7.5. Conducted Band Edge and Out-of-Band Emissions

7.5.1. Test Limit

The limit for out-of-band spurious emissions at the band edge is 20dB below the fundamental emission level, as determined from the in-band power measurement of the DTS channel performed in a 100kHz bandwidth per the PSD procedure (Section 9.1).

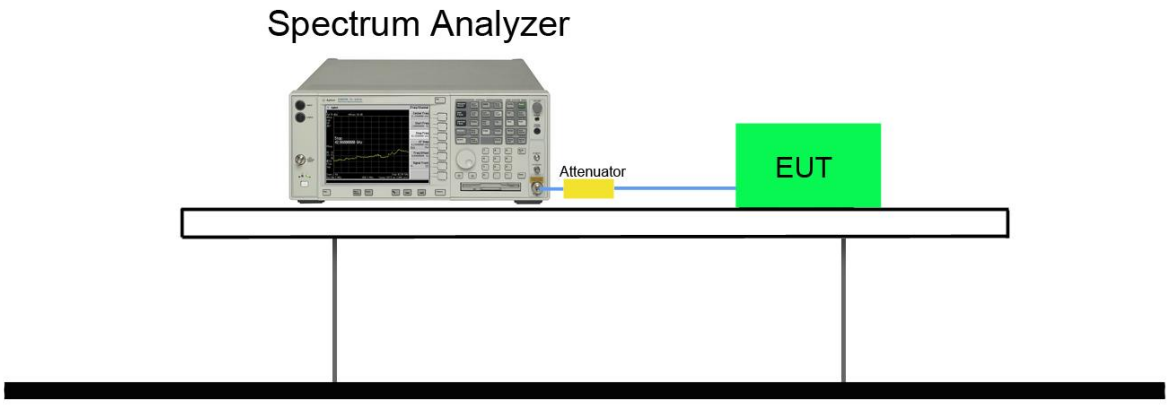
7.5.2. Test Procedure Used

KDB 558074 D01v03r01 – Section 11.3

7.5.3. Test Settitng

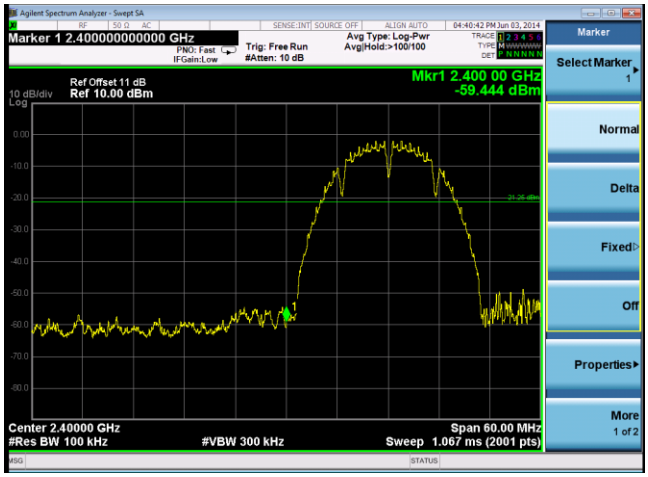
1. Set the center frequency and span to encompass frequency range to be measured
2. RBW = 100kHz
3. VBW = 300kHz
4. Detector = Peak
5. Number of sweep points ≥ 2 x Span/RBW
6. Trace mode = max hold
7. Sweep time = auto couple
8. The trace was allowed to stabilize

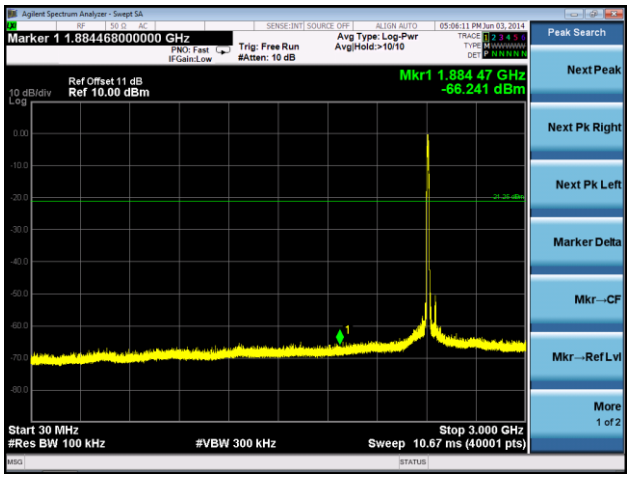
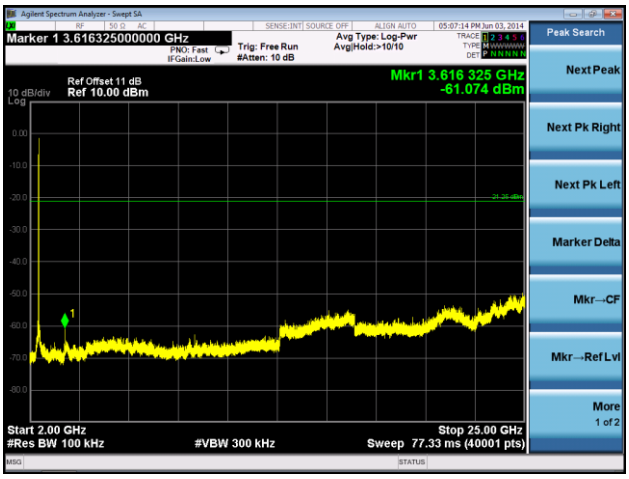
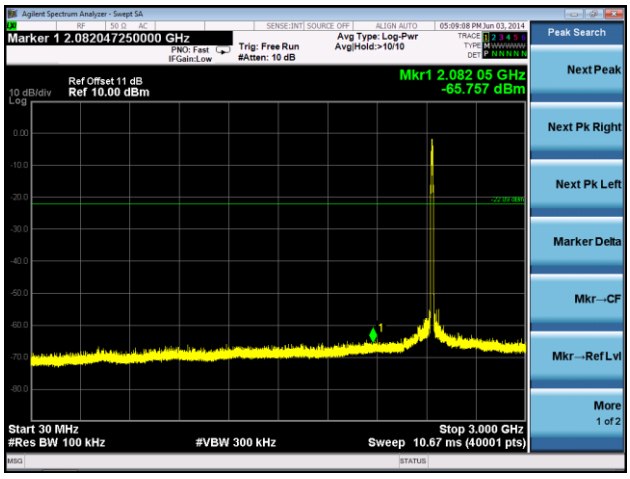
7.5.4. Test Setup

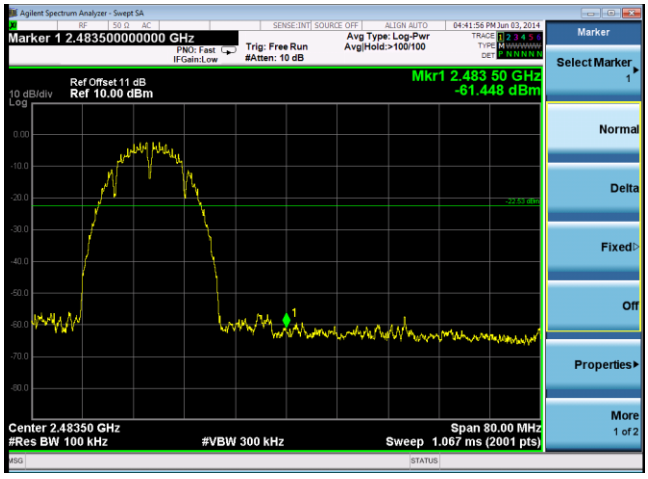
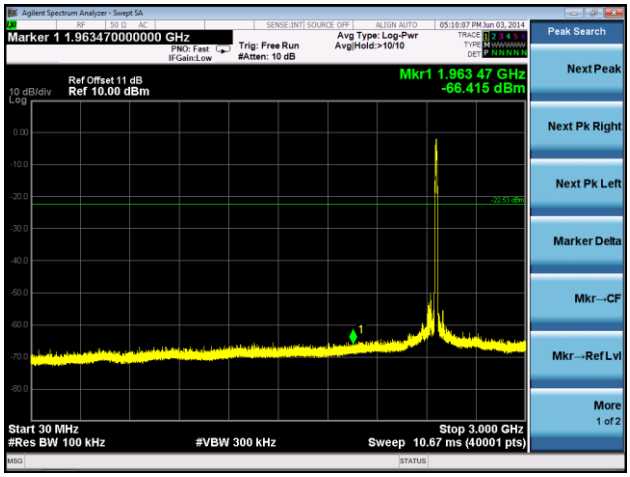
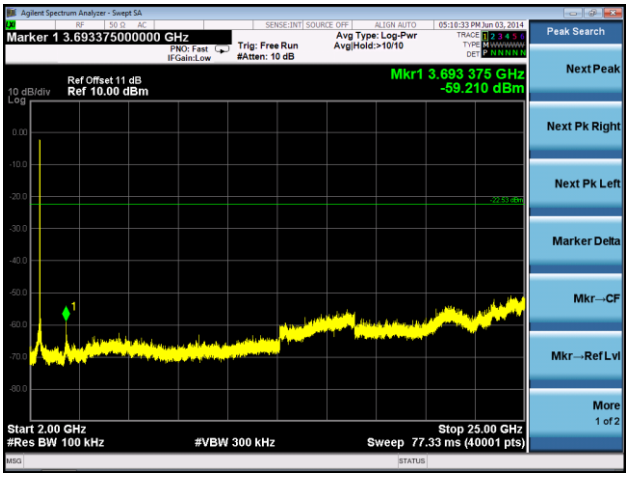


7.5.5. Test Result

Test Mode	Data Rate (Mbps)	Channel No.	Frequency (MHz)	Limit	Result
802.11b	1	01	2412	20dBc	Pass
802.11b	1	06	2437	20dBc	Pass
802.11b	1	11	2462	20dBc	Pass
802.11g	6	01	2412	20dBc	Pass
802.11g	6	06	2437	20dBc	Pass
802.11g	6	11	2462	20dBc	Pass
802.11n-HT20	6.5	01	2412	20dBc	Pass
802.11n-HT20	6.5	06	2437	20dBc	Pass
802.11n-HT20	6.5	11	2462	20dBc	Pass
802.11n-HT40	13.5	03	2422	20dBc	Pass
802.11n-HT40	13.5	06	2437	20dBc	Pass
802.11n-HT40	13.5	09	2452	20dBc	Pass

802.11b Out-of-Band Emissions	
Channel 01 (2412MHz)	
100kHz PSD reference Level	Low Band Edge
	

Spurious Emission 30MHz ~ 3GHz	Spurious Emission 2GHz ~ 25GHz
	
Channel 06 (2437MHz)	
100kHz PSD reference Level	
	
Spurious Emission 30MHz ~ 3GHz	**Spurious Emission 2GHz ~ 25GHz**
	

Channel 11 (2462MHz)	
100kHz PSD reference Level	**High Band Edge**
	
Spurious Emission 30MHz ~ 3GHz	**Spurious Emission 2GHz ~ 25GHz**
	

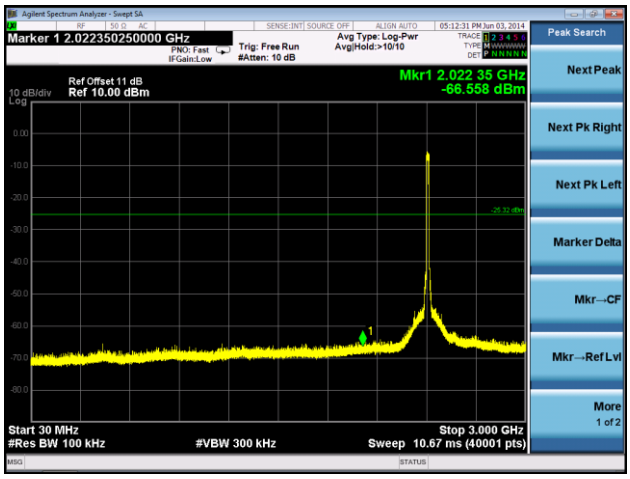
802.11g Out-of-Band Emissions

Channel 01 (2412MHz)

