

SPURIOUS BANDEGE EMISSIONS WITH HOPPING ON



10. RADIATED TEST RESULTS

LIMITS

FCC §15.205 and §15.209

Limits for radiated disturbance of an intentional radiator		
Frequency range (MHz)	Limits (µV/m)	Measurement Distance (m)
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.

FCC Part 15.205 (a) : Only spurious emissions are permitted in any of the frequency bands listed below :

MHz	MHz	MHz	MHz	GHz	GHz
0.009 – 0.110	8.41425 ~ 8.41475	108 ~ 121.94	1300 ~ 1427	4.5 ~ 5.15	14.47 ~ 14.5
0.495 – 0.505	12.29 ~ 12.293	123 ~ 138	1435 ~ 1626.5	5.35 ~ 5.46	15.35 ~ 16.2
2.1735 ~ 2.1905	12.51975 ~ 12.52025	149.9 ~ 150.05	1645.5 ~ 1646.5	7.25 ~ 7.75	17.7 ~ 21.4
4.125 ~ 4.128	12.57675 ~ 12.57725	156.52475 ~	1660 ~ 1710	8.025 ~ 8.5	22.01 ~ 23.12
4.17725 ~ 4.17775	13.36 ~ 13.41	156.52525	1718.8 ~ 1722.2	9.0 ~ 9.2	23.6 ~ 24.0
4.20725 ~ 4.20775	16.42 ~ 16.423	156.7 ~ 156.9	2200 ~ 2300	9.3 ~ 9.5	31.2 ~ 31.8
6.215 ~ 6.218	16.69475 ~ 16.69525	162.0125 ~	2310 ~ 2390	10.6 ~ 12.7	36.43 ~ 36.5
6.26775 ~ 6.26825	16.80425 ~ 16.80475	167.17	2483.5 ~ 2500	13.25 ~ 13.4	Above 38.6
6.31175 ~ 6.31225	25.5 ~ 25.67	167.72 ~ 173.2	2655 ~ 2900		
8.291 ~ 8.294	37.5 ~ 38.25	240 ~ 285	3260 ~ 3267		
8.362 ~ 8.366	73 ~ 74.6	322 ~ 335.4	3332 ~ 3339		
8.37625 ~ 8.38675	74.8 ~ 75.2	399.90 ~ 410	3345.8 ~ 3358		
		608 ~ 614	3600 ~ 4400		
		960 ~ 1240			

▪ FCC Part 15.205(b) : The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in §15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in §15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in §15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in §15.35 apply to these measurements.

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane for below 1GHz and 150 cm for above 1GHz. The EUT is configured in accordance with ANSI C63.10. The EUT is set to transmit in a continuous mode.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For measurements above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 3 MHz for peak measurements.(Pre-scans to detect harmonic and spurious emissions, the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 30 kHz for peak measurements.)

For band edge measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 3 MHz for peak measurements and 1/T (on time) for average measurement.

$$\text{GFSK} = 1/T = 1 / 0.00288\text{s} = 347\text{Hz}.$$

The minimum VBW was 347Hz, but test receiver(ESU40) couldn't set value 347Hz. Due to this reason, testing VBW was set to 500Hz(Worst cases).

The spectrum from 1GHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.
(From 30MHz to 1GHz, test was performed with the EUT set to transmit at the channel with highest output power)

The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

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

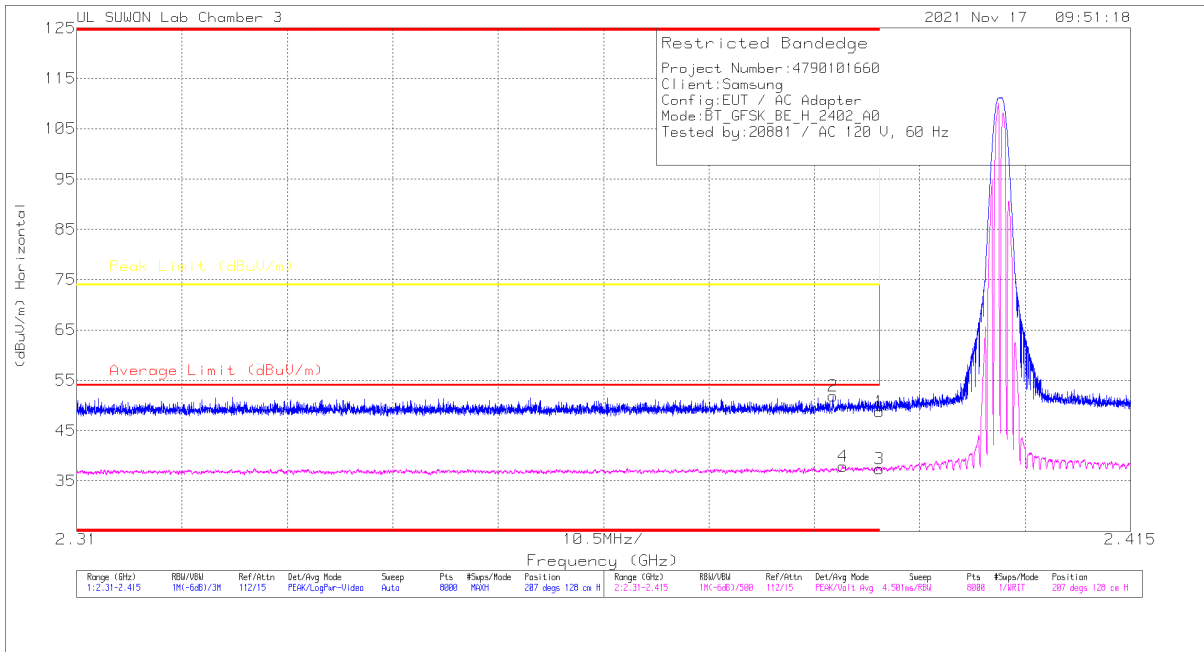
Although these tests were performed other than open field test site, adequate comparison measurements were confirmed against 30 m open are test site.
Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the one of tests made in an open field based on KDB 414788.

10.1. TRANSMITTER ABOVE 1 GHz

10.1.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

ANT1 BANDEDGE (0 CHANNEL)

HORIZONTAL RESULT



Trace Markers

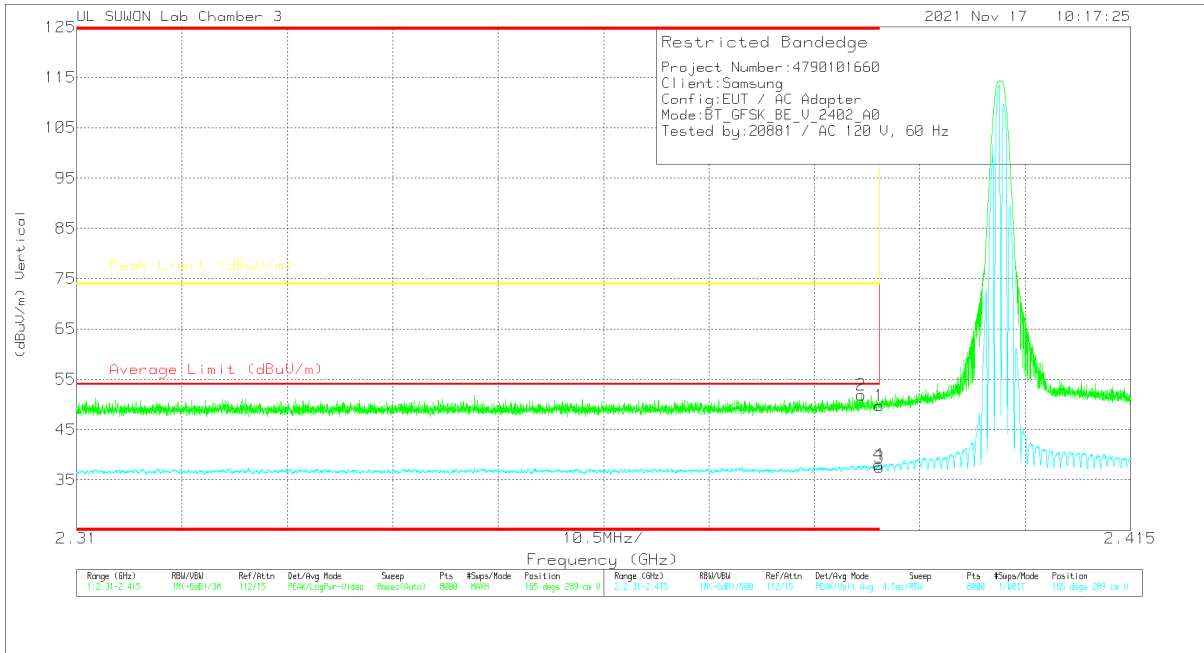
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00218957	10dB_ATT[dB]	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	41.36	Pk		-25.4	48.76	-	-	74	-25.24	207	128	H
2	* 2.38534	44.52	Pk		-25.4	51.82	-	-	74	-22.18	207	128	H
3	* 2.39	30.06	VA1T		-25.4	37.46	54	-16.54	-	-	207	128	H
4	* 2.38633	30.61	VA1T		-25.4	37.91	54	-16.09	-	-	207	128	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

VA1T - FHSS: Linear Voltage Average $V_B=1/T_{on}$ where: T_{on} is transmit duration

VERTICAL RESULT



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00218957	10dB_ATT[dB]	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	42.38	Pk	32.8	-25.4	49.78	-	-	74	-24.22	165	289	V
2	* 2.38818	44.43	Pk	32.8	-25.3	51.93	-	-	74	-22.07	165	289	V
3	* 2.39	30.1	VA1T	32.8	-25.4	37.5	54	-16.5	-	-	165	289	V
4	* 2.3899	30.6	VA1T	32.8	-25.4	38	54	-16	-	-	165	289	V

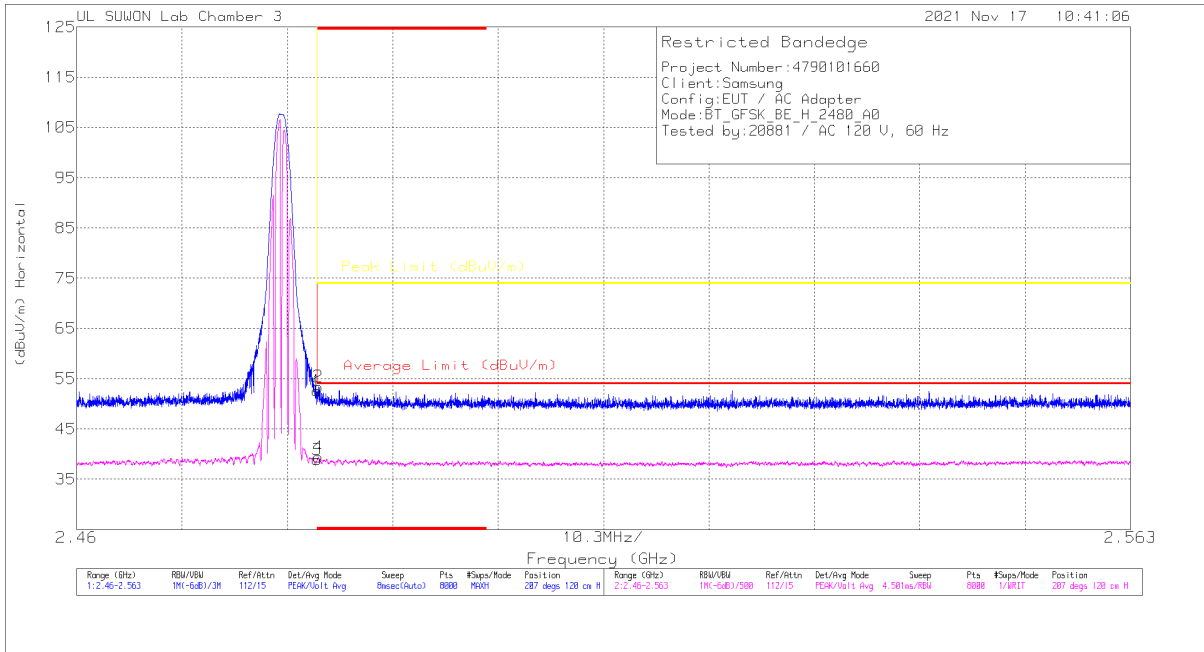
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

VA1T - FHSS: Linear Voltage Average $V_B=1/T_{on}$ where: T_{on} is transmit duration

BANDEDGE (78 CHANNEL)

HORIZONTAL RESULT



Trace Markers

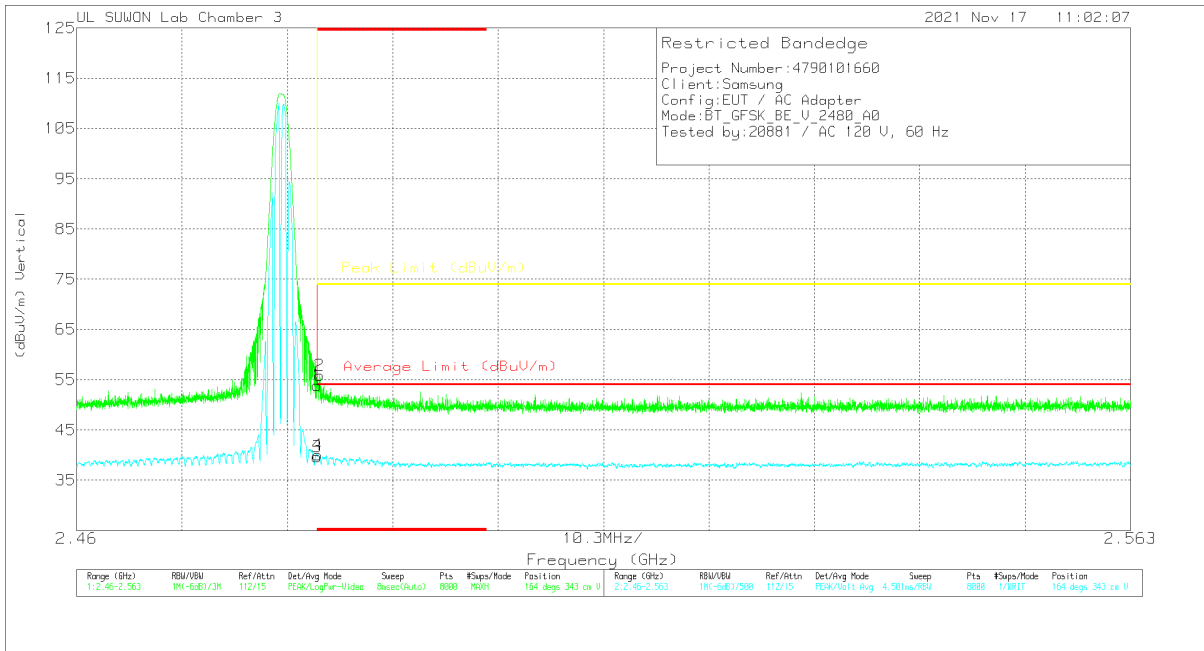
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00218957	10dB_ATT[dB]	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.4835	45.08	Pk	32.9	-25.3	52.68	-	-	74	-21.32	207	120	H
2	* 2.48359	45.83	Pk	32.9	-25.3	53.43	-	-	74	-20.57	207	120	H
3	* 2.4835	31.31	VA1T	32.9	-25.3	38.91	54	-15.09	-	-	207	120	H
4	* 2.48362	31.83	VA1T	32.9	-25.3	39.43	54	-14.57	-	-	207	120	H

