



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 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. 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 | 03/19/2012 | 03/19/2013 |
| ESCI EMI TEST RECEIVER.ESCI | ROHDE&SCHWARZ | ESCI | 100783 | 03/17/2012 | 03/17/2013 |
| Amplifier | MITEQ | AM-1604-3000 | 1123808 | 03/18/2012 | 03/18/2013 |
| Turn Table | EMCO | 2081-1.21 | N/A | N.C.R | N.C.R |
| Controller | CT | N/A | N/A | N.C.R | N.C.R |
| High Noise Amplifier | Agilent | 8449B | 3008A01838 | 03/18/2012 | 03/18/2013 |
| Bilog Antenna | SCHAFFNER | CBL6143 | 5082 | 03/17/2012 | 03/17/2013 |
| Horn Antenna | SCHWARZBECK | BBHA9120 | D286 | 03/17/2012 | 03/17/2013 |
| Loop Antenna | A, R, A | PLA-1030/B | 1029 | 03/23/2012 | 03/23/2013 |
| Temp. / Humidity Meter | VICTOR | VC230 | N/A | 03/19/2012 | 03/19/2013 |
| 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.



7.5.5. TEST RESULTS

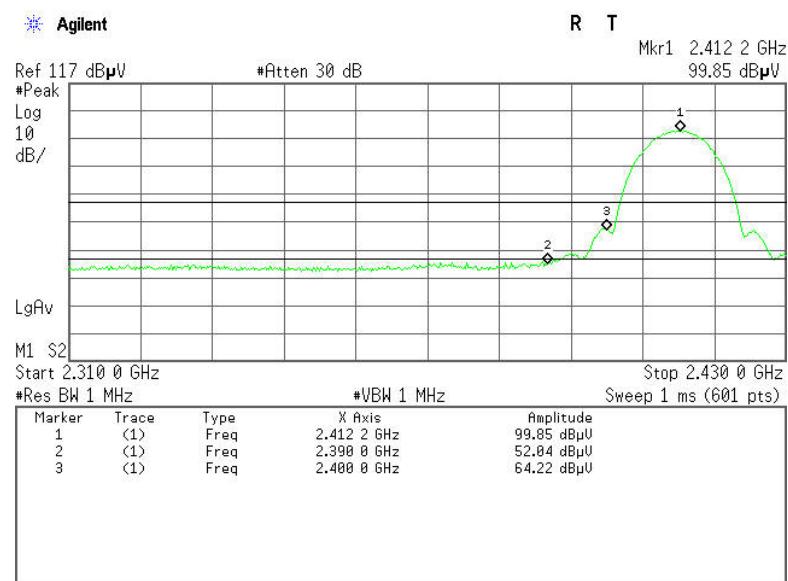
Test Plot

IEEE 802.11b mode

Band Edges (CH Low)

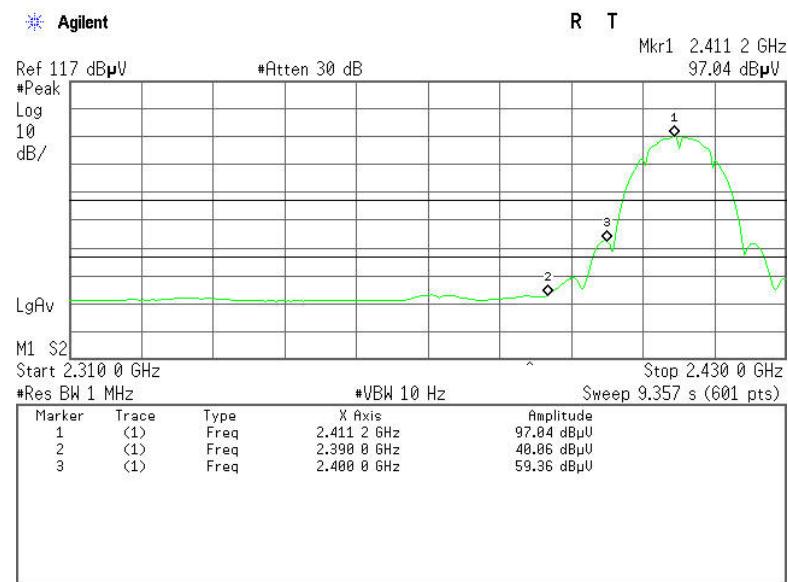
Detector mode: Peak

Polarity: Vertical



Detector mode: Average

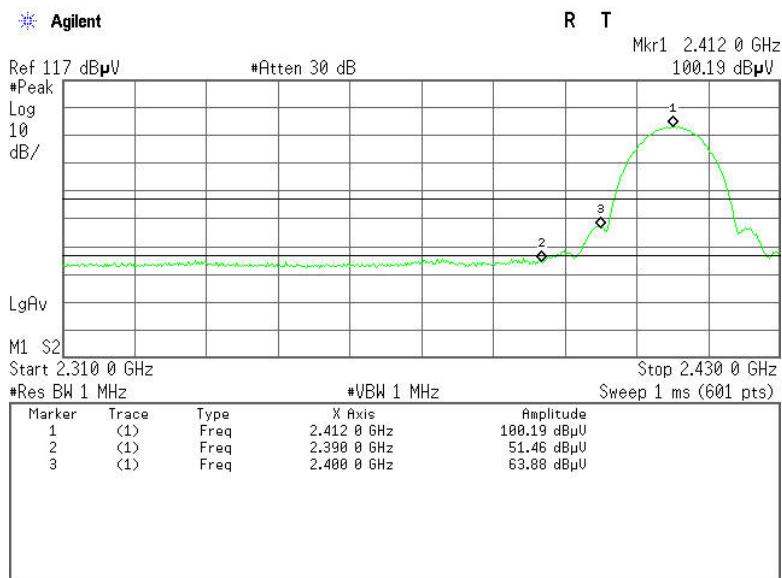
Polarity: Vertical





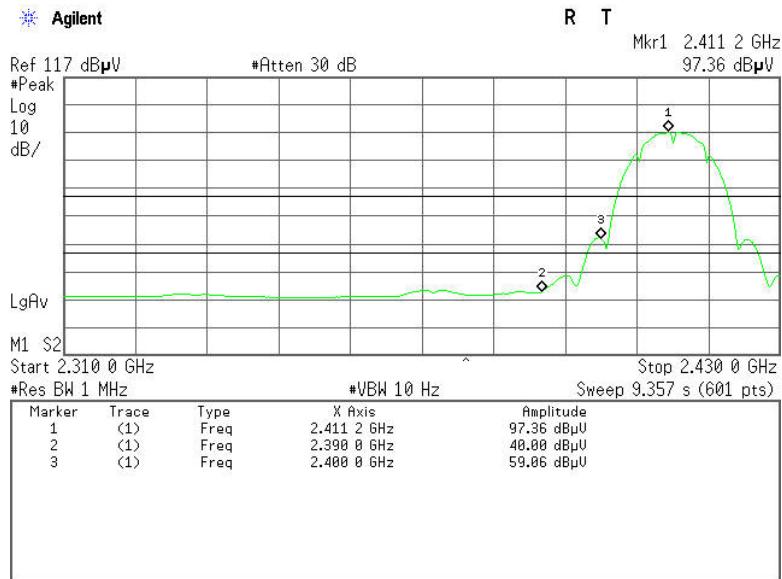
Detector mode: Peak

Polarity: Horizontal



Detector mode: Average

Polarity: Horizontal

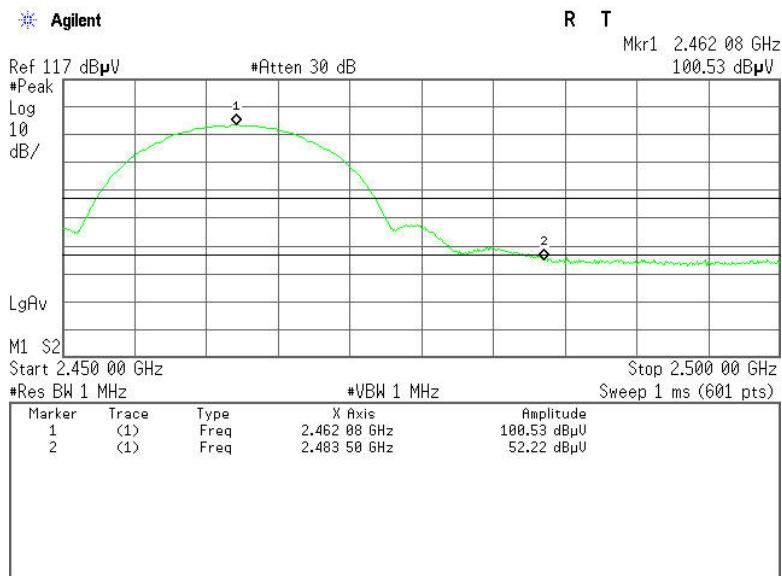




Band Edges (CH High)