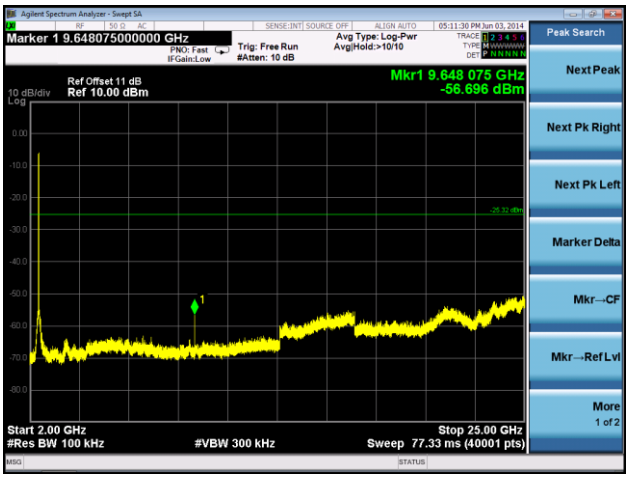
100kHz PSD reference Level

Low Band Edge

Spurious Emission 30MHz ~ 3GHz

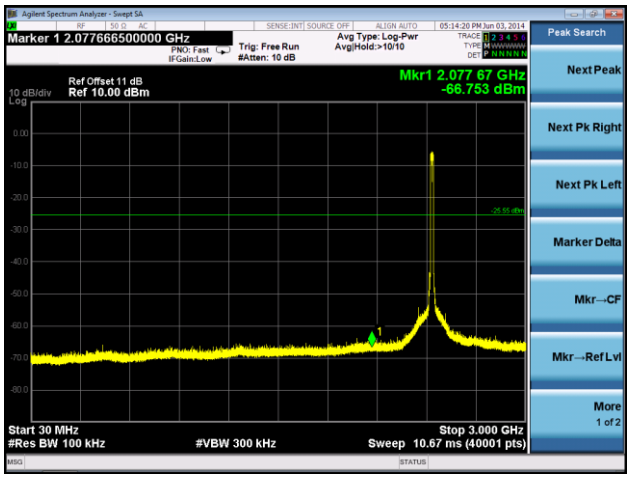
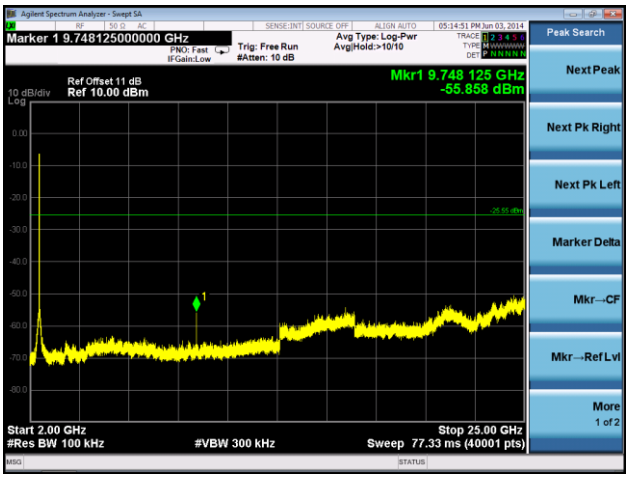
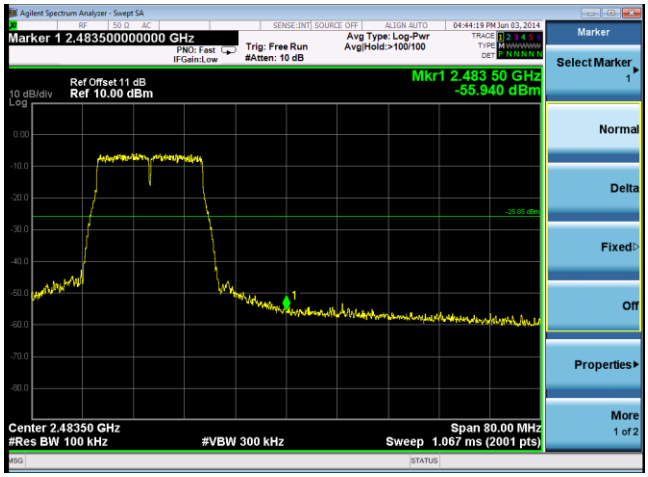
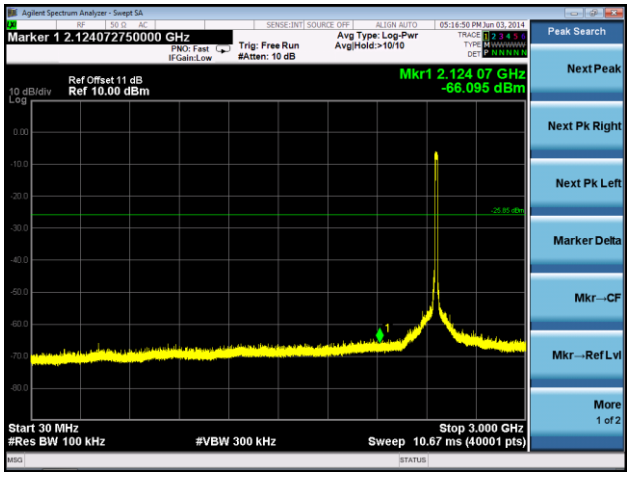
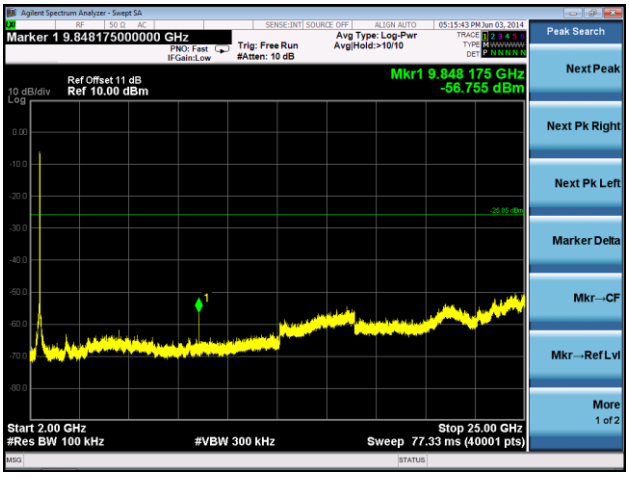


Spurious Emission 2GHz ~ 25GHz



Channel 06 (2437MHz)

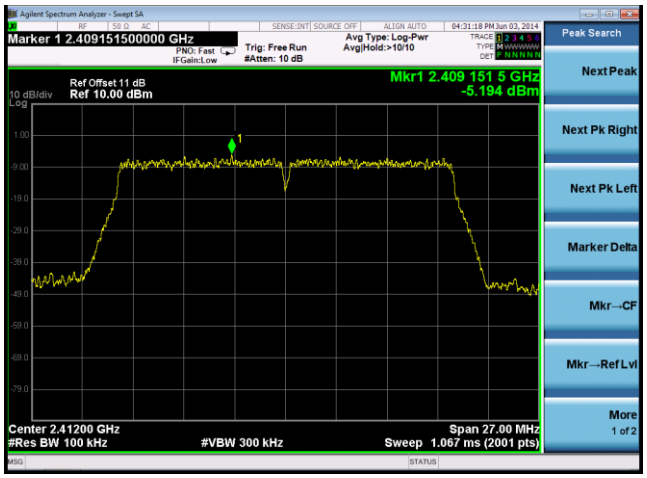
100kHz PSD reference Level

Spurious Emission 30MHz ~ 3GHz	Spurious Emission 2GHz ~ 25GHz
	
Channel 11 (2462MHz)	
100kHz PSD reference Level	**High Band Edge**
	
Spurious Emission 30MHz ~ 3GHz	**Spurious Emission 2GHz ~ 25GHz**
	

802.11n-HT20 Out-of-Band Emissions

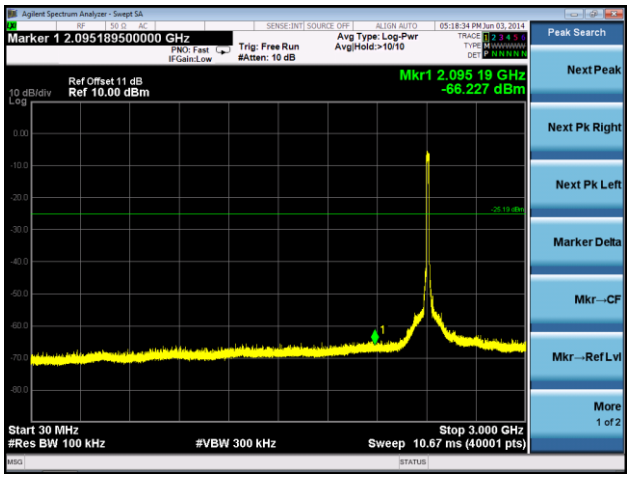
Channel 01 (2412MHz)

