FCC 47 CFR PART 15 SUBPART B

CERTIFICATION TEST REPORT

FOR

GSM Phone + Bluetooth & WLAN 2.4GHz b/g/n

MODEL NUMBER: SM-G316HU/DD

FCC ID: A3LSMG316HU

REPORT NUMBER: 14I19012-E5 REVISION A

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Prepared for
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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	10/6/14	Initial issue	D. Coronia
--	11/10/14	Update radiated and AC line conducted emissions test setup page 20	D. Coronia

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: SAMSUNG ELECTRONICS CO., LTD.

EUT DESCRIPTION: GSM Phone + Bluetooth & WLAN 2.4GHz b/g/n

MODEL: SM-G316HU/DD

SERIAL NUMBER: RV1F91CWXVA

DATE TESTED: OCTOBER 1-2, 2014

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.

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2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4-2009.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 and 47266 Benicia Street, Fremont, California, USA. Line conducted emissions are measured only at the 47173 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.

47173 Benicia Street	47266 Benicia Street
☒ Chamber A(IC: 2324B-1)	☐ Chamber D(IC: 2324B-4)
☒ Chamber B(IC: 2324B-2)	☐ Chamber E(IC: 2324B-5)
☐ Chamber C(IC: 2324B-3)	☐ Chamber F(IC: 2324B-6)
	☐ Chamber G(IC: 2324B-7)
	☐ Chamber H(IC: 2324B-8)

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at http://ts.nist.gov/standards/scopes/2000650.htm.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)

36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

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	3.52 dB
Radiated Disturbance, 30 to 1000 MHz	4.94 dB

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is GSM Phone + Bluetooth & WLAN 2.4GHz b/g/n

AC Adapter Power Requirements	100-300 VAC / 50-60 Hz, 700mA
List of frequencies generated or used by the EUT	1.0GHz (Clock Frequency)

5.2. PRELIMINARY TEST CONFIGURATIONS

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

5.3. MODE(S) OF OPERATION INVESTIGATED

Mode	Description
Idle	Receive mode

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**
Laptop	Lenovo	TP00001A	60Y5028	DoC
Earphone	Samsung	GH59	N/A	DoC
AC Adapter	Samsung	ETA0U10IBE	N/A	N/A
Mouse	Logitech	M-U0026	1304HS02AX68	N/A
Keyboard	Lenovo	KU-0225	54Y9400	N/A
Switch	Netgear	GS108T	29SA3C5T00E79	DoC