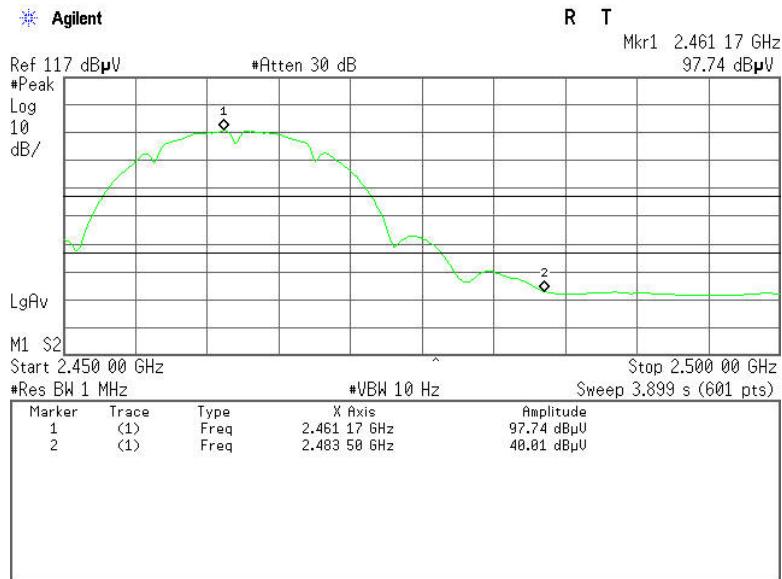
Detector mode: Peak

Polarity: Vertical



Detector mode: Average

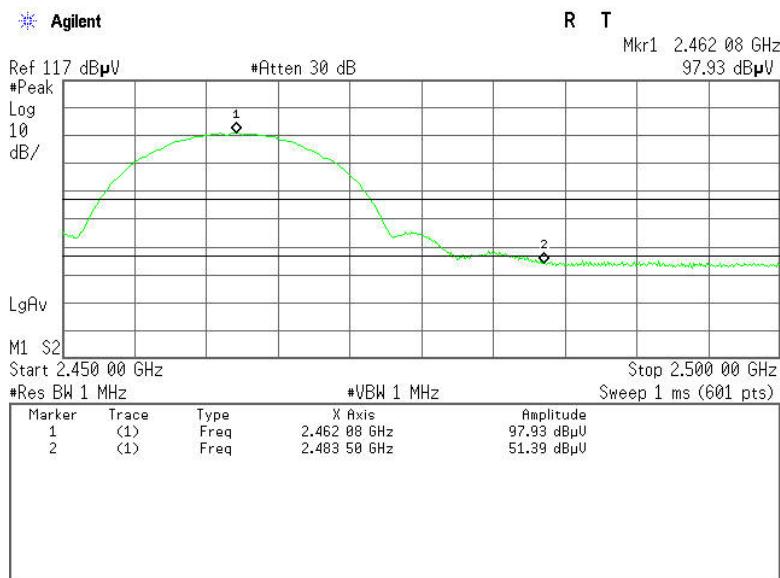
Polarity: Vertical





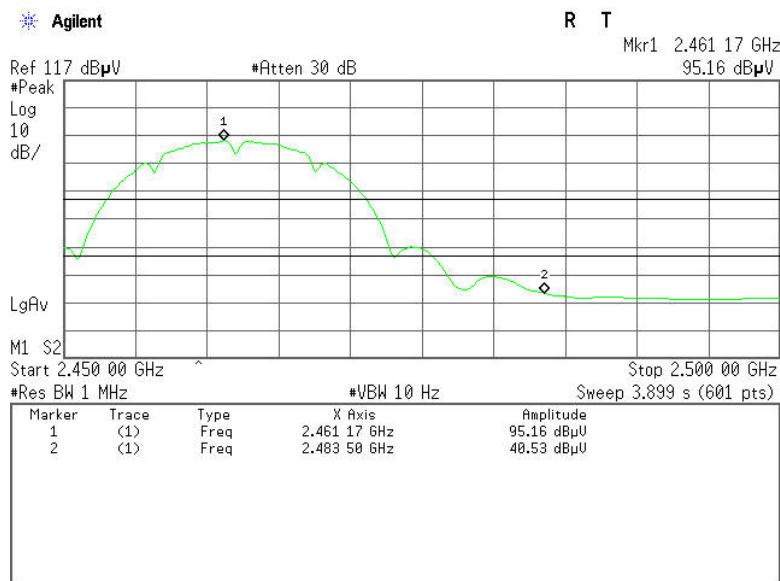
Detector mode: Peak

Polarity: Horizontal



Detector mode: Average

Polarity: Horizontal



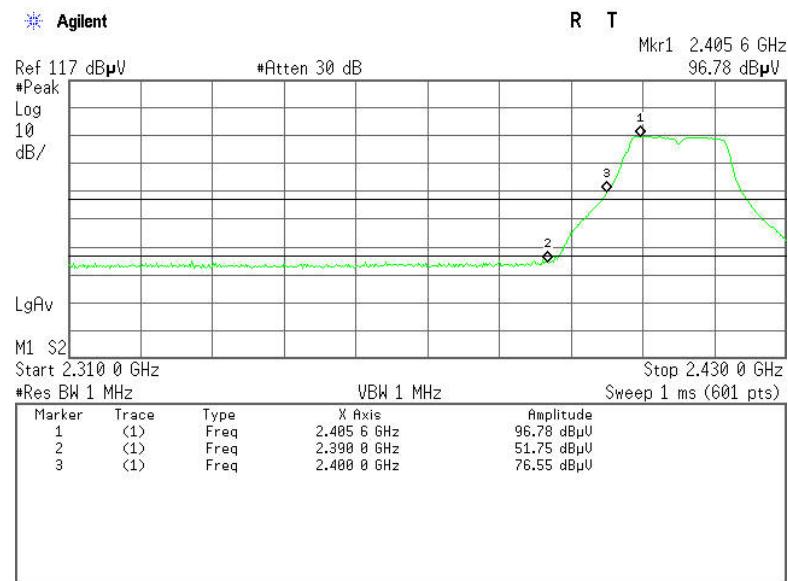


IEEE 802.11g mode

Band Edges (CH Low)

