Report On

FCC Testing of the Sharp SHL23 Dual-band CDMA (BC0, BC6) & Quad-band GSM (GSM850/GSM900/DCS1800/PCS1900) & Dual-band UMTS (FDDI, FDDV) & Quad-band LTE (B1, B3, B11, B18) multi mode cellular phone with Bluetooth, WLAN, SRD (NFC,FeliCa) and GPS
In accordance with FCC CFR 47 Part 15C (WLAN and Bluetooth Low Energy)

COMMERCIAL-IN-CONFIDENCE
FCC ID: APYHRO00196

Document 75923862 Report 14 Issue 2 **November 2013**

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REPORT ON

FCC Testing of the Sharp SHL23 Dual-band CDMA (BC0, BC6) & Quad-band GSM (GSM850/GSM900/DCS1800/PCS1900) & Dual-band UMTS (FDDI, FDDV) & Quad-band LTE (B1, B3, B11, B18) multi mode cellular phone with Bluetooth, WLAN, SRD (NFC,FeliCa) and GPS
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Document 75923862 Report 14 Issue 2

November 2013

PREPARED FOR

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Authorised Signatory

DATED 04 November 2013

This report has been up-issued to Issue 2 to amend the model description.

ENGINEERING STATEMENT

The measurements shown in this report were made in accordance with the procedures described on test pages. All reported testing was carried out on a sample equipment to demonstrate limited compliance with FCC CFR 47 Part 15C. The sample tested was found to comply with the requirements defined in the applied rules.

Test Engineer(s);

T Guy S Milliken

Product Service

CONTENTS

SECTION 1

REPORT SUMMARY

FCC Testing of the
Sharp SHL23 Dual-band CDMA (BC0, BC6) & Quad-band GSM
(GSM850/GSM900/DCS1800/PCS1900) & Dual-band UMTS (FDDI, FDDV) & Quad-band LTE
(B1, B3, B11, B18) multi mode cellular phone with
Bluetooth, WLAN, SRD (NFC,FeliCa) and GPS
In accordance with FCC CFR 47 Part 15C (WLAN and Bluetooth Low Energy)

1.1 INTRODUCTION

The information contained in this report is intended to show verification of the FCC Testing of the Sharp SHL23 Dual-band CDMA (BC0, BC6) & Quad-band GSM (GSM850/GSM900/DCS1800/PCS1900) & Dual-band UMTS (FDDI, FDDV) & Quad-band LTE (B1, B3, B11, B18) multi mode cellular phone with Bluetooth, WLAN, SRD (NFC,FeliCa) and GPS to the requirements of FCC CFR 47 Part 15C.

Objective	To perform FCC Testing to determine the Equipment Under Test's (EUT's) compliance with the Test Specification, for the series of tests carried out.
Manufacturer	Sharp Corporation
Model Number(s)	SHL23
Serial Number(s)	IMEI 004401114892827 IMEI 004401114893122 IMEI 004401114893338 IMEI 004401114893130
Number of Samples Tested	4
Test Specification/Issue/Date	FCC CFR 47 Part 15C (2012)
Incoming Release Date	Application Form 24 September 2013
Disposal Reference Number Date	Held Pending Disposal Not Applicable Not Applicable
Order Number Date	9860 25 September 2013
Start of Test	1 October 2013
Finish of Test	14 October 2013
Name of Engineer(s)	T Guy S Milliken
Related Document(s)	ANSI C63.10: 2009

Product Service

1.2 BRIEF SUMMARY OF RESULTS

A brief summary of the tests carried out in accordance with FCC CFR 47 Part 15C is shown below.

Section	Spec Clause	Test Description	Result	Comments/Base Standard
802.11(b)				
2.1	15.207	AC Line Conducted Emissions	Pass	
2.2	15.247 (b)(3)	Maximum Peak Conducted Output Power	Pass	
2.3	15.247 (b)(4)	EIRP Peak Power	Pass	
2.4	15.247 (d)	Spurious and Band Edge Emissions	Pass	
2.5	15.247 (e)	Power Spectral Density	Pass	
2.6	15.247 (2)	6dB Bandwidth	Pass	
802.11(g)				
2.2	15.247 (b)(3)	Maximum Peak Conducted Output Power	Pass	
2.3	15.247 (b)(4)	EIRP Peak Power	Pass	
2.4	15.247 (d)	Spurious and Band Edge Emissions	Pass	
2.5	15.247 (e)	Power Spectral Density	Pass	
2.6	15.247 (2)	6dB Bandwidth	Pass	
802.11(n)				
2.2	15.247 (b)(3)	Maximum Peak Conducted Output Power	Pass	
2.3	15.247 (b)(4)	EIRP Peak Power	Pass	
2.4	15.247 (d)	Spurious and Band Edge Emissions	Pass	
2.5	15.247 (e)	Power Spectral Density	Pass	
2.6	15.247 (2)	6dB Bandwidth	Pass	

Section	Spec Clause	Test Description	Result	Comments/Base Standard
Bluetooth Low Energy				
2.2	15.247 (b)(3)	Maximum Peak Conducted Output Power	Pass	
2.3	15.247 (b)(4)	EIRP Peak Power	Pass	
2.4	15.247 (d)	Spurious and Band Edge Emissions	Pass	
2.5	15.247 (e)	Power Spectral Density	Pass	
2.6	15.247 (2)	6dB Bandwidth	Pass	

Product Service

1.3 APPLICATION FORM

EQUIPMENT DESCRIPTION	
Model Name/Number	SHL23
Part Number	
FCC ID (if applicable)	APYHRO00196
Industry Canada ID (if applicable)	N/A
Technical Description (Please provide a brief description of the intended use of the equipment)	Quad-band LTE(B1/B3/B11/B18), Dual-band WCDMA (FDDI/V), Quad-band GSM(850/900/1800/1900), Dual-band CDMA(BC0/BC6) Cellular Phone with Bluetooth, WLAN, NFC and GPS

EXTREME TEMPERATURE RANGE over which the equipment is to be type tested
☐ -20°C to +55°C
☒ Other (2)
☐ Not applicable (no extreme temperature testing required)
Extreme temperature range for the host(s): -10C to 55C

(2) The equipment shall be tested over the following temperature ranges :

a) 0°C to +35°C for equipment for indoor use only, or intended for used in areas where the temperature is controlled within this range.

b) Over the extremes of the temperature range(s) of the declared host equipment(s) in case of plug-in radio devices.

TYPE OF ANTENNA			
☒ Integral			
Temporary RF connector provided:		☒ Yes	☐ No
☐ Antenna connector			
☐ Number of antenna assembly(ies) submitted			
Gain of the antenna intended for normal use:			
0 dBi	for assembly identified as	Bluetooth/WLAN	
dBi	for assembly identified as		
dBi	for assembly identified as		
dBi	for assembly identified as		
dBi	for assembly identified as		

TRANSMITTER TECHNICAL CHARACTERISTICS		
TRANSMITTER OPERATING FREQUENCY RANGE(S)		
	FCC and/or Industry Canada	**EU**
Bluetooth	to MHz	2402 to 2480 MHz
WLAN	to MHz	2412 to 2472 MHz
FCC and/or Industry Canada (only)		
Highest Internally Generated Frequency MHz		

Product Service

SPREAD SPECTRUM PARAMETERS	
☒ **Bluetooth**	Version: 4.0
FHSS: Channel ☒ 79 Other	EDR ☒ Yes ☐ No
Medium Access Protocol (Customer Declaration)	
"We have implemented Bluetooth protocol which satisfies the medium access protocol requirement of EN 300 328".	

☒ **WLAN**

IEEE 802.11(b) – DSSS ☒

IEEE 802.11(g) – OFDM ☒

IEEE 802.11(n) – OFDM ☒

Supported Spatial Streams

	2.4 GHz	5GHz
Transmitter (Tx)	1	1
Receiver (Rx)	1	1

GI (Guard Interval) ☒ 800 ns ☐ 400 ns

Band Width ☒ 20 MHz ☐ 40 MHz

Medium Access Protocol (Customer Declaration)

"We have implemented IEEE 802.11 (b/g/n) protocol which satisfies the medium access protocol requirement of EN 300 328".

☐ **Other Technology**

☐ Direct Sequence ☐ Frequency Hopping ☐ Combined ☐ Other

DSSS	Chip Sequence Length	bit
	Spectrum Width	MHz
FHSS	Total Number of Hops	
	Dwell Time	ms
	Bandwidth Per Hop	MHz
	Maximum Separation of Hops	MHz for ETSI EN 300 328
Other		

Medium Access Protocol (Customer Declaration)

"We have implemented a protocol which satisfies the medium access protocol requirement of EN 300 328".

Product Service

TRANSMITTER POWER CHARACTERSITICS								
Bluetooth								
Maximum Rated Transmitter Output								
Effective radiated power (for equipment with antenna connector)				W				
Effective radiated power (for equipment with integral antenna)			2.5m	W				
Minimum Rated Transmitter Output								
Effective radiated power (for equipment with antenna connector)				W				
Effective radiated power (for equipment with integral antenna)			0.25m	W				
Is transmitter intended for :								
Continuous duty					☒	Yes	☐	No
Intermittent duty					☐	Yes	☐	No
If intermittent state DUTY CYCLE								
Transmitter ON	seconds		Transmitter OFF	minutes				
Is continuous operation possible for testing purposes?					☒	Yes	☐	No
Is transmitter output power variable:					☒	Yes	☐	No
State during the test:								
Transmitter duty cycle	Tx on	Seconds	Tx Off	Seconds				
Duty cycle (Tx on /(Tx on +Tx off))		%						
☐ Continuously variable		☐ Stepped						
dB per step								
WLAN								
Maximum Rated Transmitter Output								
Effective radiated power (for equipment with antenna connector)				W				
Effective radiated power (for equipment with integral antenna)			0.1	W				
Minimum Rated Transmitter Output								
Effective radiated power (for equipment with antenna connector)				W				
Effective radiated power (for equipment with integral antenna)				W				
Is transmitter intended for :								
Continuous duty					☒	Yes	☐	No
Intermittent duty					☐	Yes	☐	No
If intermittent state DUTY CYCLE								
Transmitter ON	seconds		Transmitter OFF	minutes				
Is continuous operation possible for testing purposes?					☒	Yes	☐	No
Is transmitter output power variable:					☒	Yes	☐	No
State during the test:								
Transmitter duty cycle	Tx on	Seconds	Tx Off	Seconds				
Duty cycle (Tx on /(Tx on +Tx off))		%						
☐ Continuously variable		☐ Stepped						
dB per step								

TRANSMITTER POWER SOURCE (3)					
☒ Common power source for transmitter and receiver					
☐ AC mains		State voltage			
AC supply frequency	(Hz)	VAC		Max Current	Hz
☐ Single phase			☐ Three phase		
And / Or					
☐ External DC supply					
Nominal voltage			Max Current		A
Extreme upper voltage			Extreme lower voltage		
Battery					
☐ Nickel Cadmium					
☐ Lead acid (Vehicle regulated)					
☐ Alkaline					
☒ Lithium					
☐ Other Details :					
4.0 Volts nominal.					
End point voltage as quoted by equipment manufacturer			3.7	V	

(3) If a transmitter and receiver use the same power source, this should be declared. In such cases only the box for the transmitter power source should be filled in.

AUTOMATIC EQUIPMENT SWITCH OFF		
If the equipment is designed to automatically switch off at a predetermined voltage level which is higher or lower in value than the battery minimum and minimum calculated values this shall be clearly stated.		
☒ Applies	3.35	V cut-off voltage
☐ Does not apply		

RECEIVER POWER SOURCE (4)					
☐ AC mains		State voltage			
AC supply frequency	(Hz)	VAC	Max Current		Hz
☐ Single phase		☐ Three phase			
And / Or					
☐ External DC supply					
Nominal voltage		Max Current		A	
Extreme upper voltage		Extreme lower voltage			
Battery					
☐ Nickel Cadmium					
☐ Lead acid (Vehicle regulated)					
☐ Alkaline					
☐ Lithium					
☐ Other Details :					
Volts nominal.					
End point voltage as quoted by equipment manufacturer		V			

(4) If a transmitter and receiver use the same power source, this should be declared. In such cases only the box for the transmitter power source should be filled in.

AUTOMATIC EQUIPMENT SWITCH OFF
If the equipment is designed to automatically switch off at a predetermined voltage level which is higher or lower in value than the battery minimum and minimum calculated values this shall be clearly stated.
☐ Applies V cut-off voltage
☐ Does not apply

I hereby declare that I am entitled to sign on behalf of the applicant and that the information supplied is correct and complete.

Signature:  Name: Hachiro Hidaka

Position held: Asst. Manager Date: 24th September, 2013

1.4 PRODUCT INFORMATION

1.4.1 Technical Description

The Equipment Under Test (EUT) was a Sharp SHL23 Dual-band CDMA (BC0, BC6) & Quad-band GSM (GSM850/GSM900/DCS1800/PCS1900) & Dual-band UMTS (FDDI, FDDV) & Quad-band LTE (B1, B3, B11, B18) multi mode cellular phone with Bluetooth, WLAN, SRD (NFC,FeliCa) and GPS. A full technical description can be found in the manufacturer's documentation.

1.5 TEST CONDITIONS

For all tests the EUT was set up in accordance with the relevant test standard and to represent typical operating conditions. Tests were applied with the EUT situated in a shielded enclosure.

The EUT was powered from a 4.0 V DC supply.

FCC Accreditation
90987 Octagon House, Fareham Test Laboratory

1.6 DEVIATIONS FROM THE STANDARD

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

1.7 MODIFICATION RECORD

Modification 0 - No modifications were made to the test sample during testing.

Product Service

SECTION 2

TEST DETAILS

FCC Testing of the
Sharp SHL23 Dual-band CDMA (BC0, BC6) & Quad-band GSM
(GSM850/GSM900/DCS1800/PCS1900) & Dual-band UMTS (FDDI, FDDV) & Quad-band LTE
(B1, B3, B11, B18) multi mode cellular phone with
Bluetooth, WLAN, SRD (NFC,FeliCa) and GPS
In accordance with FCC CFR 47 Part 15C (WLAN and Bluetooth Low Energy)

2.1 AC LINE CONDUCTED EMISSIONS

2.1.1 Specification Reference

FCC CFR 47 Part 15C, Clause 15.207

2.1.2 Equipment Under Test and Modification State

SHL23 S/N: IMEI 004401114893338 - Modification State 0

2.1.3 Date of Test

12 October 2013

2.1.4 Test Equipment Used

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

2.1.5 Test Procedure

The EUT is set up on a test table 800mm above a horizontal ground plane. A vertical ground plane is also required and is placed 400mm from the EUT. Where a EUT is floor standing it will be stood on but insulated from the ground plane by up to 12mm.

The EUT is powered through a Line Impedance Stabilisation Network (LISN) which is bonded to the ground plane. The EUT is located so that the distance between the EUT and the LISN is no less than 800mm. Where possible the cable between the mains input of the EUT and the LISN is 1m. Where this is not possible the cable is non-inductively bundled with the bundle not exceeding 400mm in length.

A preliminary profile of the Conducted Emissions is obtained over the frequency range 150kHz to 30MHz. Any points of interest are noted for formal measurements.

During formal measurements, the measuring receiver is tuned to the emission of interest where Quasi – Peak and Average measurements are performed in a 9kHz Video and Resolution Bandwidth.

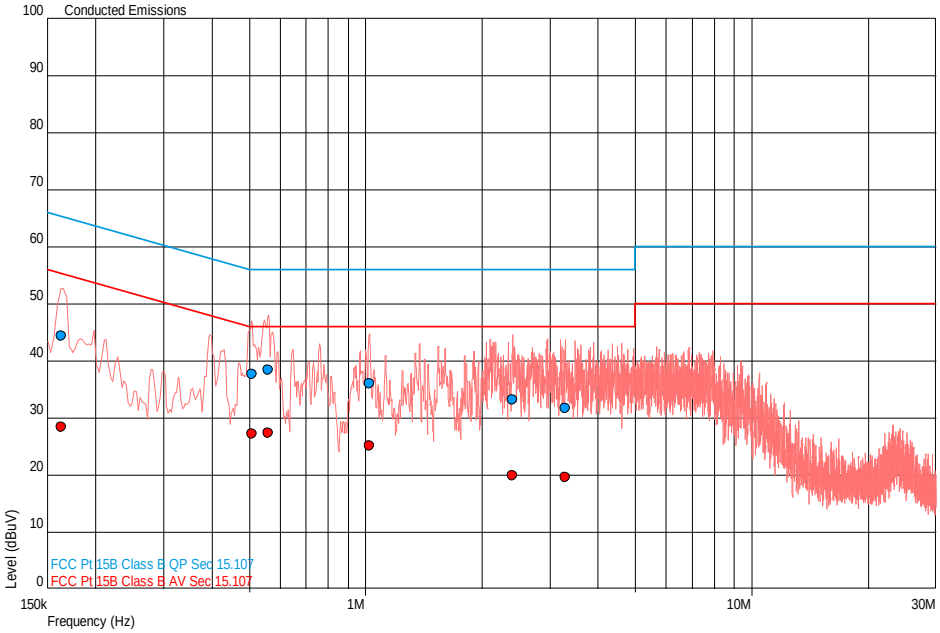
2.1.6 Environmental Conditions

Ambient Temperature	20.5°C
Relative Humidity	43.0%

2.1.7 Test Results

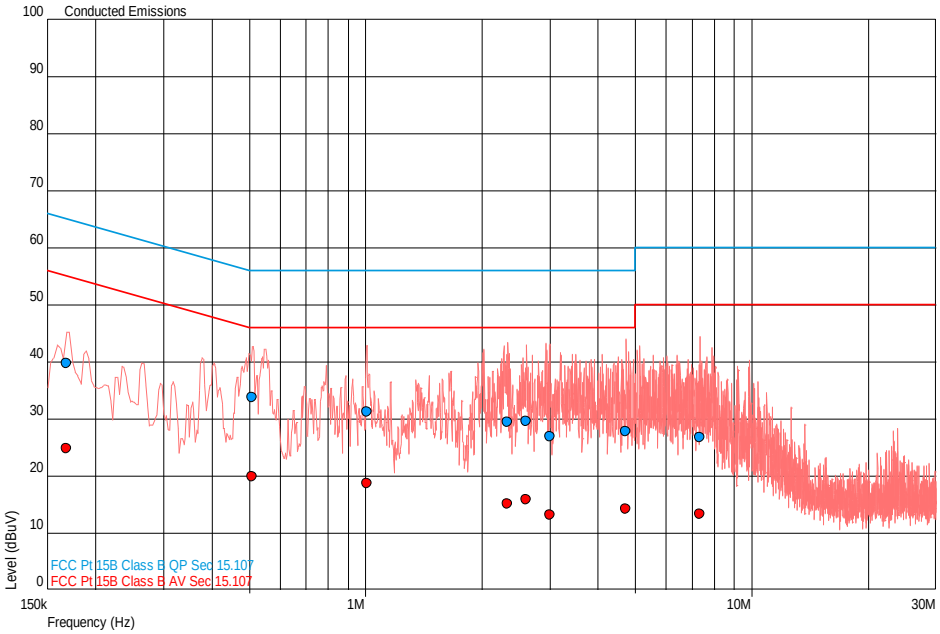
802.11(b)

Live Line



Frequency (MHz)	QP Level (dBµV)	QP Limit (dBµV)	QP Margin (dBµV)	AV Level (dBµV)	AV Limit (dBµV)	AV Margin (dBµV)
0.163	44.5	65.3	-20.9	28.4	55.3	-26.9
0.507	37.7	56.0	-18.3	27.2	46.0	-18.8
0.561	38.4	56.0	-17.6	27.3	46.0	-18.7
1.022	36.0	56.0	-20.0	25.2	46.0	-20.8
2.400	33.1	56.0	-22.9	19.9	46.0	-26.1
3.284	31.7	56.0	-24.3	19.6	46.0	-26.4

Neutral Line



Frequency (MHz)	QP Level (dBµV)	QP Limit (dBµV)	QP Margin (dBµV)	AV Level (dBµV)	AV Limit (dBµV)	AV Margin (dBµV)
0.169	39.8	65.0	-25.2	24.8	55.0	-30.2
0.509	33.8	56.0	-22.2	19.9	46.0	-26.1
1.008	31.3	56.0	-24.7	18.7	46.0	-27.3
2.335	29.5	56.0	-26.5	15.2	46.0	-30.8
2.608	29.7	56.0	-26.3	15.9	46.0	-30.1
2.996	26.9	56.0	-29.1	13.2	46.0	-32.8
4.722	27.8	56.0	-28.2	14.2	46.0	-31.8
7.329	26.7	60.0	-33.3	13.4	50.0	-36.6

2.2 MAXIMUM PEAK CONDUCTED OUTPUT POWER

2.2.1 Specification Reference

FCC CFR 47 Part 15C, Clause 15.247 (b)(3)

2.2.2 Equipment Under Test and Modification State

SHL23 S/N: IMEI 004401114893130 - Modification State 0

2.2.3 Date of Test

1 October 2013, 8 October 2013 & 9 October 2013

2.2.4 Test Equipment Used

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

2.2.5 Test Procedure

The EUT was connected to a Peak Power Meter via a cable and attenuator. The path loss between the EUT and sensor was measured and entered as an offset. Measurements were made on the bottom, middle and top channels on all supported data rates.

2.2.6 Environmental Conditions

Ambient Temperature	22.5 - 23.1°C
Relative Humidity	54.7 - 61.2%

2.2.7 Test Results

802.11(b)

4.0 V DC Supply

Modulation Data Rate (Mbps)	Maximum Peak Conducted Output Power					
	dBm			mW		
	2412 MHz	2437 MHz	2462 MHz	2412 MHz	2437 MHz	2462 MHz
1	15.72	18.63	16.25	37.299	73.007	42.200
2	15.94	18.54	16.32	39.249	71.445	42.867
5.5	15.96	18.51	16.38	39.419	70.902	43.429
11	16.13	18.75	16.58	41.049	74.919	45.467

Limit Clause

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

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

For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt.

802.11(g)

4.0 V DC Supply

Modulation Data Rate (Mbps)	Maximum Peak Conducted Output Power					
	dBm			mW		
	2412 MHz	2437 MHz	2462 MHz	2412 MHz	2437 MHz	2462 MHz
6	22.09	22.53	22.55	161.706	178.960	179.806
9	22.23	22.63	22.75	167.076	183.231	188.169
12	22.27	22.69	22.69	168.816	168.816	185.693
18	22.48	22.80	22.85	177.065	190.328	192.877
24	22.23	22.60	22.75	166.986	181.859	188.469
36	22.34	22.79	22.63	171.433	190.161	183.102
48	22.33	22.96	22.91	171.090	197.831	195.587
54	22.44	22.80	22.85	175.382	190.550	192.588

Limit Clause

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

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

For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt.

802.11(n)

4.0 V DC Supply

Modulation Data Rate (Mbps)	Maximum Peak Conducted Output Power					
	dBm			mW		
	2412 MHz	2437 MHz	2462 MHz	2412 MHz	2437 MHz	2462 MHz
6.5	21.90	22.25	22.13	154.727	168.000	163.330
13	22.45	22.47	22.55	175.614	176.534	180.023
19.5	22.18	22.33	22.45	165.017	171.099	175.954
26	22.50	22.44	22.34	177.807	175.251	171.425
39	22.27	22.70	22.67	168.609	186.085	184.743
52	22.23	22.42	22.34	167.224	174.623	171.497
58.5	22.17	22.34	22.43	164.866	171.390	175.122
65	22.20	22.26	22.33	165.855	168.382	171.055

Limit Clause

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

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

For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt.

Bluetooth Low Energy

4.0 V DC Supply

Packet Type	Maximum Peak Conducted Output Power					
	dBm			mW		
	2402 MHz	2440 MHz	2480 MHz	2402 MHz	2440 MHz	2480 MHz
37octet/prbs9	0.97	1.33	1.76	1.25	1.358	1.499

Limit Clause

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

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

For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt.

2.3 EIRP PEAK POWER

2.3.1 Specification Reference

FCC CFR 47 Part 15C, Clause 15.247 (b)(4)

2.3.2 Equipment Under Test and Modification State

SHL23 S/N: IMEI 004401114893338 - Modification State 0
SHL23 S/N: IMEI 004401114892827 - Modification State 0

2.3.3 Date of Test

3 October 2013 & 4 October 2013

2.3.4 Test Equipment Used

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

2.3.5 Test Procedure

The EUT was transmitted at maximum power via a cable to the Spectrum Analyser. The Analyser settings were adjusted to display the resultant trace on screen and a resolution bandwidth and video bandwidth of 1 MHz were used to perform the measurement. The level on the spectrum analyser was maximised by rotating the EUT through 360° and a height search of the measuring antenna. A substitution was then performed using a suitable calibrated antenna and signal generator.

This level was maximised by adjusting the height of the measuring antenna once more. The level from the signal generator was then adjusted to achieve the same raw result as with the EUT. This level was then corrected to account for cable loss and antenna factor. A peak power analyser was also used to obtain a correction factor for the wideband signal.

A calculation was then performed to obtain the final figure.

2.3.6 Environmental Conditions

Ambient Temperature	20.0 - 21.8°C
Relative Humidity	62.0 - 68.0%

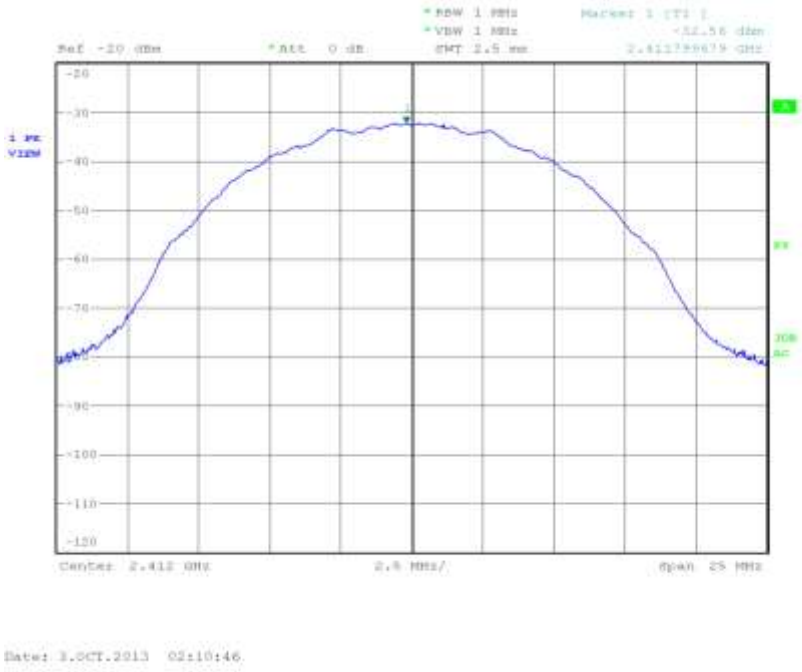
2.3.7 Test Results

802.11(b)

4.0 V DC Supply

2412 MHz

EIRP (dBm)	EIRP (mW)
17.8	60.25



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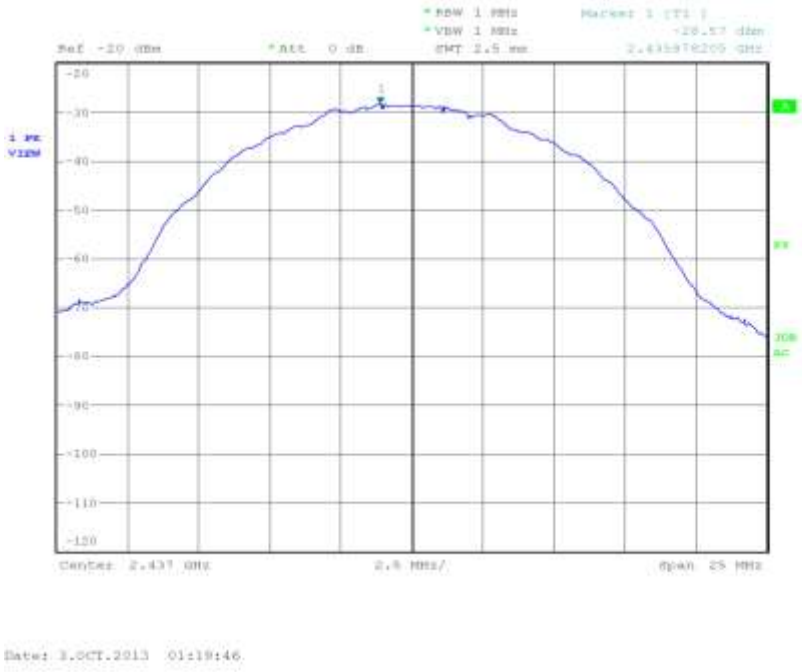
2437 MHz

EIRP (dBm)	EIRP (mW)
19.06	80.53



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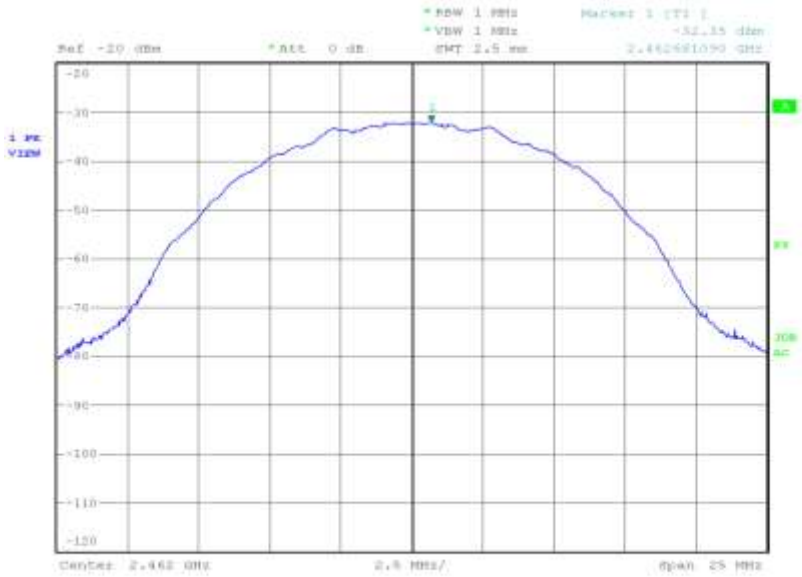
2462 MHz

EIRP (dBm)	EIRP (mW)
16.42	43.85



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Limit

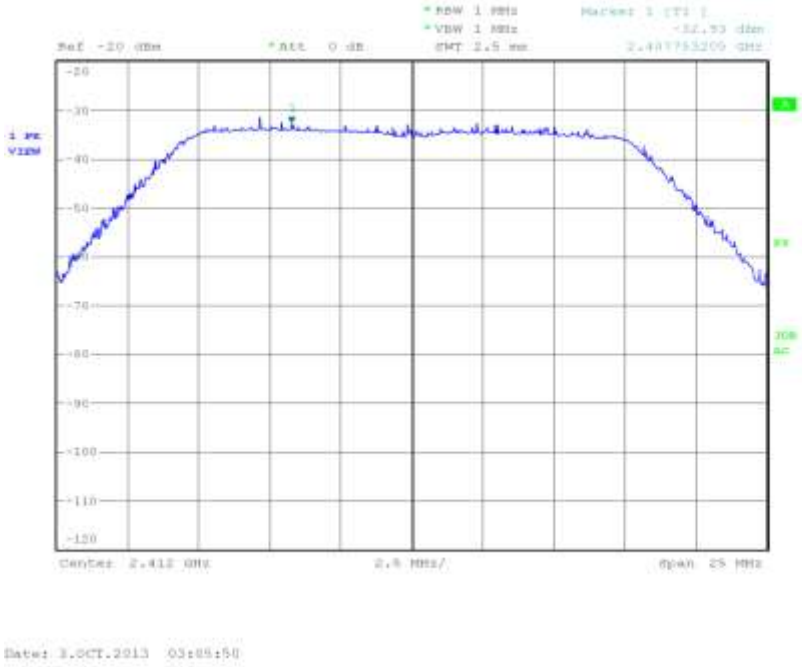
EIRP (dBm)	EIRP (mW)
36.0	4000

802.11(g)

4.0 V DC Supply

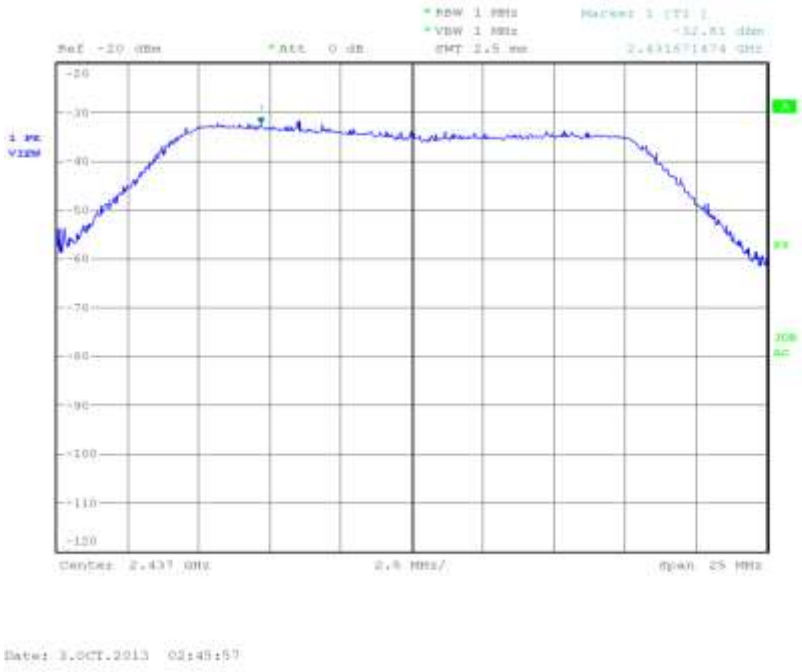
2412 MHz

EIRP (dBm)	EIRP (mW)
23.08	203.23



2437 MHz

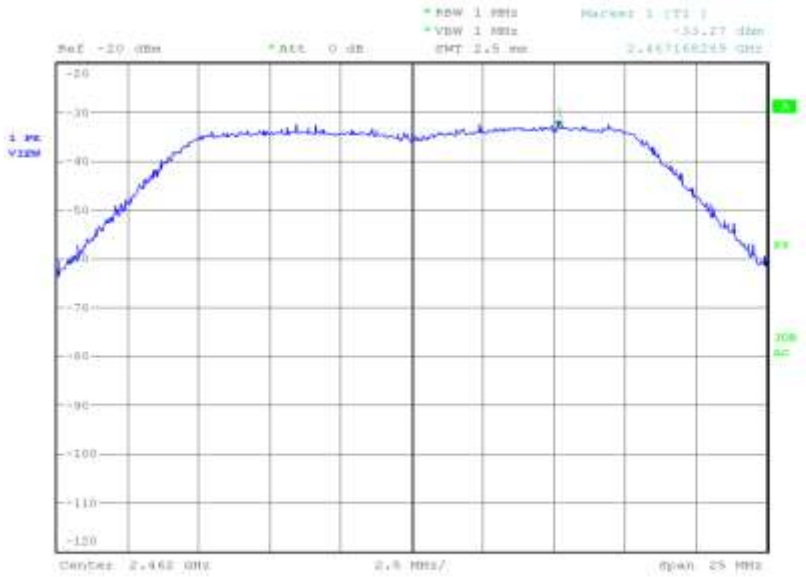
EIRP (dBm)	EIRP (mW)
22.01	158.85



Date: 3.OCT.2013 02:45:57

2462 MHz

EIRP (dBm)	EIRP (mW)
21.27	133.96



Date: 3.OCT.2013 03:11:51

Limit

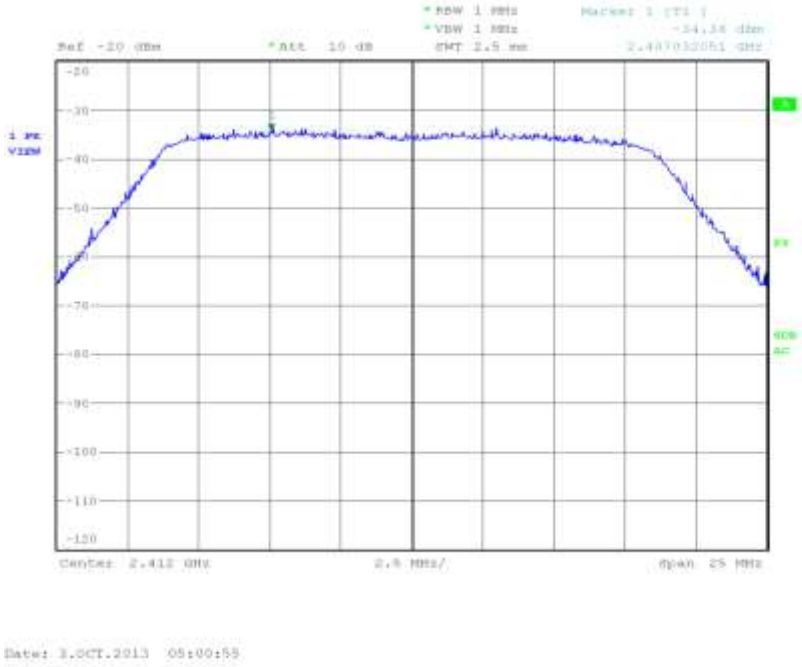
EIRP (dBm)	EIRP (mW)
36.0	4000

802.11(n)

4.0 V DC Supply

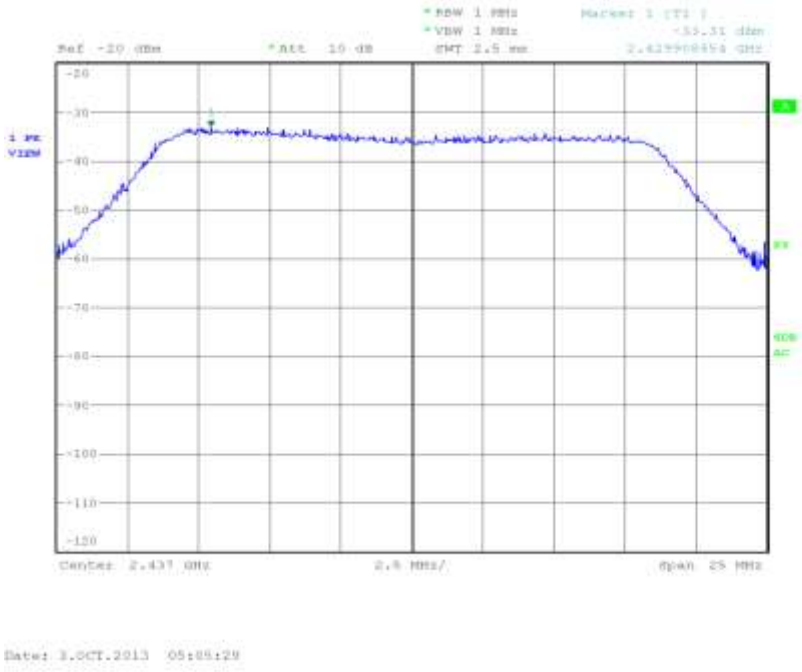
2412 MHz

EIRP (dBm)	EIRP (mW)
22.68	185.35



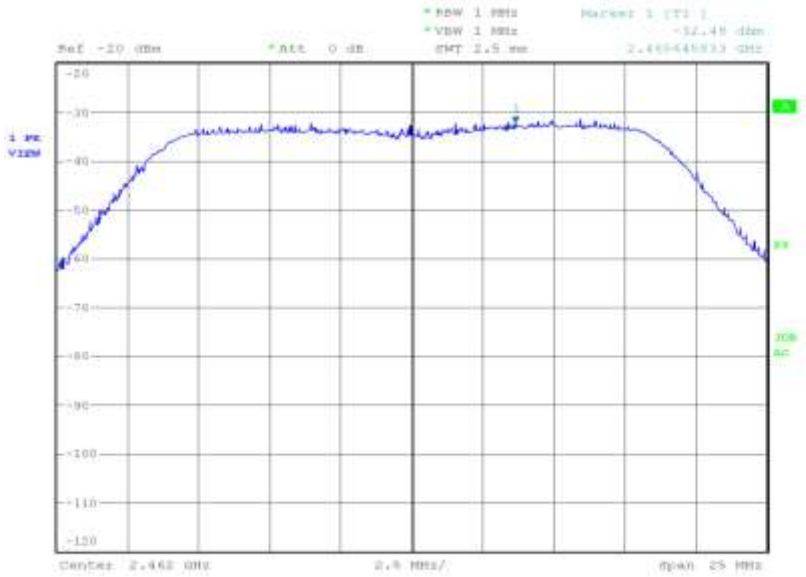
2437 MHz

EIRP (dBm)	EIRP (mW)
22.65	184.07



2462 MHz

EIRP (dBm)	EIRP (mW)
22.97	198.15



Date: 3.OCT.2013 03:42:58

Limit

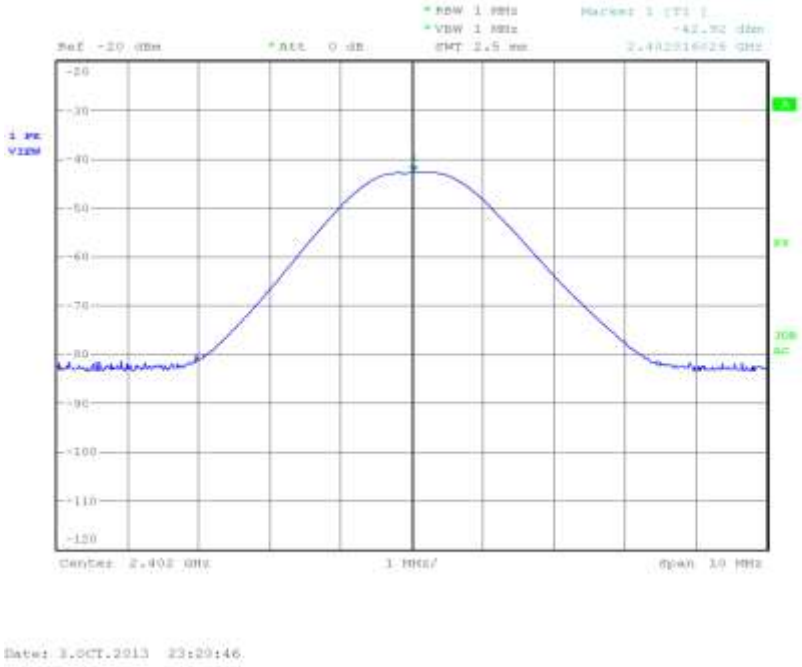
EIRP (dBm)	EIRP (mW)
36.0	4000

Bluetooth Low Energy

4.0 V DC Supply

2402 MHz

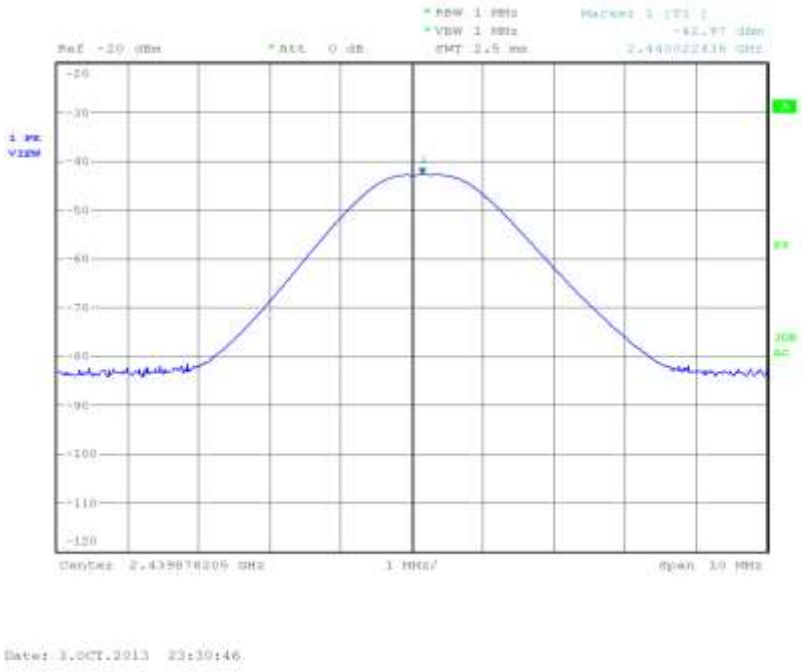
EIRP (dBm)	EIRP (mW)
0.94	1.24



Date: 3.OCT.2013 23:20:46

2440 MHz

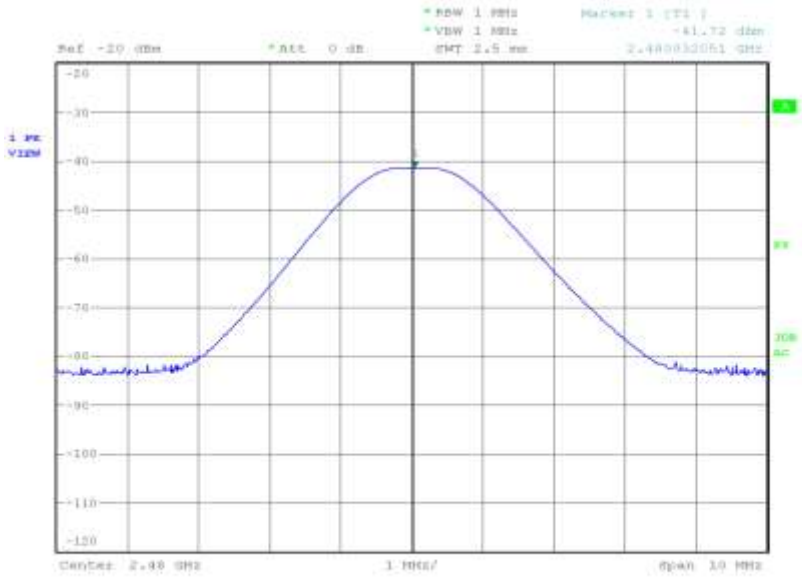
EIRP (dBm)	EIRP (mW)
-0.74	0.843



Date: 3.OCT.2013 23:30:46

2480 MHz

EIRP (dBm)	EIRP (mW)
0.76	1.19



Date: 3.OCT.2013 23:23:30

Limit

EIRP (dBm)	EIRP (mW)
36.0	4000

2.4 SPURIOUS AND BAND EDGE EMISSIONS

2.4.1 Specification Reference

FCC CFR 47 Part 15C, Clause 15.247 (d)

2.4.2 Equipment Under Test and Modification State

SHL23 S/N: IMEI 004401114893130 - Modification State 0

2.4.3 Date of Test

3 October 2013, 5 October 2013, 6 October 2013, 11 October 2013, 12 October 2013 & 13 October 2013

2.4.4 Test Equipment Used

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

2.4.5 Test Procedure

For conducted emissions, the EUT was set to operate at maximum power on the worst case data rate. The test was performed on the bottom, middle and top channels. The test was performed from 9 kHz to 25 GHz. Firstly, the power of each fundamental frequency was measured in 100 kHz bandwidth and this was used to show a -20 dBc limit line on the trace. The measurement path loss in each relevant frequency band was measured and entered a s a reference level offset.

For radiated emissions, the test method described above was also used. However, the measurement was performed from 30 MHz to 25 GHz and the path loss is incorporated as a transducer factor and entered into the spectrum analyser.

The band edge measurements were performed in accordance with ANSI C63.10, Clause 6.9.3. The results were analysed to ensure compliance with restricted bands. The EUT was set to the lowest and highest operating frequencies.

2.4.6 Environmental Conditions

Ambient Temperature	19.8 - 22.8°C
Relative Humidity	28.7 - 68.0%

Product Service

2.4.7 Test Results

802.11(b)

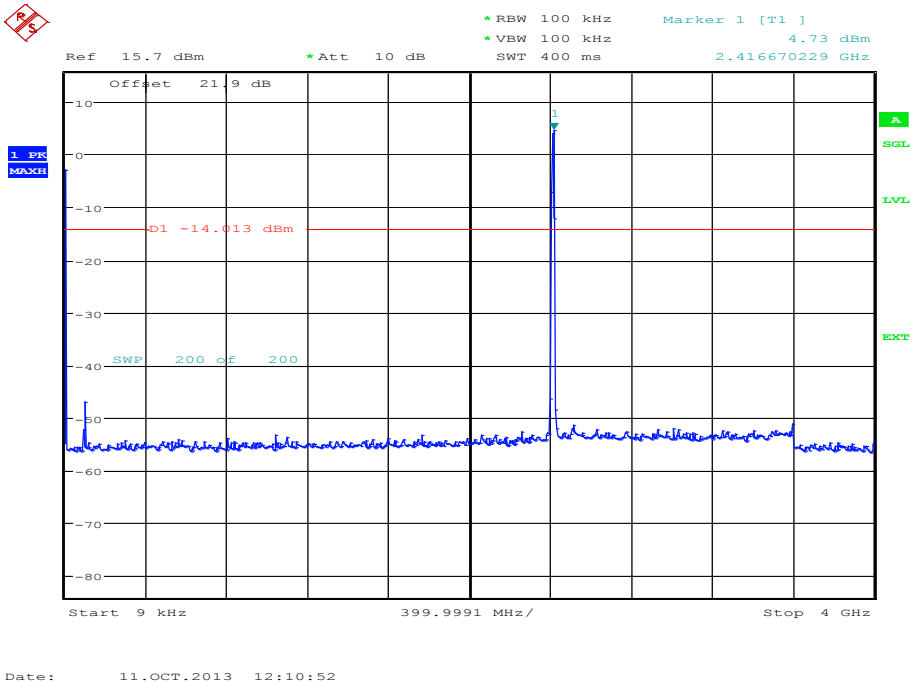
4.0 V DC Supply

Spurious Conducted Emissions

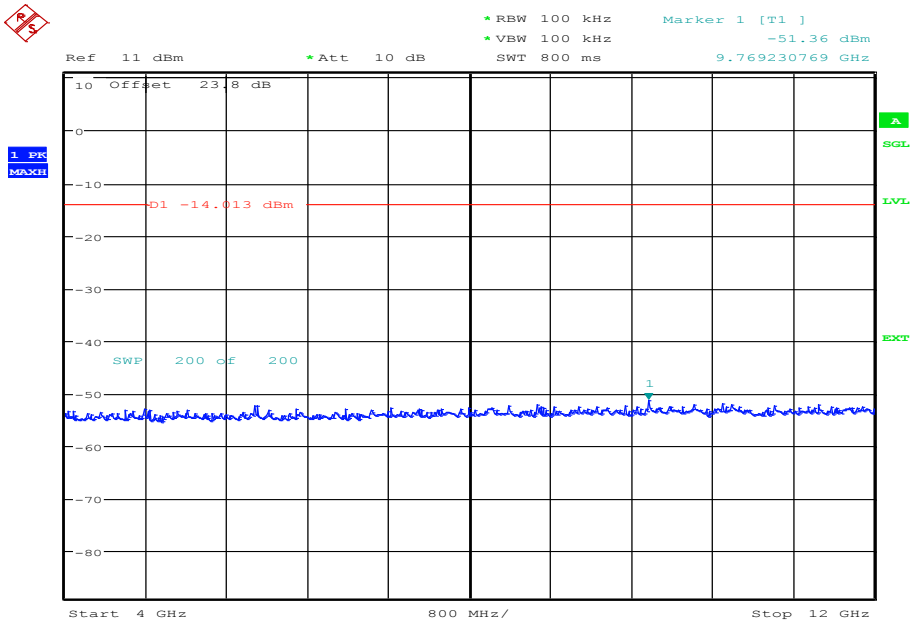
5.5 Mbps

2412 MHz

9 kHz to 4 GHz



4 GHz to 12 GHz



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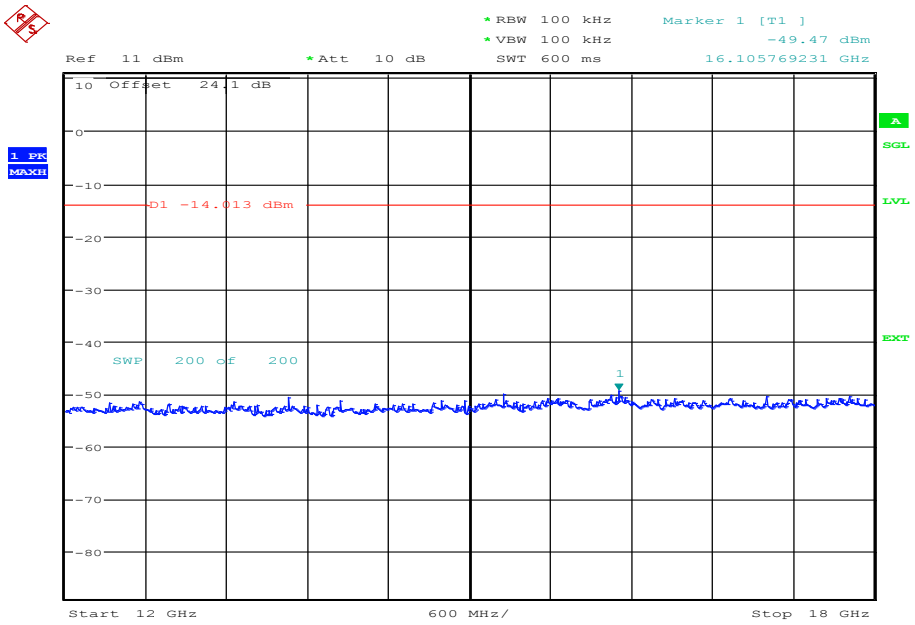
12 GHz to 18 GHz



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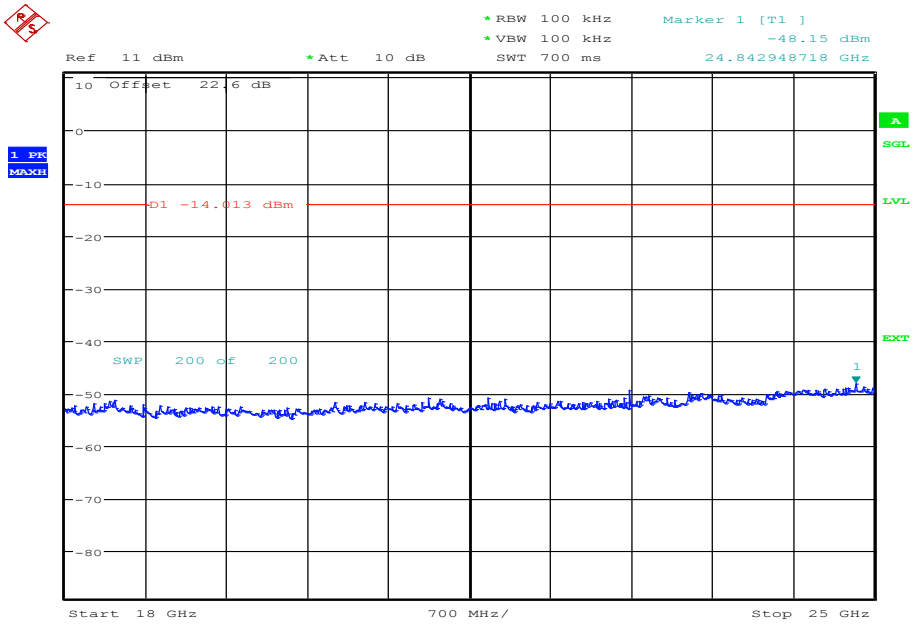
18 GHz to 25 GHz



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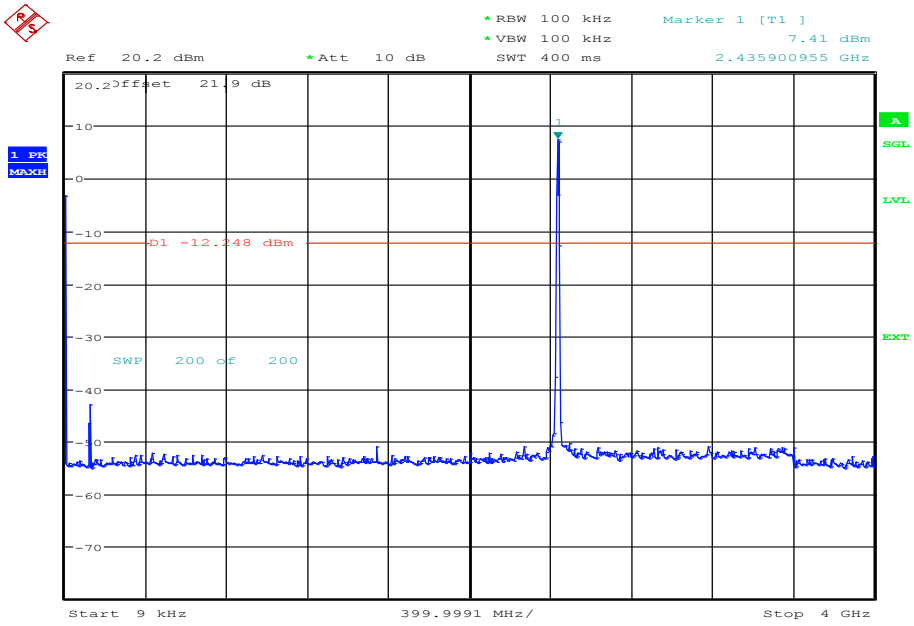
2437 MHz

9 kHz to 4 GHz



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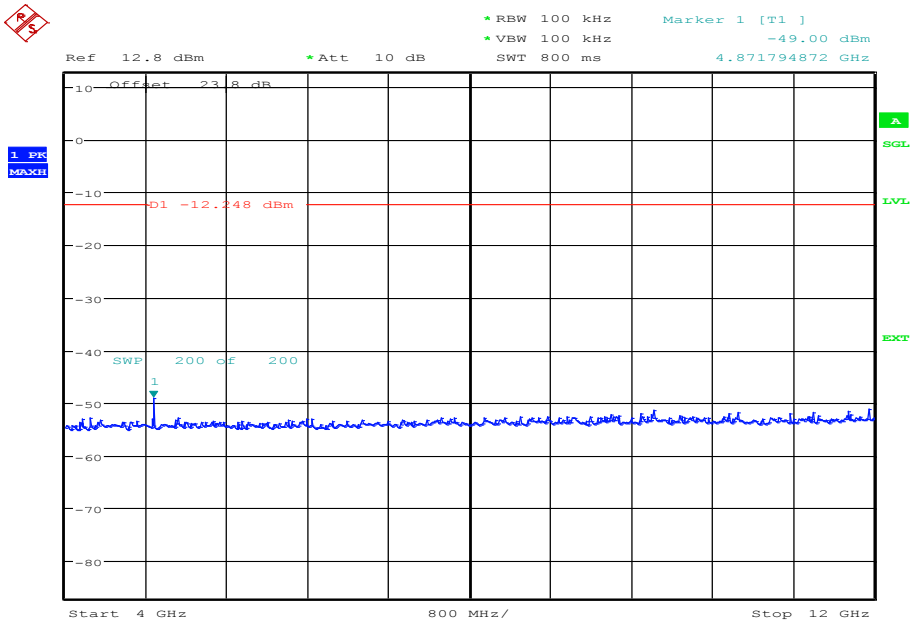
4 GHz to 12 GHz



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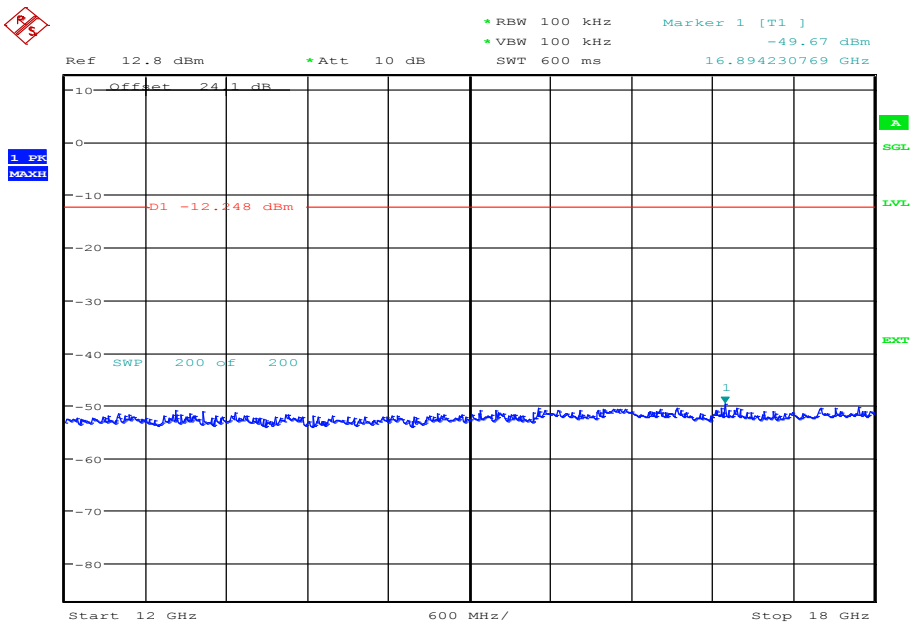
12 GHz to 18 GHz



