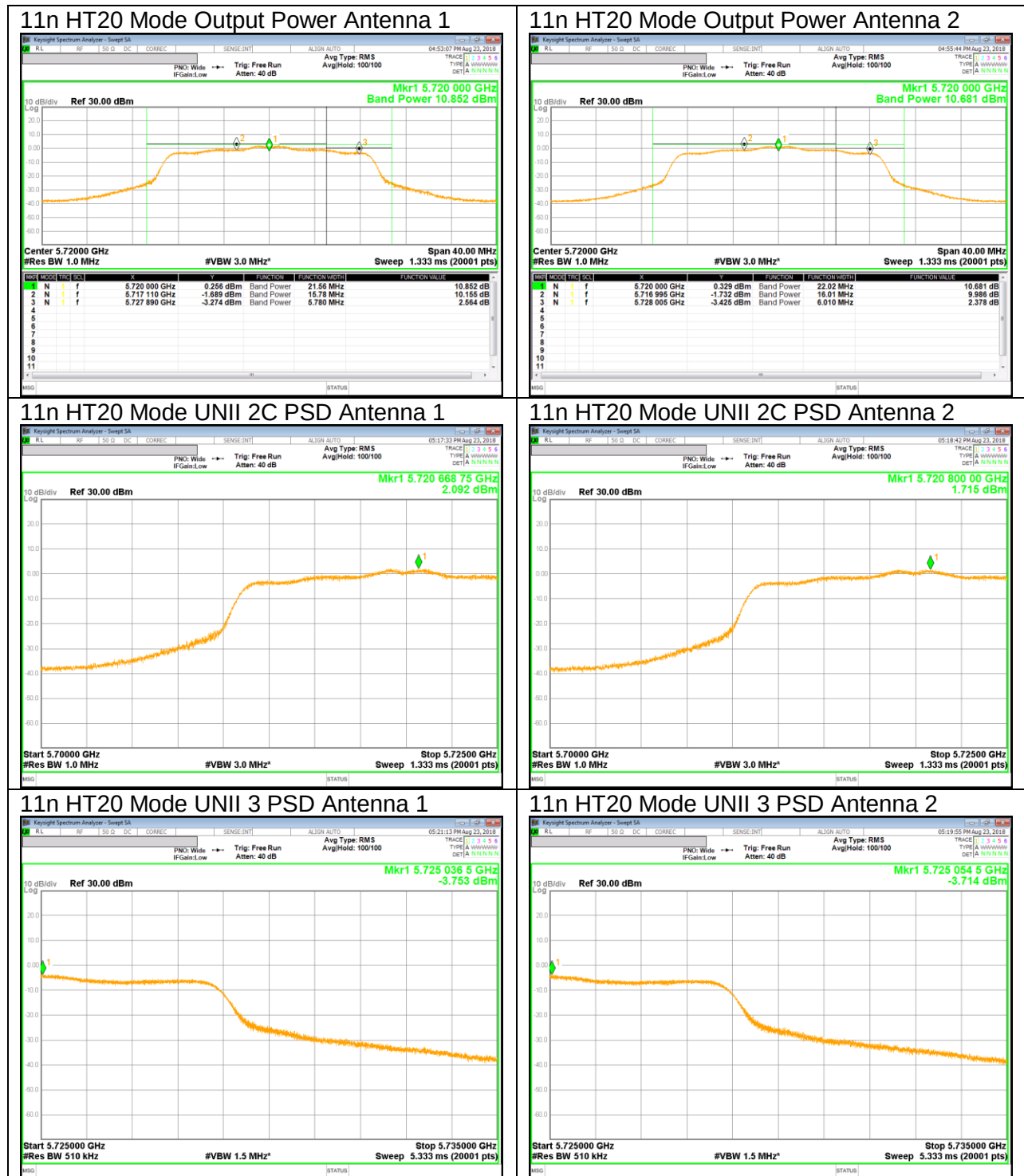
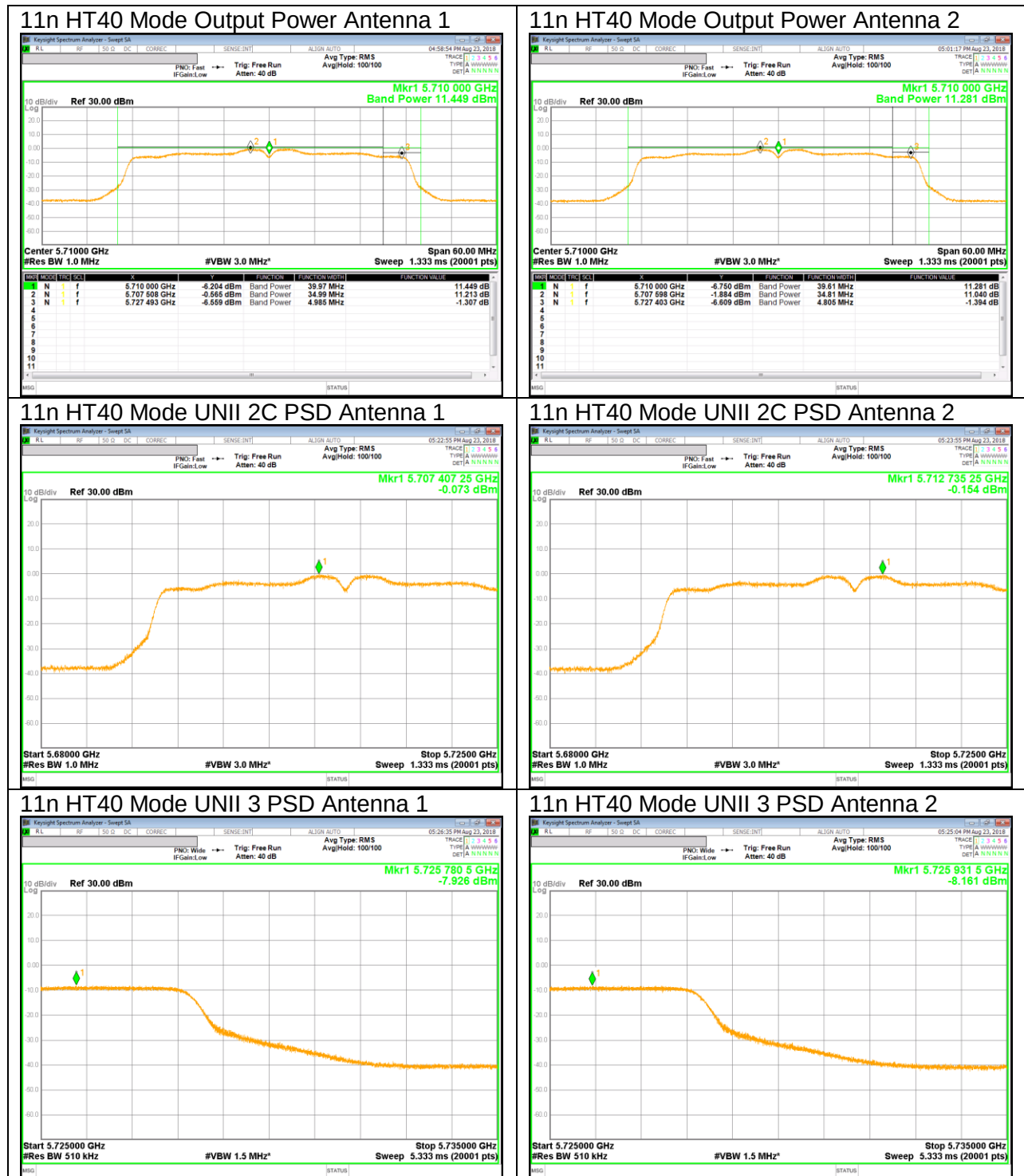


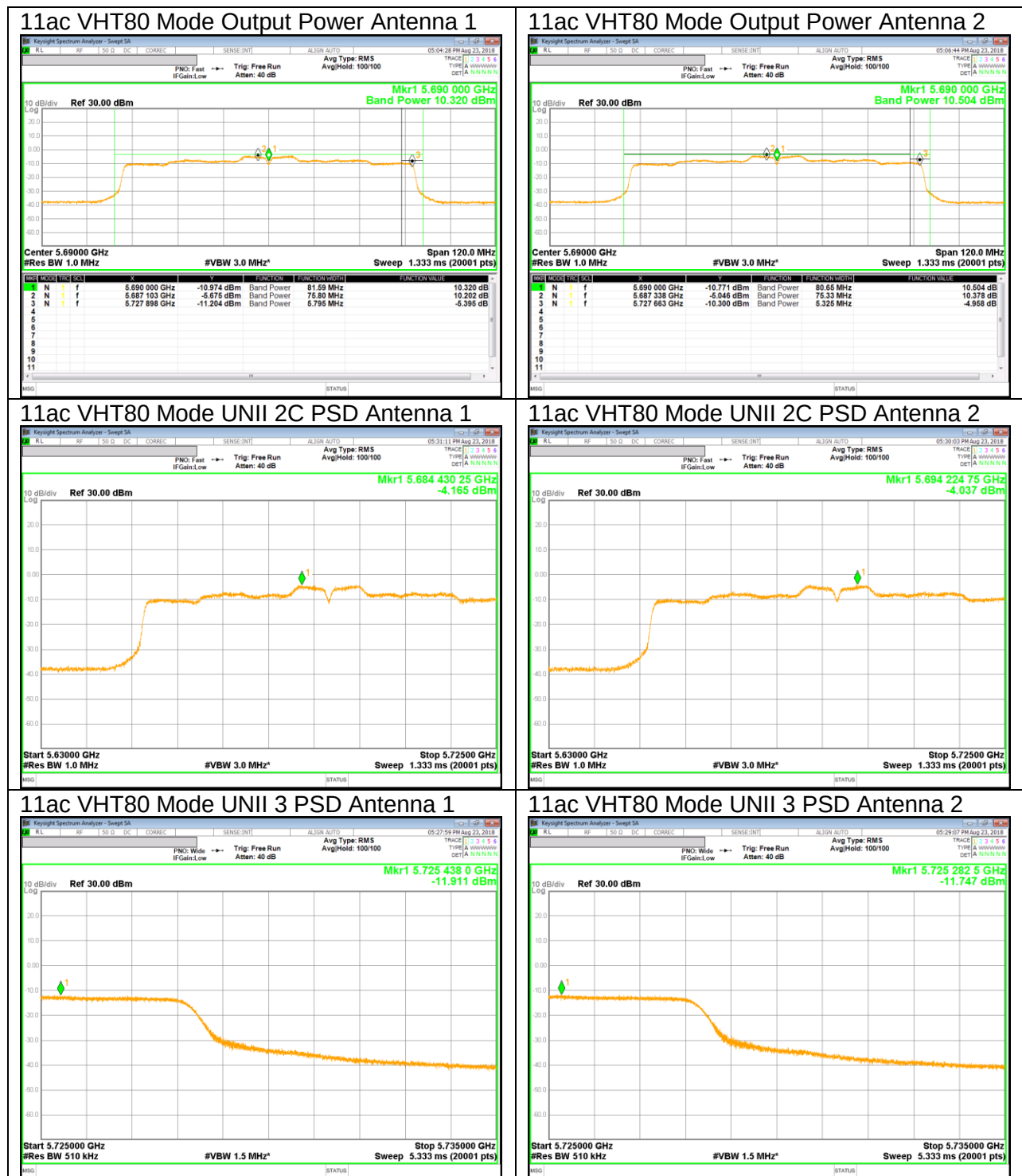
UNII Straddle Ch. IEEE 802.11n HT20 mode Ourput Power and PSD