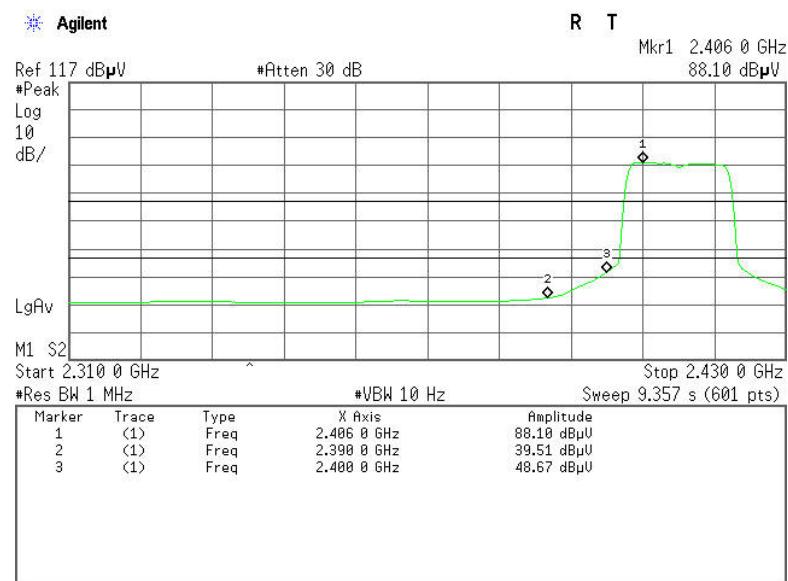
Detector mode: Peak

Polarity: Vertical



Detector mode: Average

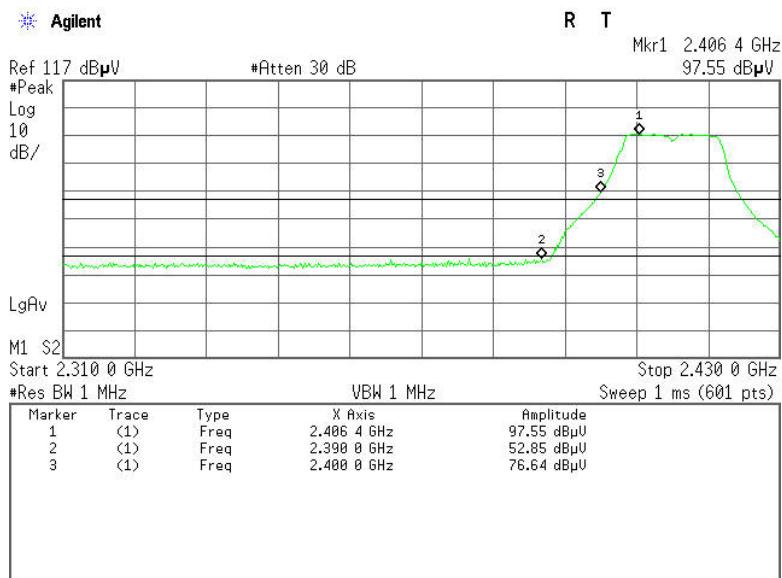
Polarity: Vertical





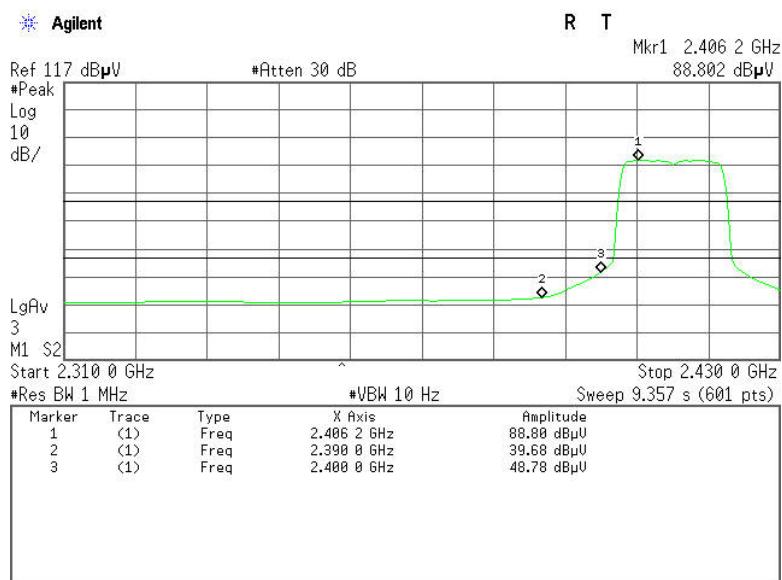
Detector mode: Peak

Polarity: Horizontal



Detector mode: Average

Polarity: Horizontal

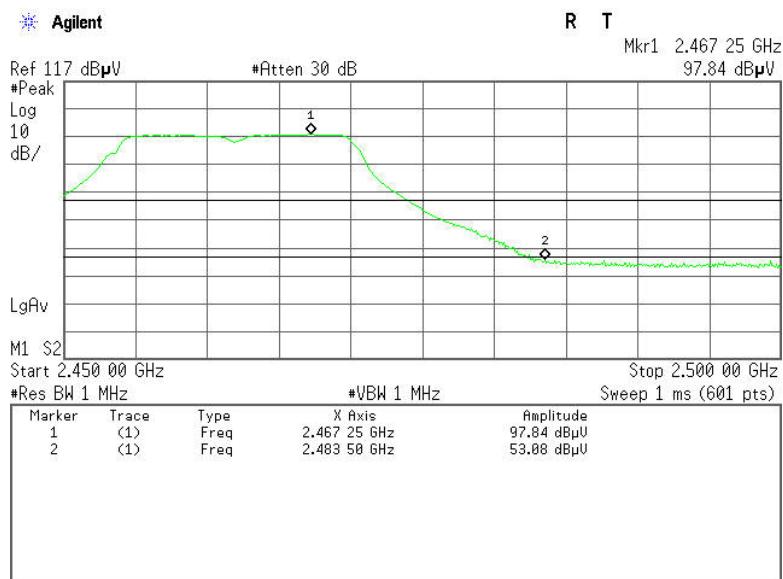




Band Edges (CH High)

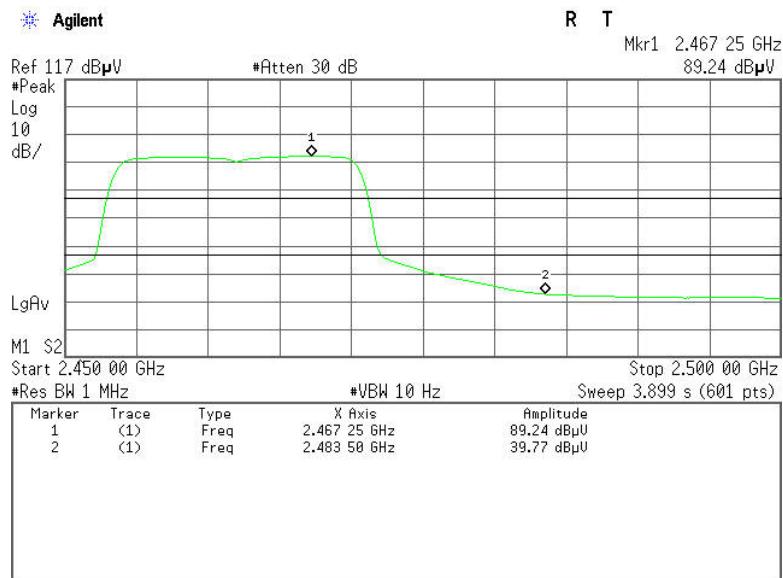
Detector mode: Peak

Polarity: Vertical



Detector mode: Average

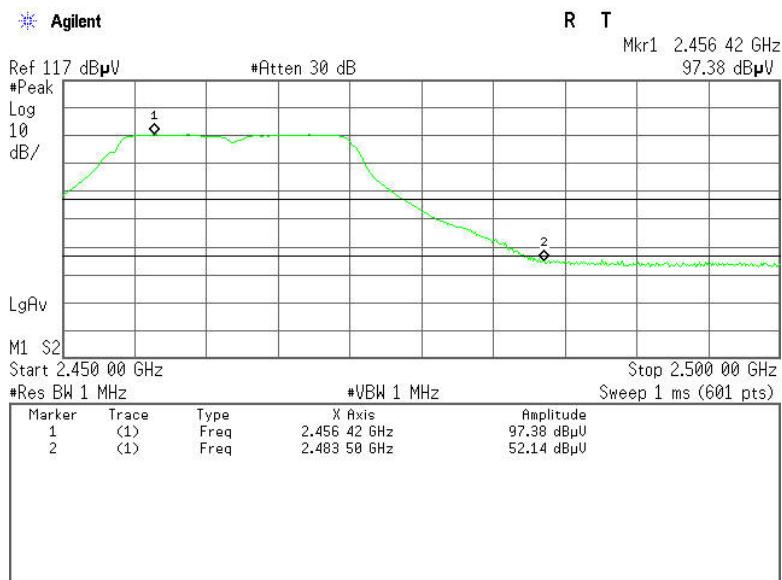
Polarity: Vertical





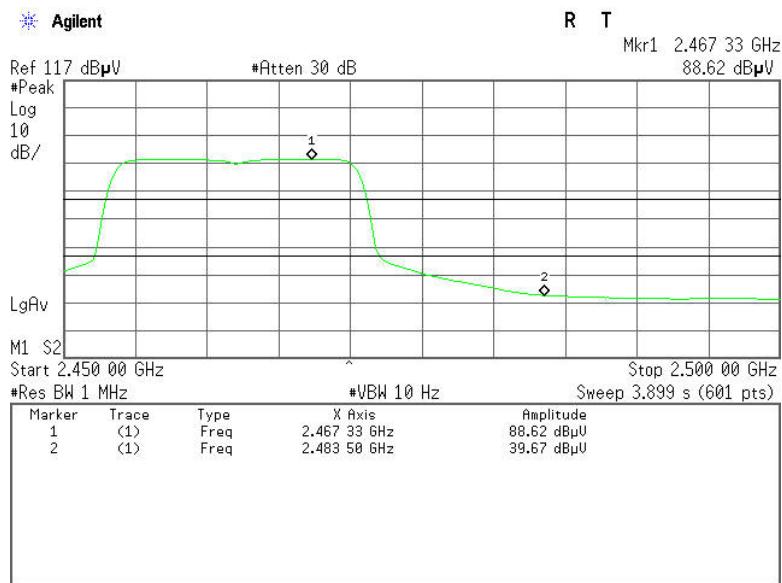
Detector mode: Peak

Polarity: Horizontal



Detector mode: Average

Polarity: Horizontal



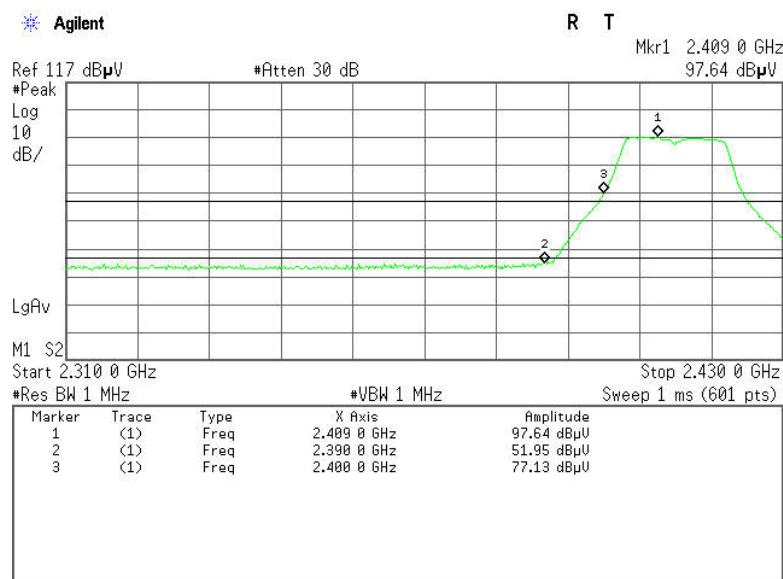


IEEE 802.11n HT20 MHz mode

Band Edges (CH Low)

