Operation Mode: TX / IEEE 802.11n HT40 MHz/ CH Mid   **Test Date:**   July 6, 2013

Temperature: 24°C   **Tested by:**   Mack Li

Humidity: 52% RH   **Polarity:**   Ver. / Hor.

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
3250.0000	50.20	-4.07	46.13	74.00	-27.87	V	Peak
4255.0000	45.68	-1.37	44.31	74.00	-29.69	V	Peak
4870.0000	48.83	0.73	49.56	74.00	-24.44	V	Peak
5245.0000	45.93	1.54	47.47	74.00	-26.53	V	Peak
5845.0000	43.49	2.85	46.34	74.00	-27.66	V	Peak
6685.0000	44.89	5.11	50.00	74.00	-24.00	V	Peak
3250.0000	50.39	-4.07	46.32	74.00	-27.68	H	Peak
3835.0000	46.57	-2.50	44.07	74.00	-29.93	H	Peak
4870.0000	50.45	0.73	51.18	74.00	-22.82	H	Peak
5350.0000	44.61	1.53	46.14	74.00	-27.86	H	Peak
5755.0000	45.87	2.59	48.46	74.00	-25.54	H	Peak
6730.0000	44.63	5.26	49.89	74.00	-24.11	H	Peak

REMARKS:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*

2. *Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.*

3. *Average test would be performed if the peak result were greater than the average limit or as required by the applicant.*

4. *Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.*

5. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*

6. *Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).*

FCC ID: PJZ6738   Page 56 / 110

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Operation Mode: TX / IEEE 802.11n HT40 MHz/ CH High   **Test Date:** July 6, 2013

Temperature: 24°C   **Tested by:** Mack Li

Humidity: 52% RH   **Polarity:**   Ver. / Hor.

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
3280.0000	49.59	-4.05	45.54	74.00	-28.46	V	Peak
4105.0000	45.71	-2.03	43.68	74.00	-30.32	V	Peak
4330.0000	44.86	-1.09	43.77	74.00	-30.23	V	Peak
4910.0000	50.01	0.91	50.92	74.00	-23.08	V	Peak
5845.0000	43.89	2.85	46.74	74.00	-27.26	V	Peak
6895.0000	45.13	5.82	50.95	74.00	-23.05	V	Peak
3280.0000	49.69	-4.05	45.64	74.00	-28.36	H	Peak
3835.0000	46.57	-2.50	44.07	74.00	-29.93	H	Peak
4910.0000	49.96	0.91	50.87	74.00	-23.13	H	Peak
5500.0000	45.58	1.73	47.31	74.00	-26.69	H	Peak
6565.0000	44.89	4.72	49.61	74.00	-24.39	H	Peak
6940.0000	45.15	6.04	51.19	74.00	-22.81	H	Peak

REMARKS:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*

2. *Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.*

3. *Average test would be performed if the peak result were greater than the average limit or as required by the applicant.*

4. *Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.*

5. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*

6. *Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).*

FCC ID: PJZ6738   Page 57 / 110

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7.3. 6dB BANDWIDTH MEASUREMENT

7.3.1. LIMITS

According to §15.247(a)(2), systems using digital modulation techniques may operate in the 902 - 928 MHz, 2400 - 2483.5 MHz, and 5725 - 5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

7.3.2. TEST INSTRUMENTS

Name of Equipment	Manufacturer	Model	Serial Number	Last Calibration	Calibration Due
Spectrum Analyzer	Agilent	E4446A	US44300399	03/09/2013	03/08/2014

7.3.3. TEST PROCEDURES (please refer to measurement standard)

1. Place the EUT on the table and set it in the transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as RBW = 1-5 % of the emission bandwidth (EBW), VBW = ≥ 3 x RBW, Sweep = auto.
4. Mark the peak frequency and –6dB (upper and lower) frequency.
5. Repeat until all the rest channels are investigated.

7.3.4. TEST SETUP
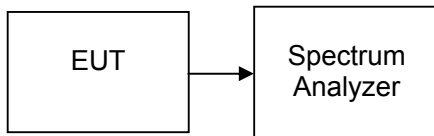
7.3.5. TEST RESULTS

No non-compliance noted

Test Data

Antenna 0

Test mode: IEEE 802.11b

Channel	Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Test Result
Low	2412	8112		PASS
Mid	2437	8094	>500	PASS
High	2462	8127		PASS

Antenna 0

Test mode: IEEE 802.11g

Channel	Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Test Result
Low	2412	15146		PASS
Mid	2437	15132	>500	PASS
High	2462	15136		PASS

Antenna 1

Test mode: IEEE 802.11g

Channel	Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Test Result
Low	2412	15126		PASS
Mid	2437	14481	>500	PASS
High	2462	15132		PASS

Antenna 0

Test mode: IEEE 802.11n HT20 MHz

Channel	Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Test Result
Low	2412	15107		PASS
Mid	2437	15133	>500	PASS
High	2462	15131		PASS

Antenna 1

Test mode: IEEE 802.11n HT20 MHz

Channel	Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Test Result
Low	2412	15134		PASS
Mid	2437	15102	>500	PASS
High	2462	15130		PASS

Antenna 0

Test mode: IEEE 802.11n HT40 MHz

Channel	Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Test Result
Low	2422	35845		PASS
Mid	2437	36276	>500	PASS
High	2452	35816		PASS

Antenna 1

Test mode: IEEE 802.11n HT40 MHz

Channel	Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Test Result
Low	2422	36066		PASS
Mid	2437	35843	>500	PASS
High	2452	35872		PASS

Test Plot

Antenna 0

IEEE 802.11b mode

6dB Bandwidth (CH Low)


```
          Agilent                              R   T

Ref 20 dBm              #Atten 30 dB
#Peak
Log
10
dB/
Offst
0.8
dB


LgAv

M1 S2
Center 2.412 00 GHz                          Span 25 MHz
#Res BW 100 kHz         #VBW 300 kHz       Sweep 2.4 ms (601 pts)
```

Occupied Bandwidth   Occ BW % Pwr   99.00 %
       10.0313 MHz   x dB   −6.00 dB
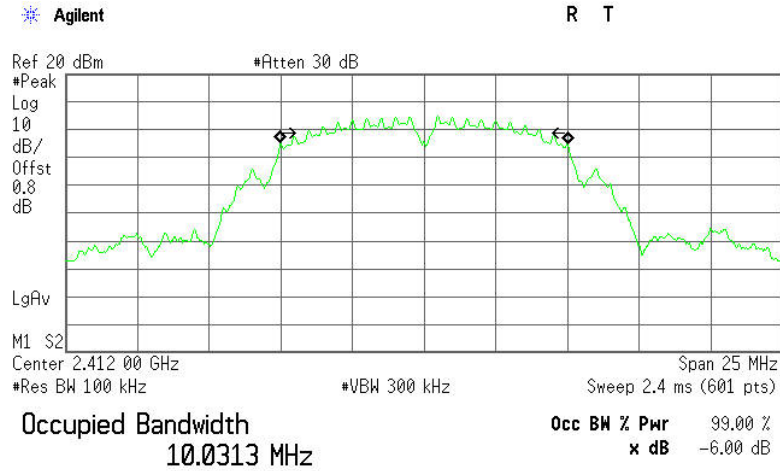
Transmit Freq Error   6.207 kHz
x dB Bandwidth   8.112 MHz

6dB Bandwidth (CH Mid)


```
          Agilent                              R   T

Ref 20 dBm              #Atten 30 dB
#Peak
Log
10
dB/
Offst
0.8
dB


LgAv

M1 S2
Center 2.437 00 GHz                          Span 25 MHz
#Res BW 100 kHz         #VBW 300 kHz       Sweep 2.4 ms (601 pts)
```

Occupied Bandwidth   Occ BW % Pwr   99.00 %
       10.0296 MHz   x dB   −6.00 dB
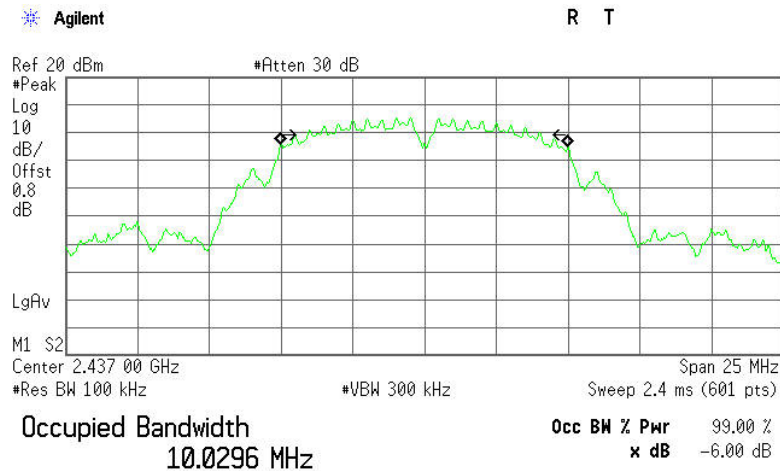
Transmit Freq Error   −24.283 kHz
x dB Bandwidth   8.094 MHz

6dB Bandwidth (CH High)

Occupied Bandwidth	Occ BW % Pwr	99.00 %
10.0650 MHz	x dB	−6.00 dB

Transmit Freq Error	−29.279 kHz
x dB Bandwidth	8.127 MHz

FCC ID: PJZ6738

Page 62 / 110

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Antenna 0

IEEE 802.11g mode

6dB Bandwidth (CH Low)

Occupied Bandwidth
16.2586 MHz

Occ BW % Pwr	99.00 %
x dB	−6.00 dB
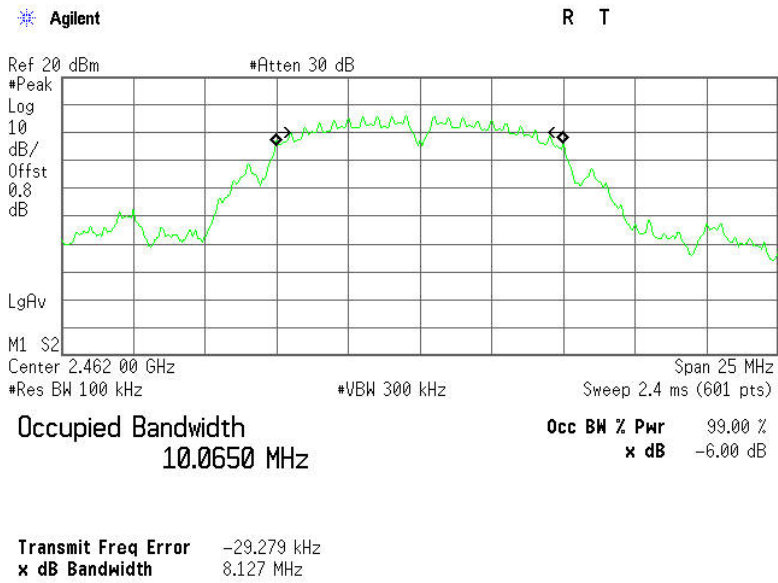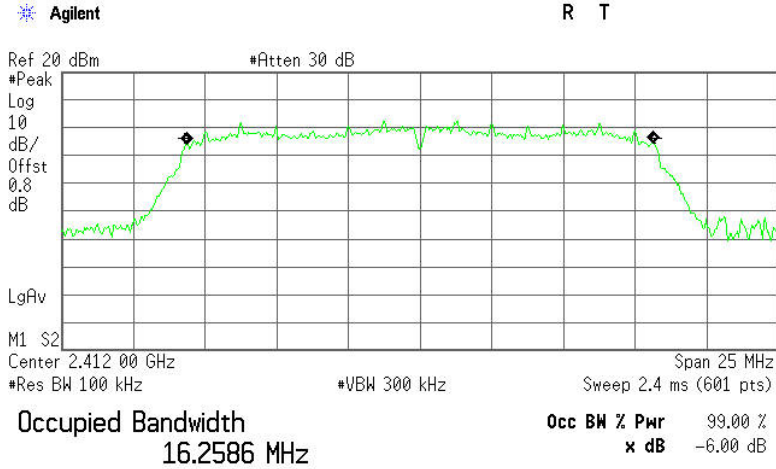
Transmit Freq Error	11.965 kHz
x dB Bandwidth	15.146 MHz

6dB Bandwidth (CH Mid)

Occupied Bandwidth
16.2659 MHz

Occ BW % Pwr	99.00 %
x dB	−6.00 dB
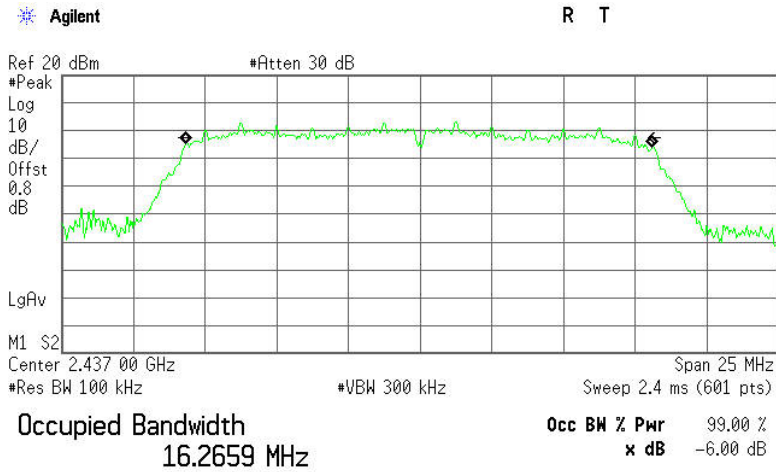
Transmit Freq Error	−34.728 kHz
x dB Bandwidth	15.132 MHz

6dB Bandwidth (CH High)

Occupied Bandwidth
16.2661 MHz

Occ BW % Pwr   99.00 %
x dB   −6.00 dB

Transmit Freq Error   −60.121 kHz
x dB Bandwidth   15.136 MHz

Antenna 1

IEEE 802.11g mode

6dB Bandwidth (CH Low)

Occupied Bandwidth
16.2721 MHz

Occ BW % Pwr   99.00 %
x dB   −6.00 dB

Transmit Freq Error   −10.126 kHz
x dB Bandwidth   15.126 MHz

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6dB Bandwidth (CH Mid)

Occupied Bandwidth
16.2771 MHz

Occ BW % Pwr   99.00 %
x dB   −6.00 dB

Transmit Freq Error   −23.944 kHz
x dB Bandwidth   14.481 MHz

6dB Bandwidth (CH High)

Occupied Bandwidth
16.2793 MHz

Occ BW % Pwr   99.00 %
x dB   −6.00 dB

Transmit Freq Error   −17.121 kHz
x dB Bandwidth   15.132 MHz

FCC ID: PJZ6738   Page 65 / 110

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Antenna 0

IEEE 802.11n HT20 MHz mode

6dB Bandwidth (CH Low)

Occupied Bandwidth
17.3902 MHz

Occ BW % Pwr   99.00 %
x dB   −6.00 dB

Transmit Freq Error   14.548 kHz
x dB Bandwidth   15.107 MHz

6dB Bandwidth (CH Mid)

Occupied Bandwidth
17.3947 MHz

Occ BW % Pwr   99.00 %
x dB   −6.00 dB
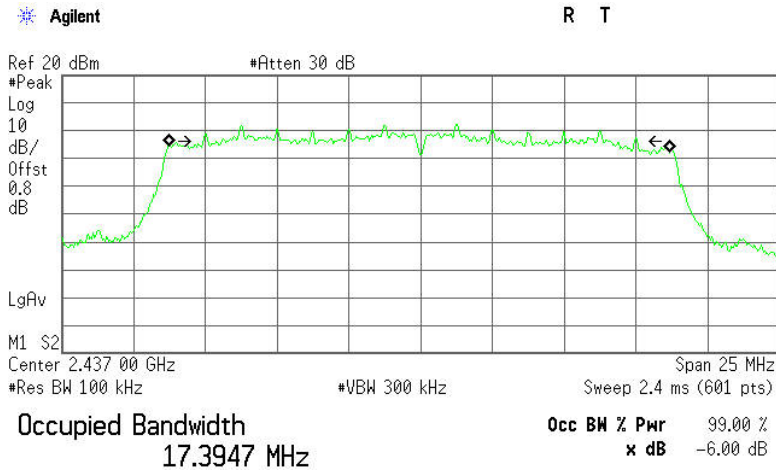
Transmit Freq Error   −37.062 kHz
x dB Bandwidth   15.133 MHz