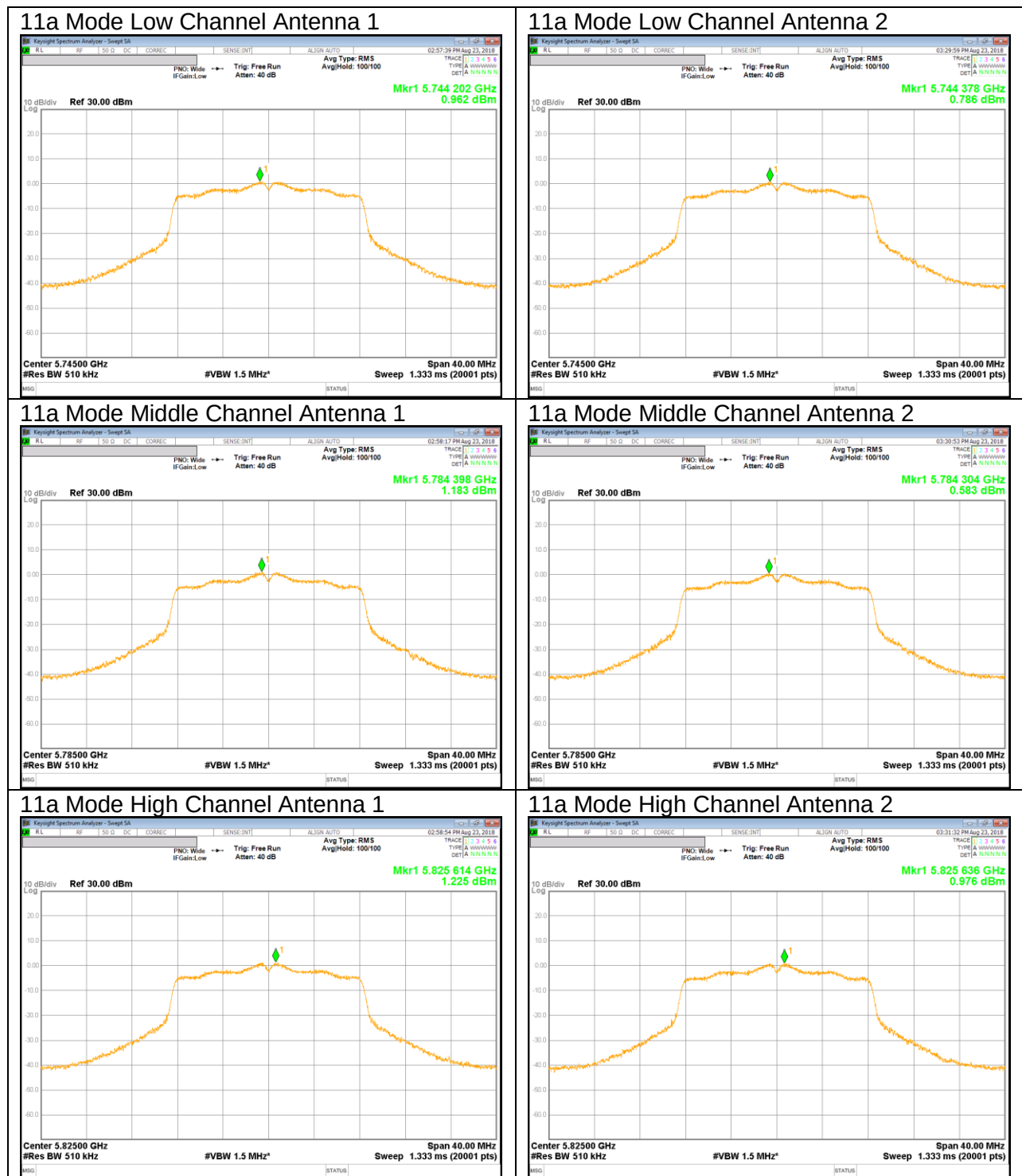
UNII Straddle Ch. IEEE 802.11n HT40 mode Ourput Power and PSD



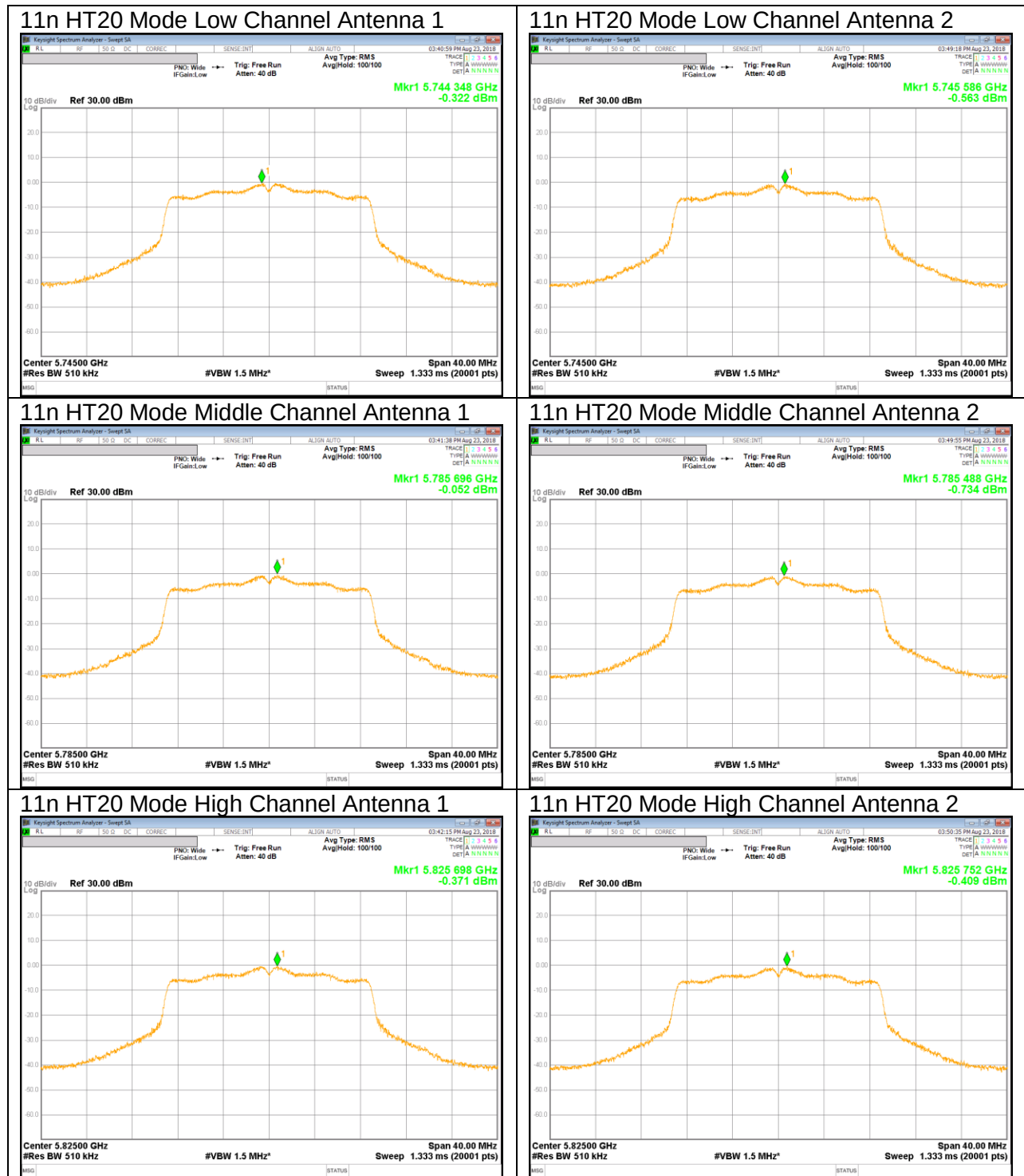
UNII Straddle Ch. IEEE 802.11ac VHT80 mode Ourput Power and PSD