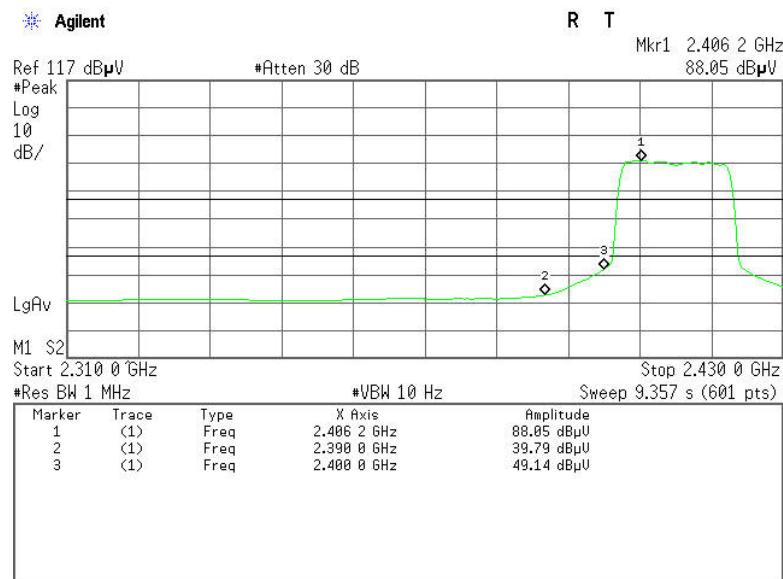
Detector mode: Peak

Polarity: Vertical



Detector mode: Average

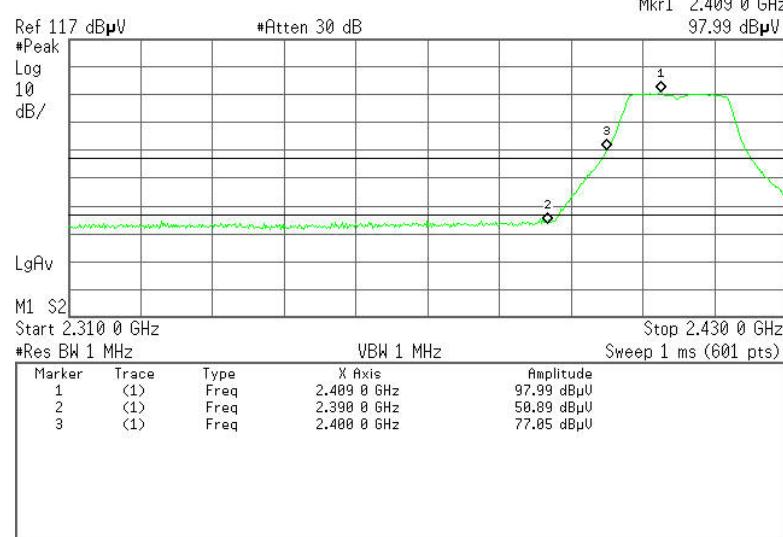
Polarity: Vertical





Detector mode: Peak

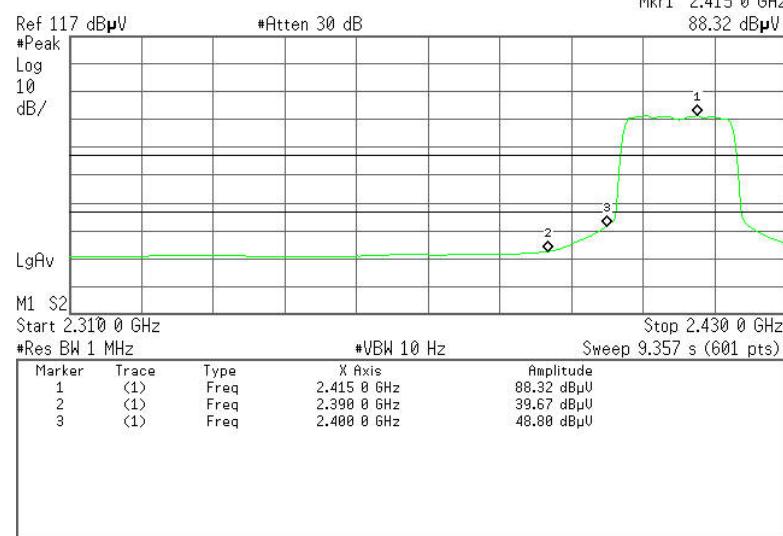
* Agilent



Polarity: Horizontal

Detector mode: Average

* Agilent



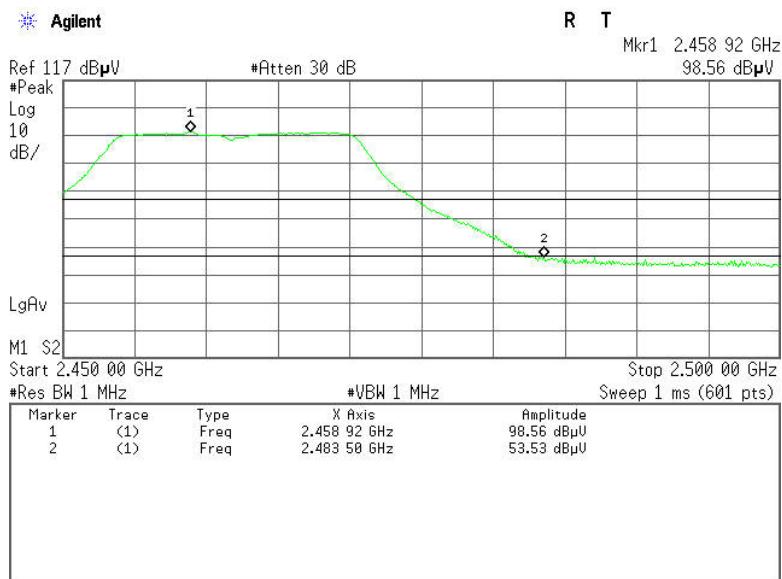
Polarity: Horizontal



Band Edges (CH High)

