# 8. OUTPUT POWER TEST

## 8.1.Test Equipment

| Item | Equipment | Manufacturer | Model No. | Serial No. | Last Cal. | Cal. Interval |
|---|---|---|---|---|---|---|
| 1. | PXA Signal Analyzer | Agilent | N9030A | MY51380221 | Sep.08,18 | 1Year |
| 2. | Power meter | Anritsu | ML2487A | 6K00002472 | Apr.23,18 | 1Year |
| 3. | Power sensor | Anritsu | MA2491A | 033005 | Apr.23,18 | 1Year |
| 4. | Attenuator | Agilent | 8491B | MY39269170 | Oct.14,18 | 1 Year |
| 5. | RF Cable | Hubersuhner | SUCOFLE X106 | 505239/6 | Apr.23,18 | 1 Year |

## 8.2.Limit (FCC Part 15C 15.247 b(3))

For systems using digital modulation in the 2400—2483.5MHz, The Peak output Power shall not exceed 1W(30dBm), As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level.

## 8.3.Test Procedure

1, Connected the EUT's antenna port to measure device by 20dB attenuator.

2, Use the test method descried in ANSI C63.10-2013 clause 11.9.2.2.2 Method AVGSA-1.

1) Set span to at least 1.5 times the OBW.
2) Set RBW = 1% to 5% of the OBW, not to exceed 1 MHz.
3) Set VBW ≥ [3 × RBW].
4) Number of points in sweep ≥ [2 × span / RBW]. (This gives bin-to-bin spacing ≤ RBW / 2, so that narrowband signals are not lost between frequency bins.)
5) Sweep time = auto.
6) Detector = RMS (i.e., power averaging), if available. Otherwise, use sample detector mode.
7) If transmit duty cycle < 98%, use a sweep trigger with the level set to enable triggering only on full power pulses. The transmitter shall operate at the maximum power control level for the entire duration of every sweep. If the EUT transmits continuously (i.e., with no OFF intervals) or at duty cycle ≥ 98%, and if each transmission is entirely at the maximum power control level, then the trigger shall be set to "free run."
8) Trace average at least 100 traces in power averaging (rms) mode.
9) Compute power by integrating the spectrum across the OBW of the signal using the instrument's band power measurement function, with band limits set equal to the OBW band edges. If the instrument does not have a band power function, sum the spectrum levels (in power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

## 8.4.Test Results

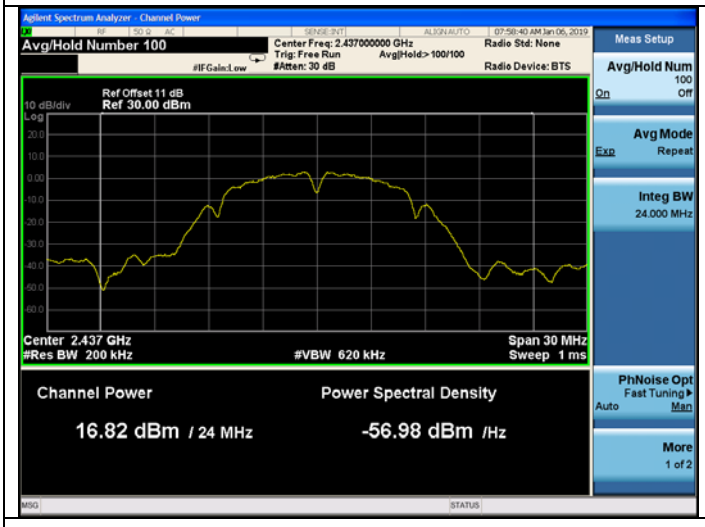
| | | |
|---|---|---|
| EUT: BCM dual band 2*2 WiFi | | |
| M/N: 50-0102-BC-22 | | |
| Test date: 2019-01-06 | Pressure: 102.1±1.0 kpa | Humidity: 51.1±3.0% |
| Tested by: Garry | Test site: RF site | Temperature:22.8±0.6 ℃ |