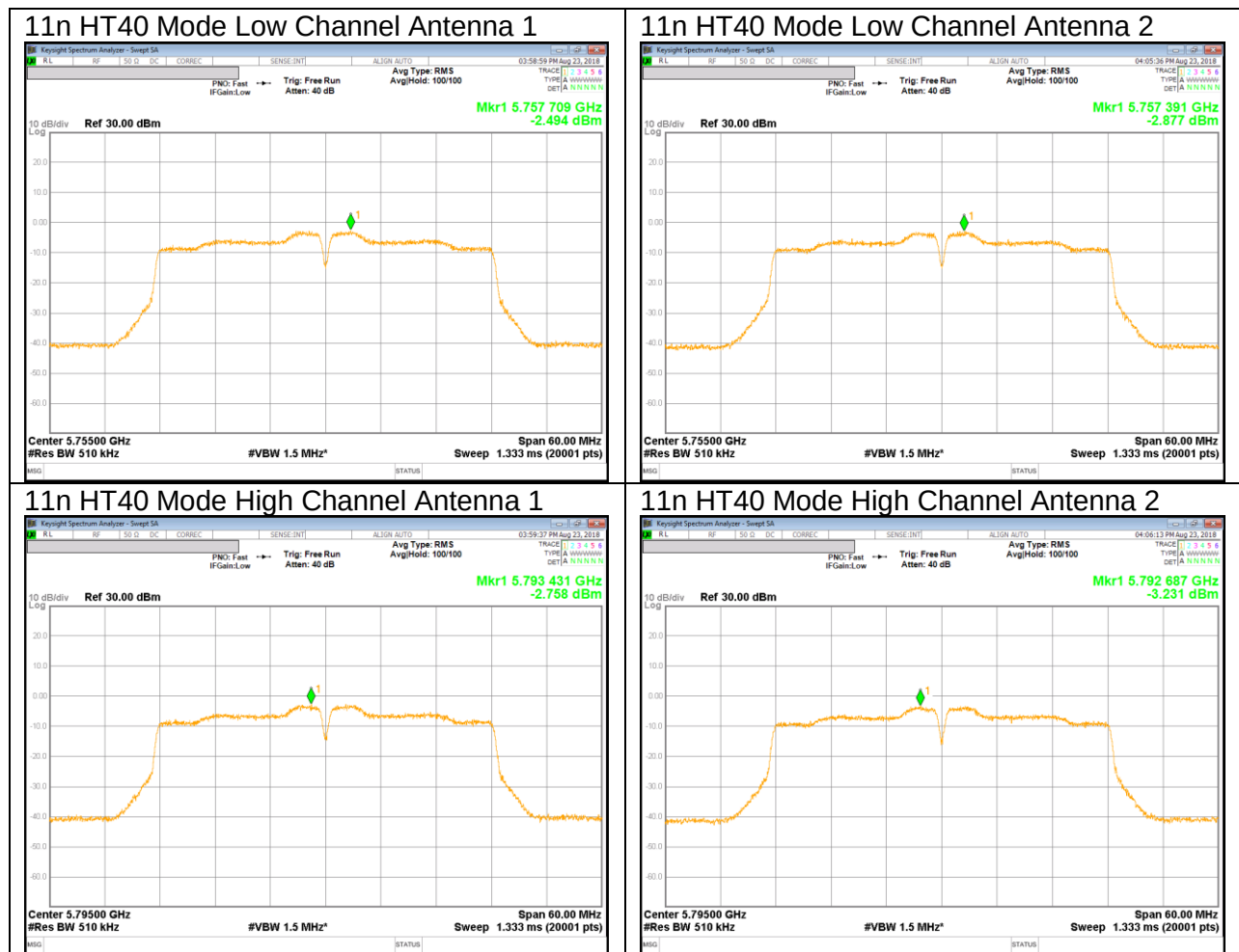
UNII 5.8 GHz IEEE 802.11a mode PSD



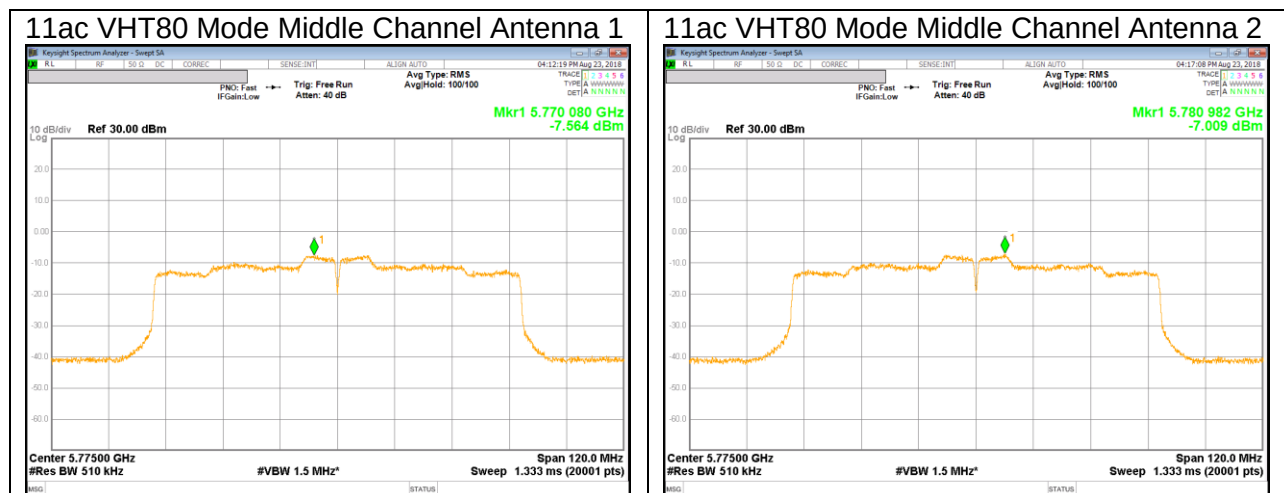
UNII 5.8 GHz IEEE 802.11n HT20 mode mode PSD



UNII 5.8 GHz IEEE 802.11n HT40 mode mode PSD



UNII 5.8 GHz IEEE 802.11ac VHT80 mode mode PSD



11. TRANSMITTER ABOVE 1 GHz

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 §15.407 (b)

(b) Undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

- (1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
- (2) For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
- (3) For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
- (4) For transmitters operating in the 5.725-5.85 GHz band:
 - (i) All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.
- (5) The emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 1 MHz.

- (6) Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209. Further, any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in §15.207.
- (7) The provisions of §15.205 apply to intentional radiators operating under this section.
- (8) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the upper and lower frequency band edges as the design of the equipment permits.

Note

- Limit translation to field strength level (FCC §15.407)

$$E[\text{dBuV/m}] = \text{EIRP}[\text{dBm}] + 95.2 = -27\text{dBm} + 95.2 = 68.2\text{dBuV/m}$$

$$E[\text{dBuV/m}] = \text{EIRP}[\text{dBm}] + 95.2 = -17\text{dBm} + 95.2 = 78.2\text{dBuV/m}$$

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 antenna to EUT distance is 3 meters. 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.

Reference to KDB 789033 D02 v02r01 UNII part G) 6) c) Method AD:

For measurements above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 3 MHz for peak measurements and add duty cycle factor to the reading offset for average 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.

The spectrum from 1GHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable 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.

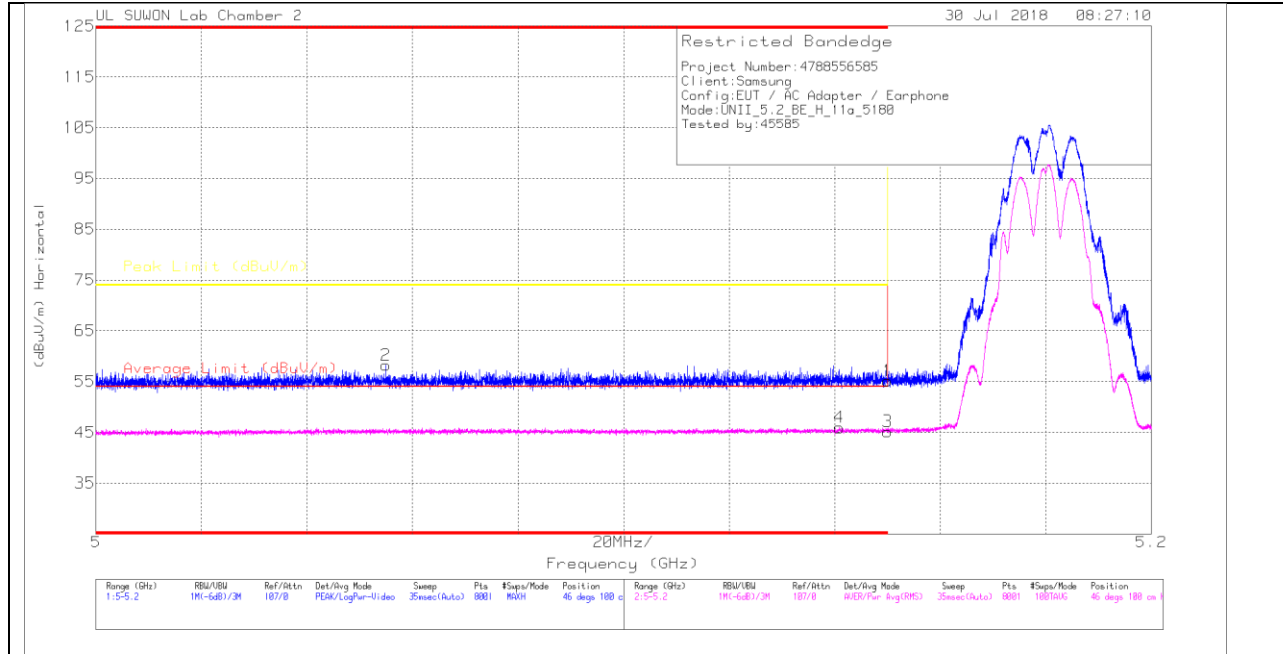
Although these tests were performed other than open area test site, adequate comparison measurements were confirmed against 30 m open area test site.
Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the one of tests made in an open field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

11.1. 5.2 GHz

11.1.1. TX Above 1GHz 802.11a 2Tx CDD MODE IN THE 5.2GHz BAND

RESTRICTED BANDEDGE (LOW CHANNEL)

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Trace Markers

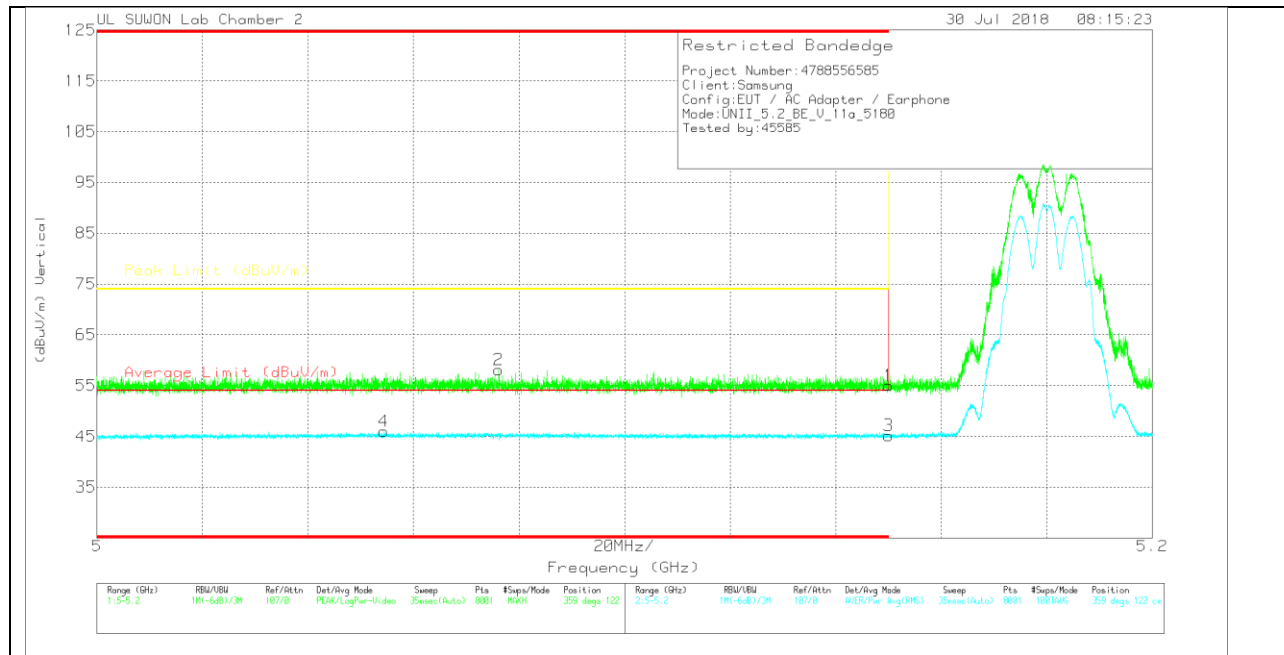
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	170531_311700168724	10dB(dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Altitude (Degs)	Height (cm)	Polarity
1	5.15	36.42	Pk	34	-15.3	0	55.12	-	-	74	-18.88	46	100	H
2	* 5.055	39.57	Pk	33.9	-15.2	0	58.27	-	-	74	-15.73	46	100	H
3	5.15	26.49	RMS	34	-15.3	0	45.19	54	-8.81	-	-	46	100	H
4	* 5.141	27.24	RMS	34	-15.3	0	45.94	54	-8.06	-	-	46	100	H

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

Pk - Peak detector

RMS - RMS detection

VERTICAL PEAK AND AVERAGE PLOT



VERTICAL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	170531_311700168724	10dB(dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Pt Margin (dB)	Altitude (Degs)	Height (cm)	Polarity
1	5.15	36.32	Pk	34	-15.3	0	55.02	-	-	74	-18.98	359	122	V
2	* 5.076	39.43	Pk	33.9	-15.2	0	58.13	-	-	74	-15.87	359	122	V
3	5.15	26.49	RMS	34	-15.3	0	45.19	54	-8.81	-	-	359	122	V
4	* 5.054	27.33	RMS	33.9	-15.2	0	46.03	54	-7.97	-	-	359	122	V

