

## 10.5. OUT-OF-BAND EMISSIONS

### LIMITS

FCC §15.247 (d)

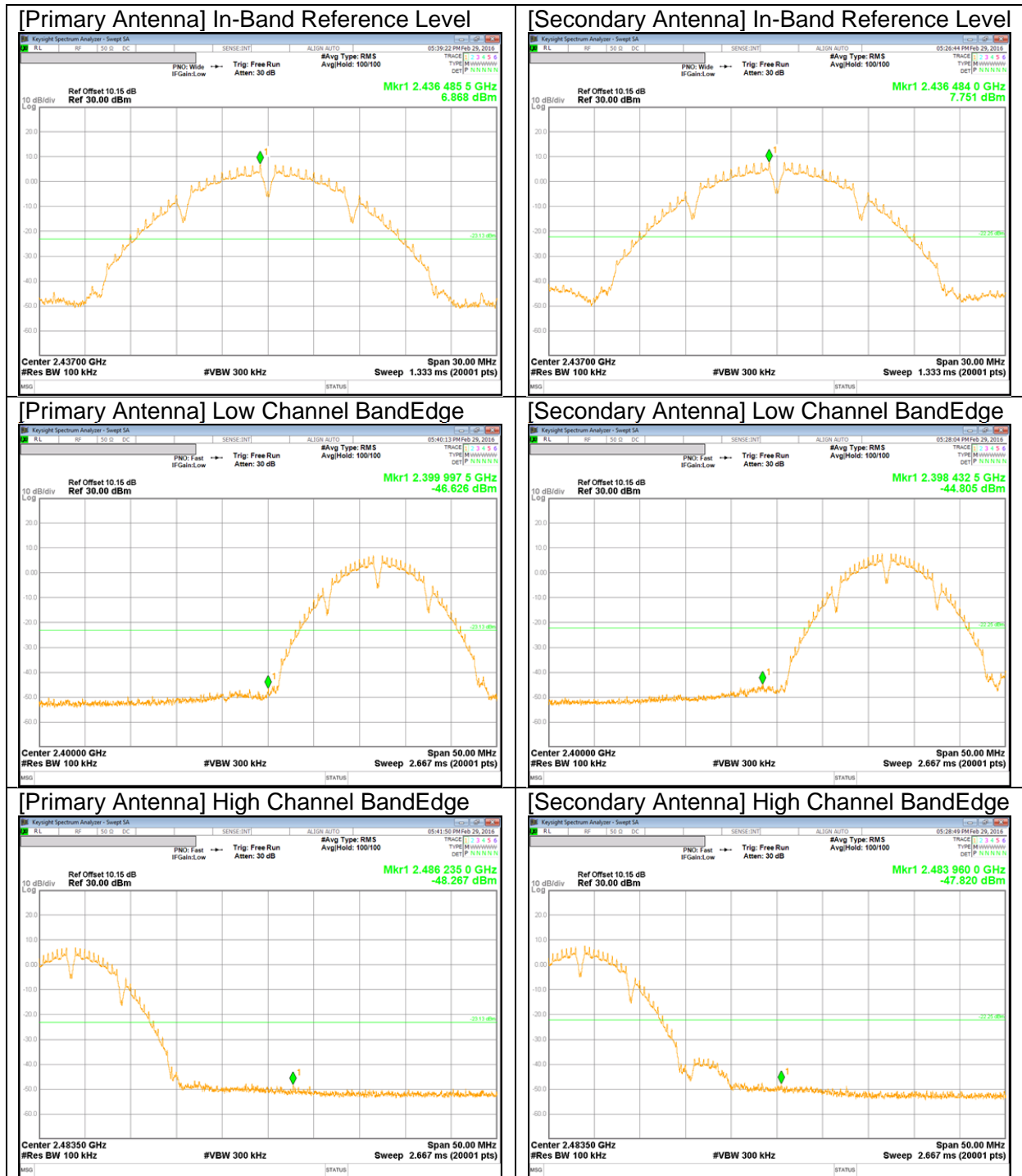
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required.

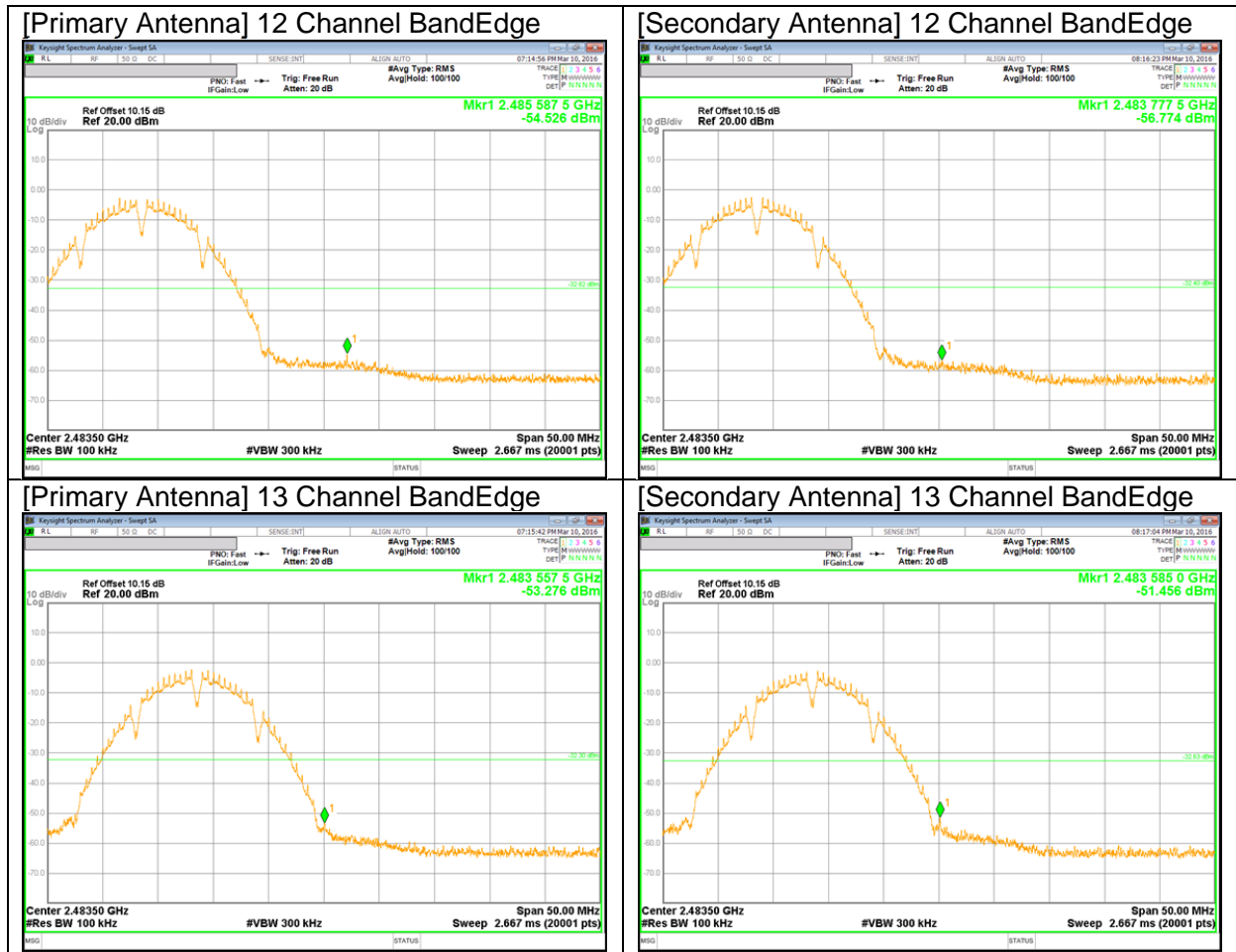
### TEST PROCEDURE

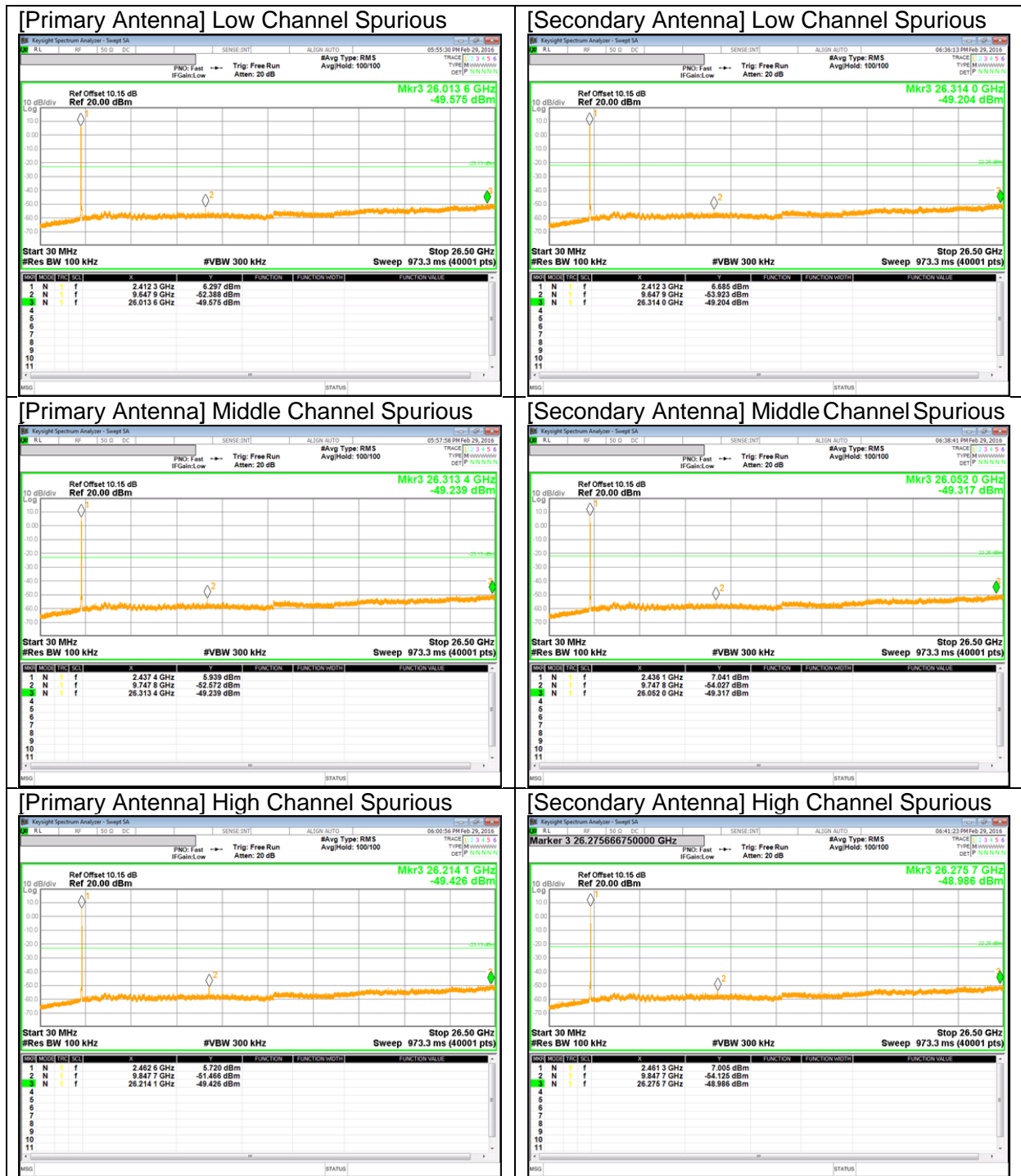
The transmitter output is connected to a spectrum analyzer with RBW = 100 kHz, VBW = 300 kHz, peak detector, and max hold. Measurements utilizing these settings are made of the in-band reference level, bandedge (where measurements to the general radiated limits will not be made) and out-of-band emissions.

