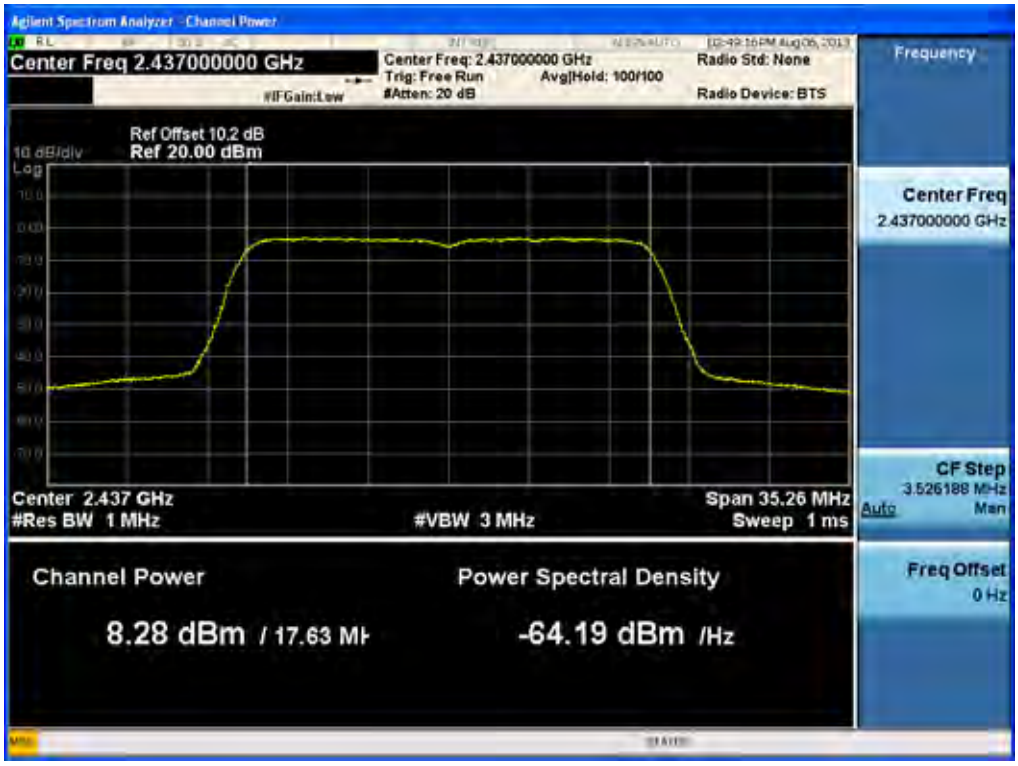
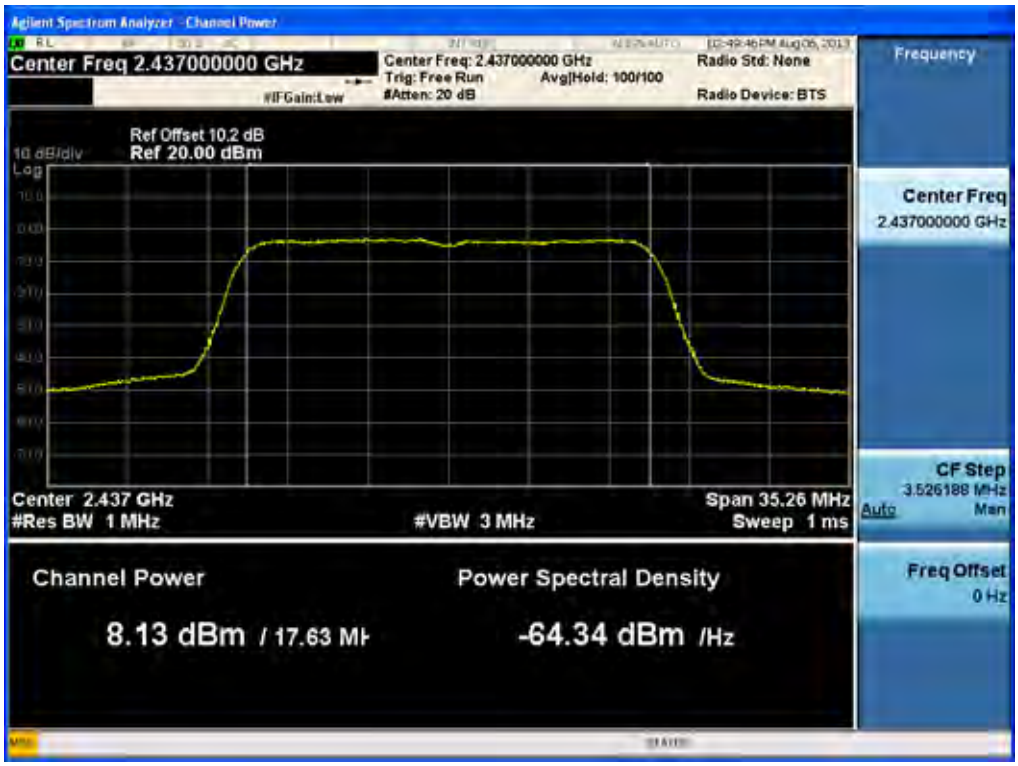
Conducted Output Power (802.11n-CH 6) 39Mbps

Conducted Output Power (802.11n-CH 6) 52Mbps



Conducted Output Power (802.11n-CH 6) 58.5Mbps



Conducted Output Power (802.11n-CH 6) 65Mbps

▣ RESULT PLOTS:_40 MHz BW

Conducted Output Power (802.11n-CH 6) 13.5 Mbps

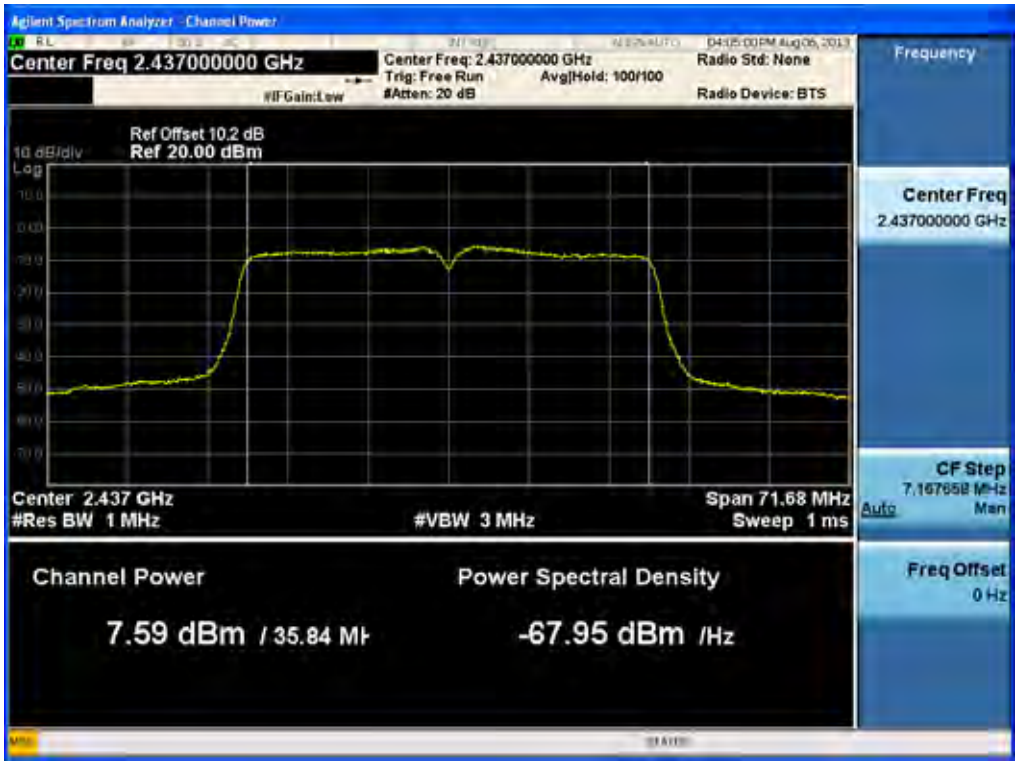
Conducted Output Power (802.11n-CH 6) 27 Mbps

Conducted Output Power (802.11n-CH 6) 40.5 Mbps

Conducted Output Power (802.11n-CH 6) 54 Mbps

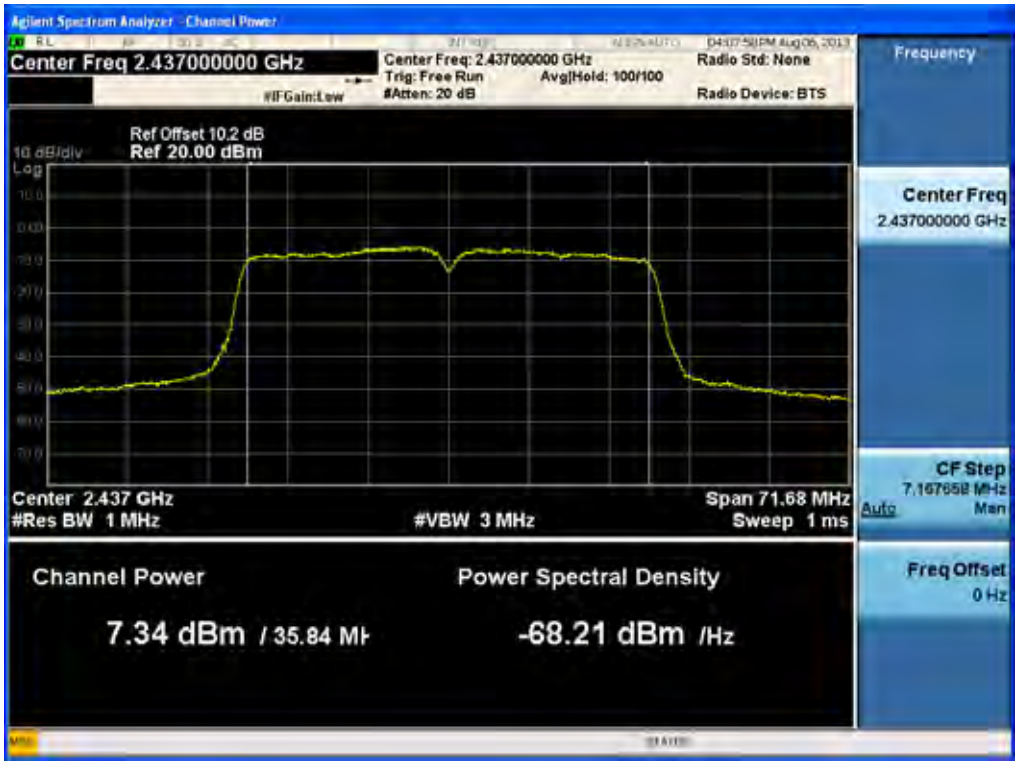
Conducted Output Power (802.11n-CH 6) 81 Mbps

Conducted Output Power (802.11n-CH 6) 108 Mbps



Conducted Output Power (802.11n-CH 6) 121.5 Mbps

Conducted Output Power (802.11n-CH 6) 135 Mbps



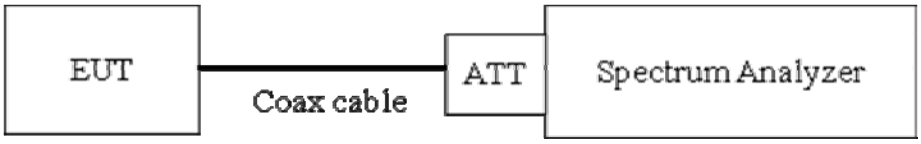
8.4 POWER SPECTRAL DENSITY (802.11b/g/n)

Test Requirements and limit, §15.247(e)

The peak power spectral density is measured with a spectrum analyzer connected to the antenna terminal while the EUT is operating in transmission mode at the appropriate frequencies.

Minimum Standard – the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

▣ TEST CONFIGURATION



▣ TEST PROCEDURE

We tested according to Procedure 10.2 in KDB 558074, issued 04/09/2013

The spectrum analyzer is set to :

Set analyzer center frequency to DTS channel center frequency.

Span = 1.5 times the DTS channel bandwidth.

RBW = 3 kHz ≤ RBW ≤ 100 kHz.

VBW ≥ 3 x RBW.

Sweep = auto couple

Detector = peak

Trace Mode = max hold

Allow trace to fully stabilize.

Use the peak marker function to determine the maximum amplitude level within the RBW.

If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

▣ Sample Calculation

PSD = Reading Value + ATT loss + Cable loss(1 ea)

= -5 dBm + 10 dB + 0.8 dB = 5.8 dBm

Note :

1. Spectrum reading values are not plot data. The PSD results in plot is already including the actual values of loss for the attenuator and cable combination.
2. Spectrum offset = Attenuator loss + Cable loss
3. We apply to the offset in the 2.4 GHz range that was rounded off to the closest tenth dB. So, 10.2 dB is offset for 2.4 GHz Band.

   Actual value of loss for the attenuator and cable combination is below table.

Band	Frequency(MHz)	Loss(dB)
2.4 GHz	2412	10.21
	2437	10.24
	2462	10.24

(Actual value of loss for the attenuator and cable combination)

▣ TEST RESULTS

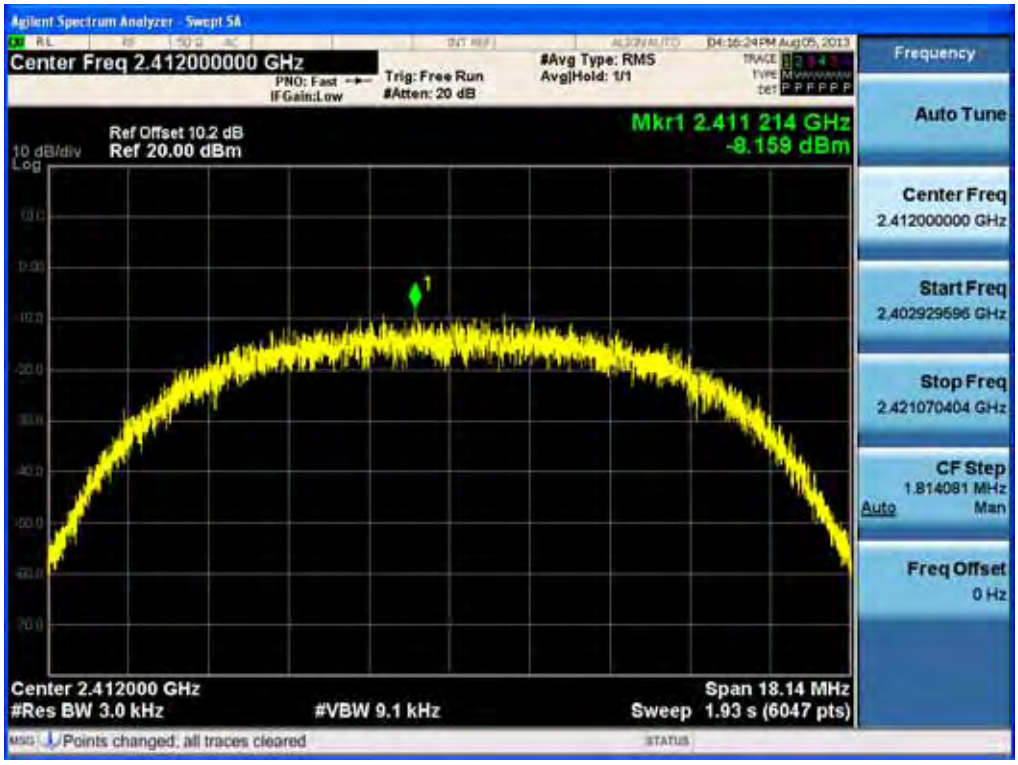
Conducted Power Density Measurements

Frequency (MHz)	Channel No.	Mode	Test Result		
			PSD (dBm)	Limit (dBm)	Pass/Fail
2412	1	802.11b	-8.159	8	Pass
2437	6		-8.939	8	Pass
2462	11		-8.963	8	Pass
2412	1	802.11g	-14.266	8	Pass
2437	6		-14.030	8	Pass
2462	11		-14.846	8	Pass
2412	1	802.11n (20 MHz BW)	-16.614	8	Pass
2437	6		-17.044	8	Pass
2462	11		-16.485	8	Pass
2422	3	802.11n (40 MHz BW)	-20.491	8	Pass
2437	6		-19.231	8	Pass
2452	9		-18.985	8	Pass

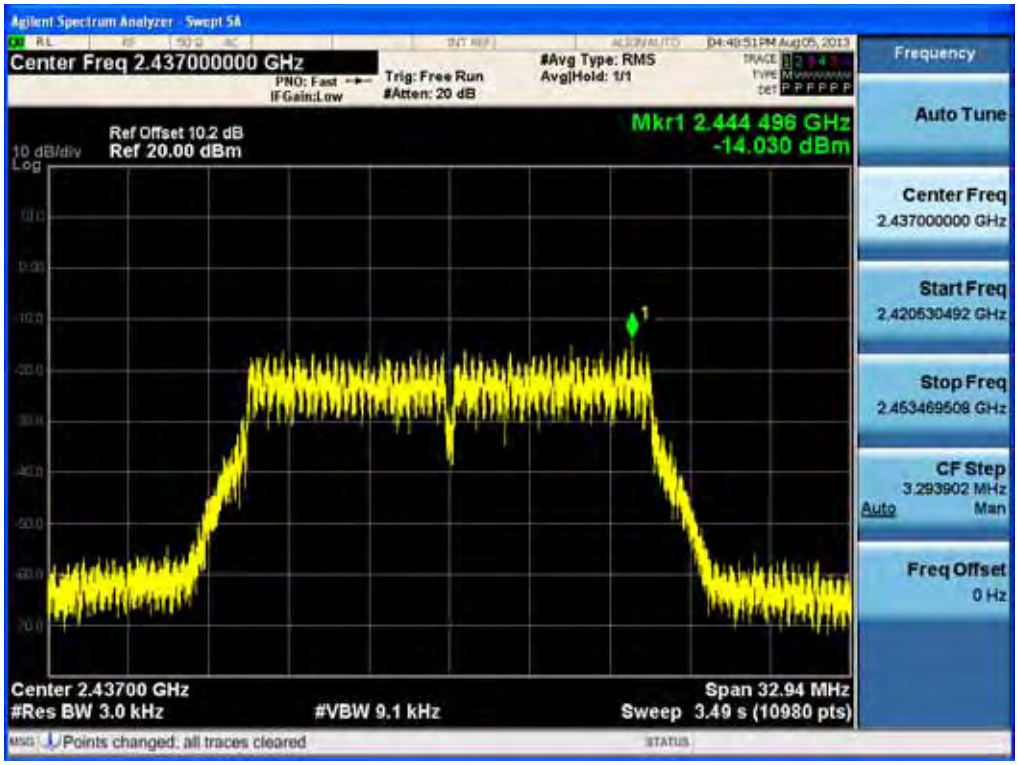
Note : In order to simplify the report, attached plots were only the highest PSD channel.