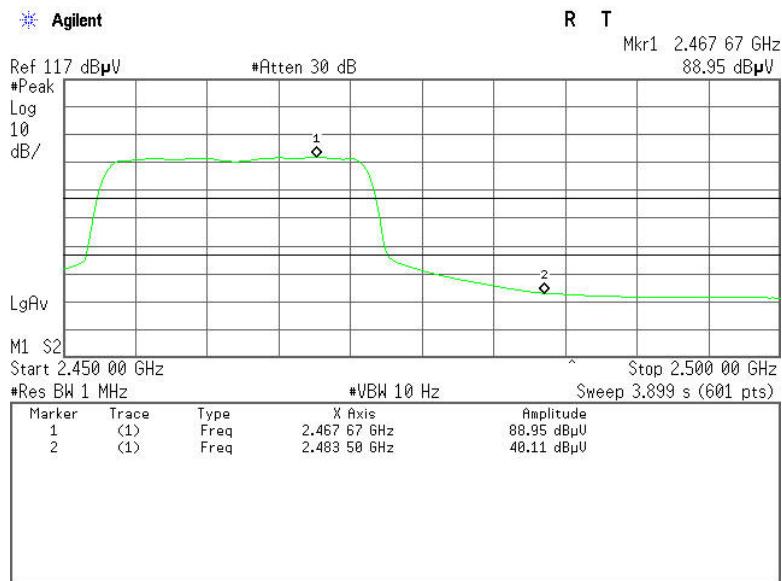
Detector mode: Peak

Polarity: Vertical



Detector mode: Average

Polarity: Vertical





Detector mode: Peak

* Agilent

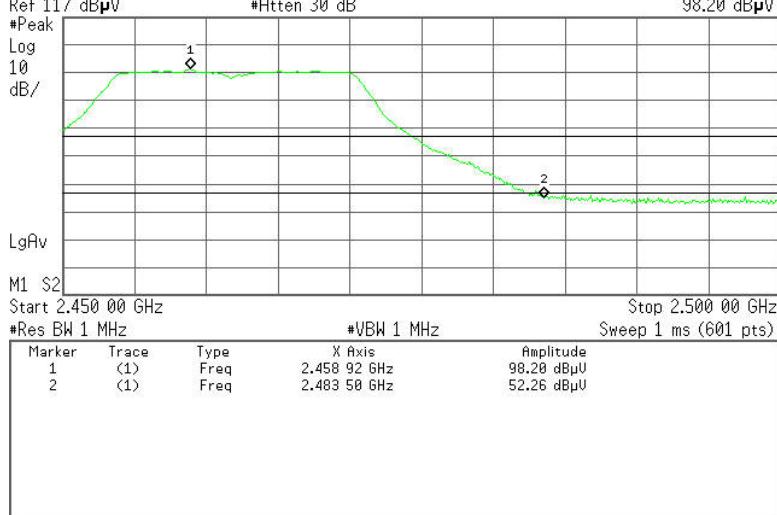
Ref 117 dB μ V

#Atten 30 dB

Polarity: Horizontal

R T

Mkr1 2.458 92 GHz
98.20 dB μ V



Detector mode: Average

* Agilent

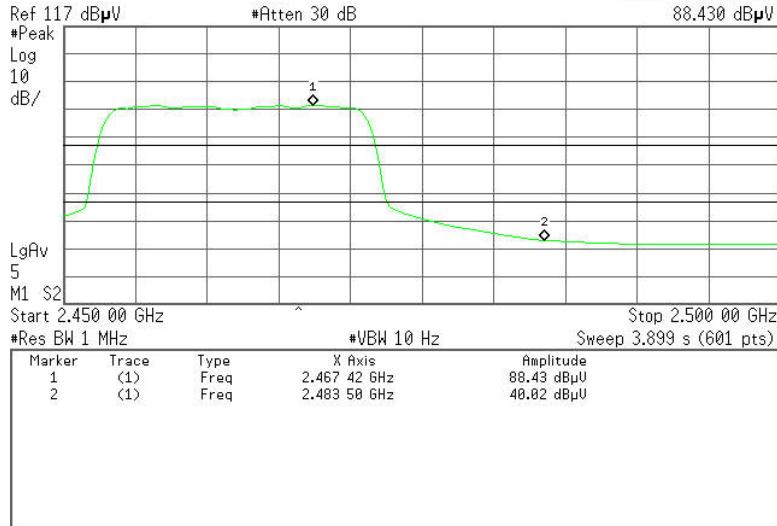
Ref 117 dB μ V

#Atten 30 dB

Polarity: Horizontal

R T

Mkr1 2.467 42 GHz
88.430 dB μ V



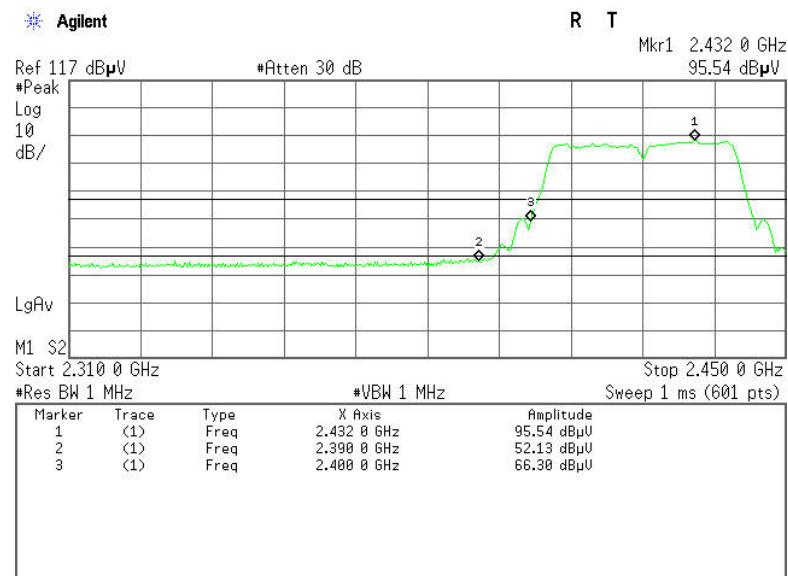


IEEE 802.11n HT40 MHz mode

Band Edges (CH Low)