100kHz PSD reference Level

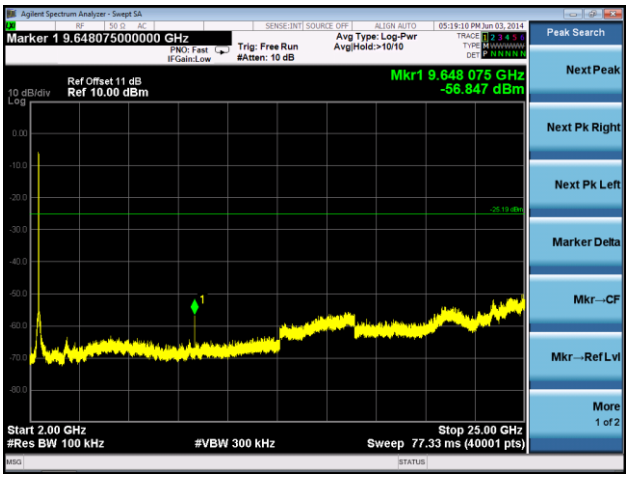


Low Band Edge

Spurious Emission 30MHz ~ 3GHz

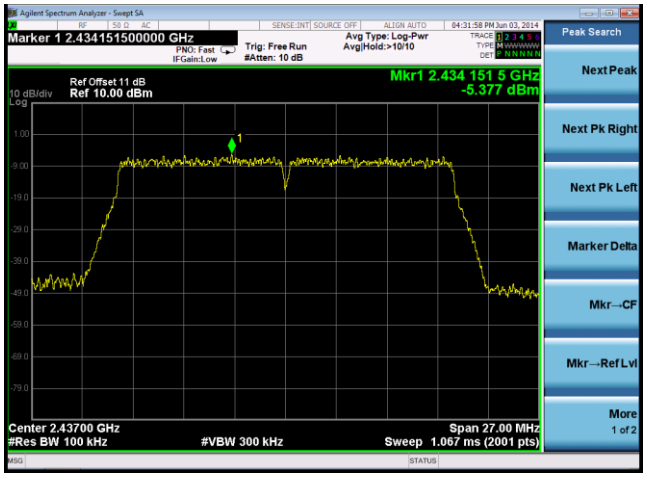


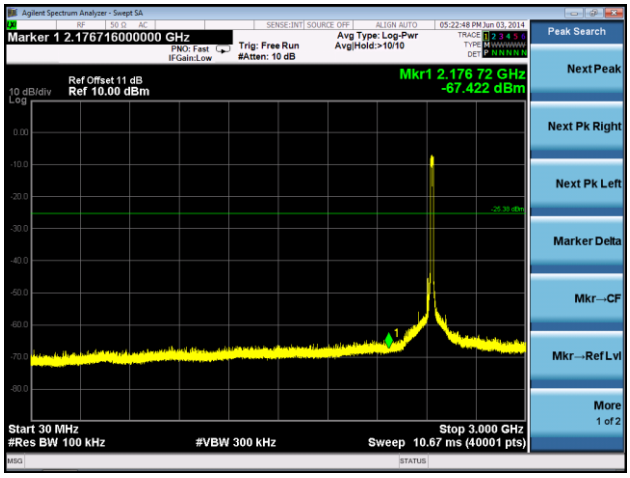
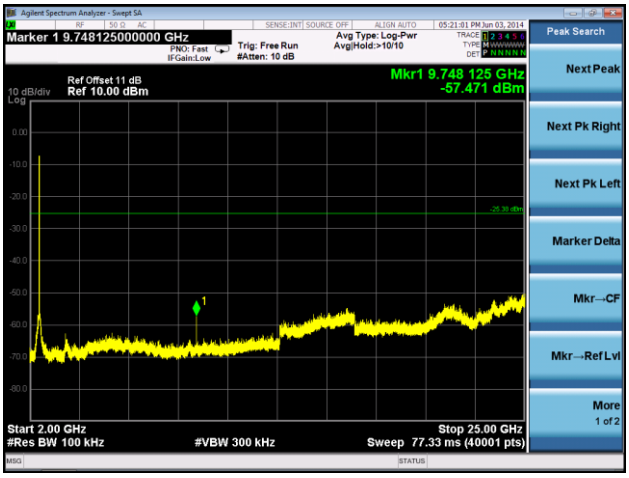
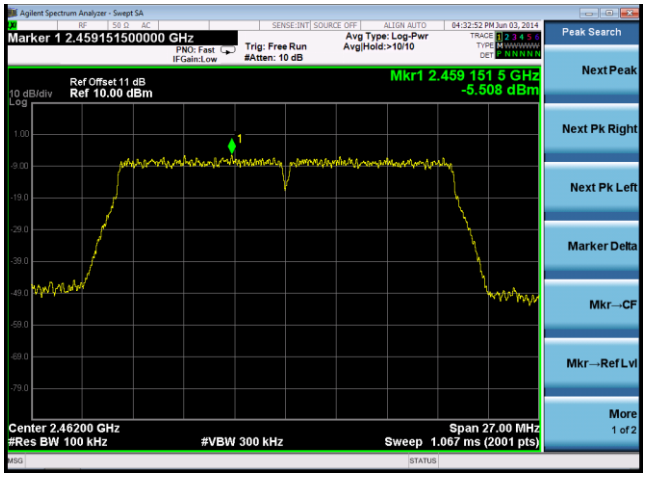
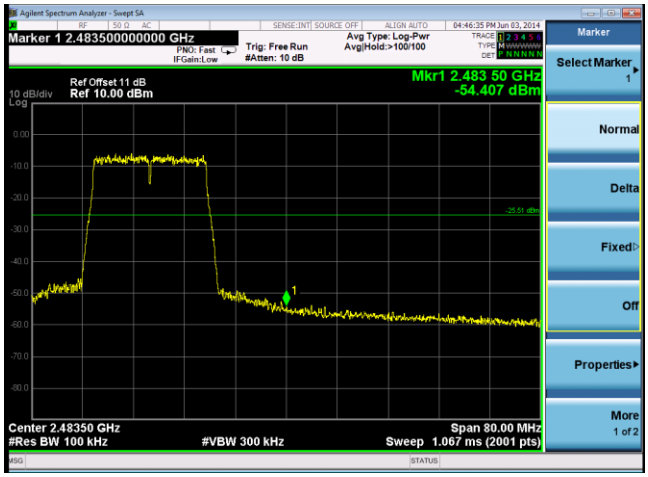
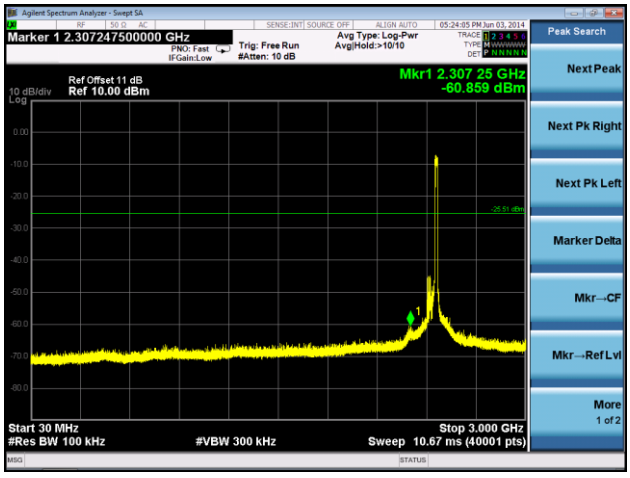
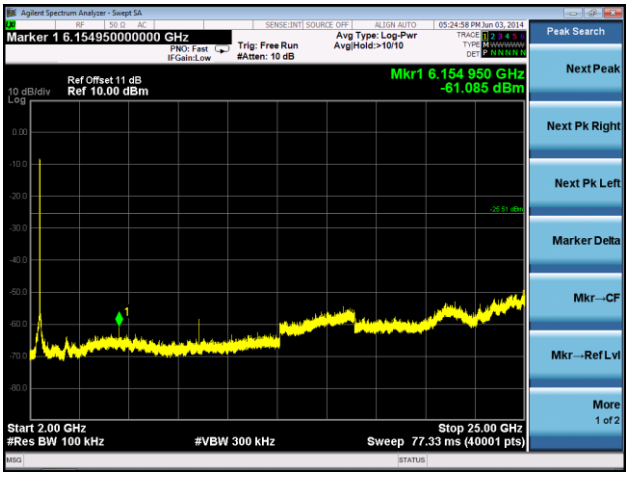
Spurious Emission 2GHz ~ 25GHz



Channel 06 (2437MHz)

100kHz PSD reference Level

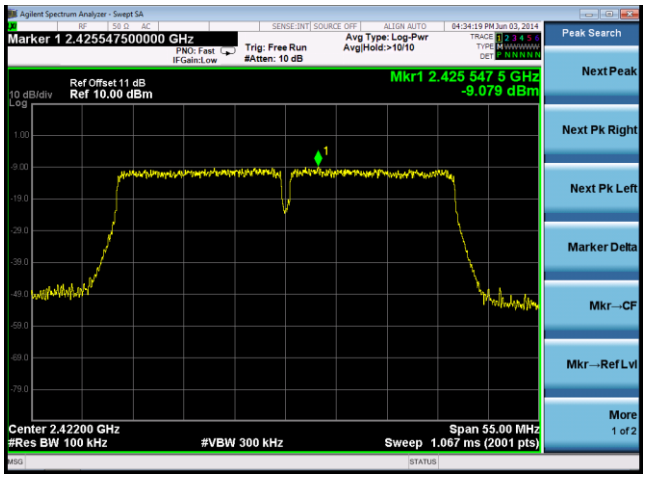


Spurious Emission 30MHz ~ 3GHz	Spurious Emission 2GHz ~ 25GHz
	
Channel 11 (2462MHz)	
100kHz PSD reference Level	**High Band Edge**
	
Spurious Emission 30MHz ~ 3GHz	**Spurious Emission 2GHz ~ 25GHz**
	

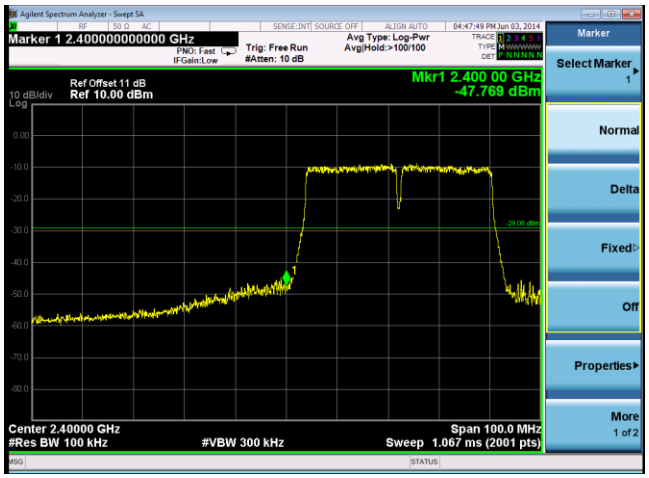
802.11n-HT40 Out-of-Band Emissions

Channel 03 (2422MHz)

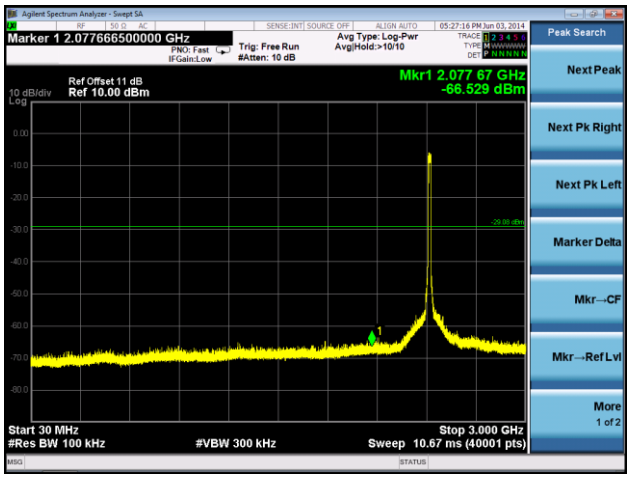
100kHz PSD reference Level



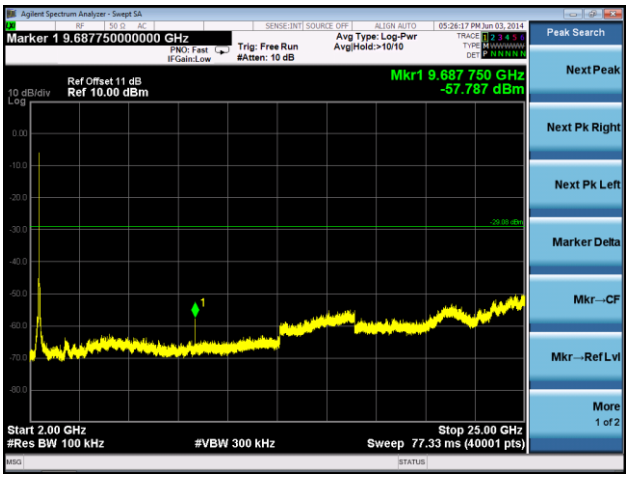
Low Band Edge



Spurious Emission 30MHz ~ 3GHz

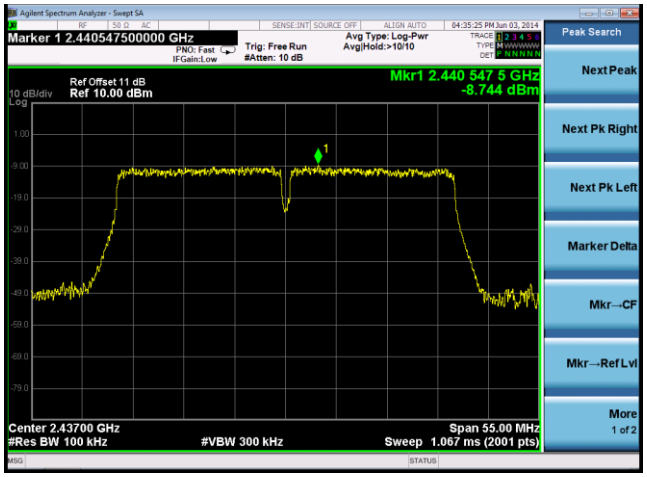


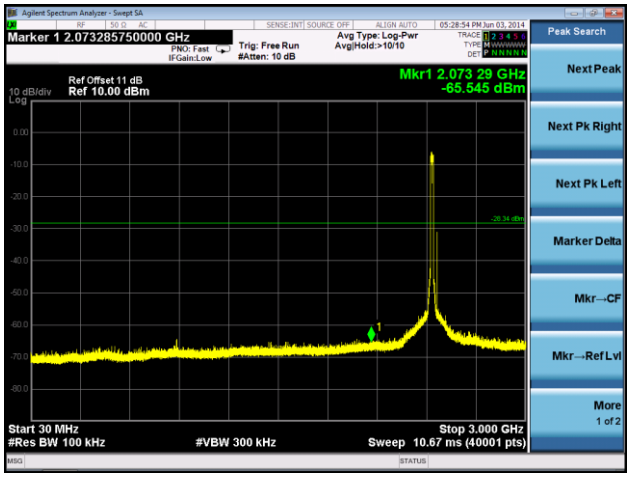
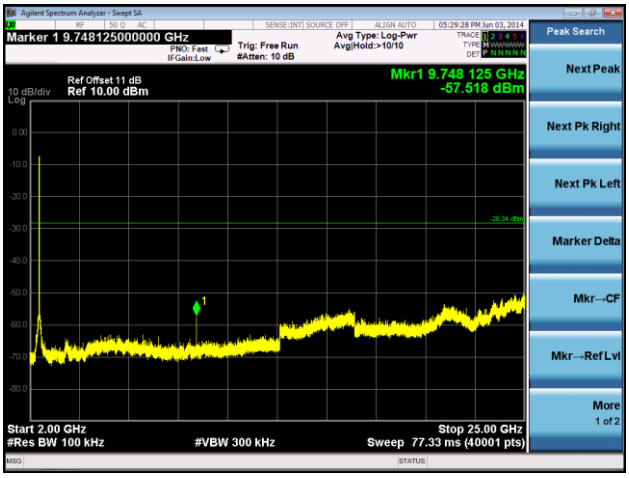
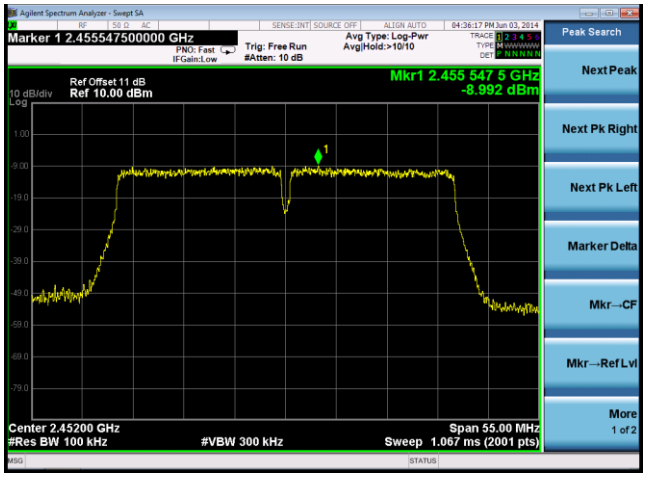
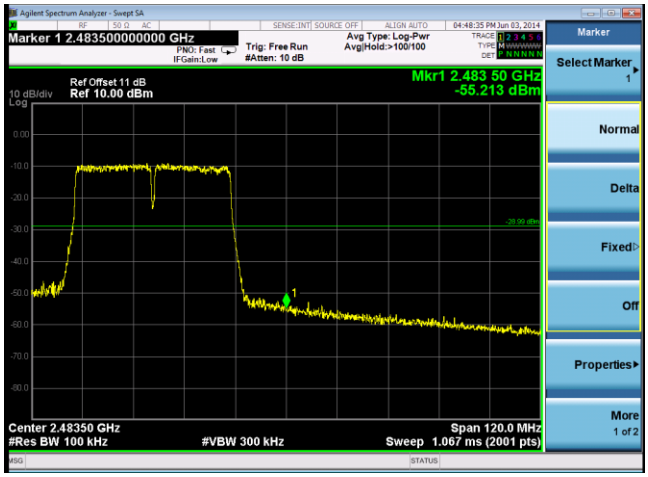
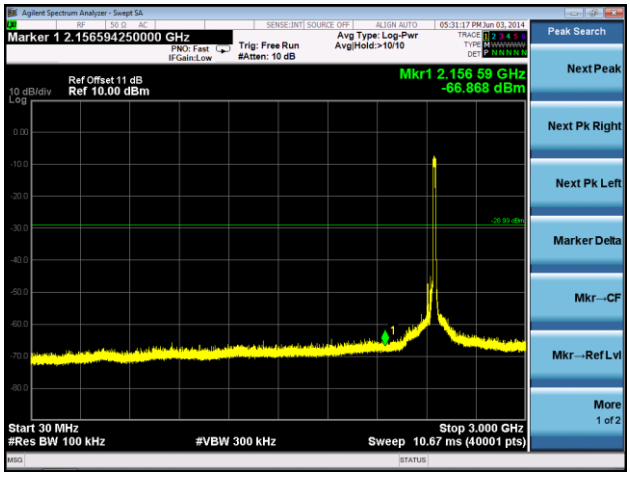
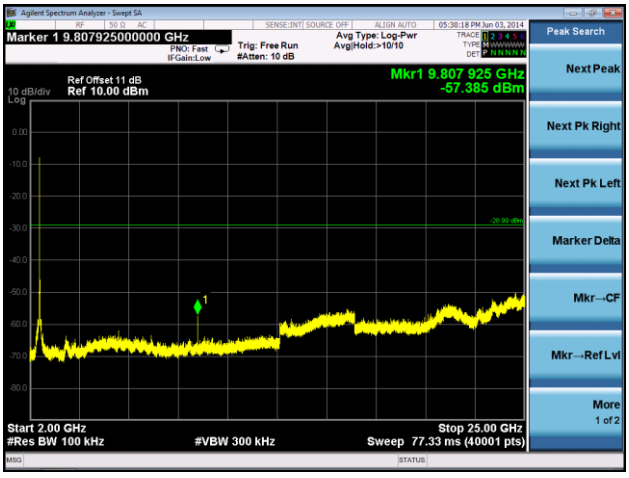
Spurious Emission 2GHz ~ 25GHz



