FCC CFR47 PART 15 SUBPART C

ANT+

CERTIFICATION TEST REPORT

FOR

GSM/WCDMA/LTE Phone + Bluetooth/BLE, DTS b/g/n and ANT+

MODEL NUMBER : SM-G610F/DD, SM-G610F/DS

FCC ID: A3LSMG610F

REPORT NUMBER: 16K23775-E4V1

ISSUE DATE: AUG 08, 2016

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

Prepared by
UL Korea, Ltd. Suwon Laboratory
218 Maeyeong-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 16675, Korea
TEL: (031) 337-9902
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ACCREDITED
TL-637

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	08/08/16	Initial issue	Junwhan Lee

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1. ATTESTATION OF TEST RESULTS

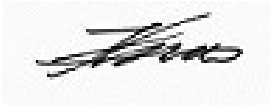
COMPANY NAME:	SAMSUNG ELECTRONICS CO., LTD.
EUT DESCRIPTION:	GSM/WCDMA/LTE Phone + Bluetooth/BLE, DTS b/g/n and ANT+
MODEL NUMBER:	SM-G610F/DD, SM-G610F/DS
SERIAL NUMBER:	5203a883e8304309, R38H70DHYVE(SM-G610F/DD, RADIATED); R38H60EJB6X (SM-G610F/DS, RADIATED); R38H60EJBGD (SM-G610F/DD, CONDUCTED)
DATE TESTED:	JUL 18, 2016 - AUG 08, 2016

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart C	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:



CY Choi
Suwon Lab Engineer
UL Korea, Ltd.

Tested By:

Junwhan Lee
Suwon Lab Engineer
UL Korea, Ltd.

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2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10-2013, 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. 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:

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	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 GSM/WCDMA/LTE Phone + Bluetooth/BLE, DTS b/g/n and ANT+.
This test report addresses the DTS (BLE) operational mode.

SM-G610F/DD and SM-G610F/DS are same hardware.
But travel charger and data cable of these two model were different.

In accordance with difference of travel charger and data cable, AC power line conducted test and radiated emmisions test below 1GHz were conducted by each model.

SM-G610F/DD was used for the other tests.

5.2. MAXIMUM OUTPUT POWER

The ANT+ mode has maximum output fundamental field strength as follows:

Frequency Range [MHz]	Mode	Peak E-field Strength [dBuV/m]	Avg E-field Strength [dBuV/m]	Distance [m]
2402 - 2480	ANT +	100.42	52.02	3.00

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an FPCB antennas, with a maximum gain of -2.1 dBi.

5.4. WORST-CASE CONFIGURATION AND MODE

Radiated emission and power line conducted emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.

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

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5.5. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

■ SM-G610F/DD

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Charger	SAMSUNG	EP-TA50IWE	DK2H418VS/A-E	N/A
Data Cable	SAMSUNG	EP-DG915UWE	N/A	N/A
Earphone	SAMSUNG	EHS61ASFWE	N/A	N/A

■ SM-G610F/DS

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Charger	SAMSUNG	EP-TA50EWE	DK4H426VS/A-E	N/A
Data Cable	SAMSUNG	ECB-DU68WE	N/A	N/A
Earphone	SAMSUNG	EHS61ASFWE	N/A	N/A

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	Mini-USB	Shielded	0.8m	N/A
2	Audio	1	Mini-Jack	Unshielded	1.0m	N/A

TEST SETUP

The EUT is set to continuously transmit in ANT + test mode.

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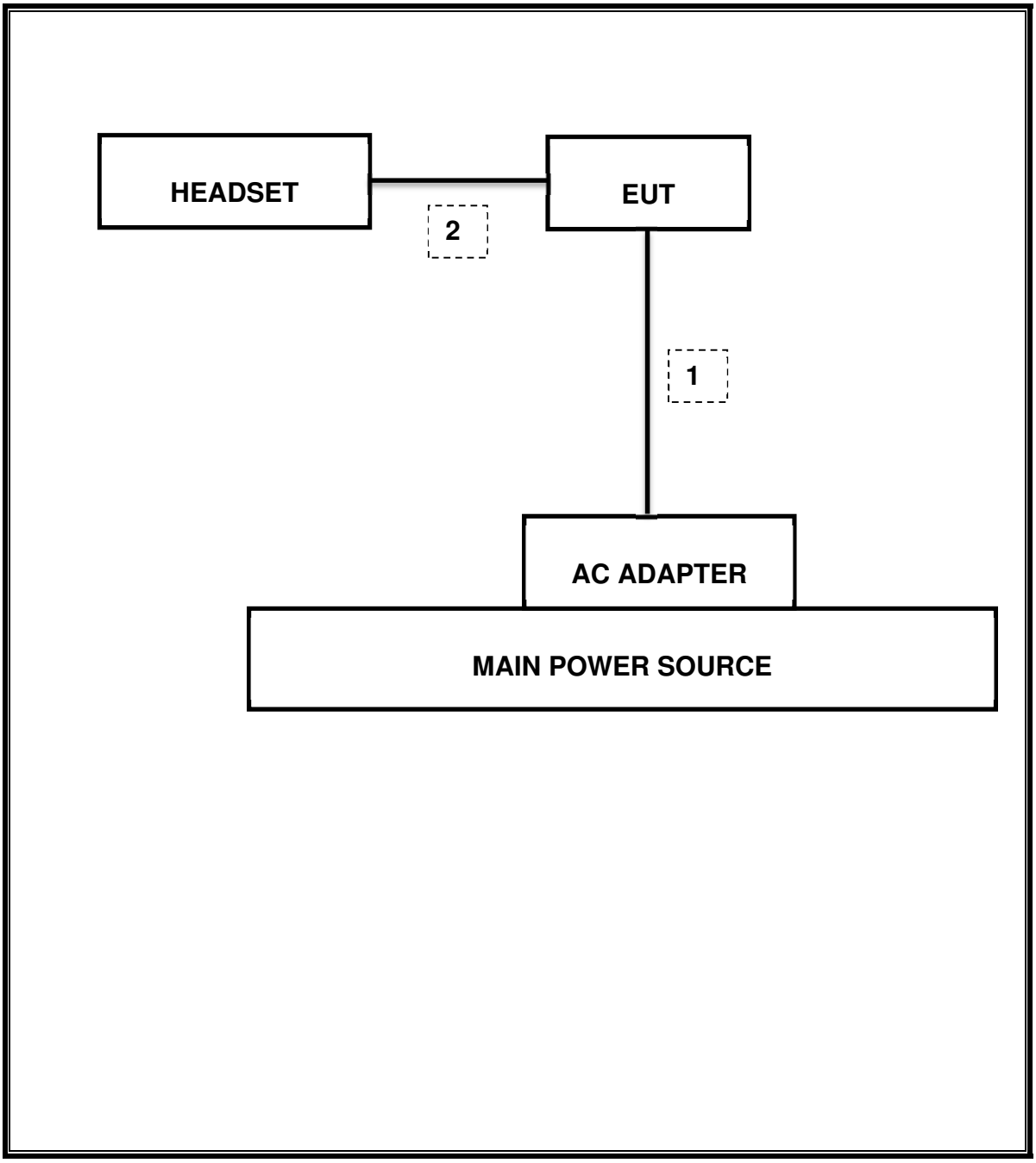
SETUP DIAGRAM FOR TESTS



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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, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	750	11-17-16
Antenna, Horn, 18 GHz	ETS	3115	00167211	09-20-16
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	00166255	11-30-17
Antenna, Horn, 40 GHz	ETS	3116C-PA	00168841	12-15-17
Preamplifier, 1000 MHz	Sonoma	310N	341282	08-18-16
Preamplifier, 1000 MHz	Sonoma	310N	351741	08-18-16
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1876511	08-18-16
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1896138	08-18-16
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54170614	08-19-16
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54490312	08-19-16
Average Power Sensor	Agilent / HP	U2000	MY54270007	08-18-16
EMI Test Receive, 40 GHz	R&S	ESU40	100439	08-19-16
EMI Test Receive, 40 GHz	R&S	ESU40	100457	08-19-16
EMI Test Receive, 3 GHz	R&S	ESR3	101832	08-19-16
Attenuator / Switch driver	HP	11713A	3748A04272	N/A
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	009	08-18-16
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	015	08-18-16
High Pass Filter 3GHz	Micro-Tronics	HPM17543	010	08-18-16
High Pass Filter 3GHz	Micro-Tronics	HPM17543	015	08-18-16
High Pass Filter 6GHz	Micro-Tronics	HPM17542	009	08-18-16
High Pass Filter 6GHz	Micro-Tronics	HPM17542	016	08-18-16
LISN	R&S	ENV-216	101836	08-19-16
LISN	R&S	ENV-216	101837	08-19-16

7. LIMITS AND RESULTS

7.1. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

RESULTS

Channel	Frequency [MHz]	20dB Bandwidth [MHz]	99% Bandwidth [MHz]
Low	2402	1.033	1.014
Mid	2441	1.033	1.011
High	2480	1.030	1.011
Worst			1.01

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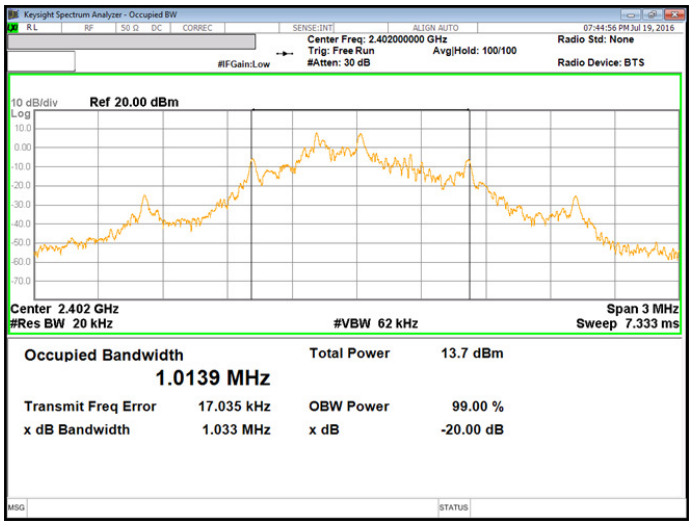
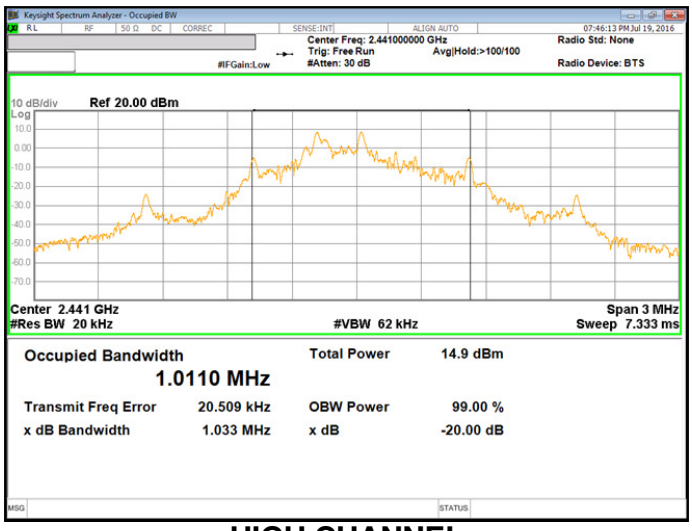
99% BANDWIDTH PLOTS