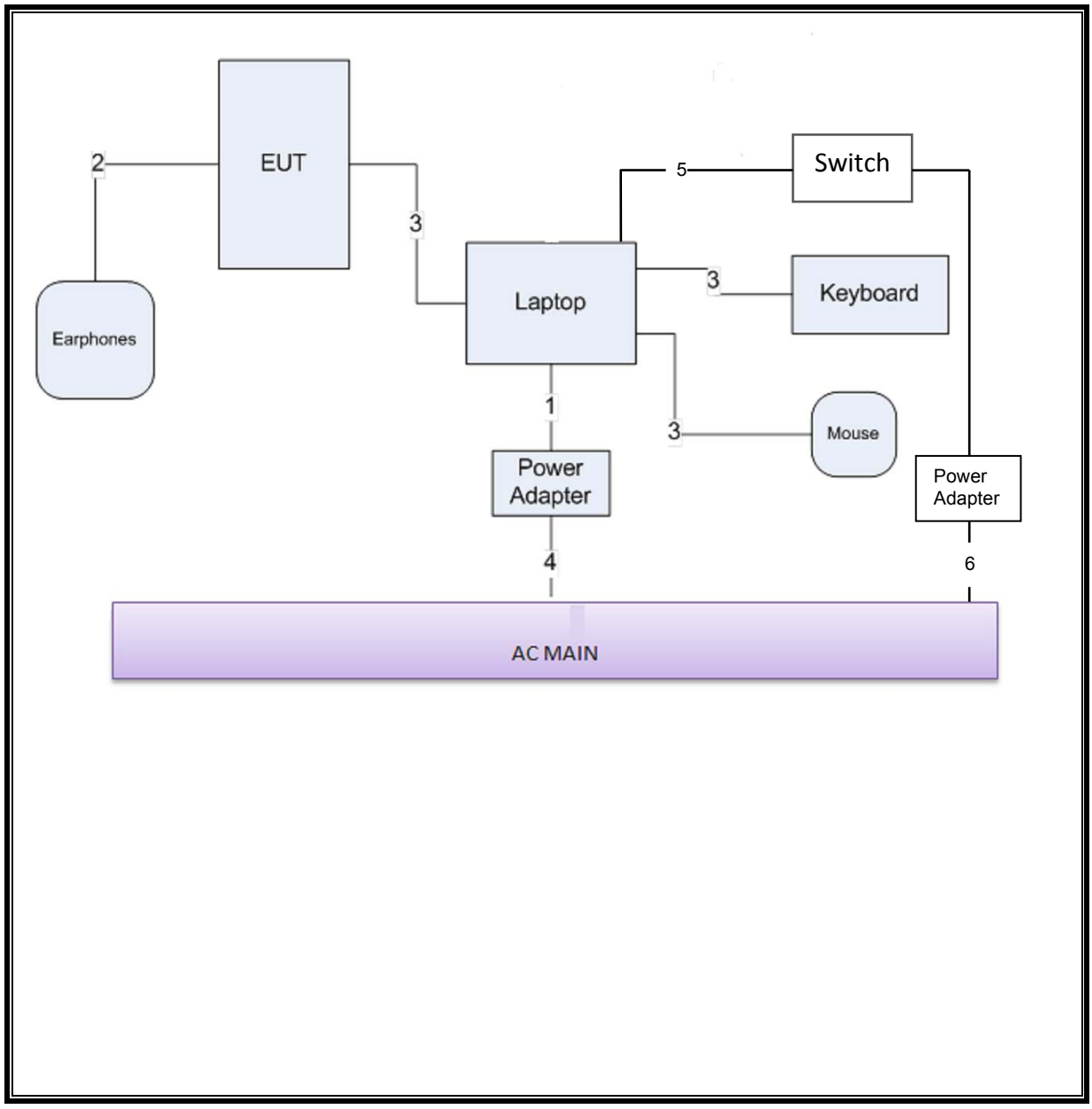
I/O CABLES

I/O Cable List						
Cable No	**Port**	**# of identical ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	DC Power	1	Power	Shielded	1.2m	N/A
2	Audio	1	Mini-Jack	Unshielded	1m	N/A
3	USB	1	Mini-USB	Shielded	2m	N/A
4	AC Power	1	IEC	Unshielded	1m	N/A
5	Ethernet	1	RJ45	Unshielded	2m	N/A

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**
Spectrum Analyzer, 44 GHz	Agilent/HP	E4446A	US42070220	04/01/15
Preamplifier, 1300 MHz	Agilent/HP	8447D	1937A02062	01/16/15
Antenna, Bilog, 30MHz-1GHz	Sunol Sciences	JB1	A0022704	08/14/15
Preamplifier, 26.5 GHz	Agilent/HP	8449B	3008A00931	10/22/15
Antenna, Horn, 18 GHz	ETS	3117	35234	02/21/15
EMI Test Receiver, 30 MHz	R&S	ESHS 20	827129/006	08/08/15
LISN, 30 MHz	FCC	50/250-25-2	114	01/14/15
LISN, 10 kHz-30MHz	Solar	8012-50-R-24-BNC	837990	C.N.R

7. APPLICABLE LIMITS AND TEST RESULTS

7.1. RADIATED EMISSIONS

TEST PROCEDURE

ANSI C63.4: 2009

The highest clock frequency generated or used in the EUT is 1.0 GHz therefore the frequency range was investigated from 30 MHz to 18 GHz.

