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Report On

FCC Testing of the
The Boeing Company Black Smartphone
In accordance with FCC CFR 47 Part 15C (WLAN)

COMMERCIAL-IN-CONFIDENCE

FCC ID: H8V-BLK1

Document 75923267 Report 01 Issue 2

December 2013



Product Service

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COMMERCIAL-IN-CONFIDENCE

REPORT ON

FCC Testing of the
The Boeing Company Black Smartphone
In accordance with FCC CFR 47 Part 15C (WLAN)

Document 75923267 Report 01 Issue 2

December 2013

PREPARED FOR

The Boeing Company
7700 Boston Blvd
Springfield
VA 22153

PREPARED BY

Natalie Bennett
Senior Administrator (Technical)

APPROVED BY

Mark Jenkins
Authorised Signatory

DATED

19 December 2013

**This report has been up issued to Issue 2 to amend
the Applicant Name and Address and Product Name.**

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);

G Lawler

A Galpin





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SECTION 1

REPORT SUMMARY

FCC Testing of the
The Boeing Company Black Smartphone
In accordance with FCC CFR 47 Part 15C (WLAN)



Product Service

1.1 INTRODUCTION

The information contained in this report is intended to show verification of the FCC Testing of the The Boeing Company Black Smartphone 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	The Boeing Company
Model Number(s)	Black Smartphone
Serial Number(s)	XCV23200791 XCV23200909
Number of Samples Tested	2
Test Specification/Issue/Date	FCC CFR 47 Part 15C (2012)
Incoming Release Date	Application Form 13 December 2013
Disposal Reference Number Date	Held Pending Disposal Not Applicable Not Applicable
Order Number Date	48774 01 July 2013
Start of Test	7 August 2013
Finish of Test	29 August 2013
Name of Engineer(s)	G Lawler A Galpin
Related Document(s)	ANSI C63.10: 2009



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	



1.3 APPLICATION FORM

EQUIPMENT DESCRIPTION	
Model Name/Number	Model:Black
Part Number	BLK1
FCC ID (if applicable)	H8V-BLK1
Industry Canada ID (if applicable)	Not yet available, but coming
Technical Description (Please provide a brief description of the intended use of the equipment)	Quad-Band GSM(GSM850/900MHz, DCS1800MHz, PCS1900MHz) and Dual-band UMTS (FDDI, FDDII, FDDV) and Tri-Band LTE(B1, B4, B17) Multi Mode Cellular Phone with Bluetooth, W-LAN, and GPS receiver

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:	
-3 dBi for assembly identified as	Bluetooth/WLAN
x dBi for assembly identified as	
x dBi for assembly identified as	
x dBi for assembly identified as	
x dBi for assembly identified as	

TRANSMITTER TECHNICAL CHARACTERISTICS		
TRANSMITTER OPERATING FREQUENCY RANGE(S)		
	FCC and/or Industry Canada	EU
Bluetooth	2402 to 2480 MHz	2402 to 2480 MHz
WLAN	2412 to 2462 MHz	2412 to 2472 MHz
FCC and/or Industry Canada (only)		
Highest Internally Generated Frequency 2480 MHz		



SPREAD SPECTRUM PARAMETERS											
☒ Bluetooth		Version: 2.1									
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	<table border="1"> <thead> <tr> <th></th> <th>2.4 GHz</th> <th>5GHz</th> </tr> </thead> <tbody> <tr> <td>Transmitter (Tx)</td> <td>1</td> <td></td> </tr> <tr> <td>Receiver (Rx)</td> <td>1</td> <td></td> </tr> </tbody> </table>			2.4 GHz	5GHz	Transmitter (Tx)	1		Receiver (Rx)	1	
	2.4 GHz	5GHz									
Transmitter (Tx)	1										
Receiver (Rx)	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".											



TRANSMITTER POWER CHARACTERISTICS				
Bluetooth				
Maximum Rated Transmitter Output				
Effective radiated power (for equipment with antenna connector)			W	
Effective radiated power (for equipment with integral antenna)	0,001		W	
Minimum Rated Transmitter Output				
Effective radiated power (for equipment with antenna connector)			W	
Effective radiated power (for equipment with integral antenna)	0,001		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)	0,01		W	
Minimum Rated Transmitter Output				
Effective radiated power (for equipment with antenna connector)			W	
Effective radiated power (for equipment with integral antenna)	0,01		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				



Product Service

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 :			
3.8	Volts nominal.		
End point voltage as quoted by equipment manufacturer	3.8	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	3.3V V cut-off voltage
☐ Does not apply	



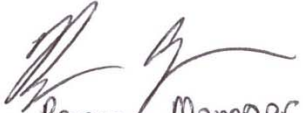
Product Service

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: Brian Chapman
 Position held: Program Manager Date: 12/13/13



Product Service

1.4 PRODUCT INFORMATION

1.4.1 Technical Description

The Equipment Under Test (EUT) was a The Boeing Company Black Smartphone. 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 3.8 V DC supply.

FCC Accreditation
90987 Octagon House, Fareham Test Laboratory

1.6 DEVIATIONS FROM THE STANDARD

No deviations from the applicable test standard 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
The Boeing Company Black Smartphone
In accordance with FCC CFR 47 Part 15C (WLAN)



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

Black Smartphone S/N: XCV23200791 - Modification State 0

2.1.3 Date of Test

20 August 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	18.0°C
Relative Humidity	51.0%

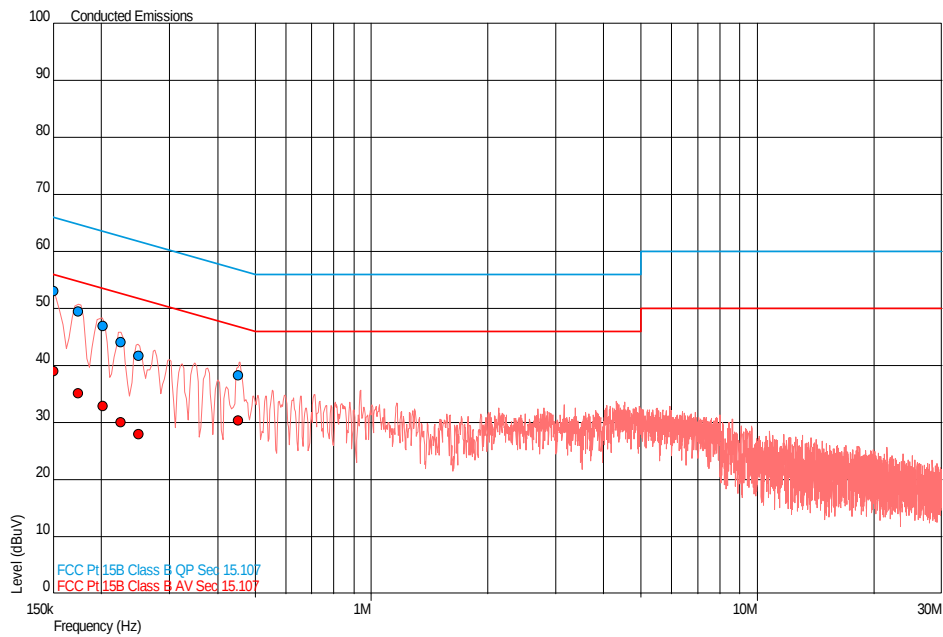


Product Service

2.1.7 Test Results

802.11(b)

Live Line

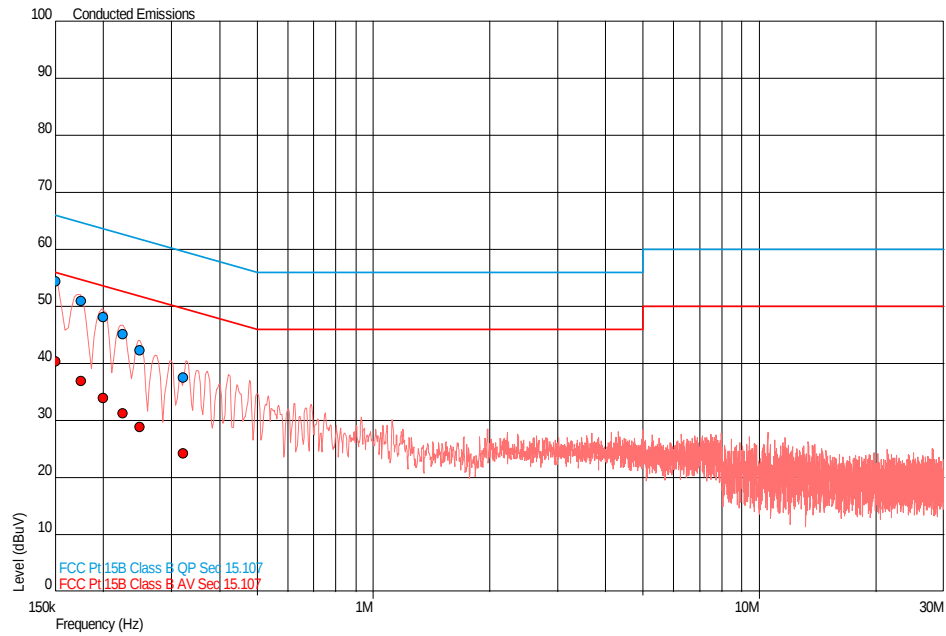


Frequency (MHz)	QP Level (dBμV)	QP Limit (dBμV)	QP Margin (dBμV)	AV Level (dBμV)	AV Limit (dBμV)	AV Margin (dBμV)
0.150	53.1	66.0	-12.9	39.1	56.0	-16.9
0.174	49.4	64.8	-15.4	35.1	54.8	-19.7
0.202	46.9	63.5	-16.7	32.8	53.5	-20.7
0.225	44.2	62.6	-18.5	30.0	52.6	-22.6
0.250	41.7	61.7	-20.1	28.0	51.7	-23.7
0.452	38.3	56.8	-18.5	30.3	46.8	-16.5



Product Service

Neutral Line



Frequency (MHz)	QP Level (dBμV)	QP Limit (dBμV)	QP Margin (dBμV)	AV Level (dBμV)	AV Limit (dBμV)	AV Margin (dBμV)
0.150	54.4	66.0	-11.6	40.4	56.0	-15.6
0.175	50.9	64.7	-13.8	36.9	54.7	-17.8
0.200	48.1	63.6	-15.5	34.0	53.6	-19.6
0.225	45.2	62.6	-17.4	31.3	52.6	-21.4
0.249	42.3	61.8	-19.4	29.0	51.8	-22.8
0.322	37.6	59.6	-22.1	24.2	49.6	-25.4



Product Service

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

Black Smartphone S/N: XCV23200909 - Modification State 0

2.2.3 Date of Test

28 August 2013 & 29 August 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 transmitted at maximum power via a cable to a Peak Power Meter. The path loss between the Power Meter and EUT was measured and used to account for the measurement path loss. The power was measured on Bottom, Middle and Top Channels on all data rates.

2.2.6 Environmental Conditions

Ambient Temperature	24.2°C
Relative Humidity	36.6%



2.2.7 Test Results

802.11(b)

3.8 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	15.50	16.79	17.07	35.46	47.78	50.89
2	15.48	16.97	17.16	35.28	49.74	52.00
5.5	15.57	17.08	17.12	36.05	51.08	51.56
11	15.67	17.22	17.29	36.92	52.78	53.56

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.



Product Service

802.11(g)

3.8 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	21.45	22.69	22.25	139.77	185.63	167.99
9	21.52	22.67	22.51	141.95	184.80	178.30
12	20.94	22.10	22.02	124.03	124.03	162.27
18	20.79	22.14	22.08	120.08	163.84	161.36
24	21.41	22.48	22.07	138.31	176.84	161.10
36	20.67	22.12	21.84	116.62	162.80	152.61
48	19.79	20.80	21.28	95.22	120.29	134.22
54	19.74	20.82	21.20	94.25	120.88	128.91

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)

3.8 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	20.72	22.37	22.10	118.01	172.45	162.13
13	21.93	22.98	22.51	155.89	198.65	178.08
19.5	21.22	22.62	22.44	132.47	182.96	175.38
26	20.63	21.97	22.05	115.49	157.43	160.44
39	20.46	21.85	21.94	111.07	153.22	156.39
52	20.40	21.39	21.45	109.61	137.86	139.60
58.5	19.52	21.08	20.94	89.52	128.33	124.22
65	19.05	20.11	20.21	80.39	102.49	105.04

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.



Product Service

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

Black Smartphone S/N: XCV23200791 - Modification State 0

2.3.3 Date of Test

18 August 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 360° and a height search of the measuring antenna. A substitution was then performed using a substitution 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

To obtain the correct power result, a correction factor between the Spectrum Analyser and a Peak Power Analyser was included in the substitution measurement..

A calculation was then performed to obtain the final figure.

2.3.6 Environmental Conditions

Ambient Temperature	23.5°C
Relative Humidity	33.0%



Product Service

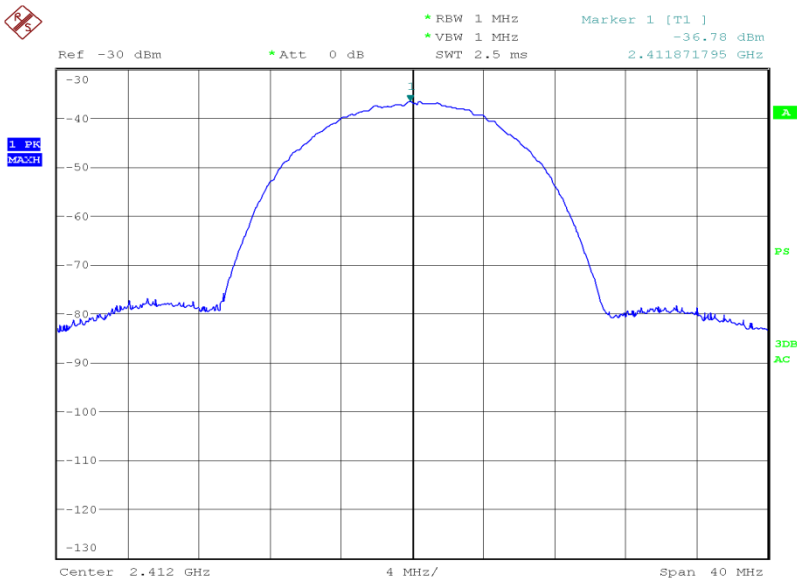
2.3.7 Test Results

802.11(b)

3.8 V DC Supply

2412 MHz

EIRP (dBm)	EIRP (mW)
10.16	10.38



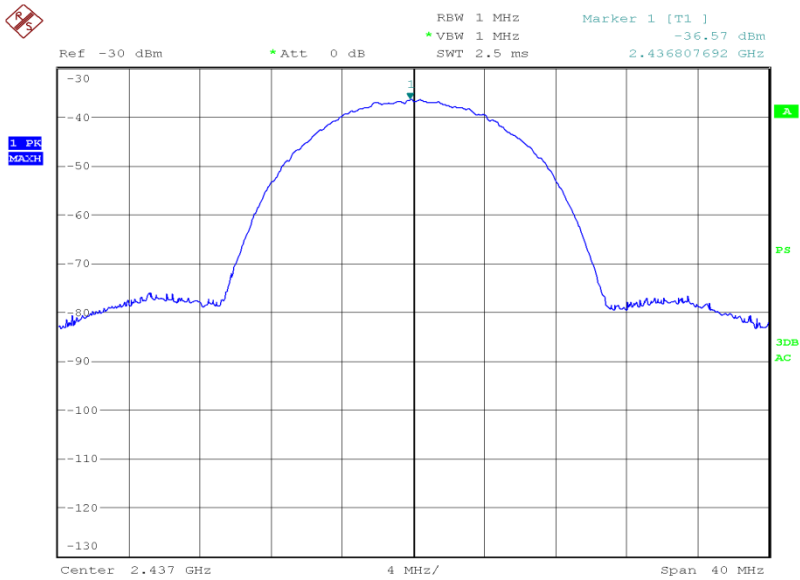
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Product Service

2437 MHz

EIRP (dBm)	EIRP (mW)
10.62	11.53



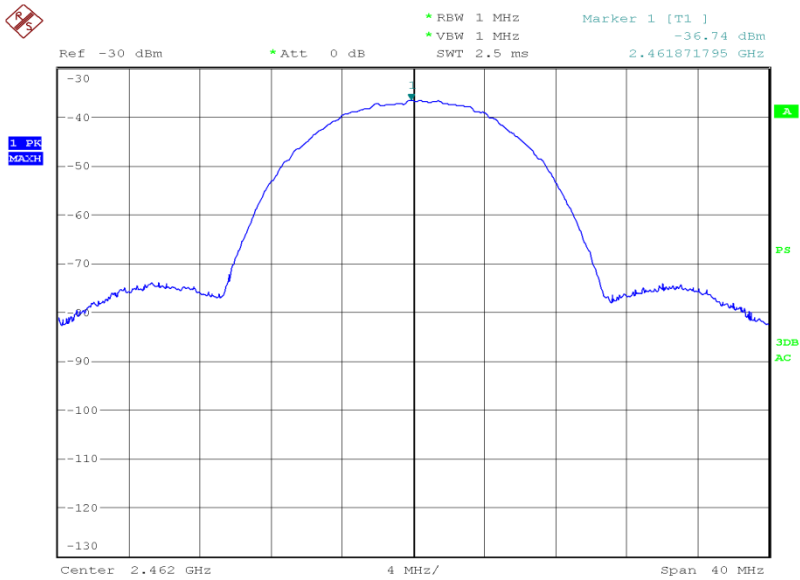
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Product Service