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Pk - Peak detector

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

VERTICAL RESULT



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00218957	10dB_ATT[dB]	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.4835	46.23	Pk	32.9	-25.3	53.83	-	-	74	-20.17	164	343	V
2	* 2.48372	48.26	Pk	32.9	-25.3	55.86	-	-	74	-18.14	164	343	V
3	* 2.4835	32.04	VA1T	32.9	-25.3	39.64	54	-14.36	-	-	164	343	V
4	* 2.48358	32.47	VA1T	32.9	-25.3	40.07	54	-13.93	-	-	164	343	V

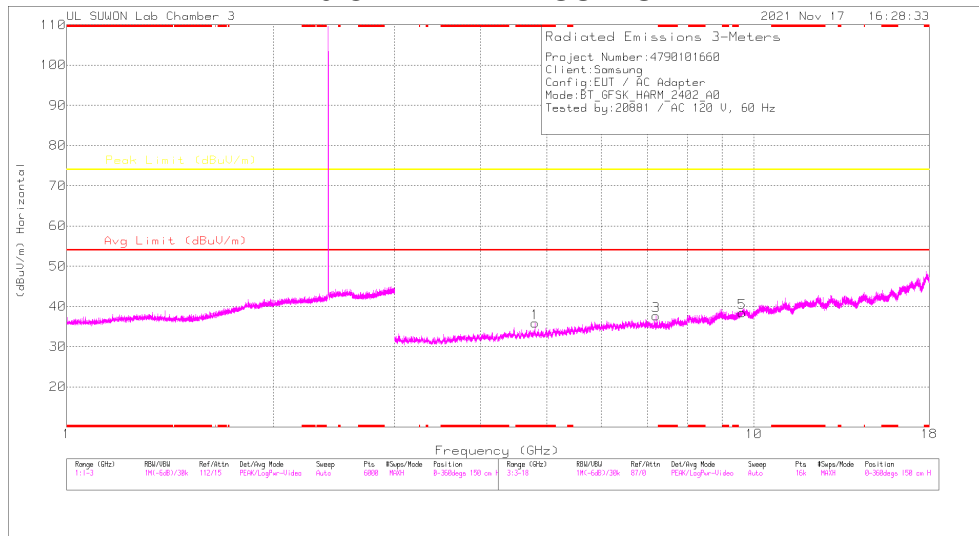
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

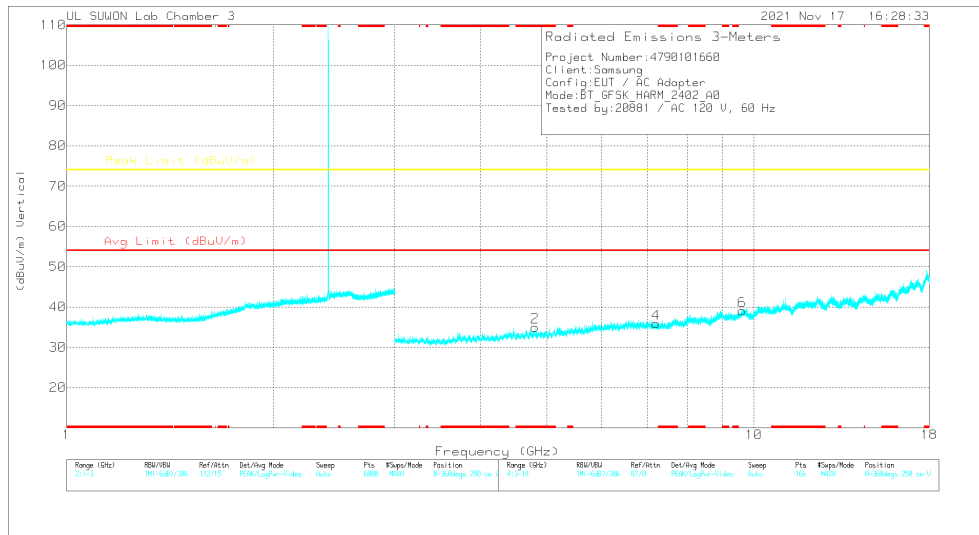
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

HARMONICS AND SPURIOUS EMISSIONS

0 CHANNEL RESULTS



HORIZONTAL



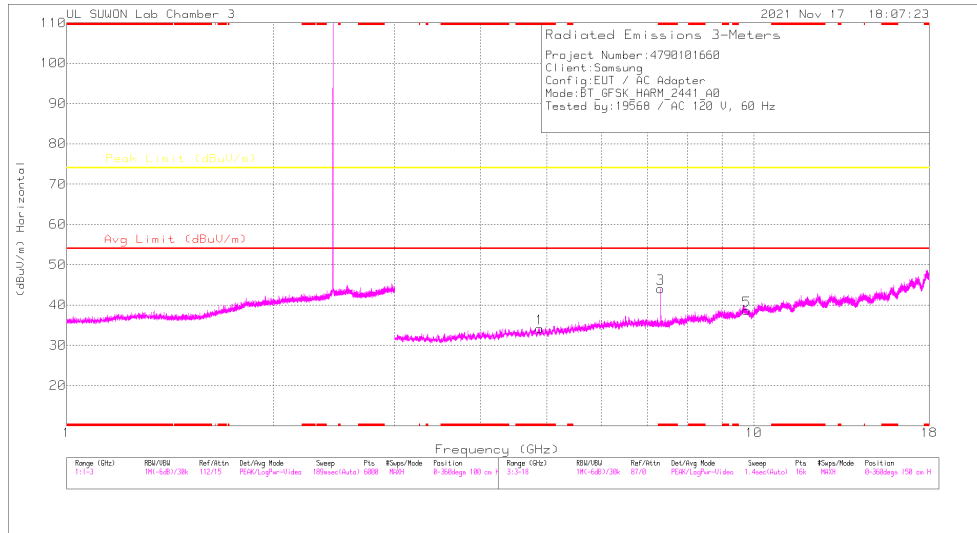
VERTICAL

RADIATED EMISSIONS

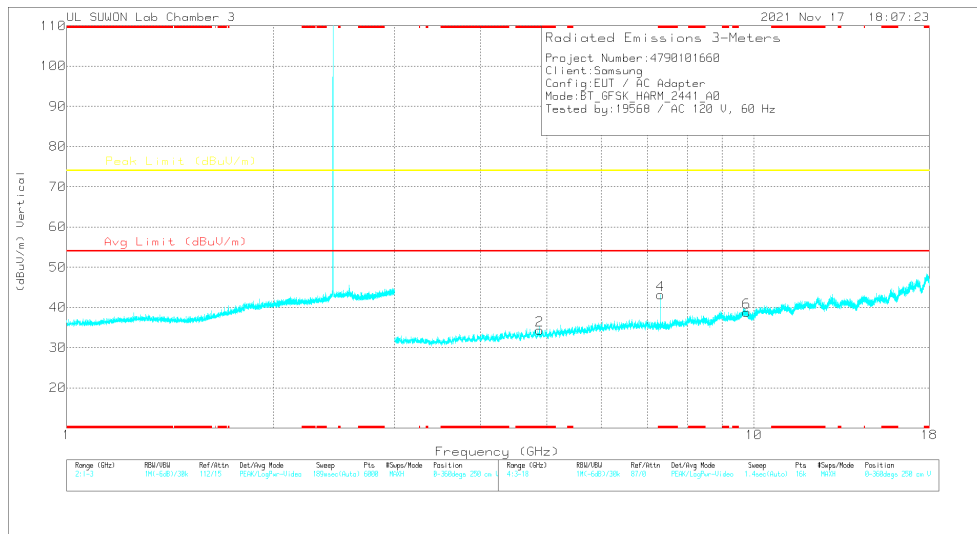
Frequency (GHz)	Meter Reading (dBuV)	Det	3117_0021895 7	3GHz_HF[dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.80372	39	PKFH	34.6	-30.4	43.2	-	-	74	-30.8	178	104	H
* 4.80384	39.13	PKFH	34.6	-30.4	43.33	-	-	74	-30.67	183	250	V
7.20575	35.46	PKFH	36.1	-26.1	45.46	-	-	74	-28.54	301	114	H
7.20647	34.47	PKFH	36.1	-26.1	44.47	-	-	74	-29.53	192	100	V
9.60718	31.63	PKFH	37.3	-22.1	46.83	-	-	74	-27.17	360	100	H
9.60176	32.14	PKFH	37.3	-22.1	47.34	-	-	74	-26.66	0	100	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 PKFH FHSS/BT RB=100k for Frequencies<1GHz / RB=1MHz for Frequencies>1GHz, VB=3 x RB, Peak

39 CHANNEL RESULTS



HORIZONTAL



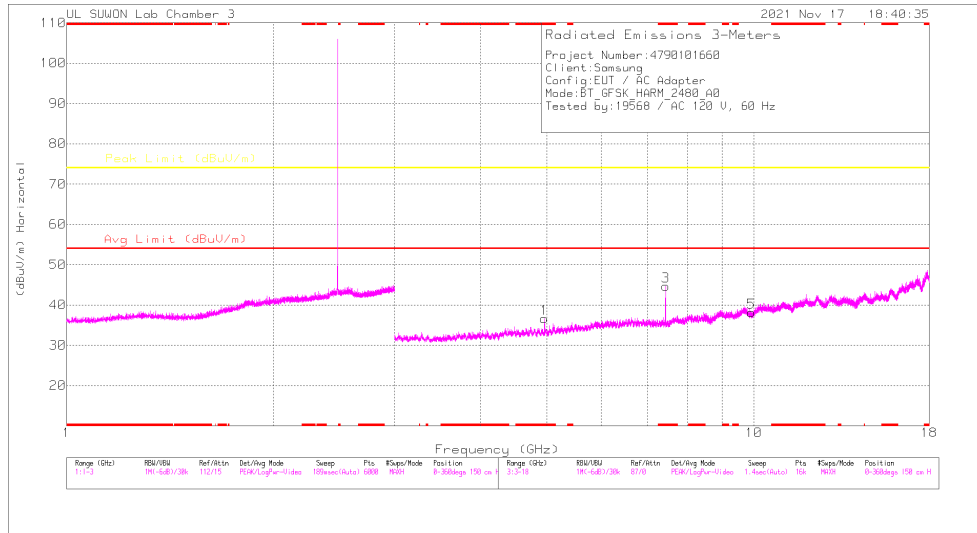
VERTICAL

RADIATED EMISSIONS

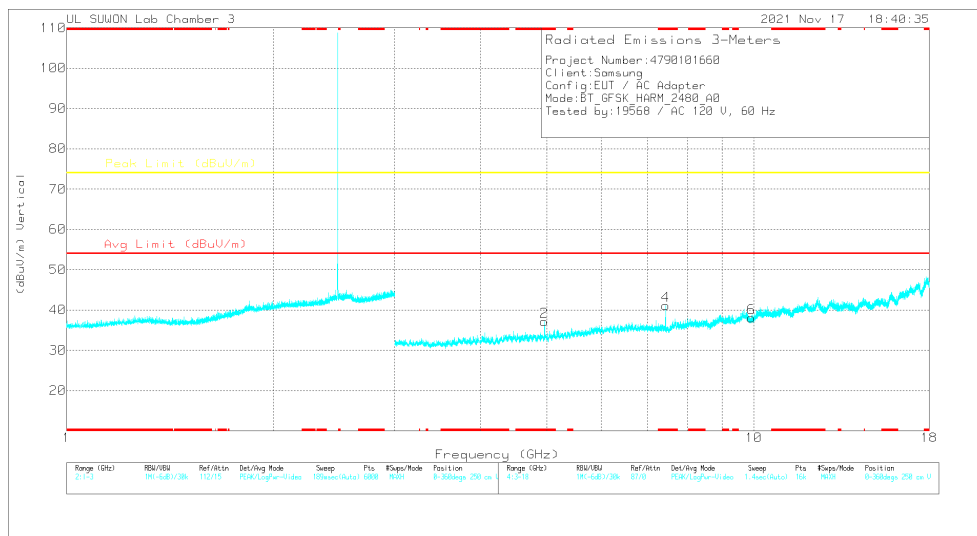
Frequency (GHz)	Meter Reading (dBuV)	Det	3117_0021895 7	3GHz_HP[dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.8832	37.82	PKFH	34.7	-31.4	41.12	-	-	74	-32.88	0	100	H
* 4.88213	37.53	PKFH	34.7	-31.2	41.03	-	-	74	-32.97	0	100	V
* 7.32247	39.88	PKFH	36	-25.5	50.38	-	-	74	-23.62	298	101	H
* 7.3231	32.97	VA1T	36	-25.4	43.57	54	-10.43	-	-	298	101	H
* 7.32316	36.97	PKFH	36	-25.4	47.57	-	-	74	-26.43	198	101	V
* 7.32304	29.3	VA1T	36	-25.4	39.9	54	-14.1	-	-	198	101	V
9.76172	30.63	PKFH	37.5	-21.7	46.43	-	-	74	-27.57	0	100	H
9.76154	30.64	PKFH	37.5	-21.7	46.44	-	-	74	-27.56	0	100	V

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 PKFH FHSS/BT RB=100k for Frequencies<1GHz / RB=1MHz for Frequencies>1GHz, VB=3 x RB, Peak
 VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