Channel 06 (2437MHz)

100kHz PSD reference Level



Spurious Emission 30MHz ~ 3GHz	Spurious Emission 2GHz ~ 25GHz
	
Channel 09 (2452MHz)	
100kHz PSD reference Level	**High Band Edge**
	
Spurious Emission 30MHz ~ 3GHz	**Spurious Emission 2GHz ~ 25GHz**
	

7.6. Radiated Spurious Emission Measurement

7.6.1. Test Limit

All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47 CFR must not exceed the limits shown in Table per Section 15.209.

FCC Part 15 Subpart C Paragraph 15.209		
Frequency [MHz]	Field Strength [V/m]	Measured Distance [Meters]
0.009 – 0.490	2400/F (kHz)	300
0.490 – 1.705	24000/F (kHz)	30
1.705 - 30	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

7.6.2. Test Procedure Used

KDB 558074 D01v03r01 – Section 12.2.3 (quasi-peak measurements)

KDB 558074 D01v03r01 – Section 12.2.4 (peak power measurements)

KDB 558074 D01v03r01 – Section 12.2.5 (average power measurements)

7.6.3. Test Setting

Peak Field Strength Measurements per Section 12.2.4 of KDB 558074 D01v03r01

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = peak
5. Sweep time = auto couple

6. Trace mode = max hold

7. Trace was allowed to stabilize

Average Field Strength Measurements per Section 12.2.5.1 of KDB 558074 D01v03r01

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest

2. RBW = 1MHz

3. VBW = 3MHz

4. Detector = power average (RMS)

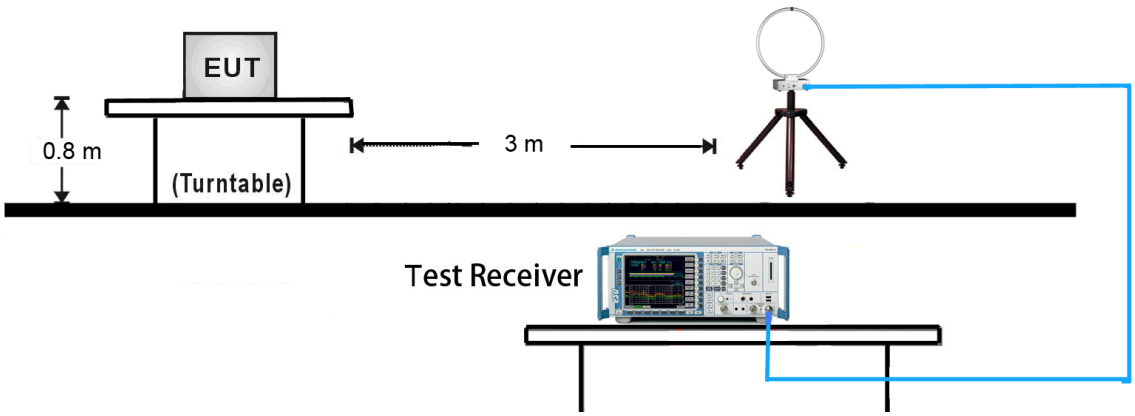
5. Number of measurement points = 1001 (Number of points must be > 2 x span/RBW)

6. Sweep time = auto

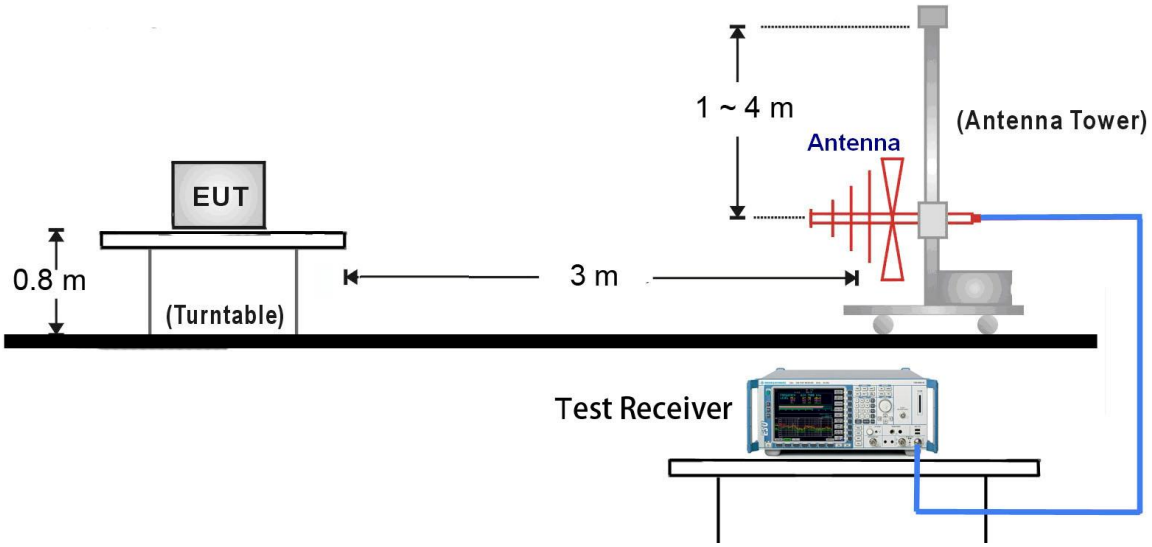
7. Trace (RMS) averaging was performed over at least 100 traces

7.6.4. Test Setup

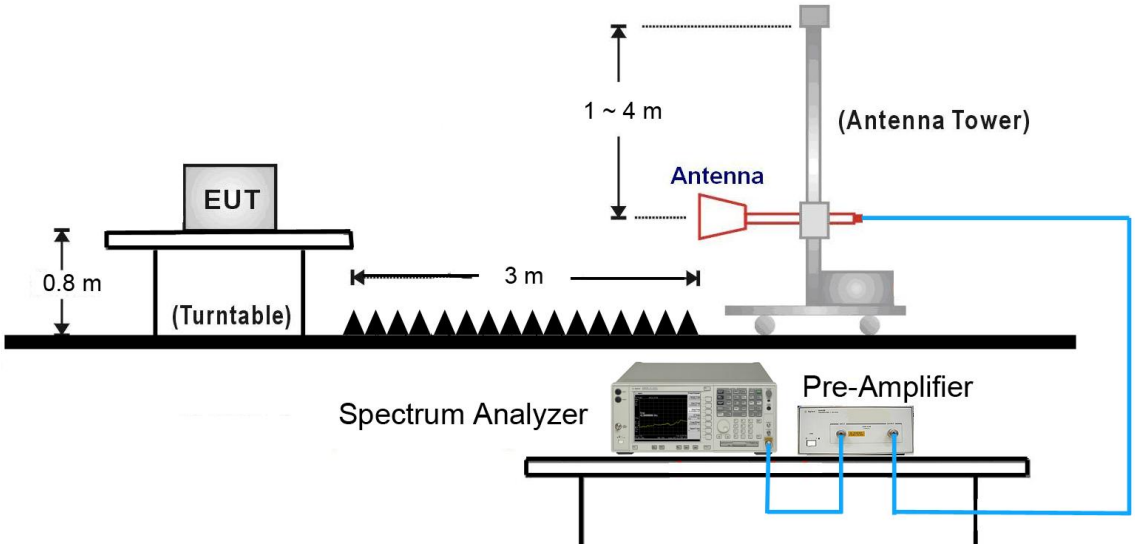
9kHz ~ 30MHz Test Setup:



30MHz ~ 1GHz Test Setup:



1GHz ~ 25GHz Test Setup:



7.6.5. Test Result

Test Mode:	802.11g	Test Site:	AC1
Test Channel:	11	Test Engineer:	Roy Cheng
Remark:	1. Average measurement was not performed if peak level lower than average limit. 2. **The worst case of Radiated Spurious Emission.** 3. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
*	3102.0	35.9	3.5	39.4	71.1	-31.7	Peak	Horizontal
*	3596.3	35.4	4.0	39.4	71.1	-31.7	Peak	Horizontal
	4927.0	38.6	6.7	45.3	74.0	-28.7	Peak	Horizontal
	7383.5	38.8	14.1	52.9	74.0	-21.1	Peak	Horizontal
*	3104.1	35.4	3.5	38.9	71.1	-32.2	Peak	Vertical
*	3597.5	35.8	4.0	39.8	71.1	-31.3	Peak	Vertical
	4927.0	37.4	6.7	44.1	74.0	-29.9	Peak	Vertical
	7383.5	37.9	14.1	52.0	74.0	-22.0	Peak	Vertical

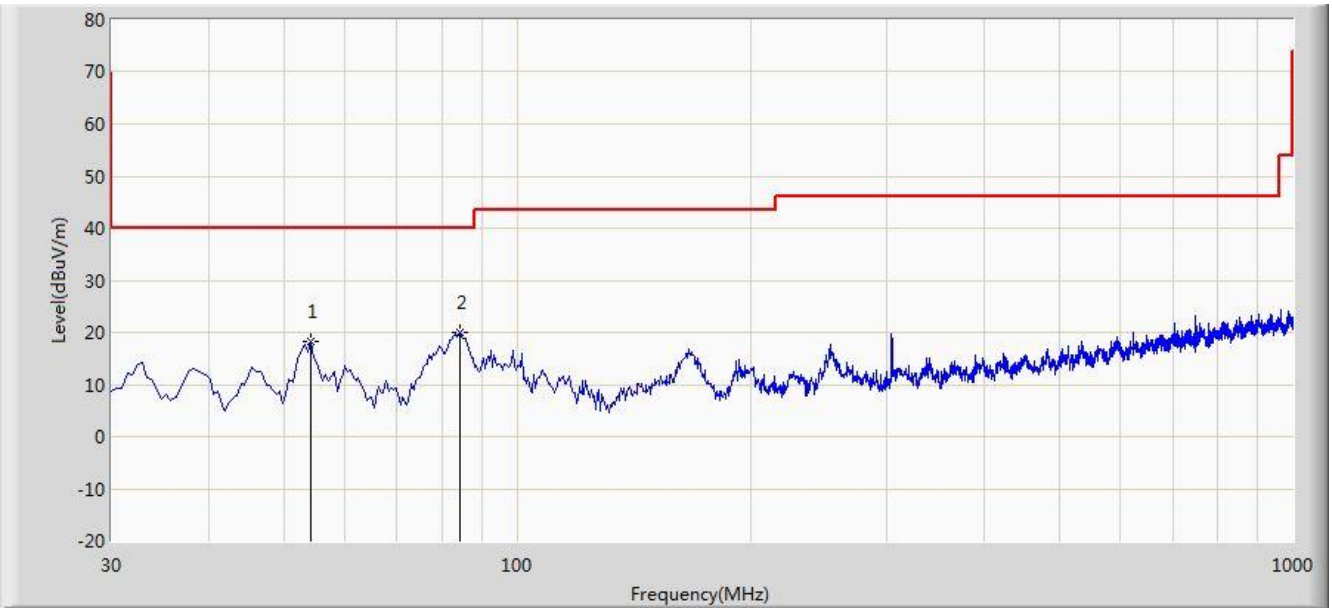
Note 1: "*" is not in restricted band, its limit is 20dBc of the fundamental emission level (91.1dBμV/m).

