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Report On

Application for Grant of Equipment Authorization of the
Novatel Wireless Inc.
T1114 Wireless Router with Cellular Voice and Data Capabilities

FCC Part 15 Subpart C §15.247

Report No. SC1307899C_REV1.0

September 2013



REPORT ON	Radio Testing of the Novatel Wireless Inc. Wireless Router with Cellular Voice and Data Capabilities
TEST REPORT NUMBER	SC1307899C_REV1.0
PREPARED FOR	Novatel Wireless Inc. 9645 Scranton Road, Suite 205 San Diego, CA 92121-3030 USA
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APPROVED BY	 _____ Chip R. Fleury Name Authorized Signatory
DATED	_____ September 3, 2013



Revision History

SC1307899C_REV1.0 Novatel Wireless Inc. T1114 Wireless Router with Cellular Voice and Data Capabilities					
DATE	OLD REVISION	NEW REVISION	REASON	PAGES AFFECTED	APPROVED BY
08/23/2013	Initial Release				Chip R. Fleury
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SECTION 1

REPORT SUMMARY

Radio Testing of the
Novatel Wireless Inc.
Wireless Router with Cellular Voice and Data Capabilities



1.1 INTRODUCTION

The information contained in this report is intended to show verification of the Novatel Wireless Inc. Wireless Router with Cellular Voice and Data Capabilities to the requirements of FCC Part 15 Subpart C §15.247.

Objective	To perform Radio Testing to determine the Equipment Under Test's (EUT's) compliance with the Test Specification, for the series of tests carried out.
Manufacturer	Novatel Wireless Inc.
Model Number(s)	T1114
FCC ID Number	PKRNVWT1114
IC Number	N/A
Serial Number(s)	SEZ100073700125
Number of Samples Tested	1
Test Specification/Issue/Date	FCC Part 15 Subpart C §15.247 (October 1, 2011).
Start of Test	August 05, 2013
Finish of Test	August 16, 2013
Name of Engineer(s)	Juan Manuel Gonzalez Kathy Mackenzie Alex Chang
Related Document(s)	Supporting documents for EUT certification are separate exhibits.

1.2 BRIEF SUMMARY OF RESULTS

A brief summary of the tests carried out in accordance with FCC Part 15 Subpart C §15.247 is shown below.

Section	§15.247 Spec Clause	Test Description	Result	Comments/ Base Standard
2.1	§15.247(b)(3)	Peak Output Power	Compliant	
2.2	§15.207(a)	Conducted Emissions	Compliant	
2.3	§15.247(a)(2)	Minimum 6 dB RF Bandwidth	Compliant	
2.4	§15.247(d)	Out-of-Band Emissions - Conducted	Compliant	
2.5	§15.247(d)	Band-edge Compliance of RF Conducted Emissions	Compliant	
2.6	§15.247(d)	Spurious Radiated Emissions	Compliant	
2.7	§15.247(e)	Power Spectral Density for Digitally Modulated Device	Compliant	



1.3 PRODUCT INFORMATION

1.3.1 Technical Description

The Equipment Under Test (EUT) was a Novatel Wireless Inc. T1114 Wireless Router with Cellular Voice and Data Capabilities. The EUT is a wireless device that delivers Internet connectivity and telephone service, it uses LTE Band 4 and 13 / CDMA BC0 & BC1. The EUT can make a phone call, connect up to 10 devices via Wi-Fi (b/g/n 2.4GHz and a/n 5GHz UNII-1 and UNII-3) and connect up to 3 devices via Ethernet, simultaneously.

The EUT poses 2 optional antenna ports accessible to customers to improve the coverage range with custom design antenna "Sold separately". (See Exhibit PKRNVWT1114_Theory of Operation page 24-28).

1.3.2 EUT General Description

EUT Description Wireless Router with Cellular Voice and Data Capabilities

Model Number(s) T1114

Rated Voltage AC-DC converter: 100-240VAC, 50/60Hz to 5.0VDC / 3.5A
 Nominal voltage.

Output Power

Mode	Average (conducted)	Peak (conducted)
802.11 b	19.65 dBm	22.07 dBm
802.11 g	20.11 dBm	25.17 dBm
802.11 n	20.12 dBm	25.12 dBm
802.11 a	14.27 dBm	23.11 dBm
802.11 n	14.85 dBm	22.80 dBm

Frequency Range 2412 MHz to 2462 MHz in the 2400 MHz to 2483.5 MHz Band
 5745 MHz to 5825 MHz in the 5725 MHz to 5850 MHz Band

Number of Operating Frequencies 11 (802.11 b/g/n)
 5 (802.11 a/n)

Channels Verified (802.11 b/g/n) Channel 1 (Low Channel 2412 MHz)
 Channel 6 (Mid Channel 2437 MHz)
 Channel 11 (High Channel 2462 MHz)

Channels Verified (802.11 a/n) Channel 149 (Low Channel 5745 MHz)
 Channel 157 (Mid Channel 5785 MHz)
 Channel 165 (High Channel 5825 MHz)

Modulation Used DSSS (802.11 b), OFDM/DSSS (802.11 g), OFDM (802.11 a/n)



1.3.3 Antenna Details

Internal Antenna Details
(Client declaration, max. Antenna
gain covered under this test report)

WWAN Antenna – CDMA

Manufacturer: Pulse
Part Number: DA-010190774
Type: PIFA
Antenna Gain:

- CDMA BC0 – 850MHz: -0.59dBi
- CDMA BC1 – 1880MHz: -0.82dBi

WWAN Antenna – LTE Band 13/4

Manufacturer: Pulse
Part Number: DA-01019775
Type: PIFA
Antenna Gain:

- LTE B13 – 700MHz: 1.21dBi
- LTE B4 – 1700MHz: 2.44dBi

WLAN – Antenna: 802.11 a/b/g/n

Manufacturer: Murata
Part Number: 12023199
Type: CERAMIC CHIP
Antenna Gain:

- 802.11 b/g/n 2.4GHz: 2.99dBi
- 802.11 a/n 5GHz: 3.02dBi



1.4 EUT TEST CONFIGURATION

1.4.1 Test Configuration Description

Test Configurations	Description
A	Conducted antenna port measurement. EUT Tx a max power and connected to supply AC-DC power adapter.
B	Radiated test setup. EUT connected wirelessly with the wideband radio communication tester (CMW500, Tx a max power and connected to supply AC-DC power adapter).
C	Rx mode. EUT in Idle mode connected to supply AC-DC power adapter.

1.4.2 EUT Exercise Software

Before each test, the EUT is configured using Qualcomm Radio Control Toolkit version 3.0.11.0. The software allows configuration of channels, mode + data rate and power level. Power level is set according to manufacturer specification for each mode (802.11 b/g/n and 802.11 a/n).

1.4.3 Support Equipment and I/O cables

Manufacturer	Equipment/Cable	Description
Dell	Support Laptop	Novatel Wireless Test configuration Support Laptop
LUXSHARE-ICT	USB cable	Shielded, Type A to Micro USB (0.912 meter) USB Revision 2.0

1.4.4 Worst Case Configuration

Worst-case configuration used in this test report based from Peak Output Power measurements:

Mode	Channel	Data Rate
802.11 b	6 (Mid Channel)	2Mbps
802.11 g	6 (Mid Channel)	36Mbps
802.11 n	6 (High Channel)	26Mbps
802.11 a	165 (High Channel)	24Mbps
802.11 n	149 (Low Channel)	52Mbps

EUT is designed for indoor use a table top operation, for radiated spurious measurement only default configuration was evaluated (See test setup picture exhibit).



1.5 DEVIATIONS FROM THE STANDARD

No deviations from the applicable test standards or test plan were made during testing.

1.6 MODIFICATION RECORD

Description of Modification	Modification Fitted By	Date Modification Fitted
Serial Number SEZ100073700125		
N/A		

The table above details modifications made to the EUT during the test programme. The modifications incorporated during each test (if relevant) are recorded on the appropriate test pages.

1.7 TEST METHODOLOGY

All measurements contained in this report were conducted with ANSI C63.4-2009, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

For conducted and radiated emissions the equipment under test (EUT) was configured to measure its highest possible emission level. This level was based on the maximized cable configuration from exploratory testing per ANSI C63.4-2009. The test modes were adapted according to the Operating Instructions provided by the manufacturer/client.

1.8 TEST FACILITY

1.8.1 FCC – Registration No.: US5296

TUV SUD America Inc. (San Diego), a §2.498 listed test firm operates the EMC Laboratory registered under Sony Electronics Inc. Product Quality Division EMC. This laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files and the Registration is US5296.

1.8.2 Industry Canada (IC) Registration No.: 3067A

The 10m Semi-anechoic chamber of TUV SUD America Inc. (San Diego), has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No. 3067A.



SECTION 2

TEST DETAILS

Radio Testing of the
Novatel Wireless Inc.
Wireless Router with Cellular Voice and Data Capabilities



2.1 PEAK OUTPUT POWER

2.1.1 Specification Reference

Part 15 Subpart C §15.247(b)(3)

2.1.2 Standard Applicable

(3) For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

2.1.3 Equipment Under Test and Modification State

Serial No: SEZ100073700125 / Test Configuration A

2.1.4 Date of Test/Initial of test personnel who performed the test

August 08, 2013/AC, KM, JMG

2.1.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.1.6 Environmental Conditions

Ambient Temperature	25.3°C
Relative Humidity	49.4%
ATM Pressure	98.8 kPa

2.1.7 Additional Observations

- This is a conducted test using Option 3: Peak Power Meter Method discussed under KDB 558074 (Revision to Compliance Measurement Guidance for 15.247 Digital Transmission Systems, April 24, 2012).
- All available modes and data rates were verified. The worst case data rate for each mode (marked bold and italic) will be verified for each test throughout this test report.

2.1.8 Test Results

See attached table



802.11 b (2.4GHz)				
Channel	Frequency (MHz)	Data Rate (Mbps)	Average Power (dBm)	Peak Power (dBm)
1	2412	1	17.89	20.43
1	2412	2	17.92	20.47
1	2412	5.5	17.78	20.13
1	2412	11	17.82	20.42
6	2437	1	19.64	22.04
6	2437	2	19.65	22.07
6	2437	5.5	19.64	21.98
6	2437	11	19.62	22.10
11	2462	1	15.21	17.83
11	2462	2	15.17	17.80
11	2462	5.5	15.18	17.64
11	2462	11	15.21	17.91

802.11 g (2.4GHz)				
Channel	Frequency (MHz)	Data Rate (Mbps)	Average Power (dBm)	Peak Power (dBm)
1	2412	6	18.43	24.74
1	2412	9	18.36	24.57
1	2412	12	18.29	24.81
1	2412	18	18.46	24.50
1	2412	24	18.51	24.77
1	2412	36	18.69	24.68
1	2412	48	18.30	24.86
1	2412	54	18.59	24.69
6	2437	6	19.97	25.12
6	2437	9	19.93	25.13
6	2437	12	19.84	25.10
6	2437	18	20.07	24.98
6	2437	24	20.06	25.14
6	2437	36	20.11	25.17
6	2437	48	19.96	25.13
6	2437	54	19.85	25.01
11	2462	6	15.72	23.88
11	2462	9	15.81	23.70
11	2462	12	15.74	23.85
11	2462	18	15.92	23.54
11	2462	24	16.20	23.89
11	2462	36	16.19	23.77
11	2462	48	16.21	23.84
11	2462	54	15.78	23.78



802.11 n (2.4GHz)				
Channel	Frequency (MHz)	Data Rate (Mbps)	Average Power (dBm)	Peak Power (dBm)
1	2412	6.5	18.38	24.60
1	2412	13	18.26	24.87
1	2412	19.5	18.43	24.89
1	2412	26	19.15	24.93
1	2412	39	19.27	25.01
1	2412	52	19.29	24.90
1	2412	58.5	19.02	25.05
1	2412	65	18.99	25.04
6	2437	6.5	19.98	25.11
6	2437	13	19.79	25.28
6	2437	19.5	19.78	24.97
6	2437	26	20.12	25.12
6	2437	39	20.10	25.08
6	2437	52	20.08	25.36
6	2437	58.5	19.53	25.18
6	2437	65	19.48	25.01
11	2462	6.5	16.07	23.77
11	2462	13	16.12	23.81
11	2462	19.5	16.18	23.78
11	2462	26	16.71	23.99
11	2462	39	16.70	23.92
11	2462	52	16.59	23.92
11	2462	58.5	16.53	24.23
11	2462	65	16.51	23.92



802.11 a (5GHz)				
Channel	Frequency (MHz)	Data Rate (Mbps)	Average Power (dBm)	Peak Power (dBm)
149	5745	6	13.47	22.46
149	5745	9	13.45	22.04
149	5745	12	13.68	22.53
149	5745	18	13.67	22.25
149	5745	24	13.95	22.70
149	5745	36	13.86	22.61
149	5745	48	13.83	22.57
149	5745	54	13.76	22.60
157	5785	6	13.65	22.66
157	5785	9	13.66	22.54
157	5785	12	13.58	22.59
157	5785	18	13.53	22.04
157	5785	24	13.43	22.60
157	5785	36	13.35	22.55
157	5785	48	13.35	22.49
157	5785	54	13.35	22.54
165	5825	6	14.08	23.01
165	5825	9	13.99	22.74
165	5825	12	13.99	22.95
165	5825	18	14.04	22.49
165	5825	24	14.27	23.11
165	5825	36	14.27	23.07
165	5825	48	14.25	23.03
165	5825	54	14.04	23.03



802.11 n (5GHz)				
Channel	Frequency (MHz)	Data Rate (Mbps)	Average Power (dBm)	Peak Power (dBm)
149	5745	6.5	14.28	22.66
149	5745	13	14.18	22.56
149	5745	19.5	14.18	22.74
149	5745	26	14.80	22.68
149	5745	39	14.81	22.83
149	5745	52	14.85	22.80
149	5745	58.5	14.73	23.07
149	5745	65	14.79	22.70
157	5785	6.5	13.76	22.62
157	5785	13	13.69	22.22
157	5785	19.5	13.82	22.64
157	5785	26	13.81	22.52
157	5785	39	13.83	22.40
157	5785	52	13.66	22.42
157	5785	58.5	13.55	22.93
157	5785	65	13.86	22.53
165	5825	6.5	14.46	23.06
165	5825	13	14.45	22.96
165	5825	19.5	14.49	23.09
165	5825	26	14.70	22.79
165	5825	39	14.53	23.02
165	5825	52	14.40	22.96
165	5825	58.5	14.66	23.41
165	5825	65	14.58	23.01



2.2 CONDUCTED EMISSIONS

2.2.1 Specification Reference

Part 15 Subpart C §15.207(a)

2.2.2 Standard Applicable

An intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN).

Frequency of emission (MHz)	Conducted limit (dB μ V)	
	Quasi-peak	Average
0.15–0.5	66 to 56*	56 to 46*
0.5–5	56	46
5–30	60	50

**Decreases with the logarithm of the frequency.*

2.2.3 Equipment Under Test and Modification State

Serial No: SEZ100073700125 / Test Configuration B

2.2.4 Date of Test/Initial of test personnel who performed the test

August 06, 2013/AC

2.2.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.2.6 Environmental Conditions

Ambient Temperature	25.3°C
Relative Humidity	49.4%
ATM Pressure	98.8 kPa

2.2.7 Additional Observations

- The EUT is connected to public AC mains via supplied AC-DC power adapter/charger.
- The EUT was verified using worst case configuration (worst case channel/mode). The EUT was set to transmit max. power while plugged into the AC-DC power adapter.
- EUT verified using input voltage of 120VAC/60Hz.



- Measurement was done using EMC32 automated software. Reported level is the actual level with all the correction factors factored in. Correction Factor column is for informational purposes only. See Section 2.2.8 for sample computation.

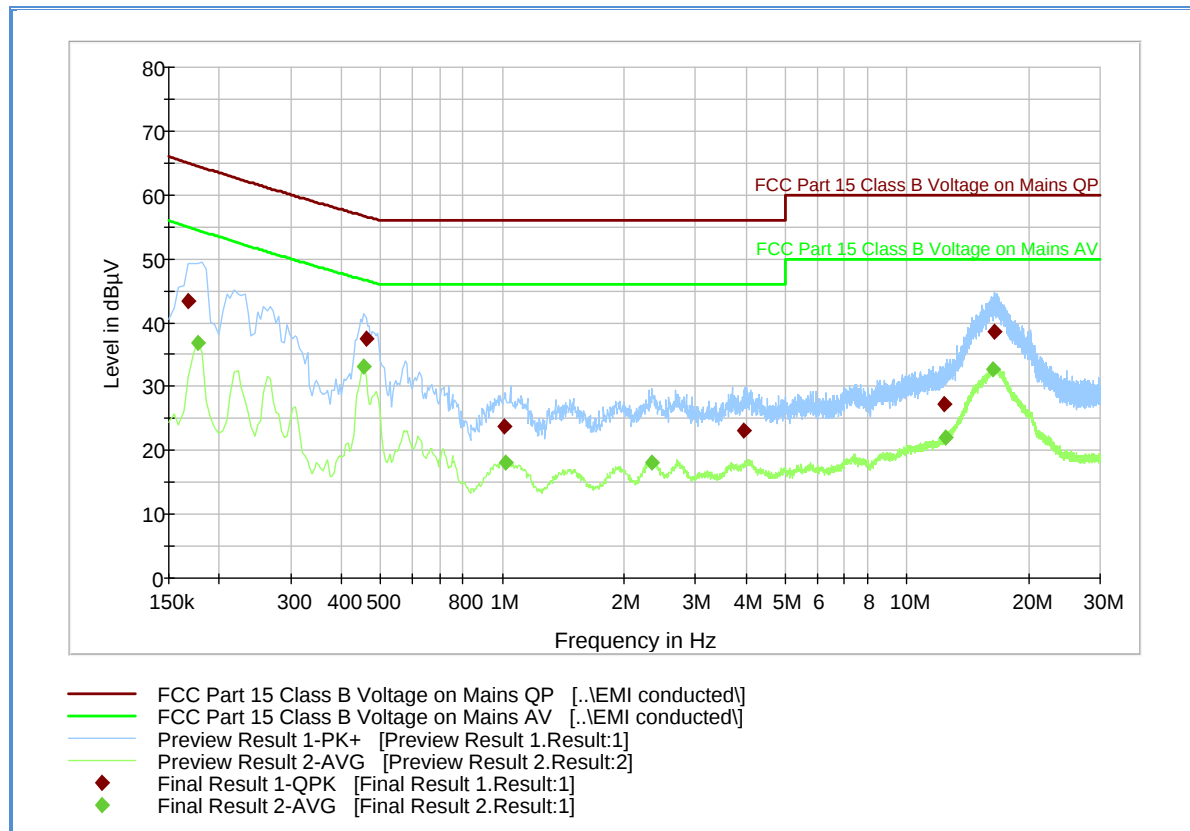
2.2.8 Sample Computation (Conducted Emission – Quasi Peak)

Measuring equipment raw measurement (db μ V) @ 150kHz			5.5
Correction Factor (dB)	Asset# 8607 (20 dB attenuator)	19.9	20.7
	Asset# 1177 (cable)	0.15	
	Asset# 1176 (cable)	0.35	
	Asset# 7567 (LISN)	0.30	
Reported QuasiPeak Final Measurement (db μ V) @ 150kHz			26.2

2.2.9 Test Results

Compliant. See attached plots and tables.

2.2.10 Line 1 (Hot)_Worst Case Configuration_802.11 n_Mid Channel Transmit mode



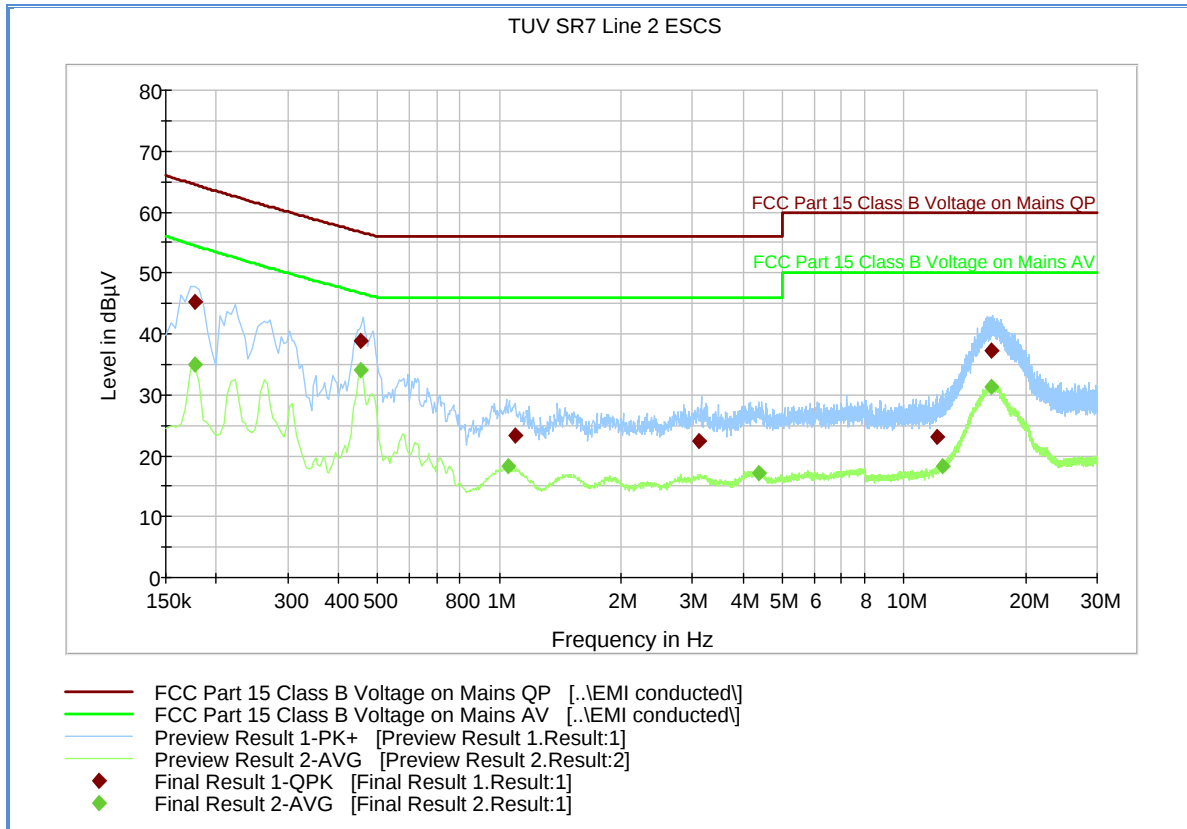
Quasi Peak

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBμV)
0.168000	43.5	1000.0	9.000	Off	L1	20.4	21.5	65.0
0.460500	37.4	1000.0	9.000	Off	L1	20.2	19.2	56.6
1.009500	23.7	1000.0	9.000	Off	L1	20.2	32.3	56.0
3.939000	23.2	1000.0	9.000	Off	L1	20.3	32.8	56.0
12.318000	27.2	1000.0	9.000	Off	L1	20.5	32.8	60.0
16.449000	38.6	1000.0	9.000	Off	L1	20.8	21.4	60.0

Average

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - Ave (dB)	Limit - Ave (dBμV)
0.177000	36.9	1000.0	9.000	Off	L1	20.4	17.6	54.5
0.456000	33.1	1000.0	9.000	Off	L1	20.2	13.6	46.7
1.023000	18.1	1000.0	9.000	Off	L1	20.2	27.9	46.0
2.350500	18.2	1000.0	9.000	Off	L1	20.3	27.8	46.0
12.439500	22.0	1000.0	9.000	Off	L1	20.6	28.0	50.0
16.278000	32.6	1000.0	9.000	Off	L1	20.8	17.4	50.0

2.2.11 Line 2 (Neutral)_Worst Case Configuration_802.11 n_Mid Channel Transmit mode



Quasi Peak

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBμV)
0.177000	45.3	1000.0	9.000	Off	N	21.2	19.2	64.5
0.456000	39.0	1000.0	9.000	Off	N	21.1	17.7	56.7
1.095000	23.4	1000.0	9.000	Off	N	21.1	32.6	56.0
3.106500	22.4	1000.0	9.000	Off	N	21.2	33.6	56.0
12.025500	23.2	1000.0	9.000	Off	N	21.3	36.8	60.0
16.485000	37.2	1000.0	9.000	Off	N	21.6	22.8	60.0

Average

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - Ave (dB)	Limit - Ave (dBμV)
0.177000	35.1	1000.0	9.000	Off	N	21.2	19.4	54.5
0.456000	34.0	1000.0	9.000	Off	N	21.1	12.7	46.7
1.050000	18.2	1000.0	9.000	Off	N	21.1	27.8	46.0
4.366500	17.1	1000.0	9.000	Off	N	21.2	28.9	46.0
12.475500	18.3	1000.0	9.000	Off	N	21.3	31.7	50.0
16.395000	31.4	1000.0	9.000	Off	N	21.6	18.6	50.0



2.3 MINIMUM 6 dB RF BANDWIDTH

2.3.1 Specification Reference

Part 15 Subpart C §15.247(a)(2)

2.3.2 Standard Applicable

(2) Systems using digital modulation techniques may operate in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

2.3.3 Equipment Under Test and Modification State

Serial No: SEZ100073700125 / Test Configuration A

2.3.4 Date of Test/Initial of test personnel who performed the test

August 08, 2013/AC, KM, JMG

2.3.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

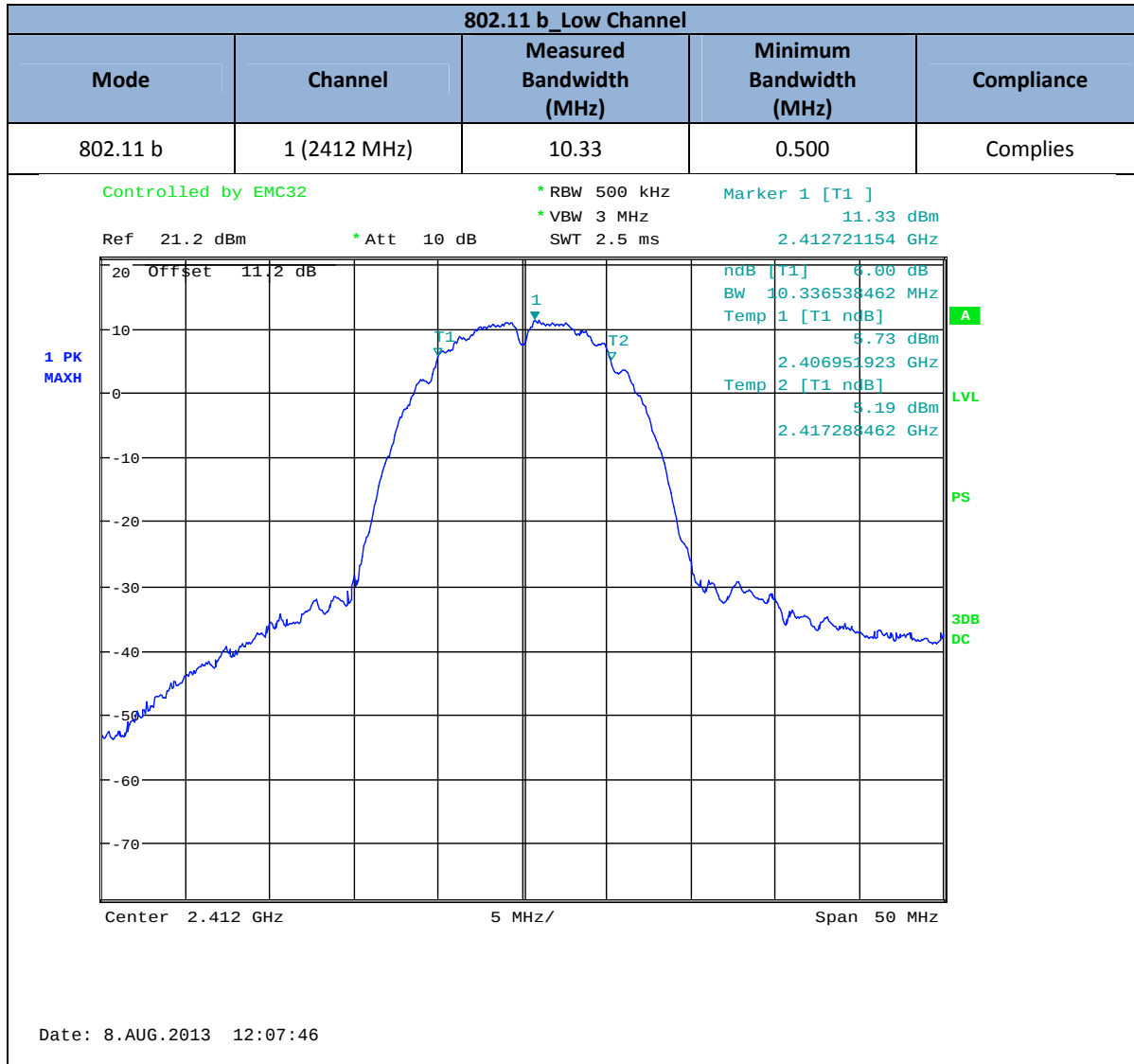
2.3.6 Environmental Conditions

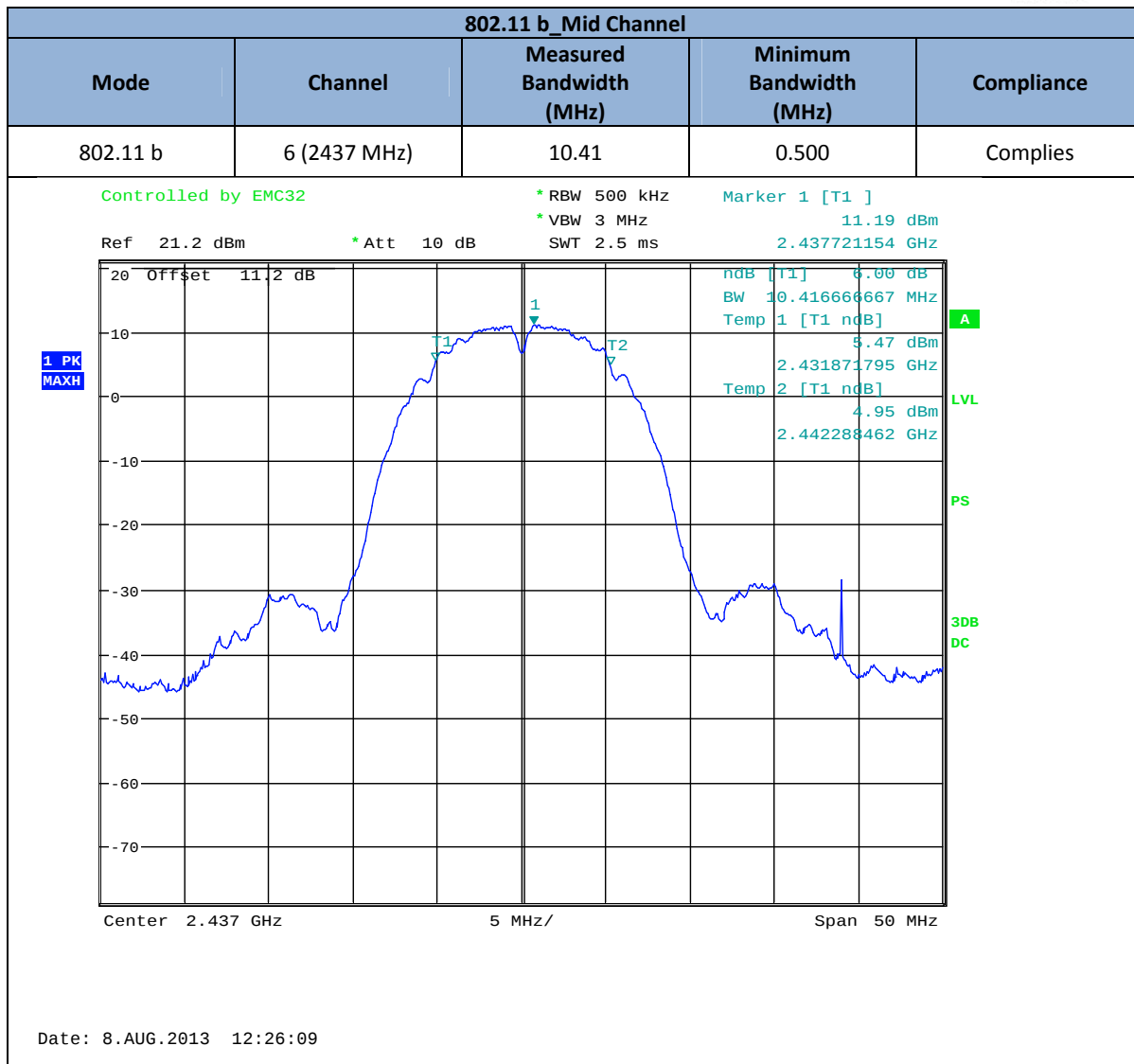
Ambient Temperature	25.3°C
Relative Humidity	49.4%
ATM Pressure	98.8 kPa

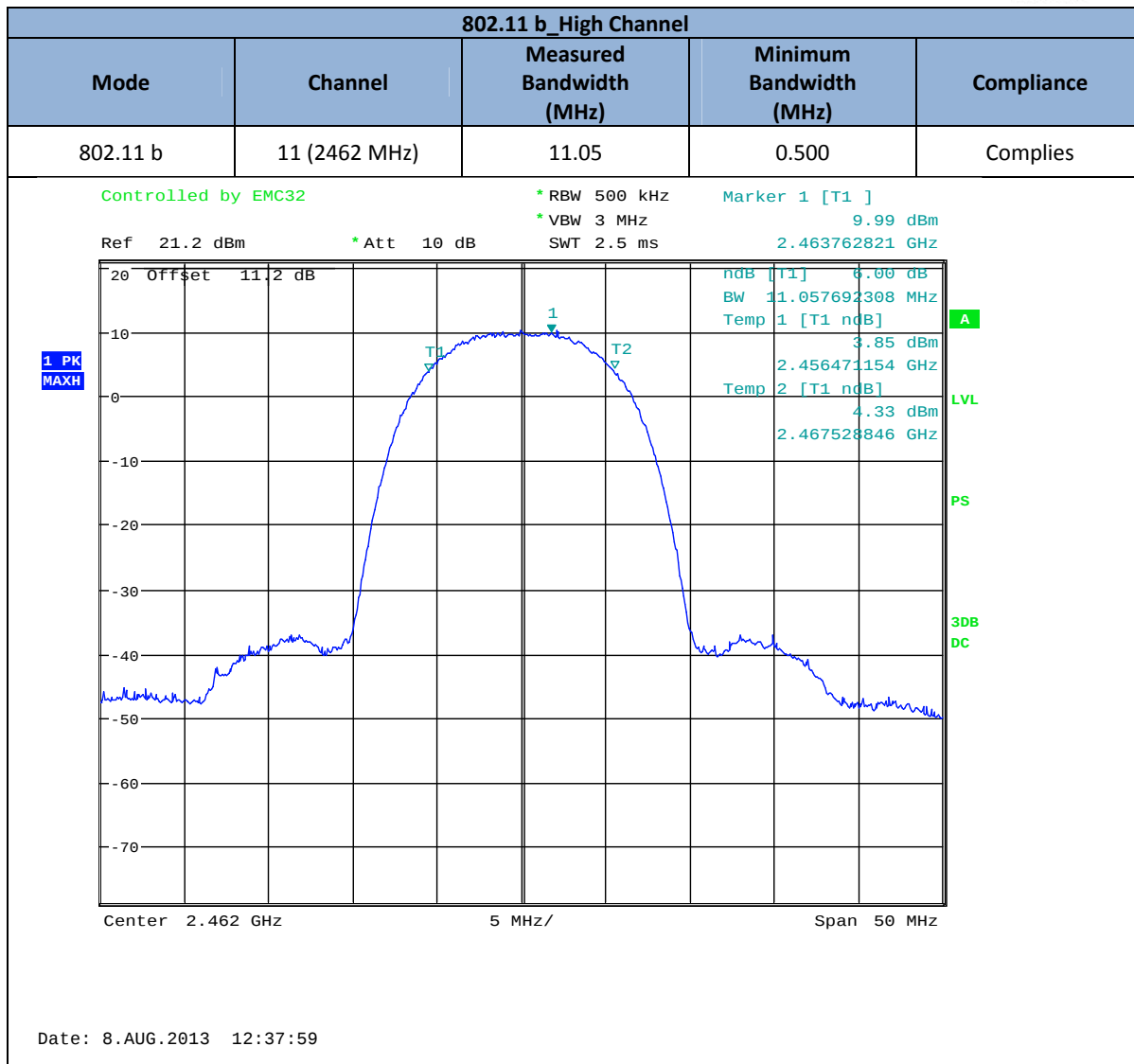
2.3.7 Additional Observations

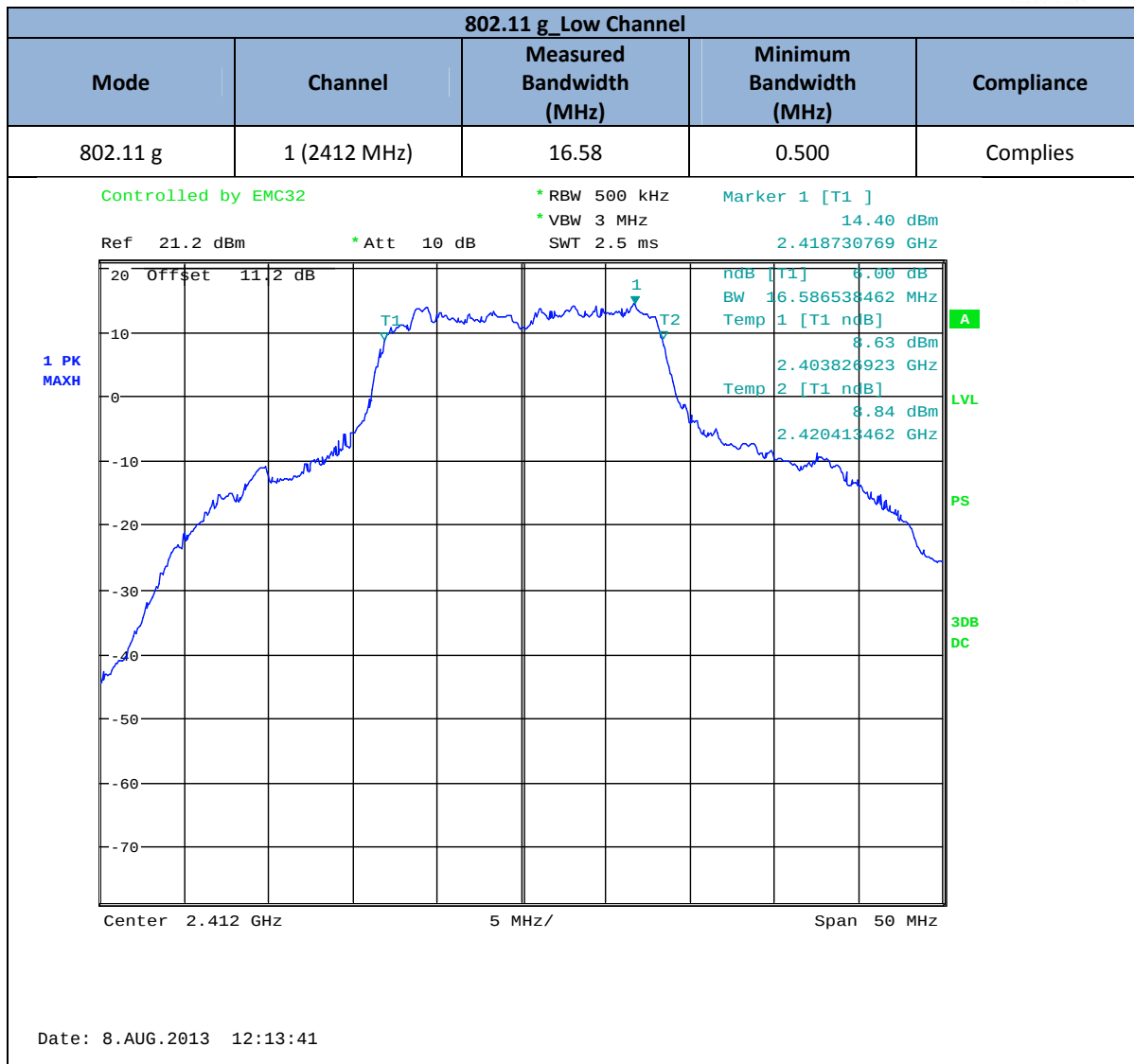
- This is a conducted test as per DTS (6-dB) Bandwidth guidance of KDB 558074 (Revision to Compliance Measurement Guidance for 15.247 Digital Transmission Systems, April 24, 2012).
- An offset of 11.2dB (for 802.11 b/g/n) and 11.5dB (for 802.11 a/n) was added to compensate for the external attenuator and cable used.
- Automatic bandwidth function of the spectrum analyzer was used for this test.
- Span is wide enough to capture the channel transmission.
- RBW is 1% to 5% of the fundamental bandwidth.
- VBW is 3X RBW.
- 100 kHz RBW setting not possible. Any RBW setting below 500 kHz will result in inaccurate measurement due to pronounced dip in the middle of the fundamental signal dividing the bandwidth by half when using automatic bandwidth function of the spectrum analyzer.
- Sweep is auto.
- Detector is peak.
- Trace is max hold.