6dB Bandwidth (CH High)

Agilent   R T

Ref 20 dBm   #Atten 30 dB
#Peak
Log
10
dB/
Offst
0.8
dB

LgAv

M1 S2
Center 2.462 00 GHz   Span 25 MHz
#Res BW 100 kHz   #VBW 300 kHz   Sweep 2.4 ms (601 pts)

Occupied Bandwidth   Occ BW % Pwr   99.00 %
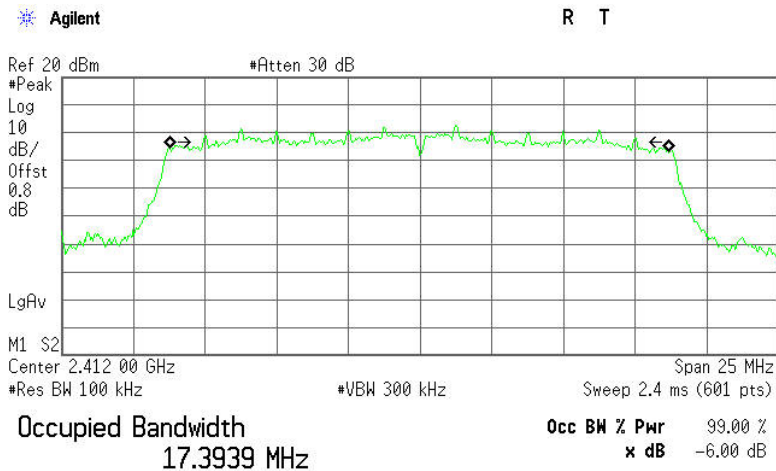   17.3738 MHz   x dB   −6.00 dB
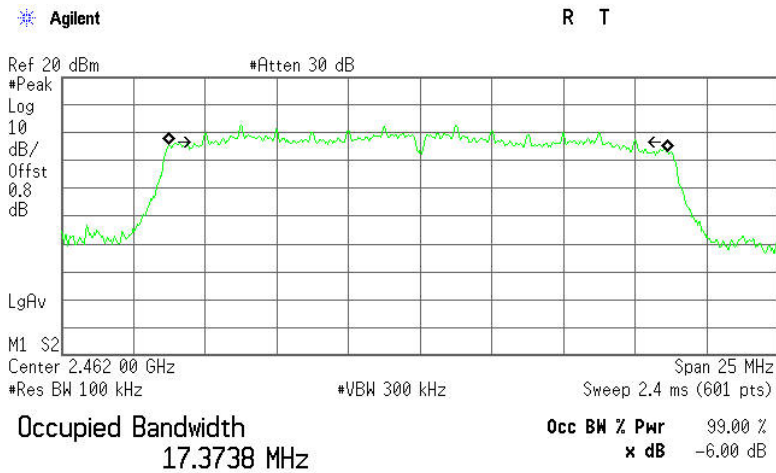
Transmit Freq Error   −53.851 kHz
x dB Bandwidth   15.131 MHz

Antenna 1

IEEE 802.11n HT20 MHz mode

6dB Bandwidth (CH Low)

Agilent   R T

Ref 20 dBm   #Atten 30 dB
#Peak
Log
10
dB/
Offst
0.8
dB

LgAv

M1 S2
Center 2.412 00 GHz   Span 25 MHz
#Res BW 100 kHz   #VBW 300 kHz   Sweep 2.4 ms (601 pts)

Occupied Bandwidth   Occ BW % Pwr   99.00 %
     17.3939 MHz   x dB   −6.00 dB

Transmit Freq Error   −13.179 kHz
x dB Bandwidth   15.134 MHz

FCC ID: PJZ6738   Page 67 / 110

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6dB Bandwidth (CH Mid)

```
※ Agilent                                    R   T
Ref 20 dBm              #Atten 30 dB
#Peak
Log
10
dB/
Offst
0.8
dB

LgAv

M1 S2
Center 2.437 00 GHz                          Span 25 MHz
#Res BW 100 kHz        #VBW 300 kHz          Sweep 2.4 ms (601 pts)
```

Occupied Bandwidth   Occ BW % Pwr   99.00 %
17.3997 MHz   x dB   −6.00 dB
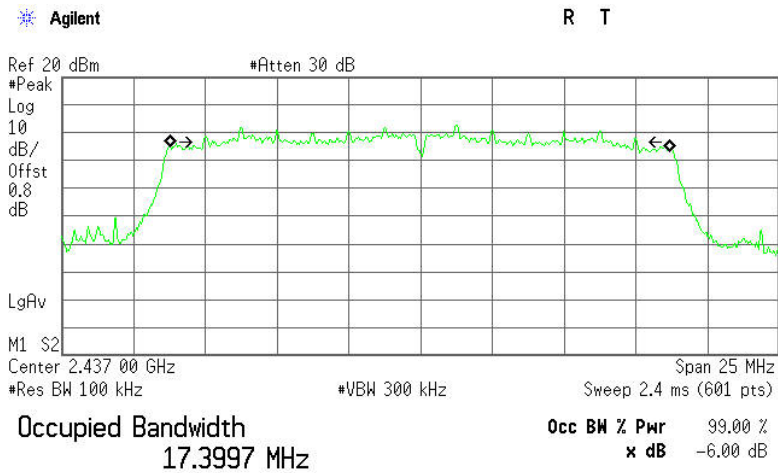
Transmit Freq Error   −23.498 kHz
x dB Bandwidth   15.102 MHz

6dB Bandwidth (CH High)

```
※ Agilent                                    R   T
Ref 20 dBm              #Atten 30 dB
#Peak
Log
10
dB/
Offst
0.8
dB

LgAv

M1 S2
Center 2.462 00 GHz                          Span 25 MHz
#Res BW 100 kHz        #VBW 300 kHz          Sweep 2.4 ms (601 pts)
```

Occupied Bandwidth   Occ BW % Pwr   99.00 %
17.3924 MHz   x dB   −6.00 dB
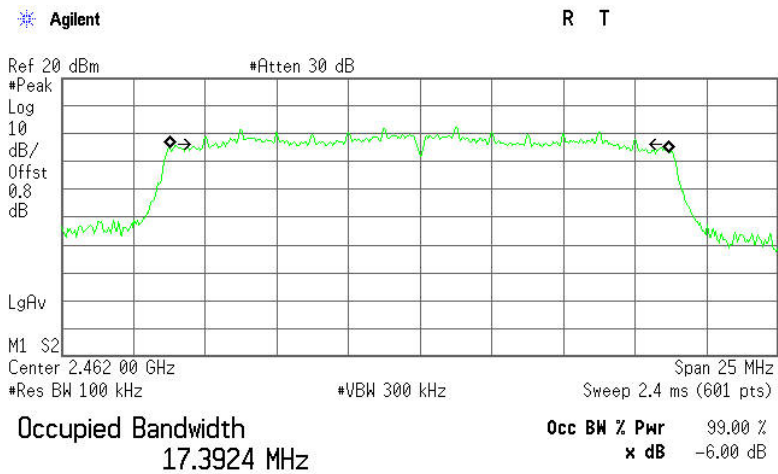
Transmit Freq Error   −25.950 kHz
x dB Bandwidth   15.130 MHz

Antenna 0

IEEE 802.11n HT40 MHz mode

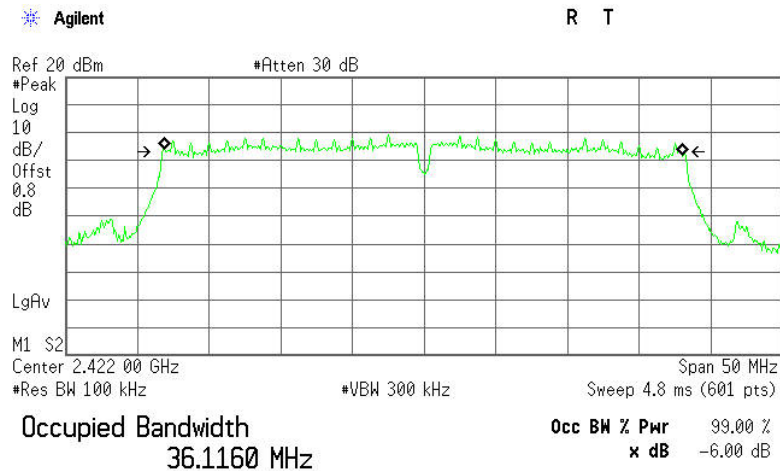### 6dB Bandwidth (CH Low)

Occupied Bandwidth
36.0935 MHz

Occ BW % Pwr   99.00 %
x dB   -6.00 dB
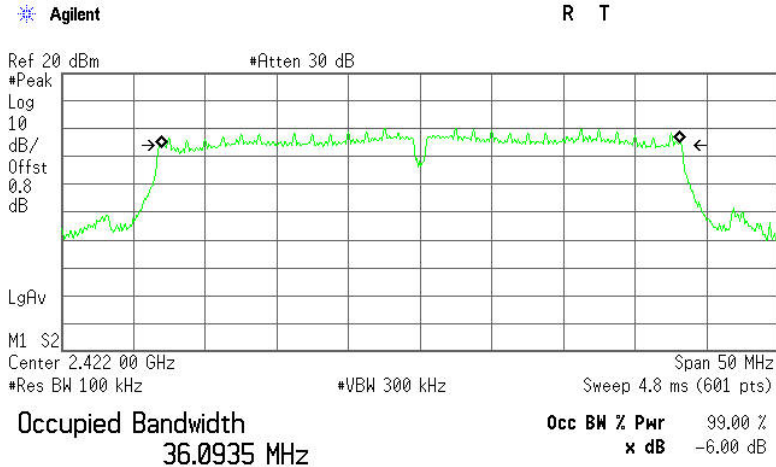
| Transmit Freq Error | 38.948 kHz |
| x dB Bandwidth | 35.845 MHz |

6dB Bandwidth (CH Mid)

Occupied Bandwidth
36.1115 MHz

Occ BW % Pwr   99.00 %
x dB   -6.00 dB
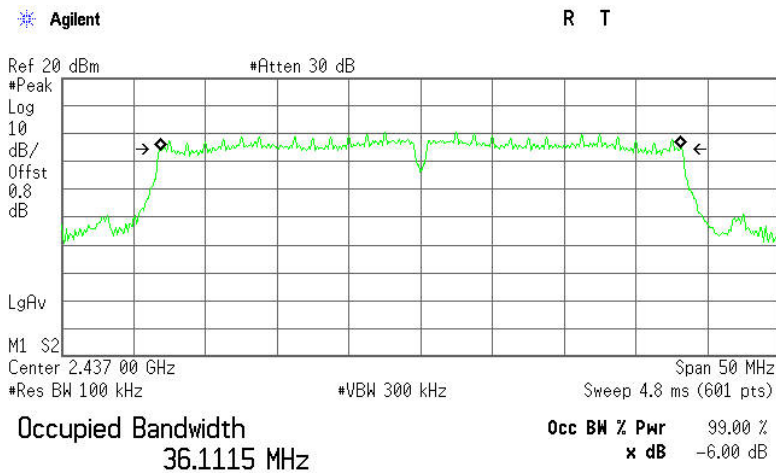
| Transmit Freq Error | 12.945 kHz |
| x dB Bandwidth | 36.276 MHz |

FCC ID: PJZ6738   Page 69 / 110

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6dB Bandwidth (CH High)

Occupied Bandwidth	Occ BW % Pwr 99.00 %
36.1038 MHz	x dB −6.00 dB
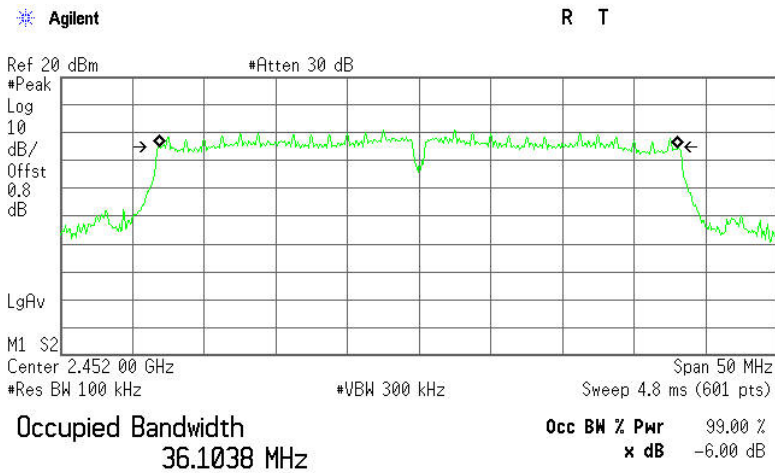
Transmit Freq Error	−18.160 kHz
x dB Bandwidth	35.816 MHz

Antenna 1

IEEE 802.11n HT40 MHz mode

6dB Bandwidth (CH Low)

Occupied Bandwidth	Occ BW % Pwr 99.00 %
36.1160 MHz	x dB −6.00 dB

Transmit Freq Error	−36.754 kHz
x dB Bandwidth	36.066 MHz

6dB Bandwidth (CH Mid)

Occupied Bandwidth
36.1182 MHz
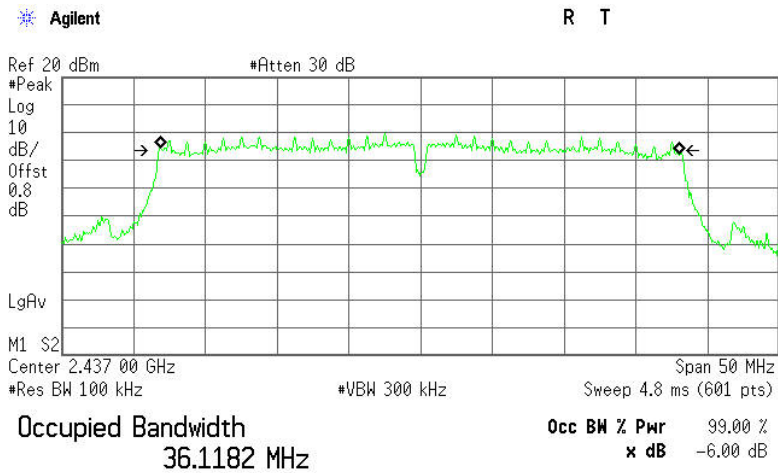
Transmit Freq Error   −30.224 kHz
x dB Bandwidth   35.843 MHz

6dB Bandwidth (CH High)

Occupied Bandwidth
36.1192 MHz
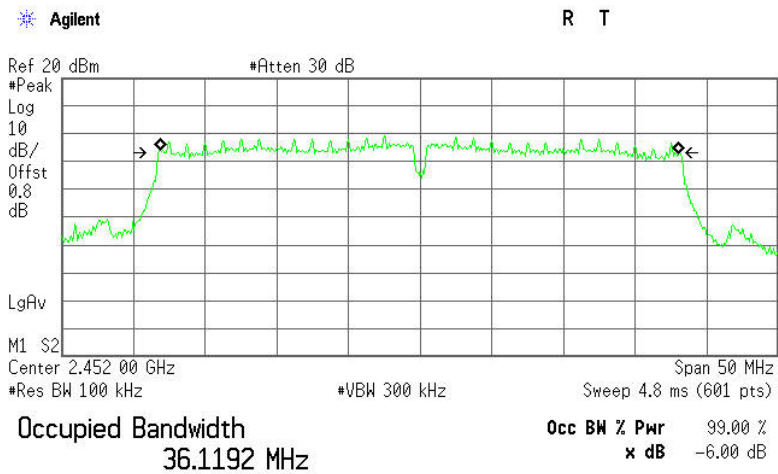
Transmit Freq Error   −34.743 kHz
x dB Bandwidth   35.872 MHz

7.4. PEAK OUTPUT POWER

7.4.1. LIMITS

The maximum peak output power of the intentional radiator shall not exceed the following:

1. According to §15.247(b)(3), for systems using digital modulation in the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz: 1 Watt.

