



**FCC 47 CFR PART 15 SUBPART B**

**CERTIFICATION TEST REPORT**

**FOR**

**DTS b/g/n Wrist device and BT/BLE**

**MODEL NUMBER : SM-R500, SM-R500X**

**FCC ID: A3LSMR500**

**REPORT NUMBER: 4788805488-E4V1**

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

*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**



**ACCREDITED\***

Testing  
Laboratory

**TL-637**

Revision History

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
V1	07/01/19	Initial issue	Sangyun Kim
V2	10/01/19	Updated to address TCB 's question	Sangyun Kim

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# 1. ATTESTATION OF TEST RESULTS

**COMPANY NAME:** SAMSUNG ELECTRONICS CO., LTD.  
**EUT DESCRIPTION:** DTS b/g/n Wrist device and BT/BLE  
**MODEL NUMBER:** SM-R500, SM-R500X  
**SERIAL NUMBER:** R3AKC0086YR  
**DATE TESTED:** JAN 02, 2019 - JAN 03, 2019

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
FCC PART 15 SUBPART B	Pass

UL Verification Services Inc. 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 Verification Services Inc. 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 Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. 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 NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Approved & Released For  
UL Korea, Ltd. By:



Changyoung Choi  
Suwon Lab Engineer  
UL Korea, Ltd.

Tested By:



Sangyun Kim  
Suwon Lab Engineer  
UL Korea, Ltd.

## 2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4-2014, FCC CFR 47 Part 2, FCC CFR 47 Part 15.

## 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 checked="" 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 <http://www.iasonline.org/PDF/TL/TL-637.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:

$$\begin{aligned} \text{Field Strength (dBuV/m)} &= \text{Measured Voltage (dBuV)} + \text{Antenna Factor (dB/m)} + \\ &\text{Cable Loss (dB)} - \text{Preamp Gain (dB)} \\ 36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} &= 28.9 \text{ dBuV/m} \end{aligned}$$

### 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	2.32 dB
Radiated Disturbance, Below 1GHz	3.86 dB
Radiated Disturbance, Above 1 GHz	5.97 dB

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

## 5. EQUIPMENT UNDER TEST

### 5.1. DESCRIPTION OF EUT

The EUT is a DTS b/g/n Wrist device and BT/BLE.

#### GENERAL INFORMATION

Type of device	Class B personal computers and peripherals
AC adapter power requirements	100-240 VAC / 50-60 Hz, 0.3 A
List of frequencies generated or used by the EUT	18 GHz (5 <sup>th</sup> harmonic of the frequency of 2.4 Hz WLAN)

### 5.2. PRELIMINARY TEST CONFIGURATIONS

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.

### 5.3. MODE(S) OF OPERATION INVESTIGATED

Mode	Description
Charging	The EUT is charging on wireless charger

### 5.4. MODIFICATIONS

No modifications were made during testing.

## 5.5. DETAILS OF TESTED SYSTEM

### SUPPORT EQUIPMENT & PERIPHERALS

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID/DoC
Wireless Charger	Samsung	EP-OR500	RF7K90PGTNITYS	-
Travel Adapter	Samsung	EP-TA50KWK	DK5K820VS/A-E	-

