



# **CERTIFICATION TEST REPORT**

**Report Number.** : 4790136523-E1V2

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

**Model** : SM-N986B1/DS, SM-N986B1

**FCC ID** : A3LSMN986B1

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

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

**Date Of Issue:**

2021-11-15

**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



**Testing Laboratory**

**TL-637**

Revision History

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
V1	2021-11-05	Initial issue	Steven(Sangyun) Kim
V2	2021-11-15	Updated to address TCB's question	Steven(Sangyun) Kim

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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/ax, NFC, WPT and UWB  
**MODEL NUMBER:** SM-N986B1/DS, SM-N986B1  
**SERIAL NUMBER:** R3CR90Y689Z (RADIATED);  
**DATE TESTED:** 2021-11-02 ~ 2021-11-05;

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:



Steven(Sangyun) Kim  
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	
<input checked="" type="checkbox"/>	Chamber 1
<input type="checkbox"/>	Chamber 2
<input type="checkbox"/>	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:

$EIRP = \text{PSA reading with EUT worst orientation (dBm)} + \text{Path loss (dB)} - \text{cable loss (between the SG and substitution antenna)} + \text{Substitution Antenna Factor (dBi)}$

$ERP = \text{PSA reading with EUT worst orientation (dBm)} + \text{Path loss (dB)} - \text{cable loss (between the SG and substitution antenna)}$

(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
Conducted Disturbance, 0.15 to 30 MHz	3.02 dB
Radiated Disturbance, 30 MHz to 1 GHz	4.05 dB
Radiated Disturbance, 1 GHz to 18 GHz	5.78 dB
Radiated Disturbance, Above 18 GHz	5.58 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 115:2007.

## 5. EQUIPMENT UNDER TEST

### 5.1. DESCRIPTION OF EUT

GSM/WCDMA/LTE Phone + BT/BLE, DTS/UNII a/b/g/n/ac/ax, NFC, WPT and UWB.

This report covers the Samsung models SM-N986B1/DS, SM-N986B1.

These models are identical in hardware except SM-N986B1/DS is supported dual SIM tray and SM-N986B1 has single SIM tray.

All series model was same hardware thus, SM-N986B1/DS(Dual SIM tray) was set for final test.

### GENERAL INFORMATION

Type of device	Class B personal computers and peripherals Other Class B digital devices & peripherals
Personal Computer power requirements	100-240 VAC / 50-60 Hz, 1.8 A
Travel Adapter power requirements	100-240 VAC / 50-60 Hz, 0.7 A
List of frequencies generated or used by the EUT	40 GHz (5th harmonic of the frequency 8 GHz UWB)
Test Voltage	120 Vac / 60 Hz

### 5.2. TEST MODE

Mode	Description
Test Case 1	Camera(Front) + Charging
Test Case 2	Video and Audio Play + Earphone
Test Case 3	Video and Audio Play + Display Out
Test Case 4	USB Data Communication with PC

Note: All descriptions were tested under simultaneous operation.

Receiver Mode (Licensed Band within 30-960MHz) test result refer to FCC Report Receiver mode(CXX).

### 5.3. WORST-CASE ORIENTATION AND MODE

The EUT was investigated in three orthogonal orientations X, Y, Z it was determined that X orientation with data transfer was worst-case; therefore, all final radiated testing was performed with the EUT in X orientation with data transfer.

## 5.1. MODIFICATIONS

No modifications were made during testing.

## 5.2. DETAILS OF TESTED SYSTEM

### SUPPORT EQUIPMENT & PERIPHERALS

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID/DoC
Laptop PC	Lenovo	T480s	PC0VHHJR	DoC
AC/DC Adapter	Lenovo	ADLX65YDC3A	8SSA10M13946D1SG862021R	N/A
Mouse	SAMSUNG	AA-MW1D5WB	CN57BA5904489BDV8JN9W1756	N/A
Data Cable	SAMSUNG	EP-DG980	GH39-0206ABBE	N/A
Charger	SAMSUNG	EP-TA800	R37R38J4A28SE3	N/A
Earphone	SAMSUNG	-	GH59-15252A	N/A
Micro SD Card	SAMSUNG	MB-MC256GA	-	-
Monitor	DELL	U2417H	CN-0767T7-WS200-74M-C4SL-A03	N/A



**I/O CABLES**

[DIAGRAM 1]

I/O Cable List						
Cable No	Port	# of identical ports	Connect or Type	Cable Type	Cable Length(m)	Remarks
1	AC Power	1	Power	-	Direct	From AC/DC Adapter to AC Main
2	Type C	1	Power	Unshielded	0.7m	From AD/DC Adapter to EUT
3	Micro SD Slot	1	-	-	Direct	Fitted In EUT

[DIAGRAM 2]

I/O Cable List						
Cable No	Port	# of identical ports	Connect or Type	Cable Type	Cable Length(m)	Remarks
1	Earphone	1	Type C	Shielded	0.7m	From Earphone to EUT
2	Micro SD Slot	1	-	-	Direct	Fitted In EUT

\* Radiated Test Only

[DIAGRAM 3]

I/O Cable List						
Cable No	Port	# of identical ports	Connect or Type	Cable Type	Cable Length(m)	Remarks
1	Type C	1	DP	Shielded	1.5m	From LCD Monitor to EUT
2	Micro SD Slot	1	-	-	Direct	Fitted In EUT

\* Radiated Test Only

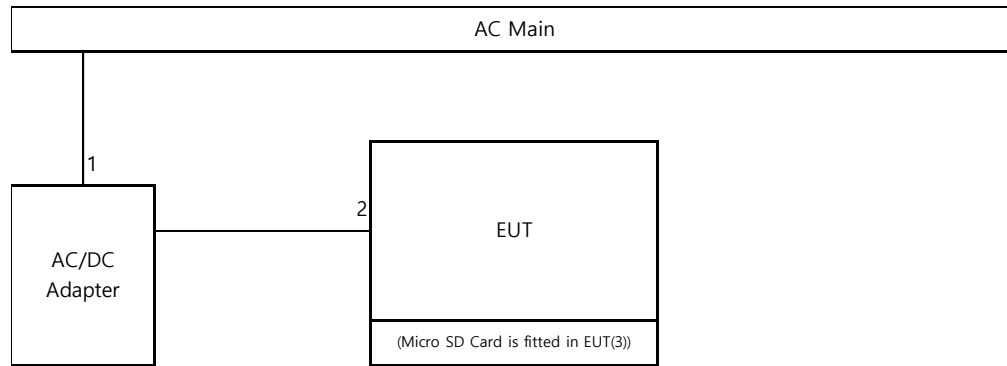
[DIAGRAM 4]

I/O Cable List						
Cable No	Port	# of identical ports	Connect or Type	Cable Type	Cable Length(m)	Remarks
1	AC Power	1	Power	Unshielded	1.5m	From AD/DC Adapter to AC Main
2	DC Power	1	Type C	Shielded	0.7m	From Laptop to AC/DC Adapter
3	USB	1	USB	Shielded	1.5m	From Laptop to EUT
4	AC Power	1	Type C	Unshielded	1.0m	From Mouse to Laptop
5	Micro SD Slot	1	-	-	Direct	Fitted In EUT
6	Ethernet	1	RJ45	Unshielded	1.5m	From Laptop to Router in out of test site

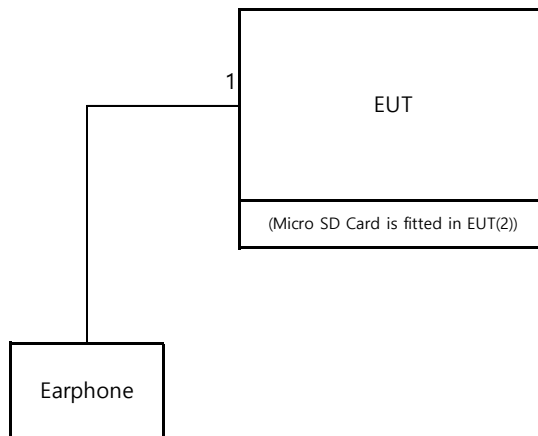
**TEST SETUP**

The EUT is installed in a typical configuration. Copy files from PC to EUT fitted Micro sd card.  
Video and sound on EUT send to the LCD Monitor from DP cable.

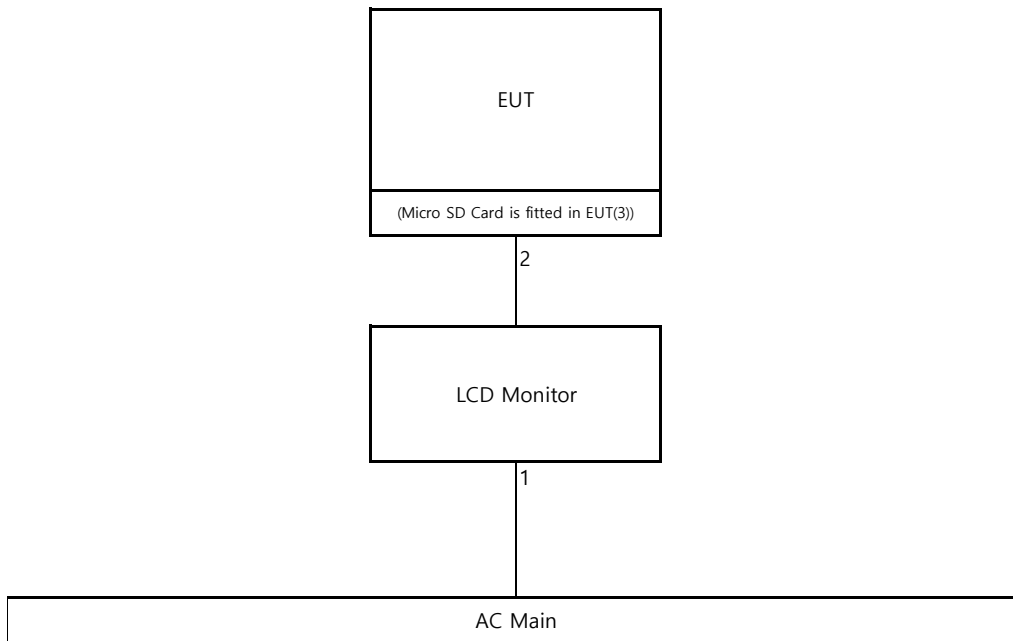
**TEST SETUP DIAGRAM 1 for Test Case 1**