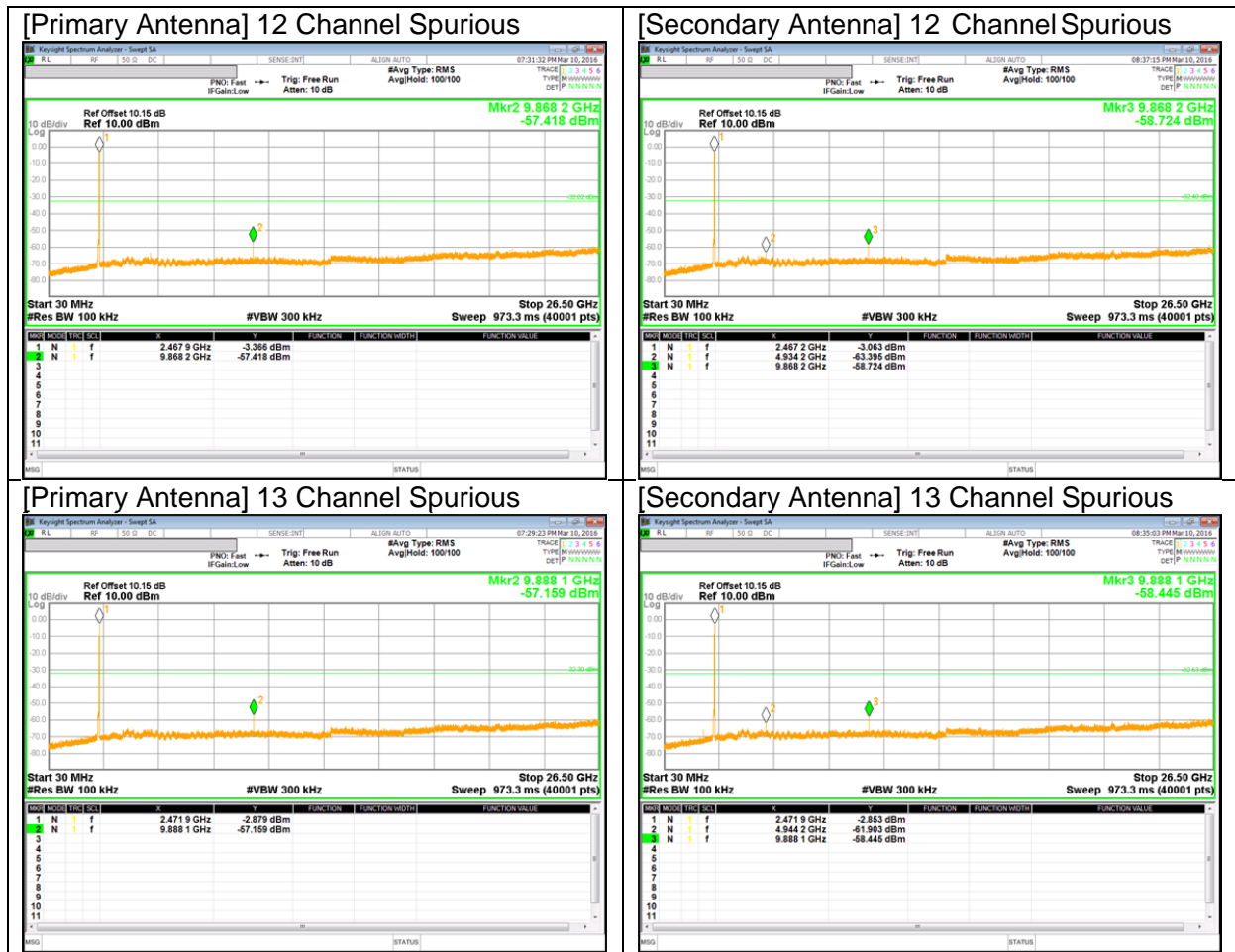
**RESULTS**

**10.5.1. 802.11b MODE IN THE 2.4 GHz BAND**

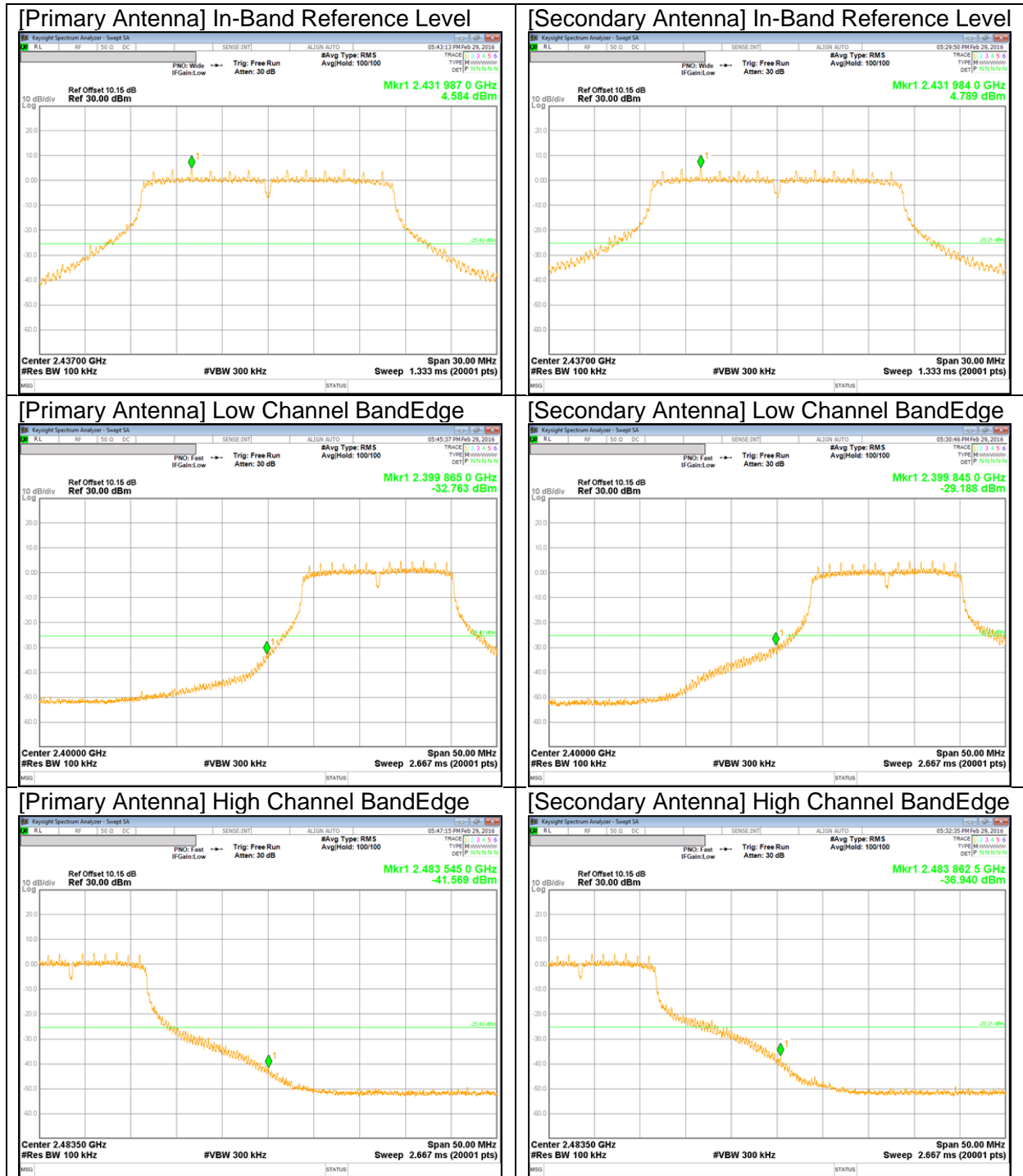


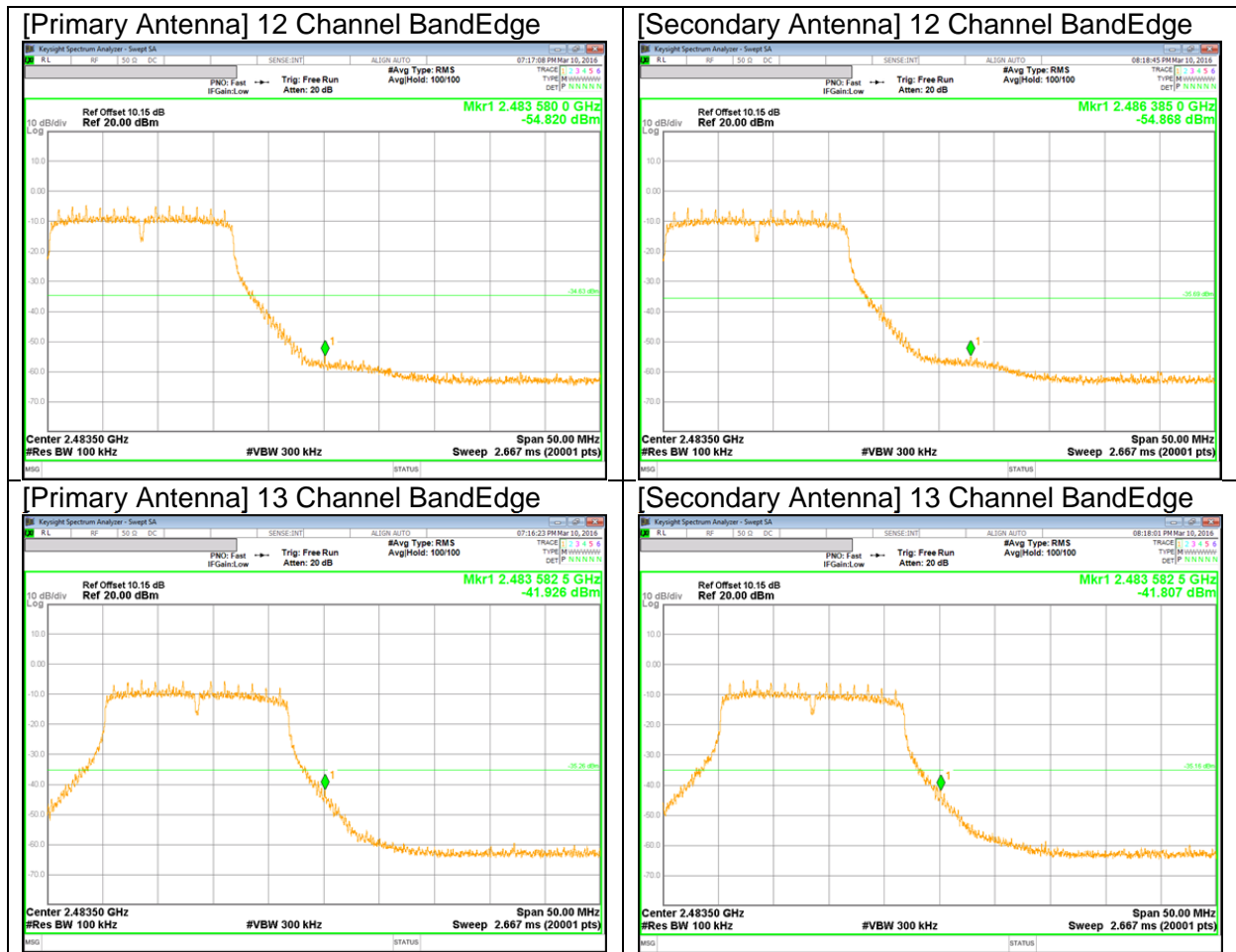


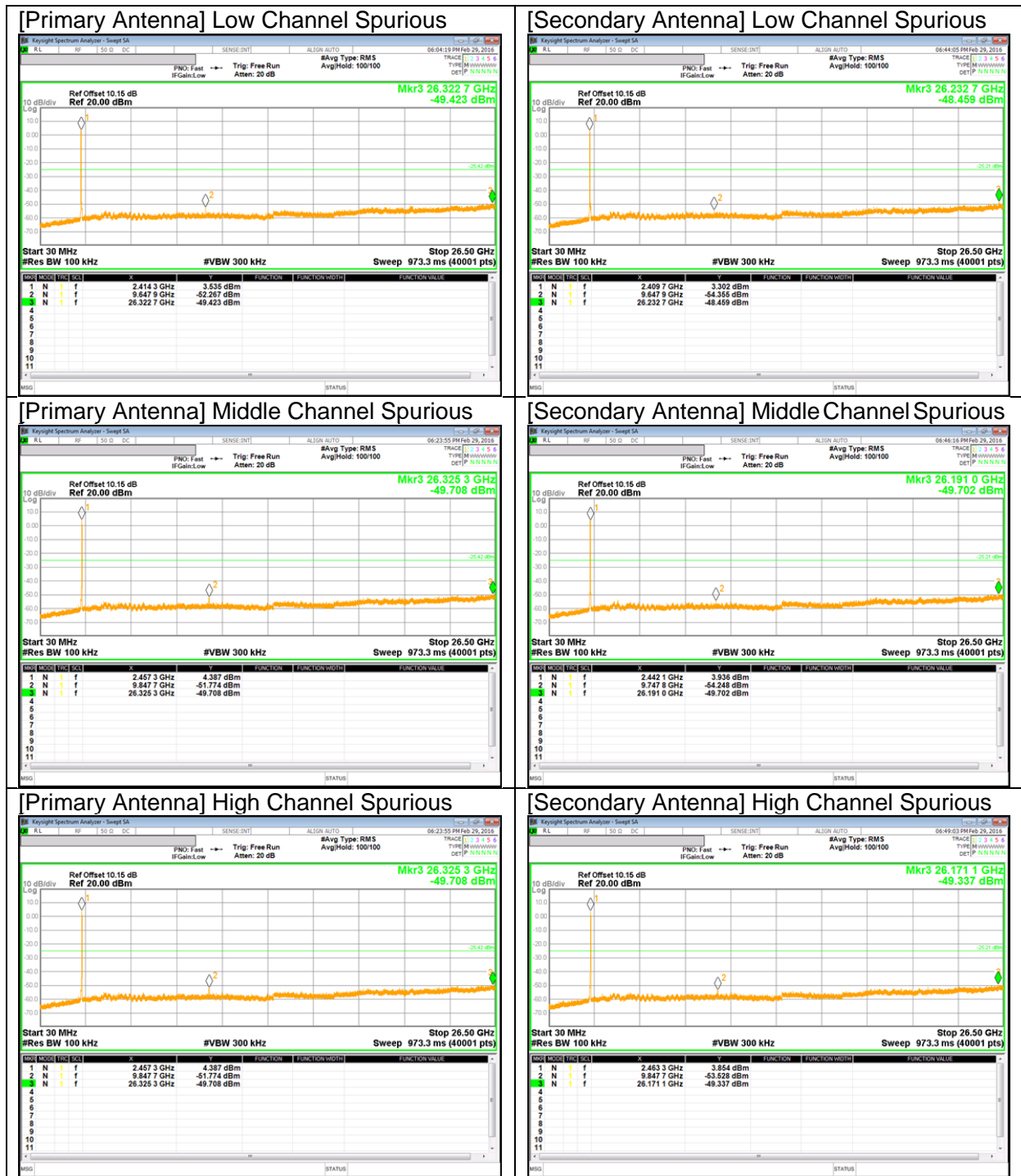


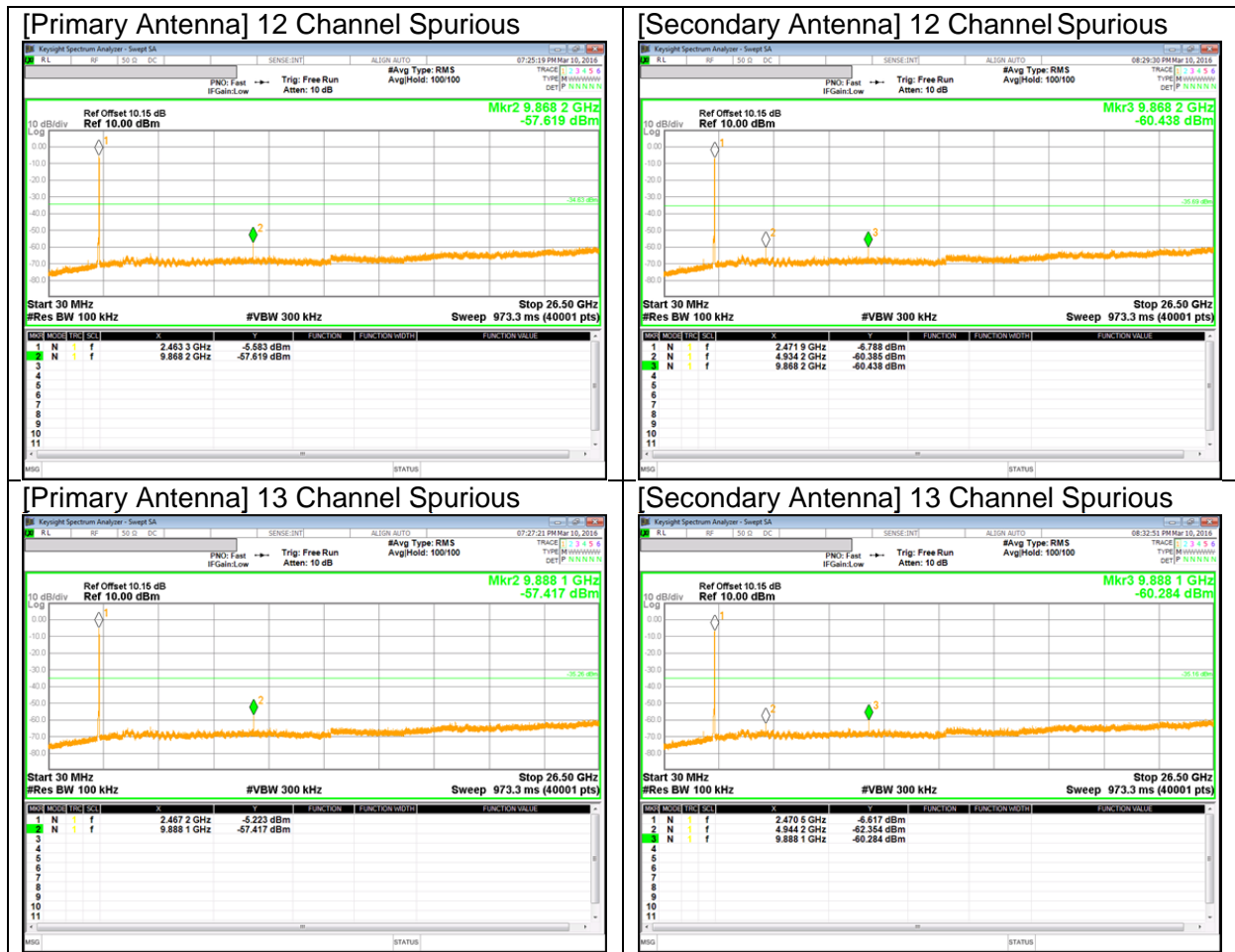


