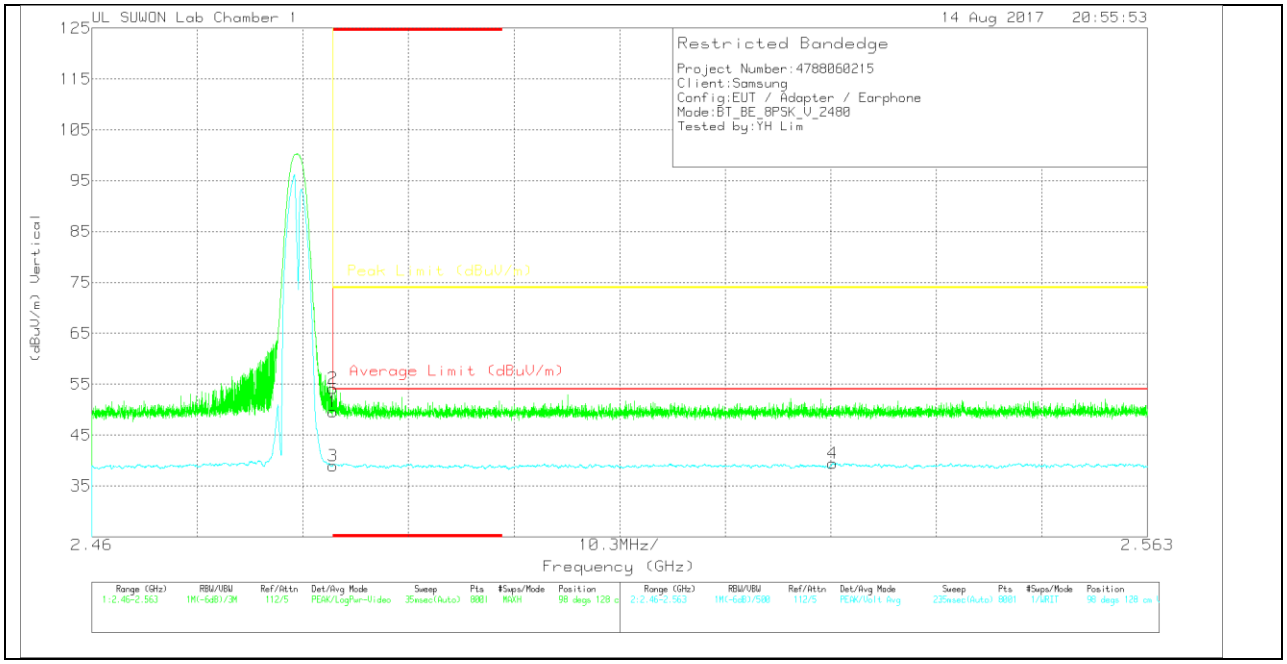
VERTICAL PEAK AND AVERAGE PLOT



VERTICAL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	20170531 _3117_00 168717	10dB_ATT (dB)_1708 09	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	43.54	Pk	31.6	-25.5	49.64	-	-	74	-24.36	98	128	V
2	* 2.484	48.09	Pk	31.6	-25.5	54.19	-	-	74	-19.81	98	128	V
3	* 2.484	32.89	VA1T	31.6	-25.5	38.99	54	-15.01	-	-	98	128	V
4	2.532	33.05	VA1T	31.7	-25.3	39.45	54	-14.55	-	-	98	128	V