### I/O CABLES

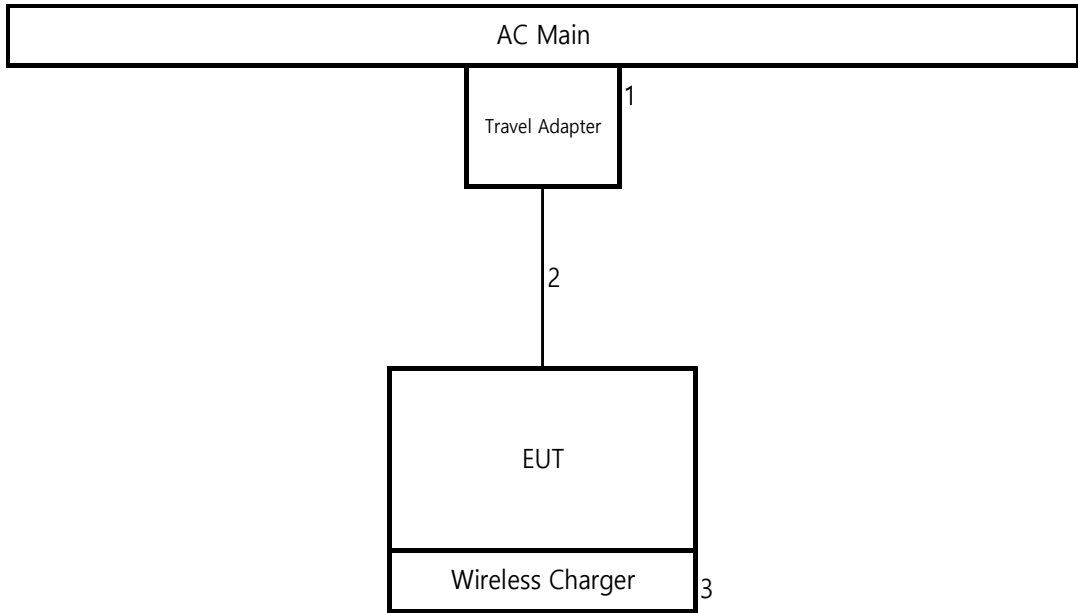
I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length(m)	Remarks
1	AC Power	1	Power	Unshielded	-	From Travel Adapter to AC Main
2	USB	1	USB	Shielded	0.8m	From EUT to PC
3	Wireless	1	Wireless	-	-	From EUT to Wireless Charger

### TEST SETUP

The EUT is installed in a typical configuration.



**TEST SETUP DIAGRAM**



## 6. TEST AND MEASUREMENT EQUIPMENT

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

Test Equipment List				
Description	Manufacturer	Model	S/N	Cal Due
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	750	08-04-20
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	749	08-04-20
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	845	08-04-20
Antenna, Horn, 18 GHz	ETS	3115	00167211	08-04-20
Antenna, Horn, 18 GHz	ETS	3115	00161451	08-04-20
Antenna, Horn, 18 GHz	ETS	3117	00168724	08-04-20
Antenna, Horn, 18 GHz	ETS	3117	00168717	08-04-20
Antenna, Horn, 18 GHz	ETS	3117	00205959	08-04-20
Antenna, Horn, 40 GHz	ETS	3116C	00166155	12-04-19
Antenna, Horn, 40 GHz	ETS	3116C	00168645	12-04-19
Antenna, Horn, 40 GHz	ETS	3116C-PA	00168841	08-09-19
Preamplifier, 1000 MHz	Sonoma	310N	341282	08-07-19
Preamplifier, 1000 MHz	Sonoma	310N	351741	08-07-19
Preamplifier, 1000 MHz	Sonoma	310N	370599	08-07-19
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1876511	08-07-19
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1896138	08-07-19
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	2029169	08-07-19
EMI Test Receive, 40 GHz	R&S	ESU40	100439	08-06-19
EMI Test Receive, 40 GHz	R&S	ESU40	100457	08-06-19
EMI Test Receive, 44 GHz	R&S	ESW44	101590	08-06-19
EMI Test Receive, 3 GHz	R&S	ESR3	101832	08-06-19
LISN	R&S	ENV-216	101837	08-09-19
LISN	R&S	ENV-216	101837	08-09-19
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

The highest clock frequency generated or used in the EUT is 2.4GHz therefore the frequency range was investigated from 30 MHz to 18 GHz.