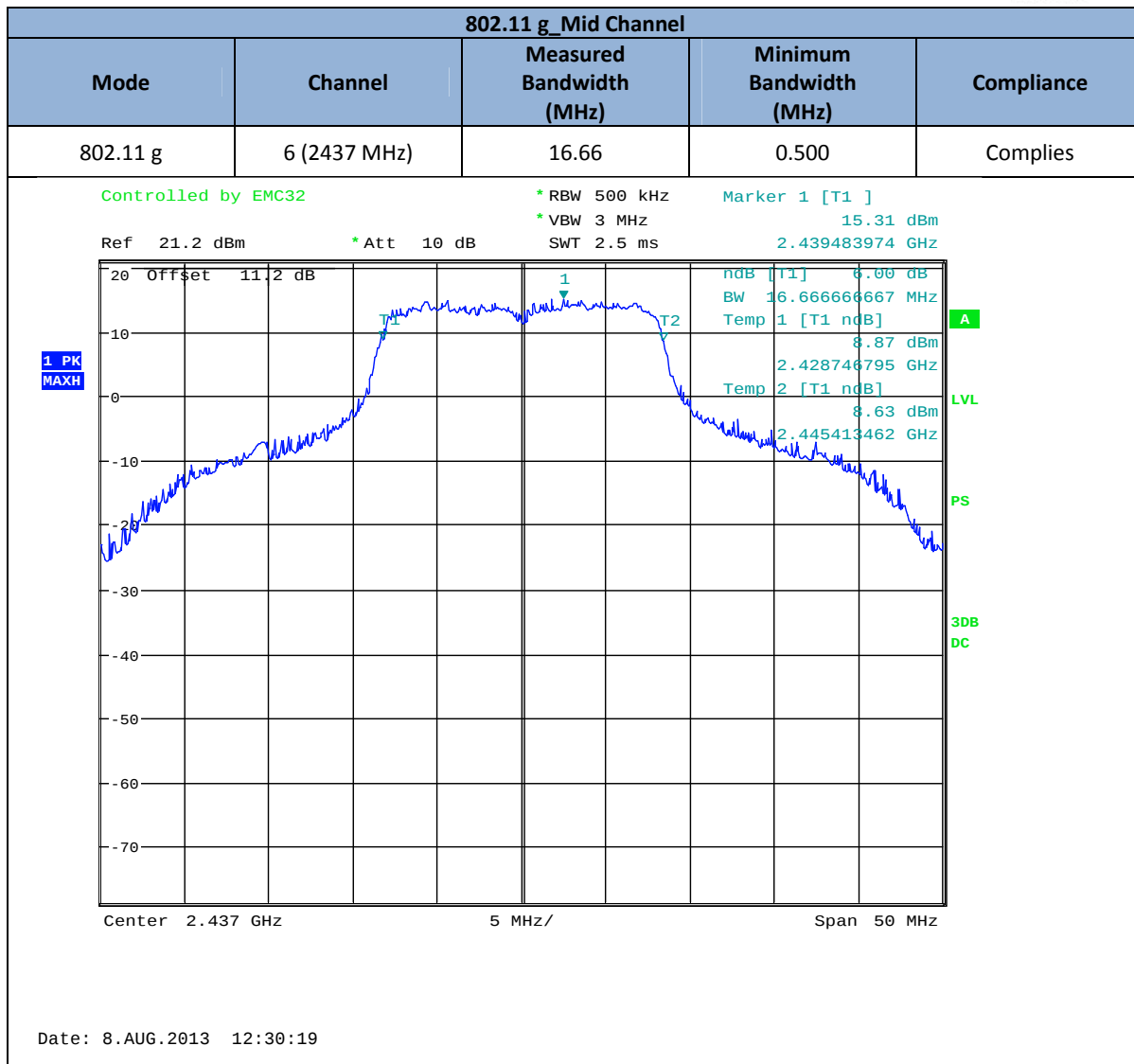
2.3.8 Test Results/Plots

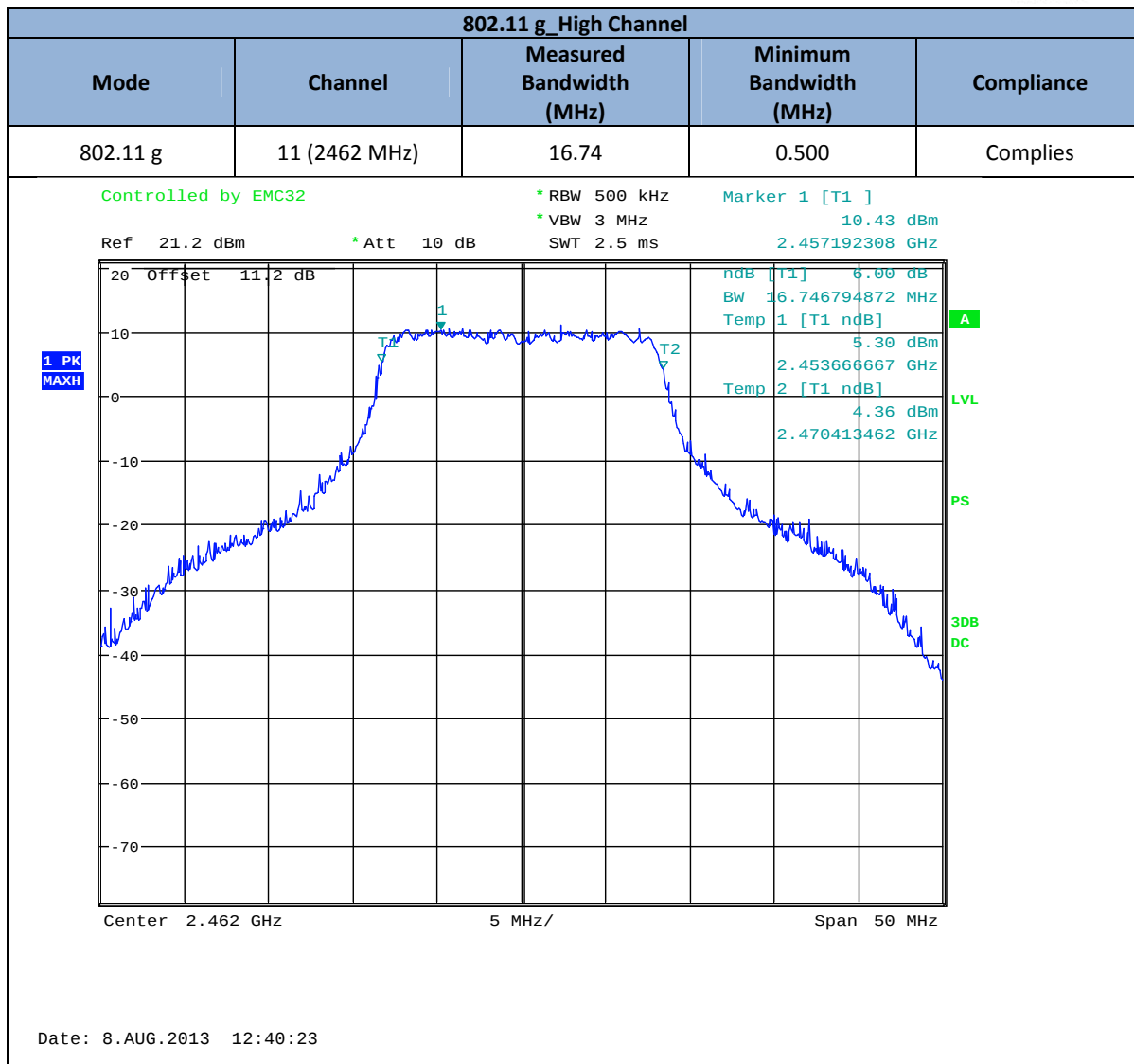


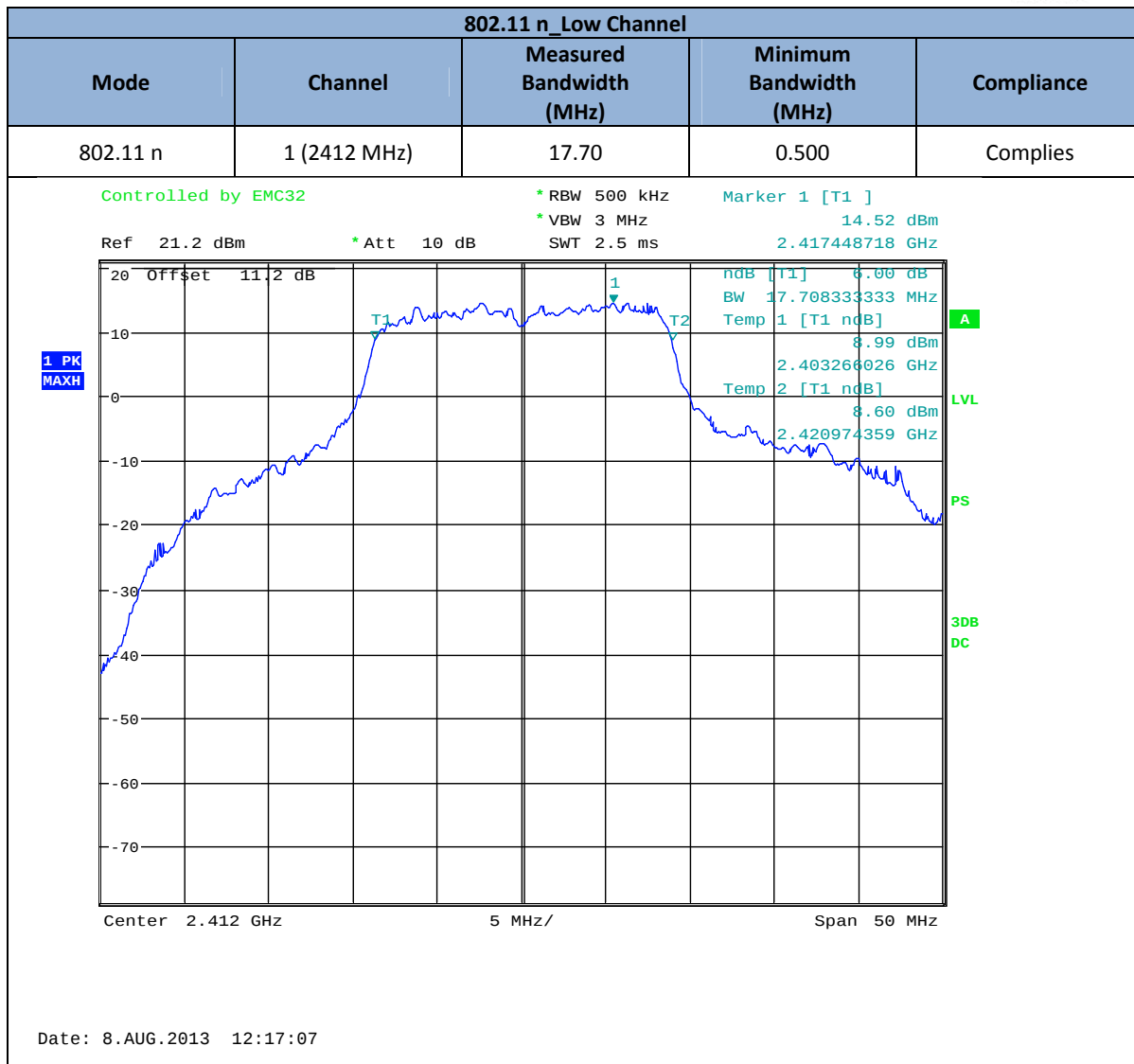


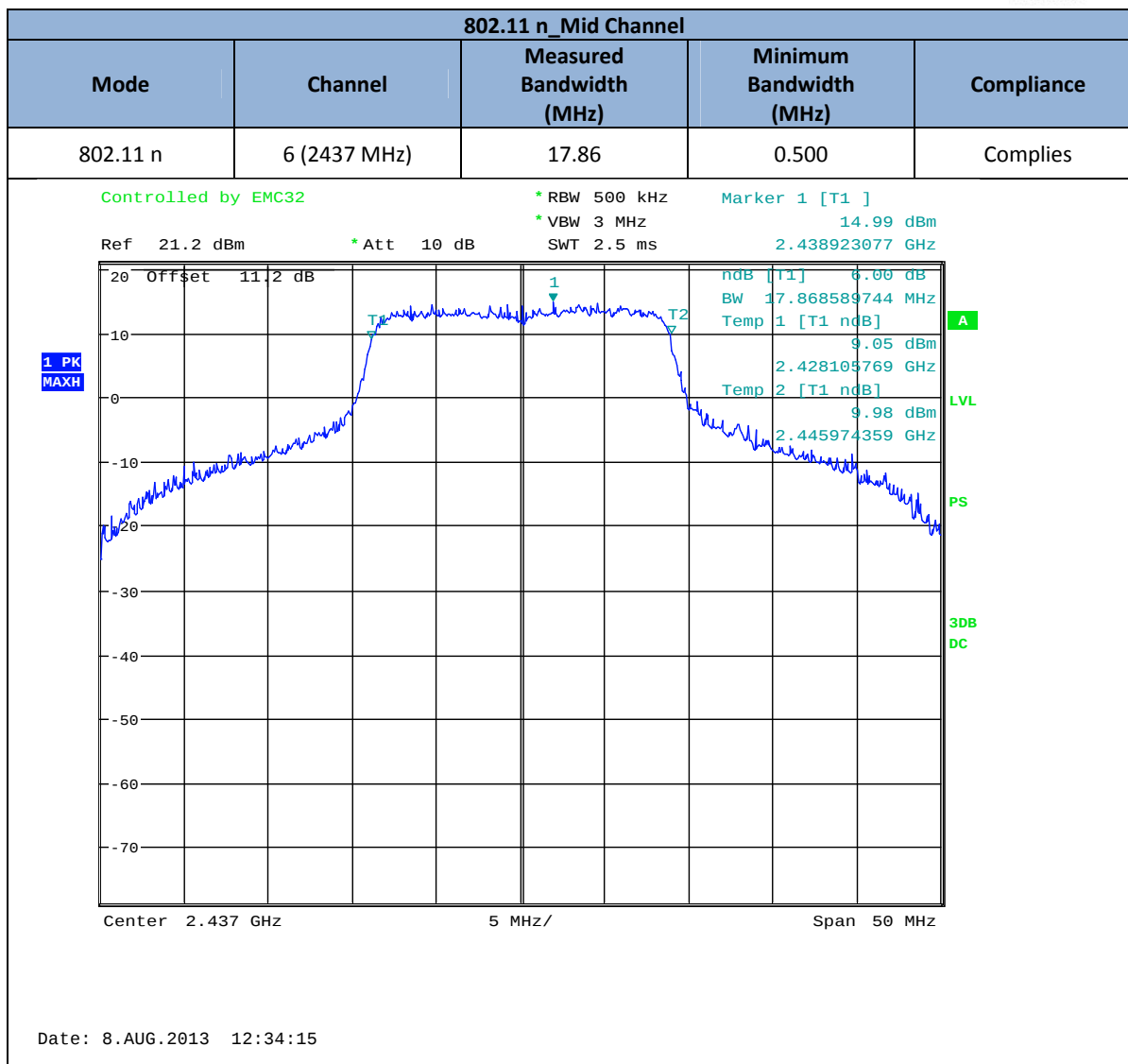


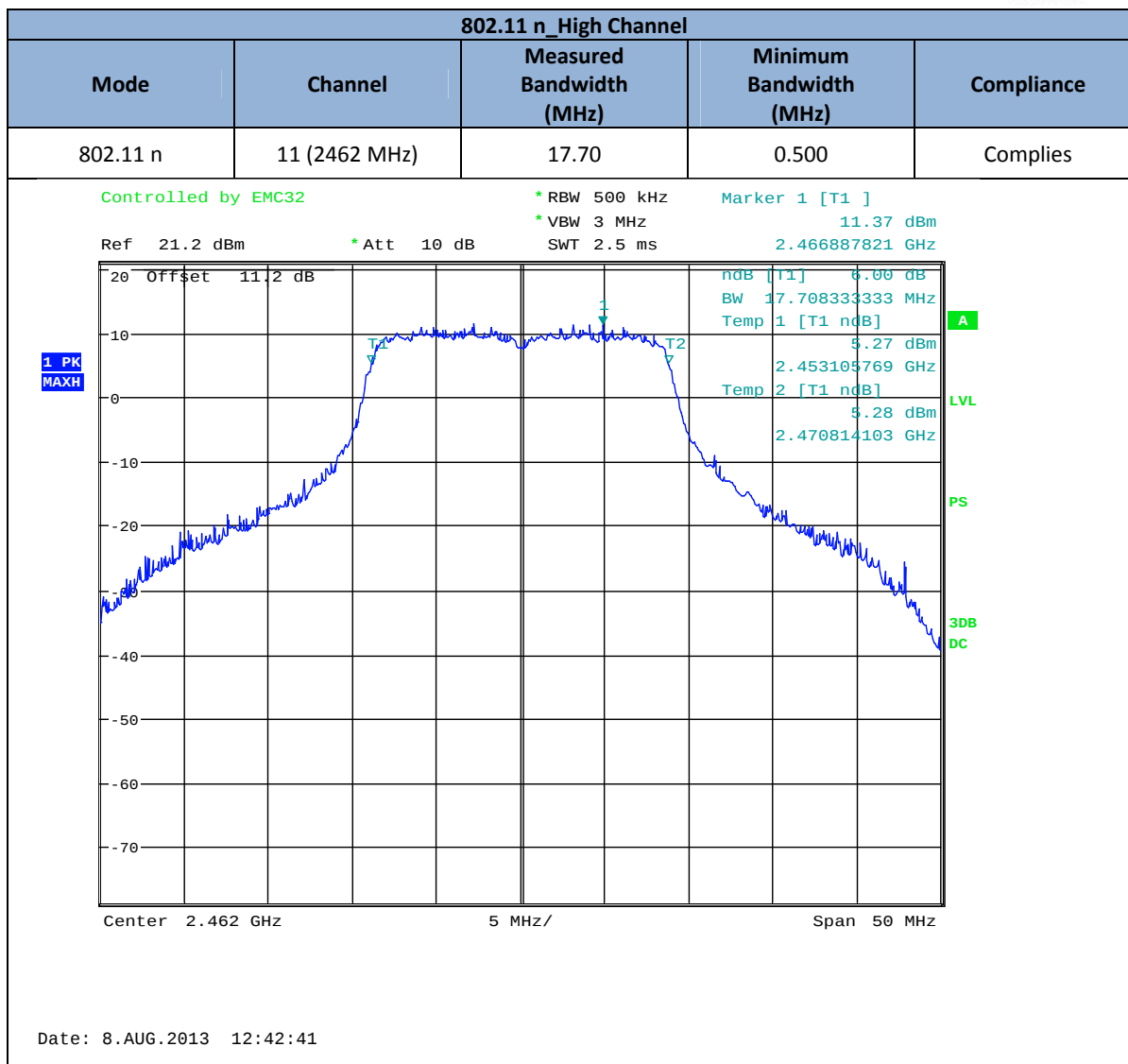


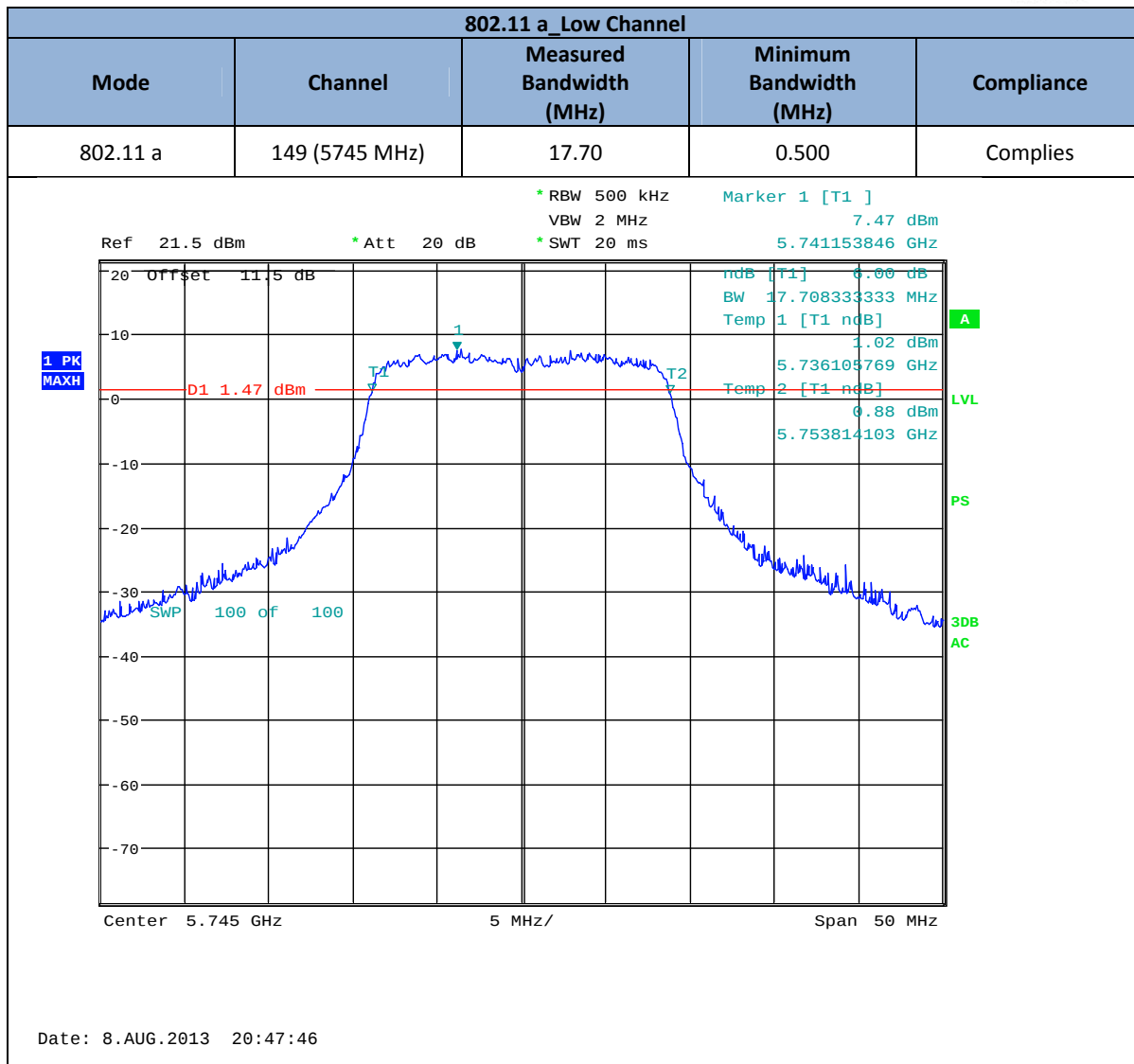


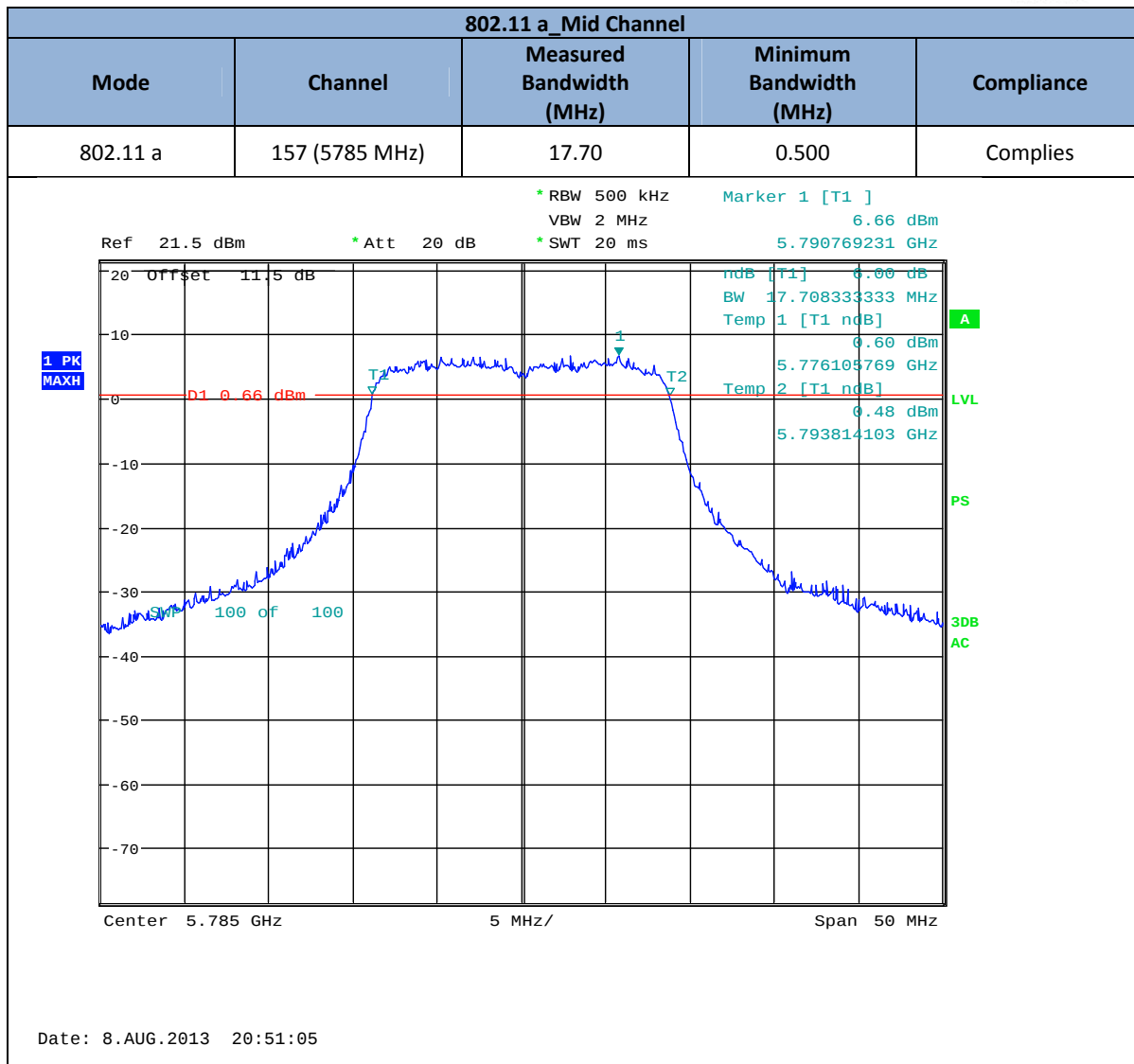




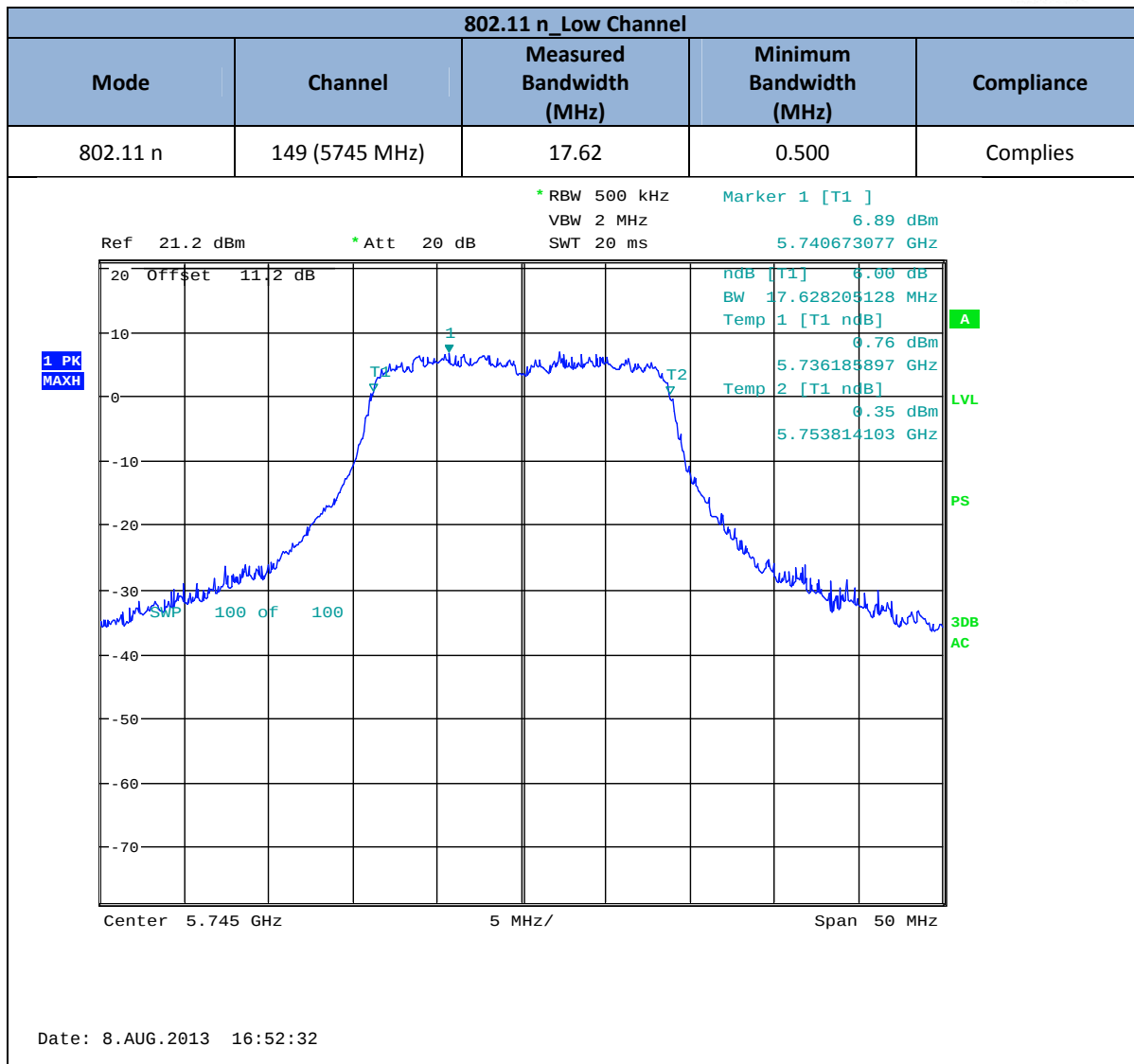


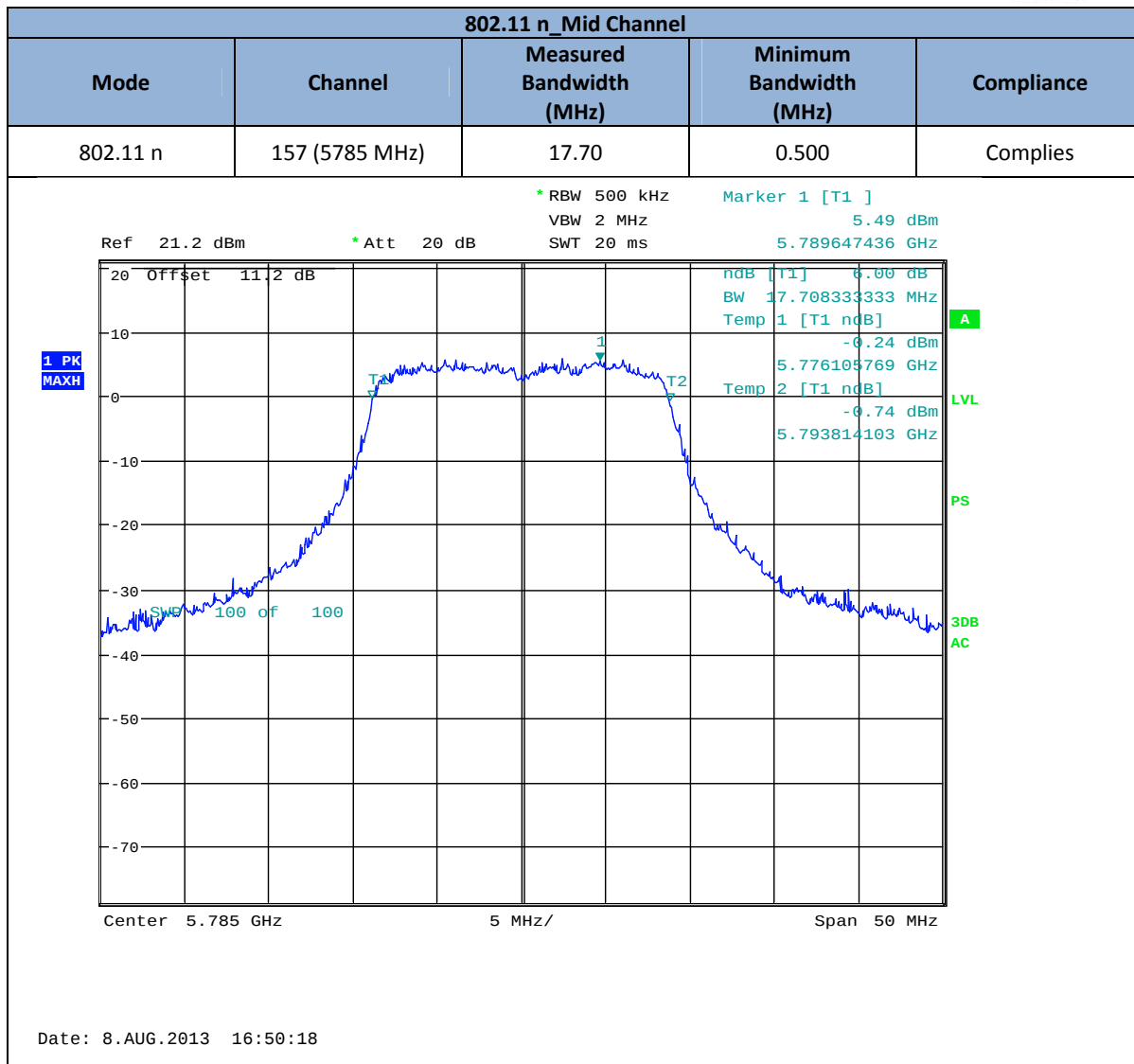


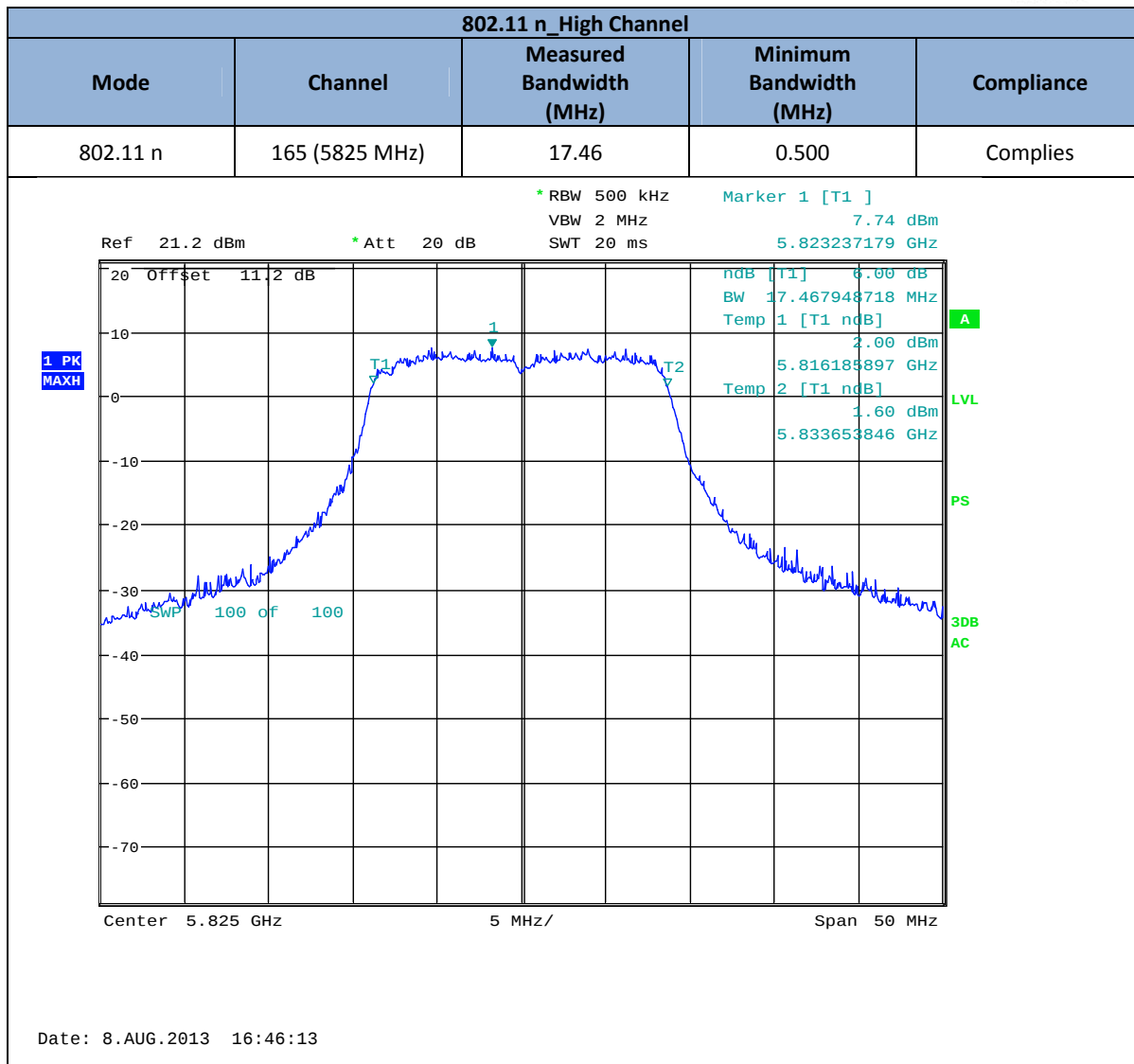




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2.4 OUT-OF-BAND EMISSIONS - CONDUCTED

2.4.1 Specification Reference

Part 15 Subpart C §15.247(d)