LIMIT

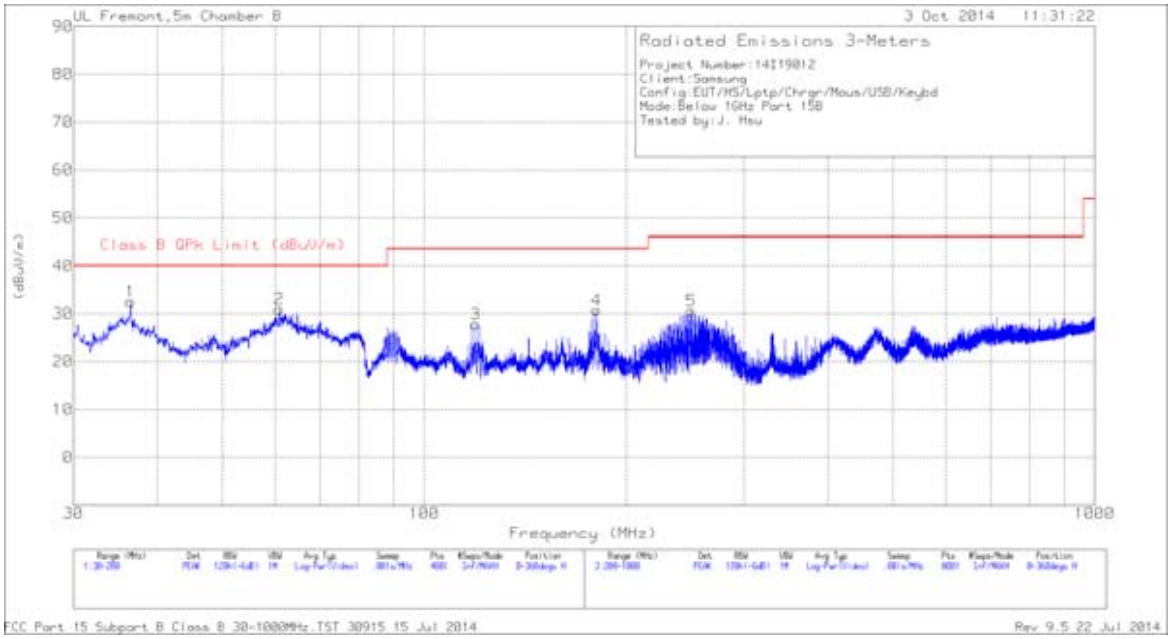
§15.109 (a) Except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Limits for radiated disturbance of Class B ITE at measuring distance of 3 m	
Frequency range (MHz)	Quasi-peak limits (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.	