#### LIMIT

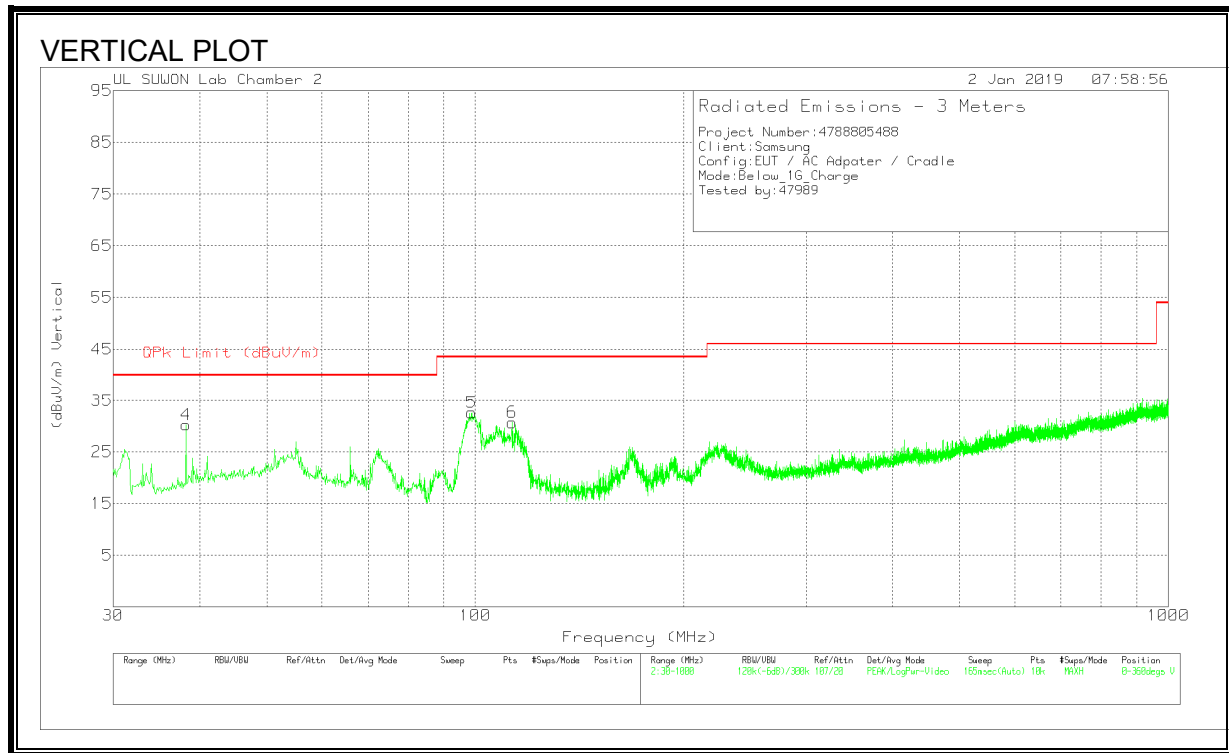
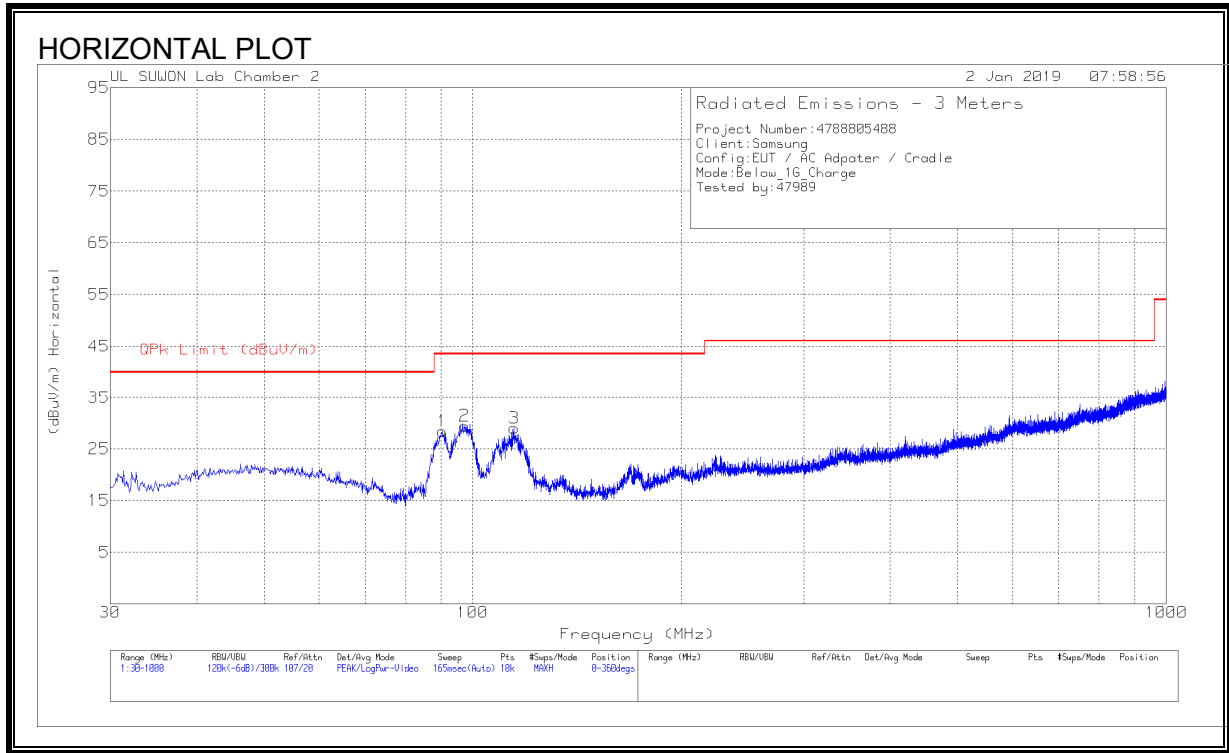
§15.109 (a) Except for Class B digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