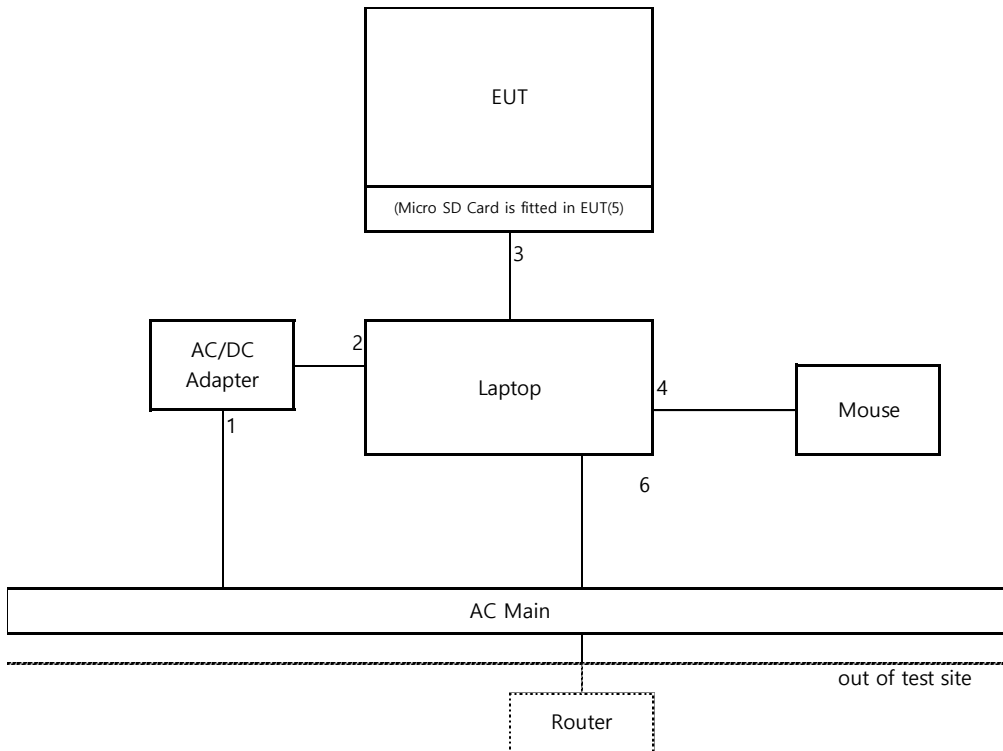
**TEST SETUP DIAGRAM 2 for Test Case 2**



**TEST SETUP DIAGRAM 3 for Test case 3**



**TEST SETUP DIAGRAM 4 for Test case 4**



## 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, Horn, 40 GHz	ETS	3116C	00166155	2022-08-04
Antenna, Horn, 40 GHz	ETS	3116C	00168645	2022-08-04
Preamplifier	ETS	3116C-PA	00168841	2022-08-04
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	750	2022-08-19
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	845	2022-08-13
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	749	2022-08-13
Antenna, Horn, 18 GHz	ETS	3115	00167211	2022-07-27
Antenna, Horn, 18 GHz	ETS	3115	00161451	2022-08-15
Antenna, Horn, 18 GHz	ETS	3117	00168724	2022-07-27
Antenna, Horn, 18 GHz	ETS	3117	00168717	2022-08-15
Preamplifier, 1000 MHz	Sonoma	310N	341282	2022-08-02
Preamplifier, 1000 MHz	Sonoma	310N	370599	2022-08-02
Preamplifier, 1000 MHz	Sonoma	310N	351741	2022-08-02
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1876511	2022-08-02
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	2029168	2022-08-02
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1896138	2022-08-02
EMI Test Receive, 40 GHz	R&S	ESU40	100439	2022-08-02
EMI Test Receive, 40 GHz	R&S	ESU40	100457	2022-08-02
EMI Test Receive, 3 GHz	R&S	ESR3	101832	2022-08-02
LISN	R&S	ENV-216	101836	2022-08-05
LISN	R&S	ENV-216	101837	2022-08-05
UL Software				
Description	Manufacturer	Model	Version	
Radiated software	UL	UL EMC	Ver 9.5	
AC Line Conducted software	UL	UL EMC	Ver 9.5	

## 7. TEST RESULTS

### 7.1. RADIATED EMISSIONS

#### TEST PROCEDURE

ANSI C63.4-2014

The highest clock frequency generated or used in the EUT is 40 GHz therefore the frequency range was investigated from 30 MHz to 40 GHz.

#### LIMIT

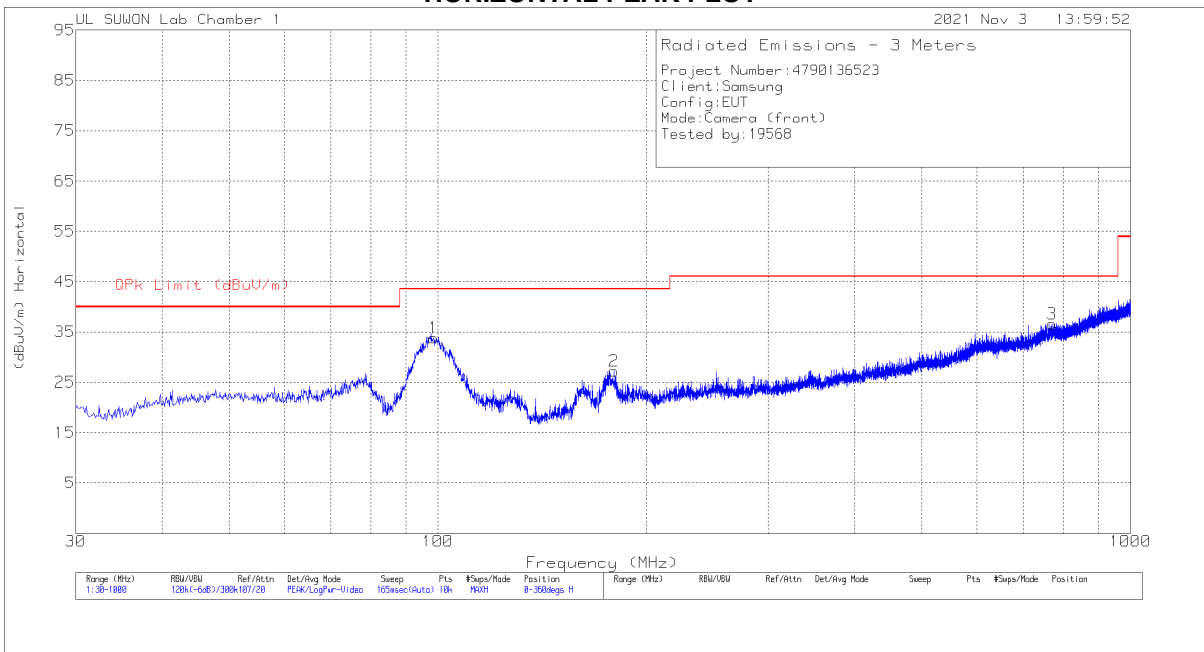
§15.109 (a) Except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Limits for radiated disturbance of Class B ITE at measuring distance of 3 m	
Frequency range (MHz)	Quasi-peak limits (dB $\mu$ V/m)
30 to 88	40
88 to 216	43.5
216 to 960	46
Above 960 MHz	54

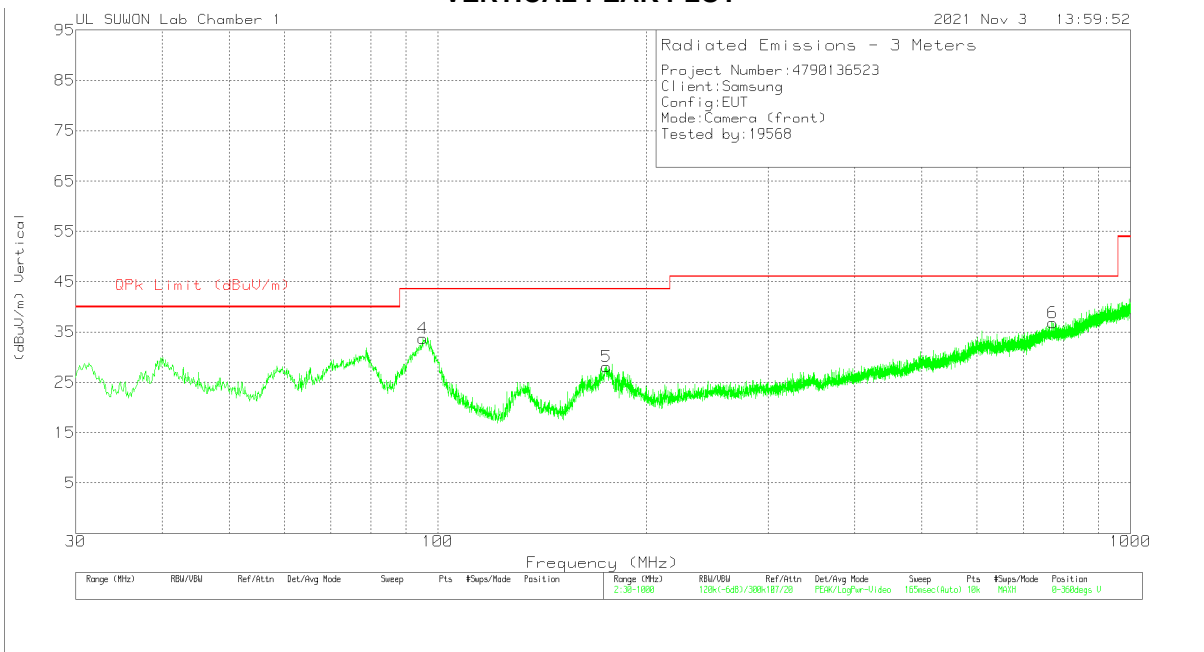
Note: The lower limit shall apply at the transition frequency.