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

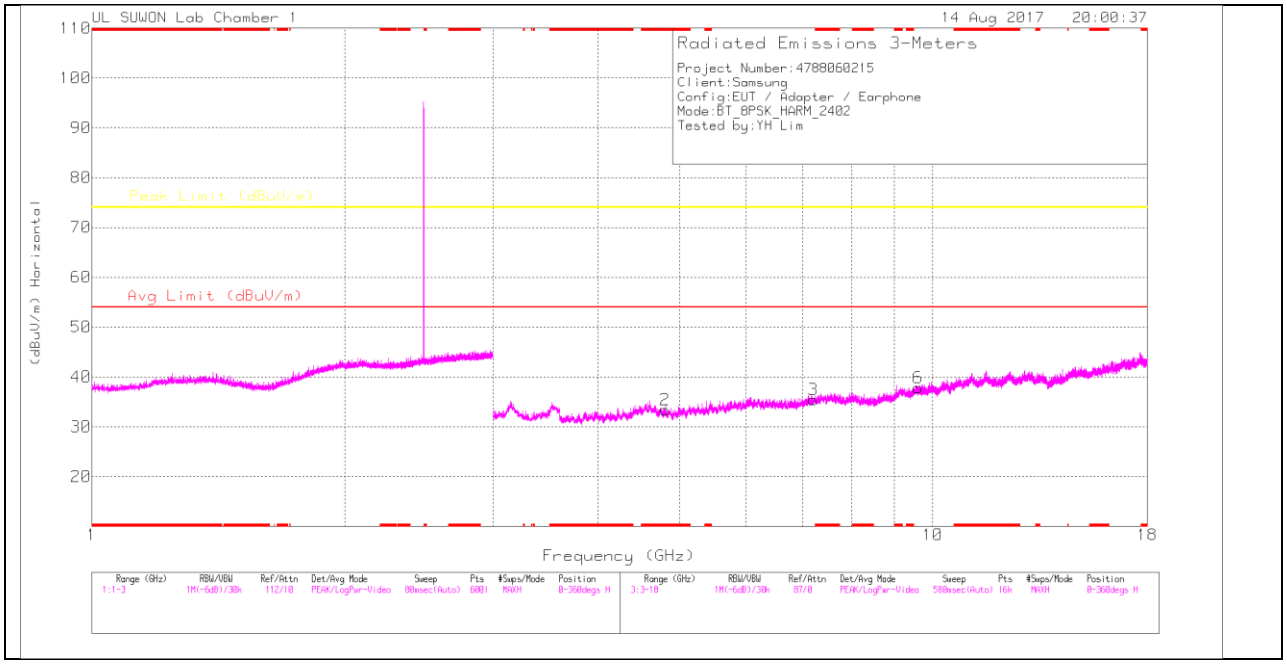
Pk - Peak detector

VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

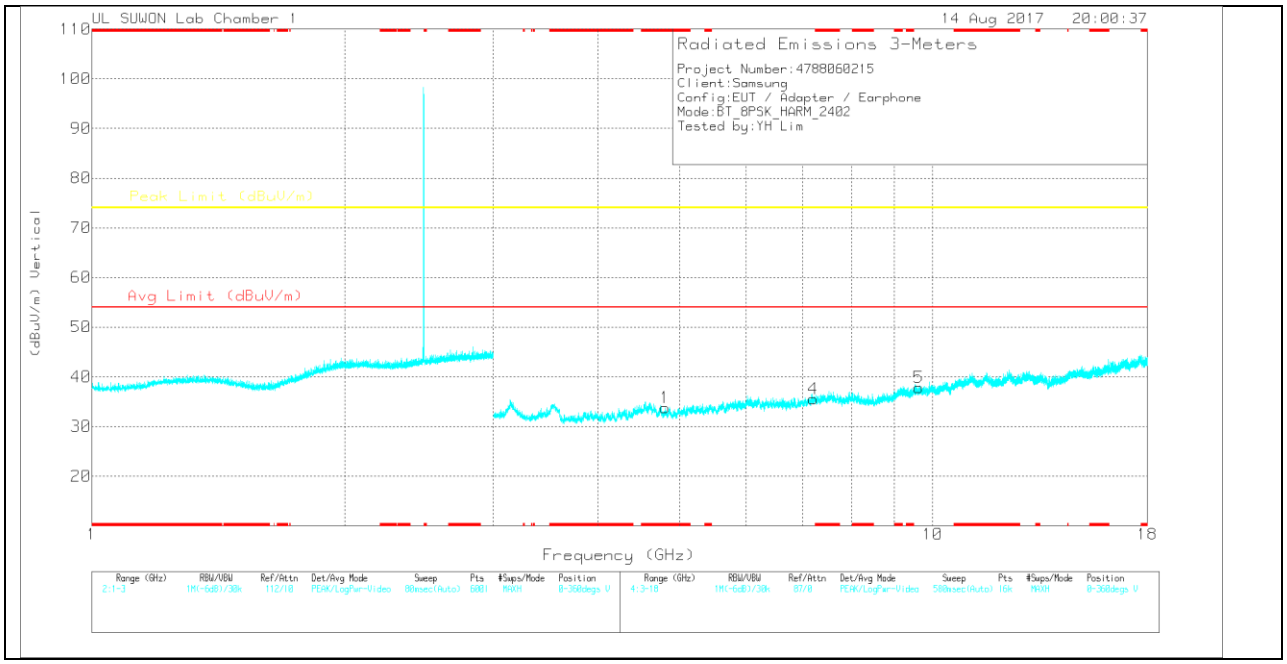
UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_15C
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea TEL: (031) 337-9902 FAX: (031) 213-5433
UL Korea, Ltd. Confidential
This report shall not be reproduced except in full, without the written approval of UL Korea, Ltd.

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.

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
UL Korea, Ltd. Confidential
This report shall not be reproduced except in full, without the written approval of UL Korea, Ltd.

LOW CHANNEL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	20170531_3117_00168717	3GHz_HP(dB)_170809	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 4.807	31.32	PK	33.8	-31.7	33.42	-	-	74	-40.58	0-360	250	H
3	7.214	27.61	PK	35.9	-28.1	35.41	-	-	74	-38.59	0-360	250	H
6	9.613	24.69	PK	36.7	-23.6	37.79	-	-	74	-36.21	0-360	150	H
1	* 4.807	31.64	PK	33.8	-31.7	33.74	-	-	74	-40.26	0-360	250	V
4	7.215	27.69	PK	35.9	-28	35.59	-	-	74	-38.41	0-360	150	V
5	9.617	24.62	PK	36.7	-23.5	37.82	-	-	74	-36.18	0-360	150	V

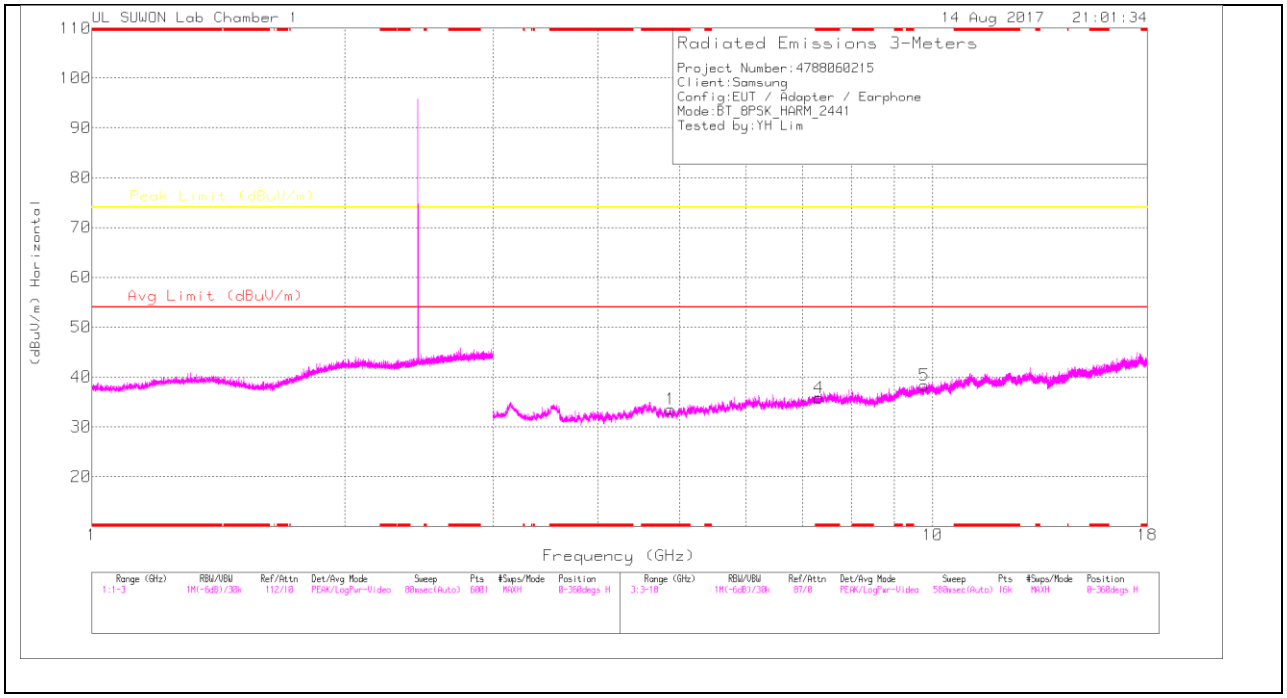
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK – Peak detector