2.4.2 Standard Applicable

(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

2.4.3 Equipment Under Test and Modification State

Serial No: SEZ100073700125 / Test Configuration A

2.4.4 Date of Test/Initial of test personnel who performed the test

August 08, 2013/AC, KM, JMG

2.4.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

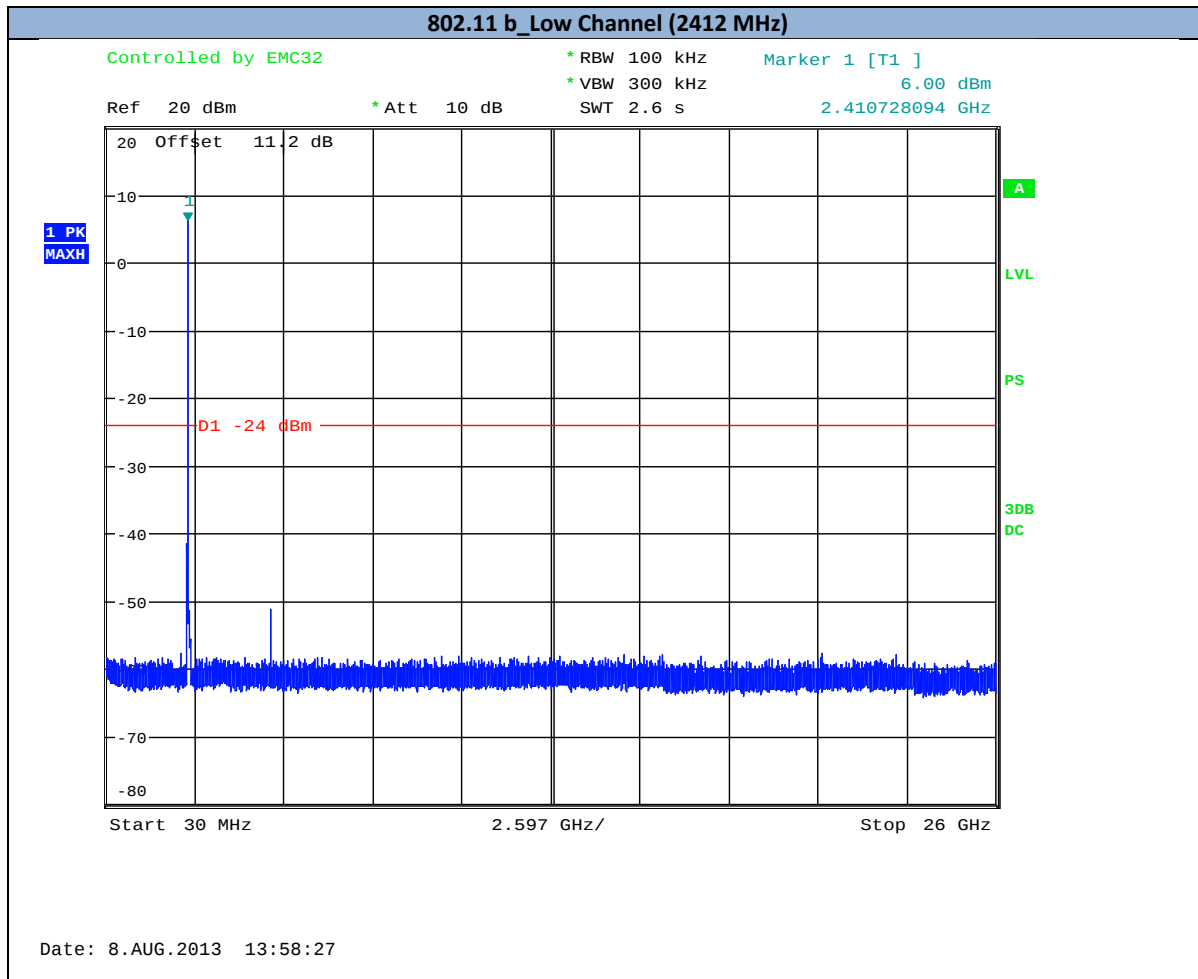
2.4.6 Environmental Conditions

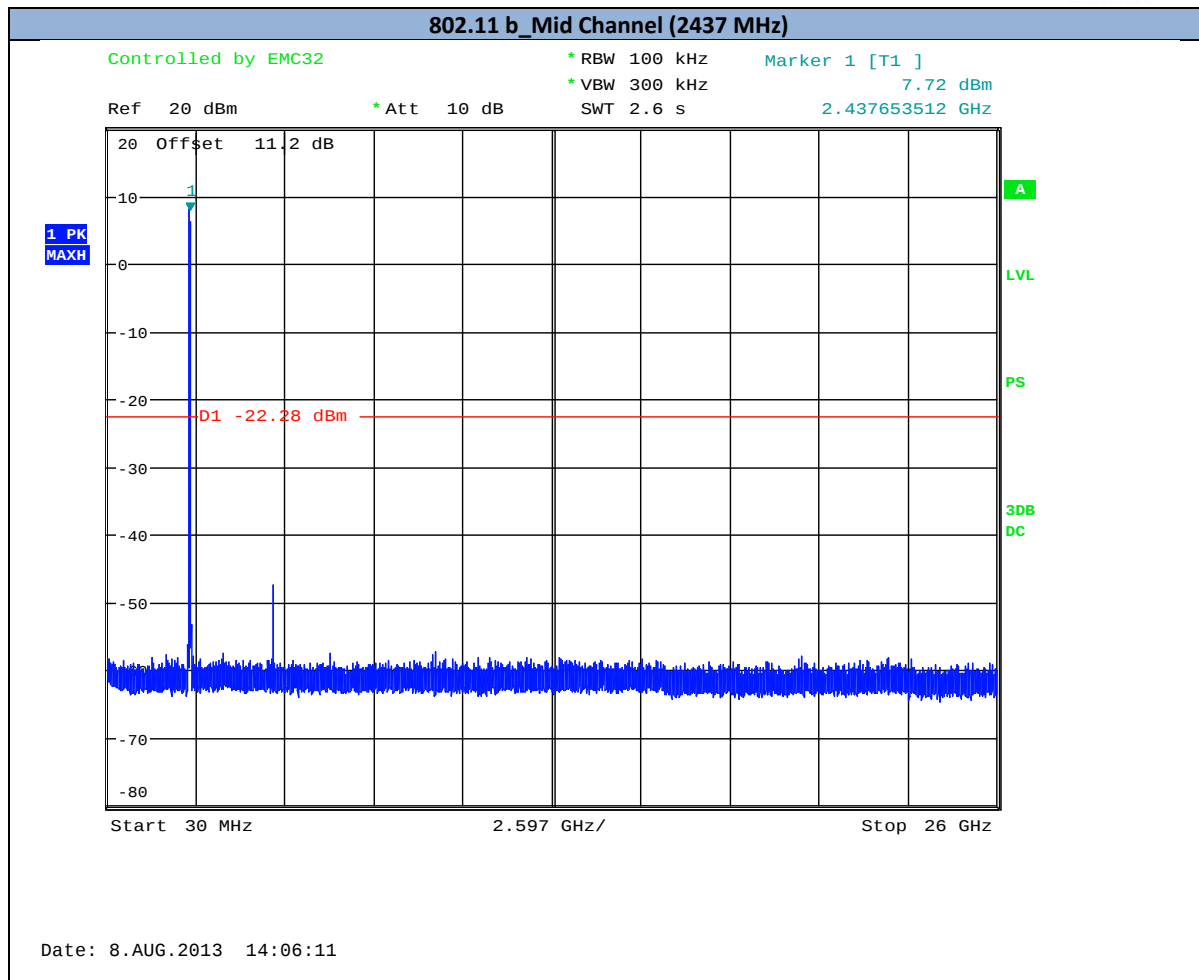
Ambient Temperature	26.3°C
Relative Humidity	46.7%
ATM Pressure	98.7 kPa

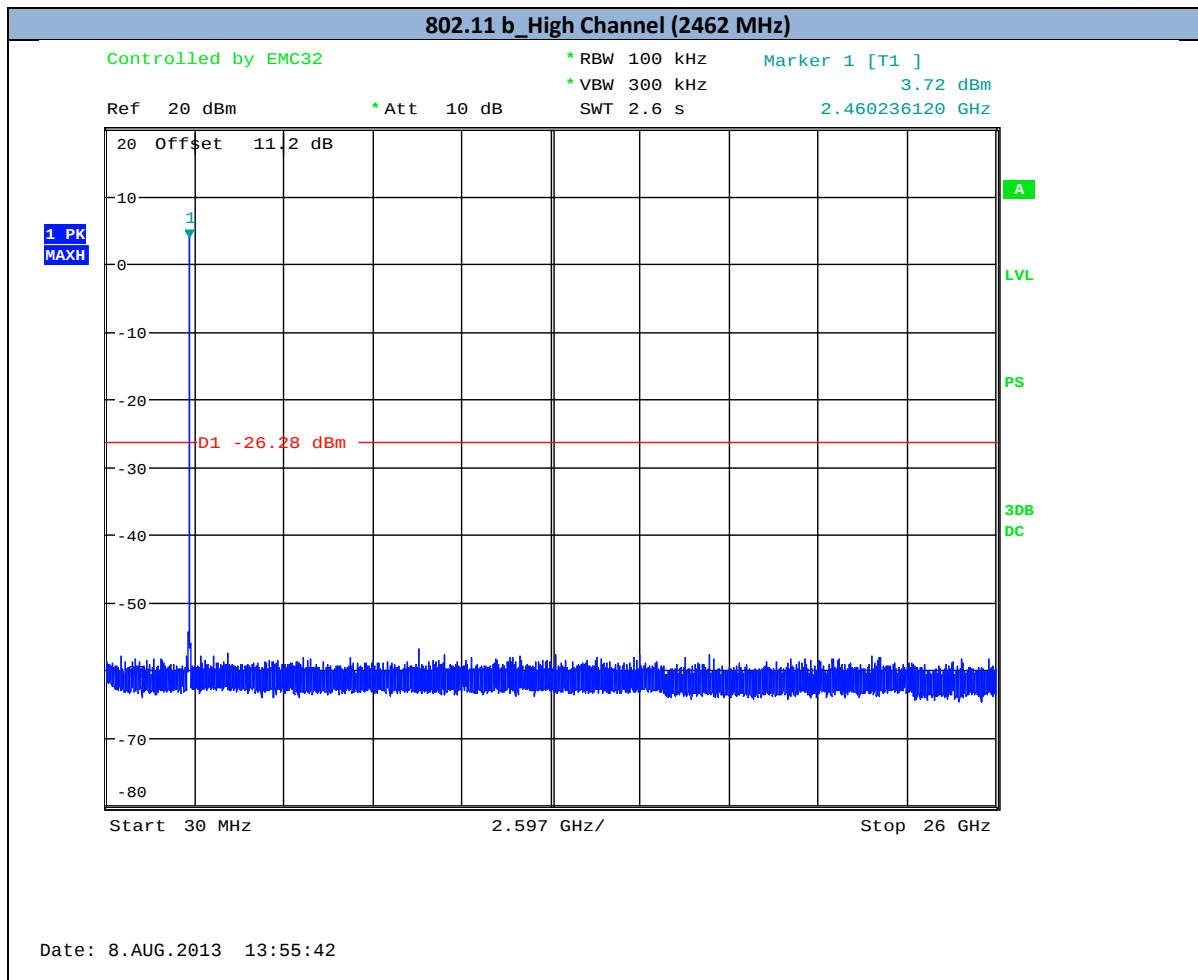
2.4.7 Additional Observations

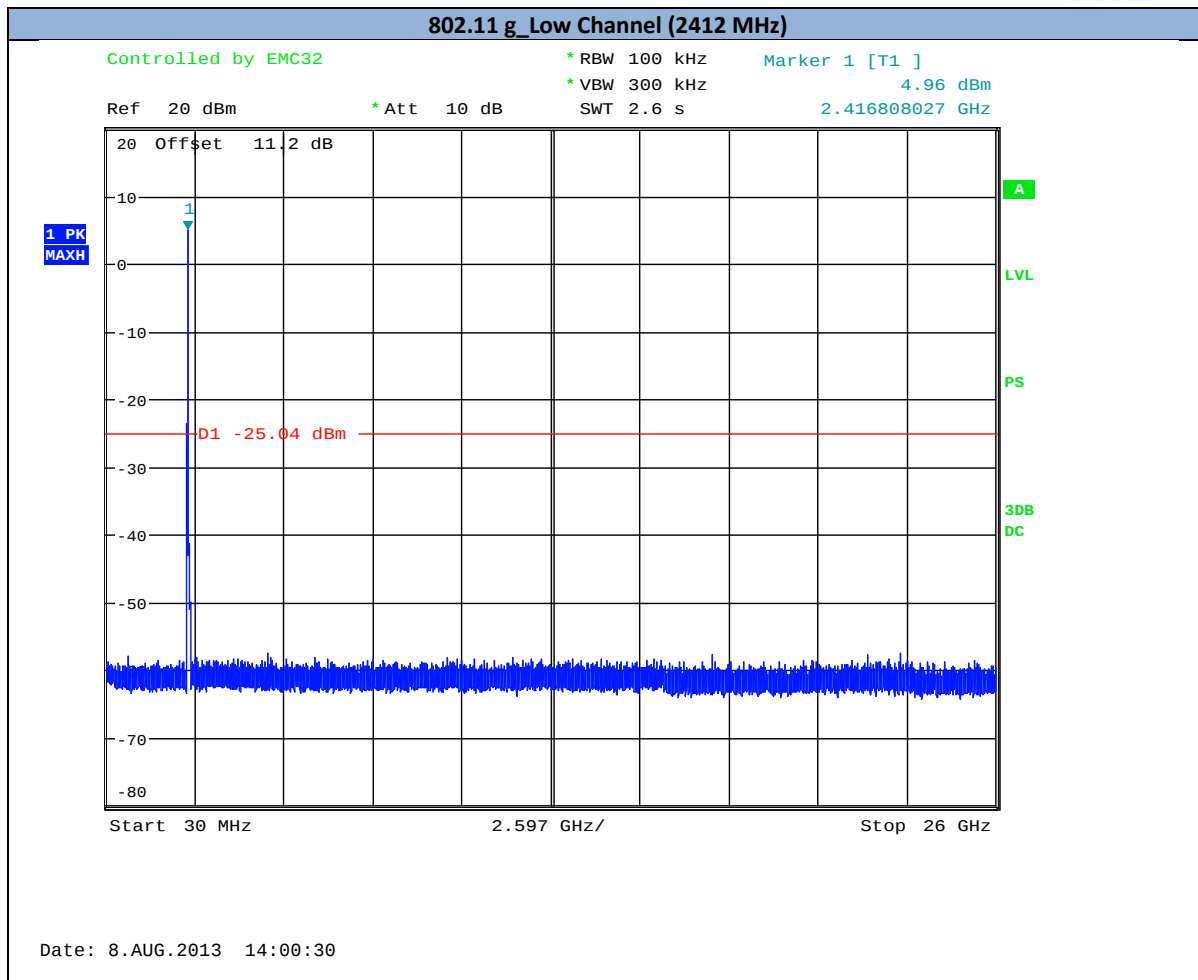
- This is a conducted test.
- An offset of 11.2dB (for 802.11 b/g/n) and 11.5dB (for 802.11 a/n) was added to compensate for the external attenuator and cable used.
- RBW is 100kHz.VBW is 3X RBW.
- Sweep is auto. Detector is peak. Trace is max hold.
- Initial scan was performed to determine the highest level of the desired power within the band. Limit (display line) was drawn 30dB below this level (worst case).
- Spectrum was searched from 30MHz up to 26GHz (802.11 b/g/n) and up to 40GHz (802.11 a/n).