▣ RESULT PLOTS

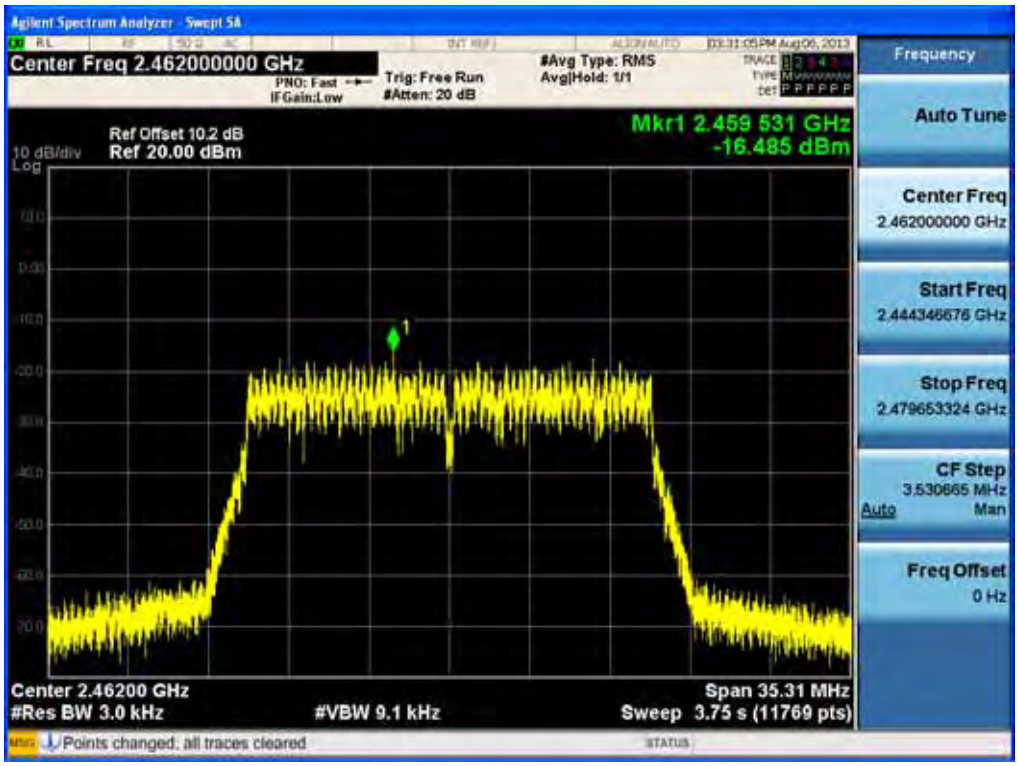
Power Spectral Density (802.11b-CH 1)



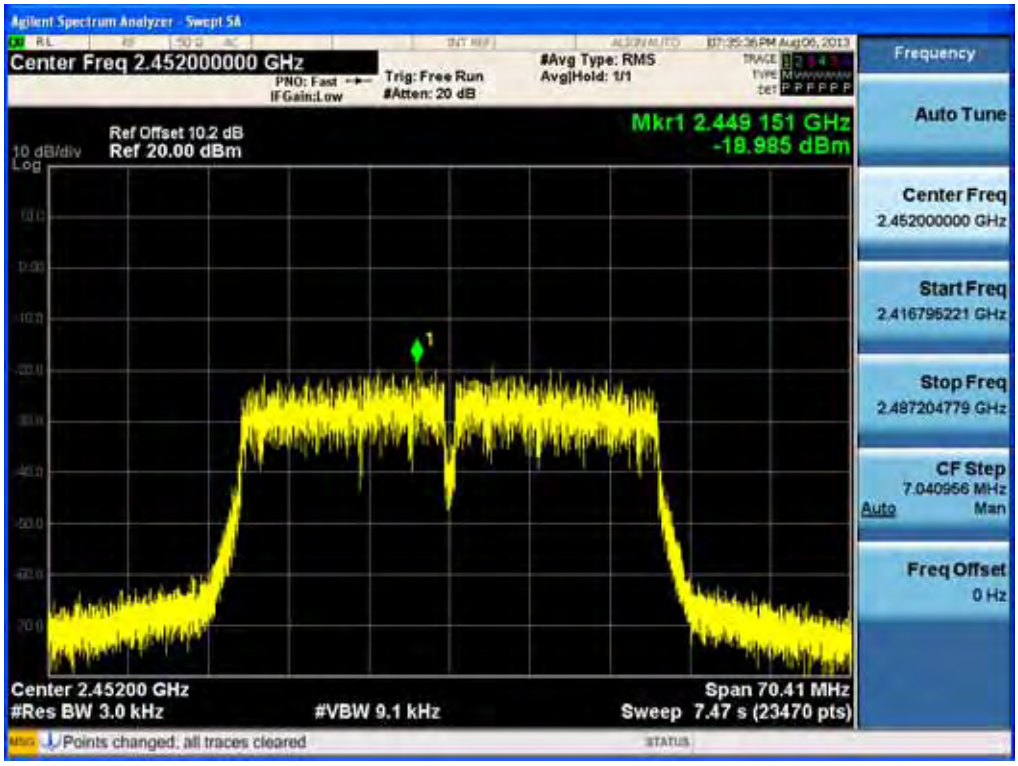
Power Spectral Density (802.11g-CH 6)



Power Spectral Density (802.11n-CH11) _ 20 MHz BW



Power Spectral Density (802.11n-CH9) _ 40 MHz BW



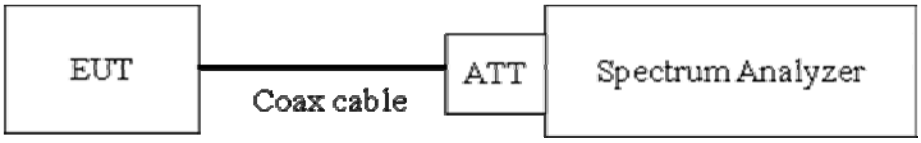
8.5 OUT OF BAND EMISSIONS AT THE BAND EDGE/ CONDUCTED SPURIOUS EMISSIONS

Test Requirements and limit, §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. In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a) (see § 15.205(c)).

Limit : 20 dBc

▣ TEST CONFIGURATION



▣ TEST PROCEDURE

The transmitter output is connected to the spectrum analyzer. (Procedure 11.0 in KDB 558074, issued 04/09/2013)

RBW = 100 kHz(Upon 1 GHz = 1 MHz, In order to increase the measurement speed).

VBW ≥ 3 x RBW(Upon 1 GHz = 3 MHz, In order to increase the measurement speed).

Set span to encompass the spectrum to be examined

Detector = Peak

Trace Mode = max hold

Sweep time = auto couple

Ensure that the number of measurement points ≥ Span/RBW

Allow trace to fully stabilize.

Use peak marker function to determine the maximum amplitude level.

Measurements are made over the 30 MHz to 10th harmonic range with the transmitter set to the lowest, middle, and highest channels.

Note :

1. The band edge results in plot is already including the actual values of loss for the attenuator and cable combination.
2. Spectrum offset = Attenuator loss + Cable loss
3. We apply to the offset in the 2.4 GHz range that was rounded off to the closest tenth dB. So, 10.2 dB is

offset for 2.4 GHz Band. Actual value of loss for the attenuator and cable combination is below table.

Band	Frequency(MHz)	Loss(dB)
2.4 GHz	2412	10.21
	2437	10.24
	2462	10.24

(Actual value of loss for the attenuator and cable combination)

4. In case of conducted spurious emissions test, please check factors blow table.
5. The display line shown in the following plots denotes the limit at 20 dB below the fundamental emission level measured in a 100 kHz bandwidth. However, since the traces in the following plots are measured with a 1 MHz RBW, the display line may not necessarily appear to be 20 dB below the level of the fundamental in a 1 MHz bandwidth.
6. For plots showing conducted spurious emissions near the limit, the frequencies were investigated with a reduced RBW to ensure that no emissions were present.

▣ FACTORS FOR FREQUENCY

Freq(MHz)	Factor(dB)
30	9.95
100	10.01
200	10.03
300	10.04
400	10.05
500	10.04
600	10.03
700	10.09
800	10.10
900	10.08
1000	10.11
2000	10.25
2400*	10.19
2500*	10.26
3000	10.27
4000	10.22
5000	10.48
5700*	10.42
5800*	10.48
6000	10.48
7000	10.57

8000	10.45
9000	10.50
10000	10.64
11000	10.69
12000	10.75
13000	10.92
14000	11.90
15000	11.00
16000	11.03
17000	10.93
18000	10.96
19000	10.85
20000	12.11
21000	11.17
22000	10.99
23000	11.12
24000	11.10
25000	11.42

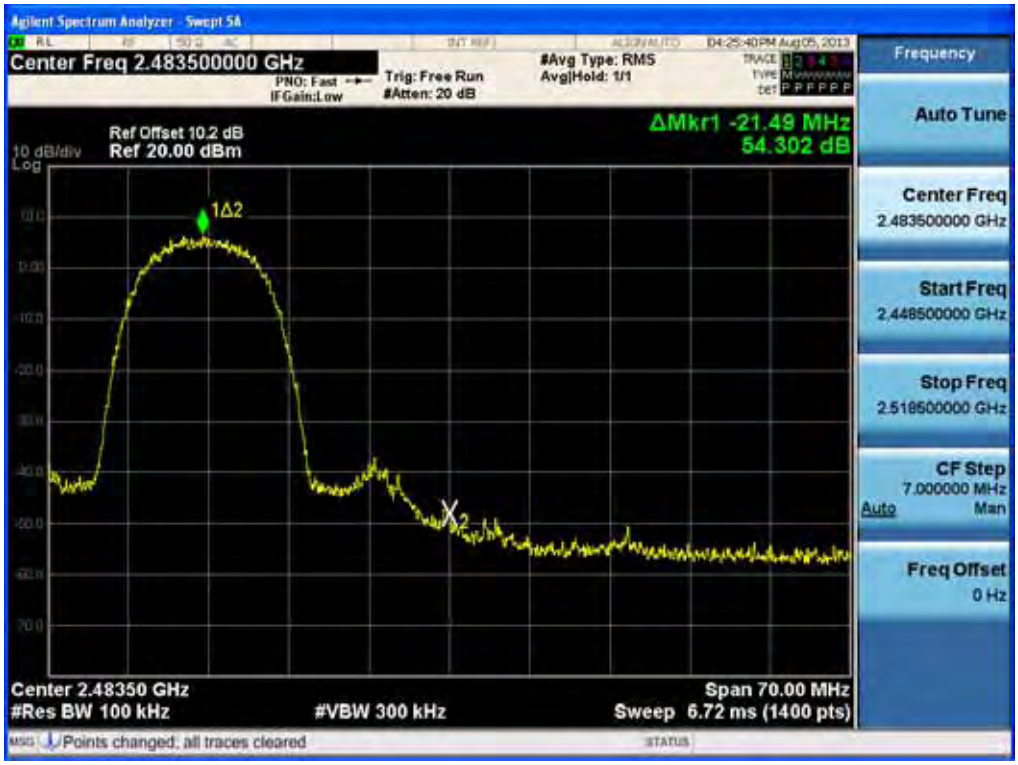
Note : 1. '*' is fundamental frequency range.

2. Factor = Cable loss + Attenuator loss

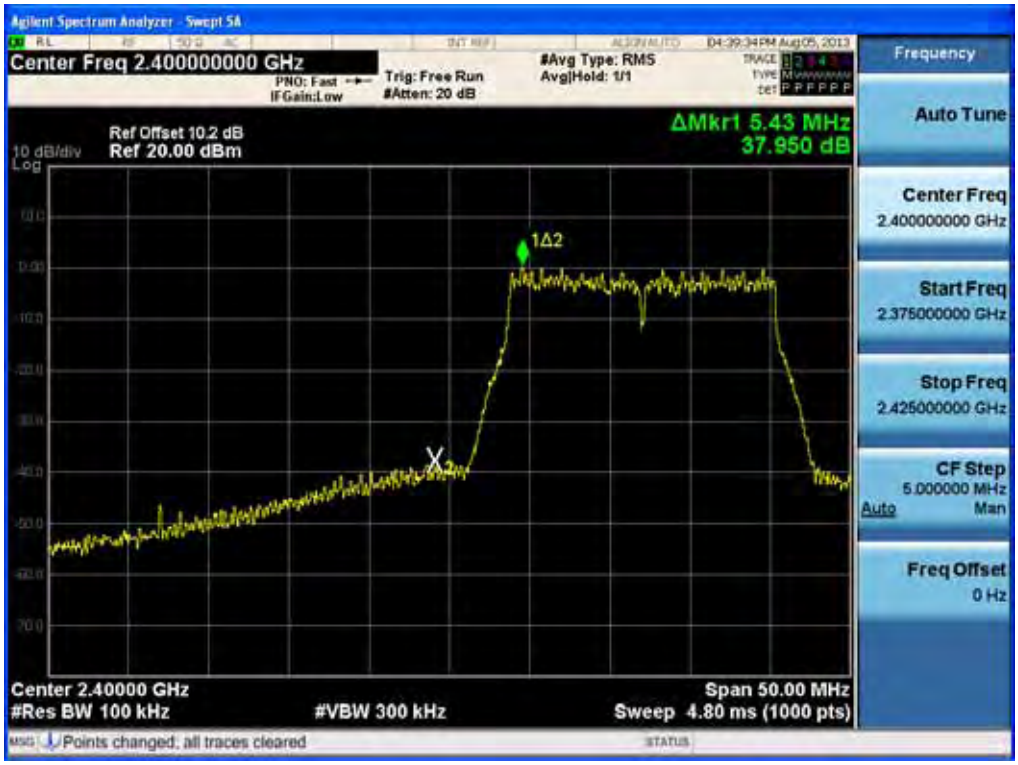
▣ RESULT PLOTS

BandEdge (802.11b-CH1)

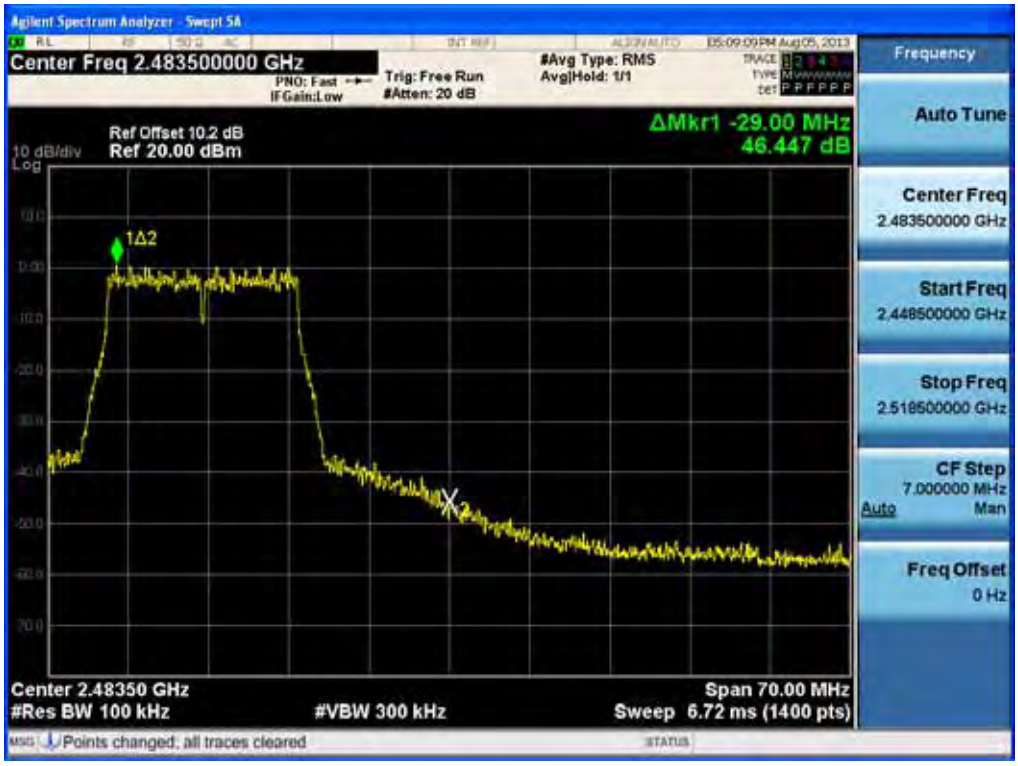
BandEdge (802.11b-CH11)



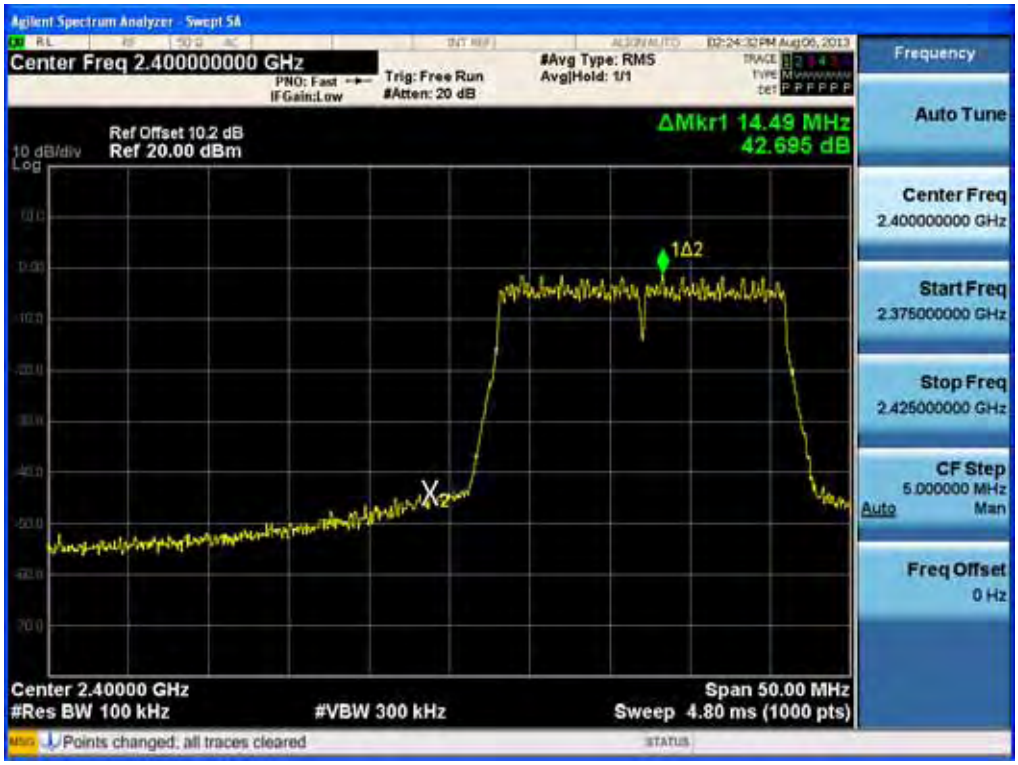
BandEdge (802.11g-CH1)



