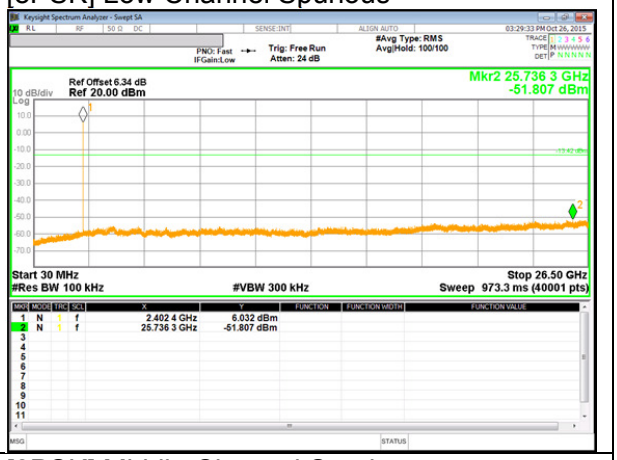
8PSK Mode

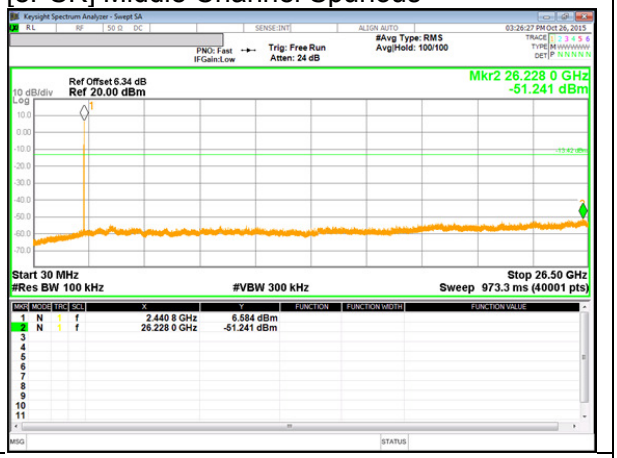
[8PSK] Low Channel BandEdge

[8PSK] Low Channel Spurious

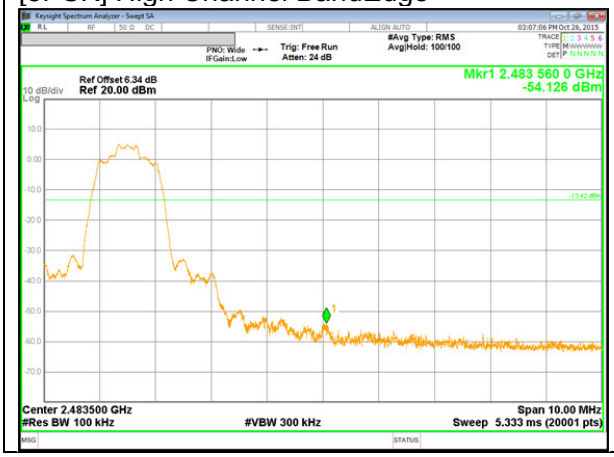


[8PSK] Middle Channel BandEdge

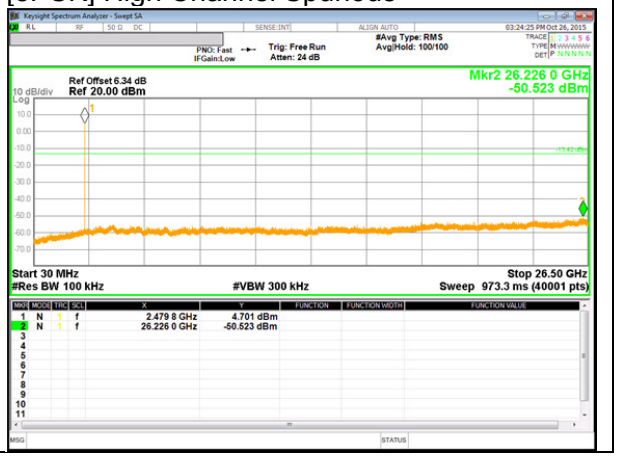
[8PSK] Middle Channel Spurious



[8PSK] High Channel BandEdge



[8PSK] High Channel Spurious



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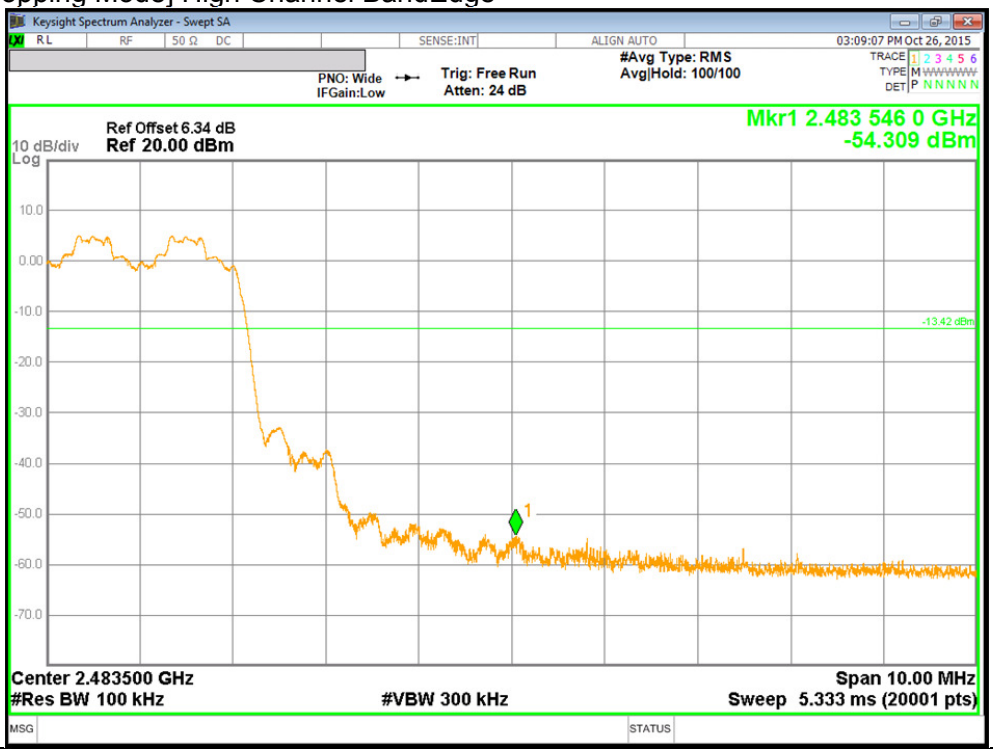
BandEdge Emission at 8PSK Hopping Mode

[8PSK Hopping Mode] Low Channel BandEdge

[8PSK Hopping Mode] High Channel BandEdge



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9. RADIATED TEST RESULTS

9.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane. 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.

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

GFSK = 1/T = 1 / 0.0029S = 350Hz.

The spectrum from 1GHzHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

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.

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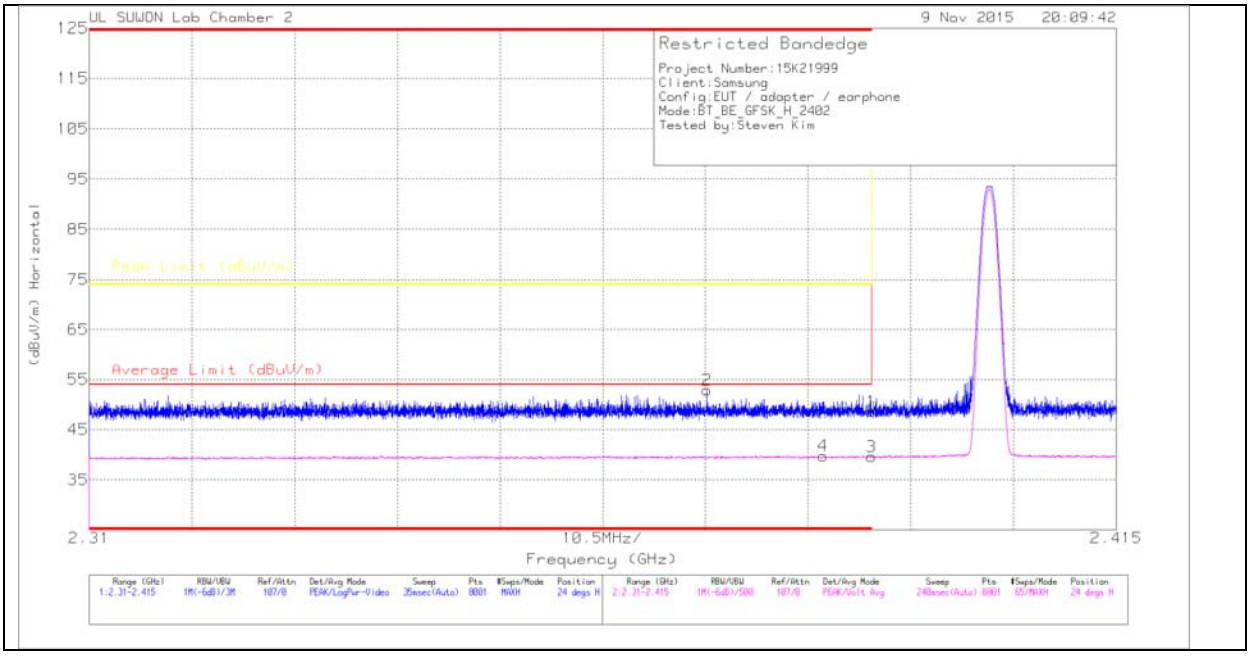
9.2. TRANSMITTER ABOVE 1 GHz

9.2.1. BASIC DATA RATE GFSK MODULATION

RESTRICTED BANDEDGE (LOW CHANNEL)

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(0016 8717)_150 619	Path_2_10 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	36.44	Pk	31.7	-19.5	48.64	-	-	74	-25.36	24	125	H
2	* 2.373	40.82	Pk	31.7	-19.6	52.92	-	-	74	-21.08	24	125	H
3	* 2.39	27.44	V1TV	31.7	-19.5	39.64	54	-14.36	-	-	24	125	H
4	* 2.385	27.61	V1TV	31.7	-19.5	39.81	54	-14.19	-	-	24	125	H

