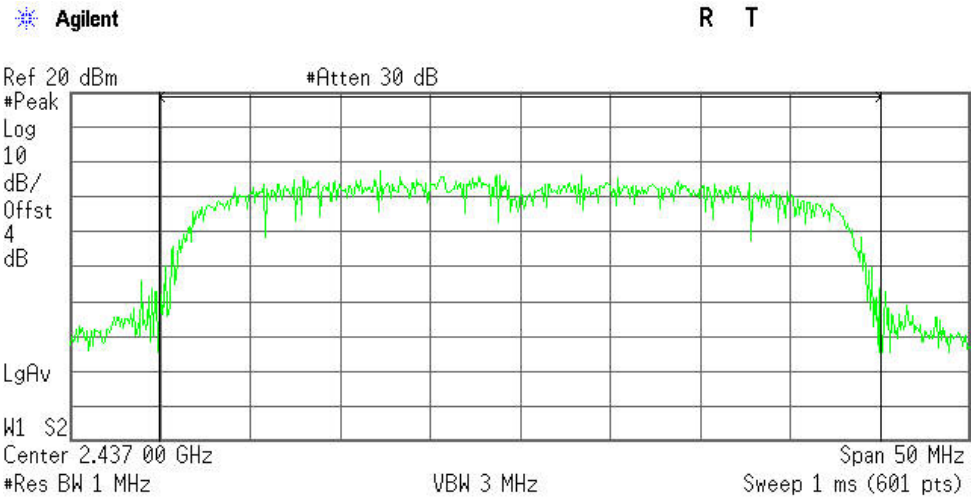
Peak power (CH Mid)



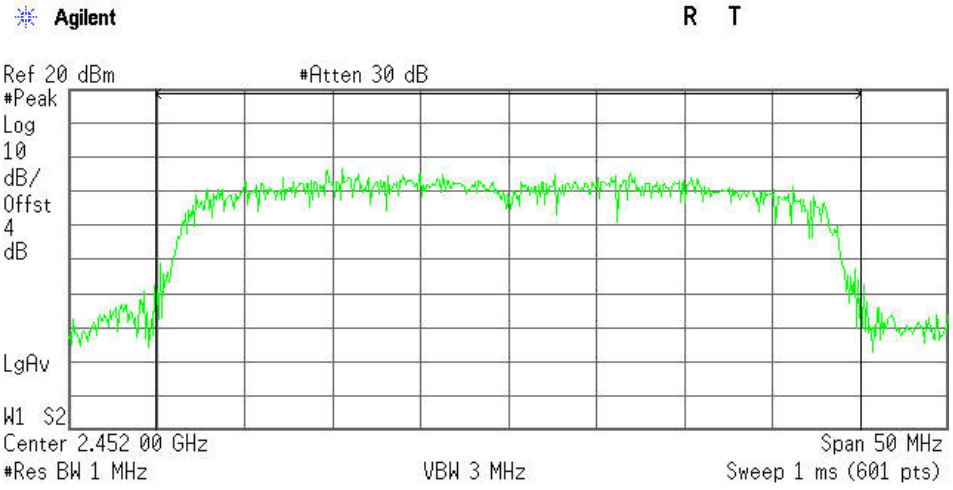
Channel Power

7.04 dBm /40.0000 MHz

Power Spectral Density

-68.98 dBm/Hz

Peak power (CH High)



Channel Power

6.32 dBm /40.0000 MHz

Power Spectral Density

-69.70 dBm/Hz

6.6. PEAK OUTPUT POWER (BLUETOOTH)

6.6.1. LIMITS

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

1. For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

2. Except as shown in paragraphs (b)(3) (i), (ii) and (iii) of this section, if transmitting antennas of directional gain greater than 6dBi are used the peak output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1) or (b)(2) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6dBi.

3. 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.

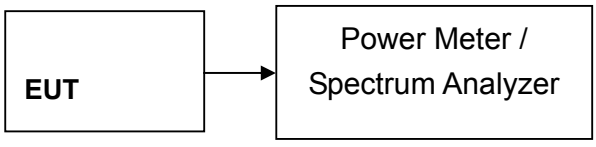
6.6.2. TEST INSTRUMENTS

Name of Equipment	Manufacturer	Model	Serial Number	Last Calibration	Due Calibration
Power Meter	Anritsu	ML2487A	6K00001491	03/19/2012	03/19/2013
Spectrum Analyzer	Agilent	E4446A	US44300399	03/19/2012	03/19/2013

6.6.3. TEST PROCEDURES (please refer to measurement standard)

The transmitter output is connected to the RF Power Meter. The RF Power Meter is set to the peak power detection.

6.6.4. TEST SETUP



6.6.5. TEST RESULTS

No non-compliance noted

Test Data

GFSK

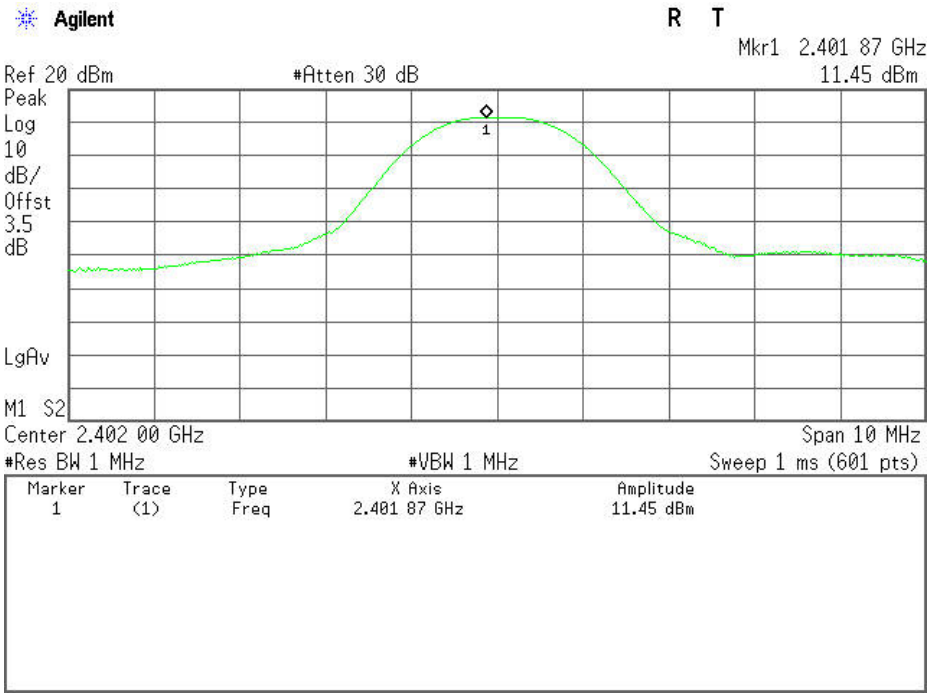
Channel	Frequency (MHz)	Reading Power (dBm)	Factor (dB)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2402	7.95	3.50	11.45	0.01396	1	PASS
Mid	2441	8.32	3.50	11.82	0.01521		PASS
High	2480	8.75	3.50	12.25	0.01679		PASS

8DPSK

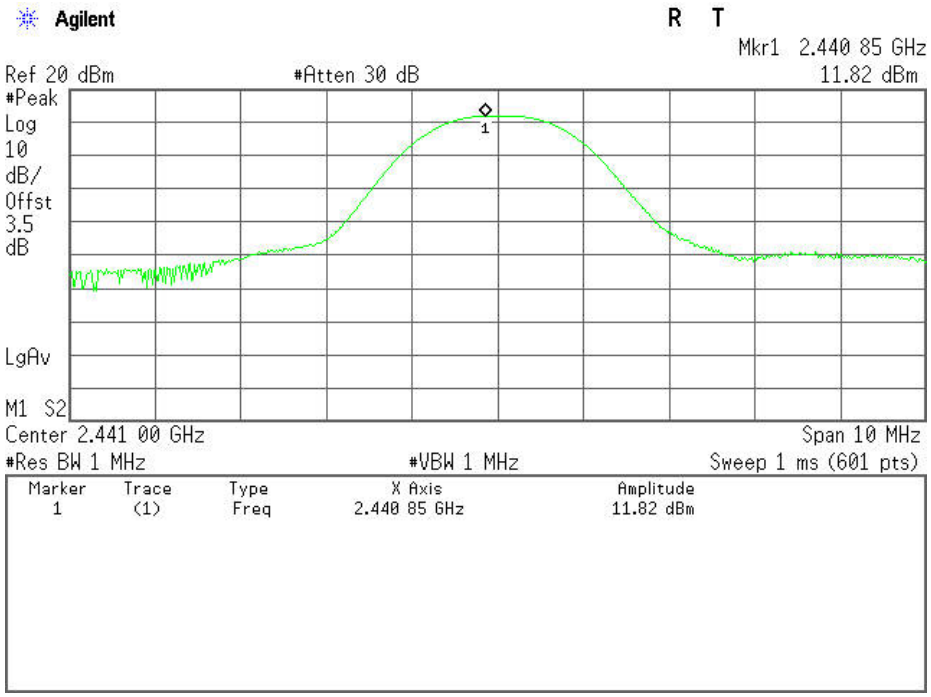
Channel	Frequency (MHz)	Reading Power (dBm)	Factor (dB)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2402	6.90	3.50	10.40	0.01096	1	PASS
Mid	2441	6.80	3.50	10.30	0.01072		PASS
High	2480	6.37	3.50	9.87	0.00971		PASS

Test Plot
GFSK

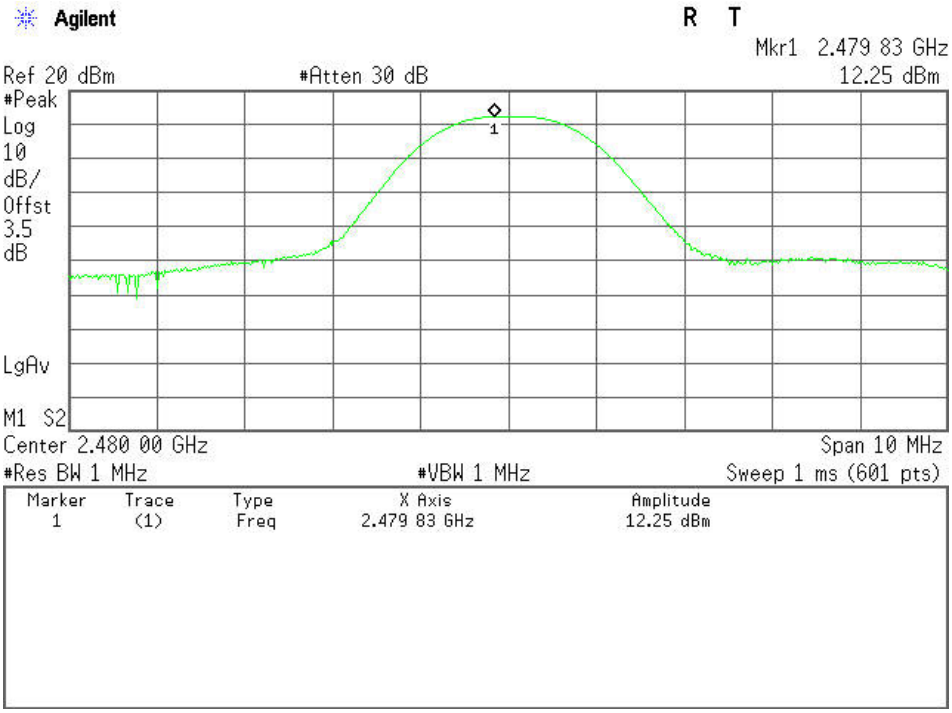
Peak power (CH Low)



Peak power (CH Mid)

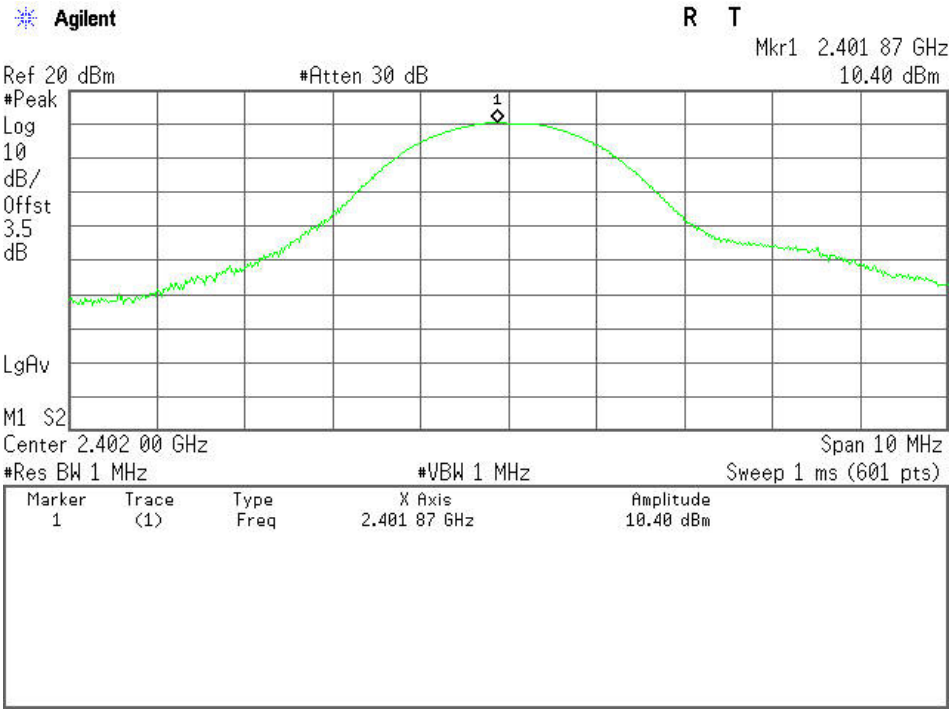


Peak power (CH High)

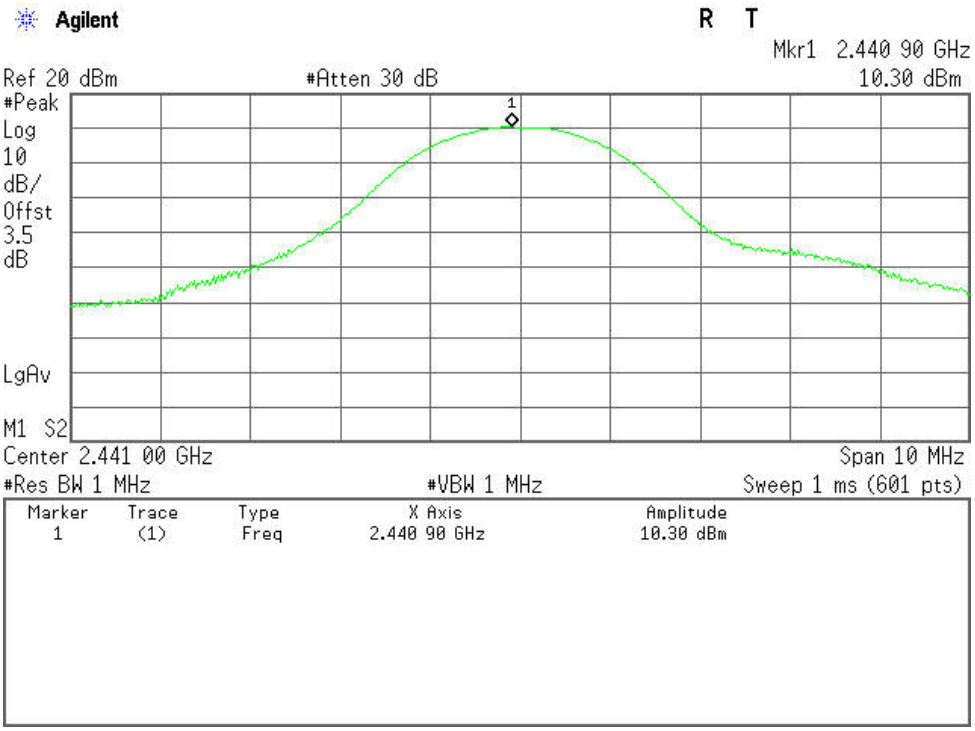


8DPSK

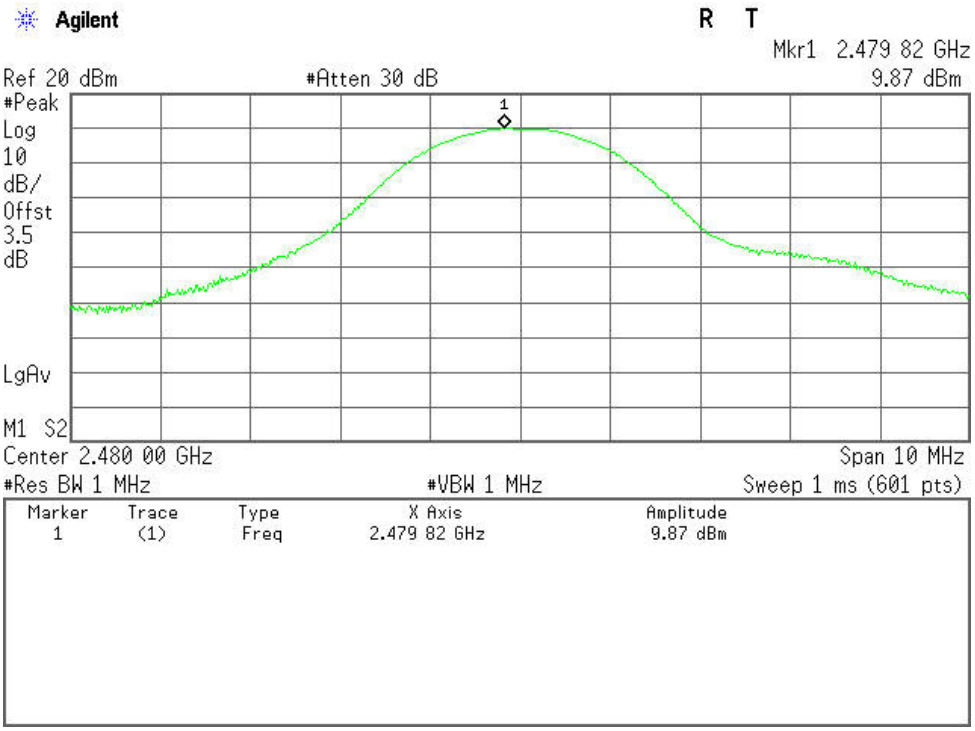
Peak power (CH Low)



Peak power (CH Mid)



Peak power (CH High)



6.7. BAND EDGES MEASUREMENT

6.7.1. 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)).

6.7.2. 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.

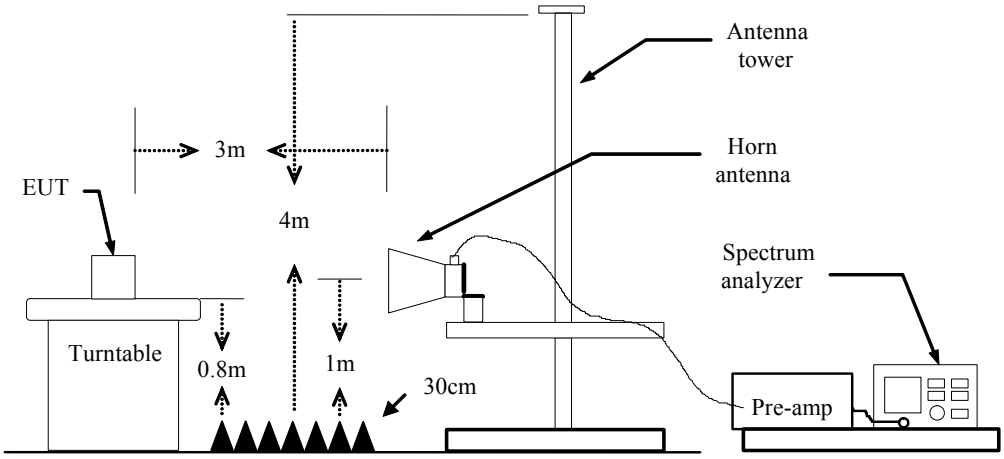
2. The FCC Site Registration number is 101879.