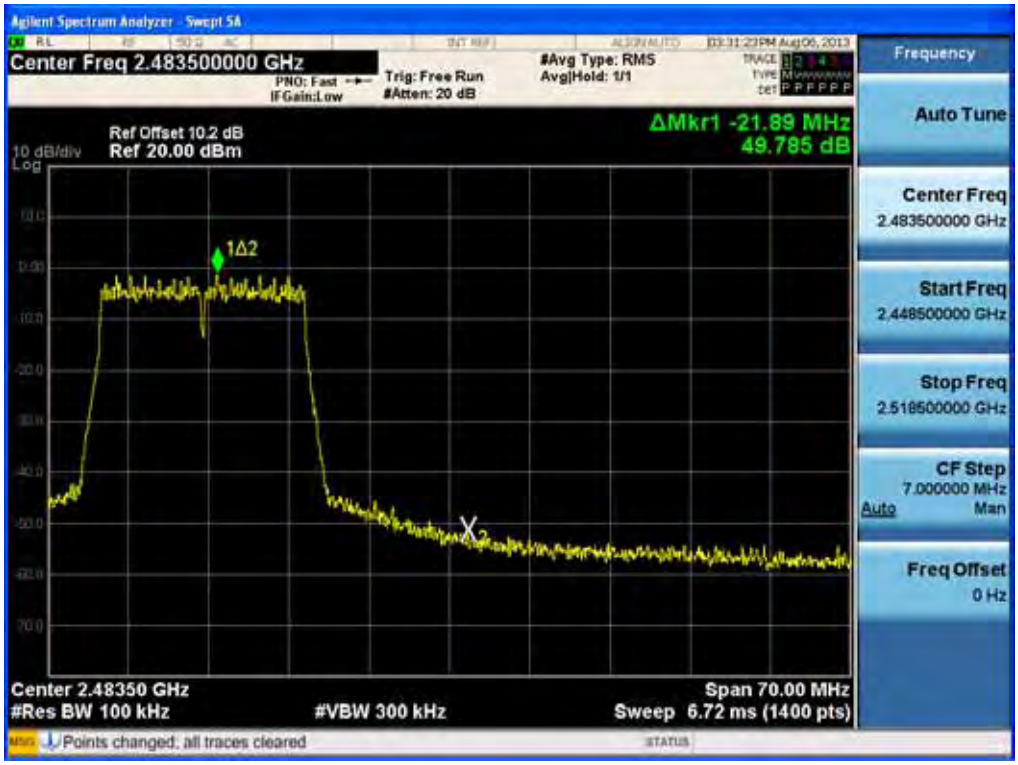
BandEdge (802.11g-CH11)



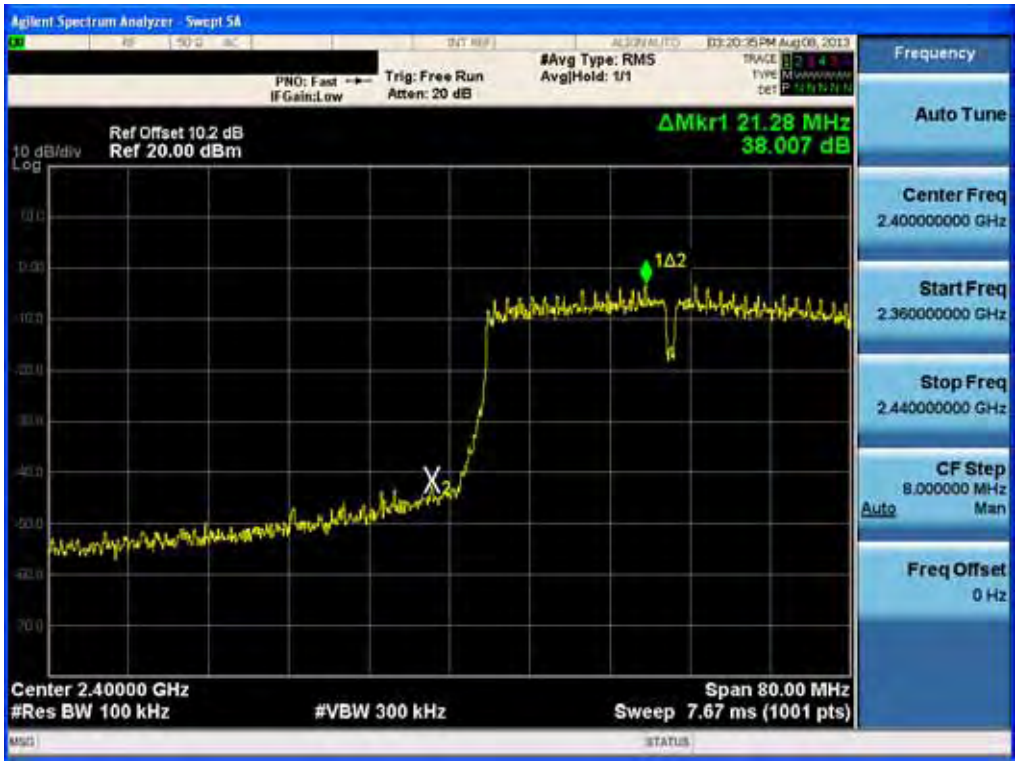
Band Edge (802.11n-CH1) _ 20 MHz BW



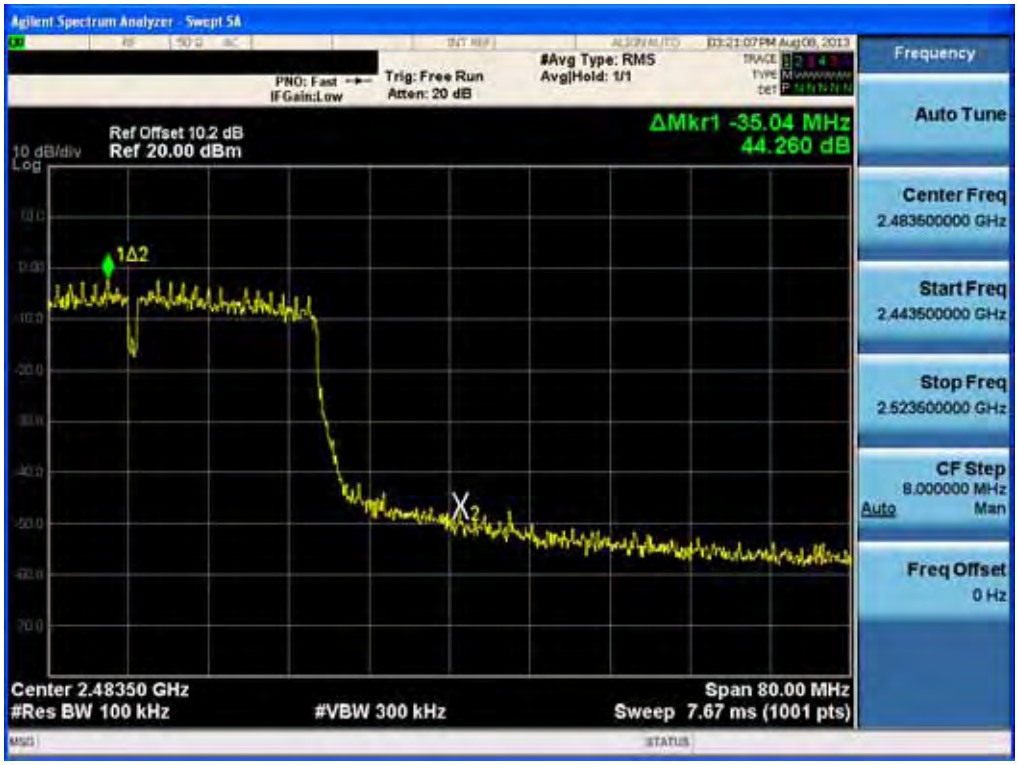
Band Edge (802.11n-CH11) _ 20 MHz BW



Band Edge (802.11n-CH3)_40 MHz BW

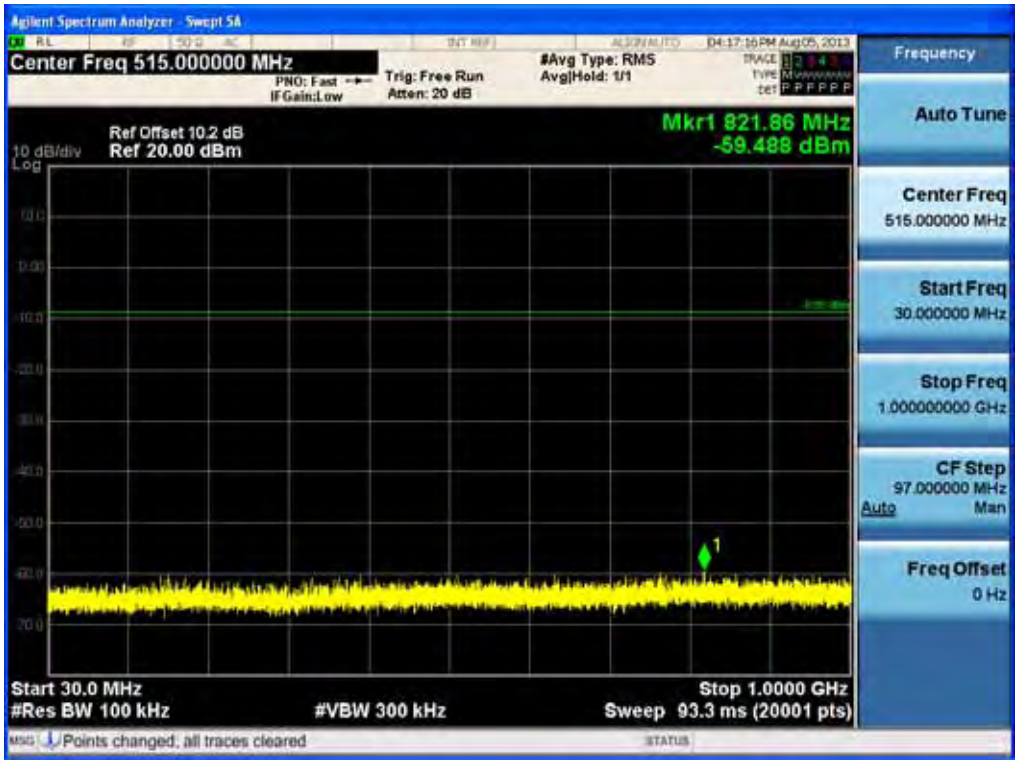


Band Edge (802.11n-CH9) _40 MHz BW

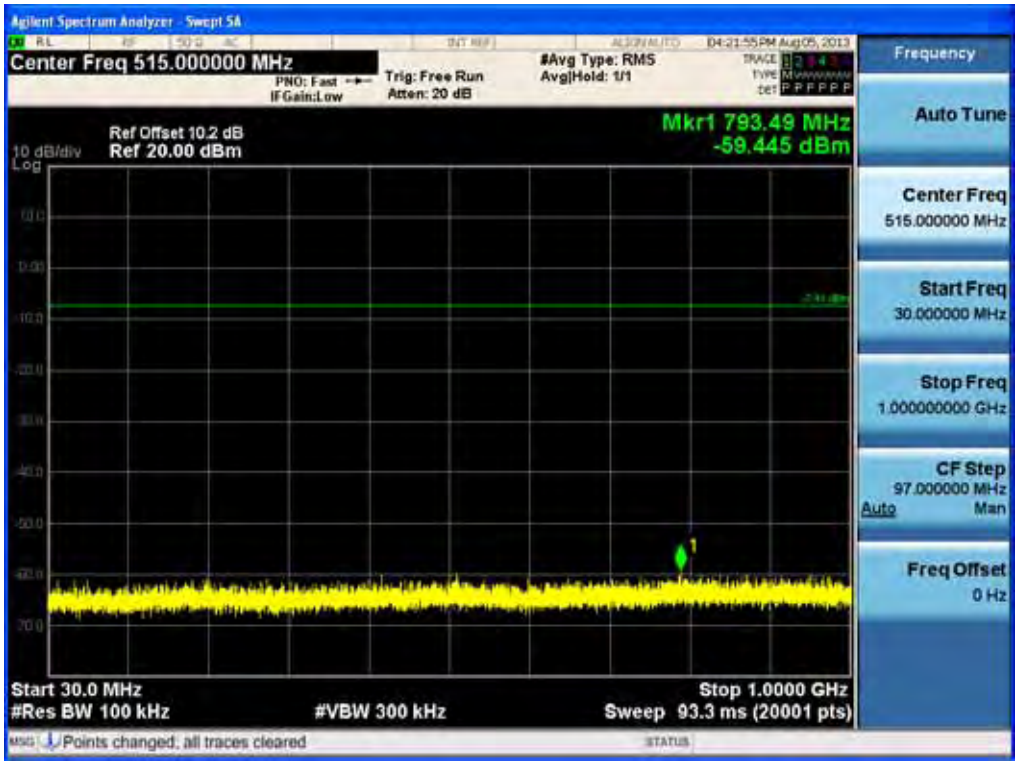


30 MHz ~ 1 GHz

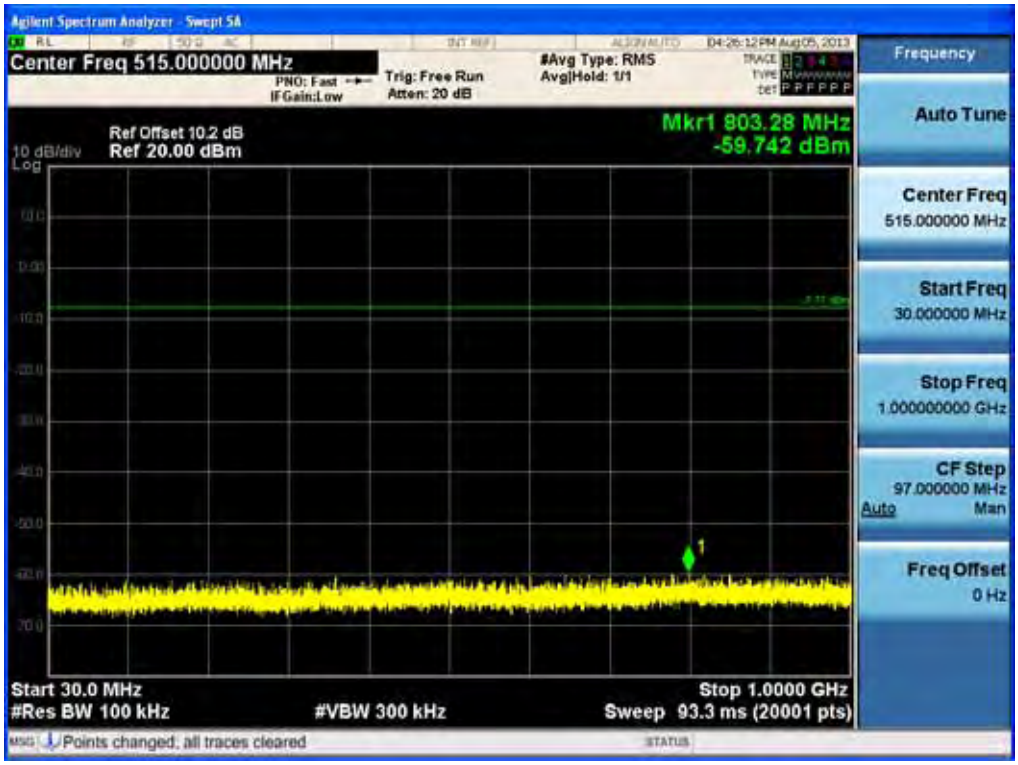
Conducted Spurious Emission (802.11b-CH1)



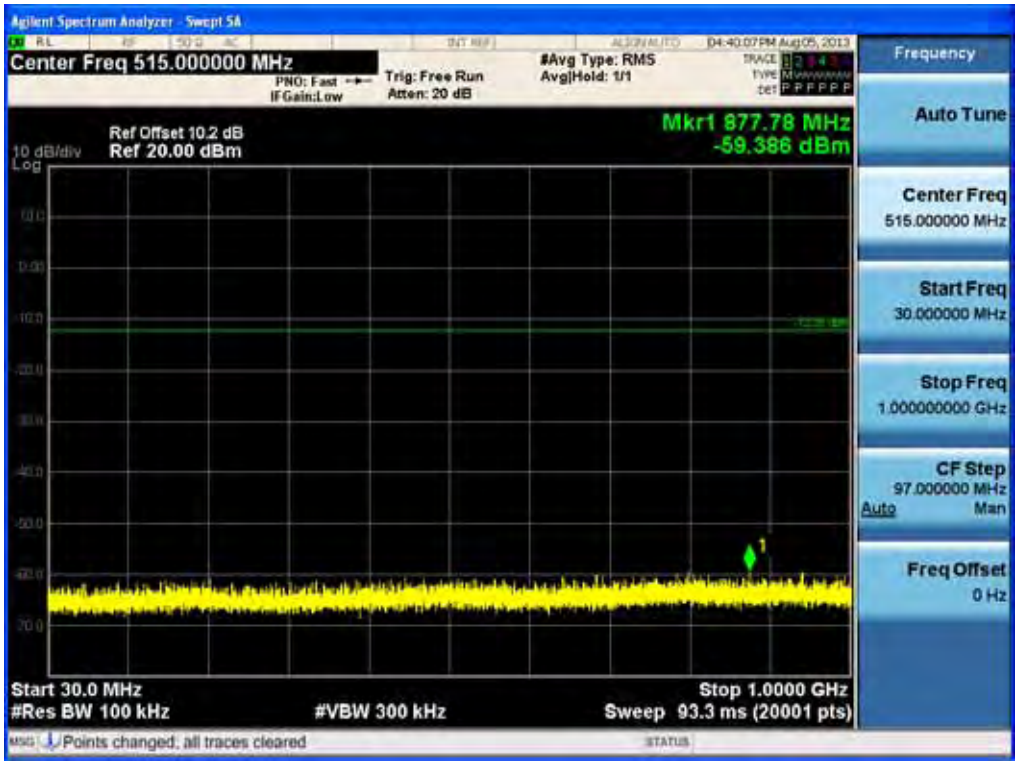
Conducted Spurious Emission (802.11b-CH6)