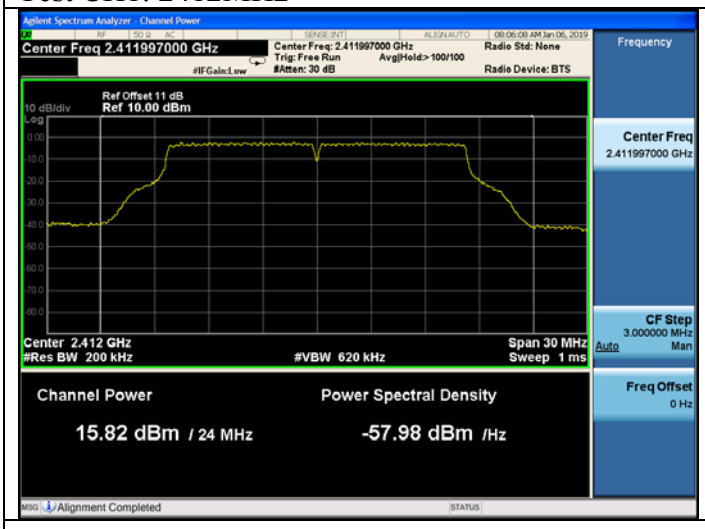
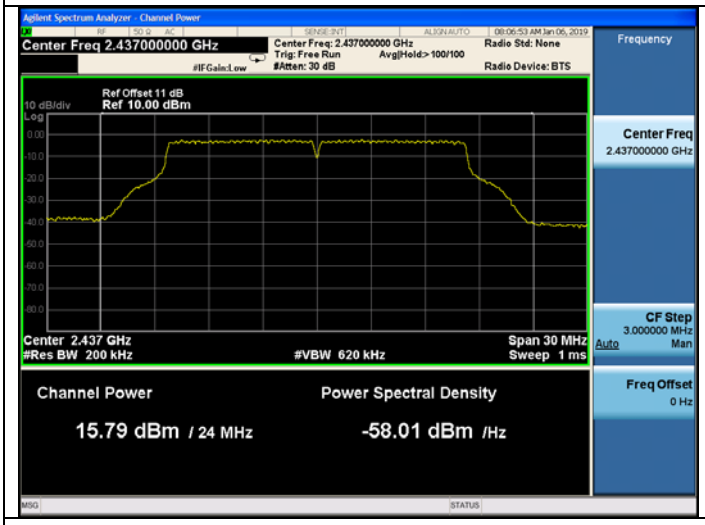
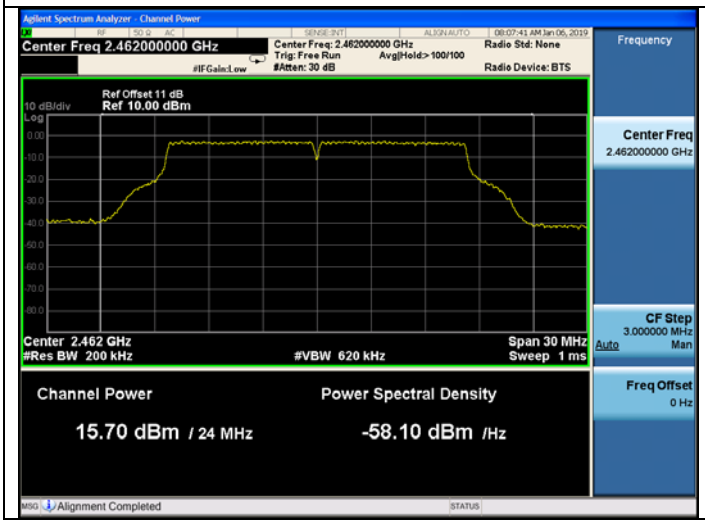
| Test Mode | CH | output Power (dBm) | | | Limit (dBm) |
|---|---|---|---|---|---|
| | | ANT0 | ANT1 | Total | |
| 11b | CH1 | 16.94 | 16.63 | 19.80 | 29.75 |
| | CH6 | 16.82 | 16.88 | 19.86 | |
| | CH11 | 16.90 | 16.39 | 19.66 | |
| 11g | CH1 | 16.12 | 15.79 | 18.97 | 29.75 |
| | CH6 | 16.09 | 15.74 | 18.93 | |
| | CH11 | 16.00 | 15.35 | 18.70 | |
| 11n HT20 | CH1 | 15.98 | 16.37 | 19.19 | 29.75 |
| | CH6 | 16.15 | 16.15 | 19.16 | |
| | CH11 | 16.05 | 15.52 | 18.80 | |
| 11n HT40 | CH3 | 12.22 | 12.29 | 15.27 | 29.75 |
| | CH6 | 12.25 | 12.25 | 15.26 | |
| | CH9 | 12.27 | 11.85 | 15.08 | |
| Conclusion: PASS | | | | | |

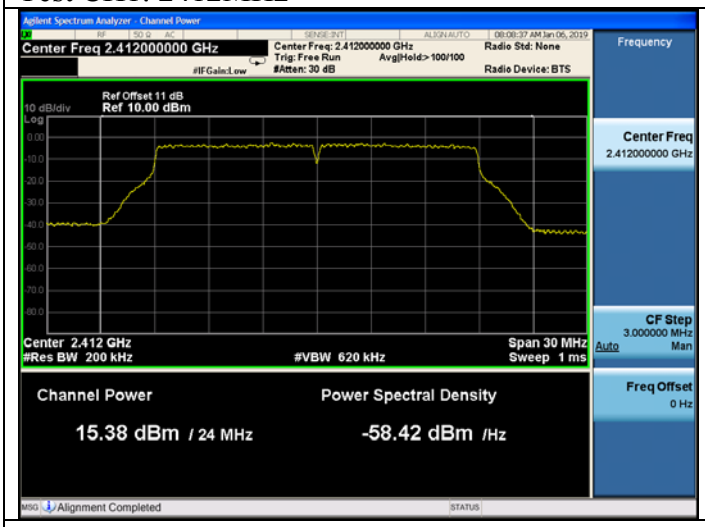
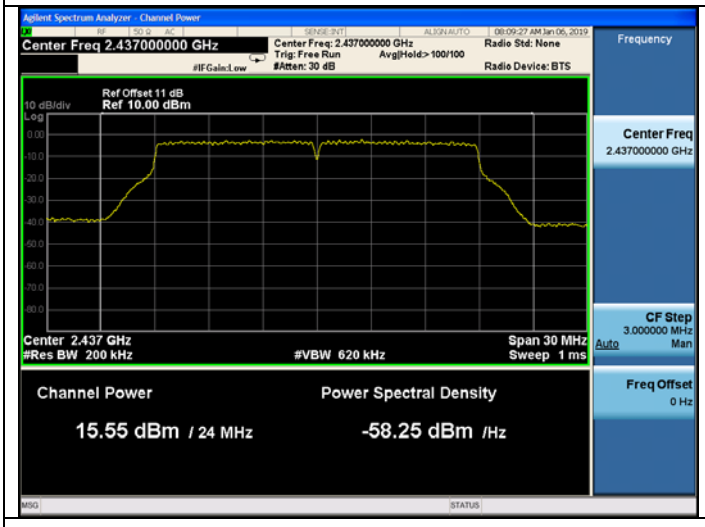
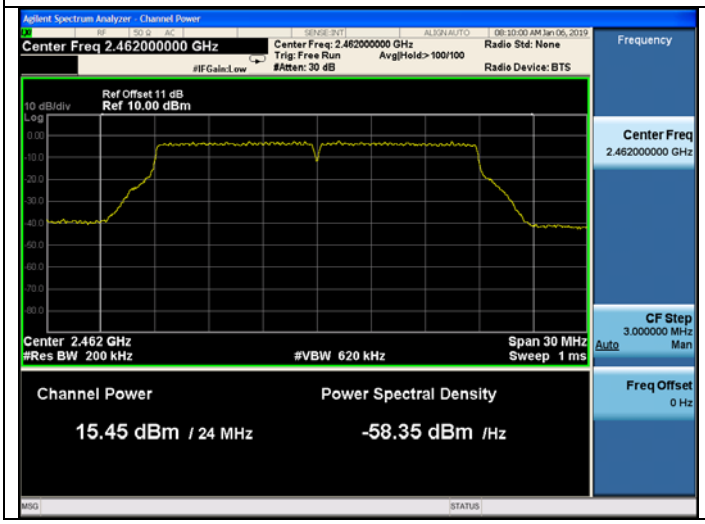
Note: 1. Directional Gain= $10 \log[(10^{4/20}+10^{2.4/20})^2/2]$dBi

