



CE MARKING

*ELECTROMAGNETIC COMPATIBILITY
ELECTRICAL SAFETY
LASER SPECTROSCOPY
ENVIRONMENTAL PHYSIC*



**Organizzazione con Sistema
di Gestione certificato
Company with Management
System certified**

ISO 9001:2008

SINCERT

G.S.D. S.r.l PISA - Italy	Test Report n. 12962-FCC-IC	Rev. 03
Manufacturer	TWS S.r.l.	
Address	Via Zaccagna, 6 54033 Avenza Carrara (MS) Italy	
Test Family Name	6081-001 (WIFI subsystem)	
Testing Laboratory Name	G.S.D. S.r.l.	
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	FCC Listed: Registration Number: 424037 IC Listed: Registration Number: 9353A	
Location and Date of Issue	Pisa, 2012 July 16	

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SENIOR EMC TEST MANAGER
Dr. Gian Luca Garavasi

QUALITY MANAGER

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1. MANUFACTURER AND EUT IDENTIFICATION¹

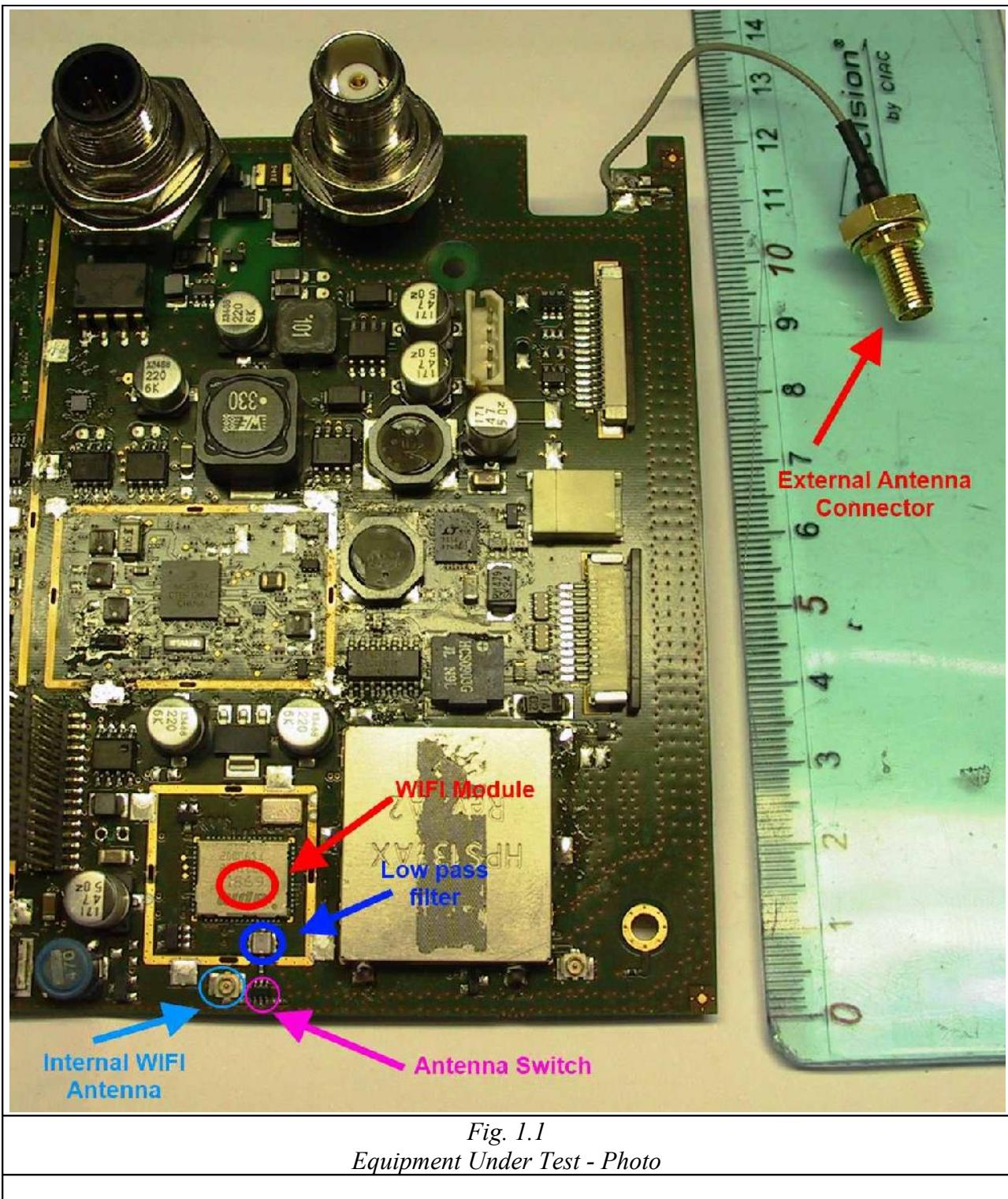
Manufacturer	TWS S.r.l..
Address	Via Zaccagna, 6 54033 Avenza Carrara (MS) Italy
Test Family Name	6081-001 (WIFI subsystem)
Date of reception	2012 March 08
Sampling	Laboratory sample for certification
Test Item Description	WiFi Device This system is made by a WIFI module (APM6981), a low pass-filter (LFB2H2G45SG7A158), an antenna switch (AS179-92LF), internal antenna and SMA reverse external antenna connector. This system is controlled by an external CPU using a digital signals (SD I/O bus).
Nominal Input Voltage	3.3 Vdc
Auxiliary Equipment	Tests were performed on the FURUNO Mod. GP-1870 sn 2030245 containing 6081-001 (WIFI subsystem)
Software	PDA UniTest eeprom 25u.exe
FCC ID	CU9-6081-001

¹A detailed documentation is preserved in the internal fascicle.

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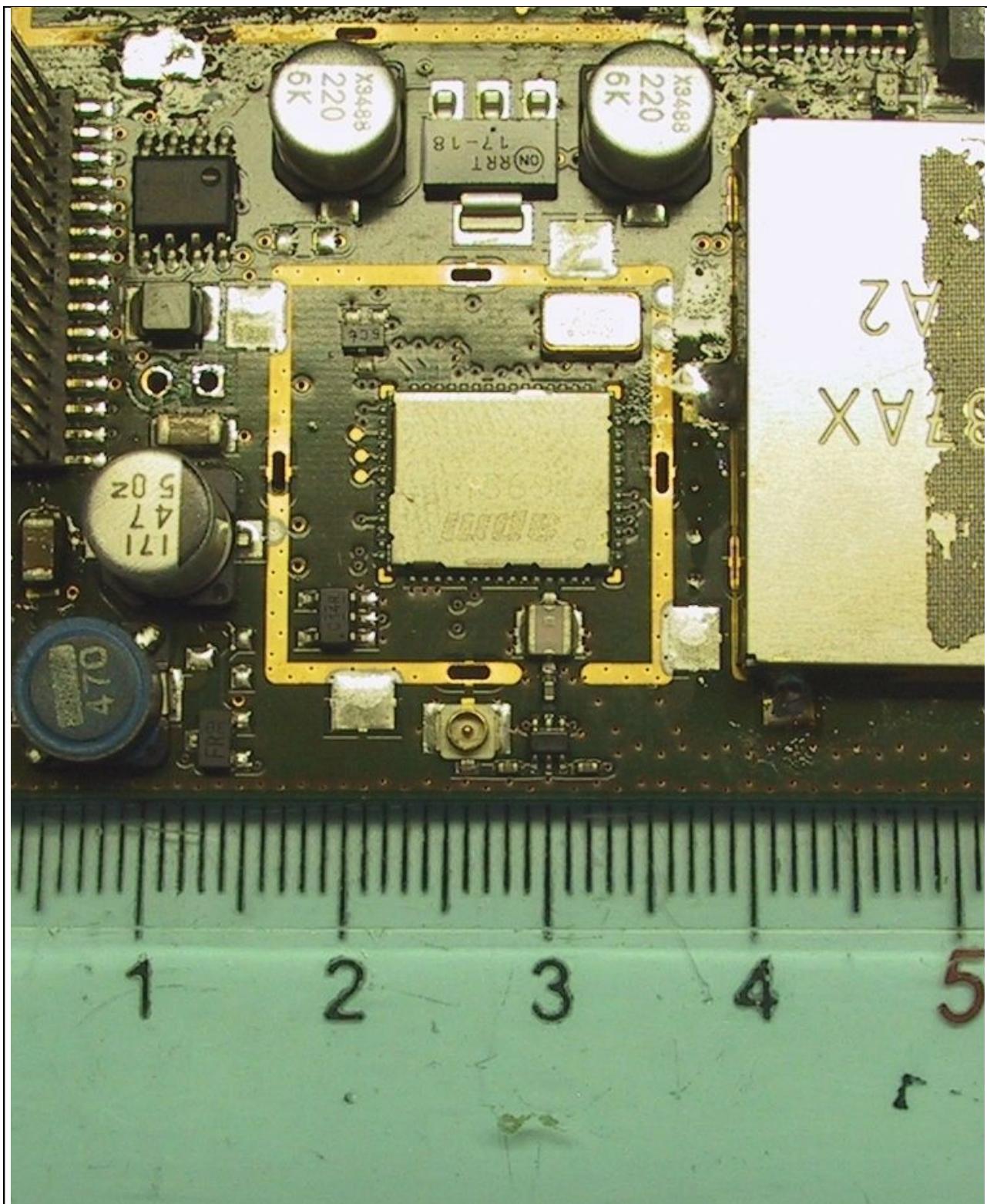
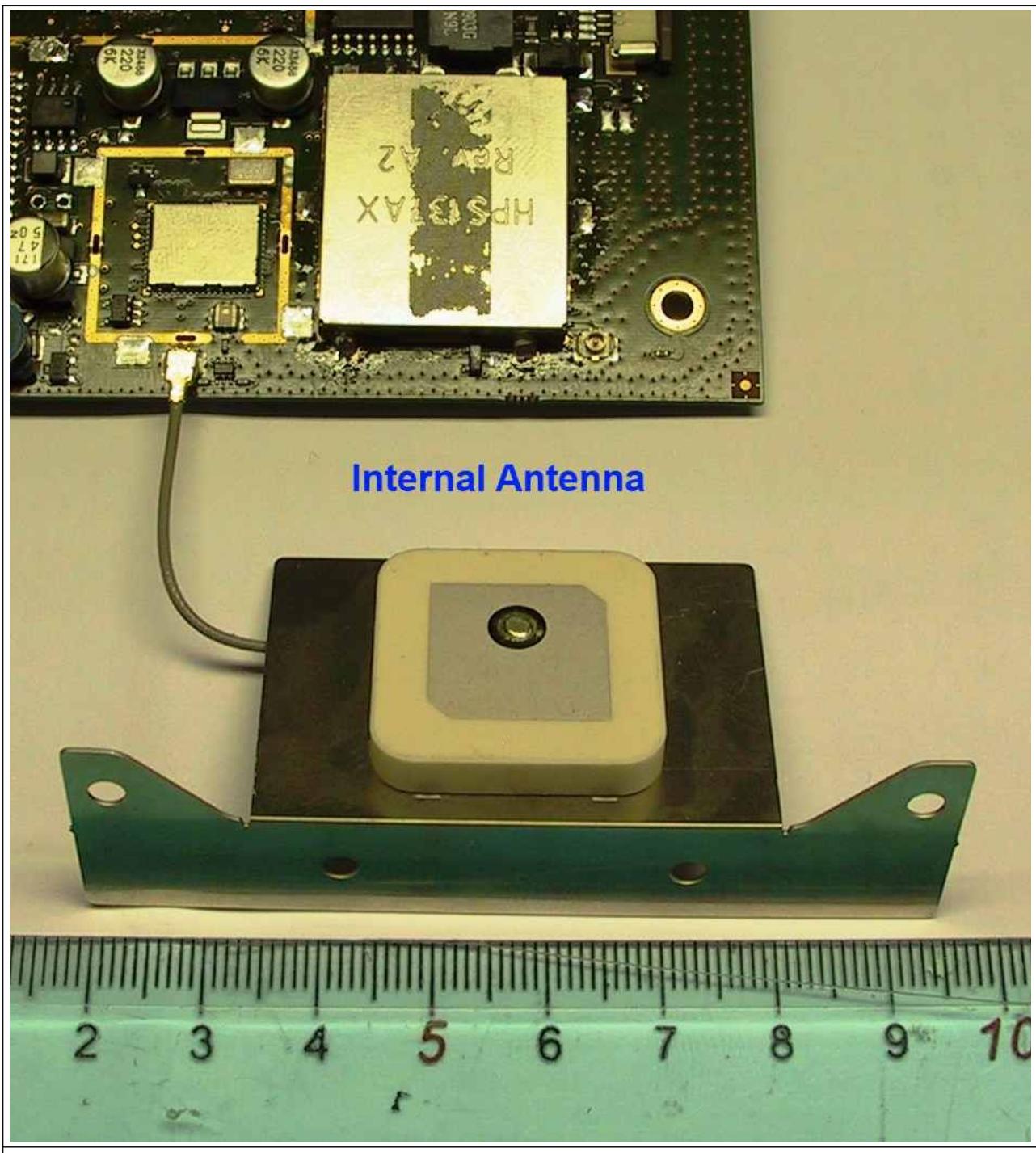


Fig. 1.2
Equipment Under Test - Photo



*Fig. 1.3
Equipment Under Test - Photo*

2. REFERENCE STANDARDS	
Tests and measurements are performed accordingly to the reference standards given in the table below:	
<i>TEST</i>	<i>STANDARD</i>
Operation within the band 2400-2483,5 MHz: Test Procedures 15.247 (a)(2), (b)(3), (d), (e)	FCC Rules ad Regulations, Title 47 (2008) Part 15 – Sub part B ANSI C63.4 – American National Standard for Methods of Measuring of Radio-Noise Emissions from Low Voltage Electrical and Electronic Equipment in the Range of 9 kHz – 40 GHz
Annex 8, Frequency Hopping and Digital Modulation Systems Operating in the Bands 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz	RSS-210 Issue 8 Licence-exempt Radio Apparatus (All Frequency Bands): Category I Equipment
Maximum Permissible Exposure	OET Bulletin 65 Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields FCC Rules ad Regulations, Title 47 (2008) Part 15 – Sub part B

3. RESULT, CONDITION, MEASUREMENT UNCERTAINTY

Summary of Test Results

TEST	RESULT
6 dB bandwidth <i>Section 15.247 (a) (2)</i>	Pass
Peak Conducted Output Power: <i>Section 15.247 (b) (3)</i>	Pass
Band Edge <i>Section 15.247 (d)</i>	Pass
Power Spectral Density <i>Section 15.247 (e)</i>	Pass
Power Line Conducted Emissions <i>Section 15.207</i>	Pass
Radiated Emissions <i>Section 15.209</i>	Pass

Internal Procedures:

APR01: internal procedure for antenna port measurement Revision 01

CE22R01: internal procedure for power lead port measurement Revision 01

RE22R02: internal procedure for radiated emissions measurement Revision 02

Measurement uncertainty

TEST	EXPANDED UNCERTAINTY
Conducted Emission – 50Ω/50µH AMN (150 kHz - 30 MHz)	± 3.5 dB
Radiated Emission – (Semianechoic Room) (30 MHz - 40 GHz)	± 4.7 dB

Climatic Conditions

PARAMETER	VALUE
Temperature	(293 ± 3) K
Relative humidity	(50 ± 5) %

Power during the tests: 12 Vdc

External Antenna used: INTELLINET - I-WL2-ANT3 - 5dBi

Internal Antenna: TAOGLAS model WLP2450 - 5dBi

Extensions

The results refer only to the sampled EUT and under the specified conditions.

4. 6 dB BANDWIDTH							
Peak Output Power							
Equipment shall meet the limits below .							
<i>FREQUENCY RANGE (MHz)</i>		<i>Limit</i>					
2400 2483,5		The minimum 6 dB Bandwidth shall be at least 500 kHz					
Results: 6dB Bandwidth > 500 kHz							
802.11b Mode, 11 Mbs							
<i>Channel</i>		<i>Frequency (MHz)</i>	<i>6 dB Bandwidth (MHz)</i>	<i>Minimum Limit (MHz)</i>			
Low		2412	9,58	0,5			
Mid		2437	9,62	0,5			
High		2462	9,66	0,5			
802.11g Mode, 54 Mbs							
<i>Channel</i>		<i>Frequency (MHz)</i>	<i>6 dB Bandwidth (MHz)</i>	<i>Minimum Limit (MHz)</i>			
Low		2412	16,42	0,5			
Mid		2437	16,34	0,5			
High		2462	16,34	0,5			
802.11n Mode, 65 Mbs							
<i>Channel</i>		<i>Frequency (MHz)</i>	<i>6 dB Bandwidth (MHz)</i>	<i>Minimum Limit (MHz)</i>			
Low		2412	16,94	0,5			
Mid		2437	17,52	0,5			
High		2462	17,52	0,5			

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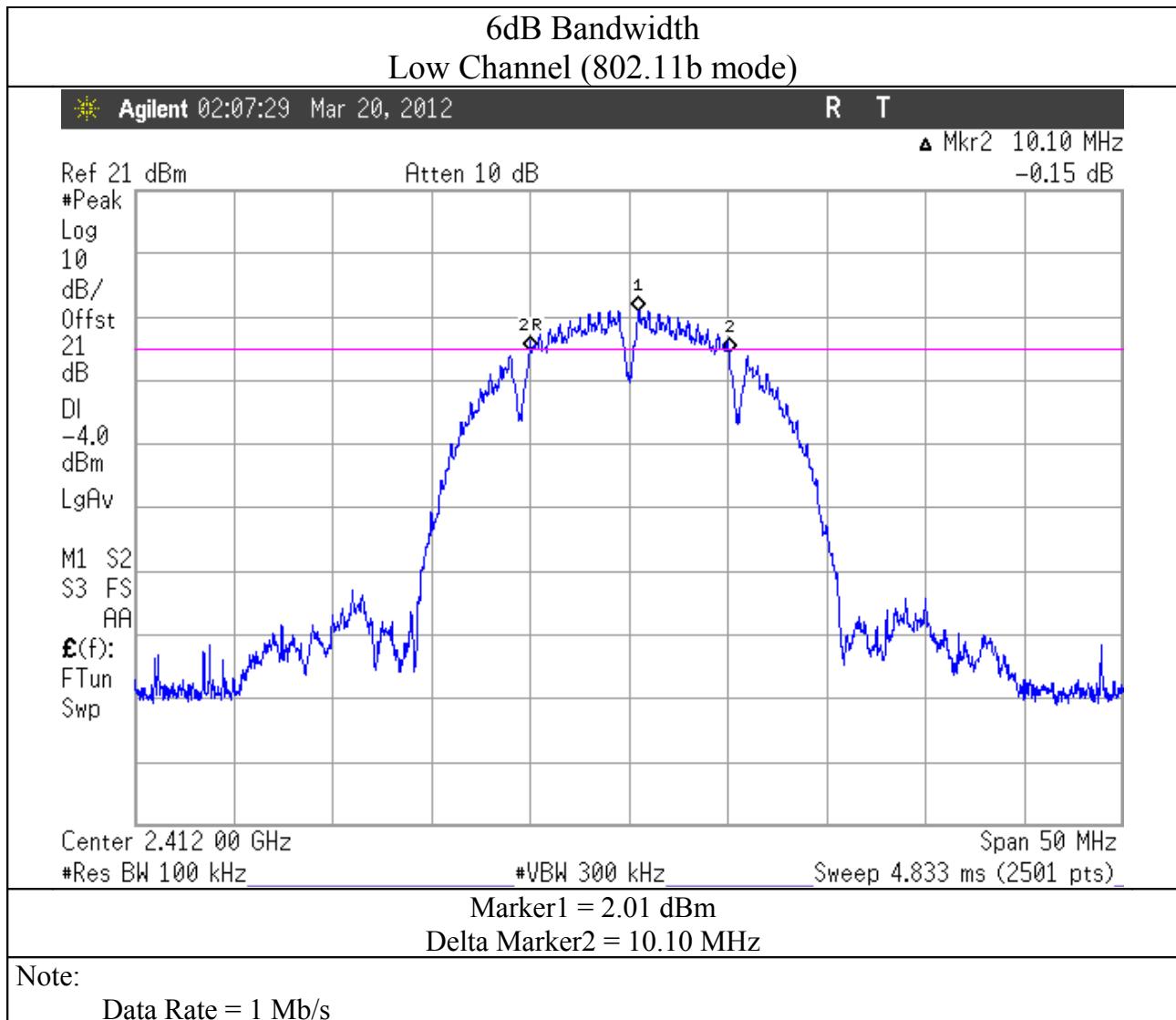
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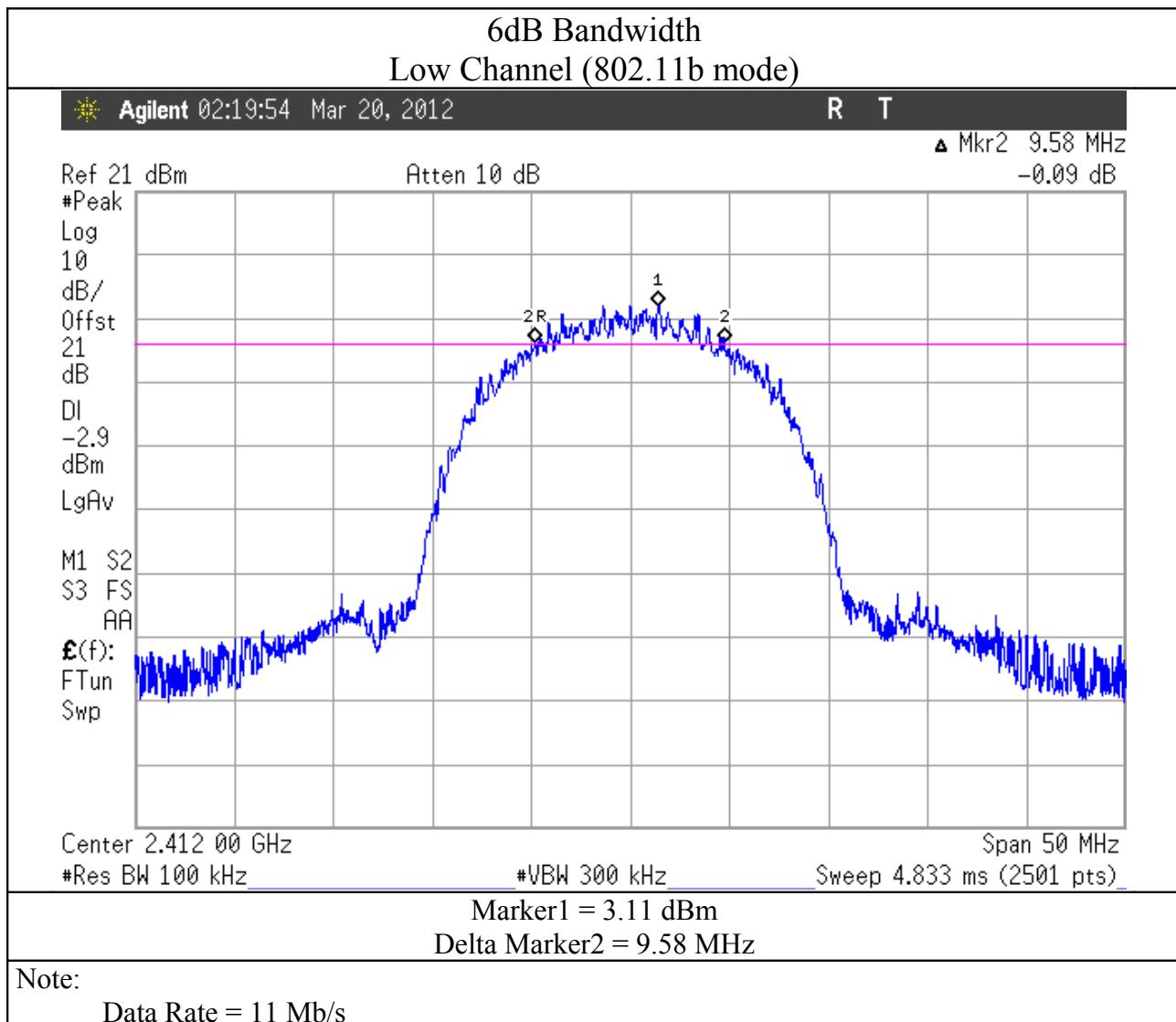
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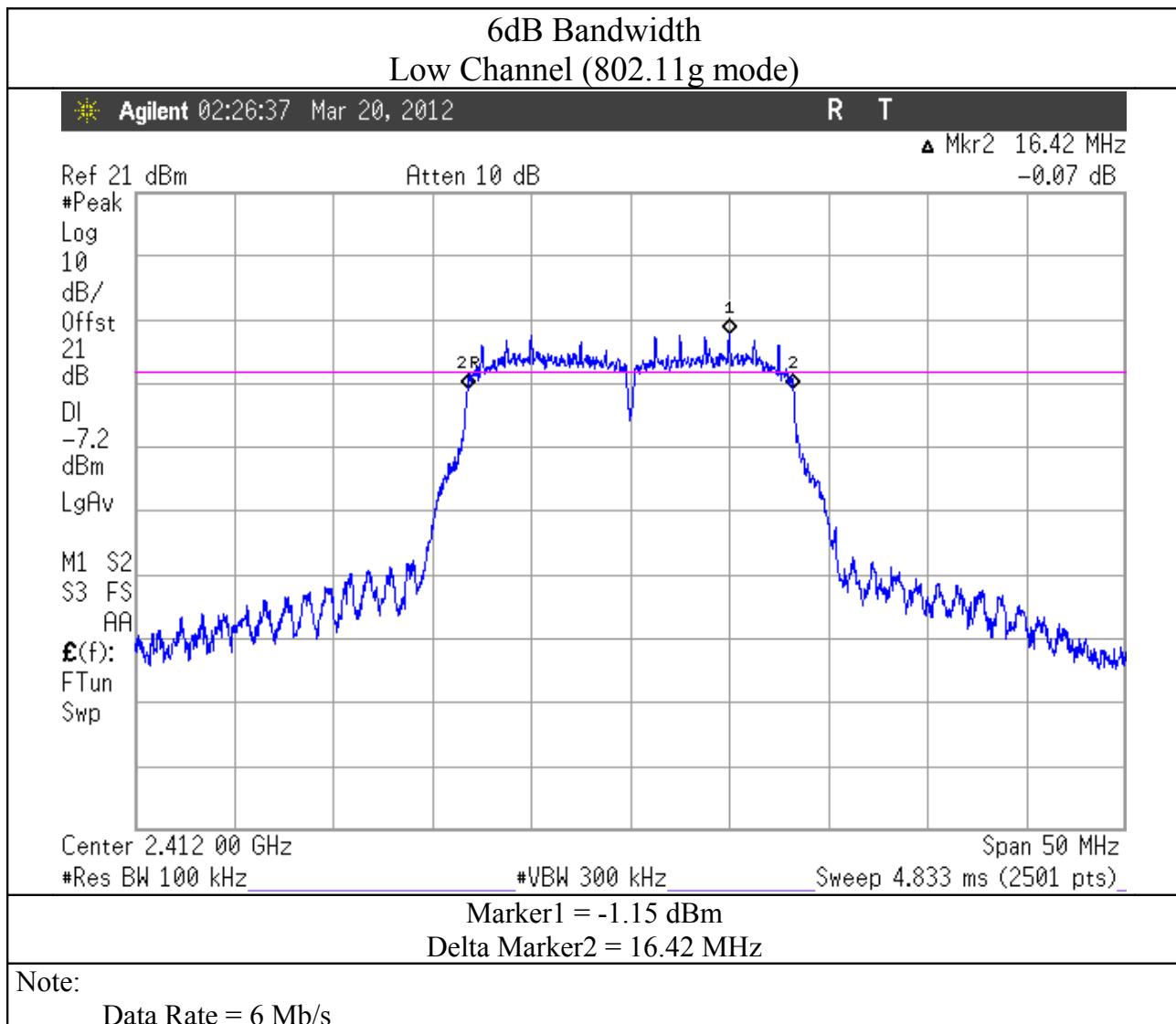
<u>Test Equipment</u>			
EQUIPMENT	MANUFACTURER	MODEL	CAL. DATE
EMI Receiver	Agilent	E4440A	01/2012
<u>Test procedure: APR01</u>			
Test performed on low, middle and high channels and in the b,g,n protocols at maximum and minimum data rate for each protocol.			
In the following graphs results are shown:			

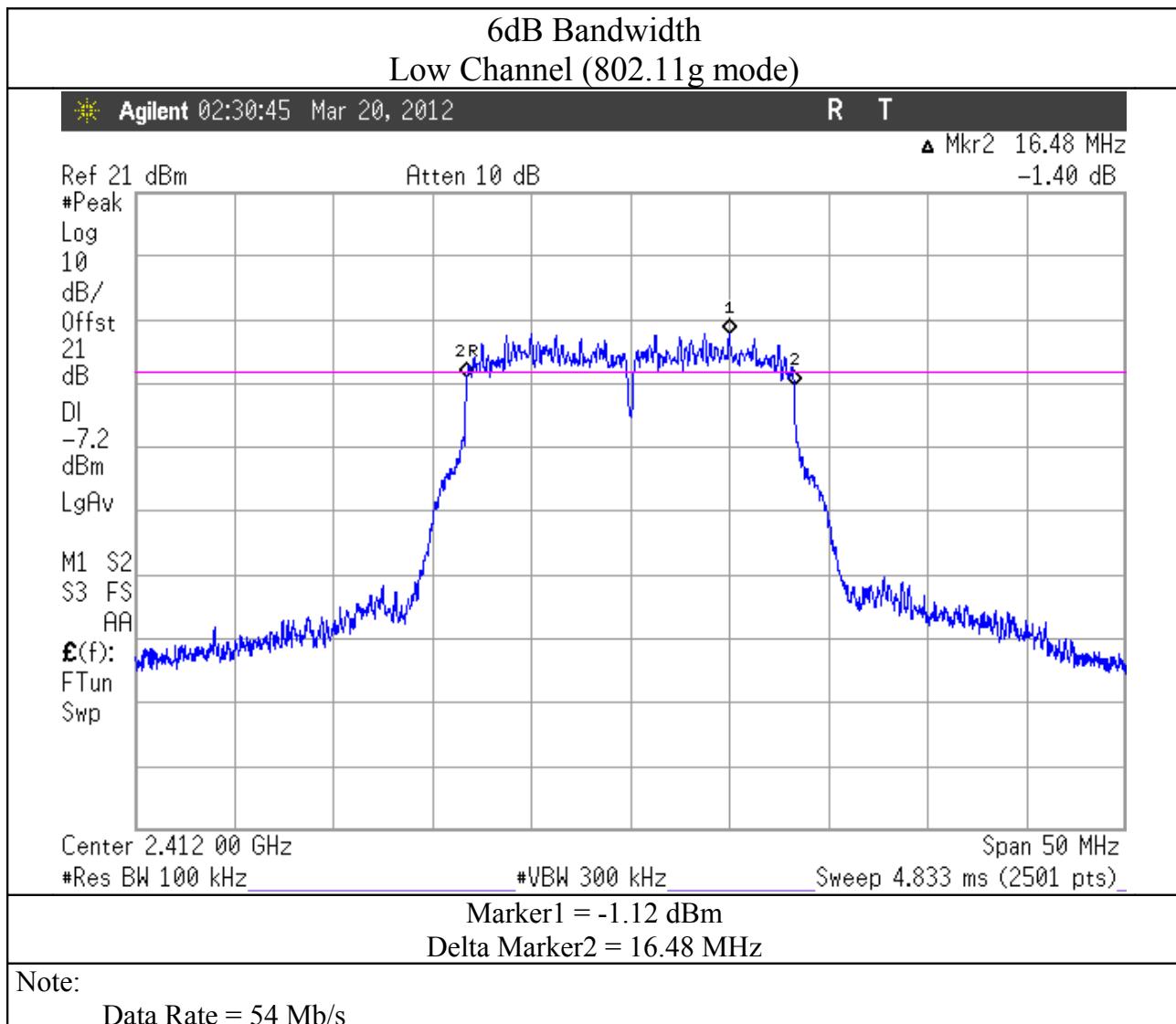
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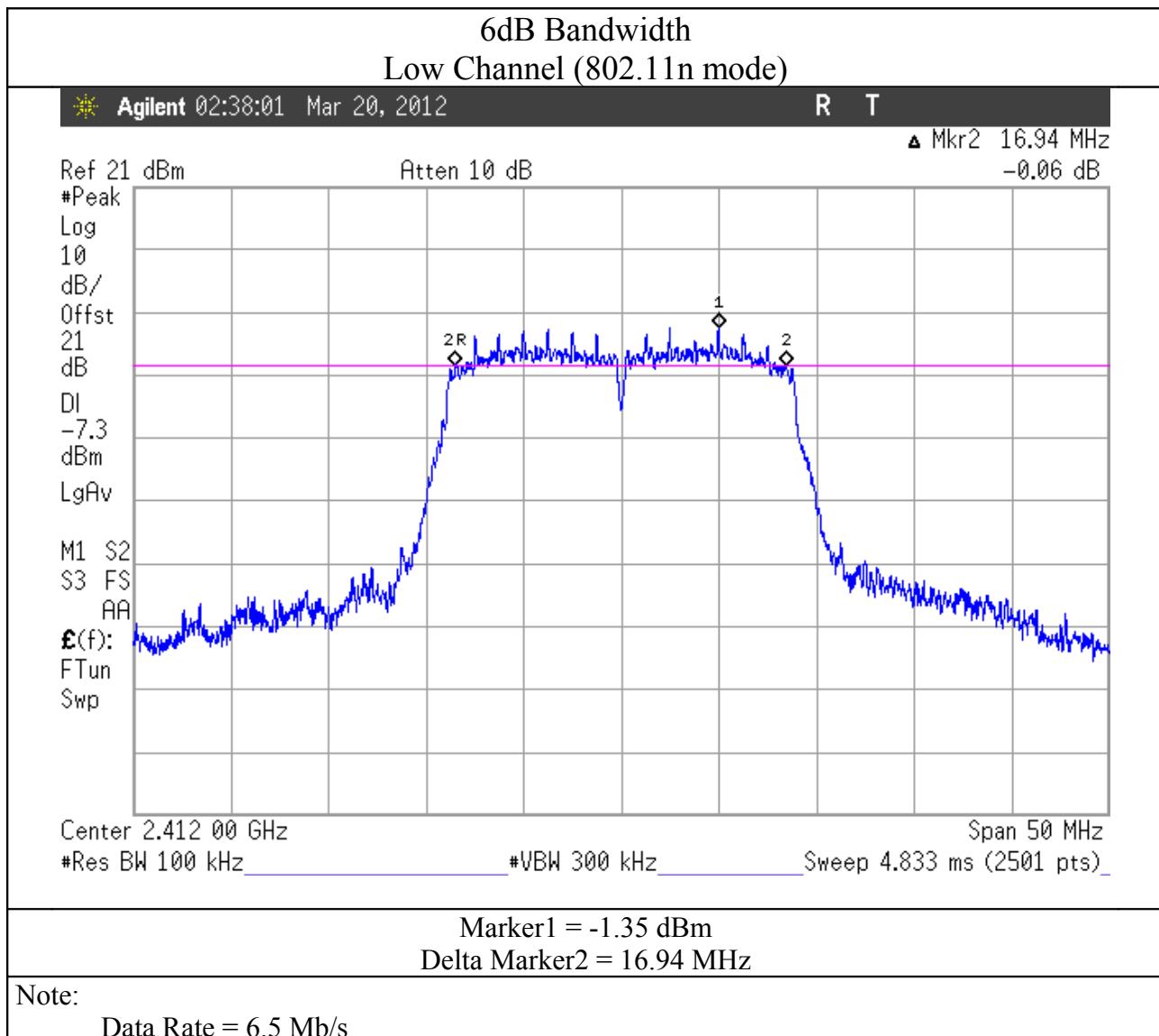
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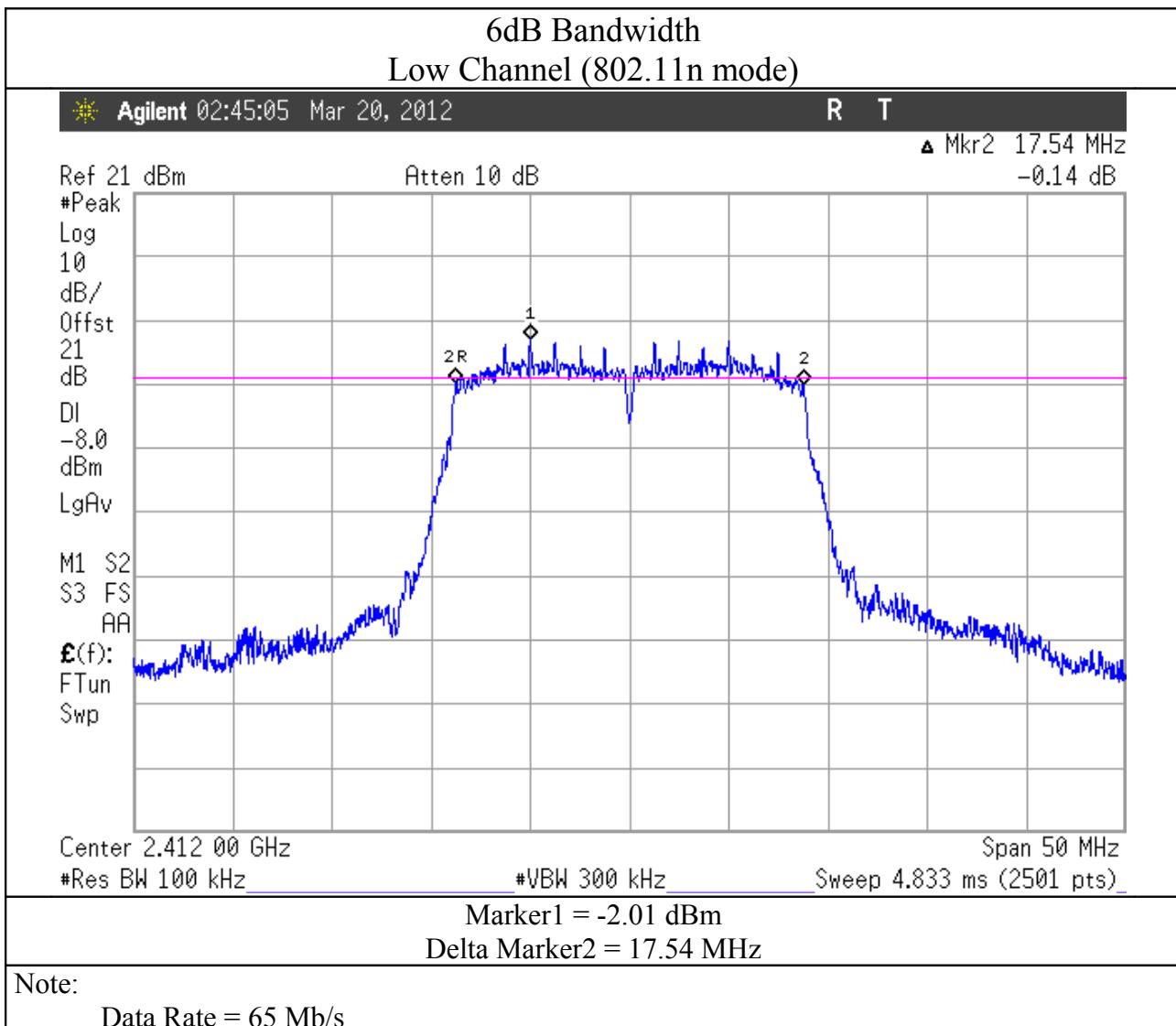