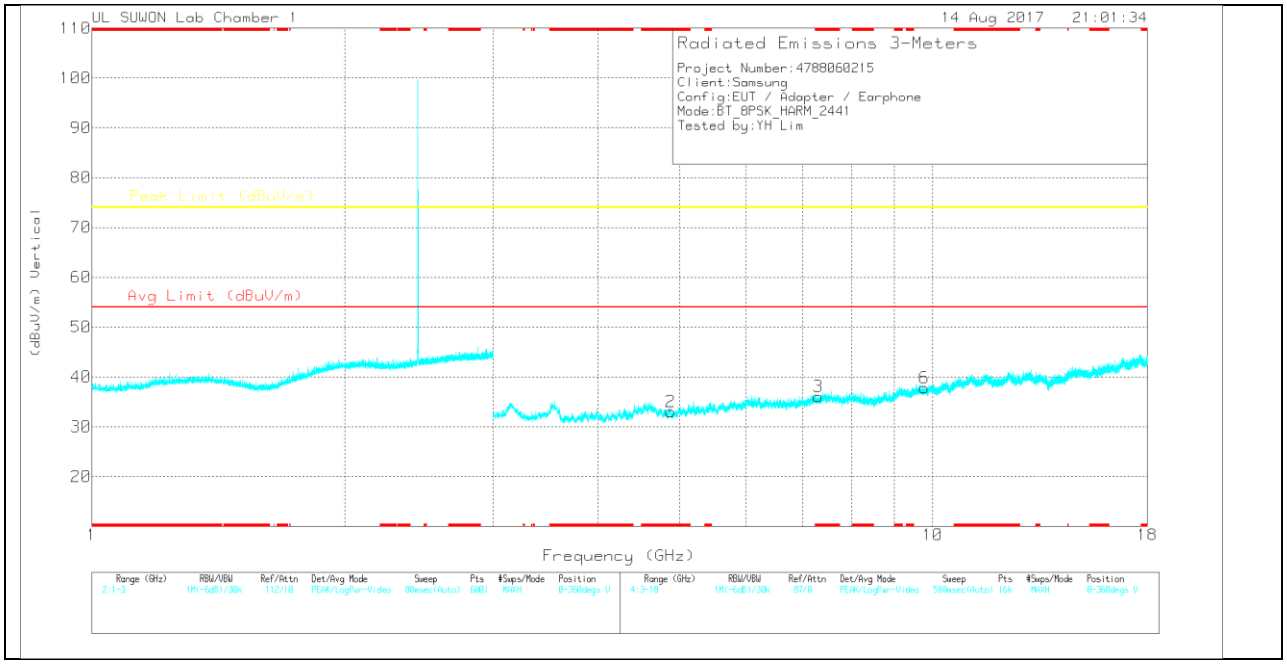
Note: Only peak measurement was performed. Because peak measurement result of unwanted emission is less than average limit (54dBuV/m).

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
UL Korea, Ltd. Confidential
This report shall not be reproduced except in full, without the written approval of UL Korea, Ltd.

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.

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
UL Korea, Ltd. Confidential
This report shall not be reproduced except in full, without the written approval of UL Korea, Ltd.

MID CHANNEL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	20170531_3117_00168717	3GHz_HP(dB)_170809	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.877	31.45	PK	33.8	-31.7	33.55	-	-	74	-40.45	0-360	250	H
4	* 7.316	27.53	PK	35.9	-27.6	35.83	-	-	74	-38.17	0-360	150	H
5	9.766	25.59	PK	36.9	-24.2	38.29	-	-	74	-35.71	0-360	150	H
2	* 4.881	30.88	PK	33.8	-31.7	32.98	-	-	74	-41.02	0-360	250	V
3	* 7.312	27.72	PK	35.9	-27.6	36.02	-	-	74	-37.98	0-360	250	V
6	9.77	25.1	PK	36.9	-24.2	37.8	-	-	74	-36.2	0-360	150	V

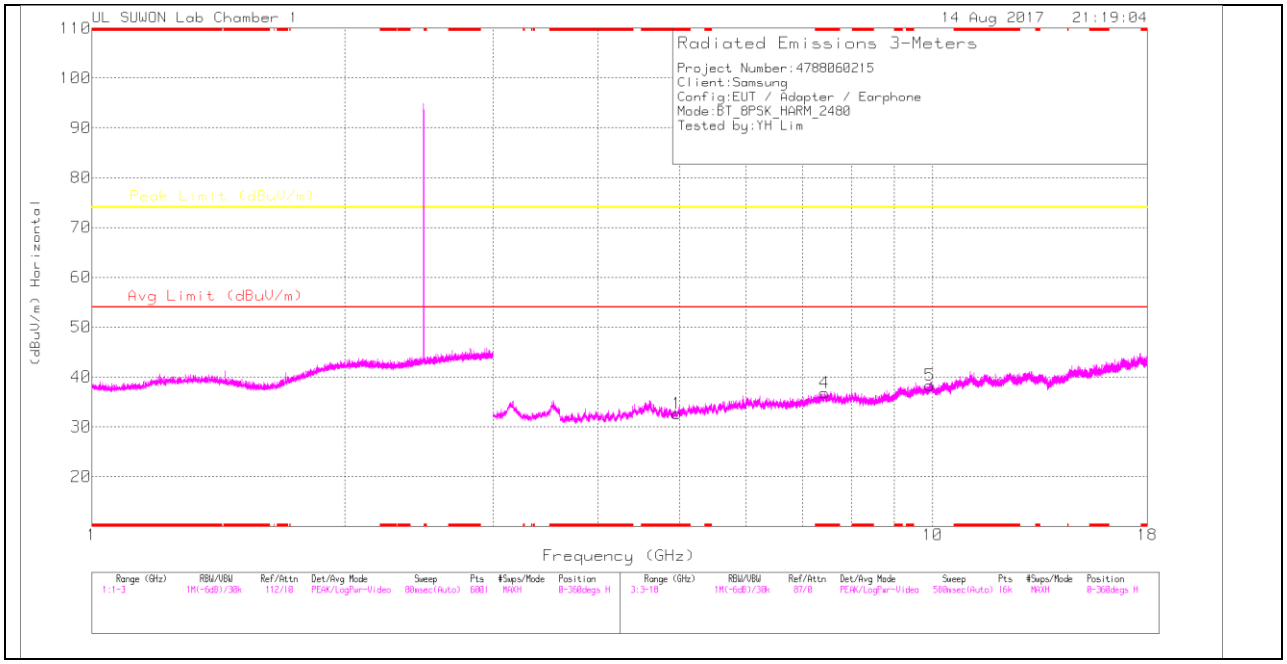
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK – Peak detector