**10.5.2. 802.11g MODE IN THE 2.4 GHz BAND**

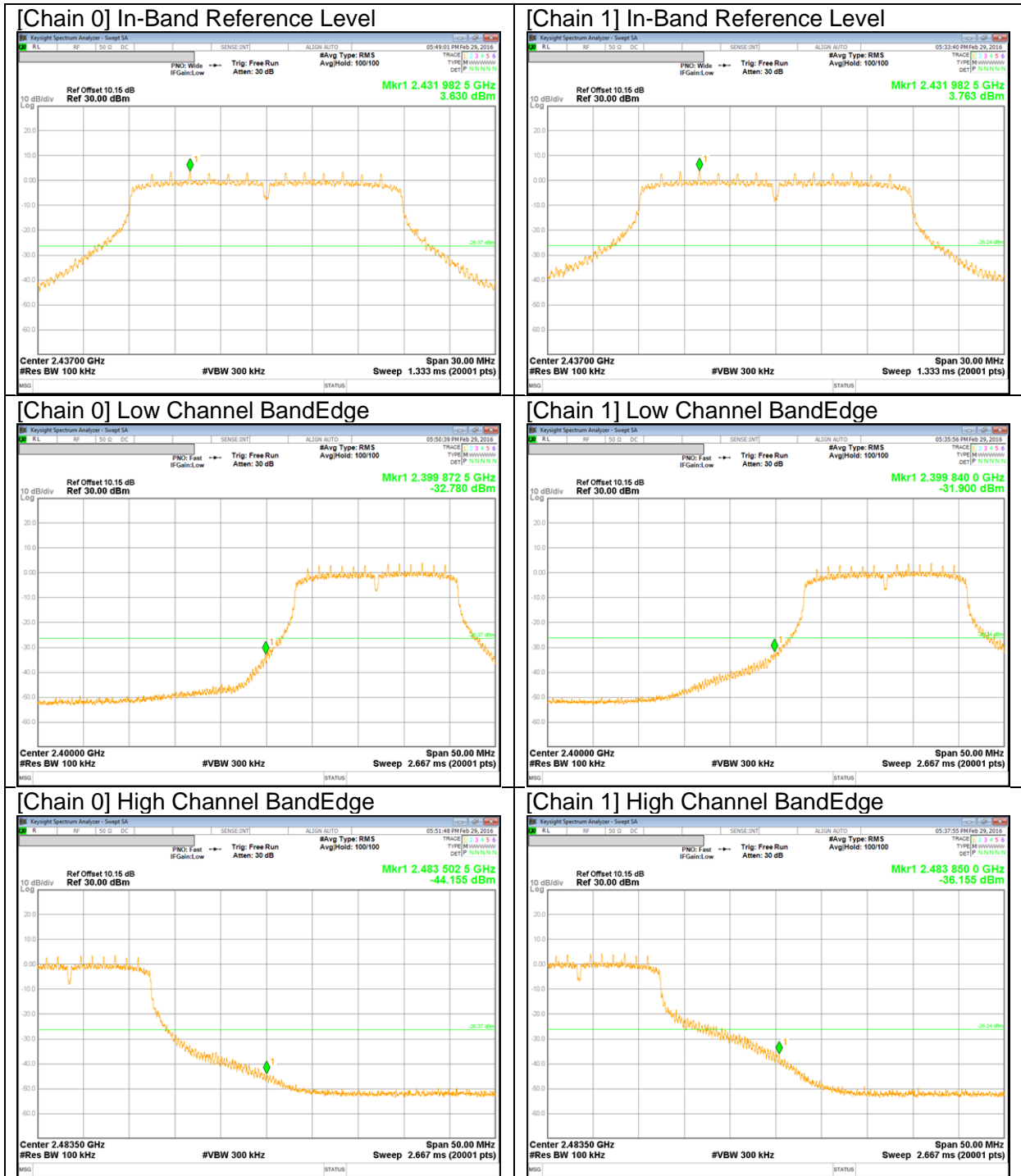


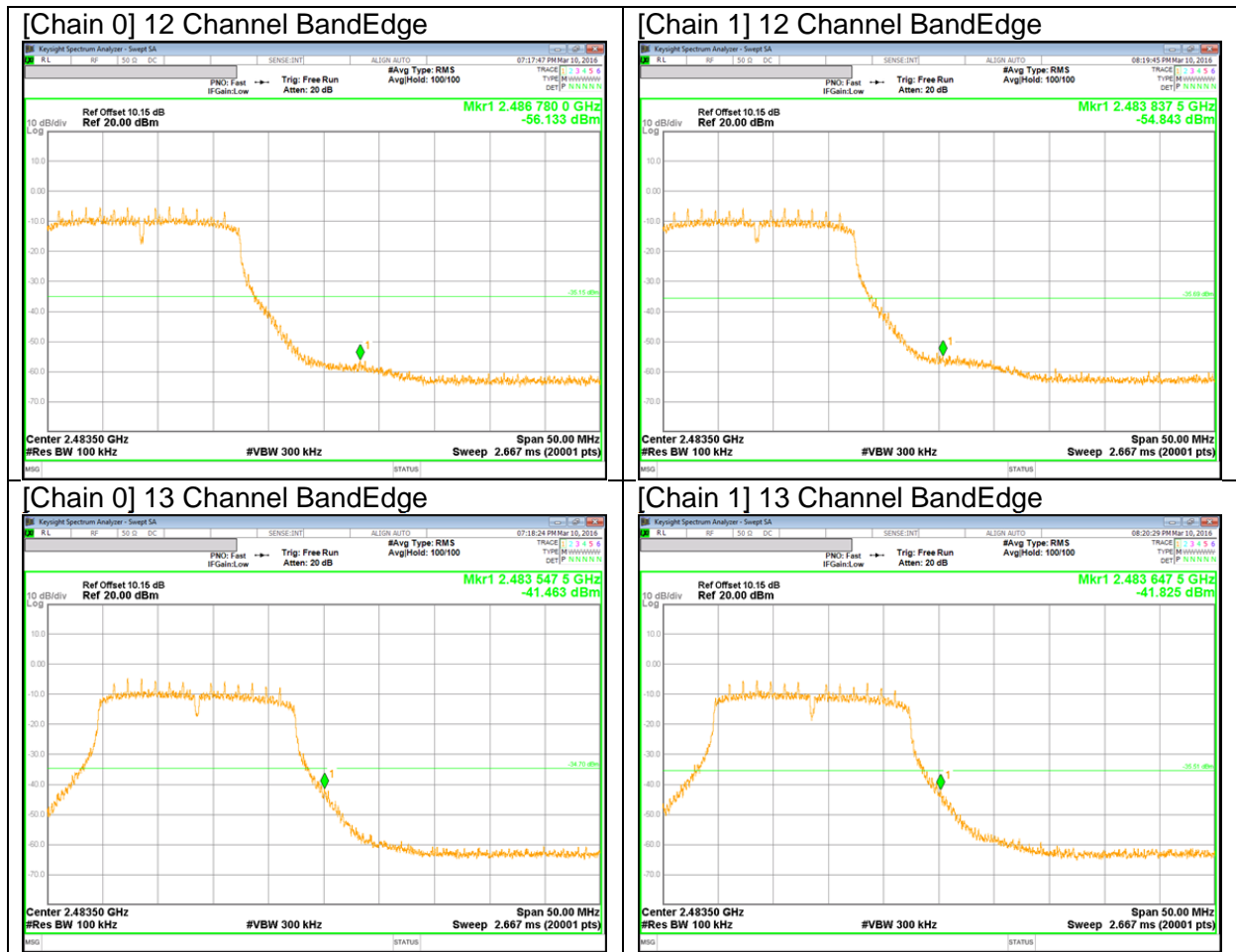


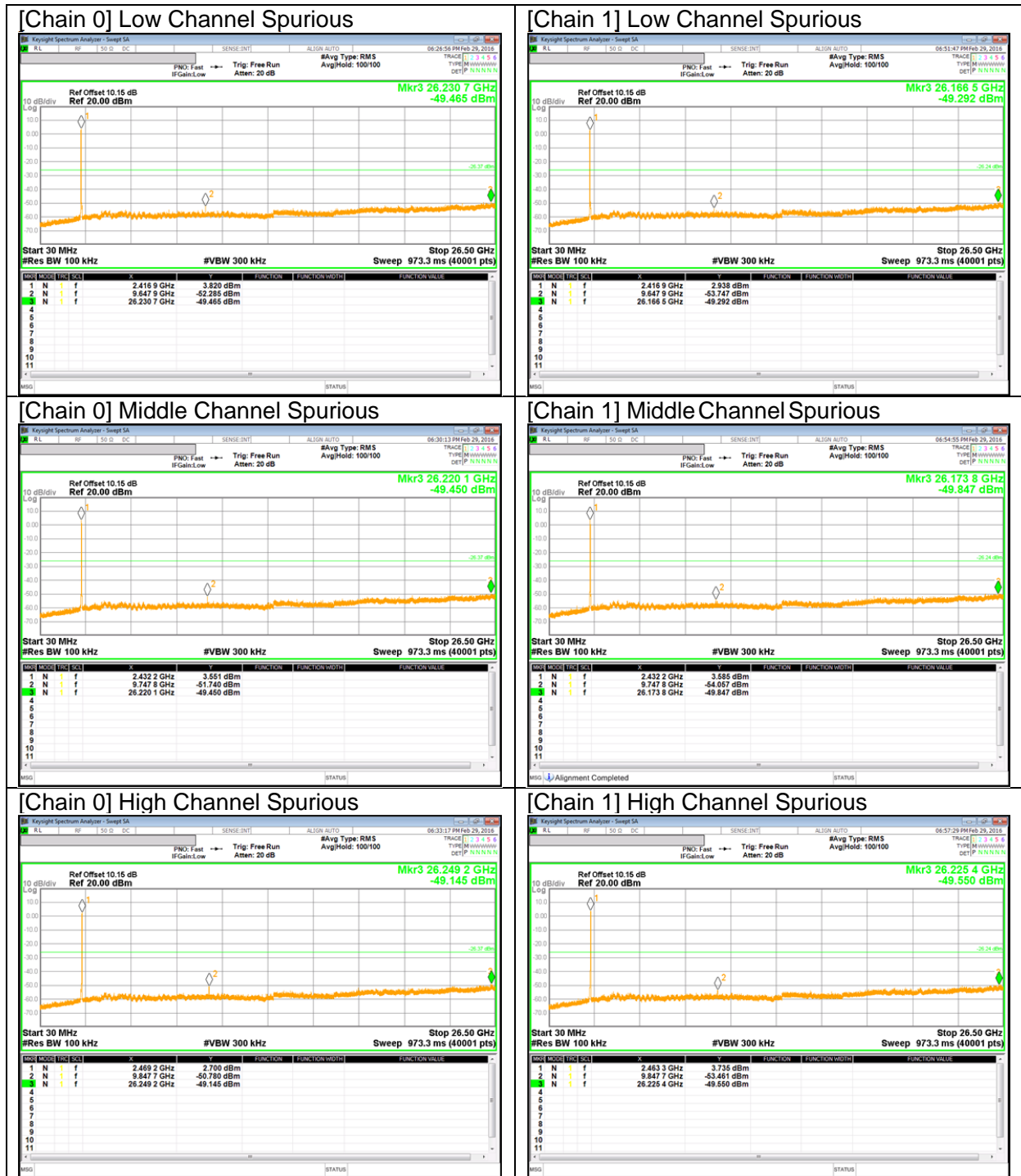


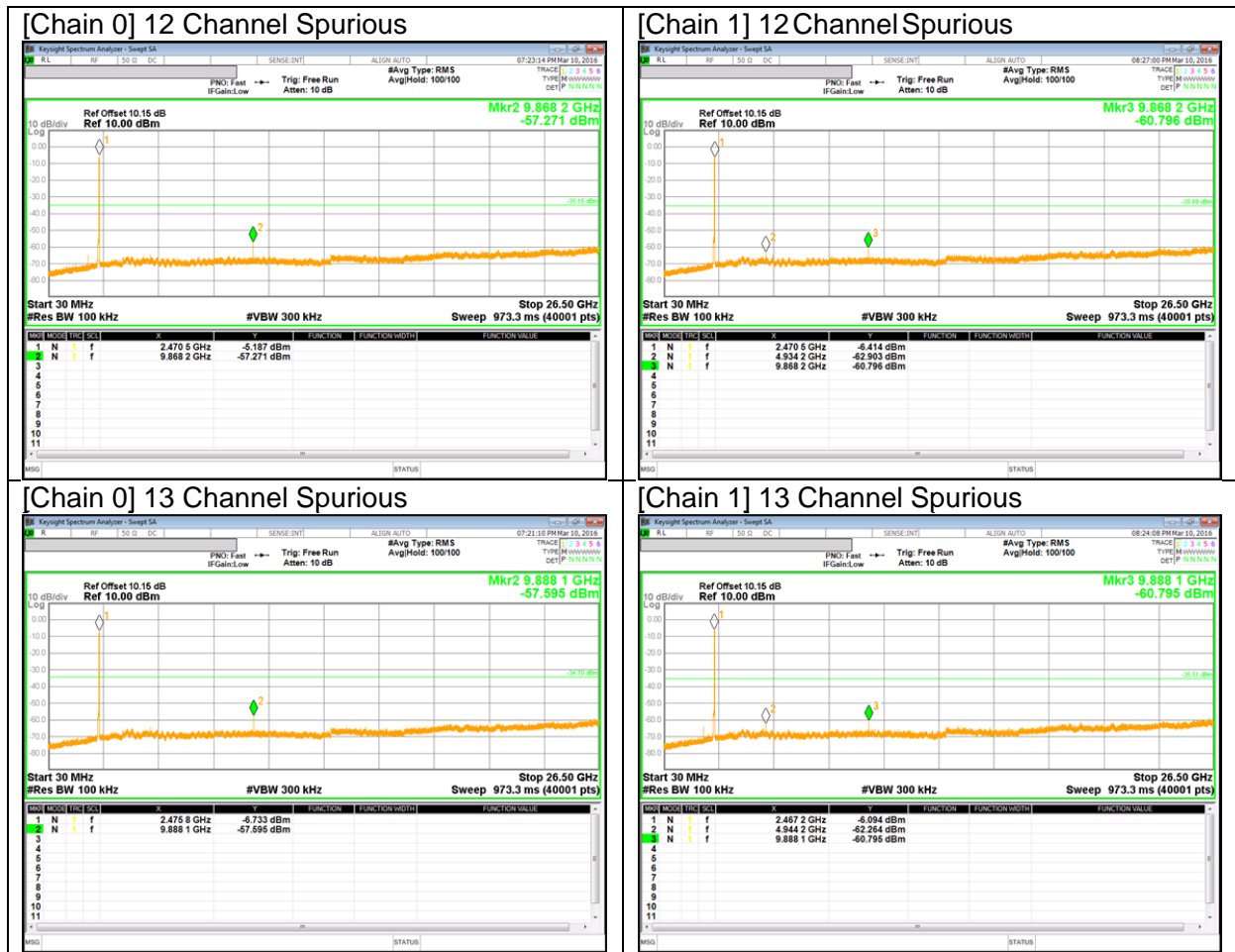


**10.5.3. 802.11n HT20 MODE IN THE 2.4 GHz BAND**









## 11. RADIATED TEST RESULTS

### 11.1. 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.

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 and add duty cycle factor for average measurements. Duty cycle factor =  $10\log(1/x)$  For this sample B mode = 0dB (duty cycle >98%); G mode = 0.29dB; N mode = 0.31dB.

