TRaC Wireless Test Report : TRA-007055WJP2

Applicant : Digi International Ltd.

Apparatus : Wi-i.MX53

Specification : Ordinance Regulating Radio Equipment
Referenced under the Japanese Radio Law

Authorised by :

: Radio Product Manager

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Section 1: Introduction

1.1 General

This report contains an assessment of an apparatus based upon tests carried out on samples submitted to the Laboratory.

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1.2 Tests Requested By

This testing in this report was requested by:

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1.3 Manufacturer

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1.4 Apparatus Assessed

The following apparatus was assessed between 05/03/12 and 07/06/13

Wi-i.MX53

The above device is a Wi-Fi transmitter module capable of generating 802.11a and 802.11n HT20 signals.

1.5 Test Result Summary

Full details of test results are contained within Appendix A. The following table summarises the results of the assessment.

The statements relating to compliance with the standards below apply ONLY as qualified in the notes and deviations stated in sections 1.6 to 1.7 of this test report.

Full details of test results are contained within Appendix A. The following table summarises the results of the assessment.

This report contains an assessment of an apparatus against the applicable articles of the Ordinance Regulating Radio Equipment based upon tests carried out on samples submitted to the Laboratory.

Test Type	Application	Ordinance Reference	Appendix no in this report	Mod no.	Result
Antenna Power 5180MHz to 5320MHz	Test Fixture	49.20, 3) (f) (2) & (3)	A1/A2	0	Pass
Antenna Power 5500MHz to 5700 MHz	Test Fixture	Article 49.20, 3-2) (d) (2) & (3)	A3/A4	0	Pass
Tolerances of Antenna Power	Test Fixture	14, 7 (5)	A5	0	Pass
Maximum EIRP	Antenna or Test Fixture	49.20, 3) g and 49.20, 3-2) e	A6	0	Pass
Tolerance Of Occupied Bandwidth 5180MHz to 5320MHz	Test Fixture	6 Table 2 Note XXX 2 (2)	A7/A8	0	Pass
Tolerance Of Occupied Bandwidth 5500MHz to 5700 MHz	Test Fixture	6 Table 2 Note XXX 3 (2)	A9/A10	0	Pass
Tolerance Of Unwanted Emission Intensity	Test Fixture	7 Table 3, note 28	A11 to A14	0	Pass
Secondary Emissions	Test Fixture	24 (1 & 2)	A15 to A18	0	Pass
Tolerance Of Frequency	Test Fixture	5 Table 1 row 7 Item 10	A19/A20	0	Pass
Adjacent channel power 5180MHz to 5320MHz	Test Fixture	Article 49.20, 3) j	A21/A22	0	Pass
Adjacent channel power 5500MHz to 5700 MHz	Test Fixture	Article 49.20, 3-2) f	A23/A24	0	Pass

1.6 Summary Of Compliance

The samples, as assessed, satisfied the relevant articles of the Ordinance Regulating Radio Equipment, as detailed in section 2.1 of this test report.

1.7 Notes Relating To The Assessment

With regard to this assessment, the following points should be noted:

The results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.

The apparatus was set up and exercised using the configurations, modes of operation and arrangements defined in this report only.

Particular operating modes, apparatus monitoring methods and performance criteria required by the standards tested to have been performed except where identified in Section 1.7 of this test report (Deviations from Test Standards).

For emissions testing, throughout this test report, “Pass” indicates that the results for the sample as tested were below the specified limit (refer also to Section 2, Measurement Uncertainty).

All testing with the exception of testing at the Open Area Test Site was performed under the following environmental conditions:

Temperature	: 15 to 23 °C
Humidity	: 63 to 73 %
Barometric Pressure	: 86 to 106 kPa

Note that temperature and humidity conditions can be found in the relevant test results appendix A.

All dates used in this report are in the format dd/mm/yy.

1.8 Deviations from Test Standards

No deviations were made from test standards

Section 2: Measurement Uncertainty

2.1 Measurement Uncertainty Values

For any test data recorded in accordance with note (iii) of Section 2.1 the following measurement uncertainty was calculated:

Test type	Quantity	Quantity frequency range	Uncertainty
Radiated electric field emissions 3m alternative test site Effective Radiated Power 3m alternative test site	Amplitude	30MHz to 300MHz Horizontal	±4.6dB
		30MHz to 300MHz Vertical	±5.1dB
		300MHz to 1000MHz Horizontal	±5.2dB
		300MHz to 1000MHz Vertical	±5.5dB
		1GHz to 26.5GHz Horizontal and Vertical	±4.1dB
Conducted emissions		N/A	±0.9 dB
Absolute RF power (via antenna connector)		N/A	±0.9 dB
PSD		N/A	±0.9 dB
Frequency Range	Frequency	9kHz to 26.5GHz	3.611kHz

Section 3: Modifications

3.1 Modifications Performed During Assessment

No modifications were performed during the assessment

Appendix A: Formal Emission Test Results

Abbreviations used in the tables in this appendix:

Spec	: Specification
Mod	: Modification
EUT	: Equipment Under Test
SE	: Support Equipment
L	: Live Power Line
N	: Neutral Power Line
E	: Earth Power Line
Pk	: Peak Detector
QP	: Quasi-Peak Detector
Av	: Average Detector

ALSR	: Absorber Lined Screened Room
OATS	: Open Area Test Site
ATS	: Alternative Test Site
Ref	: Reference
Freq	: Frequency
MD	: Measurement Distance
SD	: Spec Distance
Pol	: Polarisation
H	: Horizontal Polarisation
V	: Vertical Polarisation
CDN	: Coupling & decoupling network

A1 Antenna Power 5180MHz to 5320MHz 802.11a

Test Details: Antenna Power Wi-Fi device 802.11a CH36, CH48 and CH64	
Standard	Ordinance Regulating Radio Equipment
Reference clause	Article 49.20, 3) (f) (2) & (3)
Frequency range	5180MHz – 5320MHz
Application	Temporary Antenna Connector
EUT sample number	TRA-007055S17
Modification state	0
SE in test environment	None
SE isolated from EUT	None
EUT set up	Refer to Appendix C

802.11a 6Mbps Antenna Port								
Freq (MHz)	RBW (MHz)	Power meter (dBm)	Signal generator (dBm)	Result (dBm)	Result (mW/MHz)	Limit (mW/MHz)	Margin (mW/MHz)	Summary
5180	1	-31.2	-0.24	-0.91	0.81096	10	9.1890	Pass
5240	1	-30.5	-0.04	-0.68	0.85507	10	9.1449	Pass
5320	1	-30.6	0.36	-0.30	0.93325	10	9.0667	Pass

802.11a 54Mbps Antenna Port								
Freq (MHz)	RBW (MHz)	Power meter (dBm)	Signal generator (dBm)	Result (dBm)	Result (mW/MHz)	Limit (mW/MHz)	Margin (mW/MHz)	Summary
5180	1	-30.8	0.06	-0.61	0.86896	10	9.1310	Pass
5240	1	-30.7	-0.14	-0.78	0.83560	10	9.1644	Pass
5320	1	-30.4	0.56	-0.11	0.97499	10	9.0250	Pass

CH	Freq (MHz)
36	5180
48	5240
64	5320

Article 49.20, 3) (f)

(2) For the antenna power of the transmitting equipment which uses the modulation method prescribed in Item C, (1)(ii) above, the mean power shall be 10 mW or less.

(3) For the antenna power of the transmitting equipment which uses the modulation method prescribed in Item C, (1)(iii) and (2) above, the mean power shall be as follows;

(i) For the Occupied Bandwidth is no greater than 19 MHz, the mean power within a bandwidth of 1 MHz shall be 10 mW or less.

(ii) For the Occupied Bandwidth is greater than 19 MHz to 38 MHz, the mean power within a bandwidth of 1 MHz shall be 5 mW or less.

A2 Antenna Power 5180MHz to 5320MHz 802.11n

Test Details: Antenna Power Wi-Fi device 802.11n CH36, CH48 and CH64	
Standard	Ordinance Regulating Radio Equipment
Reference clause	Article 49.20, 3) (f) (2) & (3)
Frequency range	5180MHz – 5320MHz
Application	Temporary Antenna Connector
EUT sample number	TRA-007055S17
Modification state	0
SE in test environment	None
SE isolated from EUT	None
EUT set up	Refer to Appendix C

802.11n MCS0 Antenna Port								
Freq (MHz)	RBW (MHz)	Power meter (dBm)	Signal generator (dBm)	Result (dBm)	Result (mW/MHz)	Limit (mW/MHz)	Margin (mW/MHz)	Summary
5180	1	-31.2	-0.24	-0.91	0.81096	10	9.1890	Pass
5240	1	-30.4	0.16	-0.48	0.89536	10	9.1046	Pass
5320	1	-30.7	0.36	-0.30	0.93325	10	9.0667	Pass

802.11n MCS7 Antenna Port								
Freq (MHz)	RBW (MHz)	Power meter (dBm)	Signal generator (dBm)	Result (dBm)	Result (mW/MHz)	Limit (mW/MHz)	Margin (mW/MHz)	Summary
5180	1	-31.2	-0.24	-0.91	0.81096	10	9.1890	Pass
5240	1	-30.8	-0.14	-0.78	0.83560	10	9.1644	Pass
5320	1	-30.4	0.56	-0.11	0.97499	10	9.0250	Pass

CH	Freq (MHz)
36	5180
48	5240
64	5320

Article 49.20, 3) (f)

(2) For the antenna power of the transmitting equipment which uses the modulation method prescribed in Item C, (1)(ii) above, the mean power shall be 10 mW or less.

(3) For the antenna power of the transmitting equipment which uses the modulation method prescribed in Item C, (1)(iii) and (2) above, the mean power shall be as follows;

(i) For the Occupied Bandwidth is no greater than 19 MHz, the mean power within a bandwidth of 1 MHz shall be 10 mW or less.

(ii) For the Occupied Bandwidth is greater than 19 MHz to 38 MHz, the mean power within a bandwidth of 1 MHz shall be 5 mW or less.

A3 Antenna Power 5500MHz to 5700MHz 802.11a

Test Details: Antenna Power Wi-Fi device 802.11a CH100, CH120 and CH140	
Standard	Ordinance Regulating Radio Equipment
Reference clause	Article 49.20, 3-2) (d) (2) & (3)
Frequency range	5500MHz – 5700MHz
Application	Temporary Antenna Connector
EUT sample number	TRA-007055S17
Modification state	0
SE in test environment	None
SE isolated from EUT	None
EUT set up	Refer to Appendix C

802.11a 6Mbps Antenna Port								
Freq (MHz)	RBW (MHz)	Power meter (dBm)	Signal generator (dBm)	Result (dBm)	Result (mW/MHz)	Limit (mW/MHz)	Margin (mW/MHz)	Summary
5500	1	-30.8	-0.94	-1.61	0.69024	10	9.3098	Pass
5600	1	-33.0	-2.74	-3.46	0.45082	10	9.5492	Pass
5700	1	-36.2	-6.24	-7.00	0.19953	10	9.8005	Pass

802.11a 54Mbps Antenna Port								
Freq (MHz)	RBW (MHz)	Power meter (dBm)	Signal generator (dBm)	Result (dBm)	Result (mW/MHz)	Limit (mW/MHz)	Margin (mW/MHz)	Summary
5500	1	-31.0	-0.94	-1.61	0.69024	10	9.3098	Pass
5600	1	-33.1	-2.74	-3.46	0.45082	10	9.5492	Pass
5700	1	-36.2	-6.24	-7.00	0.19953	10	9.8005	Pass

CH	Freq (MHz)
100	5500
120	5600
140	5700

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Limits from Article 49.20, 3-2)

d The antenna power of the transmitter shall be one of the items below.

(1) For the antenna power of the transmitting equipment which uses the modulation method prescribed in Item b, (1)(i) above (the direct spread method), the mean power within a bandwidth of 1 MHz shall be 10 mW or less.
(2) For the antenna power of the transmitting equipment which uses the modulation method prescribed in Item b, (1)(ii) above (The amplitude modulation method, phase

modulation method, frequency modulation method, pulse modulation method or combination of these methods), the mean power shall be 10 mW or less.

(3) For the antenna power of the transmitting equipment which uses the modulation method prescribed in Item b, (1)(iii) and Item b, (2) above (OFDM), the mean power shall be as follows;

(i) For the Occupied Bandwidth is no greater than 19.7 MHz, the mean power within a bandwidth of 1 MHz shall be 10 mW or less.

(ii) For the Occupied Bandwidth is greater than 19.7 MHz to 38 MHz, the mean power within a bandwidth of 1 MHz shall be 5 mW or less.

A4 Antenna Power 5500MHz to 5700MHz 802.11n

Test Details: Antenna Power Wi-Fi device 802.11n CH100, CH120 and CH140	
Standard	Ordinance Regulating Radio Equipment
Reference clause	Article 49.20, 3-2) (d) (2) & (3)
Frequency range	5500MHz – 5700MHz
Application	Temporary Antenna Connector
EUT sample number	TRA-007055S17
Modification state	0
SE in test environment	None
SE isolated from EUT	None
EUT set up	Refer to Appendix C

802.11n MCS0 Antenna Port								
Freq (MHz)	RBW (MHz)	Power meter (dBm)	Signal generator (dBm)	Result (dBm)	Result (mW/MHz)	Limit (mW/MHz)	Margin (mW/MHz)	Summary
5500	1	-31.0	-0.94	-1.61	0.69024	10	9.3098	Pass
5600	1	-32.9	-2.64	-3.36	0.46132	10	9.5387	Pass
5700	1	-36.5	-6.44	-7.20	0.19055	10	9.8095	Pass

802.11n MCS7 Antenna Port								
Freq (MHz)	RBW (MHz)	Power meter (dBm)	Signal generator (dBm)	Result (dBm)	Result (mW/MHz)	Limit (mW/MHz)	Margin (mW/MHz)	Summary
5500	1	-31.1	-0.94	-1.61	0.69024	10	9.3098	Pass
5600	1	-32.4	-1.64	-2.36	0.58076	10	9.4192	Pass
5700	1	-35.3	-4.64	-5.39	0.28907	10	9.7109	Pass

CH	Freq (MHz)
100	5500
120	5600
140	5700

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Limits from Article 49.20, 3-2)

d The antenna power of the transmitter shall be one of the items below.

(1) For the antenna power of the transmitting equipment which uses the modulation method prescribed in Item b, (1)(i) above (the direct spread method), the mean power within a bandwidth of 1 MHz shall be 10 mW or less.
(2) For the antenna power of the transmitting equipment which uses the modulation method prescribed in Item b, (1)(ii) above (The amplitude modulation method, phase

modulation method, frequency modulation method, pulse modulation method or combination of these methods), the mean power shall be 10 mW or less.

(3) For the antenna power of the transmitting equipment which uses the modulation method prescribed in Item b, (1)(iii) and Item b, (2) above (OFDM), the mean power shall be as follows;

(i) For the Occupied Bandwidth is no greater than 19.7 MHz, the mean power within a bandwidth of 1 MHz shall be 10 mW or less.

(ii) For the Occupied Bandwidth is greater than 19.7 MHz to 38 MHz, the mean power within a bandwidth of 1 MHz shall be 5 mW or less.

A5 Tolerances of Antenna Power

Software Setting used	TRaC max measured power (802.11n MCS7 mode)	Declared tolerance of power	-80% of Calculated Average	+20% of Calculated Average
53	1.0mW	5mW/MHz	1.0mW	6.0mW

Limit Article 14, (7) (5)

The tolerance of antenna power shall have an upper limit = 20% and the lower limit = 80%

A6 Maximum Equivalent Isotropic Radiated power

The maximum measured antenna power was 1.0 mW/MHz

The maximum declared antenna gain for any antenna to be used with the EUT is 5dBi (3.2 numeric). Please refer to Annex D for Manufacturers data sheet.

Therefore the Maximum EIRP from the EUT is equal to 1.0 x antenna gain numeric.

Equal to 3.2mW/MHz EIRP

Limit Article 49.20, 3)

g The equivalent isotropic radiated power within a bandwidth of 1 MHz shall be as follows:

(1) In case of the Occupied Bandwidth is no greater than 19 MHz;

(i) When using emissions of a frequency of 5,180 MHz, 5,200 MHz, 5,220 MHz, or 5,240 MHz :

10 mW or lower

(ii) When using emissions of a frequency of 5,260 MHz, 5,280 MHz, 5,300 MHz or 5,320 MHz

(a) When equipped with a function that reduces the mean antenna power by 3 dB in the communication system specified in 1):

10 mW or lower

(b) Cases other than (a):

5 mW or lower

Limit Article 49.20, 3-2)

The equivalent isotropic radiated power within a bandwidth of 1 MHz shall be as follows:

(1) In case of the Occupied Bandwidth is no greater than 19.7 MHz;

(i) When equipped with a function that reduces the mean antenna power by 3 dB in the communication system specified in 1):

50 mW or lower

(ii) Cases other than (i):

25 mW or lower

A7 Tolerance of Occupied Bandwidth 5180MHz to 5320MHz 802.11a.

Test Details: Wi-Fi device 802.11a CH36, CH48 and CH64	
Standard	Ordinance Regulating Radio Equipment
Reference clause	Article 6 Table 2 Note XXX 2(2)
Frequency range	5180MHz – 5320MHz
Application	Temporary Antenna Connector
EUT sample number	TRA-007055S17
Modification state	0
SE in test environment	None
SE isolated from EUT	None
EUT set up	Refer to Appendix C

Freq (MHz)	Occupied bandwidth (MHz)		Result
	6Mbps	54Mbps	
5180	16.4343	16.4307	Pass
5240	16.5194	16.5091	Pass
5320	16.3577	16.5327	Pass

Limit Article 6 Table 2 Note XXX 2(2) of the Ordinance Regulating Radio Equipment

The occupied bandwidth shall be less than 19MHz

A8 Tolerance of Occupied Bandwidth 5180MHz to 5320MHz 802.11n

Test Details: Wi-Fi device 802.11n CH36, C48 and CH64	
Standard	Ordinance Regulating Radio Equipment
Reference clause	Article 6 Table 2 Note XXX 2(2)
Frequency range	5180MHz – 5320MHz
Application	Temporary Antenna Connector
EUT sample number	TRA-007055S17
Modification state	0
SE in test environment	None
SE isolated from EUT	None
EUT set up	Refer to Appendix C

Freq (MHz)	Occupied bandwidth (MHz)		Result
	MCS0	MCS7	
5180	17.6974	17.5931	Pass
5240	17.6024	17.3913	Pass
5320	17.5955	17.8620	Pass

Limit Article 6 Table 2 Note XXX 2(2) of the Ordinance Regulating Radio Equipment

The occupied bandwidth shall be less than 19MHz

A9 Tolerance of Occupied Bandwidth 5500MHz to 5700MHz 802.11a.

Test Details: Wi-Fi device 802.11a CH100, CH120 and CH140	
Standard	Ordinance Regulating Radio Equipment
Reference clause	Article 6 Table 2 Note XXX 3(2)
Frequency range	5500MHz – 5700MHz
Application	Temporary Antenna Connector
EUT sample number	TRA-007055S17
Modification state	0
SE in test environment	None
SE isolated from EUT	None
EUT set up	Refer to Appendix C

Freq (MHz)	Occupied bandwidth (MHz)		Result
	6Mbps	54Mbps	
5500	16.8398	16.6508	Pass
5600	16.4878	16.5203	Pass
5700	16.2996	16.3522	Pass

Limit Article 6 Table 2 Note XXX 3(2) of the Ordinance Regulating Radio Equipment

The occupied bandwidth shall be less than 19.7MHz

A10 Tolerance of Occupied Bandwidth 5500MHz to 5700MHz 802.11n

Test Details: Wi-Fi device 802.11n CH100, CH120 and CH140	
Standard	Ordinance Regulating Radio Equipment
Reference clause	Article 6 Table 2 Note XXX 3(2)
Frequency range	5500MHz – 5700MHz
Application	Temporary Antenna Connector
EUT sample number	TRA-007055S17
Modification state	0
SE in test environment	None
SE isolated from EUT	None
EUT set up	Refer to Appendix C

Freq (MHz)	Occupied bandwidth (MHz)		Result
	MCS0	MCS7	
5500	18.6770	18.3106	Pass
5600	17.6999	17.7306	Pass
5700	17.5961	17.4779	Pass

Limit Article 6 Table 2 Note XXX 3(2) of the Ordinance Regulating Radio Equipment

The occupied bandwidth shall be less than 19.7MHz

A11 Tolerance of Unwanted Emissions Intensity 5180MHz to 5320MHz 802.11a

Test Details: TX Mode: Wi-Fi device 802.11a CH36, CH48 and CH64	
Standard	Ordinance Regulating Radio Equipment
Reference clause	Article 7 Table 3, Note 28
Frequency range	9kHz to 16GHz
Application	Temporary Antenna Connector
EUT sample number	TRA-007055S17
Modification state	0
SE in test environment	None
SE isolated from EUT	None
EUT set up	Refer to Appendix C

Transmitting Bottom Channel 36: 5180MHz @ 6Mbps

Freq range (MHz)		Measured Frequency (MHz)	Detector (Peak or Sample)	RBW	Result (dBm)	Limit dBm	Margin dB	Summary
From	To							
9kHz	150kHz	0.037670	Pk	200Hz	-101.29	-26	75.29	Pass
150kHz	30MHz	2.2900	Pk	9kHz	-97.85	-26	71.85	Pass
30MHz	1000MHz	503.70	Pk	1MHz	-84.29	-26	58.29	Pass
1000MHz	5000MHz	3453.0	Pk	1MHz	-60.69	-26	34.69	Pass
5000MHz	5140MHz	5140.0	Pk	1MHz	-55.49	-26	29.49	Pass
5360MHz	10000MHz	6907.0	Pk	1MHz	-65.58	-26	39.58	Pass
10000MHz	16000MHz	10360.0	Pk	1MHz	-70.79	-26	44.79	Pass

Transmitting Bottom Channel 36: 5180MHz @ 54Mbps

Freq range (MHz)		Measured Frequency (MHz)	Detector (Peak or Sample)	RBW	Result (dBm)	Limit dBm	Margin dB	Summary
From	To							
9kHz	150kHz	0.016990	Pk	200Hz	-100.69	-26	74.69	Pass
150kHz	30MHz	19.1500	Pk	9kHz	-97.61	-26	71.61	Pass
30MHz	1000MHz	647.60	Pk	1MHz	-86.43	-26	60.43	Pass
1000MHz	5000MHz	3453.0	Pk	1MHz	-61.59	-26	35.59	Pass
5000MHz	5140MHz	5140.0	Pk	1MHz	-57.29	-26	31.29	Pass
5360MHz	10000MHz	6907.0	Pk	1MHz	-66.05	-26	40.05	Pass
10000MHz	16000MHz	10360.0	Pk	1MHz	-70.14	-26	44.14	Pass

Transmitting Middle Channel 48: 5240MHz @ 6Mbps

Freq range (MHz)		Measured Frequency (MHz)	Detector (Peak or Sample)	RBW	Result (dBm)	Limit dBm	Margin dB	Summary
From	To							
9kHz	150kHz	0.011585	Pk	200Hz	-99.64	-26	73.64	Pass
150kHz	30MHz	25.8200	Pk	9kHz	-96.97	-26	70.97	Pass

30MHz	1000MHz	864.20	Pk	1MHz	-86.02	-26	60.02	Pass
1000MHz	5000MHz	3493.0	Pk	1MHz	-58.68	-26	32.68	Pass
5000MHz	5140MHz	5080.0	Pk	1MHz	-58.29	-26	32.29	Pass
5360MHz	10000MHz	5360.0	Pk	1MHz	-56.37	-26	30.37	Pass
10000MHz	16000MHz	10480.0	Pk	1MHz	-68.61	-26	42.61	Pass

Transmitting Middle Channel 48: 5240MHz @ 54Mbps

Freq range (MHz)		Measured Frequency (MHz)	Detector (Peak or Sample)	RBW	Result (dBm)	Limit dBm	Margin dB	Summary
From	To							
9kHz	150kHz	0.010880	Pk	200Hz	-101.09	-26	75.09	Pass
150kHz	30MHz	0.4000	Pk	9kHz	-94.00	-26	68.00	Pass
30MHz	1000MHz	477.80	Pk	1MHz	-83.67	-26	57.67	Pass
1000MHz	5000MHz	3493.0	Pk	1MHz	-58.81	-26	32.81	Pass
5000MHz	5140MHz	5119.9	Pk	1MHz	-57.83	-26	31.83	Pass
5360MHz	10000MHz	5360.0	Pk	1MHz	-55.16	-26	29.16	Pass
10000MHz	16000MHz	10480.0	Pk	1MHz	-68.42	-26	42.42	Pass

Tolerance of Unwanted Emissions Intensity continued

Transmitting Top Channel 64: 5320MHz @ 6Mbps

Freq range (MHz)		Measured Frequency (MHz)	Detector (Peak or Sample)	RBW	Result (dBm)	Limit dBm	Margin dB	Summary
From	To							
9kHz	150kHz	0.020515	Pk	200Hz	-101.73	-26	75.73	Pass
150kHz	30MHz	1.6900	Pk	9kHz	-94.60	-26	68.60	Pass
30MHz	1000MHz	489.10	Pk	1MHz	-85.03	-26	59.03	Pass
1000MHz	5000MHz	3547.0	Pk	1MHz	-50.99	-26	24.99	Pass
5000MHz	5140MHz	5066.7	Pk	1MHz	-59.48	-26	33.48	Pass
5360MHz	10000MHz	5360.0	Pk	1MHz	-53.44	-26	27.44	Pass
10000MHz	16000MHz	10640.0	Pk	1MHz	-68.43	-26	42.43	Pass

Transmitting Top Channel 64: 5320MHz @ 54Mbps

Freq range (MHz)		Measured Frequency (MHz)	Detector (Peak or Sample)	RBW	Result (dBm)	Limit dBm	Margin dB	Summary
From	To							
9kHz	150kHz	0.047070	Pk	200Hz	-104.34	-26	78.34	Pass
150kHz	30MHz	7.5100	Pk	9kHz	-98.56	-26	72.56	Pass
30MHz	1000MHz	759.10	Pk	1MHz	-85.02	-26	59.02	Pass
1000MHz	5000MHz	3547.0	Pk	1MHz	-50.66	-26	24.66	Pass
5000MHz	5140MHz	5066.7	Pk	1MHz	-59.56	-26	33.59	Pass
5360MHz	10000MHz	5360.0	Pk	1MHz	-51.05	-26	25.05	Pass
10000MHz	16000MHz	10640.0	Pk	1MHz	-68.46	-26	42.46	Pass

Limit Article 7 Table 3 Note 28 of the Ordinance Regulating Radio Equipment

Lower than 5,140 MHz and higher than 5,360 MHz
2.5μW

A12 Tolerance of Unwanted Emissions Intensity 5180MHz to 5320MHz 802.11n

Test Details: TX Mode: Wi-Fi device 802.11n CH36, CH48 and CH64	
Standard	Ordinance Regulating Radio Equipment
Reference clause	Article 7 Table 3, Note 28
Frequency range	9kHz to 16GHz
Application	Temporary Antenna Connector
EUT sample number	TRA-007055S17
Modification state	0
SE in test environment	None
SE isolated from EUT	None
EUT set up	Refer to Appendix C

Transmitting Bottom Channel 36: 5180MHz (MCS0)

Freq range (MHz)		Measured Frequency (MHz)	Detector (Peak or Sample)	RBW	Result (dBm)	Limit dBm	Margin dB	Summary
From	To							
9kHz	150kHz	0.024040	Pk	200Hz	-102.86	-26	76.86	Pass
150kHz	30MHz	0.5500	Pk	9kHz	-95.26	-26	69.26	Pass
30MHz	1000MHz	500.40	Pk	1MHz	-83.85	-26	57.85	Pass
1000MHz	5000MHz	3453.0	Pk	1MHz	-60.51	-26	34.51	Pass
5000MHz	5140MHz	5140.0	Pk	1MHz	-53.98	-26	27.98	Pass
5360MHz	10000MHz	5414.0	Pk	1MHz	-62.86	-26	36.86	Pass
10000MHz	16000MHz	10360.0	Pk	1MHz	-69.99	-26	43.99	Pass

Transmitting Bottom Channel 36: 5180MHz (MCS7)

Freq range (MHz)		Measured Frequency (MHz)	Detector (Peak or Sample)	RBW	Result (dBm)	Limit dBm	Margin dB	Summary
From	To							
9kHz	150kHz	0.020045	Pk	200Hz	-102.40	-26	76.40	Pass
150kHz	30MHz	17.0200	Pk	9kHz	-96.31	-26	70.31	Pass
30MHz	1000MHz	578.00	Pk	1MHz	-85.55	-26	59.55	Pass
1000MHz	5000MHz	3453.0	Pk	1MHz	-61.17	-26	35.17	Pass
5000MHz	5140MHz	5139.8	Pk	1MHz	-53.36	-26	27.36	Pass
5360MHz	10000MHz	5414.0	Pk	1MHz	-62.60	-26	36.60	Pass
10000MHz	16000MHz	10360.0	Pk	1MHz	-70.80	-26	44.80	Pass

Transmitting Middle Channel 48: 5240MHz (MCS0)

Freq range (MHz)		Measured Frequency (MHz)	Detector (Peak or Sample)	RBW	Result (dBm)	Limit dBm	Margin dB	Summary
From	To							
9kHz	150kHz	0.015580	Pk	200Hz	-101.06	-26	75.06	Pass
150kHz	30MHz	0.7500	Pk	9kHz	-92.99	-26	66.99	Pass

30MHz	1000MHz	764.00	Pk	1MHz	-83.40	-26	57.40	Pass
1000MHz	5000MHz	3493.0	Pk	1MHz	-58.63	-26	32.63	Pass
5000MHz	5140MHz	5119.7	Pk	1MHz	-58.30	-26	32.30	Pass
5360MHz	10000MHz	5360.0	Pk	1MHz	-56.15	-26	30.15	Pass
10000MHz	16000MHz	10480.0	Pk	1MHz	-66.94	-26	40.94	Pass

Transmitting Middle Channel 48: 5240MHz (MCS7)

Freq range (MHz)		Measured Frequency (MHz)	Detector (Peak or Sample)	RBW	Result (dBm)	Limit dBm	Margin dB	Summary
From	To							
9kHz	150kHz	0.014405	Pk	200Hz	-99.13	-26	73.13	Pass
150kHz	30MHz	0.2000	Pk	9kHz	-95.04	-26	69.04	Pass
30MHz	1000MHz	479.40	Pk	1MHz	-85.28	-26	59.28	Pass
1000MHz	5000MHz	3493.0	Pk	1MHz	-58.85	-26	32.85	Pass
5000MHz	5140MHz	5119.9	Pk	1MHz	-59.10	-26	33.10	Pass
5360MHz	10000MHz	5360.0	Pk	1MHz	-55.68	-26	29.68	Pass
10000MHz	16000MHz	10480.0	Pk	1MHz	-69.40	-26	43.40	Pass

Tolerance of Unwanted Emissions Intensity continued

Transmitting Top Channel 64: 5320MHz (MCS0)

Freq range (MHz)		Measured Frequency (MHz)	Detector (Peak or Sample)	RBW	Result (dBm)	Limit dBm	Margin dB	Summary
From	To							
9kHz	150kHz	0.010175	Pk	200Hz	-99.17	-26	73.17	Pass
150kHz	30MHz	13.8300	Pk	9kHz	-95.57	-26	69.57	Pass
30MHz	1000MHz	744.60	Pk	1MHz	-84.75	-26	58.75	Pass
1000MHz	5000MHz	3547.0	Pk	1MHz	-50.90	-26	24.90	Pass
5000MHz	5140MHz	5066.7	Pk	1MHz	-61.25	-26	35.25	Pass
5360MHz	10000MHz	5360.0	Pk	1MHz	-50.40	-26	24.40	Pass
10000MHz	16000MHz	10640.0	Pk	1MHz	-66.93	-26	40.93	Pass

Transmitting Top Channel 64: 5320MHz (MCS7)

Freq range (MHz)		Measured Frequency (MHz)	Detector (Peak or Sample)	RBW	Result (dBm)	Limit dBm	Margin dB	Summary
From	To							
9kHz	150kHz	0.012290	Pk	200Hz	-100.98	-26	74.98	Pass
150kHz	30MHz	0.8000	Pk	9kHz	-94.08	-26	68.08	Pass
30MHz	1000MHz	482.70	Pk	1MHz	-84.07	-26	58.07	Pass
1000MHz	5000MHz	3547.0	Pk	1MHz	-50.64	-26	24.64	Pass
5000MHz	5140MHz	5066.7	Pk	1MHz	-59.21	-26	33.21	Pass
5360MHz	10000MHz	5360.0	Pk	1MHz	-49.73	-26	23.73	Pass
10000MHz	16000MHz	10640.0	Pk	1MHz	-68.01	-26	42.01	Pass

Limit Article 7 Table 3 Note 28 of the Ordinance Regulating Radio Equipment

Lower than 5,140 MHz and higher than 5,360 MHz
2.5μW

A13 Tolerance of Unwanted Emissions Intensity 5500MHz to 5700MHz 802.11a

Test Details: TX Mode: Wi-Fi device 802.11a CH100, CH120 and CH140	
Standard	Ordinance Regulating Radio Equipment
Reference clause	Article 7 Table 3, Note 28
Frequency range	9kHz to 18GHz
Application	Temporary Antenna Connector
EUT sample number	TRA-007055S17
Modification state	0
SE in test environment	None
SE isolated from EUT	None
EUT set up	Refer to Appendix C

Transmitting Bottom Channel 100: 5500MHz @ 6Mbps

Freq range (MHz)		Measured Frequency (MHz)	Detector (Peak or Sample)	RBW	Result (dBm)	Limit dBm	Margin dB	Summary
From	To							
9kHz	150kHz	0.011820	Pk	200Hz	-100.26	-26	74.26	Pass
150kHz	30MHz	6.4200	Pk	9kHz	-97.99	-26	71.99	Pass
30MHz	1000MHz	233.70	Pk	1MHz	-85.92	-26	59.92	Pass
1000MHz	5000MHz	3667.0	Pk	1MHz	-48.00	-26	22.00	Pass
5000MHz	5460MHz	5460.0	Pk	1MHz	-50.36	-26	24.36	Pass
5740MHz	10000MHz	5740.0	Pk	1MHz	-69.29	-26	43.29	Pass
10000MHz	18000MHz	11000.0	Pk	1MHz	-68.15	-26	42.15	Pass

Transmitting Bottom Channel 100: 5500MHz @ 54Mbps

Freq range (MHz)		Measured Frequency (MHz)	Detector (Peak or Sample)	RBW	Result (dBm)	Limit dBm	Margin dB	Summary
From	To							
9kHz	150kHz	0.018870	Pk	200Hz	-100.99	-26	74.99	Pass
150kHz	30MHz	18.7100	Pk	9kHz	-97.35	-26	71.35	Pass
30MHz	1000MHz	633.00	Pk	1MHz	-85.89	-26	59.89	Pass
1000MHz	5000MHz	3667.0	Pk	1MHz	-47.85	-26	21.85	Pass
5000MHz	5460MHz	5460.0	Pk	1MHz	-50.67	-26	24.67	Pass
5740MHz	10000MHz	5740.0	Pk	1MHz	-70.56	-26	44.56	Pass
10000MHz	18000MHz	11000.0	Pk	1MHz	-66.19	-26	40.19	Pass

Transmitting Middle Channel 120: 5600MHz @ 6Mbps

Freq range (MHz)		Measured Frequency (MHz)	Detector (Peak or Sample)	RBW	Result (dBm)	Limit dBm	Margin dB	Summary
From	To							
9kHz	150kHz	0.013465	Pk	200Hz	-101.89	-26	75.89	Pass
150kHz	30MHz	0.0150	Pk	9kHz	-94.18	-26	68.18	Pass

30MHz	1000MHz	371.10	Pk	1MHz	-84.81	-26	58.81	Pass
1000MHz	5000MHz	3733.0	Pk	1MHz	-45.12	-26	19.12	Pass
5000MHz	5460MHz	5440.1	Pk	1MHz	-56.01	-26	30.01	Pass
5740MHz	10000MHz	5740.0	Pk	1MHz	-70.52	-26	44.52	Pass
10000MHz	18000MHz	11200.0	Pk	1MHz	-60.89	-26	34.89	Pass

Transmitting Middle Channel 120: 5600MHz @ 54Mbps

Freq range (MHz)		Measured Frequency (MHz)	Detector (Peak or Sample)	RBW	Result (dBm)	Limit dBm	Margin dB	Summary
From	To							
9kHz	150kHz	0.016520	Pk	200Hz	-99.81	-26	73.81	Pass
150kHz	30MHz	1.3900	Pk	9kHz	-97.47	-26	71.47	Pass
30MHz	1000MHz	495.60	Pk	1MHz	-84.26	-26	58.26	Pass
1000MHz	5000MHz	3733.0	Pk	1MHz	-45.01	-26	19.01	Pass
5000MHz	5460MHz	5440.1	Pk	1MHz	-58.80	-26	32.80	Pass
5740MHz	10000MHz	5740.0	Pk	1MHz	-70.07	-26	44.07	Pass
10000MHz	18000MHz	11200.0	Pk	1MHz	-61.27	-26	35.27	Pass

Tolerance of Unwanted Emissions Intensity continued

Transmitting Top Channel 140: 5700MHz @ 6Mbps

Freq range (MHz)		Measured Frequency (MHz)	Detector (Peak or Sample)	RBW	Result (dBm)	Limit dBm	Margin dB	Summary
From	To							
9kHz	150kHz	0.017695	Pk	200Hz	-100.85	-26	74.85	Pass
150kHz	30MHz	3.6300	Pk	9kHz	-97.41	-26	71.41	Pass
30MHz	1000MHz	487.50	Pk	1MHz	-84.38	-26	58.38	Pass
1000MHz	5000MHz	3800.0	Pk	1MHz	-42.29	-26	16.29	Pass
5000MHz	5460MHz	5240.0	Pk	1MHz	-61.79	-26	35.79	Pass
5740MHz	10000MHz	5740.0	Pk	1MHz	-66.92	-26	40.92	Pass
10000MHz	18000MHz	11400.0	Pk	1MHz	-64.19	-26	3819	Pass

Transmitting Top Channel 140: 5700MHz @ 54Mbps

Freq range (MHz)		Measured Frequency (MHz)	Detector (Peak or Sample)	RBW	Result (dBm)	Limit dBm	Margin dB	Summary
From	To							
9kHz	150kHz	0.010410	Pk	200Hz	-98.81	-26	72.81	Pass
150kHz	30MHz	0.5000	Pk	9kHz	-95.42	-26	69.42	Pass
30MHz	1000MHz	374.40	Pk	1MHz	-83.79	-26	57.79	Pass
1000MHz	5000MHz	3800.0	Pk	1MHz	-42.17	-26	16.17	Pass
5000MHz	5460MHz	5240.0	Pk	1MHz	-61.04	-26	35.04	Pass
5740MHz	10000MHz	5740.0	Pk	1MHz	-66.32	-26	40.32	Pass
10000MHz	18000MHz	11400.0	Pk	1MHz	-64.80	-26	38.80	Pass

Limit Article 7 Table 3 Note 28 of the Ordinance Regulating Radio Equipment

Lower than 5,420 MHz and higher than 5,760 MHz
2.5μW

A14 Tolerance of Unwanted Emissions Intensity 5500MHz to 5700MHz 802.11n

Test Details: TX Mode: Wi-Fi device 802.11n CH100, CH120 and CH140	
Standard	Ordinance Regulating Radio Equipment
Reference clause	Article 7 Table 3, Note 28
Frequency range	9kHz to 18GHz
Application	Temporary Antenna Connector
EUT sample number	TRA-007055S17
Modification state	0
SE in test environment	None
SE isolated from EUT	None
EUT set up	Refer to Appendix C

Transmitting Bottom Channel 100: 5500MHz (MCS0)

Freq range (MHz)		Measured Frequency (MHz)	Detector (Peak or Sample)	RBW	Result (dBm)	Limit dBm	Margin dB	Summary
From	To							
9kHz	150kHz	0.055765	Pk	200Hz	-102.31	-26	76.31	Pass
150kHz	30MHz	1.6900	Pk	9kHz	-96.24	-26	70.24	Pass
30MHz	1000MHz	359.80	Pk	1MHz	-84.37	-26	58.37	Pass
1000MHz	5000MHz	3667.0	Pk	1MHz	-48.08	-26	22.08	Pass
5000MHz	5460MHz	5460.0	Pk	1MHz	-49.38	-26	23.68	Pass
5740MHz	10000MHz	5740.0	Pk	1MHz	-68.59	-26	42.59	Pass
10000MHz	18000MHz	11000.0	Pk	1MHz	-65.31	-26	39.31	Pass

Transmitting Bottom Channel 100: 5500MHz (MCS7)

Freq range (MHz)		Measured Frequency (MHz)	Detector (Peak or Sample)	RBW	Result (dBm)	Limit dBm	Margin dB	Summary
From	To							
9kHz	150kHz	0.021690	Pk	200Hz	-101.73	-26	75.73	Pass
150kHz	30MHz	0.4500	Pk	9kHz	-91.74	-26	65.74	Pass
30MHz	1000MHz	616.80	Pk	1MHz	-83.77	-26	57.77	Pass
1000MHz	5000MHz	3667.0	Pk	1MHz	-47.89	-26	21.89	Pass
5000MHz	5460MHz	5460.0	Pk	1MHz	-51.17	-26	25.17	Pass
5740MHz	10000MHz	5740.0	Pk	1MHz	-68.47	-26	42.47	Pass
10000MHz	18000MHz	11000.0	Pk	1MHz	-66.72	-26	40.72	Pass

Transmitting Middle Channel 120: 5600MHz (MCS0)

Freq range (MHz)		Measured Frequency (MHz)	Detector (Peak or Sample)	RBW	Result (dBm)	Limit dBm	Margin dB	Summary
From	To							
9kHz	150kHz	0.025450	Pk	200Hz	-101.18	-26	75.18	Pass
150kHz	30MHz	0.2000	Pk	9kHz	-92.81	-26	66.81	Pass

30MHz	1000MHz	413.20	Pk	1MHz	-83.51	-26	57.51	Pass
1000MHz	5000MHz	3733.0	Pk	1MHz	-45.26	-26	19.26	Pass
5000MHz	5460MHz	5440.1	Pk	1MHz	-56.85	-26	30.85	Pass
5740MHz	10000MHz	5740.0	Pk	1MHz	-70.06	-26	44.06	Pass
10000MHz	18000MHz	11200.0	Pk	1MHz	-64.52	-26	38.52	Pass

Transmitting Middle Channel 120: 5600MHz (MCS7)

Freq range (MHz)		Measured Frequency (MHz)	Detector (Peak or Sample)	RBW	Result (dBm)	Limit dBm	Margin dB	Summary
From	To							
9kHz	150kHz	0.010410	Pk	200Hz	-100.42	-26	74.42	Pass
150kHz	30MHz	0.3000	Pk	9kHz	-92.33	-26	66.33	Pass
30MHz	1000MHz	713.80	Pk	1MHz	-83.21	-26	57.21	Pass
1000MHz	5000MHz	3733.0	Pk	1MHz	-45.15	-26	19.15	Pass
5000MHz	5460MHz	5440.1	Pk	1MHz	-56.66	-26	30.66	Pass
5740MHz	10000MHz	5740.0	Pk	1MHz	-69.55	-26	43.55	Pass
10000MHz	18000MHz	11200.0	Pk	1MHz	-61.69	-26	35.69	Pass

Tolerance of Unwanted Emissions Intensity continued

Transmitting Top Channel 140: 5700MHz (MCS0)

Freq range (MHz)		Measured Frequency (MHz)	Detector (Peak or Sample)	RBW	Result (dBm)	Limit dBm	Margin dB	Summary
From	To							
9kHz	150kHz	0.013935	Pk	200Hz	-102.17	-26	76.17	Pass
150kHz	30MHz	1.5900	Pk	9kHz	-93.84	-26	67.84	Pass
30MHz	1000MHz	515.00	Pk	1MHz	-85.02	-26	59.02	Pass
1000MHz	5000MHz	3800.0	Pk	1MHz	-42.32	-26	16.32	Pass
5000MHz	5460MHz	5259.9	Pk	1MHz	-61.54	-26	35.54	Pass
5740MHz	10000MHz	5740.0	Pk	1MHz	-63.13	-26	37.13	Pass
10000MHz	18000MHz	11400.0	Pk	1MHz	-64.18	-26	38.18	Pass

Transmitting Top Channel 140: 5700MHz (MCS7)

Freq range (MHz)		Measured Frequency (MHz)	Detector (Peak or Sample)	RBW	Result (dBm)	Limit dBm	Margin dB	Summary
From	To							
9kHz	150kHz	0.012995	Pk	200Hz	-99.37	-26	73.37	Pass
150kHz	30MHz	18.8100	Pk	9kHz	-96.05	-26	70.05	Pass
30MHz	1000MHz	636.20	Pk	1MHz	-86.36	-26	60.36	Pass
1000MHz	5000MHz	3800.0	Pk	1MHz	-42.32	-26	16.32	Pass
5000MHz	5460MHz	5240.0	Pk	1MHz	-61.71	-26	35.71	Pass
5740MHz	10000MHz	5740.0	Pk	1MHz	-63.80	-26	37.80	Pass
10000MHz	18000MHz	11400.0	Pk	1MHz	-62.86	-26	36.86	Pass

Limit Article 7 Table 3 Note 28 of the Ordinance Regulating Radio Equipment

Lower than 5,420 MHz and higher than 5,760 MHz
2.5μW

A15 Limit of Secondary Emissions 5180MHz to 5320MHz 802.11a

Preview measurement of secondary radio emissions was performed using a peak detector with the RBW set to 100kHz and the VBW>RBW. Frequencies were scanned up through to the 4th harmonic with the EUT in receive mode on its lowest, centre and highest receive frequency in turn. Formal measurements were made using a RBW of 100 kHz for frequencies below 1 GHz and 1 MHz for frequencies above 1 GHz.

Test Details: Receive Mode: Wi-Fi device 802.11a CH36, CH48 and CH64	
Standard	Ordinance Regulating Radio Equipment
Reference clause	Article 24 (1 & 2)
Frequency range	9kHz to 18 GHz
Application	Temporary Antenna Connector
EUT sample number	TRA-007055S17
Modification state	0
SE in test environment	REF1270
SE isolated from EUT	None
EUT set up	Refer to Appendix C

The worst-case emission measurements for spurious emissions and harmonics are listed below:

Freq range (MHz)		Measured Frequency (MHz)	Detector (Peak or Sample)	RBW	Result (dBm)	Limit dBm	Margin dB	Summary
From	To							
9kHz	150kHz	0.032735	Sample	200Hz	-101.53	-54	47.53	Pass
150kHz	30MHz	7.0200	Sample	9kHz	-96.64	-54	42.64	Pass
30MHz	1000MHz	430.90	Sample	100kHz	-84.21	-54	30.21	Pass
1000MHz	5000MHz	3253.0	Sample	1MHz	-80.53	-47	33.53	Pass
5000MHz	10000MHz	7108.0	Sample	1MHz	-80.65	-47	33.65	Pass
10000MHz	18000MHz	15800.0	Sample	1MHz	-78.18	-47	31.18	Pass

Limit Article 24 (1 & 2) of the Ordinance Regulating Radio Equipment

Frequency range	Limit
9kHz to 1 GHz	4 nW (-54dBm)
Above 1 GHz	20nW (-47dBm)

A16 Limit of Secondary Emissions 5180MHz to 5320MHz 802.11n

Preview measurement of secondary radio emissions was performed using a peak detector with the RBW set to 100kHz and the VBW>RBW. Frequencies were scanned up through to the 4th harmonic with the EUT in receive mode on its lowest, centre and highest receive frequency in turn. Formal measurements were made using a RBW of 100 kHz for frequencies below 1 GHz and 1MHz for frequencies above 1 GHz.

Test Details: Receive Mode: Wi-Fi device 802.11n CH36, CH48 and CH64	
Standard	Ordinance Regulating Radio Equipment
Reference clause	Article 24 (1 & 2)
Frequency range	9kHz to 18 GHz
Application	Temporary Antenna Connector
EUT sample number	TRA-007055S17
Modification state	0
SE in test environment	REF1270
SE isolated from EUT	None
EUT set up	Refer to Appendix C

The worst-case emission measurements for spurious emissions and harmonics are listed below:

Freq range (MHz)		Measured Frequency (MHz)	Detector (Peak or Sample)	RBW	Result (dBm)	Limit dBm	Margin dB	Summary
From	To							
9kHz	150kHz	0.032735	Sample	200Hz	-101.53	-54	47.53	Pass
150kHz	30MHz	7.0200	Sample	9kHz	-96.64	-54	42.64	Pass
30MHz	1000MHz	430.90	Sample	100kHz	-84.21	-54	30.21	Pass
1000MHz	5000MHz	3253.0	Sample	1MHz	-80.53	-47	33.53	Pass
5000MHz	10000MHz	7108.0	Sample	1MHz	-80.65	-47	33.65	Pass
10000MHz	18000MHz	15800.0	Sample	1MHz	-78.18	-47	31.18	Pass

Limit Article 24 (1 & 2) of the Ordinance Regulating Radio Equipment

Frequency range	Limit
9kHz to 1 GHz	4 nW (-54dBm)
Above 1 GHz	20nW (-47dBm)

A17 Limit of Secondary Emissions 5500MHz to 5700MHz 802.11a

Preview measurement of secondary radio emissions was performed using a peak detector with the RBW set to 100kHz and the VBW>RBW. Frequencies were scanned up through to the 4th harmonic with the EUT in receive mode on its lowest, centre and highest receive frequency in turn. Formal measurements were made using a RBW of 100 kHz for frequencies below 1 GHz and 1 MHz for frequencies above 1 GHz.

Test Details: Receive Mode: Wi-Fi device 802.11a CH100, CH120 and CH140	
Standard	Ordinance Regulating Radio Equipment
Reference clause	Article 24 (1 & 2)
Frequency range	9kHz to 18 GHz
Application	Temporary Antenna Connector
EUT sample number	TRA-007055S17
Modification state	0
SE in test environment	REF1270
SE isolated from EUT	None
EUT set up	Refer to Appendix C

The worst-case emission measurements for spurious emissions and harmonics are listed below:

Freq range (MHz)		Measured Frequency (MHz)	Detector (Peak or Sample)	RBW	Result (dBm)	Limit dBm	Margin dB	Summary
From	To							
9kHz	150kHz	0.032735	Sample	200Hz	-101.53	-54	47.53	Pass
150kHz	30MHz	7.0200	Sample	9kHz	-96.64	-54	42.64	Pass
30MHz	1000MHz	430.90	Sample	100kHz	-84.21	-54	30.21	Pass
1000MHz	5000MHz	3253.0	Sample	1MHz	-80.53	-47	33.53	Pass
5000MHz	10000MHz	7108.0	Sample	1MHz	-80.65	-47	33.65	Pass
10000MHz	18000MHz	15800.0	Sample	1MHz	-78.18	-47	31.18	Pass

Limit Article 24 (1 & 2) of the Ordinance Regulating Radio Equipment

Frequency range	Limit
9kHz to 1 GHz	4 nW (-54dBm)
Above 1 GHz	20nW (-47dBm)

A18 Limit of Secondary Emissions 5500MHz to 5700MHz 802.11n

Preview measurement of secondary radio emissions was performed using a peak detector with the RBW set to 100kHz and the VBW>RBW. Frequencies were scanned up through to the 4th harmonic with the EUT in receive mode on its lowest, centre and highest receive frequency in turn. Formal measurements were made using a RBW of 100 kHz for frequencies below 1 GHz and 1MHz for frequencies above 1 GHz.

Test Details: Receive Mode: Wi-Fi device 802.11n CH100, CH120 and CH140	
Standard	Ordinance Regulating Radio Equipment
Reference clause	Article 24 (1 & 2)
Frequency range	9kHz to 18 GHz
Application	Temporary Antenna Connector
EUT sample number	TRA-007055S17
Modification state	0
SE in test environment	REF1270
SE isolated from EUT	None
EUT set up	Refer to Appendix C

The worst-case emission measurements for spurious emissions and harmonics are listed below:

Freq range (MHz)		Measured Frequency (MHz)	Detector (Peak or Sample)	RBW	Result (dBm)	Limit dBm	Margin dB	Summary
From	To							
9kHz	150kHz	0.032735	Sample	200Hz	-101.53	-54	47.53	Pass
150kHz	30MHz	7.0200	Sample	9kHz	-96.64	-54	42.64	Pass
30MHz	1000MHz	430.90	Sample	100kHz	-84.21	-54	30.21	Pass
1000MHz	5000MHz	3253.0	Sample	1MHz	-80.53	-47	33.53	Pass
5000MHz	10000MHz	7108.0	Sample	1MHz	-80.65	-47	33.65	Pass
10000MHz	18000MHz	15800.0	Sample	1MHz	-78.18	-47	31.18	Pass

Limit Article 24 (1 & 2) of the Ordinance Regulating Radio Equipment

Frequency range	Limit
9kHz to 1 GHz	4 nW (-54dBm)
Above 1 GHz	20nW (-47dBm)

A19 Tolerance of Frequency 5180MHz to 5320MHz 802.11a/n

Test Details: Transmit	
Standard	Ordinance Regulating Radio Equipment
Reference clause	Article 5 Table 1 Row 7 Item 10
Application	Temporary Antenna Connector
EUT sample number	TRA-007055S17
Modification state	0
SE in test environment	REF1270
SE isolated from EUT	None
EUT set up	Refer to Appendix C

Test Conditions	Channel 36	Channel 48	Channel 64
Wanted Frequency (MHz)	5180	5240	5320
Frequency Error (ppm)	19.4	19.8	19.2
Result	Pass	Pass	Pass
Limit	±50 ppm		

Limit Article 5 Table 1 Row 7 Item 10 of the Ordinance Regulating Radio Equipment

±50 ppm

A20 Tolerance of Frequency 5500MHz to 5700MHz 802.11a/n

Test Details: Transmit	
Standard	Ordinance Regulating Radio Equipment
Reference clause	Article 5 Table 1 Row 7 Item 10
Application	Temporary Antenna Connector
EUT sample number	TRA-007055S17
Modification state	0
SE in test environment	REF1270
SE isolated from EUT	None
EUT set up	Refer to Appendix C

Test Conditions	Channel 100	Channel 120	Channel 140
Wanted Frequency (MHz)	5500	5600	5700
Frequency Error (ppm)	18.9	19.2	19.5
Result	Pass	Pass	Pass
Limit	±50 ppm		

Limit Article 5 Table 1 Row 7 Item 10 of the Ordinance Regulating Radio Equipment

±50 ppm

A21 Adjacent Channel Leakage Power 5180MHz to 5320MHz 802.11a

Test Details: Transmit Mode: Wi-Fi device 802.11a CH36, CH48 and CH64	
Standard	Ordinance Regulating Radio Equipment
Reference clause	Article 49.20, 3) j
Application	Temporary Antenna Connector
EUT sample number	TRA-007055S17
Modification state	0
SE in test environment	REF1270
SE isolated from EUT	None
EUT set up	Refer to Appendix C

Carrier Freq (MHz)	Freq Offset (MHz)	6Mbps		54Mbps		Limit (dBc)	Result
		Lower Channel (dBc)	Upper Channel (dBc)	Lower Channel (dBc)	Upper Channel (dBc)		
5180	20	-31.48	-31.34	-31.09	-31.03	-25	Pass
	40	-49.02	-46.93	-50.14	-48.18	-40	Pass
5240	20	-29.51	-29.49	-30.48	-30.25	-25	Pass
	40	-47.55	-47.19	-48.56	-48.20	-40	Pass
5320	20	-28.21	-27.19	-30.10	-28.26	-25	Pass
	40	-47.40	-45.91	-48.04	-46.80	-40	Pass

Limit Article 49.20, 3)

j The Adjacent Channel Leakage Power shall be as follows;

(1) In case of the Occupied Bandwidth is no greater than 18 MHz; The mean power radiated within a bandwidth of ±9 MHz of the frequencies 20 MHz and 40 MHz distant from the frequency of the carrier shall be lower than the mean power of the carrier by 25 dB and 40 dB.

(2) In case of the Occupied Bandwidth is greater than 18 MHz to 19 MHz; The mean power radiated within a bandwidth of ±9.5 MHz of the frequencies 20 MHz and 40 MHz distant from the frequency of the carrier shall be lower than the mean power of the carrier by 25 dB and 40 dB.

(3) In case of the Occupied Bandwidth is greater than 19 MHz to 38 MHz; The mean power radiated within a bandwidth of ±19 MHz of the frequencies 40 MHz and 80 MHz distant from the frequency of the carrier shall be lower than the mean power of the carrier by 25 dB and 40 dB.

A22 Adjacent Channel Leakage Power 5180MHz to 5320MHz 802.11n

Test Details: Transmit Mode: Wi-Fi device 802.11n CH36, CH48 and CH64	
Standard	Ordinance Regulating Radio Equipment
Reference clause	Article 49.20, 3) j
Application	Temporary Antenna Connector
EUT sample number	TRA-007055S17
Modification state	0
SE in test environment	REF1270
SE isolated from EUT	None
EUT set up	Refer to Appendix C

Carrier Freq (MHz)	Freq Offset (MHz)	MCS0		MCS7		Limit (dBc)	Result
		Lower Channel (dBc)	Upper Channel (dBc)	Lower Channel (dBc)	Upper Channel (dBc)		
5180	20	-31.17	-29.68	-30.67	-29.16	-25	Pass
	40	-47.93	-47.37	-47.26	-46.11	-40	Pass
5240	20	-28.80	-28.08	-29.19	-29.59	-25	Pass
	40	-47.25	-45.99	-47.16	-46.45	-40	Pass
5320	20	-29.40	-26.18	-28.76	-27.01	-25	Pass
	40	-46.26	-44.86	-46.75	-45.19	-40	Pass

Limit Article 49.20, 3)

j The Adjacent Channel Leakage Power shall be as follows;

(1) In case of the Occupied Bandwidth is no greater than 18 MHz; The mean power radiated within a bandwidth of ±9 MHz of the frequencies 20 MHz and 40 MHz distant from the frequency of the carrier shall be lower than the mean power of the carrier by 25 dB and 40 dB.

(2) In case of the Occupied Bandwidth is greater than 18 MHz to 19 MHz; The mean power radiated within a bandwidth of ±9.5 MHz of the frequencies 20 MHz and 40 MHz distant from the frequency of the carrier shall be lower than the mean power of the carrier by 25 dB and 40 dB.

(3) In case of the Occupied Bandwidth is greater than 19 MHz to 38 MHz; The mean power radiated within a bandwidth of ±19 MHz of the frequencies 40 MHz and 80 MHz distant from the frequency of the carrier shall be lower than the mean power of the carrier by 25 dB and 40 dB.

A23 Adjacent Channel Leakage Power 5500MHz to 5700MHz 802.11a

Test Details: Transmit Mode: Wi-Fi device 802.11a CH100, CH120 and CH140	
Standard	Ordinance Regulating Radio Equipment
Reference clause	Article 49.20, 3-2) f
Application	Temporary Antenna Connector
EUT sample number	TRA-007055S17
Modification state	0
SE in test environment	REF1270
SE isolated from EUT	None
EUT set up	Refer to Appendix C

Carrier Freq (MHz)	Freq Offset (MHz)	6Mbps		54Mbps		Limit (dBc)	Result
		Lower Channel (dBc)	Upper Channel (dBc)	Lower Channel (dBc)	Upper Channel (dBc)		
5500	20	-26.14	-26.51	-26.38	-25.87	-25	Pass
	40	-45.62	-45.94	-45.09	-45.29	-40	Pass
5600	20	-28.60	-28.03	-28.69	-28.78	-25	Pass
	40	-47.28	-48.17	-48.06	-49.11	-40	Pass
5700	20	-33.43	-34.49	-34.10	-34.76	-25	Pass
	40	-52.00	-52.69	-52.89	-53.04	-40	Pass

Limit Article 49.20, 3-2)

f The Adjacent Channel Leakage Power shall be as follows;

(1) In case of the modulation type is not OFDM; The mean power radiated within a bandwidth of ±9 MHz of the frequencies 20 MHz and 40 MHz distant from the frequency of the carrier shall be lower than the mean power of the carrier by 25 dB and 40 dB.

(2) In case of the modulation type is OFDM, shall be as follows;

(i) In case of the Occupied Bandwidth is 19.7 MHz or less; The mean power radiated within a bandwidth of ±9.5 MHz of the frequencies 20 MHz and 40 MHz distant from the frequency of the carrier shall be lower than the mean power of the carrier by 25 dB and 40 dB.

(ii) In case of the Occupied Bandwidth is greater than 19.7 MHz to 38 MHz; The mean power radiated within a bandwidth of ±19 MHz of the frequencies 40 MHz and 80 MHz distant from the frequency of the carrier shall be lower than the mean power of the carrier by 25 dB and 40 dB.

A24 Adjacent Channel Leakage Power 5500MHz to 5700MHz 802.11n

Test Details: Transmit Mode: Wi-Fi device 802.11n CH100, CH120 and CH140	
Standard	Ordinance Regulating Radio Equipment
Reference clause	Article 49.20, 3-2) f
Application	Temporary Antenna Connector
EUT sample number	TRA-007055S17
Modification state	0
SE in test environment	REF1270
SE isolated from EUT	None
EUT set up	Refer to Appendix C

Carrier Freq (MHz)	Freq Offset (MHz)	MCS0		MCS7		Limit (dBc)	Result
		Lower Channel (dBc)	Upper Channel (dBc)	Lower Channel (dBc)	Upper Channel (dBc)		
5500	20	-25.01	-25.19	-25.58	-25.30	-25	Pass
	40	-44.69	-44.10	-45.27	-44.53	-40	Pass
5600	20	-27.02	-26.66	-27.43	-27.51	-25	Pass
	40	-46.27	-46.73	-46.22	-47.61	-40	Pass
5700	20	-32.58	-33.17	-32.28	-33.40	-25	Pass
	40	-50.96	-50.64	-51.59	-49.79	-40	Pass

Limit Article 49.20, 3-2)

f The Adjacent Channel Leakage Power shall be as follows;

(1) In case of the modulation type is not OFDM; The mean power radiated within a bandwidth of ±9 MHz of the frequencies 20 MHz and 40 MHz distant from the frequency of the carrier shall be lower than the mean power of the carrier by 25 dB and 40 dB.

(2) In case of the modulation type is OFDM, shall be as follows;

(i) In case of the Occupied Bandwidth is 19.7 MHz or less; The mean power radiated within a bandwidth of ±9.5 MHz of the frequencies 20 MHz and 40 MHz distant from the frequency of the carrier shall be lower than the mean power of the carrier by 25 dB and 40 dB.

(ii) In case of the Occupied Bandwidth is greater than 19.7 MHz to 38 MHz; The mean power radiated within a bandwidth of ±19 MHz of the frequencies 40 MHz and 80 MHz distant from the frequency of the carrier shall be lower than the mean power of the carrier by 25 dB and 40 dB.

Appendix B: Supporting Graphical Data

This appendix contains graphical data obtained during testing.

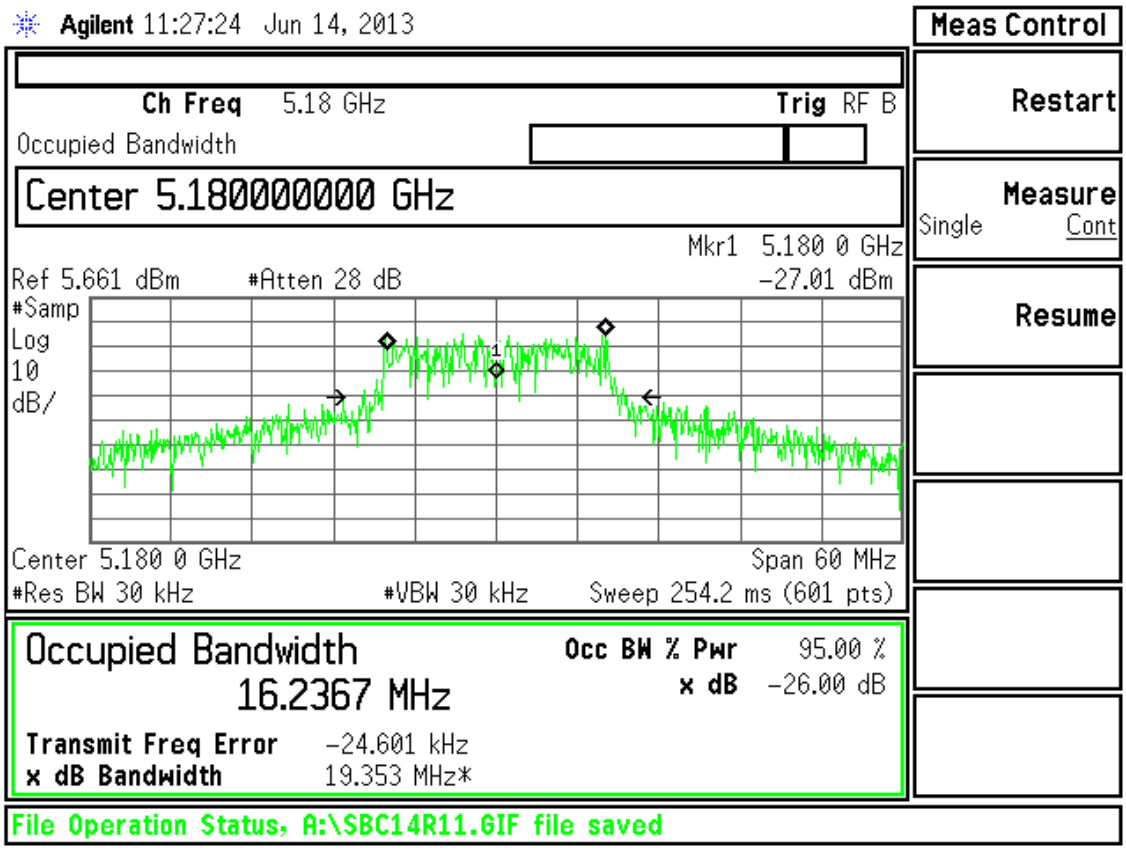
Notes:

a) The graphical data in this appendix is preview data. For details of formal results, refer to Appendix A

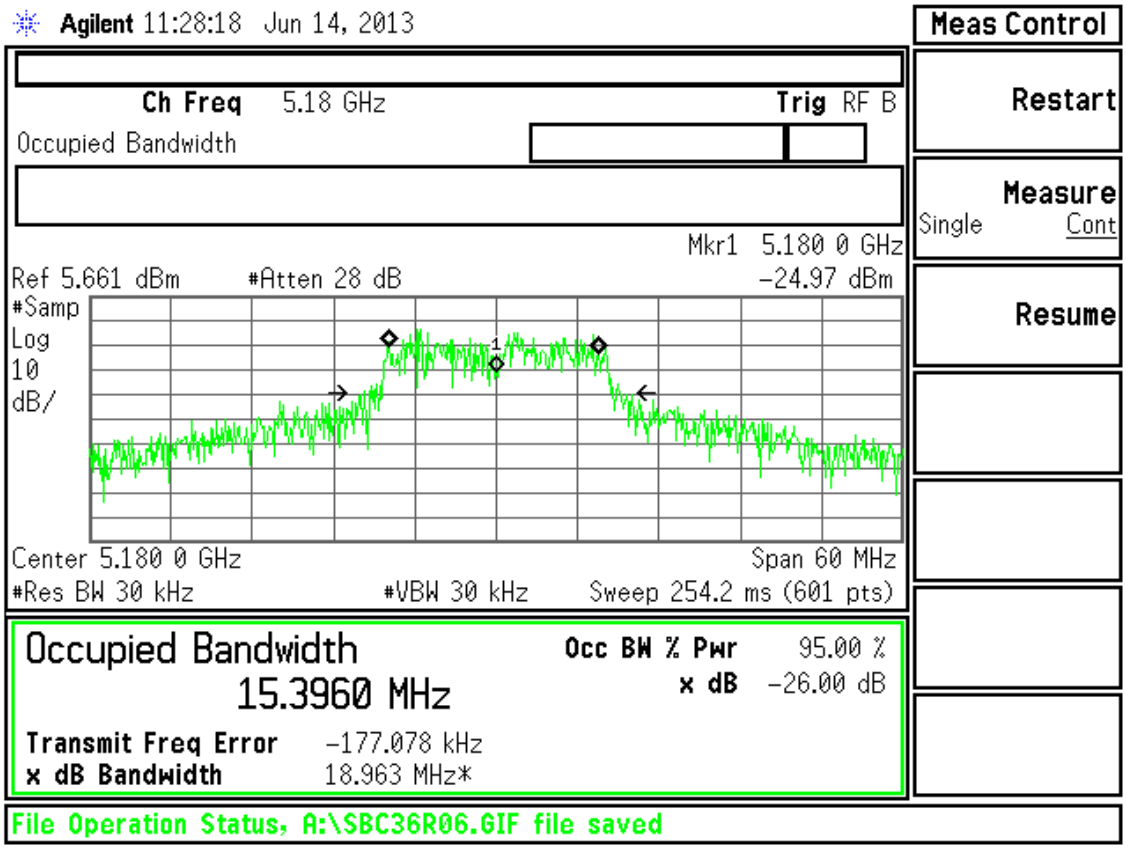
b) The time and date on the plots do not necessarily equate to the time of the test.

c) Appendix C details the numbering system used to identify the sample and its modification state.

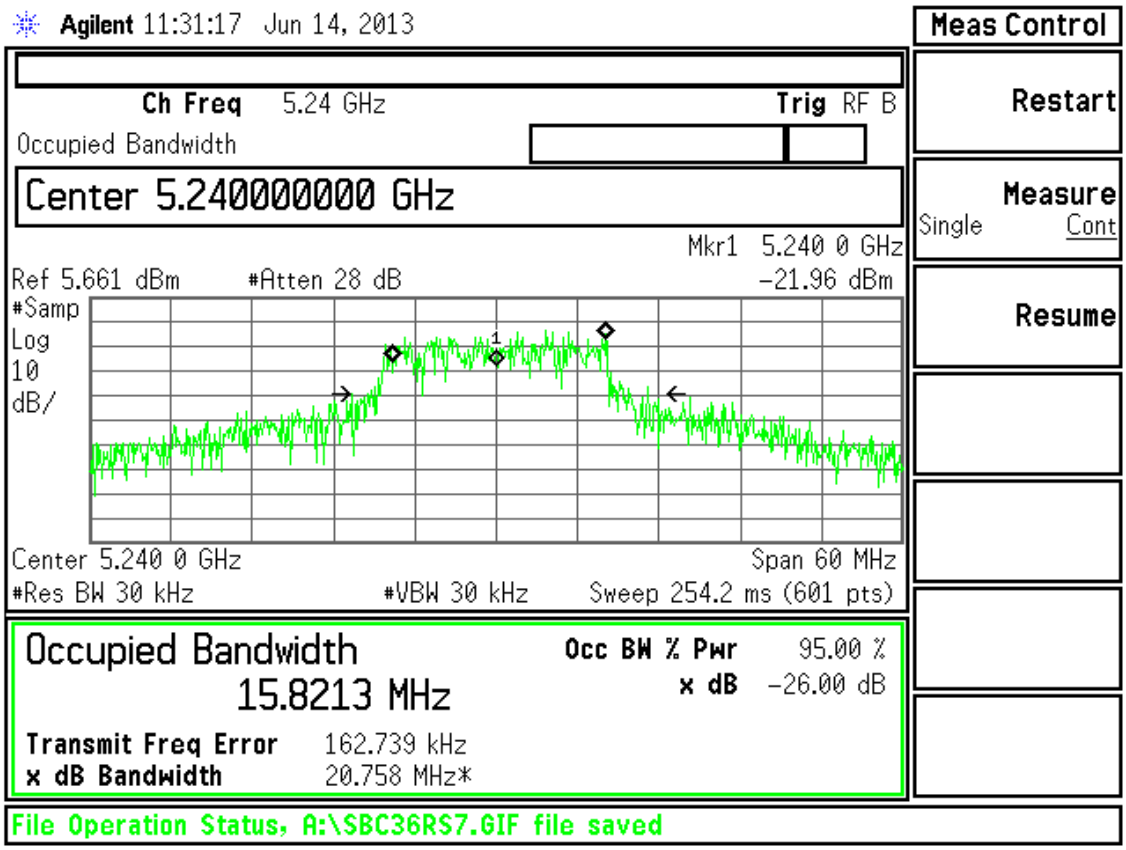
d) The plots presented in this appendix may not be a complete record of the measurements performed, but are a representative sample, relative to the final assessment.



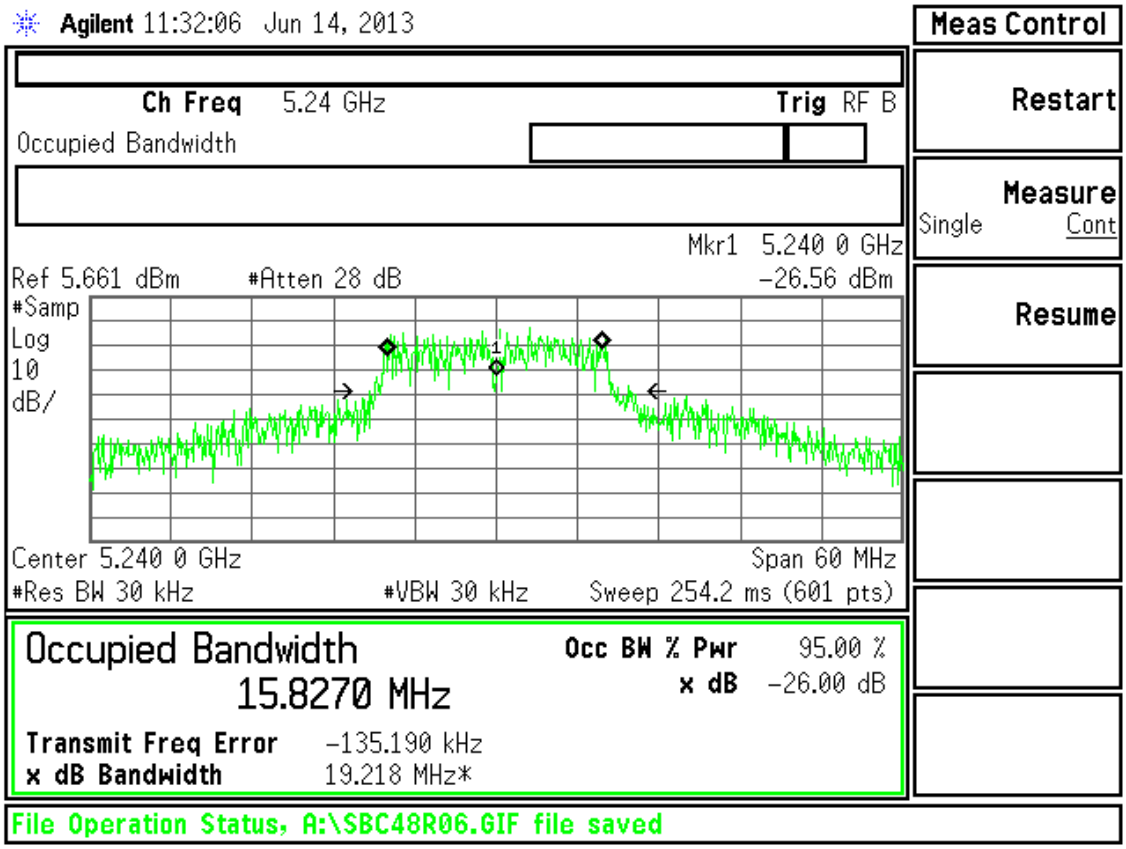
95% Spreading Bandwidth – 802.11a CH36 (5180MHz) 6Mbps



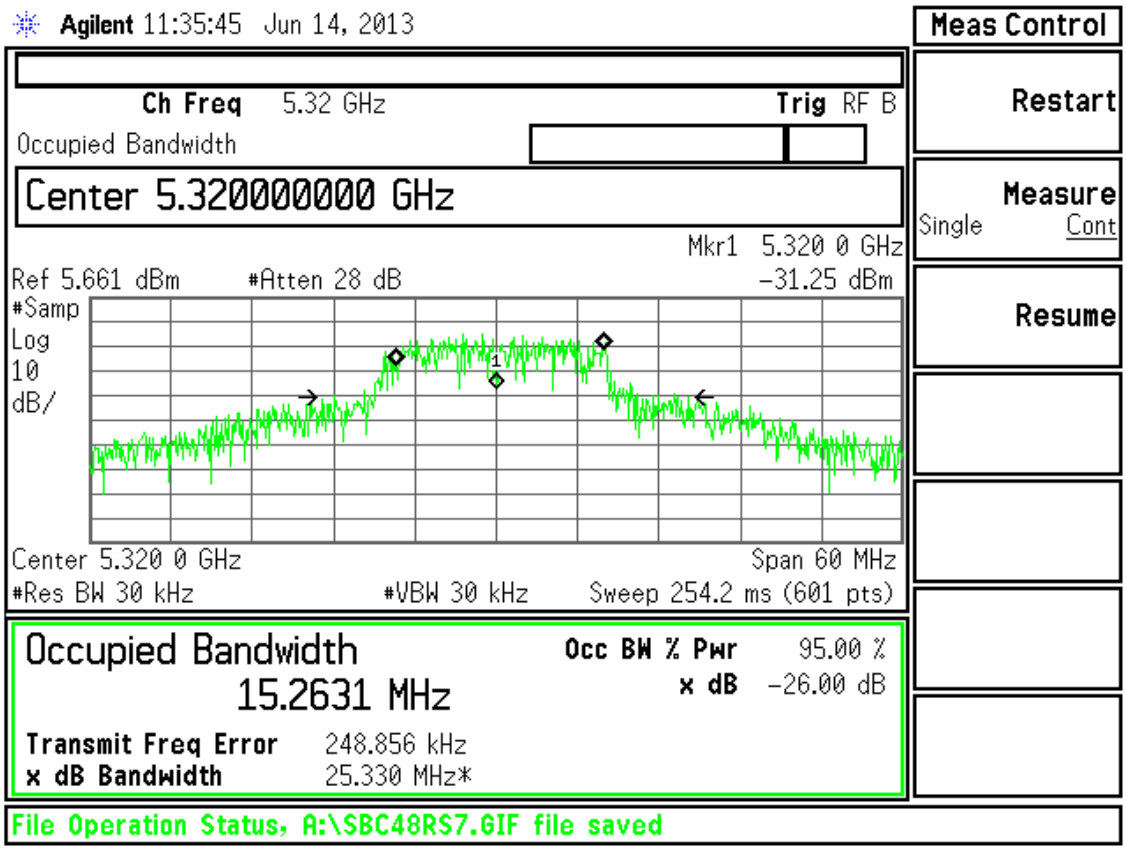
95% Spreading Bandwidth – 802.11a CH36 (5180MHz) 54Mbps



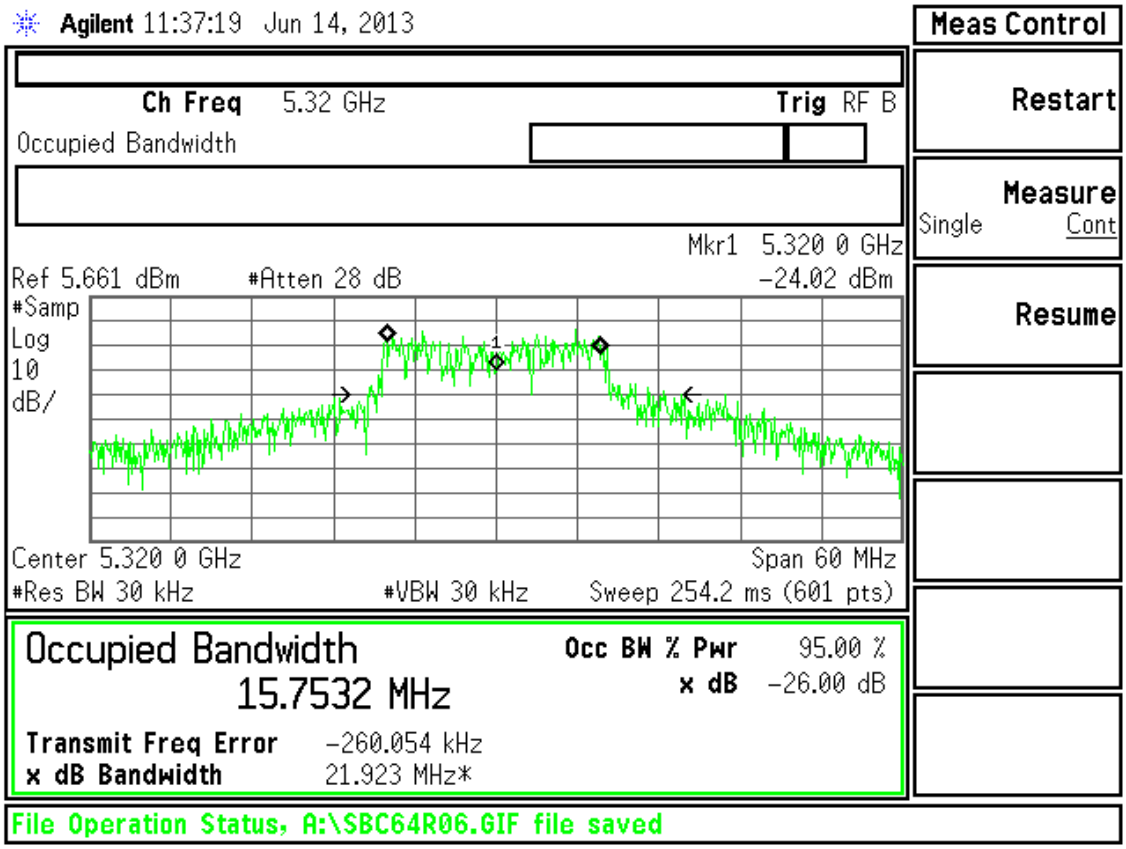
95% Spreading Bandwidth – 802.11a CH48 (5240MHz) 6Mbps



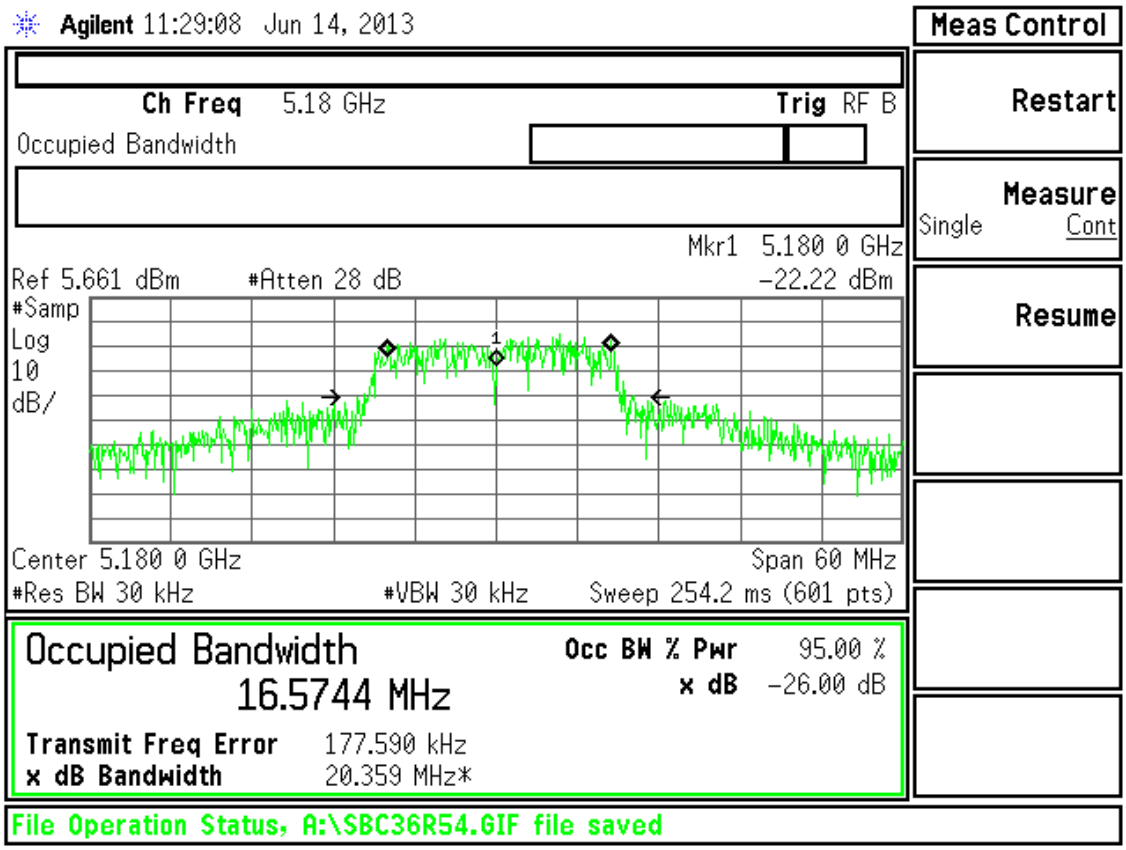
95% Spreading Bandwidth – 802.11a CH48 (5240MHz) 54Mbps



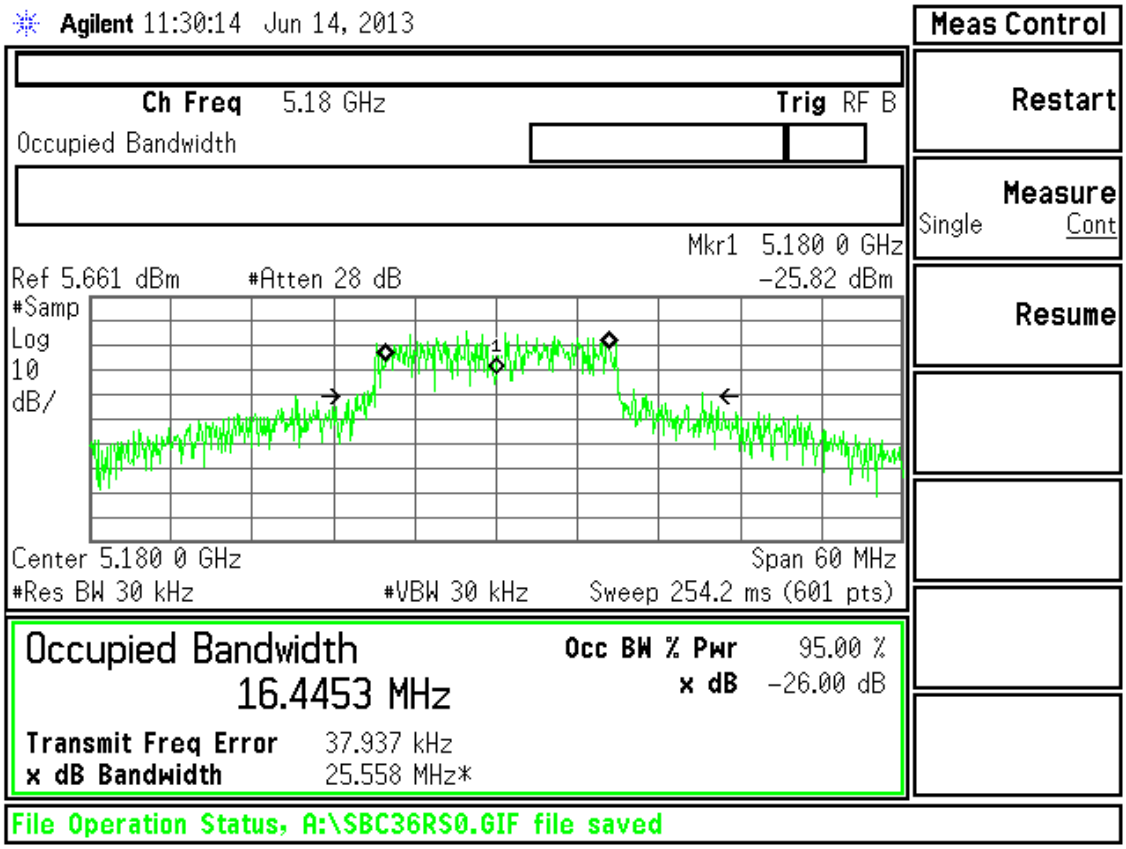
95% Spreading Bandwidth – 802.11a CH64 (5320MHz) 6Mbps



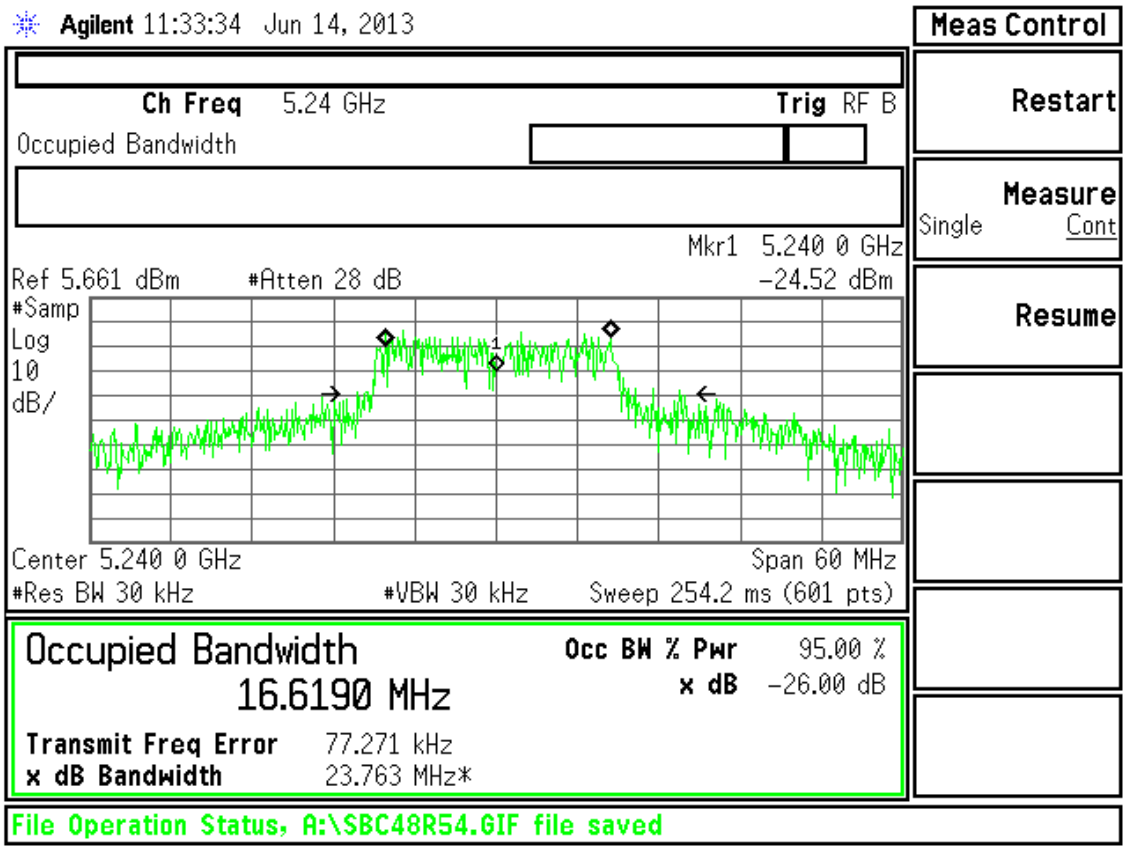
95% Spreading Bandwidth – 802.11a CH64 (5320MHz) 54Mbps



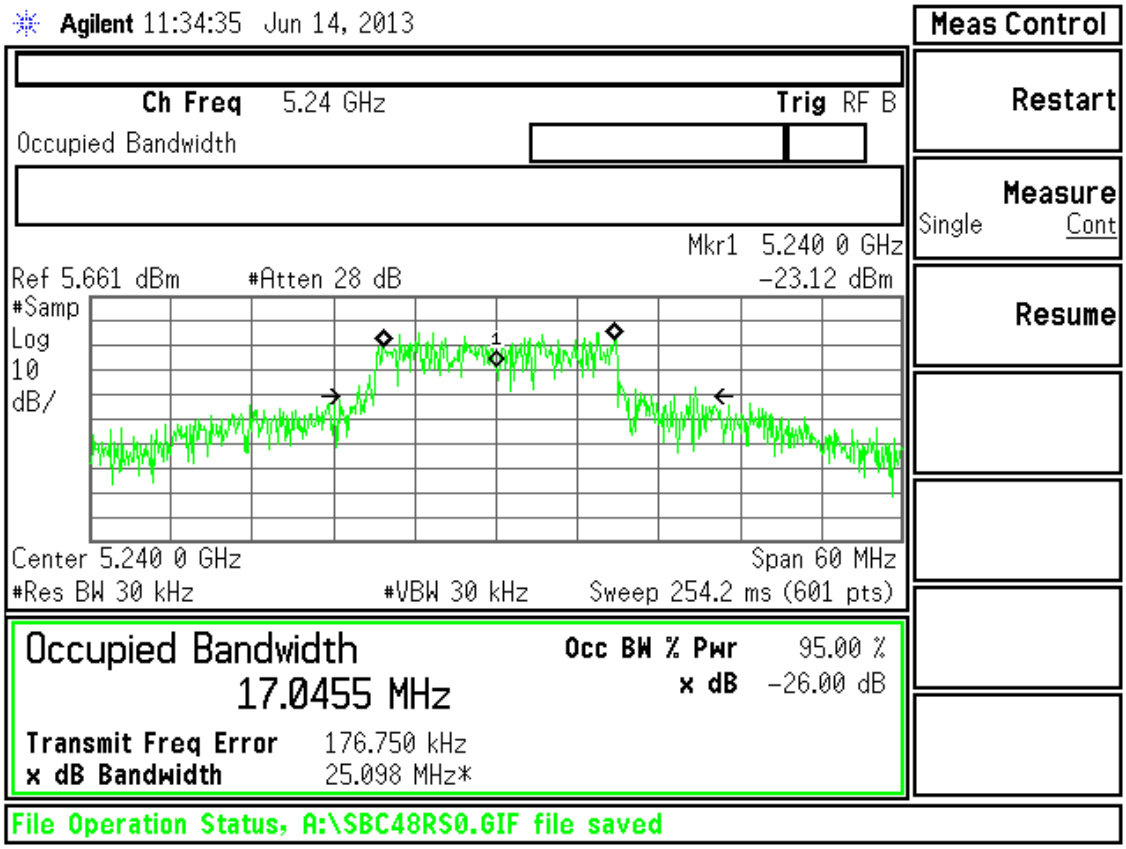
95% Spreading Bandwidth – 802.11n CH36 (5180MHz) MCS0



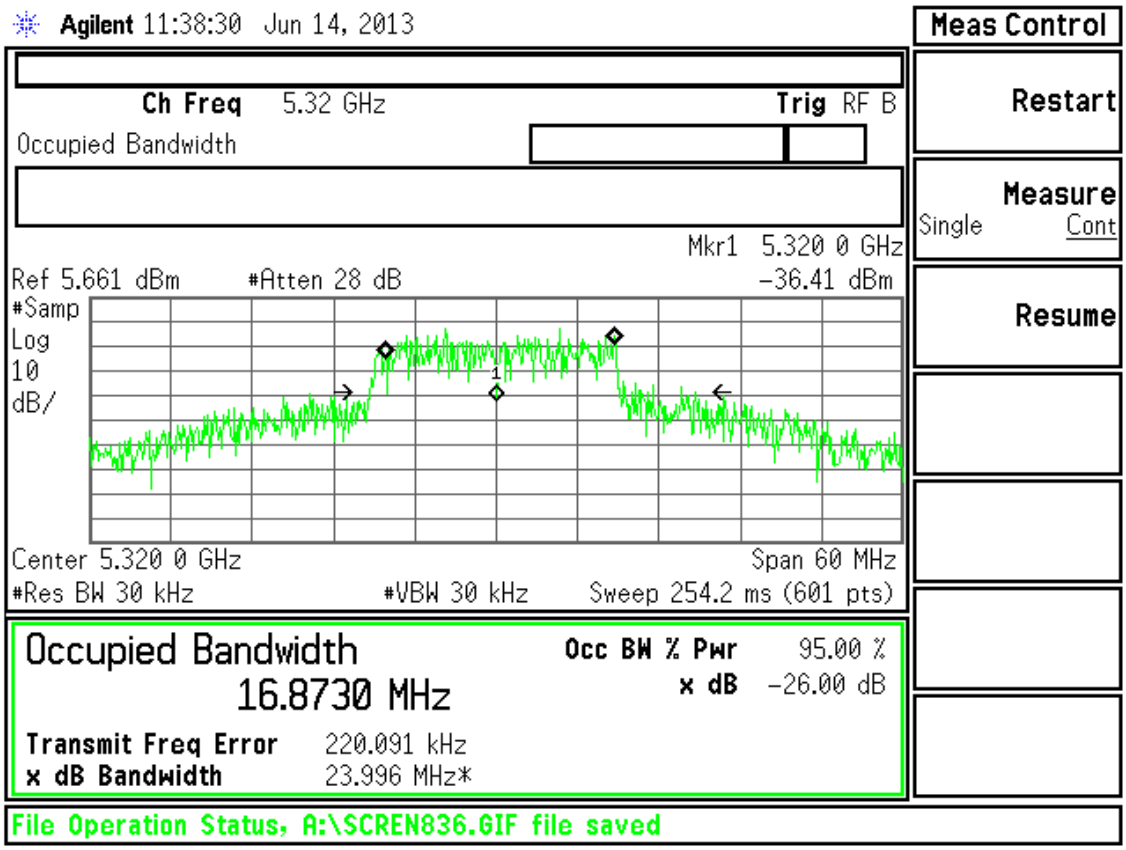
95% Spreading Bandwidth – 802.11n CH36 (5180MHz) MCS7



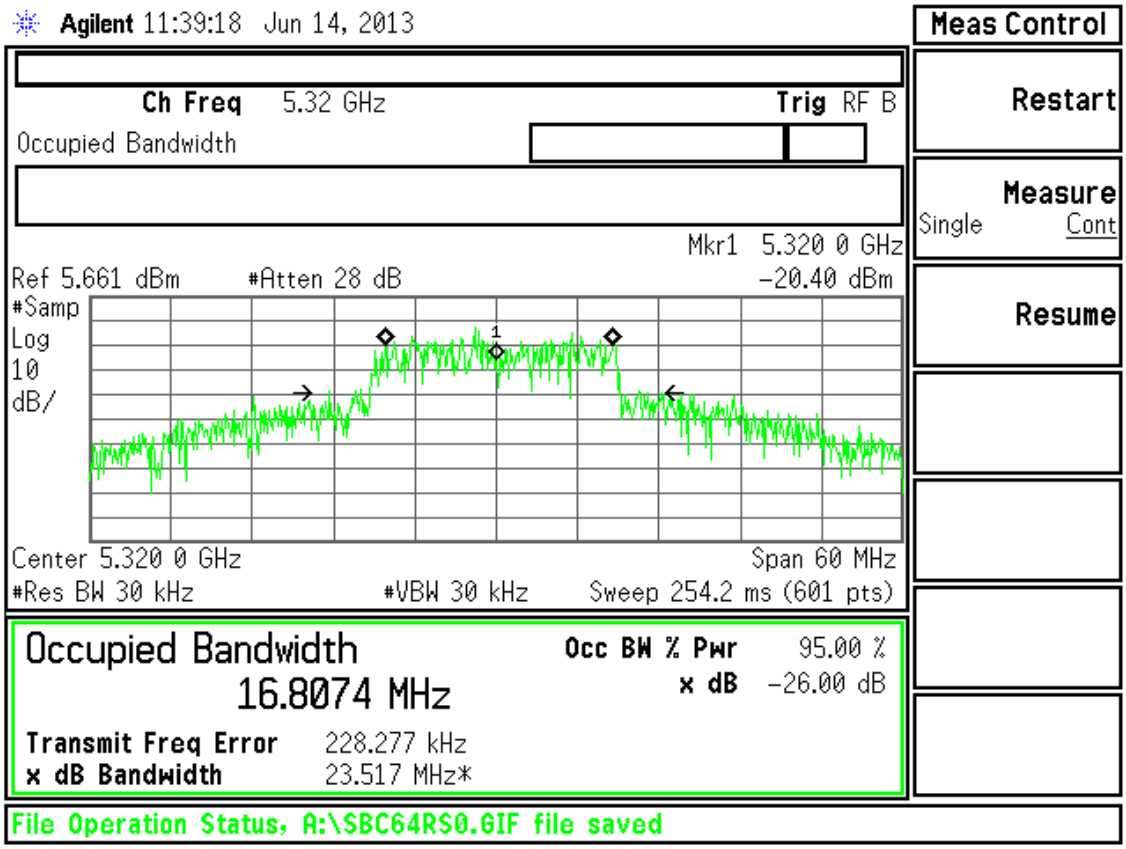
95% Spreading Bandwidth – 802.11n CH48 (5240MHz) MCS0



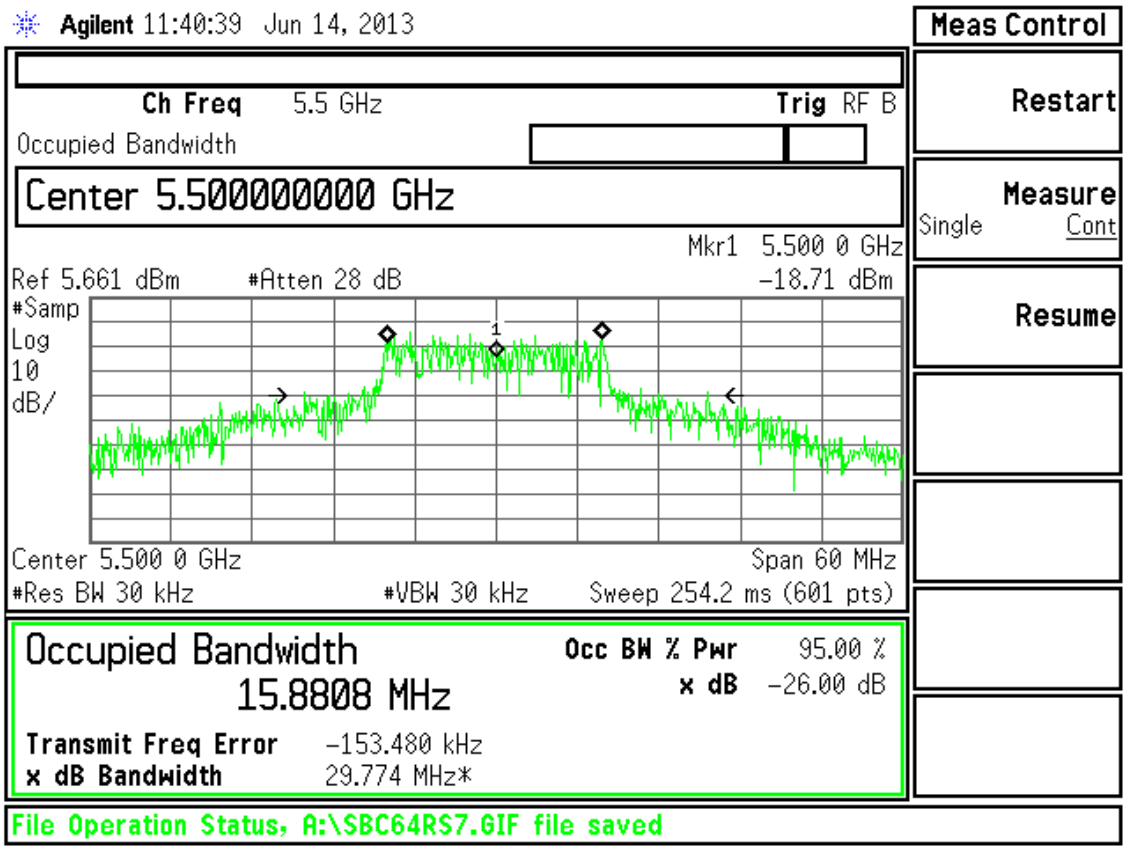
95% Spreading Bandwidth – 802.11n CH48 (5240MHz) MCS7



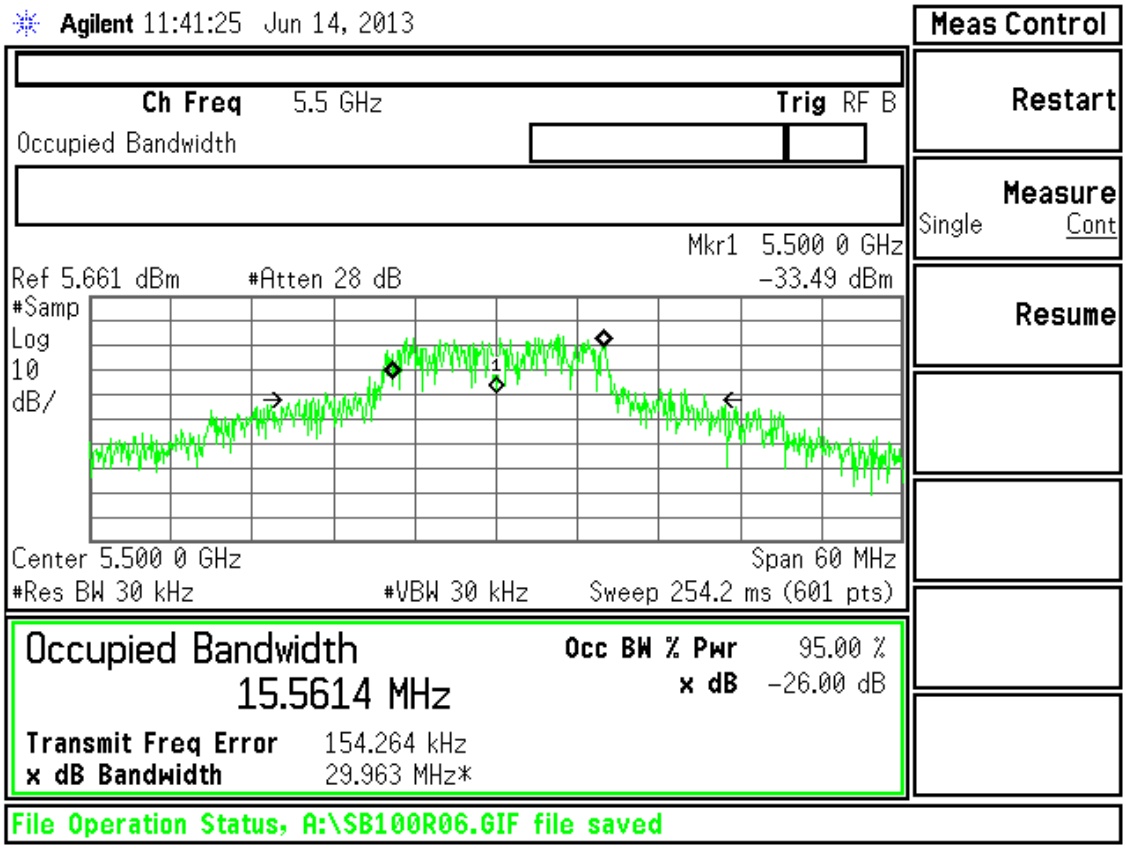
95% Spreading Bandwidth – 802.11n CH64 (5320MHz) MCS0