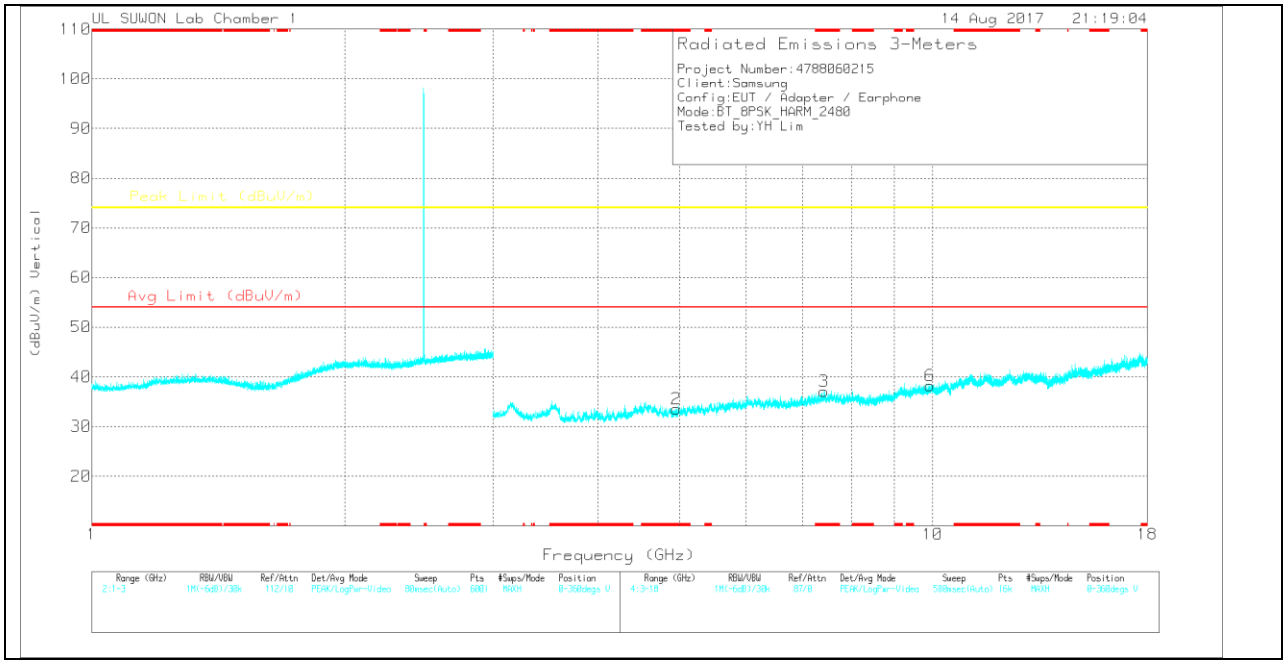
Note: Only peak measurement was performed. Because peak measurement result of unwanted emission is less than average limit (54dBuV/m).

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
UL Korea, Ltd. Confidential
This report shall not be reproduced except in full, without the written approval of UL Korea, Ltd.

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.

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
UL Korea, Ltd. Confidential
This report shall not be reproduced except in full, without the written approval of UL Korea, Ltd.

HIGH CHANNEL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	20170531_3117_00168717	3GHz_HP(dB)_170809	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.96	30.45	PK	33.8	-31.6	32.65	-	-	74	-41.35	0-360	150	H
4	* 7.437	28.09	PK	35.9	-27.2	36.79	-	-	74	-37.21	0-360	150	H
5	9.923	23.6	PK	37.1	-22.4	38.3	-	-	74	-35.7	0-360	150	H
2	* 4.956	31.44	PK	33.8	-31.7	33.54	-	-	74	-40.46	0-360	250	V
3	* 7.425	28.29	PK	35.9	-27.1	37.09	-	-	74	-36.91	0-360	250	V
6	9.927	23.43	PK	37.1	-22.3	38.23	-	-	74	-35.77	0-360	150	V

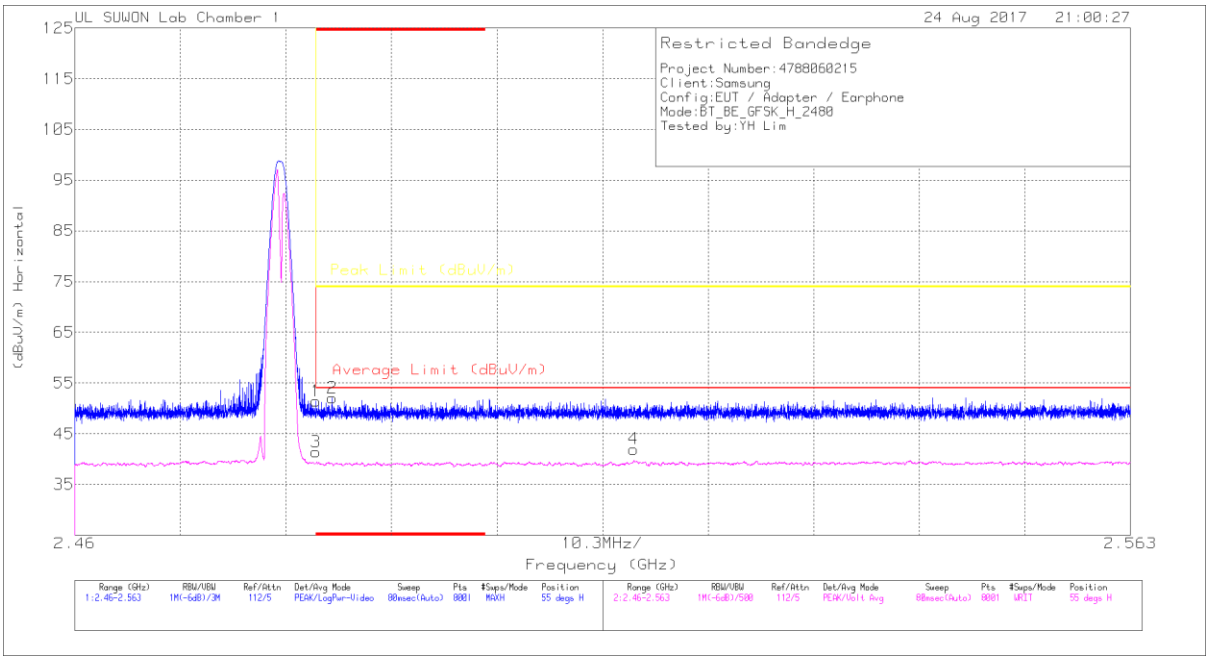
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