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

6.7.3. 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

6.7.4. TEST SETUP



6.7.5. TEST RESULTS

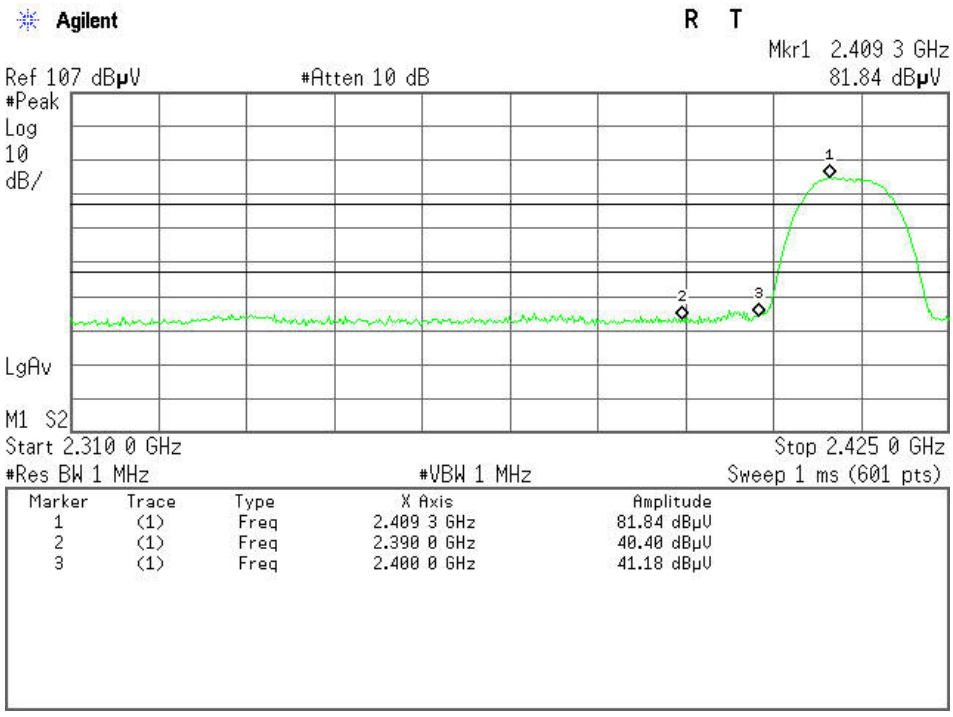
Test Plot

WIFI

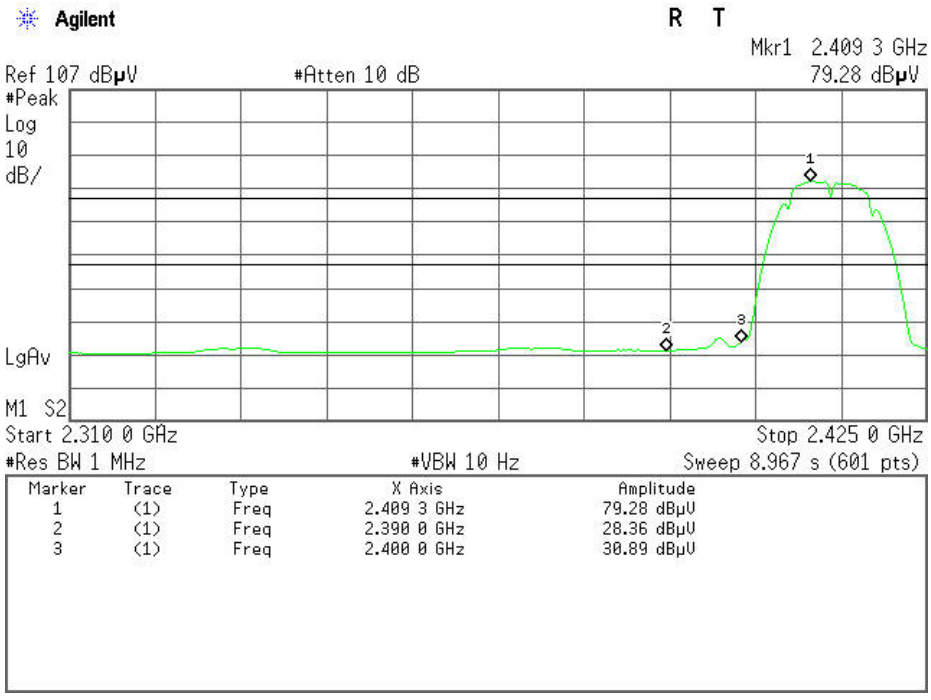
IEEE 802.11b mode

Band Edges (CH Low)

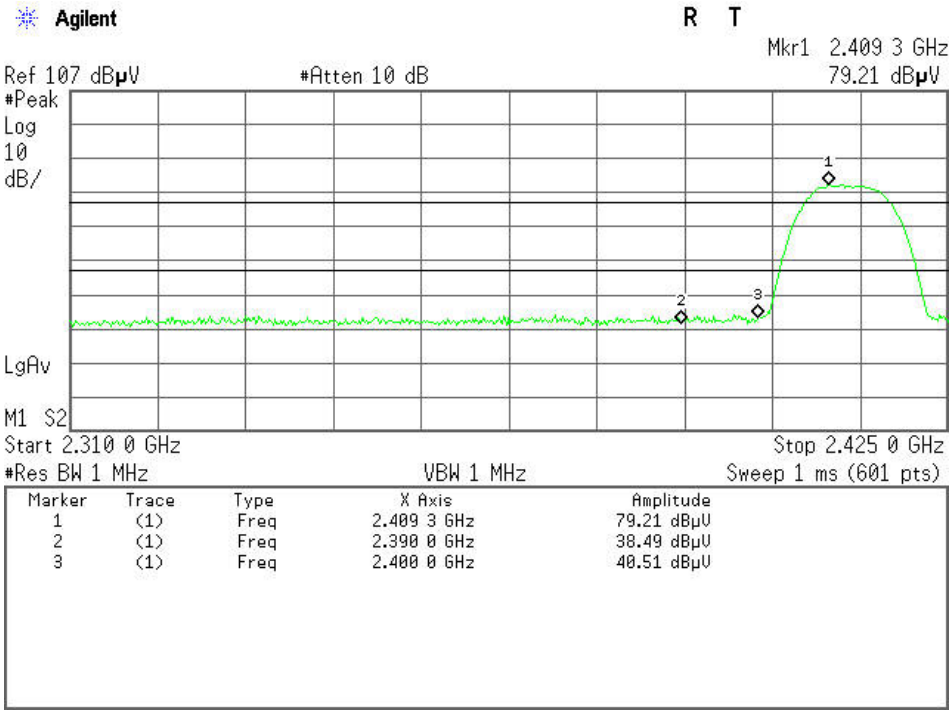
Detector mode: Peak **Polarity: Vertical**



Detector mode: Average **Polarity: Vertical**

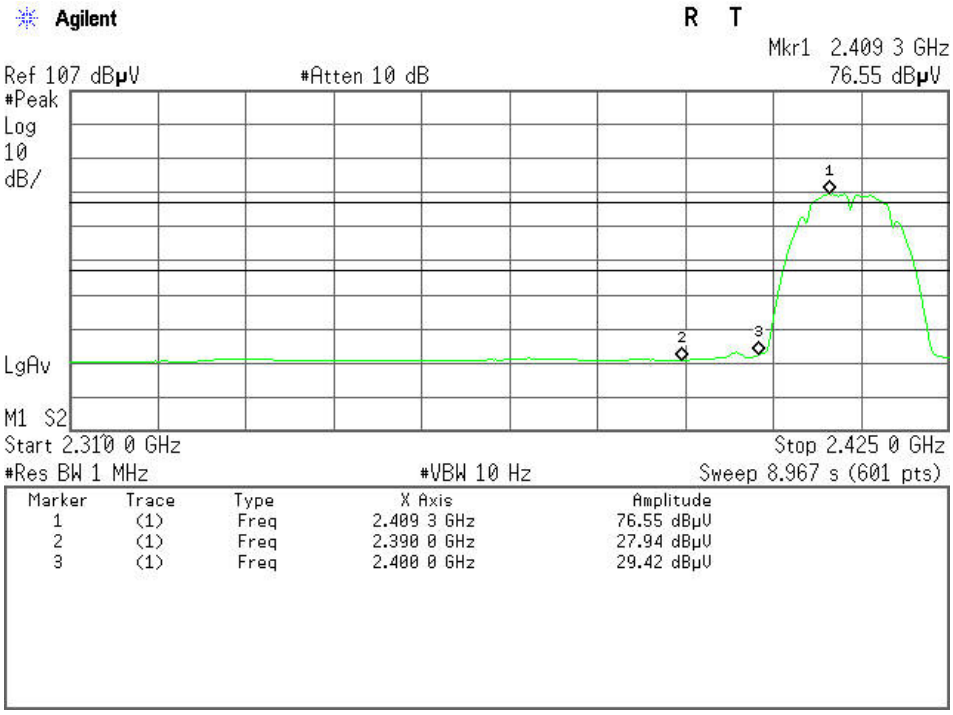


Detector mode: Peak **Polarity: Horizontal**



Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.409 3 GHz	79.21 dBµV
2	(1)	Freq	2.390 0 GHz	38.49 dBµV
3	(1)	Freq	2.400 0 GHz	40.51 dBµV

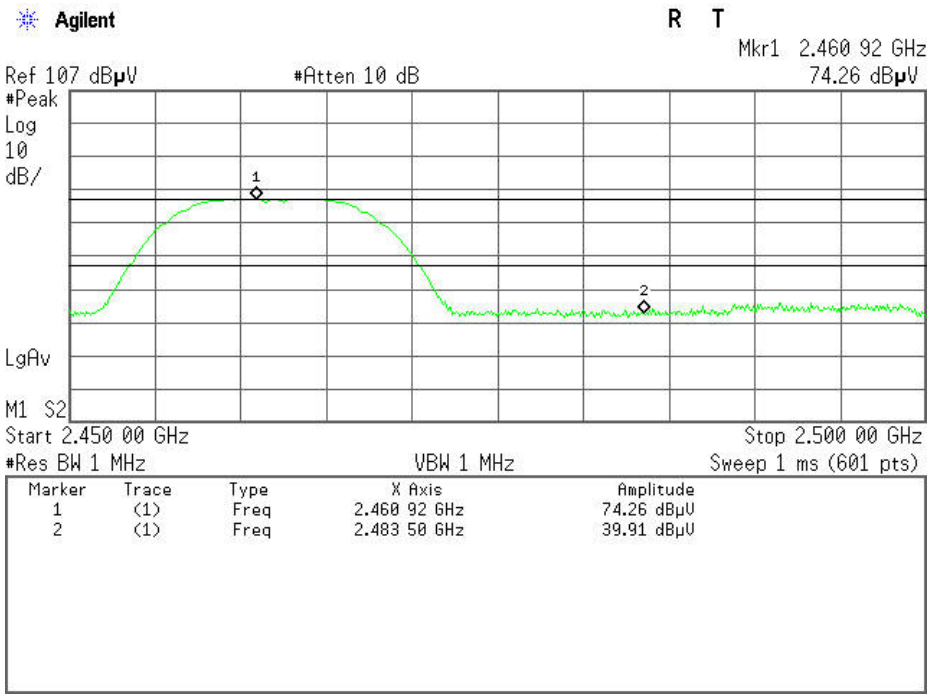
Detector mode: Average **Polarity: Horizontal**



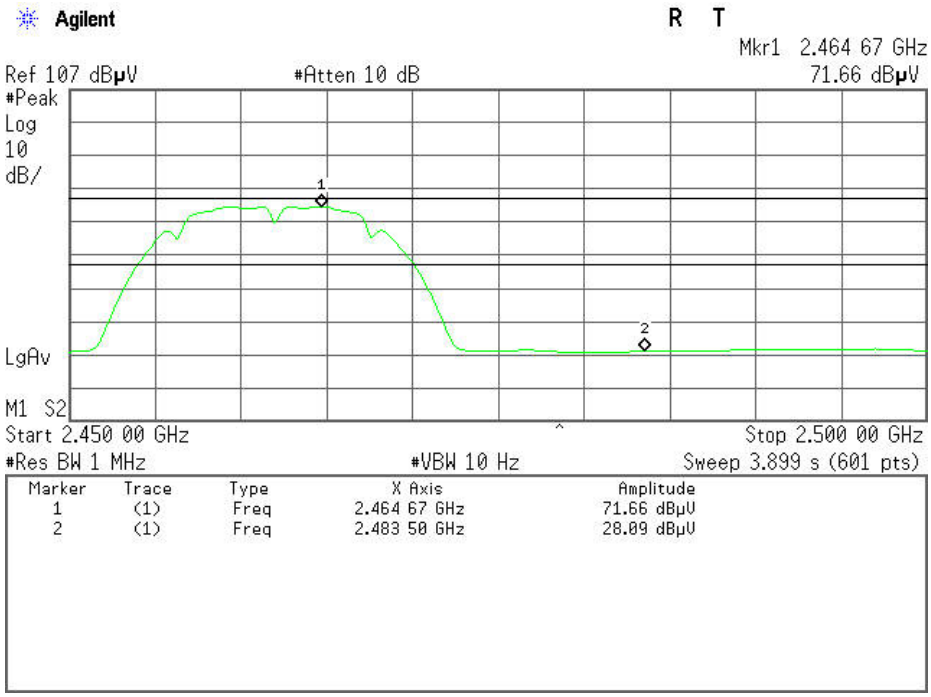
Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.409 3 GHz	76.55 dBµV
2	(1)	Freq	2.390 0 GHz	27.94 dBµV
3	(1)	Freq	2.400 0 GHz	29.42 dBµV

Band Edges (CH High)

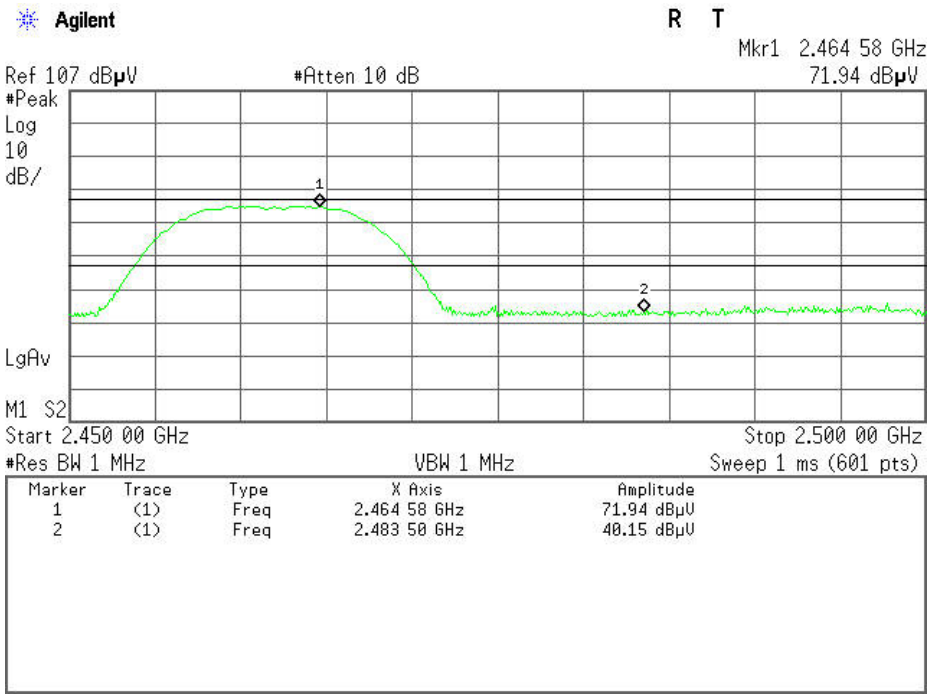
Detector mode: Peak Polarity: Vertical



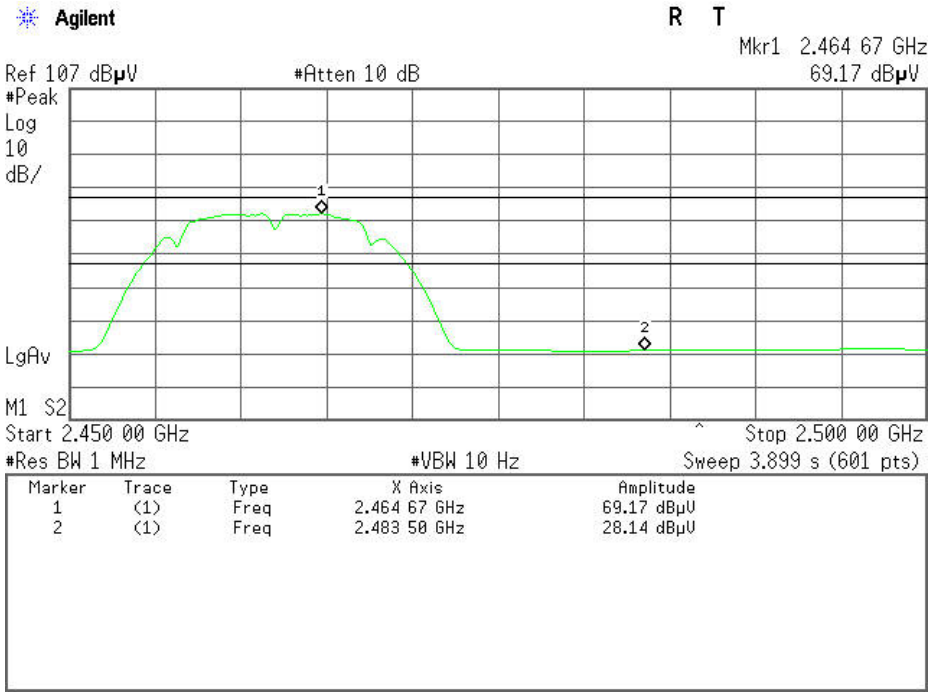
Detector mode: Average Polarity: Vertical



Detector mode: Peak **Polarity: Horizontal**



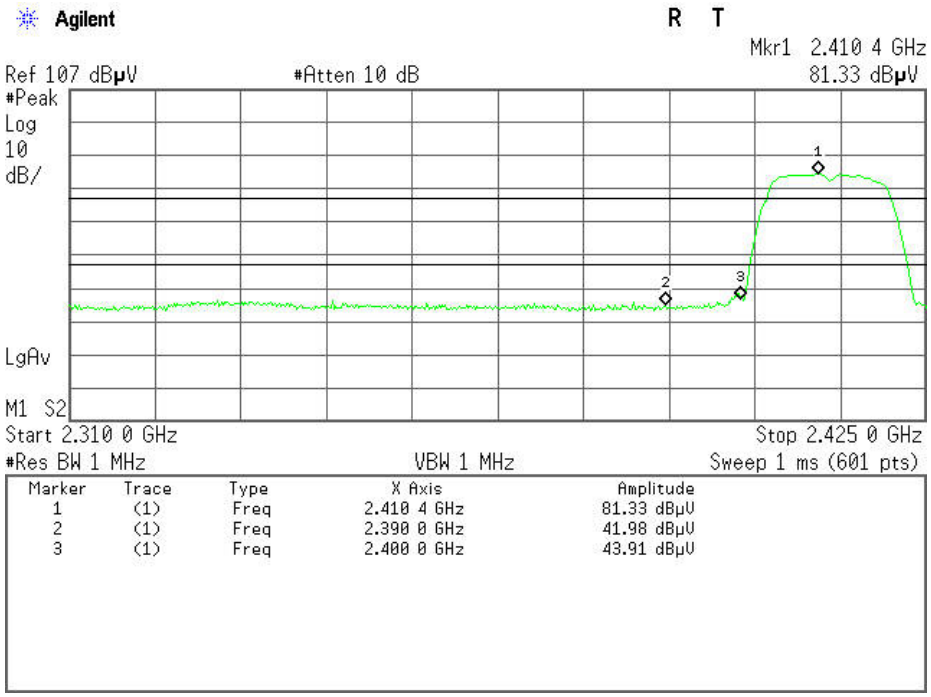
Detector mode: Average **Polarity: Horizontal**



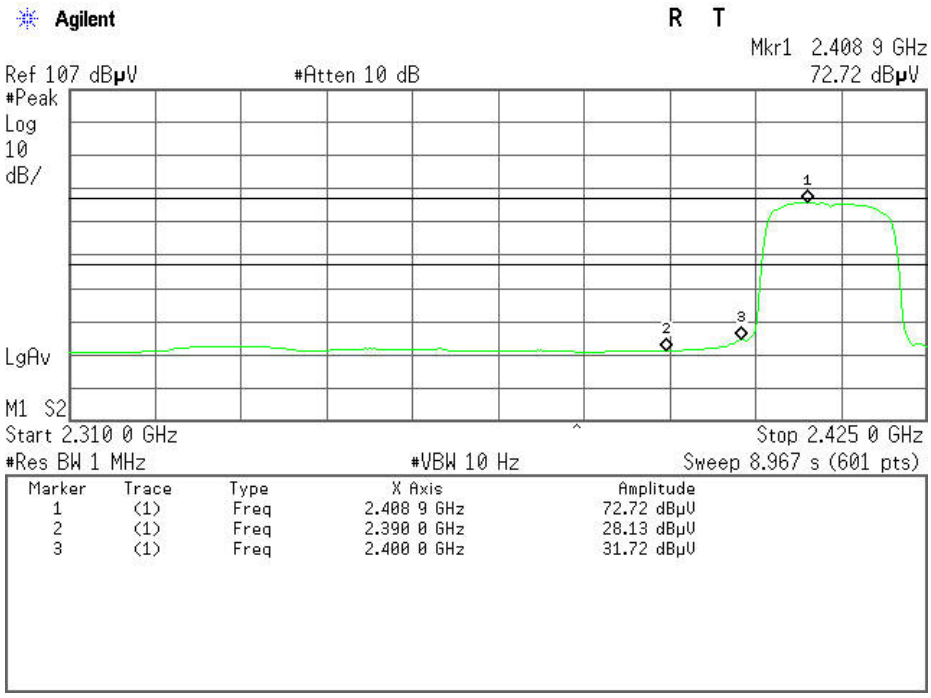
IEEE 802.11g mode

Band Edges (CH Low)

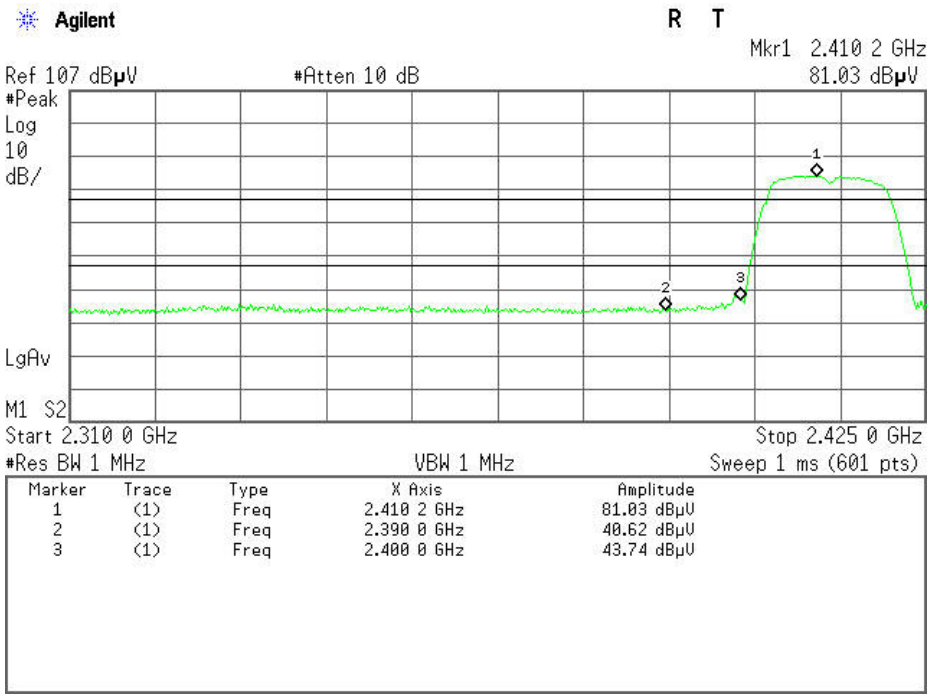
Detector mode: Peak **Polarity: Vertical**



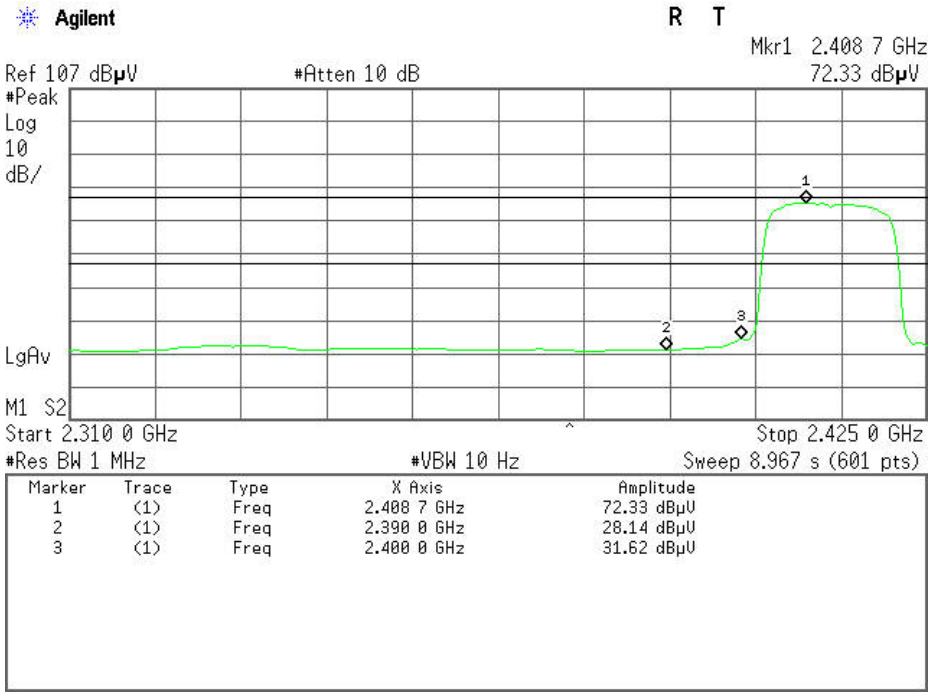
Detector mode: Average **Polarity: Vertical**