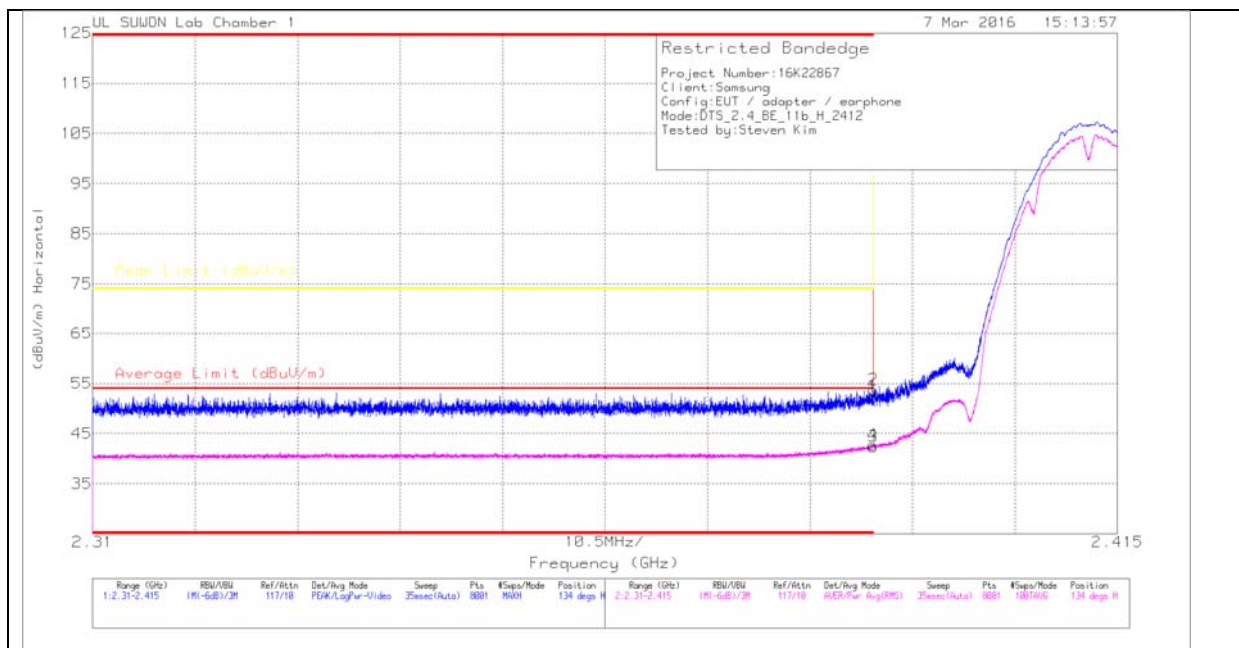
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band.

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.

## 11.2. TRANSMITTER ABOVE 1 GHz

### 11.2.1. TX ABOVE 1 GHz 802.11b MODE IN THE 2.4 GHz BAND RESTRICTED BANDEDGE (LOW CHANNEL)

#### HORIZONTAL PEAK AND AVERAGE PLOT



#### HORIZONTAL DATA

##### TRACE MARKERS

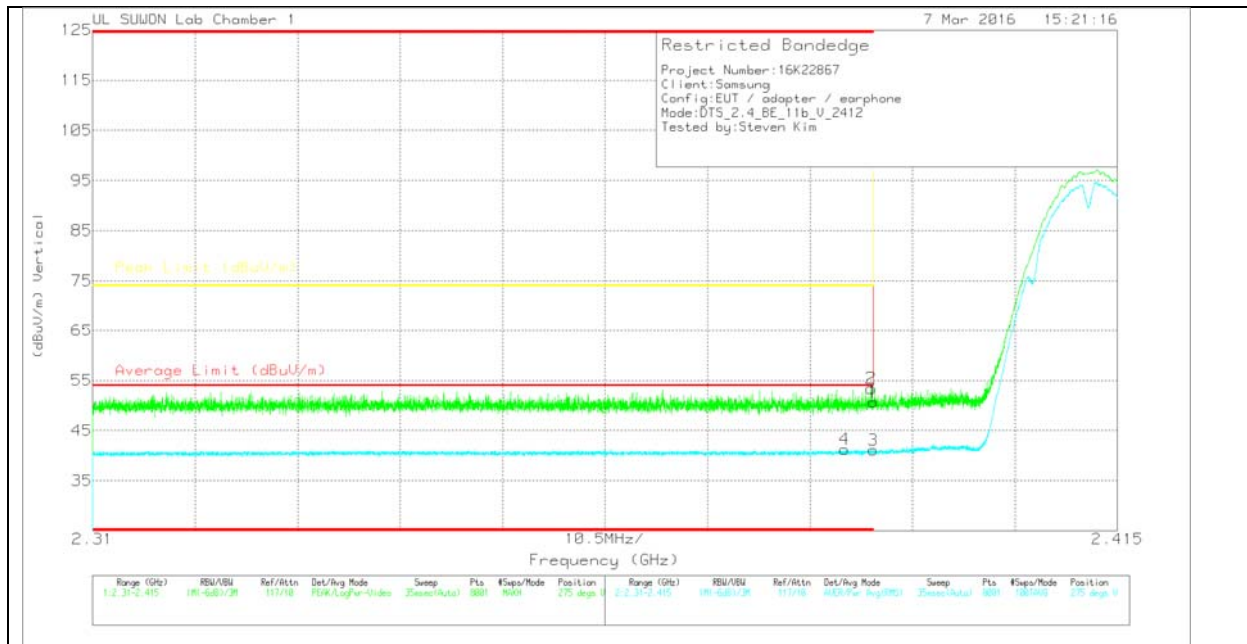
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(001687 17_150619)	Path_2	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	49.51	Pk		-29	0	52.31	-	-	74	-21.69	134	141	H
2	* 2.39	50.95	Pk		-29	0	53.75	-	-	74	-20.25	134	141	H
3	* 2.39	39.61	RMS		-29	0	42.41	54	-11.59	-	-	134	141	H
4	* 2.39	39.94	RMS		-29	0	42.74	54	-11.26	-	-	134	141	H

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

Pk - Peak detector

RMS - RMS detection

**VERTICAL PEAK AND AVERAGE PLOT**



**VERTICAL DATA**

**TRACE MARKERS**

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(00168 717)_15061 9	Path_2	DC Corr (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	47.91	Pk			0	50.71	-	-	74	-23.29	275	133	V
2	* 2.39	50.62	Pk			0	53.42	-	-	74	-20.58	275	133	V
3	* 2.39	38.34	RMS			0	41.14	54	-12.86	-	-	275	133	V
4	* 2.387	38.5	RMS			0	41.3	54	-12.7	-	-	275	133	V

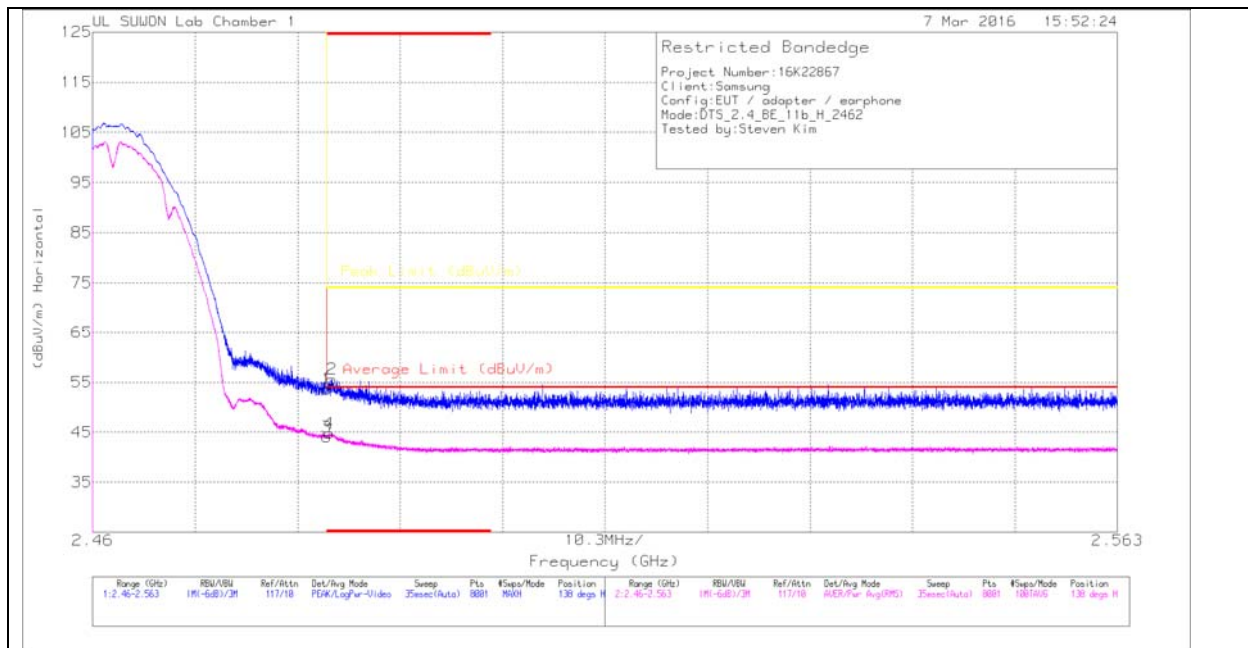
\* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

RMS - RMS detection

**AUTHORIZED BANDEDGE (HIGH CHANNEL)**

**HORIZONTAL PEAK AND AVERAGE PLOT**



**HORIZONTAL DATA**

**TRACE MARKERS**

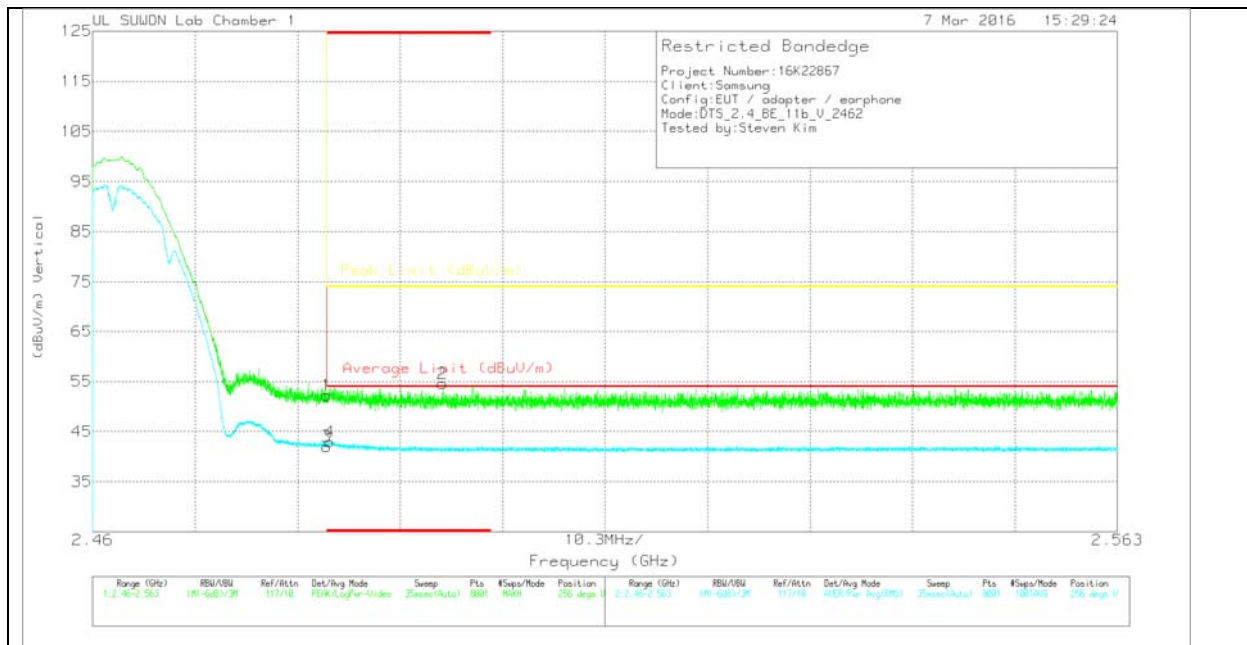
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(00168717)_150 619	Path_2	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	49.97	PK	32	-28.3	0	53.67	-	-	74	-20.33	138	136	H
2	* 2.484	51.91	PK	32	-28.3	0	55.61	-	-	74	-18.39	138	136	H
3	* 2.484	40.34	RMS	32	-28.3	0	44.04	54	-9.96	-	-	138	136	H
4	* 2.484	41.11	RMS	32	-28.3	0	44.81	54	-9.19	-	-	138	136	H