2. According to §15.247(b)(4), the conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
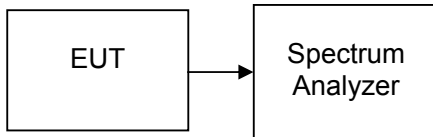
7.4.2. TEST INSTRUMENTS

Name of Equipment	Manufacturer	Model	Serial Number	Last Calibration	Calibration Due
Spectrum Analyzer	Agilent	E4446A	US44300399	03/09/2013	03/08/2014

7.4.3. TEST PROCEDURES (please refer to measurement standard)

1. This procedure provides an integrated measurement alternative when the maximum available RBW < EBW.
2. Set the RBW = 1 MHz.
3. Set the VBW = 3 MHz.
4. Set the span to a value that is 5-30 % greater than the EBW.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the spectrum analyzer's integrated band power measurement function with band limits set equal to the EBW band edges(for some analyzers, this may require a manual overrideto ensure use of peak detector). If the spectrum analyzer does not have a band power function, sum the spectrum levels (in linear power units) at 1 MHz intervals extending across the EBW of the spectrum.

FCC ID: PJZ6738   Page 72 / 110

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7.4.4. TEST SETUP

```
┌──────────┐      ┌──────────┐
│   EUT    │─────▶│ Spectrum │
│          │      │ Analyzer │
└──────────┘      └──────────┘
```

7.4.5. TEST RESULTS

No non-compliance noted
Test Data
Antenna 0
Test mode: IEEE 802.11b

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2412	17.51	0.05636		PASS
Mid	2437	17.82	0.06053	1	PASS
High	2462	18.09	0.06442		PASS

Antenna 0

Test mode: IEEE 802.11g

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2412	23.45	0.22131		PASS
Mid	2437	23.85	0.24266	1	PASS
High	2462	24.22	0.26424		PASS

Antenna 1

Test mode: IEEE 802.11g

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2412	23.87	0.24378		PASS
Mid	2437	24.30	0.26915	1	PASS
High	2462	24.11	0.25763		PASS

Combine with Antenna 0 and Antenna 1

Test mode: IEEE 802.11n HT20 MHz

Channel	Frequency (MHz)	Output Power (dBm)			Output Power (W)	Limit (W)	Result
		Chain 0	Chain 1	Total			
Low	2412	22.66	23.52	26.12	0.40941		PASS
Mid	2437	23.15	23.65	26.42	0.43828	1	PASS
High	2462	23.53	23.26	26.41	0.43726		PASS

Combine with Antenna 0 and Antenna 1
Test mode: IEEE 802.11n HT40 MHz

Channel	Frequency (MHz)	Output Power (dBm)			Output Power	Limit (W)	Result
		Chain 0	Chain 1	Total			
Low	2422	20.85	22.53	24.78	0.30068		PASS
Mid	2437	21.39	22.23	24.84	0.30483	1	PASS
High	2452	22.00	22.55	25.29	0.33838		PASS

Note : Combine Power Calculation :

Total Power(dBm) =log (10 $^{(\text{chain 0 power}/10)}$+10 $^{(\text{chain 1 power}/10)}$)*10

FCC ID: PJZ6738   Page 74 / 110

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7.5. BAND EDGES MEASUREMENT

7.5.1. LIMITS

According to §15.247(d), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator in 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. 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 Section 15.205(c)).

7.5.2. TEST INSTRUMENTS

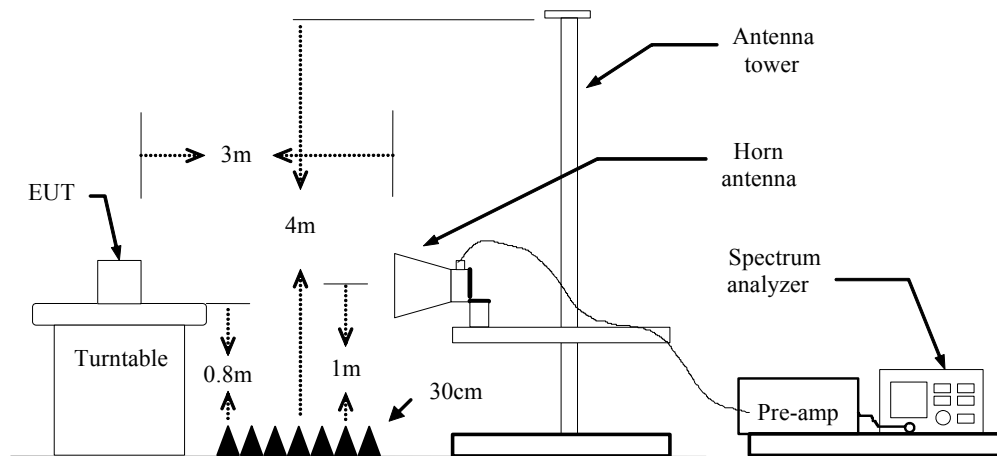| Radiated Emission Test Site 966(2)					
Name of Equipment	Manufacturer	Model Number	Serial Number	Last Calibration	Due Calibration
PSA Series Spectrum Analyzer	Agilent	E4446A	US44300399	03/09/2013	03/08/2014
ESCI EMI TEST RECEIVER.ESCI	ROHDE&SCHWARZ	ESCI	100783	03/09/2013	03/08/2014
Amplifier	MITEQ	AM-1604-3000	1123808	03/18/2013	03/18/2014
High Noise Amplifier	Agilent	8449B	3008A01838	03/18/2013	03/18/2014
Board-Band Horn Antenna	Schwarzbeck	BBHA 9170	9170-497	06/21/2013	06/21/2014
Bilog Antenna	SCHAFFNER	CBL6143	5082	03/02/2013	03/01/2014
Horn Antenna	SCHWARZBECK	BBHA9120	D286	03/02/2013	03/01/2014
Loop Antenna	A、R、A	PLA-1030/B	1029	03/23/2013	03/23/2014
Turn Table	N/A	N/A	N/A	N.C.R	N.C.R
Controller	Sunol Sciences	SC104V	022310-1	N.C.R	N.C.R
Controller	CT	N/A	N/A	N.C.R	N.C.R
Temp. / Humidity Meter	Anymetre	JR913	N/A	03/04/2013	03/03/2014
Antenna Tower	SUNOL	TLT2	N/A	N.C.R	N.C.R
Test S/W	FARAD	LZ-RF / CCS-SZ-3A2			

NOTE: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

2. The FCC Site Registration number is 101879.

3. N.C.R = No Calibration Required.

7.5.3. TEST PROCEDURES (please refer to measurement standard)

1. The EUT is placed on a turntable, which is 0.8m above the ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.
4. Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission:
   (a) PEAK: RBW=VBW=1MHz / Sweep=AUTO
   (b) AVERAGE: RBW=1MHz / VBW=10Hz / Sweep=AUTO
5. Repeat the procedures until all the PEAK and AVERAGE versus POLARIZATION are
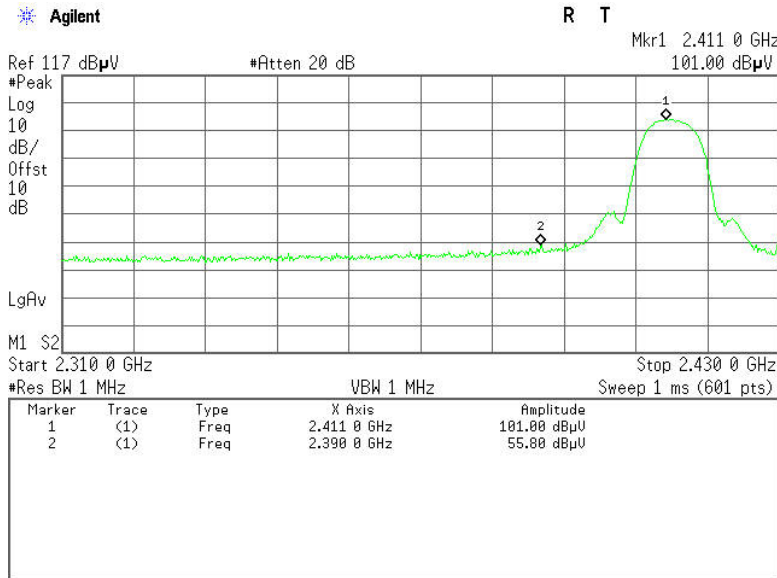
7.5.4. TEST SETUP

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7.5.5. TEST RESULTS

Test Plot

Antenna 0

IEEE 802.11b mode

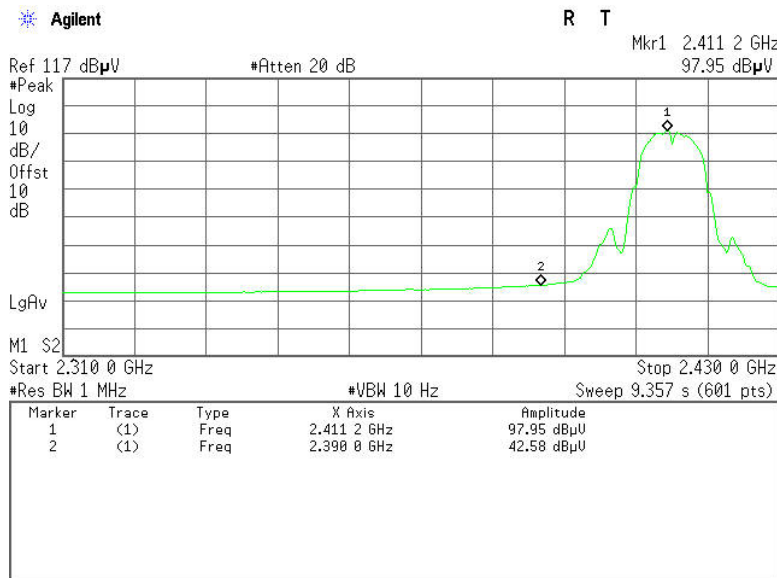**Band Edges (CH Low)**

Detector mode: Peak   **Polarity: Vertical**

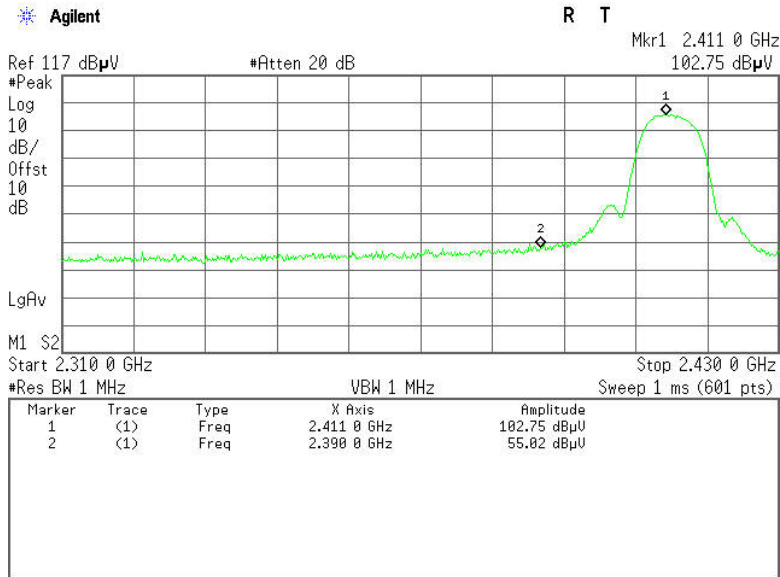**Detector mode: Average**   **Polarity: Vertical**

No.	Frequency (MHz)	Reading (dBuV)	Corrected (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Antenna Pole
1	2390.0000	49.20	-6.60	55.80	74.00	-18.20	Peak	Vertical
2	2390.0000	35.98	-6.60	42.58	54.00	-11.42	Average	Vertical

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Detector mode: Peak **Polarity: Horizontal**


```
※ Agilent                                          R  T
                                              Mkr1  2.411 0 GHz
Ref 117 dBµV          #Atten 20 dB            102.75 dBµV
#Peak
Log
10
dB/
Offst
10
dB

LgAv

M1 S2
Start 2.310 0 GHz                         Stop 2.430 0 GHz
#Res BW 1 MHz          VBW 1 MHz          Sweep 1 ms (601 pts)
```

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.411 0 GHz	102.75 dBµV
2	(1)	Freq	2.390 0 GHz	55.02 dBµV

Detector mode: Average **Polarity: Horizontal**


```
※ Agilent                                          R  T
                                              Mkr1  2.411 2 GHz
Ref 117 dBµV          #Atten 20 dB            99.71 dBµV
#Peak
Log
10
dB/
Offst
10
dB

LgAv

M1 S2
Start 2.310 0 GHz          ^              Stop 2.430 0 GHz
#Res BW 1 MHz          #VBW 10 Hz         Sweep 9.357 s (601 pts)
```

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.411 2 GHz	99.71 dBµV
2	(1)	Freq	2.390 0 GHz	44.00 dBµV

No.	Frequency (MHz)	Reading (dBuV)	Corrected (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Antenna Pole
1	2390.0000	48.42	-6.60	55.02	74.00	-18.98	Peak	Horizontal
2	2390.0000	37.40	-6.60	44.00	54.00	-10.00	Average	Horizontal
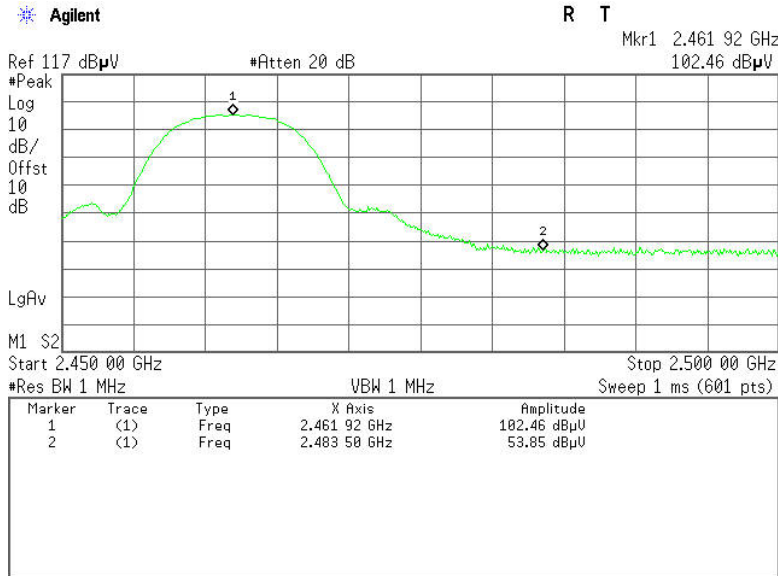
Band Edges (CH High)
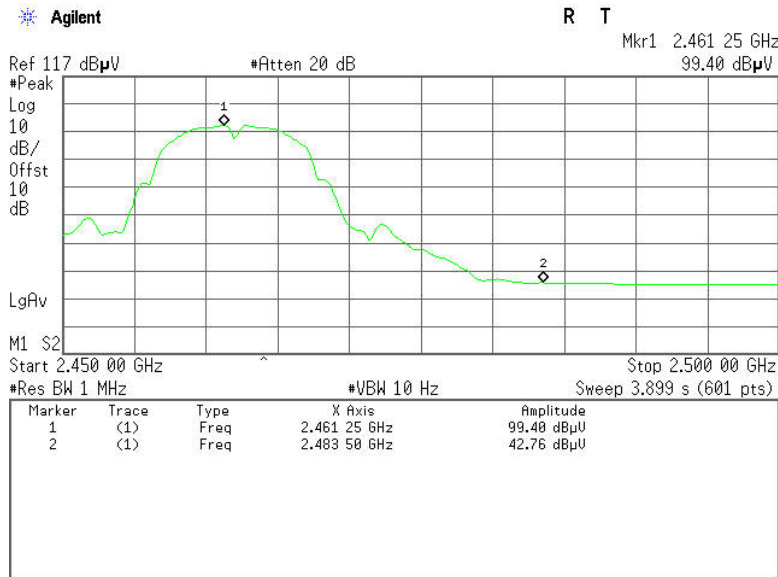### Detector mode: Peak   Polarity: Vertical