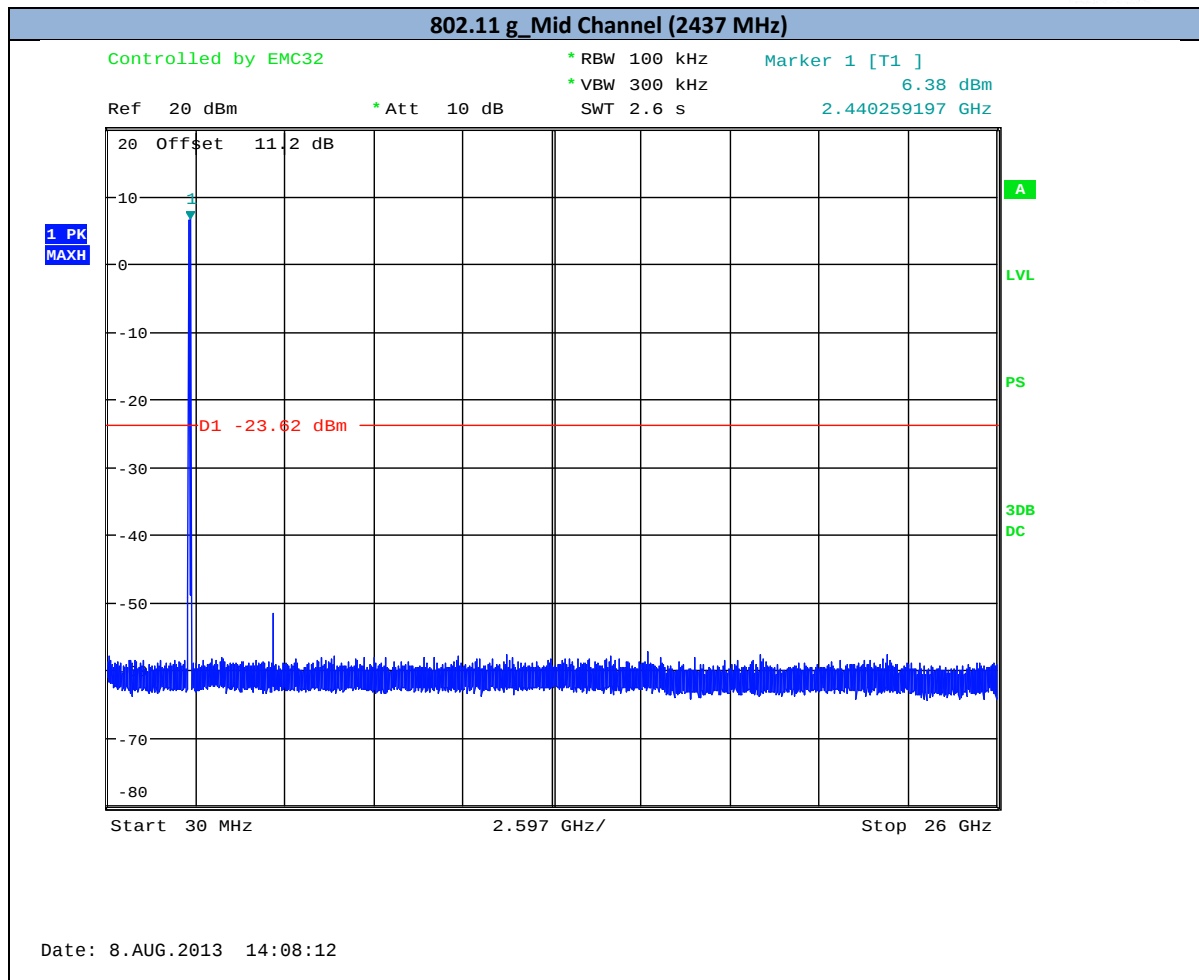
2.4.8 Test Results/Plots

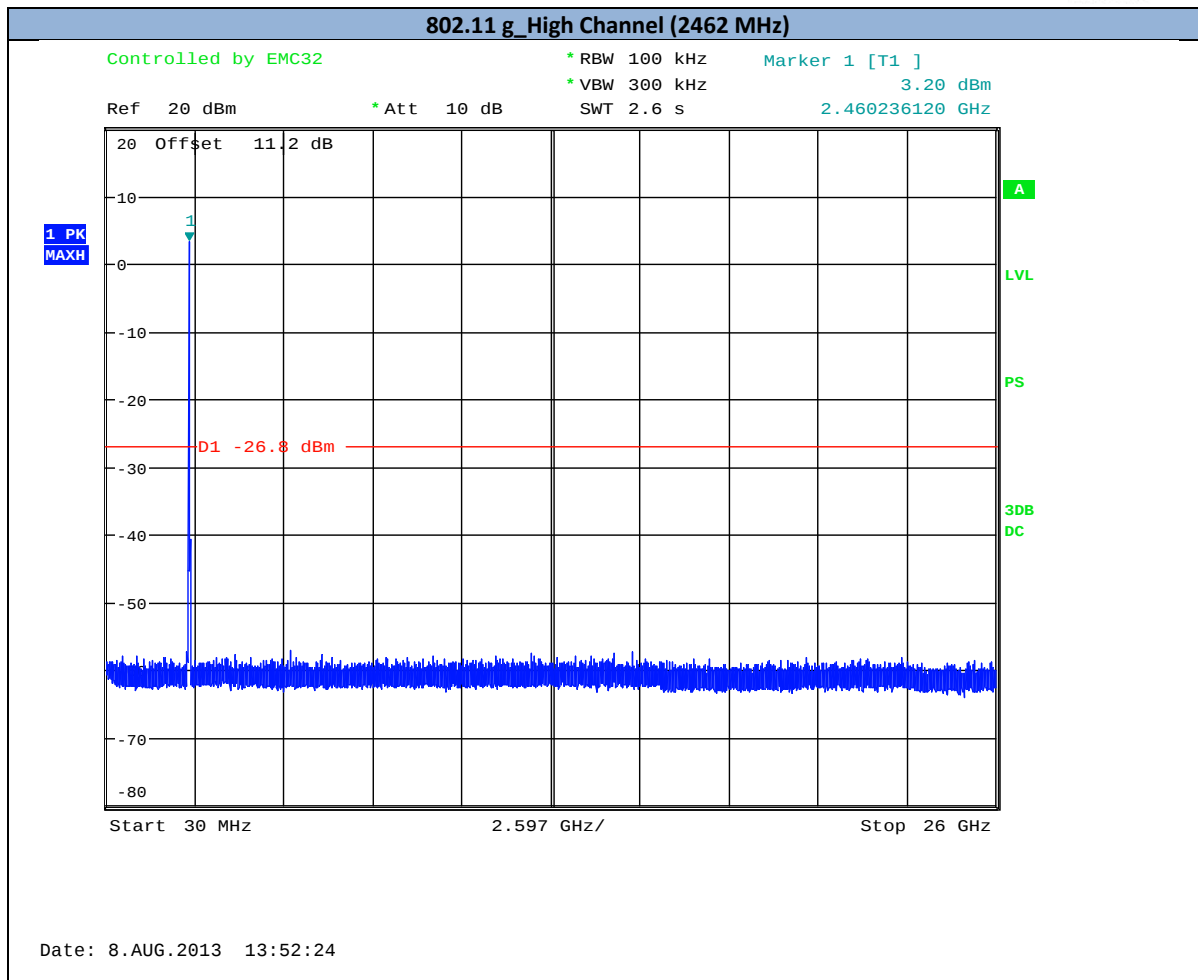


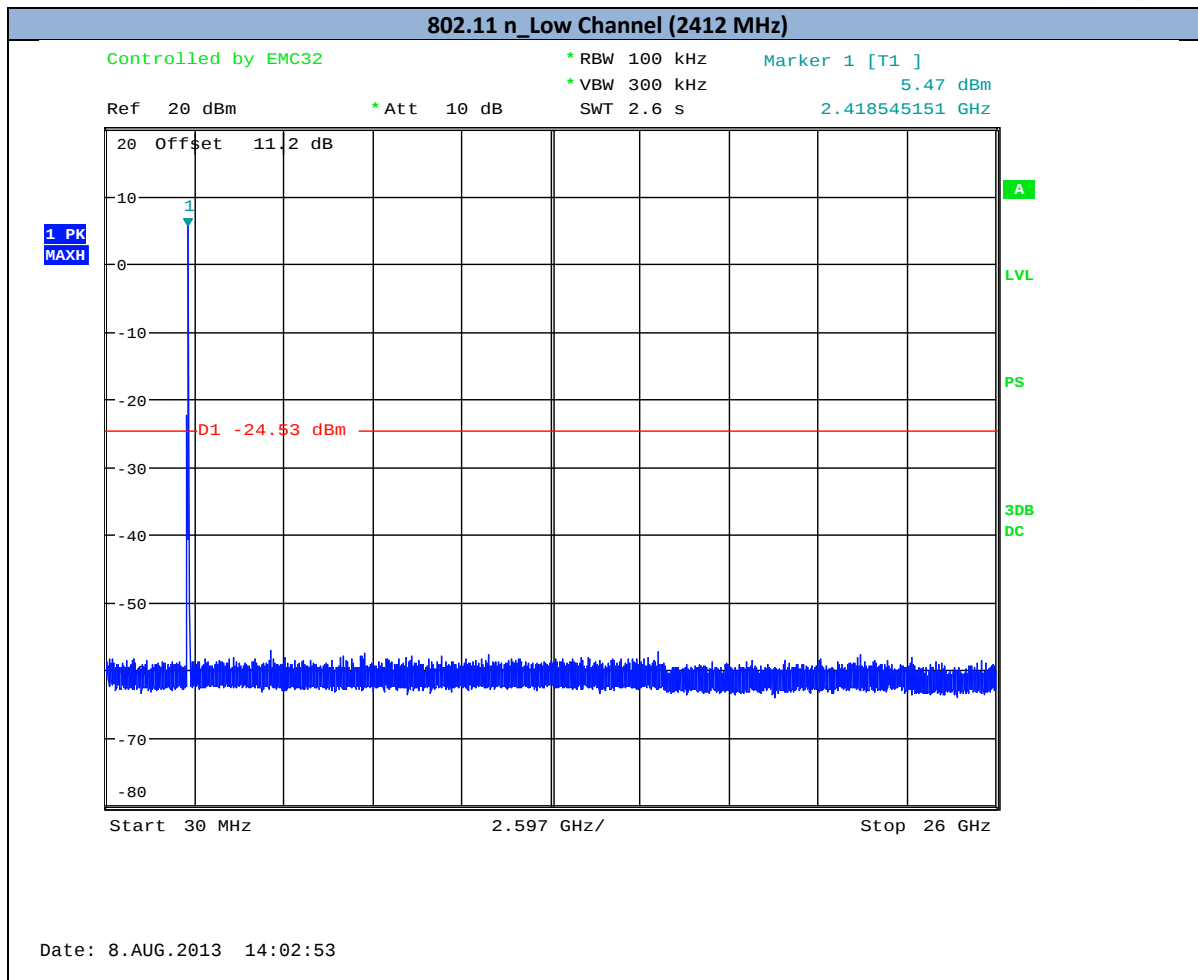


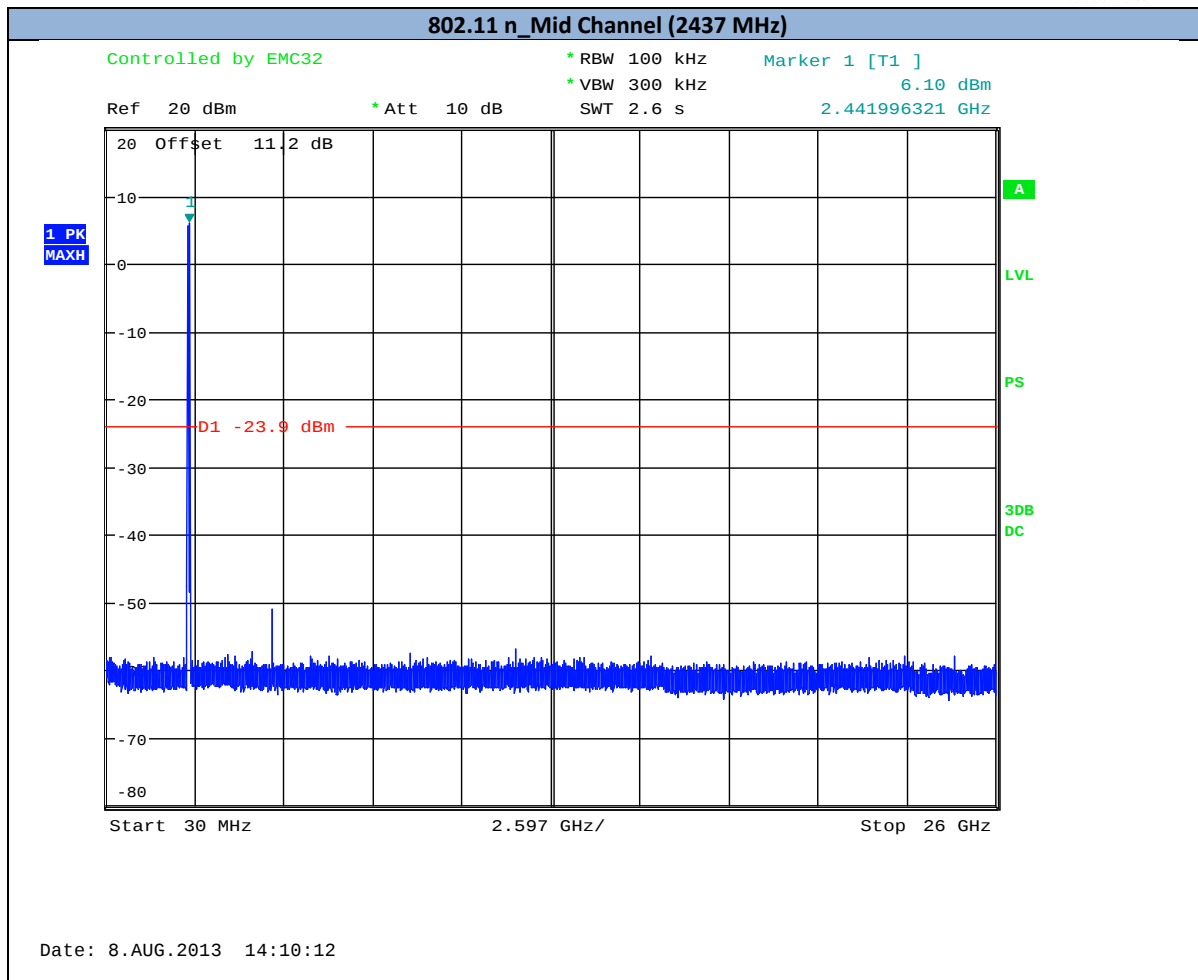


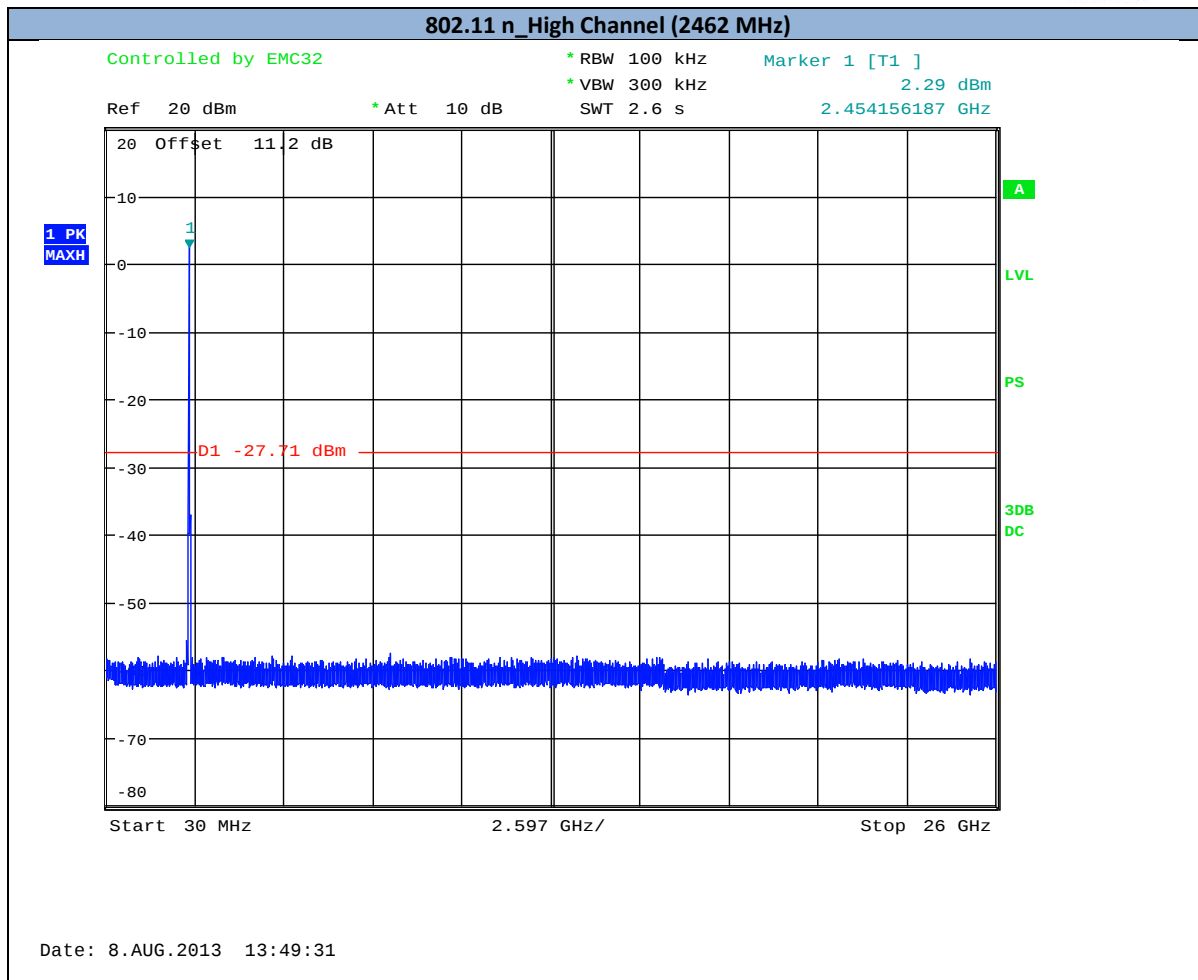


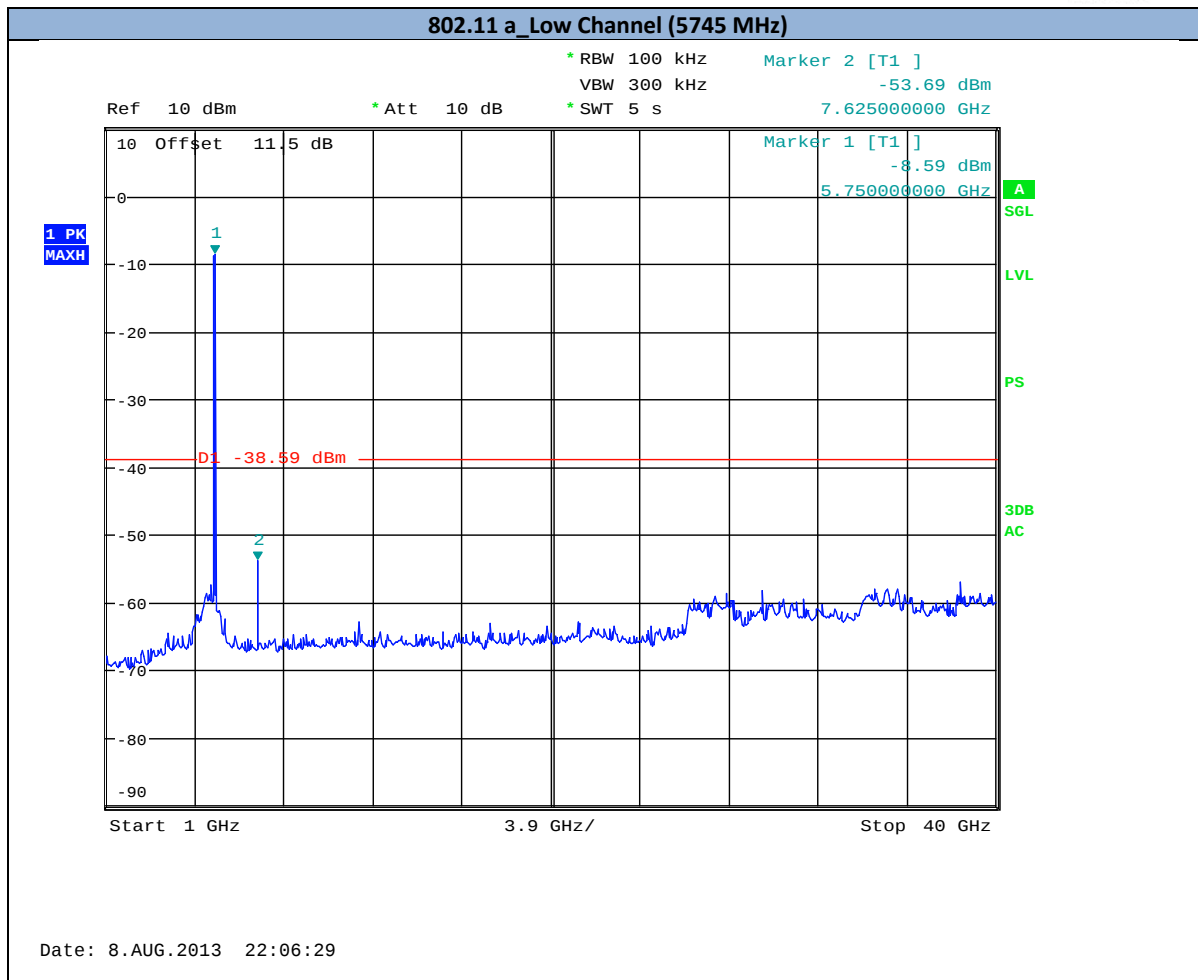


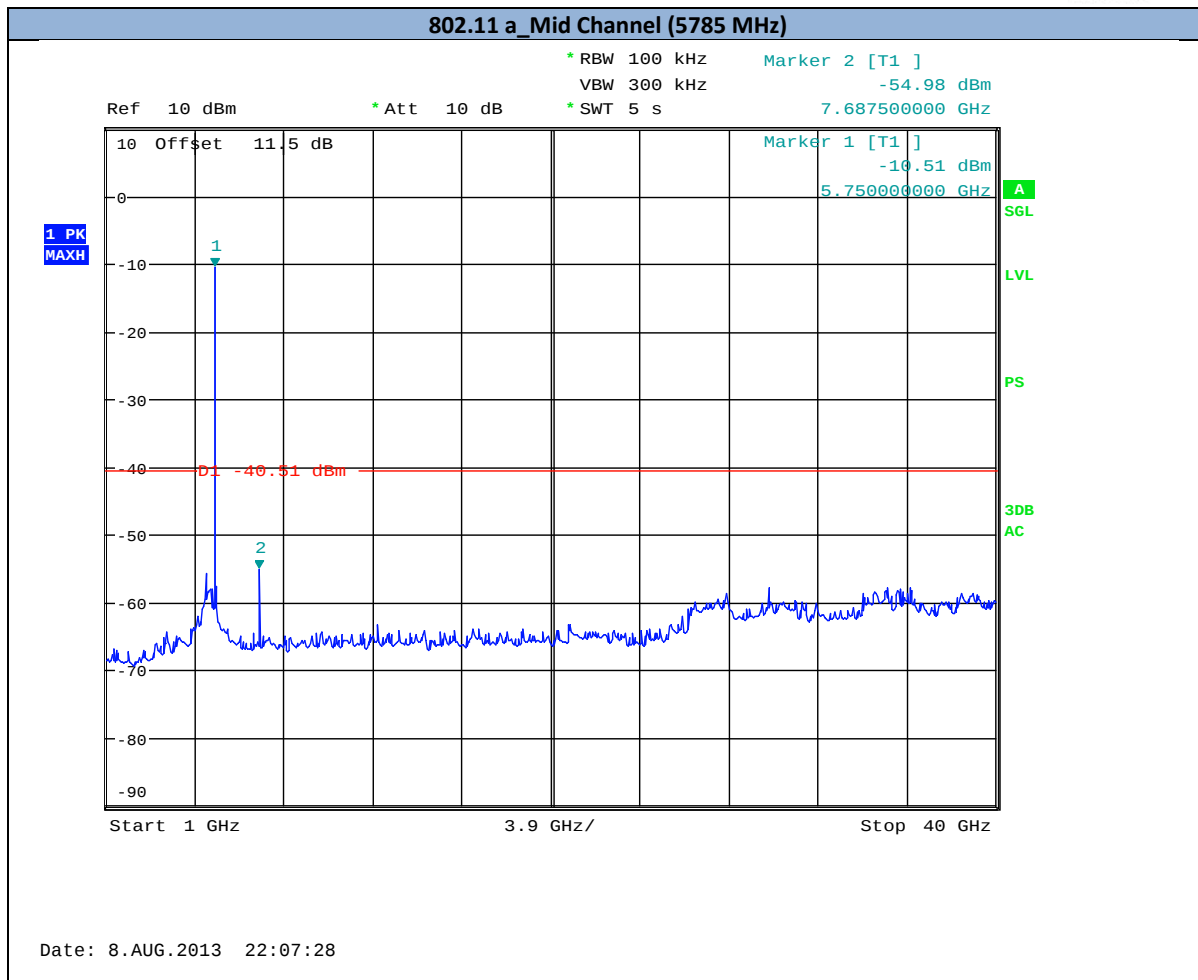


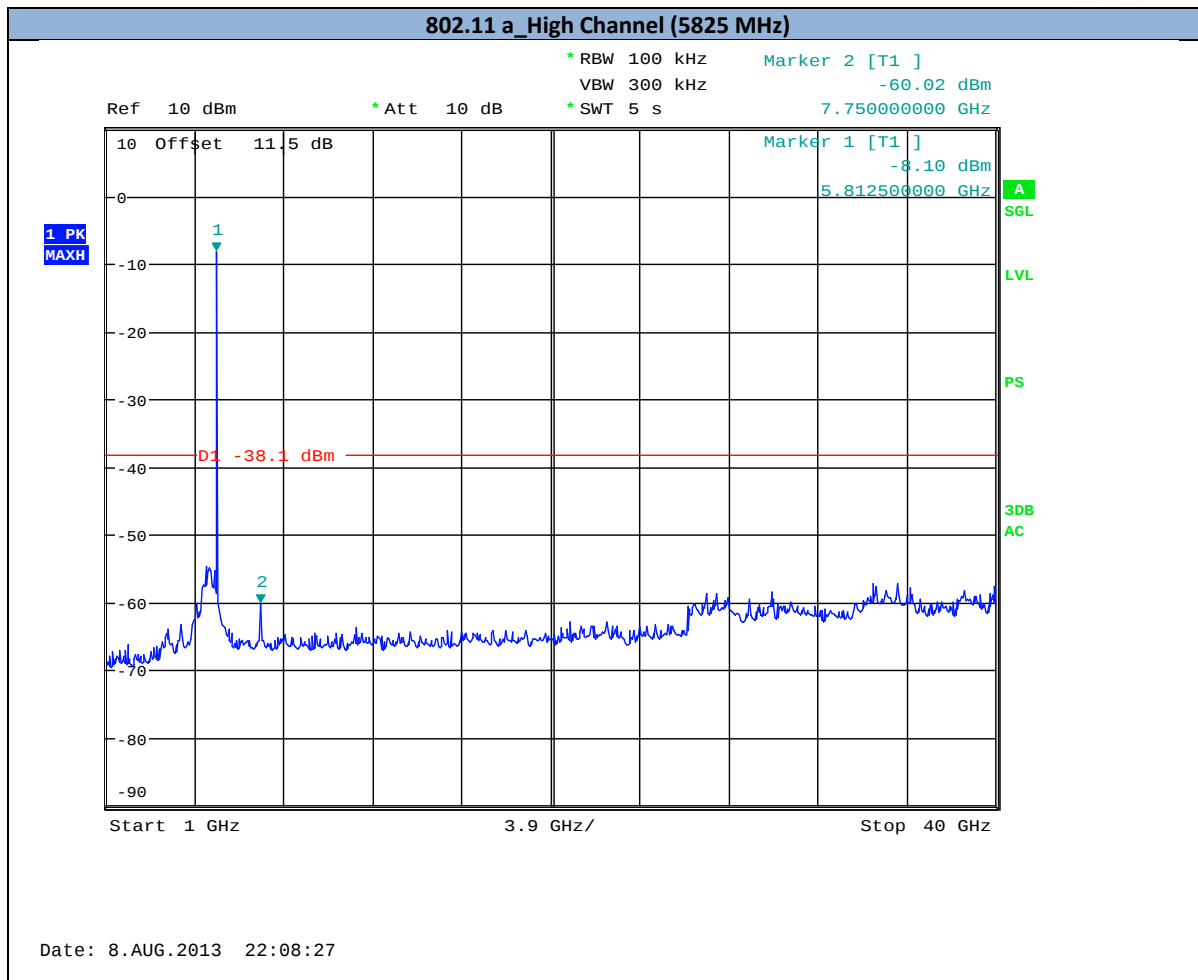


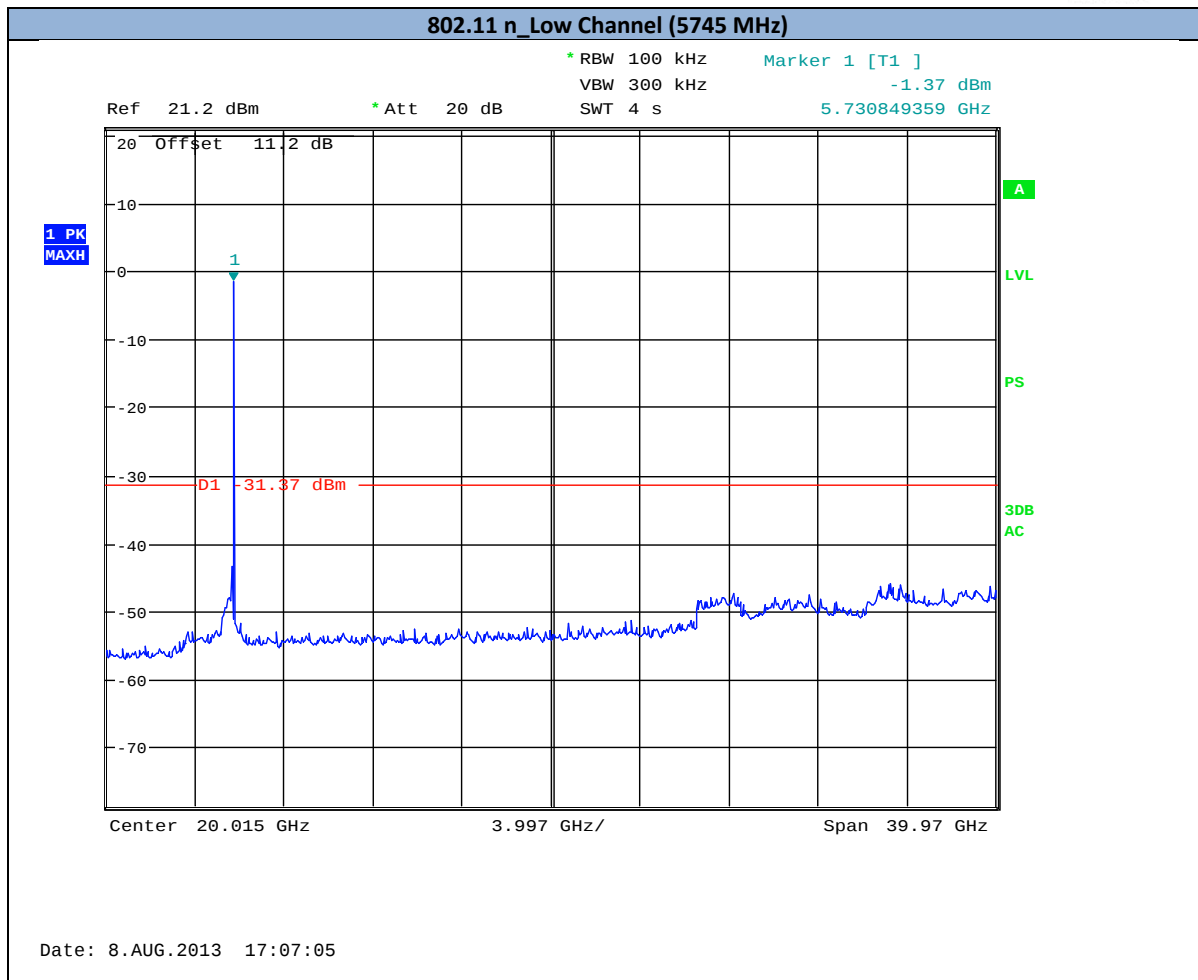


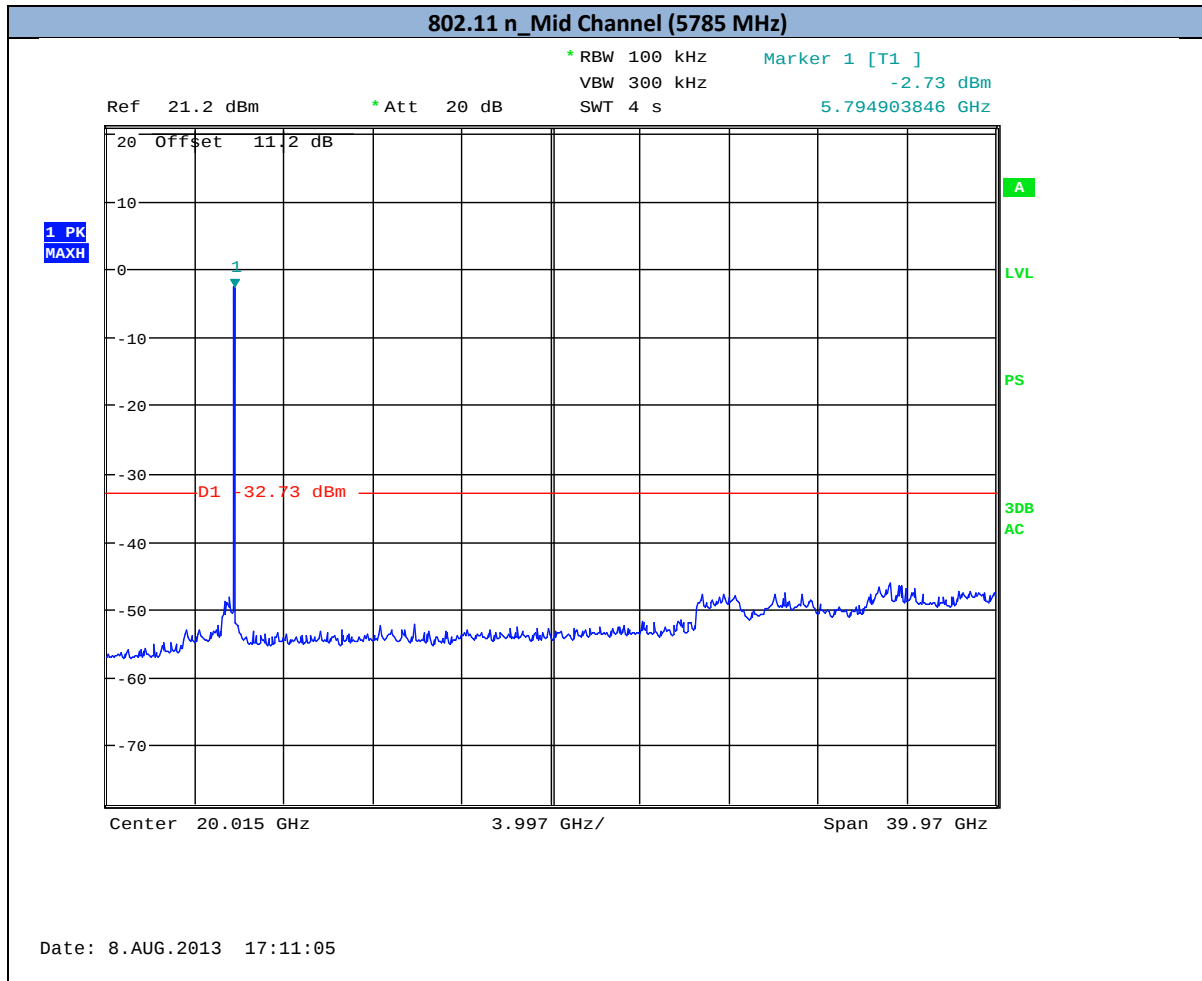


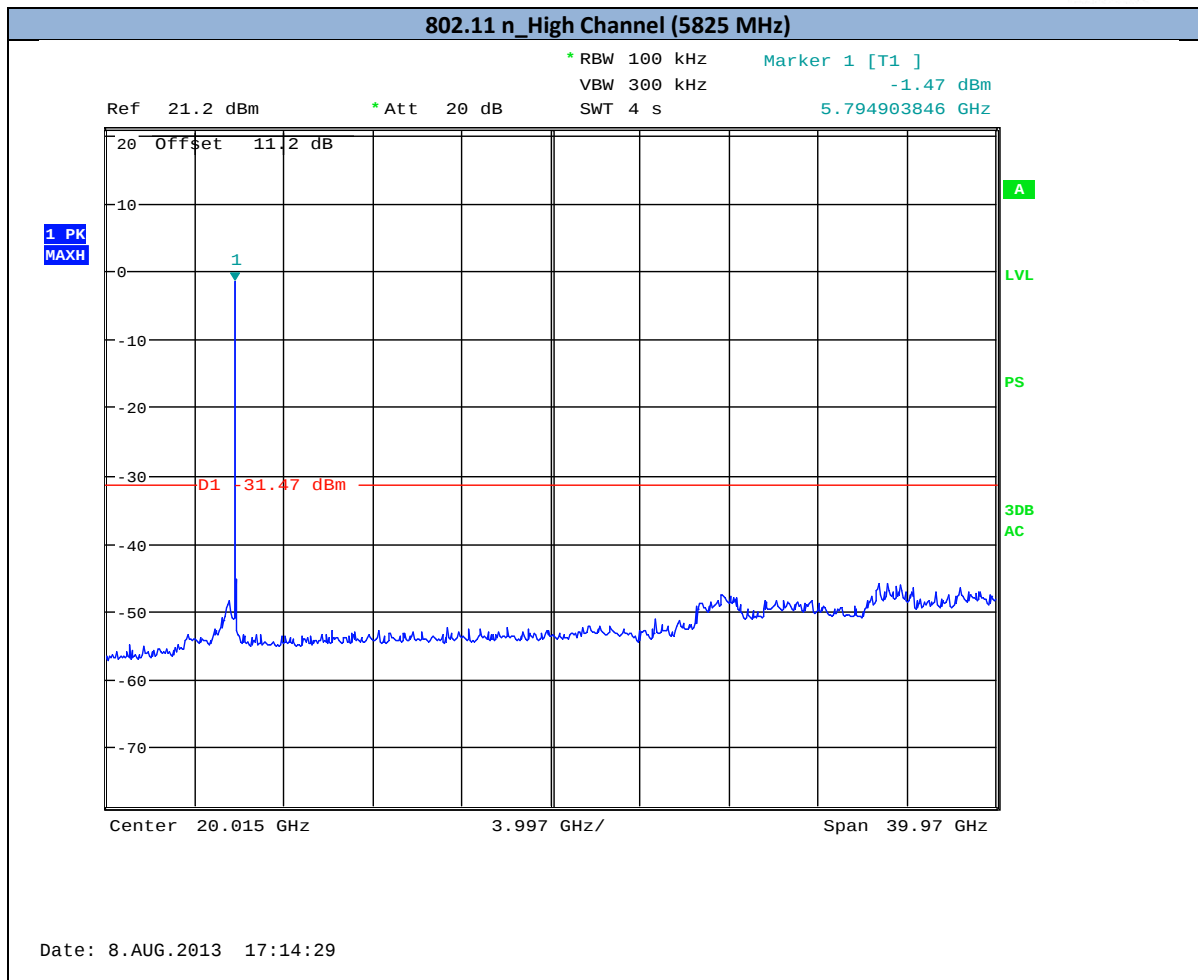














2.5 BAND-EDGE COMPLIANCE OF RF CONDUCTED EMISSIONS

2.5.1 Specification Reference

Part 15 Subpart C §15.247(d)

2.5.2 Standard Applicable

See previous test.

2.5.3 Equipment Under Test and Modification State

Serial No: SEZ100073700125/ Test Configuration A

2.5.4 Date of Test/Initial of test personnel who performed the test

August 08, 2013/AC, KM, JMG

2.5.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.5.6 Environmental Conditions

Ambient Temperature	26.4°C
Relative Humidity	45.1%
ATM Pressure	98.7 kPa

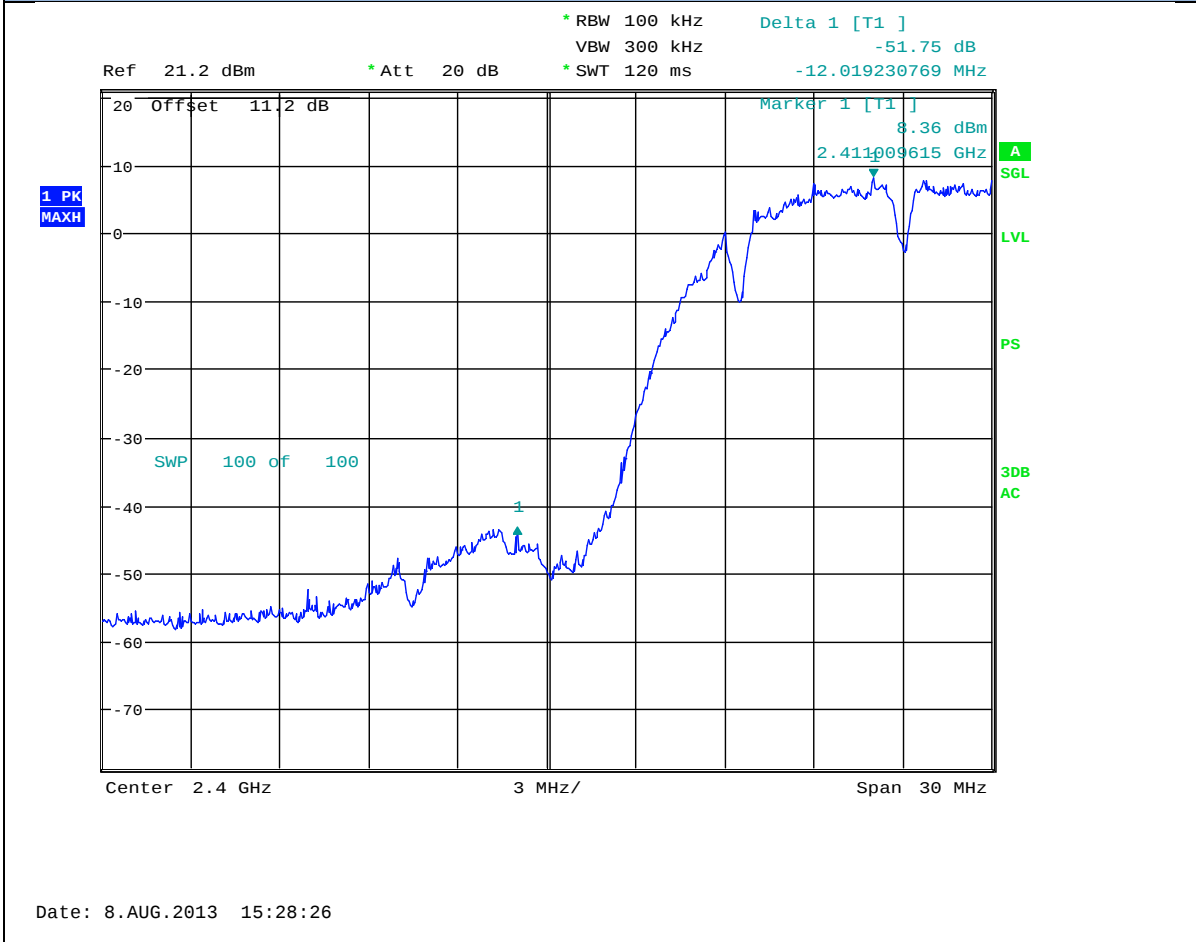
2.5.7 Additional Observations

- Setup is identical to “Out-of-Band Emissions – Conducted” test (previous test).
- Band-edge (2400MHz and 2483.5MHz/5725MHz and 5850MHz) emissions were verified in this test.
- The spectrum analyzer was centred on the band-edge frequency while setting the EUT to the corresponding transmit channel (i.e. Low Channel for lower band-edge).
- RBW setting used is 100 kHz.
- Limit used is 20dB which is relative to the in-band peak output power in 100 kHz.
- The worst delta from the highest level of desired power to or beyond the band edge is presented in this test report.

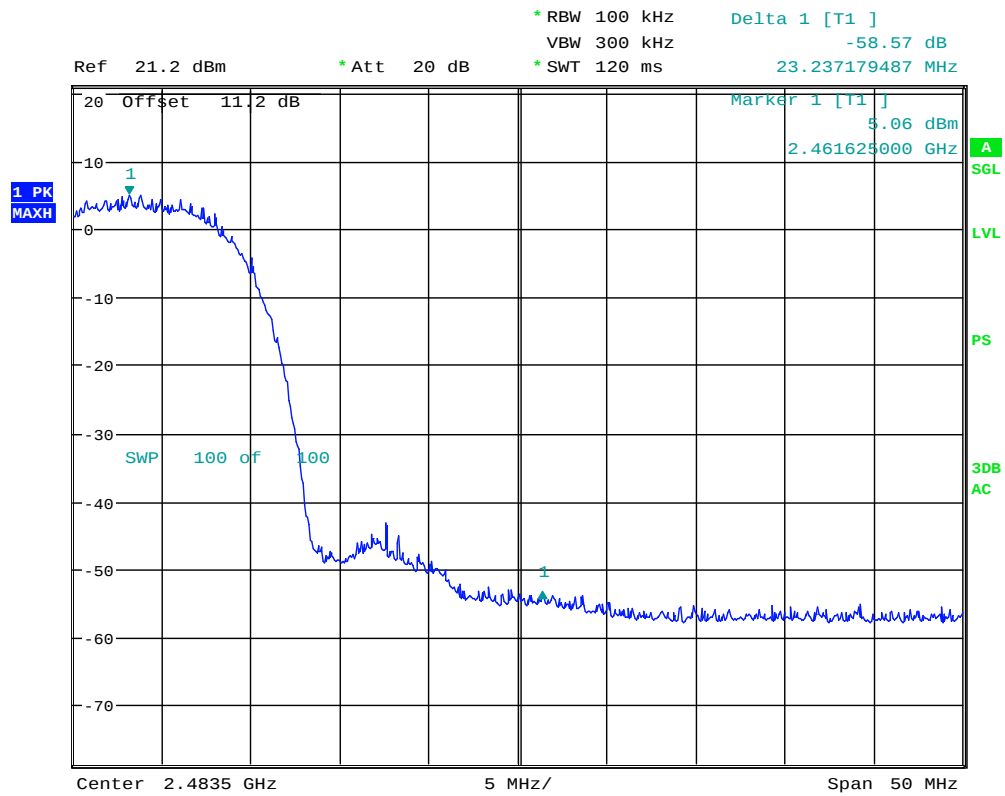
2.5.8 Test Results

Complies. See attached plots.

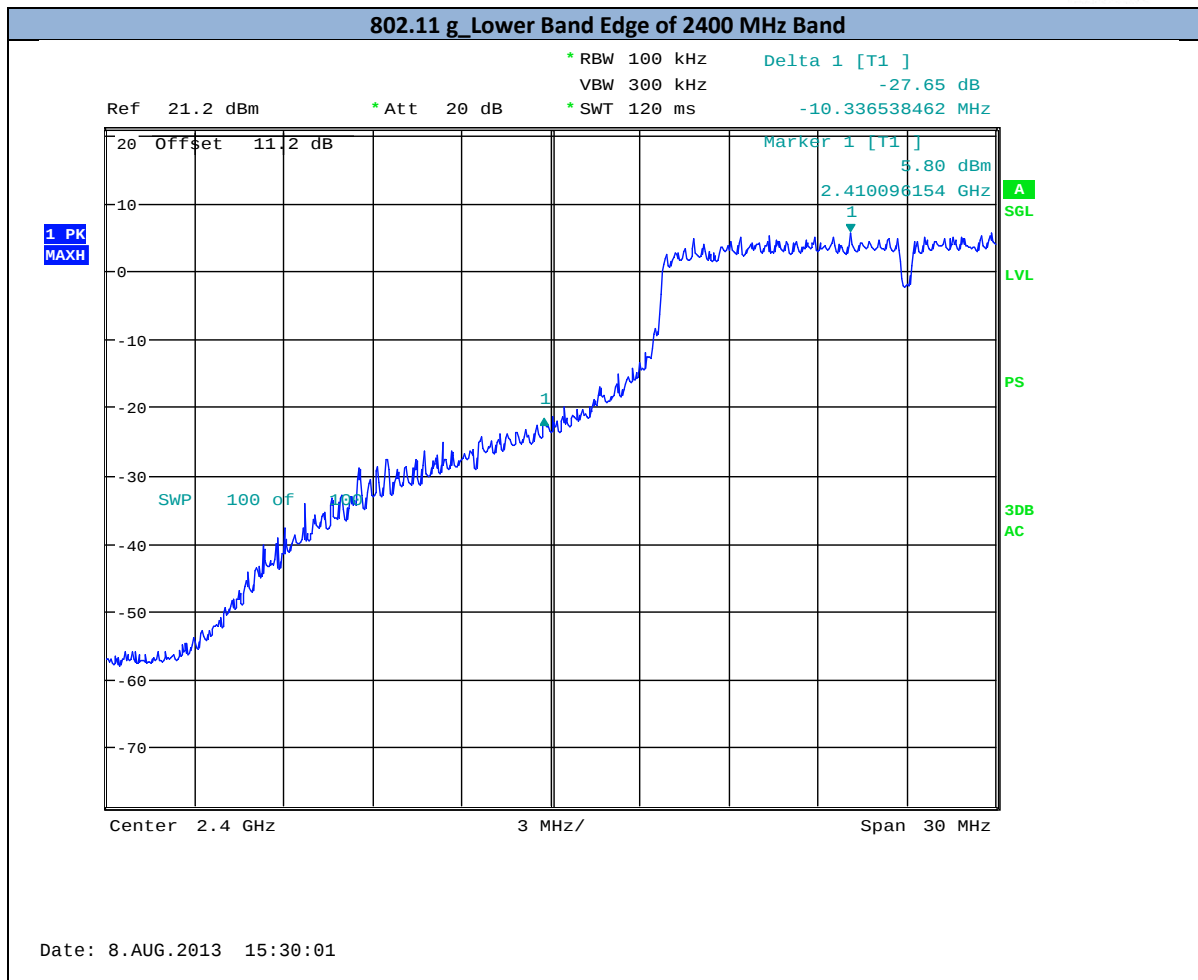
802.11 b_Lower Band Edge of 2400 MHz Band



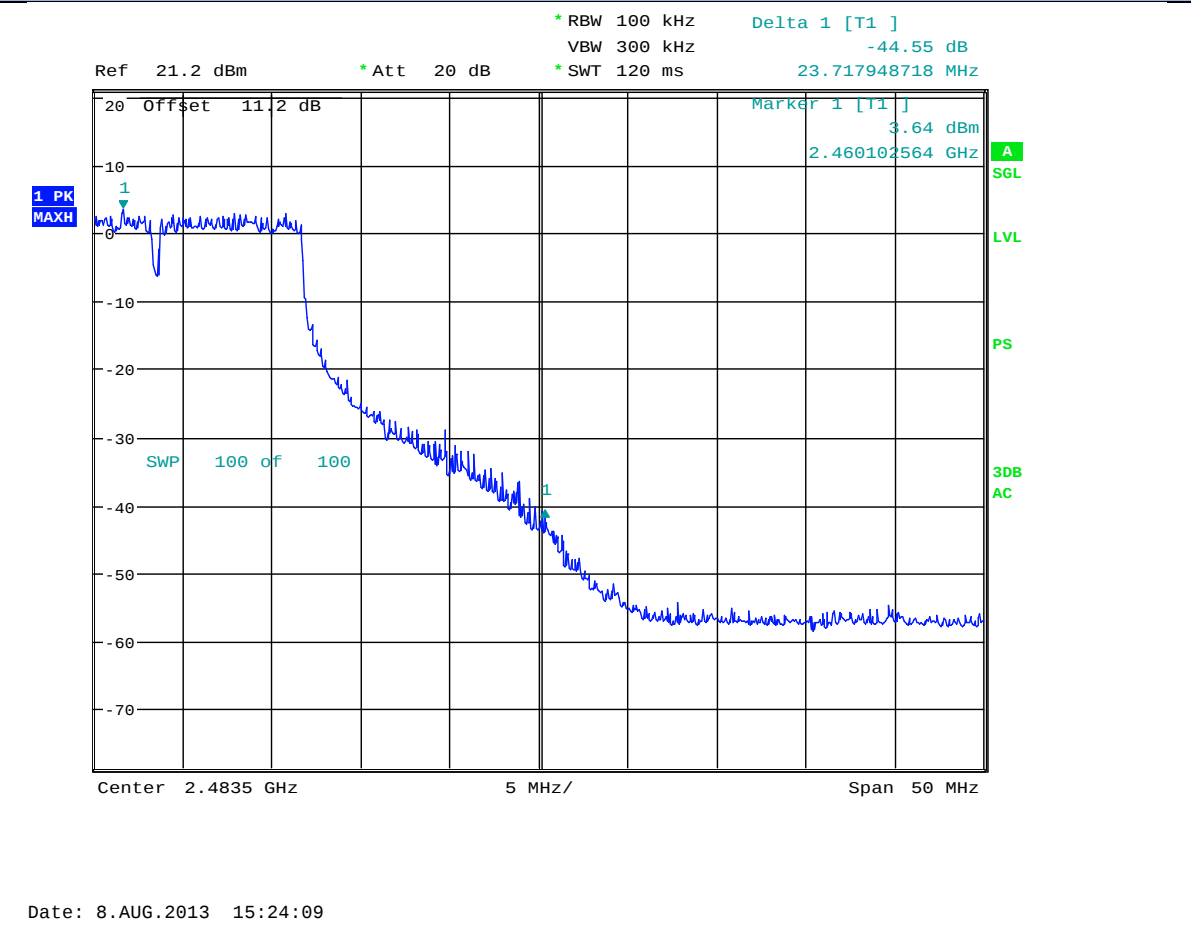
802.11 b_Higher Band Edge of 2483.5 MHz Band



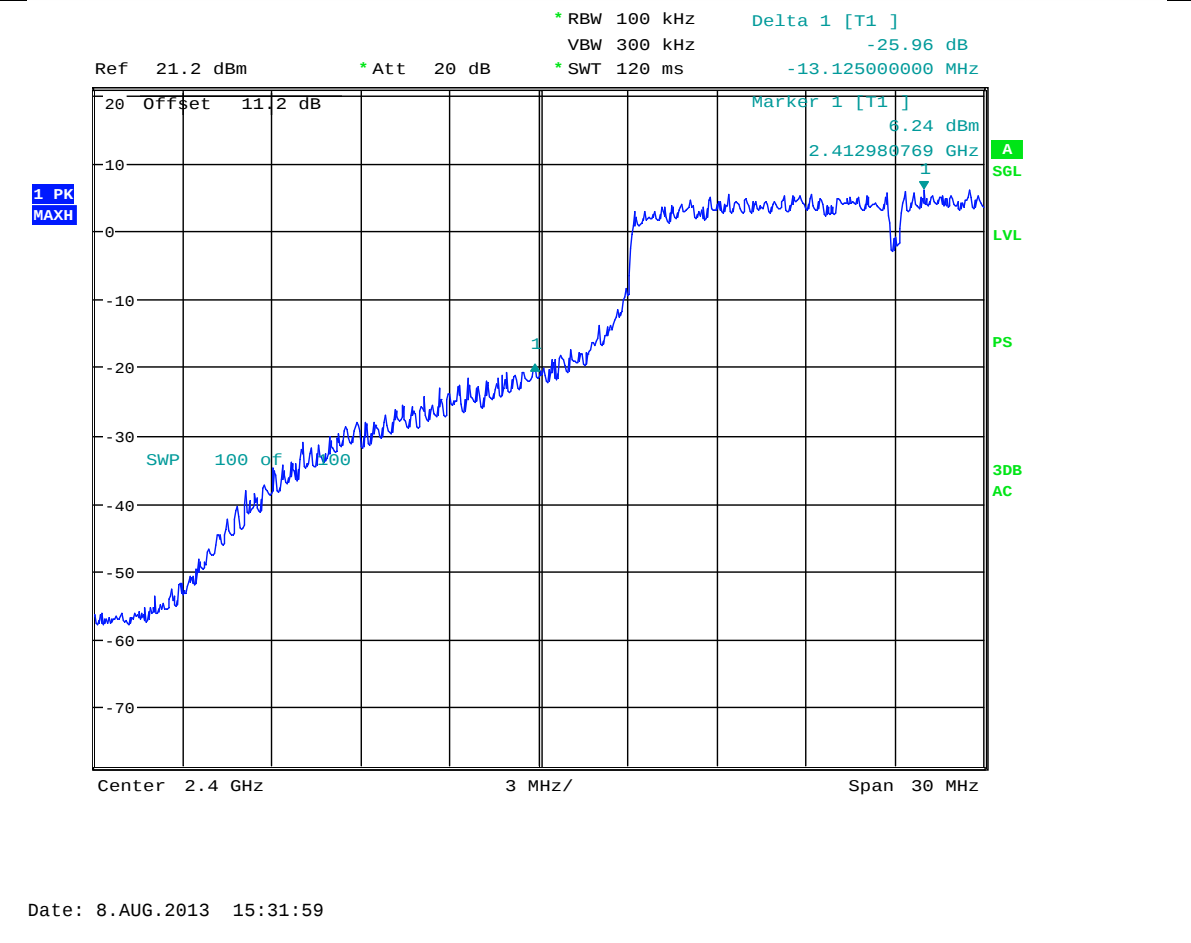
Date: 8.AUG.2013 15:26:07

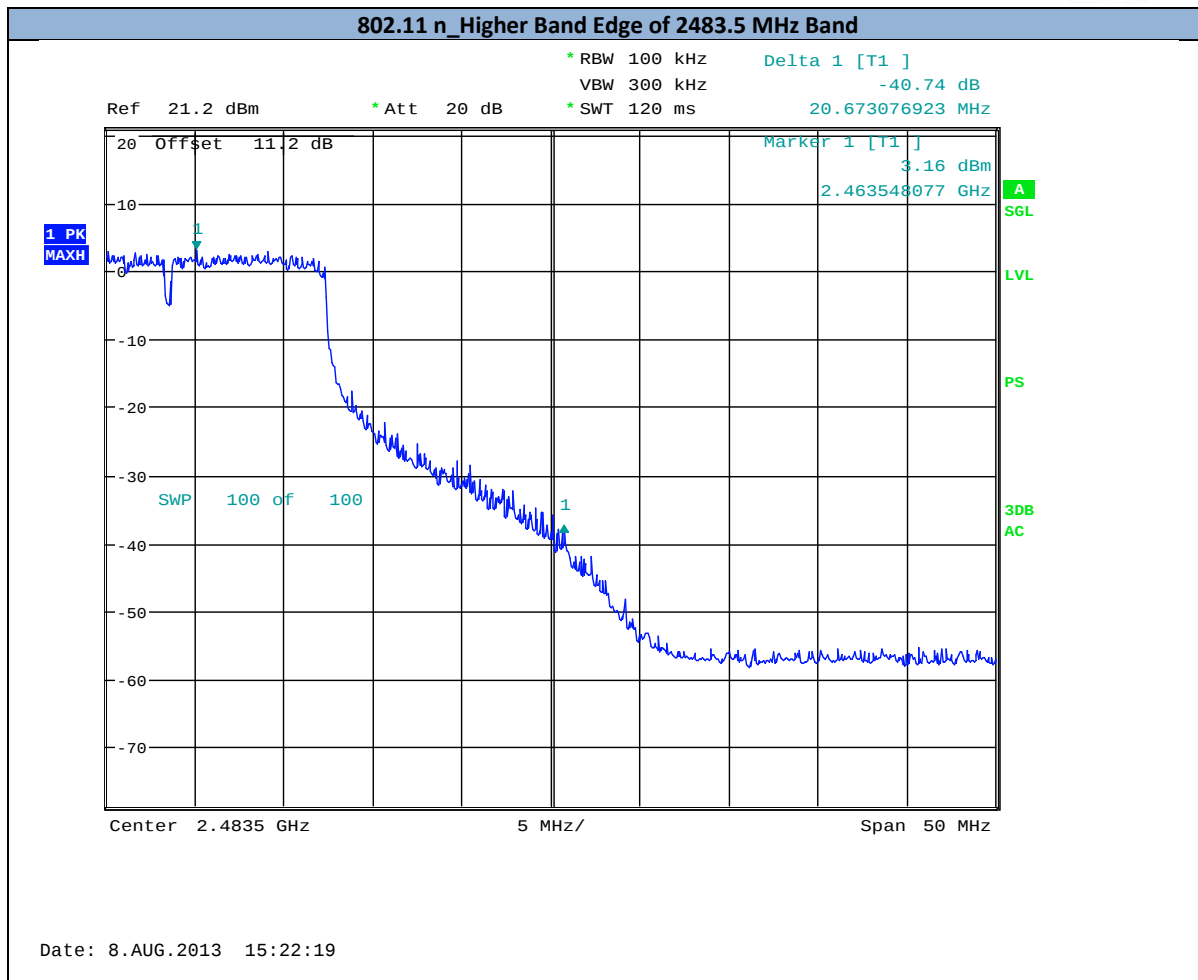


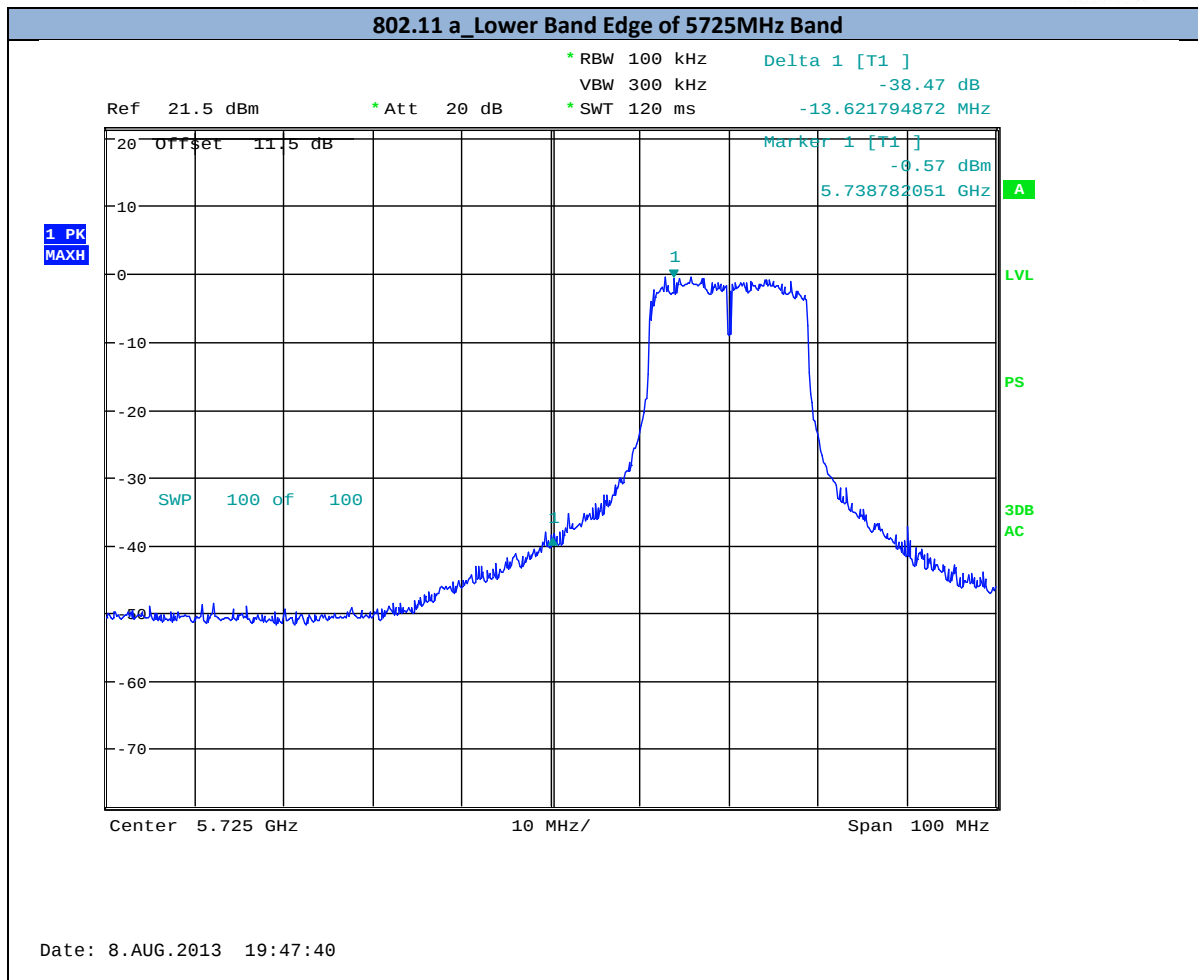
802.11 g_Higher Band Edge of 2483.5 MHz Band