### 7.1.1. RADIATED EMISSIONS 30 TO 1000 MHz [Test case 1]

#### HORIZONTAL PEAK PLOT



#### VERTICAL PEAK PLOT



**DATA**

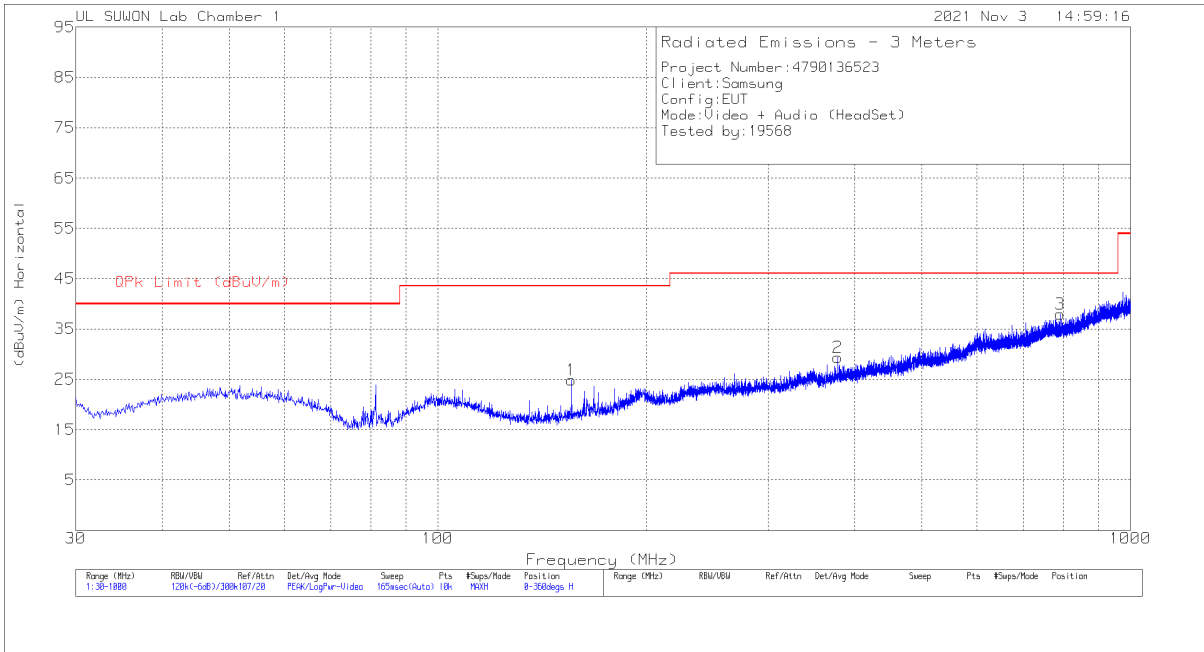
Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	VULB9163_750	Below_1G[dB]	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	98.482	46.28	Pk	17.8	-30.2	33.88	43.52	-9.64	0-360	200	H
2	179.574	41.28	Pk	15.5	-29.5	27.28	43.52	-16.24	0-360	100	H
3	771.274	35.97	Pk	26.9	-26.3	36.57	46.02	-9.45	0-360	300	H
4	95.184	46.76	Pk	17.3	-30.3	33.76	43.52	-9.76	0-360	200	V
5	175.015	42.39	Pk	15.1	-29.4	28.09	43.52	-15.43	0-360	200	V
6	772.341	36.18	Pk	26.9	-26.3	36.78	46.02	-9.24	0-360	200	V

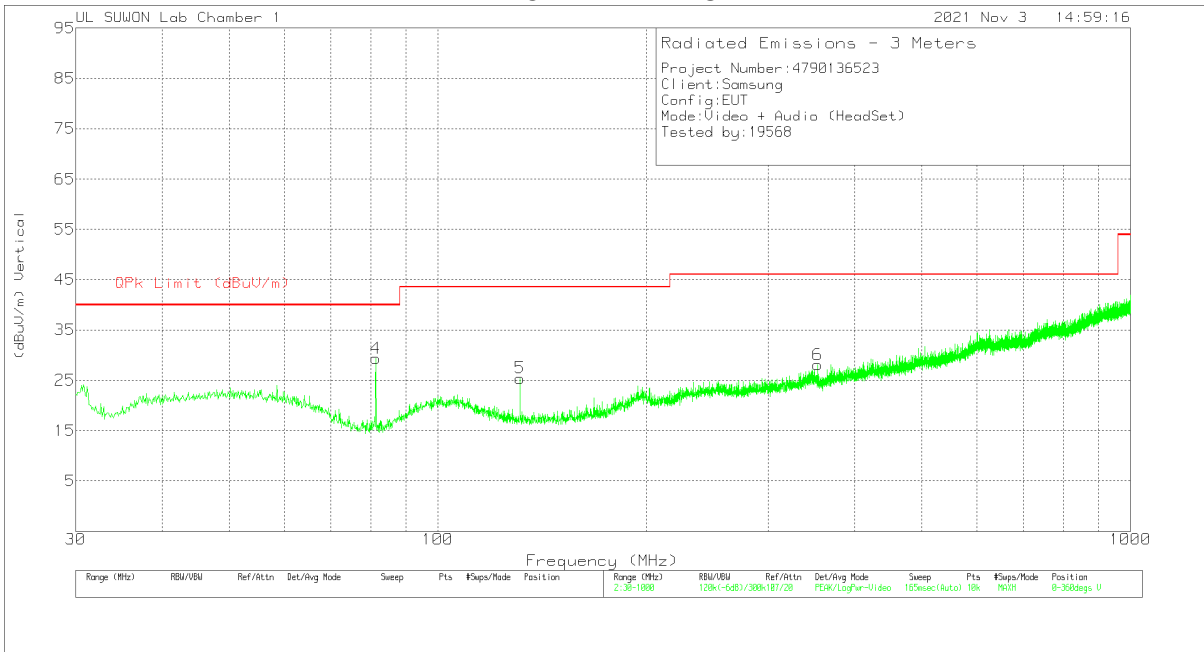
Pk - Peak detector

[Test case 2]

**HORIZONTAL PEAK PLOT**



**VERTICAL PEAK PLOT**





**DATA**

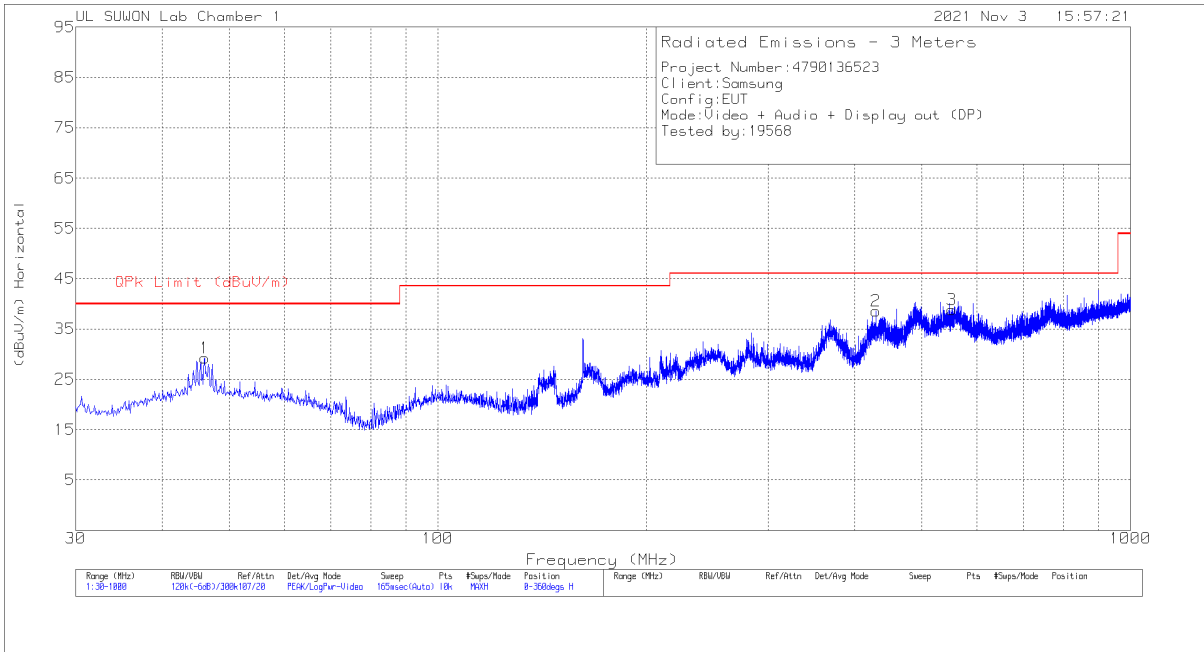
Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	VULB9163_750	Below_1G[dB]	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	155.906	40.23	Pk	14.2	-29.6	24.83	43.52	-18.69	0-360	100	H
2	377.842	36.5	Pk	21.1	-28.2	29.4	46.02	-16.62	0-360	100	H
3	792.517	37.32	Pk	26.8	-26.2	37.92	46.02	-8.1	0-360	300	H
4	81.313	47.2	Pk	12.8	-30.6	29.4	40	-10.6	0-360	200	V
5	131.365	41.23	Pk	14.2	-30	25.43	43.52	-18.09	0-360	100	V
6	353.786	35.96	Pk	20.4	-28.2	28.16	46.02	-17.86	0-360	100	V

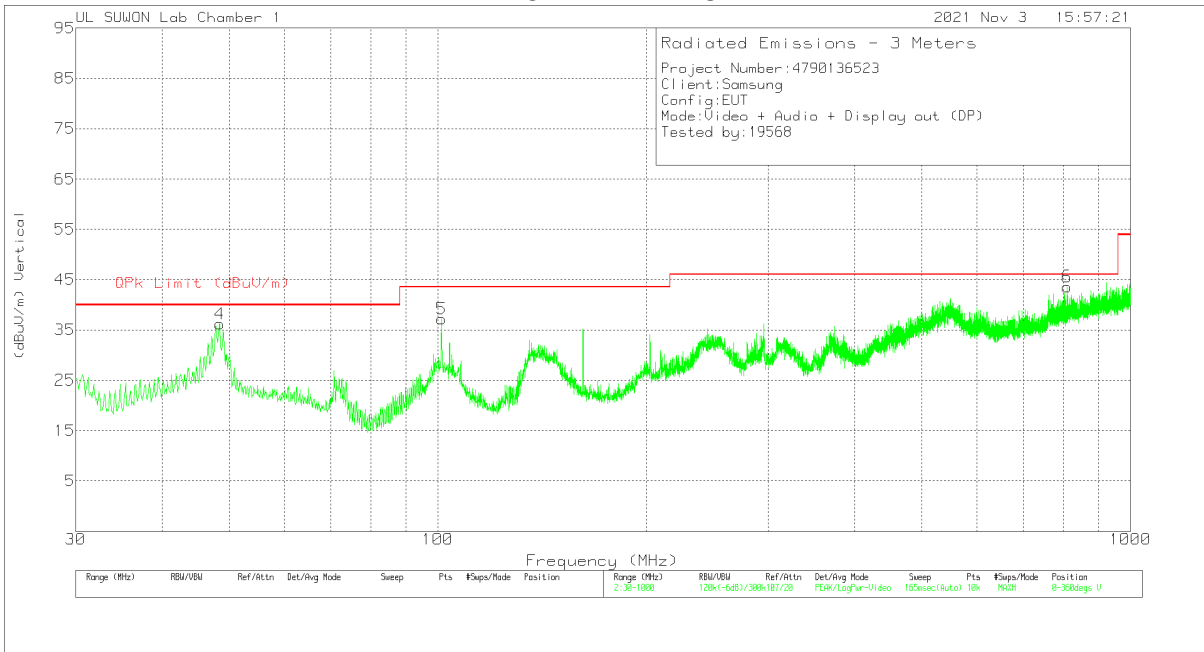
Pk - Peak detector

[Test case 3]