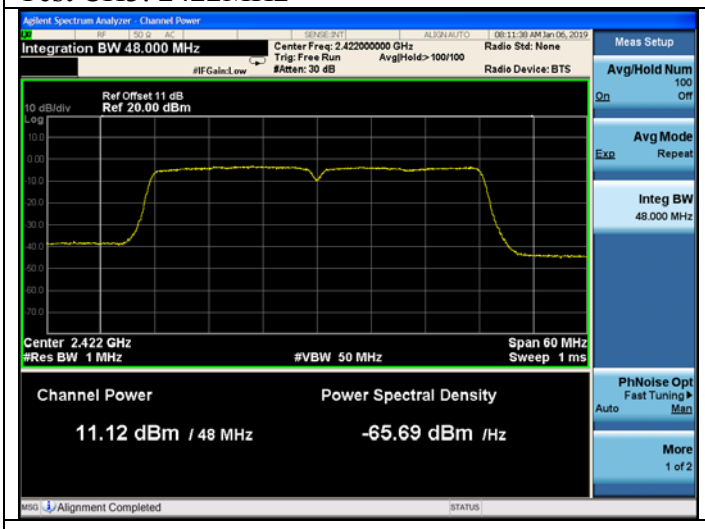
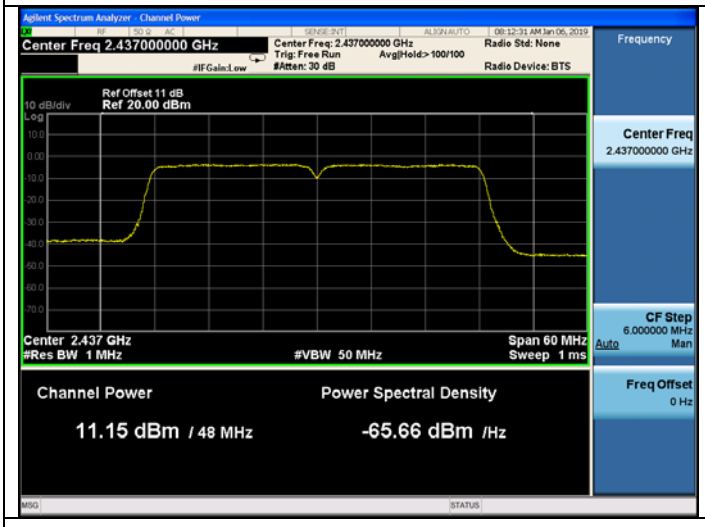
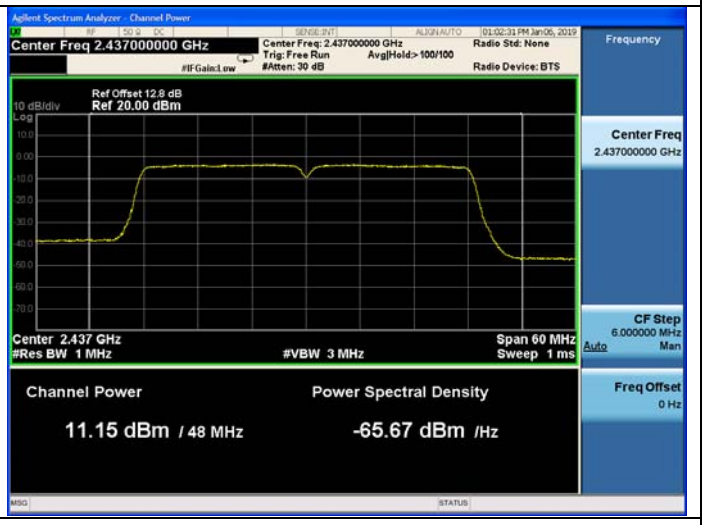
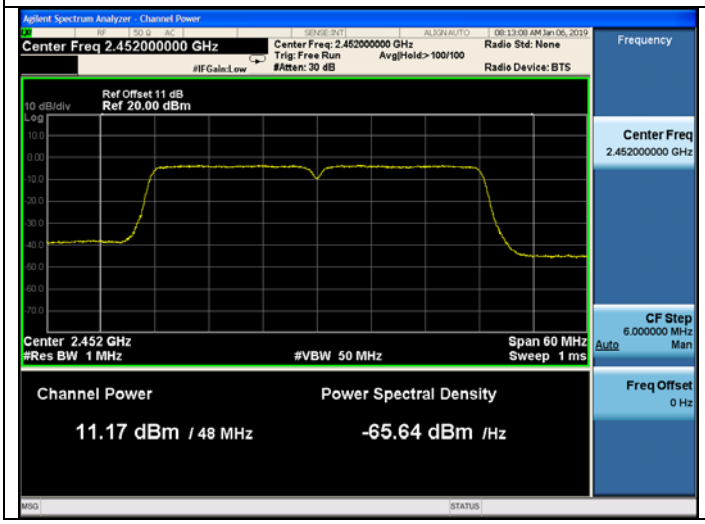
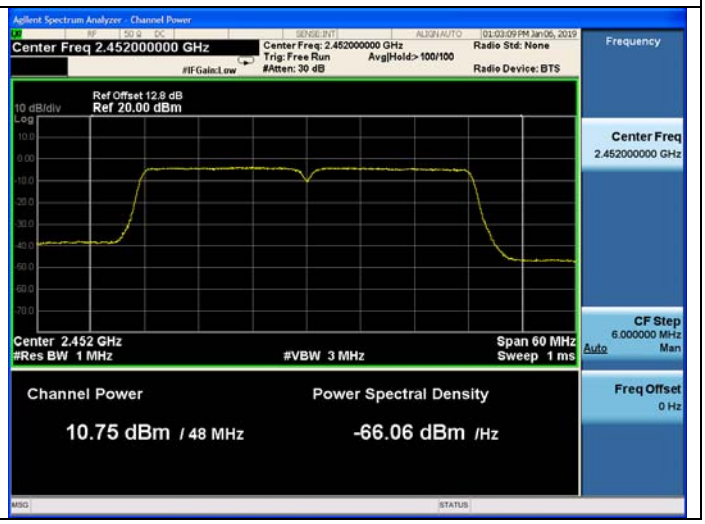
= 6.25dBi>6dBi.