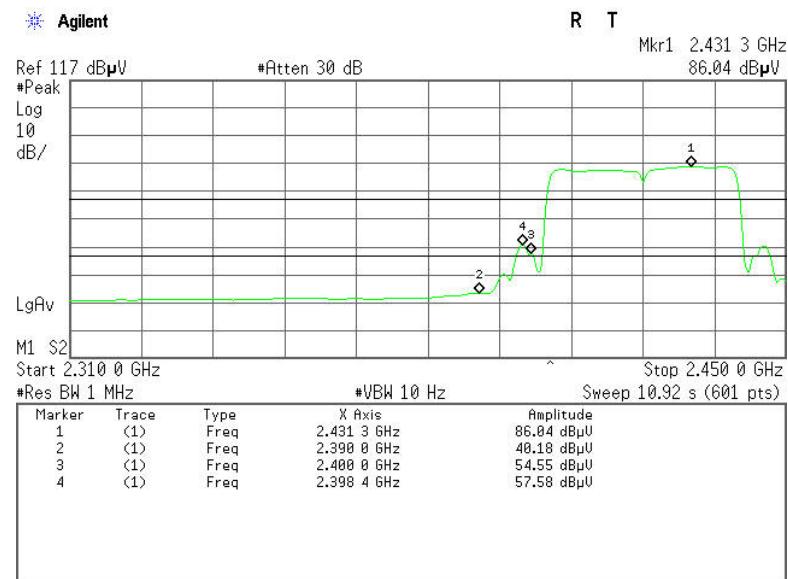
Detector mode: Peak

Polarity: Vertical



Detector mode: Average

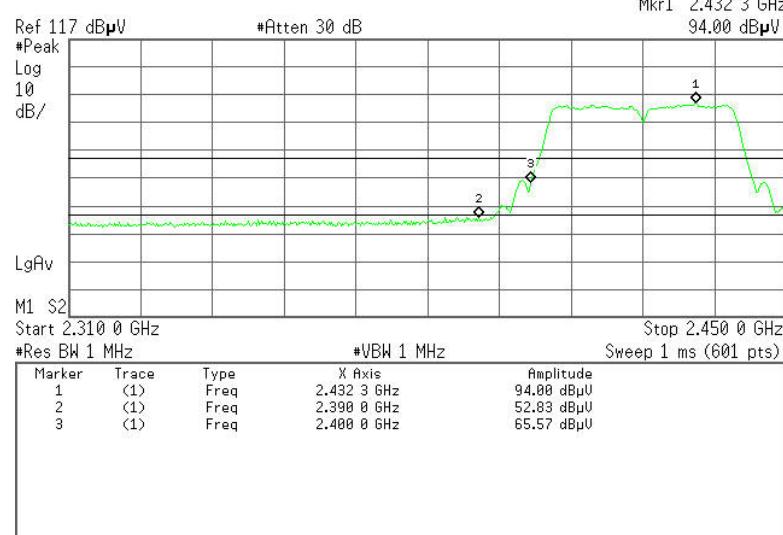
Polarity: Vertical





Detector mode: Peak

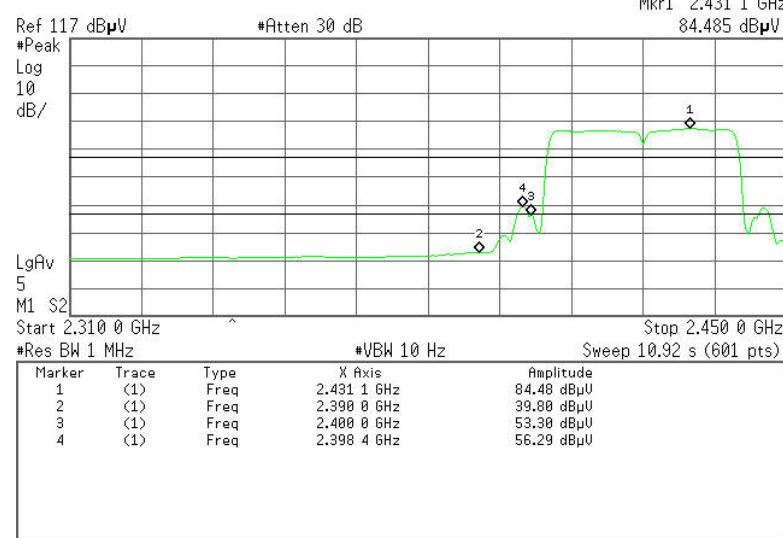
* Agilent



Polarity: Horizontal

Detector mode: Average

* Agilent



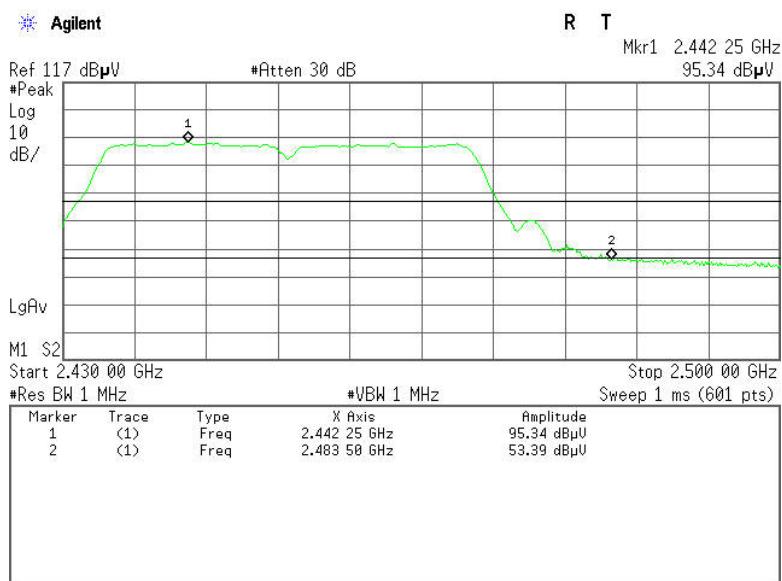
Polarity: Horizontal



Band Edges (CH High)

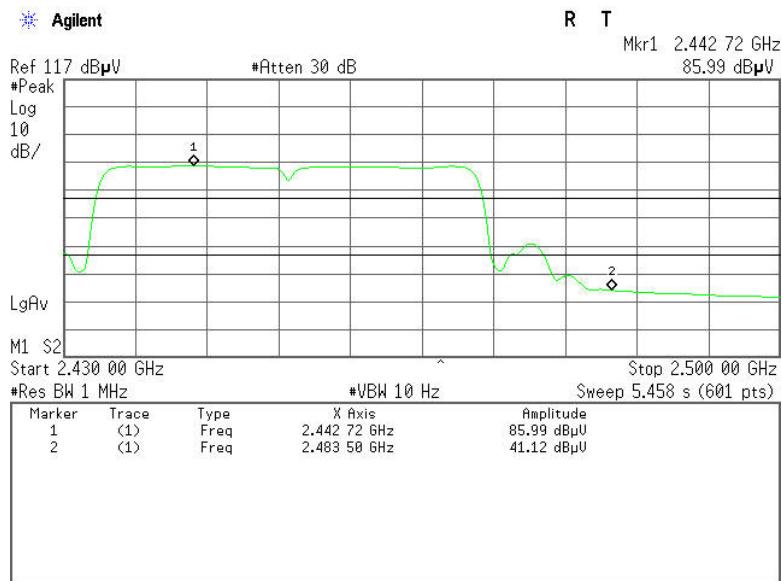
Detector mode: Peak

Polarity: Vertical



Detector mode: Average

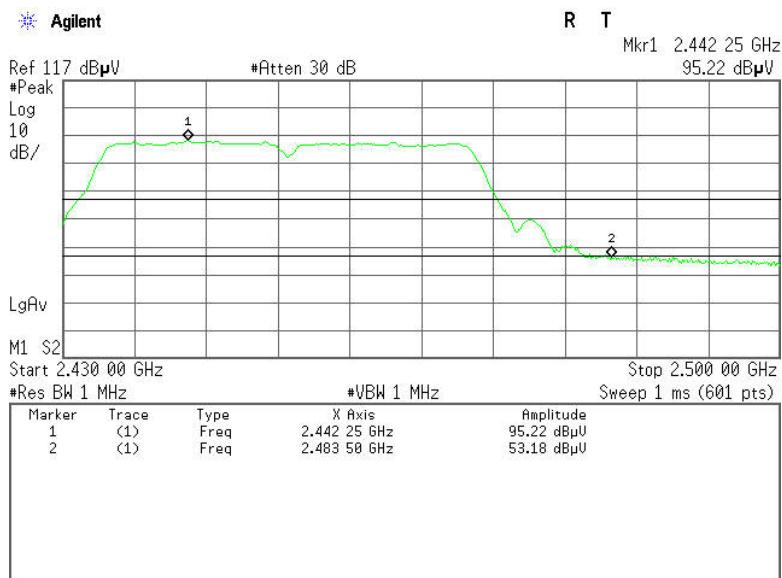
Polarity: Vertical





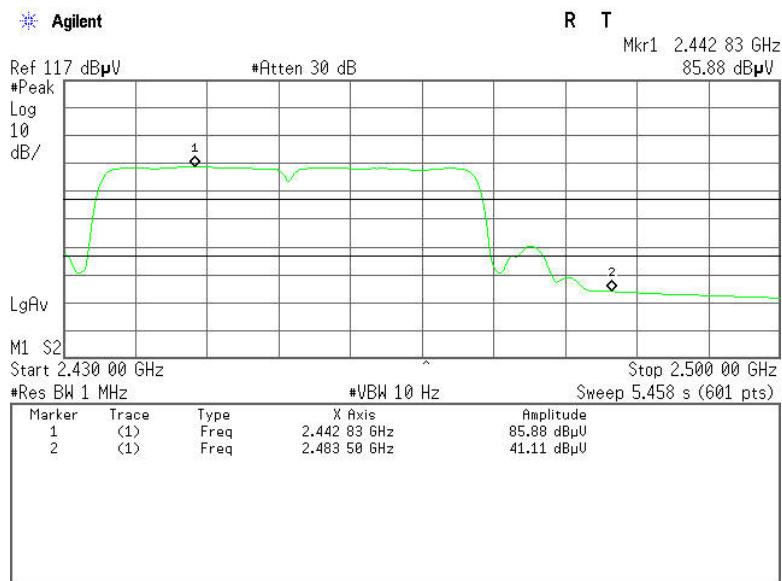
Detector mode: Peak

Polarity: Horizontal



Detector mode: Average

Polarity: 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

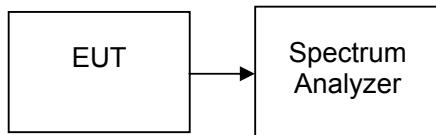
| Name of Equipment | Manufacturer | Model | Serial Number | Last Calibration | Calibration Due |
|-------------------|--------------|--------|---------------|------------------|-----------------|
| Spectrum Analyzer | Agilent | E4446A | US44300399 | 03/19/2012 | 03/19/2013 |

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 = 3 kHz.
3. Set the VBW = 10 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 $BWCF = 10\log(3 \text{ kHz}/100 \text{ kHz}) = -15.2 \text{ dB}$.
11. The resulting peak PSD level must be $\leq 8 \text{ dBm}$.

7.6.4. TEST SETUP





7.6.5. TEST RESULTS

No non-compliance noted

Test Data

Test mode: IEEE 802.11b

| Channel | Frequency (MHz) | Peak (dBm) | Factor (BWCF) | PPSD (dBm) | Limit (dBm) | Test Result |
|---------|-----------------|------------|---------------|------------|-------------|-------------|
| Low | 2412 | -21.97 | -15.20 | -37.17 | 8 | PASS |
| Mid | 2437 | -21.35 | -15.20 | -36.55 | | PASS |
| High | 2462 | -21.53 | -15.20 | -36.73 | | PASS |

Test mode: IEEE 802.11g

| Channel | Frequency (MHz) | Peak (dBm) | Factor (BWCF) | PPSD (dBm) | Limit (dBm) | Test Result |
|---------|-----------------|------------|---------------|------------|-------------|-------------|
| Low | 2412 | -25.00 | -15.20 | -35.20 | 8 | PASS |
| Mid | 2437 | -24.92 | -15.20 | -40.12 | | PASS |
| High | 2462 | -24.25 | -15.20 | -39.45 | | PASS |

Test mode: IEEE 802.11n HT20 MHz

| Channel | Frequency (MHz) | Peak (dBm) | Factor (BWCF) | PPSD (dBm) | Limit (dBm) | Test Result |
|---------|-----------------|------------|---------------|------------|-------------|-------------|
| Low | 2412 | -25.07 | -15.20 | -40.27 | 8 | PASS |
| Mid | 2437 | -24.71 | -15.20 | -39.91 | | PASS |
| High | 2462 | -24.07 | -15.20 | -39.27 | | PASS |