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

Pk - Peak detector

RMS - RMS detection

**VERTICAL PEAK AND AVERAGE PLOT**



**VERTICAL DATA**

**TRACE MARKERS**

Marker	Frequenc y (GHz)	Meter Reading (dBuV)	Det	3117(0016871 7)_150619	Path_2	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarit y	Marker
1	* 2.484	48.5	Pk	32	-28.3	52.2	-	-	74	-21.8	256	279	V	1
2	* 2.495	50.87	Pk	32	-28.3	54.57	-	-	74	-19.43	256	279	V	2
3	* 2.484	38.32	RMS	32	-28.3	42.02	54	-11.98	-	-	256	279	V	3
4	* 2.484	39.26	RMS	32	-28.3	42.96	54	-11.04	-	-	256	279	V	4

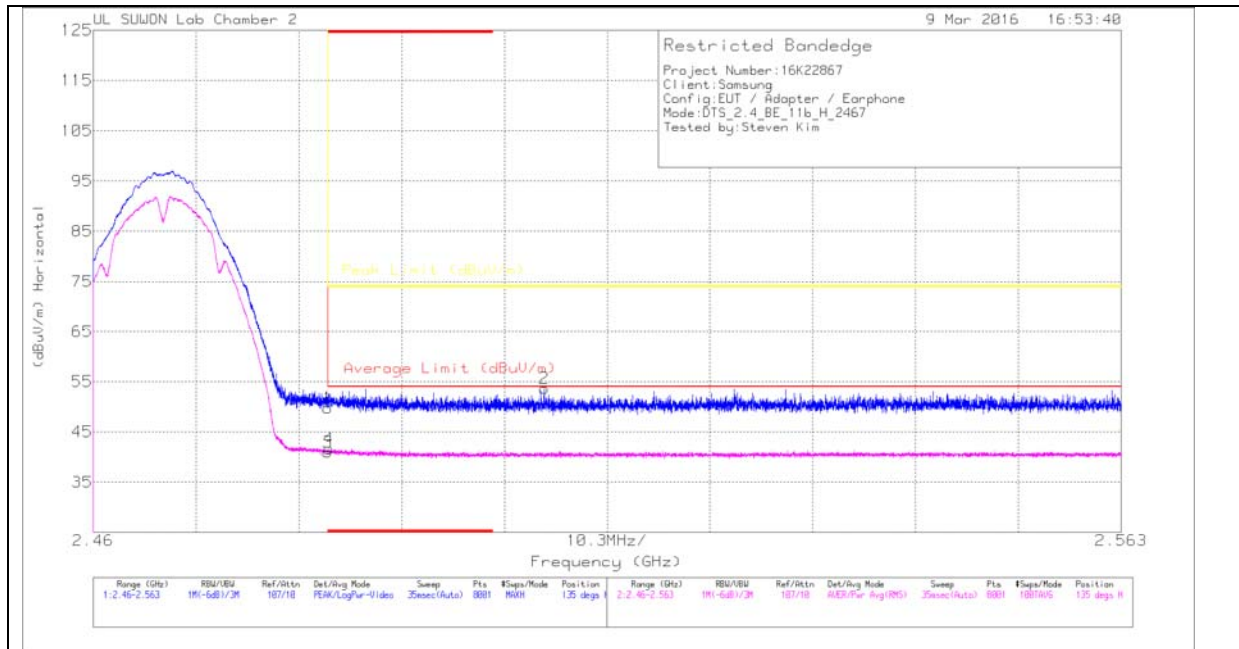
\* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

RMS - RMS detection

## AUTHORIZED BANDEDGE (12 CHANNEL)

### HORIZONTAL PEAK AND AVERAGE PLOT



### HORIZONTAL DATA

#### Trace Markers

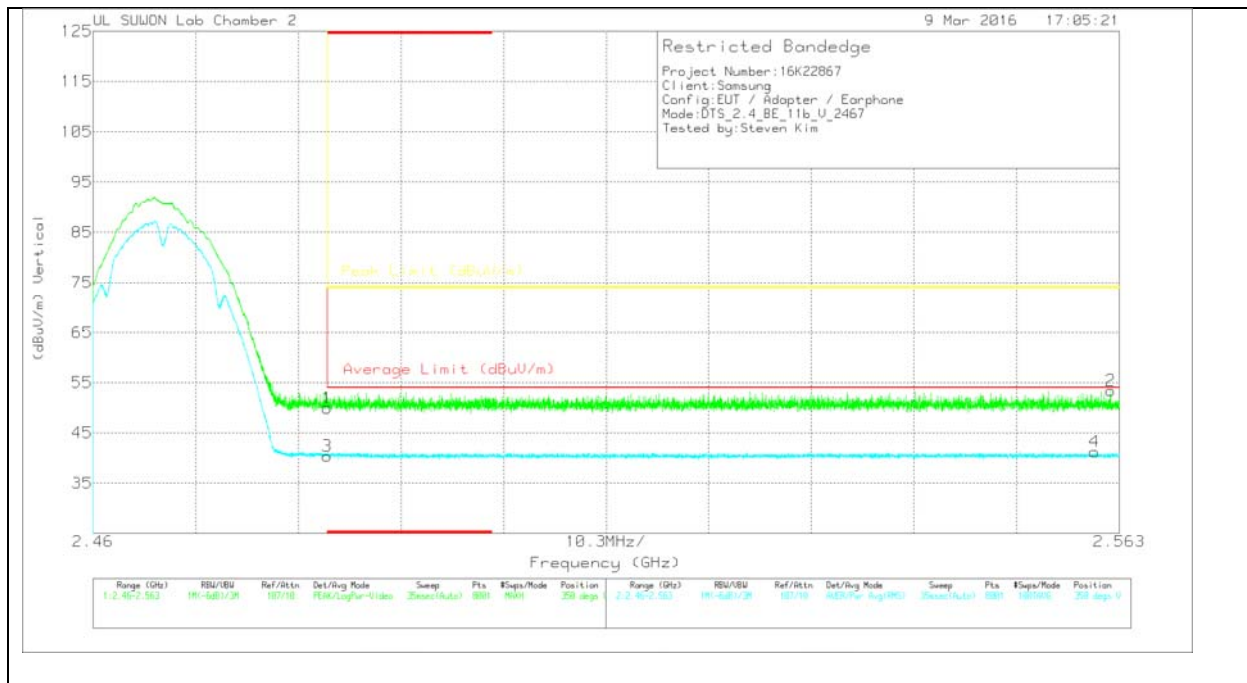
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(001687 24)_150619	Path_2_10dB	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	37.37	Pk	31.8	-19.4	0	49.77	-	-	74	-24.23	135	251	H
2	2.505	41.08	Pk	31.9	-19.3	0	53.68	-	-	74	-20.32	135	251	H
3	* 2.484	28.59	RMS	31.8	-19.4	0	40.99	54	-13.01	-	-	135	251	H
4	* 2.484	29.27	RMS	31.8	-19.4	0	41.67	54	-12.33	-	-	135	251	H

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

Pk - Peak detector

RMS - RMS detection

**VERTICAL PEAK AND AVERAGE PLOT**



**VERTICAL DATA**

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117/001687 24_150619	Path_2_10dB	DC Corr (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	37.55	Pk	31.8	-19.4	0	49.95	-	-	74	-24.05	350	176	V
2	2.562	40.82	Pk	31.9	-19.3	0	53.42	-	-	74	-20.58	350	176	V
3	* 2.484	28.01	RMS	31.8	-19.4	0	40.41	54	-13.59	-	-	350	176	V
4	2.561	28.69	RMS	31.9	-19.3	0	41.29	54	-12.71	-	-	350	176	V

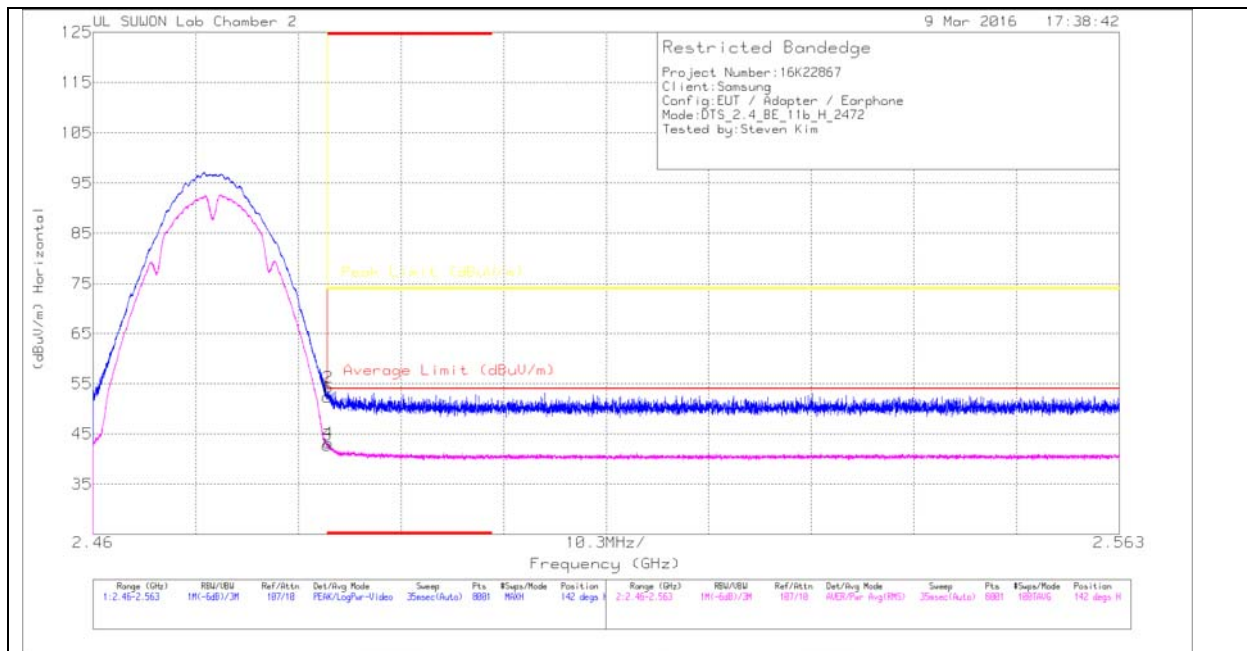
\* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