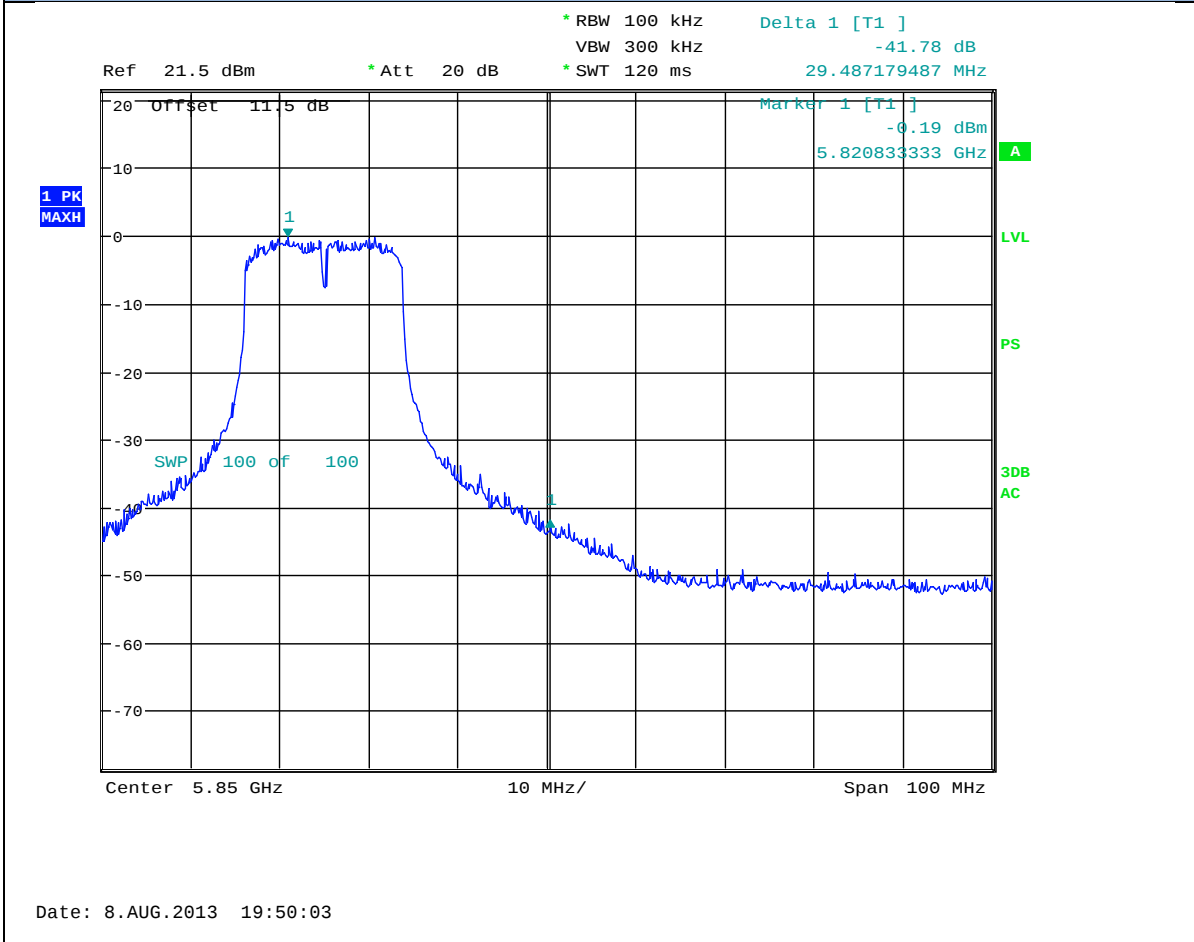
802.11 n_Lower Band Edge of 2400 MHz Band



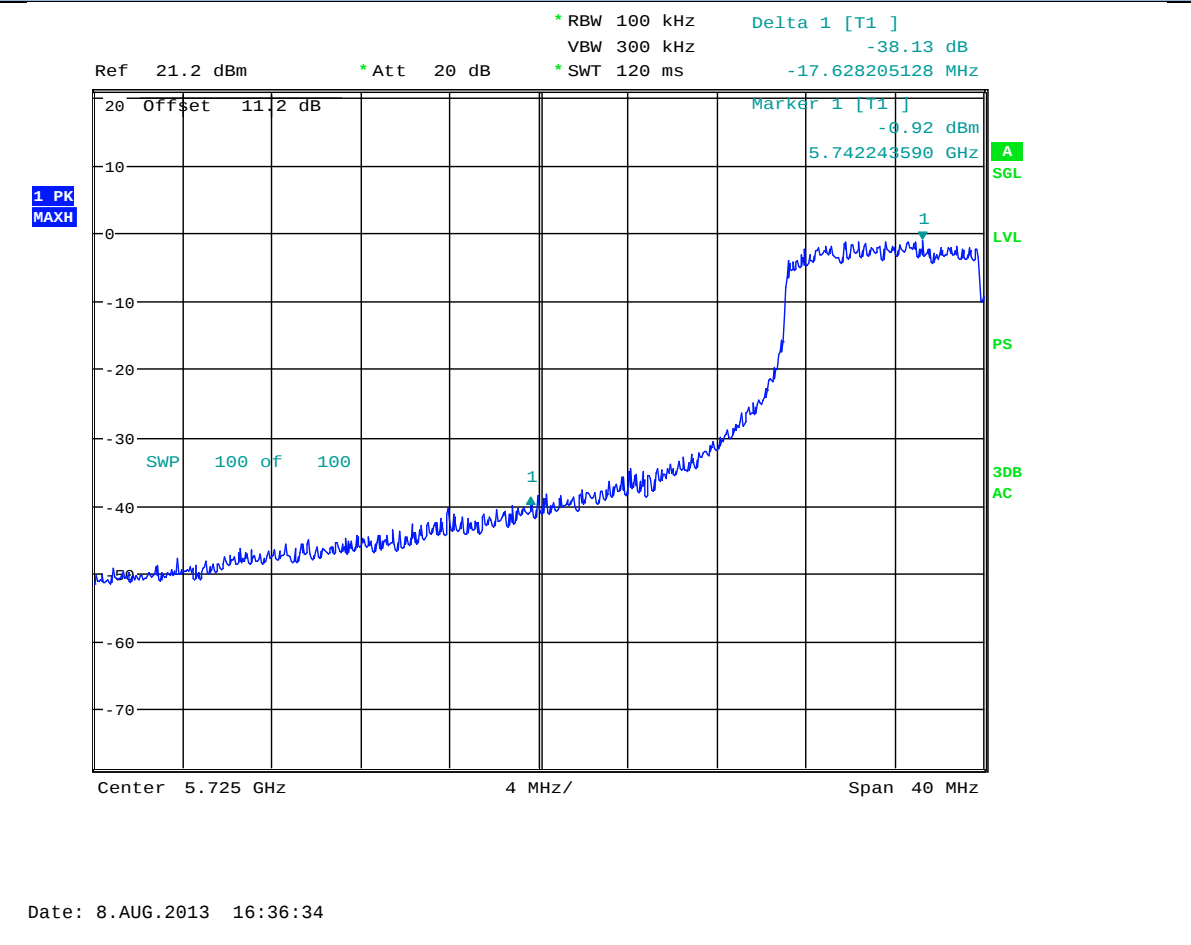




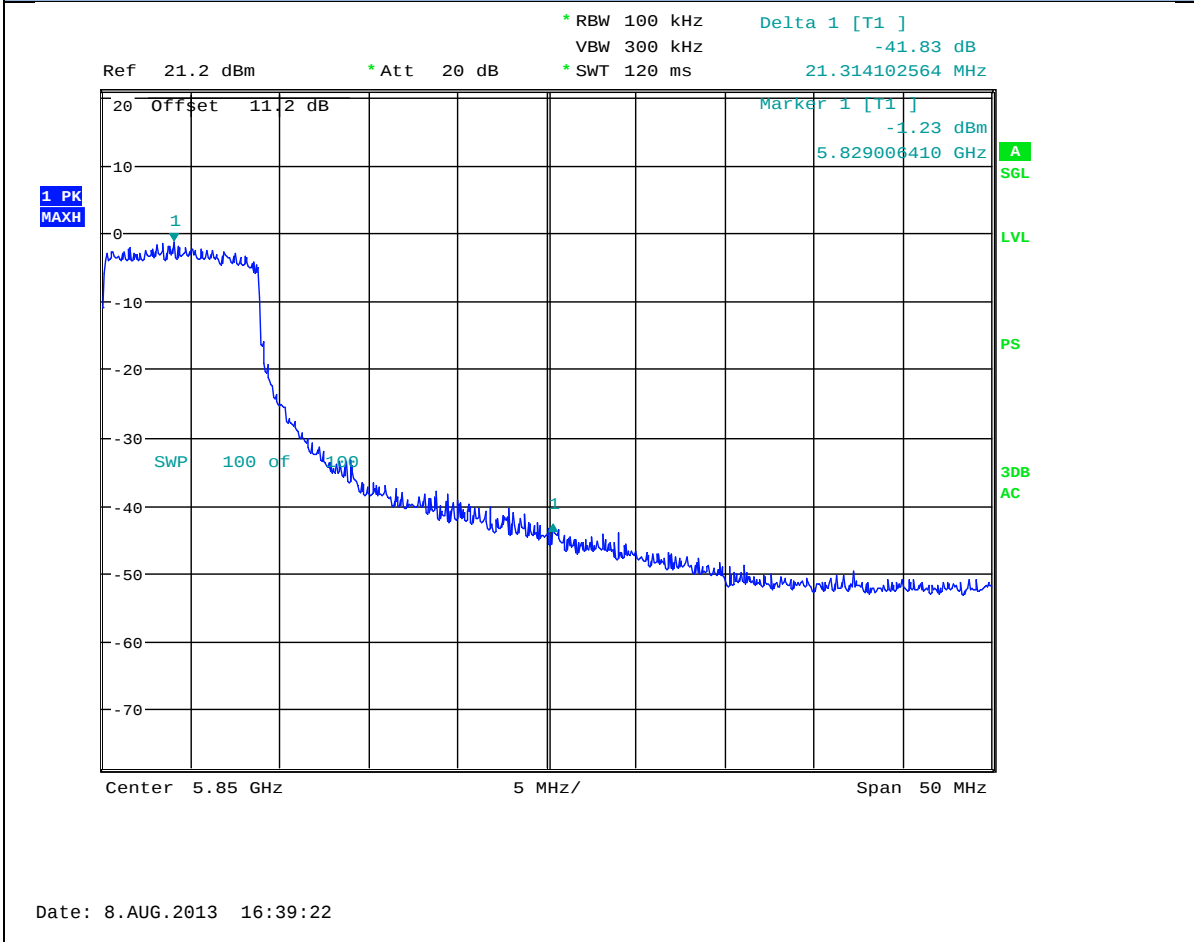
802.11 a_Higher Band Edge of 5850 MHz Band



802.11 n_Lower Band Edge of 5725 MHz Band



802.11 n_Higher Band Edge of 5850 MHz Band





2.6 SPURIOUS RADIATED EMISSIONS

2.6.1 Specification Reference

Part 15 Subpart C §15.247(d)

2.6.2 Standard Applicable

(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

2.6.3 Equipment Under Test and Modification State

Serial No: SEZ100073700125 / Test Configuration B and C

2.6.4 Date of Test/Initial of test personnel who performed the test

August 07, 08, 09, 2013/AC, KM, JMG

2.6.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.6.6 Environmental Conditions

Ambient Temperature	26.4°C
Relative Humidity	45.1%
ATM Pressure	98.7 kPa

2.6.7 Additional Observations

- This is a radiated test. The spectrum was searched from 30MHz to the 10th harmonic.
- There are no emissions found that do not comply to the restricted bands defined in FCC Part 15 Subpart C, 15.205 or Part 15.247(d).
- Test procedure is consistent with those specified under C63.10.
- Measurement was done using EMC32 automated software. Reported level is the actual level with all the correction factors factored in. Correction Factor column is for informational purposes only. See Section 2.7.8 for sample computation.



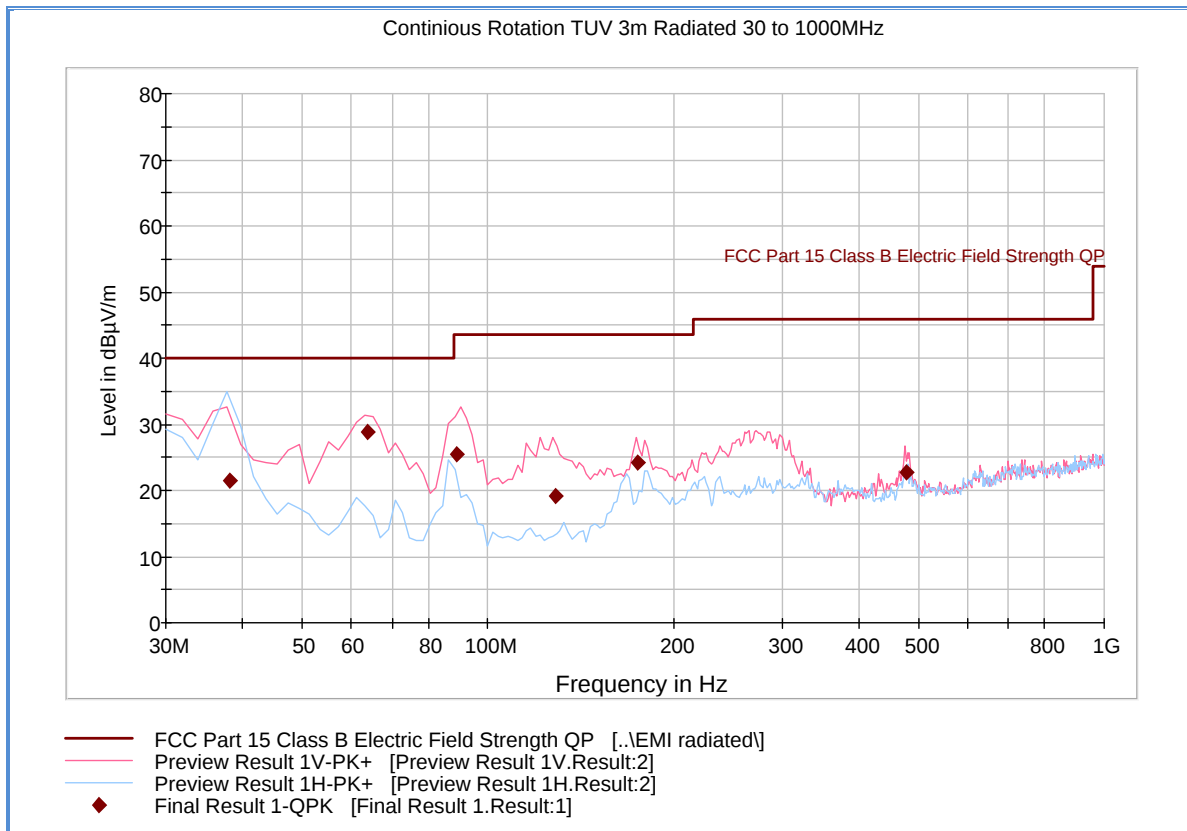
2.6.8 Sample Computation (Radiated Emission)

Measuring equipment raw measurement (db μ V) @ 30 MHz			24.4
Correction Factor (dB)	Asset# 1066 (cable)	0.3	-12.6
	Asset# 1172 (cable)	0.3	
	Asset# 1016 (preamplifier)	-30.7	
	Asset# 1175(cable)	0.3	
	Asset# 1002 (antenna)	17.2	
Reported QuasiPeak Final Measurement (db μ V/m) @ 30MHz			11.8

2.6.9 Test Results

See attached plots.

2.6.10 Test Results Below 1GHz (Receive Mode)_Worst Case Configuration

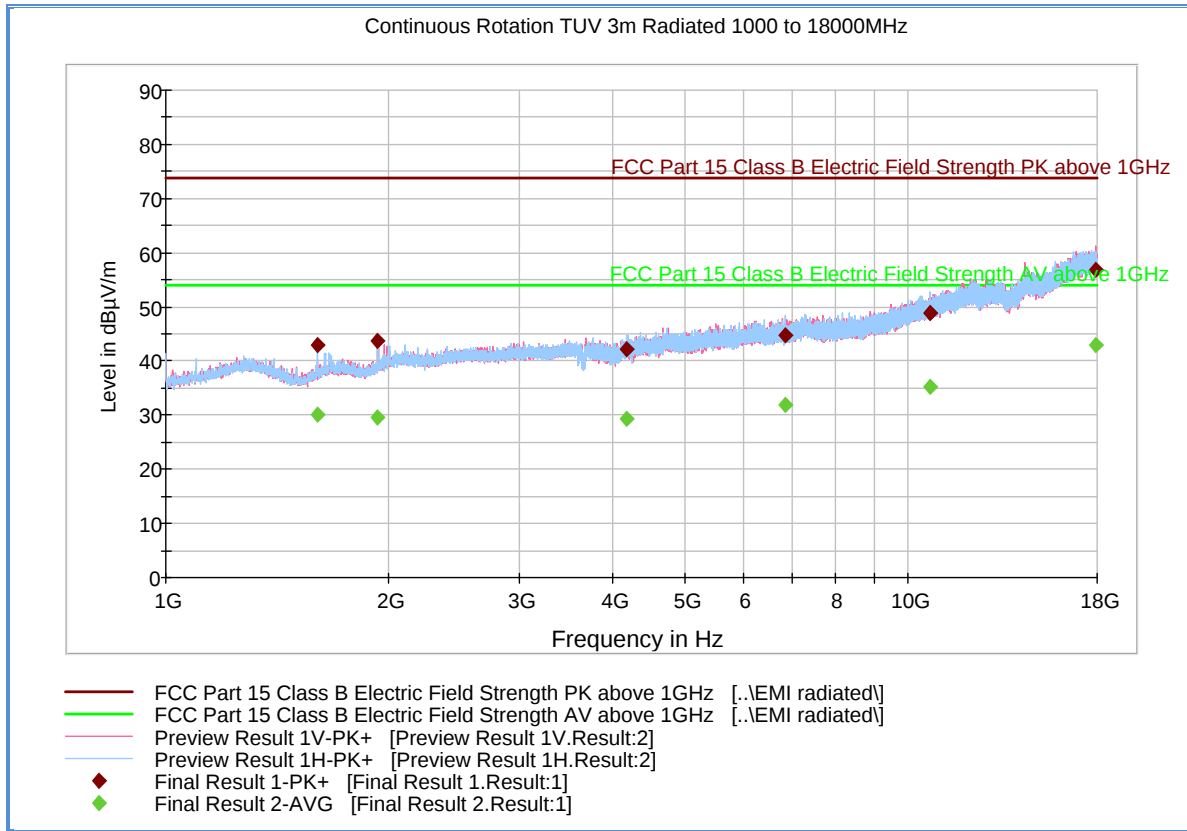


Quasi Peak Data

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
38.175551	21.5	1000.0	120.000	365.0	H	15.0	-15.3	18.5	40.0
63.726092	28.7	1000.0	120.000	110.0	V	173.0	-21.4	11.3	40.0
89.212745	25.4	1000.0	120.000	150.0	V	15.0	-20.1	18.1	43.5
128.754389	19.1	1000.0	120.000	106.0	V	15.0	-19.9	24.4	43.5
175.247695	24.2	1000.0	120.000	100.0	V	325.0	-17.0	19.3	43.5
477.958076	22.7	1000.0	120.000	120.0	V	316.0	-5.8	23.3	46.0

Test Notes: Only worst case channel presented for spurious emissions below 1GHz.

2.6.11 Test Results Above 1GHz (Receive Mode)_Worst Case Configuration



Peak Data

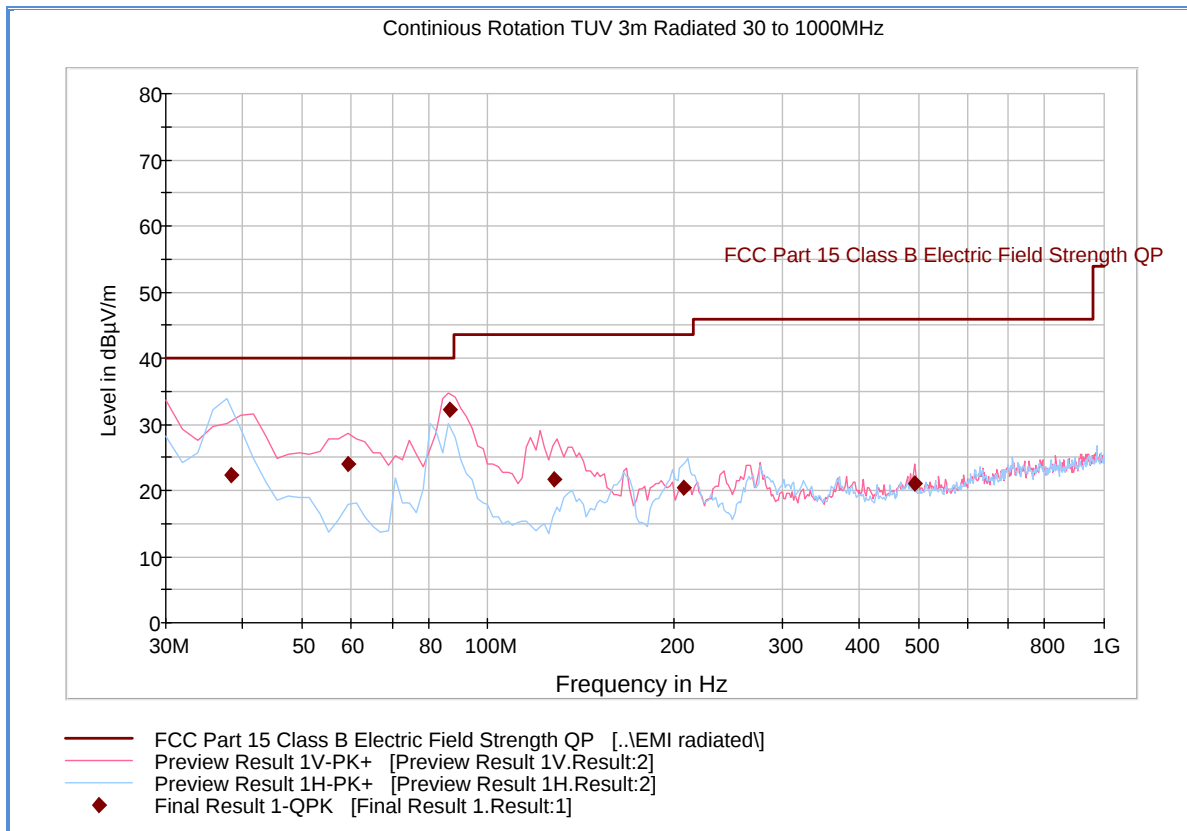
Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1599.900000	43.0	1000.0	1000.000	400.5	H	46.0	-4.3	30.9	73.9
1931.966667	43.8	1000.0	1000.000	355.1	V	39.0	-2.0	30.1	73.9
4174.866667	42.1	1000.0	1000.000	131.6	H	270.0	3.7	31.8	73.9
6830.666667	44.6	1000.0	1000.000	158.5	H	283.0	8.8	29.3	73.9
10721.70000	49.0	1000.0	1000.000	300.2	H	194.0	13.8	24.9	73.9
17896.73333	56.8	1000.0	1000.000	203.4	V	278.0	22.4	17.1	73.9

Average Data

Frequency (MHz)	Average (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1599.900000	30.1	1000.0	1000.000	400.5	H	46.0	-4.3	23.8	53.9
1931.966667	29.5	1000.0	1000.000	355.1	V	39.0	-2.0	24.4	53.9
4174.866667	29.4	1000.0	1000.000	131.6	H	270.0	3.7	24.5	53.9
6830.666667	31.9	1000.0	1000.000	158.5	H	283.0	8.8	22.0	53.9
10721.70000	35.3	1000.0	1000.000	300.2	H	194.0	13.8	18.6	53.9
17896.73333	42.9	1000.0	1000.000	203.4	V	278.0	22.4	11.0	53.9

Test Notes: Only worst case channel presented for spurious emissions above 1GHz.

2.6.12 Test Results Below 1GHz (Transmit Mode)_Worst Case Configuration_802.11 n_Mid(6) Channel

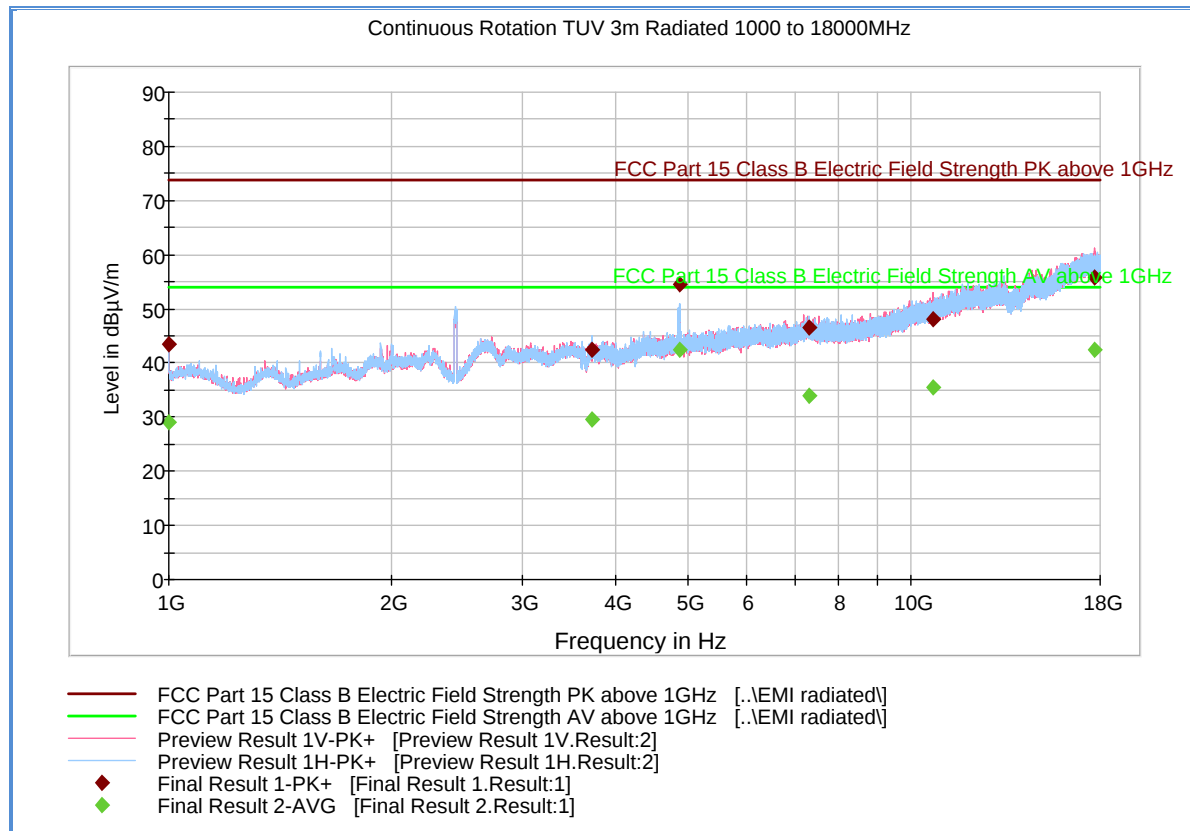


Quasi Peak Data

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
38.295551	22.2	1000.0	120.000	400.0	H	263.0	-15.4	17.8	40.0
59.398317	23.9	1000.0	120.000	100.0	V	151.0	-20.9	16.1	40.0
86.852745	32.3	1000.0	120.000	115.0	V	207.0	-20.5	7.7	40.0
128.218277	21.7	1000.0	120.000	100.0	V	81.0	-19.9	21.8	43.5
208.181563	20.4	1000.0	120.000	171.0	H	319.0	-14.8	23.1	43.5
492.765291	21.1	1000.0	120.000	100.0	V	88.0	-6.0	24.9	46.0

Test Notes: Only worst case channel presented for spurious emissions below 1GHz.

2.6.13 Test Results Above 1GHz (Transmit Mode)_Worst Case Configuration_802.11 n_Mid(6) Channel



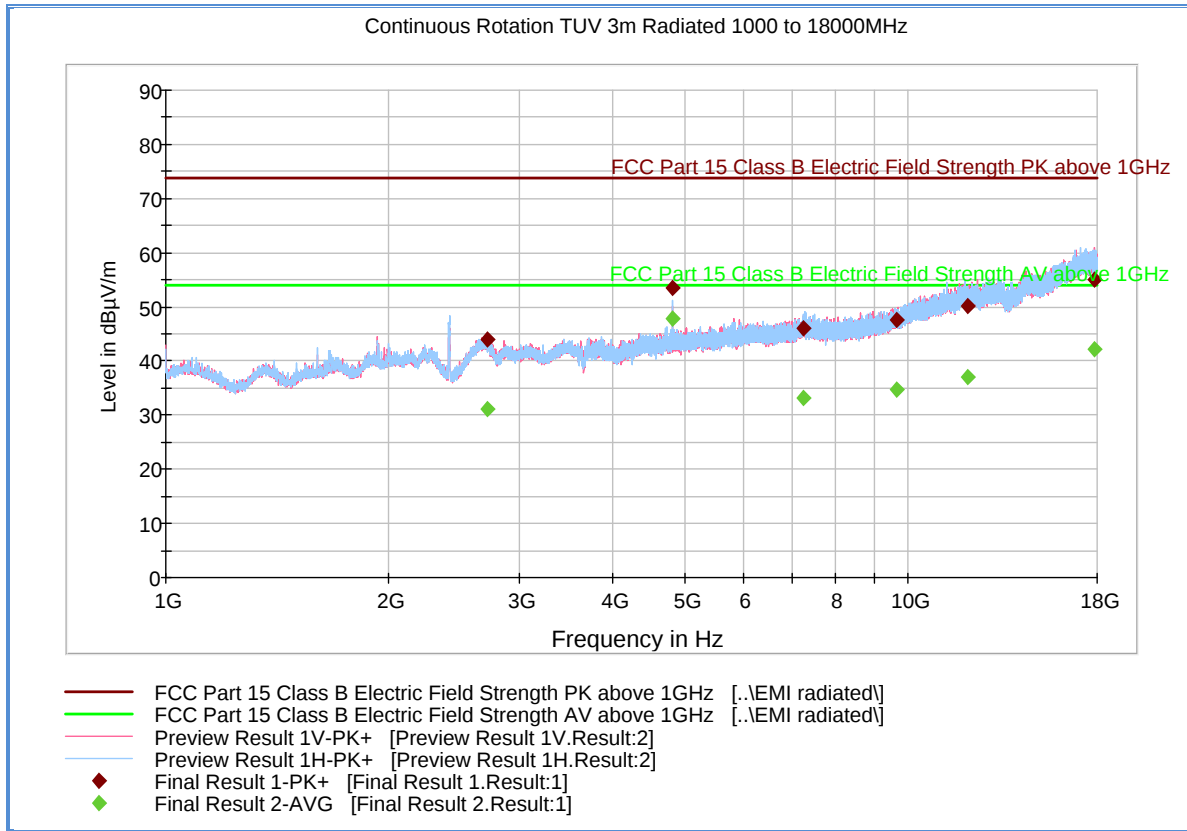
Peak Data

Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1000.400000	43.4	1000.0	1000.000	207.4	H	206.0	-6.3	30.5	73.9
3723.600000	42.3	1000.0	1000.000	196.4	H	344.0	3.0	31.6	73.9
4872.233333	54.5	1000.0	1000.000	178.5	H	287.0	5.2	19.4	73.9
7307.400000	46.5	1000.0	1000.000	250.3	H	281.0	9.8	27.4	73.9
10732.866666	48.2	1000.0	1000.000	400.4	V	340.0	13.8	25.7	73.9
17680.766666	55.9	1000.0	1000.000	99.6	V	81.0	22.1	18.0	73.9

Average Data

Frequency (MHz)	Average (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1000.400000	29.0	1000.0	1000.000	207.4	H	206.0	-6.3	24.9	53.9
3723.600000	29.5	1000.0	1000.000	196.4	H	344.0	3.0	24.4	53.9
4872.233333	42.3	1000.0	1000.000	178.5	H	287.0	5.2	11.6	53.9
7307.400000	34.0	1000.0	1000.000	250.3	H	281.0	9.8	19.9	53.9
10732.866666	35.4	1000.0	1000.000	400.4	V	340.0	13.8	18.5	53.9
17680.766666	42.5	1000.0	1000.000	99.6	V	81.0	22.1	11.4	53.9

2.6.14 Test Results Above 1GHz (Transmit Mode)_802.11 b_Low(1) Channel



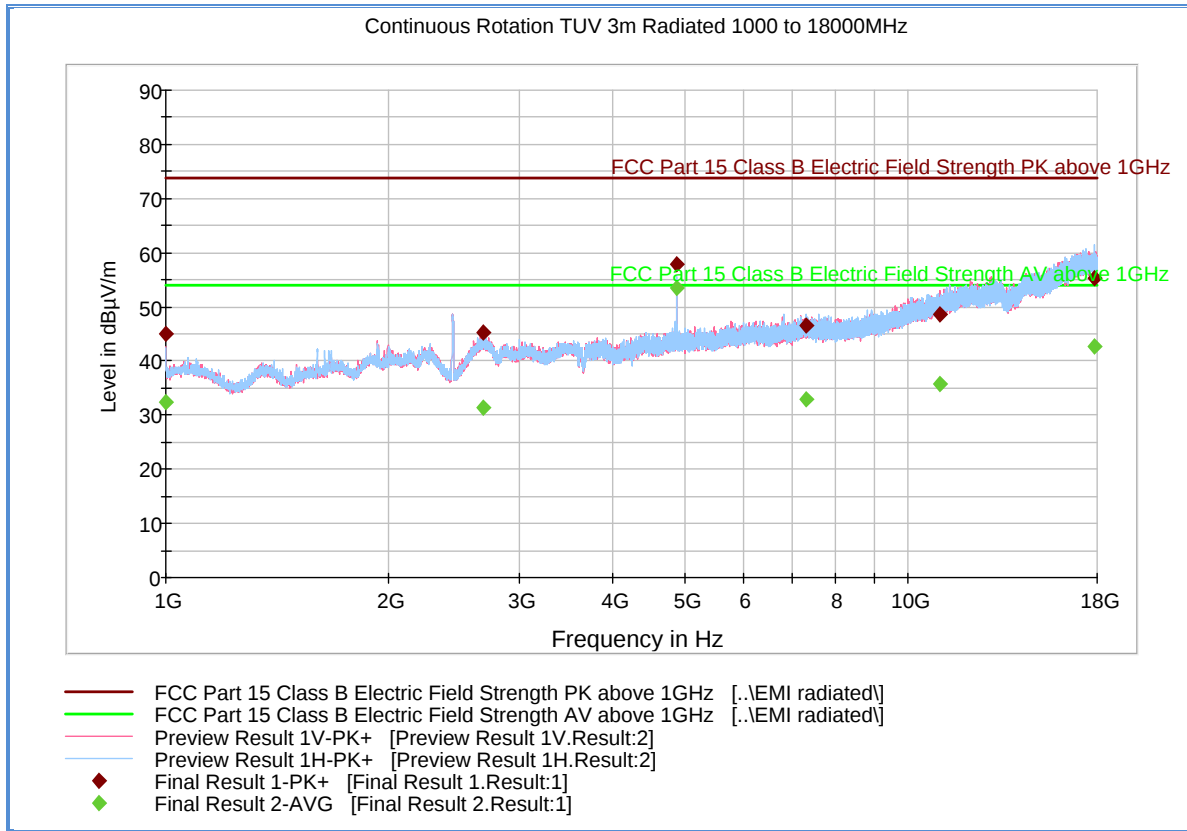
Peak Data

Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
2714.700000	43.9	1000.0	1000.000	400.4	V	120.0	0.8	30.0	73.9
4824.066667	53.4	1000.0	1000.000	179.5	H	310.0	5.3	20.5	73.9
7233.933333	46.0	1000.0	1000.000	179.5	H	326.0	9.6	27.9	73.9
9647.133333	47.5	1000.0	1000.000	400.4	V	20.0	11.6	26.4	73.9
12044.366666	50.1	1000.0	1000.000	159.5	H	60.0	16.2	23.8	73.9
17865.266666	55.1	1000.0	1000.000	168.5	V	290.0	22.3	18.8	73.9

Average Data

Frequency (MHz)	Average (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
2714.700000	31.1	1000.0	1000.000	400.4	V	120.0	0.8	22.8	53.9
4824.066667	47.9	1000.0	1000.000	179.5	H	310.0	5.3	6.0	53.9
7233.933333	33.1	1000.0	1000.000	179.5	H	326.0	9.6	20.8	53.9
9647.133333	34.7	1000.0	1000.000	400.4	V	20.0	11.6	19.2	53.9
12044.366666	37.1	1000.0	1000.000	159.5	H	60.0	16.2	16.8	53.9
17865.266666	42.3	1000.0	1000.000	168.5	V	290.0	22.3	11.6	53.9

2.6.15 Test Results Above 1GHz (Transmit Mode)_802.11 b_Mid(6) Channel



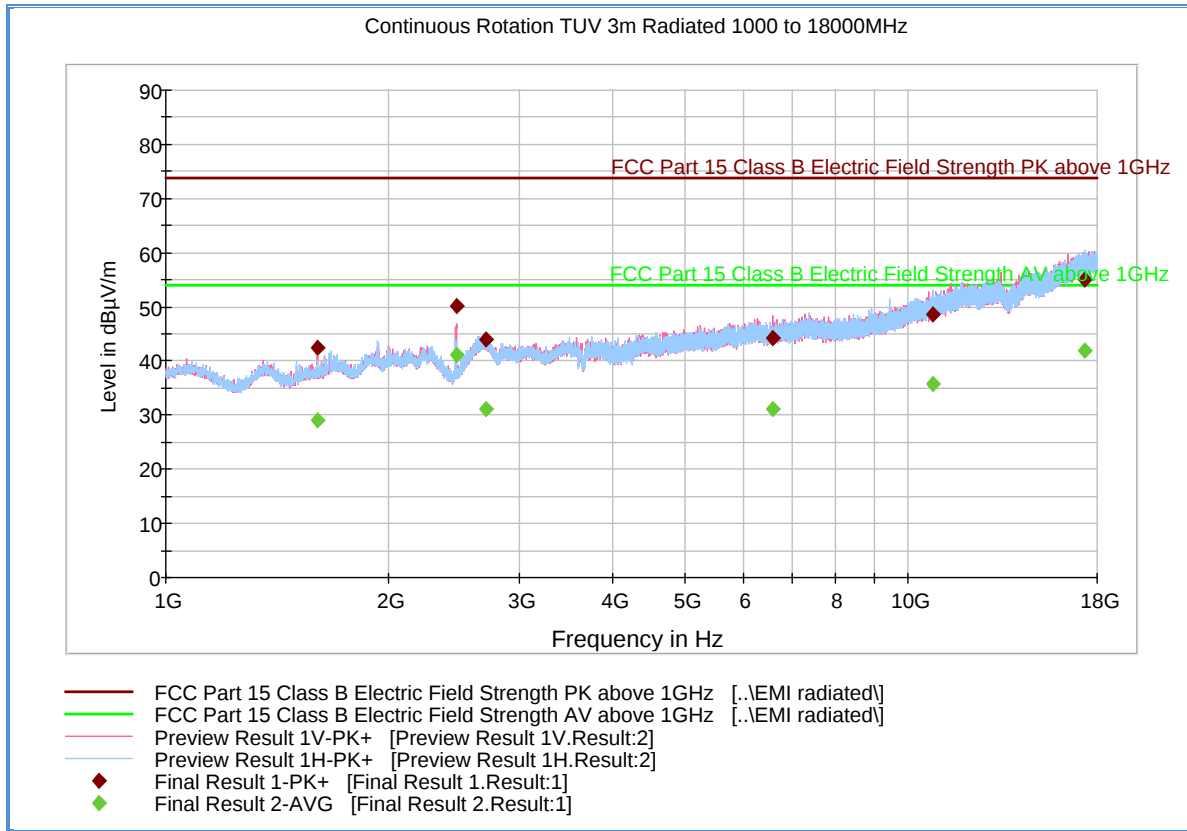
Peak Data

Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1000.000000	44.9	1000.0	1000.000	197.4	V	171.0	-6.3	29.0	73.9
2673.033333	45.1	1000.0	1000.000	400.4	H	112.0	0.6	28.8	73.9
4873.933333	57.9	1000.0	1000.000	175.5	H	309.0	5.2	16.0	73.9
7306.066667	46.4	1000.0	1000.000	300.2	H	299.0	9.8	27.5	73.9
11049.83333	48.5	1000.0	1000.000	250.3	V	149.0	14.6	25.4	73.9
17859.50000	55.2	1000.0	1000.000	400.4	H	341.0	22.3	18.7	73.9

Average Data

Frequency (MHz)	Average (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1000.000000	32.4	1000.0	1000.000	197.4	V	171.0	-6.3	21.5	53.9
2673.033333	31.4	1000.0	1000.000	400.4	H	112.0	0.6	22.5	53.9
4873.933333	53.4	1000.0	1000.000	175.5	H	309.0	5.2	0.5	53.9
7306.066667	33.0	1000.0	1000.000	300.2	H	299.0	9.8	20.9	53.9
11049.83333	35.8	1000.0	1000.000	250.3	V	149.0	14.6	18.1	53.9
17859.50000	42.7	1000.0	1000.000	400.4	H	341.0	22.3	11.2	53.9