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.

**RESULTS**

**RADIATED EMISSIONS 30 TO 1000 MHz**



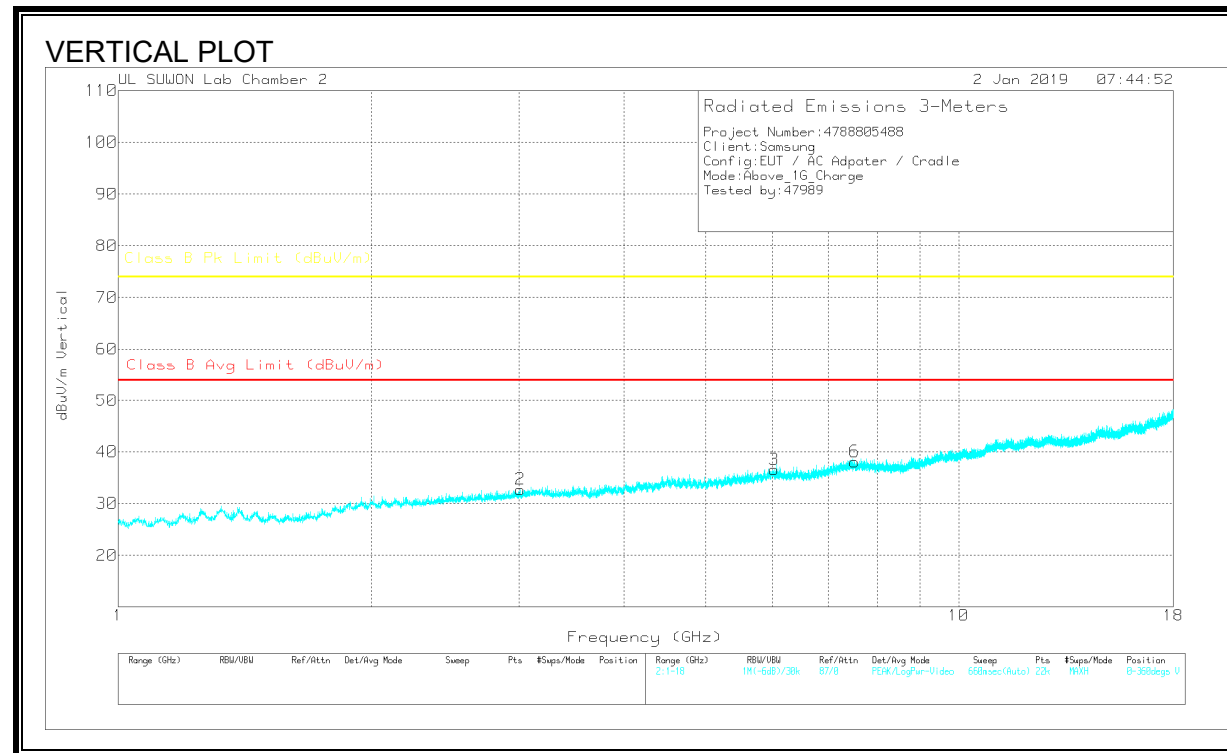
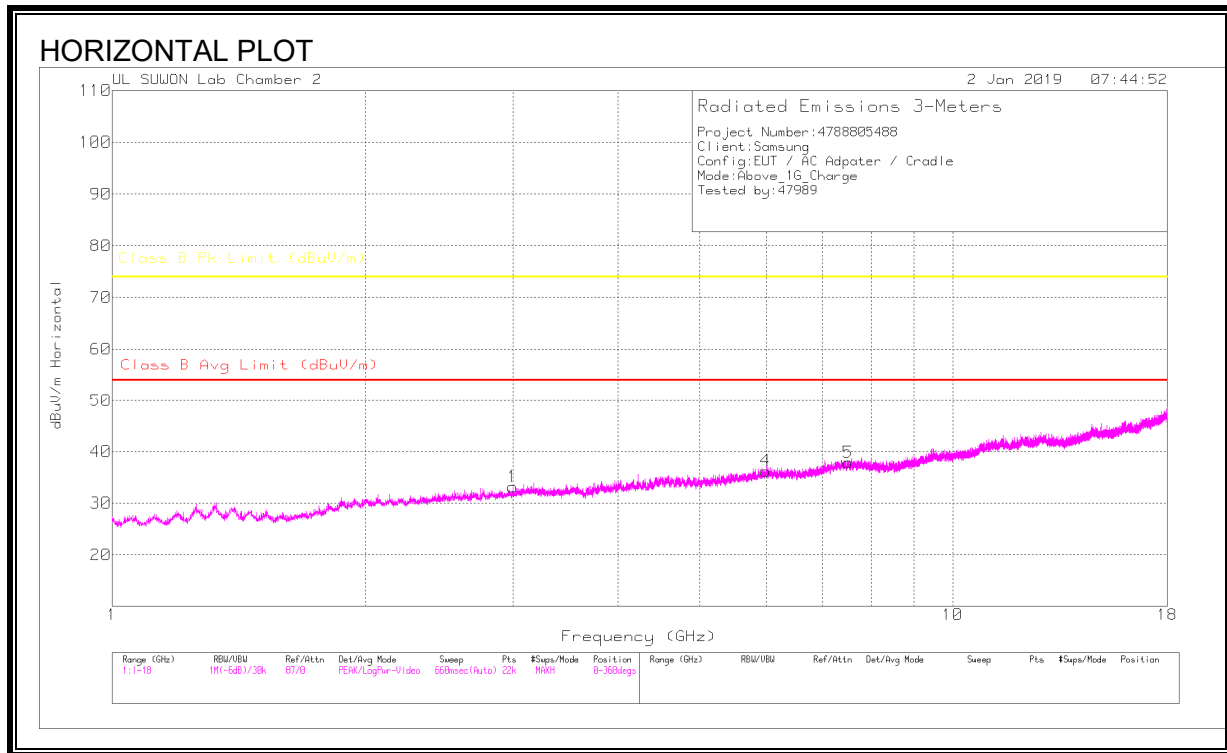
**HORIZONTAL AND VERTICAL DATA**