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) – Pre_Amplifier Gain (dB)

The worst case of Radiated Emission below 1GHz:

Engineer: Milo Li	
Site: AC1	Time: 2014/06/05 - 16:12
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: VULB9162_0.03-8GHz	Polarity: Horizontal
EUT: Smart Phone	Power: AC 120V/60Hz
Worst Case Mode: 802.11n-HT20 Channel 2437MHz	

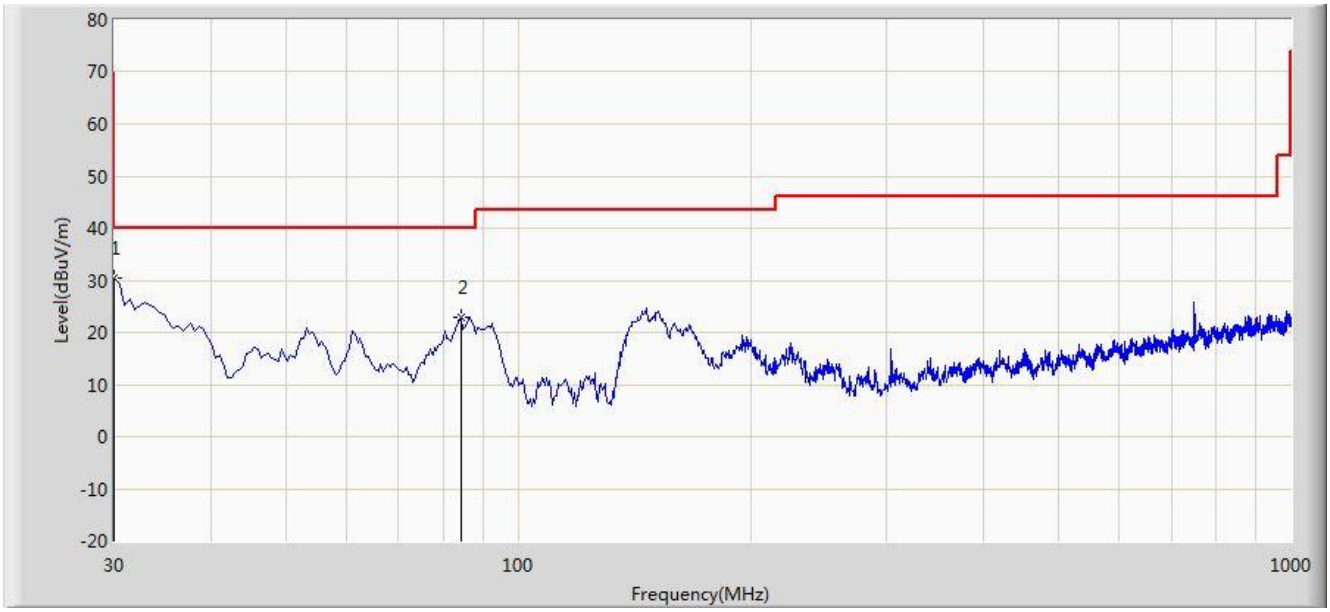


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			54.250	18.299	36.944	-21.701	40.000	-18.645	PK
2		*	84.320	20.034	43.677	-19.966	40.000	-23.643	PK

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

Engineer: Milo Li	
Site: AC1	Time: 2014/06/05 - 16:17
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: VULB9162_0.03-8GHz	Polarity: Vertical
EUT: Smart Phone	Power: AC 120V/60Hz
Worst Case Mode: 802.11n-HT20 Channel 2437MHz	

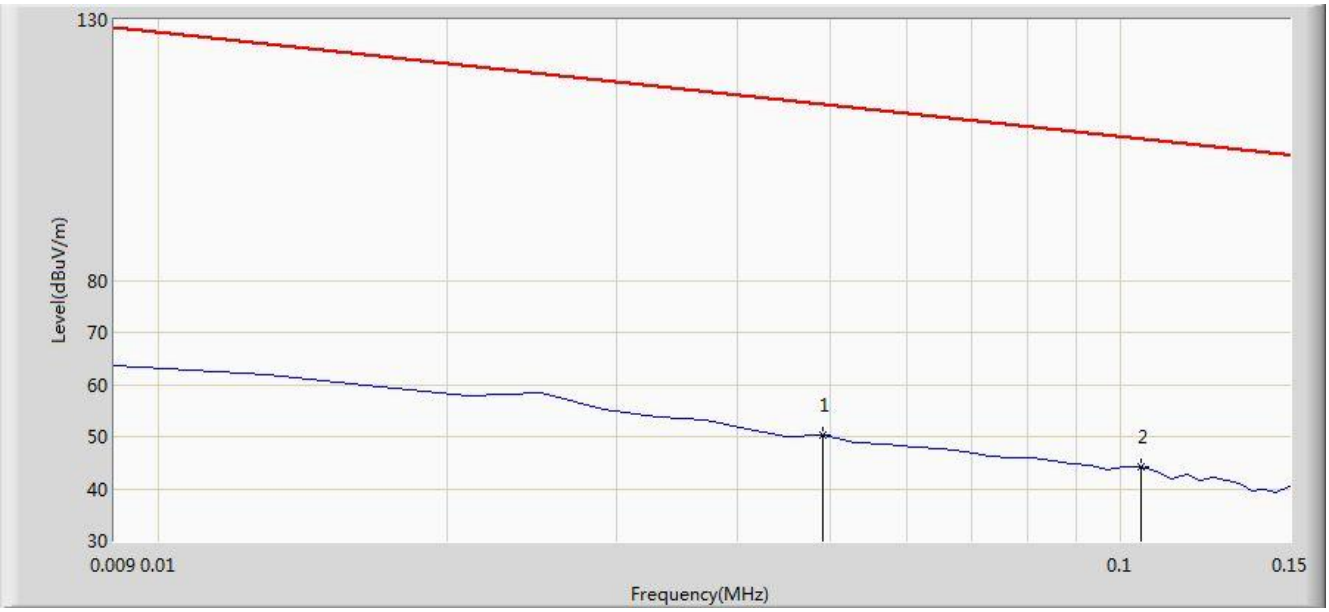


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		*	30.000	30.380	50.260	-9.620	40.000	-19.880	PK
2			84.320	22.780	46.423	-17.220	40.000	-23.643	PK

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

Engineer: Roy Cheng	
Site: AC1	Time: 2014/06/03 - 16:39
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: FMZB1519_0.009-30MHz	Polarity: Face On
EUT: Smart Phone	Power: AC 120V/60Hz
Note: There is the ambient noise within frequency range 9kHz~30MHz.	

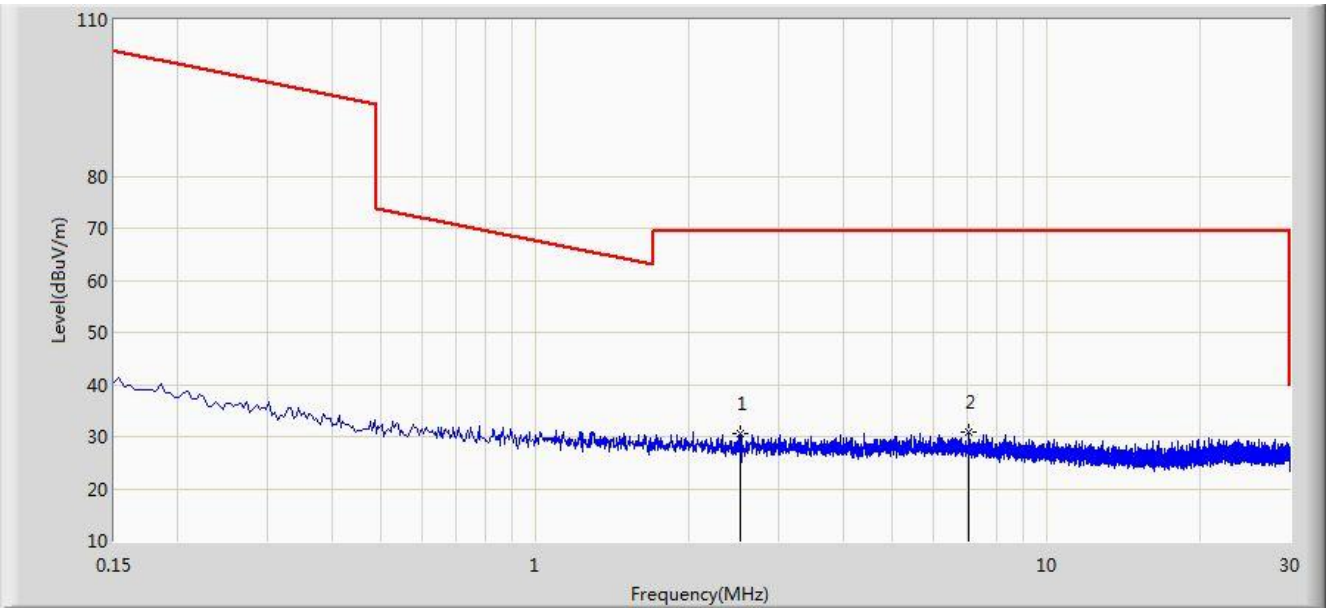


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			0.049	50.367	29.861	-63.422	113.789	20.505	PK
2		*	0.105	44.143	23.996	-63.029	107.173	20.147	PK

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

Engineer: Roy Cheng	
Site: AC1	Time: 2014/06/03 - 16:41
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: FMZB1519_0.009-30MHz	Polarity: Face On
EUT: Smart Phone	Power: AC 120V/60Hz
Note: There is the ambient noise within frequency range 9kHz~30MHz.	

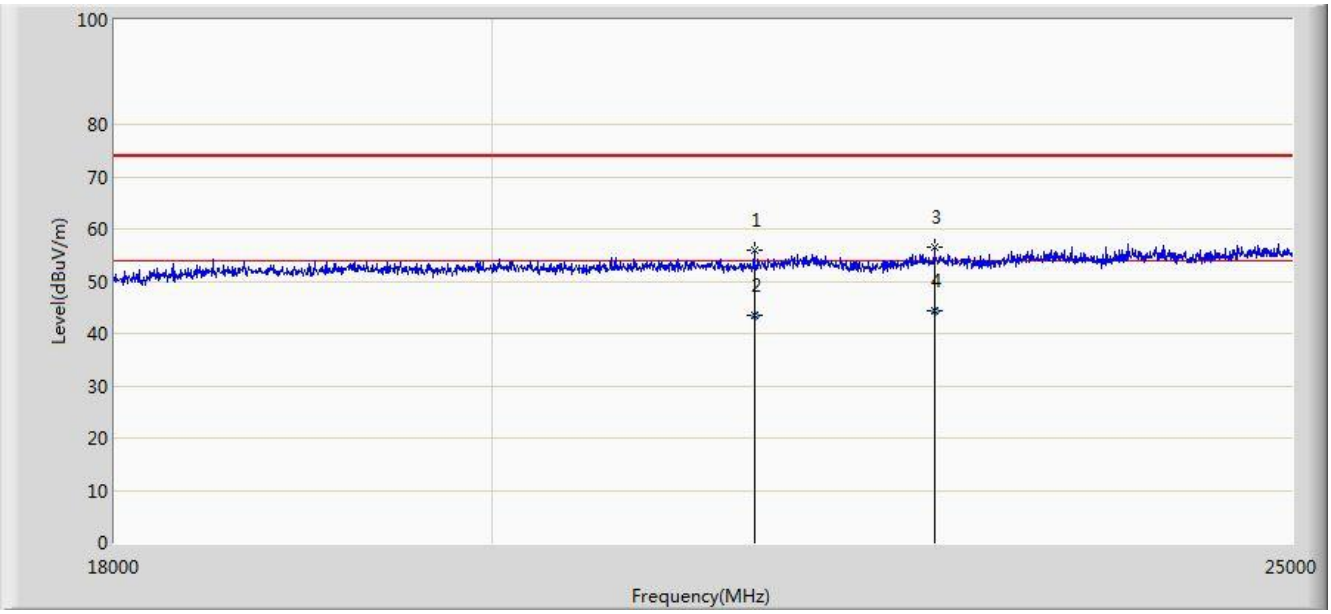


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2.513	30.495	10.336	-39.005	69.500	20.159	PK
2		*	7.041	30.974	10.579	-38.526	69.500	20.395	PK

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

Engineer: Roy Cheng	
Site: AC1	Time: 2014/06/03 - 17:39
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: BBHA9170_18-40GHz	Polarity: Horizontal
EUT: Smart Phone	Power: AC 120V/60Hz
Note: There is the ambient noise within frequency range 18 ~ 25GHz.	