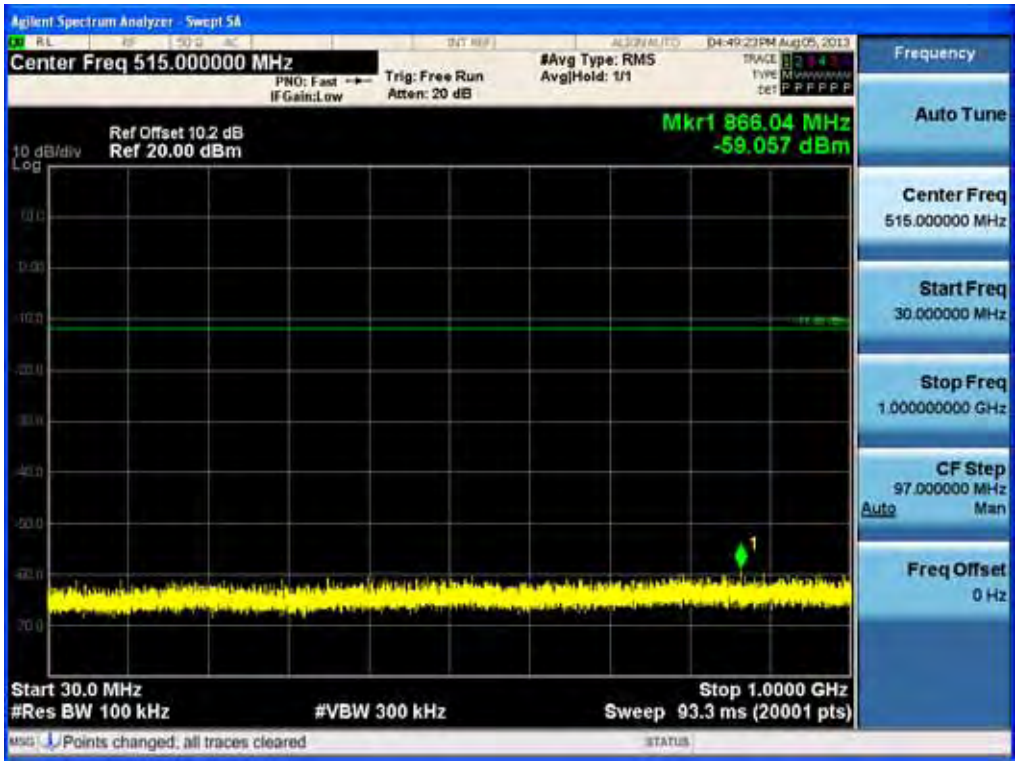
Conducted Spurious Emission (802.11b-CH11)



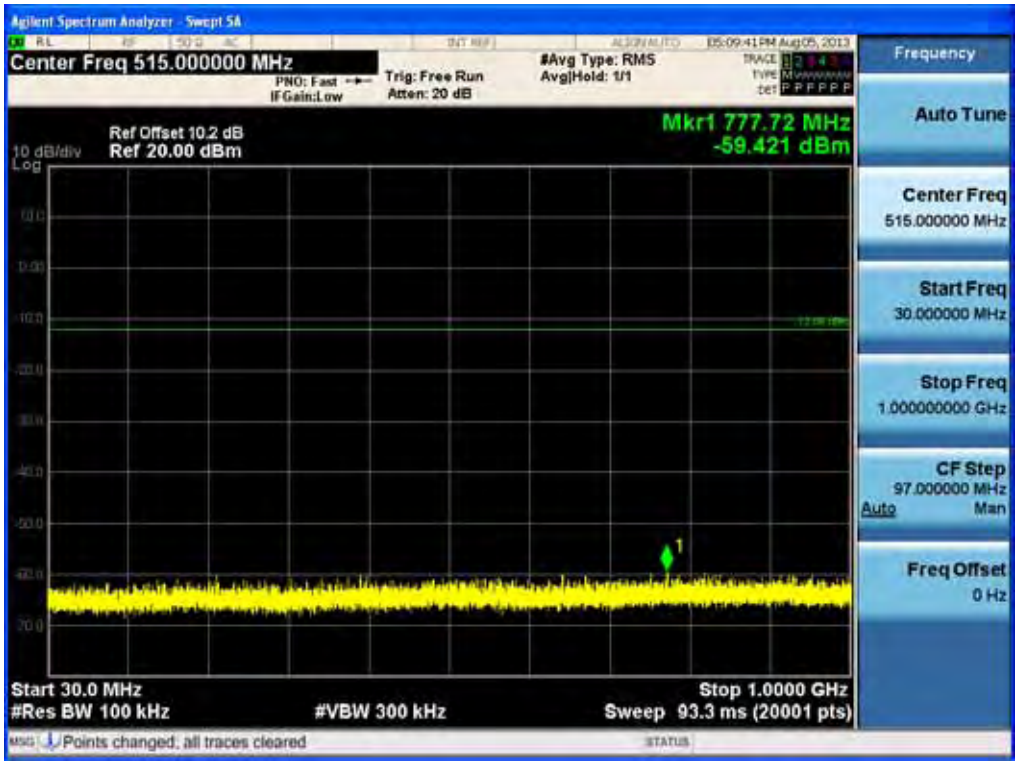
Conducted Spurious Emission (802.11g-CH1)



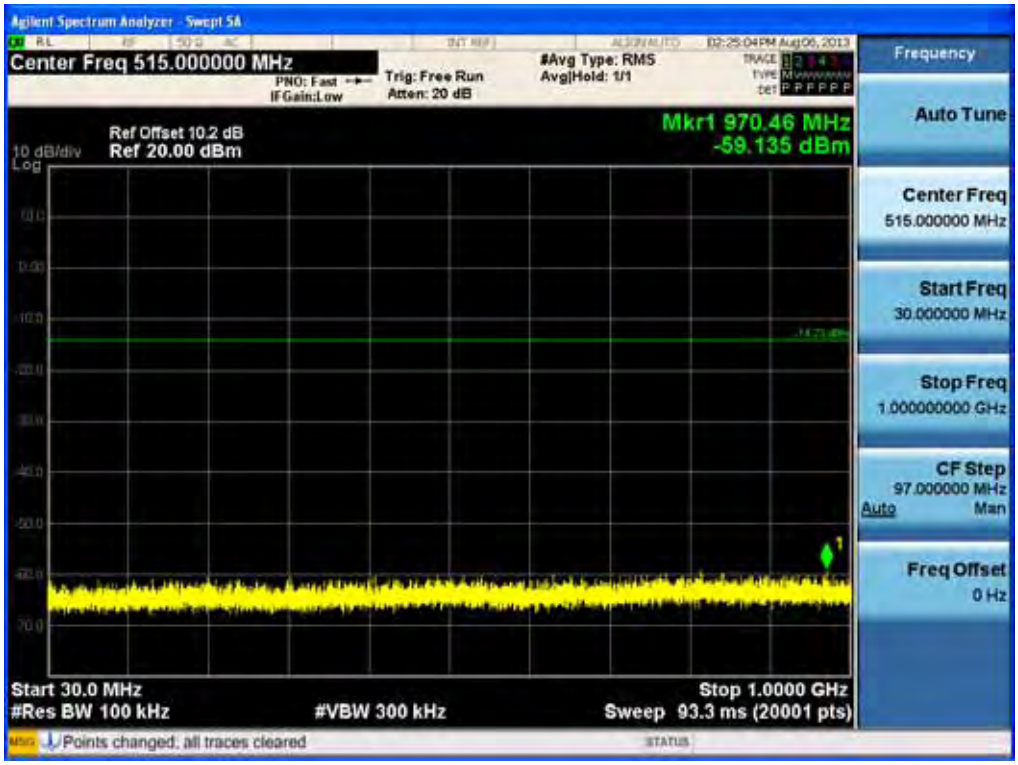
Conducted Spurious Emission (802.11g-CH6)



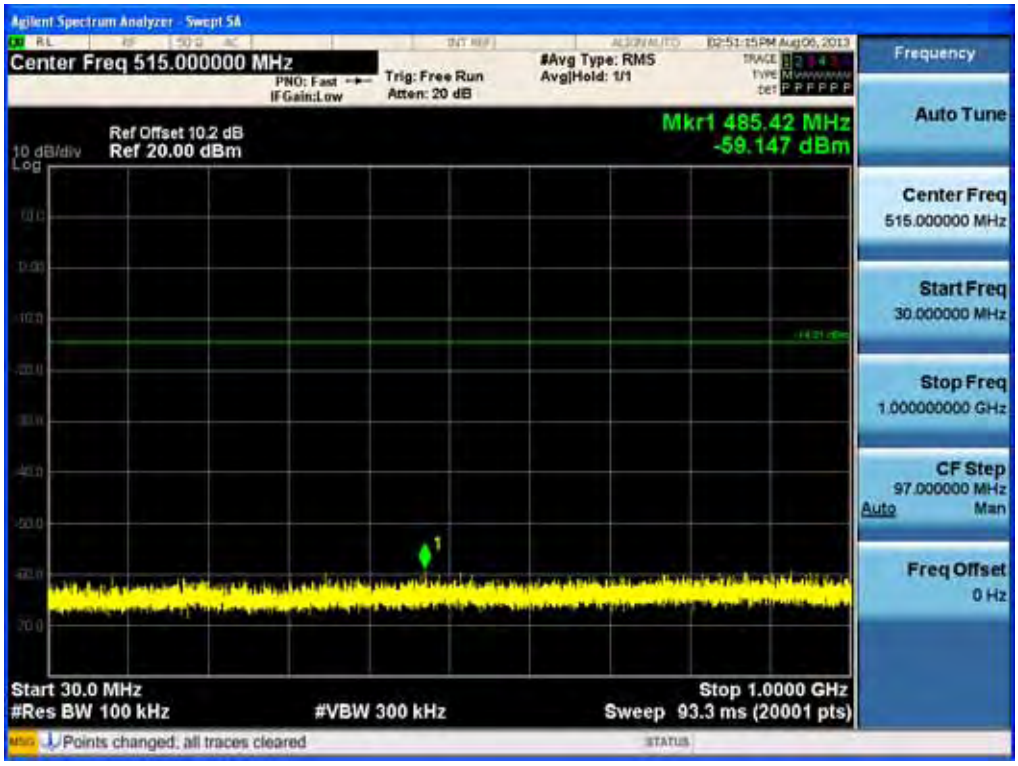
Conducted Spurious Emission (802.11g-CH11)



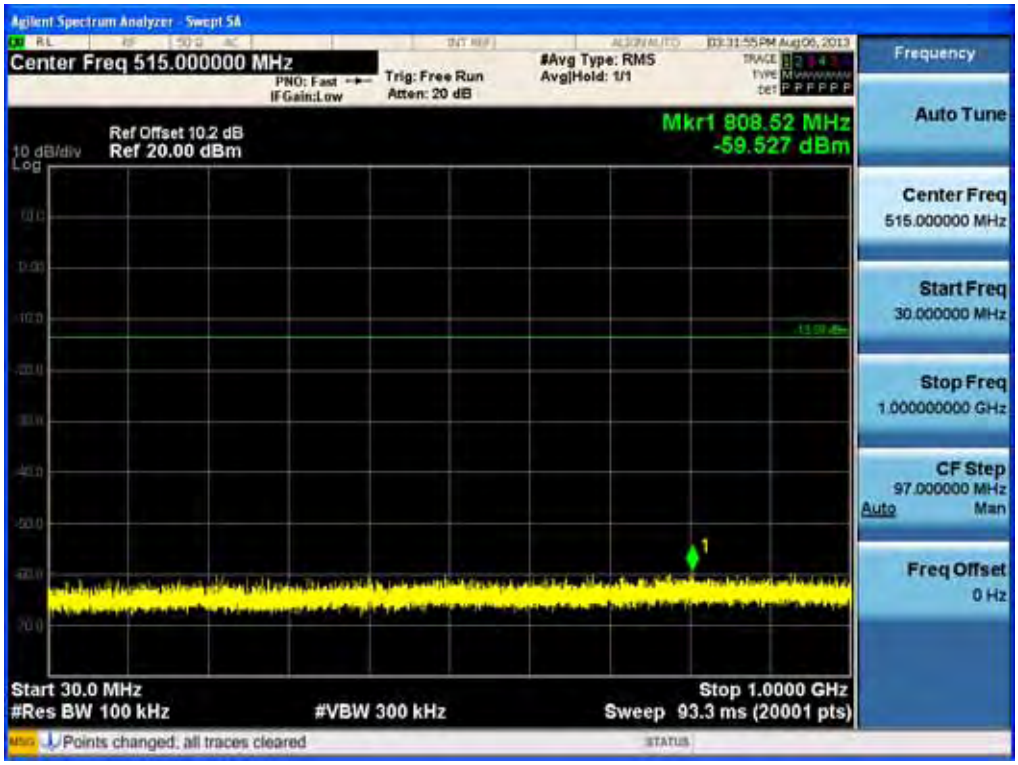
Conducted Spurious Emission (802.11n-CH1)_20 MHz BW



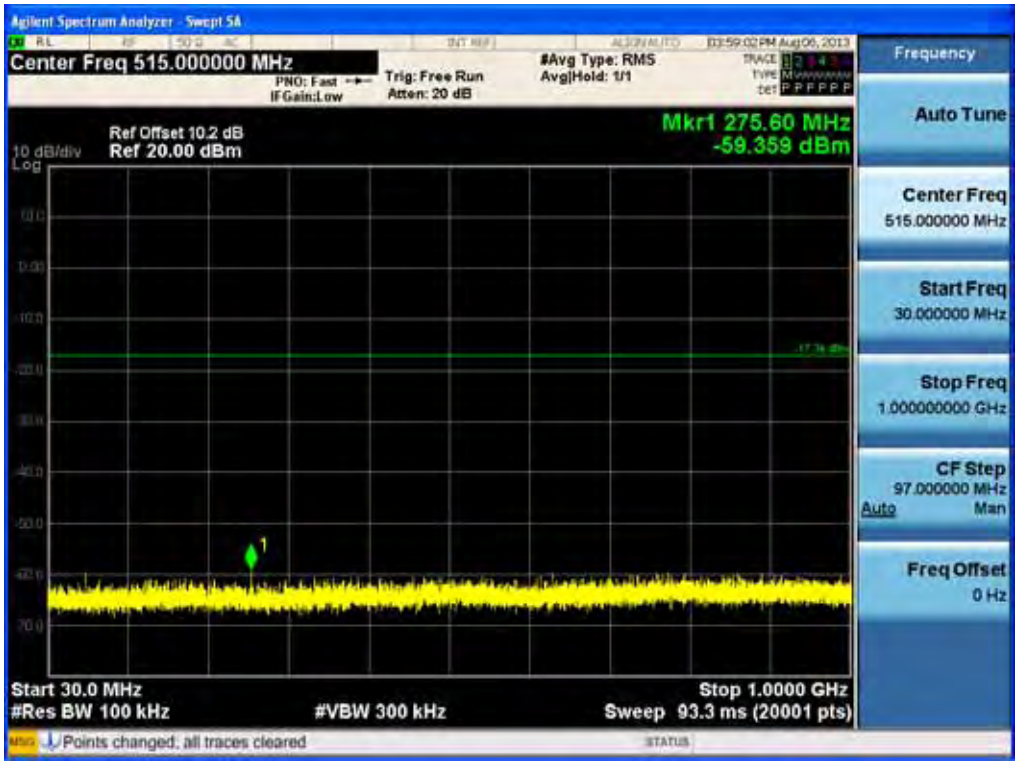
Conducted Spurious Emission (802.11n-CH6) _20 MHz BW



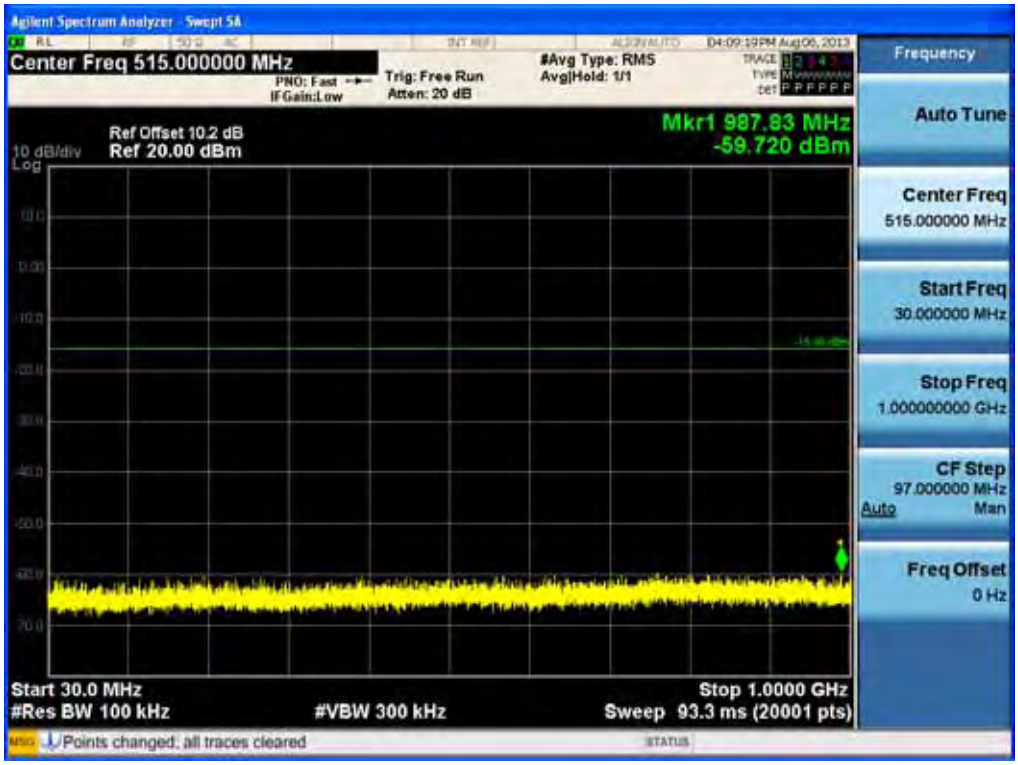
Conducted Spurious Emission (802.11n-CH11) _20 MHz BW