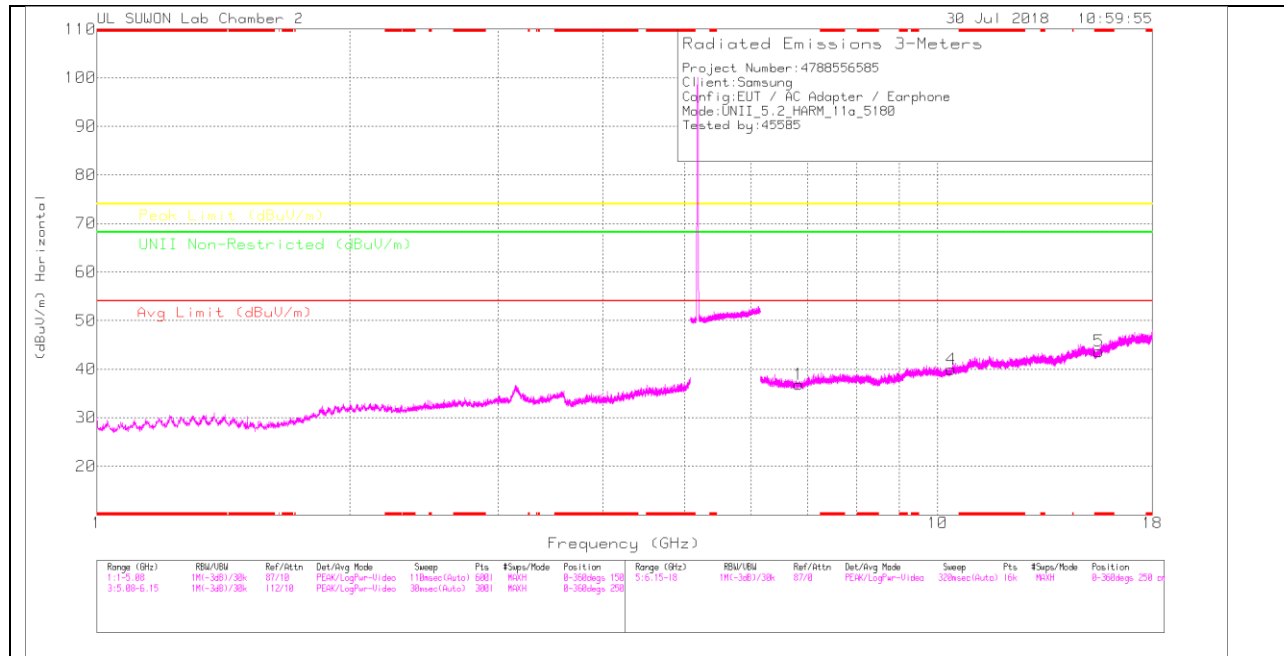
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

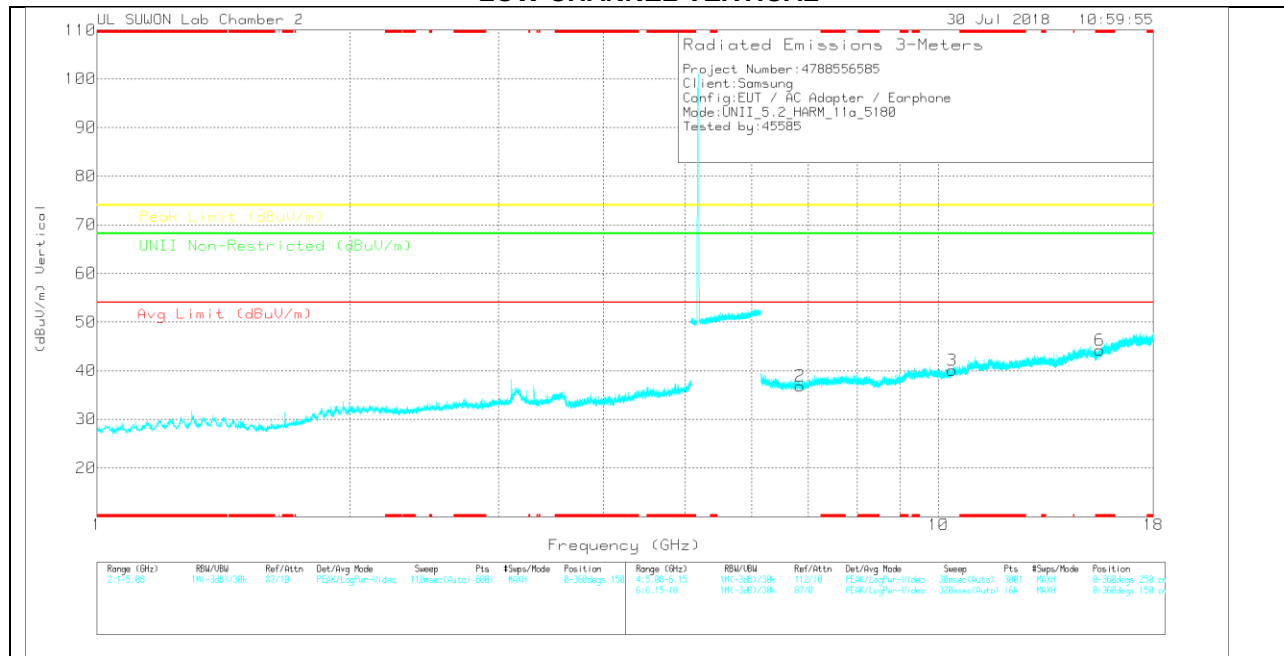
RMS - RMS detection

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL HORIZONTAL



LOW CHANNEL VERTICAL



Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

LOW CHANNEL DATA

Trace Markers

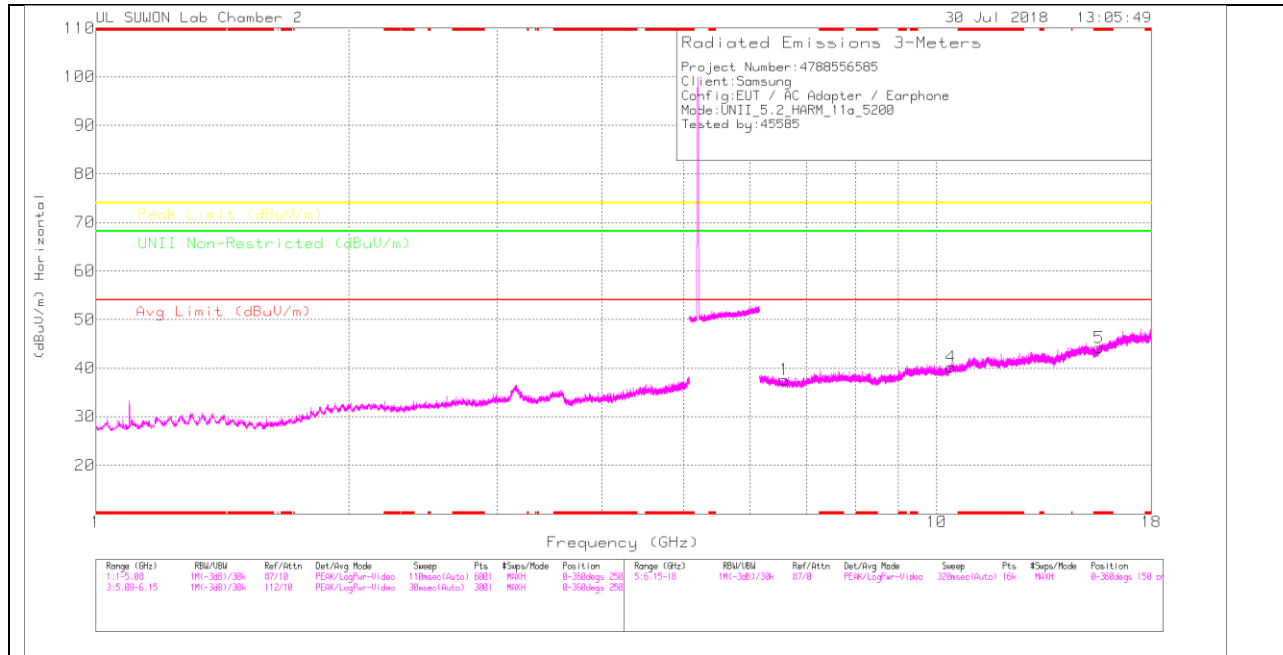
Marker	Frequency (GHz)	Marker Reading (dBuV)	Det	170531_1117(001887 24)	6GHz_HF(0dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Unit Non-Restricted (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	6.837	23.39	PK	35.4	-21.9	0	36.89	-	-	-	-	68.2	-31.31	0-360	250	H
4	10.378	19	PK	37.5	-16.6	0	39.9	-	-	-	-	68.2	-28.3	0-360	150	H
5	* 15.541	18.23	PK	39.8	-14.4	0	43.63	-	-	74	-30.37	-	-	0-360	150	H
2	6.849	23.36	PK	35.4	-21.9	0	36.86	-	-	-	-	68.2	-31.34	0-360	250	V
3	10.378	19.17	PK	37.5	-16.6	0	40.07	-	-	-	-	68.2	-28.13	0-360	150	V
6	* 15.54	18.85	PK	39.8	-14.4	0	44.25	-	-	74	-29.75	-	-	0-360	150	V