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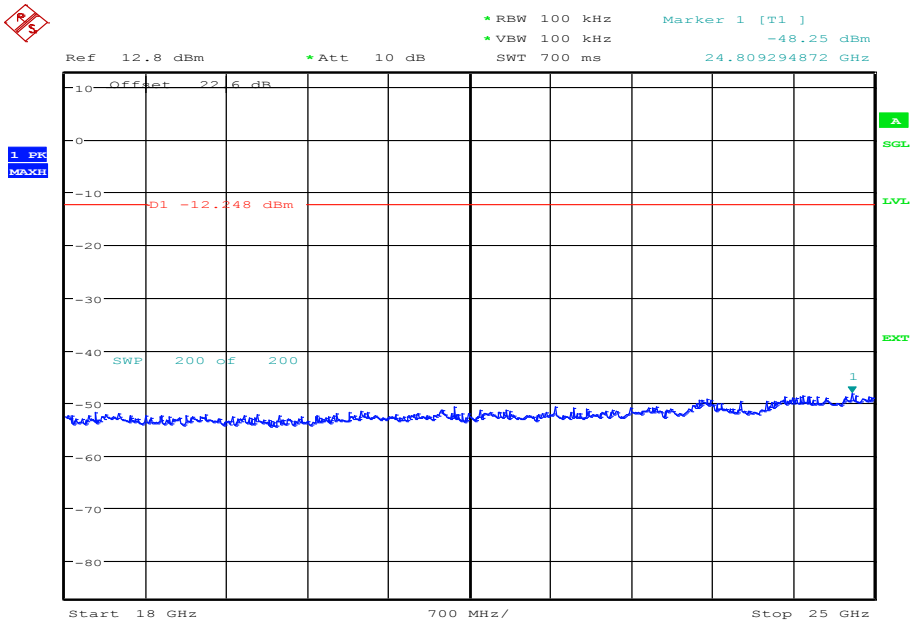
18 GHz to 25 GHz



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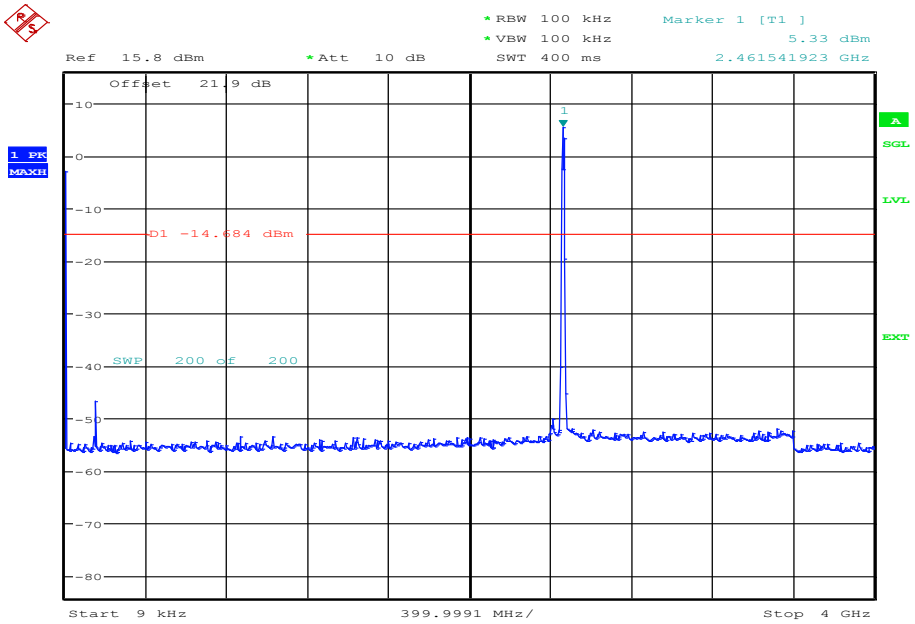
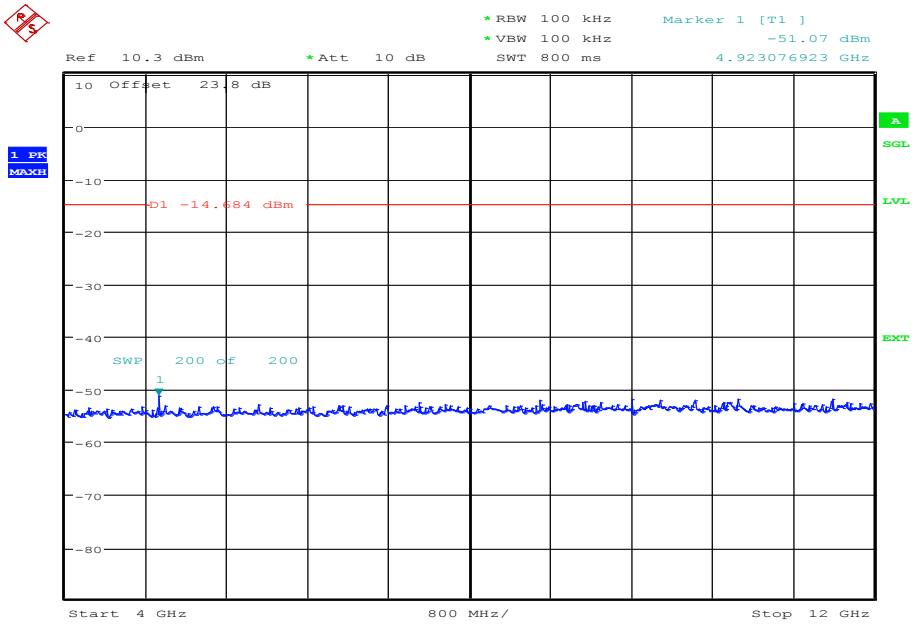
2462 MHz

9 kHz to 4 GHz



Date: 11.OCT.2013 12:56:07

4 GHz to 12 GHz



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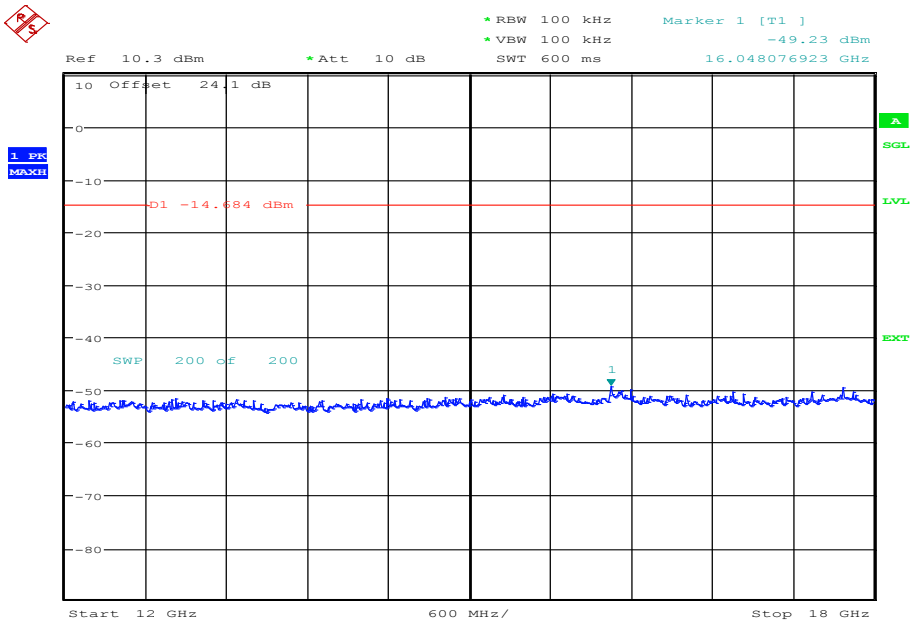
12 GHz to 18 GHz



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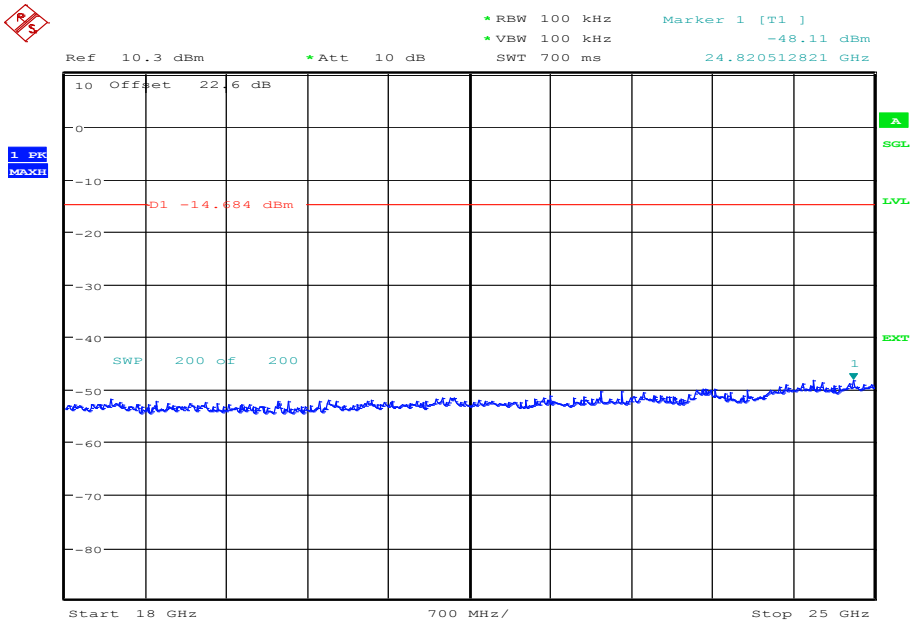
18 GHz to 25 GHz



Limit Clause

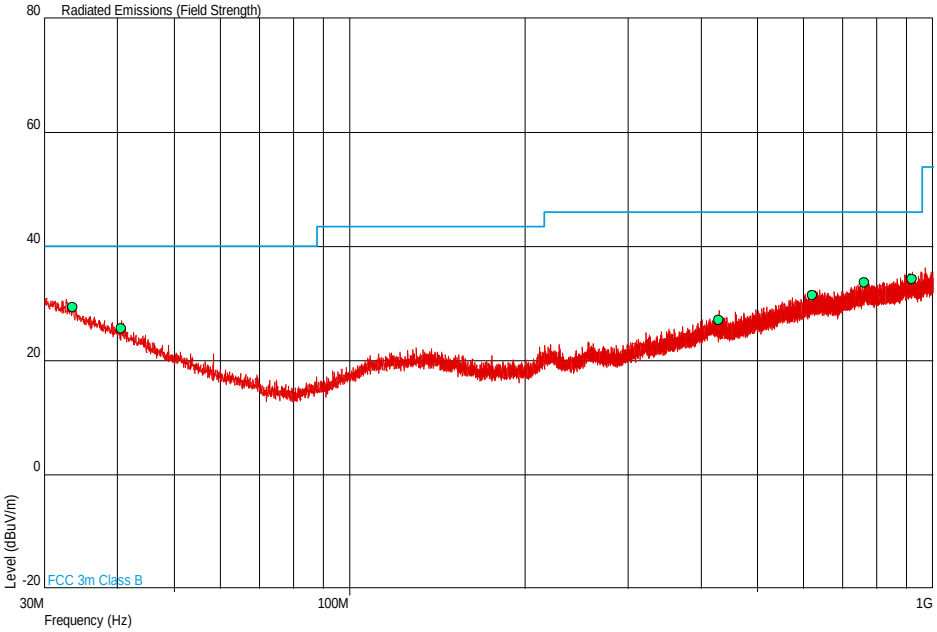
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the 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 the attenuation required shall be 30 dB instead of 20 dB.

Spurious Radiated Emissions

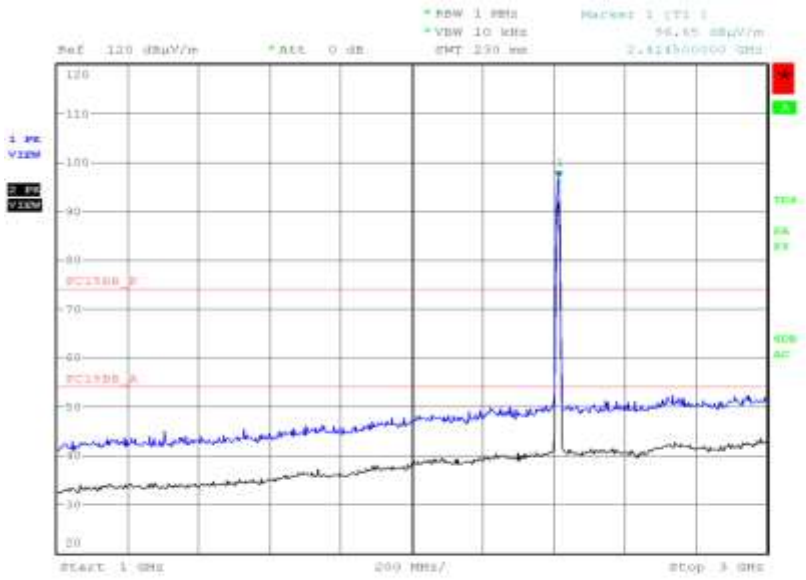
2412 MHz

30 MHz to 1 GHz



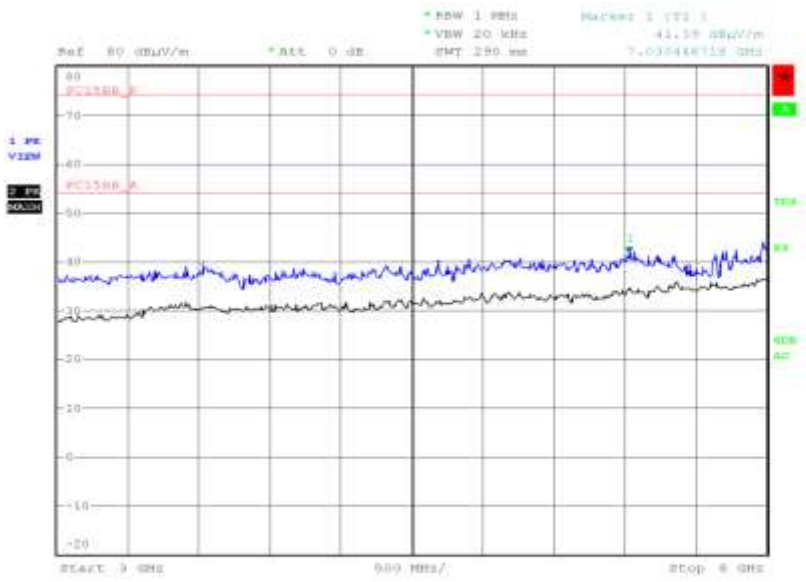
Frequency (MHz)	QP Level (dBµV/m)	QP Level (µV/m)	QP Limit (dBµV/m)	QP Limit (µV/m)	QP Margin (dBµV/m)	QP Margin (µV/m)	Angle (Deg)	Height (m)	Polarity
33.544	29.4	29.5	40.0	100	-10.6	70.5	84	1.64	Horizontal
40.618	25.7	19.3	40.0	100	-14.3	80.7	331	1.00	Vertical
429.024	27.2	22.9	46.0	200	-18.8	177.1	129	1.00	Horizontal
620.954	31.4	37.2	46.0	200	-14.6	162.8	294	1.00	Horizontal
764.229	33.6	47.9	46.0	200	-12.4	152.1	2	1.00	Vertical
921.196	34.2	51.3	46.0	200	-11.8	148.7	20	2.13	Horizontal

1 GHz to 3 GHz



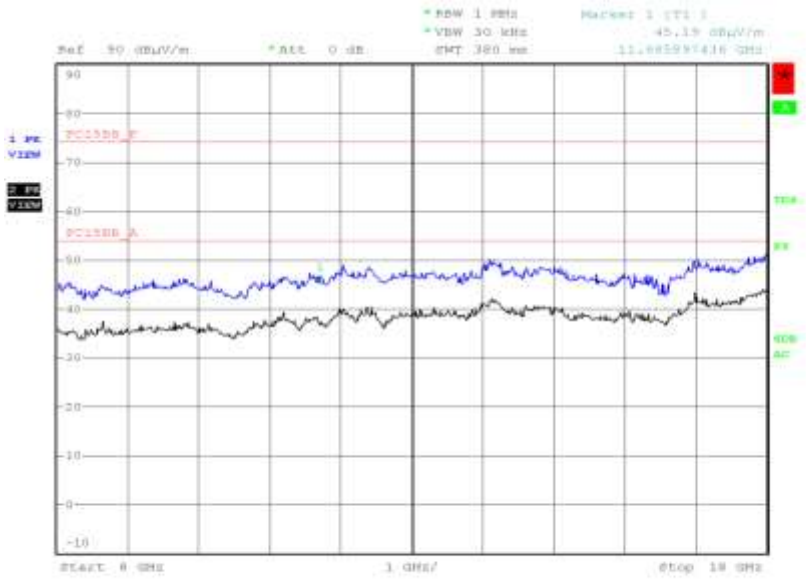
Date: 2.OCT.2013 23:55:28

3 GHz to 8 GHz



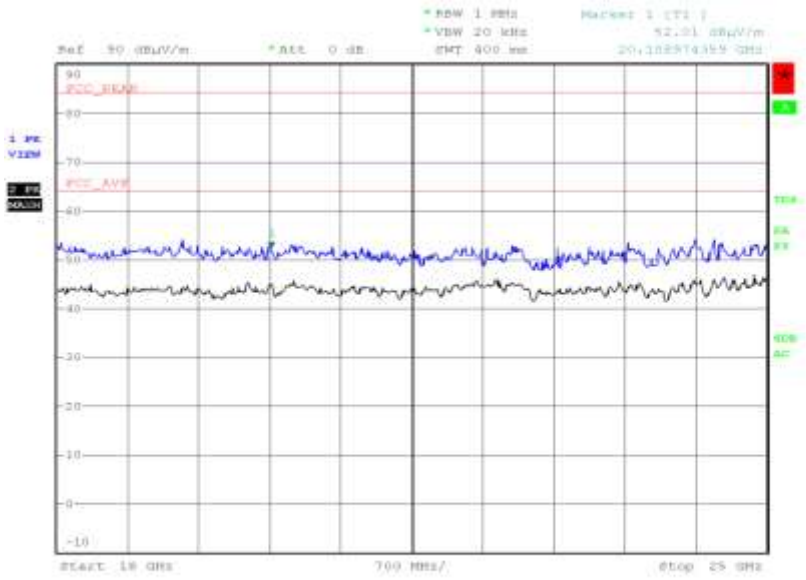
Date: 3.OCT.2013 03:11:54

8 GHz to 18 GHz



Date: 5.OCT.2013 01:36:49

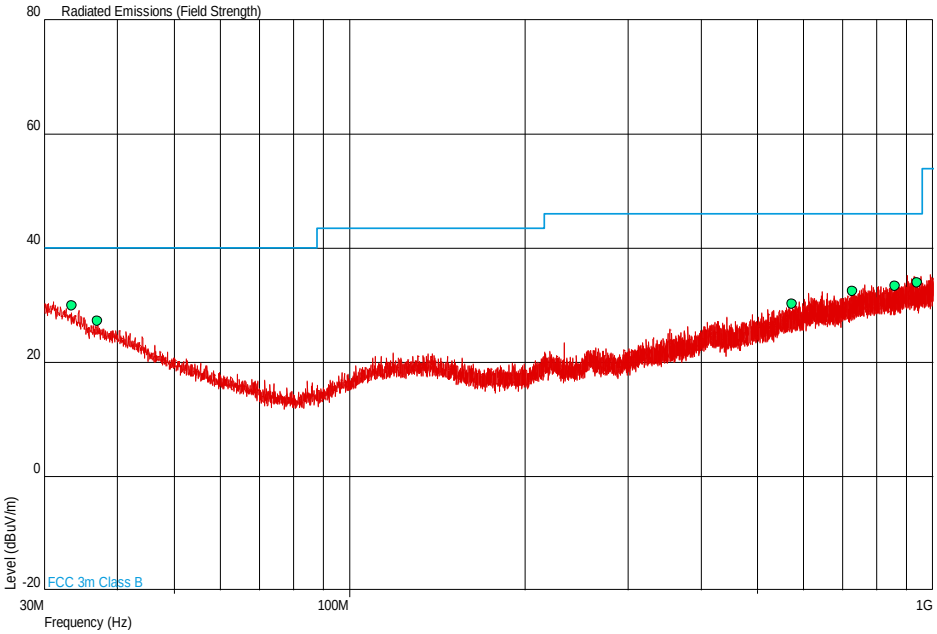
18 GHz to 25 GHz



Date: 12.OCT.2013 22:55:51

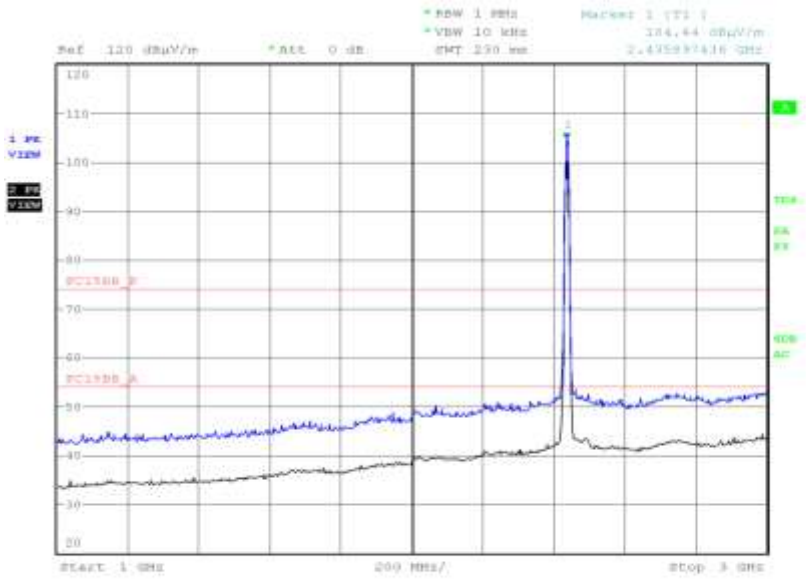
2437 MHz

30 MHz to 1 GHz



Frequency (MHz)	QP Level (dBµV/m)	QP Level (µV/m)	QP Limit (dBµV/m)	QP Limit (µV/m)	QP Margin (dBµV/m)	QP Margin (µV/m)	Angle (Deg)	Height (m)	Polarity
33.434	29.9	31.3	40.0	100	-10.1	68.7	330	1.00	Horizontal
37.028	27.2	22.9	40.0	100	-12.8	77.1	130	1.00	Horizontal
573.805	30.2	32.4	46.0	200	-15.8	167.6	360	3.13	Vertical
728.689	32.5	42.2	46.0	200	-13.5	157.8	298	1.00	Horizontal
860.929	33.3	46.2	46.0	200	-12.7	153.8	144	1.00	Horizontal
938.178	34.0	50.1	46.0	200	-12.0	149.9	208	2.39	Vertical

1 GHz to 3 GHz



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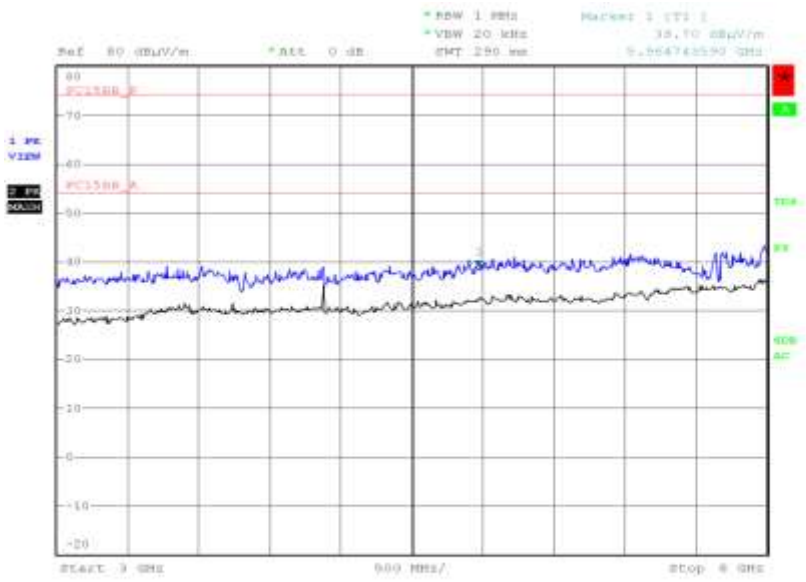
3 GHz to 8 GHz



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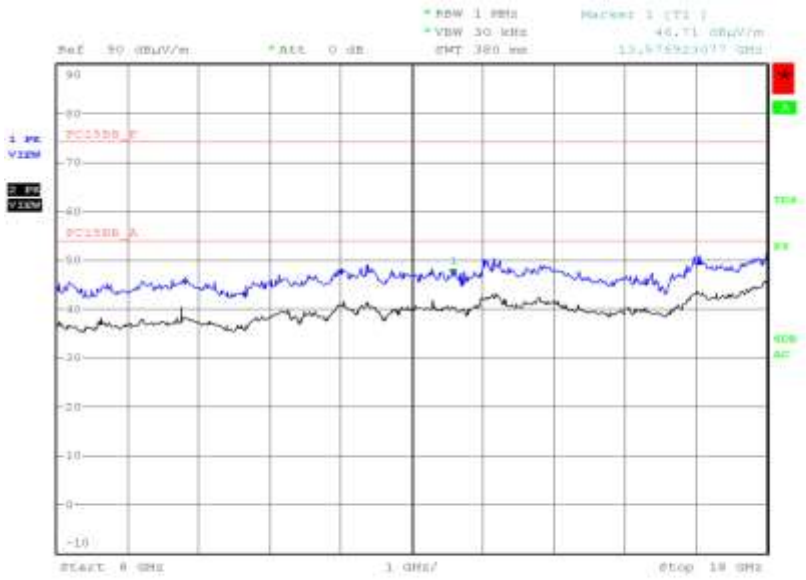
8 GHz to 18 GHz



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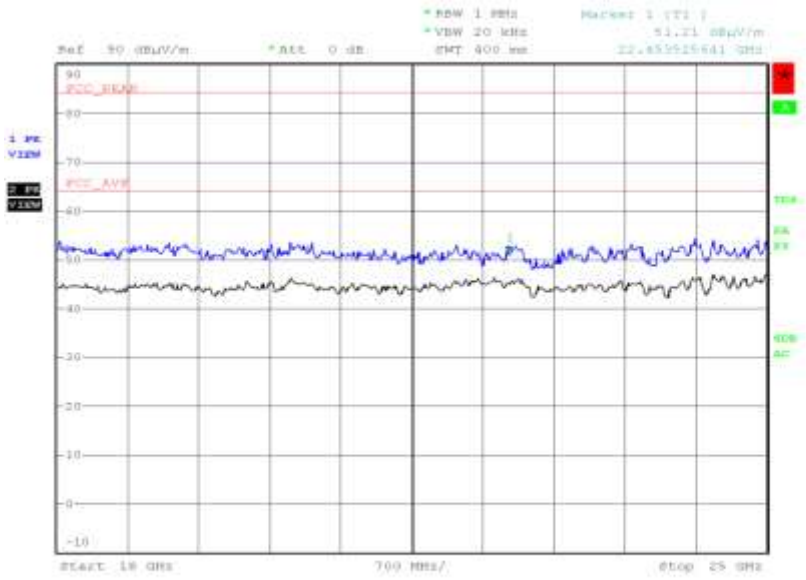
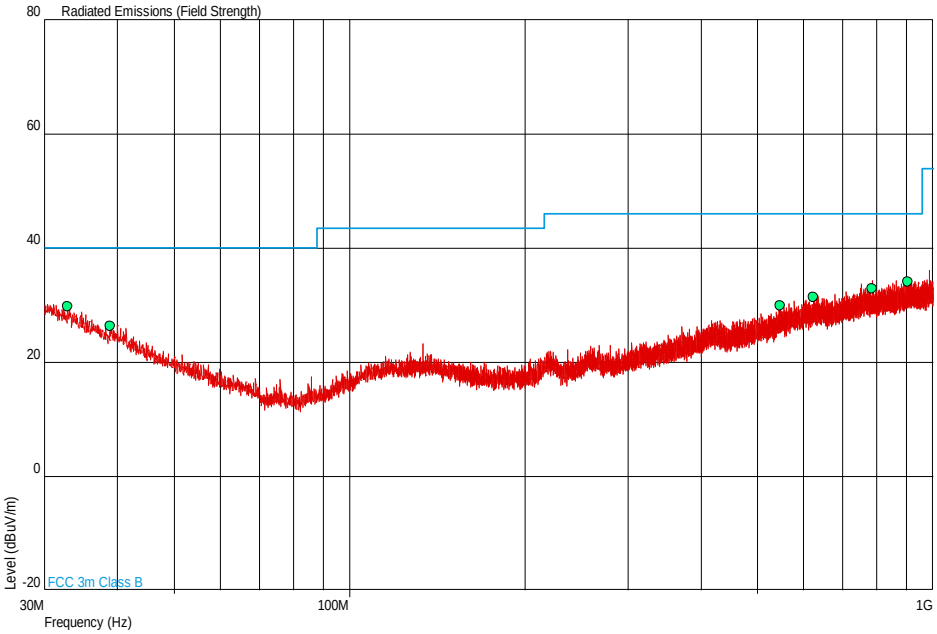
18 GHz to 25 GHz



Date: 12.OCT.2013 22:46:30

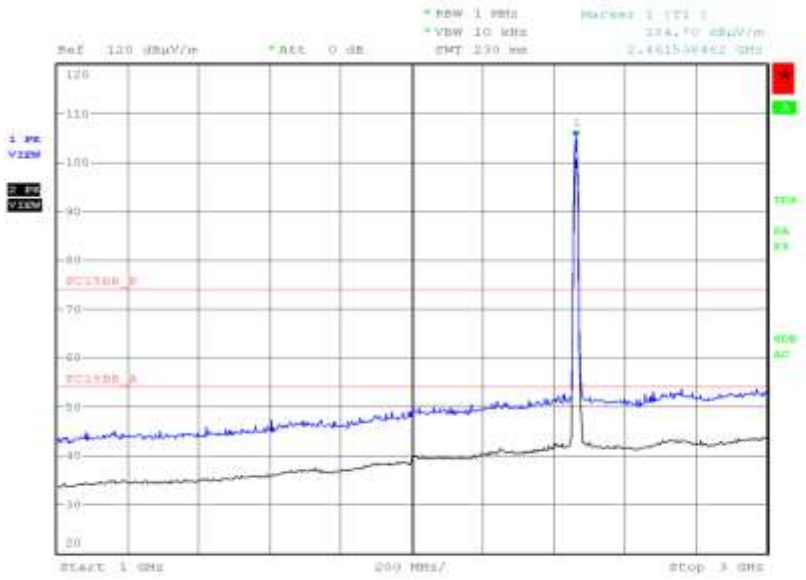
2462 MHz

30 MHz to 1 GHz



Frequency (MHz)	QP Level (dBµV/m)	QP Level (µV/m)	QP Limit (dBµV/m)	QP Limit (µV/m)	QP Margin (dBµV/m)	QP Margin (µV/m)	Angle (Deg)	Height (m)	Polarity
32.859	29.8	30.9	40.0	100	-10.2	69.1	112	1.00	Vertical
38.962	26.3	20.7	40.0	100	-13.7	79.3	228	3.99	Vertical
546.542	29.9	31.3	46.0	200	-16.1	168.7	129	1.00	Horizontal
623.594	31.4	37.2	46.0	200	-14.6	162.8	360	2.62	Vertical
786.899	33.0	44.7	46.0	200	-13.0	155.3	241	1.00	Horizontal
906.764	34.2	51.3	46.0	200	-11.8	148.7	30	1.00	Vertical

1 GHz to 3 GHz



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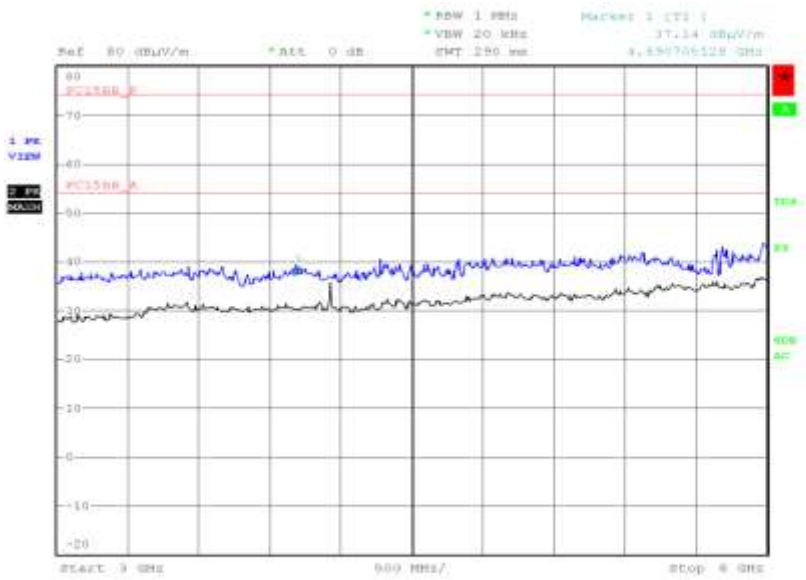
3 GHz to 8 GHz



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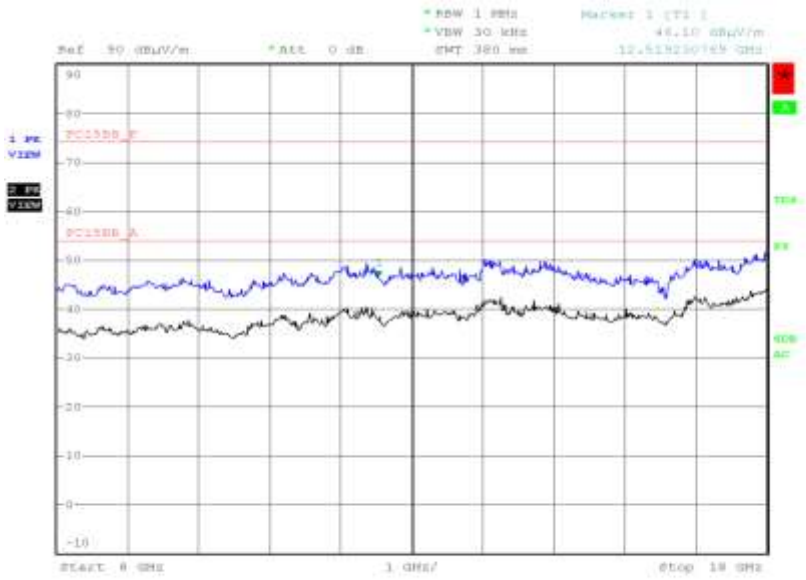
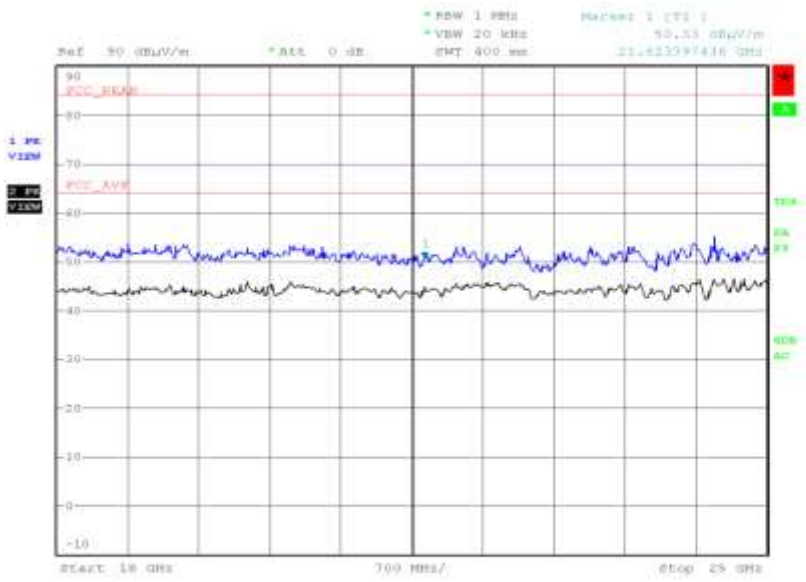
8 GHz to 18 GHz



18 GHz to 25 GHz



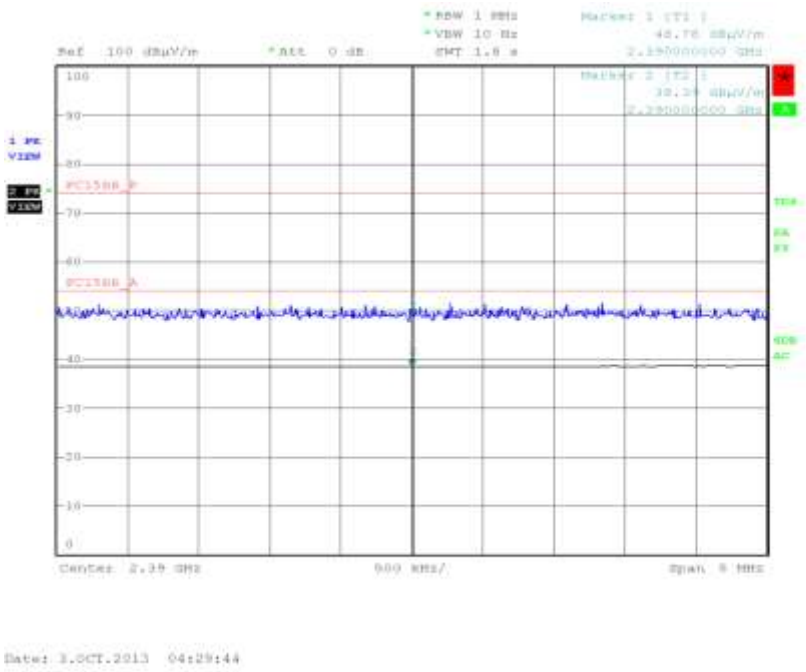
Limit

Peak (dBµV/m)	Average (dBµV/m)
74.0	54.0

Band Edge Emissions

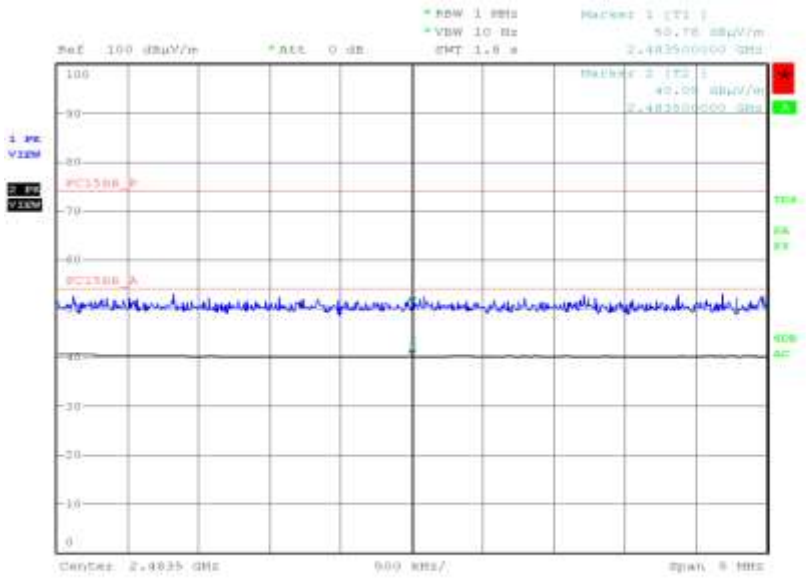
2412 MHz

Polarisation	Final Peak (dBµV/m)	Final Average (dBµV/m)
Horizontal	48.78	38.39



2462 MHz

Polarisation	Final Peak (dBµV/m)	Final Average (dBµV/m)
Horizontal	50.78	40.05



Limit

Peak (dBµV/m)	Average (dBµV/m)
74.0	54.0

802.11(g)

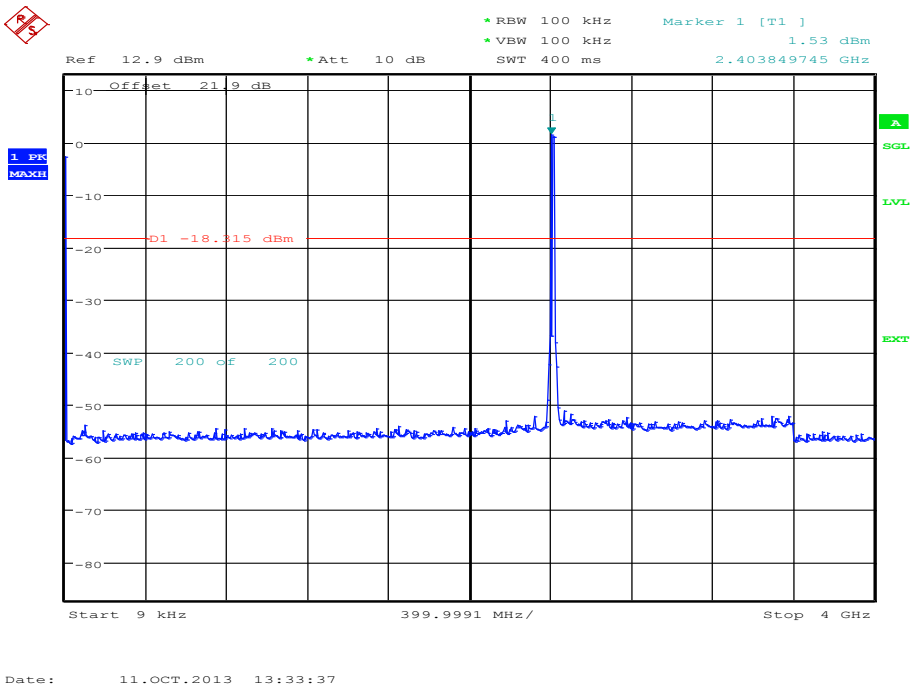
4.0 V DC Supply

Spurious Conducted Emissions

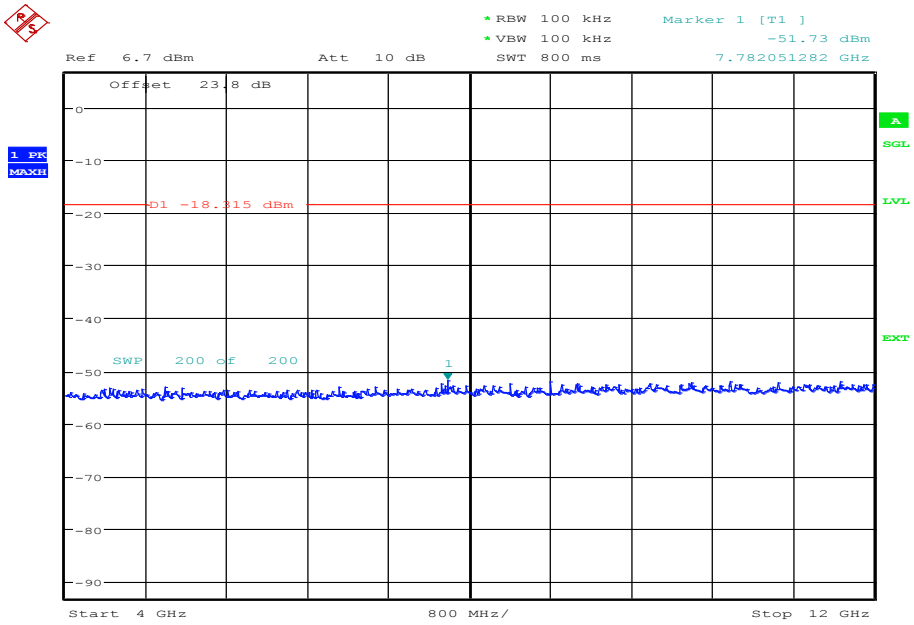
9 Mbps

2412 MHz

9 kHz to 4 GHz



4 GHz to 12 GHz



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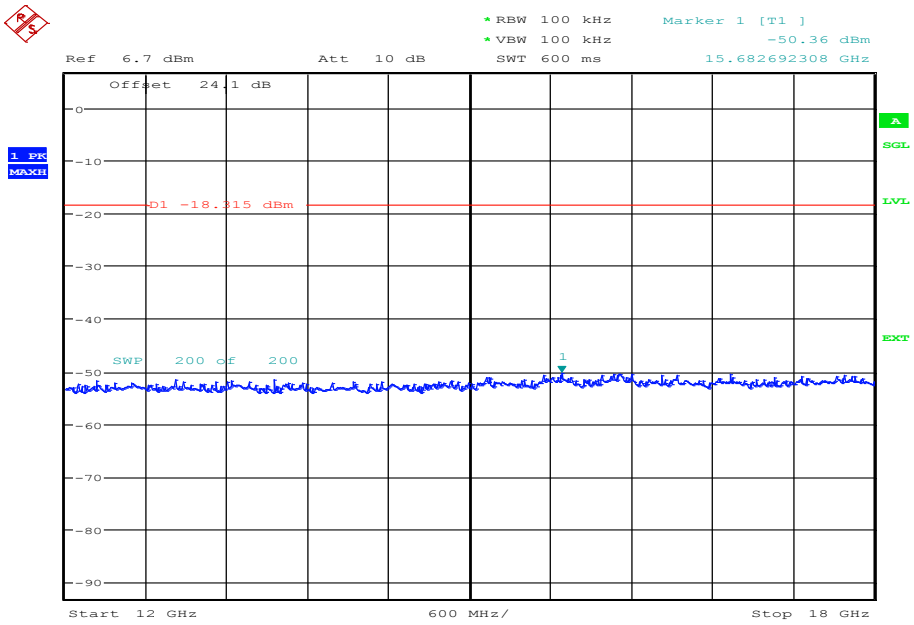
12 GHz to 18 GHz



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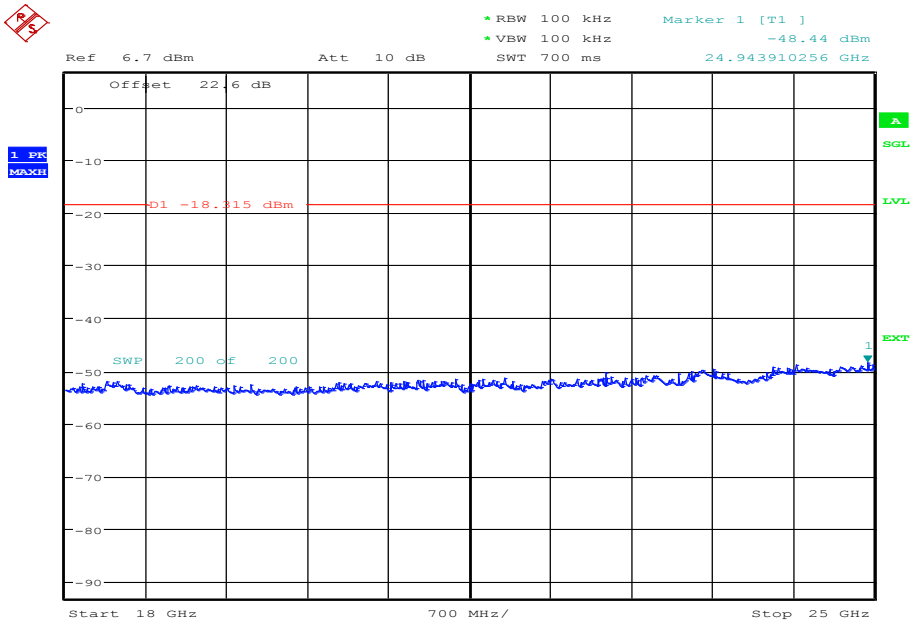
18 GHz to 25 GHz



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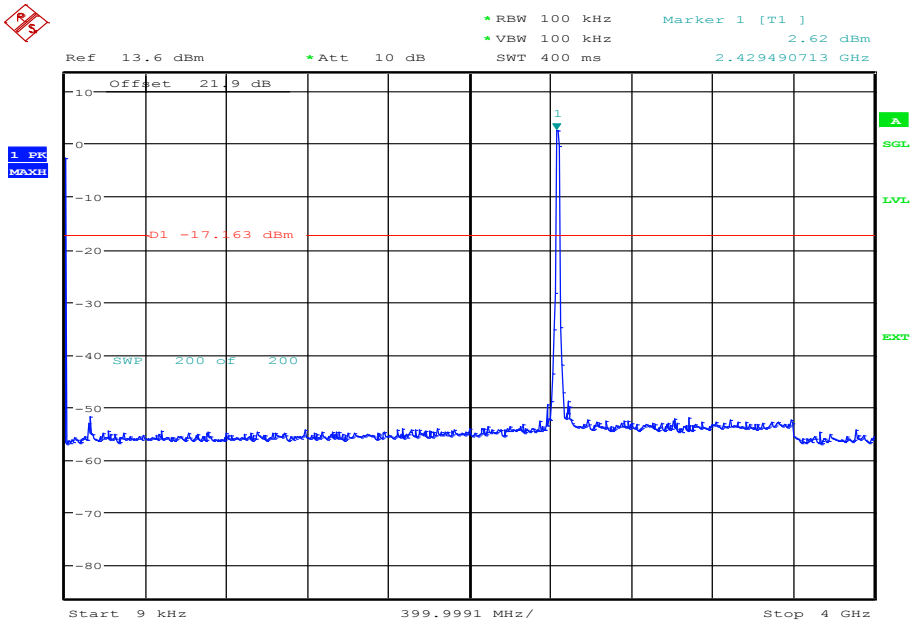
2437 MHz

9 kHz to 4 GHz



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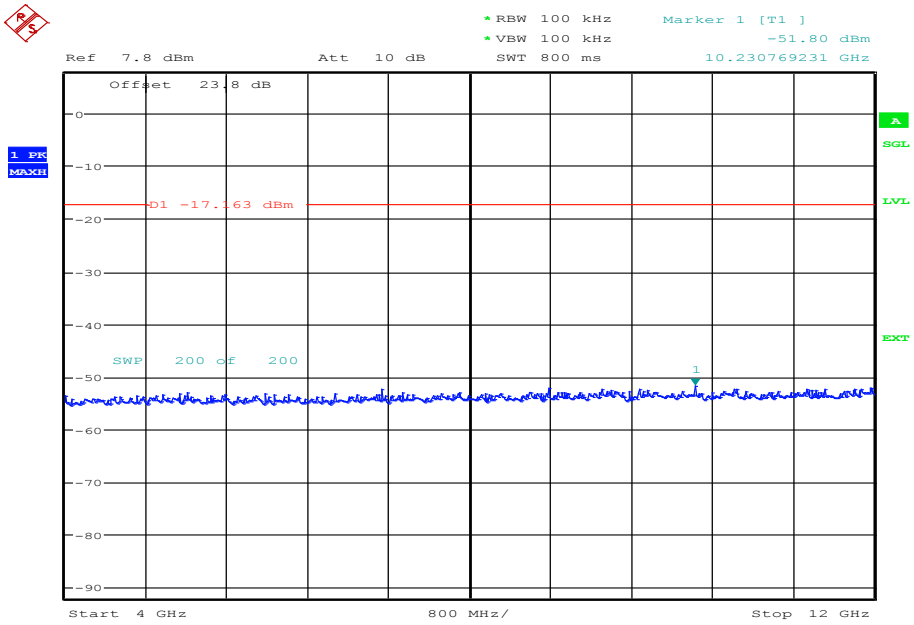
4 GHz to 12 GHz



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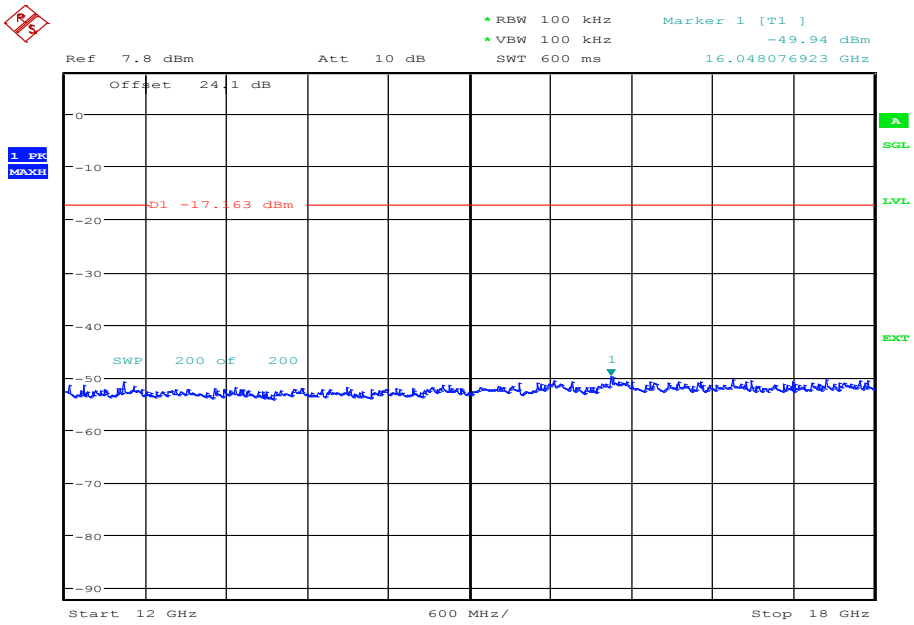
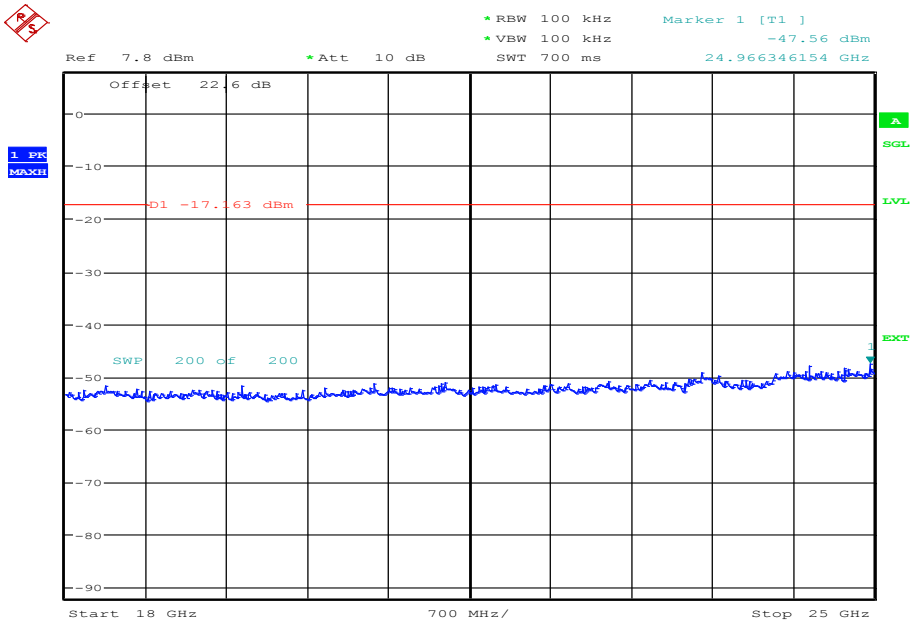
12 GHz to 18 GHz



Date: 11.OCT.2013 14:00:21

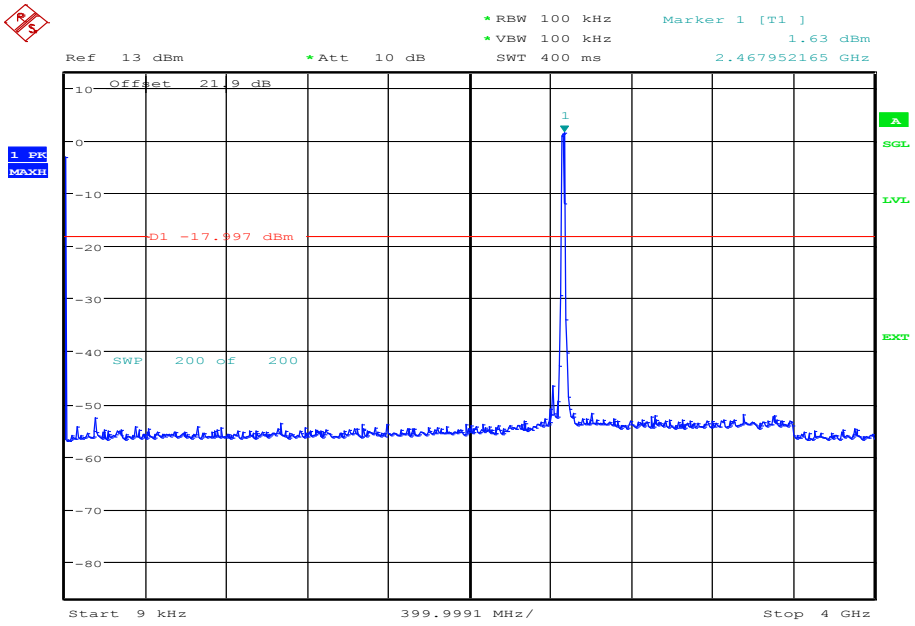
18 GHz to 25 GHz



Date: 11.OCT.2013 14:22:57

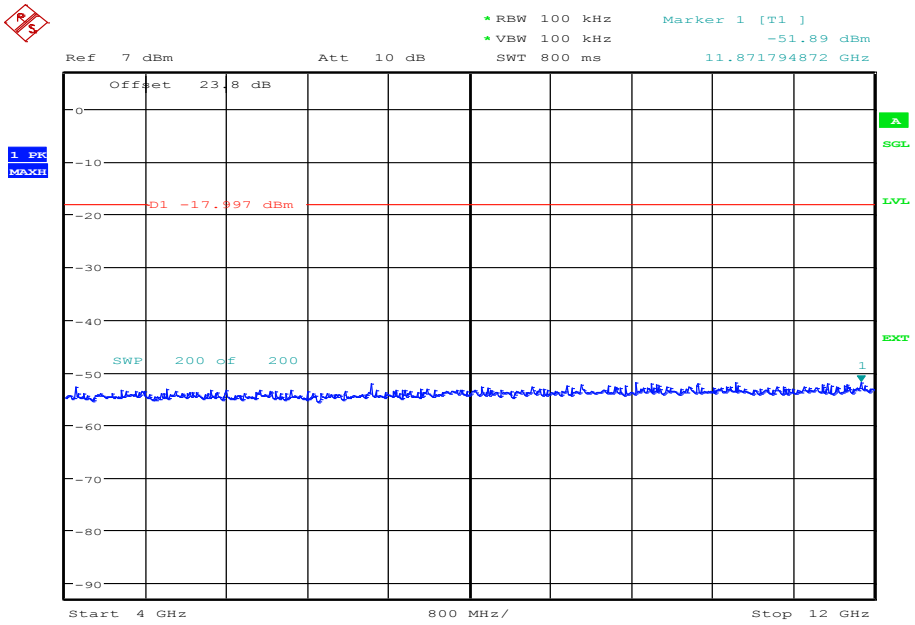
2462 MHz

9 kHz to 4 GHz



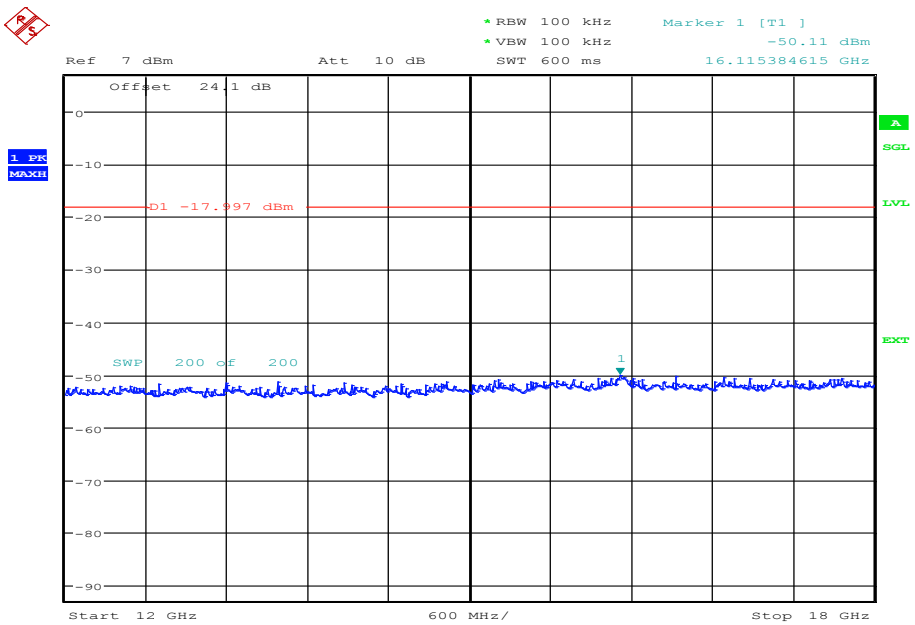
Date: 11.OCT.2013 13:43:07

4 GHz to 12 GHz



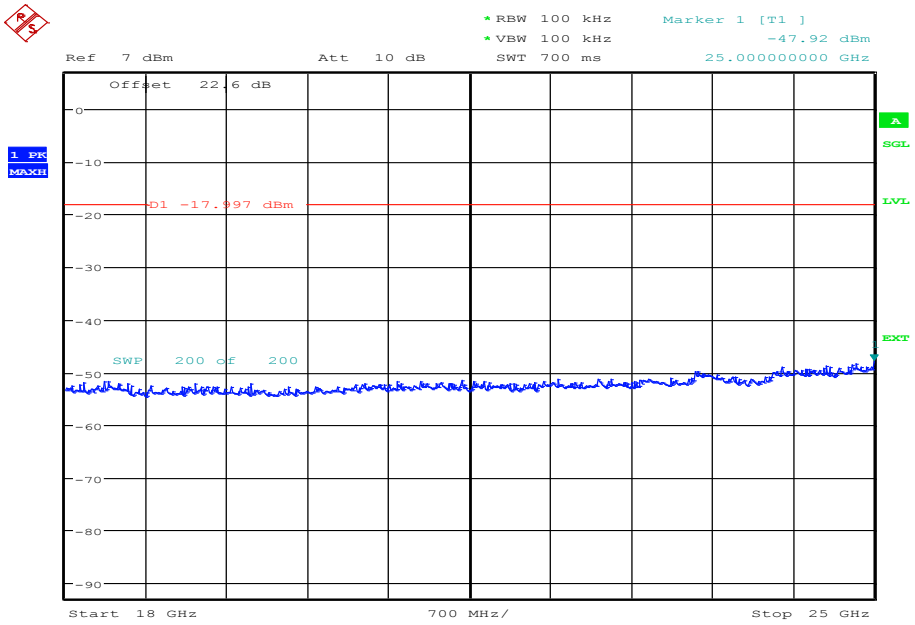
Date: 11.OCT.2013 14:04:10

12 GHz to 18 GHz



Date: 11.OCT.2013 14:07:09

18 GHz to 25 GHz



Date: 11.OCT.2013 14:14:09

Limit Clause

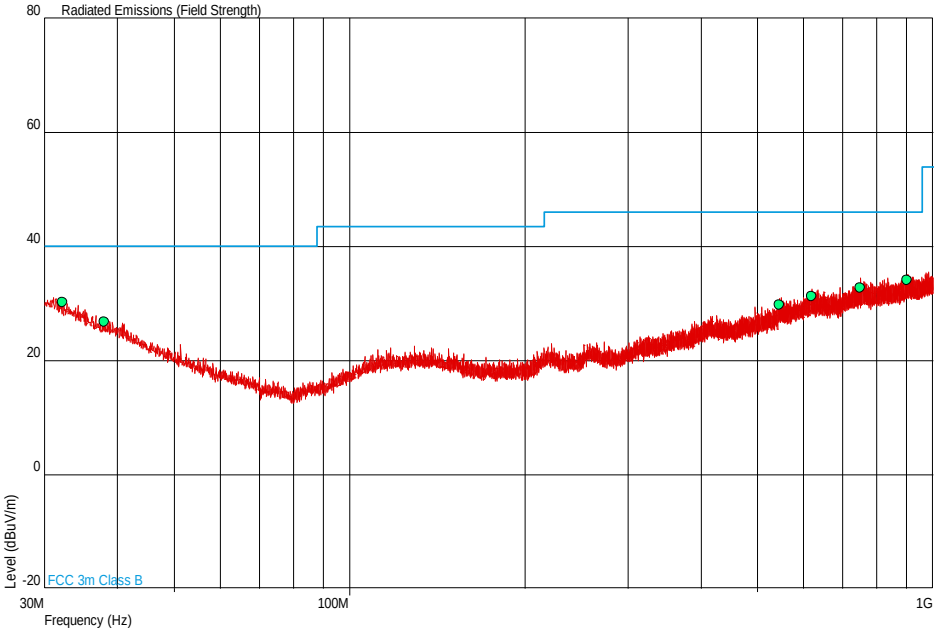
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the 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 the attenuation required shall be 30 dB instead of 20 dB.