Detector mode: Peak **Polarity: Horizontal**

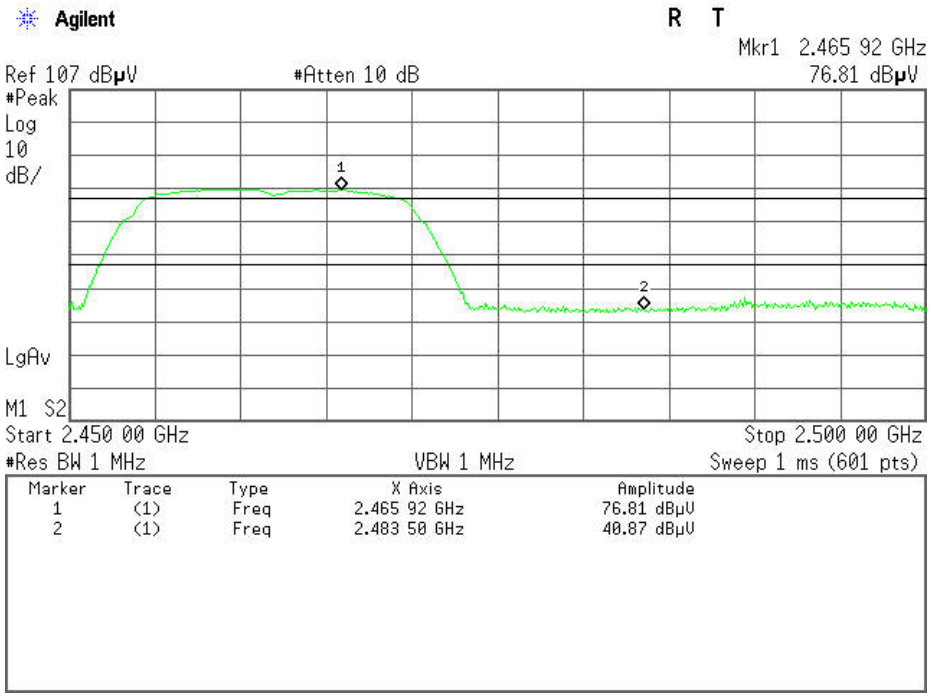


Detector mode: Average **Polarity: Horizontal**

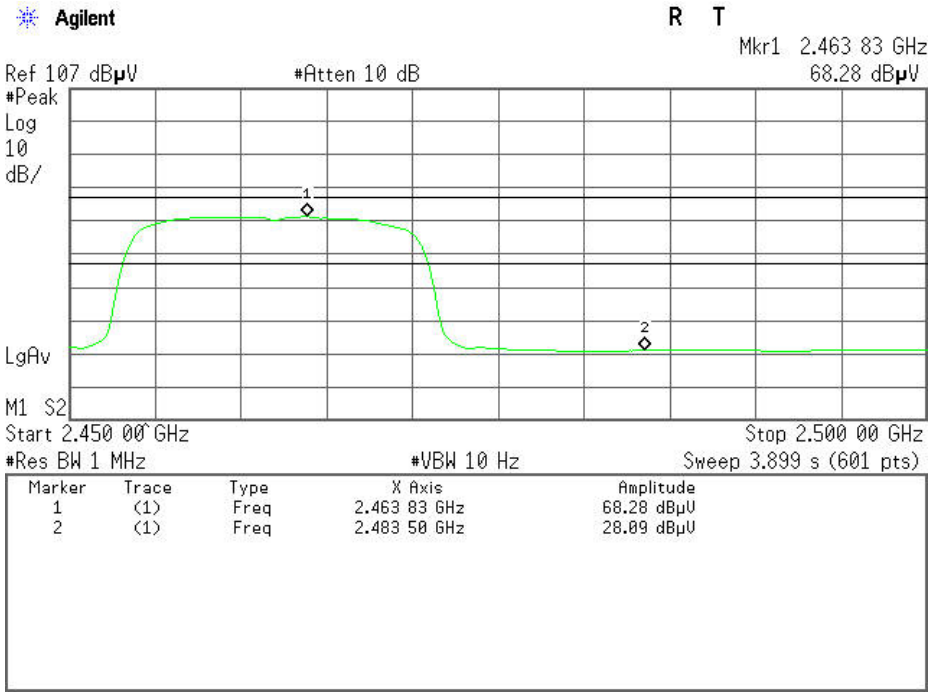


Band Edges (CH High)

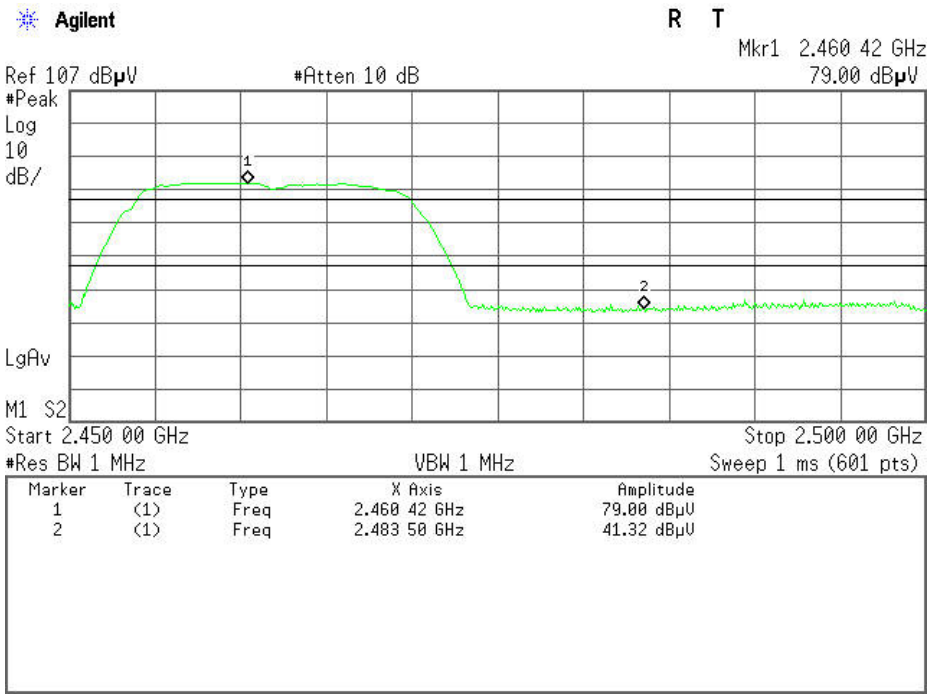
Detector mode: Peak **Polarity: Vertical**



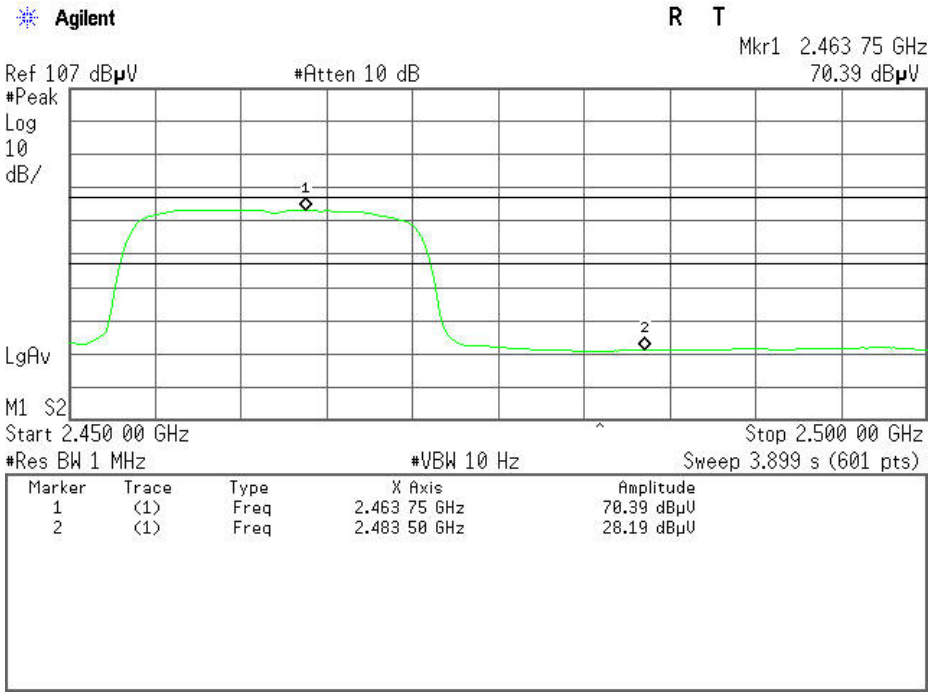
Detector mode: Average **Polarity: Vertical**



Detector mode: Peak **Polarity: Horizontal**



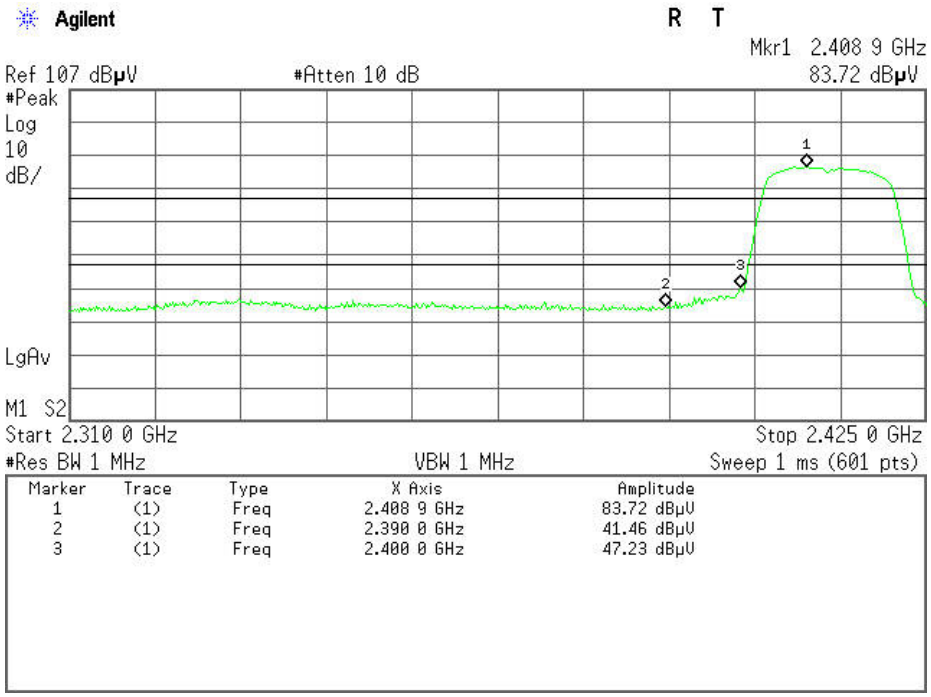
Detector mode: Average **Polarity: Horizontal**



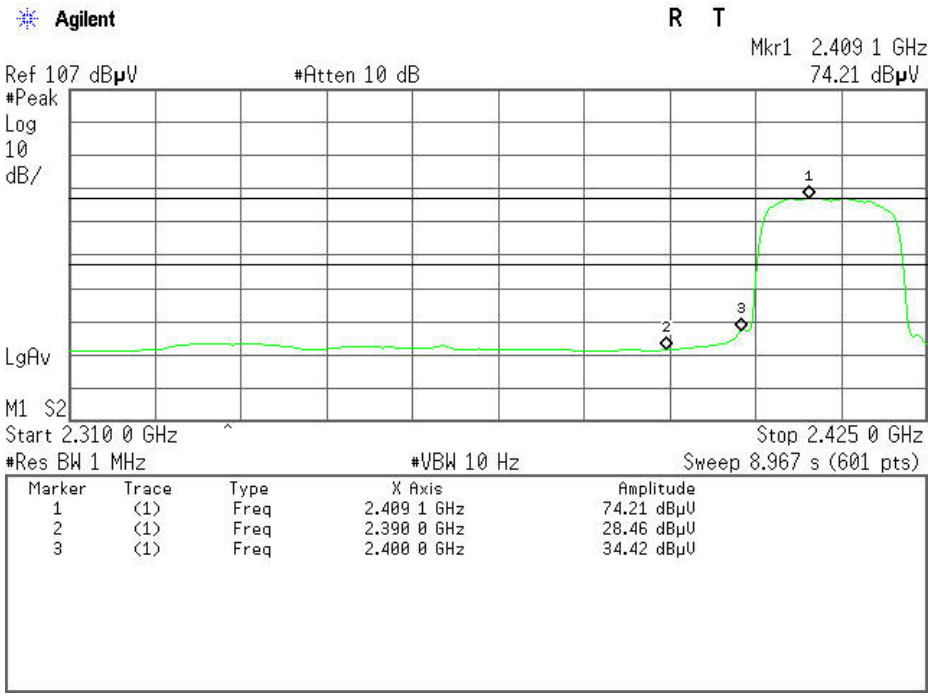
IEEE 802.11n HT20 MHz mode

Band Edges (CH Low)

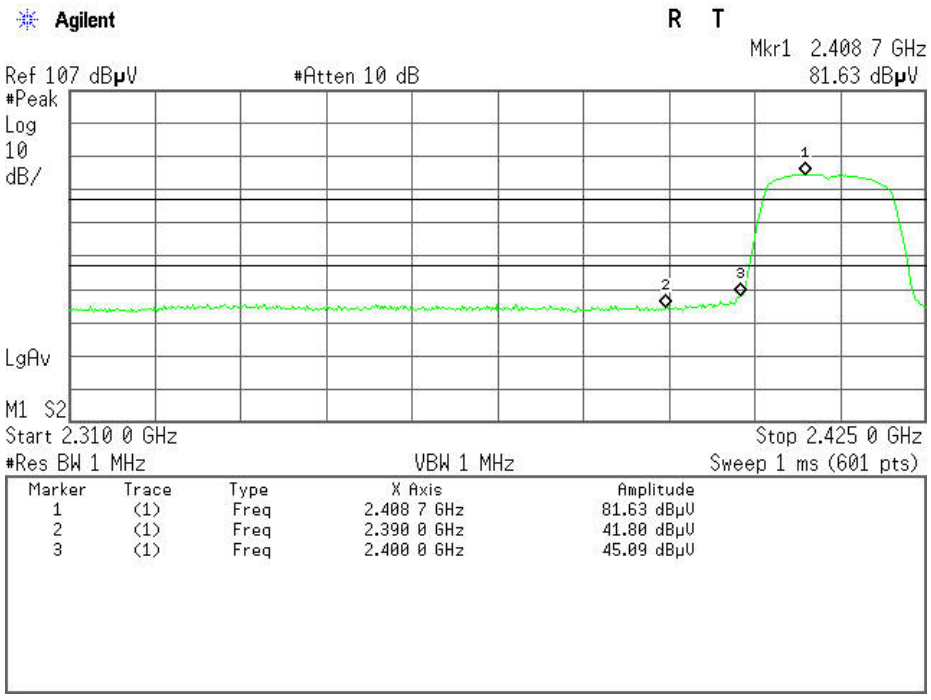
Detector mode: Peak **Polarity: Vertical**



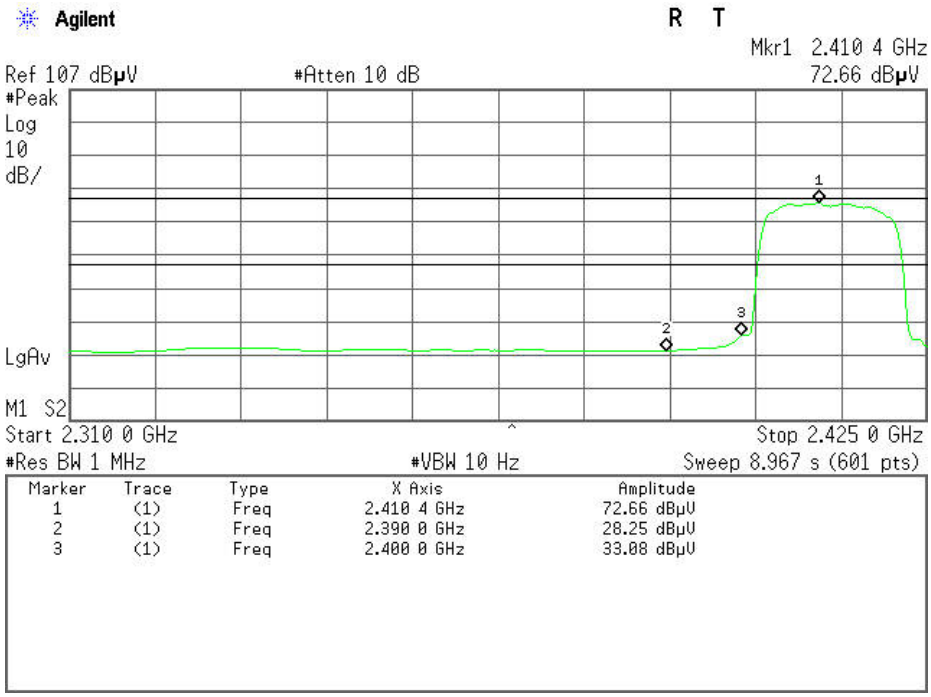
Detector mode: Average **Polarity: Vertical**



Detector mode: Peak **Polarity: Horizontal**

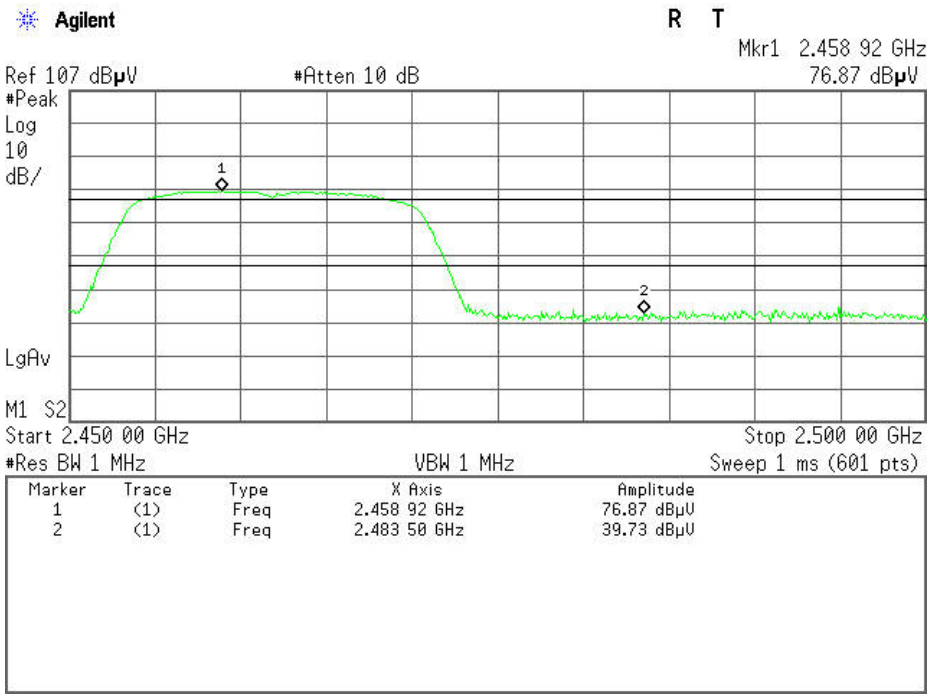


Detector mode: Average **Polarity: Horizontal**

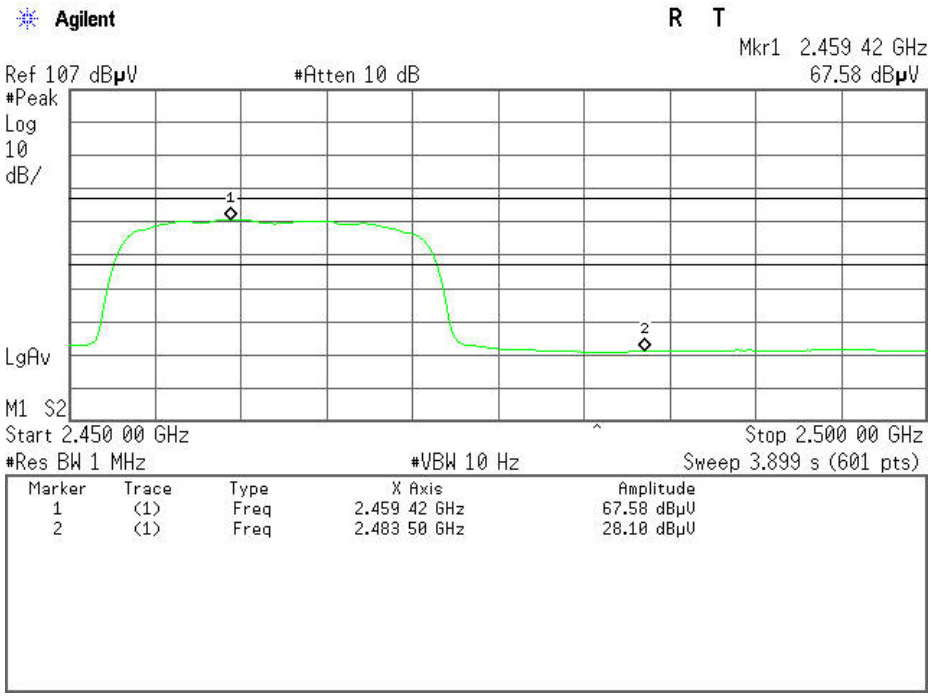


Band Edges (CH High)

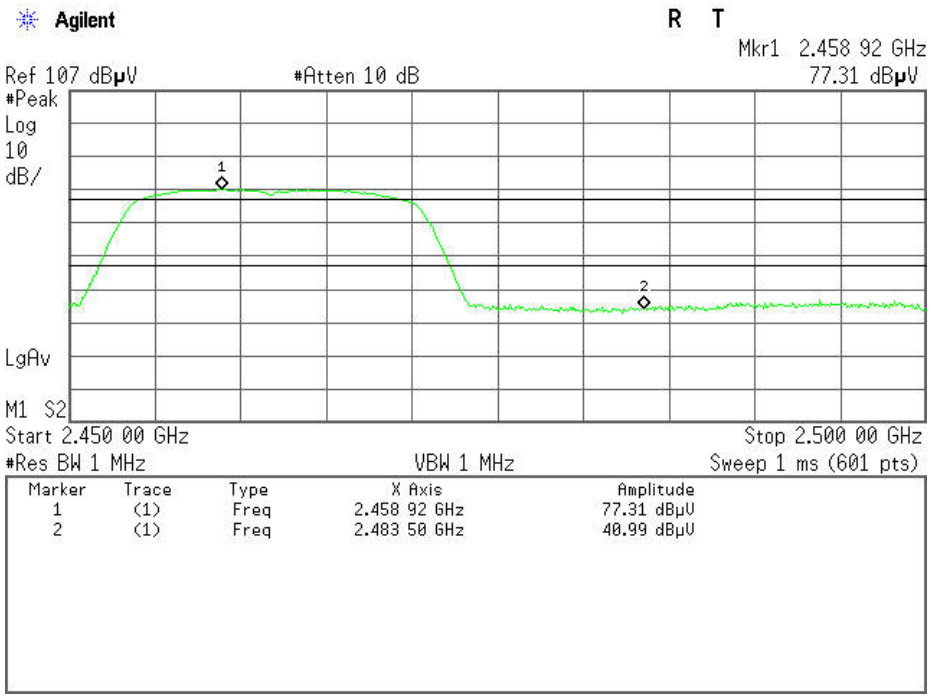
Detector mode: Peak **Polarity: Vertical**