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	VULB9163_749	Below_1G[dB]	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	90.334	44.11	Pk	15.8	-31.5	28.41	43.52	-15.11	0-360	200	H
2	97.318	43.42	Pk	17.5	-31.5	29.42	43.52	-14.1	0-360	300	H
3	114.778	44.11	Pk	16.2	-31.3	29.01	43.52	-14.51	0-360	300	H
4	38.245	44.11	Pk	18	-31.9	30.21	40	-9.79	0-360	100	V
5	98.773	46.3	Pk	17.7	-31.4	32.6	43.52	-10.92	0-360	100	V
6	112.935	45.36	Pk	16.6	-31.3	30.66	43.52	-12.86	0-360	100	V

Pk - Peak detector

**ADIATED EMISSIONS 1GHz to 18GHz**



**HORIZONTAL AND VERTICAL DATA**

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	1-18GHz[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	2.997	30.99	PK	32.5	-30.3	33.19	-	-	74	-40.81	0-360	100	H
4	5.99	28.76	PK	35	-27.5	36.26	-	-	74	-37.74	0-360	100	H
5	7.504	26.81	PK	36.1	-25	37.91	-	-	74	-36.09	0-360	200	H
2	3.008	30.44	PK	32.5	-30.2	32.74	-	-	74	-41.26	0-360	100	V
3	6.033	28.95	PK	35	-27.4	36.55	-	-	74	-37.45	0-360	200	V
6	7.522	27.09	PK	36.1	-25.1	38.09	-	-	74	-35.91	0-360	100	V

PK - Peak detector

Note: Only peak measurement was performed. Because peak measurement result of unwanted emission is less than average limit (54dBuV/m).