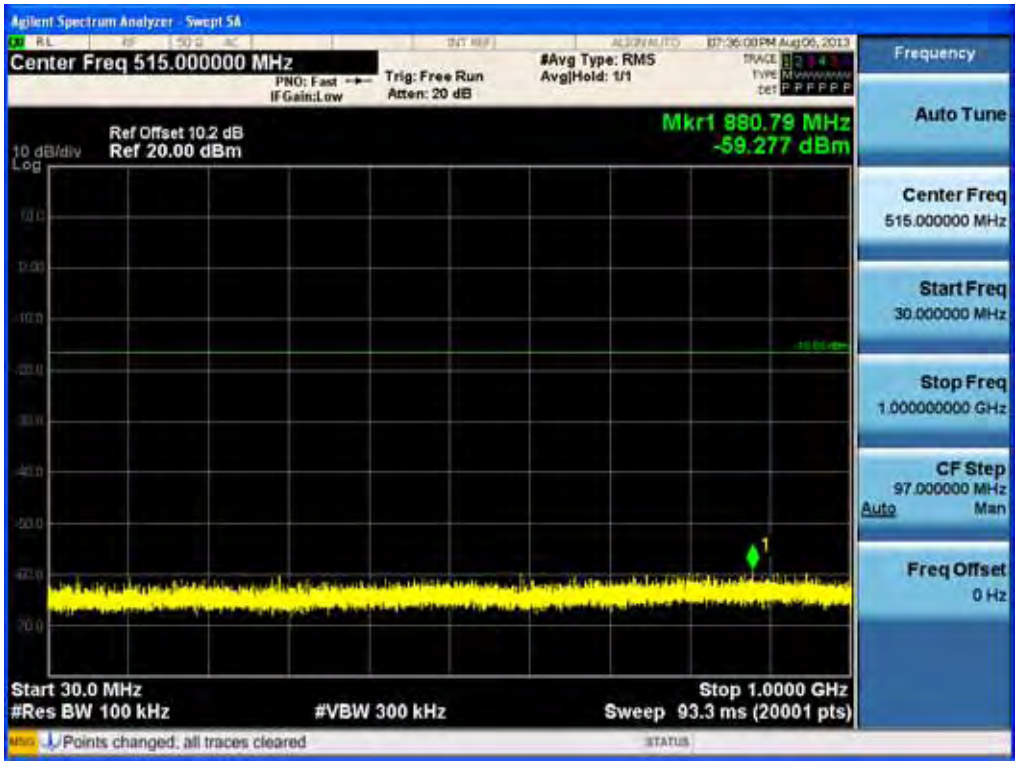
Conducted Spurious Emission (802.11n-CH3)_40 MHz BW



Conducted Spurious Emission (802.11n-CH6)_40 MHz BW

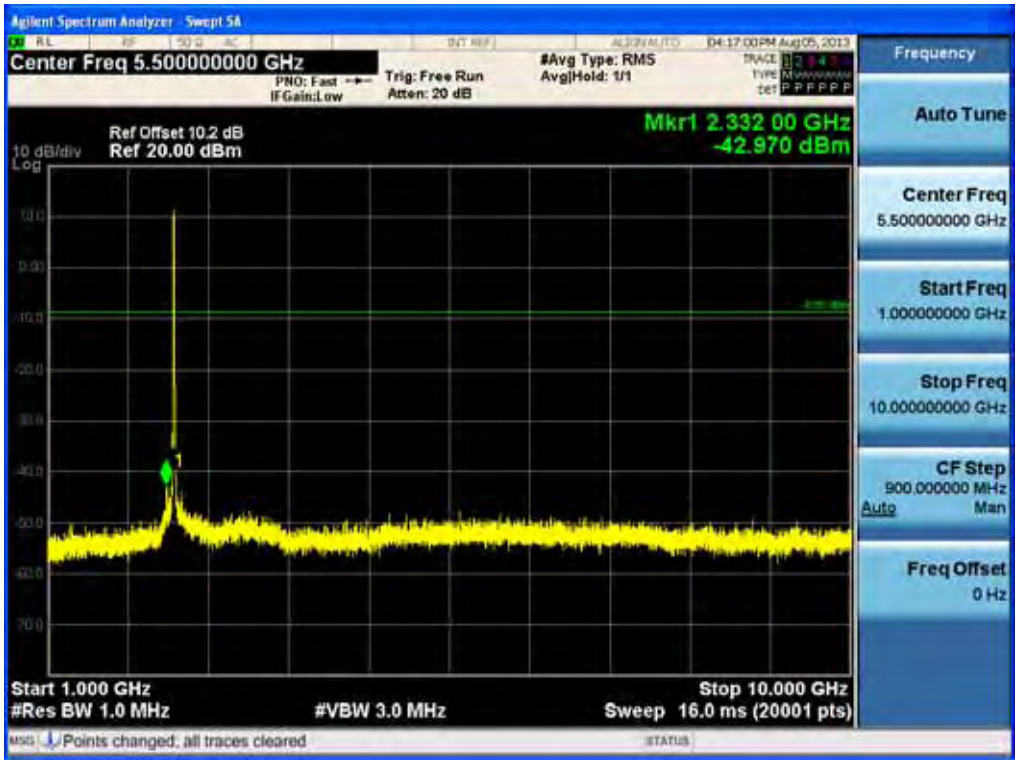


Conducted Spurious Emission (802.11n-CH9) _40 MHz BW

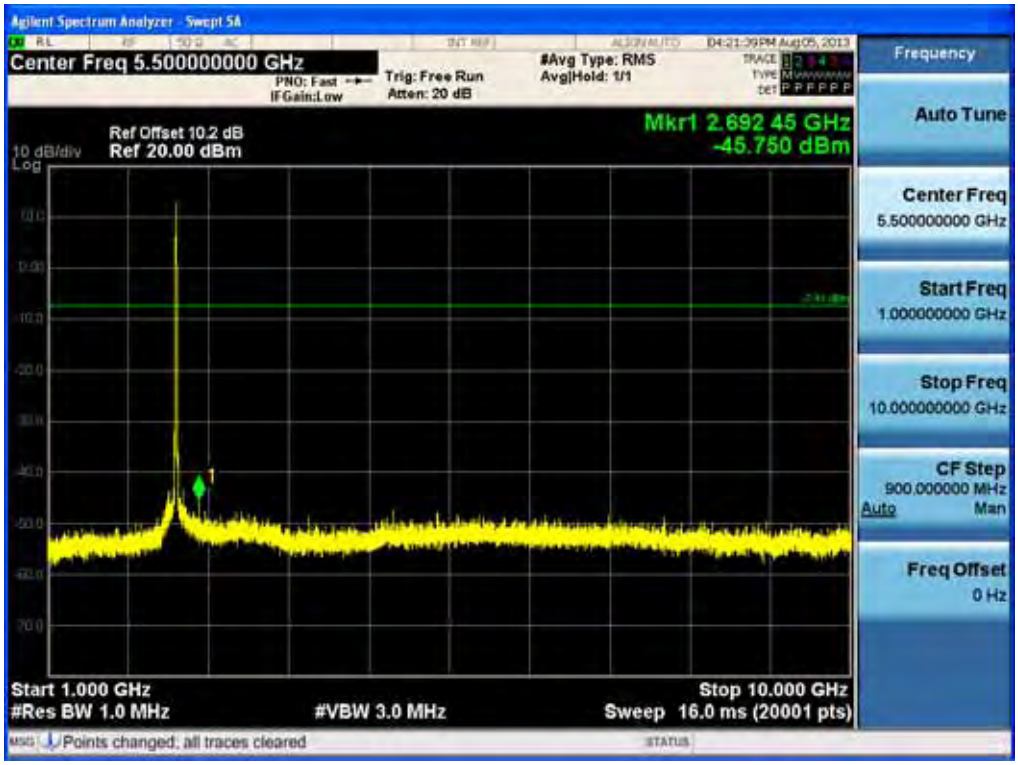


1 GHz ~ 10 GHz

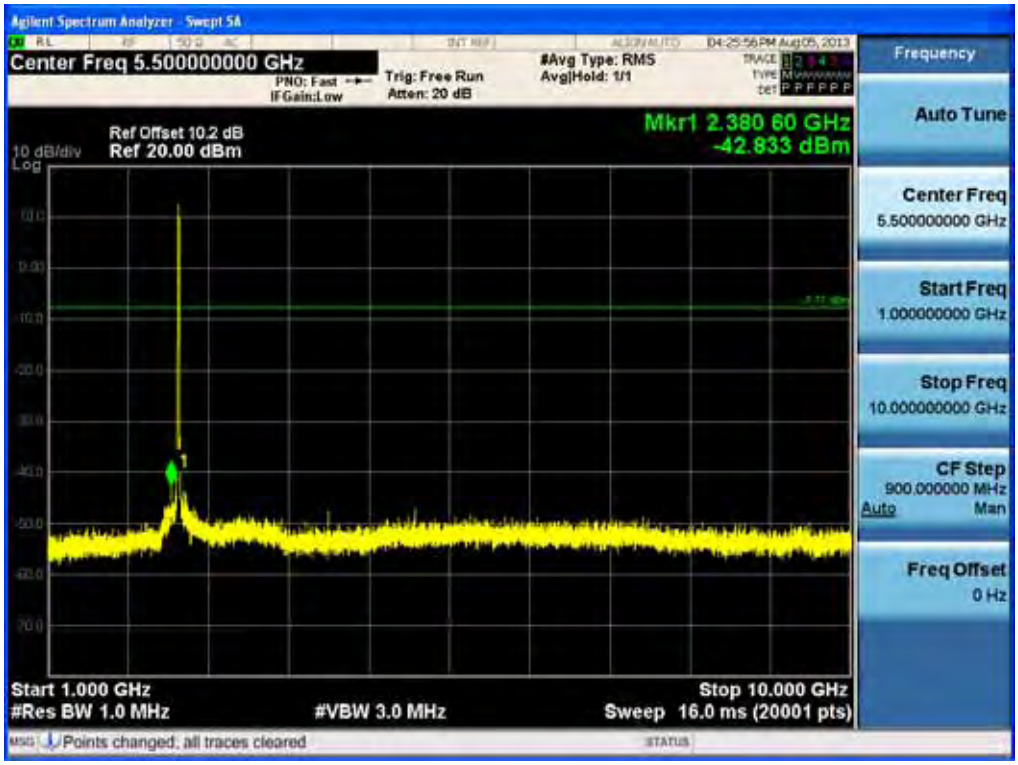
Conducted Spurious Emission (802.11b-CH1)



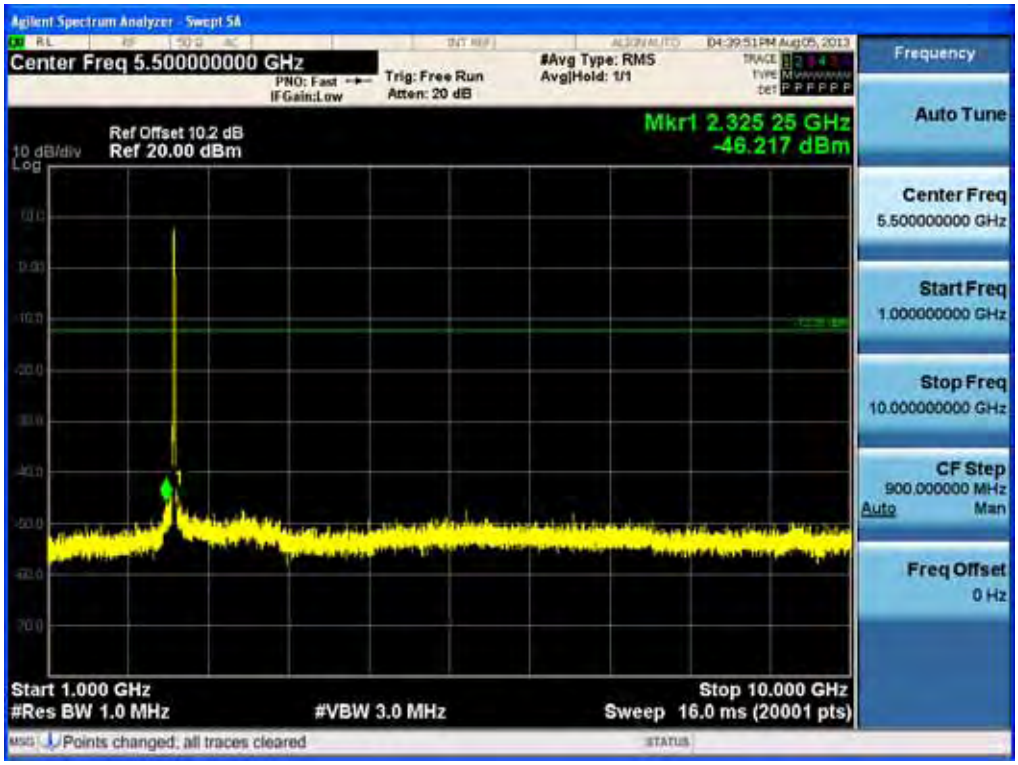
Conducted Spurious Emission (802.11b-CH6)



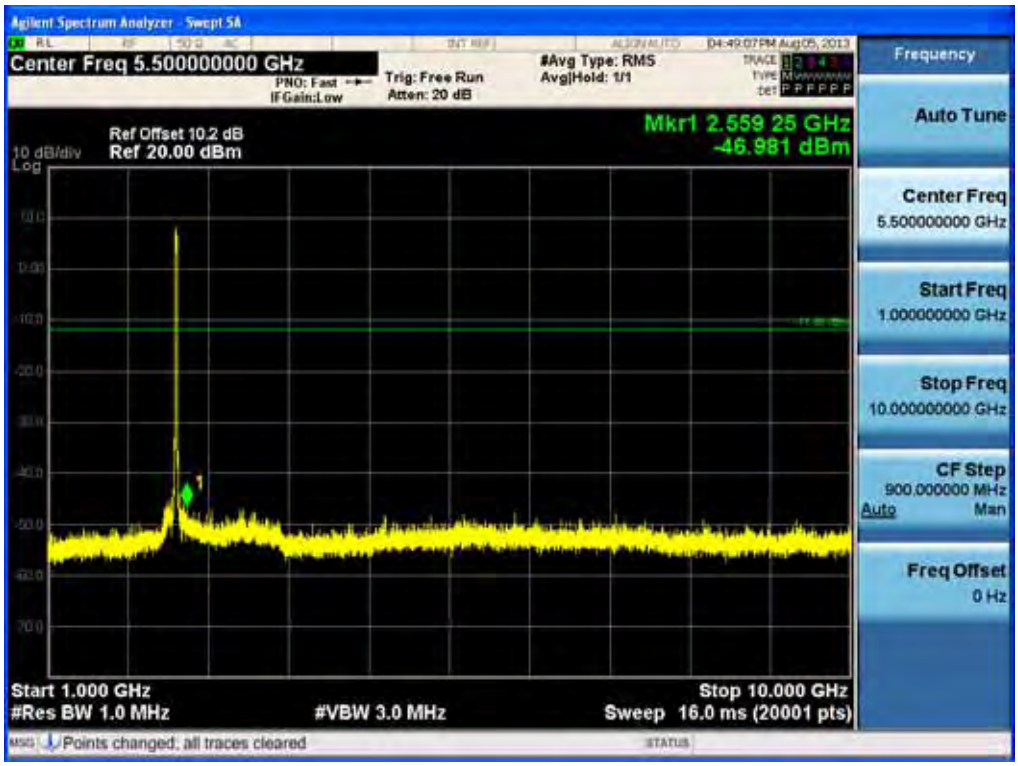
Conducted Spurious Emission (802.11b-CH11)



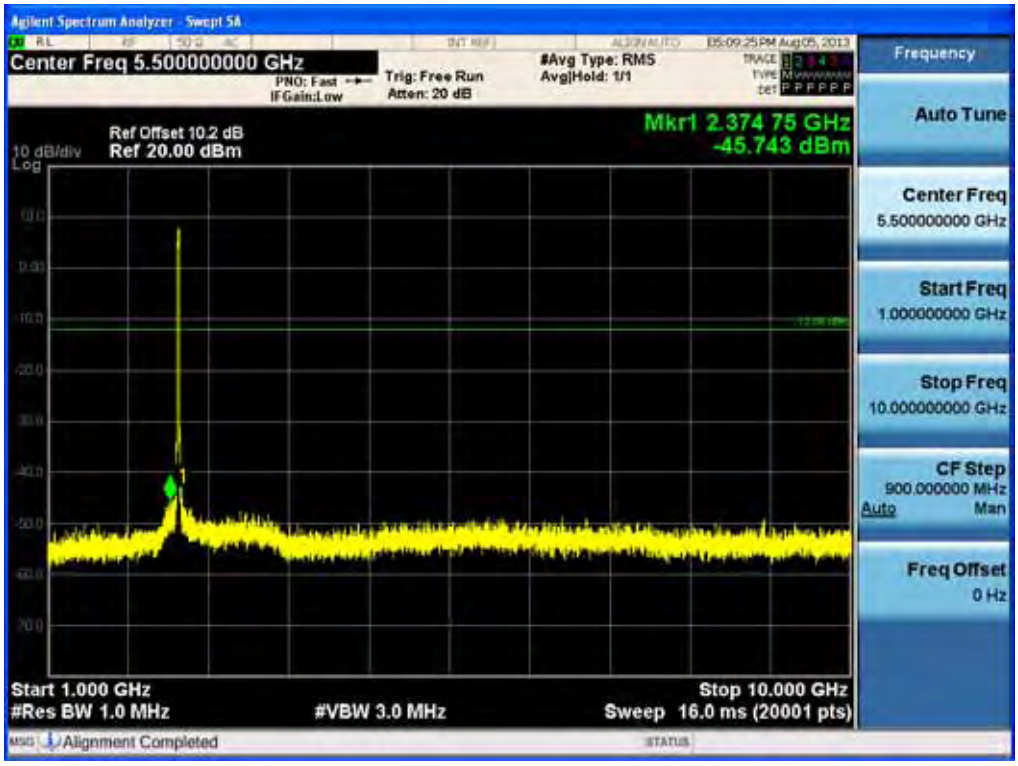
Conducted Spurious Emission (802.11g-CH1)