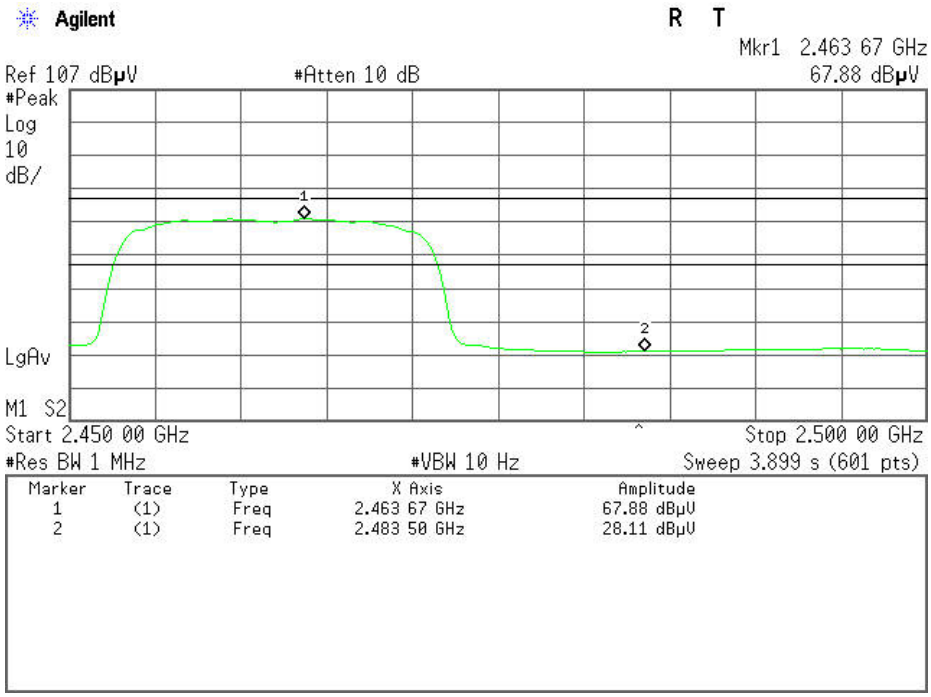
Detector mode: Average **Polarity: Vertical**



Detector mode: Peak **Polarity: Horizontal**



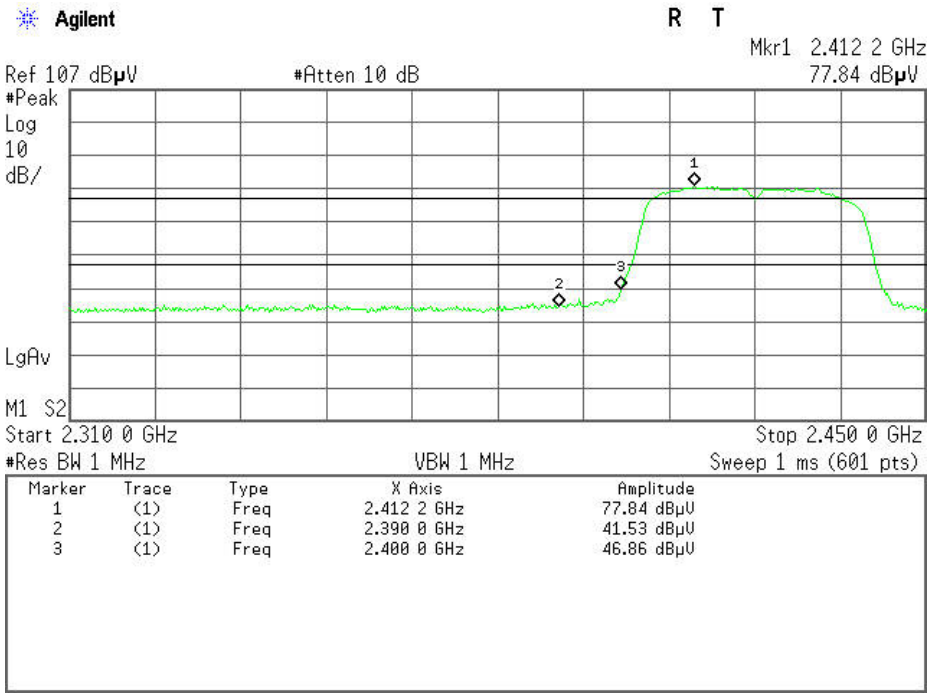
Detector mode: Average **Polarity: Horizontal**



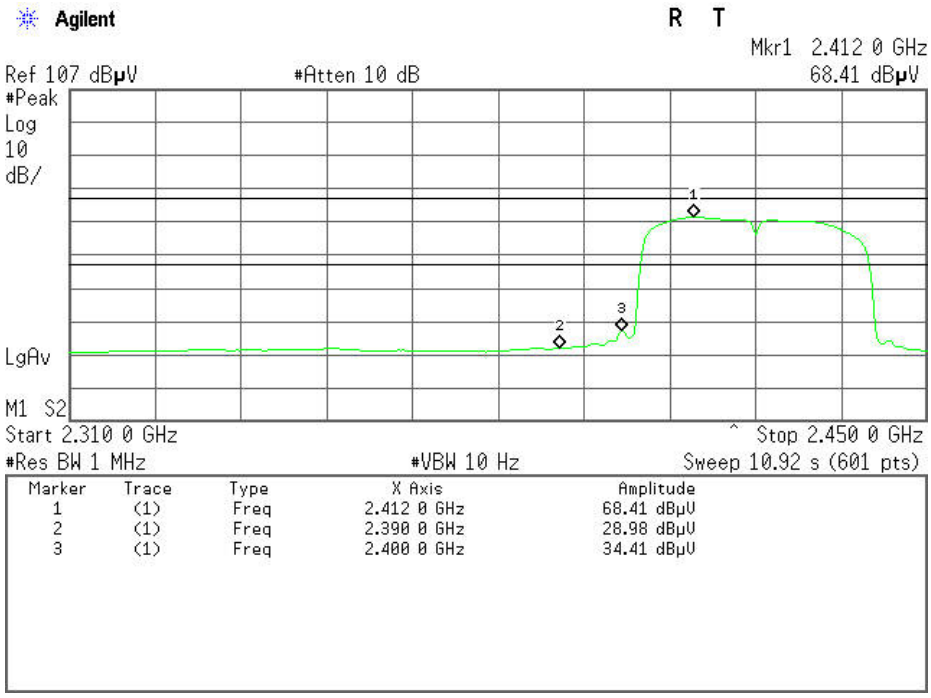
IEEE 802.11n HT40 MHz mode

Band Edges (CH Low)

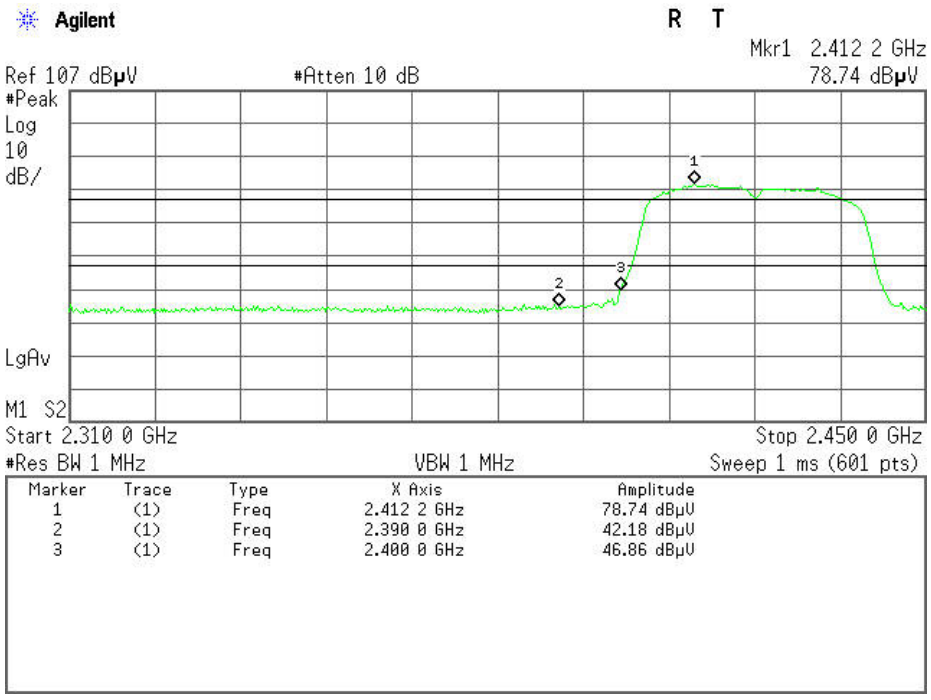
Detector mode: Peak **Polarity: Vertical**



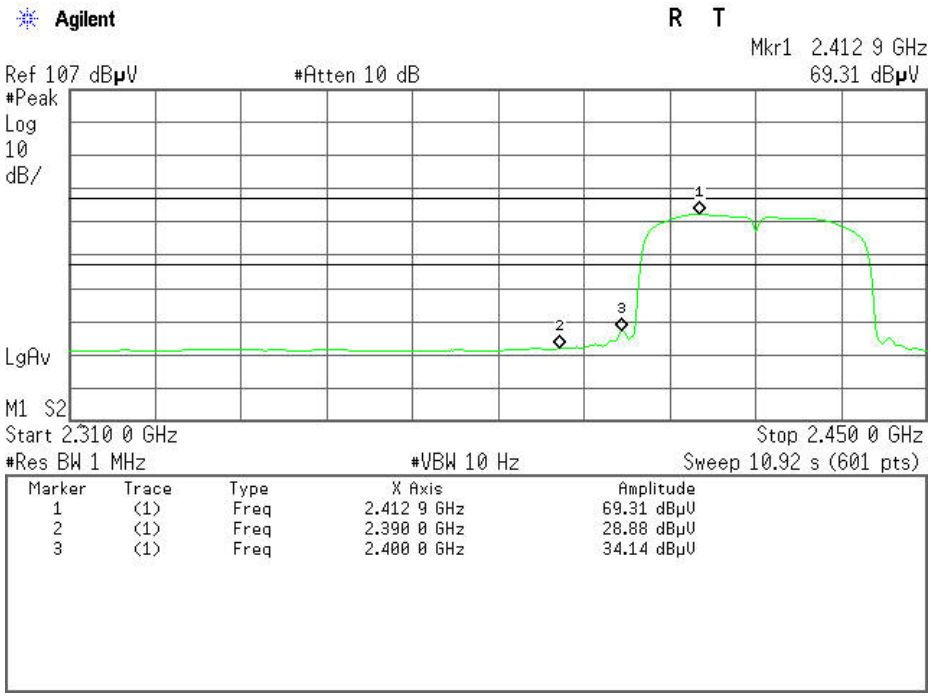
Detector mode: Average **Polarity: Vertical**



Detector mode: Peak **Polarity: Horizontal**

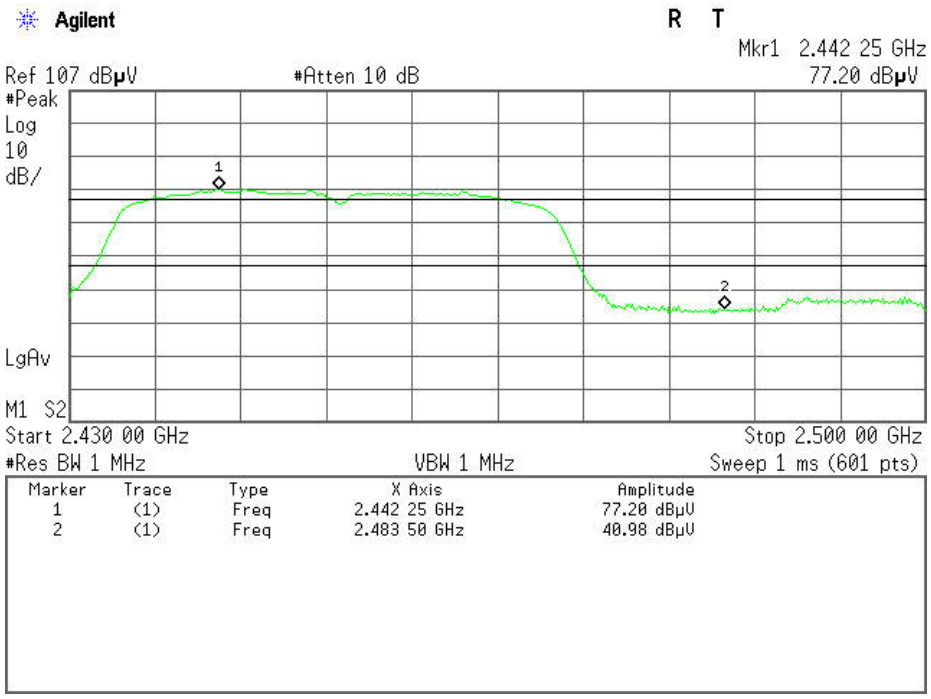


Detector mode: Average **Polarity: Horizontal**

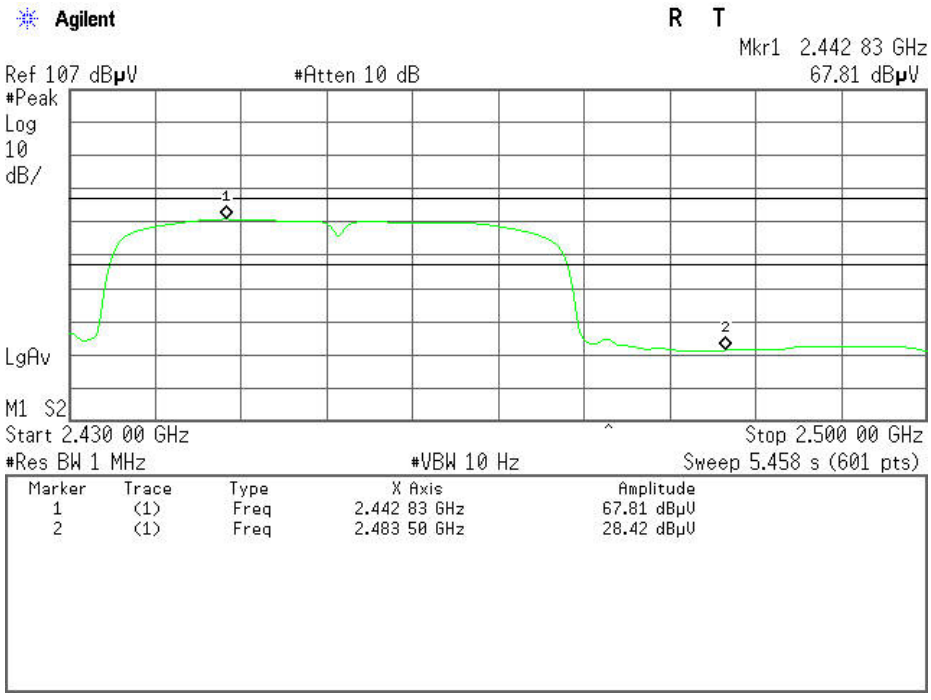


Band Edges (CH High)

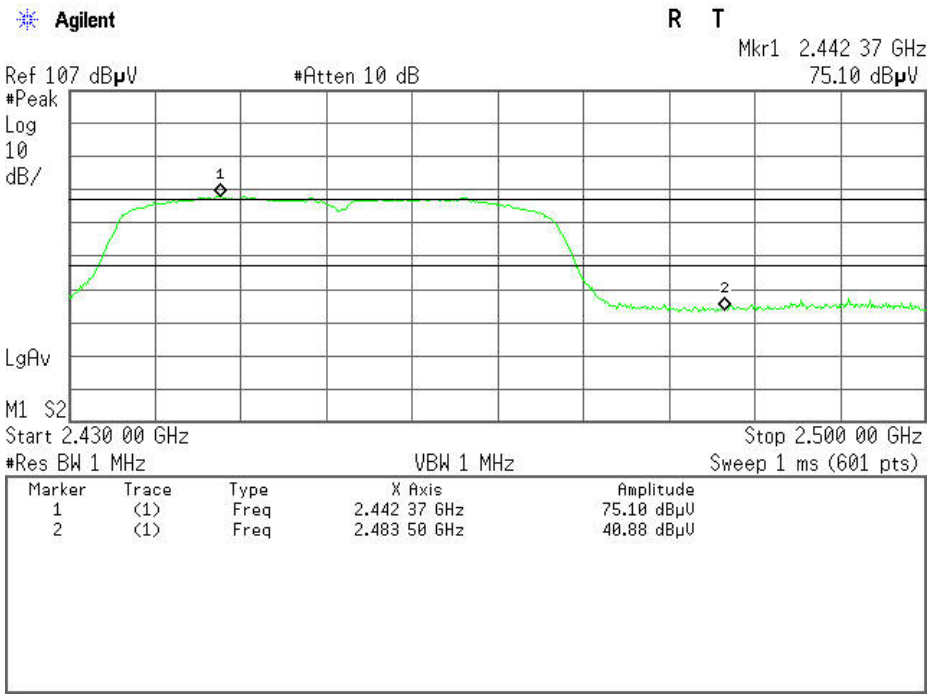
Detector mode: Peak **Polarity: Vertical**



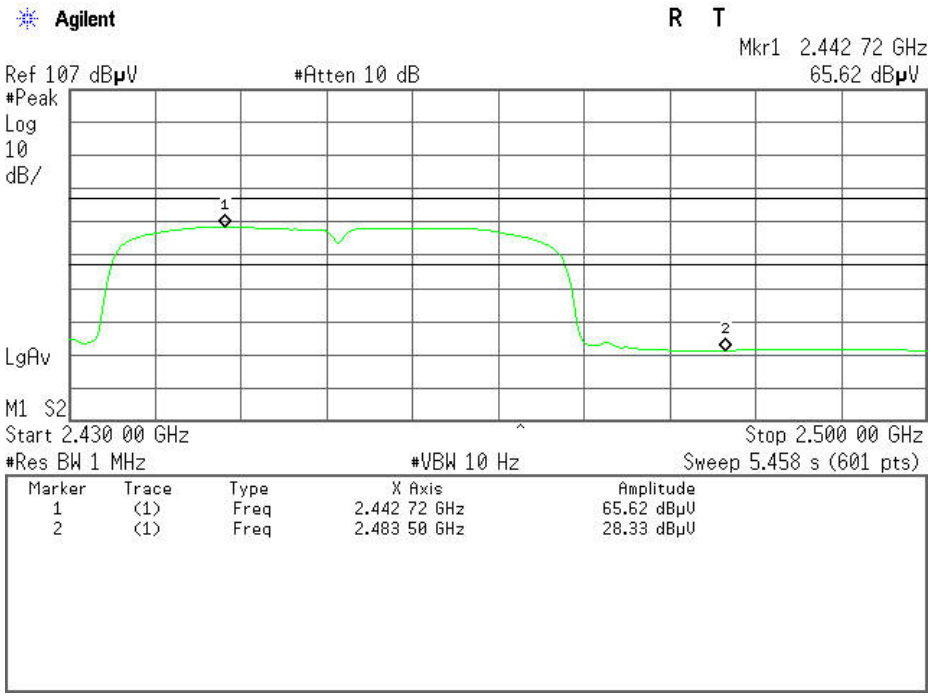
Detector mode: Average **Polarity: Vertical**



Detector mode: Peak **Polarity: Horizontal**



Detector mode: Average **Polarity: Horizontal**

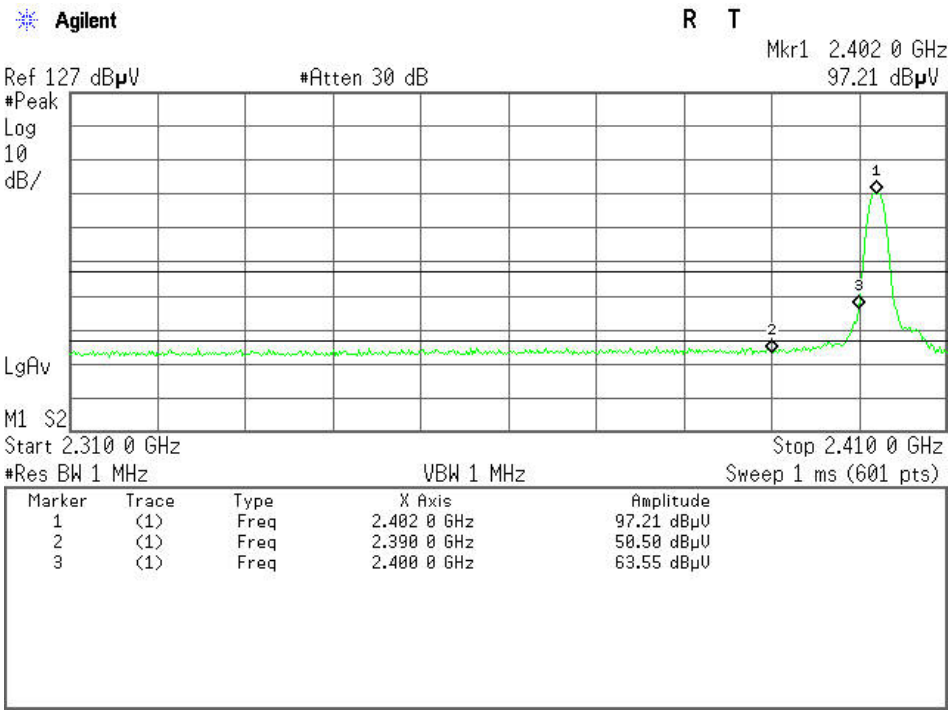


Bluetooth

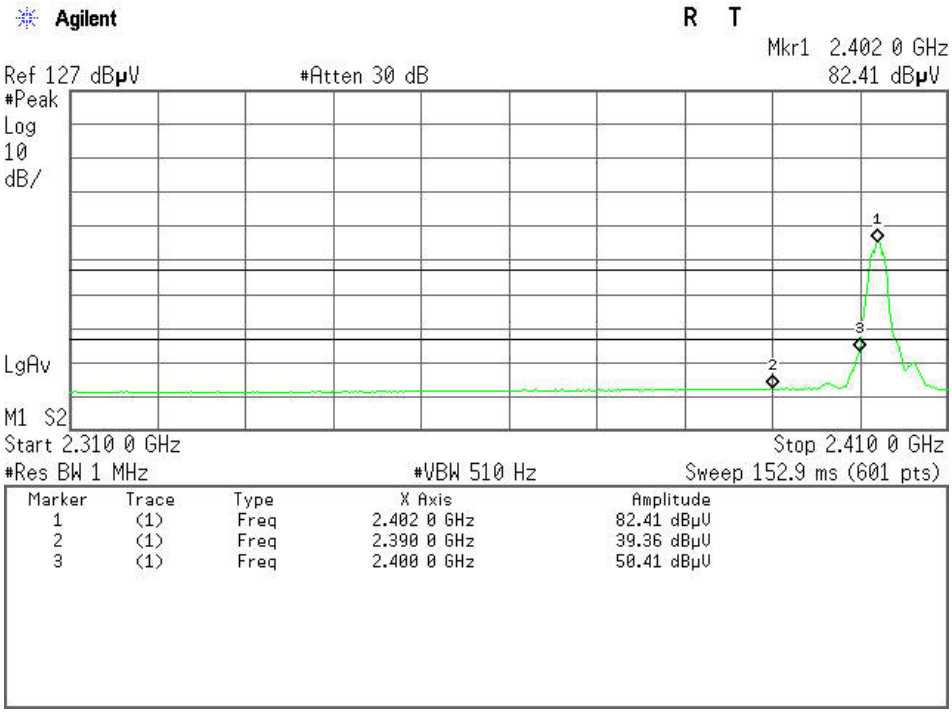
Test Data (GFSK)