78 CHANNEL RESULTS



HORIZONTAL



VERTICAL

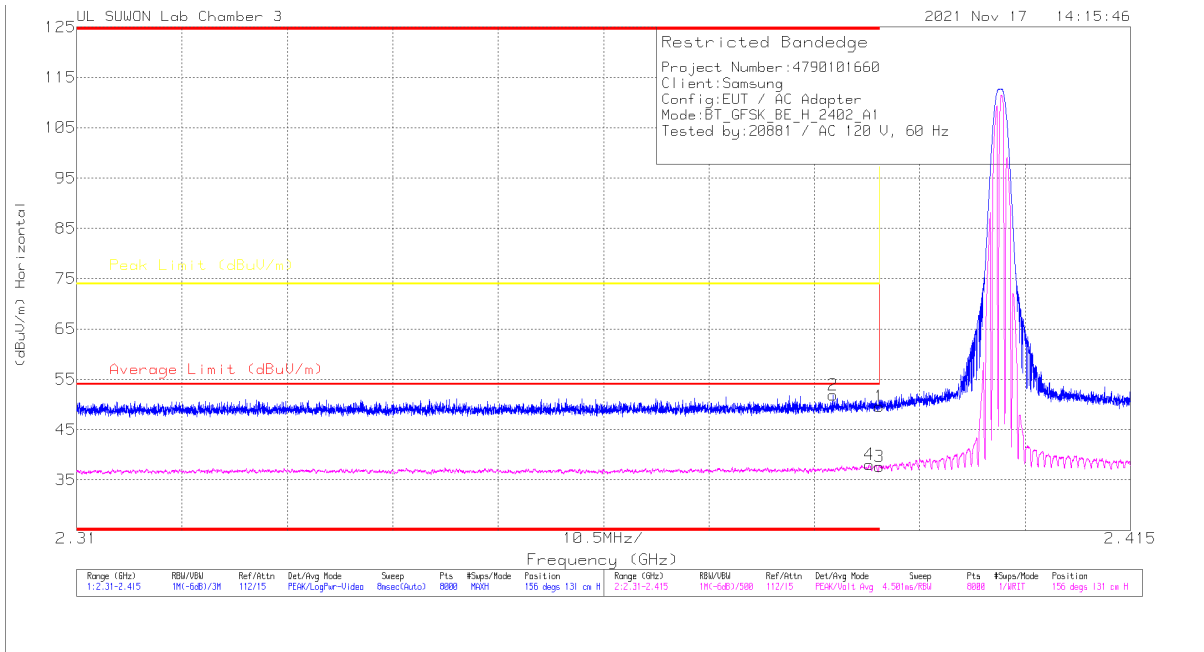
RADIATED EMISSIONS

Frequency (GHz)	Meter Reading (dBuV)	Det	3117_0021895 7	3GHz_HF[dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.96004	39.33	PKFH	34.7	-31	43.03	-	-	74	-30.97	191	104	H
* 4.9601	30.56	VA1T	34.7	-31	34.26	54	-19.74	-	-	191	104	H
* 4.96042	41.11	PKFH	34.7	-31	44.81	-	-	74	-29.19	167	252	V
* 4.9599	32.43	VA1T	34.7	-31	36.13	54	-17.87	-	-	167	252	V
* 7.43962	40.44	PKFH	36	-25.3	51.14	-	-	74	-22.86	299	100	H
* 7.4399	33.76	VA1T	36	-25.3	44.46	54	-9.54	-	-	299	100	H
* 7.44026	37.3	PKFH	36	-25.3	48	-	-	74	-26	190	101	V
* 7.44006	30.34	VA1T	36	-25.3	41.04	54	-12.96	-	-	190	101	V
9.91983	29.54	PKFH	37.7	-21.9	45.34	-	-	74	-28.66	360	100	H
9.91932	30.77	PKFH	37.7	-21.9	46.57	-	-	74	-27.43	360	100	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 PKFH FHSS/BT RB=100k for Frequencies<1GHz / RB=1MHz for Frequencies>1GHz, VB=3 x RB, Peak
 VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

ANT2
BANDEDGE (0 CHANNEL)

HORIZONTAL RESULT

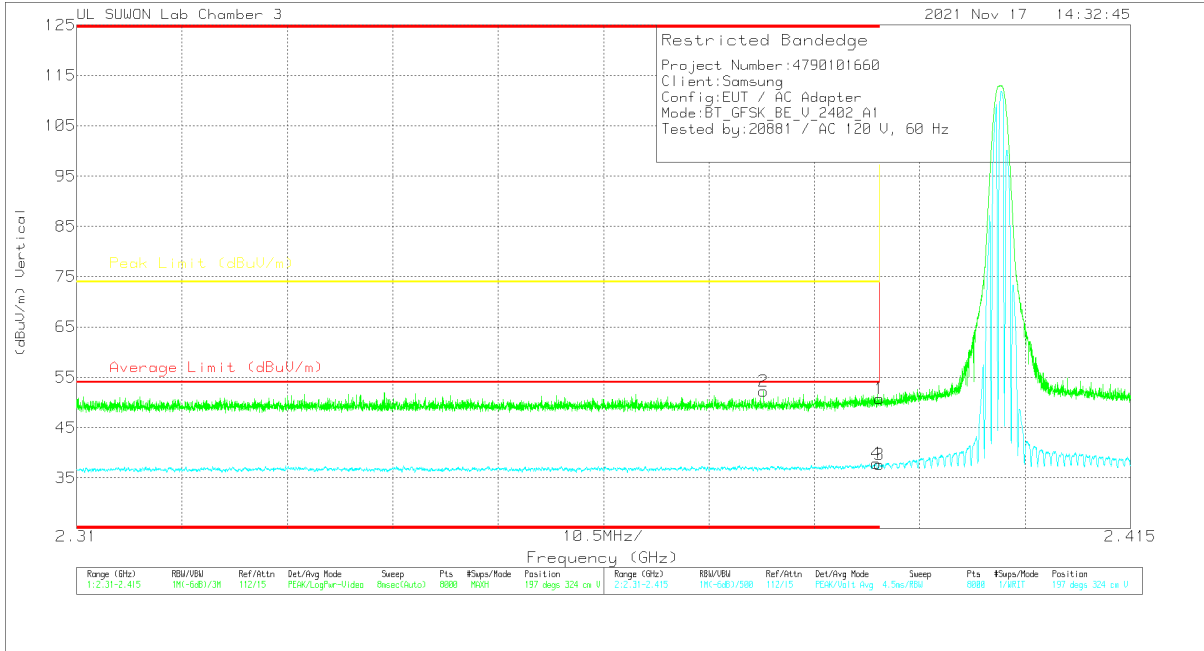


Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00218957	10dB_ATT[dB]	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	42.28	Pk	32.8	-25.4	49.68	-	-	74	-24.32	156	131	H
2	* 2.38534	44.58	Pk	32.7	-25.4	51.88	-	-	74	-22.12	156	131	H
3	* 2.39	30.23	VA1T	32.8	-25.4	37.63	54	-16.37	-	-	156	131	H
4	* 2.38897	30.7	VA1T	32.8	-25.4	38.1	54	-15.9	-	-	156	131	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 Pk - Peak detector
 VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

VERTICAL RESULT



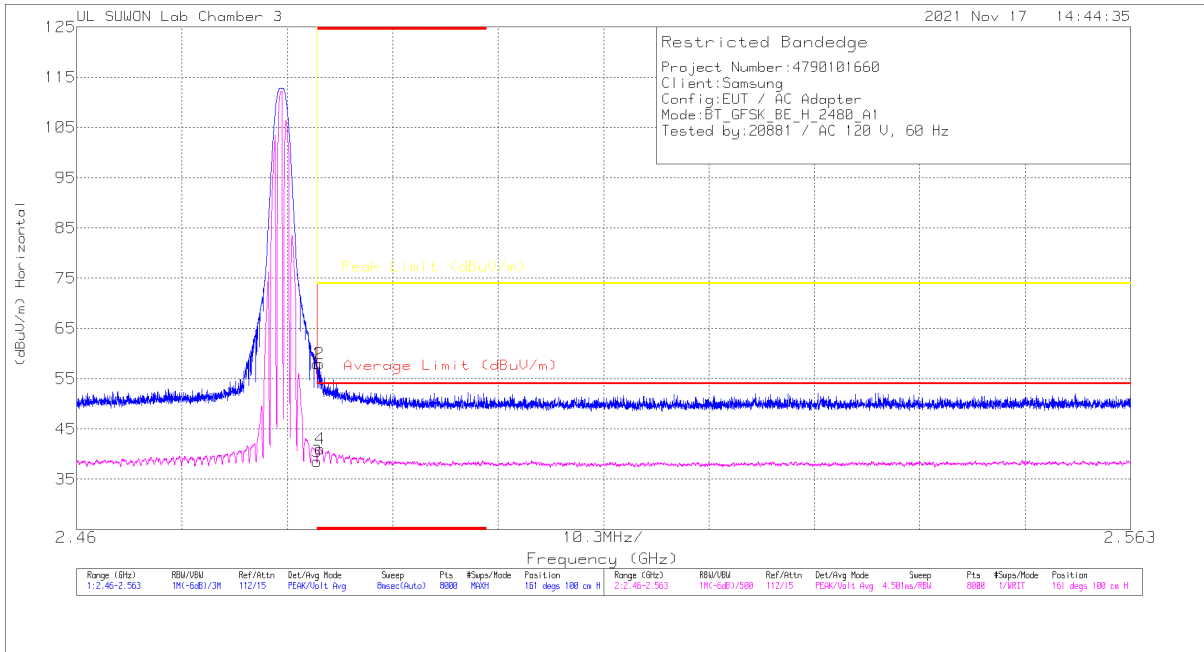
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00218957	10dB_ATT[dB]	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	43.37	Pk	32.8	-25.4	50.77	-	-	74	-23.23	197	324	V
2	* 2.37843	44.93	Pk	32.7	-25.4	52.23	-	-	74	-21.77	197	324	V
3	* 2.39	30.32	VA1T	32.8	-25.4	37.72	54	-16.28	-	-	197	324	V
4	* 2.38964	30.49	VA1T	32.8	-25.4	37.89	54	-16.11	-	-	197	324	V

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

BANDEDGE (78 CHANNEL)

HORIZONTAL RESULT

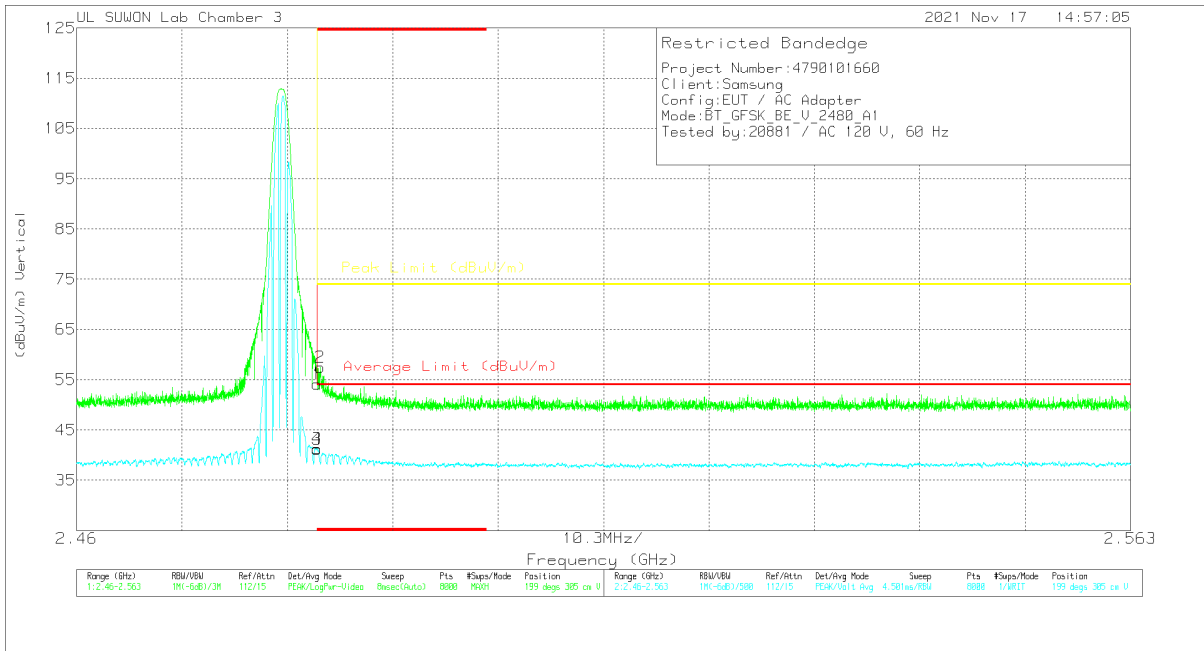


Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00218957	10dB_ATT[dB]	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.4835	50.41	Pk	32.9	-25.3	58.01	-	-	74	-15.99	161	100	H
2	* 2.48375	50.34	Pk	32.9	-25.3	57.94	-	-	74	-16.06	161	100	H
3	* 2.4835	30.93	VA1T	32.9	-25.3	38.53	54	-15.47	-	-	161	100	H
4	* 2.48381	33.46	VA1T	32.9	-25.3	41.06	54	-12.94	-	-	161	100	H

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VERTICAL RESULT



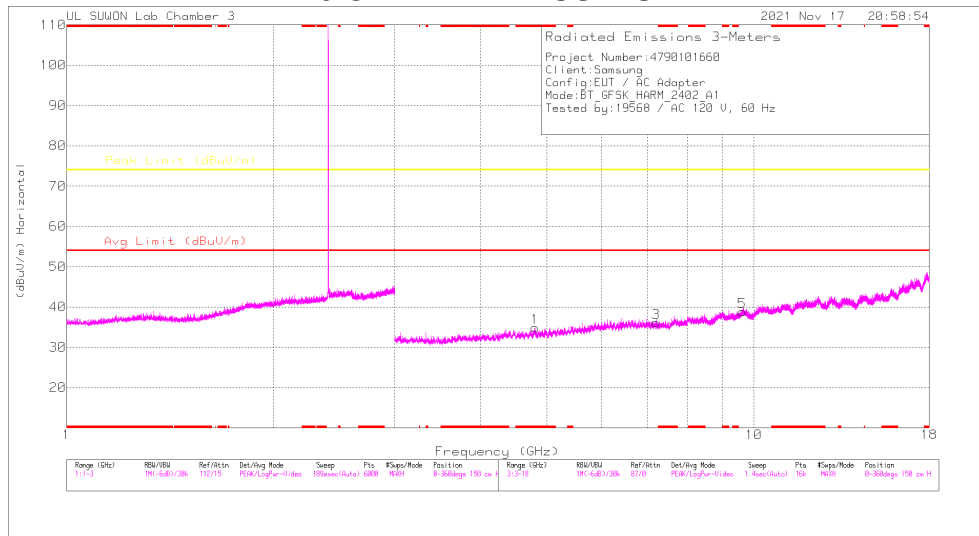
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00218957	10dB_ATT[dB]	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.4835	46.49	Pk	32.9	-25.3	54.09	-	-	74	-19.91	199	305	V
2	* 2.48381	49.86	Pk	32.9	-25.3	57.46	-	-	74	-16.54	199	305	V
3	* 2.4835	33.62	VA1T	32.9	-25.3	41.22	54	-12.78	-	-	199	305	V
4	* 2.48351	33.65	VA1T	32.9	-25.3	41.25	54	-12.75	-	-	199	305	V

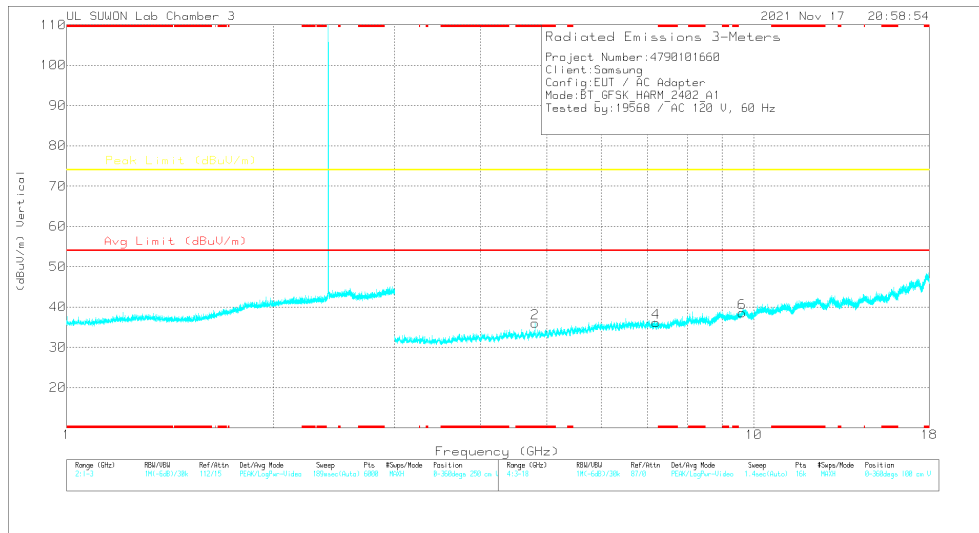
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HARMONICS AND SPURIOUS EMISSIONS