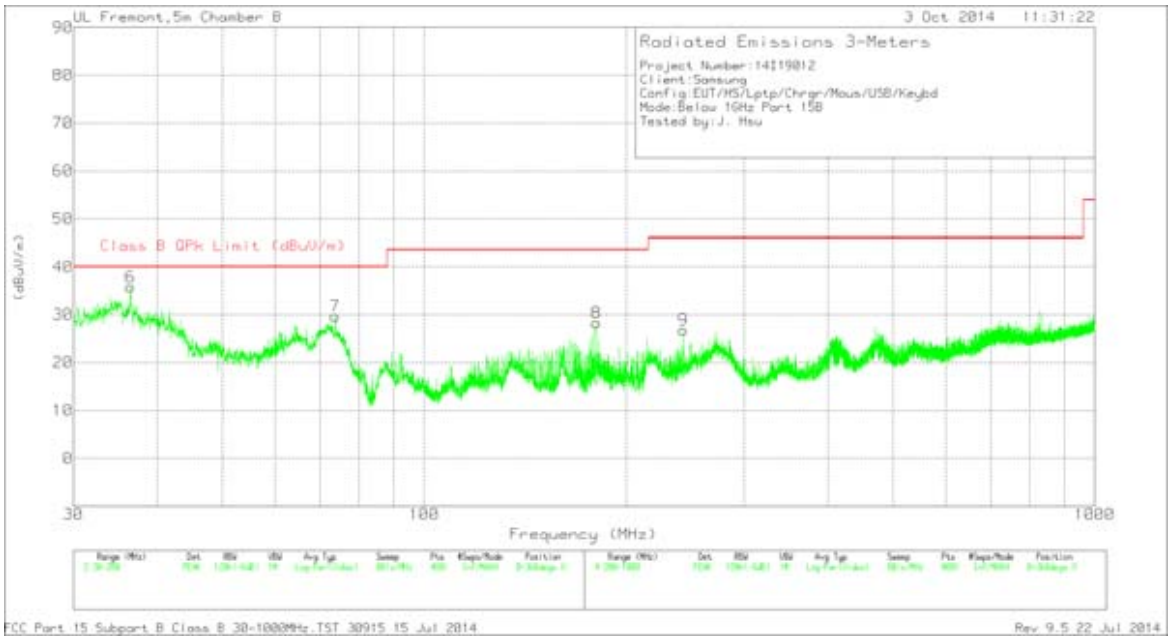
RESULTS

RADIATED EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION)

HORIZONTAL PLOT



VERTICAL PLOT



HORIZONTAL AND VERTICAL DATA

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T243 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	Class B QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	36.5025	44.74	PK	16.5	-28.7	32.54	40	-7.46	0-360	300	H
6	36.5025	48.08	PK	16.5	-28.7	35.88	40	-4.12	0-360	101	V
2	60.855	51.85	PK	7.5	-28.4	30.95	40	-9.05	0-360	400	H
7	73.7325	49.95	PK	8.1	-28.3	29.75	40	-10.25	0-360	101	V
3	119.2075	41.79	PK	13.9	-27.8	27.89	43.52	-15.63	0-360	300	H
8	180.705	44.52	PK	10.9	-27.1	28.32	43.52	-15.2	0-360	101	V
4	180.79	47.01	PK	10.9	-27.1	30.81	43.52	-12.71	0-360	100	H
9	243.4	41.58	PK	11.7	-26.4	26.88	46.02	-19.14	0-360	200	V
5	250.2	45.45	PK	11.6	-26.4	30.65	46.02	-15.37	0-360	101	H

