	H
5	58.2848	10.27	Pk	18.8	.9	29.97	40	-10.03	0-360	100	V
6	95.8879	9.19	Pk	16.8	1	26.99	43.52	-16.53	0-360	300	V
7	181.1547	9.82	Pk	15.4	1.6	26.82	43.52	-16.7	0-360	100	V
8	714.3929	71.23	Pk	25.6	3	99.83	**46.02**	**53.81**	0-360	100	V

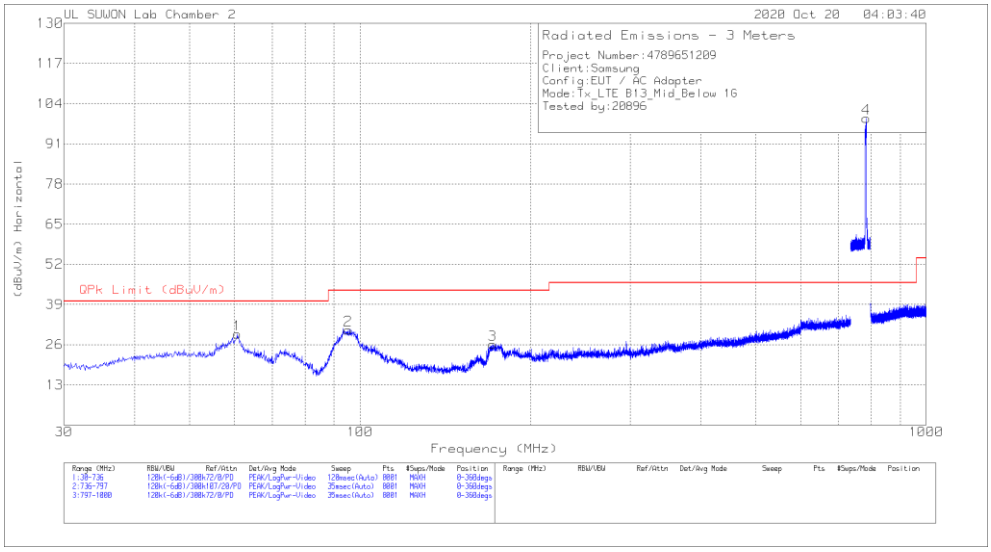
Pk - Peak detector

Note: Unwanted emissions captured from 699MHz to 716MHz and from 729MHz to 746MHz were the TX and RX signals generated from the call-simulator.

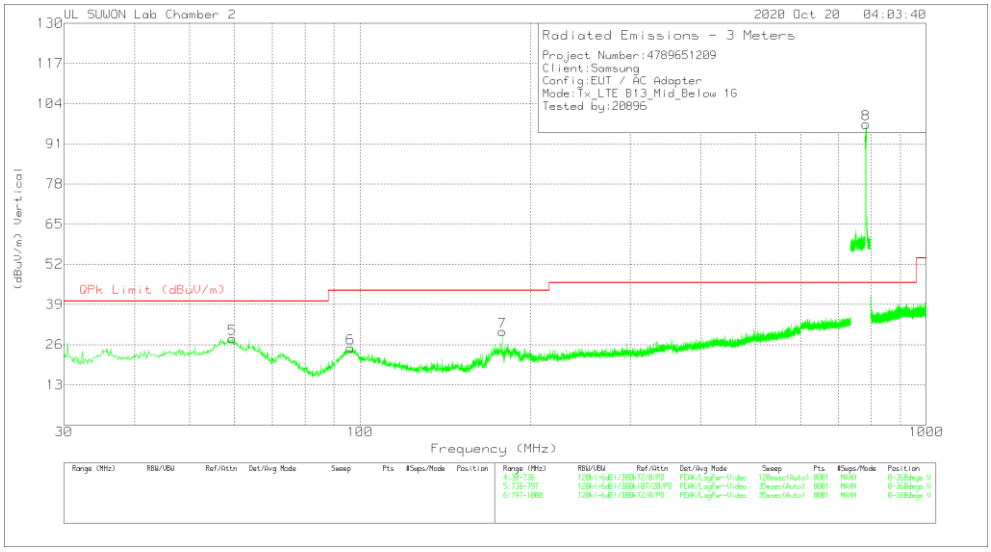
7.10. Below 1 GHz in the LTE Band 13

MID CHANNEL(751.0 MHz)