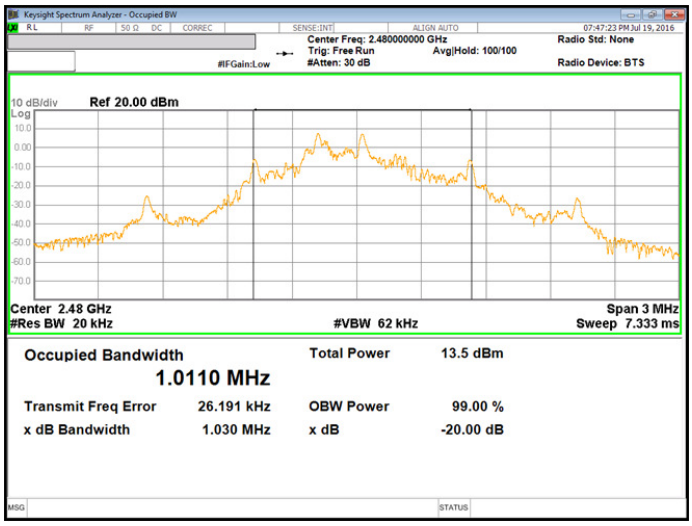
LOW CHANNEL



MID CHANNEL



HIGH CHANNEL



7.2. TRANSMITTER RADIATED EMISSIONS

TEST PROCEDURE

ANSI C63.10: 2013

LIMIT

FCC 15.249

Operation within the bands 902–928 MHz, 2400–2483.5 MHz, 5725–5875 MHZ, and 24.0–24.25 GHz.
(a) Except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
902–928 MHz	50	500
2400–2483.5 MHz	50	500
5725–5875 MHz	50	500
24.0–24.25 GHz	250	2500

(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in § 15.209, whichever is the lesser attenuation.

(e) As shown in Sec. 15.35(b), for frequencies above 1000 MHz, the field strength limits in paragraphs (a) and (b) of this section are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009–0.490	2400/F(kHz)	300
0.490–1.705	24000/F(kHz)	30
1.705–30.0	30	30
30–88	100 **	3
88–216	150 **	3
216–960	200 **	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54–72 MHz, 76–88 MHz, 174–216 MHz or 470–806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241.

Note : Emission was pre-scanned from 9KHz to 30MHz; No emissions were detected which was at least 20dB below the specification limit. Per FCC part 15.31(o), test results were not reported.

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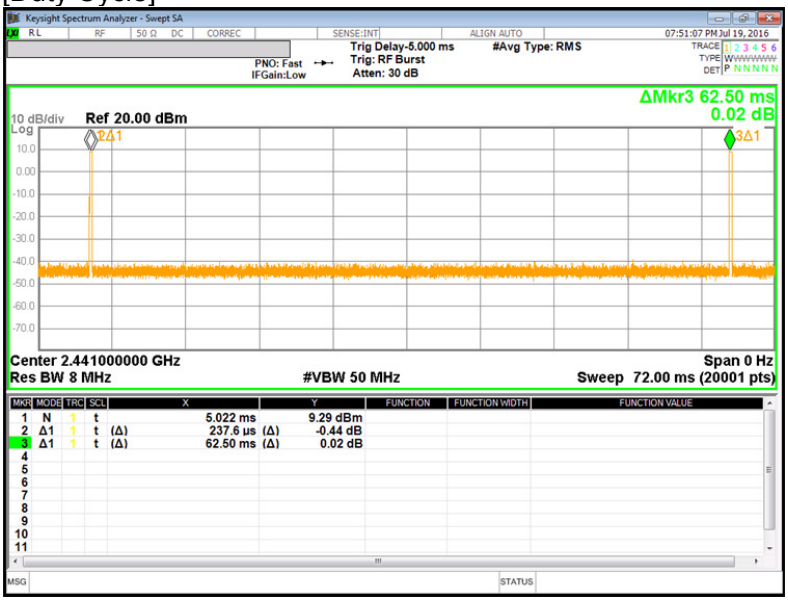
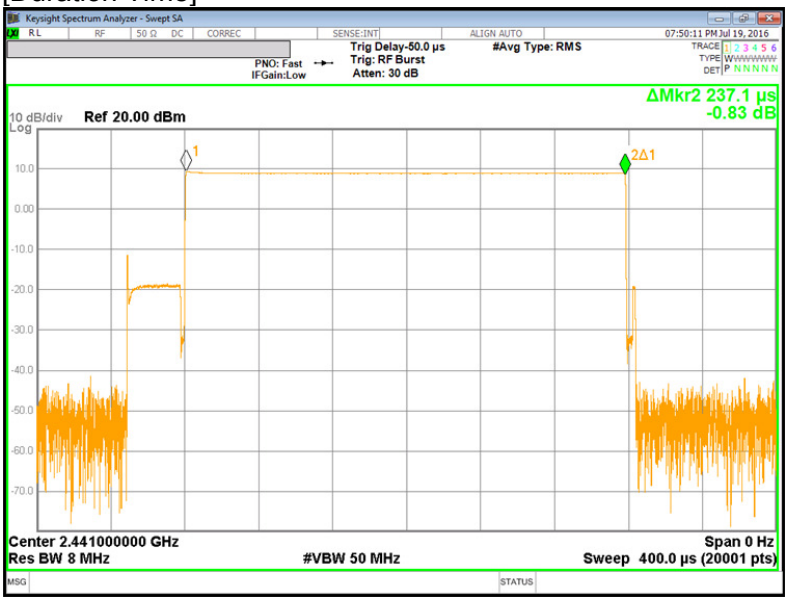
RESULTS

7.2.1. DUTY CYCLE

[Duty Cycle]



[Duration Time]



Duty Cycle = ON time / Period = 0.238 / 62.50 = 0.38%
Duty Cycle Factor= 20log(0.0038) = 48.40 dB
VBW=1/(0.237 ms)= 4.219 kHz

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7.2.2. FUNDAMENTAL FREQUENCY RADIATED EMISSION

FCC
UL SUWON LAB
Chamber 1

Project #:	16K23775
Report #:	16K23775
Date& Time:	2016-07-29
Test Engr:	YH Lim
Company:	Samsung
EUT Description:	GSM/WCDMA/LTE Phone + Bluetooth/BLE, DTS b/g/n and ANT+
Test Configuration :	XPOSITION
Type of Test:	FCC
Mode of Operation:	Transmitting : ANT+ mode

M% = ((t1+t2+t3+...)/T) * 66.83% = 0.38%

Av Reading = Pk Reading + 20*log(M%)	
20 * log (M%) =	-48.40

Freq.	Pk Rdg	Av Rdg	AF	Closs	Pre-amp	Pk Level	Av Level	Pk Limit	Av Limit	Pk Margin	Avg Margin	Pol	Az	Height
(MHz)	(dBuV)	(dBuV)	(dB)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	FCC_B	FCC_B	(dB)	(dB)	(H/V)	(Deg)	(Meter)
Low channel														
2402.00	108.58	60.18	27.85	-38.39	0.00	98.04	49.64	114.00	94.00	-15.96	-44.36	3mV	0.00	1.00
2402.00	109.42	61.02	27.85	-38.39	0.00	98.88	50.48	114.00	94.00	-15.12	-43.52	3mH	0.00	2.00
Mid channel														
2441.00	110.73	62.33	27.85	-38.39	0.00	100.19	51.79	114.00	94.00	-13.81	-42.21	3mV	0.00	1.00
2441.00	110.96	62.56	27.85	-38.39	0.00	100.42	52.02	114.00	94.00	-13.58	-41.98	3mH	0.00	2.00
High channel														
2480.00	107.54	59.14	27.85	-38.39	0.00	97.00	48.60	114.00	94.00	-17.00	-45.40	3mV	0.00	1.00
2480.00	109.49	61.09	27.85	-38.39	0.00	98.95	50.55	114.00	94.00	-15.05	-43.45	3mH	0.00	2.00

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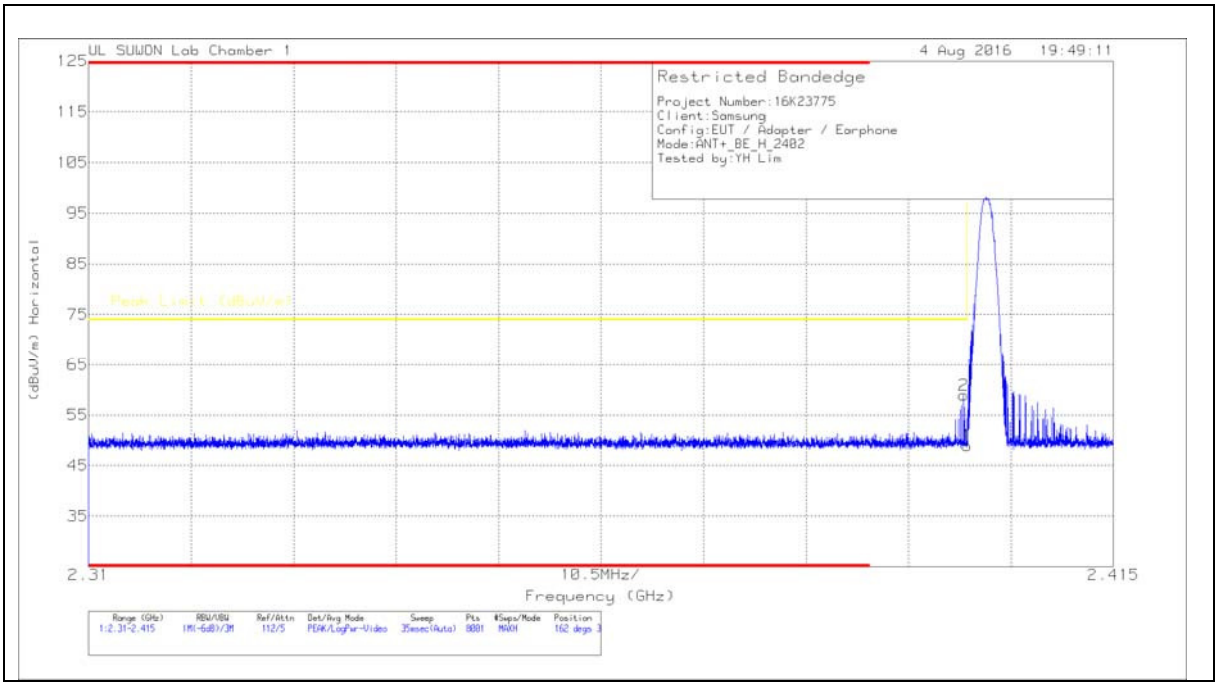
7.2.3. TRANSMITTER RESTRICTED BAND EDGES