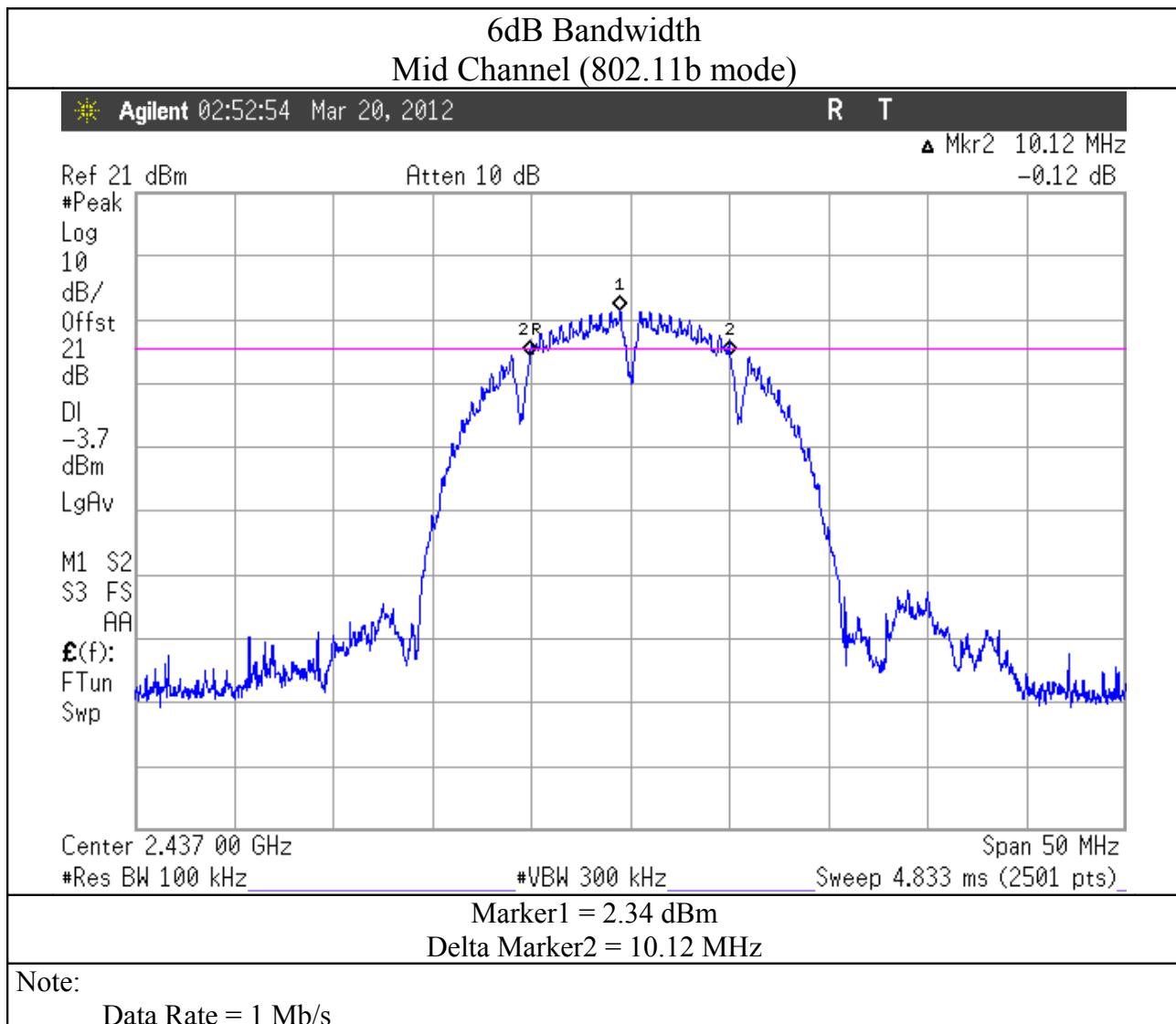


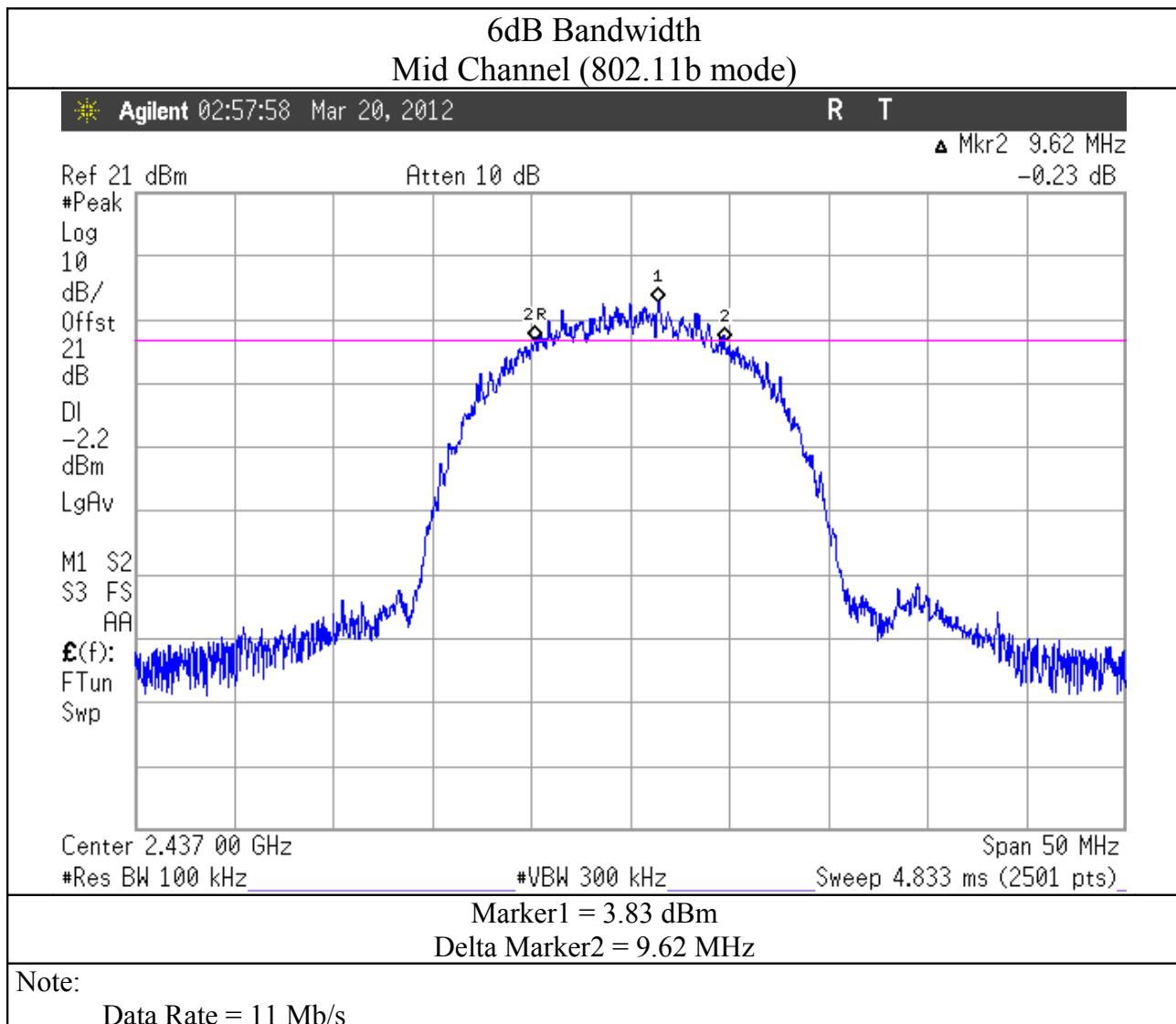


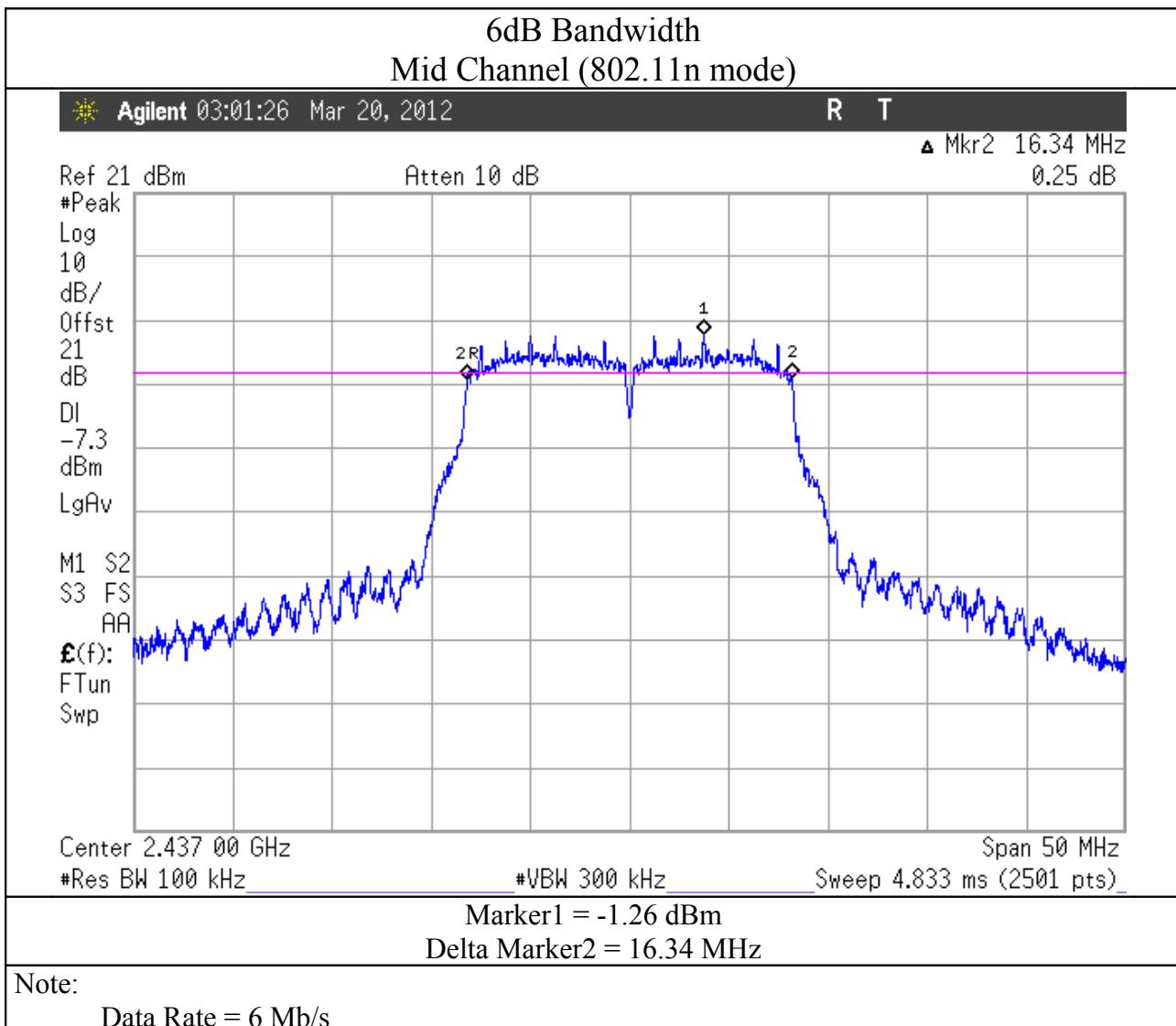


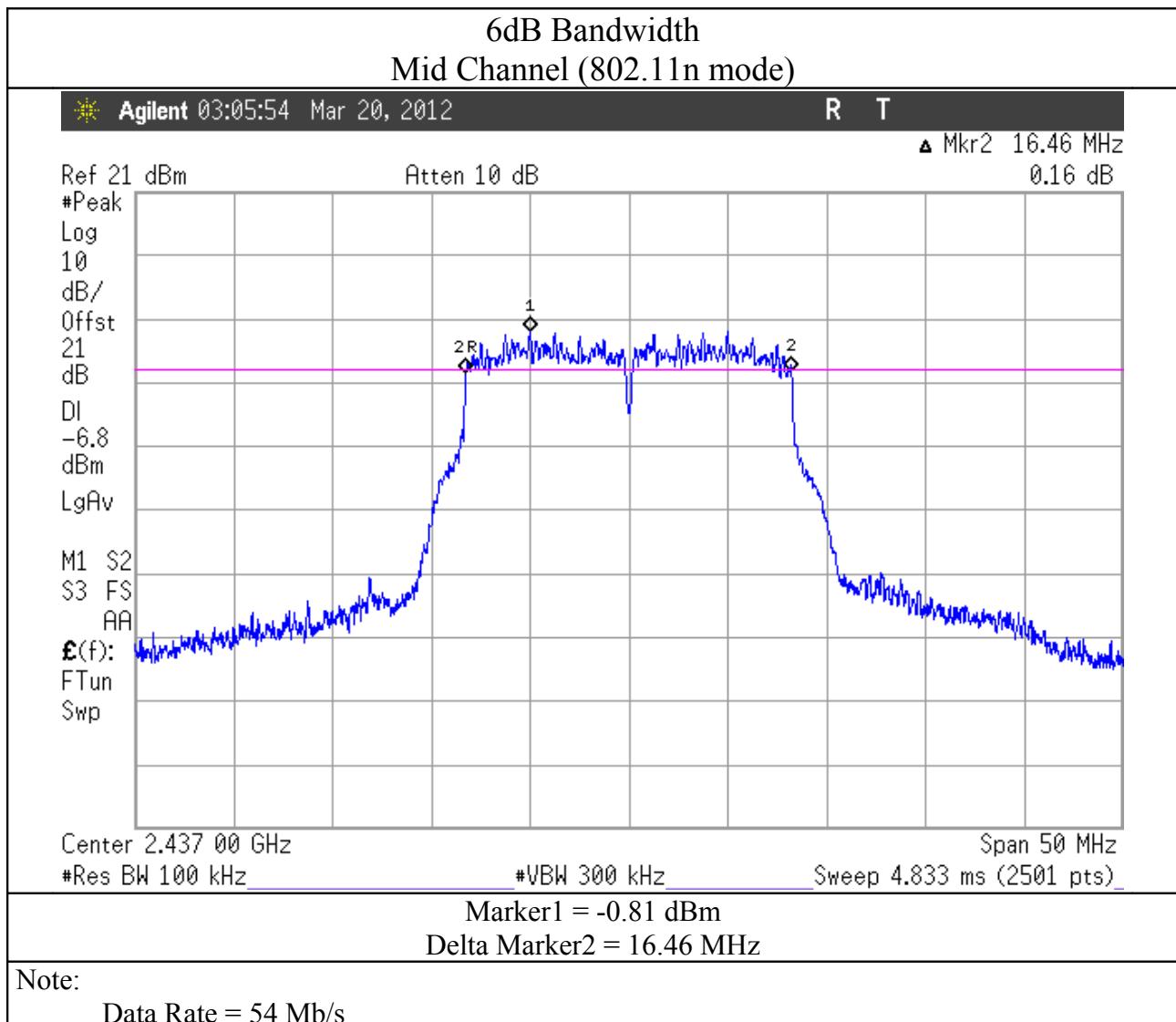


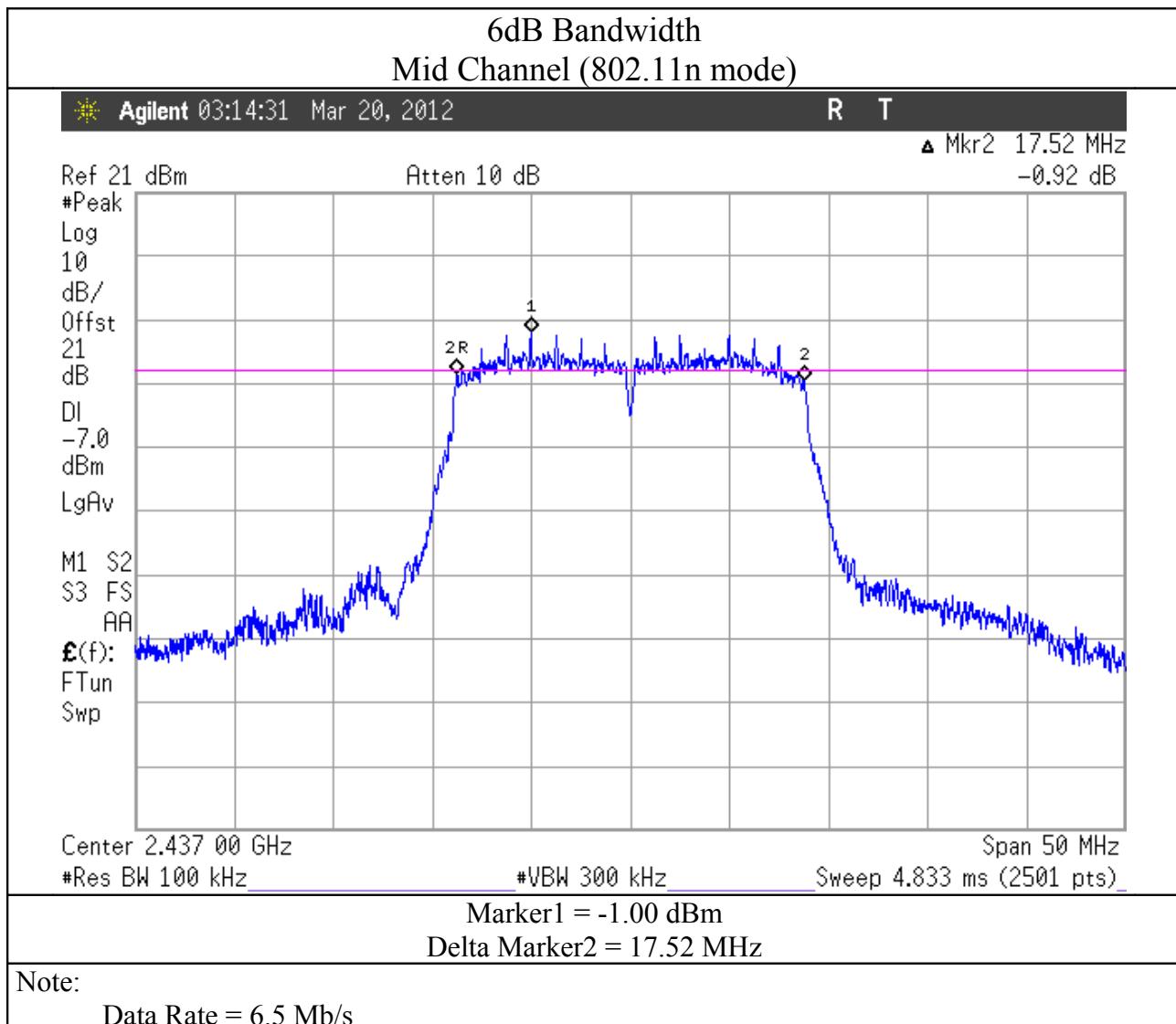


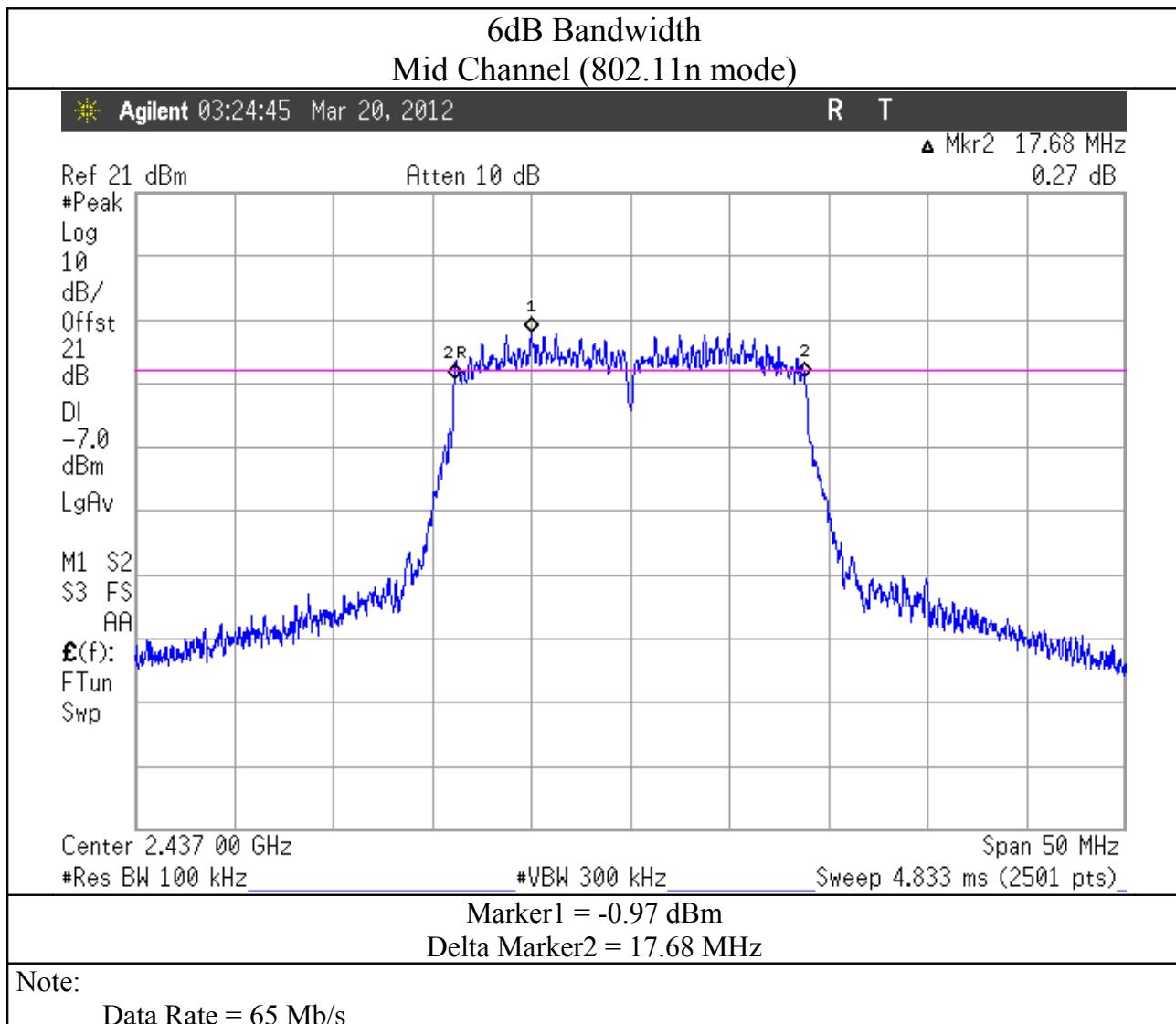


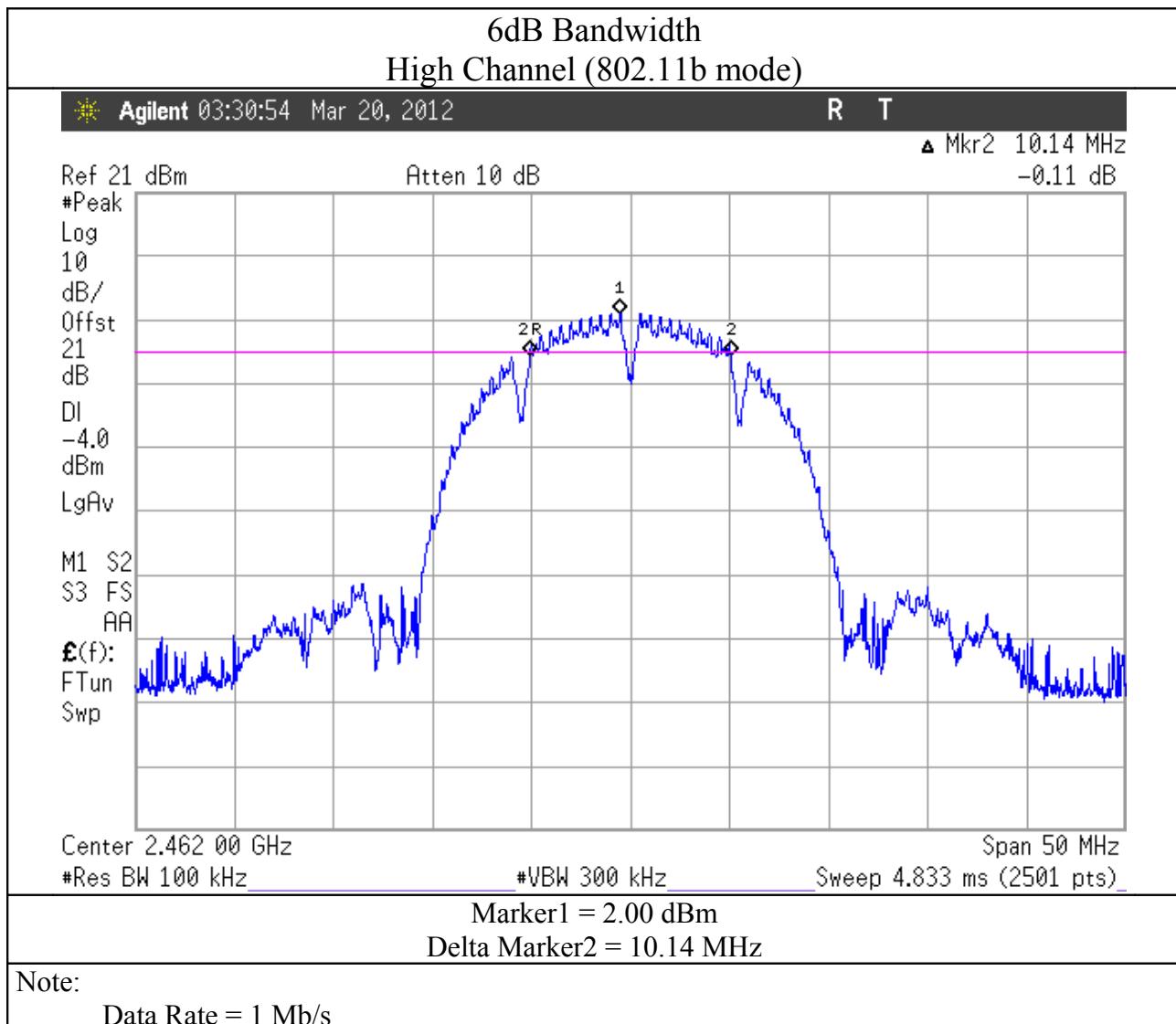


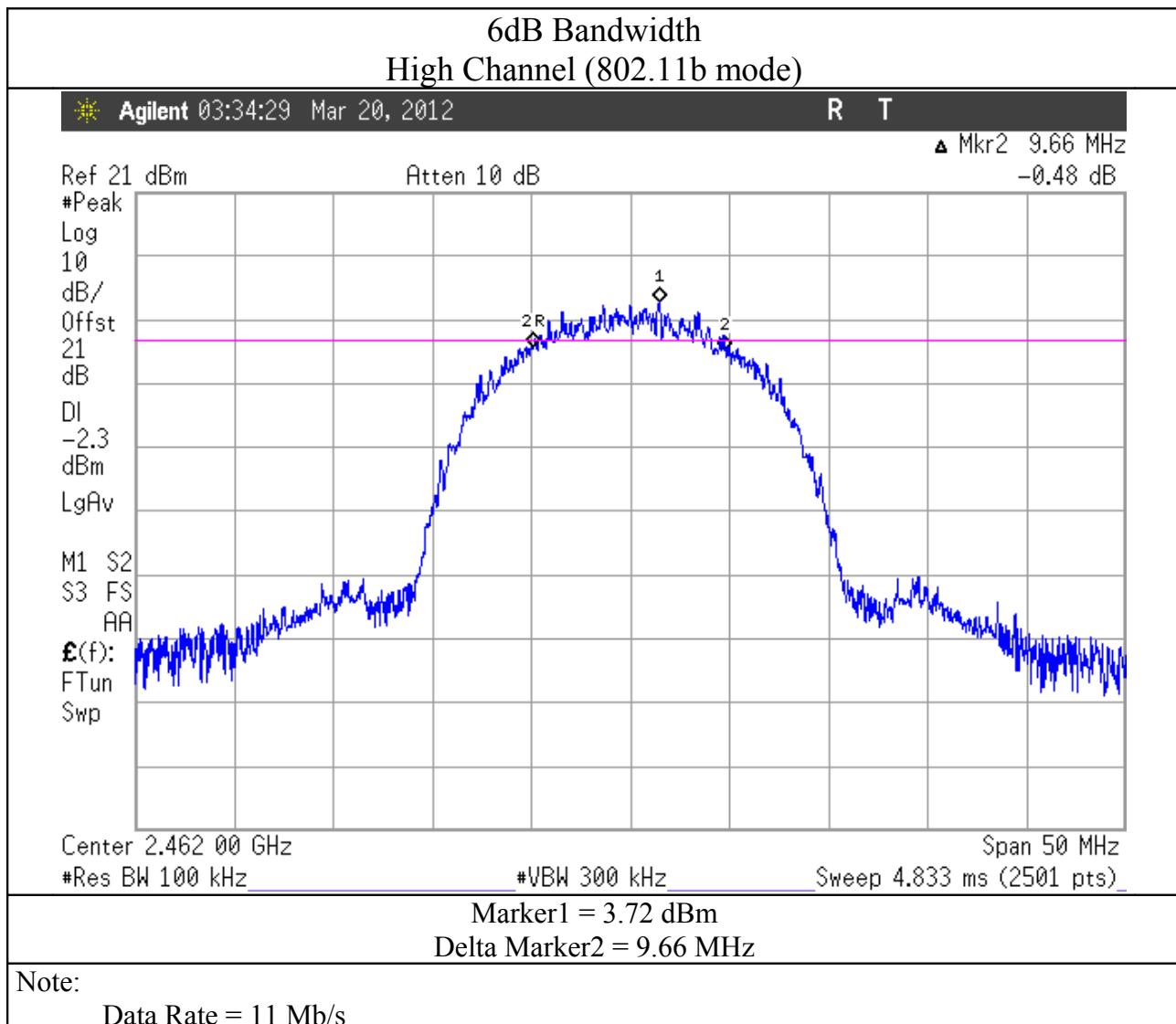


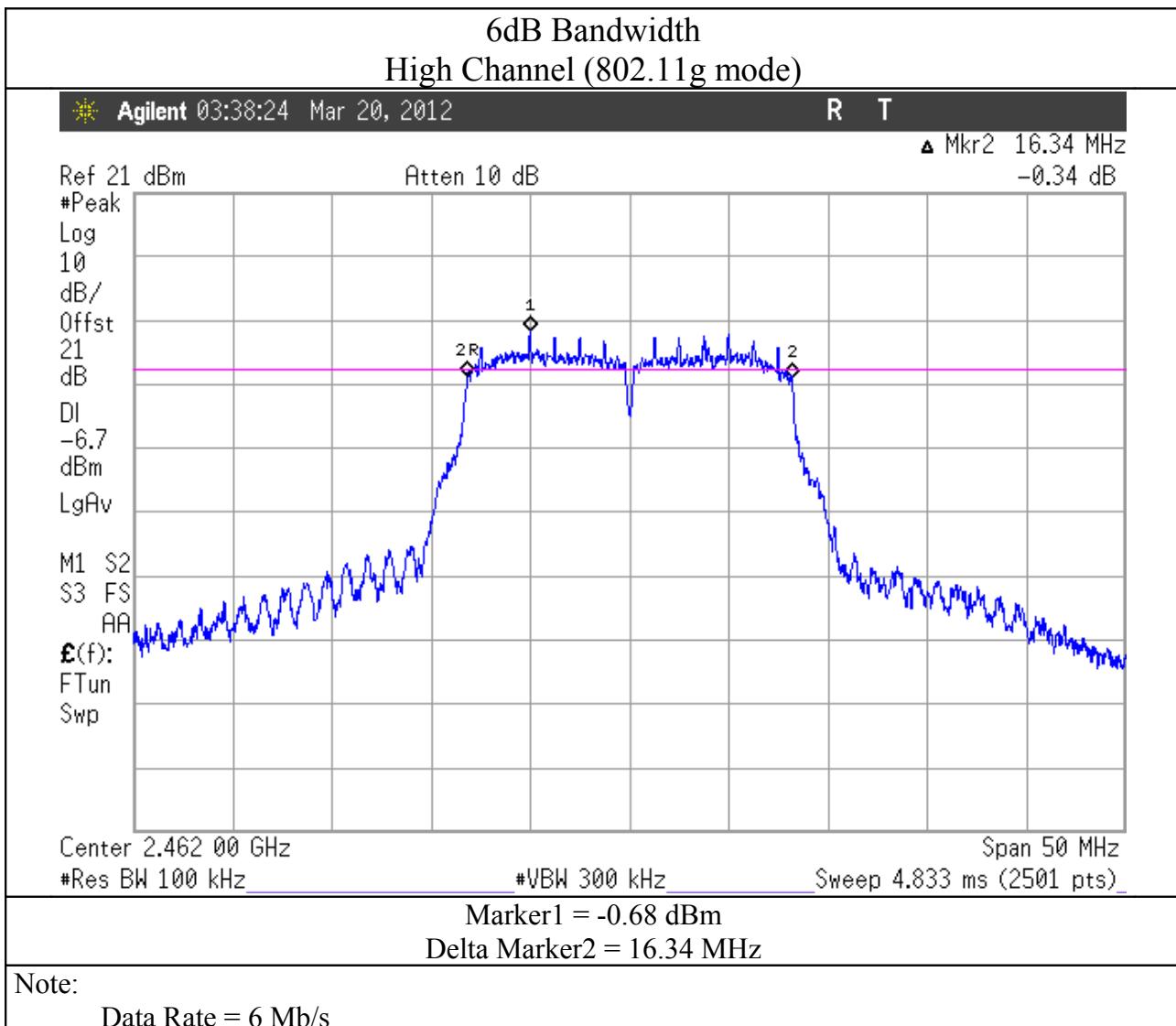


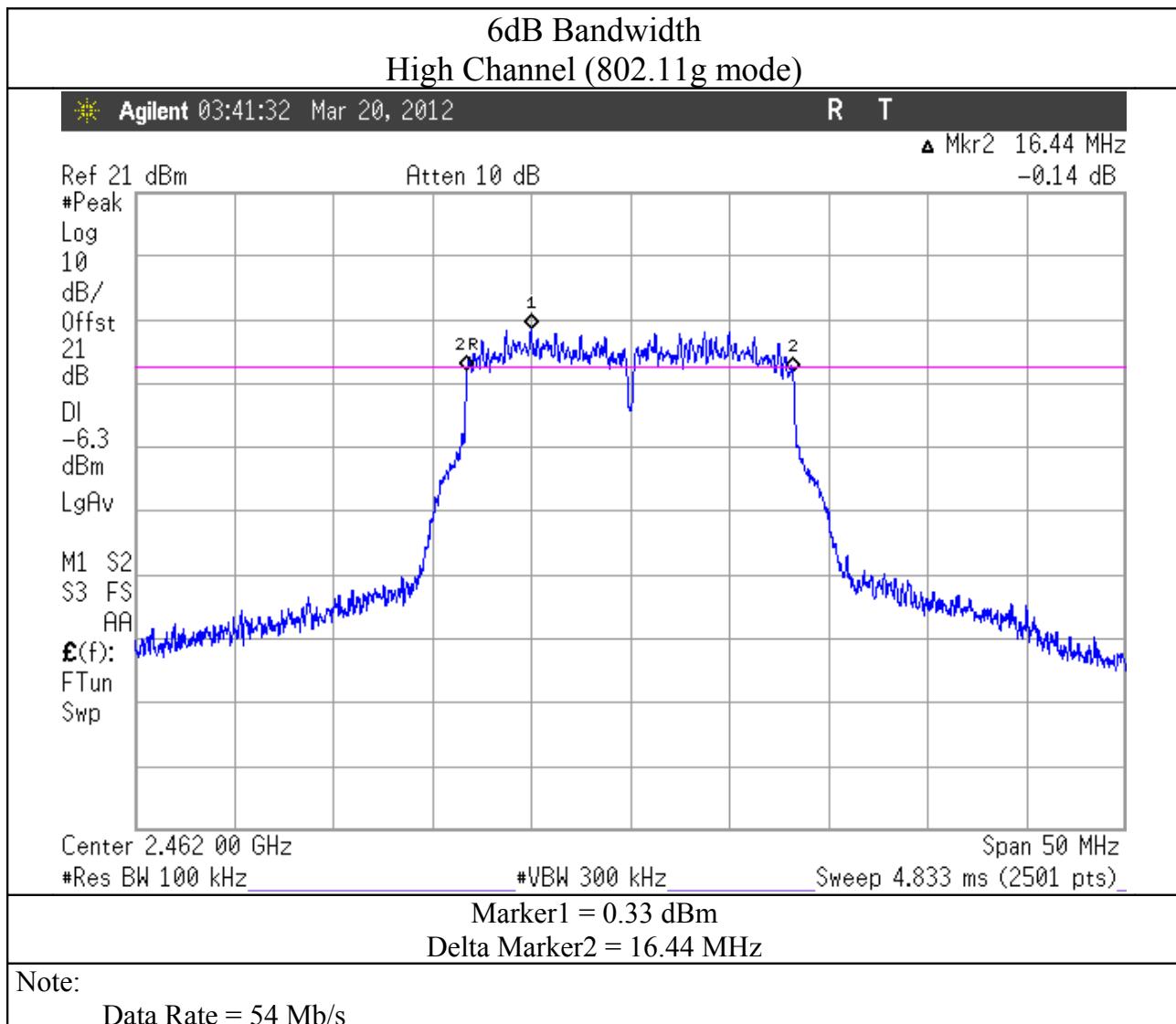


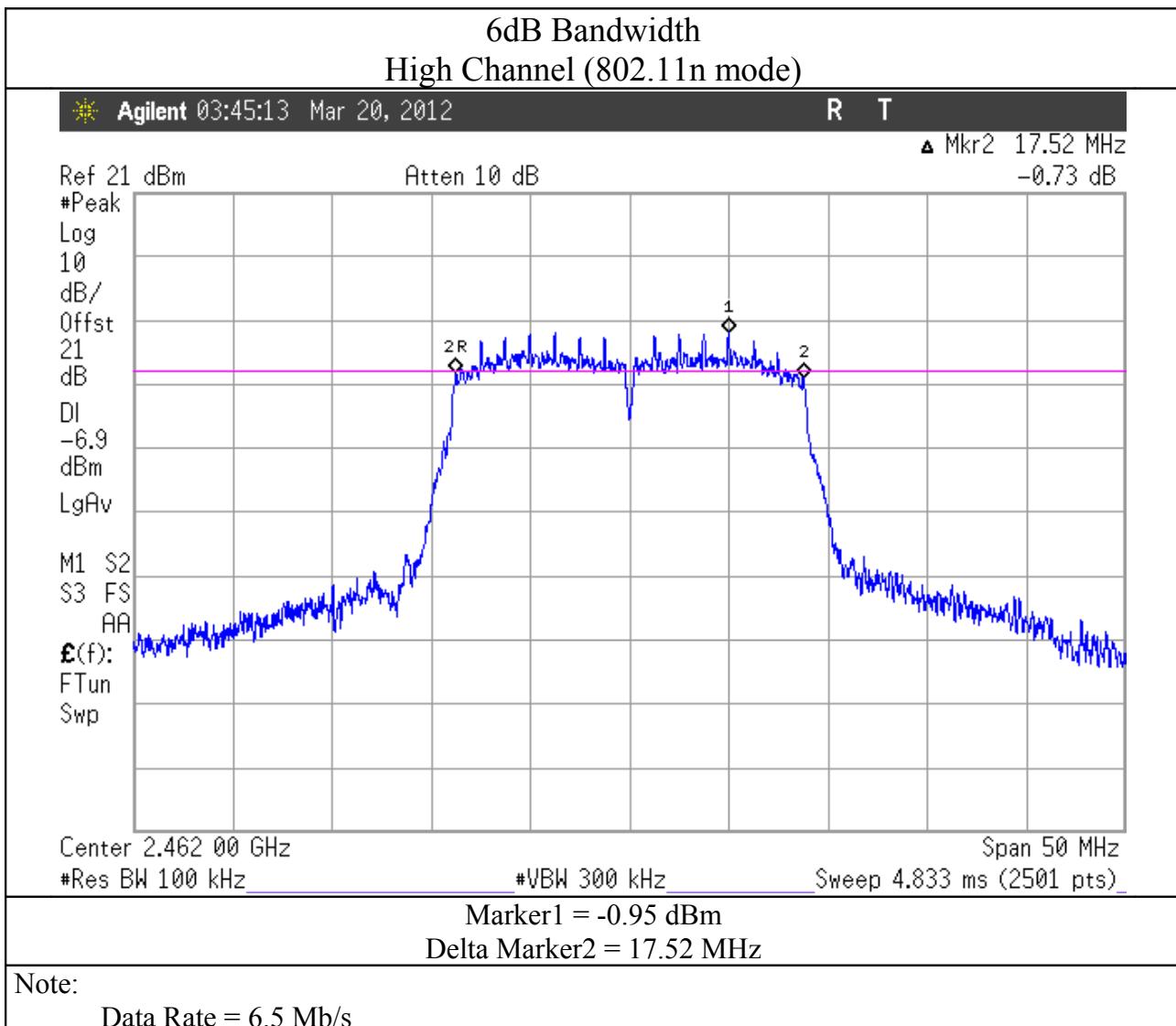


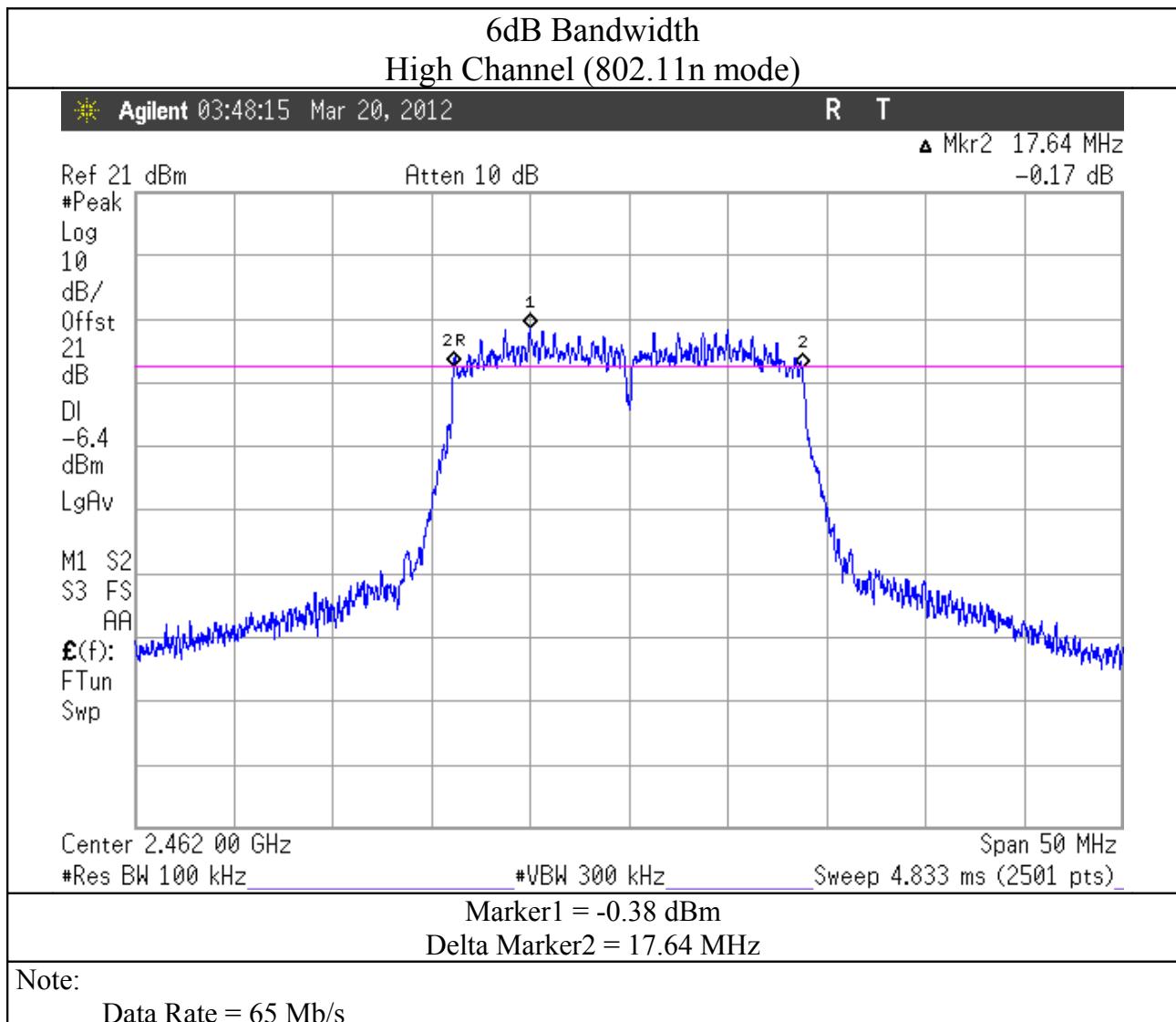












5. MAXIMUM PEAK OUTPUT POWER

Equipment shall meet the limits below .

For systems using digital modulation in the 2400-2483.5 MHz: 1 Watt (+30 dBm).

Test Equipment

EQUIPMENT	MANUFACTURER	MODEL	CAL. DATE
EMI Receiver	Agilent	E4440A	01/2012

Test procedure: APR01

The transmitter output is connected to a spectrum analyzer and the analyzer internal channel power integration is used to integrate the power over a bandwidth greater than or equal to the 26 dB bandwidth.

Test performed on low, middle and high channels and in the b,g,n protocols at maximum data rate for each protocol.

Results:

No non-compliance noted

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802.11b Mode, 11 Mbs				
Channel	Frequency (MHz)	Peak Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	13,62	30	-16,38
Mid	2437	13,97	30	-16,03
High	2462	16,3	30	-13,7
802.11g Mode, 54 Mbs				
Channel	Frequency (MHz)	Peak Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	11,85	30	-18,15
Mid	2437	11,23	30	-18,77
High	2462	11,66	30	-18,34
802.11n Mode, 65Mbs				
Channel	Frequency (MHz)	Peak Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	10,91	30	-19,09
Mid	2437	11,23	30	-18,77
High	2462	11,35	30	-18,65

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6. BAND EDGE AND CONDUCTED SPURIOUS EMISSIONS

Equipment shall meet the limits below .

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

Test Equipment

EQUIPMENT	MANUFACTURER	MODEL	CAL. DATE
EMI Receiver	Agilent	E4440A	01/2012

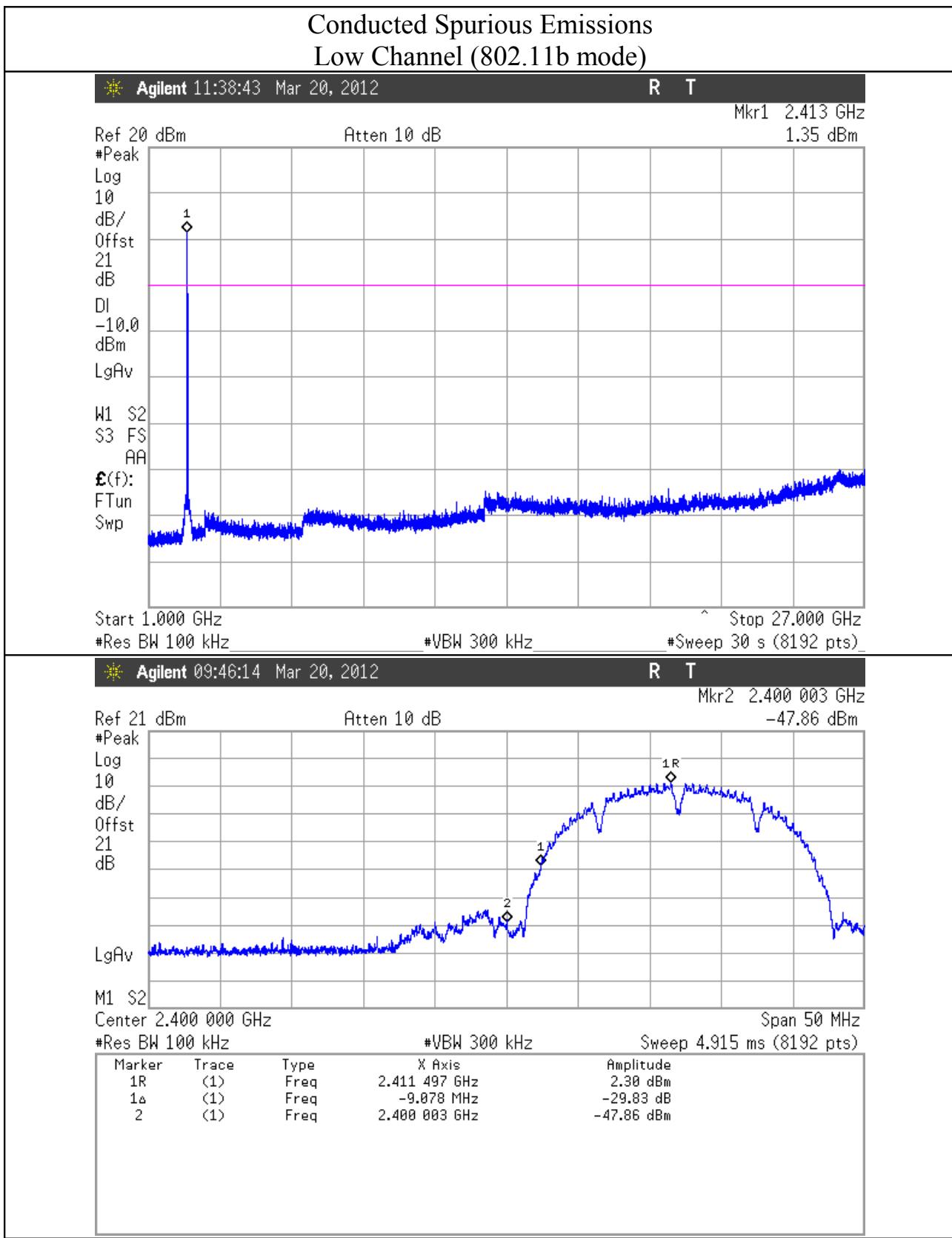
Test procedure: APR01

Test performed on low, middle and high channels and in the b,g,n protocols at maximum and minimum data rate for each protocol.

Results:

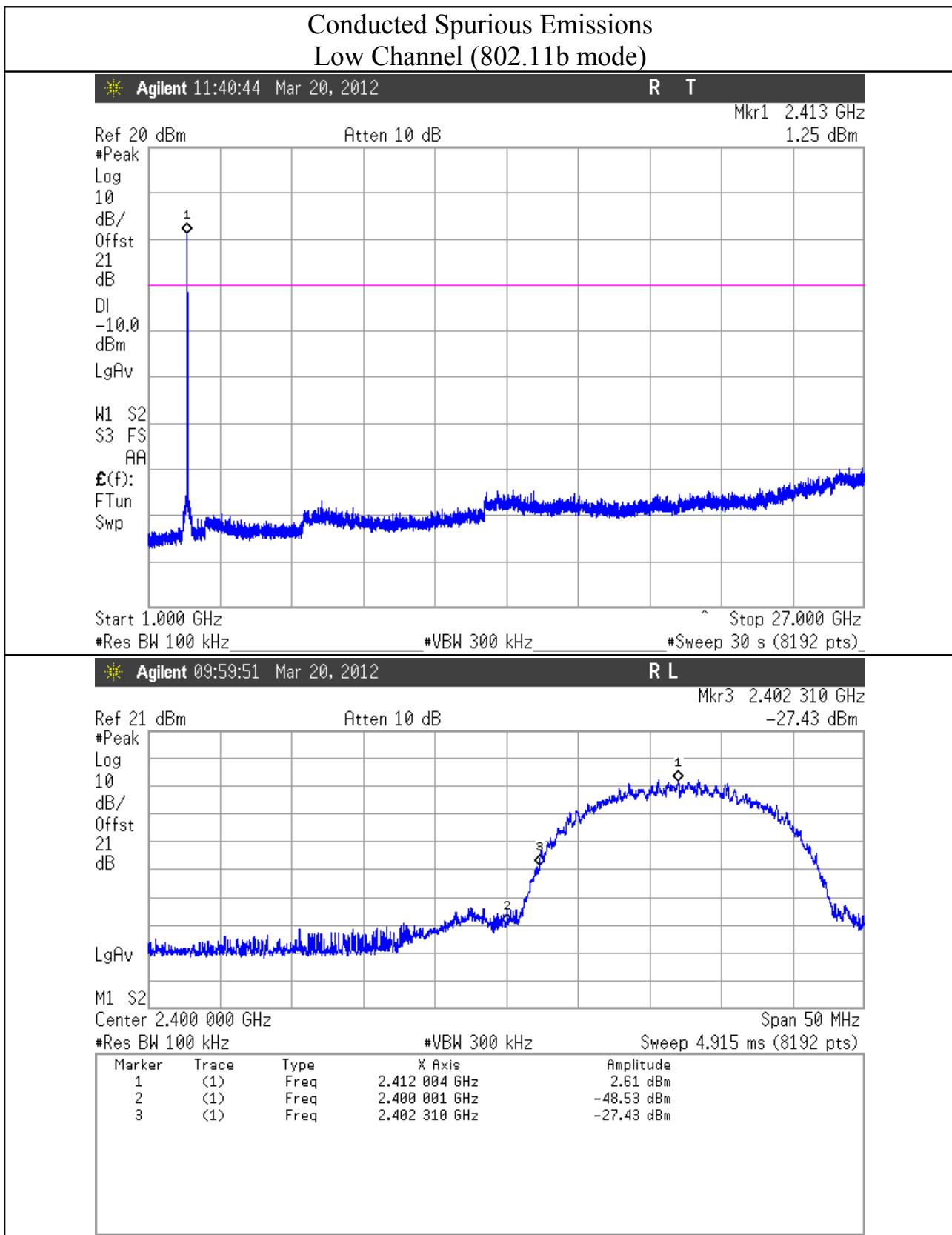
No non-compliance noted

The following figures show the results.



Note:

Data Rate = 1 Mb/s

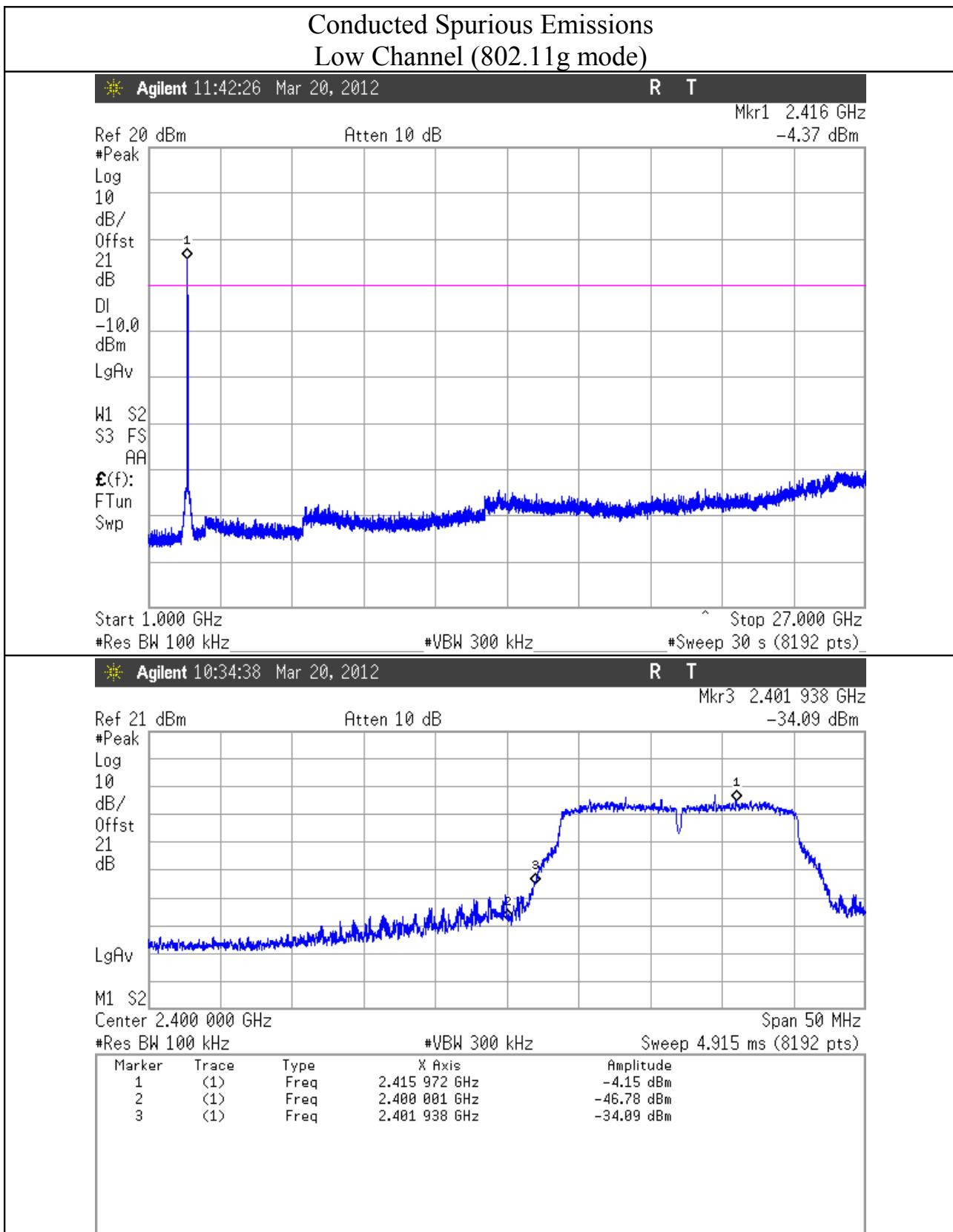


Note:

Data Rate = 11 Mb/s

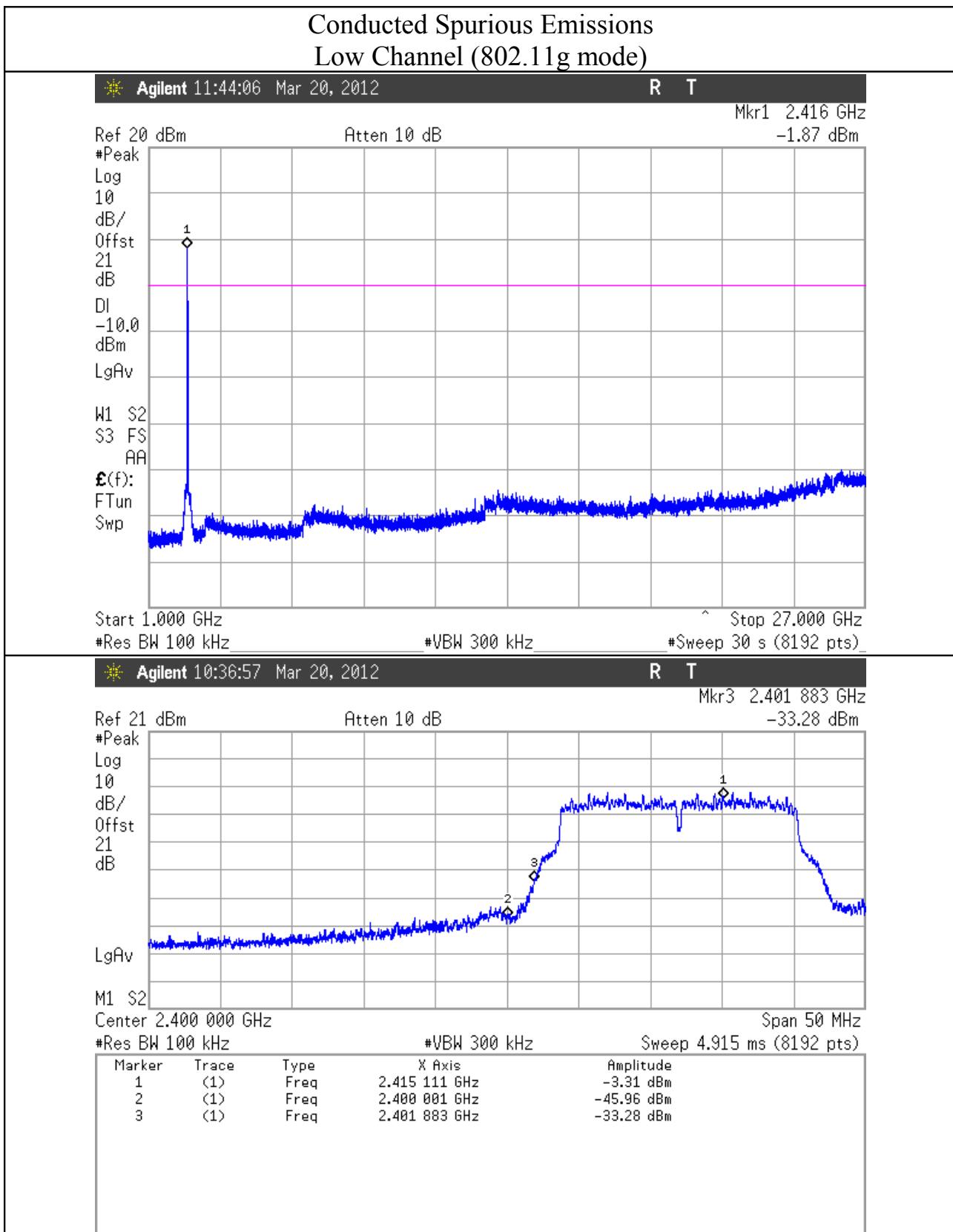
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Note:

Data Rate = 6 Mb/s



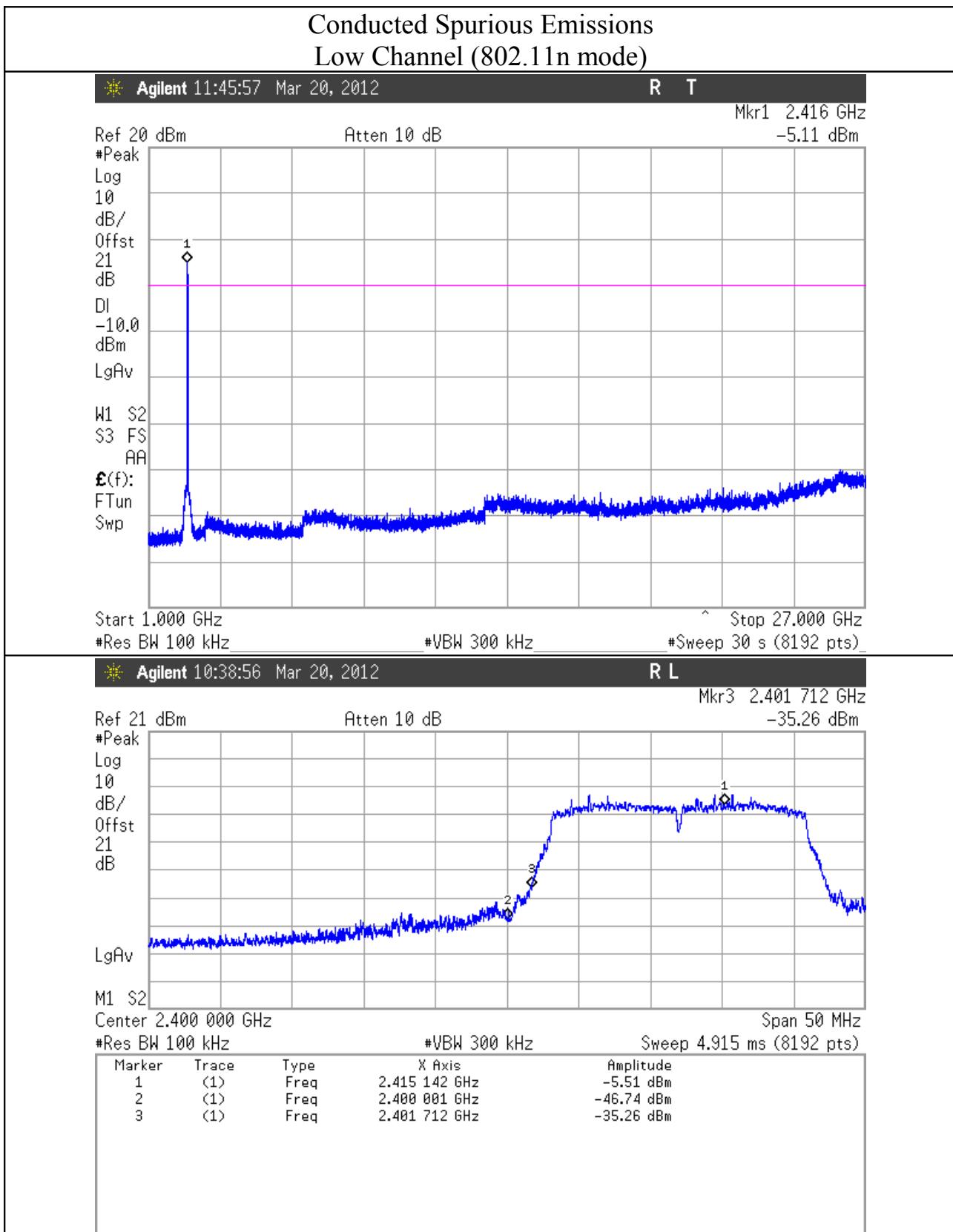
Note:

Data Rate = 54 Mb/s

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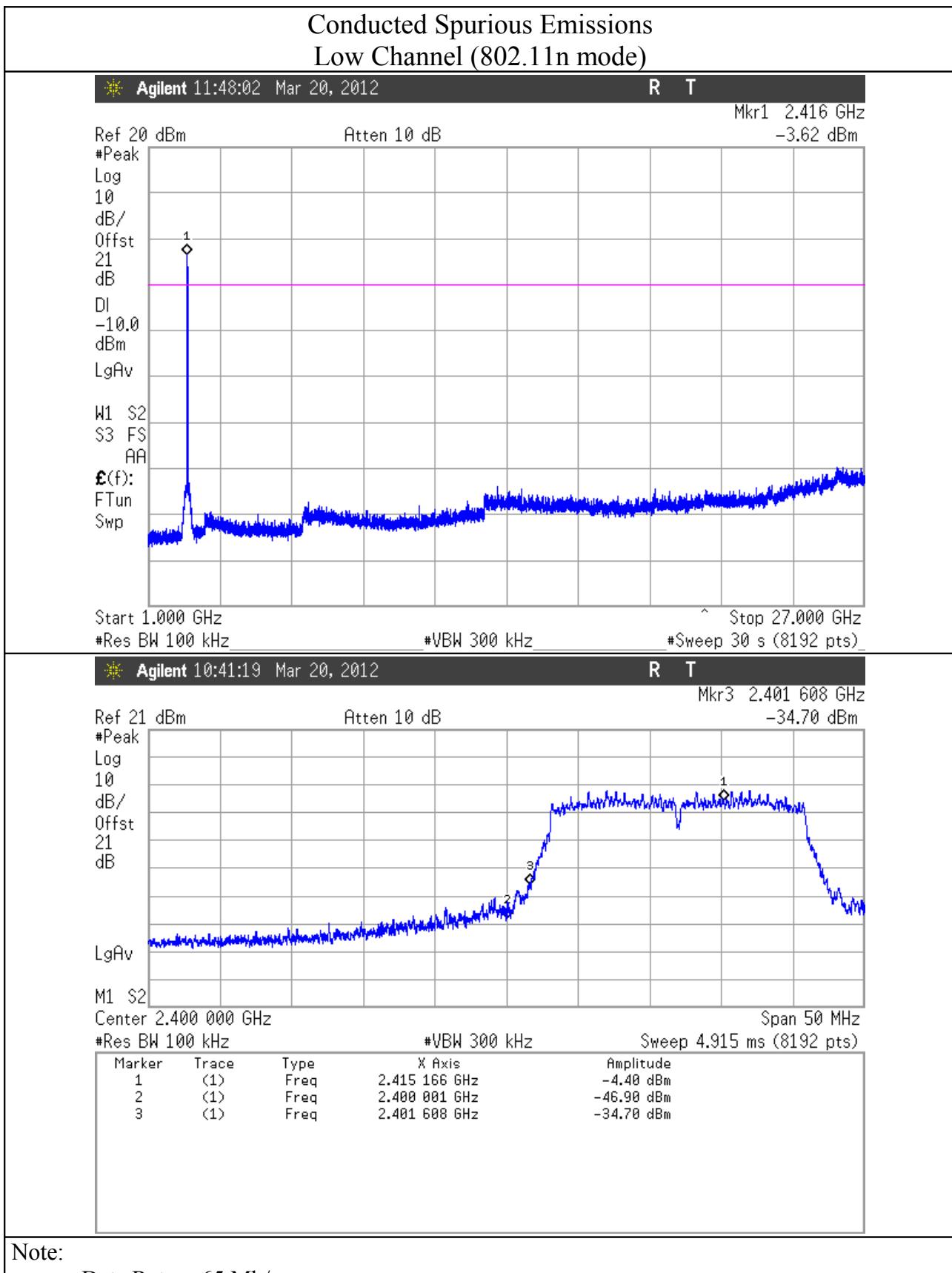
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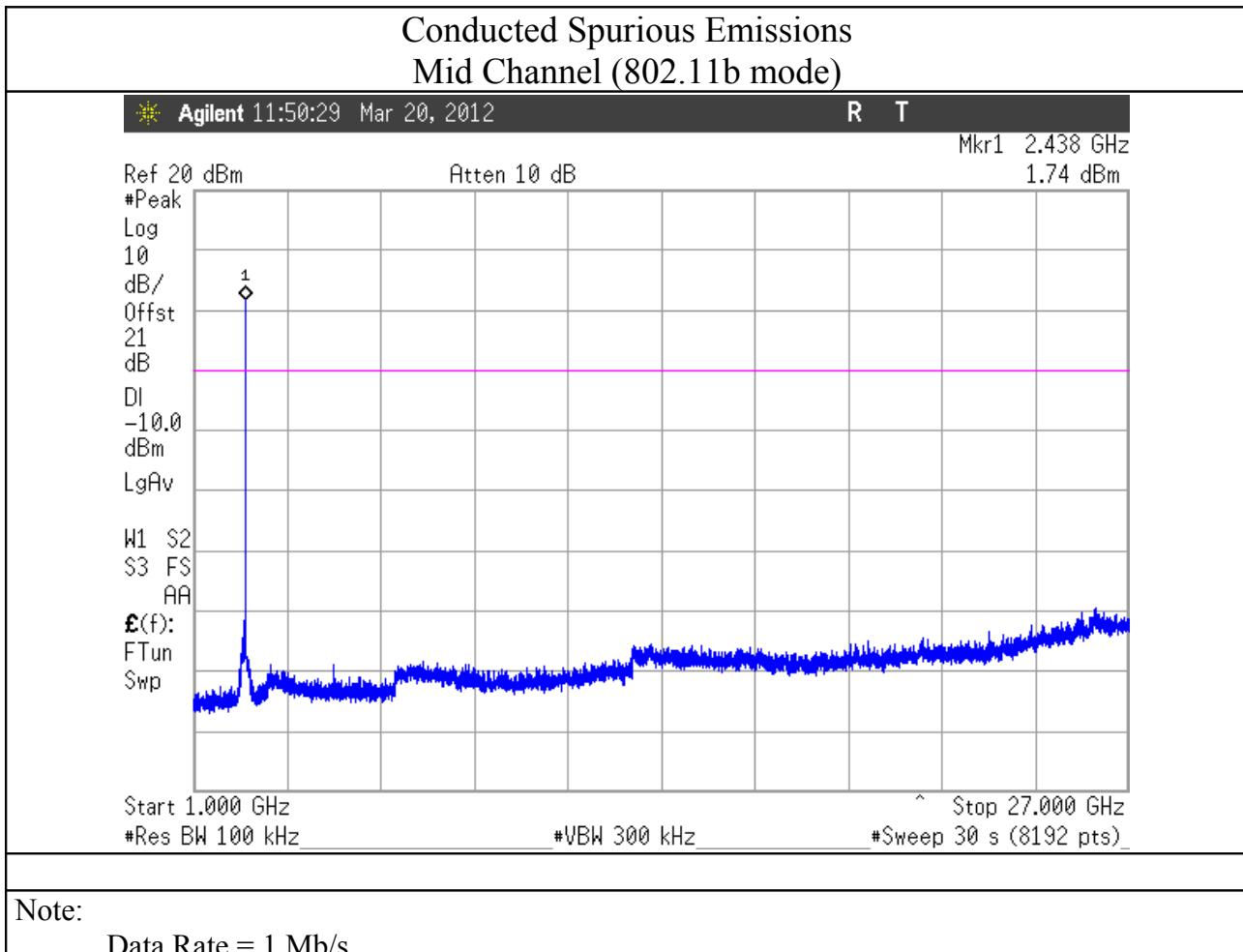
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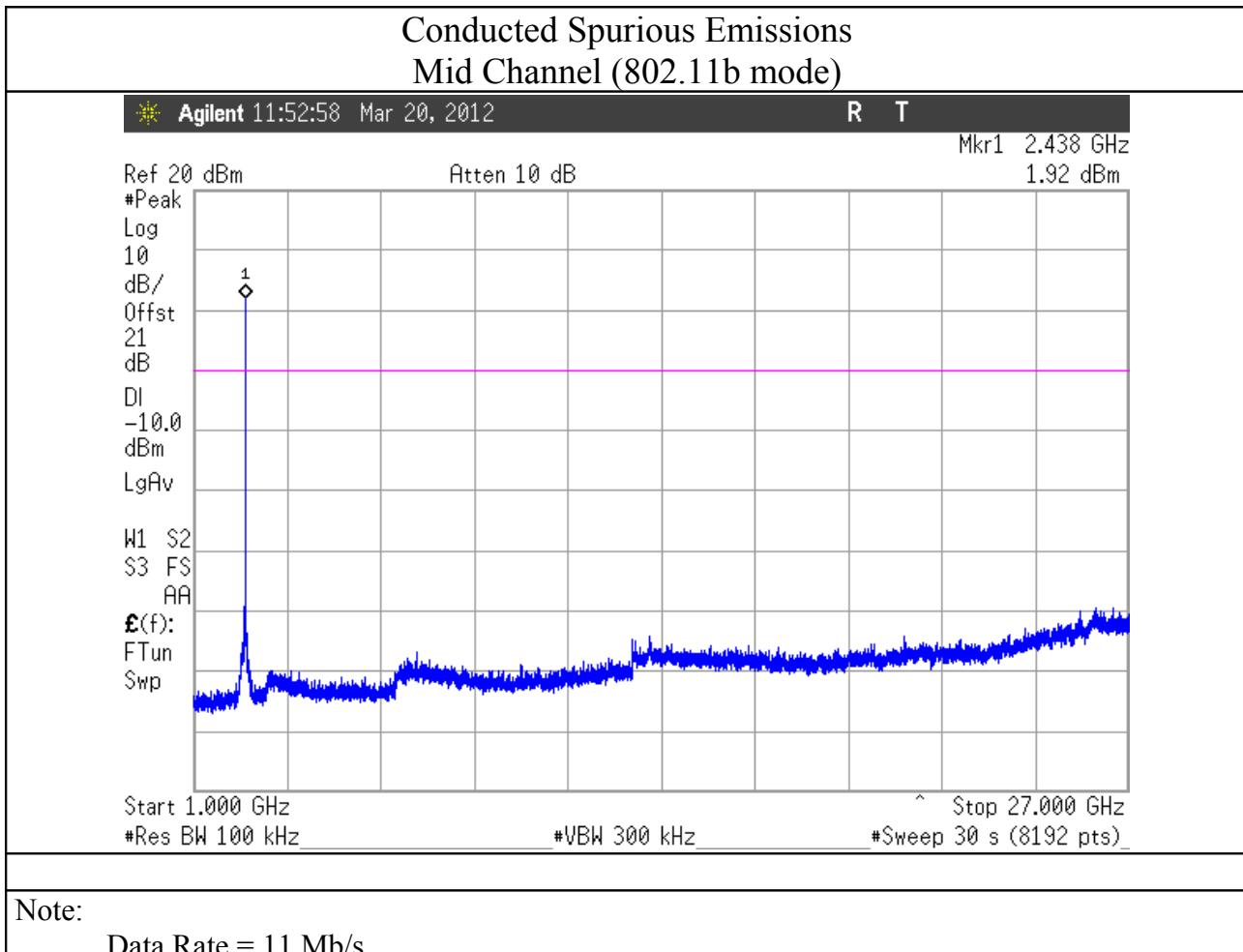


Note:

Data Rate = 6.5 Mb/s

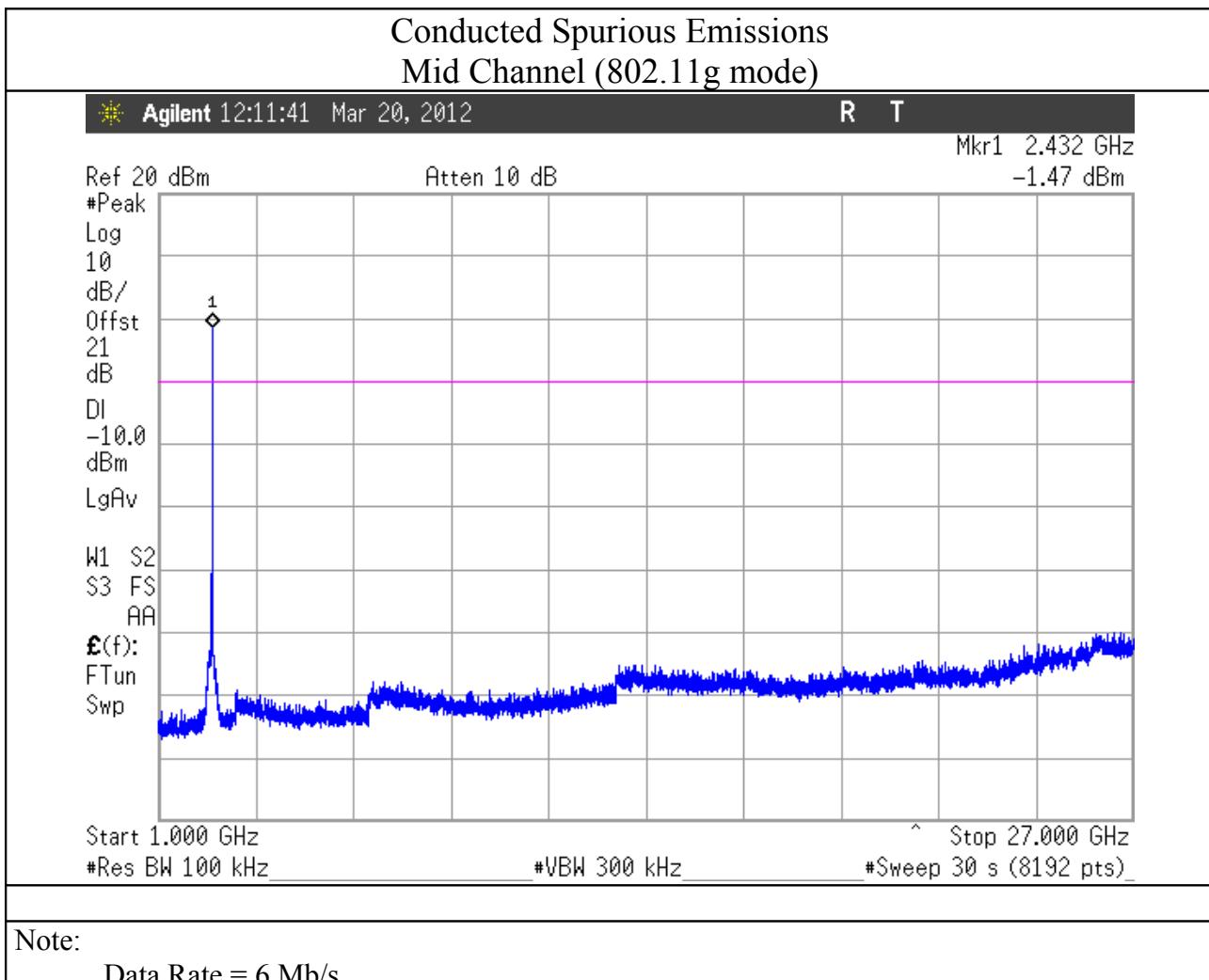


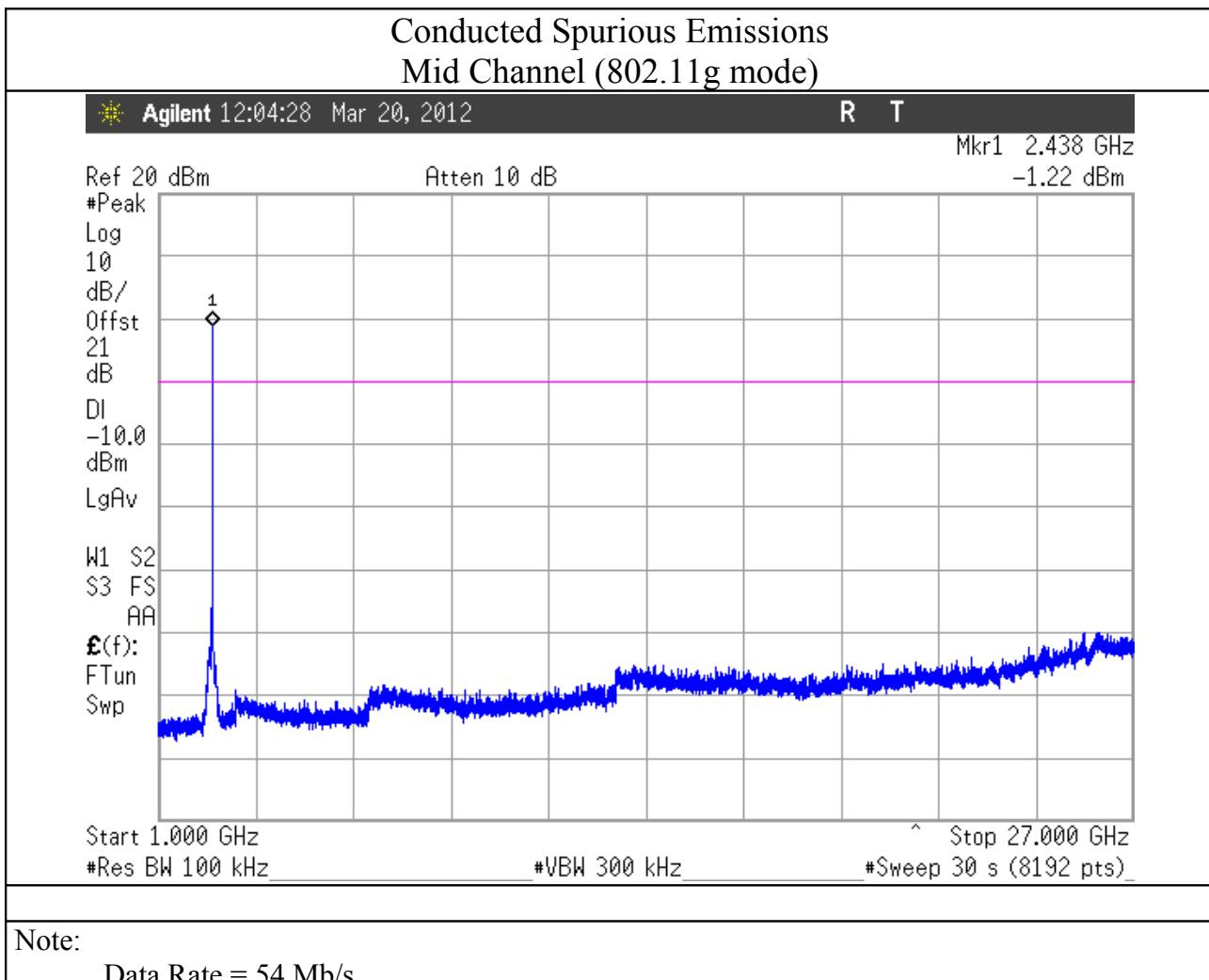


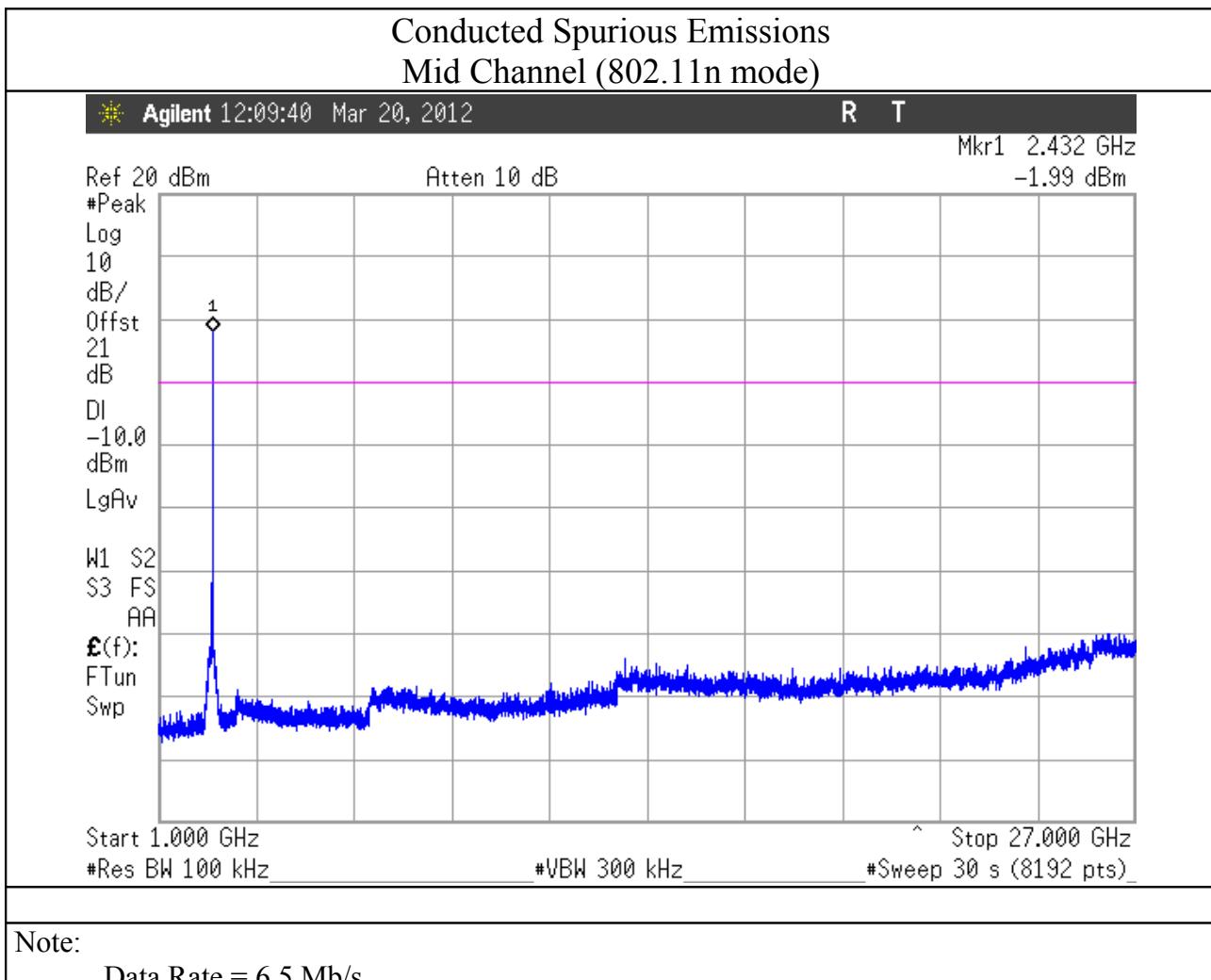


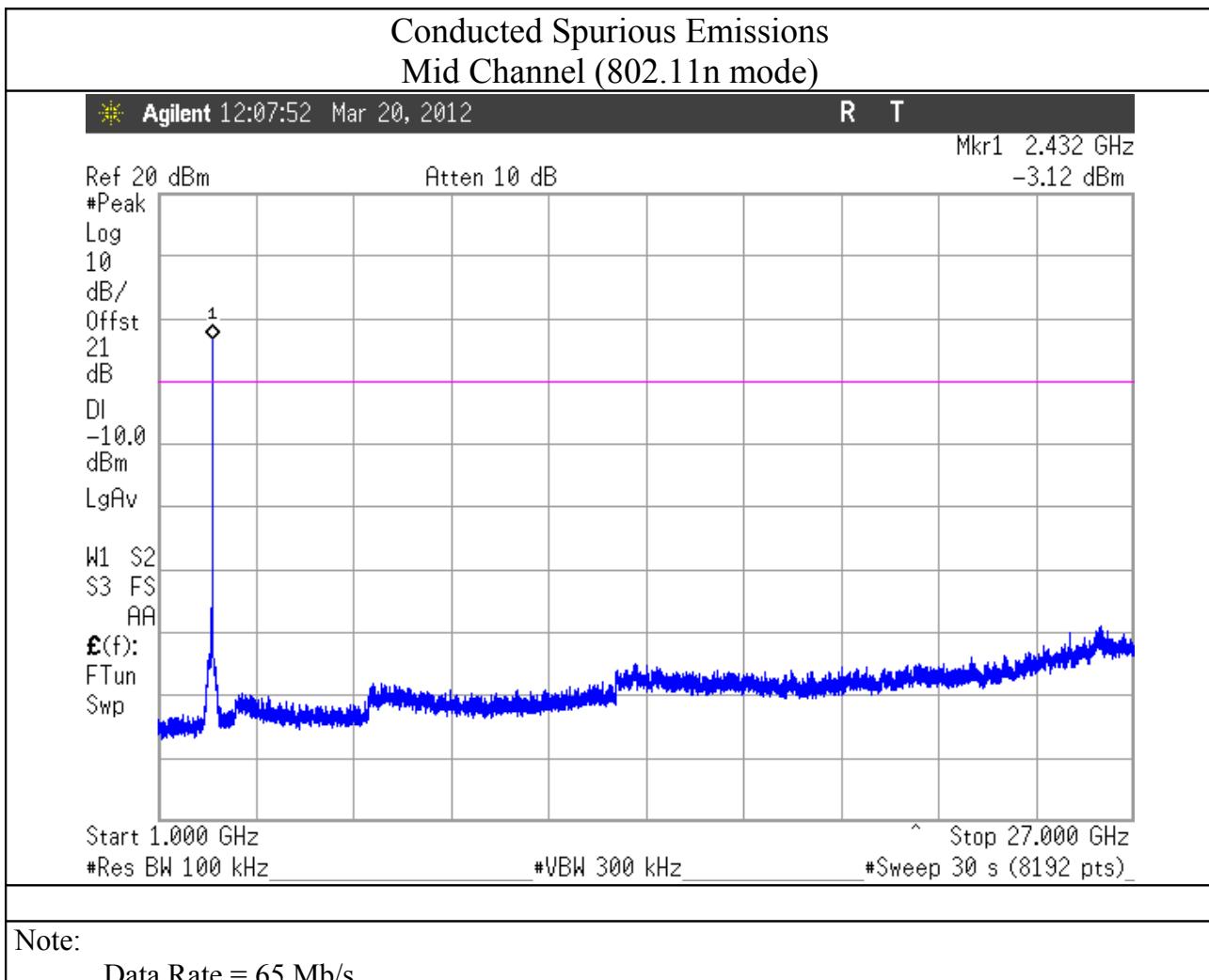
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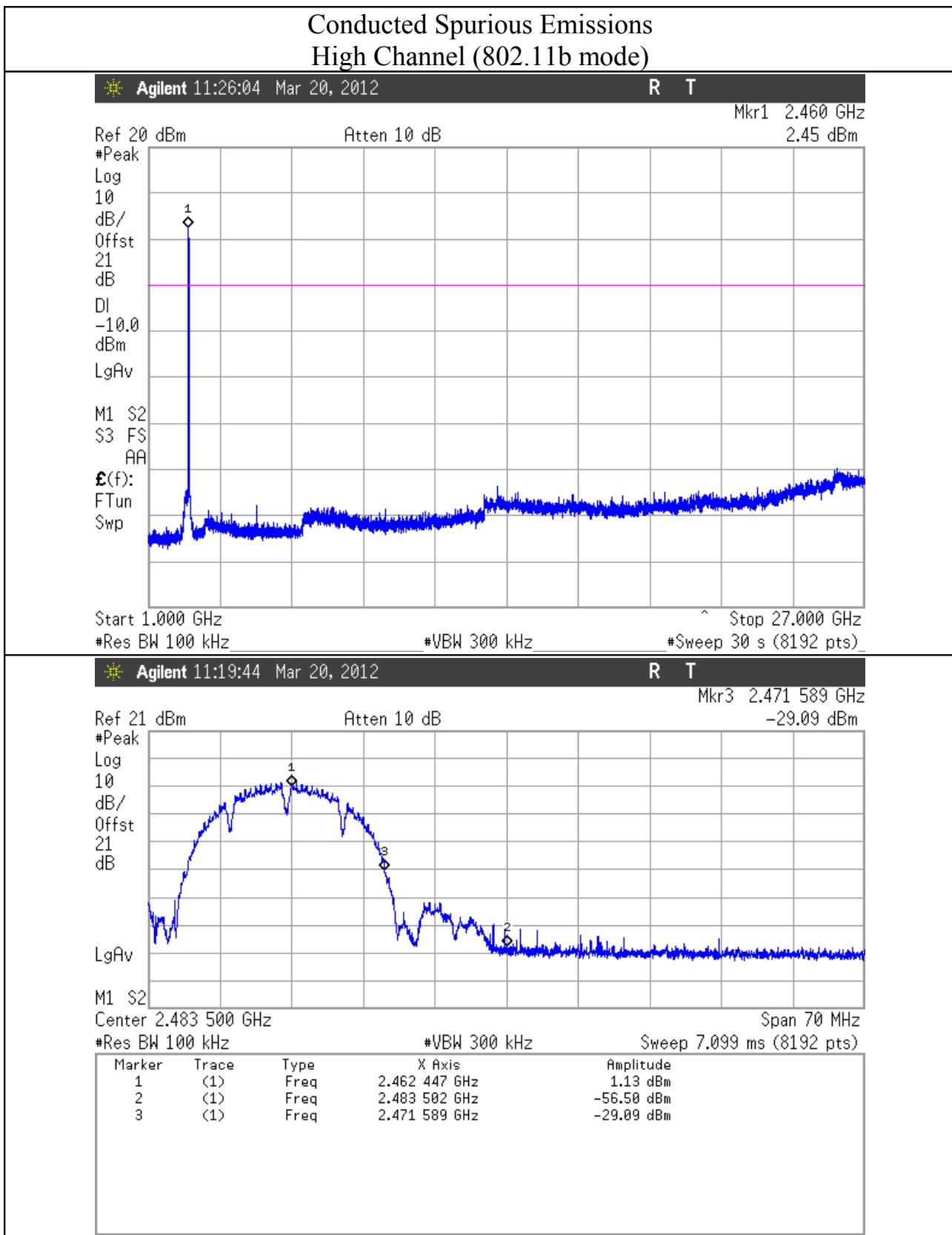
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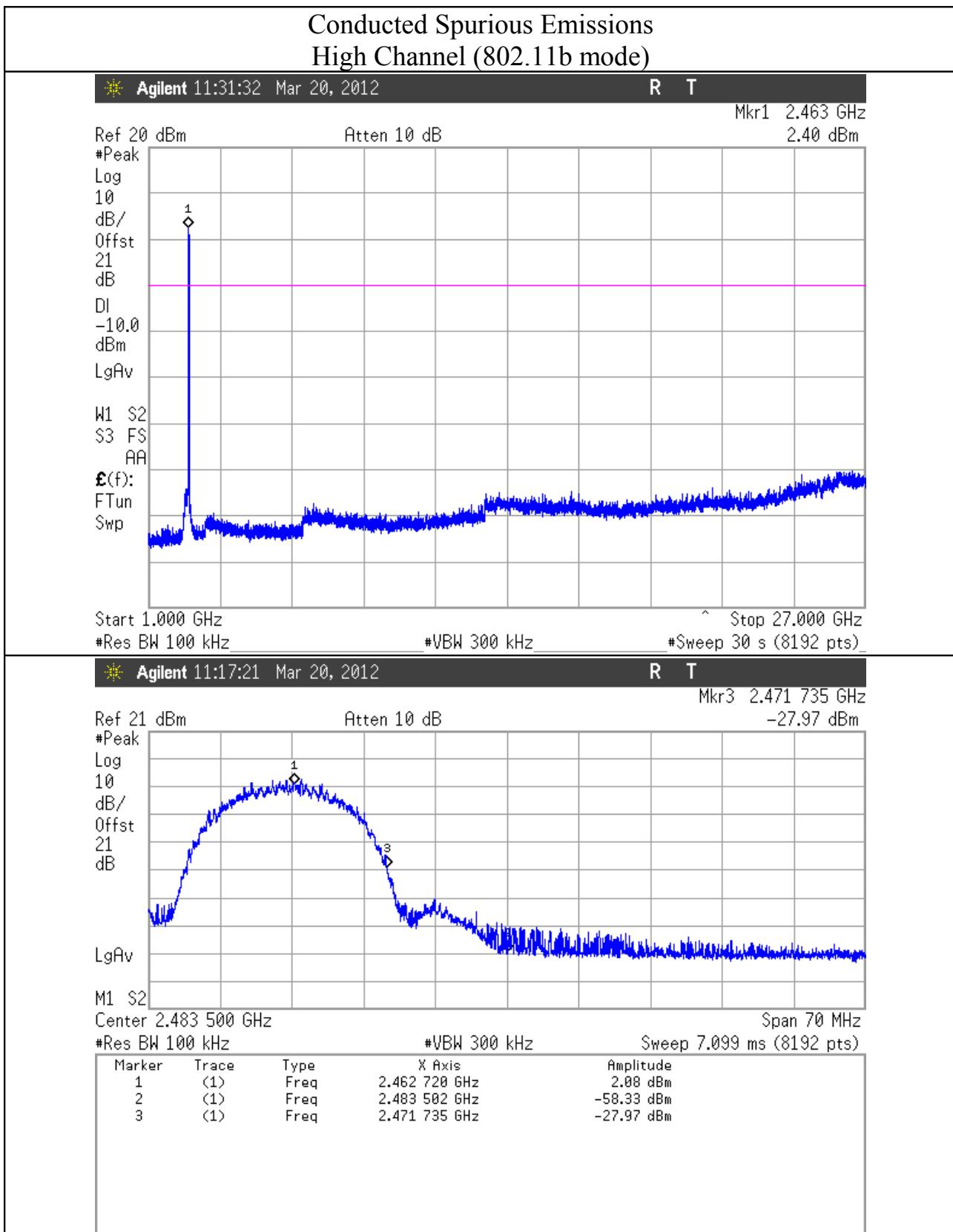


Note:

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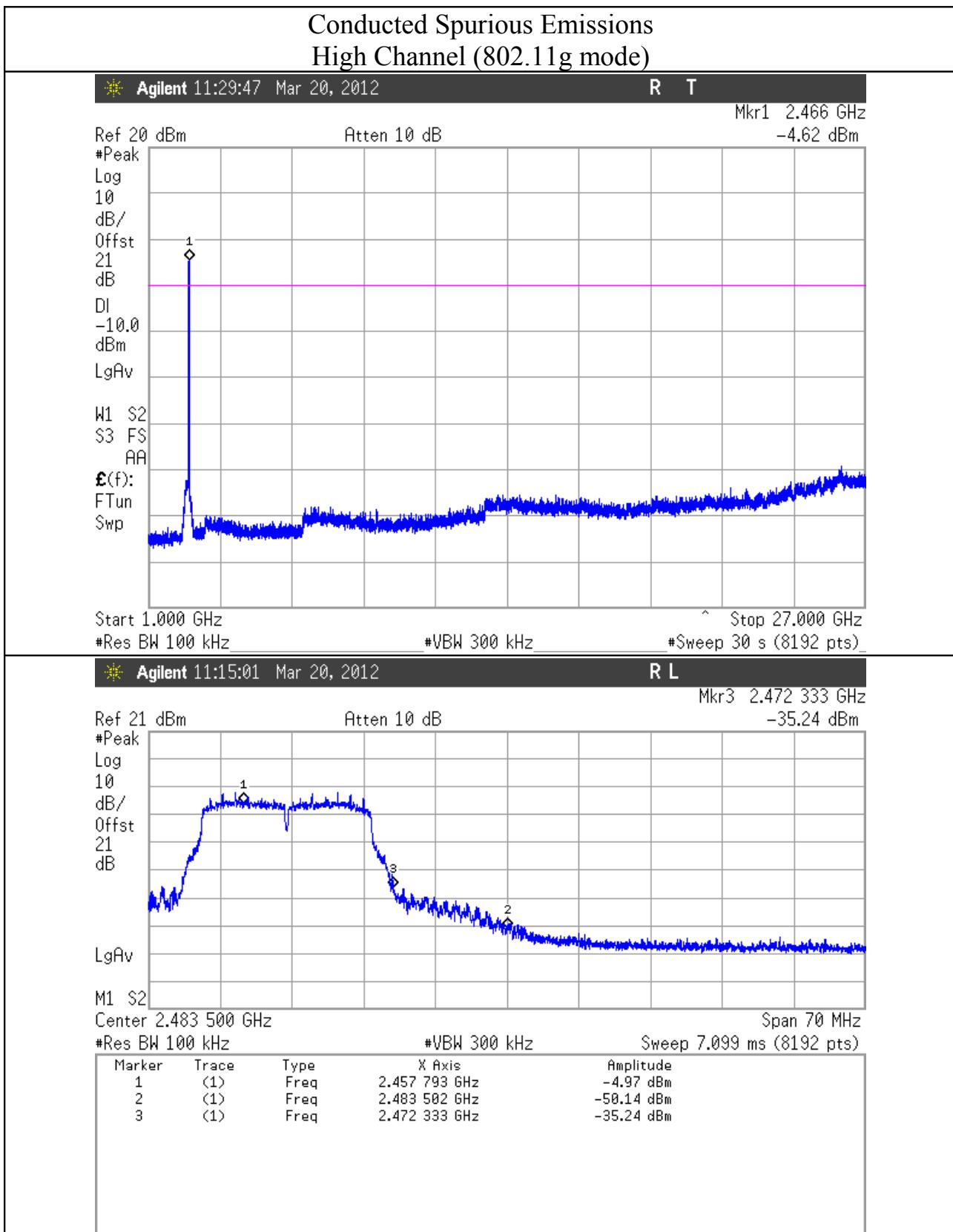
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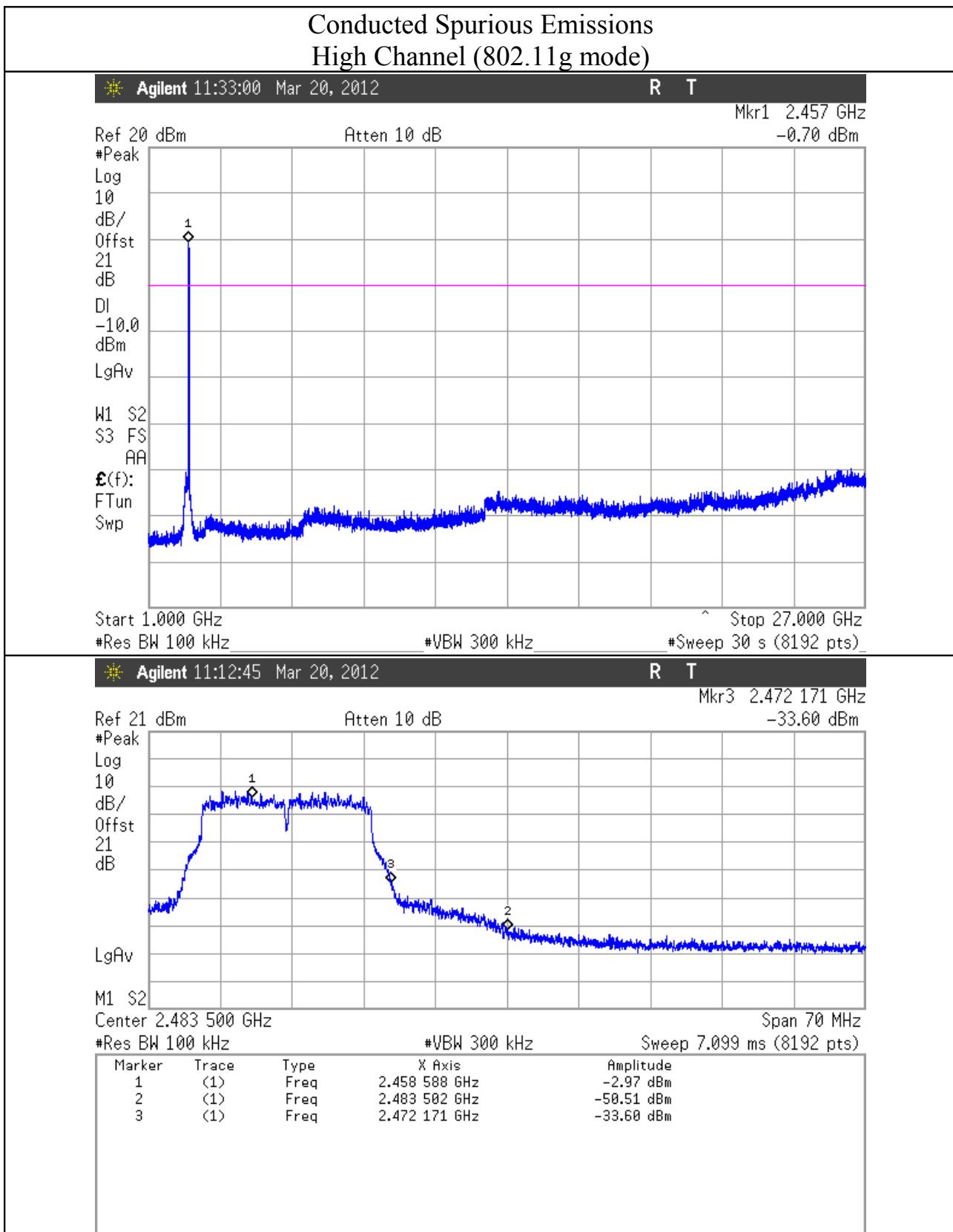
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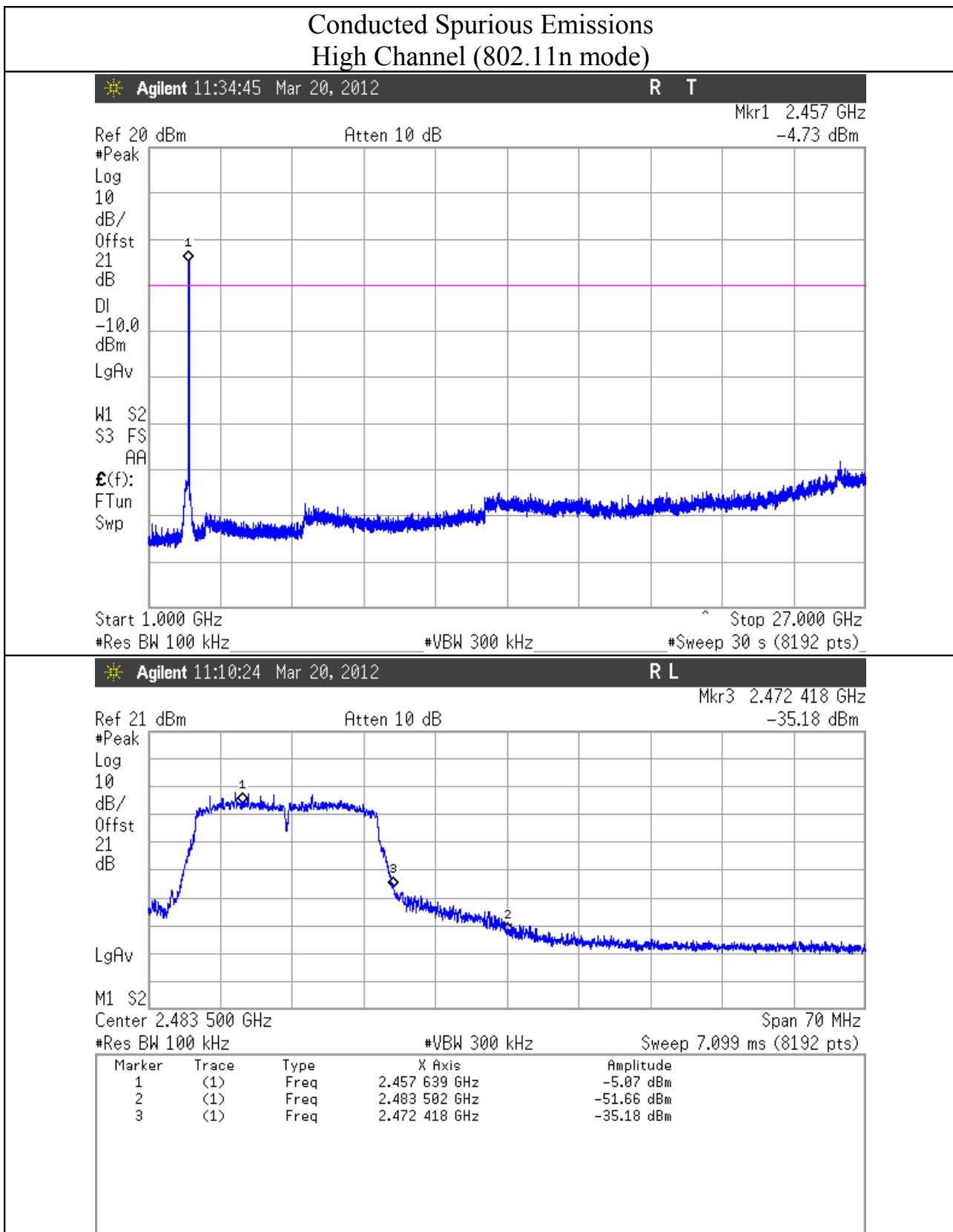
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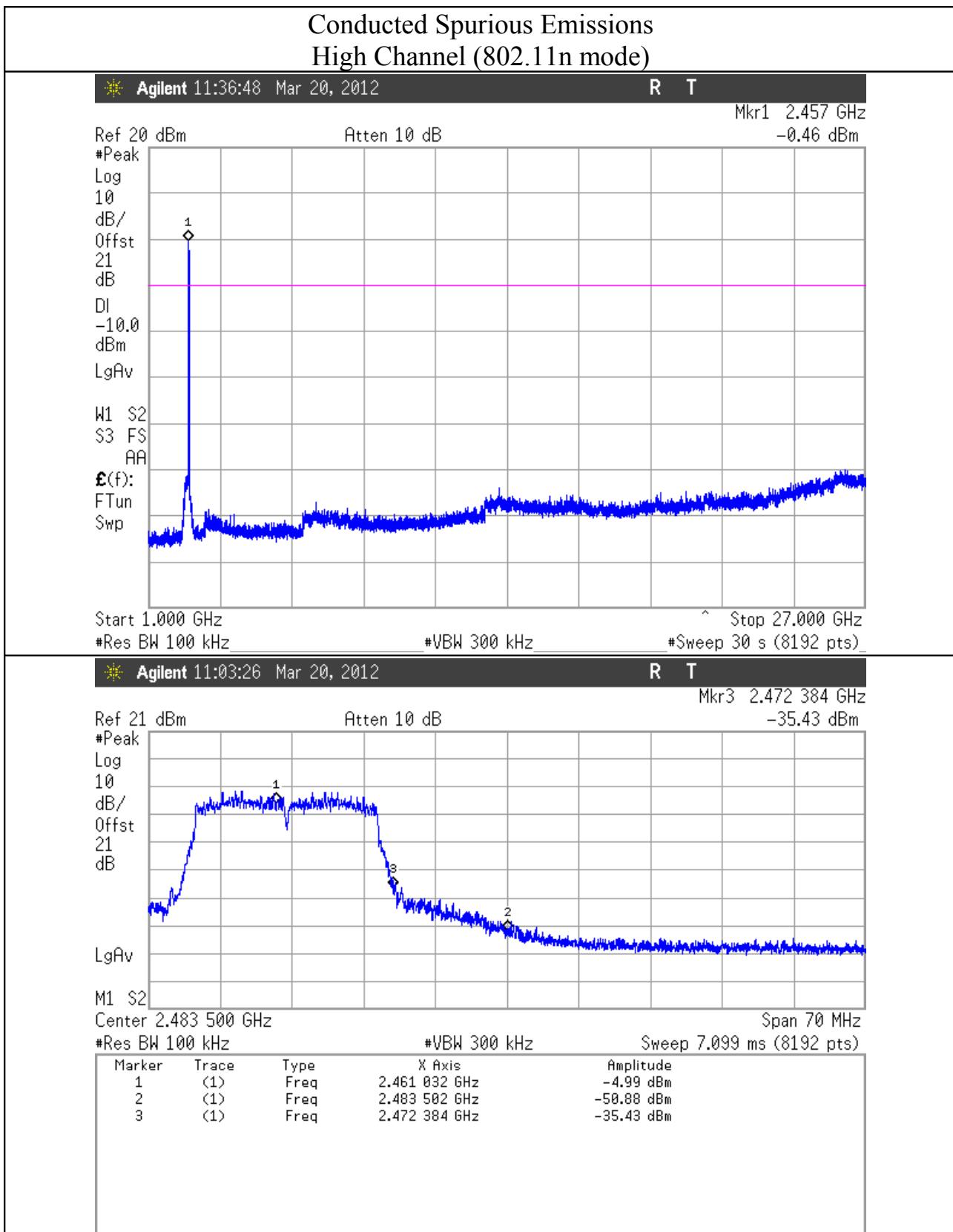
Note:

Data Rate = 54 Mb/s



Note:

Data Rate = 6.5 Mb/s

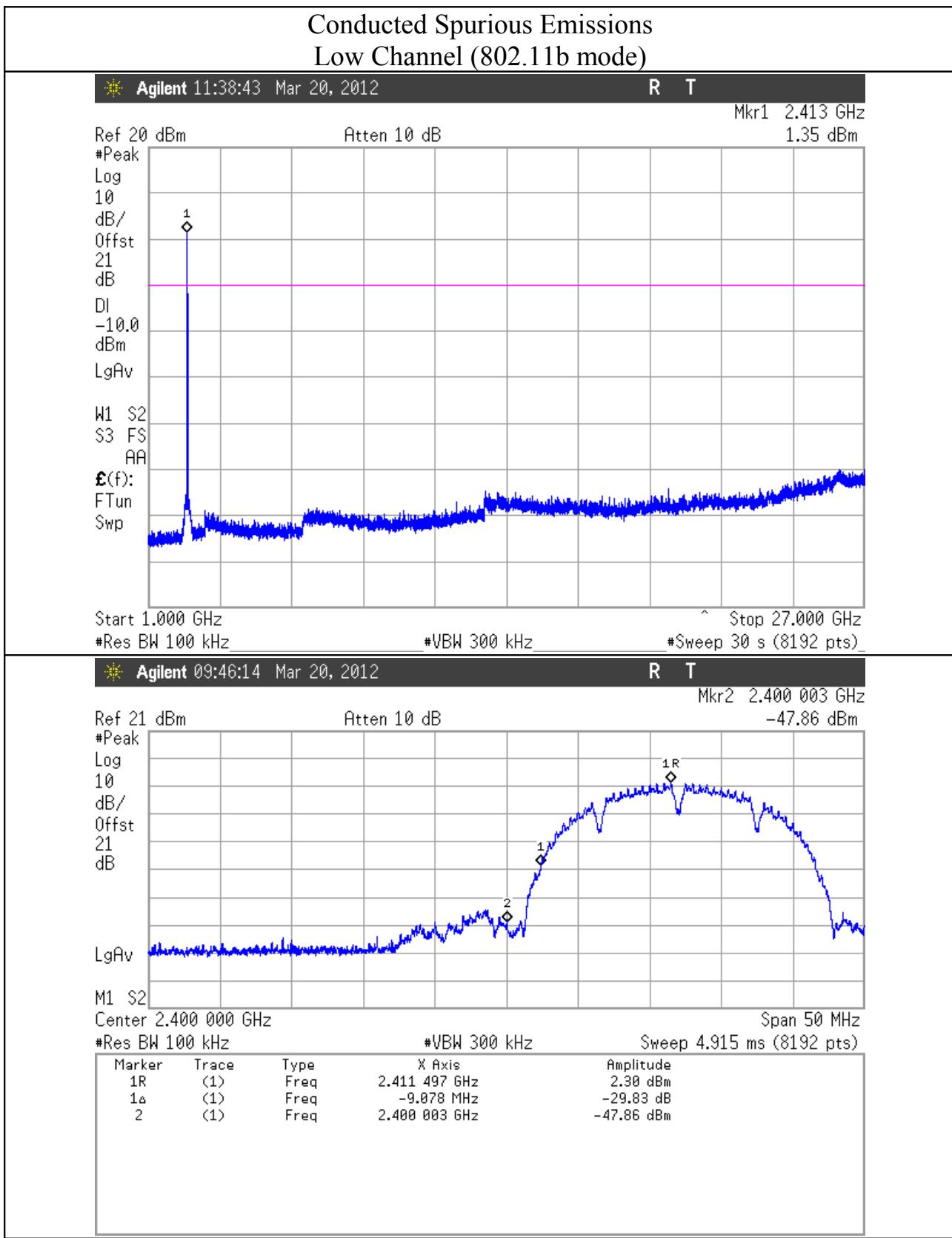


Note:

Data Rate = 65 Mb/s

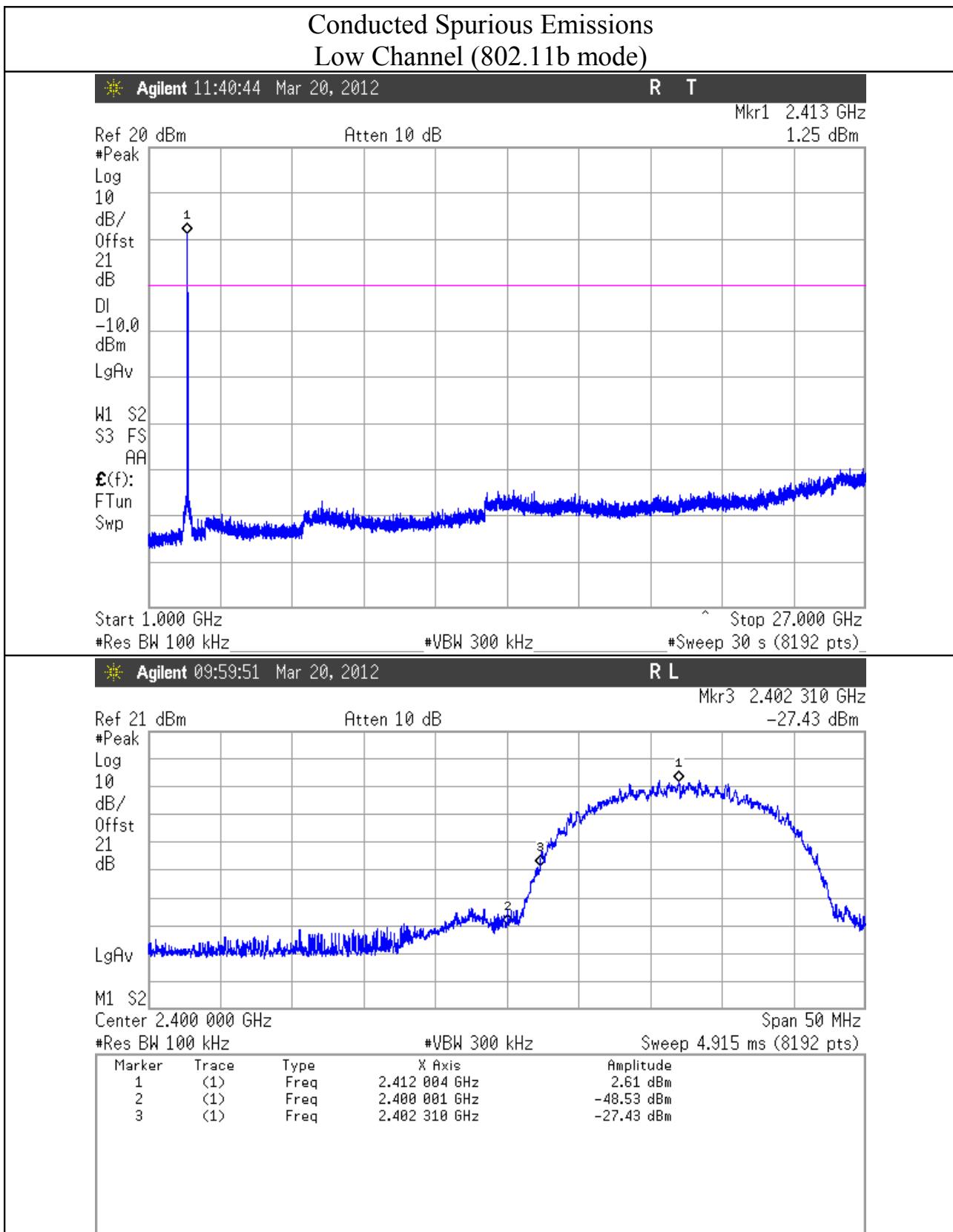
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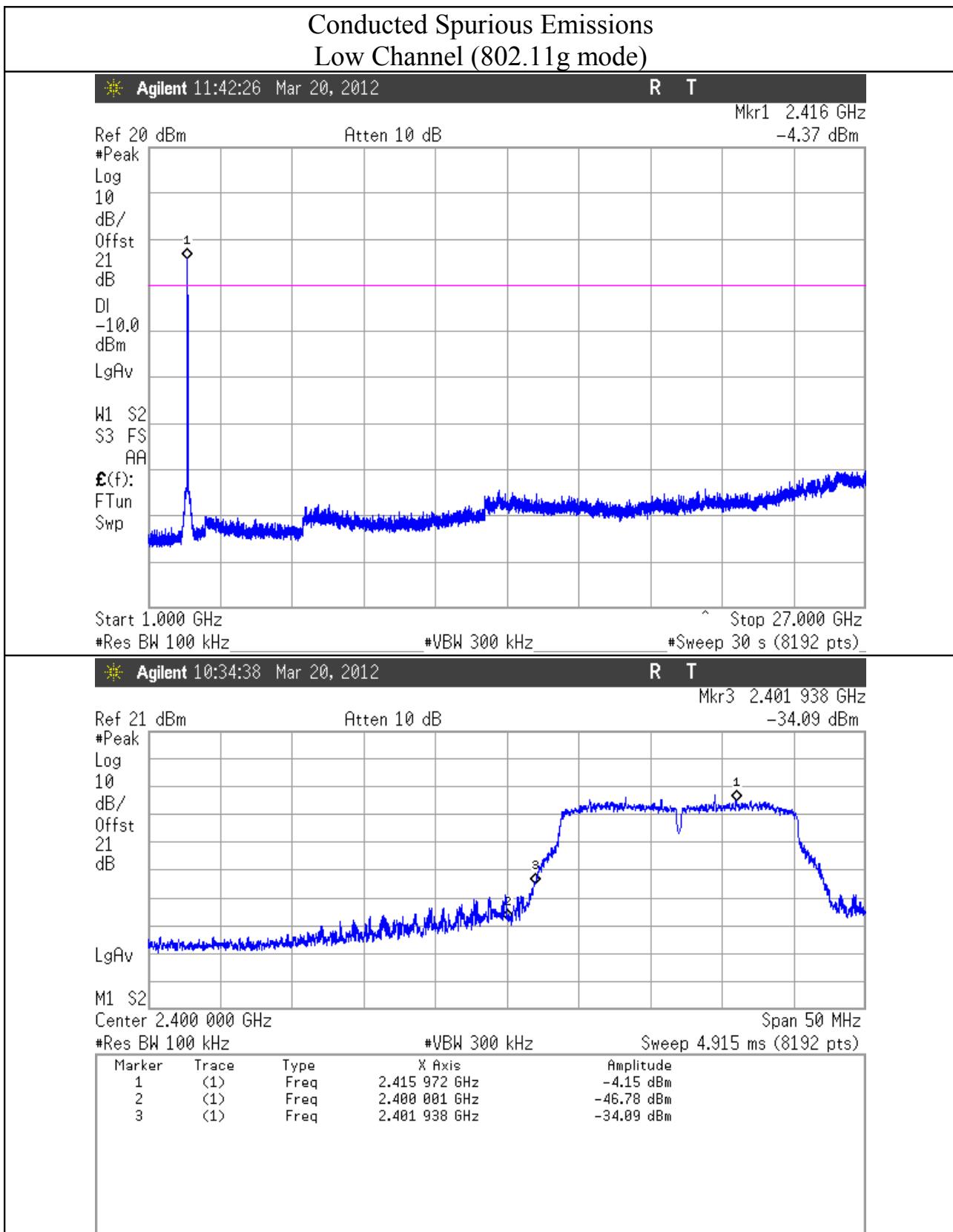
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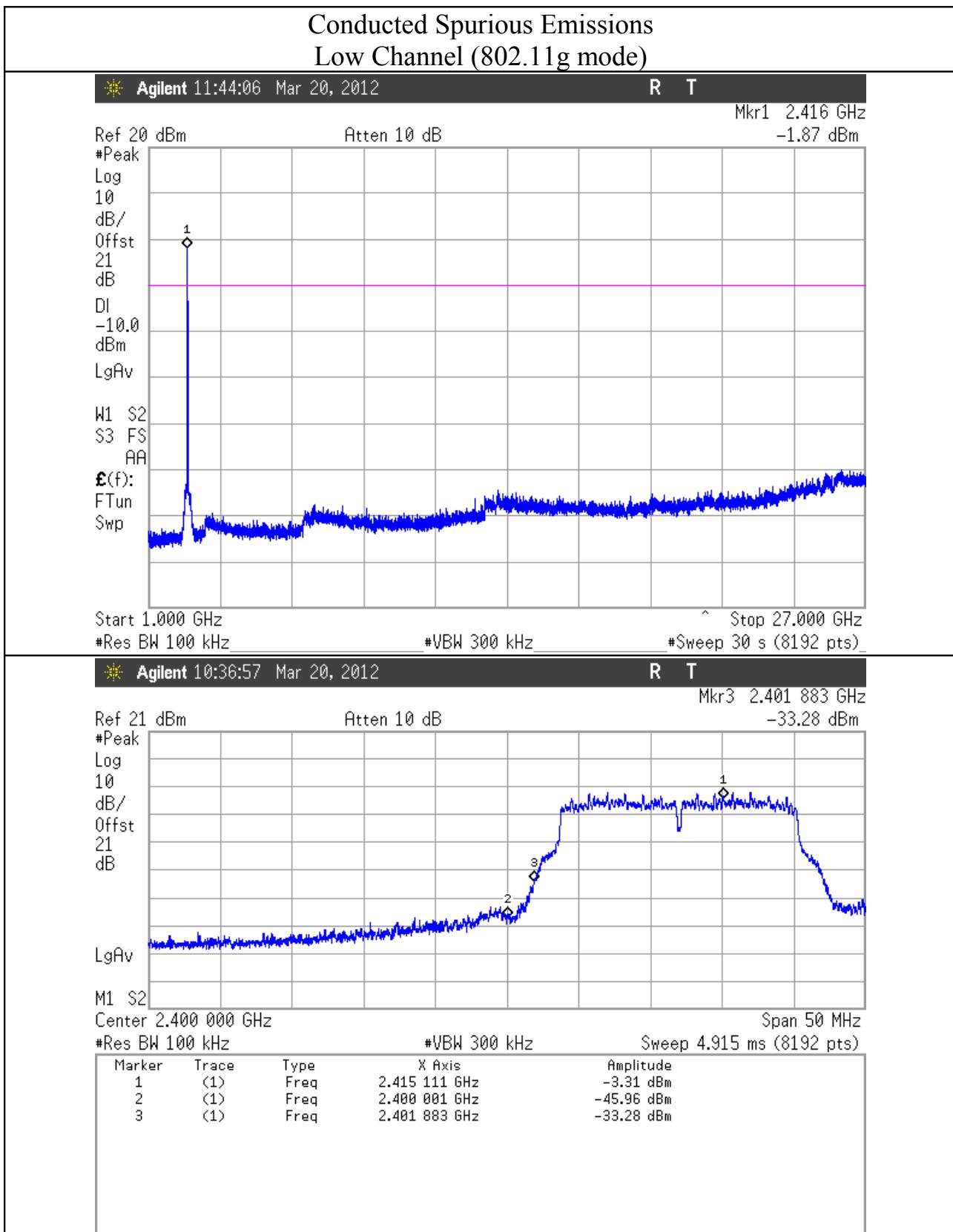
Note:

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Note:

Data Rate = 6 Mb/s

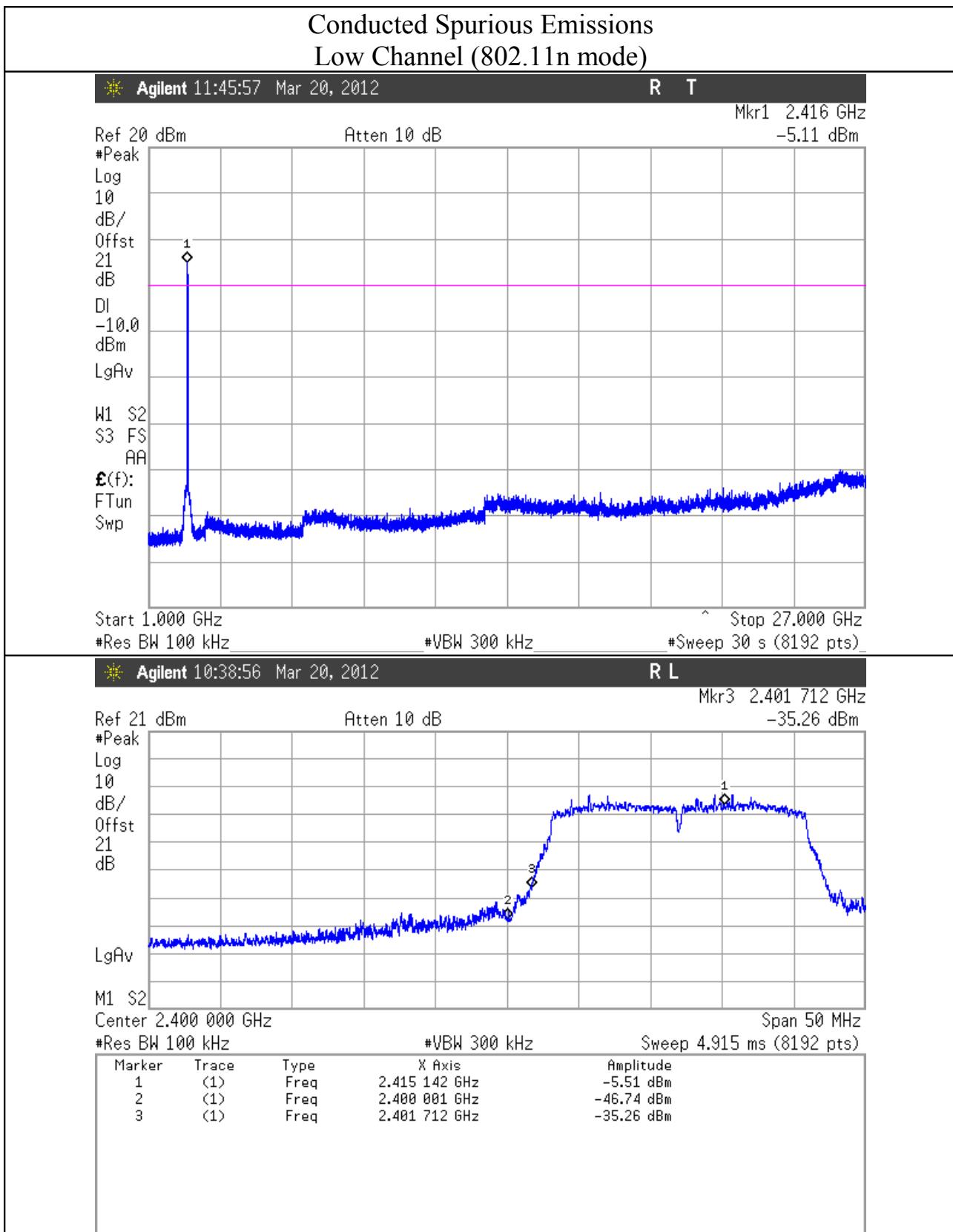


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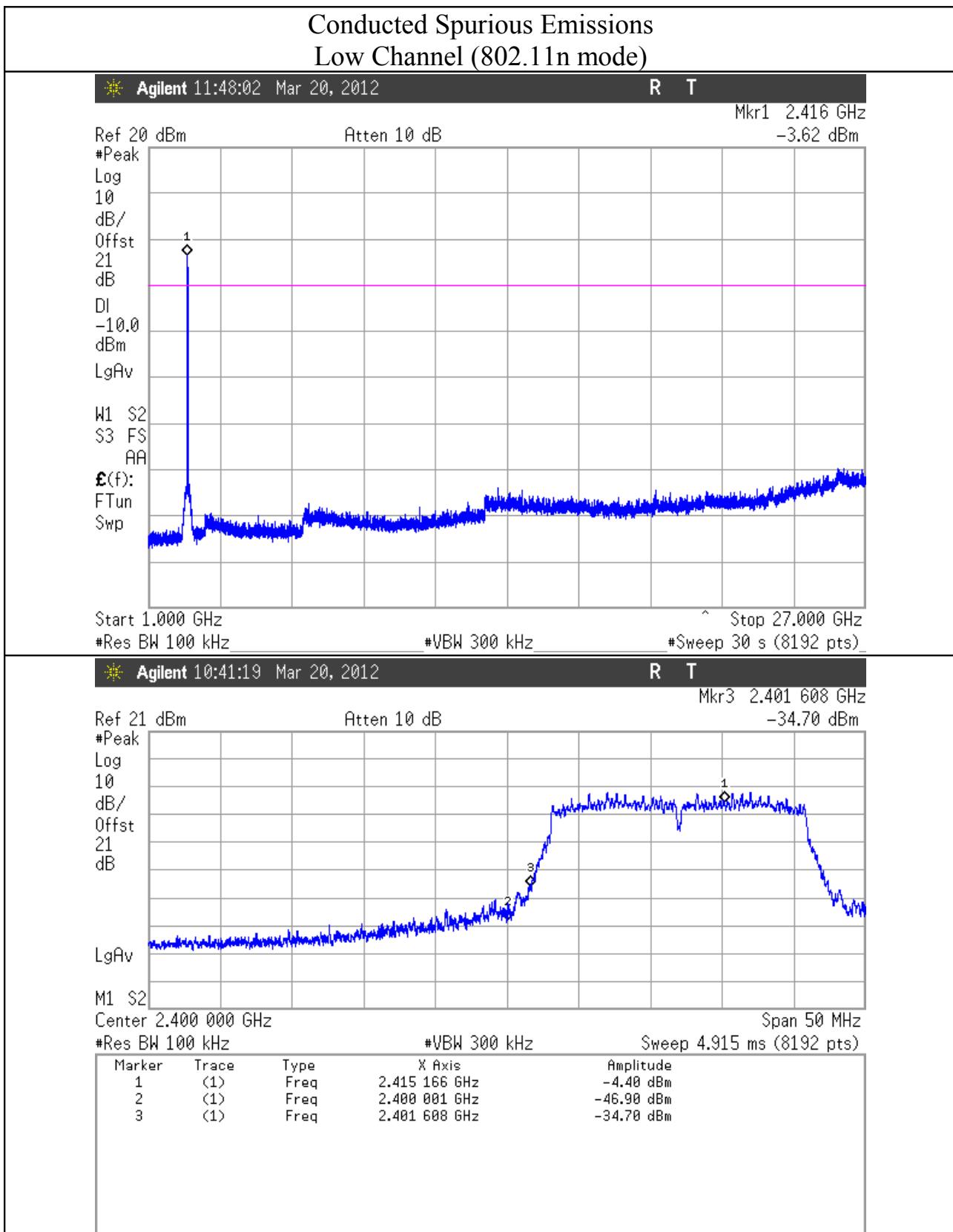
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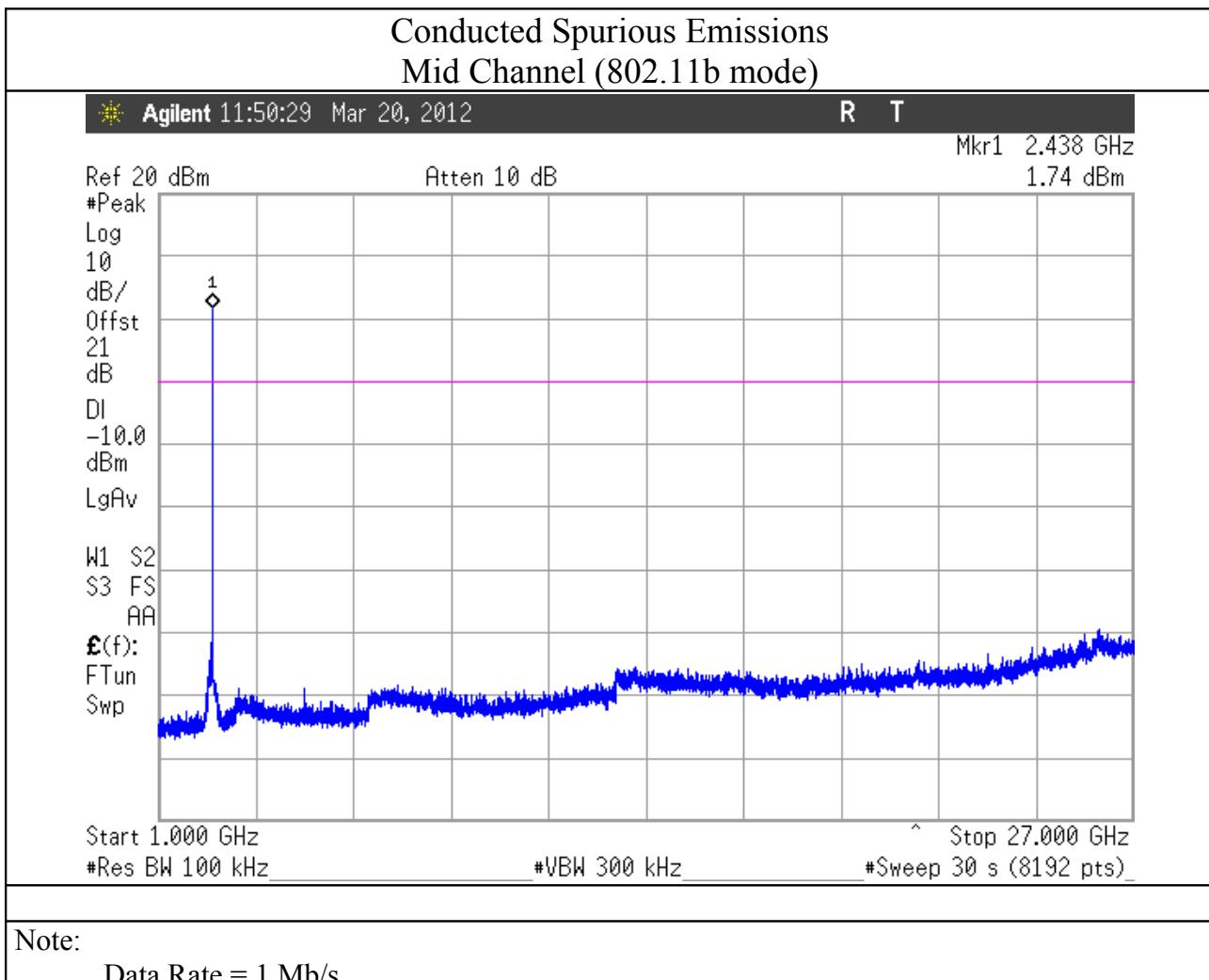
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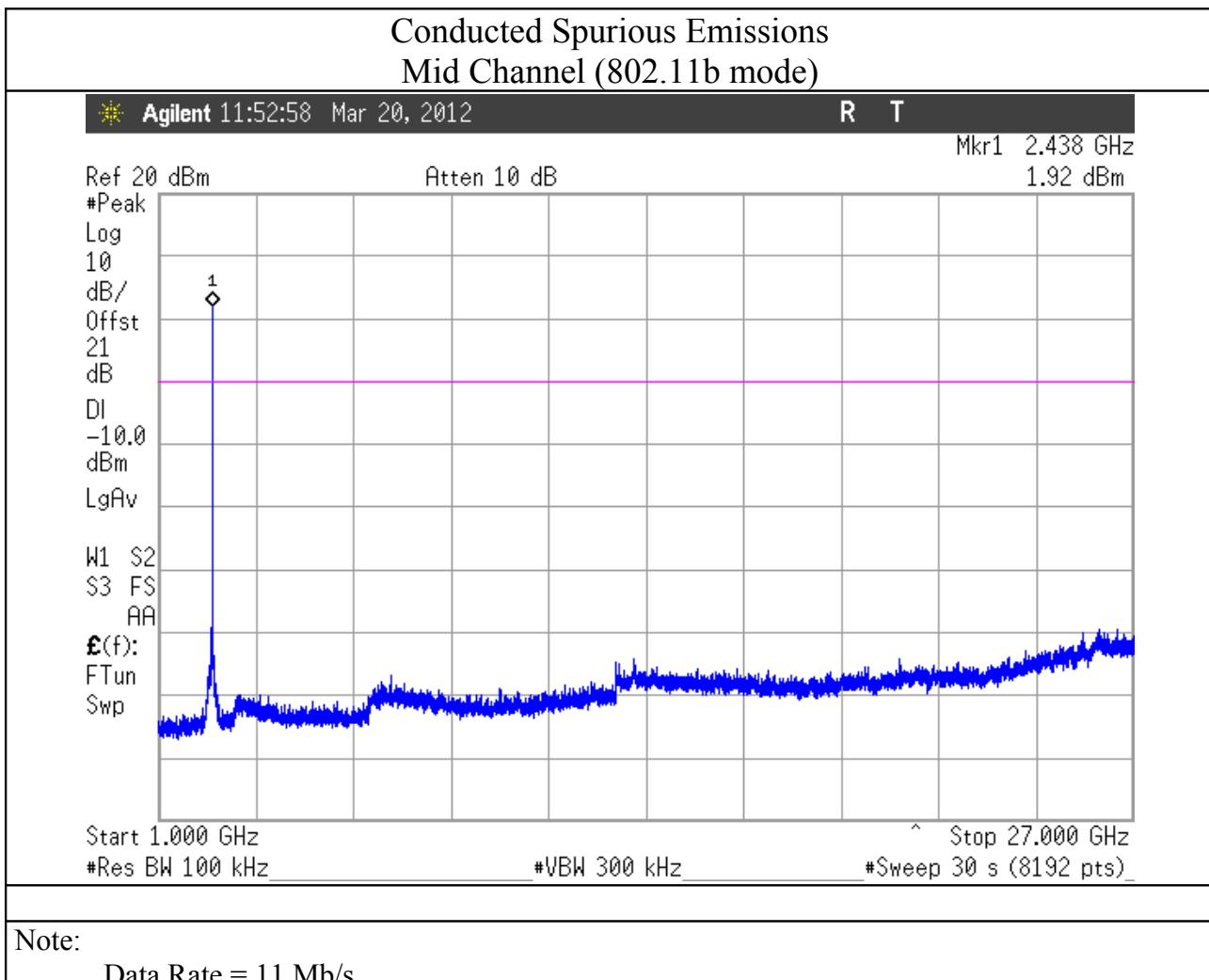
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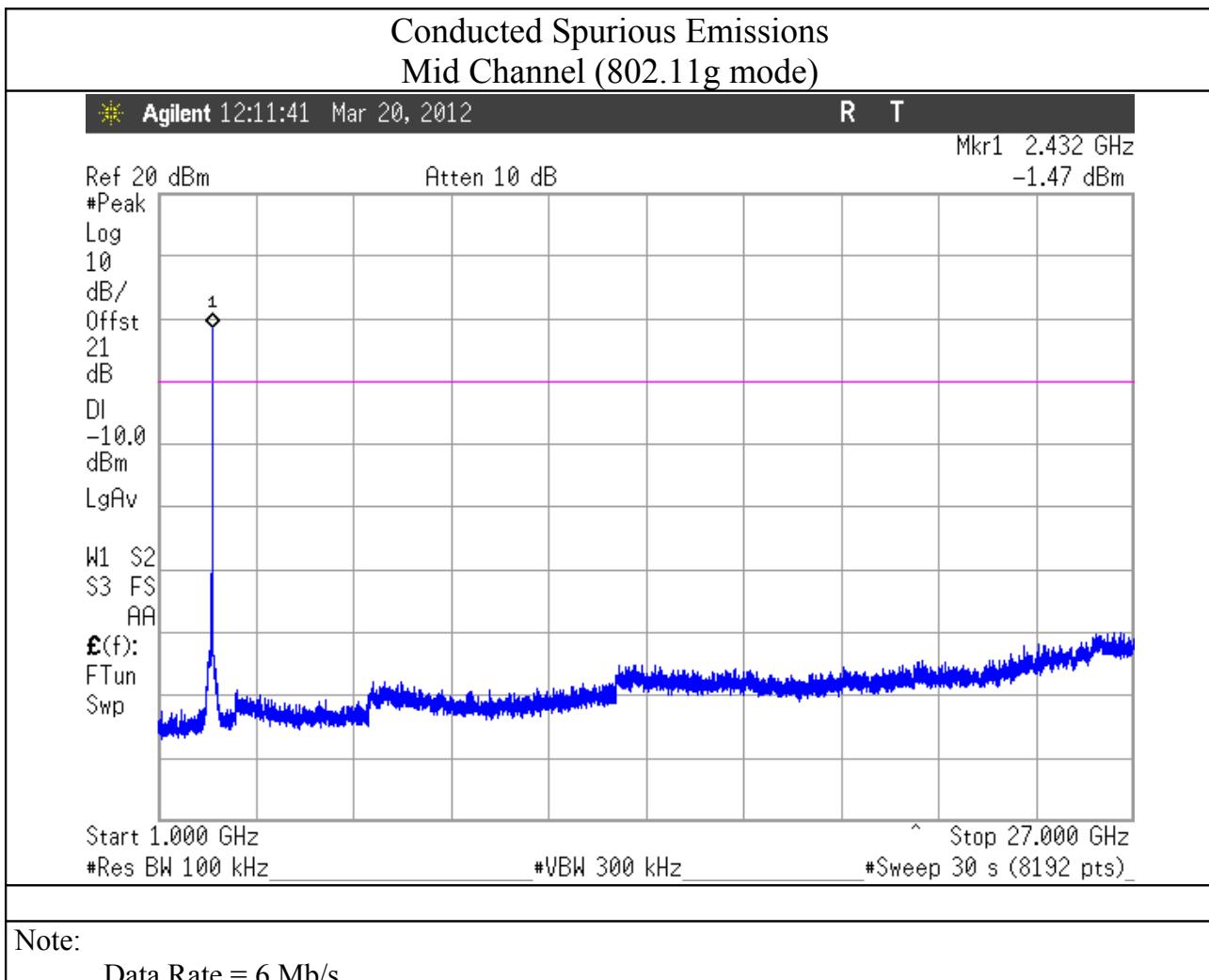


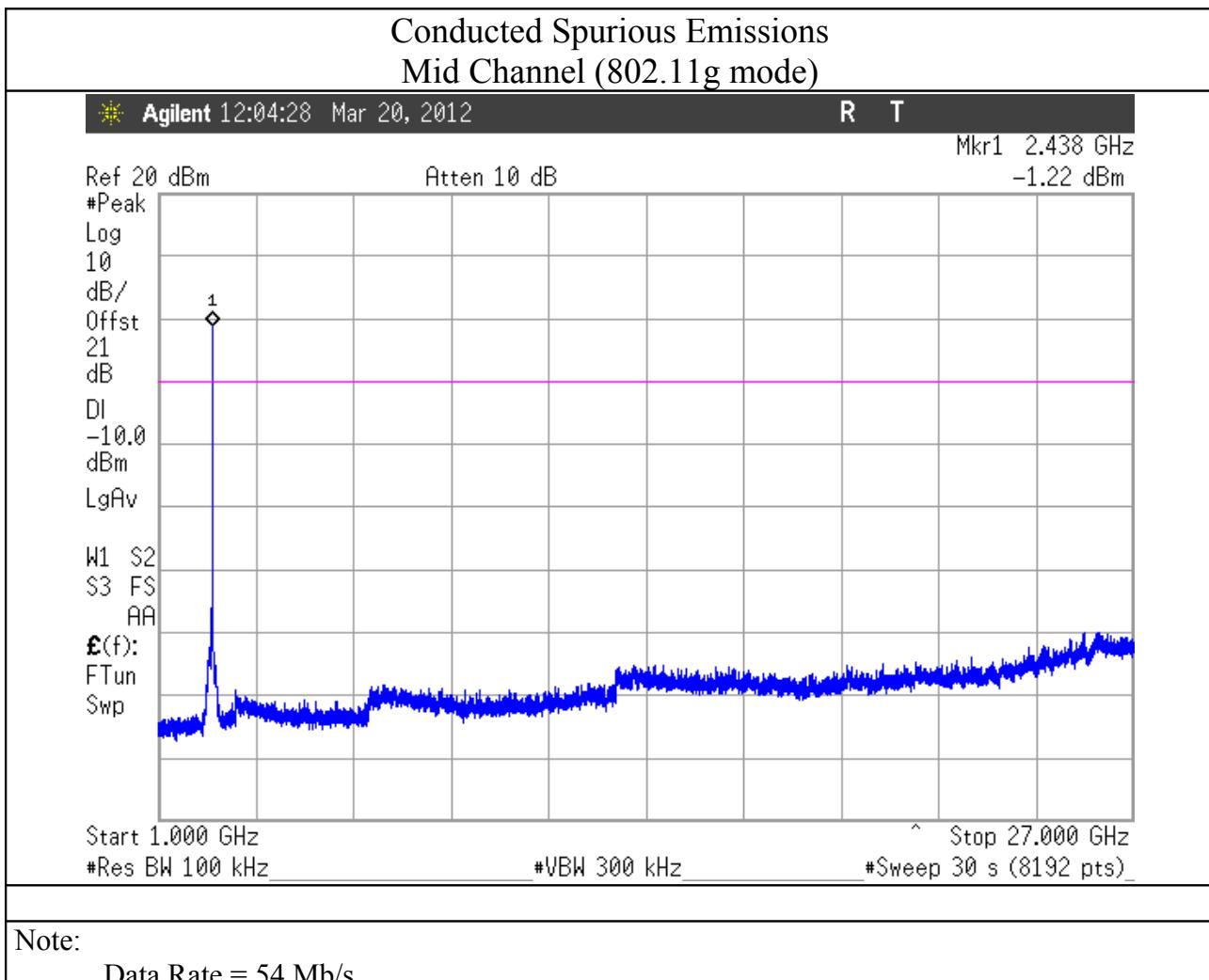
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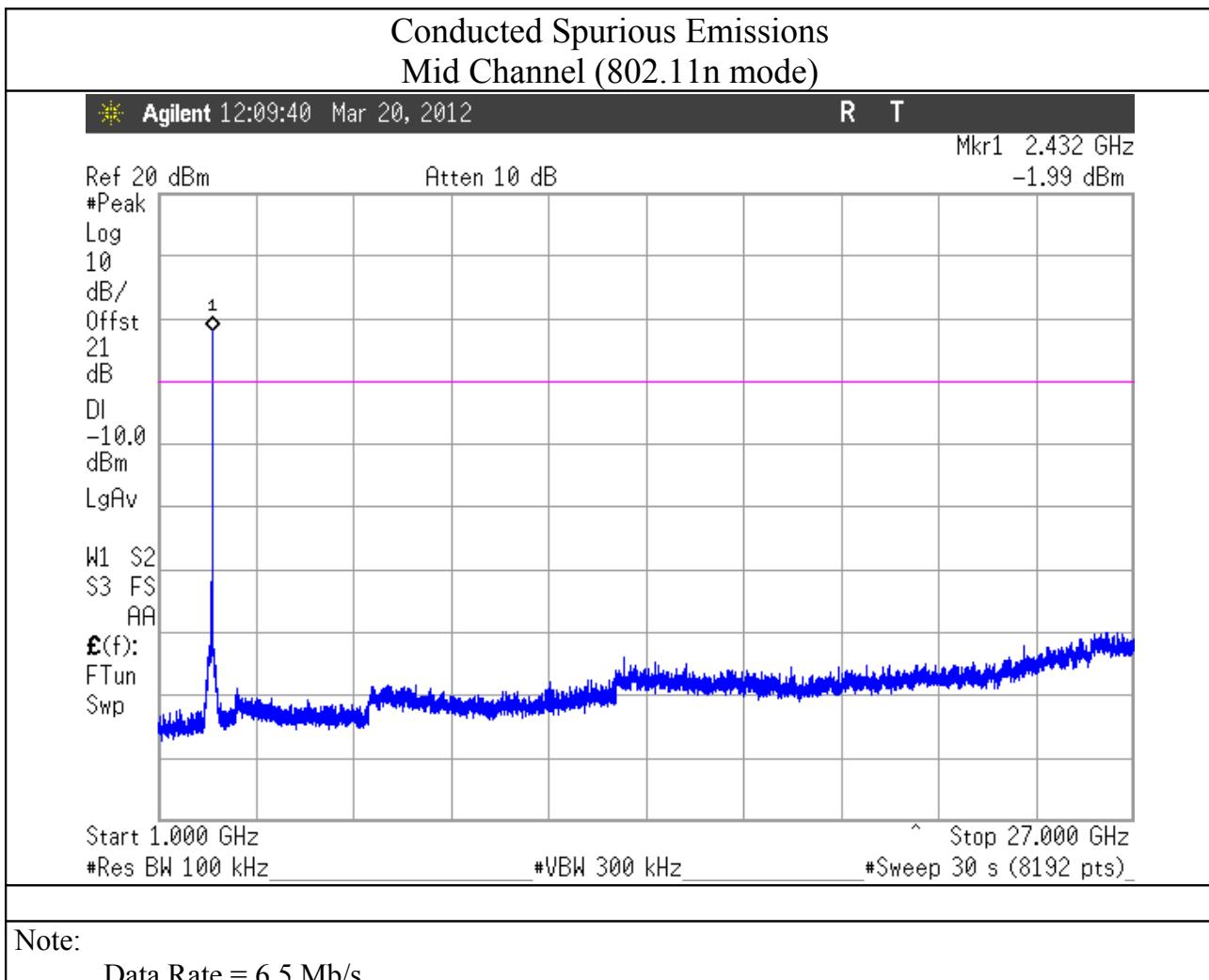
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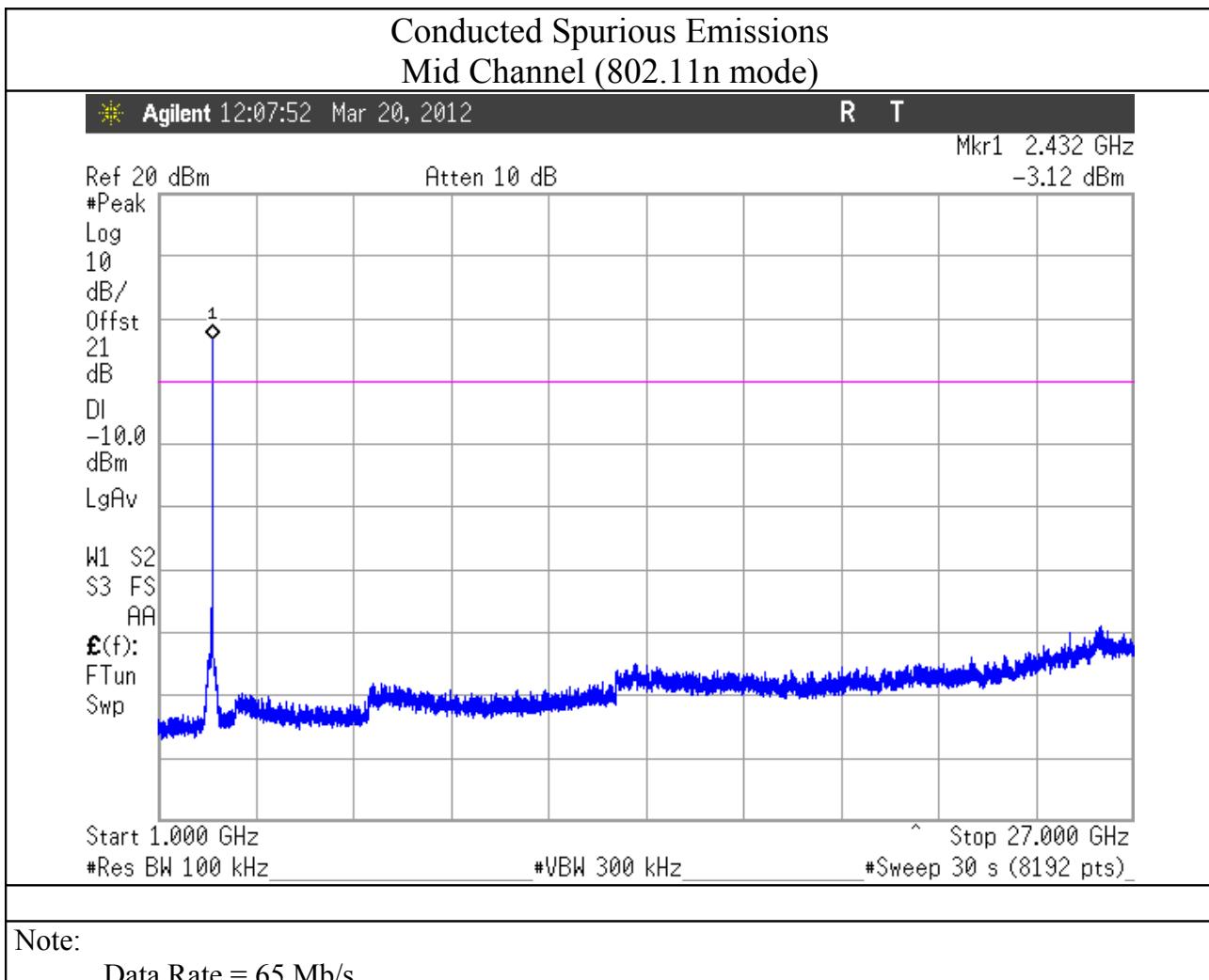


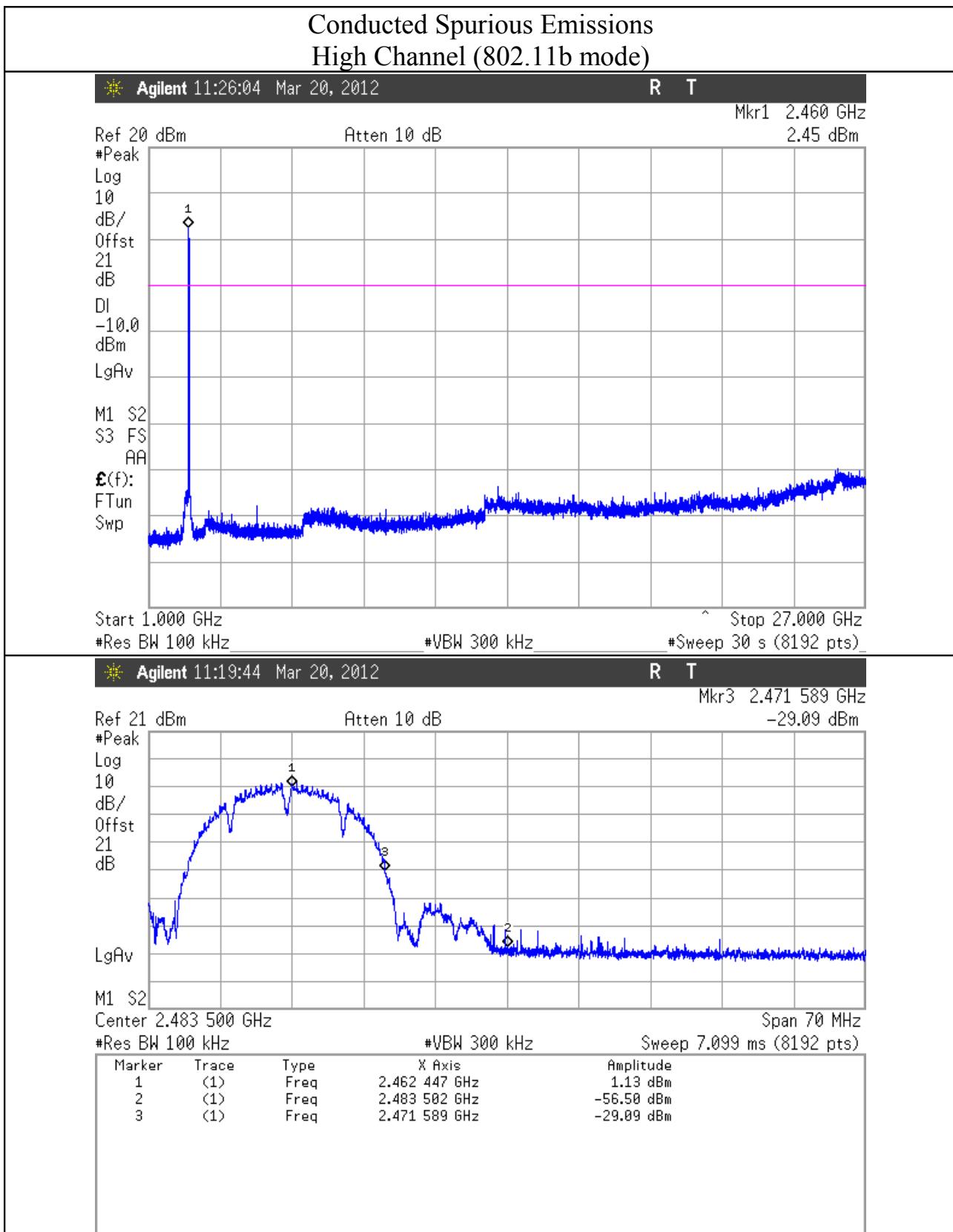












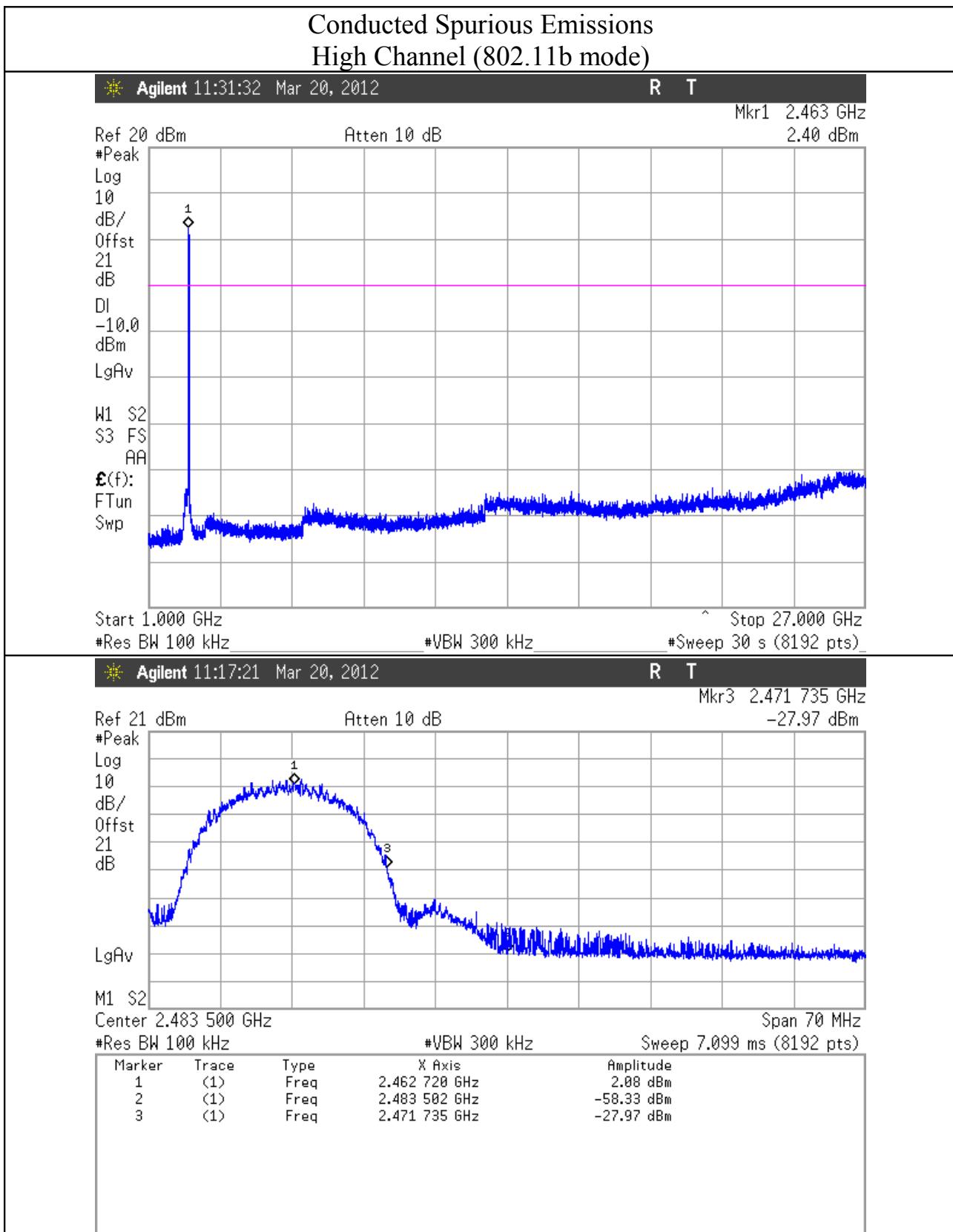
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Data Rate = 1 Mb/s

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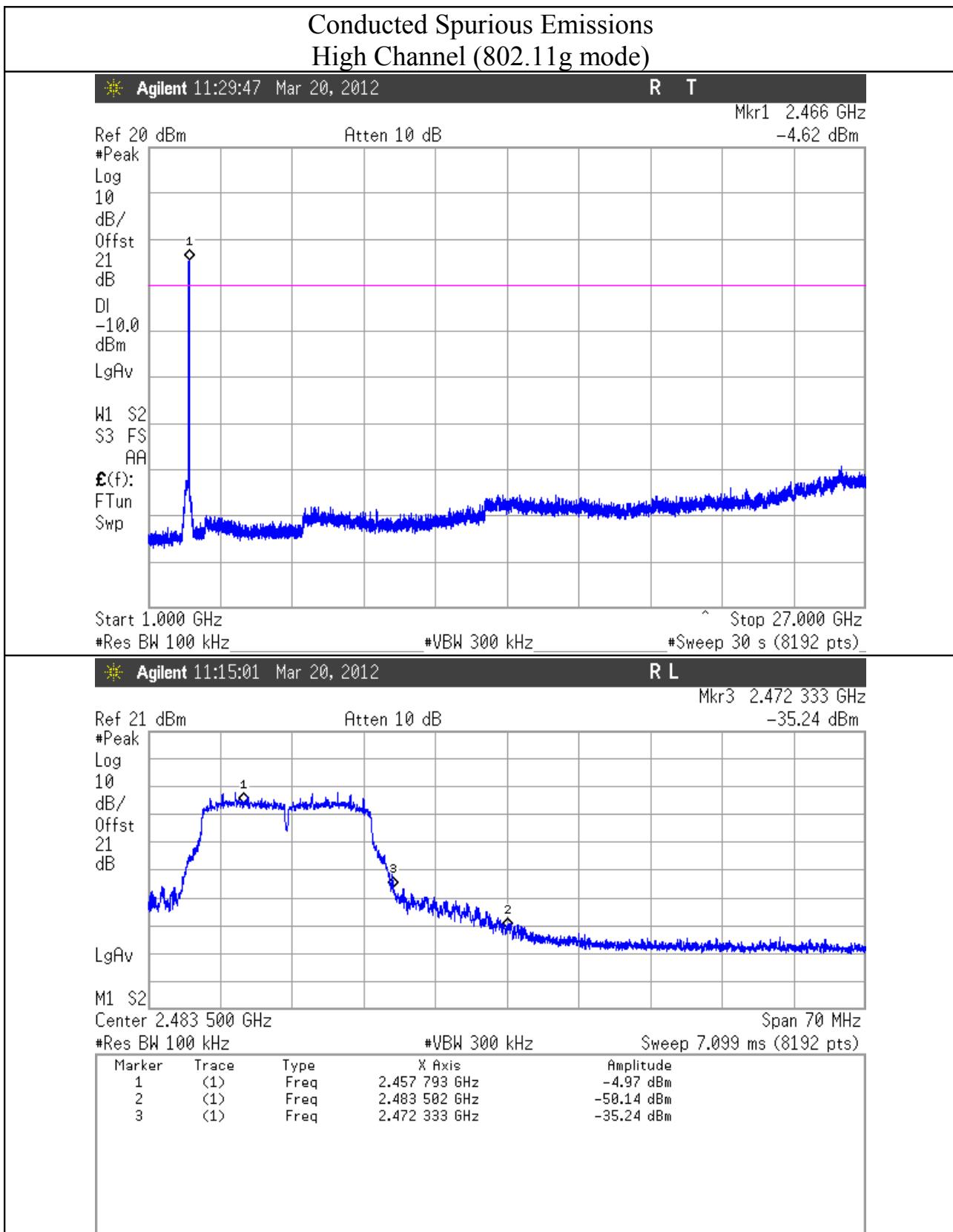
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Note:

Data Rate = 11 Mb/s

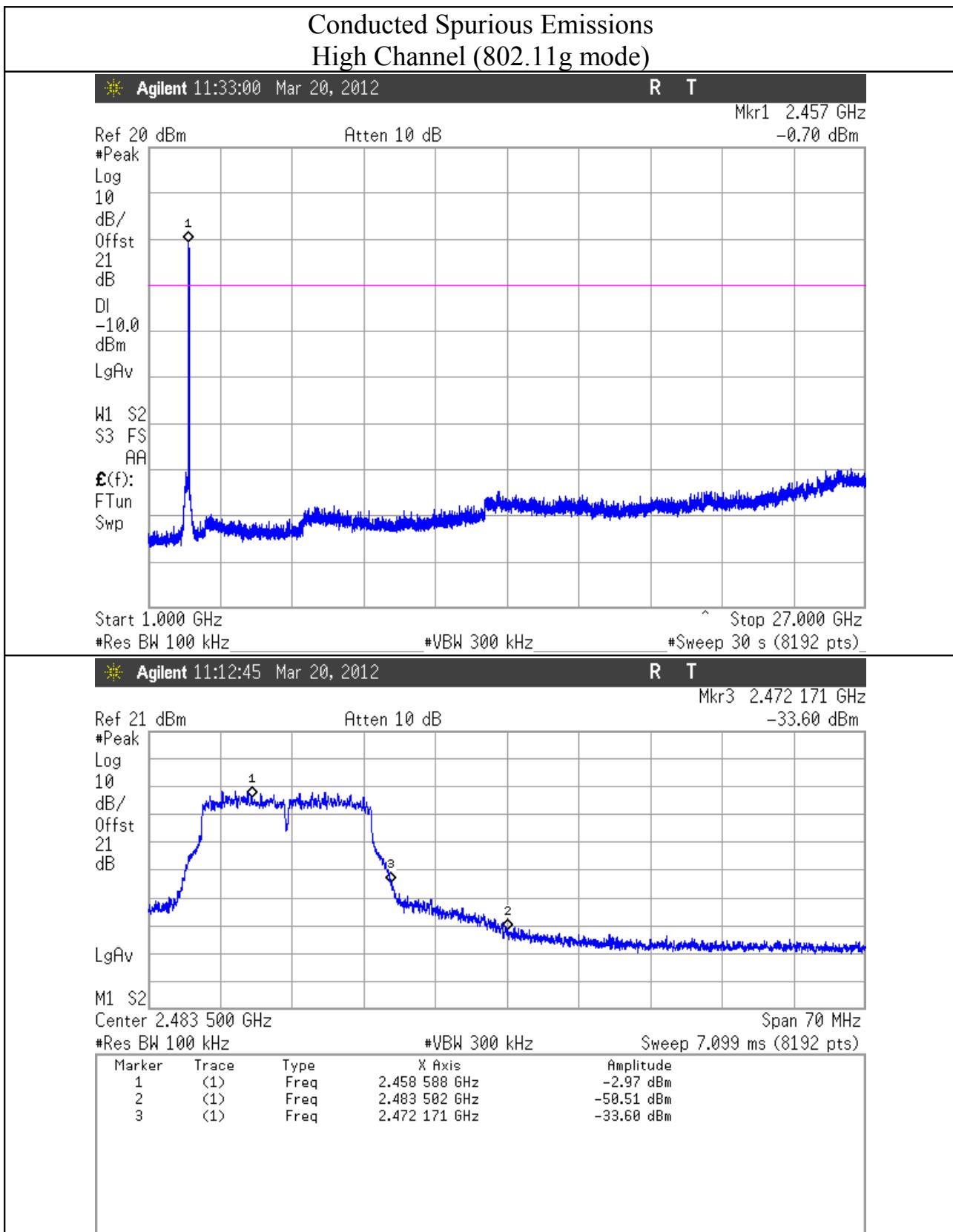


Note:

Data Rate = 6 Mb/s

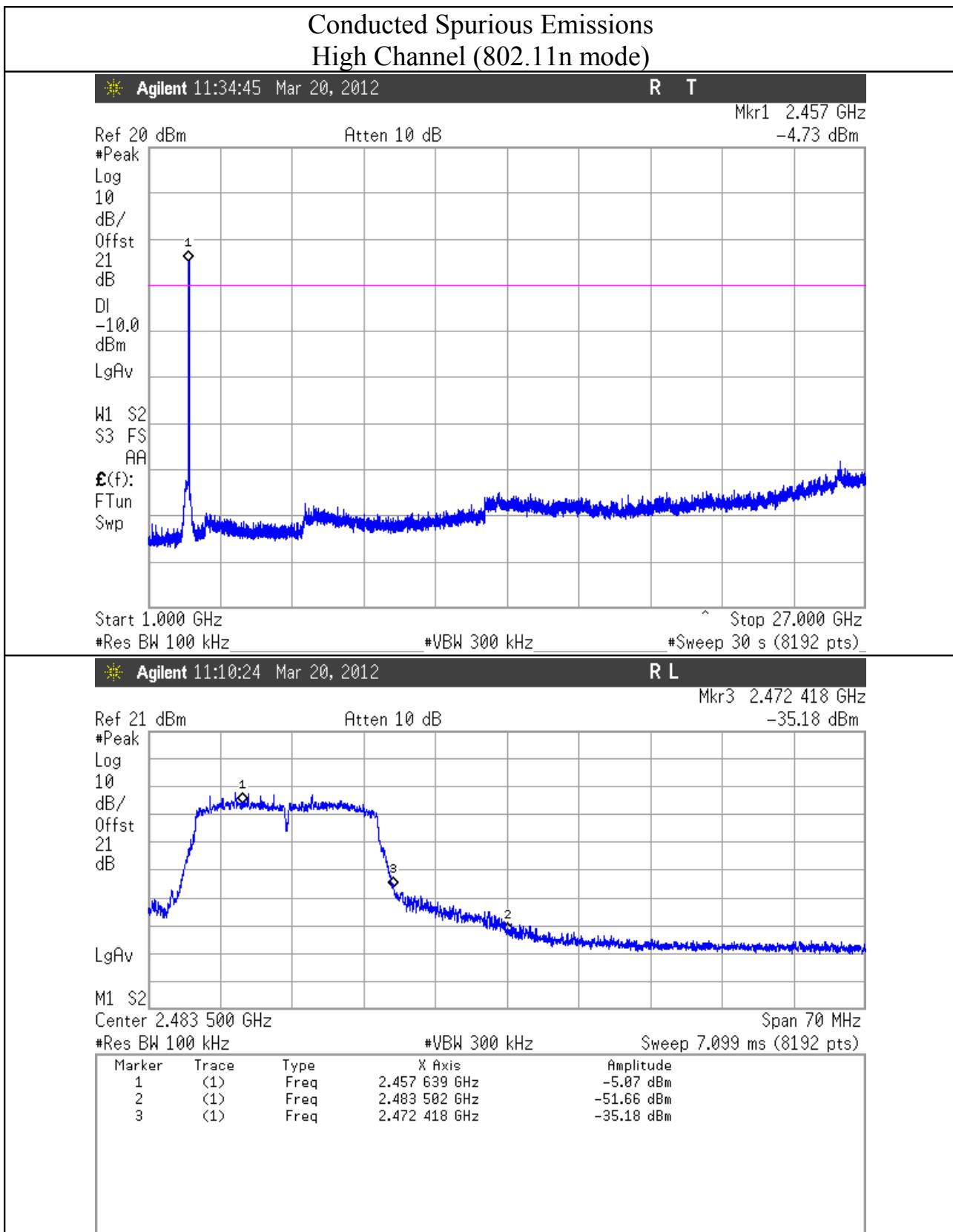
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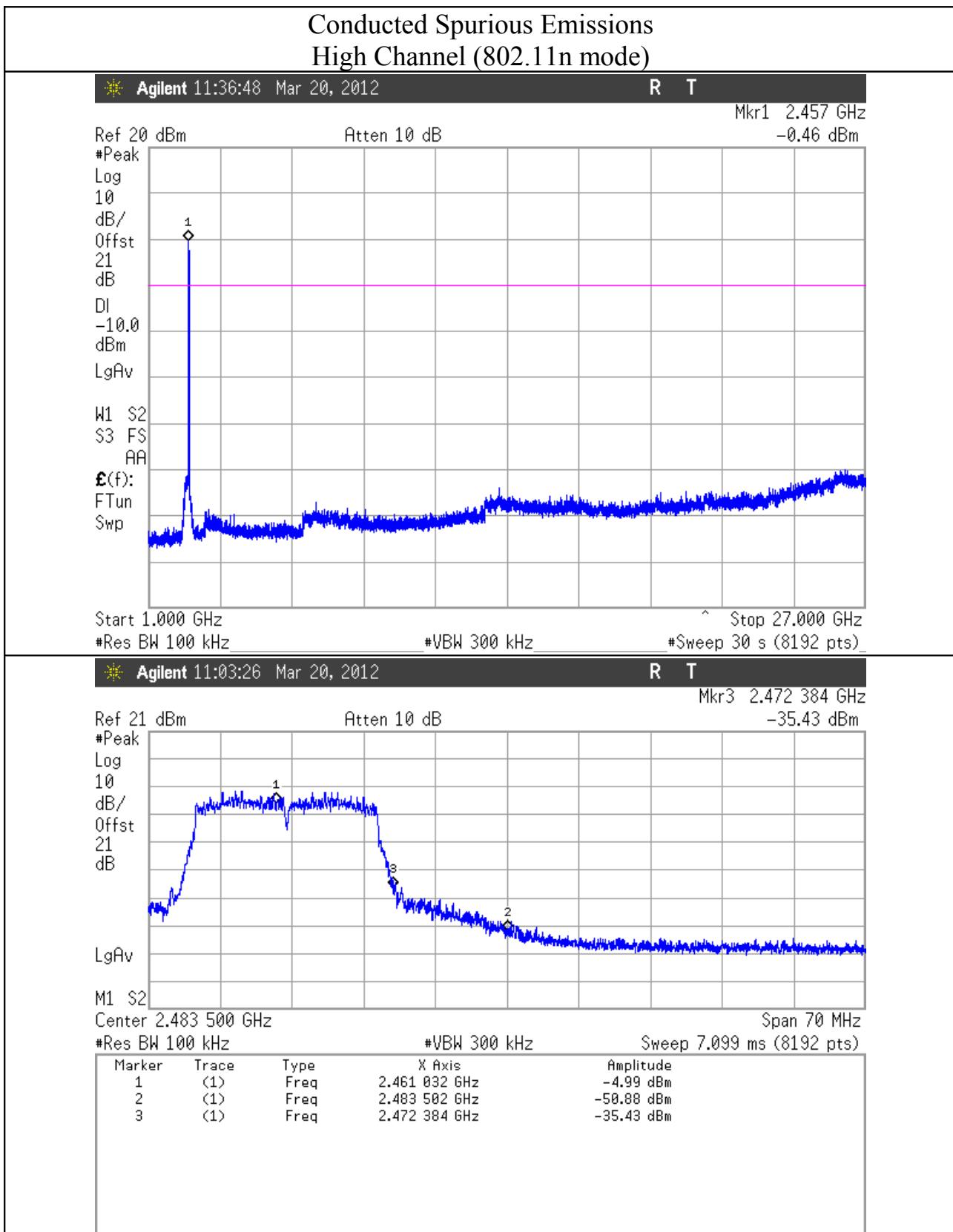
Note:

Data Rate = 54 Mb/s



Note:

Data Rate = 6.5 Mb/s



Note:

Data Rate = 65 Mb/s

7. PEAK POWER SPECTRAL DENSITY

Equipment shall meet the limits below .