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

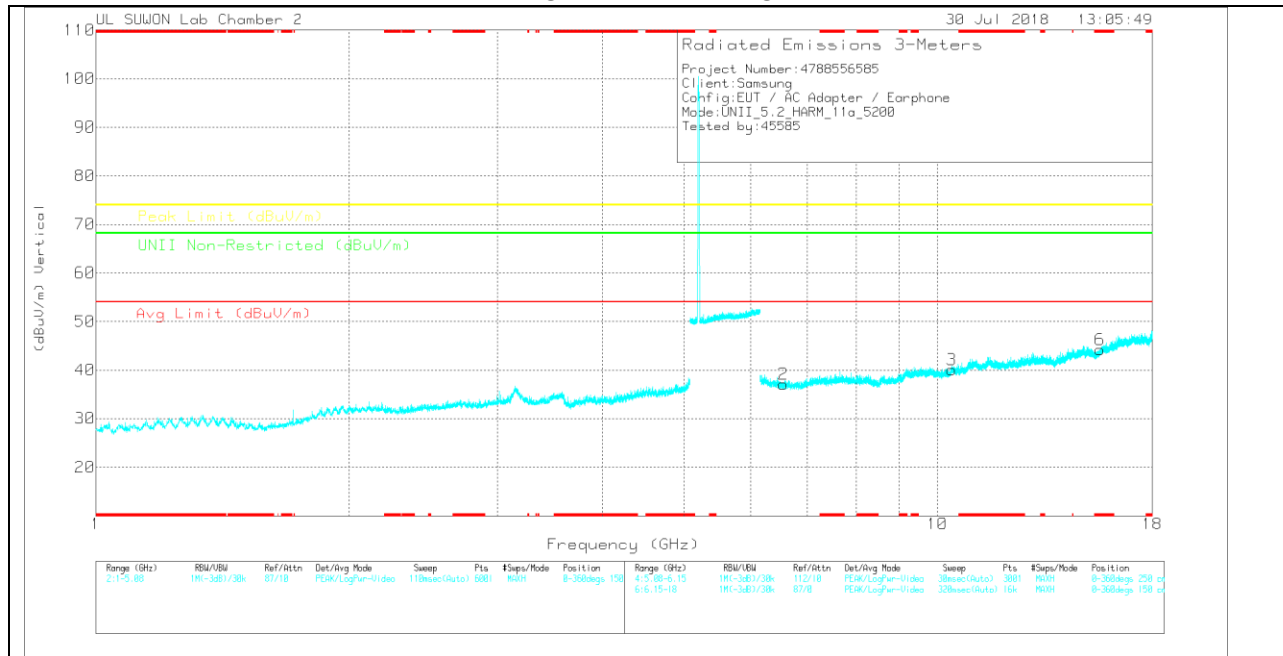
PK – Peak Detector

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

MID CHANNEL HORIZONTAL



MID CHANNEL VERTICAL



Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

MID CHANNEL DATA

Trace Markers

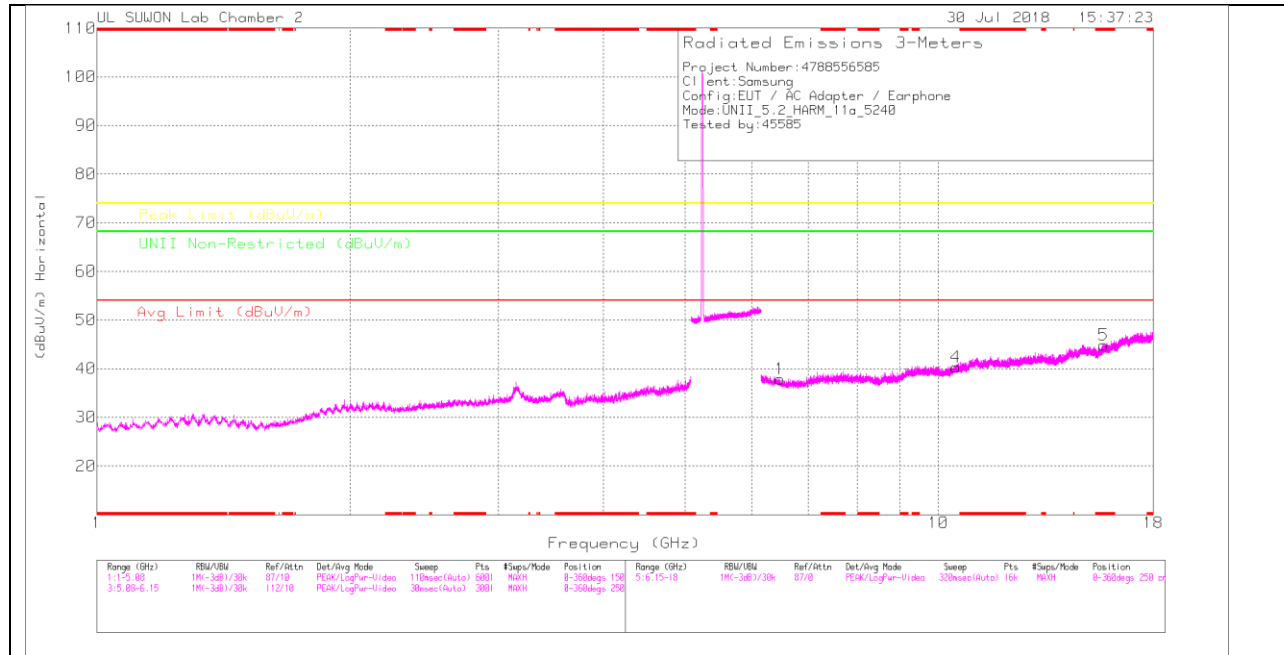
Marker	Frequency (GHz)	Marker Reading (dBuV)	Det	170531_1117(001887 24)	6GHz_HF(dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Unl Non-Restricted (dBuV/m)	Margin (dB)	Altitude (Degs)	Height (cm)	Polarity
1	6.594	24.59	PK	35.1	-22.1	0	37.59	-	-	-	-	68.2	-30.61	0-360	150	H
4	10.399	19.11	PK	37.5	-16.4	0	40.21	-	-	-	-	68.2	-27.99	0-360	150	H
5	* 15.599	18.89	PK	39.8	-14.5	0	44.19	-	-	74	-29.81	-	-	0-360	150	H
2	6.562	24.42	PK	35.1	-22.4	0	37.12	-	-	-	-	68.2	-31.08	0-360	150	V
3	10.401	18.97	PK	37.5	-16.4	0	40.07	-	-	-	-	68.2	-28.13	0-360	250	V
6	* 15.604	18.91	PK	39.8	-14.5	0	44.21	-	-	74	-29.79	-	-	0-360	150	V

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

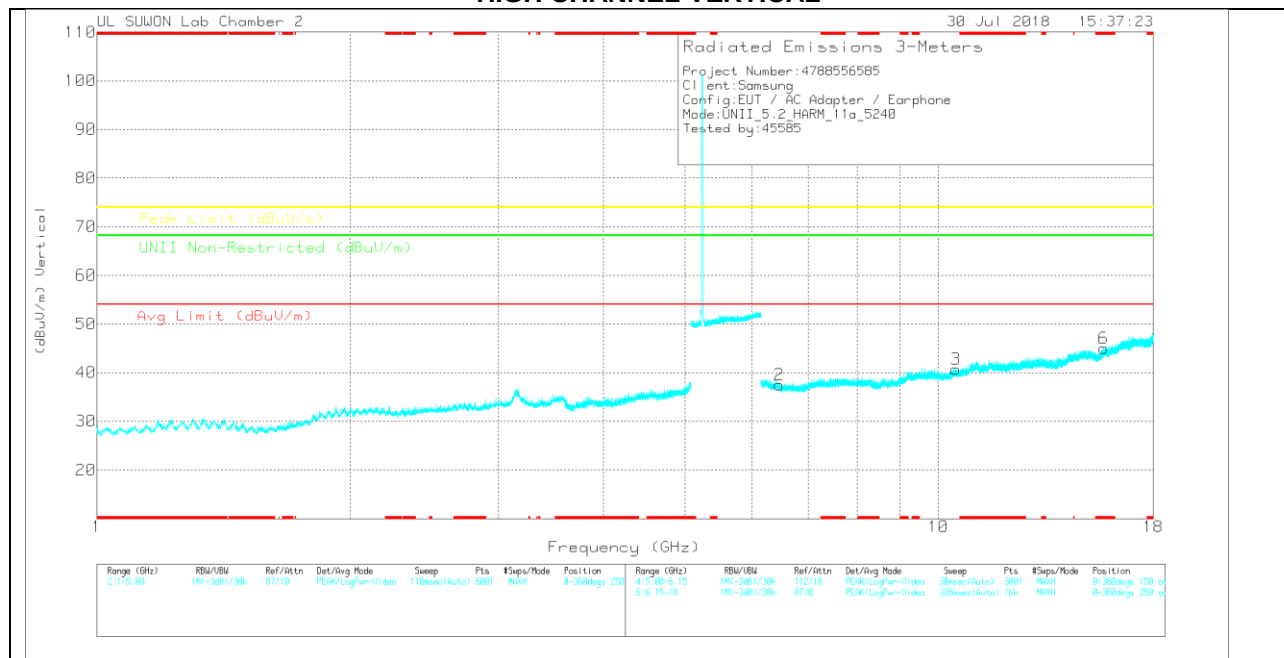
PK – Peak Detector

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

HIGH CHANNEL HORIZONTAL



HIGH CHANNEL VERTICAL



Note: Emission was scanned up to 40GHz; 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	170531_3117003887 24]	60Hz_HF(dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Unli Non-Restricted (dBuV/m)	Margin (dB)	Altitude (Degs)	Height (cm)	Polarity
1	6.482	24.74	PK	35.1	-22	0	37.84	-	-	-	-	68.2	-30.36	0-360	150	H
4	10.48	19.2	PK	37.5	-16.4	0	40.3	-	-	-	-	68.2	-27.9	0-360	250	H
5	* 15.722	19.76	PK	39.9	-14.8	0	44.86	-	-	74	-29.14	-	-	0-360	150	H
2	6.468	24.29	PK	35.1	-21.9	0	37.49	-	-	-	-	68.2	-30.71	0-360	150	V
3	10.479	19.62	PK	37.5	-16.4	0	40.72	-	-	-	-	68.2	-27.48	0-360	250	V
6	* 15.721	19.84	PK	39.9	-14.8	0	44.94	-	-	74	-29.06	-	-	0-360	150	V

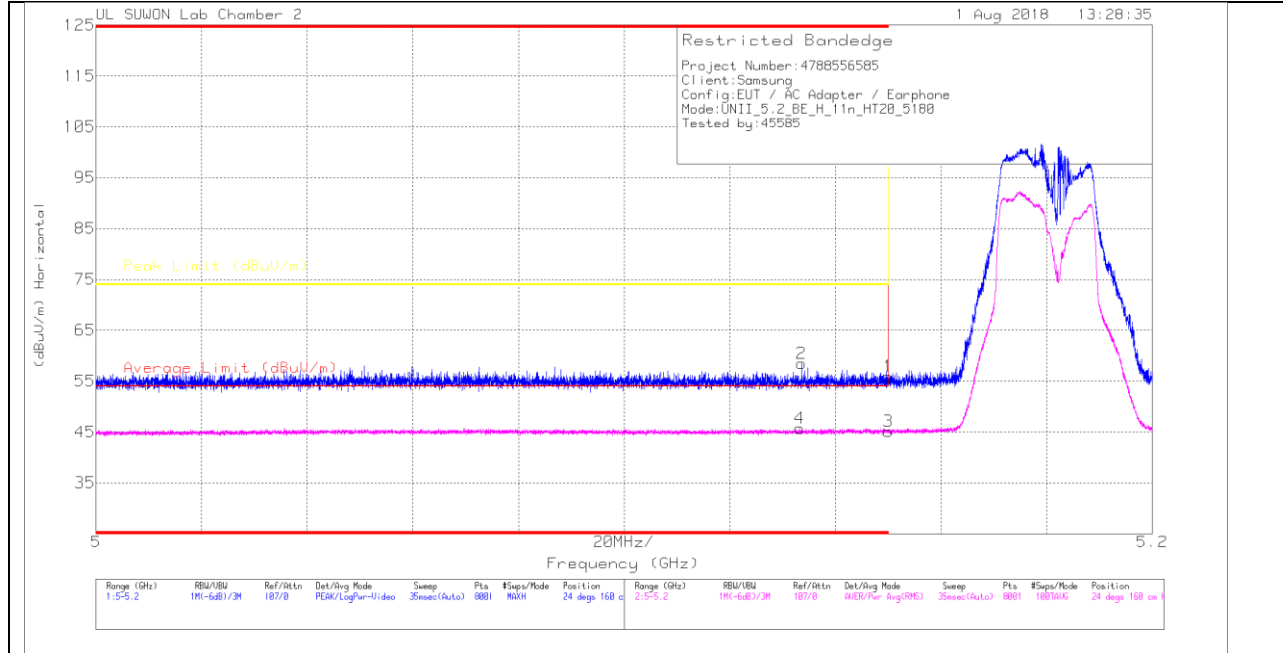
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

PK – Peak Detector

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

11.1.2.TX Above 1GHz 802.11n HT20 2Tx CDD MODE IN THE 5.2GHz BAND RESTRICTED BANDEDGE (LOW CHANNEL)

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Trace Markers

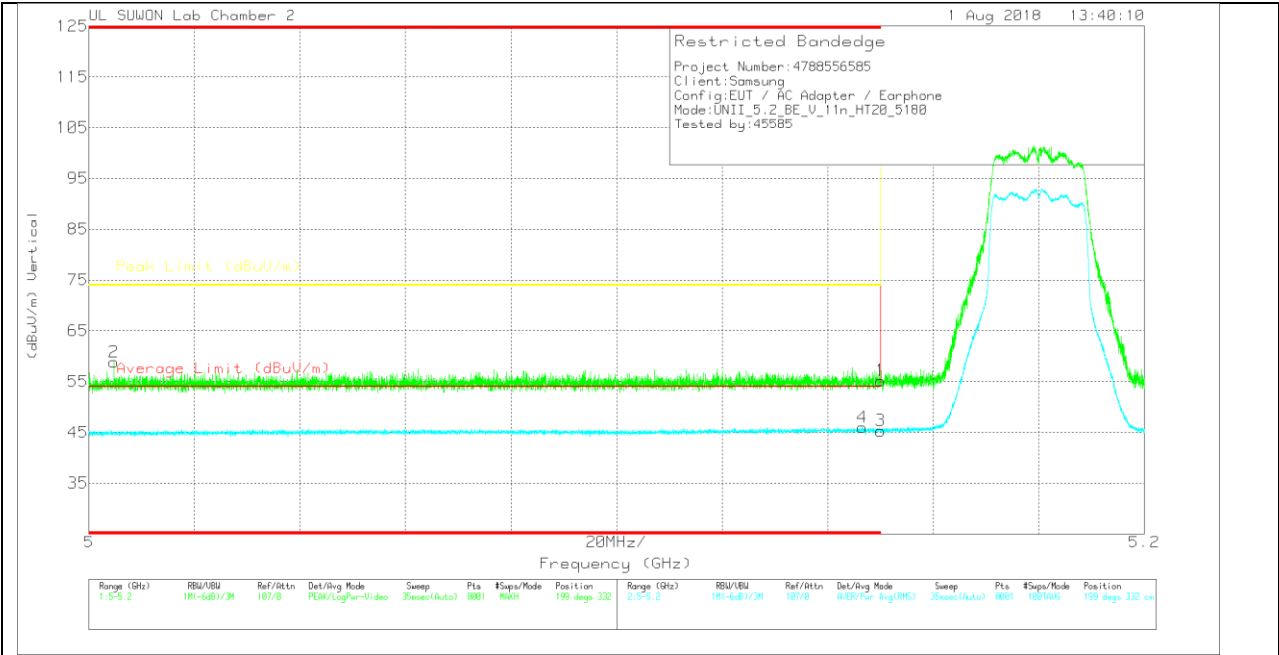
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	170531_3117(00168724)	10dB(dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Altitude (Degs)	Height (cm)	Polarity
1	5.15	37.25	Pk	34	-15.3	0	55.95	-	-	74	-18.05	24	160	H
2	* 5.134	39.8	Pk	34	-15.3	0	58.5	-	-	74	-15.5	24	160	H
3	5.15	26.41	RMS	34	-15.3	0	45.11	54	-8.89	-	-	24	160	H
4	* 5.133	27.1	RMS	34	-15.3	0	45.8	54	-8.2	-	-	24	160	H