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
UL Korea, Ltd. Confidential
This report shall not be reproduced except in full, without the written approval of UL Korea, Ltd.

10.3. BANDEDGE (on Worst case) equipped with protective case



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	20170531_3117_00168717	10dB_ATT(dB)_170809	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	45.35	Pk	31.6	-25.5	51.45	-	-	74	-22.55	55	108	H
2	* 2.485	45.98	Pk	31.6	-25.5	52.08	-	-	74	-21.92	55	108	H
3	* 2.484	33.04	VA1T	31.6	-25.5	39.14	54	-14.86	-	-	55	108	H
4	2.515	33.4	VA1T	31.6	-25.3	39.7	54	-14.3	-	-	55	108	H

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

Pk - Peak detector

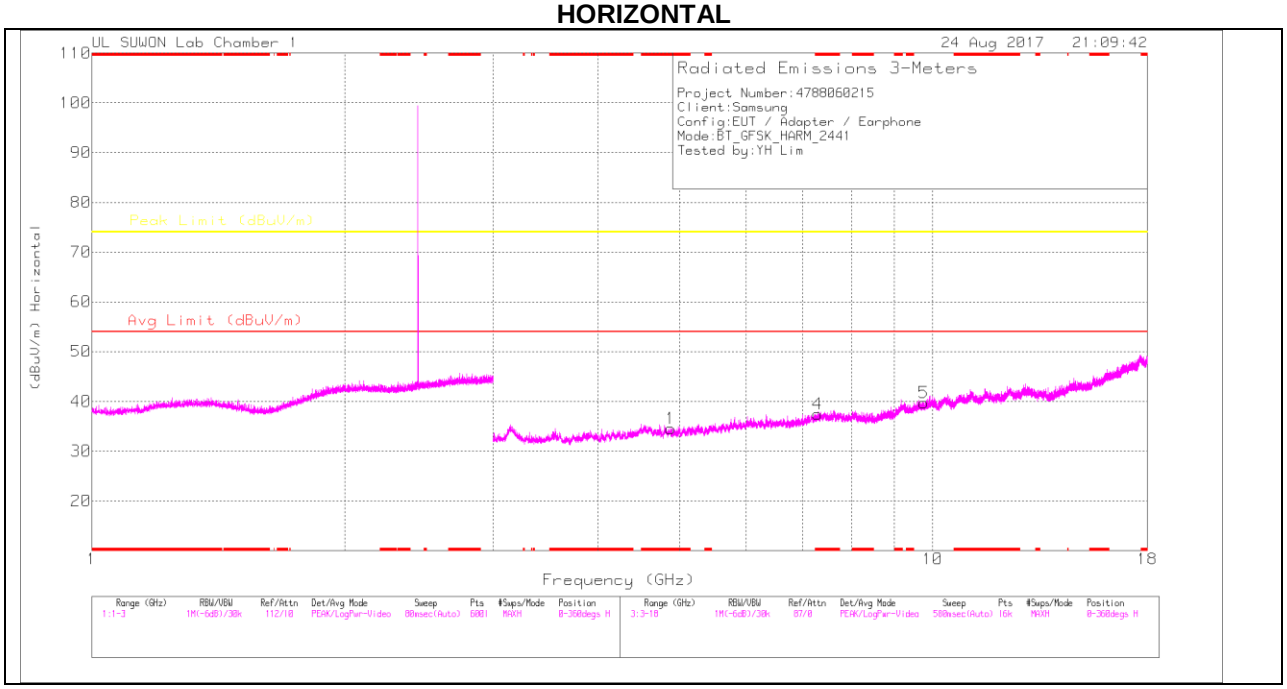
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

Note : Noise floor level.(Both stand-alone and euipped with protective case condition)