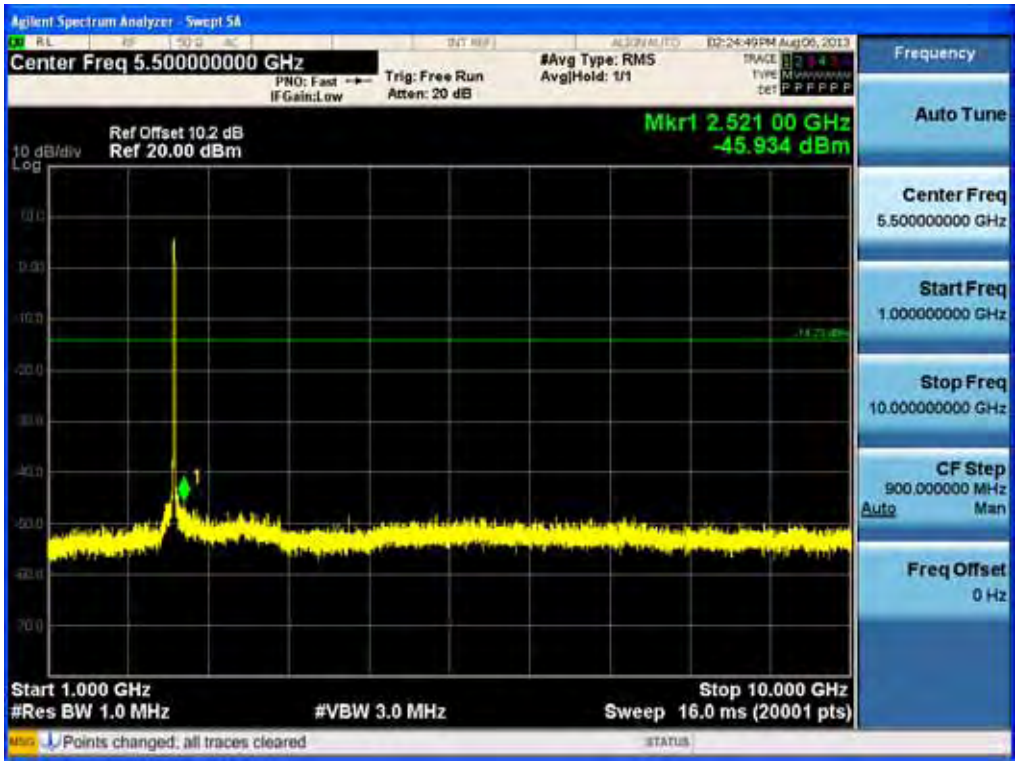
Conducted Spurious Emission (802.11g-CH6)



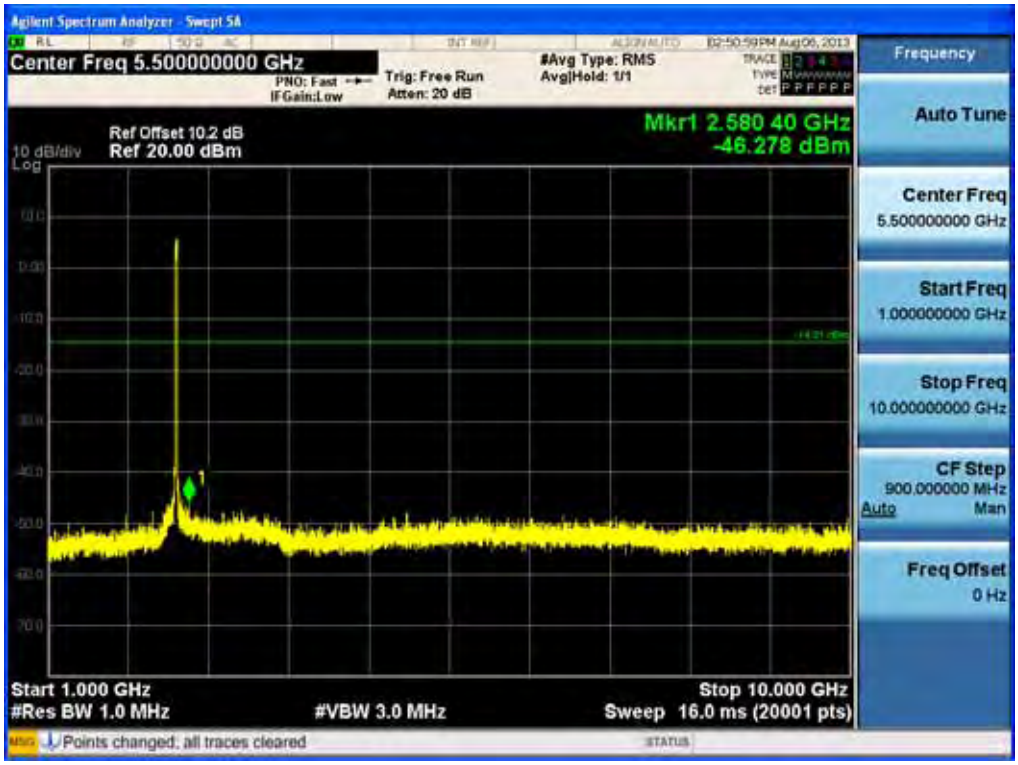
Conducted Spurious Emission (802.11g-CH11)



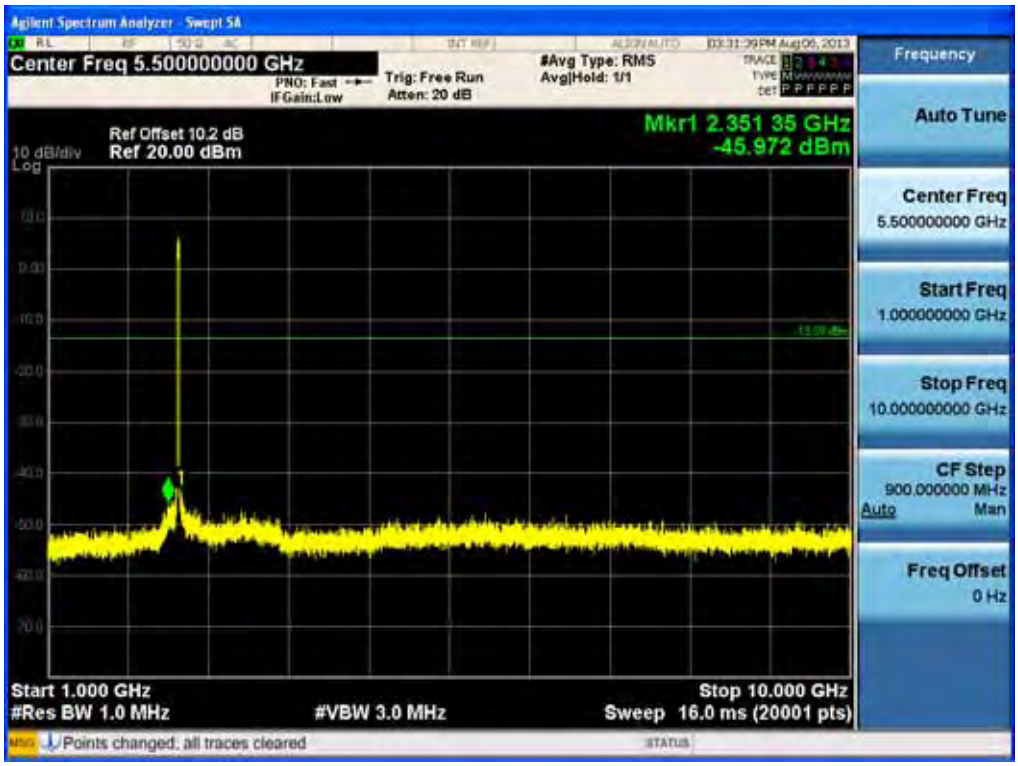
Conducted Spurious Emission (802.11n-CH1) _20 MHz BW



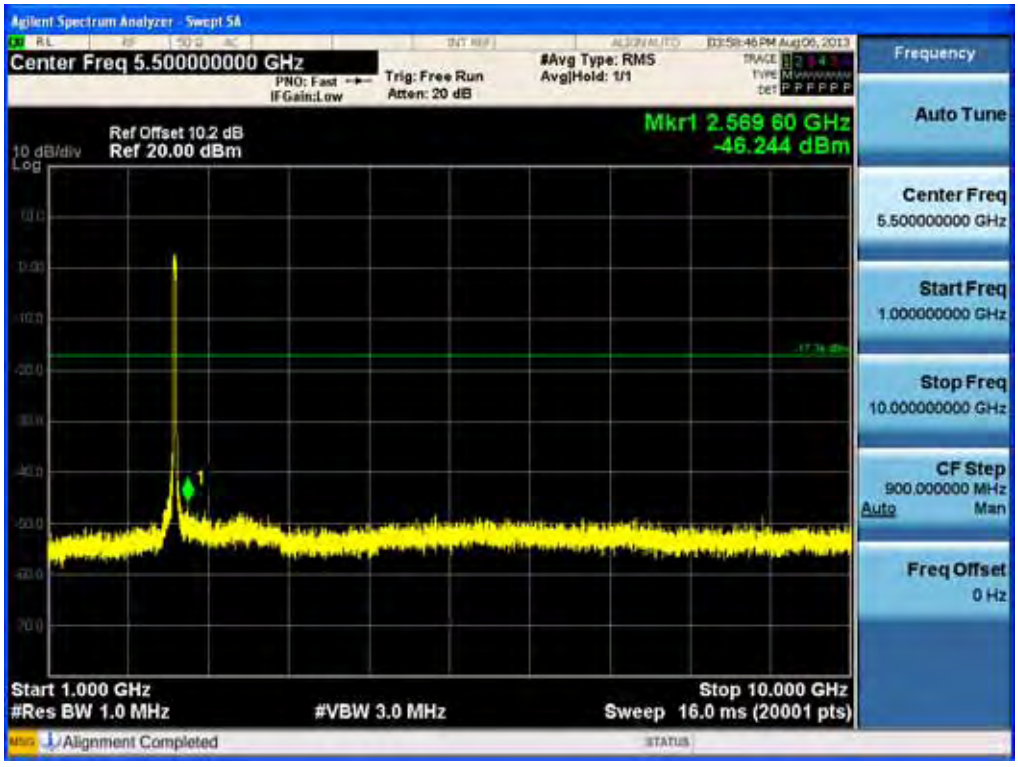
Conducted Spurious Emission (802.11n-CH6) _20 MHz BW



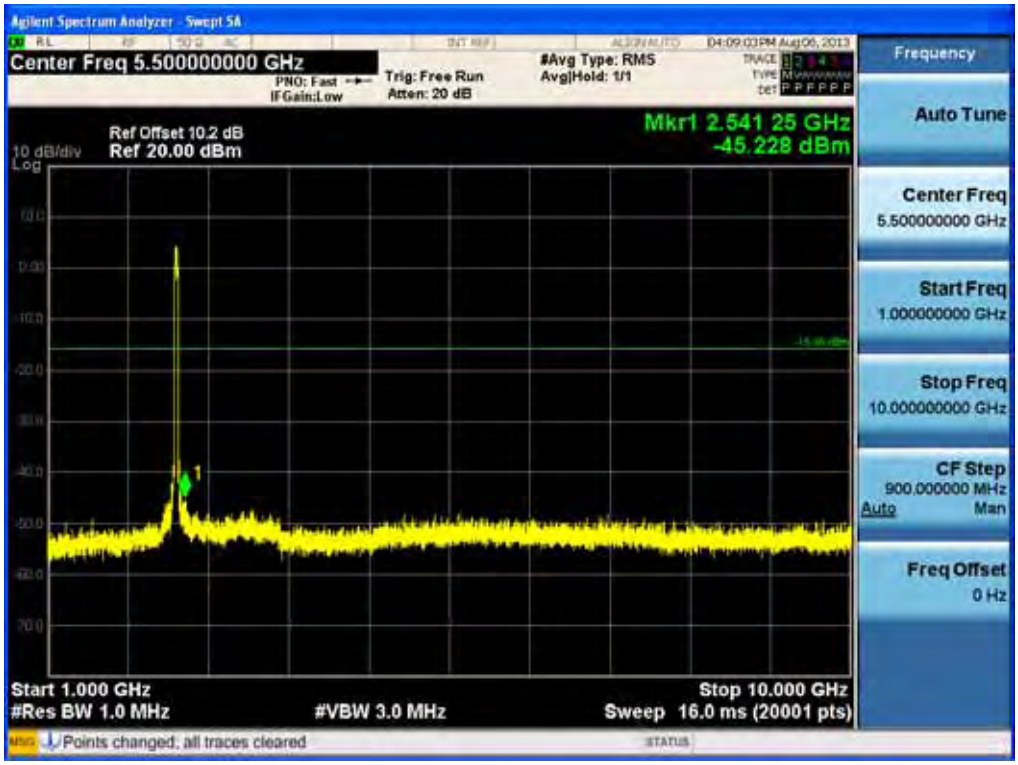
Conducted Spurious Emission (802.11n-CH11) _20 MHz BW



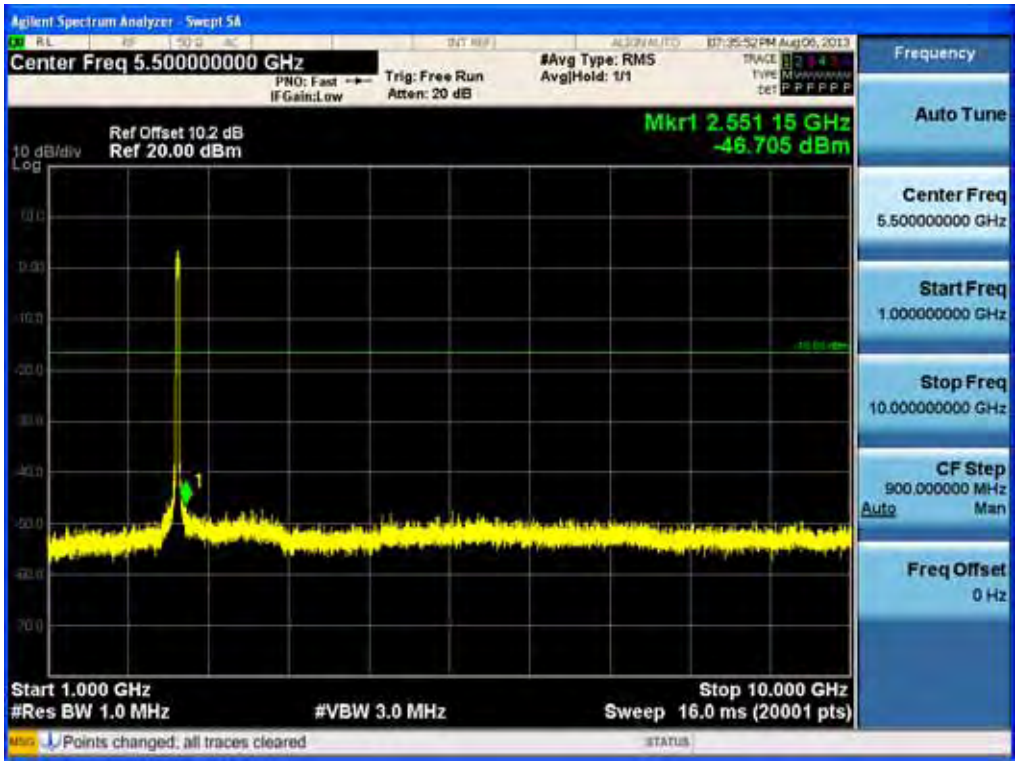
Conducted Spurious Emission (802.11n-CH3)_40 MHz BW



Conducted Spurious Emission (802.11n-CH6)_40 MHz BW



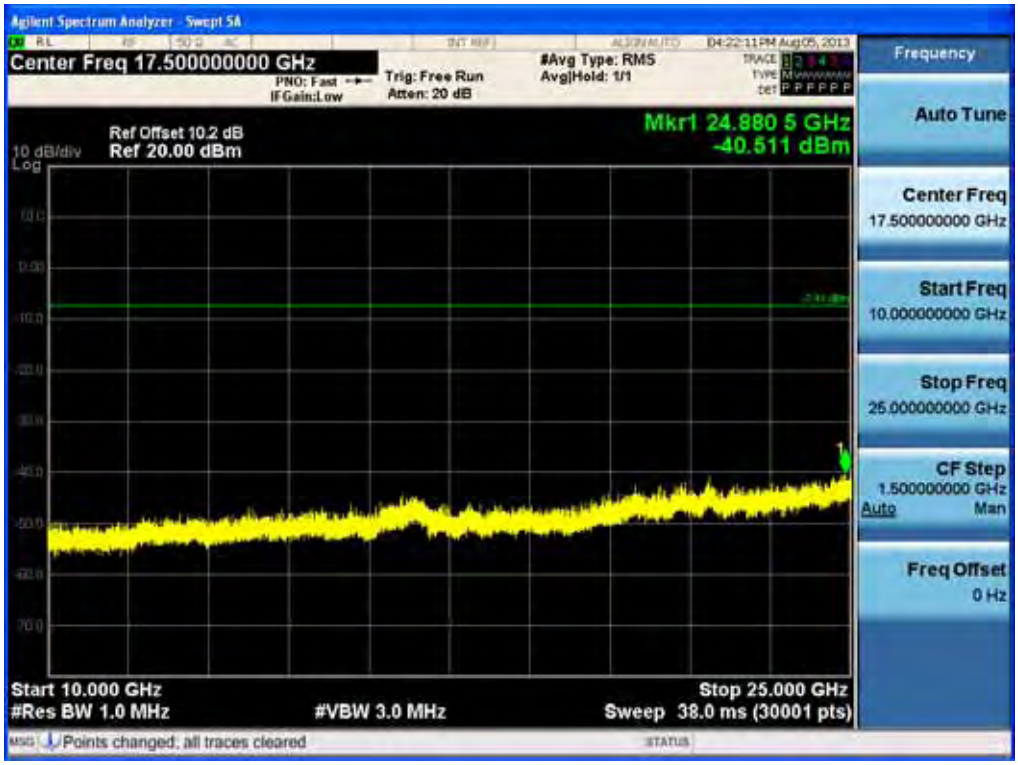
Conducted Spurious Emission (802.11n-CH9) _40 MHz BW



10 GHz ~ 25 GHz

Conducted Spurious Emission (802.11b-CH1)

Conducted Spurious Emission (802.11b-CH6)