HORIZONTAL PEAK PLOT



VERTICAL PEAK PLOT



DATA

Trace Markers

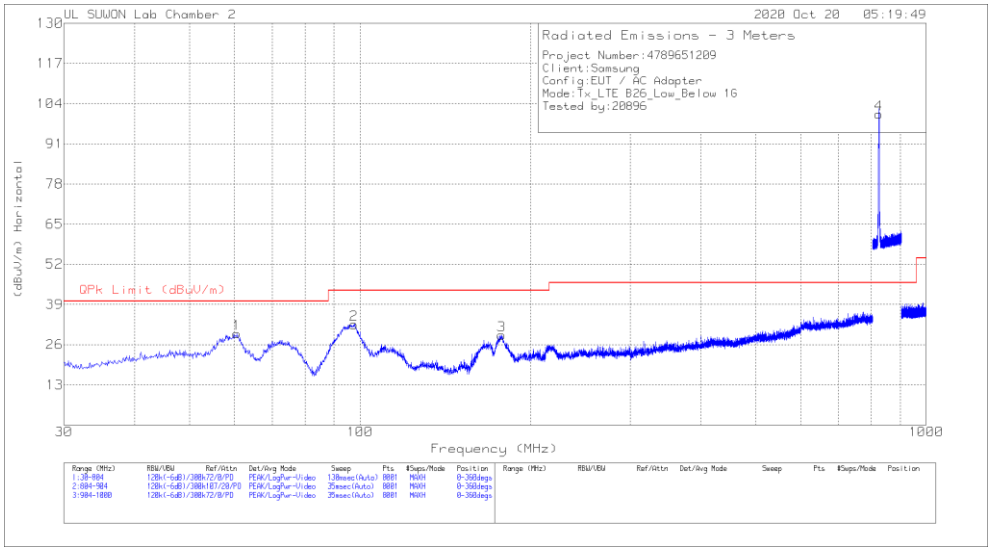
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	VULB9163_749	Below_1G_Bypass [dB]	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	60.711	10.1	Pk	18.4	.9	29.4	40	-10.6	0-360	400	H
2	95.305	13.07	Pk	16.6	1.1	30.77	43.52	-12.75	0-360	300	H
3	171.6413	10.08	Pk	14.6	1.4	26.08	43.52	-17.44	0-360	100	H
4	784.0299	69.66	Pk	26.5	3.1	99.26	**46.02**	**53.24**	0-360	100	H
5	59.4755	8.38	Pk	18.6	.9	27.88	40	-12.12	0-360	200	V
6	96.2758	6.98	Pk	16.9	1	24.88	43.52	-18.64	0-360	300	V
7	178.5248	13.6	Pk	15.2	1.4	30.2	43.52	-13.32	0-360	100	V
8	783.5343	67.74	Pk	26.5	3.1	97.34	**46.02**	**51.32**	0-360	200	V