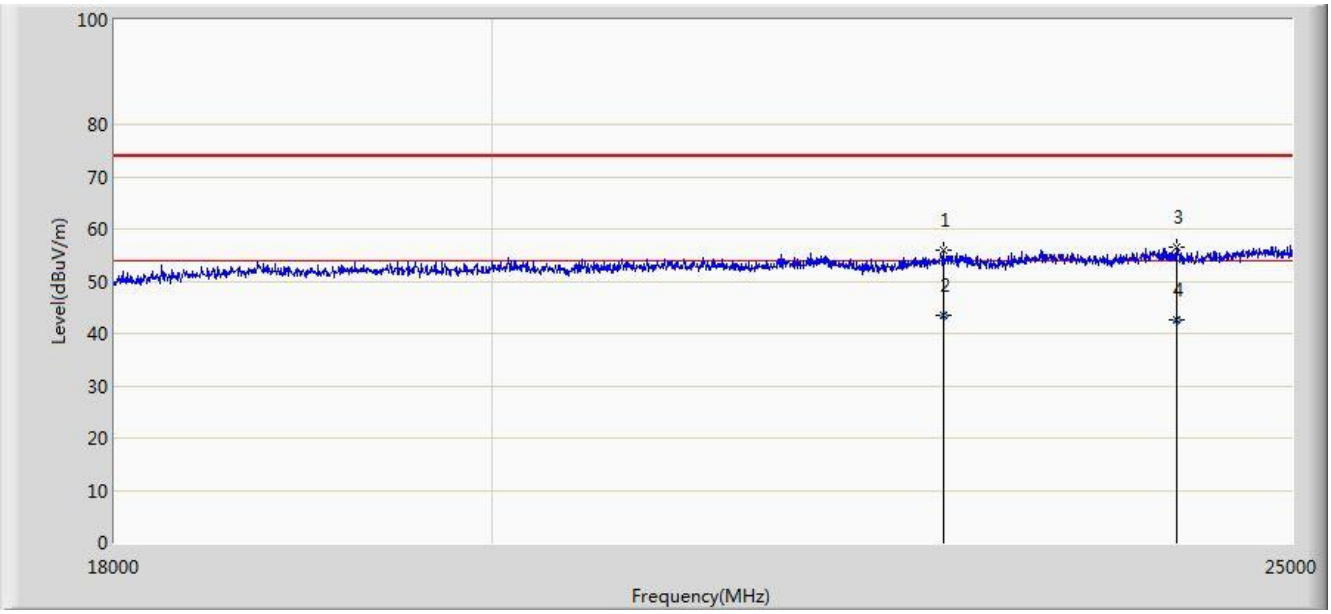


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			21517.500	55.869	17.883	-18.131	74.000	37.986	PK
2			21517.650	43.351	5.365	-10.649	54.000	37.986	AV
3			22630.500	56.509	18.223	-17.491	74.000	38.286	PK
4		*	22630.540	44.310	6.024	-9.690	54.000	38.286	AV

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

Engineer: Roy Cheng	
Site: AC1	Time: 2014/06/03 - 17:43
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: BBHA9170_18-40GHz	Polarity: Vertical
EUT: Smart Phone	Power: AC 120V/60Hz
Note: There is the ambient noise within frequency range 18 ~ 25GHz.	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			22686.500	55.811	17.457	-18.189	74.000	38.354	PK
2		*	22686.540	43.598	5.244	-10.402	54.000	38.354	AV
3			24205.500	56.430	17.607	-17.570	74.000	38.823	PK
4			24205.658	42.518	3.695	-11.482	54.000	38.823	AV

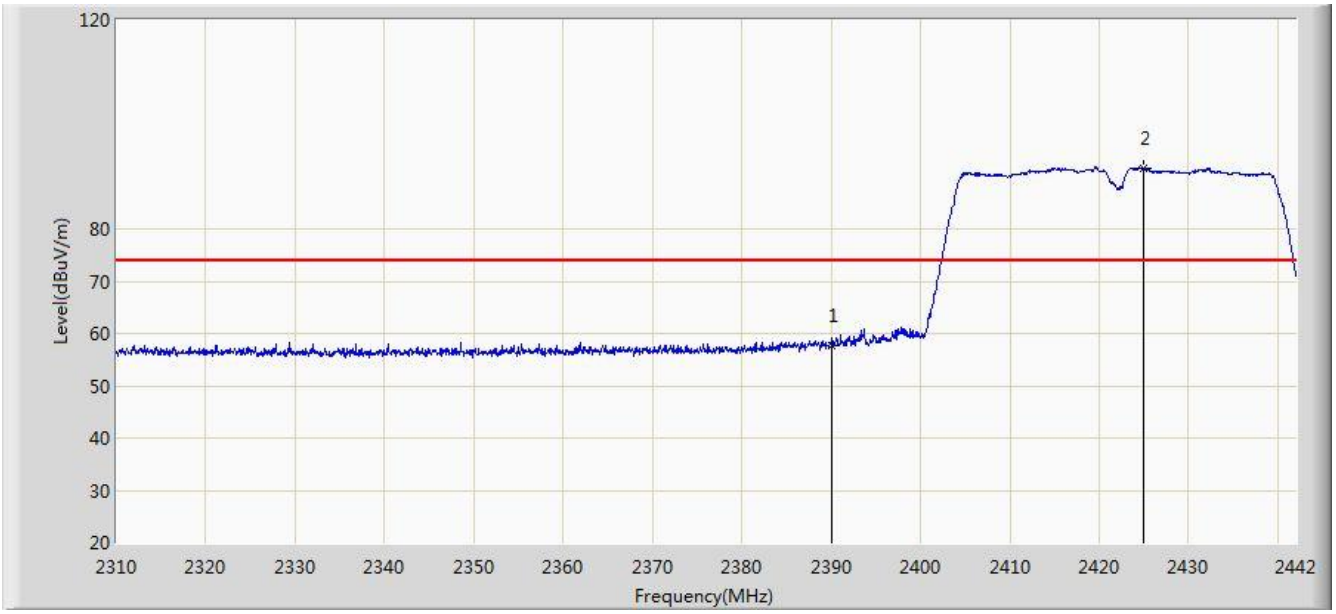
Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

7.7. Radiated Restricted Band Edge Measurement

7.7.1. Test Result

Engineer: Roy Cheng	
Site: AC1	Time: 2014/06/03 - 18:34
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: Smart Phone	Power: AC 120V/60Hz
Worst Case Mode: 802.11n-HT40 Channel 2422MHz	

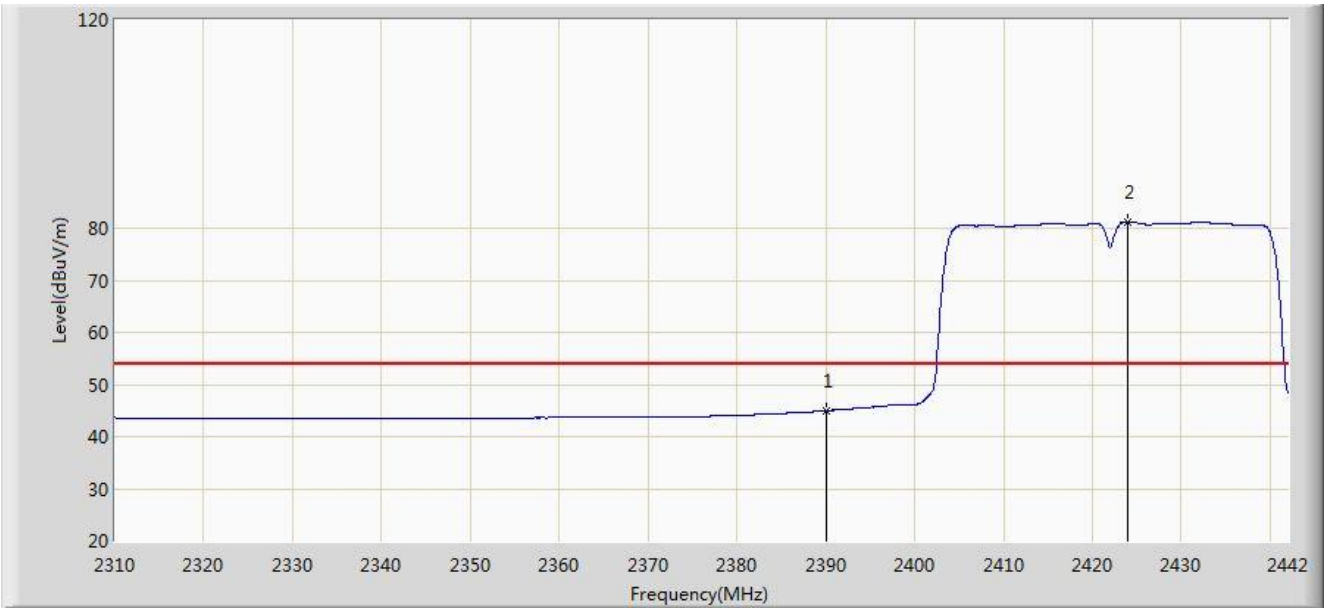


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2390.000	57.561	26.877	-16.439	74.000	30.684	PK
2		*	2424.906	91.669	61.044	N/A	N/A	30.624	PK

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

Engineer: Roy Cheng	
Site: AC1	Time: 2014/06/03 - 18:37
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: Smart Phone	Power: AC 120V/60Hz
Worst Case Mode: 802.11n-HT40 Channel 2422MHz	

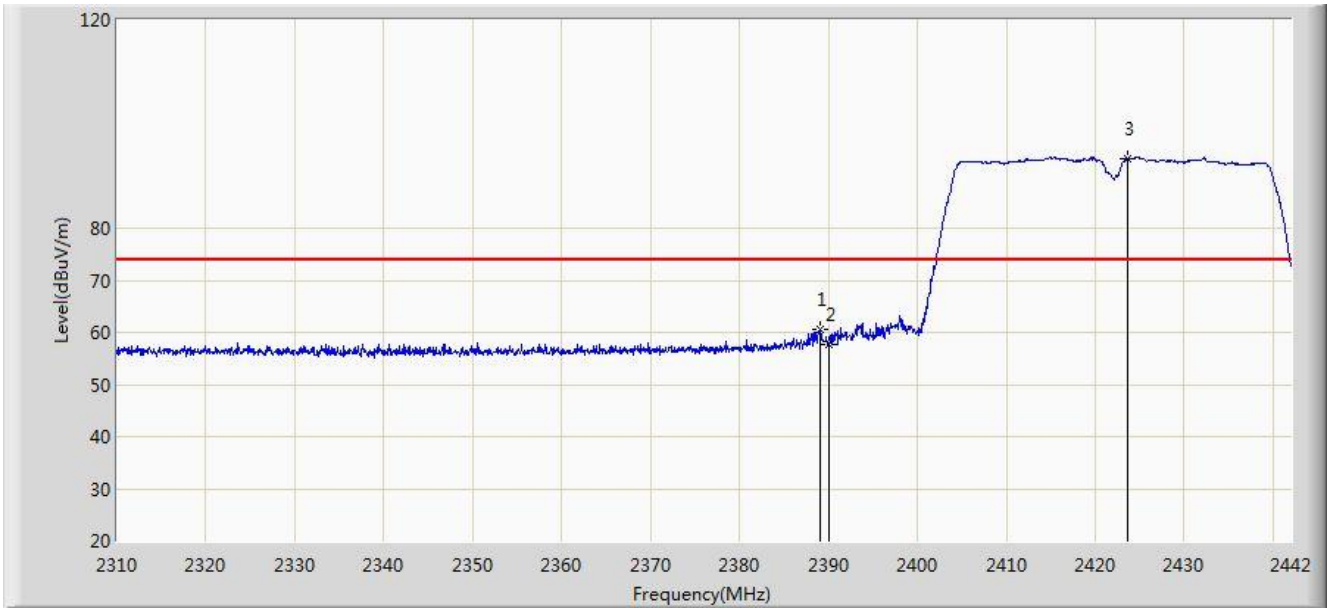


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2390.000	44.992	14.308	-9.008	54.000	30.684	AV
2		*	2424.048	81.220	50.594	N/A	N/A	30.626	AV

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

Engineer: Roy Cheng	
Site: AC1	Time: 2014/06/03 - 18:38
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: Smart Phone	Power: AC 120V/60Hz
Worst Case Mode: 802.11n-HT40 Channel 2422MHz	