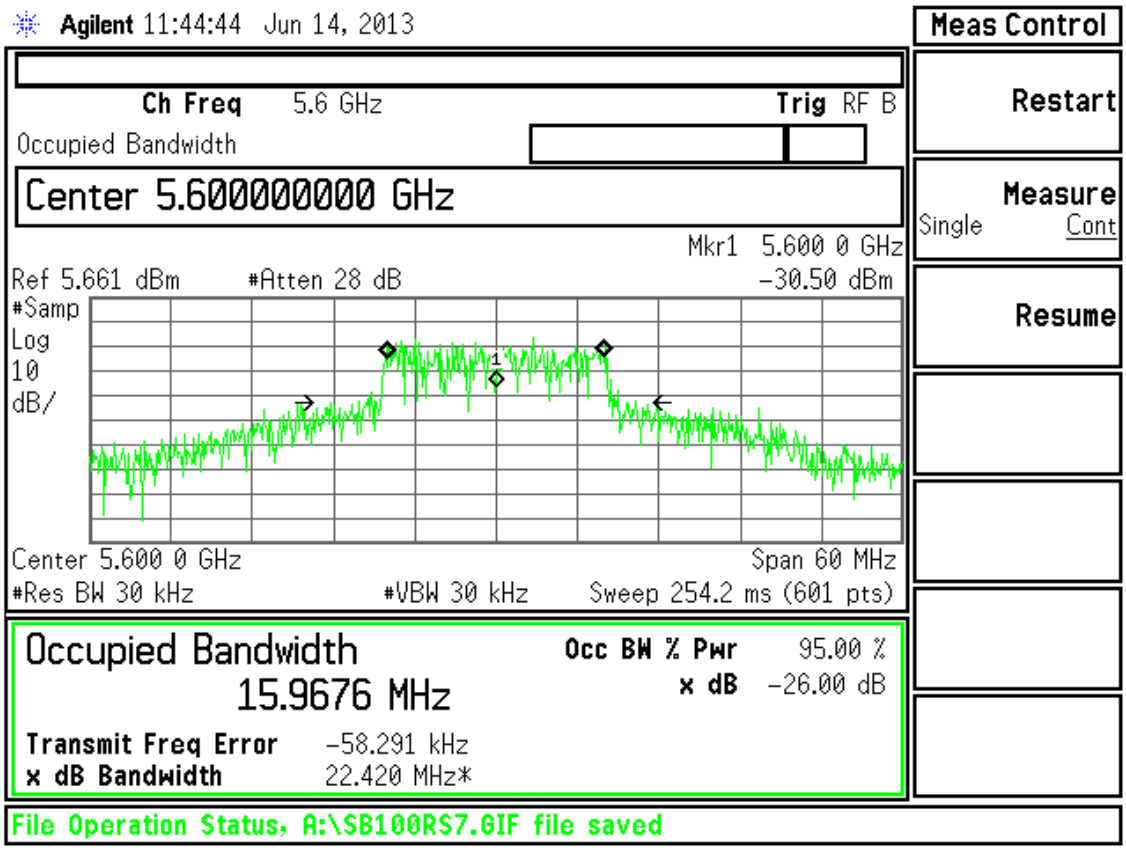
95% Spreading Bandwidth – 802.11n CH64 (5320MHz) MCS7



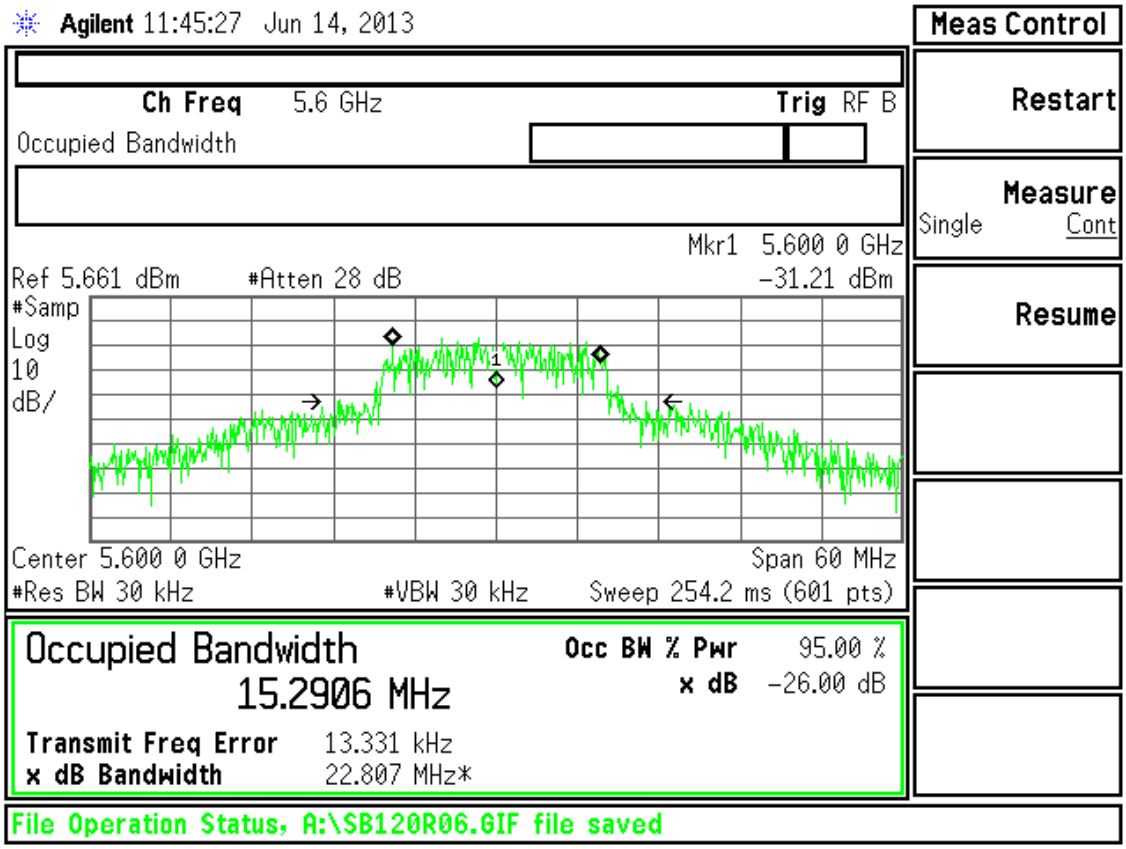
95% Spreading Bandwidth – 802.11a CH100 (5500MHz) 6Mbps



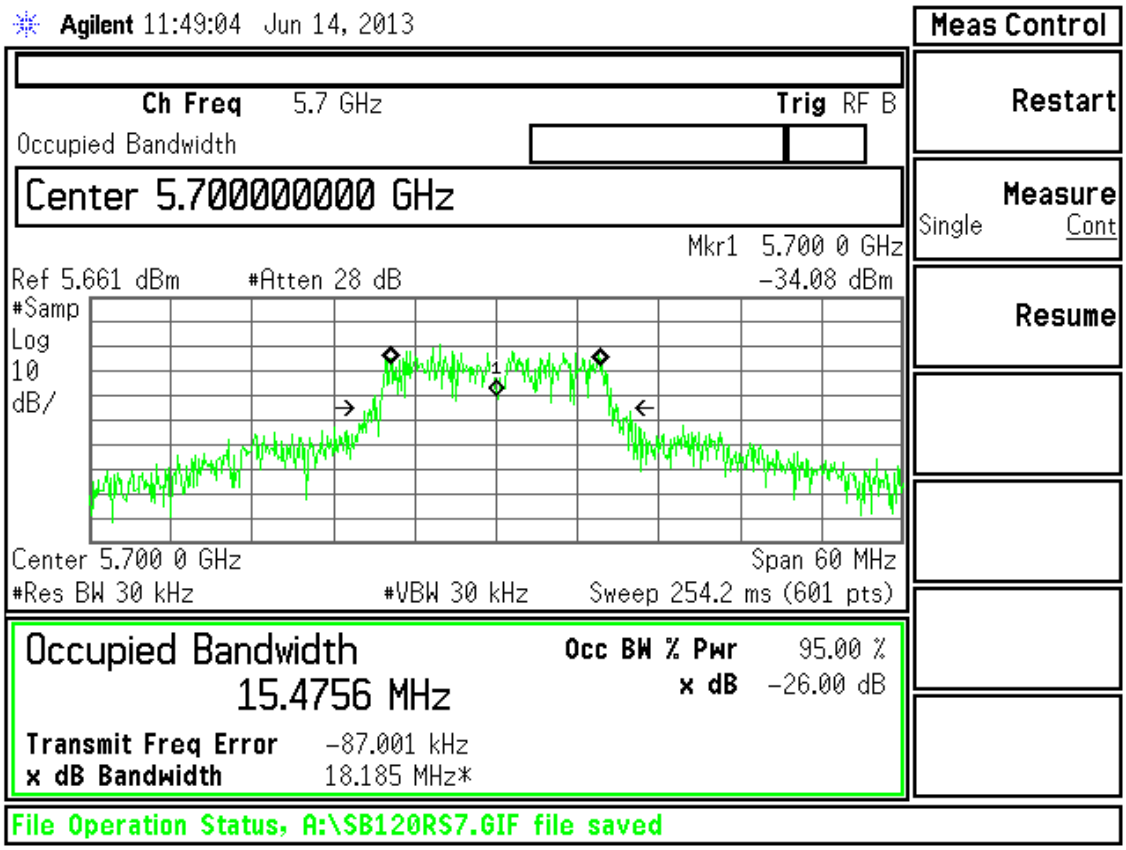
95% Spreading Bandwidth – 802.11a CH100 (5500MHz) 54Mbps



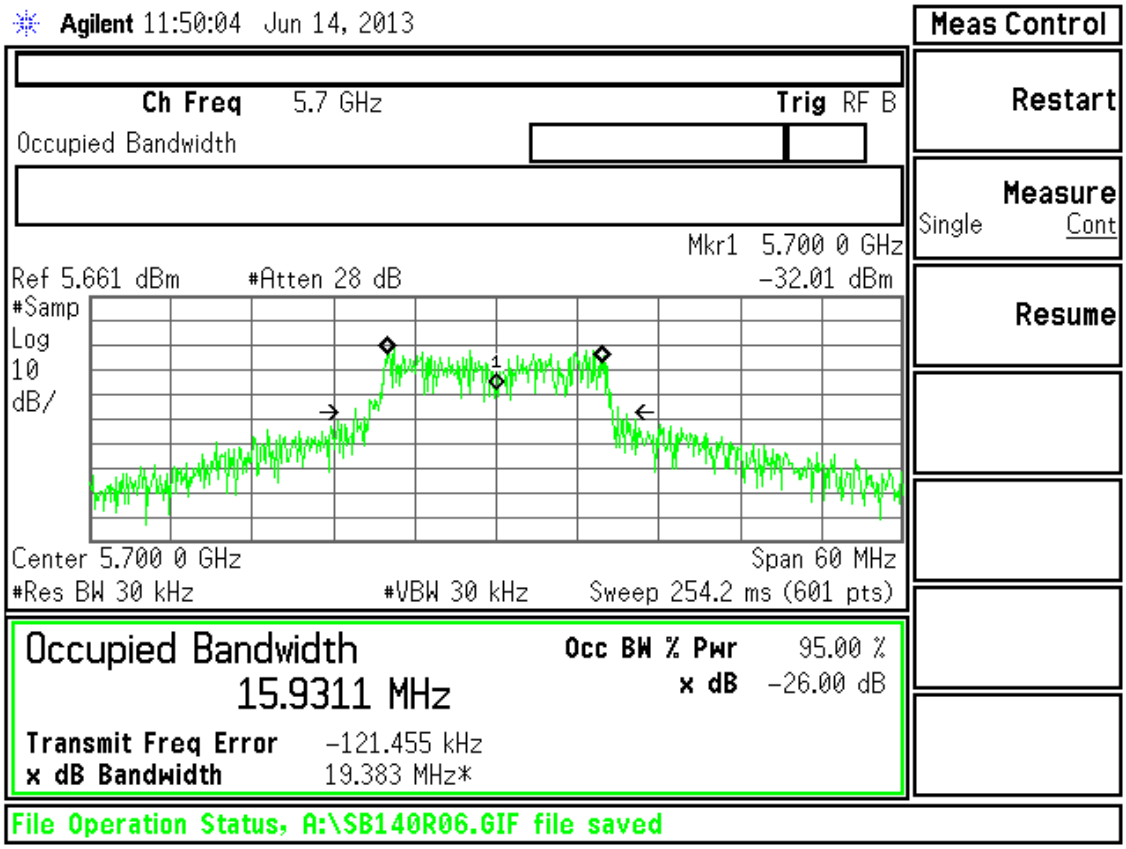
95% Spreading Bandwidth – 802.11a CH120 (5600MHz) 6Mbps



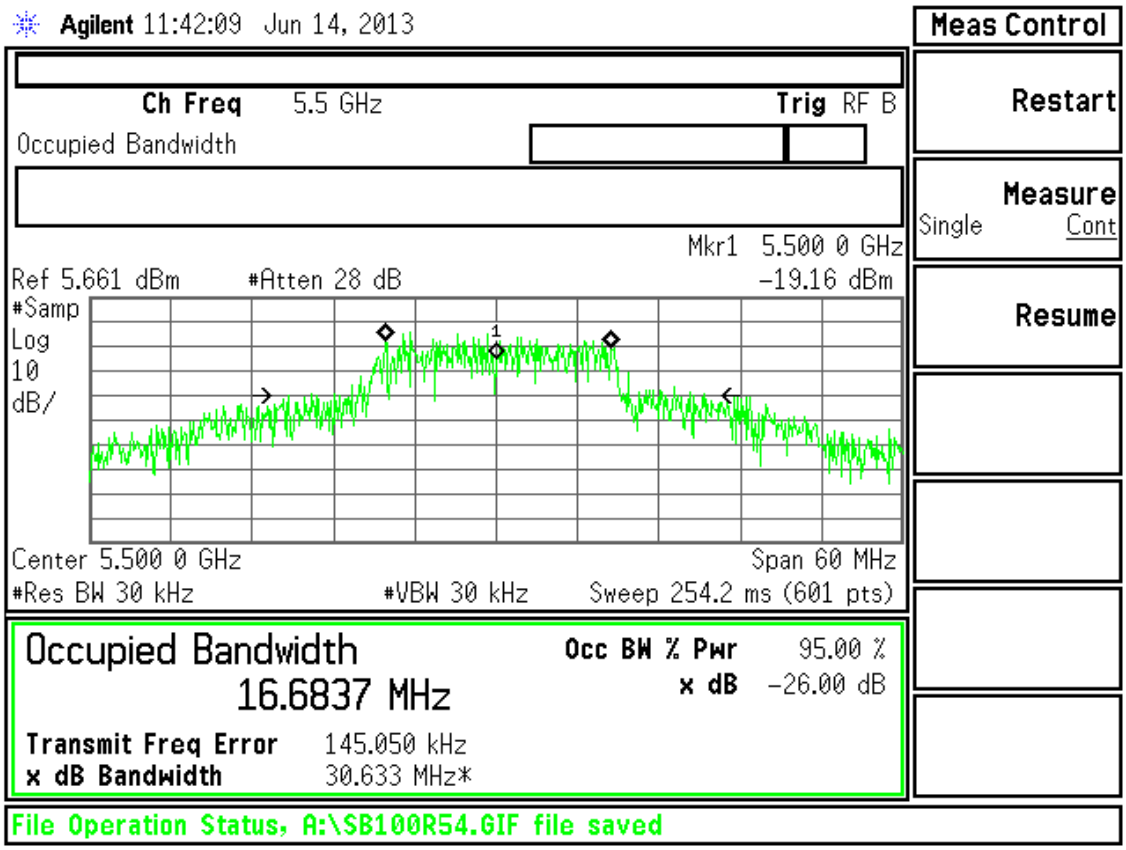
95% Spreading Bandwidth – 802.11a CH120 (5600MHz) 54Mbps



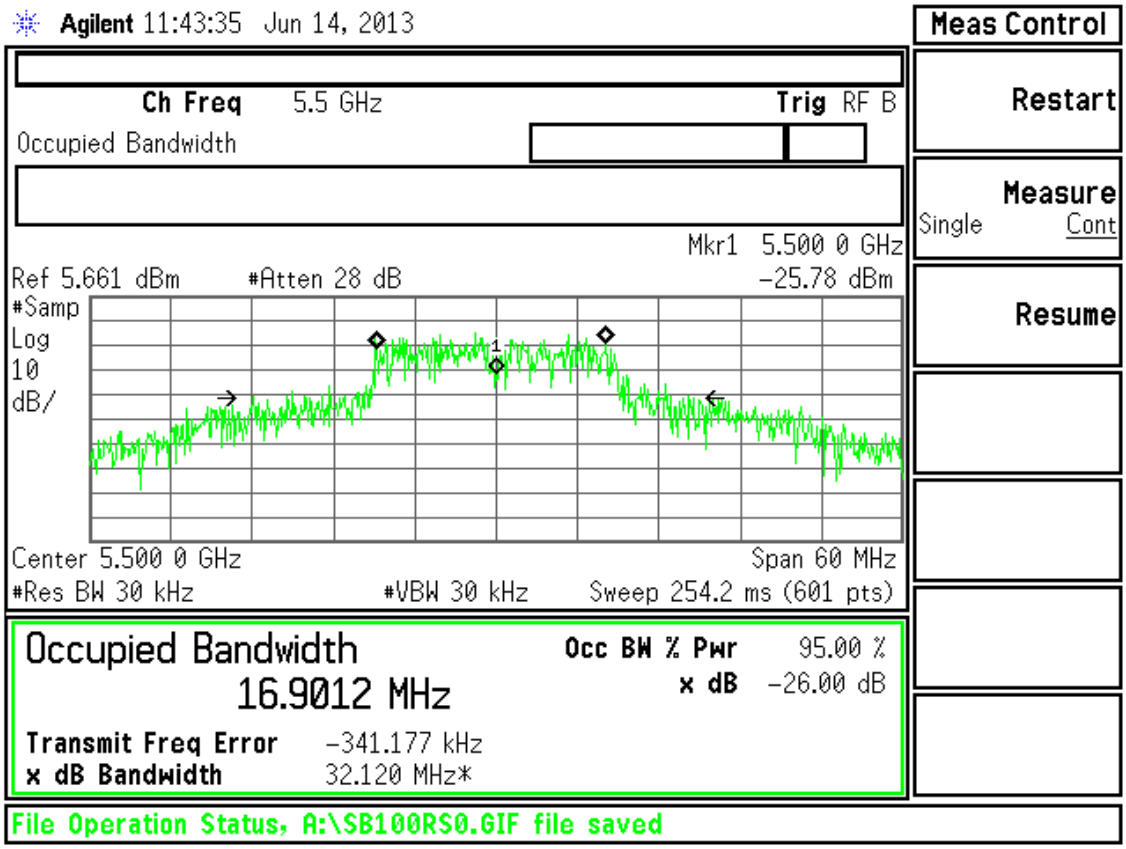
95% Spreading Bandwidth – 802.11a CH140 (5700MHz) 6Mbps



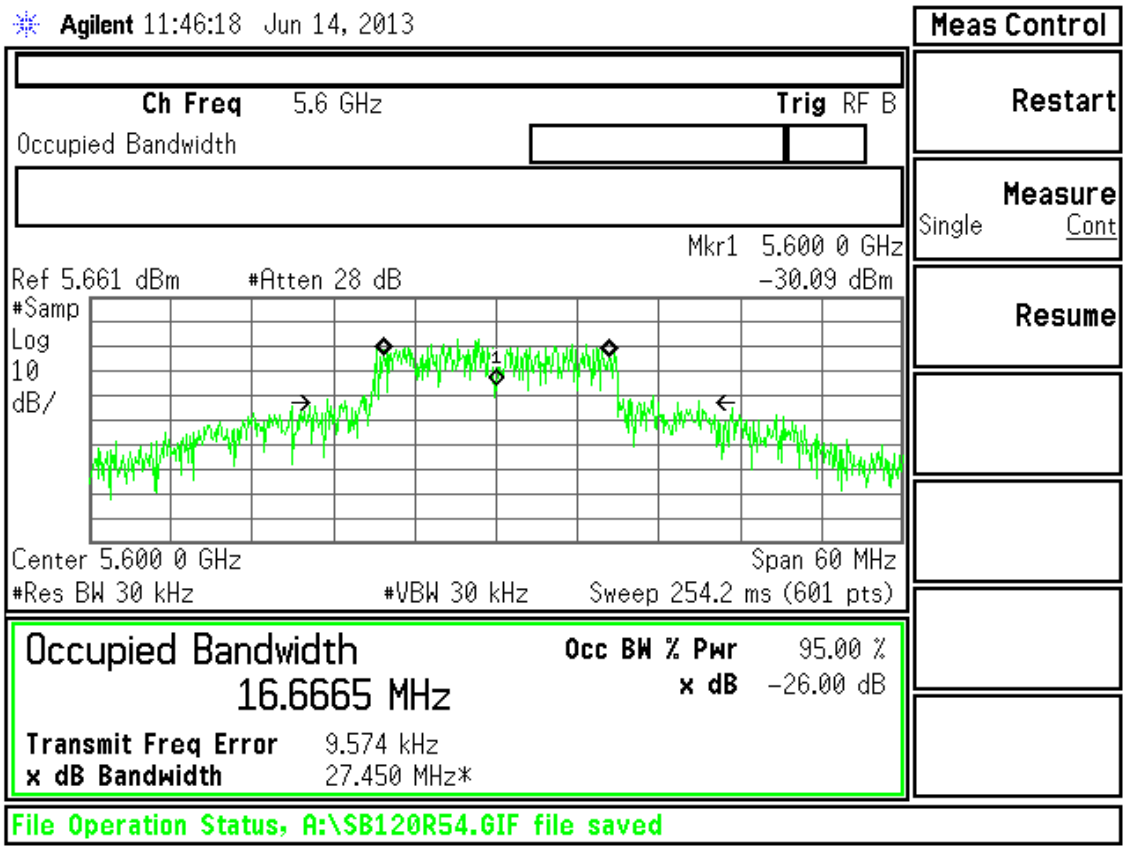
95% Spreading Bandwidth – 802.11a CH140 (5700MHz) 54Mbps



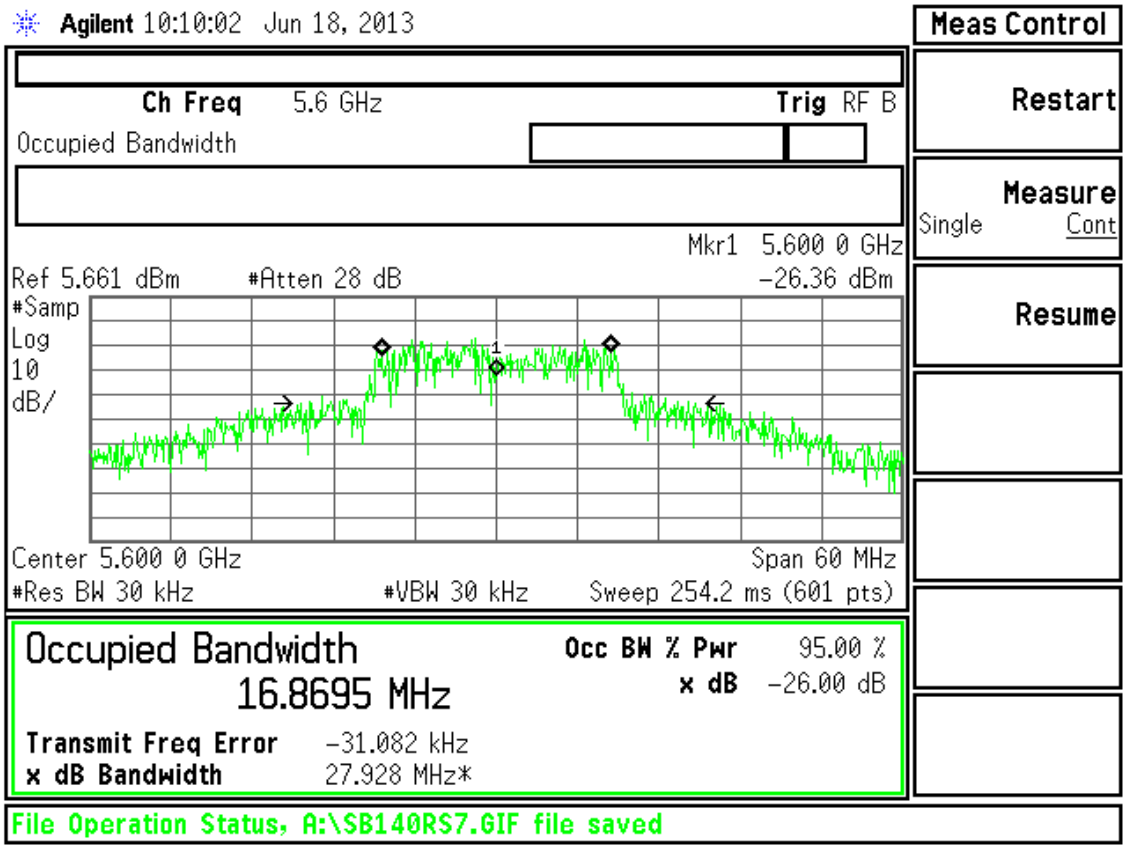
95% Spreading Bandwidth – 802.11n CH100 (5500MHz) MCS0



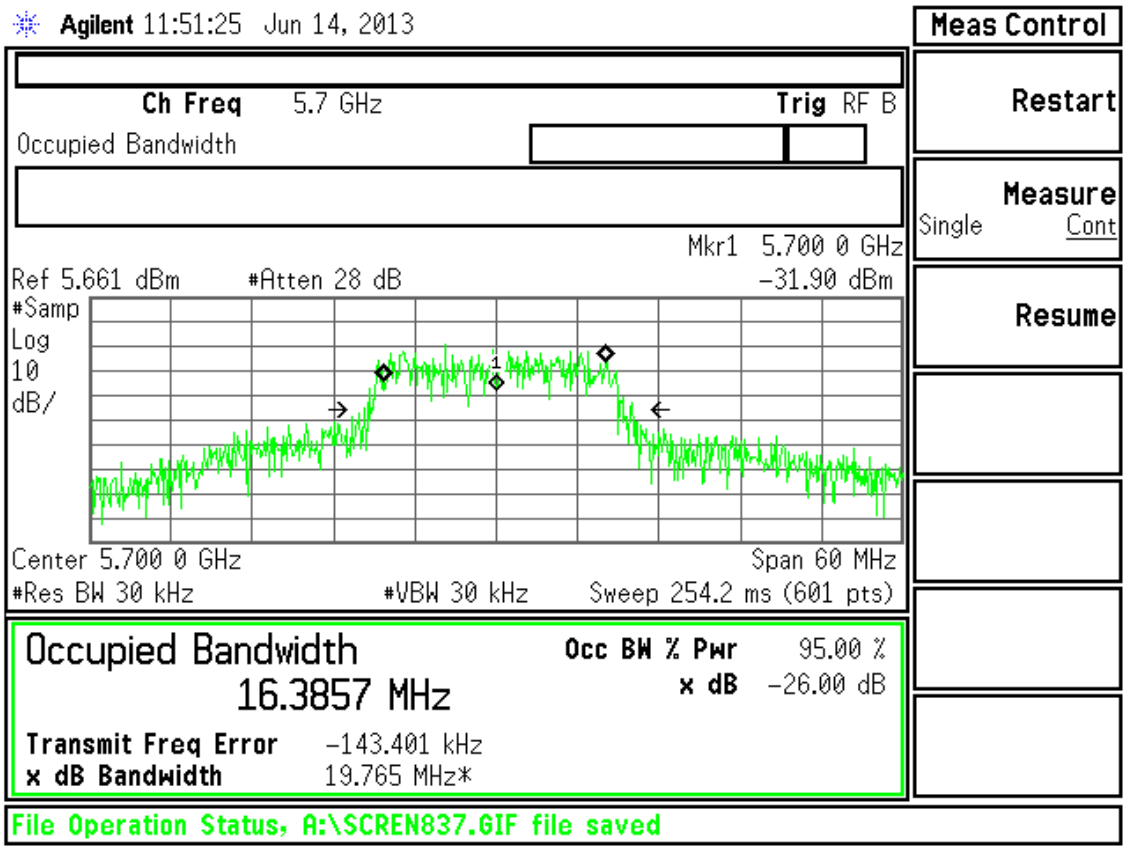
95% Spreading Bandwidth – 802.11n CH100 (5500MHz) MCS7



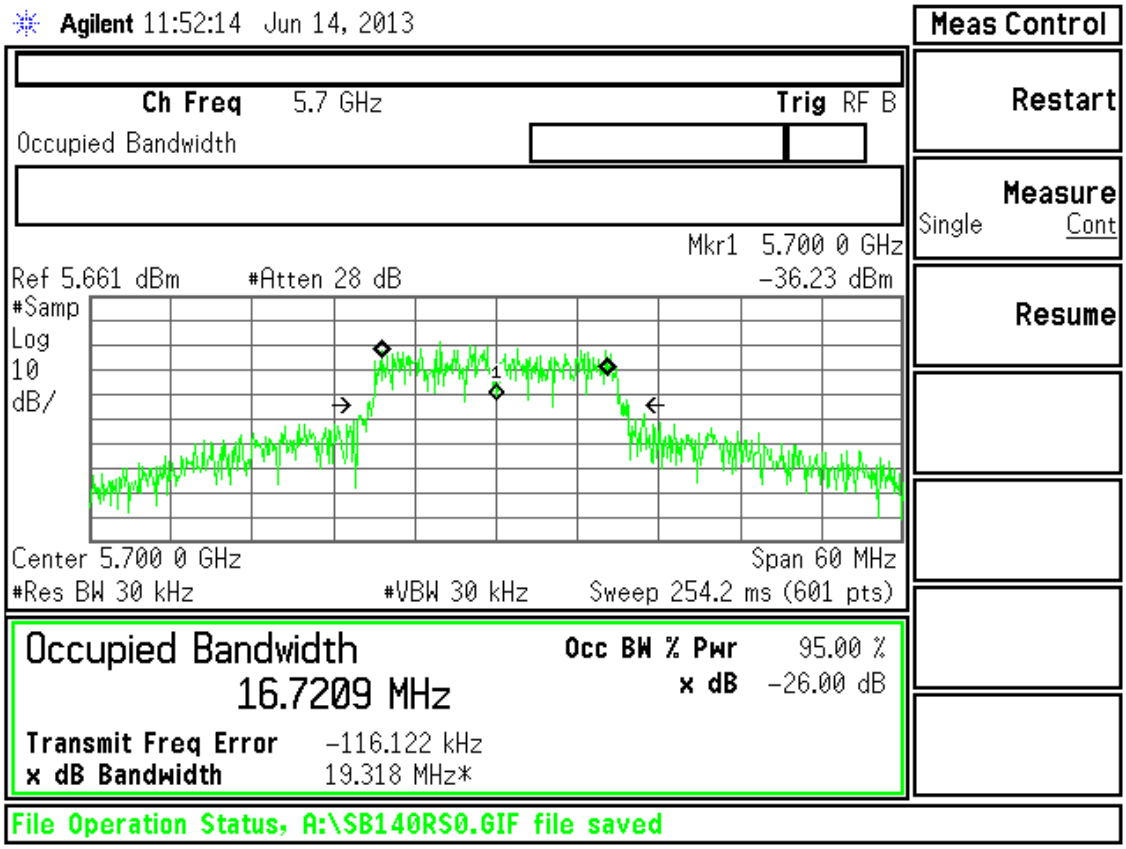
95% Spreading Bandwidth – 802.11n CH120 (5600MHz) MCS0



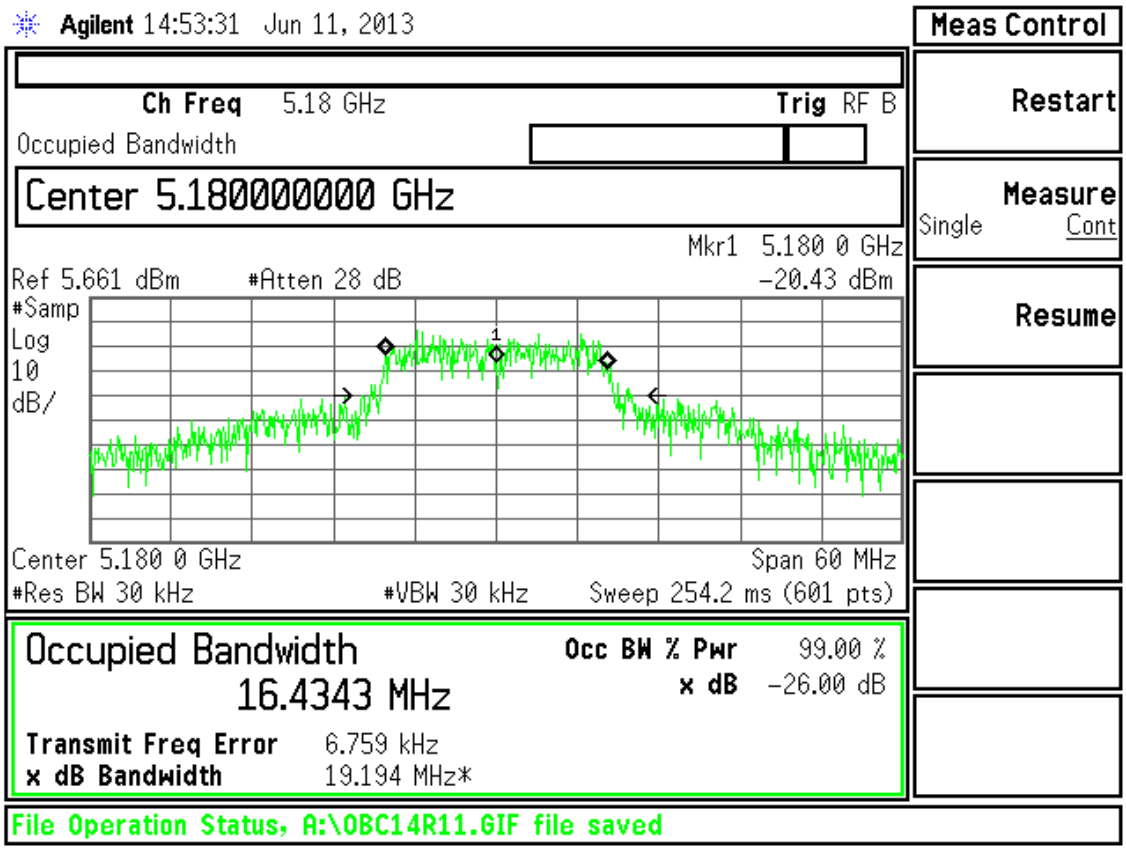
95% Spreading Bandwidth – 802.11n CH120 (5600MHz) MCS7



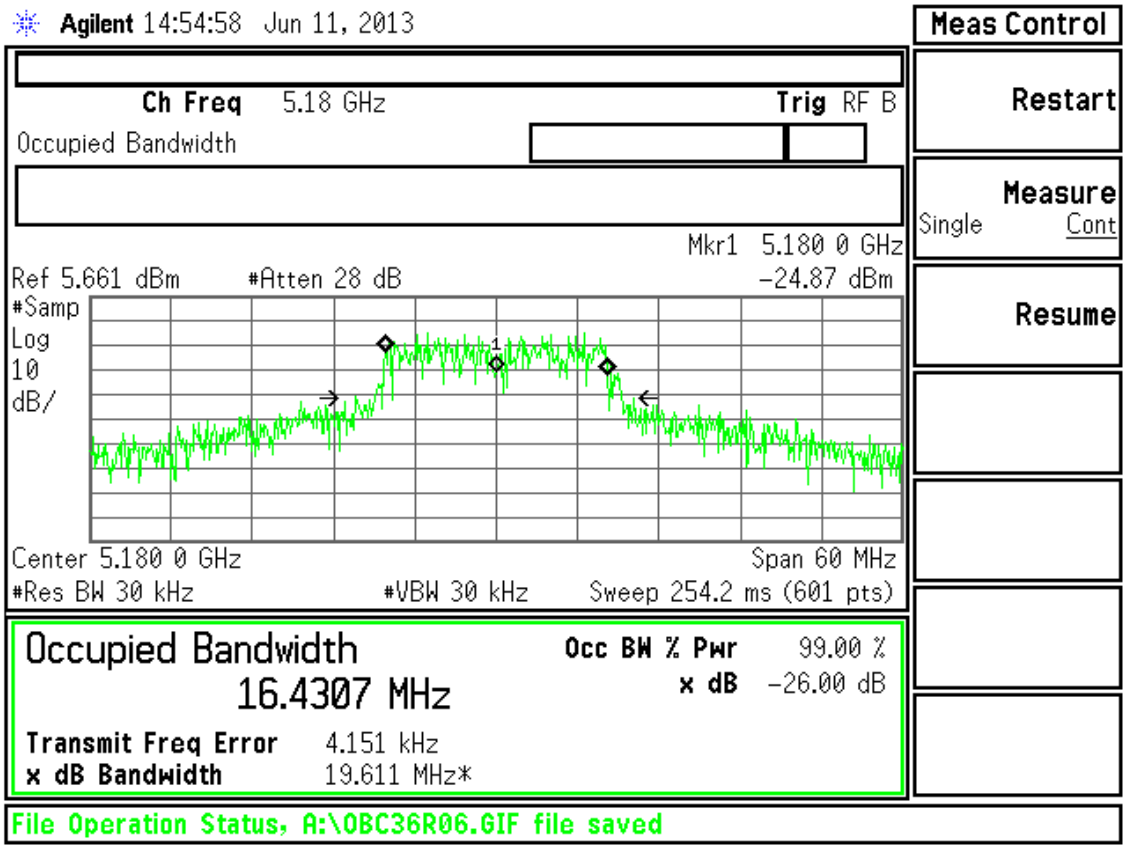
95% Spreading Bandwidth – 802.11n CH140 (5700MHz) MCS0



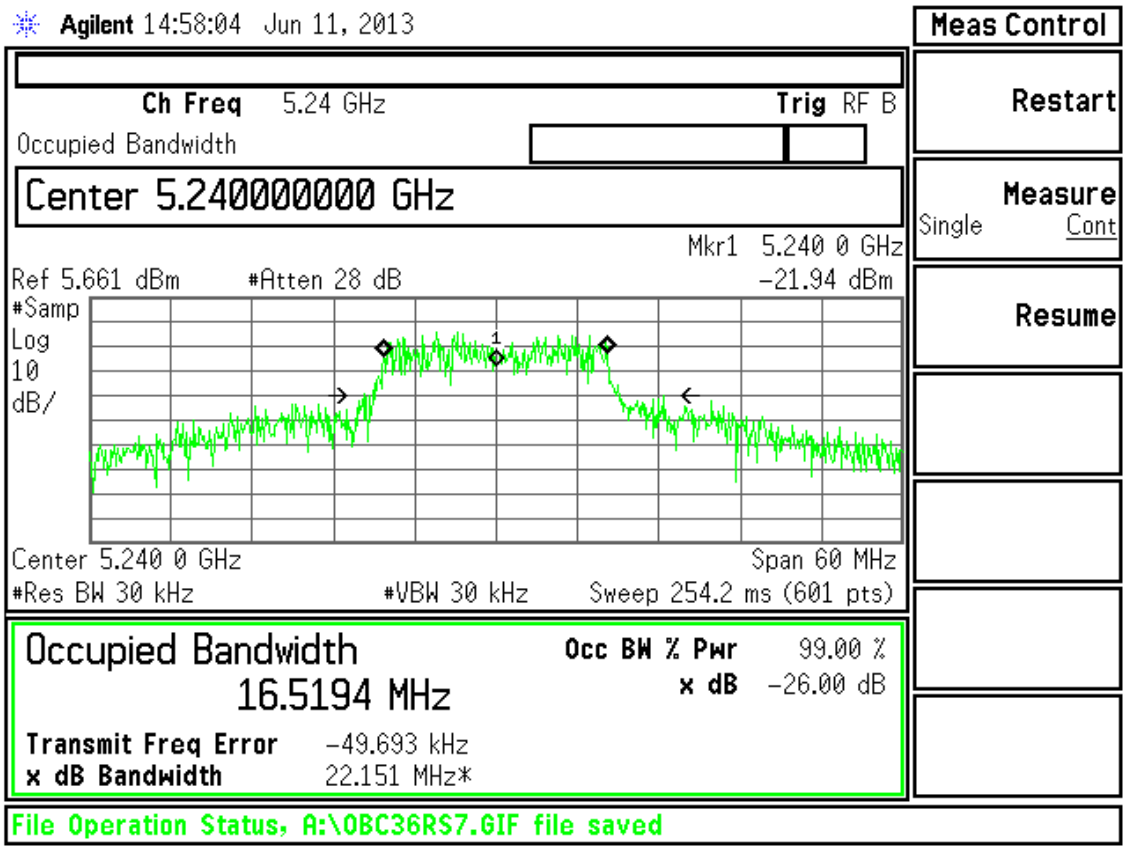
95% Spreading Bandwidth – 802.11n CH140 (5700MHz) MCS7



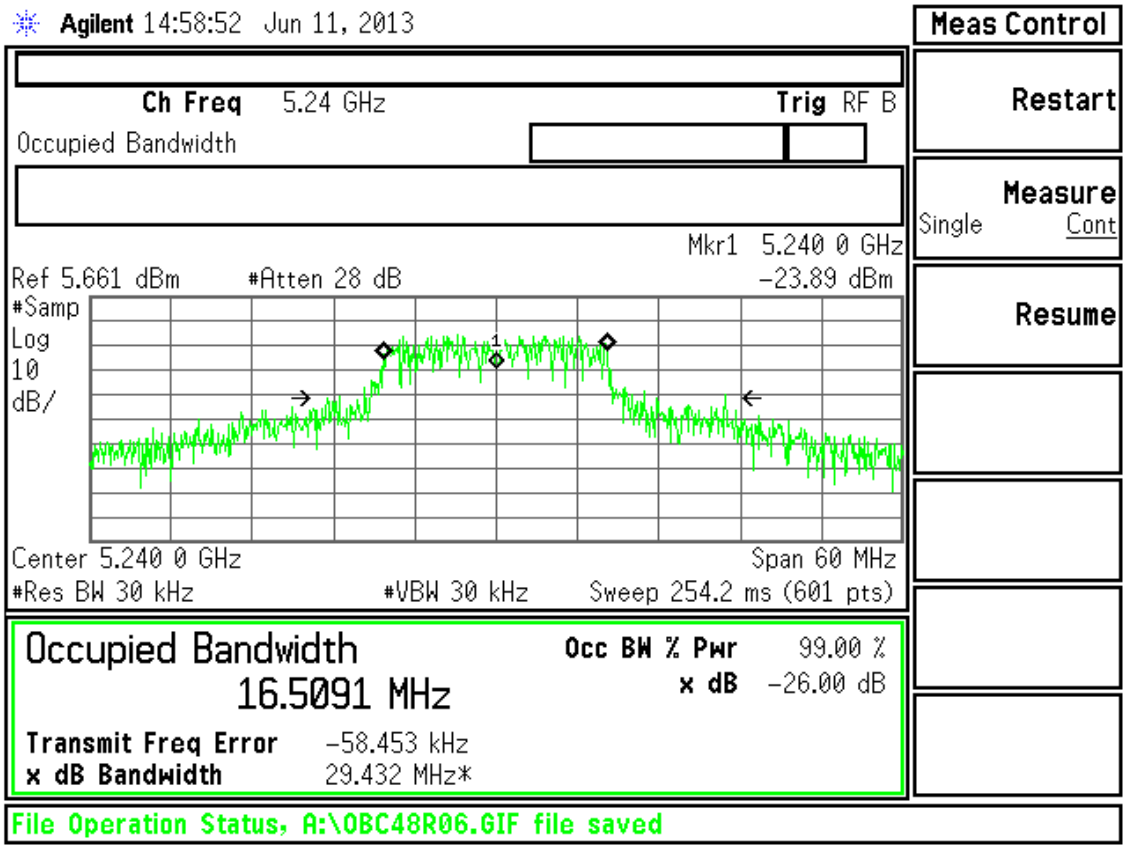
99.5% Occupied Bandwidth – 802.11a CH36 (5180MHz) 6Mbps



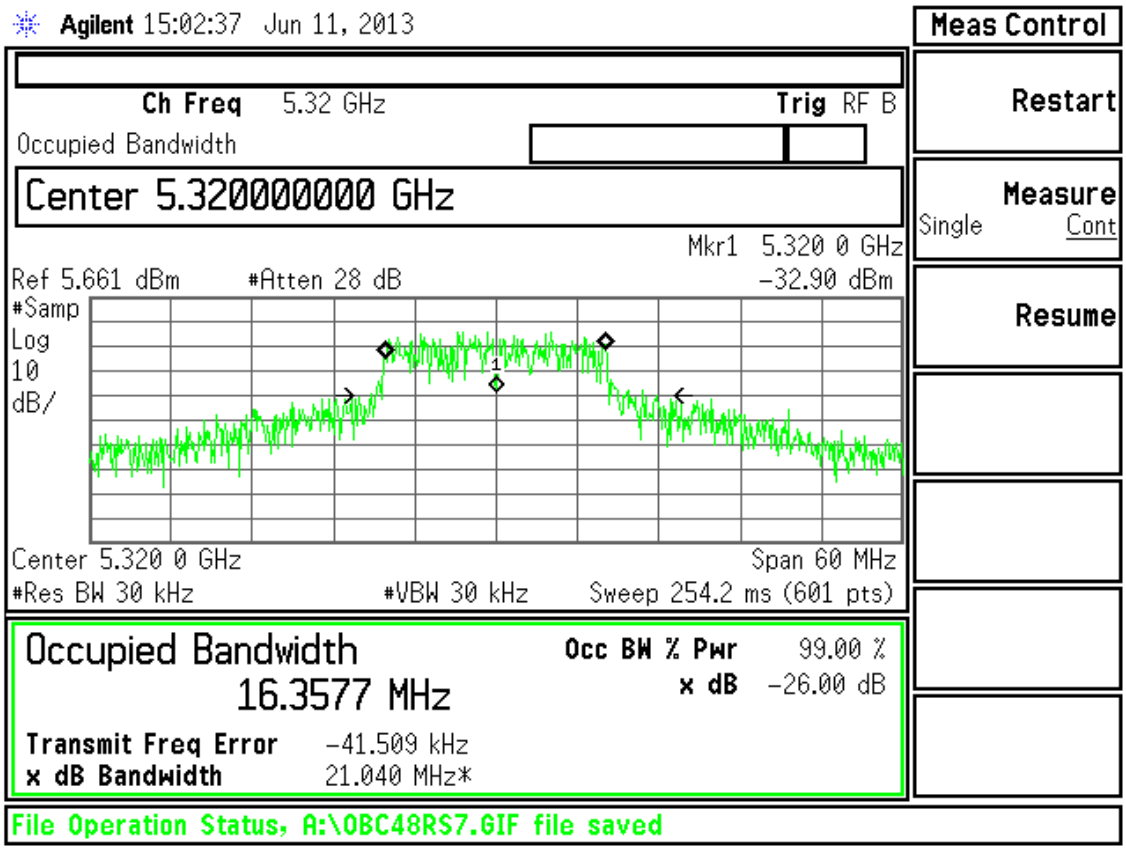
99.5% Occupied Bandwidth – 802.11a CH36 (5180MHz) 54Mbps



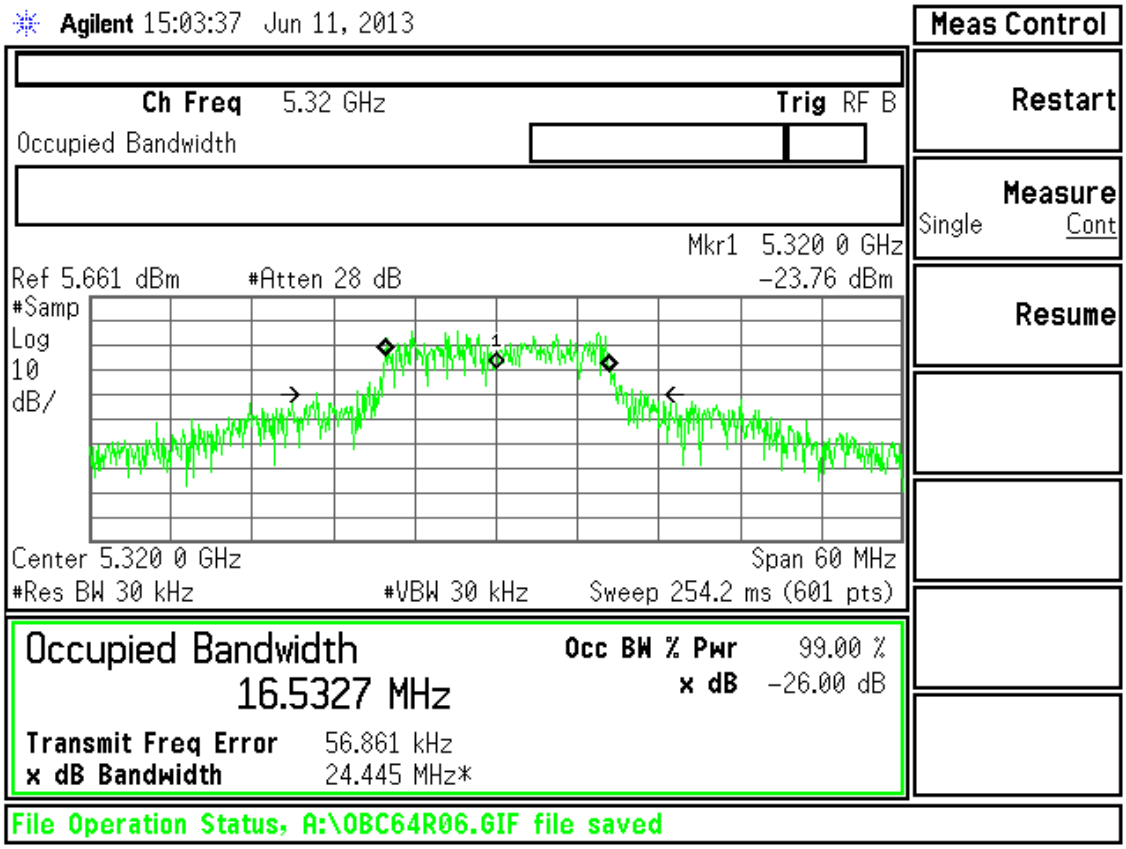
99.5% Occupied Bandwidth – 802.11a CH48 (5240MHz) 6Mbps



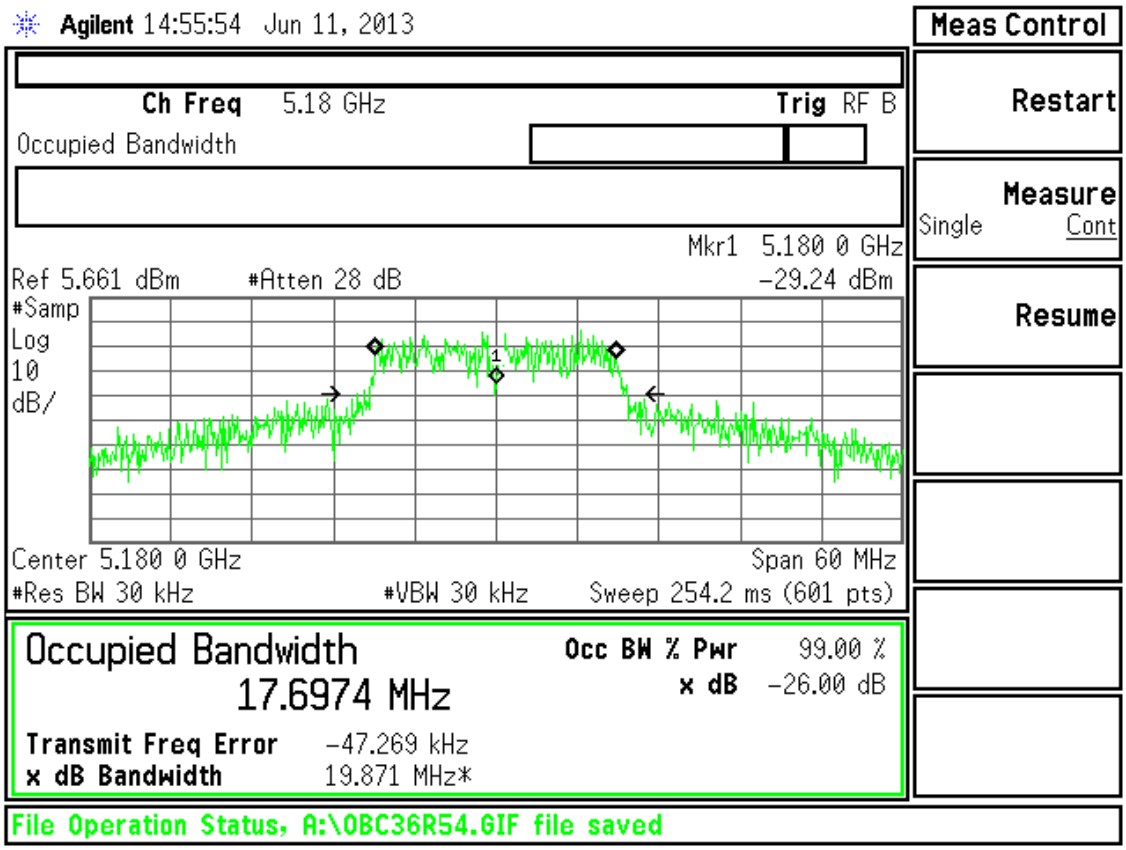
99.5% Occupied Bandwidth – 802.11a CH48 (5240MHz) 54Mbps



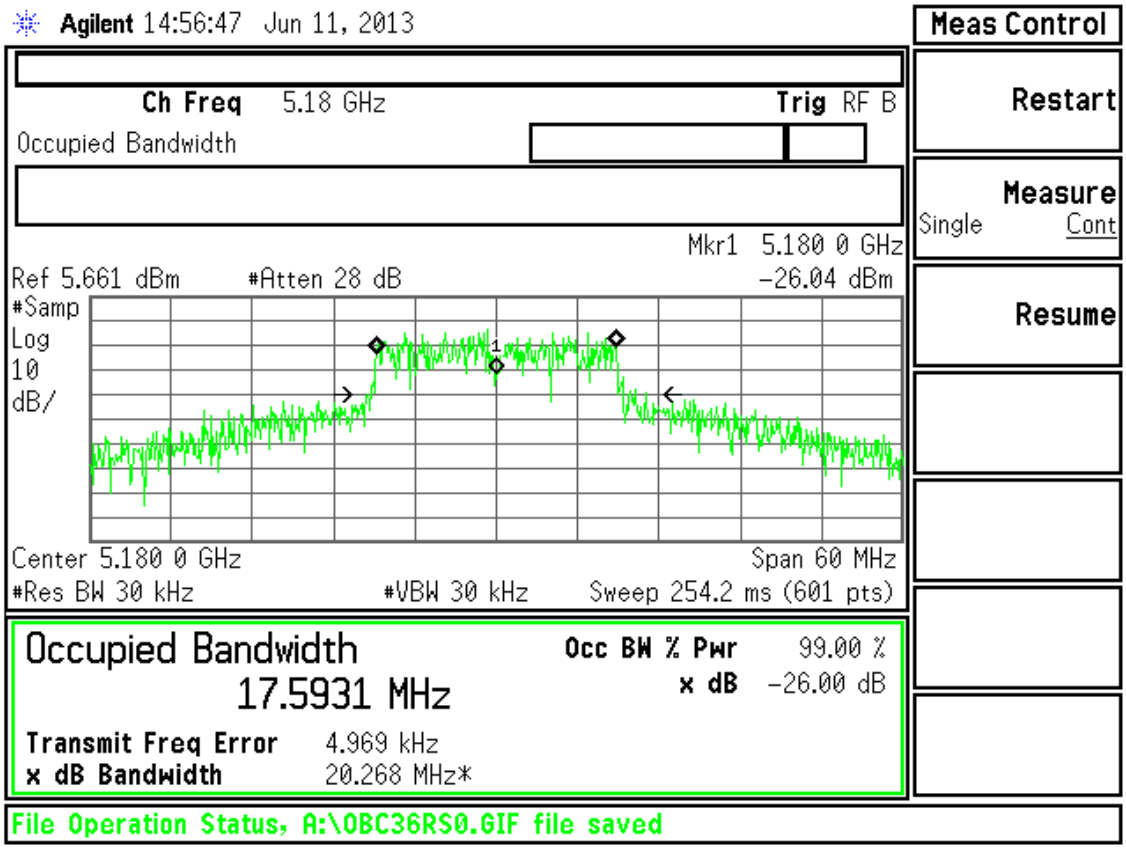
99.5% Occupied Bandwidth - 802.11a CH64 (5320MHz) 6Mbps



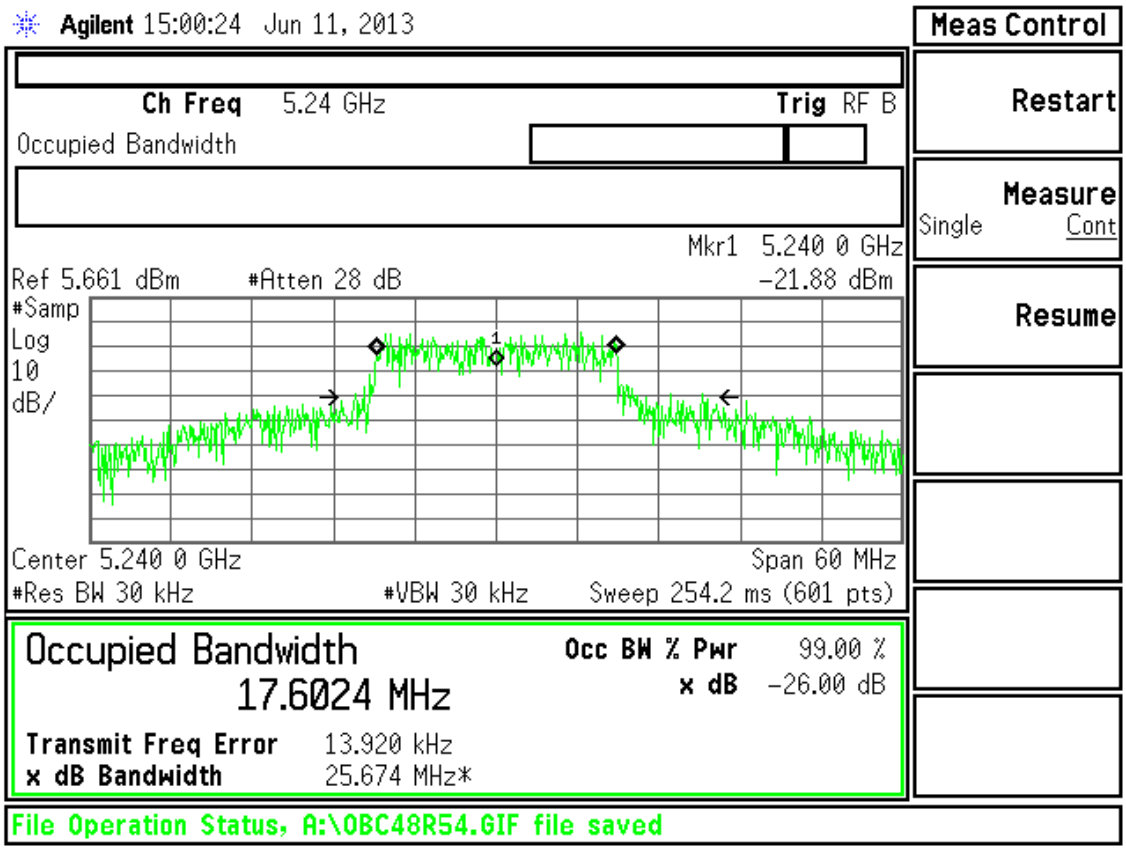
99.5% Occupied Bandwidth - 802.11a CH64 (5320MHz) 54Mbps



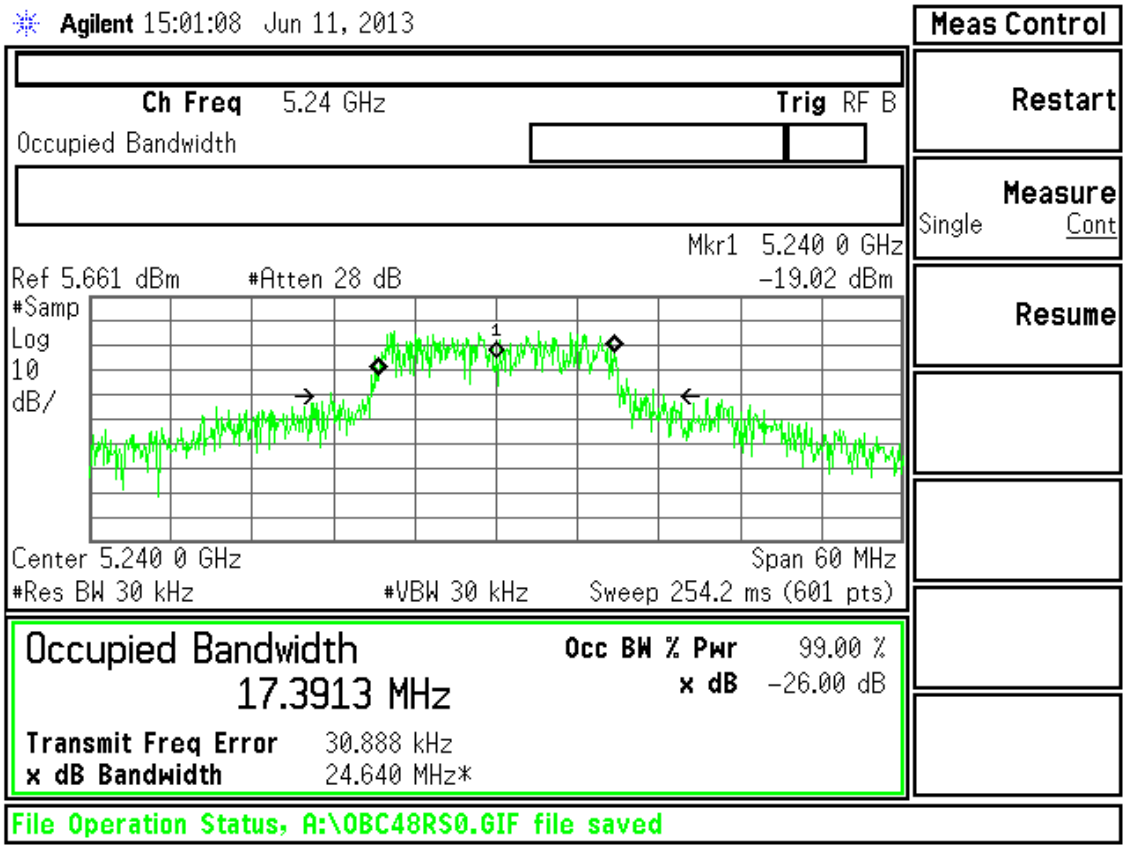
99.5% Occupied Bandwidth – 802.11n CH36 (5180MHz) MCS0



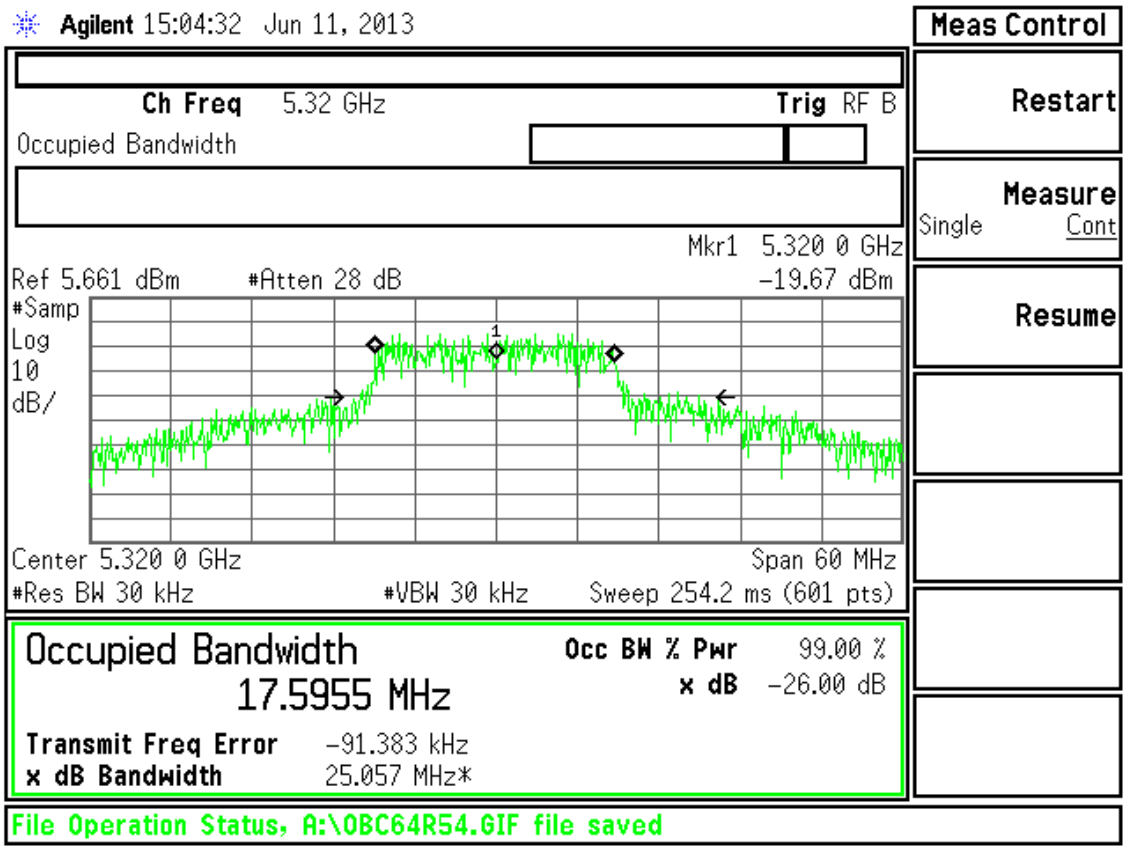
99.5% Occupied Bandwidth – 802.11n CH36 (5180MHz) MCS7



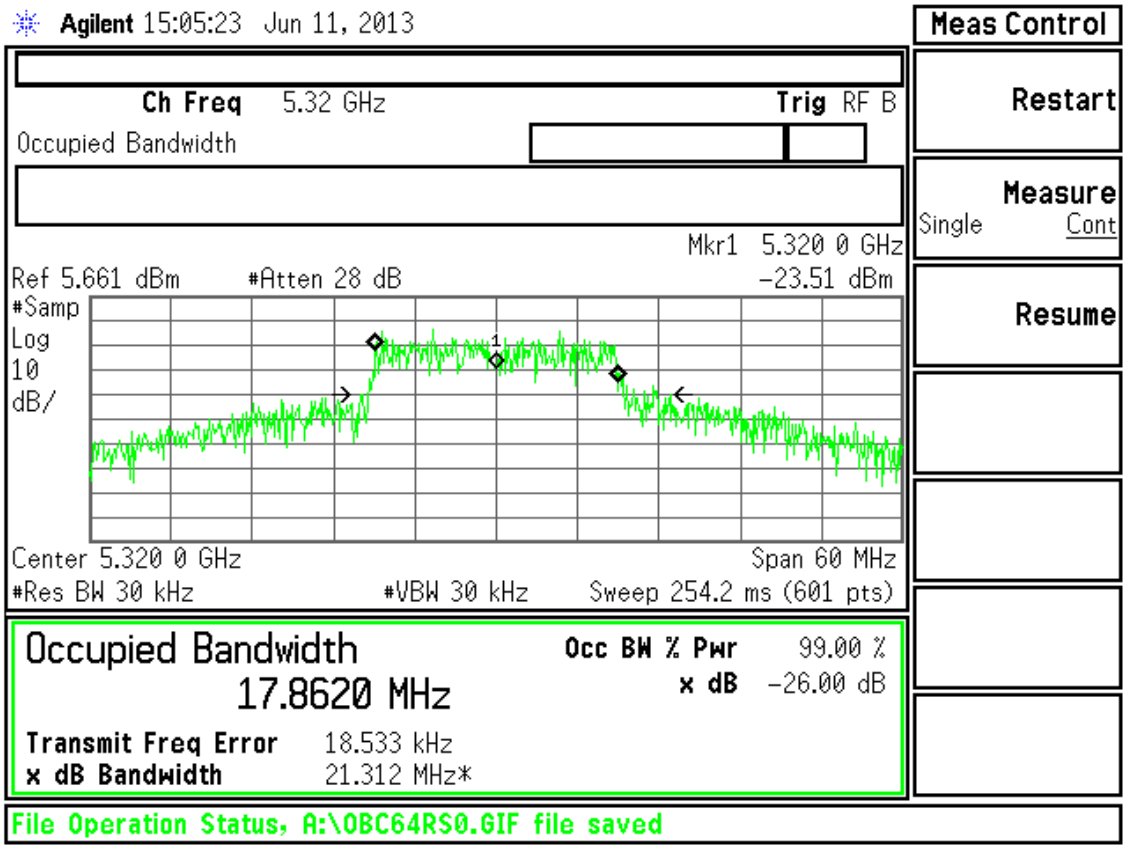
99.5% Occupied Bandwidth – 802.11n CH48 (5240MHz) MCS0



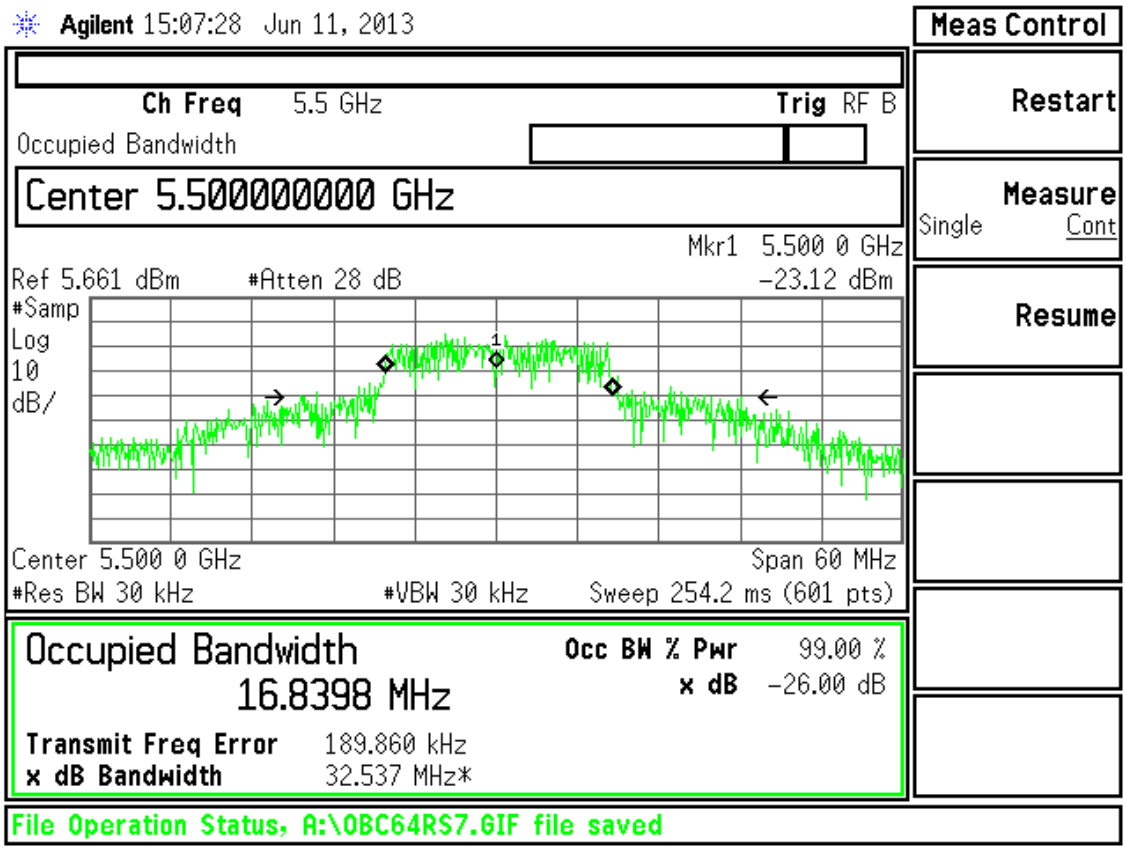
99.5% Occupied Bandwidth – 802.11n CH48 (5240MHz) MCS7



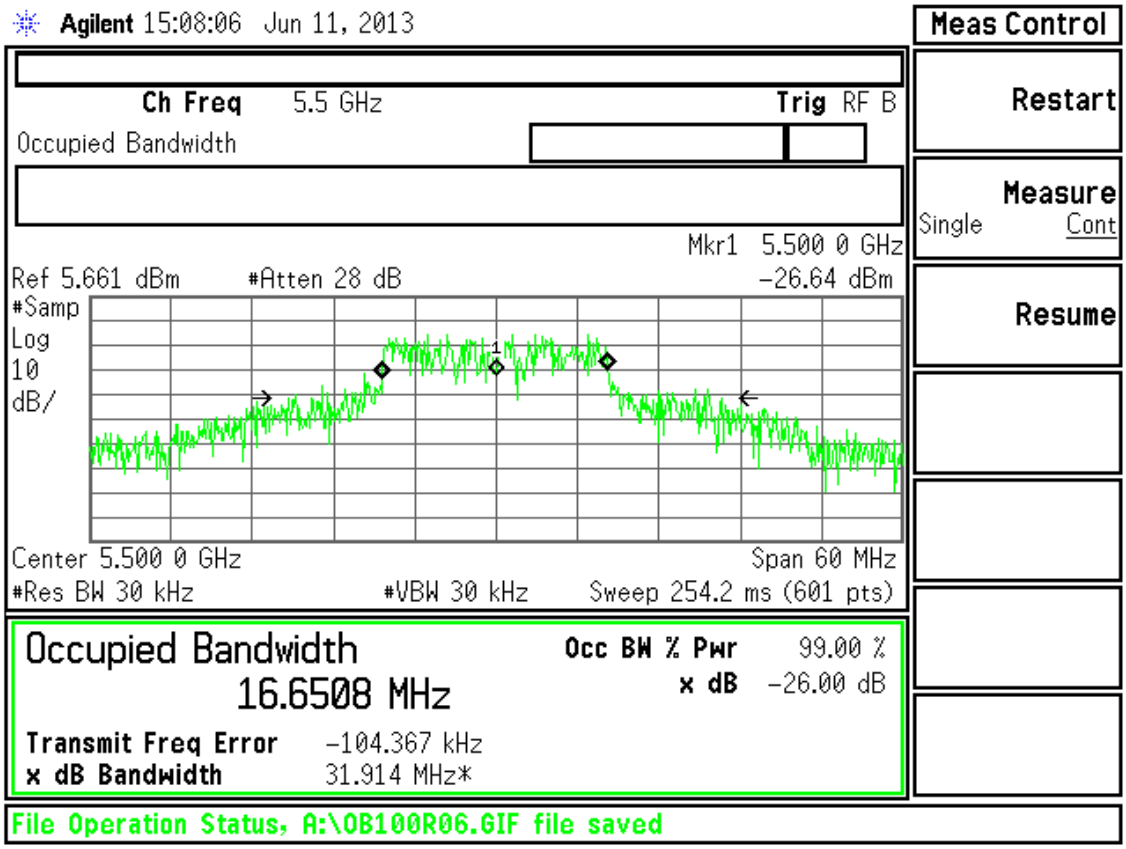
99.5% Occupied Bandwidth - 802.11n CH64 (5320MHz) MCS0



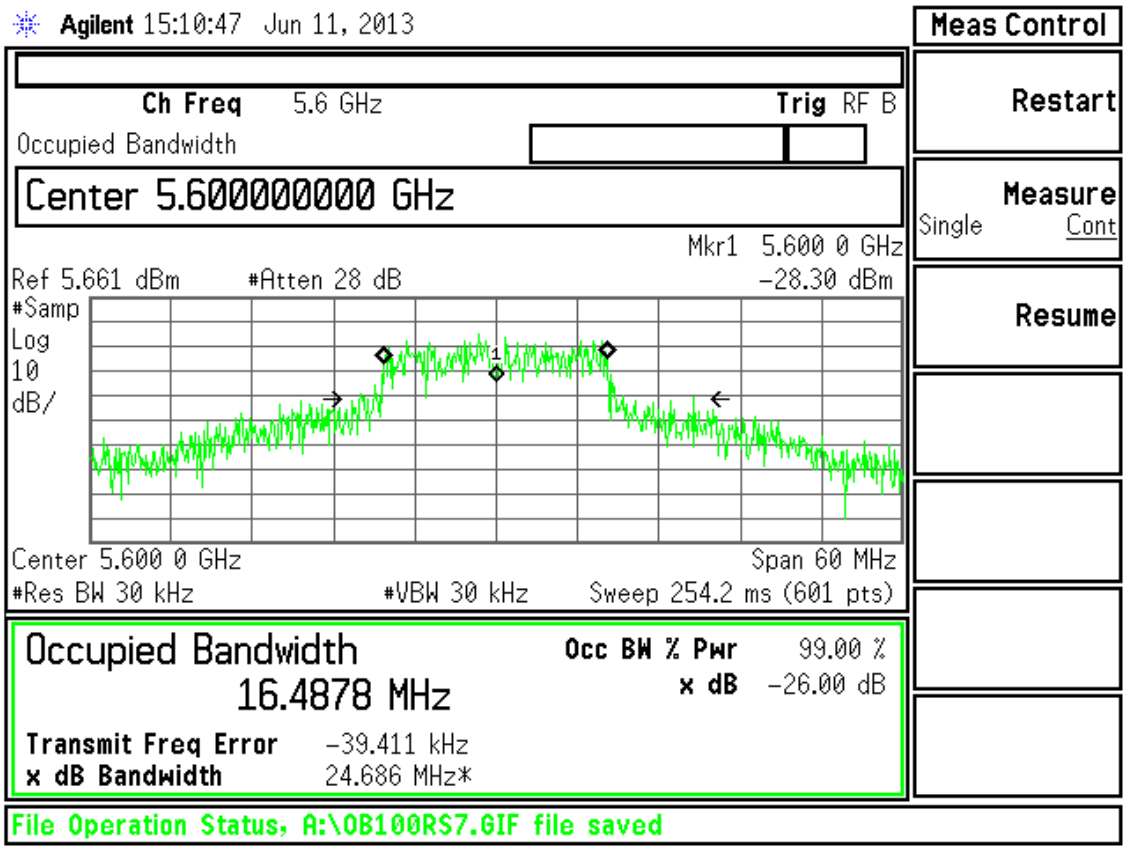
99.5% Occupied Bandwidth - 802.11n CH64 (5320MHz) MCS7



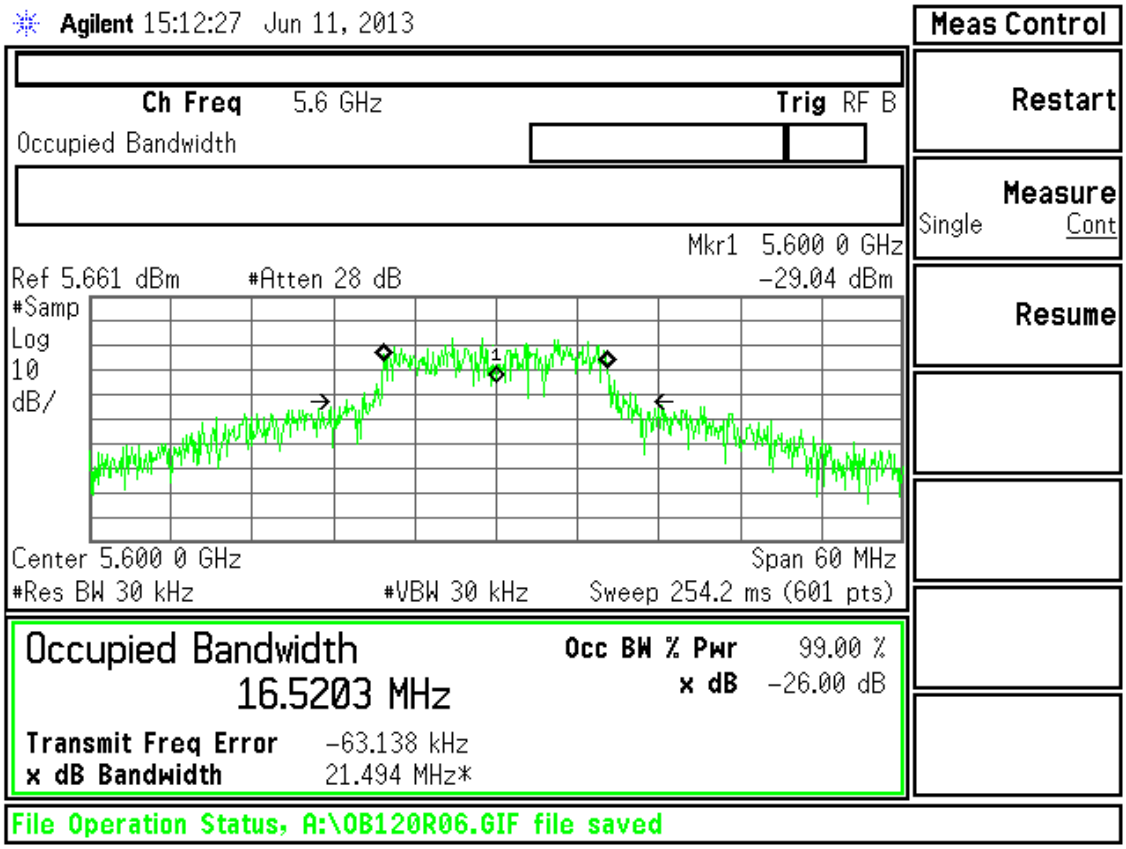
99.5% Occupied Bandwidth – 802.11a CH100 (5500MHz) 6Mbps



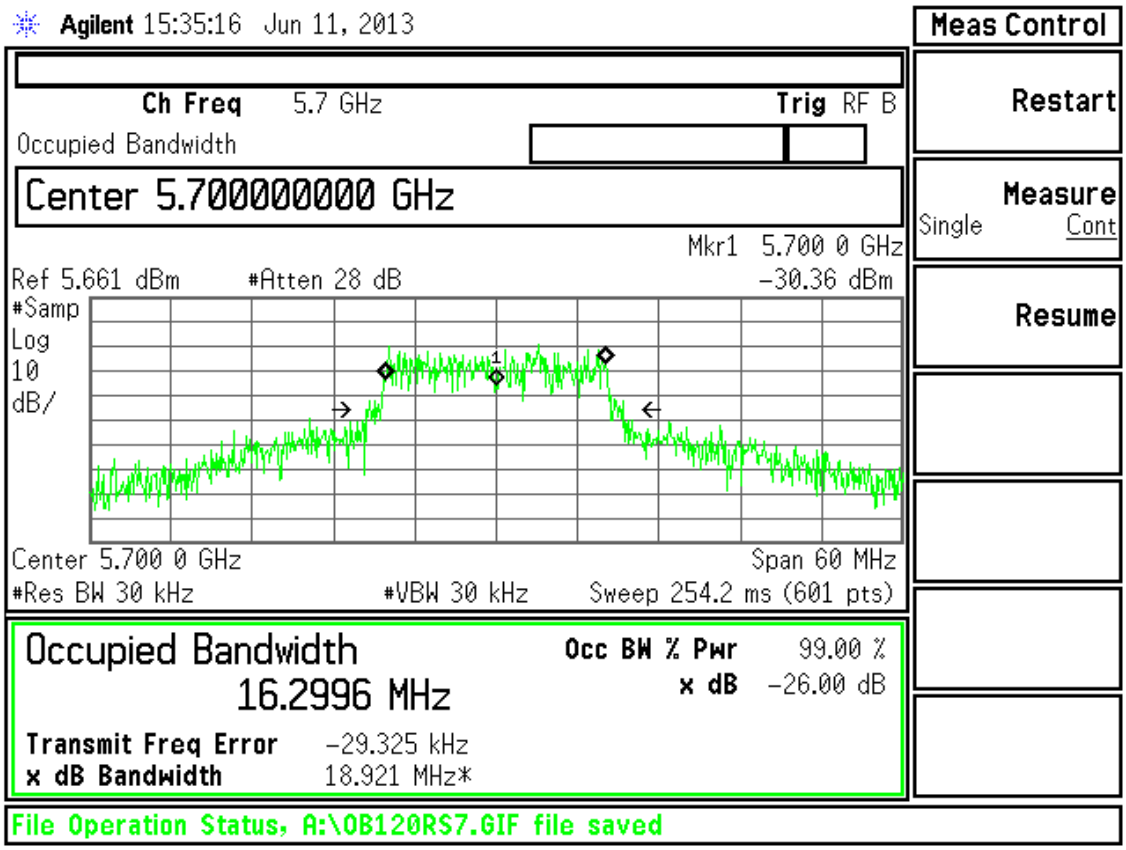
99.5% Occupied Bandwidth – 802.11a CH100 (5500MHz) 54Mbps



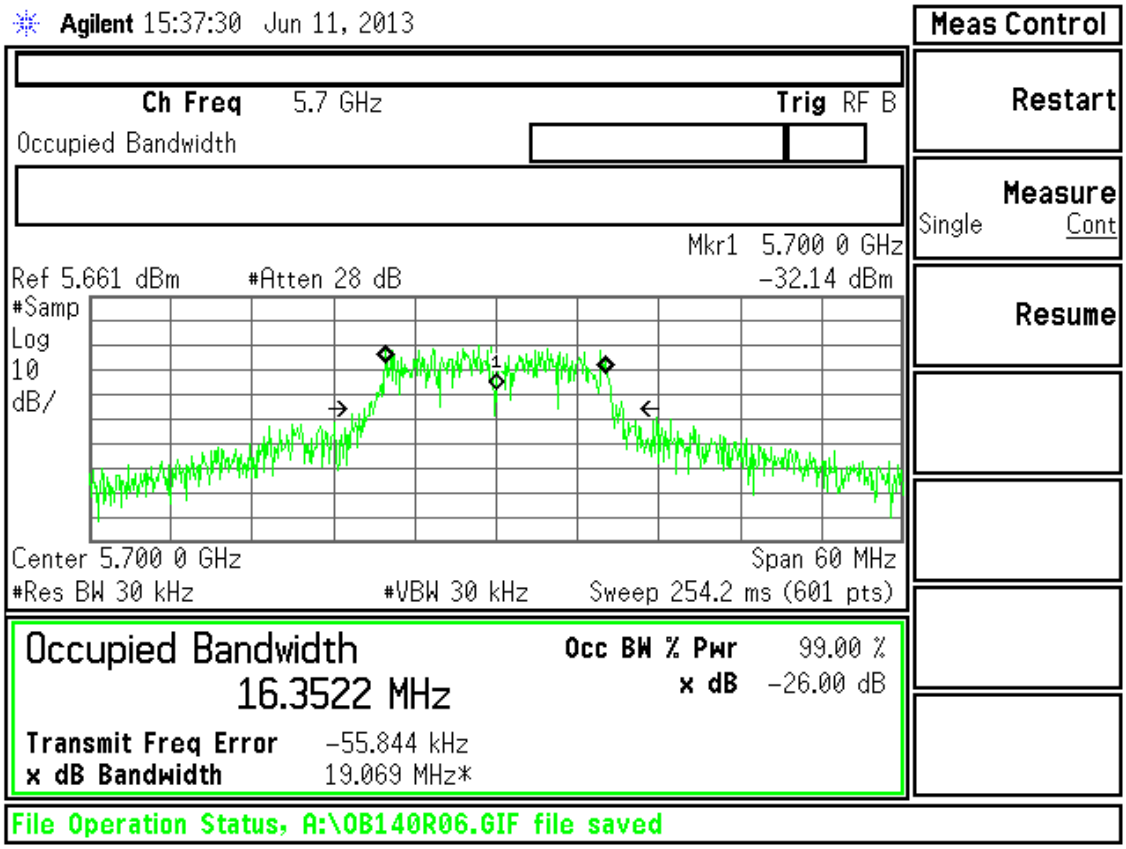
99.5% Occupied Bandwidth – 802.11a CH120 (5600MHz) 6Mbps



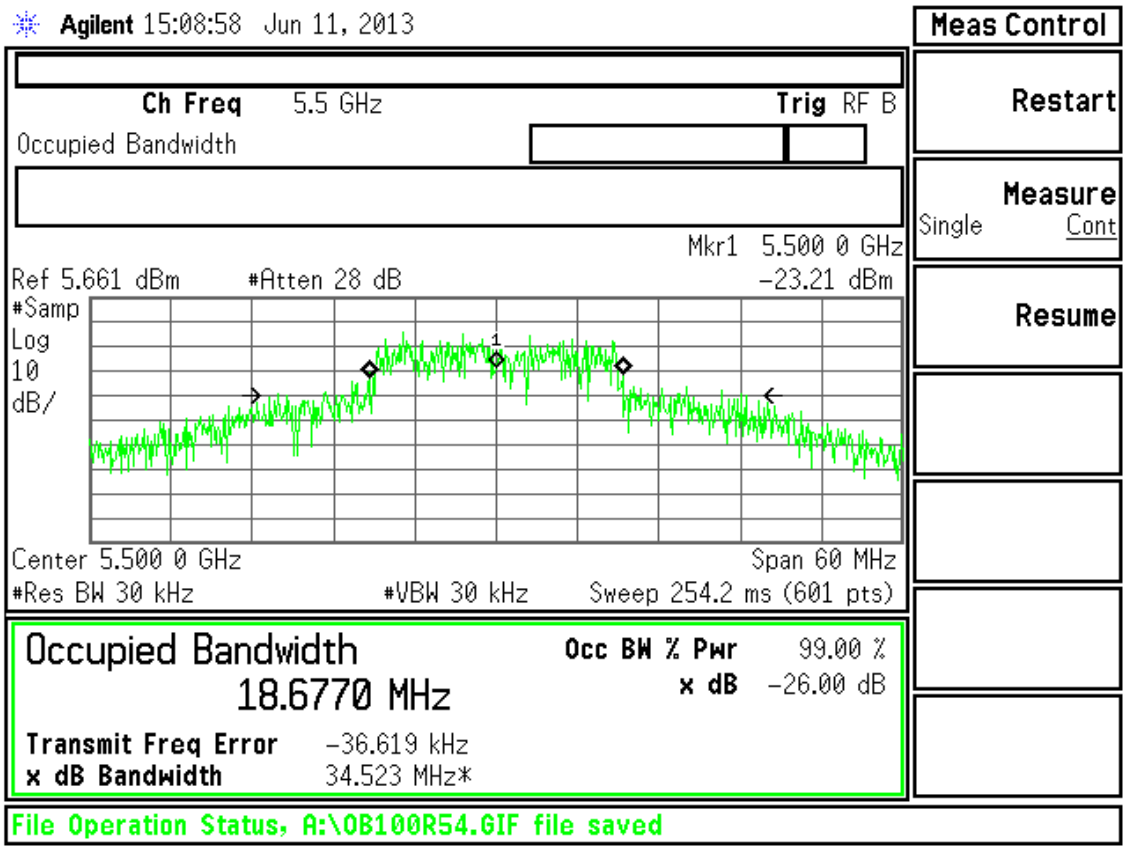
99.5% Occupied Bandwidth – 802.11a CH120 (5600MHz) 54Mbps



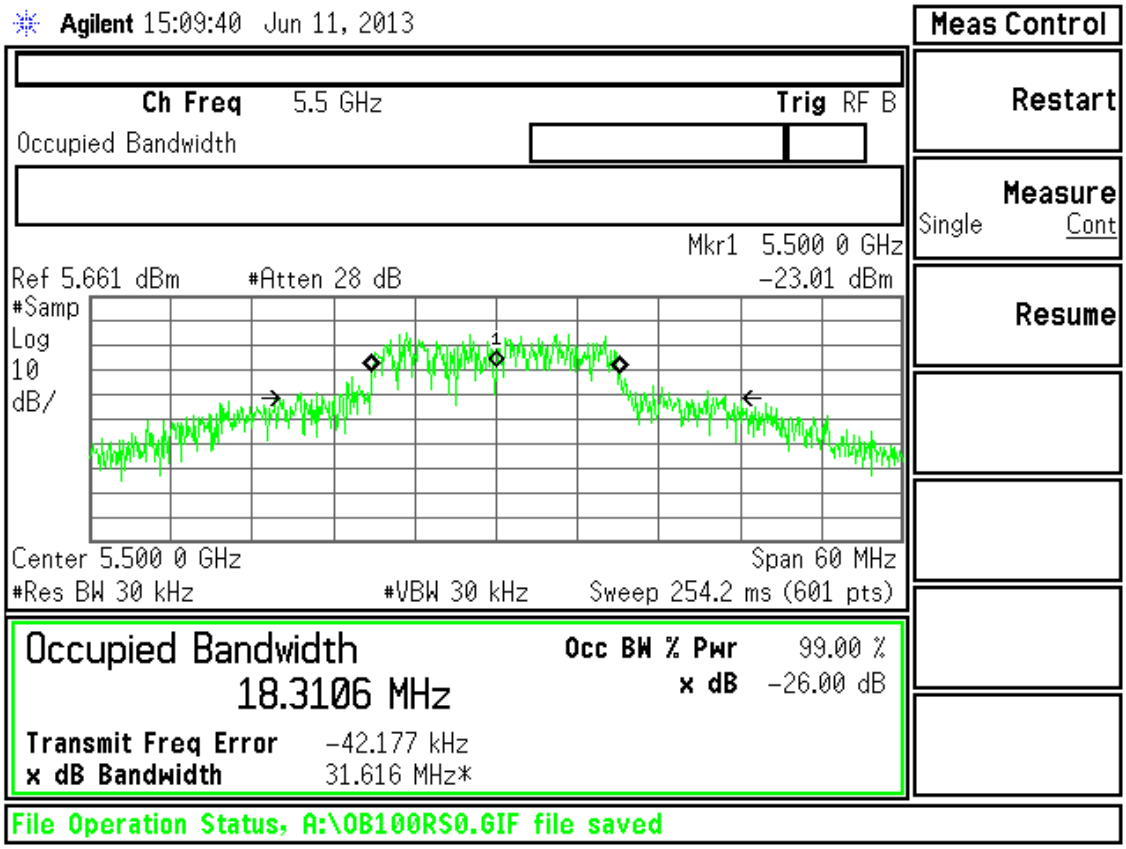
99.5% Occupied Bandwidth - 802.11a CH140 (5700MHz) 6Mbps



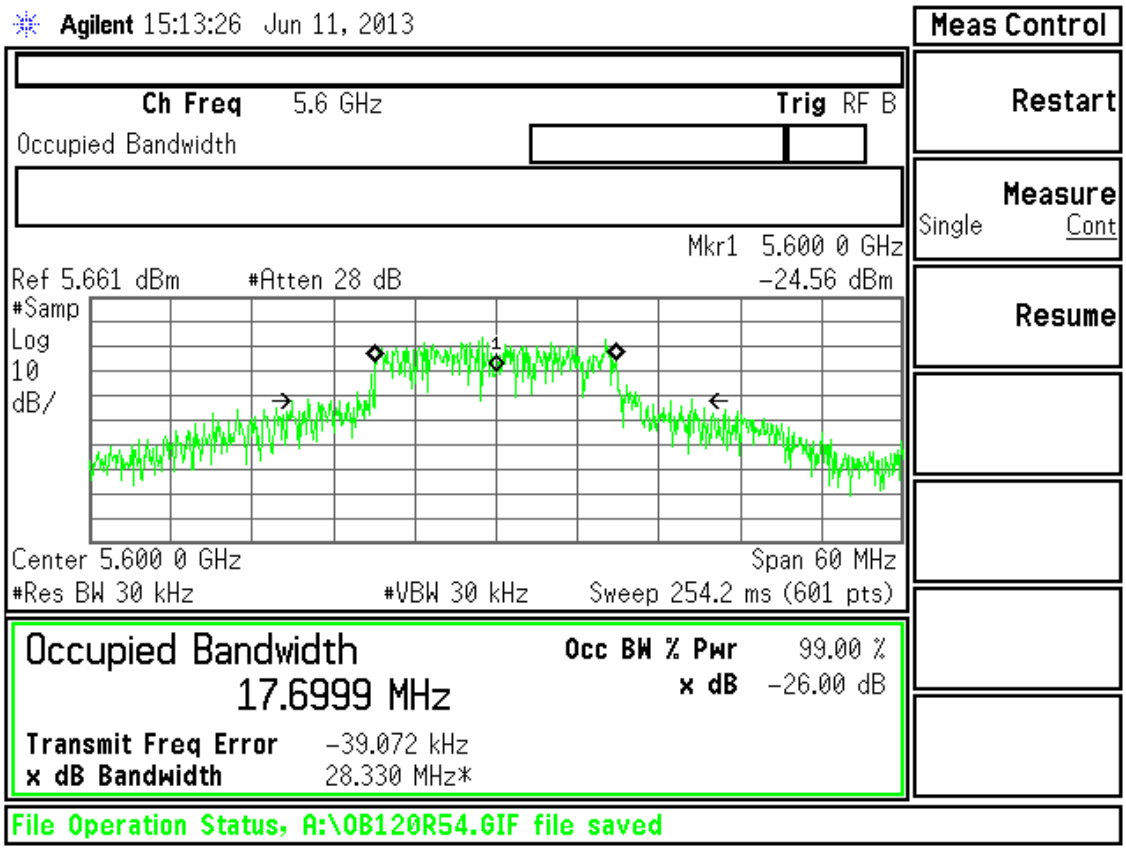
99.5% Occupied Bandwidth - 802.11a CH140 (5700MHz) 54Mbps



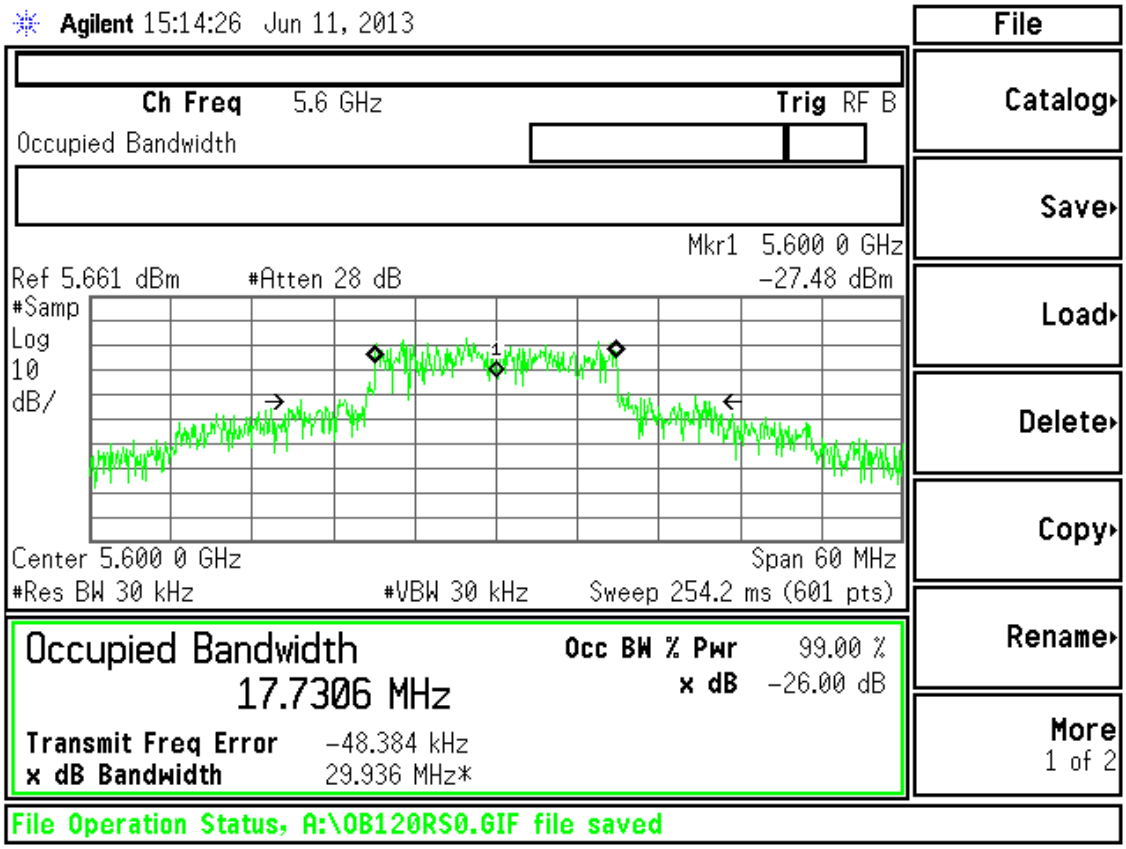
99.5% Occupied Bandwidth – 802.11n CH100 (5500MHz) MCS0



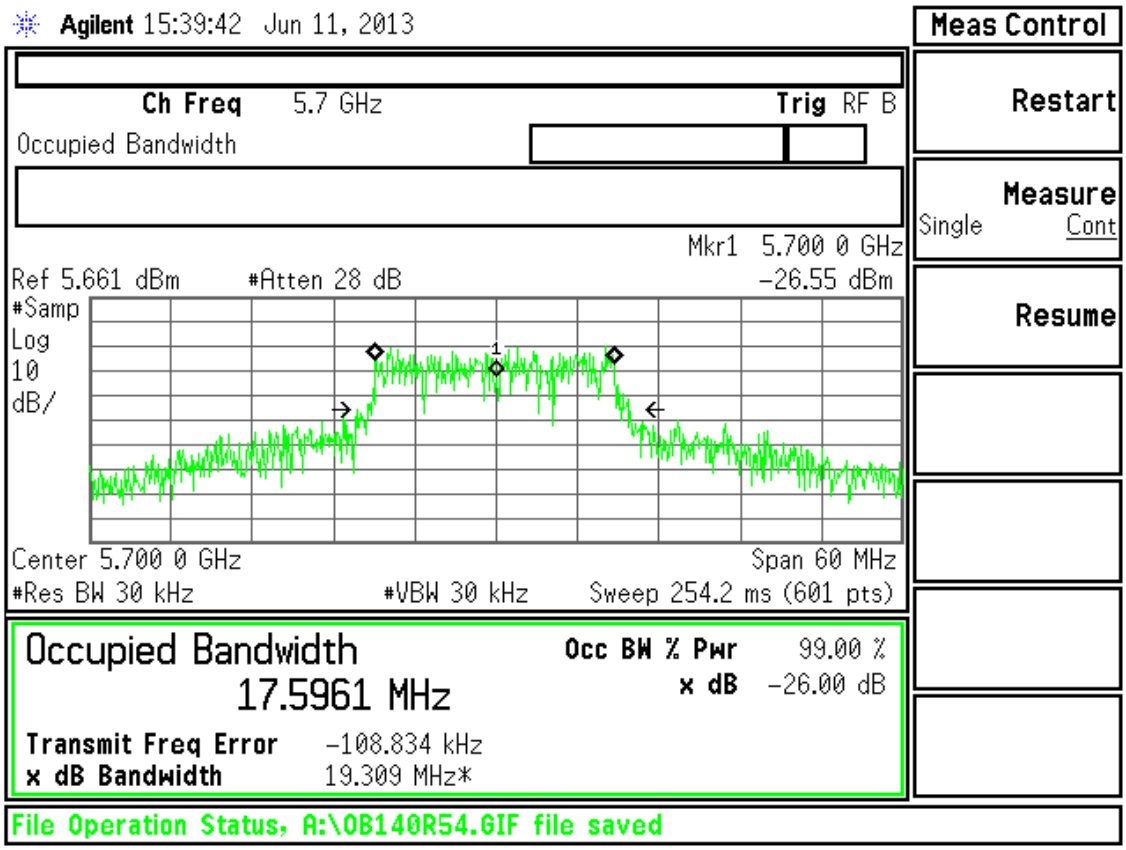
99.5% Occupied Bandwidth – 802.11n CH100 (5500MHz) MCS7



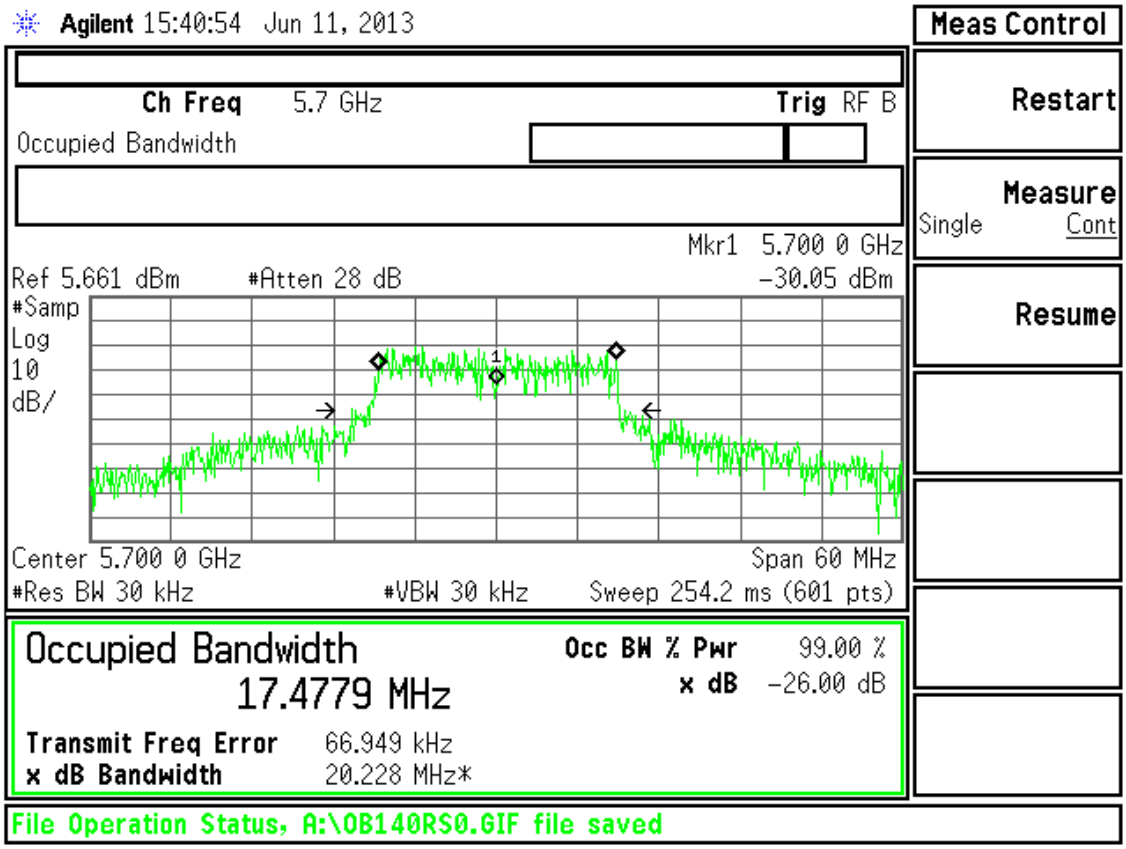
99.5% Occupied Bandwidth – 802.11n CH120 (5600MHz) MCS0



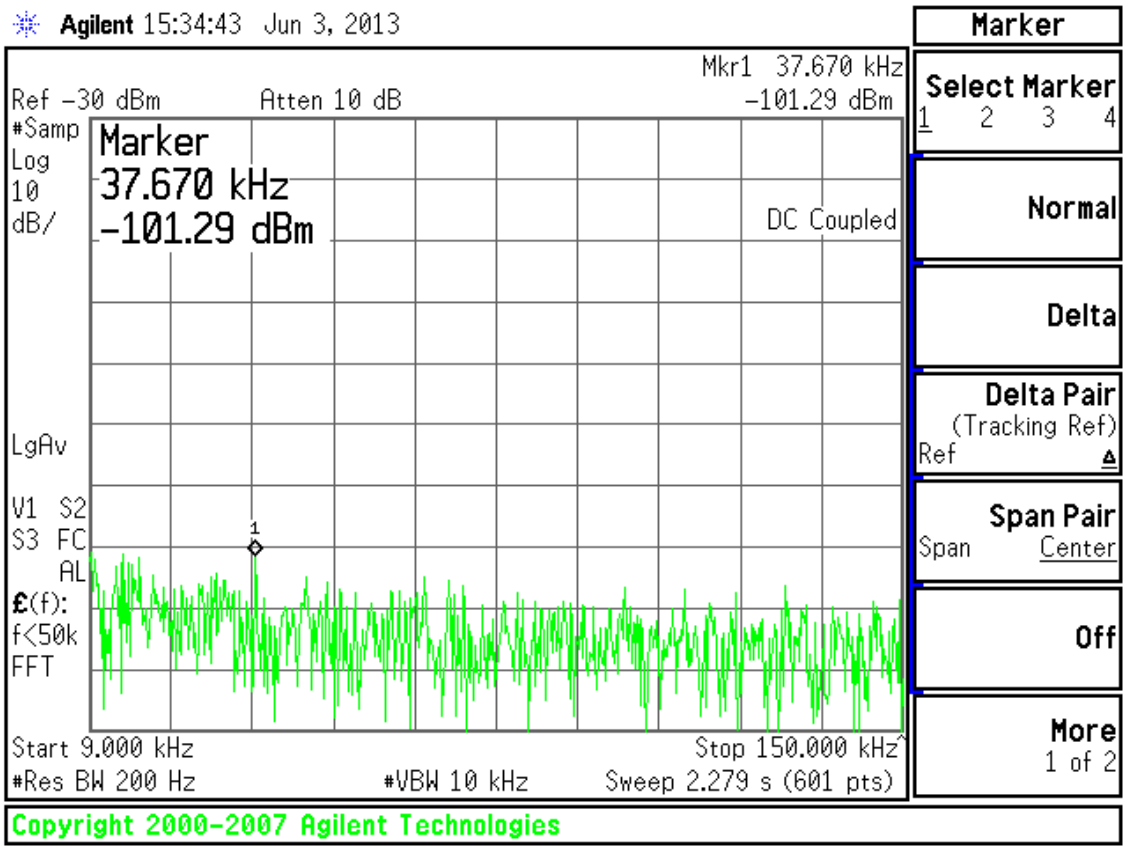
99.5% Occupied Bandwidth – 802.11n CH120 (5600MHz) MCS7