BANDEDGE (LOW CHANNEL, HORIZONTAL)



HORIZONTAL DATA

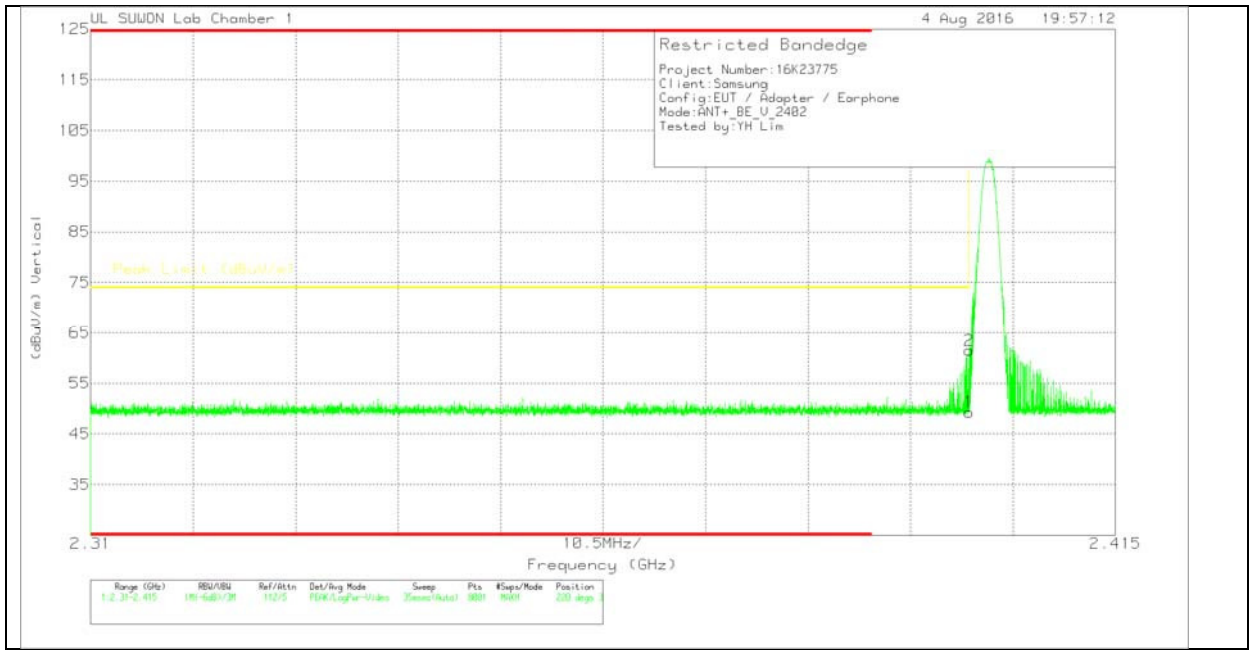
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(00168717)_150619	Path_2	Corrected Reading (dBuV/m)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	2.4	46.18	Pk	31.8	-29	48.98	74	-25.02	162	370	H
2	2.4	56.14	Pk	31.8	-29	58.94	74	-15.06	162	370	H

Pk - Peak detector

* For marker 2, 2.4 GHz, used the following method to do averaging:
DCCF=48.4
Corrected AV reading = Peak Reading – DCCF
= 58.94 – 48.4 = 10.54 dBuV/m

VERTICAL PEAK AND AVERAGE PLOT



VERTICAL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(00168717)_150619	Path_2	Corrected Reading (dBuV/m)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	2.4	46.53	Pk	31.8	-29	49.33	74	-24.67	220	385	V
2	2.4	58.7	Pk	31.8	-29	61.5	74	-12.5	220	385	V

Pk - Peak detector

* For marker 2, 2.4 GHz, used the following method to do averaging:
DCCF=48.4
Corrected AV reading = Peak Reading – DCCF
= 61.5 – 48.4 = 13.1 dBuV/m

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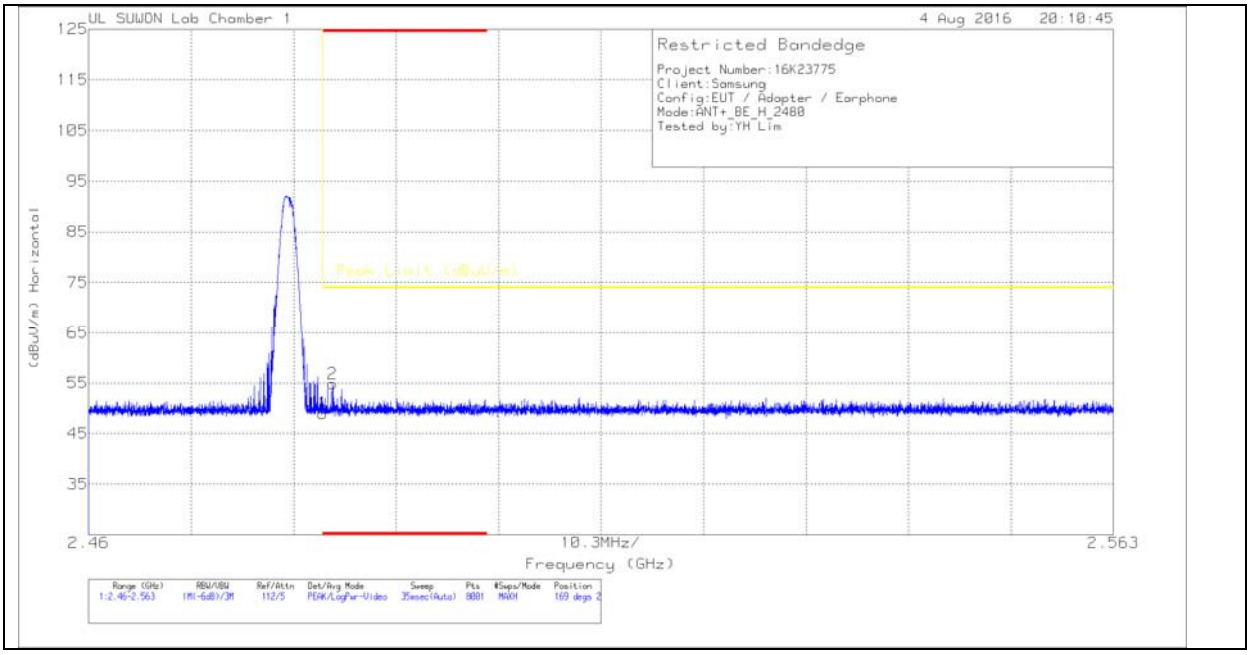
AUTHORIZED BANDEDGE (HIGH CHANNEL)

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(00168717)_150619	Path_2	Corrected Reading (dBuV/m)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	45.87	Pk	32	-28.9	48.97	74	-25.03	169	216	H
2	* 2.485	51.77	Pk	32	-28.9	54.87	74	-19.13	169	216	H

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

* For marker 2, 2.485 GHz, used the following method to do averaging:
DCCF=48.4
Corrected AV reading = Peak Reading – DCCF
= 54.87 – 48.4 = 6.47 dBuV/m

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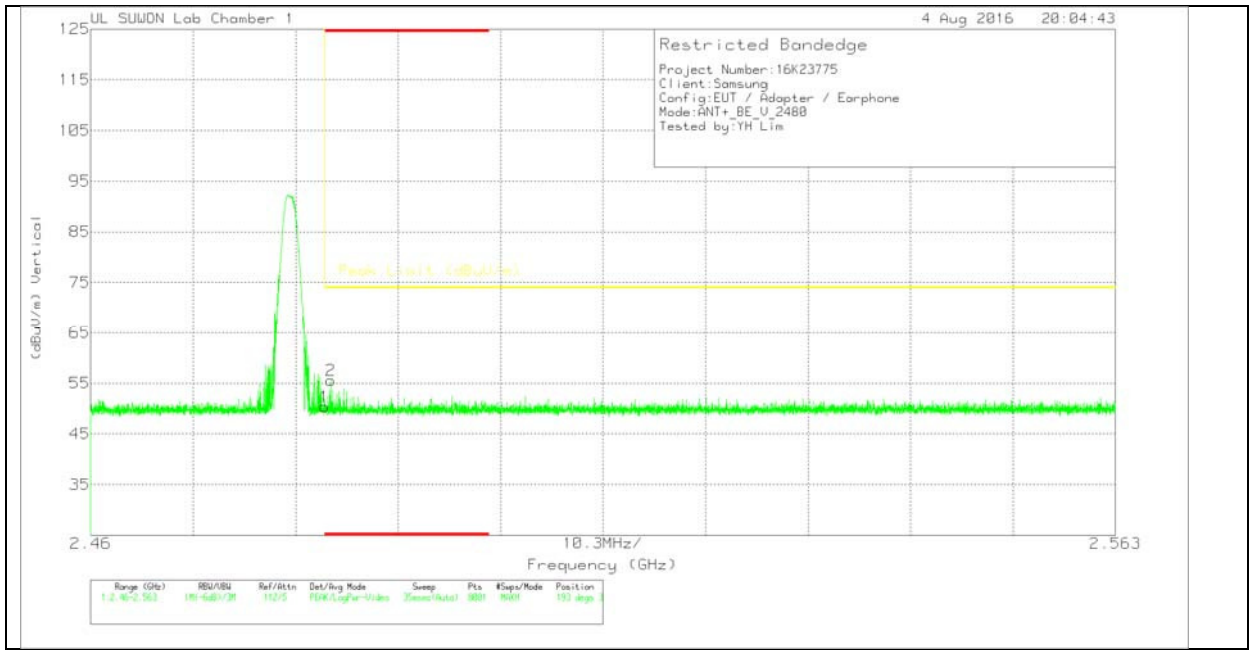
VERTICAL PEAK AND AVERAGE PLOT