PK - Peak detector

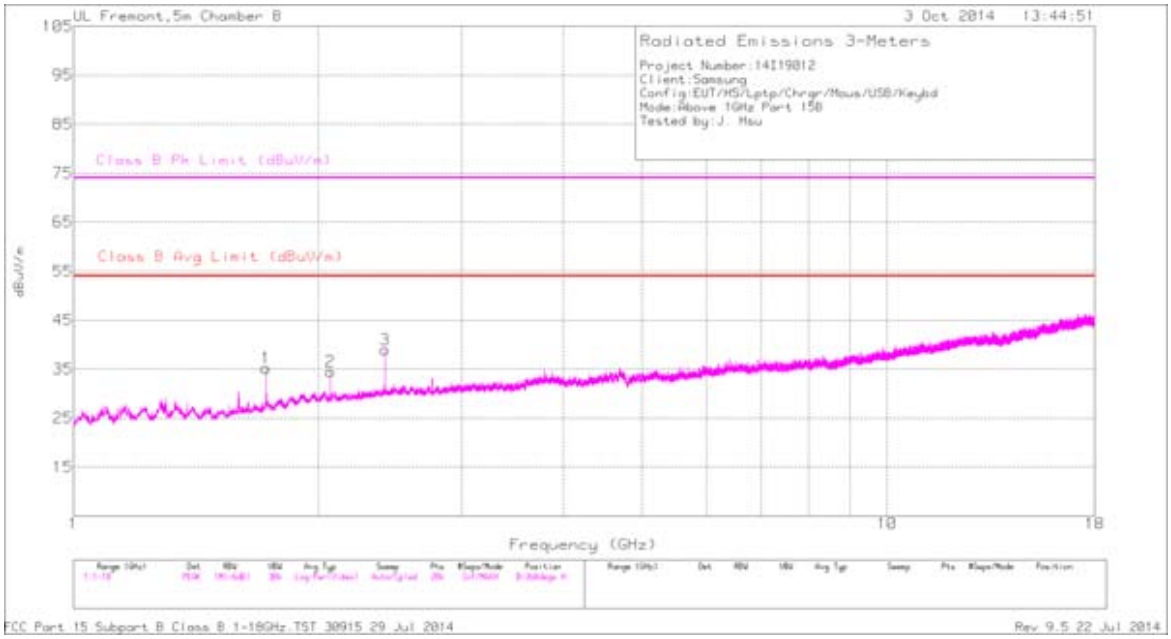
Radiated Emissions

Frequency (MHz)	Meter Reading (dBuV)	Det	AF T243 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	Class B QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
36.4804	42.16	QP	16.6	-28.7	30.06	40	-9.94	204	317	H
36.4823	43.63	QP	16.6	-28.7	31.53	40	-8.47	262	104	V