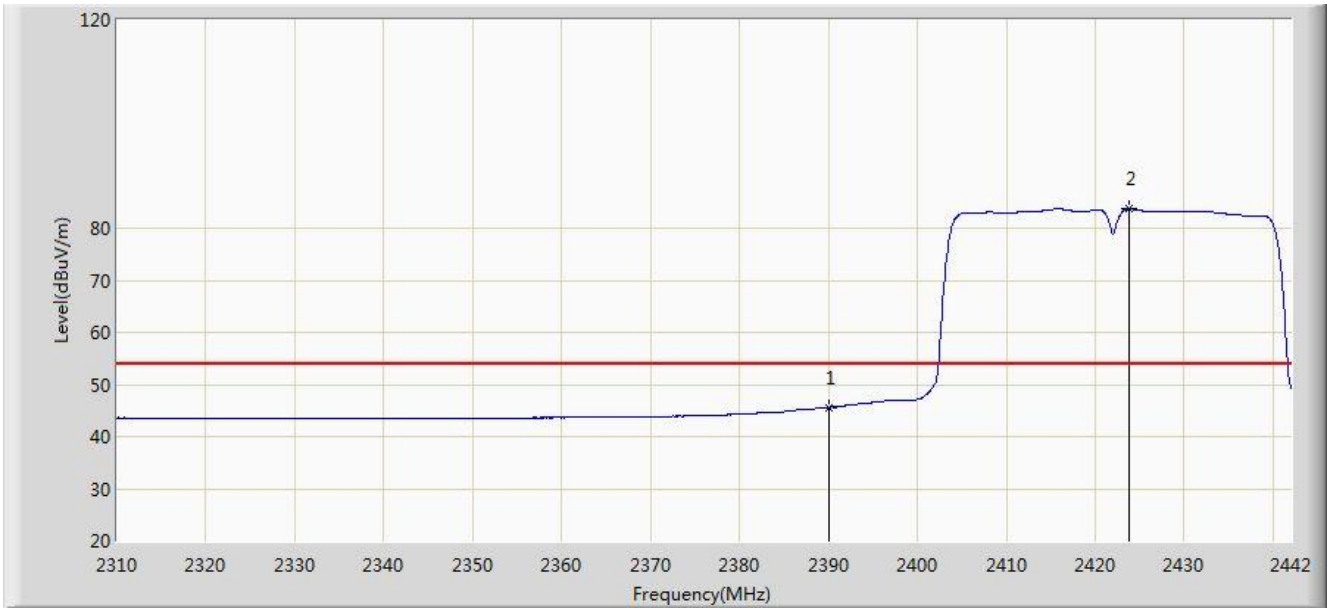


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2389.134	60.627	29.941	-13.373	74.000	30.686	PK
2			2390.000	57.821	27.137	-16.179	74.000	30.684	PK
3		*	2423.652	93.476	62.849	N/A	N/A	30.626	PK

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

Engineer: Roy Cheng	
Site: AC1	Time: 2014/06/03 - 18:40
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: Smart Phone	Power: AC 120V/60Hz
Worst Case Mode: 802.11n-HT40 Channel 2422MHz	

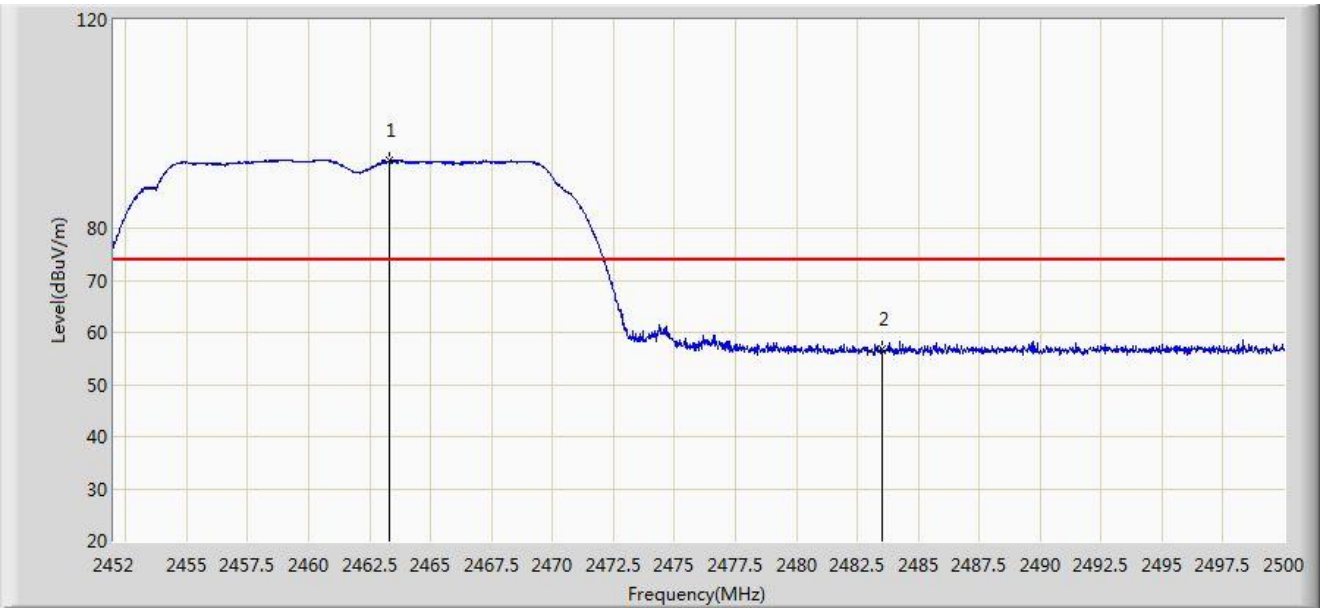


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2390.000	45.625	14.941	-8.375	54.000	30.684	AV
2		*	2423.850	83.715	53.089	N/A	N/A	30.627	AV

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

Engineer: Roy Cheng	
Site: AC1	Time: 2014/06/03 - 17:21
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: Smart Phone	Power: AC 120V/60Hz
Worst Case Mode: 802.11n-HT20 Channel 2462MHz	

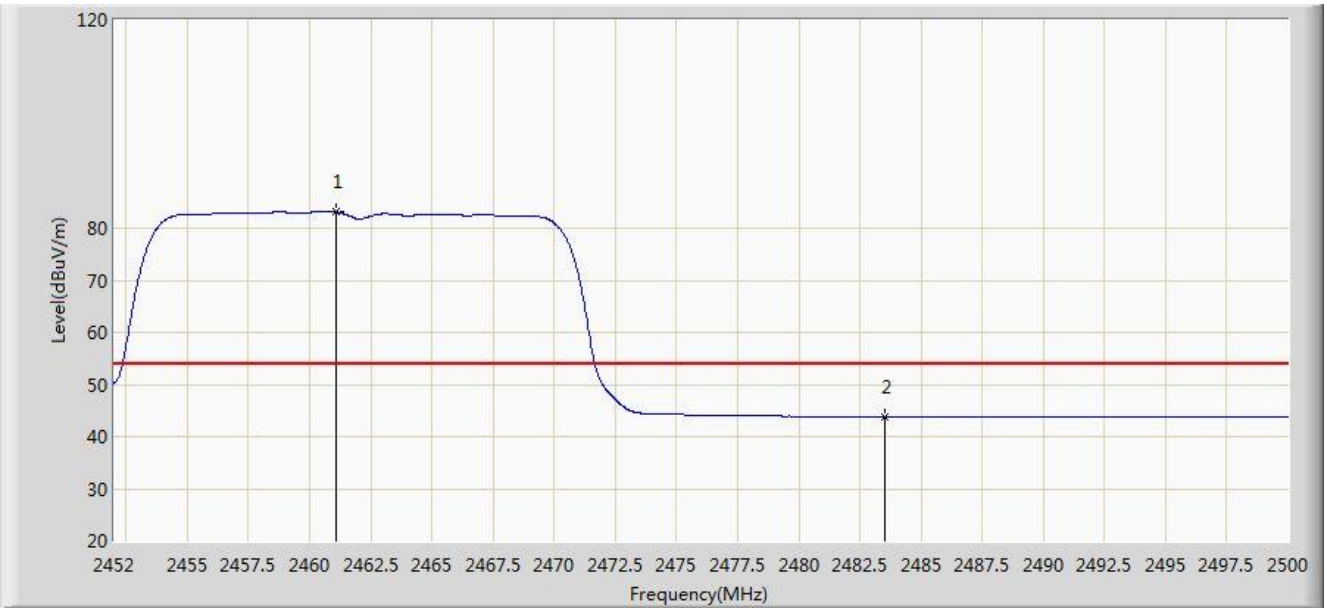


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		*	2463.328	92.953	62.339	N/A	N/A	30.614	PK
2			2483.500	56.779	26.106	-17.221	74.000	30.673	PK

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

Engineer: Roy Cheng	
Site: AC1	Time: 2014/06/03 - 17:25
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: Smart Phone	Power: AC 120V/60Hz
Worst Case Mode: 802.11n-HT20 Channel 2462MHz	

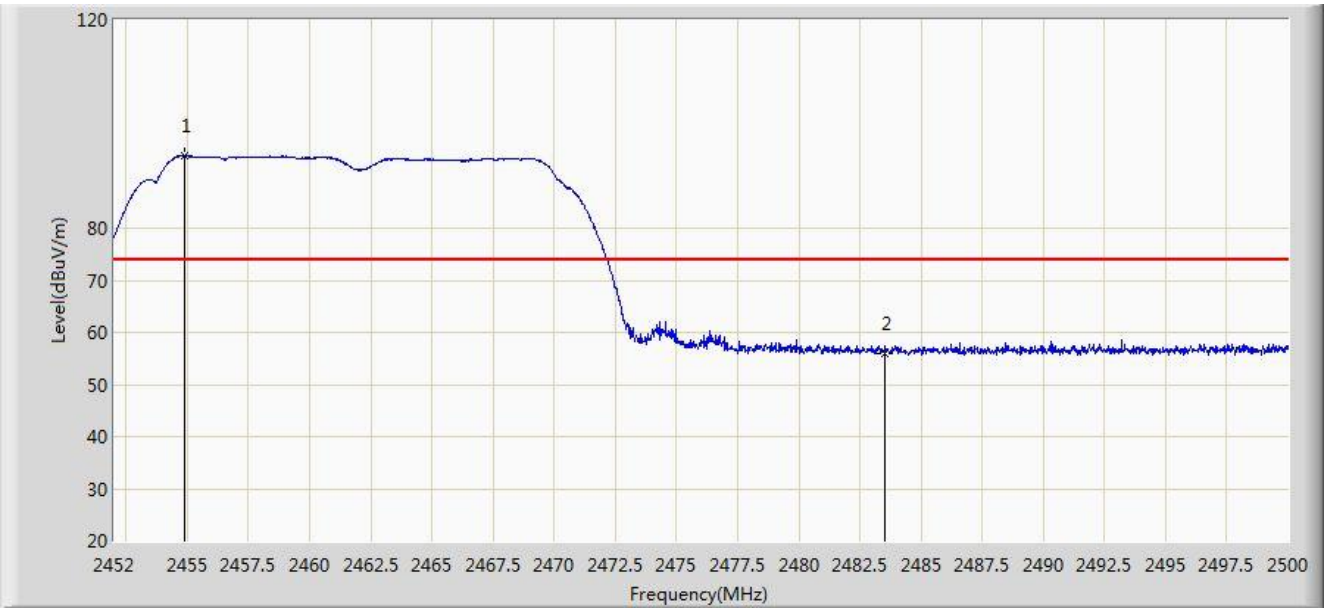


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		*	2461.072	83.074	52.464	N/A	N/A	30.610	AV
2			2483.500	43.674	13.001	-10.326	54.000	30.673	AV

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

Engineer: Roy Cheng	
Site: AC1	Time: 2014/06/03 - 17:30
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: Smart Phone	Power: AC 120V/60Hz
Worst Case Mode: 802.11n-HT20 Channel 2462MHz	

