



FCC 47 CFR PART 15 SUBPART B

CERTIFICATION TEST REPORT

FOR

MOBILE PHONE

MODEL NUMBER: SM-A320X

FCC ID: A3LSMA320X

REPORT NUMBER: 4787741217-E1V2

ISSUE DATE: DEC 21, 2016

Prepared for

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

Prepared by

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Revision History

Rev.	Issue Date	Revisions	Revised By
V1	12/12/16	Initial issue	SungGil Park
V2	12/2/16	Addressed TCB's questions	SungGil Park

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: SAMSUNG ELECTRONICS CO., LTD.
EUT DESCRIPTION: Mobile Phone
MODEL NUMBER: SM-A320X
SERIL NUMBER: R38HB0D8J3L
DATE TESTED: DEC 09, 2016 - DEC 12, 2016

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:



CY Choi
Suwon Lab Engineer
UL Korea, Ltd.

Tested By:



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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	
☒	Chamber 1
☒	Chamber 2

UL Korea, Ltd. Suwon Laboratory is a FCC-recognized 2.948-listed testing laboratory.

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:

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

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	4.14 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 bar type mobile phone which incorporates a camera, Bluetooth, ANT+, Wi-Fi, GPS, NFC, MST, FM Radio, MP3 player and MP4 player.

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	30 GHz (5 th harmonic of the frequency of 5.8GHz 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
Data transfer	USB Mode (Data Communication)

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
USB Cable	SAMSUNG	EP-DN930CWE	N/A	N/A
Headset	SAMSUNG	EHS64AVFWE	N/A	N/A
Desktop	HP	C8N27AV	CZC4125J25	DoC
Micro SD Card	SAMSUNG	16G	N/A	N/A
LCD Monitor	HP	C9V75AA	3CQ4250CNN	DoC
Mouse	LOGITECH	U0026	1451HS05S6G8	DoC
Keyboard	LENOVO	SK-8825	3971989	DoC