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

Pk - Peak detector

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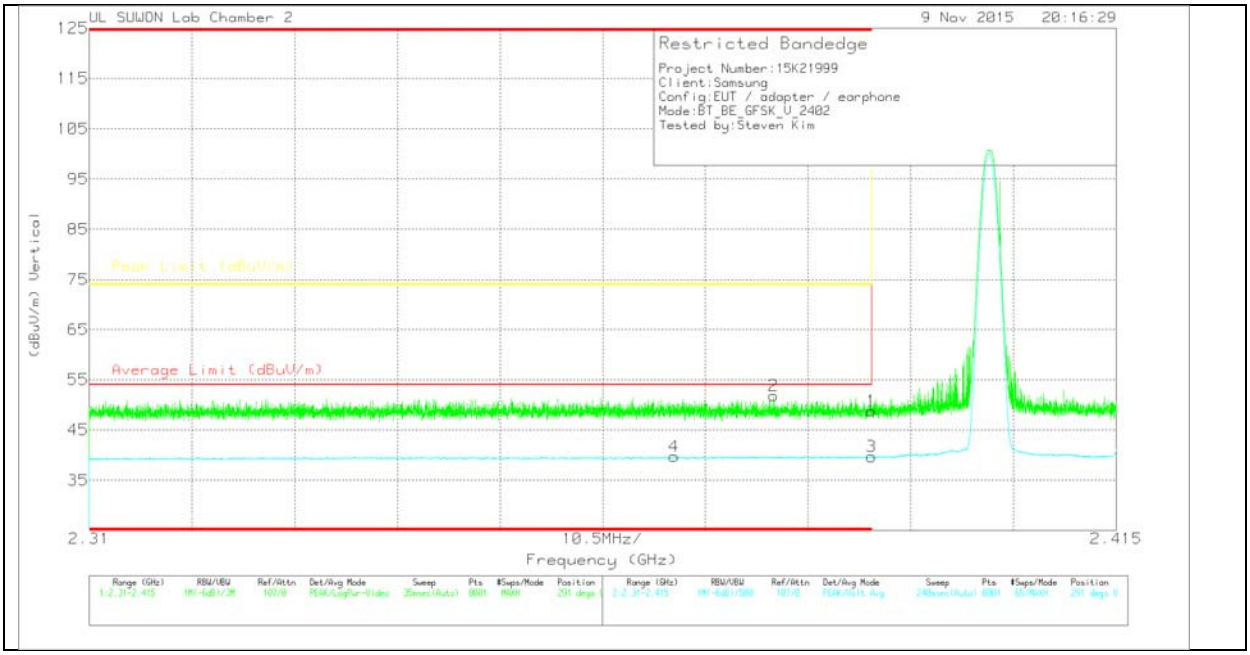
VERTICAL PEAK AND AVERAGE PLOT



VERTICAL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(00168717)_150619	Path_2_10 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	36.6	Pk	31.7	-19.5	48.8	-	-	74	-25.2	291	241	V
2	* 2.38	39.73	Pk	31.7	-19.6	51.83	-	-	74	-22.17	291	241	V
3	* 2.39	27.52	V1TV	31.7	-19.5	39.72	54	-14.28	-	-	291	241	V
4	* 2.37	27.68	V1TV	31.7	-19.6	39.78	54	-14.22	-	-	291	241	V

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

Pk - Peak detector

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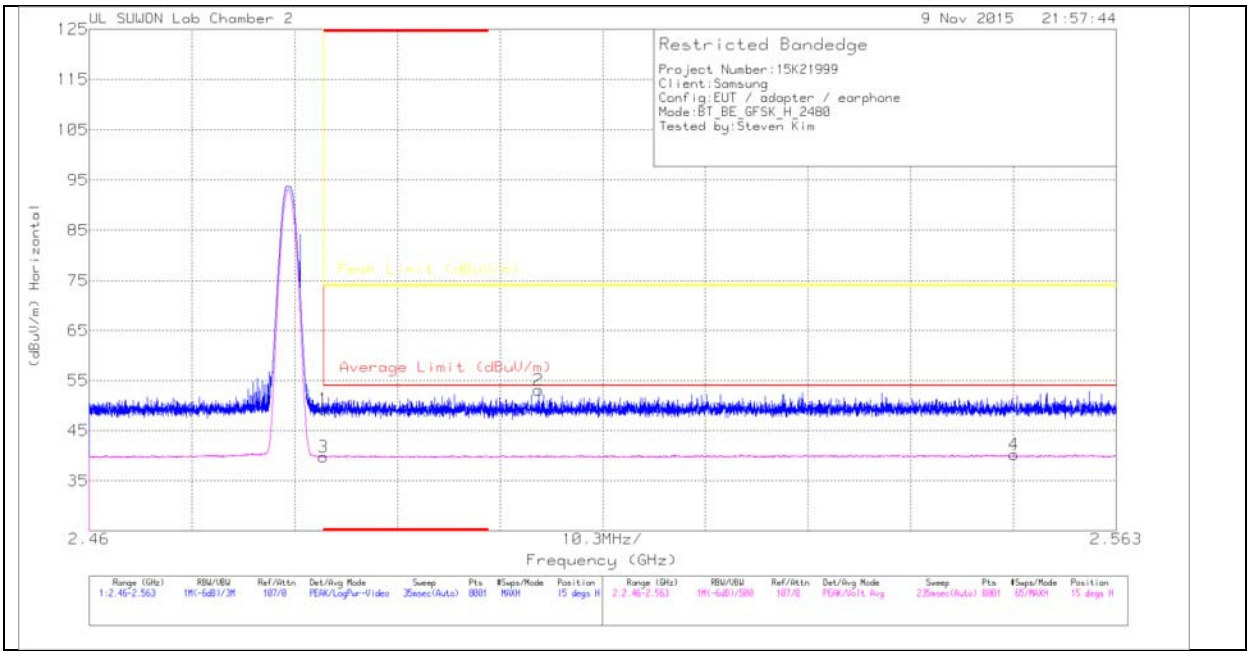
AUTHORIZED BANDEDGE (HIGH CHANNEL)

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(0016 8717)_150 619	Path_2_10 dB	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	36.92	Pk	31.8	-19.4	49.32	-	-	74	-24.68	15	107	H
2	2.505	40.51	Pk	31.9	-19.3	53.11	-	-	74	-20.89	15	107	H
3	* 2.484	27.39	V1TV	31.8	-19.4	39.79	54	-14.21	-	-	15	107	H
4	2.553	27.68	V1TV	31.9	-19.3	40.28	54	-13.72	-	-	15	107	H

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

Pk - Peak detector

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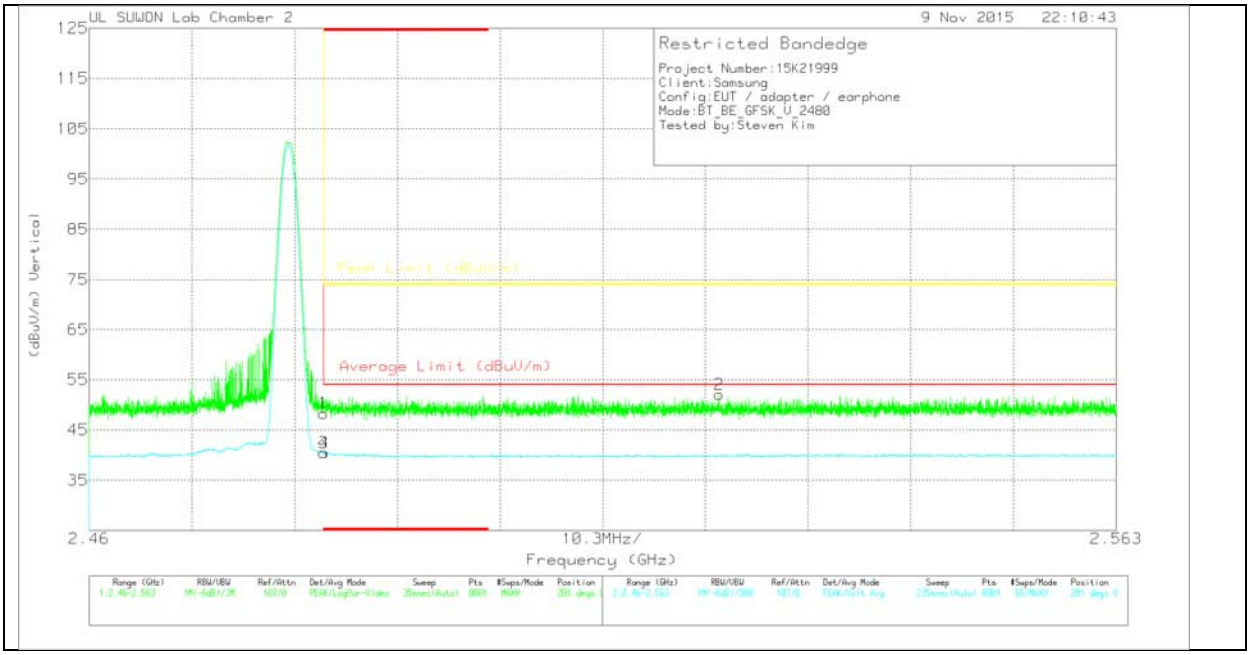
VERTICAL PEAK AND AVERAGE PLOT



VERTICAL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(00168717)_150619	Path_2_10 dB	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	35.94	Pk	31.8	-19.4	48.34	-	-	74	-25.66	281	285	V
2	2.523	39.46	Pk	31.9	-19.3	52.06	-	-	74	-21.94	281	285	V
3	* 2.484	28.1	V1TV	31.8	-19.4	40.5	54	-13.5	-	-	281	285	V
4	* 2.484	28.09	V1TV	31.8	-19.4	40.49	54	-13.51	-	-	281	285	V