0 CHANNEL RESULTS



HORIZONTAL



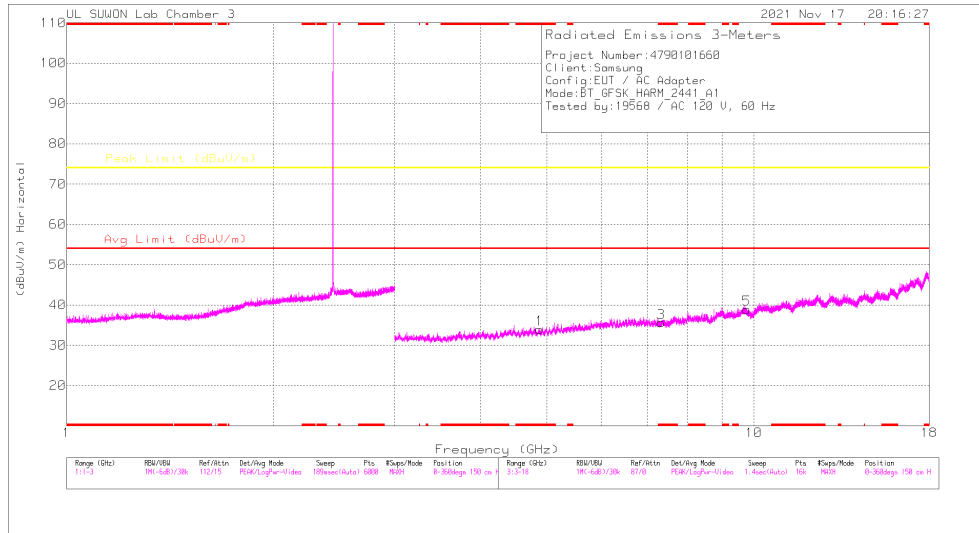
VERTICAL

RADIATED EMISSIONS

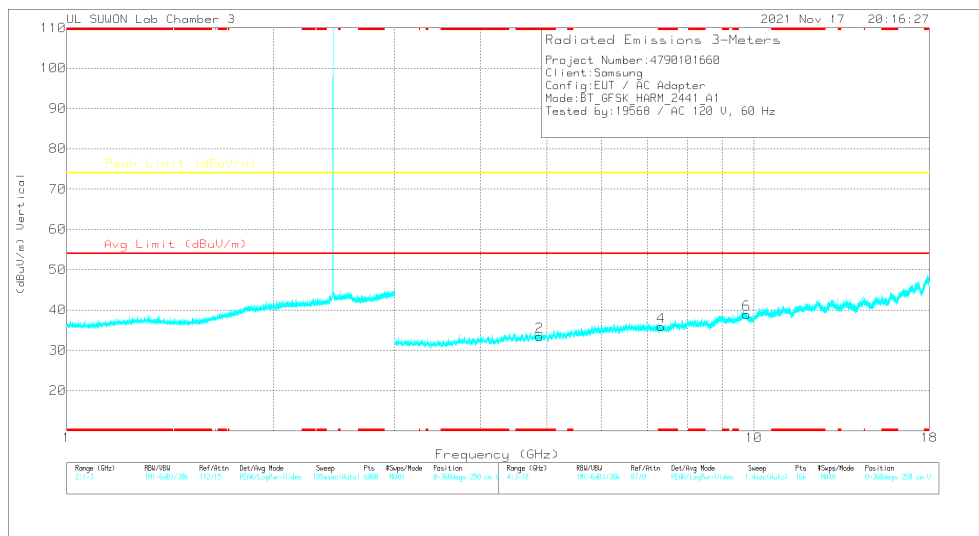
Frequency (GHz)	Meter Reading (dBuV)	Det	3117_0021895 7	3GHz_HP[dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
7.2072	33.07	PKFH	36.1	-26.1	43.07	-	-	74	-30.93	360	100	H
7.20746	33.99	PKFH	36.1	-26.1	43.99	-	-	74	-30.01	360	100	V
9.60862	31.61	PKFH	37.3	-22.1	46.81	-	-	74	-27.19	360	100	H
9.60675	31.59	PKFH	37.3	-22.1	46.79	-	-	74	-27.21	360	100	V
* 4.80418	38.94	PKFH	34.6	-30.4	43.14	-	-	74	-30.86	201	100	H
* 4.80402	28.89	VA1T	34.6	-30.4	33.09	54	-20.91	-	-	201	100	H
* 4.80422	38.68	PKFH	34.6	-30.4	42.88	-	-	74	-31.12	179	249	V
* 4.80384	29.24	VA1T	34.6	-30.4	33.44	54	-20.56	-	-	179	249	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 PKFH FHSS/BT RB=100k for Frequencies<1GHz / RB=1MHz for Frequencies>1GHz, VB=3 x RB, Peak
 VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

39 CHANNEL RESULTS



HORIZONTAL



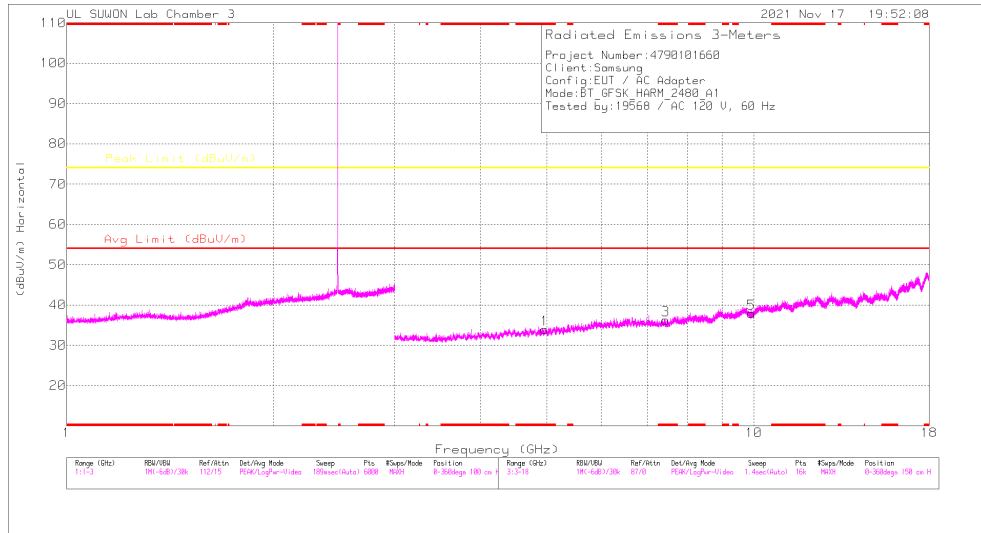
VERTICAL

RADIATED EMISSIONS

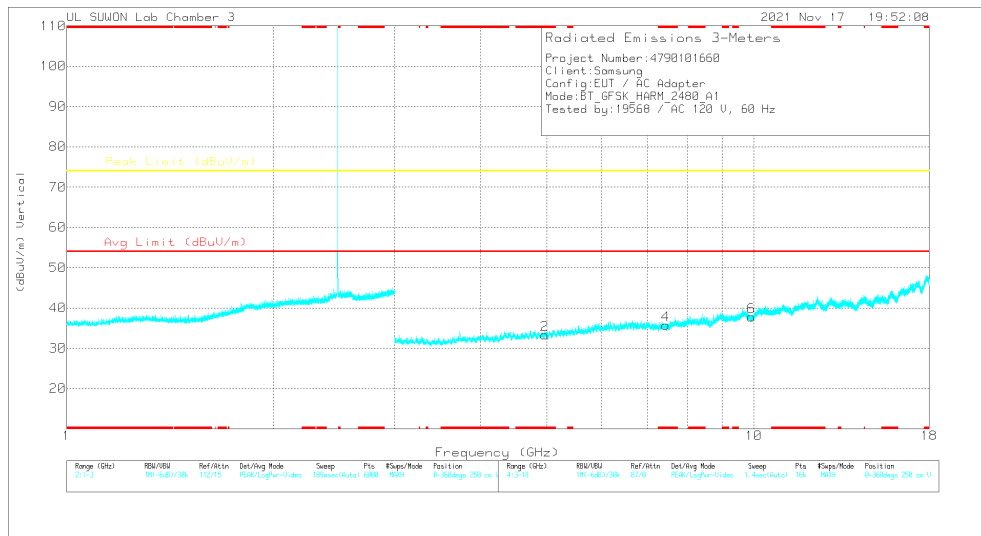
Frequency (GHz)	Meter Reading (dBuV)	Det	3117_0021895 7	3GHz_HP[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.88247	38.42	PKFH	34.7	-31.3	0	41.82	-	-	74	-32.18	360	100	H
* 4.88397	37.23	PKFH	34.7	-31.3	0	40.63	-	-	74	-33.37	360	100	V
* 7.3245	32.74	PKFH	36	-25.5	0	43.24	-	-	74	-30.76	360	100	H
* 7.32349	33.44	PKFH	36	-25.4	0	44.04	-	-	74	-29.96	360	100	V
9.7637	30.29	PKFH	37.5	-21.7	0	46.09	-	-	74	-27.91	360	100	H
9.76285	30.62	PKFH	37.5	-21.7	0	46.42	-	-	74	-27.58	360	100	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 PKFH FHSS/BT RB=100k for Frequencies<1GHz / RB=1MHz for Frequencies>1GHz, VB=3 x RB, Peak

78 CHANNEL RESULTS



HORIZONTAL



VERTICAL

RADIATED EMISSIONS

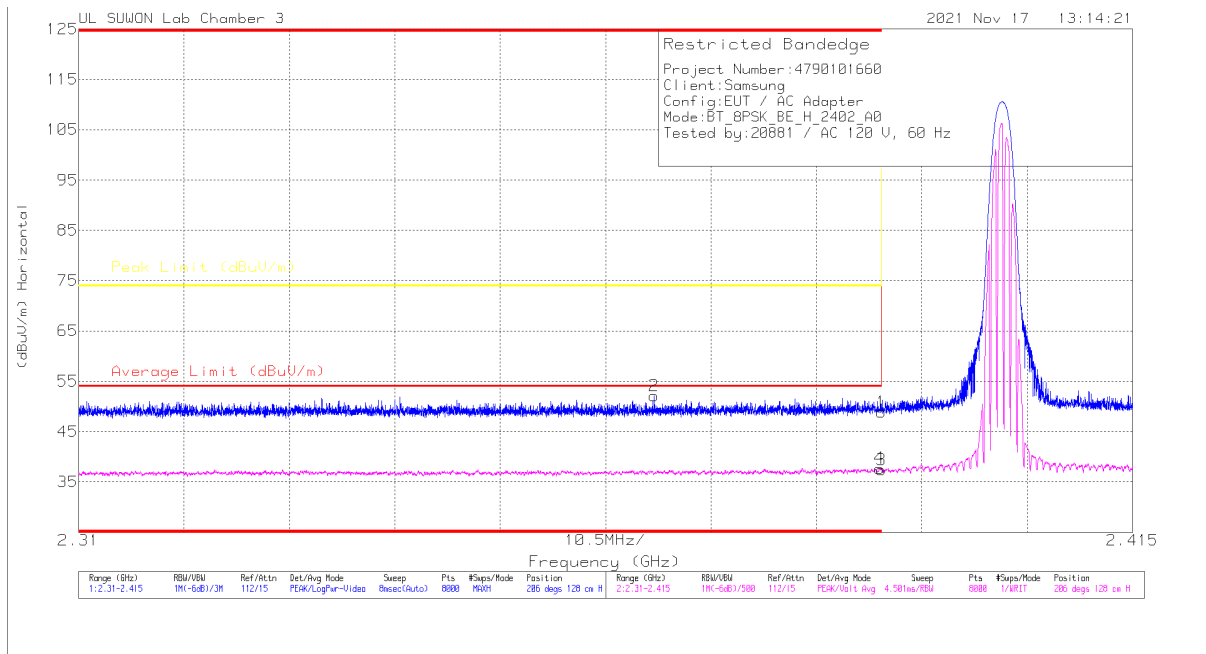
Frequency (GHz)	Meter Reading (dBuV)	Det	3117_0021895 7	3GHz_HP[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.95815	37.71	PKFH	34.7	-30.9	0	41.51	-	-	74	-32.49	360	100	H
* 4.9616	37.33	PKFH	34.7	-30.9	0	41.13	-	-	74	-32.87	360	100	V
* 7.44124	33.42	PKFH	36	-25.3	0	44.12	-	-	74	-29.88	360	100	H
* 7.43937	32.77	PKFH	36	-25.3	0	43.47	-	-	74	-30.53	360	100	V
9.92107	31.26	PKFH	37.7	-21.9	0	47.06	-	-	74	-26.94	360	100	H
9.91966	29.07	PKFH	37.7	-21.9	0	44.87	-	-	74	-29.13	360	100	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 PKFH FHSS/BT RB=100k for Frequencies<1GHz / RB=1MHz for Frequencies>1GHz, VB=3 x RB, Peak

10.1.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION

ANT1 BANDEDGE (0 CHANNEL)

HORIZONTAL RESULT

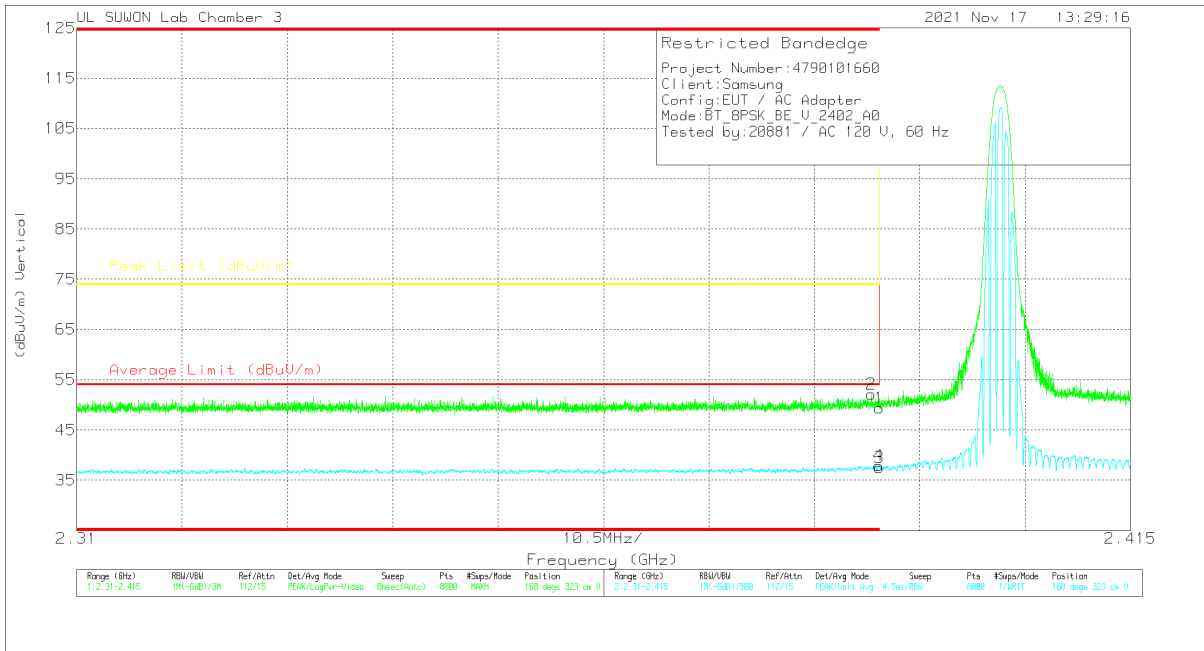


Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00218957	10dB_ATT[dB]	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	41.5	Pk	32.8	-25.4	48.9	-	-	74	-25.1	206	128	H
2	* 2.36734	44.8	Pk	32.7	-25.4	52.1	-	-	74	-21.9	206	128	H
3	* 2.39	30.07	VA1T	32.8	-25.4	37.47	54	-16.53	-	-	206	128	H
4	* 2.38981	30.33	VA1T	32.8	-25.4	37.73	54	-16.27	-	-	206	128	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 PK - Peak detector
 VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