2. The transmit signals are correlated.

| **ANT0:** | **ANT1:** |
|---|---|
| Test Mode: IEEE 802.11b<br>Test CH1: 2412MHz | Test Mode: IEEE 802.11b<br>Test CH1: 2412MHz |
| | |
| Test CH6: 2437MHz | Test CH6: 2437MHz |
|  | |
| Test CH11: 2462MHz | Test CH11: 2462MHz |
| | |

| ANT0: | ANT1: |
|---|---|
| Test Mode: IEEE 802.11g<br>Test CH1: 2412MHz | Test Mode: IEEE 802.11g<br>Test CH1: 2412MHz |
|  | |
| Test CH6: 2437MHz | Test CH6: 2437MHz |
|  | |
| Test CH11: 2462MHz | Test CH11: 2462MHz |
|  | |

| **ANT0:** | **ANT1:** |
|---|---|
| Test Mode: IEEE 802.11n HT20<br>Test CH1: 2412MHz | Test Mode: IEEE 802.11n HT20<br>Test CH1: 2412MHz |
|  | |
| Test CH6: 2437MHz | Test CH6: 2437MHz |
|  | |
| Test CH11: 2462MHz | Test CH11: 2462MHz |
|  | |

| **ANT0:** | **ANT1:** |
|---|---|
| Test Mode: IEEE 802.11n HT40<br>Test CH3: 2422MHz | Test Mode: IEEE 802.11n HT40<br>Test CH3: 2422MHz |
|  | |
| Test CH6: 2437MHz | Test CH6: 2437MHz |
|  |  |
| Test CH9: 2452MHz | Test CH9: 2452MHz |
|  |  |

# 9. POWER SPECTRAL DENSITY TEST

## 9.1.Test Equipment

| Item | Equipment | Manufacturer | Model No. | Serial No. | Last Cal. | Cal. Interval |
|---|---|---|---|---|---|---|
| 1. | PXA Signal Analyzer | Agilent | N9030A | MY51380221 | Sep.08,18 | 1Year |
| 2. | Attenuator | Agilent | 8491B | MY39269170 | Oct.14,18 | 1 Year |
| 3. | RF Cable | Hubersuhner | SUCOFLEX106 | 505239/6 | Apr.23,18 | 1 Year |

## 9.2.Limit

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3kHz band during any time interval of continuous transmission.

## 9.3.Test Procedure

a) Set analyzer center frequency to DTS channel center frequency.
b) Set the span to 1.5 DTS bandwidth.
c) Set the RBW to: 3 kHz ≤ RBW ≤ 100 kHz.
d) Set the VBW ≥ [3 × RBW].
e) Detector = peak.
f) Sweep time = auto couple.
g) Trace mode = max hold.
h) Allow trace to fully stabilize.
i) Use the peak marker function to determine the maximum amplitude level within the RBW.

## 9.4.Test Results

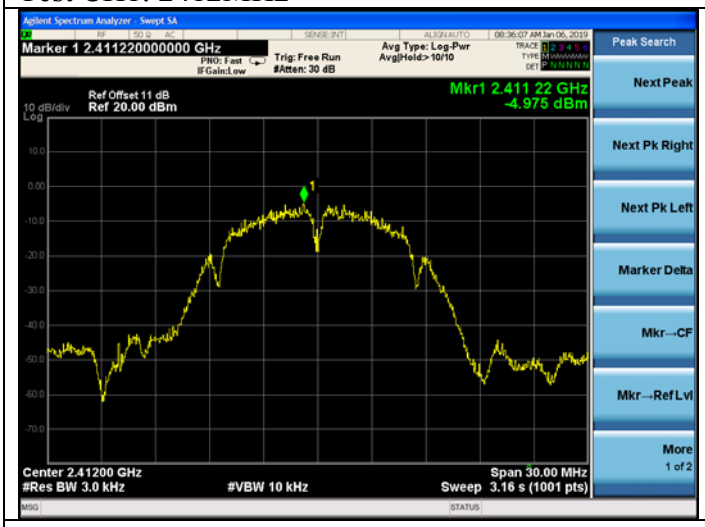
| | | |
|---|---|---|
| EUT: BCM dual band 2*2 WiFi | | |
| M/N: 50-0102-BC-22 | | |
| Test date: 2019-01-06 | Pressure: 102.1±1.0 kpa | Humidity: 51.1±3.0% |
| Tested by: Garry | Test site: RF site | Temperature:22.8±0.6 ℃ |