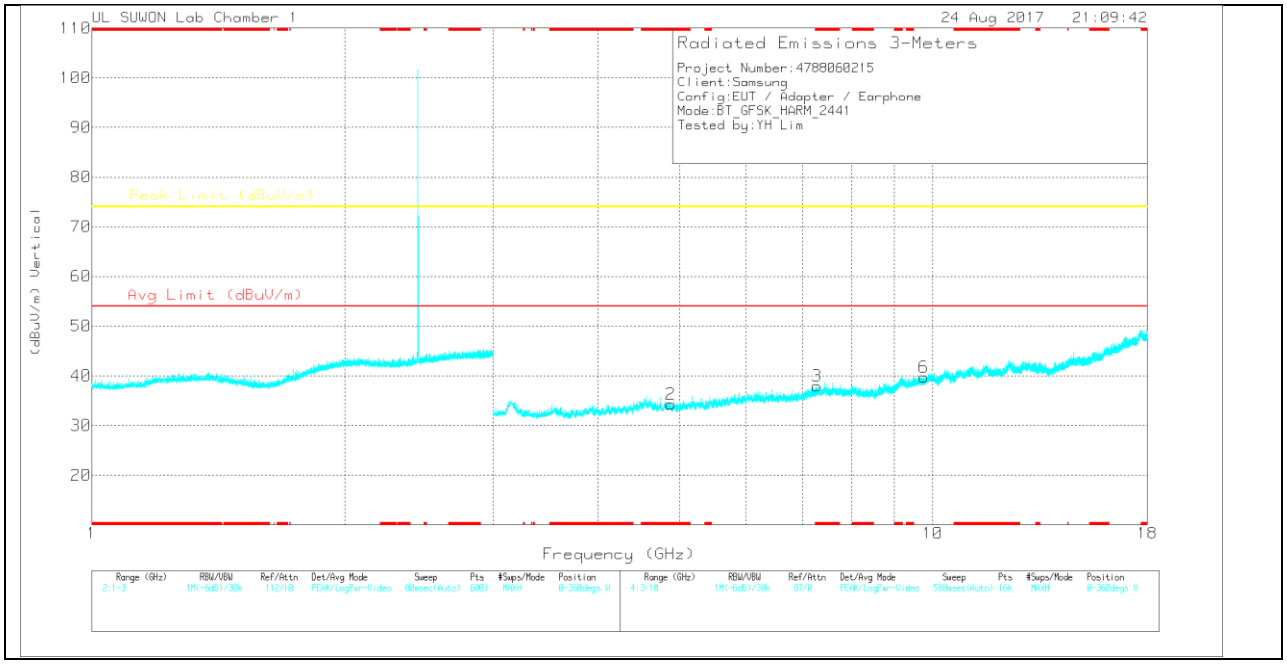
UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_15C
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea TEL: (031) 337-9902 FAX: (031) 213-5433
UL Korea, Ltd. Confidential
This report shall not be reproduced except in full, without the written approval of UL Korea, Ltd.

10.4. HARMONICS AND SPURIOUS EMISSIONS (on Worst case) equipped with protective case

HORIZONTAL



VERTICAL



UL Korea, Ltd. Confidential
This report shall not be reproduced except in full, without the written approval of UL Korea, Ltd.

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	20170531_3117_00168717	3GHz_HP(dB)_170809	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.88	32.41	PK	33.8	-31.7	34.51	-	-	74	-39.49	0-360	150	H
4	* 7.293	29.3	PK	35.9	-27.8	37.4	-	-	74	-36.6	0-360	250	H
5	9.753	27.02	PK	36.9	-24.2	39.72	-	-	74	-34.28	0-360	150	H
2	* 4.878	32.15	PK	33.8	-31.7	34.25	-	-	74	-39.75	0-360	250	V
3	* 7.29	29.84	PK	35.9	-27.8	37.94	-	-	74	-36.06	0-360	250	V
6	9.752	27.07	PK	36.9	-24.2	39.77	-	-	74	-34.23	0-360	150	V

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

PK – Peak detector

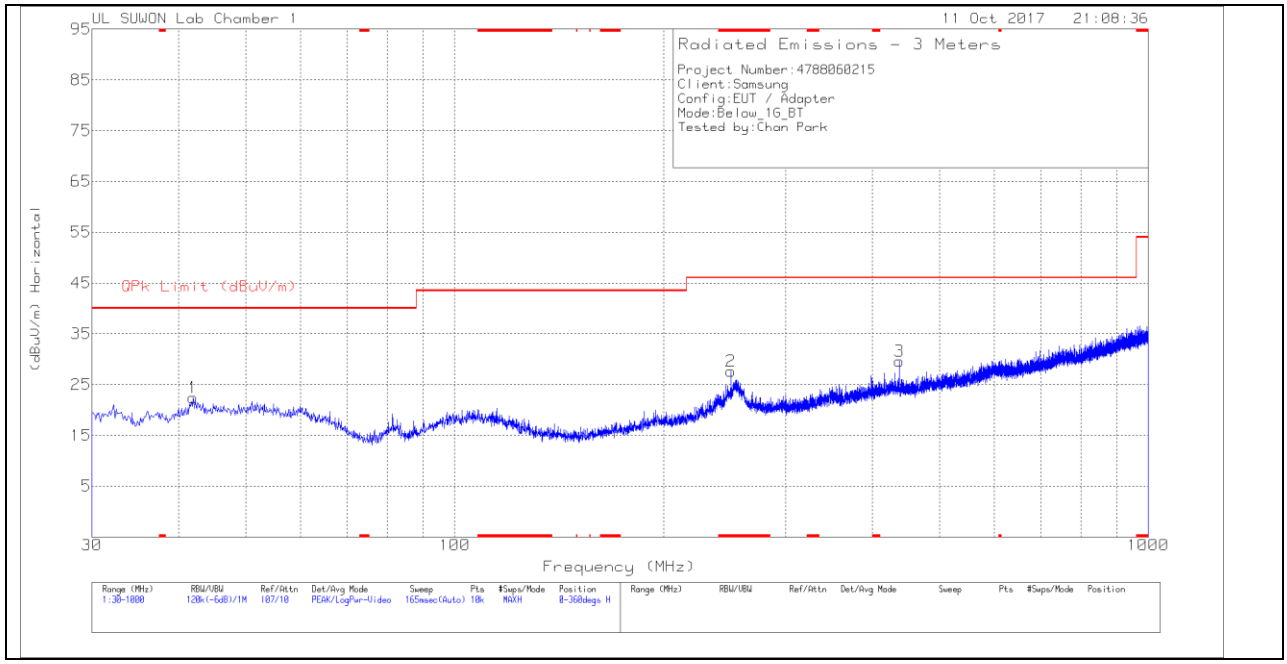
Note : Noise floor level.(Both stand-alone and euipped with protective case condition)

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
UL Korea, Ltd. Confidential
This report shall not be reproduced except in full, without the written approval of UL Korea, Ltd.