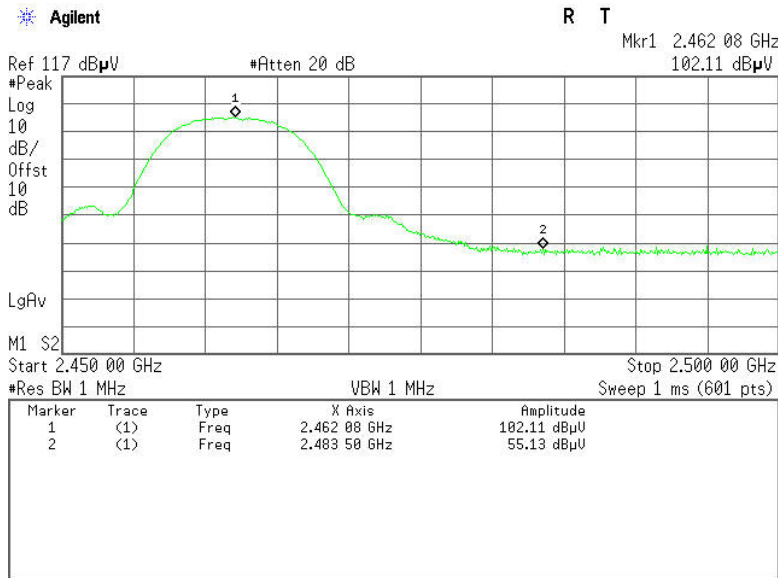### Detector mode: Average   Polarity: Vertical

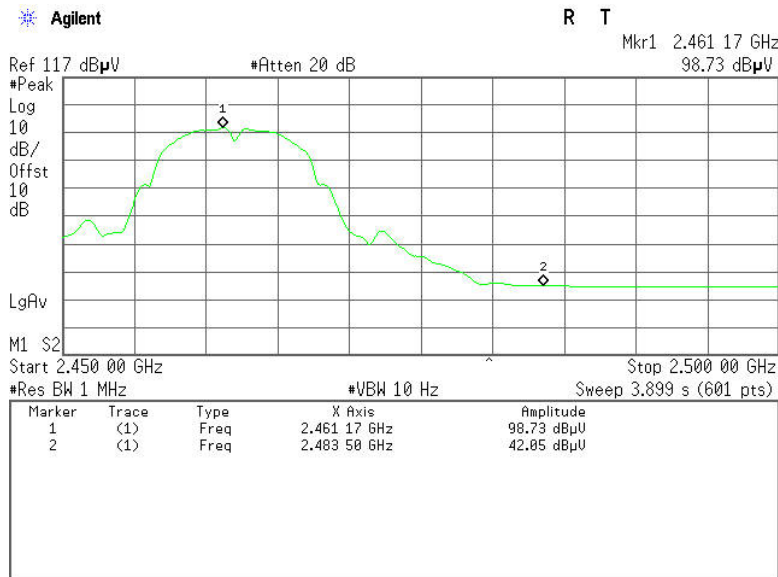| No.	Frequency (MHz)	Reading (dBuV)	Corrected (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Antenna Pole
1	2483.5000	47.61	-6.24	53.85	74.00	-20.15	Peak	Vertical
2	2483.5000	36.52	-6.24	42.76	54.00	-11.24	Average	Vertical

Detector mode: Peak   Polarity: Horizontal

Detector mode: Average   Polarity: Horizontal

No.	Frequency (MHz)	Reading (dBuV)	Corrected (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Antenna Pole
1	2483.5000	48.89	-6.24	55.13	74.00	-18.87	Peak	Horizontal
2	2483.5000	35.81	-6.24	42.05	54.00	-11.95	Average	Horizontal

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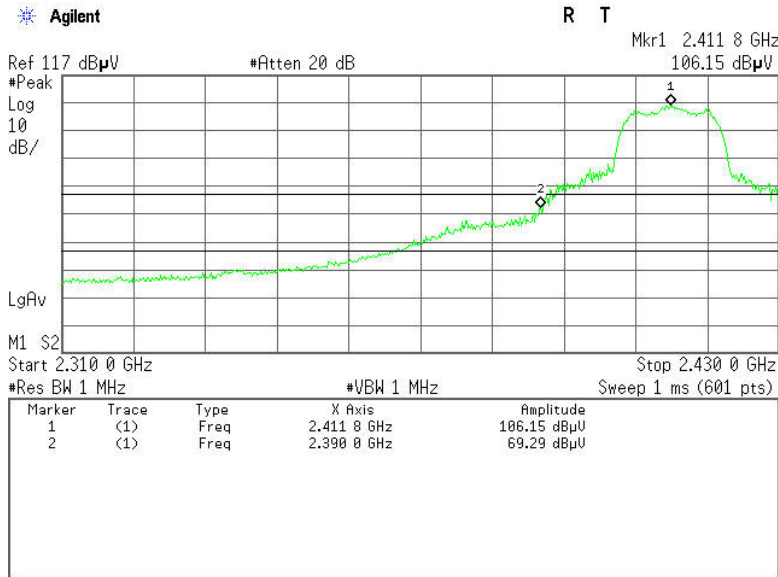**Antenna 0**

IEEE 802.11g mode

Band Edges (CH Low)
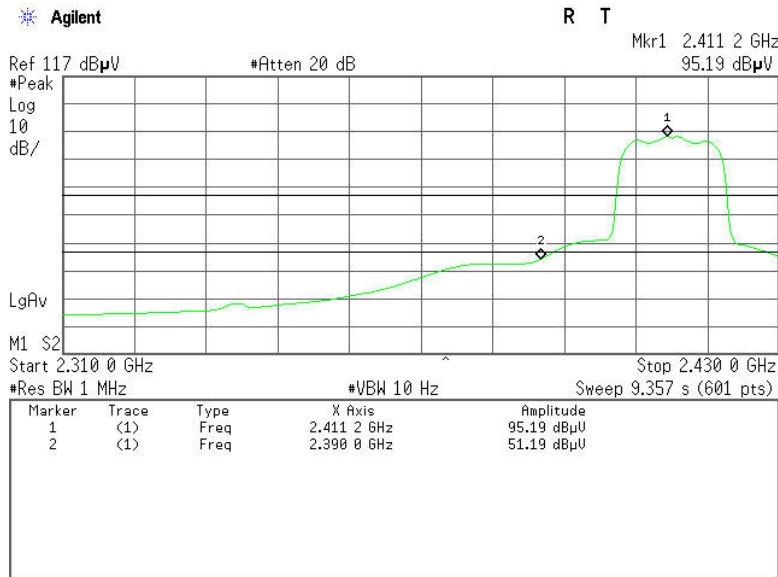
Detector mode: Peak   Polarity: Vertical
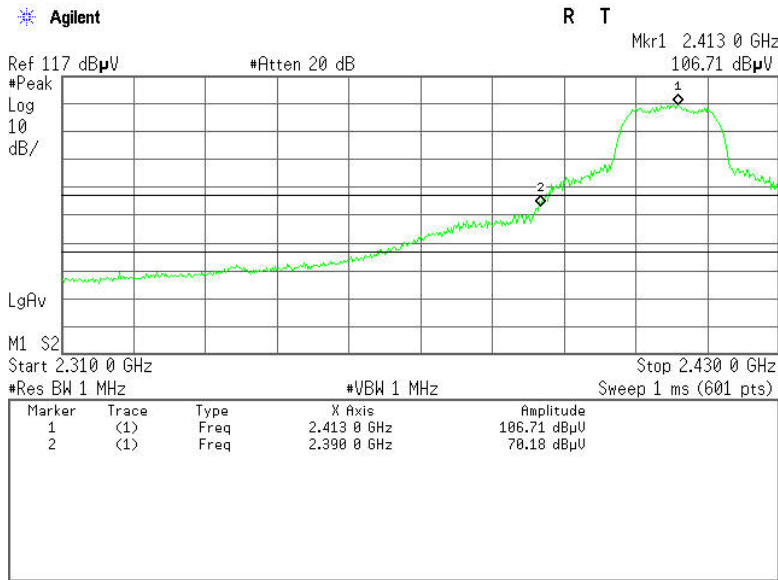

Detector mode: Average   Polarity: Vertical

No.	Frequency (MHz)	Reading (dBuV)	Corrected (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Antenna Pole
1	2390.0000	61.77	-6.60	68.37	74.00	-5.63	Peak	Vertical
2	2390.0000	43.52	-6.60	50.12	54.00	-3.88	Average	Vertical

Detector mode: Peak   Polarity: Horizontal

Agilent   R T

Mkr1 2.413 0 GHz
106.71 dBµV

Ref 117 dBµV   #Atten 20 dB
#Peak
Log
10
dB/

LgAv

M1 S2
Start 2.310 0 GHz   Stop 2.430 0 GHz
#Res BW 1 MHz   #VBW 1 MHz   Sweep 1 ms (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.413 0 GHz	106.71 dBµV
2	(1)	Freq	2.390 0 GHz	70.18 dBµV

Detector mode: Average   Polarity: Horizontal

Agilent   R T

Mkr1 2.411 0 GHz
95.236 dBµV

Ref 117 dBµV   #Atten 20 dB
#Peak
Log
10
dB/

LgAv
3
M1 S2
Start 2.310 0 GHz   Stop 2.430 0 GHz
#Res BW 1 MHz   #VBW 10 Hz   Sweep 9.357 s (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.411 0 GHz	95.24 dBµV
2	(1)	Freq	2.390 0 GHz	50.90 dBµV
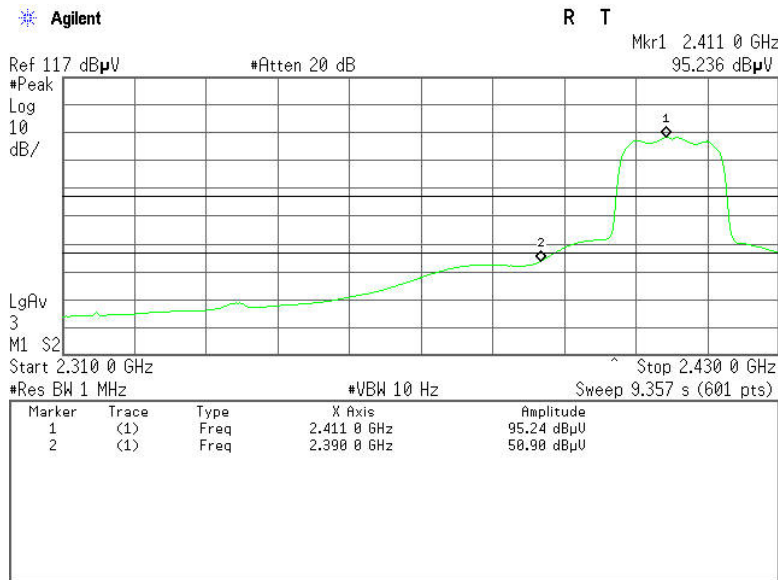
No.	Frequency (MHz)	Reading (dBuV)	Corrected (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Antenna Pole
1	2390.0000	66.43	-6.60	73.03	74.00	-0.97	Peak	Horizontal
2	2390.0000	46.17	-6.60	52.77	54.00	-1.23	Average	Horizontal

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Band Edges (CH High)

Detector mode: Peak   Polarity: Vertical

Agilent   R T
                                                  Mkr1 2.462 00 GHz
Ref 117 dBμV   #Atten 20 dB   106.80 dBμV
#Peak
Log
10
dB/

LgAv

M1 S2
Start 2.450 00 GHz   Stop 2.500 00 GHz
#Res BW 1 MHz   #VBW 1 MHz   Sweep 1 ms (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.462 00 GHz	106.80 dBμV
2	(1)	Freq	2.483 50 GHz	67.59 dBμV

Detector mode: Average   Polarity: Vertical

Agilent   R T
                                                  Mkr1 2.461 08 GHz
Ref 117 dBμV   #Atten 20 dB   94.53 dBμV
#Peak
Log
10
dB/

LgAv

M1 S2
Start 2.450 00 GHz   Stop 2.500 00 GHz
#Res BW 1 MHz   #VBW 10 Hz   Sweep 3.899 s (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.461 08 GHz	94.53 dBμV
2	(1)	Freq	2.483 50 GHz	48.38 dBμV

No.	Frequency (MHz)	Reading (dBuV)	Corrected (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Antenna Pole
1	2483.5000	62.63	-6.24	68.87	74.00	-5.13	Peak	Vertical
2	2483.5000	43.61	-6.24	49.85	54.00	-4.15	Average	Vertical
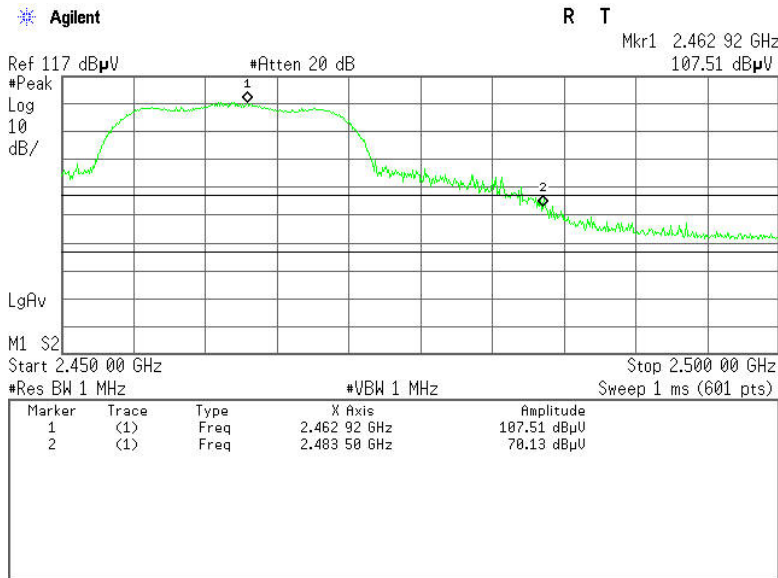
This report shall not be reproduced except in full, without the written approval of Compliance Certification Services.
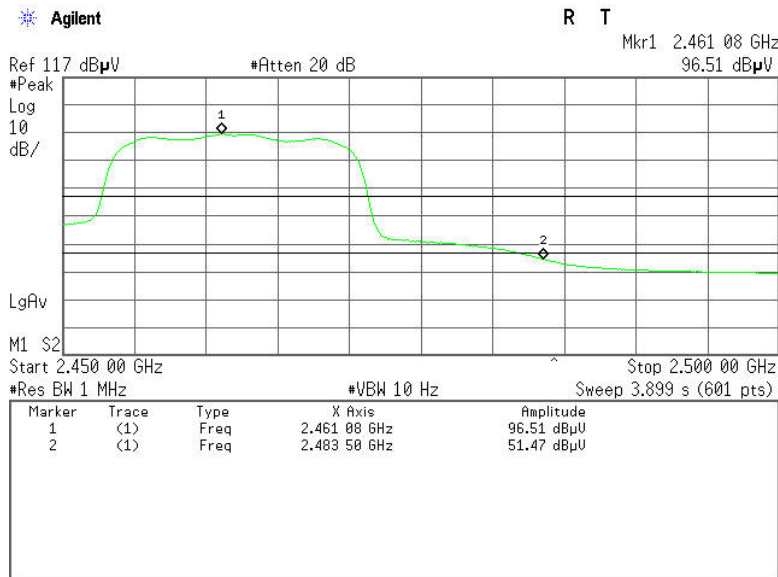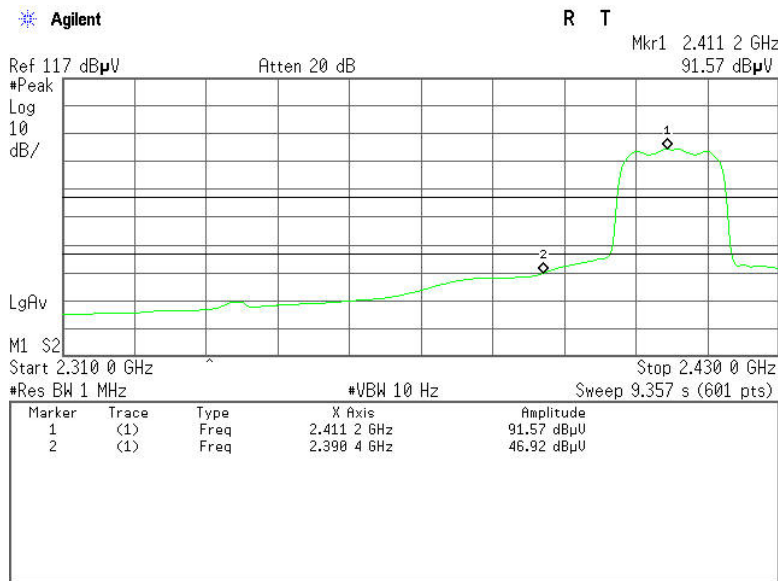
Detector mode: Peak   **Polarity: Horizontal**