Band Edges (CH-Low)

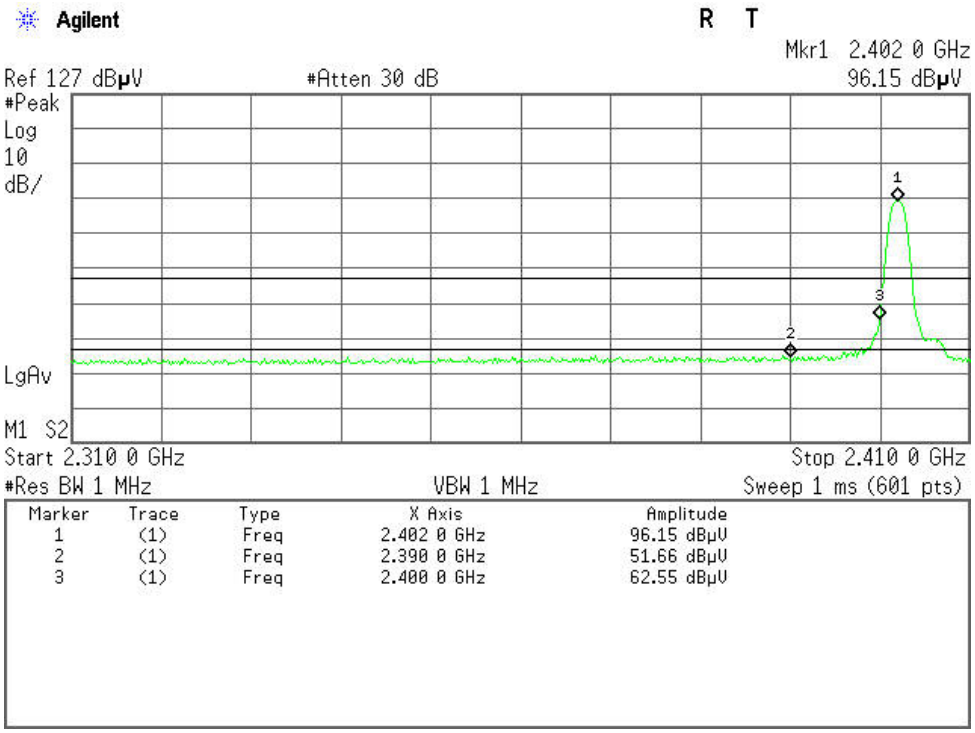
Detector mode: Peak **Polarity: Vertical**



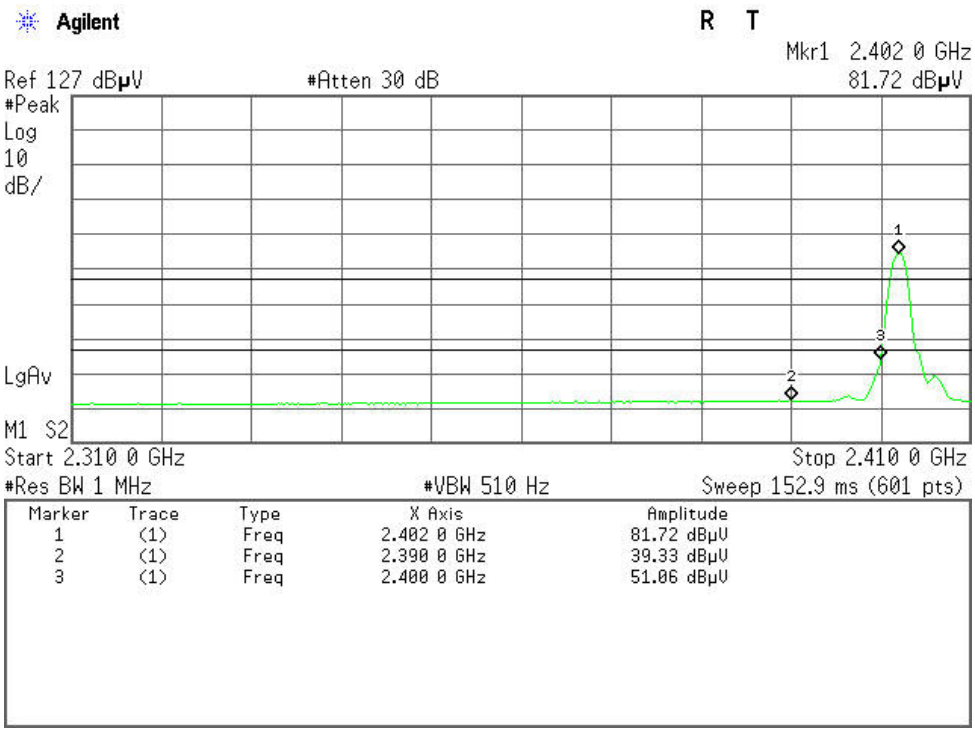
Detector mode: Average **Polarity: Vertical**



Detector mode: Peak **Polarity: Horizontal**

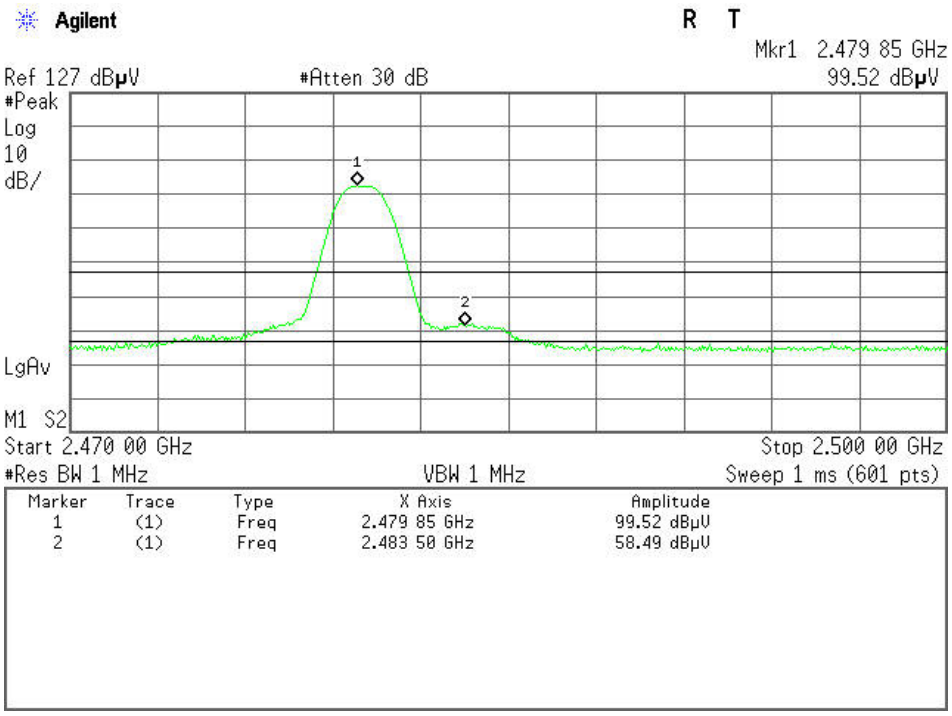


Detector mode: Average **Polarity: Horizontal**



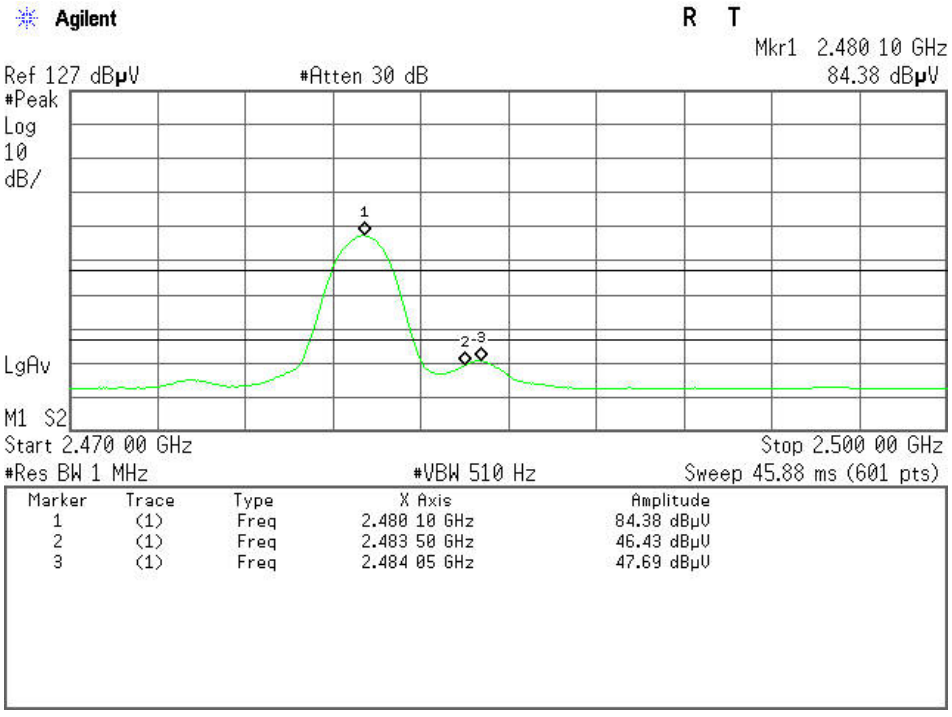
Band Edges (CH-High)

Detector mode: Peak — Polarity: Vertical



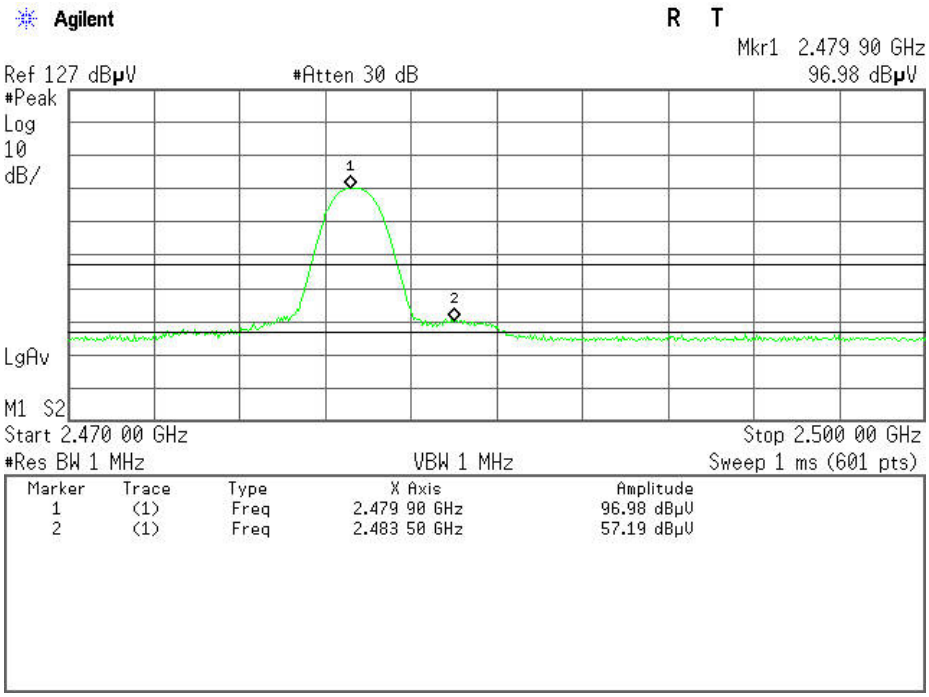
Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.479 85 GHz	99.52 dBµV
2	(1)	Freq	2.483 50 GHz	58.49 dBµV

Detector mode: Average — Polarity: Vertical

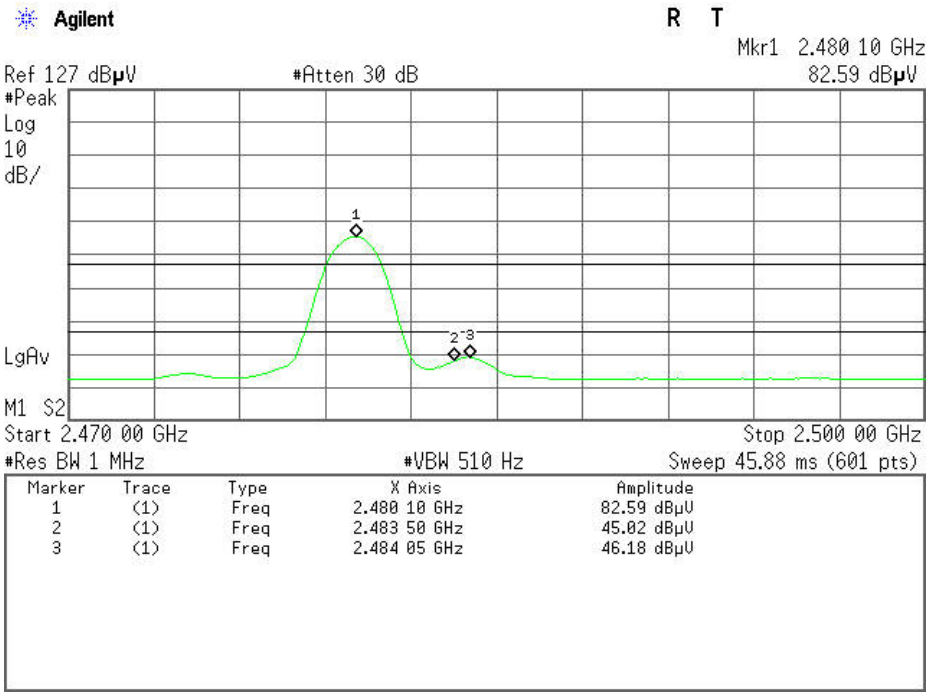


Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.480 10 GHz	84.38 dBµV
2	(1)	Freq	2.483 50 GHz	46.43 dBµV
3	(1)	Freq	2.484 05 GHz	47.69 dBµV

Detector mode: Peak **Polarity: Horizontal**



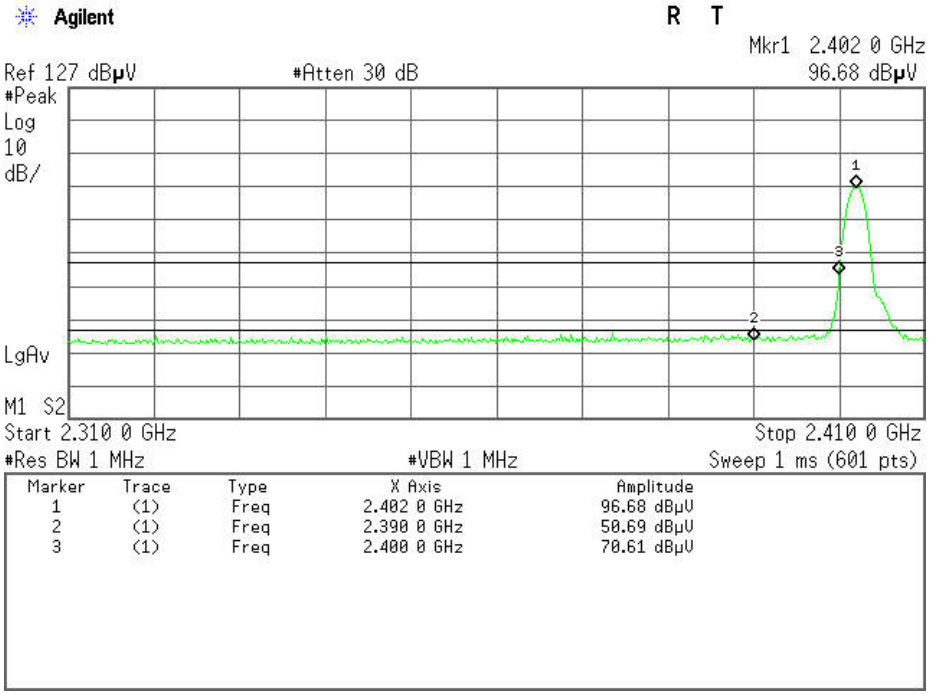
Detector mode: Average **Polarity: Horizontal**



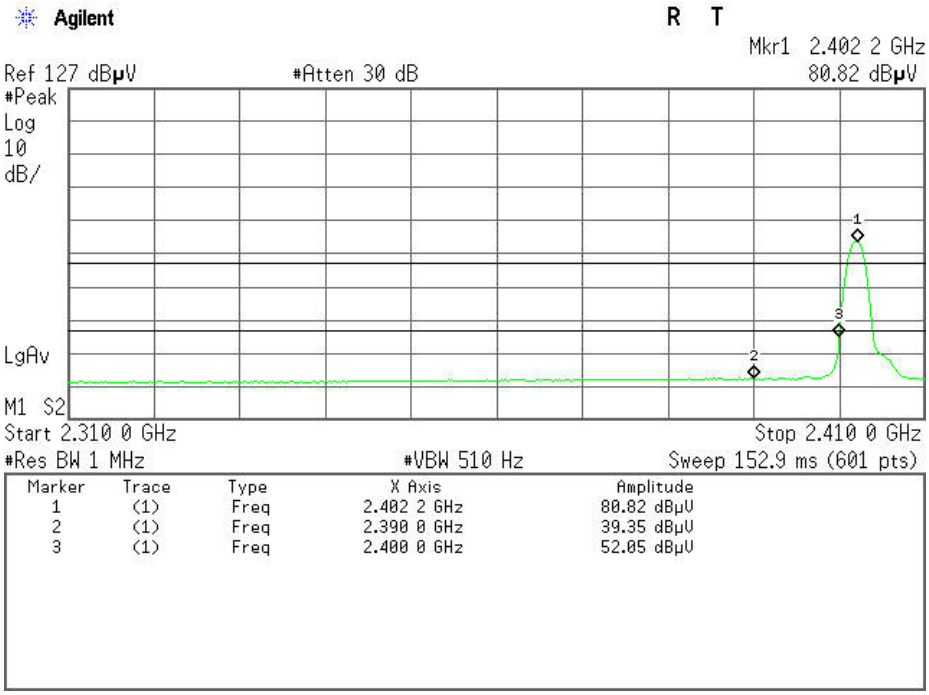
Test Data (8DPSK)

Band Edges (CH-Low)

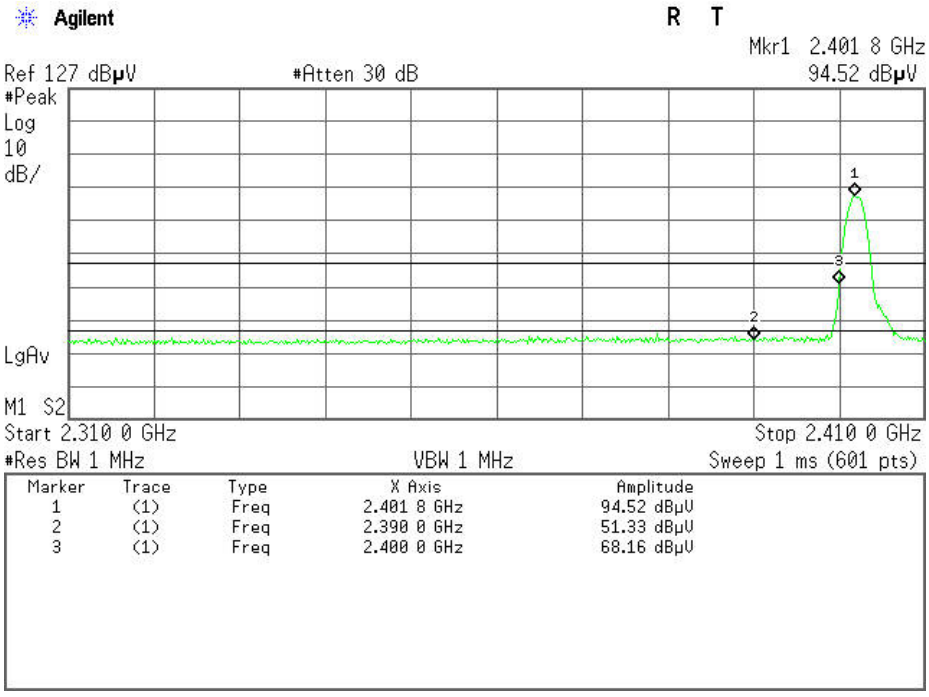
Detector mode: Peak **Polarity: Vertical**



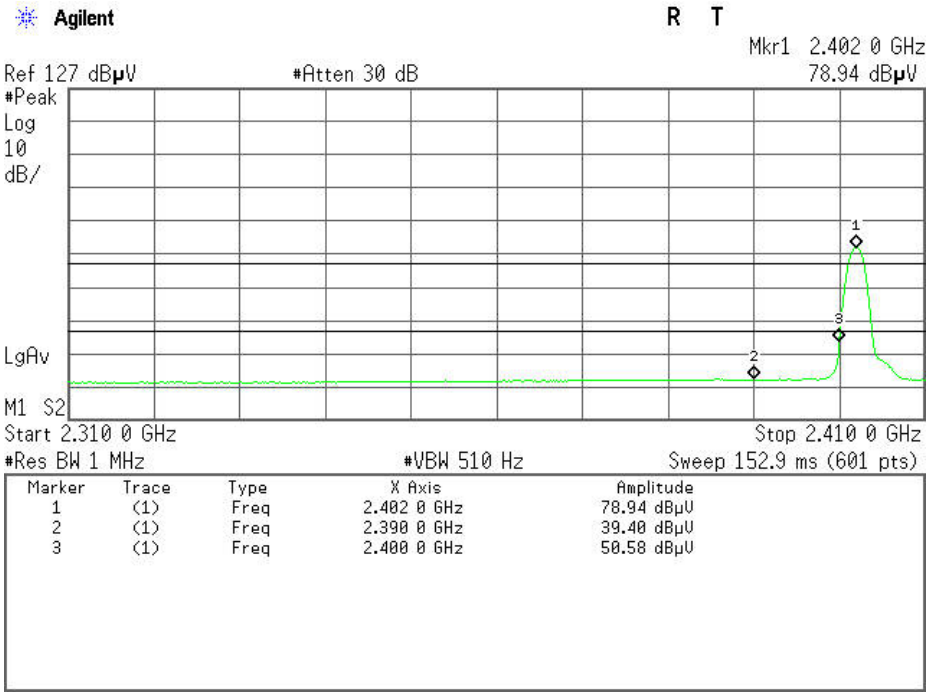
Detector mode: Average **Polarity: Vertical**