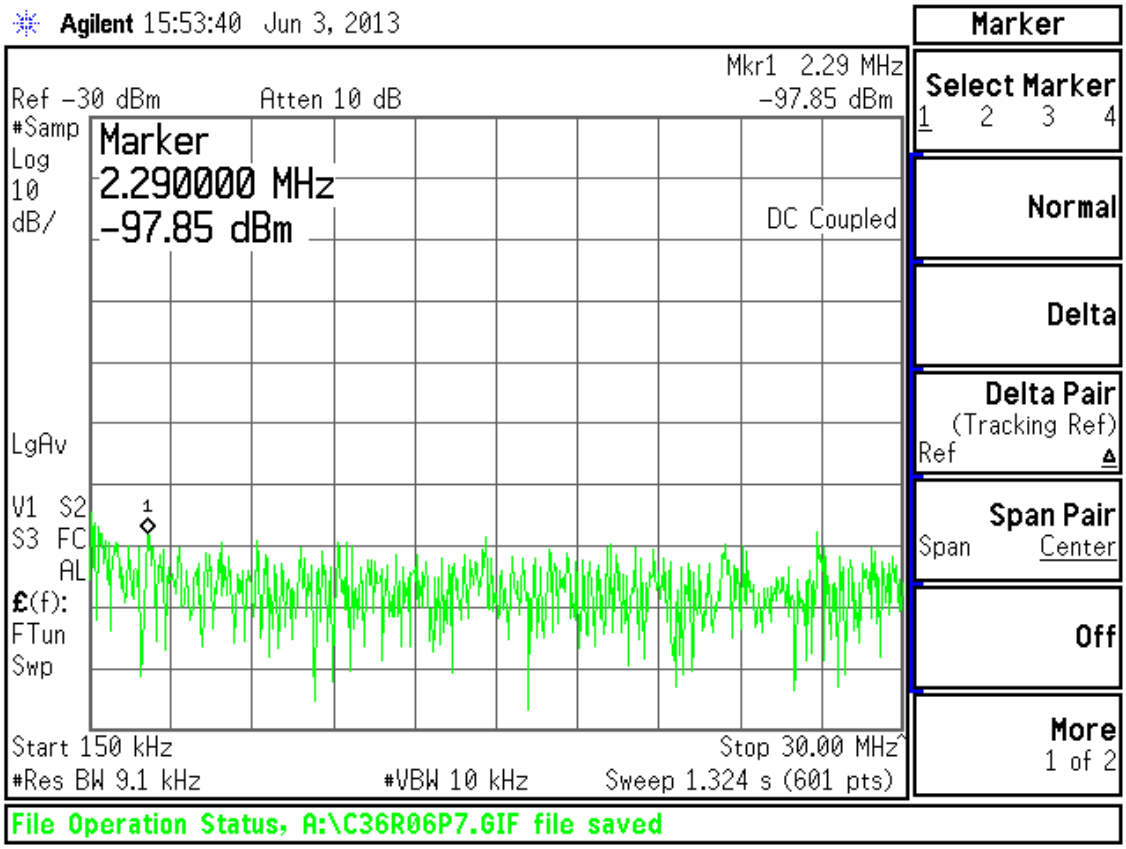
99.5% Occupied Bandwidth - 802.11n CH140 (5700MHz) MCS0



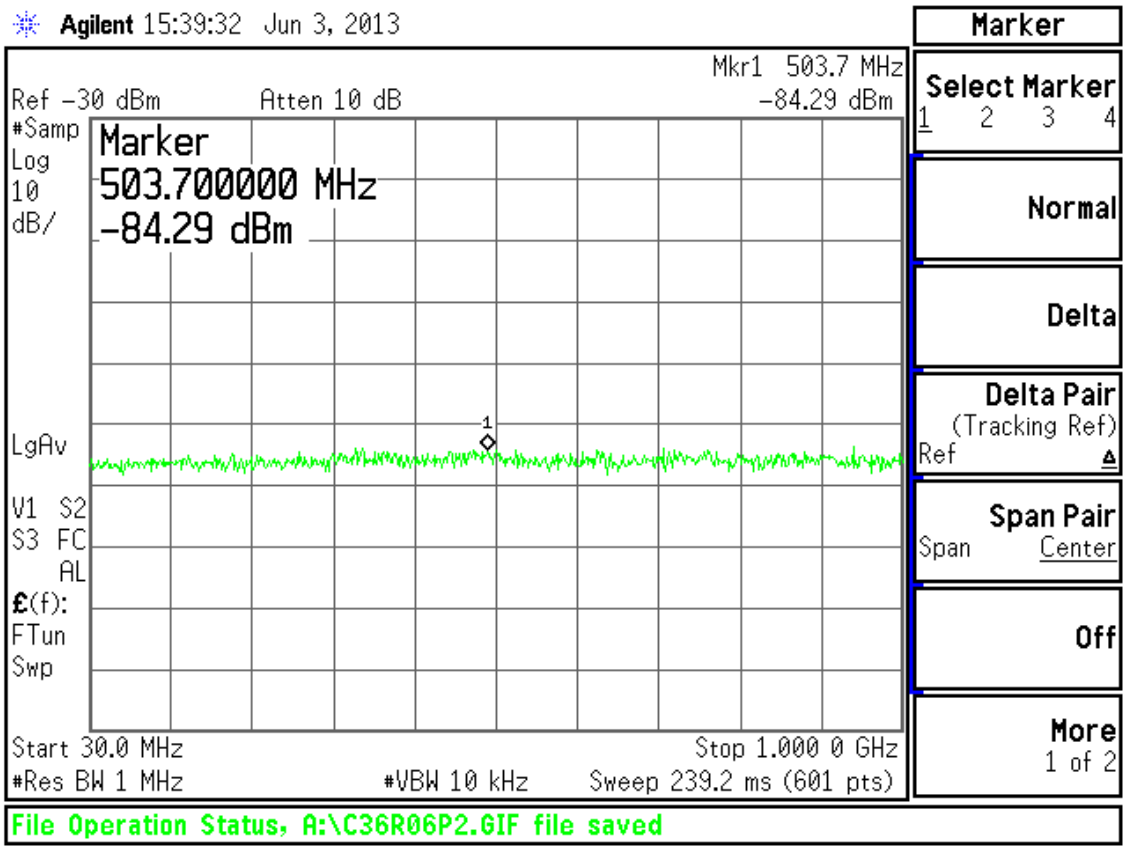
99.5% Occupied Bandwidth - 802.11n CH140 (5700MHz) MCS7



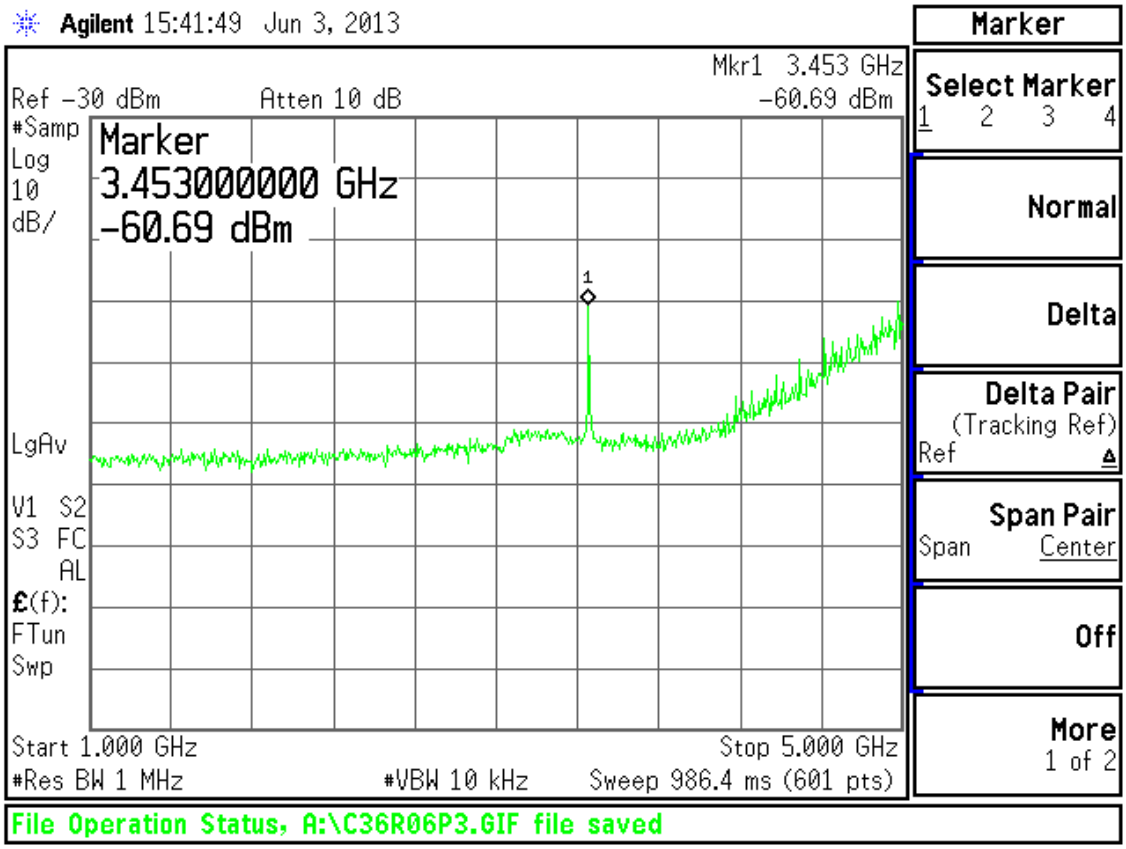
CH36 802.11a Tx Conducted Emissions @ 6Mbps



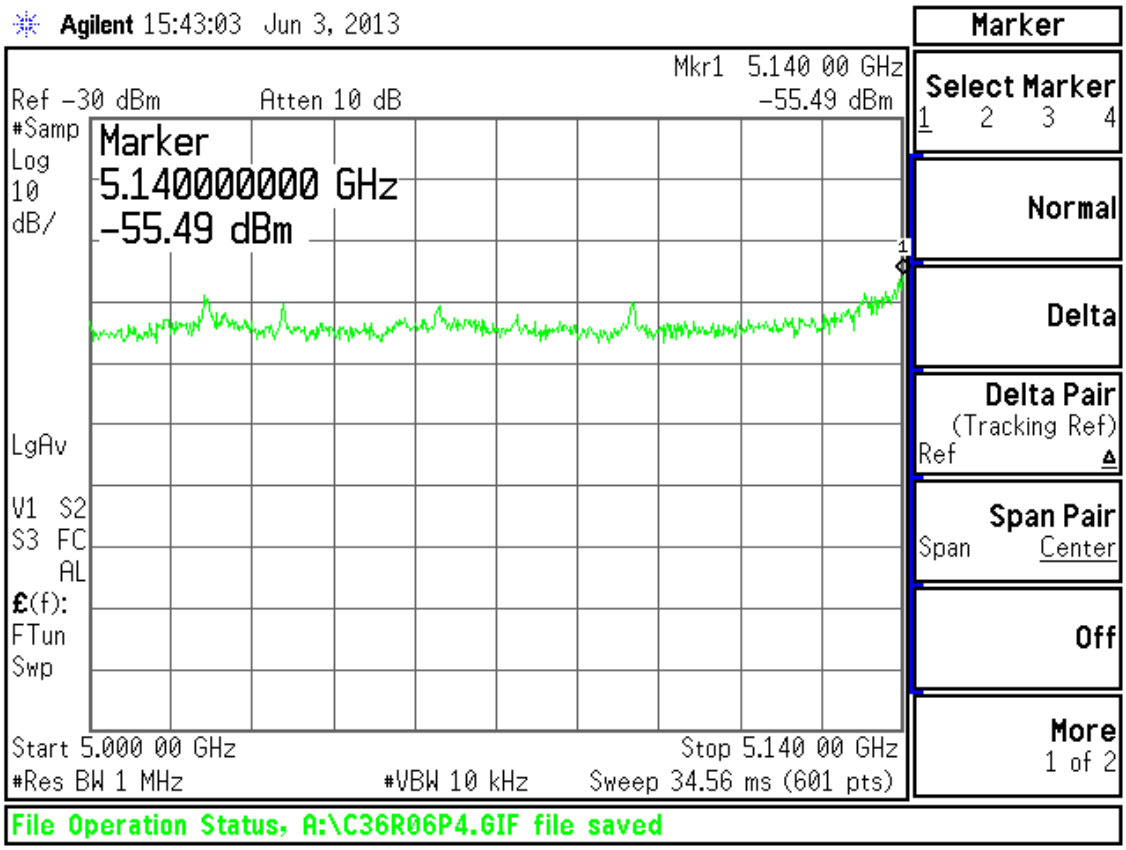
CH36 802.11a Tx Conducted Emissions @ 6Mbps



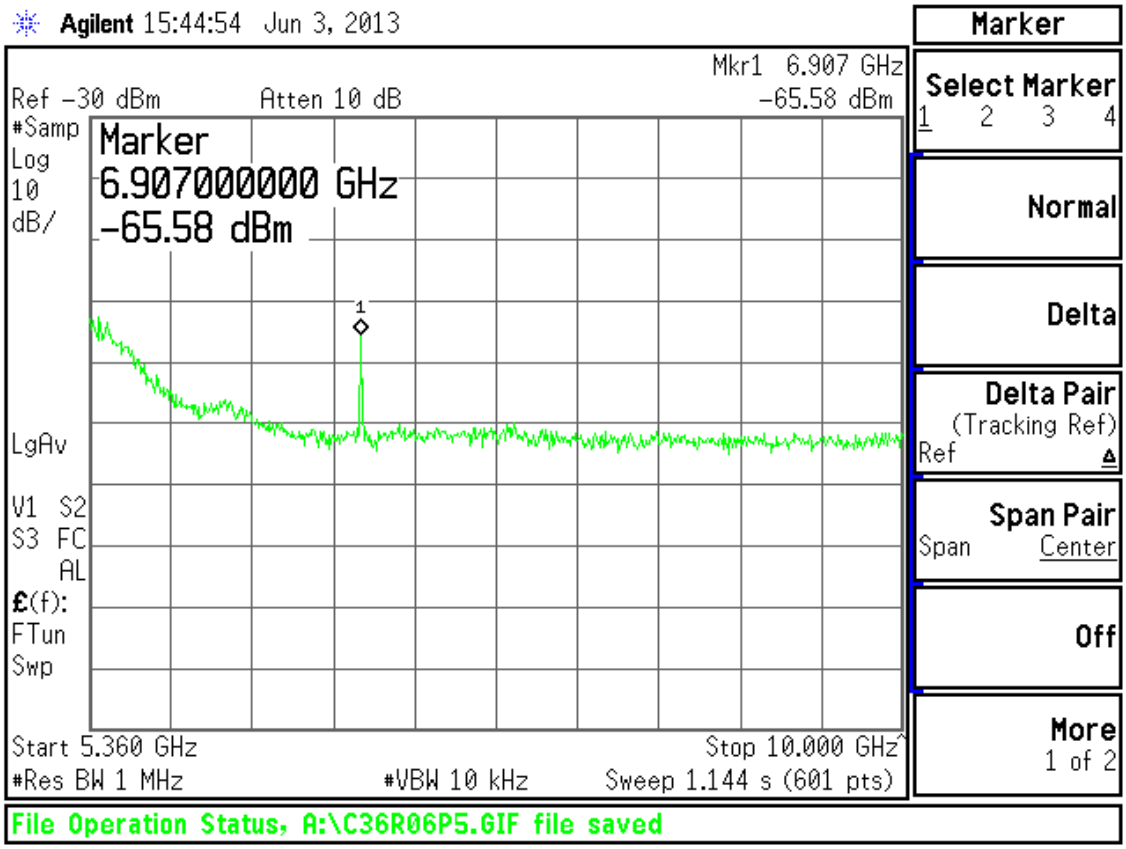
CH36 802.11a Tx Conducted Emissions @ 6Mbps



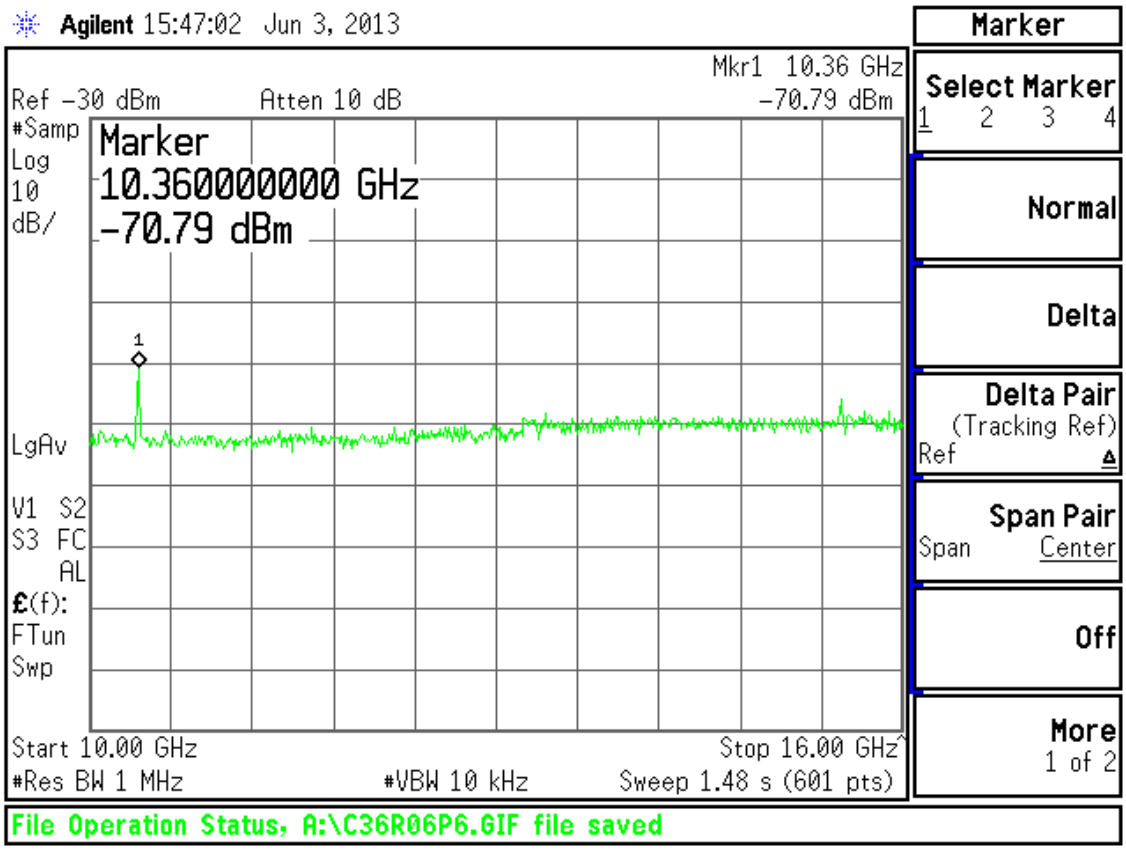
CH36 802.11a Tx Conducted Emissions @ 6Mbps



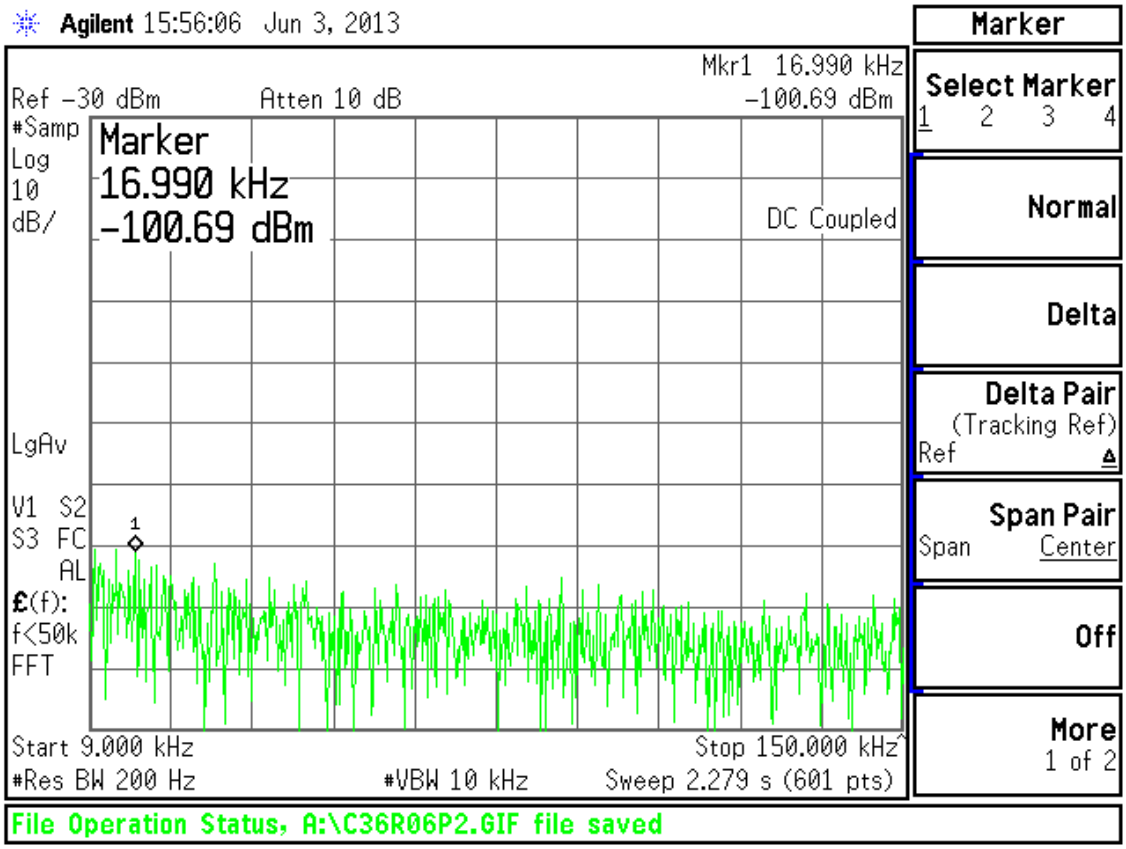
CH36 802.11a Tx Conducted Emissions @ 6Mbps



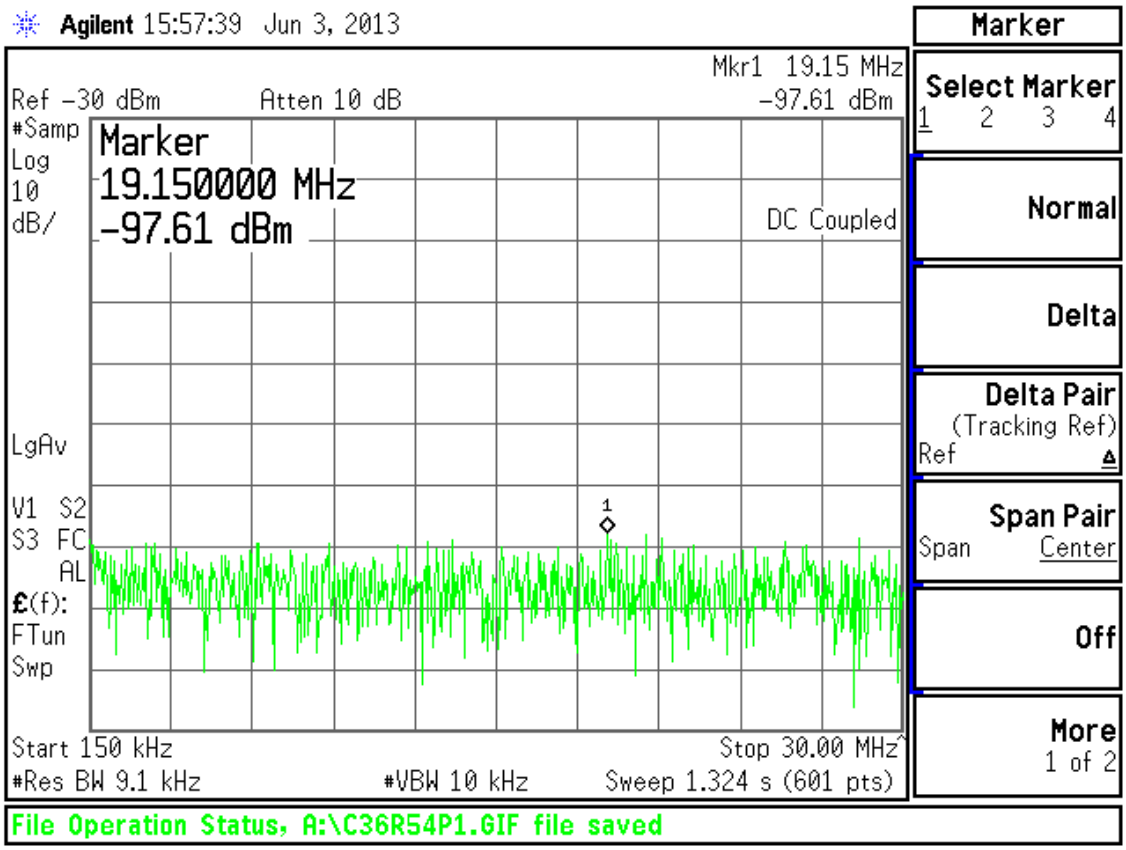
CH36 802.11a Tx Conducted Emissions @ 6Mbps



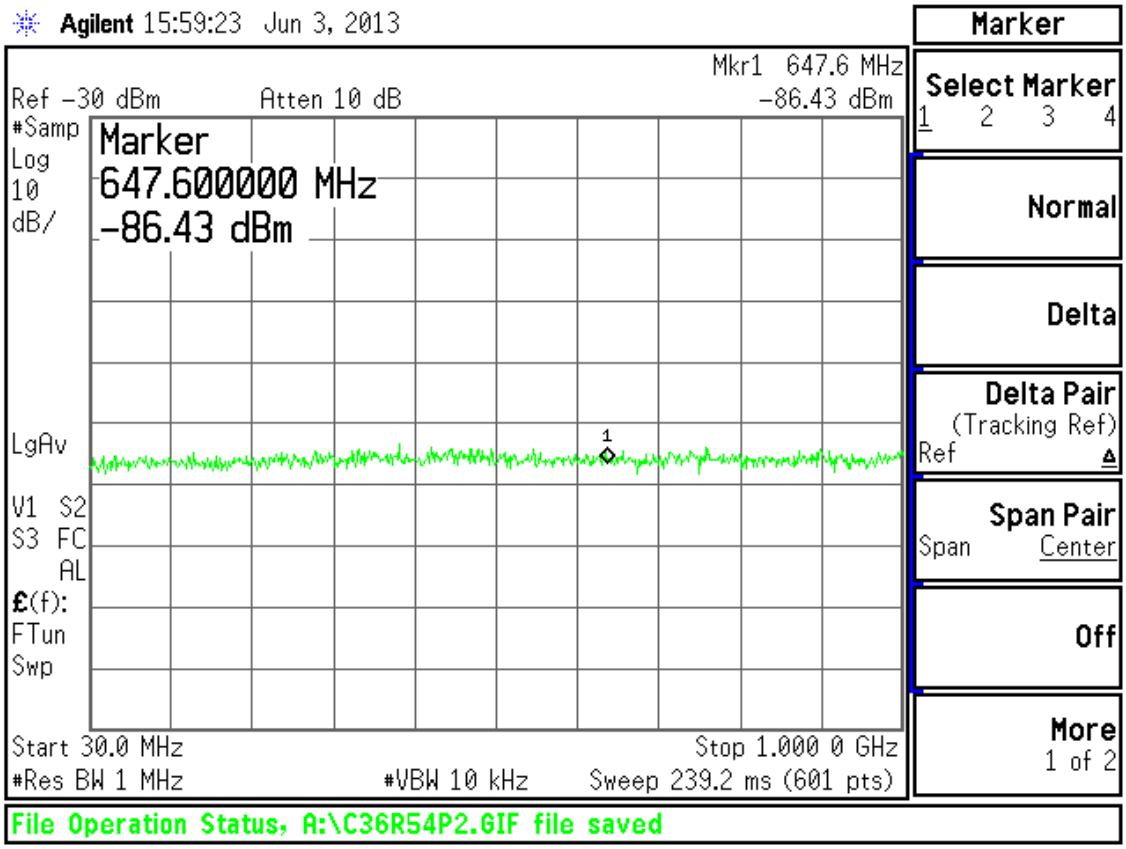
CH36 802.11a Tx Conducted Emissions @ 6Mbps



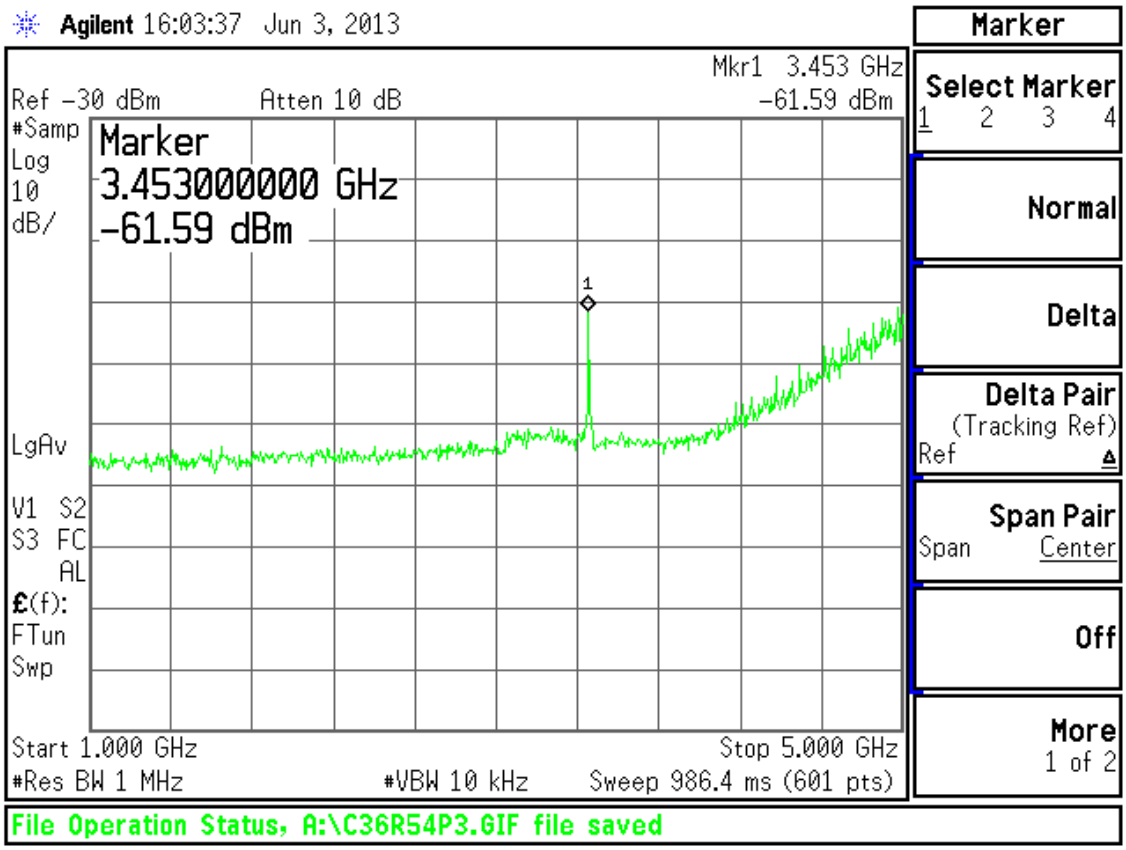
CH36 802.11a Tx Conducted Emissions @ 54Mbps



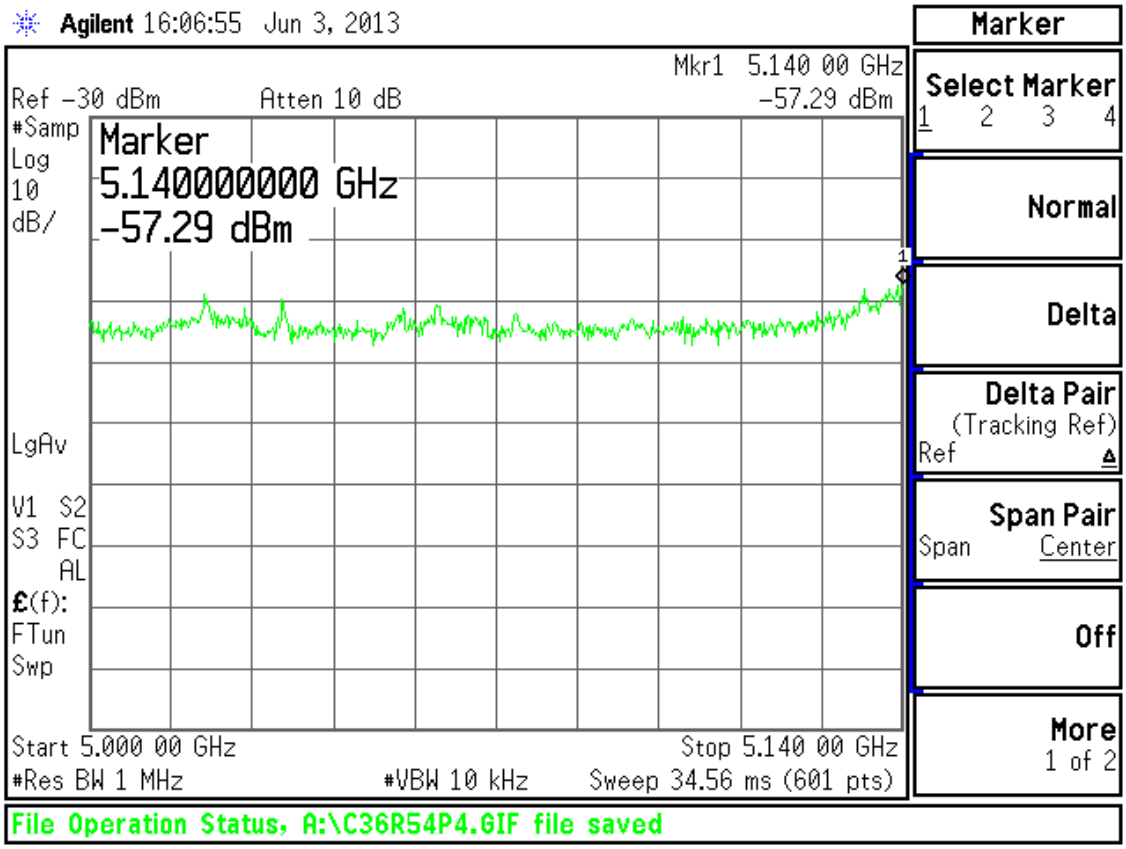
CH36 802.11a Tx Conducted Emissions @ 54Mbps



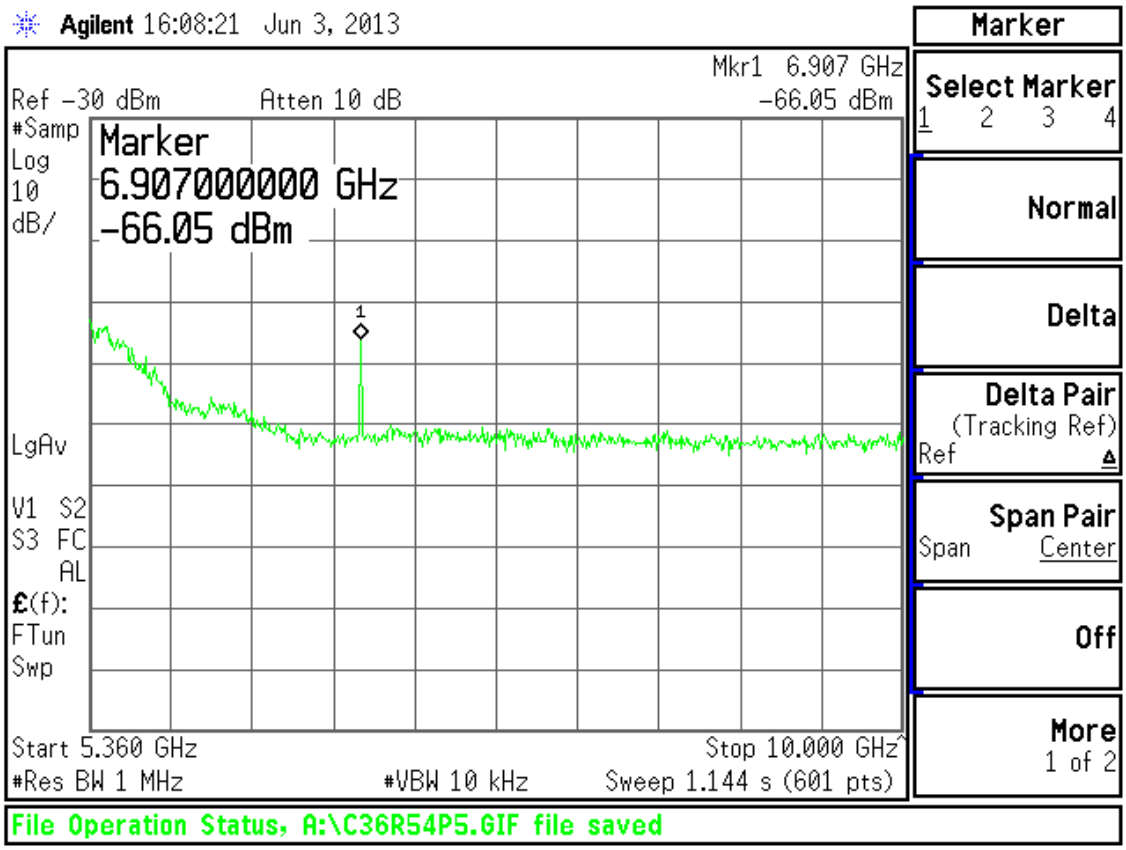
CH36 802.11a Tx Conducted Emissions @ 54Mbps



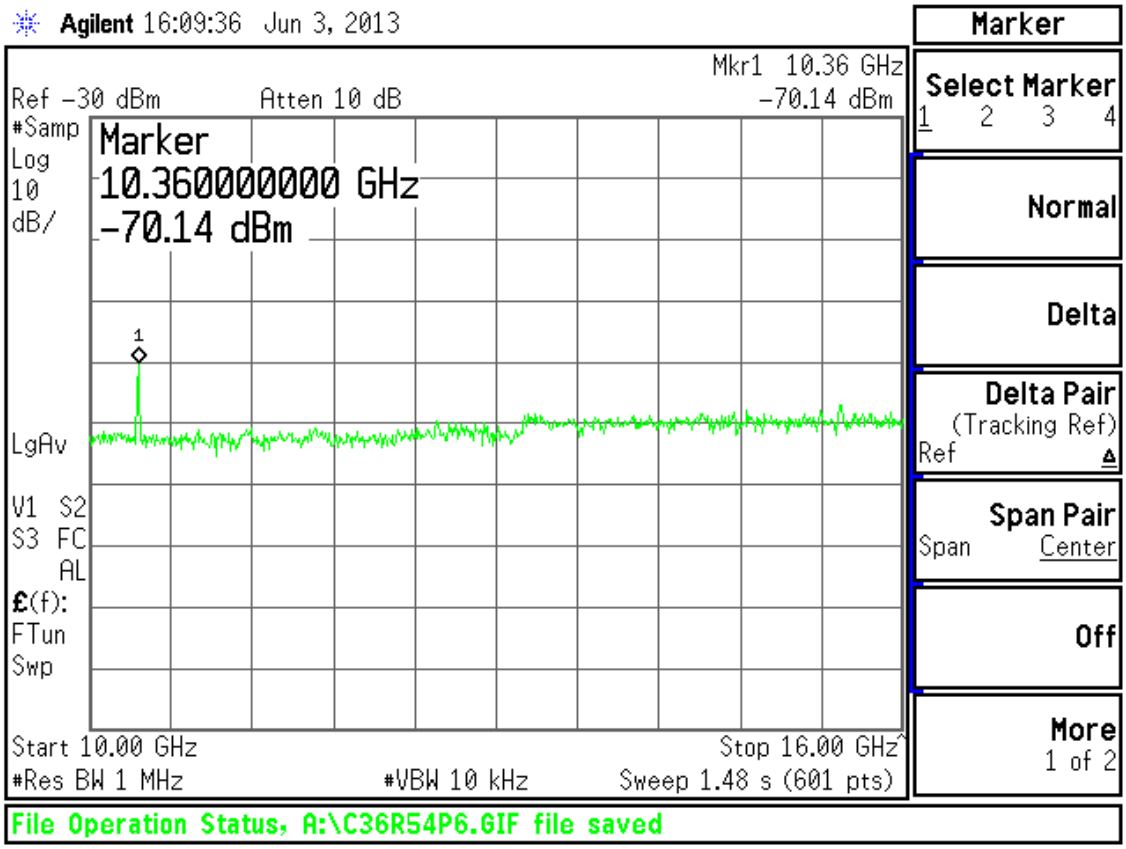
CH36 802.11a Tx Conducted Emissions @ 54Mbps



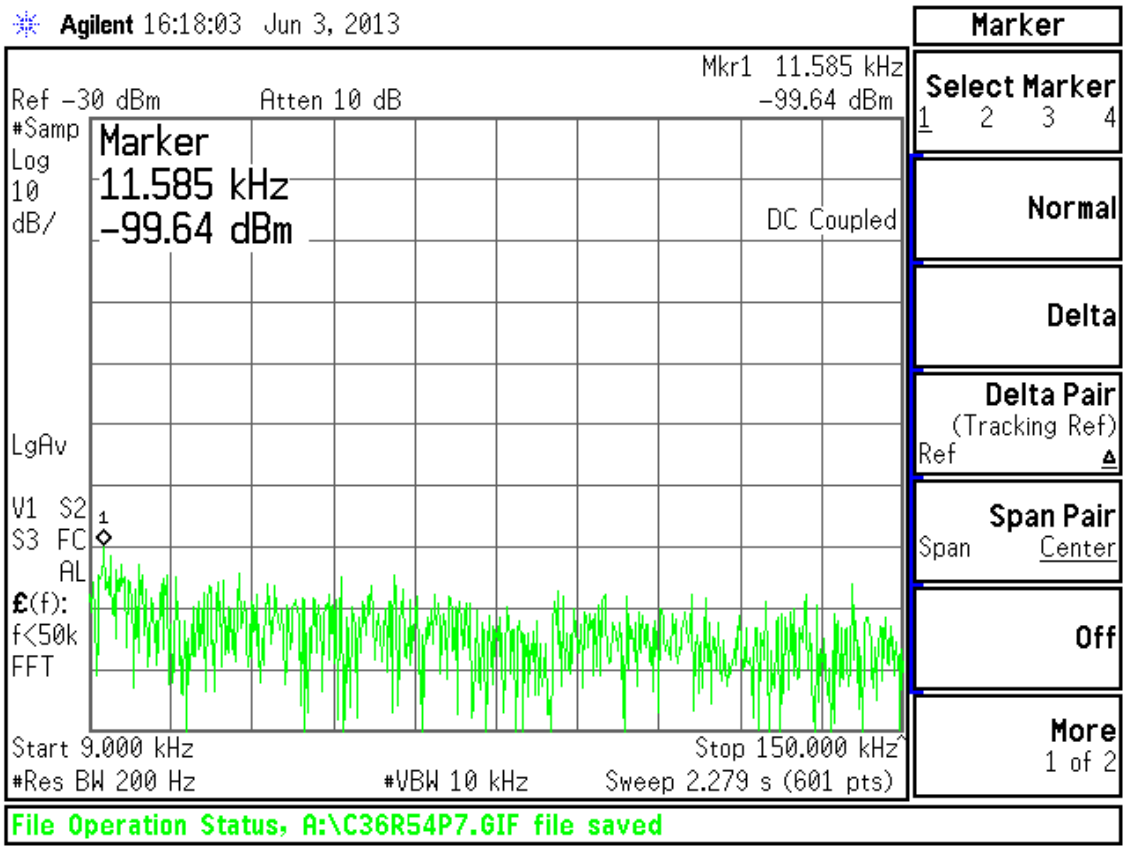
CH36 802.11a Tx Conducted Emissions @ 54Mbps



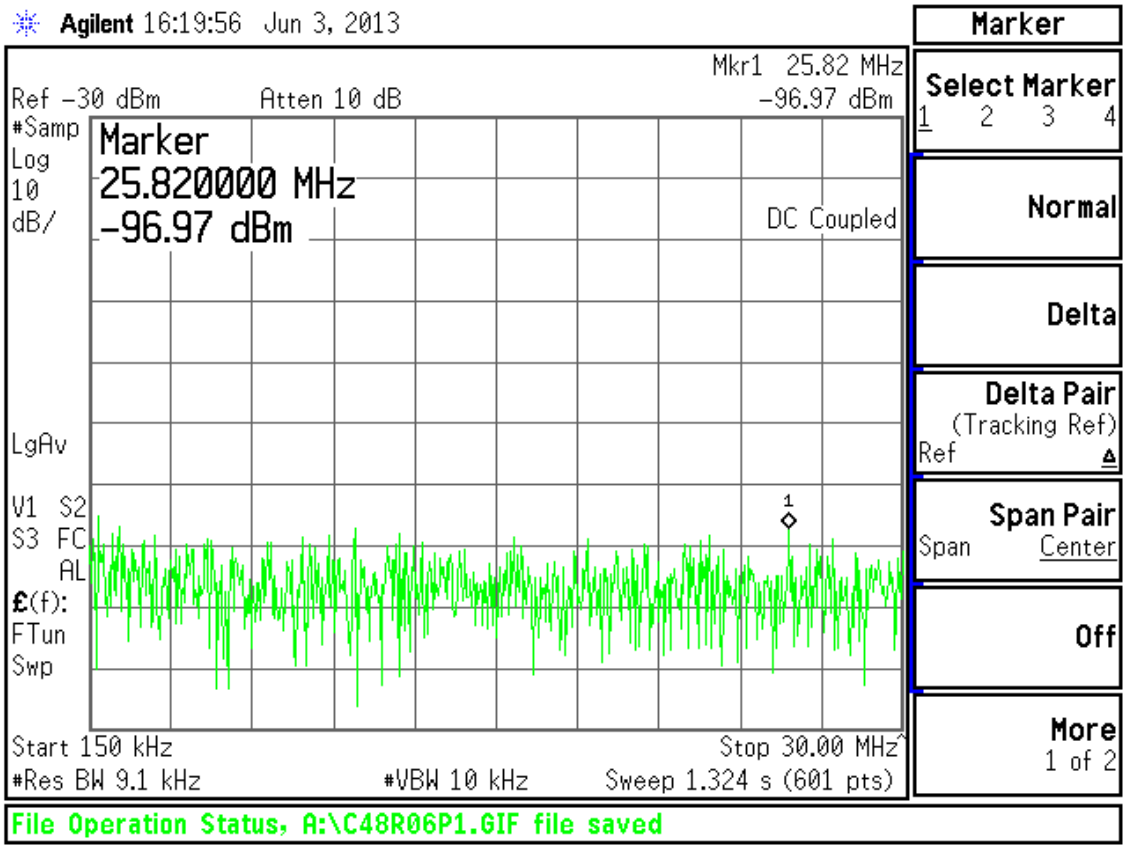
CH36 802.11a Tx Conducted Emissions @ 54Mbps



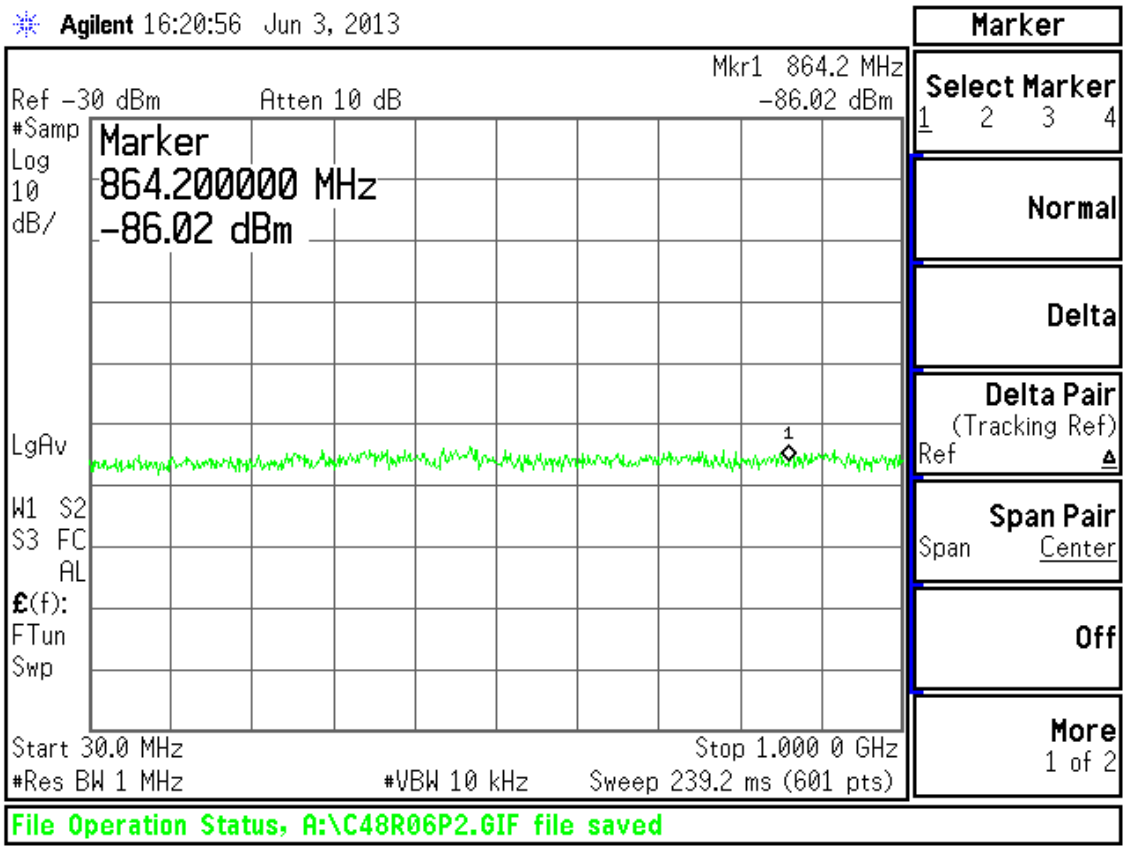
CH36 802.11a Tx Conducted Emissions @ 54Mbps



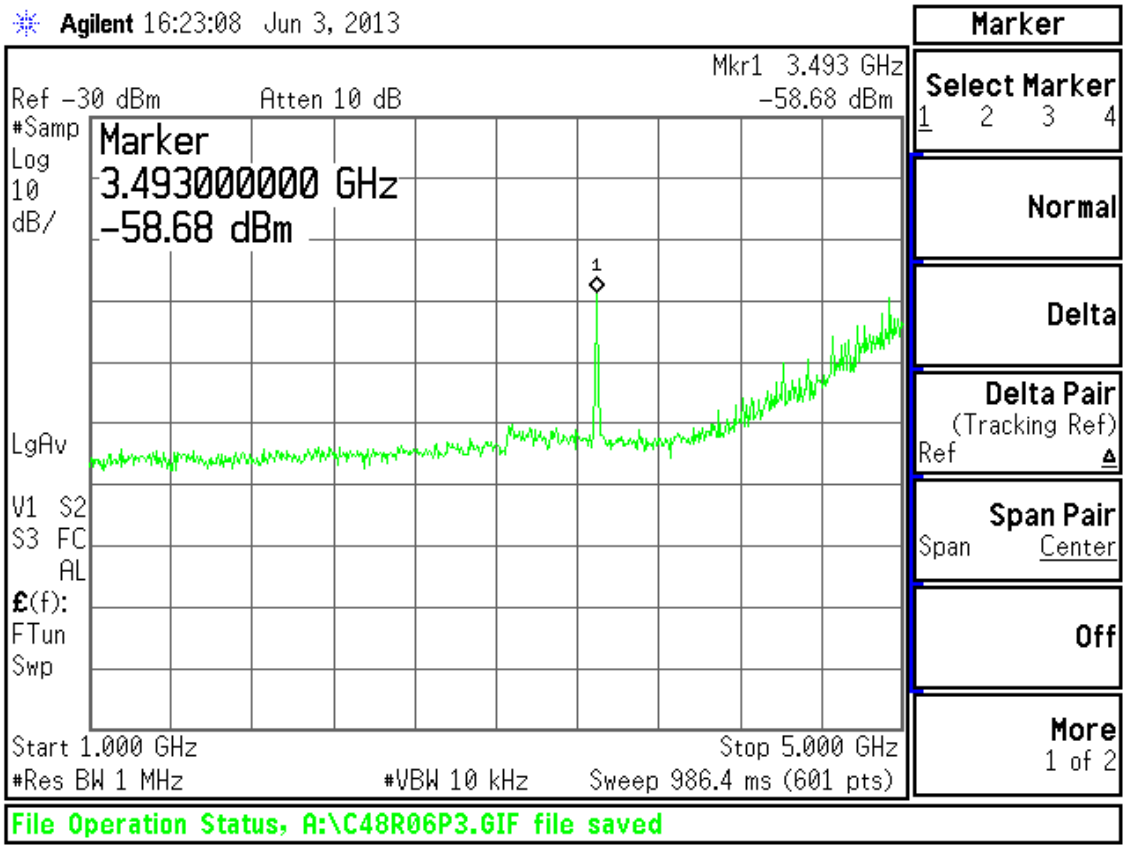
CH48 802.11a Tx Conducted Emissions @ 6Mbps



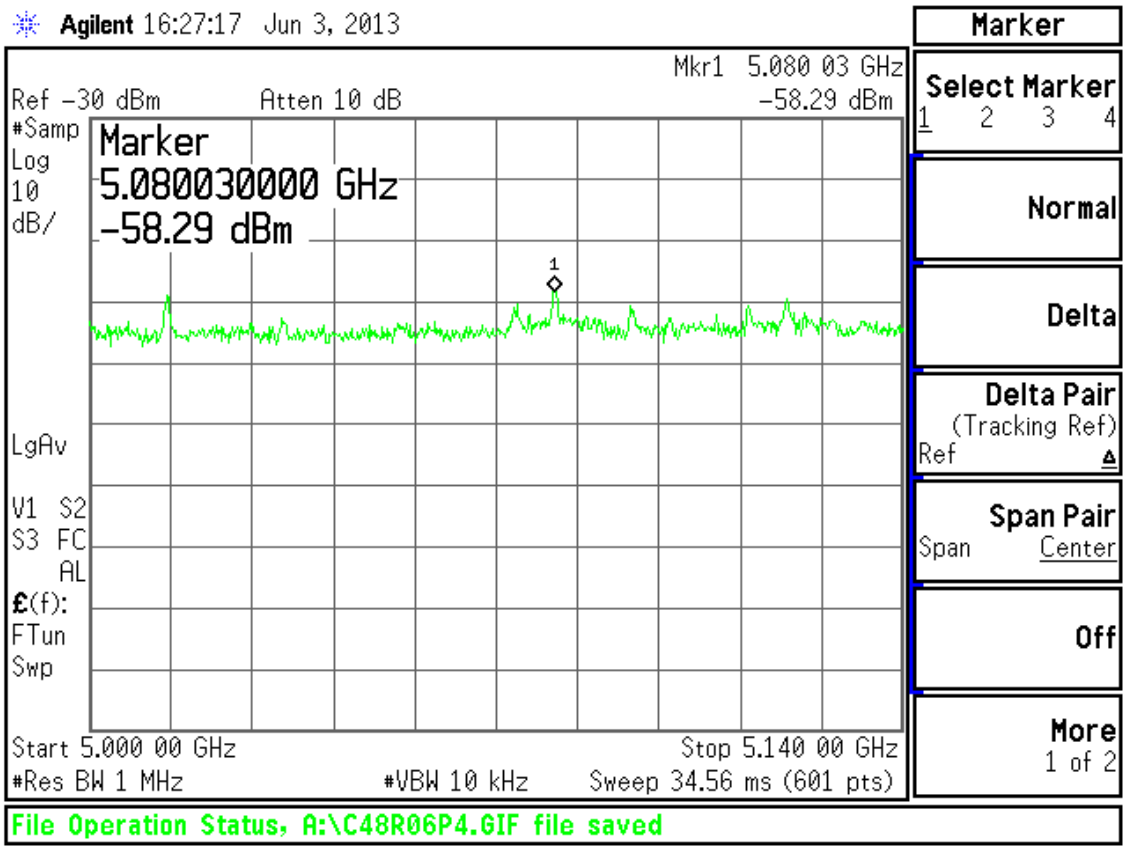
CH48 802.11a Tx Conducted Emissions @ 6Mbps



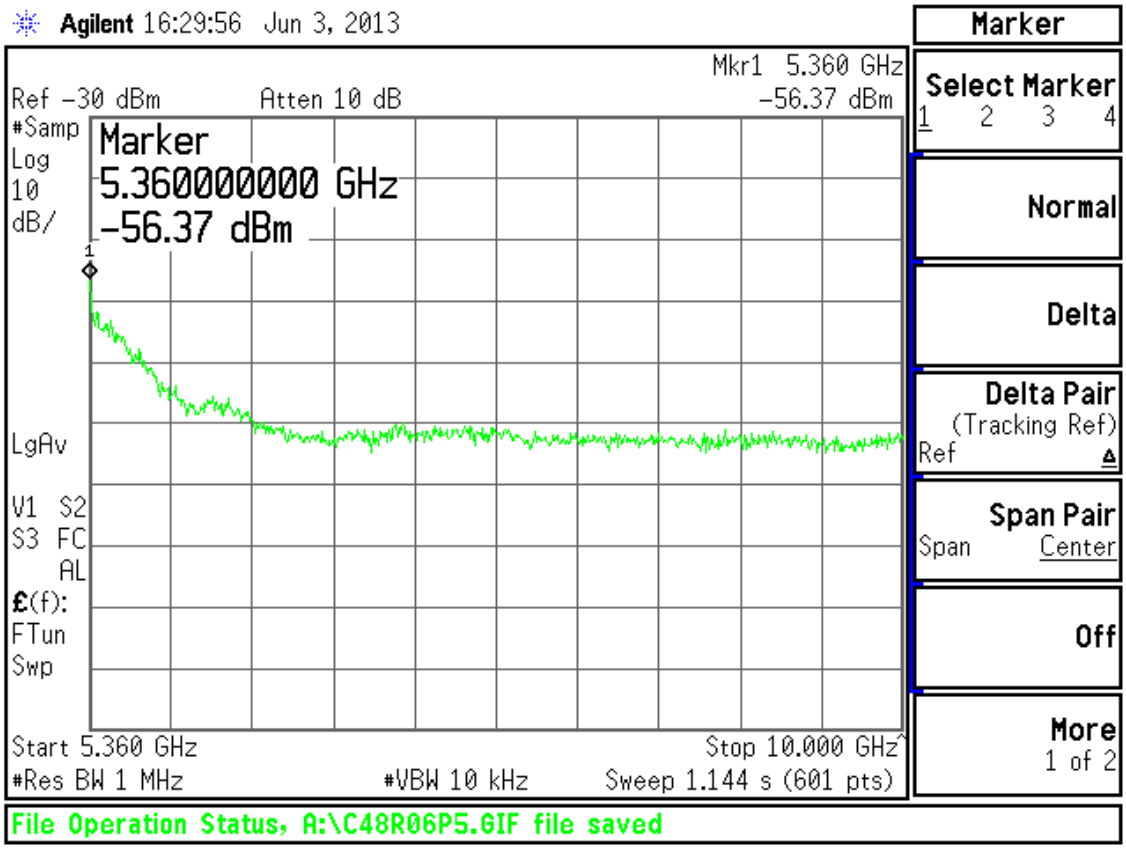
CH48 802.11a Tx Conducted Emissions @ 6Mbps



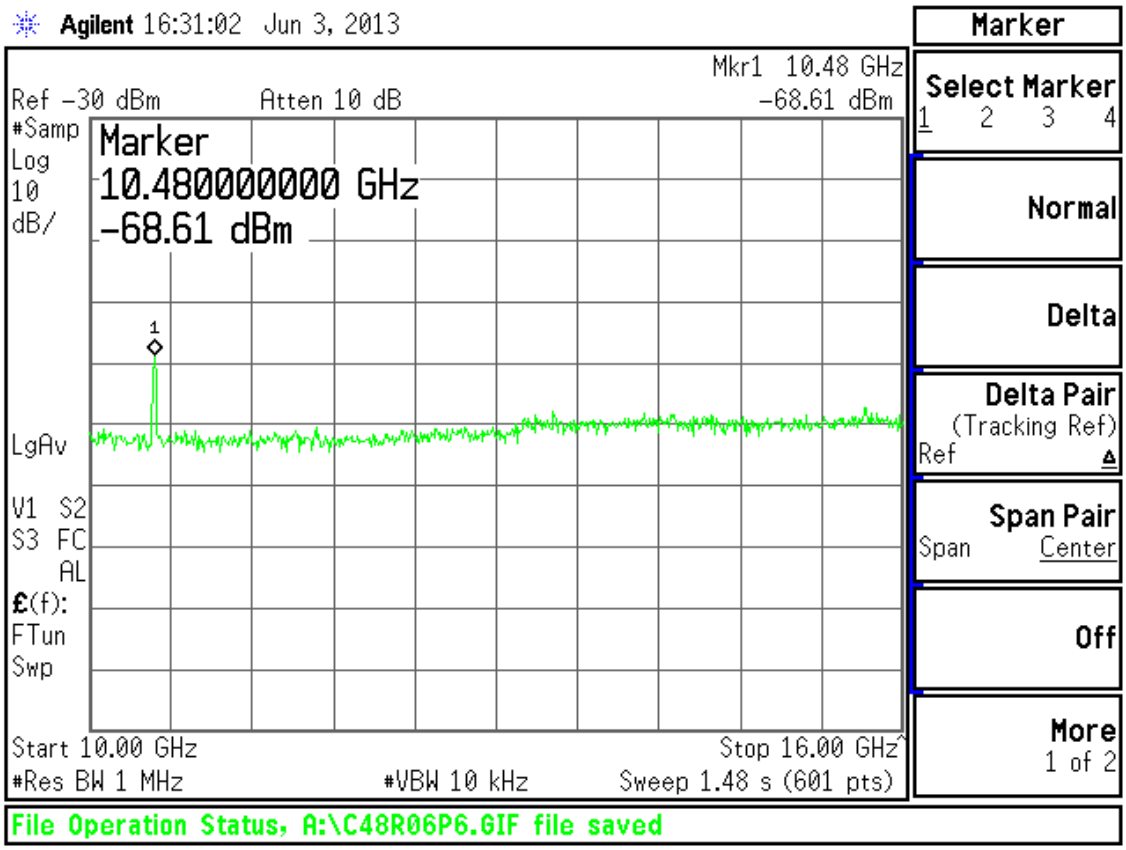
CH48 802.11a Tx Conducted Emissions @ 6Mbps



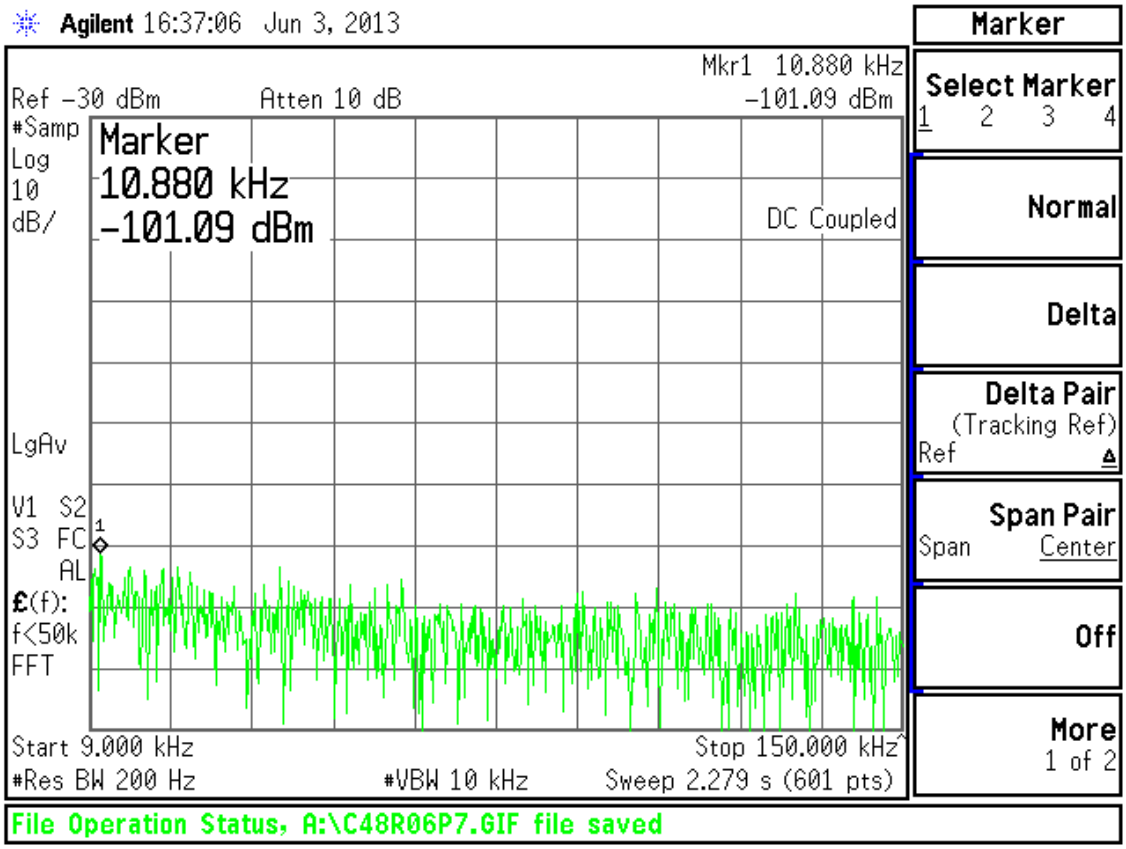
CH48 802.11a Tx Conducted Emissions @ 6Mbps



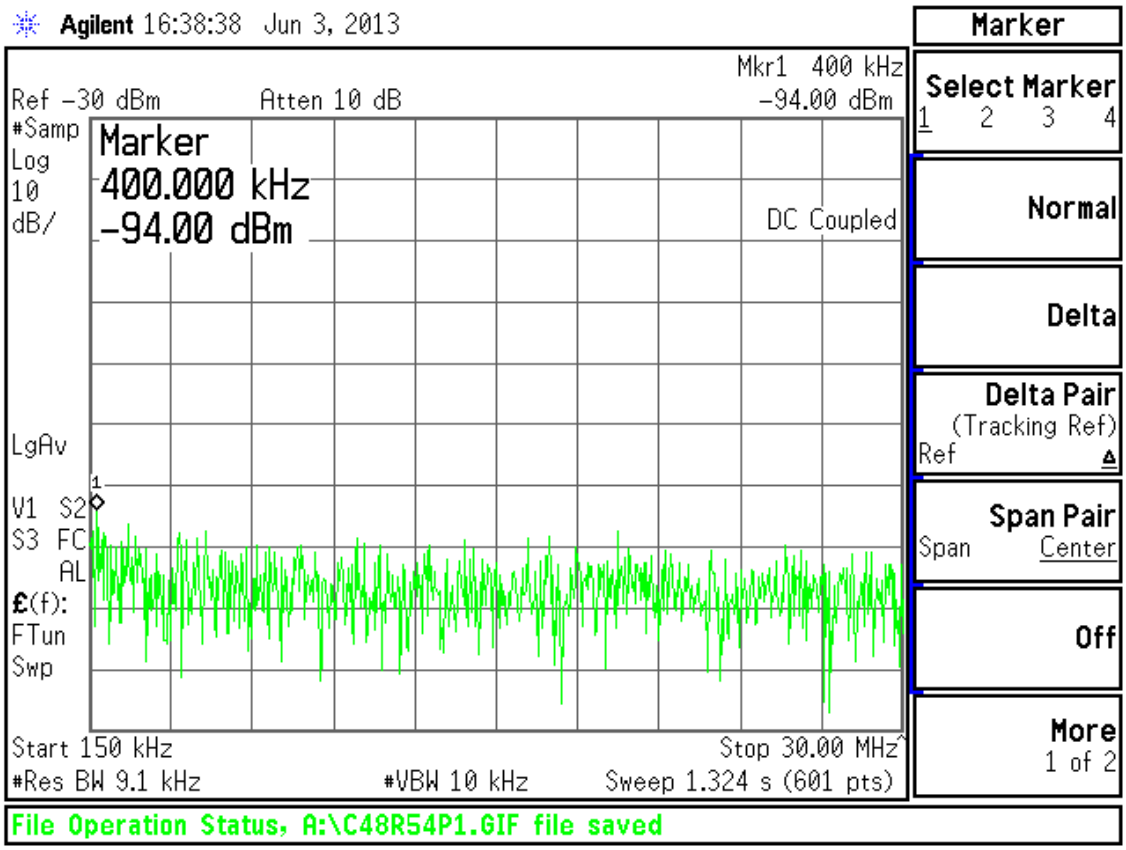
CH48 802.11a Tx Conducted Emissions @ 6Mbps



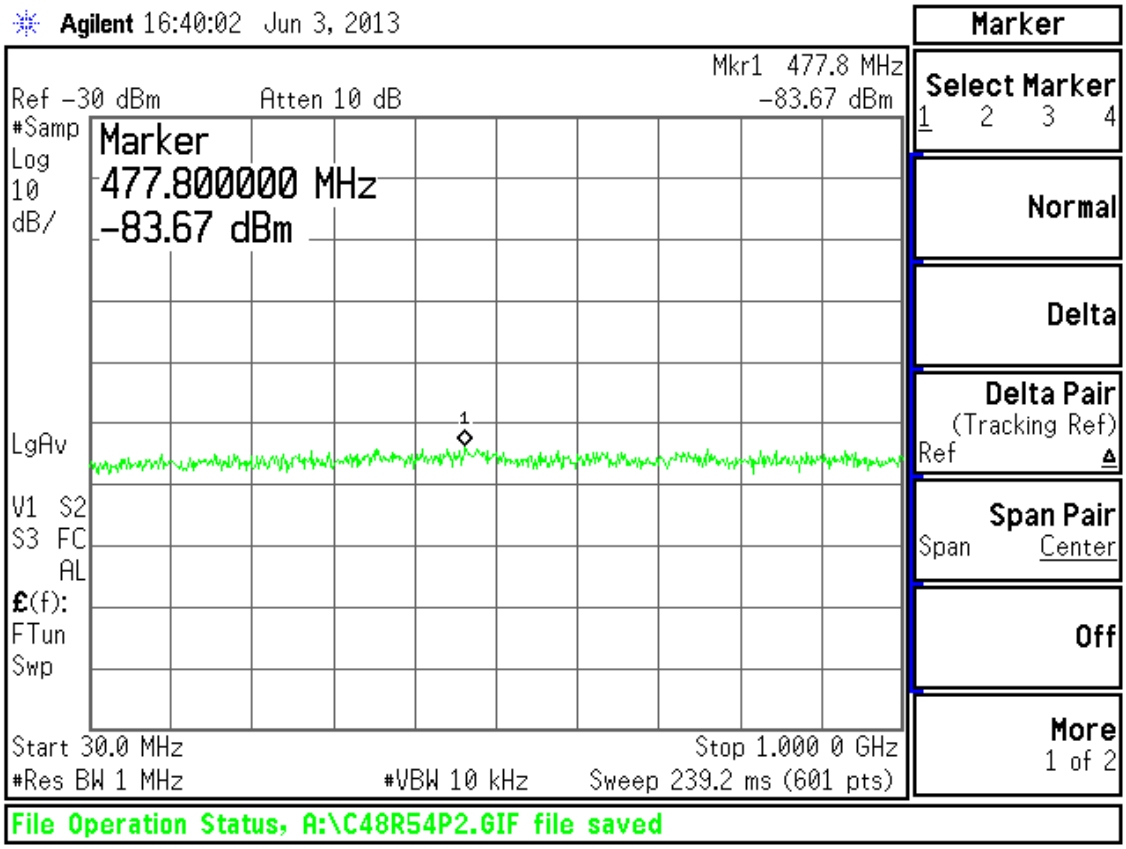
CH48 802.11a Tx Conducted Emissions @ 6Mbps



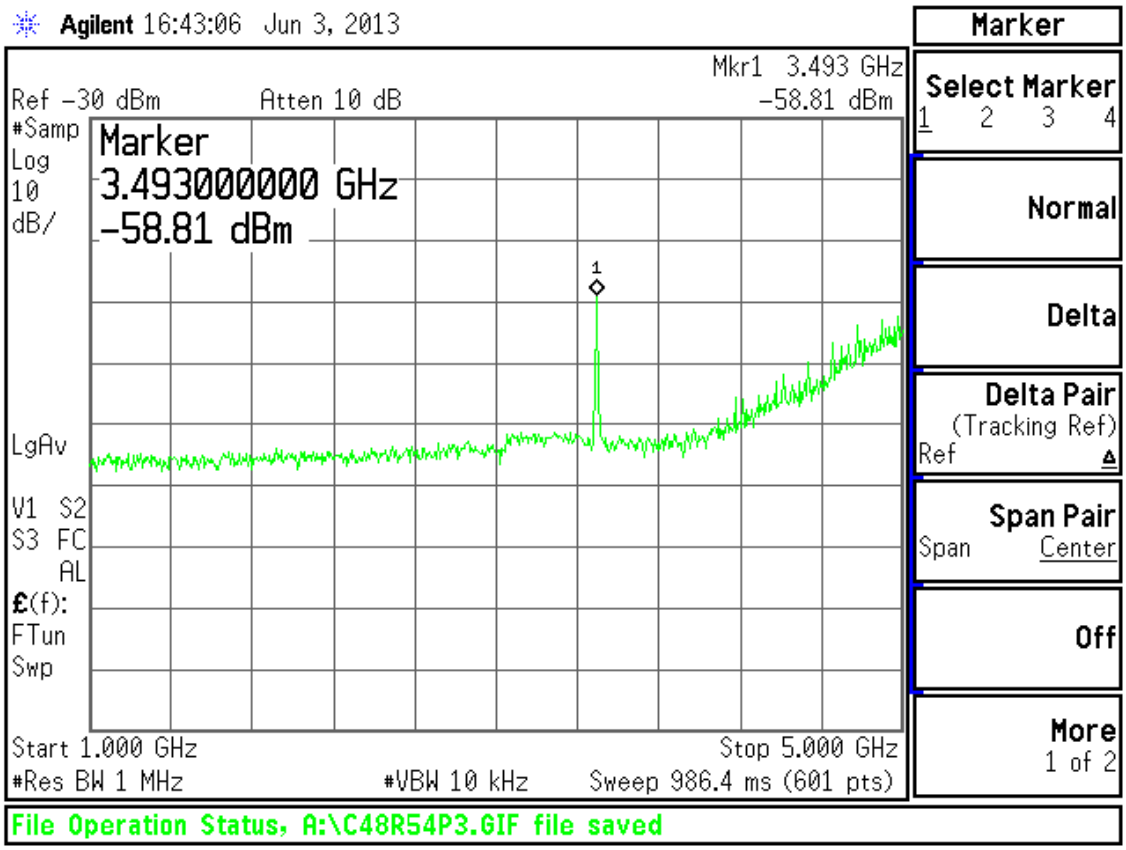
CH48 802.11a Tx Conducted Emissions @ 54Mbps



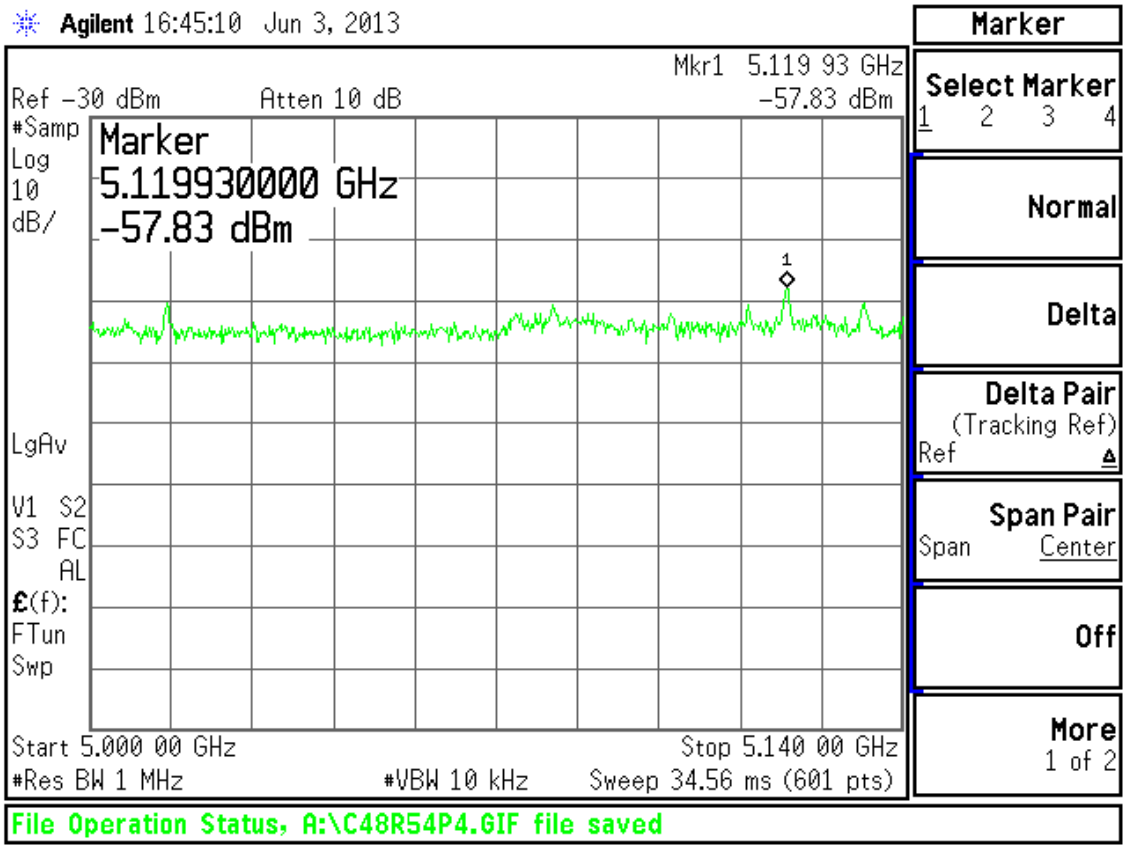
CH48 802.11a Tx Conducted Emissions @ 54Mbps



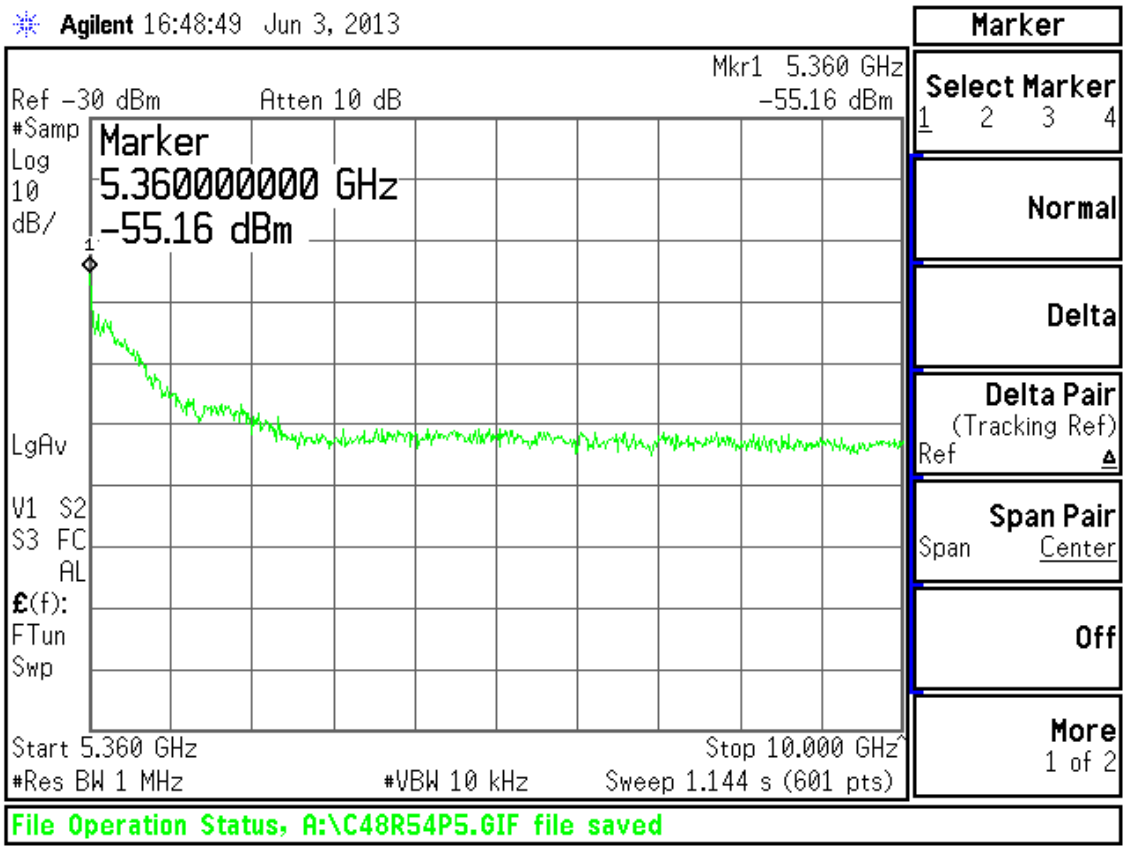
CH48 802.11a Tx Conducted Emissions @ 54Mbps



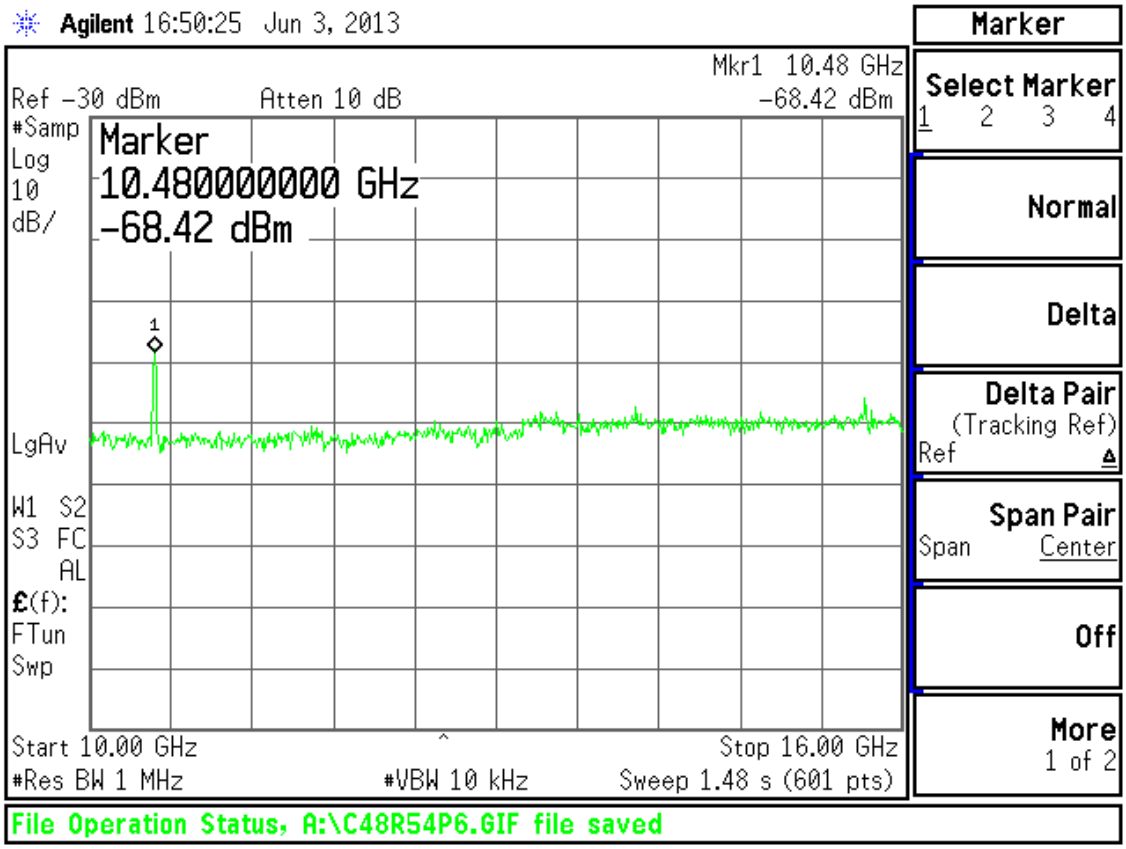
CH48 802.11a Tx Conducted Emissions @ 54Mbps



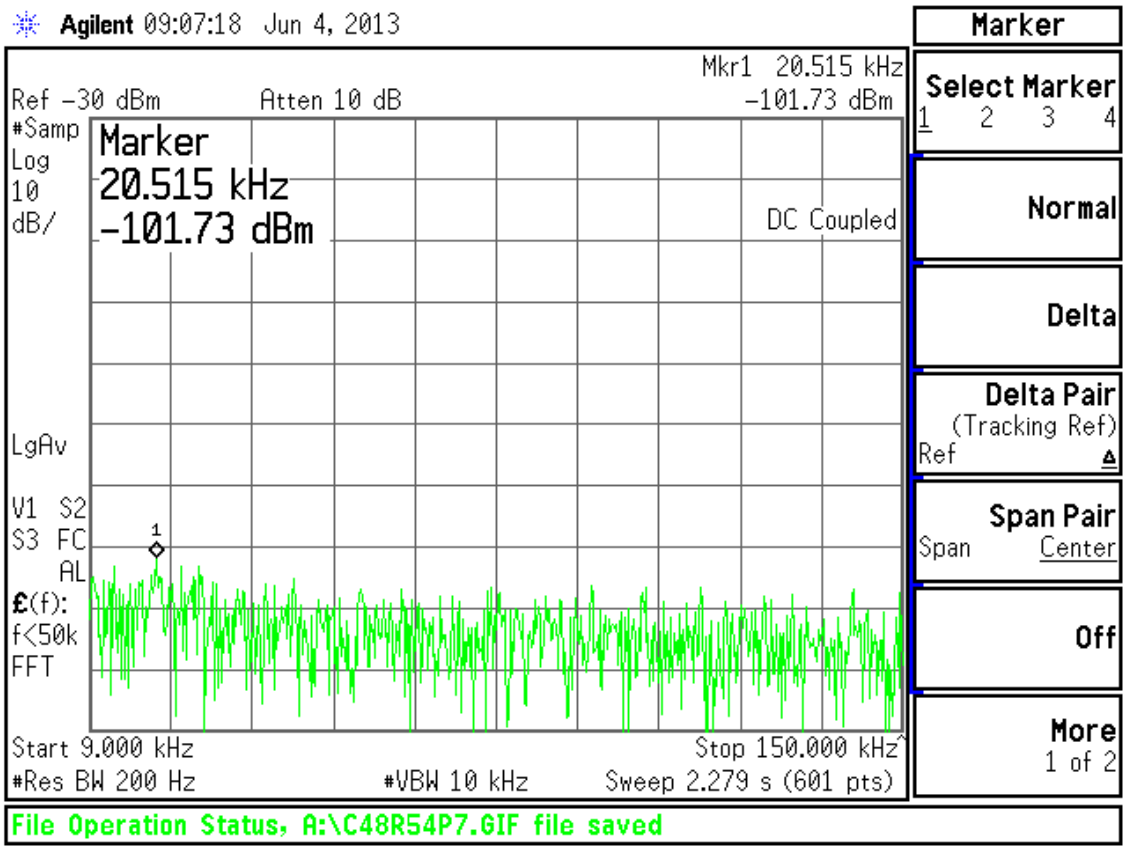
CH48 802.11a Tx Conducted Emissions @ 54Mbps



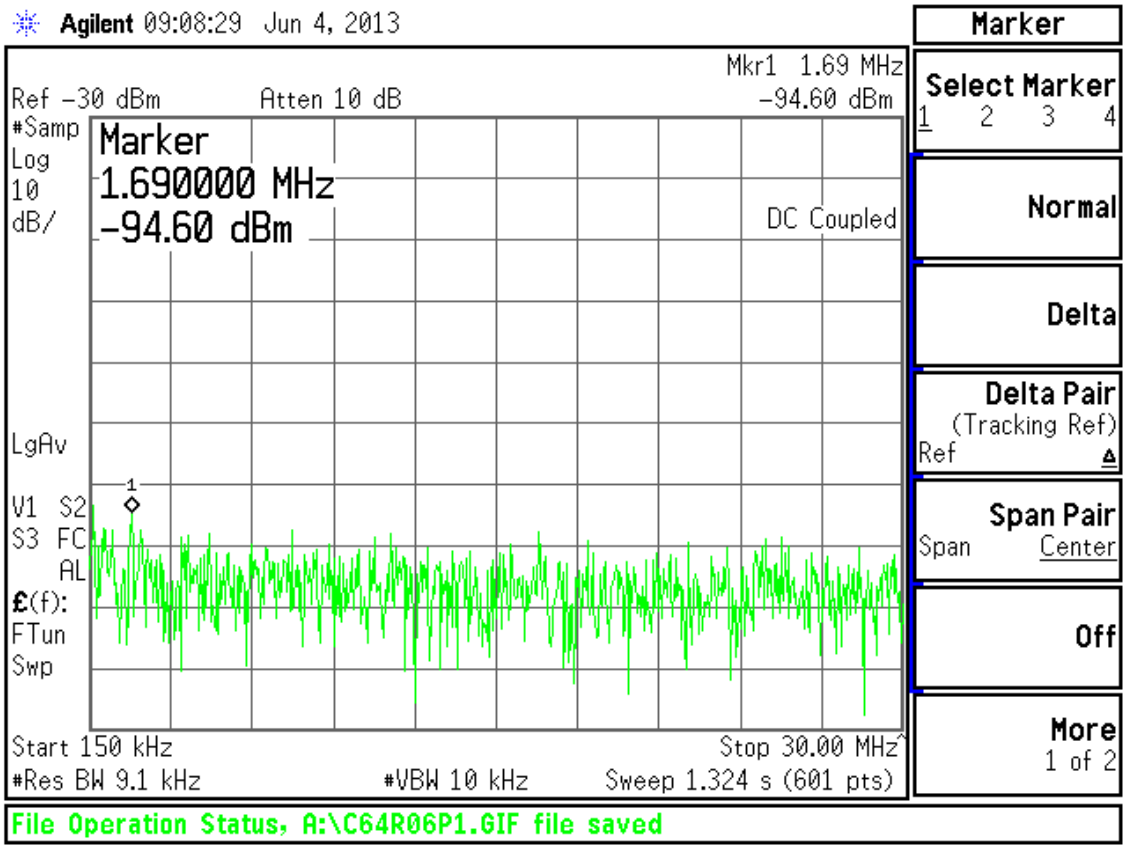
CH48 802.11a Tx Conducted Emissions @ 54Mbps



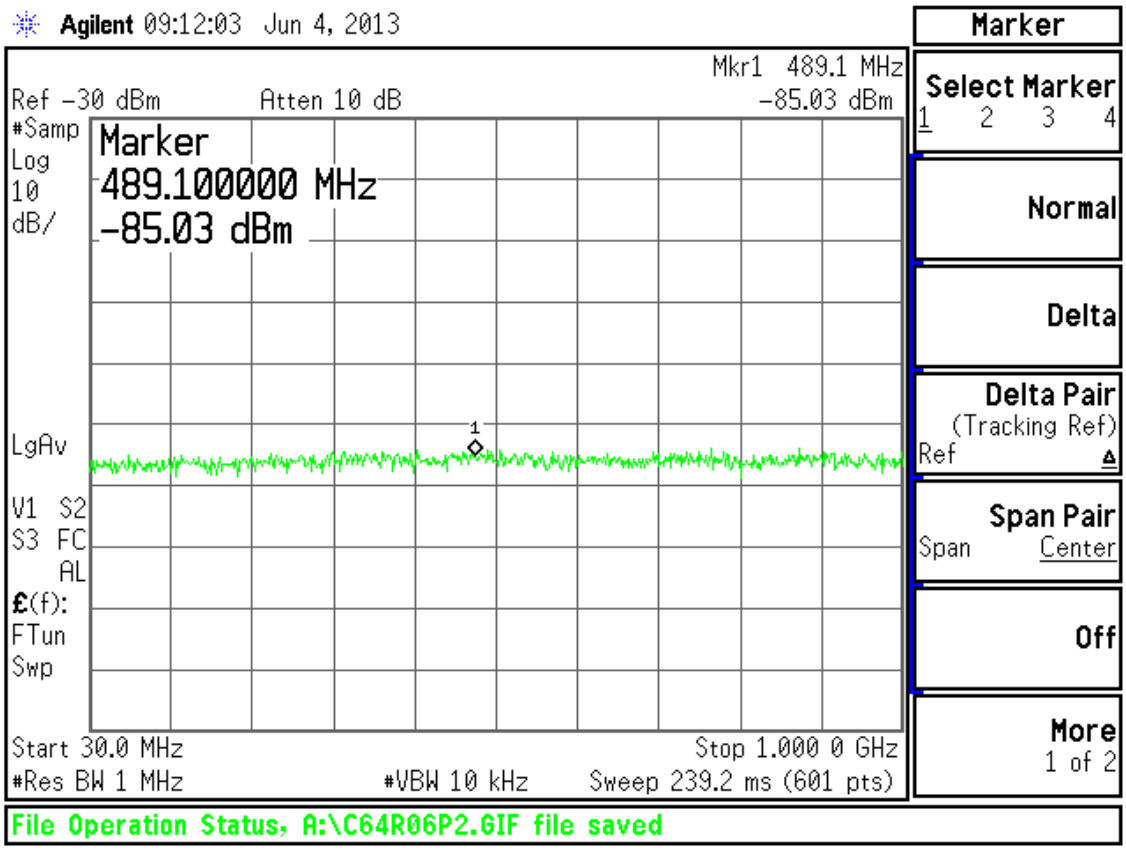
CH48 802.11a Tx Conducted Emissions @ 54Mbps



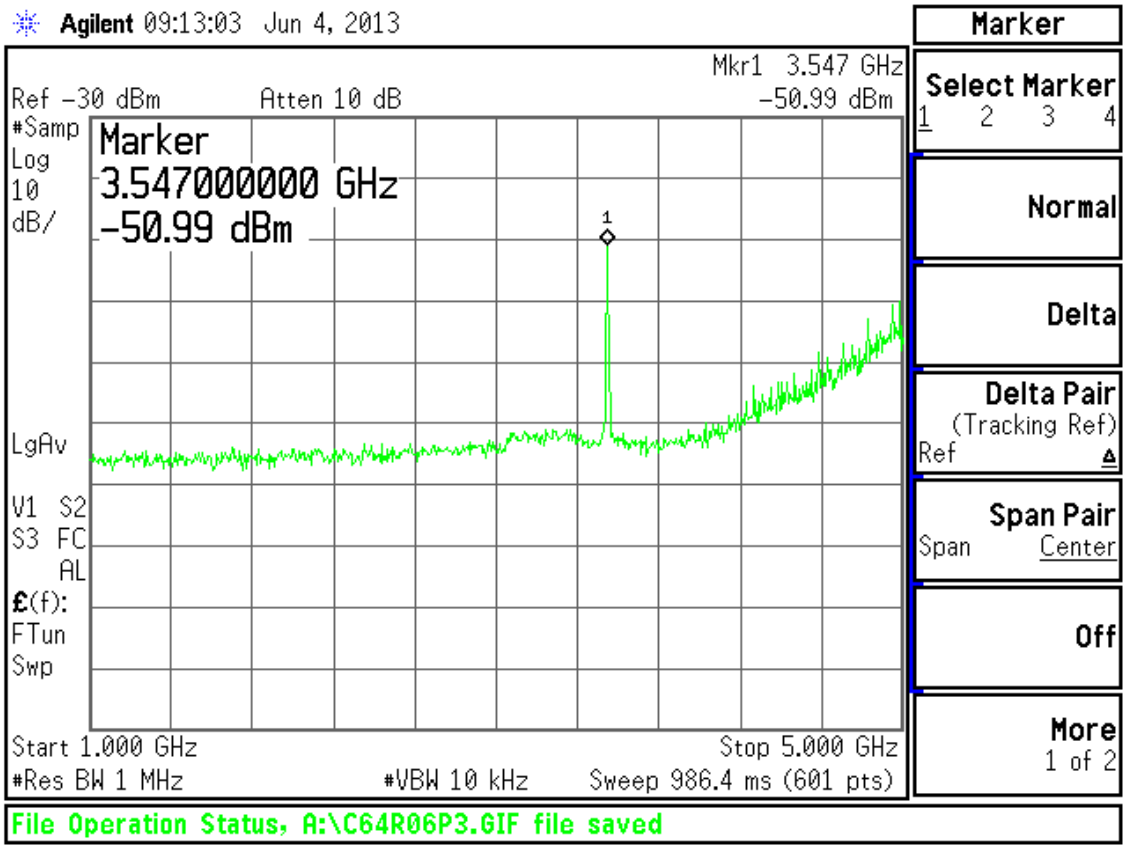
CH64 802.11a Tx Conducted Emissions @ 6Mbps



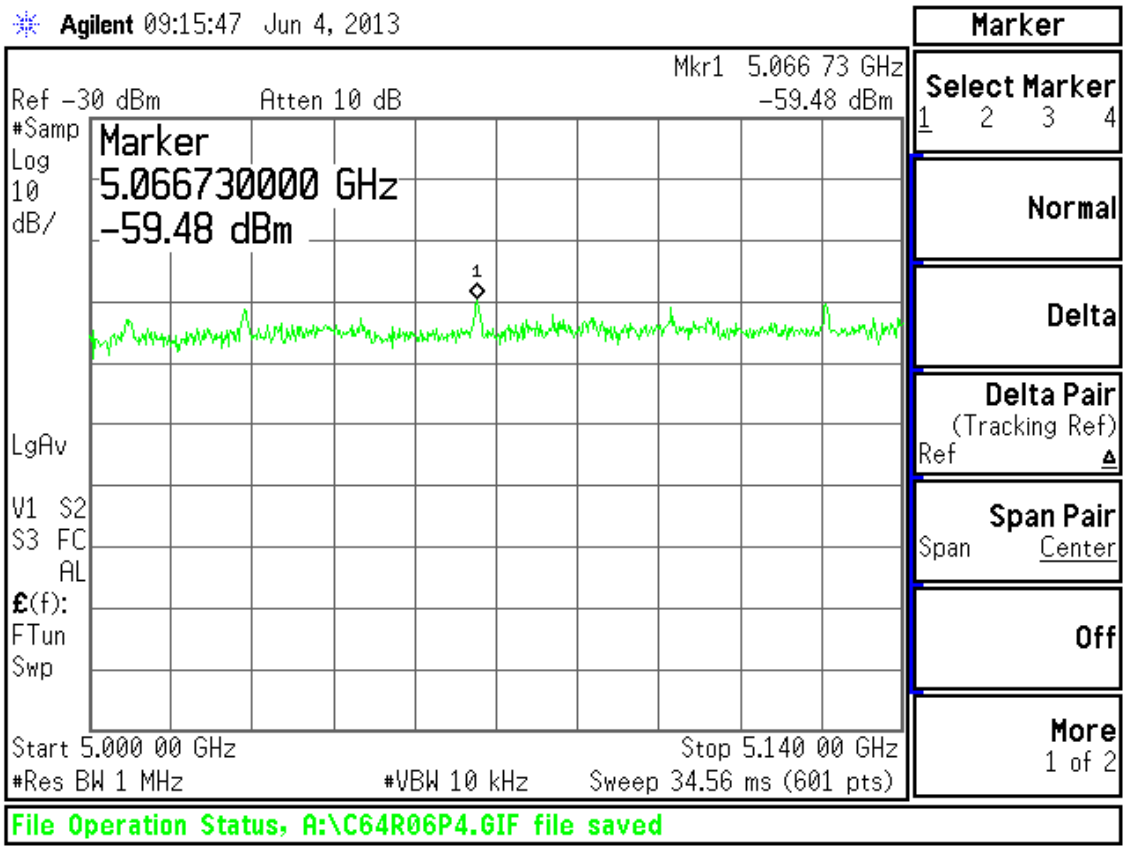
CH64 802.11a Tx Conducted Emissions @ 6Mbps



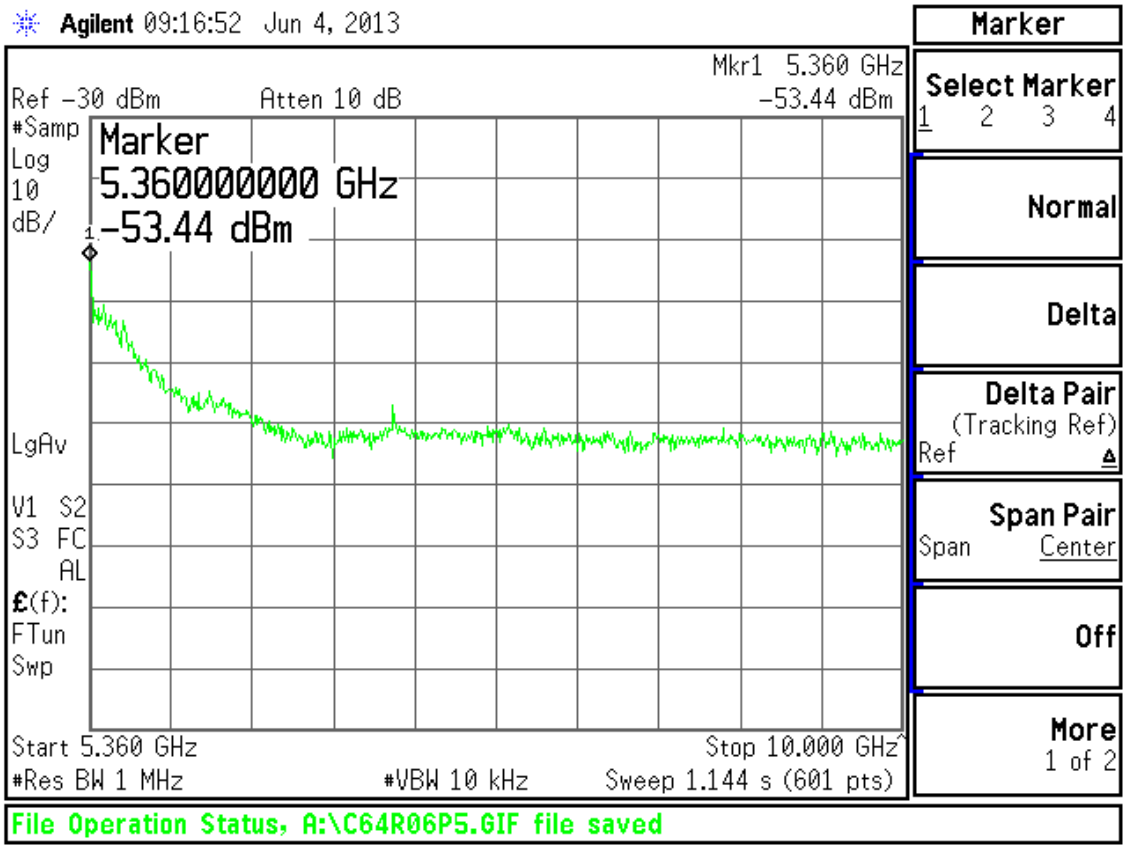
CH64 802.11a Tx Conducted Emissions @ 6Mbps



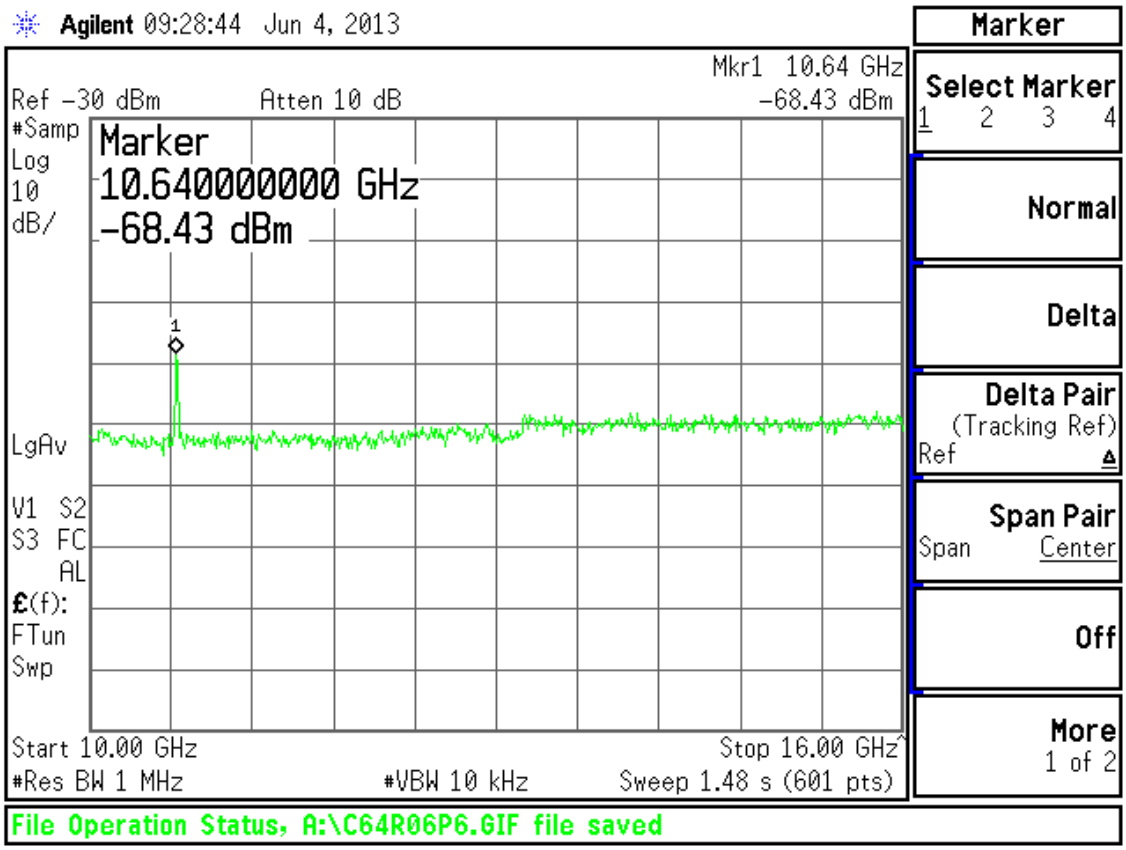
CH64 802.11a Tx Conducted Emissions @ 6Mbps