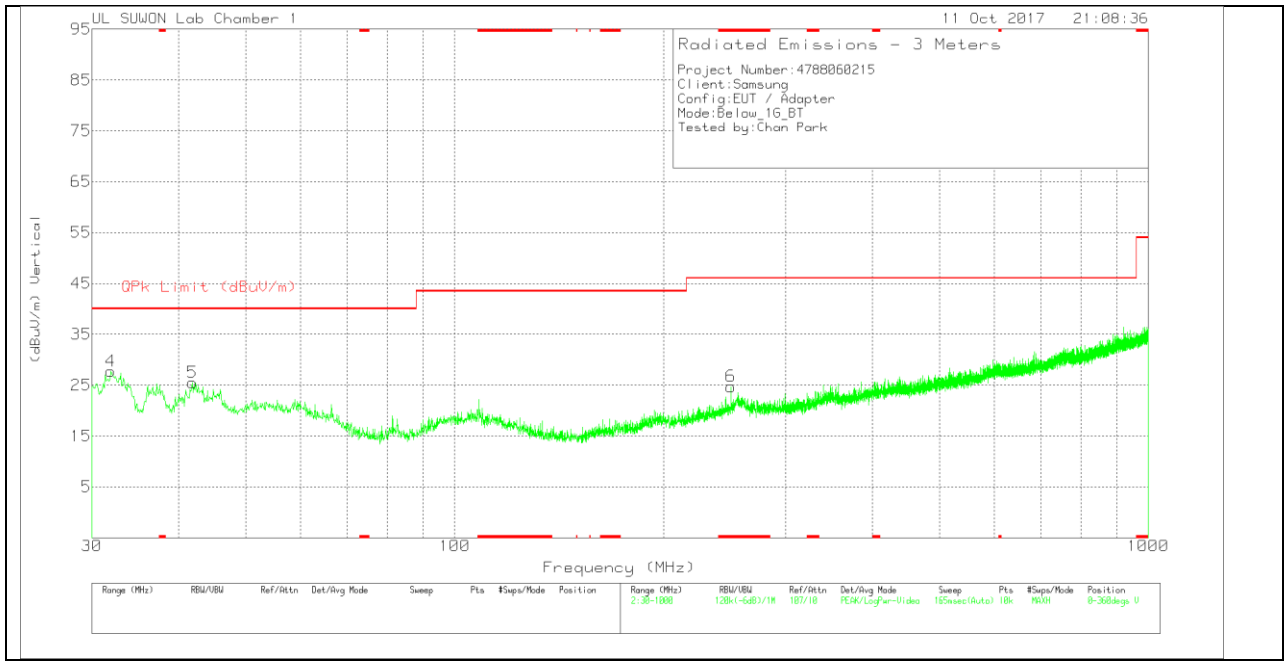
10.5. WORST-CASE BELOW 1 GHz

GFSK SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)

HORIZONTAL PLOT



VERTICAL PLOT



UL Korea, Ltd. Confidential
This report shall not be reproduced except in full, without the written approval of UL Korea, Ltd.

BELOW 1 GHz TABLE

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	750_20170831	30-1000MHz[dB]	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	41.931	32.87	Pk	19	-29.4	22.47	40	-17.53	0-360	300	H
2	* 250.287	36.57	Pk	18.4	-27.4	27.57	46.02	-18.45	0-360	100	H
3	437.497	33.65	Pk	22	-26	29.65	46.02	-16.37	0-360	100	H
4	31.94	41.2	Pk	16.2	-29.6	27.8	40	-12.2	0-360	100	V
5	41.834	35.96	Pk	19	-29.4	25.56	40	-14.44	0-360	100	V
6	* 250.287	33.72	Pk	18.4	-27.4	24.72	46.02	-21.3	0-360	200	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
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
UL Korea, Ltd. Confidential
This report shall not be reproduced except in full, without the written approval of UL Korea, Ltd.

11. 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.

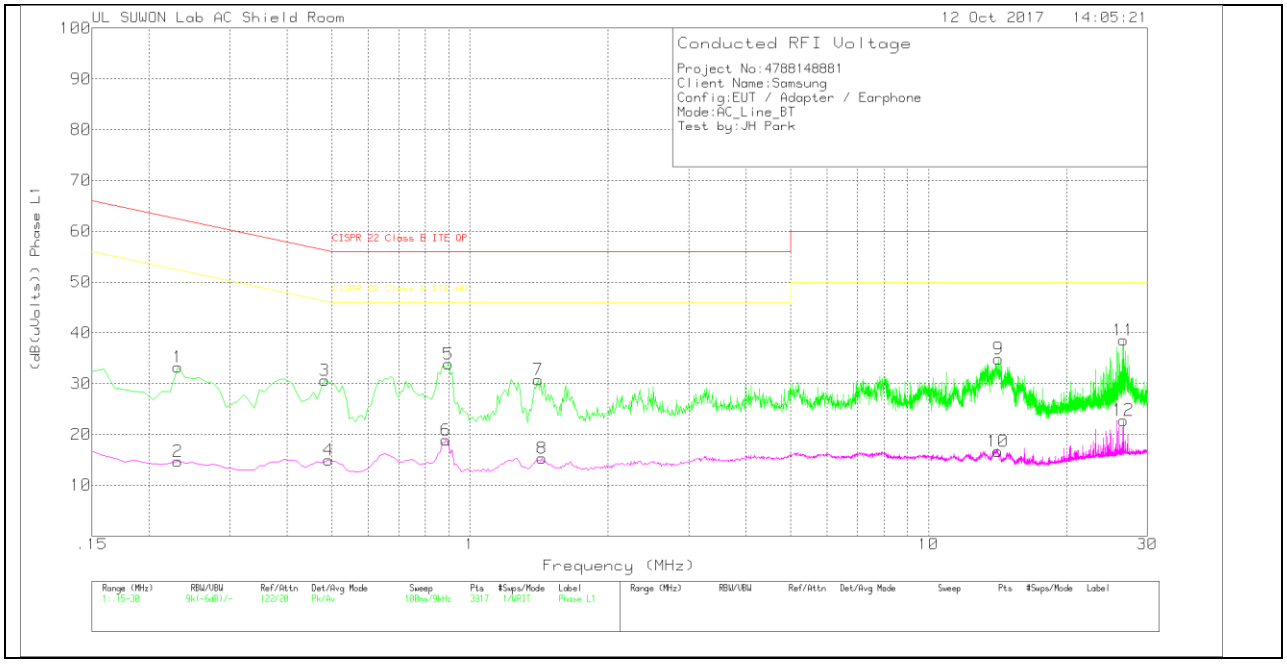
Line conducted data is recorded for both NEUTRAL and HOT lines.