Pk - Peak detector

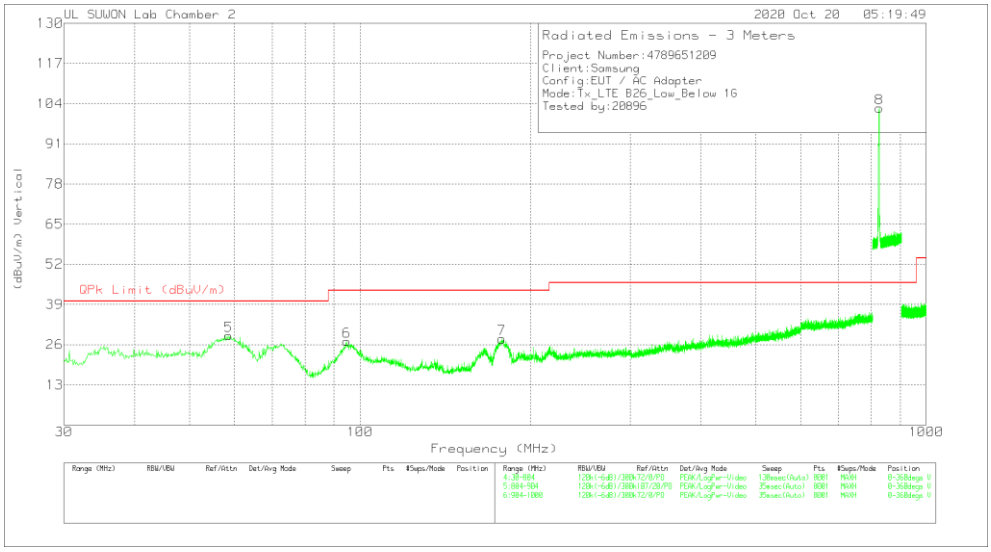
7.11. Below 1 GHz in the LTE Band 26

LOW CHANNEL(860.5 MHz)

HORIZONTAL PEAK PLOT



VERTICAL PEAK PLOT



DATA

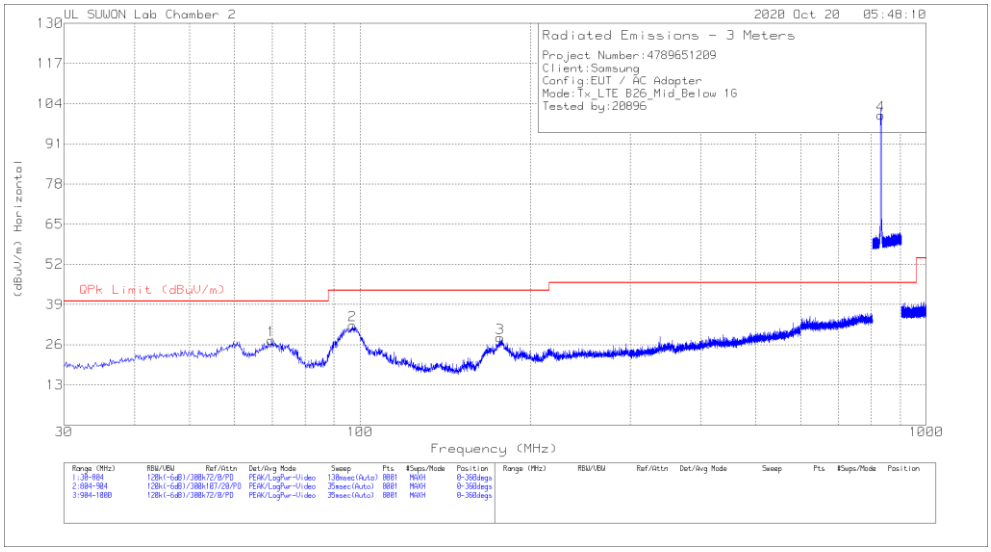
Trace Markers

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	60.6698	10.24	Pk	18.4	.9	29.54	40	-10.46	0-360	400	H
2	97.5315	14.39	Pk	17.1	1	32.49	43.52	-11.03	0-360	300	H
3	177.9308	12.45	Pk	15.1	1.5	29.05	43.52	-14.47	0-360	100	H
4	825.5625	70.64	Pk	26.7	3.2	100.54	**46.02**	**54.52**	0-360	100	H
5	58.638	9.39	Pk	18.8	.7	28.89	40	-11.11	0-360	100	V
6	94.7258	9.45	Pk	16.5	1.1	27.05	43.52	-16.47	0-360	300	V
7	178.221	11.15	Pk	15.1	1.6	27.85	43.52	-15.67	0-360	100	V
8	826.5375	72.64	Pk	26.7	3.2	102.54	**46.02**	**56.52**	0-360	200	V