Spurious Radiated Emissions

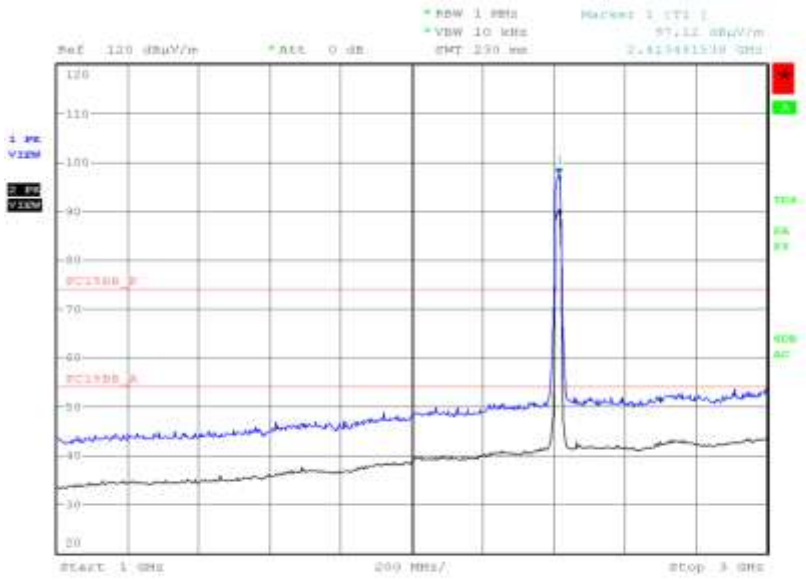
2412 MHz

30 MHz to 1 GHz



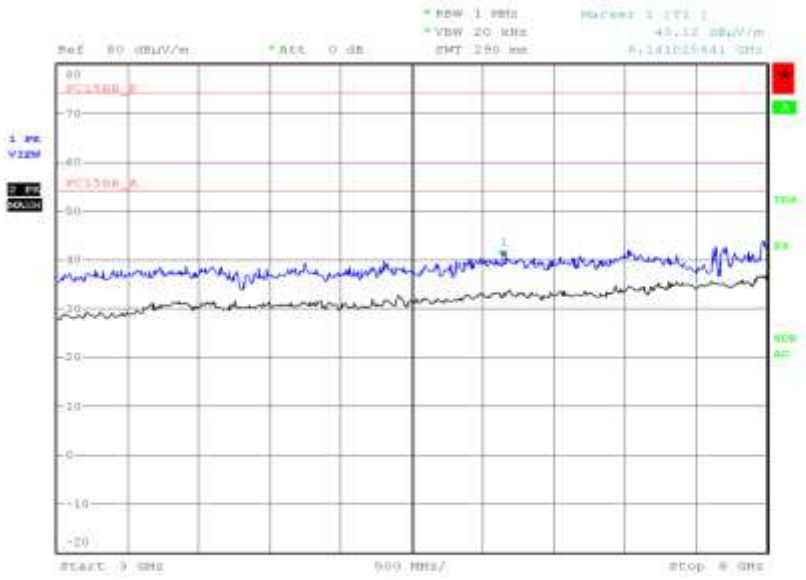
Frequency (MHz)	QP Level (dBµV/m)	QP Level (µV/m)	QP Limit (dBµV/m)	QP Limit (µV/m)	QP Margin (dBµV/m)	QP Margin (µV/m)	Angle (Deg)	Height (m)	Polarity
32.223	30.2	32.4	40.0	100	-9.8	67.6	112	1.00	Vertical
37.984	26.8	21.9	40.0	100	-13.2	78.1	329	1.00	Vertical
545.039	29.8	30.9	46.0	200	-16.2	169.1	0	1.00	Vertical
620.422	31.3	36.7	46.0	200	-14.7	163.3	101	2.51	Horizontal
749.763	32.7	43.2	46.0	200	-13.3	156.8	81	2.45	Horizontal
902.681	34.1	50.7	46.0	200	-11.9	149.3	159	4.00	Horizontal

1 GHz to 3 GHz



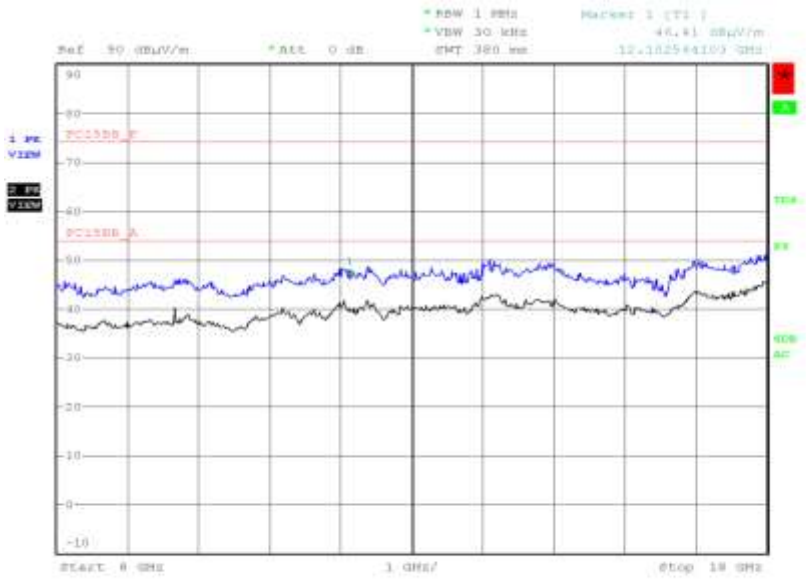
Date: 3.OCT.2013 20:55:27

3 GHz to 8 GHz



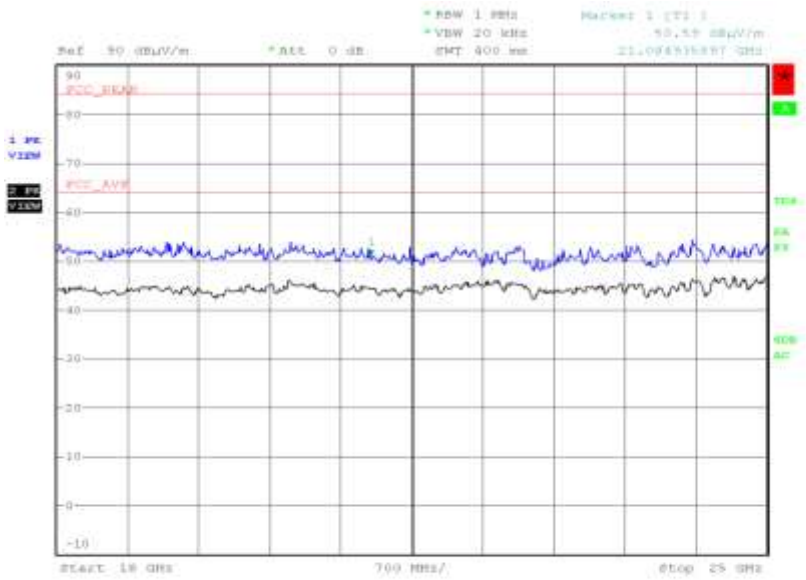
Date: 3.OCT.2013 03:30:13

8 GHz to 18 GHz



Date: 5.OCT.2013 00:58:22

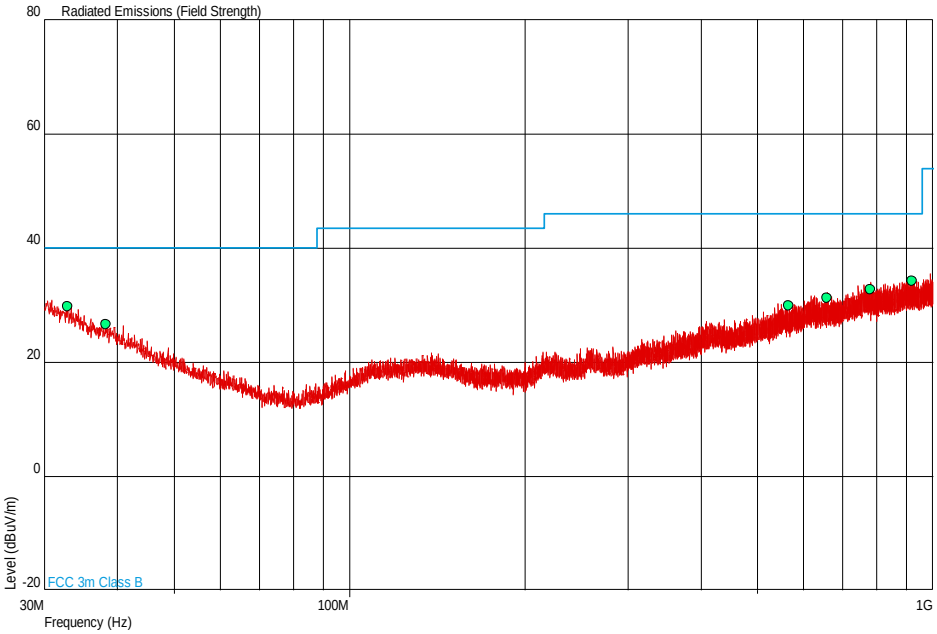
18 GHz to 25 GHz



Date: 12.OCT.2013 23:26:03

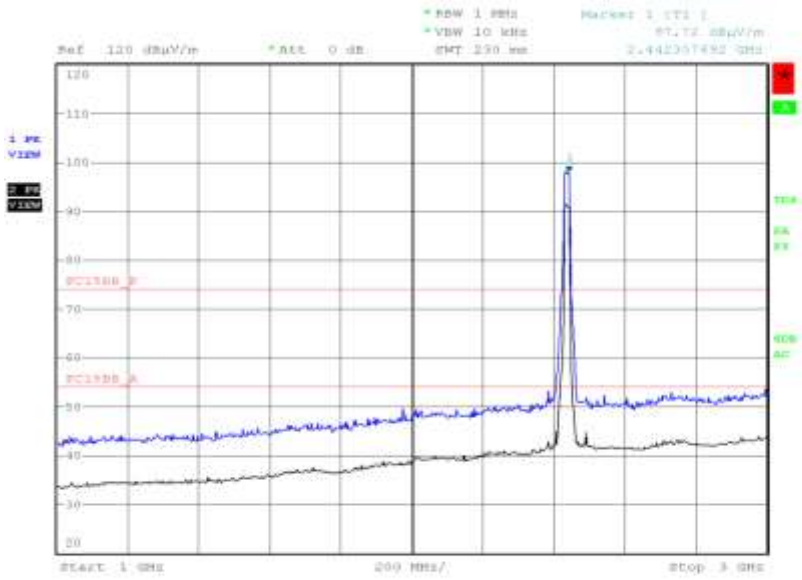
2437 MHz

30 MHz to 1 GHz



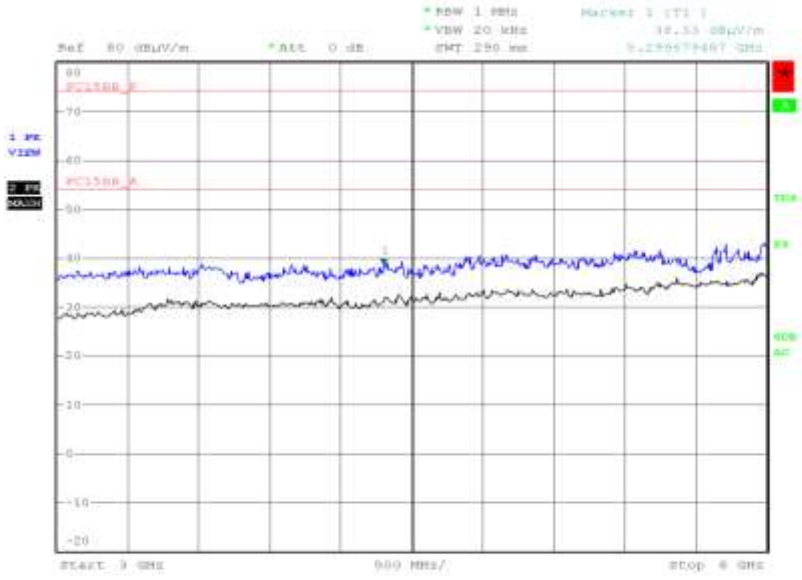
Frequency (MHz)	QP Level (dBµV/m)	QP Level (µV/m)	QP Limit (dBµV/m)	QP Limit (µV/m)	QP Margin (dBµV/m)	QP Margin (µV/m)	Angle (Deg)	Height (m)	Polarity
32.855	29.8	30.9	40.0	100	-10.2	69.1	268	1.00	Horizontal
38.226	26.6	21.4	40.0	100	-13.4	78.6	10	2.50	Horizontal
566.162	29.9	31.3	46.0	200	-16.1	168.7	360	1.00	Horizontal
658.851	31.3	36.7	46.0	200	-14.7	163.3	0	1.00	Horizontal
782.111	32.7	43.2	46.0	200	-13.3	156.8	66	2.09	Horizontal
920.784	34.2	51.3	46.0	200	-11.8	148.7	260	1.00	Horizontal

1 GHz to 3 GHz



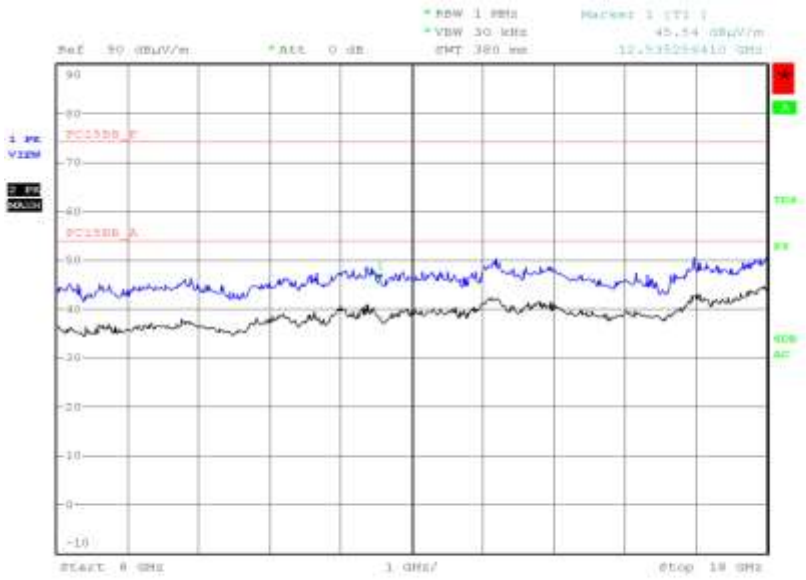
Date: 3.OCT.2013 20:59:08

3 GHz to 8 GHz



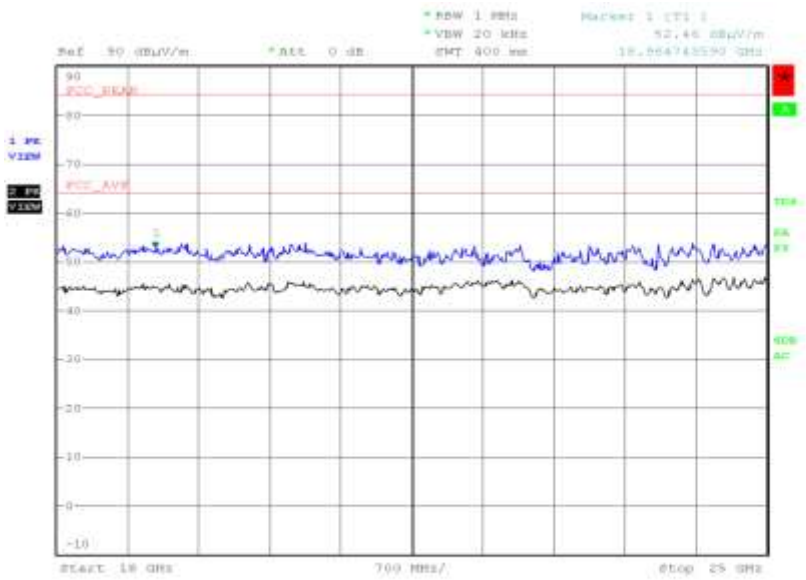
Date: 3.OCT.2013 03:35:07

8 GHz to 18 GHz



Date: 5.OCT.2013 00:42:08

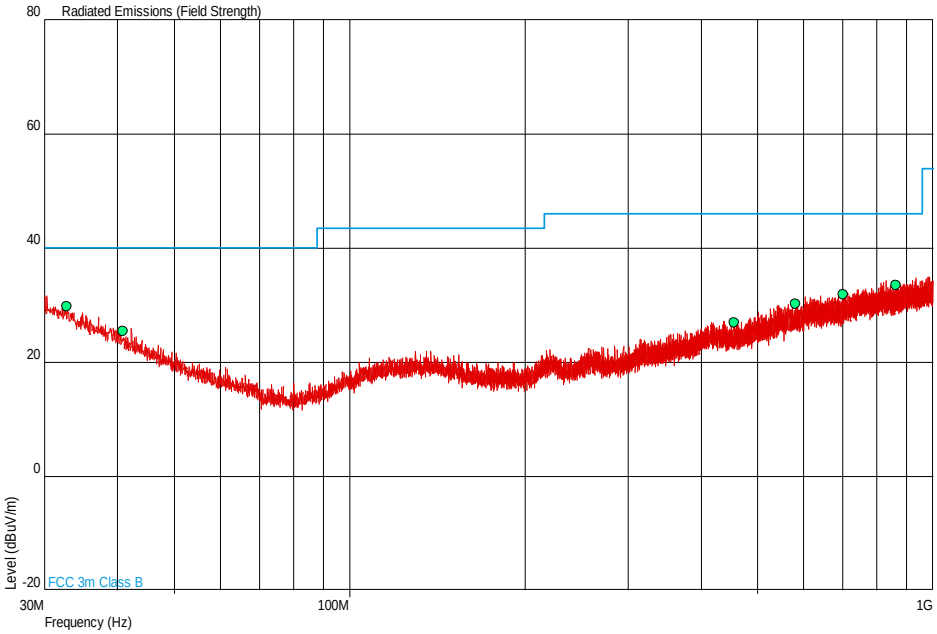
18 GHz to 25 GHz



Date: 12.OCT.2013 21:06:44

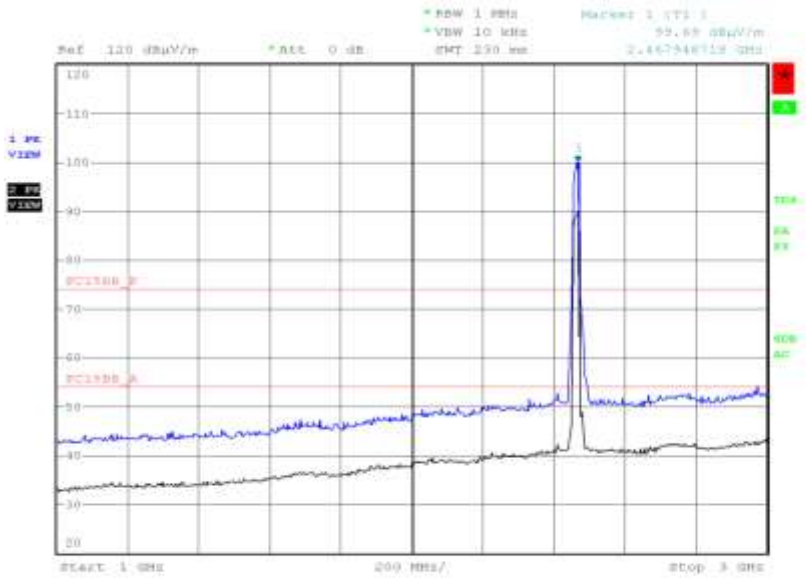
2462 MHz

30 MHz to 1 GHz



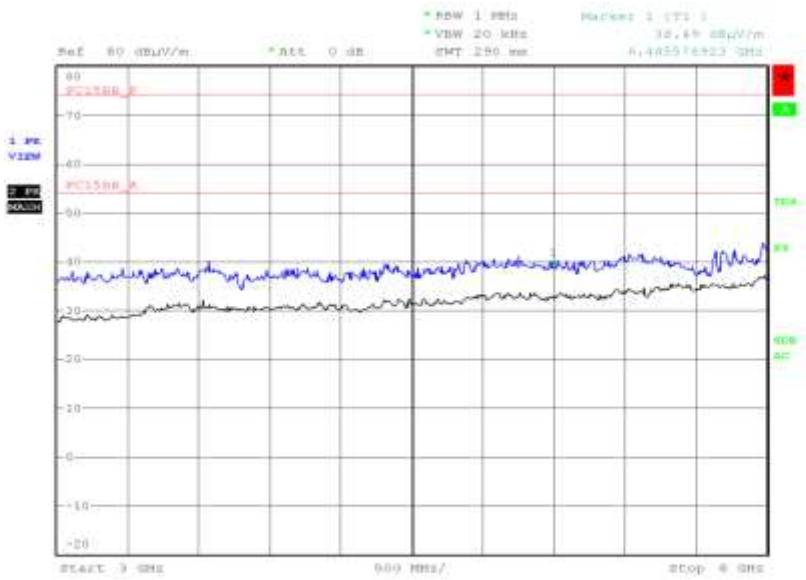
Frequency (MHz)	QP Level (dBµV/m)	QP Level (µV/m)	QP Limit (dBµV/m)	QP Limit (µV/m)	QP Margin (dBµV/m)	QP Margin (µV/m)	Angle (Deg)	Height (m)	Polarity
32.812	29.8	30.9	40.0	100	-10.2	69.1	360	1.00	Vertical
40.998	25.5	18.8	40.0	100	-14.5	81.2	68	1.00	Vertical
456.517	26.9	22.1	46.0	200	-19.1	177.9	243	3.22	Vertical
581.383	30.2	32.4	46.0	200	-15.8	167.6	292	1.00	Horizontal
700.636	31.8	38.9	46.0	200	-14.2	161.1	0	3.65	Vertical
863.579	33.6	47.9	46.0	200	-12.4	152.1	222	1.00	Vertical

1 GHz to 3 GHz



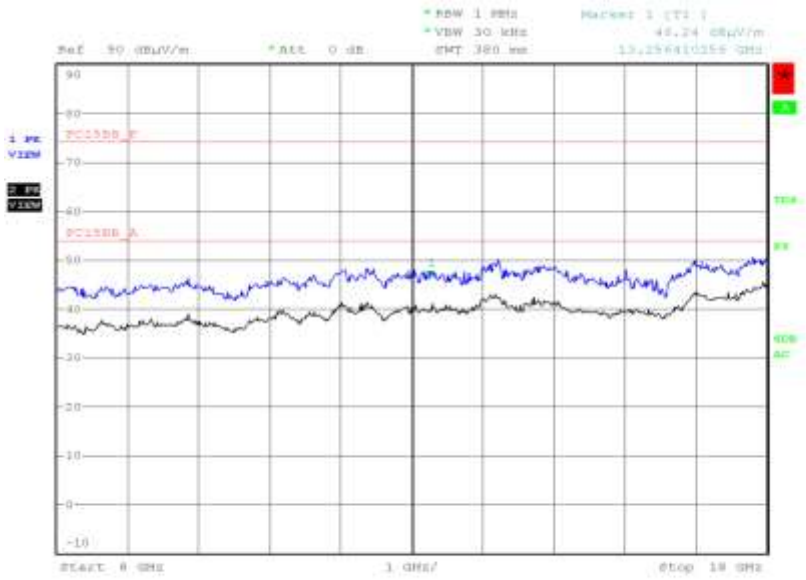
Date: 3.OCT.2013 21:03:30

3 GHz to 8 GHz



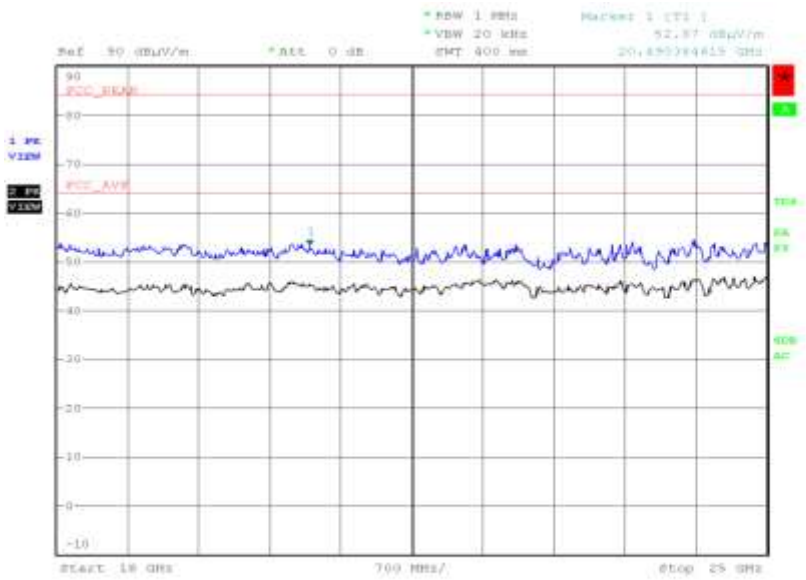
Date: 3.OCT.2013 03:42:26

8 GHz to 18 GHz



Date: 5.OCT.2013 00:30:47

18 GHz to 25 GHz



Date: 12.OCT.2013 23:21:00

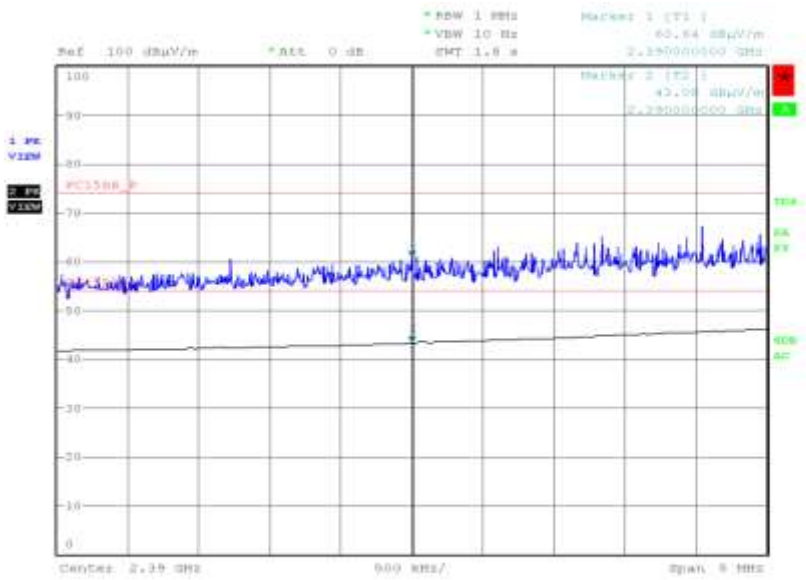
Limit

Peak (dBµV/m)	Average (dBµV/m)
74.0	54.0

Band Edge Emissions

2412 MHz

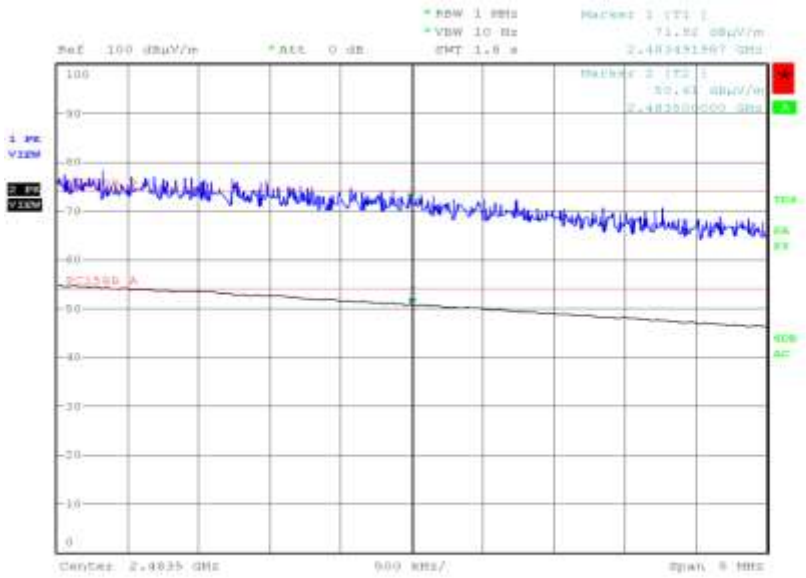
Polarisation	Final Peak (dBµV/m)	Final Average (dBµV/m)
Horizontal	60.64	43.08



Date: 3.OCT.2013 04:31:49

2462 MHz

Polarisation	Final Peak (dBµV/m)	Final Average (dBµV/m)
Horizontal	71.92	50.61



Limit

Peak (dBµV/m)	Average (dBµV/m)
74.0	54.0

802.11(n)

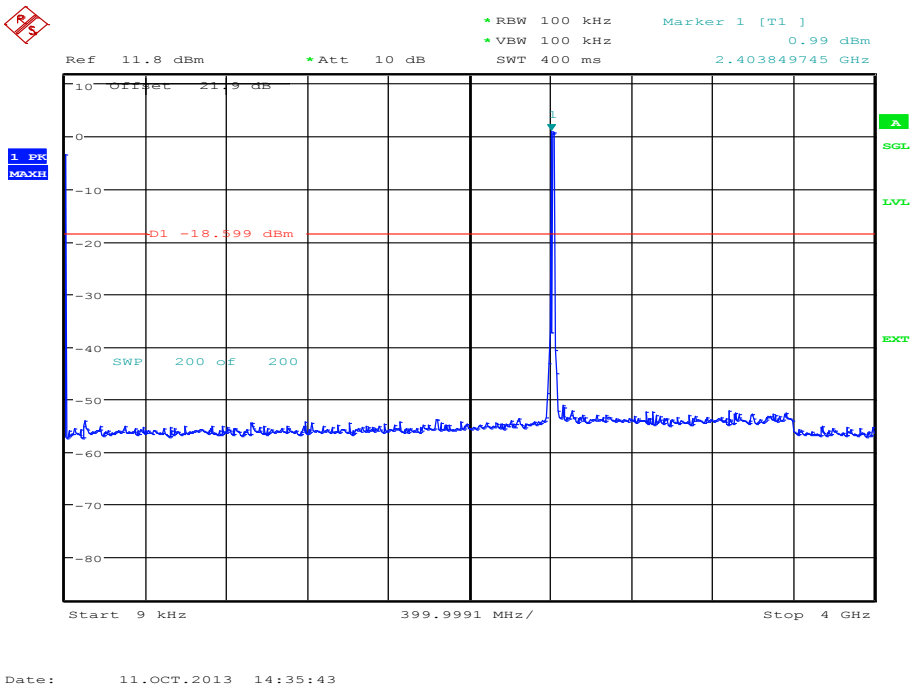
4.0 V DC Supply

Spurious Conducted Emissions

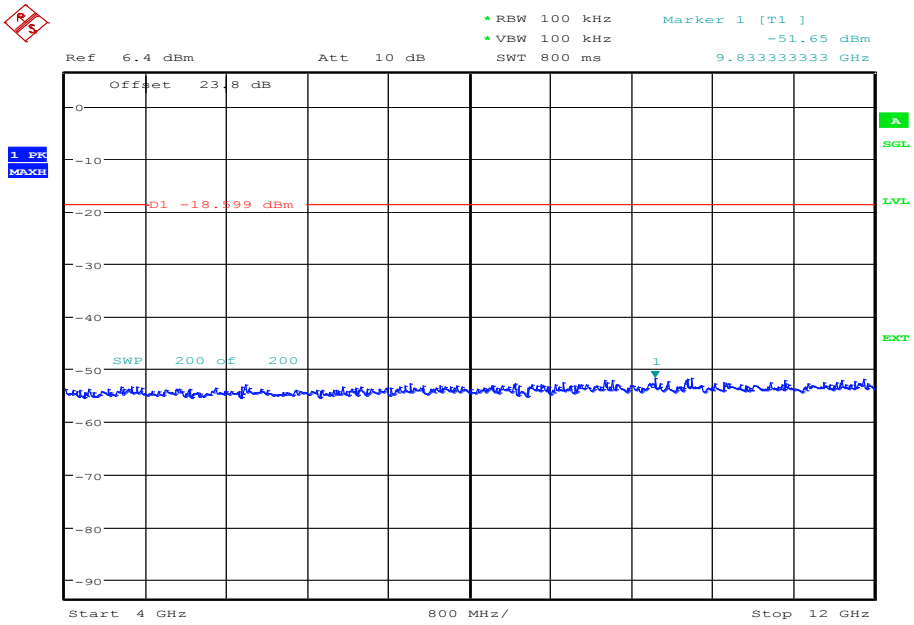
6.5 Mbps

2412 MHz

9 kHz to 4 GHz

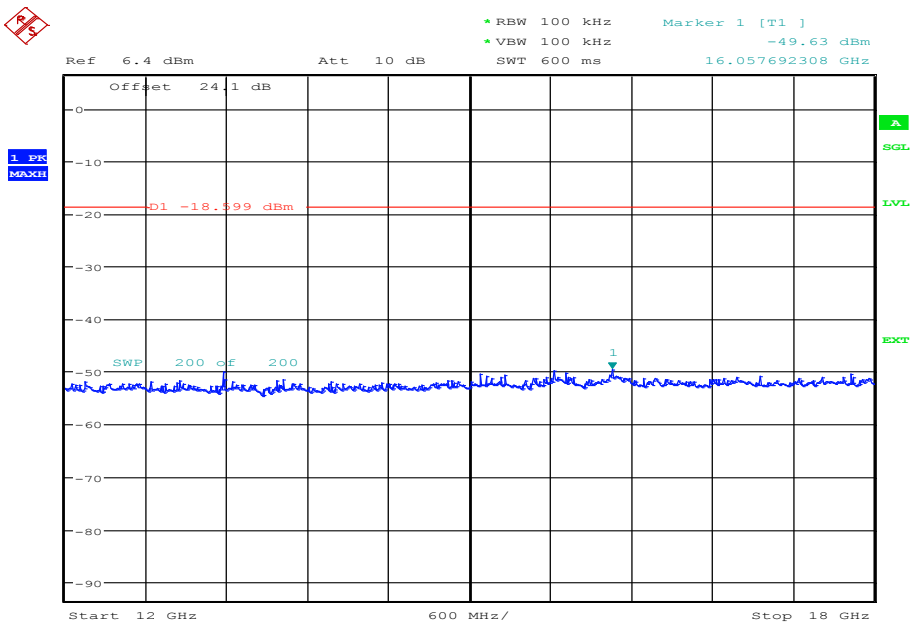


4 GHz to 12 GHz



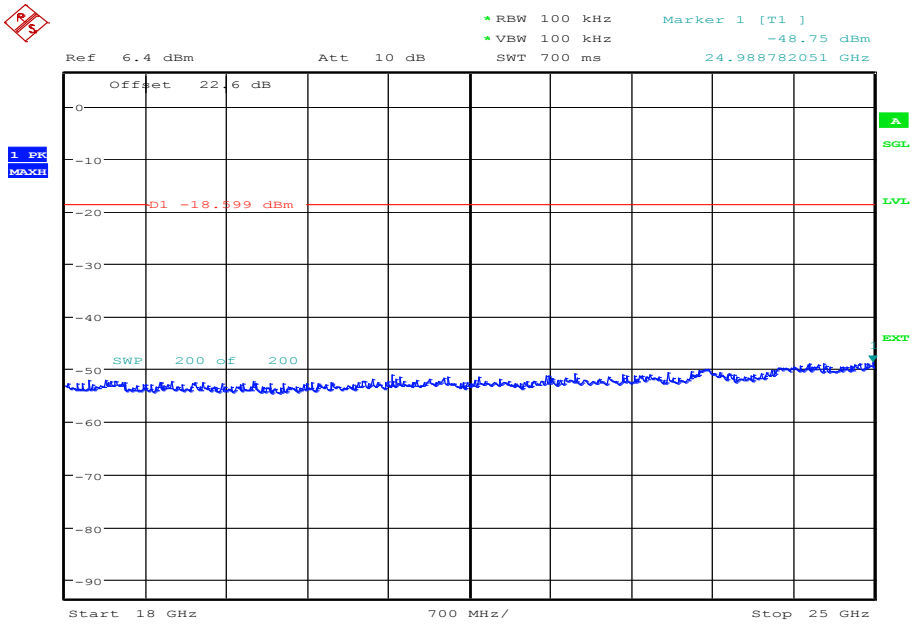
Date: 11.OCT.2013 14:50:50

12 GHz to 18 GHz



Date: 11.OCT.2013 14:53:21

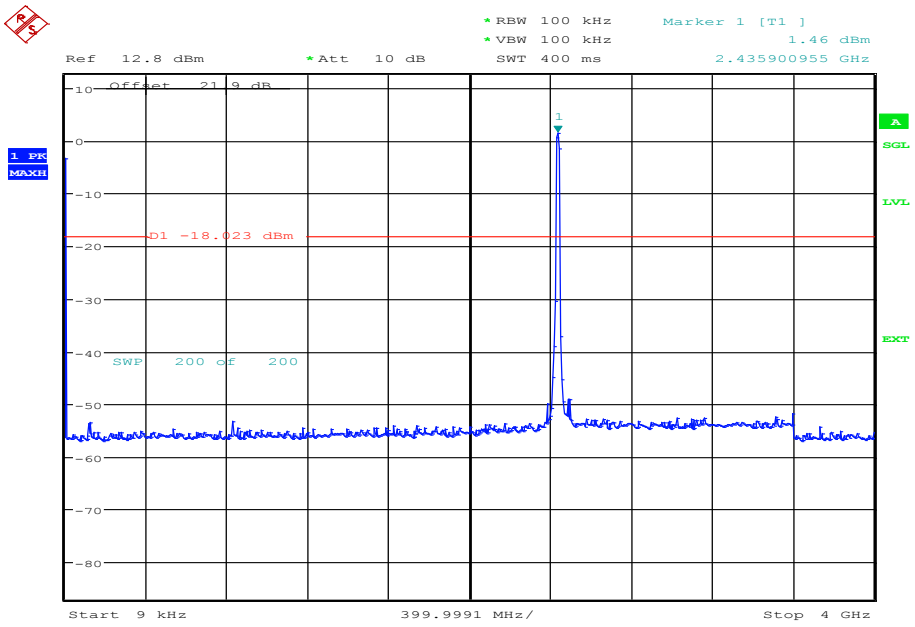
18 GHz to 25 GHz



Date: 11.OCT.2013 15:17:40

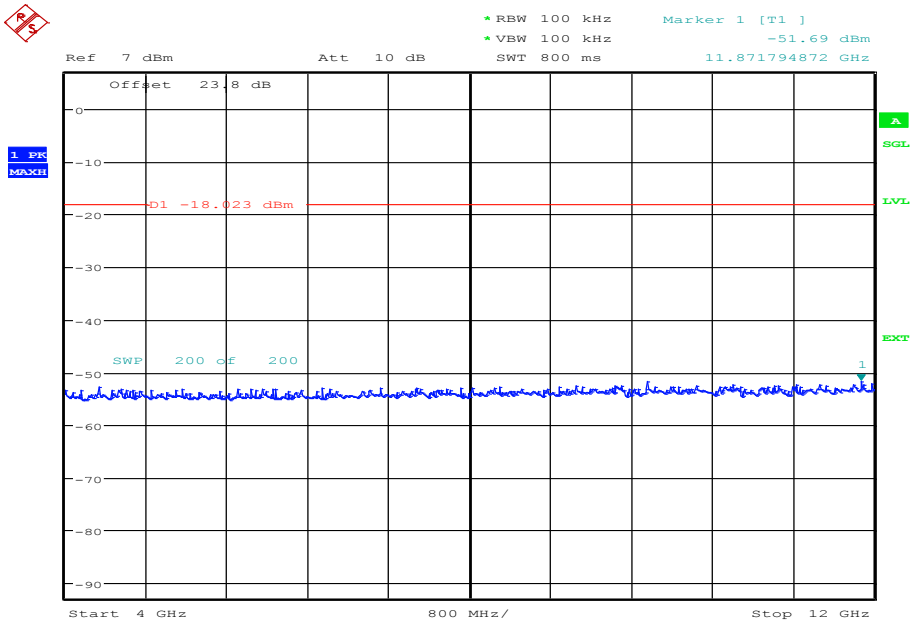
2437 MHz

9 kHz to 4 GHz



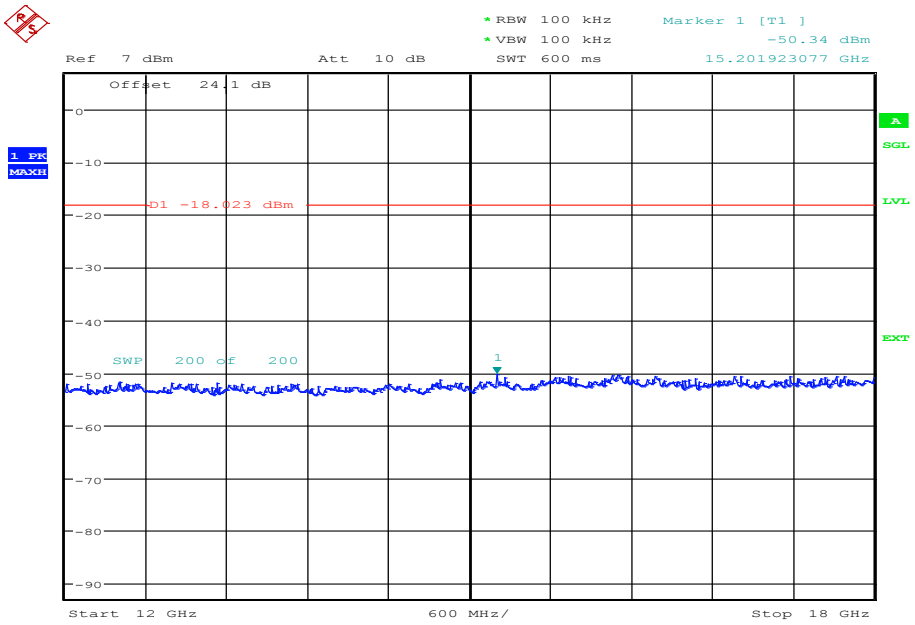
Date: 11.OCT.2013 14:39:25

4 GHz to 12 GHz



Date: 11.OCT.2013 14:58:52

12 GHz to 18 GHz



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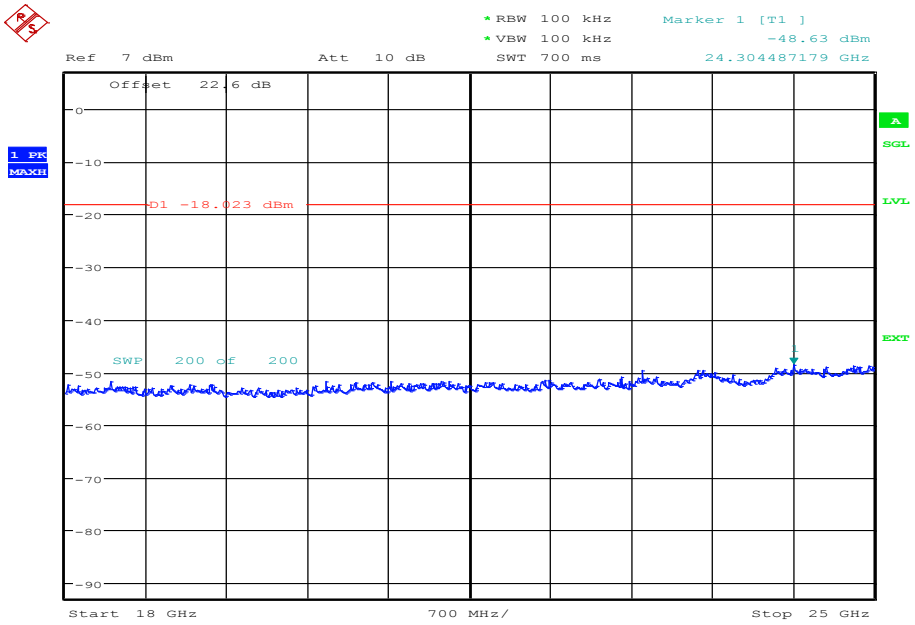
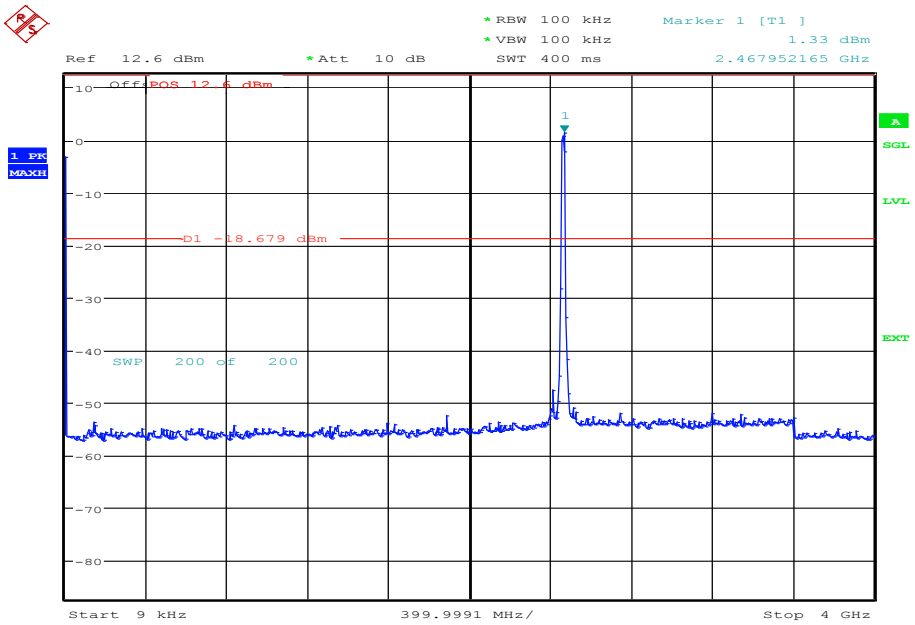
18 GHz to 25 GHz



Date: 11.OCT.2013 15:22:23

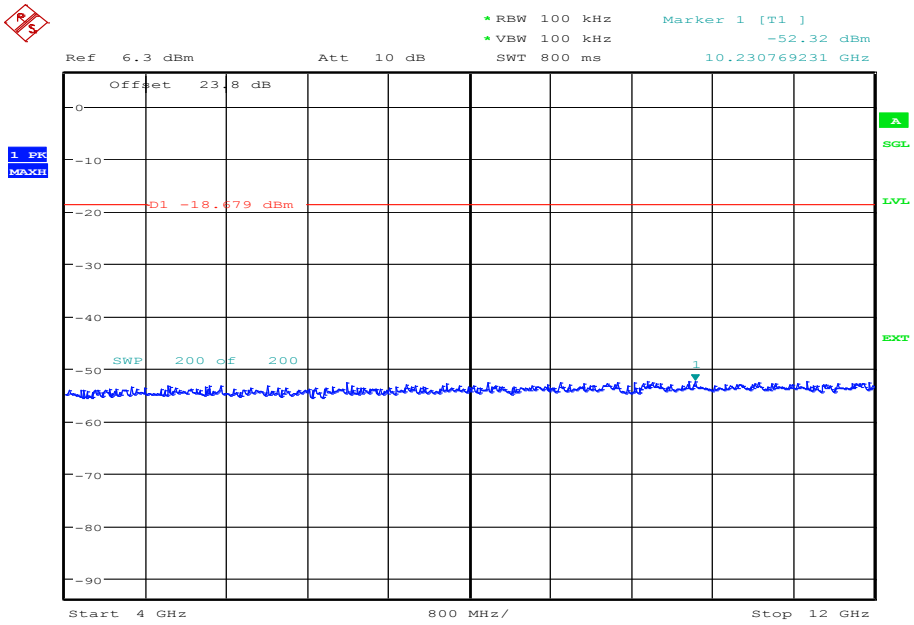
2462 MHz

9 kHz to 4 GHz



Date: 11.OCT.2013 14:42:43

4 GHz to 12 GHz



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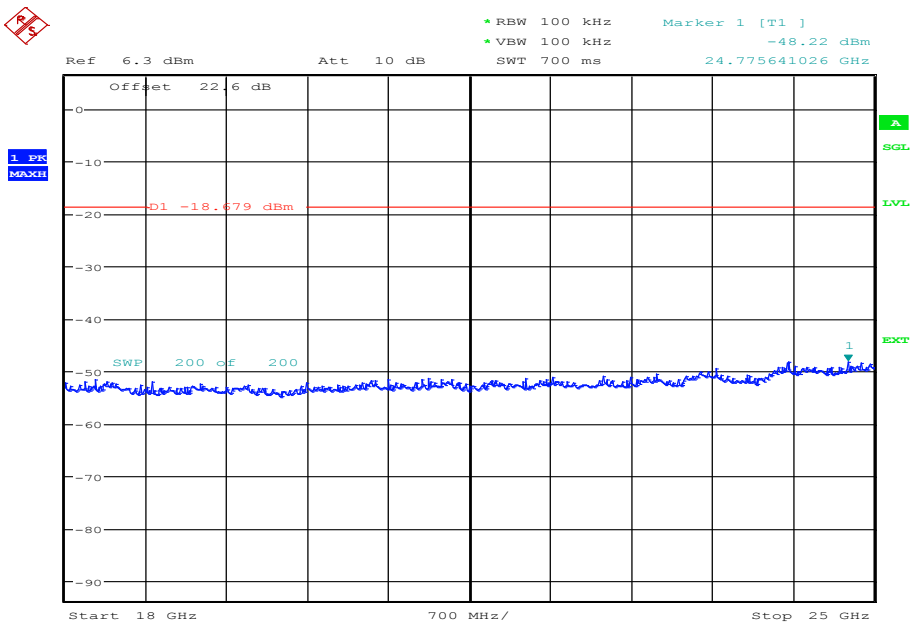
12 GHz to 18 GHz



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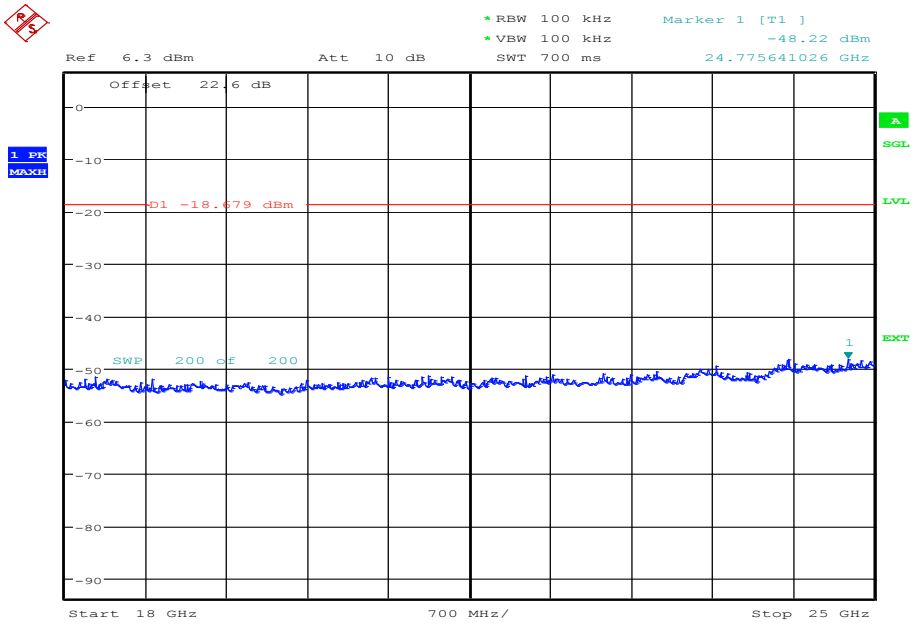
18 GHz to 25 GHz



Limit Clause

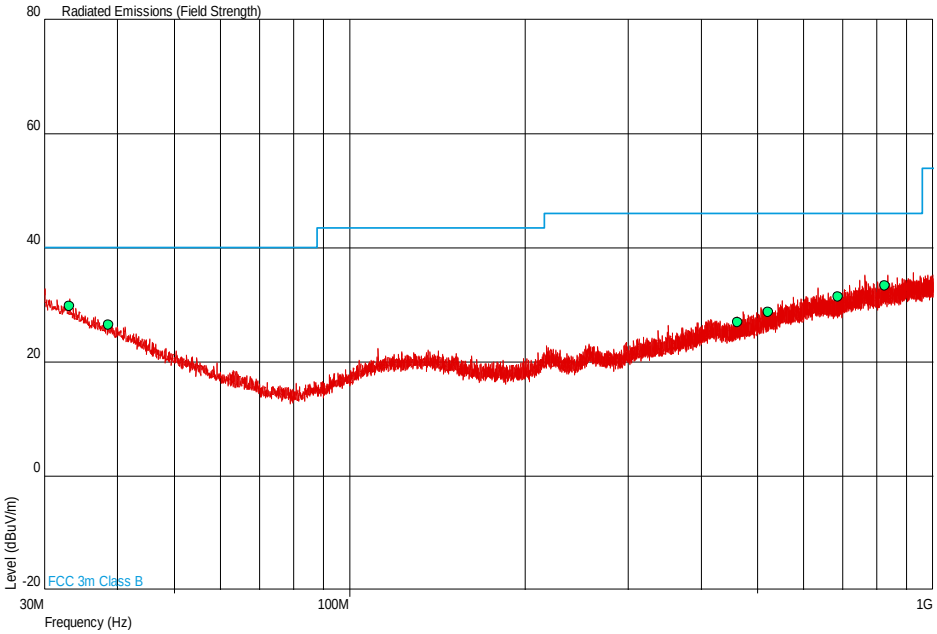
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the 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 the attenuation required shall be 30 dB instead of 20 dB.