VERTICAL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(00168717)_150619	Path_2	Corrected Reading (dBuV/m)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	47.26	Pk	32	-28.9	50.36	74	-23.64	193	393	V
2	* 2.484	52.47	Pk	32	-28.9	55.57	74	-18.43	193	393	V

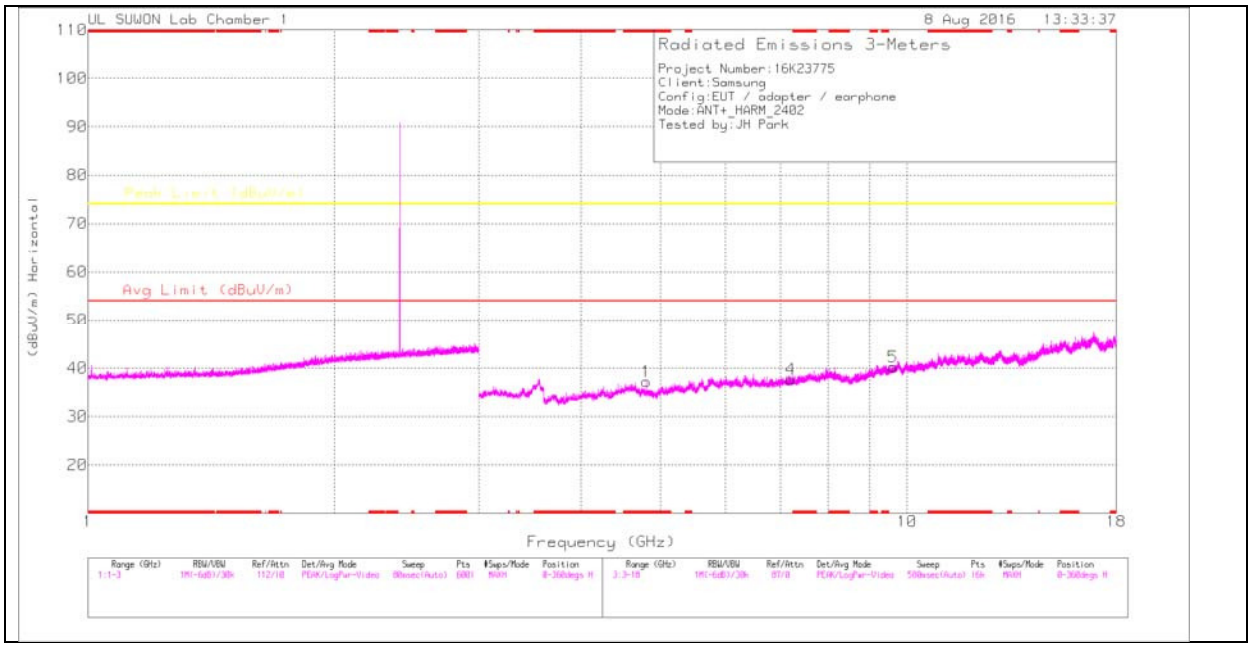
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

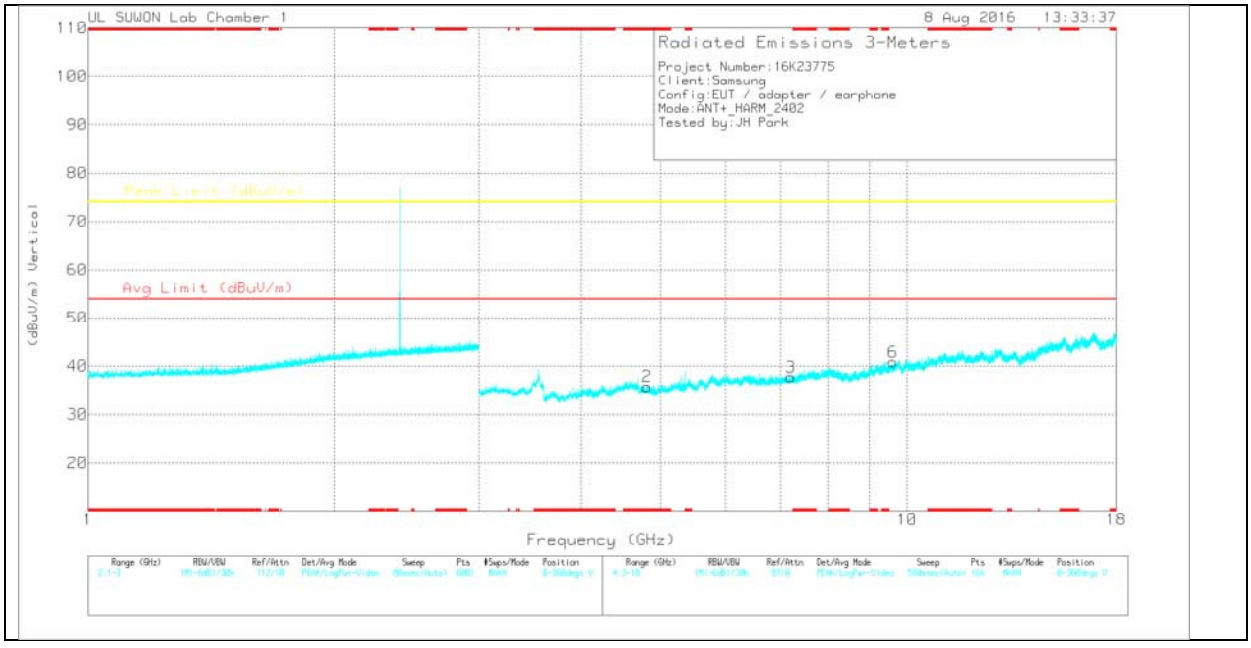
* For marker 2, 2.484 GHz, used the following method to do averaging:
DCCF=48.4
Corrected AV reading = Peak Reading – DCCF
= 55.57 – 48.4 = 7.17 dBuV/m

7.2.4. HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL HORIZONTAL



LOW CHANNEL VERTICAL



Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

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LOW CHANNEL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(0016 8717)_150 619	Path_3	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.804	37.04	PK	34	-33.8	37.24	-	-	74	-36.76	0-360	250	H
4	7.203	32.84	PK	35.7	-30.8	37.74	-	-	74	-36.26	0-360	150	H
5	9.61	30.56	PK	37	-27.3	40.26	-	-	74	-33.74	0-360	150	H
2	* 4.809	35.55	PK	34	-33.8	35.75	-	-	74	-38.25	0-360	250	V
3	7.206	32.77	PK	35.7	-30.8	37.67	-	-	74	-36.33	0-360	150	V
6	9.611	31.19	PK	37	-27.3	40.89	-	-	74	-33.11	0-360	150	V

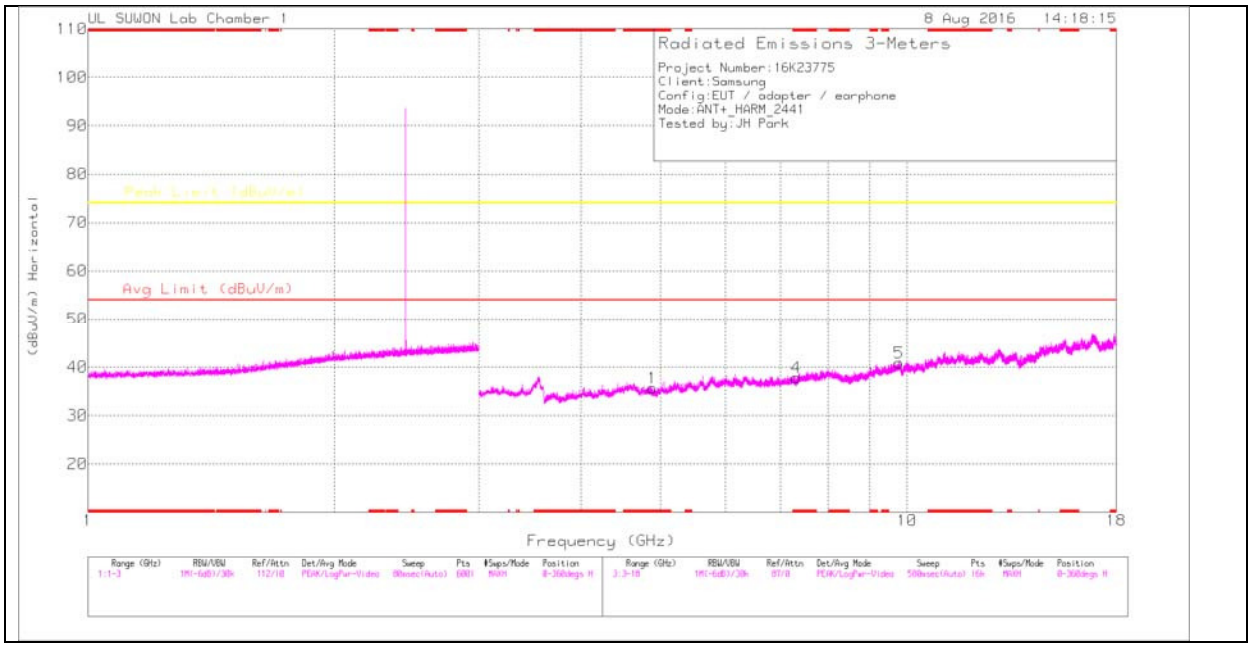
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK – Peak Detector