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

Pk - Peak detector

RMS - RMS detection

VERTICAL PEAK AND AVERAGE PLOT



VERTICAL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	170531_3117(00168724)	10dB(dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Altitude (Degs)	Height (cm)	Polarity
1	5.15	36.51	Pk	34	-15.3	0	55.21	-	-	74	-18.79	199	332	V
2	* 5.005	40.25	Pk	33.8	-15.2	0	58.85	-	-	74	-15.15	199	332	V
3	5.15	26.62	RMS	34	-15.3	0	45.32	54	-8.68	-	-	199	332	V
4	* 5.147	27.32	RMS	34	-15.3	0	46.02	54	-7.98	-	-	199	332	V

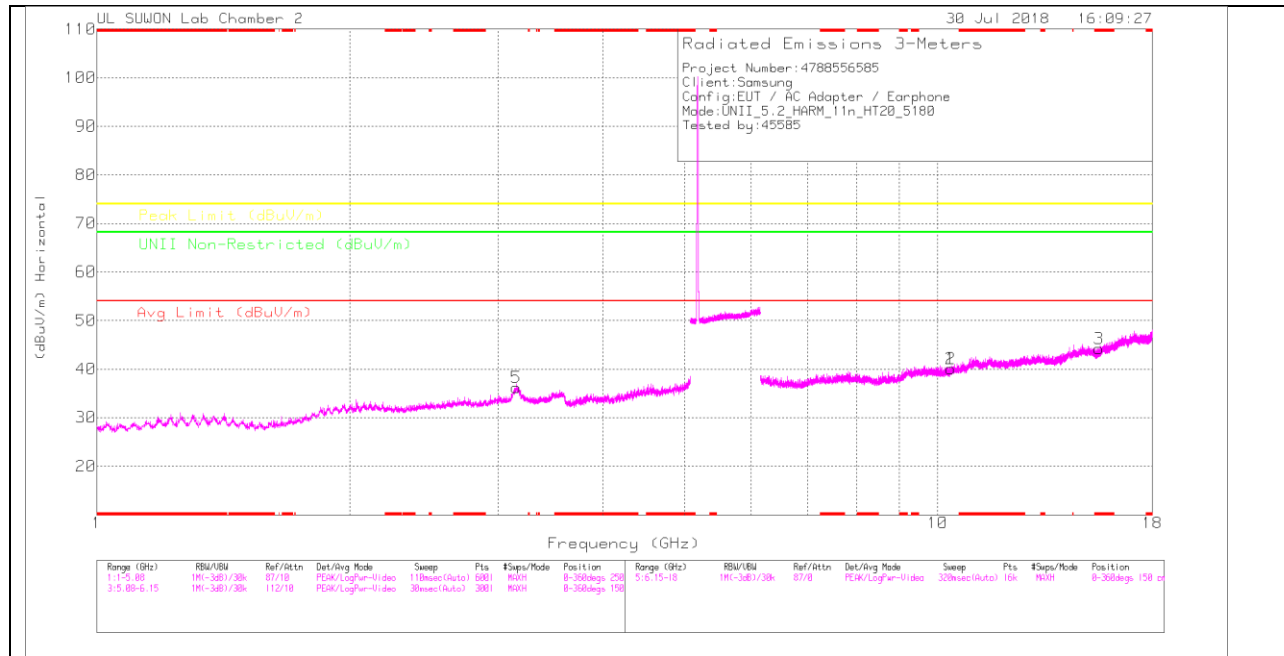
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

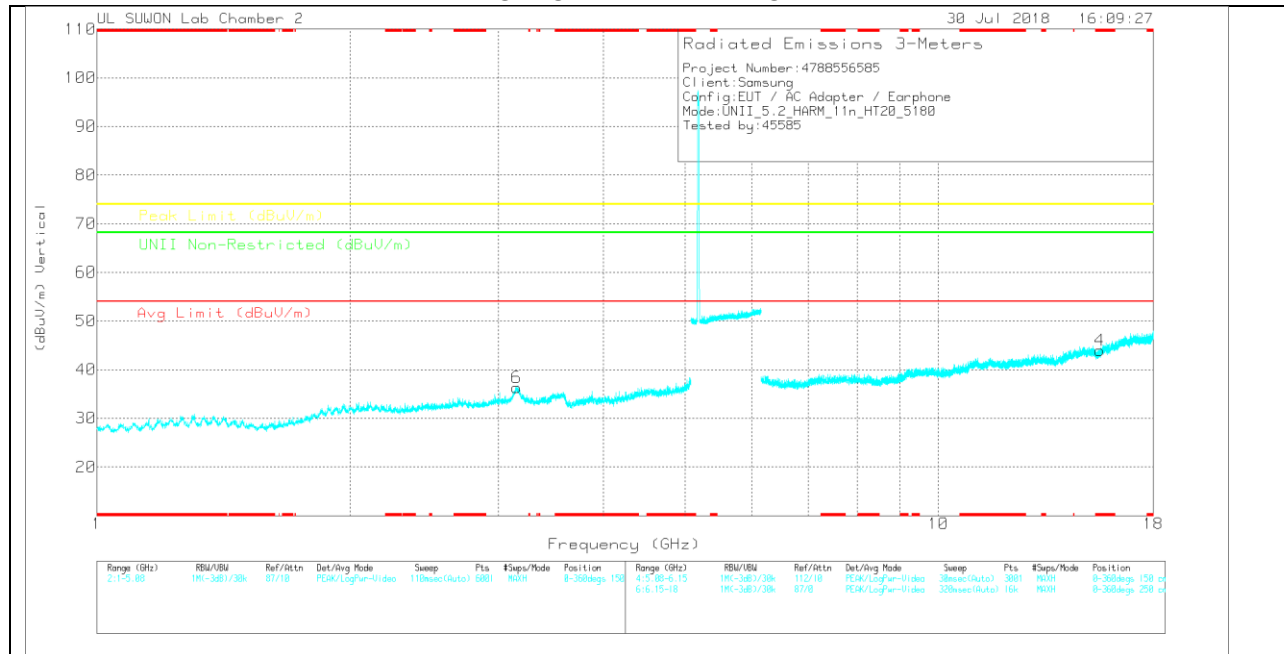
RMS - RMS detection

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL HORIZONTAL



LOW CHANNEL VERTICAL



Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

LOW CHANNEL DATA

Trace Markers

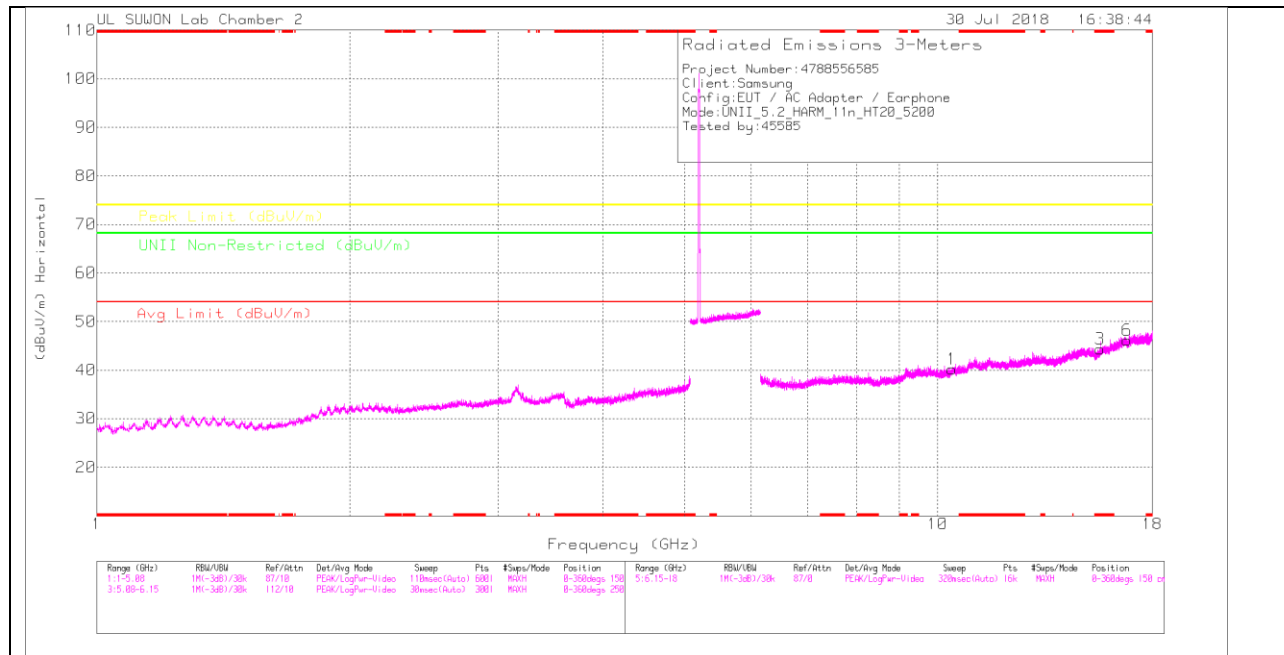
Marker	Frequency (GHz)	Marker Reading (dBuV)	Det	170531_3117001887 24	SCN1_LF(dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Unit Non-Restricted (dBuV/m)	Margin (dB)	Altitude (Degs)	Height (cm)	Polarity
5	3.154	27.39	PK	34.8	-26	0	36.19	-	-	-	-	68.2	-32.01	0-360	150	H
6	3.154	27.56	PK	34.8	-26	0	36.36	-	-	-	-	68.2	-31.84	0-360	250	V
1	10.355	19.37	PK	37.5	-16.8	0	40.07	-	-	-	-	68.2	-28.13	0-360	250	H
2	10.355	19.37	PK	37.5	-16.8	0	40.07	-	-	-	-	68.2	-28.13	0-360	250	H
3	* 15.535	19.02	PK	39.7	-14.5	0	44.22	-	-	74	-29.78	-	-	0-360	250	H
4	* 15.543	18.56	PK	39.8	-14.4	0	43.96	-	-	74	-30.04	-	-	0-360	250	V