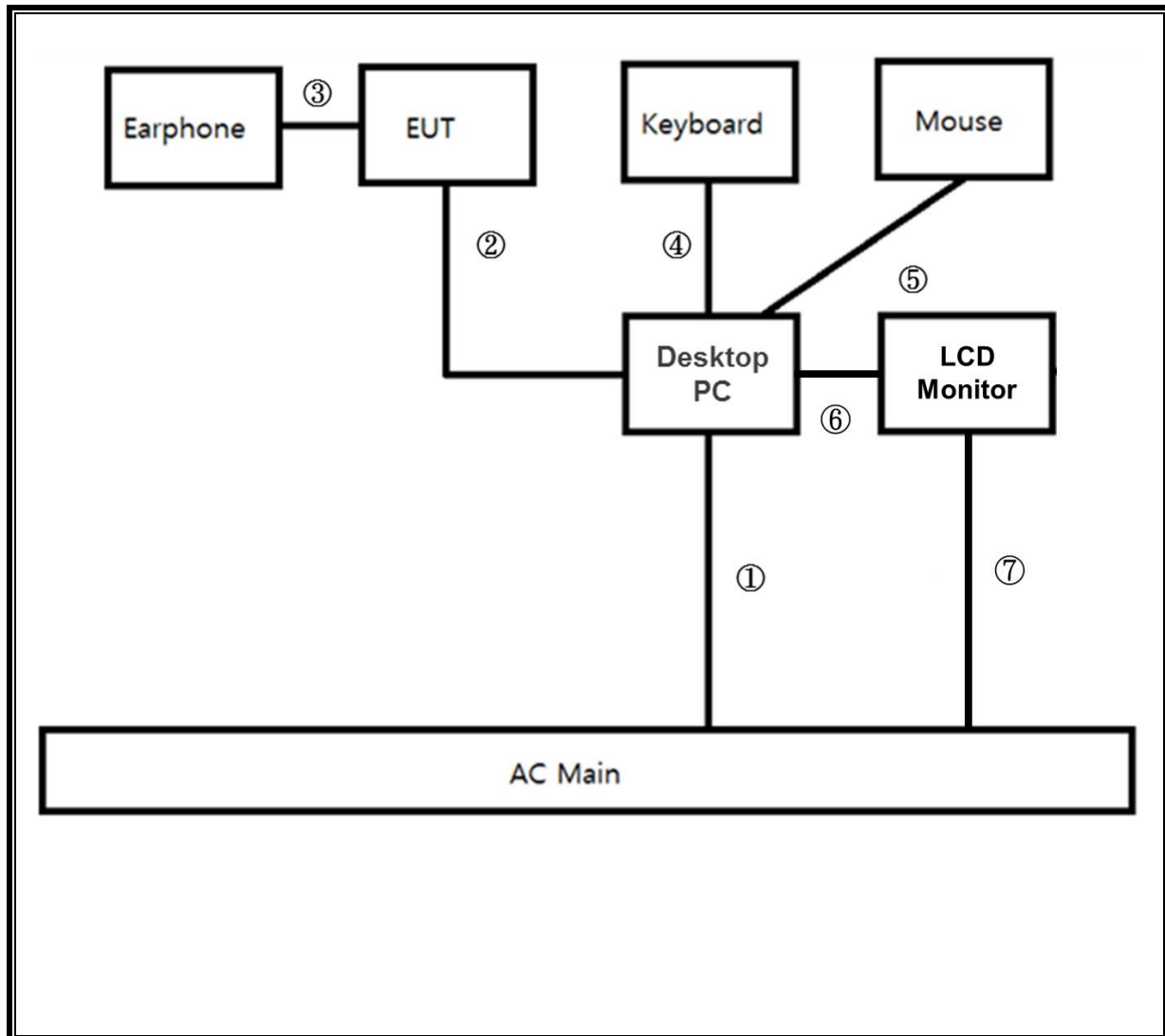
I/O CABLES

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	AC Power	1	Power	Unshielded	1.8m	For Desktop
2	USB	1	C-type	Shielded	1.2m	From EUT to Desktop
3	Audio	1	Mini-Jack	Unshielded	1.2m	From EUT to Headset
4	Keyboard	1	USB	Shielded	1.5m	From Desktop to Keyboard
5	Mouse	1	USB	Shielded	1.5m	From Desktop to Mouse
6	RGB	1	D-SUV	Shielded	1.8m	From Desktop to LCD Monitor
7	AC Power	1	Power	Unshielded	1.8m	For LCD Monitor

TEST SETUP

The EUT is installed in a typical configuration. Test software exercised the EUT.

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	749	04-25-17
Antenna, Horn, 18 GHz	ETS	3115	00161451	05-17-17
Antenna, Horn, 18 GHz	ETS	3117	00168724	06-17-17
Antenna, Horn, 18 GHz	ETS	3117	00168717	06-17-17
Antenna, Horn, 40 GHz	ETS	3116C	00166155	11-30-17
Antenna, Horn, 40 GHz	ETS	3116C-PA	00168841	12-15-17
Preamplifier, 1000 MHz	Sonoma	310N	341282	08-17-17
Preamplifier, 1000 MHz	Sonoma	310N	351741	08-16-17
Preamplifier	ETS	3115-PA	00167475	08-17-17
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1896138	08-16-17
EMI Test Receive, 40 GHz	R&S	ESU40	100439	08-17-17
EMI Test Receive, 40 GHz	R&S	ESU40	100457	08-16-17
EMI Test Receive, 3 GHz	R&S	ESR3	101832	08-16-17
Attenuator / Switch driver	HP	11713A	3748A04272	N/A
LISN	R&S	ENV-216	101836	08-16-17
LISN	R&S	ENV-216	101837	08-16-17

Note: The testing was performed in accordance with ANSI C63.4-2014.
C63.4:2014 requires measurement antennas to be calibrated in accordance with C63.5: 2006.
The antenna calibration was done in accordance with C63.5: 2006.

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 5.8GHz therefore the frequency range was investigated from 30 MHz to 30 GHz.