Spurious Radiated Emissions

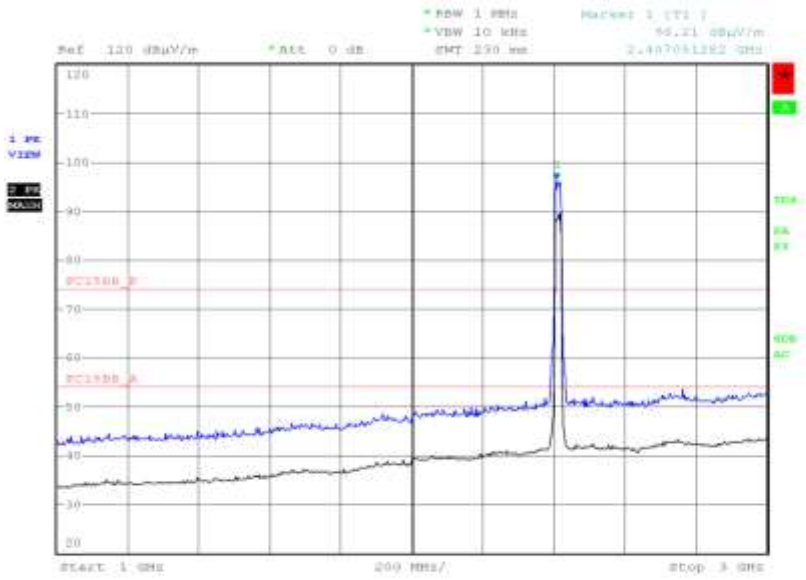
2412 MHz

30 MHz to 1 GHz



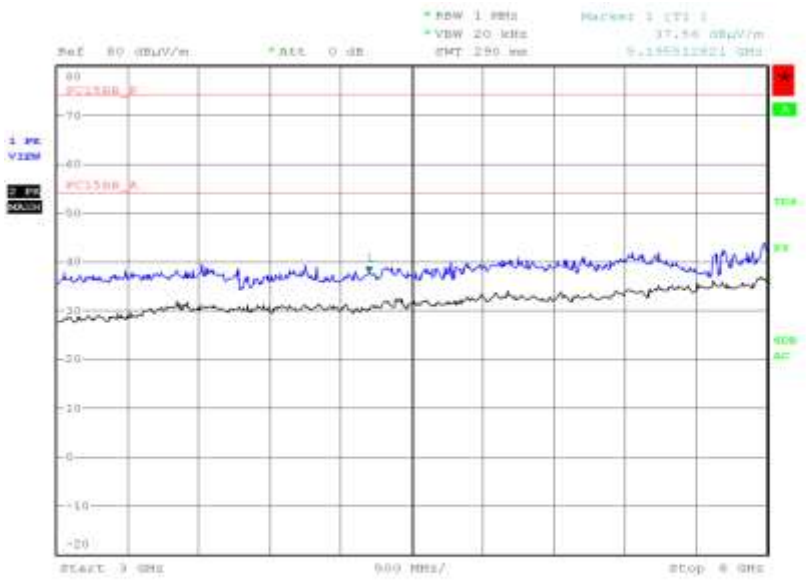
Frequency (MHz)	QP Level (dBµV/m)	QP Level (µV/m)	QP Limit (dBµV/m)	QP Limit (µV/m)	QP Margin (dBµV/m)	QP Margin (µV/m)	Angle (Deg)	Height (m)	Polarity
33.157	29.7	30.5	40.0	100	-10.3	69.5	235	3.54	Horizontal
38.718	26.5	21.1	40.0	100	-13.5	78.9	24	3.92	Horizontal
462.375	27.0	22.4	46.0	200	-19.0	177.6	114	1.00	Horizontal
522.061	28.7	27.2	46.0	200	-17.3	172.8	184	1.00	Horizontal
686.604	31.4	37.2	46.0	200	-14.6	162.8	212	1.00	Horizontal
826.005	33.4	46.8	46.0	200	-12.6	153.2	0	1.00	Horizontal

1 GHz to 3 GHz



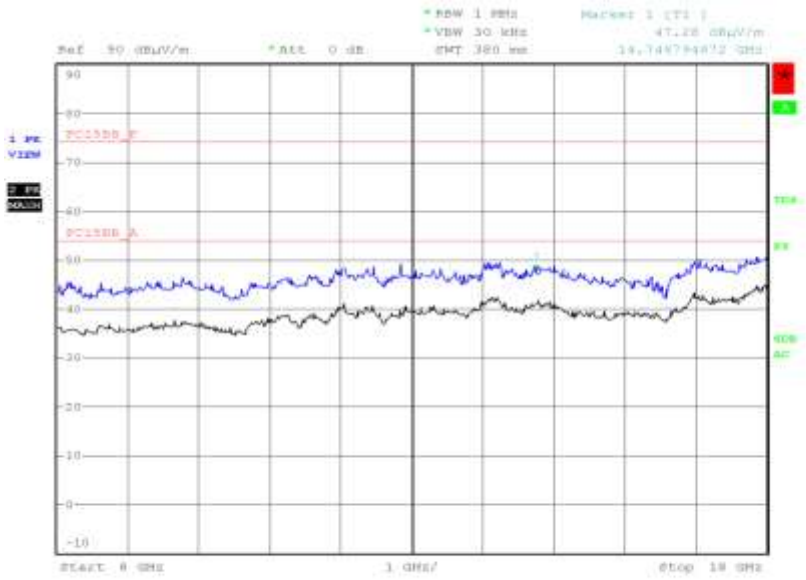
Date: 3.OCT.2013 21:07:12

3 GHz to 8 GHz



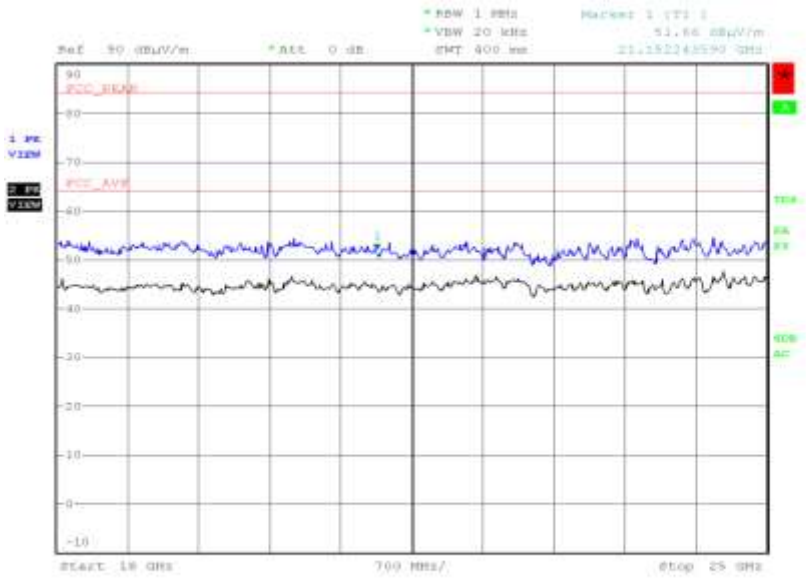
Date: 3.OCT.2013 03:47:13

8 GHz to 18 GHz



Date: 5.OCT.2013 00:24:11

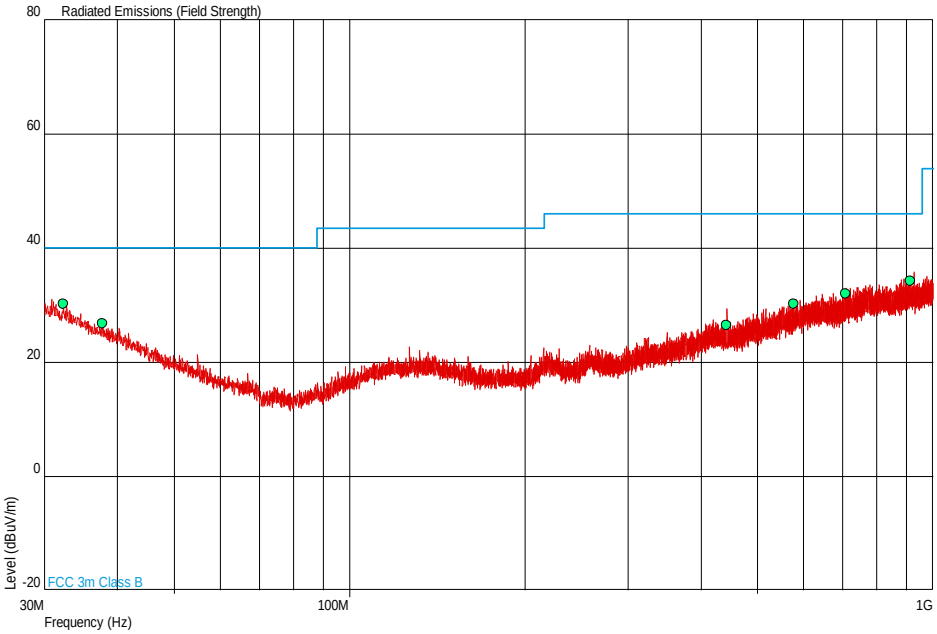
18 GHz to 25 GHz



Date: 12.OCT.2013 23:53:39

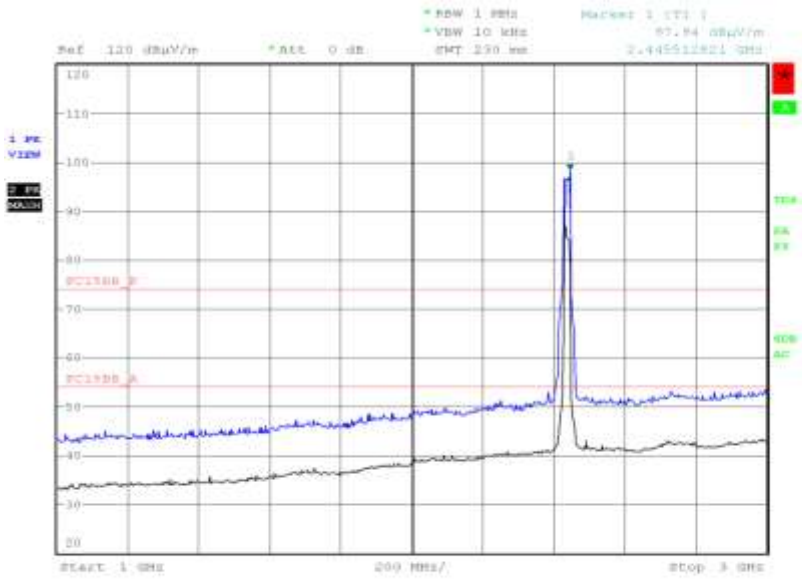
2437 MHz

30 MHz to 1 GHz



Frequency (MHz)	QP Level (dBµV/m)	QP Level (µV/m)	QP Limit (dBµV/m)	QP Limit (µV/m)	QP Margin (dBµV/m)	QP Margin (µV/m)	Angle (Deg)	Height (m)	Polarity
32.327	30.2	32.4	40.0	100	-9.8	67.6	153	1.25	Horizontal
37.745	26.8	21.9	40.0	100	-13.2	78.1	273	1.06	Horizontal
443.056	26.6	21.4	46.0	200	-19.4	178.6	258	2.18	Vertical
576.600	30.2	32.4	46.0	200	-15.8	167.6	117	1.00	Horizontal
708.581	32.1	40.3	46.0	200	-13.9	159.7	305	1.00	Vertical
915.047	34.2	51.3	46.0	200	-11.8	148.7	229	1.00	Vertical

1 GHz to 3 GHz



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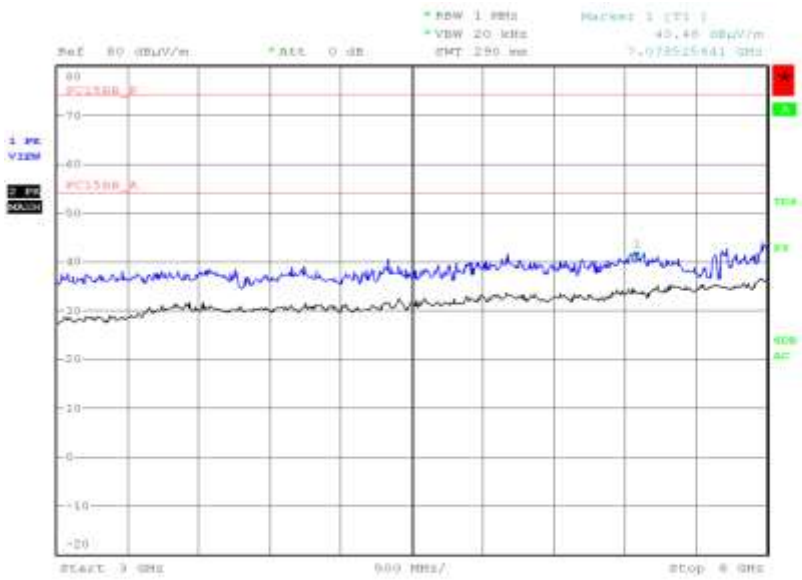
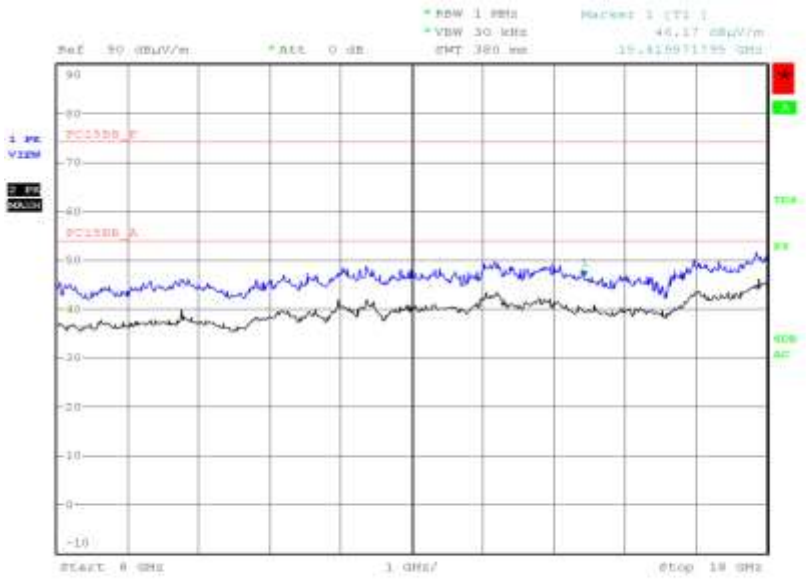
3 GHz to 8 GHz



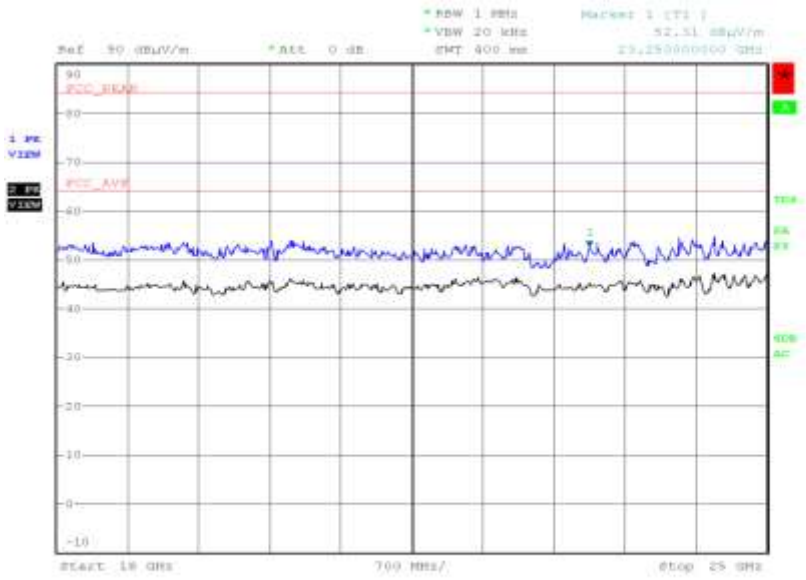
Date: 3.OCT.2013 03:51:13

8 GHz to 18 GHz



Date: 5.OCT.2013 00:17:52

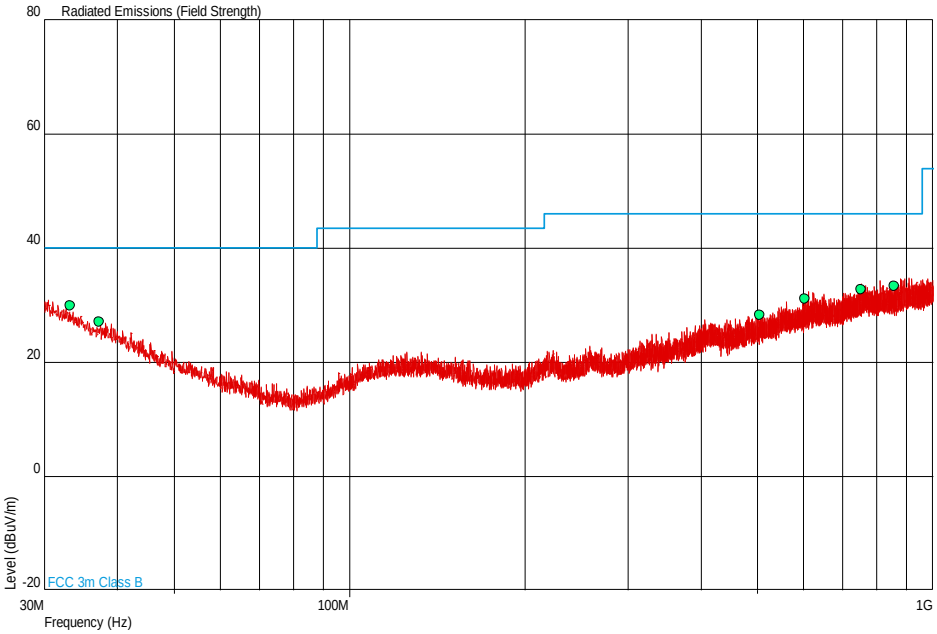
18 GHz to 25 GHz



Date: 12.OCT.2013 23:34:22

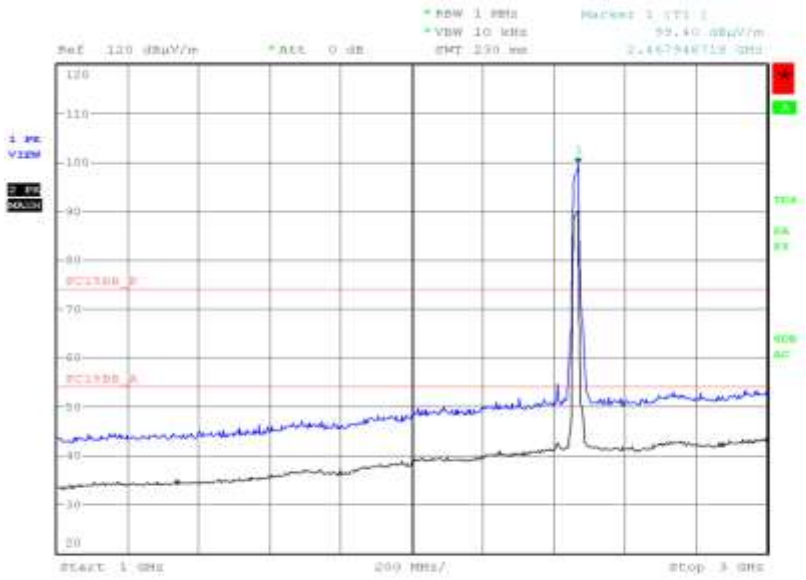
2462 MHz

30 MHz to 1 GHz



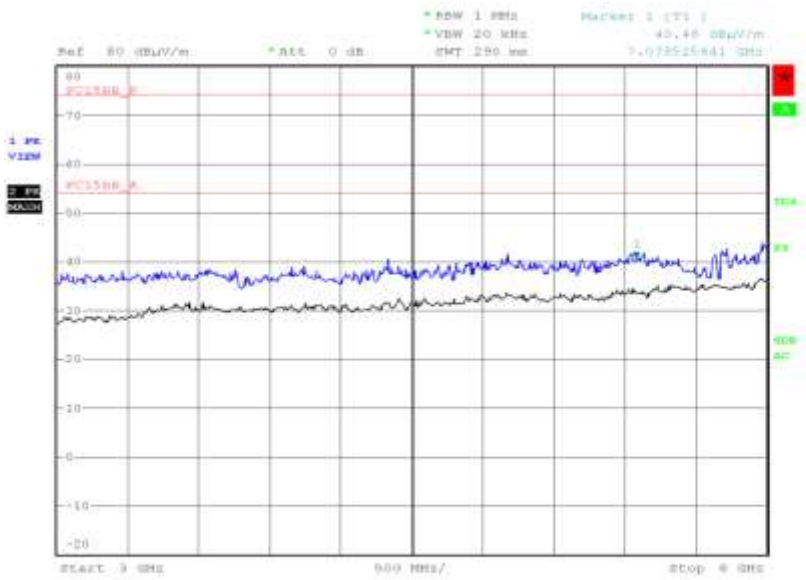
Frequency (MHz)	QP Level (dBµV/m)	QP Level (µV/m)	QP Limit (dBµV/m)	QP Limit (µV/m)	QP Margin (dBµV/m)	QP Margin (µV/m)	Angle (Deg)	Height (m)	Polarity
33.221	30.0	31.6	40.0	100	-10.0	68.4	282	1.00	Horizontal
37.273	27.1	22.6	40.0	100	-12.9	77.4	264	1.00	Horizontal
505.049	28.3	26.0	46.0	200	-17.7	174.0	0	3.38	Vertical
602.756	31.1	35.9	46.0	200	-14.9	164.1	160	1.00	Vertical
752.600	32.7	43.2	46.0	200	-13.3	156.8	348	1.00	Horizontal
859.483	33.3	46.2	46.0	200	-12.7	153.8	0	1.00	Vertical

1 GHz to 3 GHz



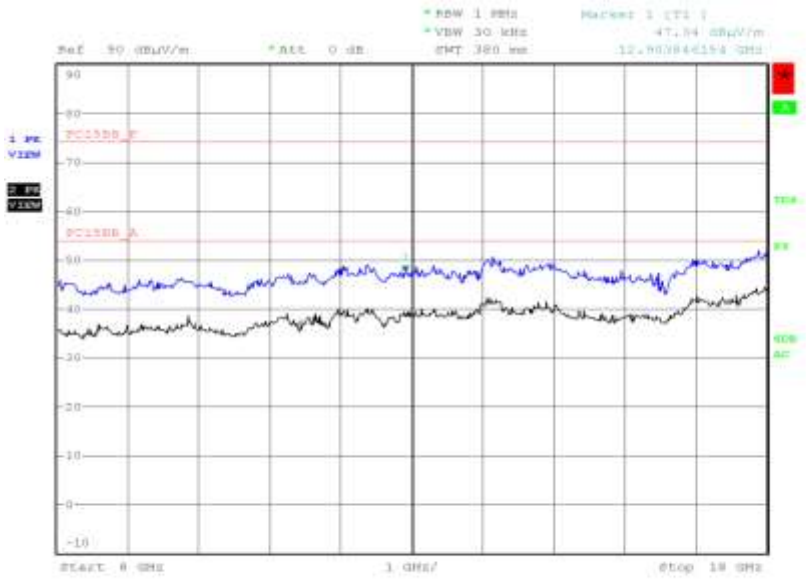
Date: 3.OCT.2013 21:25:40

3 GHz to 8 GHz



Date: 3.OCT.2013 03:51:13

8 GHz to 18 GHz



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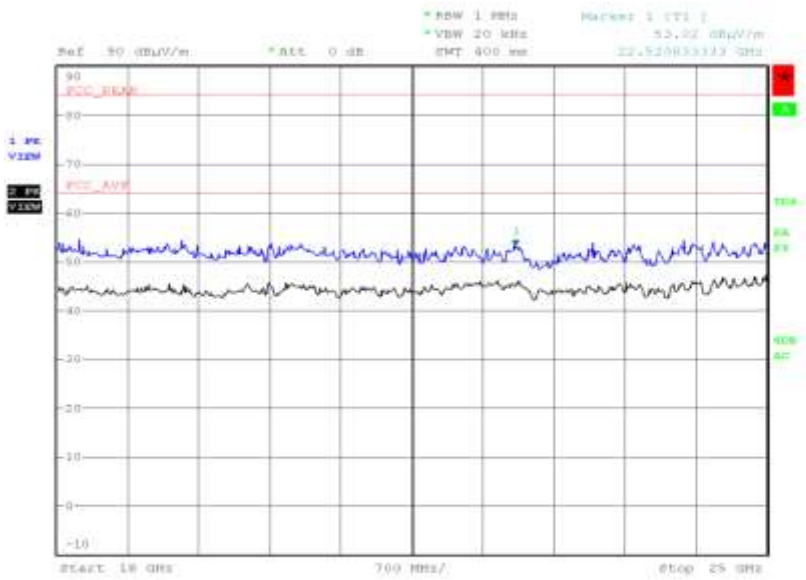
18 GHz to 25 GHz



Date: 12.OCT.2013 23:40:21

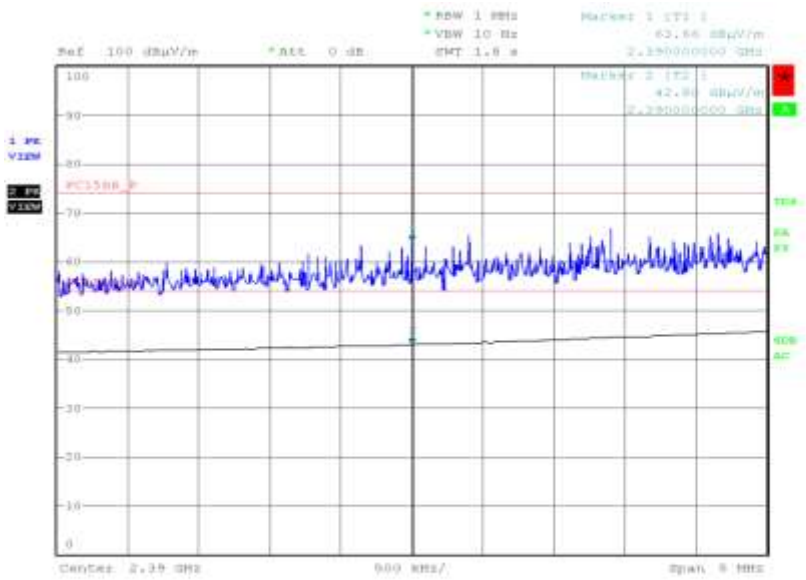
Limit

Peak (dBµV/m)	Average (dBµV/m)
74.0	54.0

Band Edge Emissions

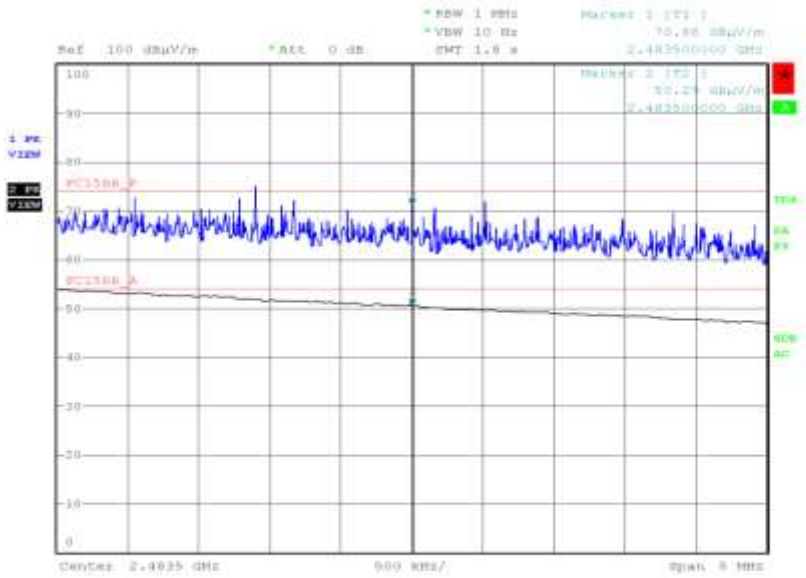
2412 MHz

Polarisation	Final Peak (dBµV/m)	Final Average (dBµV/m)
Horizontal	63.66	42.80



2462 MHz

Polarisation	Final Peak (dBµV/m)	Final Average (dBµV/m)
Horizontal	70.88	50.29



Limit

Peak (dBµV/m)	Average (dBµV/m)
74.0	54.0

Bluetooth Low Energy

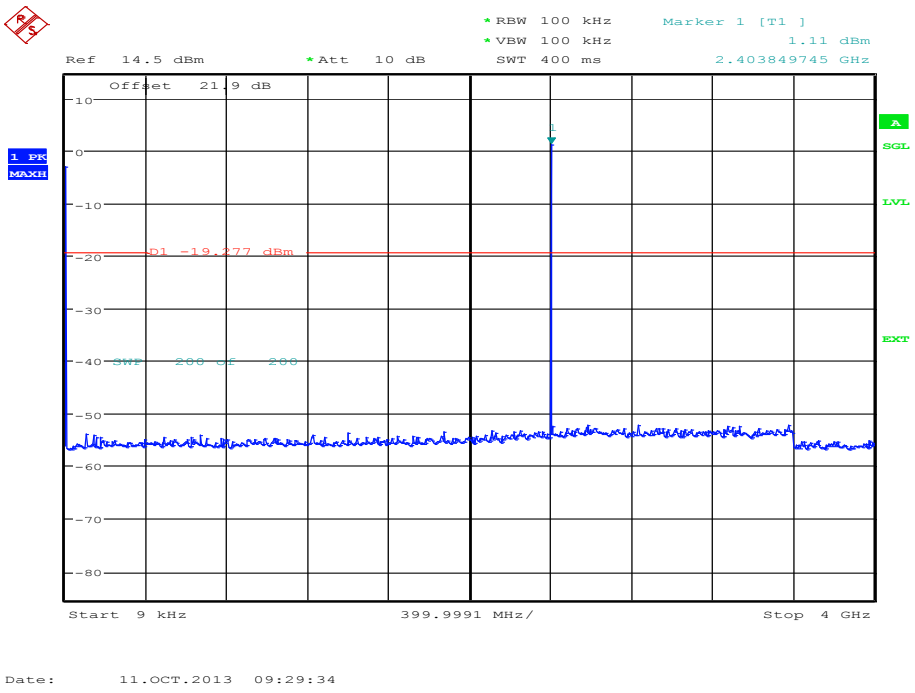
4.0 V DC Supply

Spurious Conducted Emissions

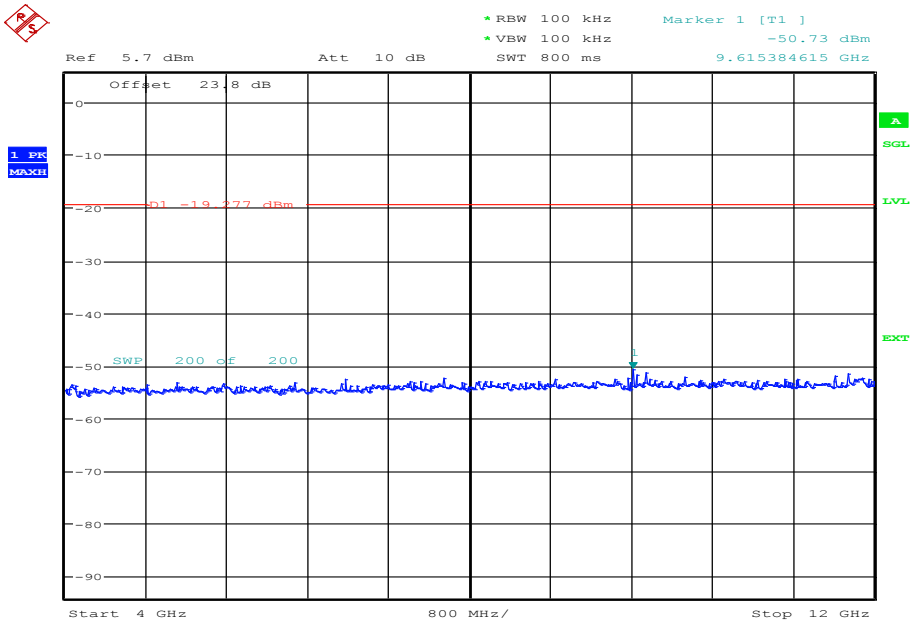
BLE

2402 MHz

9 kHz to 4 GHz

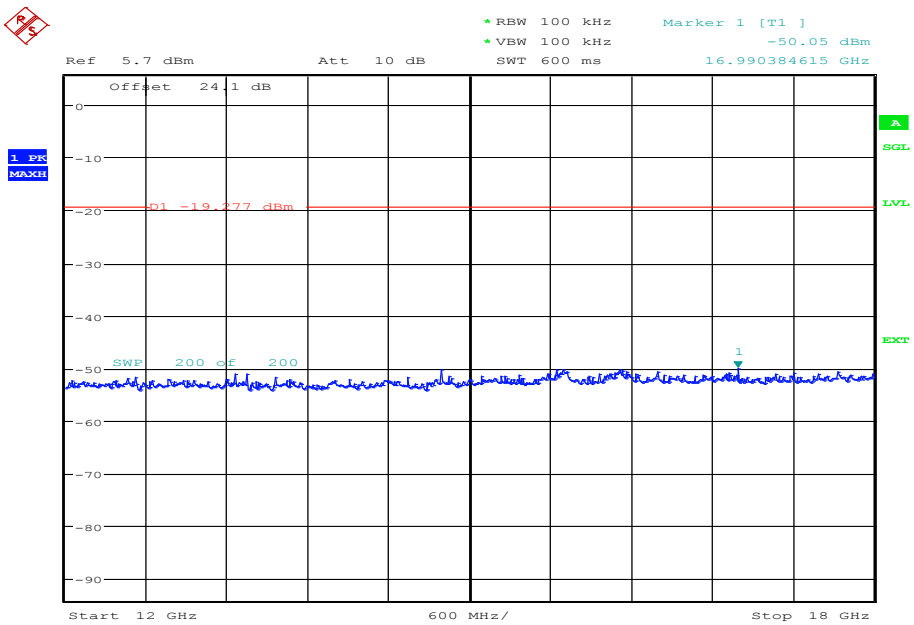


4 GHz to 12 GHz



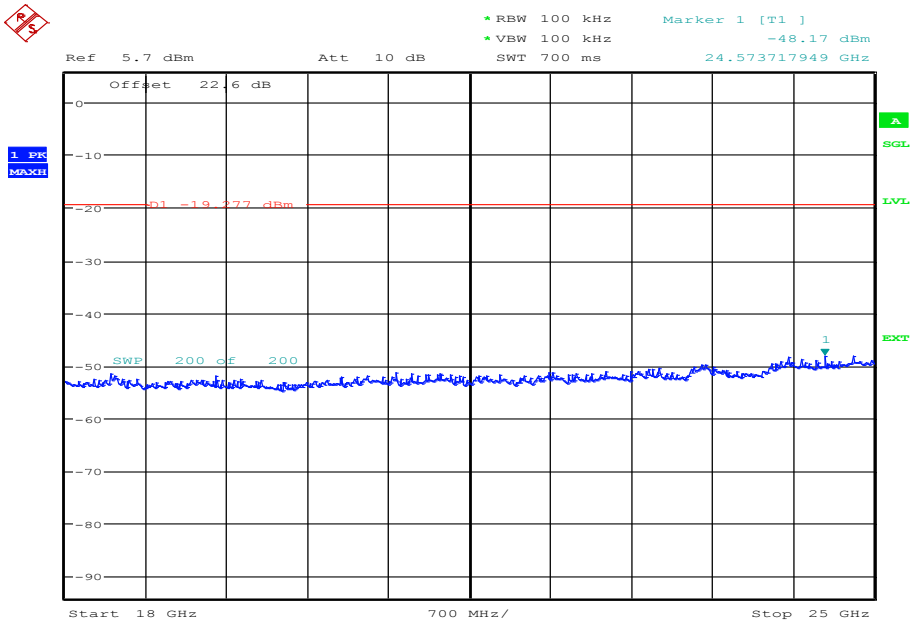
Date: 11.OCT.2013 09:35:10

12 GHz to 18 GHz



Date: 11.OCT.2013 09:38:51

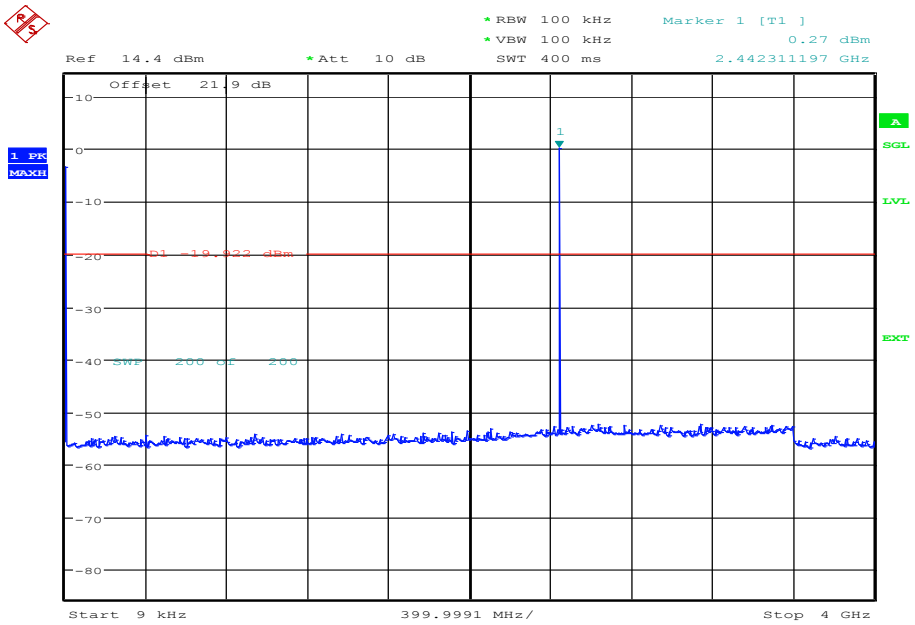
18 GHz to 25 GHz



Date: 11.OCT.2013 09:45:45

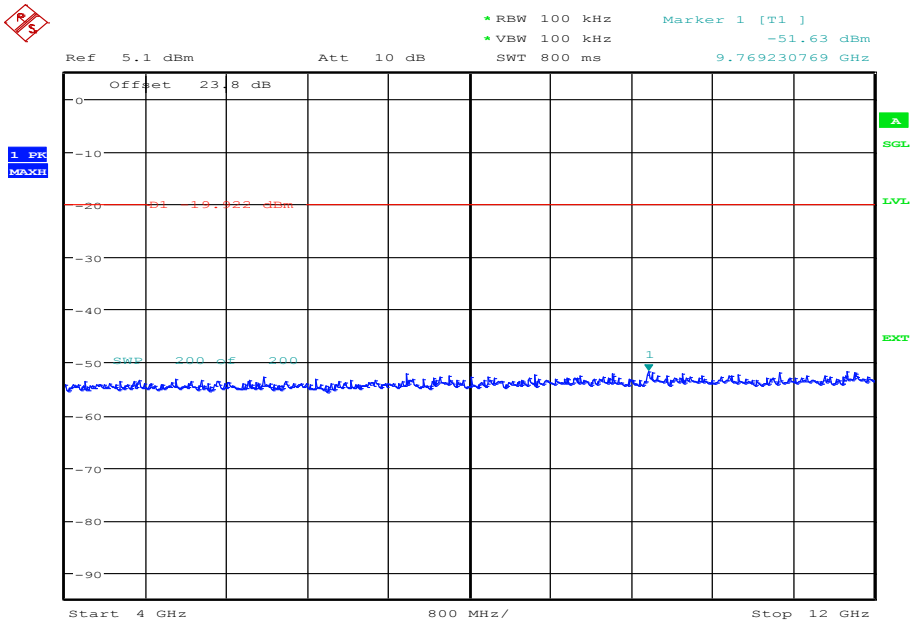
2440 MHz

9 kHz to 4 GHz



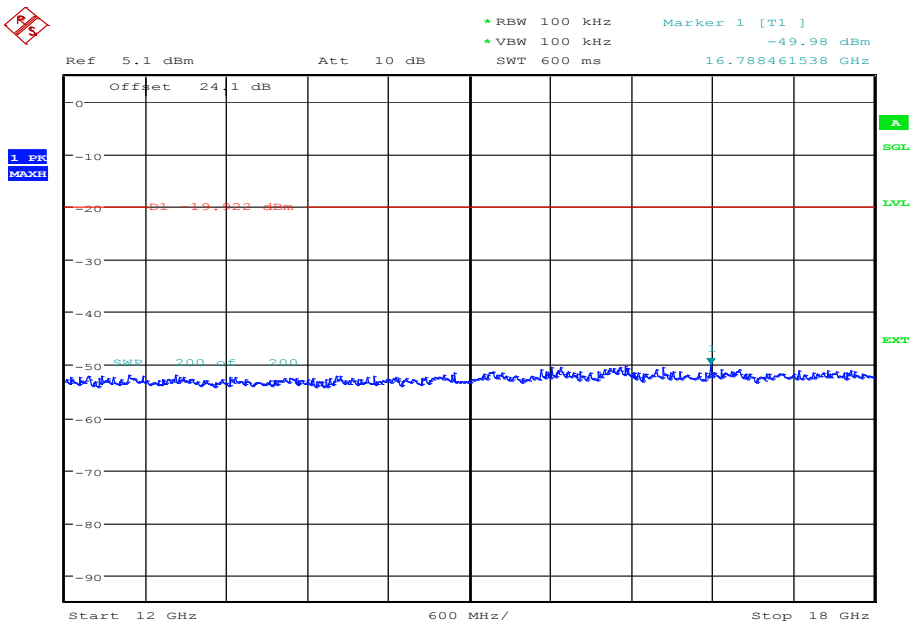
Date: 11.OCT.2013 09:57:01

4 GHz to 12 GHz



Date: 11.OCT.2013 11:15:07

12 GHz to 18 GHz



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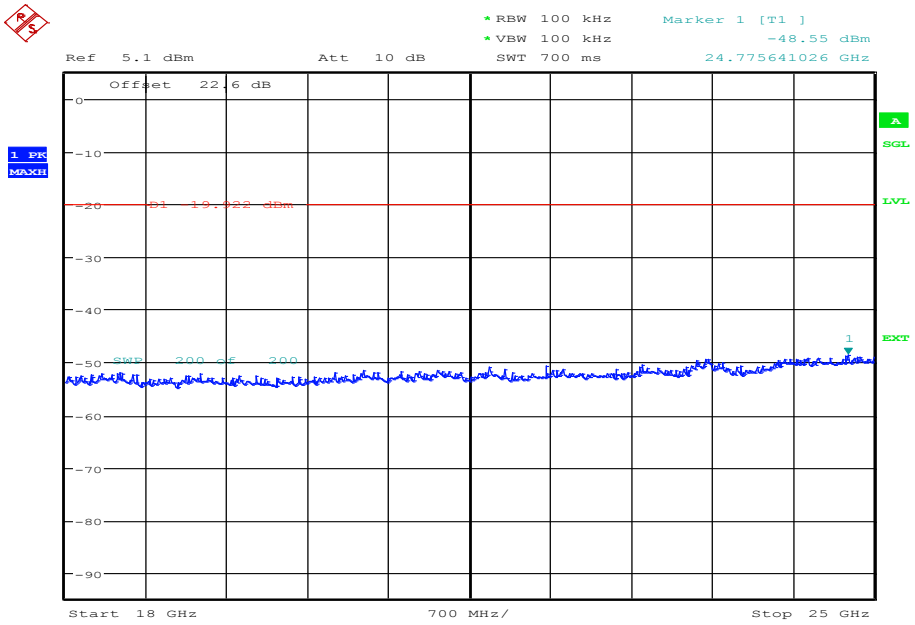
18 GHz to 25 GHz



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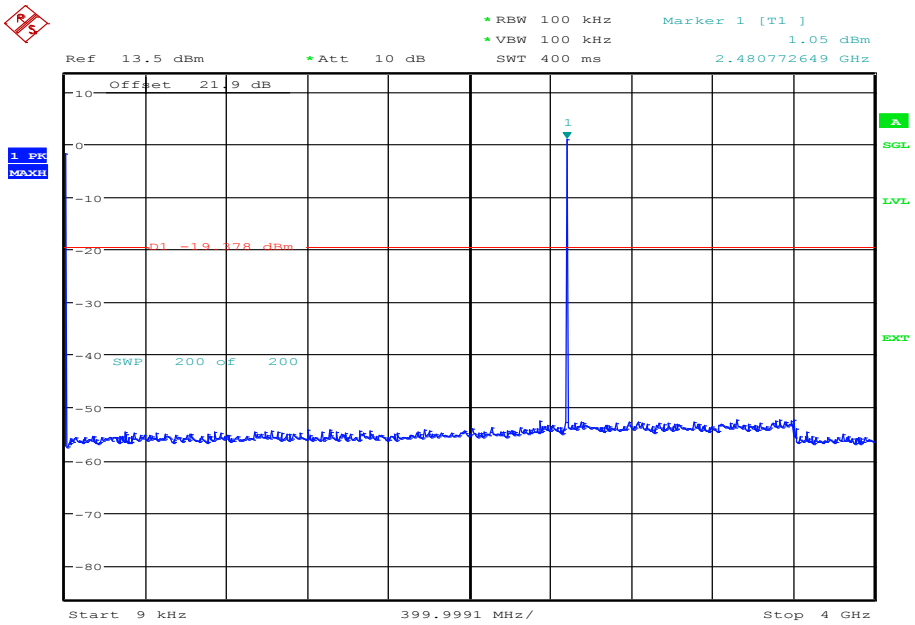
2480 MHz

9 kHz to 4 GHz



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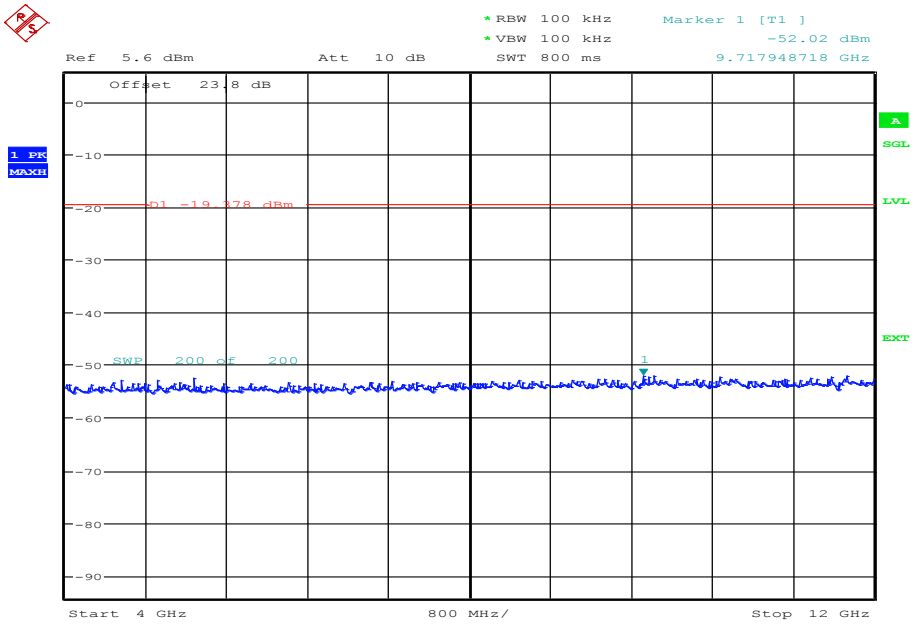
4 GHz to 12 GHz



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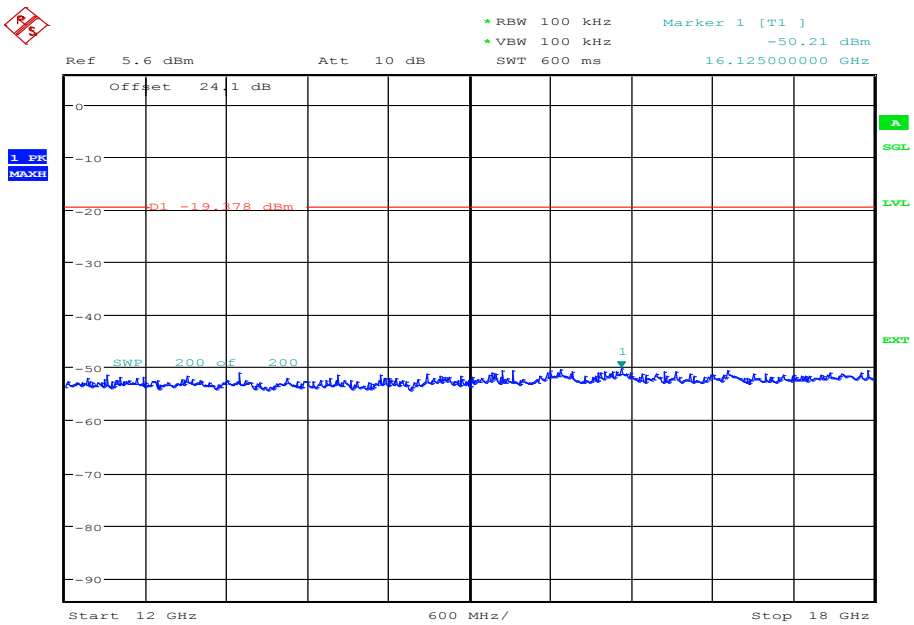
12 GHz to 18 GHz



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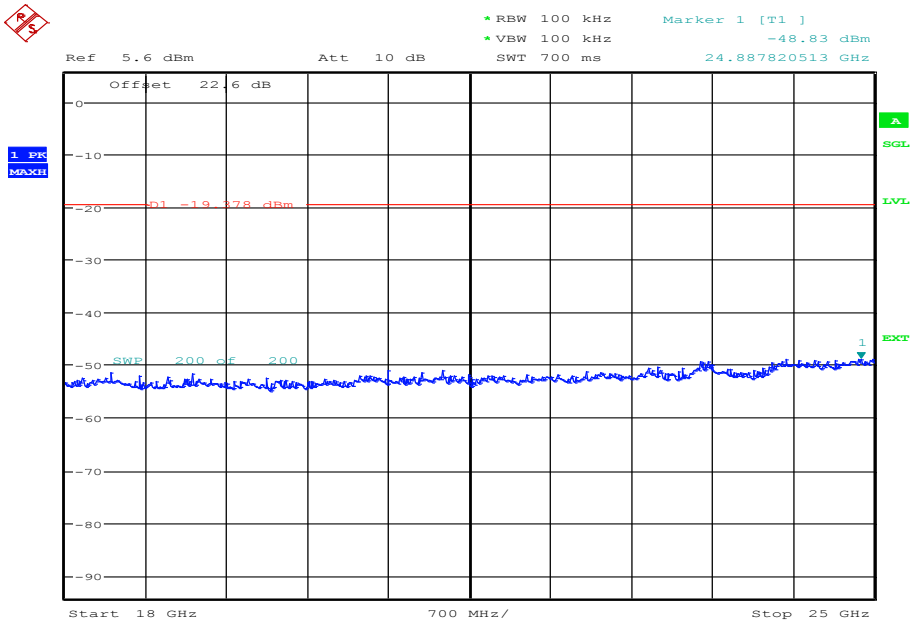
18 GHz to 25 GHz



Limit Clause

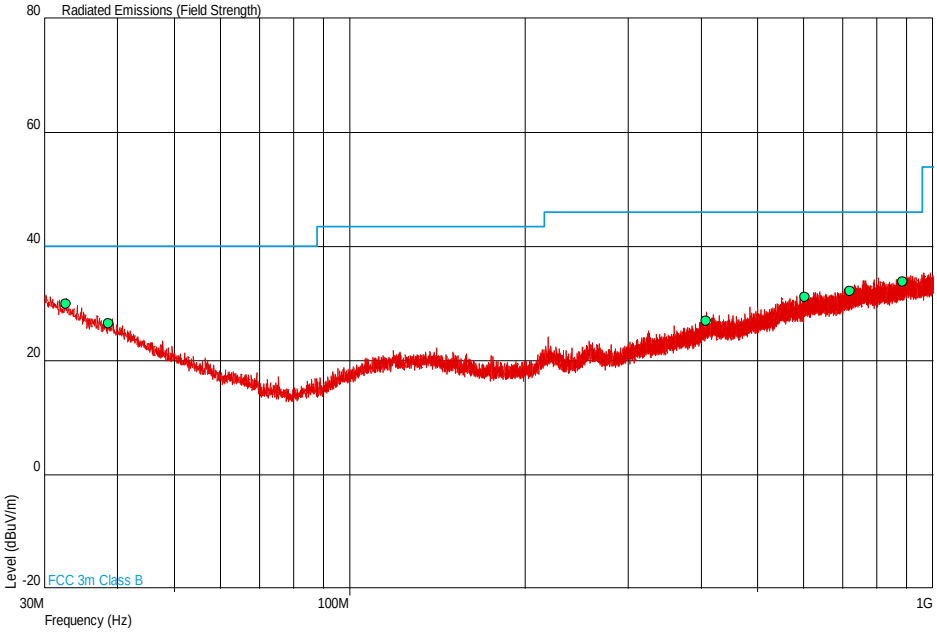
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the 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 the attenuation required shall be 30 dB instead of 20 dB.

Spurious Radiated Emissions

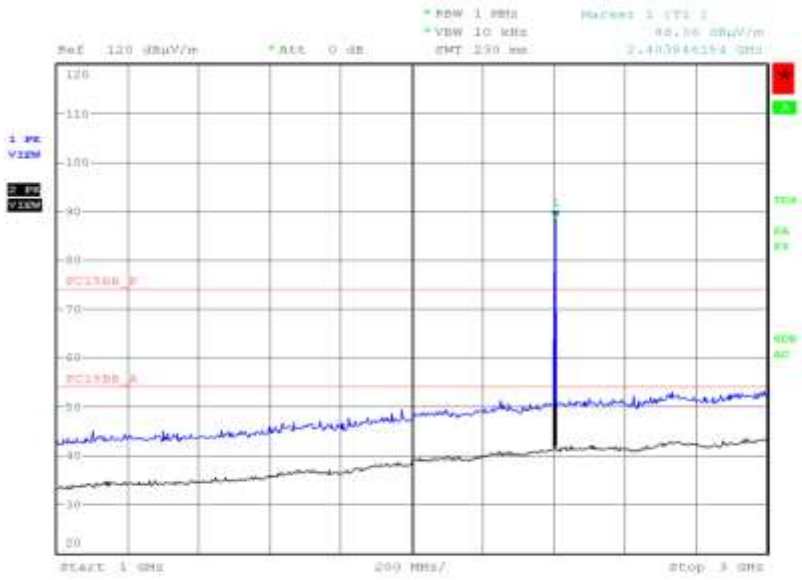
2402 MHz

30 MHz to 1 GHz



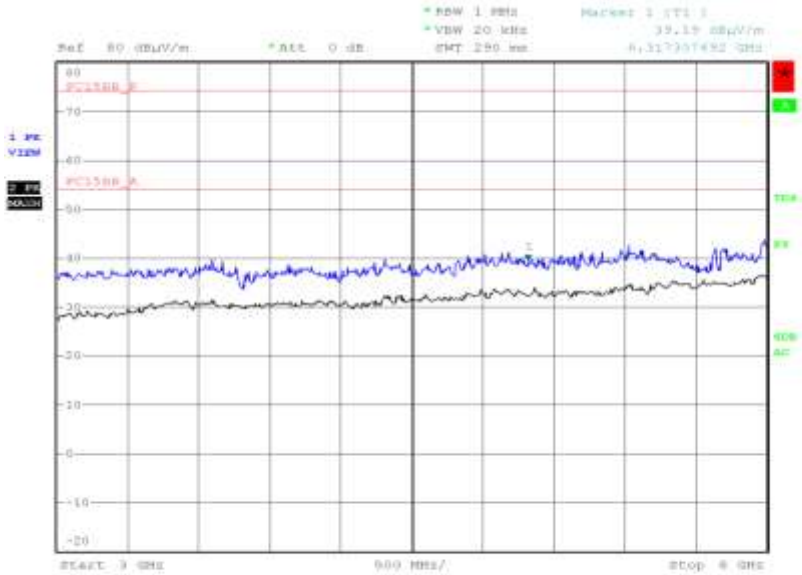
Frequency (MHz)	QP Level (dBµV/m)	QP Level (µV/m)	QP Limit (dBµV/m)	QP Limit (µV/m)	QP Margin (dBµV/m)	QP Margin (µV/m)	Angle (Deg)	Height (m)	Polarity
32.719	29.9	31.3	40.0	100	-10.1	68.7	189	1.00	Horizontal
38.717	26.5	21.1	40.0	100	-13.5	78.9	281	1.00	Horizontal
409.109	27.0	22.4	46.0	200	-19.0	177.6	0	3.82	Horizontal
602.435	31.1	35.9	46.0	200	-14.9	164.1	360	3.20	Horizontal
720.652	32.2	40.7	46.0	200	-13.8	159.3	216	3.95	Horizontal
887.345	33.9	49.5	46.0	200	-12.1	150.5	116	1.30	Vertical

1 GHz to 3 GHz



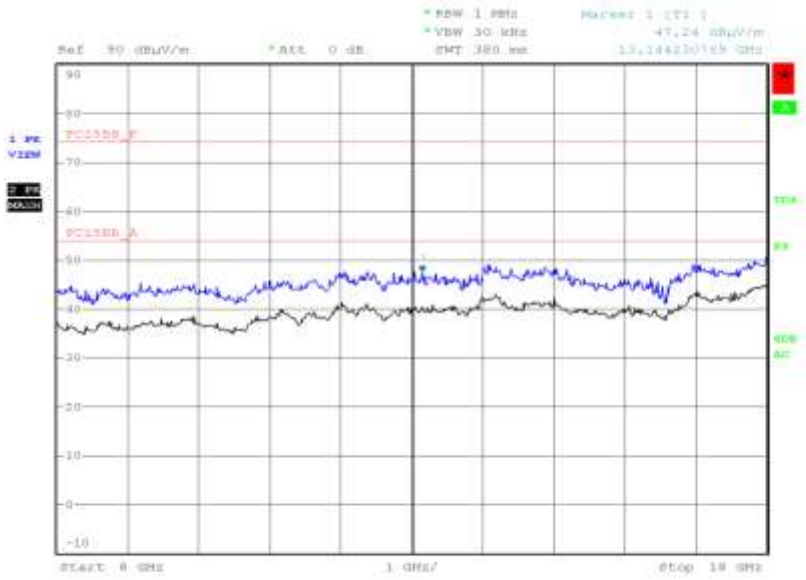
Date: 3.OCT.2013 23:35:33

3 GHz to 8 GHz



Date: 5.OCT.2013 02:55:34

8 GHz to 18 GHz



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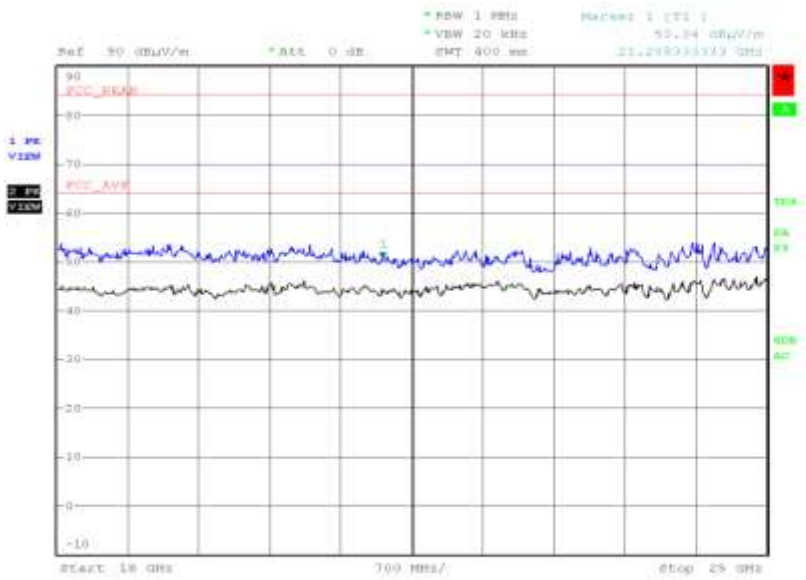
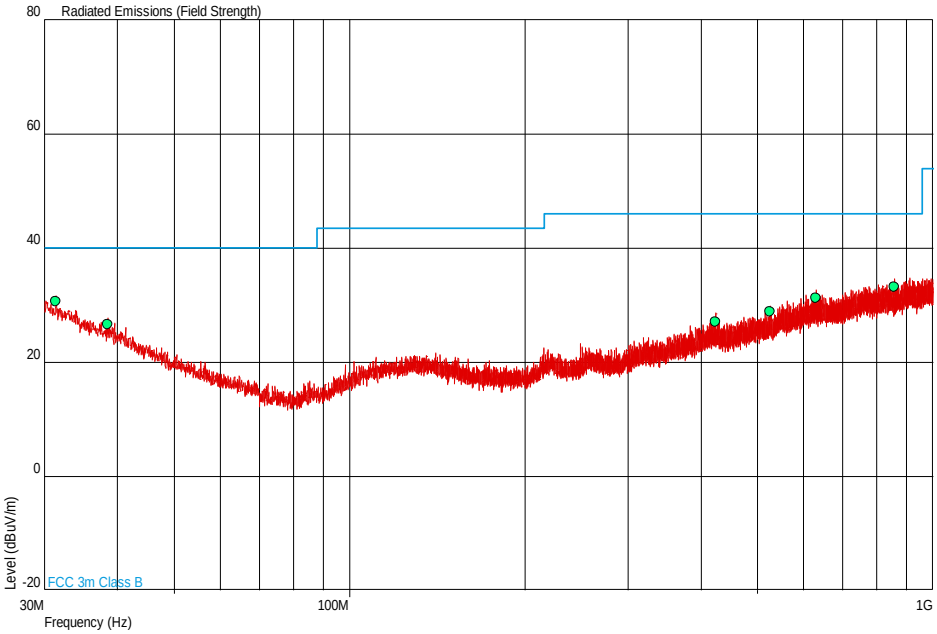
18 GHz to 25 GHz