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

Pk - Peak detector

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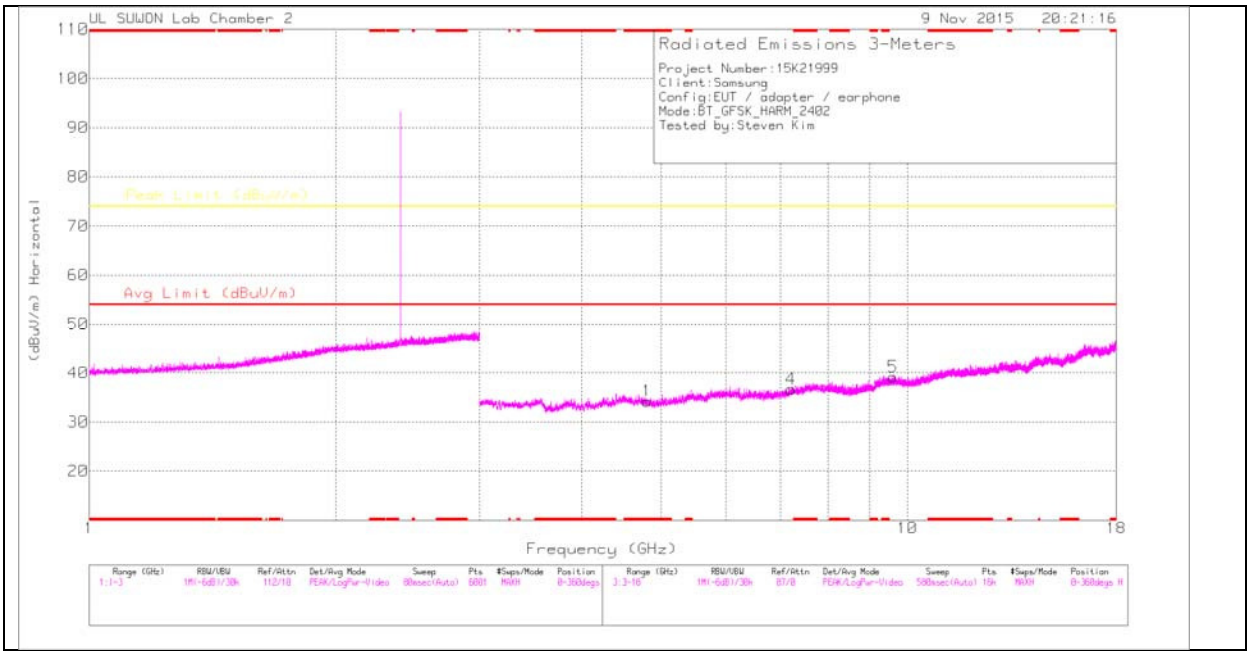
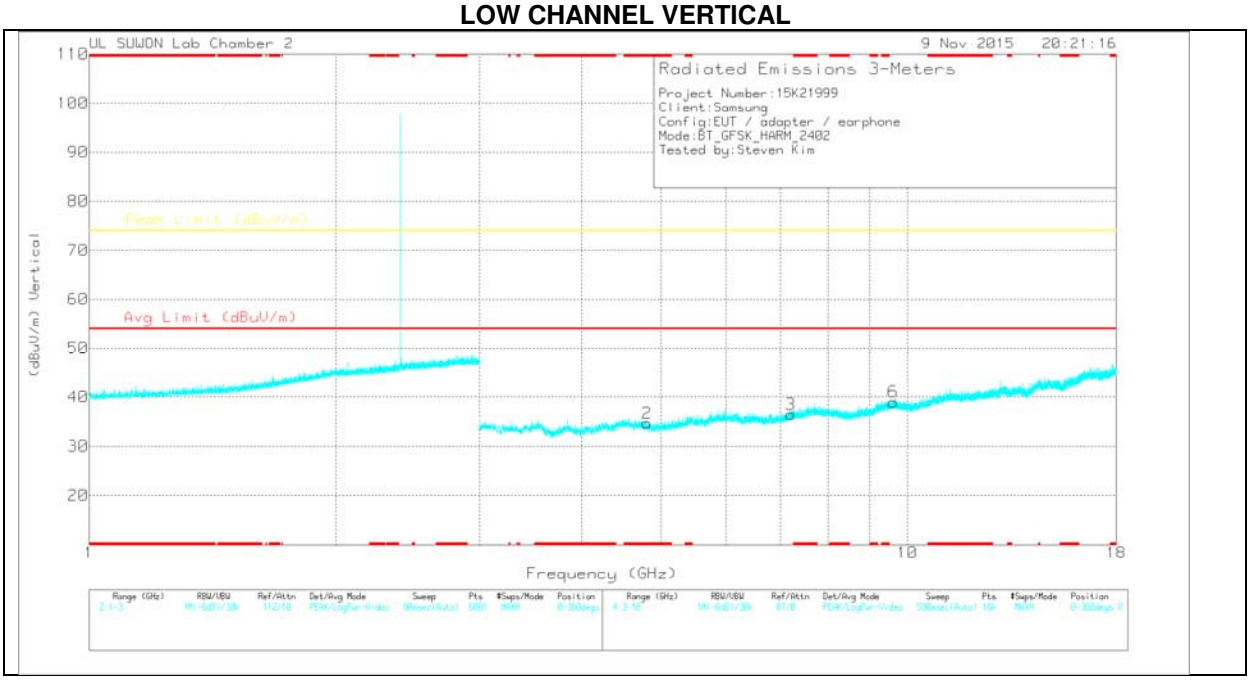
HARMONICS AND SPURIOUS EMISSIONS

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(00168717)_150619	Path_3_3G HP	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.804	25.65	PK	33.9	-25.3	34.25	-	-	74	-39.75	0-360	200	H
4	7.208	23.92	PK	35.8	-23	36.72	-	-	74	-37.28	0-360	200	H
5	9.607	21.39	PK	36.9	-19.1	39.19	-	-	74	-34.81	0-360	200	H
2	* 4.806	26.08	PK	33.9	-25.3	34.68	-	-	74	-39.32	0-360	100	V
3	7.207	23.65	PK	35.8	-23	36.45	-	-	74	-37.55	0-360	200	V
6	9.609	21.19	PK	36.9	-19.1	38.99	-	-	74	-35.01	0-360	100	V

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

PK – Peak Detector

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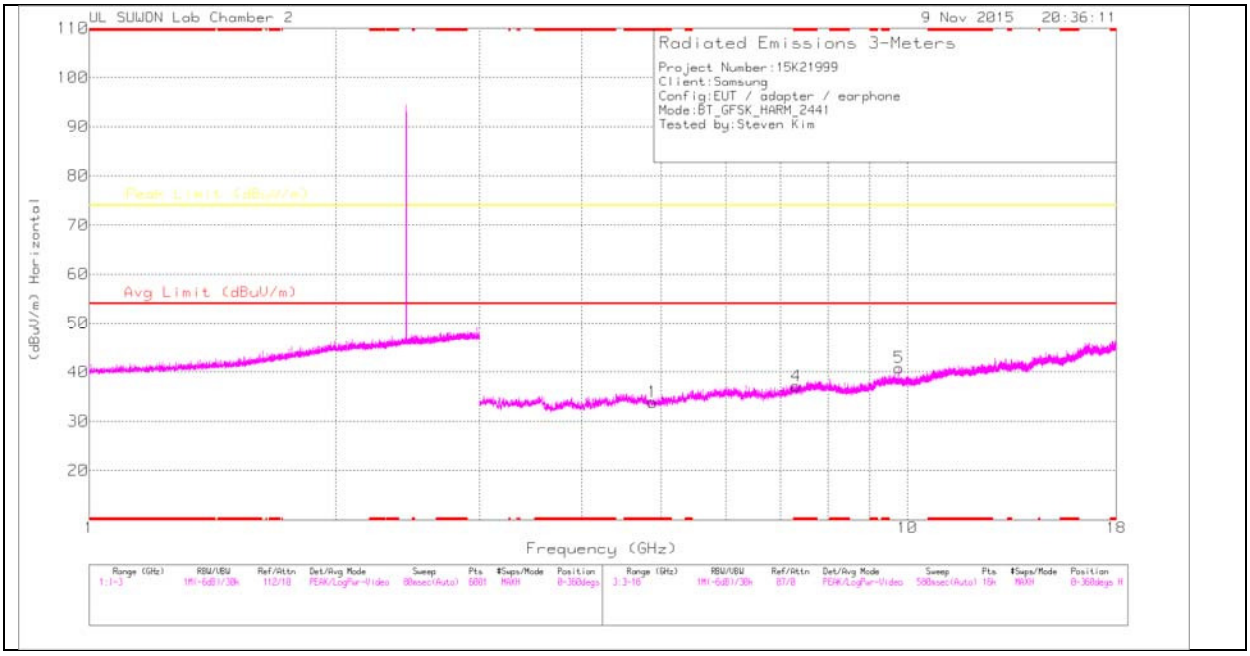
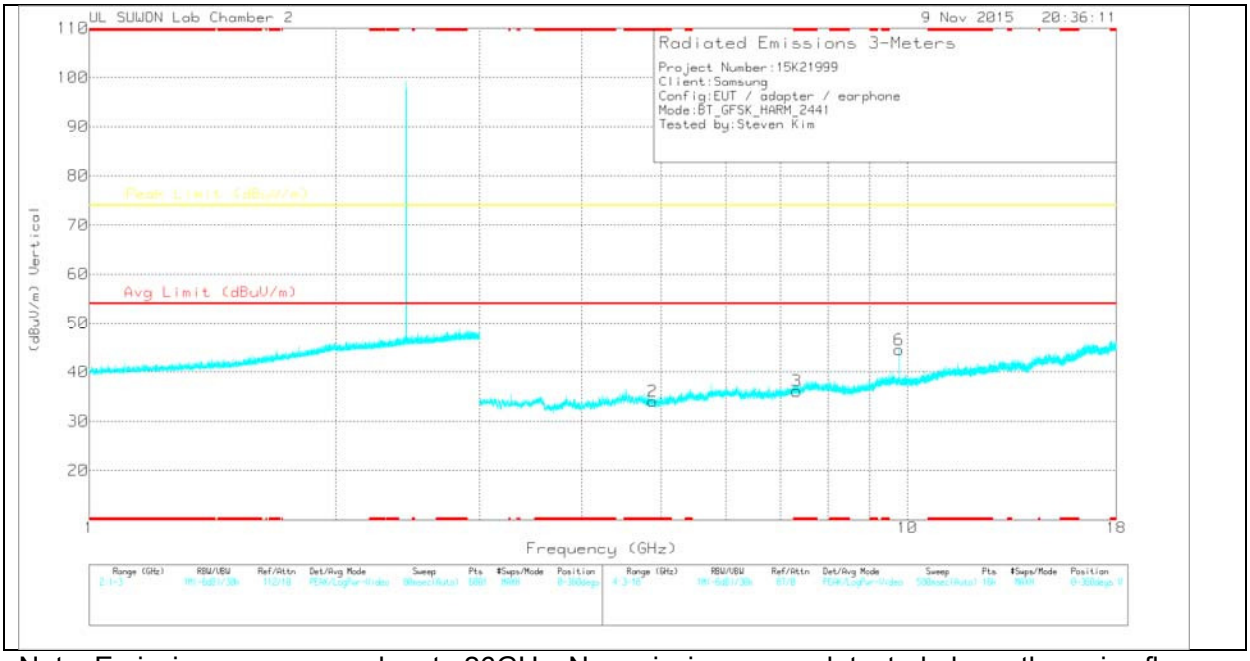
MID CHANNEL HORIZONTAL