Detector mode: Average   **Polarity: Horizontal**

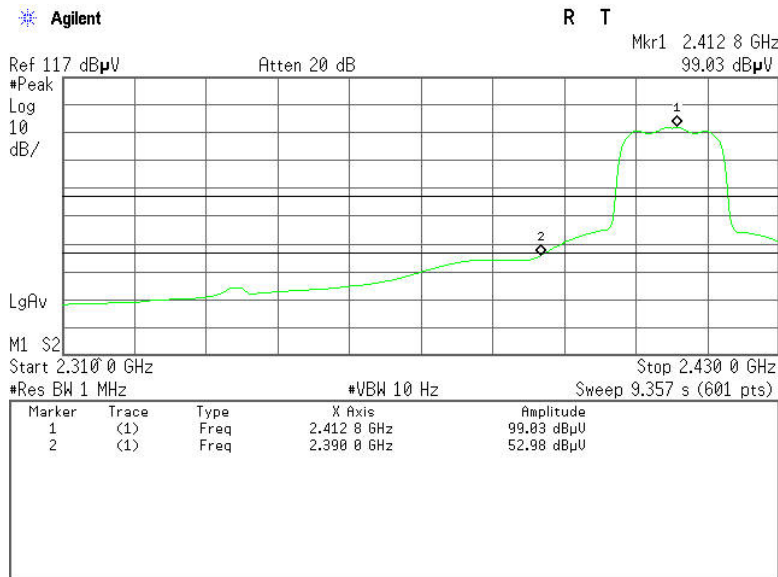| No.	Frequency (MHz)	Reading (dBuV)	Corrected (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Antenna Pole
1	2483.5000	61.00	-6.24	67.24	74.00	-6.76	Peak	Horizontal
2	2483.5000	41.73	-6.24	47.97	54.00	-6.03	Average	Horizontal

FCC ID: PJZ6738   Page 84 / 110

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Antenna 1

IEEE 802.11g mode

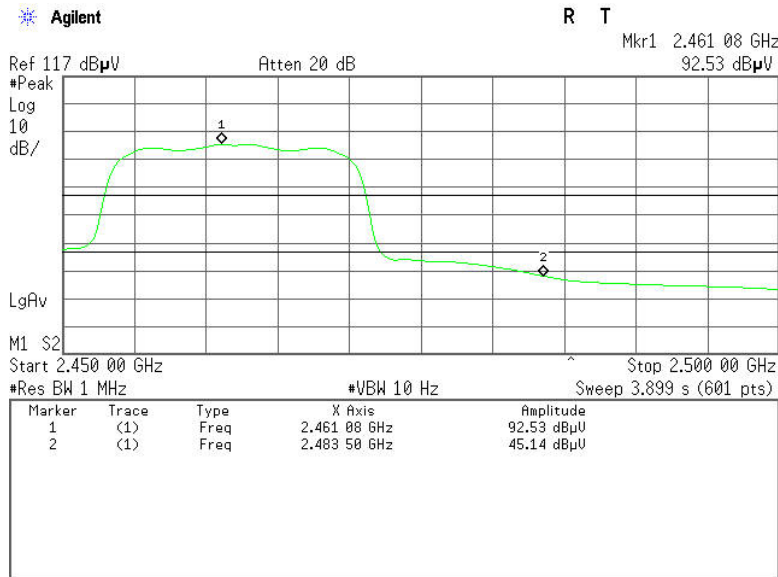**Band Edges (CH Low)**

Detector mode: Peak   **Polarity: Vertical**
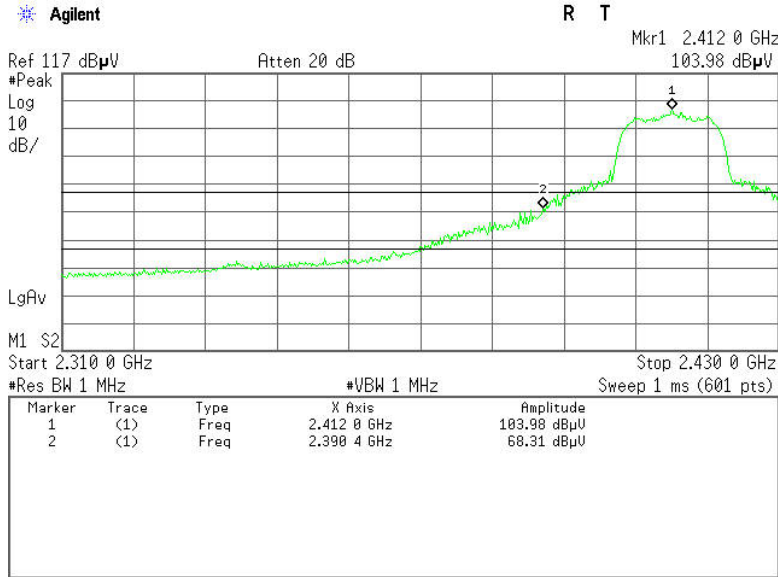
Detector mode: Average   **Polarity: Vertical**

No.	Frequency (MHz)	Reading (dBuV)	Corrected (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Antenna Pole
1	2390.0000	61.71	-6.60	68.31	74.00	-5.69	Peak	Vertical
2	2390.0000	40.32	-6.60	46.92	54.00	-7.08	Average	Vertical
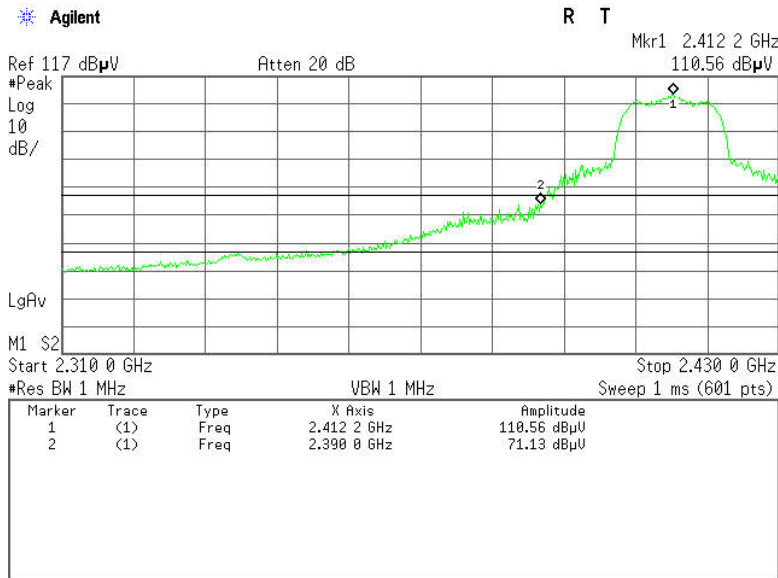
Detector mode: Peak   Polarity: Horizontal


```
※ Agilent                                        R   T
                                              Mkr1  2.412 2 GHz
Ref 117 dBµV          Atten 20 dB              110.56 dBµV
#Peak
Log
10
dB/

                                                       1

                                                2

LgAv

M1 S2
Start 2.310 0 GHz                          Stop 2.430 0 GHz
#Res BW 1 MHz              VBW 1 MHz        Sweep 1 ms (601 pts)
 Marker   Trace    Type       X Axis         Amplitude
   1       (1)     Freq     2.412 2 GHz      110.56 dBµV
   2       (1)     Freq     2.390 0 GHz       71.13 dBµV
```

Detector mode: Average   Polarity: Horizontal


```
※ Agilent                                        R   T
                                              Mkr1  2.412 8 GHz
Ref 117 dBµV          Atten 20 dB               99.03 dBµV
#Peak
Log
10
dB/

                                                       1

                                                2

LgAv

M1 S2
Start 2.310 0 GHz                          Stop 2.430 0 GHz
#Res BW 1 MHz              #VBW 10 Hz       Sweep 9.357 s (601 pts)
 Marker   Trace    Type       X Axis         Amplitude
   1       (1)     Freq     2.412 8 GHz       99.03 dBµV
   2       (1)     Freq     2.390 0 GHz       52.98 dBµV
```

No.	Frequency (MHz)	Reading (dBuV)	Corrected (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Antenna Pole
1	2390.0000	64.53	-6.60	71.13	74.00	-2.87	Peak	Horizontal
2	2390.0000	46.38	-6.60	52.98	54.00	-1.02	Average	Horizontal
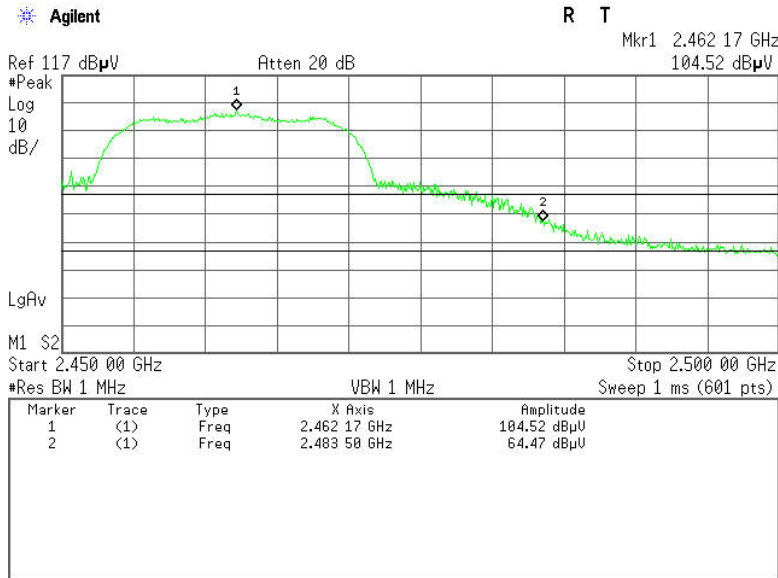
Band Edges (CH High)
Detector mode: Peak   Polarity: Vertical

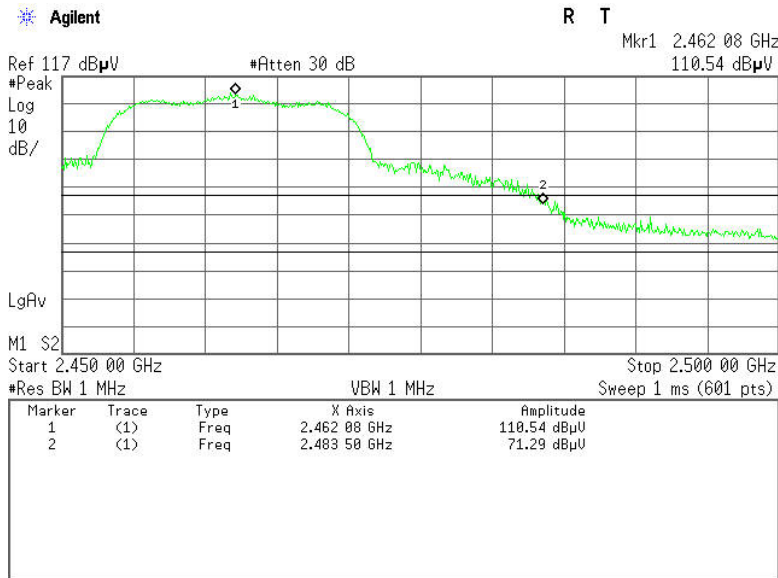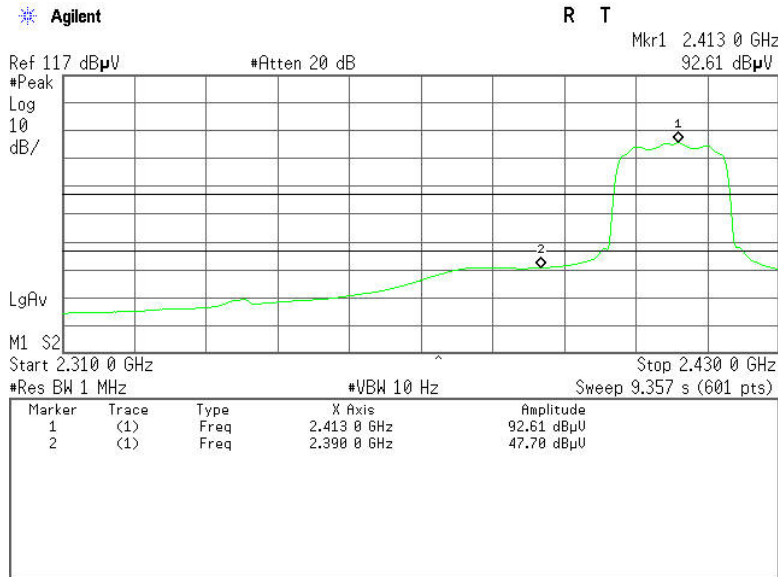### Detector mode: Average   Polarity: Vertical

No.	Frequency (MHz)	Reading (dBuV)	Corrected (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Antenna Pole
1	2483.5000	58.23	-6.24	64.47	74.00	-9.53	Peak	Vertical
2	2483.5000	38.90	-6.24	45.14	54.00	-8.86	Average	Vertical

Compliance Certification Services Inc.