VERTICAL RESULT



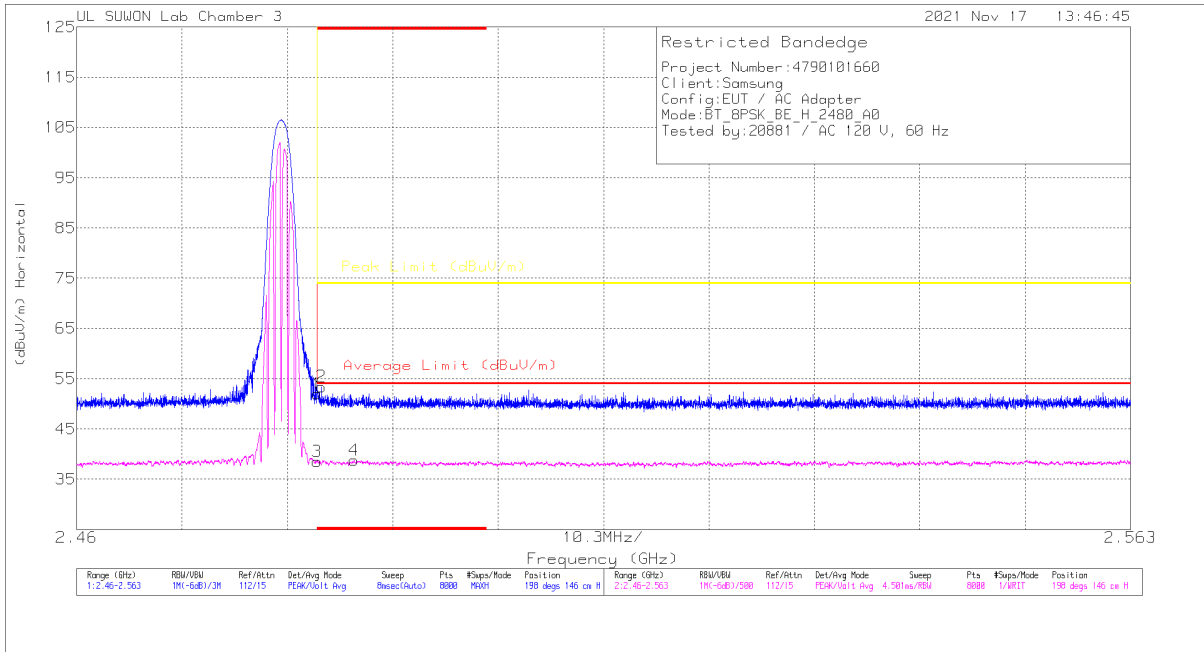
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00218957	10dB_ATT[dB]	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	41.94	Pk	32.8	-25.4	49.34	-	-	74	-24.66	168	323	V
2	* 2.38918	44.72	Pk	32.8	-25.4	52.12	-	-	74	-21.88	168	323	V
3	* 2.39	30.12	VA1T	32.8	-25.4	37.52	54	-16.48	-	-	168	323	V
4	* 2.38994	30.56	VA1T	32.8	-25.4	37.96	54	-16.04	-	-	168	323	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 Pk - Peak detector
 VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

BANDEDGE (78 CHANNEL)

HORIZONTAL RESULT

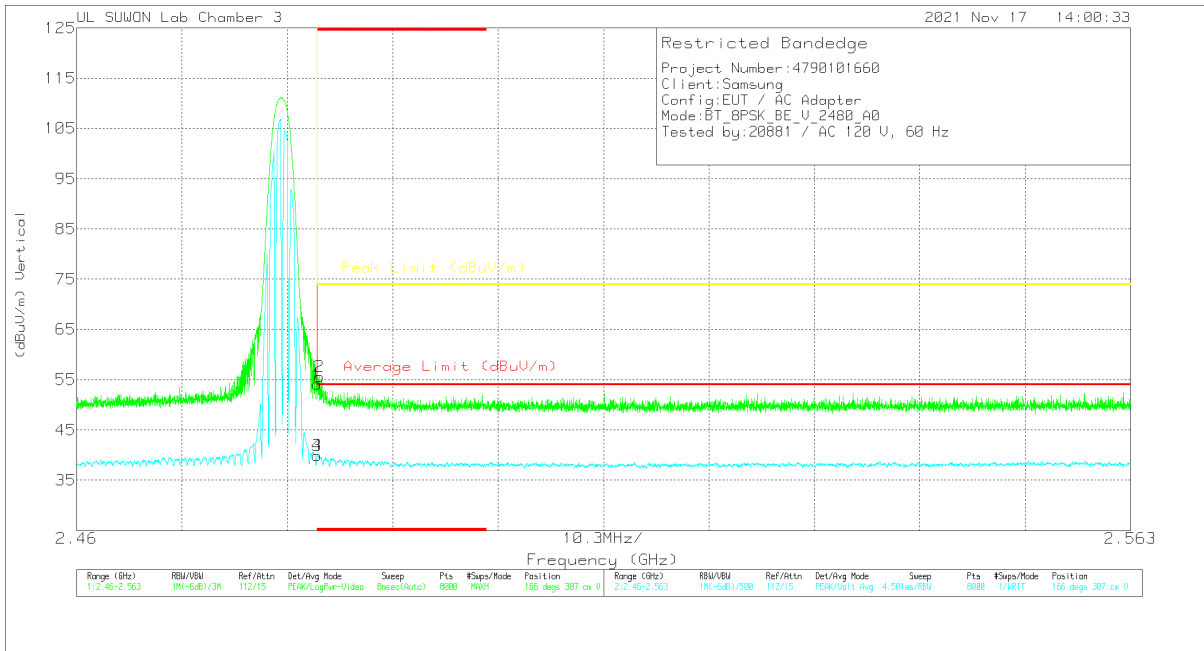


Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00218957	10dB_ATT[dB]	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.4835	44.35	Pk	32.9	-25.3	51.95	-	-	74	-22.05	198	146	H
2	* 2.48393	45.83	Pk	32.9	-25.3	53.43	-	-	74	-20.57	198	146	H
3	* 2.4835	30.97	VA1T	32.9	-25.3	38.57	54	-15.43	-	-	198	146	H
4	* 2.48711	31.13	VA1T	32.9	-25.2	38.83	54	-15.17	-	-	198	146	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 Pk - Peak detector
 VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

VERTICAL RESULT



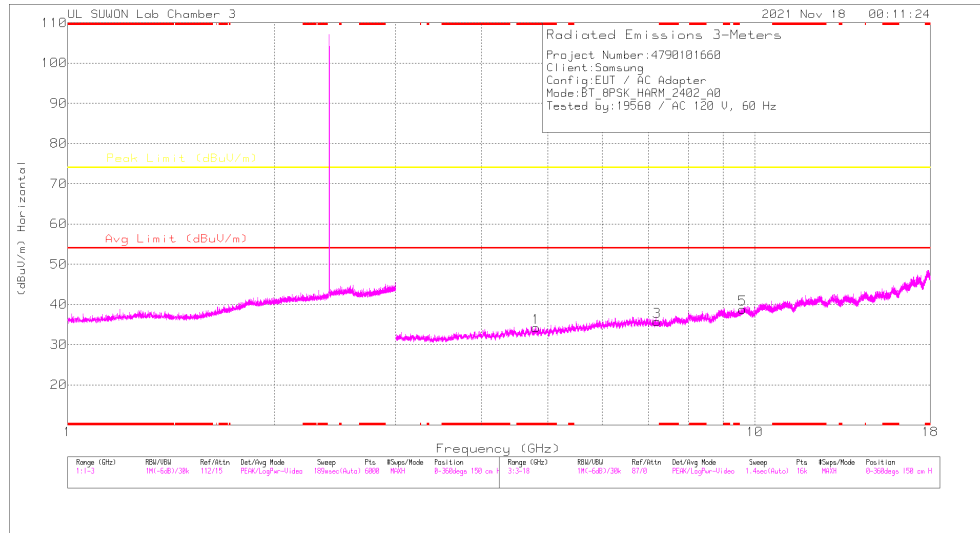
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00218957	10dB_ATT[dB]	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.4835	46.53	Pk		-25.3	54.13	-	-	74	-19.87	166	307	V
2	* 2.48376	47.99	Pk		-25.3	55.59	-	-	74	-18.41	166	307	V
3	* 2.4835	32.28	VA1T		-25.3	39.88	54	-14.12	-	-	166	307	V
4	* 2.48351	32.35	VA1T		-25.3	39.95	54	-14.05	-	-	166	307	V

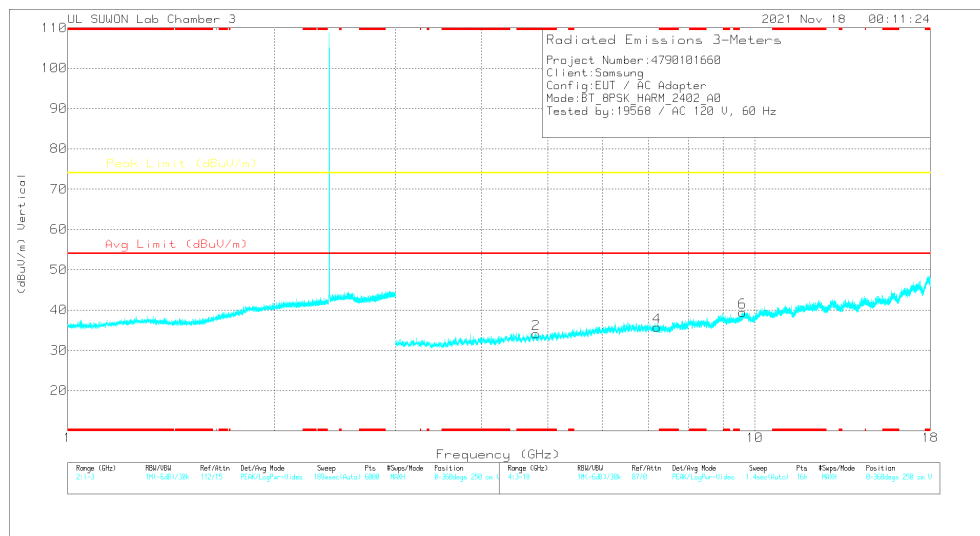
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 Pk - Peak detector
 VA1T - FHSS: Linear Voltage Average $V_B=1/T_{on}$ where: T_{on} is transmit duration

HARMONICS AND SPURIOUS EMISSIONS

0 CHANNEL RESULTS



HORIZONTAL



VERTICAL

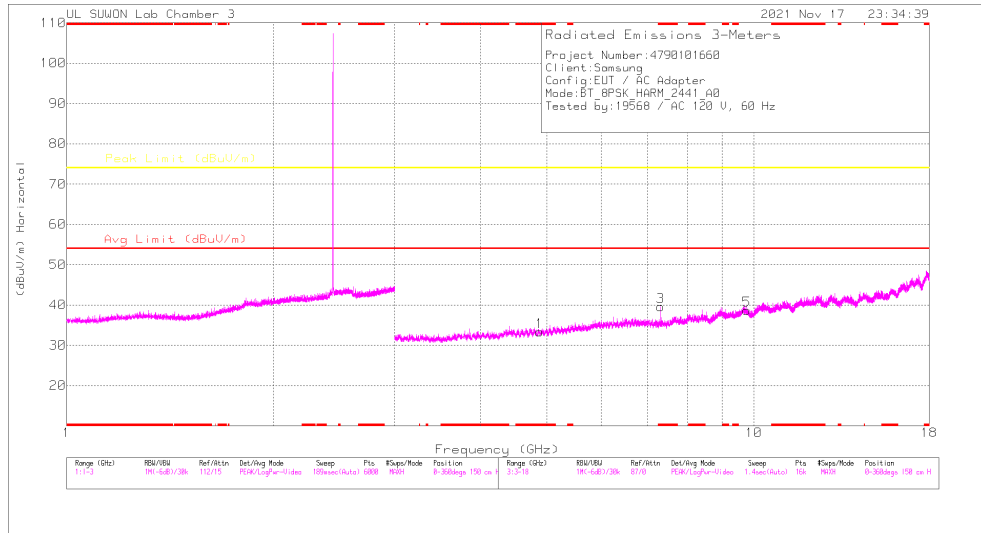
RADIATED EMISSIONS

Frequency (GHz)	Meter Reading (dBuV)	Det	3117_0021895 7	3GHz_HP[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.803	37.68	PKFH	-34.6	-30.5	0	41.78	-	-	74	-32.22	360	100	H
* 4.80529	37.49	PKFH	-34.6	-30.5	0	41.59	-	-	74	-32.41	360	100	V
7.20524	33.16	PKFH	-36.1	-26.1	0	43.16	-	-	74	-30.84	360	100	H
7.20784	32.59	PKFH	-36.1	-26.1	0	42.59	-	-	74	-31.41	360	100	V
9.60923	31.05	PKFH	-37.3	-22.1	0	46.25	-	-	74	-27.75	360	100	H
9.60955	31.24	PKFH	-37.3	-22.1	0	46.44	-	-	74	-27.56	360	100	V