**HORIZONTAL PEAK PLOT**



**VERTICAL PEAK PLOT**



**DATA**

**Trace Markers**

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	VULB9163_750	Below_1G[dB]	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	46.102	40.63	Pk	19.7	-31.1	29.23	40	-10.77	0-360	300	H
2	429.349	44.36	Pk	22	-27.8	38.56	46.02	-7.46	0-360	100	H
3	552.539	42.09	Pk	24	-27.3	38.79	46.02	-7.23	0-360	100	H
4	48.43	47.32	Pk	19.8	-30.9	36.22	40	-3.78	0-360	100	V
5	101.198	49.53	Pk	17.9	-30.2	37.23	43.52	-6.29	0-360	100	V
6	810.074	42.62	Pk	27	-26	43.62	46.02	-2.4	0-360	100	V

Pk - Peak detector

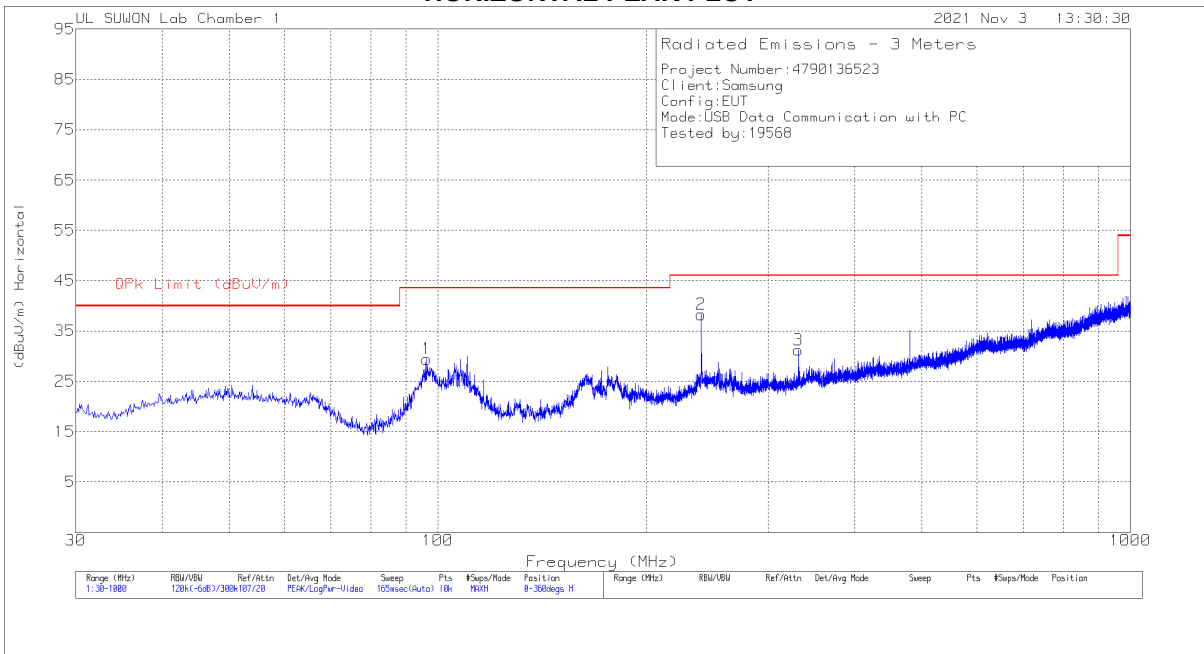
**Radiated Emissions**

Frequency (MHz)	Meter Reading (dBuV)	Det	VULB9163_750	Below_1G[dB]	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
48.43	44.83	Qp	19.8	-30.9	33.73	40	-6.27	57	100	V
810.008	38.43	Qp	27	-26	39.43	46.02	-6.59	313	109	V

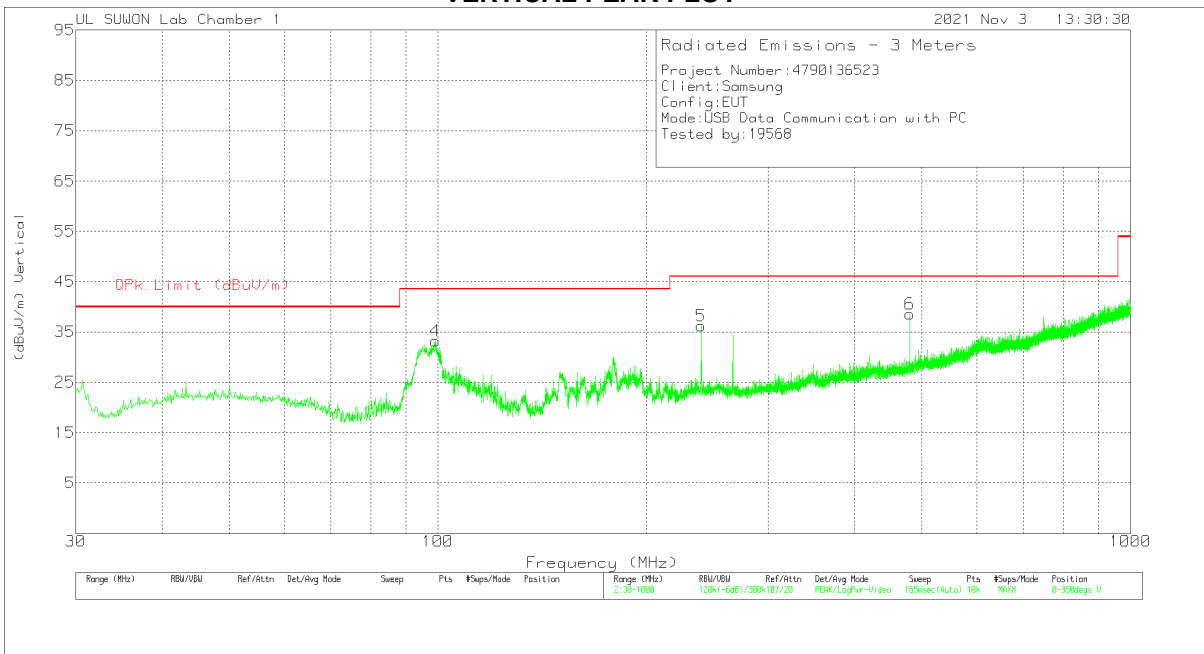
Qp - Quasi-Peak detector

[Test case 4]

**HORIZONTAL PEAK PLOT**



**VERTICAL PEAK PLOT**



**DATA**

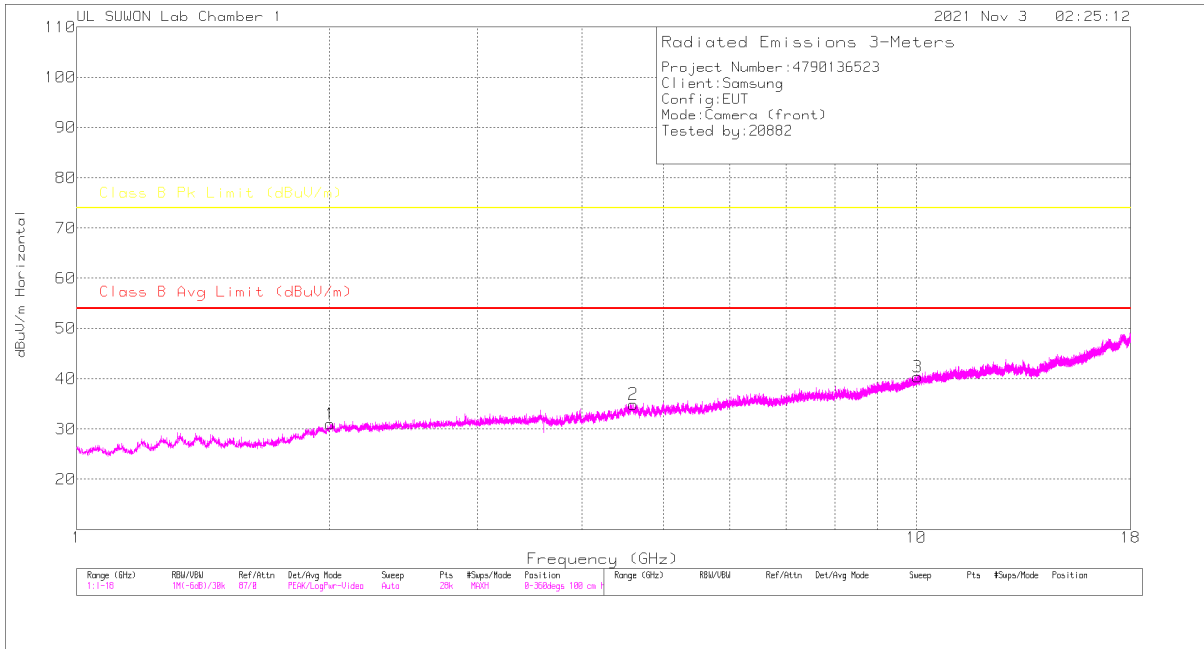
Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	VULB9163_750	Below_1G[dB]	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	96.348	42.22	Pk	17.5	-30.3	29.42	43.52	-14.1	0-360	200	H
2	240.005	48.57	Pk	18.6	-28.9	38.27	46.02	-7.75	0-360	100	H
3	331.67	39.29	Pk	20.2	-28.3	31.19	46.02	-14.83	0-360	100	H
4	99.258	45.71	Pk	17.8	-30.3	33.21	43.52	-10.31	0-360	100	V
5	240.005	46.47	Pk	18.6	-28.9	36.17	46.02	-9.85	0-360	100	V
6	479.983	43.45	Pk	22.7	-27.6	38.55	46.02	-7.47	0-360	100	V