2.6.16 Test Results Above 1GHz (Transmit Mode)_802.11 b_High(11) Channel



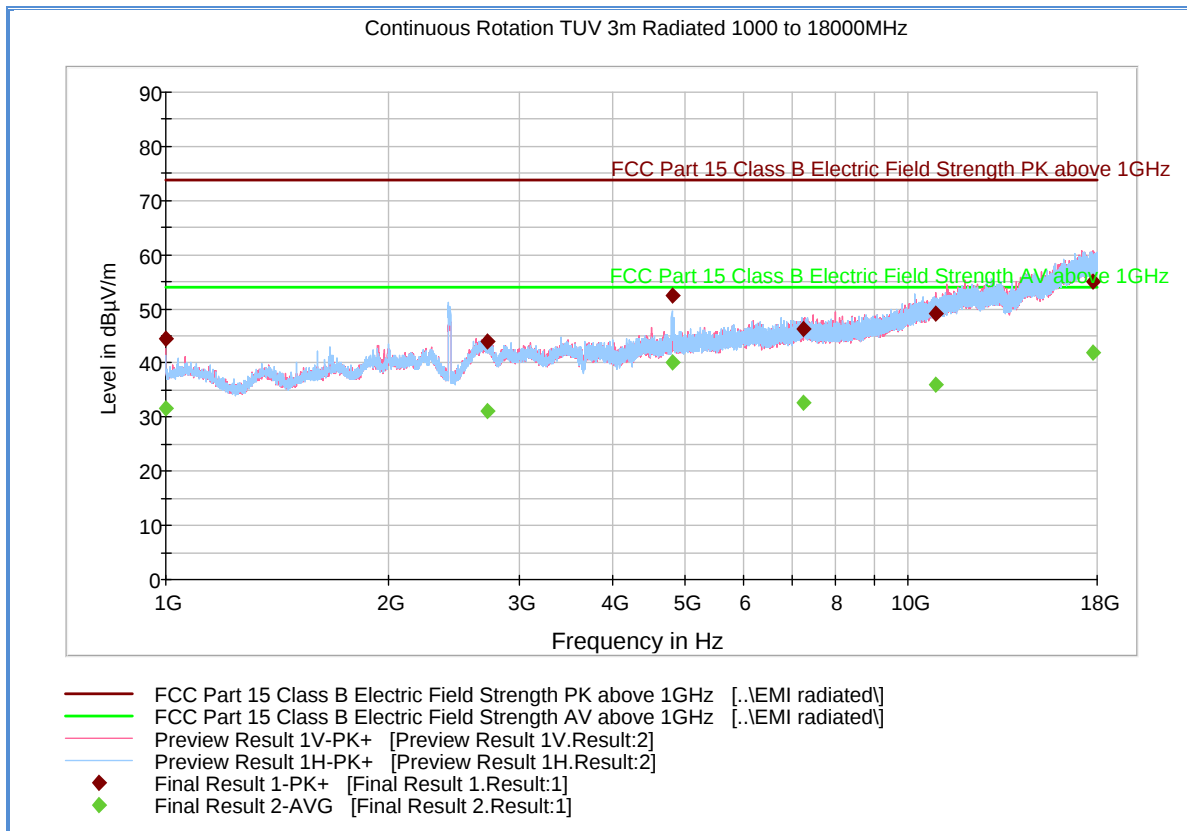
Peak Data

Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1599.766667	42.5	1000.0	1000.000	226.3	V	89.0	-4.3	31.4	73.9
2463.333333	50.1	1000.0	1000.000	140.5	V	196.0	-0.2	23.8	73.9
2705.866667	43.9	1000.0	1000.000	260.3	V	310.0	0.7	30.0	73.9
6566.800000	44.3	1000.0	1000.000	366.1	V	356.0	8.0	29.6	73.9
10818.066666	48.7	1000.0	1000.000	346.1	H	141.0	14.0	25.2	73.9
17281.833333	55.0	1000.0	1000.000	246.3	H	165.0	21.8	18.9	73.9

Average Data

Frequency (MHz)	Average (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1599.766667	29.1	1000.0	1000.000	226.3	V	89.0	-4.3	24.8	53.9
2463.333333	41.0	1000.0	1000.000	140.5	V	196.0	-0.2	12.9	53.9
2705.866667	31.0	1000.0	1000.000	260.3	V	310.0	0.7	22.9	53.9
6566.800000	31.1	1000.0	1000.000	366.1	V	356.0	8.0	22.8	53.9
10818.066666	35.6	1000.0	1000.000	346.1	H	141.0	14.0	18.3	53.9
17281.833333	42.0	1000.0	1000.000	246.3	H	165.0	21.8	11.9	53.9

2.6.17 Test Results Above 1GHz (Transmit Mode)_802.11 g_Low(1) Channel



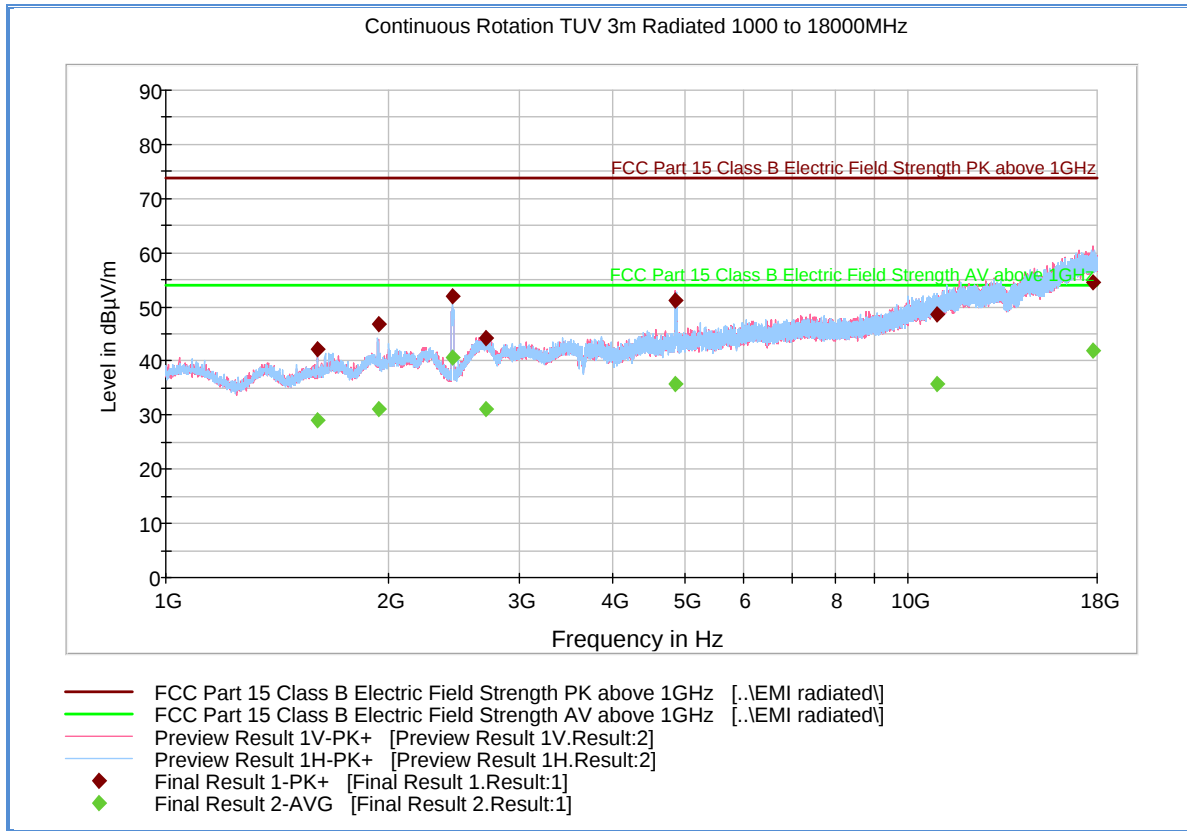
Peak Data

Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1000.000000	44.5	1000.0	1000.000	200.4	V	62.0	-6.3	29.4	73.9
2710.766667	44.0	1000.0	1000.000	229.3	H	7.0	0.7	29.9	73.9
4822.366667	52.3	1000.0	1000.000	179.5	H	296.0	5.3	21.6	73.9
7235.566667	46.4	1000.0	1000.000	240.3	V	147.0	9.6	27.5	73.9
10916.30000	49.1	1000.0	1000.000	271.2	V	55.0	14.3	24.8	73.9
17743.43333	55.1	1000.0	1000.000	400.4	V	47.0	22.1	18.8	73.9

Average Data

Frequency (MHz)	Average (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1000.000000	31.6	1000.0	1000.000	200.4	V	62.0	-6.3	22.3	53.9
2710.766667	31.1	1000.0	1000.000	229.3	H	7.0	0.7	22.8	53.9
4822.366667	40.1	1000.0	1000.000	179.5	H	296.0	5.3	13.8	53.9
7235.566667	32.7	1000.0	1000.000	240.3	V	147.0	9.6	21.2	53.9
10916.30000	36.0	1000.0	1000.000	271.2	V	55.0	14.3	17.9	53.9
17743.43333	42.0	1000.0	1000.000	400.4	V	47.0	22.1	11.9	53.9

2.6.18 Test Results Above 1GHz (Transmit Mode)_802.11 g_Mid(6) Channel



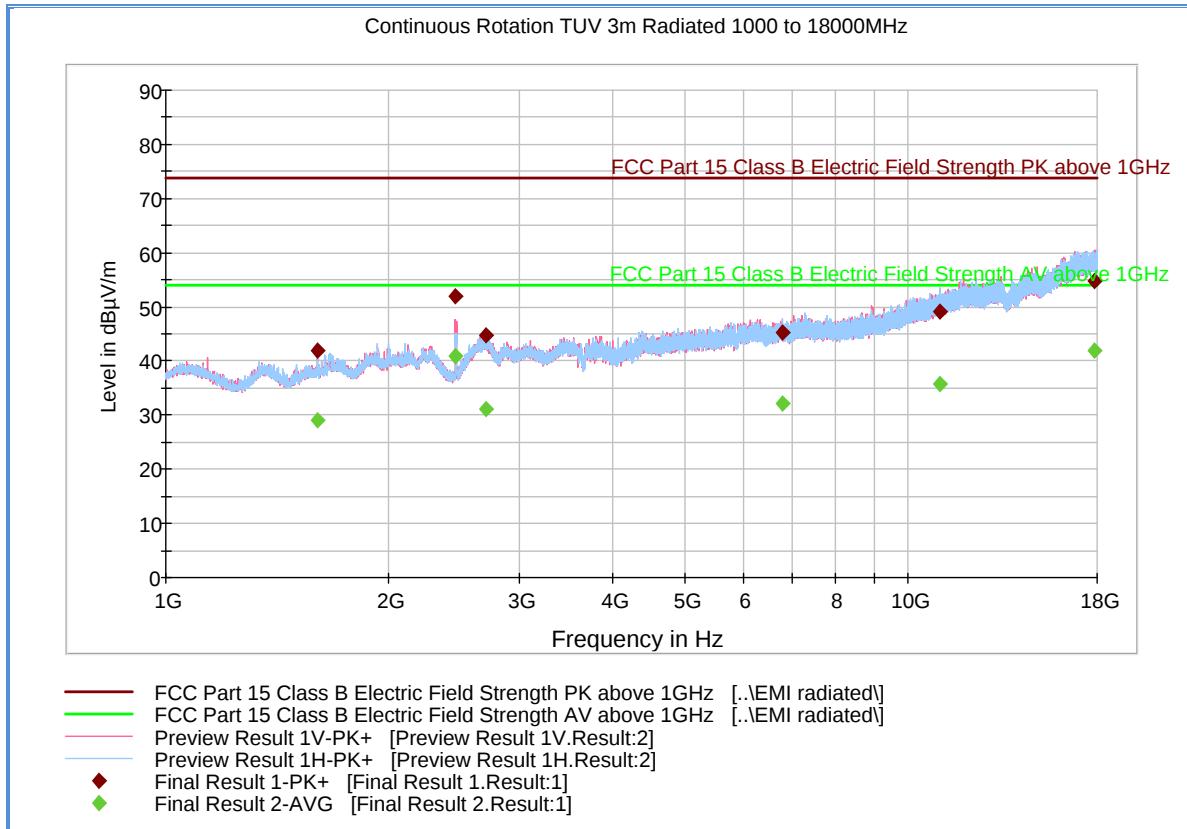
Peak Data

Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1599.566667	42.1	1000.0	1000.000	227.4	V	101.0	-4.3	31.8	73.9
1932.966667	46.8	1000.0	1000.000	99.6	H	-9.0	-2.0	27.1	73.9
2438.566667	51.8	1000.0	1000.000	99.6	H	236.0	-0.3	22.1	73.9
2702.233333	44.1	1000.0	1000.000	302.2	V	94.0	0.7	29.8	73.9
4860.500000	51.3	1000.0	1000.000	167.5	V	263.0	5.2	22.6	73.9
10961.266666	48.5	1000.0	1000.000	369.1	H	147.0	14.4	25.4	73.9
17757.266666	54.5	1000.0	1000.000	196.5	V	-9.0	22.2	19.4	73.9

Average Data

Frequency (MHz)	Average (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1599.566667	29.1	1000.0	1000.000	227.4	V	101.0	-4.3	24.8	53.9
1932.966667	31.0	1000.0	1000.000	99.6	H	-9.0	-2.0	22.9	53.9
2438.566667	40.6	1000.0	1000.000	99.6	H	236.0	-0.3	13.3	53.9
2702.233333	31.2	1000.0	1000.000	302.2	V	94.0	0.7	22.8	53.9
4860.500000	35.8	1000.0	1000.000	167.5	V	263.0	5.2	18.1	53.9
10961.266666	35.7	1000.0	1000.000	369.1	H	147.0	14.4	18.2	53.9
17757.266666	42.0	1000.0	1000.000	196.5	V	-9.0	22.2	11.9	53.9

2.6.19 Test Results Above 1GHz (Transmit Mode)_802.11 g_High(11) Channel



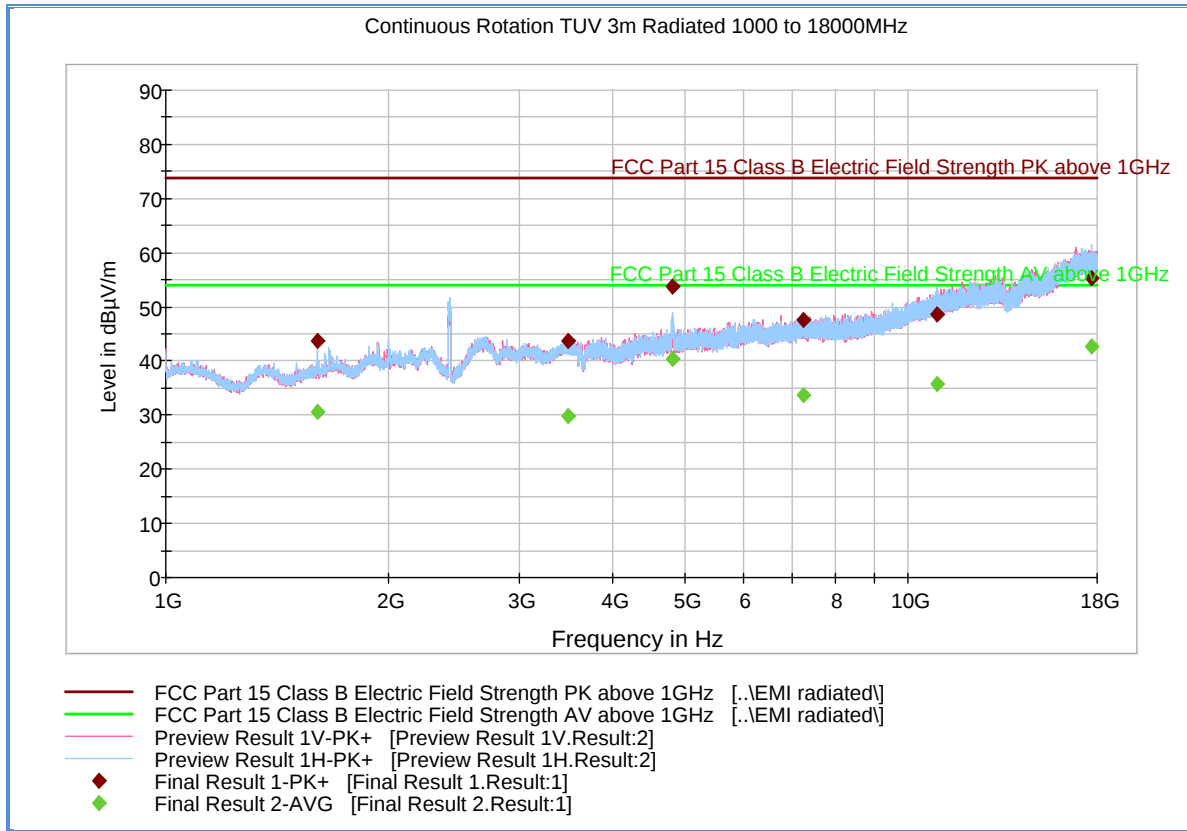
Peak Data

Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1599.533333	41.8	1000.0	1000.000	219.3	V	322.0	-4.3	32.1	73.9
2455.333333	52.0	1000.0	1000.000	140.5	V	188.0	-0.3	21.9	73.9
2707.000000	44.7	1000.0	1000.000	141.5	H	48.0	0.7	29.2	73.9
6770.733333	45.2	1000.0	1000.000	400.3	H	145.0	8.7	28.7	73.9
11049.83333	49.0	1000.0	1000.000	301.6	H	223.0	14.6	24.9	73.9
17817.16666	54.7	1000.0	1000.000	354.1	V	302.0	22.3	19.2	73.9

Average Data

Frequency (MHz)	Average (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1599.533333	29.0	1000.0	1000.000	219.3	V	322.0	-4.3	24.9	53.9
2455.333333	40.8	1000.0	1000.000	140.5	V	188.0	-0.3	13.1	53.9
2707.000000	31.0	1000.0	1000.000	141.5	H	48.0	0.7	22.9	53.9
6770.733333	32.2	1000.0	1000.000	400.3	H	145.0	8.7	21.7	53.9
11049.83333	35.9	1000.0	1000.000	301.6	H	223.0	14.6	18.0	53.9
17817.16666	42.0	1000.0	1000.000	354.1	V	302.0	22.3	11.9	53.9

2.6.20 Test Results Above 1GHz (Transmit Mode)_802.11 n_Low(1) Channel



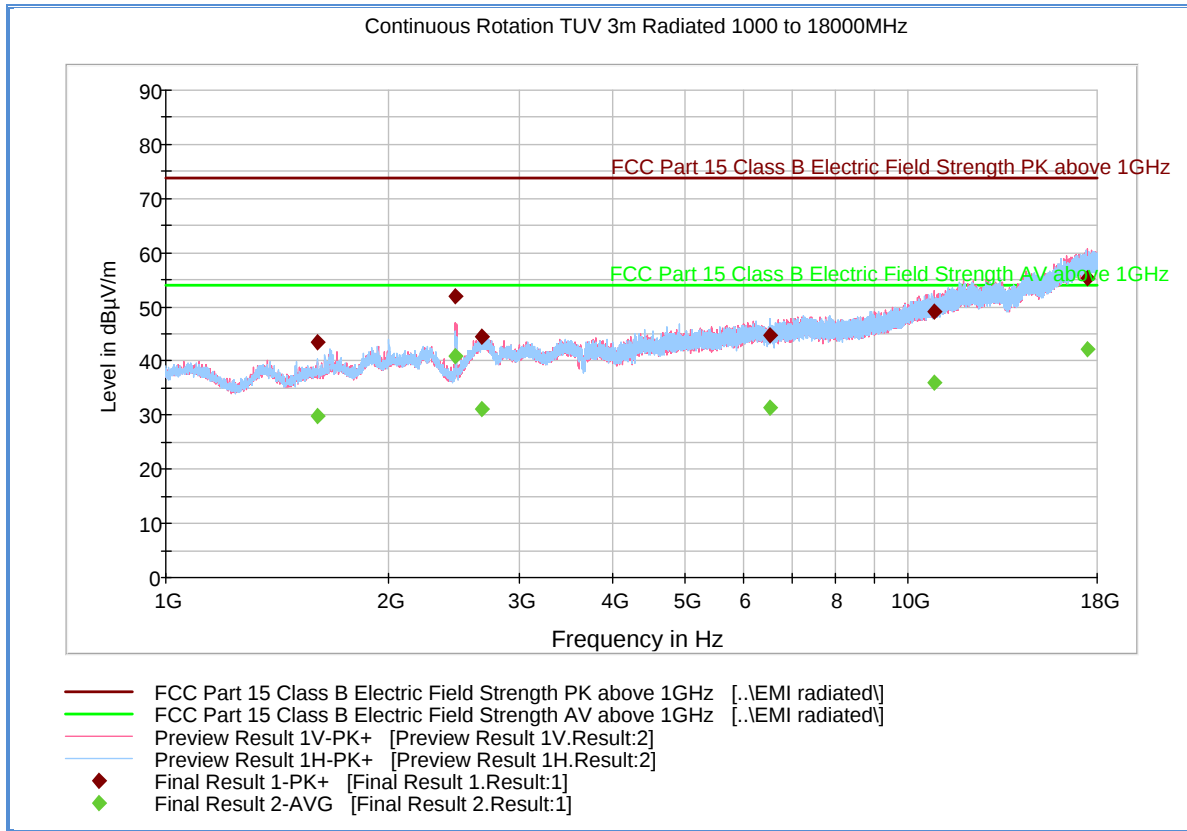
Peak Data

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1599.933333	43.6	1000.0	1000.000	400.4	H	157.0	-4.3	30.3	73.9
3484.700000	43.6	1000.0	1000.000	196.4	V	20.0	2.1	30.3	73.9
4824.100000	53.7	1000.0	1000.000	180.5	H	305.0	5.3	20.2	73.9
7236.133333	47.6	1000.0	1000.000	189.4	H	309.0	9.6	26.3	73.9
10937.066666	48.5	1000.0	1000.000	292.2	H	246.0	14.4	25.4	73.9
17680.966666	55.4	1000.0	1000.000	304.2	H	122.0	22.1	18.5	73.9

Average Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1599.933333	30.6	1000.0	1000.000	400.4	H	157.0	-4.3	23.3	53.9
3484.700000	29.7	1000.0	1000.000	196.4	V	20.0	2.1	24.2	53.9
4824.100000	40.3	1000.0	1000.000	180.5	H	305.0	5.3	13.6	53.9
7236.133333	33.7	1000.0	1000.000	189.4	H	309.0	9.6	20.2	53.9
10937.066666	35.8	1000.0	1000.000	292.2	H	246.0	14.4	18.1	53.9
17680.966666	42.6	1000.0	1000.000	304.2	H	122.0	22.1	11.3	53.9

2.6.21 Test Results Above 1GHz (Transmit Mode)_802.11 n_High(11) Channel



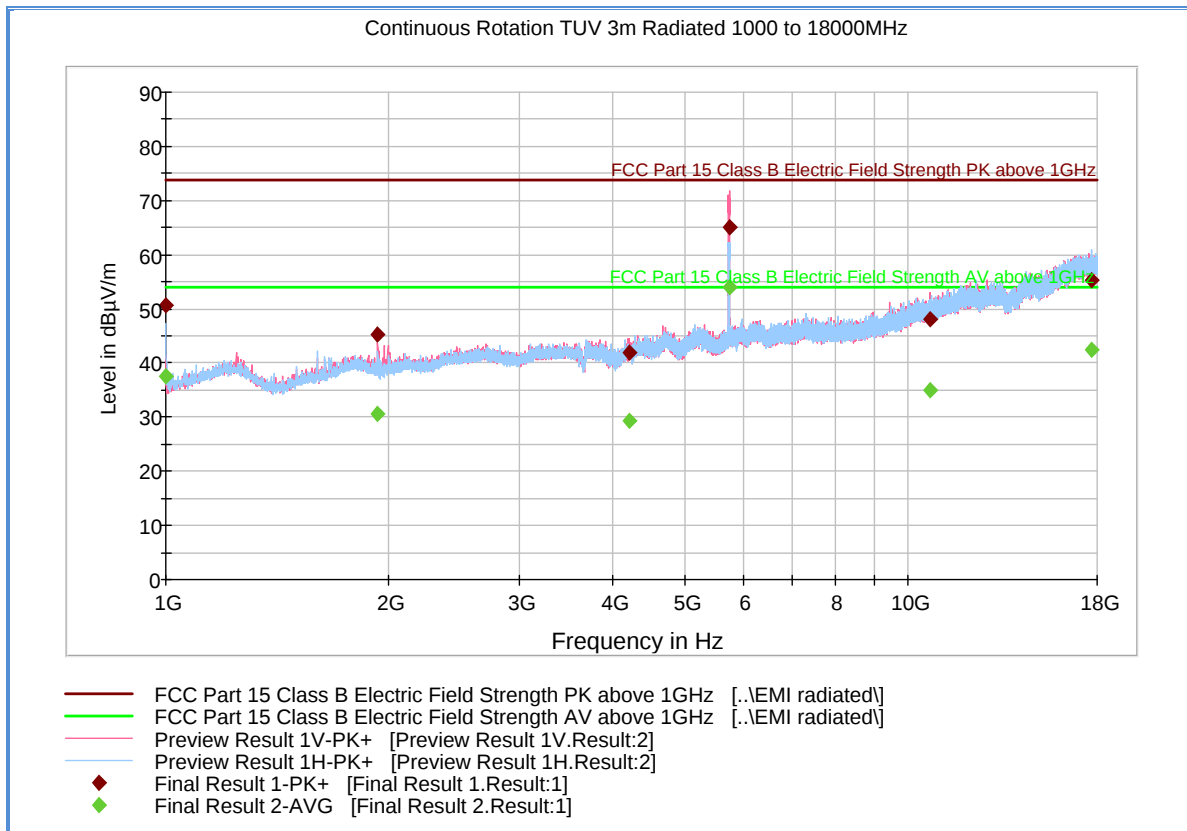
Peak Data

Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1600.466667	43.4	1000.0	1000.000	227.3	H	242.0	-4.3	30.5	73.9
2457.833333	51.9	1000.0	1000.000	140.5	V	197.0	-0.2	22.0	73.9
2667.700000	44.4	1000.0	1000.000	202.4	V	20.0	0.6	29.5	73.9
6528.433333	44.7	1000.0	1000.000	400.3	H	227.0	7.9	29.2	73.9
10852.866666	49.0	1000.0	1000.000	101.6	V	145.0	14.1	24.9	73.9
17463.233333	55.3	1000.0	1000.000	342.1	V	-10.0	22.2	18.6	73.9

Average Data

Frequency (MHz)	Average (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1600.466667	29.9	1000.0	1000.000	227.3	H	242.0	-4.3	24.0	53.9
2457.833333	40.9	1000.0	1000.000	140.5	V	197.0	-0.2	13.0	53.9
2667.700000	31.1	1000.0	1000.000	202.4	V	20.0	0.6	22.8	53.9
6528.433333	31.3	1000.0	1000.000	400.3	H	227.0	7.9	22.6	53.9
10852.866666	35.9	1000.0	1000.000	101.6	V	145.0	14.1	18.0	53.9
17463.233333	42.1	1000.0	1000.000	342.1	V	-10.0	22.2	11.8	53.9

2.6.22 Test Results Above 1GHz (Transmit Mode)_802.11 a_Low(149) Channel



Peak Data

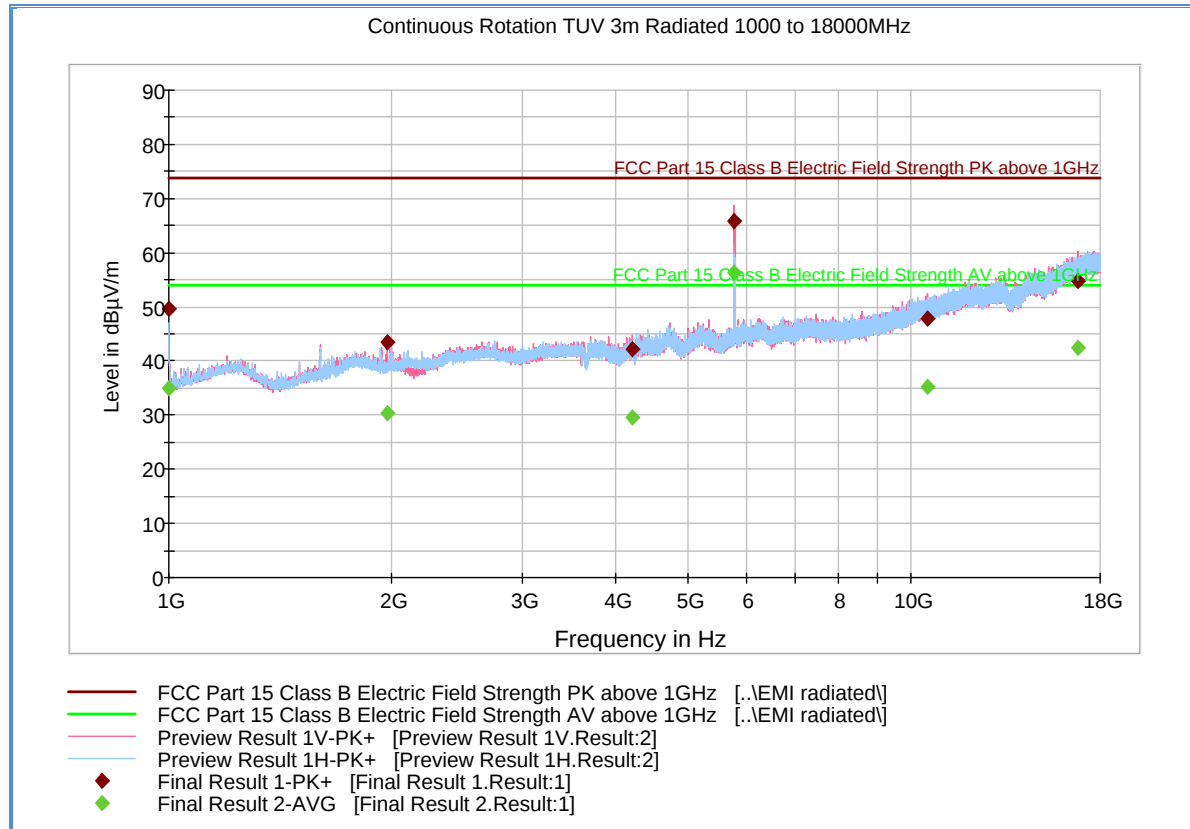
Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1000.000000	50.7	1000.0	1000.000	188.4	H	192.0	-6.3	23.2	73.9
1932.566667	45.3	1000.0	1000.000	343.1	V	50.0	-2.0	28.6	73.9
4220.166667	41.9	1000.0	1000.000	336.1	V	10.0	3.9	32.0	73.9
5741.266667	65.1	1000.0	1000.000	188.4	V	343.0	Fundamental		
10740.833333	48.2	1000.0	1000.000	186.4	V	257.0	13.8	25.7	73.9
17677.933333	55.3	1000.0	1000.000	269.2	H	312.0	22.1	18.6	73.9

Average Data

Frequency (MHz)	Average (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1000.000000	37.6	1000.0	1000.000	188.4	H	192.0	-6.3	16.3	53.9
1932.566667	30.6	1000.0	1000.000	343.1	V	50.0	-2.0	23.3	53.9
4220.166667	29.3	1000.0	1000.000	336.1	V	10.0	3.9	24.6	53.9
5741.266667	53.9	1000.0	1000.000	188.4	V	343.0	Fundamental		
10740.833333	35.0	1000.0	1000.000	186.4	V	257.0	13.8	18.9	53.9
17677.933333	42.3	1000.0	1000.000	269.2	H	312.0	22.1	11.6	53.9

Test Notes: 5741.2 MHz is part of fundamental measurement and not subjected to 15.209 and 15.205 limits. There are no emissions observed above 10GHz (noise floor measurements).

2.6.23 Test Results Above 1GHz (Transmit Mode)_802.11 a_Mid(157) Channel



Peak Data

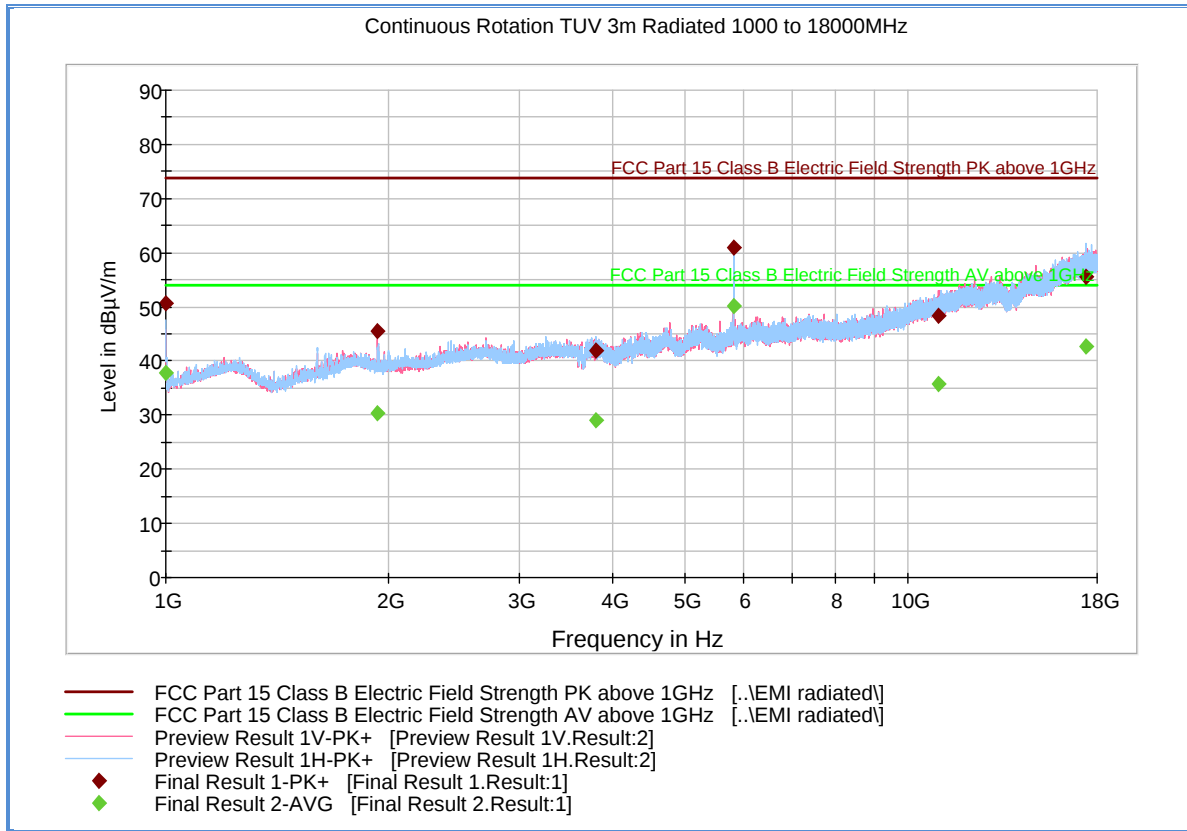
Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1000.400000	49.6	1000.0	1000.000	197.4	H	117.0	-6.3	24.3	73.9
1971.833333	43.4	1000.0	1000.000	103.6	V	16.0	-1.8	30.5	73.9
4217.333333	42.3	1000.0	1000.000	220.3	V	0.0	3.9	31.6	73.9
5778.266667	65.9	1000.0	1000.000	99.6	V	221.0	Fundamental		
10543.266666	47.9	1000.0	1000.000	378.0	V	175.0	13.6	26.0	73.9
16833.233333	54.9	1000.0	1000.000	354.1	V	59.0	21.6	19.0	73.9

Average Data

Frequency (MHz)	Average (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1000.400000	35.1	1000.0	1000.000	197.4	H	117.0	-6.3	18.8	53.9
1971.833333	30.4	1000.0	1000.000	103.6	V	16.0	-1.8	23.5	53.9
4217.333333	29.6	1000.0	1000.000	220.3	V	0.0	3.9	24.3	53.9
5778.266667	56.2	1000.0	1000.000	99.6	V	221.0	Fundamental		
10543.266666	35.3	1000.0	1000.000	378.0	V	175.0	13.6	18.6	53.9
16833.233333	42.5	1000.0	1000.000	354.1	V	59.0	21.6	11.4	53.9

Test Notes: 5778.2 MHz is part of fundamental measurement and not subjected to 15.209 and 15.205 limits. There are no emissions observed above 10GHz (noise floor measurements).

2.6.24 Test Results Above 1GHz (Transmit Mode)_802.11 a_High(165) Channel



Peak Data

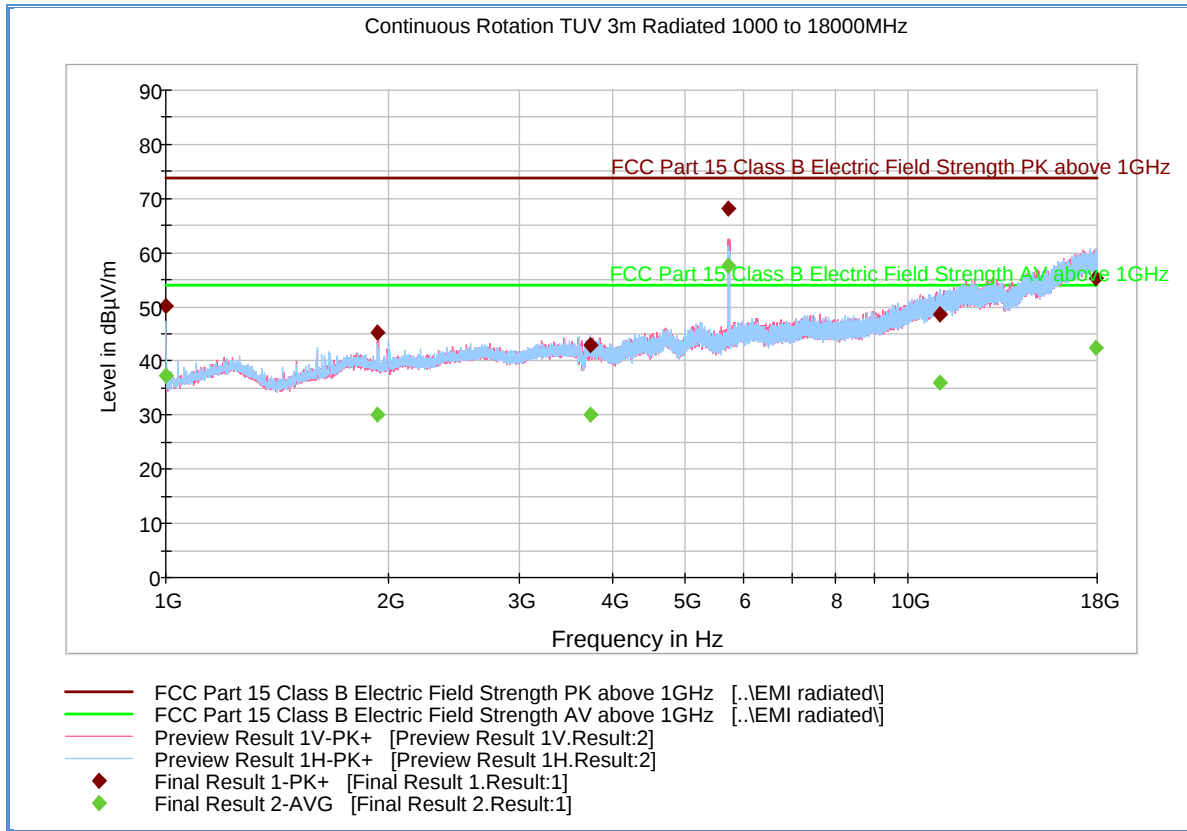
Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1000.000000	50.7	1000.0	1000.000	197.4	H	347.0	-6.3	23.2	73.9
1932.400000	45.5	1000.0	1000.000	343.1	V	331.0	-2.0	28.4	73.9
3800.433333	42.0	1000.0	1000.000	371.1	H	274.0	2.8	31.9	73.9
5823.100000	60.9	1000.0	1000.000	103.6	H	327.0	Fundamental		
11005.10000	48.4	1000.0	1000.000	343.1	V	173.0	14.5	25.5	73.9
17424.86666	55.6	1000.0	1000.000	372.0	H	130.0	22.2	18.3	73.9

Average Data

Frequency (MHz)	Average (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1000.000000	37.9	1000.0	1000.000	197.4	H	347.0	-6.3	16.0	53.9
1932.400000	30.3	1000.0	1000.000	343.1	V	331.0	-2.0	23.6	53.9
3800.433333	29.2	1000.0	1000.000	371.1	H	274.0	2.8	24.7	53.9
5823.100000	50.0	1000.0	1000.000	103.6	H	327.0	Fundamental		
11005.10000	35.7	1000.0	1000.000	343.1	V	173.0	14.5	18.2	53.9
17424.86666	42.6	1000.0	1000.000	372.0	H	130.0	22.2	11.3	53.9

Test Notes: 5823.1 MHz is part of fundamental measurement and not subjected to 15.209 and 15.205 limits. There are no emissions observed above 10GHz (noise floor measurements).