RMS - RMS detection

**AUTHORIZED BANDEDGE (13 CHANNEL)**

**HORIZONTAL PEAK AND AVERAGE PLOT**



**HORIZONTAL DATA**

Trace Markers

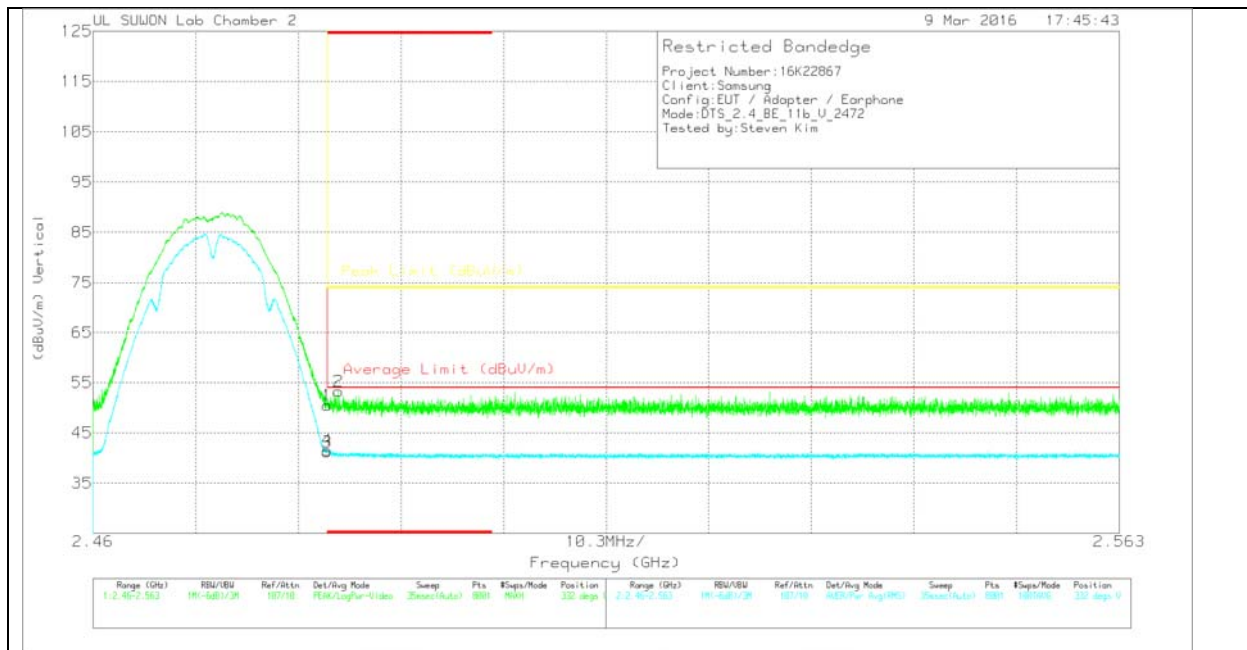
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(001687 24)_150619	Path_2_10dB	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	39.98	Pk	31.8	-19.4	0	52.38	-	-	74	-21.62	142	135	H
2	* 2.484	41.85	Pk	31.8	-19.4	0	54.25	-	-	74	-19.75	142	135	H
3	* 2.484	30.36	RMS	31.8	-19.4	0	42.76	54	-11.24	-	-	142	135	H
4	* 2.484	30.79	RMS	31.8	-19.4	0	43.19	54	-10.81	-	-	142	135	H

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

Pk - Peak detector

RMS - RMS detection

**VERTICAL PEAK AND AVERAGE PLOT**



**VERTICAL DATA**

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117/001687 24/150619	Path_2_10dB	DC Corr (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	38.1	Pk	31.8	-19.4	0	50.5	-	-	74	-23.5	332	106	V
2	* 2.485	40.87	Pk	31.8	-19.4	0	53.27	-	-	74	-20.73	332	106	V
3	* 2.484	28.83	RMS	31.8	-19.4	0	41.23	54	-12.77	-	-	332	106	V
4	* 2.484	29.15	RMS	31.8	-19.4	0	41.55	54	-12.45	-	-	332	106	V

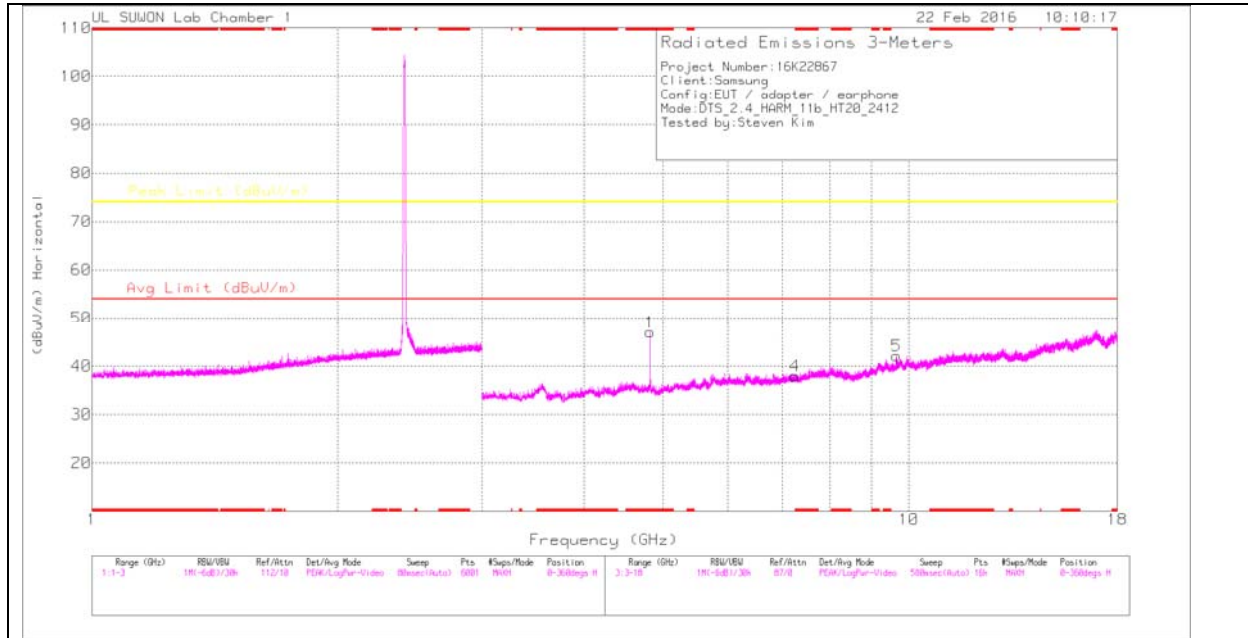
\* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

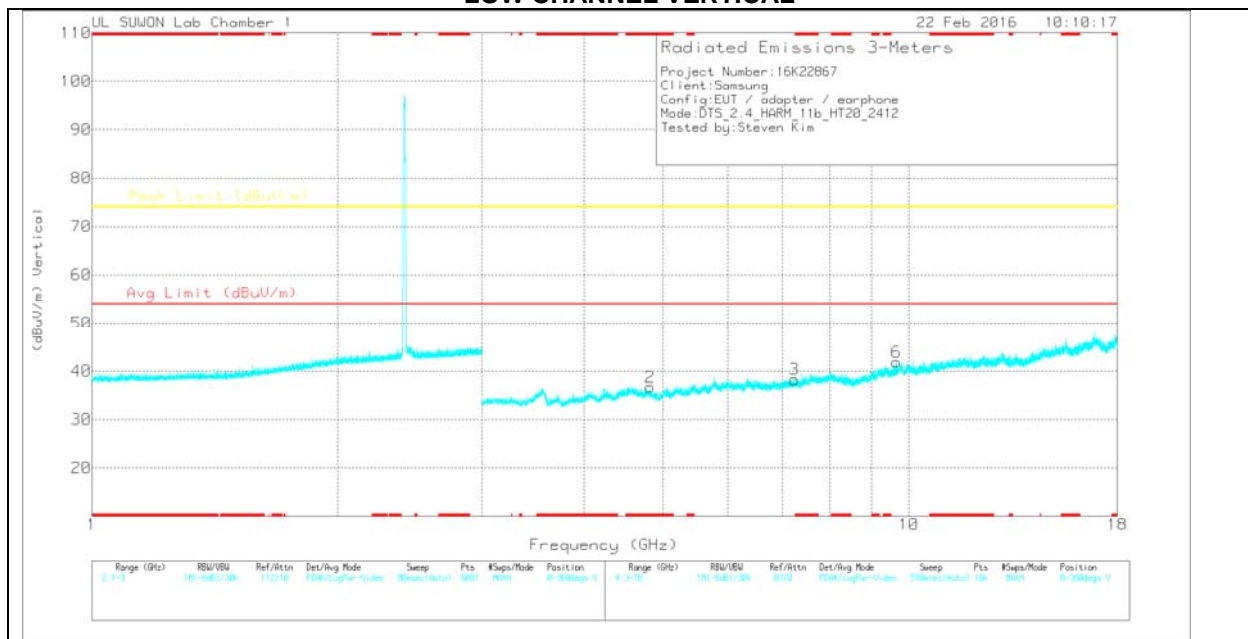
RMS - RMS detection

### 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.

**LOW CHANNEL DATA**

**TRACE MARKERS**

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(00168 717)_15061 9	Path_3	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.823	46.82	Pk	34	-33.8	0	47.02	-	-	74	-26.98	0-360	100	H
4	7.248	33.07	Pk	35.7	-30.8	0	37.97	-	-	74	-36.03	0-360	100	H
5	9.648	32.43	Pk	37.1	-27.4	0	42.13	-	-	74	-31.87	0-360	100	H
2	* 4.823	36.51	Pk	34	-33.8	0	36.71	-	-	74	-37.29	0-360	100	V
3	7.242	33.48	Pk	35.7	-30.9	0	38.28	-	-	74	-35.72	0-360	200	V
6	9.648	32.14	Pk	37.1	-27.4	0	41.84	-	-	74	-32.16	0-360	200	V

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

PK – Peak detector

**Radiated Emissions**

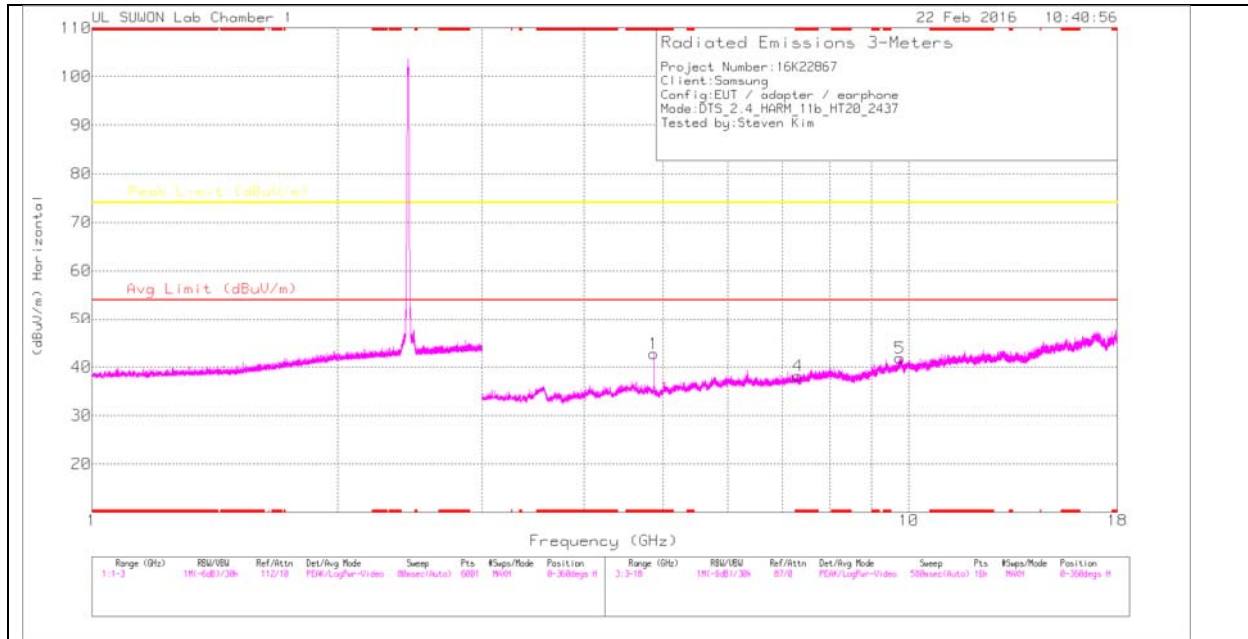
Frequency (GHz)	Meter Reading (dBuV)	Det	3117(0016 8717)_150 619	Path_3	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.824	52.43	PK2	34	-33.8	0	52.63	-	-	74	-21.37	124	103	H
* 4.824	47.26	MAv1	34	-33.8	0	47.46	54	-6.54	-	-	124	103	H