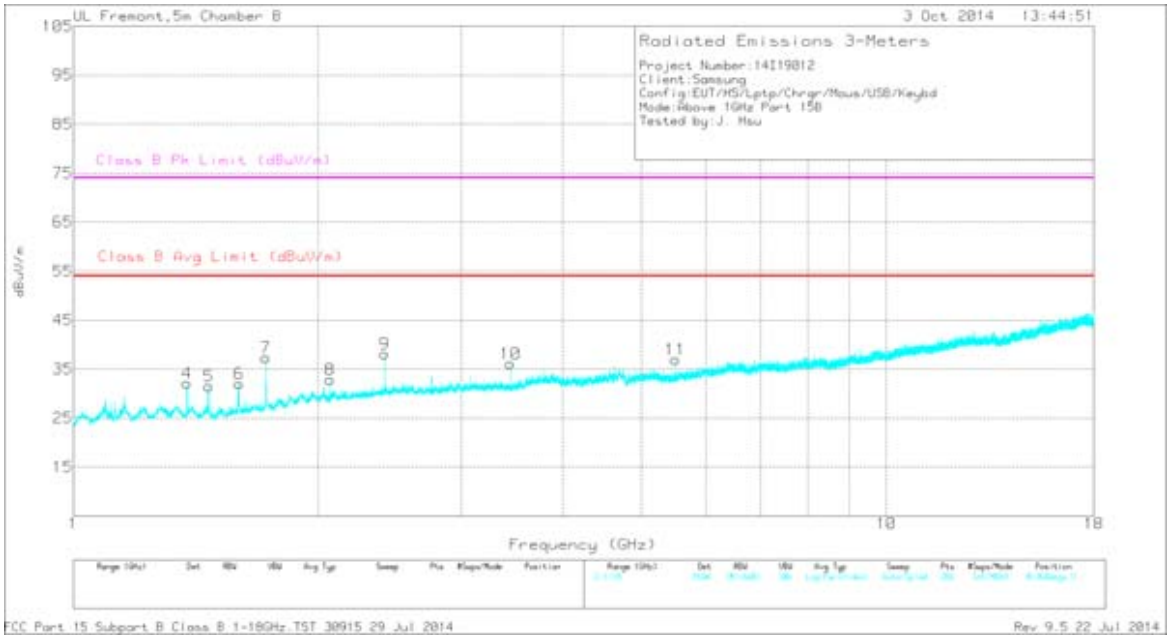
QP - Quasi-Peak detector

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

HORIZONTAL PLOT



VERTICAL PLOT



HORIZONTAL AND VERTICAL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl (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
4	1.38	37.96	PK	28.6	-34.4	32.16	-	-	74	-41.84	0-360	200	V
5	1.466	37.6	PK	28.1	-34.2	31.5	-	-	74	-42.5	0-360	101	V
6	1.599	37.38	PK	28.5	-33.8	32.08	-	-	74	-41.92	0-360	200	V
1	1.725	39.4	PK	29.3	-33.5	35.2	-	-	74	-38.8	0-360	200	H
7	1.725	41.57	PK	29.3	-33.5	37.37	-	-	74	-36.63	0-360	200	V
2	2.07	36.69	PK	31.3	-33.5	34.49	-	-	74	-39.51	0-360	200	H