2462 MHz

EIRP (dBm)	EIRP (mW)
10.23	10.54



Date: 18.AUG.2013 09:34:46

Limit

EIRP (dBm)	EIRP (mW)
36.0	4000



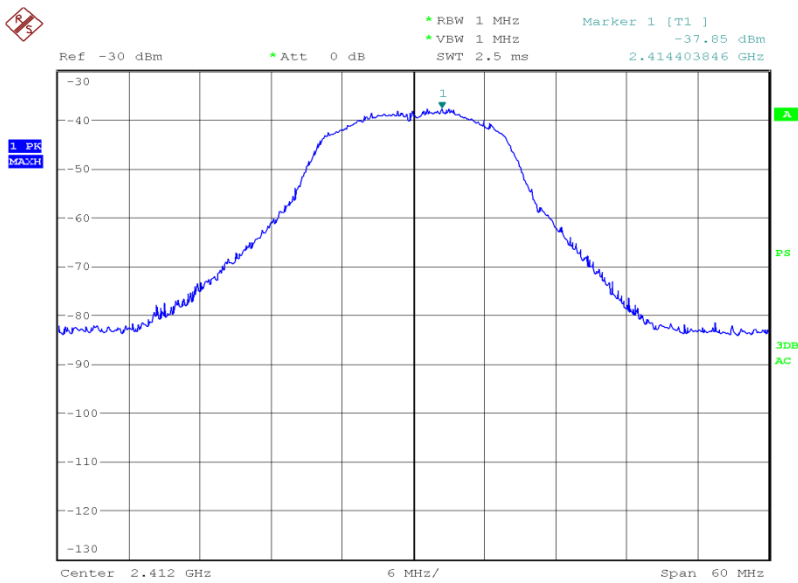
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802.11(g)

3.8 V DC Supply

2412 MHz

EIRP (dBm)	EIRP (mW)
12.91	19.54



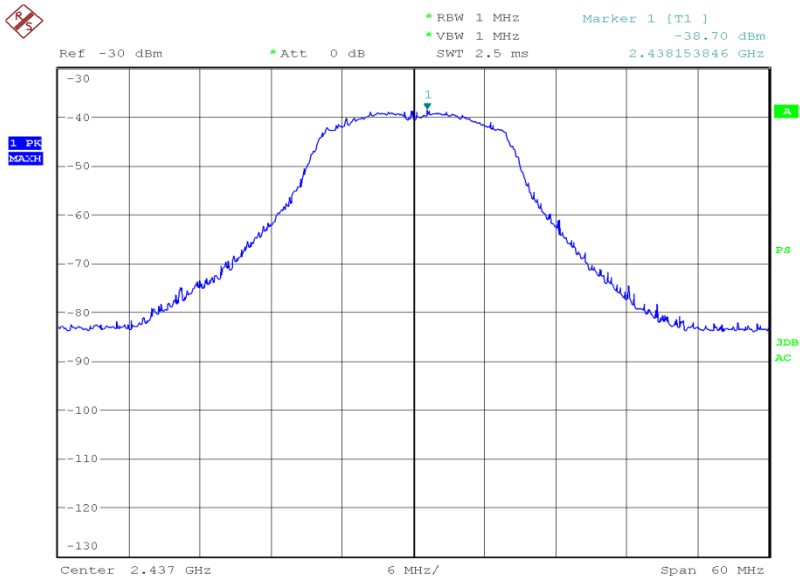
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Product Service

2437 MHz

EIRP (dBm)	EIRP (mW)
12.28	16.90



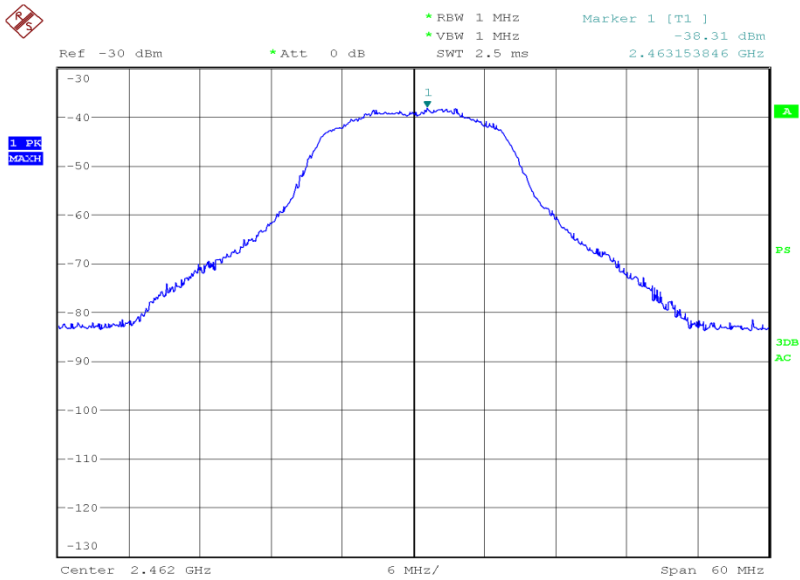
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Product Service

2462 MHz

EIRP (dBm)	EIRP (mW)
12.48	17.70



Date: 18.AUG.2013 12:09:50

Limit

EIRP (dBm)	EIRP (mW)
36.0	4000



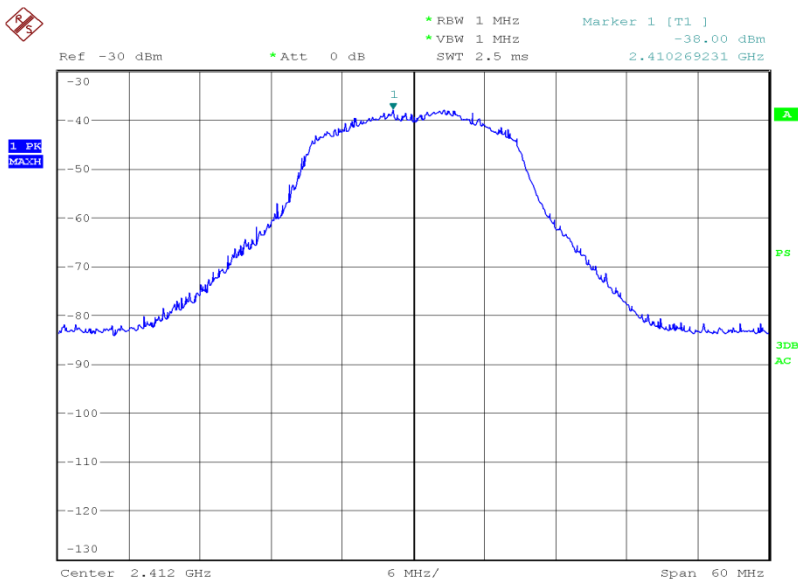
Product Service

802.11(n)

3.8 V DC Supply

2412 MHz

EIRP (dBm)	EIRP (mW)
12.45	17.58



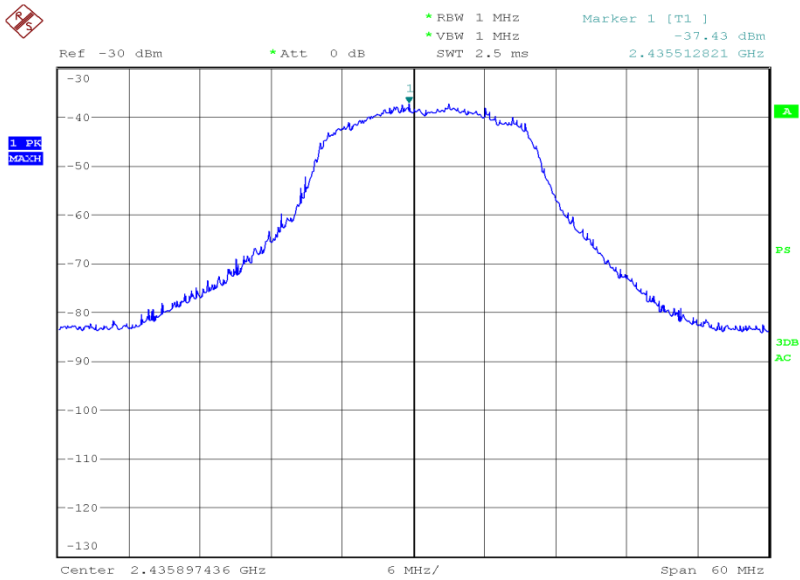
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Product Service

2437 MHz

EIRP (dBm)	EIRP (mW)
13.24	21.09



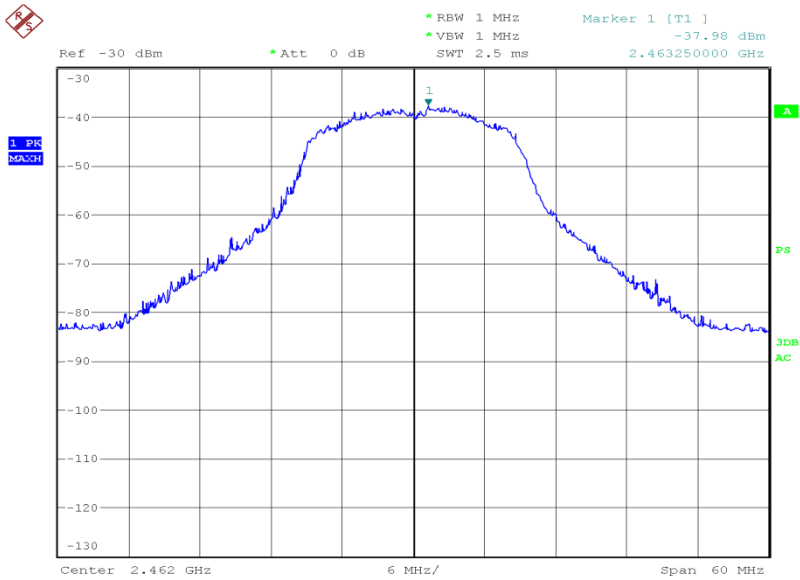
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Product Service

2462 MHz

EIRP (dBm)	EIRP (mW)
12.50	17.78



Date: 18.AUG.2013 12:53:15

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

Black Smartphone S/N: XCV23200791 - Modification State 0

Black Smartphone S/N: XCV23200909 - Modification State 0

2.4.3 Date of Test

7 August 2013, 8 August 2013, 19 August 2013 & 20 August 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 as 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	18.0 - 22.3°C
Relative Humidity	51.0 - 61.0%



Product Service

2.4.7 Test Results

802.11(b)