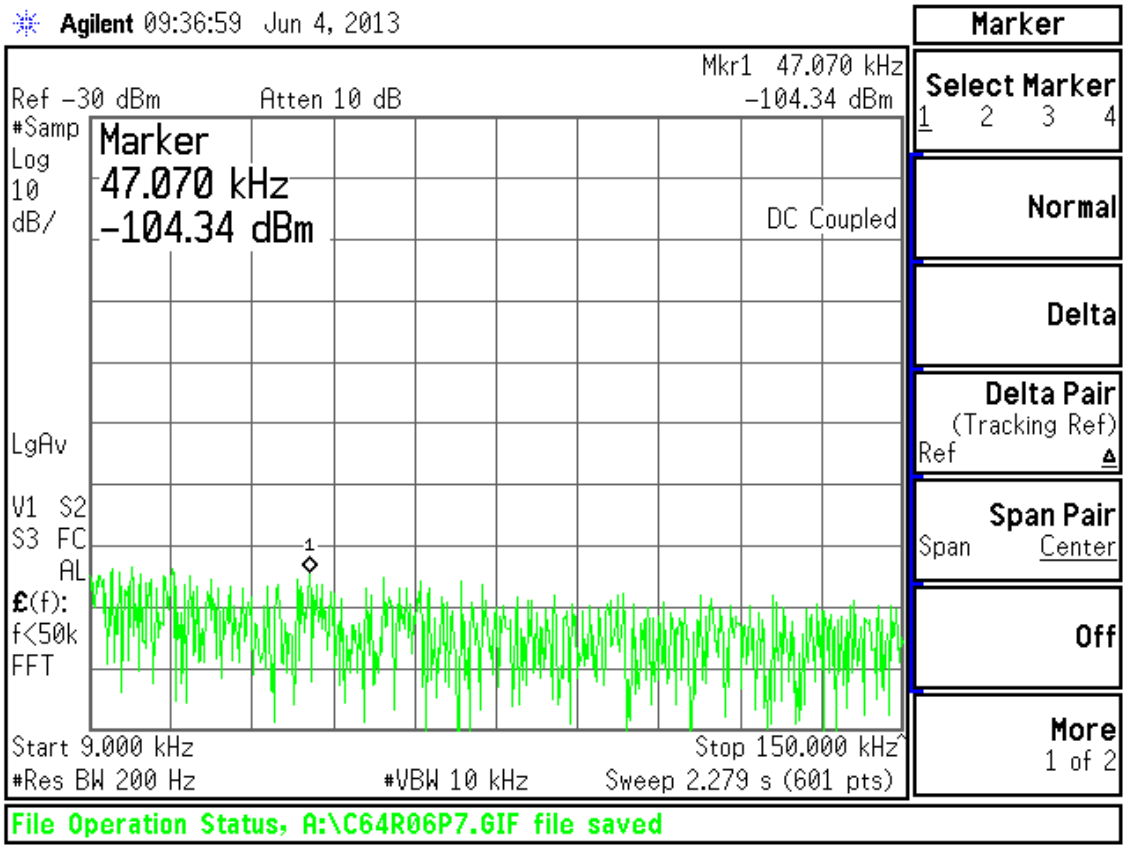
CH64 802.11a Tx Conducted Emissions @ 6Mbps



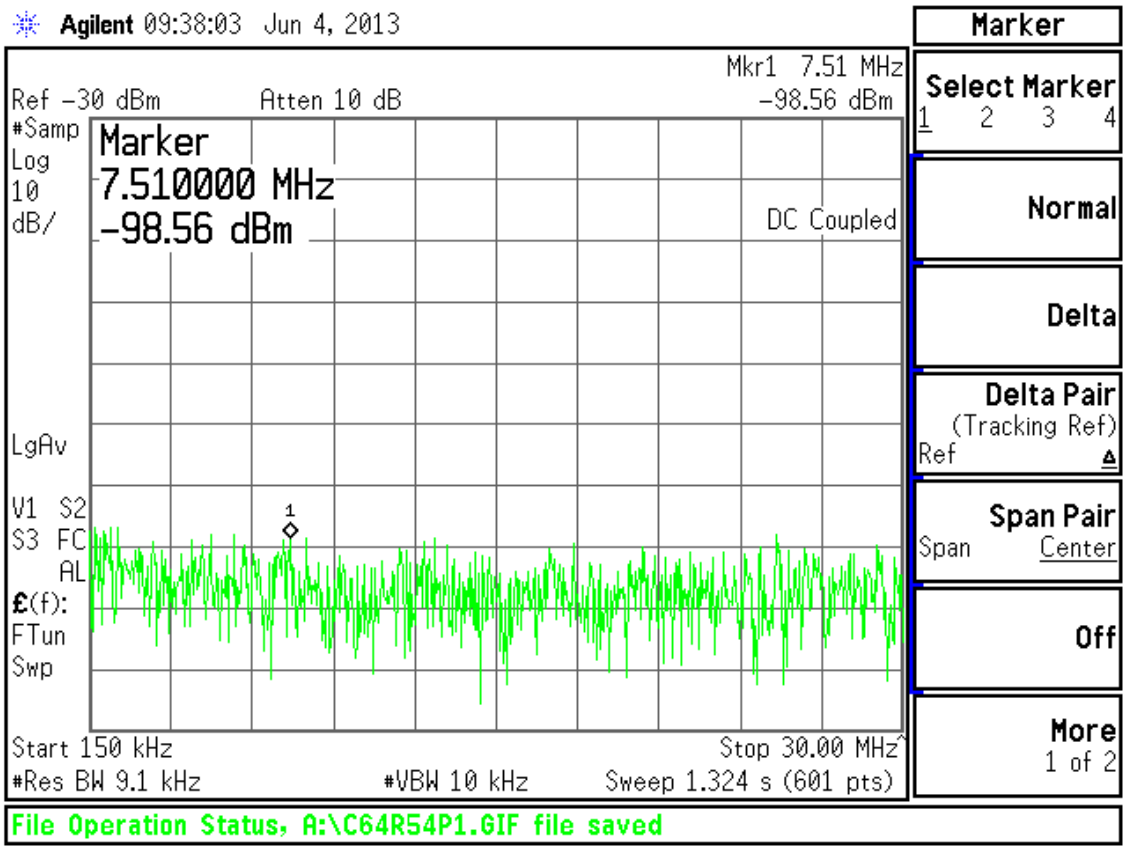
CH64 802.11a Tx Conducted Emissions @ 6Mbps



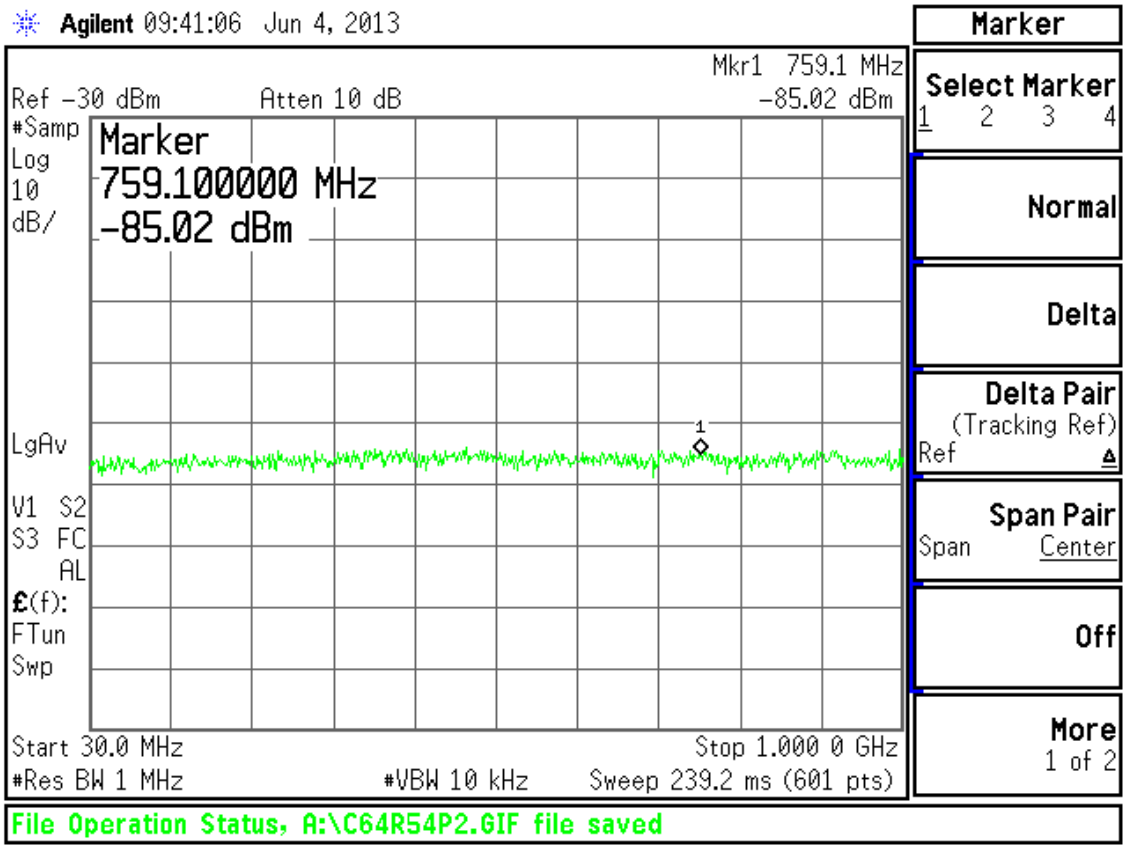
CH64 802.11a Tx Conducted Emissions @ 6Mbps



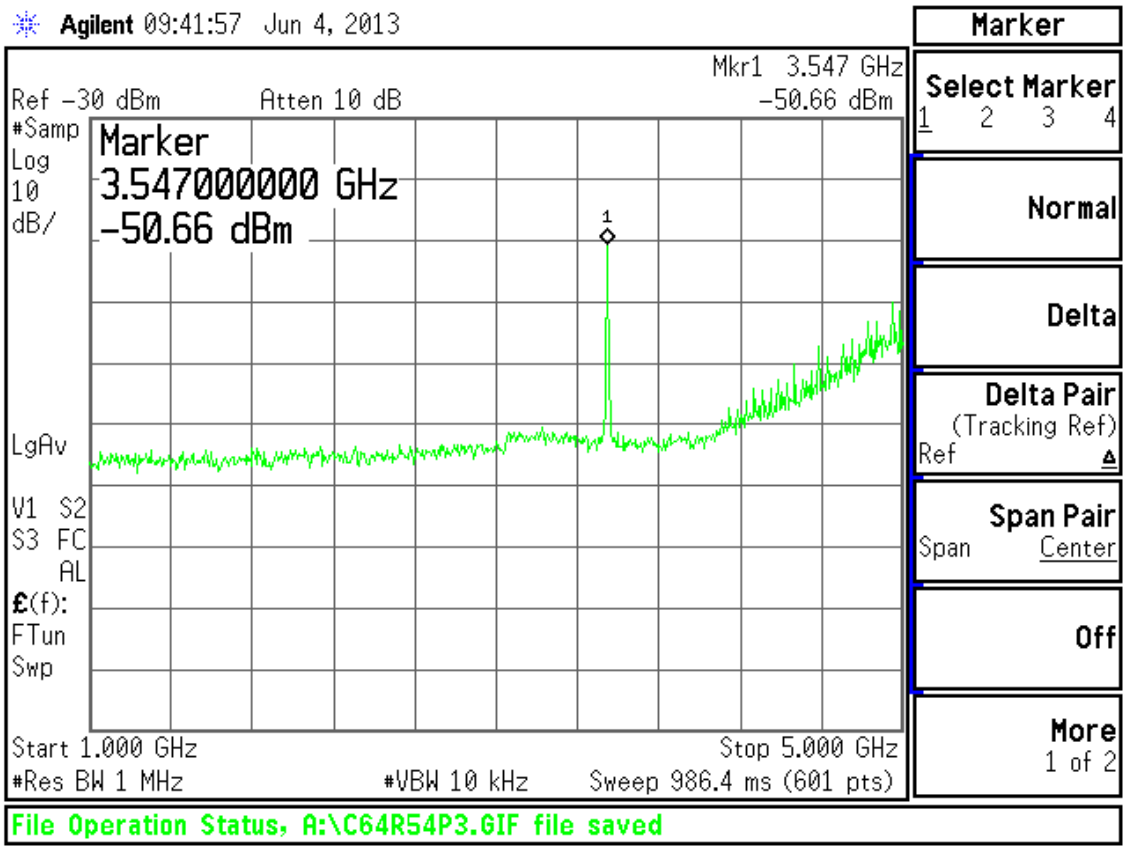
CH64 802.11a Tx Conducted Emissions @ 54Mbps



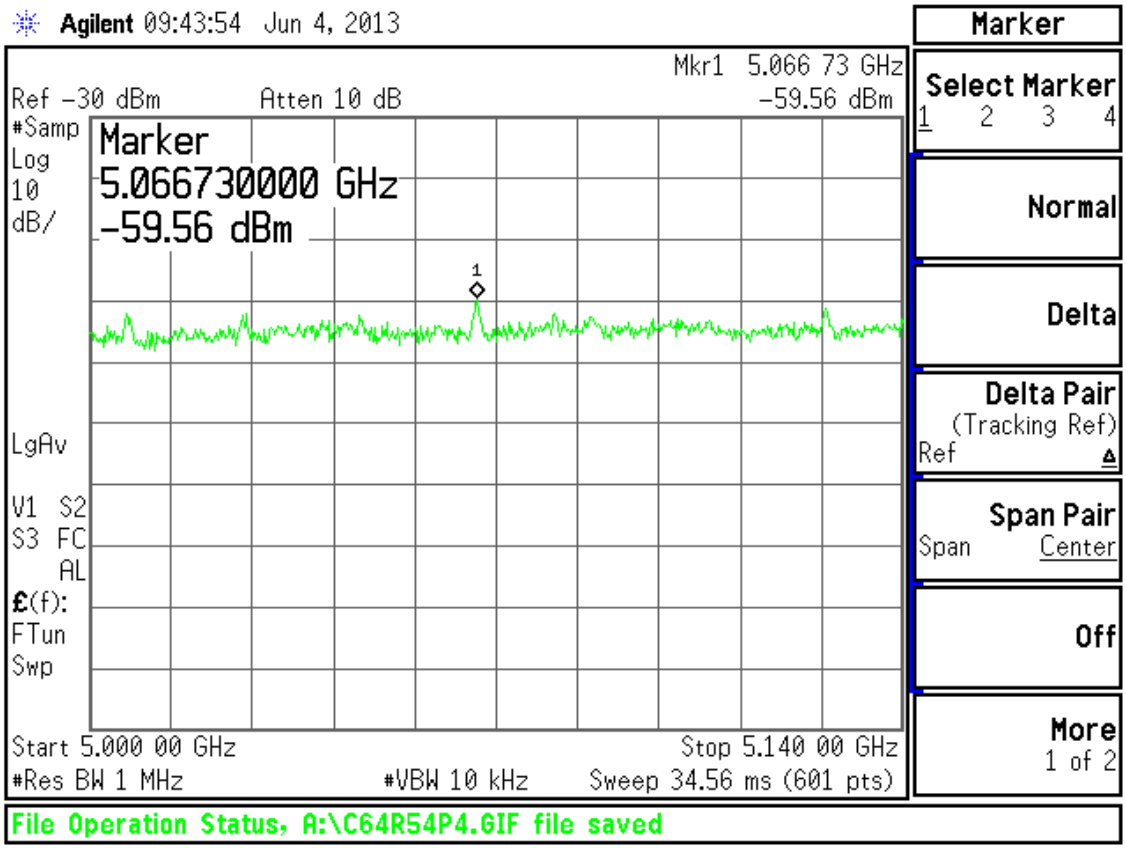
CH64 802.11a Tx Conducted Emissions @ 54Mbps



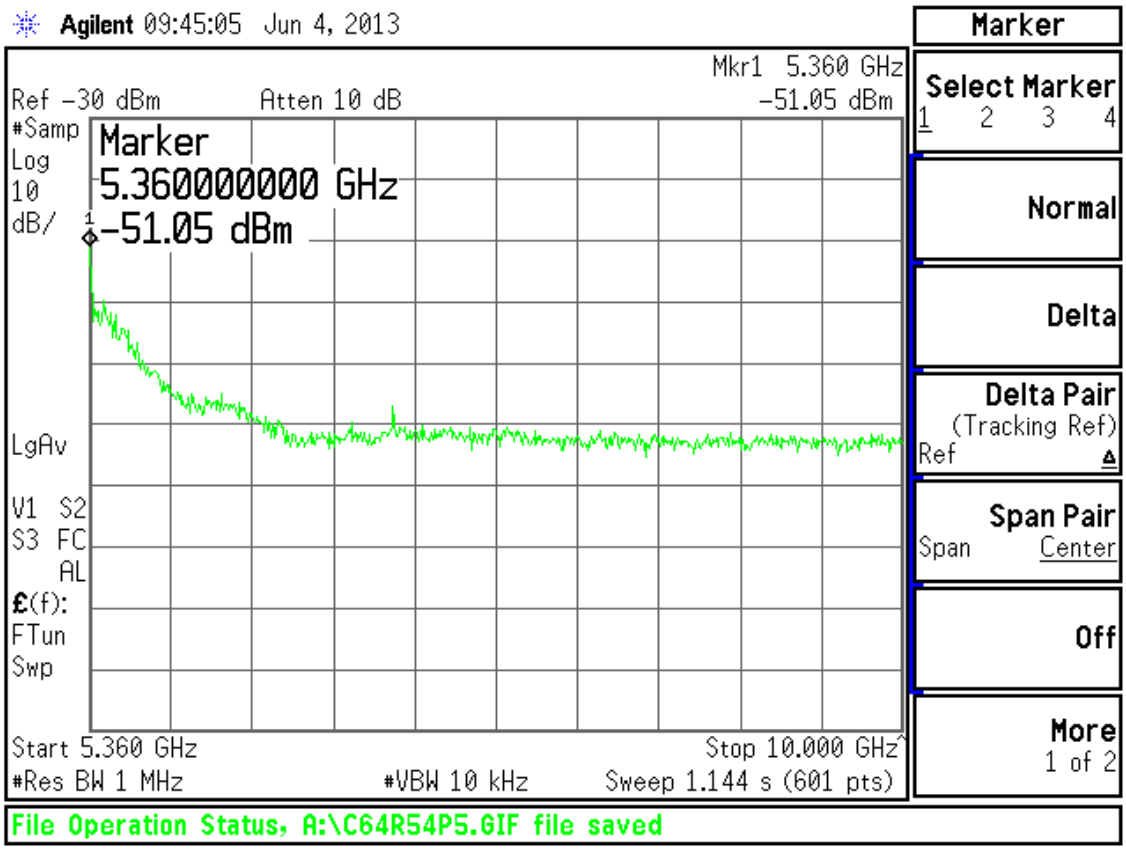
CH64 802.11a Tx Conducted Emissions @ 54Mbps



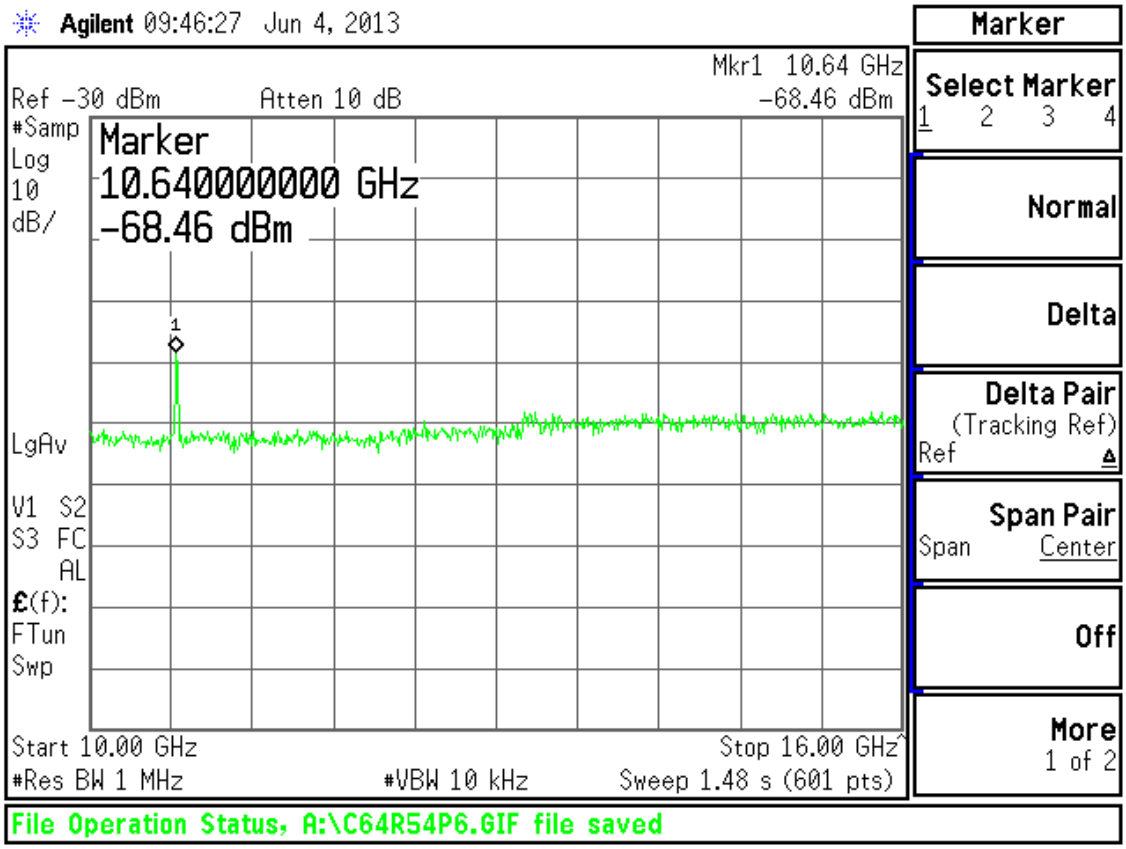
CH64 802.11a Tx Conducted Emissions @ 54Mbps



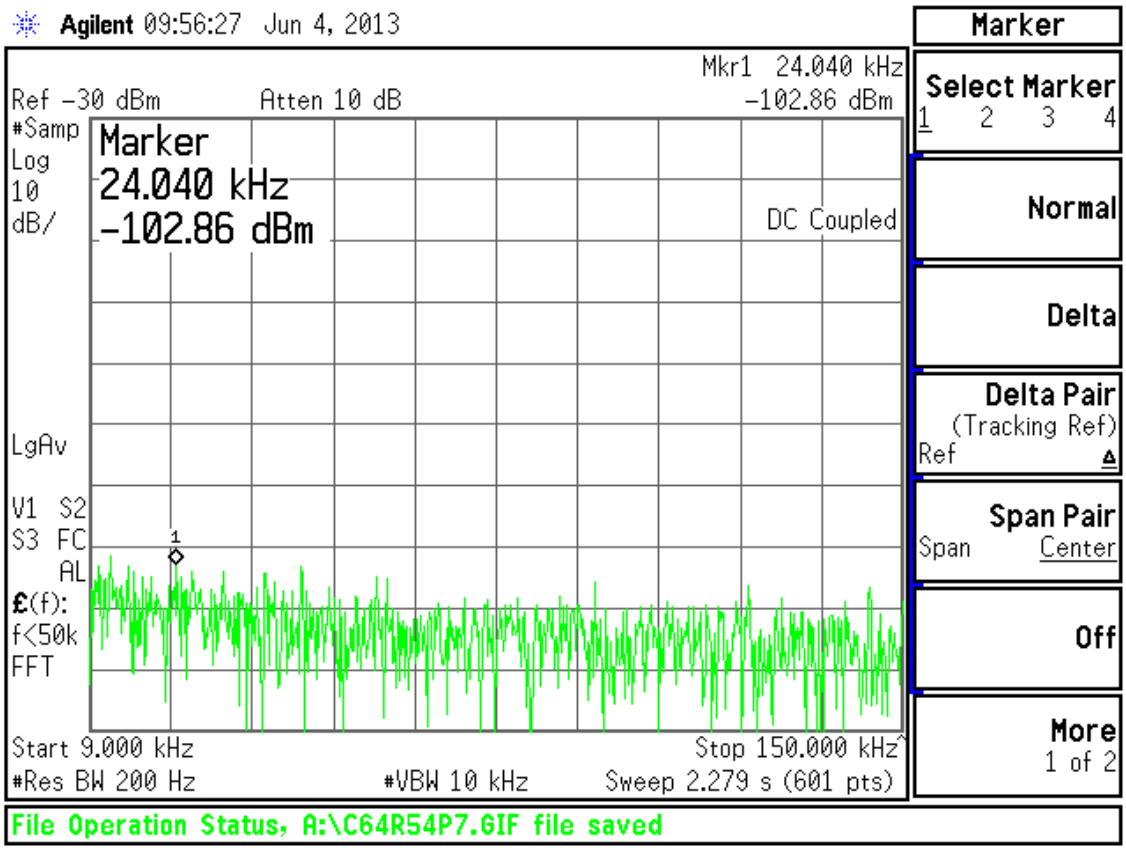
CH64 802.11a Tx Conducted Emissions @ 54Mbps



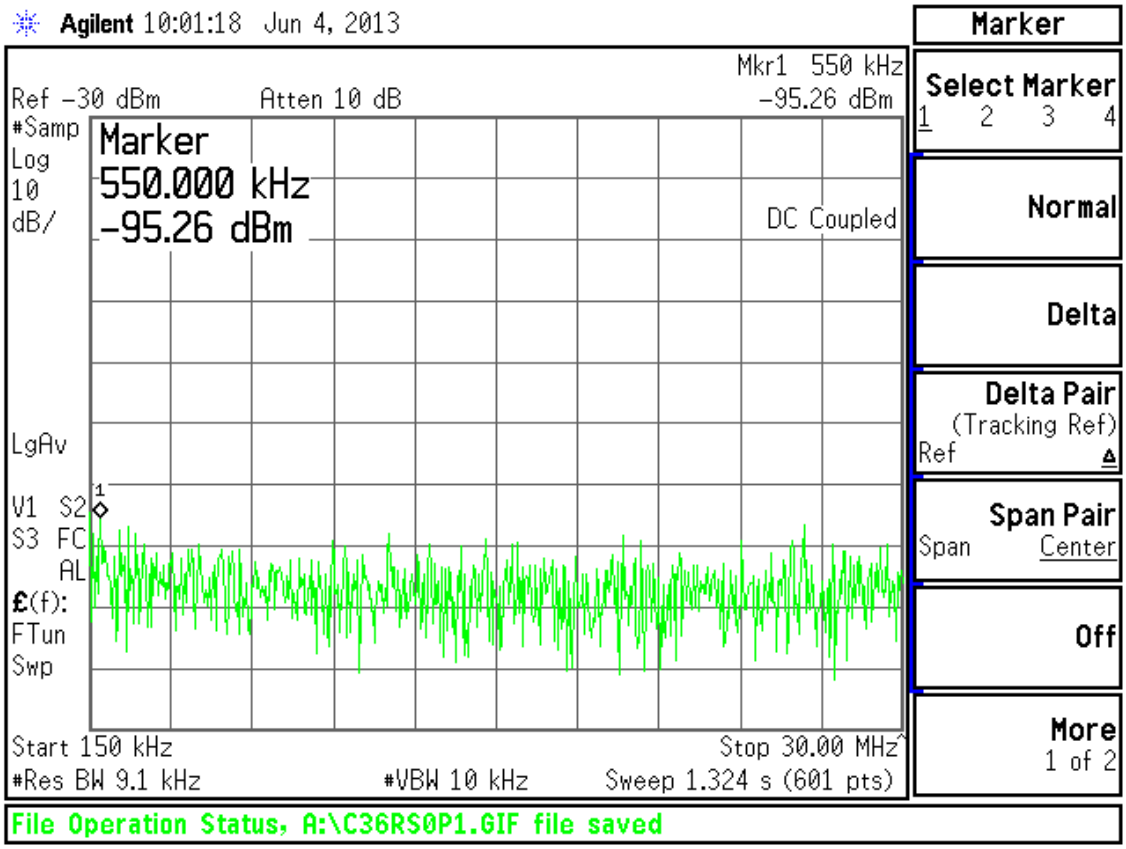
CH64 802.11a Tx Conducted Emissions @ 54Mbps



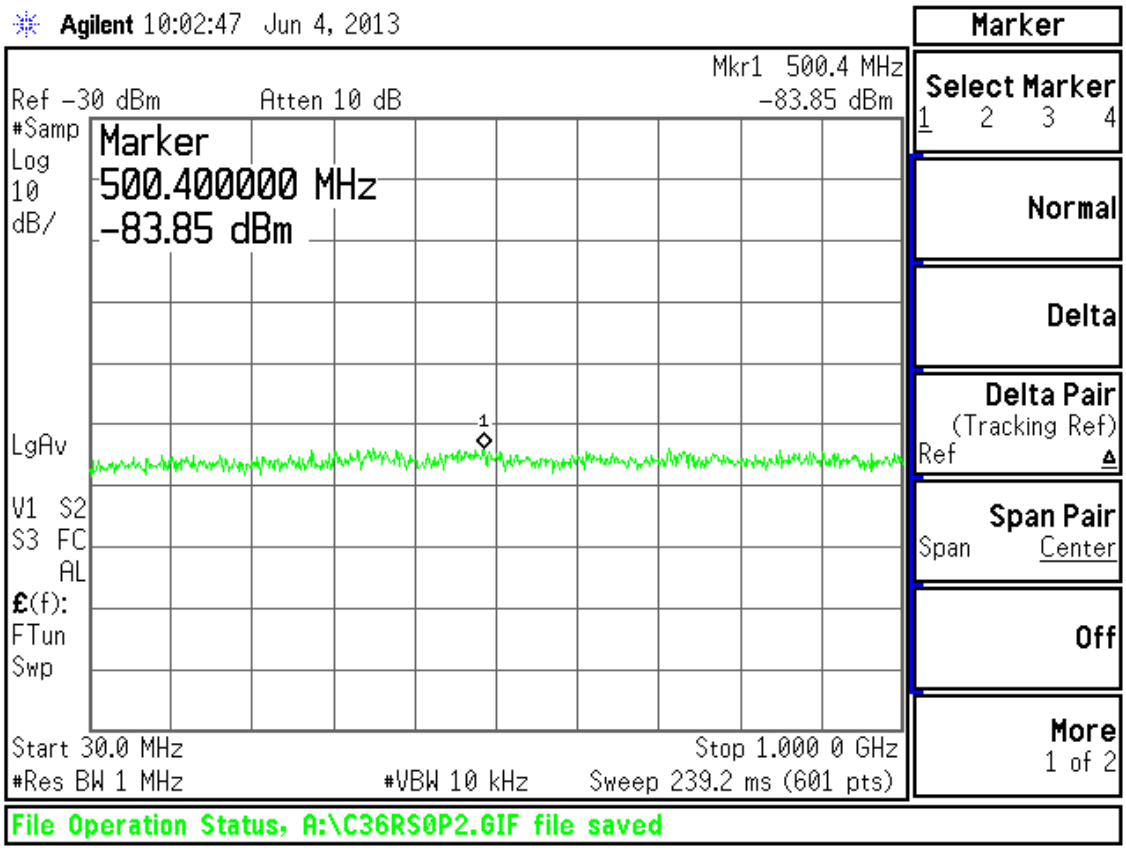
CH64 802.11a Tx Conducted Emissions @ 54Mbps



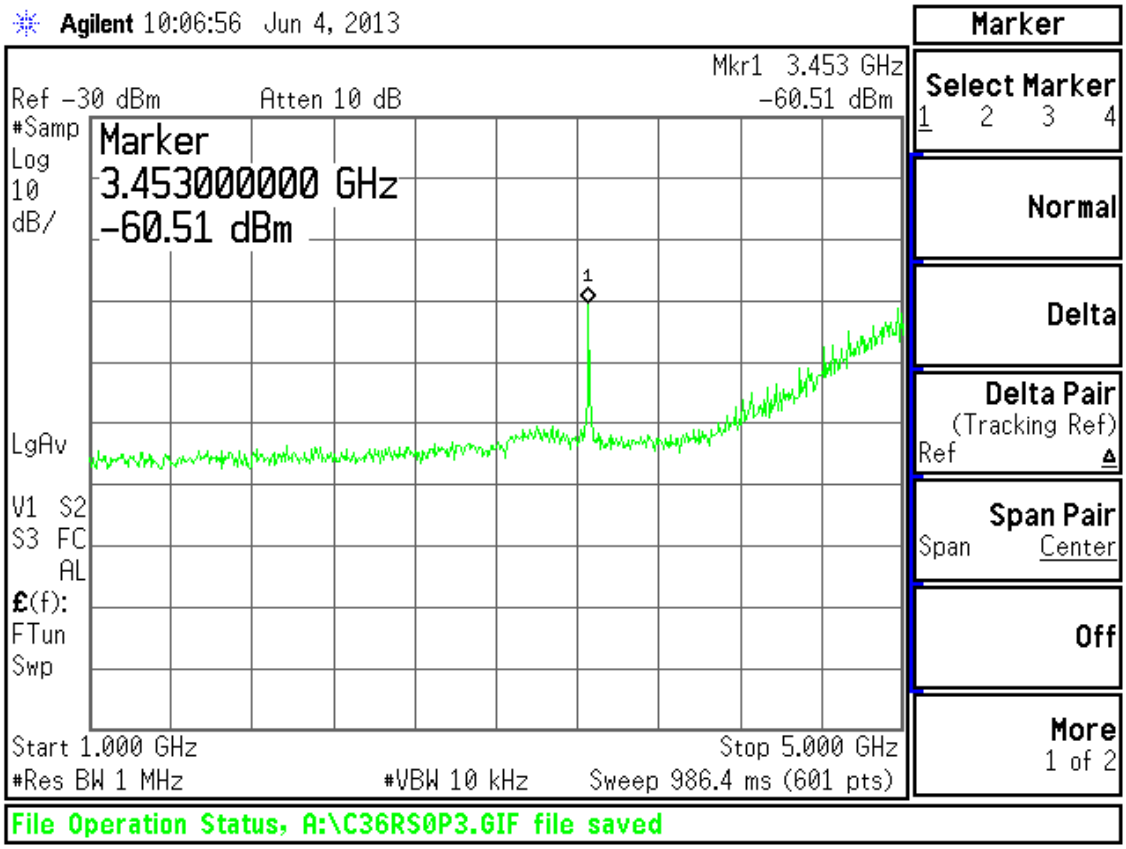
CH36 802.11n Tx Conducted Emissions (MCS0)



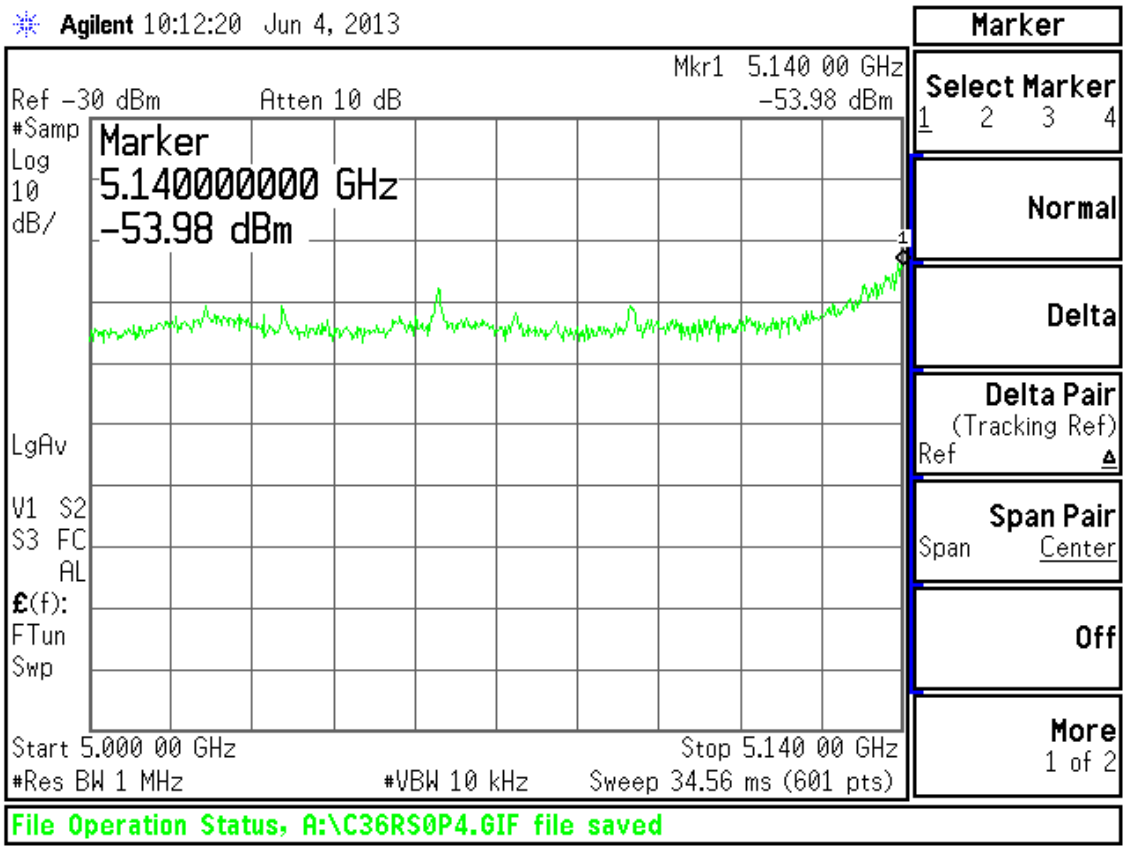
CH36 802.11n Tx Conducted Emissions (MCS0)



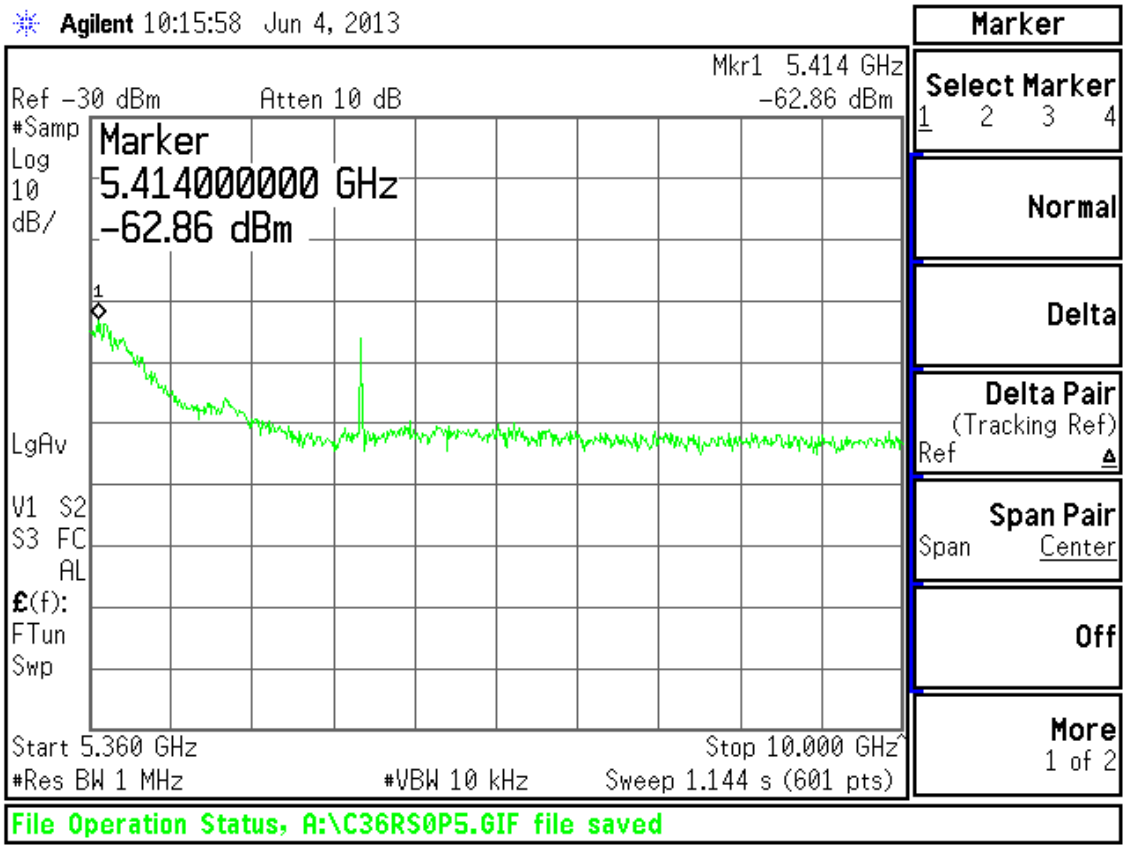
CH36 802.11n Tx Conducted Emissions (MCS0)



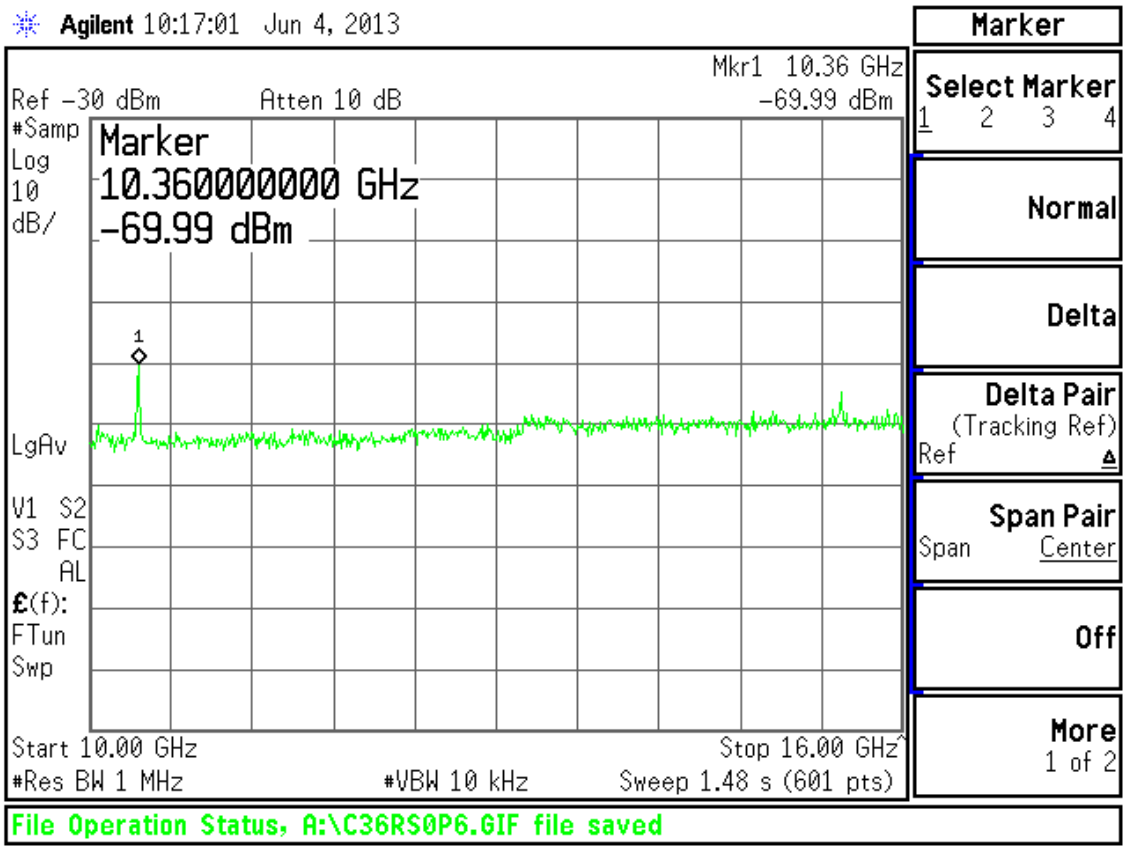
CH36 802.11n Tx Conducted Emissions (MCS0)



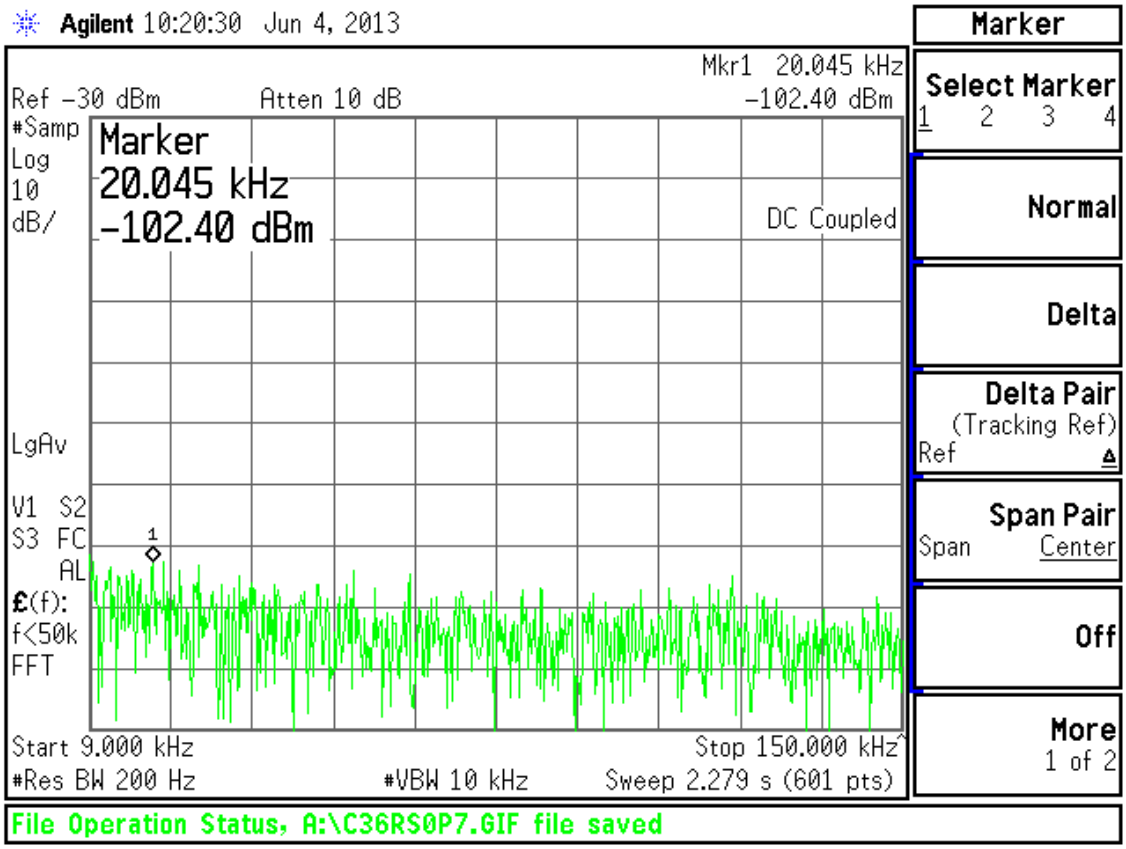
CH36 802.11n Tx Conducted Emissions (MCS0)



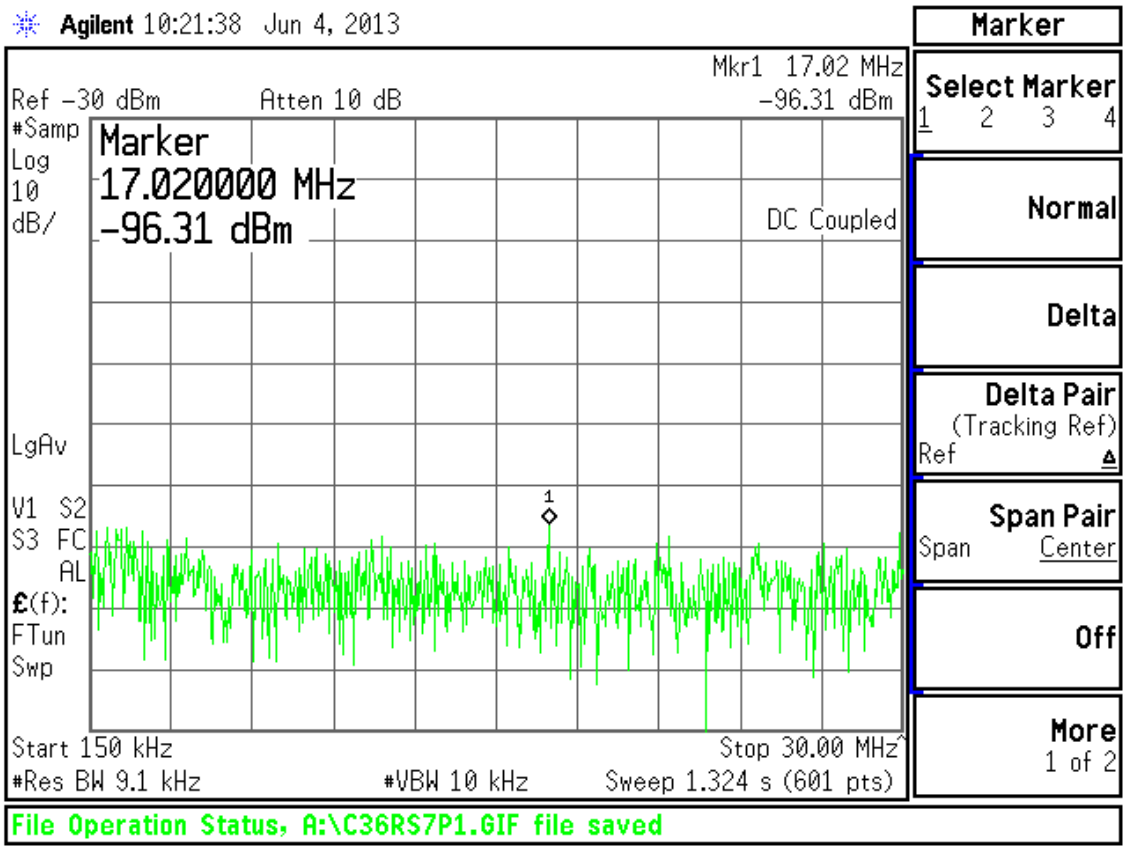
CH36 802.11n Tx Conducted Emissions (MCS0)



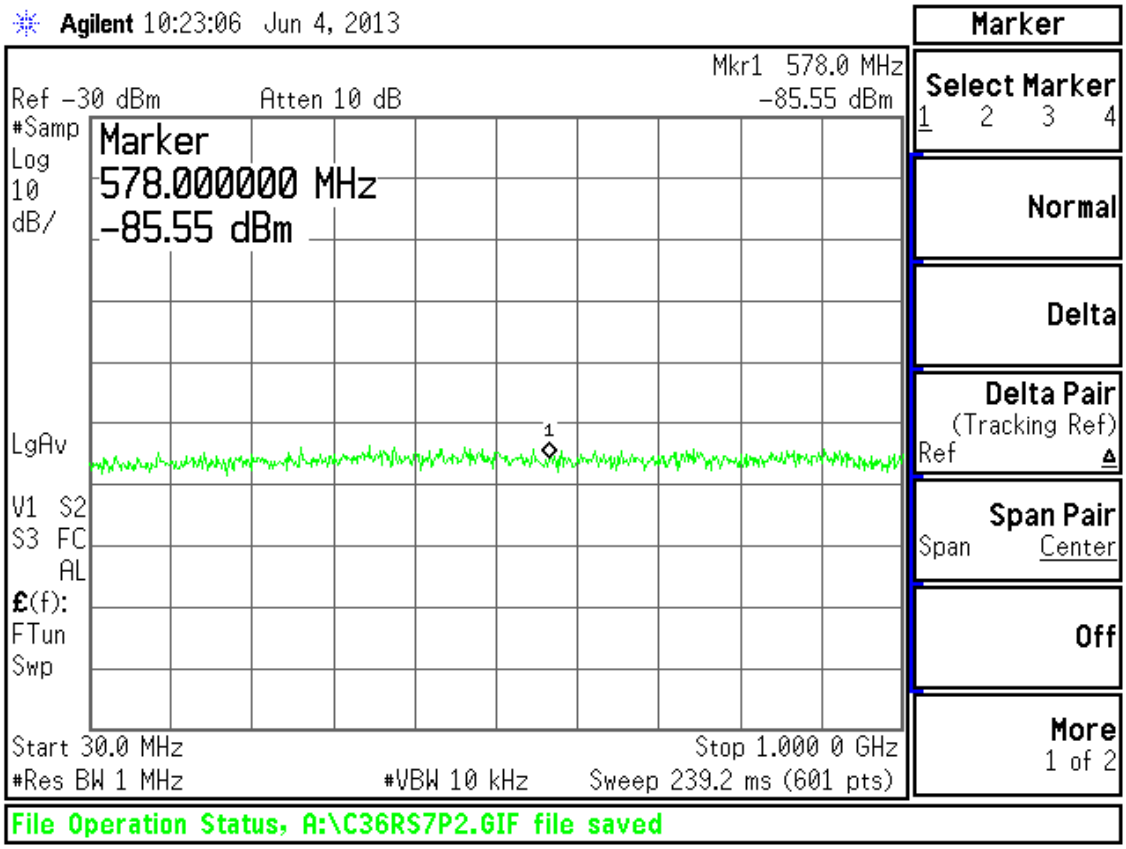
CH36 802.11n Tx Conducted Emissions (MCS0)



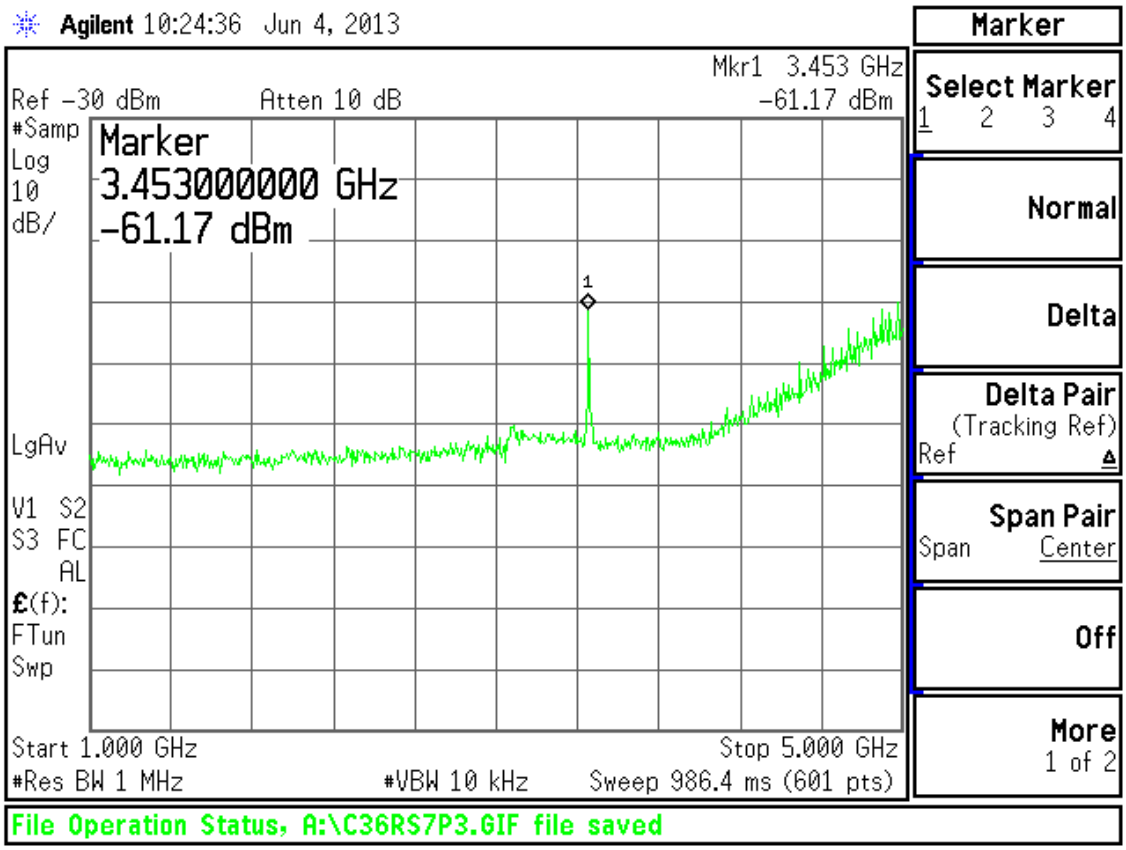
CH36 802.11n Tx Conducted Emissions (MCS7)



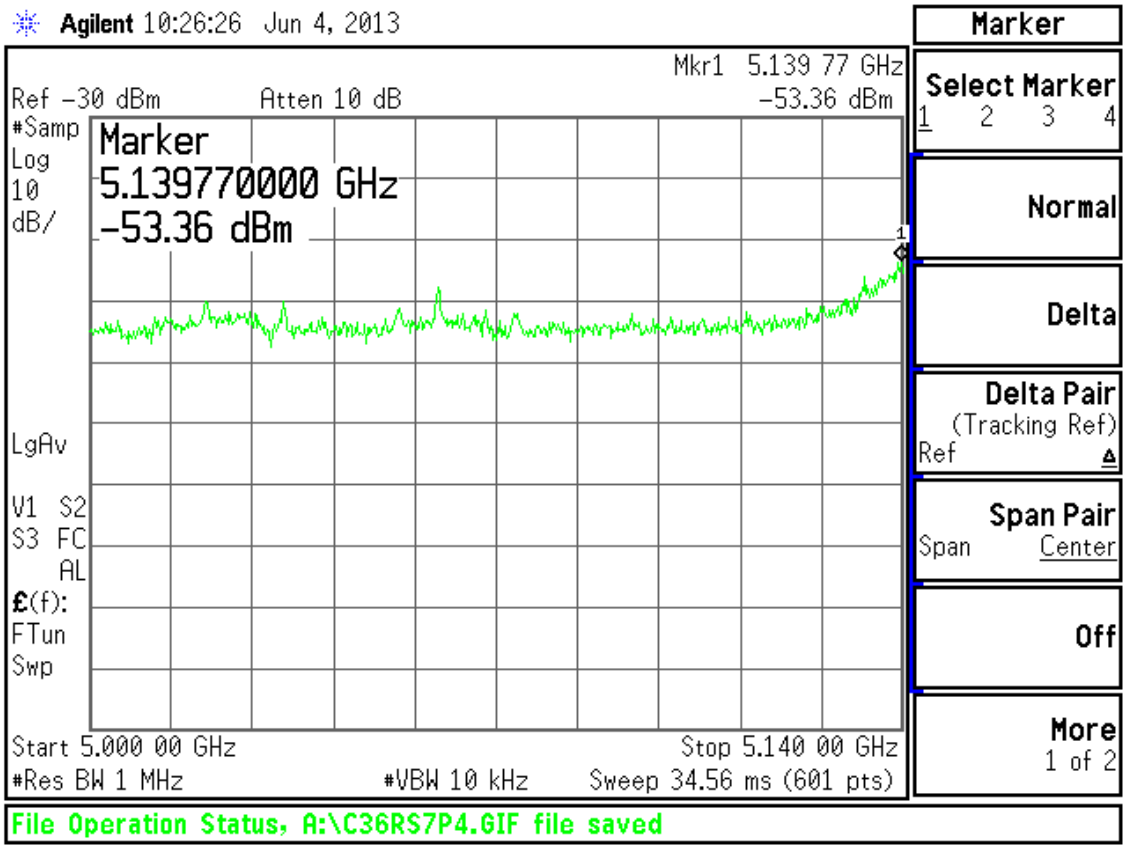
CH36 802.11n Tx Conducted Emissions (MCS7)



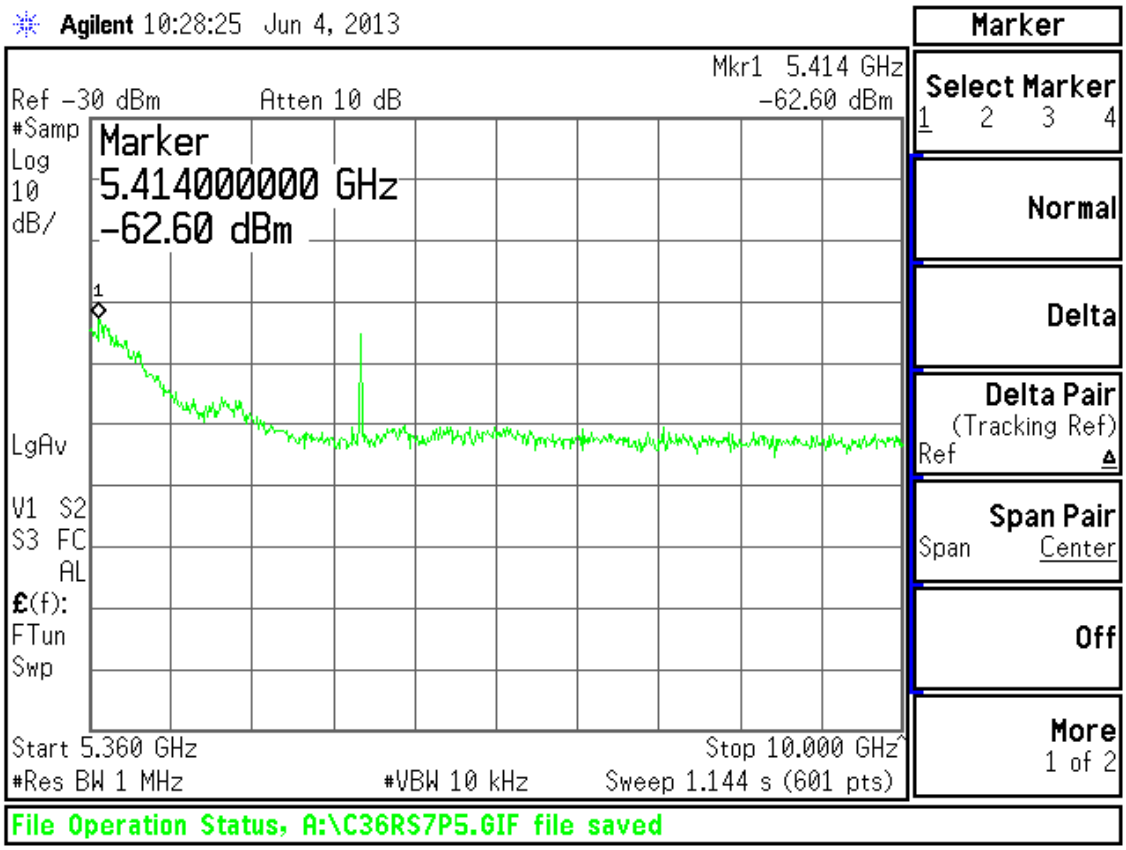
CH36 802.11n Tx Conducted Emissions (MCS7)



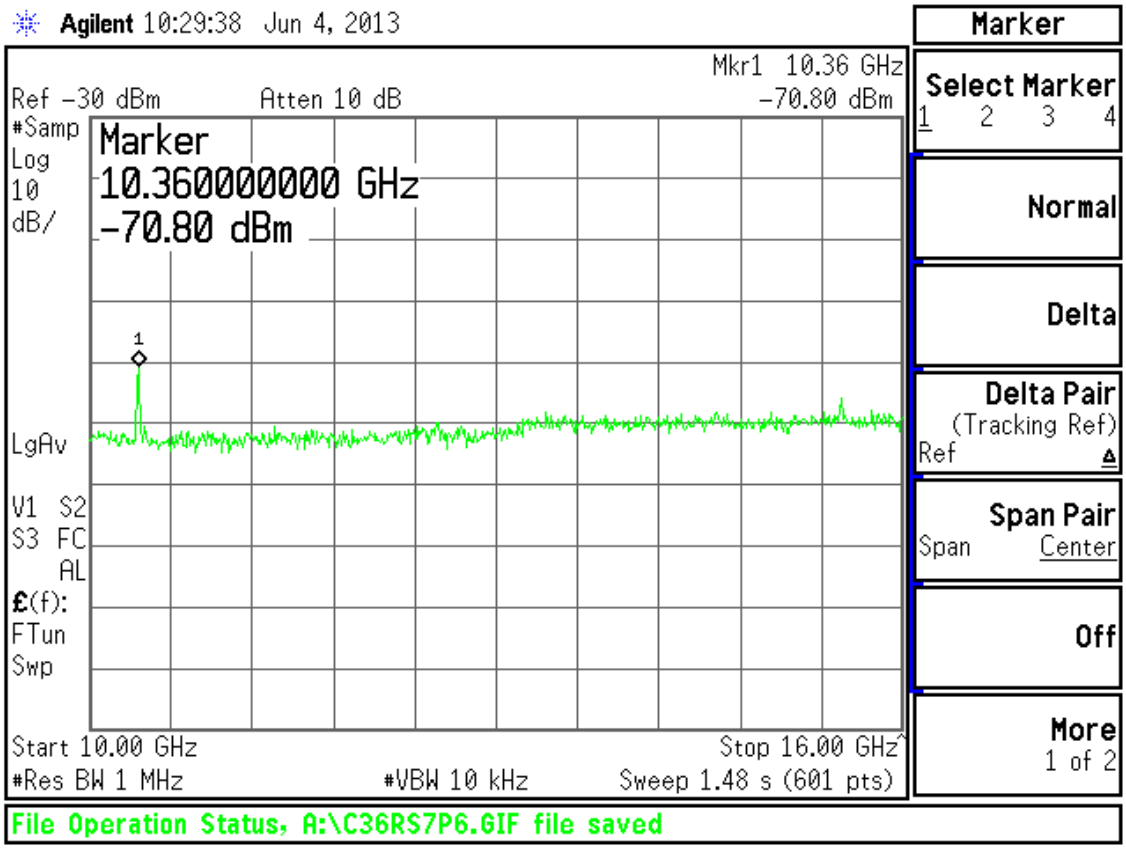
CH36 802.11n Tx Conducted Emissions (MCS7)



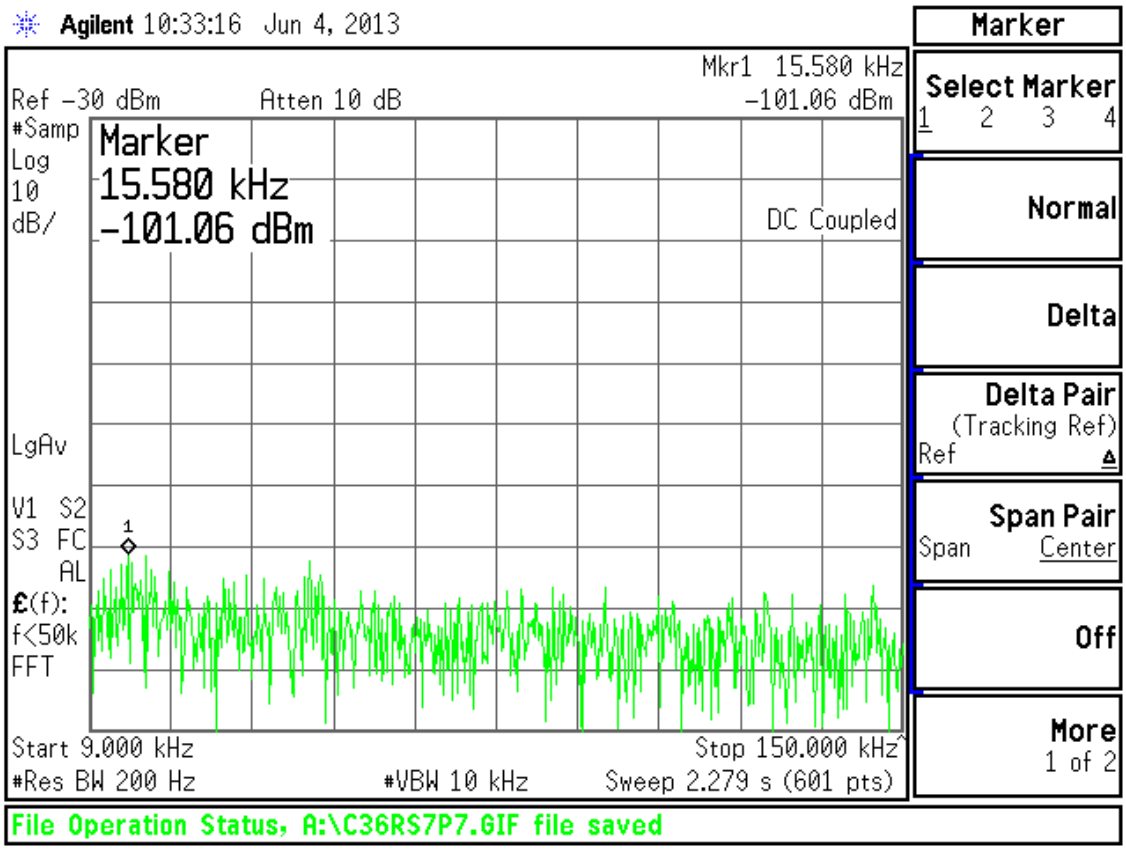
CH36 802.11n Tx Conducted Emissions (MCS7)



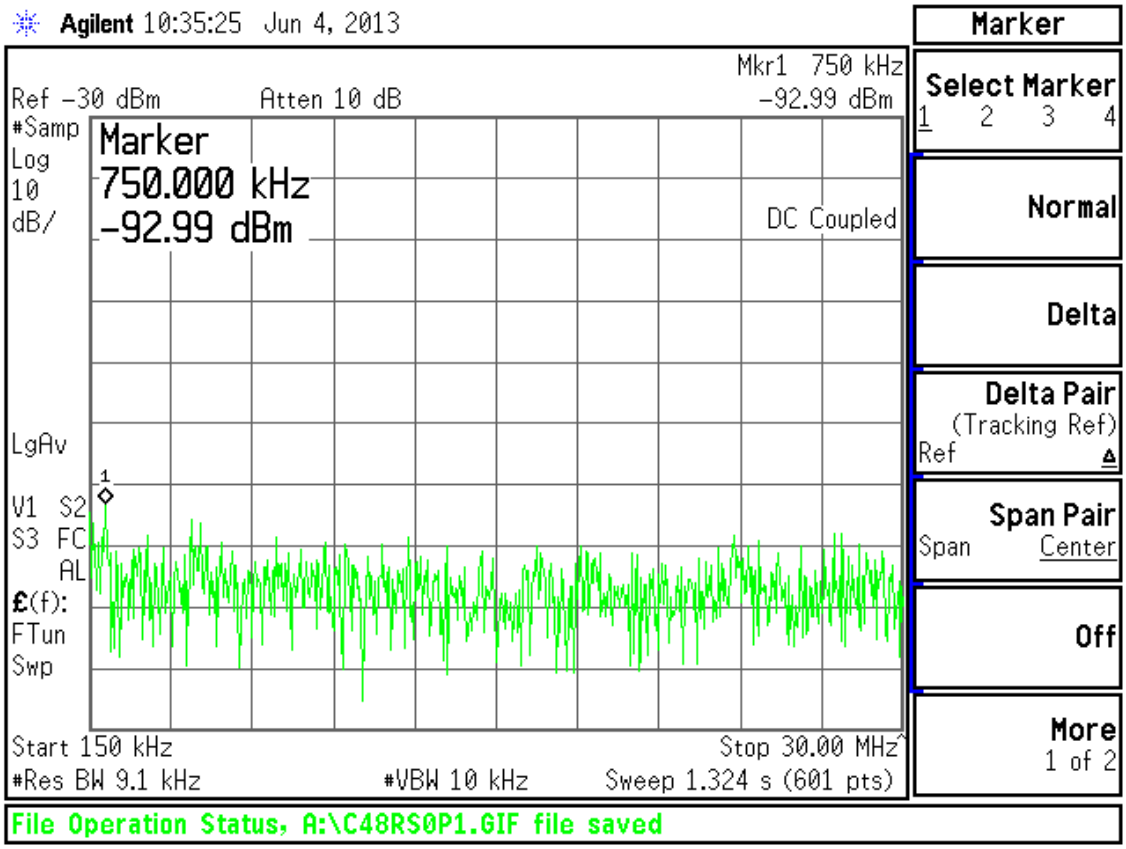
CH36 802.11n Tx Conducted Emissions (MCS7)



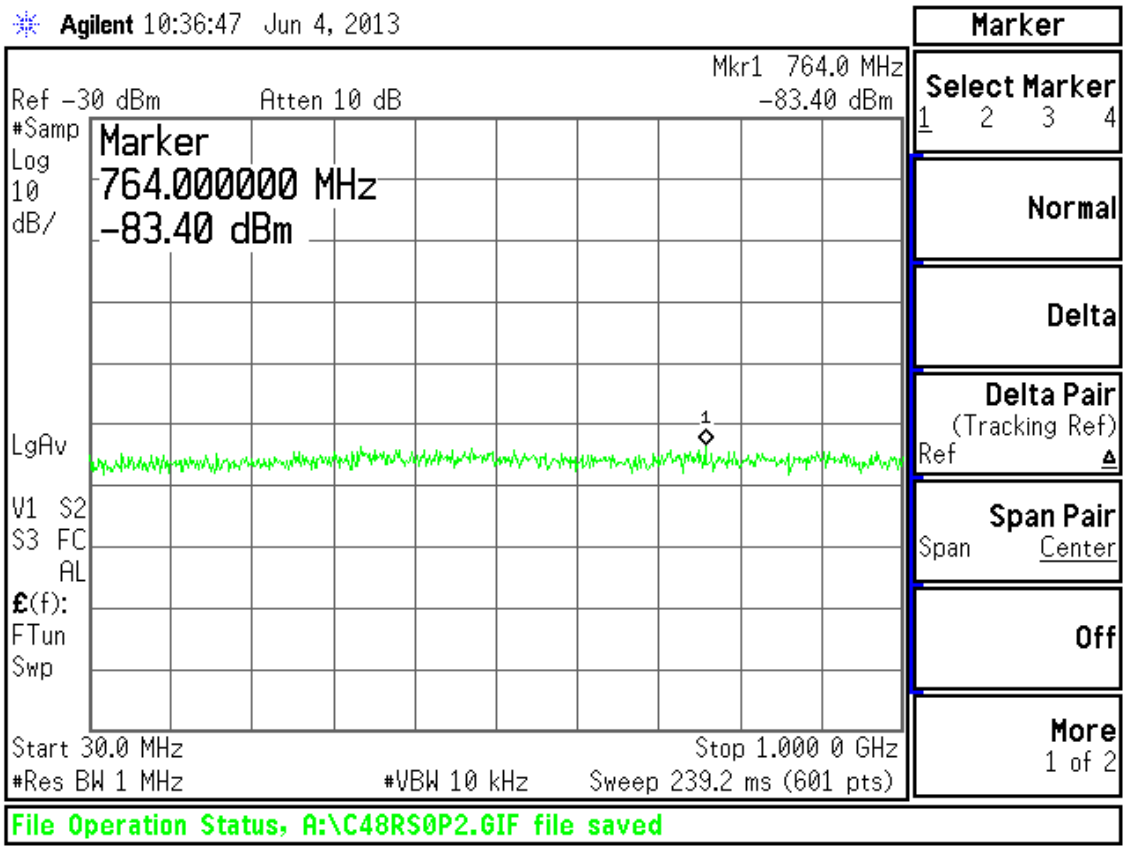
CH36 802.11n Tx Conducted Emissions (MCS7)



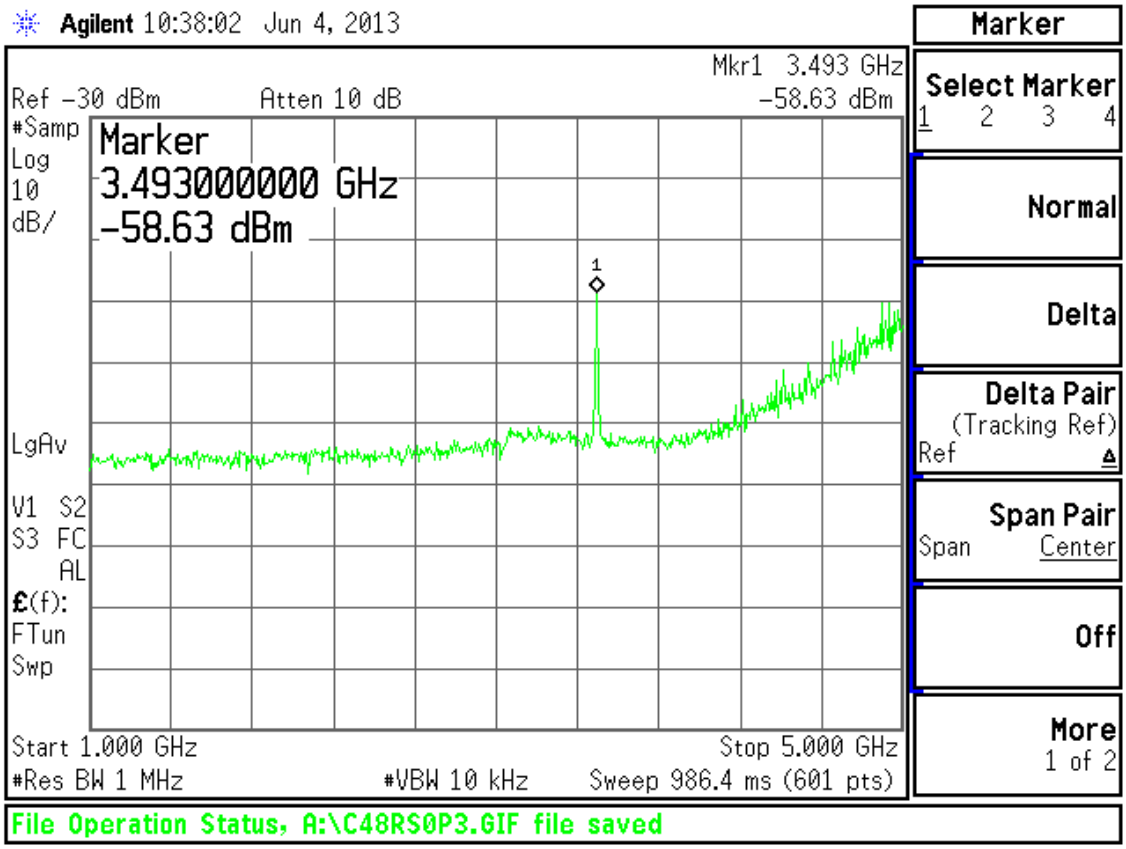
CH48 802.11n Tx Conducted Emissions (MCS0)



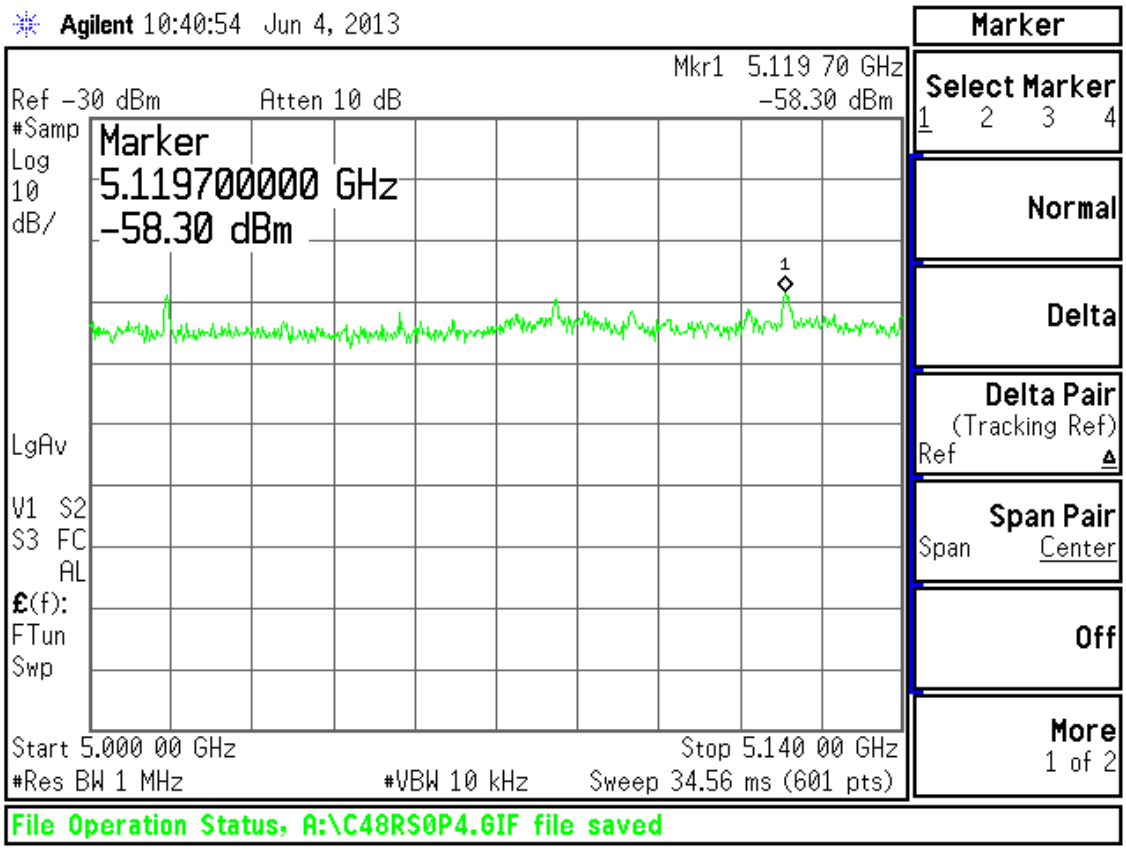
CH48 802.11n Tx Conducted Emissions (MCS0)



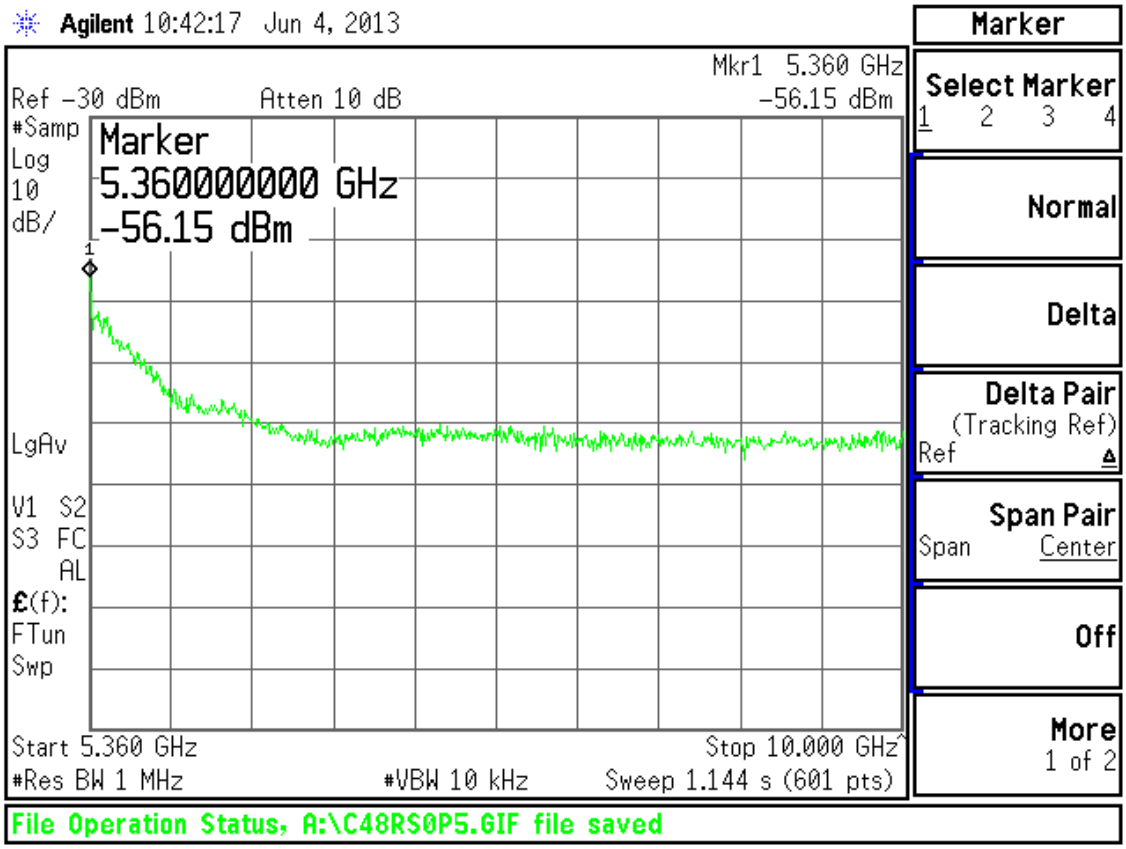
CH48 802.11n Tx Conducted Emissions (MCS0)



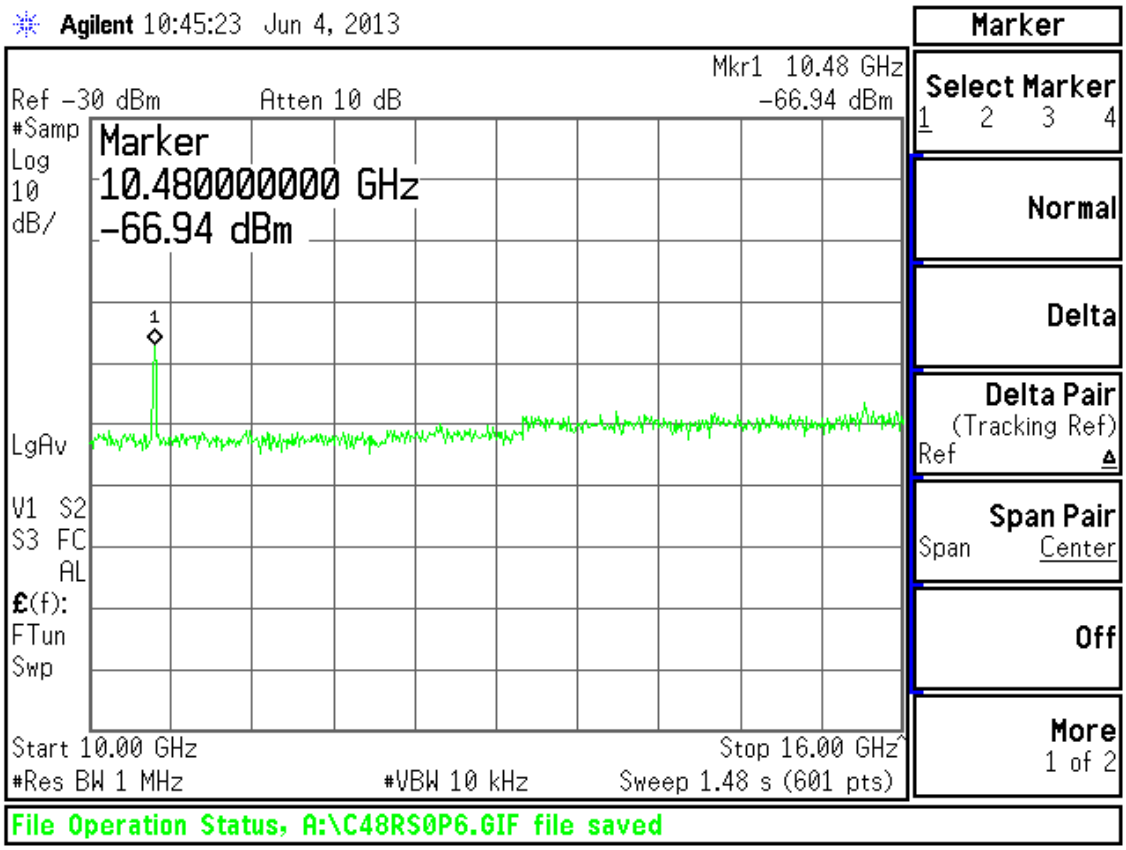
CH48 802.11n Tx Conducted Emissions (MCS0)



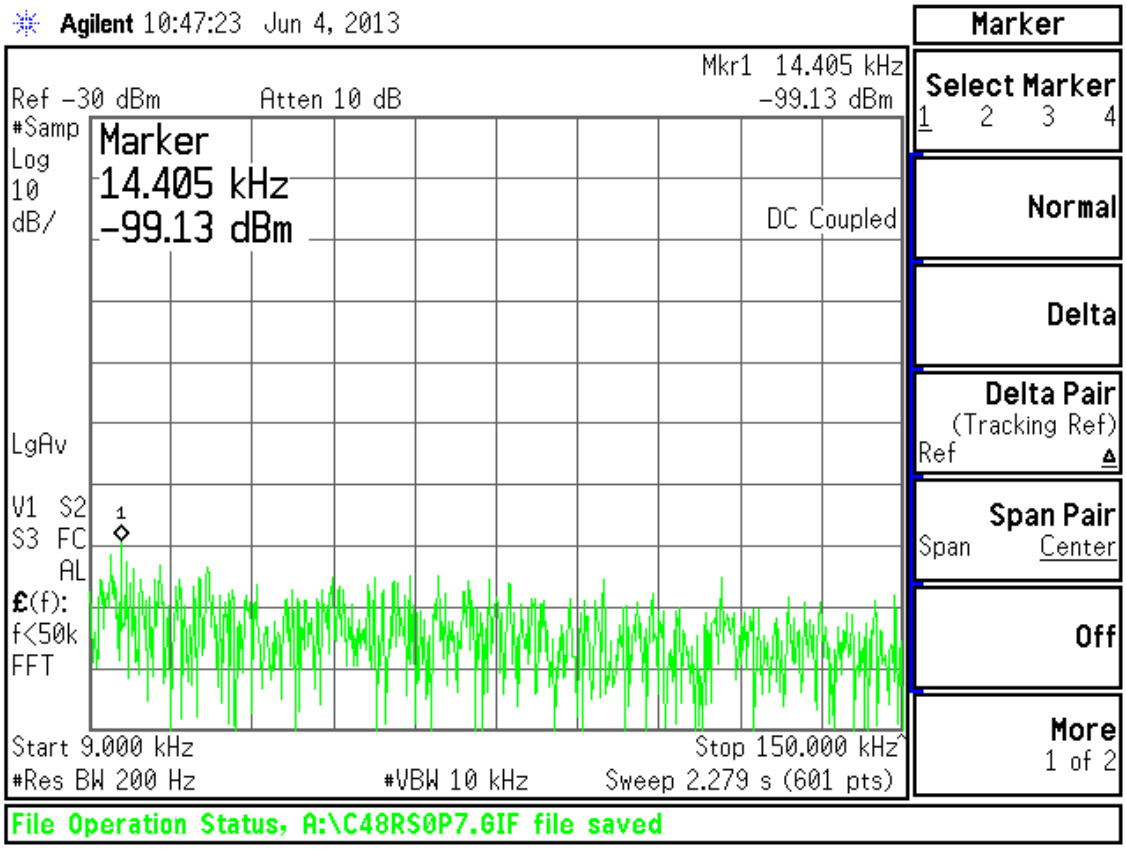
CH48 802.11n Tx Conducted Emissions (MCS0)



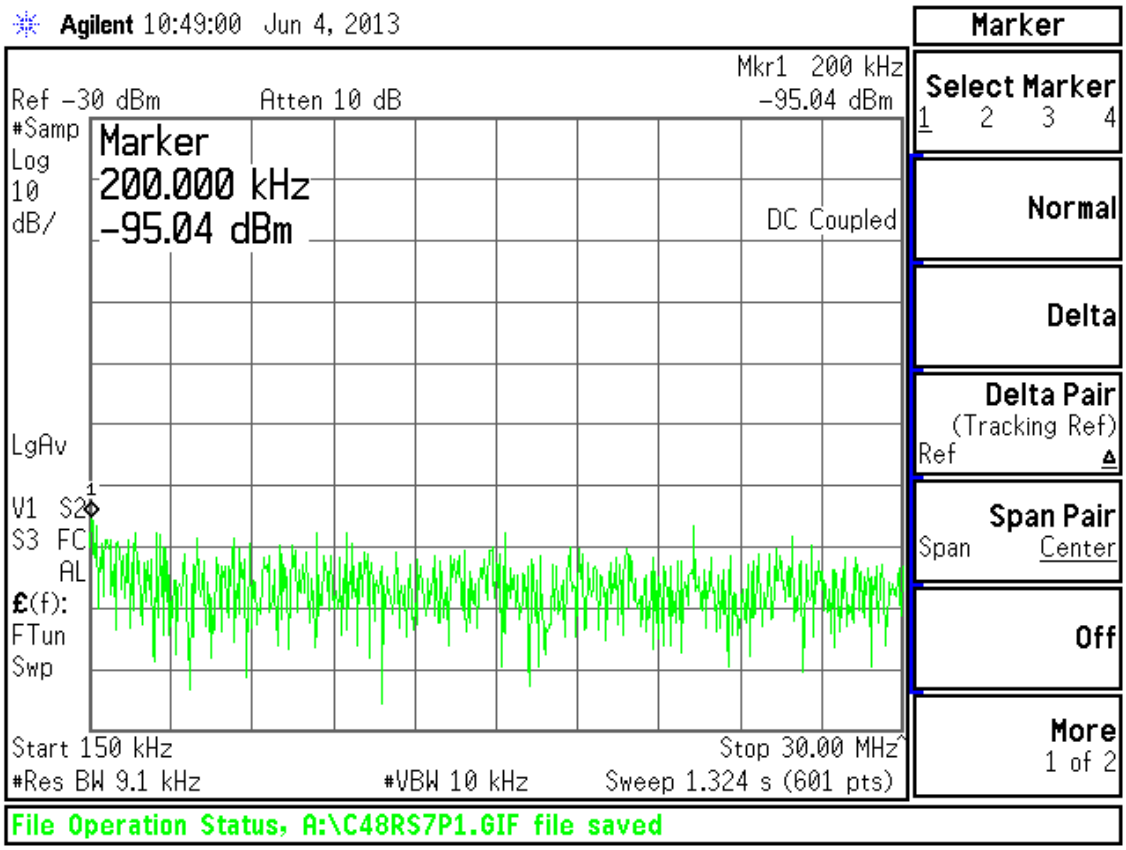
CH48 802.11n Tx Conducted Emissions (MCS0)



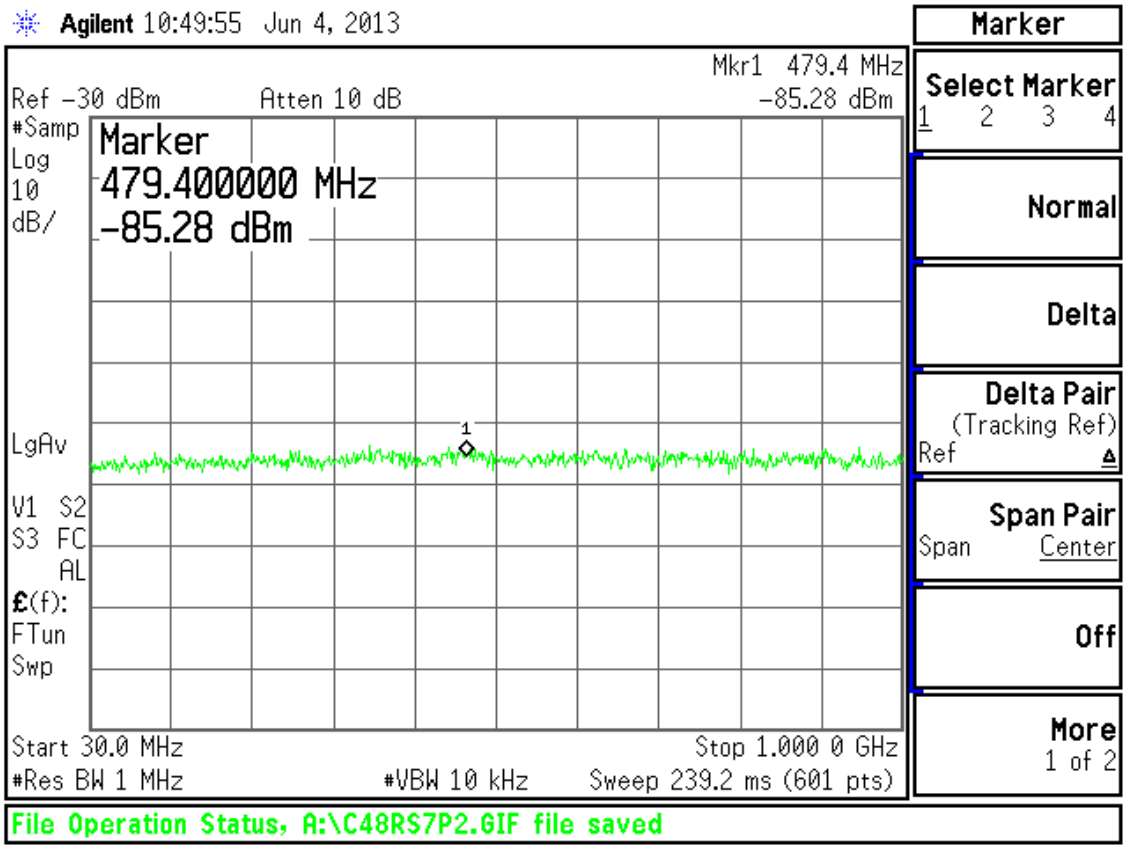
CH48 802.11n Tx Conducted Emissions (MCS0)



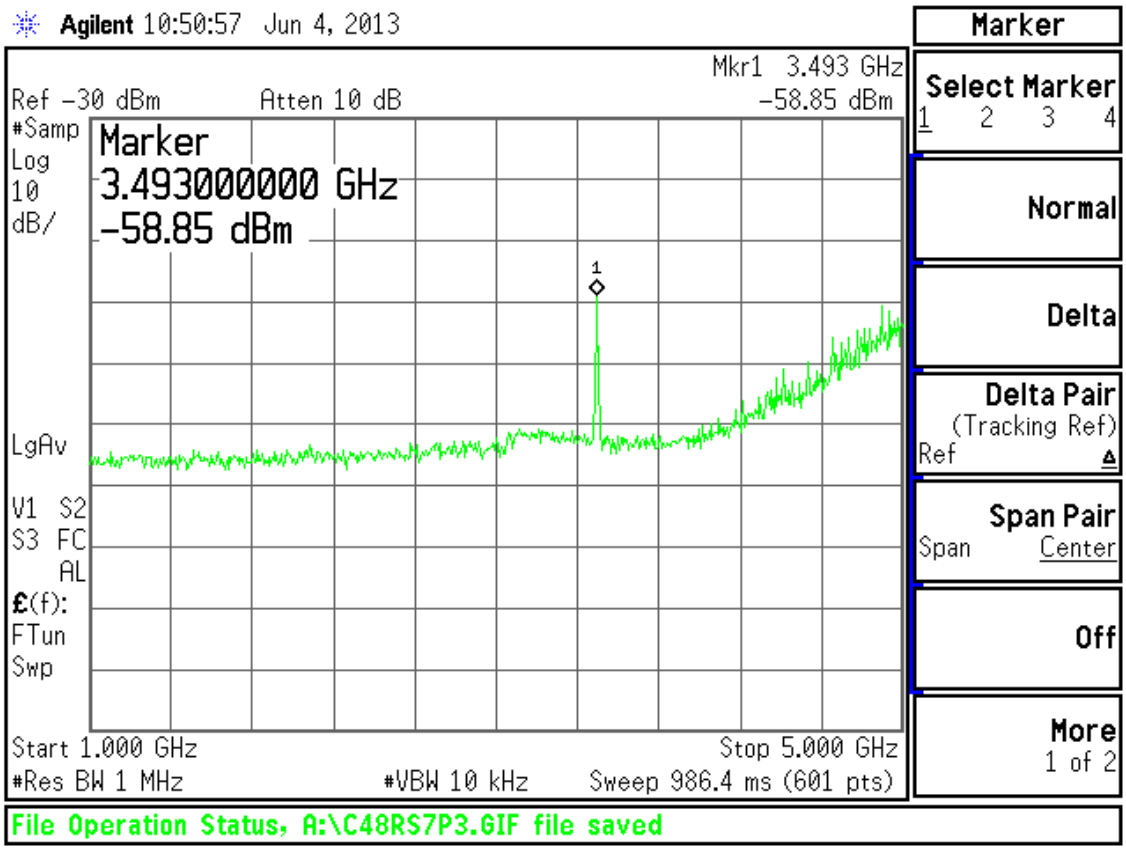
CH48 802.11n Tx Conducted Emissions (MCS7)



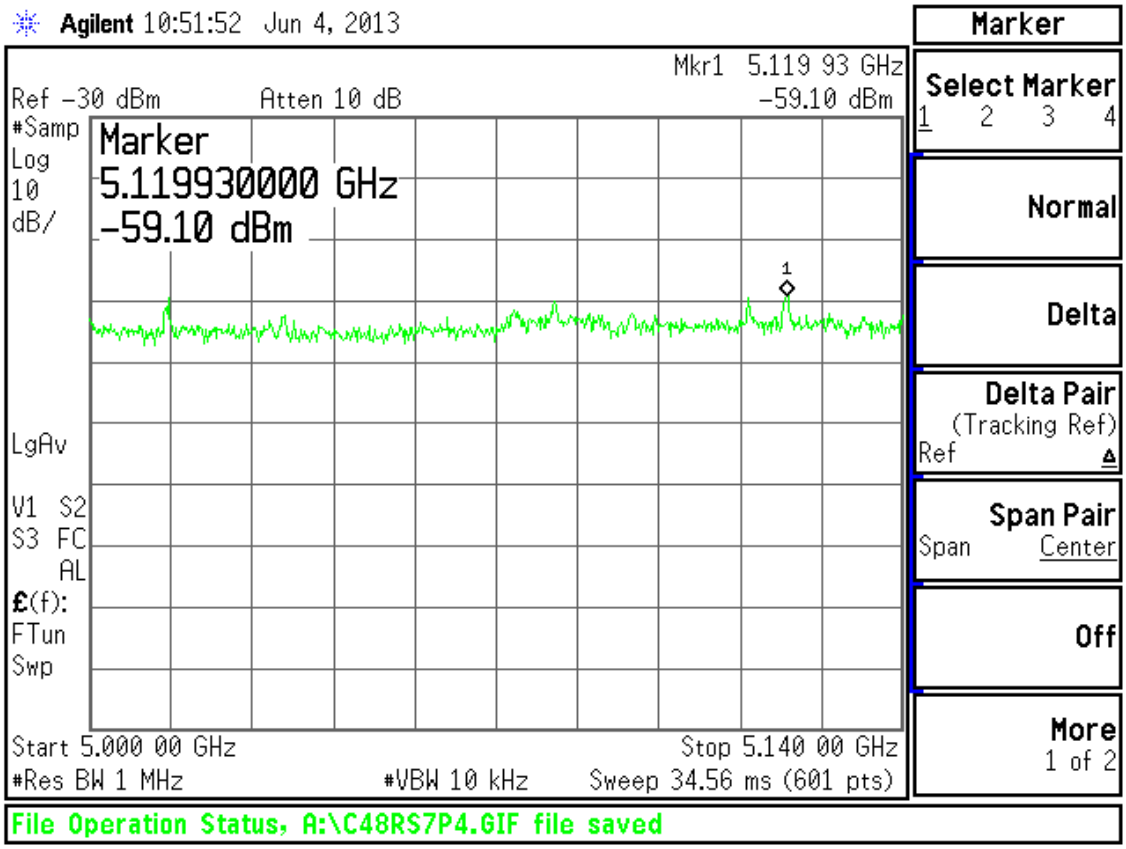
CH48 802.11n Tx Conducted Emissions (MCS7)



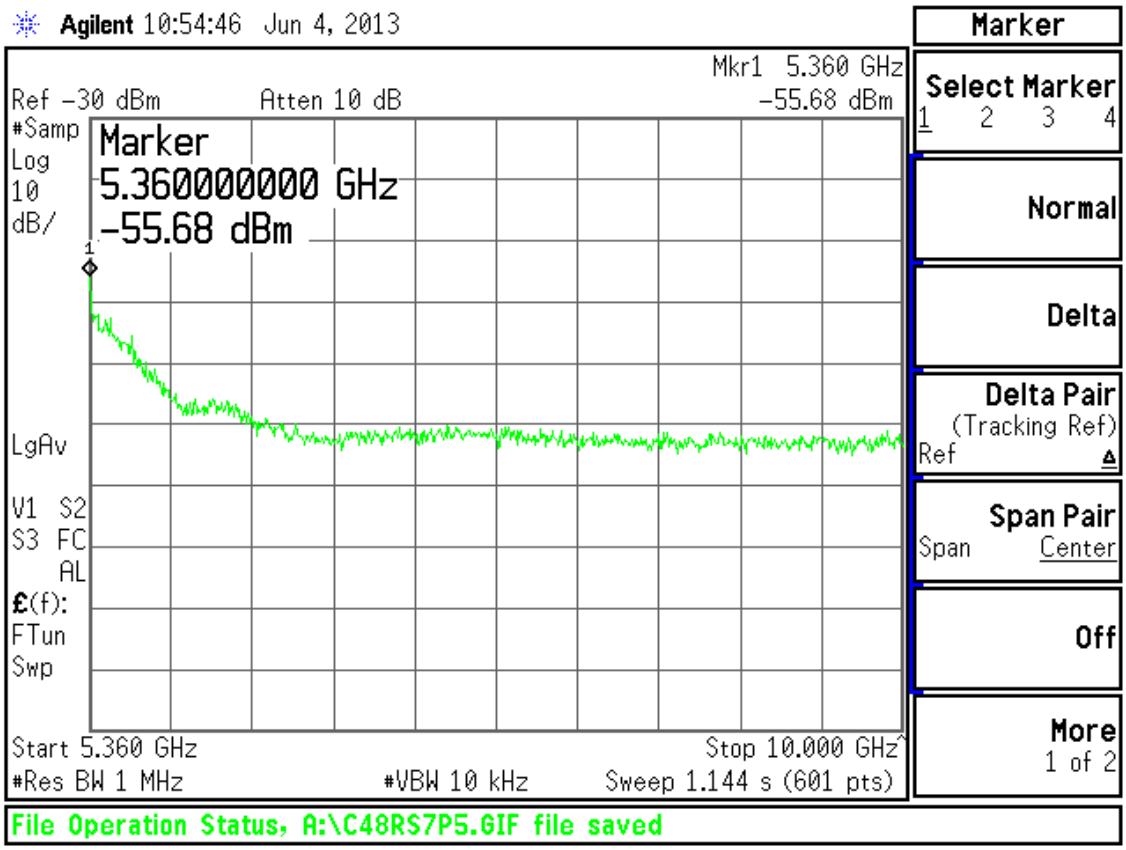
CH48 802.11n Tx Conducted Emissions (MCS7)



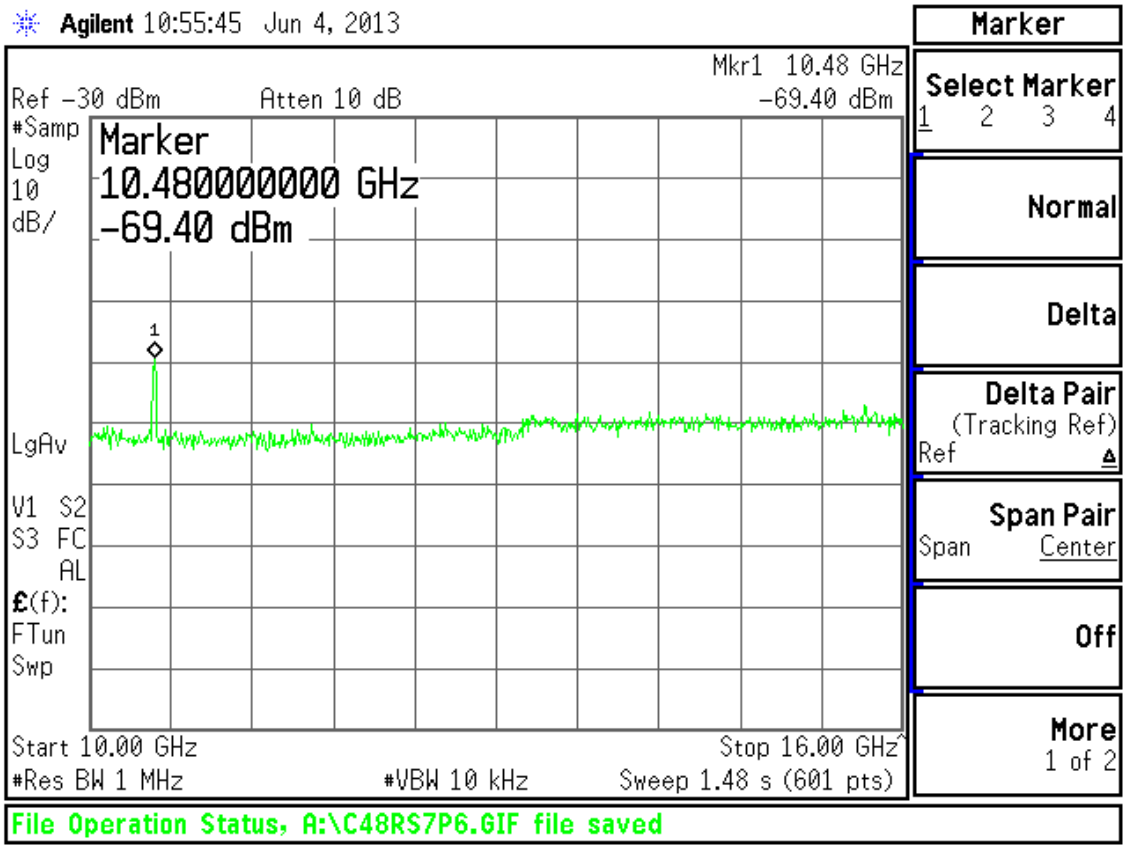
CH48 802.11n Tx Conducted Emissions (MCS7)