Detector mode: Peak **Polarity: Horizontal**


```
※ Agilent                                          R   T
                                          Mkr1  2.462 08 GHz
Ref 117 dBμV              #Atten 30 dB          110.54 dBμV
#Peak
Log
10
dB/

LgAv

M1 S2
Start 2.450 00 GHz                        Stop 2.500 00 GHz
#Res BW 1 MHz             VBW 1 MHz        Sweep 1 ms (601 pts)
Marker  Trace   Type      X Axis         Amplitude
   1     (1)    Freq    2.462 08 GHz     110.54 dBμV
   2     (1)    Freq    2.483 50 GHz      71.29 dBμV
```

Detector mode: Average **Polarity: Horizontal**


```
※ Agilent                                          R   T
                                          Mkr1  2.461 17 GHz
Ref 117 dBμV              #Atten 30 dB           99.29 dBμV
#Peak
Log
10
dB/

LgAv

M1 S2
Start 2.450 00 GHz            ^           Stop 2.500 00 GHz
#Res BW 1 MHz             #VBW 10 Hz      Sweep 3.899 s (601 pts)
Marker  Trace   Type      X Axis         Amplitude
   1     (1)    Freq    2.461 17 GHz      99.29 dBμV
   2     (1)    Freq    2.483 50 GHz      52.65 dBμV
```
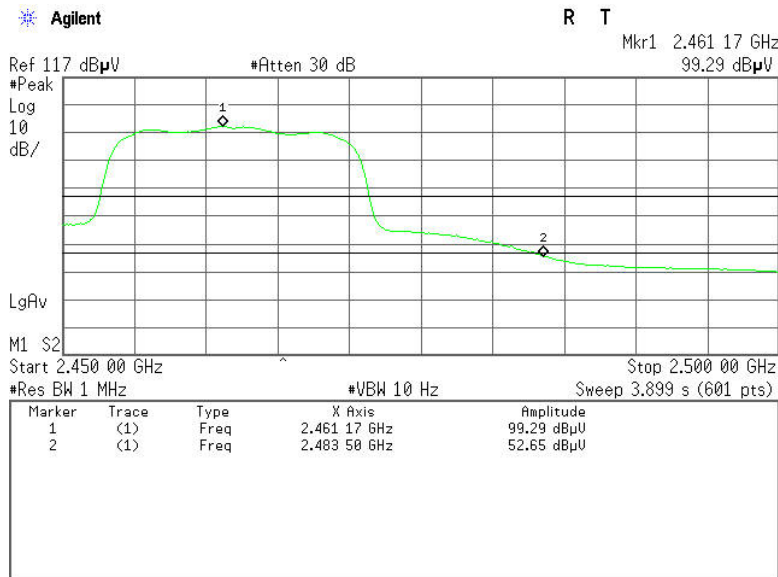
No.	Frequency (MHz)	Reading (dBuV)	Corrected (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Antenna Pole
1	2483.5000	65.05	-6.24	71.29	74.00	-2.71	Peak	Horizontal
2	2483.5000	46.41	-6.24	52.65	54.00	-1.35	Average	Horizontal

Combine with Antenna 0 and Antenna 1

IEEE 802.11n HT20 MHz mode

Band Edges (CH Low)
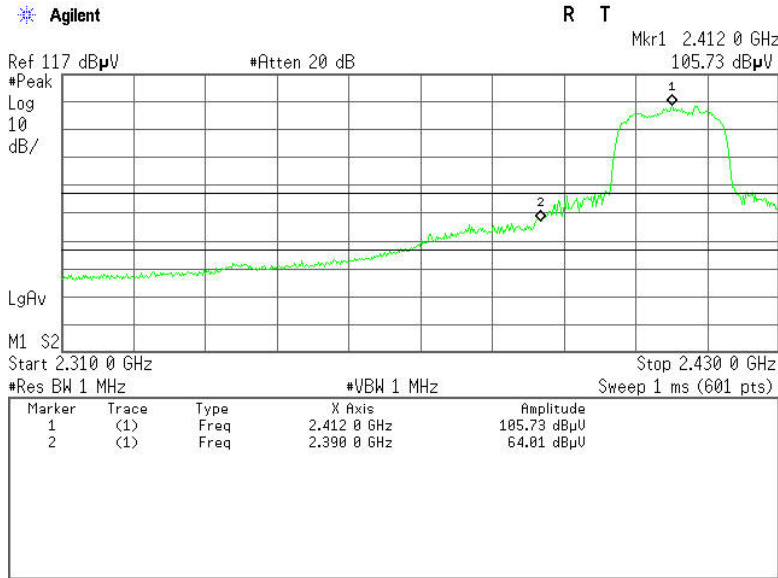
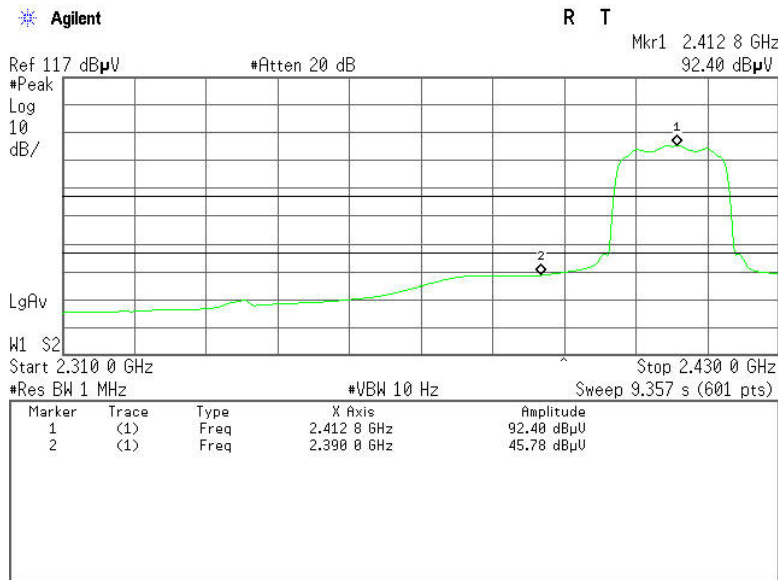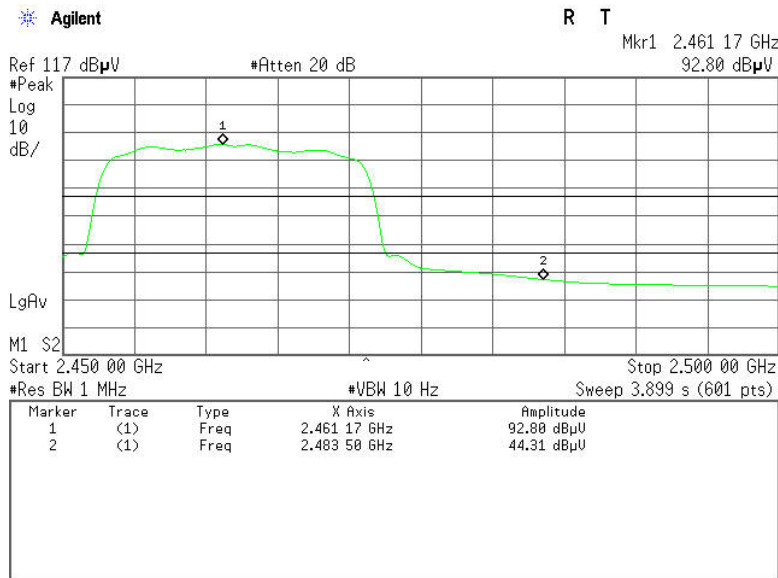**Detector mode: Peak**   **Polarity: Vertical**

Detector mode: Average   **Polarity: Vertical**
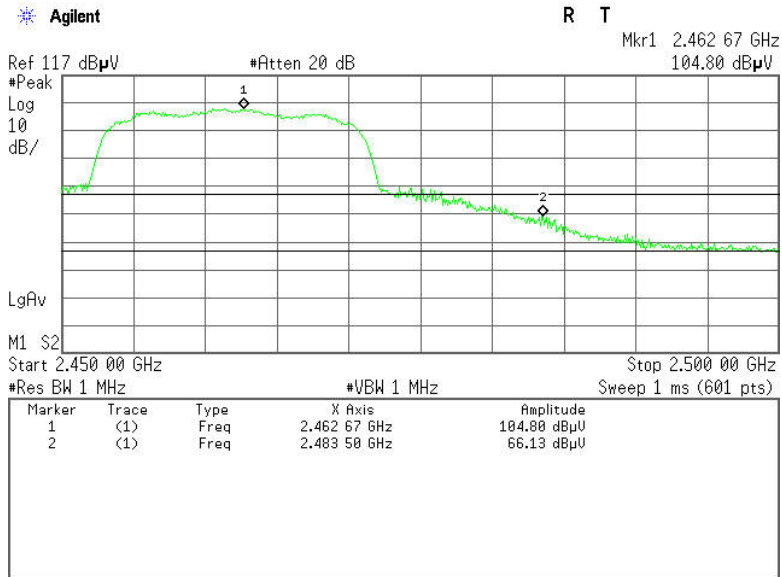

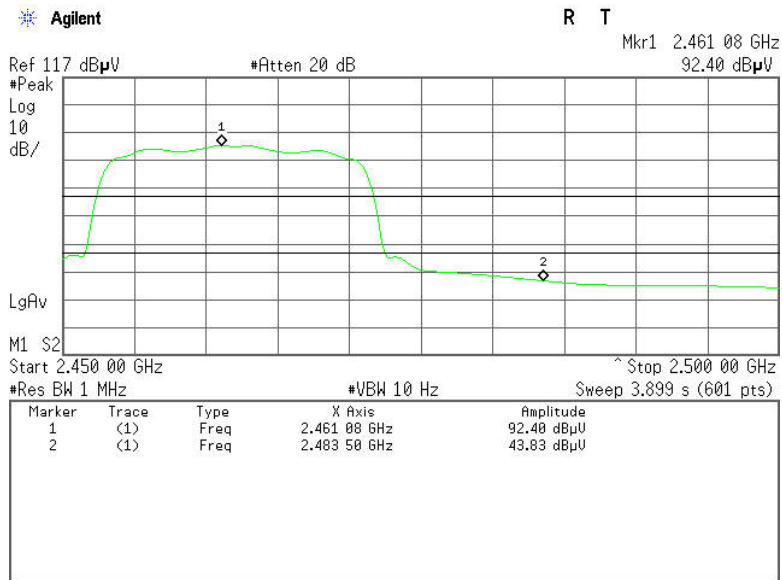| No.	Frequency (MHz)	Reading (dBuV)	Corrected (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Antenna Pole
1	2390.0000	57.41	-6.60	64.01	74.00	-9.99	Peak	Vertical
2	2390.0000	41.10	-6.60	47.70	54.00	-6.30	Average	Vertical
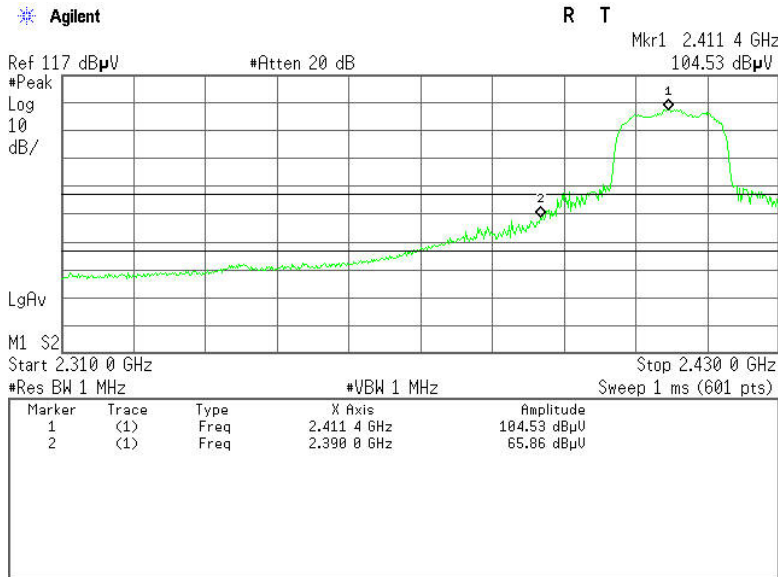
Detector mode: Peak   **Polarity: Horizontal**

Detector mode: Average   **Polarity: Horizontal**

No.	Frequency (MHz)	Reading (dBuV)	Corrected (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Antenna Pole
1	2390.0000	59.26	-6.60	65.86	74.00	-8.14	Peak	Horizontal
2	2390.0000	39.18	-6.60	45.78	54.00	-8.22	Average	Horizontal
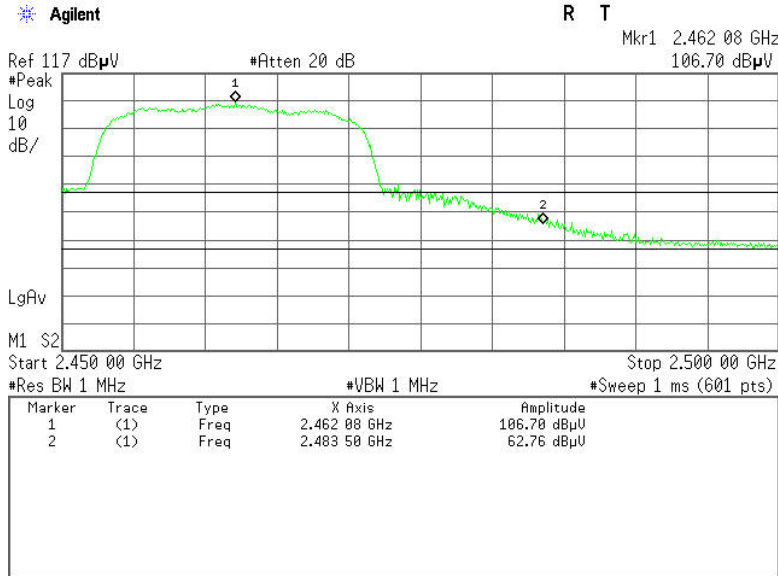
Band Edges (CH High)

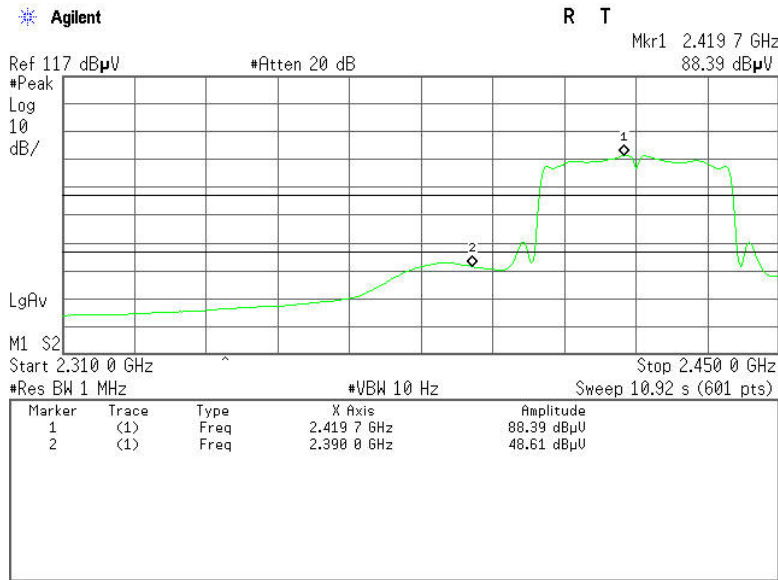**Detector mode: Peak**   **Polarity: Vertical**

Detector mode: Average   **Polarity: Vertical**
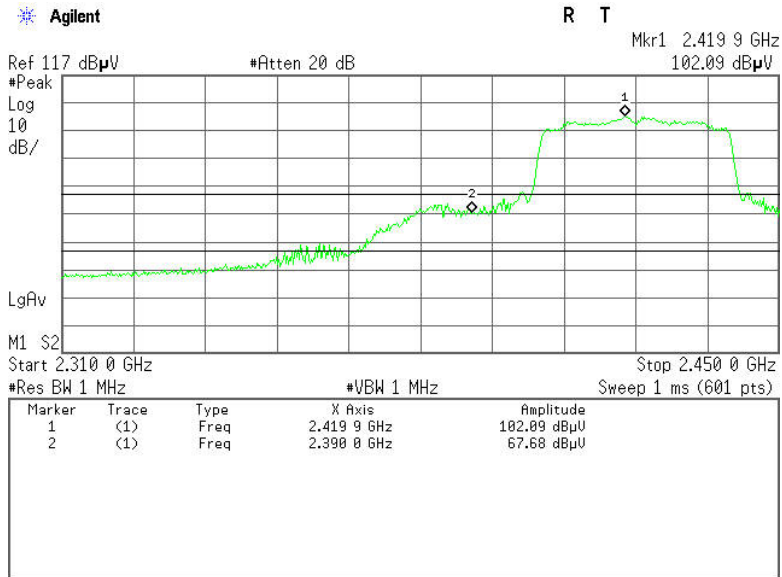

No.	Frequency (MHz)	Reading (dBuV)	Corrected (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Antenna Pole
1	2483.5000	56.52	-6.24	62.76	74.00	-11.24	Peak	Vertical
2	2483.5000	38.07	-6.24	44.31	54.00	-9.69	Average	Vertical

FCC ID: PJZ6738   Page 91 / 110

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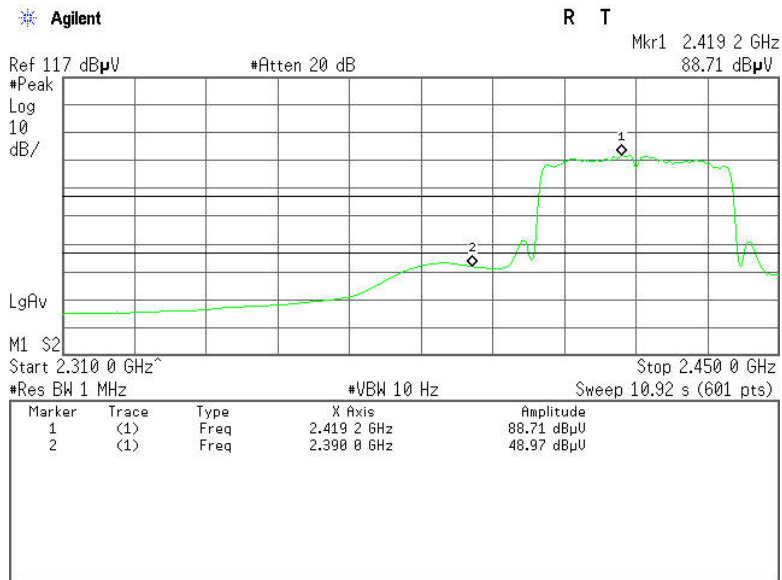## Compliance Certification Services Inc.