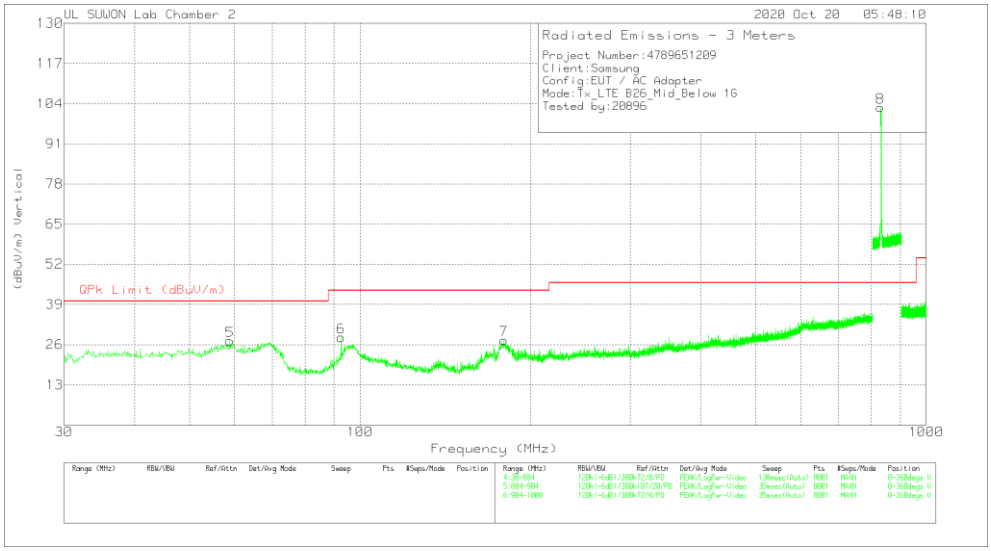
Pk - Peak detector

MID CHANNEL(876.5 MHz)

HORIZONTAL PEAK PLOT



VERTICAL PEAK PLOT



DATA

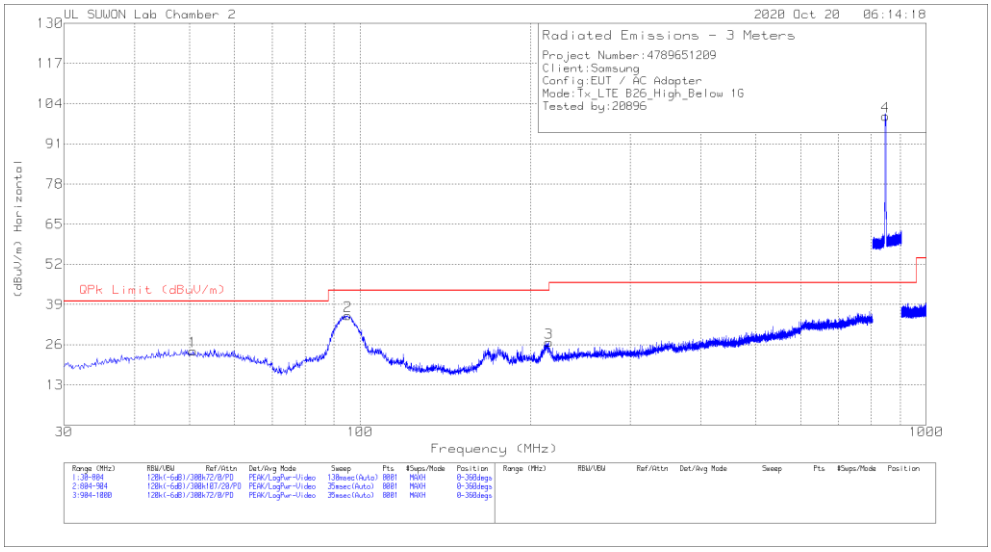
Trace Markers

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	69.7643	10.92	Pk	15.4	1.1	27.42	40	-12.58	0-360	300	H
2	97.0478	14.21	Pk	17	1.1	32.31	43.52	-11.21	0-360	300	H
3	176.7698	11.83	Pk	15	1.4	28.23	43.52	-15.29	0-360	200	H
4	831.5	70.14	Pk	26.8	3.3	100.24	**46.02**	**54.22**	0-360	100	H
5	58.9283	7.5	Pk	18.7	1	27.2	40	-12.8	0-360	300	V
6	92.694	11.24	Pk	16.1	1	28.34	43.52	-15.18	0-360	100	V
7	179.6723	10.68	Pk	15.3	1.5	27.48	43.52	-16.04	0-360	200	V
8	830.5875	72.64	Pk	26.8	3.3	102.74	**46.02**	**56.72**	0-360	200	V