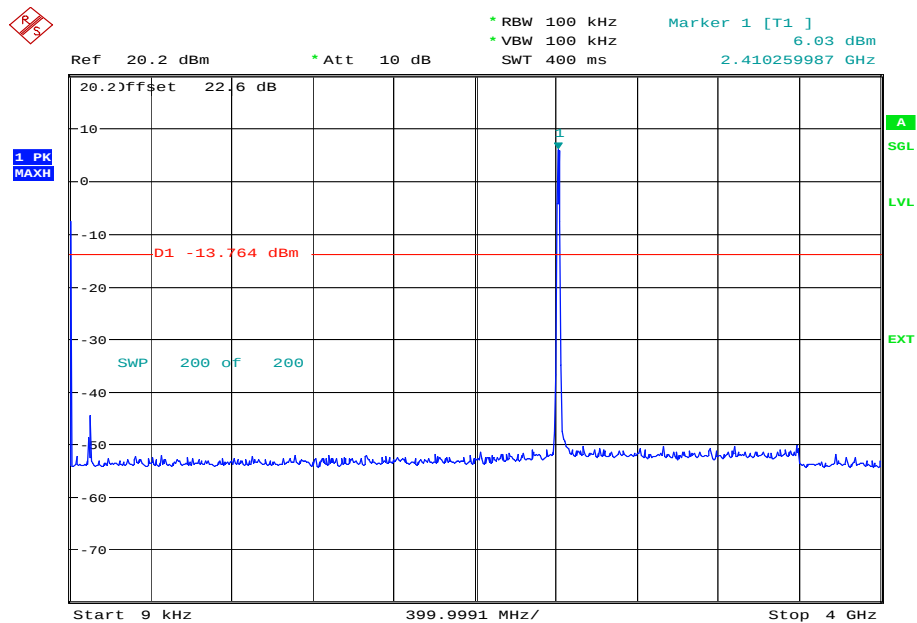
3.8 V DC Supply

Spurious Conducted Emissions

5.5 Mbps

2412 MHz

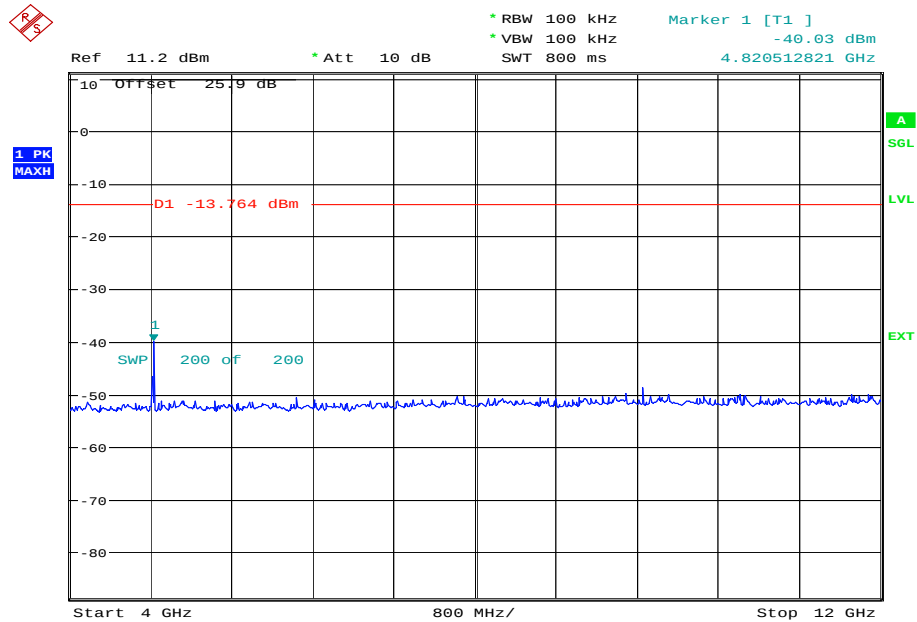
9 kHz to 4 GHz



Date: 6.AUG.2013 13:12:16

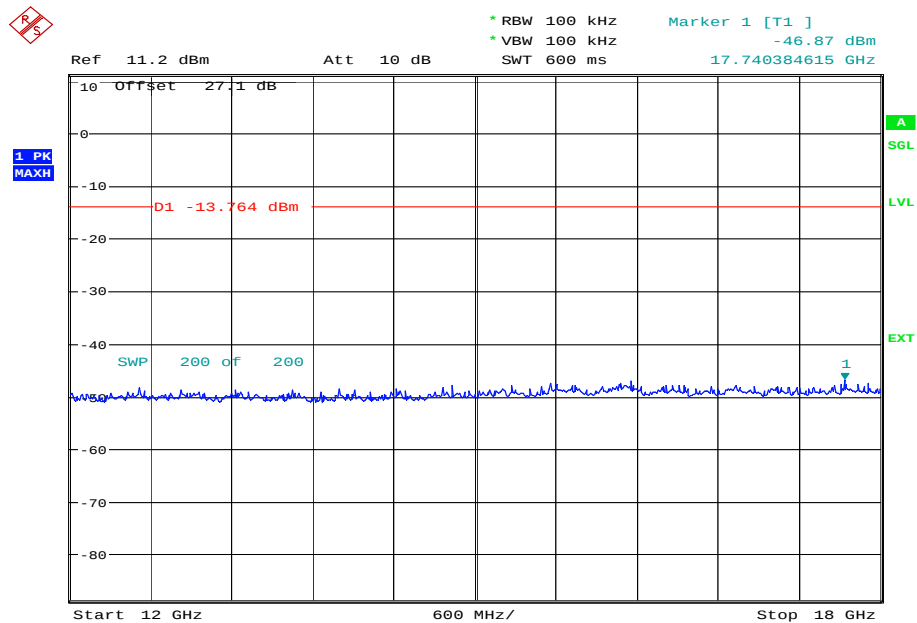


4 GHz to 12 GHz



Date: 6.AUG.2013 13:16:01

12 GHz to 18 GHz

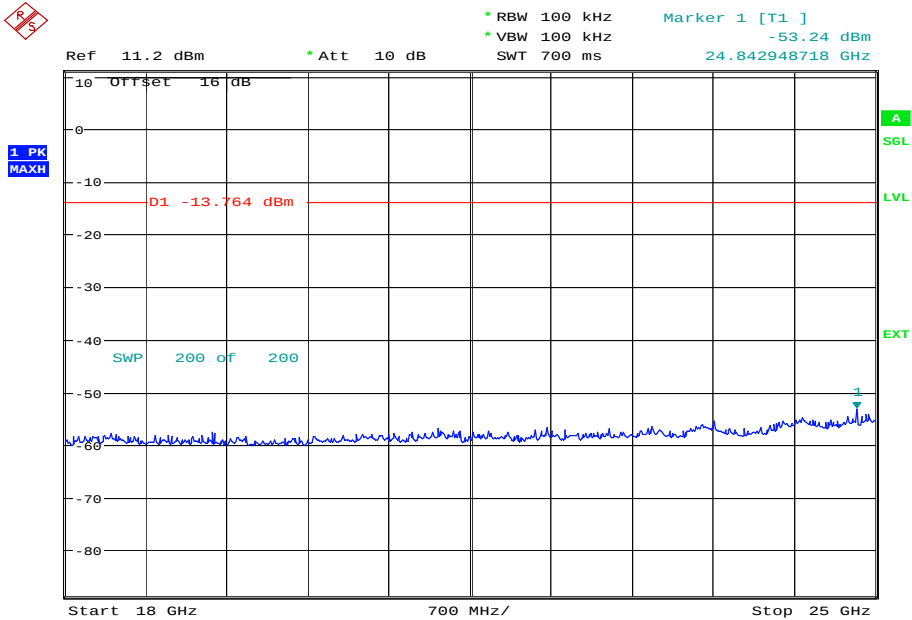


Date: 6.AUG.2013 13:18:36



Product Service

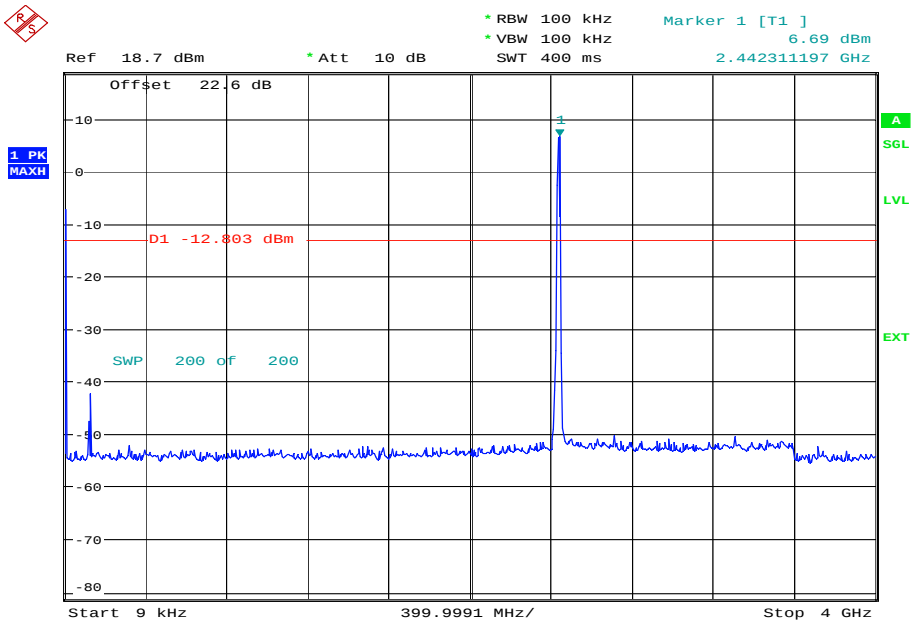
18 GHz to 25 GHz



Date: 6.AUG.2013 13:22:33

2437 MHz

9 kHz to 4 GHz

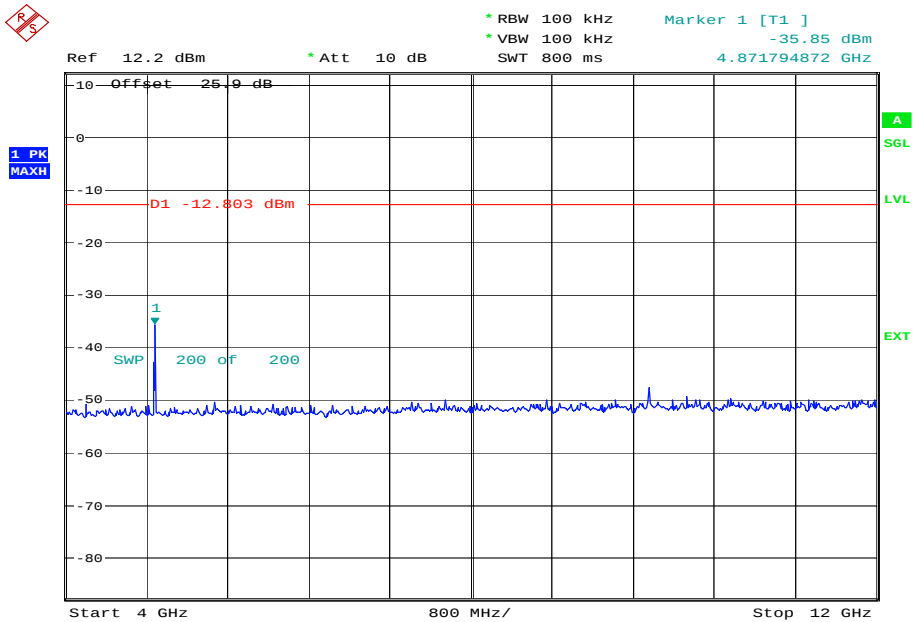


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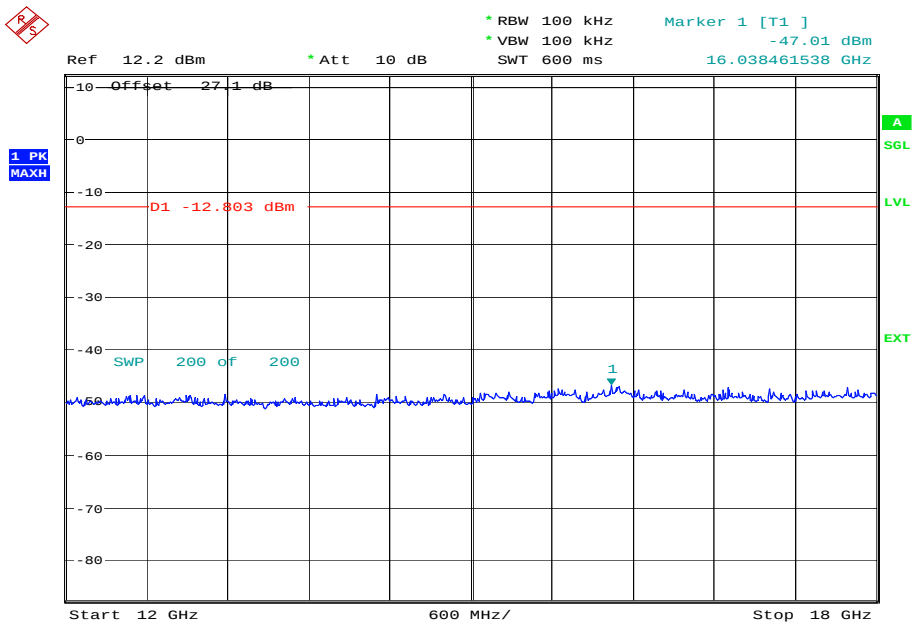
Product Service

4 GHz to 12 GHz



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12 GHz to 18 GHz

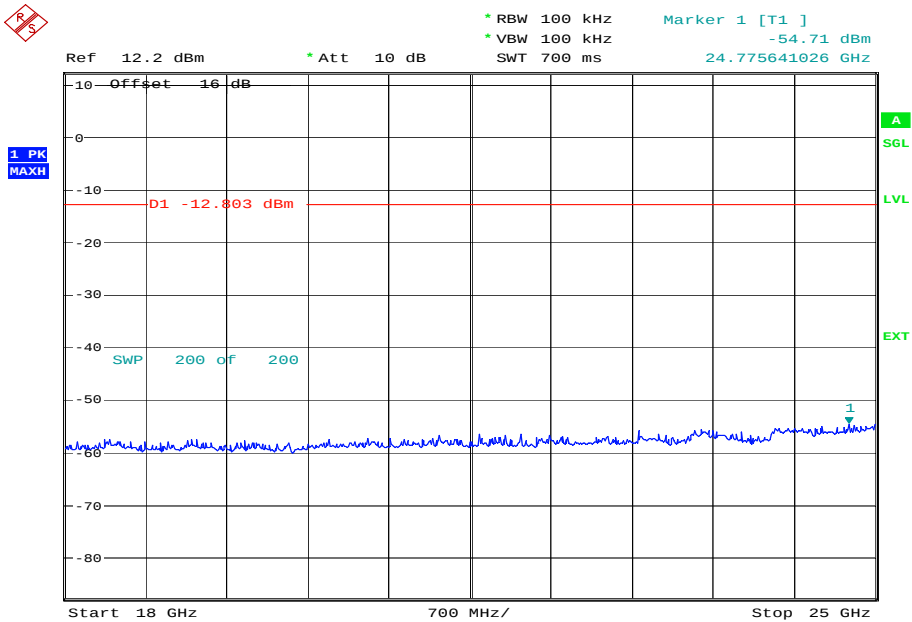


Date: 6.AUG.2013 13:39:53



Product Service

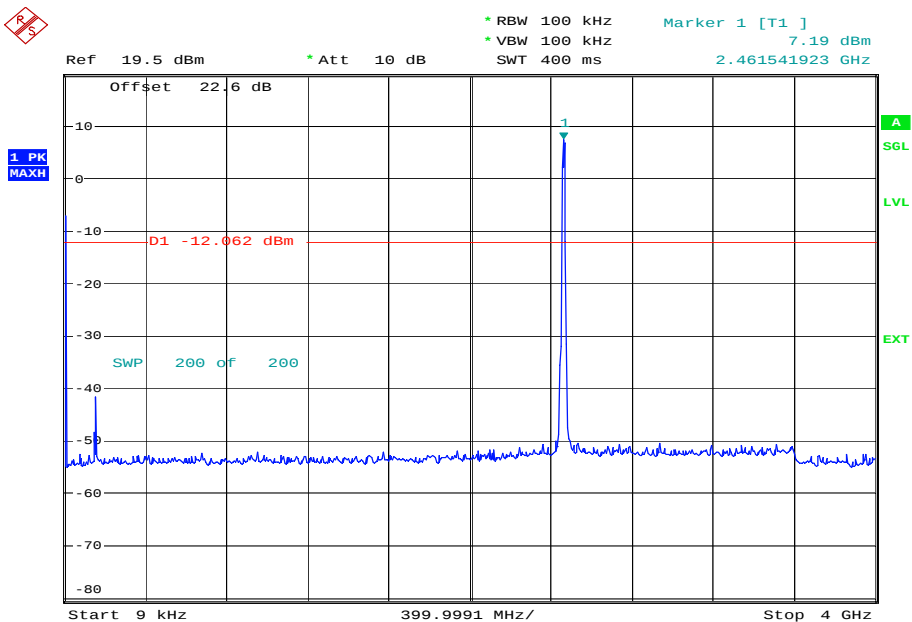
18 GHz to 25 GHz



Date: 6.AUG.2013 13:43:48

2462 MHz

9 kHz to 4 GHz

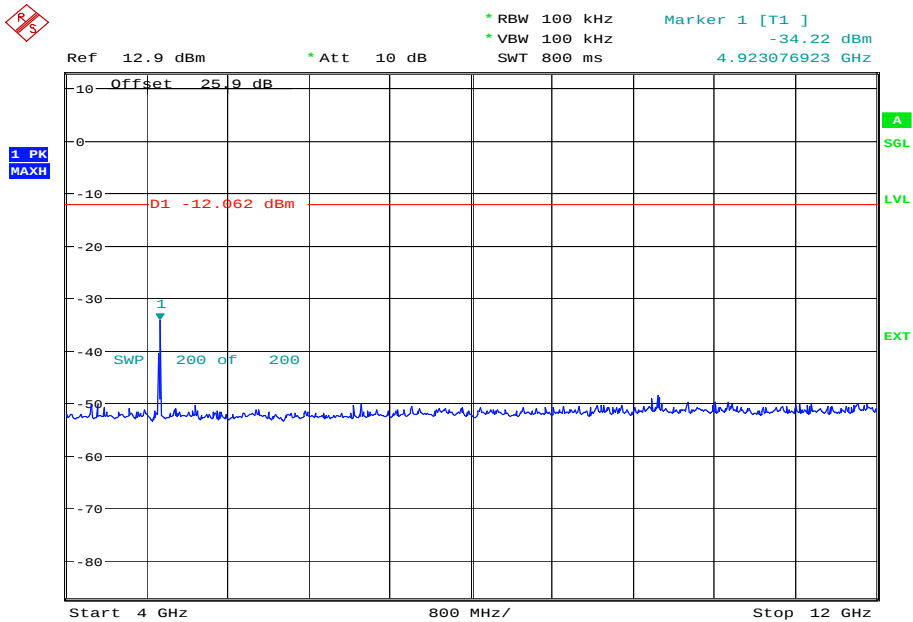


Date: 6.AUG.2013 13:48:15



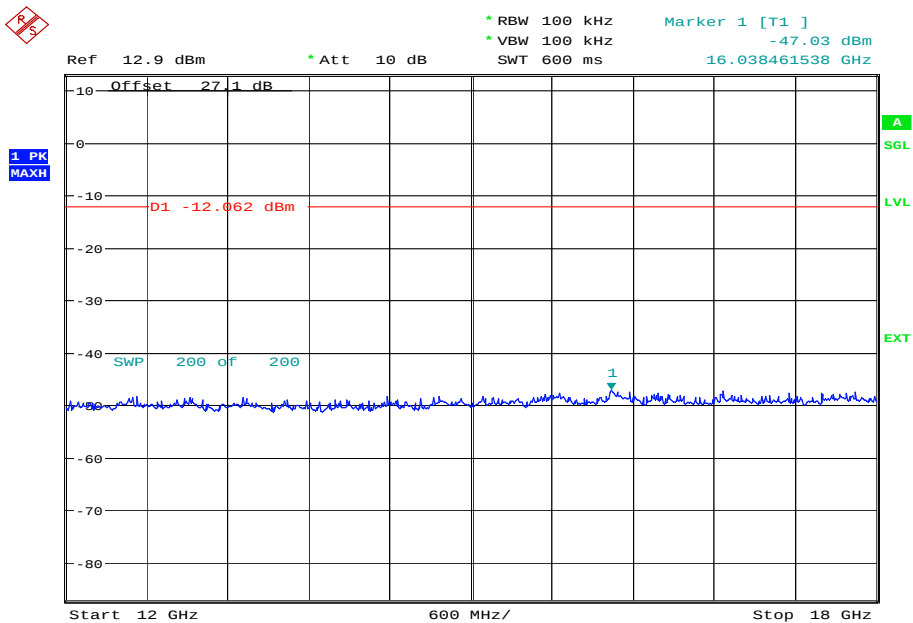
Product Service

4 GHz to 12 GHz



Date: 6.AUG.2013 13:52:45

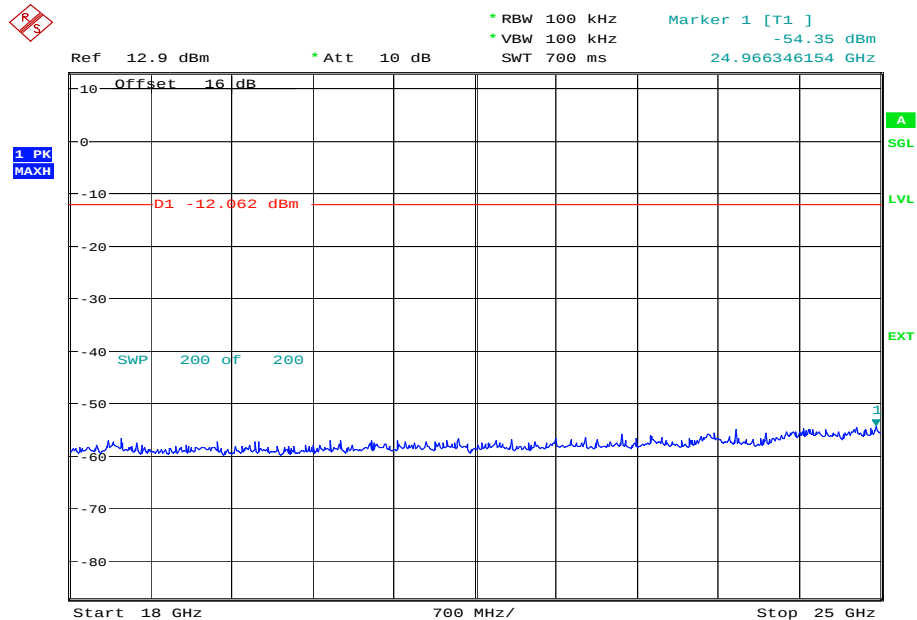
12 GHz to 18 GHz



Date: 6.AUG.2013 13:55:19



Product Service

18 GHz to 25 GHz

Date: 6.AUG.2013 13:59:07

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.

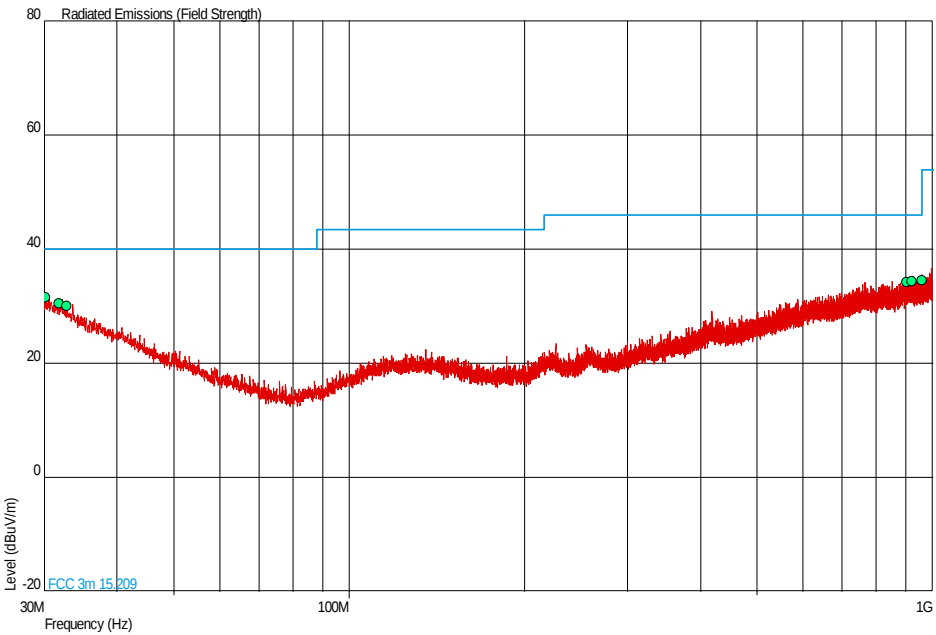


Product Service

Spurious Radiated Emissions

2412 MHz

30 MHz to 1 GHz

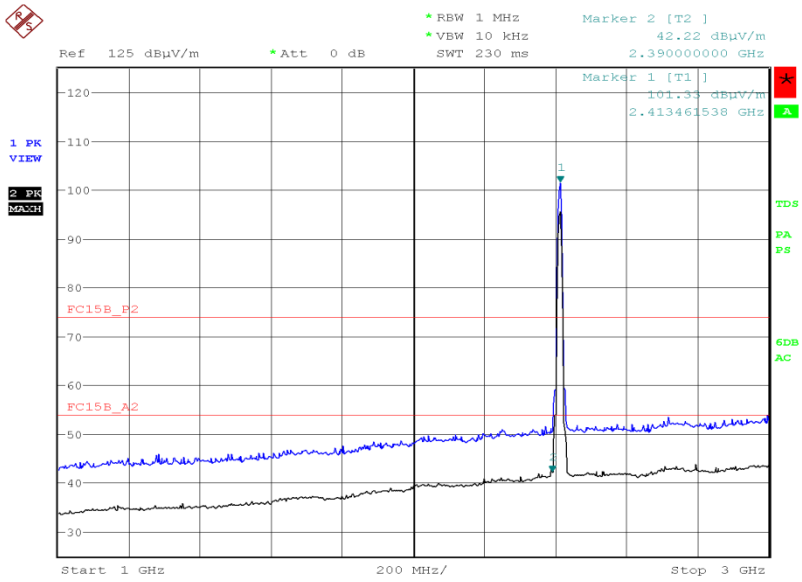


Frequency (MHz)	QP Level (dBμV/m)	QP Level (μV/m)	QP Limit (dBμV/m)	QP Limit (μV/m)	QP Margin (dBμV/m)	QP Margin (μV/m)	Angle (Deg)	Height (m)	Polarity
30.194	31.6	38.0	40.0	100	-8.4	62.0	0	1.00	Horizontal
31.795	30.6	33.9	40.0	100	-9.4	66.1	0	1.00	Vertical
32.813	30.0	31.6	40.0	100	-10.0	68.4	45	1.00	Horizontal
903.049	34.2	51.3	46.0	200	-11.8	148.7	0	1.00	Horizontal
920.848	34.4	52.5	46.0	200	-11.6	147.5	45	1.00	Horizontal
957.757	34.5	53.1	46.0	200	-11.5	146.9	0	1.00	Horizontal