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_3GHP	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.881	25.2	PK	33.9	-25.2	33.9	-	-	74	-40.1	0-360	100	H
4	* 7.318	23.84	PK	35.9	-22.6	37.14	-	-	74	-36.86	0-360	200	H
5	9.764	23.15	PK	37	-19.3	40.85	-	-	74	-33.15	0-360	200	H
2	* 4.882	25.34	PK	33.9	-25.2	34.04	-	-	74	-39.96	0-360	100	V
3	* 7.322	22.75	PK	35.9	-22.5	36.15	-	-	74	-37.85	0-360	100	V
6	9.765	26.8	PK	37	-19.3	44.5	-	-	74	-29.5	0-360	200	V

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

PK – Peak Detector

Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	3117(00168724)_150619	Path_3	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
9.769	32.55	PK2	37	-19.3	50.25	-	-	74	-23.75	13	273	H
9.764	33.67	PK2	37	-19.3	51.37	-	-	74	-22.63	38	215	V

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

PK2 - Maximum Peak

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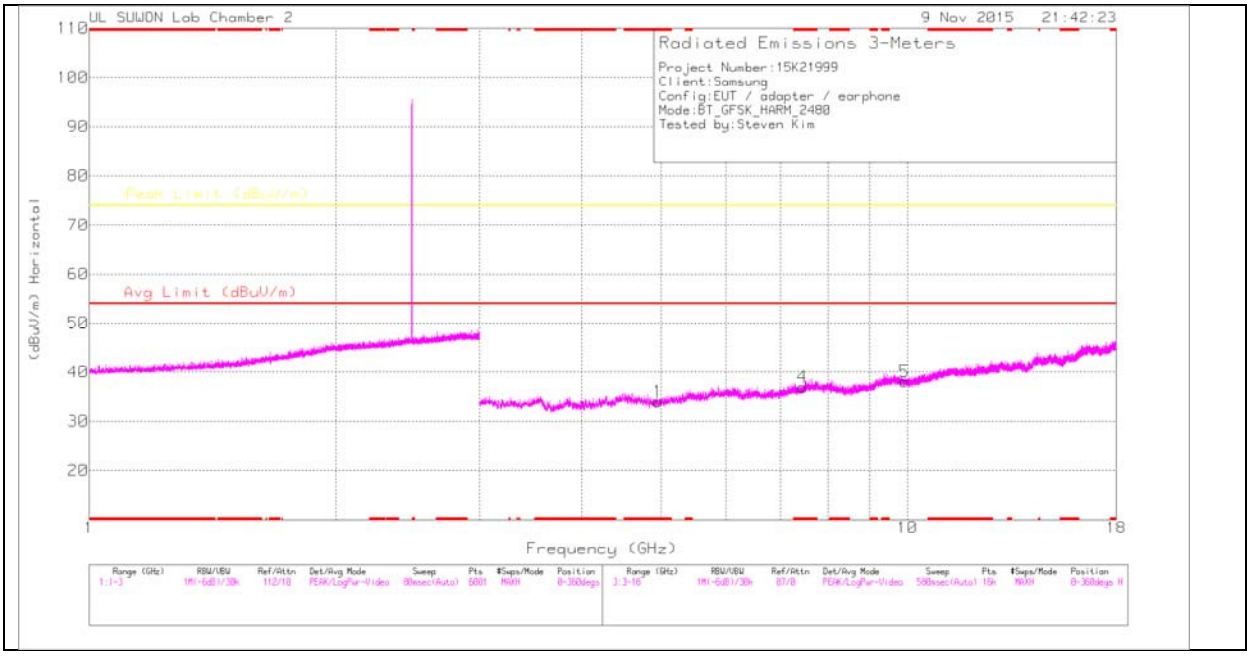
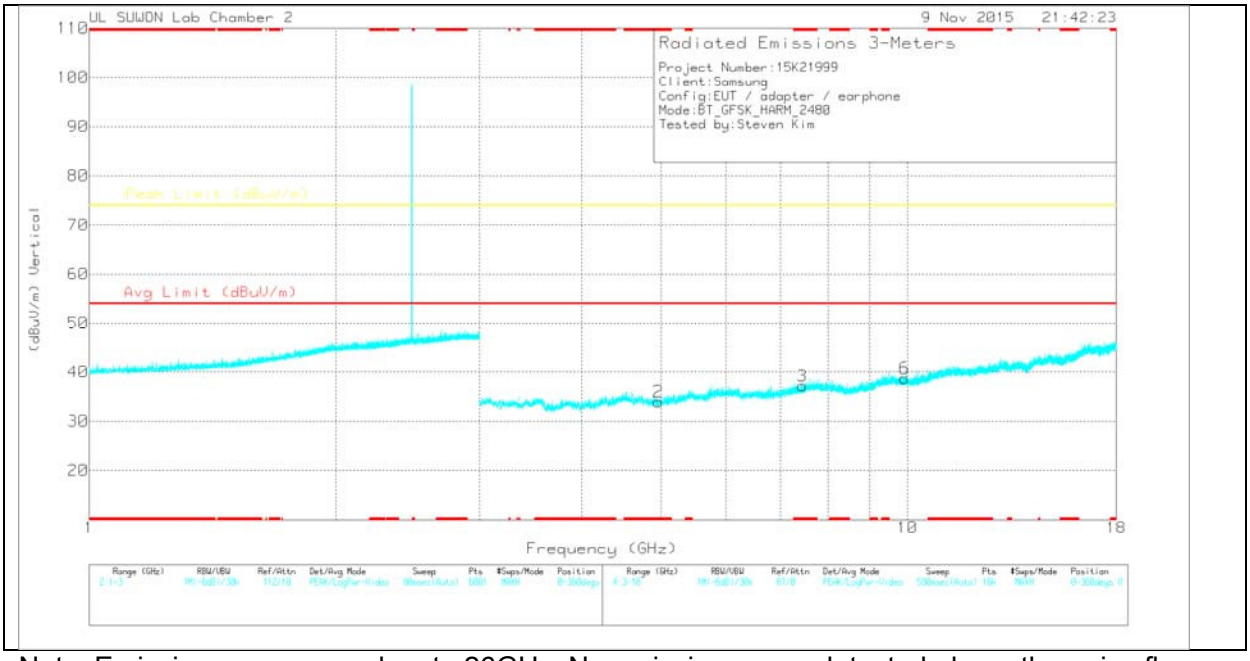
HIGH CHANNEL HORIZONTAL



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.

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HIGH CHANNEL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(00168717)_150619	Path_3_3G HP	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.961	25.07	PK	33.9	-25	33.97	-	-	74	-40.03	0-360	100	H
4	* 7.439	23.08	PK	36	-22.1	36.98	-	-	74	-37.02	0-360	100	H
5	9.921	19.87	PK	37.2	-19	38.07	-	-	74	-35.93	0-360	100	H
2	* 4.962	25.08	PK	33.9	-25	33.98	-	-	74	-40.02	0-360	100	V
3	* 7.442	23.26	PK	36	-22.1	37.16	-	-	74	-36.84	0-360	100	V
6	9.916	20.62	PK	37.1	-19	38.72	-	-	74	-35.28	0-360	100	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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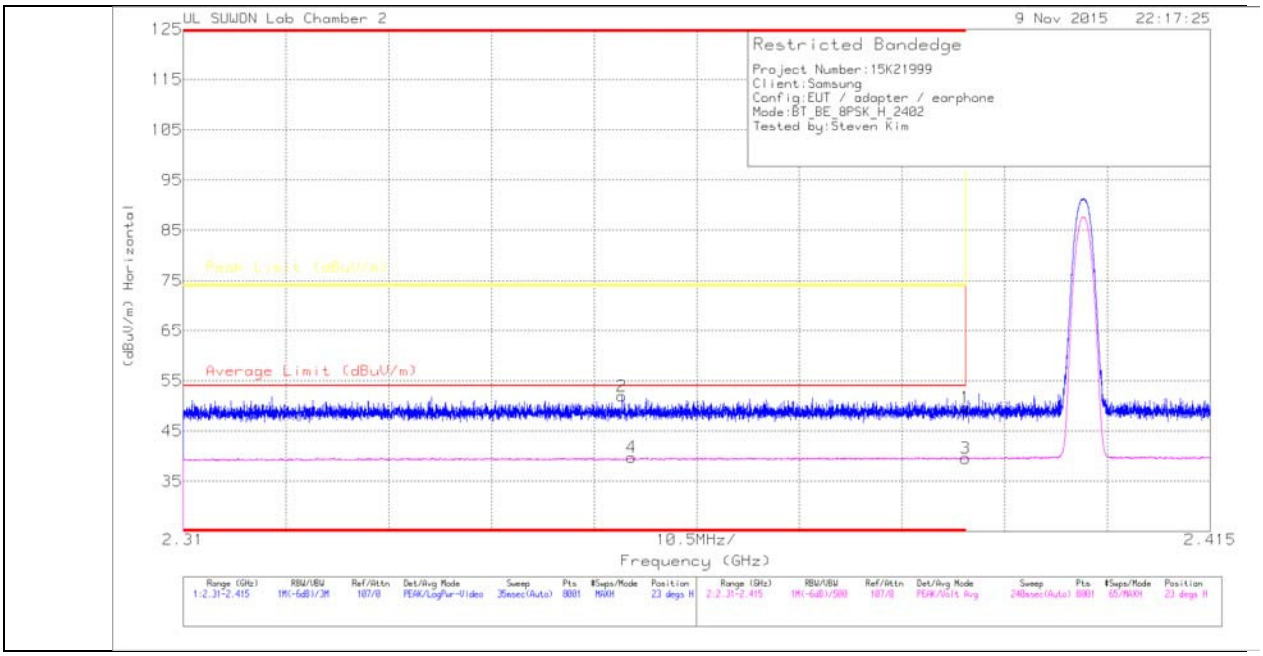
9.2.2. ENHANCED DATA RATE 8PSK MODULATION RESTRICTED BANDEDGE (LOW CHANNEL)

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(0016 8717)_150 619	Path_2_10 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	37.46	Pk	31.7	-19.5	49.66	-	-	74	-24.34	23	120	H
2	* 2.355	39.95	Pk	31.6	-19.6	51.95	-	-	74	-22.05	23	120	H
3	* 2.39	27.4	V1TV	31.7	-19.5	39.6	54	-14.4	-	-	23	120	H
4	* 2.356	27.69	V1TV	31.7	-19.6	39.79	54	-14.21	-	-	23	120	H