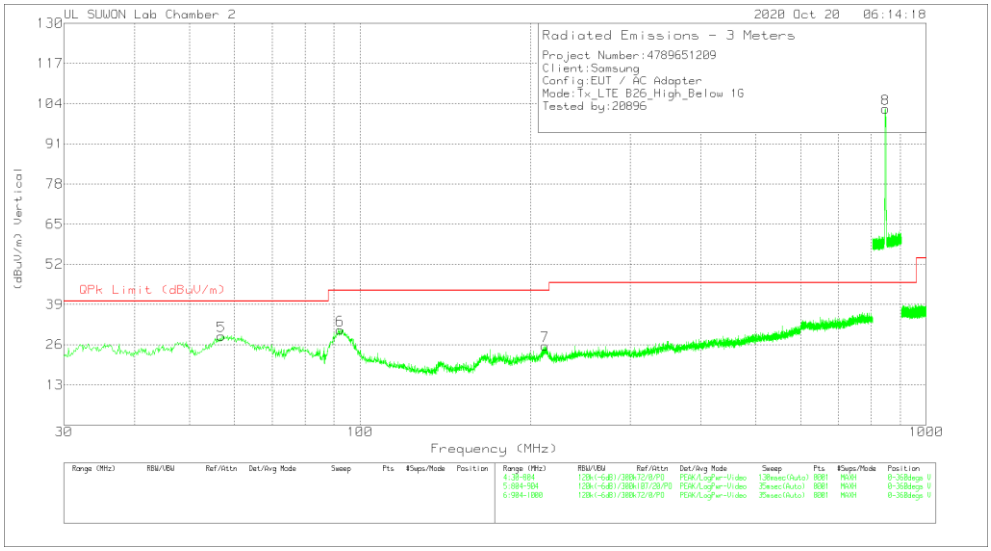
Pk - Peak detector

HIGH CHANNEL(892.5 MHz)

HORIZONTAL PEAK PLOT



VERTICAL PEAK PLOT



DATA

Trace Markers

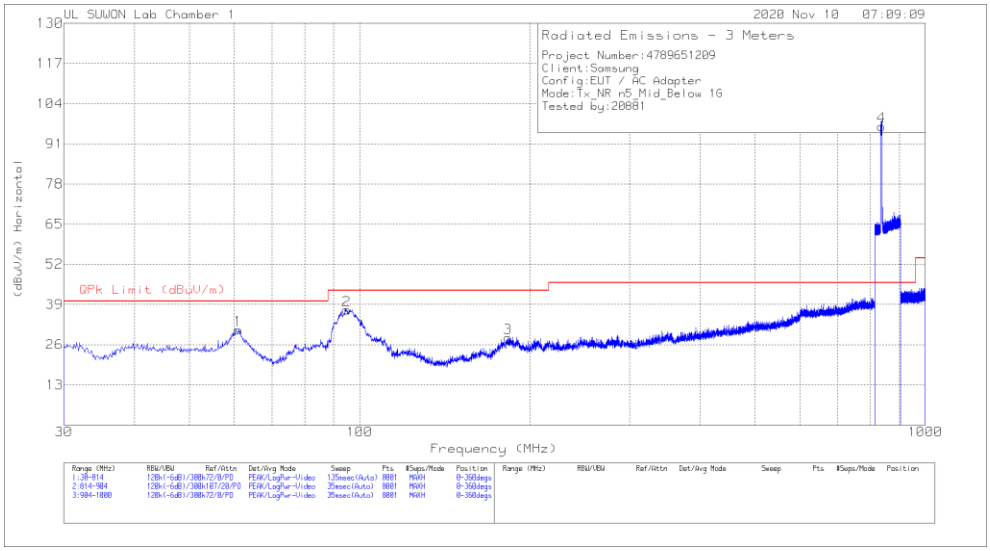
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	VULB9163_749	Below_1G_Bypass [dB]	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	50.7045	3.25	Pk	19.8	.9	23.95	40	-16.05	0-360	300	H
2	95.1128	17.82	Pk	16.5	1.1	35.42	43.52	-8.1	0-360	300	H
3	215.5665	8.12	Pk	16.8	1.8	26.72	43.52	-16.8	0-360	100	H
4	847.5625	69.34	Pk	27.3	3.3	99.94	**46.02**	**53.92**	0-360	100	H
5	56.8965	8.81	Pk	19.1	.9	28.81	40	-11.19	0-360	100	V
6	92.2103	13.69	Pk	16	1.1	30.79	43.52	-12.73	0-360	100	V
7	212.1803	7.35	Pk	16.7	1.6	25.65	43.52	-17.87	0-360	200	V
8	847.9625	71.74	Pk	27.3	3.3	102.34	**46.02**	**56.32**	0-360	200	V