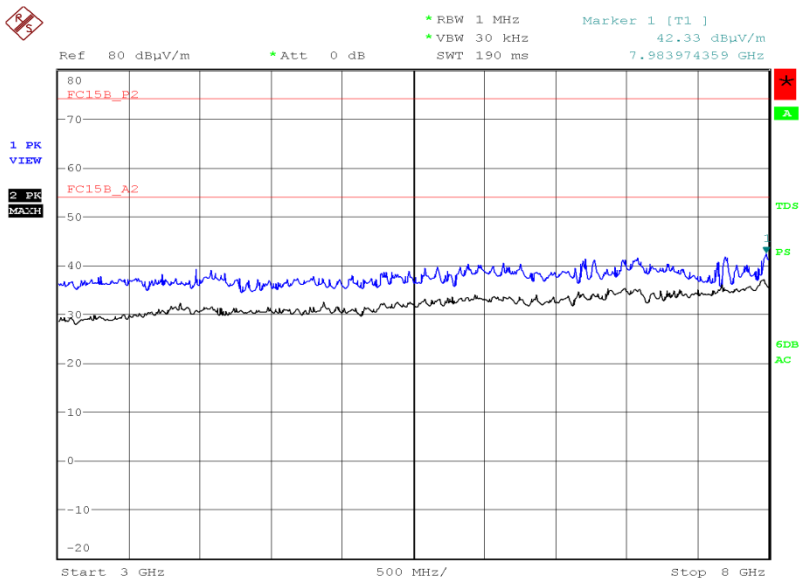
Product Service

1 GHz to 3 GHz



Date: 18.AUG.2013 08:39:01

3 GHz to 8 GHz

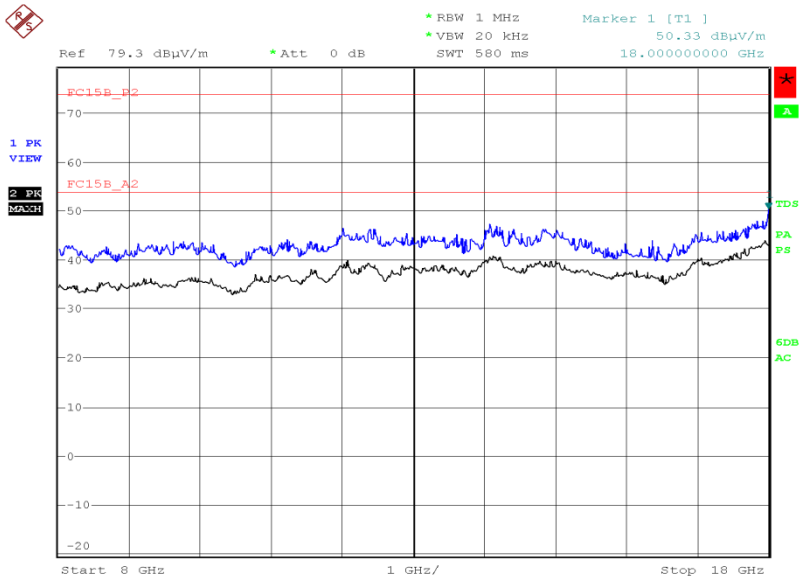


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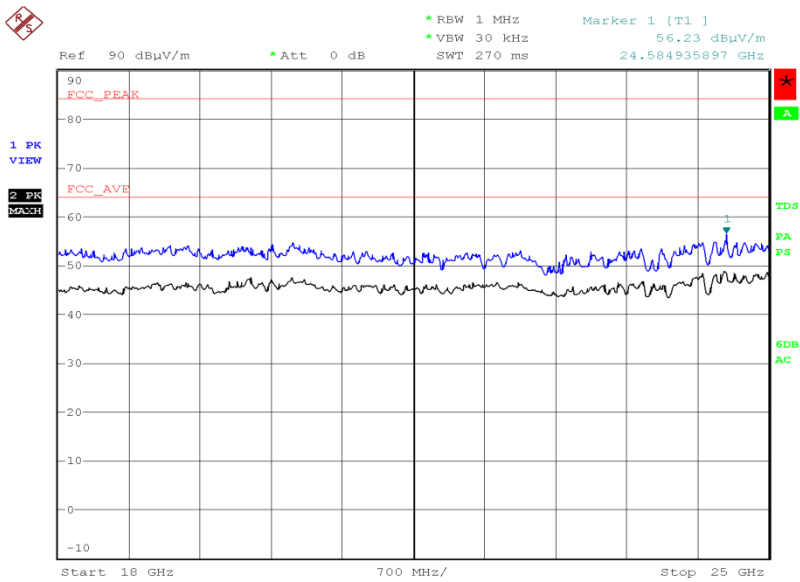
Product Service

8 GHz to 18 GHz



Date: 19.AUG.2013 18:14:50

18 GHz to 25 GHz



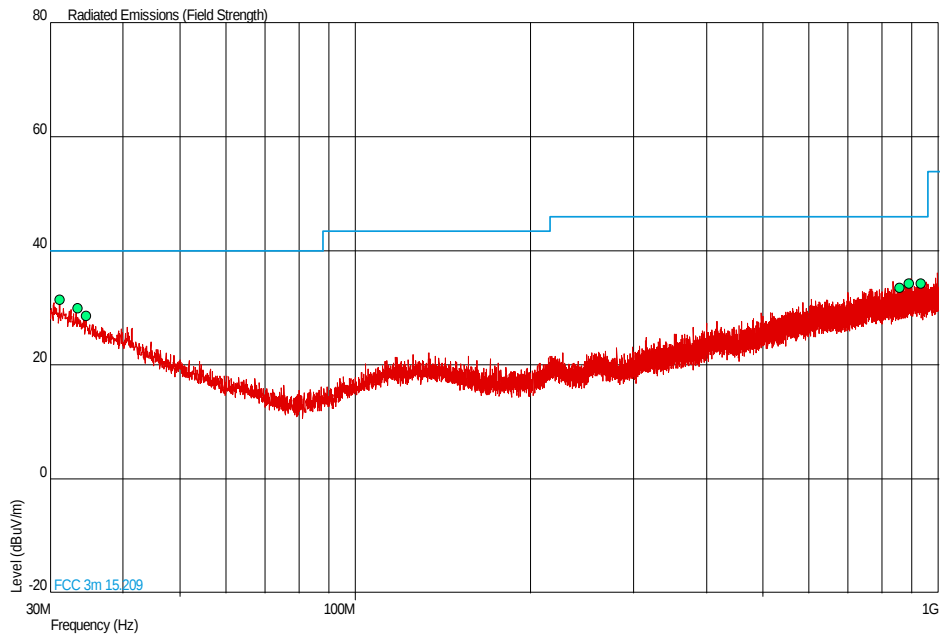
Date: 19.AUG.2013 20:43:08



Product Service

2437 MHz

30 MHz to 1 GHz

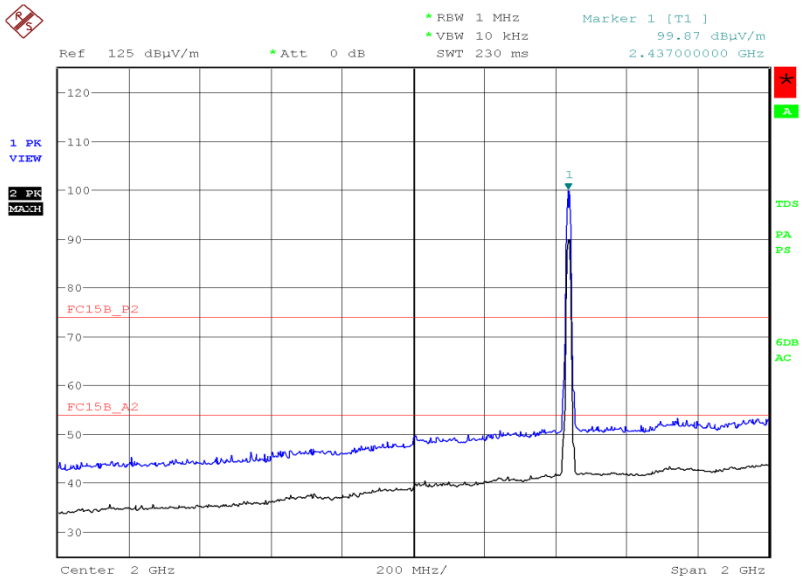


Frequency (MHz)	QP Level (dBµV/m)	QP Level (µV/m)	QP Limit (dBµV/m)	QP Limit (µV/m)	QP Margin (dBµV/m)	QP Margin (µV/m)	Angle (Deg)	Height (m)	Polarity
31.213	31.4	37.2	40.0	100	-8.6	62.8	0	1.00	Vertical
33.444	30.0	31.6	40.0	100	-10.0	68.4	0	1.00	Vertical
34.608	28.6	26.9	40.0	100	-11.4	73.1	0	1.00	Vertical
858.235	33.4	46.8	46.0	200	-12.6	153.2	0	1.00	Vertical
891.651	34.3	51.9	46.0	200	-11.7	148.1	0	1.00	Vertical
932.440	34.3	51.9	46.0	200	-11.7	148.1	0	1.00	Vertical



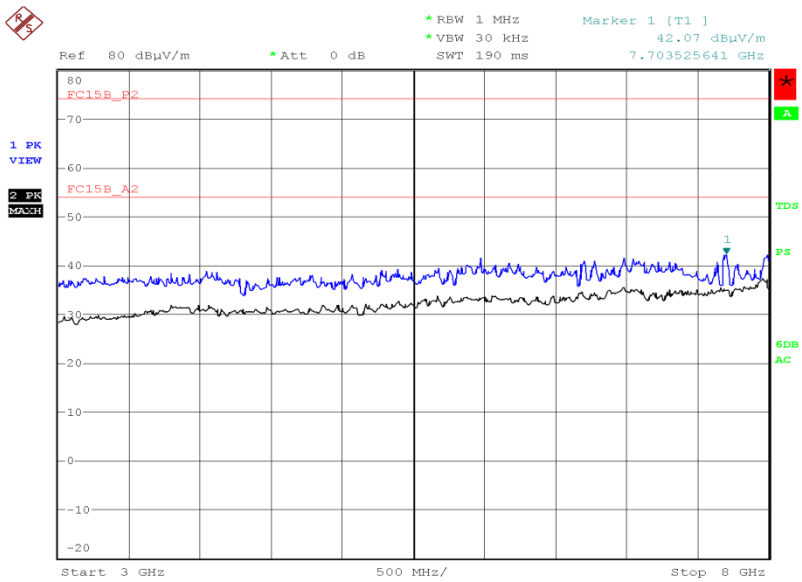
Product Service

1 GHz to 3 GHz



Date: 18.AUG.2013 09:24:23

3 GHz to 8 GHz

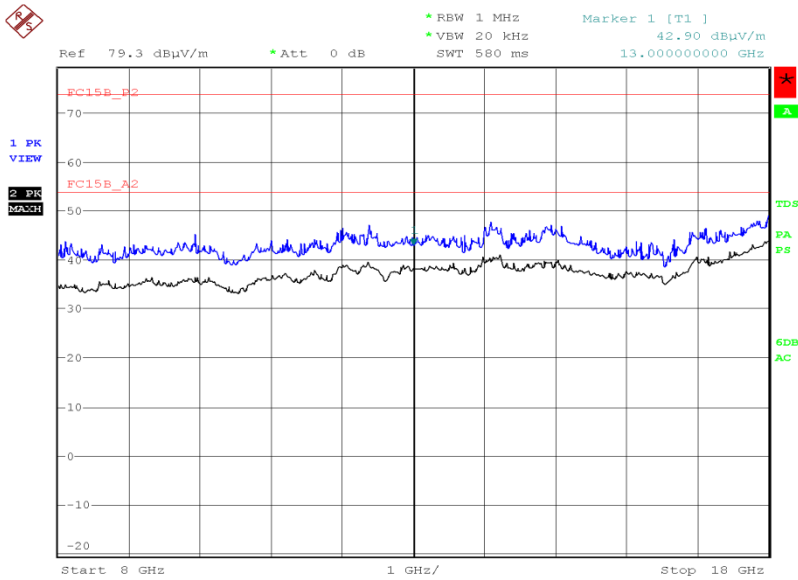


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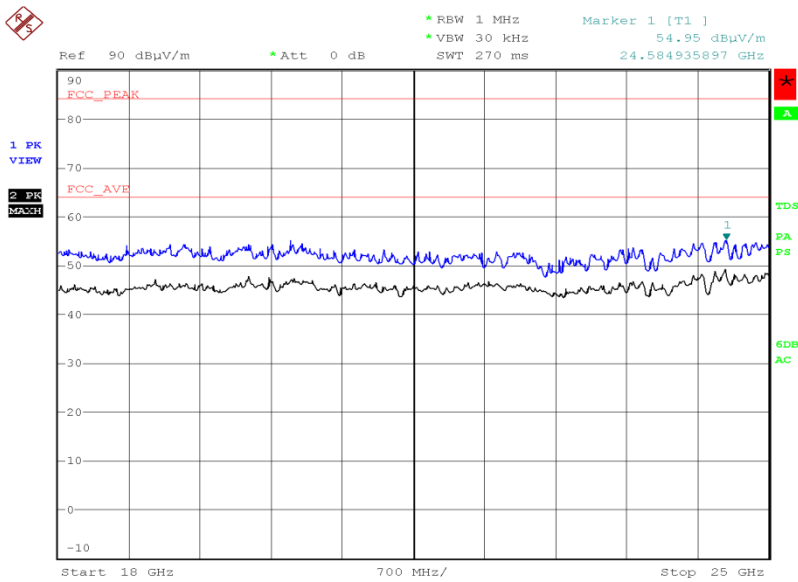
Product Service

8 GHz to 18 GHz



Date: 19.AUG.2013 18:30:07

18 GHz to 25 GHz



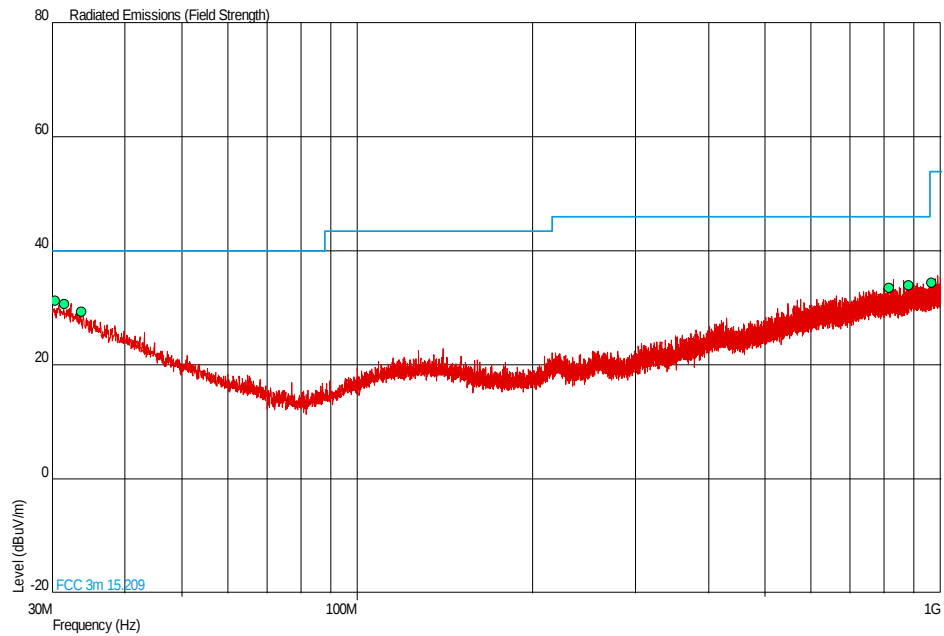
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Product Service

2462 MHz

30 MHz to 1 GHz

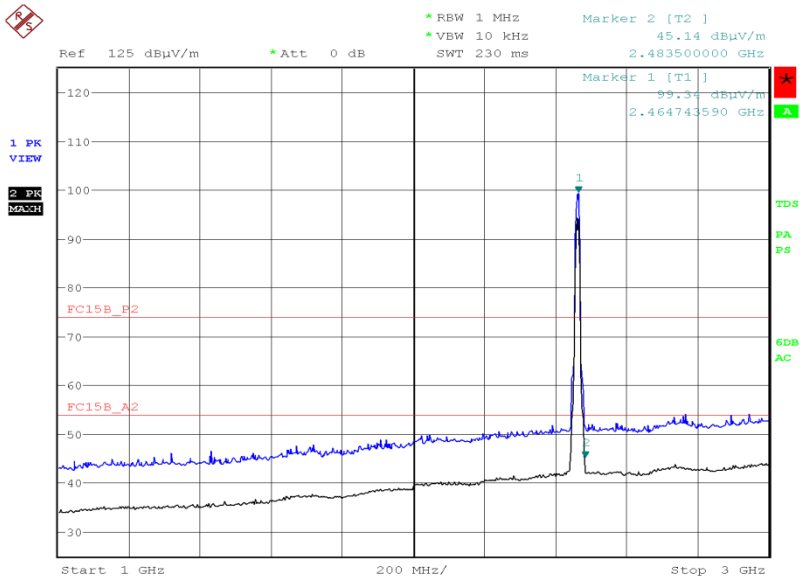


Frequency (MHz)	QP Level (dBµV/m)	QP Level (µV/m)	QP Limit (dBµV/m)	QP Limit (µV/m)	QP Margin (dBµV/m)	QP Margin (µV/m)	Angle (Deg)	Height (m)	Polarity
30.388	31.3	36.7	40.0	100	-8.7	63.3	0	1.00	Vertical
31.455	30.7	34.3	40.0	100	-9.3	65.7	0	1.00	Horizontal
33.735	29.3	29.2	40.0	100	-10.7	70.8	0	1.00	Vertical
816.040	33.5	47.3	46.0	200	-12.5	152.7	0	1.00	Vertical
880.302	33.9	49.5	46.0	200	-12.1	150.5	0	1.00	Horizontal
964.401	34.5	53.1	54.0	501	-19.5	446.9	0	1.00	Horizontal