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

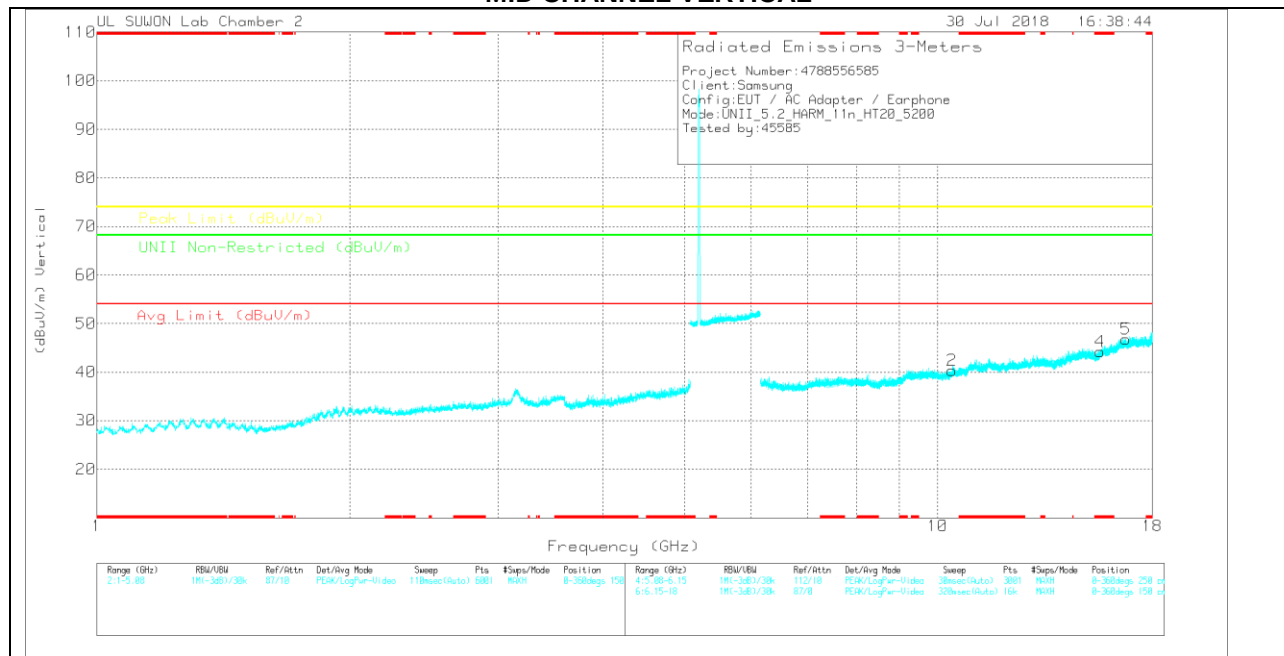
PK – Peak Detector

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

MID CHANNEL HORIZONTAL



MID CHANNEL VERTICAL



Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

MID CHANNEL DATA

Trace Markers

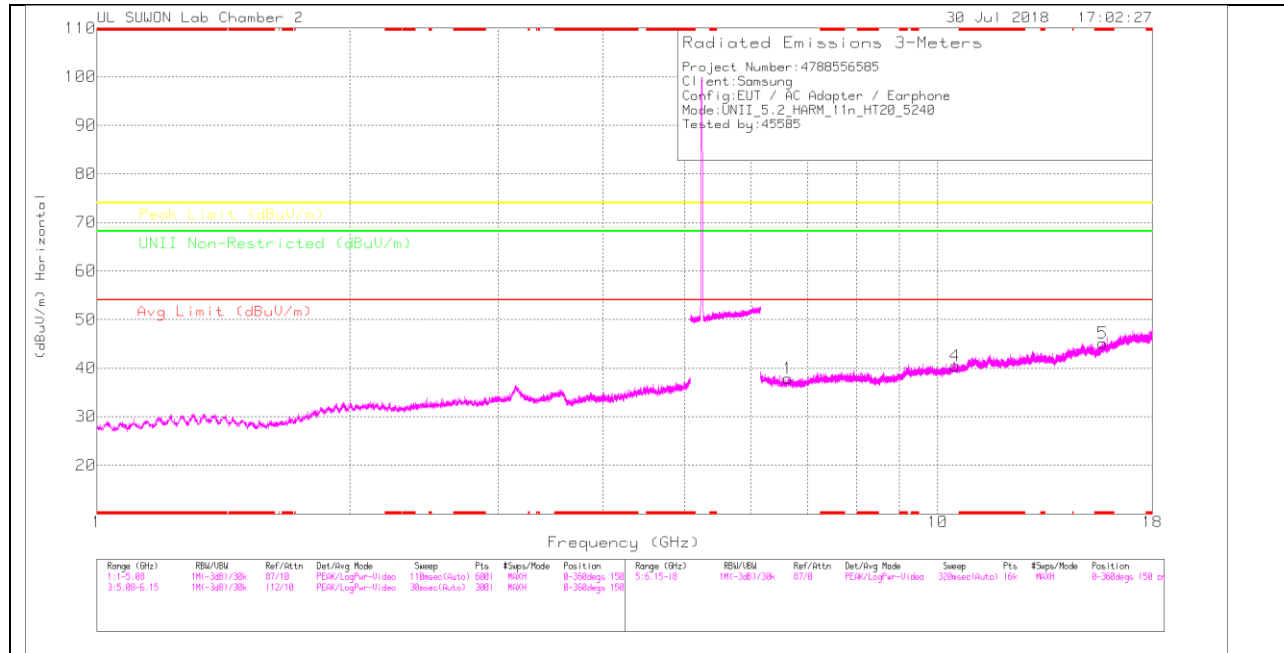
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	170531_3117(30)1687 24)	6GHz_HF(dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	UNII Non-Restricted (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	10.403	18.98	PK	37.5	-16.3	0	40.18	-	-	-	-	68.2	-28.02	0-360	250	H
3	* 15.598	19.19	PK	39.8	-14.6	0	44.39	-	-	74	-29.61	-	-	0-360	250	H
6	16.804	18.76	PK	40.9	-13.5	0	46.16	-	-	-	-	68.2	-22.04	0-360	150	H
2	10.402	19.28	PK	37.5	-16.4	0	40.38	-	-	-	-	68.2	-27.82	0-360	150	V
4	* 15.602	18.95	PK	39.8	-14.5	0	44.25	-	-	74	-29.75	-	-	0-360	150	V
5	16.733	19.68	PK	40.9	-13.8	0	46.78	-	-	-	-	68.2	-21.42	0-360	250	V

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

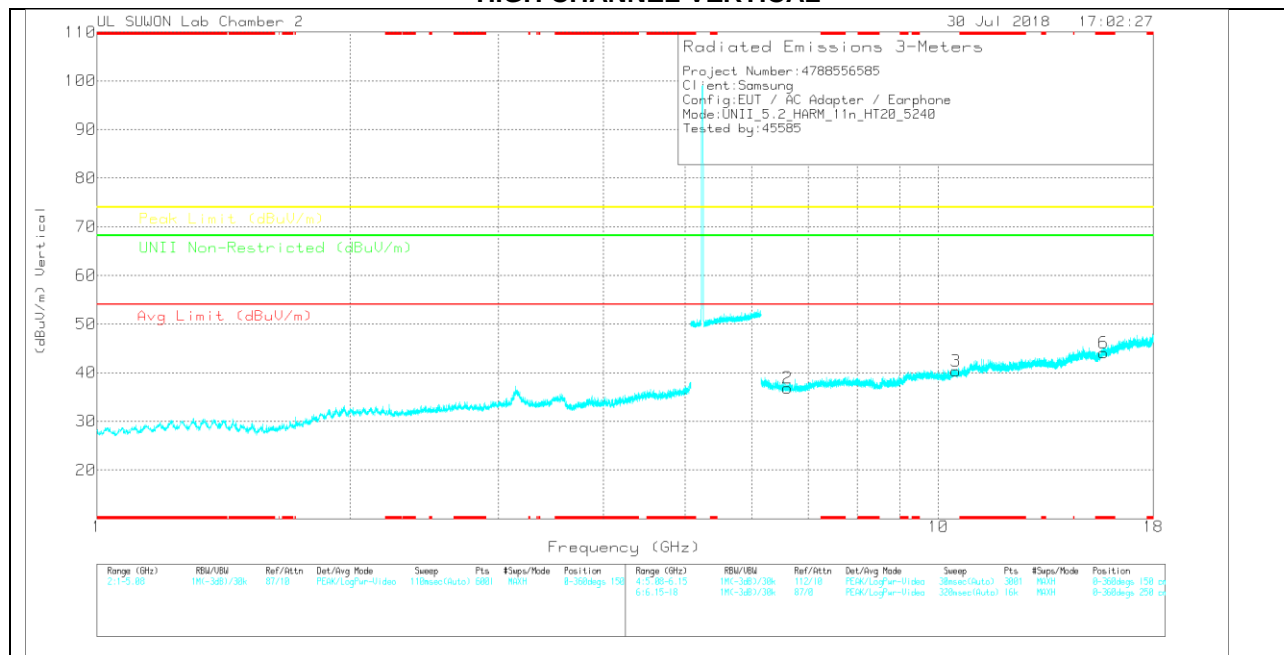
PK – Peak Detector

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

HIGH CHANNEL HORIZONTAL



HIGH CHANNEL VERTICAL



Note: Emission was scanned up to 40GHz; 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)	Marker Reading (dBuV)	Det	170531_1117(001887 24)	6GHz_HF(0dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Unl Non-Restricted (dBuV/m)	Margin (dB)	Altitude (Degs)	Height (cm)	Polarity
1	6.638	24.36	PK	35.2	-21.7	0	37.86	-	-	-	-	68.2	-30.34	0-360	150	H
4	10.48	19.38	PK	37.5	-16.4	0	40.48	-	-	-	-	68.2	-27.72	0-360	250	H
5	* 15.721	20.07	PK	39.9	-14.8	0	45.17	-	-	74	-28.83	-	-	0-360	250	H
2	6.618	23.64	PK	35.1	-21.9	0	36.84	-	-	-	-	68.2	-31.36	0-360	150	V
3	10.484	19.33	PK	37.5	-16.5	0	40.33	-	-	-	-	68.2	-27.87	0-360	150	V
6	* 15.721	18.97	PK	39.9	-14.8	0	44.07	-	-	74	-29.93	-	-	0-360	250	V

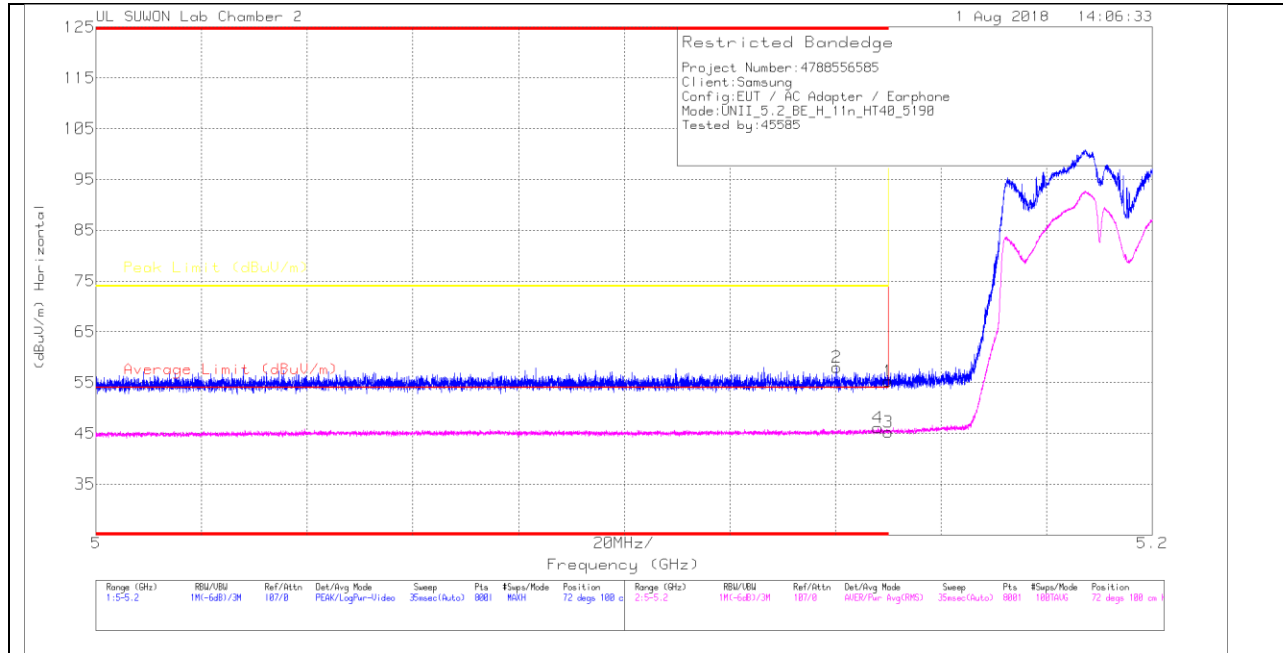
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