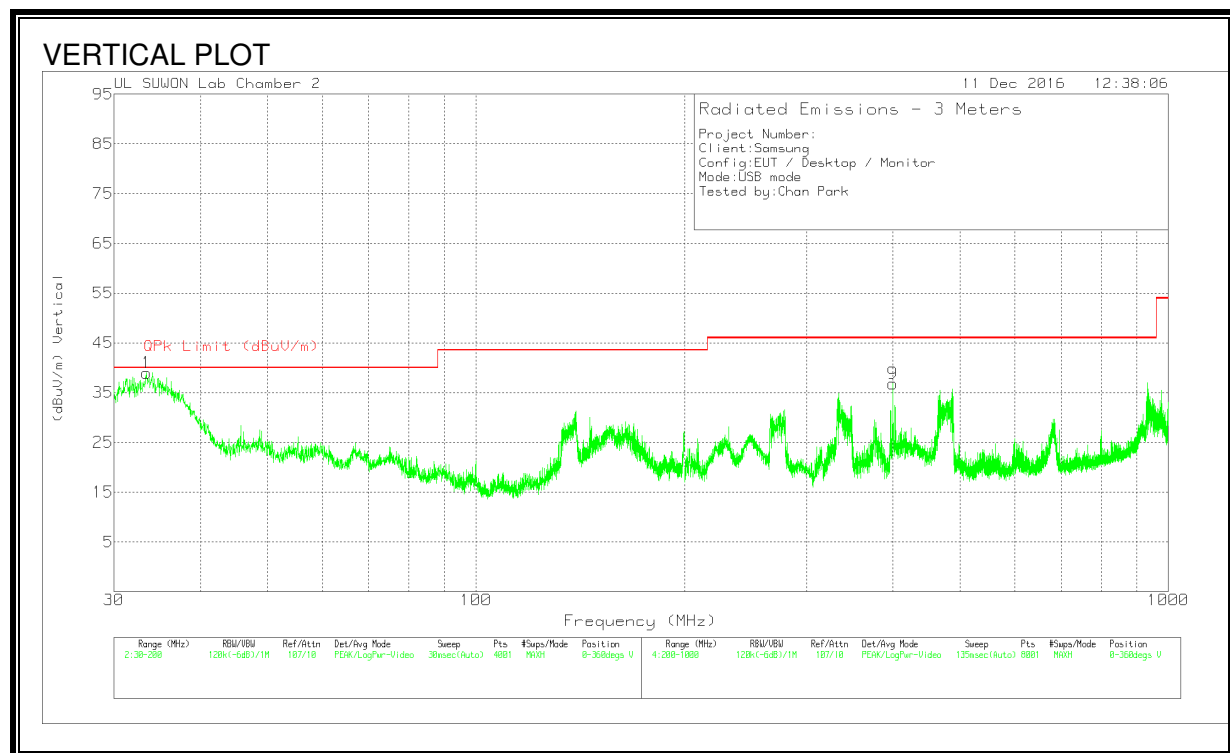
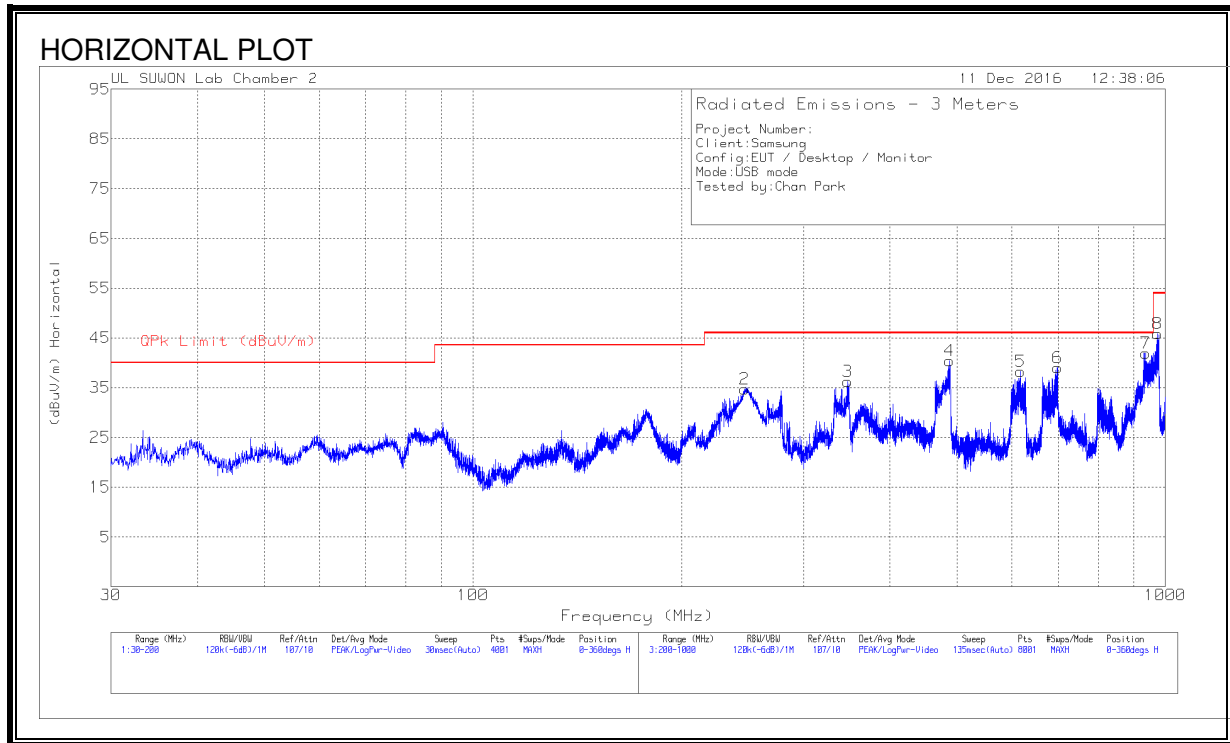
LIMIT

§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 μ 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 (WORST-CASE CONFIGURATION)



HORIZONTAL AND VERTICAL DATA

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	VULB9163-750	30-1000MHz[dB]	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	33.4425	60.16	Pk	10.4	-31.6	38.96	40	-1.04	0-360	100	V
2	246.5	52.73	Pk	12.3	-30.3	34.73	46.02	-11.29	0-360	100	H
3	347.8	51.69	Pk	14.4	-29.9	36.19	46.02	-9.83	0-360	200	H
4	487.9	53.07	Pk	16.9	-29.6	40.37	46.02	-5.65	0-360	100	H
5	618	48.33	Pk	19.2	-29.3	38.23	46.02	-7.79	0-360	100	H
6	698.7	48.54	Pk	19.6	-29.1	39.04	46.02	-6.98	0-360	100	H
7	936.1	47.35	Pk	22.2	-27.6	41.95	46.02	-4.07	0-360	100	H
8	974.1	50.65	Pk	22.4	-27.2	45.85	53.97	-8.12	0-360	100	H
9	400	51.01	Pk	15.6	-29.8	36.81	46.02	-9.21	0-360	100	V