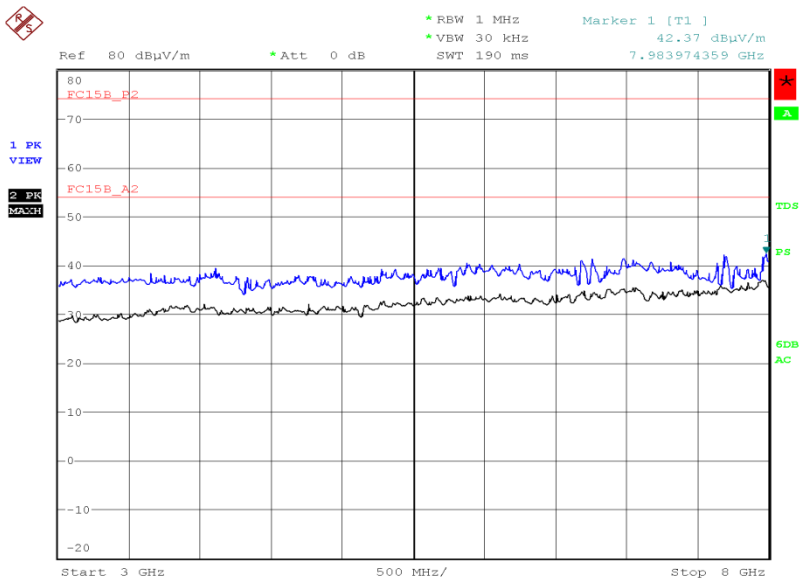
Product Service

1 GHz to 3 GHz



Date: 18.AUG.2013 10:05:23

3 GHz to 8 GHz

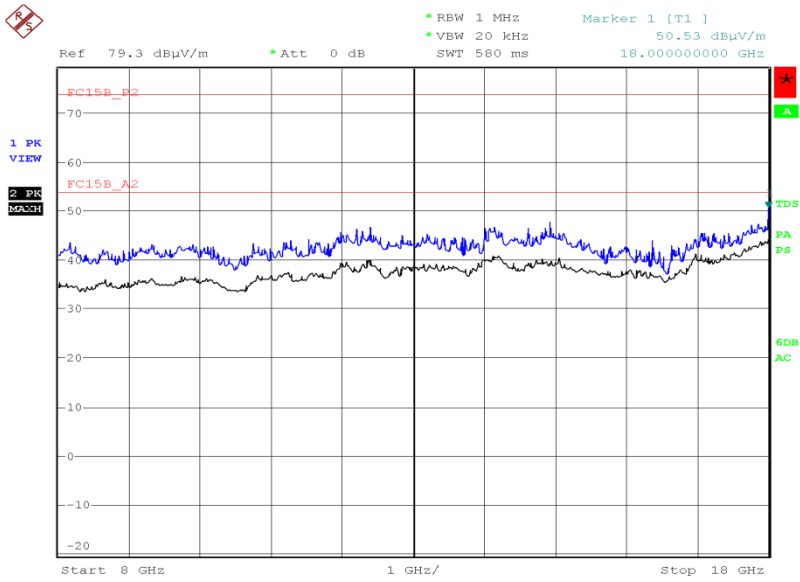


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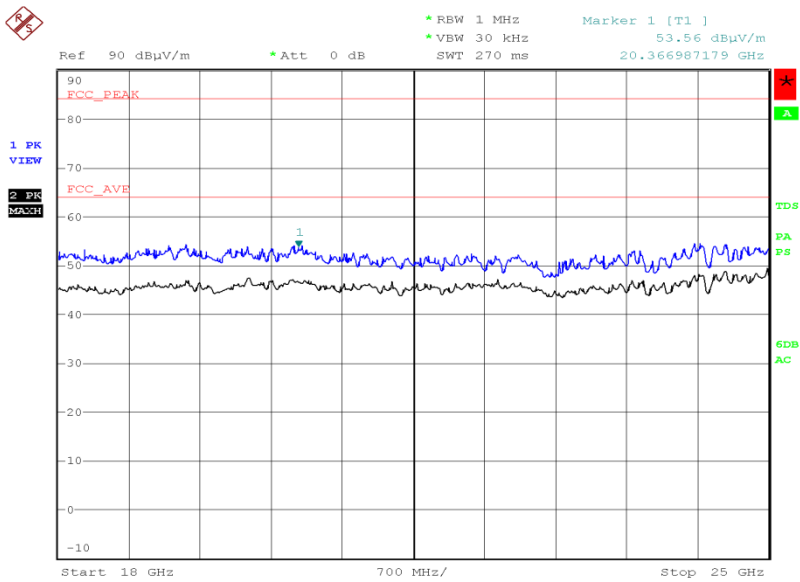
Product Service

8 GHz to 18 GHz



Date: 19.AUG.2013 18:44:37

18 GHz to 25 GHz



Date: 19.AUG.2013 20:51:49

Limit

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

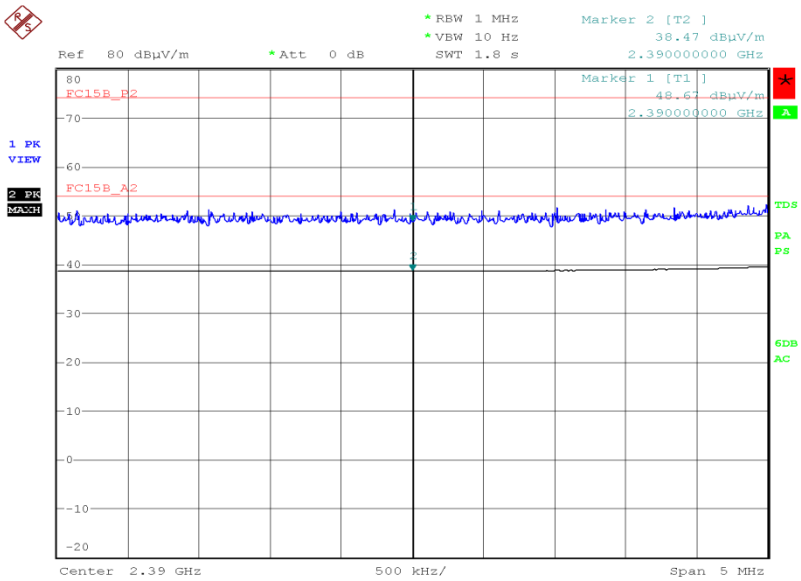


Product Service

Band Edge Emissions

2412 MHz

Polarisation	Final Peak (dBμV/m)	Final Average (dBμV/m)
Horizontal	48.67	38.47



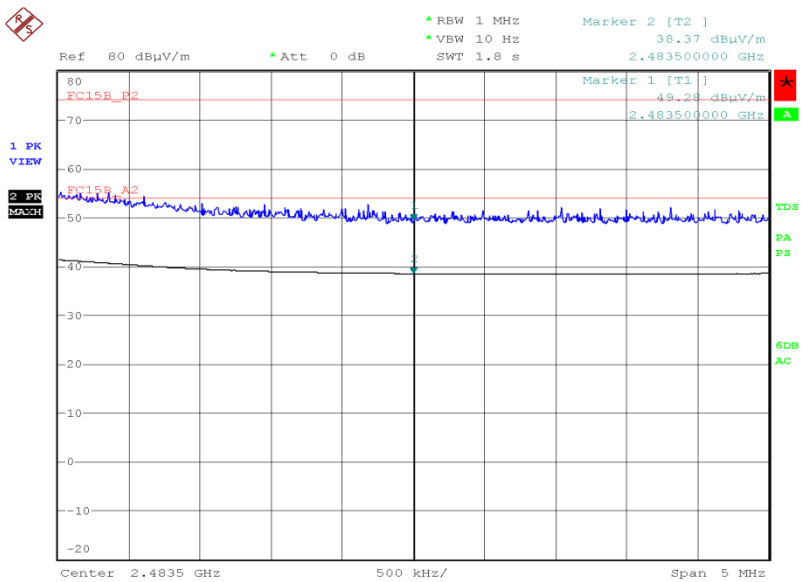
Date: 18.AUG.2013 08:23:29



Product Service

2462 MHz

Polarisation	Final Peak (dBµV/m)	Final Average (dBµV/m)
Horizontal	49.28	38.37



Date: 18.AUG.2013 09:40:06

Limit

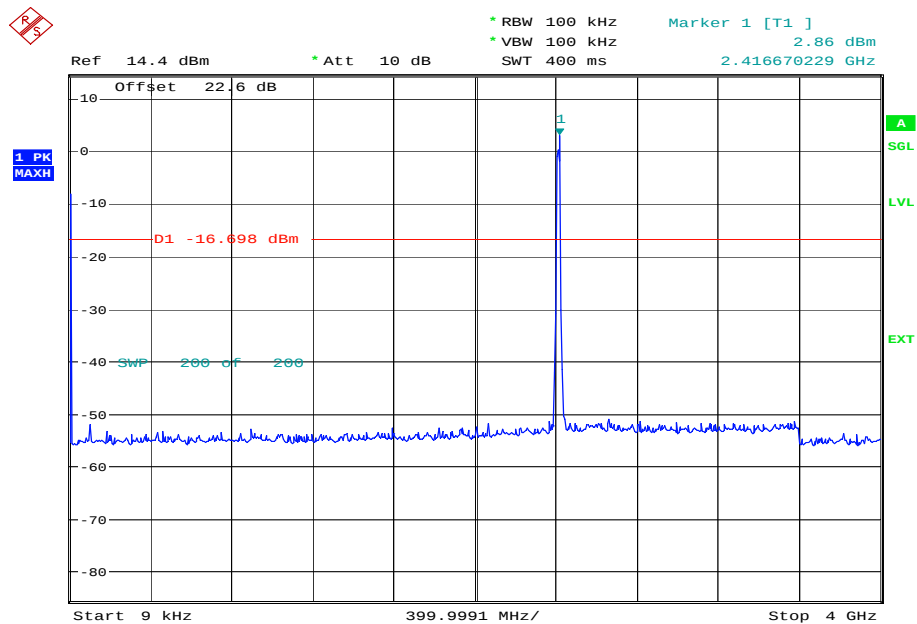
Peak (dBµV/m)	Average (dBµV/m)
74.0	54.0



Product Service

802.11(g)

3.8 V DC Supply

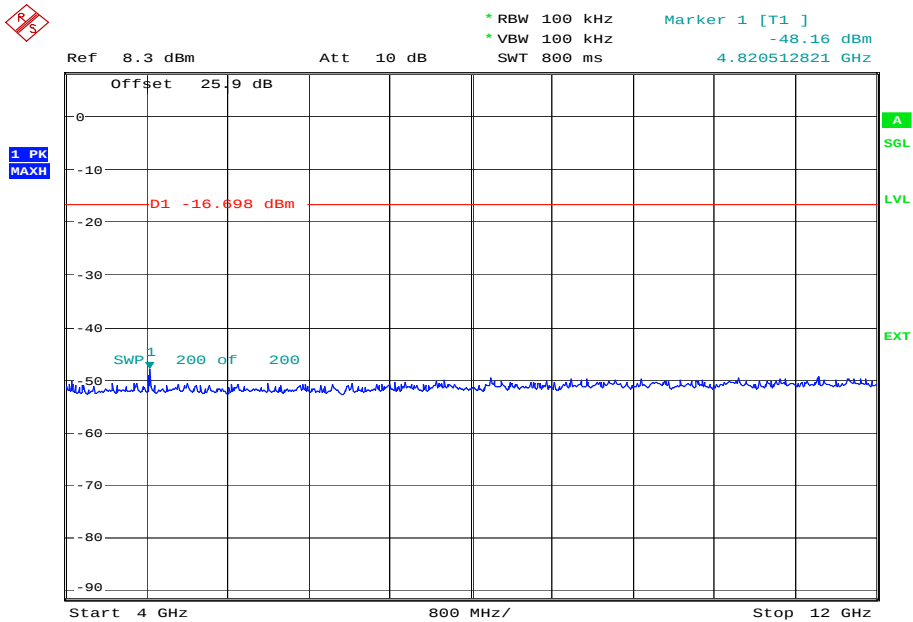
Spurious Conducted Emissions6 Mbps2412 MHz9 kHz to 4 GHz