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.

Test Equipment

EQUIPMENT	MANUFACTURER	MODEL	CAL. DATE
EMI Receiver	Agilent	E4440A	01/2012

Test procedure: APR01

Test performed on low, middle and high channels and in the b,g,n protocols at maximum and minimum data rate for each protocol.

Results:

No non-compliance noted

802.11b Mode, 11 Mbs

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	1,88	8	-6,12
Mid	2437	2,17	8	-5,83
High	2462	2,66	8	-5,34

802.11g Mode, 54 Mbs

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-14,52	8	-22,52
Mid	2437	-14,52	8	-22,52
High	2462	-13,99	8	-21,99

802.11n Mode, 65 Mbs

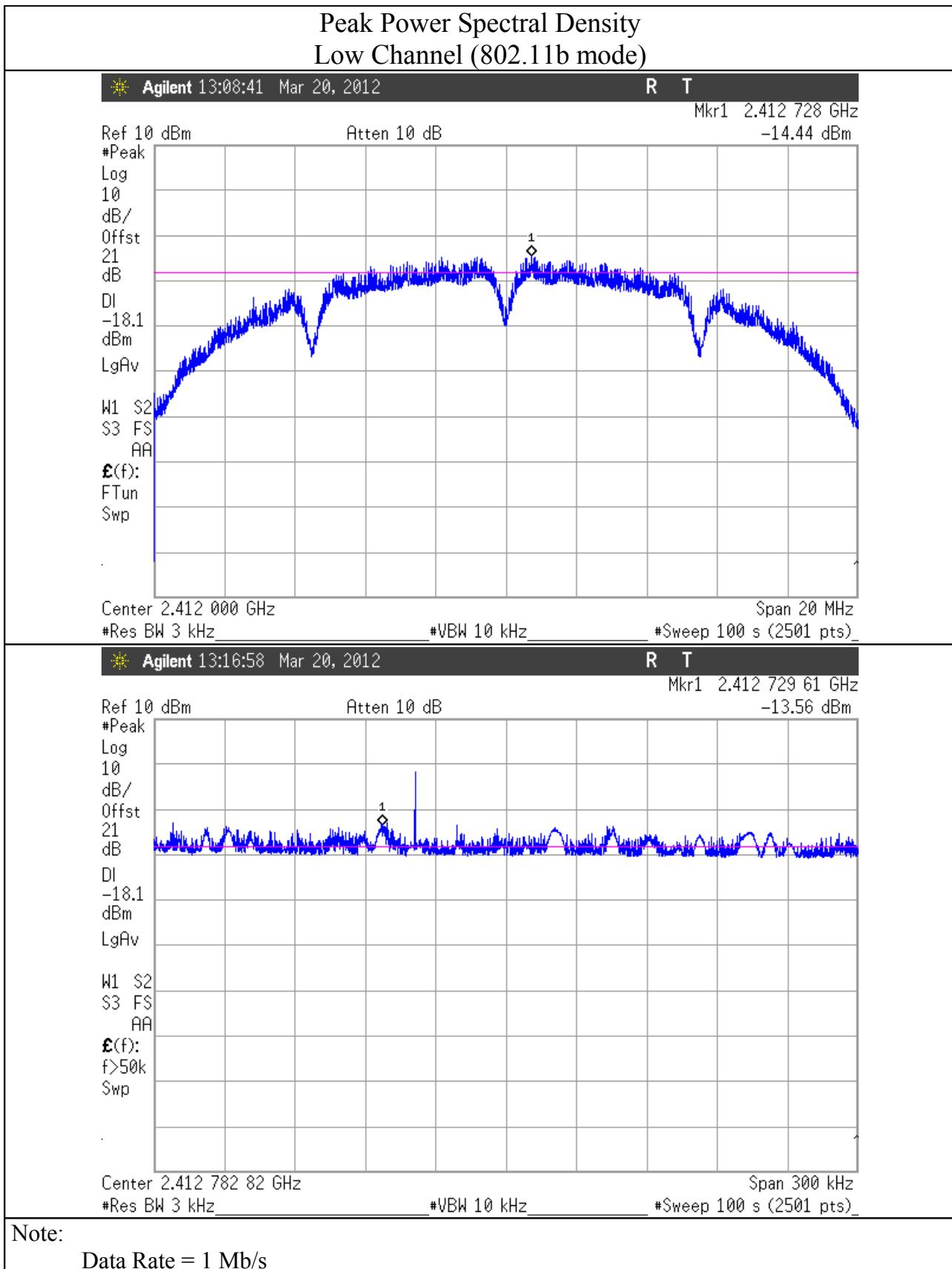
Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-15,31	8	-23,31
Mid	2437	-15,3	8	-23,3
High	2462	-15,31	8	-23,31

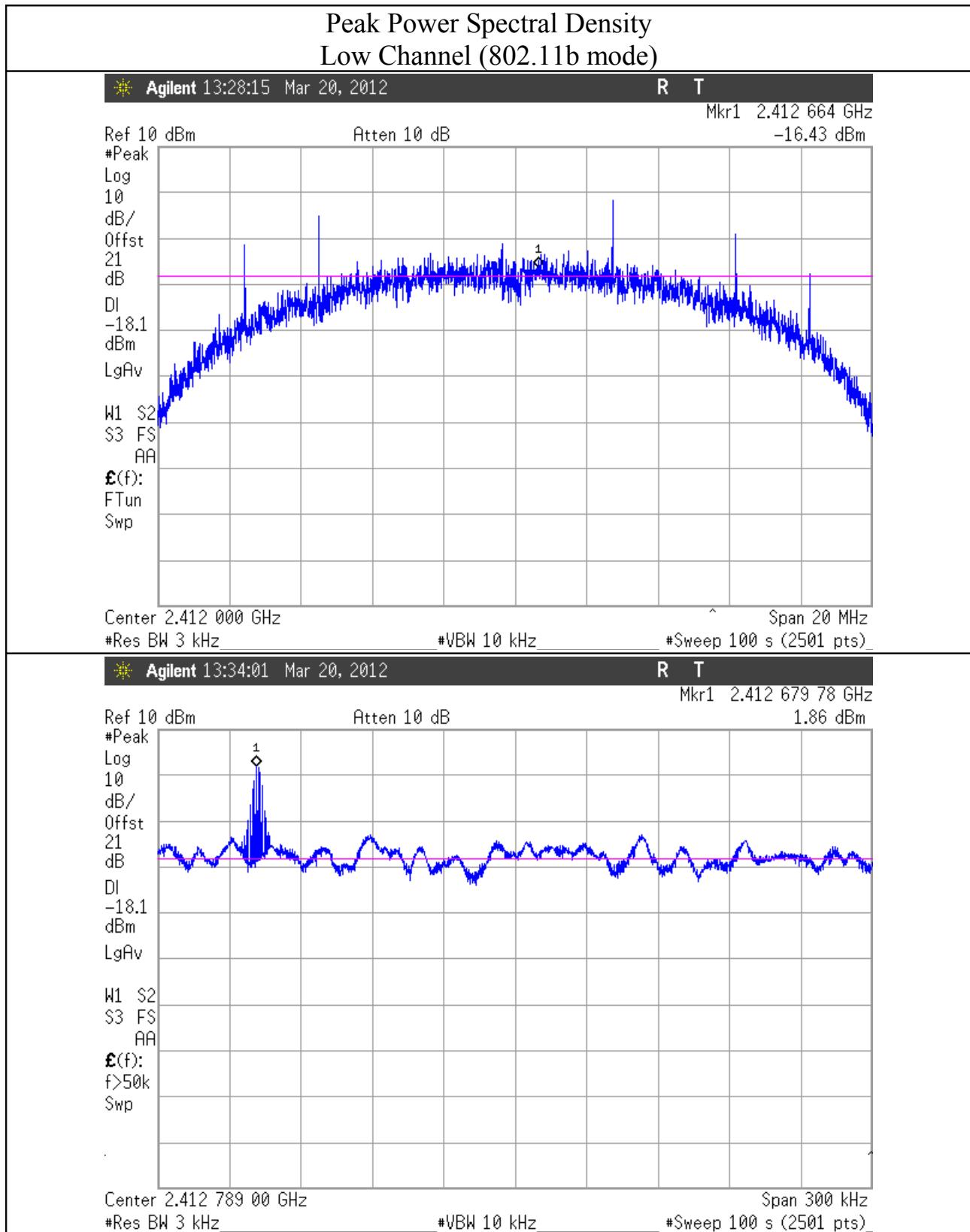
The following figures show the results.

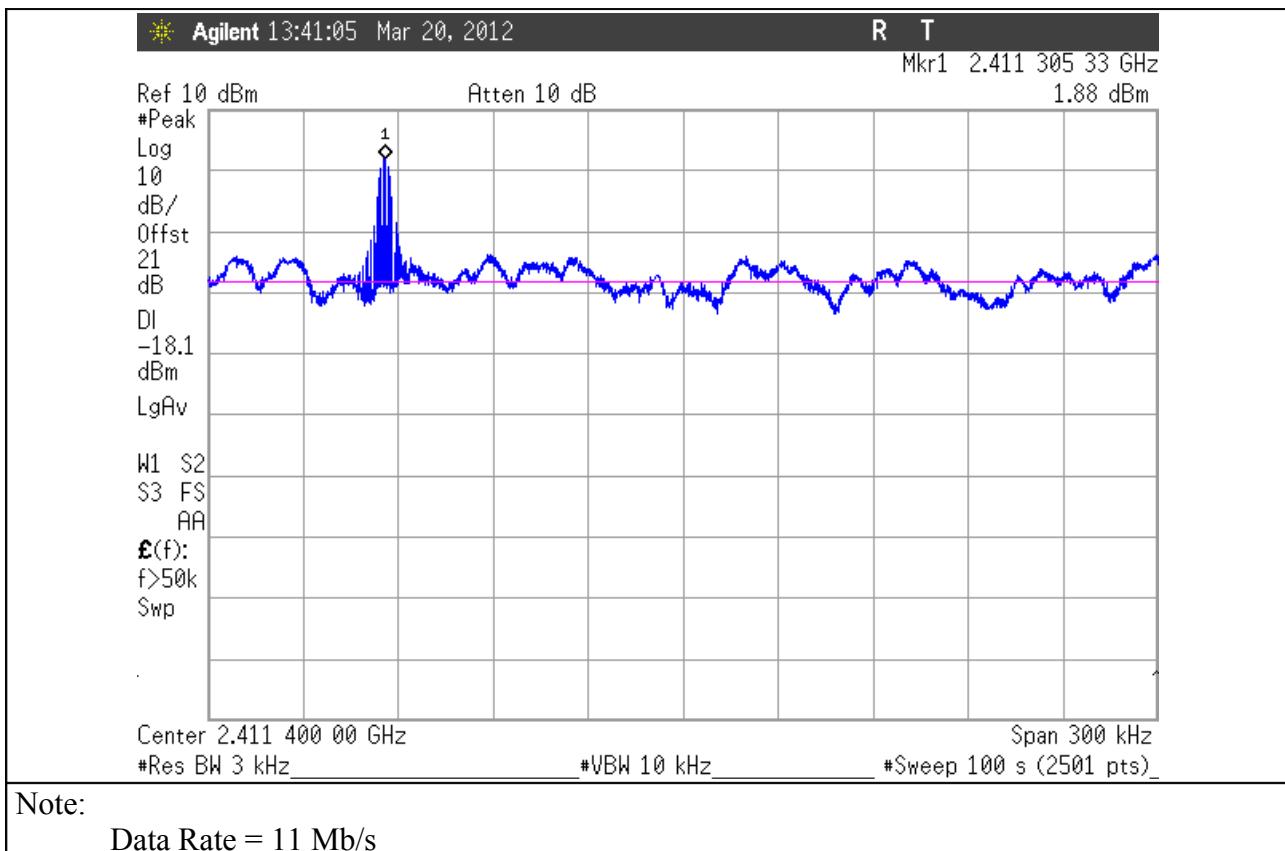
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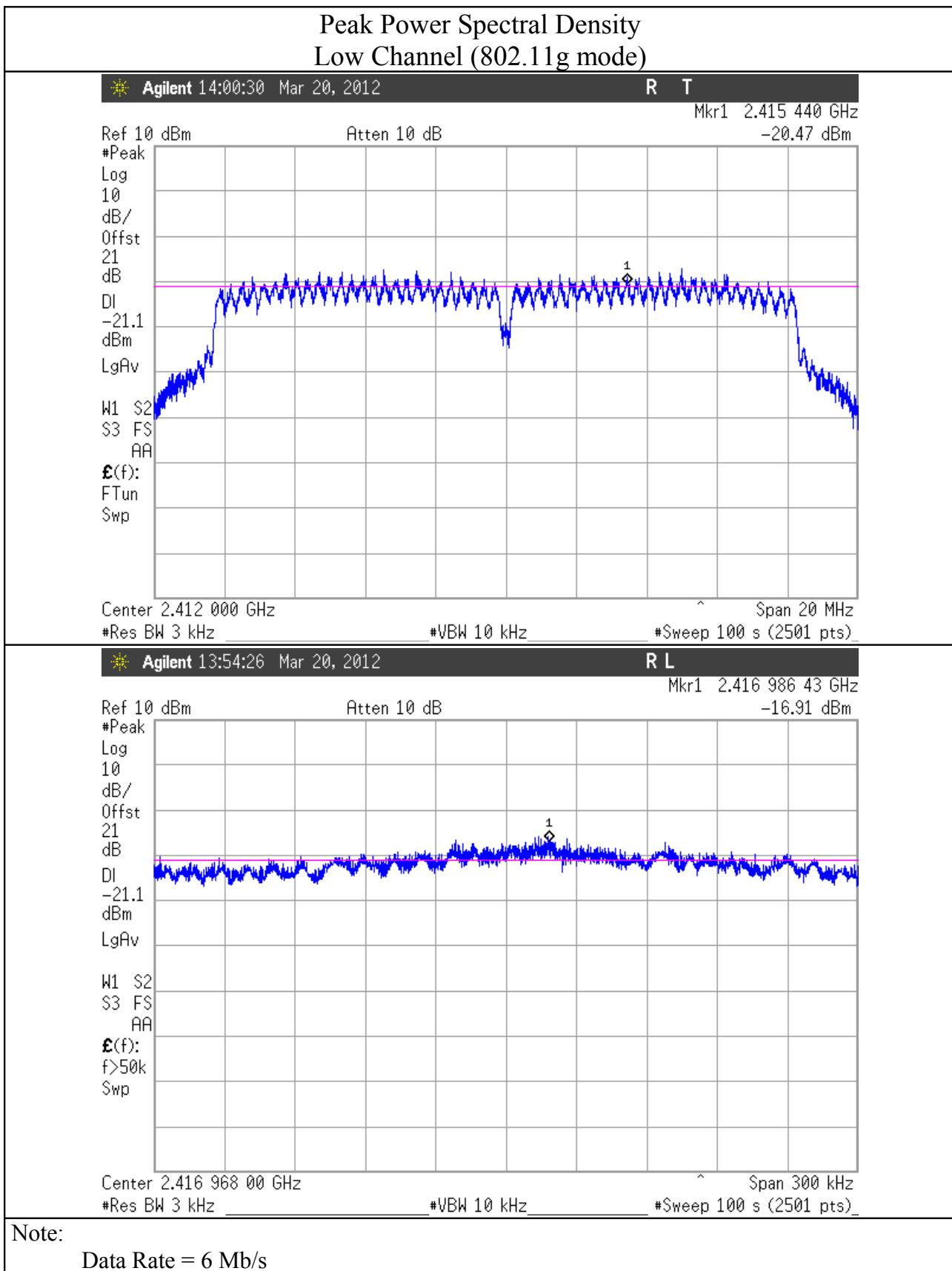
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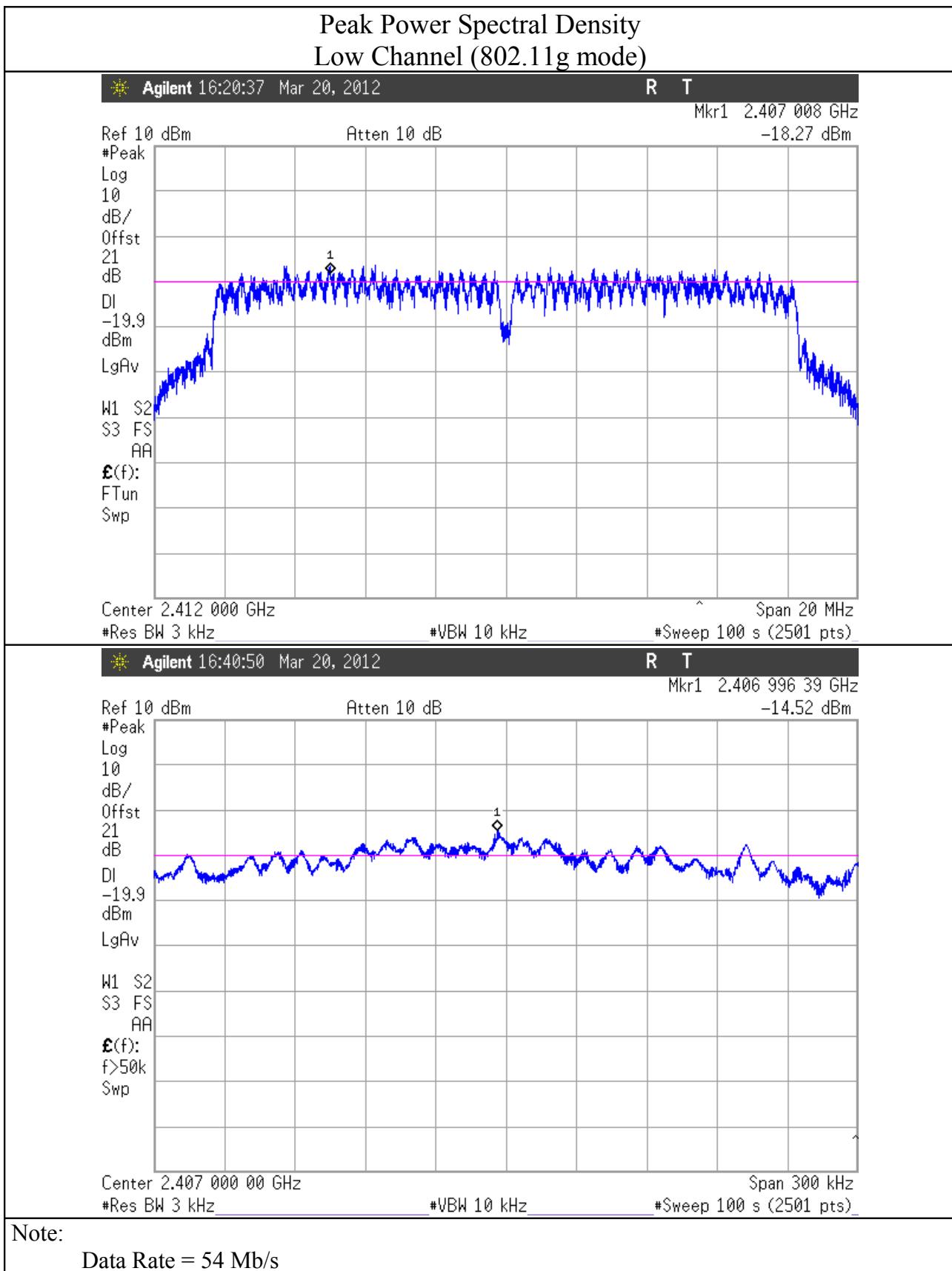
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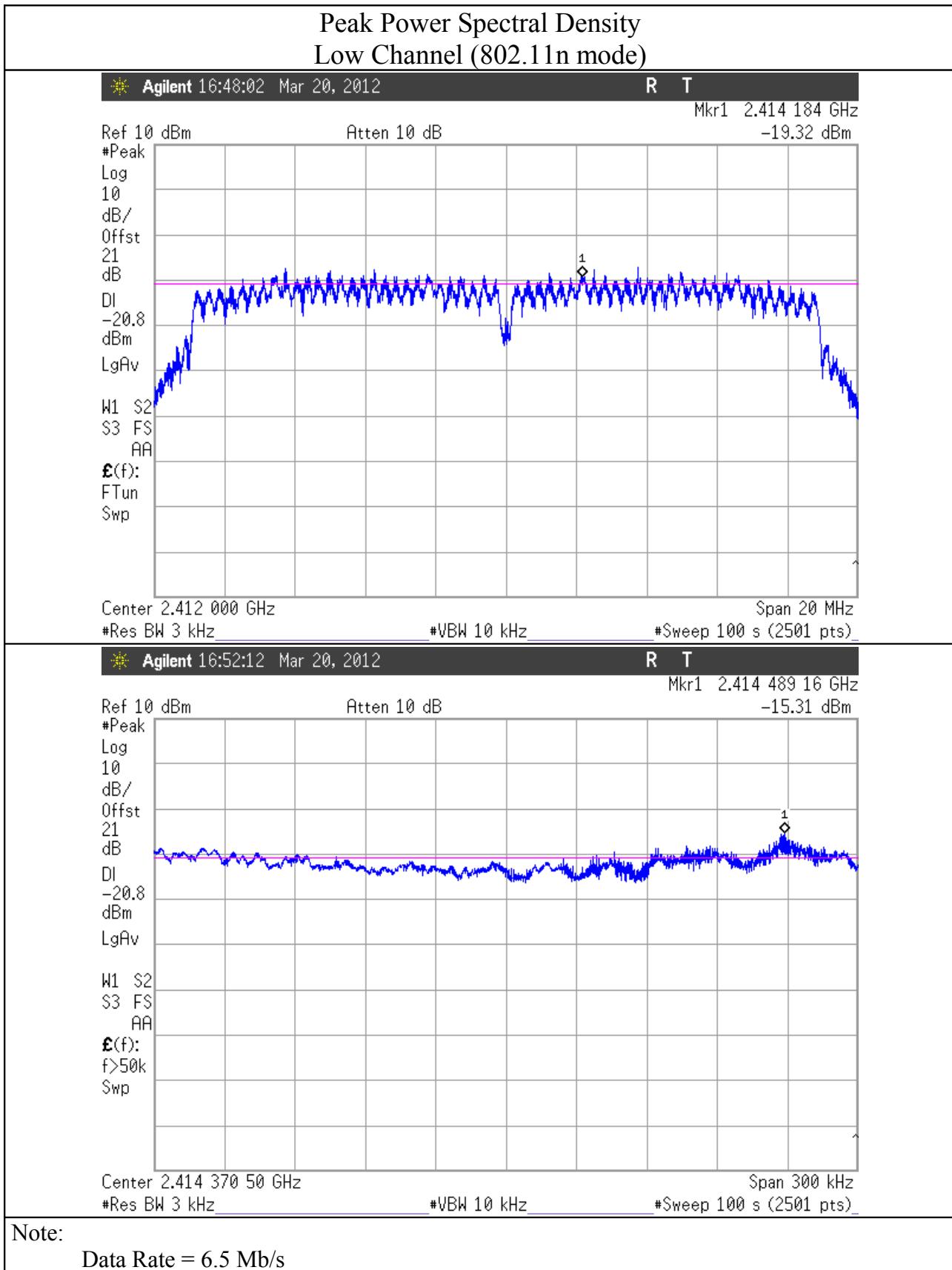