2.6.25 Test Results Above 1GHz (Transmit Mode)_802.11 n_Low(149) Channel



Peak Data

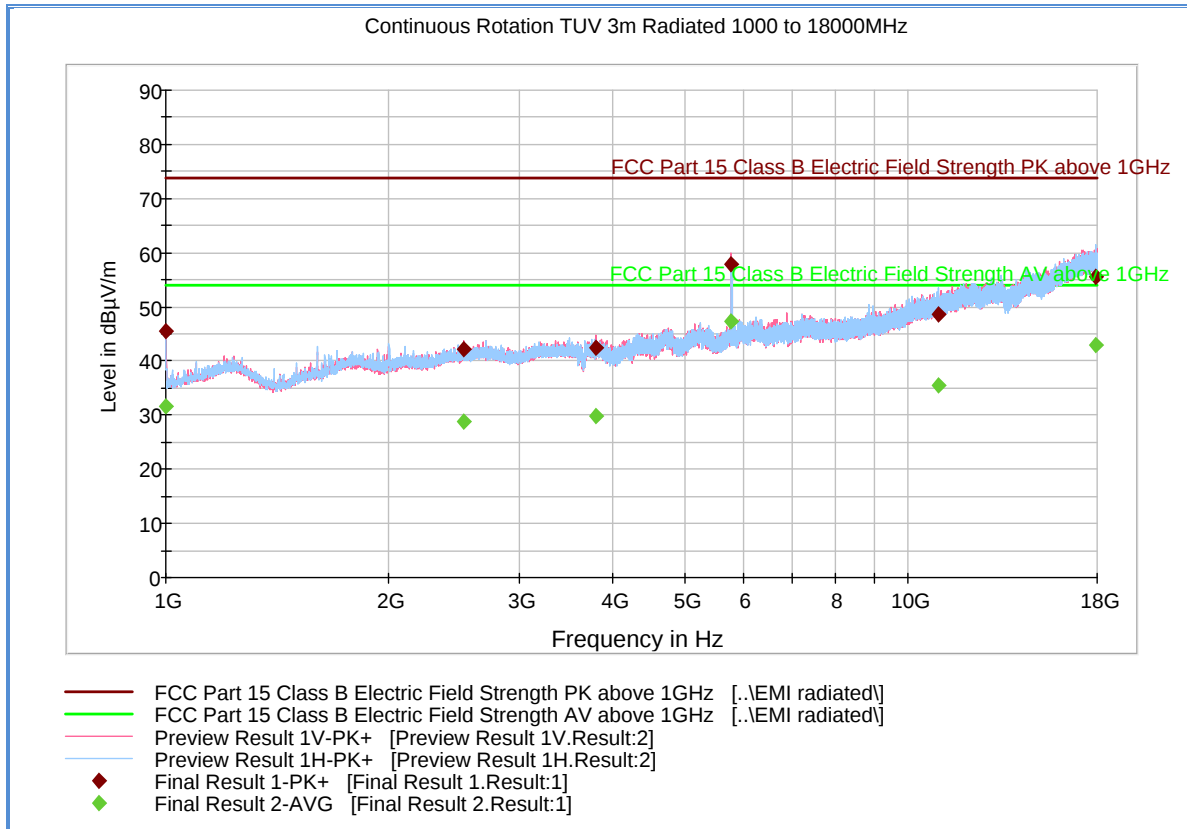
Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1000.000000	50.0	1000.0	1000.000	189.4	H	110.0	-6.3	23.9	73.9
1932.533333	45.4	1000.0	1000.000	332.1	V	50.0	-2.0	28.5	73.9
3737.700000	43.0	1000.0	1000.000	168.5	H	275.0	3.0	30.9	73.9
5738.666667	68.1	1000.0	1000.000	140.5	V	308.0	Fundamental		
11029.300000	48.5	1000.0	1000.000	99.6	H	249.0	14.5	25.4	73.9
17889.066666	55.3	1000.0	1000.000	338.1	H	107.0	22.4	18.6	73.9

Average Data

Frequency (MHz)	Average (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1000.000000	37.3	1000.0	1000.000	189.4	H	110.0	-6.3	16.6	53.9
1932.533333	30.0	1000.0	1000.000	332.1	V	50.0	-2.0	23.9	53.9
3737.700000	30.0	1000.0	1000.000	168.5	H	275.0	3.0	23.9	53.9
5738.666667	57.7	1000.0	1000.000	140.5	V	308.0	Fundamental		
11029.300000	36.0	1000.0	1000.000	99.6	H	249.0	14.5	17.9	53.9
17889.066666	42.3	1000.0	1000.000	338.1	H	107.0	22.4	11.6	53.9

Test Notes: 5738.6 MHz is part of fundamental measurement and not subjected to 15.209 and 15.205 limits. There are no emissions observed above 10GHz (noise floor measurements).

2.6.26 Test Results Above 1GHz (Transmit Mode)_802.11 n_Mid(157) Channel



Peak Data

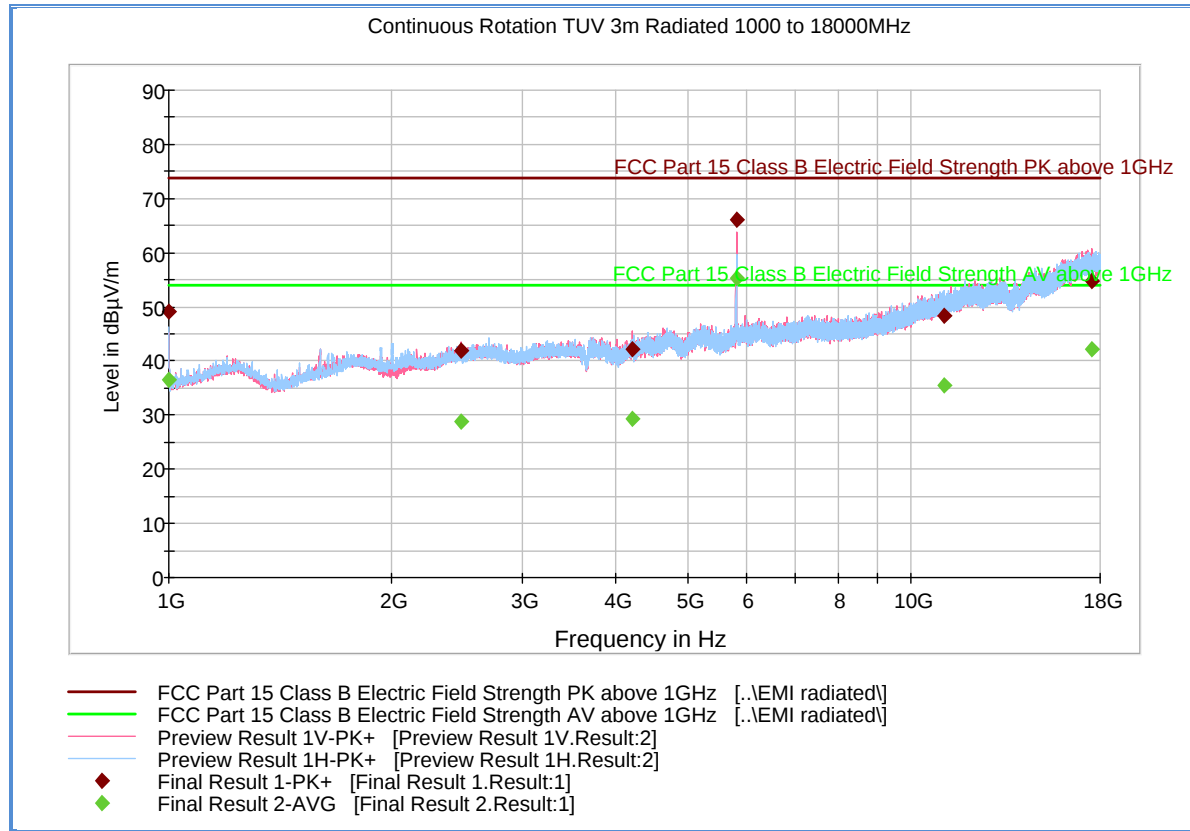
Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1000.400000	45.5	1000.0	1000.000	188.4	V	338.0	-6.3	28.4	73.9
2521.500000	42.2	1000.0	1000.000	170.5	V	194.0	0.0	31.7	73.9
3806.533333	42.5	1000.0	1000.000	151.5	V	-3.0	2.8	31.4	73.9
5779.833333	57.9	1000.0	1000.000	305.1	V	158.0	Fundamental		
10991.266666	48.5	1000.0	1000.000	386.0	H	72.0	14.5	25.4	73.9
17930.866666	55.5	1000.0	1000.000	400.3	H	90.0	22.5	18.4	73.9

Average Data

Frequency (MHz)	Average (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1000.400000	31.6	1000.0	1000.000	188.4	V	338.0	-6.3	22.3	53.9
2521.500000	28.9	1000.0	1000.000	170.5	V	194.0	0.0	25.0	53.9
3806.533333	29.8	1000.0	1000.000	151.5	V	-3.0	2.8	24.1	53.9
5779.833333	47.3	1000.0	1000.000	305.1	V	158.0	Fundamental		
10991.266666	35.6	1000.0	1000.000	386.0	H	72.0	14.5	18.3	53.9
17930.866666	42.8	1000.0	1000.000	400.3	H	90.0	22.5	11.1	53.9

Test Notes: 5779.8 MHz is part of fundamental measurement and not subjected to 15.209 and 15.205 limits. There are no emissions observed above 10GHz (noise floor measurements).

2.6.27 Test Results Above 1GHz (Transmit Mode)_802.11 n_High(165) Channel



Peak Data

Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1000.000000	49.0	1000.0	1000.000	189.4	H	332.0	-6.3	24.9	73.9
2472.900000	41.9	1000.0	1000.000	219.3	V	145.0	-0.2	32.0	73.9
4213.566667	42.1	1000.0	1000.000	400.3	V	32.0	3.9	31.8	73.9
5820.633333	66.2	1000.0	1000.000	149.5	V	75.0	Fundamental		
11098.800000	48.5	1000.0	1000.000	355.1	H	359.0	14.6	25.4	73.9
17557.966666	54.9	1000.0	1000.000	400.2	V	71.0	22.1	19.0	73.9

Average Data

Frequency (MHz)	Average (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1000.000000	36.4	1000.0	1000.000	189.4	H	332.0	-6.3	17.5	53.9
2472.900000	28.9	1000.0	1000.000	219.3	V	145.0	-0.2	25.0	53.9
4213.566667	29.3	1000.0	1000.000	400.3	V	32.0	3.9	24.6	53.9
5820.633333	55.3	1000.0	1000.000	149.5	V	75.0	Fundamental		
11098.800000	35.5	1000.0	1000.000	355.1	H	359.0	14.6	18.4	53.9
17557.966666	42.1	1000.0	1000.000	400.2	V	71.0	22.1	11.8	53.9

Test Notes: 5820.6 MHz is part of fundamental measurement and not subjected to 15.209 and 15.205 limits. There are no emissions observed above 10GHz (noise floor measurements).



2.7 POWER SPECTRAL DENSITY

2.7.1 Specification Reference

Part 15 Subpart C §15.247(e)

2.7.2 Standard Applicable

(e) For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

2.7.3 Equipment Under Test and Modification State

Serial No: SEZ100073700125 / Test Configuration A

2.7.4 Date of Test/Initial of test personnel who performed the test

August 09, 2013/AC, KM, JMG

2.7.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

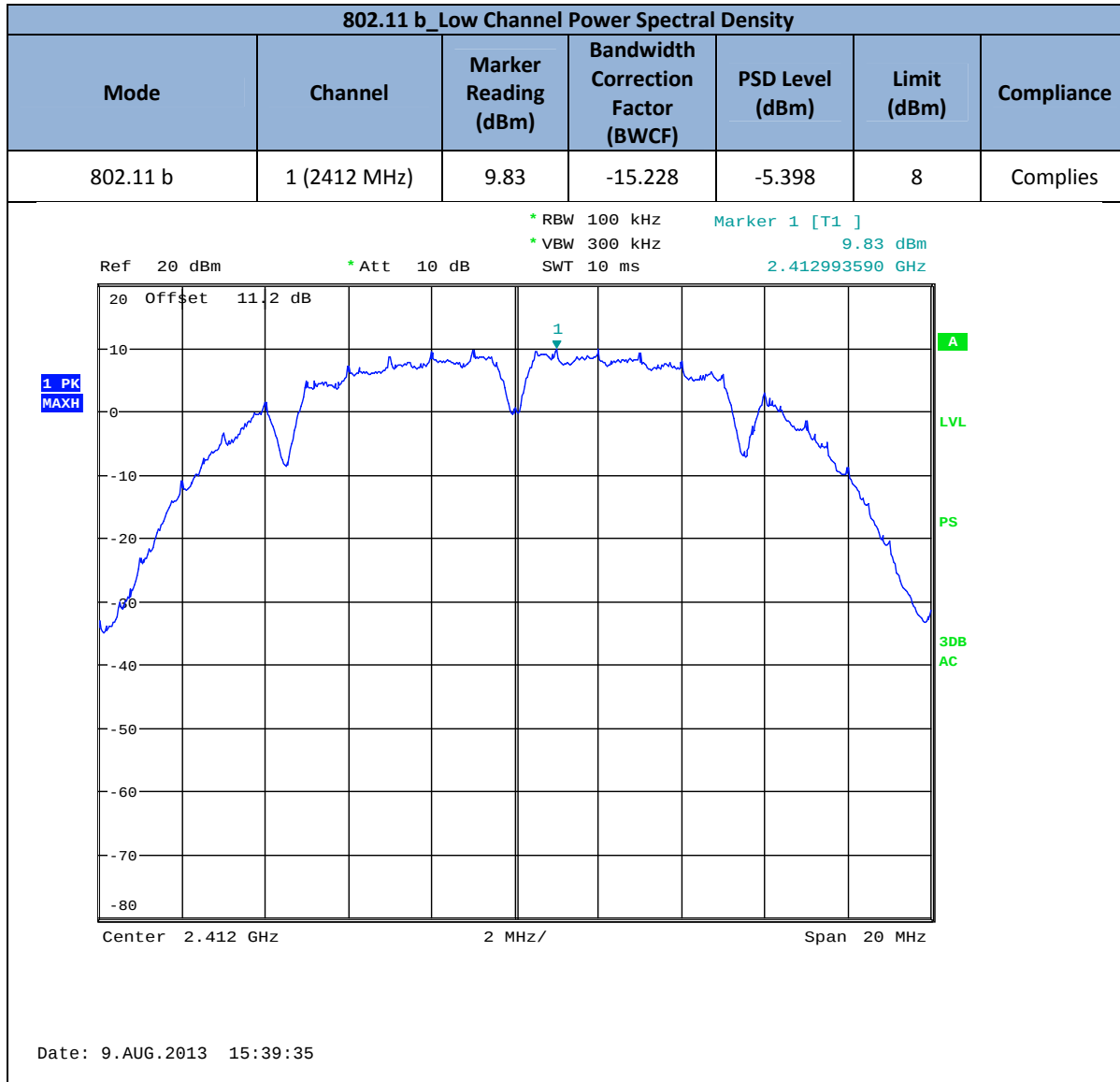
2.7.6 Environmental Conditions

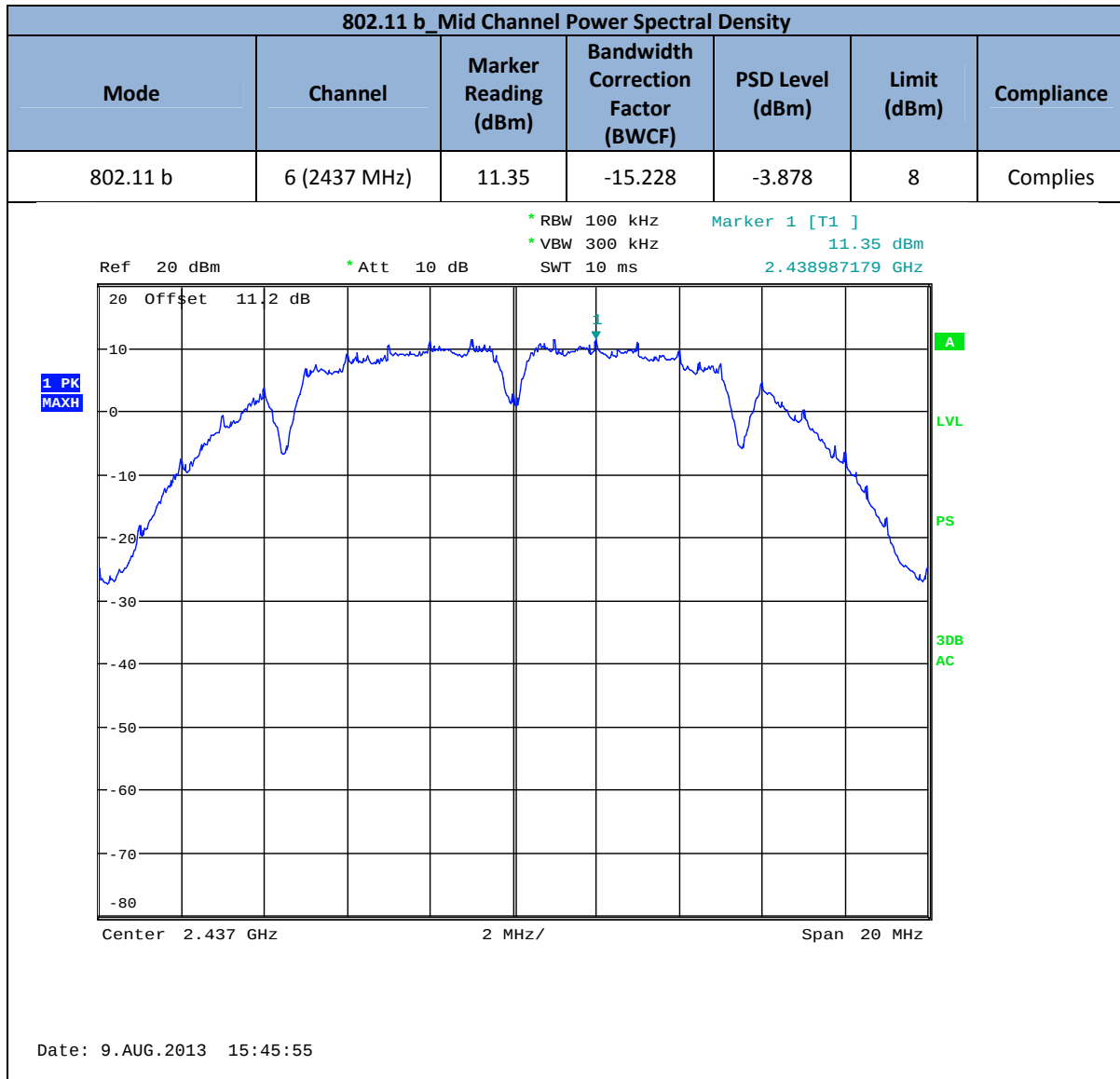
Ambient Temperature	25.6°C
Relative Humidity	48.7%
ATM Pressure	98.7 kPa

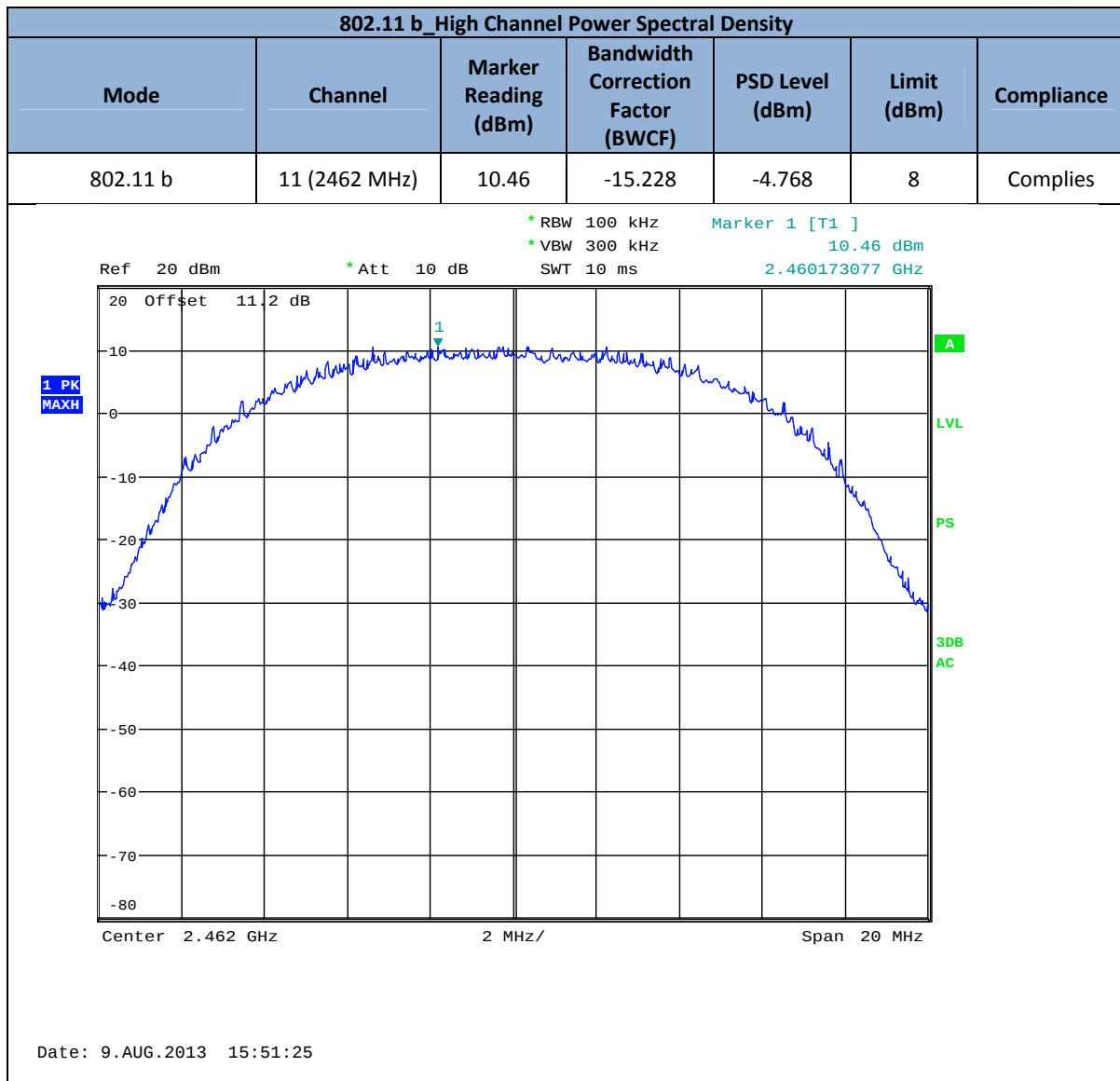
2.7.7 Additional Observations

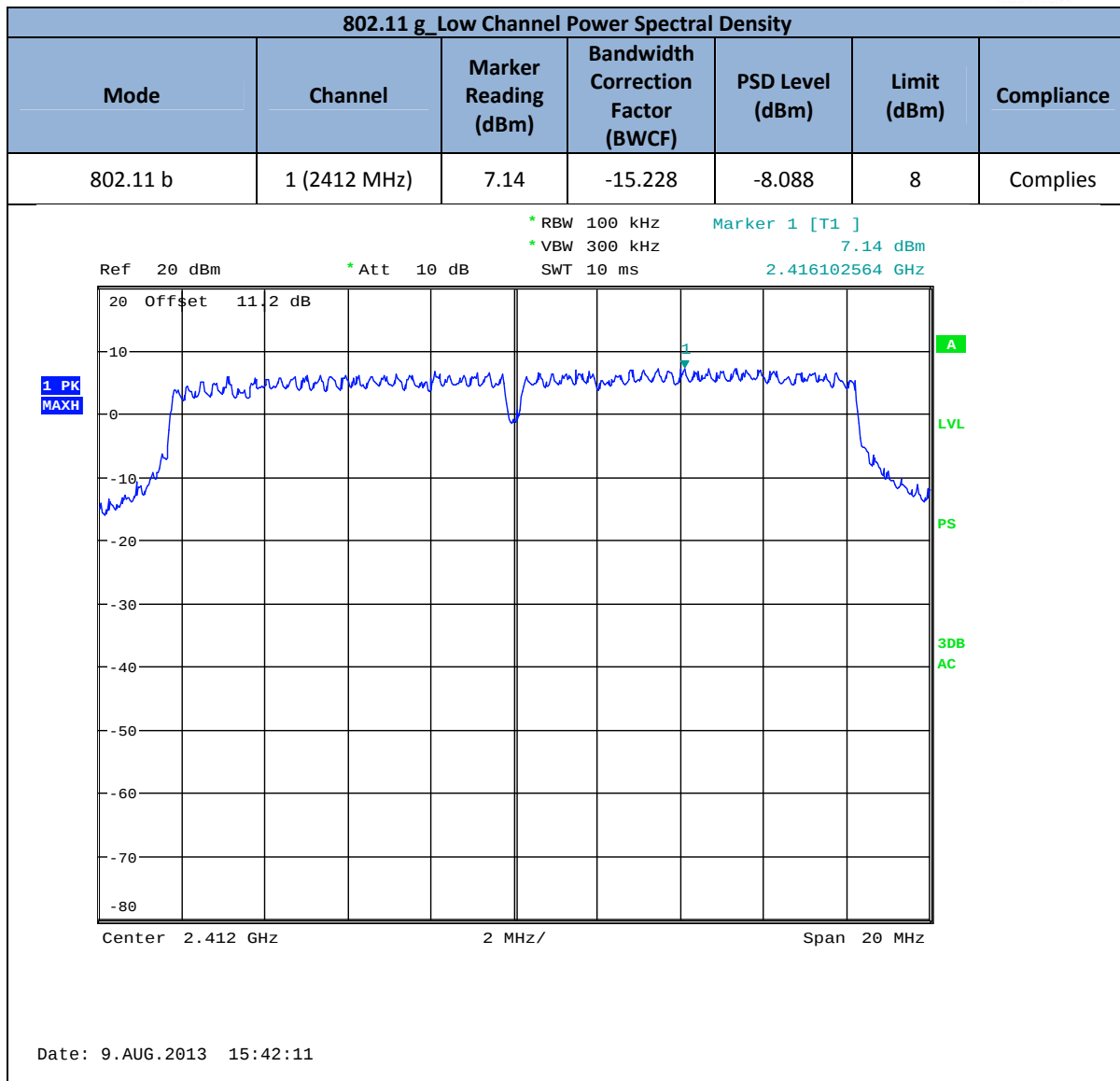
- This is a conducted test.
- Test procedure is per Section 5.3.1 of KDB 558074 (January 18, 2012).
- An offset of 11.2dB (for 802.11 b/g/n) and 11.5dB (for 802.11 a/n) was added to compensate for the external attenuator and cable used.
- Detector is Peak.
- Trace mode is Max Hold.
- Sweep time is Auto Couple.
- Bandwidth Correction Factor BWCF is from $10\log(3\text{kHz}/100\text{kHz}) = (-15.22)$