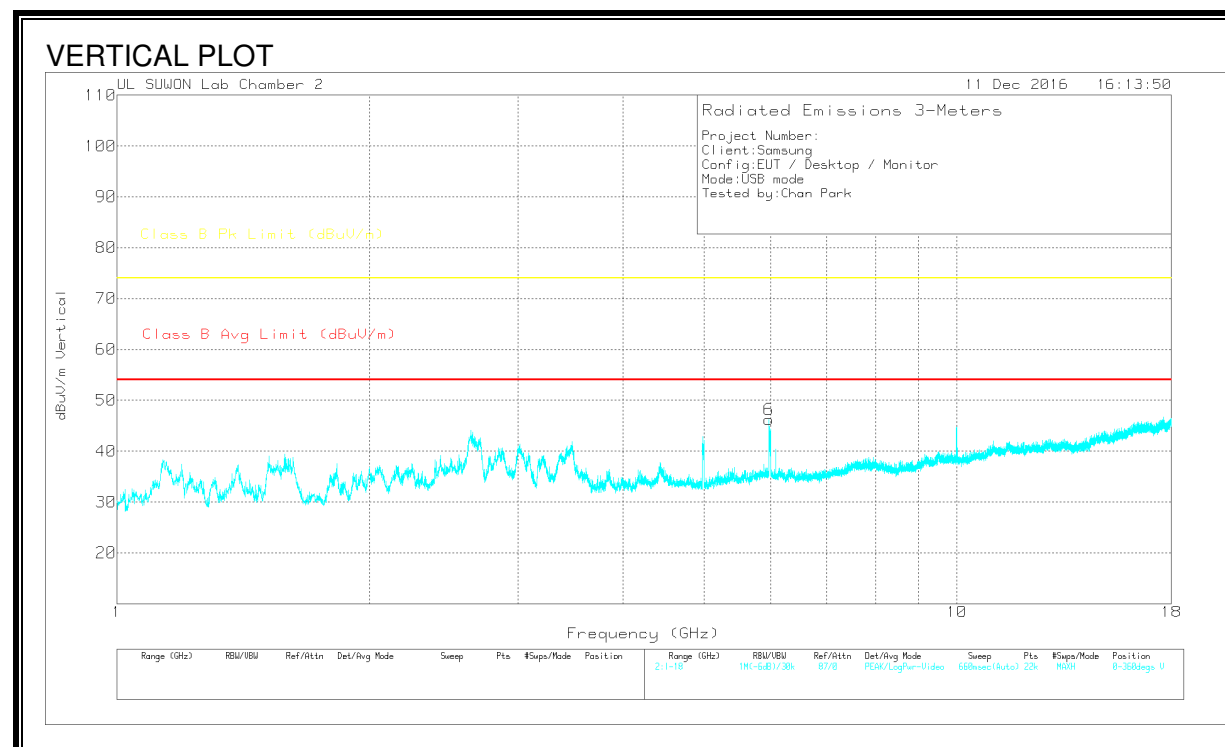
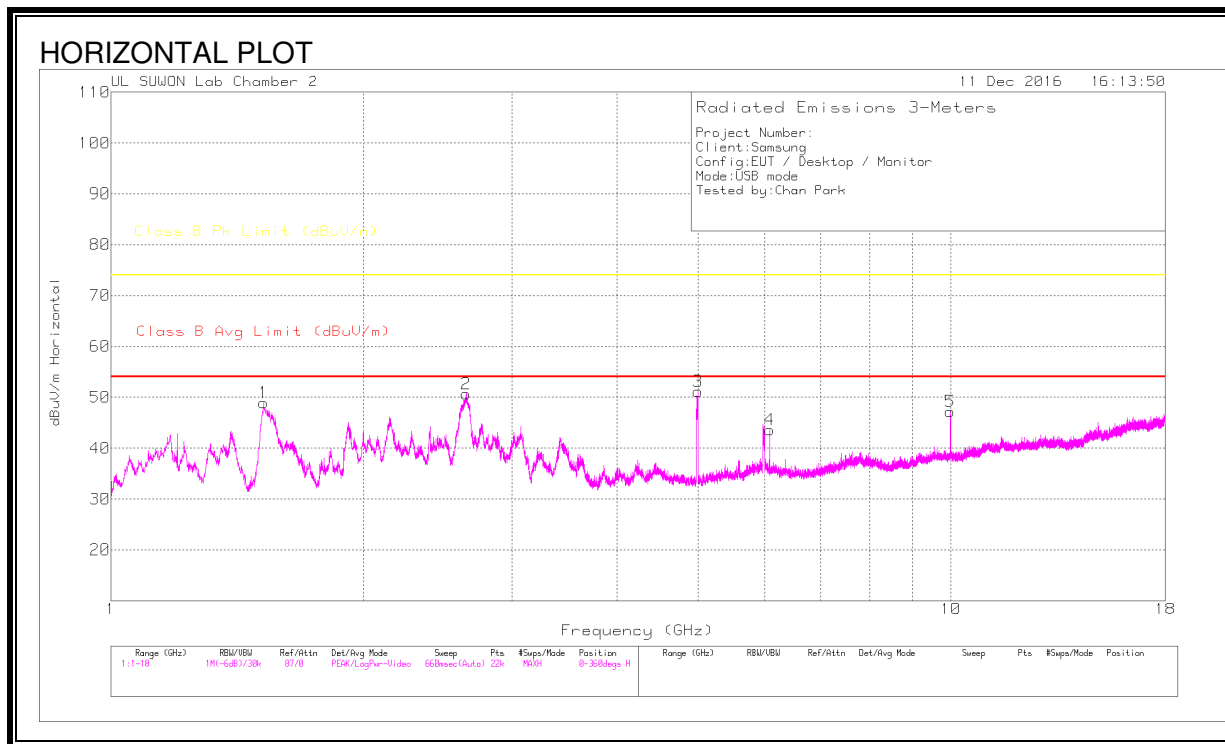
Pk - Peak detector