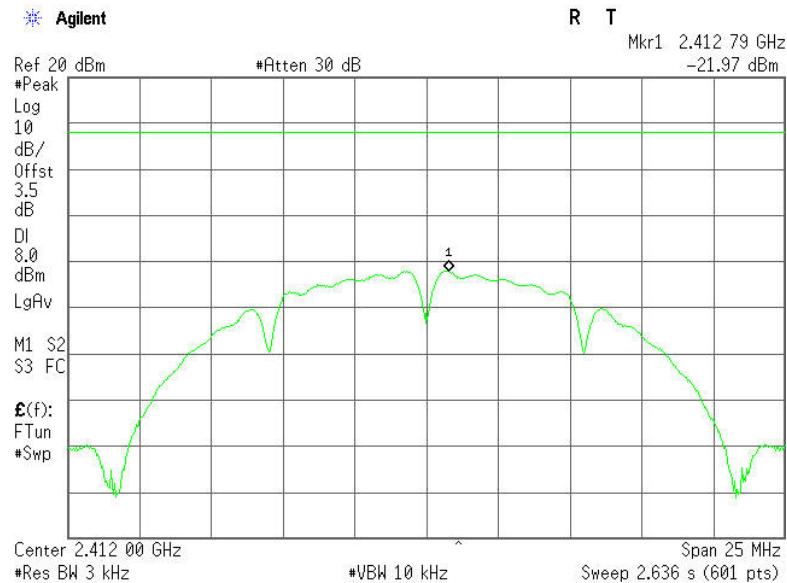
Test mode: IEEE 802.11n HT40 MHz

| Channel | Frequency (MHz) | Peak (dBm) | Factor (BWCF) | PPSD (dBm) | Limit (dBm) | Test Result |
|---------|-----------------|------------|---------------|------------|-------------|-------------|
| Low | 2422 | -27.23 | -15.20 | -42.43 | 8 | PASS |
| Mid | 2437 | -25.16 | -15.20 | -40.36 | | PASS |
| High | 2452 | -24.24 | -15.20 | -39.44 | | PASS |

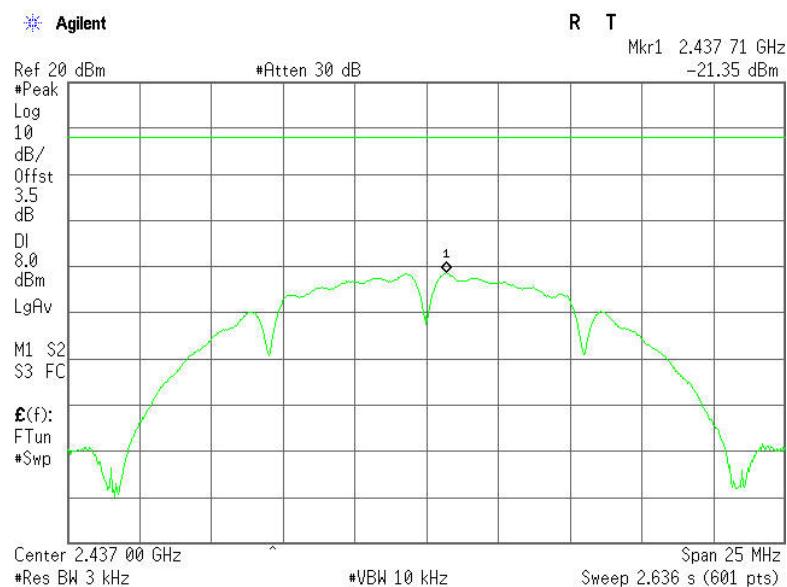


Test Plot IEEE 802.11b mode

PPSD (CH Low)

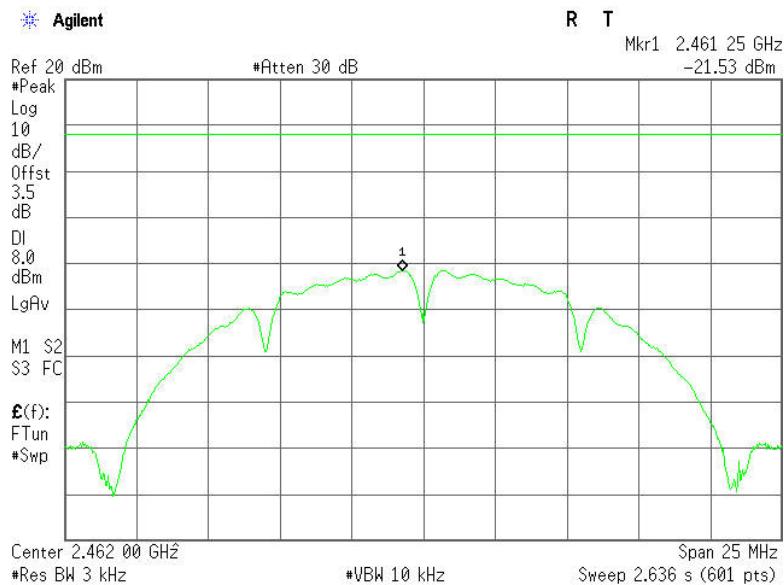


PPSD (CH Mid)



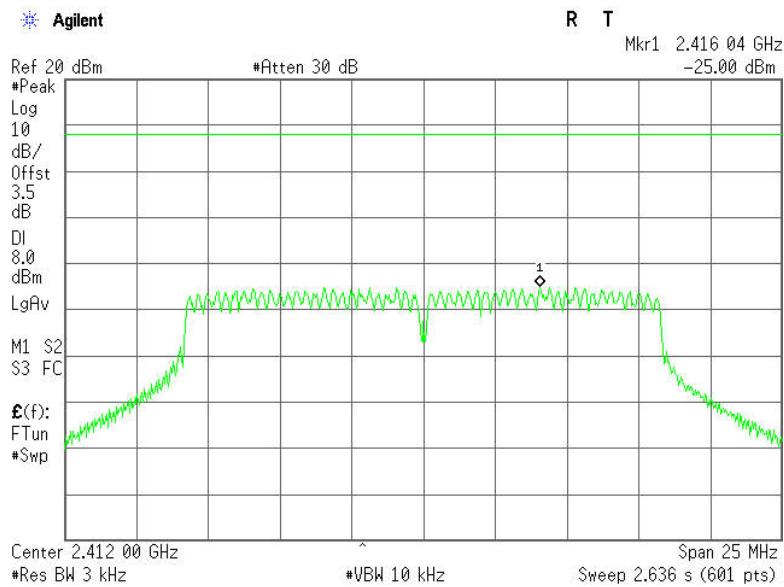


PPSD (CH High)



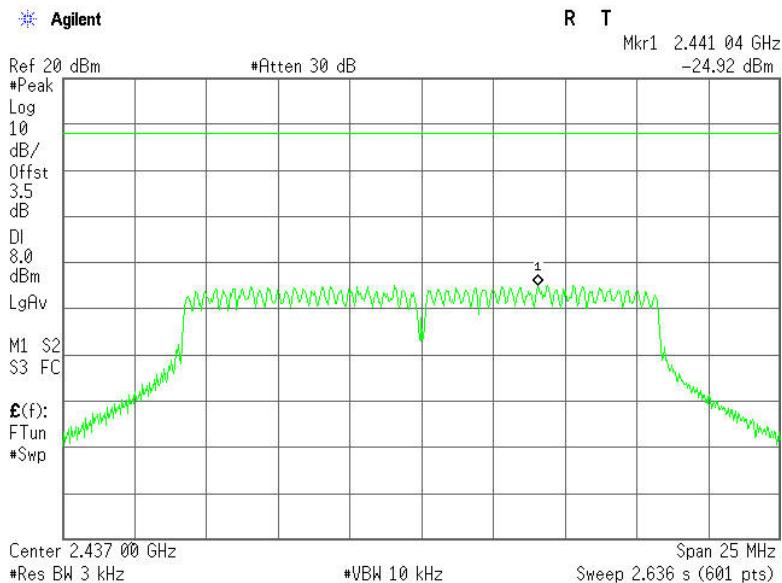
IEEE 802.11g mode

PPSD (CH Low)