Detector mode: Peak **Polarity: Horizontal**

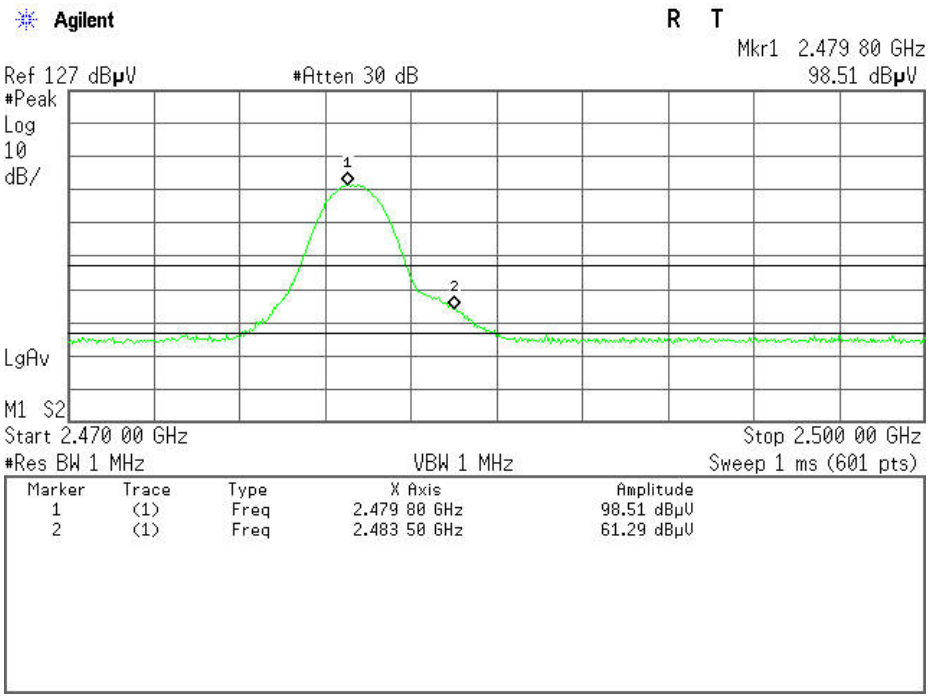


Detector mode: Average **Polarity: Horizontal**

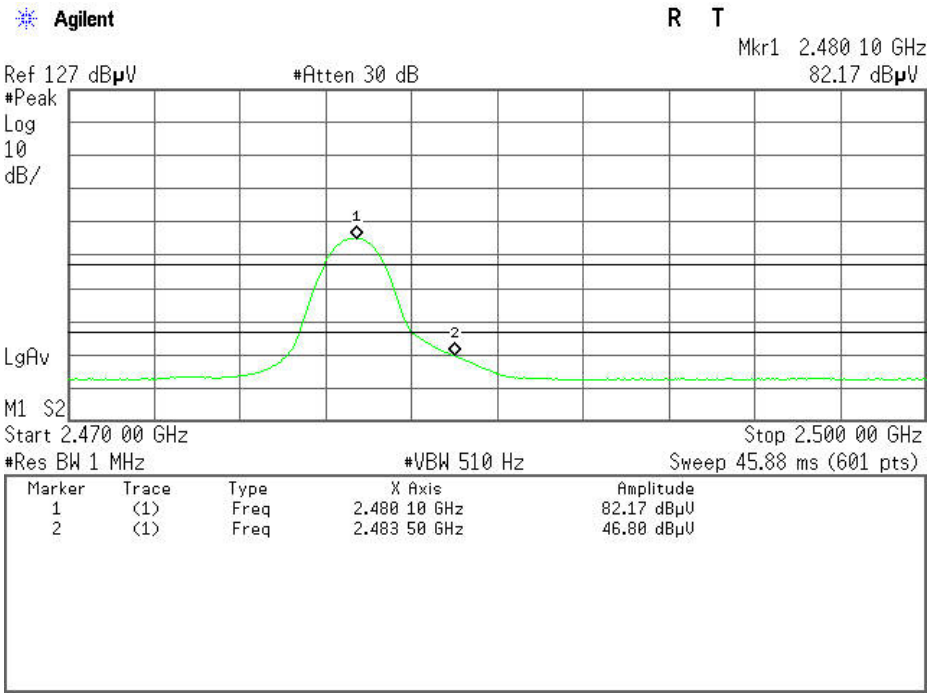


Band Edges (CH-High)

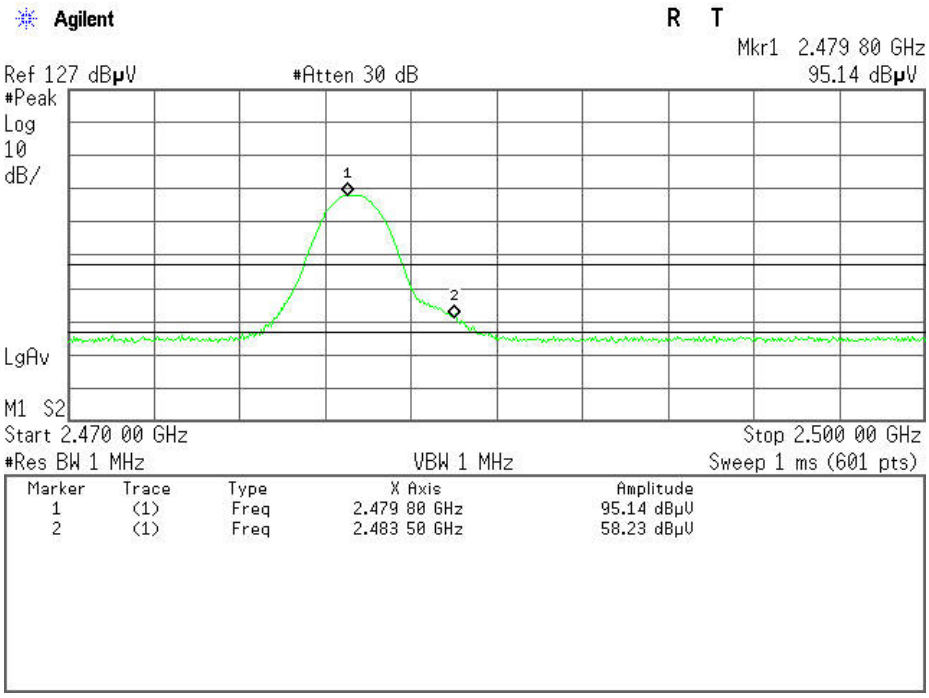
Detector mode: Peak — Polarity: Vertical



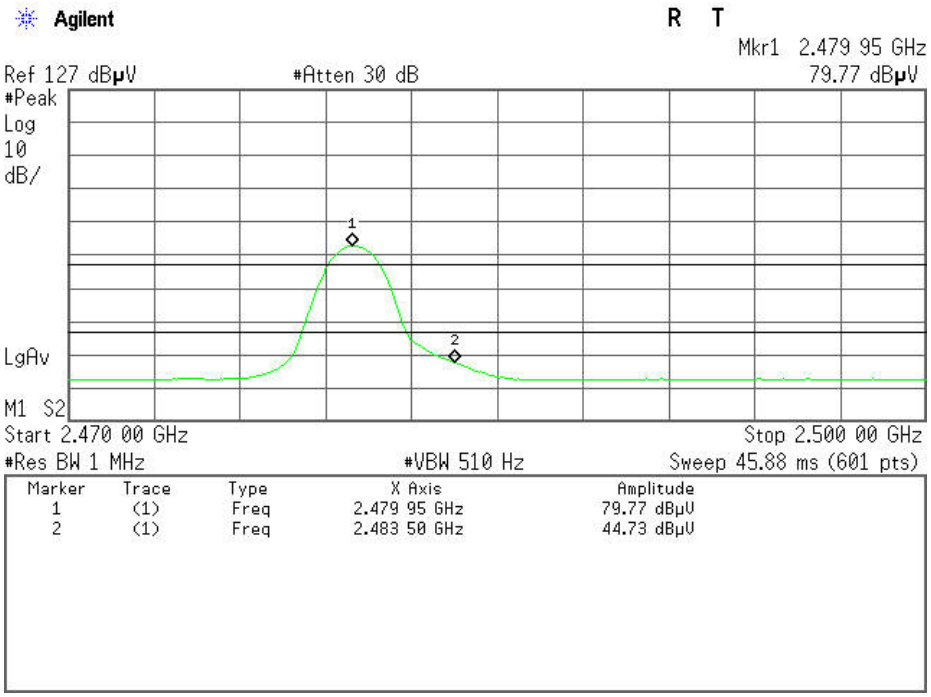
Detector mode: Average — Polarity: Vertical



Detector mode: Peak **Polarity: Horizontal**



Detector mode: Average **Polarity: Horizontal**



6.8. PEAK POWER SPECTRAL DENSITY MEASUREMENT

6.8.1. 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.

6.8.2. TEST INSTRUMENTS

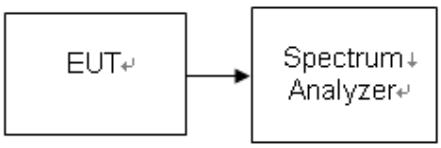
Name of Equipment	Manufacturer	Model	Serial Number	Last Calibration	Calibration Due
Spectrum Analyzer	Agilent	E4446A	US44300399	03/19/2012	03/19/2013

6.8.3. 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.

6.8.4. TEST SETUP



6.8.5. TEST RESULTS

WIFI

Test Data

Test mode: IEEE 802.11b

Channel	Frequency (MHz)	Peak (dBm)	Factor (BWCF)	PPSD (dBm)	Limit (dBm)	Test Result
Low	2412.00	-0.96	-15.20	-16.16	8	PASS
Mid	2437.00	-3.38	-15.20	-18.58		PASS
High	2462.00	-5.43	-15.20	-20.63		PASS

Test mode: IEEE 802.11g

Channel	Frequency (MHz)	Peak (dBm)	Factor (BWCF)	PPSD (dBm)	Limit (dBm)	Test Result
Low	2412.00	-7.17	-15.20	-22.37	8	PASS
Mid	2437.00	-9.03	-15.20	-24.23		PASS
High	2462.00	-10.19	-15.20	-25.39		PASS

Test mode: IEEE 802.11n HT20 MHz

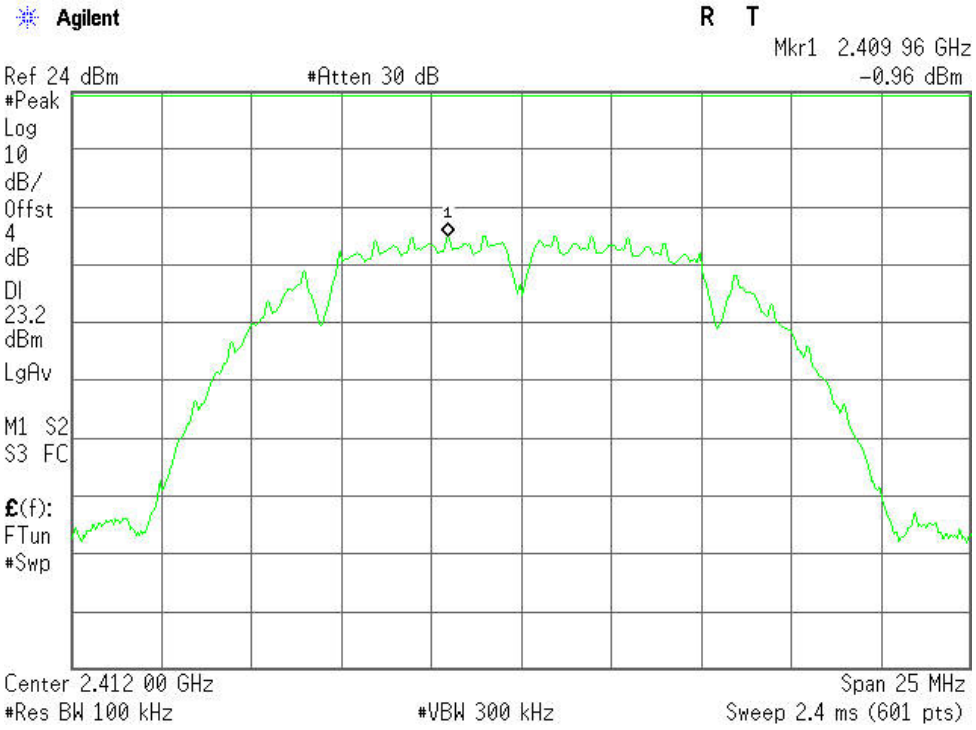
Channel	Frequency (MHz)	Peak (dBm)	Factor (BWCF)	PPSD (dBm)	Limit (dBm)	Test Result
Low	2412.00	-7.18	-15.20	-22.38	8	PASS
Mid	2437.00	-9.16	-15.20	-24.36		PASS
High	2462.00	-9.82	-15.20	-25.02		PASS

Test mode: IEEE 802.11n HT40 MHz

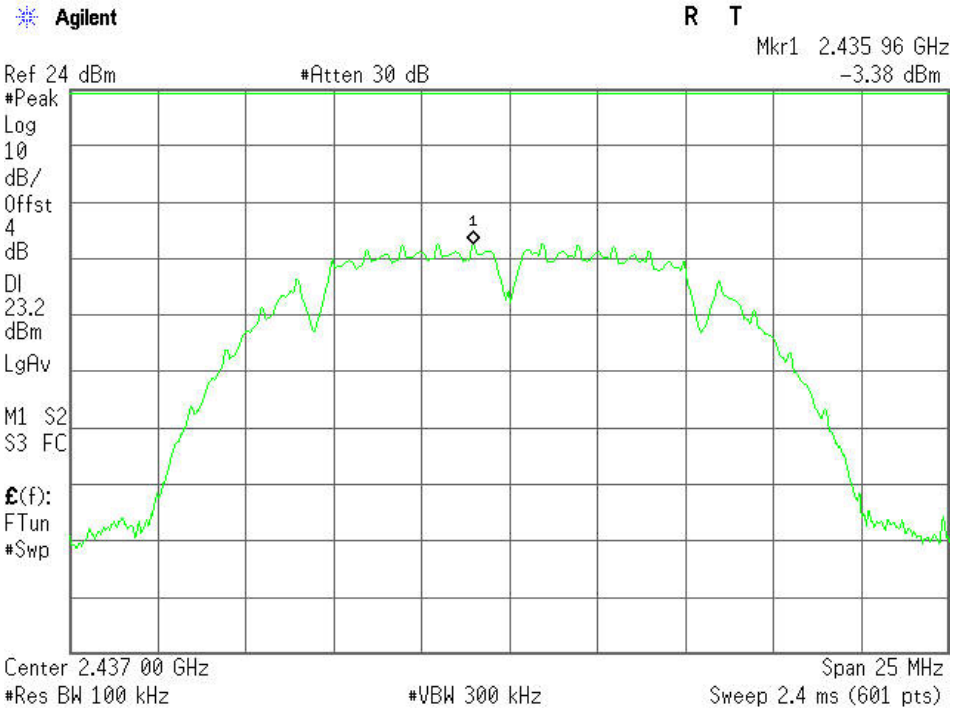
Channel	Frequency (MHz)	Peak (dBm)	Factor (BWCF)	PPSD (dBm)	Limit (dBm)	Test Result
Low	2422.00	-10.88	-15.20	-26.08	8	PASS
Mid	2437.00	-11.96	-15.20	-27.16		PASS
High	2452.00	-12.90	-15.20	-28.10		PASS

Test Plot IEEE 802.11b mode

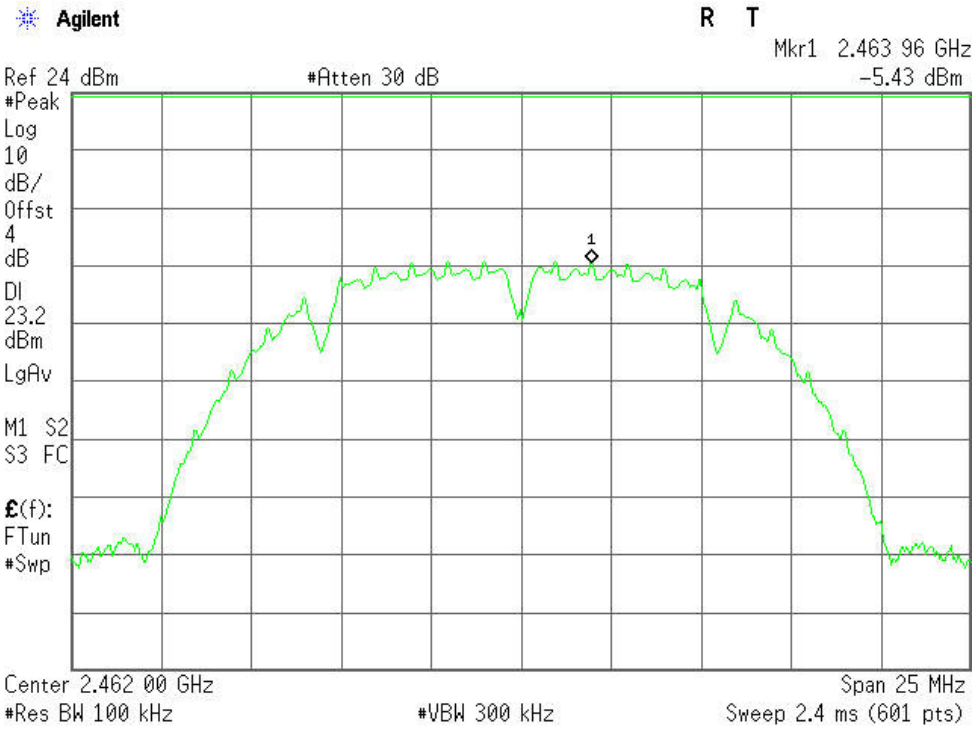
PPSD (CH Low)



PPSD (CH Mid)

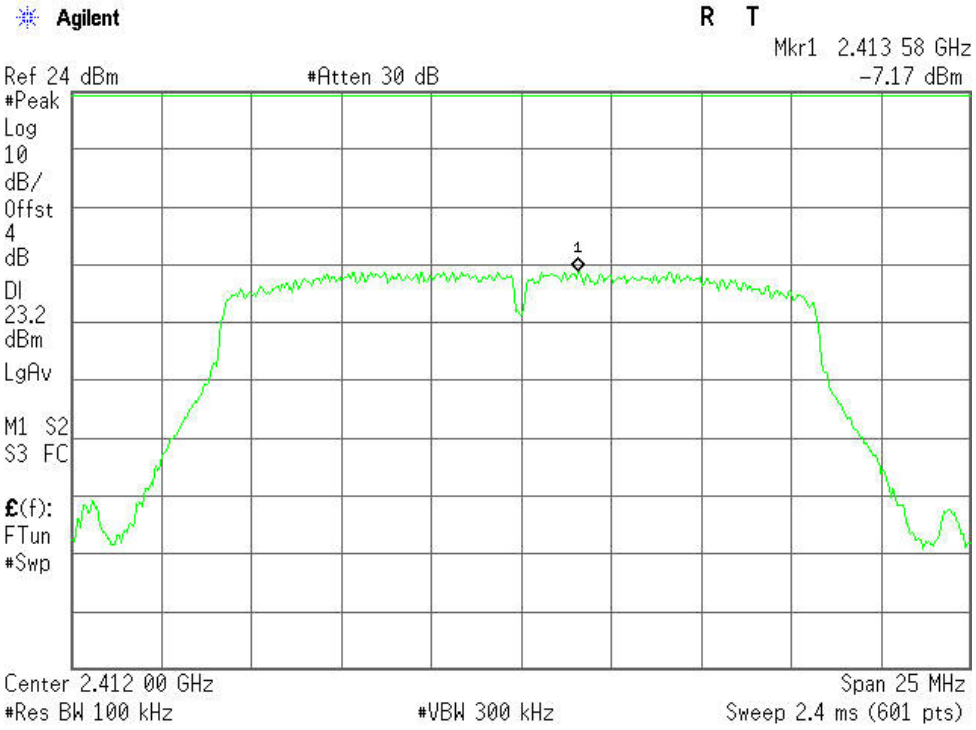


PPSD (CH High)

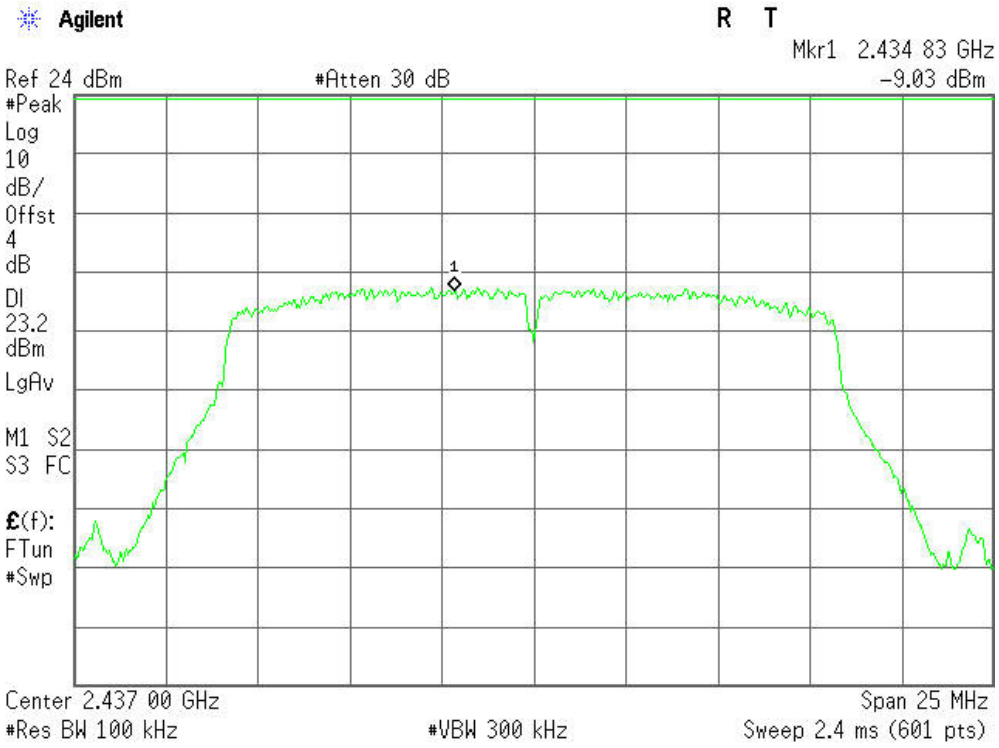


IEEE 802.11g mode

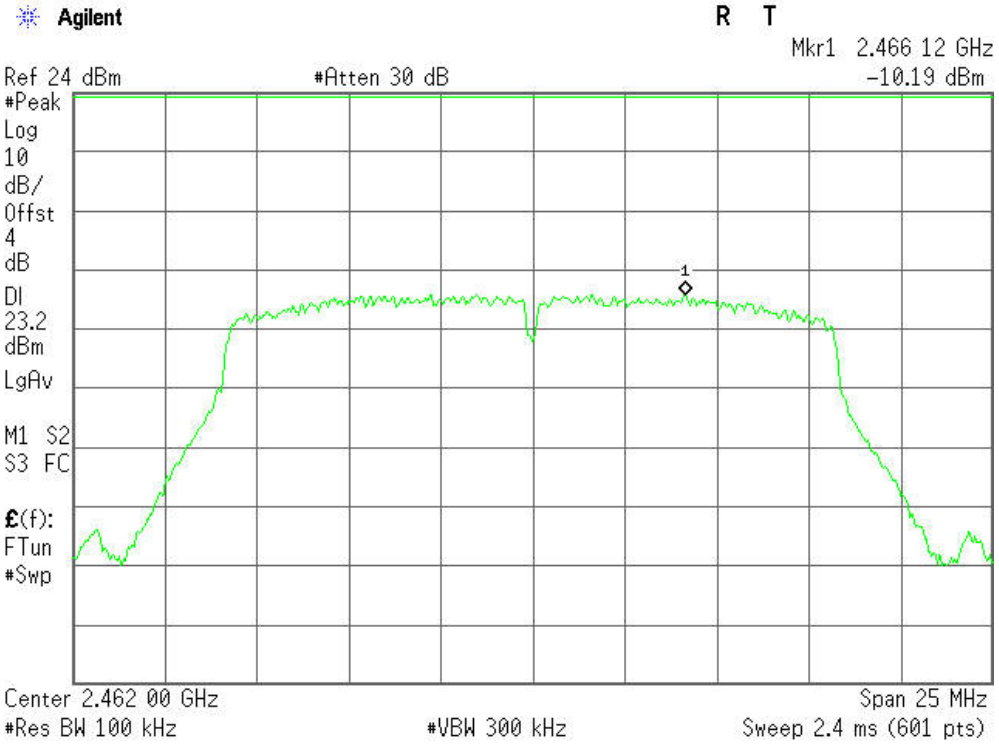
PPSD (CH Low)