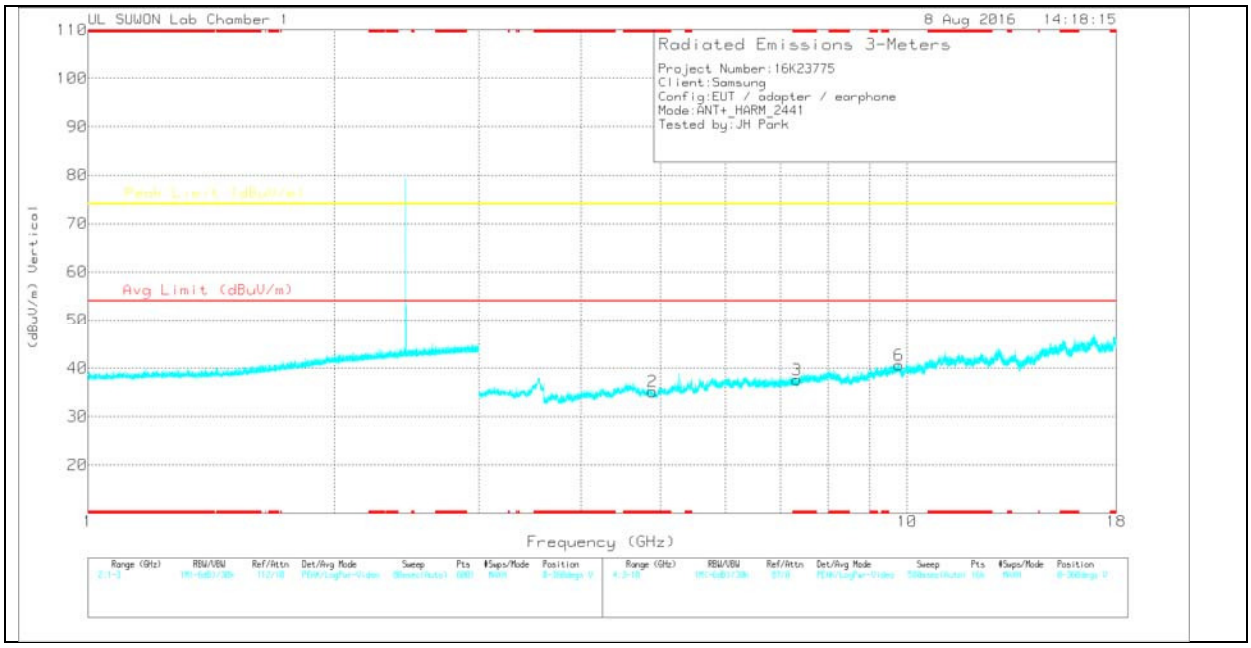
Note: Only peak measurement was performed. Because peak measurement result of unwanted emission is less than average limit (54dBuV/m).

UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_15C
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

MID CHANNEL HORIZONTAL



MID CHANNEL VERTICAL



Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

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MID CHANNEL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(00168717)_150619	Path_3	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.888	35.65	PK	34	-34	35.65	-	-	74	-38.35	0-360	250	H
4	* 7.324	32.92	PK	35.8	-30.9	37.82	-	-	74	-36.18	0-360	250	H
5	9.775	30.11	PK	37.2	-26.4	40.91	-	-	74	-33.09	0-360	250	H
2	* 4.884	35.12	PK	34	-34	35.12	-	-	74	-38.88	0-360	250	V
3	* 7.329	32.6	PK	35.8	-30.8	37.6	-	-	74	-36.4	0-360	150	V
6	9.769	29.9	PK	37.2	-26.5	40.6	-	-	74	-33.4	0-360	250	V

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK – Peak Detector

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

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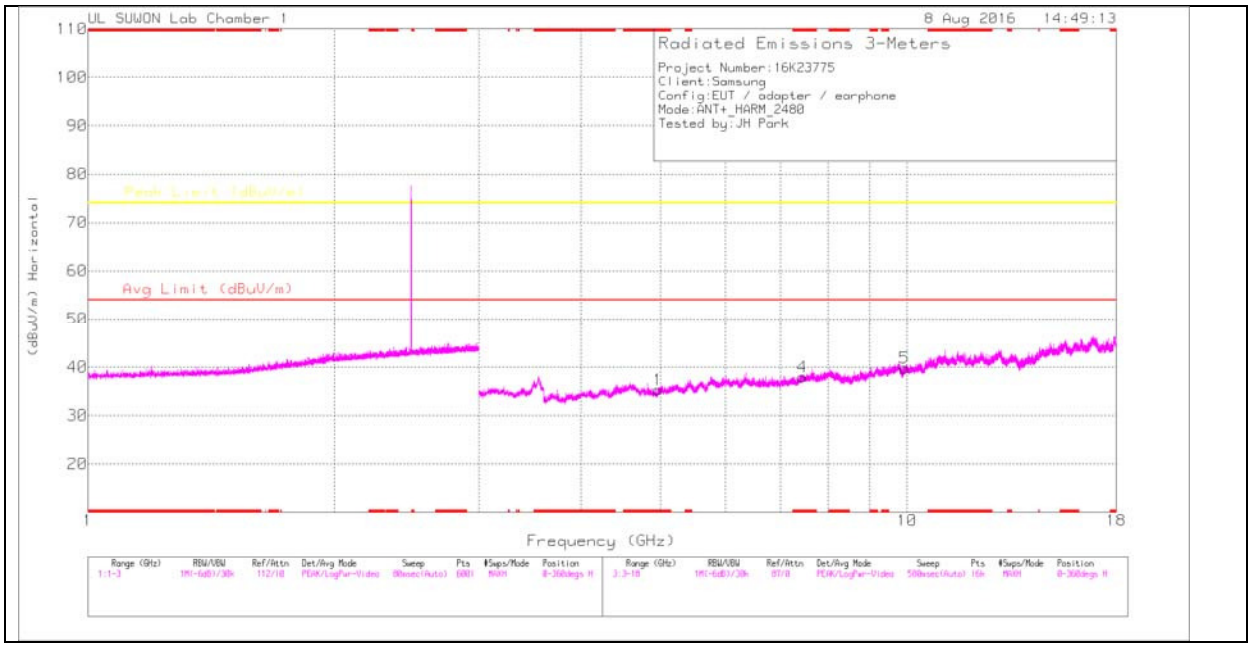
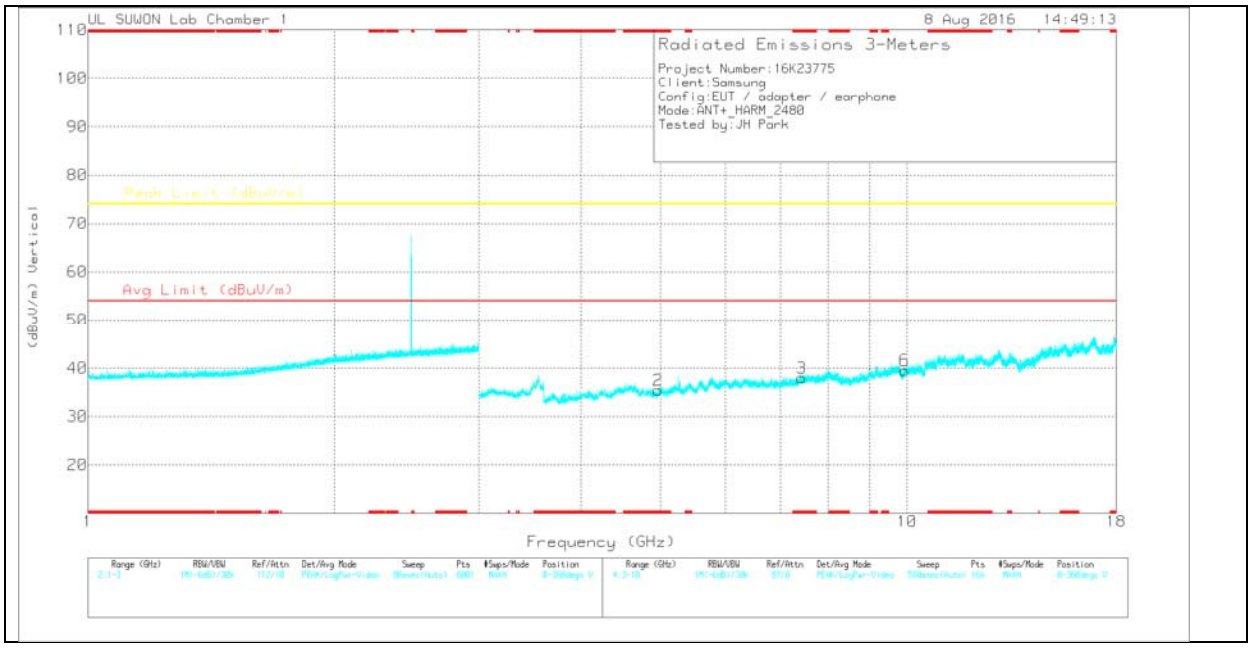
HIGH CHANNEL HORIZONTAL



HIGH CHANNEL VERTICAL



Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

HIGH CHANNEL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(00168717)_150619	Path_3	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.962	35.34	PK	34	-34	35.34	-	-	74	-38.66	0-360	250	H
4	* 7.445	32.74	PK	35.8	-30.6	37.94	-	-	74	-36.06	0-360	250	H
5	9.921	29.6	PK	37.4	-27.2	39.8	-	-	74	-34.2	0-360	250	H
2	* 4.966	35.31	PK	34.1	-34	35.41	-	-	74	-38.59	0-360	150	V
3	* 7.442	32.85	PK	35.8	-30.7	37.95	-	-	74	-36.05	0-360	150	V
6	9.92	29.34	PK	37.4	-27.2	39.54	-	-	74	-34.46	0-360	150	V

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK – Peak Detector

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

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HARMONICS

FCC
UL SUWON LAB
Chamber 1

Project #:	16K23775
Report #:	16K23775
Date& Time:	2016-07-29
Test Engr:	YH Lim
Company:	Samsung
EUT Description:	GSM/WCDMA/LTE Phone + Bluetooth/BLE, DTS b/g/n/ and ANT+
Test Configuration :	XPOSITION
Type of Test:	FCC
Mode of Operation:	Transmitting : ANT+ mode