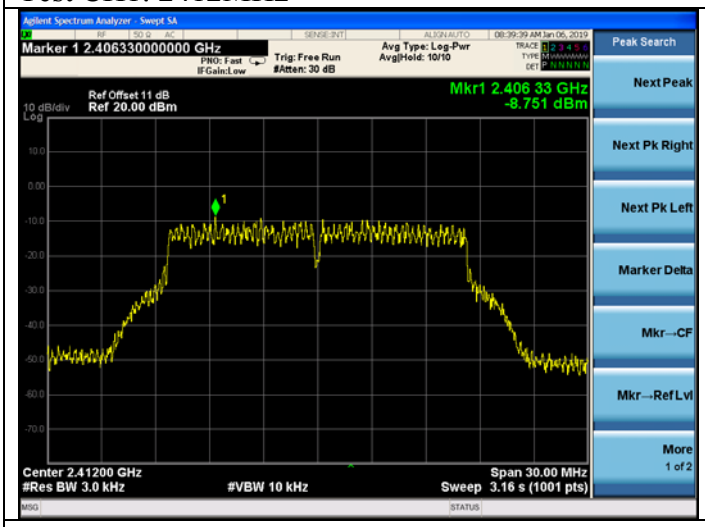
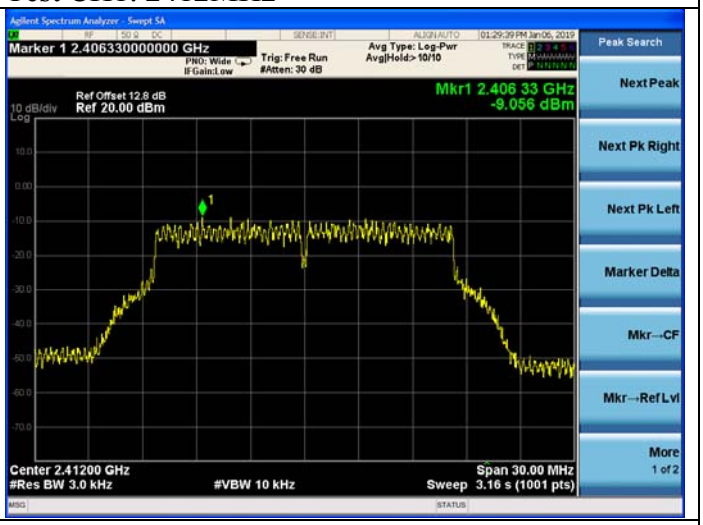
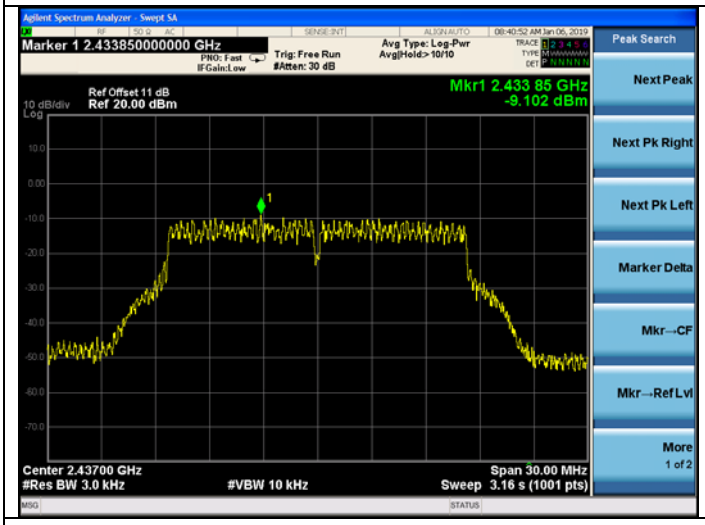
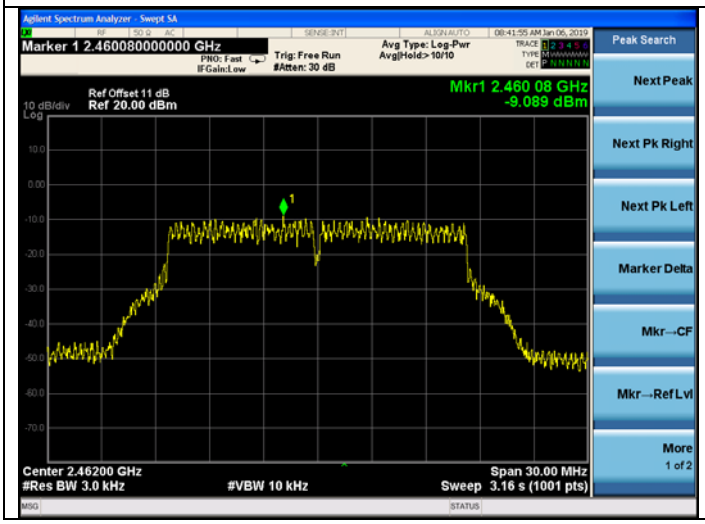
| Test Mode | CH | Power Density (dBm/3kHz) | | | Limit (dBm/3kHz) |
|---|---|---|---|---|---|
| | | ANT0 | ANT1 | Total | |
| 11b | CH1 | -4.975 | -5.138 | -2.05 | 7.75 |
| | CH6 | -5.718 | -4.257 | -1.92 | |
| | CH11 | -4.681 | -5.529 | -2.07 | |
| 11g | CH1 | -8.751 | -9.056 | -5.89 | 7.75 |
| | CH6 | -9.102 | -8.827 | -5.95 | |
| | CH11 | -9.089 | -9.313 | -6.19 | |
| 11n HT20 | CH1 | -9.784 | -9.168 | -6.45 | 7.75 |
| | CH6 | -8.574 | -9.361 | -5.94 | |
| | CH11 | -8.815 | -9.974 | -6.35 | |
| 11n HT40 | CH3 | -16.130 | -16.055 | -13.08 | 7.75 |
| | CH6 | -16.245 | -15.163 | -12.66 | |
| | CH9 | -15.244 | -16.789 | -12.94 | |
| Conclusion: PASS | | | | | |