PPSD (CH Mid)



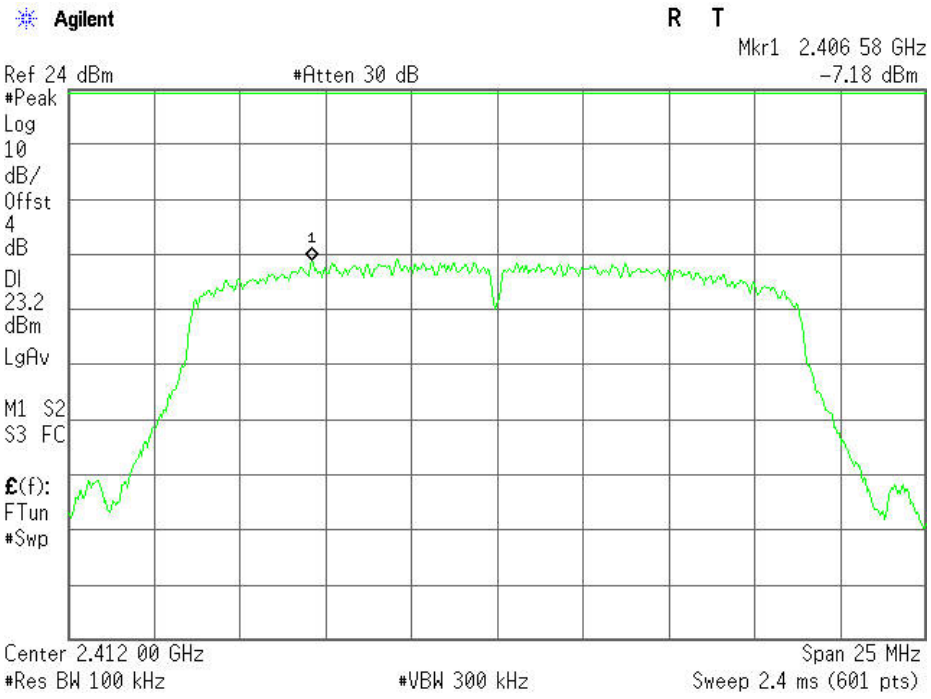
PPSD (CH High)



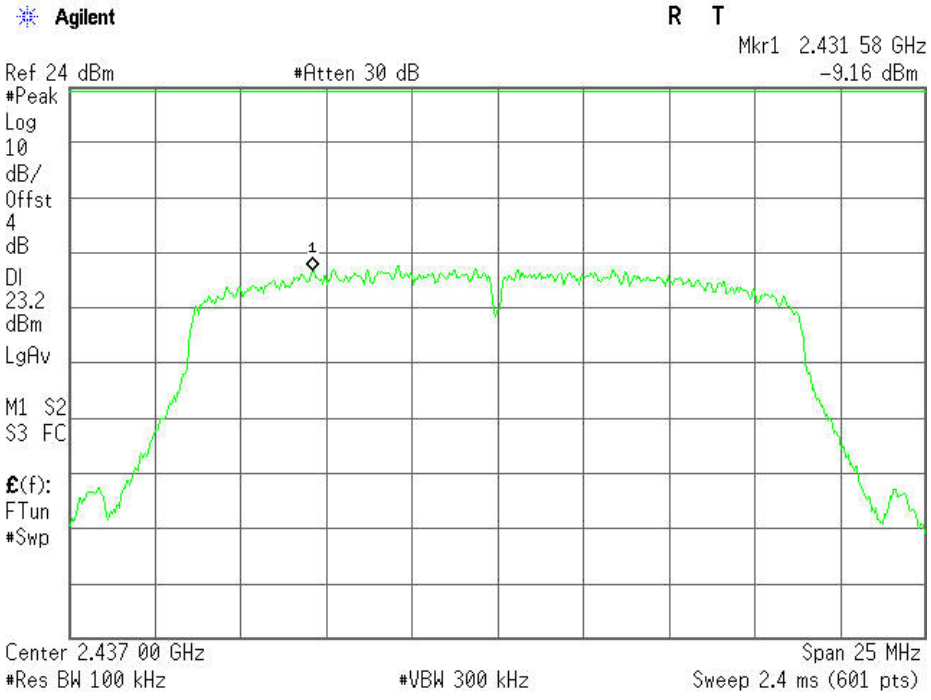
I

EEE 802.11n HT20 MHz mode

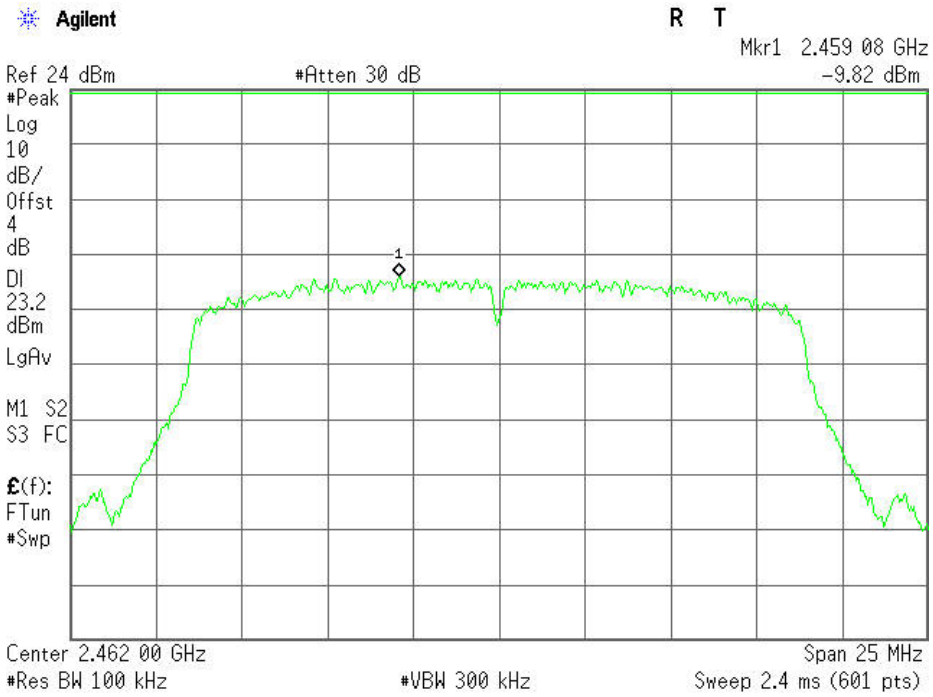
PPSD (CH Low)



PPSD (CH Mid)

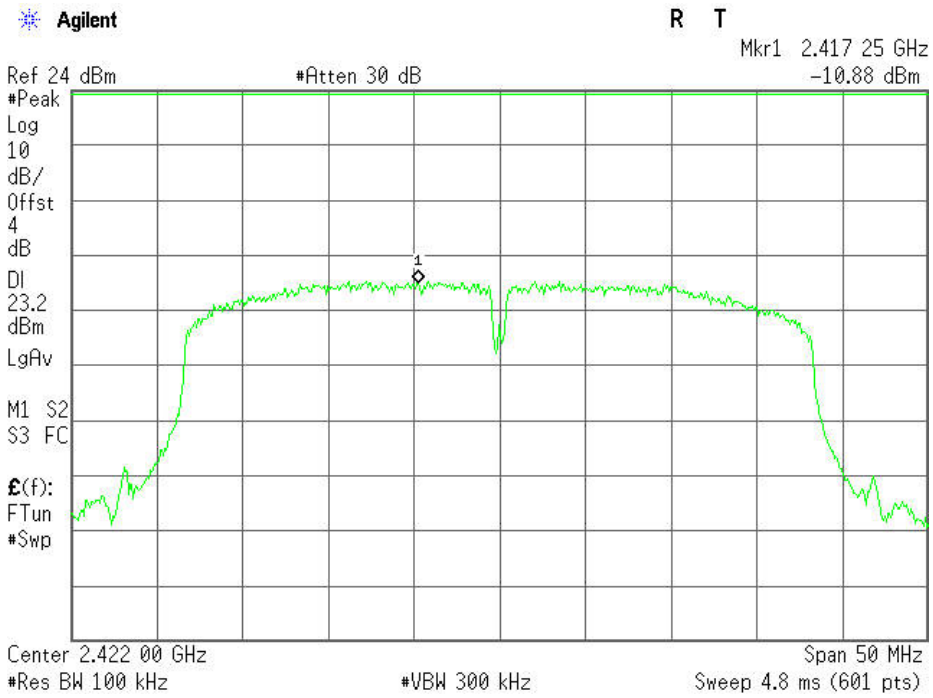


PPSD (CH High)

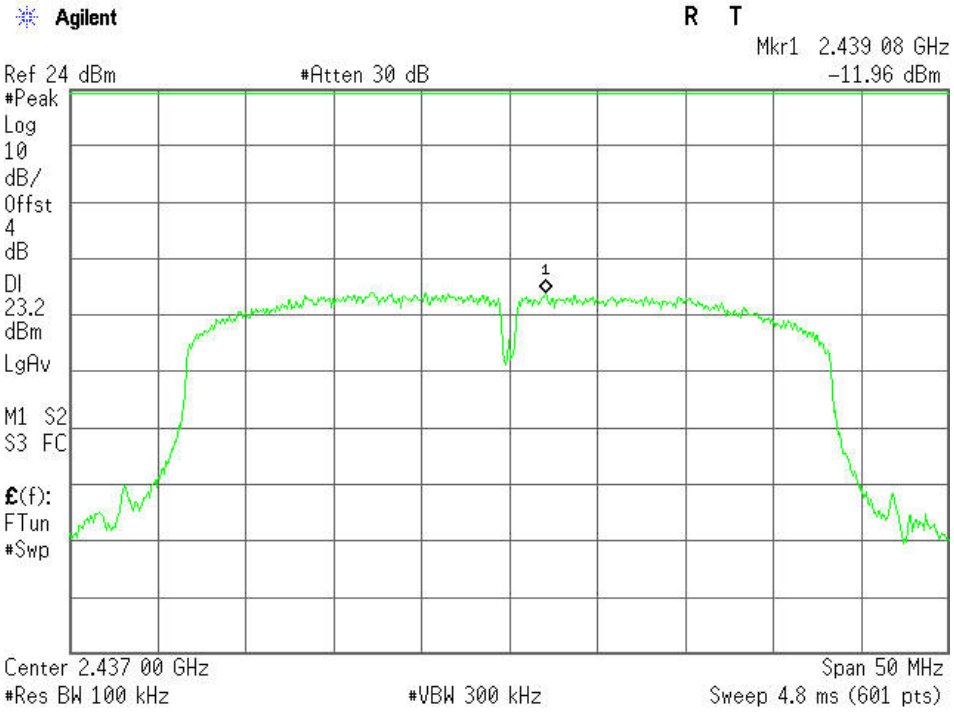


IEEE 802.11n HT40 MHz mode

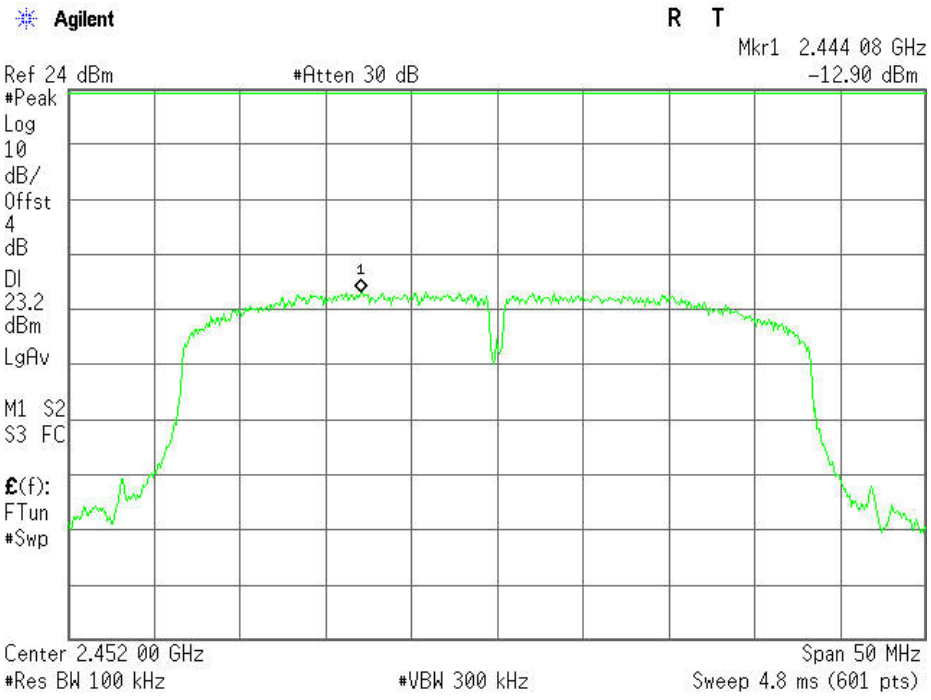
PPSD (CH Low)



PPSD (CH Mid)



PPSD (CH High)



Bluetooth: Not applicable

6.9. FREQUENCY SEPARATION

LIMIT

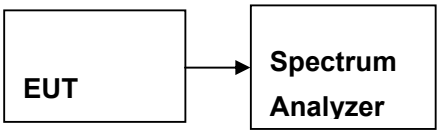
According to §15.247(a)(1), Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

MEASUREMENT EQUIPMENT USED

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

Remark: *Each piece of equipment is scheduled for calibration once a year.*

Test Configuration



TEST PROCEDURE

1. Place the EUT on the table and set it in 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 center frequency of spectrum analyzer = middle of hopping channel.
4. Set the spectrum analyzer as RBW=30kHz, VBW=30kHz, Adjust Span to 4 MHz, Sweep = auto.
5. Max hold. Mark 3 Peaks of hopping channel and record the 3 peaks frequency.

TEST RESULTS

WIFI ： Not applicable

Bluetooth

Test Data

GFSK

Channel Separation (MHz)	Two-thirds of the 20 dB Bandwidth (kHz)	Channel Separation Limit	Result
1.000	575.260	> Two-thirds of the 20 dB Bandwidth	Pass

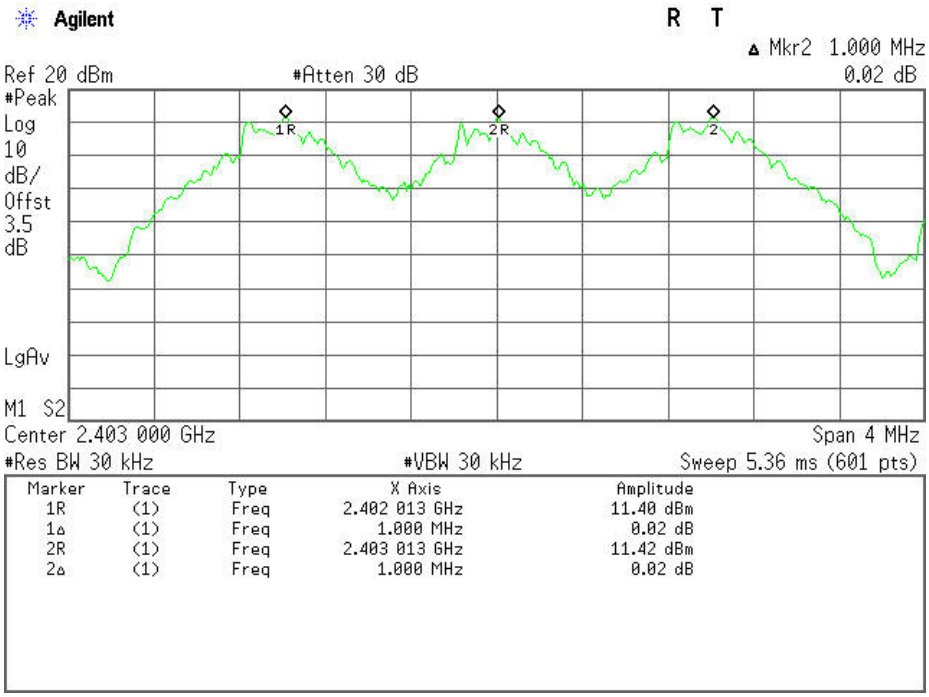
8DPSK

Channel Separation (MHz)	Two-thirds of the 20 dB Bandwidth (kHz)	Channel Separation Limit	Result
1.000	808.000	> Two-thirds of the 20 dB Bandwidth	Pass

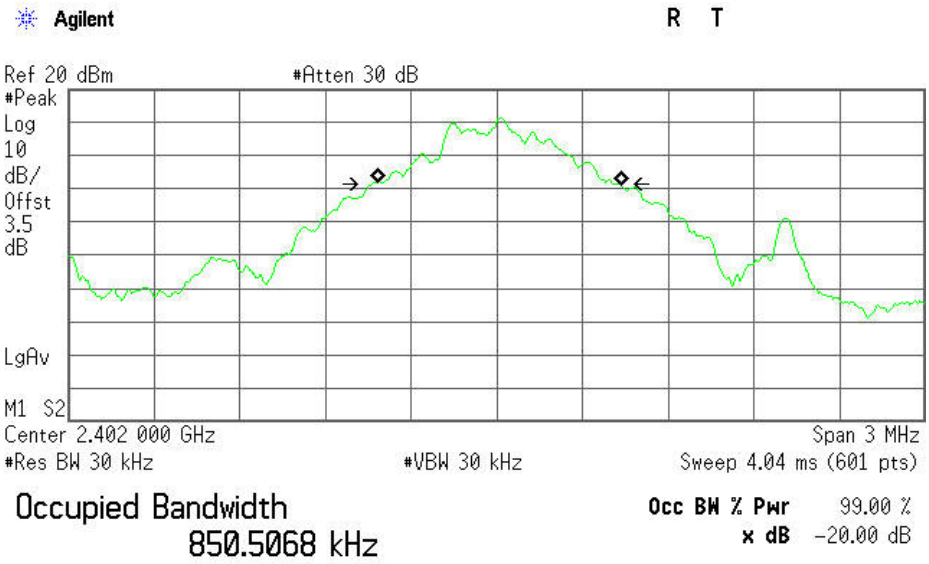
GFSK

Test Plot

Measurement of Channel Separation



20 dB bandwidth(CH High)

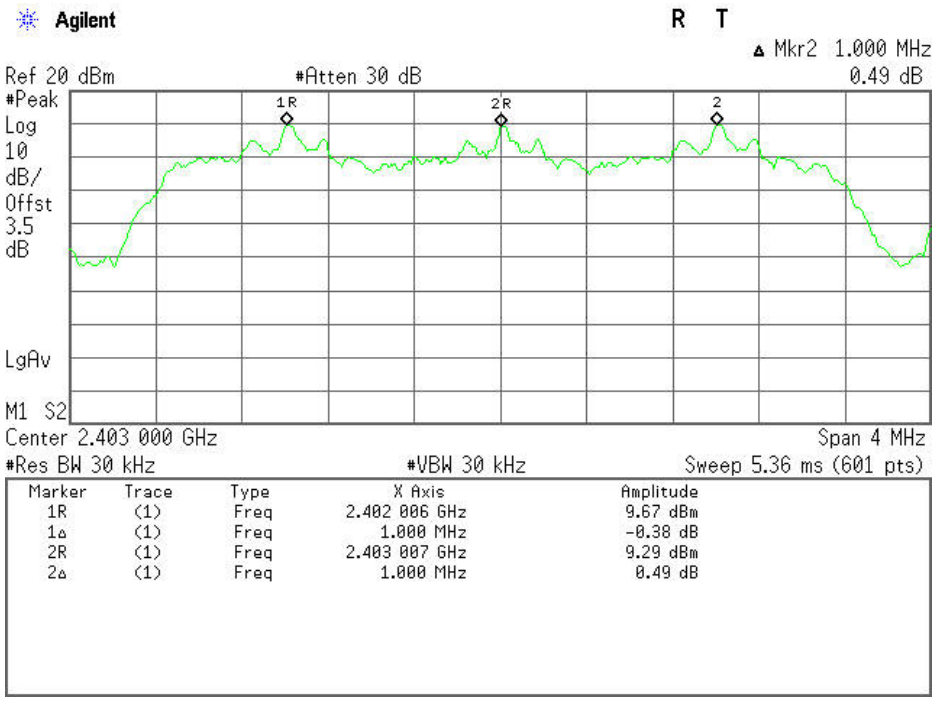


Transmit Freq Error 9.265 kHz
x dB Bandwidth 862.891 kHz

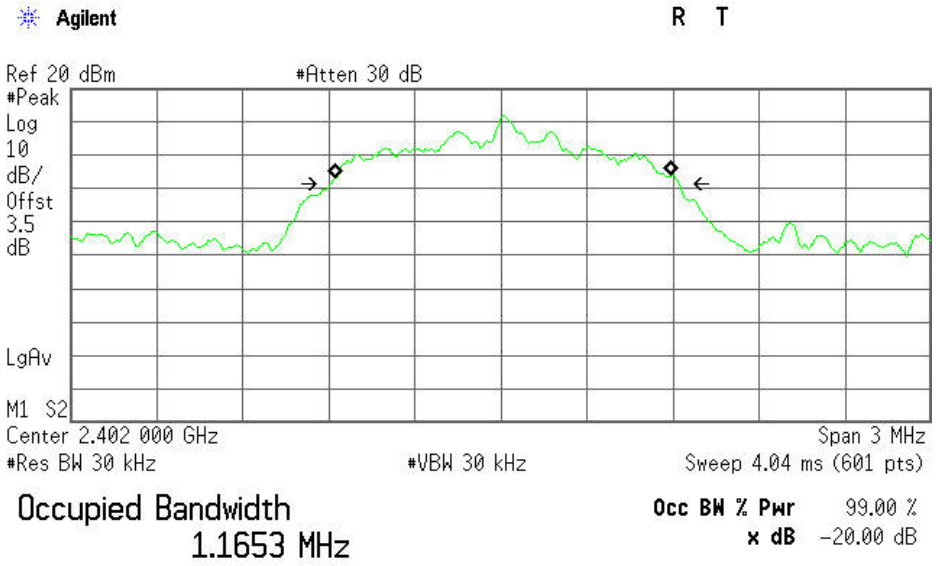
8DPSK

Test Plot

Measurement of Channel Separation



20 dB bandwidth(CH High)



6.10. NUMBER OF HOPPING FREQUENCY

LIMIT

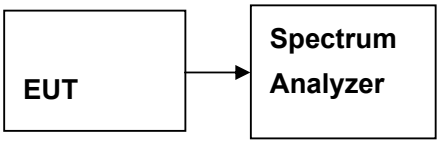
According to §15.247(a)(1)(ii), Frequency hopping systems operating in the 2400MHz-2483.5 MHz bands shall use at least 15 hopping frequencies.