Date: 7.AUG.2013 11:06:41



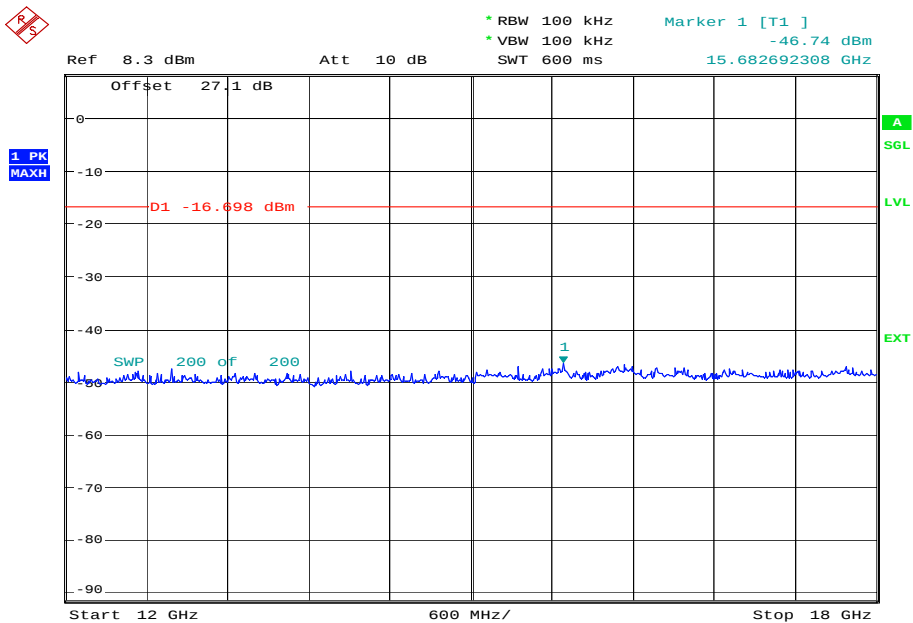
Product Service

4 GHz to 12 GHz



Date: 7.AUG.2013 11:10:50

12 GHz to 18 GHz

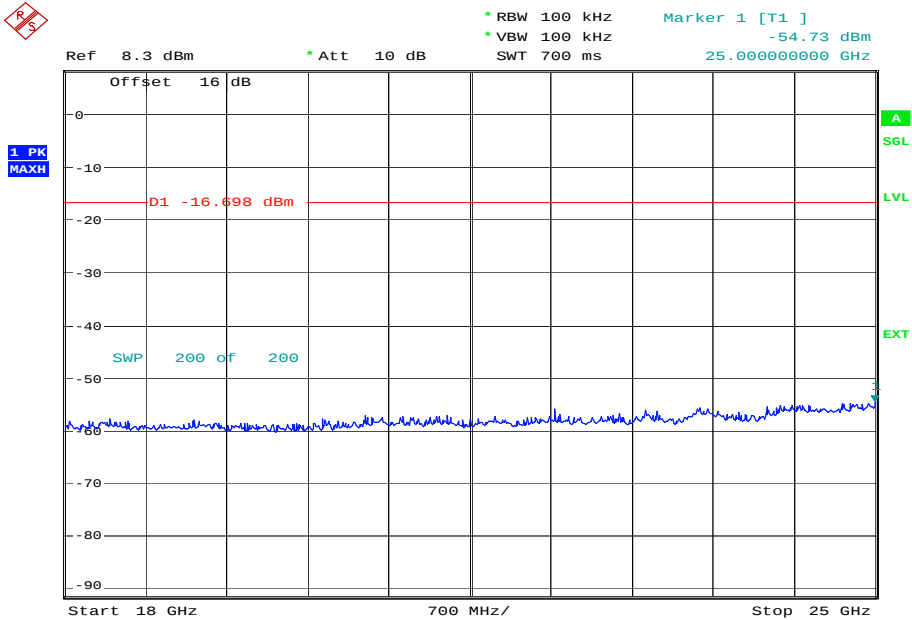


Date: 7.AUG.2013 11:13:24



Product Service

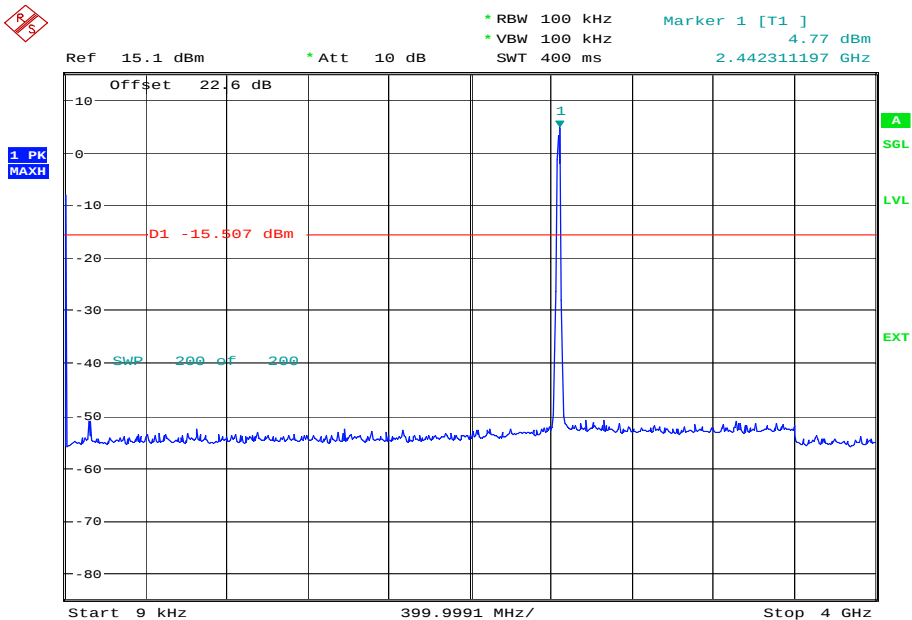
18 GHz to 25 GHz



Date: 7.AUG.2013 11:18:24

2437 MHz

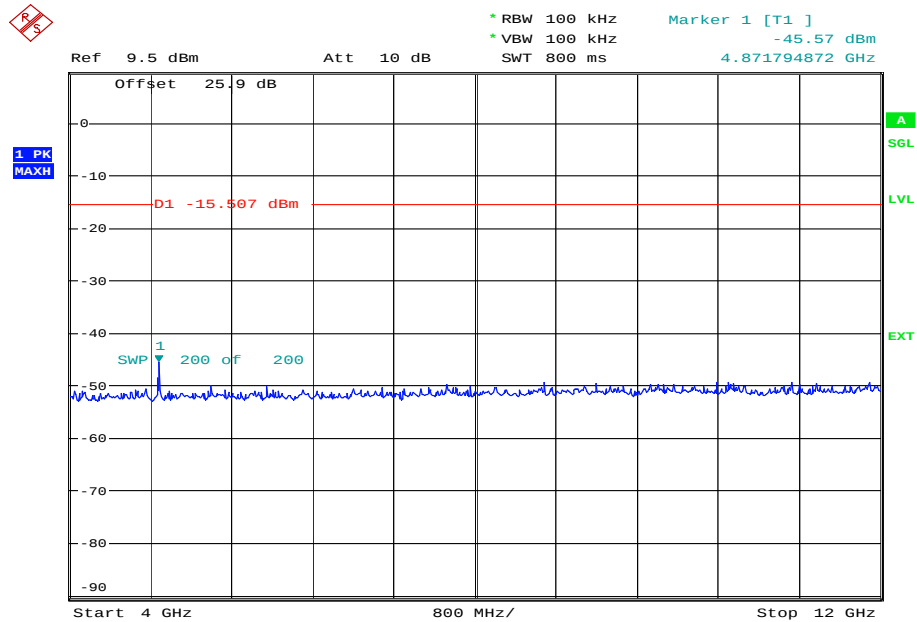
9 kHz to 4 GHz



Date: 7.AUG.2013 11:24:03

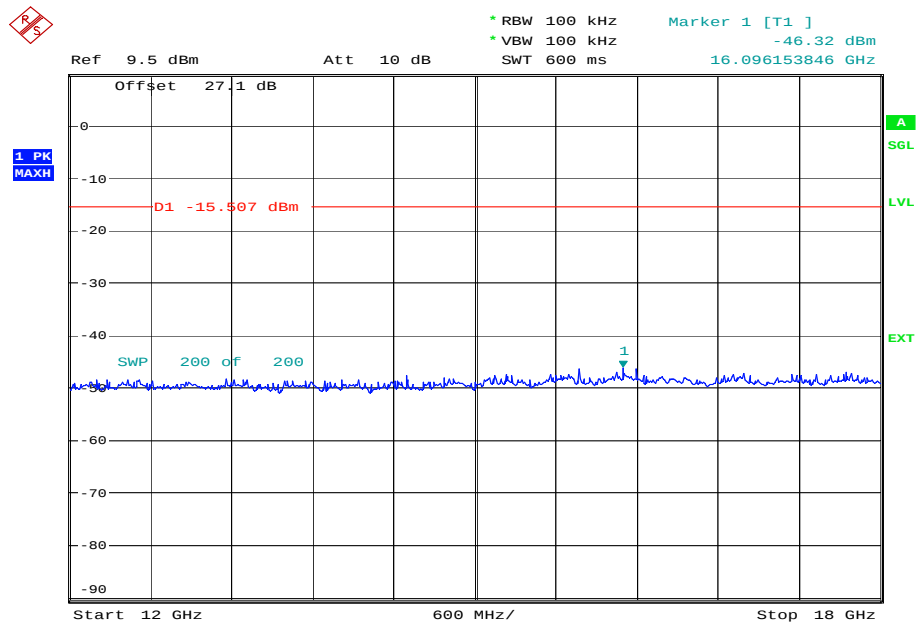


4 GHz to 12 GHz



Date: 7.AUG.2013 11:28:16

12 GHz to 18 GHz

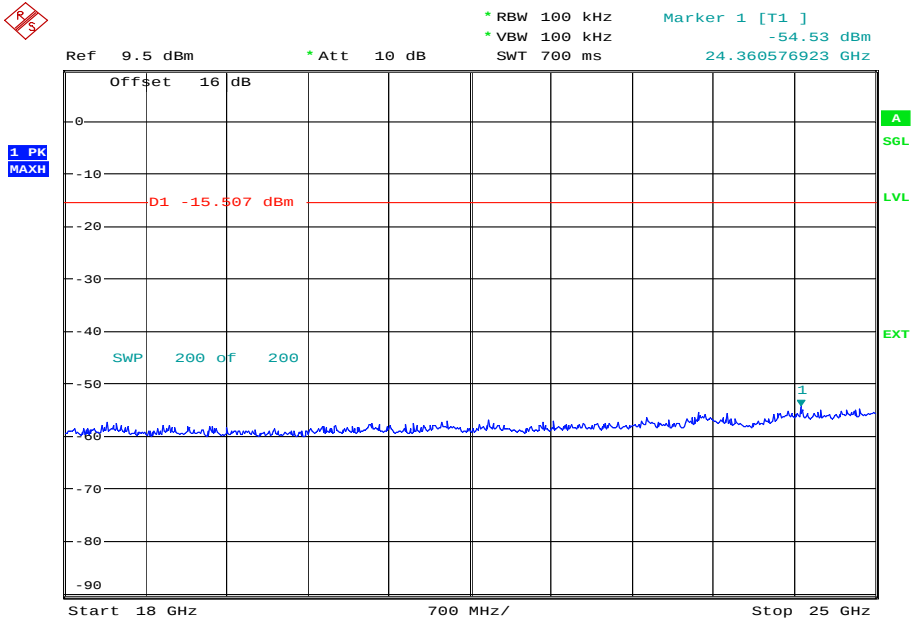


Date: 7.AUG.2013 11:31:02



Product Service

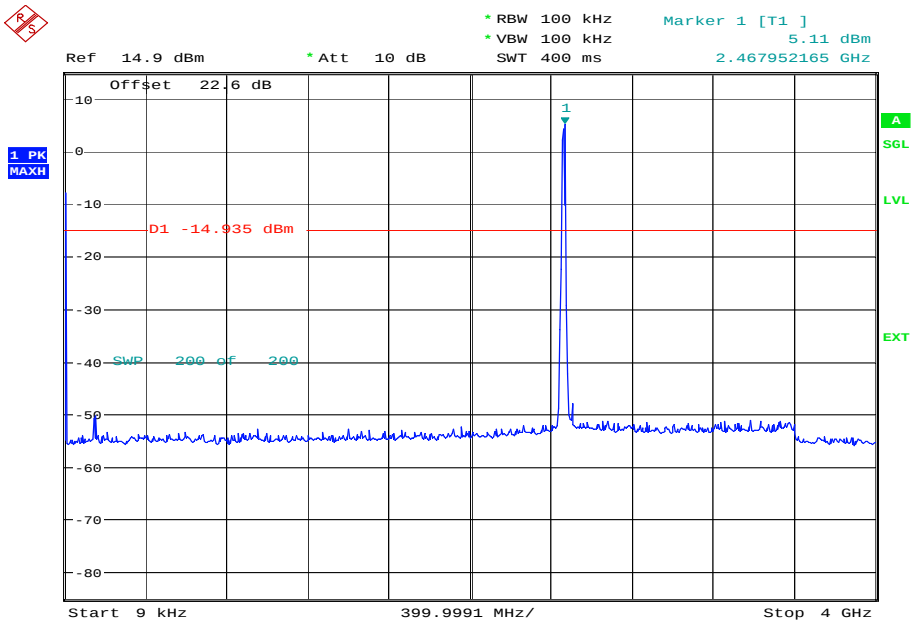
18 GHz to 25 GHz



Date: 7.AUG.2013 11:35:03

2462 MHz

9 kHz to 4 GHz

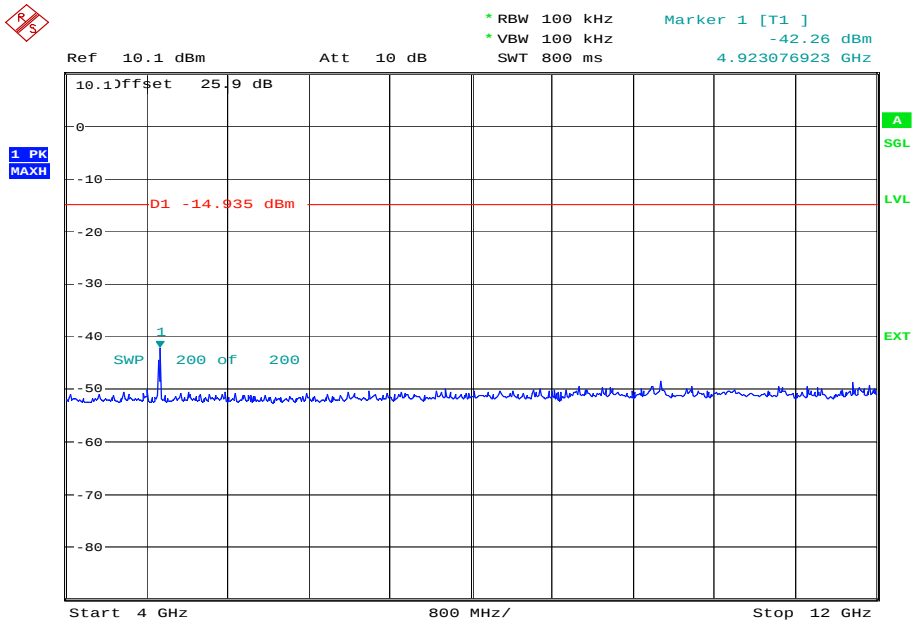


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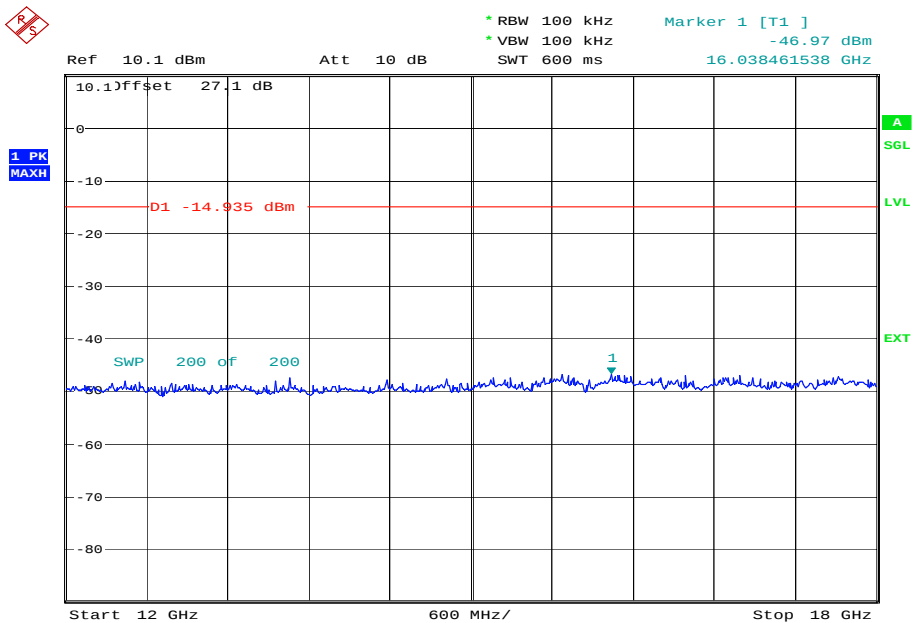
Product Service

4 GHz to 12 GHz



Date: 7.AUG.2013 11:46:28

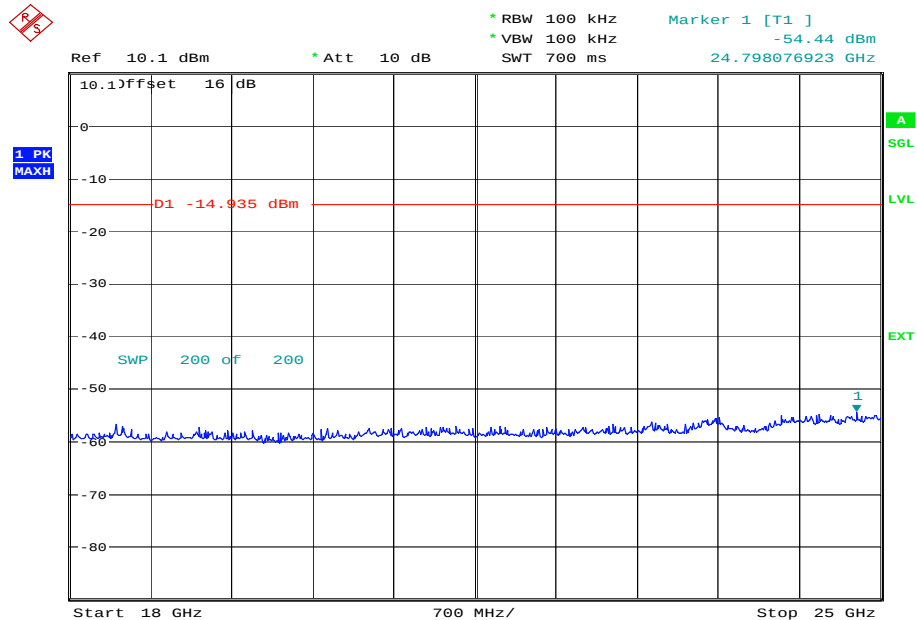
12 GHz to 18 GHz



Date: 7.AUG.2013 11:50:01



Product Service

18 GHz to 25 GHz

Date: 7.AUG.2013 11:53:57

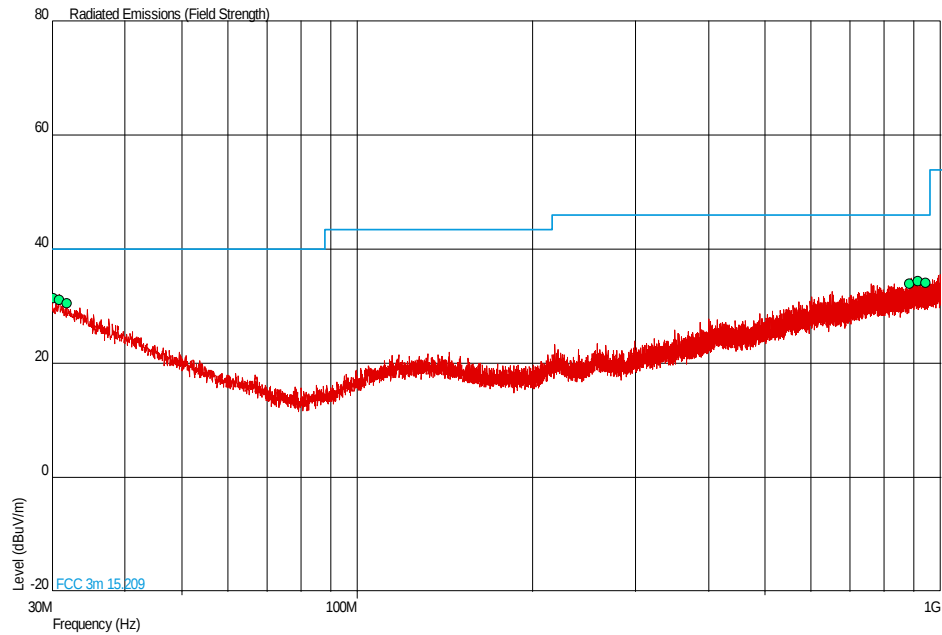
Limit Clause

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.