Date: 12.OCT.2013 22:05:32

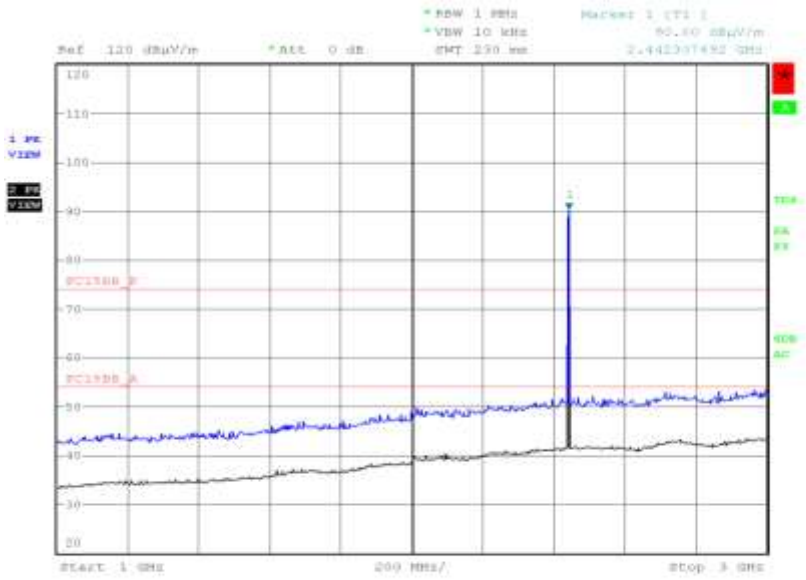
2440 MHz

30 MHz to 1 GHz



Frequency (MHz)	QP Level (dBµV/m)	QP Level (µV/m)	QP Limit (dBµV/m)	QP Limit (µV/m)	QP Margin (dBµV/m)	QP Margin (µV/m)	Angle (Deg)	Height (m)	Polarity
31.412	30.6	33.9	40.0	100	-9.4	66.1	30	3.85	Horizontal
38.492	26.6	21.4	40.0	100	-13.4	78.6	309	1.00	Horizontal
423.777	27.1	22.6	46.0	200	-18.9	177.4	75	1.00	Vertical
525.202	28.9	27.9	46.0	200	-17.1	172.1	268	1.00	Vertical
630.905	31.3	36.7	46.0	200	-14.7	163.3	105	1.00	Horizontal
859.676	33.3	46.2	46.0	200	-12.7	153.8	281	3.60	Vertical

1 GHz to 3 GHz



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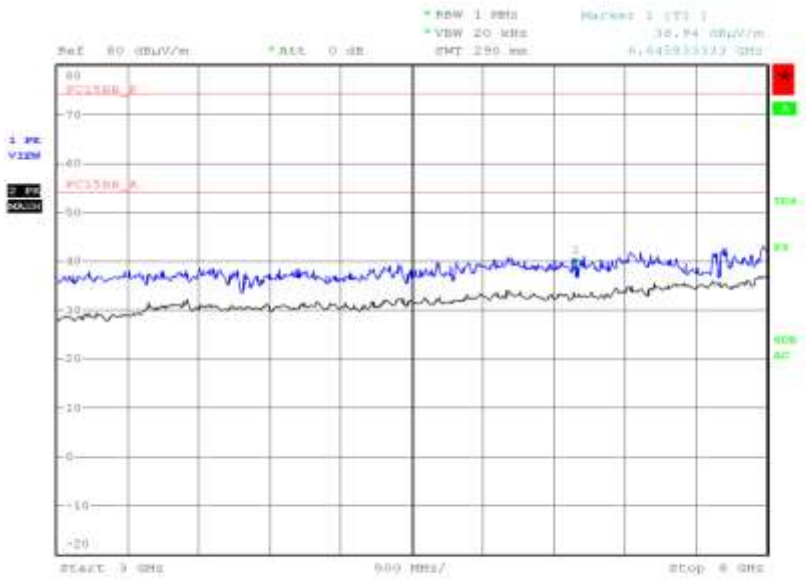
3 GHz to 8 GHz



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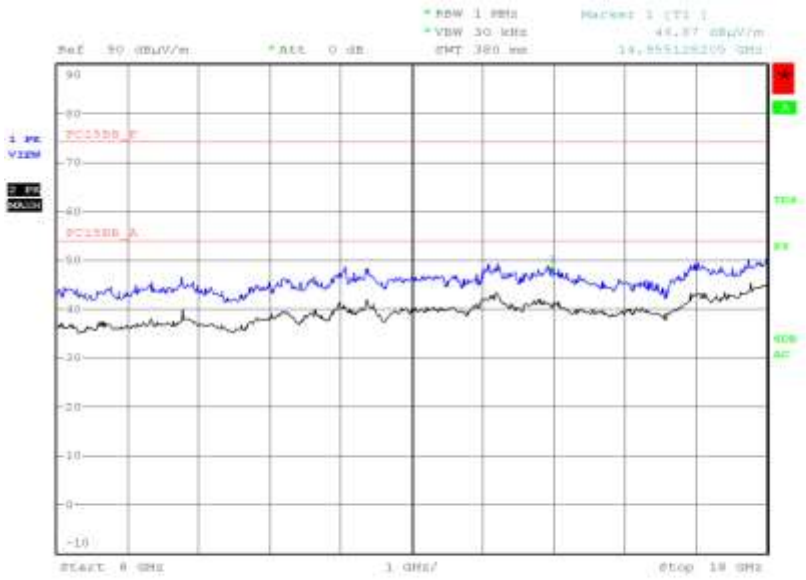
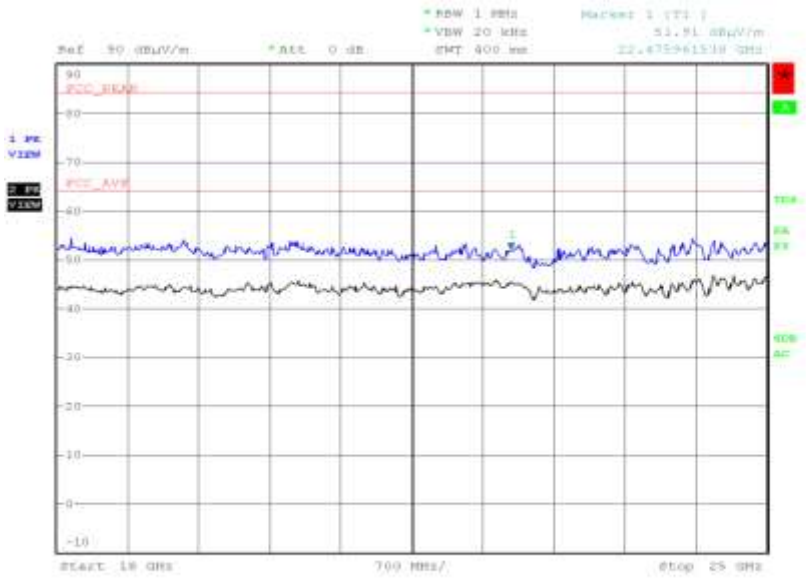
8 GHz to 18 GHz



Date: 5.OCT.2013 02:28:07

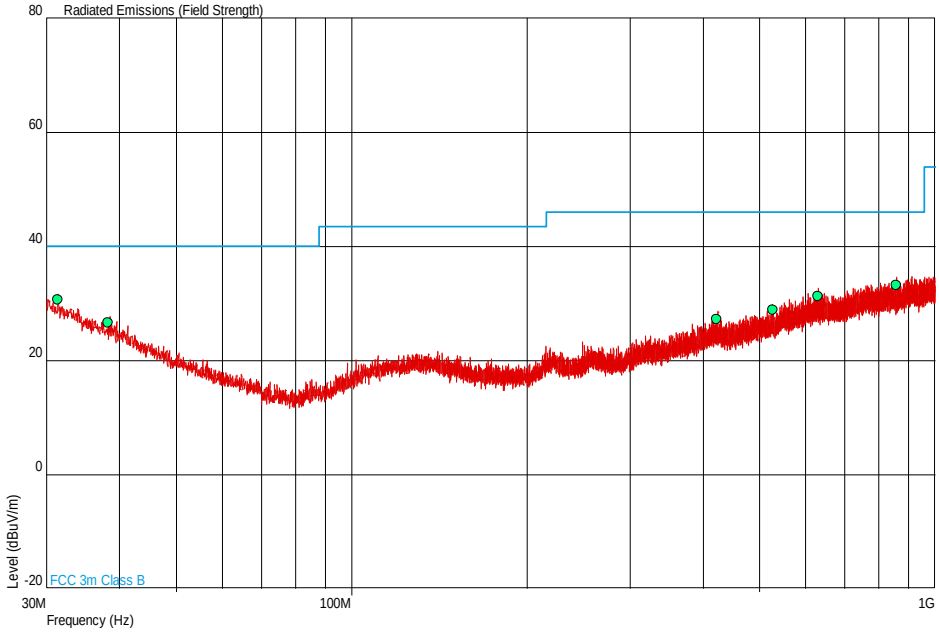
18 GHz to 25 GHz



Date: 12.OCT.2013 21:53:29

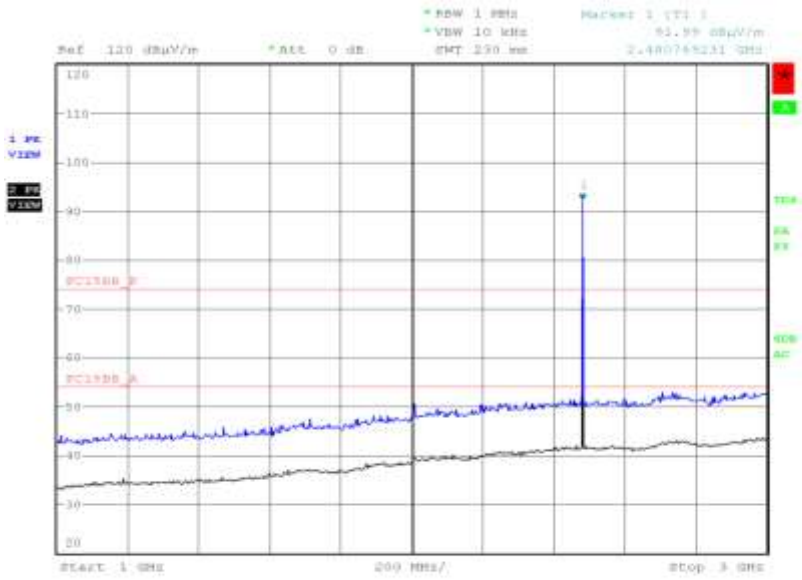
2480 MHz

30 MHz to 1 GHz



Frequency (MHz)	QP Level (dBµV/m)	QP Level (µV/m)	QP Limit (dBµV/m)	QP Limit (µV/m)	QP Margin (dBµV/m)	QP Margin (µV/m)	Angle (Deg)	Height (m)	Polarity
31.408	30.6	33.9	40.0	100	-9.4	66.1	167	1.99	Horizontal
38.334	26.6	21.4	40.0	100	-13.4	78.6	123	1.00	Horizontal
422.854	27.2	22.9	46.0	200	-18.8	177.1	360	1.00	Vertical
526.565	28.9	27.9	46.0	200	-17.1	172.1	22	2.39	Vertical
629.146	31.2	36.3	46.0	200	-14.8	163.7	37	1.00	Horizontal
857.306	33.3	46.2	46.0	200	-12.7	153.8	36	1.00	Vertical

1 GHz to 3 GHz



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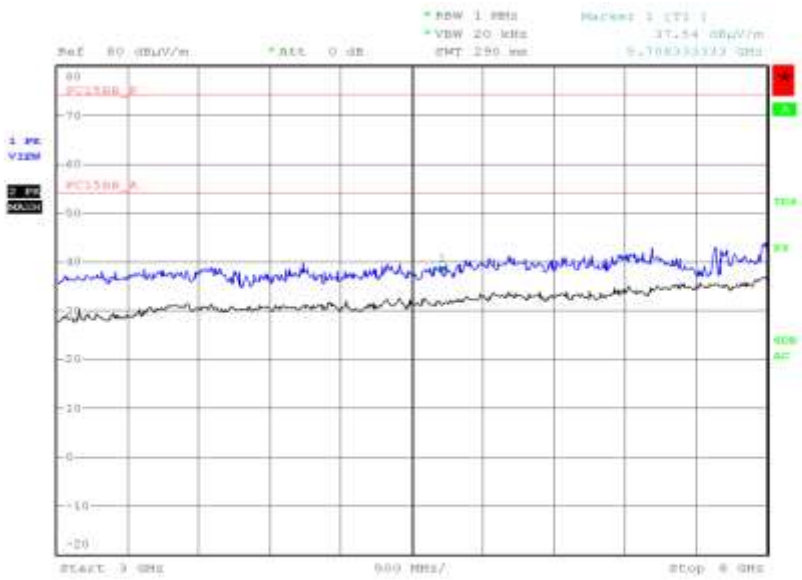
3 GHz to 8 GHz



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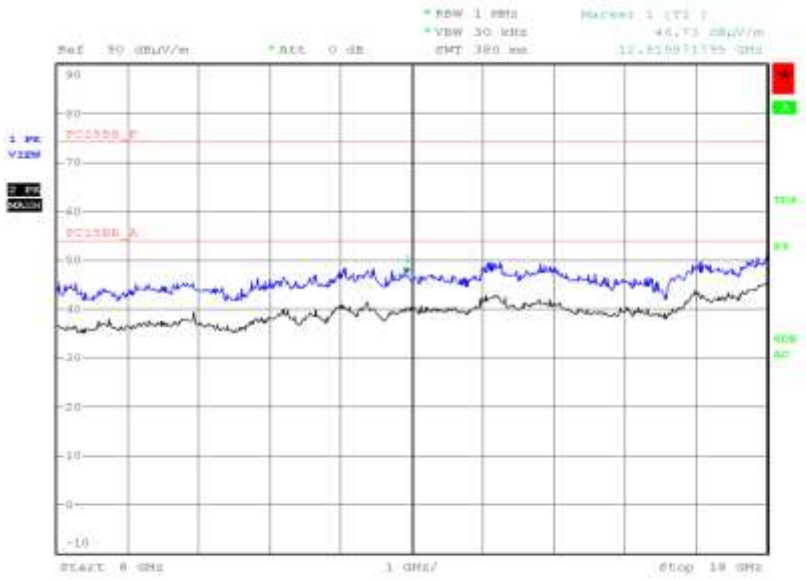
8 GHz to 18 GHz



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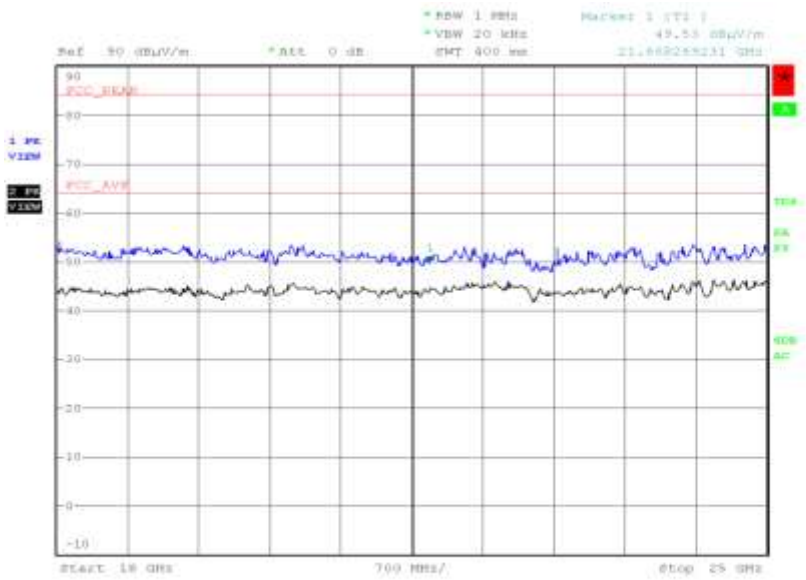
18 GHz to 25 GHz



Date: 12.OCT.2013 21:58:42

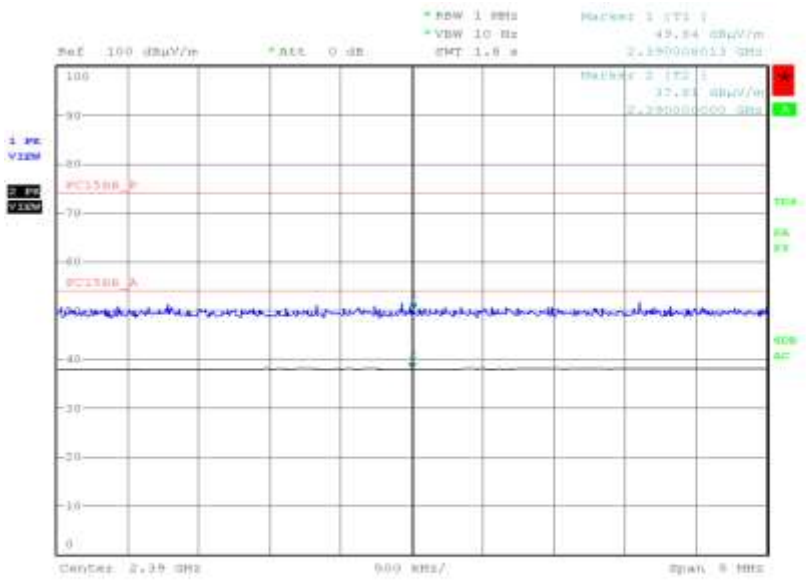
Limit

Peak (dBµV/m)	Average (dBµV/m)
74.0	54.0

Band Edge Emissions

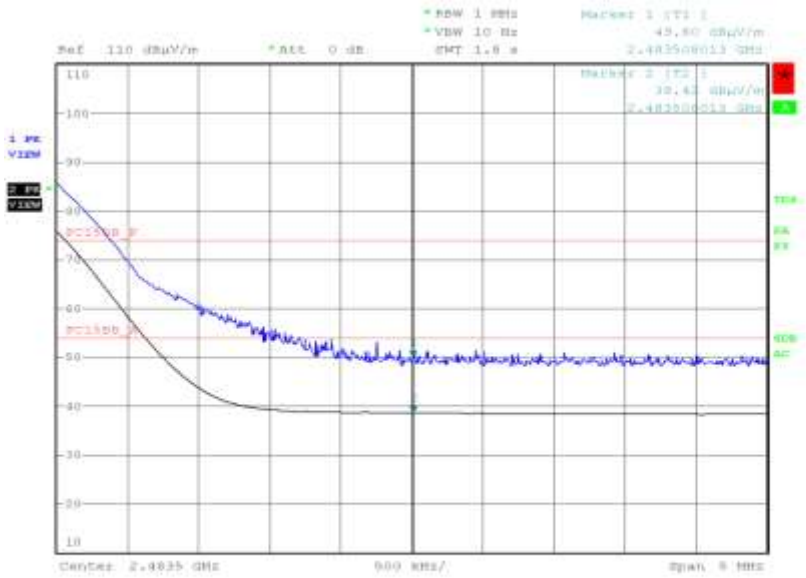
2402 MHz

Polarisation	Final Peak (dBµV/m)	Final Average (dBµV/m)
Horizontal	49.84	37.81



2480 MHz

Polarisation	Final Peak (dBµV/m)	Final Average (dBµV/m)
Horizontal	49.80	38.42



Limit

Peak (dBµV/m)	Average (dBµV/m)
74.0	54.0

2.5 POWER SPECTRAL DENSITY

2.5.1 Specification Reference

FCC CFR 47 Part 15C, Clause 15.247 (e)

2.5.2 Equipment Under Test and Modification State

SHL23 S/N: IMEI 004401114893130 - Modification State 0

2.5.3 Date of Test

1 October 2013, 9 October 2013 & 14 October 2013

2.5.4 Test Equipment Used

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

2.5.5 Test Procedure

The EUT was connected to a spectrum analyser via a 10 dB attenuator. The path loss was measured between the EUT and the spectrum analyser and entered as a reference level offset. The trace was set to max hold and using a peak detector the maximum response was established. With the spectrum analyser RBW at 3 kHz and VBW at 10 kHz, the power spectral density in a 3 kHz bandwidth was measured.

2.5.6 Environmental Conditions

Ambient Temperature	22.5 - 22.8°C
Relative Humidity	54.7 - 57.1%

2.5.7 Test Results

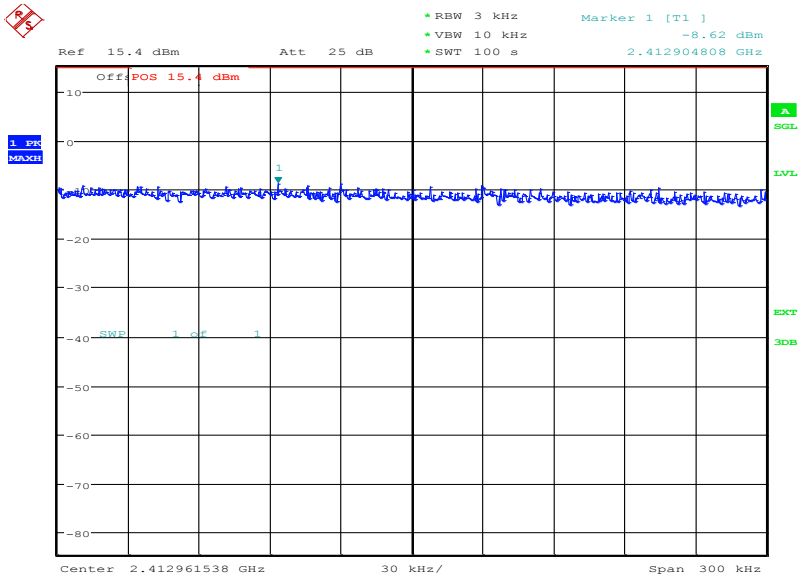
802.11(b)

4.0 V DC Supply

Frequency	Data Rate (Mbps)	Power Spectral Density in 3 kHz Bands (dBm)
2412 MHz	1	-8.62
	2	-7.39
	5.5	-8.50
	11	-8.17
2437 MHz	1	-5.17
	2	-5.89
	5.5	-6.69
	11	-6.53
2462 MHz	1	-8.84
	2	-8.33
	5.5	-9.64
	11	-9.74

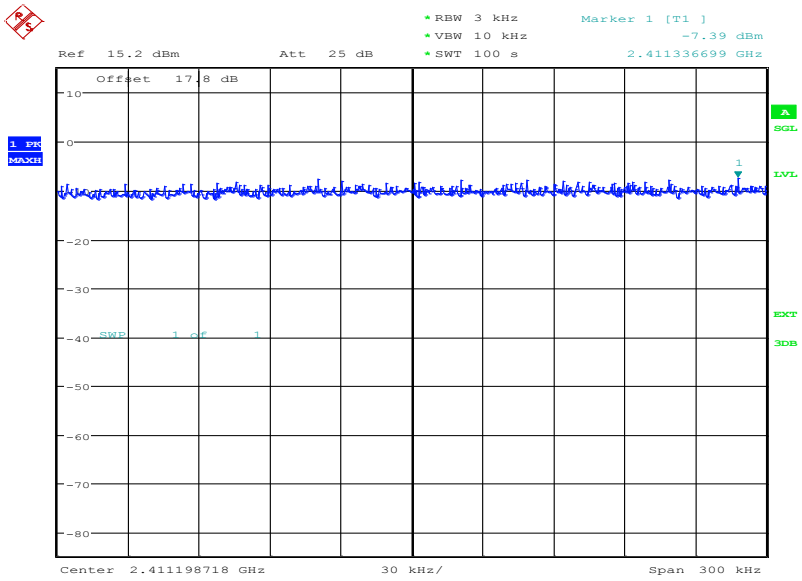
2412 MHz

1 Mbps



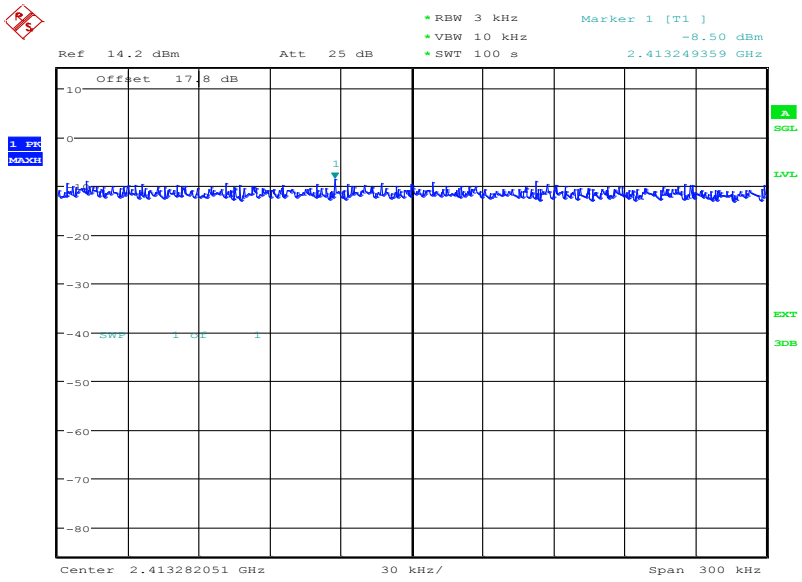
Date: 1.OCT.2013 14:27:32

2 Mbps



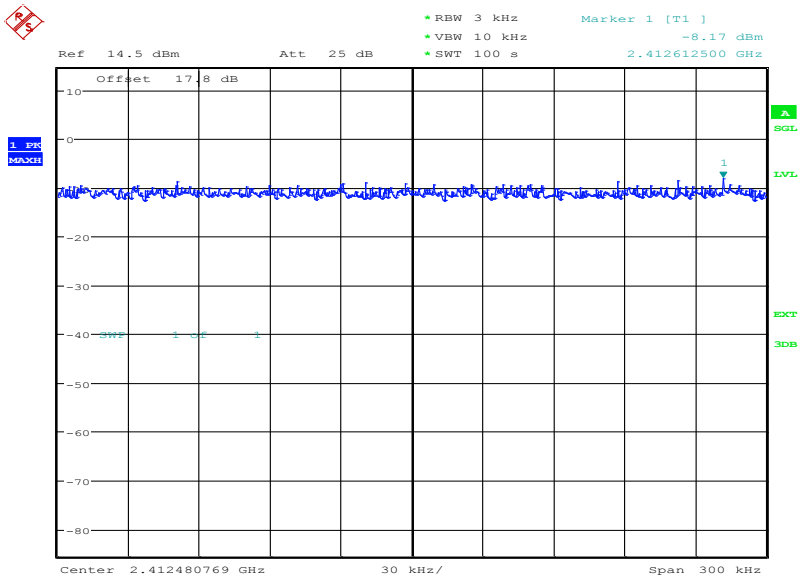
Date: 1.OCT.2013 15:07:19

5.5 Mbps



Date: 1.OCT.2013 15:28:53

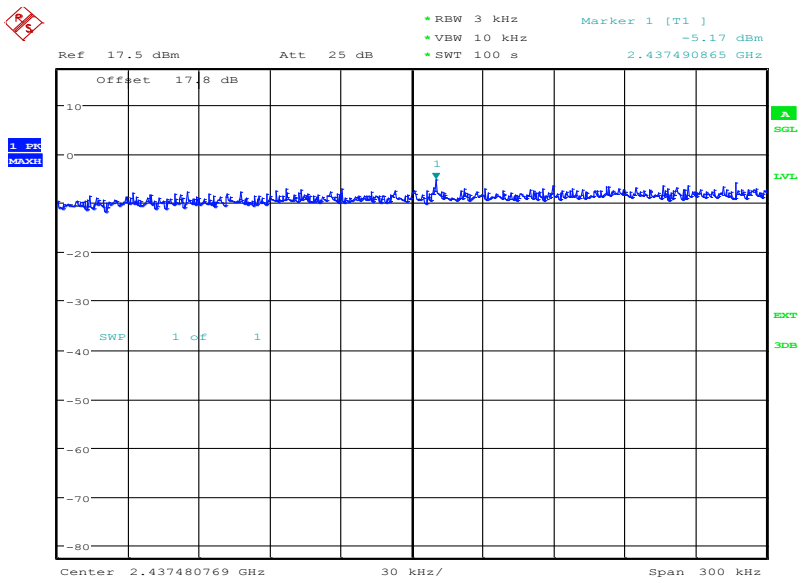
11 Mbps



Date: 1.OCT.2013 15:45:34

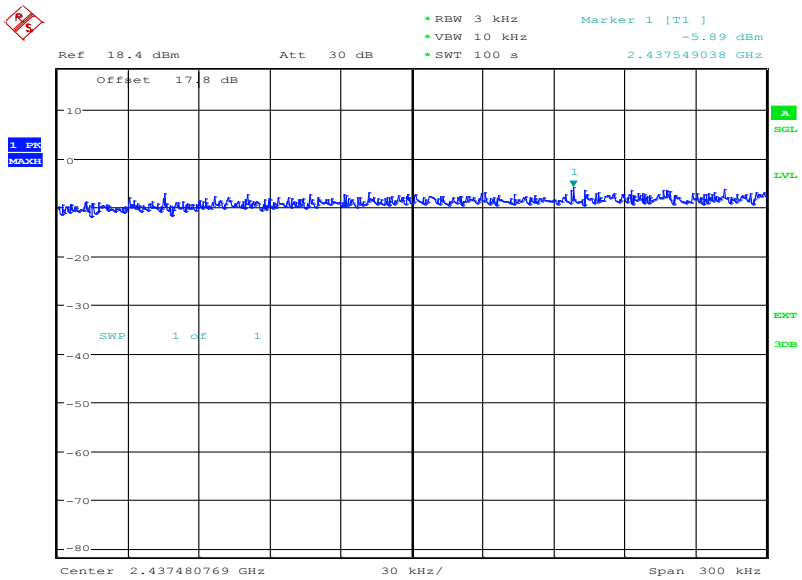
2437 MHz

1 Mbps



Date: 1.OCT.2013 14:45:24

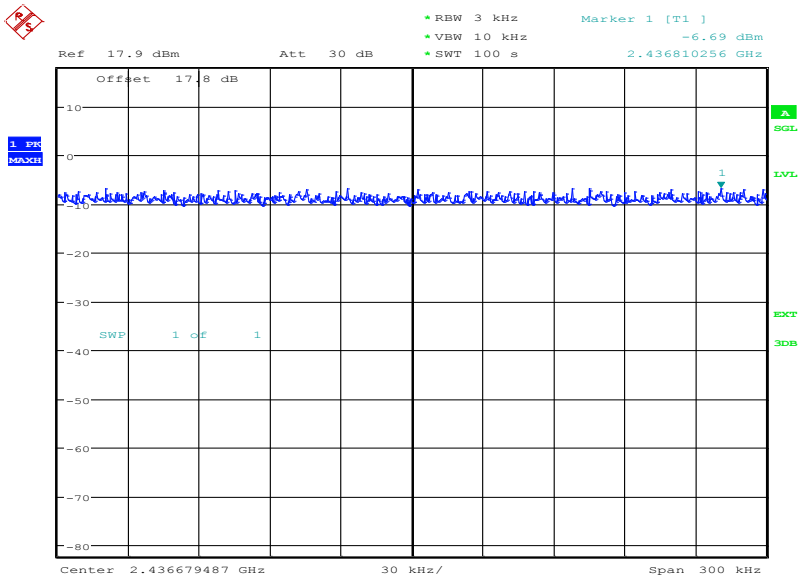
2 Mbps



Date: 1.OCT.2013 15:12:31

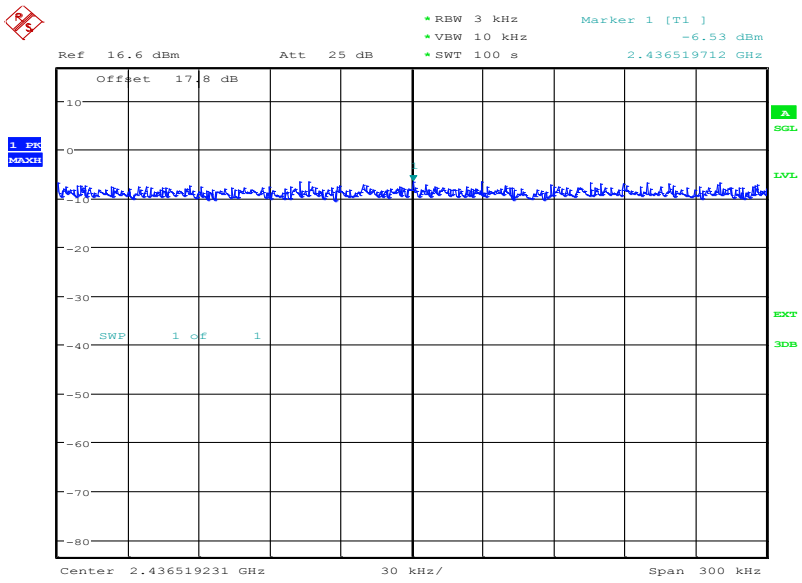
Product Service

5.5 Mbps



Date: 1.OCT.2013 15:34:28

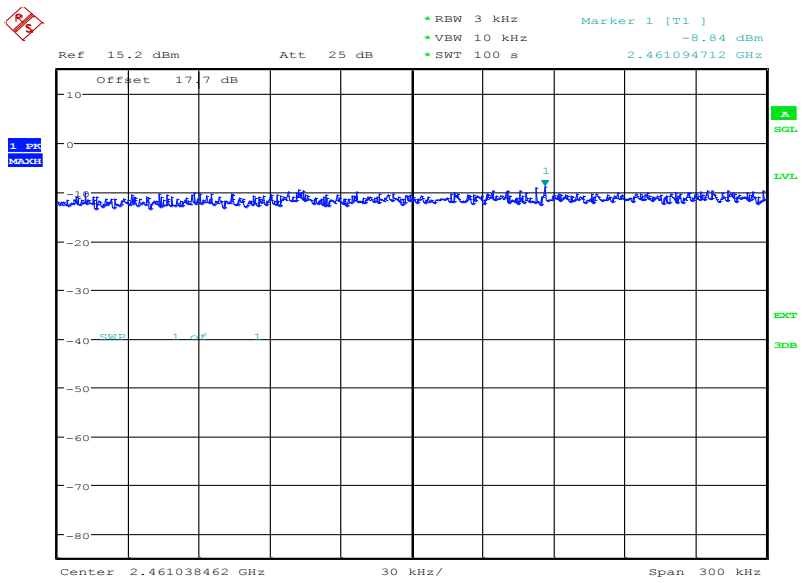
11 Mbps



Date: 1.OCT.2013 15:50:57

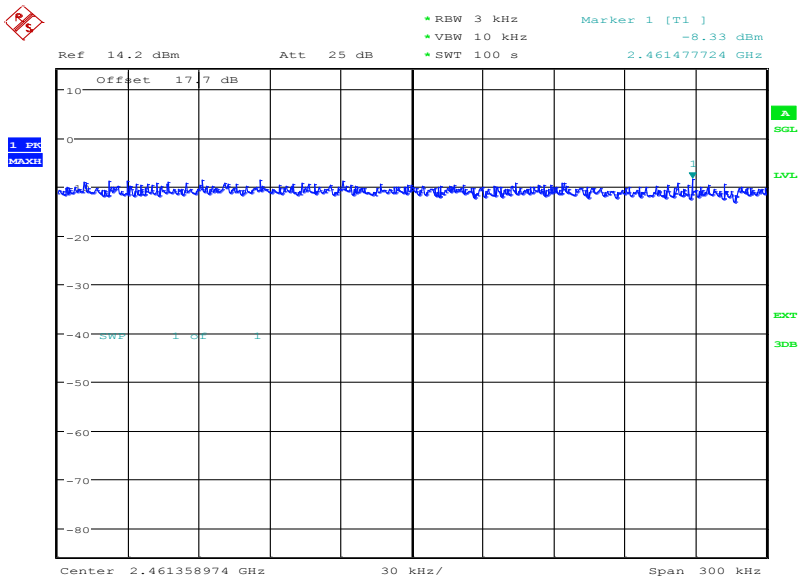
2462 MHz

1 Mbps



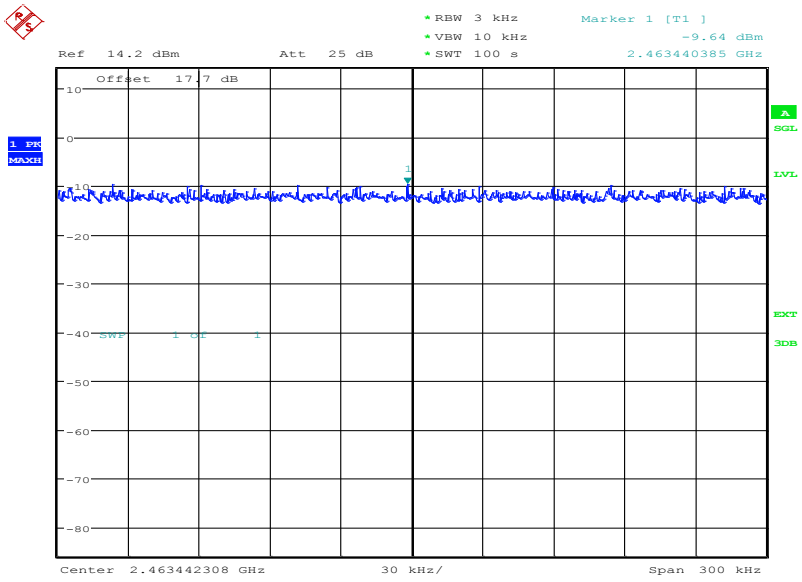
Date: 1.OCT.2013 14:59:27

2 Mbps



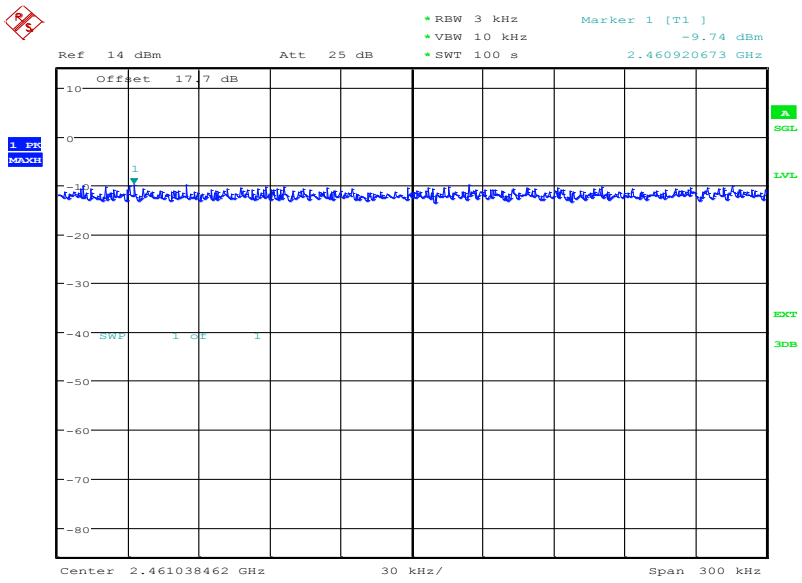
Date: 1.OCT.2013 15:17:35

5.5 Mbps



Date: 1.OCT.2013 15:40:33

11 Mbps



Date: 1.OCT.2013 16:04:27

Limit Clause

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.

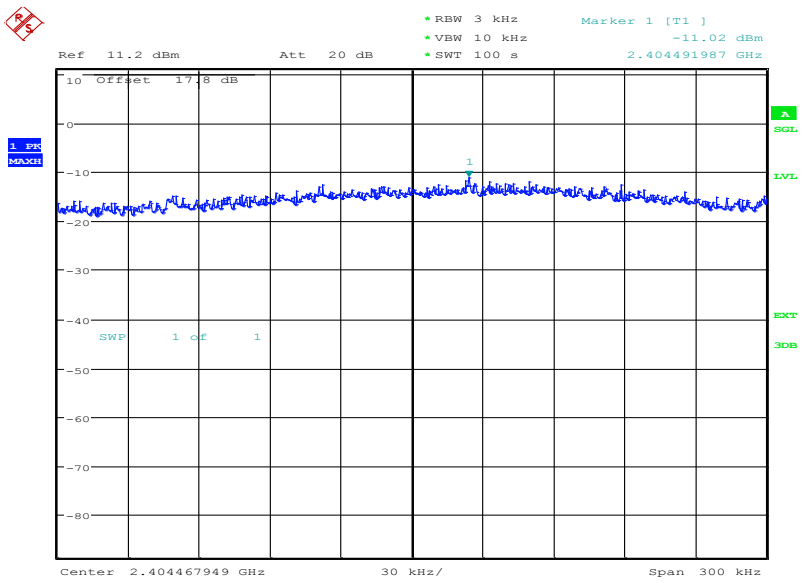
802.11(g)

4.0 V DC Supply

Frequency	Data Rate (Mbps)	Power Spectral Density in 3 kHz Bands (dBm)
2412 MHz	6	-11.02
	9	-9.92
	12	-11.36
	18	-10.64
	24	-11.18
	36	-10.72
	48	-10.86
	54	-11.00
2437 MHz	6	-10.79
	9	-10.24
	12	-10.14
	18	-10.44
	24	-11.14
	36	-9.76
	48	-10.46
	54	-9.91
2462 MHz	6	-11.52
	9	-11.28
	12	-11.57
	18	-11.13
	24	-10.83
	36	-11.12
	48	-11.36
	54	-10.87