Radiated Emissions

Frequency (MHz)	Meter Reading (dBuV)	Det	VULB9163-750	30-1000MHz[dB]	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
33.668	55.64	Qp	10.4	-31.6	34.44	40	-5.56	86	100	V
244.6731	44.71	Qp	12.2	-30.3	26.61	46.02	-19.41	181	108	H
347.8278	47.26	Qp	14.4	-29.9	31.76	46.02	-14.26	228	100	H
486.5298	52.62	Qp	16.8	-29.6	39.82	46.02	-6.2	176	106	H
617.882	42.36	Qp	19.2	-29.3	32.26	46.02	-13.76	135	106	H
698.3308	47.81	Qp	19.6	-29.1	38.31	46.02	-7.71	171	142	H
936.4663	45.57	Qp	22.2	-27.6	40.17	46.02	-5.85	135	101	H
974.6793	47.28	Qp	22.4	-27.1	42.58	53.97	-11.39	168	102	H
400.00018	51.8	Qp	15.6	-29.8	37.6	46.02	-8.42	219	201	H

Qp - Quasi-Peak detector

RADIATED EMISSIONS 1GHz to 18GHz (WORST-CASE CONFIGURATION)



HORIZONTAL AND VERTICAL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(0016 8724)_150 619	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	1.52	49.95	Pk	28.6	-29.6	48.95	-	-	74	-25.05	0-360	246	H
2	2.647	46.81	Pk	32	-28.1	50.71	-	-	74	-23.29	0-360	246	H
3	4.999	42.72	Pk	33.9	-25.5	51.12	-	-	74	-22.88	0-360	346	H