8	2.07	35.06	PK	31.3	-33.5	32.86	-	-	74	-41.14	0-360	200	V
3	2.415	39.73	PK	32.2	-33	38.93	-	-	74	-35.07	0-360	102	H
9	2.415	38.95	PK	32.2	-33	38.15	-	-	74	-35.85	0-360	200	V
10	3.45	35.3	PK	32.8	-32	36.1	-	-	74	-37.9	0-360	101	V
11	5.503	32.97	PK	34.5	-30.5	36.97	-	-	74	-37.03	0-360	101	V

PK - Peak detector

7.2. AC MAINS LINE CONDUCTED EMISSIONS

TEST PROCEDURE

ANSI C63.4: 2009

LIMIT

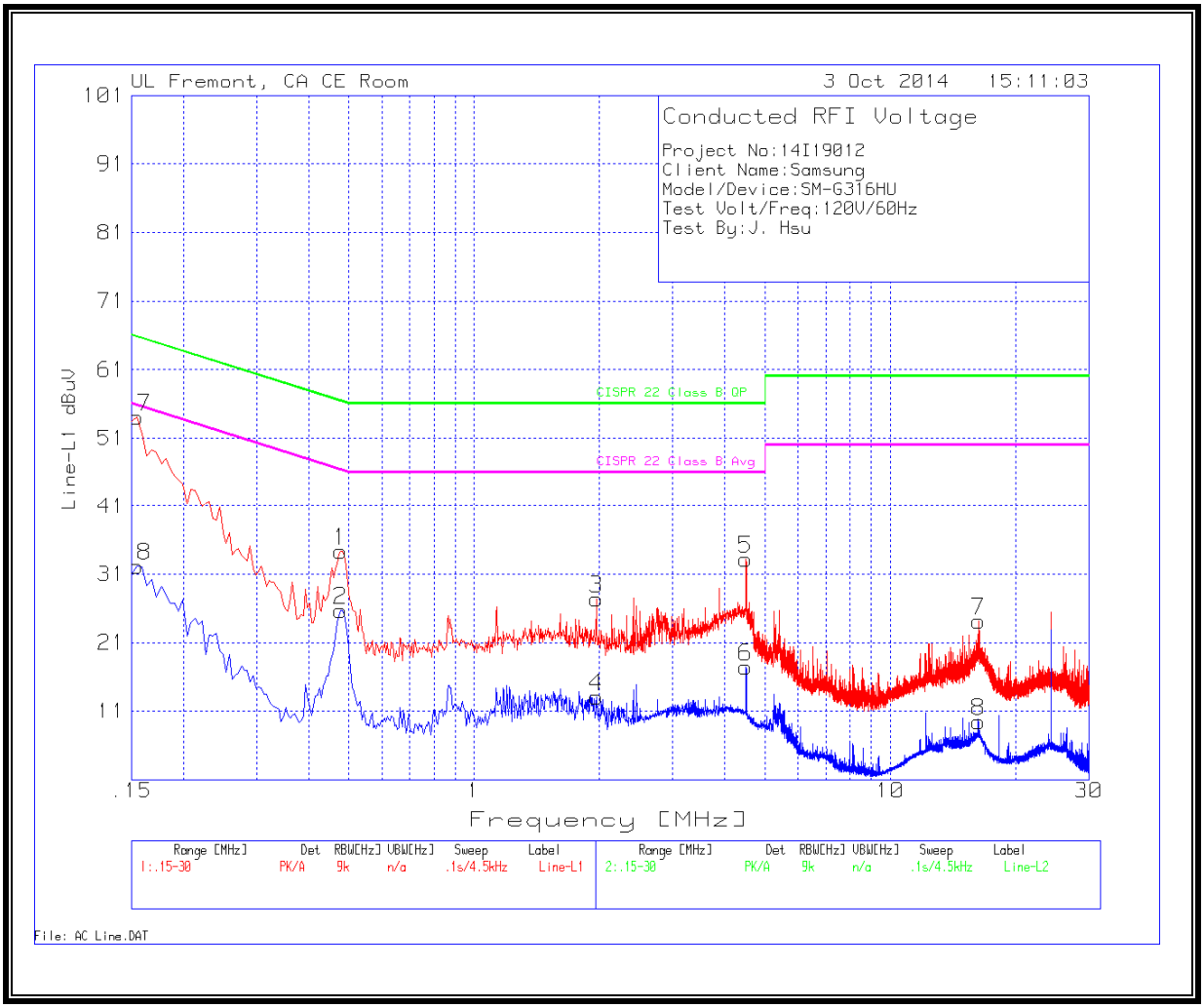
§15.107 (a) Except for Class A digital devices, for equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits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