MEASUREMENT EQUIPMENT USED

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

Remark: *Each piece of equipment is scheduled for calibration once a year.*

Test Configuration



TEST PROCEDURE

1. Place the EUT on the table and set it in 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 spectrum analyzer Start=2402MHz, Stop = 2441MHz, Sweep = 1ms and Start=2441MHz, Stop = 2483.5MHz, Sweep = 1ms.
4. Set the spectrum analyzer as RBW, VBW=300kHz,
5. Max hold, view and count how many channel in the band.

TEST RESULTS

No non-compliance noted

WIFI：Not Applicable

Bluetooth:

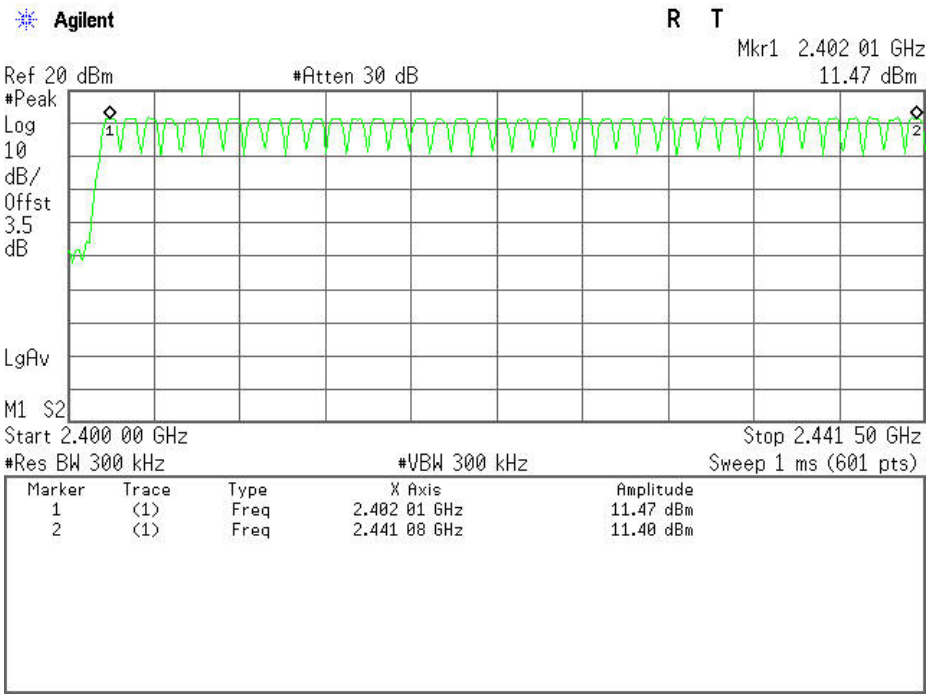
Test Data

Result (No. of CH)	Limit (No. of CH)	Result
79	>15	PASS

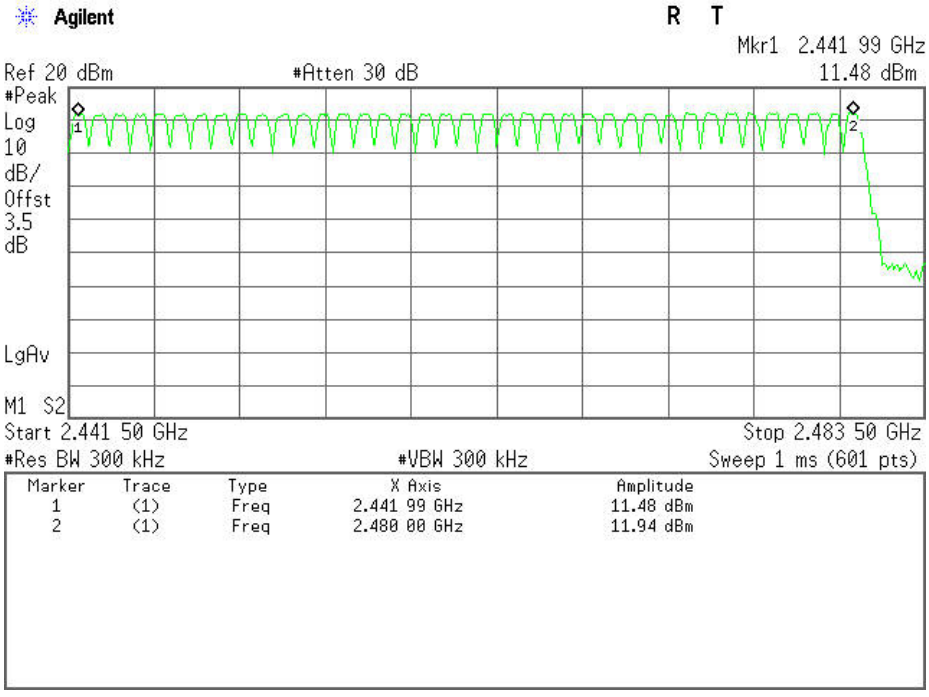
Test Plot (GFSK)

Channel Number

2.400 GHz – 2.4415 GHz



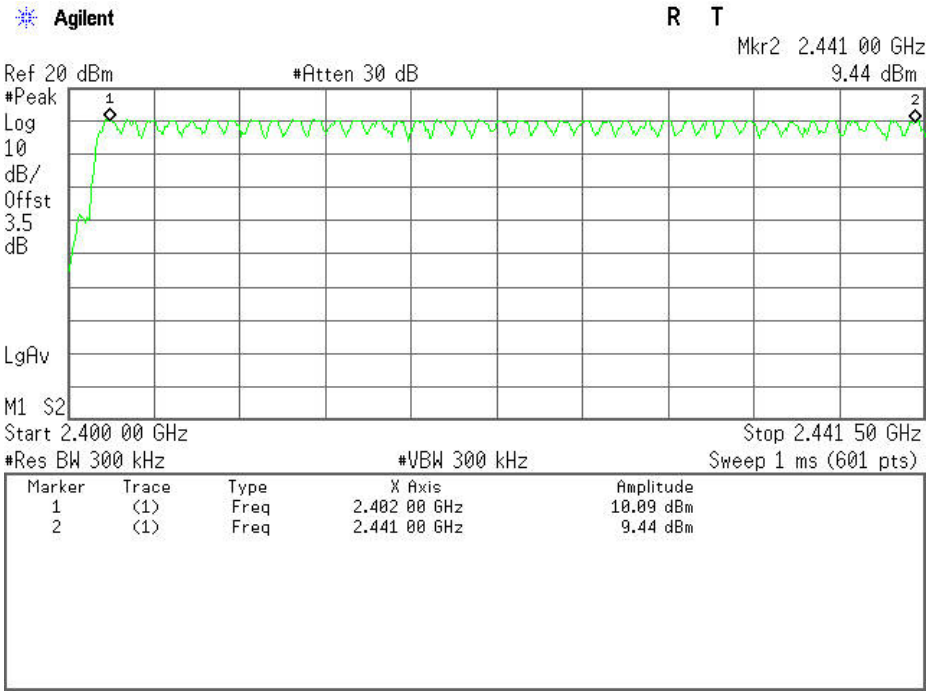
2.4415 GHz –2.4835GHz



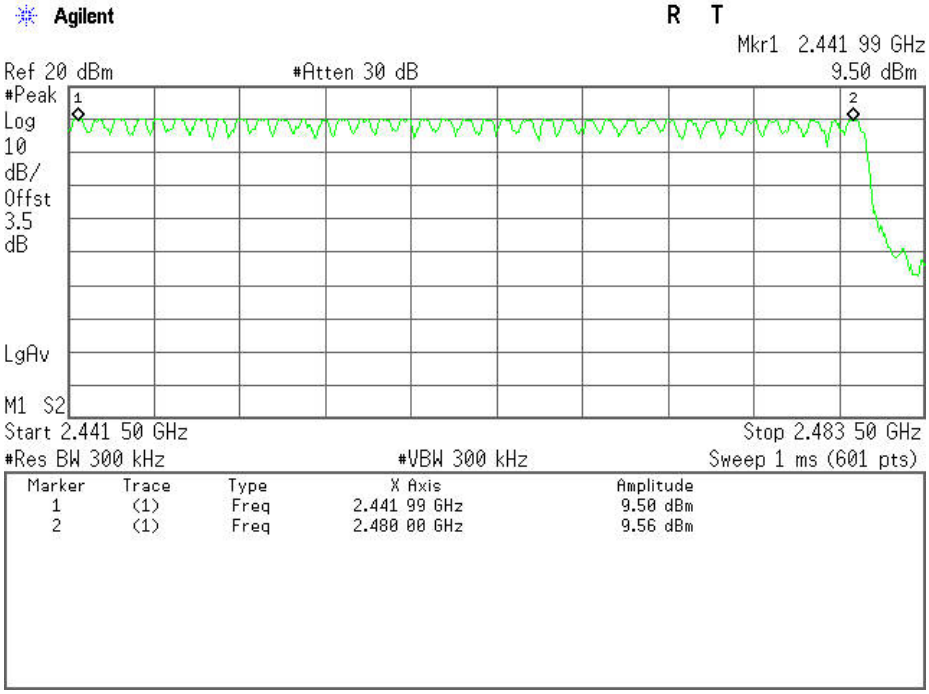
Test Plot (8DPSK)

Channel Number

2.400 GHz – 2.4415 GHz



2.4415 GHz –2.4835 GHz



6.11. TIME OF OCCUPANCY (DWELL TIME)

LIMIT

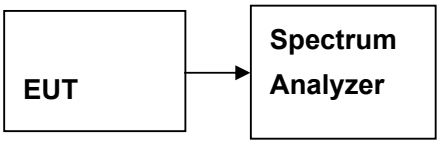
According to §15.247(a)(1)(iii), Frequency hopping systems operating in the 2400MHz-2483.5 MHz bands. The average time of occupancy on any channels shall not greater than 0.4 s within a period 0.4 s multiplied by the number of hopping channels employed.

MEASUREMENT EQUIPMENT USED

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

Remark: *Each piece of equipment is scheduled for calibration once a year.*

Test Configuration



TEST PROCEDURE

1. Place the EUT on the table and set it in 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 center frequency of spectrum analyzer = operating frequency.
4. Set the spectrum analyzer as RBW, VBW=1MHz, Span = 0Hz, Sweep = auto.
5. Repeat above procedures until all frequency measured were complete.

TEST RESULTS

No non-compliance noted
WIFI ：Not applicable
Bluetooth:
Test Data
GFSK

DH 1

CH Low: 0.493* (1600/2)/79 * 31.6 = 157.759 (ms)

CH	Pulse Time (ms)	Total of Dwell (ms)	Period Time (s)	Limit (ms)	Result
Low	0.493	157.759	31.60	400.00	PASS

DH 3

CH Low: 1.745* (1600/4)/79 * 31.6 = 279.199 (ms)

CH	Pulse Time (ms)	Total of Dwell (ms)	Period Time (s)	Limit (ms)	Result
Low	1.745	279.199	31.60	400.00	PASS

DH 5

CH Low: 2.983* (1600/6)/79 * 31.6 = 318.186 (ms)

CH	Pulse Time (ms)	Total of Dwell (ms)	Period Time (s)	Limit (ms)	Result
Low	2.983	318.186	31.60	400.00	PASS

Test Data

8DPSK

DH 1

CH Low: 0.510* (1600/2)/79 * 31.6 = 163.199 (ms)

CH	Pulse Time (ms)	Total of Dwell (ms)	Period Time (s)	Limit (ms)	Result
Low	0.510	163.199	31.60	400.00	PASS

DH 3

CH Low: 1.755* (1600/4)/79 * 31.6 = 280.799 (ms)

CH	Pulse Time (ms)	Total of Dwell (ms)	Period Time (s)	Limit (ms)	Result
Low	1.755	280.799	31.60	400.00	PASS

DH 5

CH Low: 3.000* (1600/6)/79 * 31.6 = 319.999 (ms)

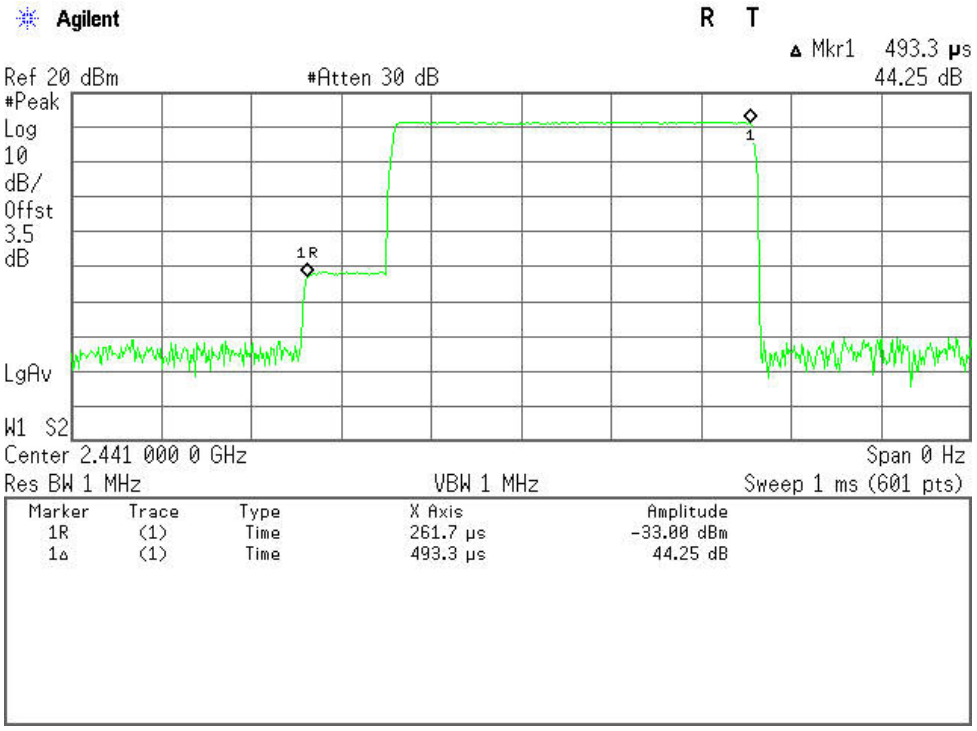
CH	Pulse Time (ms)	Total of Dwell (ms)	Period Time (s)	Limit (ms)	Result
Low	3.000	319.999	31.60	400.00	PASS

Test Plot

GFSK

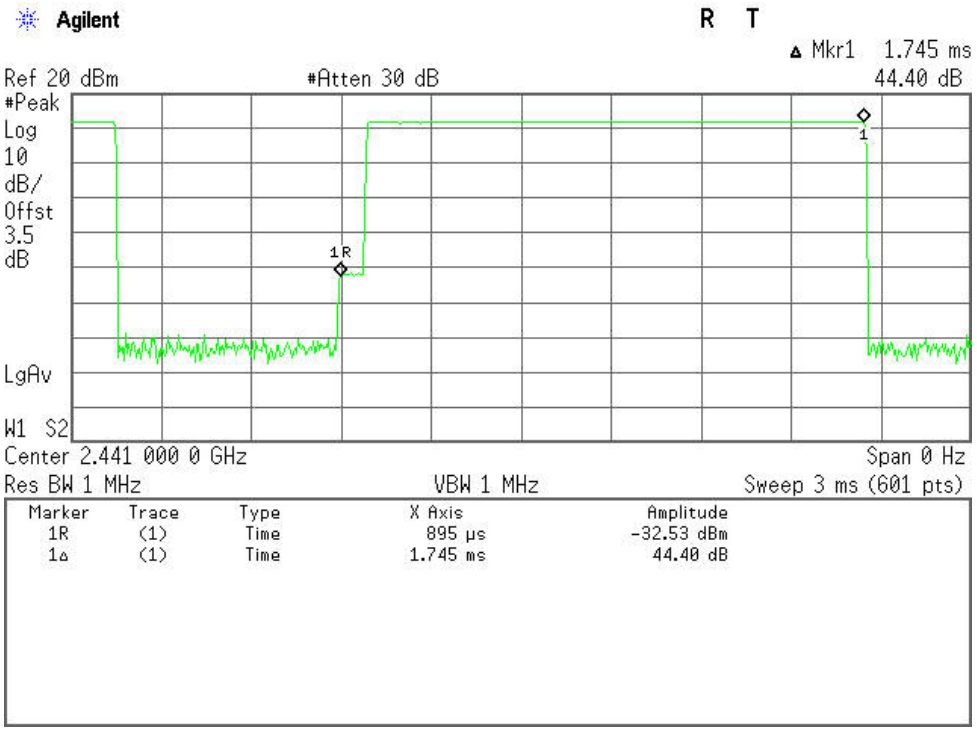
DH 1

(CH Low)



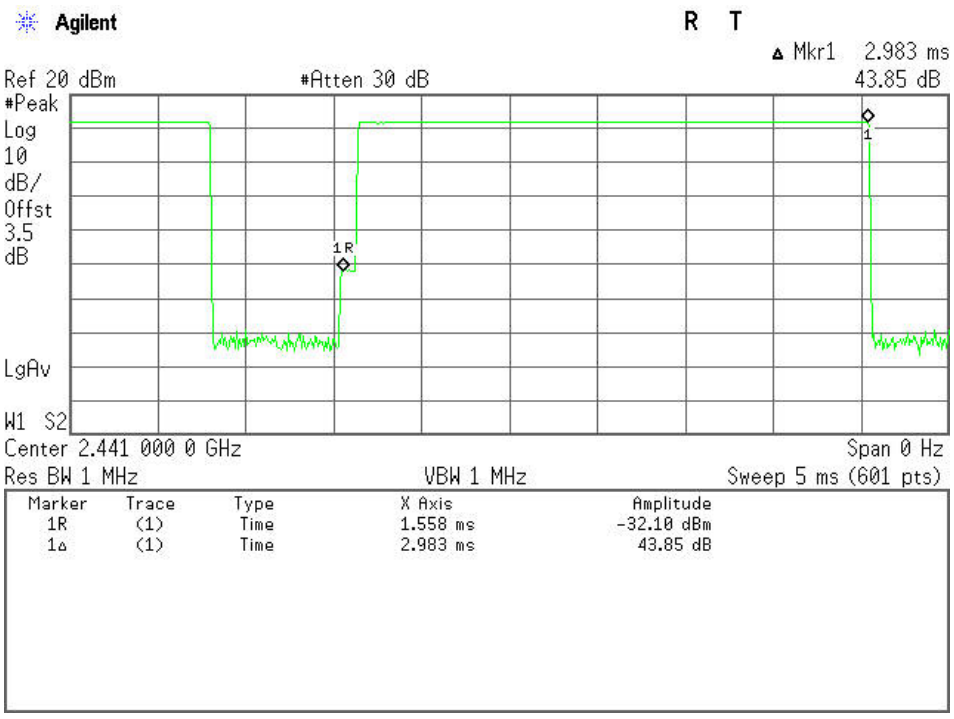
DH 3

(CH Low)



DH 5

(CH Low)

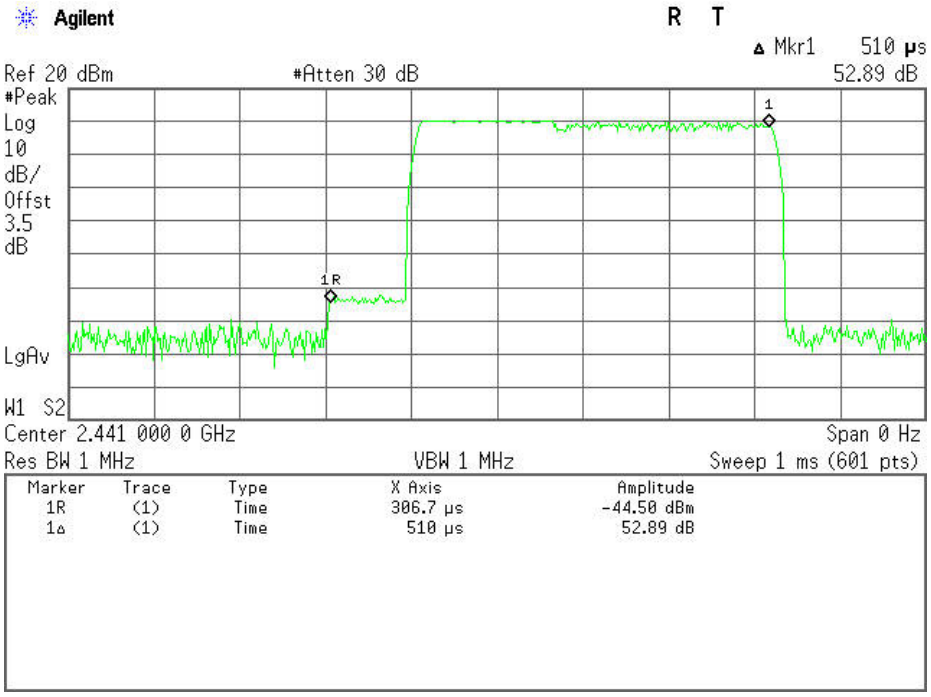


Test Plot

8DPSK

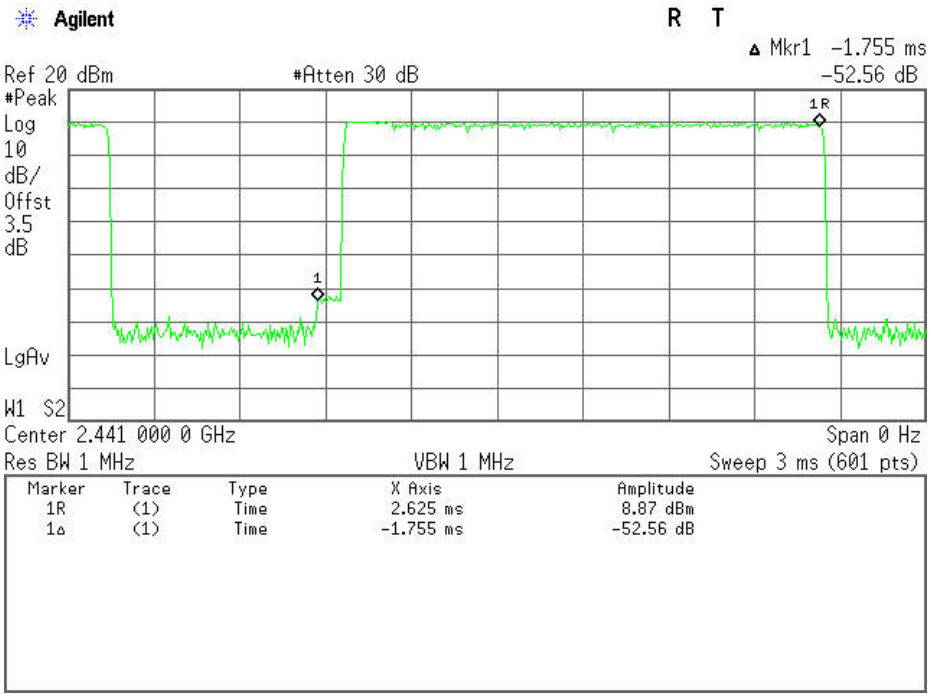
DH 1

(CH Low)



DH 3

(CH Low)



DH 5

(CH Low)