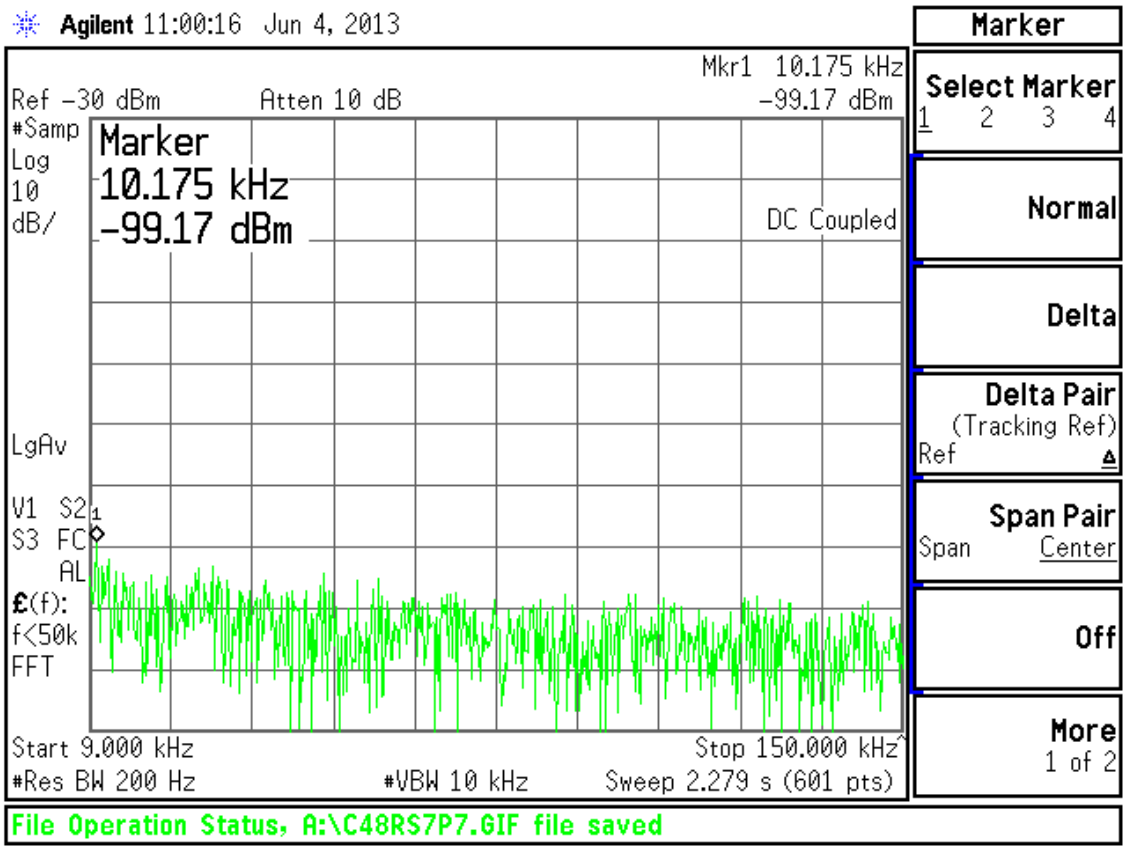
CH48 802.11n Tx Conducted Emissions (MCS7)



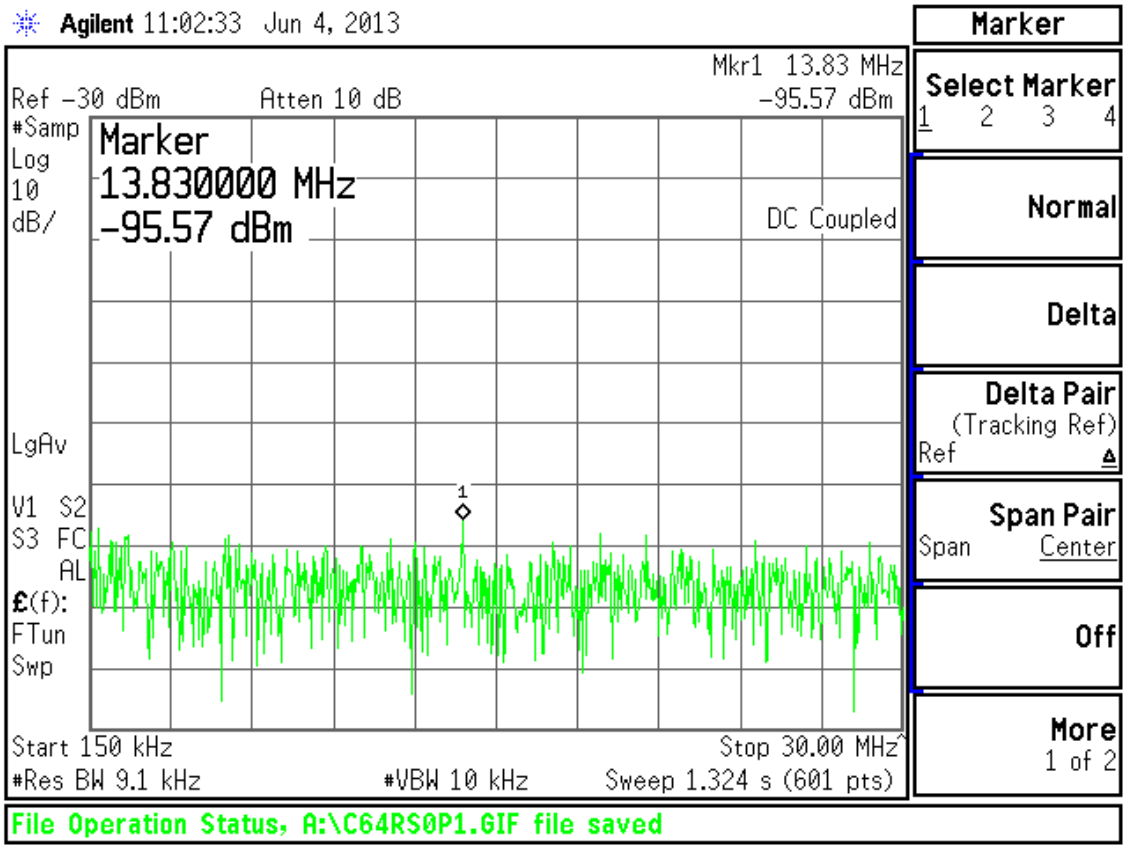
CH48 802.11n Tx Conducted Emissions (MCS7)



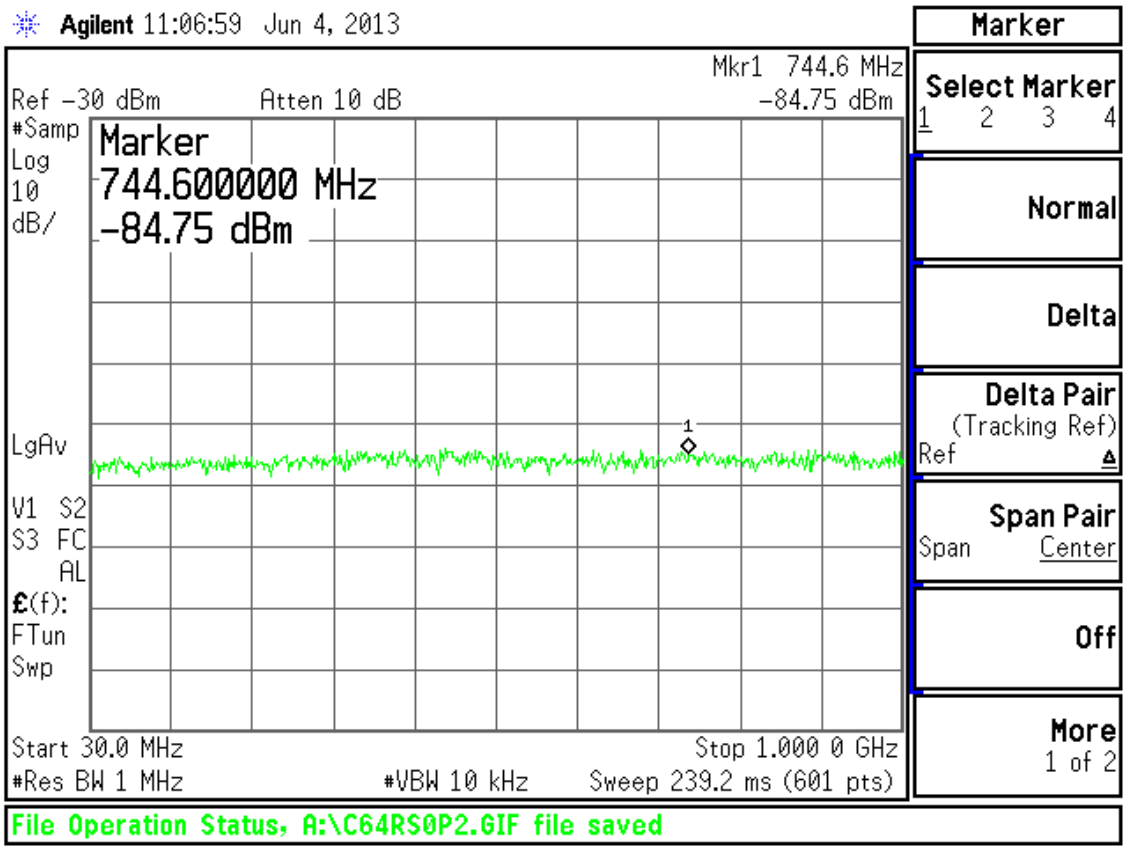
CH48 802.11n Tx Conducted Emissions (MCS7)



CH64 802.11n Tx Conducted Emissions (MCS0)



CH64 802.11n Tx Conducted Emissions (MCS0)



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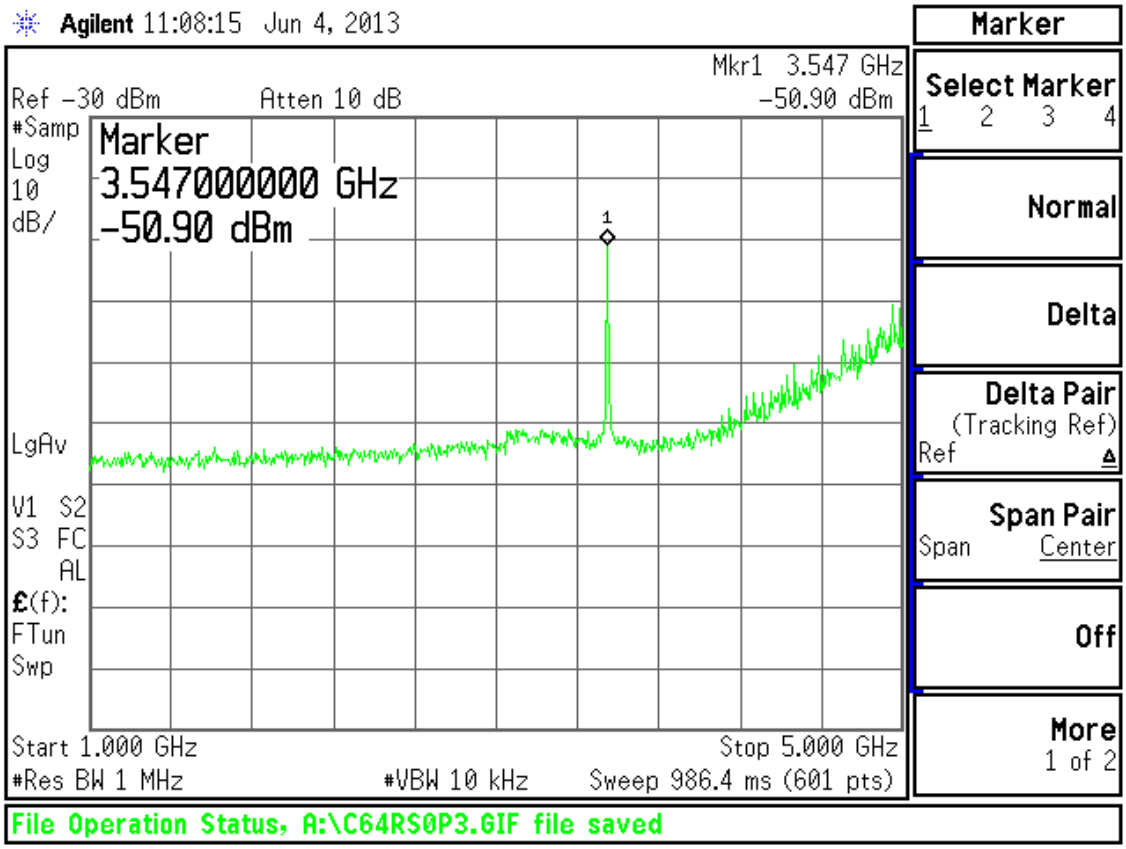
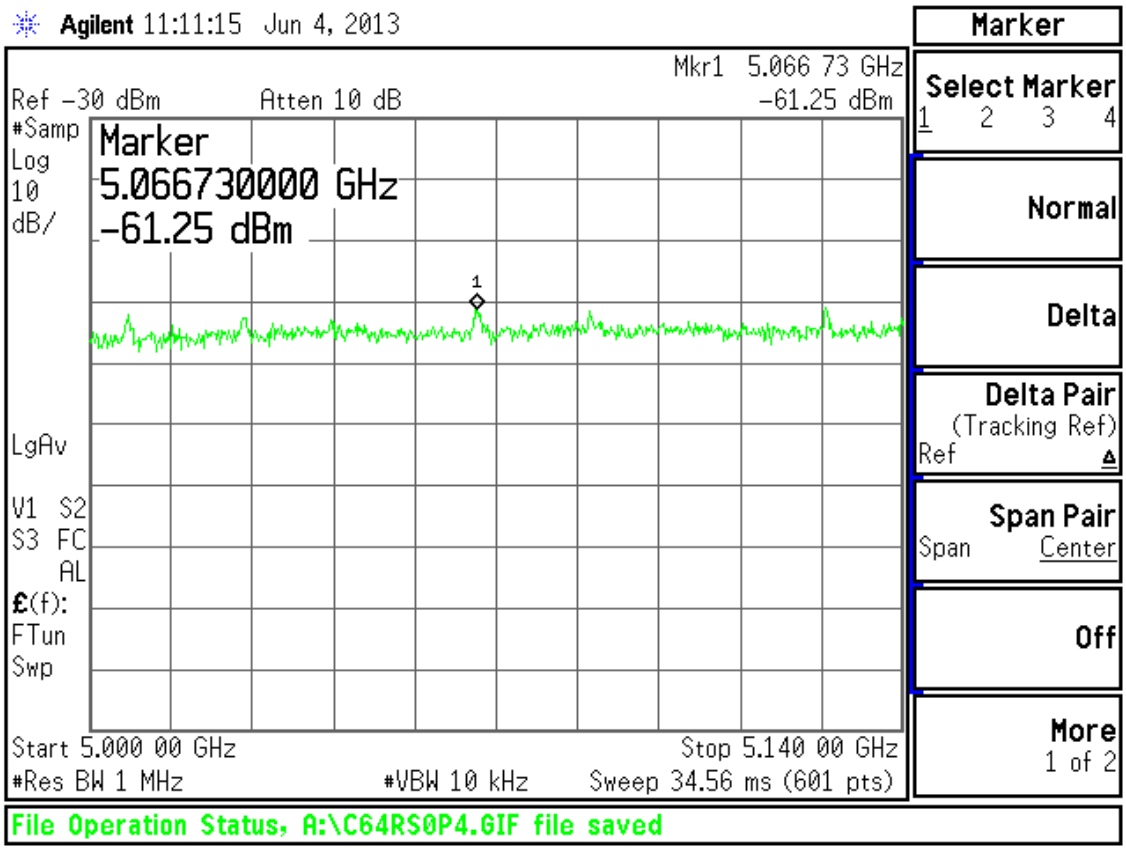
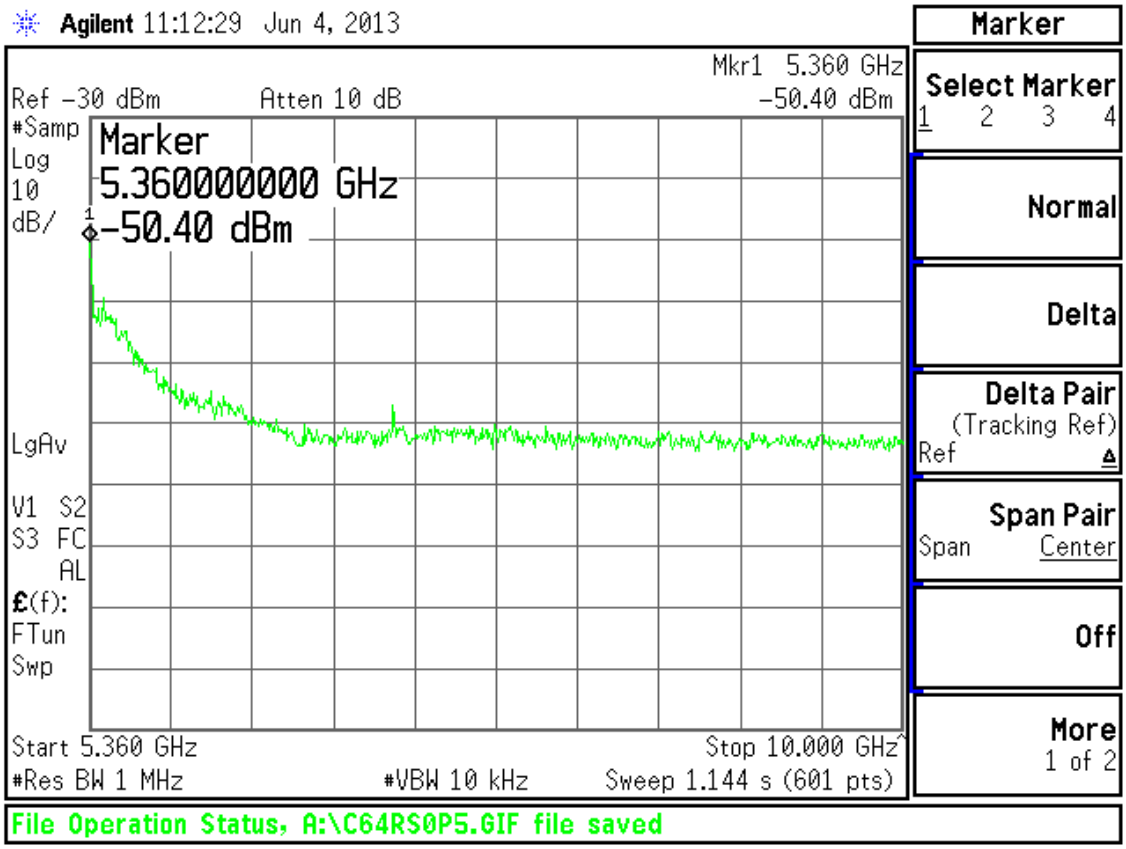


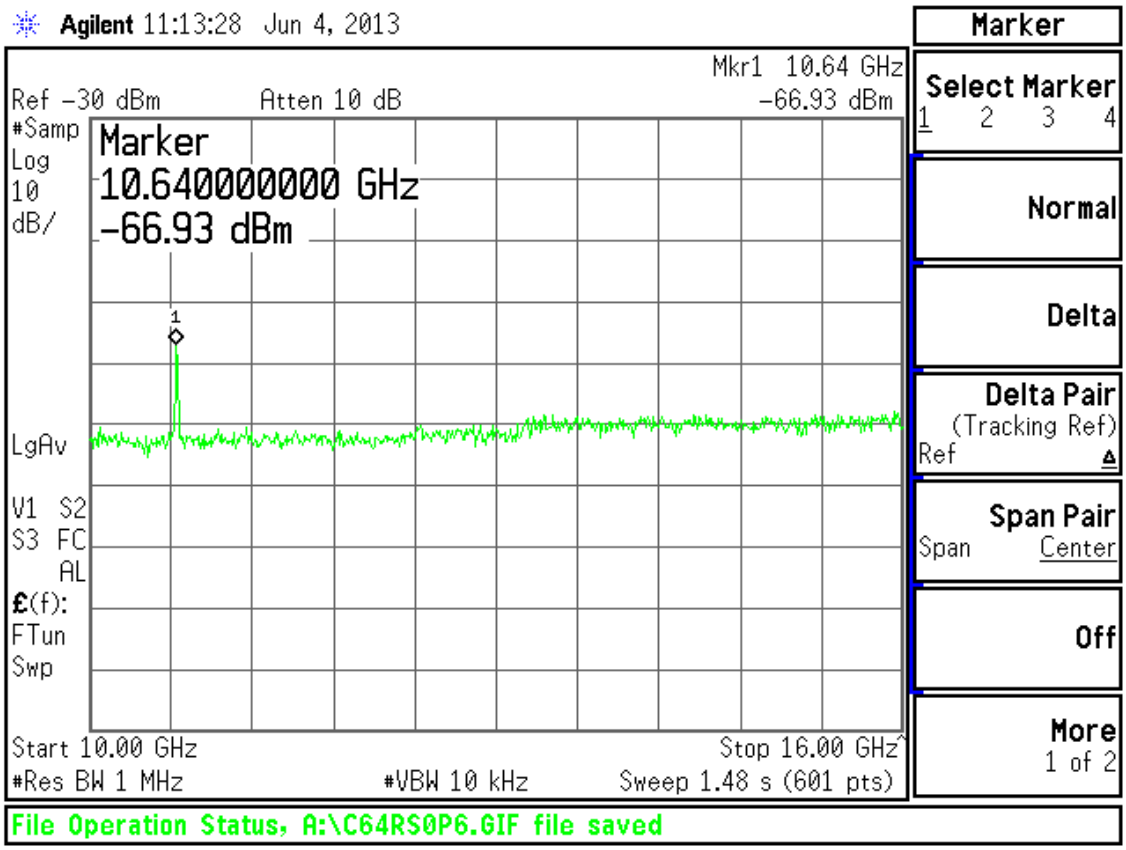
CH64 802.11n Tx Conducted Emissions (MCS0)



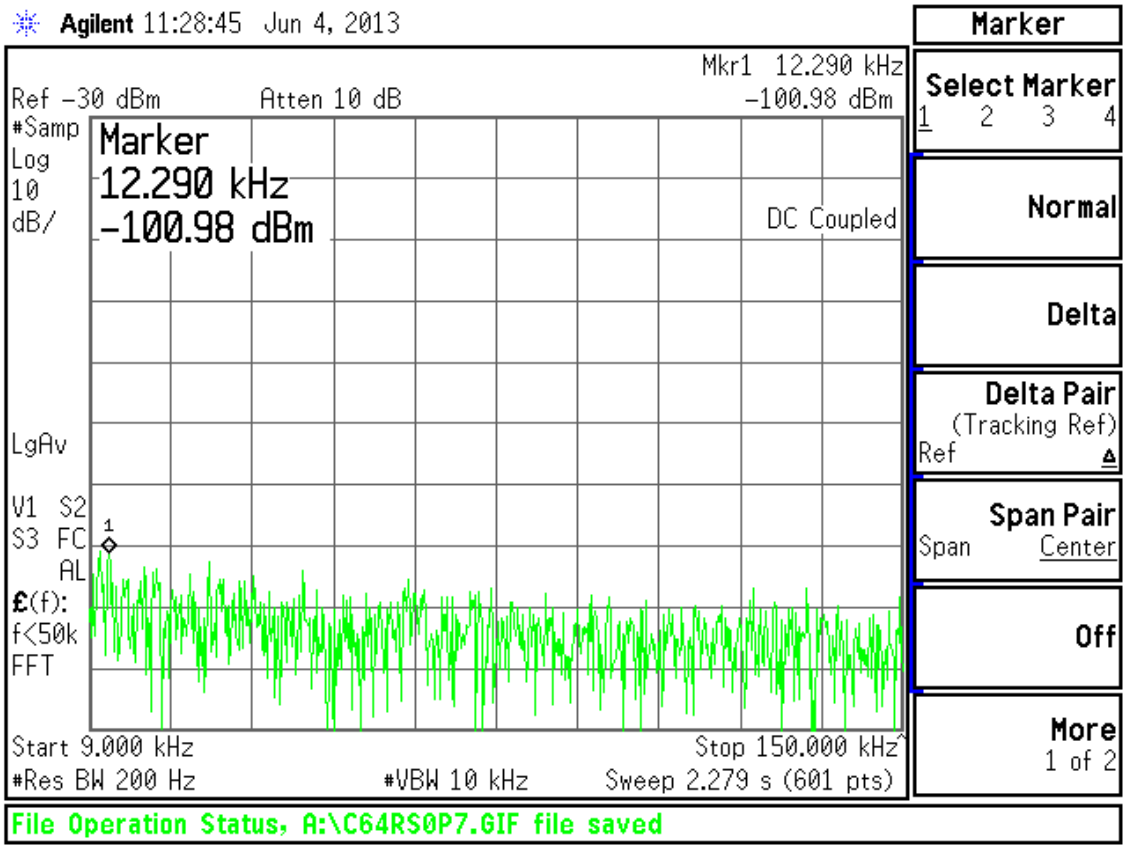
CH64 802.11n Tx Conducted Emissions (MCS0)



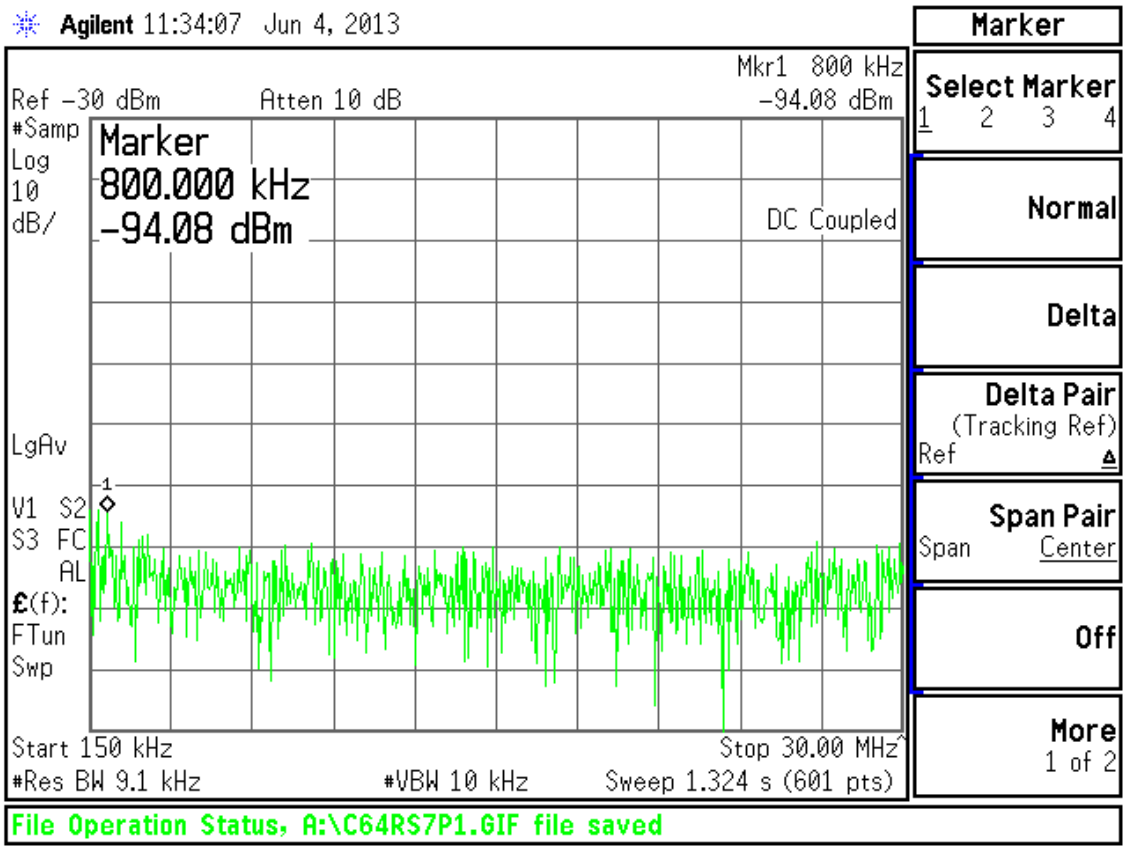
CH64 802.11n Tx Conducted Emissions (MCS0)



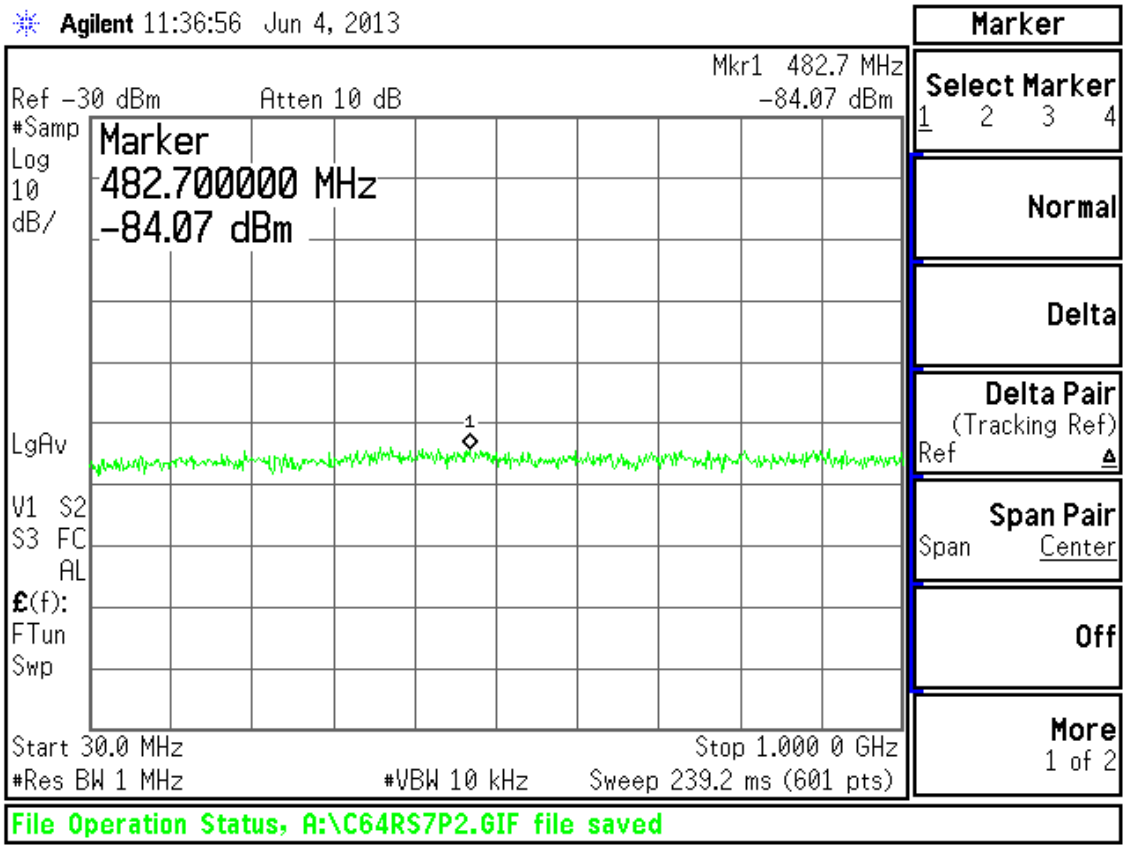
CH64 802.11n Tx Conducted Emissions (MCS0)



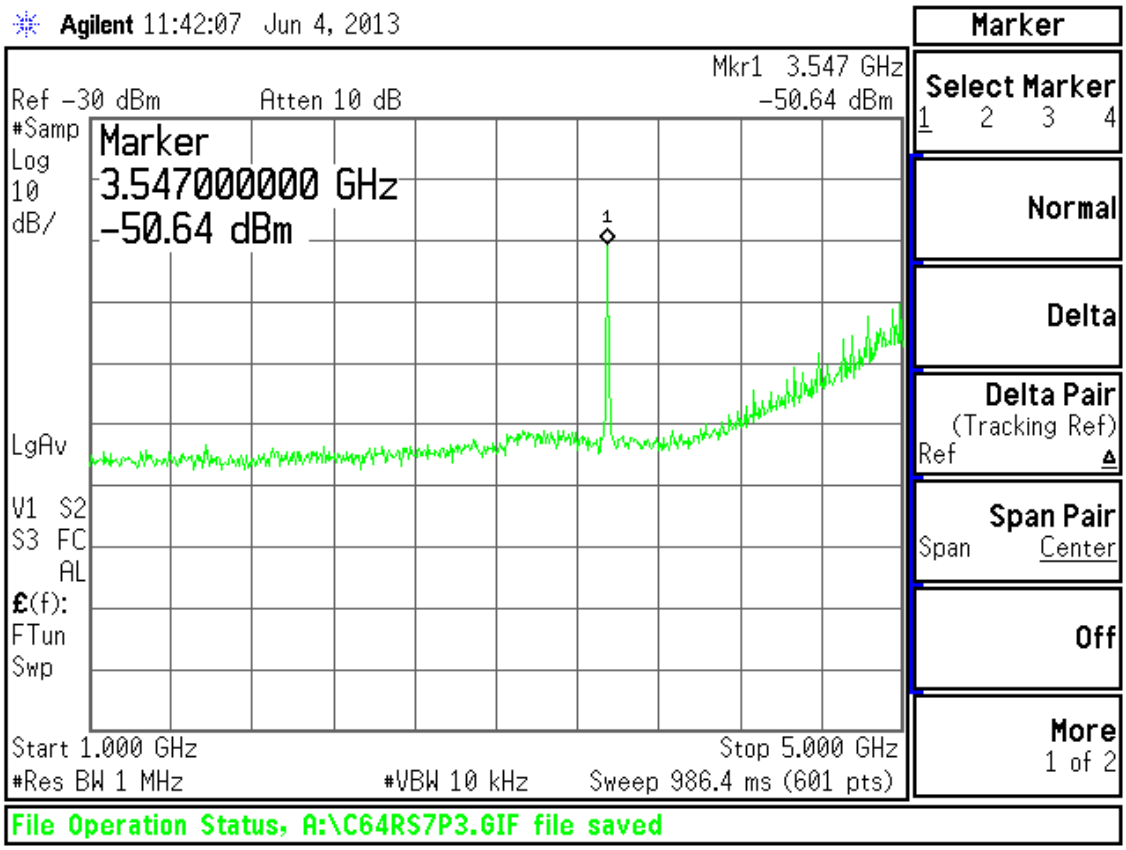
CH64 802.11n Tx Conducted Emissions (MCS7)



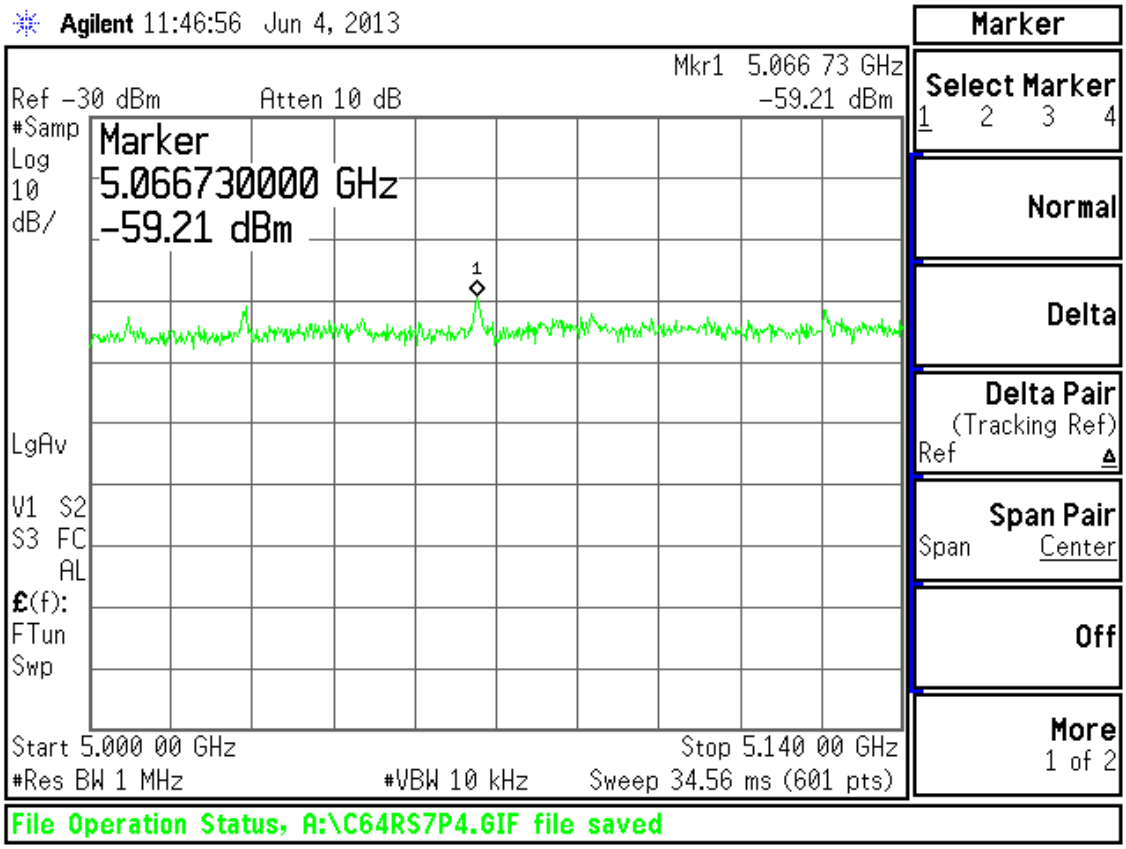
CH64 802.11n Tx Conducted Emissions (MCS7)



CH64 802.11n Tx Conducted Emissions (MCS7)



CH64 802.11n Tx Conducted Emissions (MCS7)



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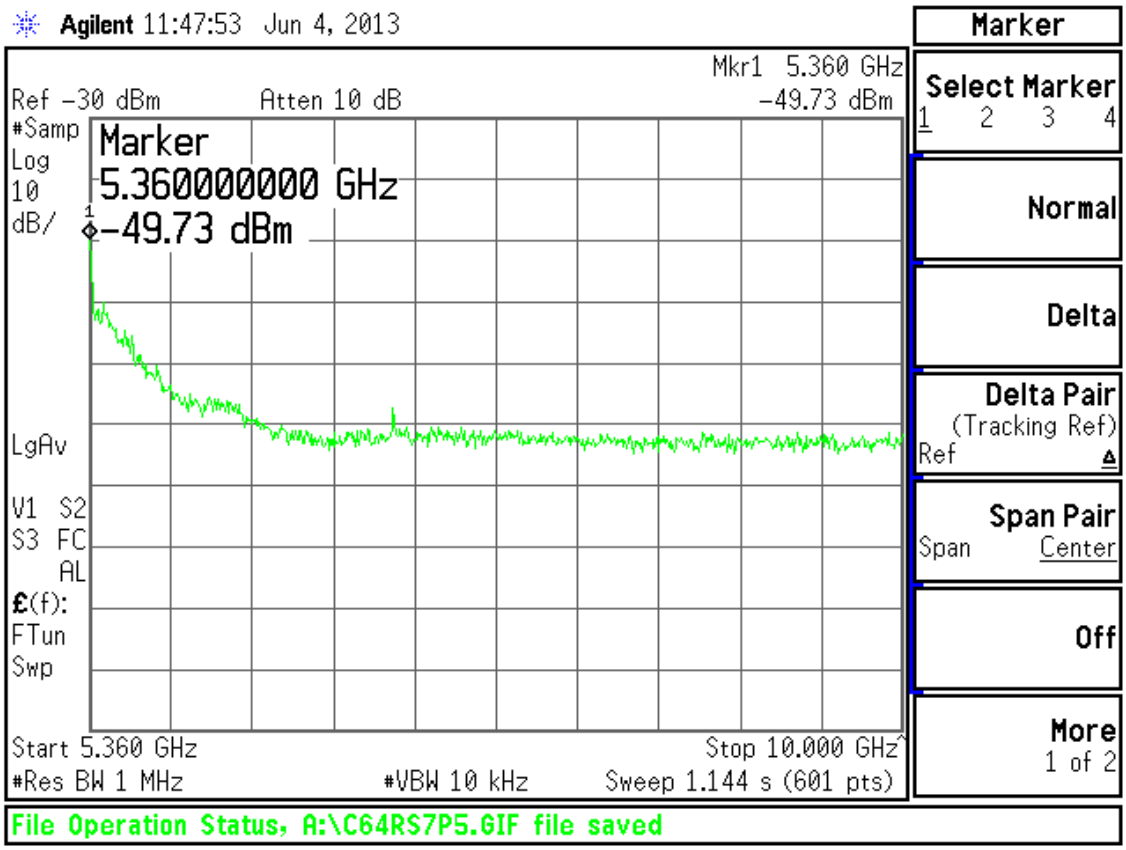
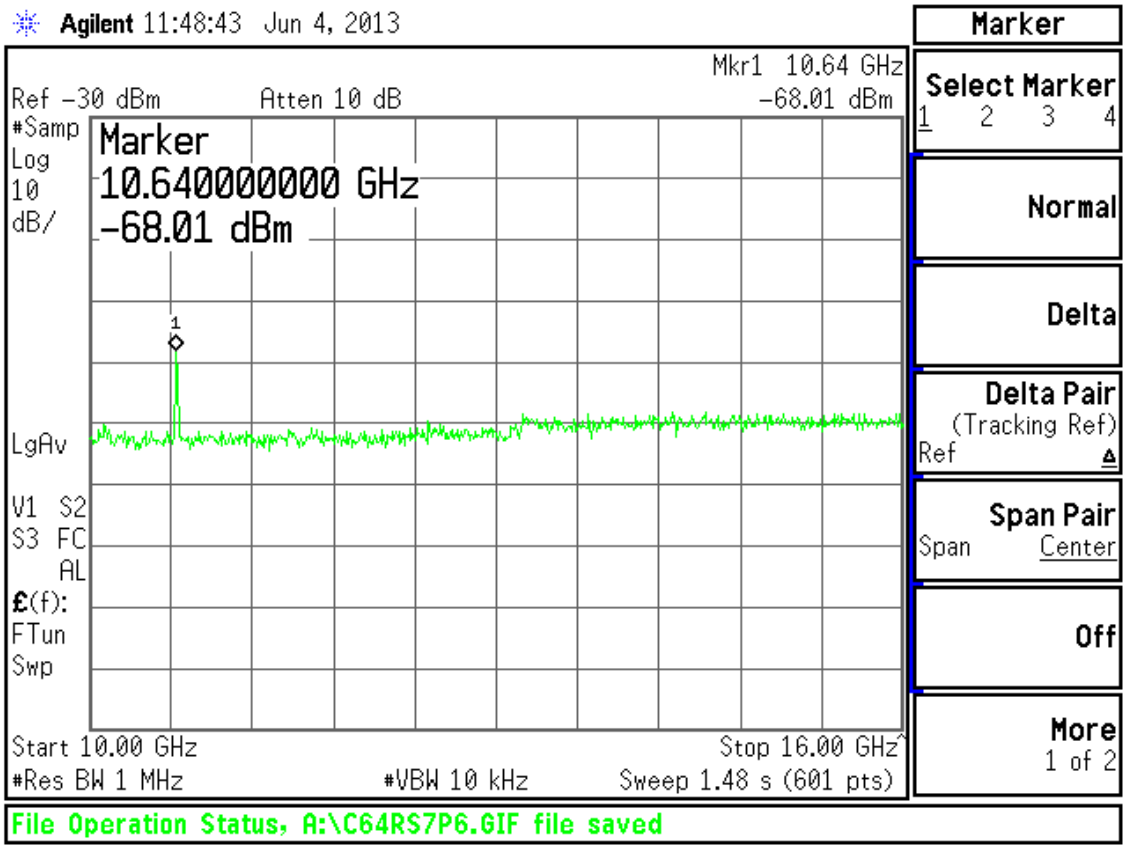
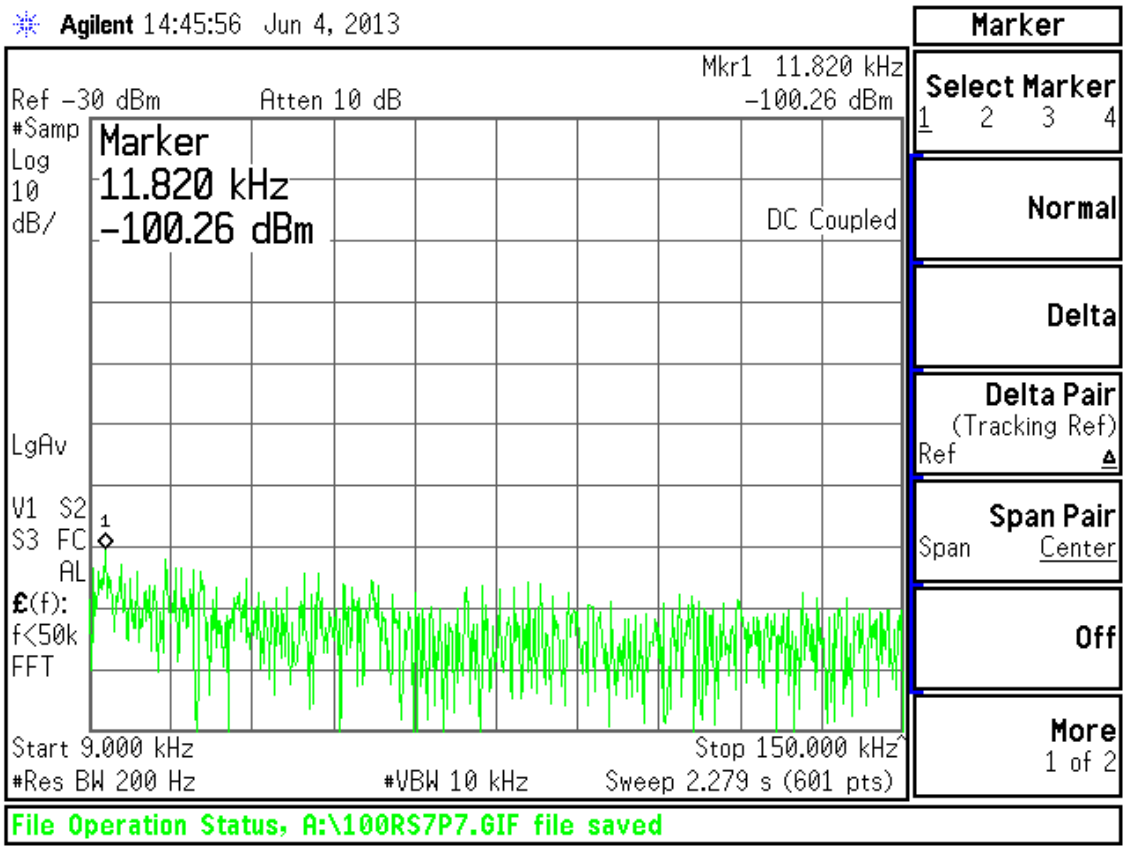


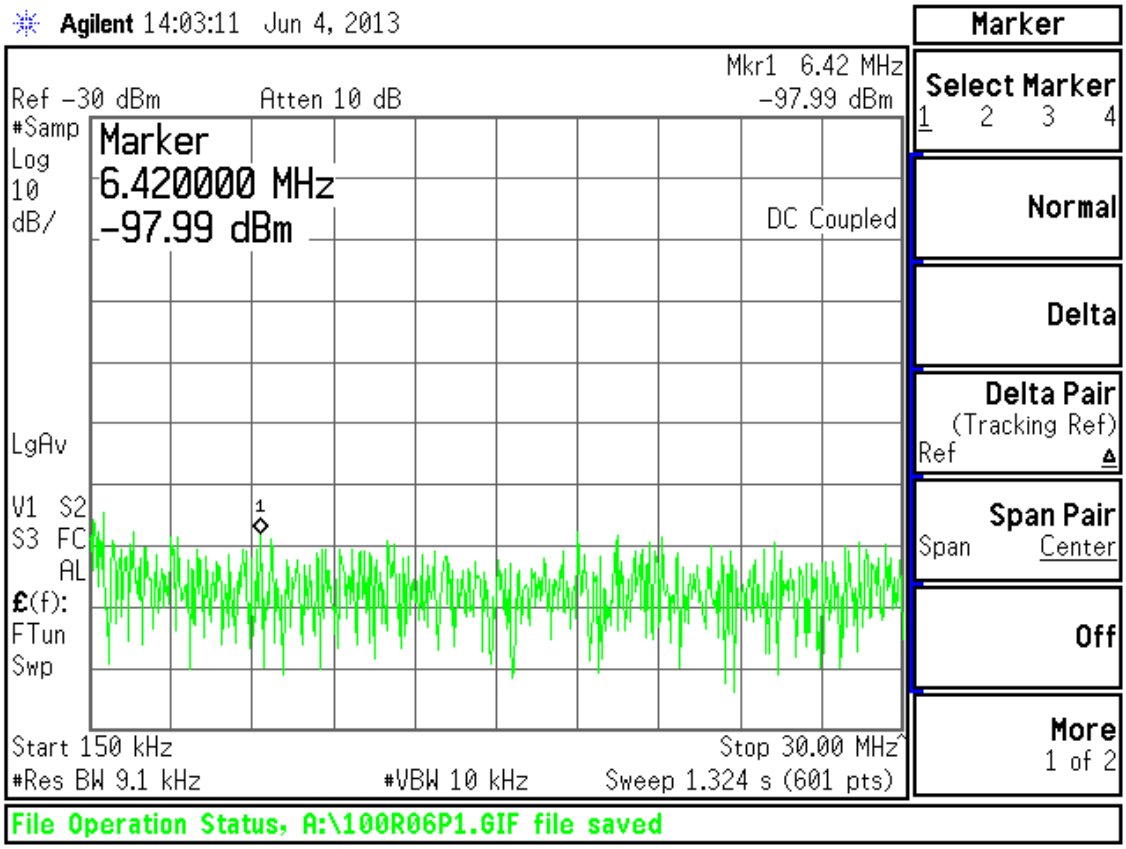
CH64 802.11n Tx Conducted Emissions (MCS7)



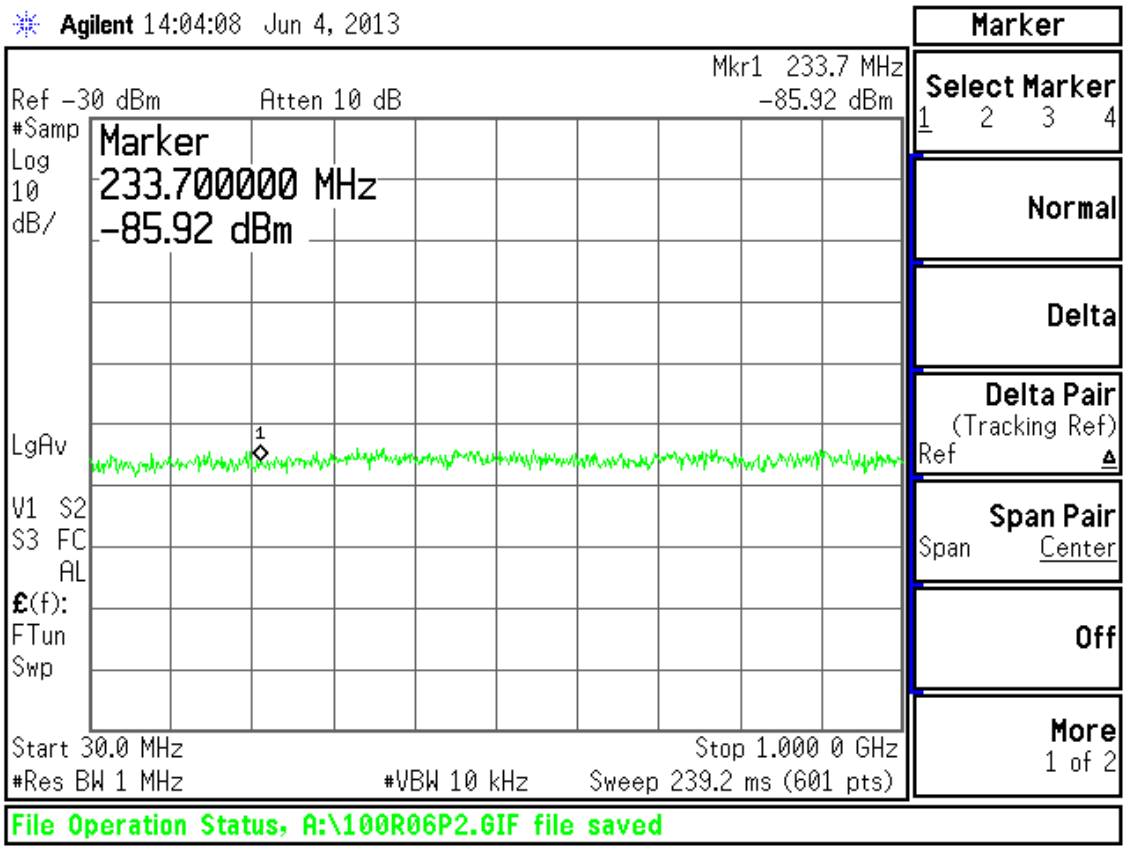
CH64 802.11n Tx Conducted Emissions (MCS7)



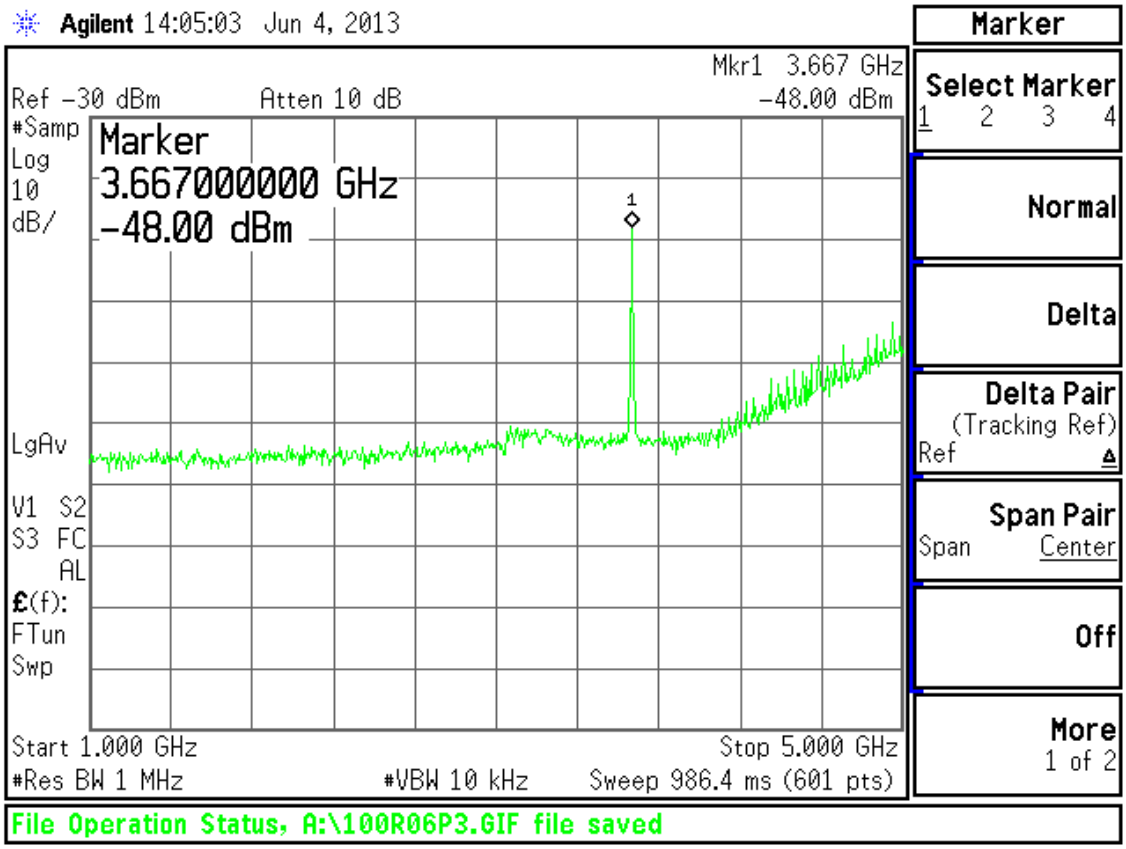
CH100 802.11a Tx Conducted Emissions @ 6Mbps



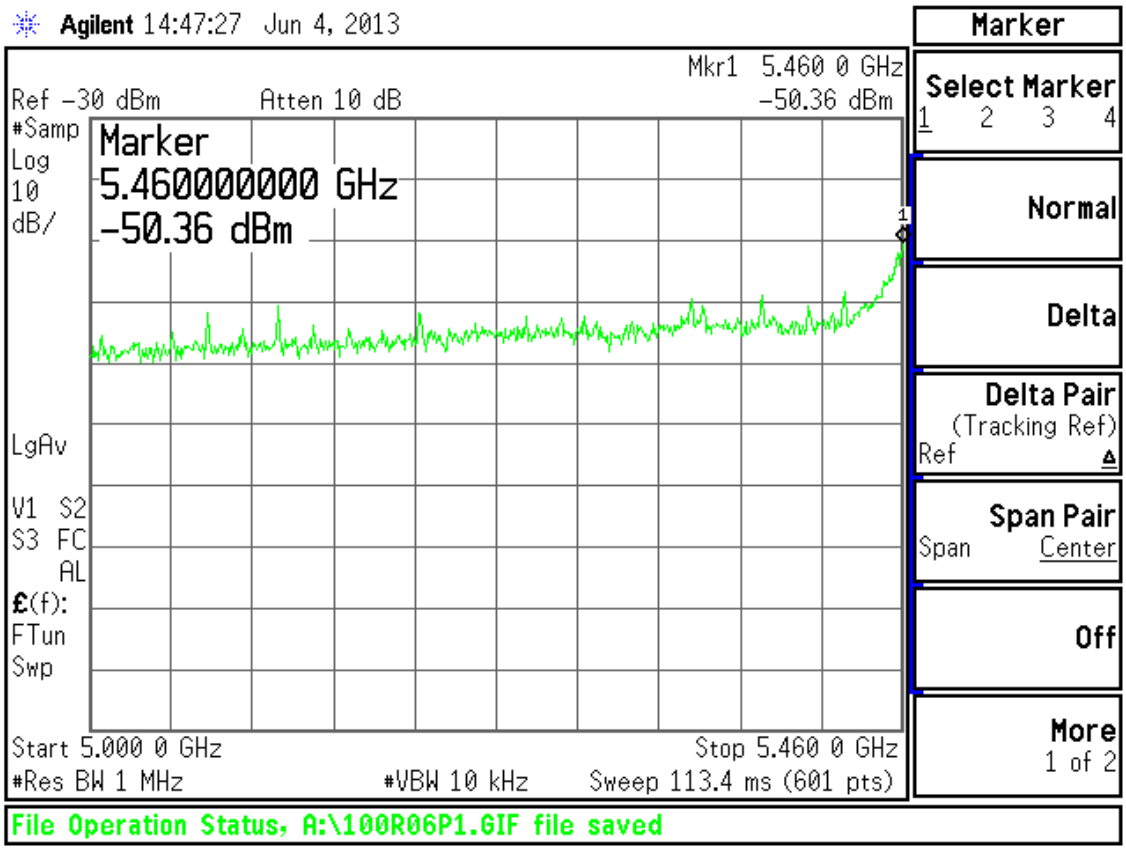
CH100 802.11a Tx Conducted Emissions @ 6Mbps



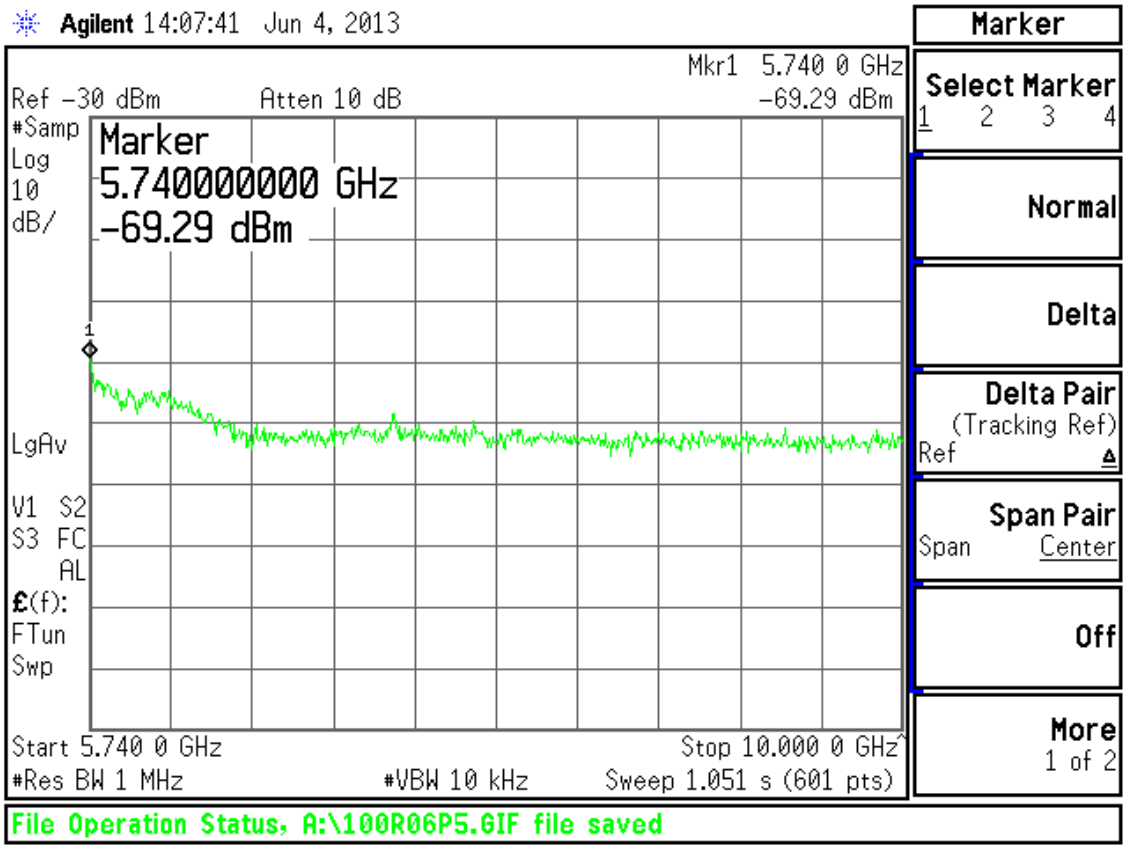
CH100 802.11a Tx Conducted Emissions @ 6Mbps



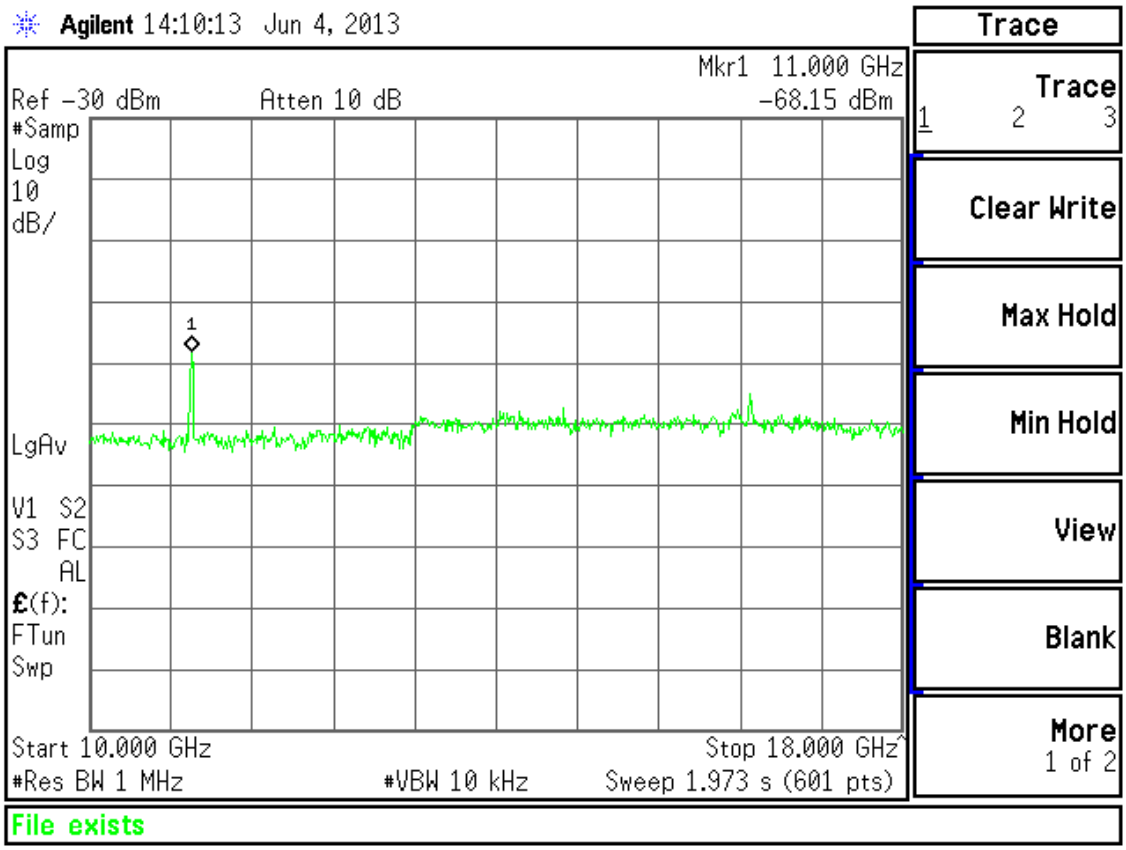
CH100 802.11a Tx Conducted Emissions @ 6Mbps



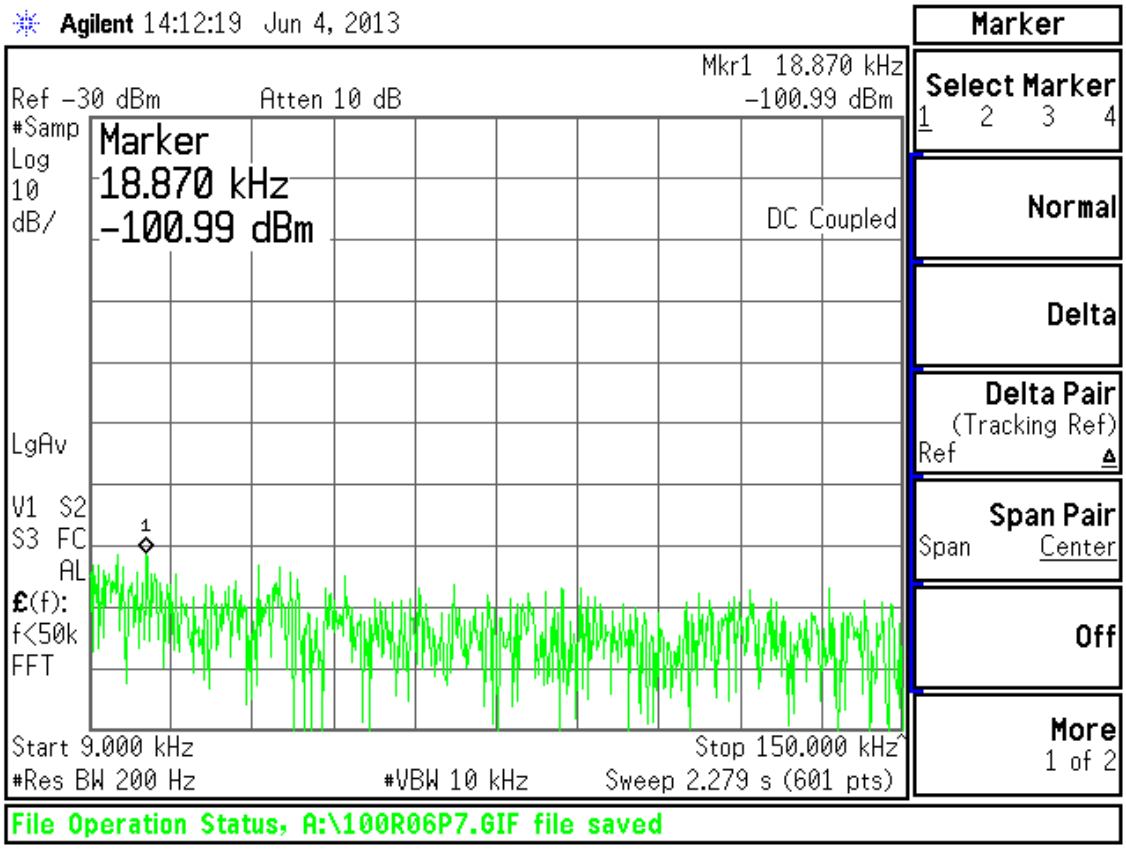
CH100 802.11a Tx Conducted Emissions @ 6Mbps



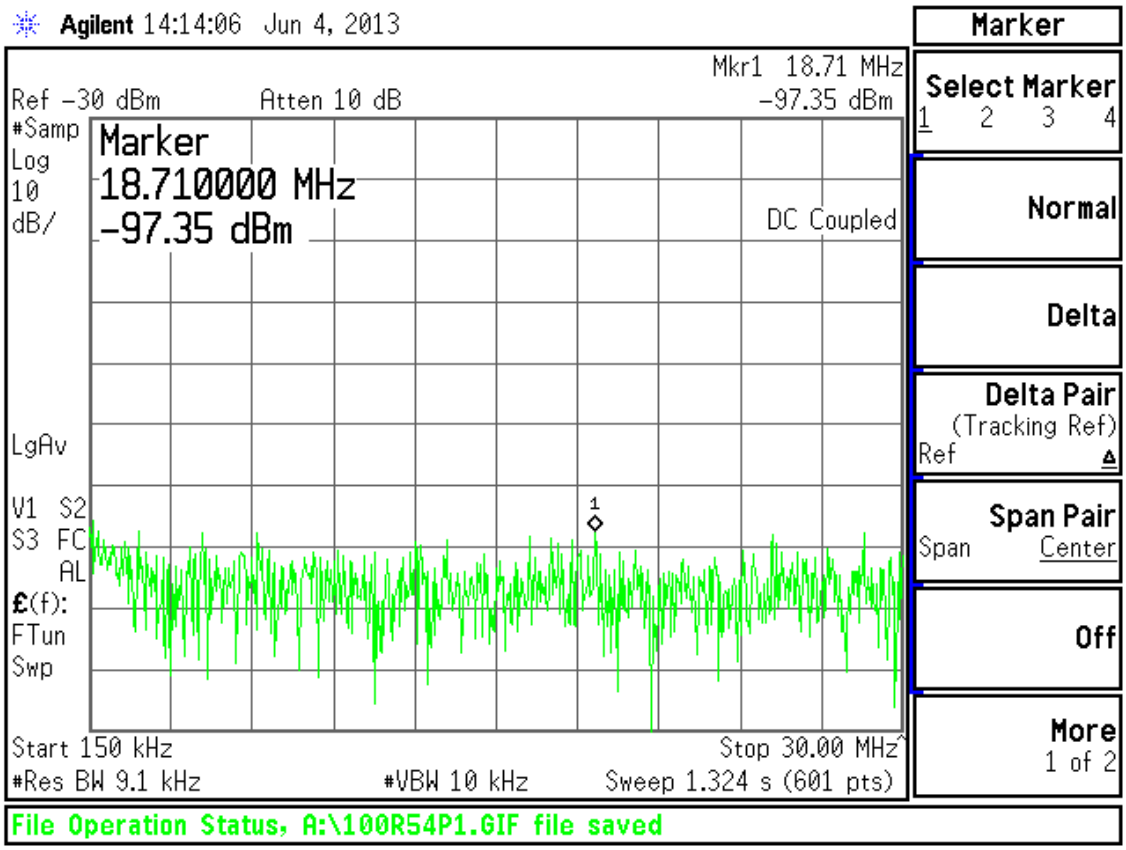
CH100 802.11a Tx Conducted Emissions @ 6Mbps



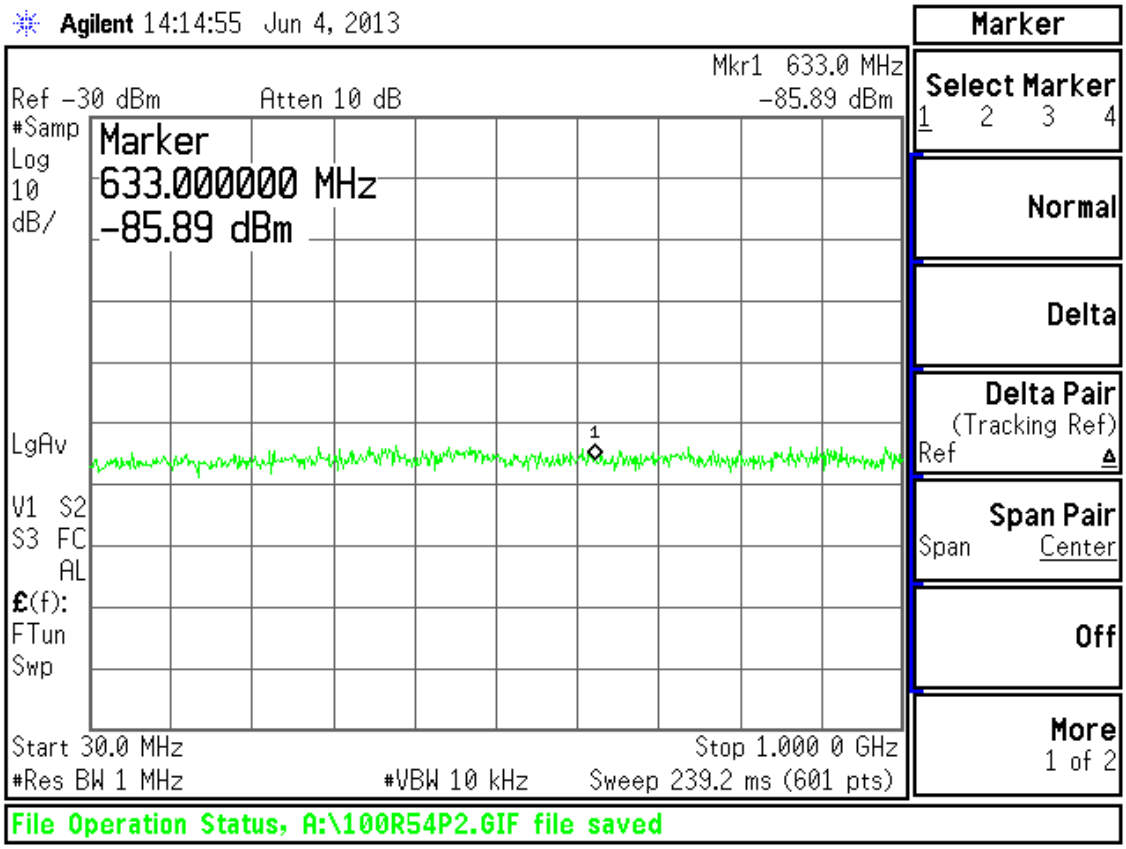
CH100 802.11a Tx Conducted Emissions @ 6Mbps



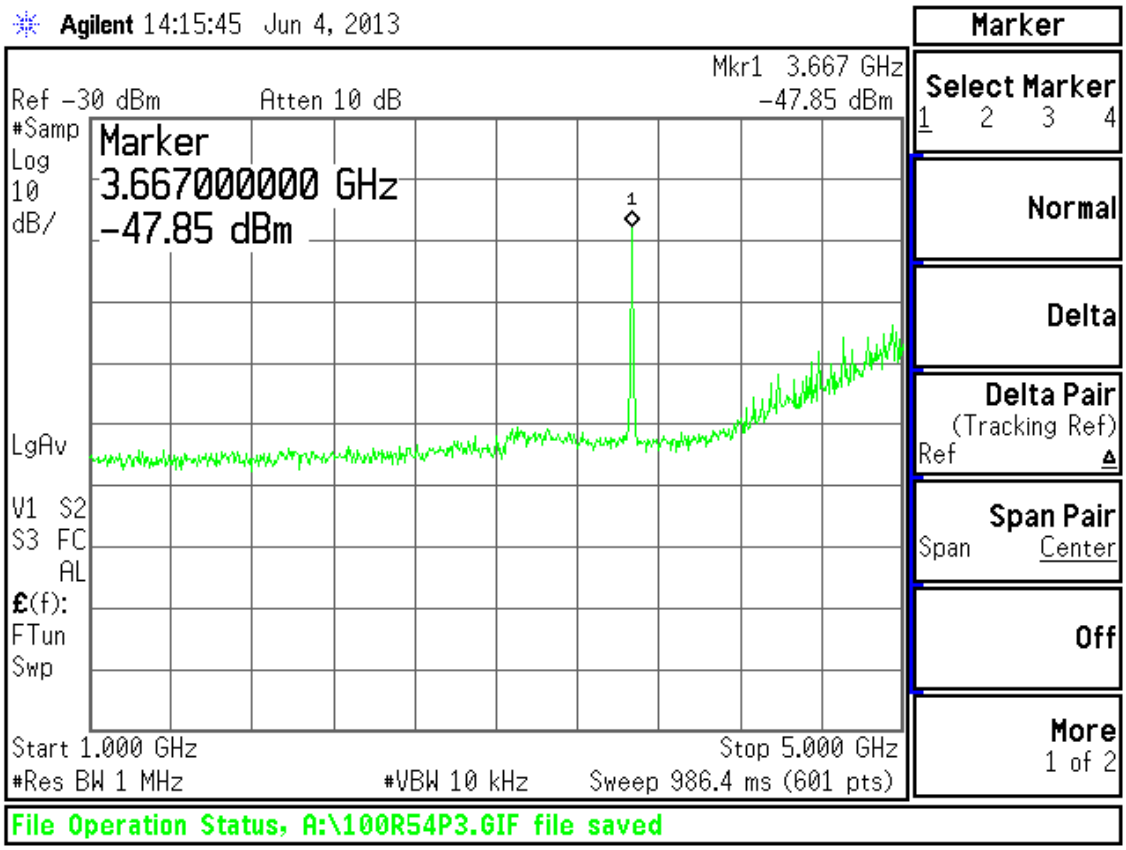
CH100 802.11a Tx Conducted Emissions @ 54Mbps



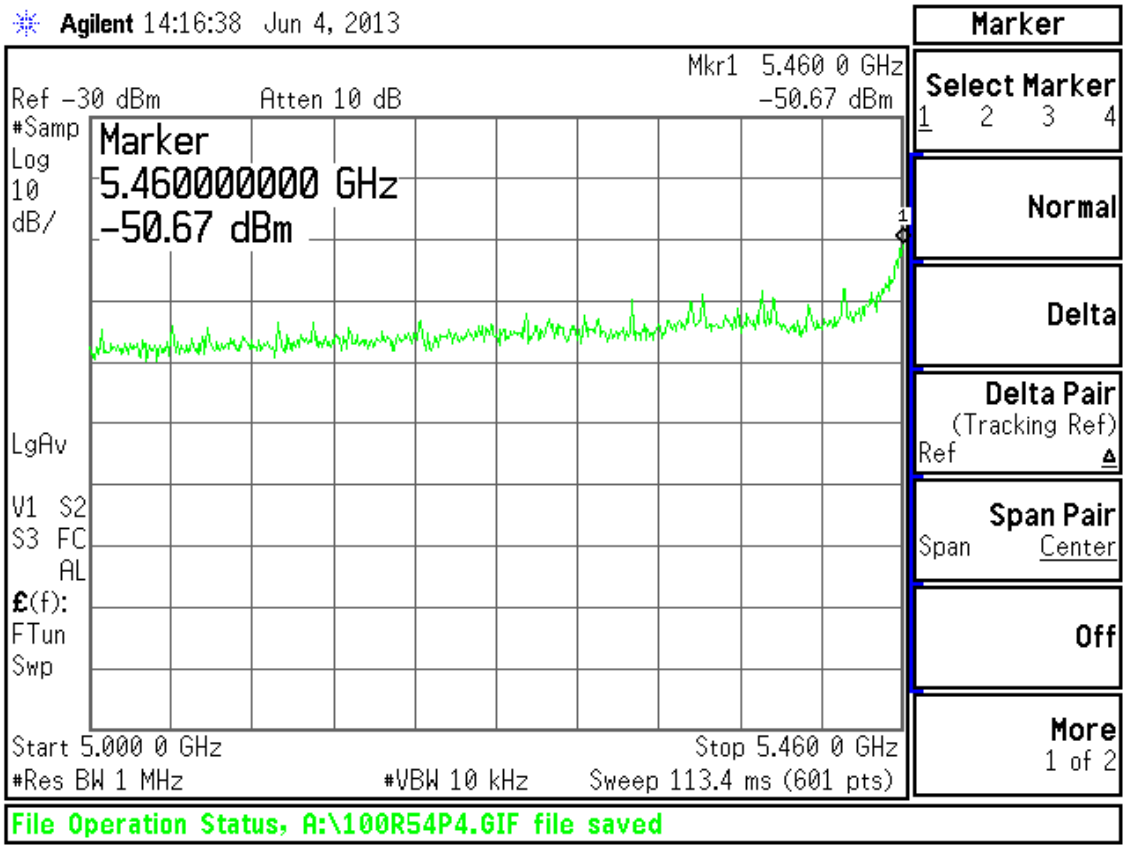
CH100 802.11a Tx Conducted Emissions @ 54Mbps



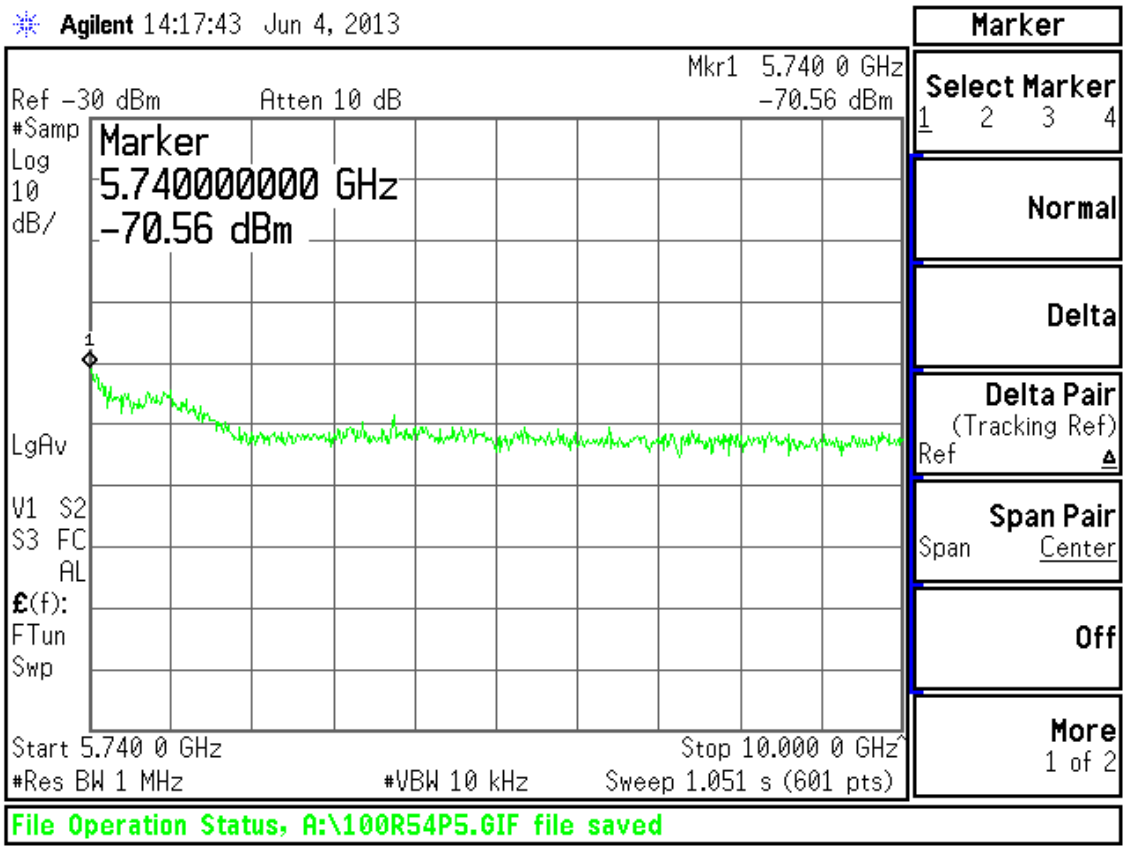
CH100 802.11a Tx Conducted Emissions @ 54Mbps



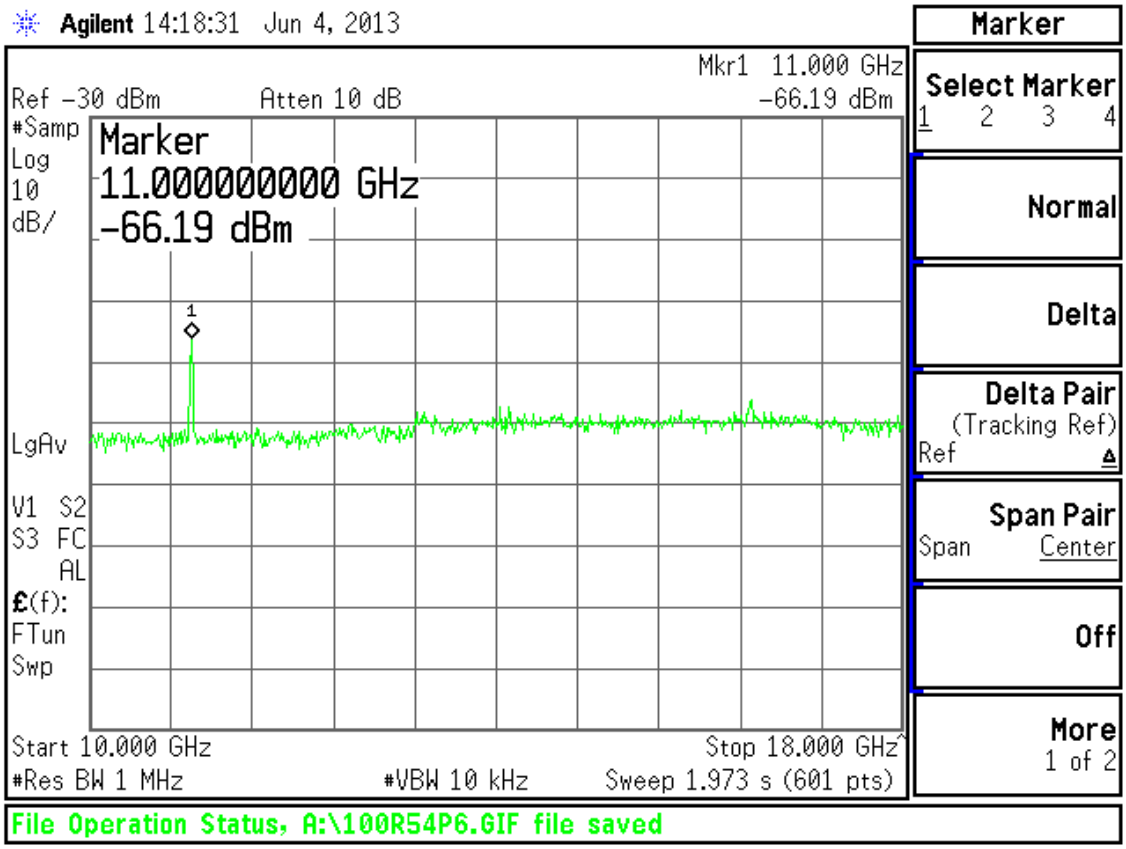
CH100 802.11a Tx Conducted Emissions @ 54Mbps



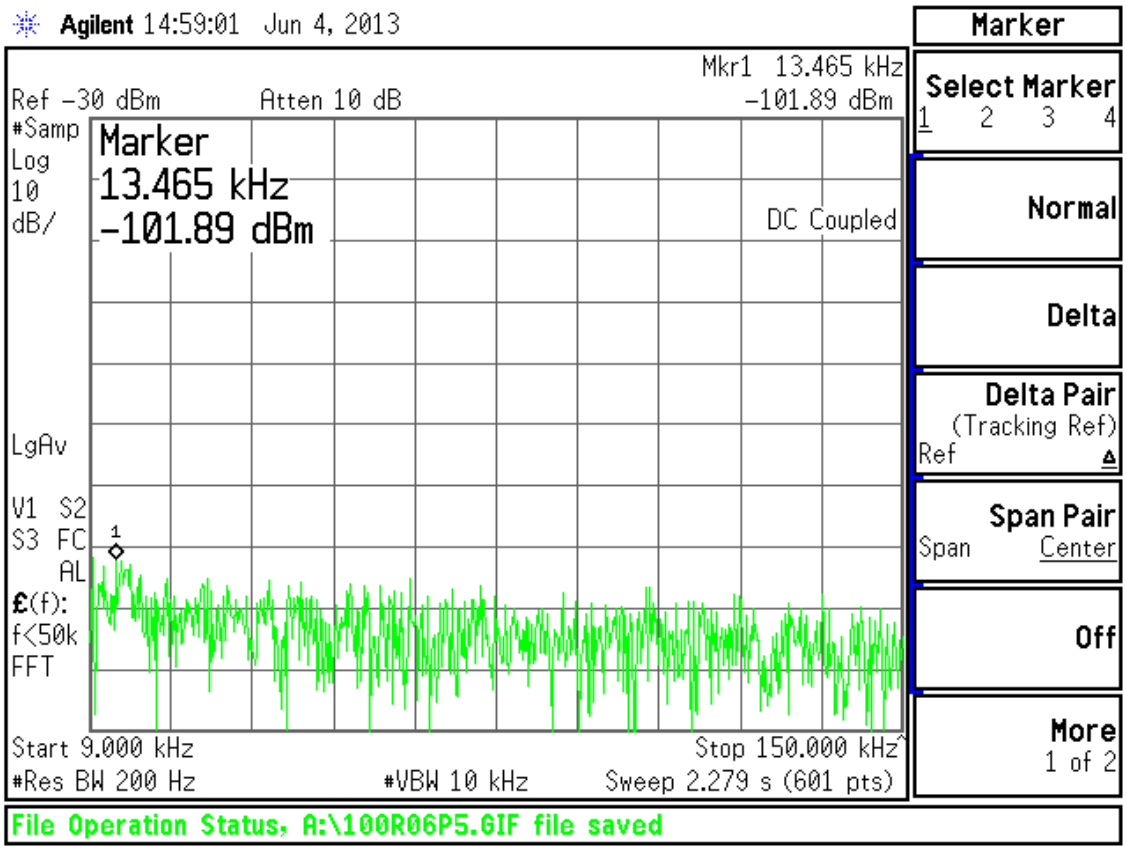
CH100 802.11a Tx Conducted Emissions @ 54Mbps



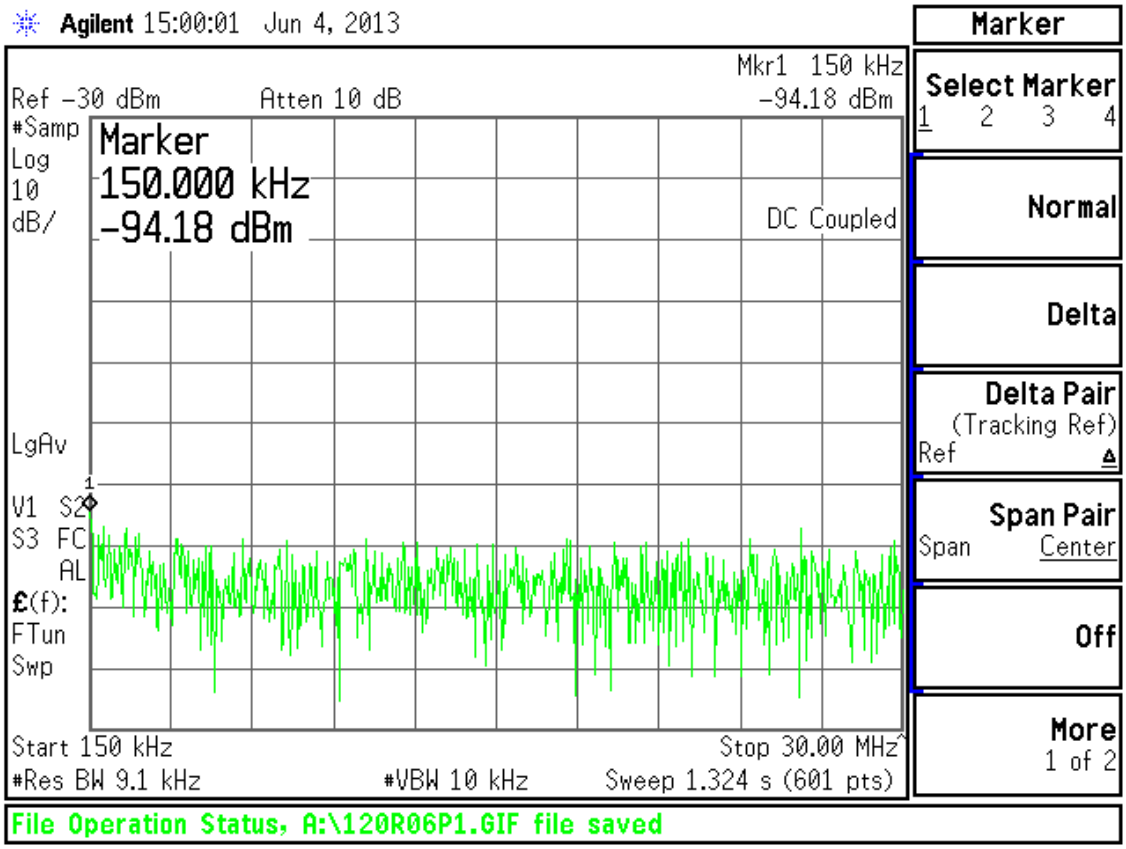
CH100 802.11a Tx Conducted Emissions @ 54Mbps



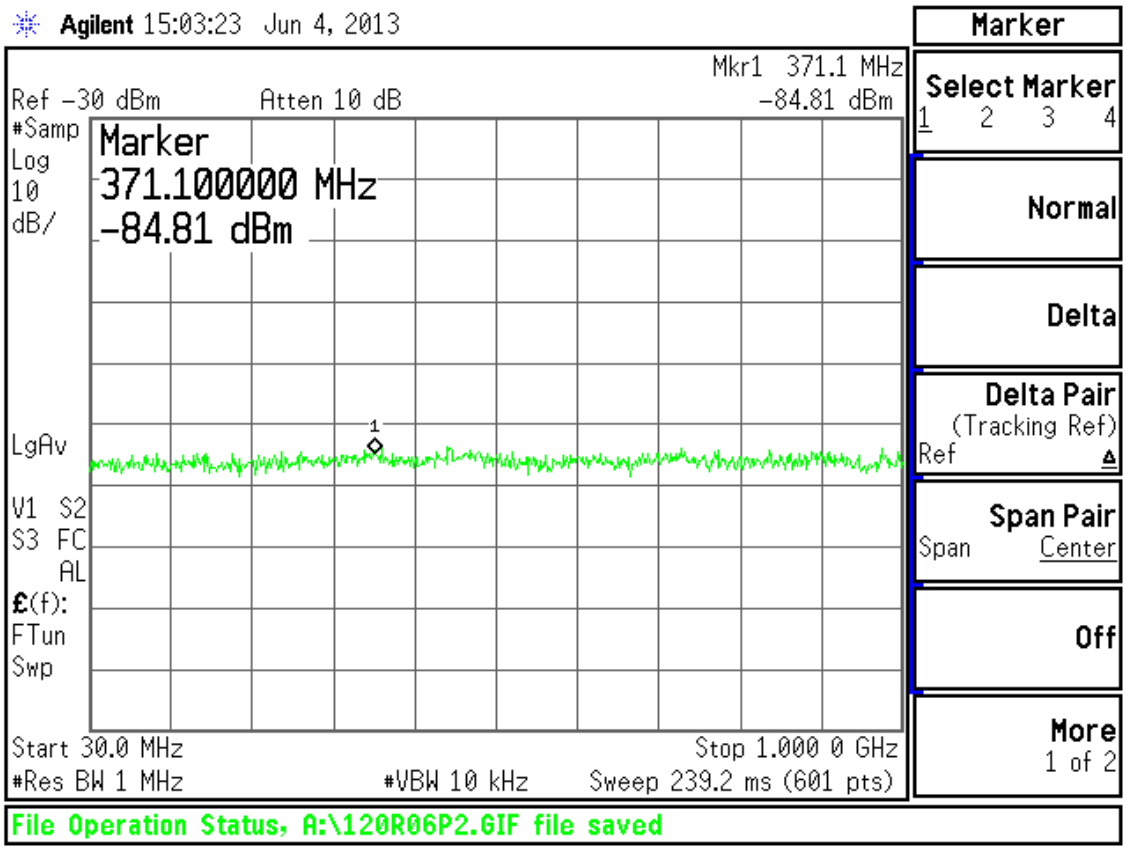
CH100 802.11a Tx Conducted Emissions @ 54Mbps



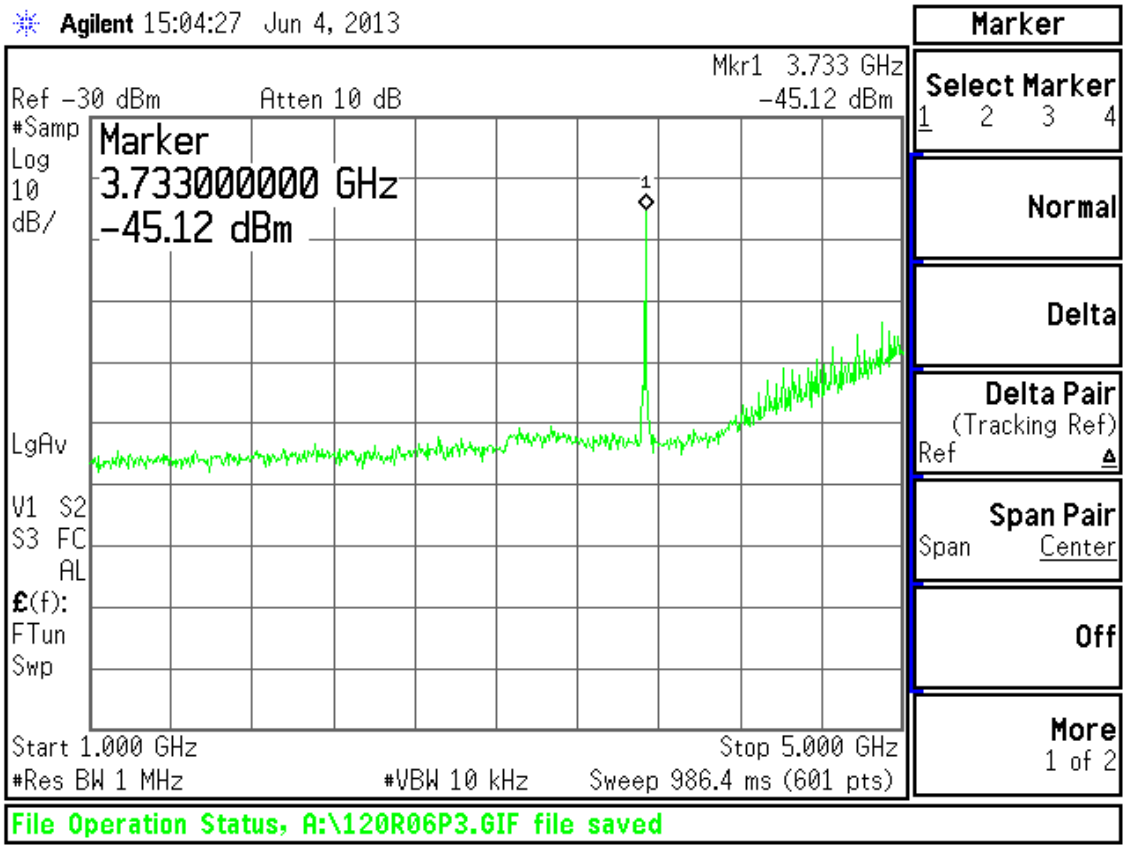
CH120 802.11a Tx Conducted Emissions @ 6Mbps



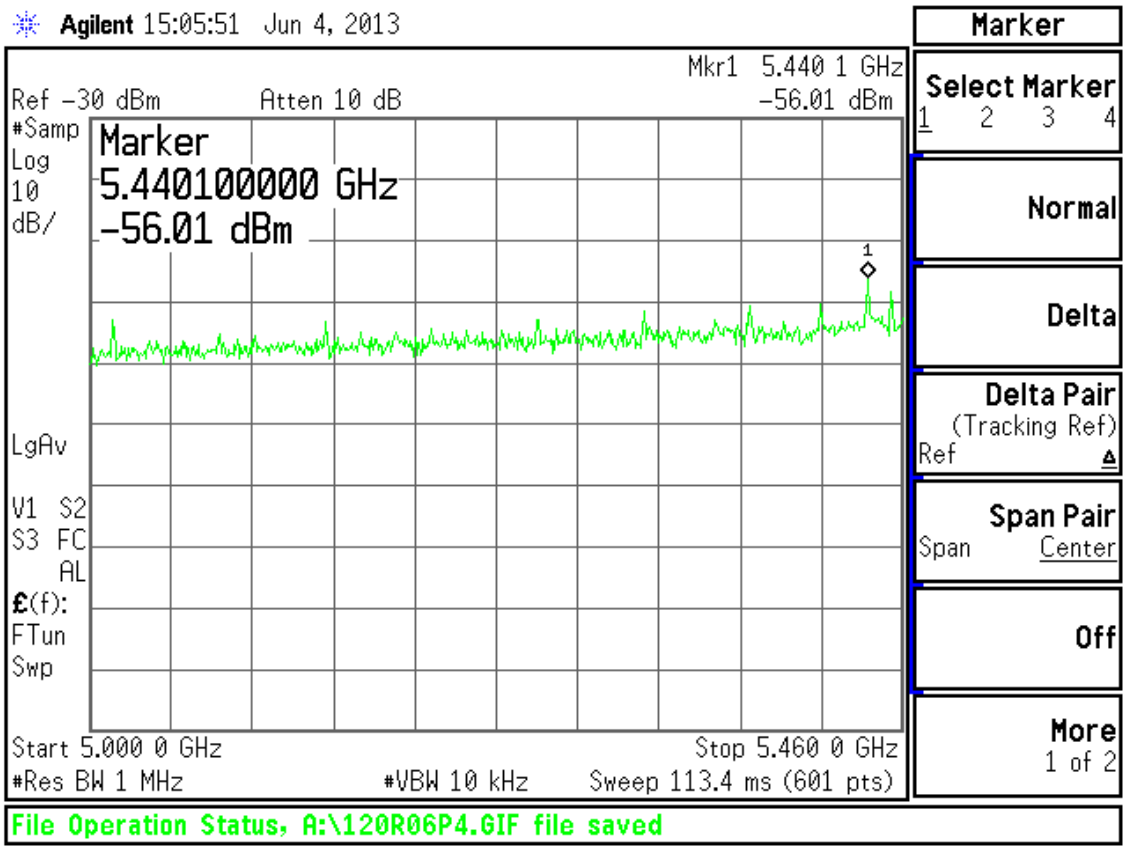
CH120 802.11a Tx Conducted Emissions @ 6Mbps



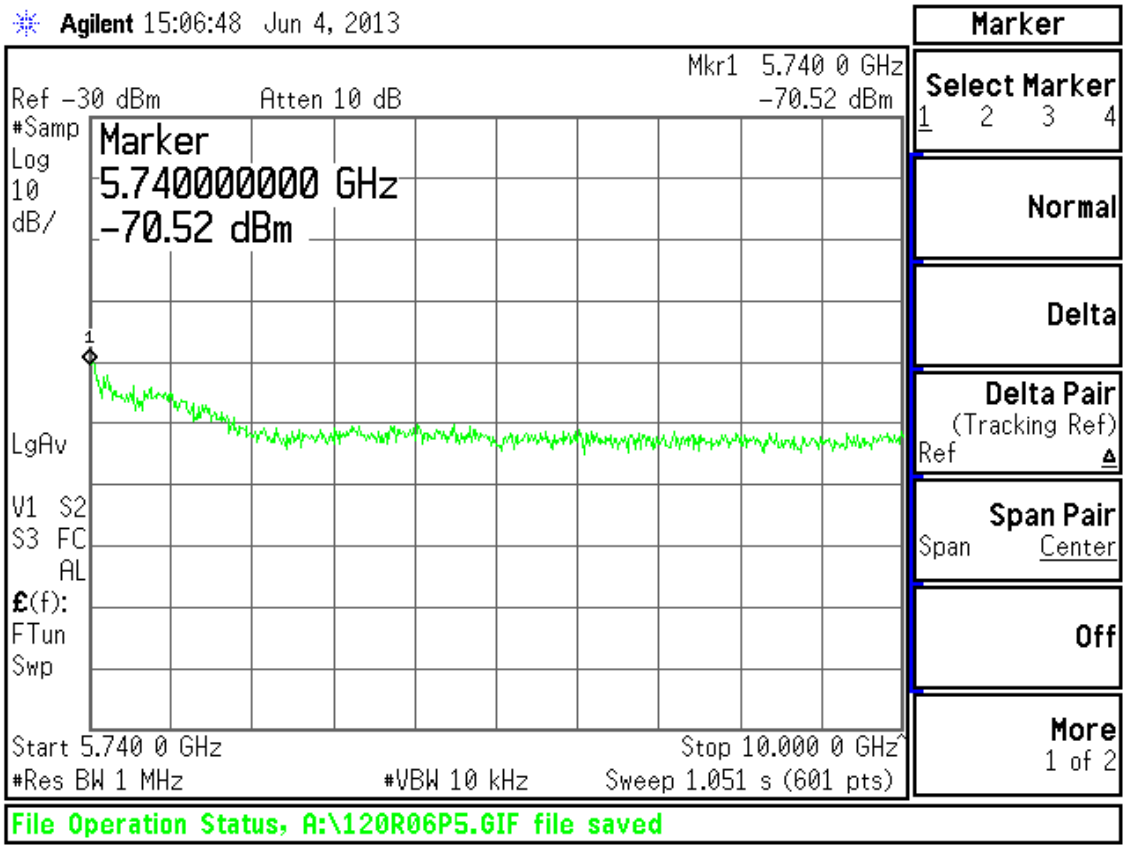
CH120 802.11a Tx Conducted Emissions @ 6Mbps