Product Service

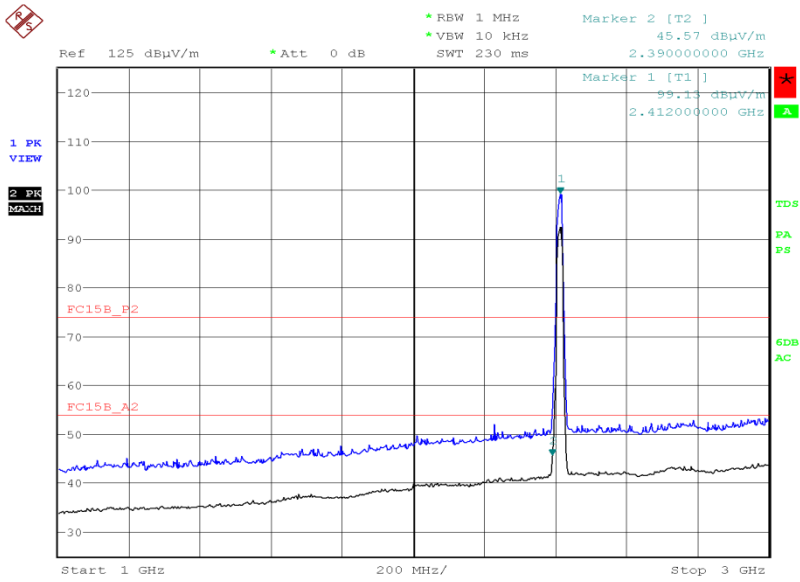
Spurious Radiated Emissions2412 MHz30 MHz to 1 GHz

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
30.194	31.4	37.2	40.0	100	-8.6	62.8	0	1.00	Vertical
30.825	31.2	36.3	40.0	100	-8.8	63.7	0	1.00	Vertical
31.843	30.5	33.5	40.0	100	-9.5	66.5	0	1.00	Horizontal
885.977	34.0	50.1	46.0	200	-12.0	149.9	0	1.00	Horizontal
914.689	34.4	52.5	46.0	200	-11.6	147.5	0	1.00	Horizontal
944.322	34.2	51.3	46.0	200	-11.8	148.7	0	1.00	Horizontal



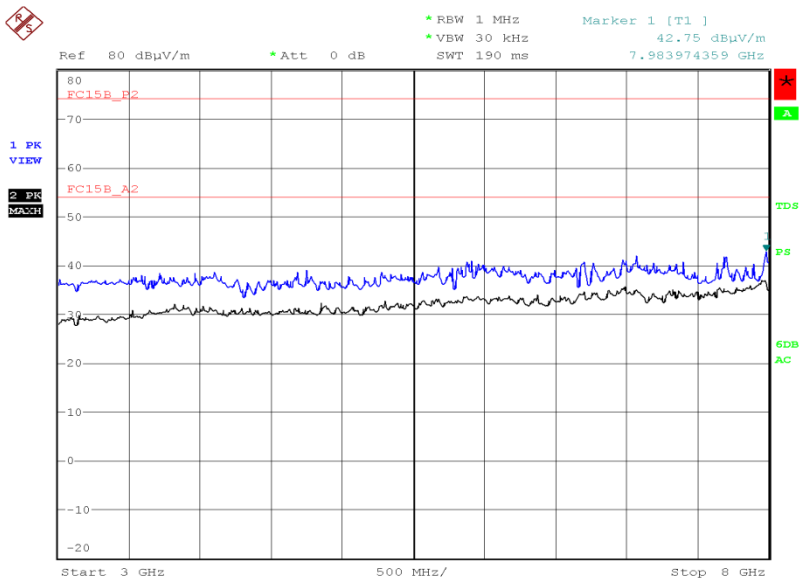
Product Service

1 GHz to 3 GHz



Date: 18.AUG.2013 11:00:36

3 GHz to 8 GHz

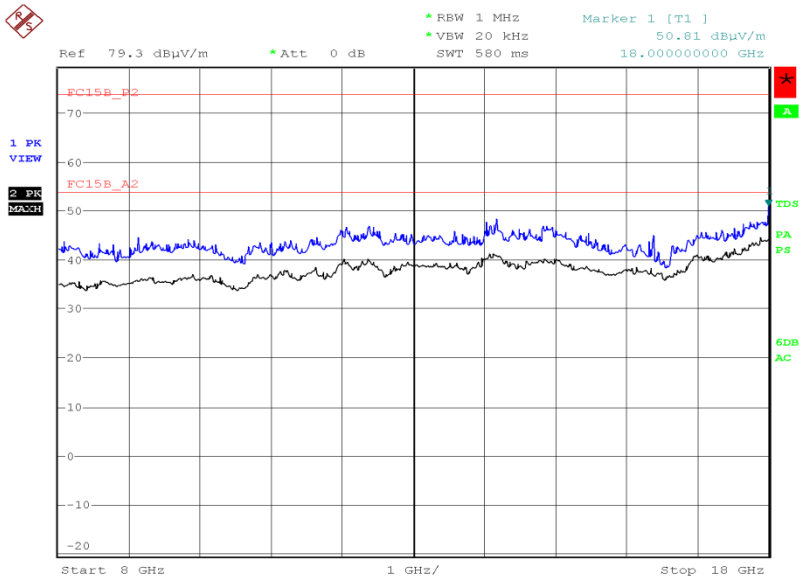


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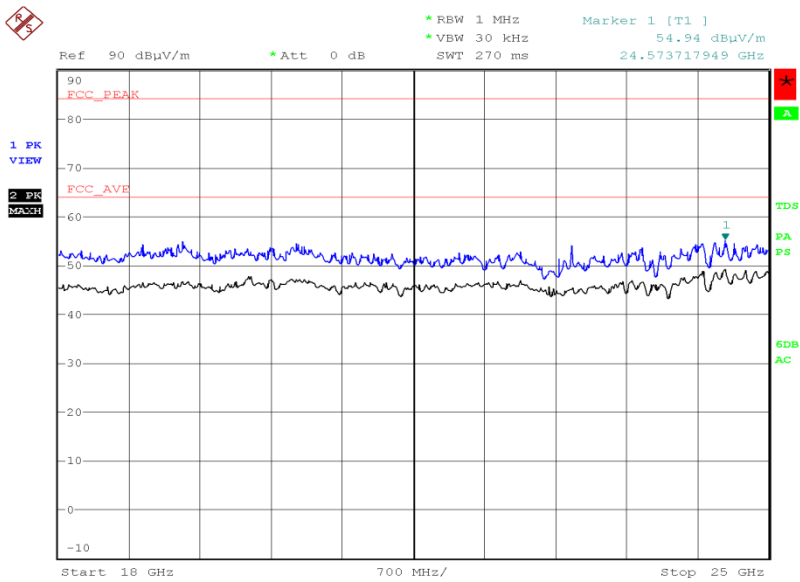
Product Service

8 GHz to 18 GHz



Date: 19.AUG.2013 18:57:19

18 GHz to 25 GHz



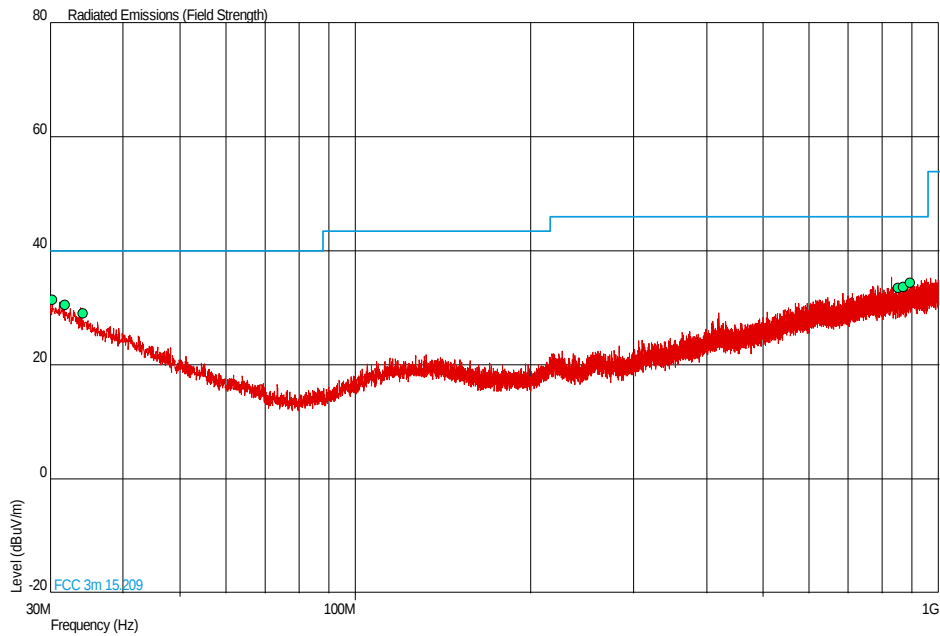
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Product Service

2437 MHz

30 MHz to 1 GHz

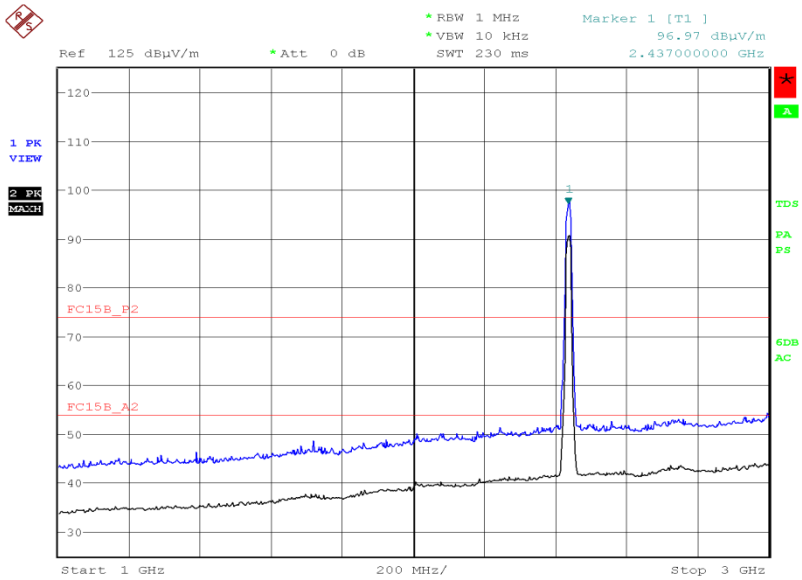


Frequency (MHz)	QP Level (dBµV/m)	QP Level (µV/m)	QP Limit (dBµV/m)	QP Limit (µV/m)	QP Margin (dBµV/m)	QP Margin (µV/m)	Angle (Deg)	Height (m)	Polarity
30.243	31.4	37.2	40.0	100	-8.6	62.8	0	1.00	Horizontal
31.843	30.6	33.9	40.0	100	-9.4	66.1	0	1.00	Horizontal
34.171	29.0	28.2	40.0	100	-11.0	71.8	0	1.00	Horizontal
851.930	33.6	47.9	46.0	200	-12.4	152.1	0	1.00	Horizontal
870.554	33.6	47.9	46.0	200	-12.4	152.1	0	1.00	Horizontal
893.688	34.3	51.9	46.0	200	-11.7	148.1	0	1.00	Vertical



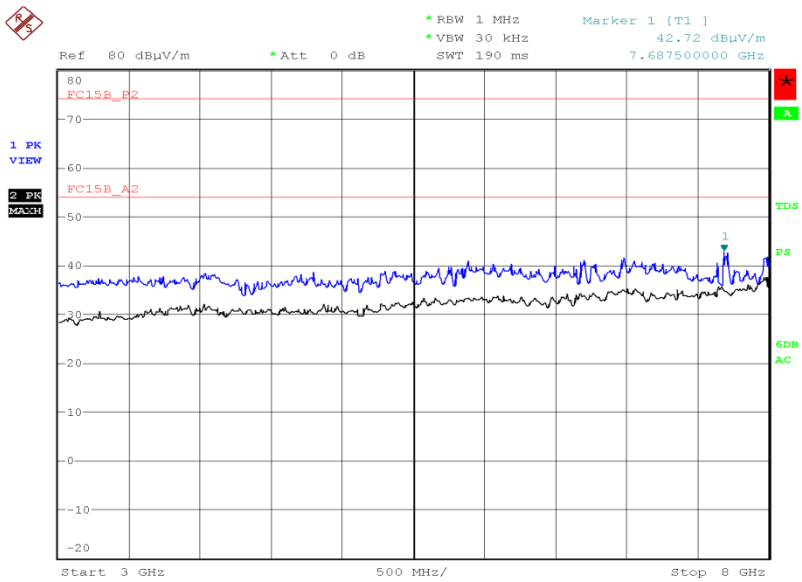
Product Service

1 GHz to 3 GHz



Date: 18.AUG.2013 11:07:29

3 GHz to 8 GHz

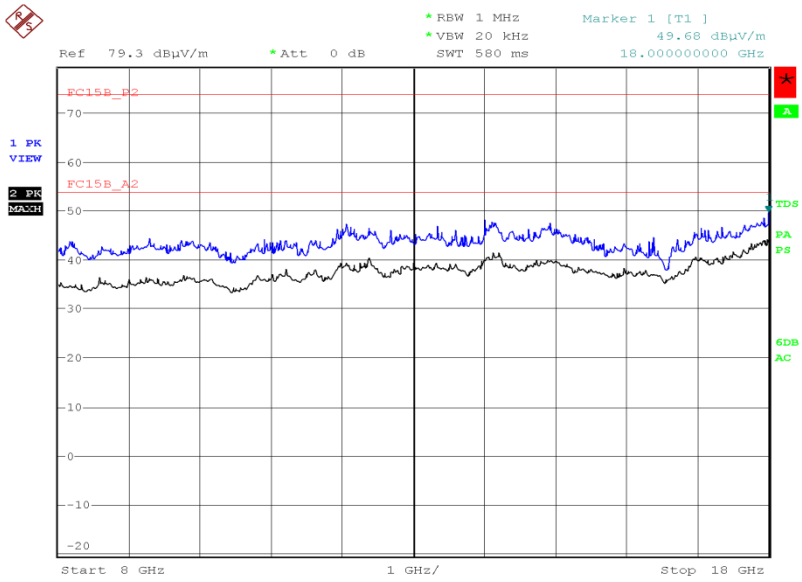


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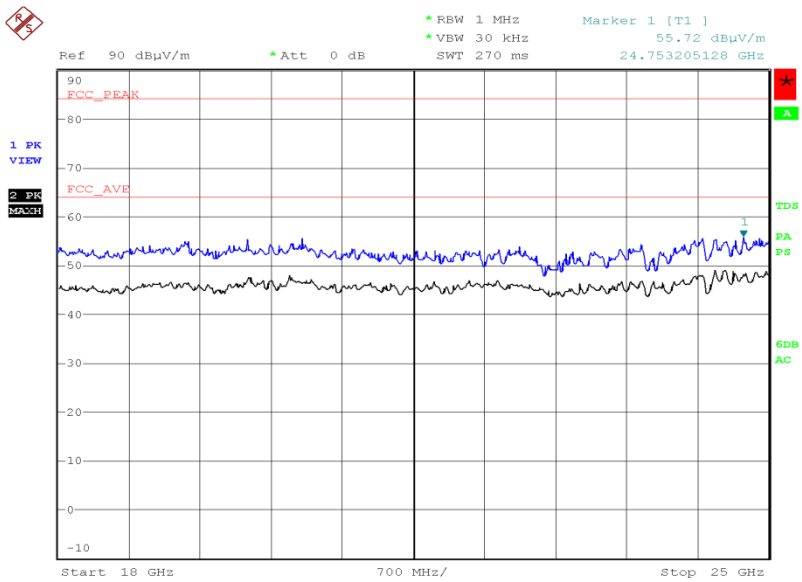
Product Service

8 GHz to 18 GHz



Date: 19.AUG.2013 19:15:36

18 GHz to 25 GHz



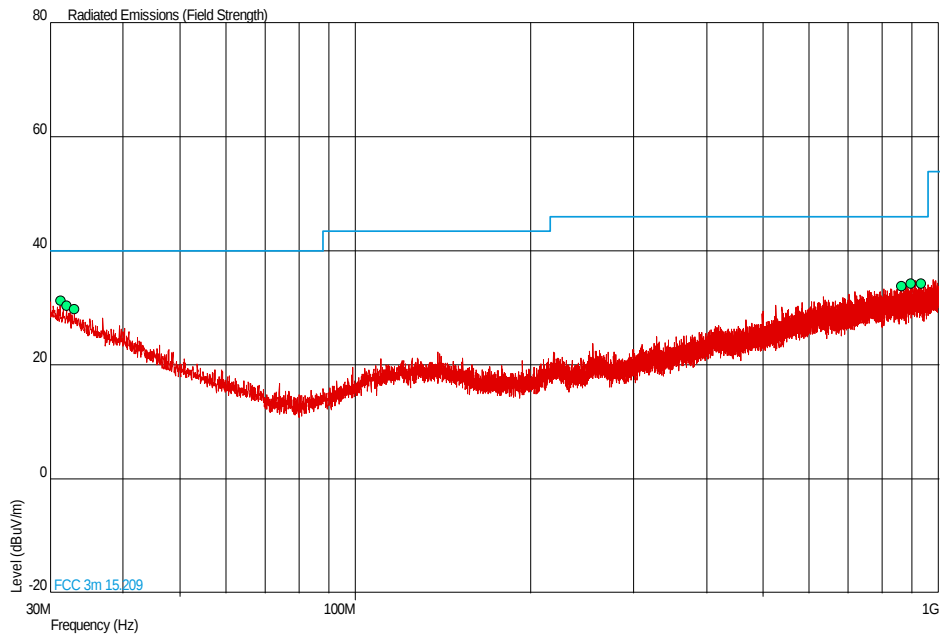
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Product Service

2462 MHz

30 MHz to 1 GHz

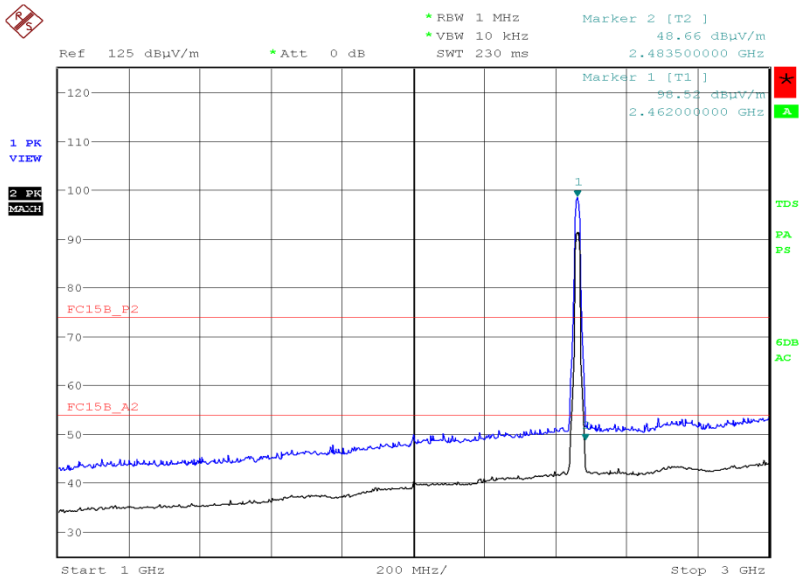


Frequency (MHz)	QP Level (dBµV/m)	QP Level (µV/m)	QP Limit (dBµV/m)	QP Limit (µV/m)	QP Margin (dBµV/m)	QP Margin (µV/m)	Angle (Deg)	Height (m)	Polarity
31.261	31.3	36.7	40.0	100	-8.7	63.3	0	1.00	Vertical
32.037	30.4	33.1	40.0	100	-9.6	66.9	0	1.00	Vertical
33.056	29.8	30.9	40.0	100	-10.2	69.1	0	1.00	Vertical
864.976	33.8	49.0	46.0	200	-12.2	151.0	0	1.00	Vertical
897.908	34.3	51.9	46.0	200	-11.7	148.1	0	1.00	Vertical
934.865	34.2	51.3	46.0	200	-11.8	148.7	0	1.00	Vertical