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

Pk - Peak detector

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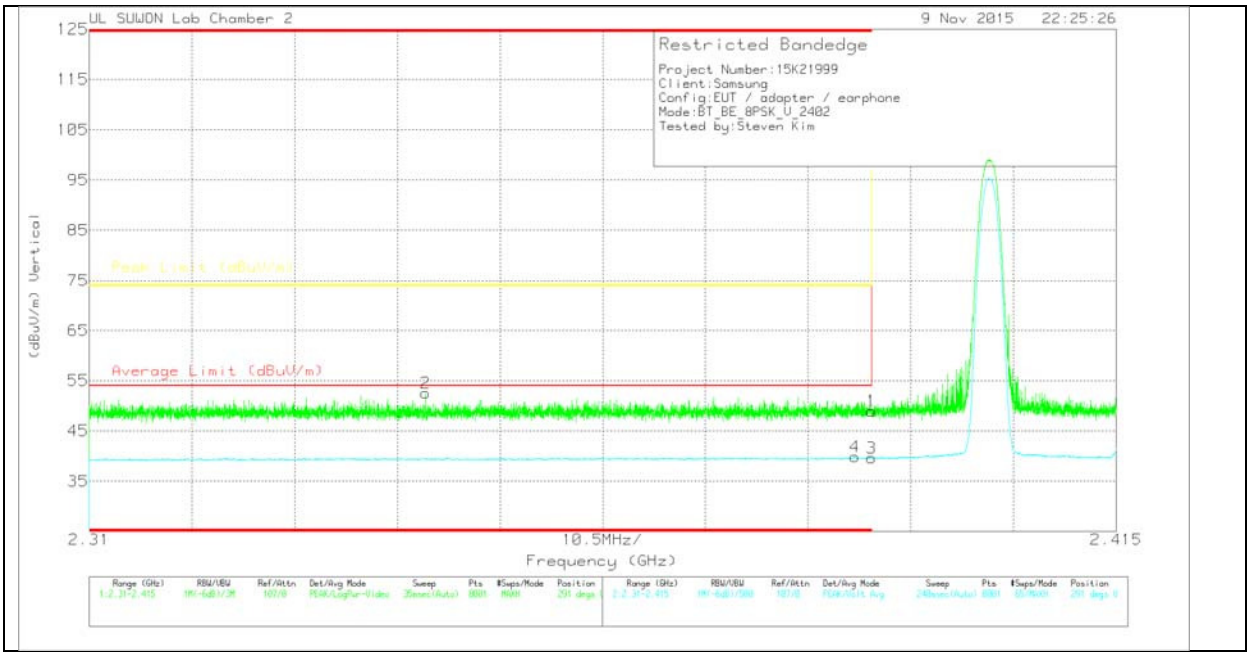
VERTICAL PEAK AND AVERAGE PLOT



VERTICAL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(00168717)_150619	Path_2_10 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	36.78	Pk	31.7	-19.5	48.98	-	-	74	-25.02	291	302	V
2	* 2.344	40.55	Pk	31.6	-19.6	52.55	-	-	74	-21.45	291	302	V
3	* 2.39	27.45	V1TV	31.7	-19.5	39.65	54	-14.35	-	-	291	302	V
4	* 2.388	27.69	V1TV	31.7	-19.5	39.89	54	-14.11	-	-	291	302	V

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

Pk - Peak detector

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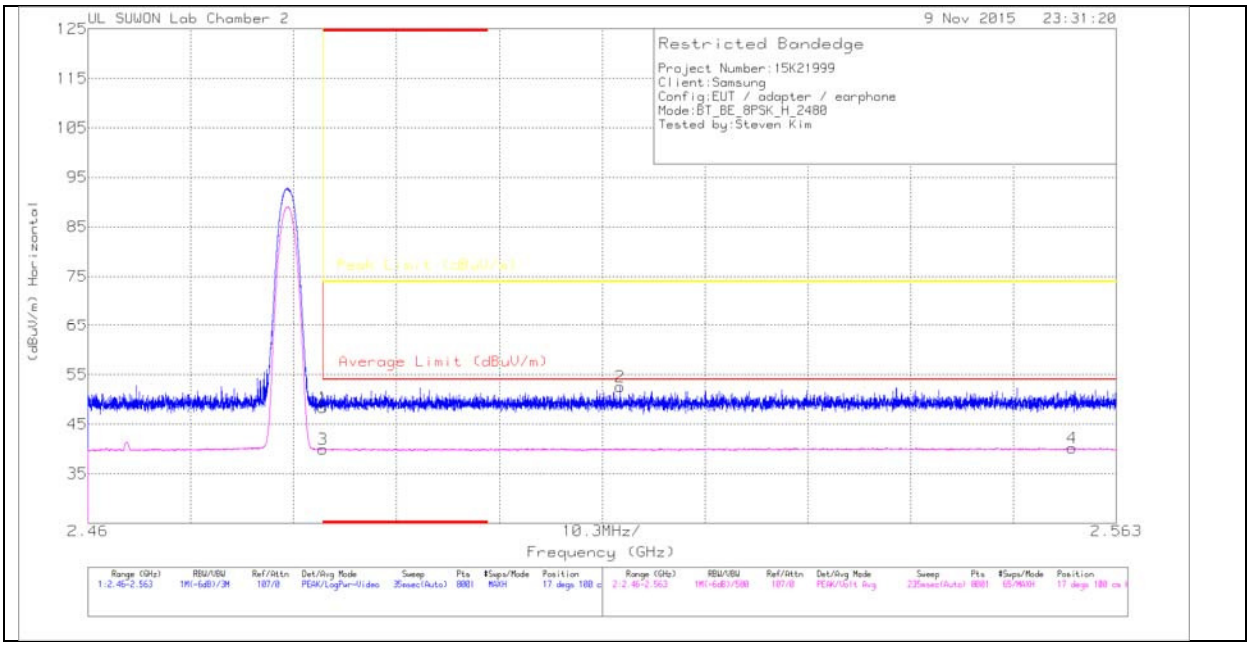
AUTHORIZED BANDEDGE (HIGH CHANNEL)

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(00168717)_150619	Path_2_10 dB	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	35.93	Pk	31.8	-19.4	48.33	-	-	74	-25.67	17	100	H
2	2.513	39.93	Pk	31.9	-19.3	52.53	-	-	74	-21.47	17	100	H
3	* 2.484	27.51	V1TV	31.8	-19.4	39.91	54	-14.09	-	-	17	100	H
4	2.559	27.62	V1TV	31.9	-19.3	40.22	54	-13.78	-	-	17	100	H

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

Pk - Peak detector

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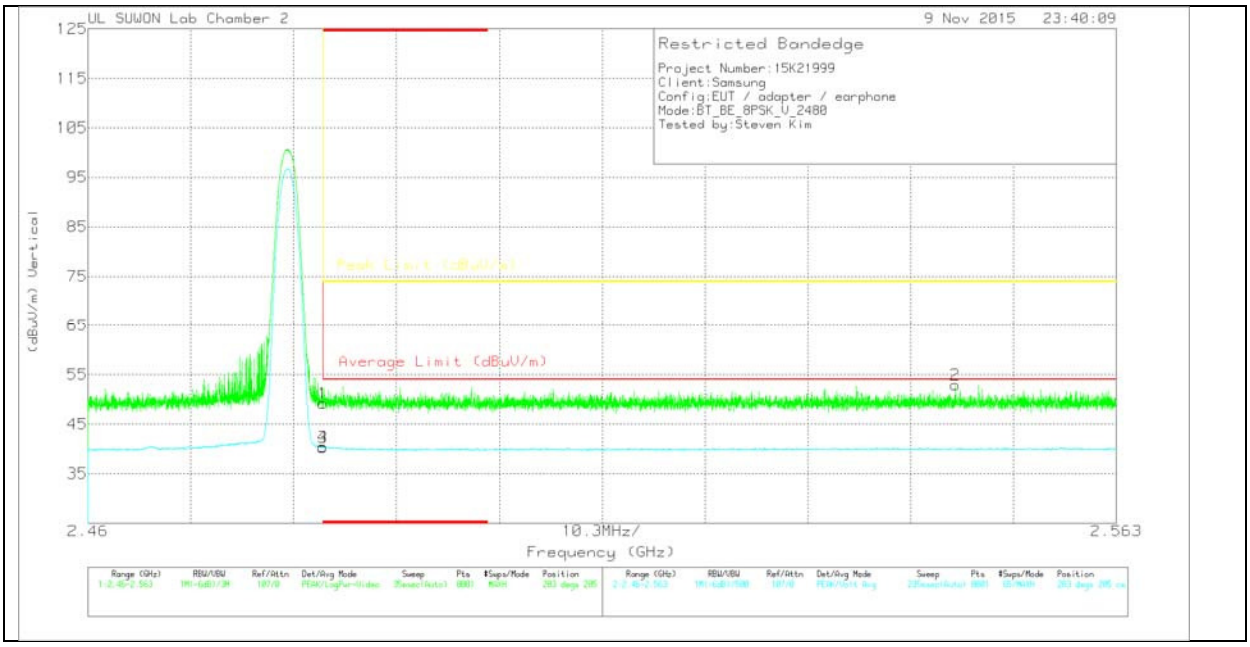
VERTICAL PEAK AND AVERAGE PLOT



VERTICAL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(00168717)_150619	Path_2_10 dB	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	36.79	Pk	31.8	-19.4	49.19	-	-	74	-24.81	283	285	V
2	2.547	40.29	Pk	31.9	-19.3	52.89	-	-	74	-21.11	283	285	V
3	* 2.484	27.95	V1TV	31.8	-19.4	40.35	54	-13.65	-	-	283	285	V
4	* 2.484	27.98	V1TV	31.8	-19.4	40.38	54	-13.62	-	-	283	285	V