Detector mode: Peak   Polarity: Horizontal

Detector mode: Average   Polarity: Horizontal

No.	Frequency (MHz)	Reading (dBuV)	Corrected (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Antenna Pole
1	2483.5000	59.89	-6.24	66.13	74.00	-7.87	Peak	Horizontal
2	2483.5000	37.59	-6.24	43.83	54.00	-10.17	Average	Horizontal

Combine with Antenna 0 and Antenna 1

IEEE 802.11n HT40 MHz mode

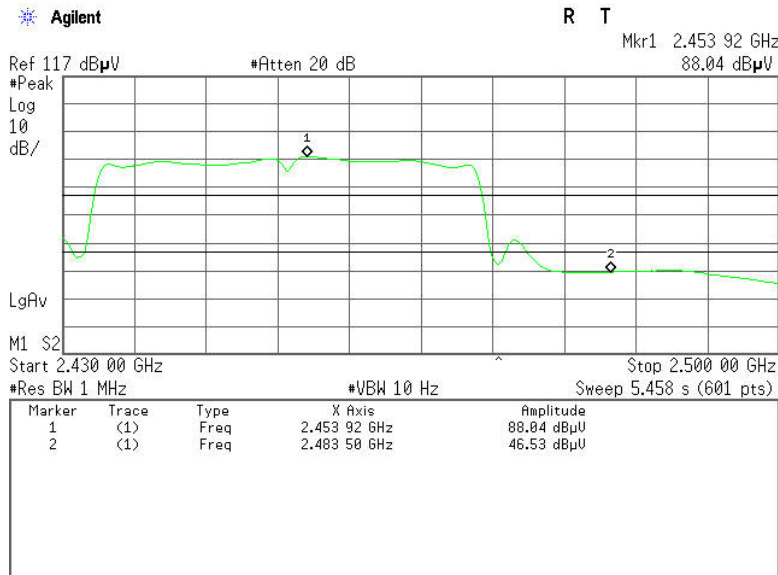**Band Edges (CH Low)**
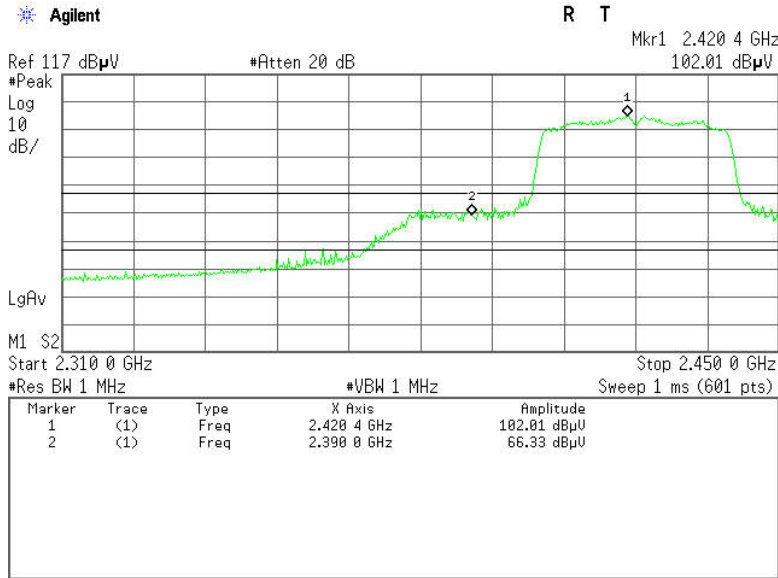
Detector mode: Peak   **Polarity: Vertical**

Detector mode: Average   **Polarity: Vertical**
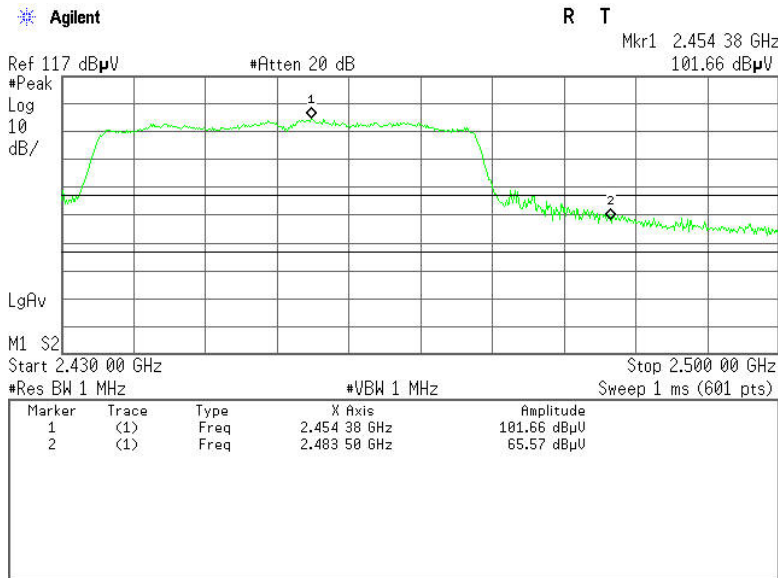

No.	Frequency (MHz)	Reading (dBuV)	Corrected (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Antenna Pole
1	2390.0000	59.73	-6.60	66.33	74.00	-7.67	Peak	Vertical
2	2390.0000	42.01	-6.60	48.61	54.00	-5.39	Average	Vertical

Detector mode: Peak   Polarity: Horizontal


```
      Agilent                                    R  T
                                                      Mkr1  2.419 9 GHz
Ref 117 dBµV            #Atten 20 dB                   102.09 dBµV
#Peak
Log
10
dB/

LgAv

M1 S2
Start 2.310 0 GHz                            Stop 2.450 0 GHz
#Res BW 1 MHz           #VBW 1 MHz           Sweep 1 ms (601 pts)
   Marker   Trace   Type      X Axis           Amplitude
      1      (1)    Freq      2.419 9 GHz       102.09 dBµV
      2      (1)    Freq      2.390 0 GHz       67.68 dBµV
```

Detector mode: Average   Polarity: Horizontal


```
      Agilent                                    R  T
                                                      Mkr1  2.419 2 GHz
Ref 117 dBµV            #Atten 20 dB                   88.71 dBµV
#Peak
Log
10
dB/

LgAv

M1 S2
Start 2.310 0 GHz^                           Stop 2.450 0 GHz
#Res BW 1 MHz           #VBW 10 Hz           Sweep 10.92 s (601 pts)
   Marker   Trace   Type      X Axis           Amplitude
      1      (1)    Freq      2.419 2 GHz       88.71 dBµV
      2      (1)    Freq      2.390 0 GHz       48.97 dBµV
```

No.	Frequency (MHz)	Reading (dBuV)	Corrected (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Antenna Pole
1	2390.0000	61.08	-6.60	67.68	74.00	-6.32	Peak	Horizontal
2	2390.0000	42.37	-6.60	48.97	54.00	-5.03	Average	Horizontal
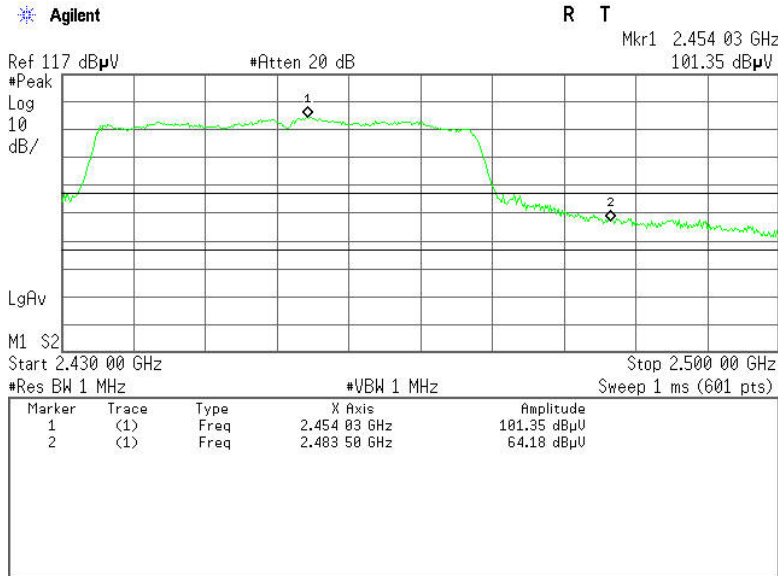
Band Edges (CH High)
Detector mode: Peak   Polarity: Vertical


```
      Agilent                              R  T
                                              Mkr1  2.454 03 GHz
Ref 117 dBµV        #Atten 20 dB                  101.35 dBµV
#Peak
Log
10
dB/

LgAv

M1 S2
Start 2.430 00 GHz                    Stop 2.500 00 GHz
#Res BW 1 MHz      #VBW 1 MHz          Sweep 1 ms (601 pts)
```

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.454 03 GHz	101.35 dBµV
2	(1)	Freq	2.483 50 GHz	64.18 dBµV

Detector mode: Average   Polarity: Vertical


```
      Agilent                              R  T
                                              Mkr1  2.453 92 GHz
Ref 117 dBµV        #Atten 20 dB                   88.04 dBµV
#Peak
Log
10
dB/

LgAv

M1 S2
Start 2.430 00 GHz                    Stop 2.500 00 GHz
#Res BW 1 MHz      #VBW 10 Hz          Sweep 5.458 s (601 pts)
```

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.453 92 GHz	88.04 dBµV
2	(1)	Freq	2.483 50 GHz	46.53 dBµV

No.	Frequency (MHz)	Reading (dBuV)	Corrected (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Antenna Pole
1	2483.5000	57.94	-6.24	64.18	74.00	-9.82	Peak	Vertical
2	2483.5000	40.29	-6.24	46.53	54.00	-7.47	Average	Vertical

Detector mode: Peak　　　　　**Polarity: Horizontal**

Detector mode: Average　　　　　**Polarity: Horizontal**
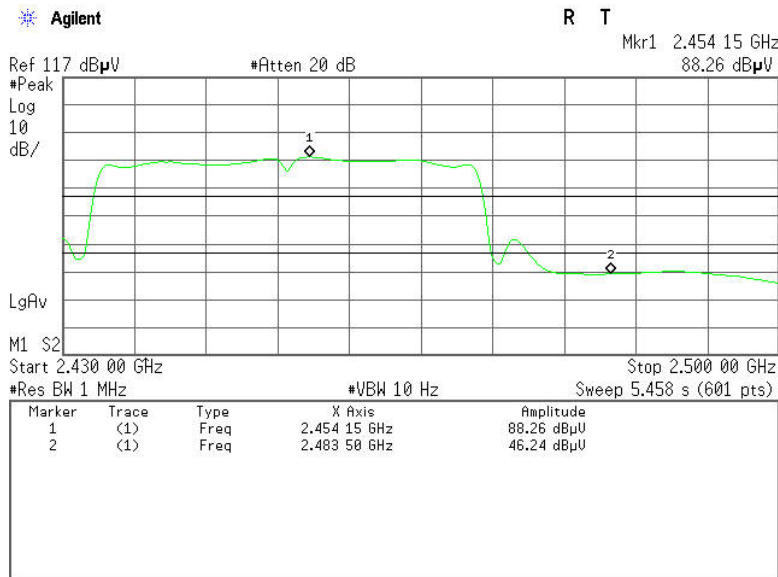
No.	Frequency (MHz)	Reading (dBuV)	Corrected (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Antenna Pole
1	2483.5000	59.33	-6.24	65.57	74.00	-8.43	Peak	Horizontal
2	2483.5000	40.00	-6.24	46.24	54.00	-7.76	Average	Horizontal

7.6. PEAK POWER SPECTRAL DENSITY MEASUREMENT

7.6.1. LIMITS

According to §15.247(e), for digitally modulated systems, 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.

According to §15.247(f), the digital modulation operation of the hybrid system, with the frequency hopping turned off, shall comply with the power density requirements of paragraph (d) of this section.

7.6.2. TEST INSTRUMENTS

Name of Equipment	Manufacturer	Model	Serial Number	Last Calibration	Calibration Due
Spectrum Analyzer	Agilent	E4446A	US44300399	03/09/2013	03/08/2014

7.6.3. TEST PROCEDURES (please refer to measurement standard)

§15.247(e)specifies a conducted power spectral density (PSD) limit of 8 dBm in any 3 kHz band segment within the fundamental EBW during any time interval of continuous transmission. The same method as used to determine the conducted output power shall be used to determine the power spectral density (i.e.,if peak-detected fundamental power was measured then use the peak PSD procedure and if average fundamental power was measured then use the average PSD procedure).

1. Use this procedure when the maximum peak conducted output power in the fundamental emission is used to demonstrate compliance.
2. Set the RBW = 100 kHz.
3. Set the VBW ≥ 300 kHz.
4. Set the span to 5-30 % greater than the EBW.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.
10. Scale the observed power level to an equivalent value in 3 kHz by adjusting (reducing) the measured power by a bandwidth correction factor (BWCF) where BWCF = 10log(3 kHz/100 kHz= -15.2 dB).
11. The resulting peak PSD level must be ≤ 8 dBm.