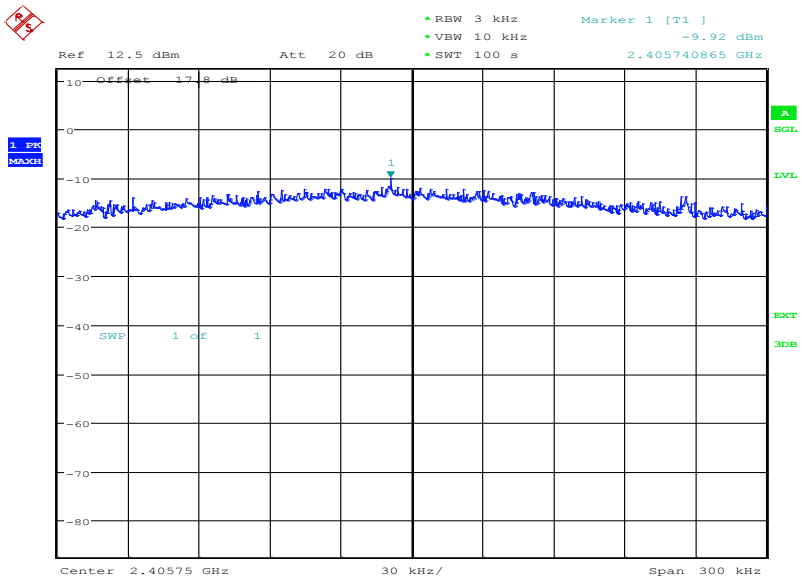
2412 MHz

6 Mbps



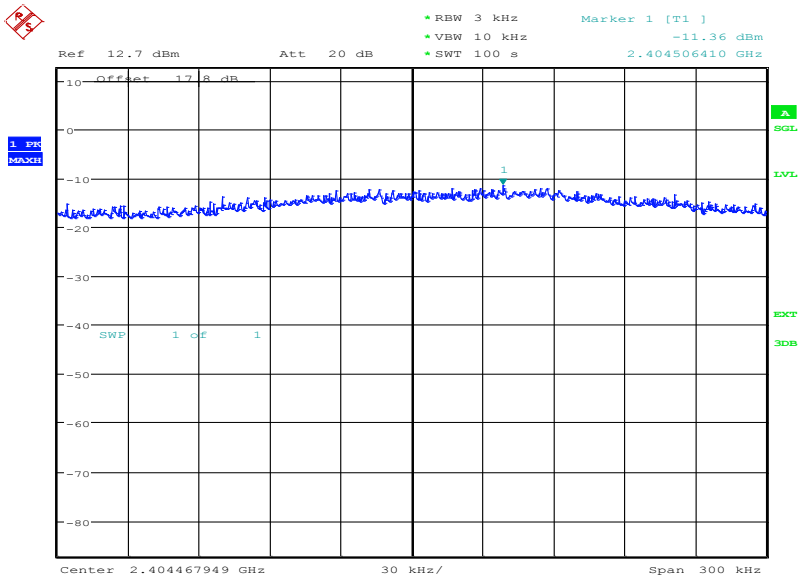
Date: 8.OCT.2013 17:58:40

9 Mbps



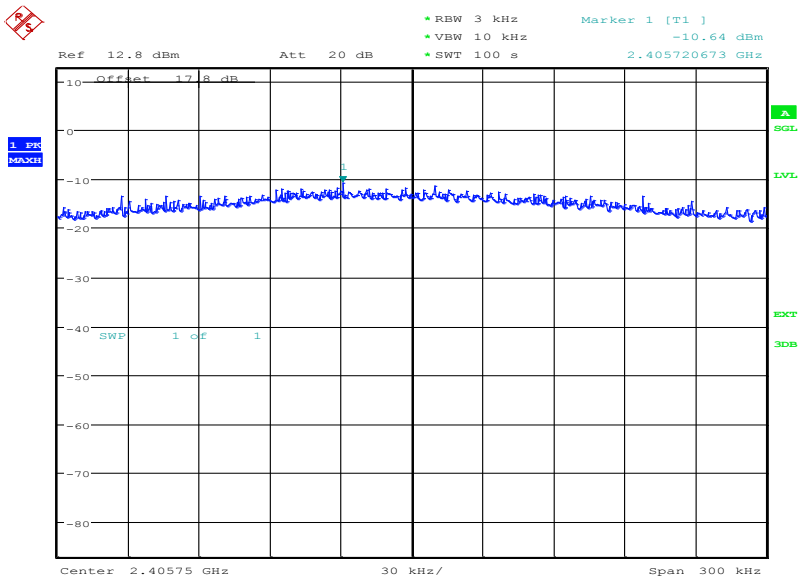
Date: 8.OCT.2013 18:14:41

12 Mbps



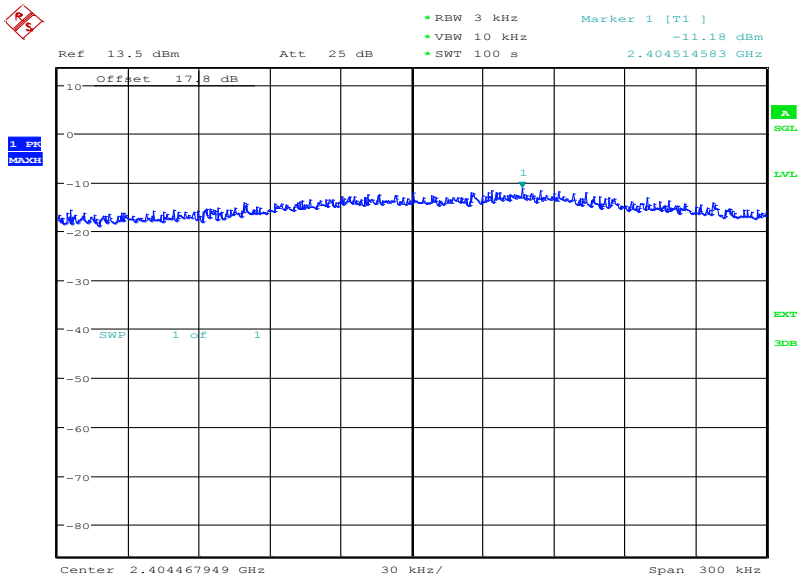
Date: 8.OCT.2013 18:32:45

18 Mbps



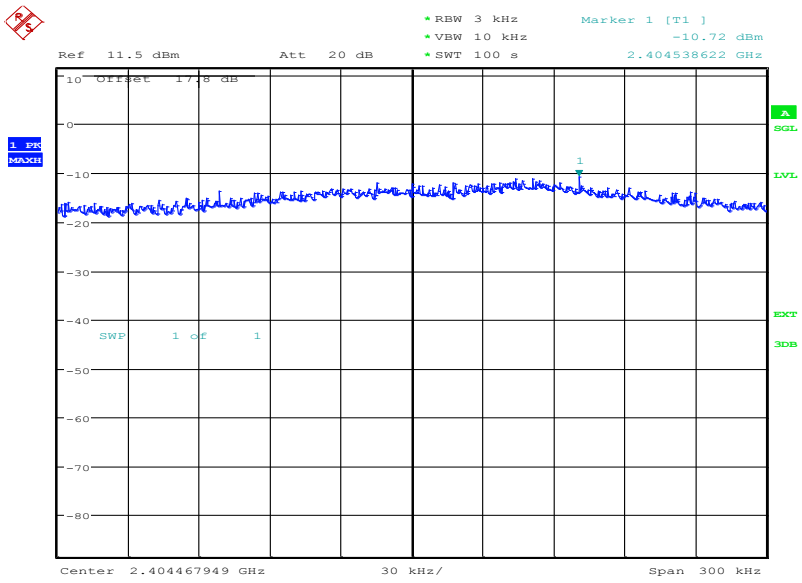
Date: 9.OCT.2013 09:05:33

24 Mbps



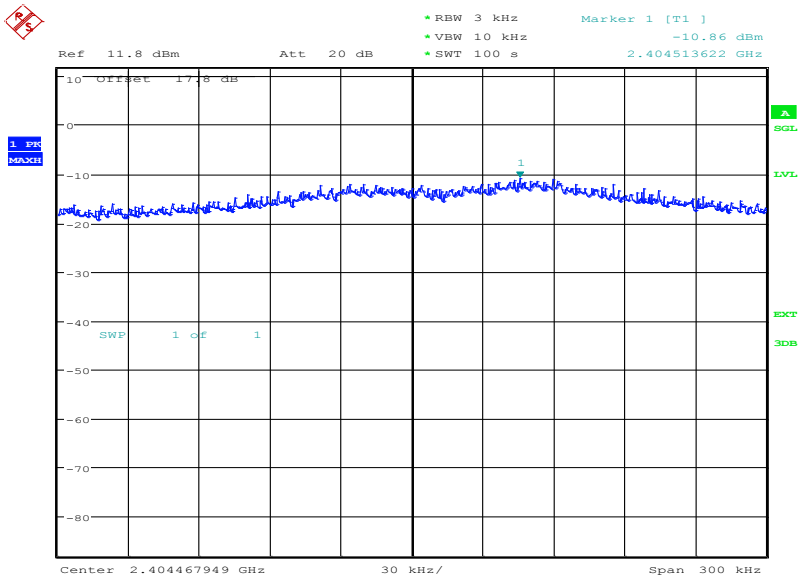
Date: 9.OCT.2013 09:34:55

36 Mbps



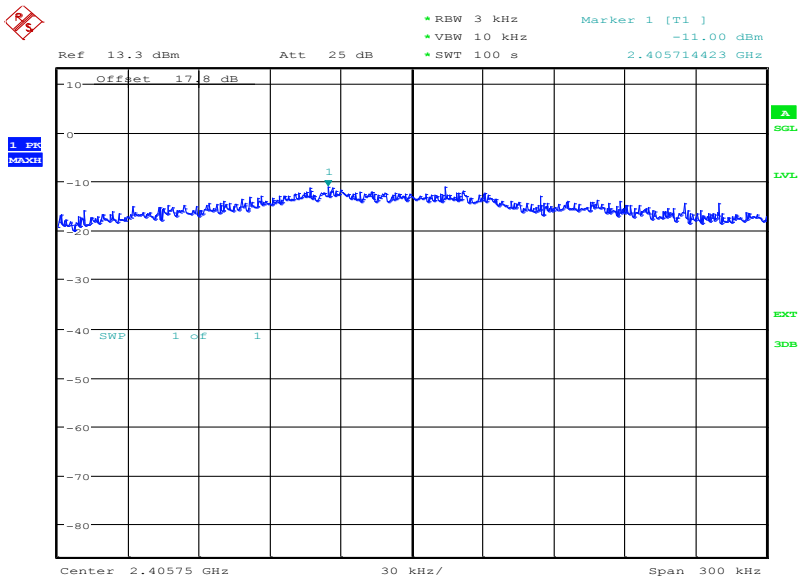
Date: 9.OCT.2013 10:17:36

48 Mbps



Date: 9.OCT.2013 10:39:43

54 Mbps

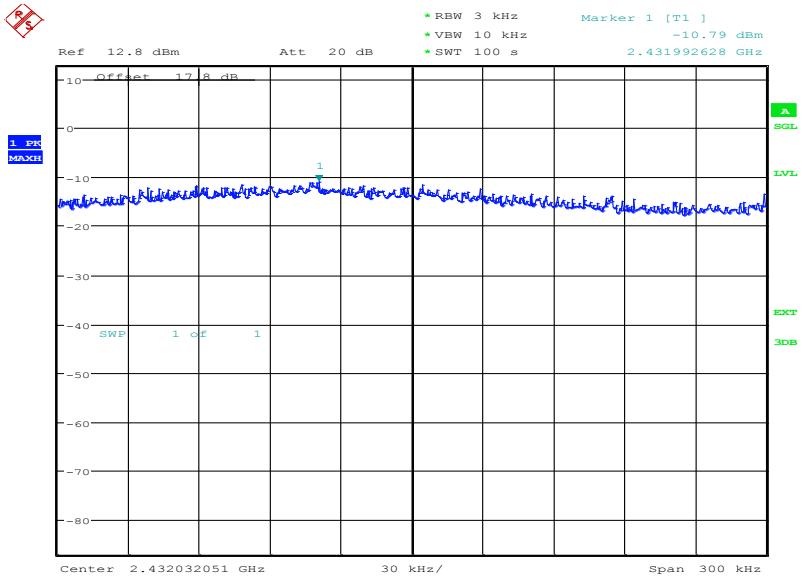


Date: 9.OCT.2013 11:05:46

Product Service

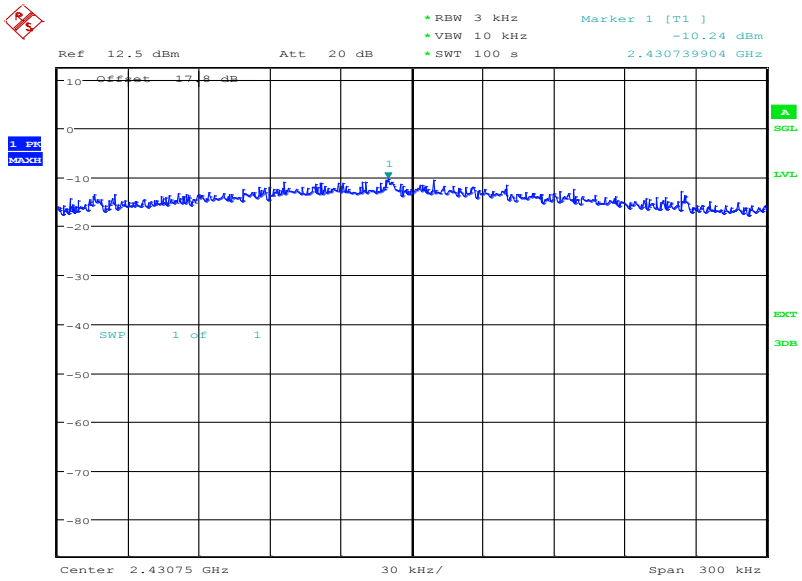
2437 MHz

6 Mbps



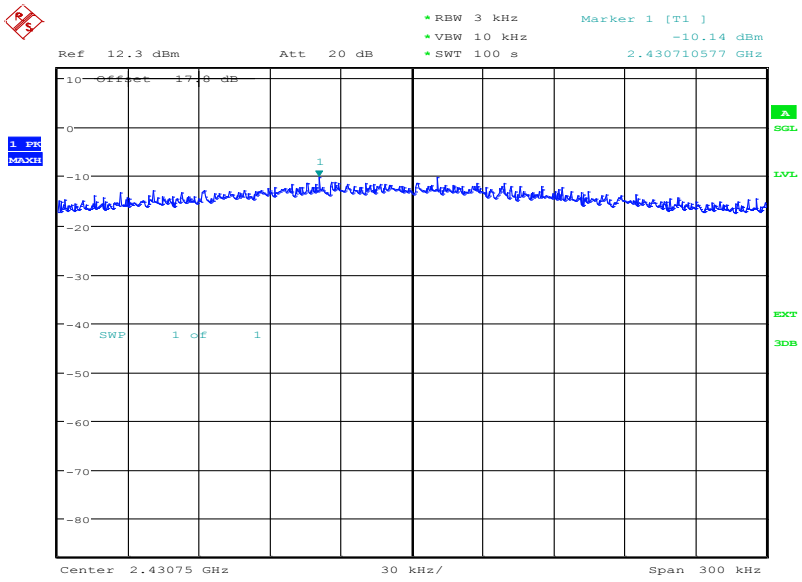
Date: 8.OCT.2013 18:03:40

9 Mbps



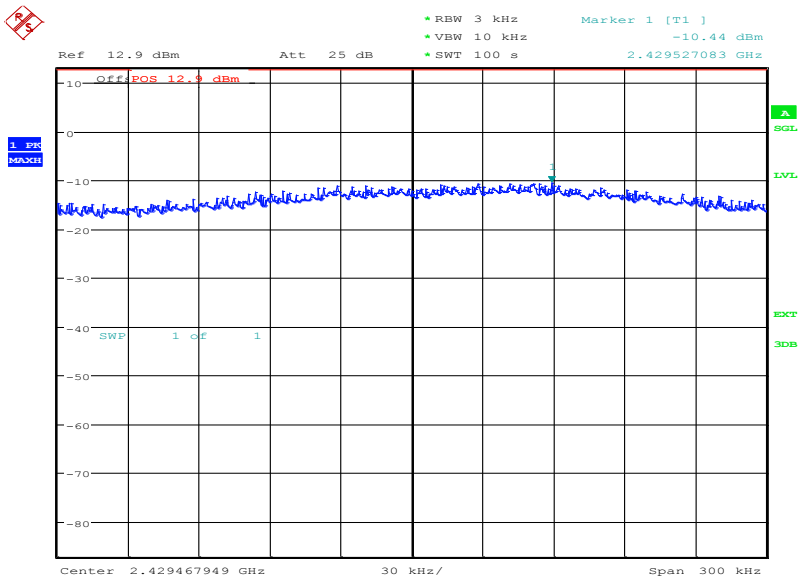
Date: 8.OCT.2013 18:19:40

12 Mbps



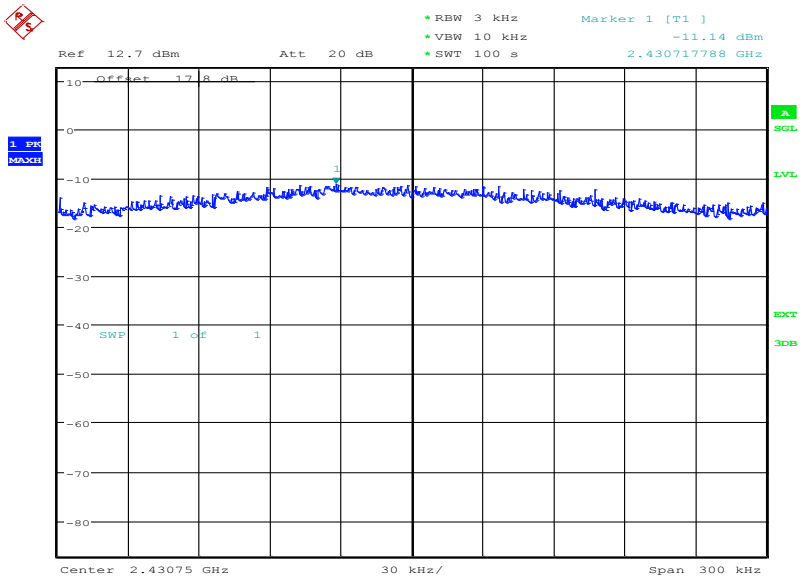
Date: 8.OCT.2013 18:40:11

18 Mbps



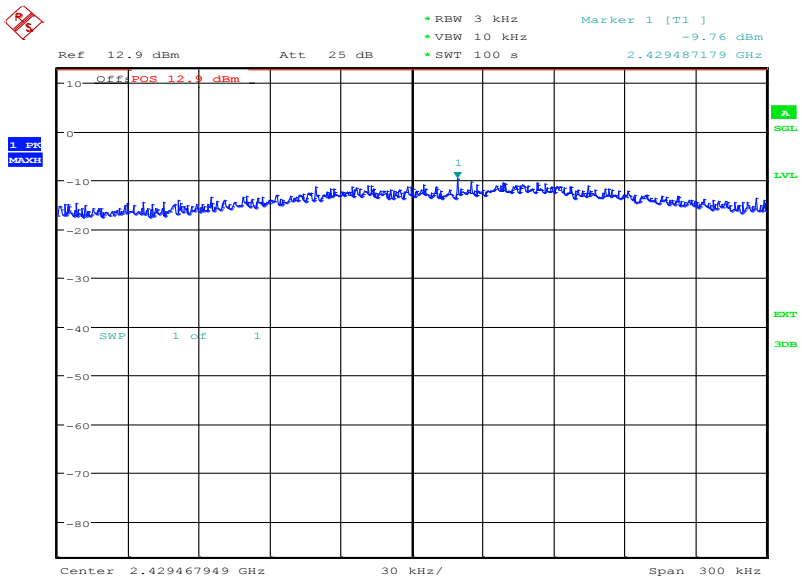
Date: 9.OCT.2013 09:10:24

24 Mbps



Date: 9.OCT.2013 10:03:38

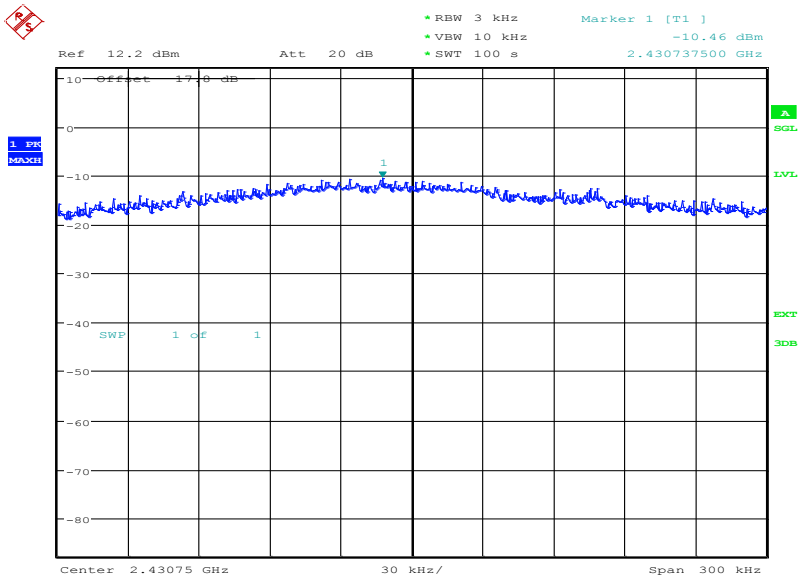
36 Mbps



Date: 9.OCT.2013 10:22:33

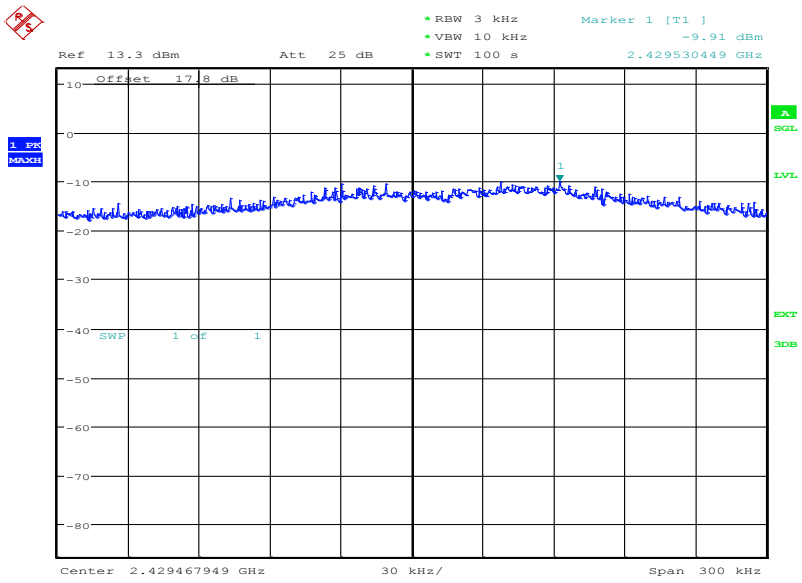
Product Service

48 Mbps



Date: 9.OCT.2013 10:56:25

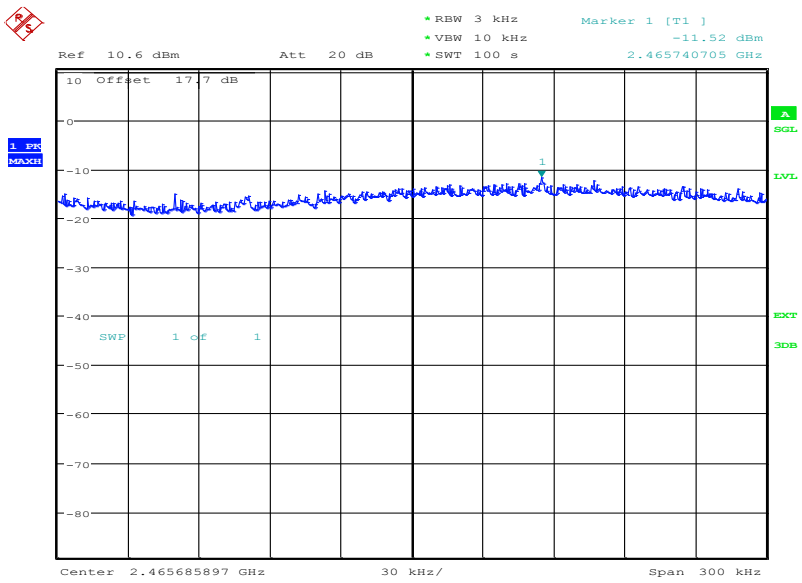
54 Mbps



Date: 9.OCT.2013 11:11:22

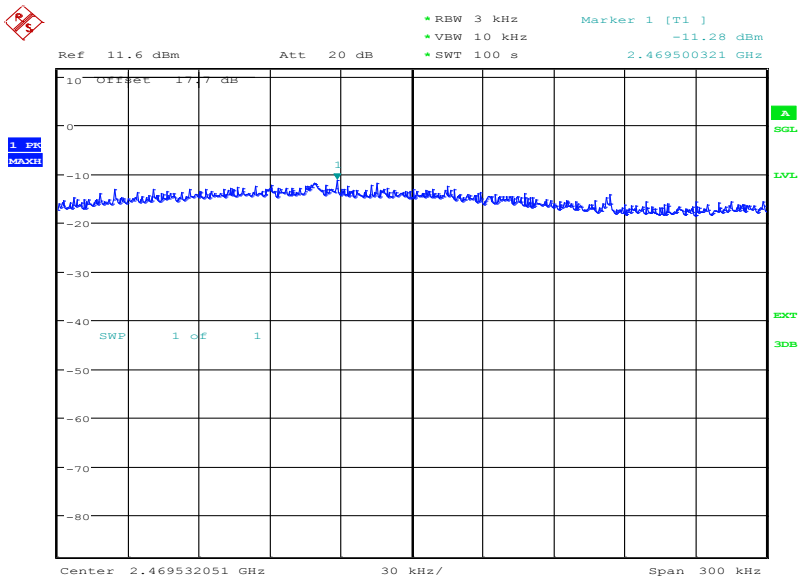
2462 MHz

6 Mbps



Date: 8.OCT.2013 18:07:53

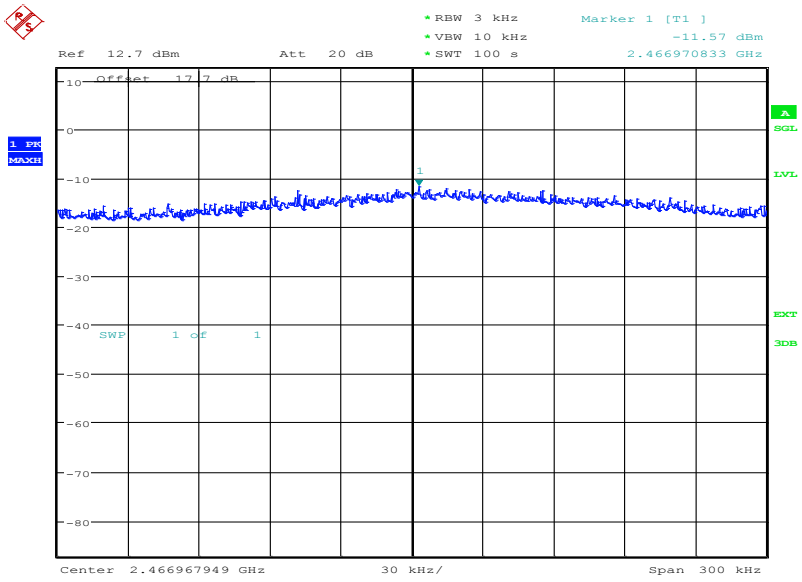
9 Mbps



Date: 8.OCT.2013 18:25:04

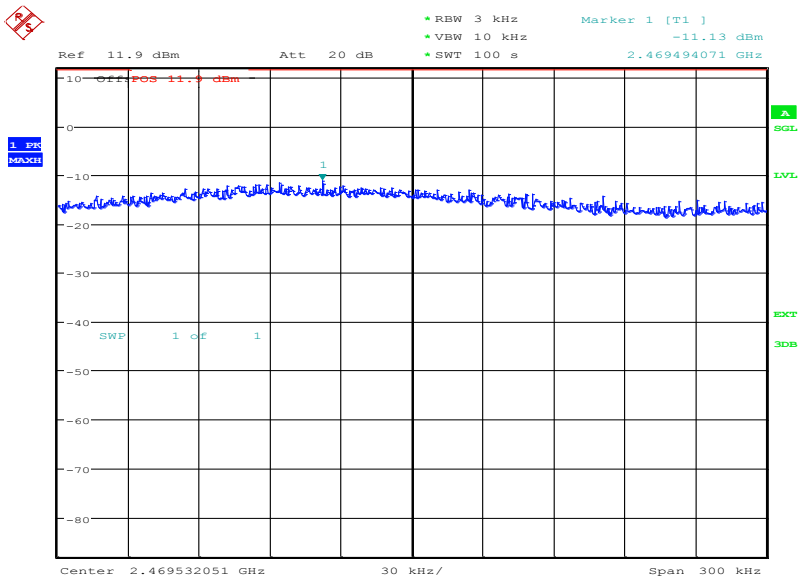
Product Service

12 Mbps



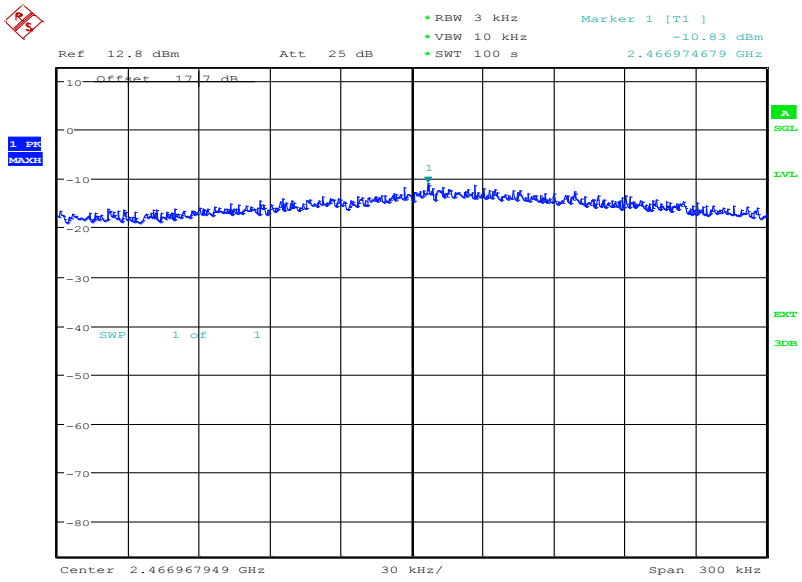
Date: 8.OCT.2013 18:44:49

18 Mbps



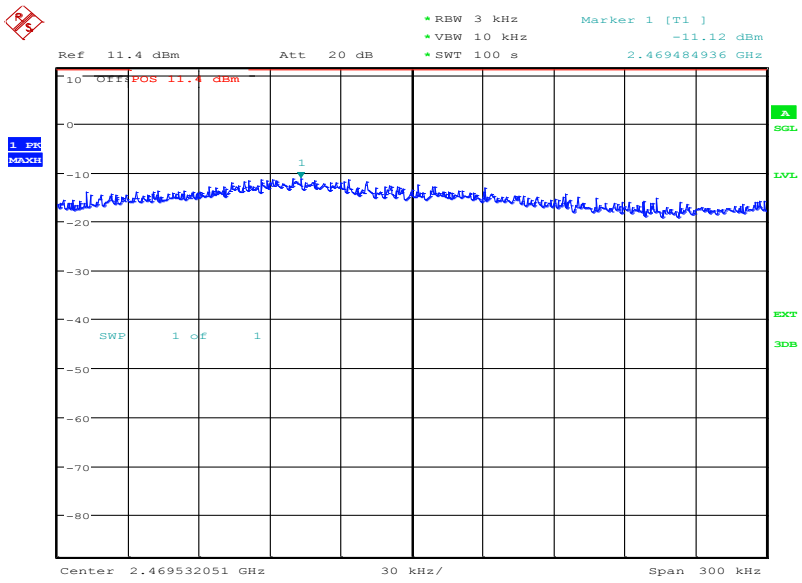
Date: 9.OCT.2013 09:15:11

24 Mbps



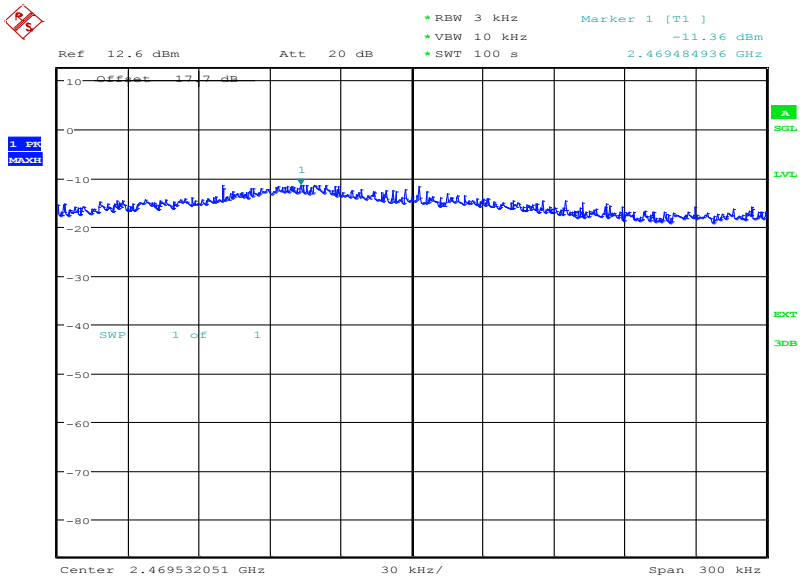
Date: 9.OCT.2013 10:09:58

36 Mbps



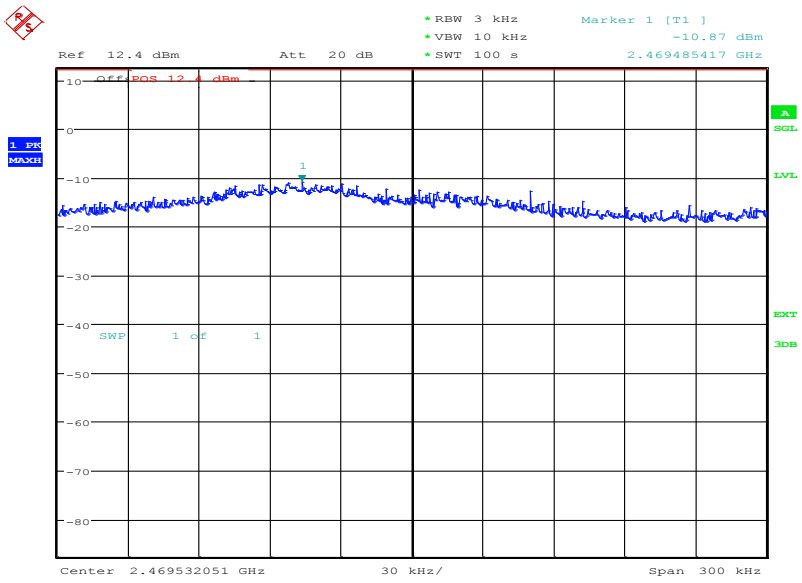
Date: 9.OCT.2013 10:29:29

48 Mbps



Date: 9.OCT.2013 11:00:44

54 Mbps



Date: 9.OCT.2013 11:28:24

Limit Clause

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.

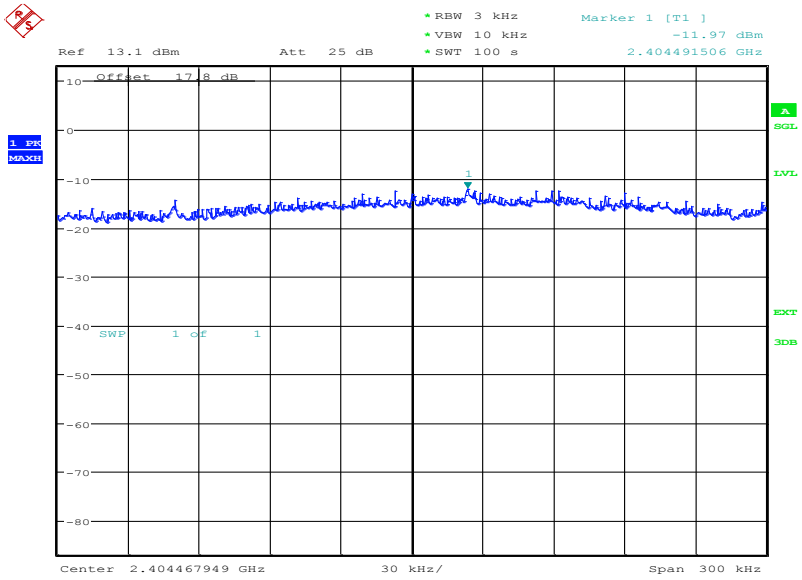
802.11(n)

4.0 V DC Supply

Frequency	Data Rate (Mbps)	Power Spectral Density in 3 kHz Bands (dBm)
2412 MHz	6.5	-11.97
	13	-12.90
	19.5	-11.33
	26	-12.61
	39	-12.01
	52	-11.47
	58.5	-11.17
	65	-11.14
2437 MHz	6.5	-11.84
	13	-11.24
	19.5	-11.71
	26	-11.63
	39	-10.69
	52	-11.03
	58.5	-11.46
	65	-11.08
2462 MHz	6.5	-11.47
	13	-12.52
	19.5	-10.73
	26	-11.38
	39	-11.68
	52	-11.25
	58.5	-11.31
	65	-10.87

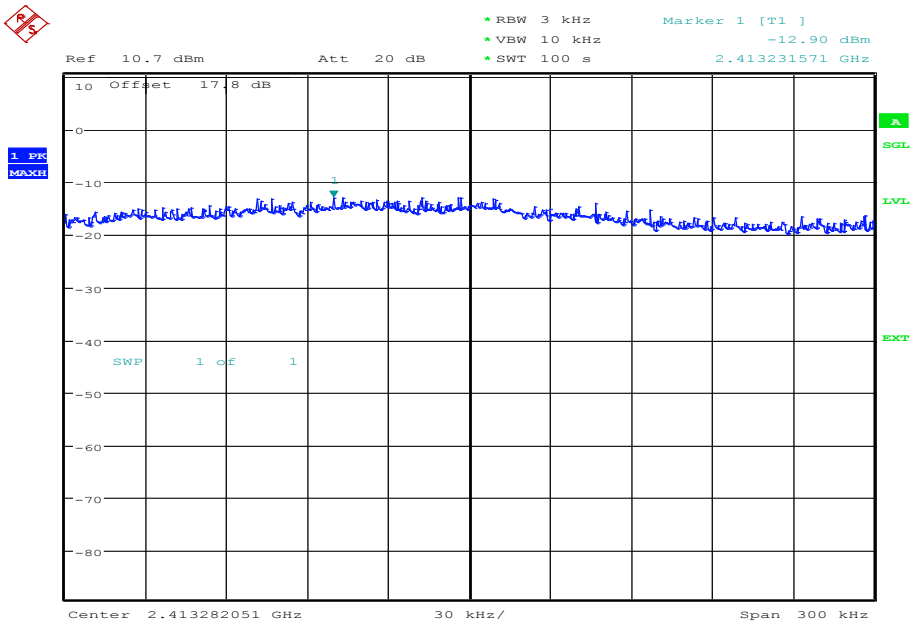
2412 MHz

6.5 Mbps



Date: 9.OCT.2013 11:35:36

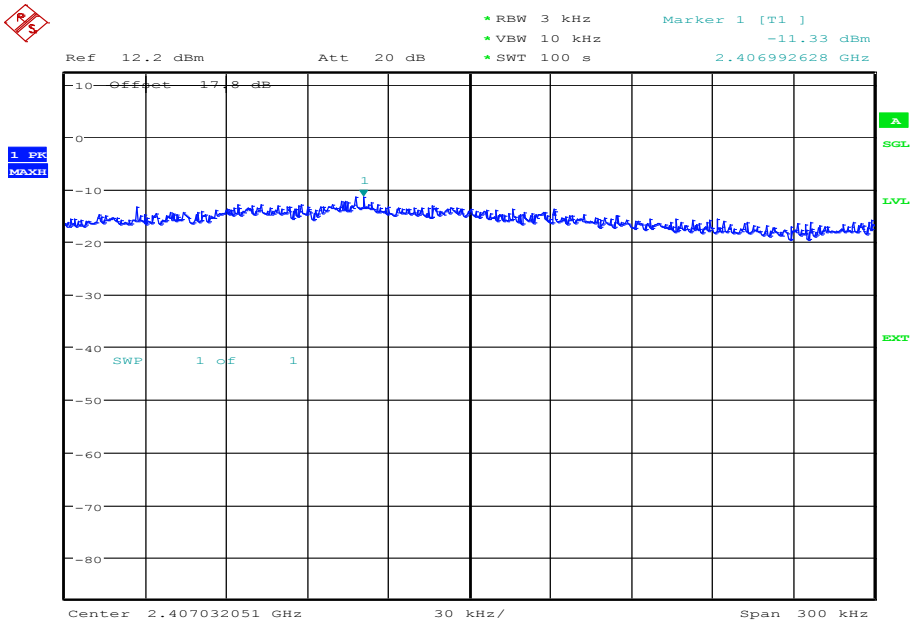
13 Mbps



Date: 9.OCT.2013 11:35:52

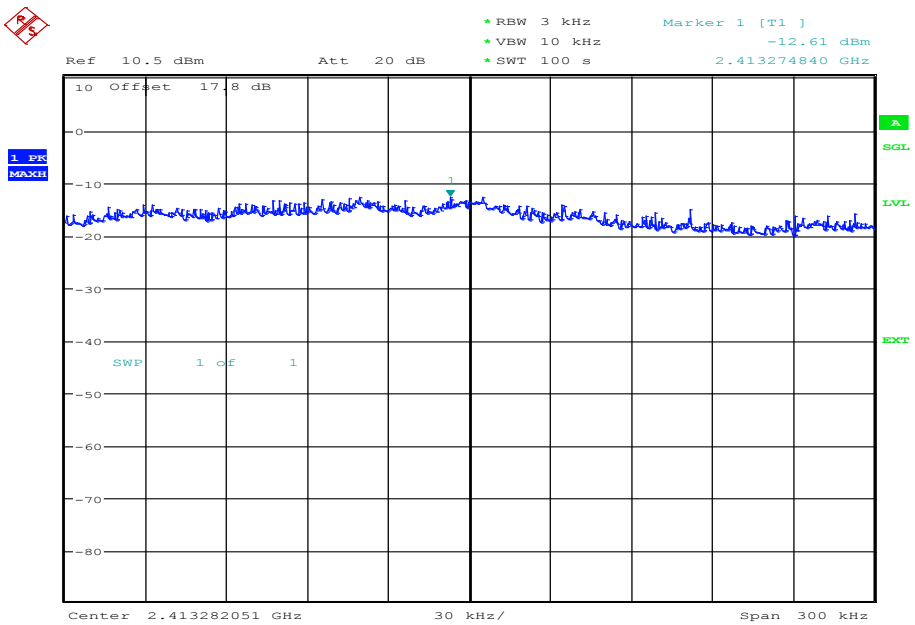
Product Service

19.5 Mbps



Date: 9.OCT.2013 11:54:54

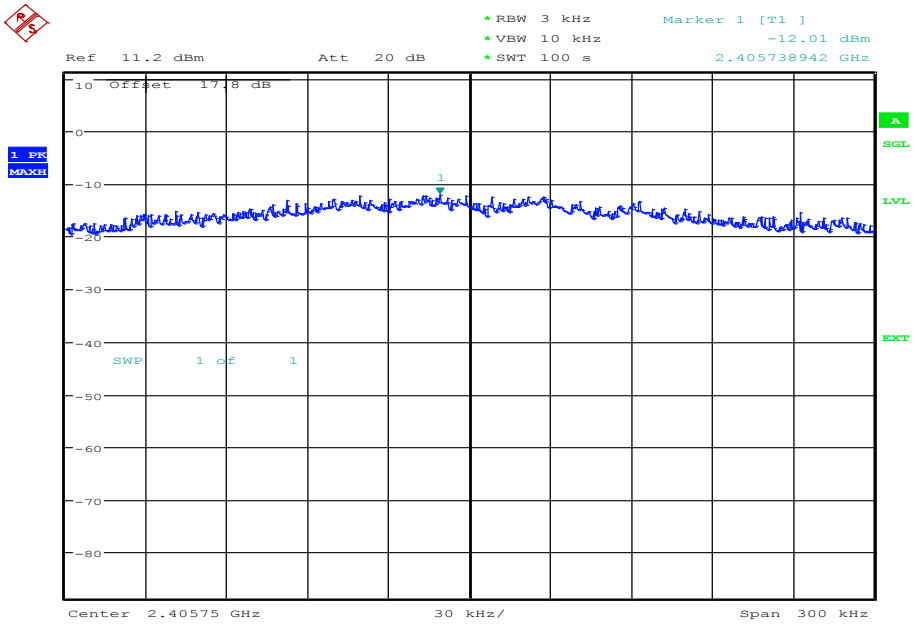
26 Mbps



Date: 9.OCT.2013 12:20:04

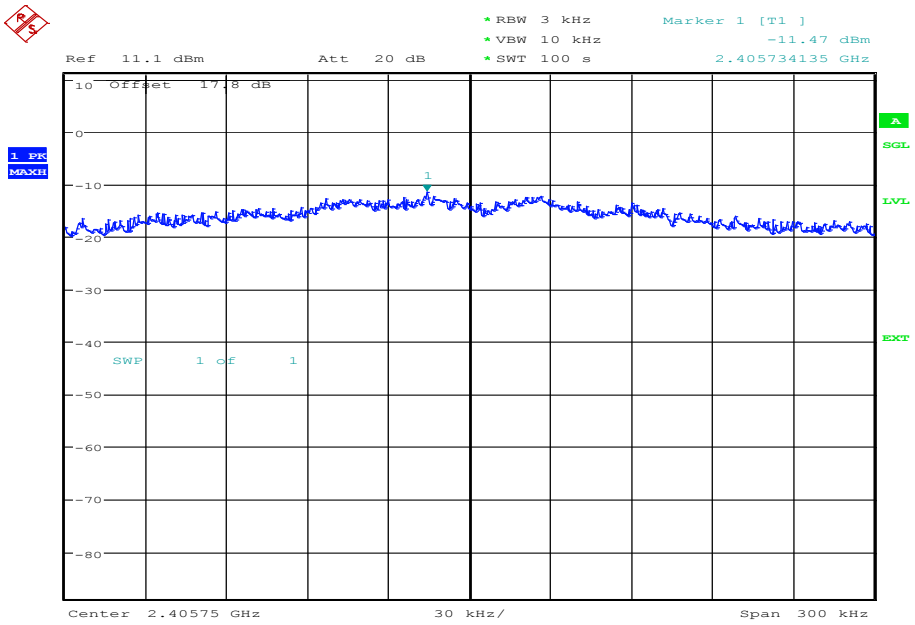
Product Service

39 Mbps



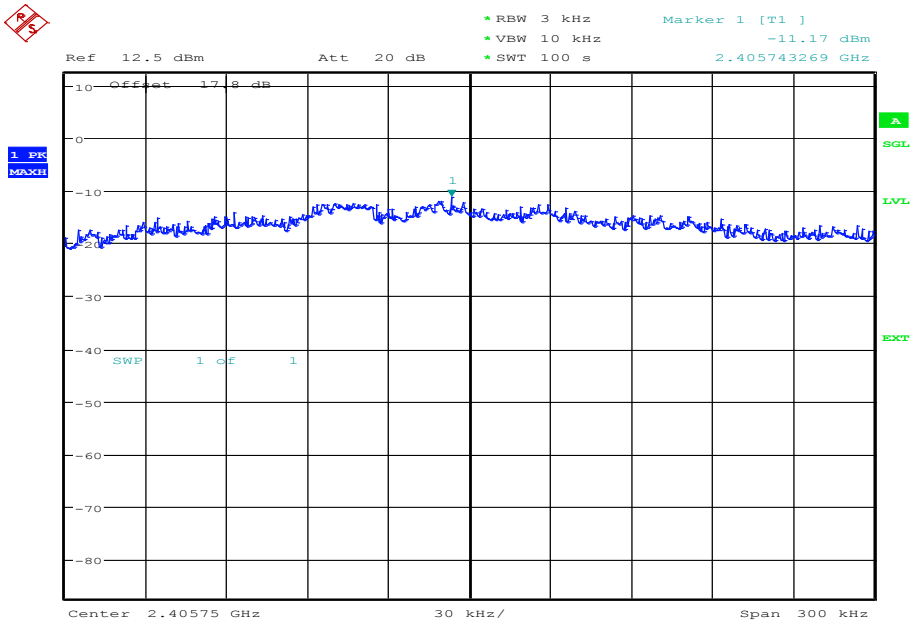
Date: 9.OCT.2013 12:45:53

52 Mbps



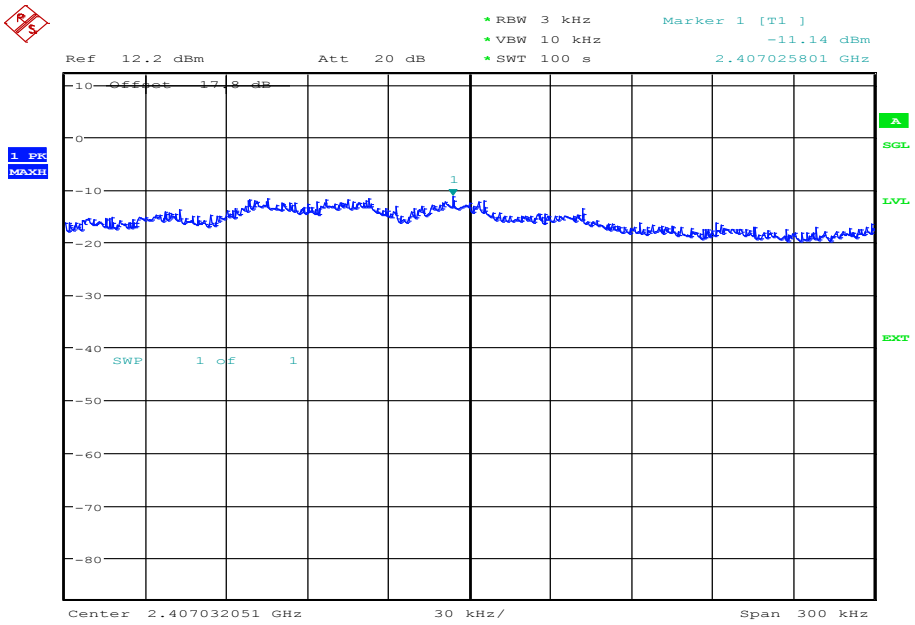
Date: 9.OCT.2013 13:11:48

58.5 Mbps



Date: 9.OCT.2013 13:49:58

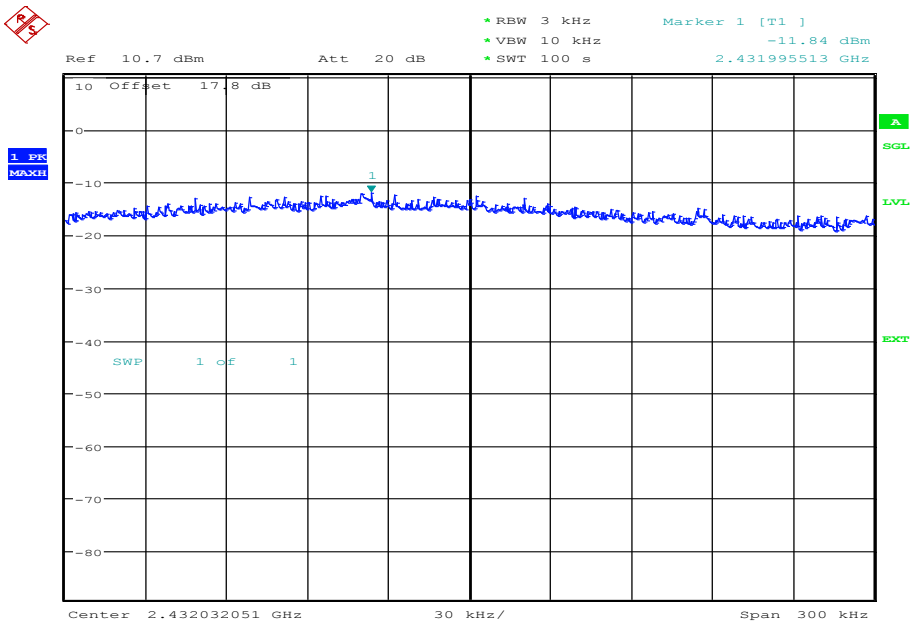
65 Mbps



Date: 9.OCT.2013 14:06:29

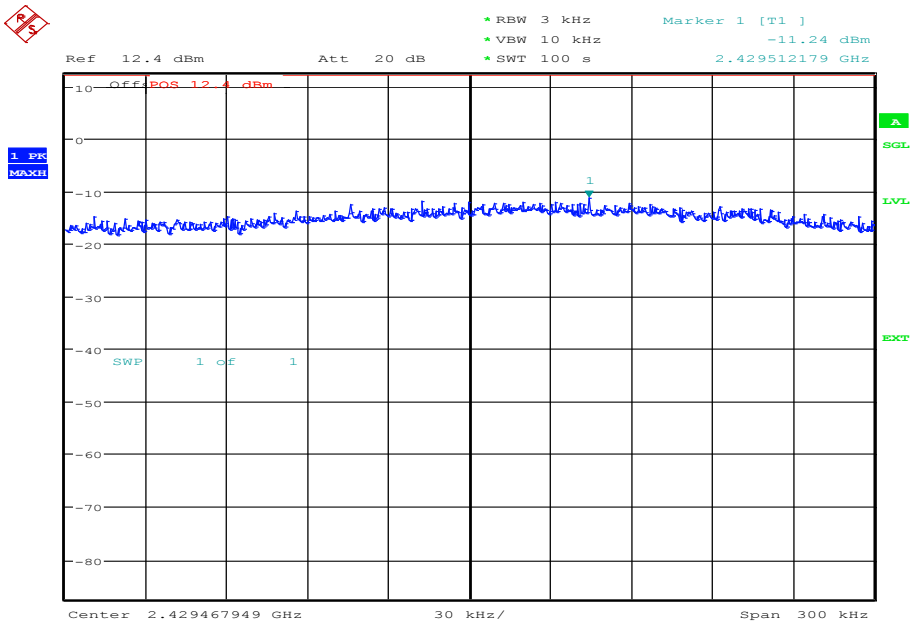
2437 MHz

6.5 Mbps



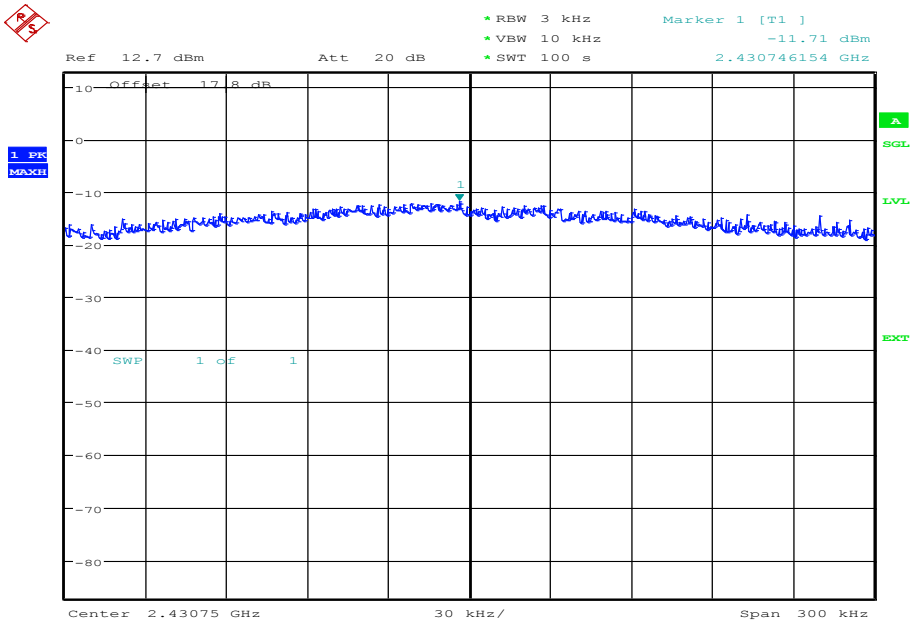
Date: 9.OCT.2013 11:16:56

13 Mbps



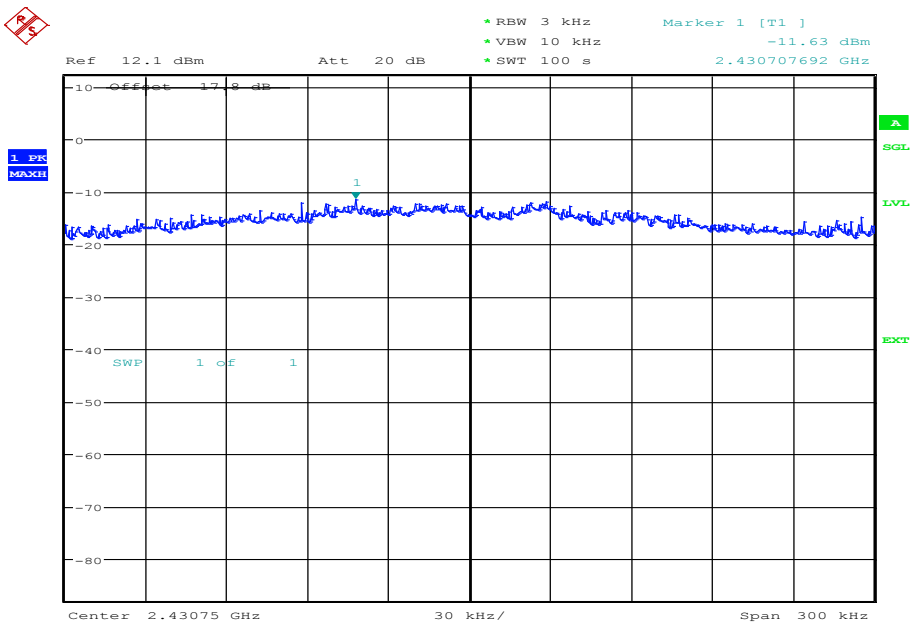
Date: 9.OCT.2013 11:40:13

19.5 Mbps



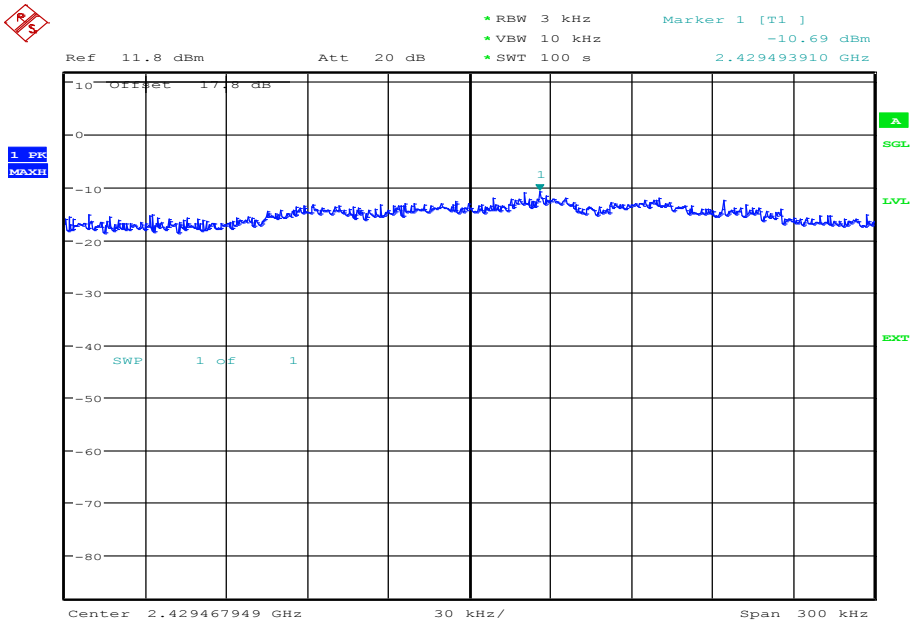
Date: 9.OCT.2013 12:05:29

26 Mbps



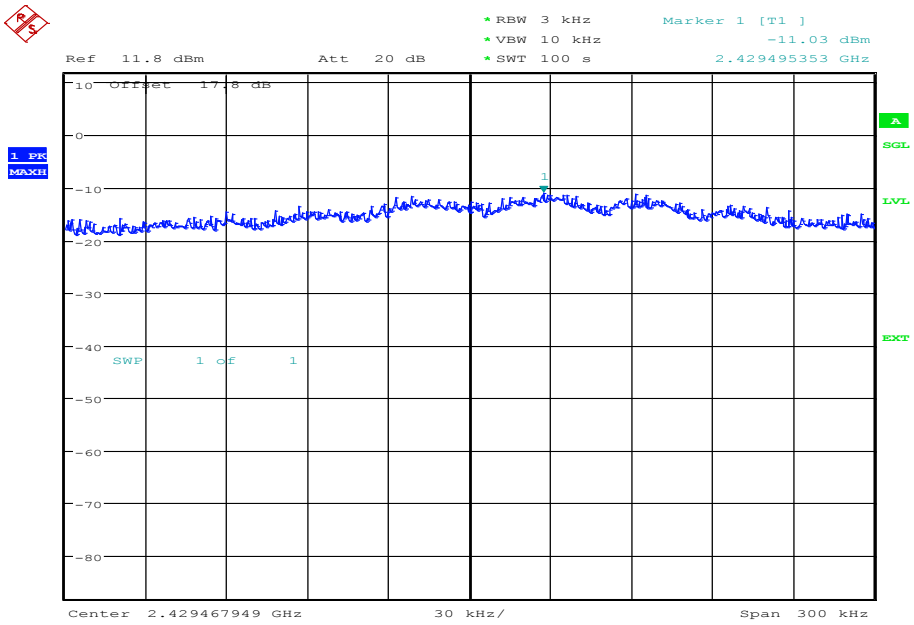
Date: 9.OCT.2013 12:33:28

39 Mbps



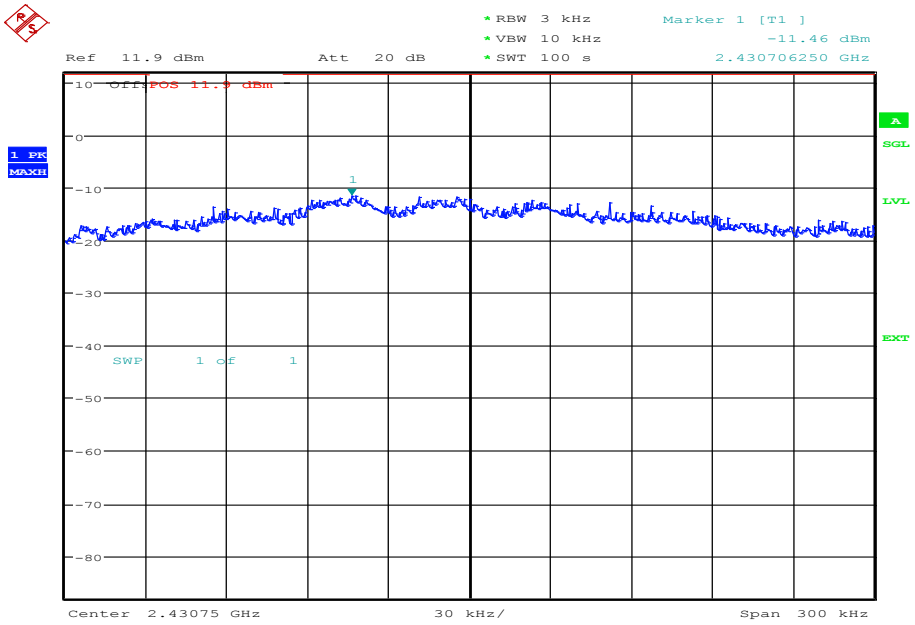
Date: 9.OCT.2013 12:50:56

52 Mbps



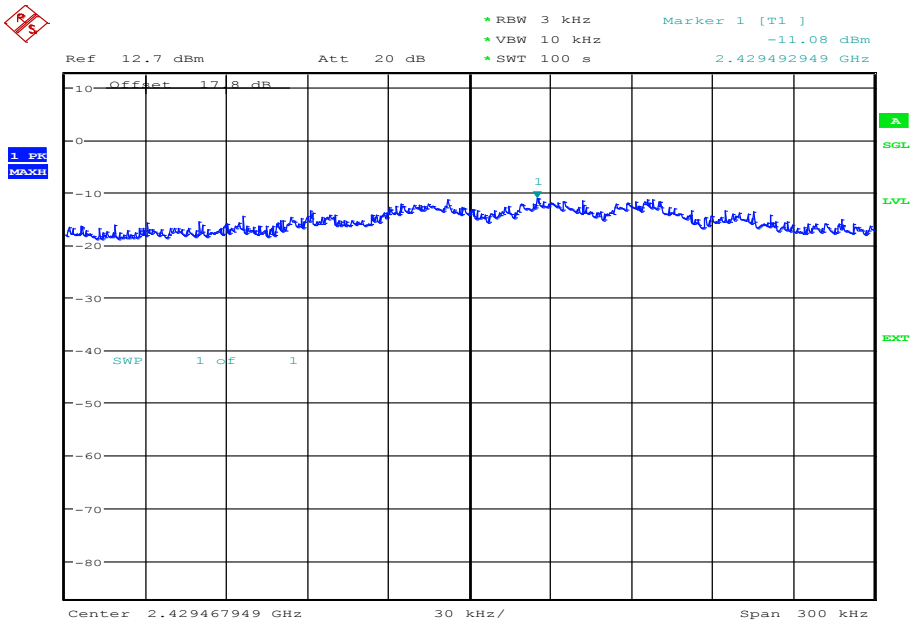
Date: 9.OCT.2013 13:22:31

58.5 Mbps



Date: 9.OCT.2013 13:54:36

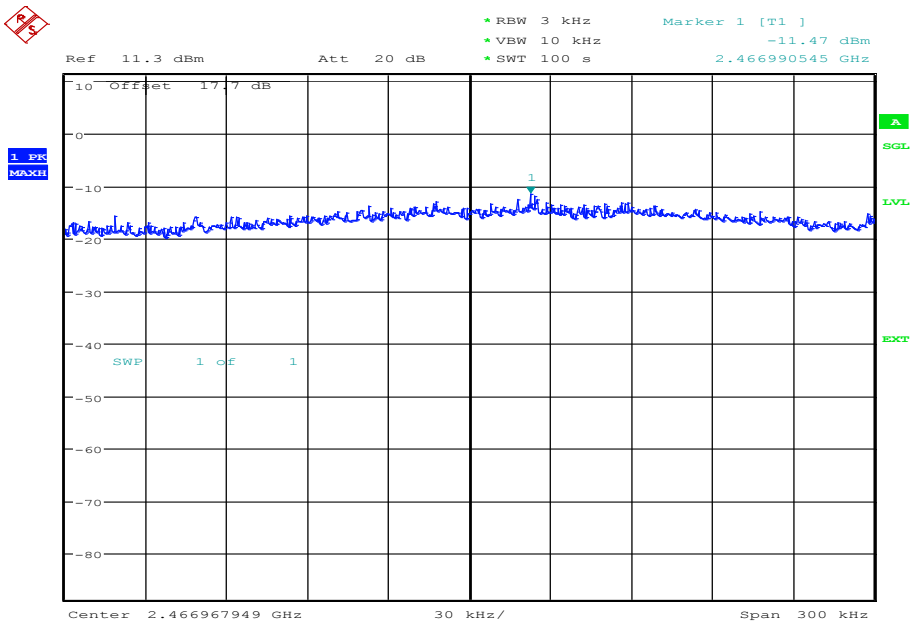
65 Mbps



Date: 9.OCT.2013 14:11:56

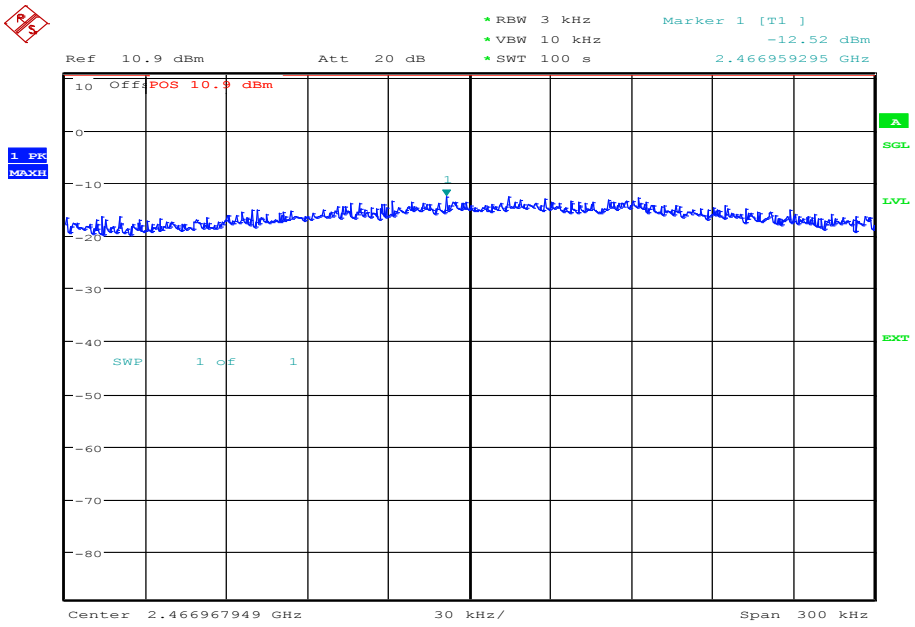
2462 MHz

6.5 Mbps



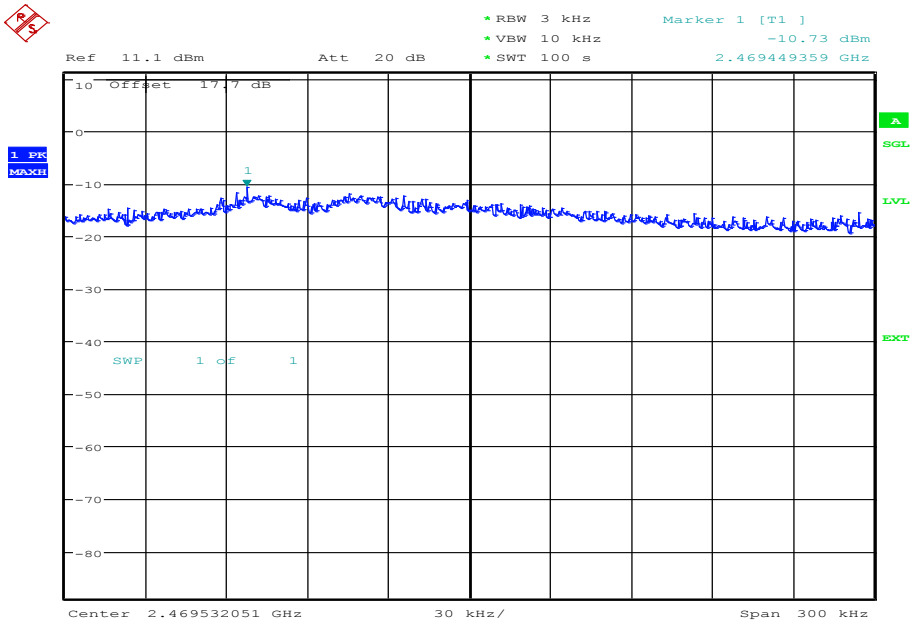
Date: 9.OCT.2013 11:28:05

13 Mbps



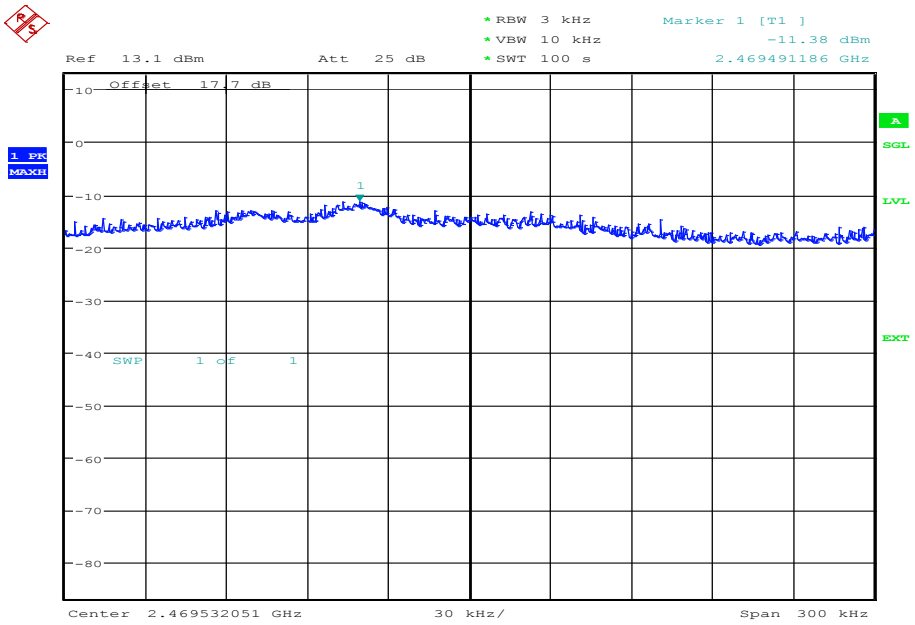
Date: 9.OCT.2013 11:46:29

19.5 Mbps



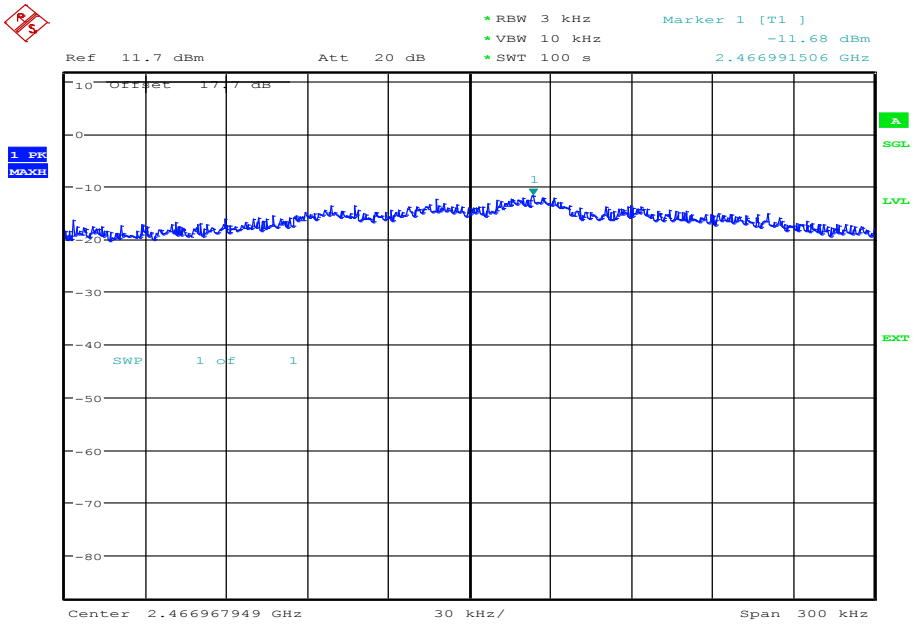
Date: 9.OCT.2013 12:12:27

26 Mbps



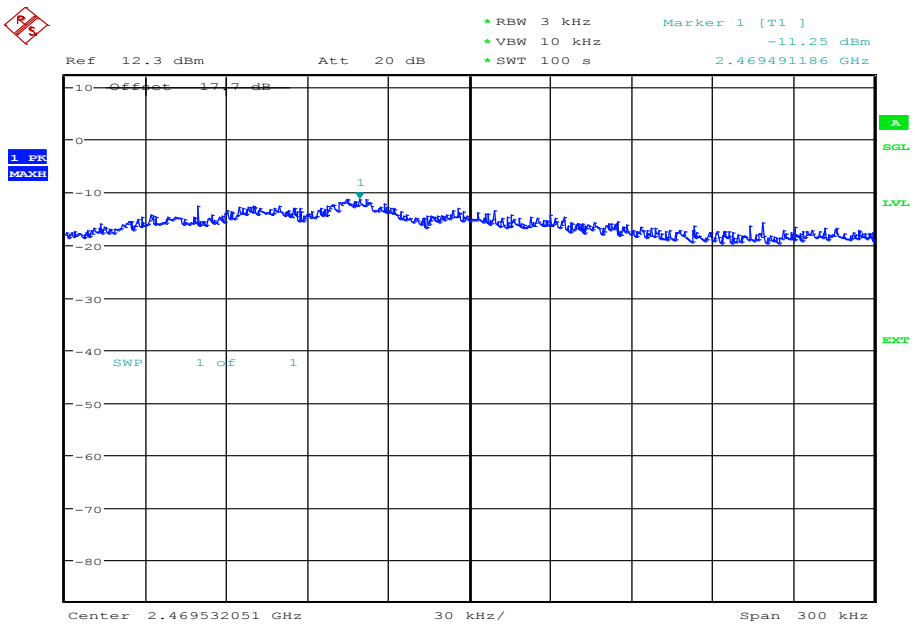
Date: 9.OCT.2013 12:39:47

39 Mbps



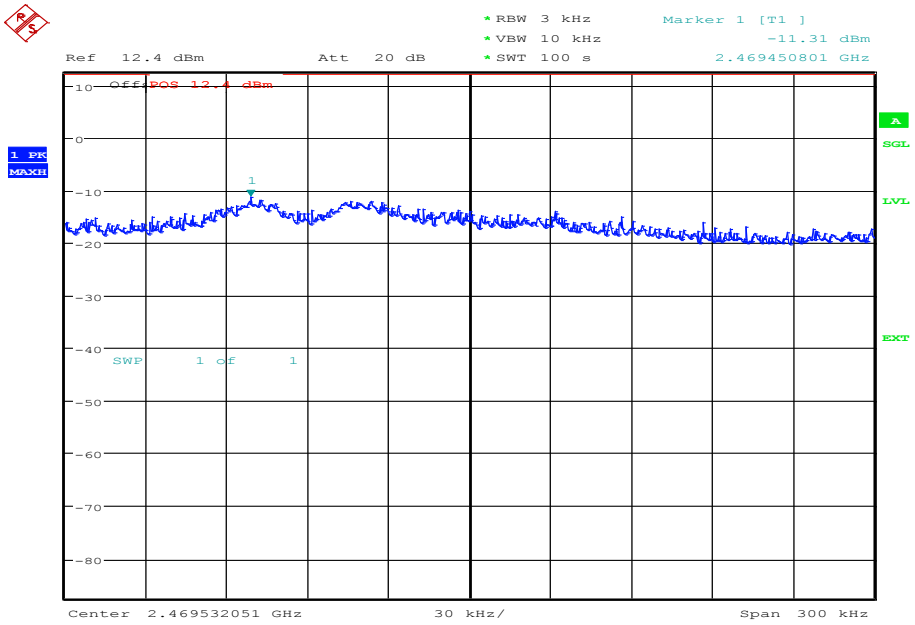
Date: 9.OCT.2013 12:56:32

52 Mbps



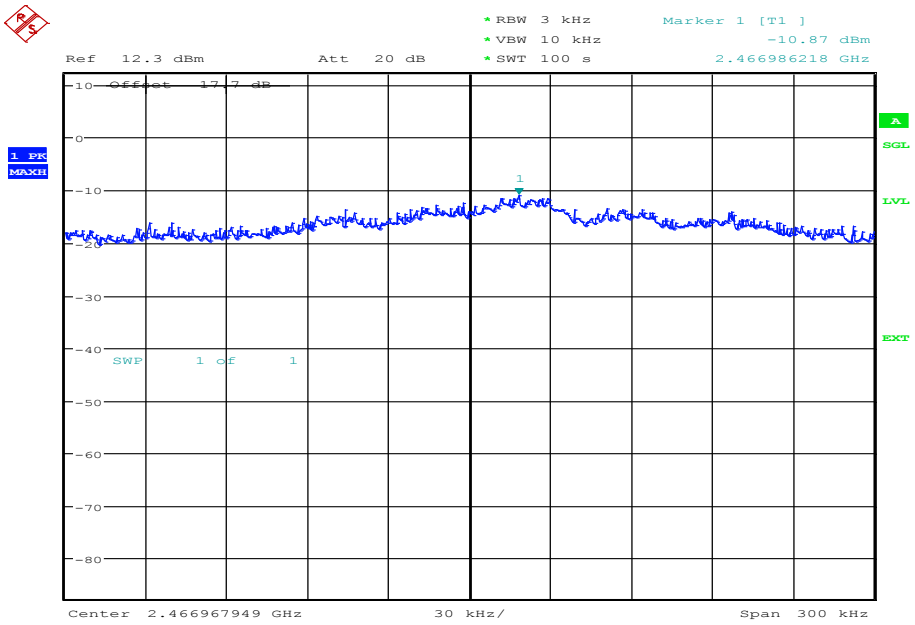
Date: 9.OCT.2013 13:27:22

58.5 Mbps



Date: 9.OCT.2013 14:01:01

65 Mbps



Date: 9.OCT.2013 14:17:48

Limit Clause

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.