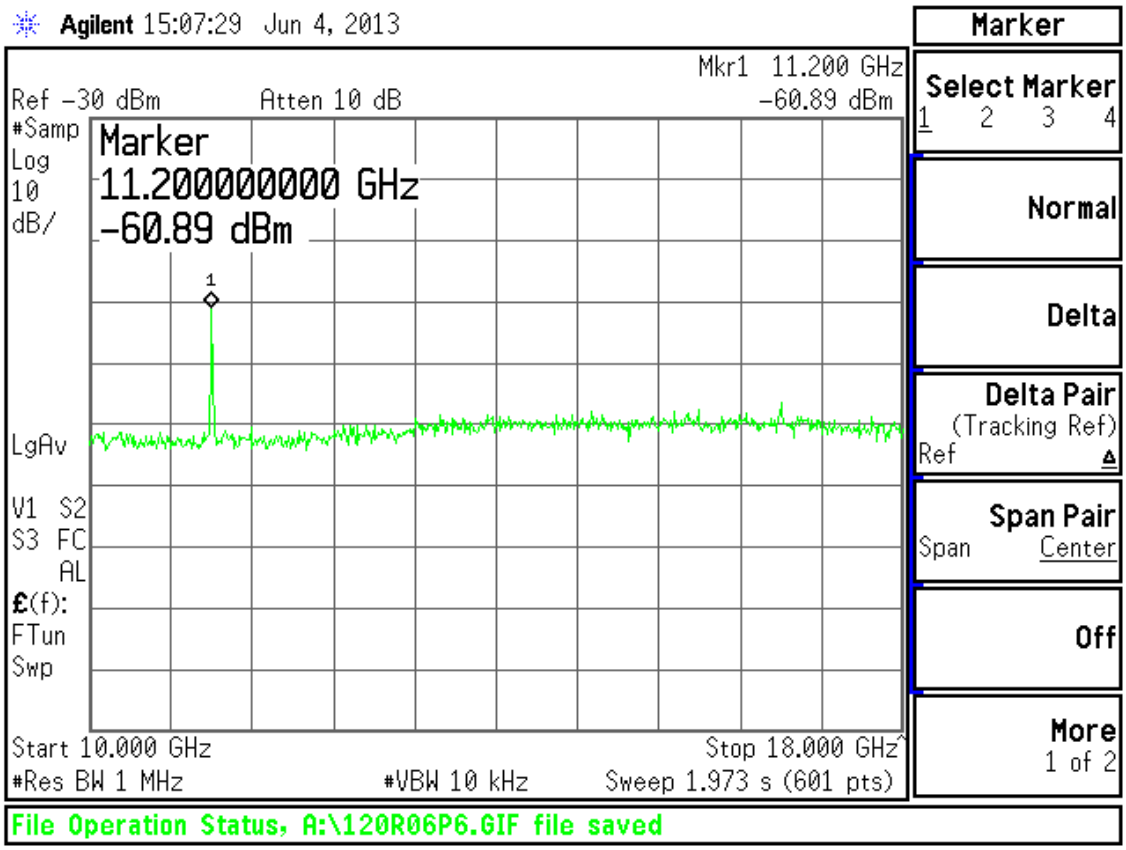
CH120 802.11a Tx Conducted Emissions @ 6Mbps



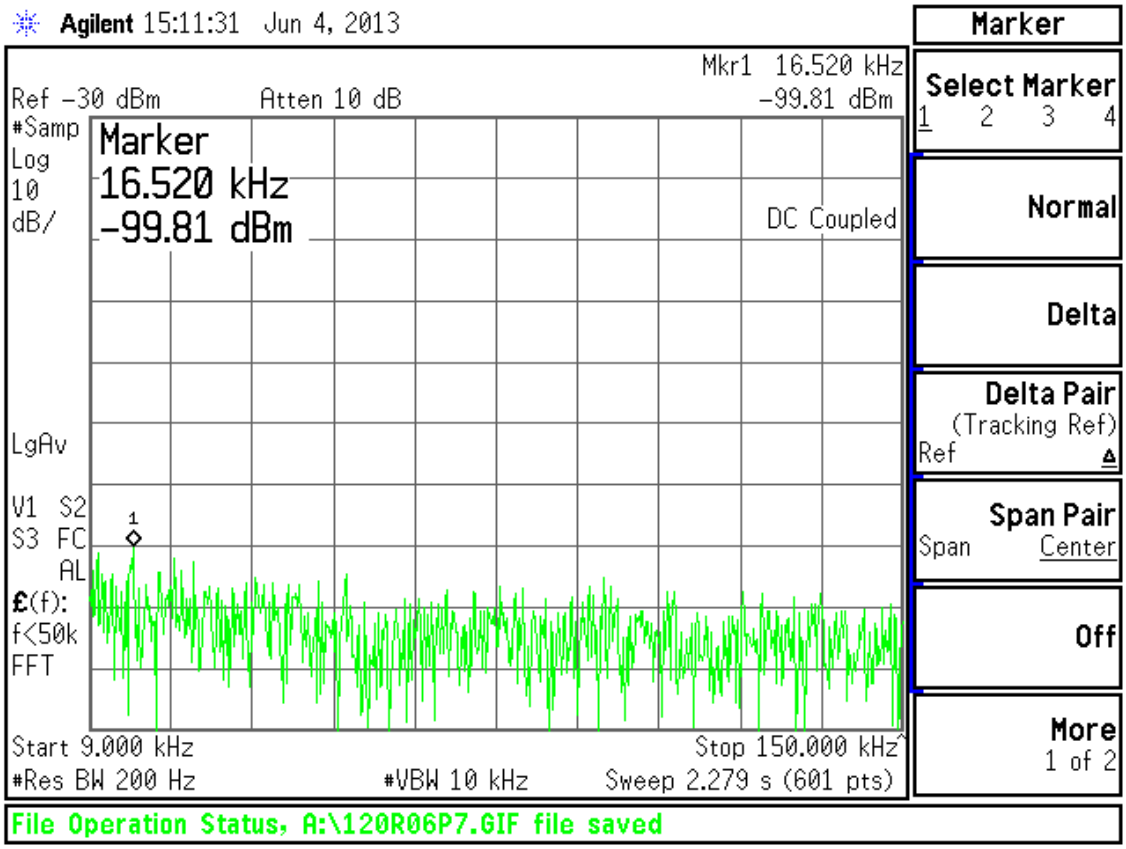
CH120 802.11a Tx Conducted Emissions @ 6Mbps



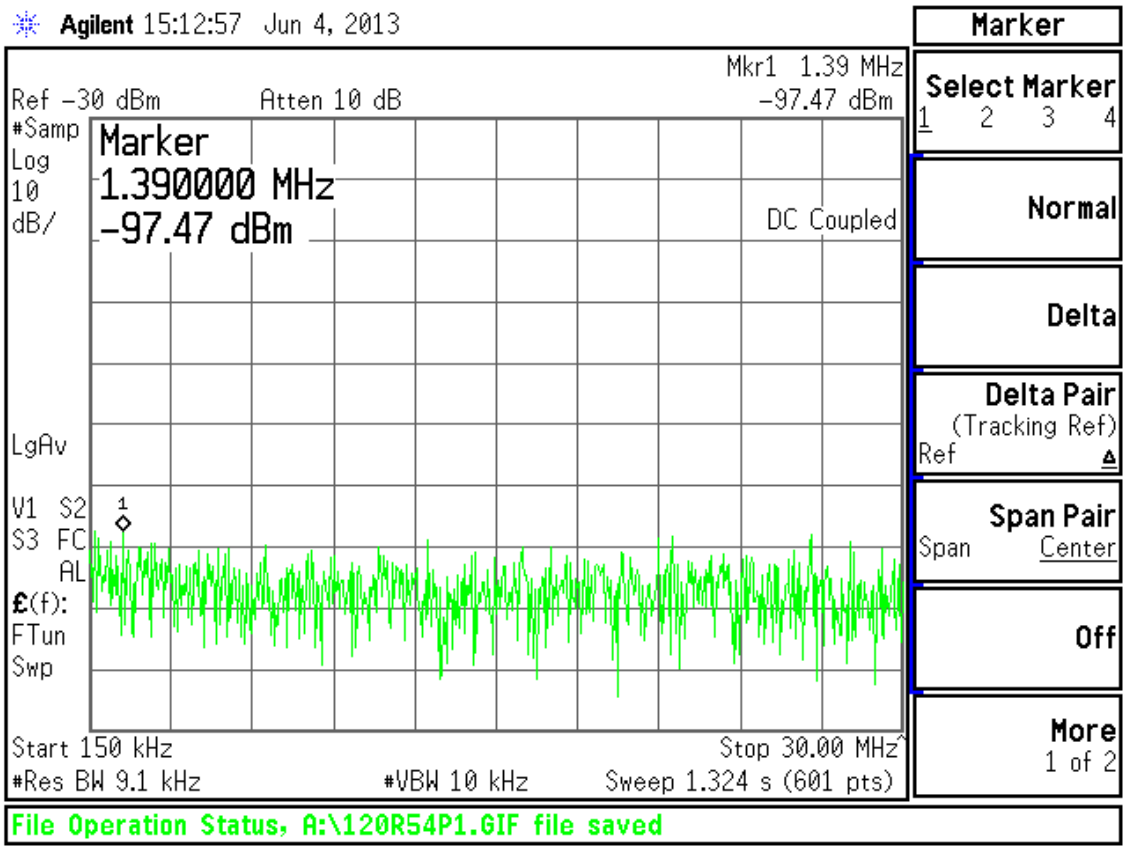
CH120 802.11a Tx Conducted Emissions @ 6Mbps



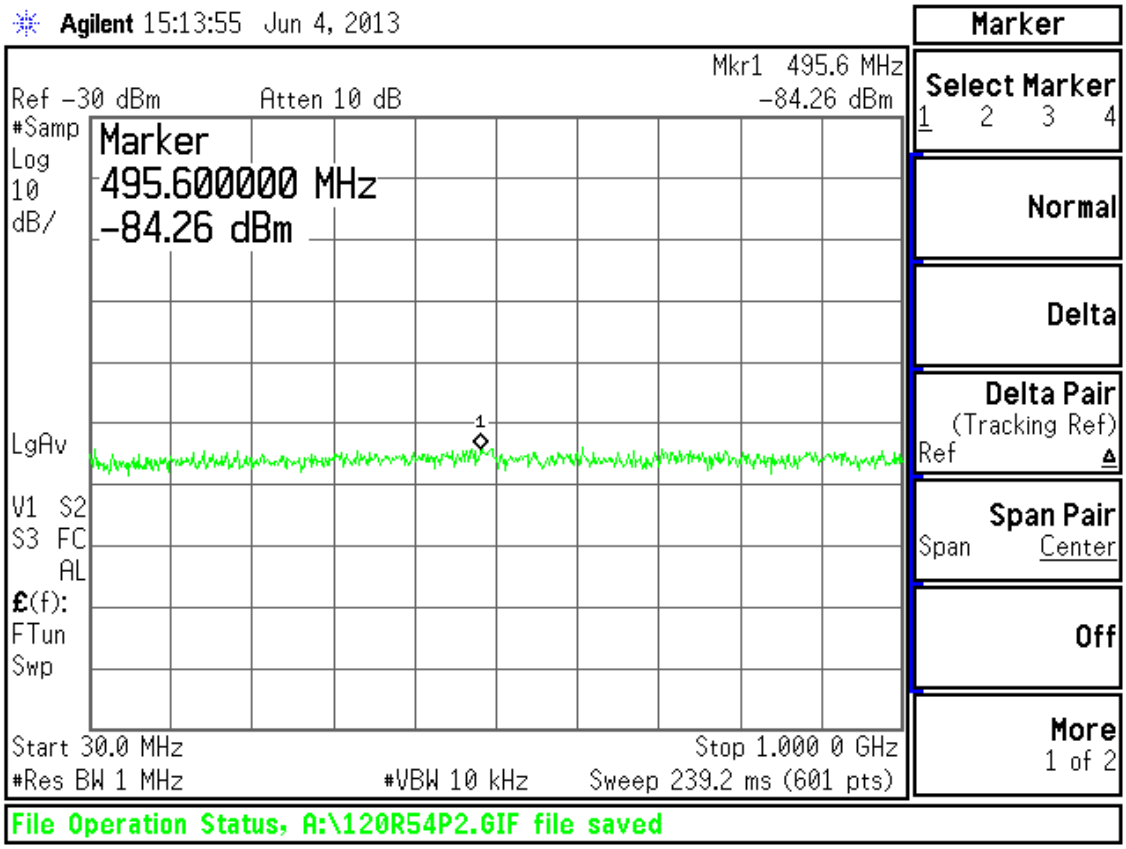
CH120 802.11a Tx Conducted Emissions @ 6Mbps



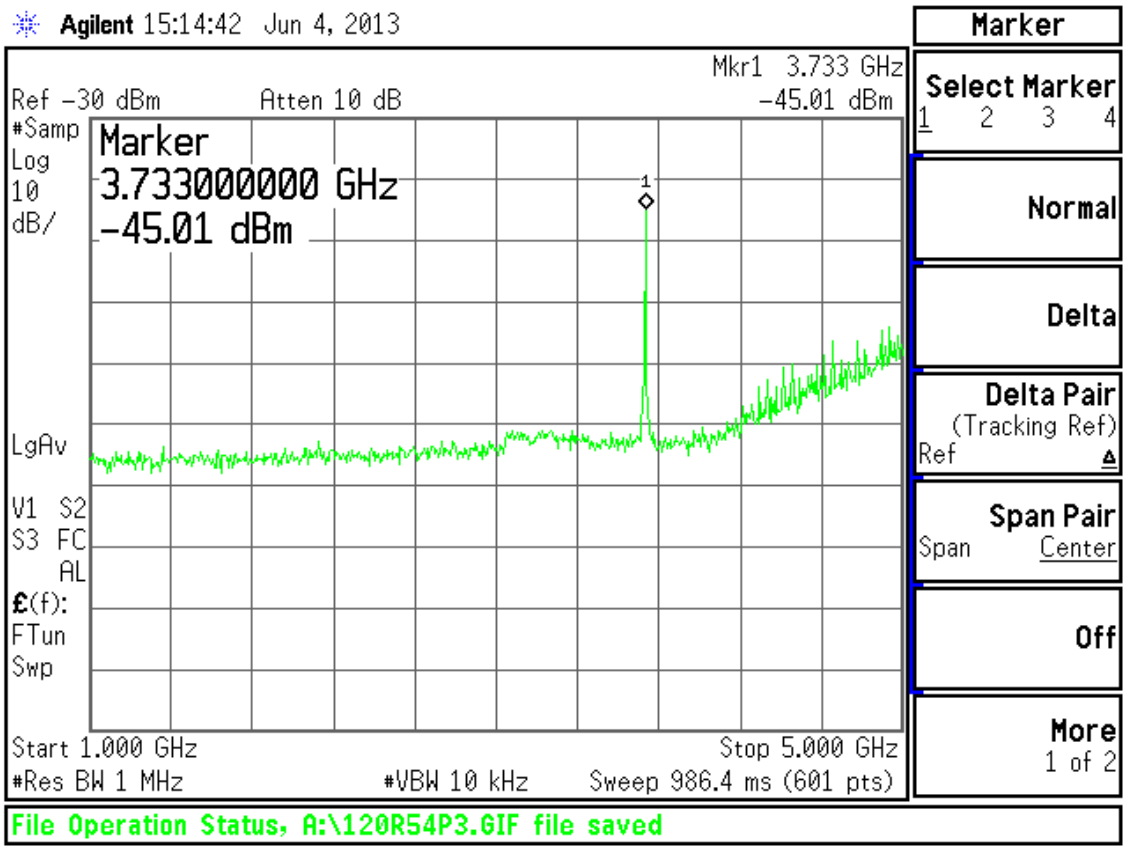
CH120 802.11a Tx Conducted Emissions @ 54Mbps



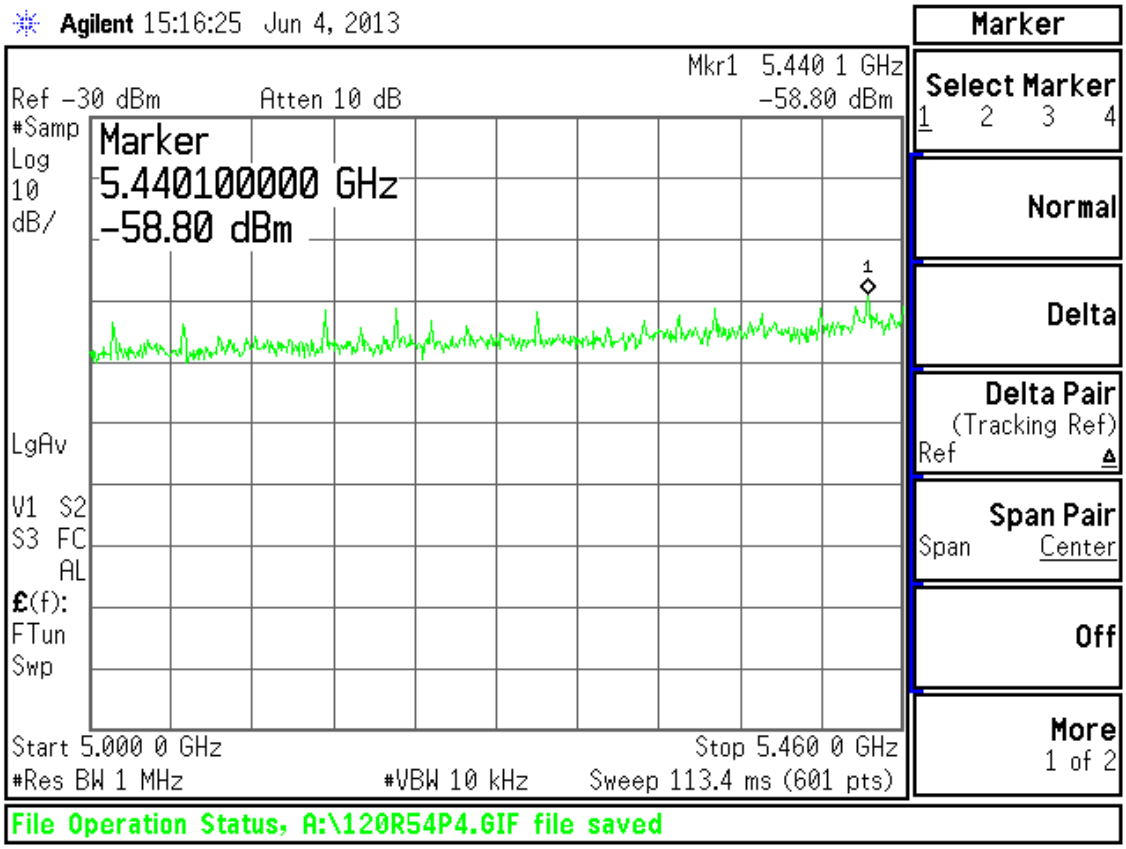
CH120 802.11a Tx Conducted Emissions @ 54Mbps



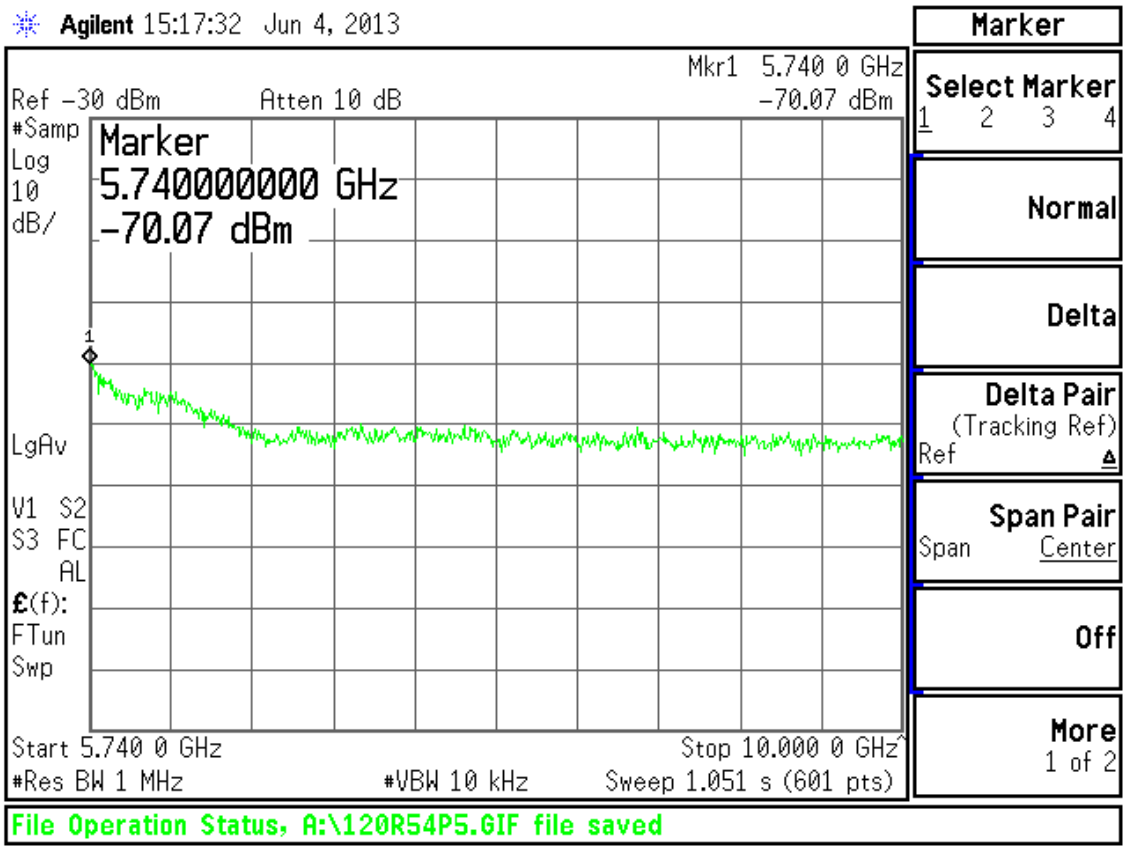
CH120 802.11a Tx Conducted Emissions @ 54Mbps



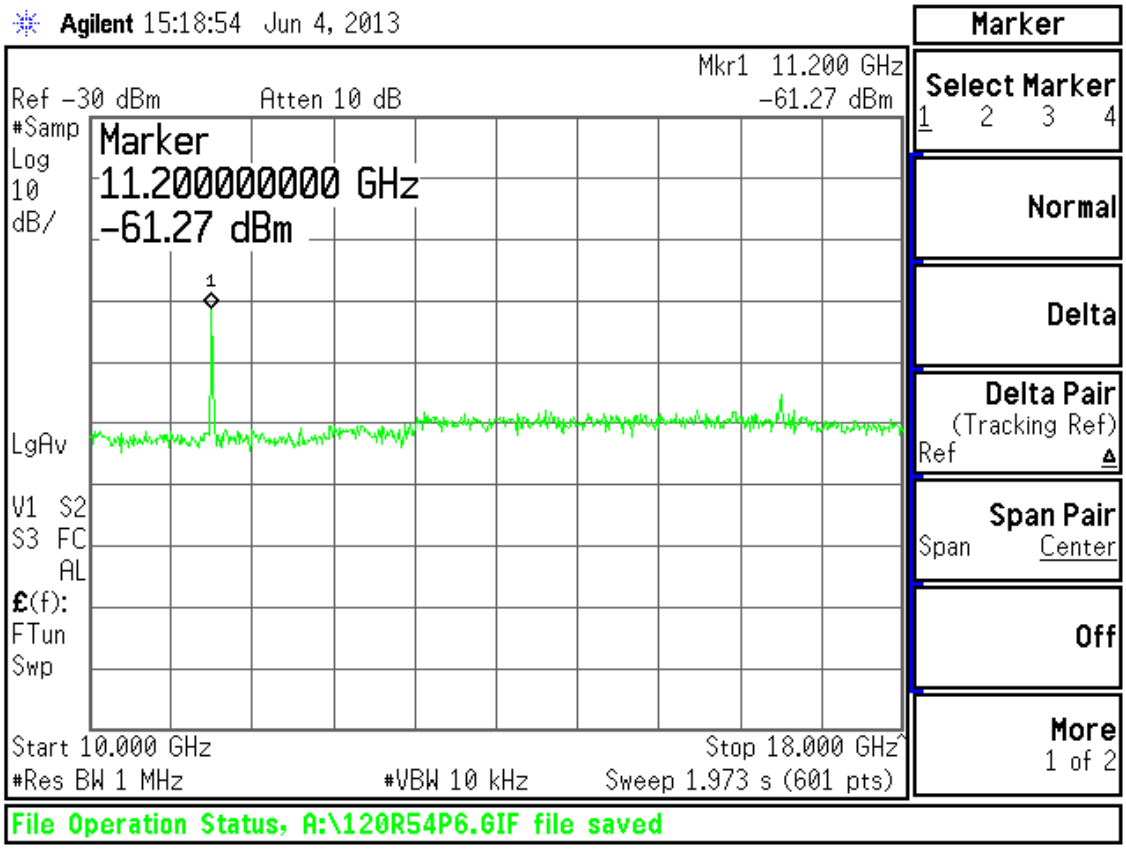
CH120 802.11a Tx Conducted Emissions @ 54Mbps



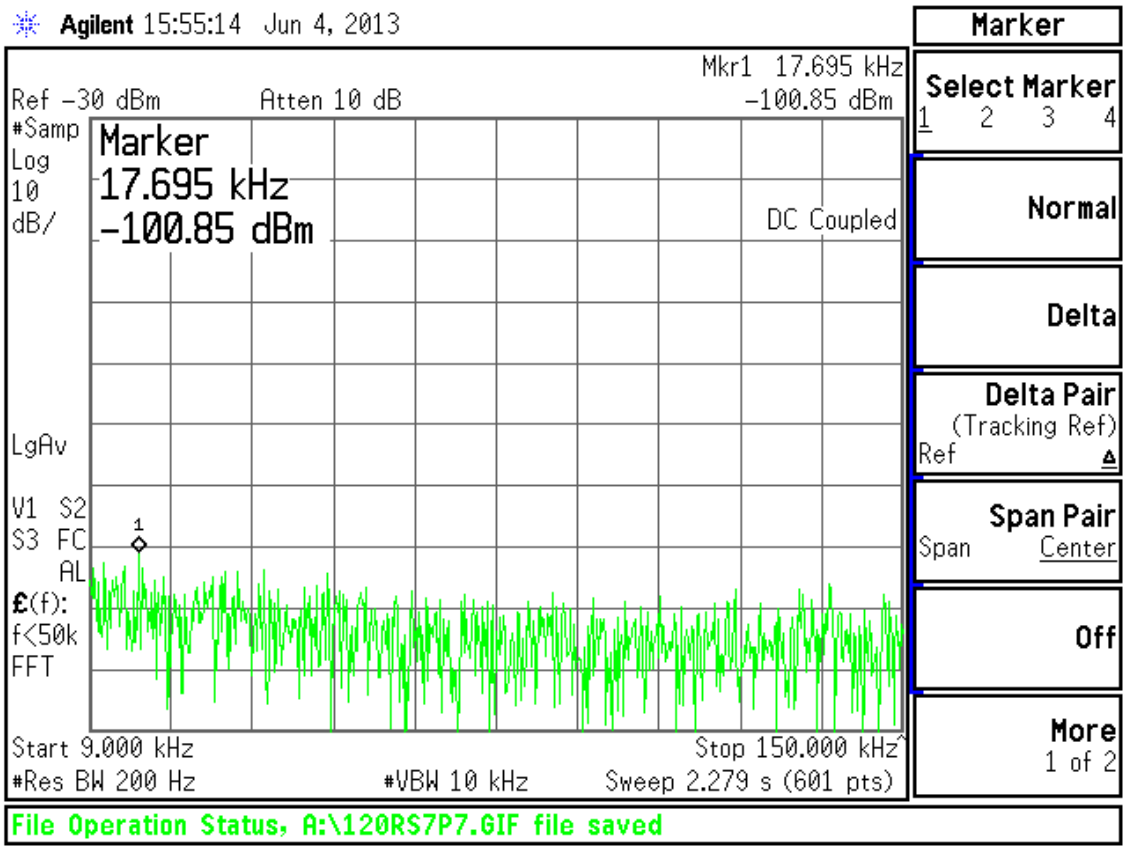
CH120 802.11a Tx Conducted Emissions @ 54Mbps



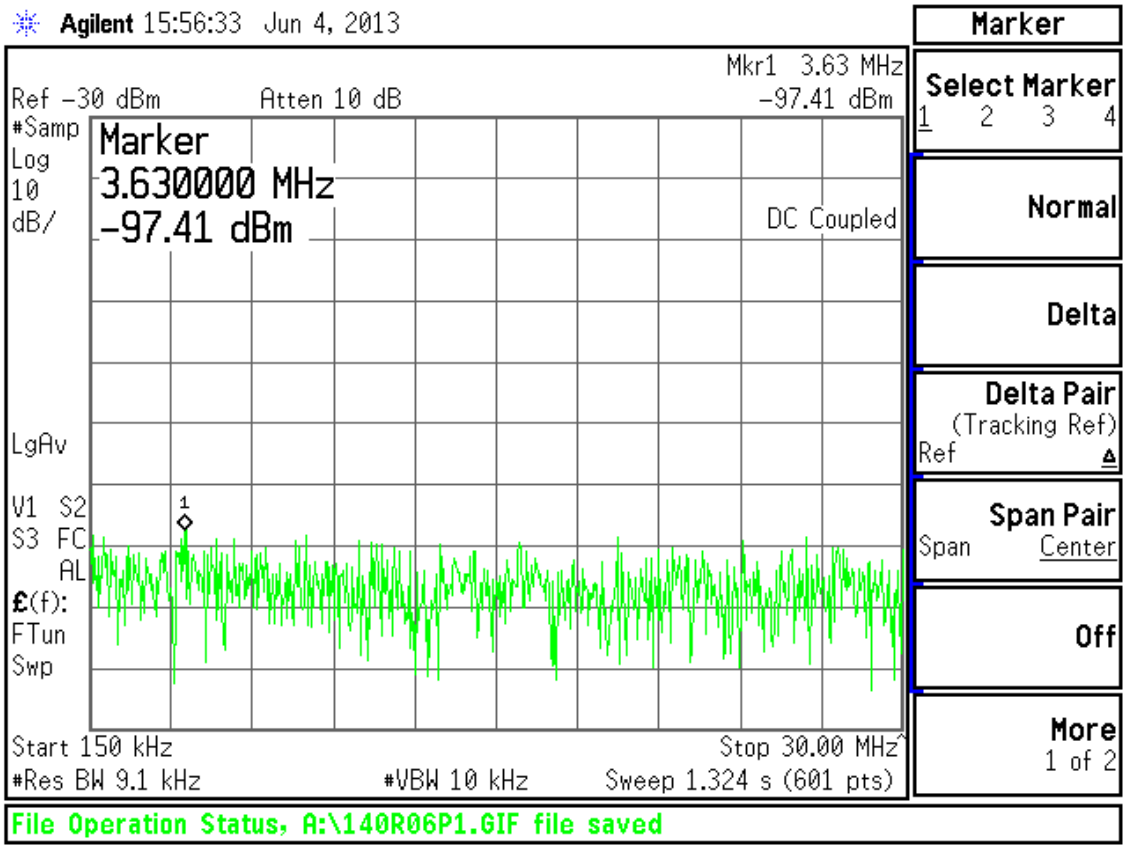
CH120 802.11a Tx Conducted Emissions @ 54Mbps



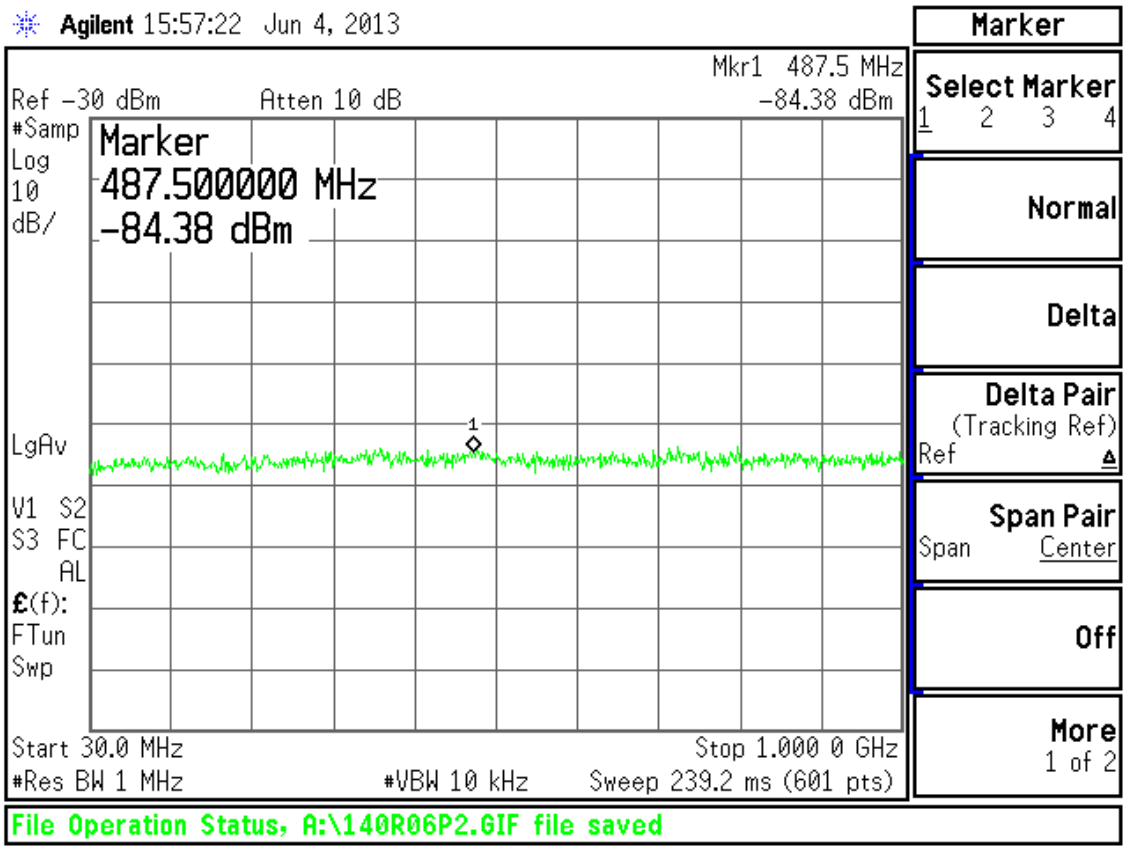
CH120 802.11a Tx Conducted Emissions @ 54Mbps



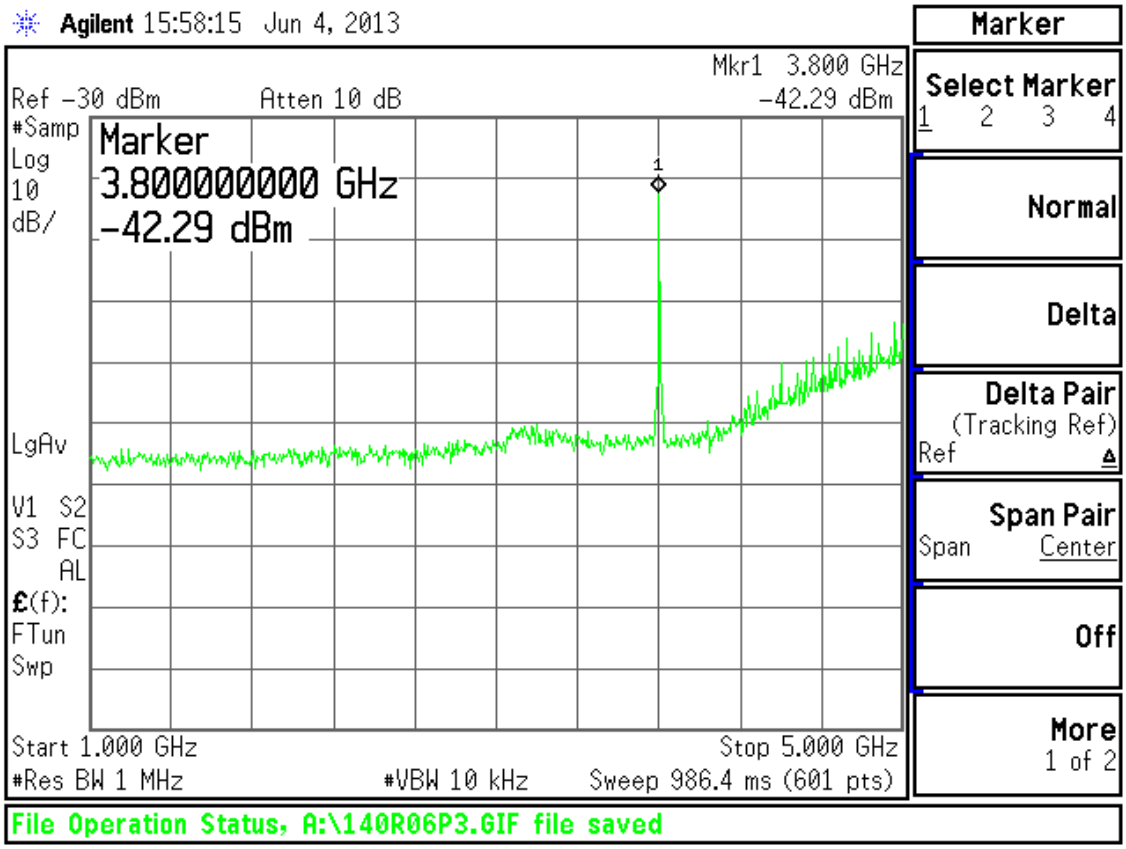
CH140 802.11a Tx Conducted Emissions @ 6Mbps



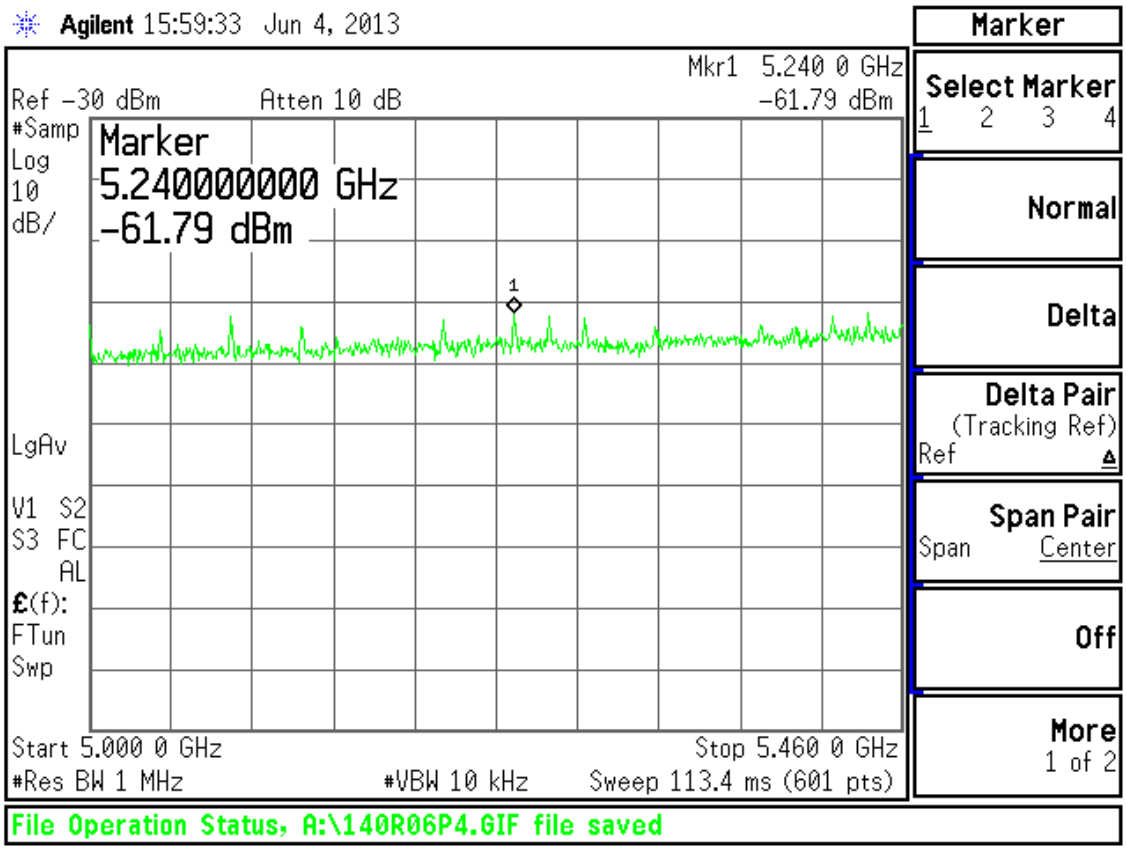
CH140 802.11a Tx Conducted Emissions @ 6Mbps



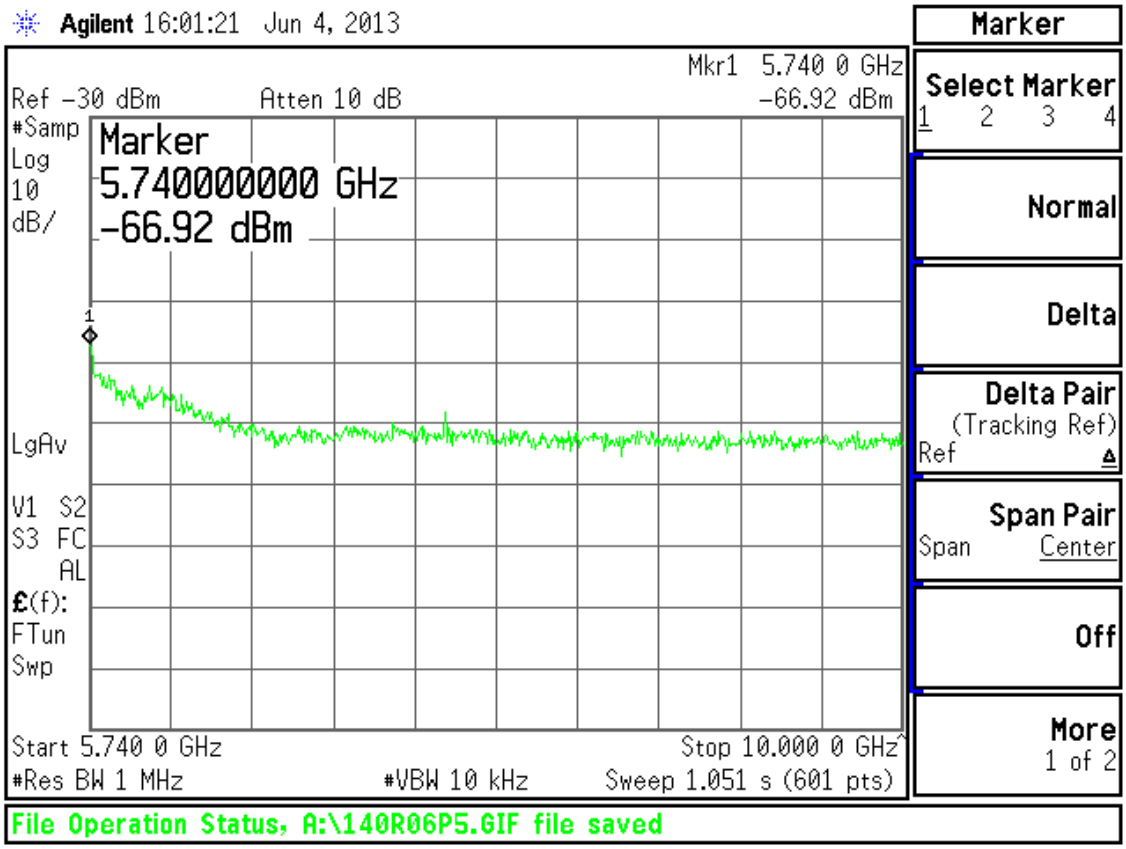
CH140 802.11a Tx Conducted Emissions @ 6Mbps



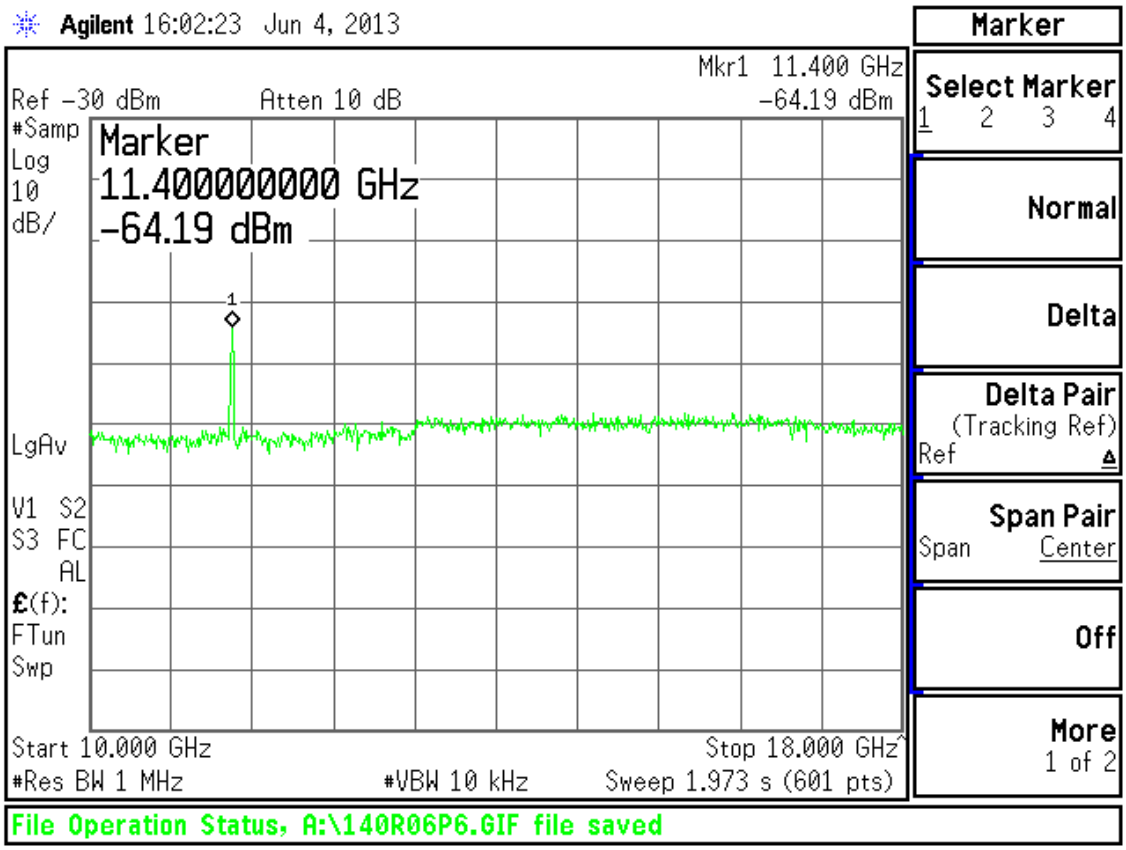
CH140 802.11a Tx Conducted Emissions @ 6Mbps



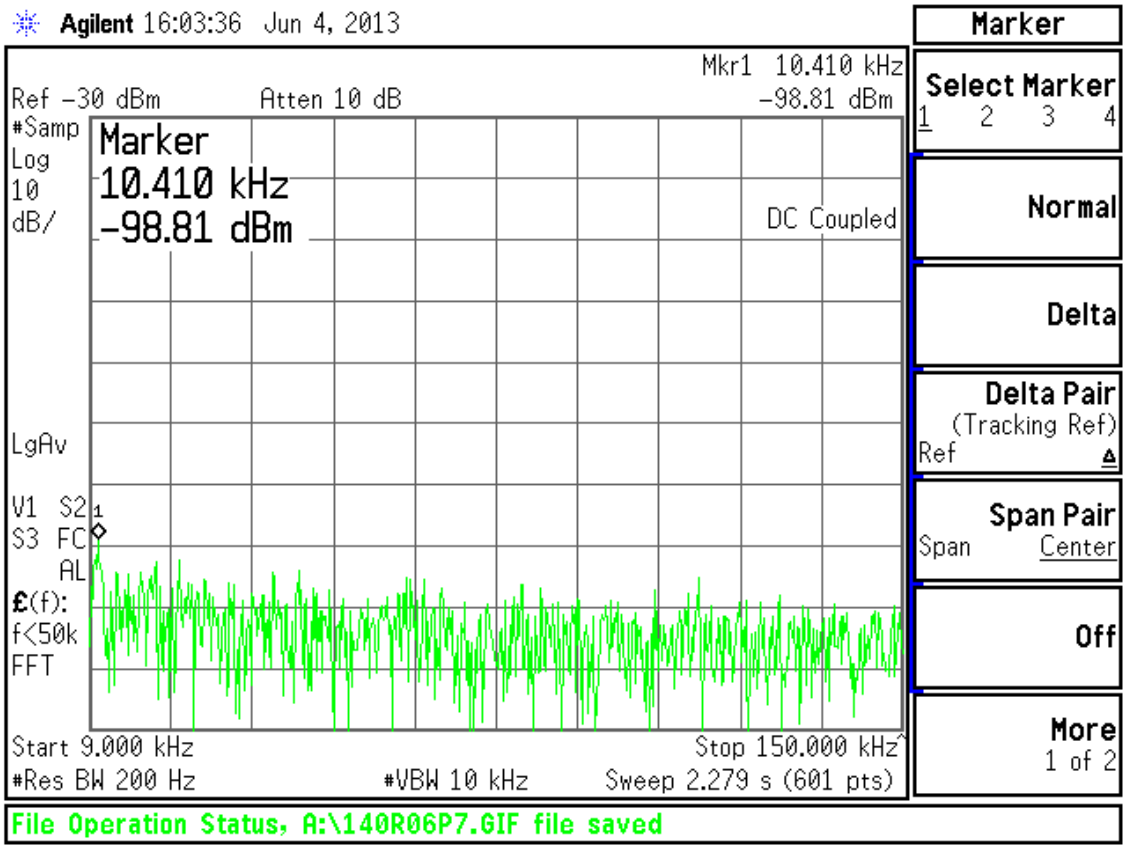
CH140 802.11a Tx Conducted Emissions @ 6Mbps



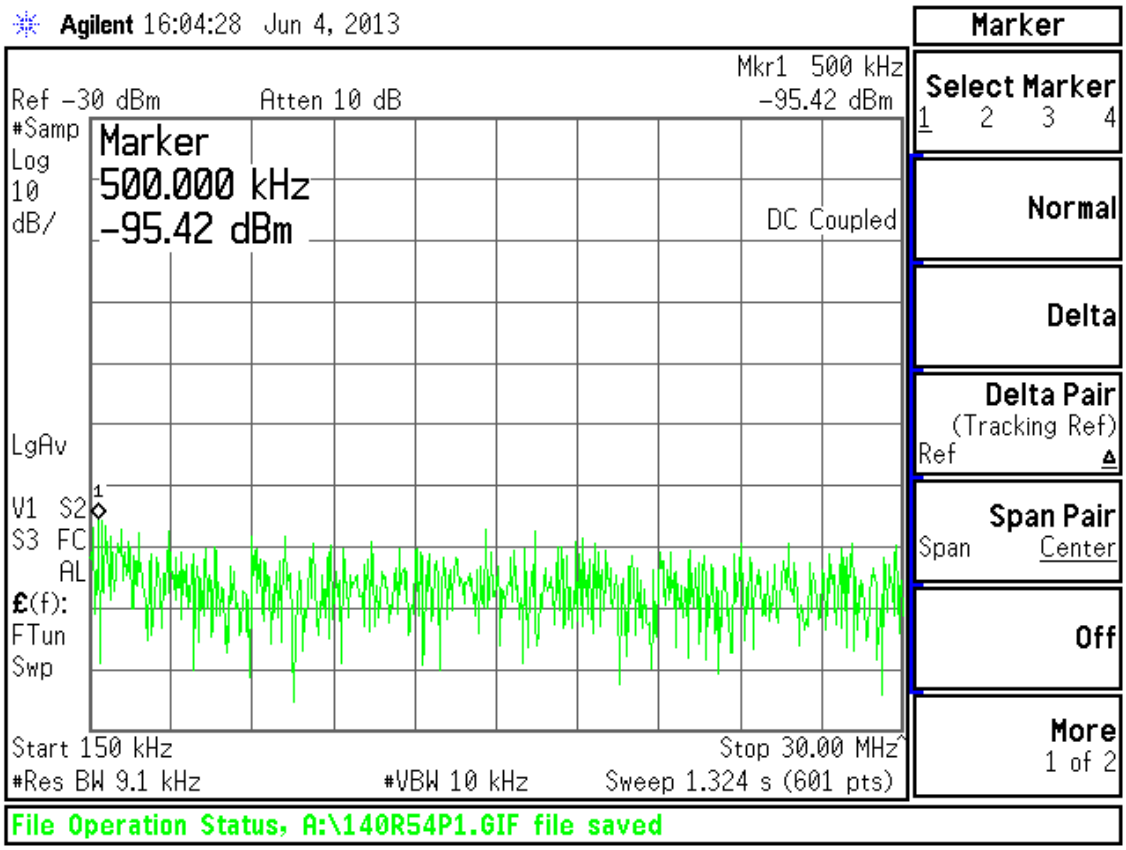
CH140 802.11a Tx Conducted Emissions @ 6Mbps



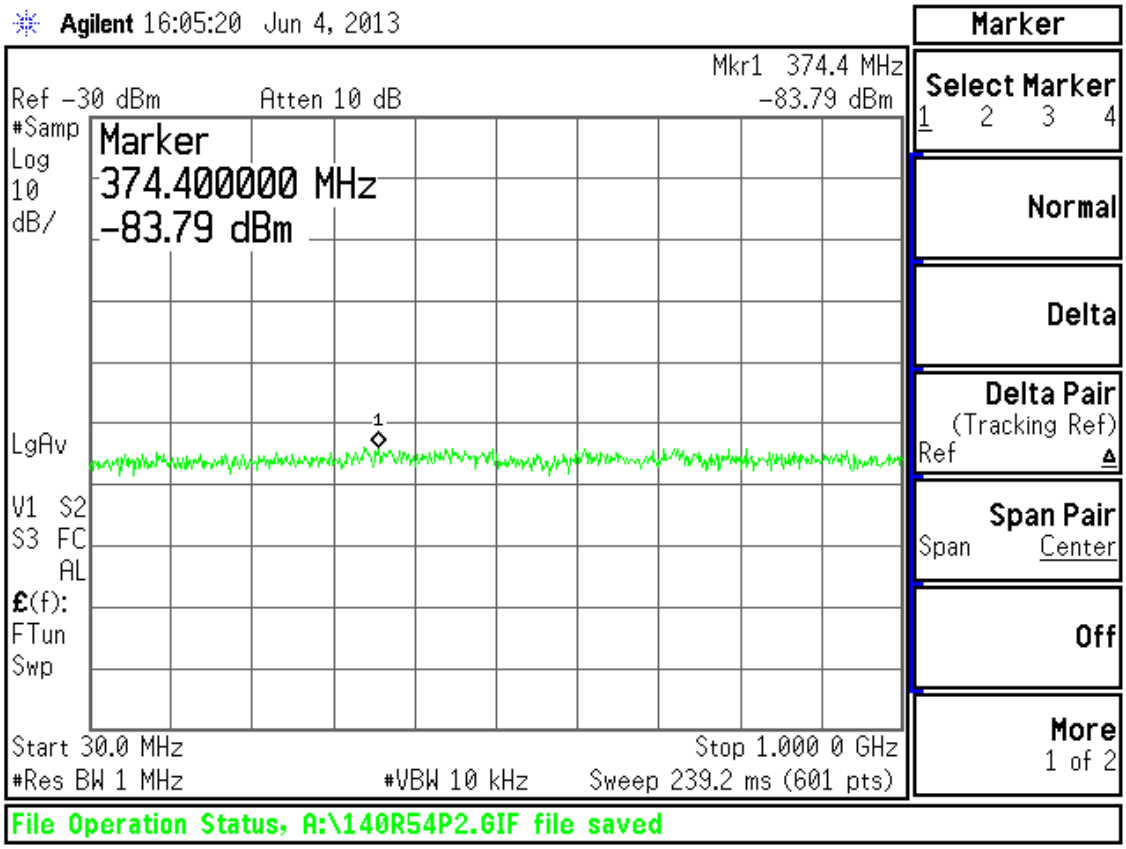
CH140 802.11a Tx Conducted Emissions @ 6Mbps



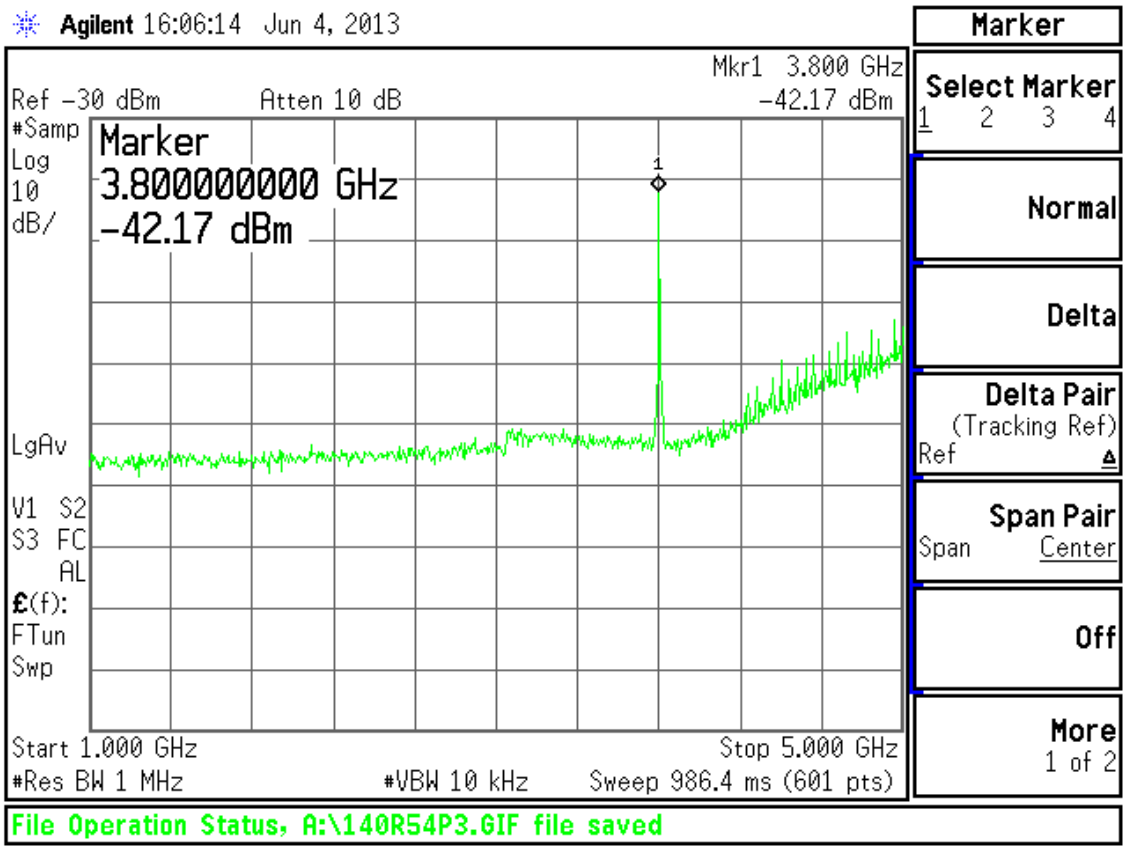
CH140 802.11a Tx Conducted Emissions @ 54Mbps



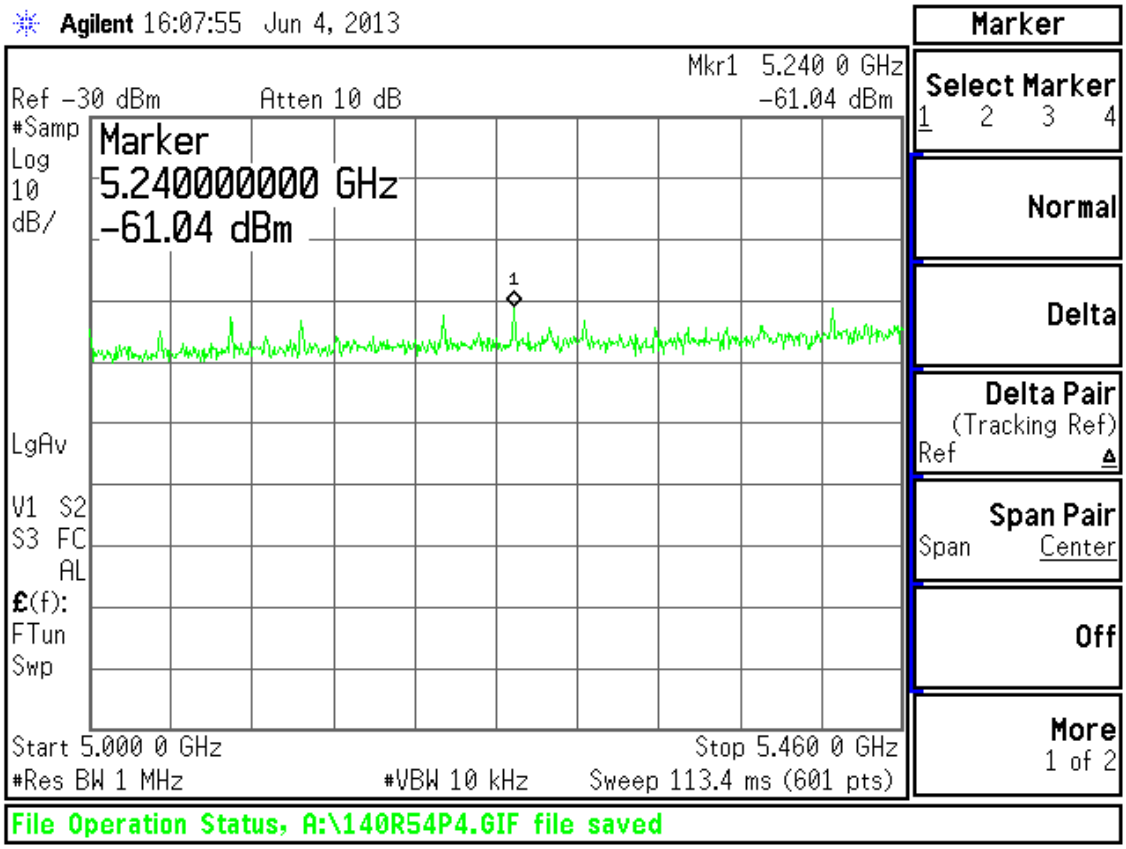
CH140 802.11a Tx Conducted Emissions @ 54Mbps



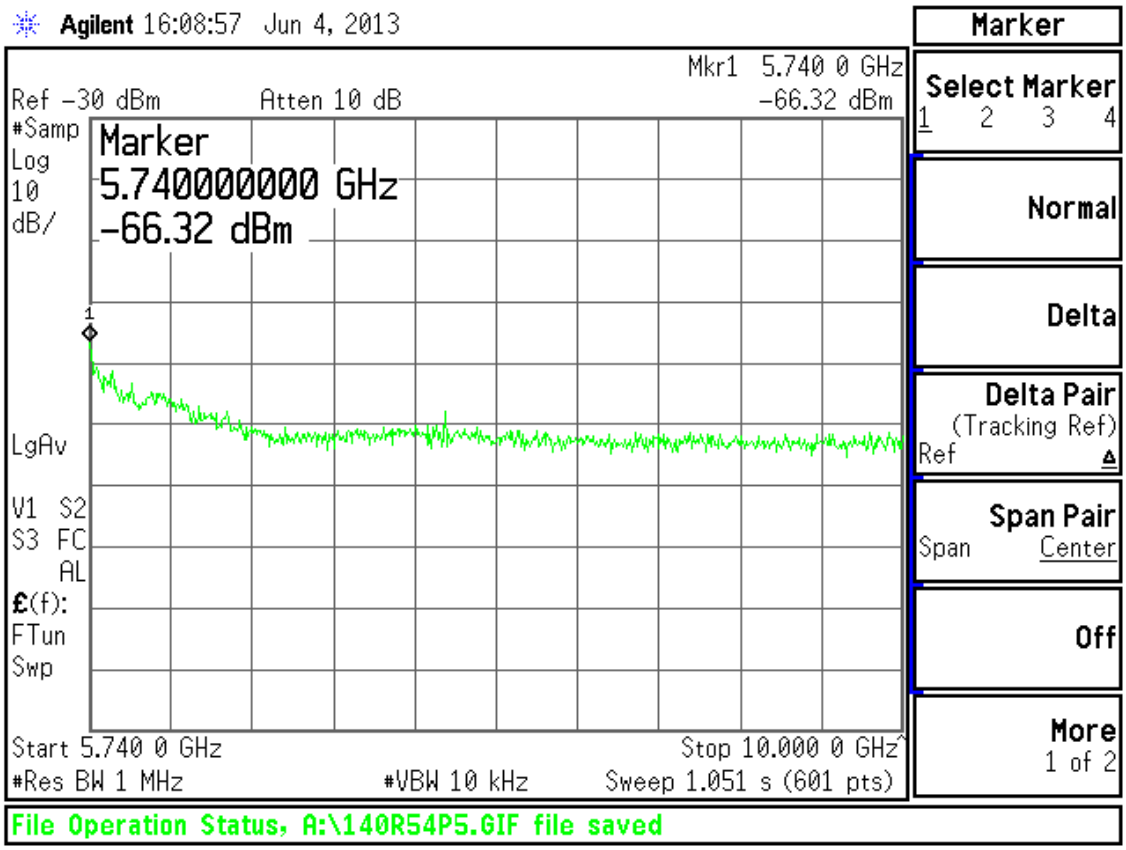
CH140 802.11a Tx Conducted Emissions @ 54Mbps



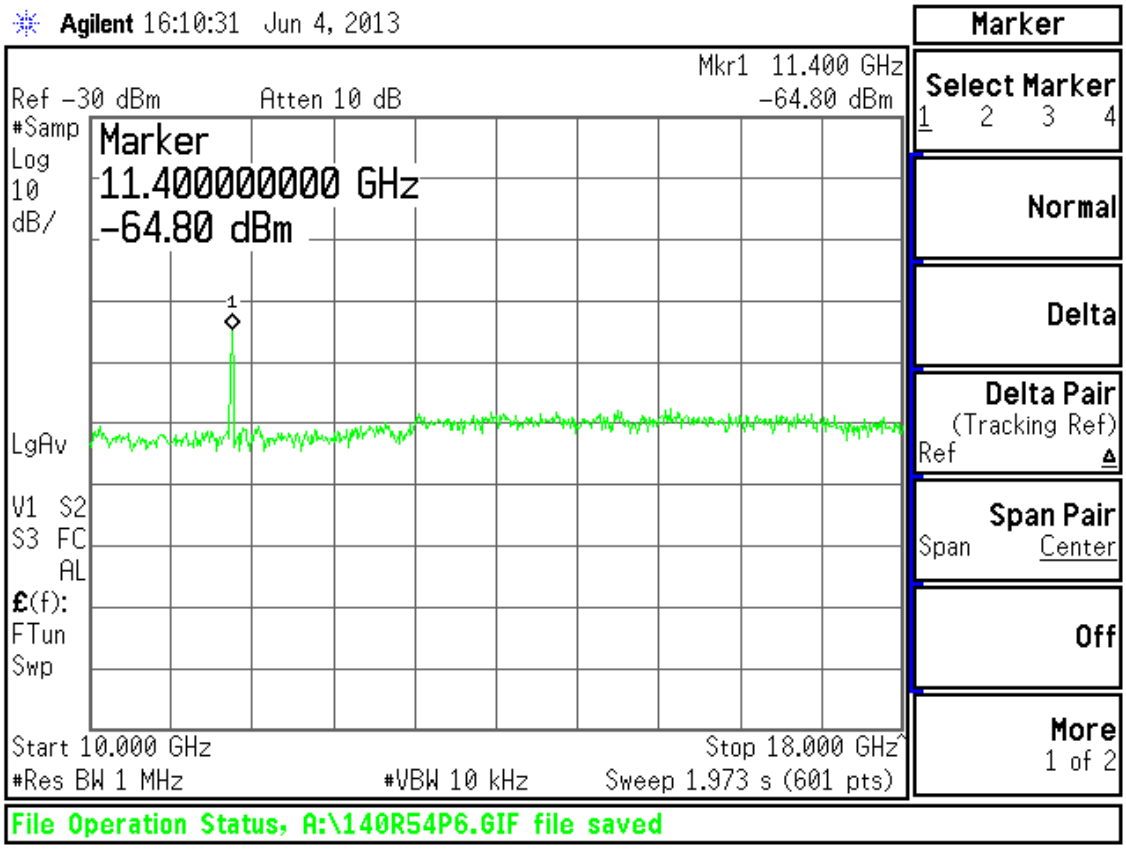
CH140 802.11a Tx Conducted Emissions @ 54Mbps



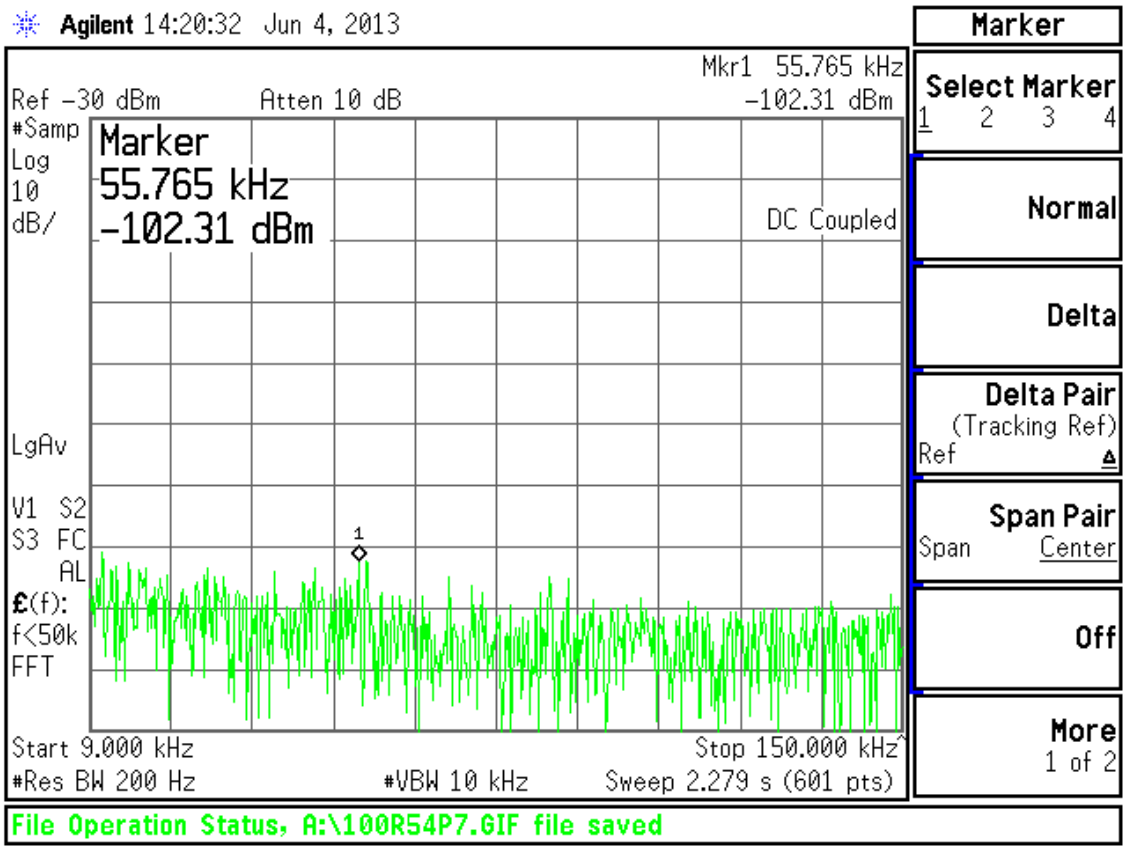
CH140 802.11a Tx Conducted Emissions @ 54Mbps



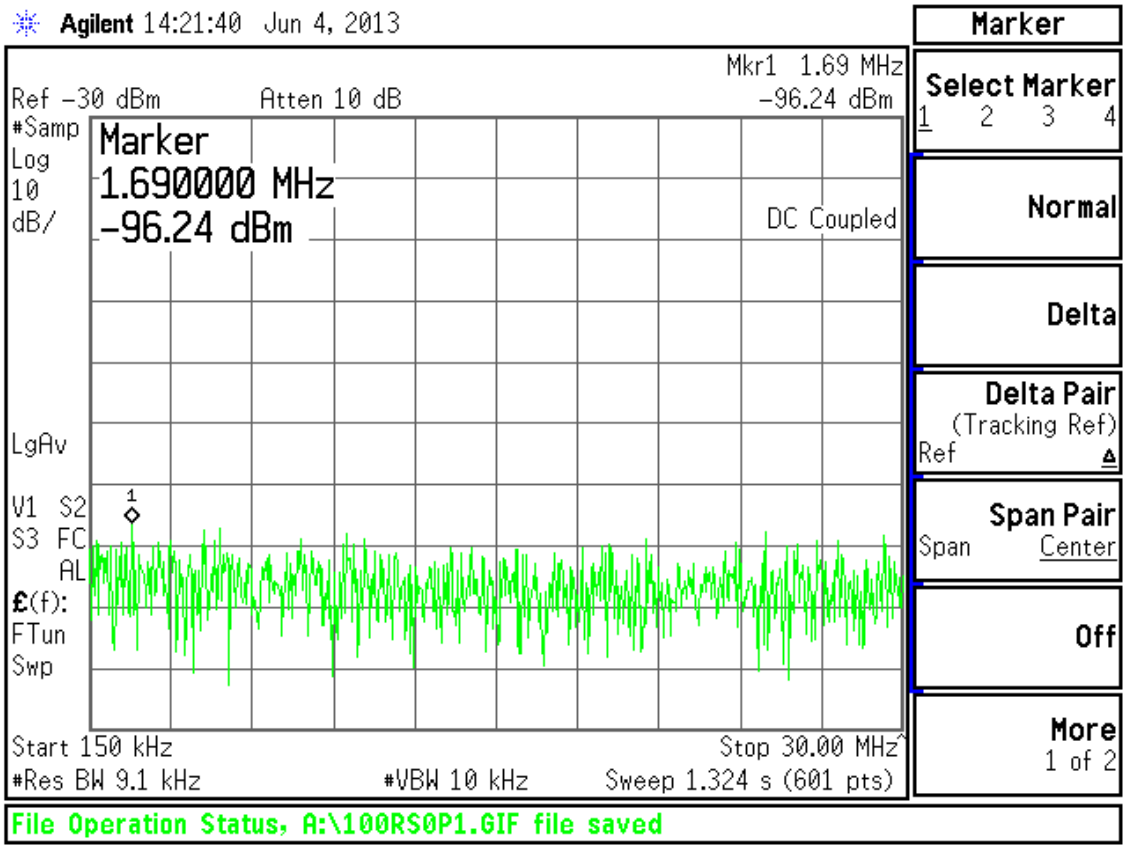
CH140 802.11a Tx Conducted Emissions @ 54Mbps



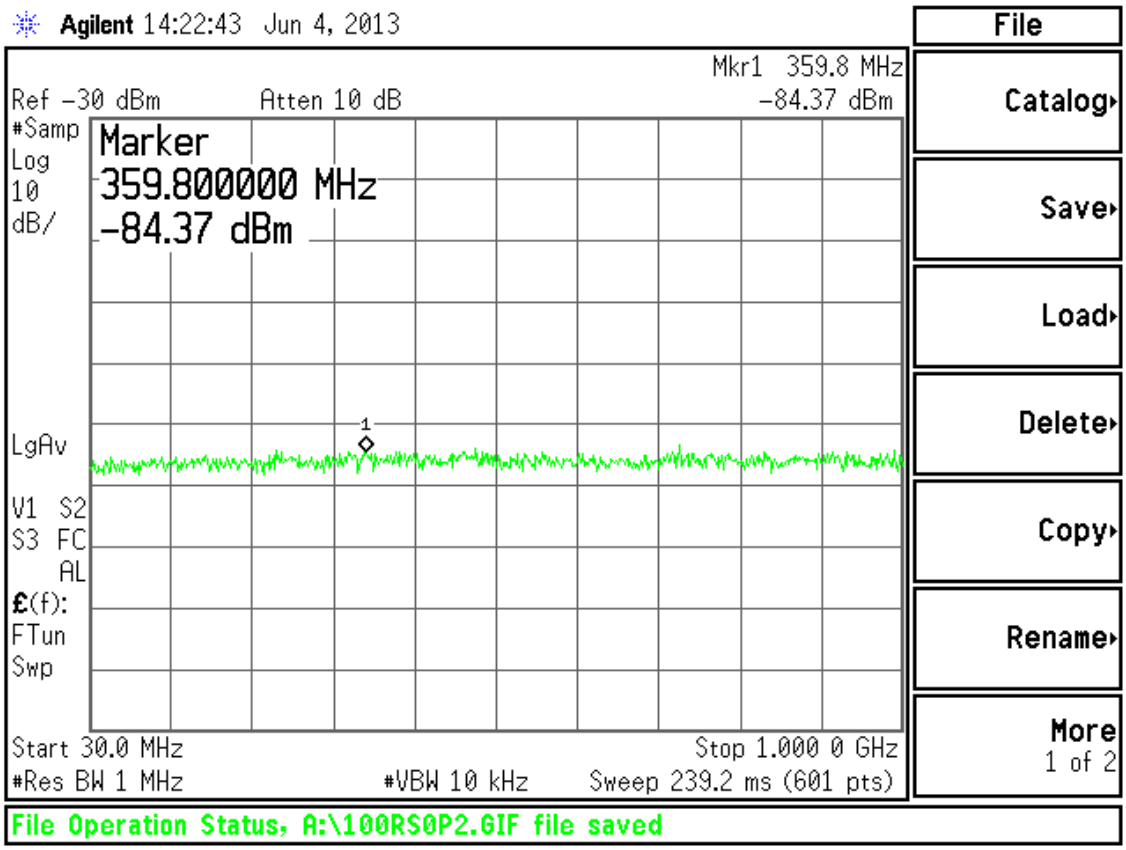
CH140 802.11a Tx Conducted Emissions @ 54Mbps



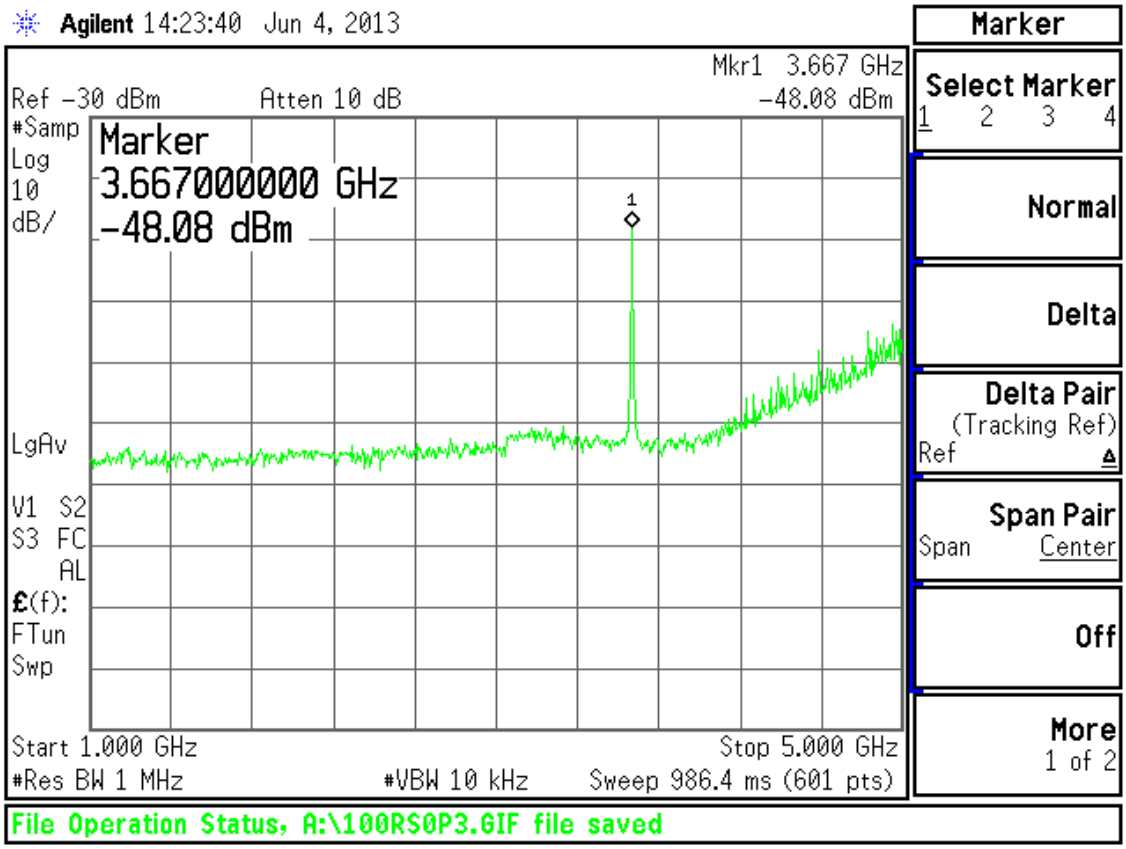
CH100 802.11n Tx Conducted Emissions (MCS0)



CH100 802.11n Tx Conducted Emissions (MCS0)



CH100 802.11n Tx Conducted Emissions (MCS0)



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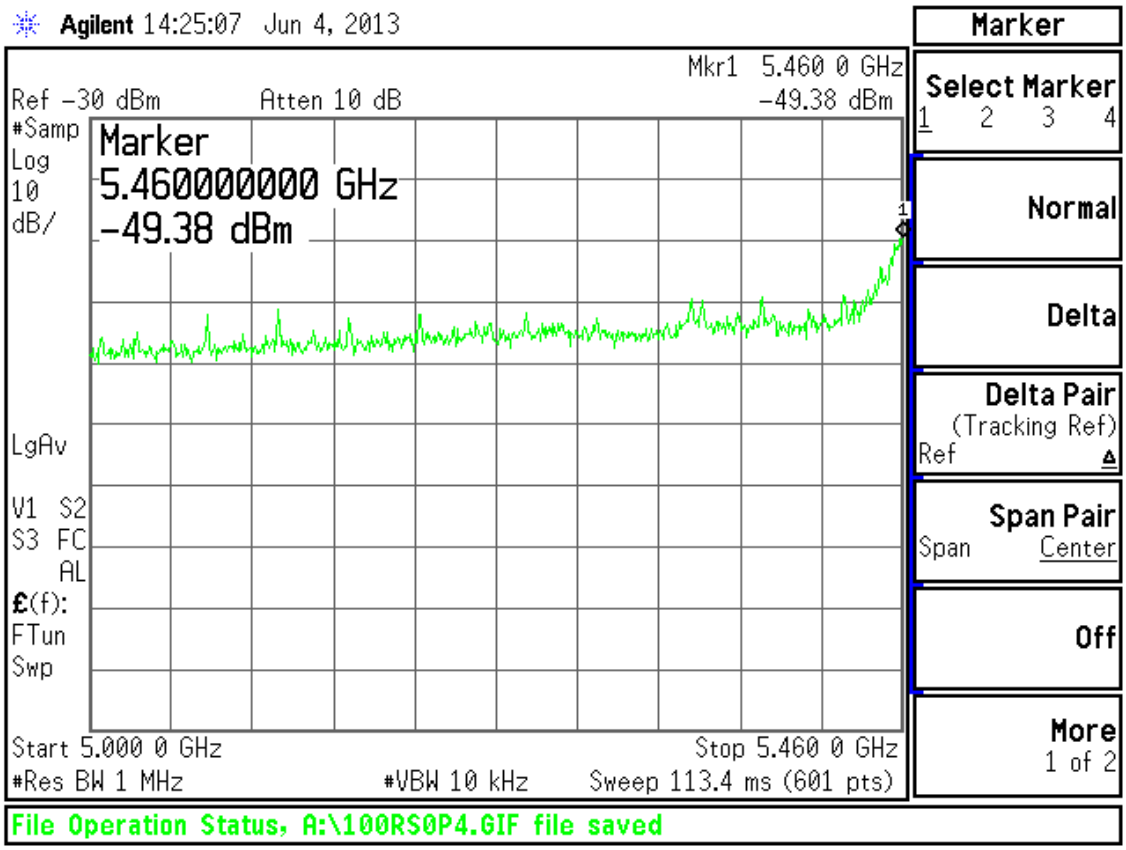
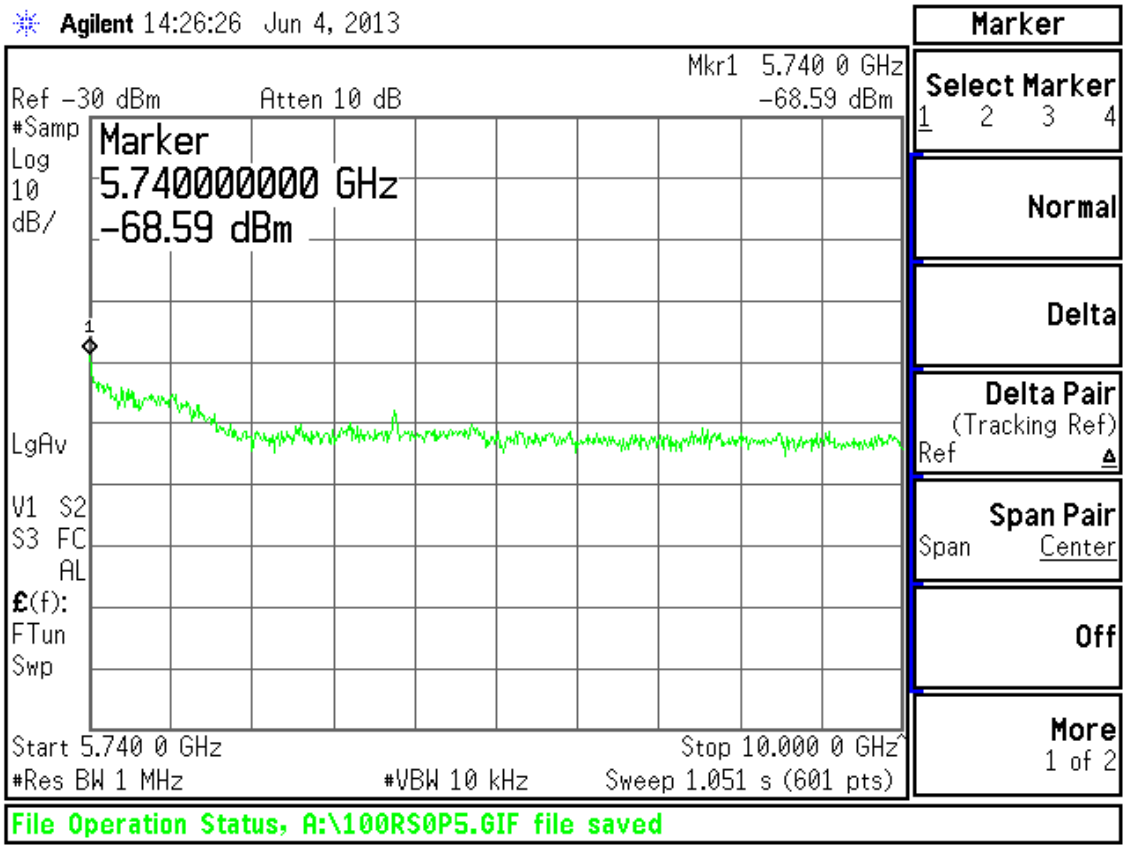


CH100 802.11n Tx Conducted Emissions (MCS0)



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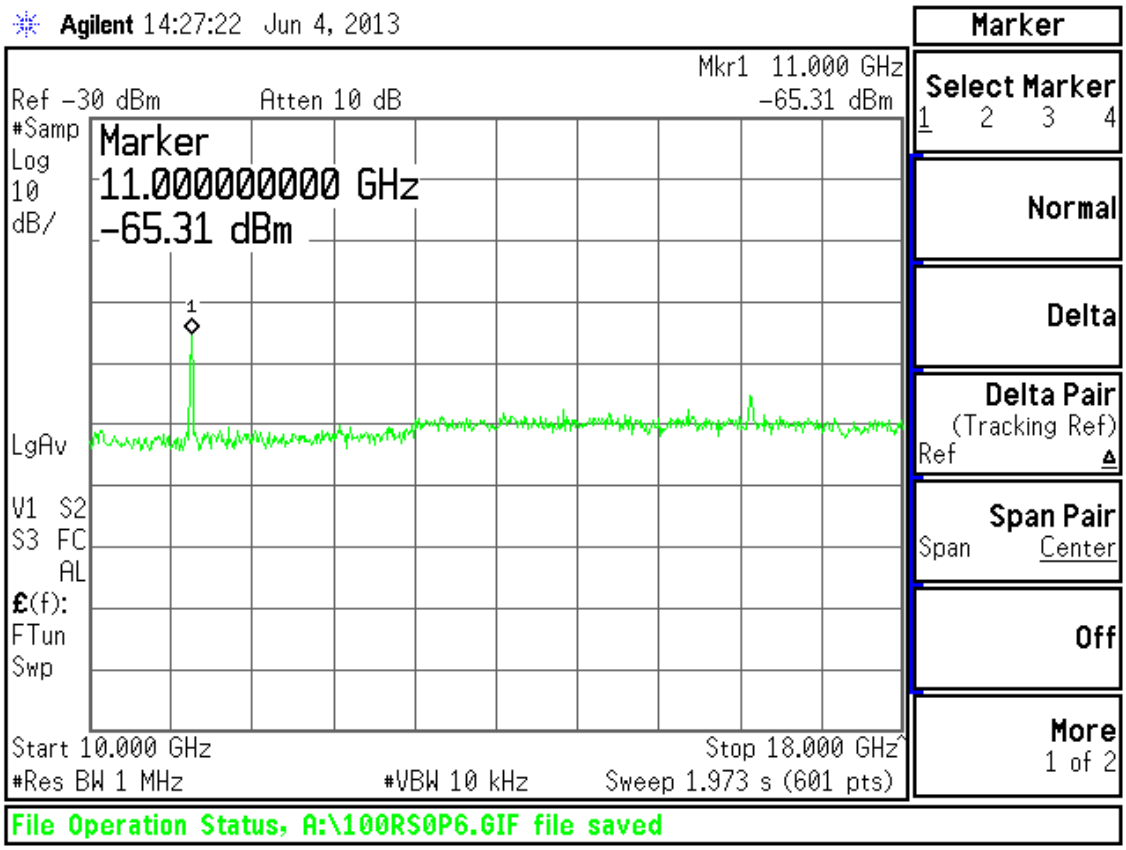

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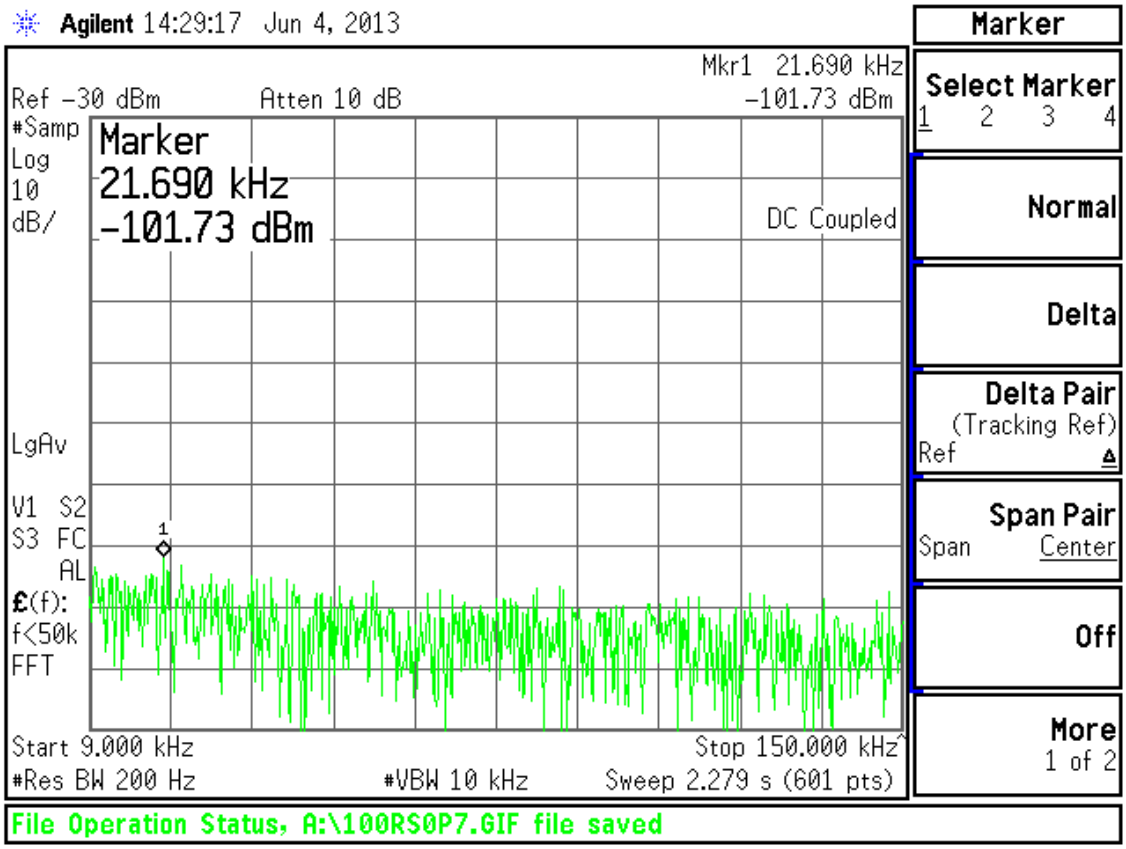
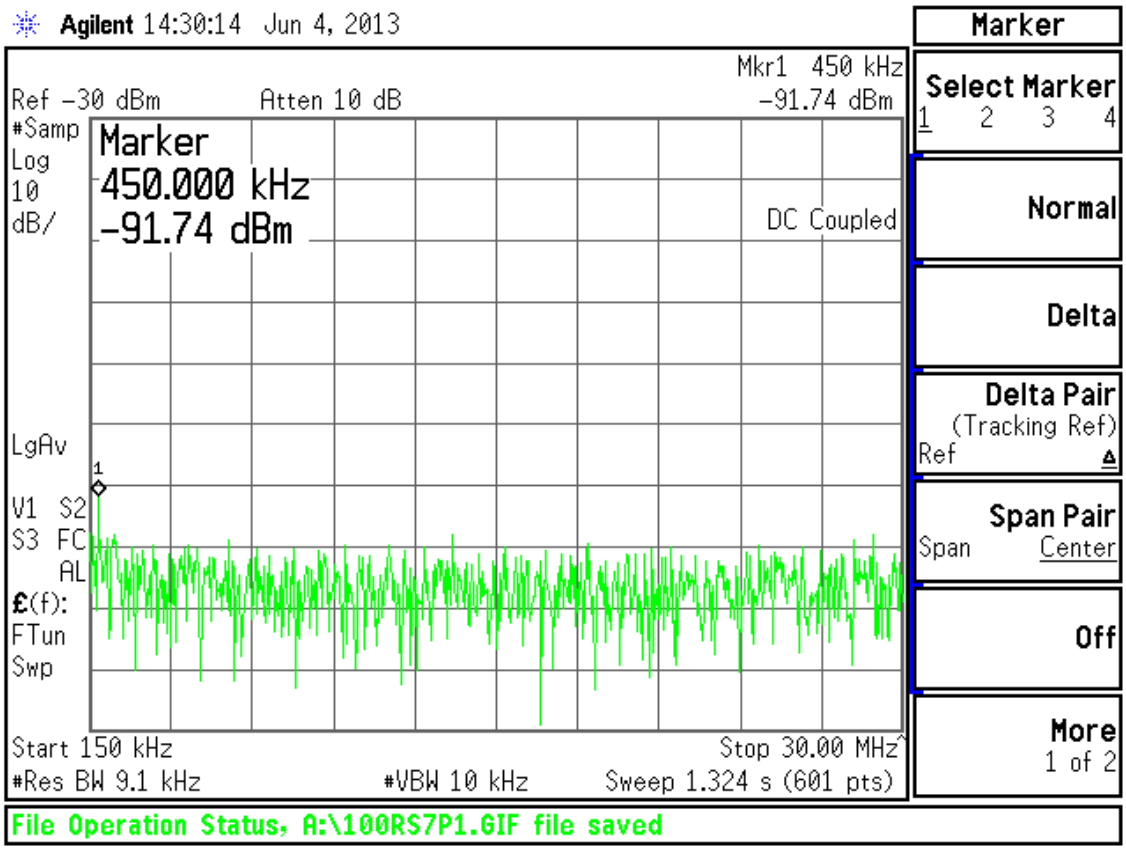
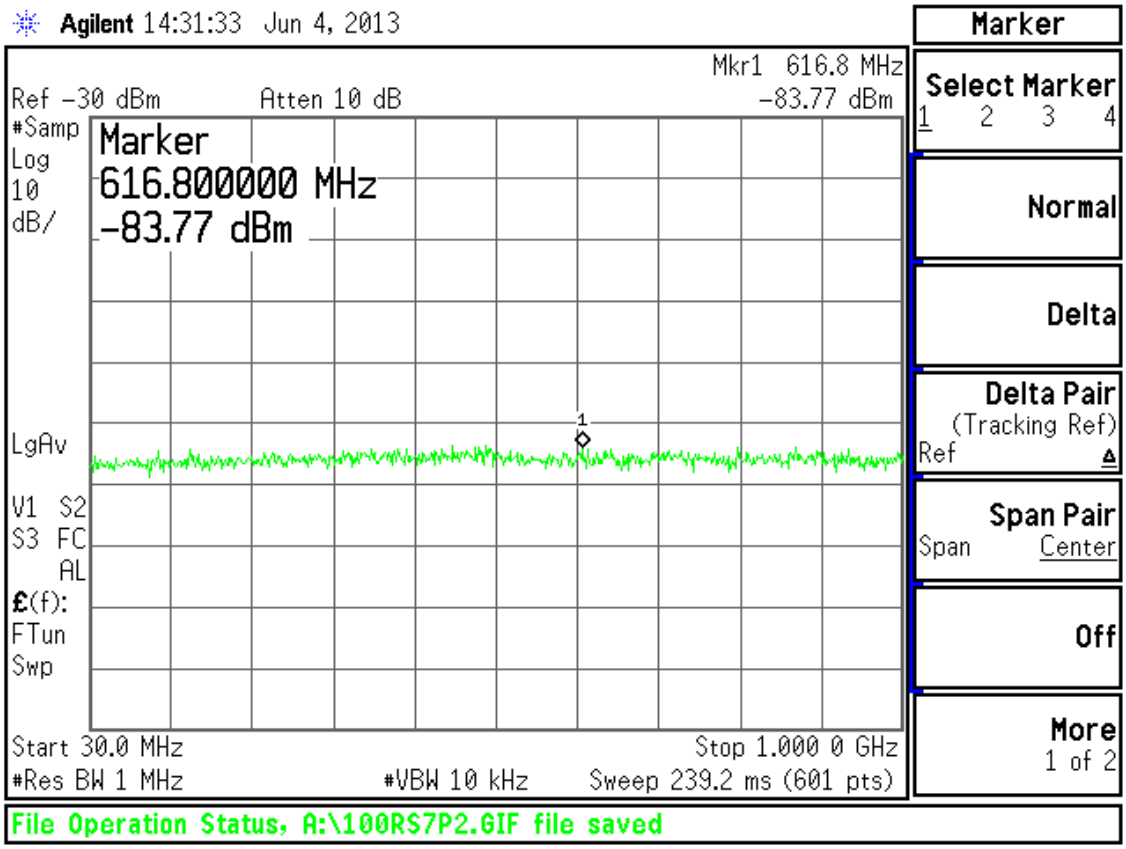


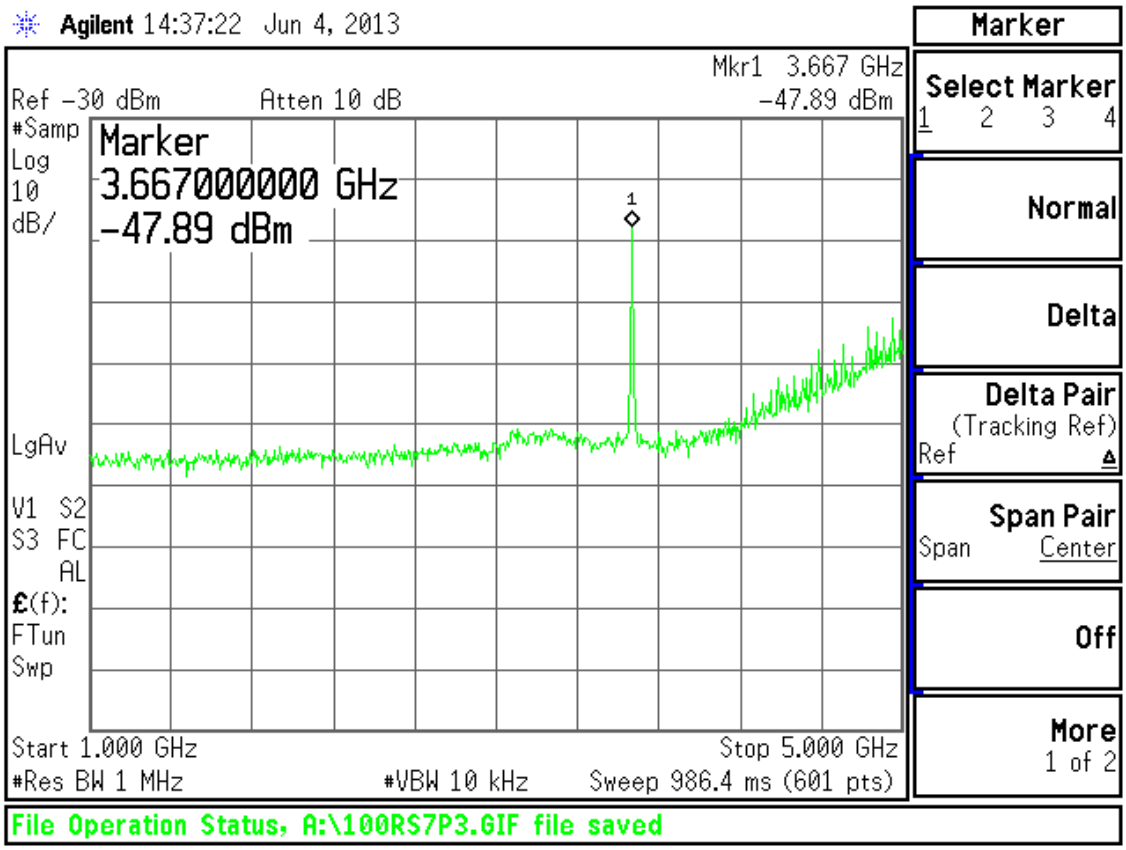
CH100 802.11n Tx Conducted Emissions (MCS7)



CH100 802.11n Tx Conducted Emissions (MCS7)



CH100 802.11n Tx Conducted Emissions (MCS7)



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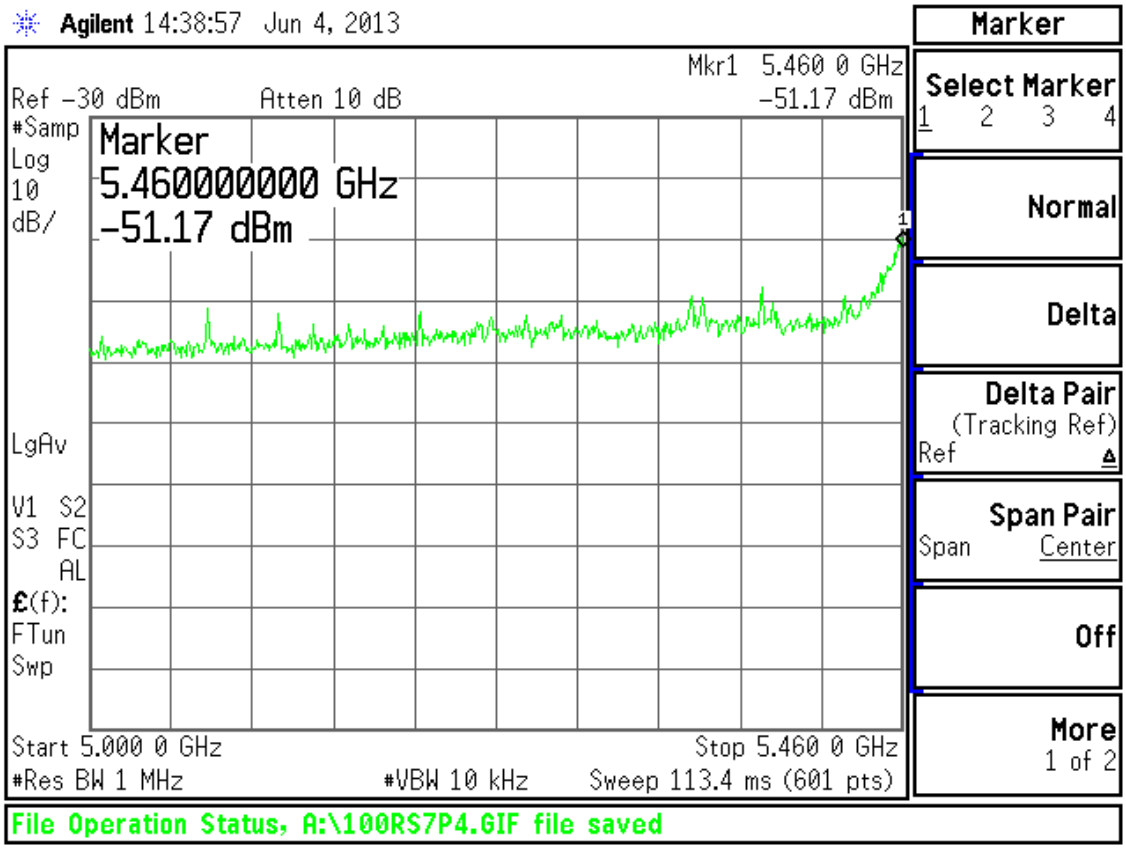

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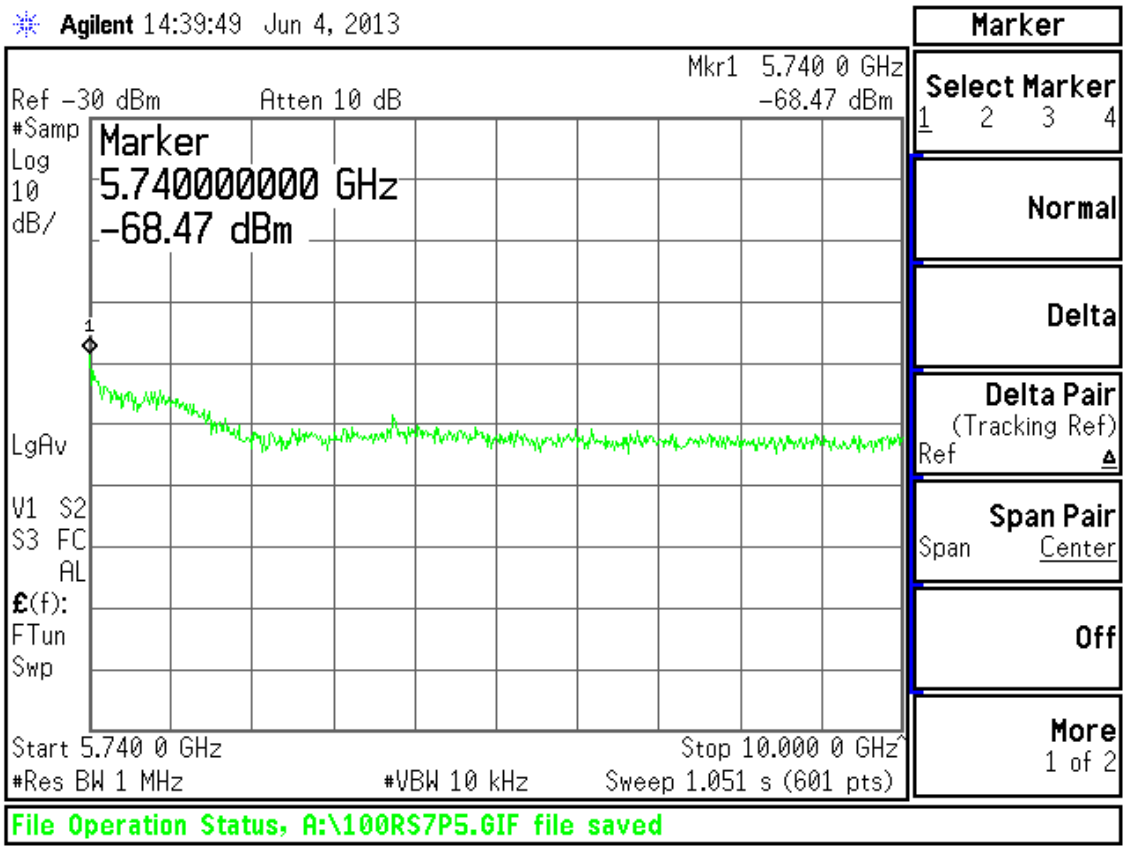