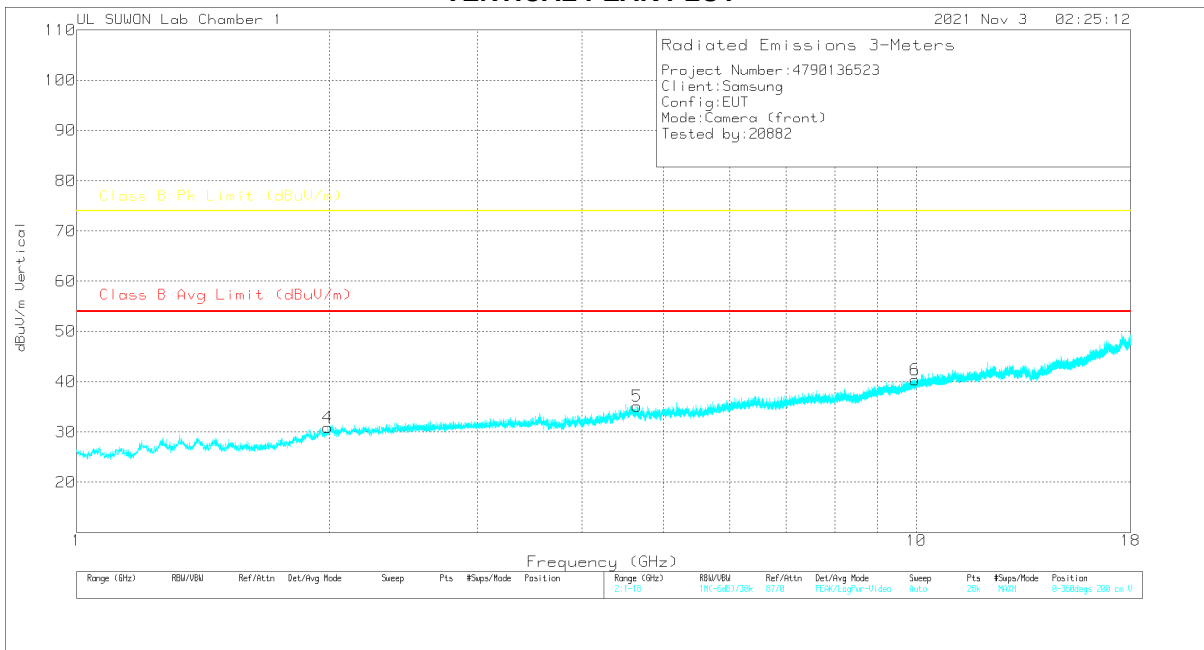
Pk - Peak detector

## 7.1.2. RADIATED EMISSIONS 1 GHz to 18 GHz [Test case 1]

### HORIZONTAL PEAK PLOT



### VERTICAL PEAK PLOT



Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168717	1-18GHz[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	2.00593	35.31	PK	31.4	-35.7	31.01	-	-	74	-42.99	0-360	100	H
2	4.60301	32.64	PK	34.2	-31.9	34.94	-	-	74	-39.06	0-360	100	H
3	10.03878	25.72	PK	37.8	-23.1	40.42	-	-	74	-33.58	0-360	100	H
4	1.99136	35.14	PK	31.4	-35.7	30.84	-	-	74	-43.16	0-360	200	V
5	4.64793	32.78	PK	34.2	-31.9	35.08	-	-	74	-38.92	0-360	200	V
6	9.96351	26.12	PK	37.7	-23.4	40.42	-	-	74	-33.58	0-360	200	V

PK – Peak Detector

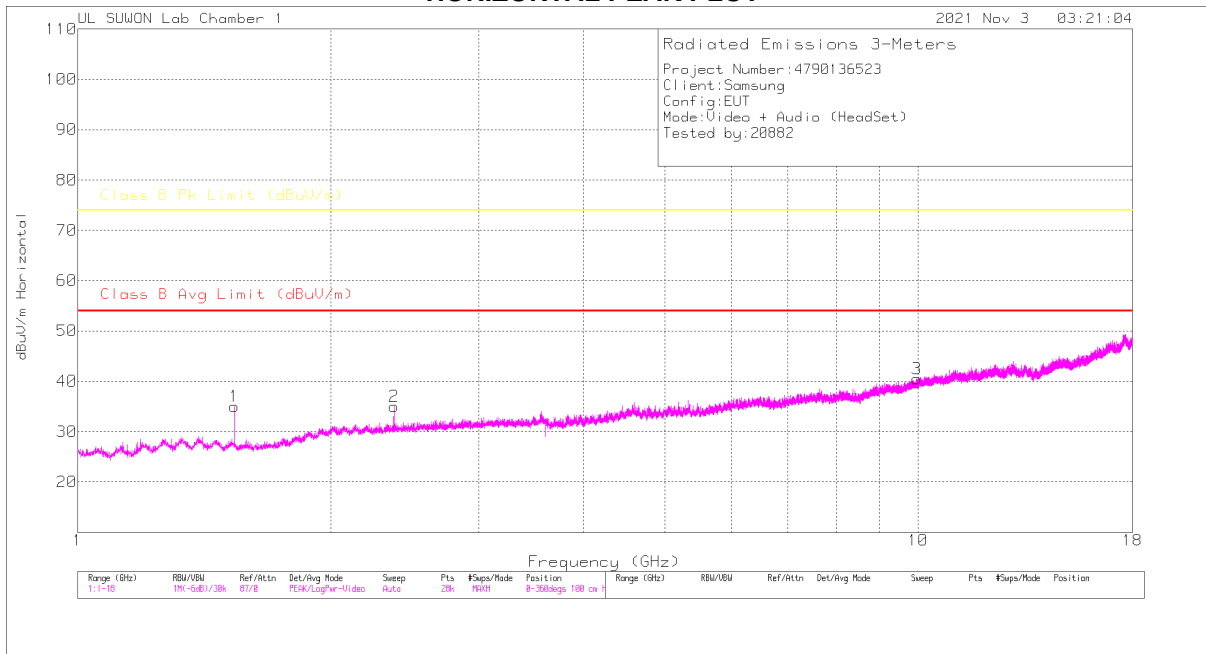
Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168717	1-18GHz[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
2.00593	35.73	Pk	31.4	-35.7	31.43	-	-	74	-42.57	0	100	H
4.60301	38.66	Pk	34.2	-31.9	40.96	-	-	74	-33.04	0	100	H
10.03878	28.15	Pk	37.8	-23.1	42.85	-	-	74	-31.15	0	100	H
2.00593	38.68	Pk	31.4	-35.7	34.38	-	-	74	-39.62	0	100	V
4.60301	32.41	Pk	34.2	-31.9	34.71	-	-	74	-39.29	0	100	V
10.03878	27.29	Pk	37.8	-23.1	41.99	-	-	74	-32.01	0	100	V

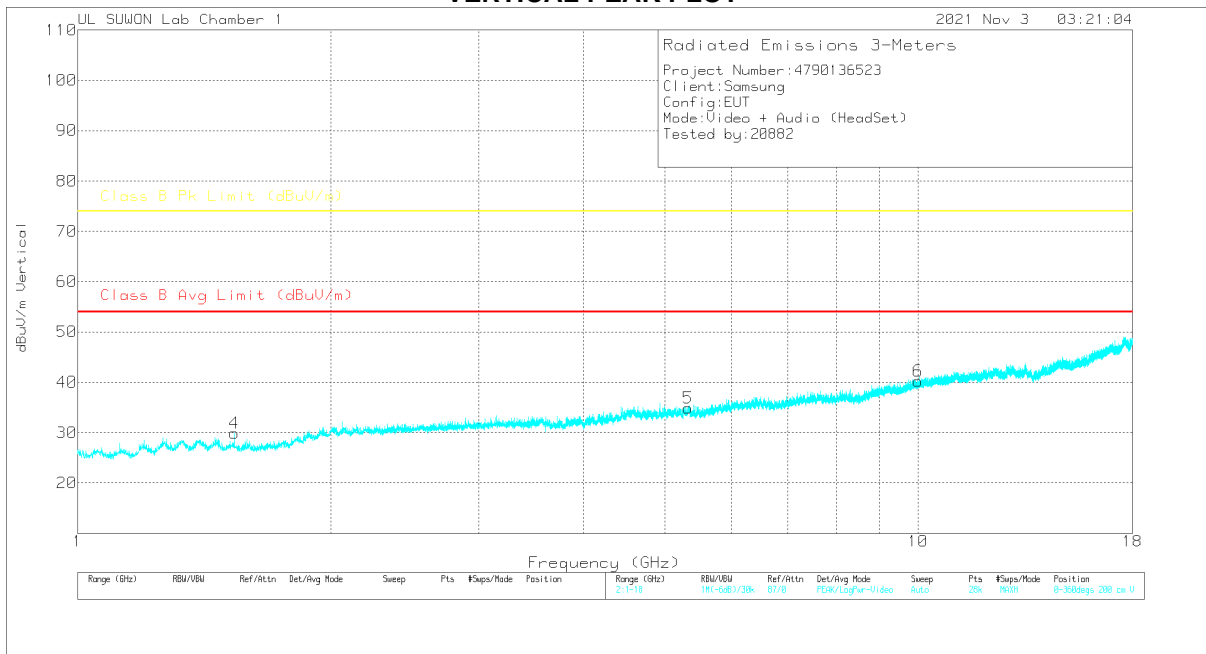
Pk - Peak detector

[Test case 2]

**HORIZONTAL PEAK PLOT**



**VERTICAL PEAK PLOT**



Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.



DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168717	1-18GHz[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	1.53605	42.86	PK	28.7	-36.6	34.96	-	-	74	-39.04	0-360	100	H
2	2.37867	38.39	PK	31.8	-35.2	34.99	-	-	74	-39.01	0-360	100	H
3	9.97504	26.21	PK	37.7	-23.4	40.51	-	-	74	-33.49	0-360	100	H
4	1.53605	37.8	PK	28.7	-36.6	29.9	-	-	74	-44.1	0-360	200	V
5	5.32179	31.72	PK	34.5	-31.3	34.92	-	-	74	-39.08	0-360	200	V
6	10.01025	25.66	PK	37.8	-23.2	40.26	-	-	74	-33.74	0-360	200	V

PK – Peak Detector

Radiated Emissions

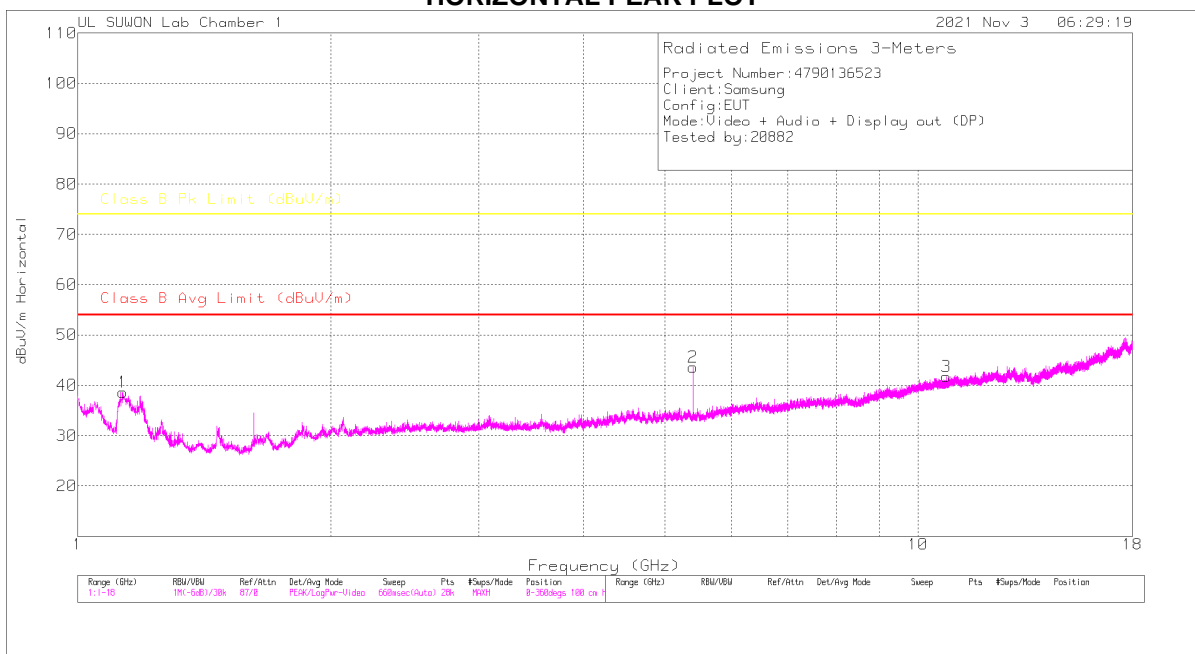
Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168717	1-18GHz[dB]	Corrected Reading dBuV/m	Class B Avg Limit (dBuV/m)	Av(CISPR)Margin (dB)	Class B Pk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1.53605	48.83	Pk	28.7	-36.6	40.93	-	-	74	-33.07	17	110	H
1.53605	41.76	Ca	28.7	-36.6	33.86	54	-20.14	-	-	17	110	H
2.37867	48.42	Pk	31.8	-35.2	45.02	-	-	74	-28.98	345	288	H
2.37867	31.19	Ca	31.8	-35.2	27.79	54	-26.21	-	-	345	288	H
9.97504	28.26	Pk	37.7	-23.4	42.56	-	-	74	-31.44	360	100	H
1.53605	48.81	Pk	28.7	-36.6	40.91	-	-	74	-33.09	17	110	H
1.53605	41.94	Ca	28.7	-36.6	34.04	54	-19.96	-	-	17	110	H
5.32179	34.04	Pk	34.5	-31.3	37.24	-	-	74	-36.76	360	100	V
9.97504	28.45	Pk	37.7	-23.4	42.75	-	-	74	-31.25	360	100	V

Pk - Peak detector

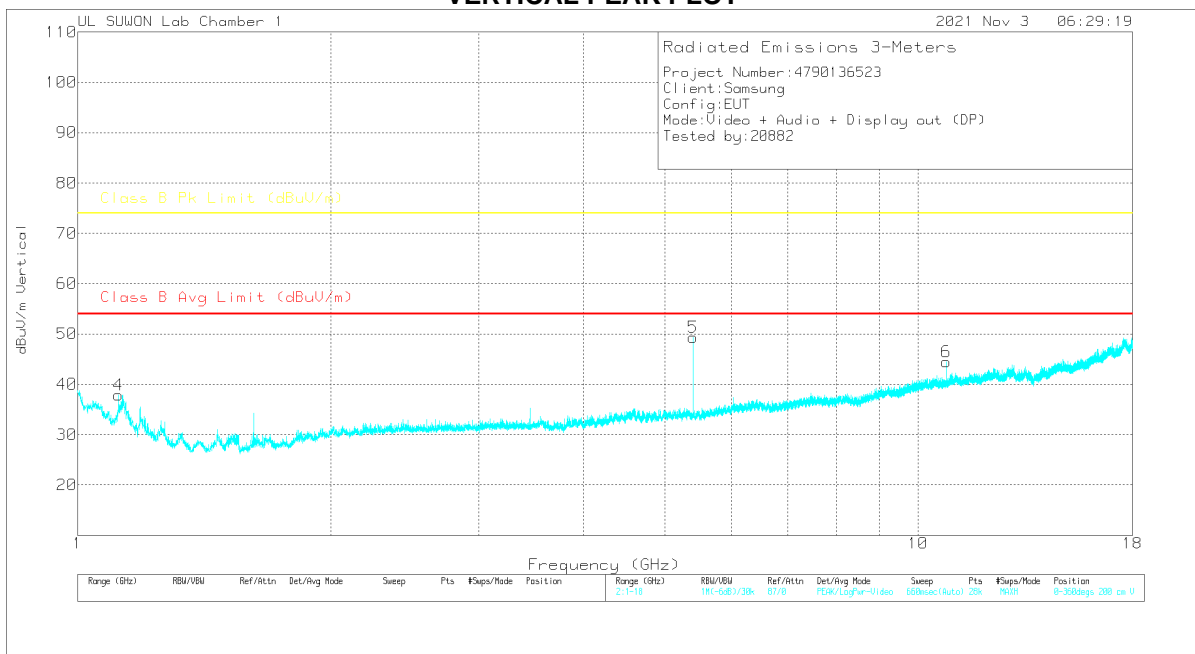
Ca - CISPR average detection

[Test case 3]

**HORIZONTAL PEAK PLOT**



**VERTICAL PEAK PLOT**



Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168717	1-18GHz[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	1.13234	48.35	PK	27.8	-37.5	38.65	-	-	74	-35.35	0-360	100	H
2	5.40071	40.21	PK	34.5	-31.1	43.61	-	-	74	-30.39	0-360	100	H
3	10.80127	26.11	PK	38.1	-22.5	41.71	-	-	74	-32.29	0-360	100	H
4	1.11838	47.65	PK	27.7	-37.5	37.85	-	-	74	-36.15	0-360	200	V
5	5.40071	45.89	PK	34.5	-31.1	49.29	-	-	74	-24.71	0-360	200	V
6	10.80188	28.91	PK	38.1	-22.5	44.51	-	-	74	-29.49	0-360	200	V

PK – Peak Detector

Radiated Emissions

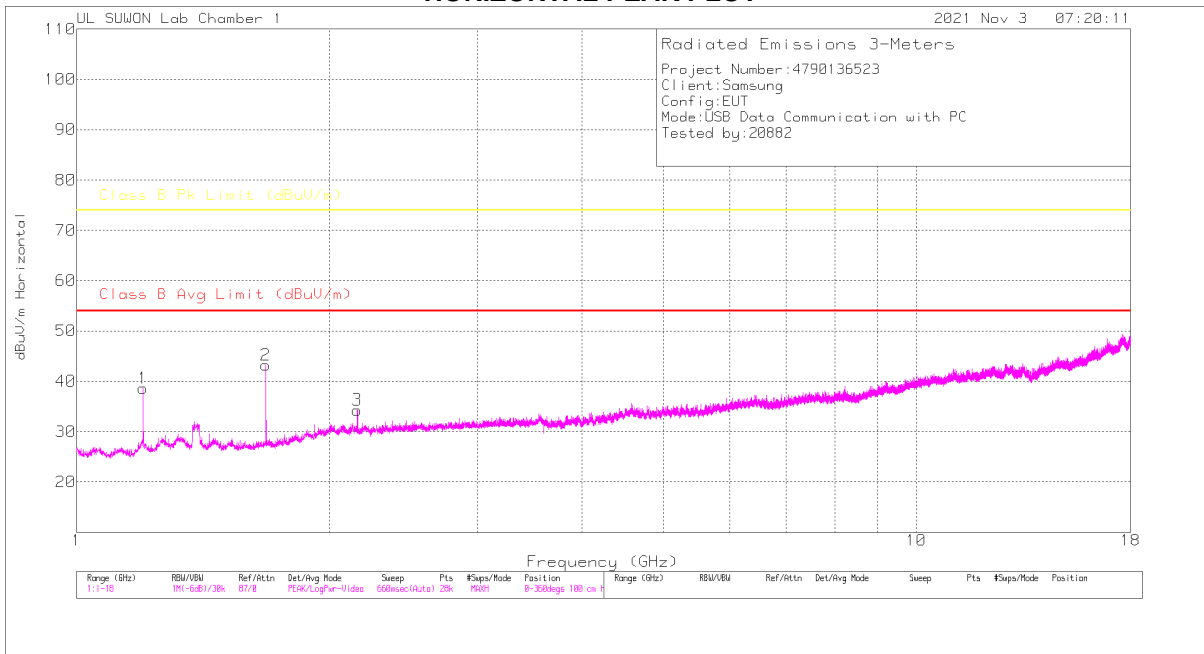
Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168717	1-18GHz[dB]	Corrected Reading dBuV/m	Class B Avg Limit (dBuV/m)	Av(CISPR)Margin (dB)	Class B Pk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1.13234	40.89	Pk	27.8	-37.5	31.19	-	-	74	-42.81	0	100	H
5.40071	45.89	Pk	34.5	-31.1	49.29	-	-	74	-24.71	162	100	H
5.40071	39.55	Ca	34.5	-31.1	42.95	54	-11.05	-	-	162	100	H
10.80127	36.63	Pk	38.1	-22.5	52.23	-	-	74	-21.77	181	107	H
1.13234	43.37	Pk	27.8	-37.5	33.67	-	-	74	-40.33	0	100	V
5.40071	50.19	Pk	34.5	-31.1	53.59	-	-	74	-20.41	191	127	V
5.40071	46.6	Ca	34.5	-31.1	50	54	-4	-	-	191	127	V
10.80127	36.86	Pk	38.1	-22.5	52.46	-	-	74	-21.54	181	107	V
10.80127	25.82	Ca	38.1	-22.5	41.42	54	-12.58	-	-	181	107	V