M% = ((t1+t2+t3+...)/T) * 66.83% = 0.38%

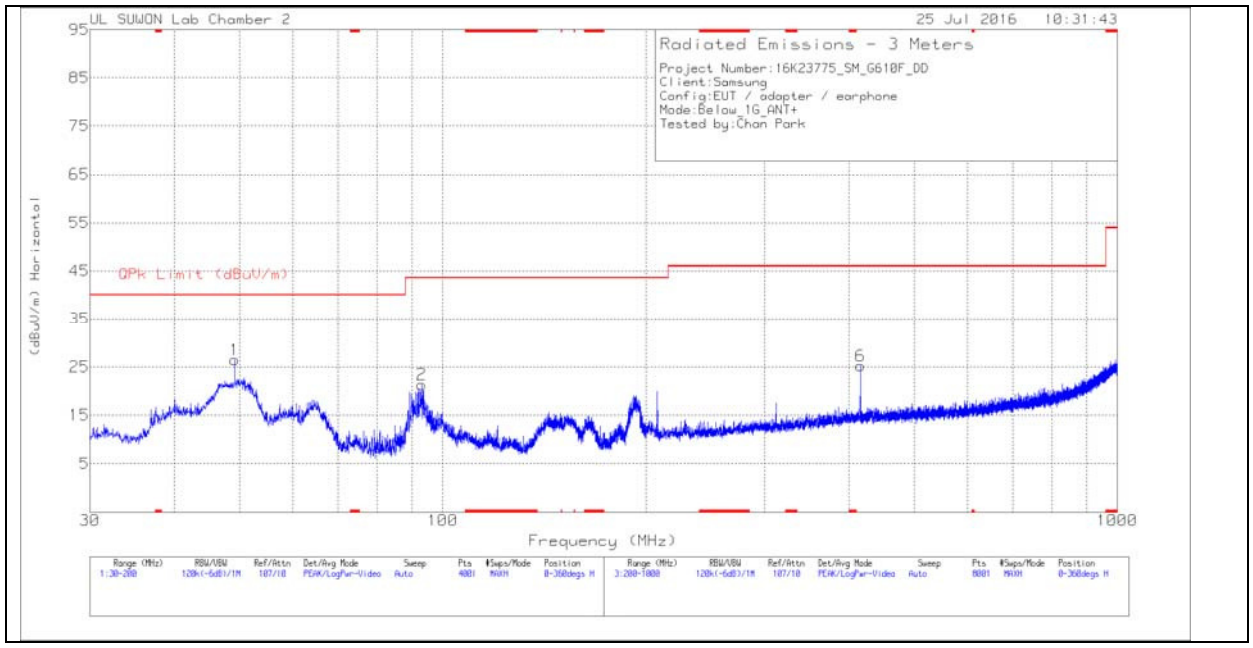
Av Reading = Pk Reading + 20*log(M%)	
20 * log (M%) =	-48.40

Freq.	Pk Rdg	Av Rdg	AF	Closs	Pre-amp	Pk Level	Av Level	Pk Limit	Av Limit	Pk Margin	Avg Margin	Pol	Az	Height
(MHz)	(dBuV)	(dBuV)	(dB)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	FCC_B	FCC_B	(dB)	(dB)	(H/V)	(Deg)	(Meter)
Low channel														
4804.00	58.81	10.41	32.00	-33.07	0.00	57.74	9.34	74.00	54.00	-16.26	-44.66	3mV	0.00	1.00
4804.00	58.77	10.37	32.00	-33.07	0.00	57.70	9.30	74.00	54.00	-16.30	-44.70	3mH	0.00	2.00
Mid channel														
4882.00	63.66	15.26	32.00	-33.07	0.00	62.59	14.19	74.00	54.00	-11.41	-39.81	3mV	0.00	1.00
4882.00	64.00	15.60	32.00	-33.07	0.00	62.93	14.53	74.00	54.00	-11.07	-39.47	3mH	0.00	2.00
High channel														
4960.00	63.88	15.48	32.00	-33.07	0.00	62.81	14.41	74.00	54.00	-11.19	-39.59	3mV	0.00	1.00
4960.00	63.88	15.48	32.00	-33.07	0.00	62.81	14.41	74.00	54.00	-11.19	-39.59	3mH	0.00	2.00

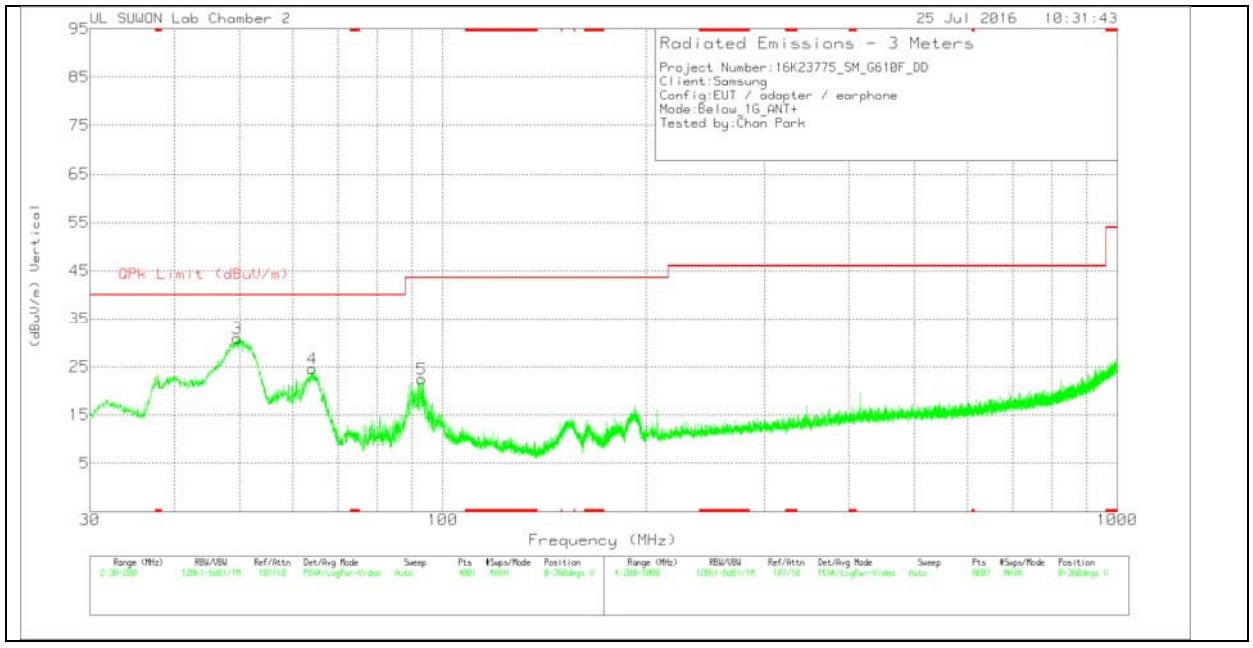
7.2.5. SPURIOUS BELOW 1 GHz

7.2.5.1. SM-G610F/DD

SPURIOUS EMISSIONS 30 TO 1000 MHz (HORIZONTAL)



VERTICAL PLOT



BELOW 1 GHz TABLE

Trace Markers

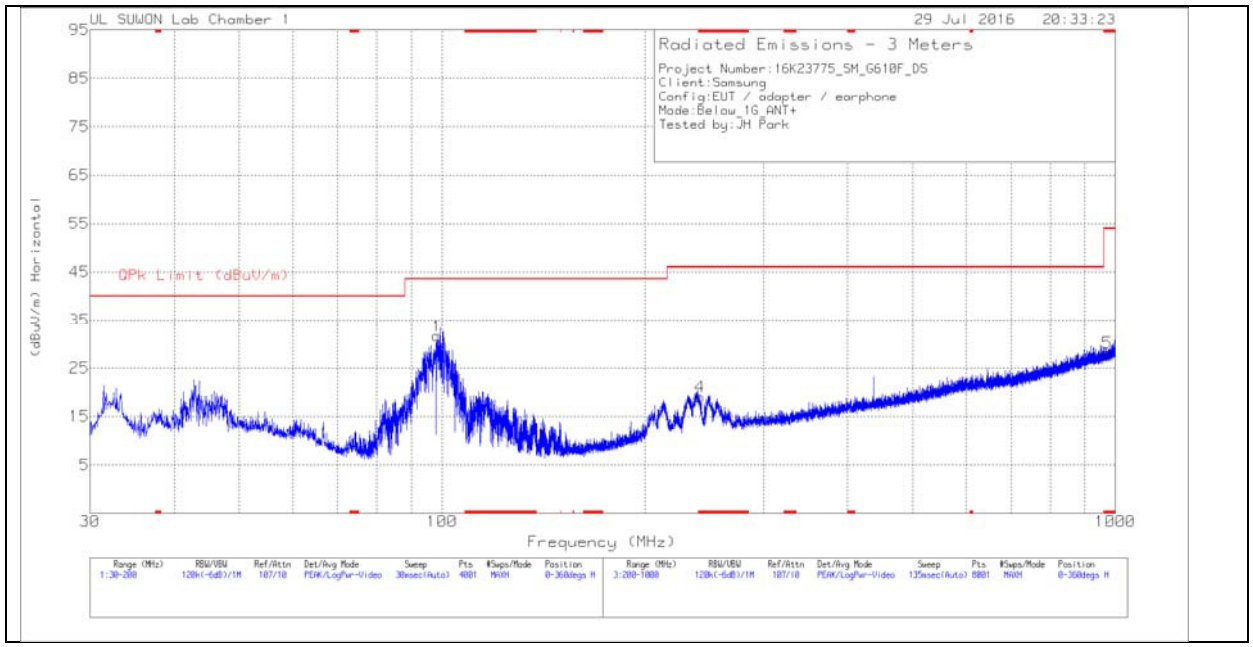
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	VULB9163-749	Below_1G	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	49.1675	43.12	Pk	14.1	-30.7	26.52	40	-13.48	0-360	100	H
2	93.1125	41.78	Pk	10.2	-30.6	21.38	43.52	-22.14	0-360	300	H
3	49.5925	47.58	Pk	14.1	-30.7	30.98	40	-9.02	0-360	100	V
4	64.0425	43.79	Pk	11.5	-30.7	24.59	40	-15.41	0-360	100	V
5	93.1125	42.86	Pk	10.2	-30.6	22.46	43.52	-21.06	0-360	100	V
6	416	39.55	Pk	15.4	-29.7	25.25	46.02	-20.77	0-360	100	H