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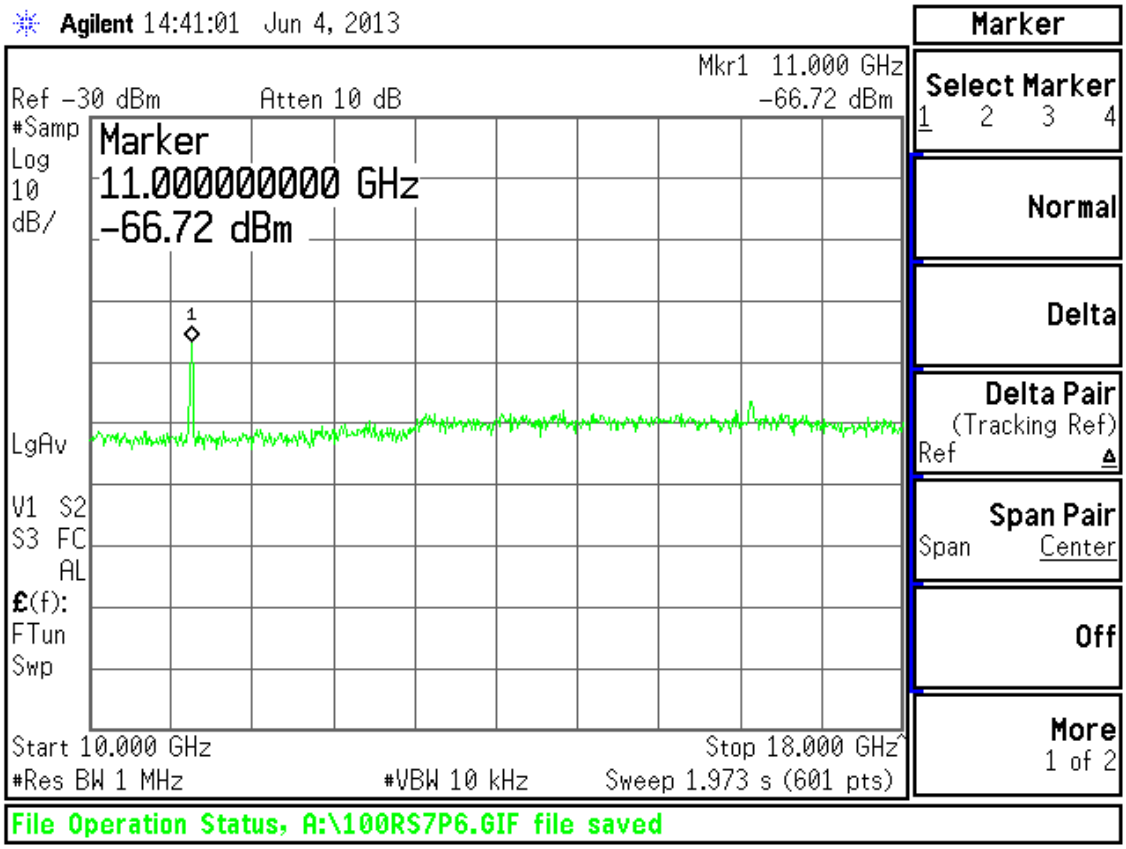
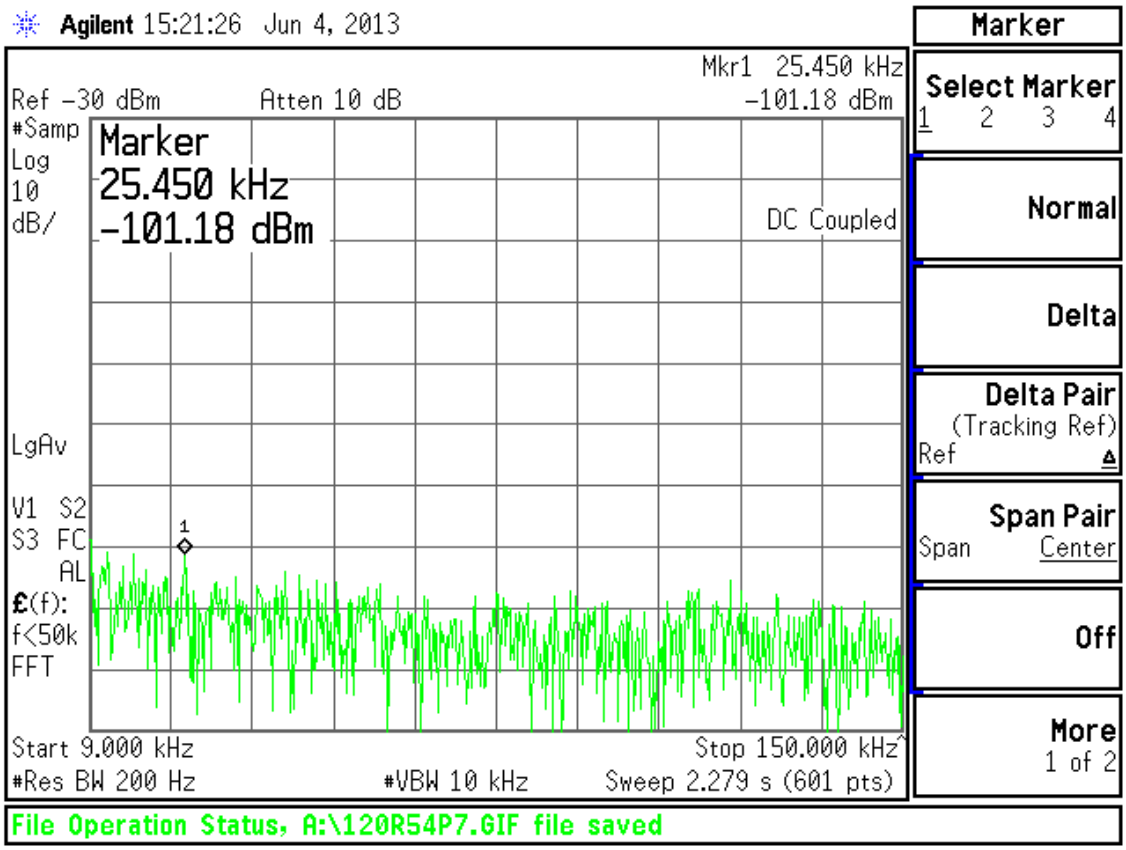
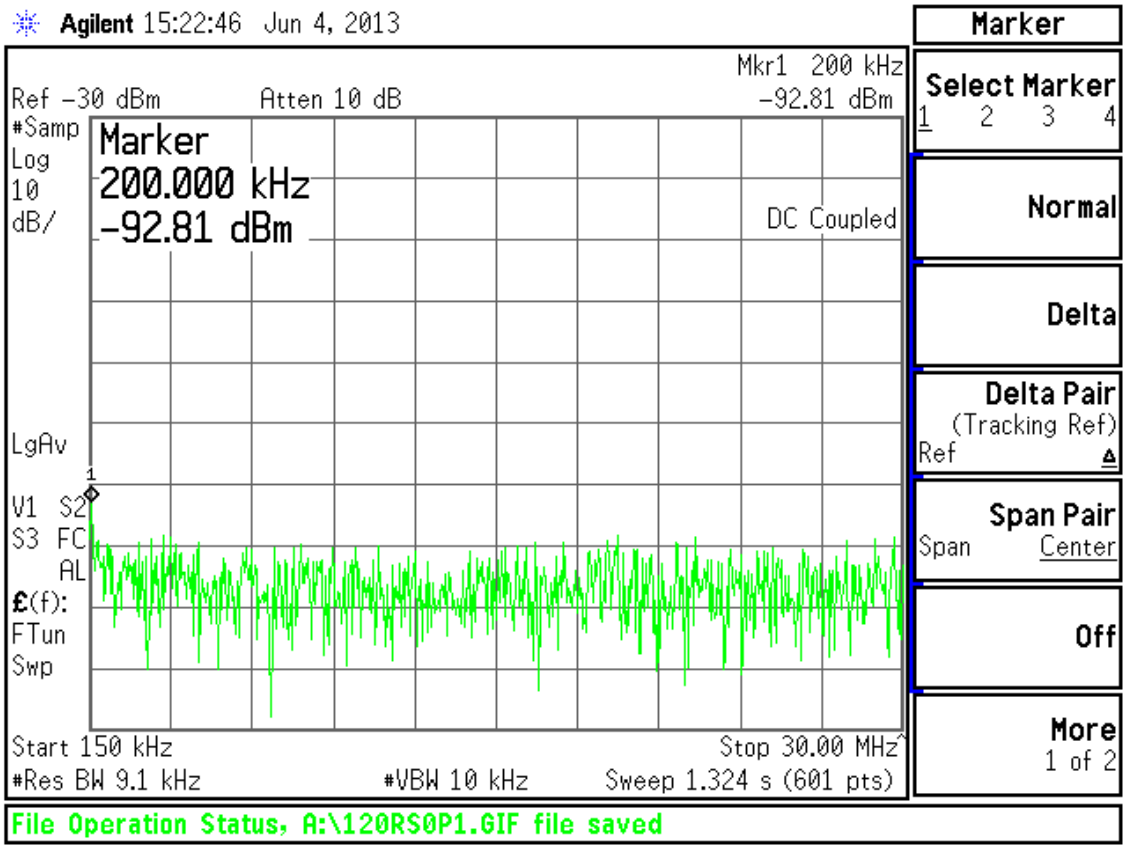


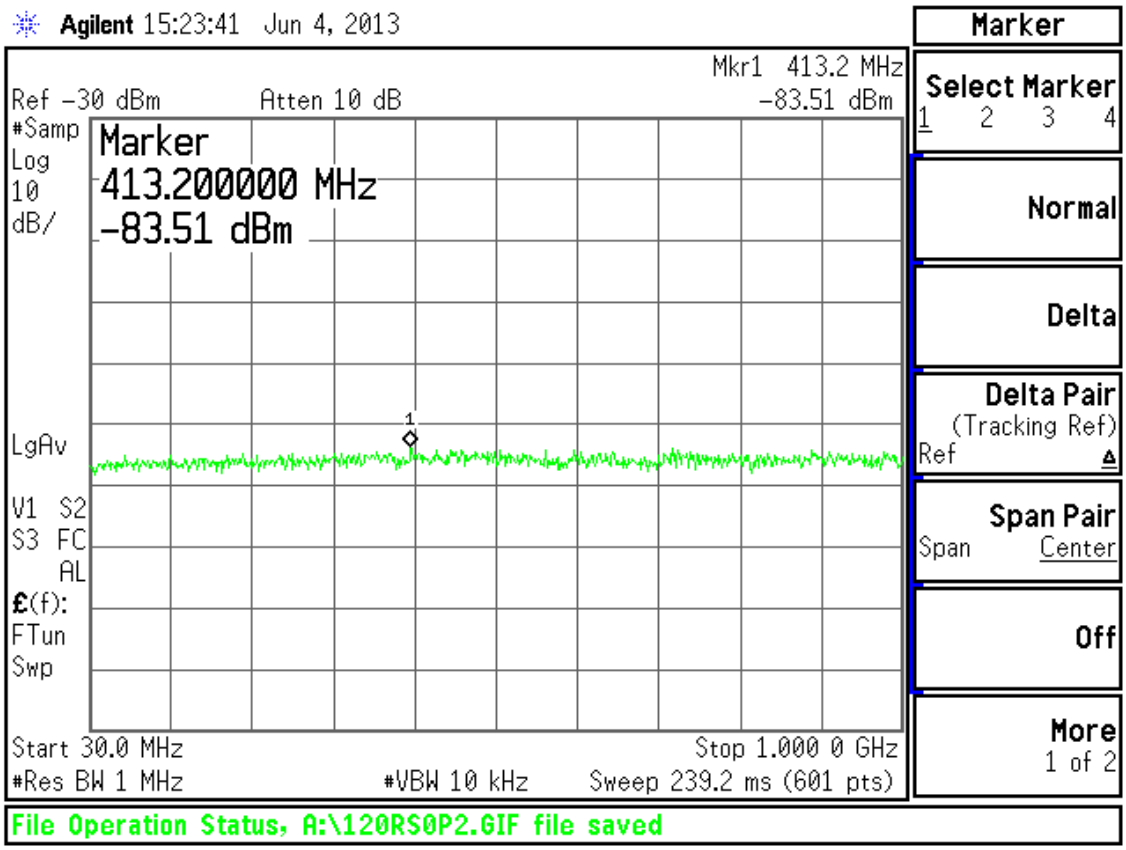
CH100 802.11n Tx Conducted Emissions (MCS7)



CH120 802.11n Tx Conducted Emissions (MCS0)



CH120 802.11n Tx Conducted Emissions (MCS0)



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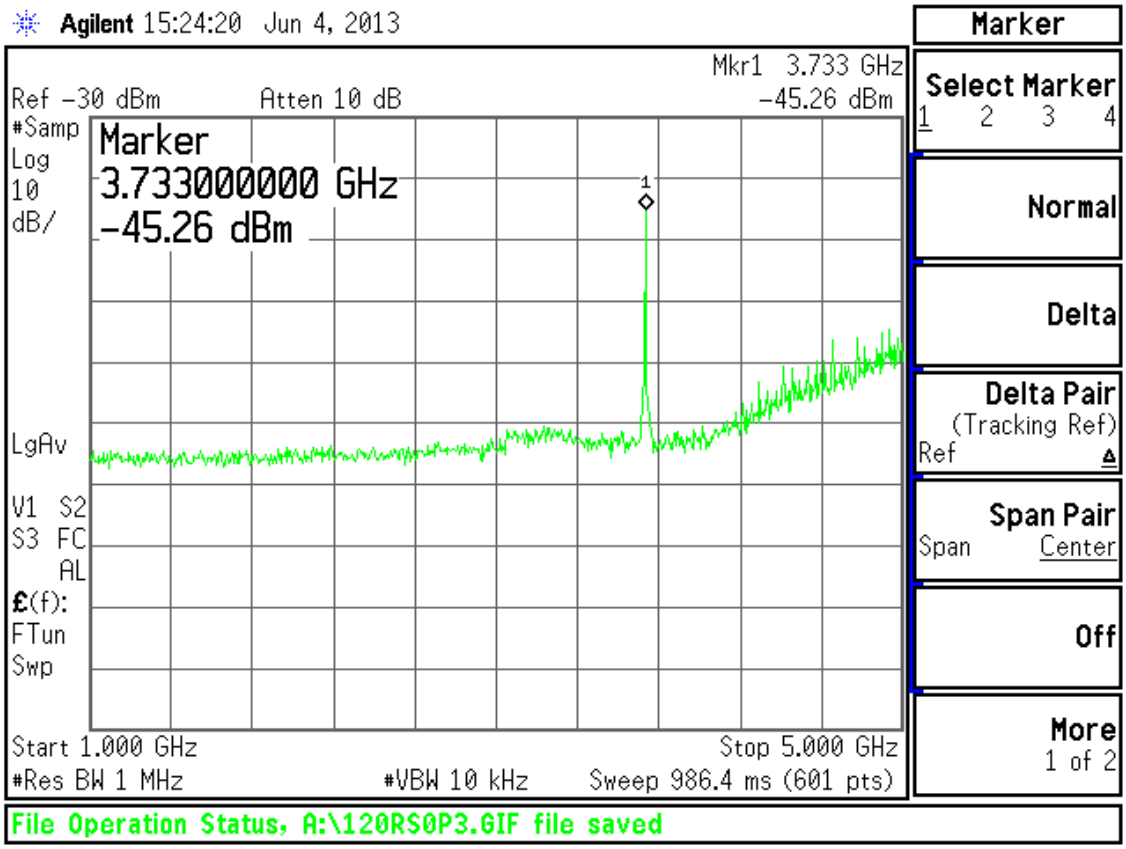
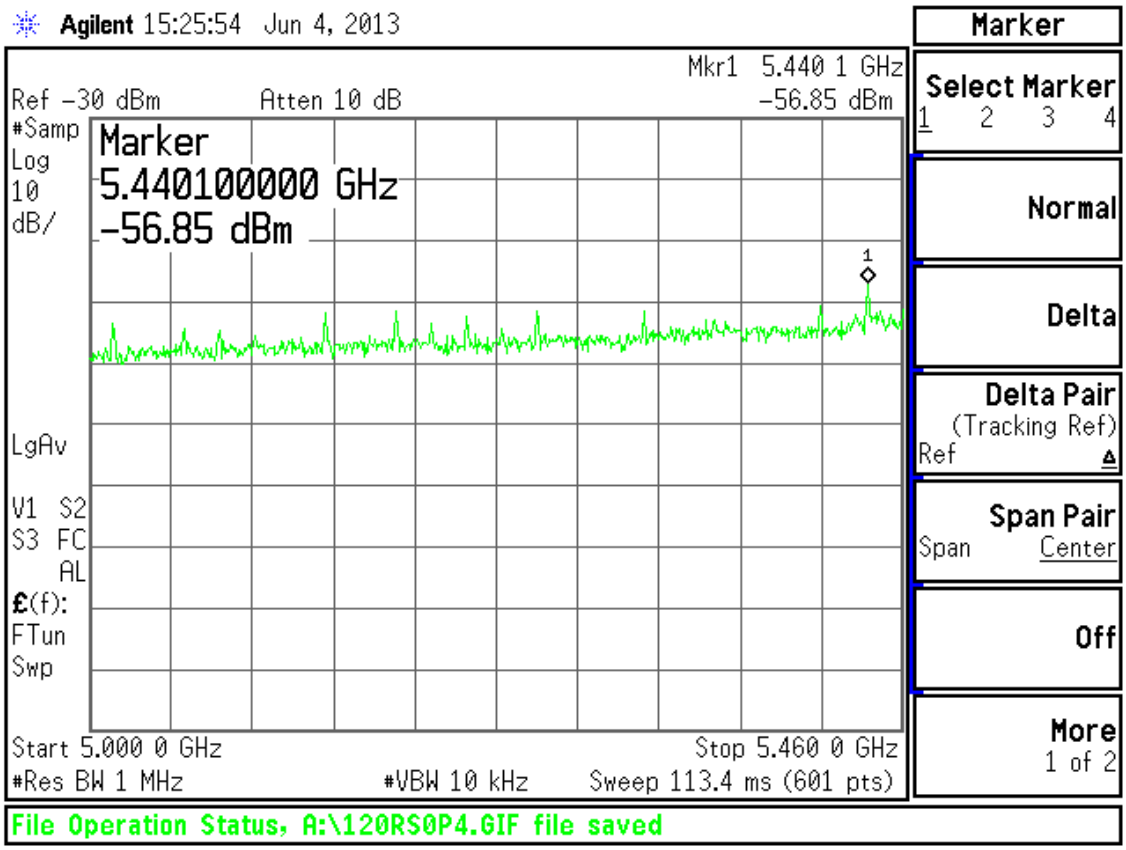


CH120 802.11n Tx Conducted Emissions (MCS0)



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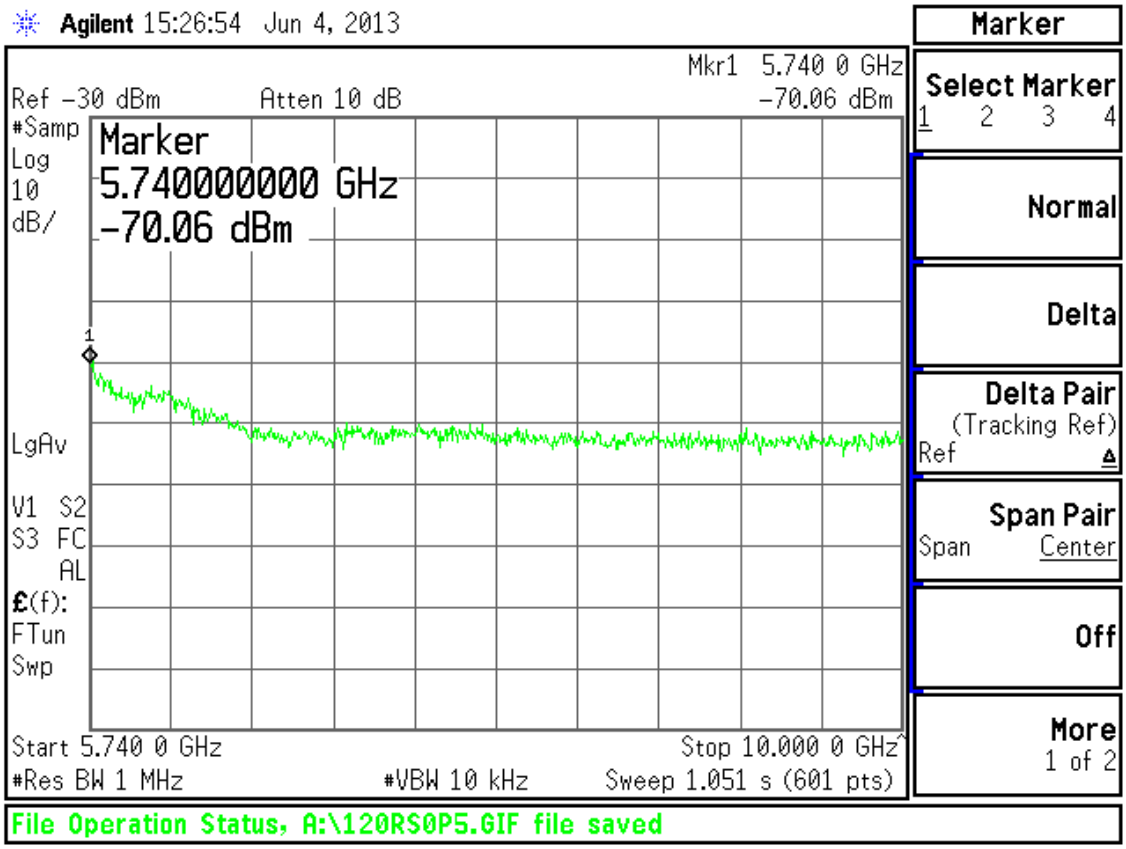

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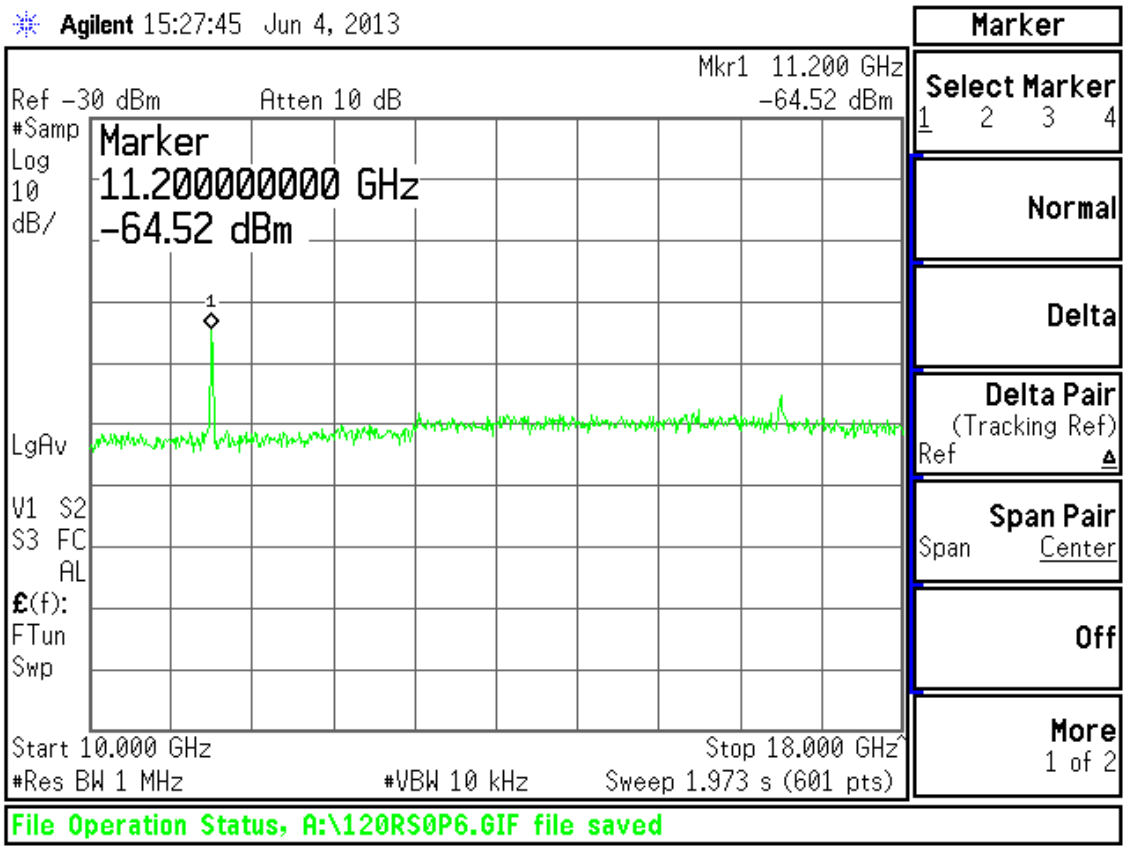

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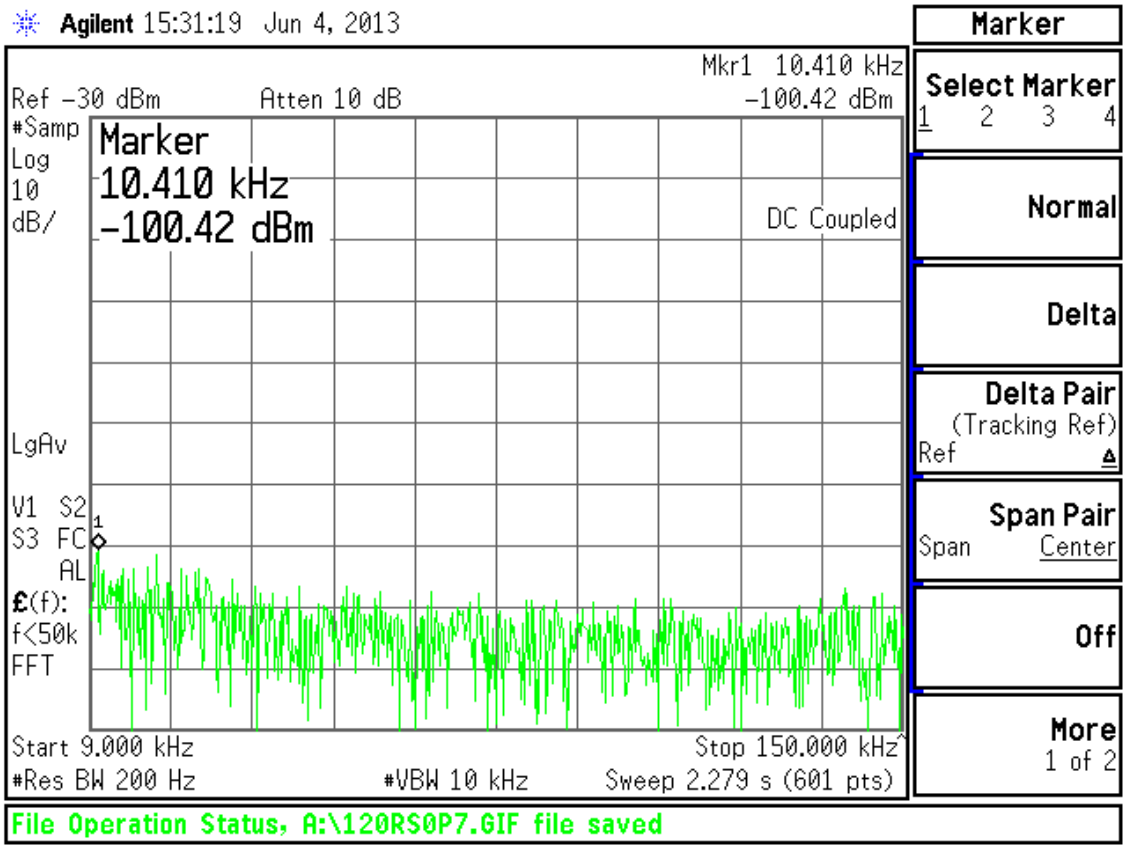
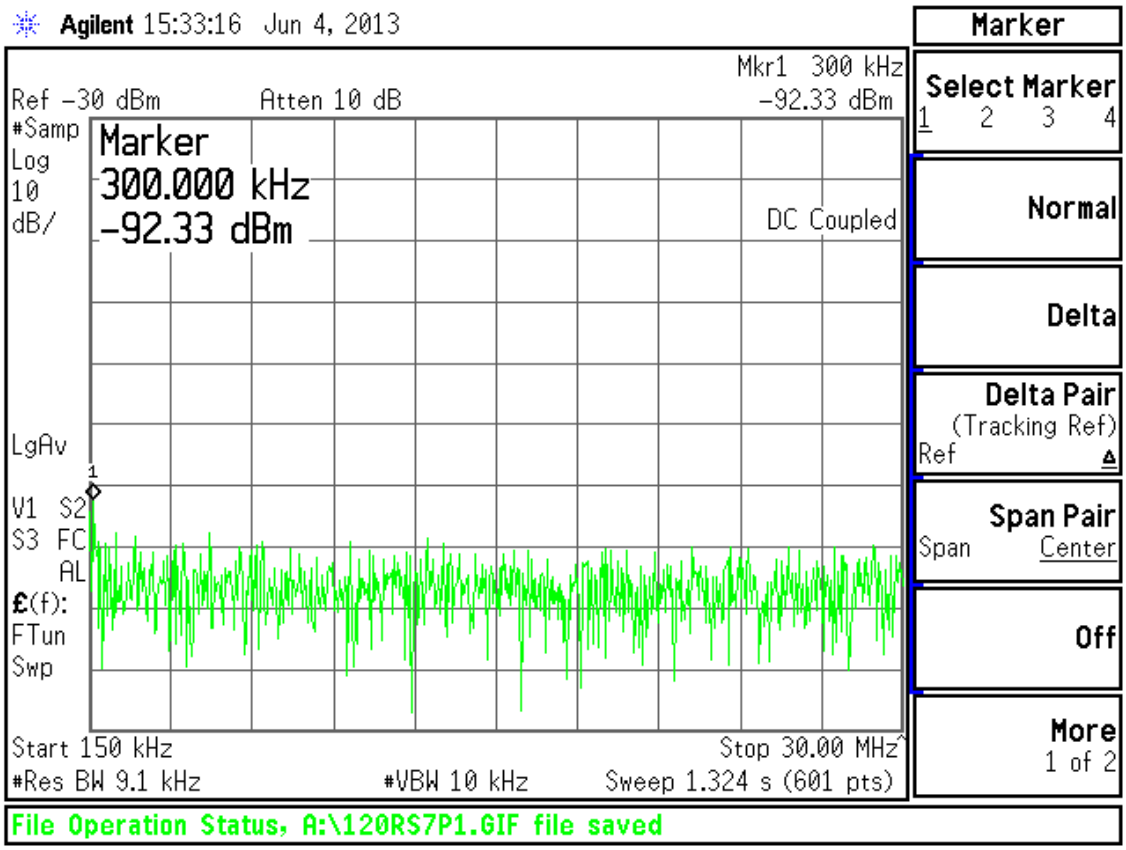
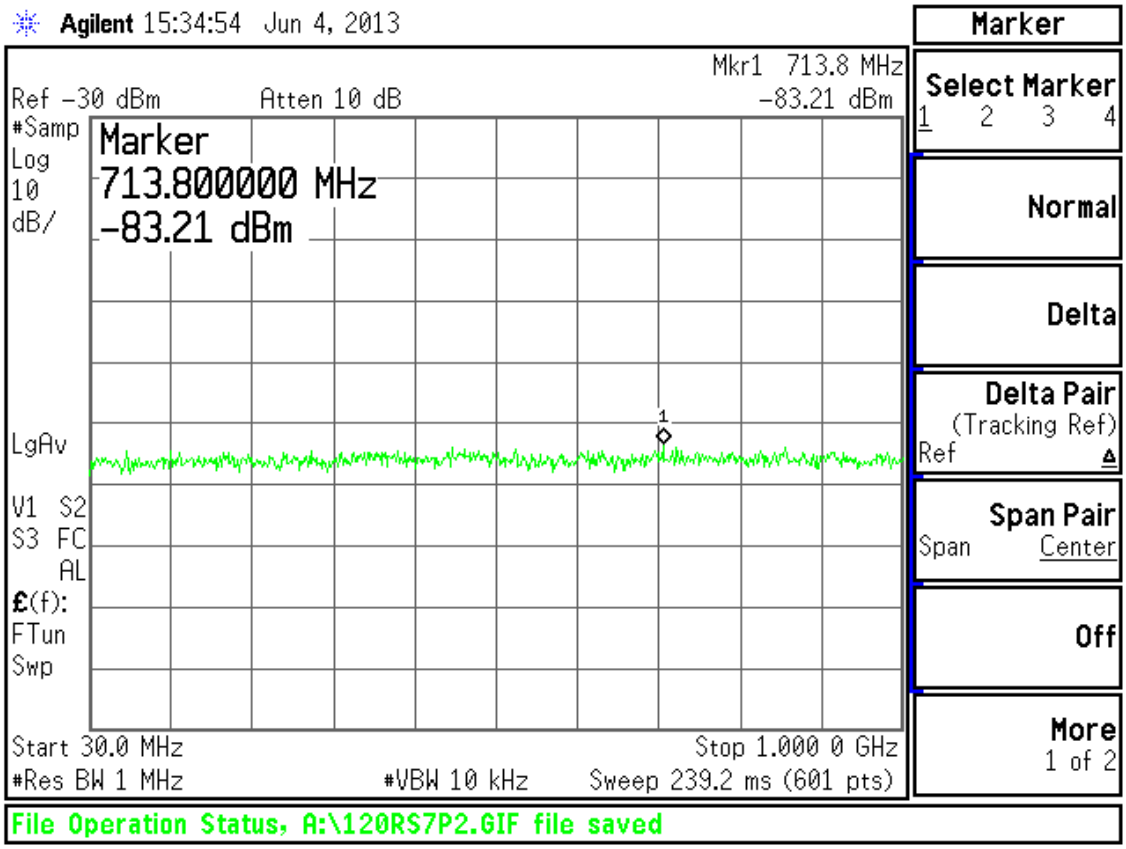


CH120 802.11n Tx Conducted Emissions (MCS7)



CH120 802.11n Tx Conducted Emissions (MCS7)



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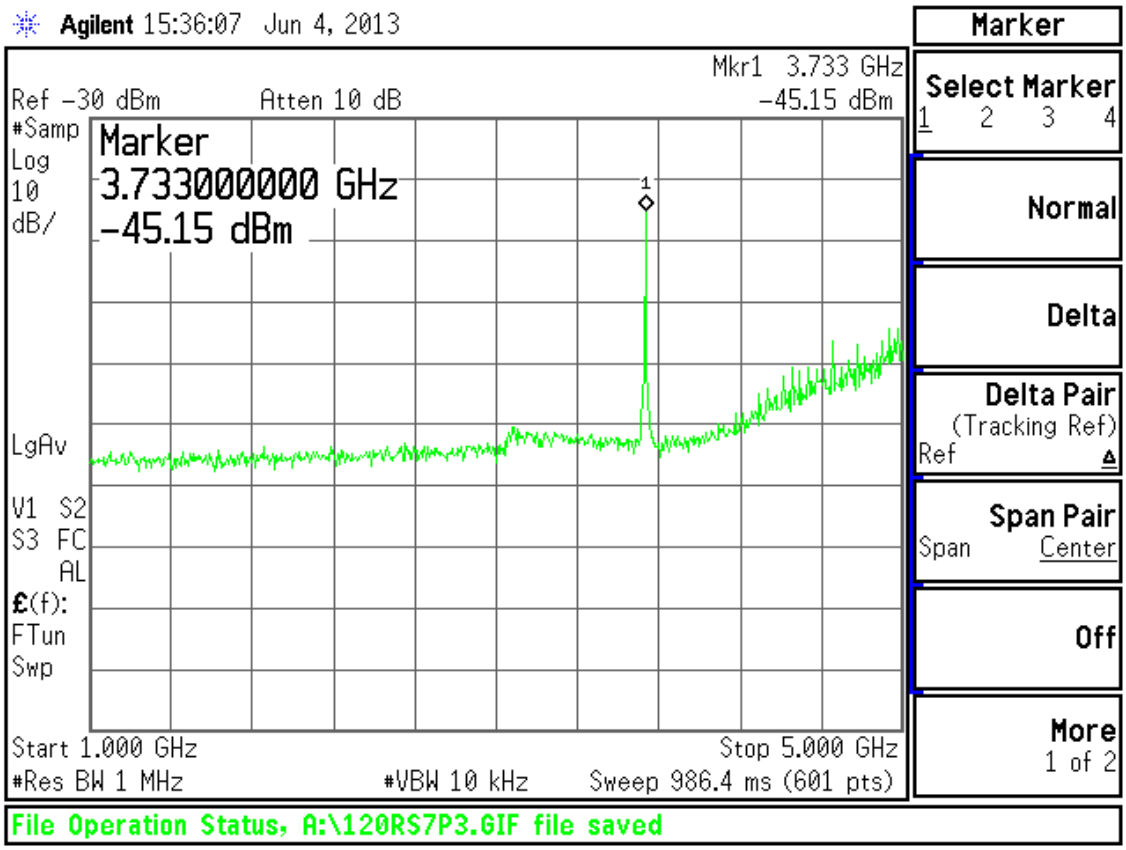

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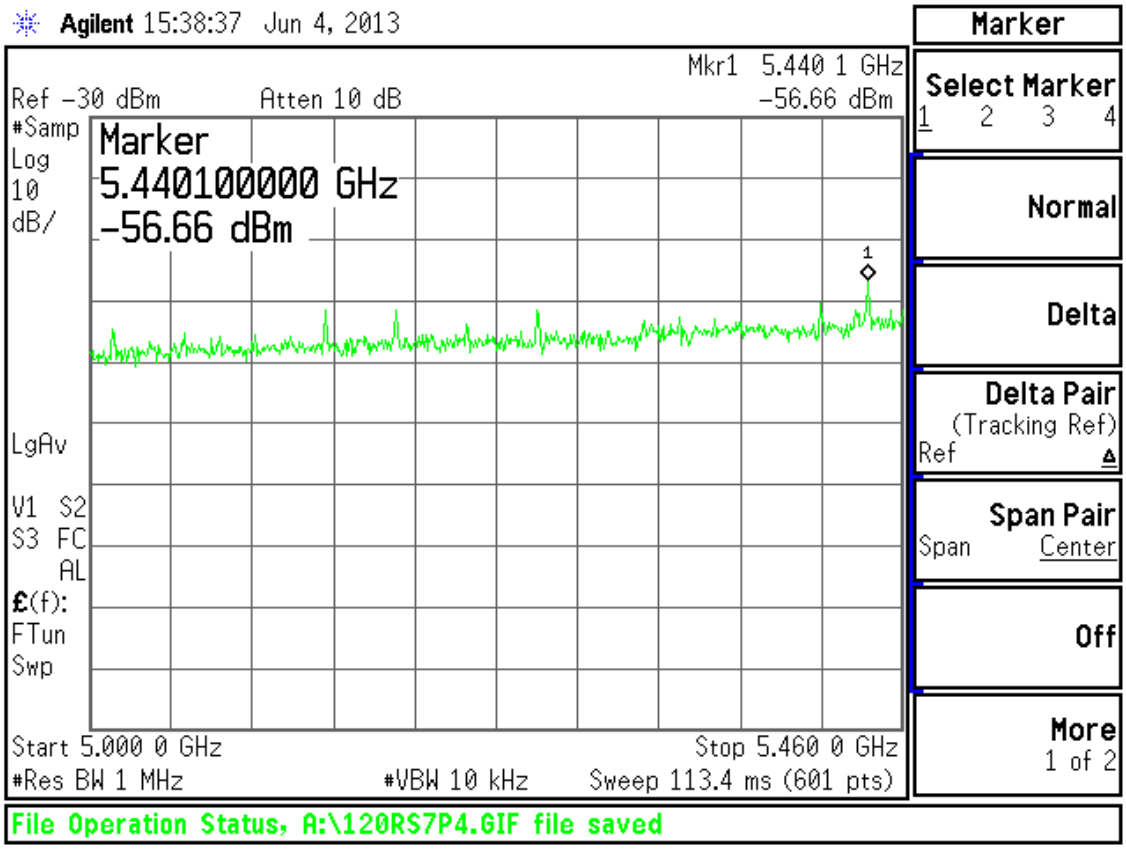

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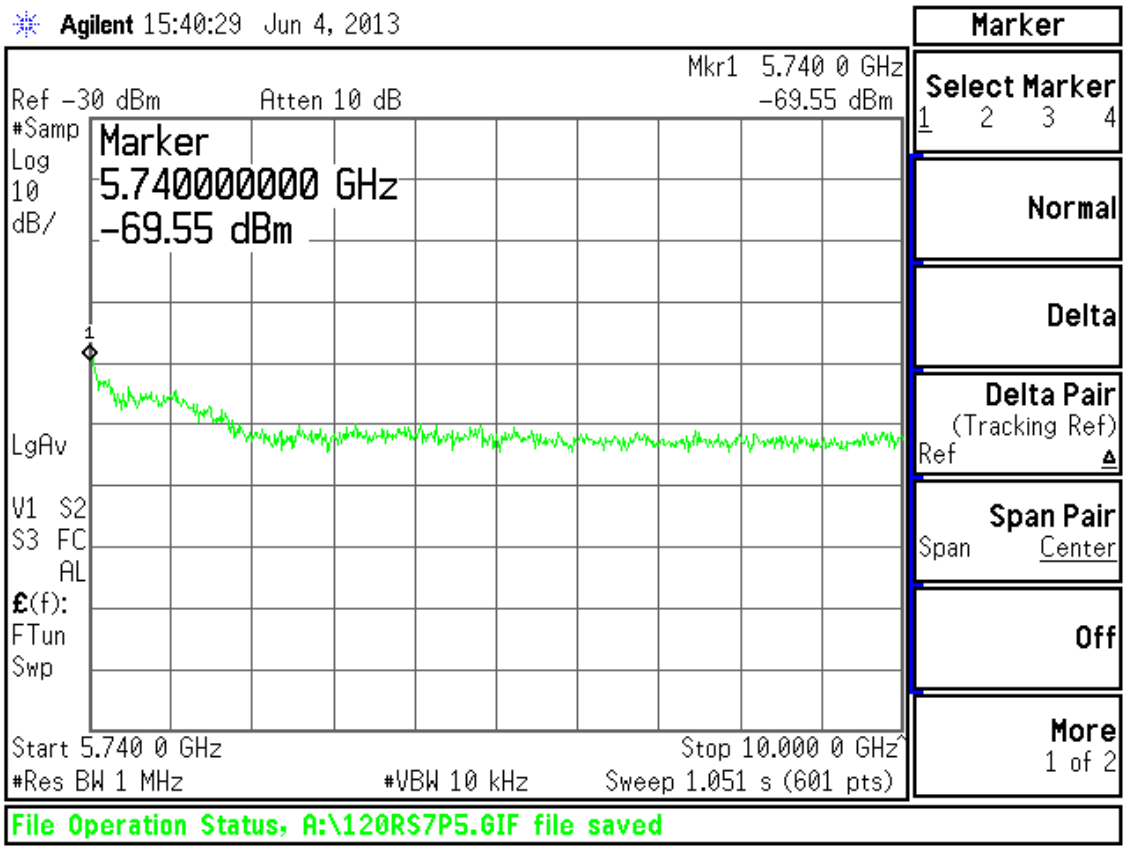
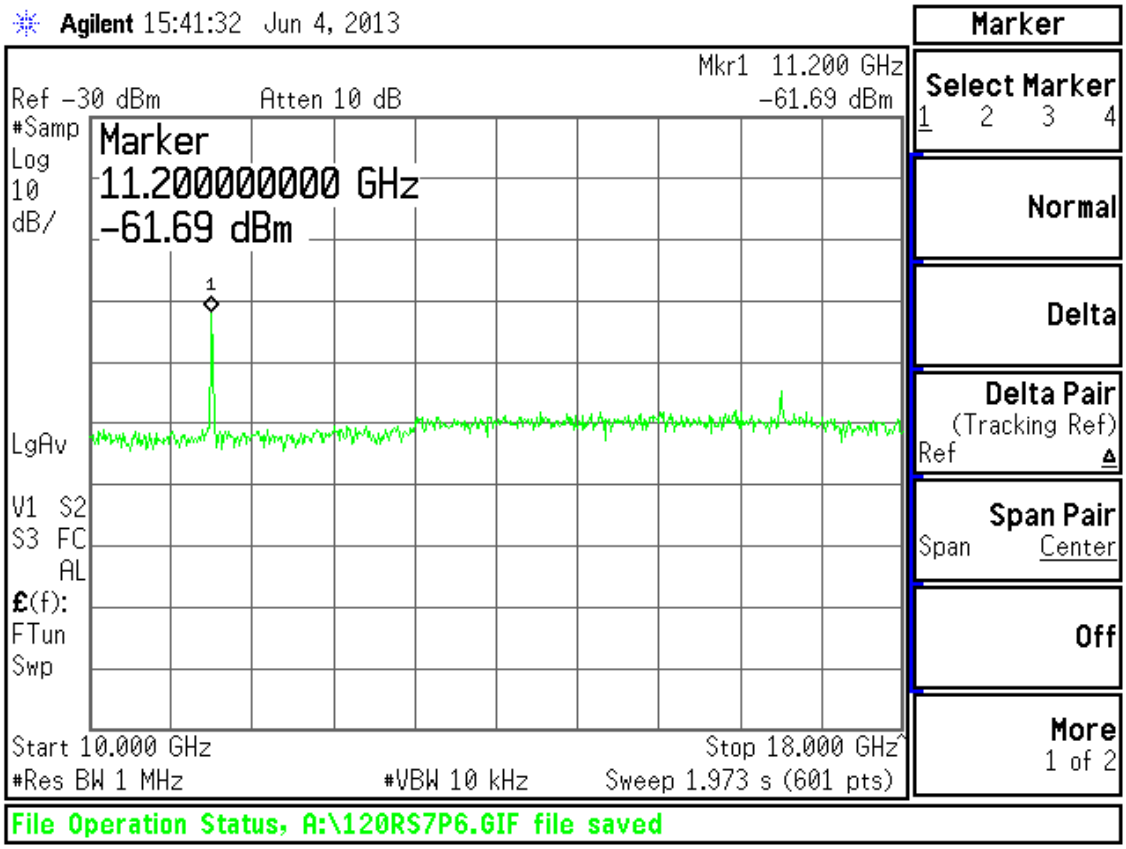


CH120 802.11n Tx Conducted Emissions (MCS7)



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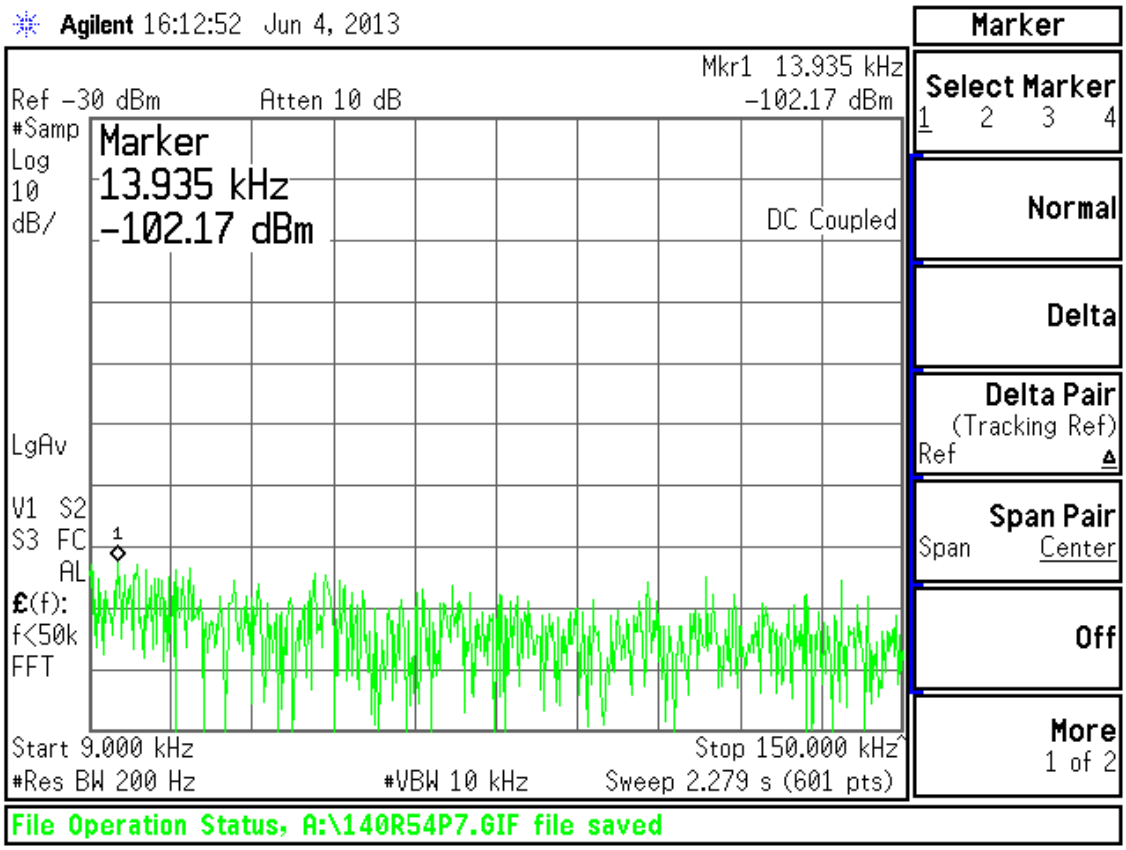

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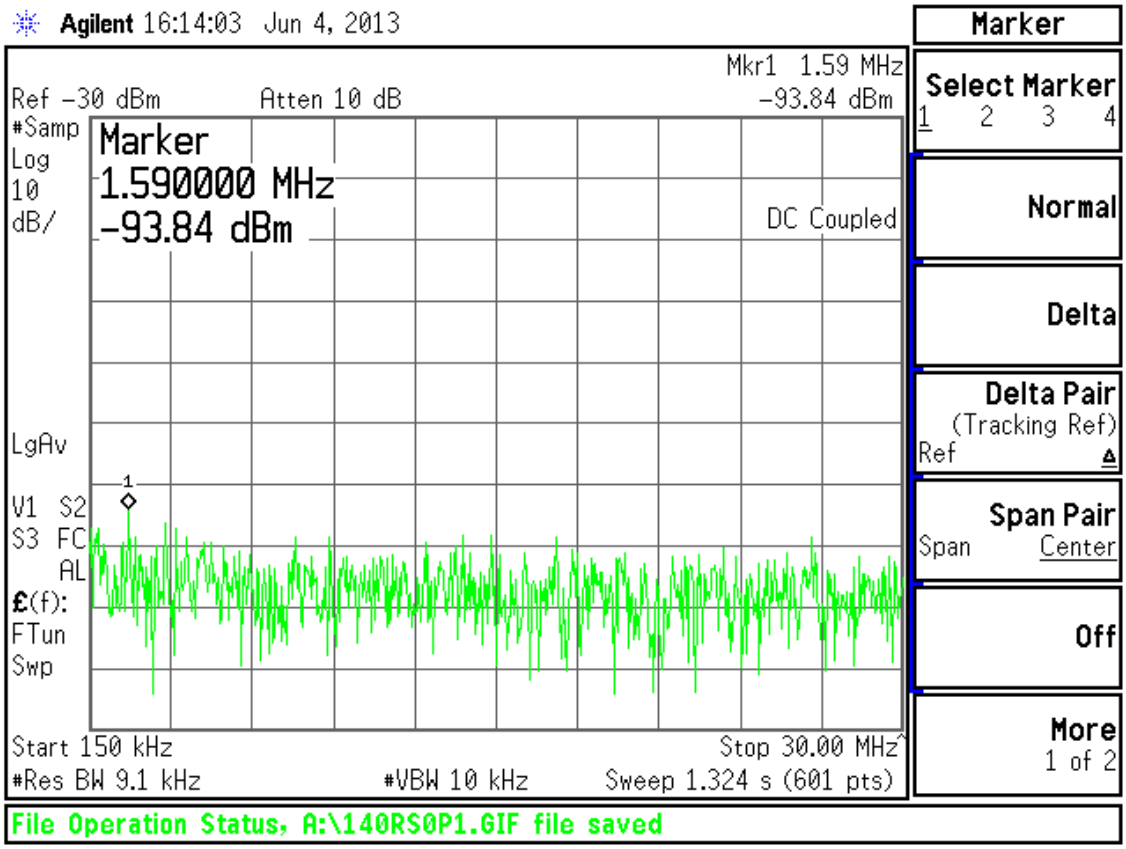

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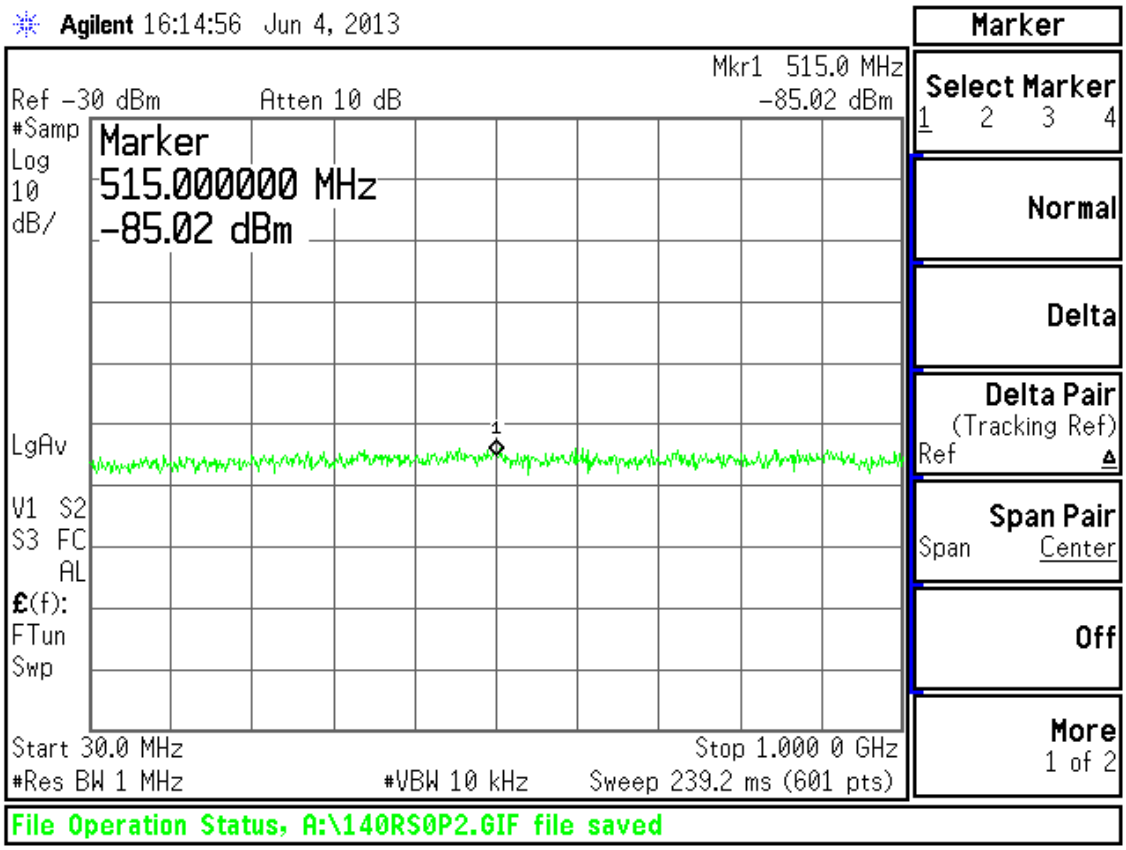

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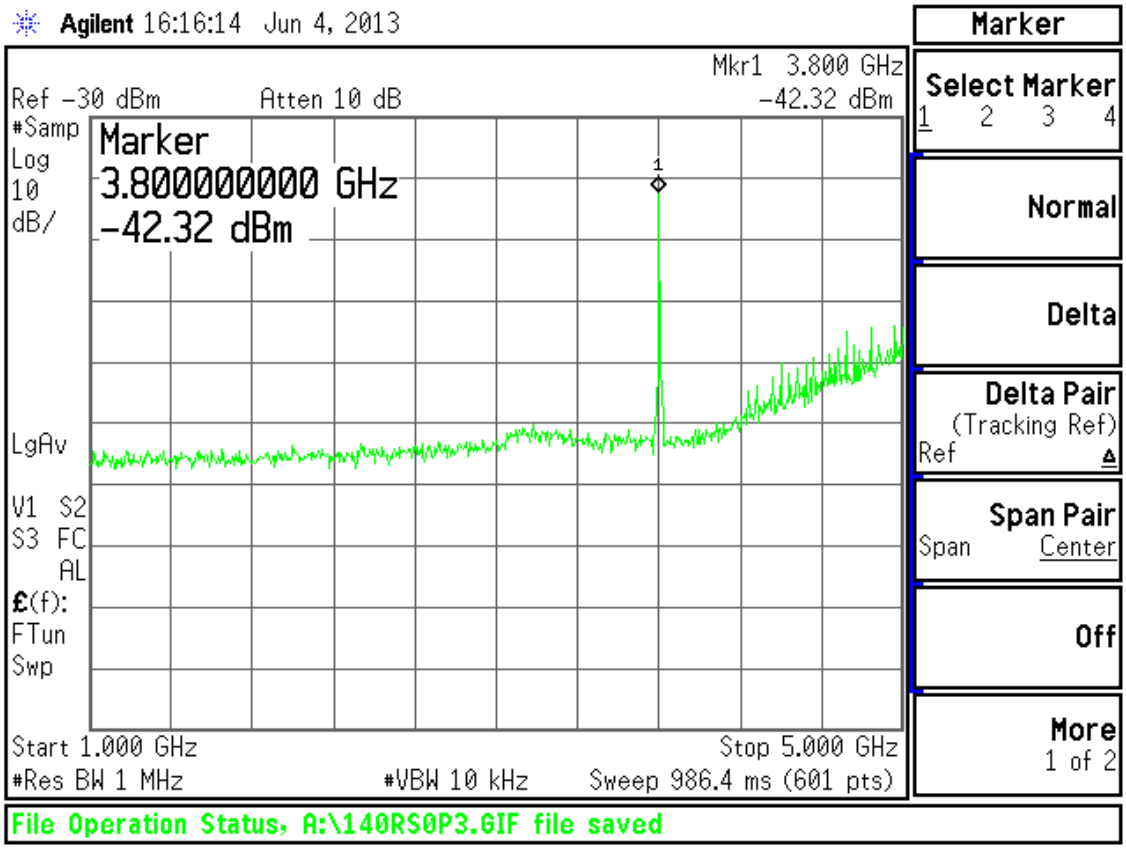

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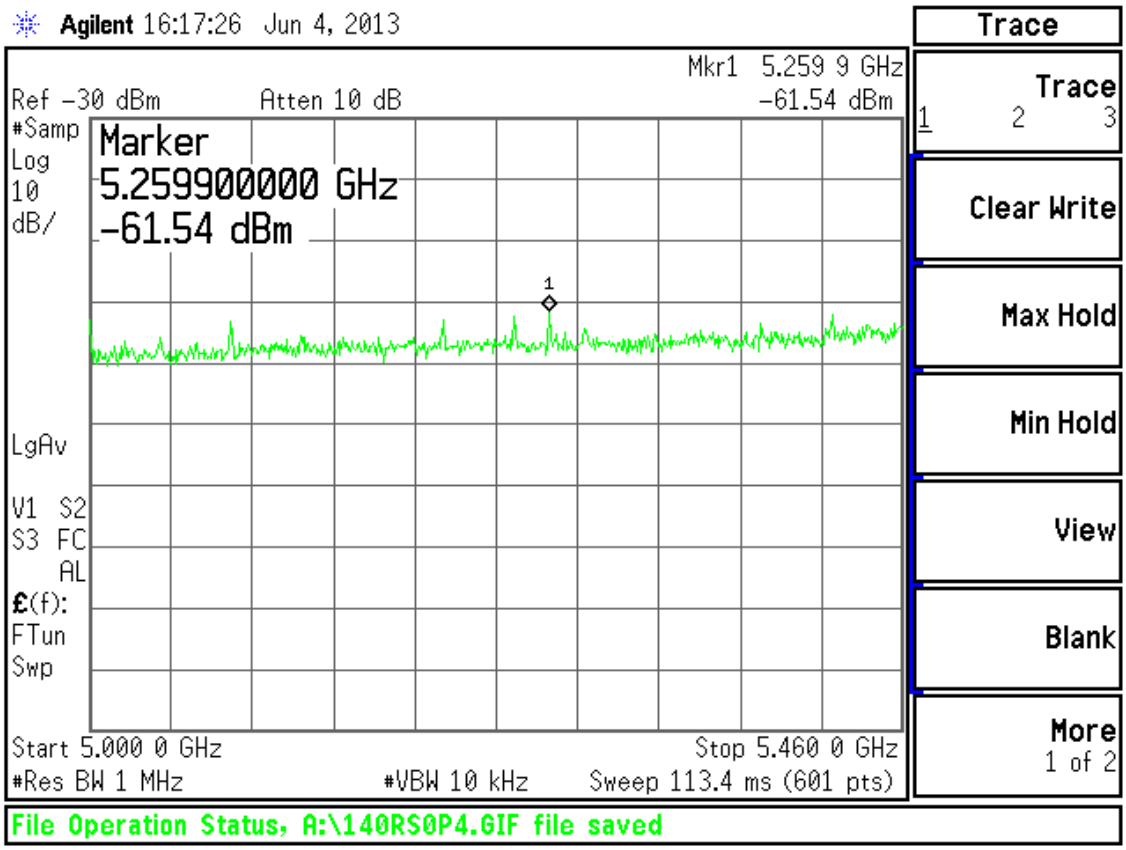

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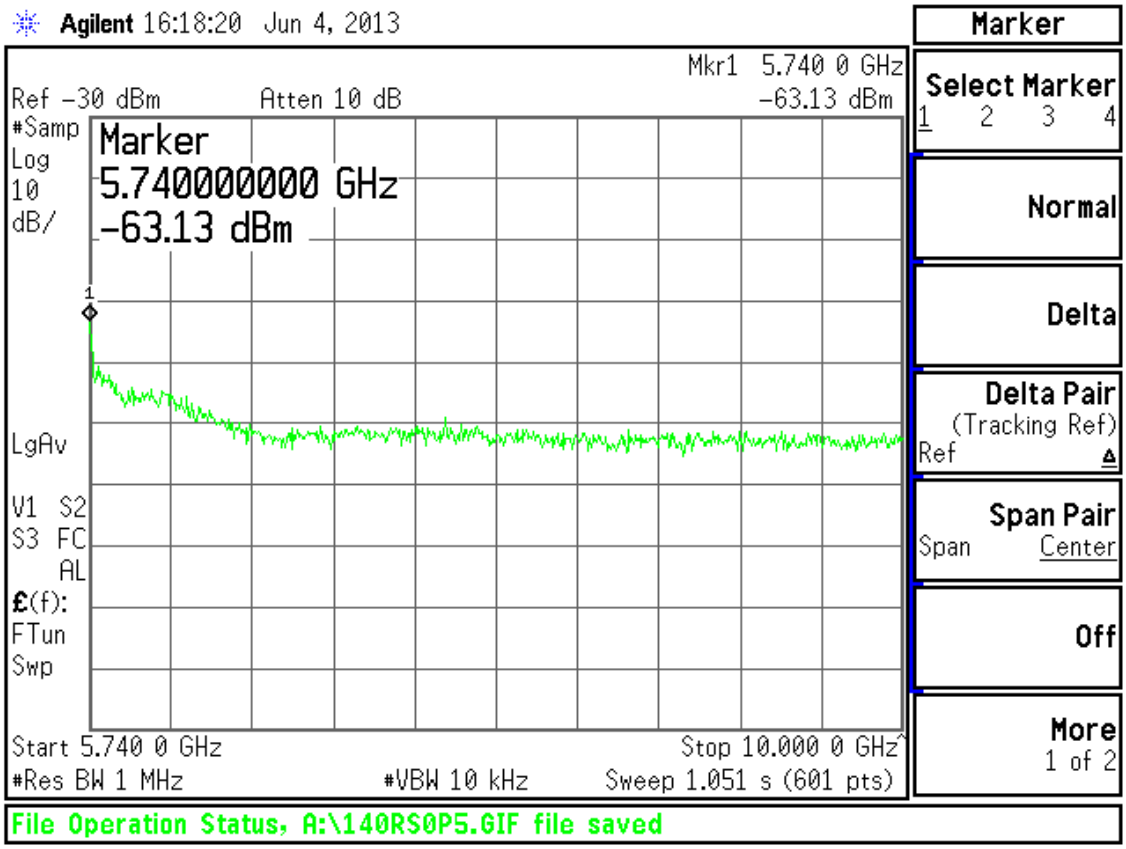

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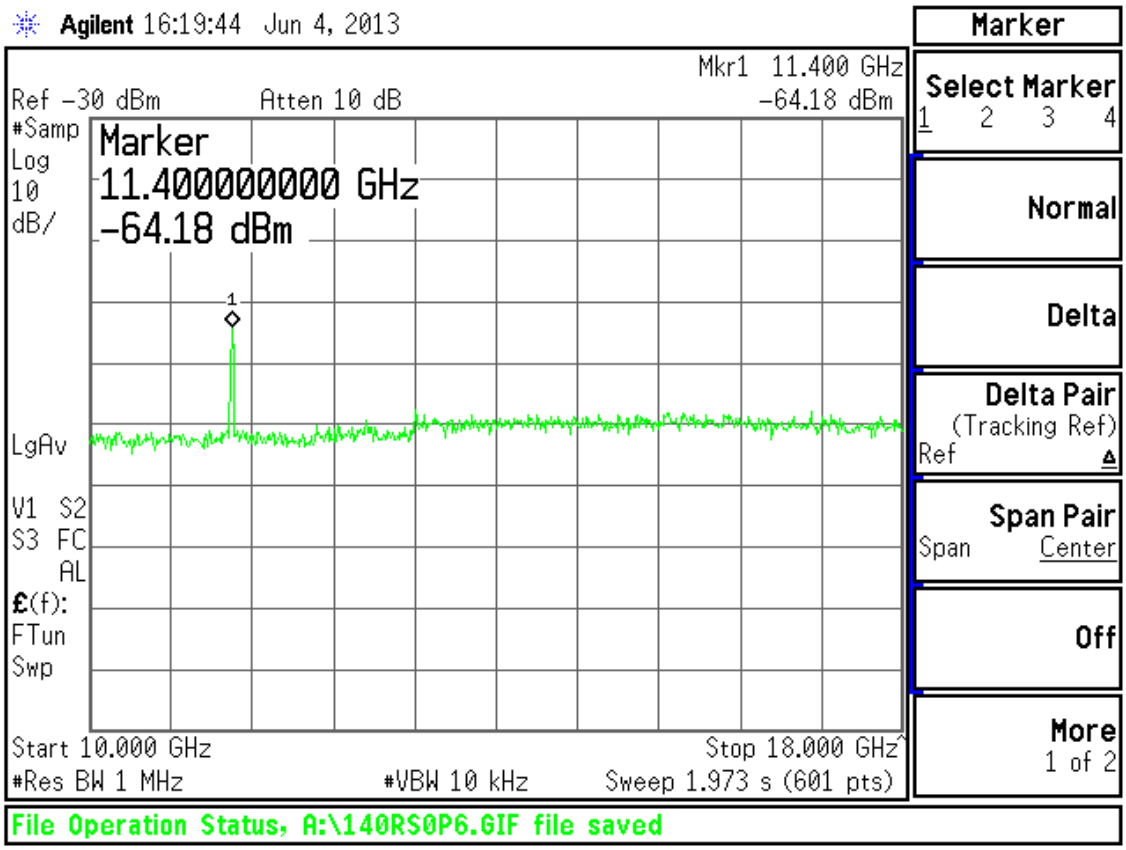

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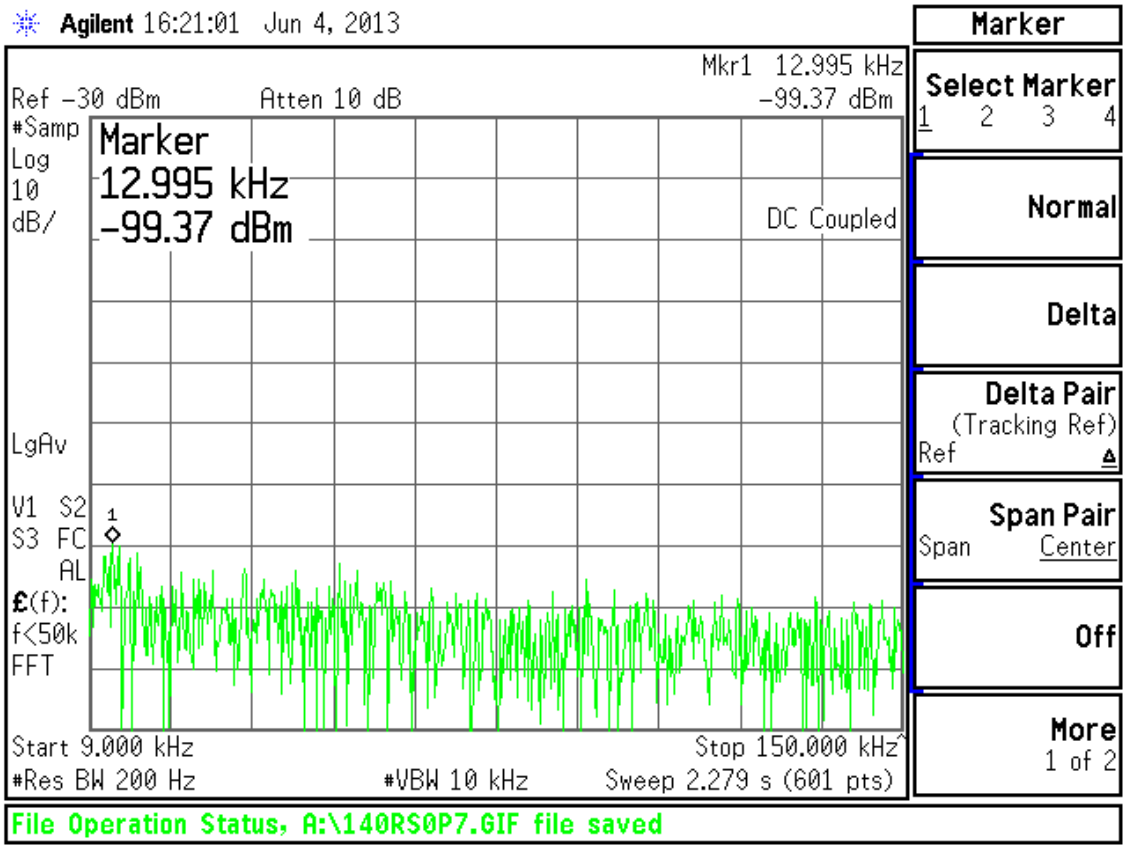

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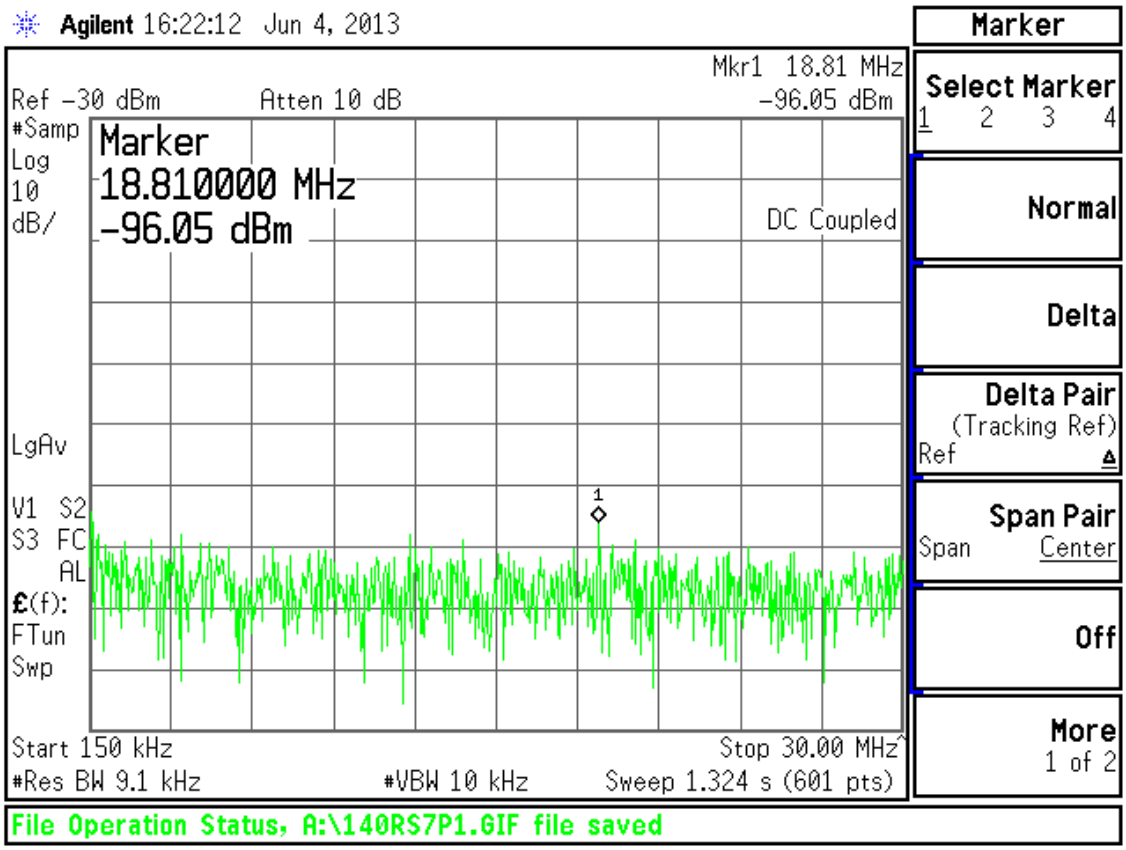

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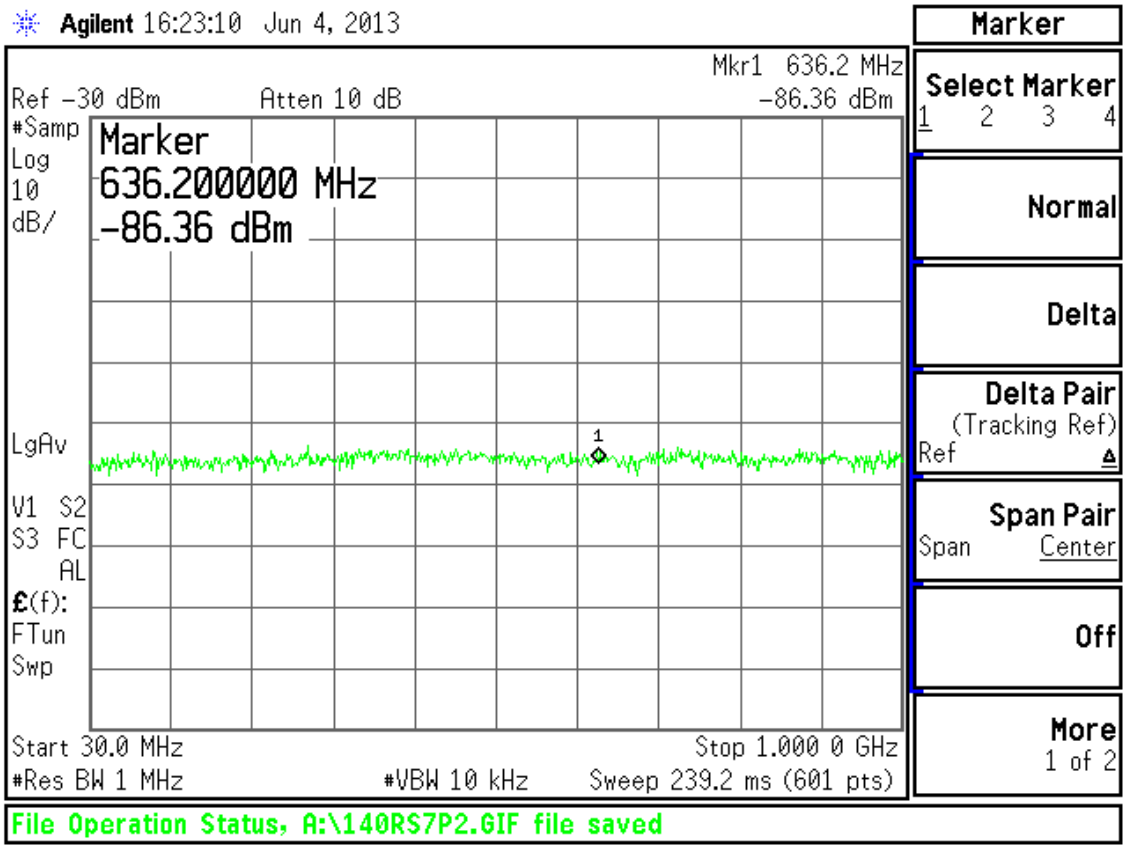

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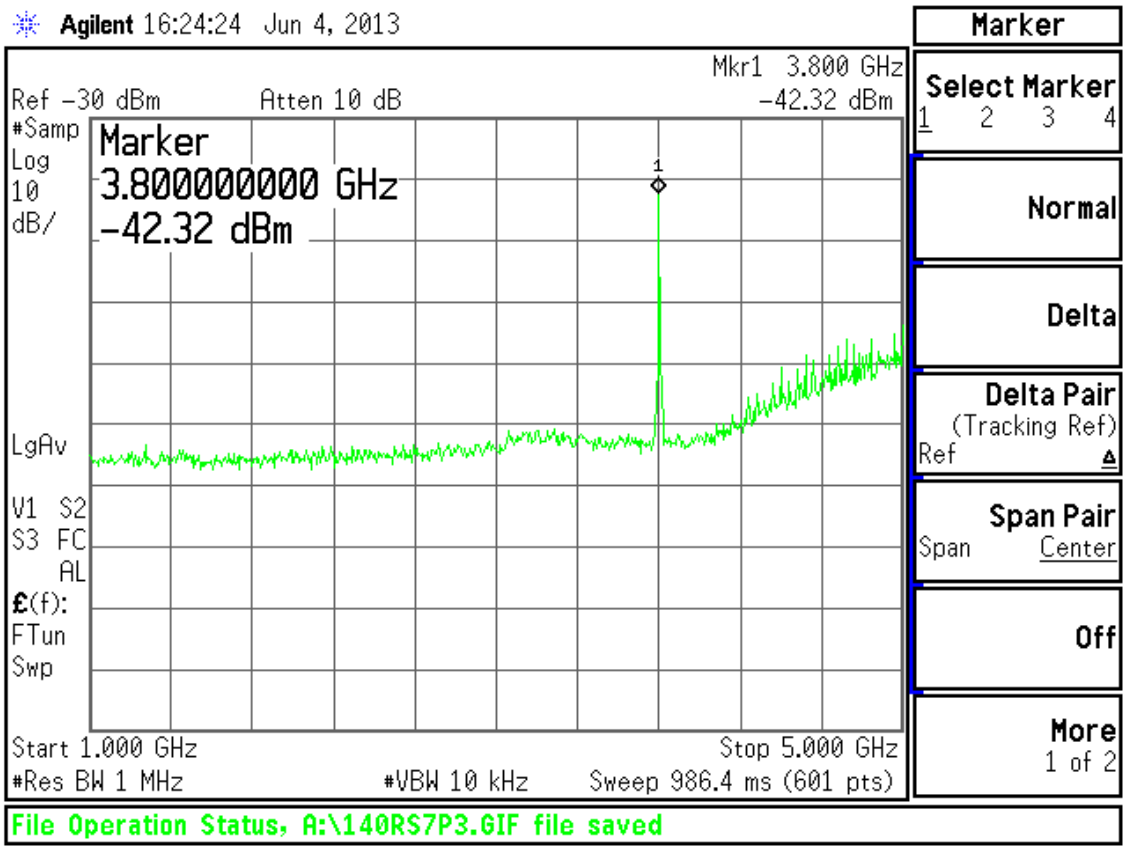

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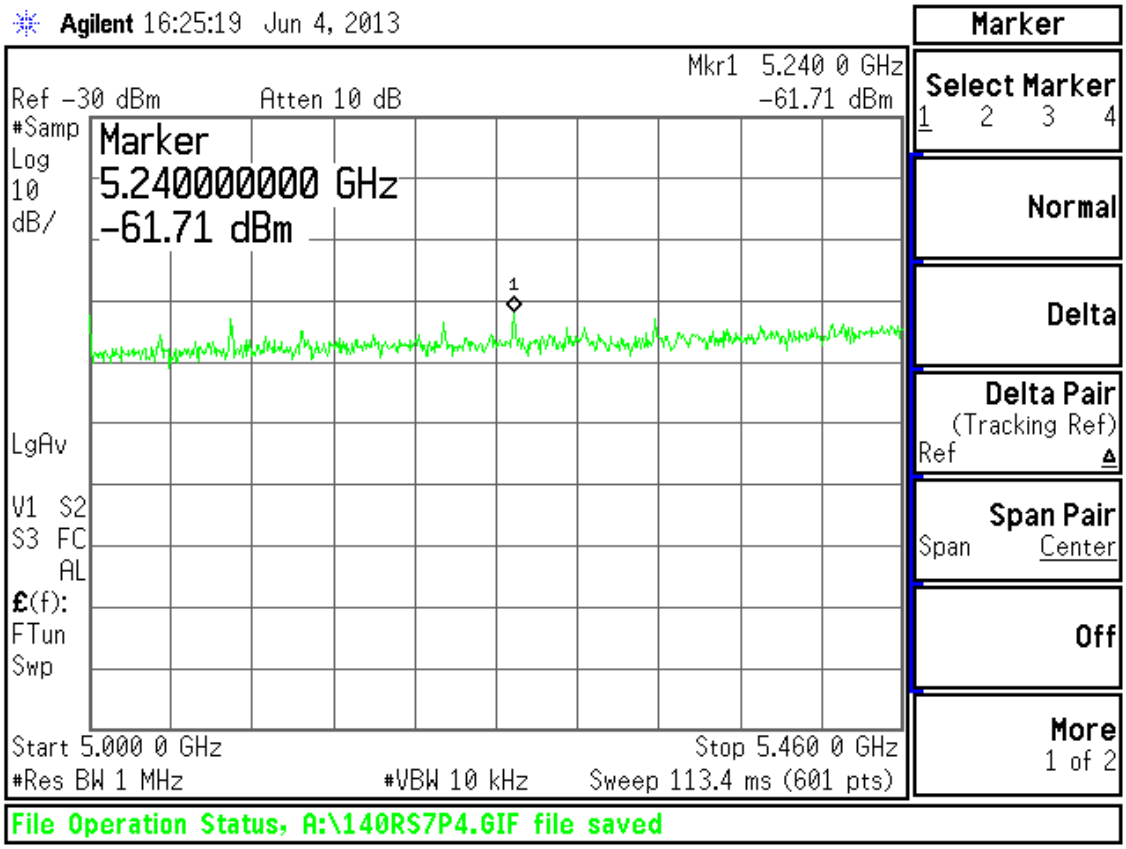

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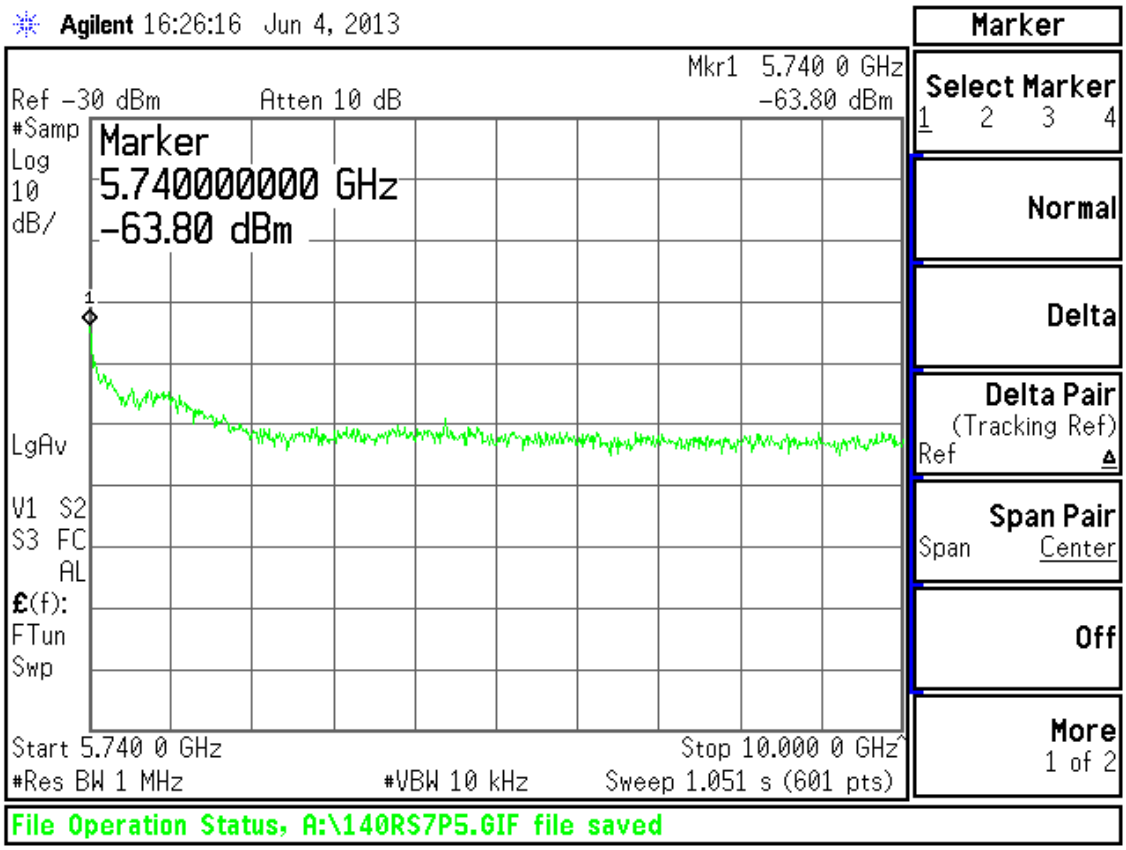

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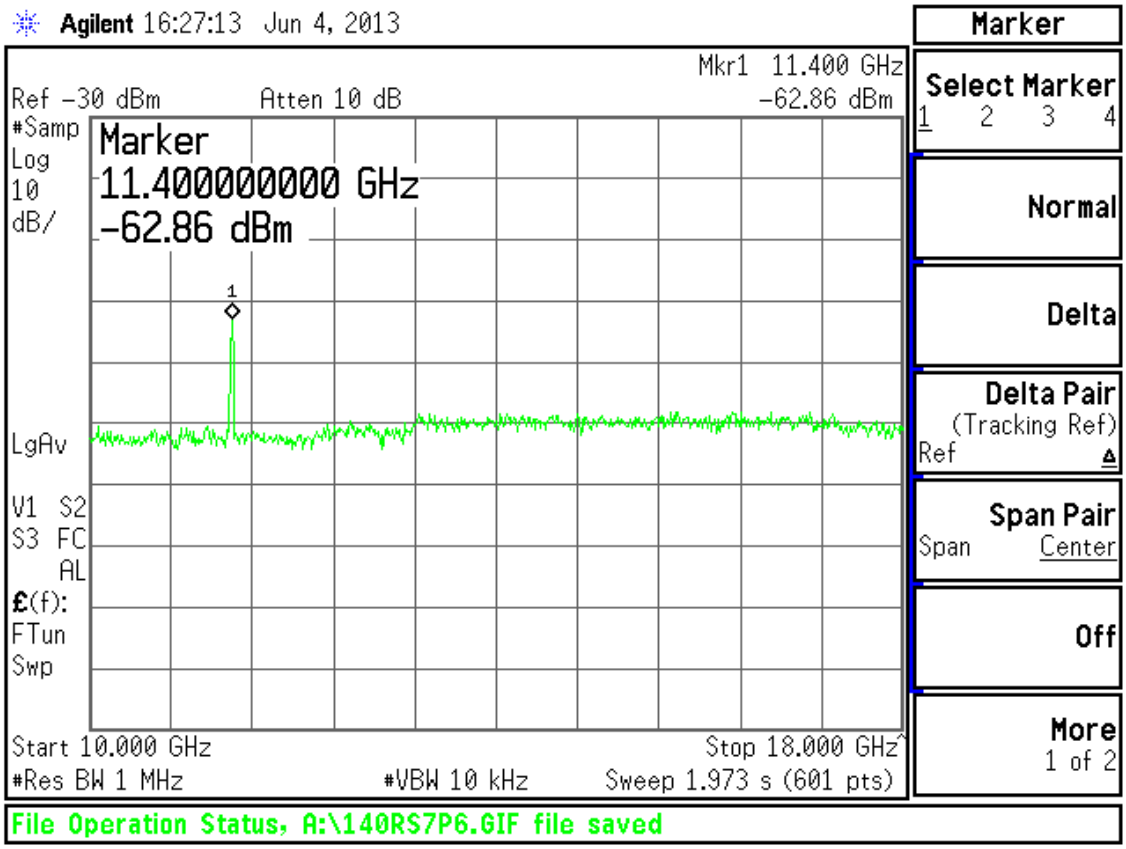

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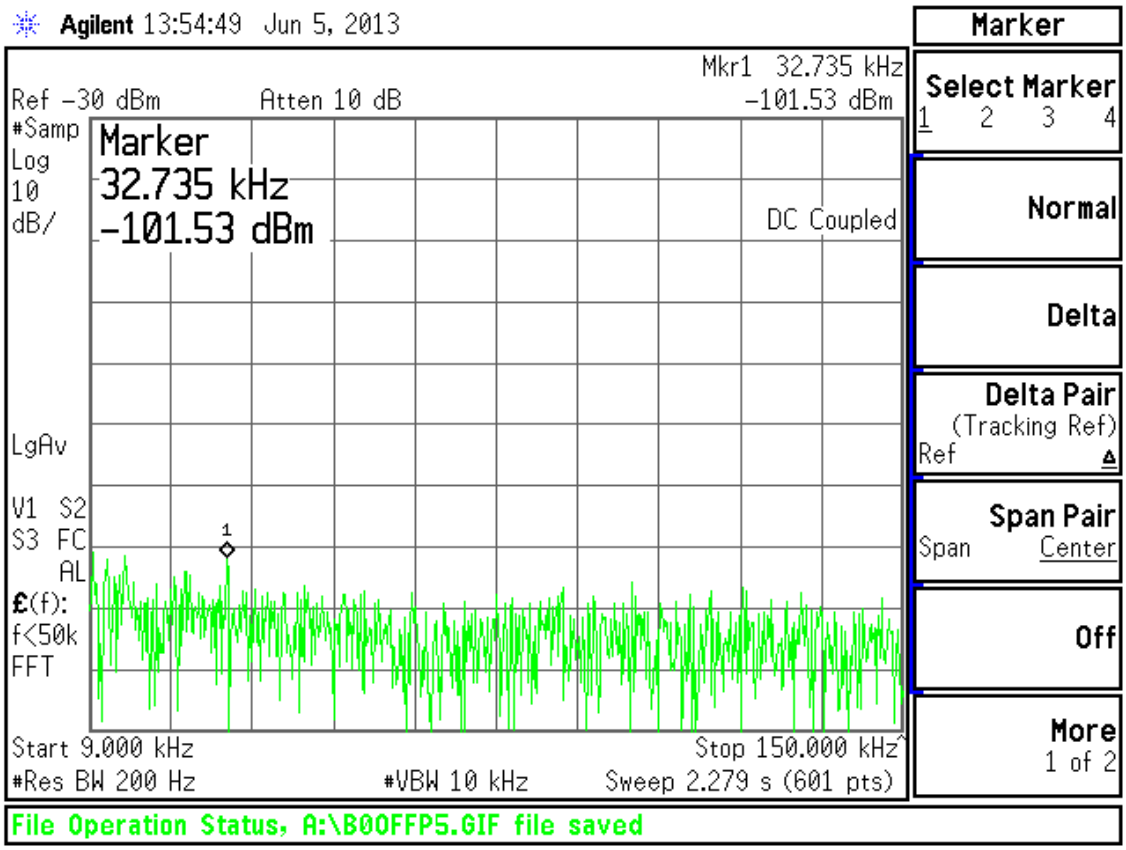
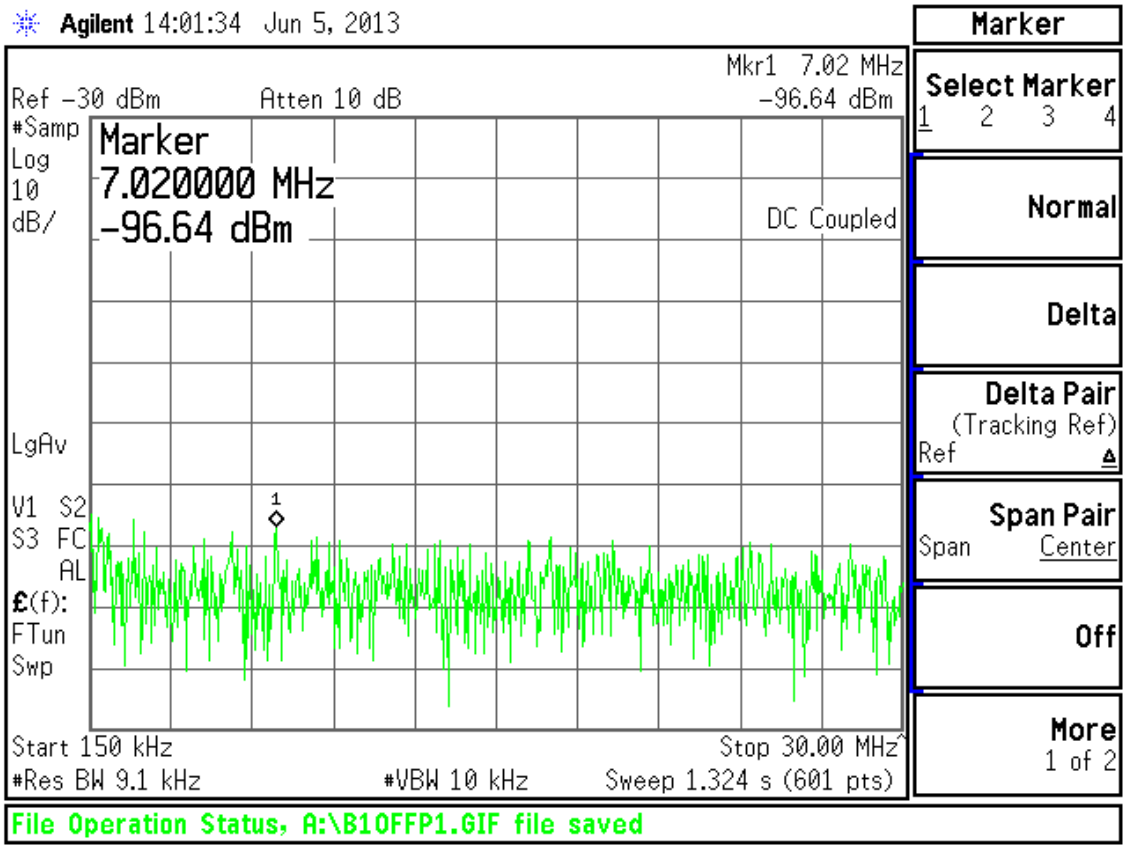
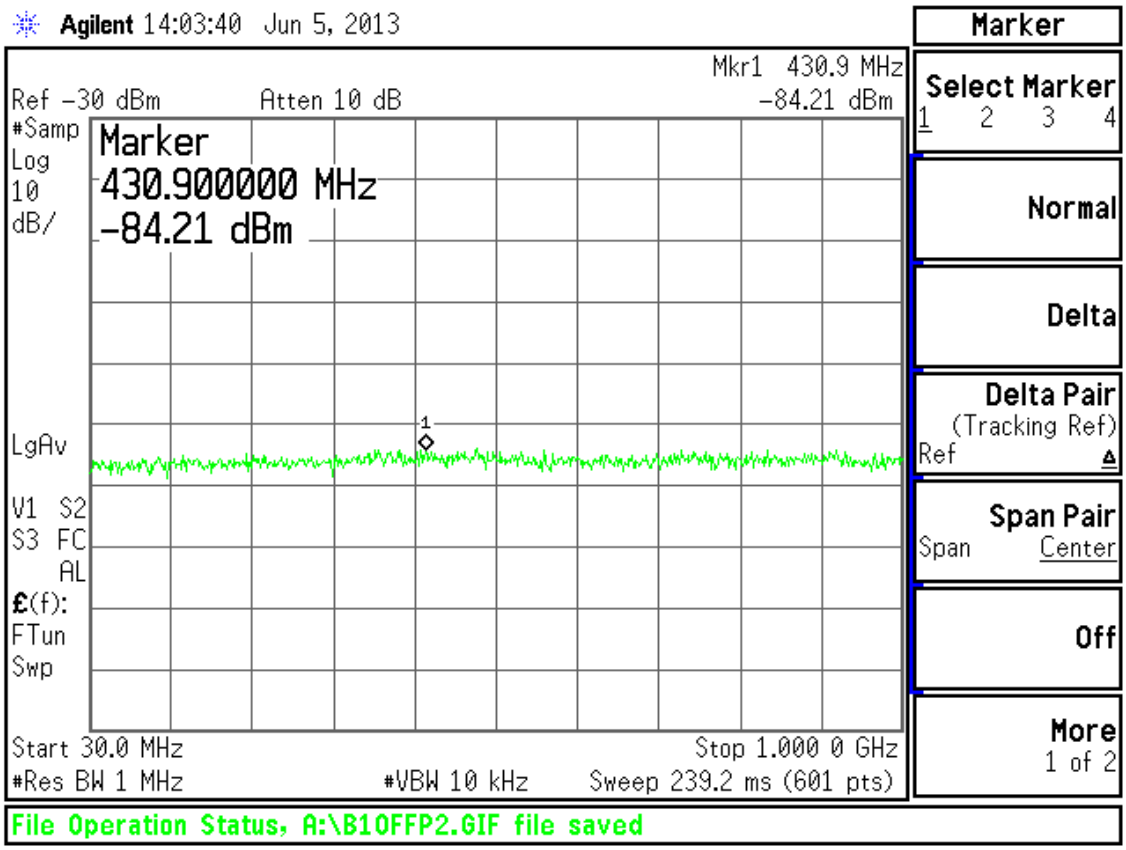


Rx Conducted Emissions



Rx Conducted Emissions



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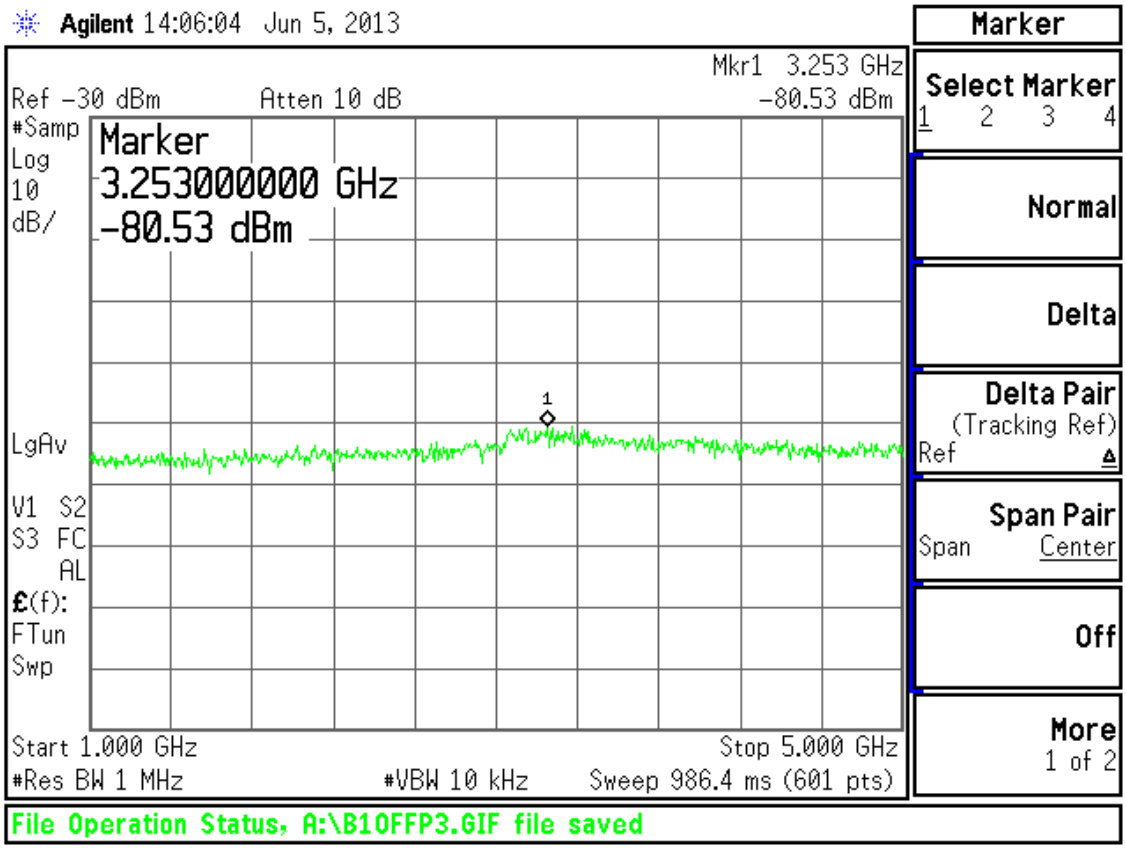

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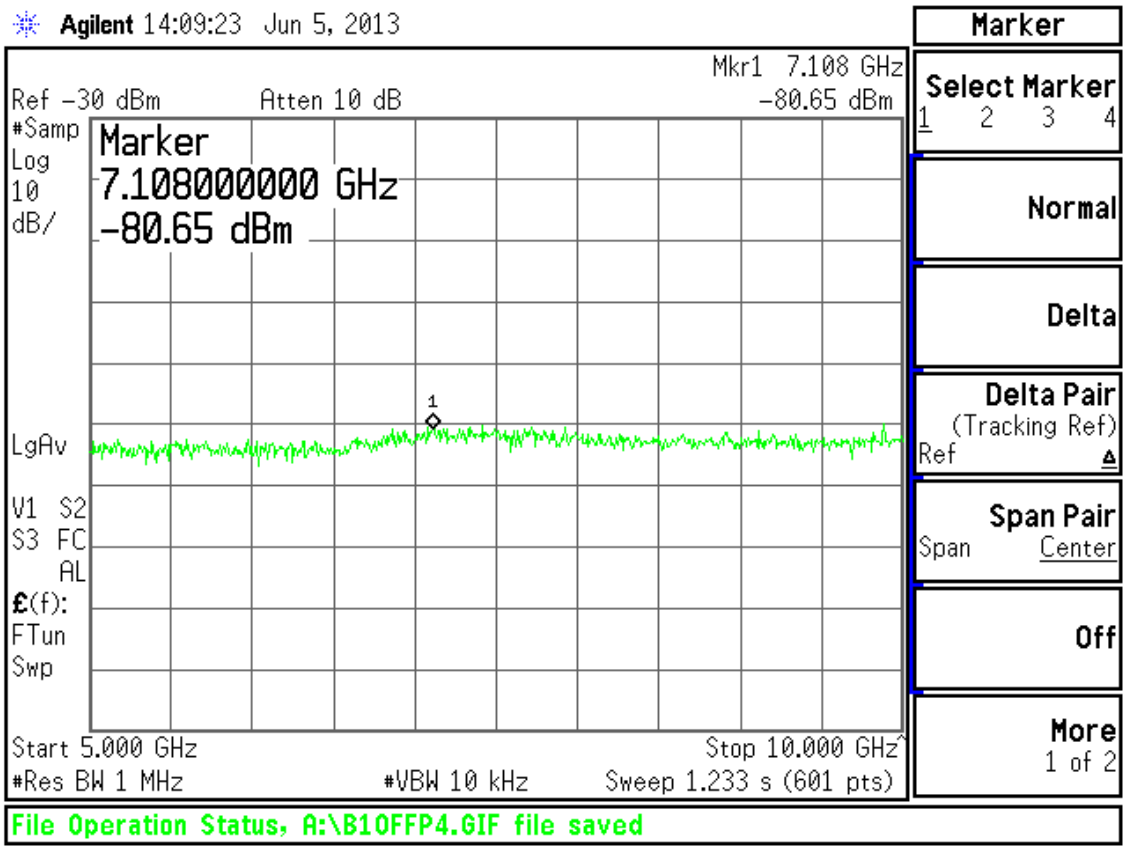

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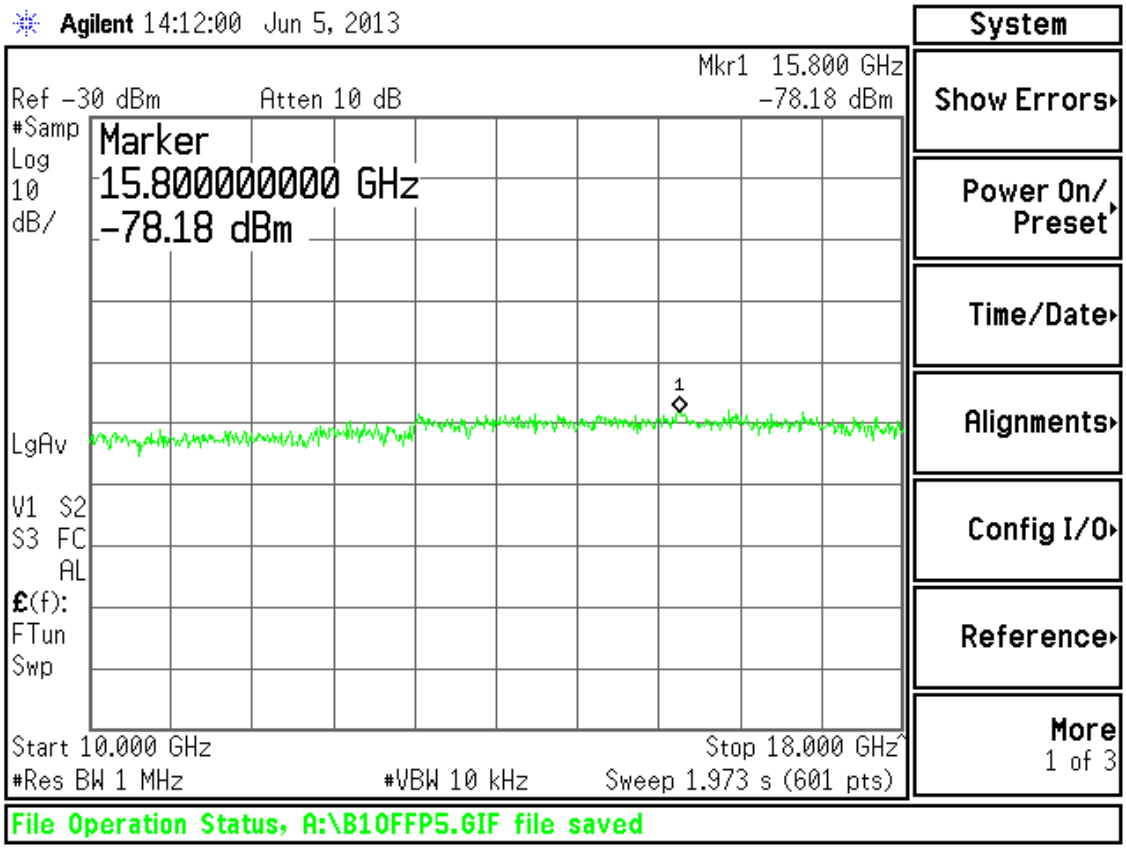