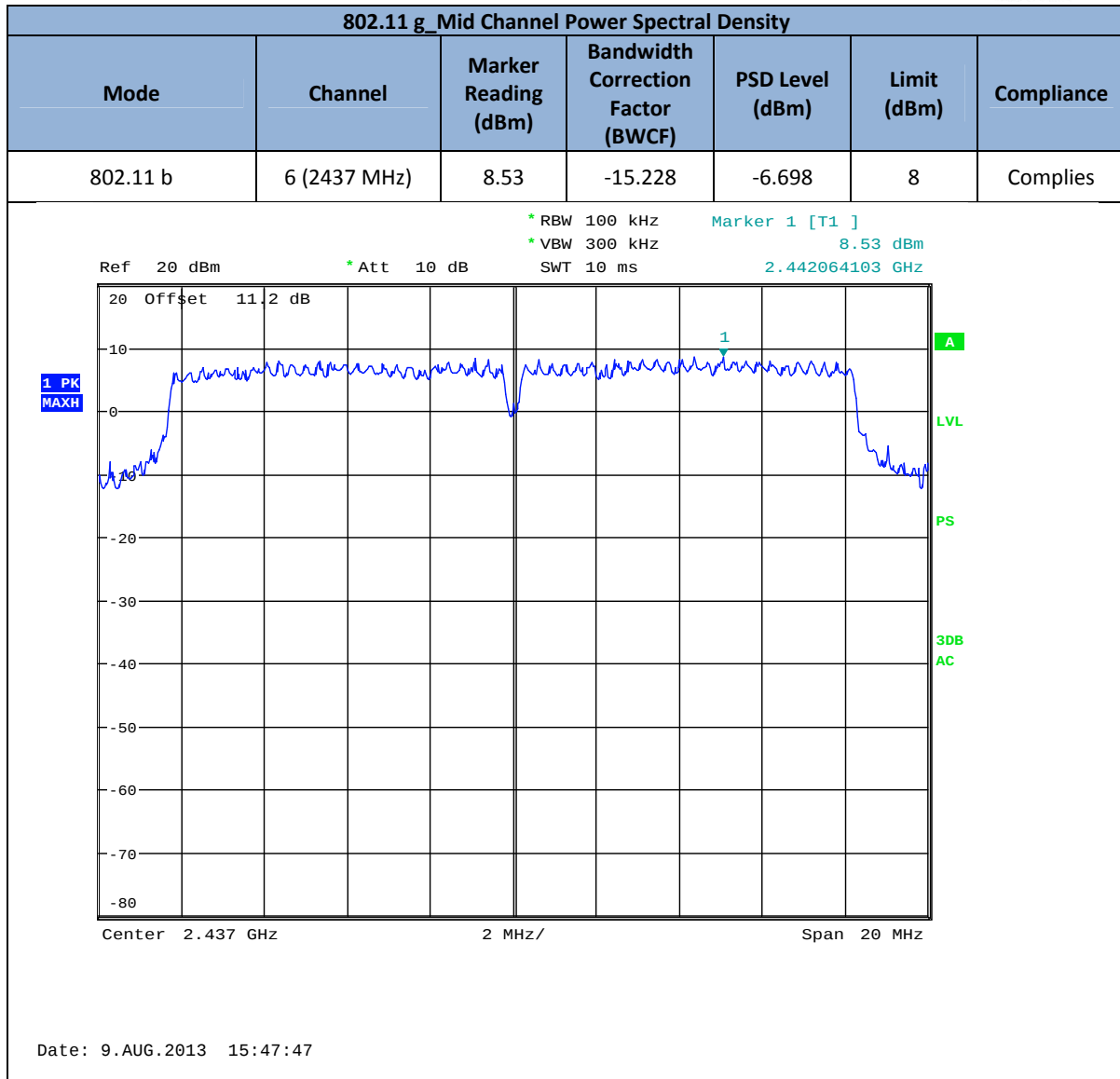
2.7.8 Test Results/Plots

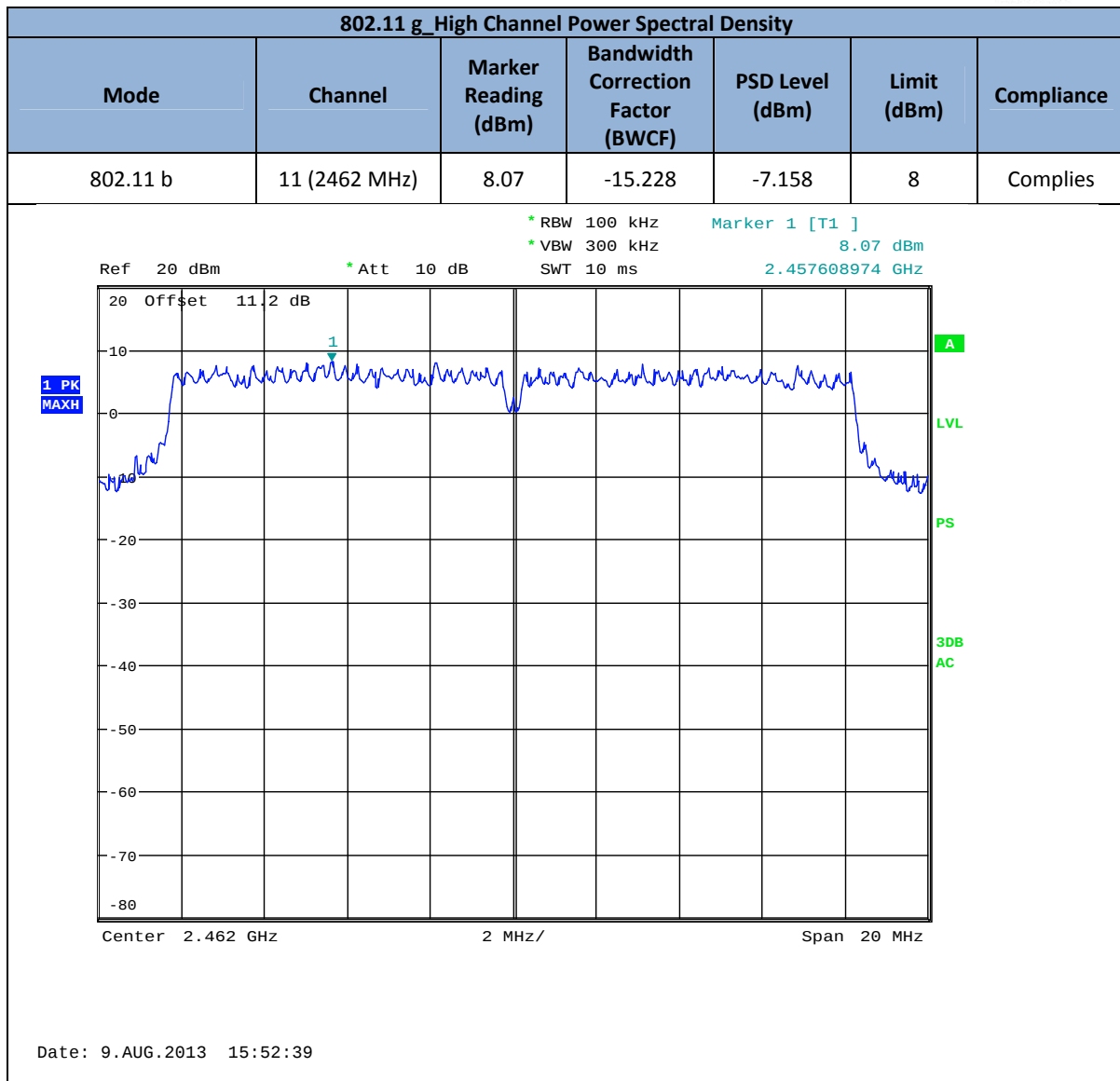


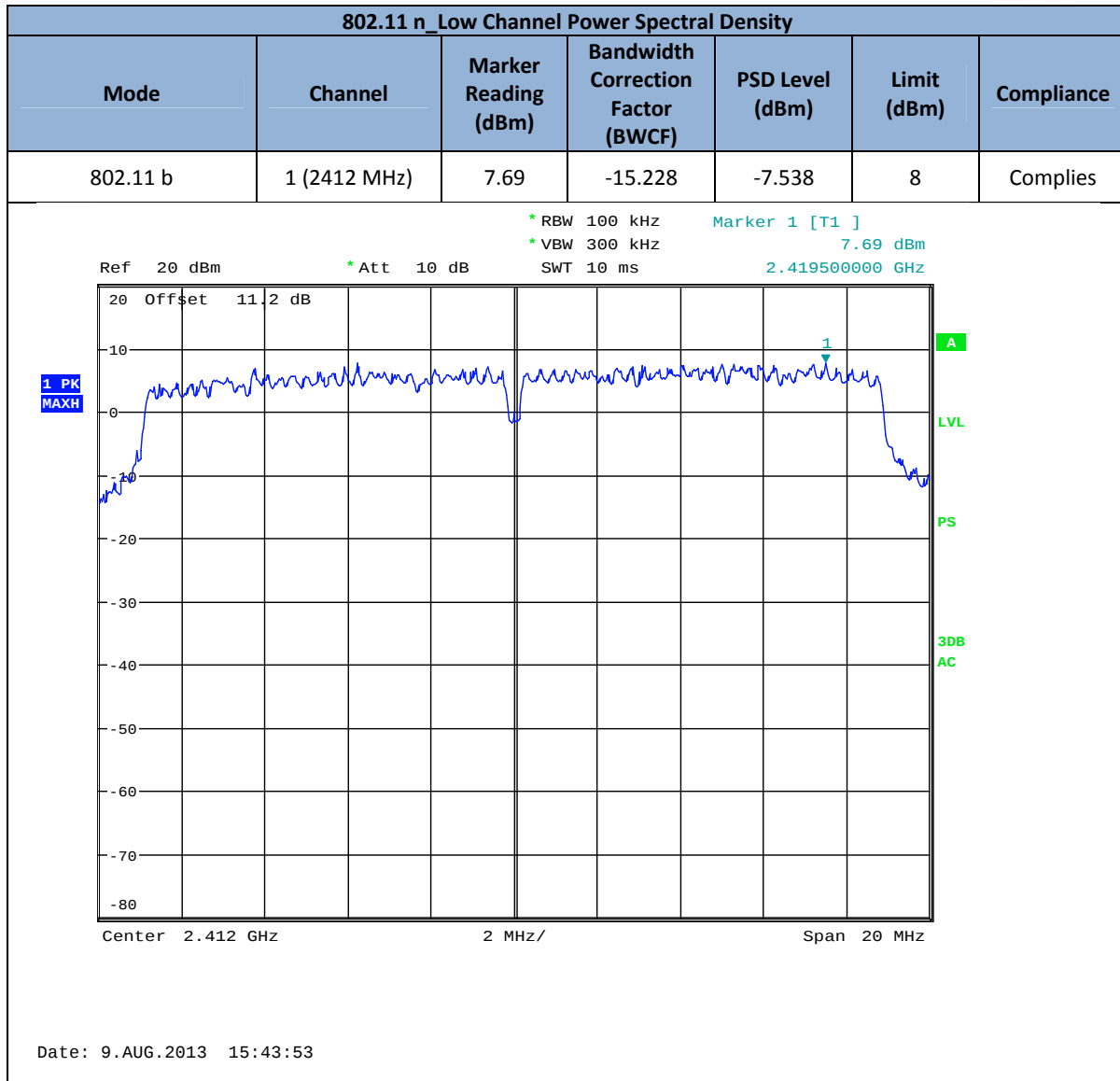


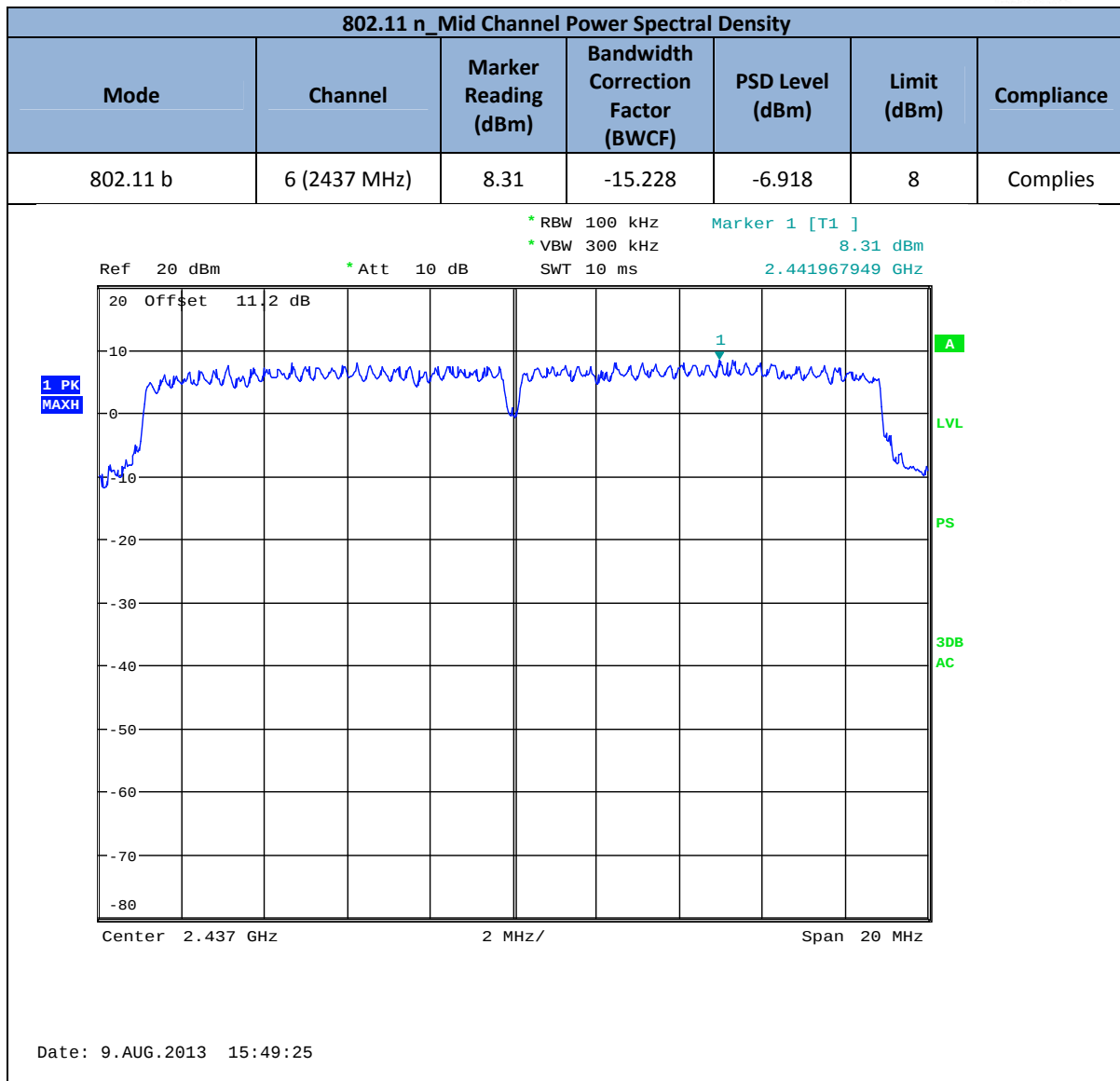


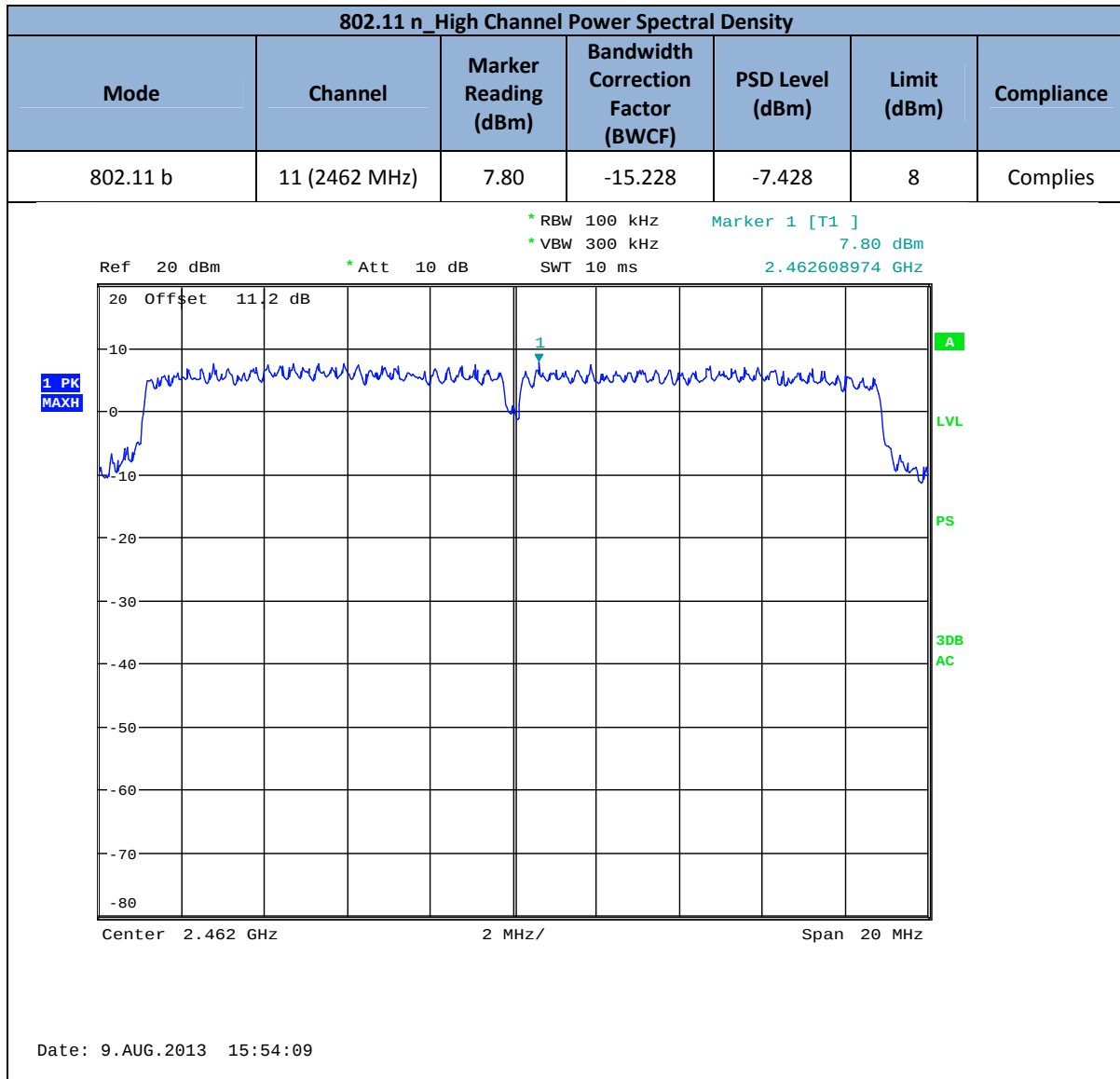


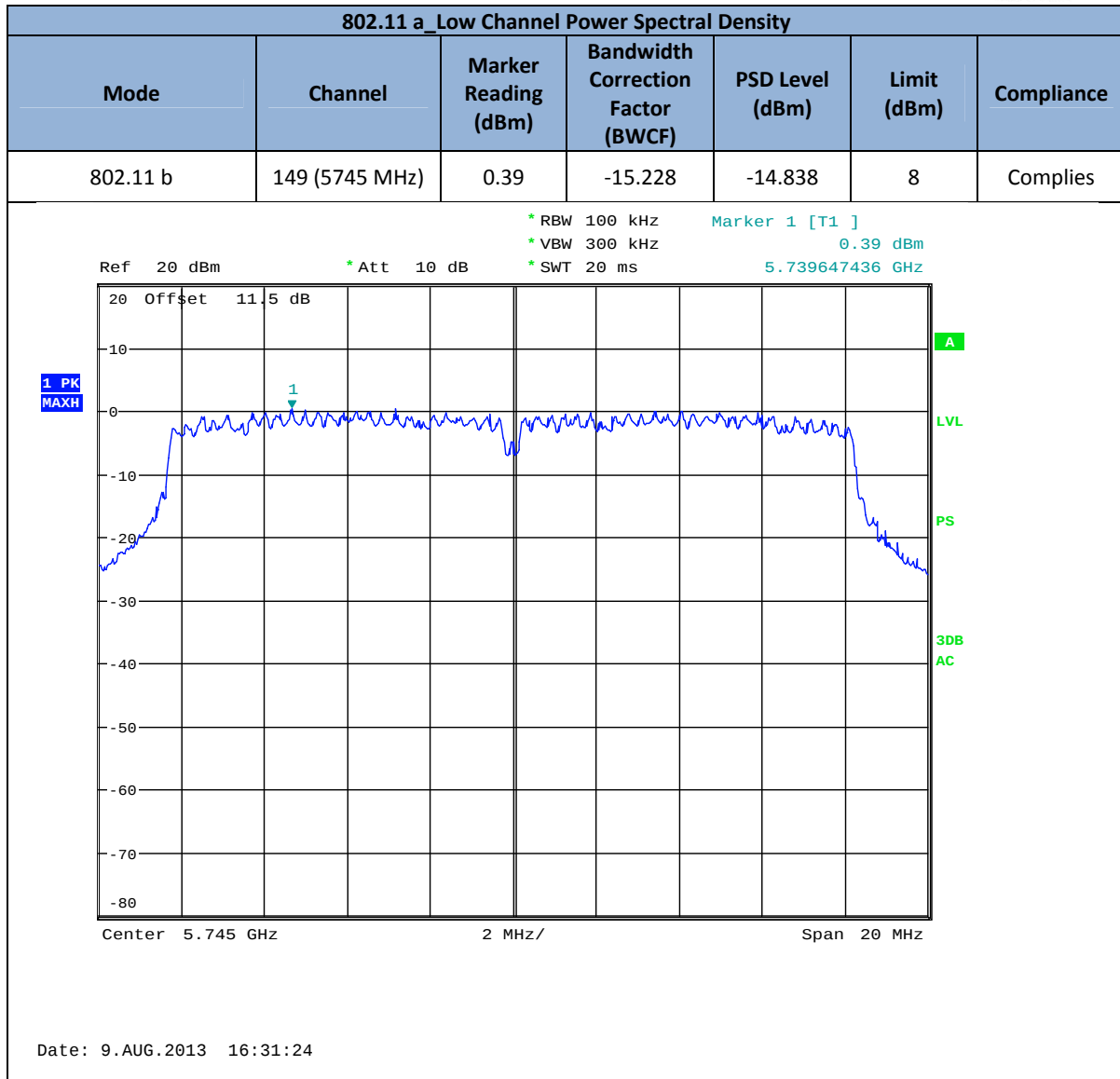


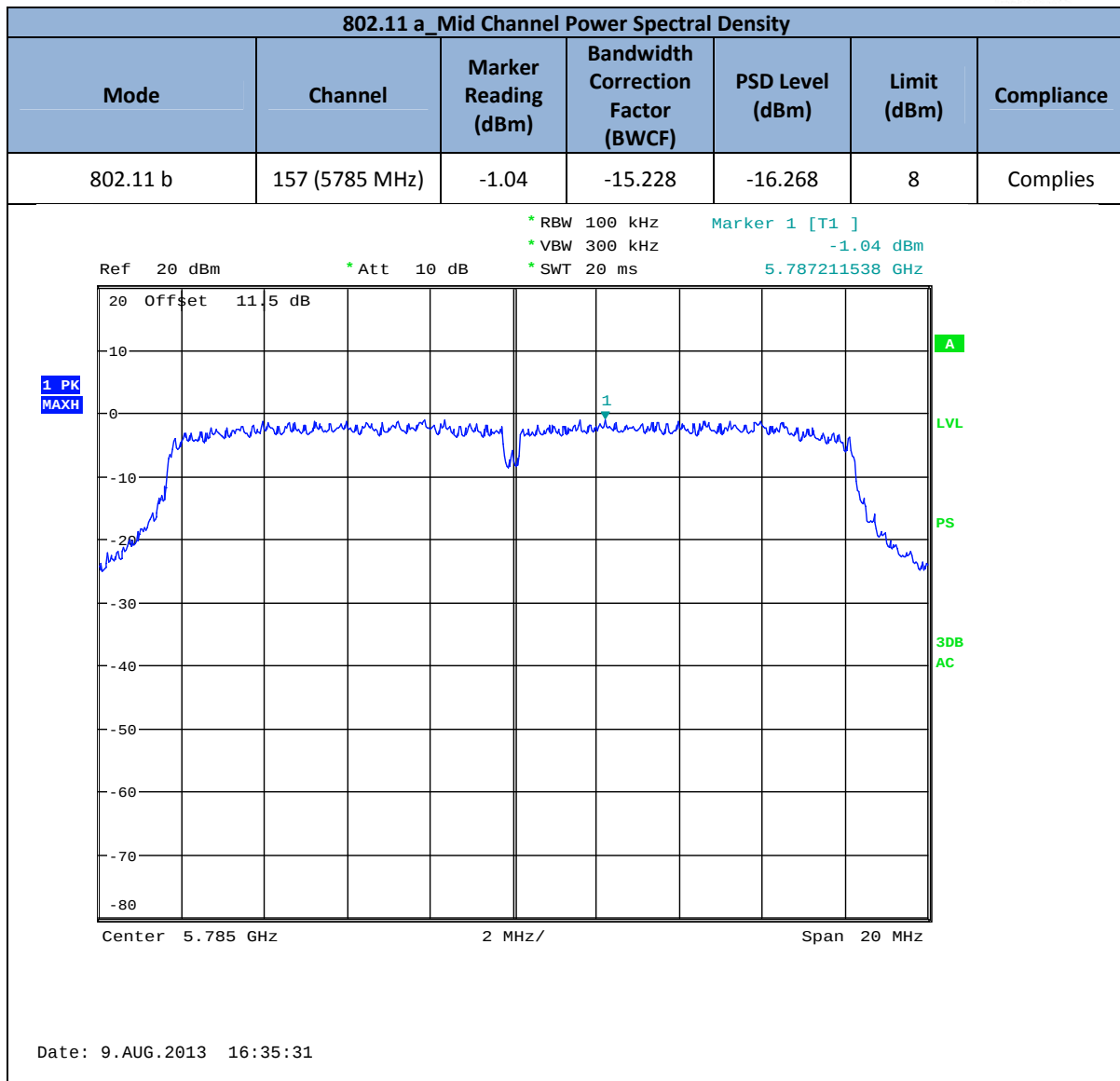


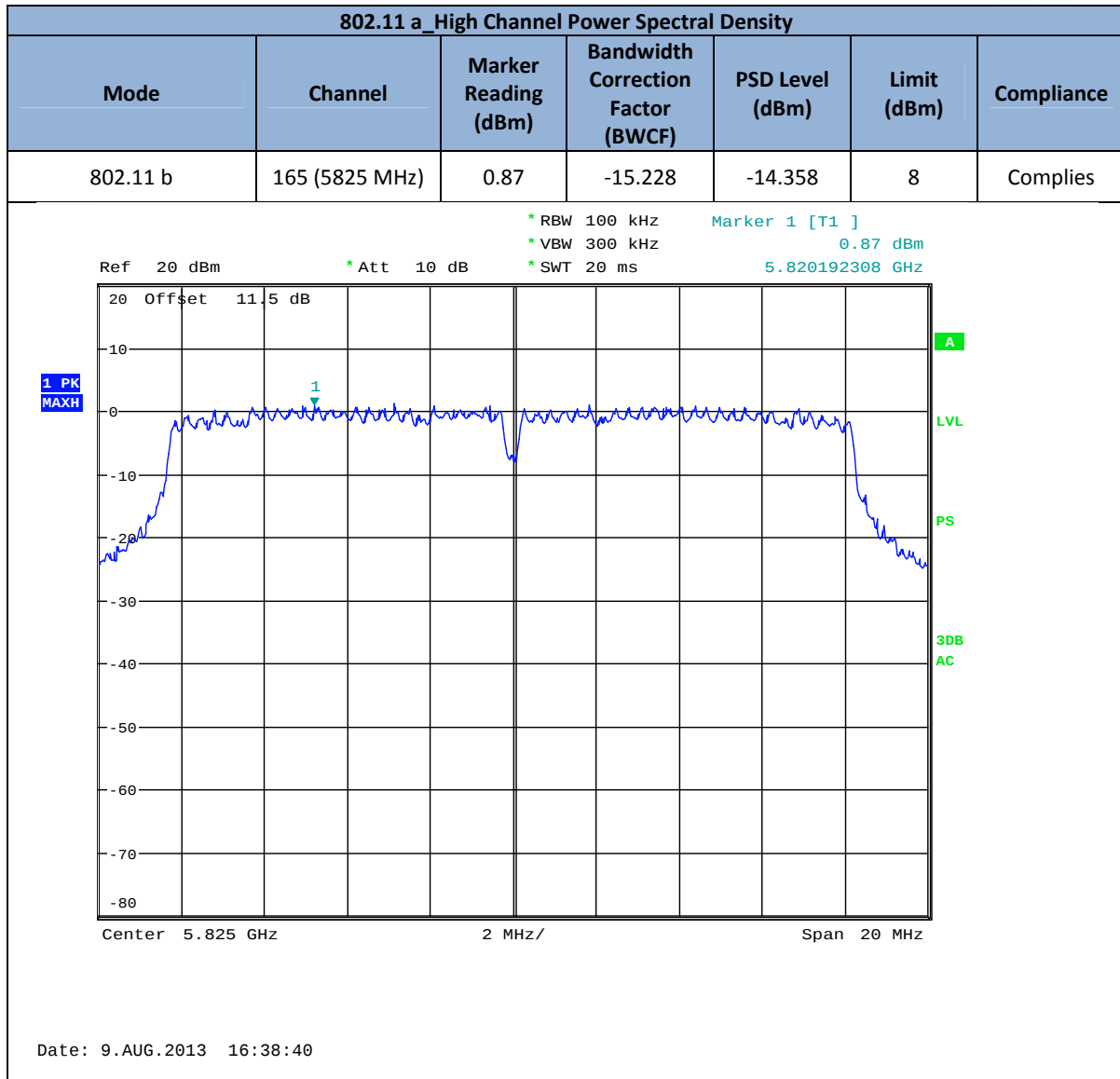


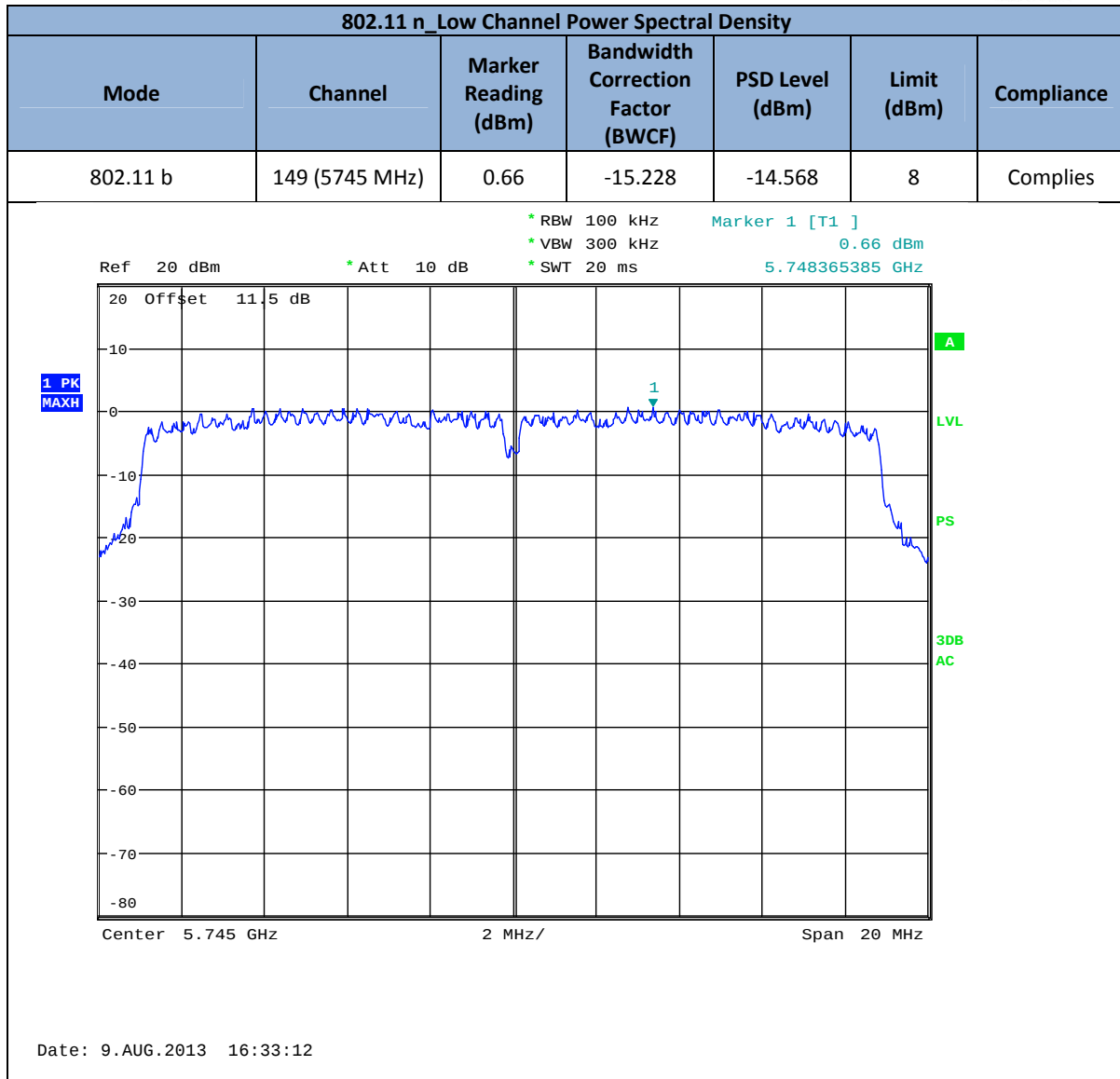


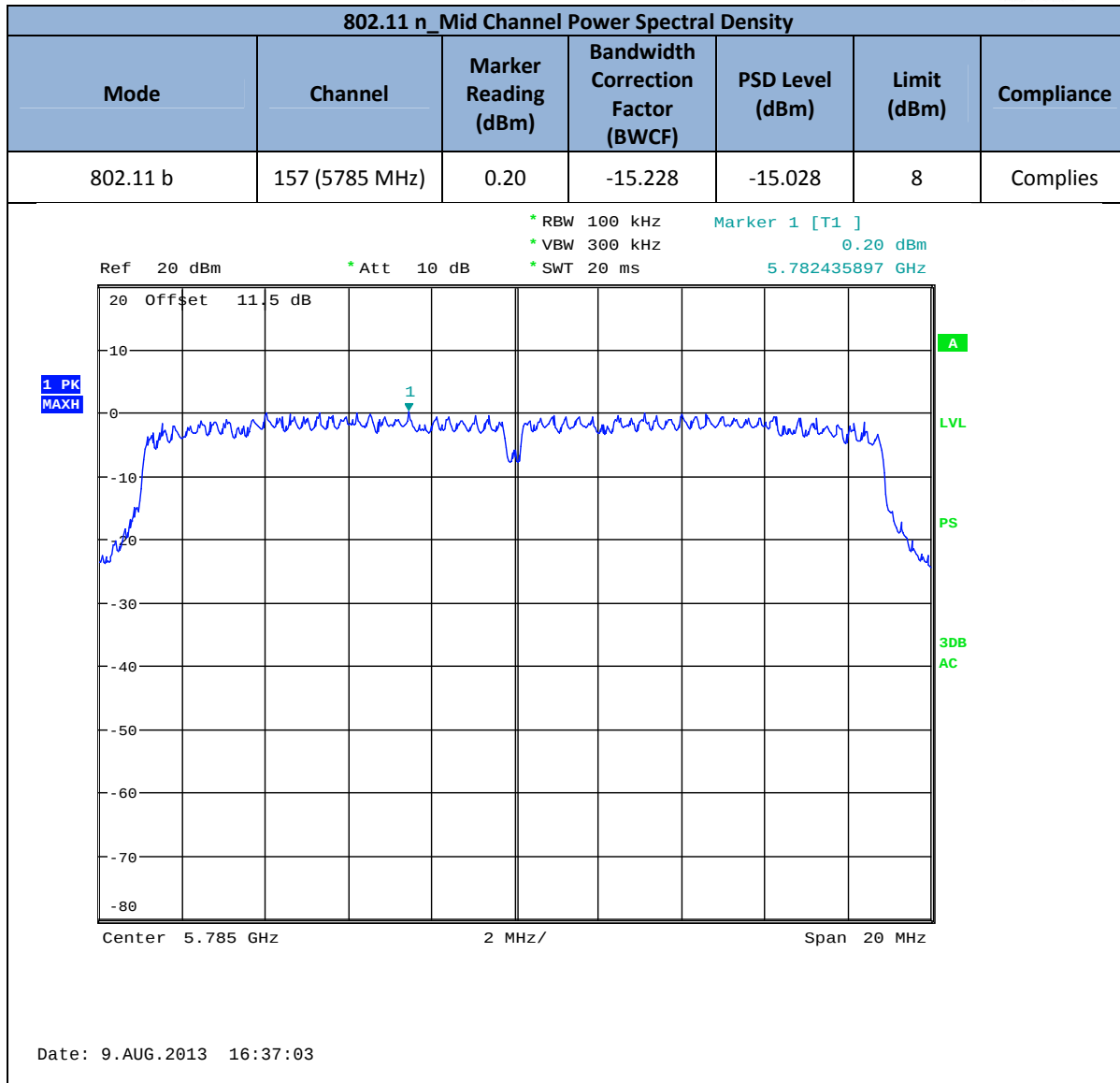


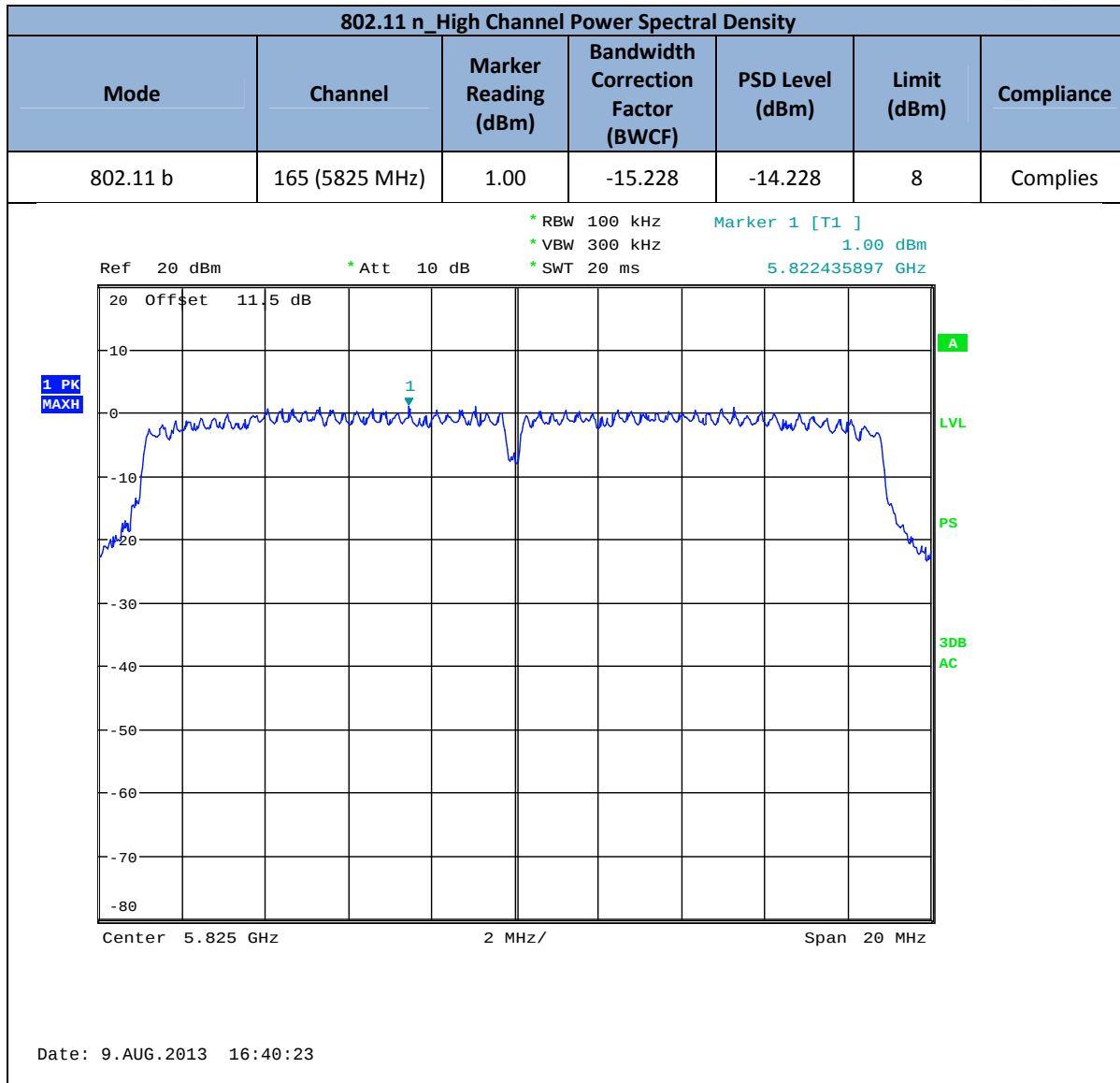














SECTION 3

TEST EQUIPMENT USED



3.1 TEST EQUIPMENT USED

List of absolute measuring and other principal items of test equipment.

ID Number (SDGE/SDRB)	Test Equipment	Type	Serial Number	Manufacturer	Cal Date	Cal Due Date
Conducted Port Setup						
7569	Series Power Meter	N1911A P-	MY45100625	Agilent	04/15/13	04/15/14
7570	50MHz-18GHz Wideband Power Sensor	N1921A	MY45240588	Agilent	05/06/13	05/06/14
1049	EMI Test Receiver	ESU	100133	Rhode & Schwarz	07/24/13	07/24/14
6814	PSA Series Spectrum Analyzer	E4440A	MY42510441	Agilent	11/07/12	11/07/13
8607	20dB Attenuator	34-20-34	BP4180	MCE/Weinschel	Verified by 6814 and 1003	
8686	20dB Attenuator	0846	BW-N20W5+	MCL	Verified by 6814 and 1003	
Radiated Test Setup						
1033	Bilog Antenna	3142C	00044556	EMCO	06/25/13	06/25/14
7575	Double-ridged waveguide horn antenna	3117	00155511	EMCO	03/25/13	03/25/14
8628	Pre-amplifier	QLJ 01182835-JO	8986002	QuinStar Technologies Inc.	09/21/12	09/21/13
1153	High-frequency cable	SucoFlex 100 SX	N/A	Suhner	09/21/12	09/21/13
8543	High-frequency cable	Micropore 19057793	N/A	United Microwave Products	09/21/12	09/21/13
1040	EMI Test Receiver	ESIB40	100292	Rhode & Schwarz	07/31/13	07/31/14
1049	EMI Test Receiver	ESU	100133	Rhode & Schwarz	07/24/13	07/24/14
1016	Pre-amplifier	PAM-0202	187	PAM	09/24/12	09/24/13
Conducted Emissions						
1024	EMI Test Receiver	ESCS 30	847793/001	Rhode & Schwarz	03/11/13	03/11/14
7567	LISN	FCC-LISN-50-25-2-10	120304	Fischer Custom Comm.	06/11/13	06/11/14
7568	LISN	FCC-LISN-50-25-2-10	120305	Fischer Custom Comm.	07/10/13	07/10/14
8607	20dB Attenuator	CAT-20	N/A	MCL HAT-20	08/21/12	08/21/13
8609	20dB Attenuator	CAT-20	N/A	MCL HAT-20	08/21/12	08/21/13
Miscellaneous						
	Test Software	EMC32	V8.53	Rhode & Schwarz	N/A	
1003	Signal Generator	SMR-40	1104.0002.40	Rhode & Schwarz	11/12/12	11/12/13
6452	Multimeter	3478A	2911A52177	Hewlett Packard	08/02/13	08/02/14
7560	Barometer/Temperature /Humidity Transmitter	iBTHX-W	1240476	Omega	11/19/12	11/19/13

Note.- For ID #8607 and 8609 Conducted Emission Was performed on August 06, 2013. (when the the Equipment was within the calibration range.)

3.2 MEASUREMENT UNCERTAINTY

For a 95% confidence level, the measurement uncertainties for defined systems are:

3.2.1 Radiated Emission Measurements (Below 1GHz)

Contribution		Probability Distribution Type	Probability Distribution x_i	Standard Uncertainty $u(x_i)$	$[u(x_i)]^2$
1	Receiver/Spectrum Analyzer	Rectangular	0.45	0.26	0.07
2	Cables	Rectangular	0.50	0.29	0.08
3	Preamp	Rectangular	0.50	0.29	0.08
4	Antenna	Rectangular	0.75	0.43	0.19
5	Site	Rectangular	3.89	2.25	5.04
6	EUT Setup	Rectangular	1.00	0.58	0.33
Combined Uncertainty (u_c):					2.41
Coverage Factor (k):					2
Expanded Uncertainty:					4.82

3.2.2 Radiated Emission Measurements (Above 1GHz)

Contribution		Probability Distribution Type	Probability Distribution x_i	Standard Uncertainty $u(x_i)$	$[u(x_i)]^2$
1	Receiver/Spectrum Analyzer	Rectangular	0.57	0.33	0.11
2	Cables	Rectangular	0.70	0.40	0.16
3	Preamp	Rectangular	0.50	0.29	0.08
4	Antenna	Rectangular	0.37	0.21	0.05
5	Site	Rectangular	3.89	2.25	5.04
6	EUT Setup	Rectangular	1.00	0.58	0.33
Combined Uncertainty (u_c):					2.40
Coverage Factor (k):					2
Expanded Uncertainty:					4.81

3.2.3 Conducted Antenna Port Measurement

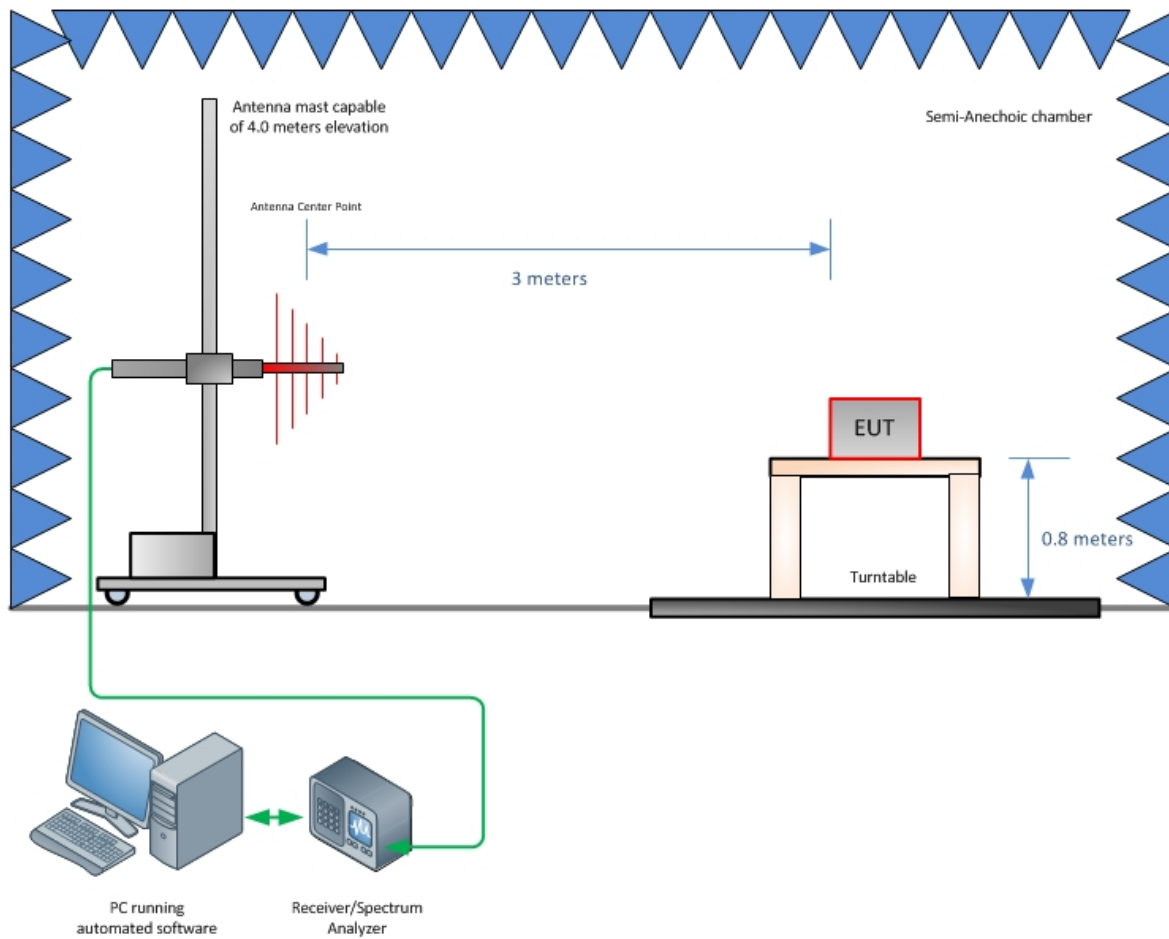
Contribution		Probability Distribution Type	Probability Distribution x_i	Standard Uncertainty $u(x_i)$	$[u(x_i)]^2$
1	Receiver/Spectrum Analyzer	Rectangular	0.57	0.33	0.11
2	Cables	Rectangular	0.50	0.29	0.08
3	EUT Setup	Rectangular	1.00	0.58	0.33
Combined Uncertainty (u_c):					0.72
Coverage Factor (k):					2
Expanded Uncertainty:					1.45



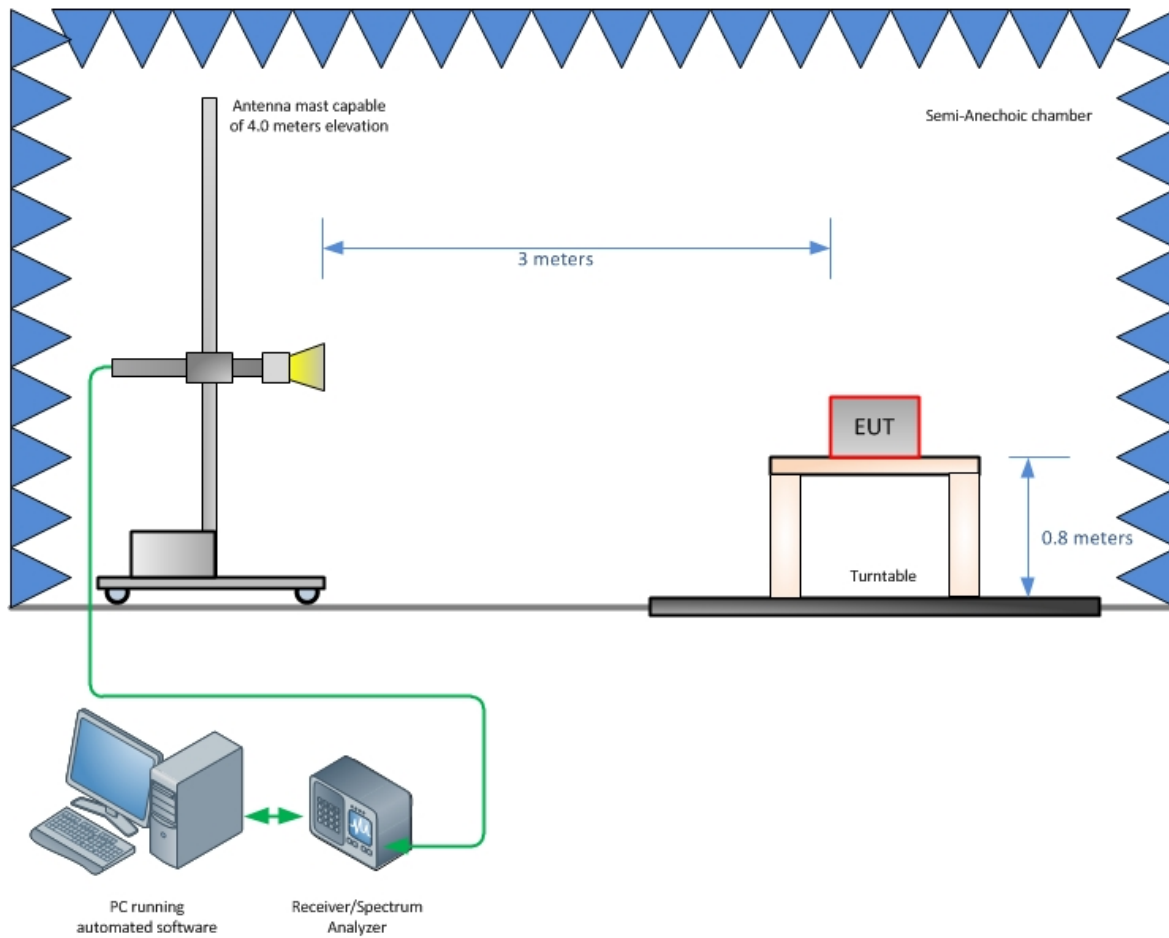
SECTION 4

DIAGRAM OF TEST SETUP

4.1 TEST SETUP DIAGRAM



Radiated Emission Test Setup (Below 1GHz)



Radiated Emission Test Setup (Above 1GHz)



SECTION 5

ACCREDITATION, DISCLAIMERS AND COPYRIGHT



5.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT

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