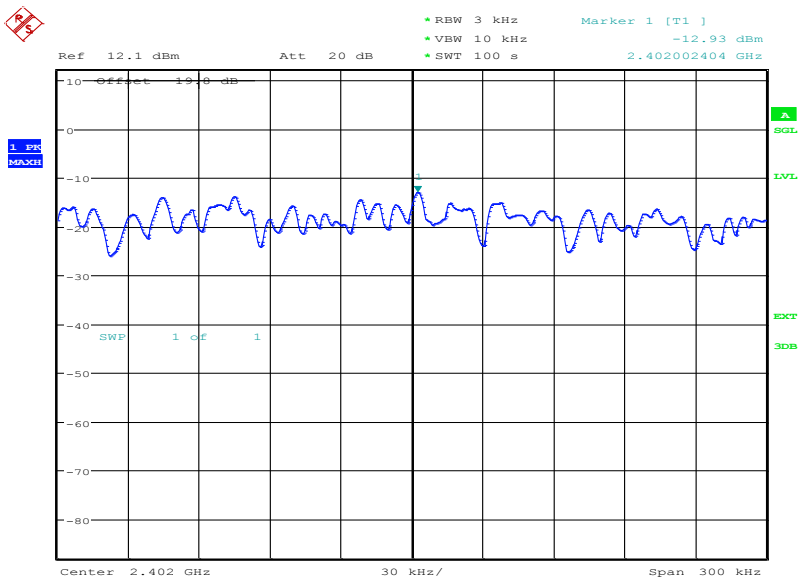
Bluetooth Low Energy

4.0 V DC Supply

Frequency	Packet Type	Power Spectral Density in 3 kHz Bands (dBm)
2402 MHz	37octet/prbs9	-12.93
2440 MHz	37octet/prbs9	-16.19
2480 MHz	37octet/prbs9	-12.82

2402 MHz

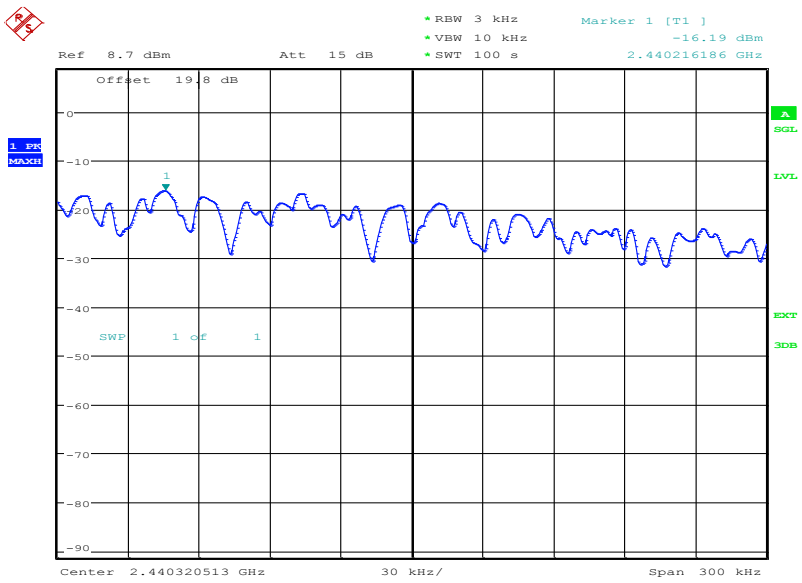
1 Mbps



Date: 1.OCT.2013 13:18:30

2440 MHz

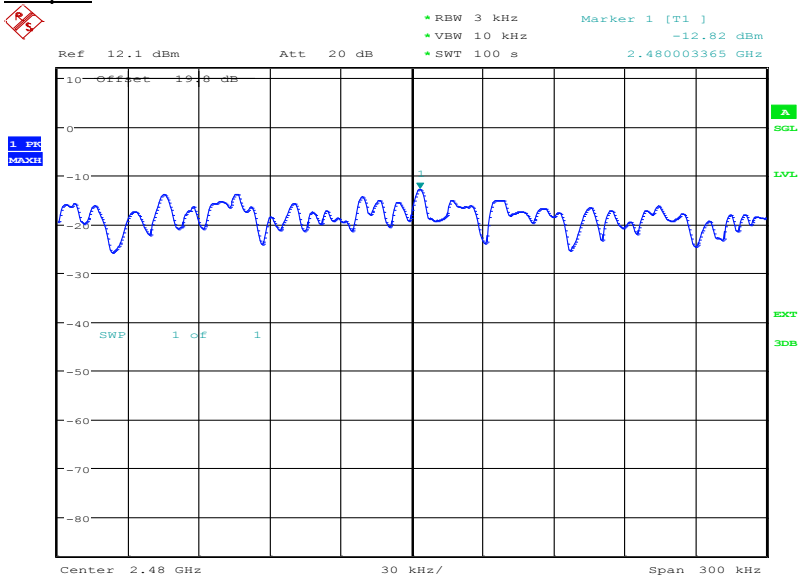
1 Mbps



Date: 1.OCT.2013 13:32:27

2480 MHz

1 Mpbs



Date: 1.OCT.2013 13:58:54

Limit Clause

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.

2.6 6dB BANDWIDTH

2.6.1 Specification Reference

FCC CFR 47 Part 15C, Clause 15.247 (a)(2)

2.6.2 Equipment Under Test and Modification State

SHL23 S/N: IMEI 004401114893130 - Modification State 0

2.6.3 Date of Test

1 October 2013, 8 October 2013 & 9 October 2013

2.6.4 Test Equipment Used

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

2.6.5 Test Procedure

The EUT was transmitted at maximum power via a cable to the Spectrum Analyser. The Analyser settings were adjusted to display the resultant trace on screen. The peak point of the trace was measured and the markers positioned to give the -6dBc points of the displayed spectrum.

2.6.6 Environmental Conditions

Ambient Temperature	22.5 - 23.1°C
Relative Humidity	54.7 - 61.2%

2.6.7 Test Results

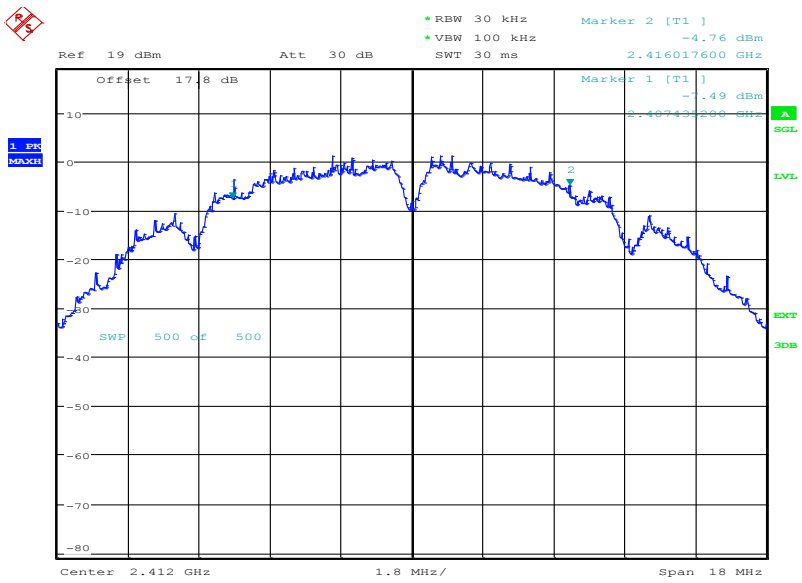
802.11(b)

4.0 V DC Supply

Frequency (MHz)	Data Rate (Mbps)	6dB Bandwidth (kHz)
2412 MHz	1	8582.4
	2	8150.4
	5.5	8755.2
	11	7718.4
2437 MHz	1	9072
	2	7776
	5.5	8236.8
	11	7920
2462 MHz	1	8582.4
	2	8812.8
	5.5	8323.2
	11	9129.6

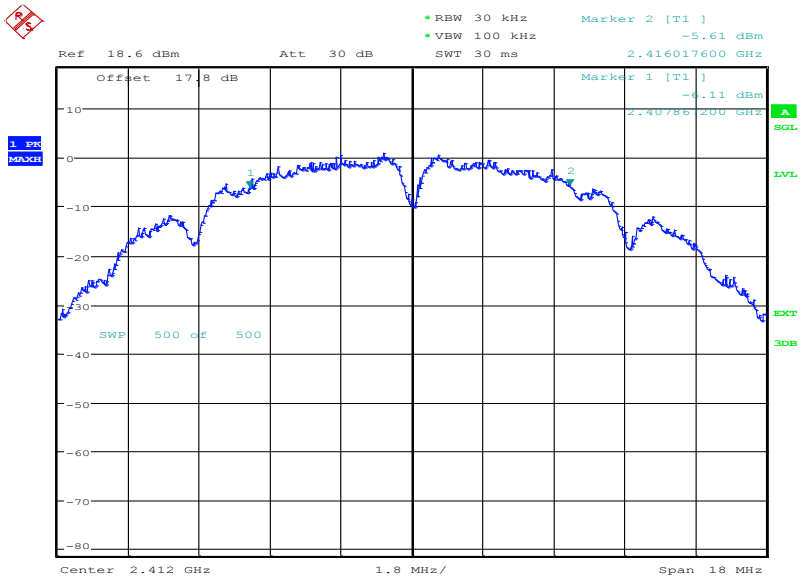
2412 MHz

1 Mbps



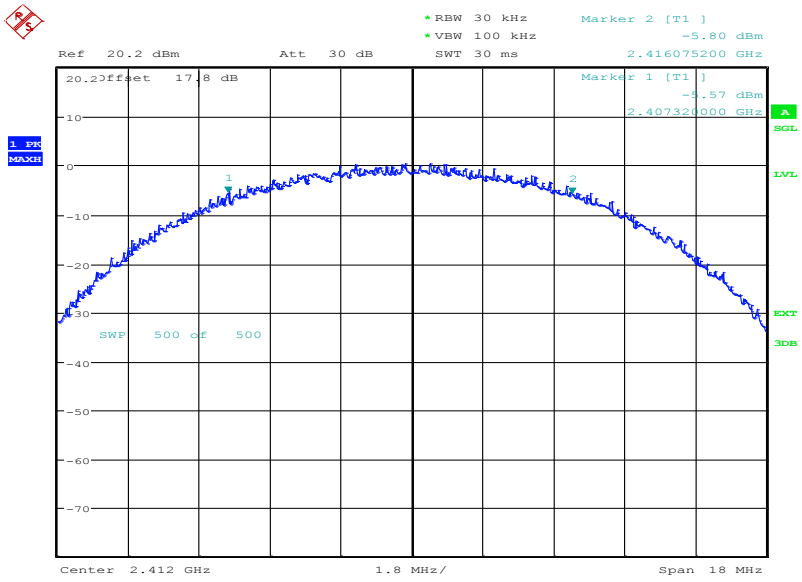
Date: 1.OCT.2013 14:25:17

2 Mbps



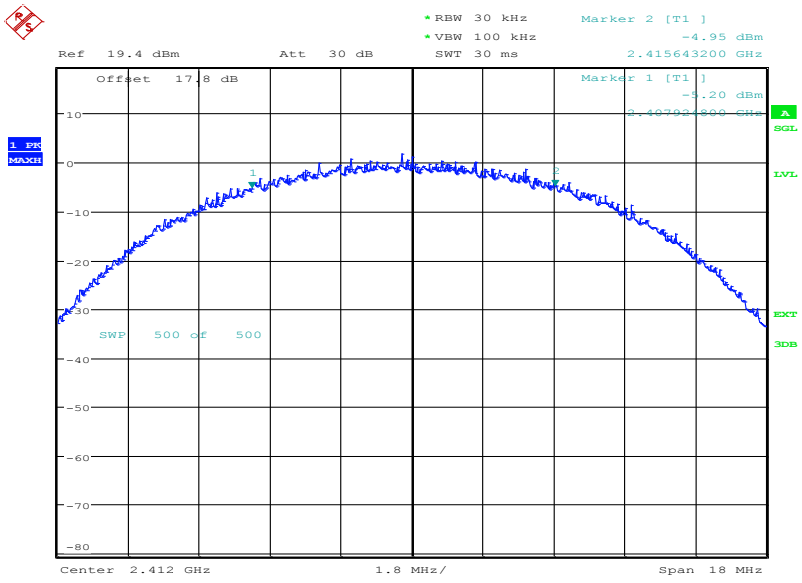
Date: 1.OCT.2013 15:04:49

5.5 Mbps



Date: 1.OCT.2013 15:26:42

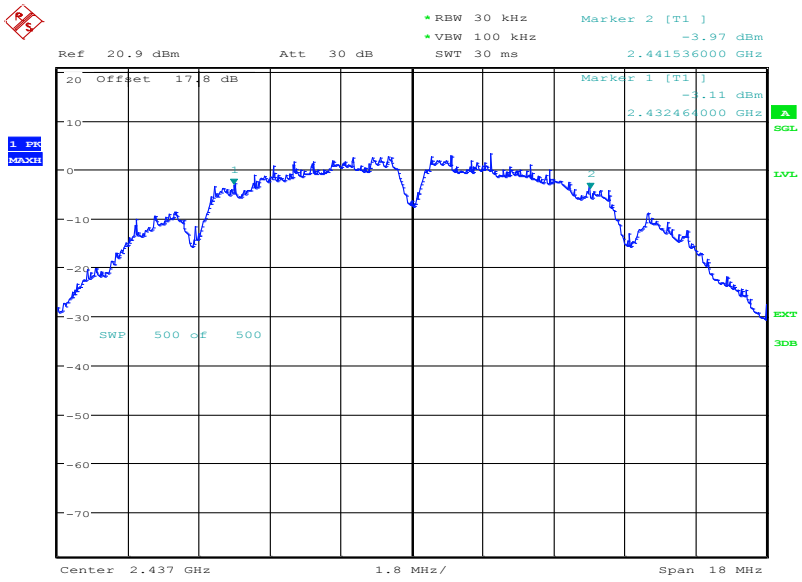
11 Mbps



Date: 1.OCT.2013 15:43:23

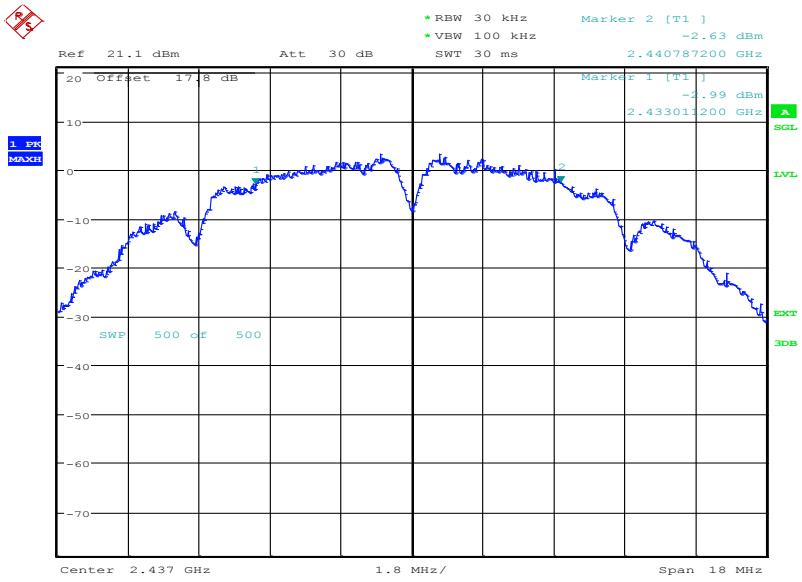
2437 MHz

1 Mbps



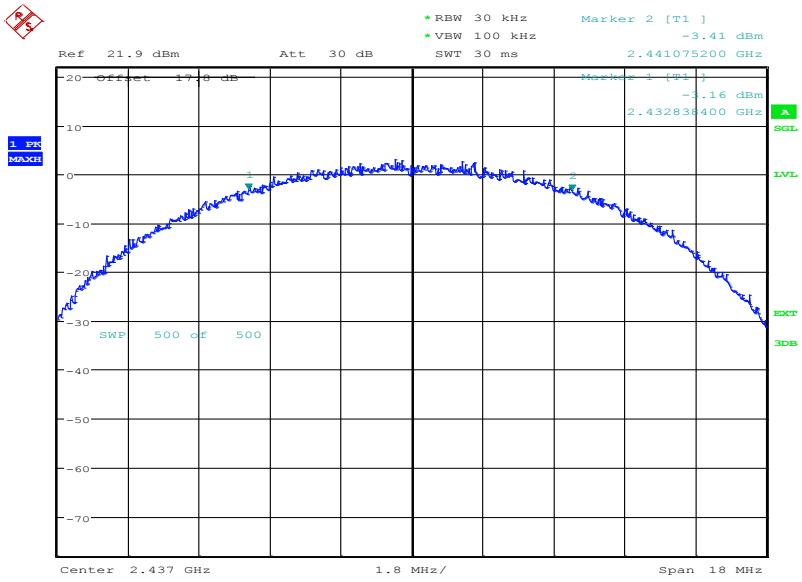
Date: 1.OCT.2013 14:43:14

2 Mbps



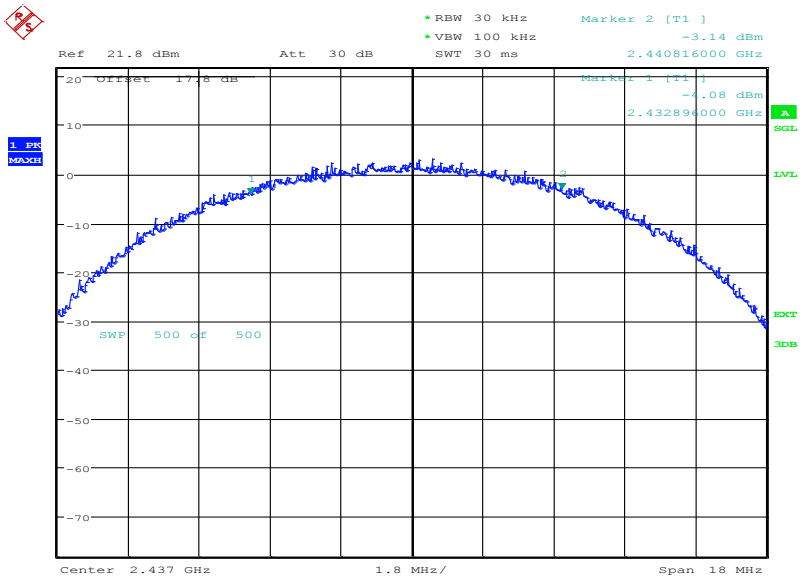
Date: 1.OCT.2013 15:10:25

5.5 Mbps



Date: 1.OCT.2013 15:32:21

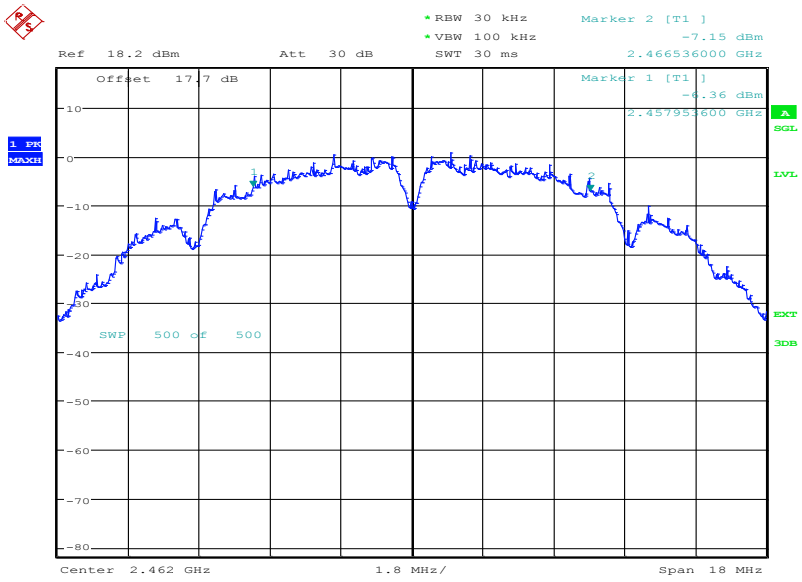
11 Mbps



Date: 1.OCT.2013 15:48:47

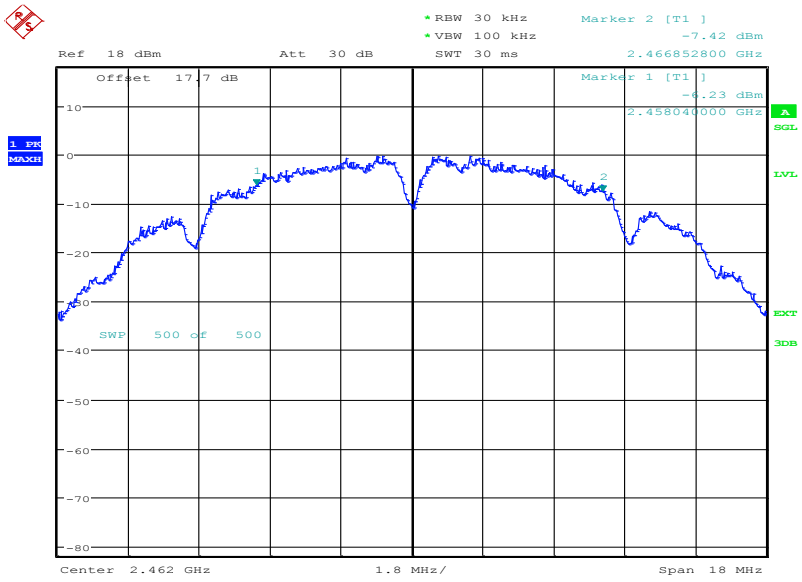
2462 MHz

1 Mbps



Date: 1.OCT.2013 14:57:00

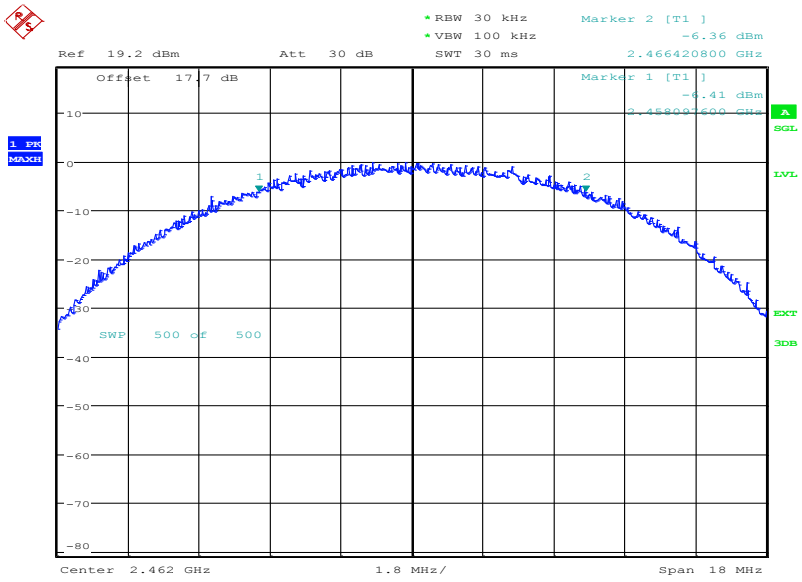
2 Mbps



Date: 1.OCT.2013 15:15:31

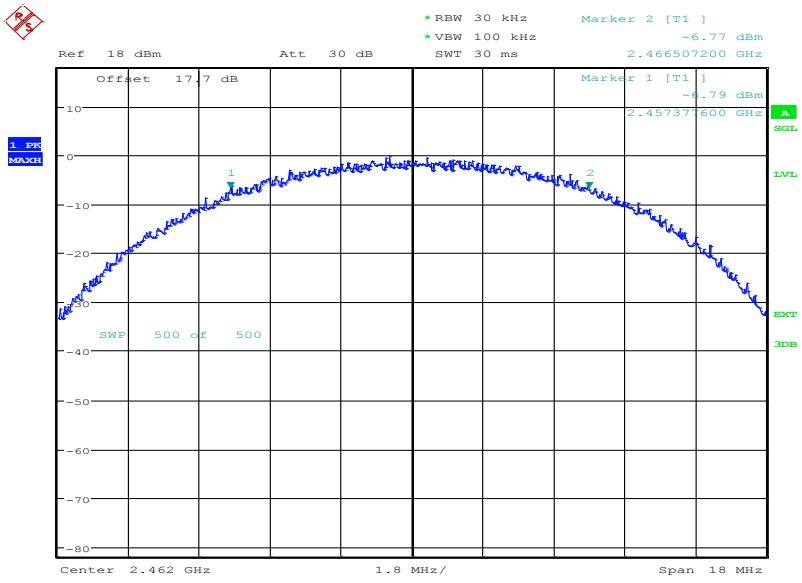
Product Service

5.5 Mbps



Date: 1.OCT.2013 15:38:15

11 Mbps



Date: 1.OCT.2013 15:57:57

Limit Clause

The minimum 6 dB Bandwidth shall be at least 500 kHz.

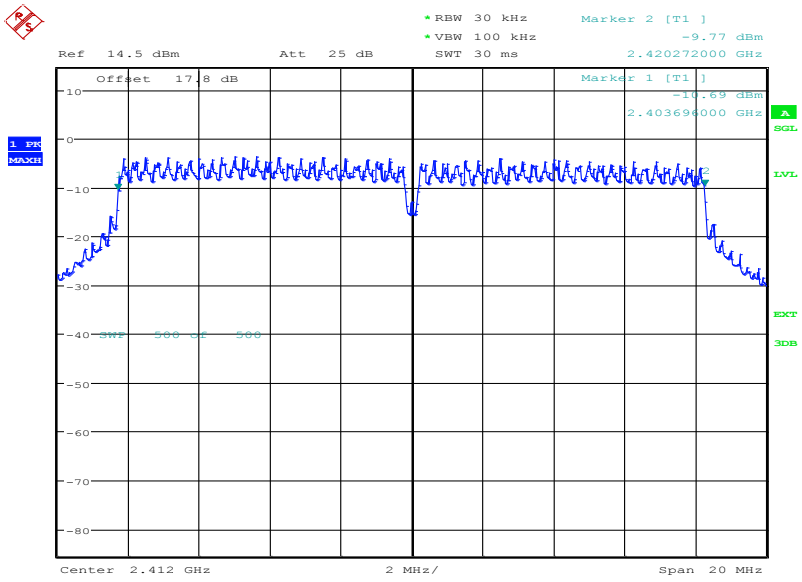
802.11(g)

4.0 V DC Supply

Frequency (MHz)	Data Rate (Mbps)	6dB Bandwidth (kHz)
2412 MHz	6	16576
	9	16608
	12	16576
	18	16512
	24	16512
	36	16544
	48	16576
	54	16608
2437 MHz	6	16576
	9	16640
	12	16576
	18	16576
	24	16576
	36	16576
	48	16544
	54	16608
2462 MHz	6	16608
	9	16608
	12	16608
	18	16576
	24	16544
	36	16608
	48	16544
	54	16544

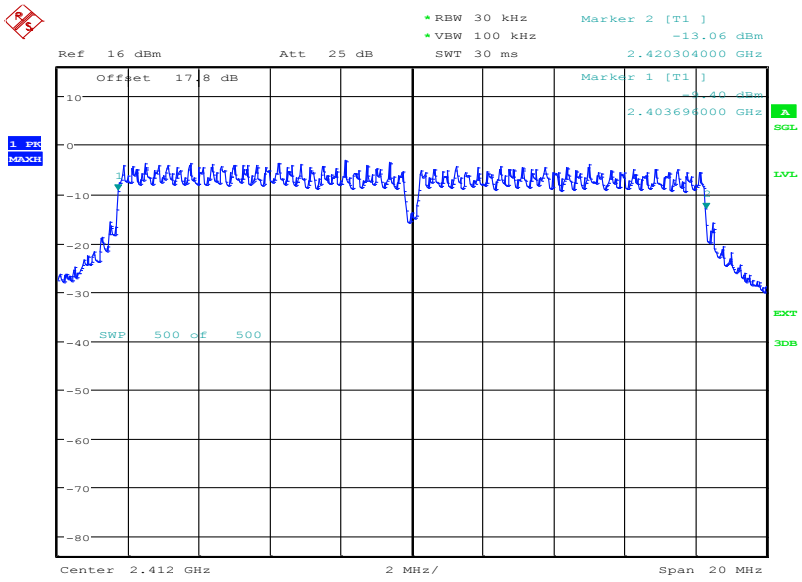
2412 MHz

6 Mbps



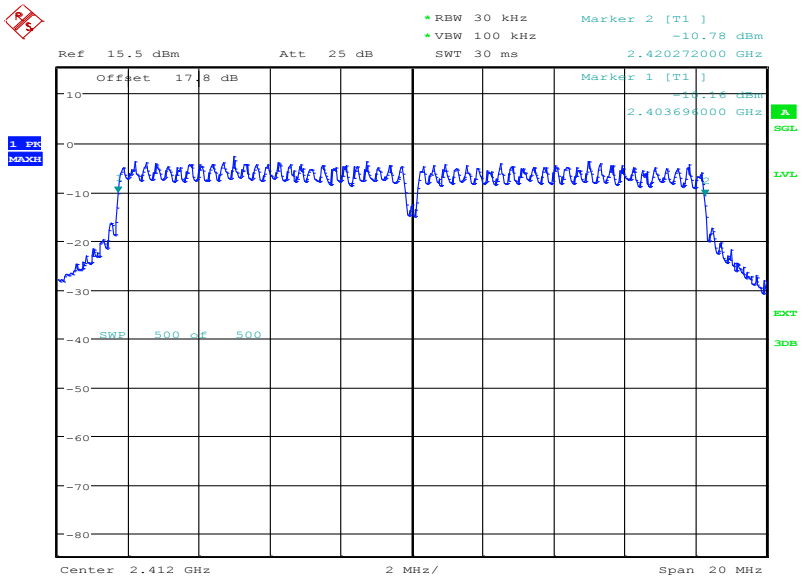
Date: 8.OCT.2013 17:56:06

9 Mbps



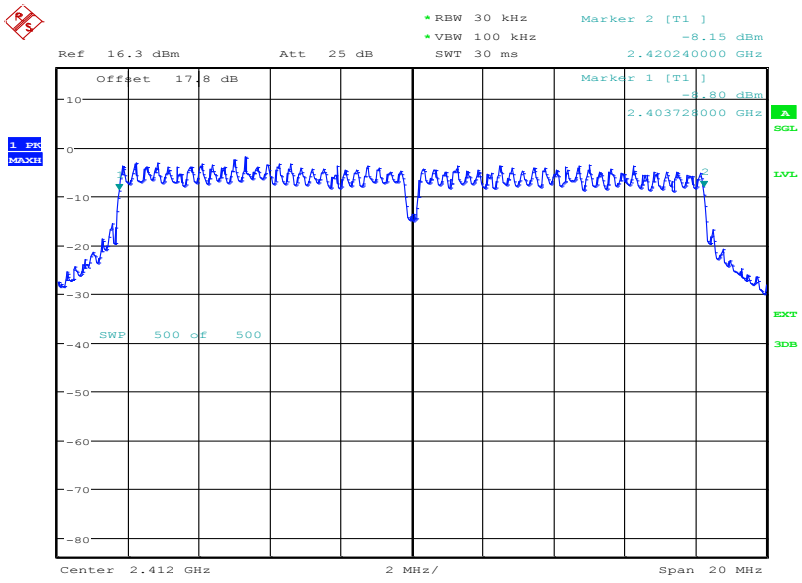
Date: 8.OCT.2013 18:12:35

12 Mbps



Date: 8.OCT.2013 18:30:18

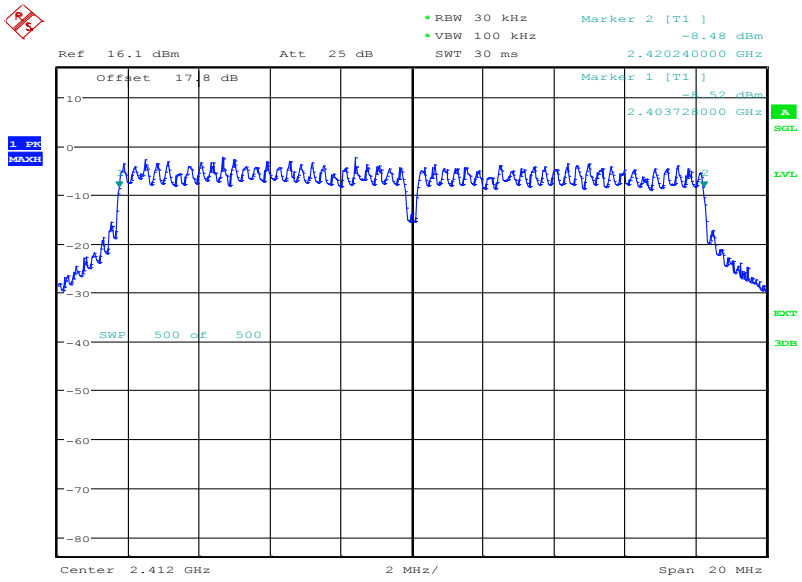
18 Mbps



Date: 9.OCT.2013 09:03:26

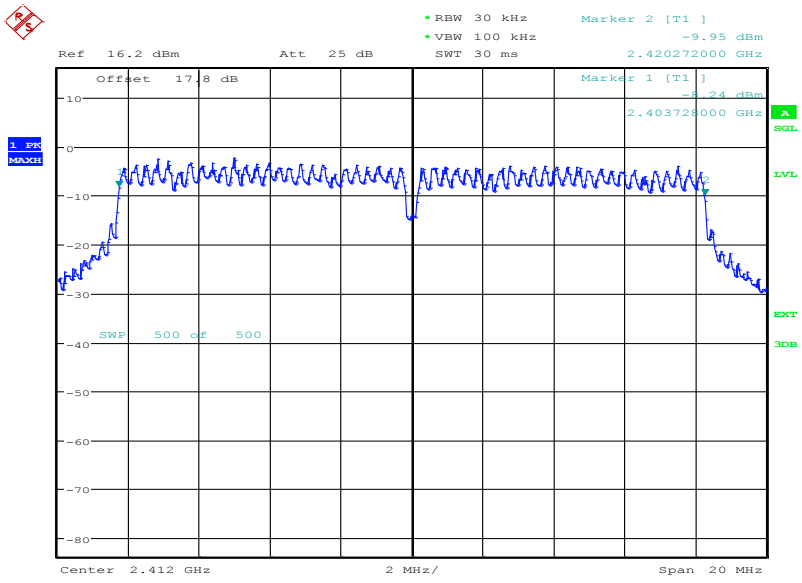
Product Service

24 Mbps



Date: 9.OCT.2013 09:32:42

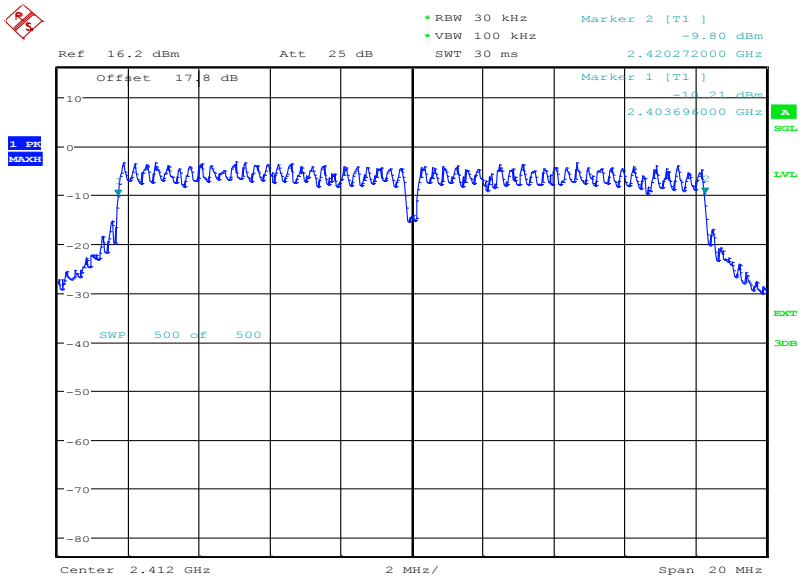
36 Mbps



Date: 9.OCT.2013 10:15:14

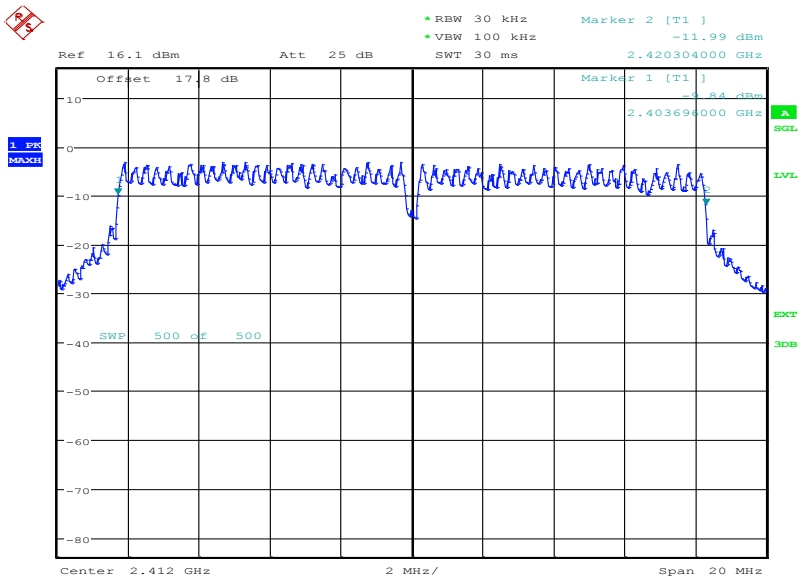
Product Service

48 Mbps



Date: 9.OCT.2013 10:37:32

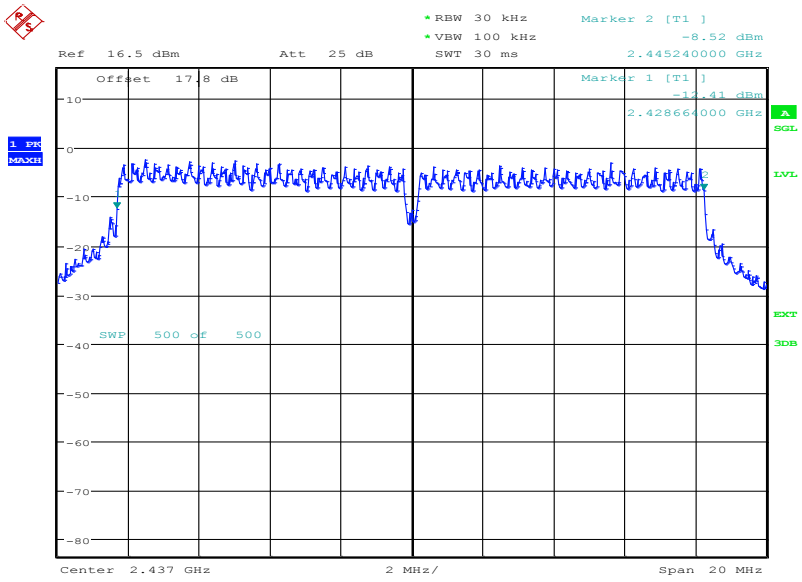
54 Mbps



Date: 9.OCT.2013 11:03:35

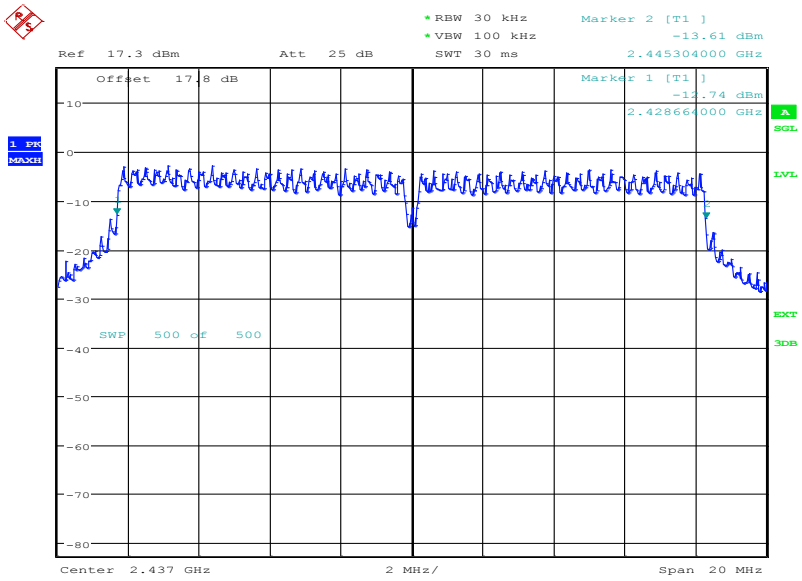
2437 MHz

6 Mbps



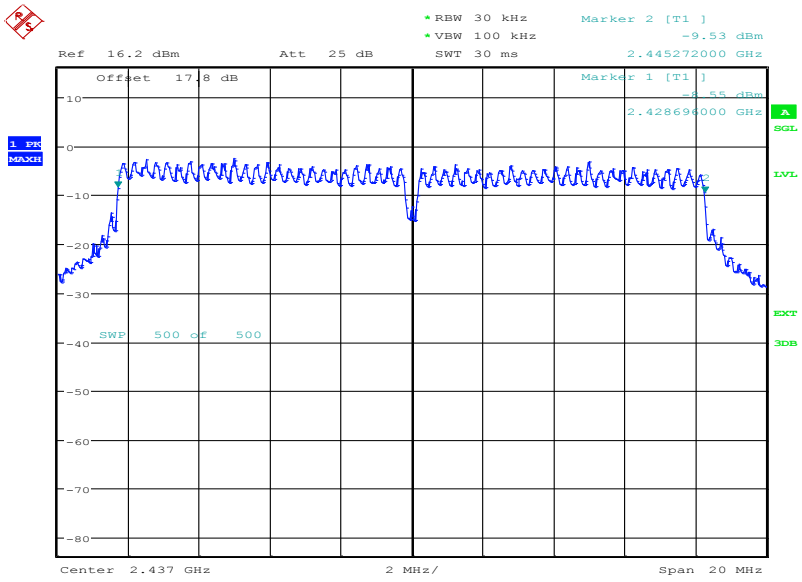
Date: 8.OCT.2013 18:01:28

9 Mbps



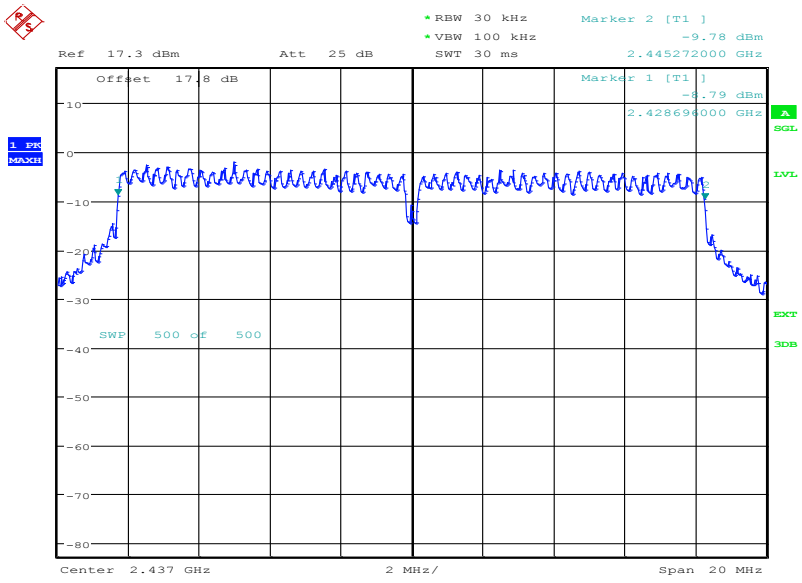
Date: 8.OCT.2013 18:17:14

12 Mbps



Date: 8.OCT.2013 18:37:59

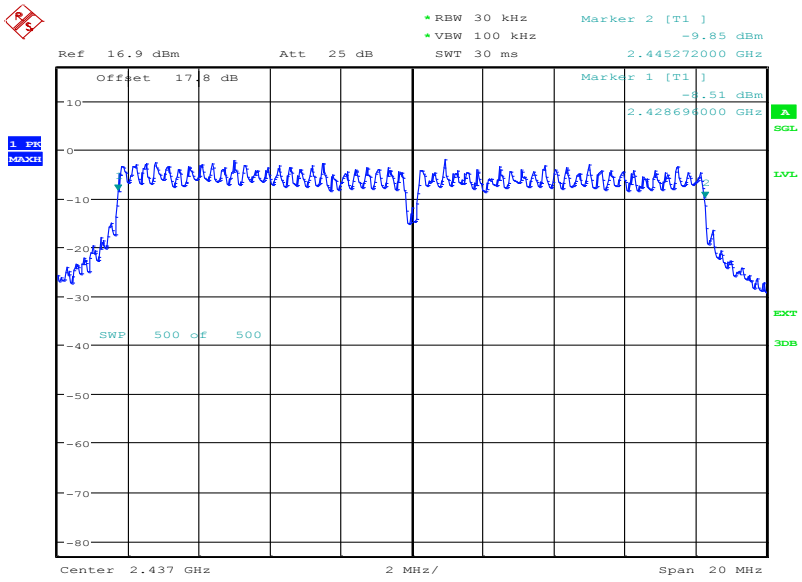
18 Mbps



Date: 9.OCT.2013 09:08:16

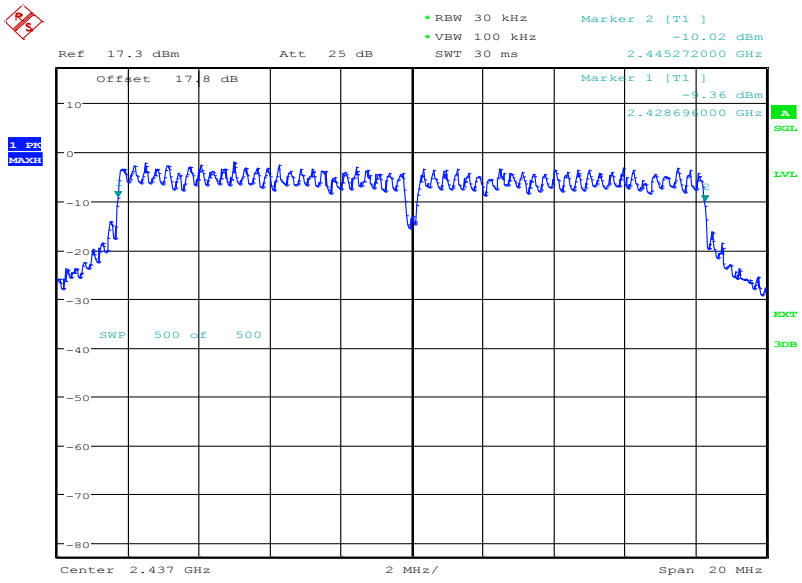
Product Service

24 Mbps



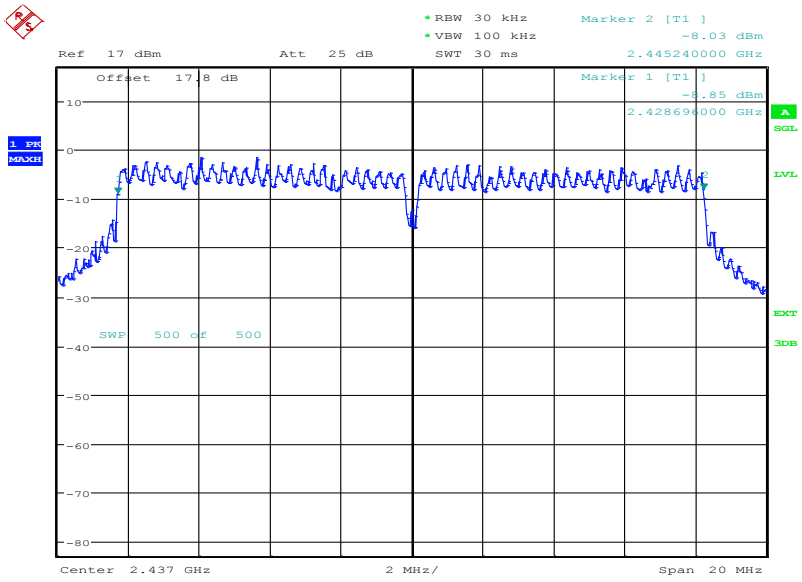
Date: 9.OCT.2013 10:01:28

36 Mbps



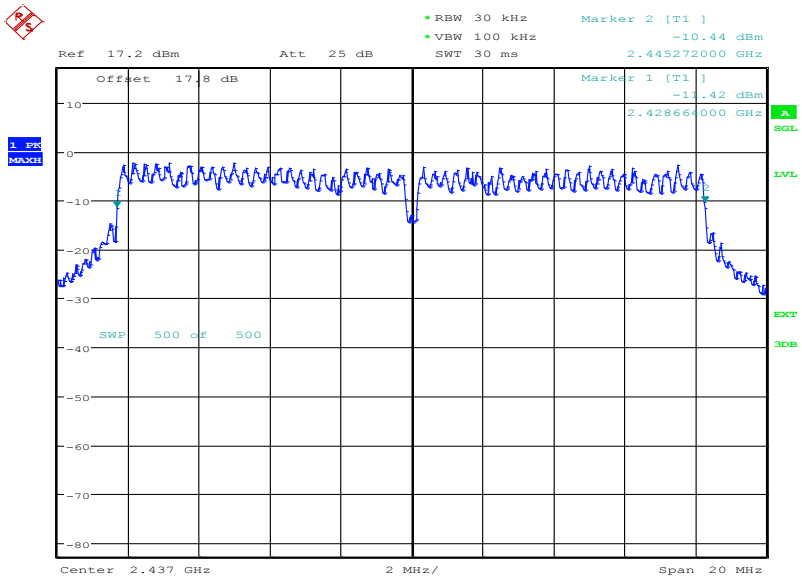
Date: 9.OCT.2013 10:20:22

48 Mbps



Date: 9.OCT.2013 10:49:47

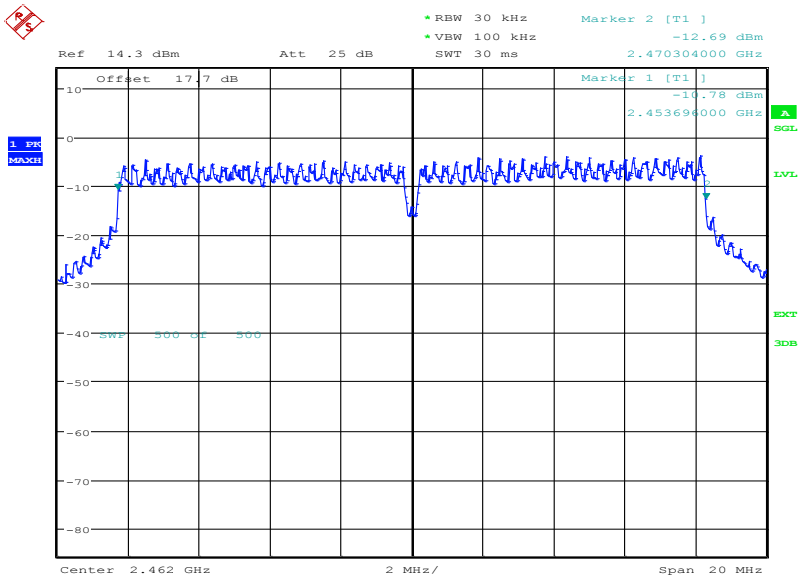
54 Mbps



Date: 9.OCT.2013 11:09:10

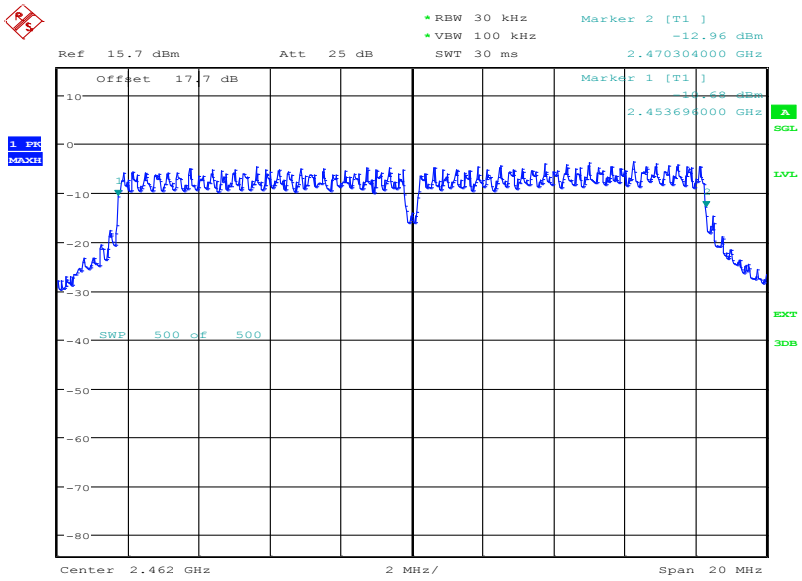
2462 MHz

6 Mbps



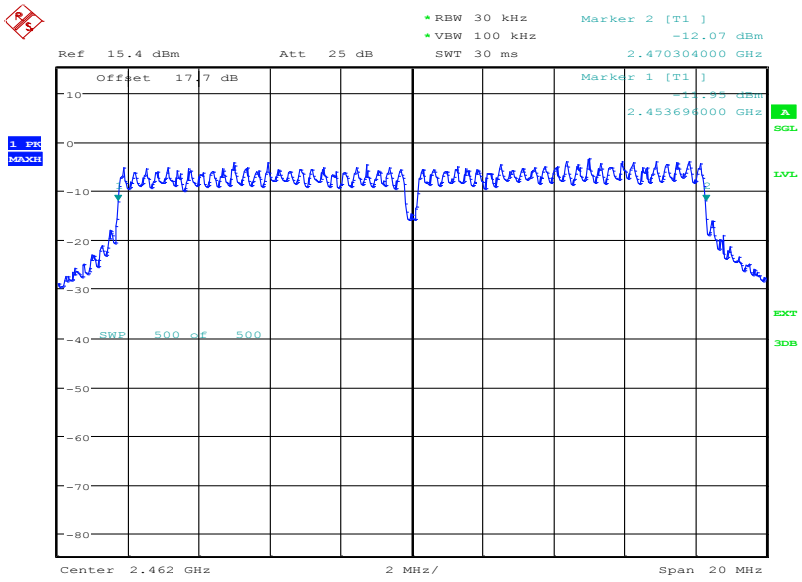
Date: 8.OCT.2013 18:05:50

9 Mbps



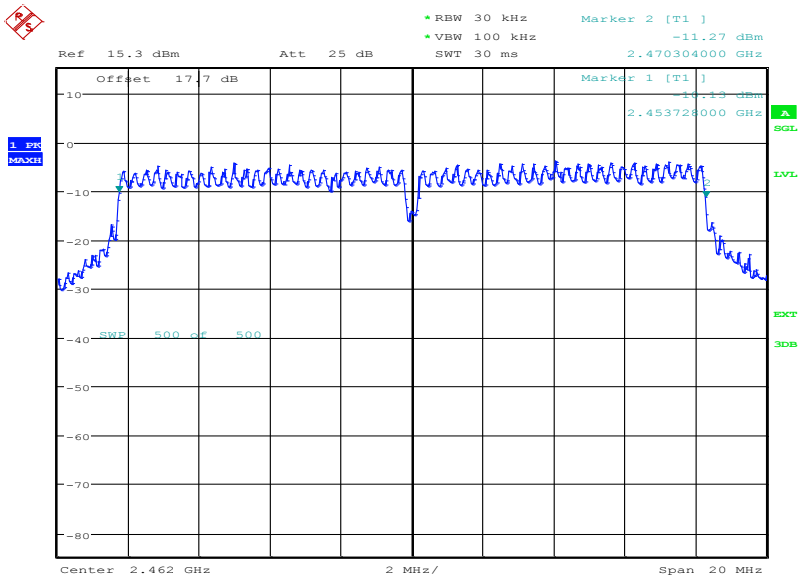
Date: 8.OCT.2013 18:22:55

12 Mbps



Date: 8.OCT.2013 18:42:25

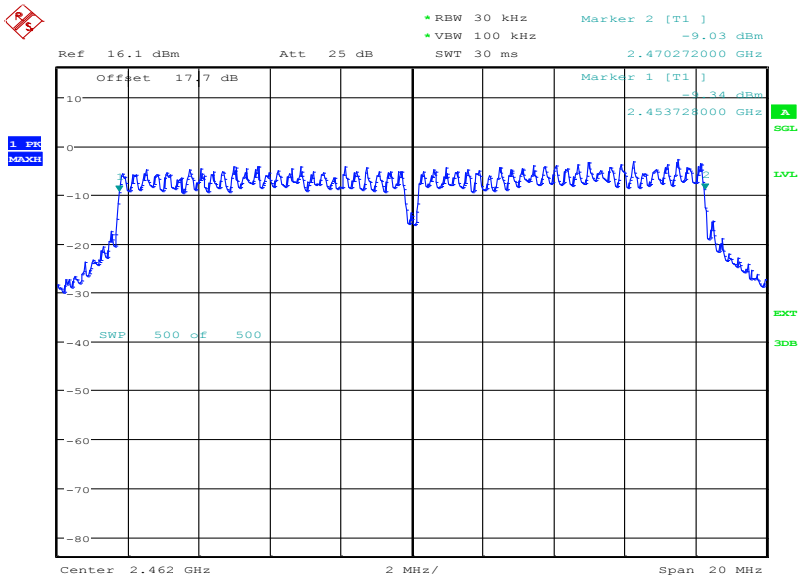
18 Mbps



Date: 9.OCT.2013 09:13:04

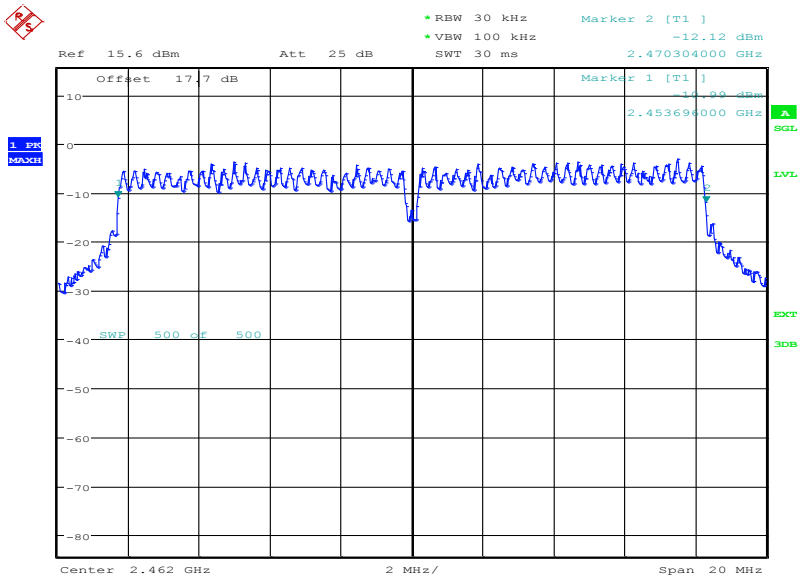
Product Service

24 Mbps



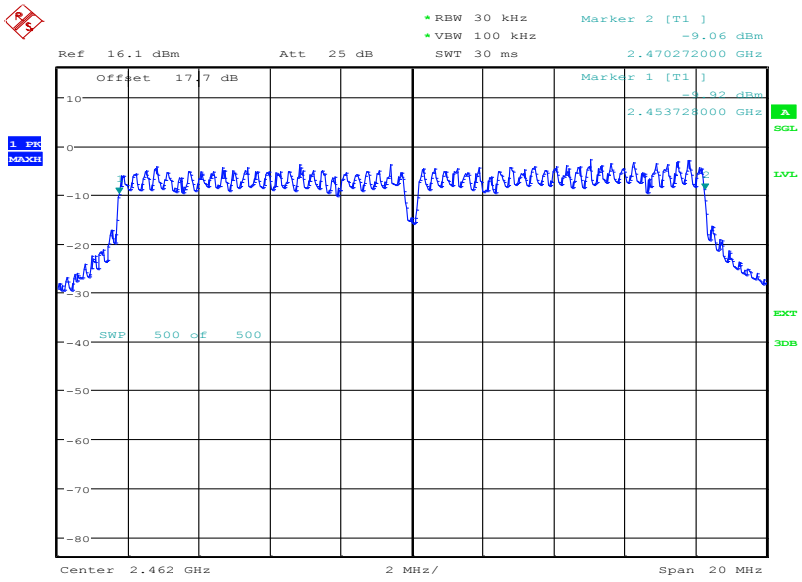
Date: 9.OCT.2013 10:07:15

36 Mbps



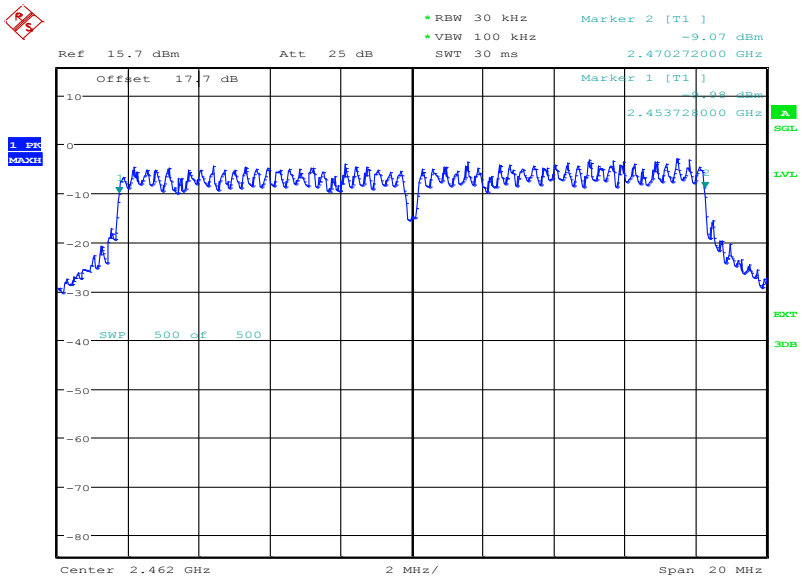
Date: 9.OCT.2013 10:26:40

48 Mbps



Date: 9.OCT.2013 10:58:40

54 Mbps



Date: 9.OCT.2013 11:26:15

Limit Clause

The minimum 6 dB Bandwidth shall be at least 500 kHz.