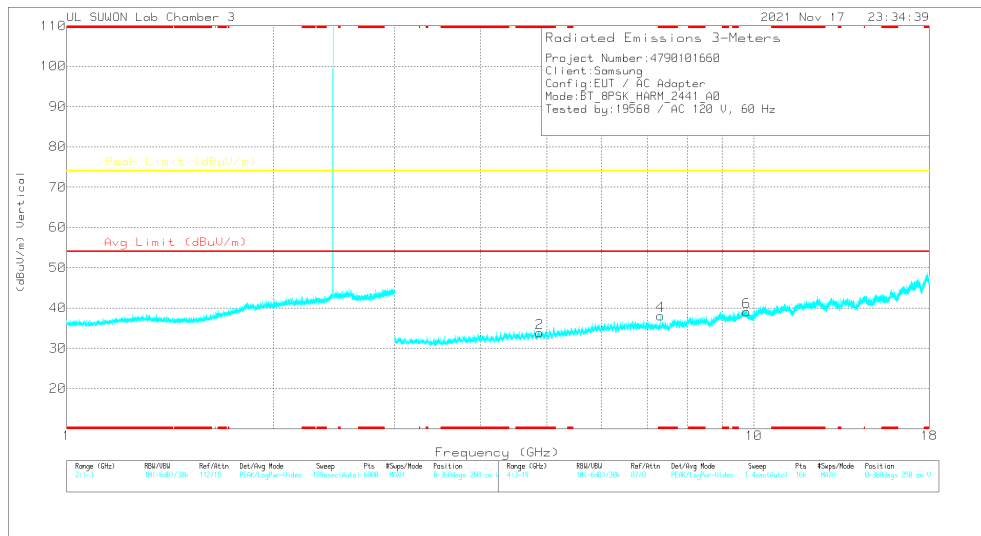
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

PKFH FHSS/BT RB=100k for Frequencies<1GHz / RB=1MHz for Frequencies>1GHz, VB=3 x RB, Peak

39 CHANNEL RESULTS



HORIZONTAL



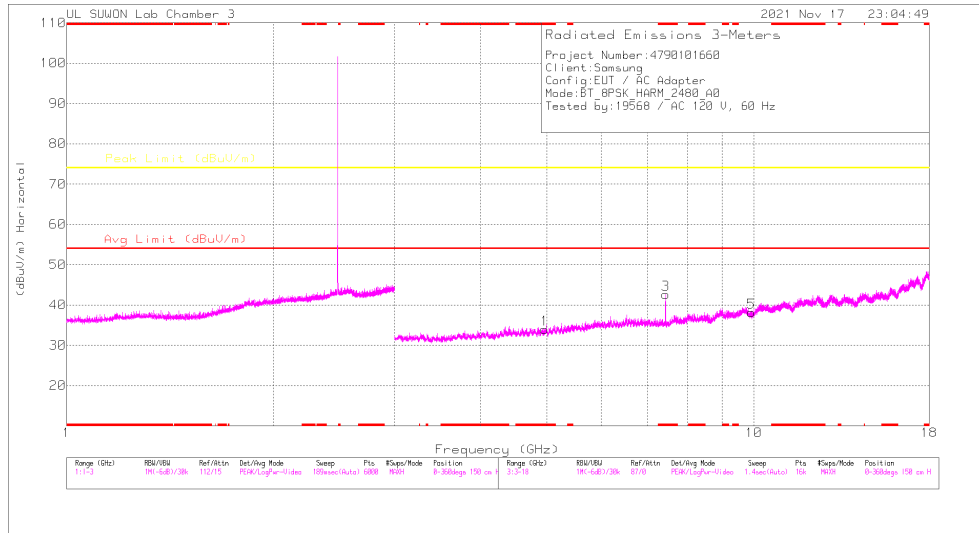
VERTICAL

RADIATED EMISSIONS

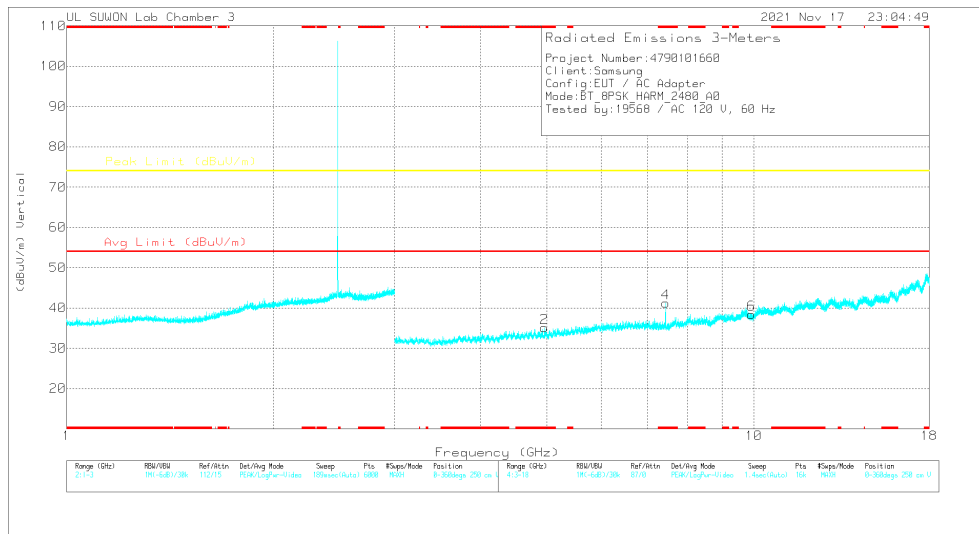
Frequency (GHz)	Meter Reading (dBuV)	Det	3117_0021895 7	3GHz_HP[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.88212	38.22	PKFH	34.7	-31.2	0	41.72	-	-	74	-32.28	360	100	H
* 4.88327	37.14	PKFH	34.7	-31.4	0	40.44	-	-	74	-33.56	360	100	V
* 7.32309	38.28	PKFH	36	-25.4	0	48.88	-	-	74	-25.12	304	106	H
* 7.32287	26.22	VA1T	36	-25.5	0	36.72	54	-17.28	-	-	304	106	H
* 7.32285	35.68	PKFH	36	-25.5	0	46.18	-	-	74	-27.82	199	100	V
* 7.32327	23.63	VA1T	36	-25.4	0	34.23	54	-19.77	-	-	199	100	V
9.76282	30.3	PKFH	37.5	-21.7	0	46.1	-	-	74	-27.9	360	100	H
9.76266	30.05	PKFH	37.5	-21.7	0	45.85	-	-	74	-28.15	360	100	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 PKFH FHSS/BT RB=100k for Frequencies<1GHz / RB=1MHz for Frequencies>1GHz, VB=3 x RB, Peak
 VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

78 CHANNEL RESULTS



HORIZONTAL



VERTICAL

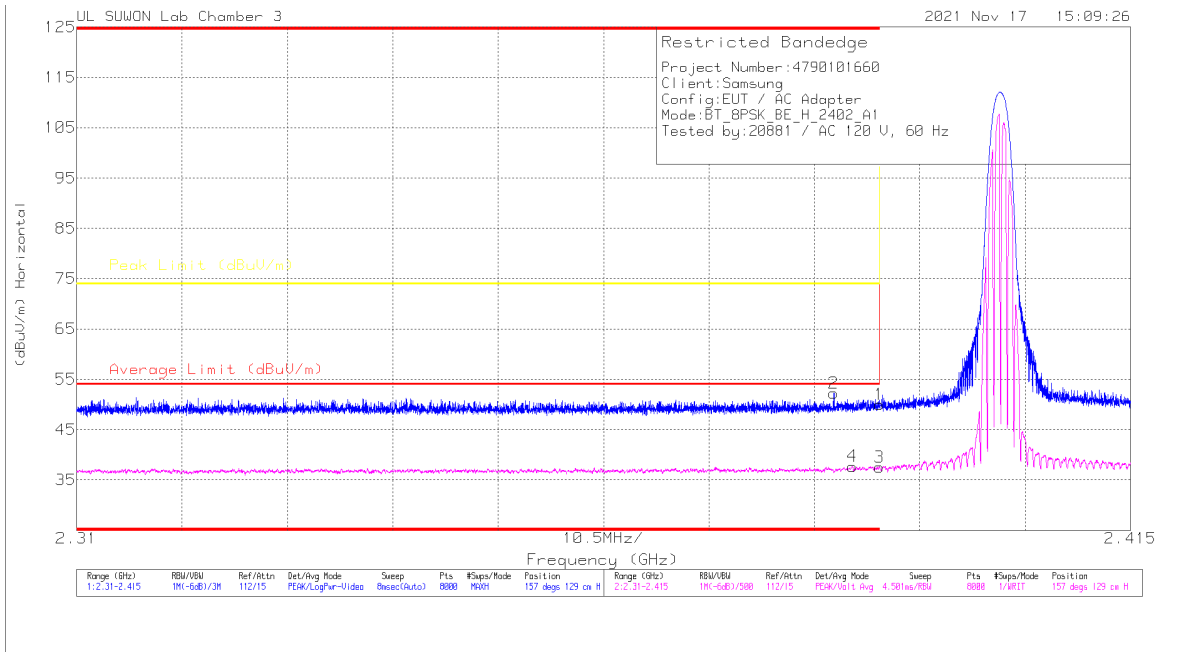
RADIATED EMISSIONS

Frequency (GHz)	Meter Reading (dBuV)	Det	3117_0021895 7	3GHz_HP[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.96056	37.91	PKFH	34.7	-30.9	0	41.71	-	-	74	-32.29	0	100	H
* 4.96122	37.46	PKFH	34.7	-30.9	0	41.26	-	-	74	-32.74	0	100	V
* 7.44018	38.52	PKFH	36	-25.3	0	49.22	-	-	74	-24.78	298	100	H
* 7.43994	27.52	VA1T	36	-25.3	0	38.22	54	-15.78	-	-	298	100	H
* 7.44008	34.73	PKFH	36	-25.3	0	45.43	-	-	74	-28.57	195	101	V
* 7.43996	23.49	VA1T	36	-25.3	0	34.19	54	-19.81	-	-	195	101	V
9.92313	29.77	PKFH	37.7	-21.9	0	45.57	-	-	74	-28.43	0	100	H
9.92272	29.67	PKFH	37.7	-21.9	0	45.47	-	-	74	-28.53	0	100	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 PKFH FHSS/BT RB=100k for Frequencies<1GHz / RB=1MHz for Frequencies>1GHz, VB=3 x RB, Peak
 VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

ANT2
BANDEDGE (0 CHANNEL)

HORIZONTAL RESULT

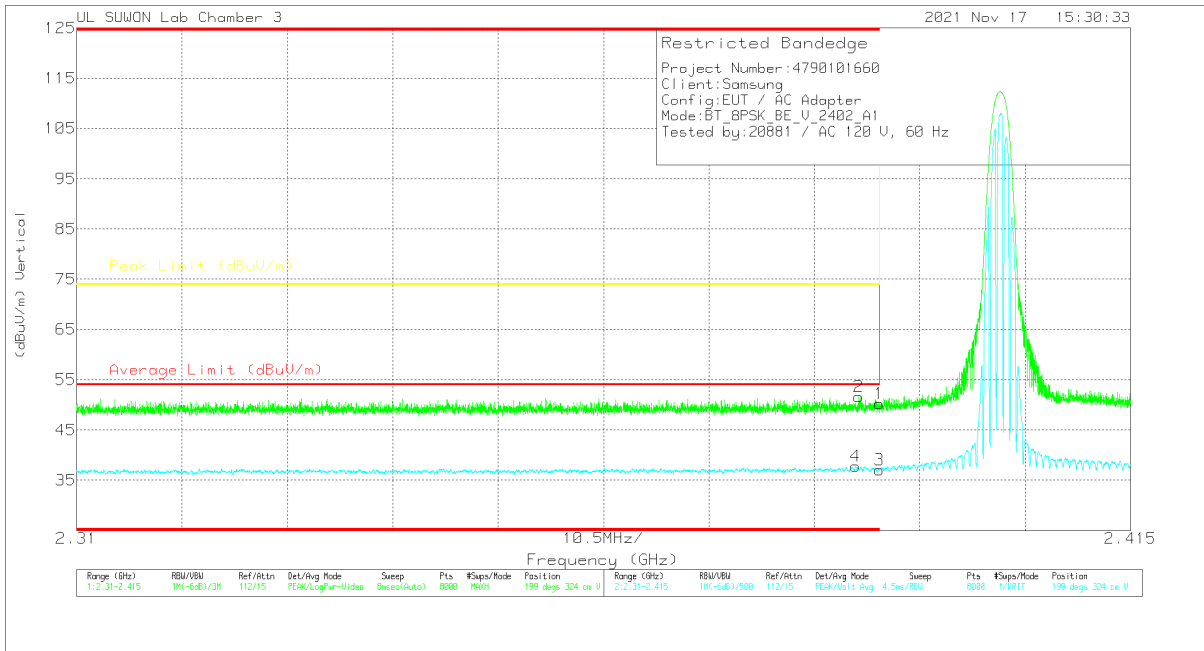


Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00218957	10dB_ATT[dB]	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	42.63	Pk	32.8	-25.4	50.03	-	-	74	-23.97	157	129	H
2	* 2.38545	44.97	Pk	32.7	-25.4	52.27	-	-	74	-21.73	157	129	H
3	* 2.39	30.17	VA1T	32.8	-25.4	37.57	54	-16.43	-	-	157	129	H
4	* 2.38728	30.43	VA1T	32.7	-25.4	37.73	54	-16.27	-	-	157	129	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 Pk - Peak detector
 VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

VERTICAL RESULT



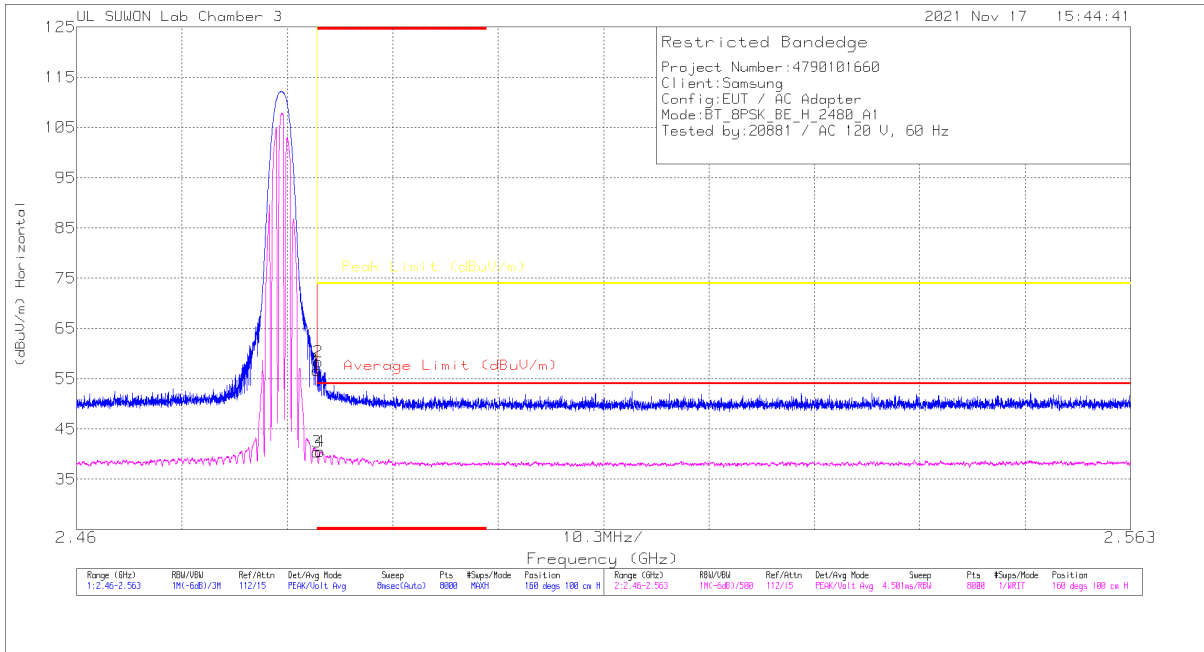
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00218957	10dB_ATT[dB]	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	42.89	Pk	32.8	-25.4	60.29	-	-	74	-23.71	199	324	V
2	* 2.38795	44.1	Pk	32.8	-25.3	51.6	-	-	74	-22.4	199	324	V
3	* 2.39	29.66	VA1T	32.8	-25.4	37.06	54	-16.94	-	-	199	324	V
4	* 2.38759	30.29	VA1T	32.8	-25.3	37.79	54	-16.21	-	-	199	324	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 Pk - Peak detector
 VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