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
UL Korea, Ltd. Confidential
This report shall not be reproduced except in full, without the written approval of UL Korea, Ltd.

RESULTS

WORST EMISSIONS

LINE 1 PLOT



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
UL Korea, Ltd. Confidential
This report shall not be reproduced except in full, without the written approval of UL Korea, Ltd.

LINE 1 RESULTS

Trace Markers

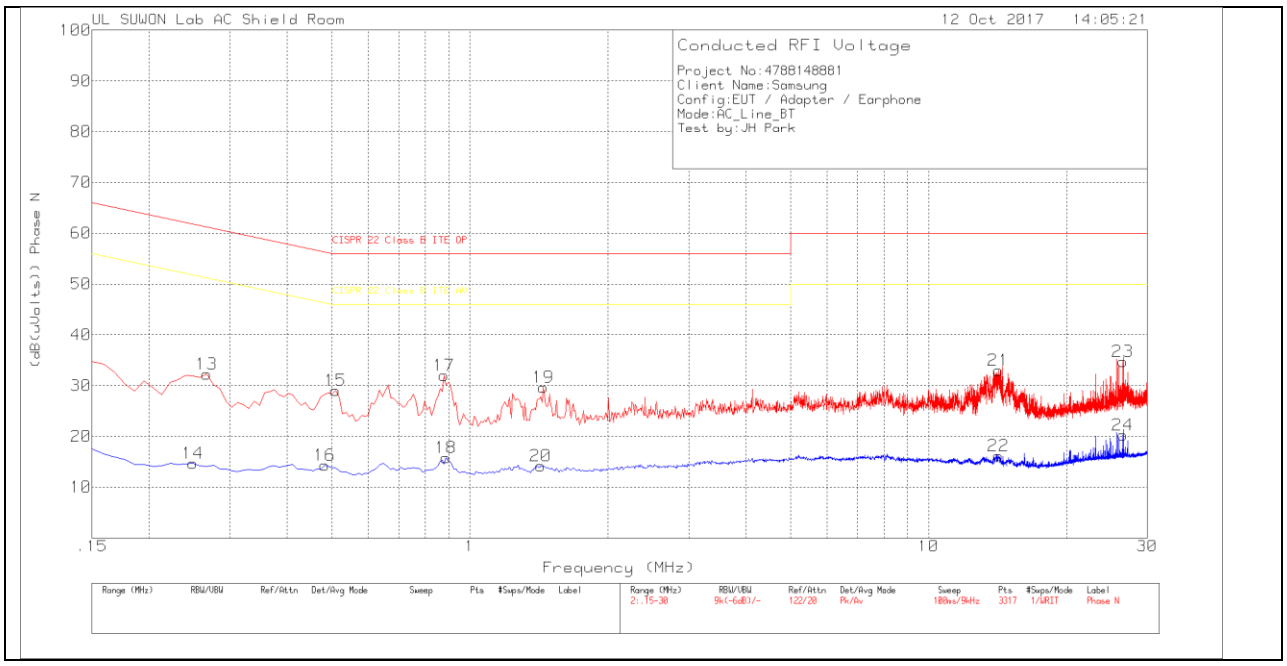
Range 1: Phase L1 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	101837_L1_with extension	CABLELOSS(dB)	Corrected Reading (dB(uVolts))	CISPR 22 Class B ITE QP	Margin (dB)	CISPR 22 Class B ITE AV	Margin (dB)
1	.231	23.41	Pk	9.6	.2	33.21	62.41	-29.2	-	-
2	.231	4.89	Av	9.6	.2	14.69	-	-	52.41	-37.72
3	.483	20.72	Pk	9.7	.2	30.62	56.29	-25.67	-	-
4	.492	5.02	Av	9.7	.2	14.92	-	-	46.13	-31.21
5	.897	23.84	Pk	9.7	.3	33.84	56	-22.16	-	-
6	.888	8.91	Av	9.7	.3	18.91	-	-	46	-27.09
7	1.41	20.61	Pk	9.9	.3	30.81	56	-25.19	-	-
8	1.437	5.07	Av	9.9	.3	15.27	-	-	46	-30.73
9	14.199	24.71	Pk	9.8	.4	34.91	60	-25.09	-	-
10	14.172	6.46	Av	9.8	.4	16.66	-	-	50	-33.34
11	26.61	27.99	Pk	10.3	.3	38.59	60	-21.41	-	-
12	26.61	12.19	Av	10.3	.3	22.79	-	-	50	-27.21

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
UL Korea, Ltd. Confidential
This report shall not be reproduced except in full, without the written approval of UL Korea, Ltd.

LINE 2 PLOT



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
UL Korea, Ltd. Confidential
This report shall not be reproduced except in full, without the written approval of UL Korea, Ltd.

LINE 2 RESULTS

Trace Markers

Range 2: Phase N .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	101837_N_with extension	CABLELOSS(dB)	Corrected Reading (dB(uVolts))	CISPR 22 Class B ITE QP	Margin (dB)	CISPR 22 Class B ITE AV	Margin (dB)
13	.267	22.44	Pk	9.6	.2	32.24	61.21	-28.97	-	-
14	.249	4.92	Av	9.6	.2	14.72	-	-	51.79	-37.07
15	.51	19.01	Pk	9.8	.2	29.01	56	-26.99	-	-
16	.483	4.27	Av	9.8	.2	14.27	-	-	46.29	-32.02
17	.879	22.02	Pk	9.7	.3	32.02	56	-23.98	-	-
18	.888	5.85	Av	9.7	.3	15.85	-	-	46	-30.15
19	1.446	19.44	Pk	9.9	.3	29.64	56	-26.36	-	-
20	1.428	4.01	Av	9.9	.3	14.21	-	-	46	-31.79
21	14.208	22.66	Pk	9.9	.4	32.96	60	-27.04	-	-
22	14.217	5.87	Av	9.9	.4	16.17	-	-	50	-33.83
23	26.547	24.2	Pk	10.2	.3	34.7	60	-25.3	-	-
24	26.547	9.8	Av	10.2	.3	20.3	-	-	50	-29.7

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
UL Korea, Ltd. Confidential
This report shall not be reproduced except in full, without the written approval of UL Korea, Ltd.