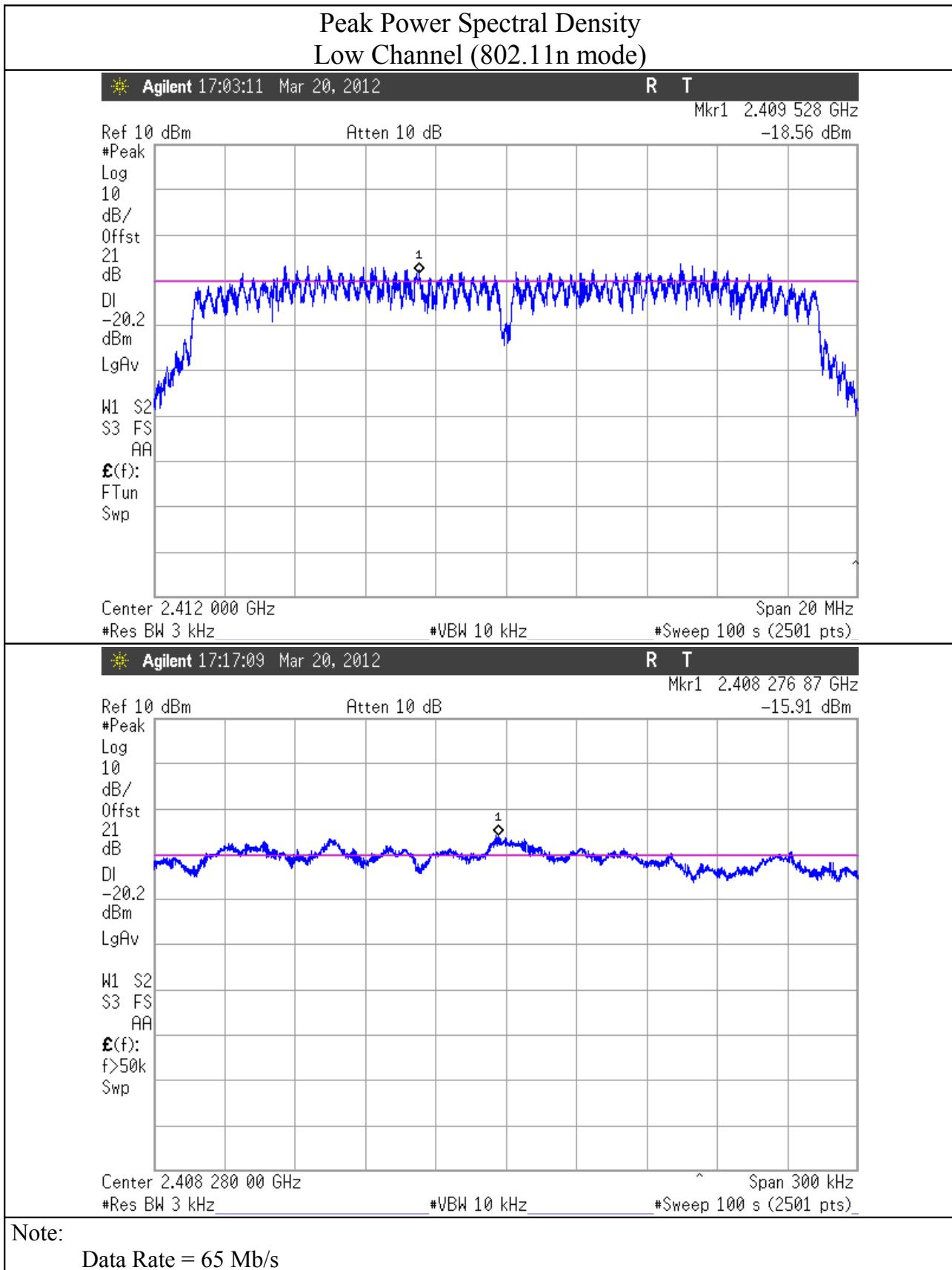


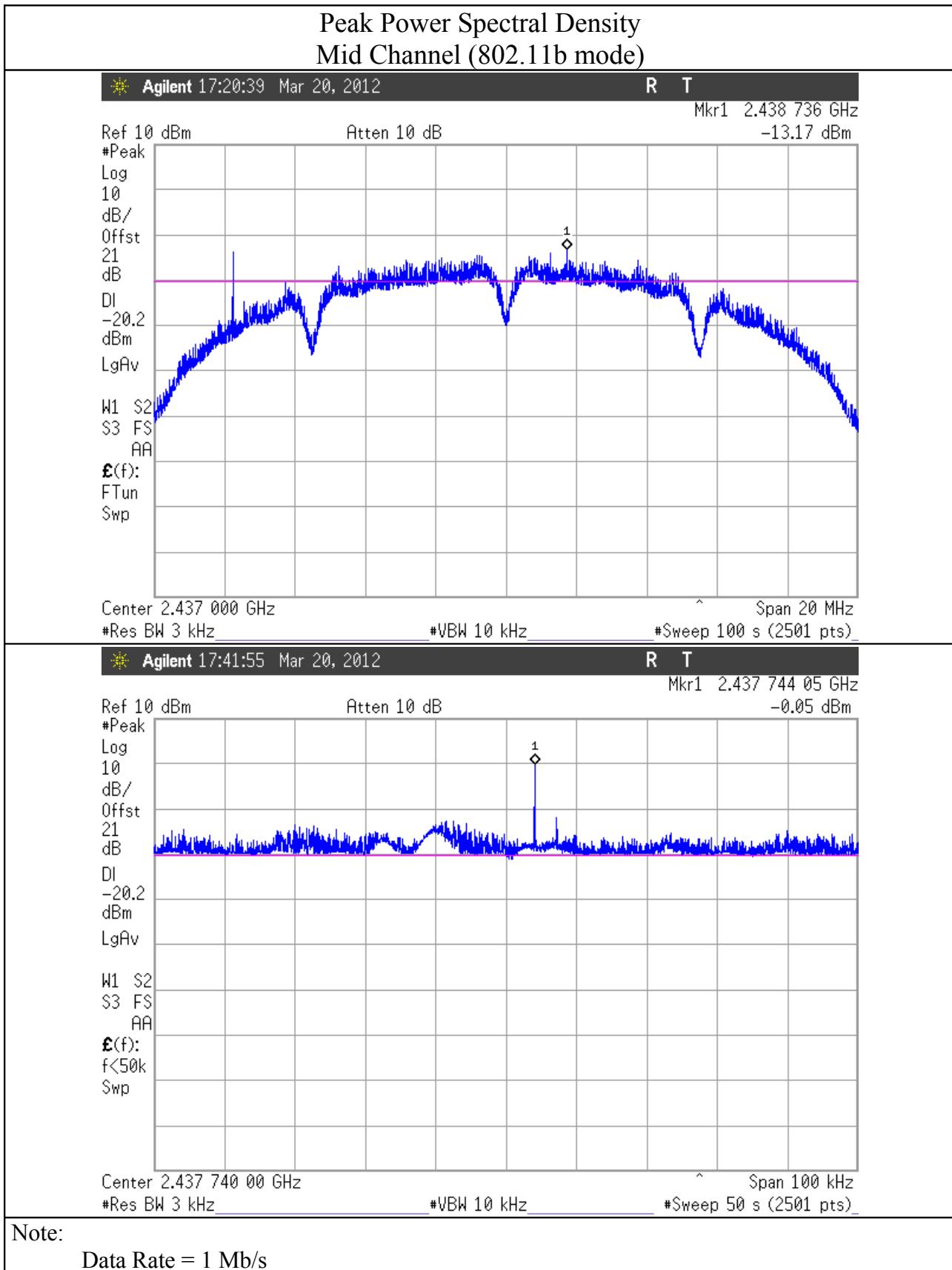


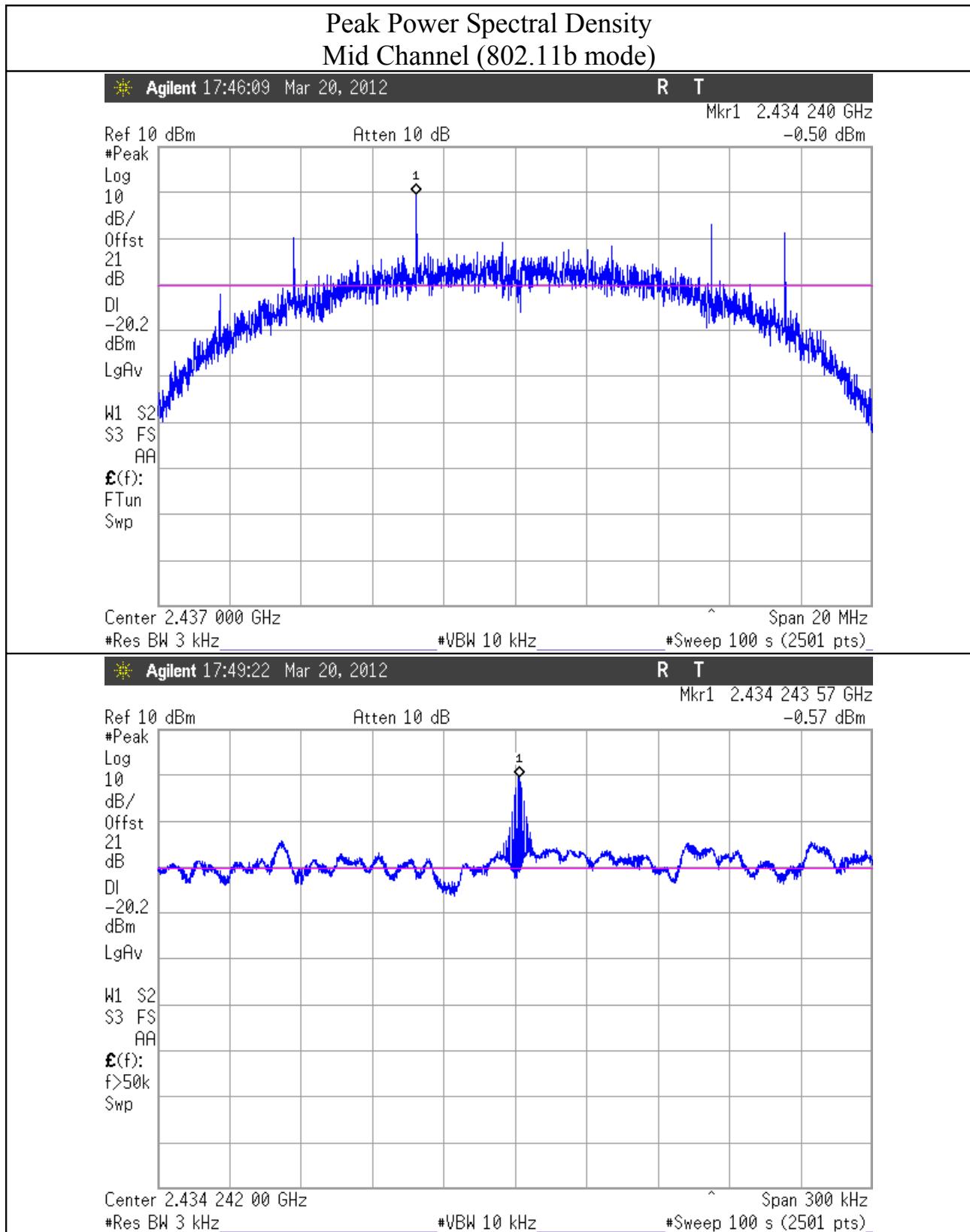


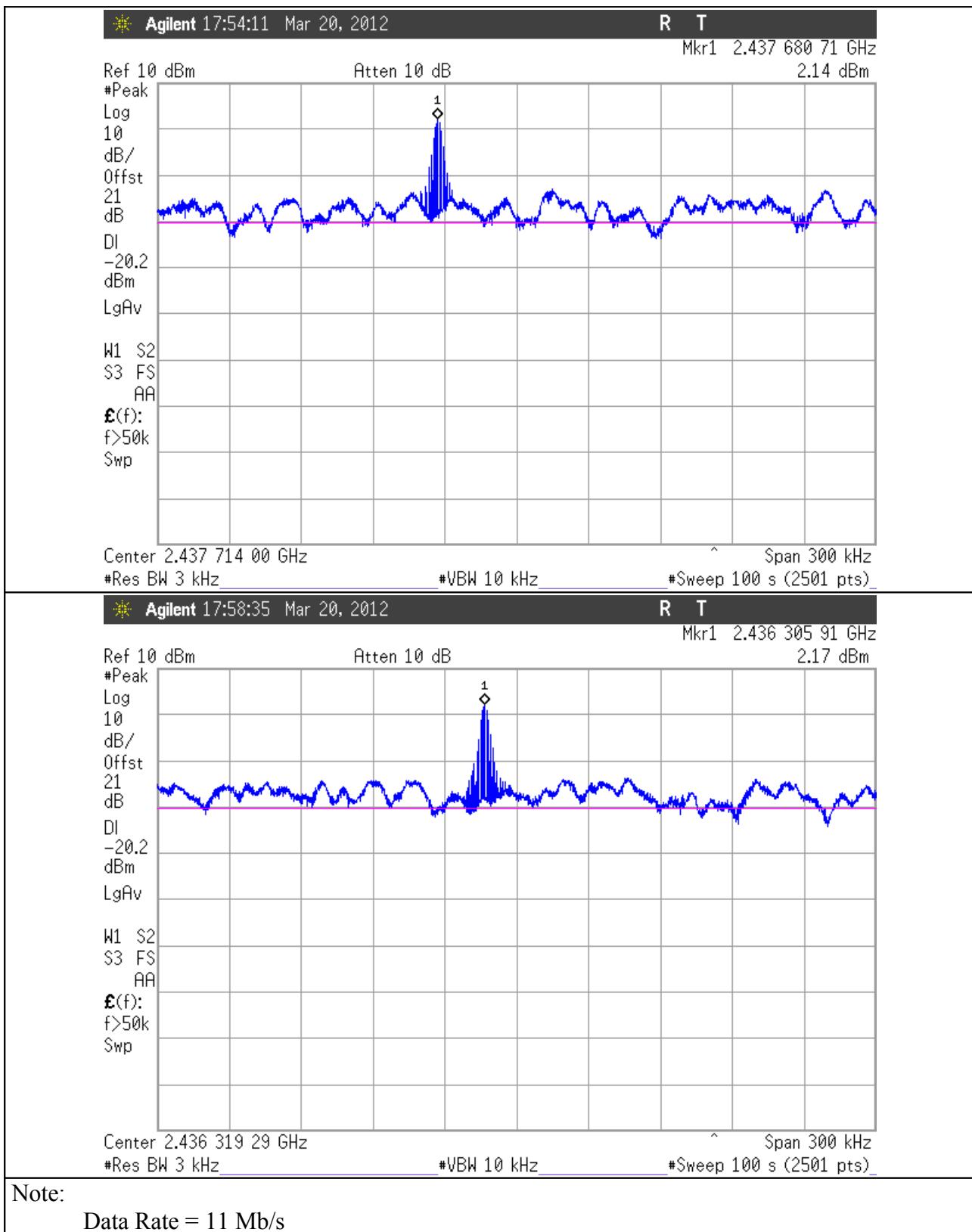


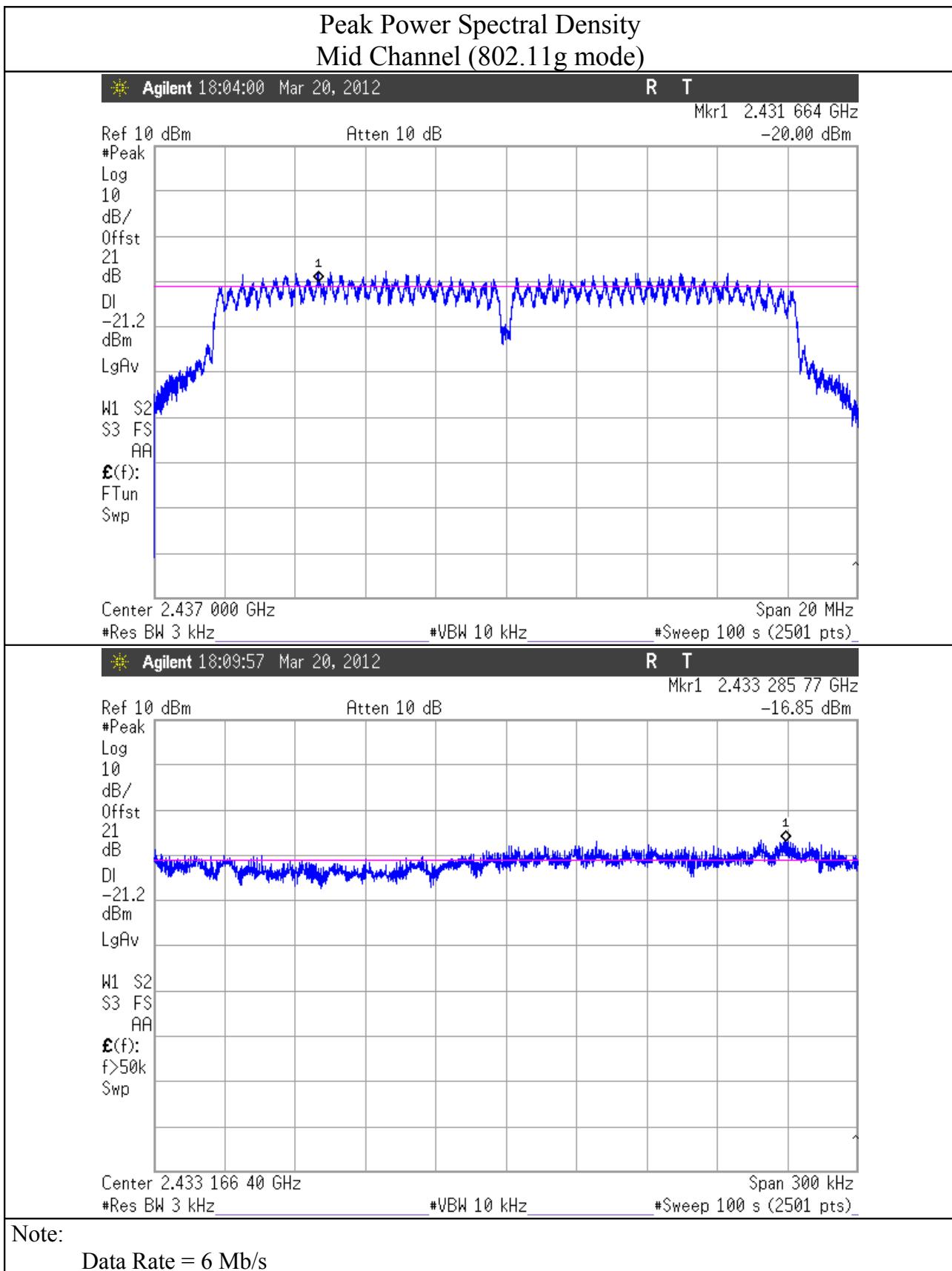


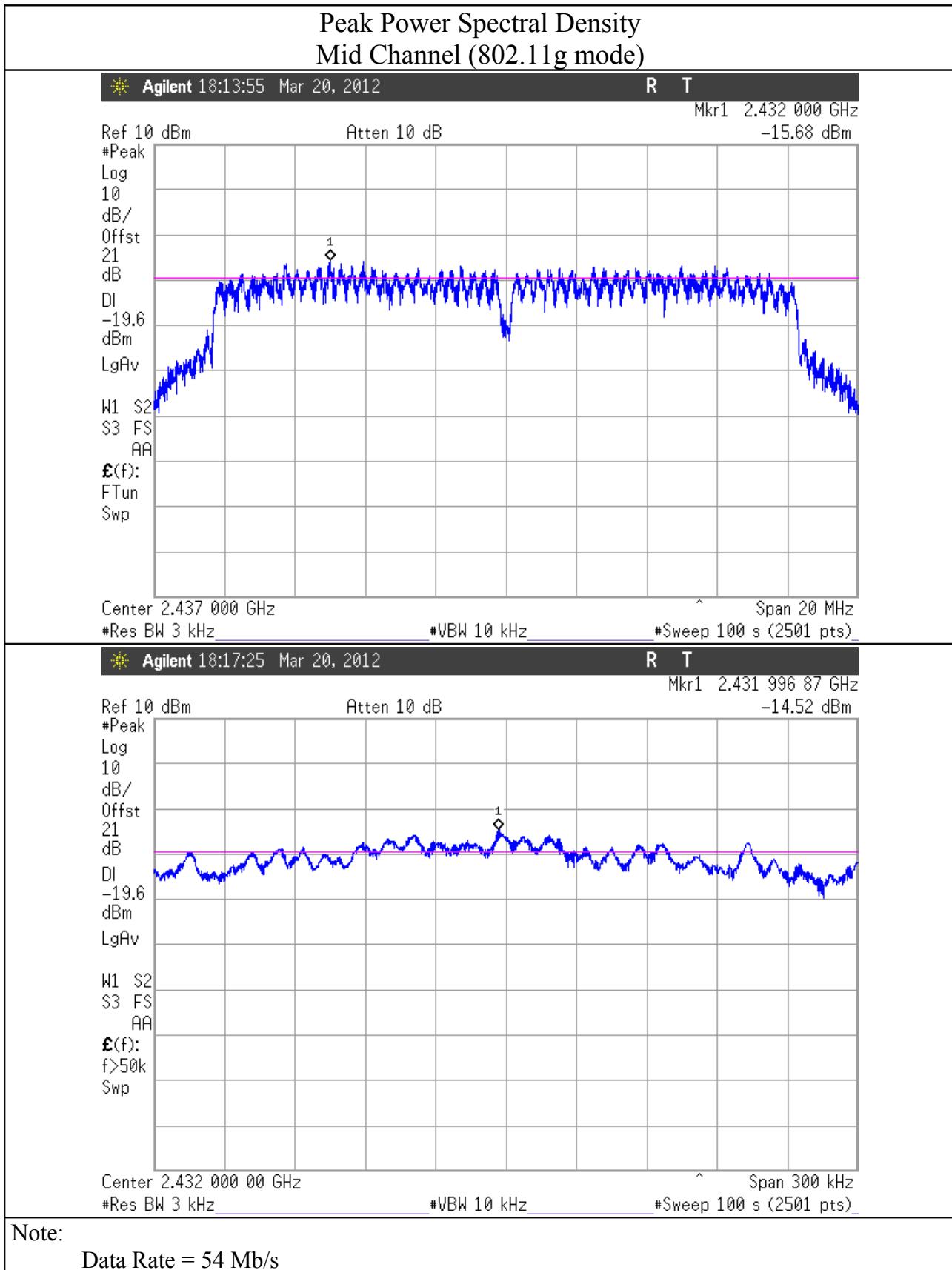


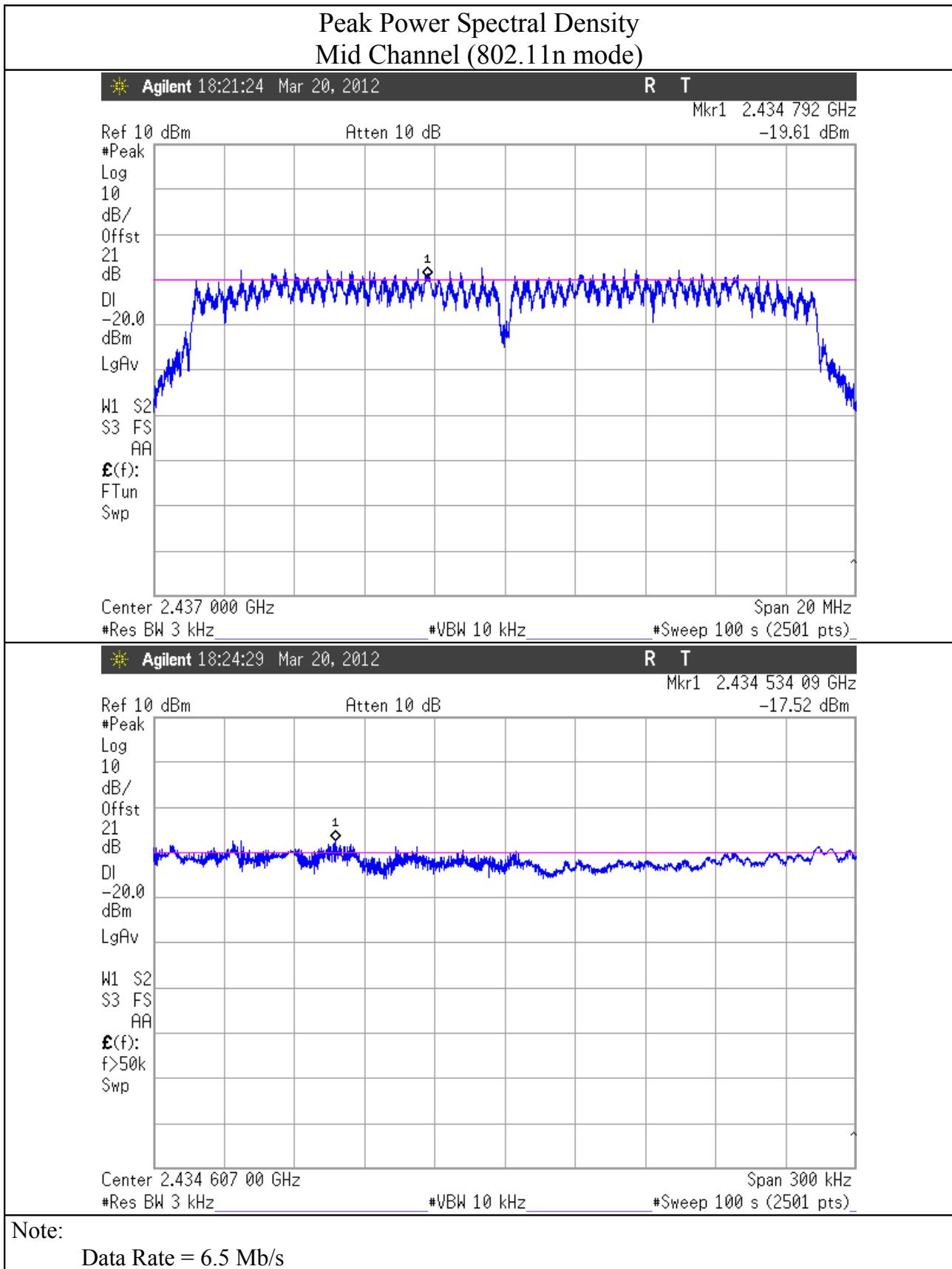


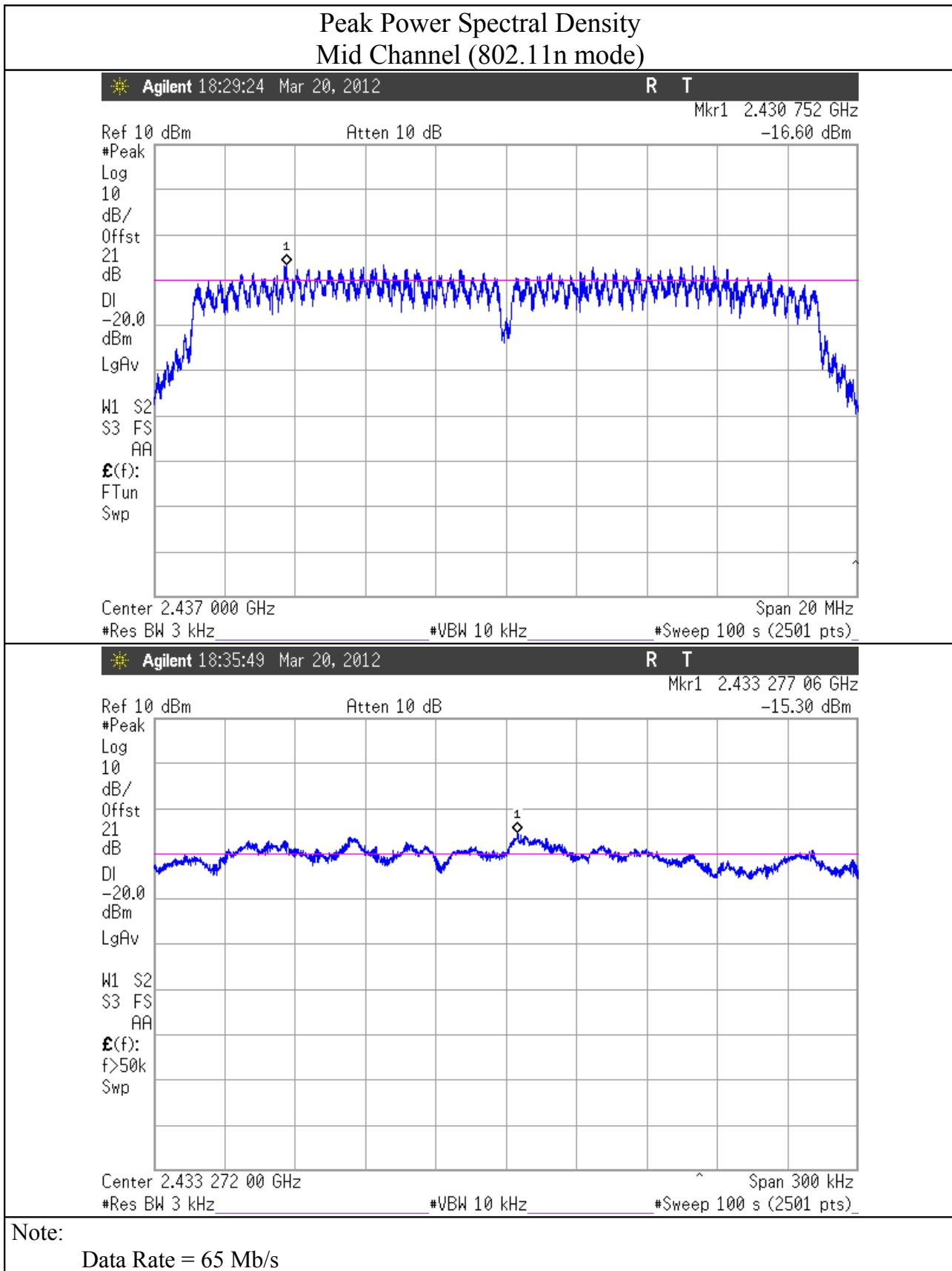


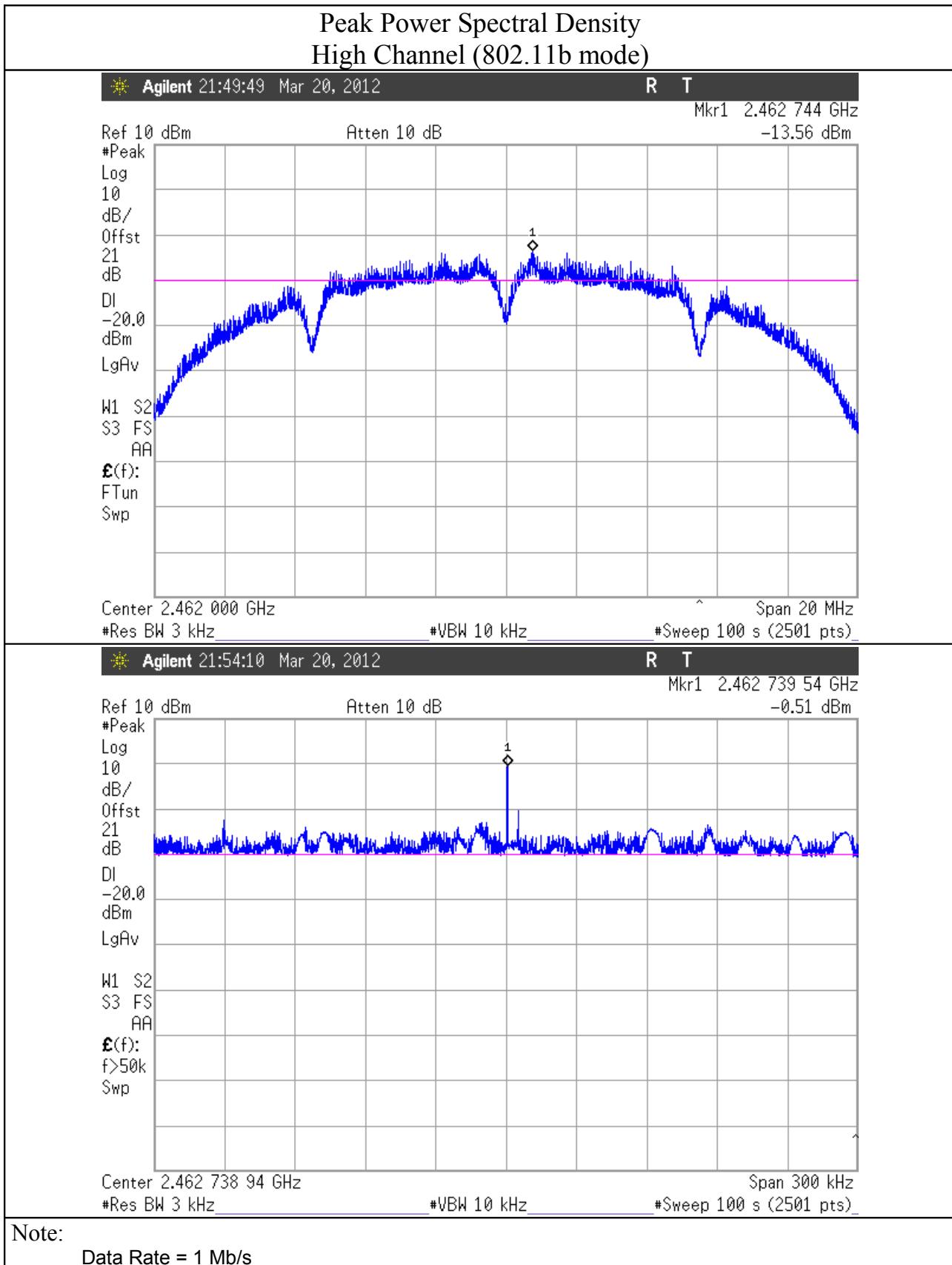


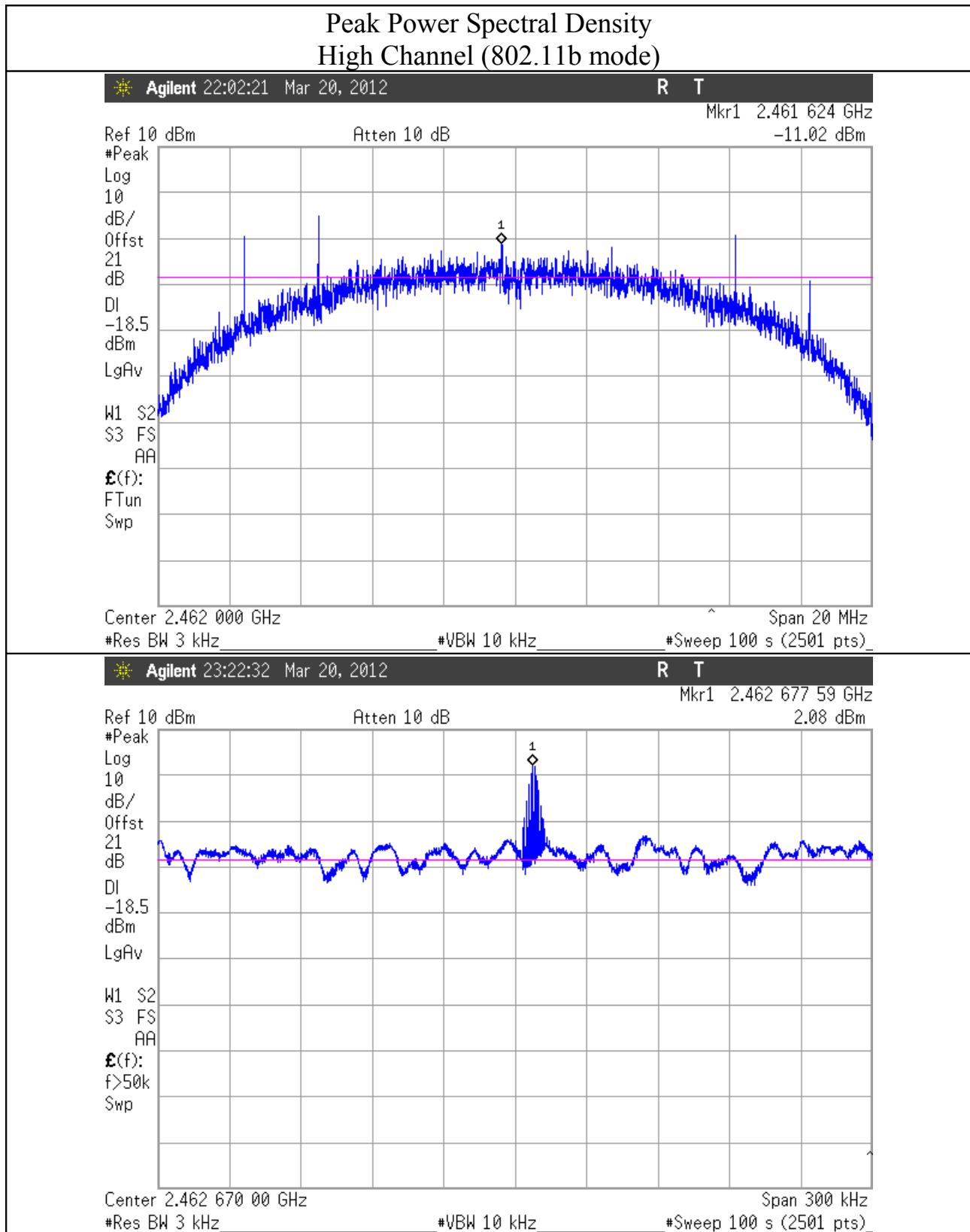


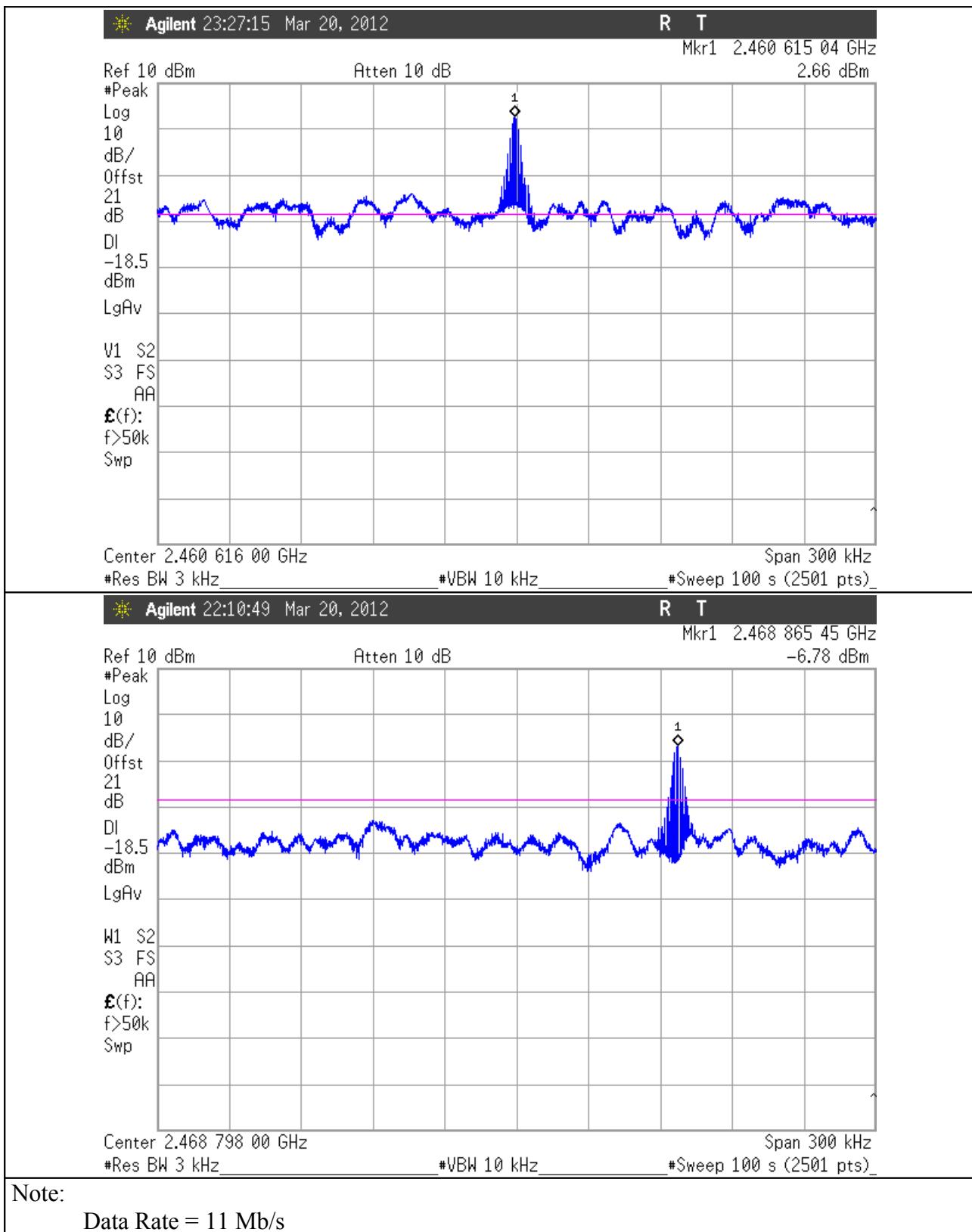


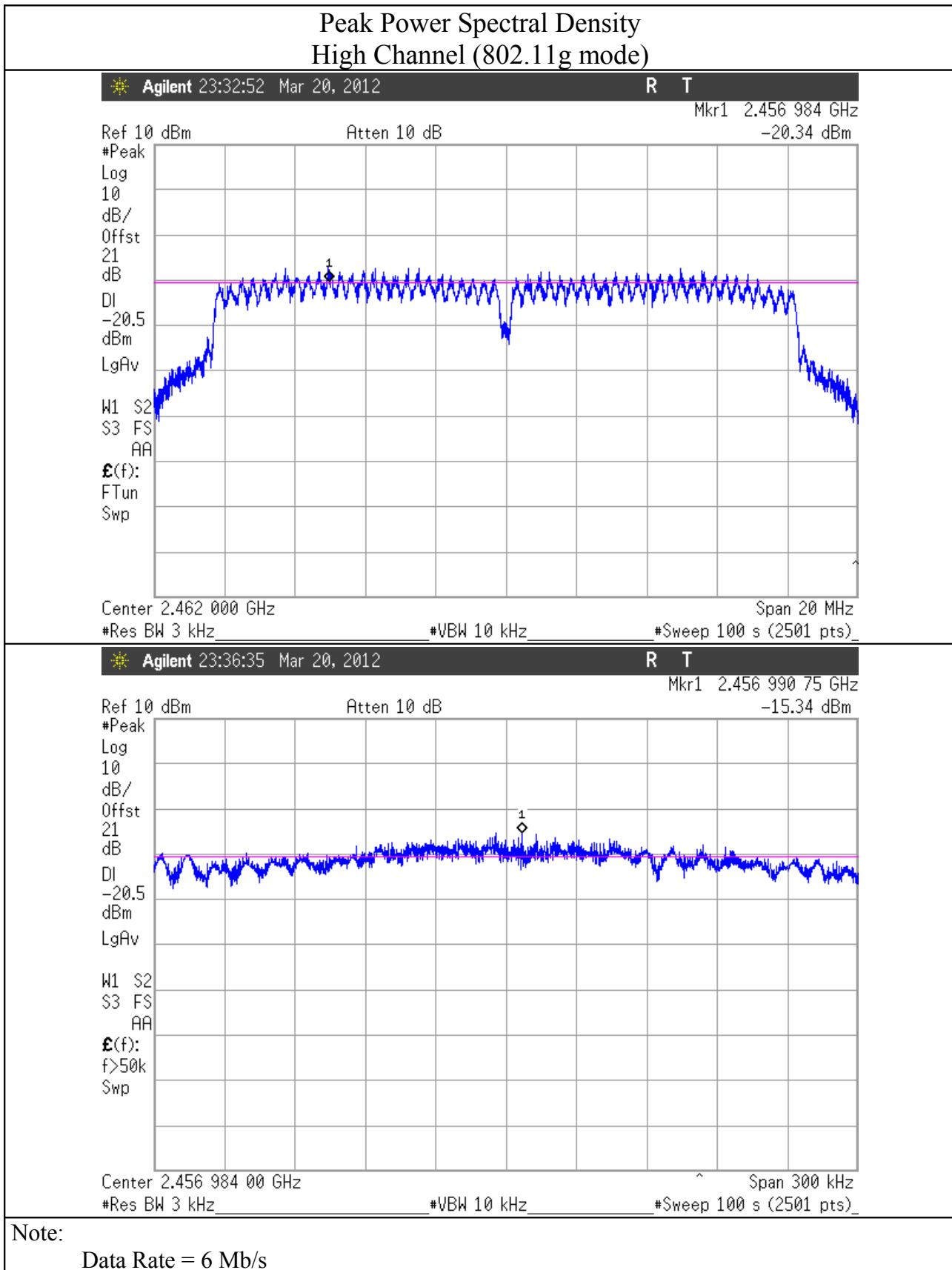


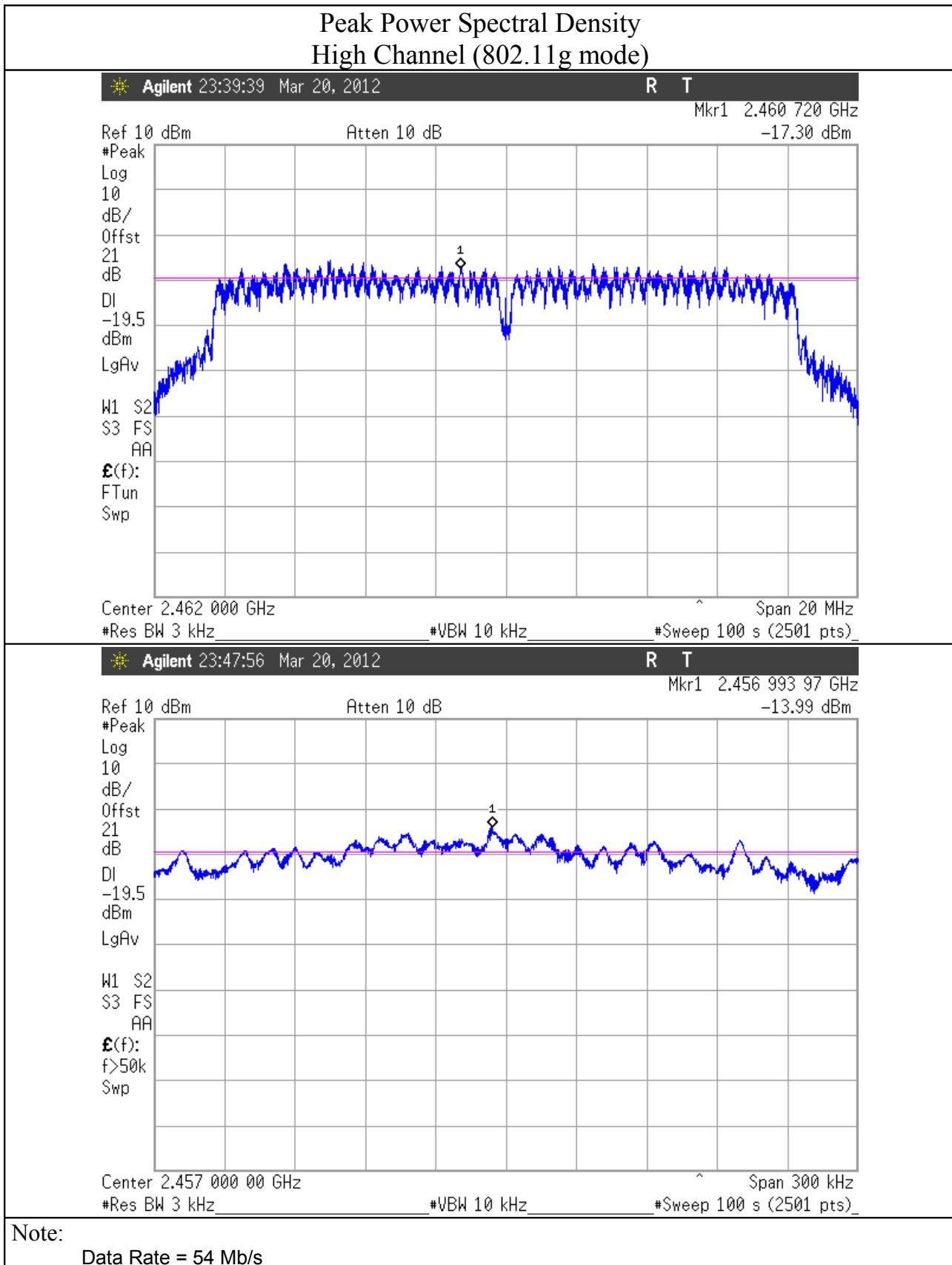


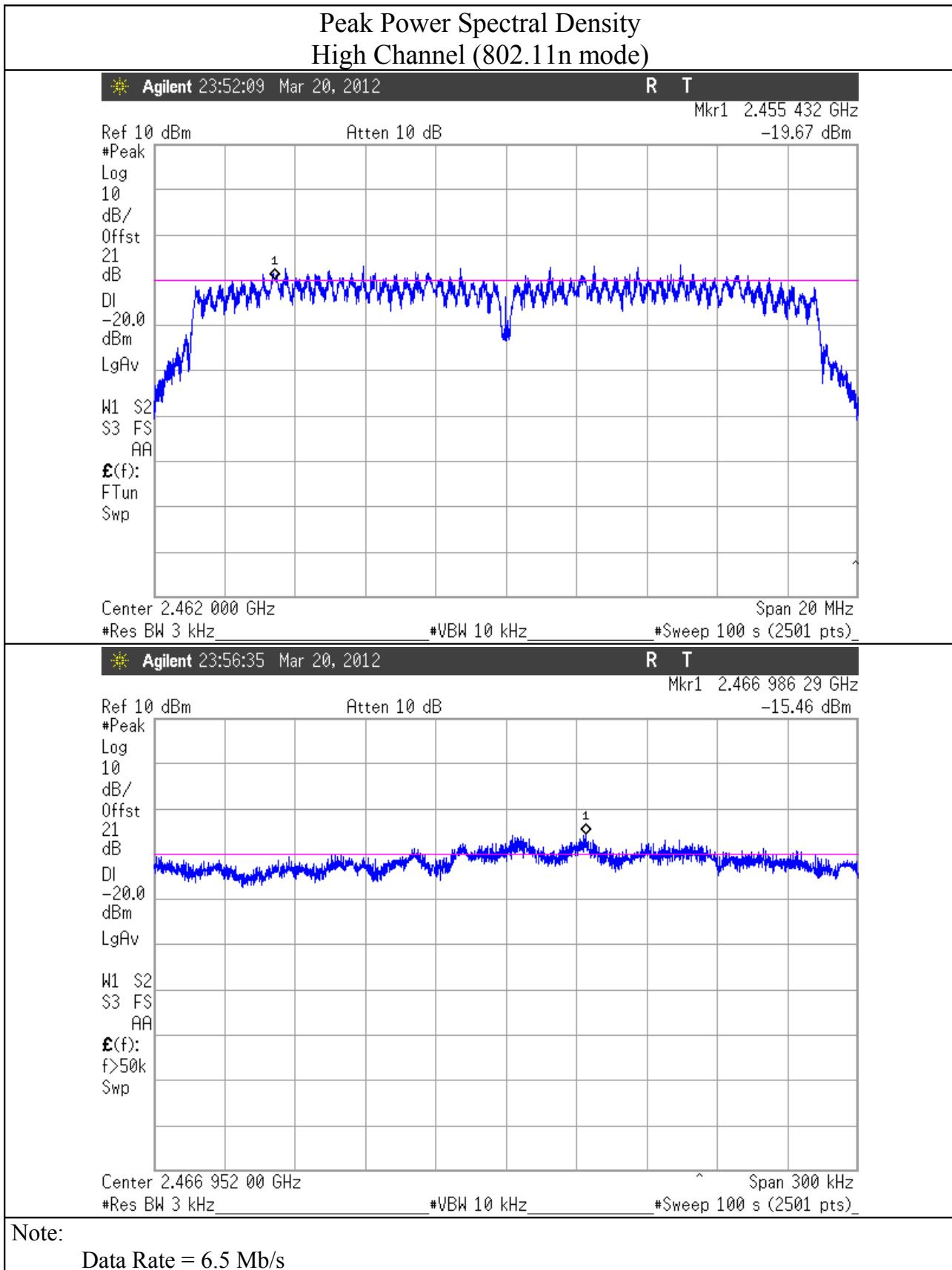


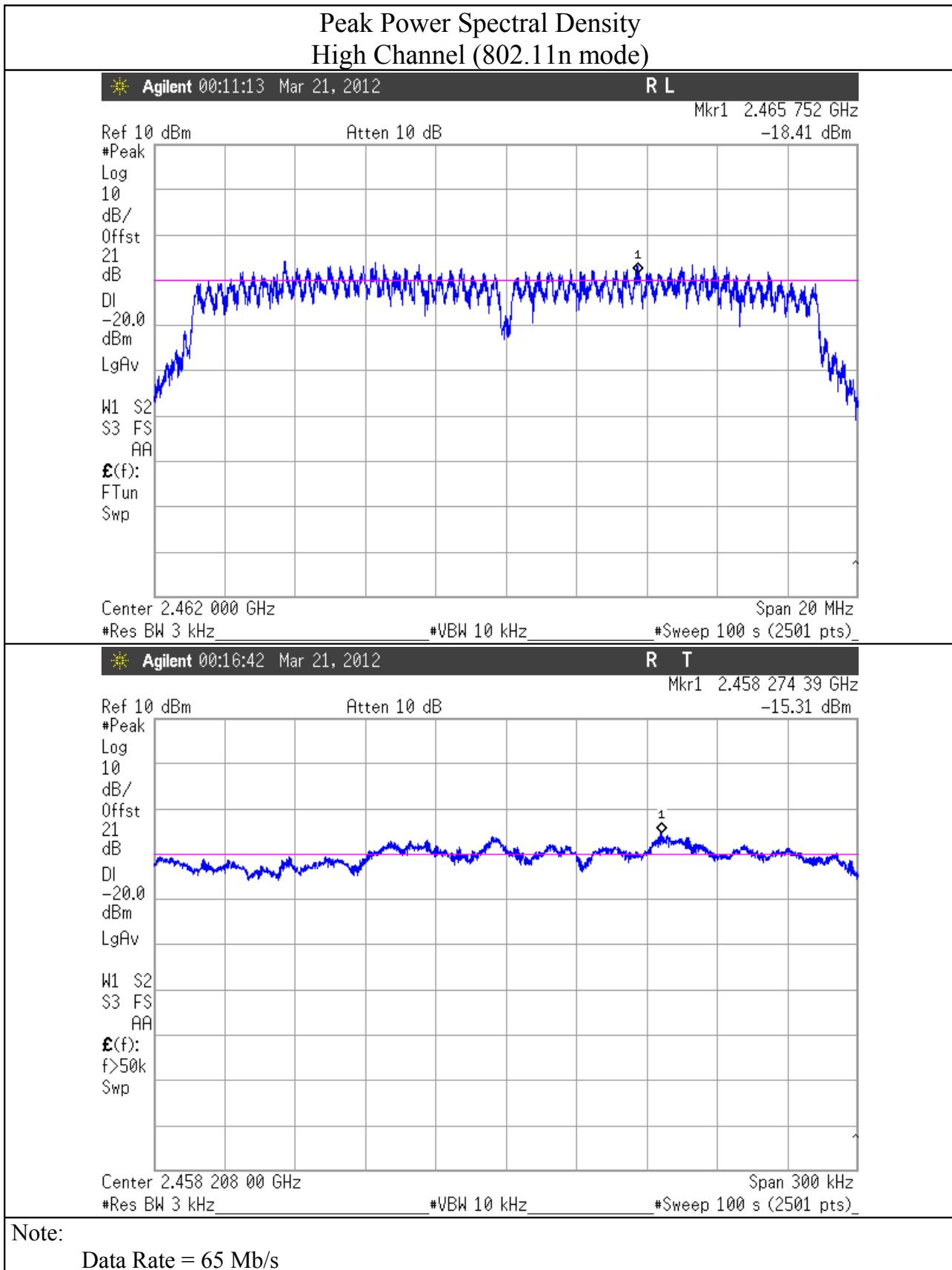












8. CONDUCTED EMISSIONS

Equipment shall meet the limits below when using a CISPR16 quasi-peak and average detector receivers.

() Limit decreasing linearly with logarithm of frequency*

FCC, EN 55022 Class B Limit

FREQUENCY RANGE (MHz)	QUASI-PEAK LIMIT [dB (μV)]	AVERAGE LIMIT [dB (μV)]
0.15 – 0.50	66 – 56 ^(*)	59 – 46 ^(*)
0.50 – 5	56	46
5 – 30	60	50

() Limit decreasing linearly with logarithm of frequency*

Test Equipment

EQUIPMENT	MANUFACTURER	MODEL	CAL. DATE
EMI Receiver	HP	HP8546A	01/2012
EMI Receiver Filter Section	HP	HP85460A	01/2012
LISN	GSD	NTW01	01/2012
Screened Room	GSD	CSC01	01/2012

Test procedure: CE22R01

Test method

Test method was in accordance with the reference standard.

EUT modes of operations were tested in order to achieve the maximum level of emission.

Results

Equipment complied with the test specification limits.

Graphics in following figures show some registrations of the frequency spectrum of the conducted emissions.

/P

ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKR 15.53 MHz
33.15 dB μ V

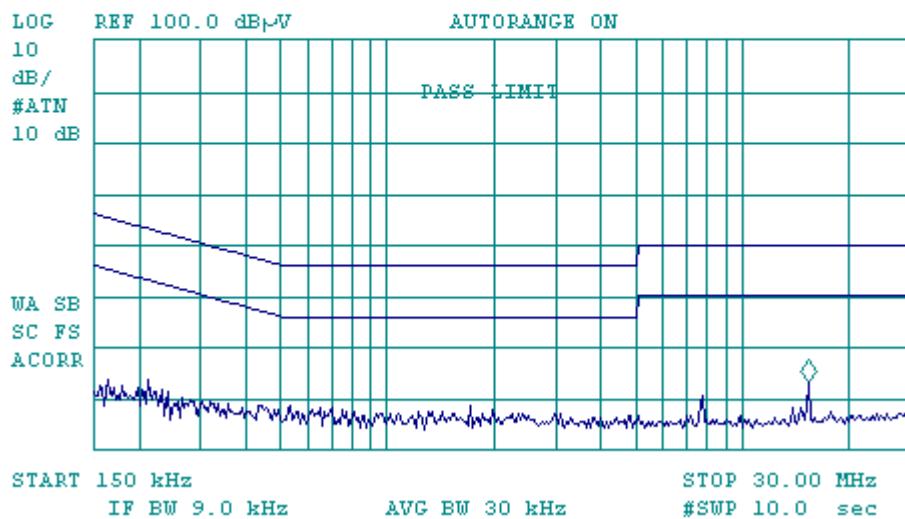
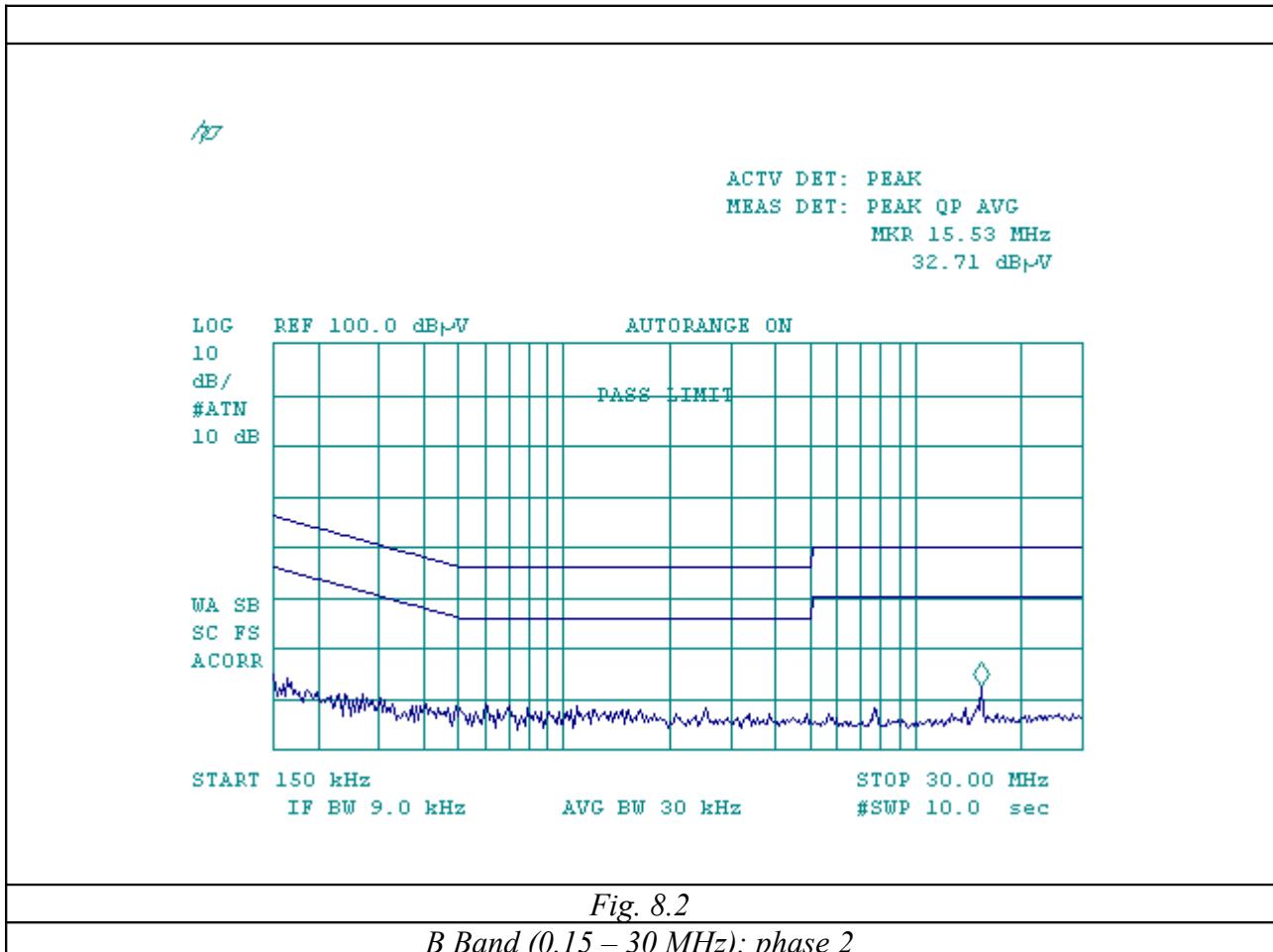


Fig. 8.1
B Band (0.15 – 30 MHz): phase 1

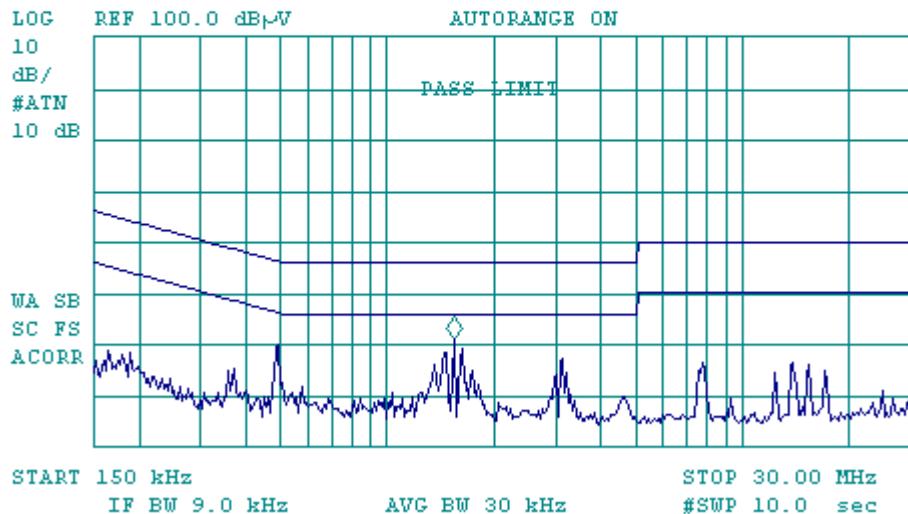


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/P

ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKR 1.56 MHz
41.00 dB_PV



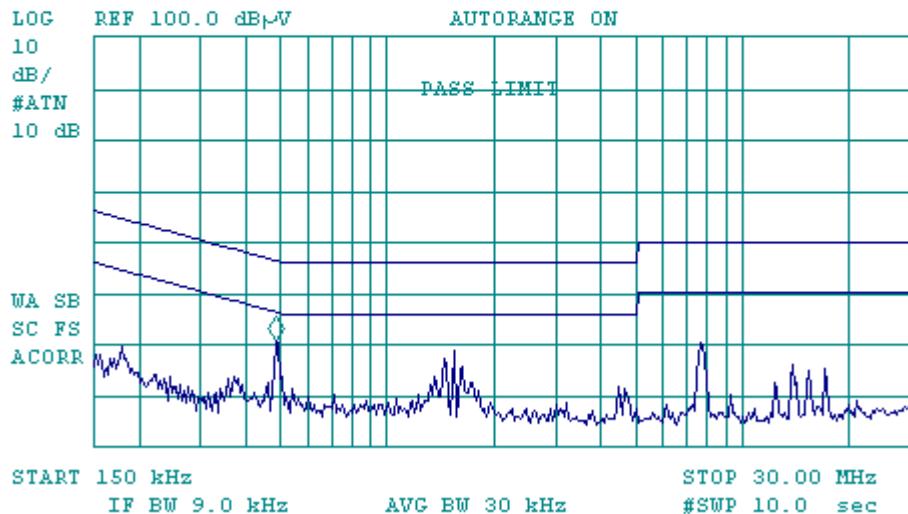
Notes:

NMEA 2000 power

Fig. 8.3
B Band (0.15 - 30 MHz): phase I

/P

ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKR 490 kHz
40.92 dB_PV



Notes:

NMEA 2000 power

Fig. 8.4
B Band (0.15 - 30 MHz): phase 2

9. RADIATED EMISSIONS

In the following table you can find the limits established by the reference standard:

FCC

<i>DISTANCE (m)</i>	<i>FREQUENCY RANGE (MHz)</i>	<i>QUASI-PEAK LIMITS [dB (μV/m)]</i>	<i>AVERAGE LIMITS [dB (μV/m)]</i>
300	0,009 – 0,49	48,52 – 13,8	
30	0,049 – 1,705	33,8 – 22,97	
30	1,705 – 30	29,54	
3	30 – 88	40	--
3	88 – 216	43,5	--
3	216 – 960	46	--
3	960 – 1000	54	--
3	Above 1000	--	54

Test Equipment

EQUIPMENT	MANUFACTURER	MODEL	CAL. DATE
EMI Receiver	HP	HP8546A	01/2012
EMI Receiver Filter Section	HP	HP85460A	01/2012
EMI Receiver	Agilent	E4440A	01/2012
EMI Receiver Filter Section	Agilent	N9039A	01/2012
Anechoic Chamber	Comtest	CSA01	01/2012
Horn Antenna (1-18 GHz)	EMCO	3115	01/2012
Loop Antenna	EMCO	6512	01/2012
Horn Antenna (18-26.5 GHz)	Alpha Ind. Inc.	100655A	01/2012
Bilog Antenna	Schaffner	CBL6112B	01/2012
Controller	Deisel	HD100	01/2012
Turn Table	Deisel	MA240	01/2012

Test procedure: RE22R02

Notes

Azimuth position EUT-Antenna corresponding to 0° identifies the rotating table orientation (TT) in which the instrument to be tested shows the front part turned towards the antenna. Positive grades individuate clockwise rotations of TT when this one is observed from the top. For negative

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degrees, TT rotation is anticlockwise.

Antenna height respect to the mass plane is conventionally individuated with: MA=XXX where XXX indicates the height (always positive for e>100) expressed in cm.

Antenna horizontal polarisation is indicated by POL=H.

Antenna vertical polarisation is indicated by POL=V.

Accordingly to reference standard, a limit relaxing factor equal to 20 dB for decade for measurements performed at 3 m has been used.

Results and conclusions

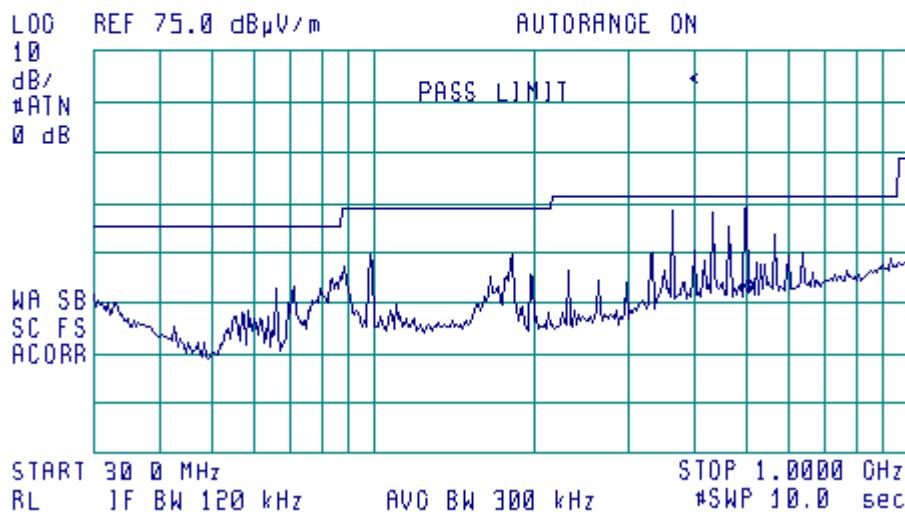
In all the operative conditions, equipment complied with the standard limits. Graphics in following figures show the most significant registrations of the performed measurements.

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FREQ 498.8 MHz
PEAK 44.8 dB μ V/m
OP 43.0 dB μ V/m
AVG 41.1 dB μ V/m



Notes:

POL V

Fig. 9.1

Record of the measurement of radiated emissions.

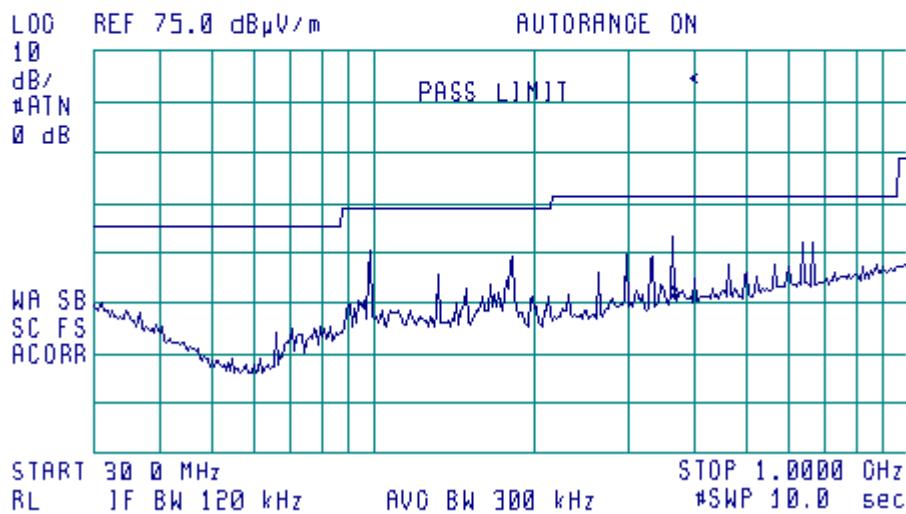
One of the maximum disturbance determined in the frequency range 30MHz – 1 GHz.

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FREQ 365.8 MHz
PEAK 40.3 dB μ V/m
OP 37.9 dB μ V/m
AVG 36.7 dB μ V/m



Notes:

POL H

Fig. 9.2

Record of the measurement of radiated emissions.

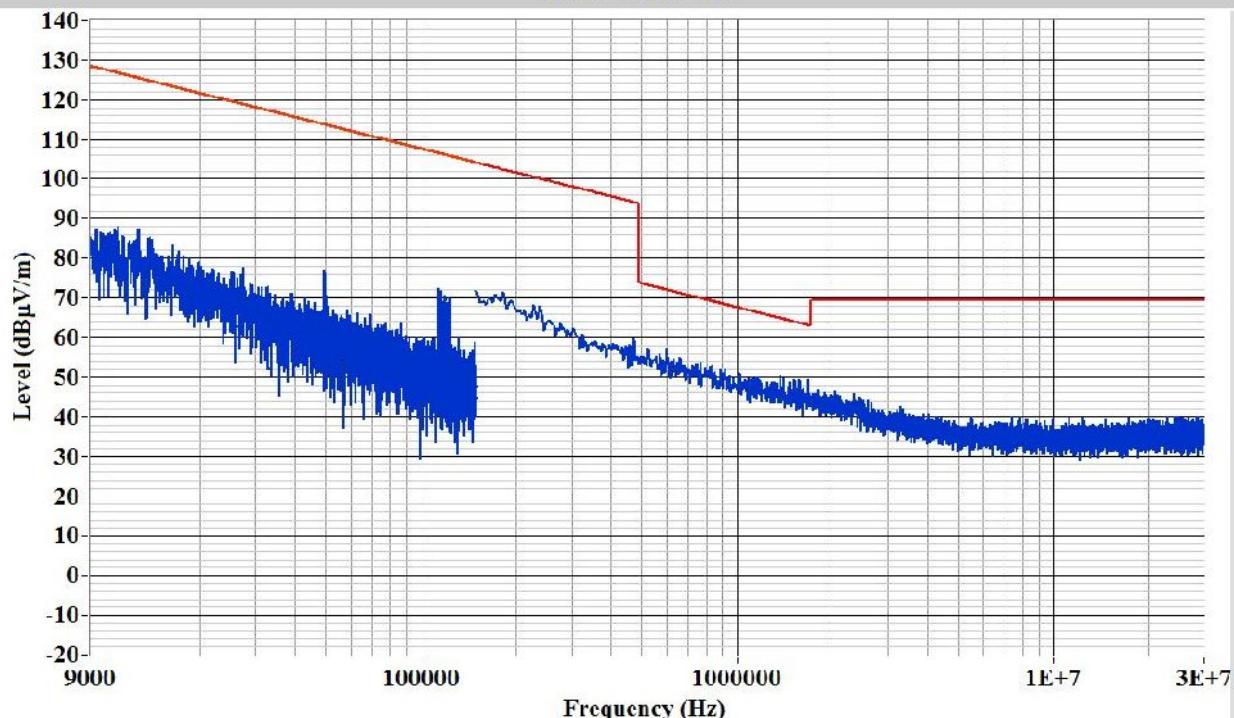
One of the maximum disturbance determined in the frequency range 30MHz – 1 GHz.

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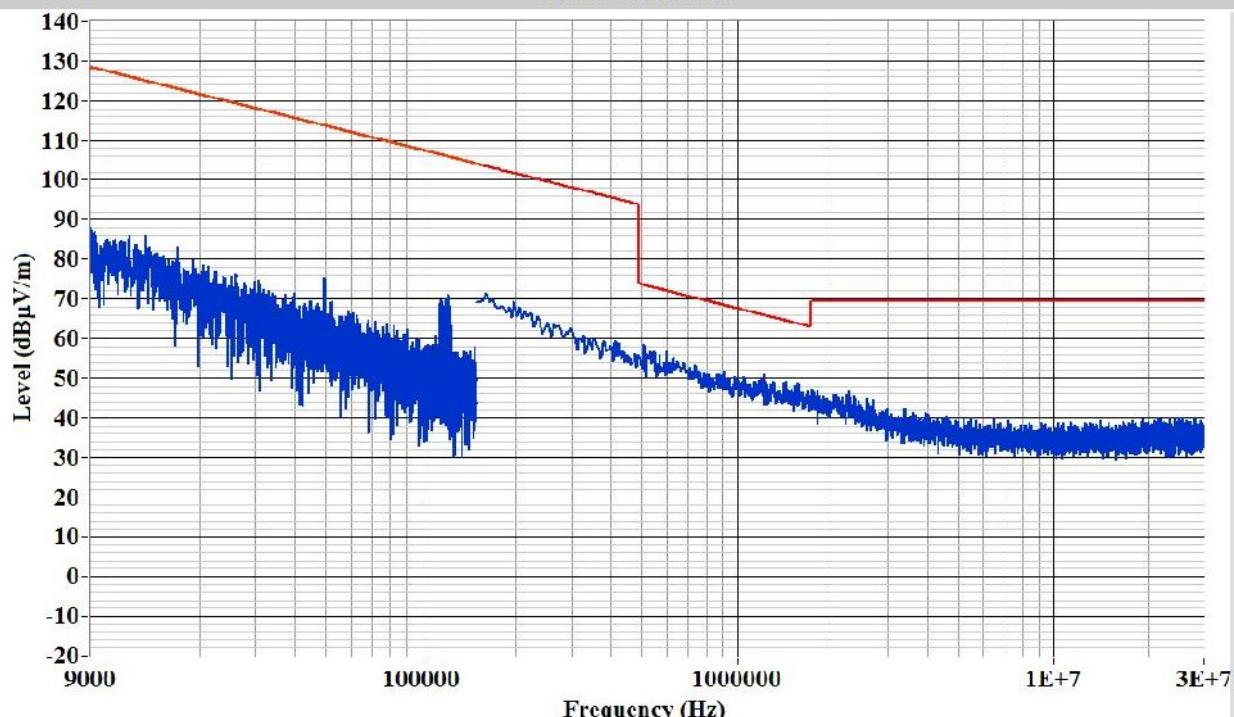
MAGNETIC FIELD EMISSIONS:

FCC Part 15



EUT FRONT SIDE, LOOP ANTENNA PARALLEL

FCC Part 15



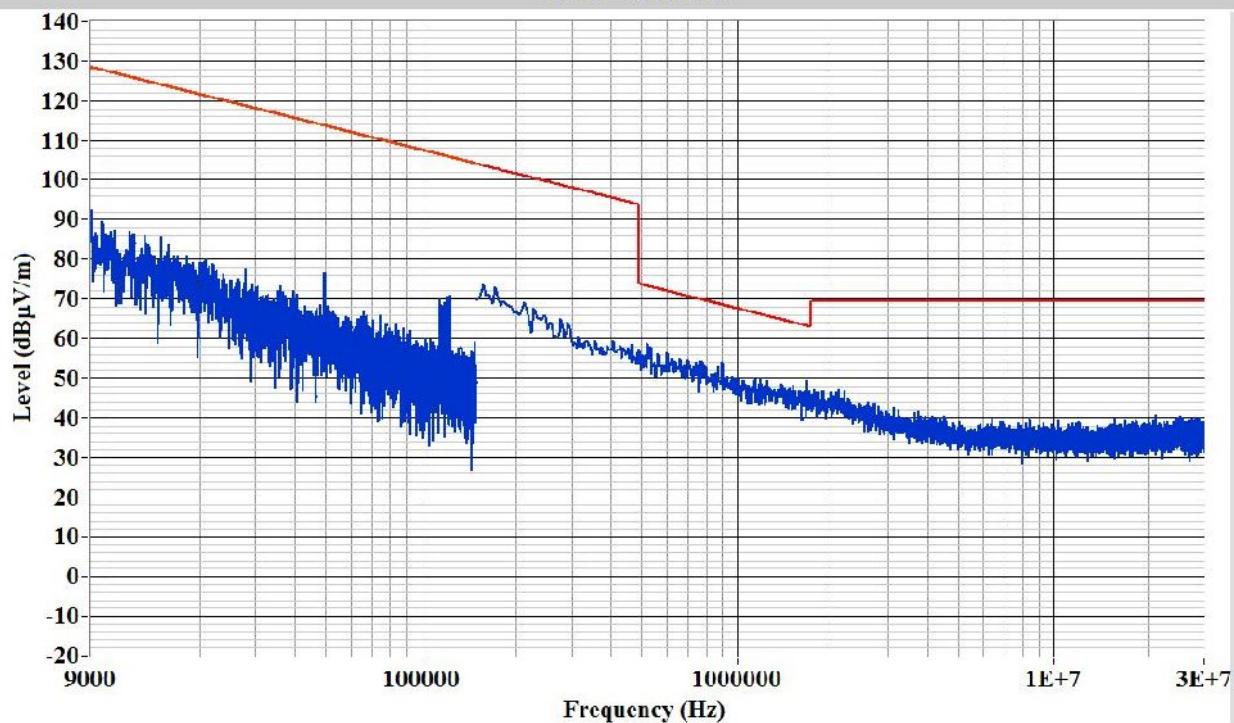
EUT FRONT SIDE, LOOP ANTENNA ORTHOGONAL

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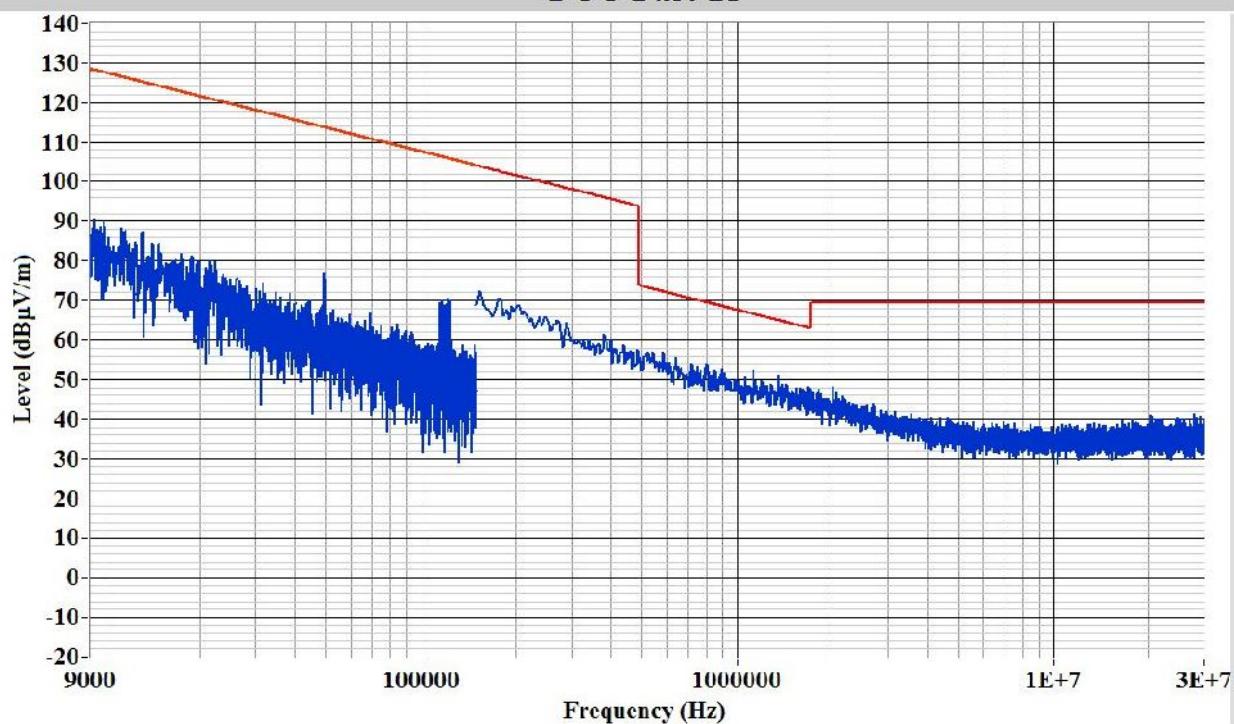
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FCC Part 15