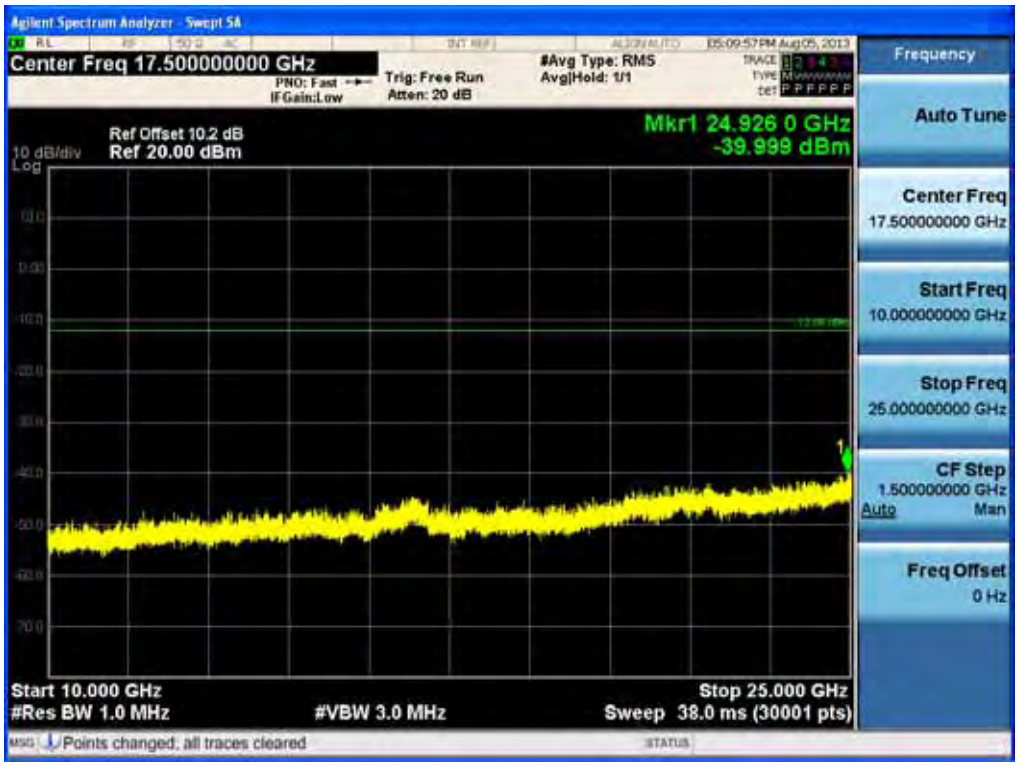


Conducted Spurious Emission (802.11b-CH11)

Conducted Spurious Emission (802.11g-CH1)

Conducted Spurious Emission (802.11g-CH6)

Conducted Spurious Emission (802.11g-CH11)



Conducted Spurious Emission (802.11n-CH1) _20 MHz BW

Conducted Spurious Emission (802.11n-CH6) _20 MHz BW

Conducted Spurious Emission (802.11n-CH11) _20 MHz BW

Conducted Spurious Emission (802.11n-CH3) _40 MHz BW

Conducted Spurious Emission (802.11n-CH6) _40 MHz BW

Conducted Spurious Emission (802.11n-CH9) _40 MHz BW

8.6 RADIATED MEASUREMENT.

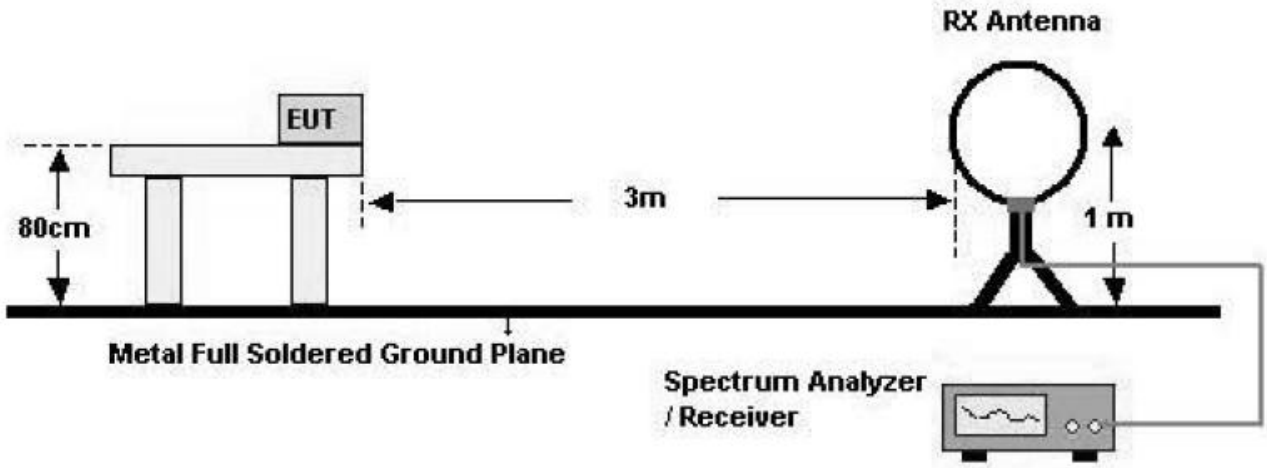
8.6.1 RADIATED SPURIOUS EMISSIONS.

Test Requirements and limit, §15.205, §15.209

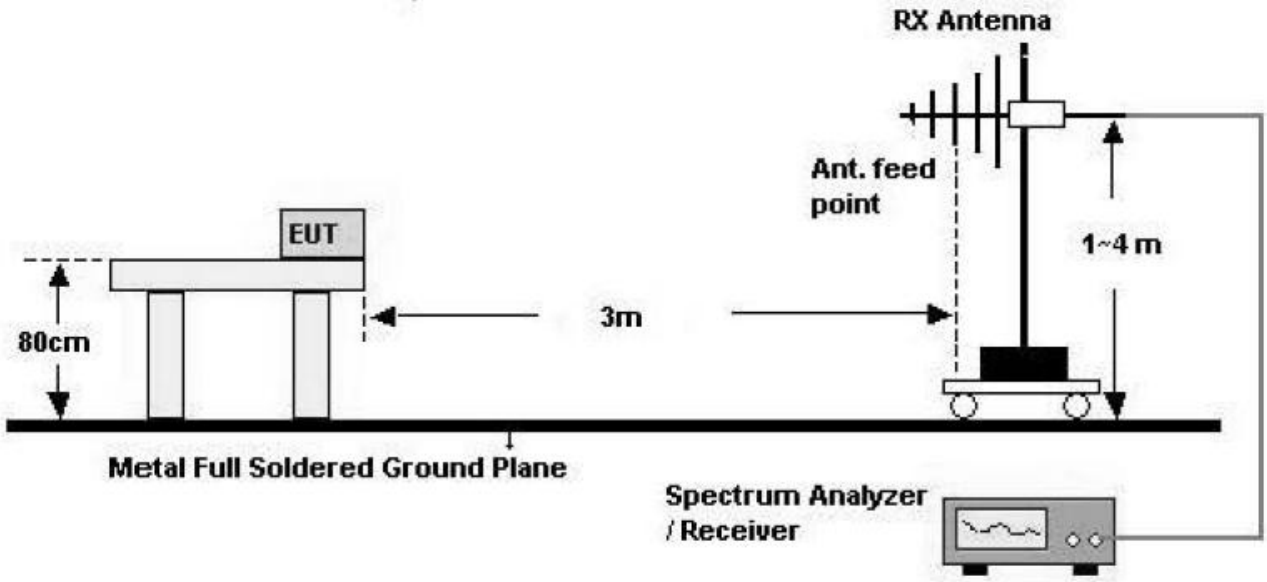
Frequency (MHz)	Field Strength (uV/m)	Measurement Distance (m)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Test Configuration

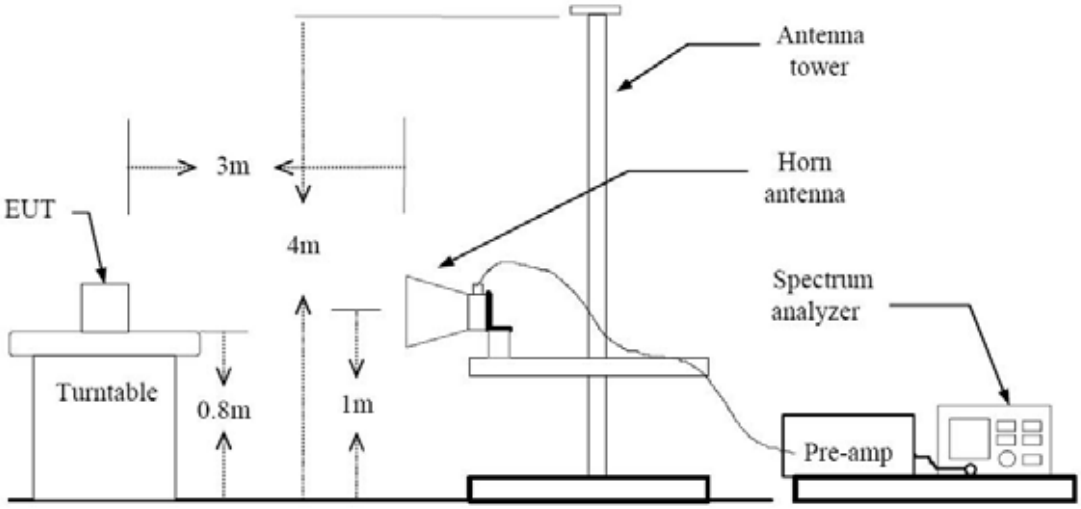
Below 30 MHz



30 MHz - 1 GHz



Above 1 GHz



TEST PROCEDURE USED

ANSI C63.4(2003)

Method 12.2.4 in KDB 558074, issued 04/09/2013 (Peak)

Method 12.2.5.1 in KDB 558074, issued 04/09/2013(Average Case 1)

Method 12.2.5.3 in KDB 558074, issued 04/09/2013(Average Case 2)

Spectrum Setting

- Peak

Peak emission levels are measured by setting the instrument as follows:

RBW = cf. Table 1.

VBW ≥ 3 x RBW.

Detector = Peak.

Sweep time = auto.

Trace mode = max hold.

Allow sweeps to continue until the trace stabilizes.

(Note that the required measurement time may be longer for low duty cycle applications).

Table 1 —RBW as a function of frequency

Frequency	RBW
9-150 kHz	200-300 Hz
0.15-30 MHz	9-10 kHz
30-1000 MHz	100-120 kHz
> 1000 MHz	1 MHz

- Average

Case 1

If the EUT can be configured or modified to transmit continuously (duty cycle ≥ 98 percent then the average emission levels shall be measured using the following method (with EUT transmitting continuously).

RBW = 1 MHz (unless otherwise specified).

VBW ≥3 x RBW.

Detector = RMS, if span/(# of points in sweep) ≤ (RBW/2). Satisfying this condition may require increasing the number of points in the sweep or reducing the span. If this condition cannot be satisfied, then the detector mode shall be set to peak.

Averaging type = power (i.e., RMS).

1) As an alternative, the detector and averaging type may be set for linear voltage averaging.
2) Some instruments require linear display mode in order to use linear voltage averaging. Log or dB averaging shall not be used.

Sweep time = auto.

Perform a trace average of at least 100 traces.

Case 2

If continuous transmission of the EUT (i.e., duty cycle ≥ 98 percent) cannot be achieved and the duty cycle is not constant (i.e., duty cycle variations exceed ± 2 percent), then the following procedure shall be used:

Set RBW = 1 MHz.

Set VBW ≥ 1/T.

Video bandwidth mode or display mode

1) The instrument shall be set to ensure that video filtering is applied in the power domain. Typically, this requires setting the detector mode to RMS and setting the Average-VBW Type to Power (RMS).
2) As an alternative, the instrument may be set to linear detector mode. Ensure that video filtering is applied in linear voltage domain (rather than in a log or dB domain). Some instruments require linear display mode in order to accomplish this. Others have a setting for Average-VBW Type, which can be set to “Voltage” regardless of the display mode.

Detector = Peak.

Sweep time = auto.

Trace mode = max hold.

Allow max hold to run for at least 50 times (1/duty cycle) traces.

Note :

1. We used the case 1 for 802.11b mode and the case 2 for802.11g/n_20/n_40 to perform the average filed strength measurements for RSE and radiate band edge test.

2. The actual setting value of VBW for 802.11g/n_20/n_40

Mode	Worst Data rate (Mbps)	T_{on} (ms)	T_{total} (ms)	Duty Cycle (%)	VBW(1/T) (Hz)	The actual setting value of VBW (Hz)
g	6	2.020	2.136	94.57	495.0	1000
n 20 MHz BW	6.5	1.881	1.998	94.14	531.6	1000
n 40 MHz BW	13.5	0.896	1.036	86.50	1116.1	3000

TEST RESULTS

9 kHz – 30MHz

Operation Mode: Normal Mode

Frequency	Reading	Ant. factor	Cable loss	Ant. POL	Total	Limit	Margin
㎒	dB㎶	dB /m	dB	(H/V)	dB㎶/m	dB㎶/m	dB
No Critical peaks found							

Notes:

1. Measuring frequencies from 9 kHz to the 30MHz.
2. The reading of emissions are attenuated more than 20 dB below the permissible limits or the field strength is too small to be measured.
3. Distance extrapolation factor = 40 log (specific distance / test distance) (dB)
4. Limit line = specific Limits (dBuV) + Distance extrapolation factor
5. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

TEST RESULTS

Below 1 GHz

Operation Mode: Normal Mode

Frequency	Reading	Ant. factor	Cable loss	Ant. POL	Total	Limit	Margin
㎒	dB㎶	dB /m	dB	(H/V)	dB㎶/m	dB㎶/m	dB
No Critical peaks found							

Notes:

1. Measuring frequencies from 30 MHz to the 1 GHz.
2. Radiated emissions measured in frequency range from 30 MHz to 1000 MHz were made with an instrument using Quasi peak detector mode.
3. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

Above 1 GHz

Operation Mode:	802.11 b
Transfer Rate:	1 Mbps
Operating Frequency	2412
Channel No.	01 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-AMP G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
4824	56.89	-4.25	V	52.64	74	21.34	PK
4824	51.38	-4.25	V	47.13	54	6.85	AV
7236	51.89	5.21	V	57.10	74	16.88	PK
7236	40.12	5.21	V	45.33	54	8.65	AV
4824	58.28	-4.25	H	54.03	74	19.95	PK
4824	52.83	-4.25	H	48.58	54	5.40	AV
7236	52.73	5.21	H	57.94	74	16.04	PK
7236	41.01	5.21	H	46.22	54	7.76	AV

Operation Mode:	802.11 g
Transfer Rate:	6 Mbps
Operating Frequency	2412
Channel No.	01 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-AMP G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
4824	55.28	-4.25	V	51.03	74	22.95	PK
4824	41.49	-4.25	V	37.24	54	16.74	AV
7236	53.42	5.21	V	58.63	74	15.35	PK
7236	39.21	5.21	V	44.42	54	9.56	AV
4824	55.43	-4.25	H	51.18	74	22.80	PK
4824	41.50	-4.25	H	37.25	54	16.73	AV
7236	53.45	5.21	H	58.66	74	15.32	PK
7236	39.24	5.21	H	44.45	54	9.53	AV

Operation Mode:	802.11 n
Transfer Rate:	6.5 Mbps
Operating Frequency	2412
Channel No.	01 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-AMP G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
4824	54.79	-4.25	V	50.54	74	23.44	PK
4824	40.75	-4.25	V	36.50	54	17.48	AV
7236	52.64	5.21	V	57.85	74	16.13	PK
7236	39.18	5.21	V	44.39	54	9.59	AV
4824	54.86	-4.25	H	50.61	74	23.37	PK
4824	40.81	-4.25	H	36.56	54	17.42	AV
7236	52.52	5.21	H	57.73	74	16.25	PK
7236	39.16	5.21	H	44.37	54	9.61	AV

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain
5. We have done 802.11b/g/n_20 mode and all data rate. Worst data rate is the lowest data of each mode.
6. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

Operation Mode: 802.11 b

Transfer Rate: 1 Mbps

Operating Frequency 2437

Channel No. 06 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-AMP G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
4874	56.95	-3.93	V	53.02	74	20.96	PK
4874	51.41	-3.93	V	47.48	54	6.50	AV
7311	51.83	4.97	V	56.80	74	17.18	PK
7311	40.35	4.97	V	45.32	54	8.66	AV
4874	58.59	-3.93	H	54.66	74	19.32	PK
4874	52.86	-3.93	H	48.93	54	5.05	AV
7311	52.55	4.97	H	57.52	74	16.46	PK
7311	41.11	4.97	H	46.08	54	7.90	AV

Operation Mode: 802.11 g

Transfer Rate: 6 Mbps

Operating Frequency 2437

Channel No. 06 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-AMP G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
4874	55.43	-3.93	V	51.50	74	22.48	PK
4874	41.63	-3.93	V	37.70	54	16.28	AV
7311	52.49	4.97	V	57.46	74	16.52	PK
7311	39.18	4.97	V	44.15	54	9.83	AV
4874	55.23	-3.93	H	51.30	74	22.68	PK
4874	41.62	-3.93	H	37.69	54	16.29	AV
7311	52.50	4.97	H	57.47	74	16.51	PK
7311	39.19	4.97	H	44.16	54	9.82	AV

Operation Mode:	802.11 n
Transfer Rate:	6.5 Mbps
Operating Frequency	2437
Channel No.	06 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-AMP G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
4874	54.25	-3.93	V	50.32	74	23.66	PK
4874	40.86	-3.93	V	36.93	54	17.05	AV
7311	52.74	4.97	V	57.71	74	16.27	PK
7311	39.29	4.97	V	44.26	54	9.72	AV
4874	54.15	-3.93	H	50.22	74	23.76	PK
4874	40.83	-3.93	H	36.90	54	17.08	AV
7311	52.64	4.97	H	57.61	74	16.37	PK
7311	39.28	4.97	H	44.25	54	9.73	AV

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain
5. We have done 802.11b/g/n_20 mode and all data rate. Worst data rate is the lowest data of each mode.
6. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

Operation Mode:	802.11 b
Transfer Rate:	1 Mbps
Operating Frequency	2462
Channel No.	11 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-AMP G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
4924	55.97	-3.75	V	52.22	74	21.76	PK
4924	49.68	-3.75	V	45.93	54	8.05	AV
7386	51.94	5.60	V	57.54	74	16.44	PK
7386	40.08	5.60	V	45.68	54	8.30	AV
4924	57.23	-3.75	H	53.48	74	20.50	PK
4924	51.08	-3.75	H	47.33	54	6.65	AV
7386	52.51	5.60	H	58.11	74	15.87	PK
7386	40.99	5.60	H	46.59	54	7.39	AV

Operation Mode:	802.11 g
Transfer Rate:	6 Mbps
Operating Frequency	2462
Channel No.	11 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-AMP G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
4924	54.26	-3.75	V	50.51	74	23.47	PK
4924	40.48	-3.75	V	36.73	54	17.25	AV
7386	52.16	5.60	V	57.76	74	16.22	PK
7386	39.12	5.60	V	44.72	54	9.26	AV
4924	54.43	-3.75	H	50.68	74	23.30	PK
4924	40.59	-3.75	H	36.84	54	17.14	AV
7386	52.18	5.60	H	57.78	74	16.20	PK
7386	39.11	5.60	H	44.71	54	9.27	AV