4	6.084	33.17	Pk	34.9	-24.4	43.67	-	-	74	-30.33	0-360	246	H
5	9.98	28.29	Pk	37.2	-18.3	47.19	-	-	74	-26.81	0-360	246	H
6	5.975	35.83	Pk	34.8	-24.4	46.23	-	-	74	-27.77	0-360	100	V

PK – Peak Detector

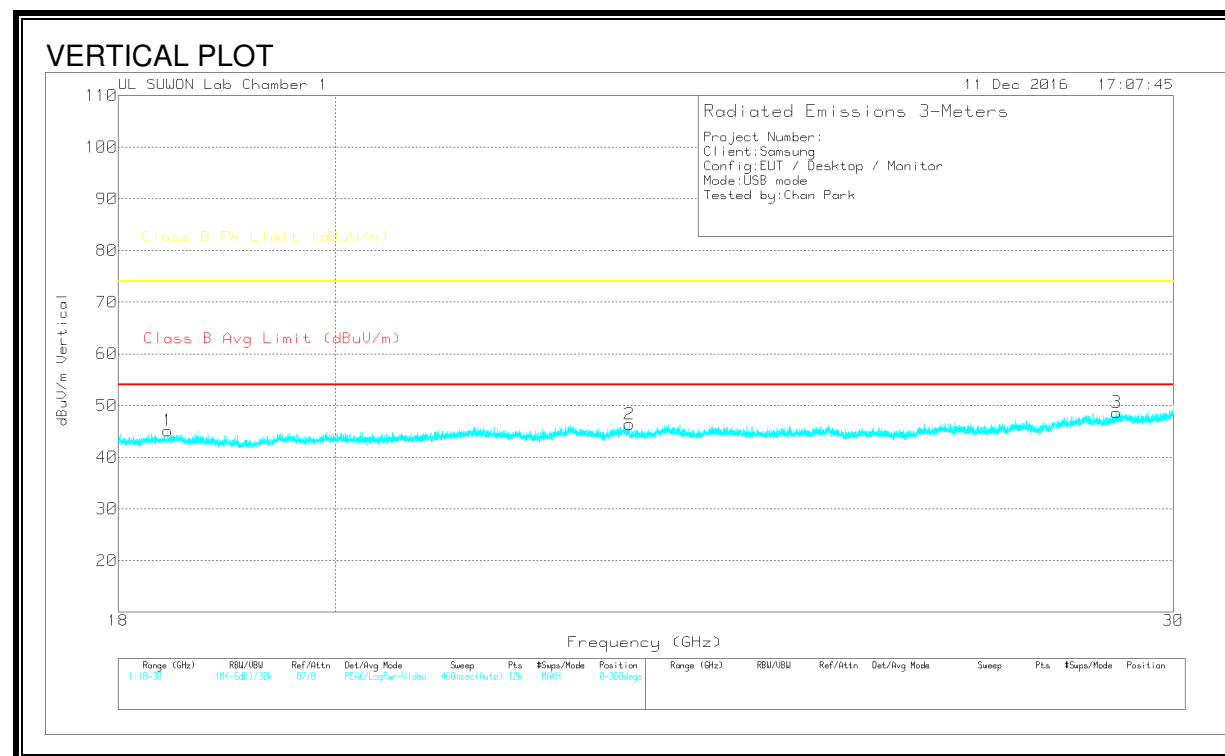
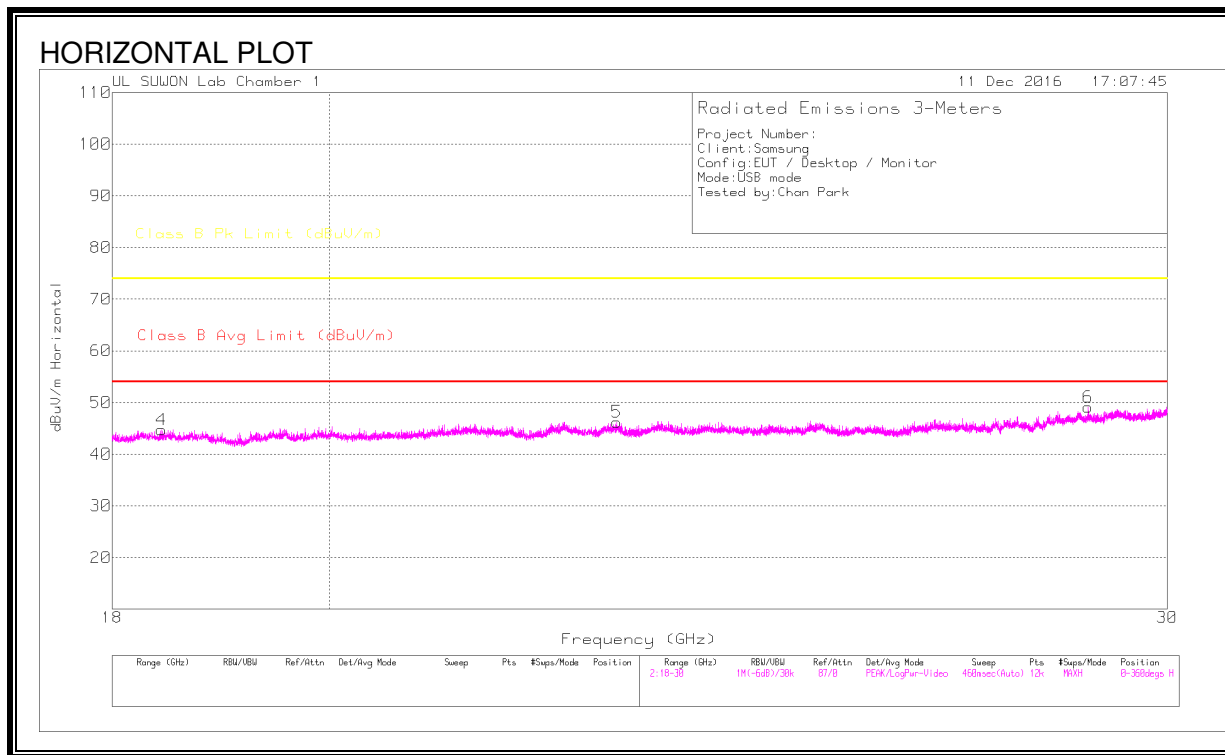
Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	3117(0016 8724)_150 619	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
1.519	60.21	Pk	28.6	-29.7	59.11	-	-	74	-14.89	328	113	H
1.519	47.52	Ca	28.6	-29.7	46.42	54	-7.58	-	-	328	113	H
2.646	58.94	Pk	32	-28.1	62.84	-	-	74	-11.16	69	125	H
2.646	45.36	Ca	32	-28.1	49.26	54	-4.74	-	-	69	125	H
4.999	53.53	Pk	33.9	-25.5	61.93	-	-	74	-12.07	346	394	H
4.999	30.58	Ca	33.9	-25.5	38.98	54	-15.02	-	-	346	394	H
6.085	41.56	Pk	34.9	-24.4	52.06	-	-	74	-21.94	337	101	H
6.085	36.81	Ca	34.9	-24.4	47.31	54	-6.69	-	-	337	101	H
9.98	38.7	Pk	37.2	-18.3	57.6	-	-	74	-16.4	44	101	H
9.98	19.7	Ca	37.2	-18.3	38.6	54	-15.4	-	-	44	101	H
5.973	47.56	Pk	34.8	-24.4	57.96	-	-	74	-16.04	194	100	V
5.973	25.87	Ca	34.8	-24.4	36.27	54	-17.73	-	-	194	100	V