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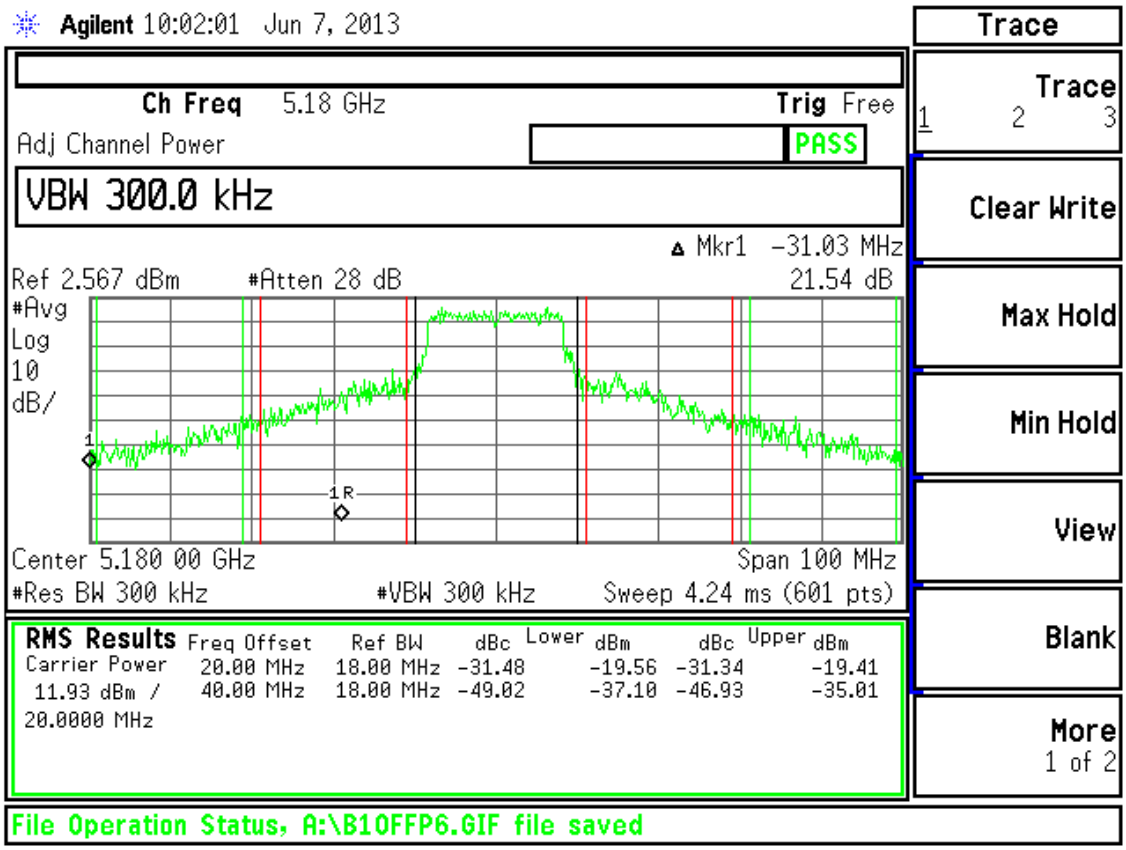
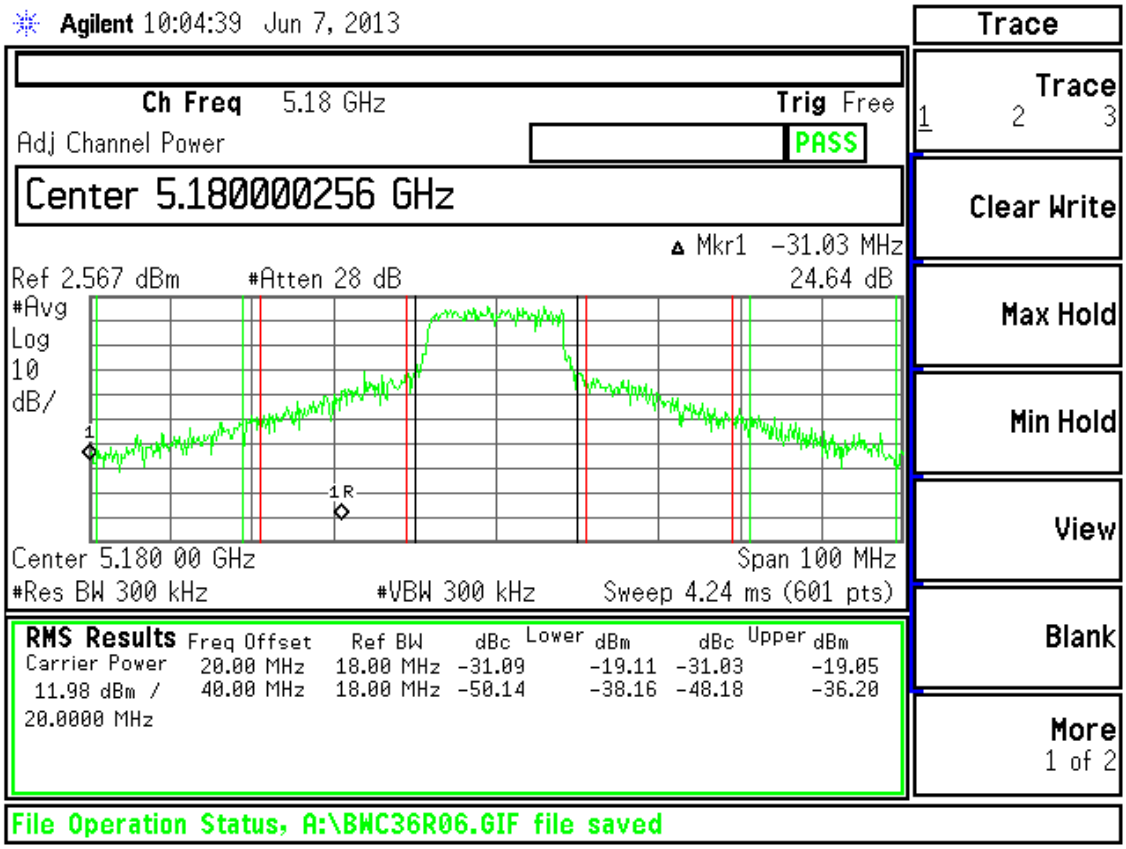
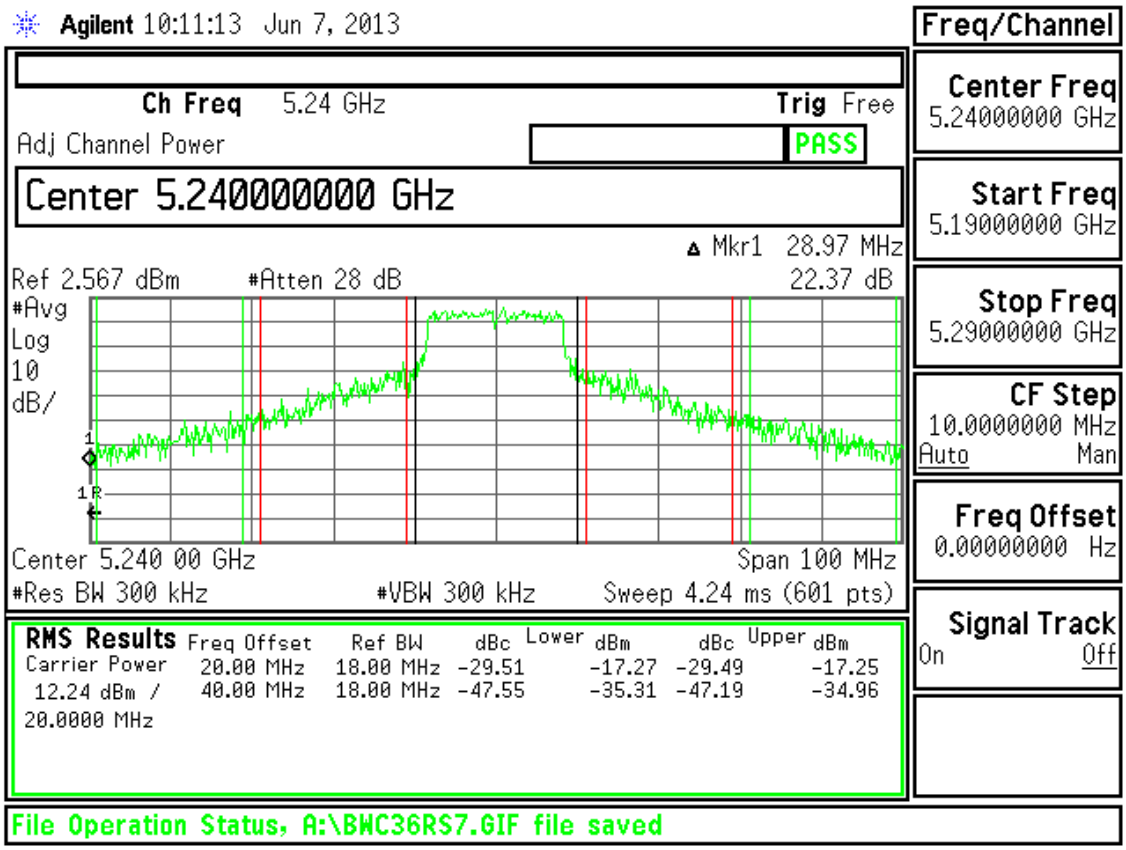


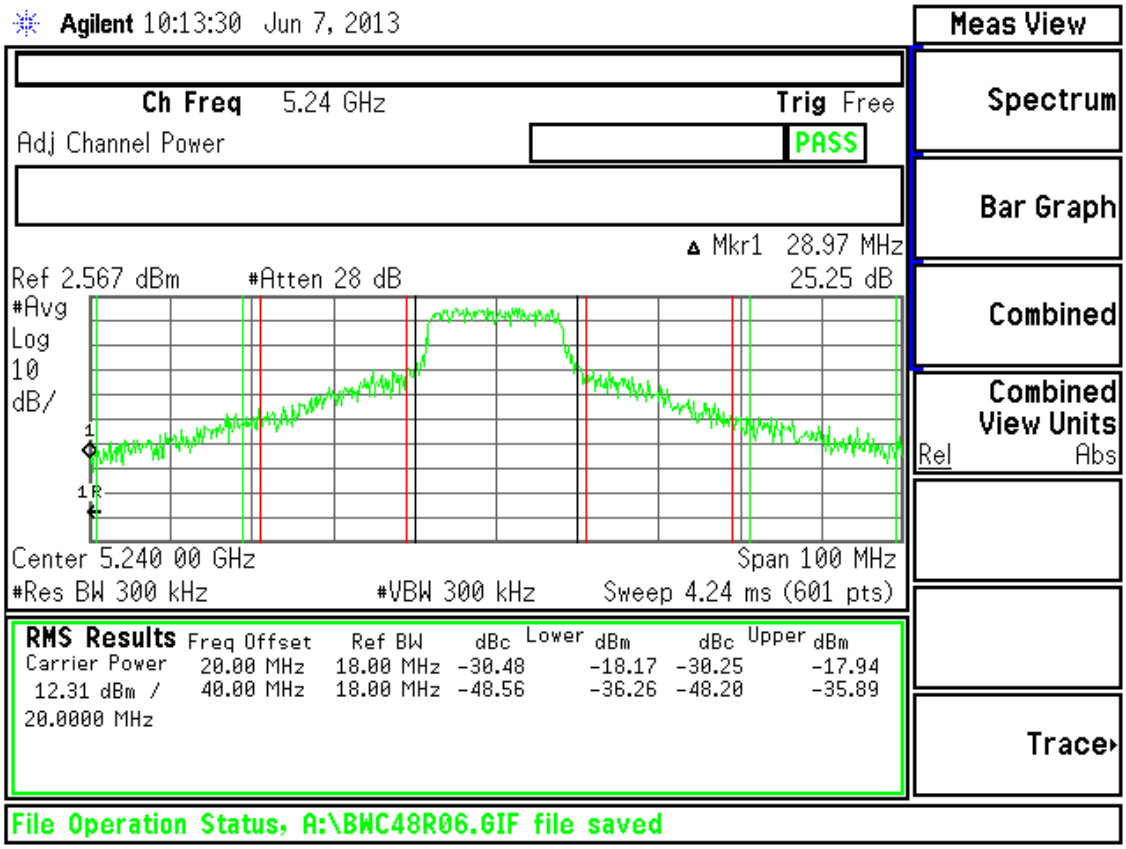
CH36 802.11a Adjacent Channel Leakage Power (6Mbps)



CH36 802.11a Adjacent Channel Leakage Power (54Mbps)



CH48 802.11a Adjacent Channel Leakage Power (6Mbps)



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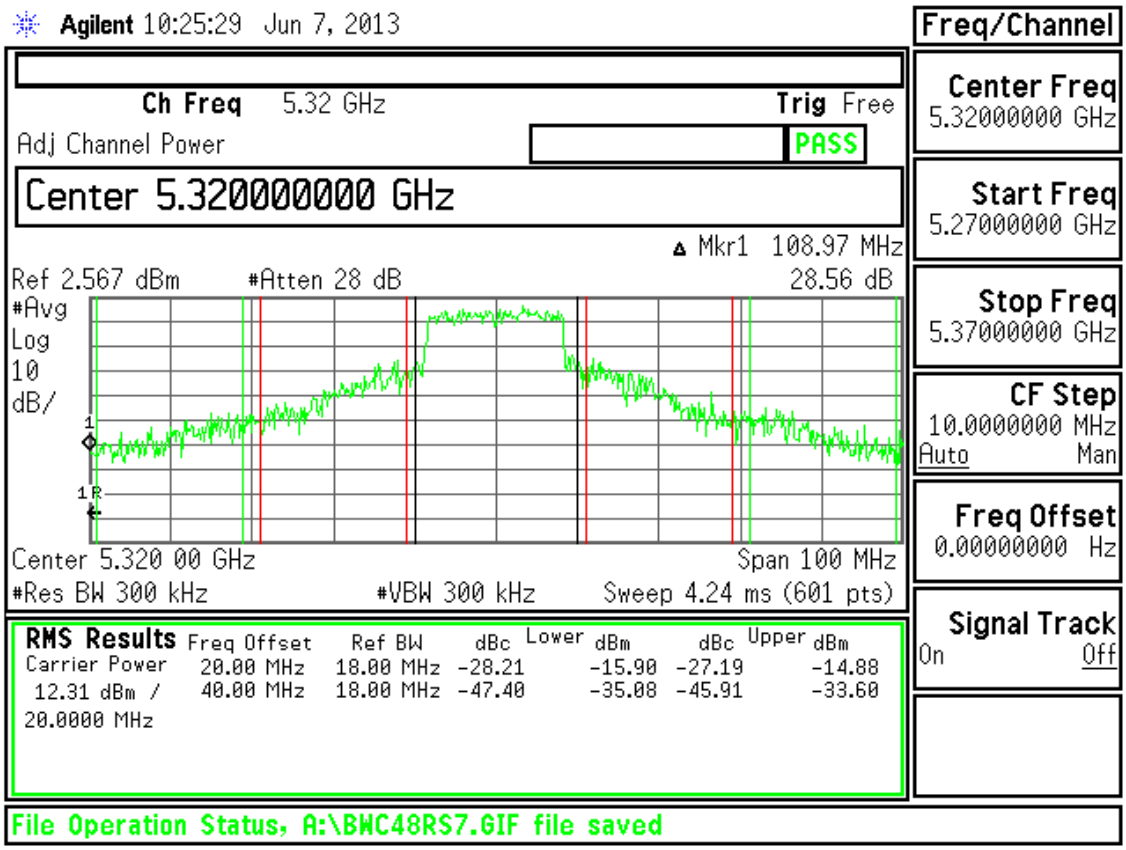
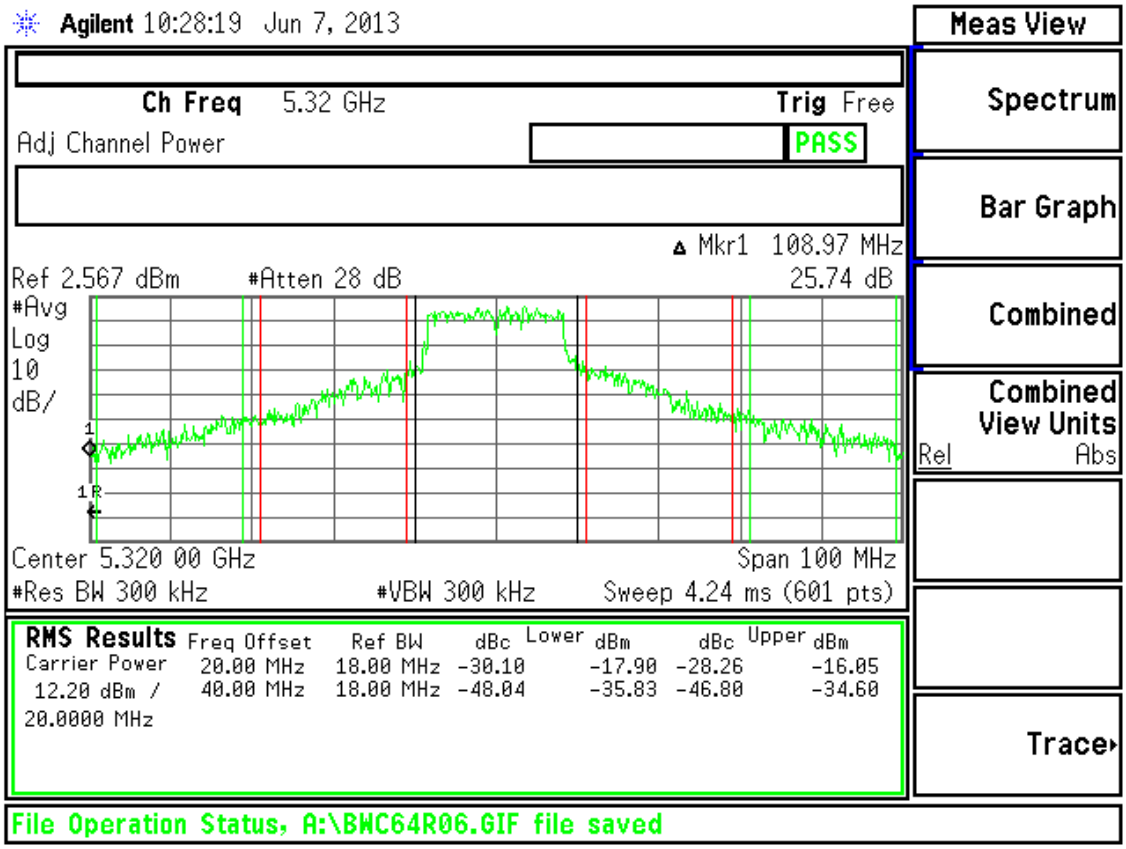


CH64 802.11a Adjacent Channel Leakage Power (6Mbps)



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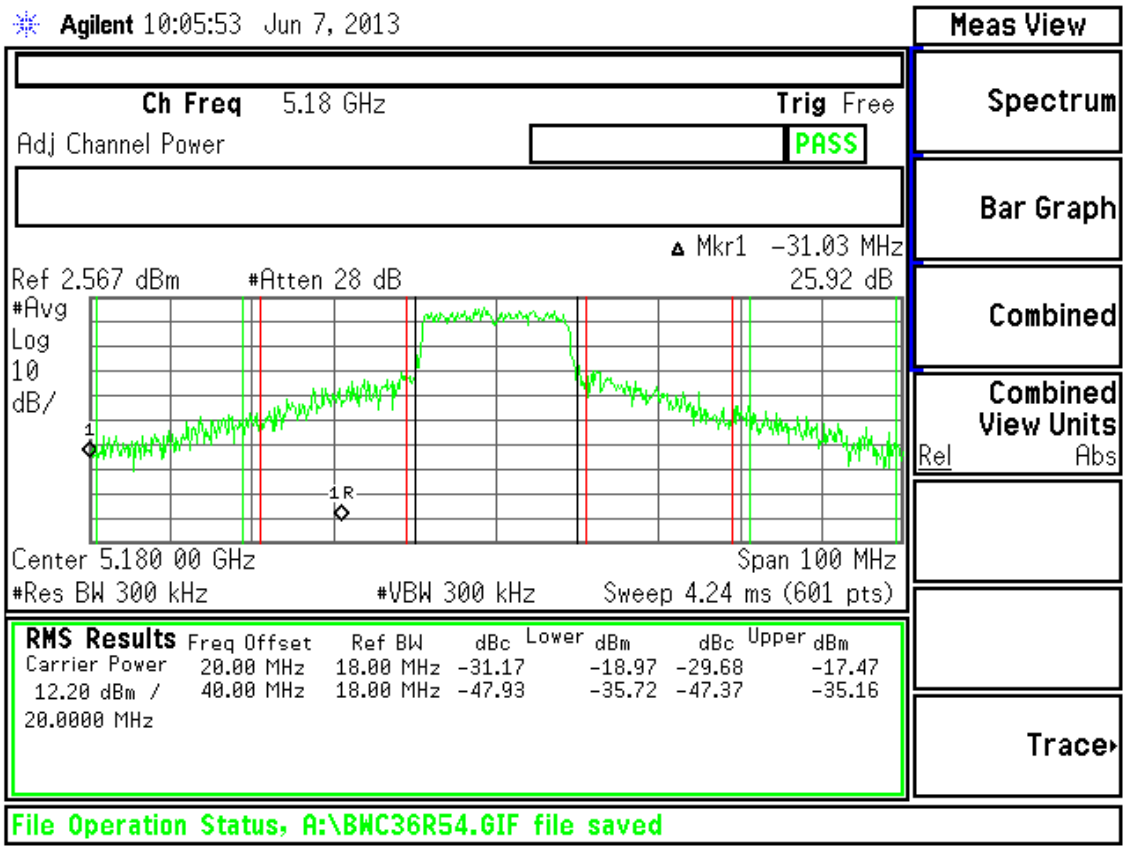
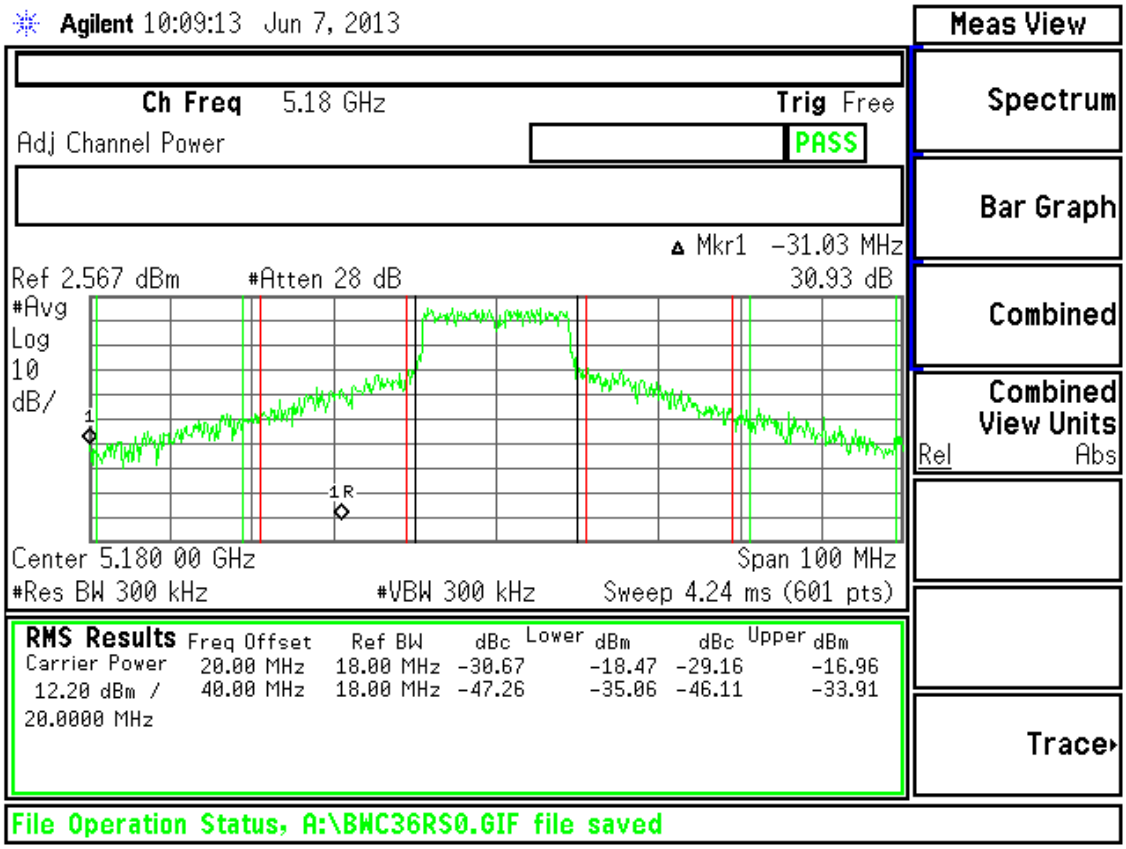
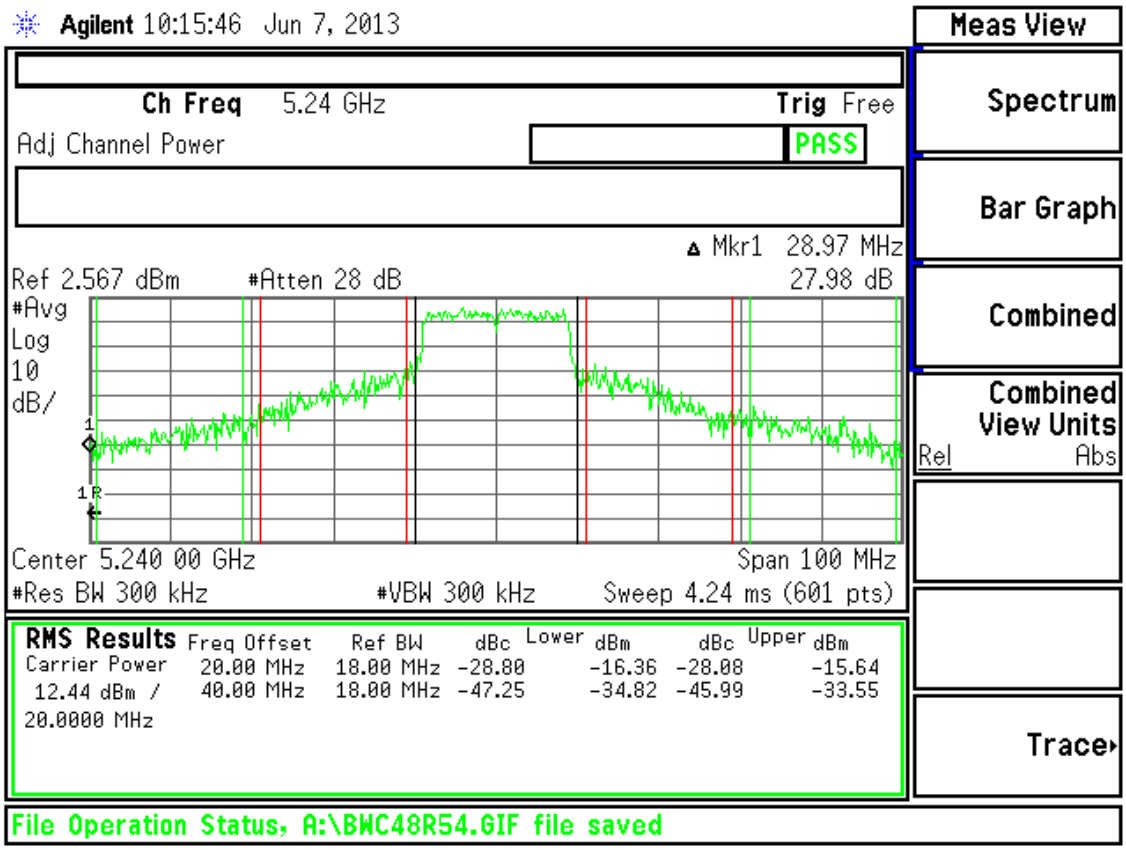


CH36 802.11n Adjacent Channel Leakage Power (MCS0)



CH36 802.11n Adjacent Channel Leakage Power (MCS7)



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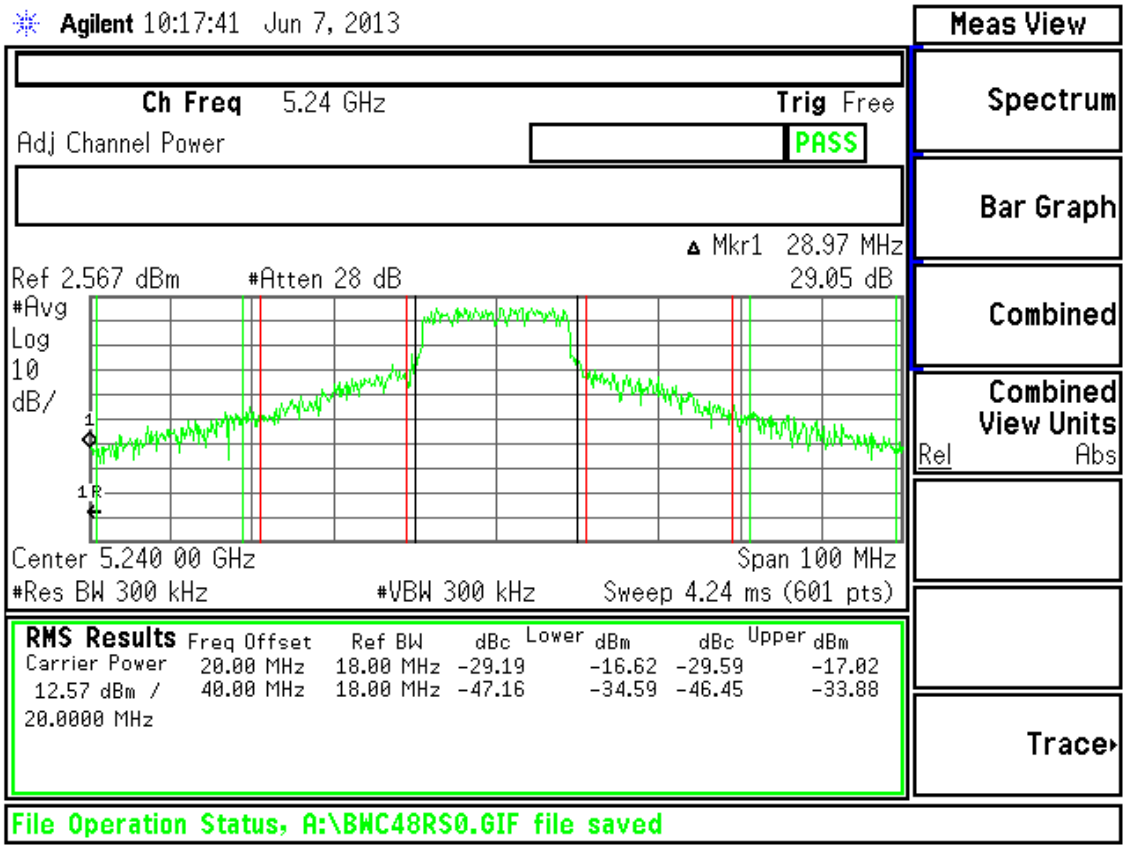

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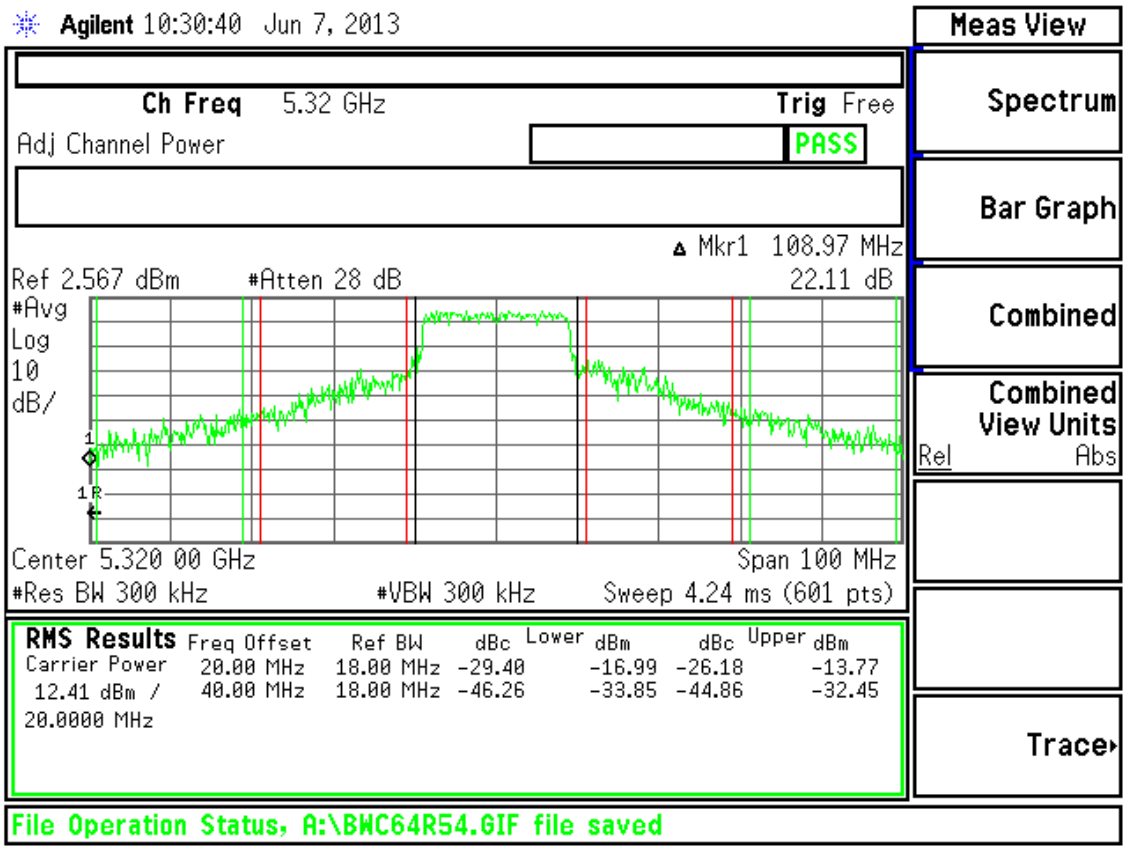

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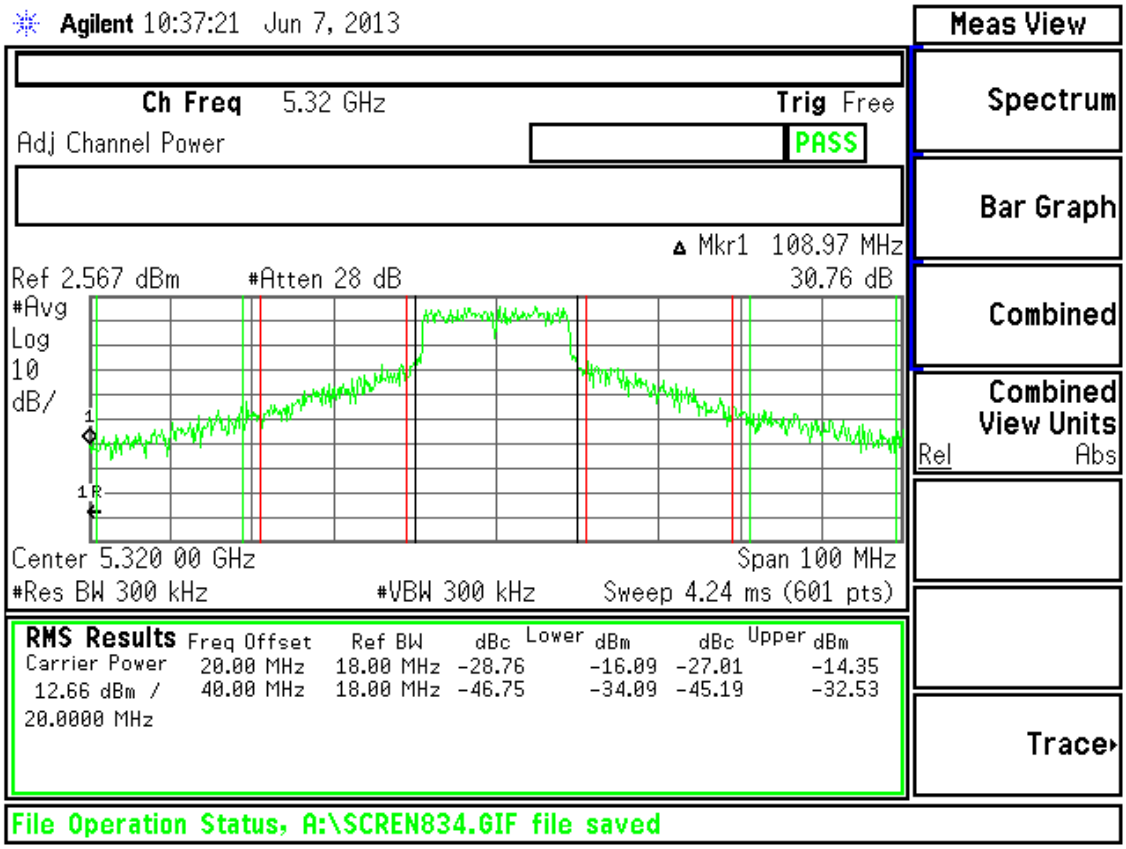

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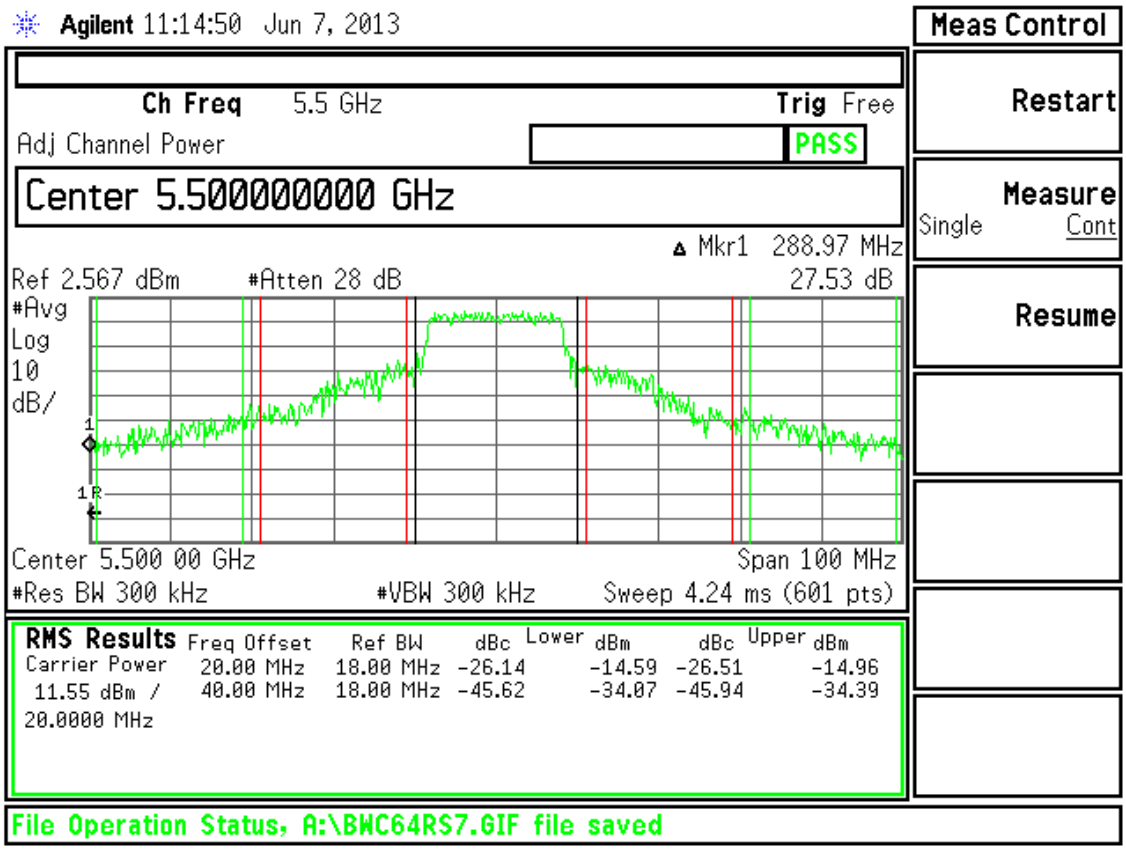

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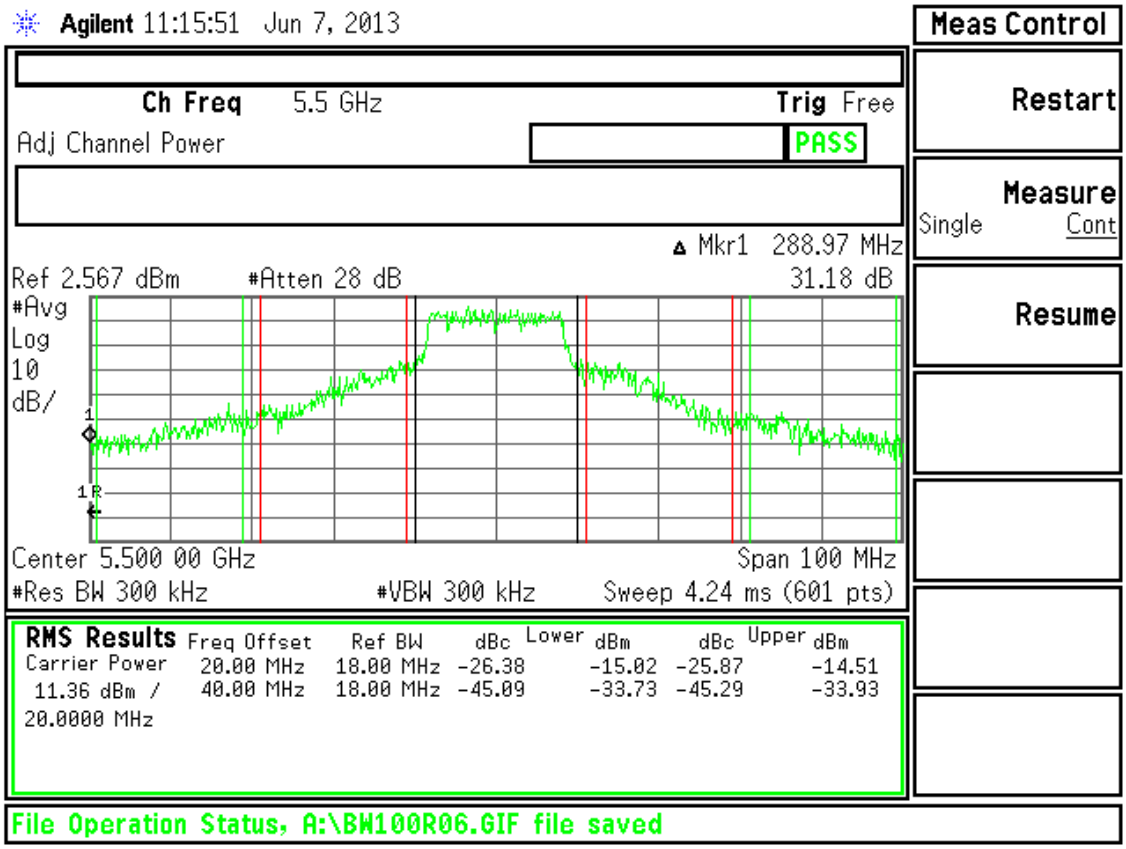

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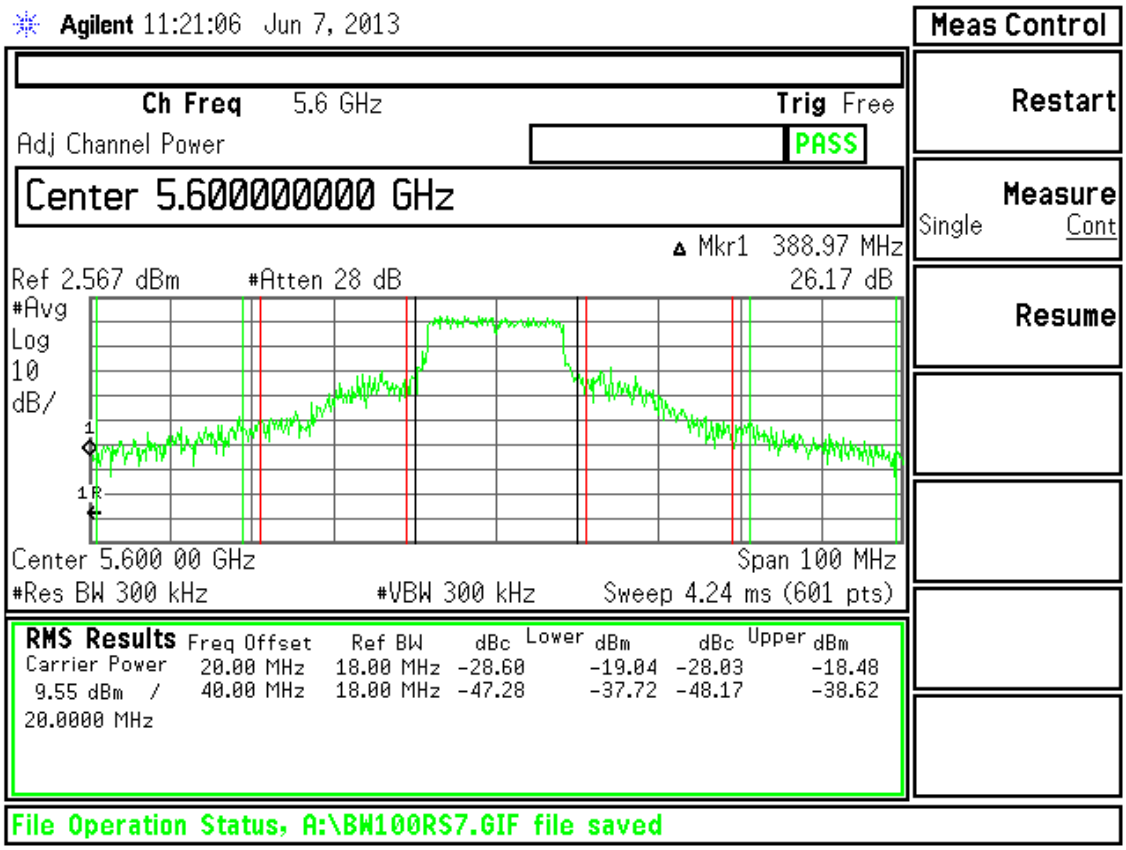

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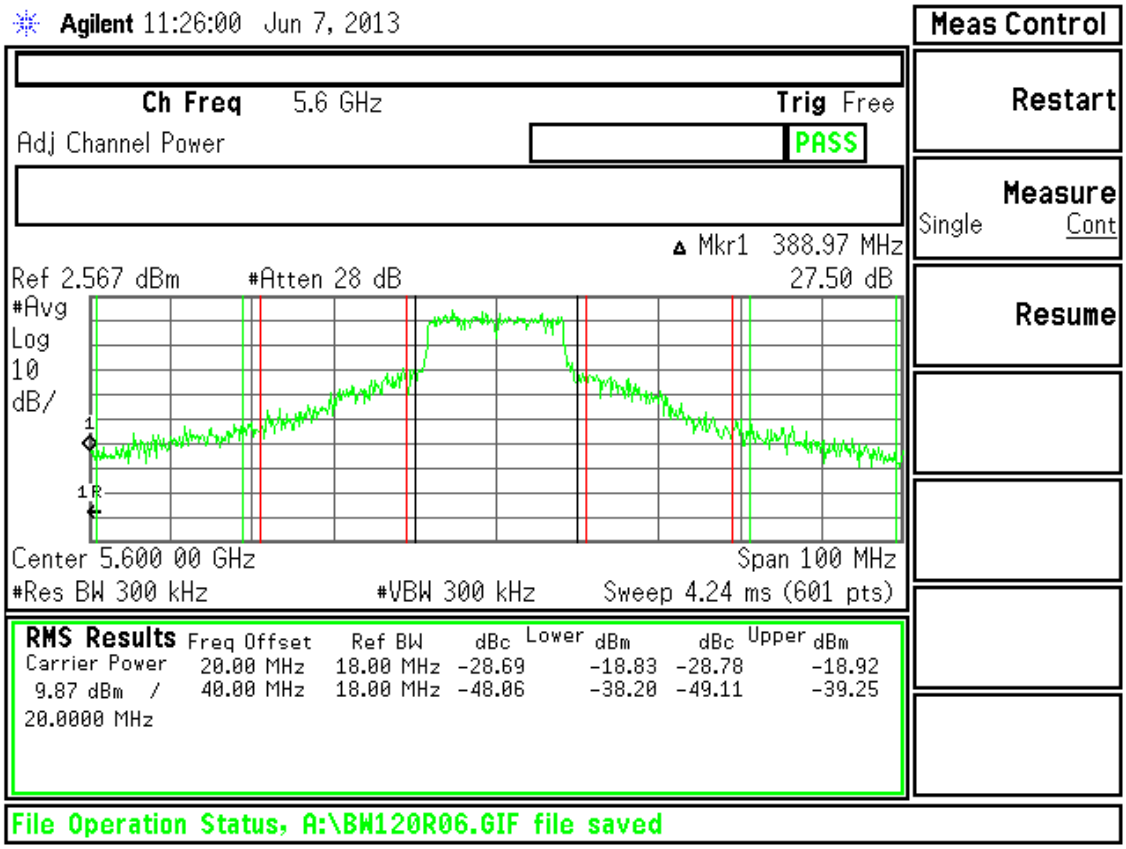

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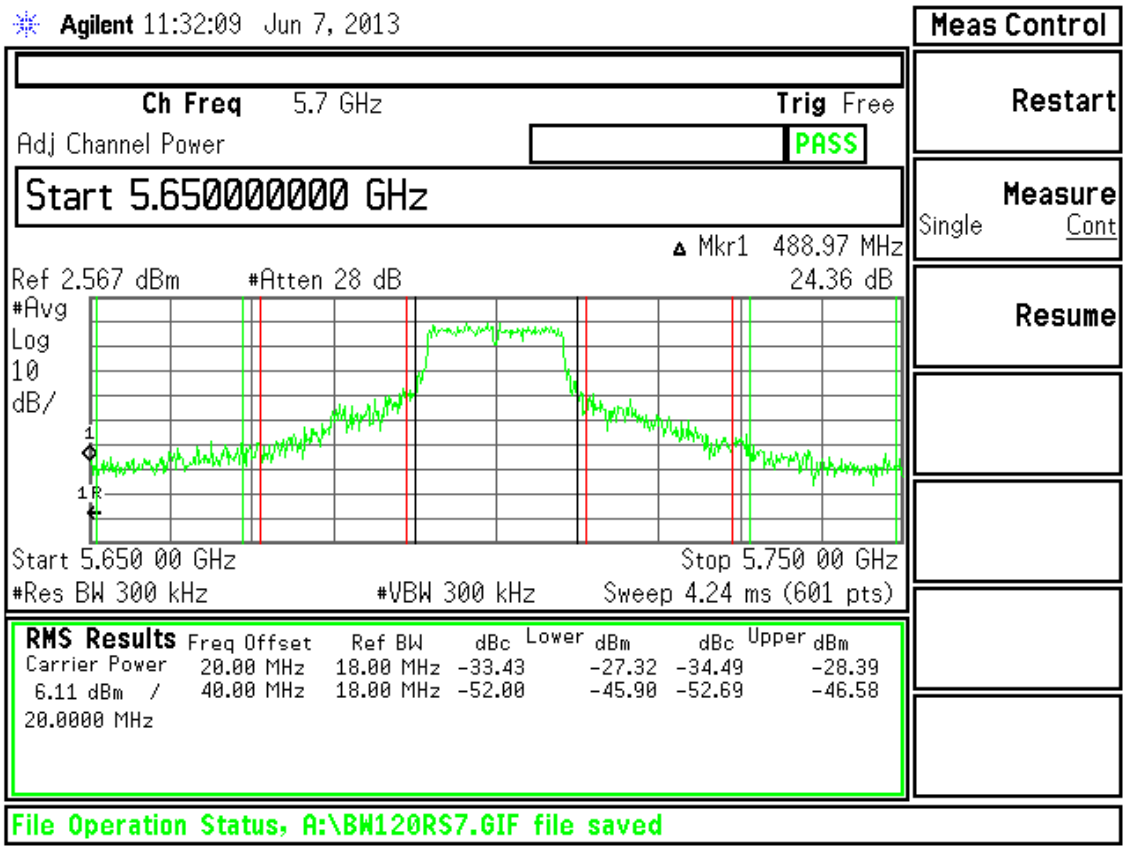

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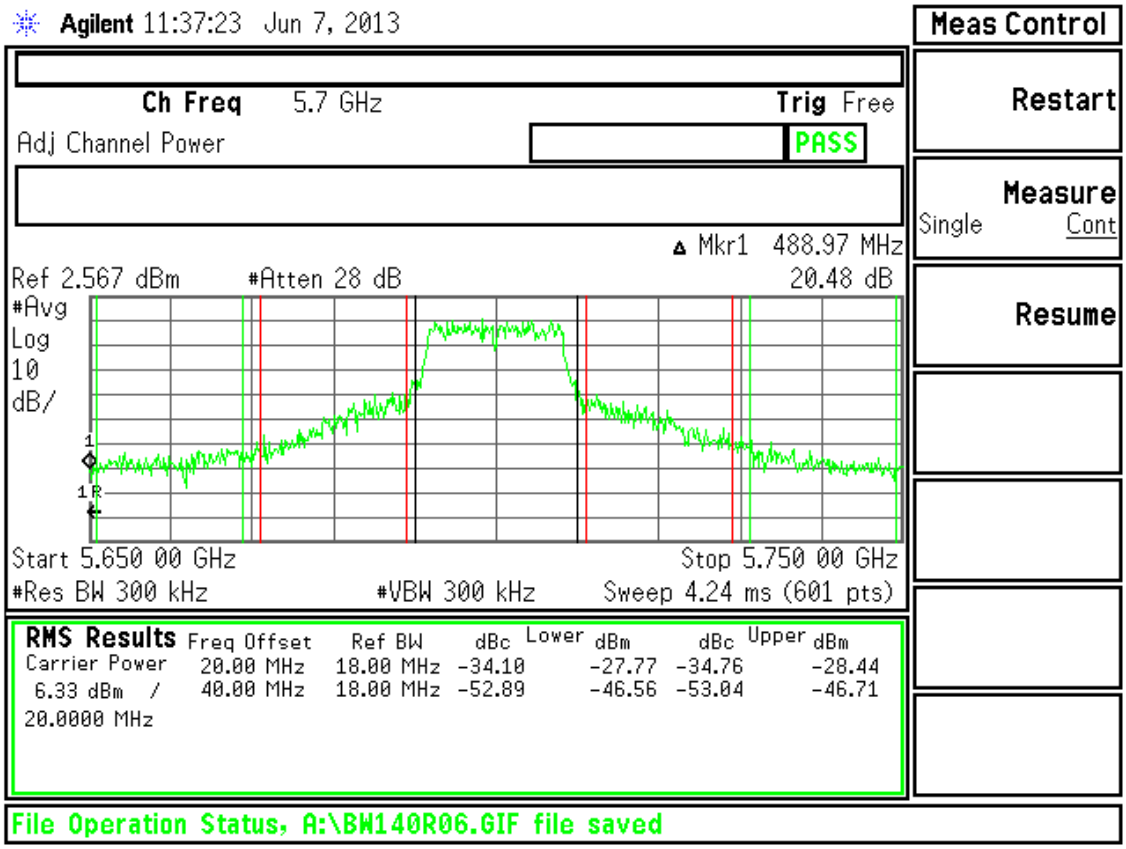

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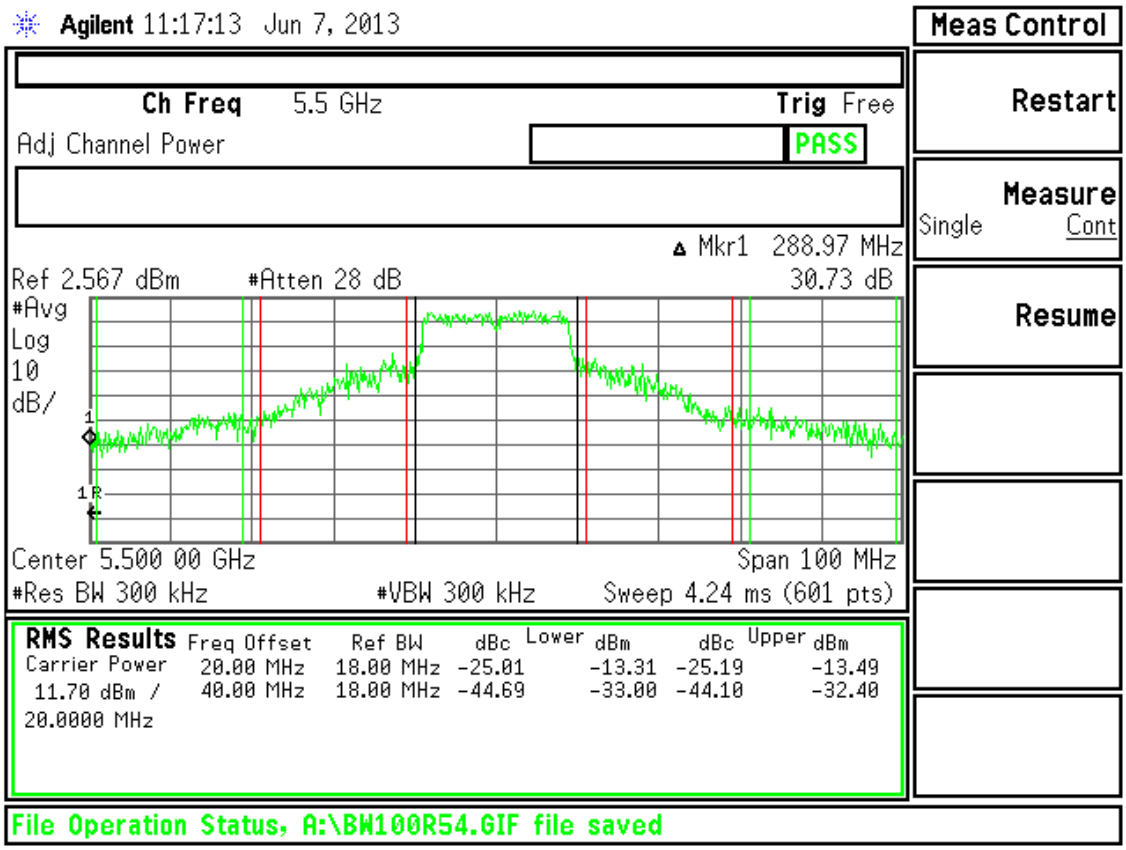
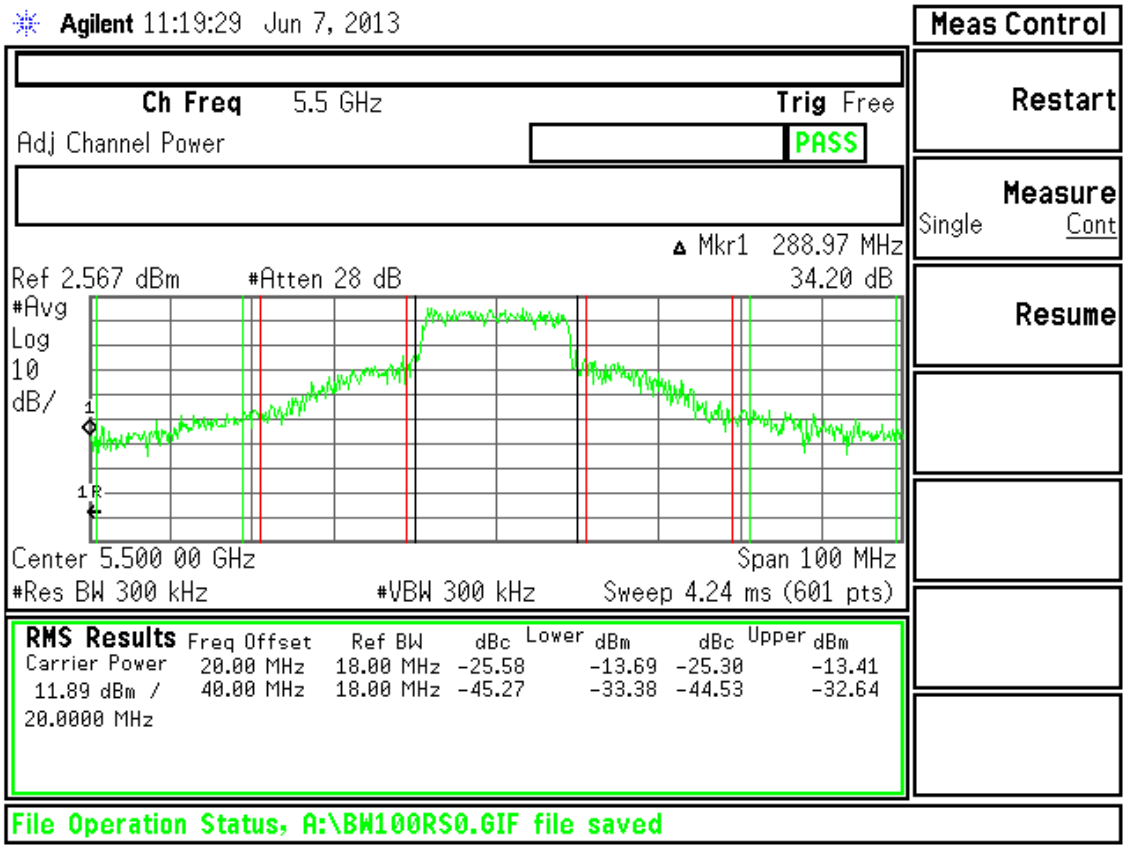


CH100 802.11n Adjacent Channel Leakage Power (MCS0)



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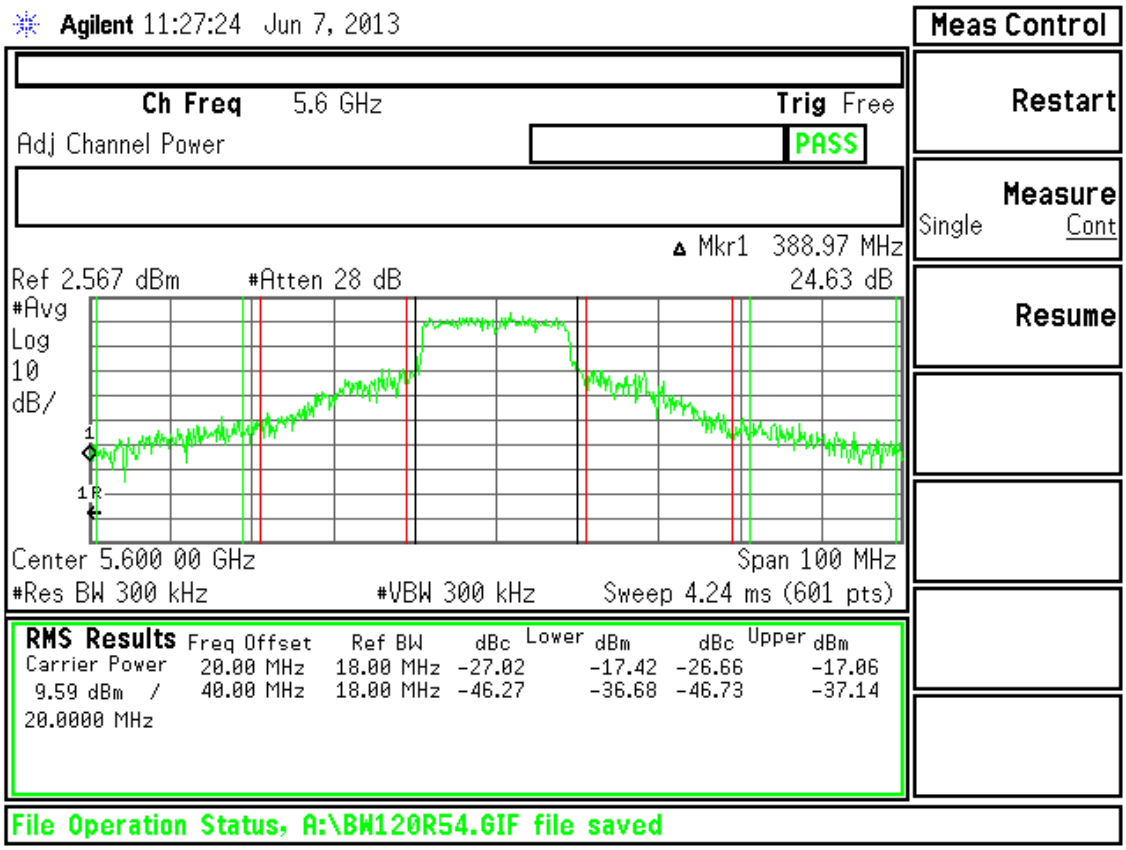

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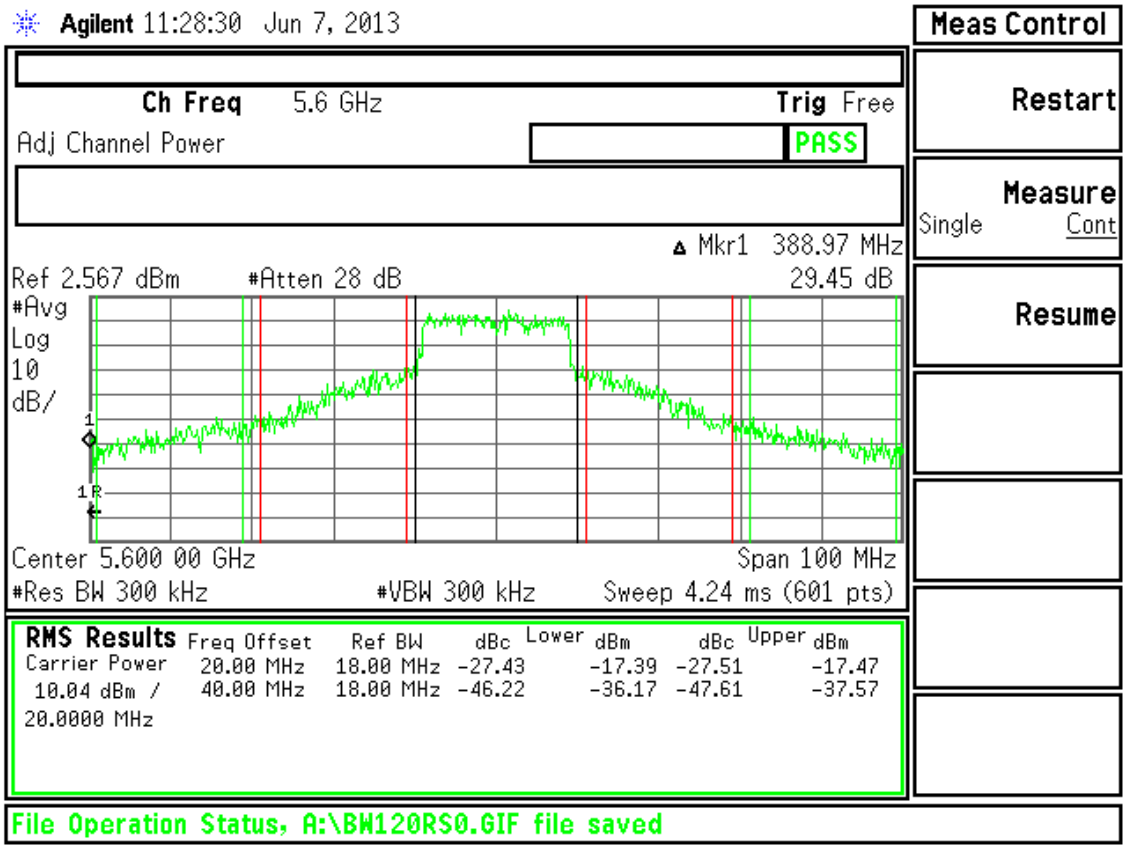
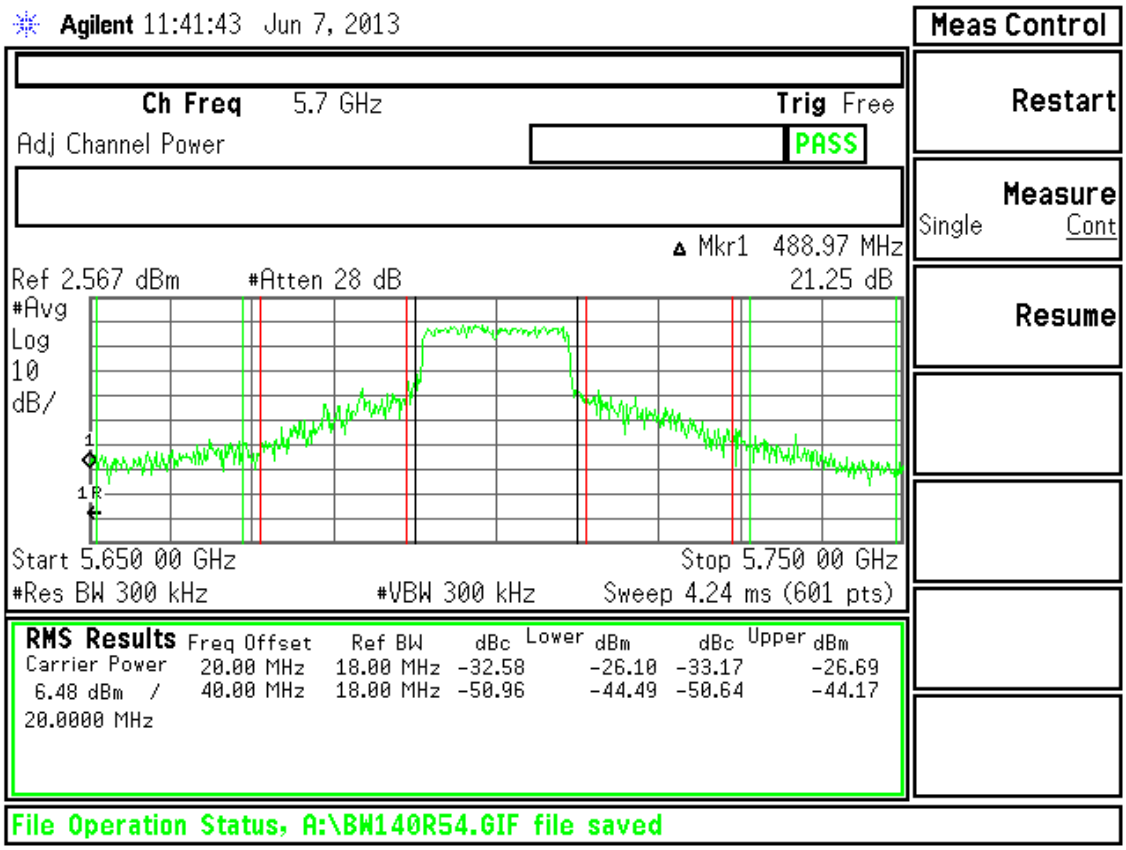


CH120 802.11n Adjacent Channel Leakage Power (MCS7)



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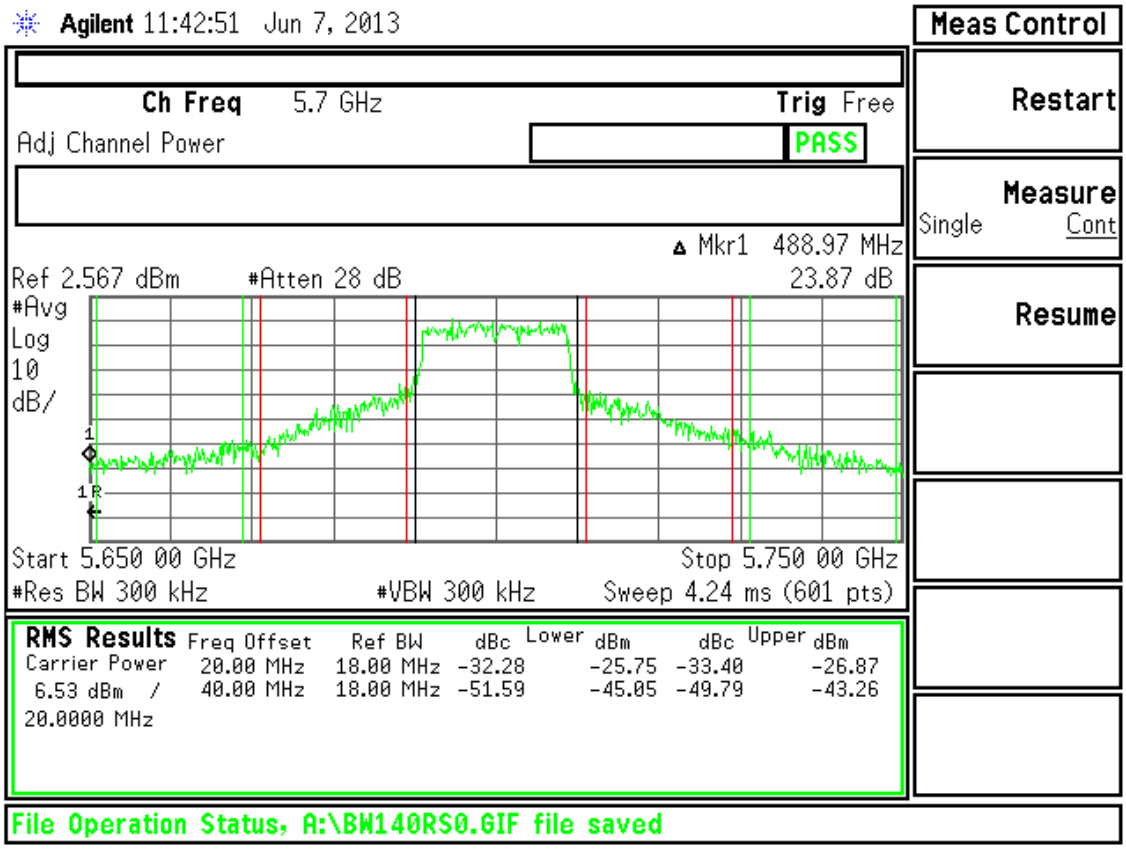


CH140 802.11n Adjacent Channel Leakage Power (MCS7)

Appendix C: Additional Test and Sample Details

This appendix contains details of:

1. The samples submitted for testing.
2. Details of EUT operating mode(s)
3. Details of EUT configuration(s) (see below).
4. EUT arrangement (see below).

Throughout testing, the following numbering system is used to identify the sample and it's modification state:

Sample No: Sxx Mod w

where:

xx = sample number eg. S01
w = modification number eg. Mod 2

The following terminology is used throughout the test report:

Support Equipment (SE) is any additional equipment required to exercise the EUT in the applicable operating mode. Where relevant SE is divided into two categories:

SE in test environment: The SE is positioned in the test environment and is not isolated from the EUT (e.g. on the table top during REFE testing).

SE isolated from the EUT: The SE is isolated via filtering from the EUT. (e.g. equipment placed externally to the ALSR during REFE testing).

EUT configuration refers to the internal set-up of the EUT. It may include for example:

Positioning of cards in a chassis.
Setting of any internal switches.
Circuit board jumper settings.
Alternative internal power supplies.

Where no change in EUT configuration is **possible**, the configuration is described as “single possible configuration”.

EUT arrangement refers to the termination of EUT ports / connection of support equipment, and where relevant, the relative positioning of samples (EUT and SE) in the test environment.

For further details of the test procedures and general test set ups used during testing please refer to the related document "EMC Test Methods - An Overview", which can be supplied by TRaC telecoms & Radio upon request.

C1) Test samples

The following samples of the apparatus were submitted by the client for testing :

Sample No.	Description	Identification
TRA-007055S17	Wi-i.MX53	55001661-01
TRA-007055S18	Bec In-Line PSU	AP1212-1 01 Rev.B

The following samples of apparatus were supplied by TRaC Telecoms & Radio as support or drive equipment (auxiliary equipment):

Identification	Description
REF1270	Variac

C2) EUT Operating Mode During Testing.

During testing, the EUT was exercised as described in the following tables :

Test	Description of Operating Mode
All tests detailed in this report excluding: RX emissions	EUT was transmitting on software power setting 53, 100% duty cycle using the following operating modes : **Operating band: 5.150 to 5.250GHz band, 5.250 GHz to 5.350 GHz, 5.470 to 5.725 GHz and 5.725 to 5.825GHz bands** 802.11a (OFDM): Channels 36, 48 and 64 with data rates: 6Mbps & 54Mbps 802.11n (20MHz): (OFDM):Channels 36, 48 and 64 using a single spatial stream with a modulation and coding scheme (MCS) 0 & 7 802.11a (OFDM): Channels 100, 120 and 140 with data rates: 6Mbps & 54Mbps 802.11n (20MHz): (OFDM): Channels 100, 120 and 140 using a single spatial stream with a modulation and coding scheme (MCS) 0 & 7
RX emissions	The EUT was in continuous Receive mode

C3) EUT Configuration Information.

The EUT was submitted for testing in one single possible configuration.

C4) List of EUT Ports.

Sample : TRA-007055S17
Tests : All tests listed within this test report.

Port	Description of Cable Attached	Cable length	Equipment Connected
Power, control and signals	None	N/A	None
dc power port	2 core unscreened	1m	PSU
Ethernet 1	None	N/A	None
Ethernet 2	Cat 5e UTP	>3m	Laptop
USB	None	N/A	None
Serial	None	N/A	None
BAT IN	None	N/A	None

The only active interface that is used by the EUT under normal operation is the Ethernet port. The other interfaces are only used to set up the support board, which is not EUT.

C5) Details of Equipment Used.

TRAC Ref	Type	Description	Manufacturer	Date Calibrated.
RFG031/032/171	436A/8482A/8481D	Power Meter/Head	HP	04/10/10
REF845	E8257D	PSG Signal generator	Agilent	19/02/10
REF837	E4440A	PSA Spectrum Analyser	Agilent	10/05/13
REF847	ESU	EMI Test Receiver (Spectrum analyser)	Rhode & Schwarz	14/06/10
RFG454	SMA	HF cable (SMA to SMA)	Utiflex	04/05/10
REF887	34405A	Digital Multi-meter	Agilent	25/08/10
REF1270	N/A	VARIAC	TRaC	CAL date N/A

Appendix D: Additional Information

Manufacturer's data sheet detailing the maximum gain used by the EUT.

Tri-band
2.45/5.2/5.8GHz
Hi-Gain Dipole **WPANTE3 Series**

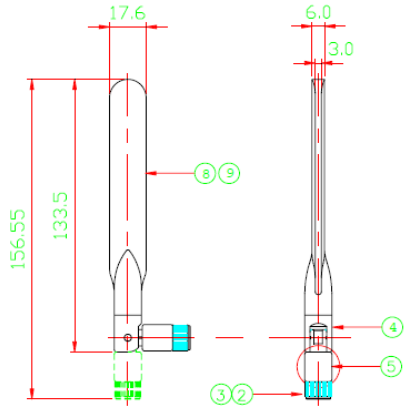
Explanation of Part Number

WPANT E3
(1) (2)

(1) Product type: Antenna
(2) Appearance Series: E3

Electrical Properties

Item	Property
Frequency Range	2.4~2.4835 GHz / 5.15~5.35/5.725~5.85GHz
Impedance	50Ω
VSWR (see Fig. 1)	2.0 max
Return Loss (see Fig 2)	-10 dB max
Gain (see Fig 3,Fig 4)	5 dBi (Typ.)
Polarization	Linear
Radiation Pattern	Near omni-directional in the horizontal plane
Admitted Power	1 W
Electrical	1/2 λ Dipole



Application

This tri-band high-gain dipole antenna is an ideal solution for dual or tri-band WLAN access points operating in the ISM 2.45GHz or UNII/III 5.2/5.8GHz bands.
Two antennas may be deployed for diversity antenna applications/requirements.
These antennas are available in a variety of standard coaxial terminations or optionally as a "snap-in" mounted version.
Please contact wireless@worldproducts.com with your specific requirements.

Figure 1. Return Loss (2.4GHz)

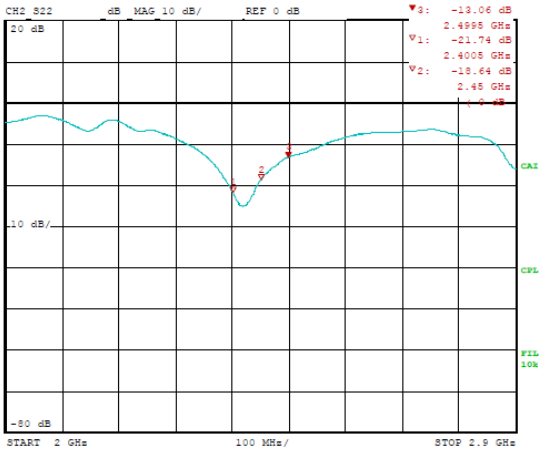


Figure 2. V.S.W.R (2.4GHz)

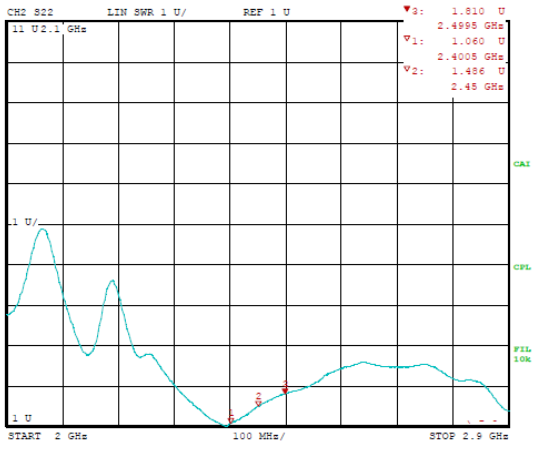


Figure 3. Return Loss (5.0GHz)

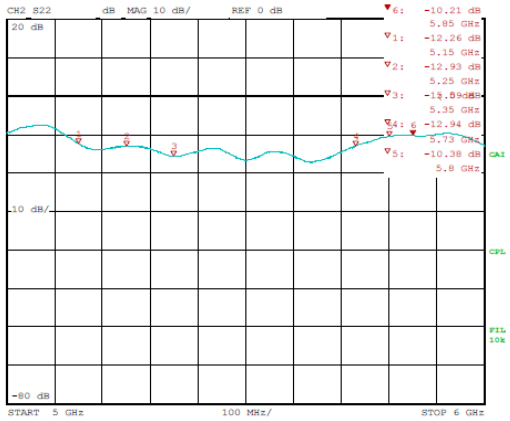


Figure 4. V.S.W.R (5.0GHz)

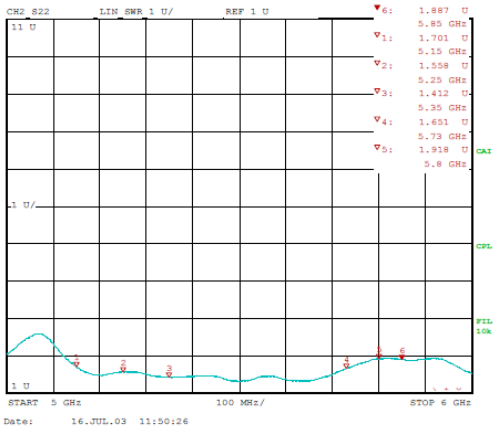


Figure 5. Return Loss (2.0 & 5.0GHz)

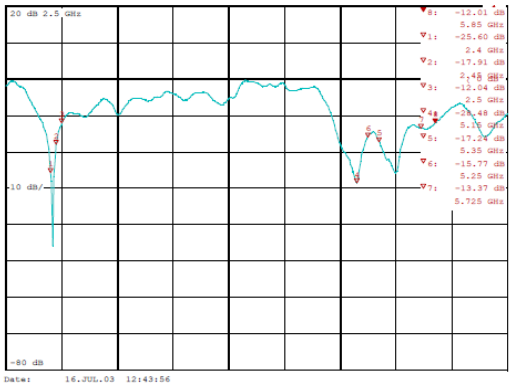
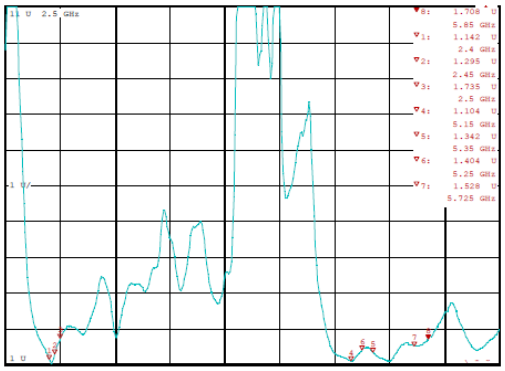


Figure 6. V.S.W.R (2.0 & 5.0GHz)



Measurement Set Up

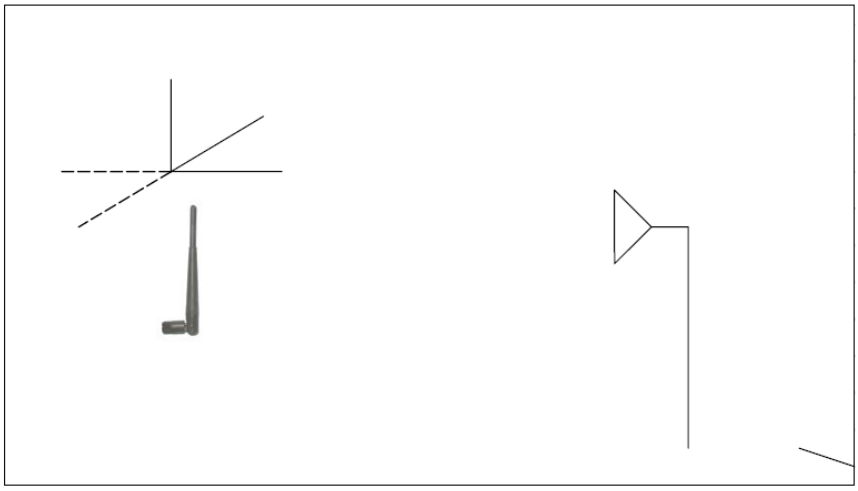


Figure 7. H-Plane (2.0GHz)

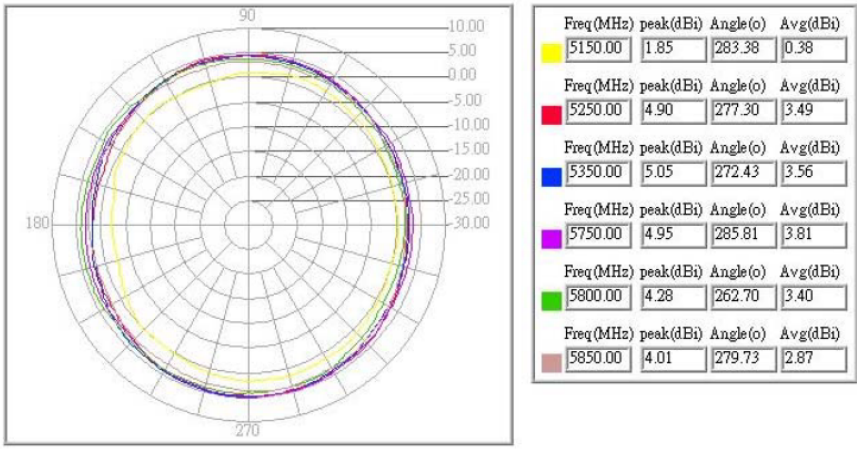
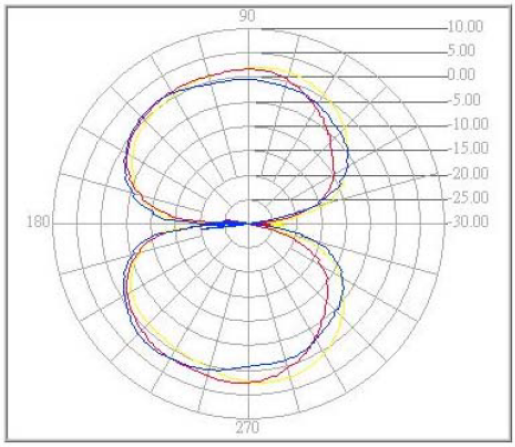
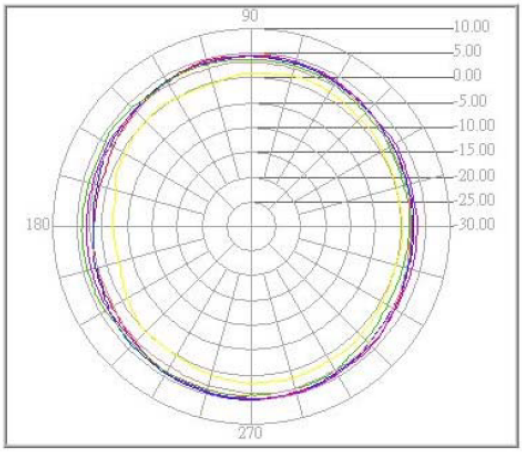


Figure 8. E-Plane (2.0GHz)



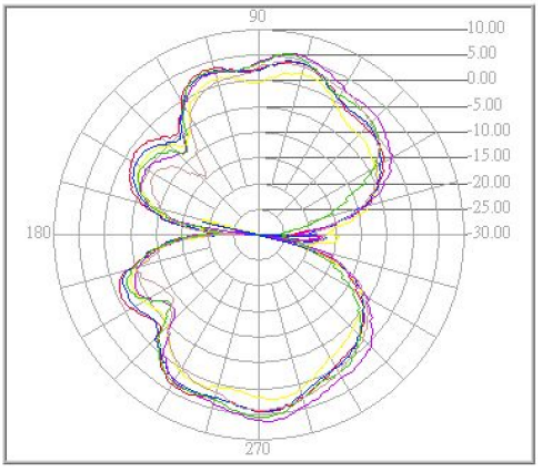
Freq(MHz)	peak(dBi)	Angle(o)	Avg(dBi)
2400.00	2.72	277.79	-1.18
2450.00	2.71	264.08	-1.39
2490.00	2.17	232.94	-1.82

Figure 9. H-Plane (5.0GHz)



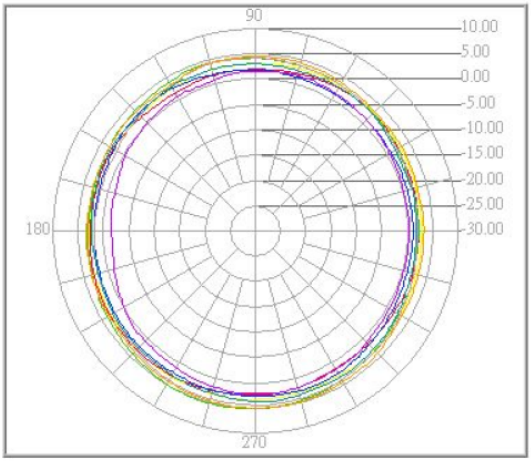
Freq(MHz)	peak(dBi)	Angle(o)	Avg(dBi)
5150.00	1.85	283.38	0.38
5250.00	4.90	277.30	3.49
5350.00	5.05	272.43	3.56
5750.00	4.95	285.81	3.81
5800.00	4.28	262.70	3.40
5850.00	4.01	279.73	2.87

Figure 10. E-Plane (5.0GHz)



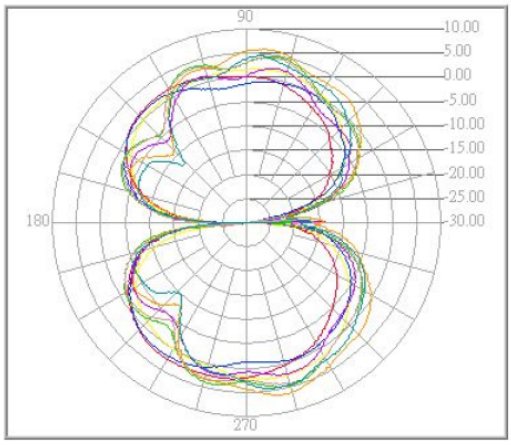
Freq(MHz)	peak(dBi)	Angle(o)	Avg(dBi)
5150.00	2.44	72.25	-2.01
5250.00	4.53	272.80	0.11
5350.00	4.51	75.99	-0.15
5750.00	6.42	274.05	0.96
5800.00	5.79	79.72	0.26
5850.00	4.20	271.56	-0.75

Figure 11. H-Plane (2.0 & 5.0GHz)



Freq(MHz)	peak(dBi)	Angle(o)	Avg(dBi)
2400.00	3.39	257.68	2.98
2450.00	3.17	214.74	2.37
2500.00	2.79	288.00	1.96
5150.00	2.25	280.42	0.82
5200.00	5.23	252.63	3.71
5250.00	4.51	272.84	3.16
5750.00	5.03	267.79	3.88
5850.00	3.83	276.63	2.74

Figure 12. E-Plane (2.0 & 5.0GHz)



Freq(MHz)	peak(dBi)	Angle(o)	Avg(dBi)
2400.00	2.60	283.22	-1.10
2450.00	2.57	240.42	-1.36
2500.00	1.92	237.27	-1.78
5150.00	2.37	78.67	-1.91
5200.00	4.80	79.30	0.32
5250.00	4.49	79.93	-0.01
5750.00	6.34	283.85	1.08
5850.00	4.67	283.22	-0.46

Mechanical Properties

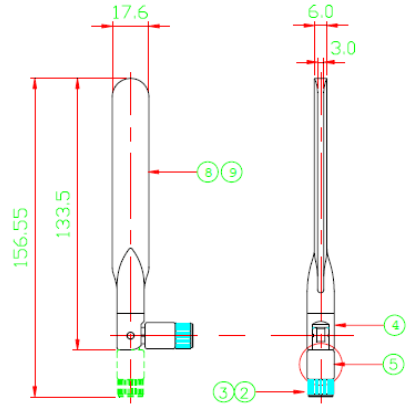
Item	Property
Color	Black/Gray
Coaxial-Cable	RG-178
Plastic Cover	TPU
Antenna Base	PC
Connector	SMA/TNC/BNC

Operation Temperature : -20~+65ºC
Storage Temperature : -20~+65ºC

Environmental Characteristics

Item	Test Condition	Specification
High Temperature/Humidity Operating test	1. Temperature: +60 ± 2ºC 2. Humidity: 90~95%RH 3. Time: 24hrs	1. Normal function. Test must be satisfied after the test. 2. No material deformation is allowed.
Low Temperature/Humidity Operating test	1. Temperature: +20 ± 2ºC 2. Humidity: 0%RH 3. Time: 24hrs	
High Temperature/Humidity Storage	1. Temperature: +65 ± 2ºC 2. Humidity: 90~95%RH 3. Time: 72hrs	
Low Temperature/Humidity Storage	1. Temperature: +20 ± 2ºC 2. Humidity: 0%RH 3. Time: 24hrs	
Temperature Cycle Operating Test	1. Temperature: -40~+75ºC 2. Duration: ▪ 88 Hours ▪ 45min./dwelling@-40ºC ▪ 10ºC per min./transition from 40~75ºC ▪ 45min./dwelling@ 75ºC	
Temperature Shock Test	1. Temperature: -40~+85ºC 2. TIME: 30min./dwelling, 5minutes/transition, 24 cycles	

Physical Dimensions



Software settings used for both modes of modulation to determine the maximum power used by the device. Antenna port A and B was assed for the highest output power to determine the software settings within this test report.

Antenna Port A/B: Operating mode 802.11a		
Software Output Power settings		
Mode 802.11a	Declared operating frequency (MHz)	Software Output Power settings
CH36	5180MHz	53
CH48	5240MHz	53
CH64	5320MHz	53
CH100	5500MHz	53
CH120	5600MHz	53
CH140	5700MHz	53

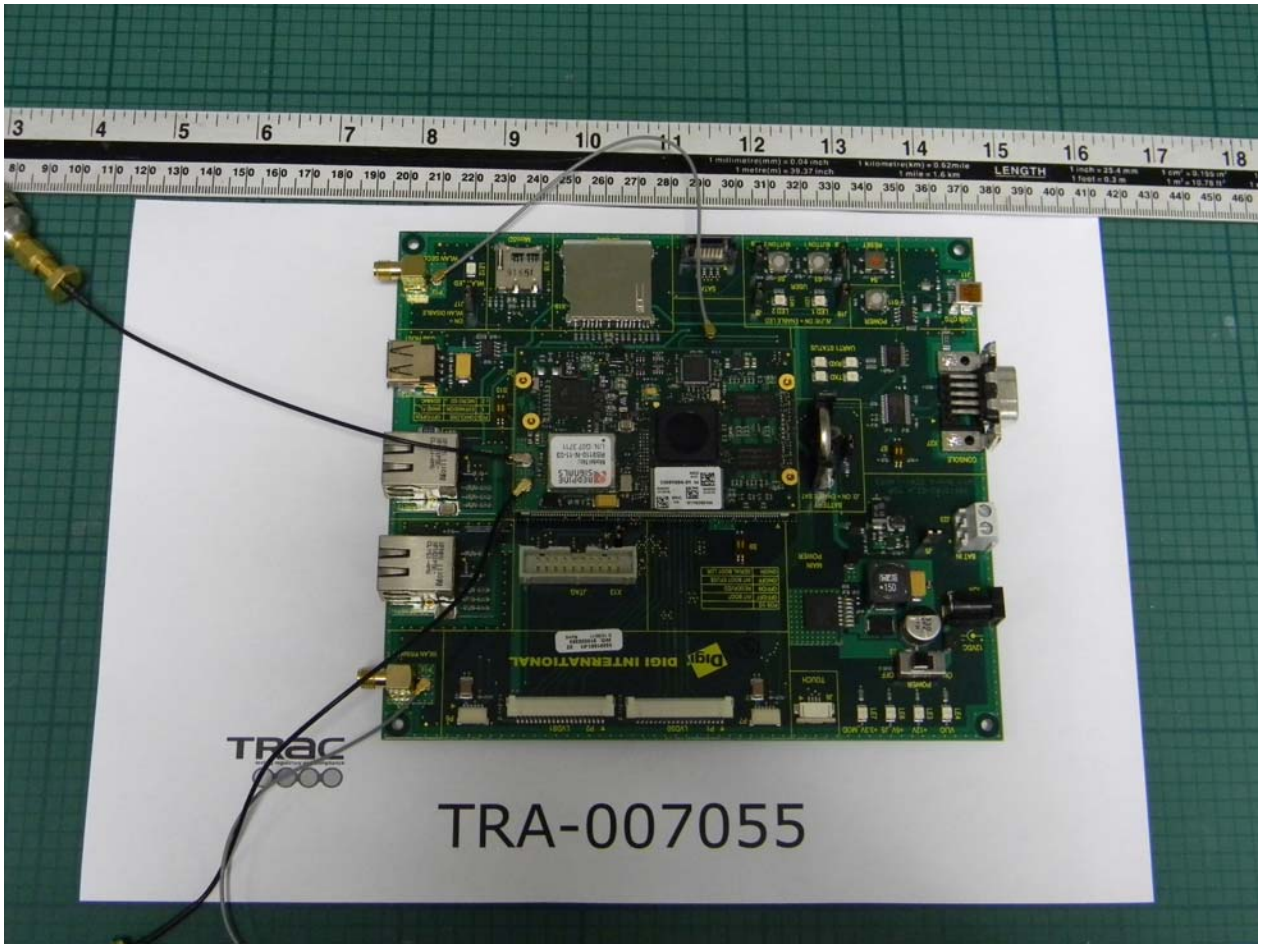
Antenna Port A/B: Operating mode 802.11n

Software Output Power settings

Mode 802.11n	Declared operating frequency (MHz)	Software Output Power settings
CH36	5180MHz	53
CH48	5240MHz	53
CH64	5320MHz	53
CH100	5500MHz	53
CH120	5600MHz	53
CH140	5700MHz	53

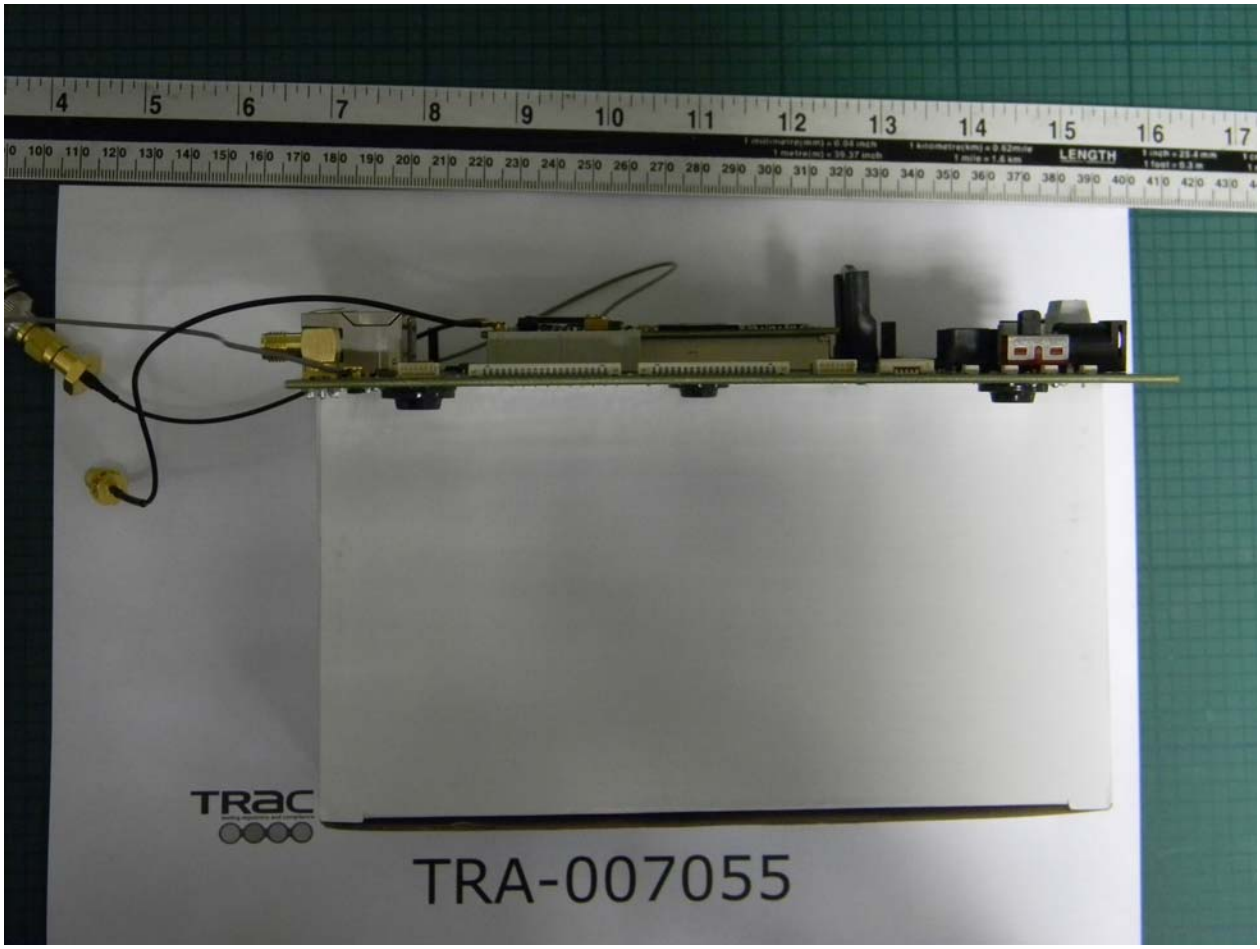
Appendix E: Photographs and Figures

1. Photo of the EUT Front view -length dimension
2. Photo of the DUT Rear view
3. Photo of the DUT Side view
4. Photo of the EUT Front view - width dimension

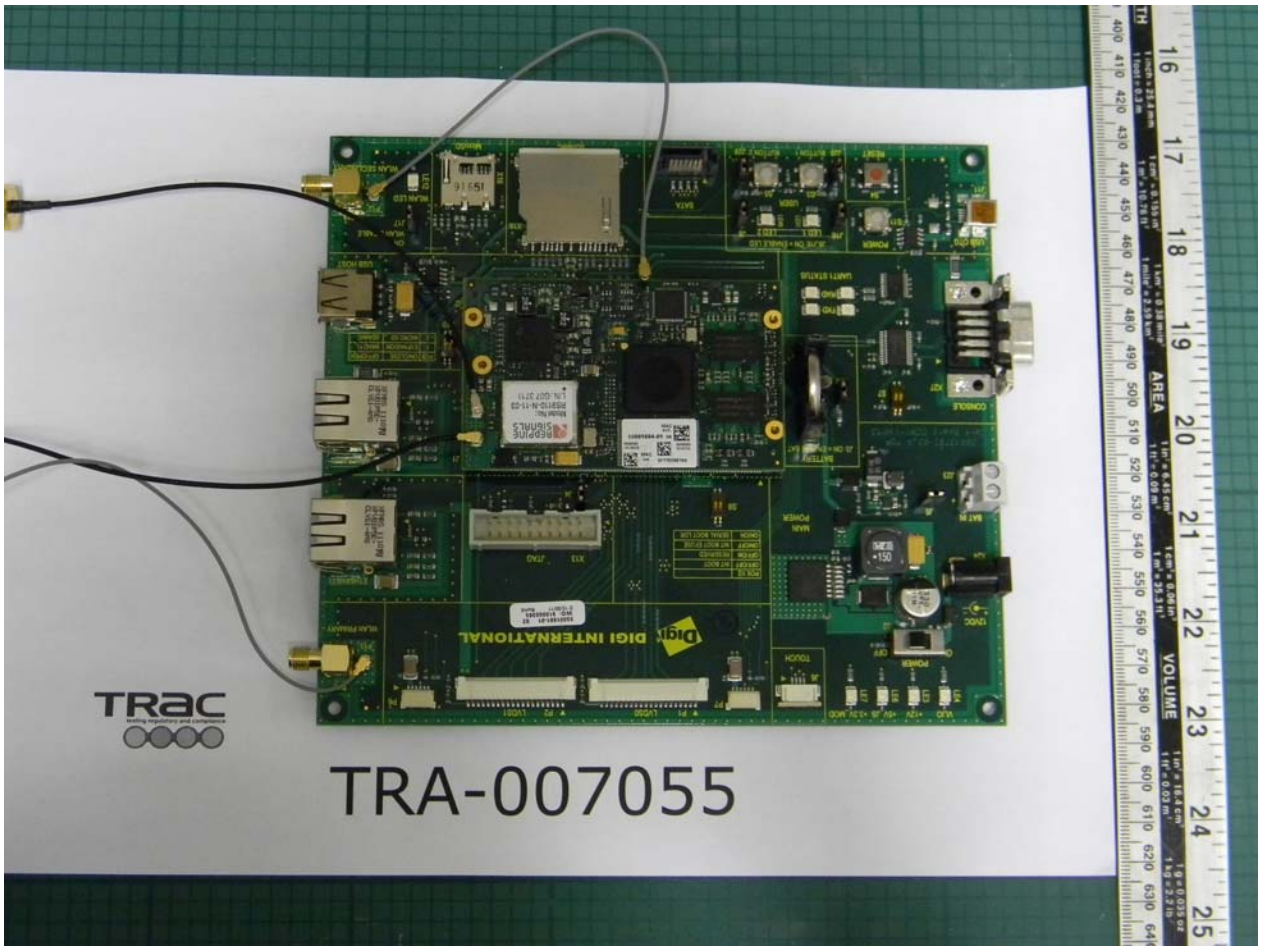


Photograph 1

Photograph 2



Photograph 3



Photograph 4

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