Pk - Peak detector

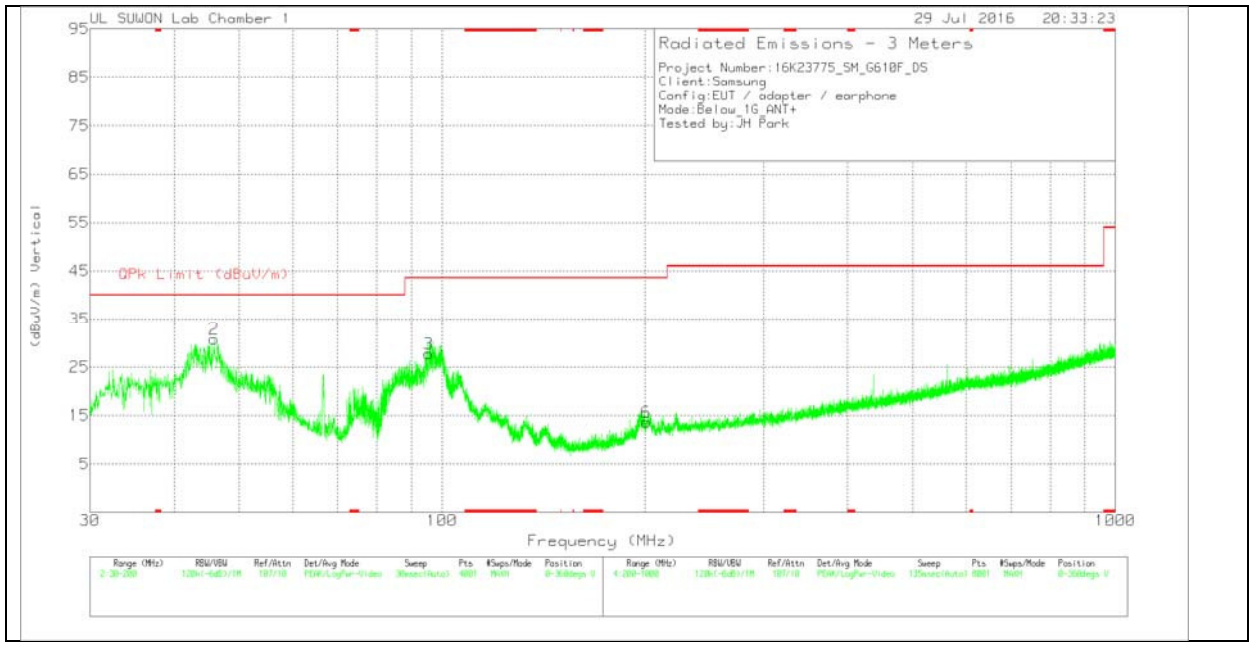
UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_15C
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

7.2.5.2. SM-G610F/DS

SPURIOUS EMISSIONS 30 TO 1000 MHz (HORIZONTAL)



VERTICAL PLOT



BELOW 1 GHz TABLE

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	VULB9163-750	Bi-Log	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	98.425	49.76	Pk	11.2	-29.3	31.66	43.52	-11.86	0-360	300	H
2	45.8525	47.36	Pk	13.7	-30.2	30.86	40	-9.14	0-360	100	V
3	95.4075	46.45	Pk	10.6	-29.3	27.75	43.52	-15.77	0-360	100	V
4	* 241.5	34.7	Pk	12.2	-27.9	19	46.02	-27.02	0-360	100	H
5	* 972.2	28.62	Pk	22.4	-22.9	28.12	53.97	-25.85	0-360	300	H
6	200.9	30.42	Pk	11.4	-28.2	13.62	43.52	-29.9	0-360	200	V

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

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8. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56 *	56 to 46 *
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

TEST PROCEDURE

The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.10.

The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

Line conducted data is recorded for both NEUTRAL and HOT lines.

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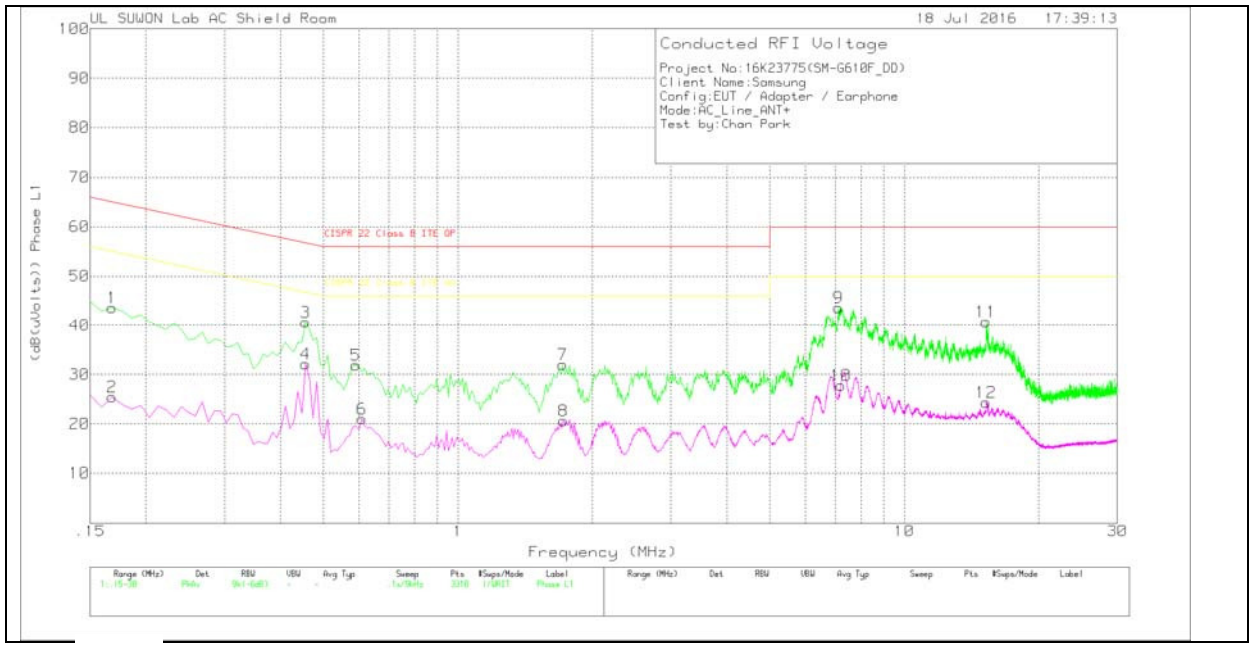
8.1. SM-G610F/DD

RESULTS

6 WORST EMISSIONS

LINE 1 PLOT



LINE 1 RESULTS

Trace Markers

Phase L1 .15 - 30MHz

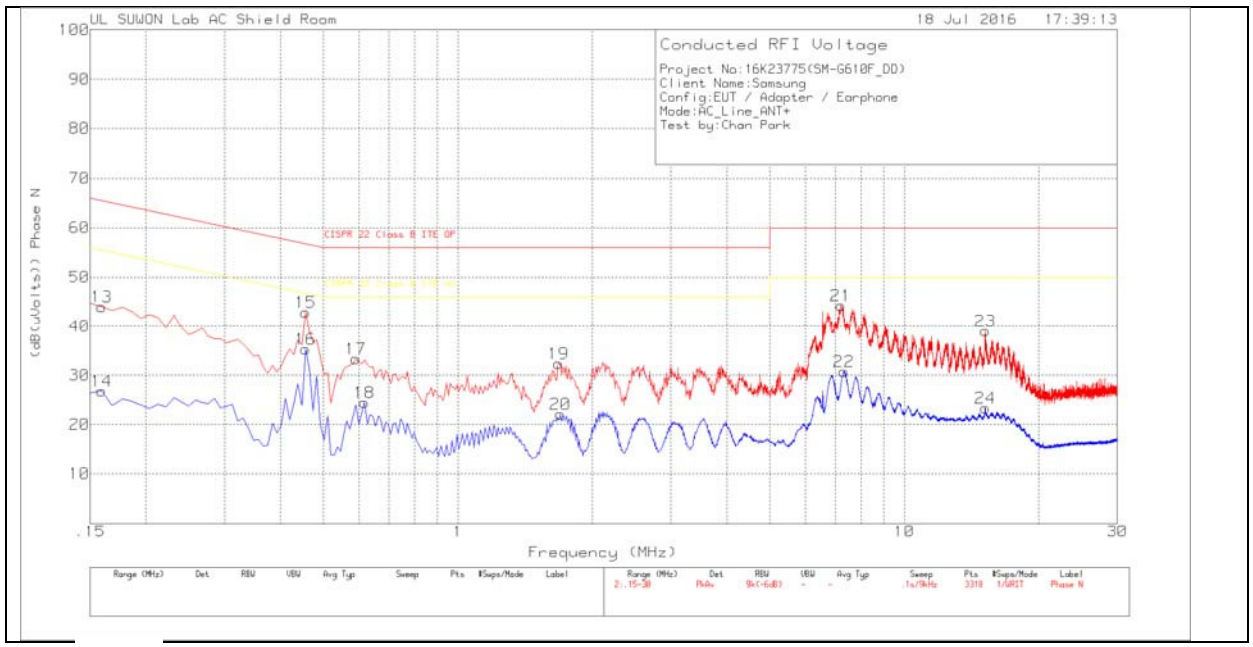
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	101837_with ex-cord_L1	CE Shield Room	Corrected Reading (dB(uVolts))	CISPR 22 Class B ITE QP	Margin (dB)	CISPR 22 Class B ITE AV	Margin (dB)
1	.168	33.39	Pk	10.2	0	43.59	65.06	-21.47	-	-
2	.168	15.22	Av	10.2	0	25.42	-	-	55.06	-29.64
3	.456	30.48	Pk	10.2	0	40.68	56.77	-16.09	-	-
4	.456	21.89	Av	10.2	0	32.09	-	-	46.77	-14.68
5	.591	21.76	Pk	10.1	0	31.86	56	-24.14	-	-
6	.609	10.89	Av	10.1	0	20.99	-	-	46	-25.01
7	1.716	22.14	Pk	9.8	.1	32.04	56	-23.96	-	-
8	1.725	10.67	Av	9.8	.1	20.57	-	-	46	-25.43
9	7.125	33.67	Pk	9.9	.1	43.67	60	-16.33	-	-
10	7.206	17.77	Av	9.9	.1	27.77	-	-	50	-22.23
11	15.261	30.33	Pk	10.2	.2	40.73	60	-19.27	-	-
12	15.261	13.95	Av	10.2	.2	24.35	-	-	50	-25.65

Pk - Peak detector

Av - Average detection

UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_15C
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