Pk - Peak detector

Ca – CISPR Average detection

RADIATED EMISSIONS 18GHz to 30GHz (WORST-CASE CONFIGURATION)



HORIZONTAL AND VERTICAL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3116PA	18G-40G	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	18.44	22.86	PK	4.8	17.5	45.16	-	-	74	-28.84	0-360	100	V
2	23.056	16.2	PK	10.7	19.5	46.4	-	-	74	-27.6	0-360	100	V
3	29.187	13.36	PK	13.1	22.2	48.66	-	-	74	-25.34	0-360	100	V
4	18.436	22.43	PK	4.8	17.5	44.73	-	-	74	-29.27	0-360	100	H
5	22.983	16.01	PK	10.7	19.5	46.21	-	-	74	-27.79	0-360	100	H
6	28.874	14.19	PK	12.9	22	49.09	-	-	74	-24.91	0-360	100	H

PK – Peak Detector

8. AC MAINS LINE CONDUCTED EMISSIONS

TEST PROCEDURE

ANSI C63.4: 2014

LIMIT

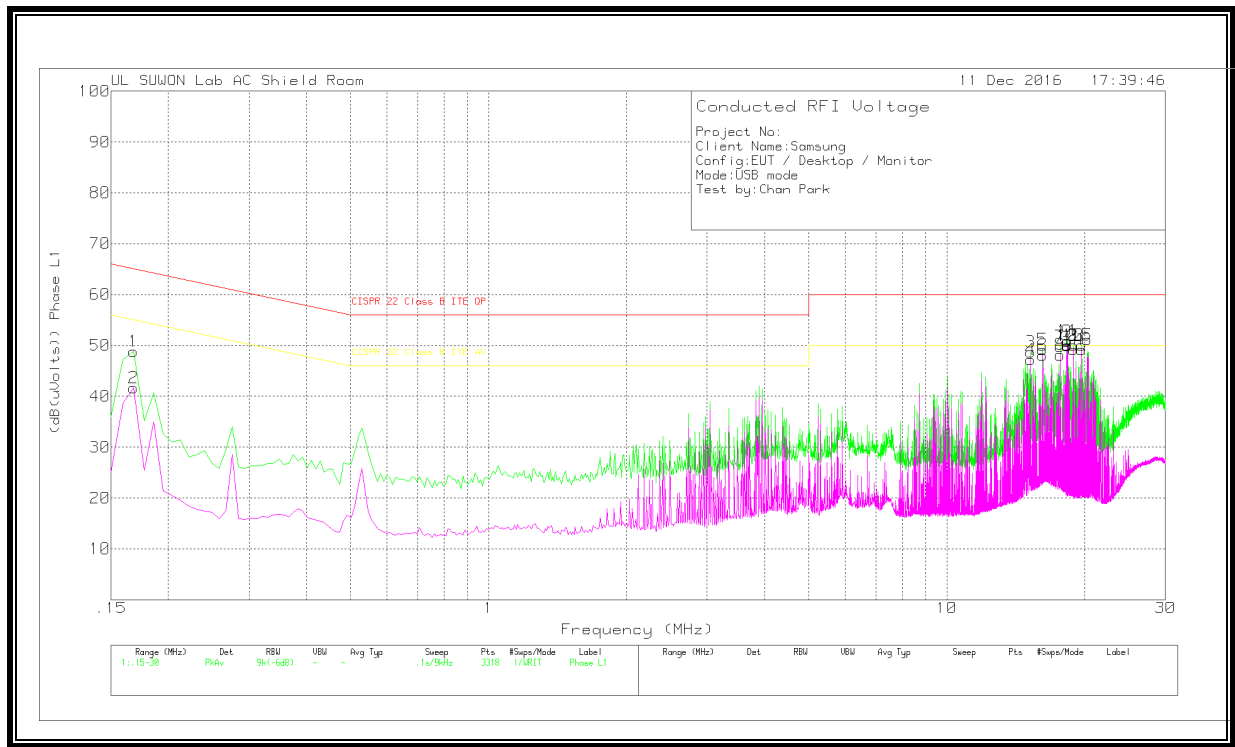
§15.107 (a) Except for Class A digital devices, for equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μ 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 μ 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

Phase L1 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	101836_L1	CE Shield Room	Corrected Reading (dB(uVolts))	CISPR 22 Class B ITE QP	Margin (dB)	CISPR 22 Class B ITE AV	Margin (dB)
1	.168	38.81	Pk	10	0	48.81	65.06	-16.25	-	-
2	.168	31.7	Av	10	0	41.7	-	-	55.06	-13.36
3	15.252	38.31	Pk	10.2	.2	48.71	60	-11.29	-	-
4	15.252	36.86	Av	10.2	.2	47.26	-	-	50	-2.74
5	16.17	38.68	Pk	10.3	.2	49.18	60	-10.82	-	-
6	16.17	37.53	Av	10.3	.2	48.03	-	-	50	-1.97
7	17.691	39.34	Pk	10.3	.2	49.84	60	-10.16	-	-
8	17.691	37.65	Av	10.3	.2	48.15	-	-	50	-1.85
9	18.303	40.19	Pk	10.4	.2	50.79	60	-9.21	-	-
10	18.303	39.35	Av	10.4	.2	49.95	-	-	50	-.05
11	18.366	40.32	Pk	10.4	.2	50.92	60	-9.08	-	-
12	18.366	39.48	Av	10.4	.2	50.08	-	-	50	.08
13	18.915	39.43	Pk	10.4	.2	50.03	60	-9.97	-	-
14	18.915	38.57	Av	10.4	.2	49.17	-	-	50	-.83
15	19.707	39.49	Pk	10.4	.2	50.09	60	-9.91	-	-
16	19.707	38.58	Av	10.4	.2	49.18	-	-	50	-.82