## 7.2. AC MAINS LINE 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

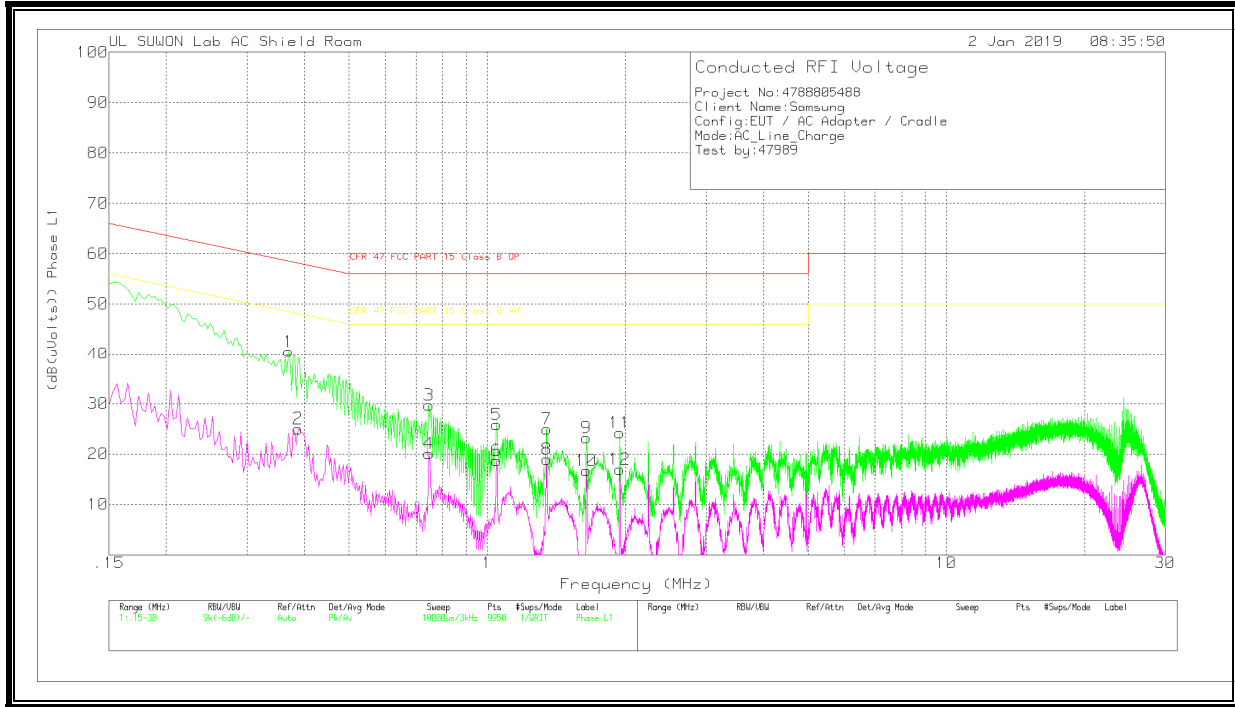
Notes:  
 1. The lower limit shall apply at the transition frequencies  
 2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