Operation Mode:	802.11 n
Transfer Rate:	6.5 Mbps
Operating Frequency	2462
Channel No.	11 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-AMP G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
4924	54.16	-3.75	V	50.41	74	23.57	PK
4924	40.00	-3.75	V	36.25	54	17.73	AV
7386	52.21	5.60	V	57.81	74	16.17	PK
7386	39.17	5.60	V	44.77	54	9.21	AV
4924	54.19	-3.75	H	50.44	74	23.54	PK
4924	40.02	-3.75	H	36.27	54	17.71	AV
7386	52.30	5.60	H	57.90	74	16.08	PK
7386	39.18	5.60	H	44.78	54	9.20	AV

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain
5. We have done 802.11b/g/n_20 mode and all data rate. Worst data rate is the lowest data of each mode.
6. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

Operation Mode:	802.11 n_40 MHz BW
Transfer Rate:	13.5 Mbps
Operating Frequency	2422
Channel No.	03 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-AMP G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
4844	52.75	-3.90	V	48.85	74	25.13	PK
4844	39.38	-3.90	V	35.48	54	18.50	AV
7266	52.16	4.91	V	57.07	74	16.91	PK
7266	39.30	4.91	V	44.21	54	9.77	AV
4844	52.78	-3.90	H	48.88	74	25.10	PK
4844	39.40	-3.90	H	35.50	54	18.48	AV
7266	52.14	4.91	H	57.05	74	16.93	PK
7266	39.35	4.91	H	44.26	54	9.72	AV

Operation Mode:	802.11 n_40 MHz BW
Transfer Rate:	13.5 Mbps
Operating Frequency	2437
Channel No.	06 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-AMP G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
4874	52.86	-3.93	V	48.93	74	25.05	PK
4874	39.15	-3.93	V	35.22	54	18.76	AV
7311	52.66	4.97	V	57.63	74	16.35	PK
7311	39.35	4.97	V	44.32	54	9.66	AV
4874	52.94	-3.93	H	49.01	74	24.97	PK
4874	39.17	-3.93	H	35.24	54	18.74	AV
7311	52.75	4.97	H	57.72	74	16.26	PK
7311	39.38	4.97	H	44.35	54	9.63	AV

Operation Mode:	802.11 n_40 MHz BW
Transfer Rate:	13.5 Mbps
Operating Frequency	2452
Channel No.	09 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-AMP G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
4904	51.51	-3.70	V	47.81	74	26.17	PK
4904	38.24	-3.70	V	34.54	54	19.44	AV
7356	52.19	6.00	V	58.19	74	15.79	PK
7356	39.16	6.00	V	45.16	54	8.82	AV
4904	51.46	-3.70	H	47.76	74	26.22	PK
4904	38.28	-3.70	H	34.58	54	19.40	AV
7356	52.21	6.00	H	58.21	74	15.77	PK
7356	39.15	6.00	H	45.15	54	8.83	AV

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain
5. We have done all data rate in 802.11n_40 MHz BW. Worst case of EUT is 13.5 Mbps in 802.11n_40 MHz BW.
6. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

8.6.2 RADIATED RESTRICTED BAND EDGES

Test Requirements and limit, §15.247(d) §15.205, §15.209

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum 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. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in section 15.209(a) (See section 15.205(c)).

Operation Mode:	802.11g
Transfer Rate:	6 Mbps
Operating Frequency	2412 MHz, 2462 MHz
Channel No.	01 Ch, 11 Ch

Frequency [MHz]	Reading dBuV	AN.+CL [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
2390.0	36.27	33.90	H	70.17	74	3.81	PK
2390.0	15.80	33.90	H	49.70	54	4.28	AV
2390.0	30.47	33.90	V	64.37	74	9.61	PK
2390.0	13.34	33.90	V	47.24	54	6.74	AV
2483.5	34.08	33.99	H	68.07	74	5.91	PK
2483.5	13.51	33.99	H	47.50	54	6.48	AV
2483.5	28.11	33.99	V	62.10	74	11.88	PK
2483.5	12.70	33.99	V	46.69	54	7.29	AV

Operation Mode:	802.11b
Transfer Rate:	1 Mbps
Operating Frequency	2412 MHz, 2462 MHz
Channel No.	01 Ch, 11 Ch

Frequency [MHz]	Reading dBuV	AN.+CL [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
2390.0	26.83	33.90	H	60.73	74	13.25	PK
2390.0	16.30	33.90	H	50.20	54	3.78	AV
2390.0	25.62	33.90	V	59.52	74	14.46	PK
2390.0	14.40	33.90	V	48.30	54	5.68	AV
2483.5	25.64	33.99	H	59.63	74	14.35	PK
2483.5	14.80	33.99	H	48.79	54	5.19	AV
2483.5	25.73	33.99	V	59.72	74	14.26	PK
2483.5	14.38	33.99	V	48.37	54	5.61	AV

Operation Mode:	802.11n_20 MHz
Transfer Rate:	39 Mbps
Operating Frequency	2412 MHz, 2462 MHz
Channel No.	01 Ch, 11 Ch

Frequency [MHz]	Reading dBuV	AN.+CL [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
2390.0	34.76	33.90	H	68.66	74	5.32	PK
2390.0	15.16	33.90	H	49.06	54	4.92	AV
2390.0	30.68	33.90	V	64.58	74	9.40	PK
2390.0	12.96	33.90	V	46.86	54	7.12	AV
2483.5	31.21	33.99	H	65.20	74	8.78	PK
2483.5	13.34	33.99	H	47.33	54	6.65	AV
2483.5	27.68	33.99	V	61.67	74	12.31	PK
2483.5	12.59	33.99	V	46.58	54	7.40	AV

Operation Mode:	802.11n_40 MHz
Transfer Rate:	13.5 Mbps
Operating Frequency	2422 MHz, 2452 MHz
Channel No.	03 Ch, 09 Ch

Frequency [MHz]	Reading dBuV	AN.+CL [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
2390.0	31.17	33.90	H	65.07	74	8.91	PK
2390.0	15.38	33.90	H	49.28	54	4.70	AV
2390.0	28.81	33.90	V	62.71	74	11.27	PK
2390.0	14.26	33.90	V	48.16	54	5.82	AV
2483.5	30.50	33.99	H	64.49	74	9.49	PK
2483.5	12.79	33.99	H	46.78	54	7.20	AV
2483.5	27.33	33.99	V	61.32	74	12.66	PK
2483.5	12.39	33.99	V	46.38	54	7.60	AV

Notes:

1. Total = Reading Value + Antenna Factor + Cable Loss
2. We have done 802.11b/g/n_20/n_40 mode and all data rate. Worst data rate is the lowest data of each mode.
3. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

8.7 POWERLINE CONDUCTED EMISSIONS

Test Requirements and limit, §15.207

For an intentional radiator which is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed 250 microvolts (The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz). The limits at specific frequency range is listed as follows:

Frequency Range (MHz)	Limits (dBμV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line (LINE and NEUTRAL) and ground at the power terminals.

Test Configuration

See test photographs attached in Appendix 1 for the actual connections between EUT and support equipment.

TEST PROCEDURE

1. The EUT is placed on a wooden table 80 cm above the reference ground plane.
2. The EUT is connected via LISN to a test power supply.
3. The measurement results are obtained as described below:
4. Detectors – Quasi Peak and Average Detector.
5. We are performed the AC Power Line Conducted Emission test for 11 Mbps, Ch.6 and 802.11b. Because 802.11b mode is worst case.

▣ RESULT PLOTS

Conducted Emissions (Line 1)

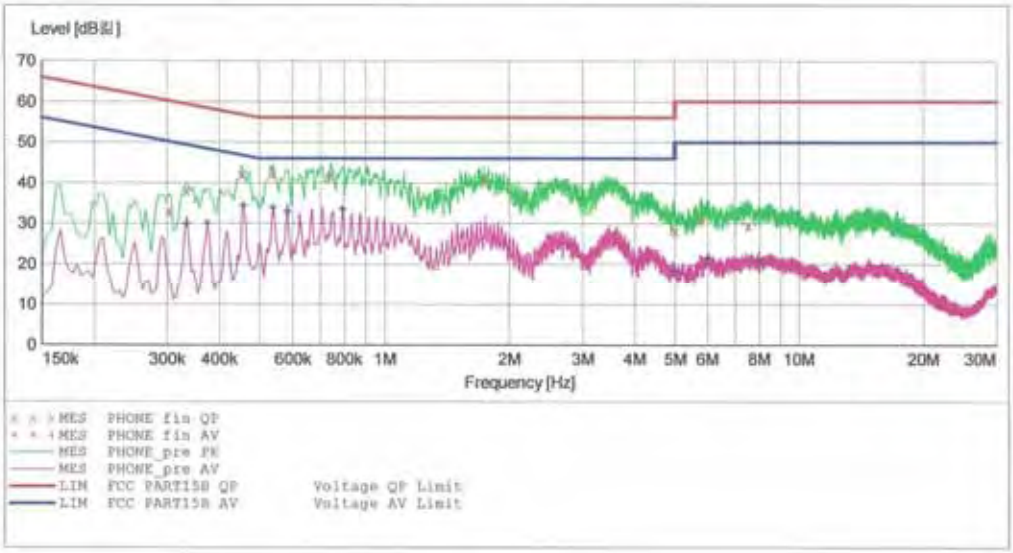
HCT

EMC

```
EUT:                  LG-D680
Manufacturer:         LG
Operating Condition:  WLAN MODE
Test Site:            SHIELD ROOM
Operator:             JC SHIN
Test Specification:   FCC PART15 B
Comment:              H
```

SCAN TABLE: "FCC CLASS B(H)"

```
Short Description:                KN22 CLASS B
Start      Stop       Step       Detector   Meas.     IF       Transducer
Frequency  Frequency  Width                 Time      Bandw.
150.0 kHz  500.0 kHz  4.0 kHz    MaxPeak    10.0 ms   9 kHz    None
                                  Average
500.0 kHz  5.0 MHz    4.0 kHz    MaxPeak    10.0 ms   9 kHz    None
                                  Average
5.0 MHz    30.0 MHz   4.0 kHz    MaxPeak    10.0 ms   9 kHz    None
                                  Average
```



MEASUREMENT RESULT: "PHONE_fin QP"

2013-08-06 10:00오전

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.302001	33.00	9.8	60	27.2	---	---
0.334001	38.10	9.8	59	21.3	---	---
0.454001	42.20	9.8	57	14.6	---	---
0.540000	42.30	9.8	56	13.7	---	---
0.744000	41.80	9.8	56	14.2	---	---
1.740000	40.70	9.9	56	15.3	---	---
5.000000	28.10	10.2	56	27.9	---	---
5.800000	31.20	10.2	60	28.8	---	---
7.556000	29.50	10.3	60	30.5	---	---

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MEASUREMENT RESULT: "PHONE_fin AV"

2013-08-06 10:00오전

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.334001	29.90	9.8	49	19.5	---	---
0.374001	29.90	9.8	48	18.5	---	---
0.458001	34.30	9.8	47	12.5	---	---
0.540000	33.90	9.8	46	12.1	---	---
0.584000	33.00	9.8	46	13.0	---	---
0.792000	33.50	9.8	46	12.5	---	---
5.000000	18.30	10.2	46	27.7	---	---
6.012000	21.50	10.2	50	28.5	---	---
7.960000	20.80	10.3	50	29.2	---	---

Conducted Emissions (Line 2)

HCT

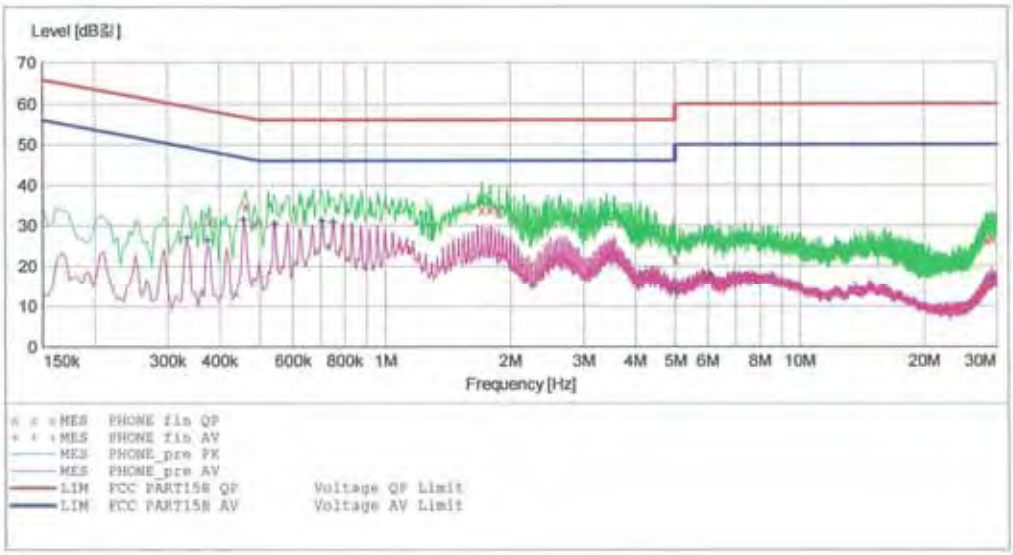
EMC

```
EUT:                    LG-D680
Manufacturer:           LG
Operating Condition:    WLAN MODE
Test Site:              SHIELD ROOM
Operator:               JC SHIN
Test Specification:     FCC PART15 B
Comment:                N
```

SCAN TABLE: "FCC CLASS B(N)"

Short Description: KN22 CLASS B

Start Frequency	Stop Frequency	Step Width	Detector	Meas. Time	IF Bandw.	Transducer
150.0 kHz	500.0 kHz	4.0 kHz	MaxPeak Average	10.0 ms	9 kHz	None
500.0 kHz	5.0 MHz	4.0 kHz	MaxPeak Average	10.0 ms	9 kHz	None
5.0 MHz	30.0 MHz	4.0 kHz	MaxPeak Average	10.0 ms	9 kHz	None



MEASUREMENT RESULT: "PHONE_fin QP"

2013-08-06 10:04오전

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.378001	31.20	10.0	58	27.1	---	---
0.462001	34.80	10.0	57	21.8	---	---
0.486001	30.40	10.0	56	25.8	---	---
1.712000	33.90	10.1	56	22.1	---	---
1.792000	34.00	10.1	56	22.0	---	---
1.876000	33.30	10.1	56	22.7	---	---
5.000000	21.80	10.4	56	34.2	---	---
28.492000	26.40	11.8	60	33.6	---	---
29.220000	26.70	11.8	60	33.3	---	---

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MEASUREMENT RESULT: "PHONE_fin AV"

2013-08-06 10:04오전

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.334001	26.90	10.0	49	22.4	---	---
0.374001	26.40	10.0	48	22.0	---	---
0.458001	31.50	10.0	47	15.2	---	---
0.544000	30.40	10.0	46	15.6	---	---
0.708000	31.00	10.0	46	15.0	---	---
0.752000	30.80	10.0	46	15.2	---	---
5.000000	14.10	10.4	46	31.9	---	---
6.048000	17.80	10.4	50	32.2	---	---
29.220000	16.40	11.8	50	33.6	---	---

9. LIST OF TEST EQUIPMENT

Manufacturer	Model / Equipment	Calibration Interval	Calibration Due	Serial No.
Rohde & Schwarz	ENV216/ LISN	Annual	02/06/2014	100073
Schwarzbeck	VULB 9160/ TRILOG Antenna	Biennial	12/17/2014	3150
Rohde & Schwarz	ESI 40 / EMI TEST RECEIVER	Annual	04/16/2014	831564103
Agilent	E4440A/ Spectrum Analyzer	Annual	04/25/2014	US45303008
Agilent	N9020A/ SIGNAL ANALYZER	Annual	05/14/2014	MY51110063
HD	MA240/ Antenna Position Tower	N/A	N/A	556
EMCO	1050/ Turn Table	N/A	N/A	114
HD GmbH	HD 100/ Controller	N/A	N/A	13
HD GmbH	KMS 560/ SlideBar	N/A	N/A	12
Rohde & Schwarz	SCU-18/ Signal Conditioning Unit	Annual	09/11/2013	10094
MITEQ	AMF-6B-180265-35-10P / POWER AMP	Annual	04/16/2014	667624
CERNEX	CBL26405040 / POWER AMP	Annual	04/16/2014	19660
Schwarzbeck	BBHA 9120D/ Horn Antenna	Biennial	10/17/2013	937
Schwarzbeck	BBHA9170 / Horn Antenna(15 GHz ~ 40 GHz)	Biennial	10/30/2014	BBHA9170124
Rohde & Schwarz	FSP / Spectrum Analyzer	Annual	02/08/2014	839117/011
Agilent	E4416A /Power Meter	Annual	11/07/2013	GB41291412
Agilent	E9327A /POWER SENSOR	Annual	04/16/2014	MY4442009
Wainwright Instrument	WHF3.0/18G-10EF / High Pass Filter	Annual	02/08/2014	F6
Wainwright Instrument	WHNX6.0/26.5G-6SS / High Pass Filter	Annual	04/16/2014	1
Wainwright Instrument	WHNX7.0/18G-8SS / High Pass Filter	Annual	04/16/2014	29
Wainwright Instrument	WRCJ2400/2483.5-2370/2520-60/14SS / Band Reject Filter	Annual	03/19/2014	1
Hewlett Packard	11636B/Power Divider	Annual	11/07/2013	11377
Agilent	87300B/Directional Coupler	Annual	12/24/2013	3116A03621
Hewlett Packard	11667B / Power Splitter	Annual	05/29/2014	05001
DIGITAL	EP-3010 /DC POWER SUPPLY	Annual	11/07/2013	3110117
ITECH	IT6720 / DC POWER SUPPLY	Annual	11/07/2013	010002156287001199
TESCOM	TC-3000C / BLUETOOTH TESTER	Annual	04/24/2014	3000C000276
Rohde & Schwarz	CBT / BLUETOOTH TESTER	Annual	04/25/2014	100422
EMCO	6502.LOOP ANTENNA	Biennial	01/11/2014	9009-2536
CERNEX	CBLU1183540 / POWER AMP	Annual	07/24/2014	21691
Agilent	8493C / Attenuator(10 dB)	Annual	07/24/2014	76649
WEINSCHEL	2-3 / Attenuator(3 dB)	Annual	11/07/2013	BR0617