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

Pk - Peak detector

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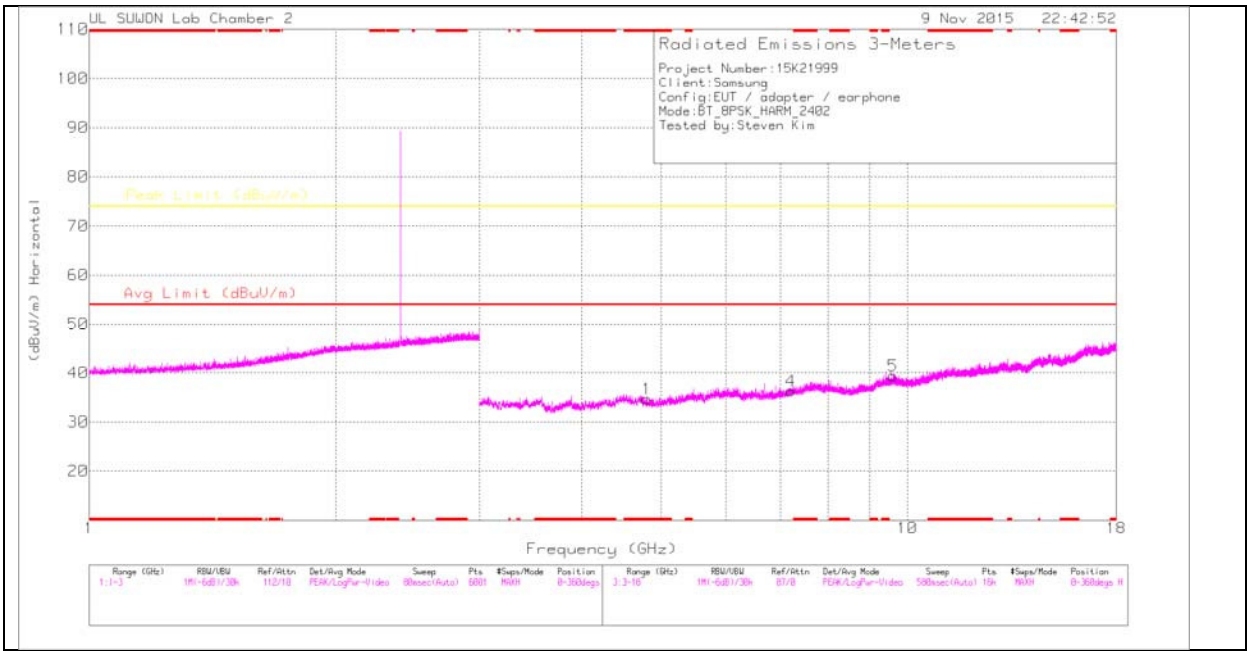
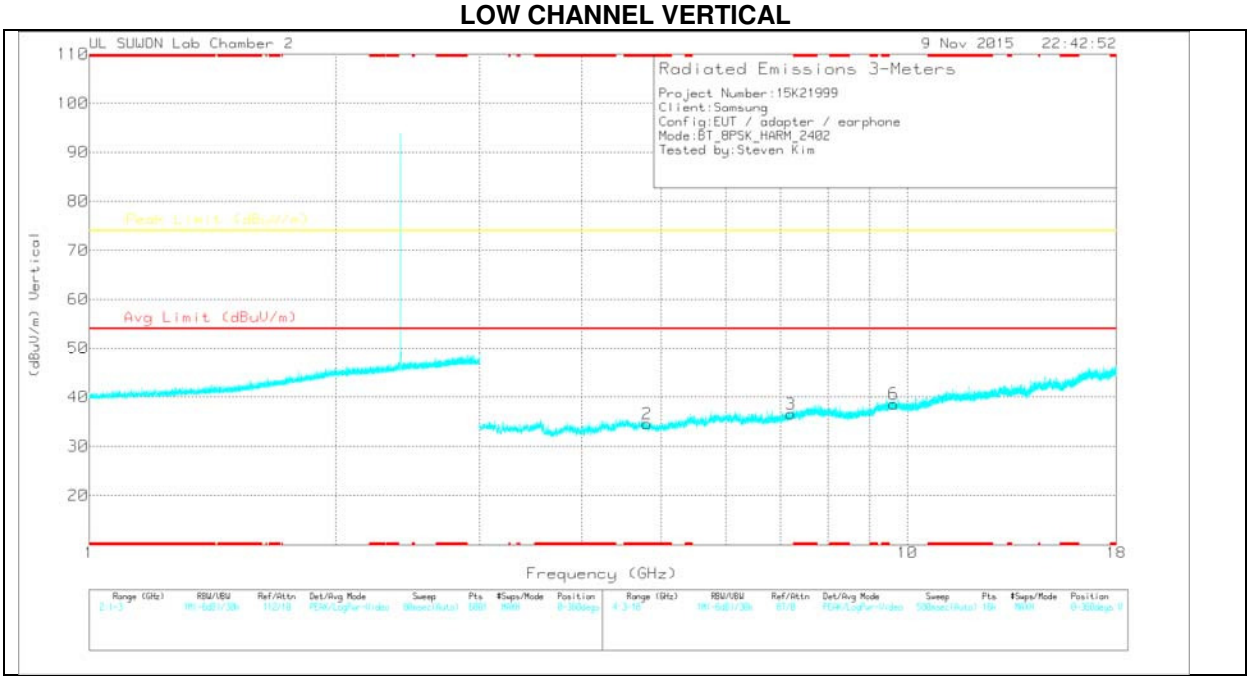
HARMONICS AND SPURIOUS EMISSIONS

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(00168717)_150619	Path_3_3G HP	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.803	26.09	PK	33.9	-25.3	34.69	-	-	74	-39.31	0-360	100	H
4	7.204	23.4	PK	35.8	-22.9	36.3	-	-	74	-37.7	0-360	100	H
5	9.608	21.6	PK	36.9	-19.1	39.4	-	-	74	-34.6	0-360	100	H
2	* 4.806	25.95	PK	33.9	-25.3	34.55	-	-	74	-39.45	0-360	200	V
3	7.205	23.65	PK	35.8	-22.9	36.55	-	-	74	-37.45	0-360	200	V
6	9.613	20.8	PK	36.9	-19.1	38.6	-	-	74	-35.4	0-360	200	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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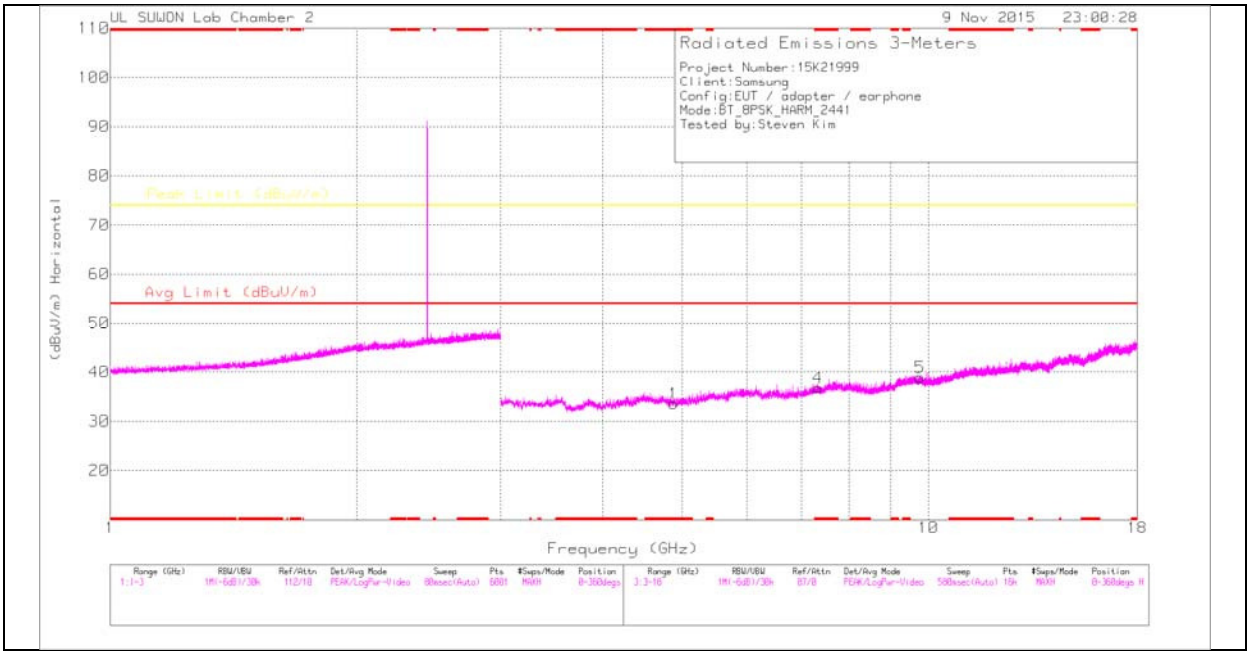
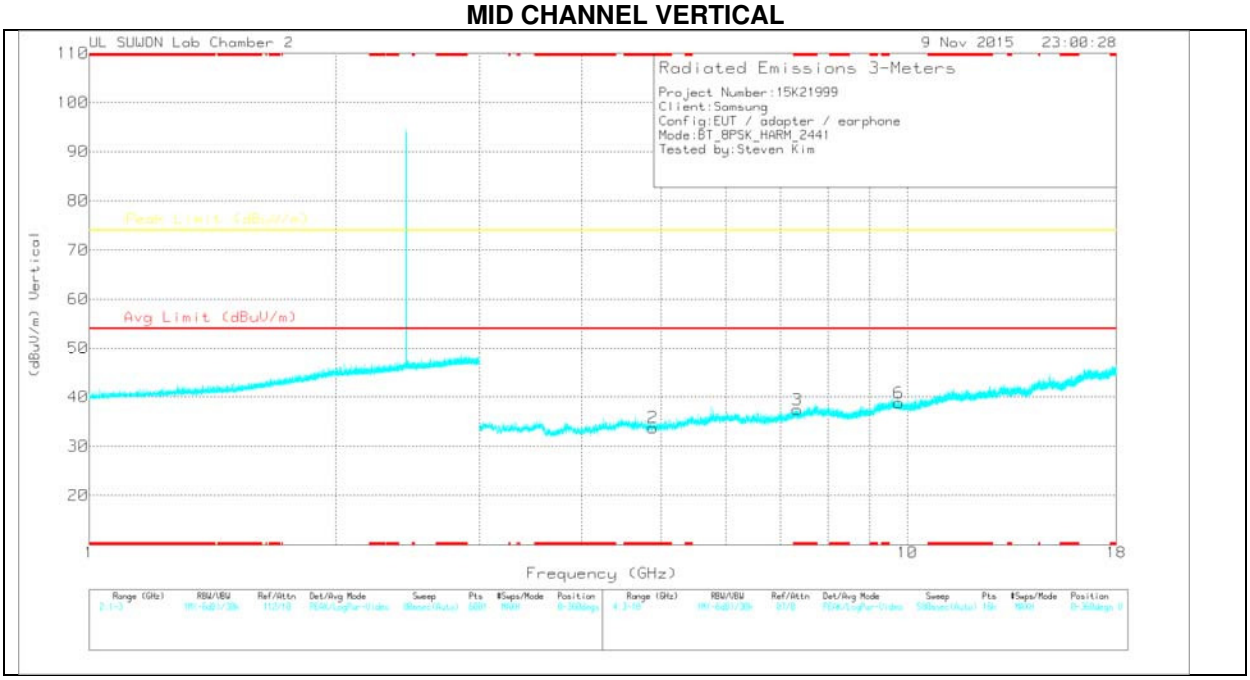
MID CHANNEL HORIZONTAL