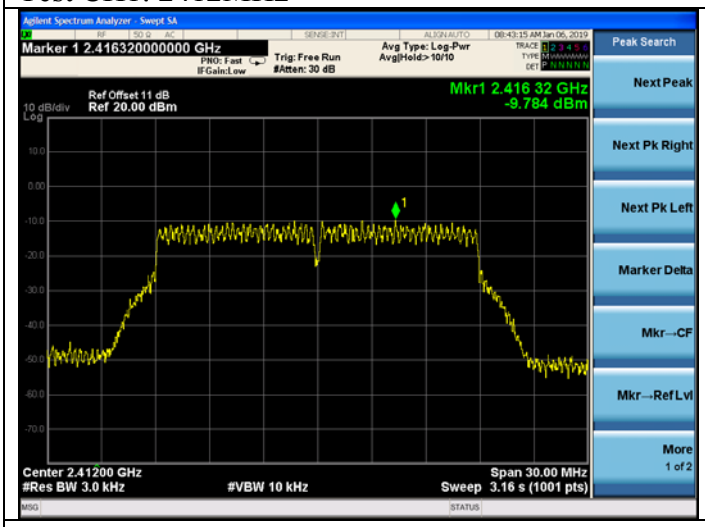
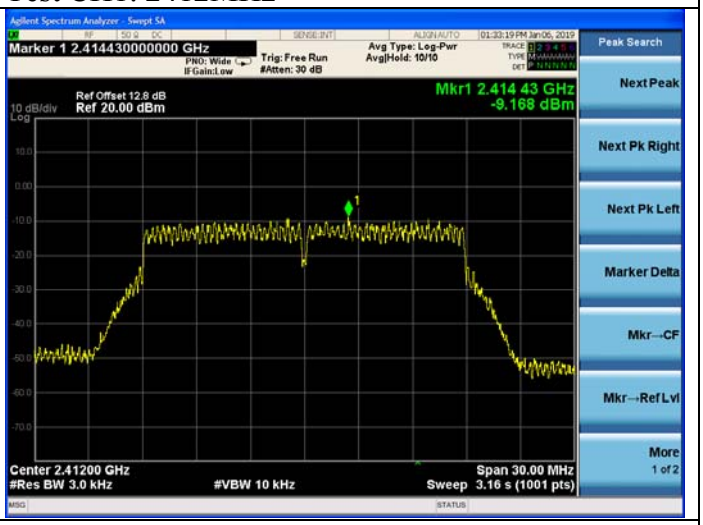
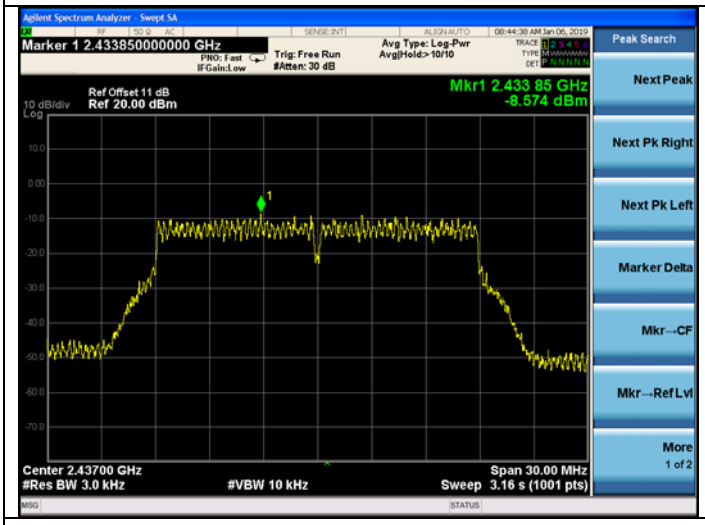
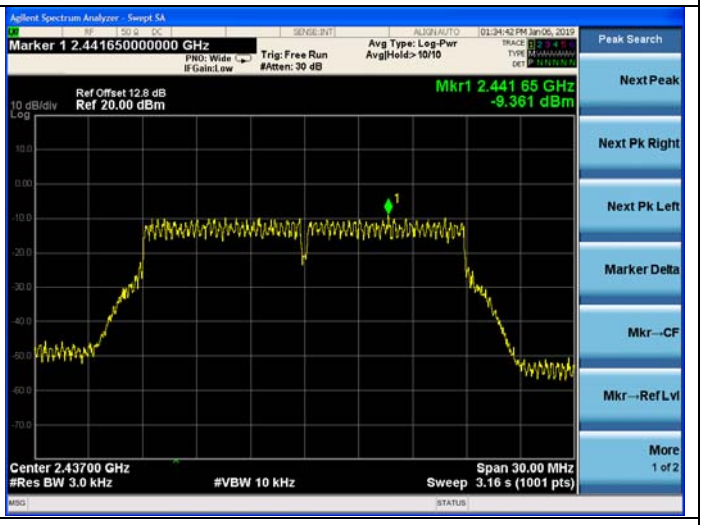
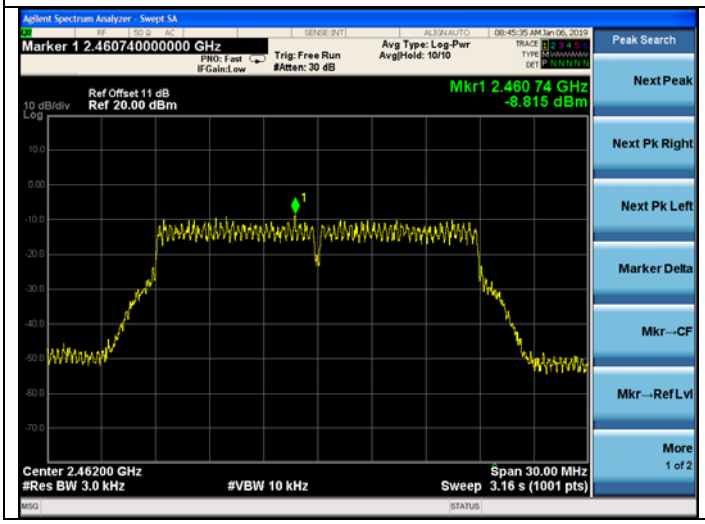
Note: 1. Directional Gain= $10 \log[(10^{4/20}+10^{2.4/20})^2/2]$dBi