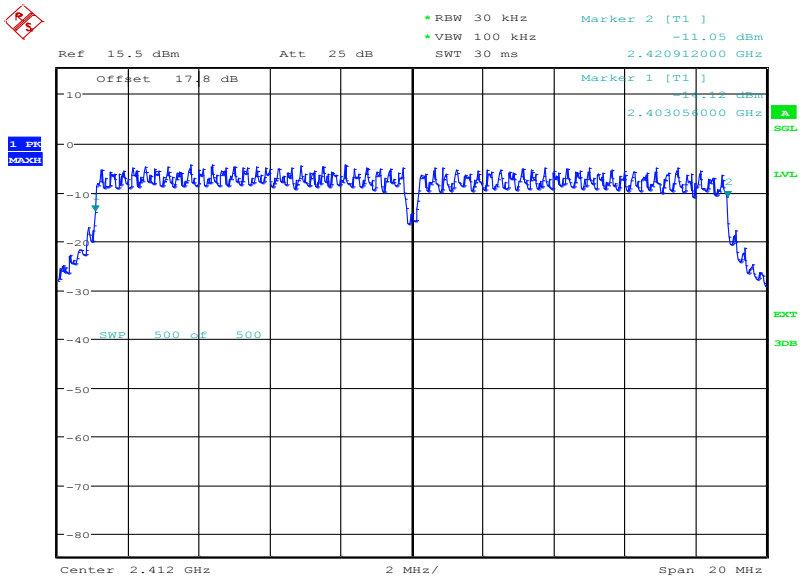
802.11(n)

4.0 V DC Supply

Frequency (MHz)	Data Rate (Mbps)	6dB Bandwidth (kHz)
2412 MHz	6.5	17856
	13	17824
	19.5	17792
	26	17792
	39	17792
	52	17760
	58.5	17792
	65	17792
2437 MHz	6.5	17760
	13	17792
	19.5	17792
	26	17824
	39	17824
	52	17792
	58.5	17824
	65	17792
2462 MHz	6.5	17824
	13	17824
	19.5	17760
	26	17824
	39	17792
	52	17792
	58.5	17792
	65	17792

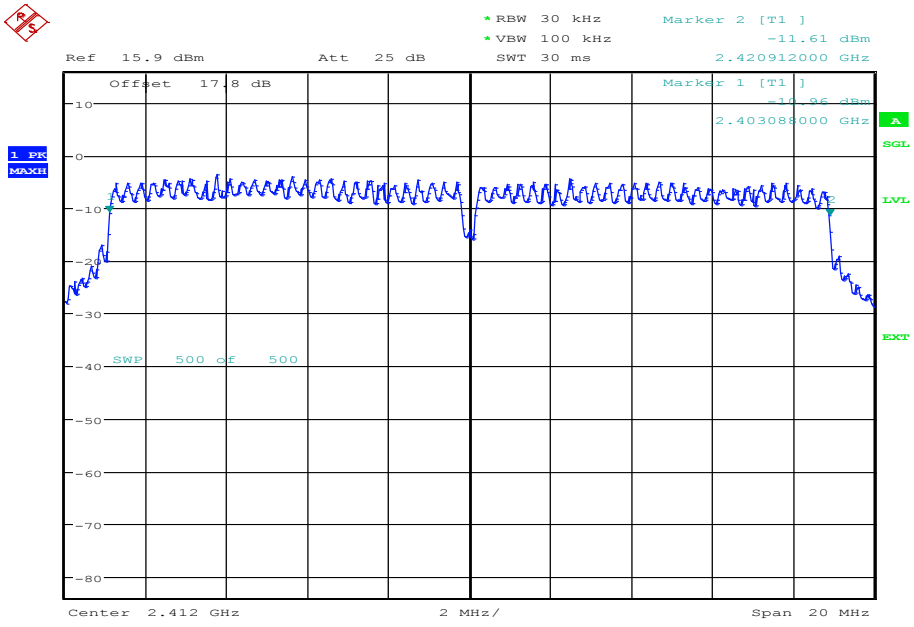
2412 MHz

6.5 Mbps



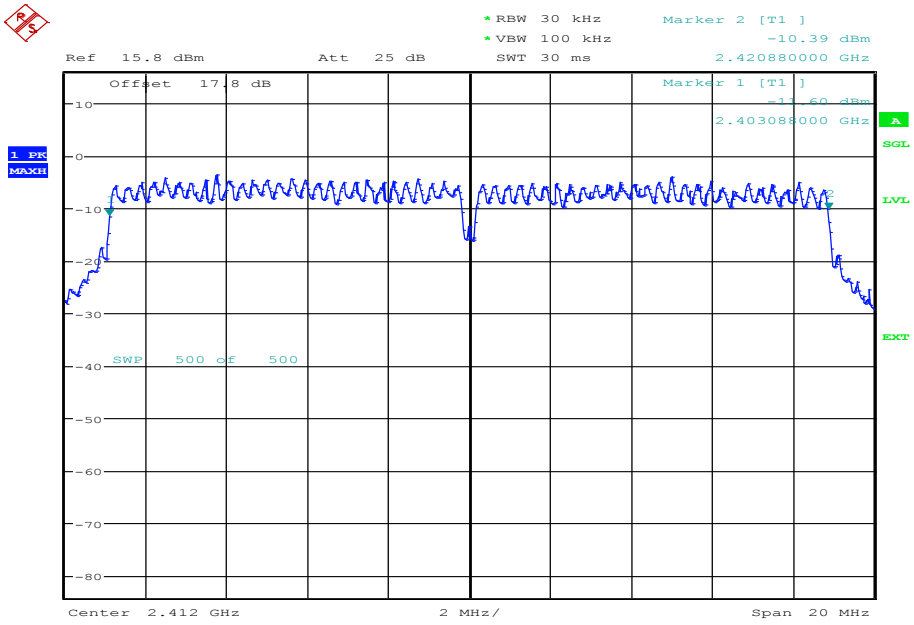
Date: 9.OCT.2013 11:32:29

13 Mbps



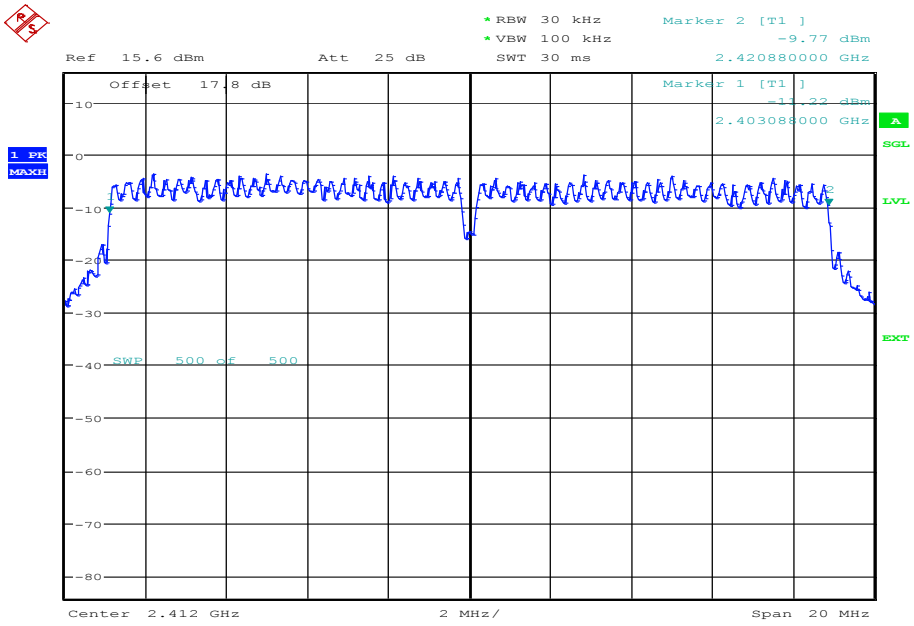
Date: 9.OCT.2013 11:33:34

19.5 Mbps



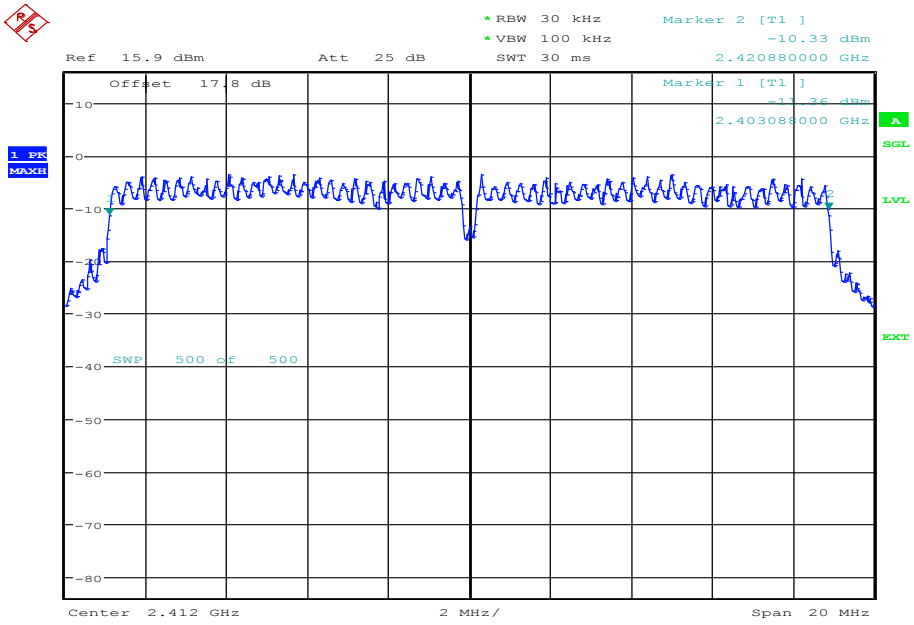
Date: 9.OCT.2013 11:50:49

26 Mbps



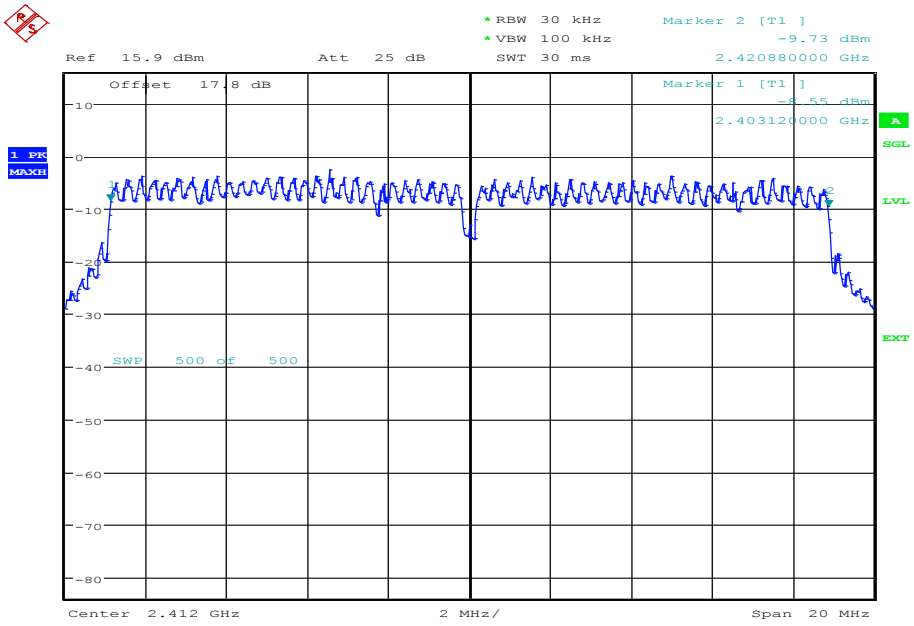
Date: 9.OCT.2013 12:17:45

39 Mbps



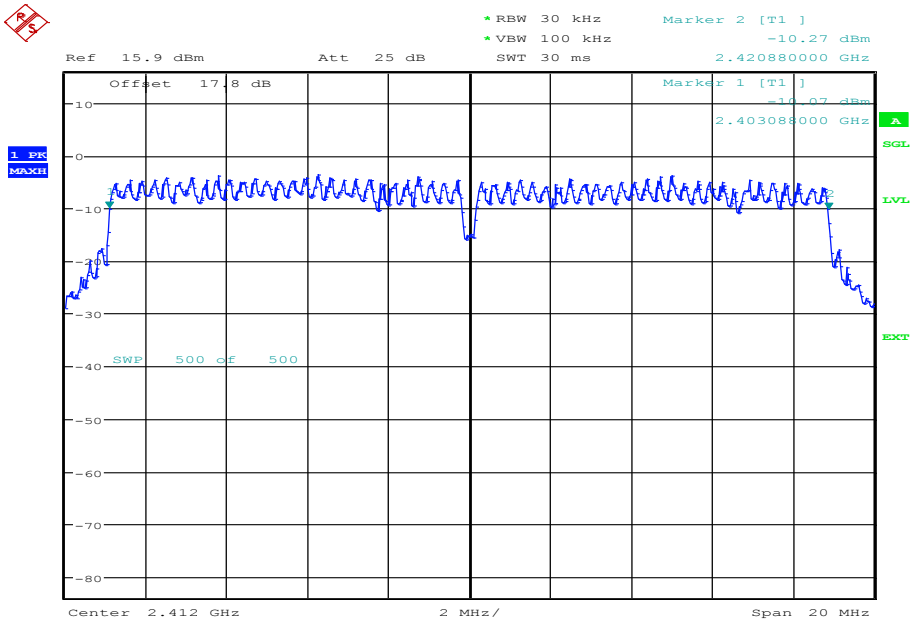
Date: 9.OCT.2013 12:43:32

52 Mbps



Date: 9.OCT.2013 13:09:26

58.5 Mbps



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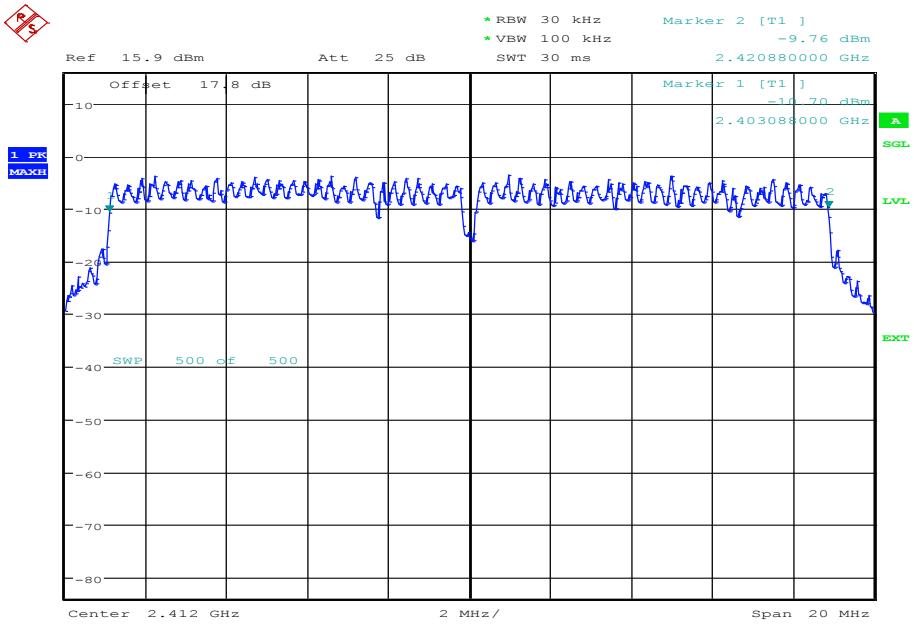
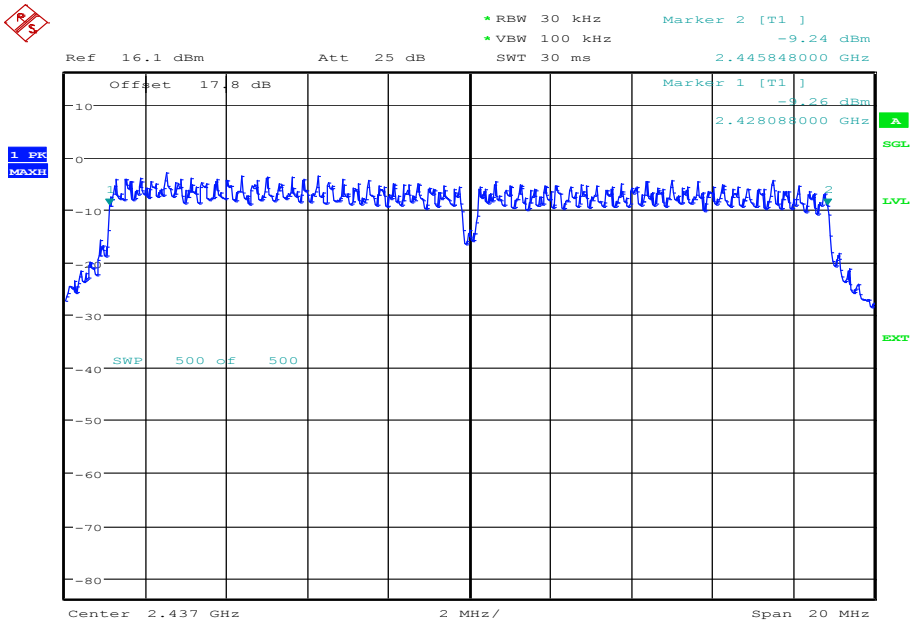
65 Mbps



Date: 9.OCT.2013 14:04:10

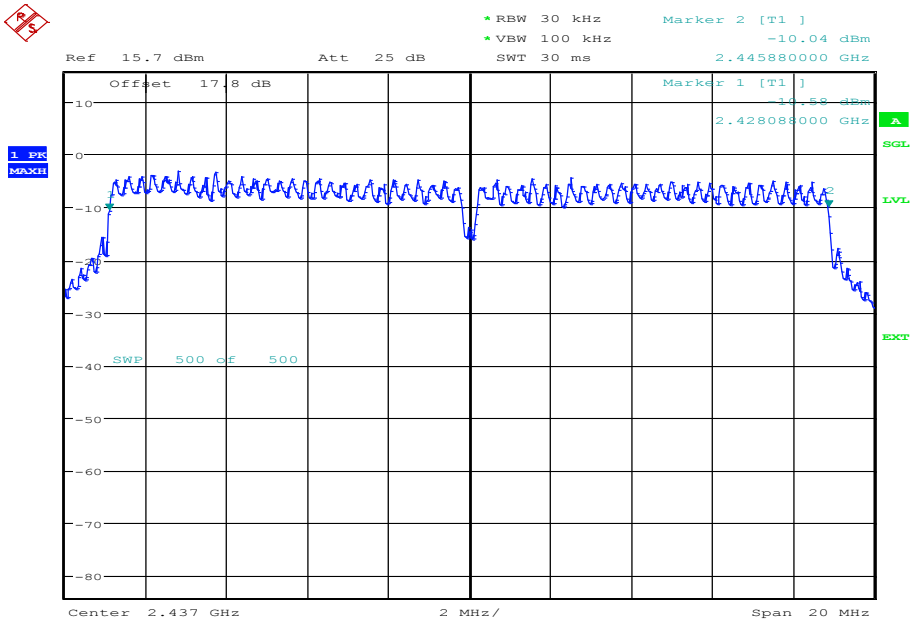
2437 MHz

6.5 Mbps



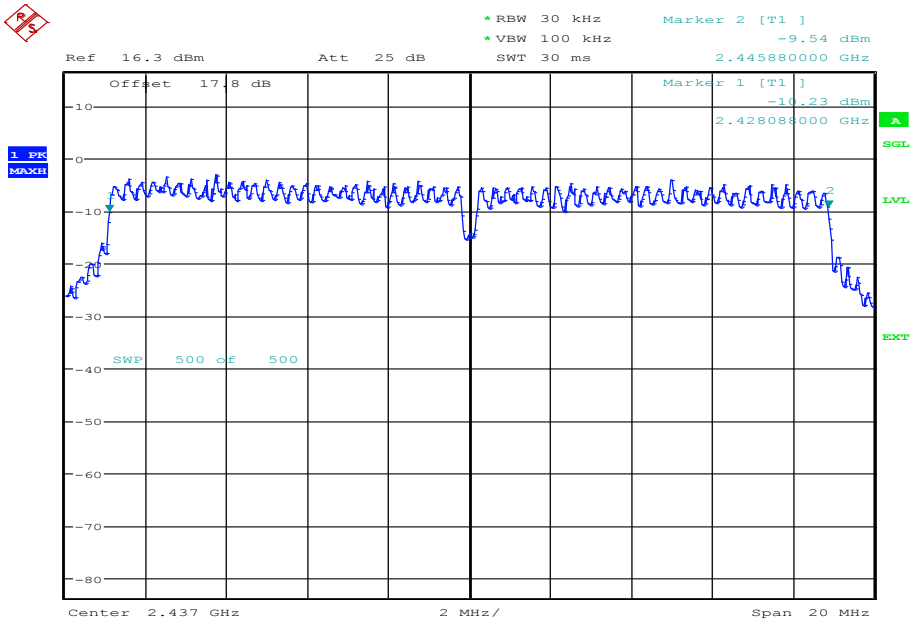
Date: 9.OCT.2013 11:13:37

13 Mbps



Date: 9.OCT.2013 11:37:57

19.5 Mbps



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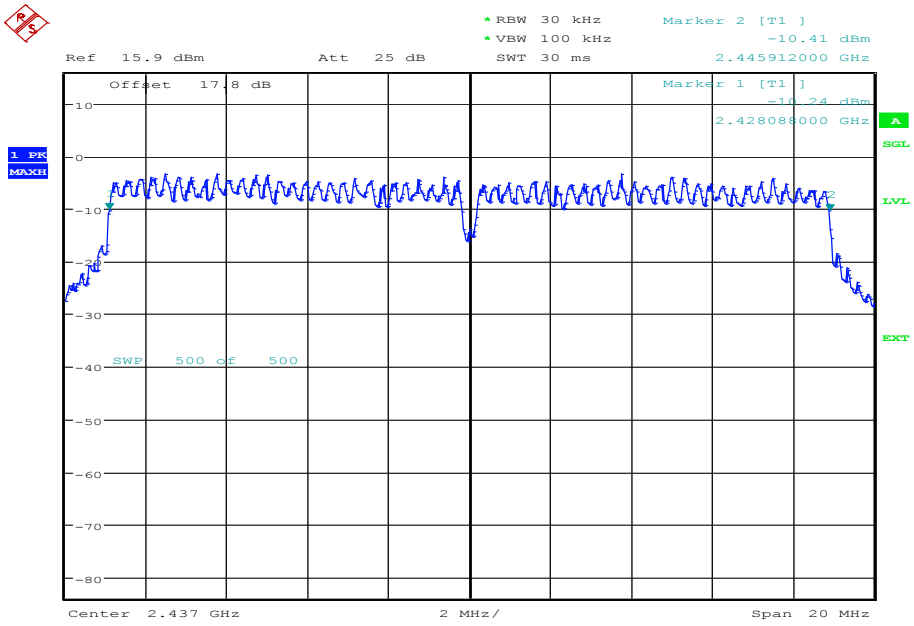
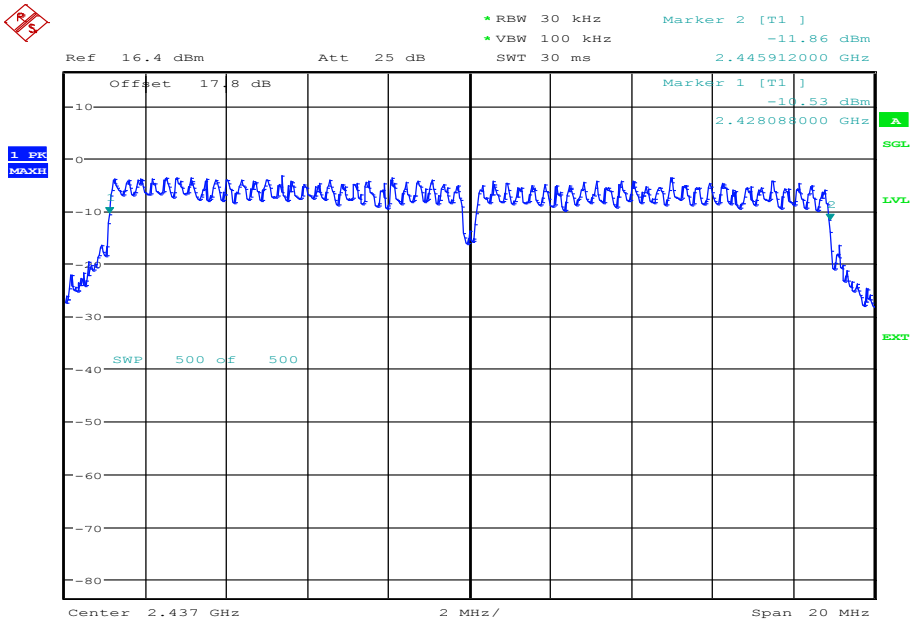
26 Mbps



Date: 9.OCT.2013 12:30:35

39 Mbps



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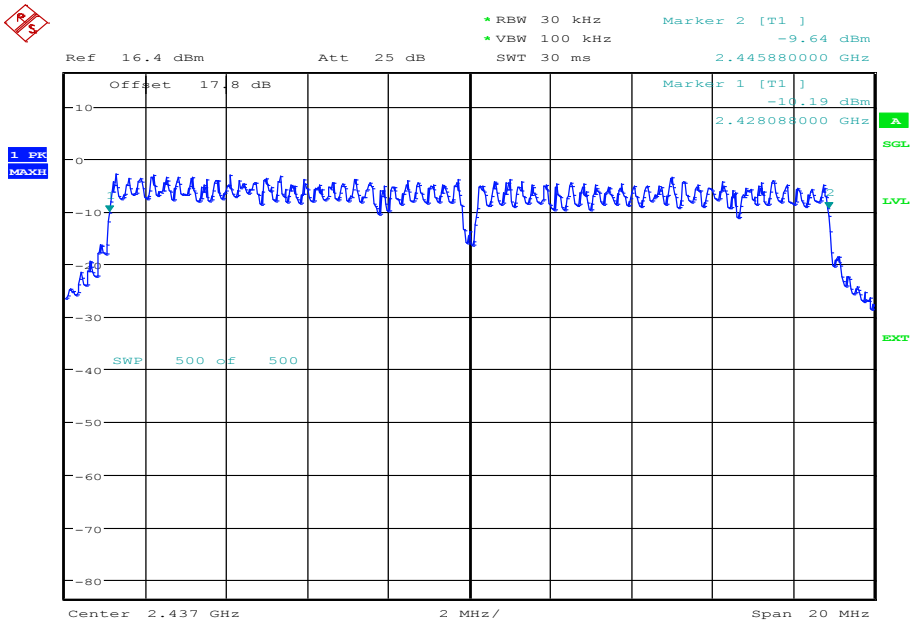
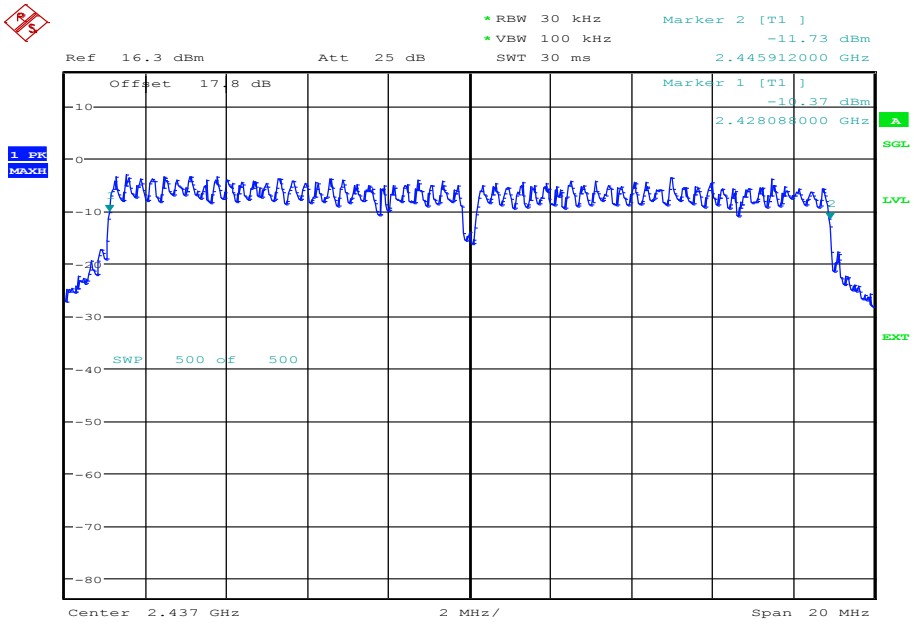
52 Mbps



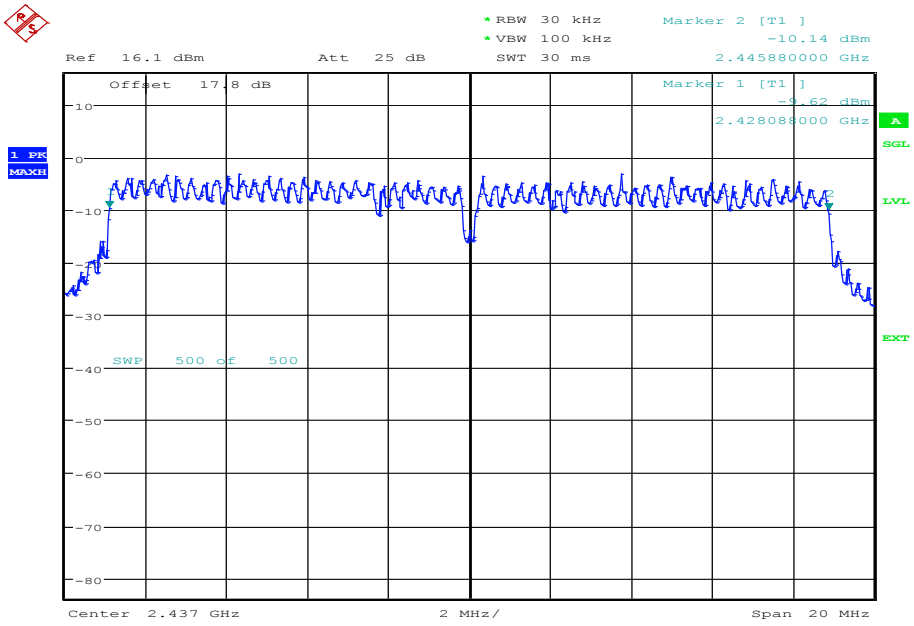
Date: 9.OCT.2013 13:19:53

58.5 Mbps



Date: 9.OCT.2013 13:52:14

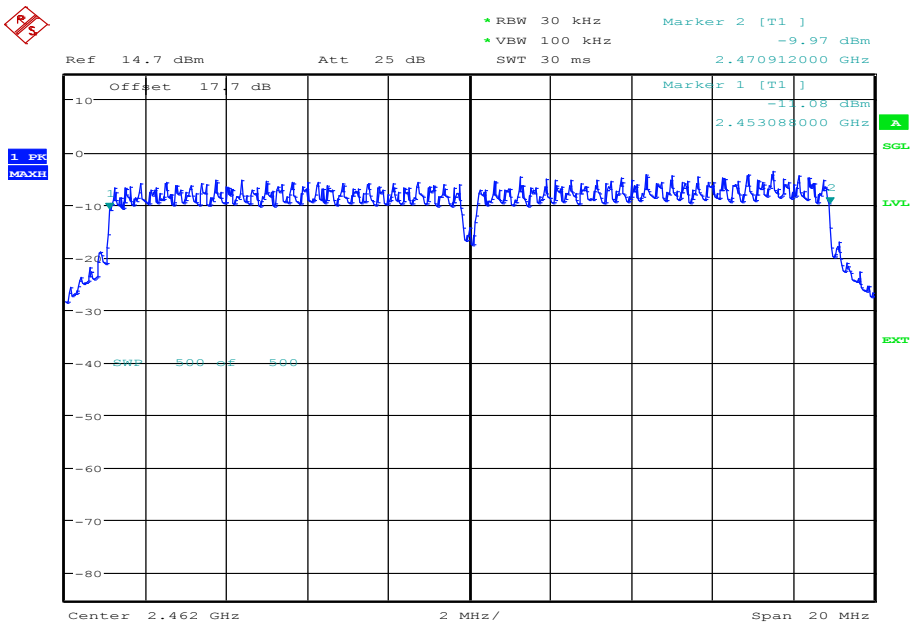
65 Mbps



Date: 9.OCT.2013 14:09:32

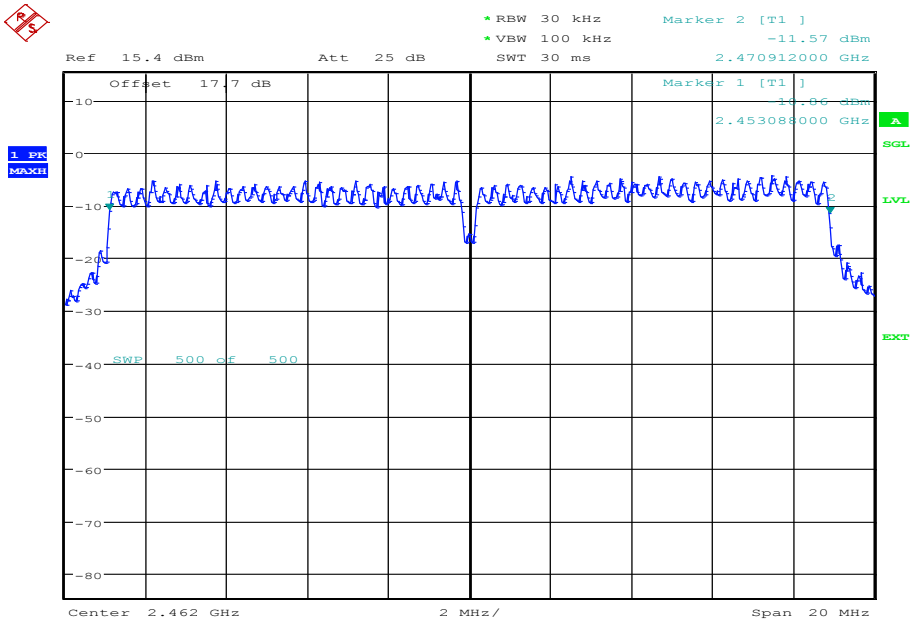
2462 MHz

6.5 Mbps



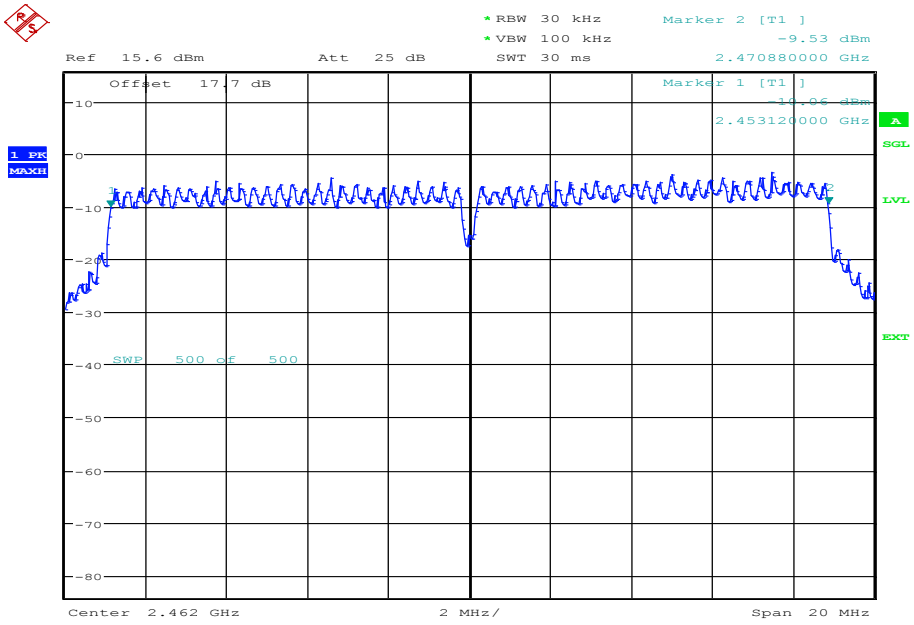
Date: 9.OCT.2013 11:25:35

13 Mbps



Date: 9.OCT.2013 11:44:05

19.5 Mbps



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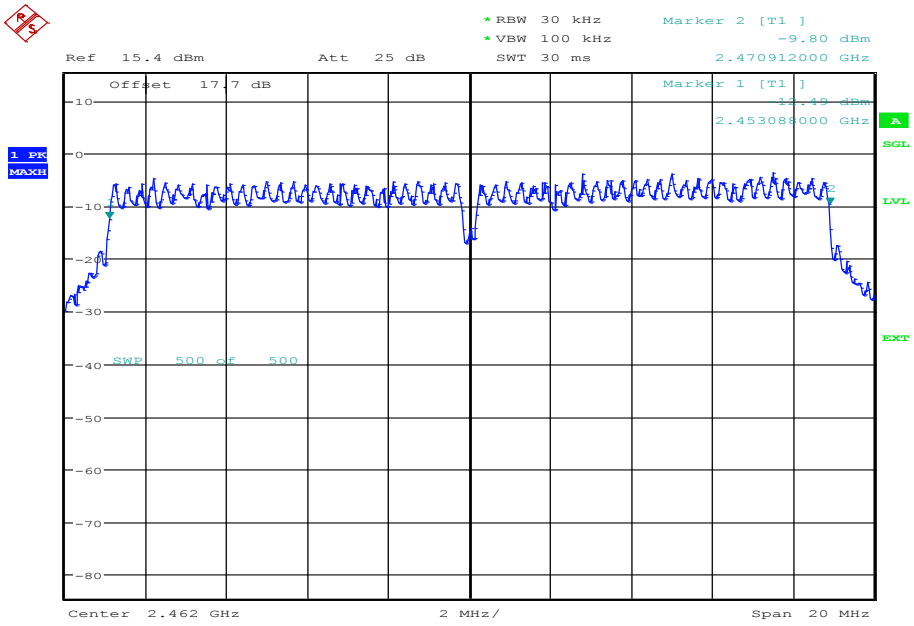
26 Mbps



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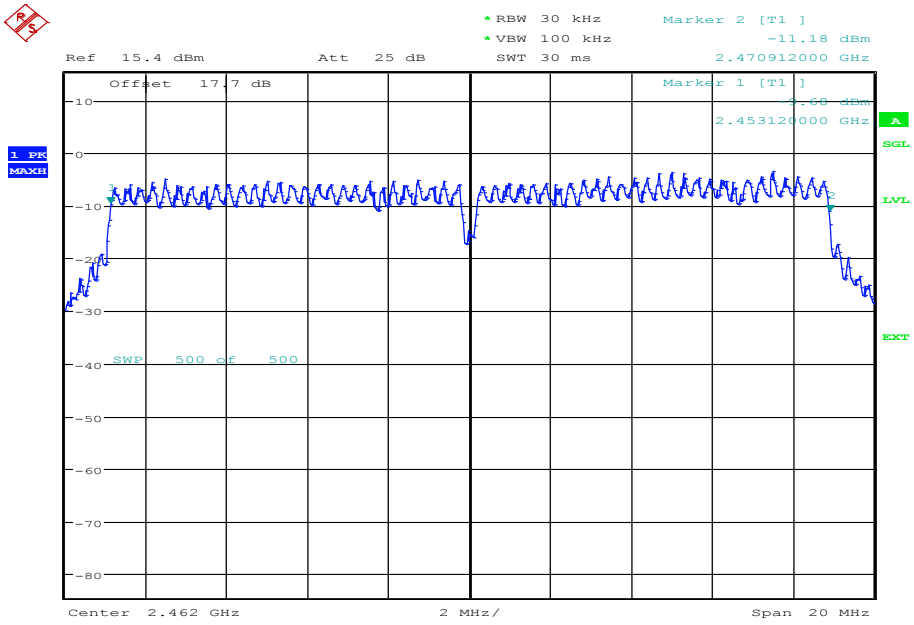
39 Mbps



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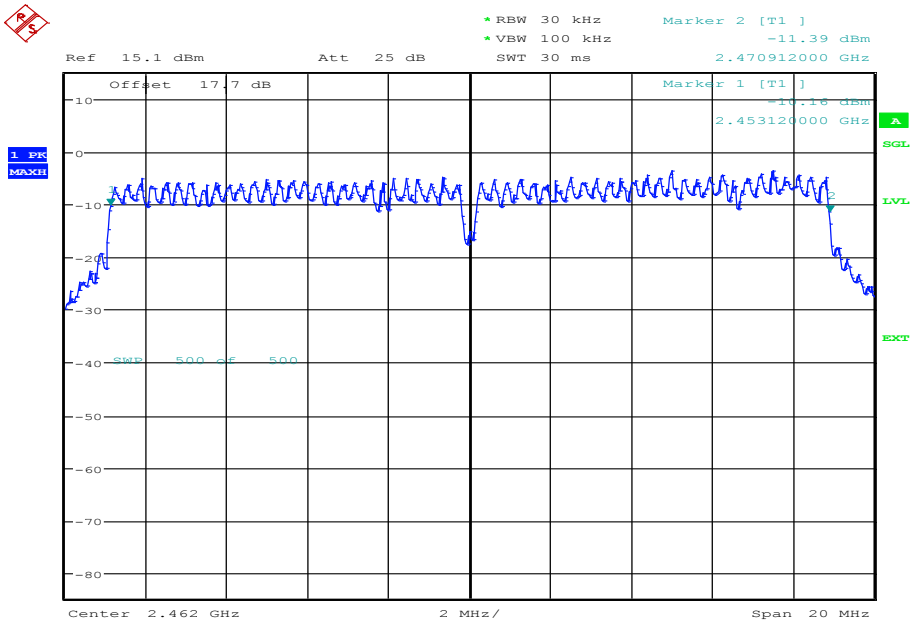
52 Mbps



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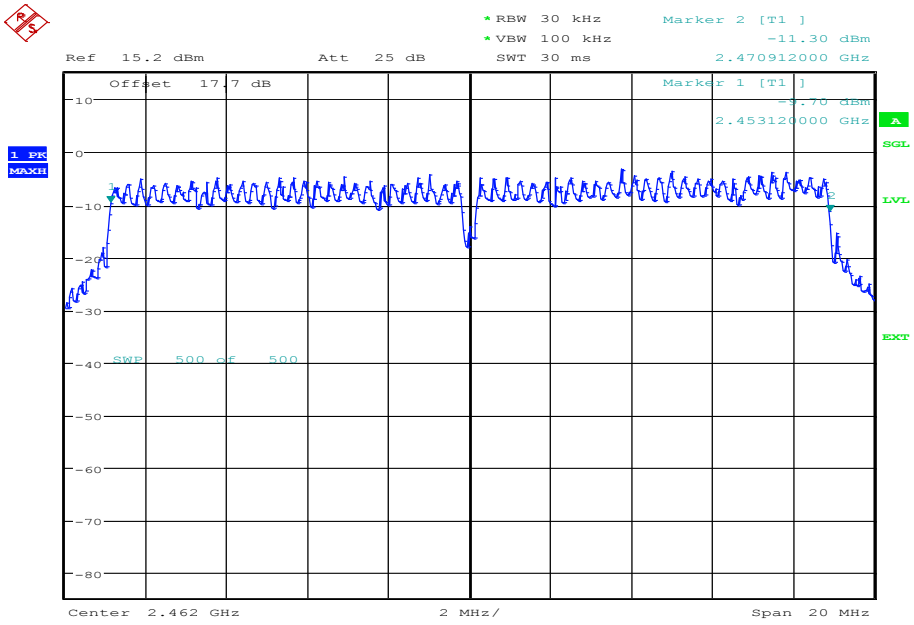
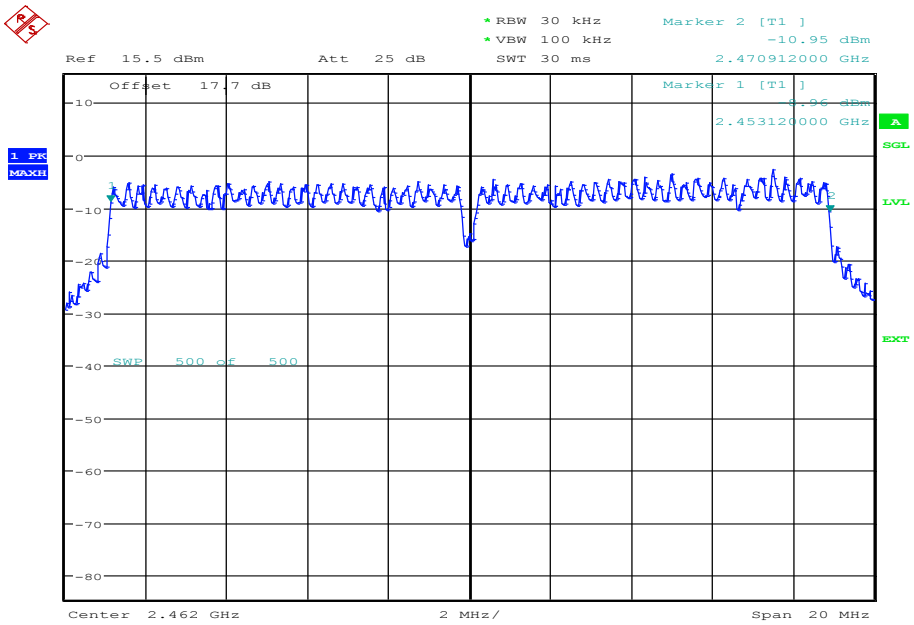
58.5 Mbps



Date: 9.OCT.2013 13:58:43

65 Mbps



Date: 9.OCT.2013 14:14:55

Limit Clause

The minimum 6 dB Bandwidth shall be at least 500 kHz.

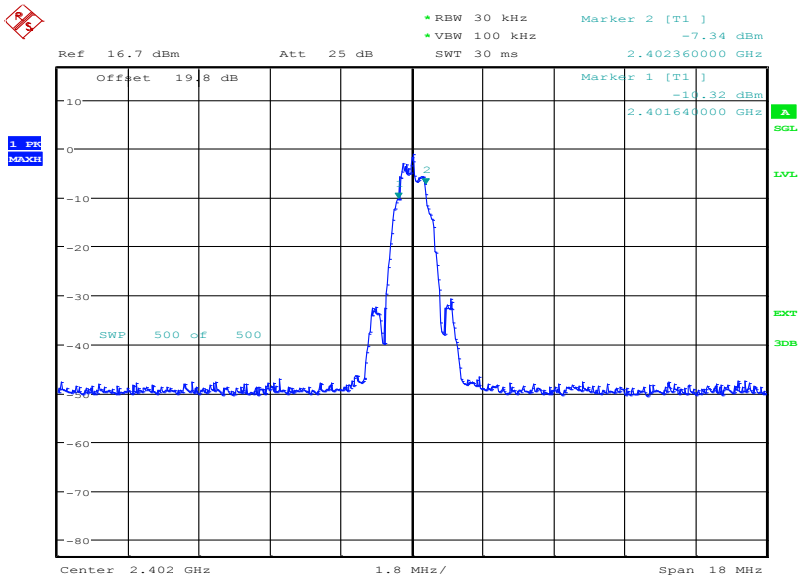
Bluetooth Low Energy

4.0 V DC Supply

Frequency (MHz)	Packet Type	6dB Bandwidth (kHz)
2402 MHz	37octet/prbs9	720
2440 MHz	37octet/prbs9	720
2480 MHz	37octet/prbs9	720

2402 MHz

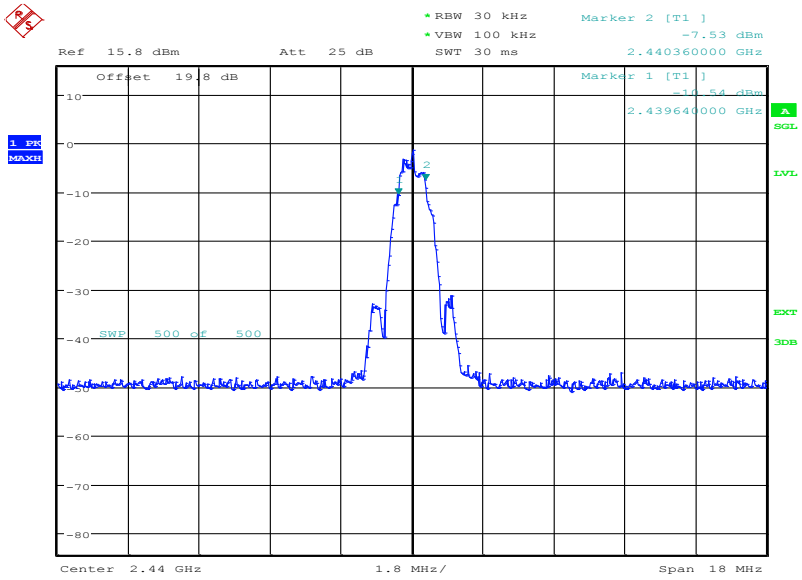
1 Mbps



Date: 1.OCT.2013 13:16:11

2440 MHz

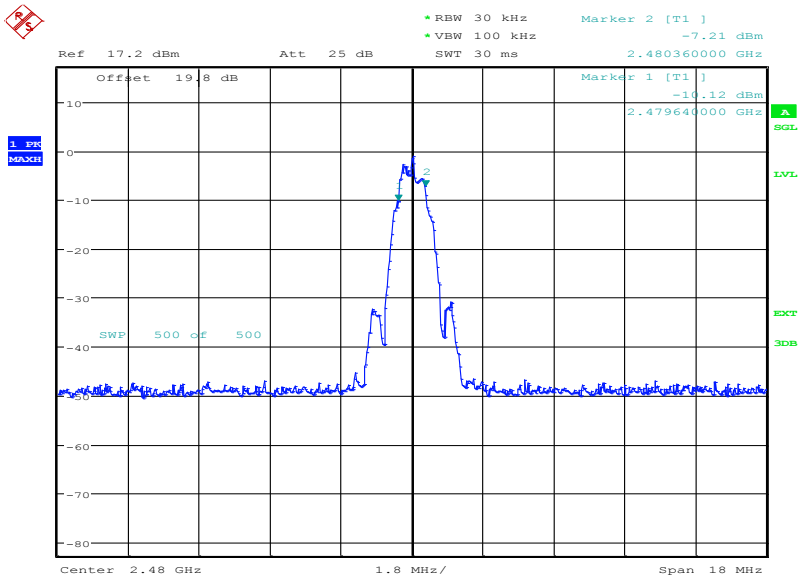
1 Mbps



Date: 1.OCT.2013 13:30:05

2480 MHz

1 Mbps



Date: 1.OCT.2013 13:56:40

Limit Clause

The minimum 6 dB Bandwidth shall be at least 500 kHz.

Product Service

SECTION 3

TEST EQUIPMENT USED

3.1 TEST EQUIPMENT USED

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

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Section 2.1 – AC Line Conducted Emissions					
LISN (1 Phase)	Chase	MN 2050	336	12	28-Mar-2014
Transient Limiter	Hewlett Packard	11947A	2377	12	13-Feb-2014
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	11-Oct-2013
Test Receiver	Rohde & Schwarz	ESIB	2941	12	23-Oct-2013
Section 2.2 - Maximum Peak Conducted Output Power					
Multimeter	White Gold	WG022	190	12	30-Oct-2013
GPS Frequency Standard	Rapco	GPS-804/3	1312	6	24-Jan-2014
Power Supply	Hewlett Packard	6104A	1948	-	TU
Attenuator (10dB, 50W)	Aeroflex / Weinschel	47-10-34	3166	12	12-Sep-2014
Hygrometer	Rotronic	I-1000	3220	12	16-Jul-2014
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	13-Sep-2014
P-Series Power Meter	Agilent Technologies	N1911A	3981	12	18-Sep-2014
50 MHz-18 GHz Wideband Power Sensor	Agilent Technologies	N1921A	3983	12	18-Sep-2014
1 Metre SMA Cable	Rhophase	3PS-1801A-1000-3PS	4099	12	26-Oct-2013
Calibration Unit	Rohde & Schwarz	ZV-Z54	4368	12	18-Sep-2014
Section 2.3 – EIRP Peak Power					
Antenna (Double Ridge Guide, 1GHz-18GHz)	EMCO	3115	234	12	3-Apr-2014
Turntable Controller	Inn-Co GmbH	CO 1000	1606	-	TU
Antenna (Log Periodic)	Schaffner	UPA6108	3108	12	5-Apr-2014
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	11-Oct-2013
Tilt Antenna Mast	maturo Gmbh	TAM 4.0-P	3916	-	TU
Mast Controller	maturo Gmbh	NCD	3917	-	TU
Section 2.4 - Spurious and Band Edge Emissions					
Multimeter	White Gold	WG022	190	12	30-Oct-2013
GPS Frequency Standard	Rapco	GPS-804/3	1312	6	24-Jan-2014
Power Supply	Hewlett Packard	6104A	1948	-	TU
Spectrum Analyser	Rohde & Schwarz	FSU26	2747	12	30-Nov-2013
High Pass Filter (4GHz)	RLC Electronics	F-100-4000-5-R	2773	12	1-Feb-2014
Hygrometer	Rotronic	I-1000	3220	12	16-Jul-2014
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	13-Sep-2014
'2.92mm' - '2.92mm' RF Cable (2m)	Rhophase	KPS-1503-2000-KPS	3694	12	25-Oct-2013
'2.92mm' - '2.92mm' RF Cable (2m)	Rhophase	KPS-1503-2000-KPS	3695	12	15-Oct-2013
1 Metre SMA Cable	Rhophase	3PS-1801A-1000-3PS	4099	12	26-Oct-2013
Attenuator (20dB/100W)	Weinschel	48-20-43	4138	9	8-Nov-2013
Calibration Unit	Rohde & Schwarz	ZV-Z54	4368	12	18-Sep-2014
Section 2.5 - Power Spectral Density					
Power Supply Unit	Farnell	LT-30-2	41	-	O/P Mon
Attenuator (20dB/ 2W)	Pasternack	PE7004-20	489	12	18-Oct-2013
Multimeter	Fluke	79 Series III	611	12	16-Aug-2014
GPS Frequency Standard	Rapco	GPS-804/3	1312	6	24-Jan-2014
Hygrometer	Rotronic	I-1000	3220	12	16-Jul-2014
Power Divider	Weinschel	1506A	3345	12	23-May-2014
Signal Analyser	Rohde & Schwarz	FSQ 26	3545	12	4-Jul-2014
P-Series Power Meter	Agilent Technologies	N1911A	3980	12	18-Sep-2014
50 MHz-18 GHz Wideband Power Sensor	Agilent Technologies	N1921A	3982	12	18-Sep-2014

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Section 2.6 - 6dB Bandwidth					
Multimeter	White Gold	WG022	190	12	30-Oct-2013
GPS Frequency Standard	Rapco	GPS-804/3	1312	6	24-Jan-2014
Power Supply	Hewlett Packard	6104A	1948	-	TU
Spectrum Analyser	Rohde & Schwarz	FSU26	2747	12	30-Nov-2013
Attenuator (10dB, 50W)	Aeroflex / Weinschel	47-10-34	3166	12	12-Sep-2014
Hygrometer	Rotronic	I-1000	3220	12	16-Jul-2014
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	13-Sep-2014
1 Metre SMA Cable	Rhophase	3PS-1801A-1000-3PS	4099	12	26-Oct-2013
Calibration Unit	Rohde & Schwarz	ZV-Z54	4368	12	18-Sep-2014

TU – Traceability Unscheduled
O/P MON – Output Monitored with Calibrated Equipment

3.2 MEASUREMENT UNCERTAINTY

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

Test Discipline	MU
6dB Bandwidth	± 212.114 kHz
EIRP Peak Power	30MHz to 1GHz: ± 5.1 dB 1GHz to 40GHz: ± 6.3 dB
Maximum Peak Conducted Output Power	± 0.70 dB
Spurious and Band Edge Emissions	30MHz to 1GHz: ± 5.1 dB 1GHz to 40GHz: ± 6.3 dB
Power Spectral Density	± 3.0 dB
AC Line Conducted Emissions	± 3.2 dB

SECTION 4

ACCREDITATION, DISCLAIMERS AND COPYRIGHT

4.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT

This report relates only to the actual item/items tested.

Our UKAS Accreditation does not cover opinions and interpretations and any expressed are outside the scope of our UKAS Accreditation.

Results of tests not covered by our UKAS Accreditation Schedule are marked NUA (Not UKAS Accredited).