Pk - Peak detector

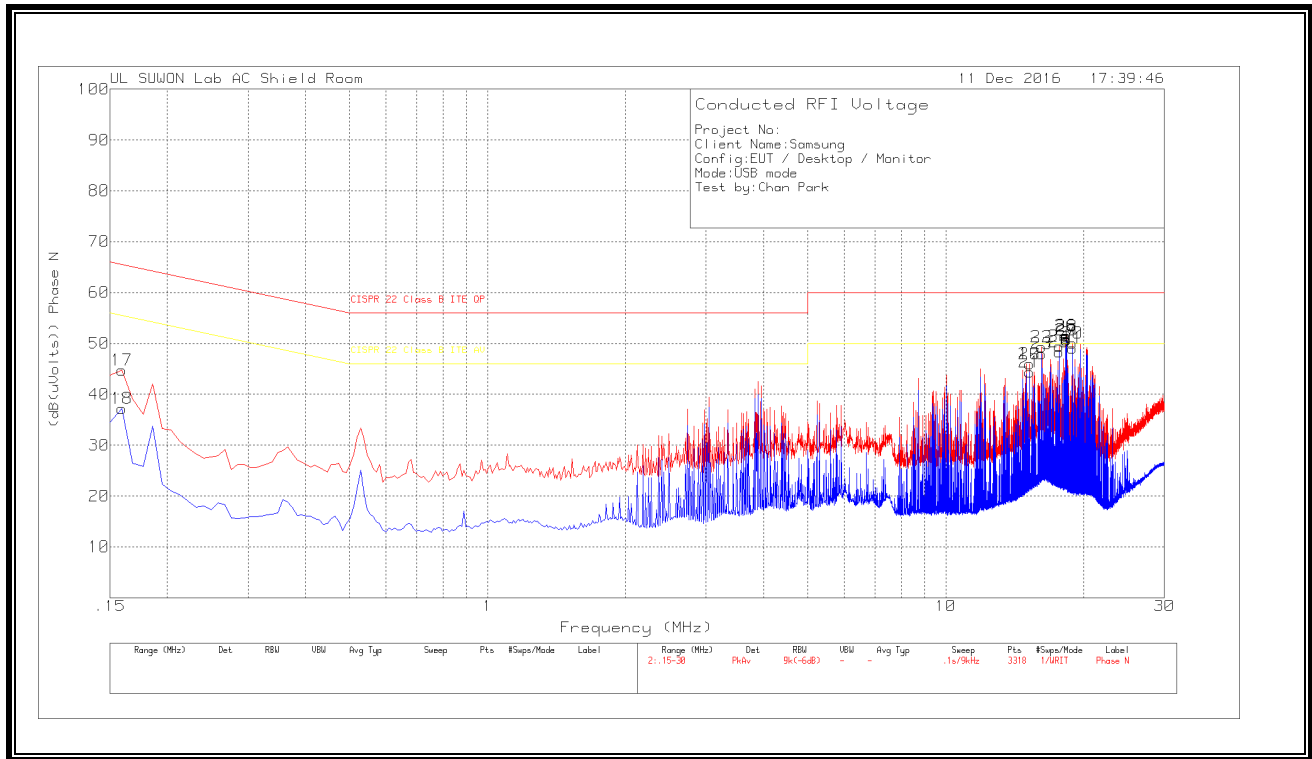
Av - Average detection

Phase L1 .15 - 30MHz

Frequency (MHz)	Meter Reading (dBuV)	Det	101836_L1	CE Shield Room	Corrected Reading (dB(uVolts))	CISPR 22 Class B ITE QP	Margin (dB)	CISPR 22 Class B ITE AV	Margin (dB)
.1635	32.93	Qp	9.9	0	42.83	65.28	-22.45	-	-
15.2511	33.89	Qp	10.2	.2	44.29	60	-15.71	-	-
16.1673	39.61	Qp	10.3	.2	50.11	60	-9.89	-	-
17.6946	41.01	Qp	10.3	.2	51.51	60	-8.49	-	-
18.3048	40.31	Qp	10.4	.2	50.91	60	-9.09	-	-
18.915	38.48	Qp	10.4	.2	49.08	60	-10.92	-	-

Qp - Quasi-Peak detector

Line-L2 .15 - 30MHz



LINE 2 RESULTS

Trace Markers

Phase N .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	101836_N	CE Shield Room	Corrected Reading (dB(uVolts))	CISPR 22 Class B ITE QP	Margin (dB)	CISPR 22 Class B ITE AV	Margin (dB)
17	.159	34.98	Pk	9.8	0	44.78	65.52	-20.74	-	-
18	.159	27.36	Av	9.8	0	37.16	-	-	55.52	-18.36
19	15.252	35.62	Pk	10.2	.2	46.02	60	-13.98	-	-
20	15.252	35.62	Pk	10.2	.2	46.02	60	-13.98	-	-
21	15.252	33.92	Av	10.2	.2	44.32	-	-	50	-5.68
22	16.17	38.95	Pk	10.2	.2	49.35	60	-10.65	-	-
23	16.17	37.55	Av	10.2	.2	47.95	-	-	50	-2.05
24	17.691	38.93	Pk	10.3	.2	49.43	60	-10.57	-	-
25	17.691	37.88	Av	10.3	.2	48.38	-	-	50	-1.62
26	18.303	41.1	Pk	10.3	.2	51.6	60	-8.4	-	-
27	18.303	40.21	Av	10.3	.2	50.71	-	-	50	.71
28	18.366	40.95	Pk	10.3	.2	51.45	60	-8.55	-	-
29	18.366	40.19	Av	10.3	.2	50.69	-	-	50	.69
30	18.915	39.53	Pk	10.3	.2	50.03	60	-9.97	-	-
31	18.915	38.62	Av	10.3	.2	49.12	-	-	50	-8.8

Pk - Peak detector

Av - Average detection

Phase N .15 - 30MHz

Frequency (MHz)	Meter Reading (dBuV)	Det	101836_N	CE Shield Room	Corrected Reading (dB(uVolts))	CISPR 22 Class B ITE QP	Margin (dB)	CISPR 22 Class B ITE AV	Margin (dB)
.1572	31.36	Qp	9.8	0	41.16	65.61	-24.45	-	-
15.2511	37.38	Qp	10.2	.2	47.78	60	-12.22	-	-
16.1673	39.44	Qp	10.2	.2	49.84	60	-10.16	-	-
17.6937	40.49	Qp	10.3	.2	50.99	60	-9.01	-	-
18.3048	41.06	Qp	10.3	.2	51.56	60	-8.44	-	-
18.9159	38.81	Qp	10.3	.2	49.31	60	-10.69	-	-

Qp - Quasi-Peak detector