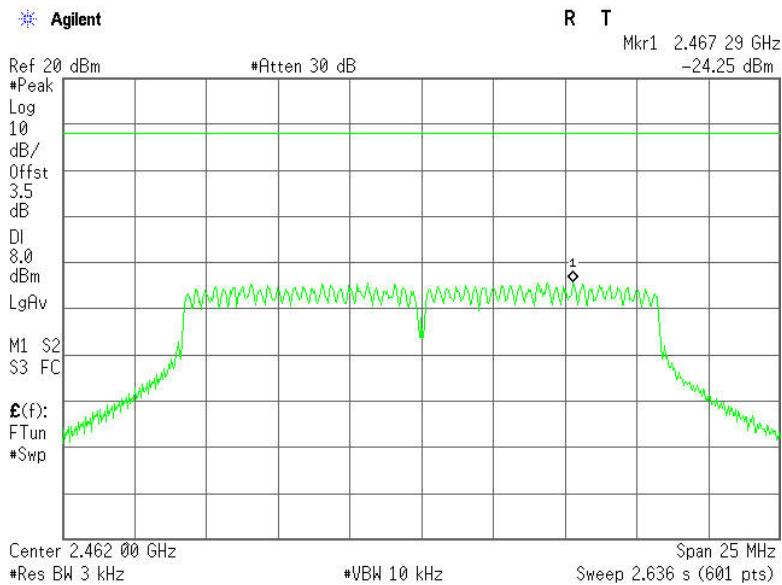




PPSD (CH Mid)



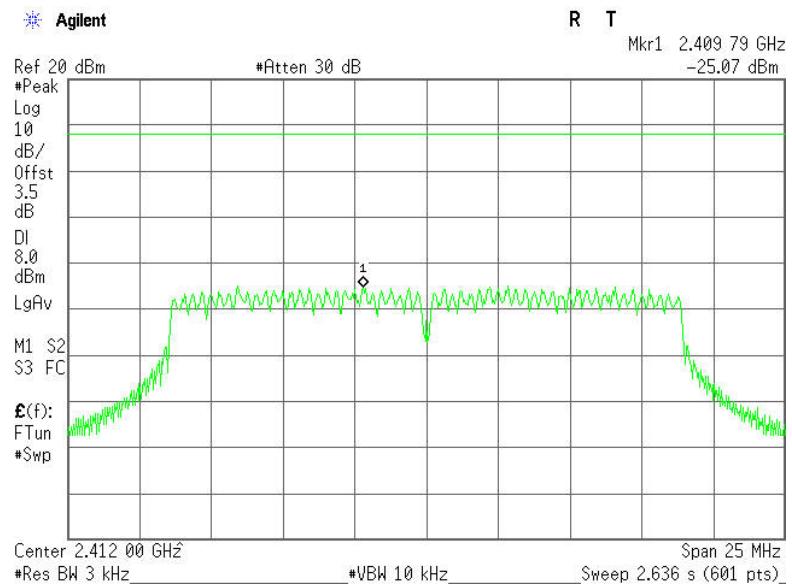
PPSD (CH High)



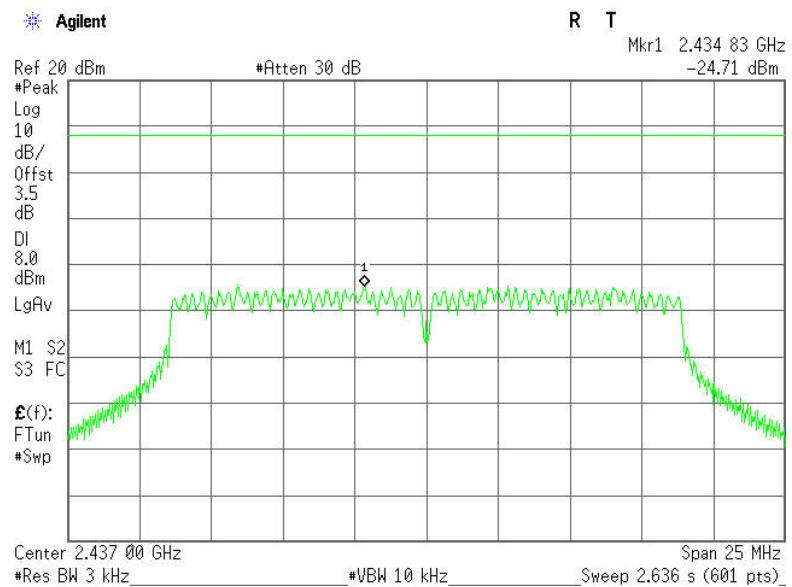


IEEE 802.11n HT20 MHz mode

PPSD (CH Low)

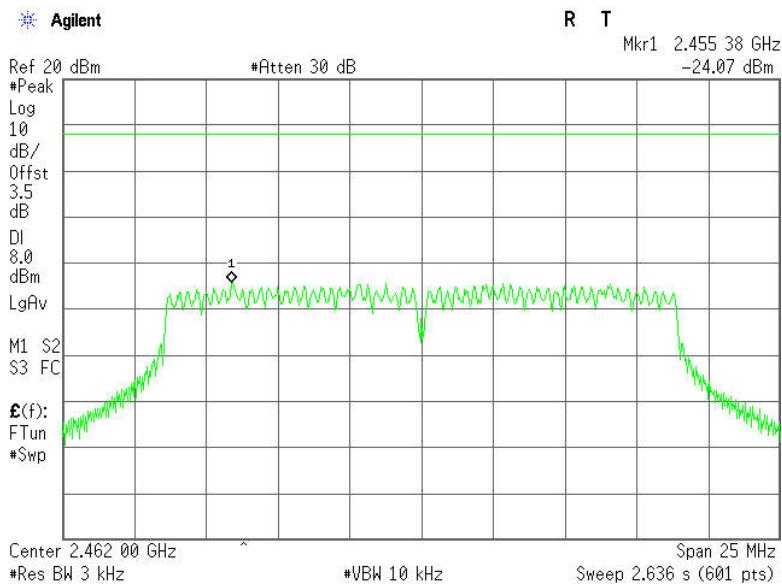


PPSD (CH Mid)



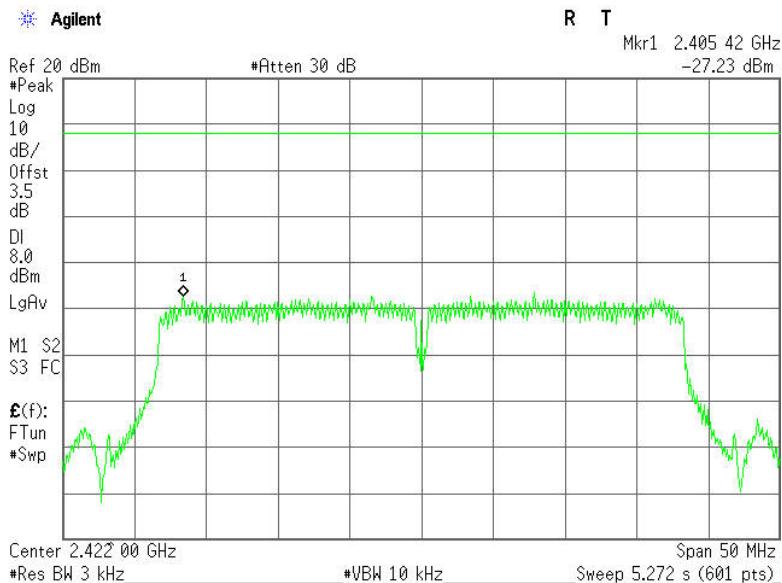


PPSD (CH High)



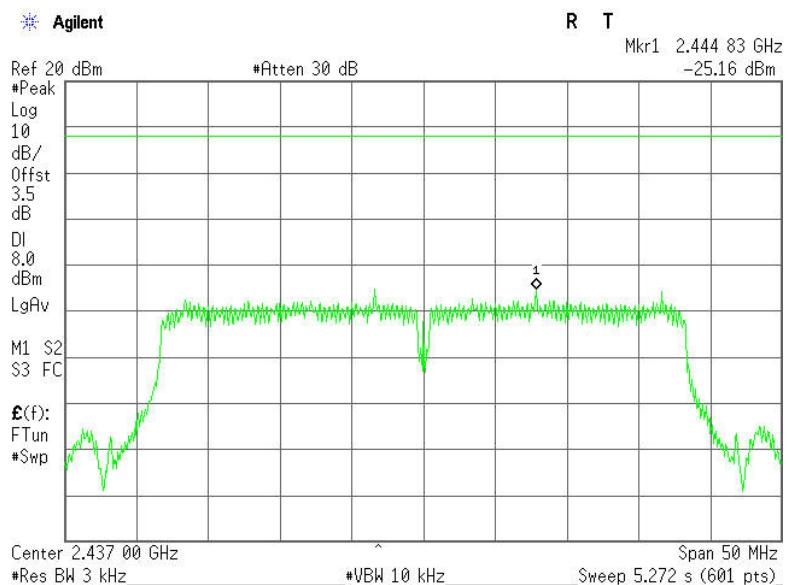
IEEE 802.11n HT40 MHz mode

PPSD (CH Low)





PPSD (CH Mid)



PPSD (CH High)