EUT LATERAL SIDE, LOOP ANTENNA ORTHOGONAL

FCC Part 15



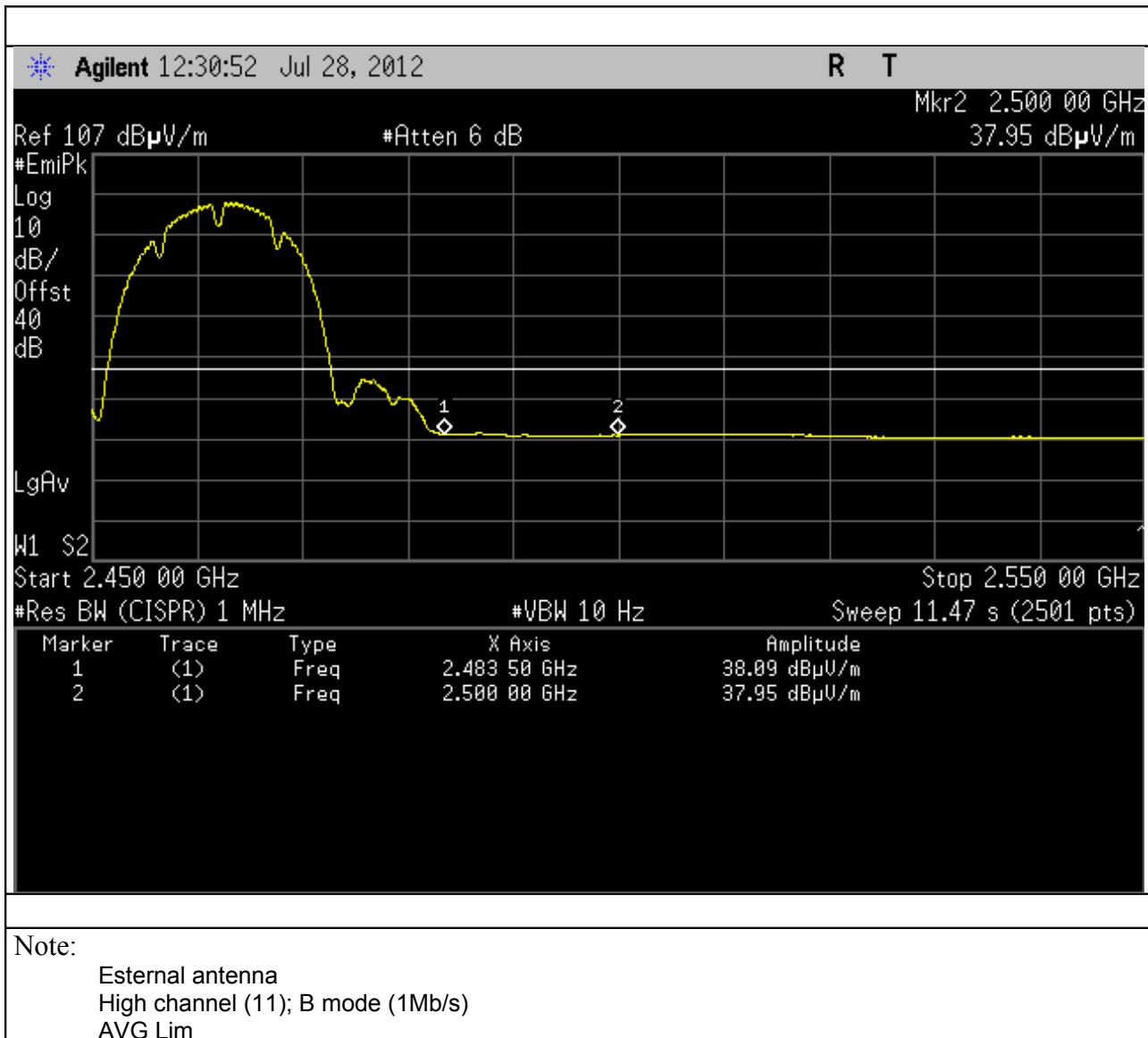
EUT LATERAL SIDE, LOOP ANTENNA PARALLEL

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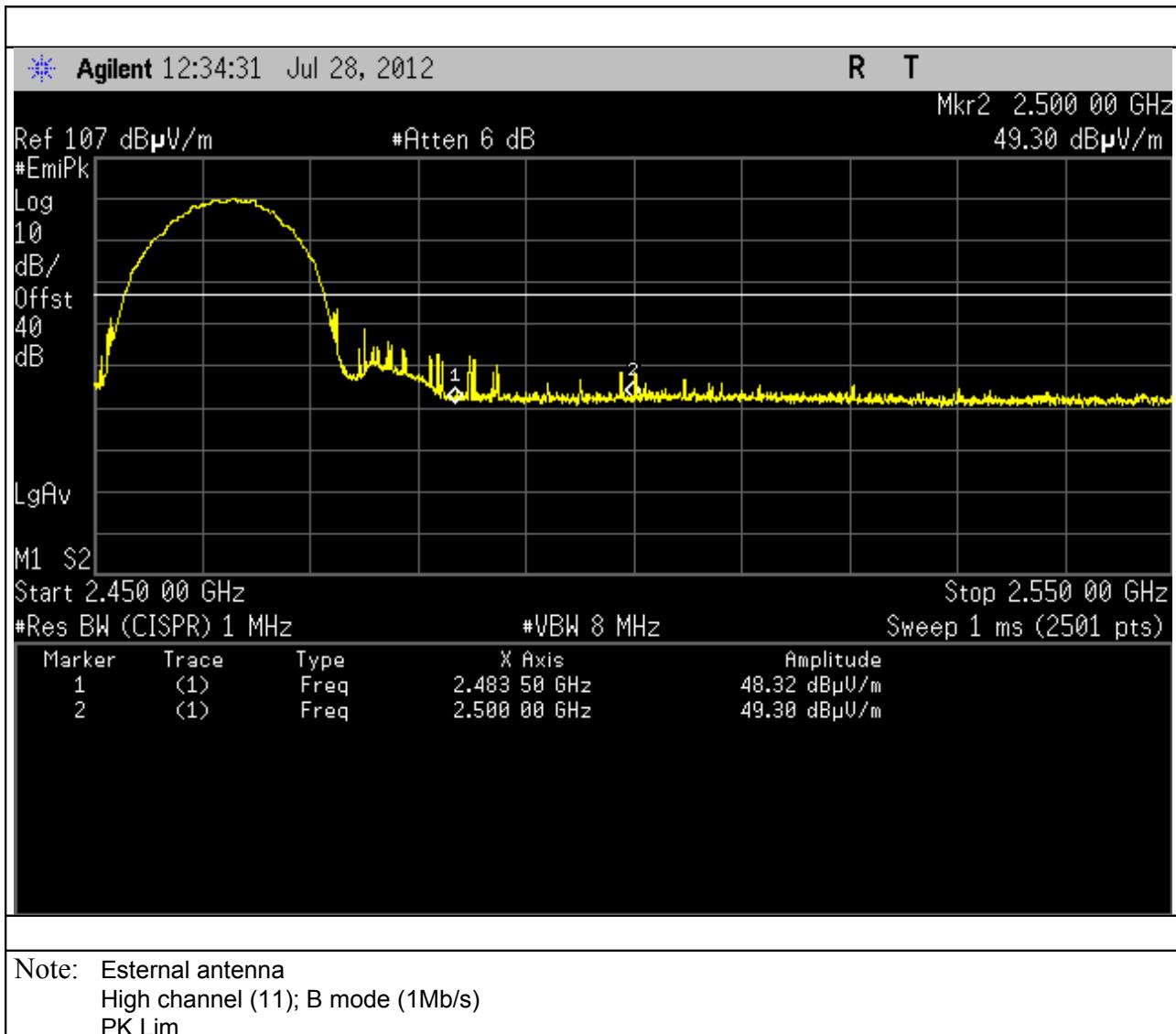
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**RESTRICTED BAND EDGE MEASUREMENT:
2483.5 – 2500 MHz BAND
EXTERNAL AND INTERNAL ANTENNA – WITH MODULATION**



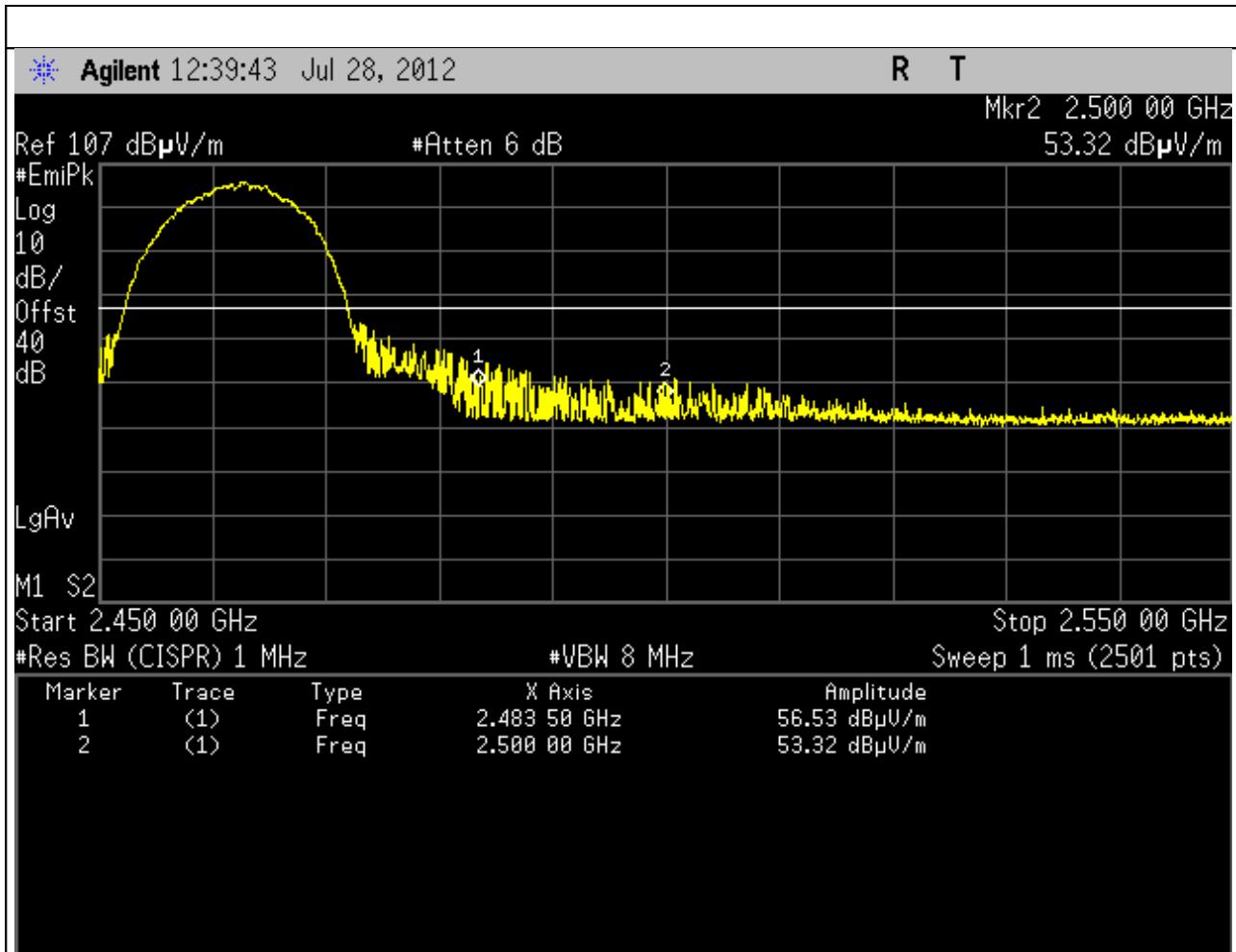
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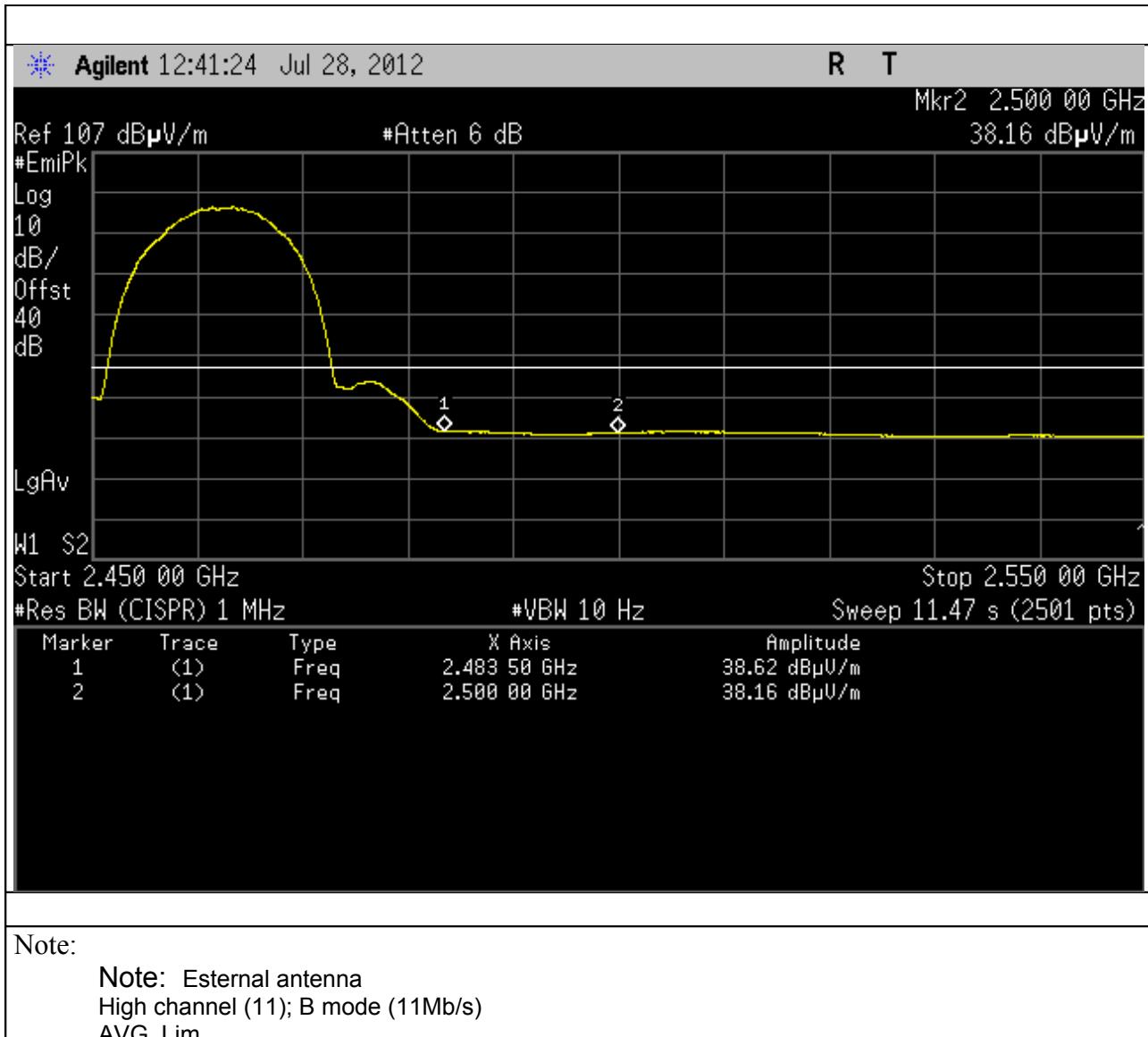
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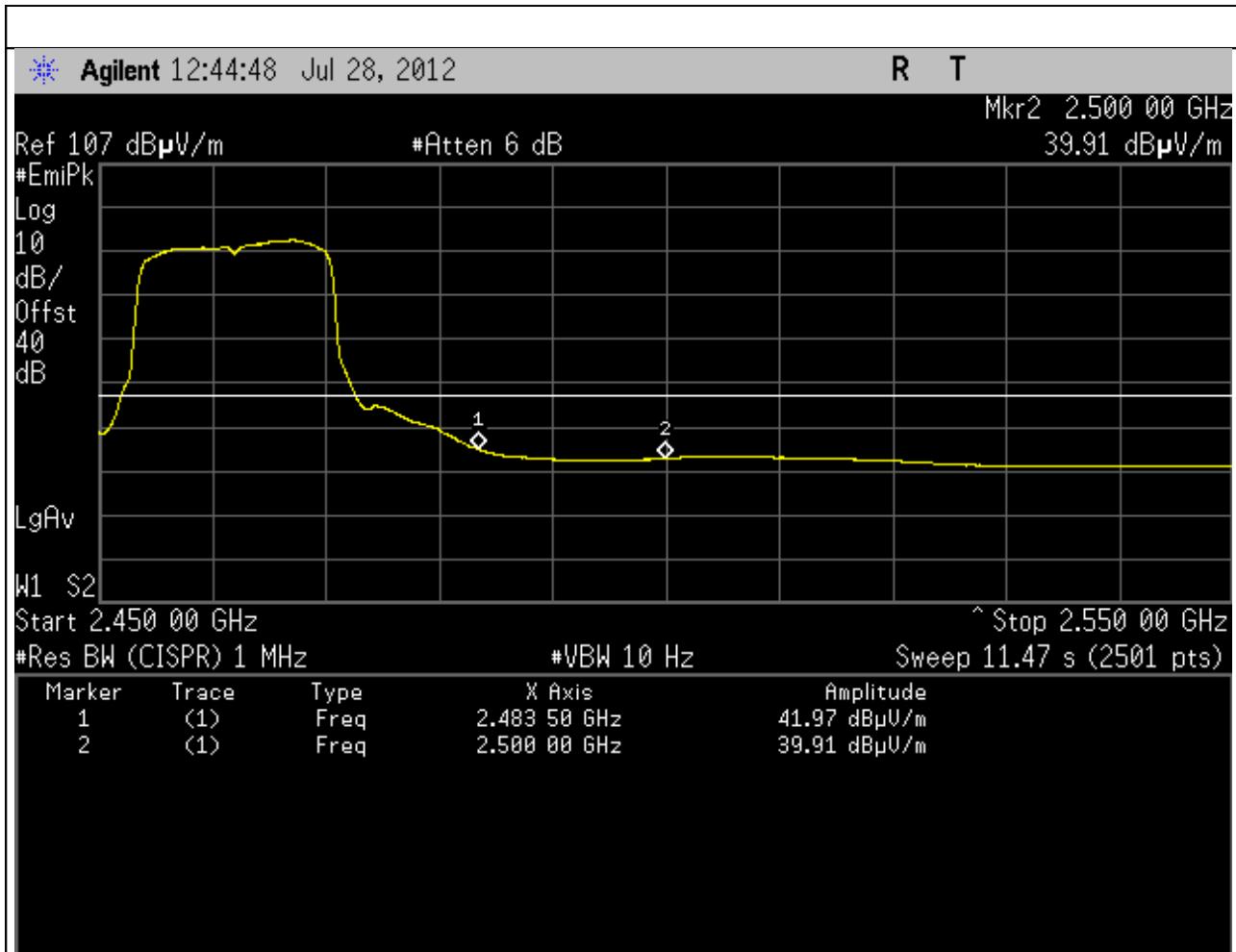
Note:

Note: External antenna
High channel (11); B mode (11Mb/s)
PK Lim



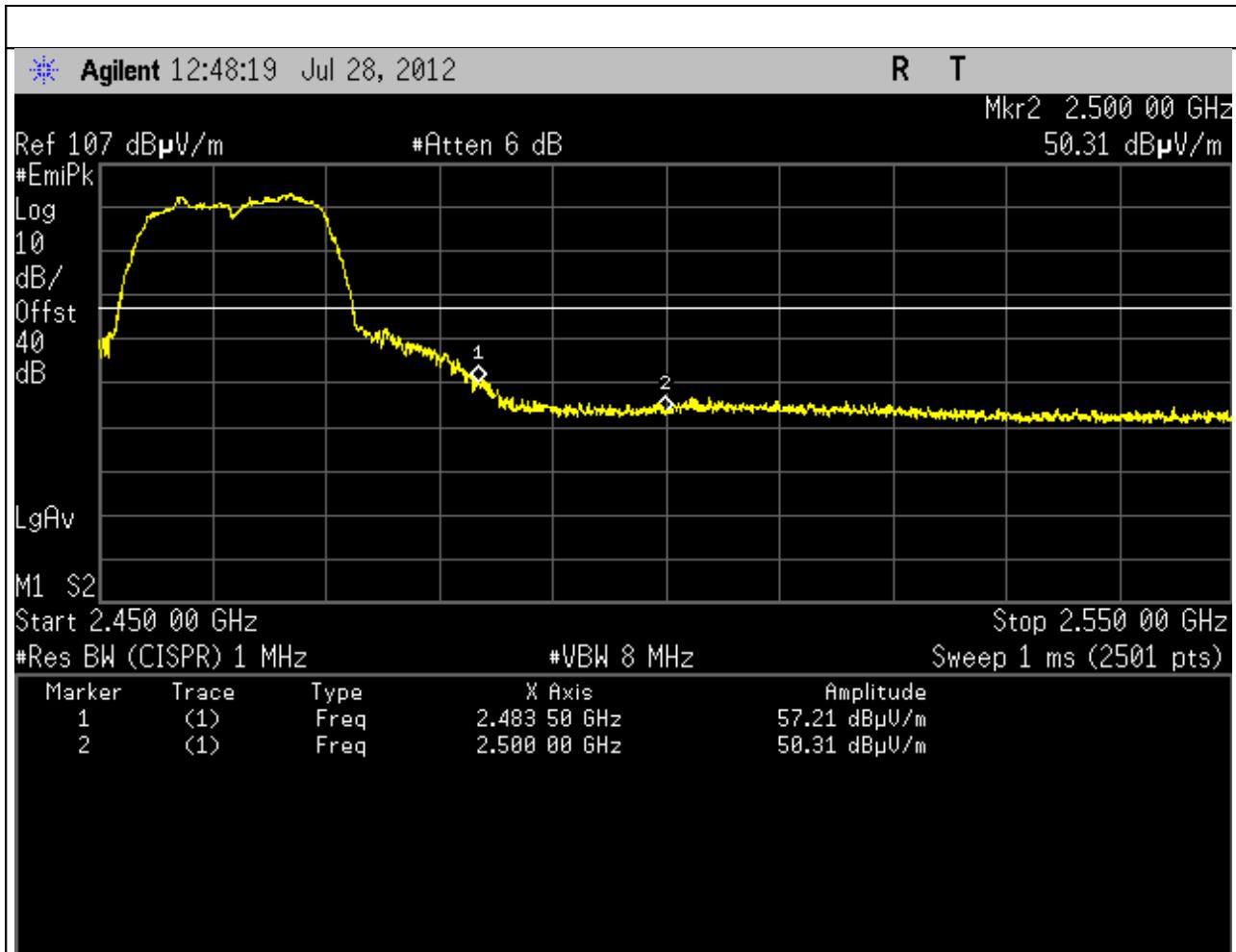
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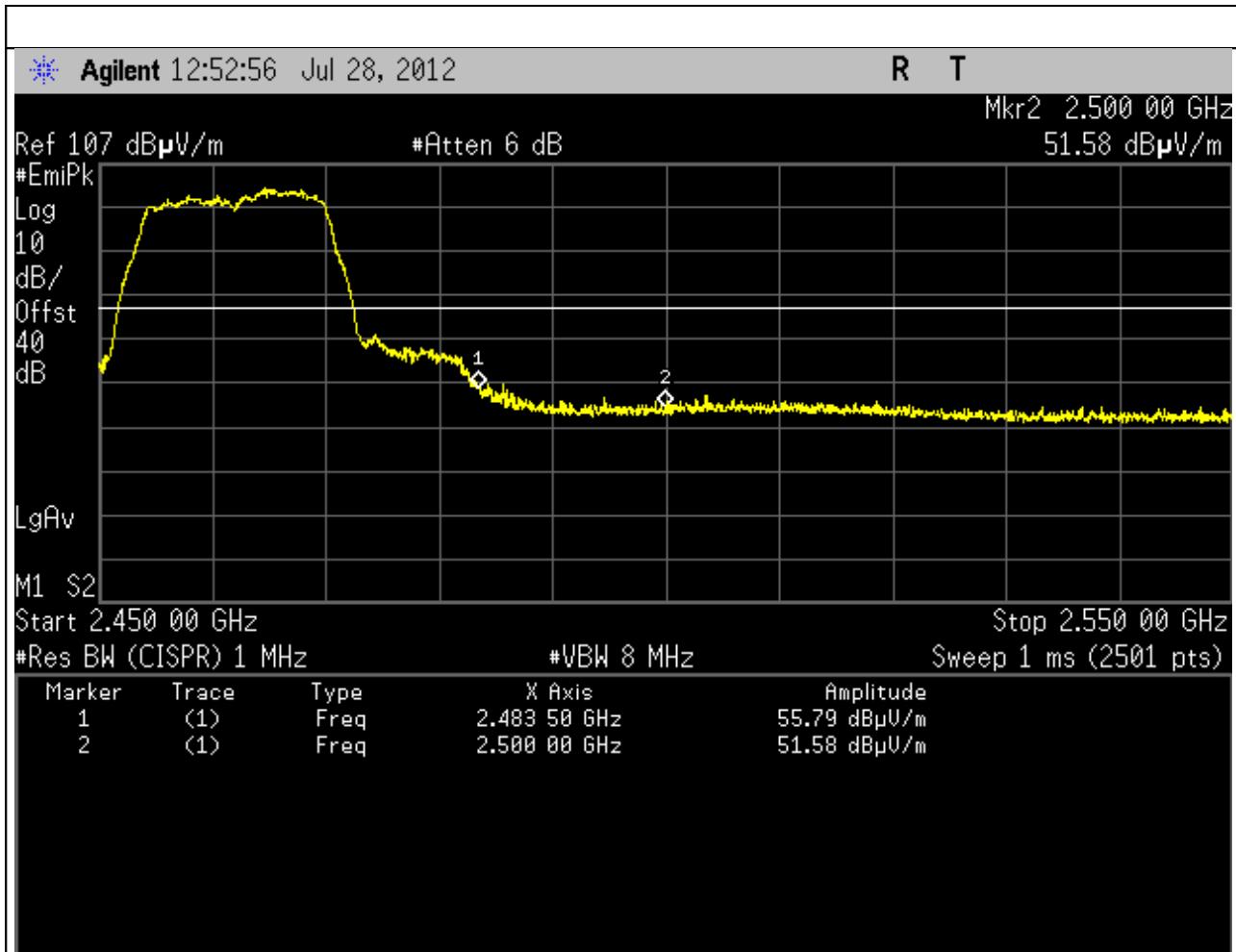
Note:

Note: External antenna
High channel (11); G mode (6 Mb/s)
AVG Lim



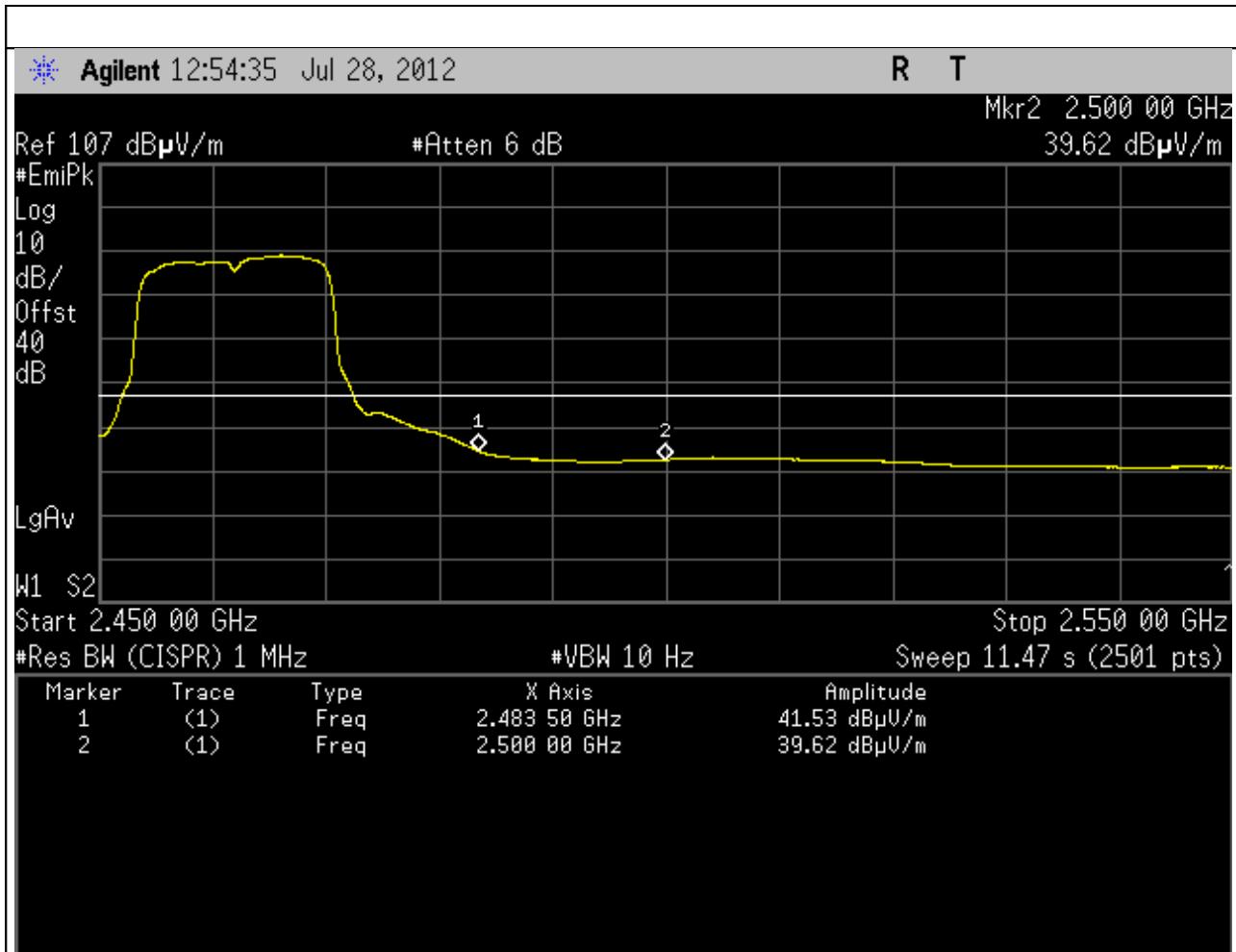
Note:

Note: External antenna
High channel (11); G mode (6 Mb/s)
PK Lim



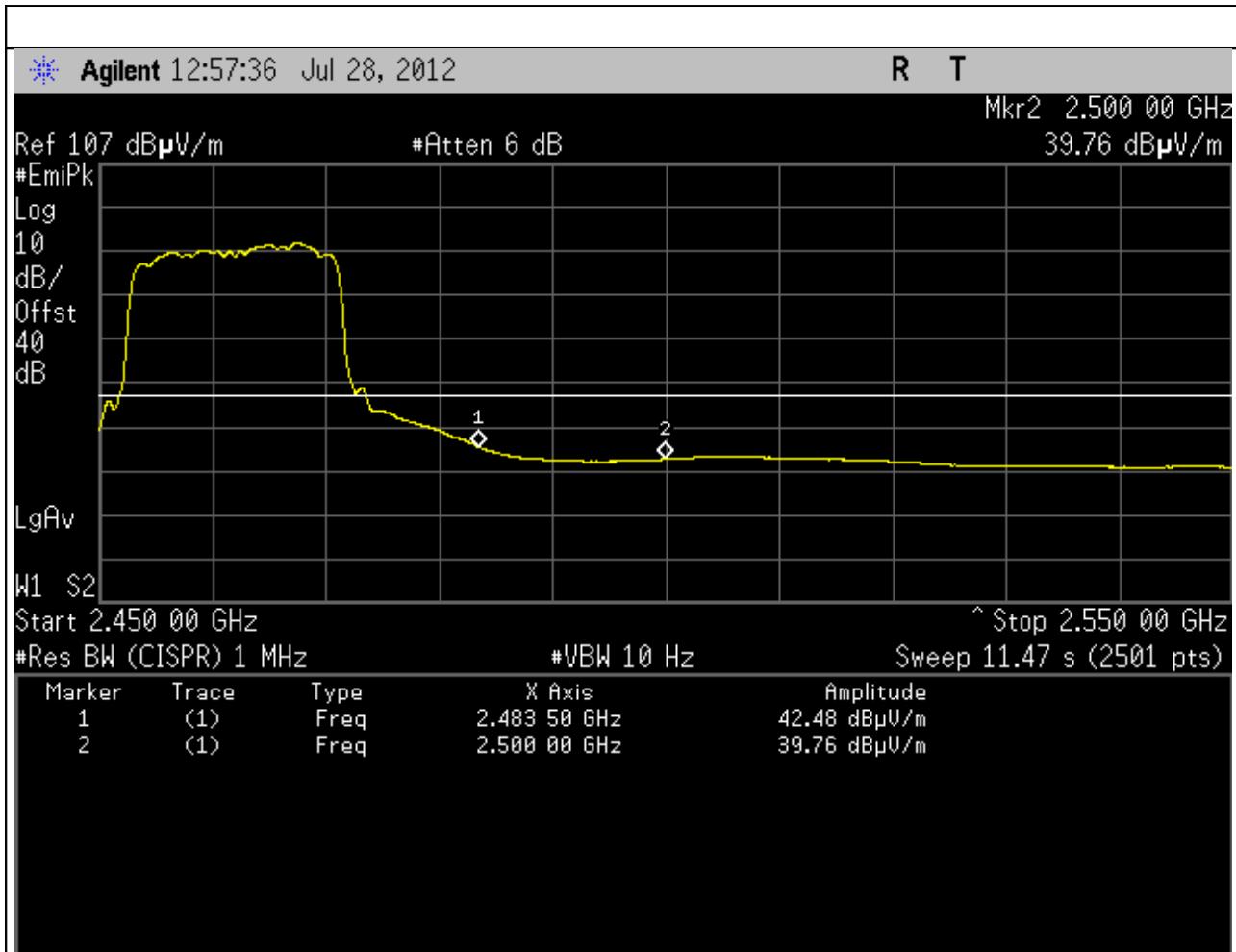
Note:

Note: External antenna
High channel (11); G mode (54 Mb/s)
PK Lim



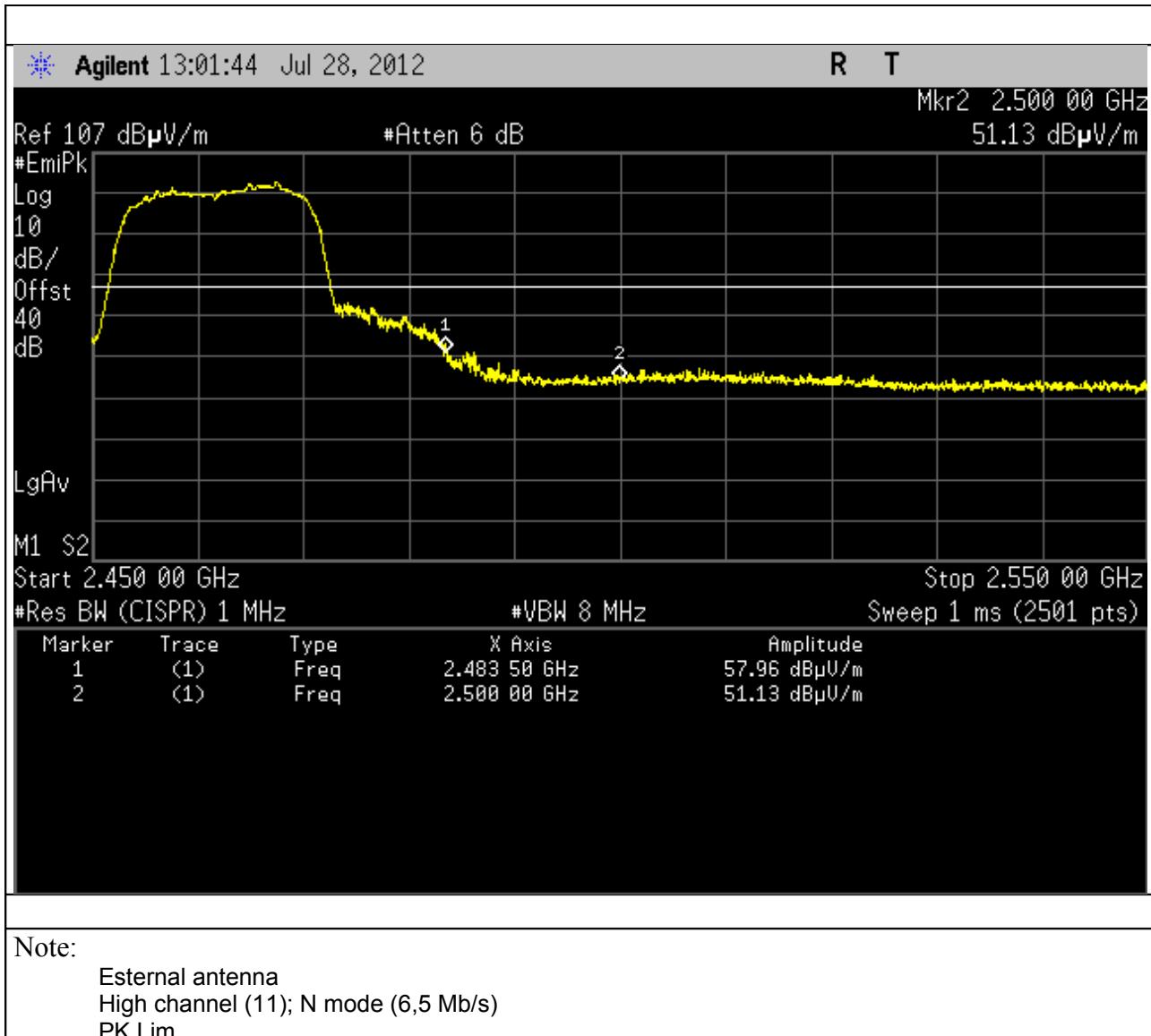
Note:

Note: External antenna
High channel (11); G mode (54 Mb/s)
AVG Lim



Note:

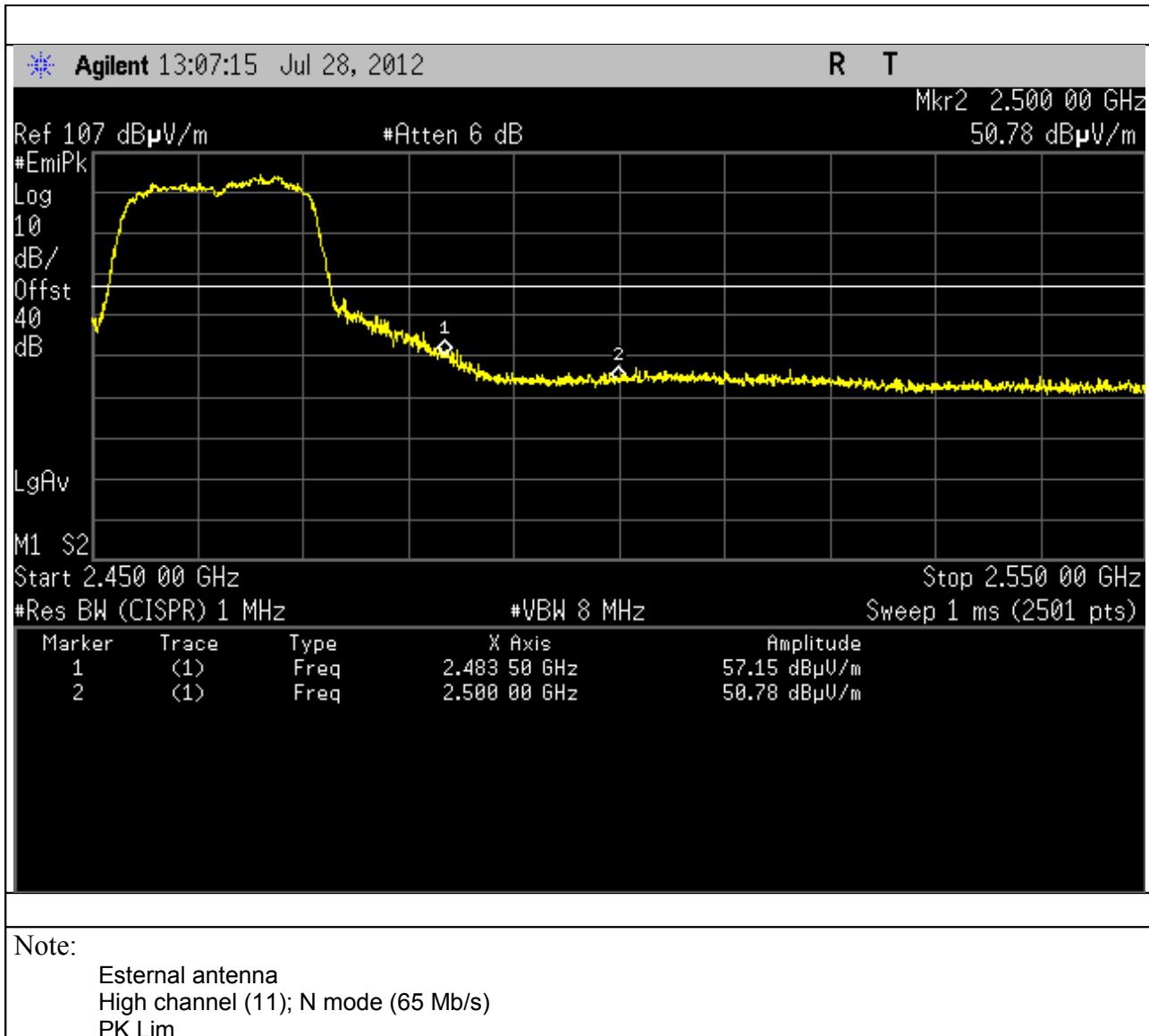
Note: External antenna
High channel (11); N mode (6,5 Mb/s)
AVG Lim

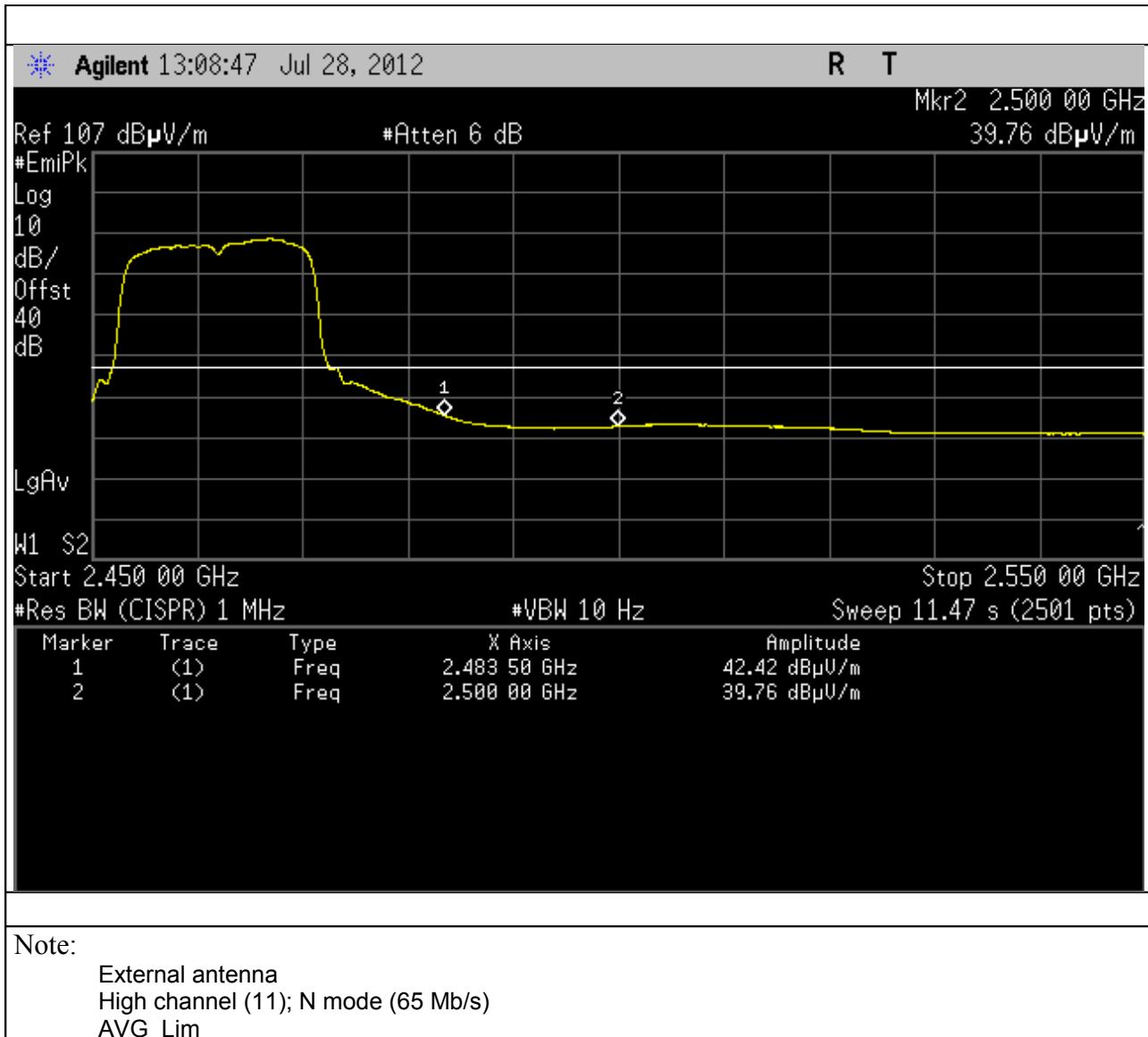


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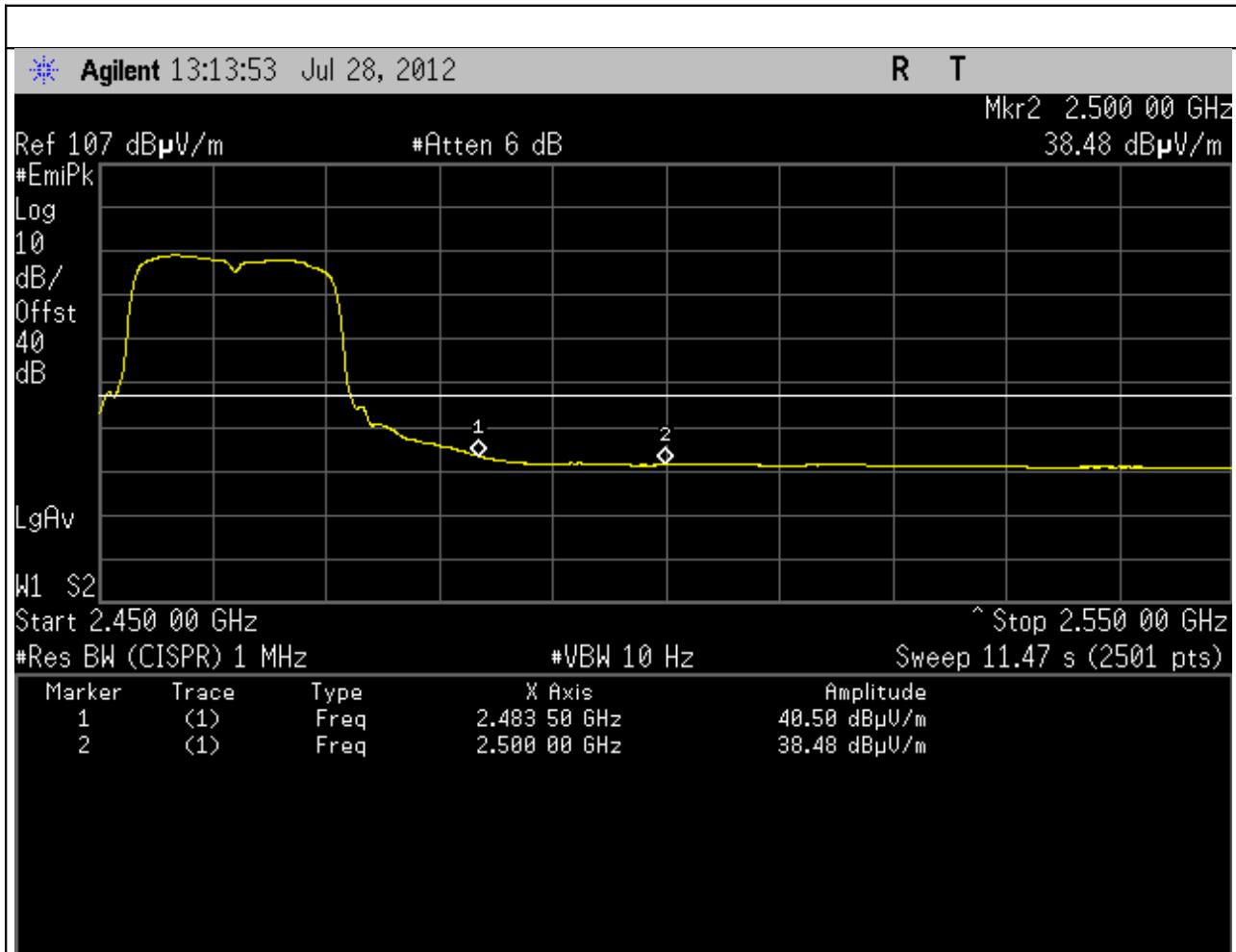




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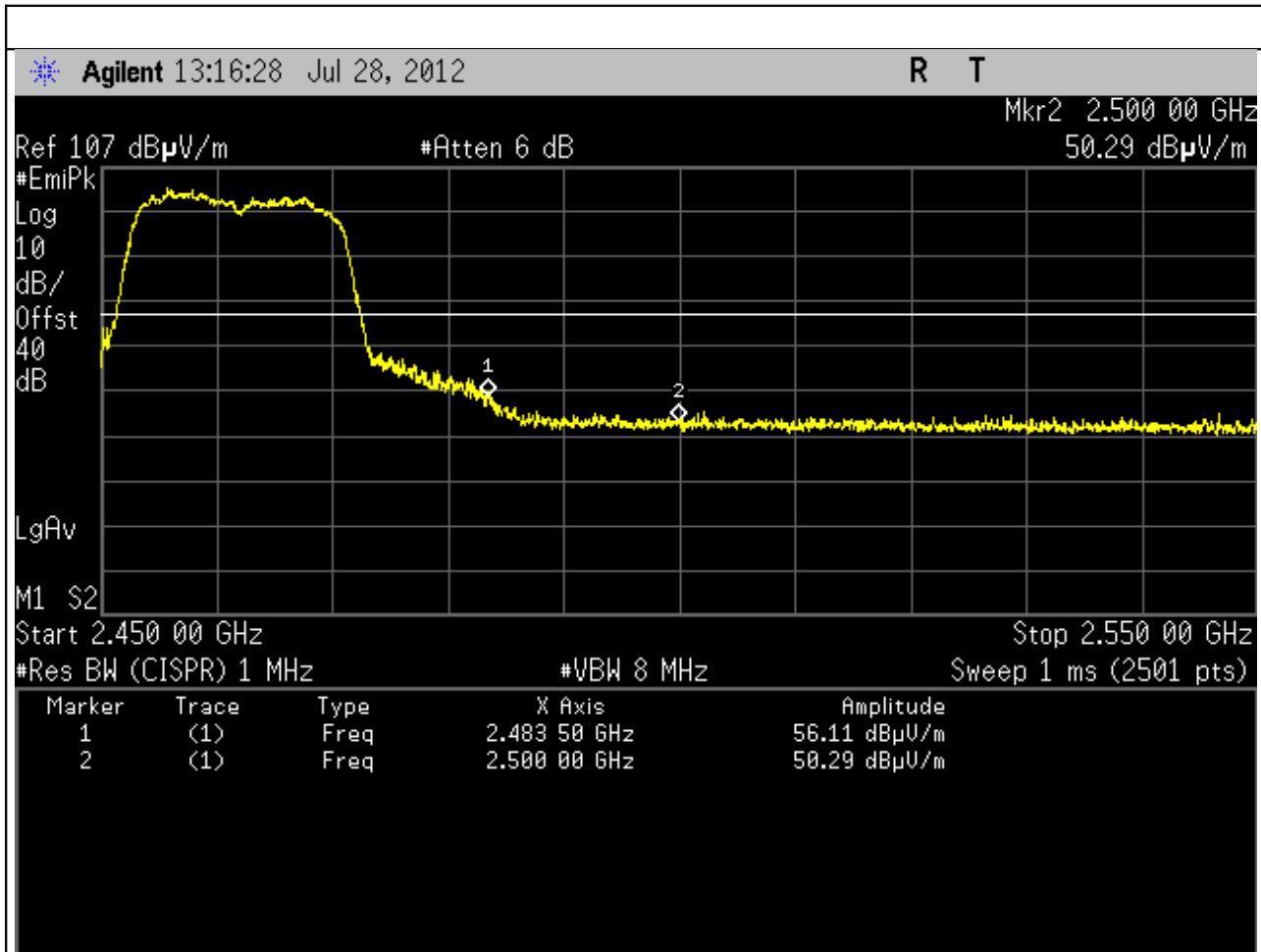
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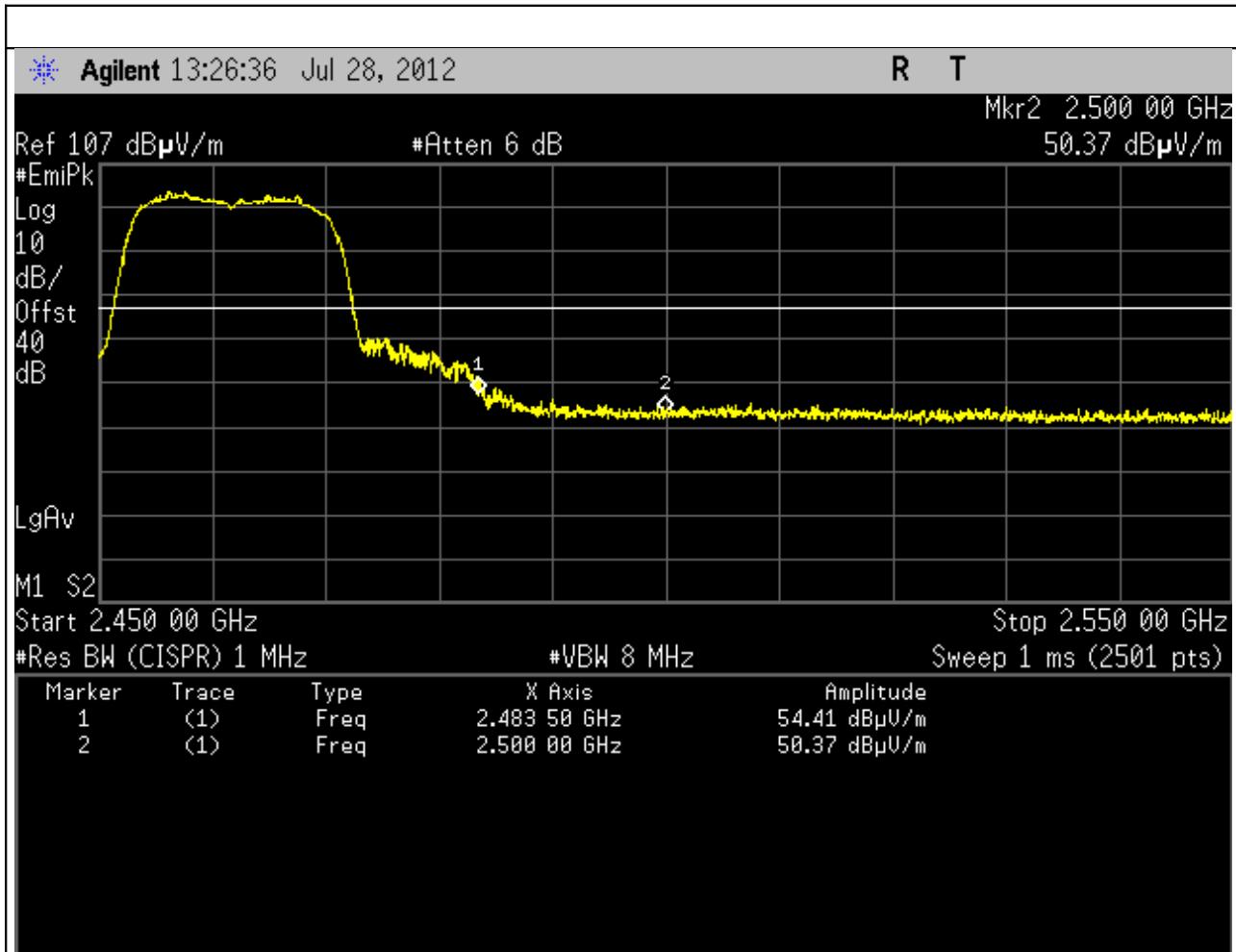
Note:

Internal antenna
High channel (11); N mode (65 Mb/s)
AVG Lim
POL H



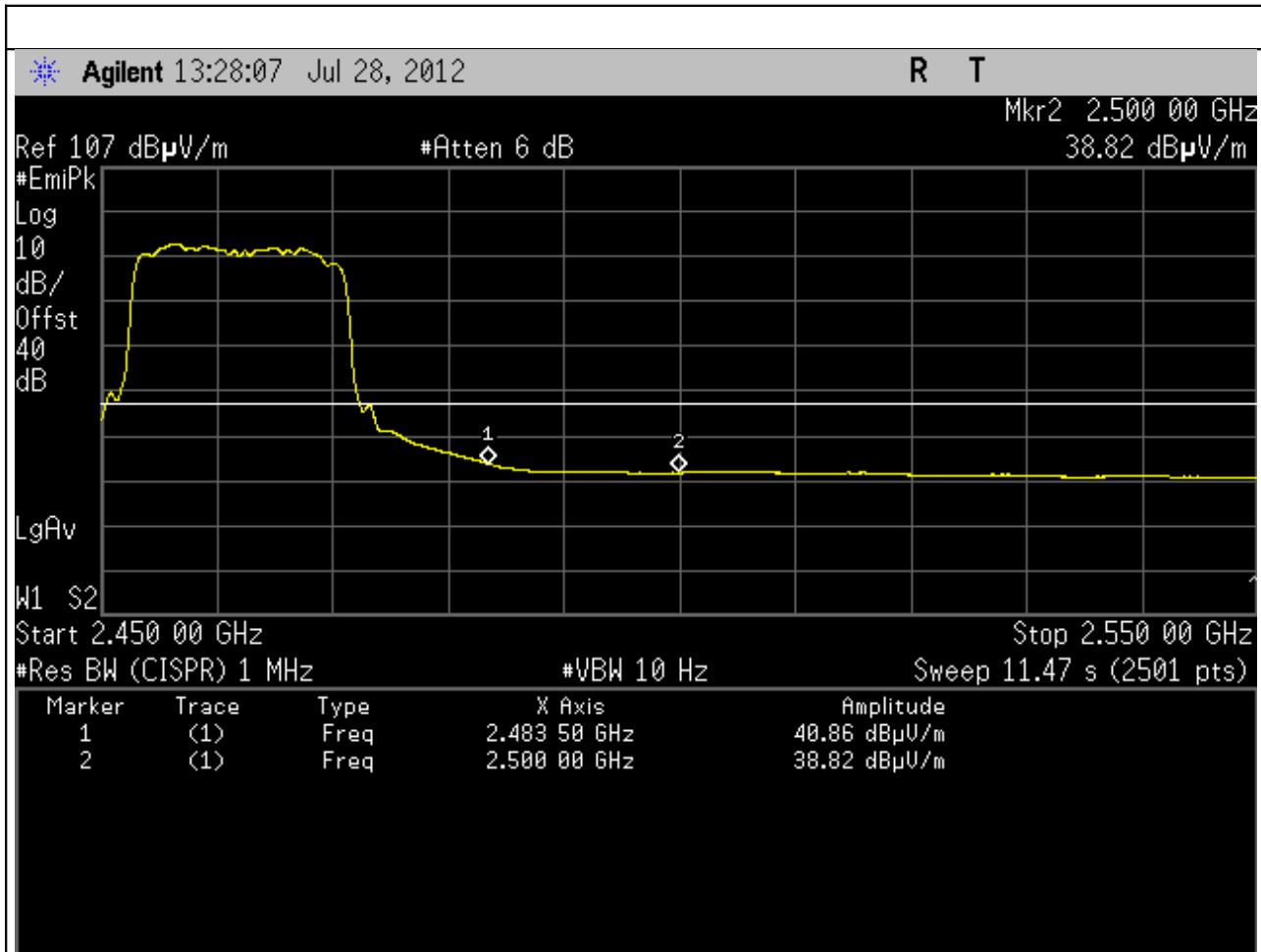
Note:

Internal antenna
High channel (11); N mode (65 Mb/s)
PK Lim
POL H



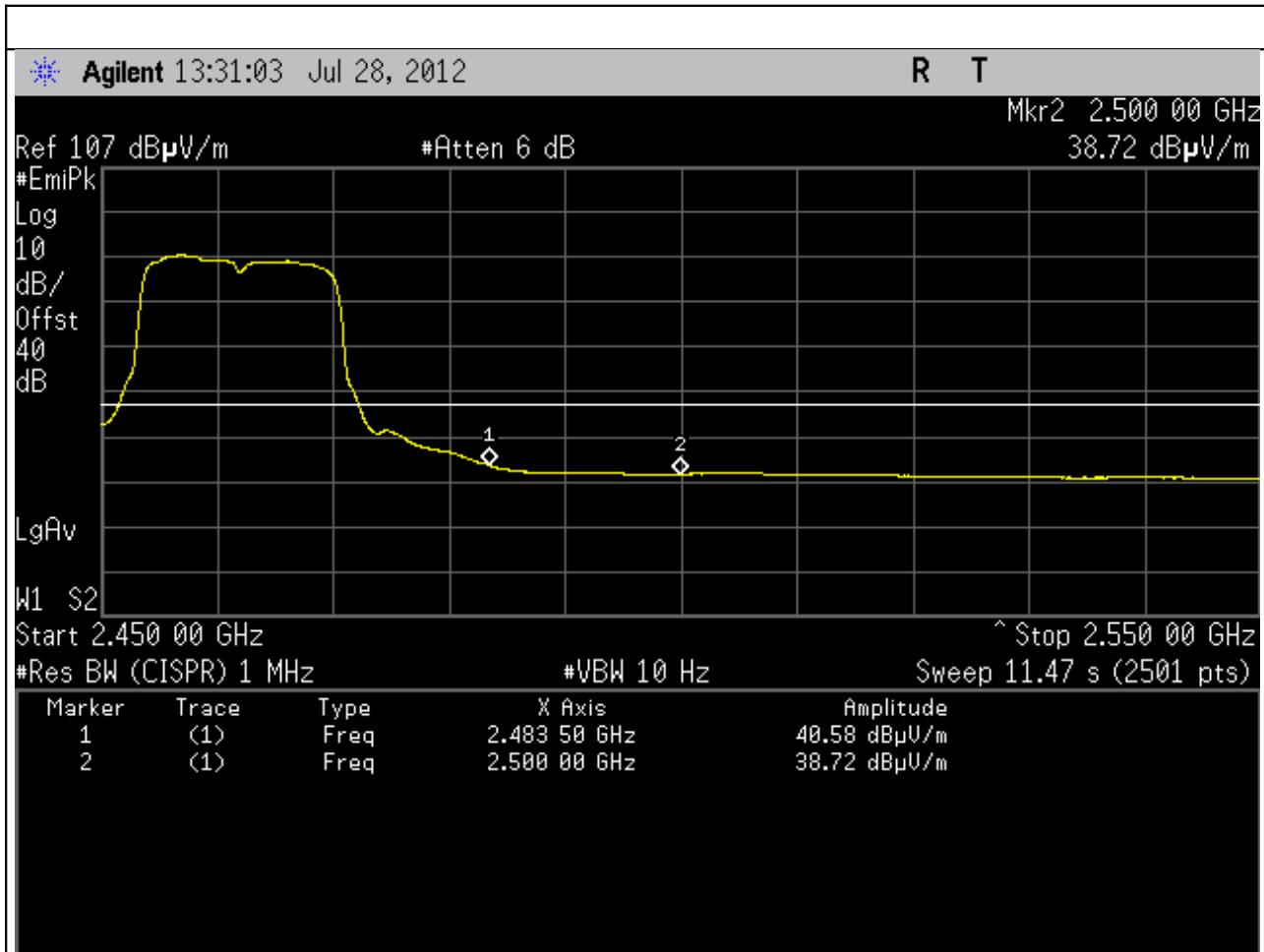
Note:

Internal antenna
High channel (11); N mode (6.5 Mb/s)
PK Lim
POL H



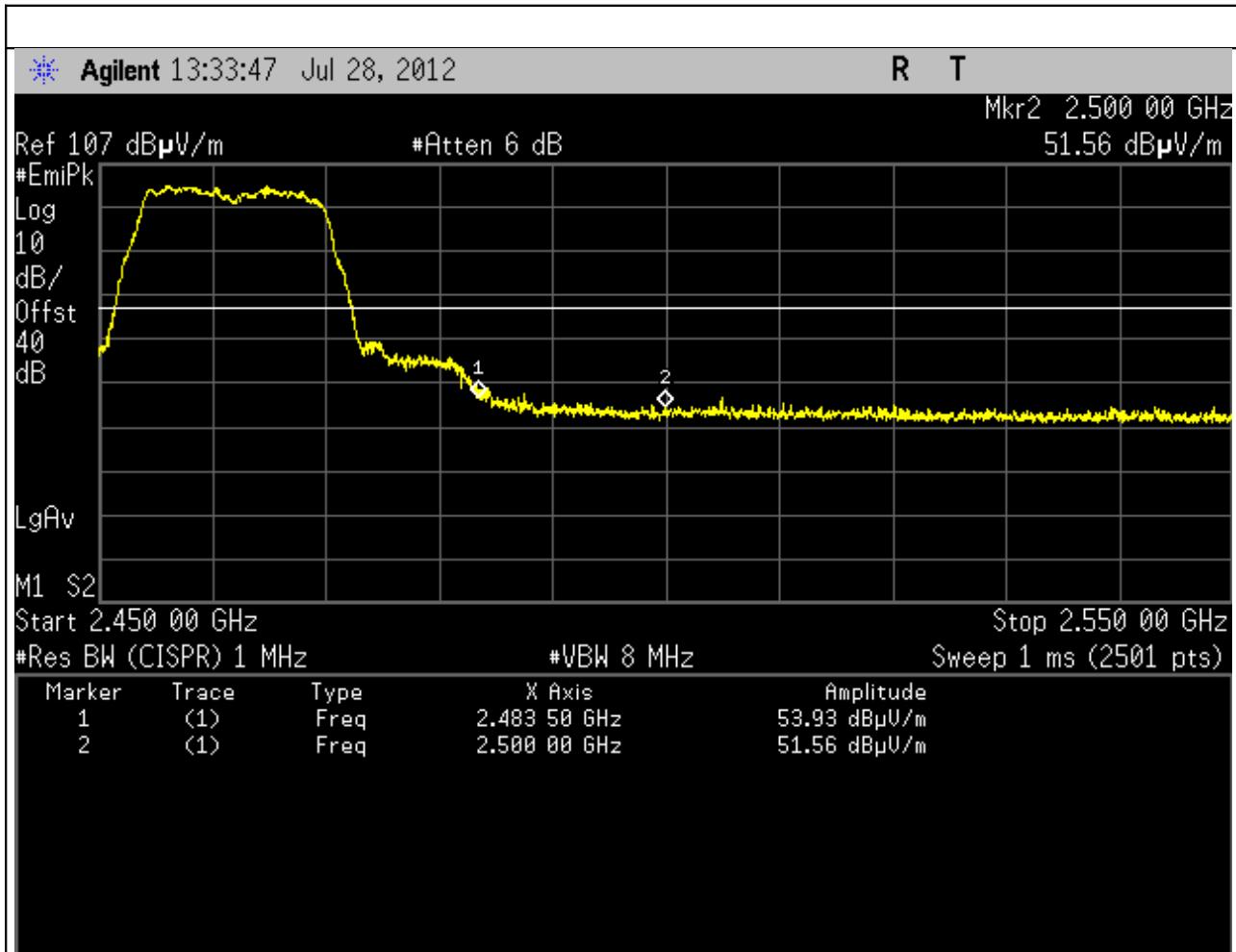
Note:

Internal antenna
High channel (11); N mode (6.5 Mb/s)
AVG Lim
POL H



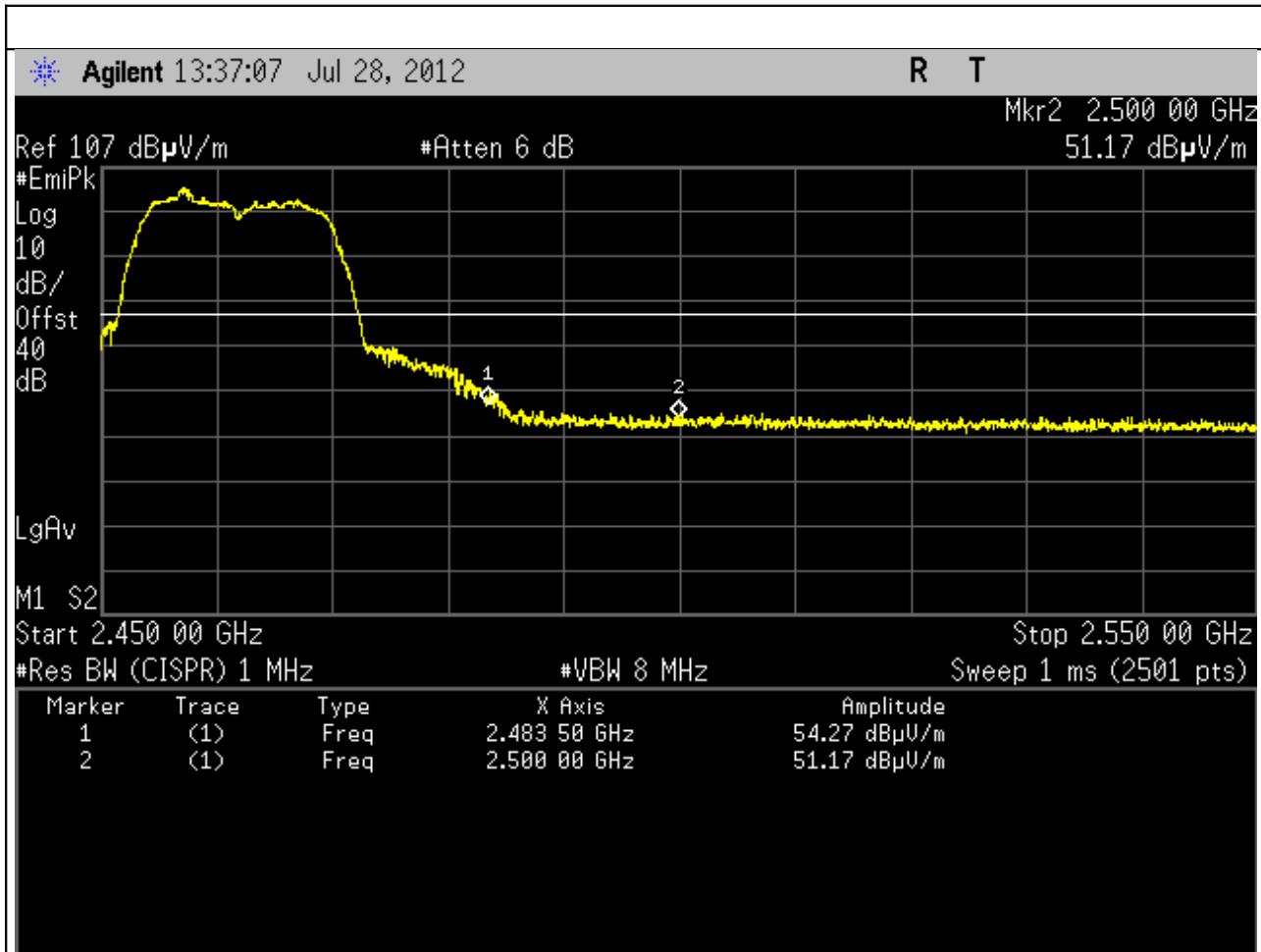
Note:

Internal antenna
High channel (11); G mode (54 Mb/s)
AVG Lim
POL H



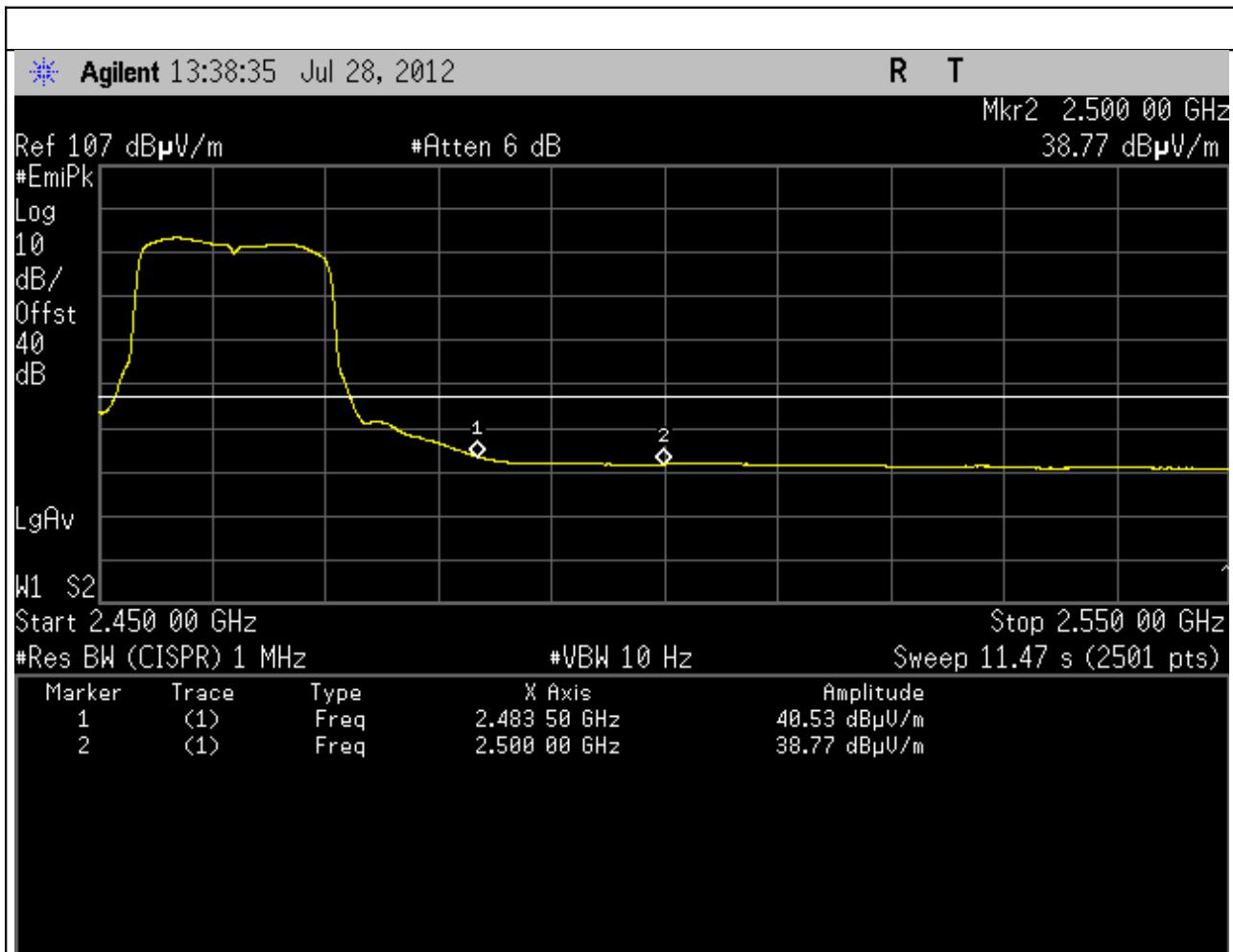
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Internal antenna
High channel (11); N mode (54 Mb/s)
PK Lim
POL H



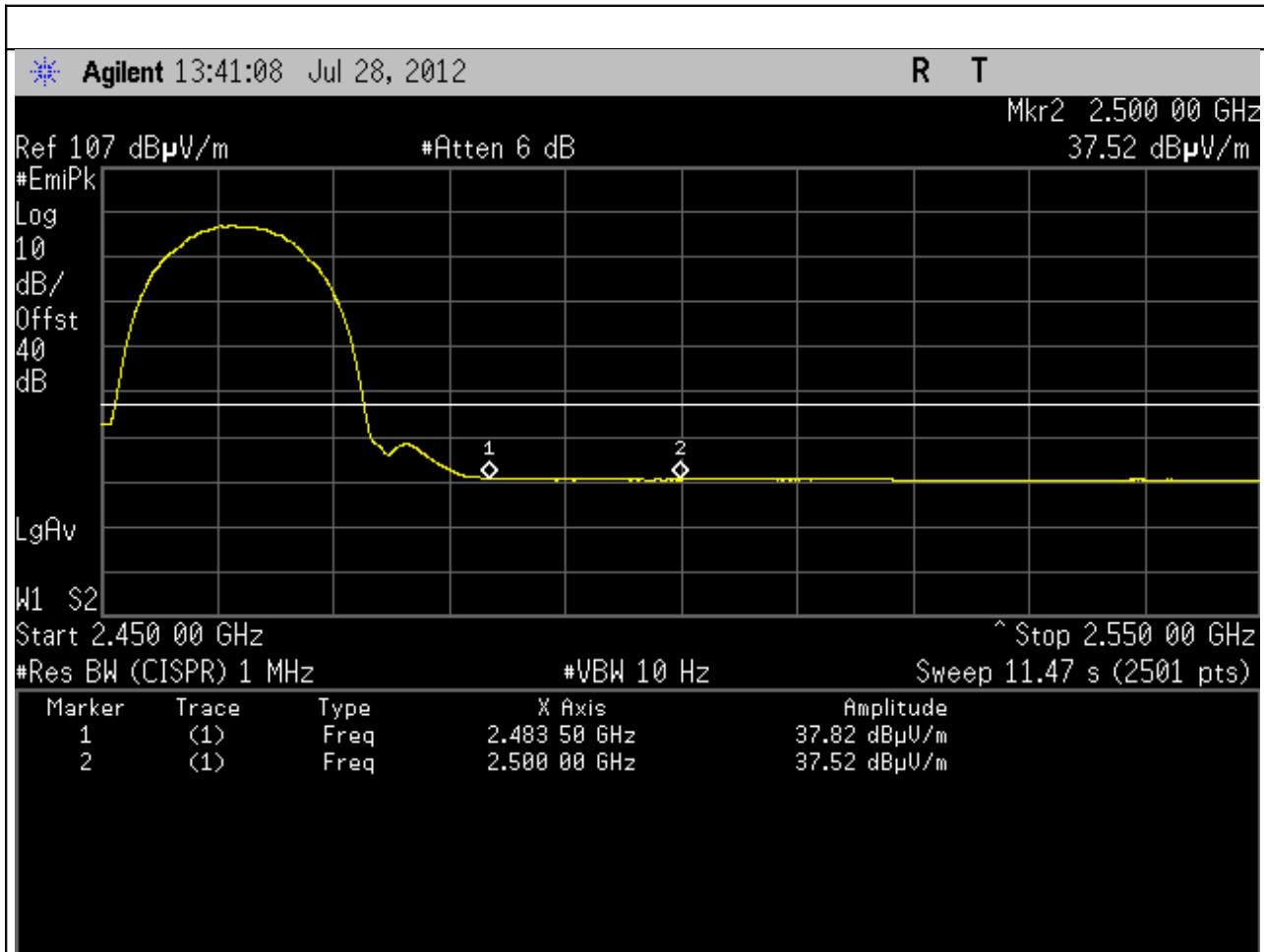
Note:

Internal antenna
High channel (11); N mode (6 Mb/s)
PK Lim
POL H



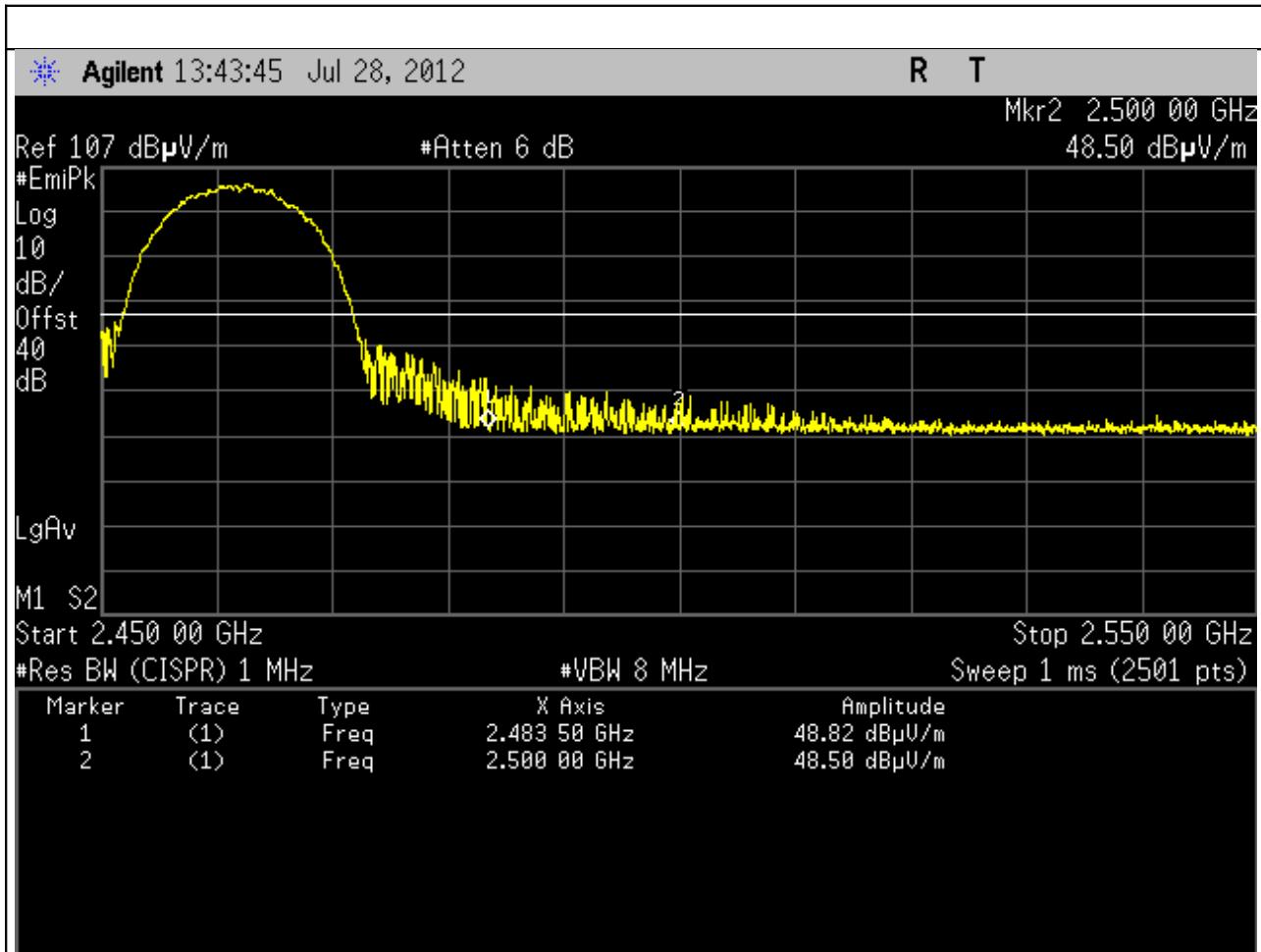
Note:

Internal antenna
High channel (11); N mode (6 Mb/s)
AVG Lim
POL H



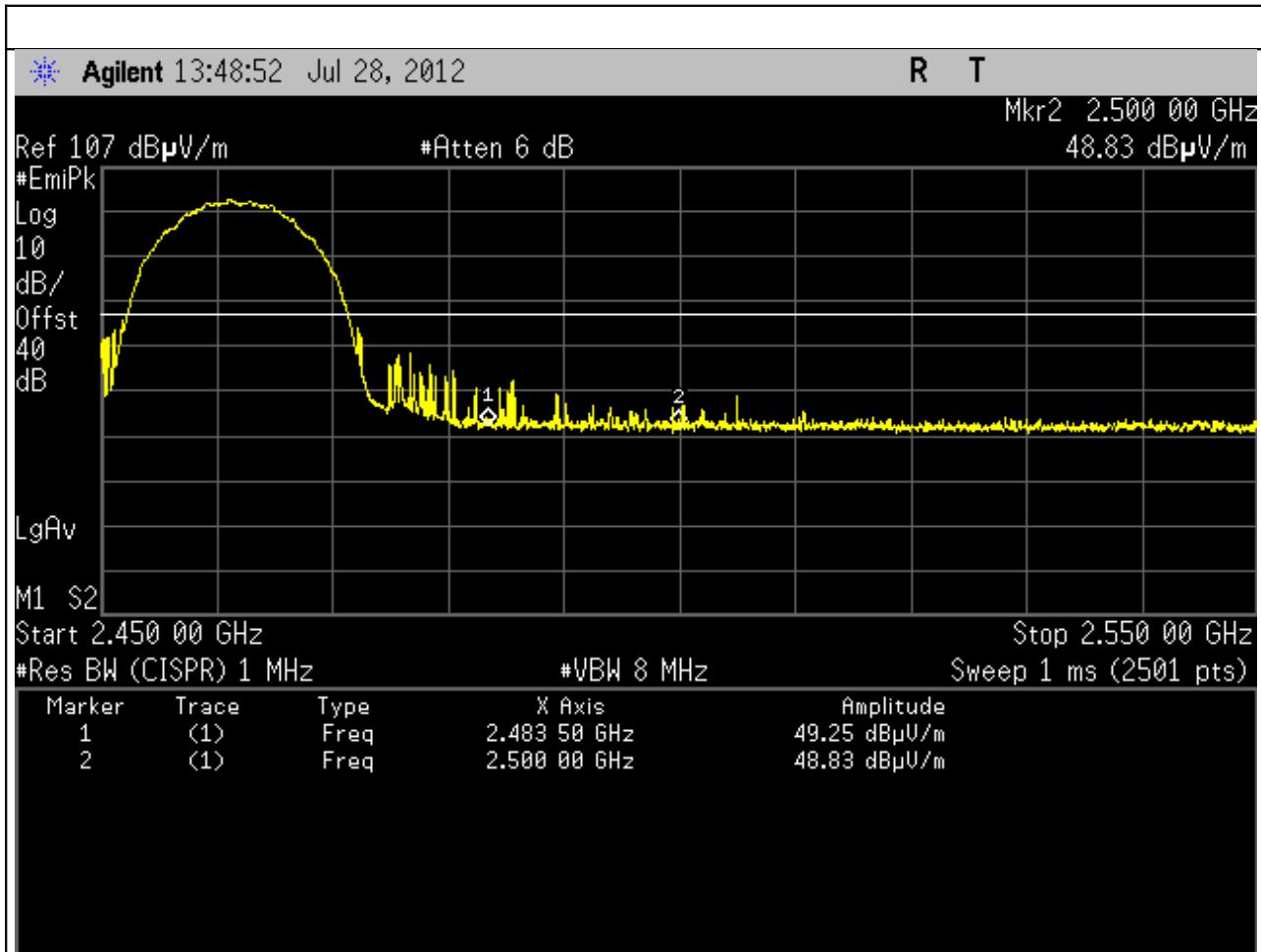
Note:

Internal antenna
High channel (11); B mode (11 Mb/s)
AVG Lim
POL H



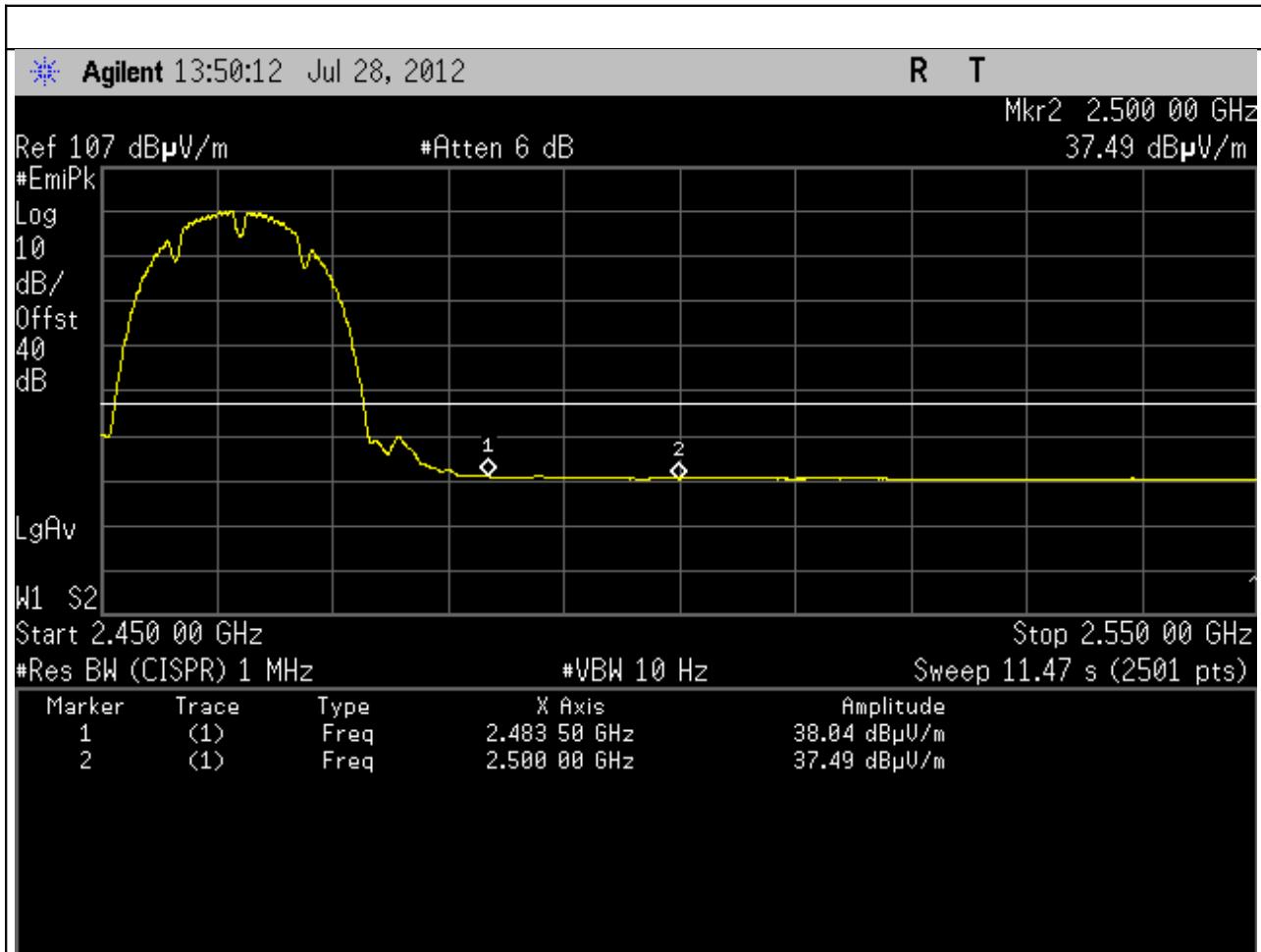
Note:

External antenna
High channel (11); B mode (11 Mb/s)
PK Lim
POL H



Note:

Internal antenna
High channel (11); N mode (1 Mb/s)
PK Lim
POL H



Note:

Internal antenna
High channel (11); N mode (1 Mb/s)
AVG Lim
POL H

RADIATED SPURIOUS EMISSIONS EXTERNAL ANTENNA

Low Channel 802.11b mode, 11 Mbs

F GHz	Polarization	Peak dBuV/m	Avg dBuV/m	Limit Peak	Limit Avg
4,824	H	51,7	-	74,0	54,0
4,824	V	55,8	49,2	74,0	54,0
7,236	H	56,5	43,3	74,0	54,0
7,236	V	60,7	47,9	74,0	54,0
9,648	H	61,1	48,8	74,0	54,0
9,648	V	62,2	50,7	74,0	54,0

NO OTHER EMISSIONS WERE DETECTED ABOVE SYSTEM NOISE FLOOR

Low Channel 802.11g mode, 54 Mbs

F GHz	Polarization	Peak dBuV/m	Avg dBuV/m	Limit Peak	Limit Avg
4,824	H	51,2	-	74,0	54,0
4,824	V	55,7	48,1	74,0	54,0
7,236	H	56,4	44,8	74,0	54,0
7,236	V	60,2	48,2	74,0	54,0
9,648	H	61,5	49,5	74,0	54,0
9,648	V	63,1	51,8	74,0	54,0

NO OTHER EMISSIONS WERE DETECTED ABOVE SYSTEM NOISE FLOOR

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Low Channel 802.11n mode, 65 Mbs					
F GHz	Polarization	Peak dBuV/m	Avg dBuV/m	Limit Peak	Limit Avg
4,824	H	51,1	-	74,0	54,0
4,824	V	55,3	48,5	74,0	54,0
7,236	H	55,9	44,3	74,0	54,0
7,236	V	60,1	48,6	74,0	54,0
9,648	H	61,2	49,8	74,0	54,0
9,648	V	63,5	51,3	74,0	54,0
NO OTHER EMISSIONS WERE DETECTED ABOVE SYSTEM NOISE FLOOR					
Mid Channel 802.11b mode, 11 Mbs					
F GHz	Polarization	Peak dBuV/m	Avg dBuV/m	Limit Peak	Limit Avg
4,874	H	53,4	-	74,0	54,0
4,824	V	50,2	-	74,0	54,0
7,311	H	57,5	45,9	74,0	54,0
7,311	V	58,1	46,8	74,0	54,0
9,748	H	59,1	47,3	74,0	54,0
9,748	V	62,3	50,1	74,0	54,0
NO OTHER EMISSIONS WERE DETECTED ABOVE SYSTEM NOISE FLOORS					

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Mid Channel 802.11g mode, 54 Mbs					
F GHz	Polarization	Peak dBuV/m	Avg dBuV/m	Limit Peak	Limit Avg
4,874	H	52,9	-	74,0	54,0
4,824	V	56,9	40,7	74,0	54,0
7,311	H	58,0	44,2	74,0	54,0
7,311	V	58,2	44,1	74,0	54,0
9,748	H	60,4	47,1	74,0	54,0
9,748	V	59,7	47,8	74,0	54,0
NO OTHER EMISSIONS WERE DETECTED ABOVE SYSTEM NOISE FLOOR					
Mid Channel 802.11n mode, 65 Mbs					
F GHz	Polarization	Peak dBuV/m	Avg dBuV/m	Limit Peak	Limit Avg
4,874	H	52,3	-	74,0	54,0
4,824	V	56,5	40,2	74,0	54,0
7,311	H	58,2	44,9	74,0	54,0
7,311	V	58,2	44,8	74,0	54,0
9,748	H	60,5	47,9	74,0	54,0
9,748	V	59,1	47,5	74,0	54,0
NO OTHER EMISSIONS WERE DETECTED ABOVE SYSTEM NOISE FLOOR					

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High Channel 802.11b mode, 11 Mbs					
F GHz	Polarization	Peak dBuV/m	Avg dBuV/m	Limit Peak	Limit Avg
4,924	H	53,2	-	74,0	54,0
4,924	V	50,8	-	74,0	54,0
7,386	H	57,7	45,8	74,0	54,0
7,386	V	58,5	46,7	74,0	54,0
9,848	H	59,3	47,4	74,0	54,0
9,848	V	62,8	50,8	74,0	54,0
NO OTHER EMISSIONS WERE DETECTED ABOVE SYSTEM NOISE FLOOR					
High Channel 802.11g mode, 54 Mbs					
F GHz	Polarization	Peak dBuV/m	Avg dBuV/m	Limit Peak	Limit Avg
4,924	H	52,5	-	74,0	54,0
4,924	V	52,9	-	74,0	54,0
7,386	H	56,7	44,8	74,0	54,0
7,386	V	58,5	46,7	74,0	54,0
9,848	H	58,4	47,8	74,0	54,0
9,748	V	62,4	50,3	74,0	54,0
NO OTHER EMISSIONS WERE DETECTED ABOVE SYSTEM NOISE FLOOR					

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High Channel 802.11n mode, 65 Mbs					
F GHz	Polarization	Peak dBuV/m	Avg dBuV/m	Limit Peak	Limit Avg
4,924	H	53,8	-	74,0	54,0
4,924	V	53,4	-	74,0	54,0
7,386	H	58,1	43,8	74,0	54,0
7,386	V	58,2	46,1	74,0	54,0
9,848	H	58,2	47,8	74,0	54,0
9,748	V	61,5	50,9	74,0	54,0
NO OTHER EMISSIONS WERE DETECTED ABOVE SYSTEM NOISE FLOOR					

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RADIATED SPURIOUS EMISSIONS INTERNAL ANTENNA

Low Channel 802.11b mode, 11 Mbs

F GHz	Polarization	Peak dBuV/m	Avg dBuV/m	Limit Peak	Limit Avg
4,824	H	50,2	48,4	74,0	54,0
4,824	V	54,8	48,5	74,0	54,0
7,236	H	55,5	42,6	74,0	54,0
7,236	V	59,1	47,2	74,0	54,0
9,648	H	60,2	47,8	74,0	54,0
9,648	V	61,4	50,5	74,0	54,0

NO OTHER EMISSIONS WERE DETECTED ABOVE SYSTEM NOISE FLOOR

Low Channel 802.11g mode, 54 Mbs

F GHz	Polarization	Peak dBuV/m	Avg dBuV/m	Limit Peak	Limit Avg
4,824	H	50,2	47,1	74,0	54,0
4,824	V	54,1	48,2	74,0	54,0
7,236	H	54,9	43,4	74,0	54,0
7,236	V	59,9	46,1	74,0	54,0
9,648	H	60,1	45,2	74,0	54,0
9,648	V	62,1	50,5	74,0	54,0

NO OTHER EMISSIONS WERE DETECTED ABOVE SYSTEM NOISE FLOOR

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Low Channel 802.11n mode, 65 Mbs					
F GHz	Polarization	Peak dBuV/m	Avg dBuV/m	Limit Peak	Limit Avg
4,824	H	50,8	48,3	74,0	54,0
4,824	V	53,1	47,4	74,0	54,0
7,236	H	55,6	43,2	74,0	54,0
7,236	V	59,1	47,0	74,0	54,0
9,648	H	60,9	48,8	74,0	54,0
9,648	V	62,8	50,2	74,0	54,0
NO OTHER EMISSIONS WERE DETECTED ABOVE SYSTEM NOISE FLOOR					
Mid Channel 802.11b mode, 11 Mbs					
F GHz	Polarization	Peak dBuV/m	Avg dBuV/m	Limit Peak	Limit Avg
4,874	H	52,4	43,2	74,0	54,0
4,824	V	50,2	42,2	74,0	54,0
7,311	H	55,6	44,8	74,0	54,0
7,311	V	57,1	45,6	74,0	54,0
9,748	H	59,5	48,4	74,0	54,0
9,748	V	62,4	50,2	74,0	54,0
NO OTHER EMISSIONS WERE DETECTED ABOVE SYSTEM NOISE FLOORS					

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Mid Channel 802.11g mode, 54 Mbs					
F GHz	Polarization	Peak dBuV/m	Avg dBuV/m	Limit Peak	Limit Avg
4,874	H	52,2	43,5	74,0	54,0
4,824	V	56,2	40,2	74,0	54,0
7,311	H	57,5	43,4	74,0	54,0
7,311	V	58,2	43,2	74,0	54,0
9,748	H	59,8	47,5	74,0	54,0
9,748	V	59,1	46,0	74,0	54,0
NO OTHER EMISSIONS WERE DETECTED ABOVE SYSTEM NOISE FLOOR					
Mid Channel 802.11n mode, 65 Mbs					
F GHz	Polarization	Peak dBuV/m	Avg dBuV/m	Limit Peak	Limit Avg
4,874	H	51,4	42,4	74,0	54,0
4,824	V	52,6	40,5	74,0	54,0
7,311	H	58,8	43,2	74,0	54,0
7,311	V	56,5	43,1	74,0	54,0
9,748	H	59,5	45,2	74,0	54,0
9,748	V	59,3	46,1	74,0	54,0
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High Channel 802.11b mode, 11 Mbs					
F GHz	Polarization	Peak dBuV/m	Avg dBuV/m	Limit Peak	Limit Avg
4,924	H	52,6	43,2	74,0	54,0
4,924	V	50,2	43,8	74,0	54,0
7,386	H	55,6	44,3	74,0	54,0
7,386	V	57,4	45,5	74,0	54,0
9,848	H	58,4	47,3	74,0	54,0
9,848	V	61,8	50,4	74,0	54,0
NO OTHER EMISSIONS WERE DETECTED ABOVE SYSTEM NOISE FLOOR					
High Channel 802.11g mode, 54 Mbs					
F GHz	Polarization	Peak dBuV/m	Avg dBuV/m	Limit Peak	Limit Avg
4,924	H	52,6	43,2	74,0	54,0
4,924	V	51,4	42,5	74,0	54,0
7,386	H	56,5	44,1	74,0	54,0
7,386	V	57,5	46,9	74,0	54,0
9,848	H	58,2	47,2	74,0	54,0
9,748	V	61,8	50,5	74,0	54,0
NO OTHER EMISSIONS WERE DETECTED ABOVE SYSTEM NOISE FLOOR					

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High Channel 802.11n mode, 65 Mbs					
F GHz	Polarization	Peak dBuV/m	Avg dBuV/m	Limit Peak	Limit Avg
4,924	H	53,2	42,2	74,0	54,0
4,924	V	52,1	43,9	74,0	54,0
7,386	H	56,6	43,1	74,0	54,0
7,386	V	57,8	45,4	74,0	54,0
9,848	H	57,9	47,4	74,0	54,0
9,748	V	61,5	50,6	74,0	54,0
NO OTHER EMISSIONS WERE DETECTED ABOVE SYSTEM NOISE FLOOR					

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10. MAXIMUM PERMISSIBLE EXPOSURE

Equipment shall meet the limits below .

1mW/cm² max at 20 cm of distance

Calculation:

$$E = \frac{\sqrt{30PG}}{d}$$

$$S = \frac{(E)^2}{3770}$$

E= Field Strength in Volts/meter

P=Power in watt

G= Numeric Antenna Gain

d= Distance in meter

S= power Density in milliwatts/square centimeter

Arranging terms to calculate the power density at a specifica distance yields:

$$S = 0.0795 * 10^{((P+G)/10)/(d^2)}$$

The power density in units of mW/cm² is converted to units of W/m² multiplying by a factor of 10.

Result

Power Density Limit mW/cm ²	Output Power (erp) mW	Power Density at 20cm mW/cm ²	Remark
1	29	0,087	-

(*) OET Bulletin 65

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11. PHOTO



Fig. 11.1
Radiated Emissions Test Set-up

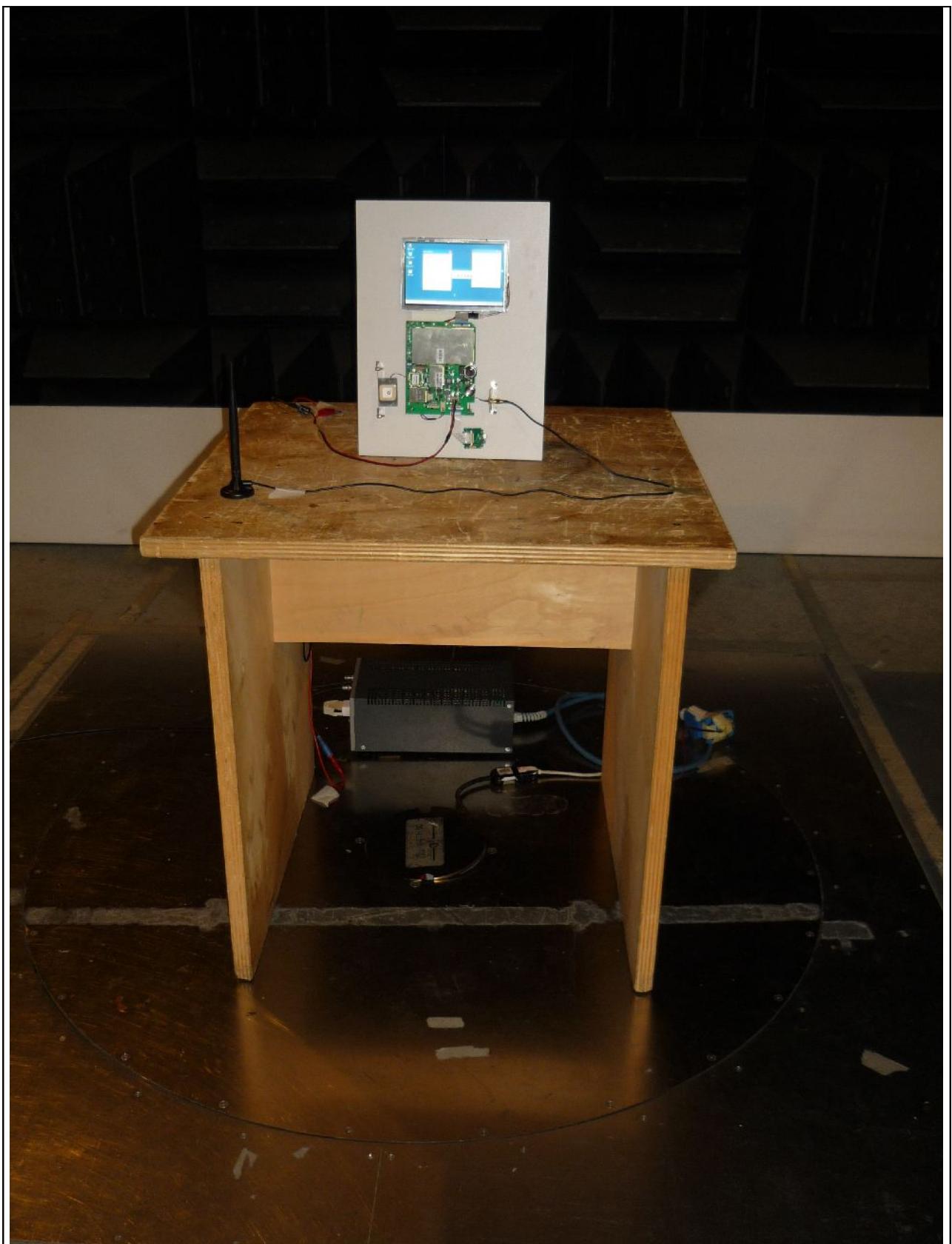


Fig. 11.2
Power Line Conducted Emissions Test Set-up

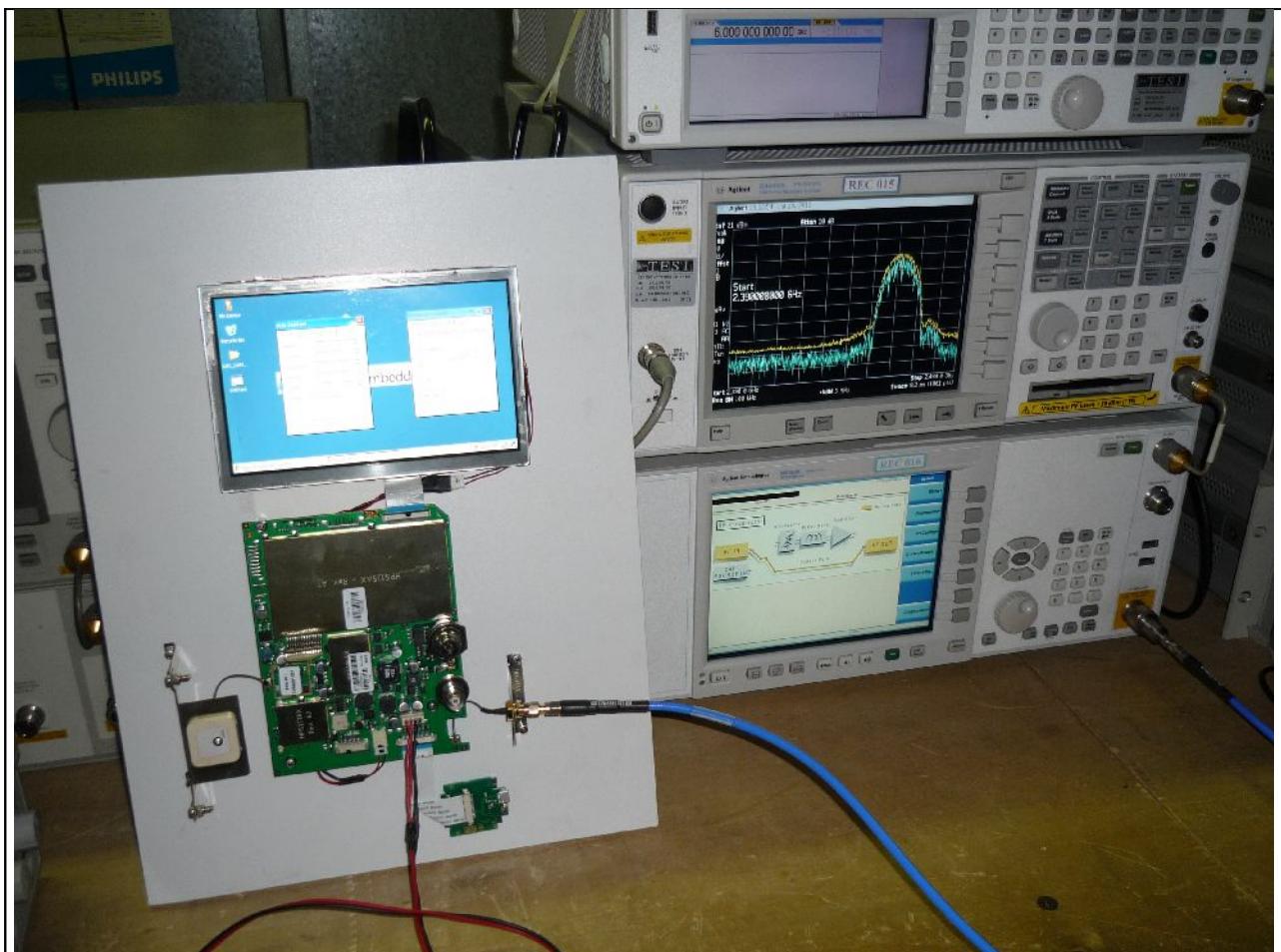


Fig. 11.3
Antenna Port Conducted Emissions Test Set-up