BANDEDGE (78 CHANNEL)

HORIZONTAL RESULT

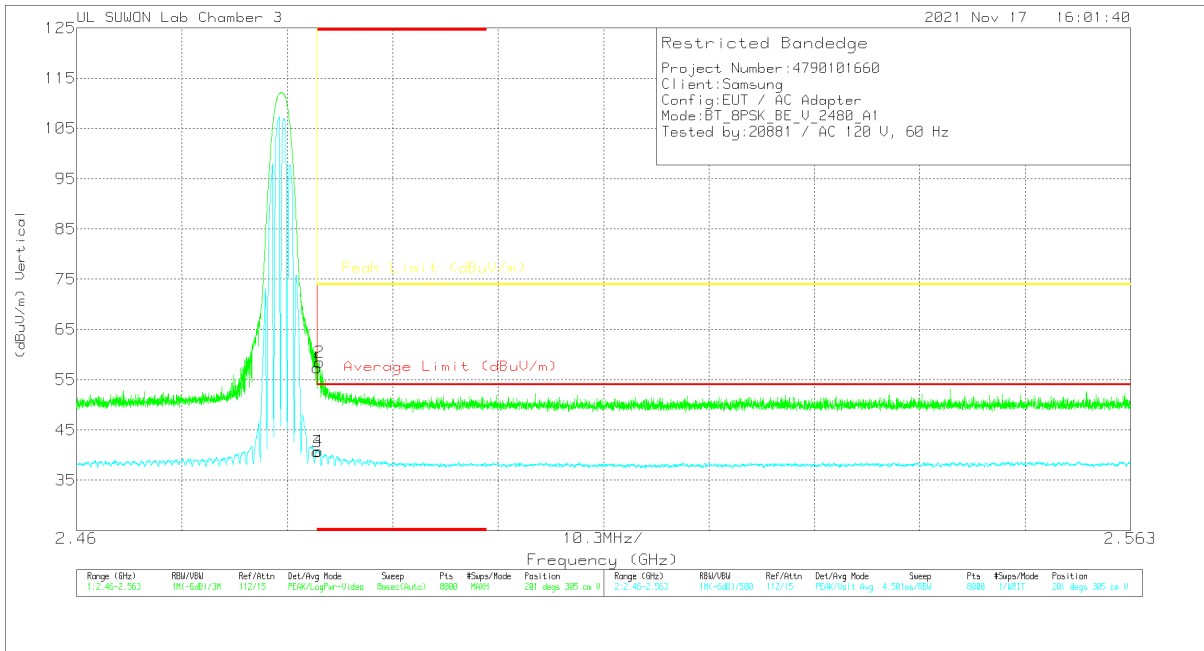


Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00218957	10dB_ATT[dB]	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.4835	49.07	Pk	32.9	-25.3	56.67	-	-	74	-17.33	160	100	H
2	* 2.4836	50.74	Pk	32.9	-25.3	58.34	-	-	74	-15.66	160	100	H
3	* 2.4835	32.83	VA1T	32.9	-25.3	40.43	54	-13.57	-	-	160	100	H
4	* 2.48378	32.97	VA1T	32.9	-25.3	40.57	54	-13.43	-	-	160	100	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 Pk - Peak detector
 VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

VERTICAL RESULT



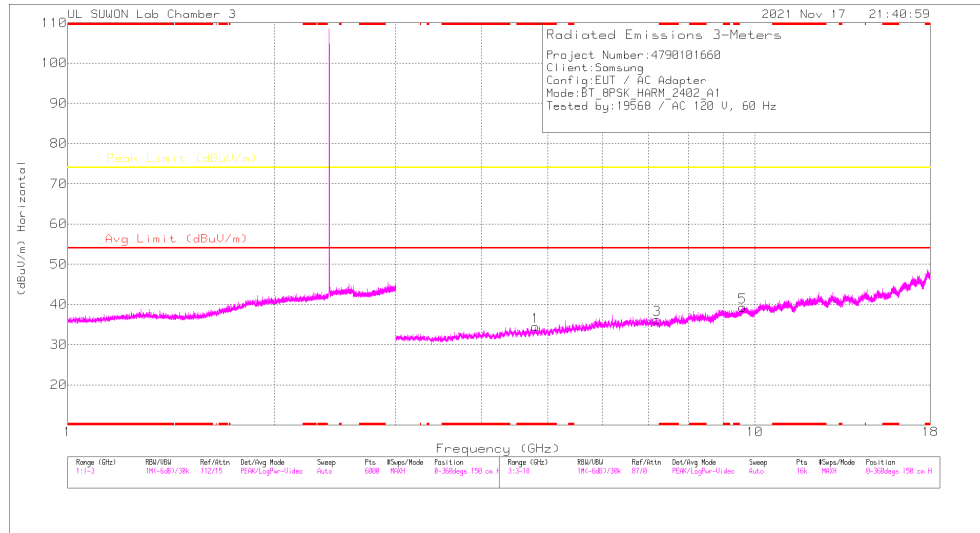
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00218957	10dB_ATT[dB]	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.4835	49.74	Pk		-25.3	57.34	-	-	74	-16.66	201	305	V
2	* 2.48376	50.9	Pk		-25.3	58.5	-	-	74	-15.5	201	305	V
3	* 2.4835	33.02	VA1T		-25.3	40.62	54	-13.38	-	-	201	305	V
4	* 2.48359	33.19	VA1T		-25.3	40.79	54	-13.21	-	-	201	305	V

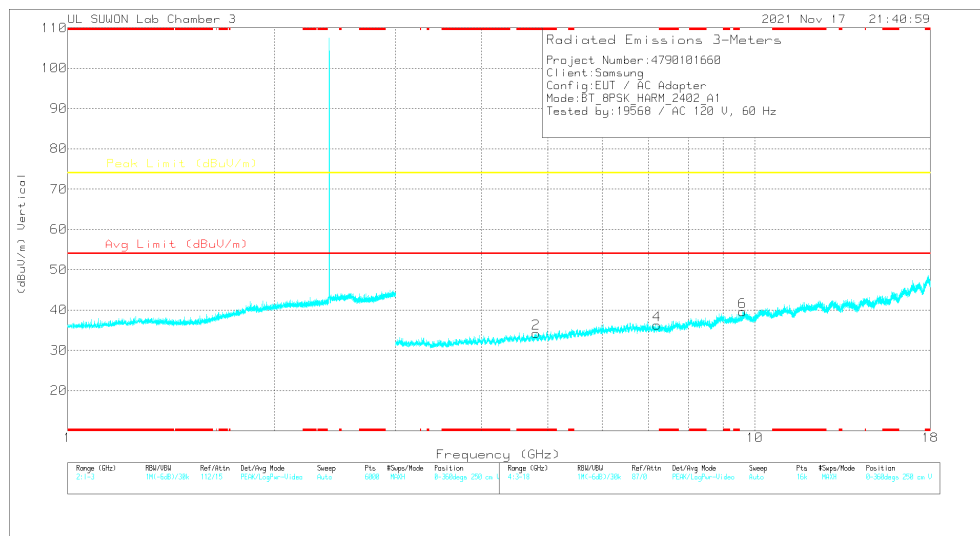
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 Pk - Peak detector
 VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

HARMONICS AND SPURIOUS EMISSIONS

0 CHANNEL RESULTS



HORIZONTAL



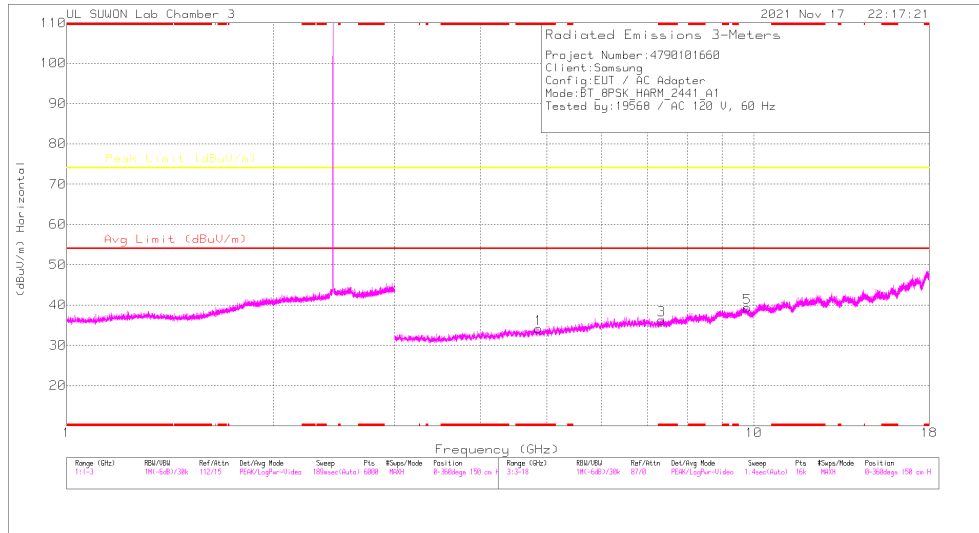
VERTICAL

RADIATED EMISSIONS

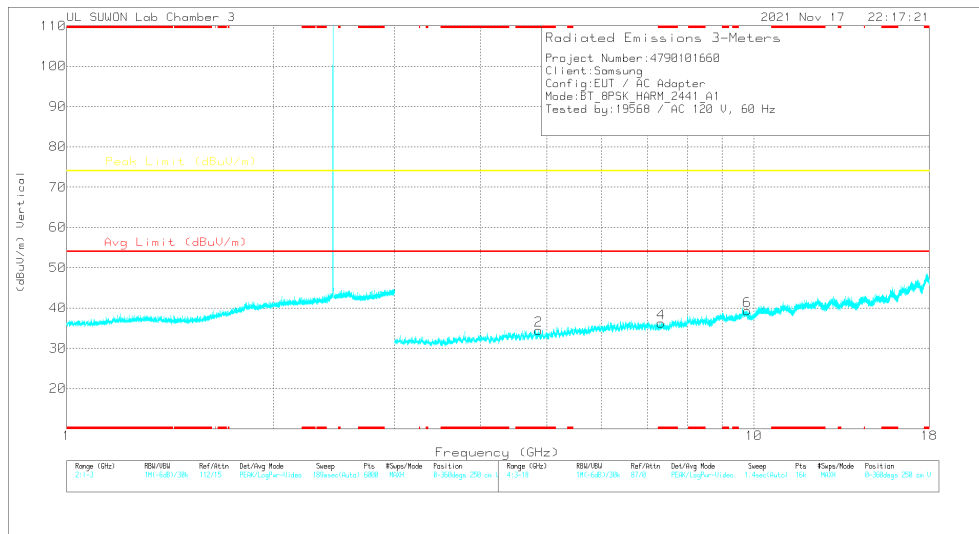
Frequency (GHz)	Meter Reading (dBuV)	Det	3117_0021895 7	3GHz_HP[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.80564	38.31	PKFH	-34.6	-30.5	0	42.41	-	-	74	-31.59	0	100	H
* 4.80457	37.56	PKFH	34.6	-30.4	0	41.76	-	-	74	-32.24	0	100	V
7.20628	33.19	PKFH	36.1	-26.1	0	43.19	-	-	74	-30.81	0	100	H
7.2071	33.18	PKFH	36.1	-26.1	0	43.18	-	-	74	-30.82	0	100	V
9.60608	31.37	PKFH	37.3	-22.1	0	46.57	-	-	74	-27.43	0	100	H
9.60759	31.52	PKFH	37.3	-22.1	0	46.72	-	-	74	-27.28	0	100	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 PKFH FHSS/BT RB=100k for Frequencies<1GHz / RB=1MHz for Frequencies>1GHz, VB=3 x RB, Peak

39 CHANNEL RESULTS



HORIZONTAL



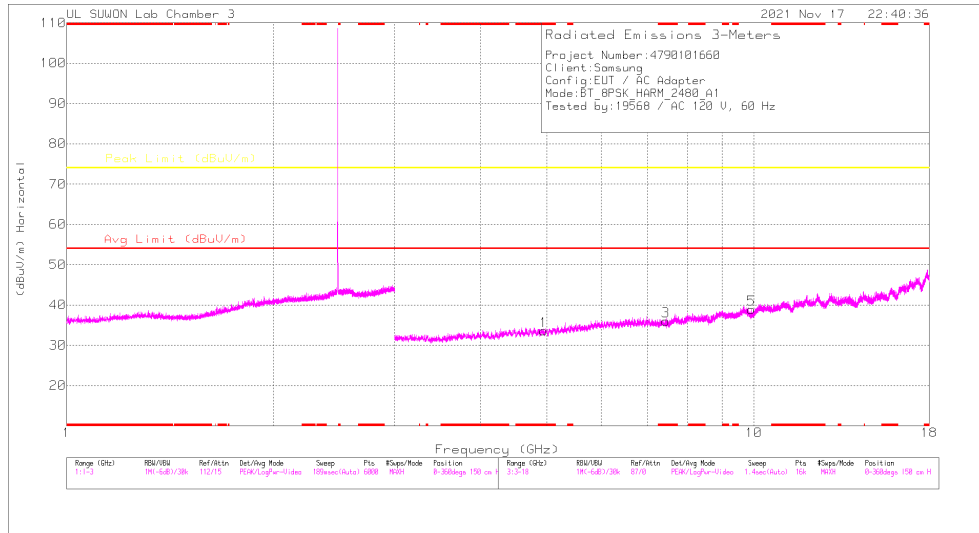
VERTICAL

RADIATED EMISSIONS

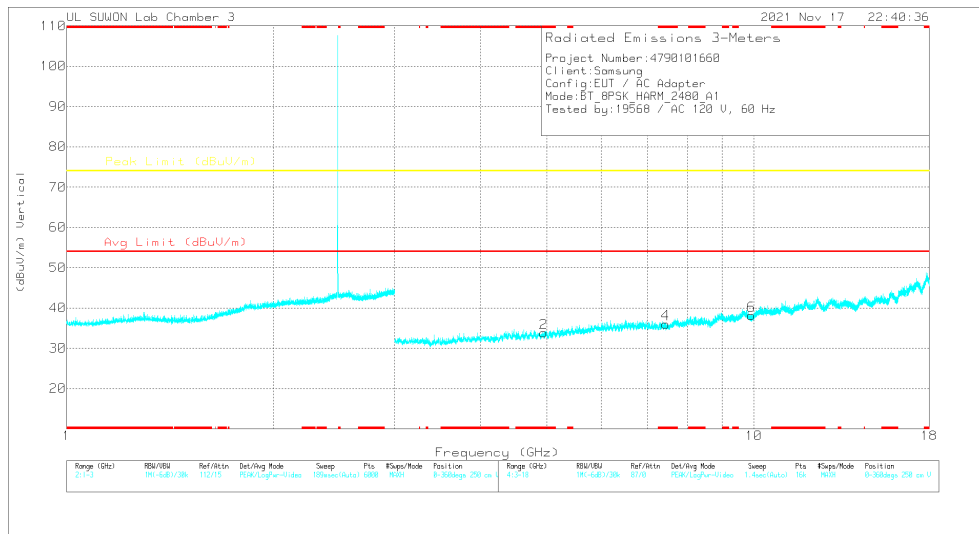
Frequency (GHz)	Meter Reading (dBuV)	Det	3117_0021895 7	3GHz_HP[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.88035	37.87	PKFH	34.7	-31.2	0	41.37	-	-	74	-32.63	0	100	H
* 4.88328	38.17	PKFH	34.7	-31.4	0	41.47	-	-	74	-32.53	0	100	V
* 7.32326	32.82	PKFH	36	-25.4	0	43.42	-	-	74	-30.58	0	100	H
* 7.32214	32.41	PKFH	36	-25.5	0	42.91	-	-	74	-31.09	0	100	V
9.76477	30.65	PKFH	37.5	-21.8	0	46.35	-	-	74	-27.65	0	100	H
9.76265	30.77	PKFH	37.5	-21.7	0	46.57	-	-	74	-27.43	0	100	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 PKFH FHSS/BT RB=100k for Frequencies<1GHz / RB=1MHz for Frequencies>1GHz, VB=3 x RB, Peak