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

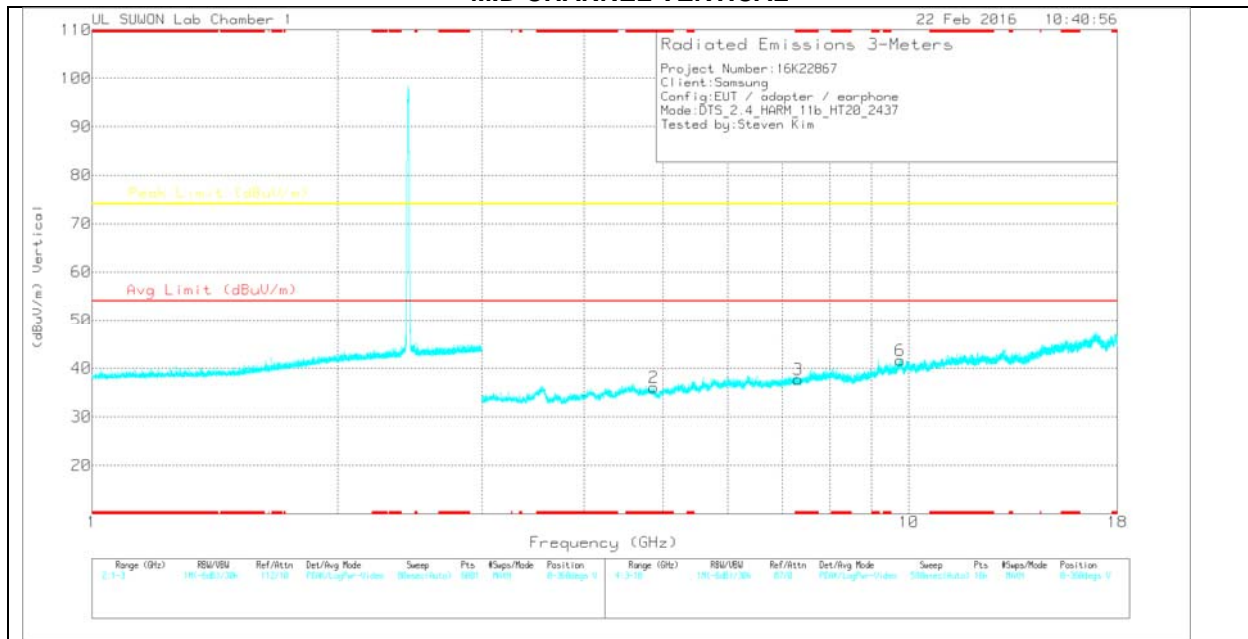
PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average

**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.

**MID CHANNEL DATA**

**TRACE MARKERS**

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(001687 17)_150619	Path_3	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.874	42.78	Pk	34	-34	0	42.78	-	-	74	-31.22	0-360	100	H
4	* 7.315	33.37	Pk	35.8	-30.9	0	38.27	-	-	74	-35.73	0-360	100	H
5	9.748	31.53	Pk	37.2	-26.8	0	41.93	-	-	74	-32.07	0-360	200	H
2	* 4.873	36.05	Pk	34	-34	0	36.05	-	-	74	-37.95	0-360	100	V
3	* 7.315	32.85	Pk	35.8	-30.9	0	37.75	-	-	74	-36.25	0-360	100	V
6	9.749	31.19	Pk	37.2	-26.8	0	41.59	-	-	74	-32.41	0-360	200	V

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

PK – Peak detector

**Radiated Emissions**

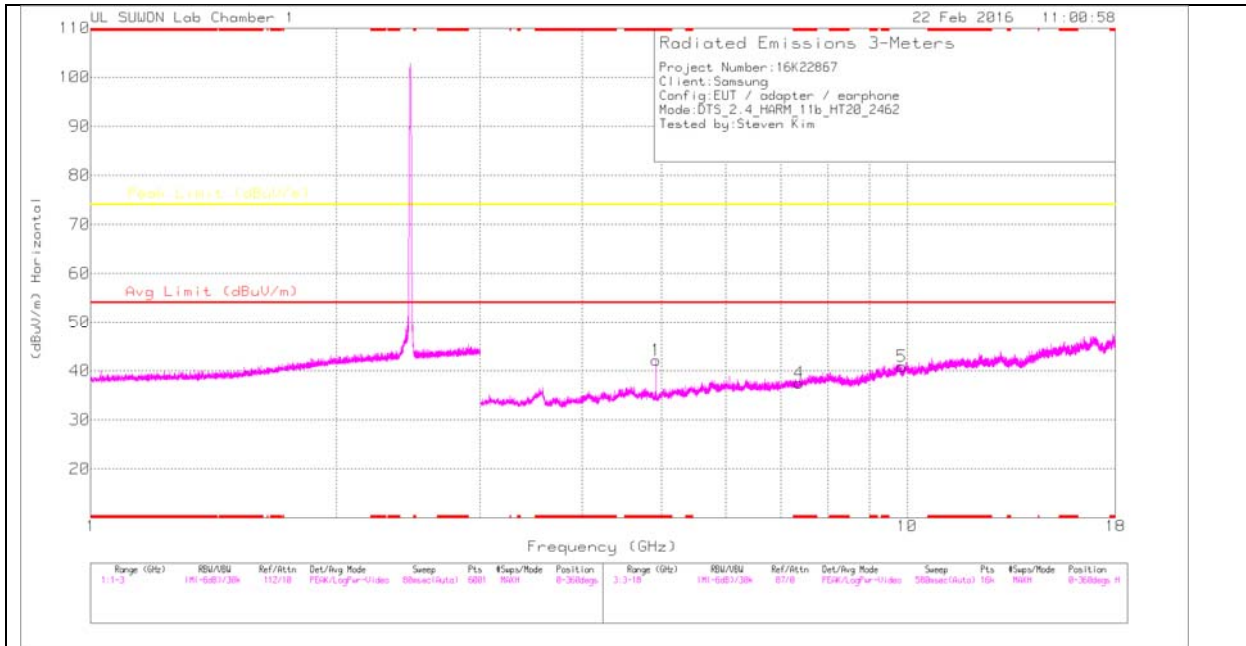
Frequency (GHz)	Meter Reading (dBuV)	Det	3117(0016 8717)_150 619	Path_3	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.874	50.69	PK2	34	-34	0	50.69	-	-	74	-23.31	124	105	H
* 4.874	43.19	MAV1	34	-34	0	43.19	54	-10.81	-	-	124	105	H

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

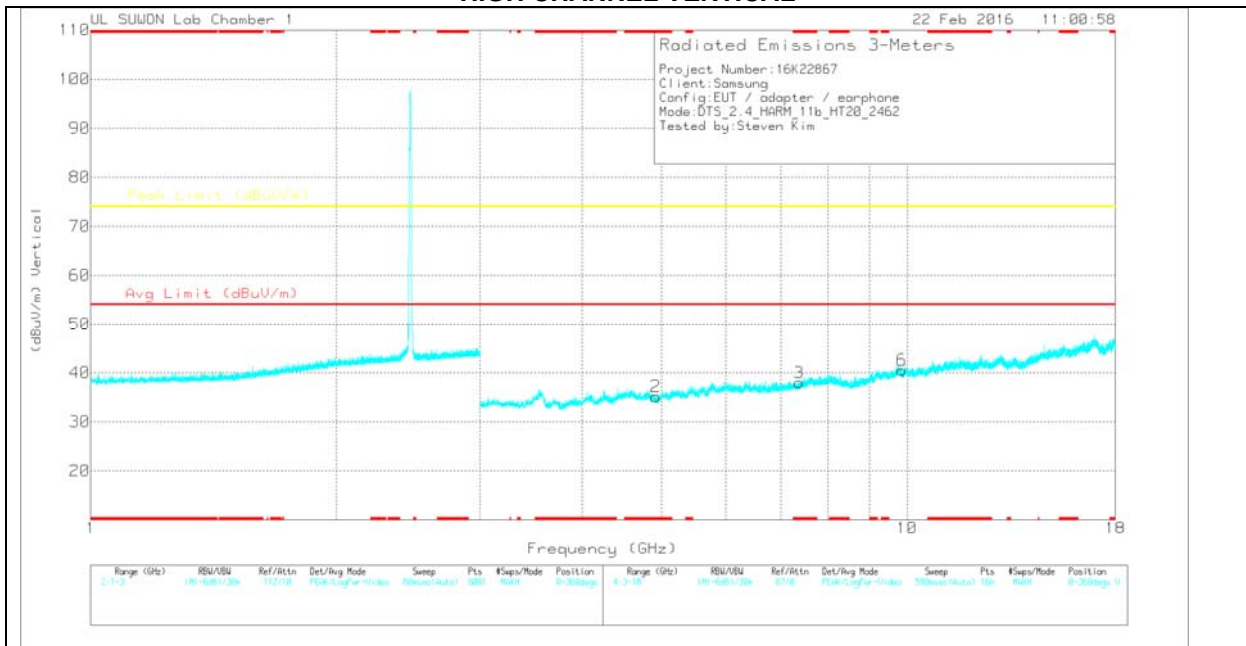
PK2 – 558074 Method: Maximum Peak

MAV1 - KDB558074 Option 1 Maximum RMS Average

**HIGH CHANNEL HORIZONTAL**



**HIGH CHANNEL VERTICAL**



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

**HIGH CHANNEL DATA**

**TRACE MARKERS**

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(001687 17)_150619	Path_3	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.924	42.16	Pk	34	-34	0	42.16	-	-	74	-31.84	0-360	200	H
4	* 7.379	32.53	Pk	35.8	-30.8	0	37.53	-	-	74	-36.47	0-360	100	H
5	9.848	31.2	Pk	37.3	-27.6	0	40.9	-	-	74	-33.1	0-360	100	H
2	* 4.922	35.16	Pk	34	-34	0	35.16	-	-	74	-38.84	0-360	200	V
3	* 7.375	32.97	Pk	35.8	-30.8	0	37.97	-	-	74	-36.03	0-360	200	V
6	9.848	30.85	Pk	37.3	-27.6	0	40.55	-	-	74	-33.45	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(0016 8717)_150 619	Path_3	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.924	49.67	PK2	34	-34	0	49.67	-	-	74	-24.33	126	172	H
* 4.924	42.73	MAv1	34	-34	0	42.73	54	-11.27	-	-	126	172	H

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

PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average