PK – Peak Detector

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

11.1.3.TX Above 1GHz 802.11n HT40 2Tx CDD MODE IN THE 5.2GHz BAND RESTRICTED BANDEDGE (LOW CHANNEL)

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Trace Markers

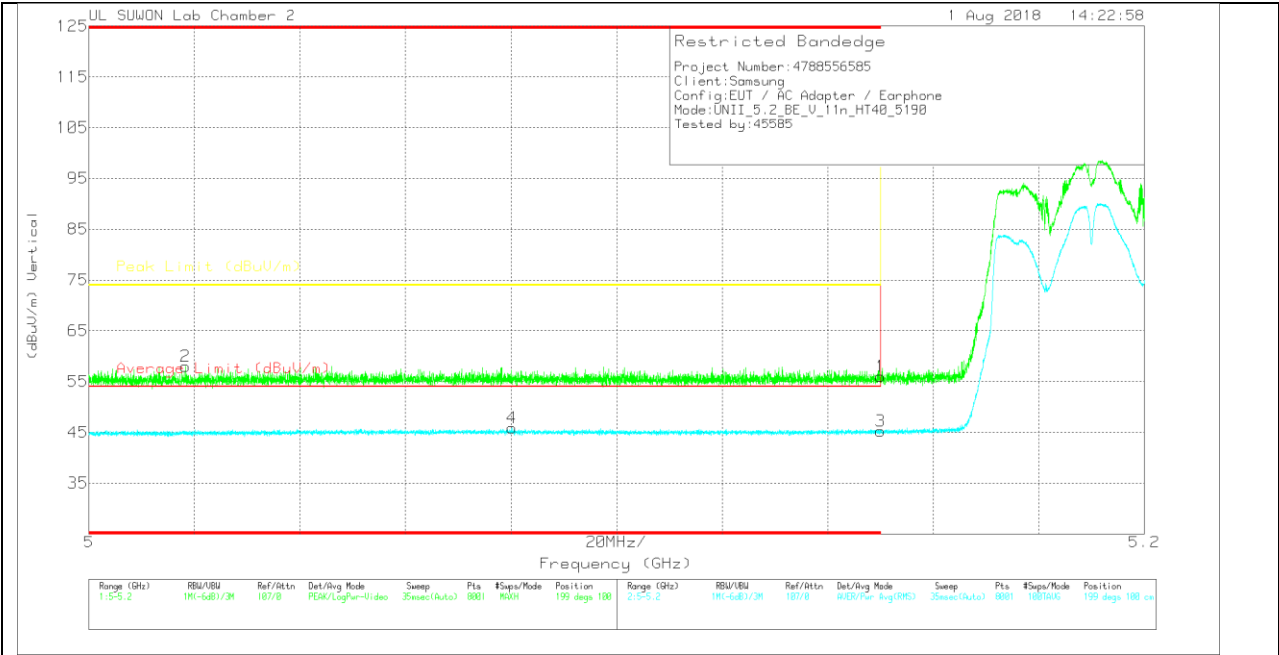
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	170531_3117(00168724)	10dB(dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Altitude (Degs)	Height (cm)	Polarity
1	5.15	36.63	Pk	34	-15.3	0	55.33	-	-	74	-18.67	72	100	H
2	* 5.14	39.33	Pk	34	-15.3	0	58.03	-	-	74	-15.97	72	100	H
3	5.15	26.58	RMS	34	-15.3	0	45.28	54	-8.72	-	-	72	100	H
4	* 5.148	27.45	RMS	34	-15.3	0	46.15	54	-7.85	-	-	72	100	H

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

Pk - Peak detector

RMS - RMS detection

VERTICAL PEAK AND AVERAGE PLOT



VERTICAL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	170531_3117[00168724]	10dB(dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Altitude (Degs)	Height (cm)	Polarity
1	5.15	37.3	Pk	34	-15.3	0	56	-	-	74	-18	199	100	V
2	* 5.018	39.42	Pk	33.8	-15.2	0	58.02	-	-	74	-15.98	199	100	V
3	5.15	26.55	RMS	34	-15.3	0	45.25	54	-8.75	-	-	199	100	V
4	* 5.08	27.15	RMS	33.9	-15.2	0	45.85	54	-8.15	-	-	199	100	V

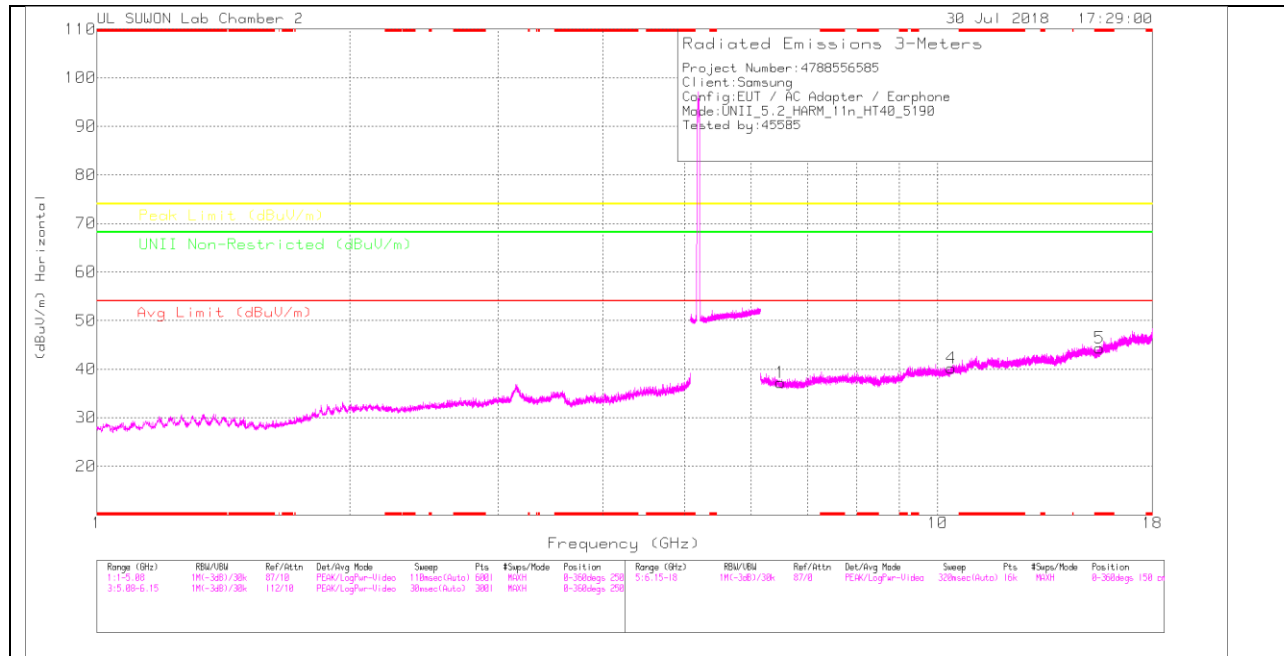
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

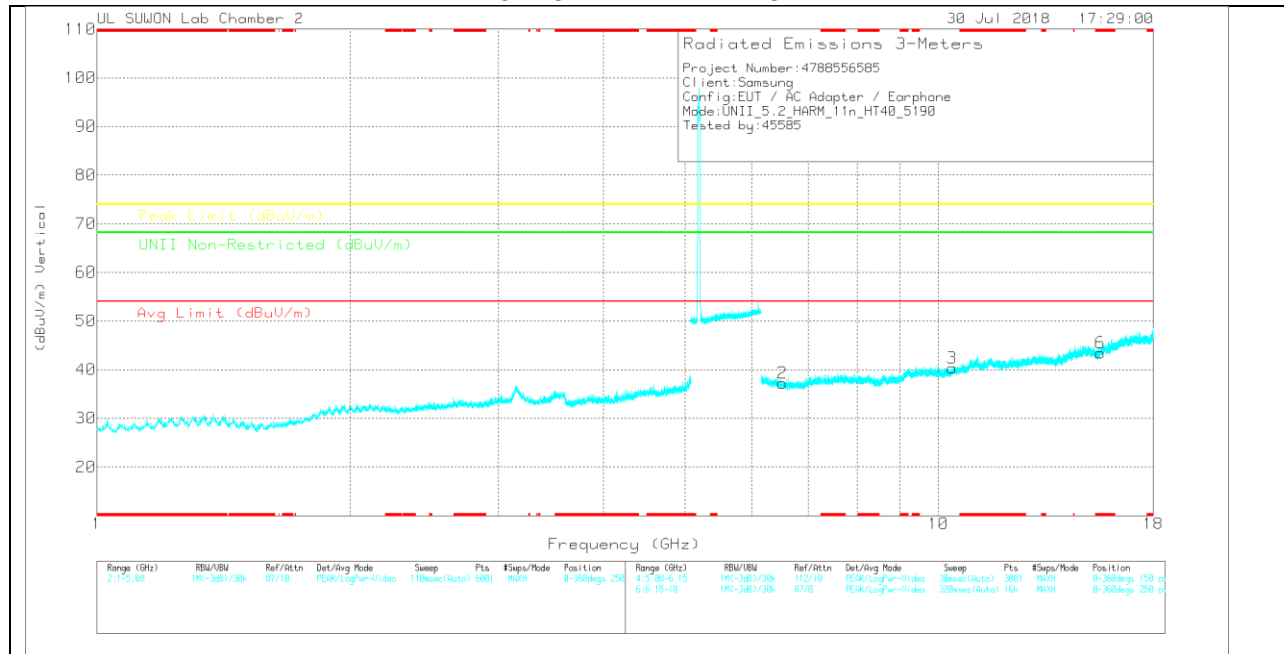
RMS - RMS detection

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL HORIZONTAL



LOW CHANNEL VERTICAL



Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

LOW CHANNEL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	170531_311700387 24]	60Hz_HF(dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Unli Non-Restricted (dBuV/m)	Margin (dB)	Altitude (Degs)	Height (cm)	Polarity
1	6.5	24.31	PK	35.1	-22.2	0	37.21	-	-	-	-	68.2	-30.99	0-360	150	H
4	10.384	19.17	PK	37.5	-16.5	0	40.17	-	-	-	-	68.2	-28.03	0-360	150	H
5	* 15.569	19.05	PK	39.8	-14.5	0	44.35	-	-	74	-29.65	-	-	0-360	150	H
2	6.523	24.38	PK	35.1	-22.3	0	37.18	-	-	-	-	68.2	-31.02	0-360	250	V
3	10.387	19.2	PK	37.5	-16.4	0	40.3	-	-	-	-	68.2	-27.9	0-360	150	V
6	* 15.571	18.27	PK	39.8	-14.6	0	43.47	-	-	74	-30.53	-	-	0-360	250	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-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).