Frequency range	Limits (dBμV)	
(MHz)	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



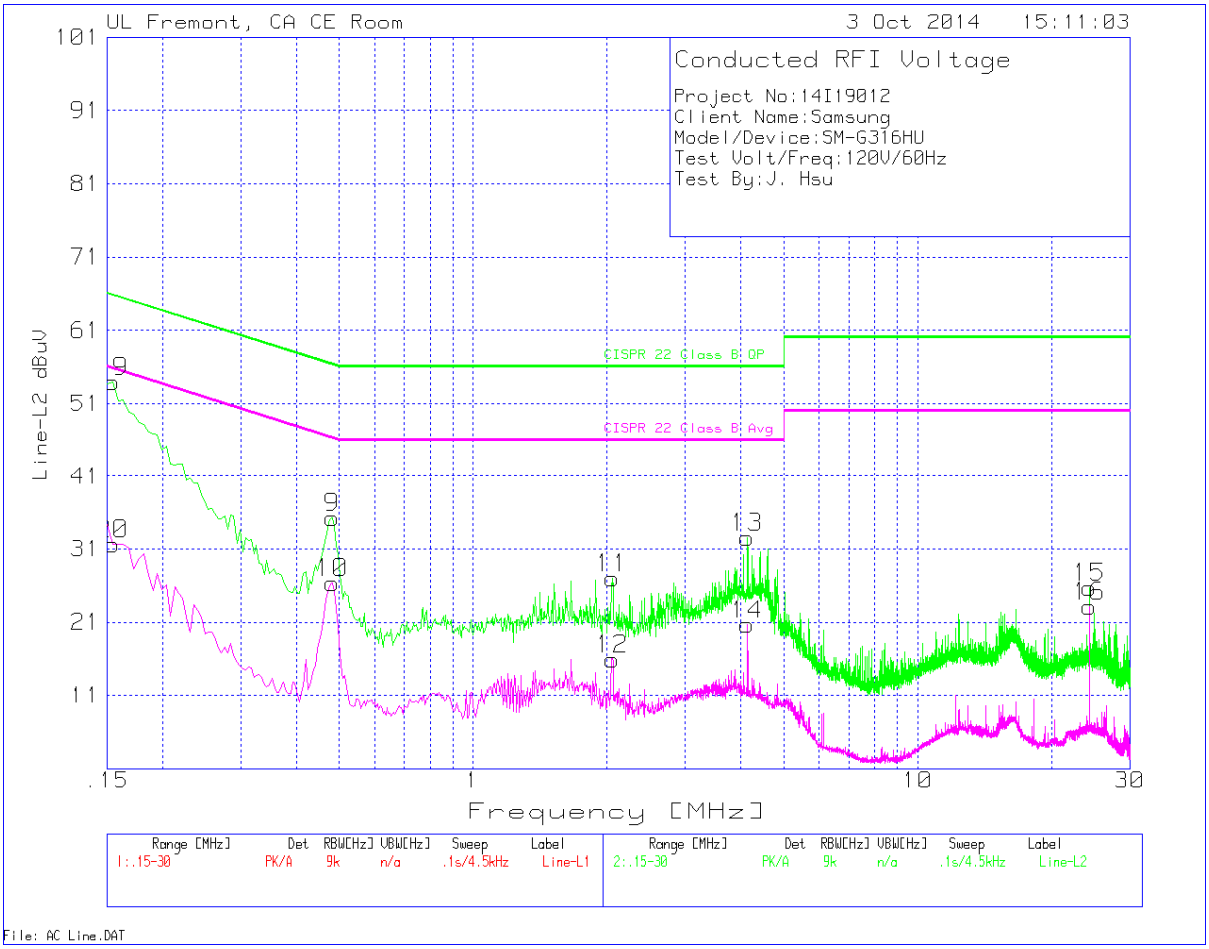
LINE 1 RESULTS

Line-L1 .15 - 30MHz

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L1 (dB)	LC Cables 1&3 (dB)	Corrected Reading dBuV	CISPR 22 Class B QP	Margin to Limit (dB)	CISPR 22 Class B Avg	Margin to Limit (dB)
17	.1545	52.8	PK	1.3	0	54.1	65.8	-11.7	-	-
18	.1545	30.88	Av	1.3	0	32.18	-	-	55.8	-23.62
1	.4785	34	PK	.4	0	34.4	56.4	-22	-	-
2	.4785	25.33	Av	.4	0	25.73	-	-	46.4	-20.67
3	1.968	27.13	PK	.2	.1	27.43	56	-28.57	-	-
4	1.968	12.72	Av	.2	.1	13.02	-	-	46	-32.98
5	4.497	32.94	PK	.2	.1	33.24	56	-22.76	-	-
6	4.497	17.18	Av	.2	.1	17.48	-	-	46	-28.52
7	16.269	23.66	PK	.3	.2	24.16	60	-35.84	-	-
8	16.269	9.02	Av	.3	.2	9.52	-	-	50	-40.48

Line-L2 .15 - 30MHz



LINE 2 RESULTS

Line-L2 .15 - 30MHz

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L2 (dB)	LC Cables 2&3 (dB)	Corrected Reading dBuV	CISPR 22 Class B QP	Margin to Limit (dB)	CISPR 22 Class B Avg	Margin to Limit (dB)
19	.1545	52.55	PK	1.4	0	53.95	65.8	-11.85	-	-
20	.1545	30.2	Av	1.4	0	31.6	-	-	55.8	-24.2
9	.483	34.81	PK	.4	0	35.21	56.3	-21.09	-	-
10	.483	25.94	Av	.4	0	26.34	-	-	46.3	-19.96
11	2.058	26.74	PK	.2	.1	27.04	56	-28.96	-	-
12	2.058	15.58	Av	.2	.1	15.88	-	-	46	-30.12
13	4.1415	32.23	PK	.2	.1	32.53	56	-23.47	-	-
14	4.1415	20.32	Av	.2	.1	20.62	-	-	46	-25.38
15	24.333	25.21	PK	.3	.2	25.71	60	-34.29	-	-
16	24.333	22.69	Av	.3	.2	23.19	-	-	50	-26.81