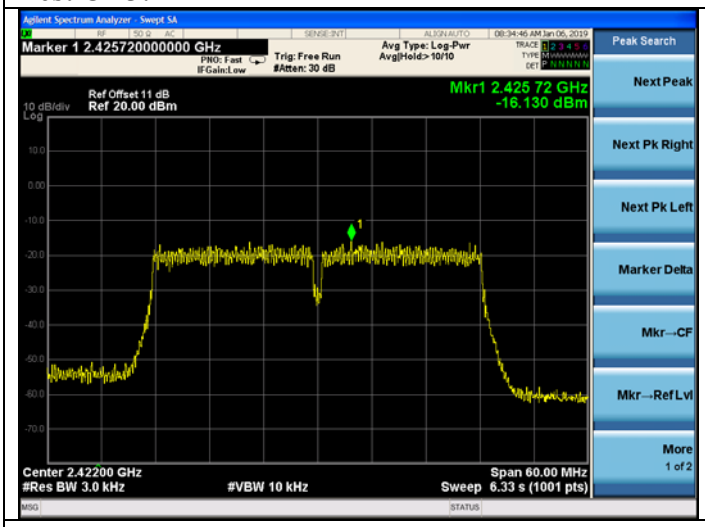
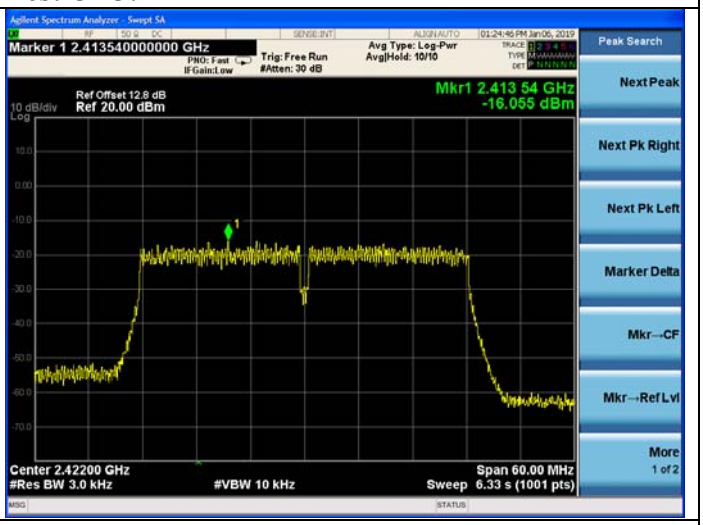
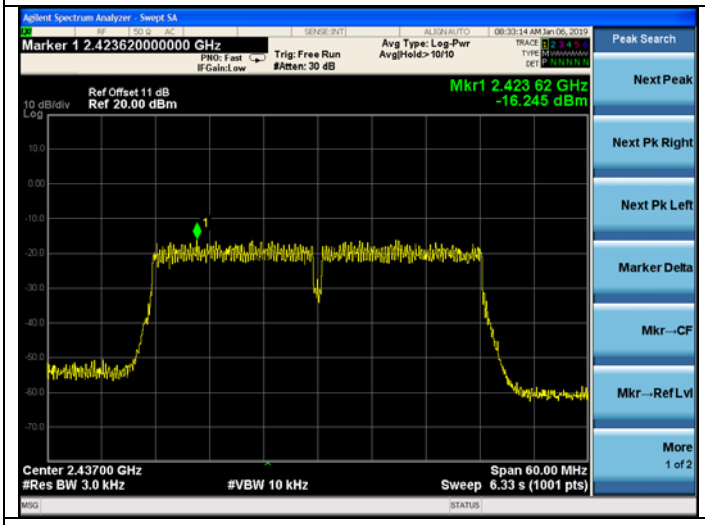
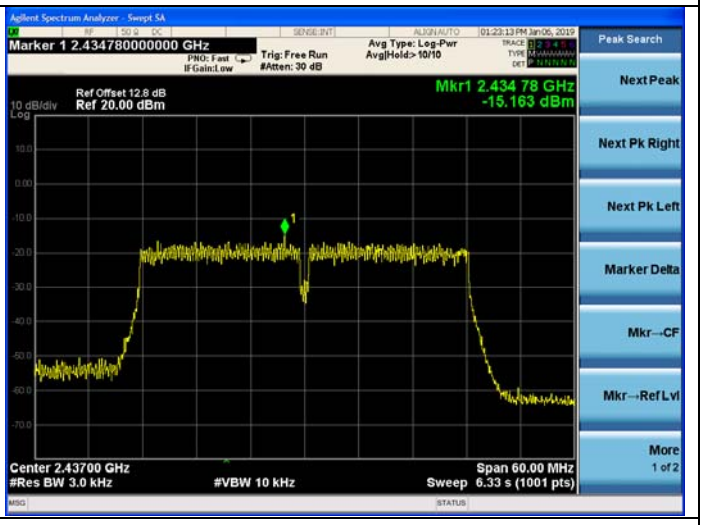
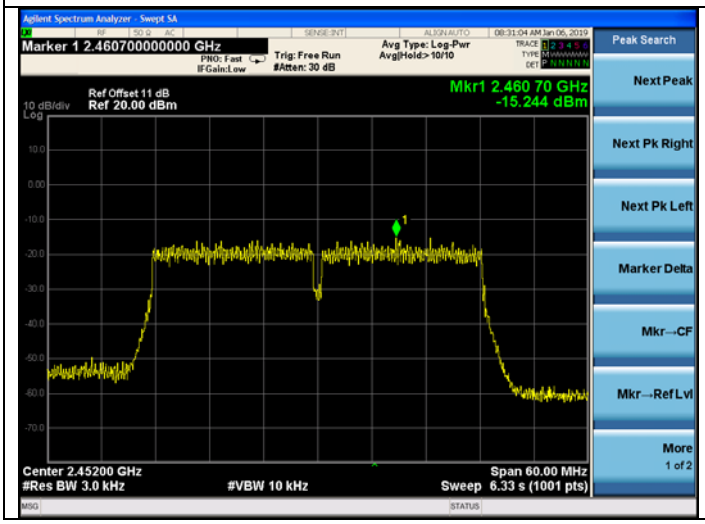
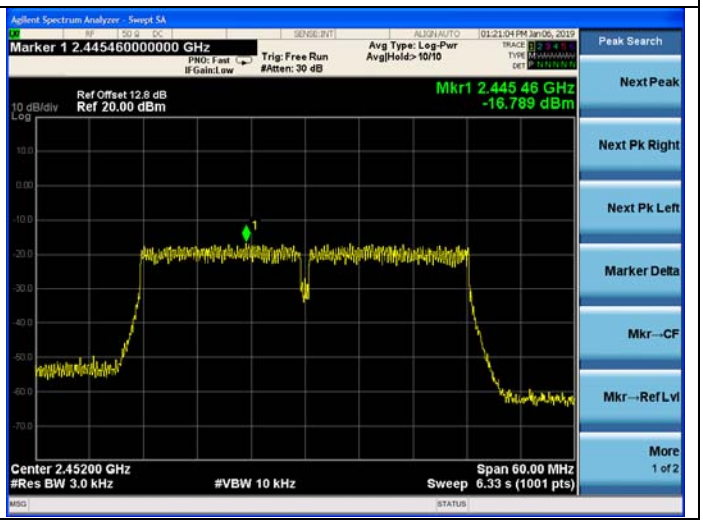
= 6.25dBi>6dBi.