### RESULTS



**6 WORST EMISSIONS**

**Line-L1 .15 - 30MHz**



**LINE 1 RESULTS**

Trace Markers

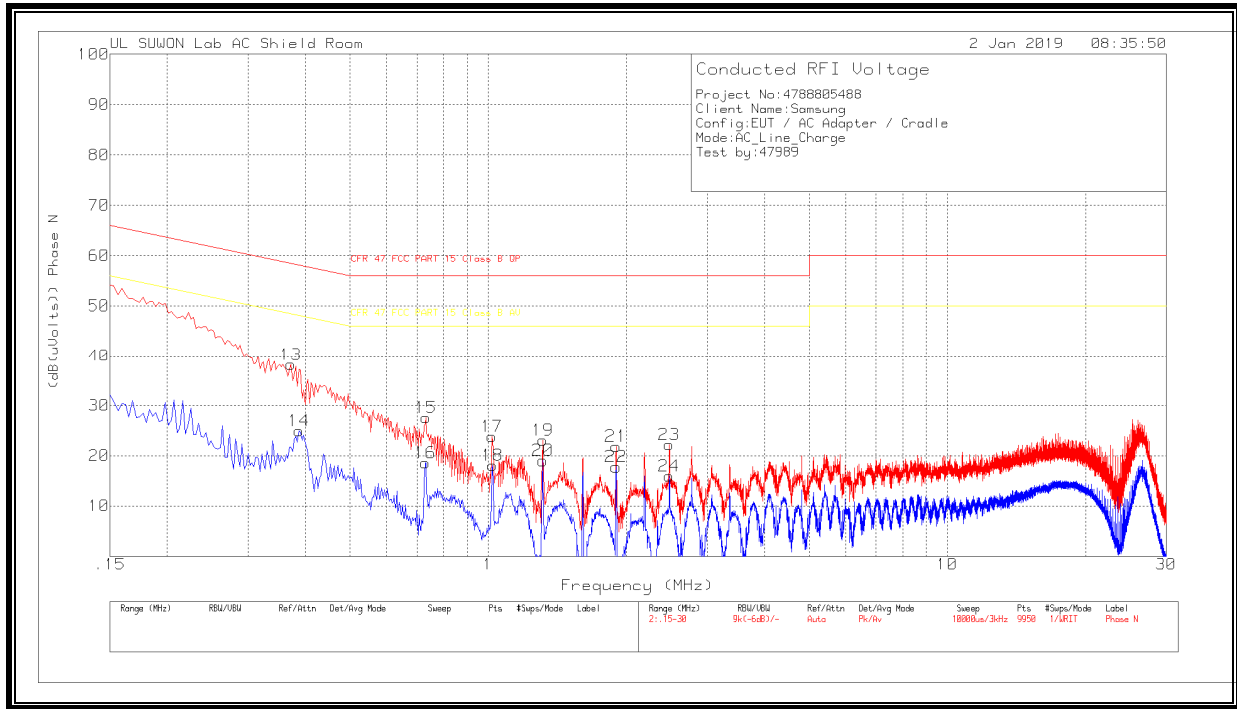
Range 1: Phase L1 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	ENV216_10183 6_With ex-cord_L1	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	.369	30.38	Pk	9.9	.2	40.48	58.52	-18.04	-	-
2	.387	14.93	Av	9.9	.2	25.03	-	-	48.13	-23.1
3	.747	19.64	Pk	9.9	.2	29.74	56	-26.26	-	-
4	.747	9.95	Av	9.9	.2	20.05	-	-	46	-25.95
5	1.047	15.79	Pk	9.8	.3	25.89	56	-30.11	-	-
6	1.047	8.63	Av	9.8	.3	18.73	-	-	46	-27.27
7	1.347	14.82	Pk	9.8	.3	24.92	56	-31.08	-	-
8	1.347	8.89	Av	9.8	.3	18.99	-	-	46	-27.01
9	1.644	13.09	Pk	9.8	.3	23.19	56	-32.81	-	-
10	1.647	6.67	Av	9.8	.3	16.77	-	-	46	-29.23
11	1.944	14.12	Pk	9.8	.3	24.22	56	-31.78	-	-
12	1.944	6.88	Av	9.8	.3	16.98	-	-	46	-29.02

Pk - Peak detector

Av - Average detection

**Line-L2 .15 - 30MHz**



**LINE 2 RESULTS**

Trace Markers

Range 2: Phase N .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	ENV216_10183 6_With ex-cord_N	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	.372	28.56	Pk	9.5	.2	38.26	58.46	-20.2	-	-
14	.387	15.53	Av	9.2	.2	24.93	-	-	48.13	-23.2
15	.732	17.5	Pk	9.9	.2	27.6	56	-28.4	-	-
16	.729	8.5	Av	9.9	.2	18.6	-	-	46	-27.4
17	1.02	13.69	Pk	9.8	.3	23.79	56	-32.21	-	-
18	1.023	7.98	Av	9.8	.3	18.08	-	-	46	-27.92
19	1.314	12.99	Pk	9.8	.3	23.09	56	-32.91	-	-
20	1.314	8.93	Av	9.8	.3	19.03	-	-	46	-26.97
21	1.899	11.9	Pk	9.7	.3	21.9	56	-34.1	-	-
22	1.899	7.78	Av	9.7	.3	17.78	-	-	46	-28.22
23	2.481	12.24	Pk	9.7	.3	22.24	56	-33.76	-	-
24	2.481	6	Av	9.7	.3	16	-	-	46	-30

Pk - Peak detector

Av - Average detection