78 CHANNEL RESULTS



HORIZONTAL



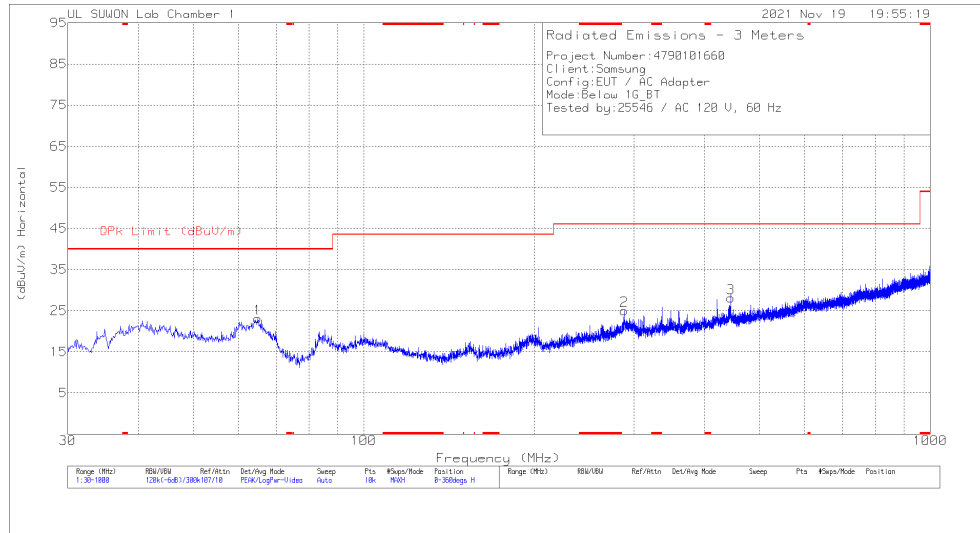
VERTICAL

RADIATED EMISSIONS

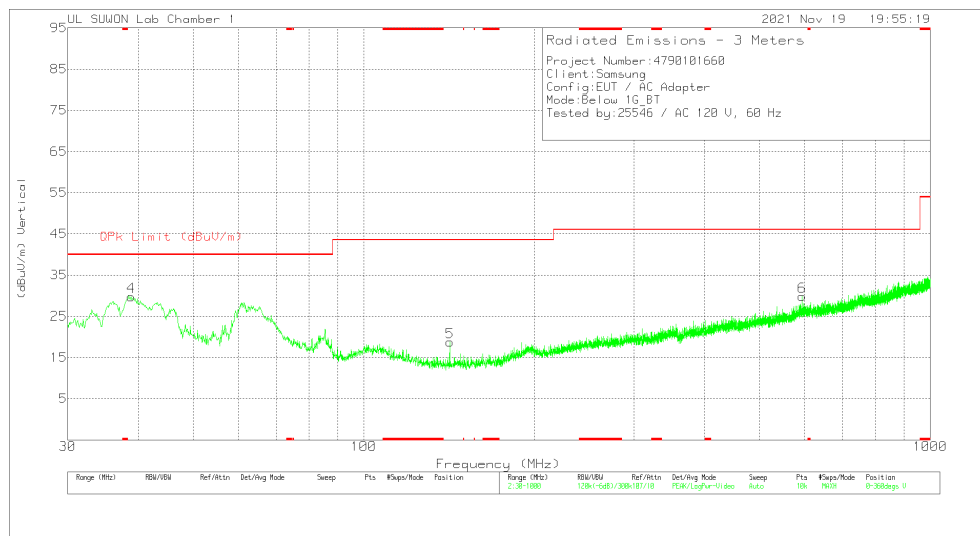
Frequency (GHz)	Meter Reading (dBuV)	Det	3117_0021895 7	3GHz_HP[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.95942	37.04	PKFH	34.7	-30.9	0	40.84	-	-	74	-33.16	0	100	H
* 4.96183	37.38	PKFH	34.7	-30.9	0	41.18	-	-	74	-32.82	0	100	V
* 7.442	32.55	PKFH	36	-25.4	0	43.15	-	-	74	-30.85	0	100	H
* 7.43904	34.08	PKFH	36	-25.3	0	44.78	-	-	74	-29.22	0	100	V
9.92055	30.01	PKFH	37.7	-21.9	0	45.81	-	-	74	-28.19	0	100	H
9.92181	29.85	PKFH	37.7	-21.9	0	45.65	-	-	74	-28.35	0	100	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 PKFH FHSS/BT RB=100k for Frequencies<1GHz / RB=1MHz for Frequencies>1GHz, VB=3 x RB, Peak

10.2. WORST CASE BELOW 1 GHZ SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION)



HORIZONTAL



VERTICAL

Below 1GHz Data

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	VULB9163_750	Below_1G[dB]	Corrected Reading (dBuV/m)	QPK Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	64.92	36.73	Pk	17.2	-30.8	23.13	40	-16.87	0-360	300	H
2	288.214	34.55	Pk	19	-28.5	25.05	46.02	-20.97	0-360	100	H
3	444.481	33.75	Pk	22.1	-27.7	28.15	46.02	-17.87	0-360	100	H
4	38.827	42.59	Pk	18.3	-31.1	29.79	40	-10.21	0-360	200	V
5	141.841	34.72	Pk	13.8	-29.8	18.72	43.52	-24.8	0-360	200	V
6	593.667	31.83	Pk	25.2	-27.2	29.83	46.02	-16.19	0-360	300	V

Pk - Peak detector

11. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 8.8

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 C63.10:2013.

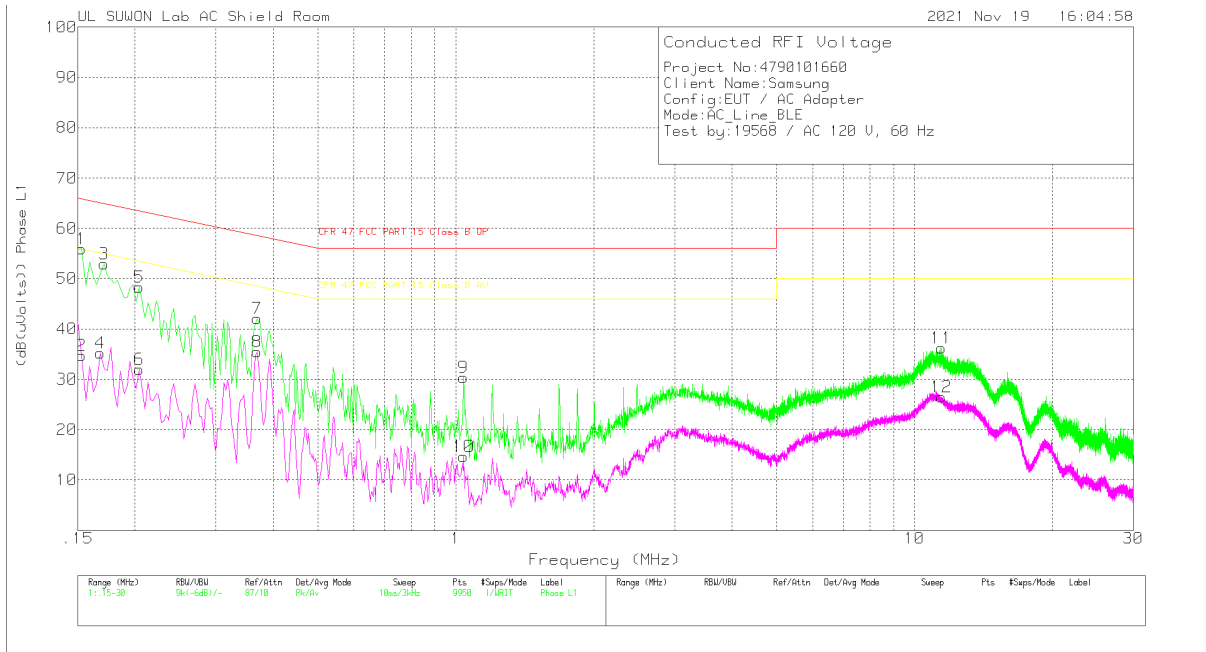
The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

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

RESULTS

11.1.1. AC Power Line

LINE 1 RESULTS



Trace Markers

Range 1: Phase L1 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	101836_With EX_L1[dB]	CABLELOS S(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	.153	45.96	Pk	9.8	.1	55.86	65.84	-9.98	-	-
2	.153	24.83	Av	9.8	.1	34.73	-	-	55.84	-21.11
3	.171	42.74	Pk	10	.2	52.94	64.91	-11.97	-	-
4	.168	25.14	Av	10	.1	35.24	-	-	55.06	-19.82
5	.204	38.29	Pk	9.8	.2	48.29	63.45	-15.16	-	-
6	.204	21.97	Av	9.8	.2	31.97	-	-	53.45	-21.48
7	.369	32.1	Pk	9.8	.2	42.1	58.52	-16.42	-	-
8	.369	25.51	Av	9.8	.2	35.51	-	-	48.52	-13.01
9	1.041	20.39	Pk	9.7	.3	30.39	56	-25.61	-	-
10	1.041	4.63	Av	9.7	.3	14.63	-	-	46	-31.37
11	11.457	25.99	Pk	9.9	.3	36.19	60	-23.81	-	-
12	11.454	16.34	Av	9.9	.3	26.54	-	-	50	-23.46

Pk - Peak detector

Av - Average detection

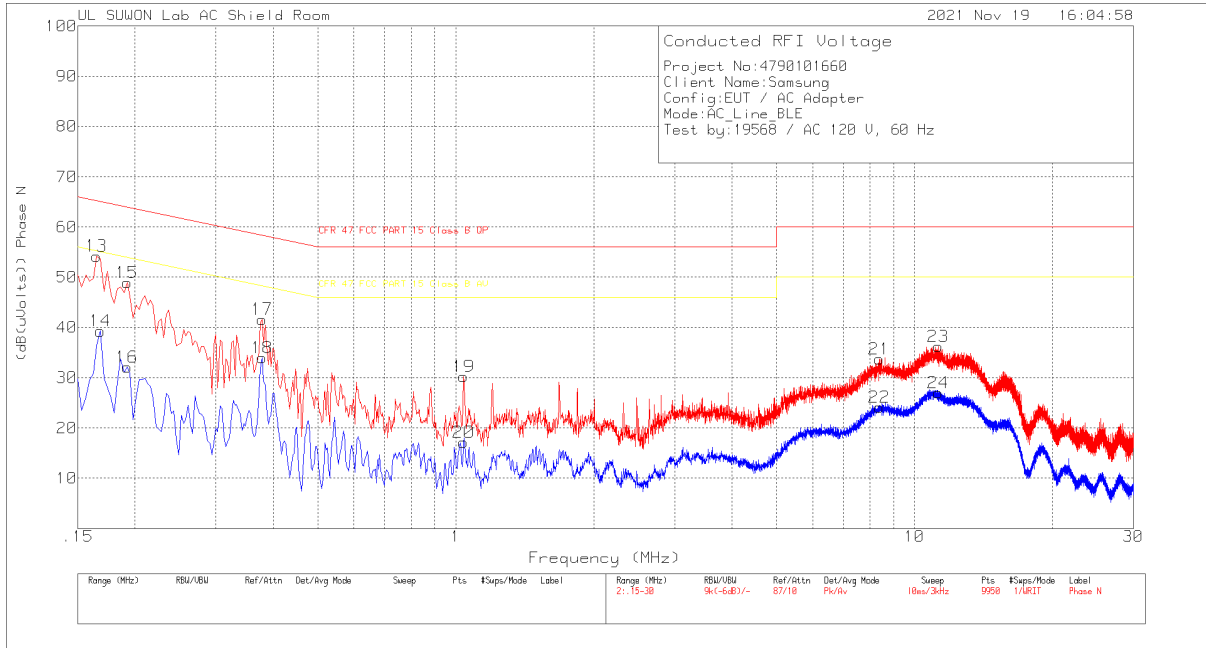
Quasi-Peak Emissions

Range 1: Phase L1 .15 - 30MHz

Frequency (MHz)	Meter Reading (dBuV)	Det	101836_With EX_L1[dB]	CABLELOS S(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)
.15225	38.42	Qp	9.7	.1	48.22	65.88	-17.66	-	-

Qp - Quasi-Peak detector

LINE 2 RESULTS



Trace Markers

Range 1: Phase L1 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	101836_Wit h EX_L1[dB]	CABLELOSS S(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	.171	40.54	Pk	10	.2	50.74	64.91	-14.17	-	-
2	.174	20.45	Av	10	.2	30.65	-	-	54.77	-24.12
3	.384	33	Pk	9.8	.2	43	58.19	-15.19	-	-
4	.381	23.07	Av	9.8	.2	33.07	-	-	48.26	-15.19
5	1.041	19.33	Pk	9.7	.3	29.33	56	-26.67	-	-
6	1.041	4.43	Av	9.7	.3	14.43	-	-	46	-31.57
7	1.2	18.08	Pk	9.7	.3	28.08	56	-27.92	-	-
8	1.203	1.71	Av	9.7	.3	11.71	-	-	46	-34.29
9	1.839	17.8	Pk	9.7	.3	27.8	56	-28.2	-	-
10	1.845	4.31	Av	9.7	.3	14.31	-	-	46	-31.69
11	2.643	17.55	Pk	9.7	.3	27.55	56	-28.45	-	-
12	2.643	6.21	Av	9.7	.3	16.21	-	-	46	-29.79

Pk - Peak detector
 Av - Average detection

END OF TEST REPORT