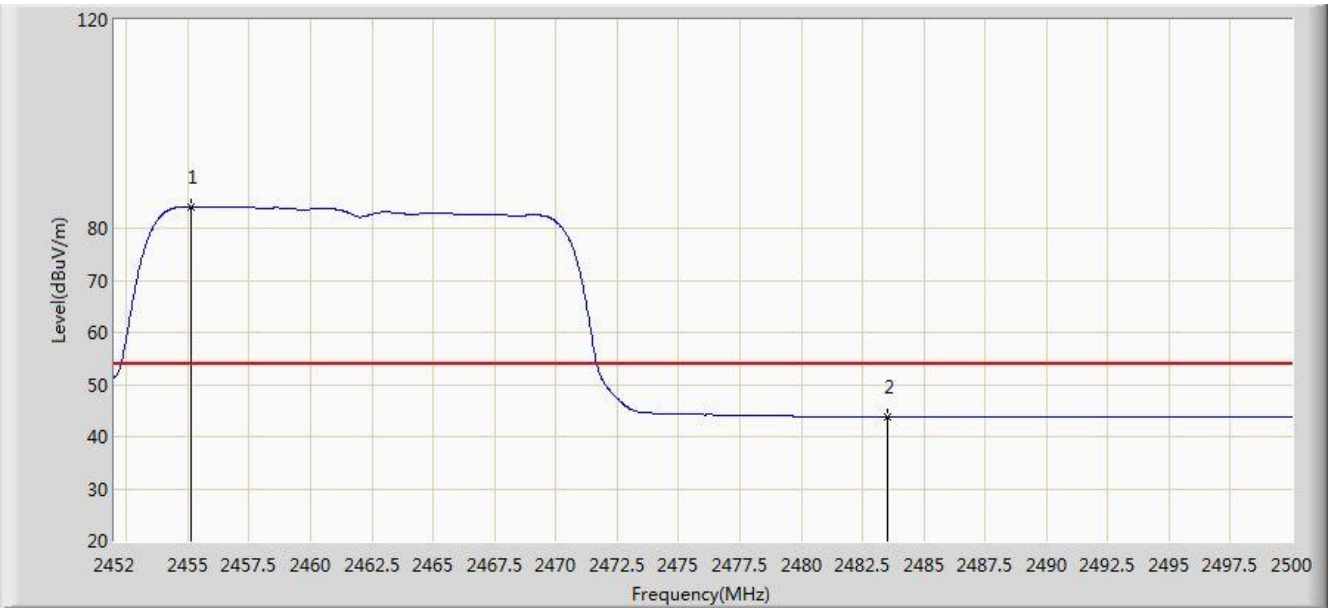


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		*	2454.880	93.890	63.289	N/A	N/A	30.601	PK
2			2483.500	56.064	25.391	-17.936	74.000	30.673	PK

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

Engineer: Roy Cheng	
Site: AC1	Time: 2014/06/03 - 17:33
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: Smart Phone	Power: AC 120V/60Hz
Worst Case Mode: 802.11n-HT20 Channel 2462MHz	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		*	2455.120	84.175	53.574	N/A	N/A	30.601	AV
2			2483.500	43.721	13.048	-10.279	54.000	30.673	AV

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

7.8. AC Conducted Emissions Measurement

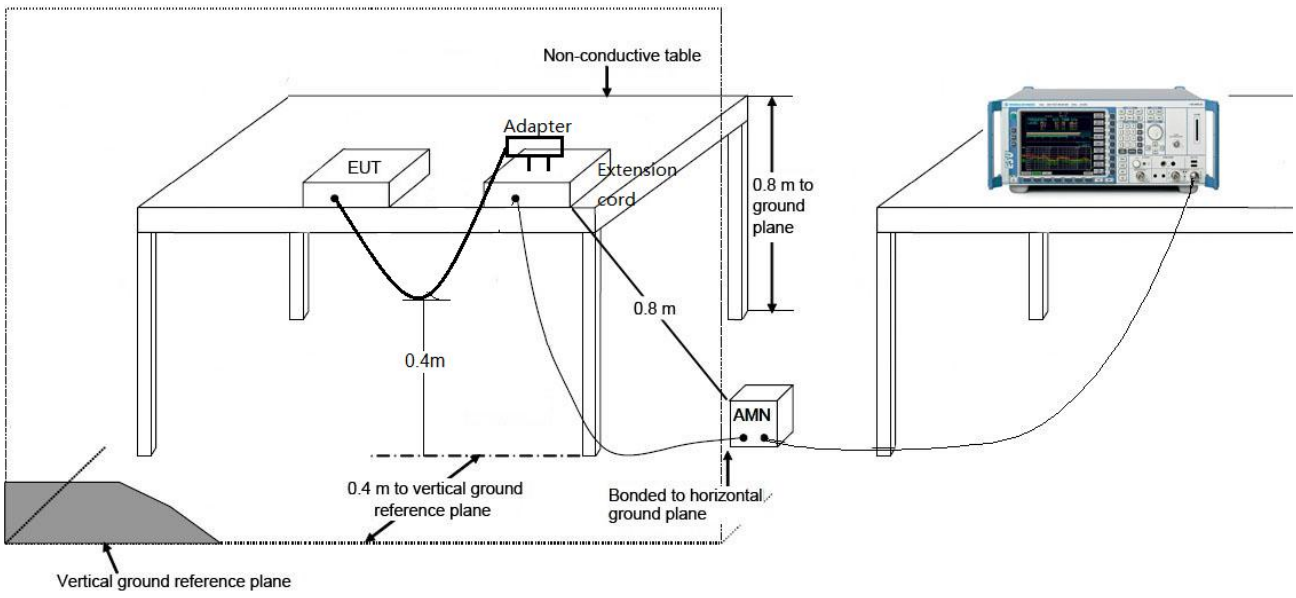
7.8.1. Test Limit

FCC Part 15 Subpart C Paragraph 15.207 Limits		
Frequency (MHz)	QP (dBuV)	AV (dBuV)
0.15 - 0.50	66 - 56	56 – 46
0.50 - 5.0	56	46
5.0 - 30	60	50

Note 1: The lower limit shall apply at the transition frequencies.

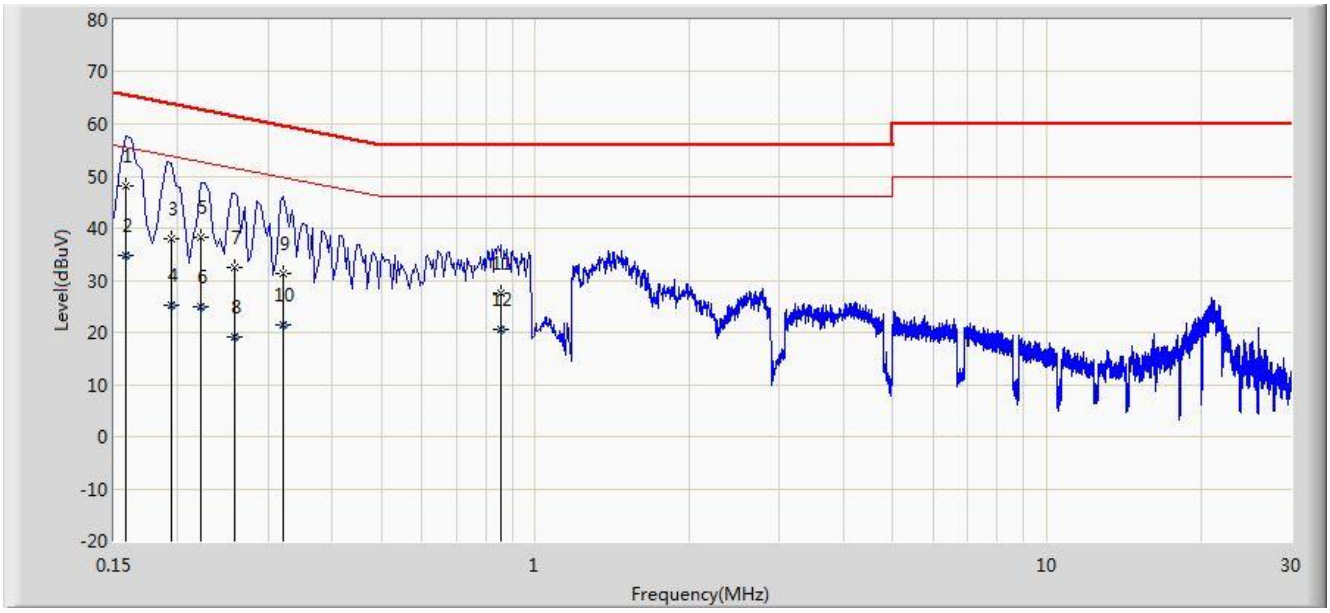
Note 2: The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.5MHz.

7.8.2. Test Setup



7.8.3. Test Result

Engineer: Milo Li	
Site: SR2	Time: 2014/05/30 - 16:10
Limit: FCC_Part15.207_CE_AC Power	Margin: 0
Probe: ENV216_101683_Filter On	Polarity: Line
EUT: Smart Phone	Power: AC 120V/60Hz
Note: Normal Operation	

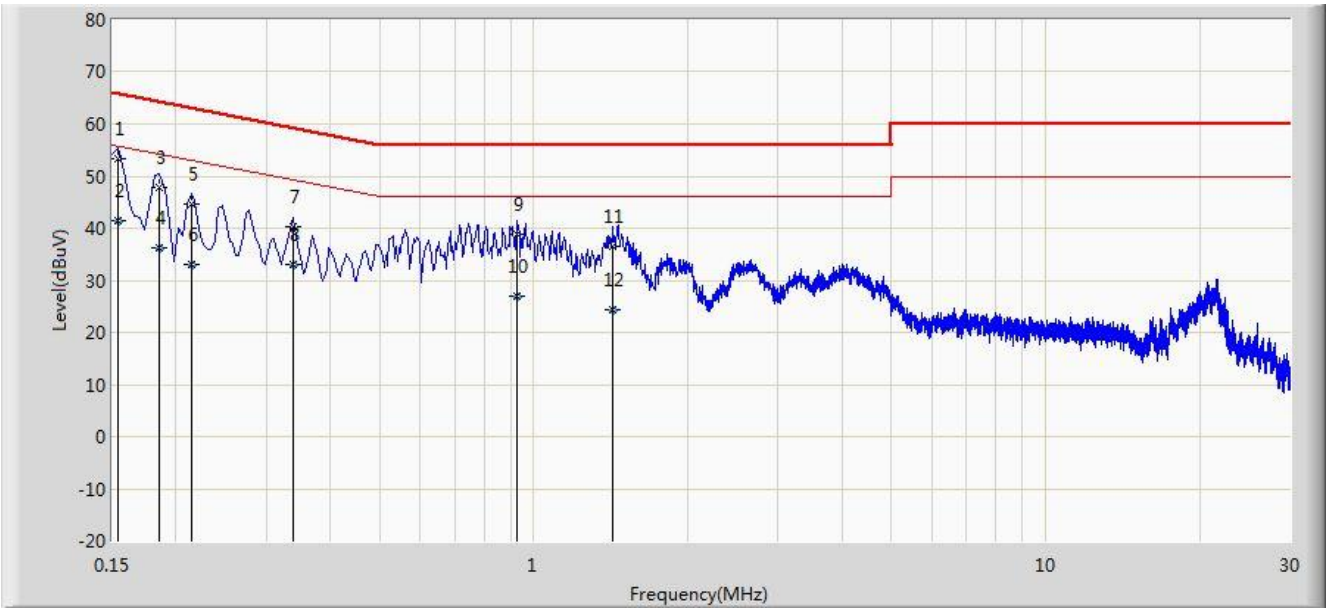


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV)	Factor (dB)	Type
1			0.158	48.182	37.871	-17.386	65.568	10.311	QP
2			0.158	34.670	24.359	-20.898	55.568	10.311	AV
3		*	0.194	38.094	28.077	-25.769	63.864	10.017	QP
4			0.194	25.239	15.222	-28.624	53.864	10.017	AV
5			0.222	38.298	28.357	-24.446	62.744	9.941	QP
6			0.222	24.800	14.859	-27.944	52.744	9.941	AV
7			0.258	32.412	22.441	-29.084	61.496	9.970	QP
8			0.258	19.181	9.210	-32.315	51.496	9.970	AV
9			0.322	31.373	21.352	-28.282	59.655	10.022	QP
10			0.322	21.488	11.466	-28.167	49.655	10.022	AV
11			0.858	27.393	17.411	-28.607	56.000	9.982	QP
12			0.858	20.563	10.581	-25.437	46.000	9.982	AV

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + LISN Factor (dB)

Engineer: Milo Li	
Site: SR2	Time: 2014/05/30 - 16:16
Limit: FCC_Part15.207_CE_AC Power	Margin: 0
Probe: ENV216_101683_Filter On	Polarity: Neutral
EUT: Smart Phone	Power: AC 120V/60Hz
Note: Normal Operation	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV)	Factor (dB)	Type
1			0.154	53.242	42.526	-12.540	65.781	10.716	QP
2			0.154	41.339	30.623	-14.442	55.781	10.716	AV
3			0.186	47.797	37.762	-16.416	64.213	10.035	QP
4			0.186	36.132	26.097	-18.081	54.213	10.035	AV
5			0.214	44.738	34.750	-18.310	63.049	9.988	QP
6			0.214	32.963	22.975	-20.086	53.049	9.988	AV
7			0.338	40.226	30.160	-19.026	59.252	10.066	QP
8			0.338	32.935	22.870	-16.317	49.252	10.066	AV
9		*	0.930	38.802	28.854	-17.198	56.000	9.947	QP
10			0.930	26.876	16.928	-19.124	46.000	9.947	AV
11			1.430	36.485	26.593	-19.515	56.000	9.893	QP
12			1.430	24.259	14.366	-21.741	46.000	9.893	AV

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + LISN Factor (dB)

8. CONCLUSION

The data collected relate only the item(s) tested and show that the **Smart Phone FCC ID:**

2AAA6-S850 is in compliance with Part 15C of the FCC Rules.

The End