7.6.4. TEST SETUP

EUT → Spectrum Analyzer
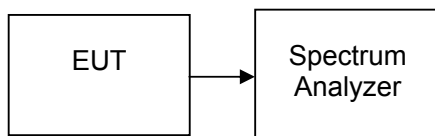
7.6.5. TEST RESULTS

No non-compliance noted

Test Data

Antenna 0

Test mode: IEEE 802.11b

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Test Result
Low	2412	-9.30		PASS
Mid	2437	-8.35	8	PASS
High	2462	-7.23		PASS

Antenna 0

Test mode: IEEE 802.11g

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Test Result
Low	2412	-11.89		PASS
Mid	2437	-10.65	8	PASS
High	2462	-10.55		PASS

Antenna 1

Test mode: IEEE 802.11g

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Test Result
Low	2412	-8.43		PASS
Mid	2437	-8.22	8	PASS
High	2462	-9.56		PASS

Combine with Antenna 0 and Antenna 1

Test mode: IEEE 802.11n HT20 MHz

Channel	Frequency (MHz)	PPSD (dBm)			Limit (dBm)	Test Result
		(Chain 0)	(Chain 1)	(Total)		
Low	2412	-13.31	-8.43	-7.21		PASS
Mid	2437	-13.01	-8.82	-7.42	8	PASS
High	2462	-12.5	-9.56	-7.78		PASS

Combine with Antenna 0 and Antenna 1

Test mode: IEEE 802.11n HT40 MHz

Channel	Frequency (MHz)	PPSD (dBm)			Limit (dBm)	Test Result
		(Chain 0)	(Chain 1)	(Total)		
Low	2422	-14.05	-15.31	-11.62		PASS
Mid	2437	-14.14	-15.76	-11.86	8	PASS
High	2452	-14.00	-14.96	-11.44		PASS

Note : Combine Power Calculation :

$$\text{Total PPSD(dBm)} = \log\left(10^{(\text{chain 0 PPSD/10})} + 10^{(\text{chain 1 PPSD/10})}\right) * 10$$

FCC ID: PJZ6738   Page 99 / 110

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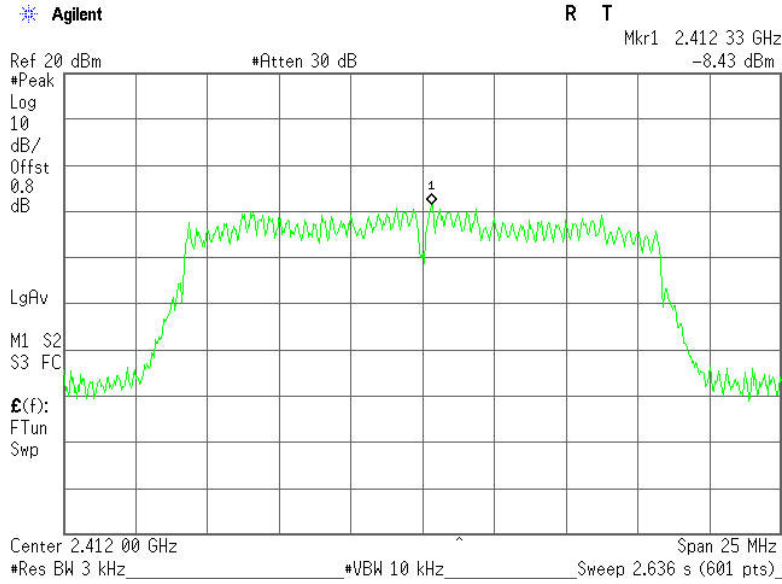
Compliance Certification Services Inc.

Test Plot

Antenna 0

IEEE 802.11b mode

PPSD (CH Low)

PPSD (CH Mid)

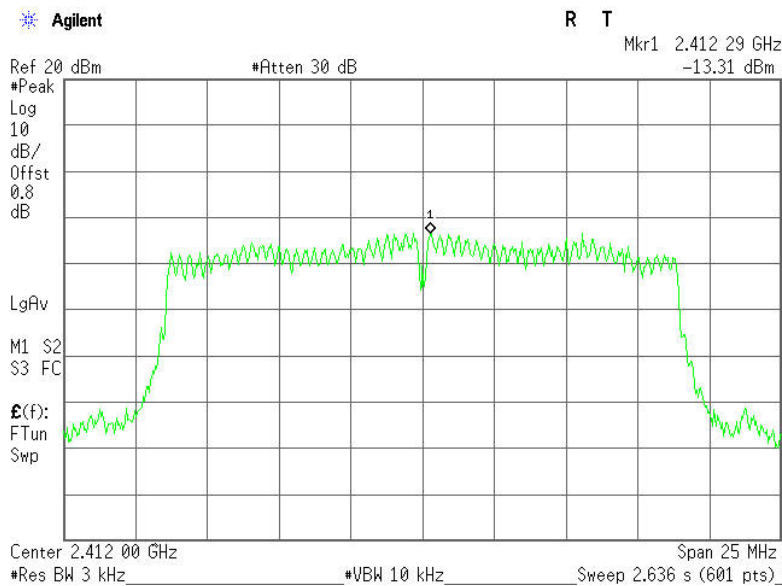*This report shall not be reproduced except in full, without the written approval of Compliance Certification Services.*

PPSD (CH High)

Antenna 0

IEEE 802.11g mode

PPSD (CH Low)

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PPSD (CH Mid)


```
           Agilent                              R   T
                                                    Mkr1  2.435 79 GHz
Ref 20 dBm              #Atten 30 dB                      -10.65 dBm
#Peak
Log
10
dB/
Offst
0.8
dB                                      1

LgAv

M1  S2
S3  FC

£(f):
FTun
Swp

Center 2.437 00 GHz                              Span 25 MHz
#Res BW 3 kHz          #VBW 10 kHz         Sweep 2.636 s (601 pts)
```

PPSD (CH High)


```
           Agilent                              R   T
                                                    Mkr1  2.460 12 GHz
Ref 20 dBm              #Atten 30 dB                      -10.55 dBm
#Peak
Log
10
dB/
Offst
0.8
dB                                      1

LgAv

M1  S2
S3  FC

£(f):
FTun
Swp

Center 2.462 00 GHz                              Span 25 MHz
#Res BW 3 kHz          #VBW 10 kHz         Sweep 2.636 s (601 pts)
```

Antenna 1

IEEE 802.11g mode

PPSD (CH Low)

PPSD (CH Mid)

FCC ID: PJZ6738

Page 103 / 110

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PPSD (CH High)

Antenna 0

IEEE 802.11n HT20 MHz mode
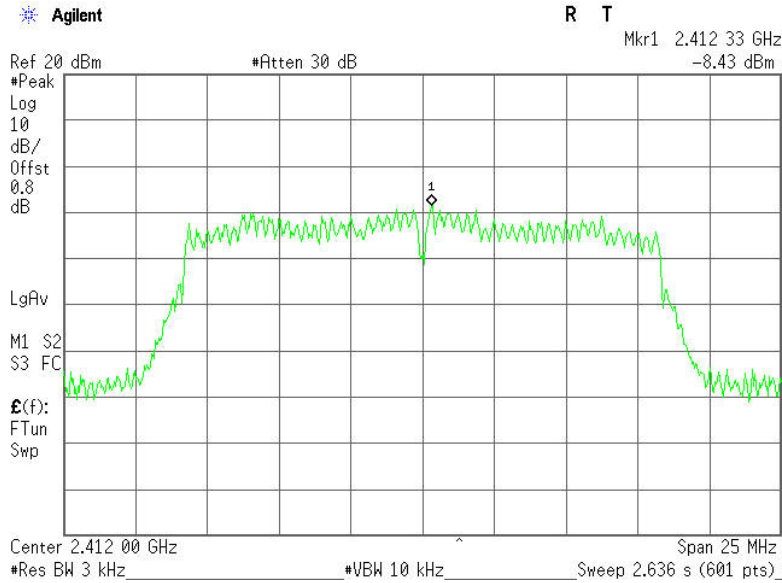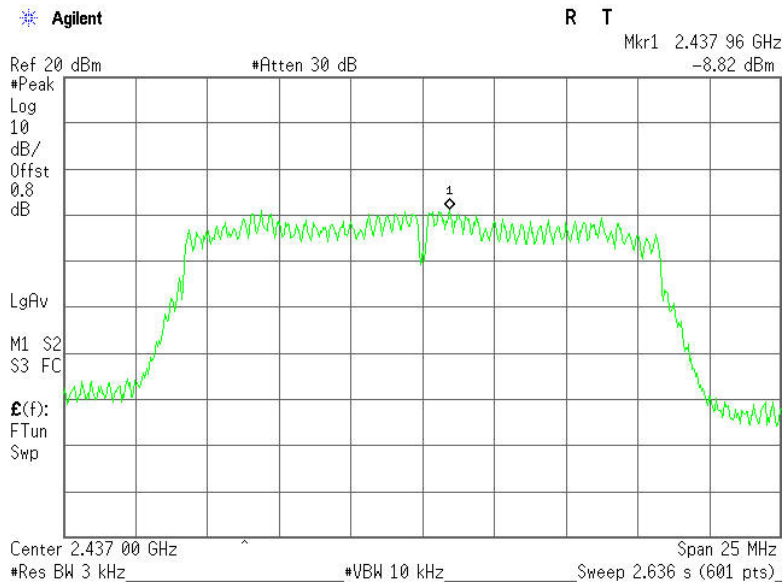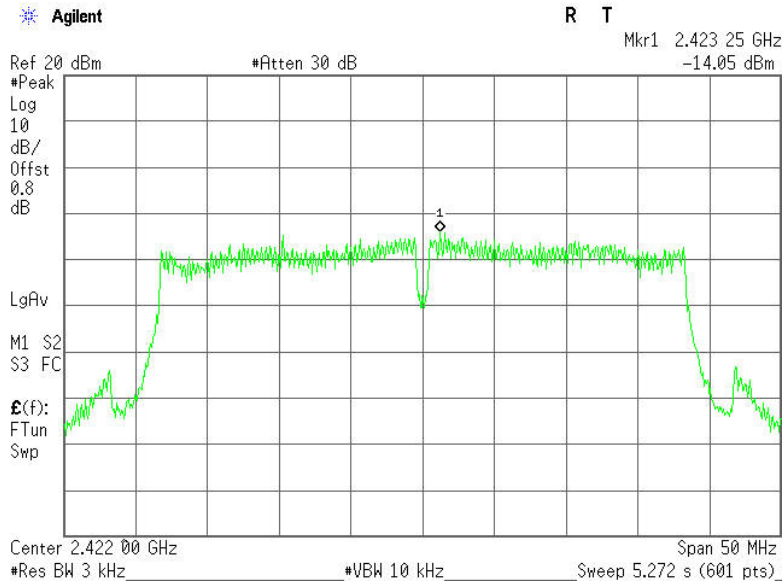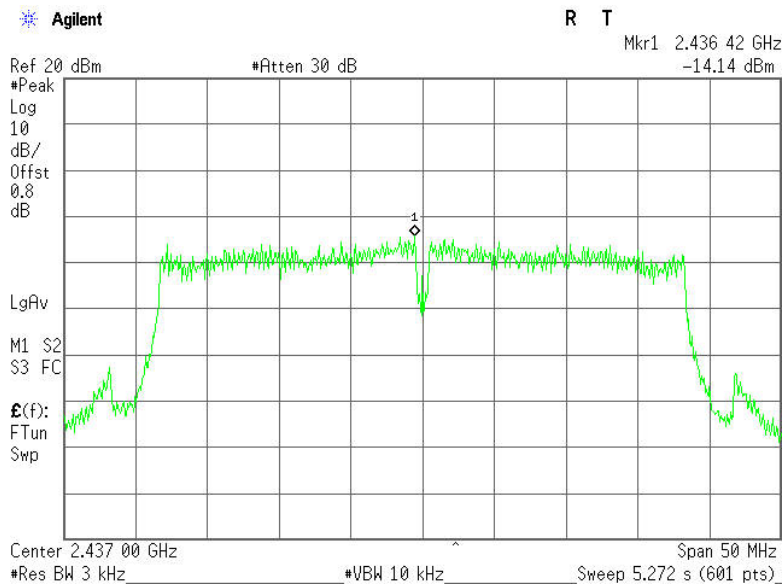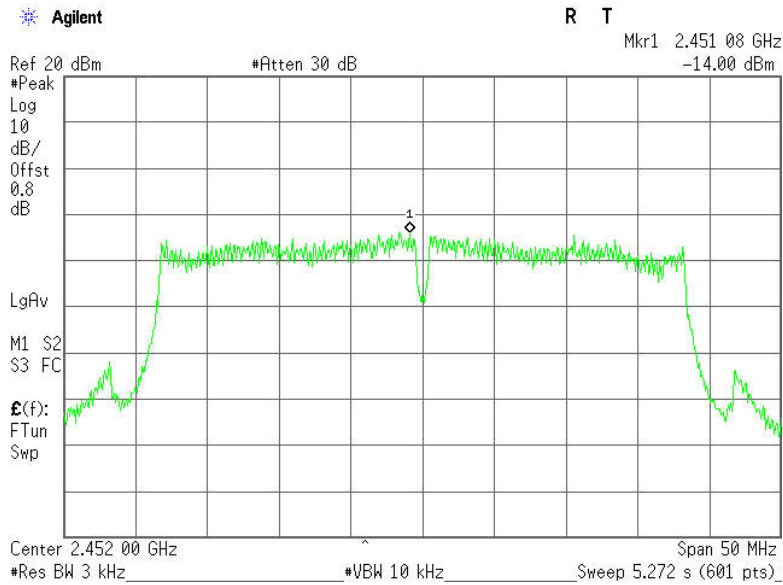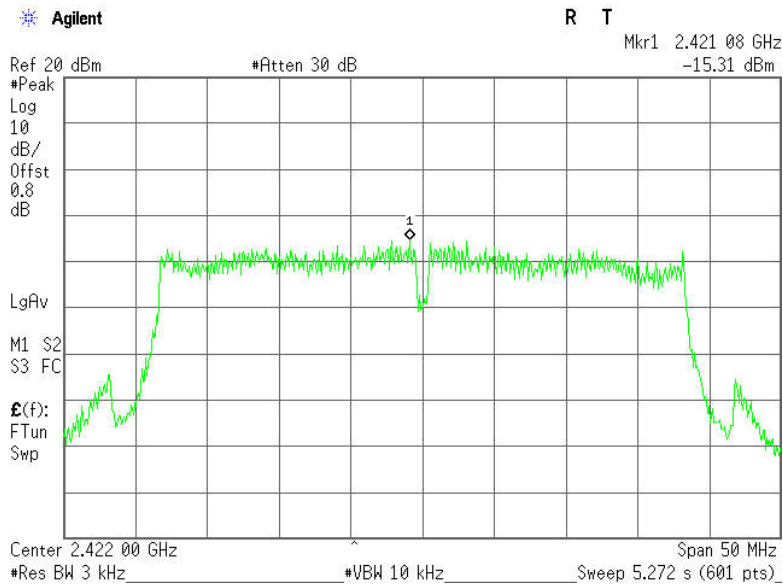
PPSD (CH Low)
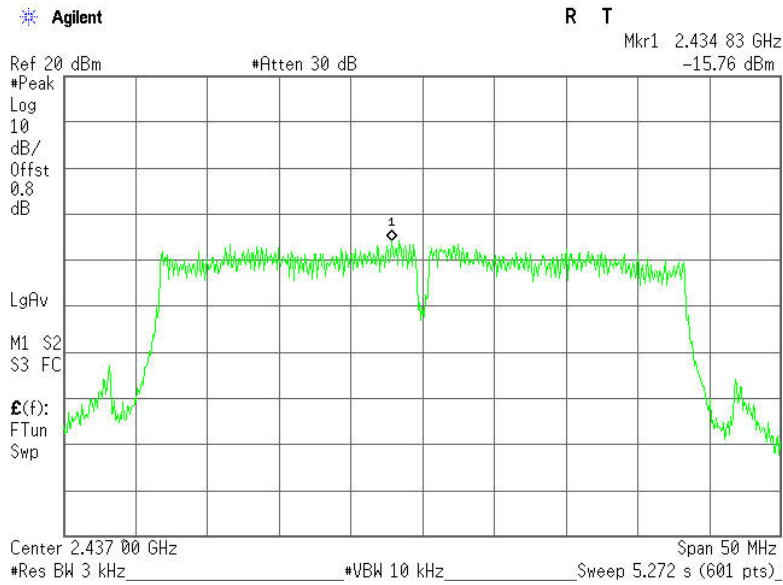
PPSD (CH Mid)

PPSD (CH High)

Antenna 1

IEEE 802.11n HT20 MHz mode

PPSD (CH Low)

PPSD (CH Mid)

PPSD (CH High)

Spectrum analyzer plot — Agilent. Ref 20 dBm, #Atten 30 dB, Mkr1 2.461 38 GHz, −9.56 dBm. #Peak Log 10 dB/ Offst 0.8 dB, LgAv, M1 S2 S3 FC, £(f): FTun Swp. Center 2.462 00 GHz, Span 25 MHz, #Res BW 3 kHz, #VBW 10 kHz, Sweep 2.636 s (601 pts).

Antenna 0

IEEE 802.11n HT40 MHz mode

PPSD (CH Low)

PPSD (CH Mid)

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PPSD (CH High)

Antenna 1

IEEE 802.11n HT40 MHz mode

PPSD (CH Low)

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PPSD (CH Mid)

PPSD (CH High)