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_3G HP	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.881	24.84	PK	33.9	-25.2	33.54	-	-	74	-40.46	0-360	100	H
4	* 7.332	23.38	PK	35.9	-22.5	36.78	-	-	74	-37.22	0-360	200	H
5	9.765	21.23	PK	37	-19.3	38.93	-	-	74	-35.07	0-360	200	H
2	* 4.886	25.06	PK	33.9	-25.2	33.76	-	-	74	-40.24	0-360	200	V
3	* 7.334	24	PK	35.9	-22.5	37.4	-	-	74	-36.6	0-360	100	V
6	9.76	21.1	PK	37	-19.3	38.8	-	-	74	-35.2	0-360	100	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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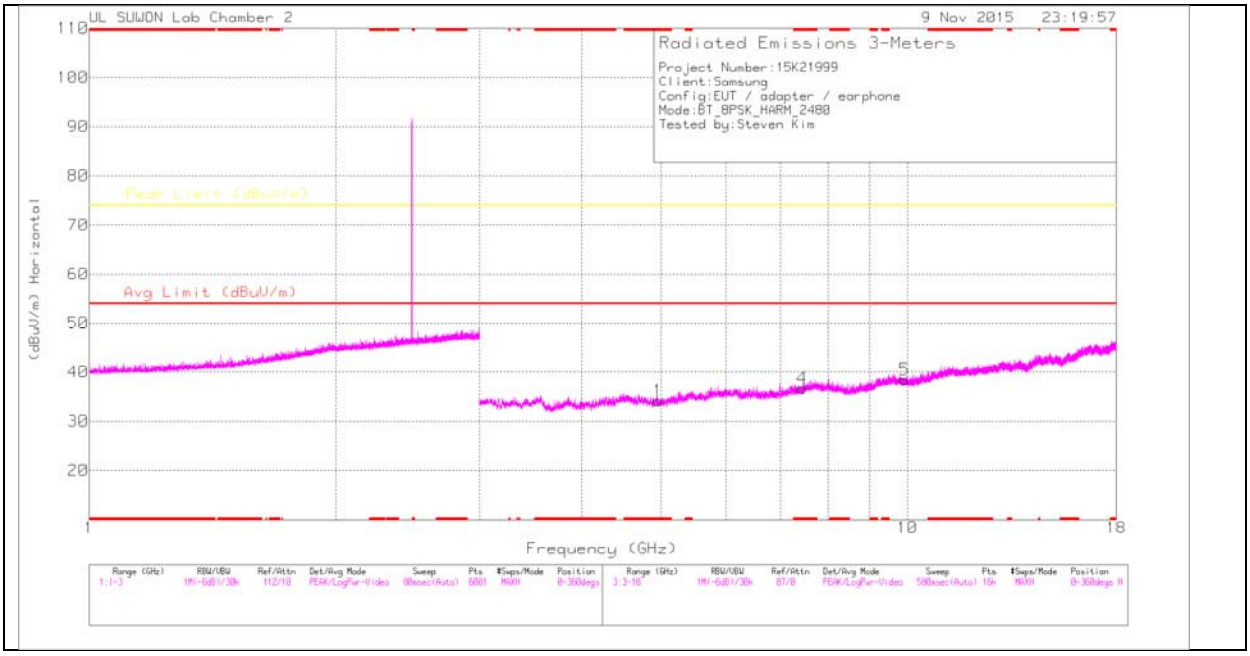
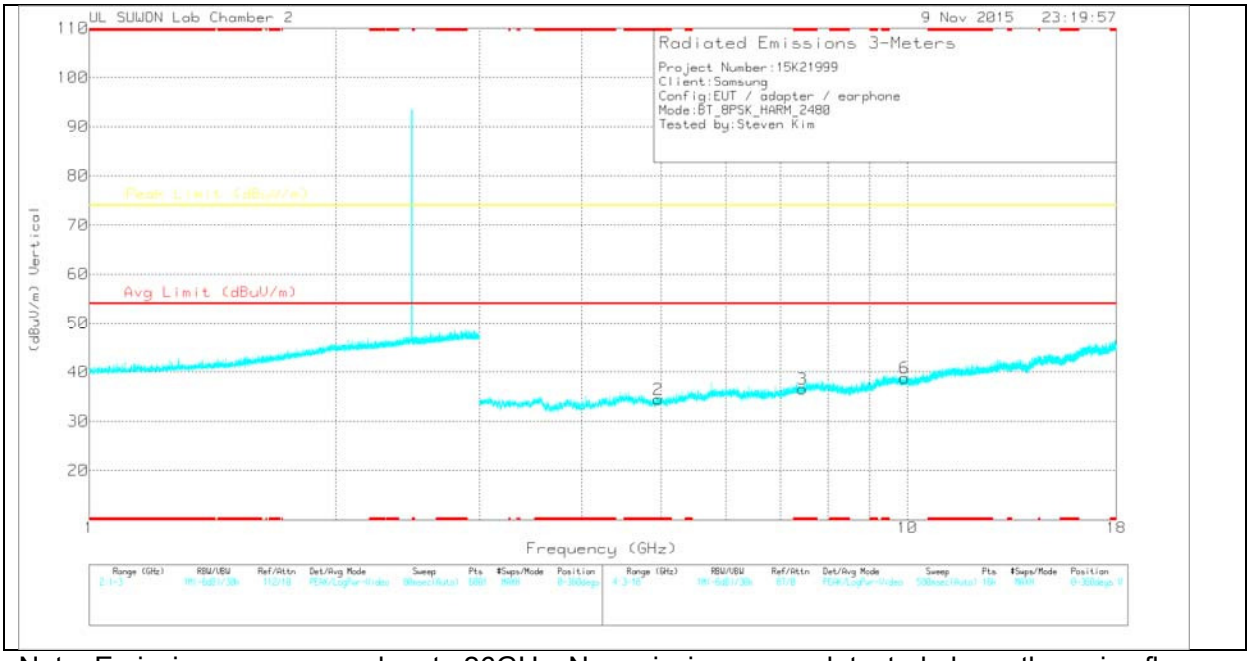
HIGH CHANNEL HORIZONTAL



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.

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HIGH CHANNEL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(00168717)_150619	Path_3_3G HP	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.96	25.31	PK	33.9	-25	34.21	-	-	74	-39.79	0-360	200	H
4	* 7.436	22.82	PK	36	-22.1	36.72	-	-	74	-37.28	0-360	100	H
5	9.921	20.27	PK	37.2	-19	38.47	-	-	74	-35.53	0-360	100	H
2	* 4.961	25.54	PK	33.9	-25	34.44	-	-	74	-39.56	0-360	100	V
3	* 7.439	22.66	PK	36	-22.1	36.56	-	-	74	-37.44	0-360	100	V
6	9.921	20.56	PK	37.2	-19	38.76	-	-	74	-35.24	0-360	200	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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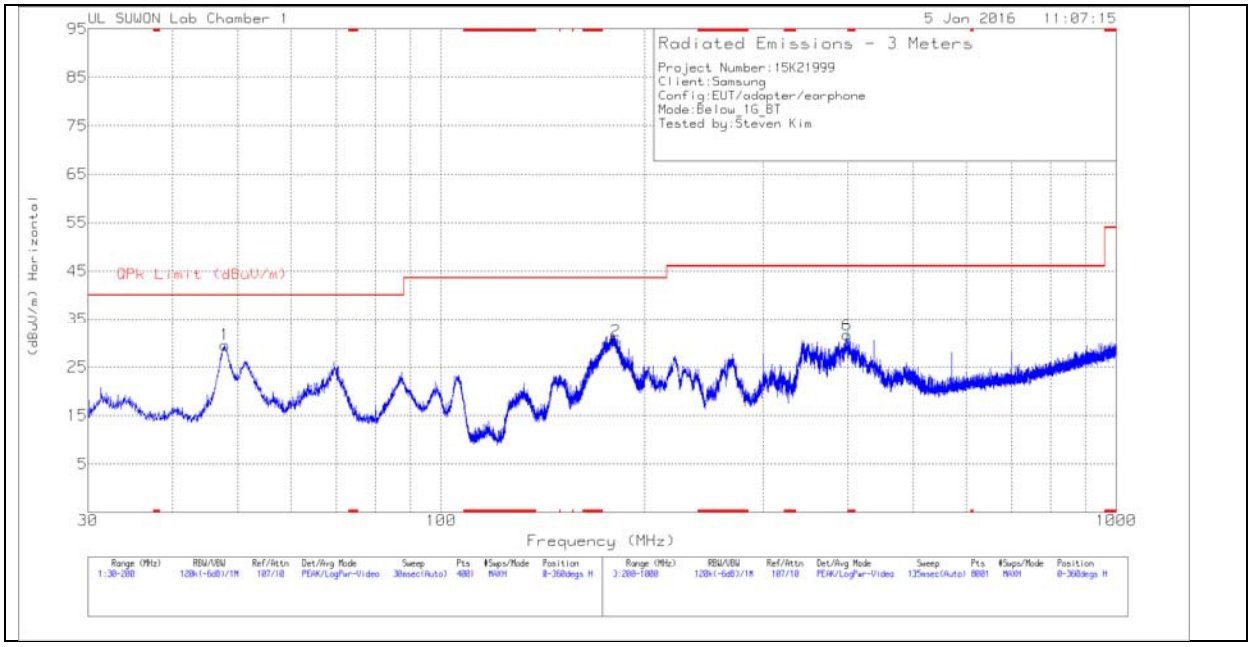
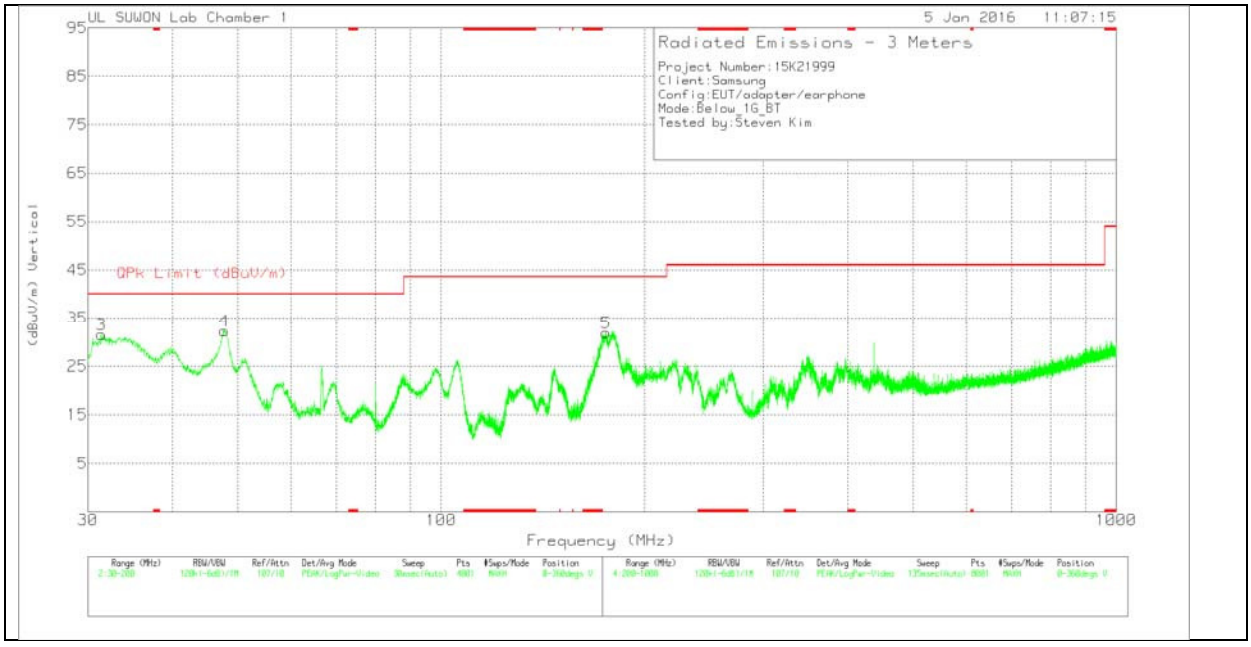
9.3. WORST-CASE BELOW 1 GHz