2. The transmit signals are correlated.

| **ANT0:** | **ANT1:** |
|---|---|
| Test Mode: IEEE 802.11b<br>Test CH1: 2412MHz | Test Mode: IEEE 802.11b<br>Test CH1: 2412MHz |
|  | |
| Test CH6: 2437MHz | Test CH6: 2437MHz |
| | |
| Test CH11: 2462MHz | Test CH11: 2462MHz |
| | |

| **ANT0:** | **ANT1:** |
|---|---|
| Test Mode: IEEE 802.11g<br>Test CH1: 2412MHz | Test Mode: IEEE 802.11g<br>Test CH1: 2412MHz |
|  |  |
| | |
| Test CH6: 2437MHz | Test CH6: 2437MHz |
|  | |
| | |
| Test CH11: 2462MHz | Test CH11: 2462MHz |
|  | |

| **ANT0:** | **ANT1:** |
|---|---|
| Test Mode: IEEE 802.11n HT20<br>Test CH1: 2412MHz | Test Mode: IEEE 802.11n HT20<br>Test CH1: 2412MHz |
|  |  |
| | |
| Test CH6: 2437MHz | Test CH6: 2437MHz |
|  |  |
| | |
| Test CH11: 2462MHz | Test CH11: 2462MHz |
|  | |

| **ANT0:** | **ANT1:** |
|---|---|
| Test Mode: IEEE 802.11n HT40<br>Test CH3: 2422MHz | Test Mode: IEEE 802.11n HT40<br>Test CH3: 2422MHz |
|  |  |
| | |
| Test CH6: 2437MHz | Test CH6: 2437MHz |
|  |  |
| | |
| Test CH9: 2452MHz | Test CH9: 2452MHz |
|  |  |

# 10. ANTENNA REQUIREMENT

## 10.1. Standard Applicable

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

## 10.2. Antenna Connected Construction

The antennas used for this product are PCB antenna that no antenna other than that furnished by the responsible party shall be used with the device, the maximum peak gain of the transmit antenna is ANT 0:4dBi & ANT 1: 2.4dBi.

# 11. DEVIATION TO TEST SPECIFICATIONS

[ NONE]