Pk - Peak detector

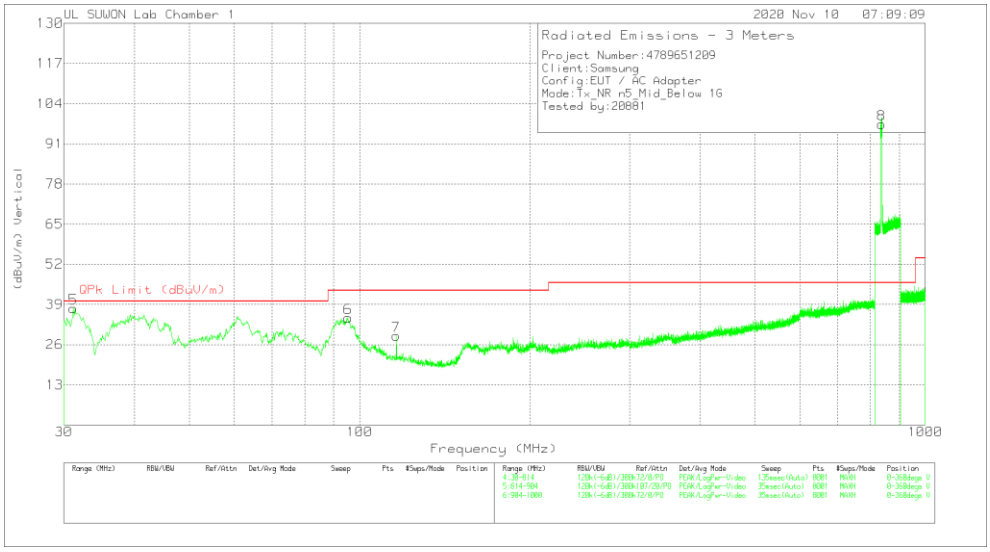
7.12. Below 1 GHz in the 5G NR Band 5

MID CHANNEL(881.6MHz)

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	61.066	10.36	Pk	18.4	2	30.76	40	-9.24	0-360	400	H
2	94.876	18.1	Pk	16.6	2.5	37.2	43.52	-6.32	0-360	300	H
3	183.076	8.88	Pk	15.7	3.6	28.18	43.52	-15.34	0-360	100	H
4	837.1413	61.81	Pk	27.1	7.7	96.61	**46.02**	**50.59**	0-360	200	H
5	31.176	20.84	Pk	15.7	1.2	37.74	40	-2.26	0-360	100	V
6	95.464	15.26	Pk	16.7	2.7	34.66	43.52	-8.86	0-360	100	V
7	116.142	9.76	Pk	16.2	2.9	28.86	43.52	-14.66	0-360	100	V
8	837.0738	62.53	Pk	27.1	7.7	97.33	**46.02**	**51.31**	0-360	100	V

Pk - Peak detector

Radiated Emissions

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
31.176	13.47	Qp	15.7	1.2	30.37	40	-9.63	44	100	V

Qp - Quasi-Peak detector

END OF TEST REPORT

UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_15B(04)
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