LINE 2 PLOT



LINE 2 RESULTS

Trace Markers

Phase N .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	101837_with ex-cord_N	CE Shield Room	Corrected Reading (dB(uVolts))	CISPR 22 Class B ITE QP	Margin (dB)	CISPR 22 Class B ITE AV	Margin (dB)
13	.159	34.02	Pk	10	0	44.02	65.52	-21.5	-	-
14	.159	16.8	Av	10	0	26.8	-	-	55.52	-28.72
15	.456	32.78	Pk	10.1	0	42.88	56.77	-13.89	-	-
16	.456	25.24	Av	10.1	0	35.34	-	-	46.77	-11.43
17	.591	23.25	Pk	10.1	0	33.35	56	-22.65	-	-
18	.618	14.39	Av	10.1	0	24.49	-	-	46	-21.51
19	1.68	22.47	Pk	9.8	.1	32.37	56	-23.63	-	-
20	1.698	12.16	Av	9.8	.1	22.06	-	-	46	-23.94
21	7.215	34.22	Pk	9.9	.1	44.22	60	-15.78	-	-
22	7.314	20.76	Av	9.9	.1	30.76	-	-	50	-19.24
23	15.171	28.58	Pk	10.3	.2	39.08	60	-20.92	-	-
24	15.171	12.85	Av	10.3	.2	23.35	-	-	50	-26.65

Pk - Peak detector

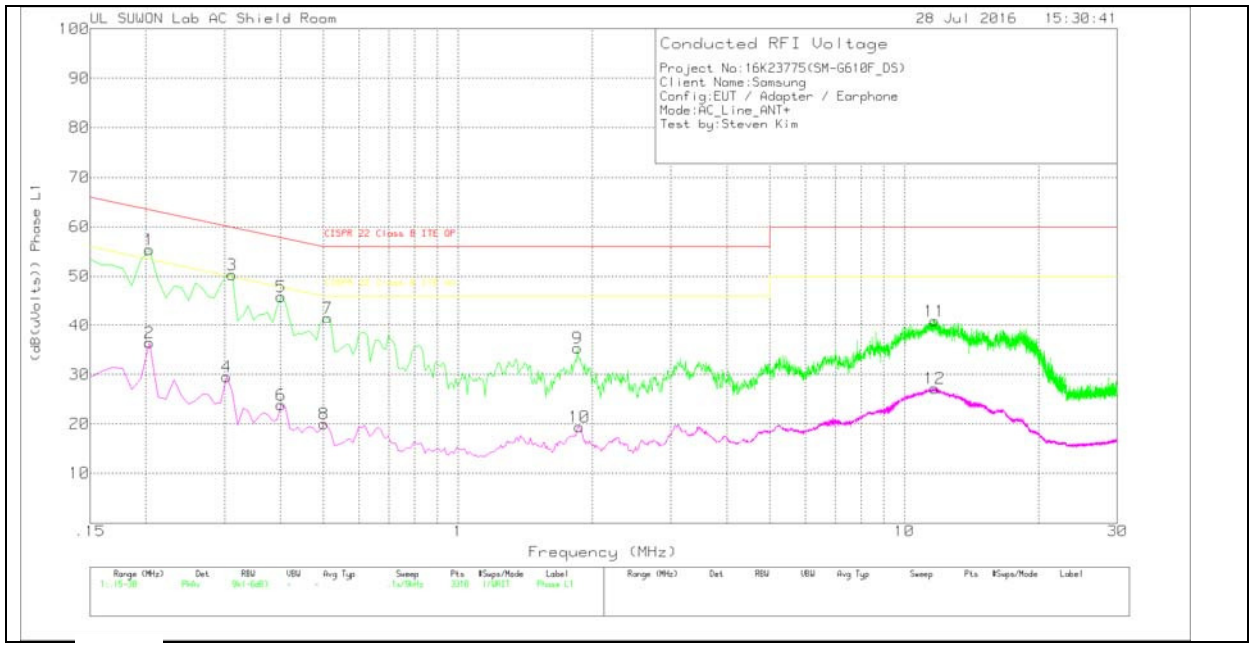
Av - Average detection

8.2. SM-G610F/DS

RESULTS

6 WORST EMISSIONS

LINE 1 PLOT



LINE 1 RESULTS

Trace Markers

Phase L1 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	101837_with ex-cord_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	.204	45.52	Pk	9.9	0	55.42	63.45	-8.03	-	-
2	.204	26.58	Av	9.9	0	36.48	-	-	53.45	-16.97
3	.312	40.38	Pk	9.9	0	50.28	59.92	-9.64	-	-
4	.303	19.64	Av	9.9	0	29.54	-	-	50.16	-20.62
5	.402	35.74	Pk	10.1	0	45.84	57.81	-11.97	-	-
6	.402	13.74	Av	10.1	0	23.84	-	-	47.81	-23.97
7	.51	31.32	Pk	10.2	0	41.52	56	-14.48	-	-
8	.501	9.81	Av	10.2	0	20.01	-	-	46	-25.99
9	1.851	25.47	Pk	9.8	.1	35.37	56	-20.63	-	-
10	1.869	9.51	Av	9.8	.1	19.41	-	-	46	-26.59
11	11.679	30.76	Pk	10	.2	40.96	60	-19.04	-	-
12	11.697	17.01	Av	10	.2	27.21	-	-	50	-22.79

Pk - Peak detector

Av - Average detection

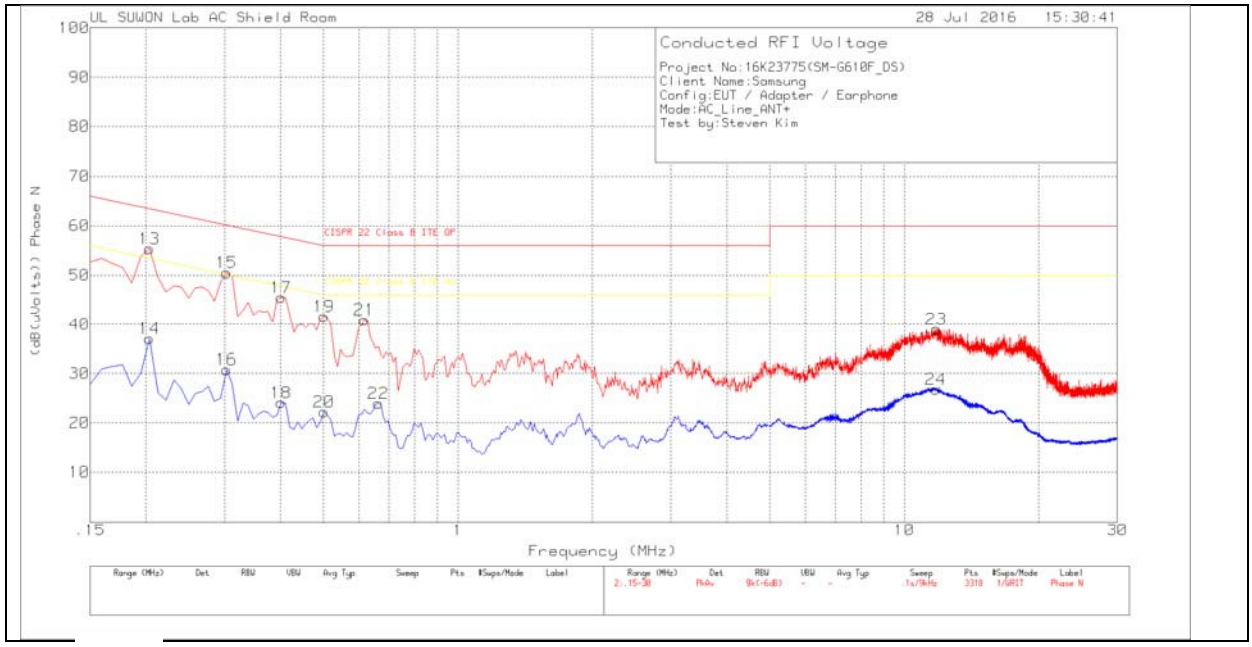
Quasi-Peak Emissions

Phase L1 .15 - 30MHz

Frequency (MHz)	Meter Reading (dBuV)	Det	101837_with ex-cord_L1	CE Shield Room	Corrected Reading (dB(uVolts))	CISPR 22 Class B ITE QP	Margin (dB)	CISPR 22 Class B ITE AV	Margin (dB)
.2031	43.84	Qp	9.9	0	53.74	63.48	-9.74	-	-
.3075	37.17	Qp	9.9	0	47.07	60.04	-12.97	-	-

Qp – Quasi-Peak detector

LINE 2 PLOT



LINE 2 RESULTS

Trace Markers

Phase N .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	101837_with ex-cord_N	CE Shield Room	Corrected Reading (dB(uVolts))	CISPR 22 Class B ITE QP	Margin (dB)	CISPR 22 Class B ITE AV	Margin (dB)
13	.204	45.47	Pk	9.9	0	55.37	63.45	-8.08	-	-
14	.204	27.19	Av	9.9	0	37.09	-	-	53.45	-16.36
15	.303	40.6	Pk	9.9	0	50.5	60.16	-9.66	-	-
16	.303	20.93	Av	9.9	0	30.83	-	-	50.16	-19.33
17	.402	35.42	Pk	10.1	0	45.52	57.81	-12.29	-	-
18	.402	14.04	Av	10.1	0	24.14	-	-	47.81	-23.67
19	.501	31.56	Pk	10.1	0	41.66	56	-14.34	-	-
20	.501	12.09	Av	10.1	0	22.19	-	-	46	-23.81
21	.618	30.87	Pk	10.1	0	40.97	56	-15.03	-	-
22	.663	14.02	Av	10	0	24.02	-	-	46	-21.98
23	11.787	28.71	Pk	10.2	.2	39.11	60	-20.89	-	-
24	11.751	16.46	Av	10.2	.2	26.86	-	-	50	-23.14

Pk - Peak detector

Av - Average detection

Quasi-Peak Emissions

Phase N .15 - 30MHz

Frequency (MHz)	Meter Reading (dBuV)	Det	101837_with ex-cord_N	CE Shield Room	Corrected Reading (dB(uVolts))	CISPR 22 Class B ITE QP	Margin (dB)	CISPR 22 Class B ITE AV	Margin (dB)
.1995	43.37	Qp	9.9	0	53.27	63.63	-10.36	-	-
.2994	37.57	Qp	9.9	0	47.47	60.26	-12.79	-	-

Qp – Quasi-Peak detector