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

HORIZONTAL PLOT



VERTICAL PLOT



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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	47.85	46	Pk	13.8	-30.2	29.6	40	-10.4	0-360	400	H
2	181.3425	49.18	Pk	9.5	-28.3	30.38	43.52	-13.14	0-360	100	H
3	31.4025	51.81	Pk	10.3	-30.5	31.61	40	-8.39	0-360	100	V
4	47.7225	48.86	Pk	13.7	-30.2	32.36	40	-7.64	0-360	100	V
5	175.6475	51.16	Pk	9.2	-28.4	31.96	43.52	-11.56	0-360	100	V
6	399	42.85	Pk	15.5	-26.7	31.65	46.02	-14.37	0-360	100	H

Pk - Peak detector

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10. 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.

RESULTS

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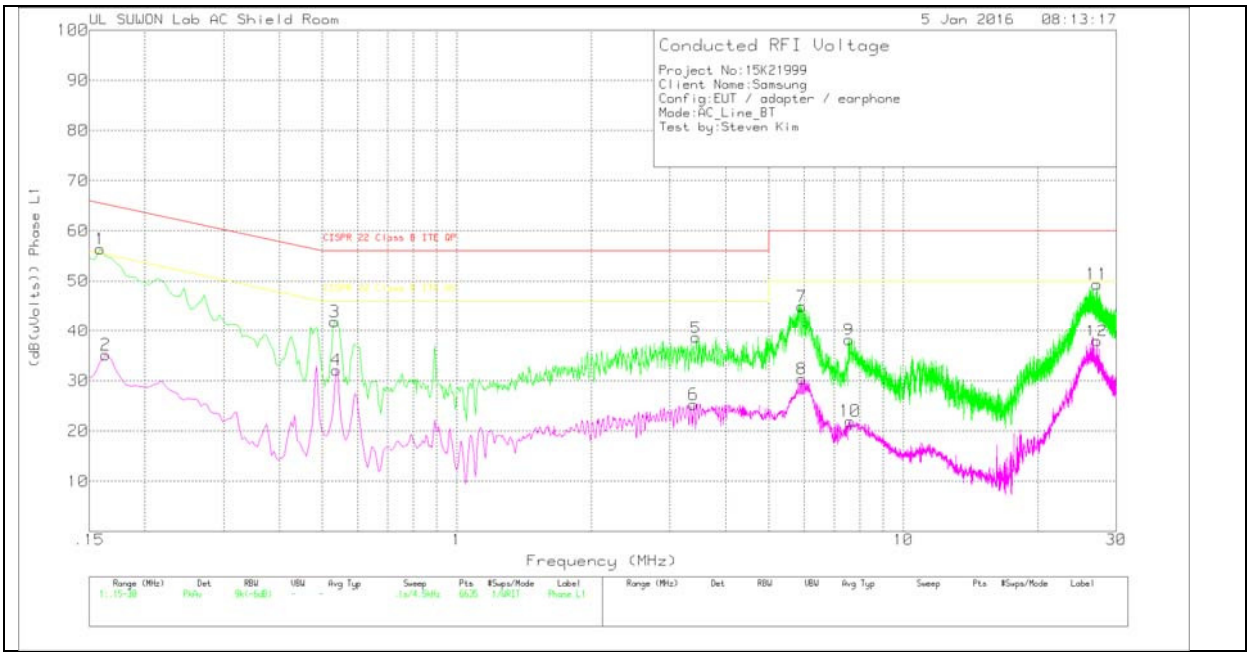
6 WORST EMISSIONS

LINE 1 PLOT



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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	.159	46.42	Pk	10	0	56.42	65.52	-9.1	-	-
2	.1635	25.05	Av	10.1	0	35.15	-	-	55.28	-20.13
3	.5325	31.83	Pk	10.1	0	41.93	56	-14.07	-	-
4	.537	22	Av	10.1	0	32.1	-	-	46	-13.9
5	3.435	28.71	Pk	9.8	.1	38.61	56	-17.39	-	-
6	3.39	15.38	Av	9.8	.1	25.28	-	-	46	-20.72
7	5.9235	34.96	Pk	9.9	.1	44.96	60	-15.04	-	-
8	5.9235	20.36	Av	9.9	.1	30.36	-	-	50	-19.64
9	7.557	28.2	Pk	9.9	.1	38.2	60	-21.8	-	-
10	7.602	11.99	Av	9.9	.1	21.99	-	-	50	-28.01
11	27.159	38.37	Pk	10.7	.3	49.37	60	-10.63	-	-
12	27.159	26.96	Av	10.7	.3	37.96	-	-	50	-12.04

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)
.1545	30.04	Qp	9.9	0	39.94	65.75	-25.81	-	-

Qp - Quasi-Peak detector

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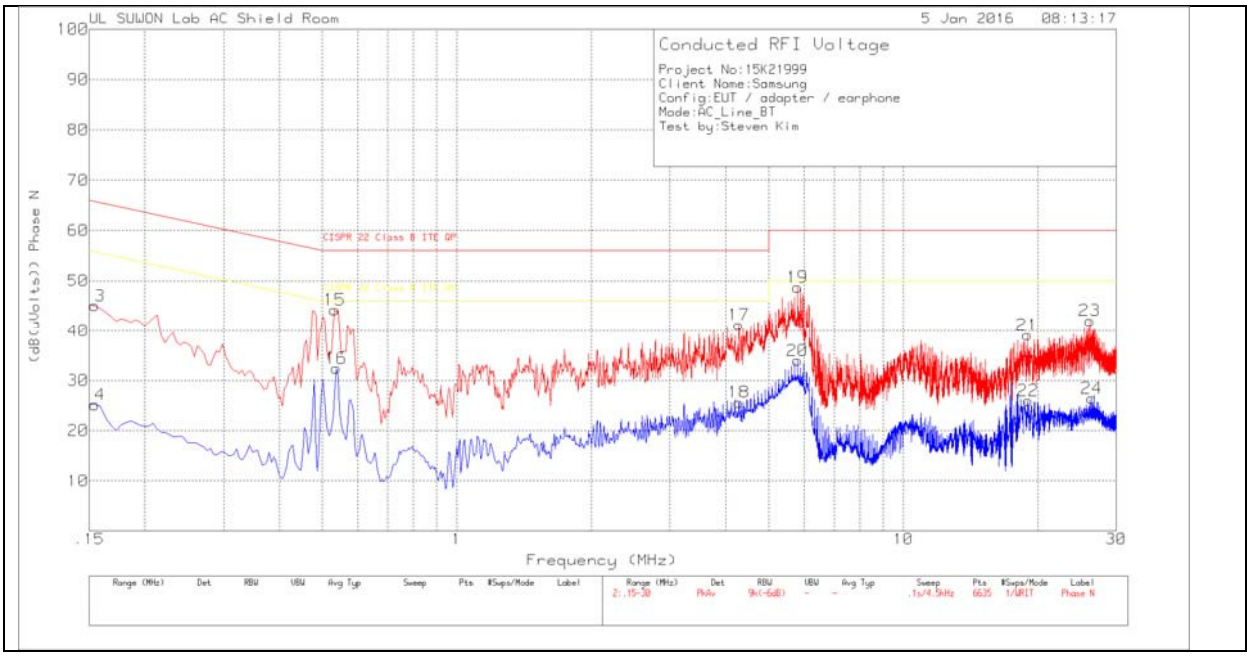
LINE 2 PLOT



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	.1545	35.17	Pk	9.9	0	45.07	65.75	-20.68	-	-
14	.1545	15.29	Av	9.9	0	25.19	-	-	55.75	-30.56
15	.5325	34.15	Pk	10.1	0	44.25	56	-11.75	-	-
16	.537	22.36	Av	10.1	0	32.46	-	-	46	-13.54
17	4.2855	31.34	Pk	9.8	.1	41.24	56	-14.76	-	-
18	4.2855	15.76	Av	9.8	.1	25.66	-	-	46	-20.34
19	5.7975	38.75	Pk	9.9	.1	48.75	60	-11.25	-	-
20	5.7975	23.99	Av	9.9	.1	33.99	-	-	50	-16.01
21	18.96	28.36	Pk	10.6	.2	39.16	60	-20.84	-	-
22	19.05	15.19	Av	10.6	.2	25.99	-	-	50	-24.01
23	26.1645	30.99	Pk	10.8	.3	42.09	60	-17.91	-	-
24	26.43	15.38	Av	10.8	.3	26.48	-	-	50	-23.52

Pk - Peak detector

Av - Average detection

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