Pk - Peak detector

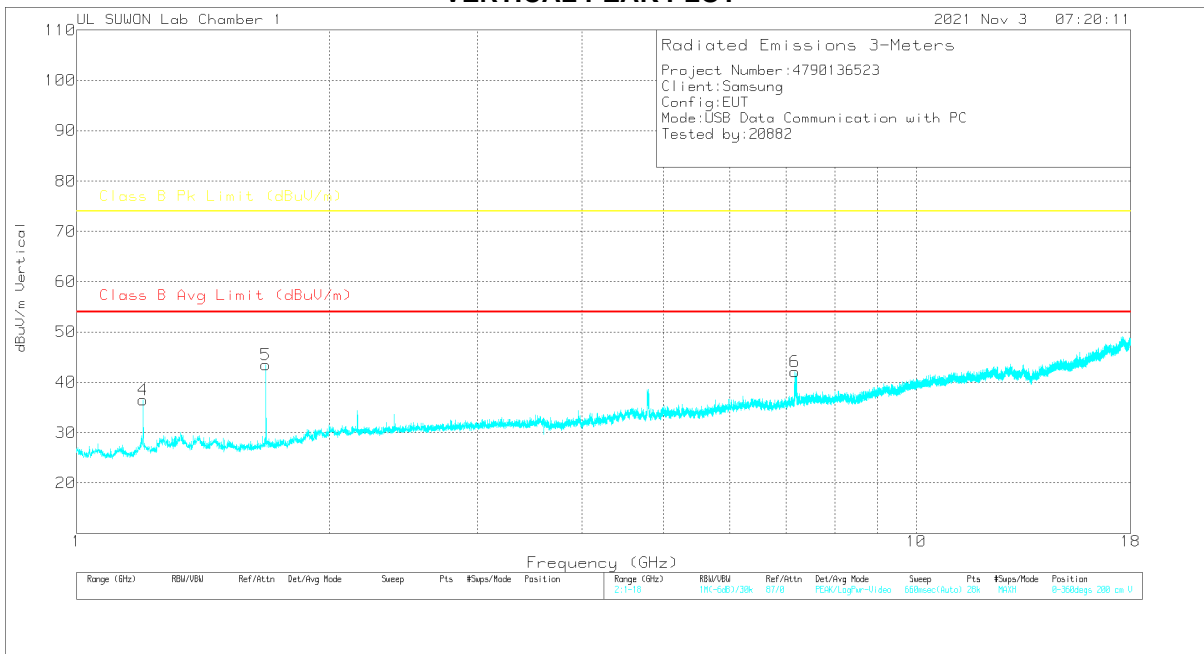
Ca - CISPR average detection

[Test case 4]

HORIZONTAL PEAK PLOT



VERTICAL PEAK PLOT



Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168717	1-18GHz(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	1.19973	47.56	PK	28.5	-37.4	38.66	-	-	74	-35.34	0-360	100	H
2	1.67993	51.08	PK	28.5	-36.4	43.18	-	-	74	-30.82	0-360	100	H
3	2.15952	38.32	PK	31.5	-35.5	34.32	-	-	74	-39.68	0-360	100	H
4	1.19973	45.43	PK	28.5	-37.4	36.53	-	-	74	-37.47	0-360	200	V
5	1.67993	51.39	PKP	28.5	-36.4	43.49	-	-	74	-30.51	0-360	200	V
6	7.17459	34.09	P	35.9	-27.9	42.09	-	-	74	-31.91	0-360	200	V

PK – Peak Detector

Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168717	1-18GHz(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
1.19973	55.46	Pk	28.5	-37.4	46.56	-	-	74	-27.44	47	127	H
1.19973	38.23	Ca	28.5	-37.4	29.33	54	-24.67	-	-	47	127	H
1.67993	44.16	Pk	28.5	-36.4	36.26	-	-	74	-37.74	104	378	H
1.67993	30.95	Ca	28.5	-36.4	23.05	54	-30.95	-	-	104	378	H
2.15952	44.14	Pk	31.5	-35.5	40.14	-	-	74	-33.86	202	268	H
2.15952	29.81	Ca	31.5	-35.5	25.81	54	-28.19	-	-	202	268	H
1.19973	52.9	Pk	28.5	-37.4	44	-	-	74	-30	53	170	V
1.19973	36.88	Ca	28.5	-37.4	27.98	54	-26.02	-	-	53	170	V
1.67993	55.32	Pk	28.5	-36.4	47.42	-	-	74	-26.58	120	100	V
1.67993	38.87	Ca	28.5	-36.4	30.97	54	-23.03	-	-	120	100	V
7.17459	41.87	Pk	35.9	-27.9	49.87	-	-	74	-24.13	287	103	V
7.17459	25.05	Ca	35.9	-27.9	33.05	54	-20.95	-	-	287	103	V

Pk - Peak detector

Ca - CISPR average detection

## 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  $\mu$ H/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 (dB $\mu$ V)	
	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.

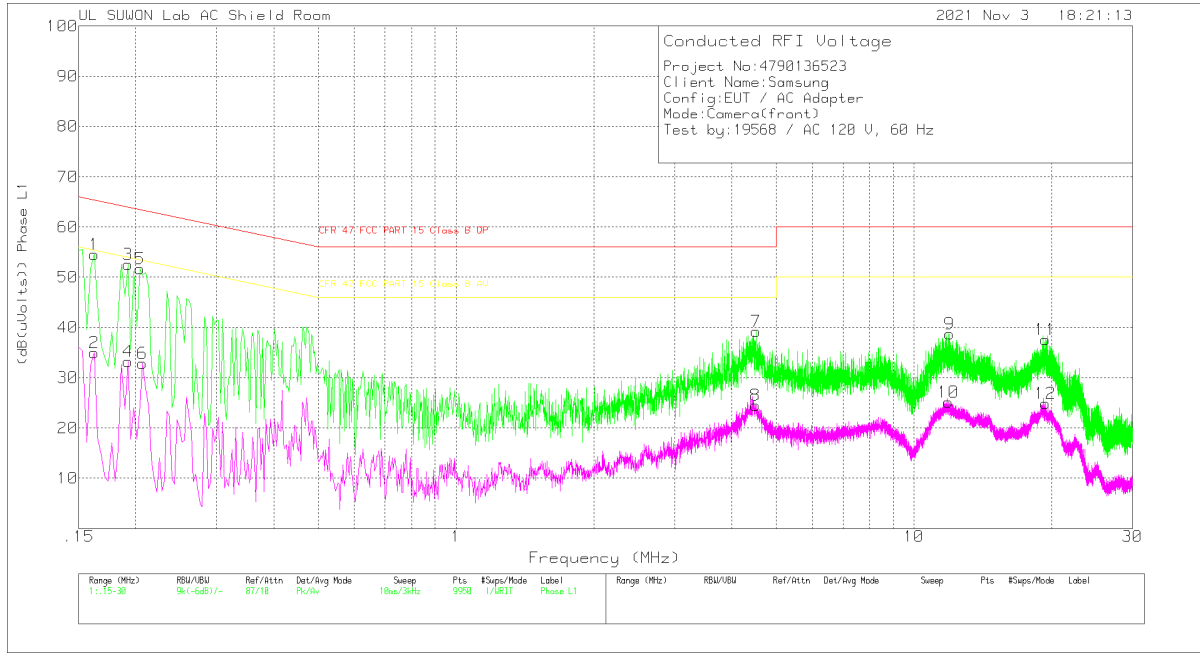
## 7.2.1. CONDUCTED EMISSIONS

[Test case 1]

### 6 WORST EMISSIONS

Line-L1 .15 – 30 MHz

### LINE 1 RESULTS



Trace Markers

Range 1: Phase L1 .15 - 30MHz

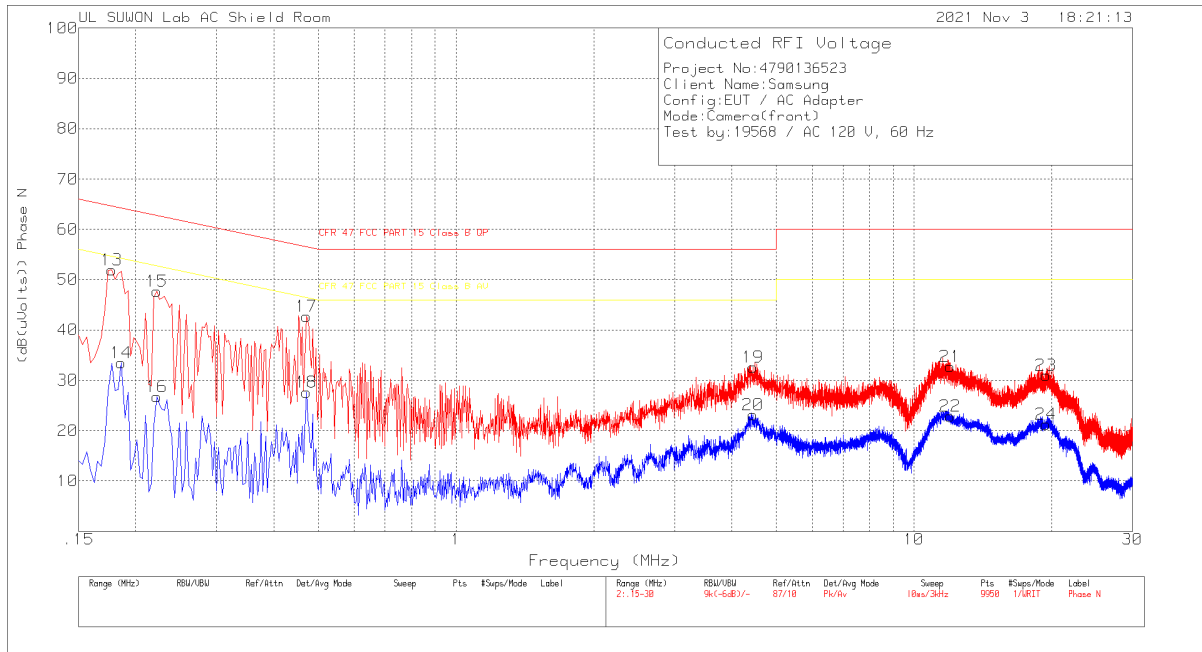
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	101836_Wit h EX_L1[dB]	CABLELOSS (dB)	Corrected Reading (dB(uVolts))	CFR 47 FCC PART 15 Class B QP	Margin (dB)	CFR 47 FCC PART 15 Class B AV	Margin (dB)
1	.162	44.51	Pk	9.9	.1	54.51	65.36	-10.85	-	-
2	.162	24.96	Av	9.9	.1	34.96	-	-	55.36	-20.4
3	.192	42.45	Pk	9.9	.2	52.55	63.95	-11.4	-	-
4	.192	23.17	Av	9.9	.2	33.27	-	-	53.95	-20.68
5	.204	41.7	Pk	9.8	.2	51.7	63.45	-11.75	-	-
6	.207	22.89	Av	9.8	.2	32.89	-	-	53.32	-20.43
7	4.521	29.19	Pk	9.7	.3	39.19	56	-16.81	-	-
8	4.506	14.47	Av	9.7	.3	24.47	-	-	46	-21.53
9	11.946	28.57	Pk	9.9	.3	38.77	60	-21.23	-	-
10	11.898	14.96	Av	9.9	.3	25.16	-	-	50	-24.84
11	19.356	27.1	Pk	10.1	.4	37.6	60	-22.4	-	-
12	19.356	14.4	Av	10.1	.4	24.9	-	-	50	-25.1

Pk - Peak detector  
 Av - Average detection



**Line-L2 .15 – 30 MHz**

**LINE 2 RESULTS**



Trace Markers

Range 1: Phase L1 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	101836_Wit h EX_L1[dB]	CABLELOS S(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	.189	32.57	Pk	10	.2	42.77	64.08	-21.31	-	-
2	.189	17.14	Av	10	.2	27.34	-	-	54.08	-26.74
3	.375	24.84	Pk	9.9	.2	34.94	58.39	-23.45	-	-
4	.381	13.11	Av	9.9	.2	23.21	-	-	48.26	-25.05
5	.711	23.05	Pk	9.9	.2	33.15	56	-22.85	-	-
6	.711	19.42	Av	9.9	.2	29.52	-	-	46	-16.48
7	4.38	22.2	Pk	9.8	.3	32.3	56	-23.7	-	-
8	4.416	14.19	Av	9.8	.3	24.29	-	-	46	-21.71
9	8.946	21.8	Pk	9.9	.4	32.1	60	-27.9	-	-
10	8.94	12.75	Av	9.9	.4	23.05	-	-	50	-26.95
11	13.155	29.61	Pk	10	.4	40.01	60	-19.99	-	-
12	13.173	15.46	Av	10	.4	25.86	-	-	50	-24.14

Pk - Peak detector

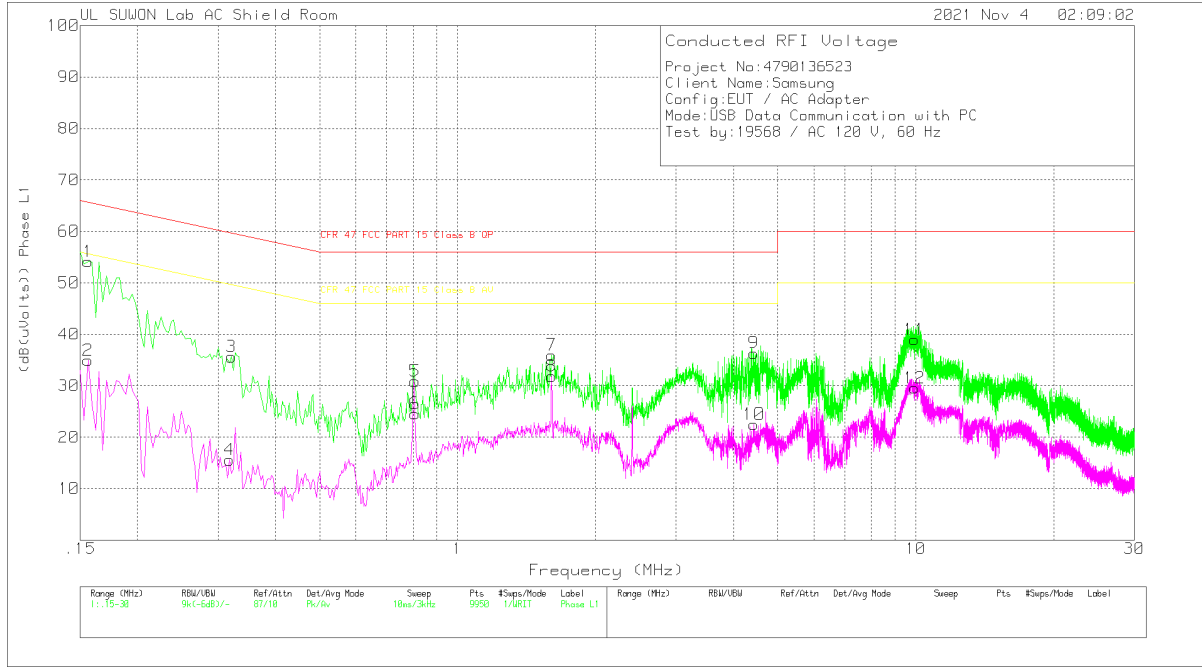
Av - Average detection

[Test case 4]

**6 WORST EMISSIONS**

**Line-L1 .15 – 30 MHz**

**LINE 1 RESULTS**



Trace Markers

Range 1: Phase L1 .15 - 30MHz

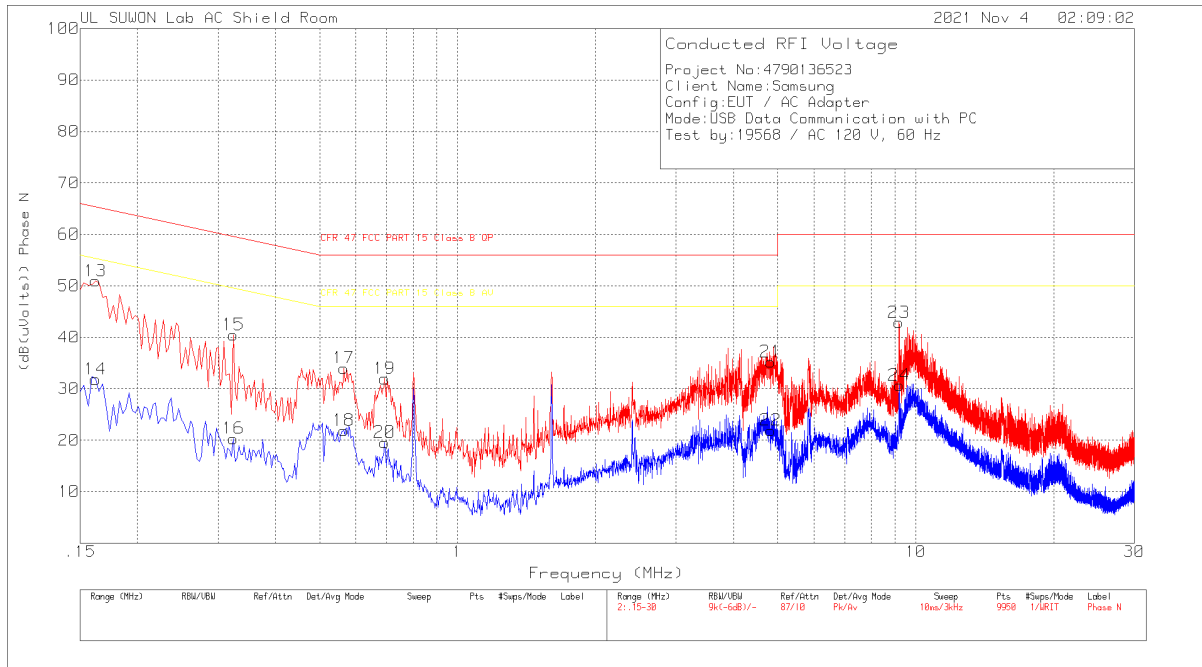
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	101836_L1[ dB]	CABLELOS S(dB)	Corrected Reading (dB(uVolts))	CFR 47 FCC PART 15 Class B QP	Margin (dB)	CFR 47 FCC PART 15 Class B AV	Margin (dB)
1	.156	44.24	Pk	9.8	.1	54.14	65.67	-11.53	-	-
2	.156	25.02	Av	9.8	.1	34.92	-	-	55.67	-20.75
3	.321	25.74	Pk	9.7	.2	35.64	59.68	-24.04	-	-
4	.318	5.69	Av	9.7	.2	15.59	-	-	49.76	-34.17
5	.807	20.97	Pk	9.7	.2	30.87	56	-25.13	-	-
6	.807	14.67	Av	9.7	.2	24.57	-	-	46	-21.43
7	1.602	26.03	Pk	9.6	.3	35.93	56	-20.07	-	-
8	1.602	21.94	Av	9.6	.3	31.84	-	-	46	-14.16
9	4.434	26.45	Pk	9.6	.3	36.35	56	-19.65	-	-
10	4.434	12.58	Av	9.6	.3	22.48	-	-	46	-23.52
11	9.939	28.86	Pk	9.7	.4	38.96	60	-21.04	-	-
12	9.933	19.46	Av	9.7	.4	29.56	-	-	50	-20.44

Pk - Peak detector

Av - Average detection

**Line-L2 .15 – 30 MHz**

**LINE 2 RESULTS**



Trace Markers

Range 2: Phase N .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	101836_N[dB]	CABLELOS S(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	.162	41.06	Pk	9.8	.1	50.96	65.36	-14.4	-	-
14	.162	21.94	Av	9.8	.1	31.84	-	-	55.36	-23.52
15	.324	30.58	Pk	9.7	.2	40.48	59.6	-19.12	-	-
16	.324	10.43	Av	9.7	.2	20.33	-	-	49.6	-29.27
17	.564	24.02	Pk	9.8	.2	34.02	56	-21.98	-	-
18	.564	11.9	Av	9.8	.2	21.9	-	-	46	-24.1
19	.693	21.97	Pk	9.8	.2	31.97	56	-24.03	-	-
20	.693	9.57	Av	9.8	.2	19.57	-	-	46	-26.43
21	4.824	25.32	Pk	9.6	.3	35.22	56	-20.78	-	-
22	4.824	12.02	Av	9.6	.3	21.92	-	-	46	-24.08
23	9.195	32.77	Pk	9.7	.4	42.87	60	-17.13	-	-
24	9.207	20.57	Av	9.7	.4	30.67	-	-	50	-19.33

Pk - Peak detector

Av - Average detection

**END OF TEST REPORT**