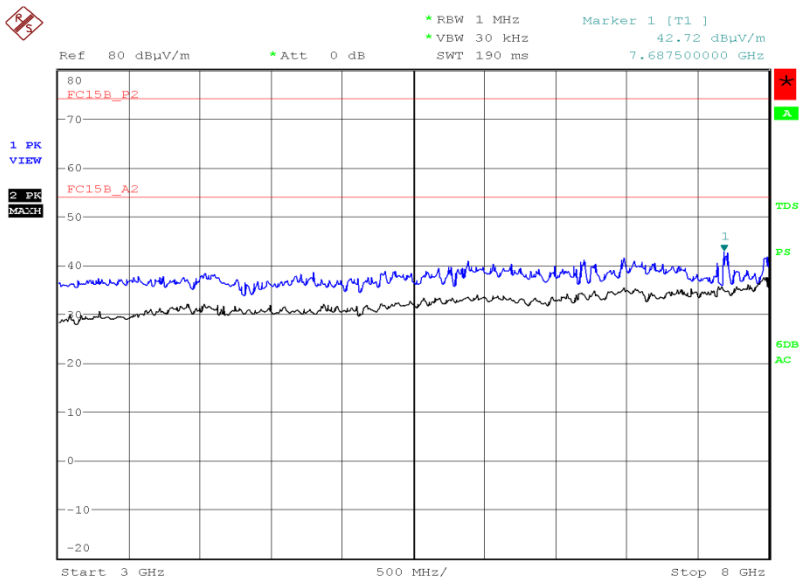
Product Service

1 GHz to 3 GHz



Date: 18.AUG.2013 11:59:19

3 GHz to 8 GHz

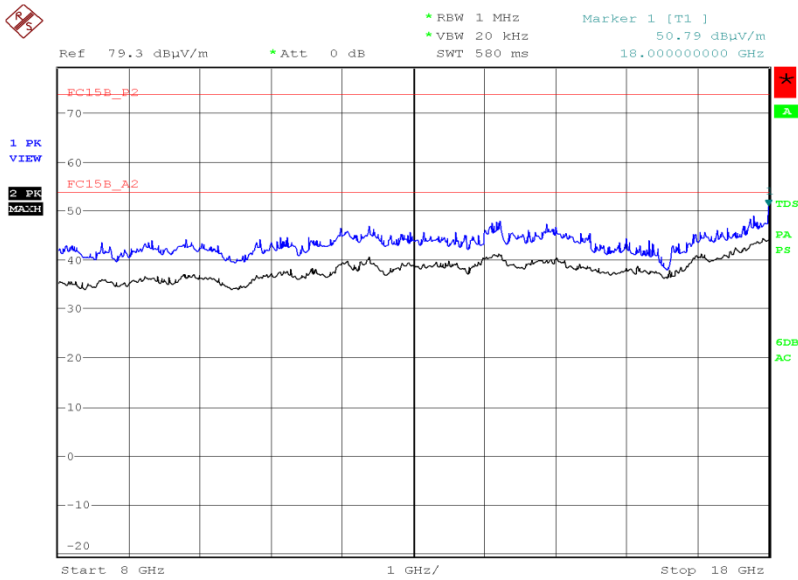


Date: 19.AUG.2013 17:25:21



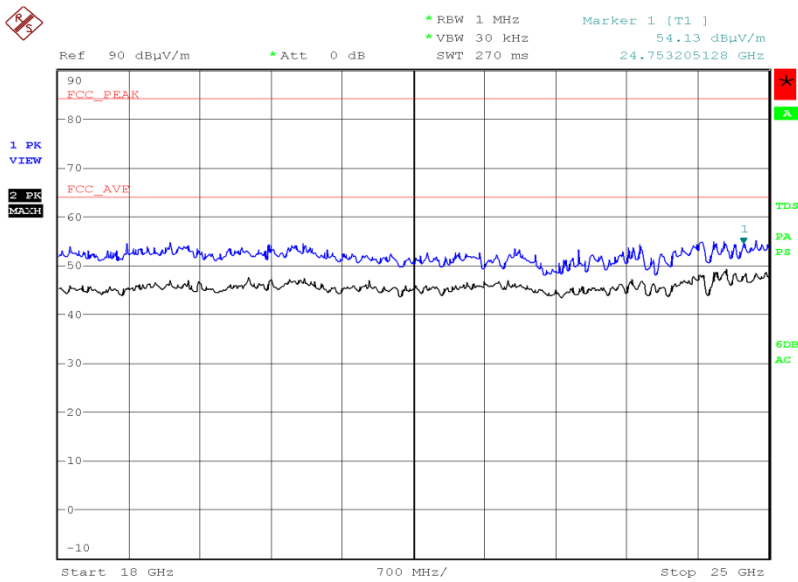
Product Service

8 GHz to 18 GHz



Date: 19.AUG.2013 19:30:49

18 GHz to 25 GHz



Date: 19.AUG.2013 21:08:53

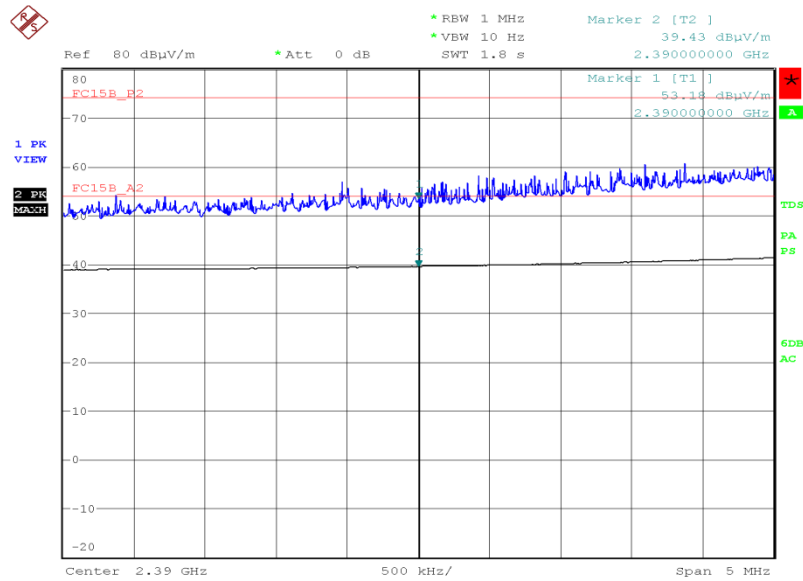
Limit

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	53.18	39.43



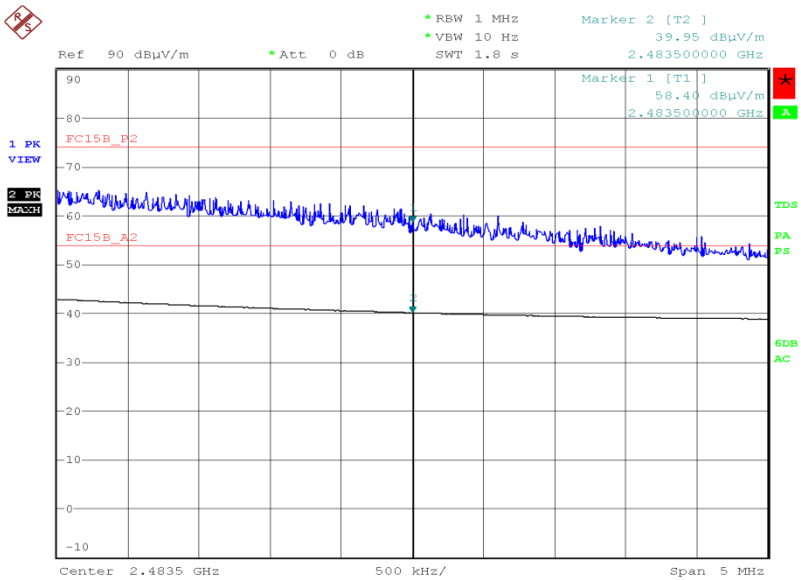
Date: 18.AUG.2013 10:51:39



Product Service

2462 MHz

Polarisation	Final Peak (dBµV/m)	Final Average (dBµV/m)
Horizontal	58.40	39.95



Date: 18.AUG.2013 12:06:39

Limit

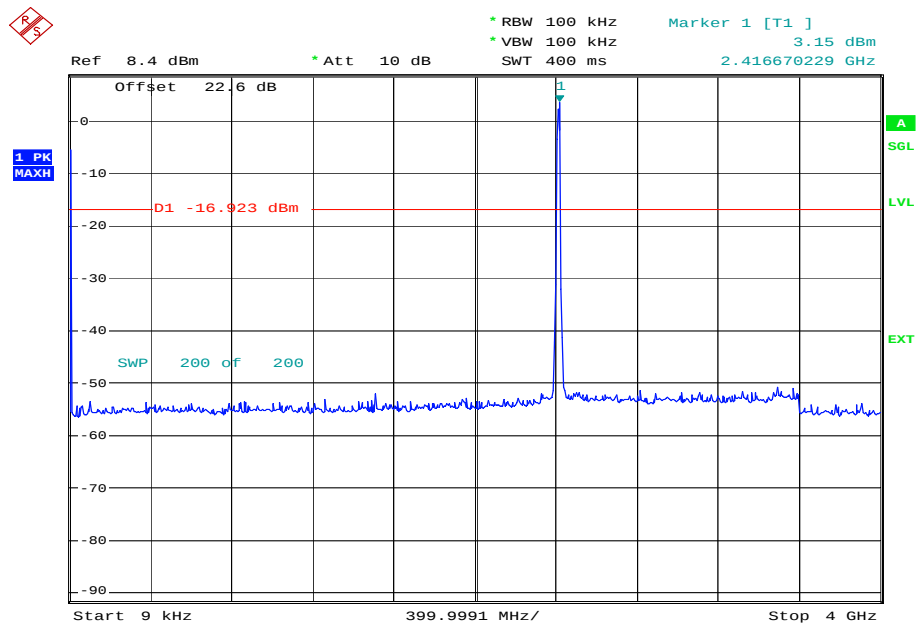
Peak (dBµV/m)	Average (dBµV/m)
74.0	54.0



Product Service

802.11(n)

3.8 V DC Supply

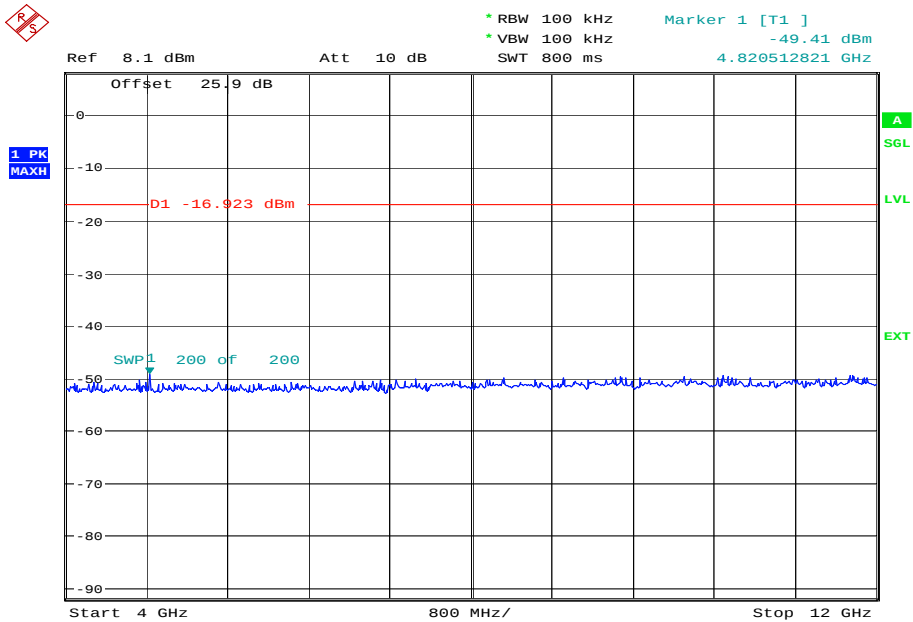
Spurious Conducted Emissions13 Mbps2412 MHz9 kHz to 4 GHz

Date: 7.AUG.2013 15:33:55



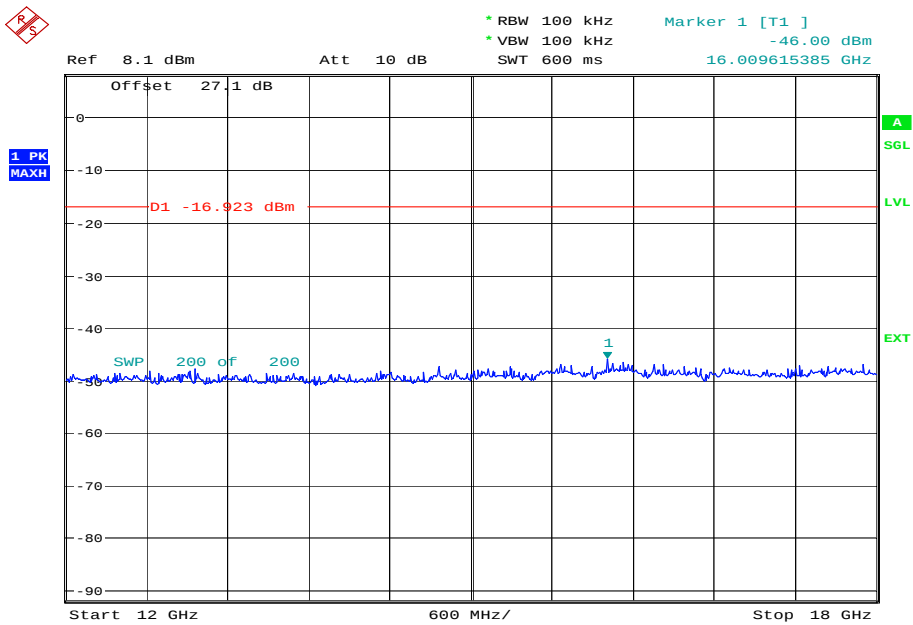
Product Service

4 GHz to 12 GHz



Date: 7.AUG.2013 15:44:29

12 GHz to 18 GHz

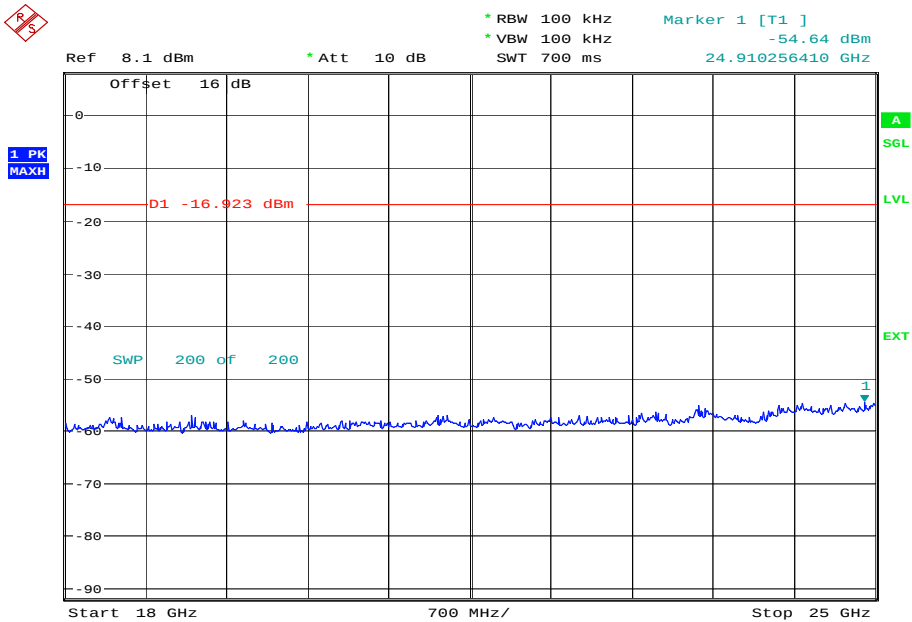


Date: 7.AUG.2013 15:47:18



Product Service

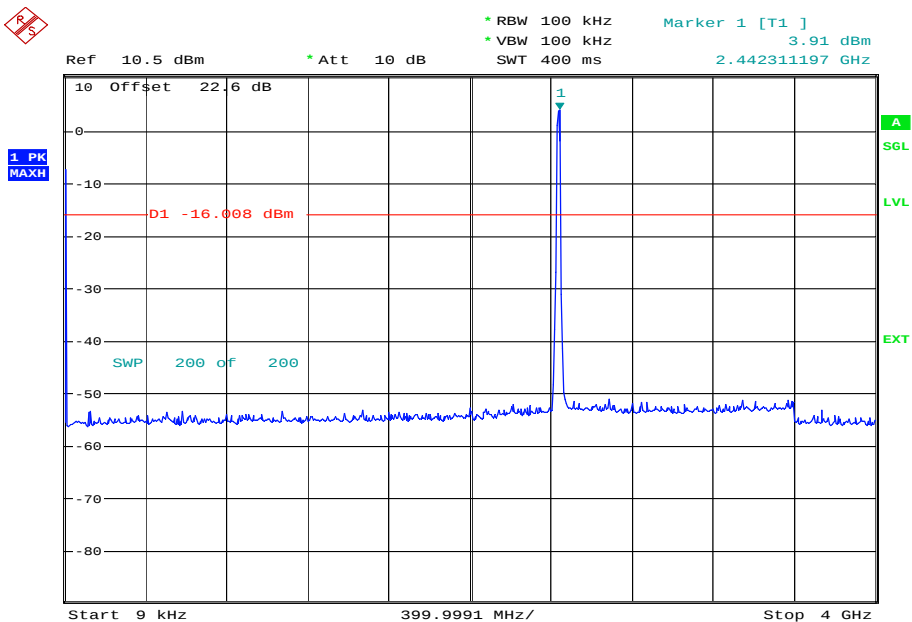
18 GHz to 25 GHz



Date: 7.AUG.2013 15:50:59

2437 MHz

9 kHz to 4 GHz

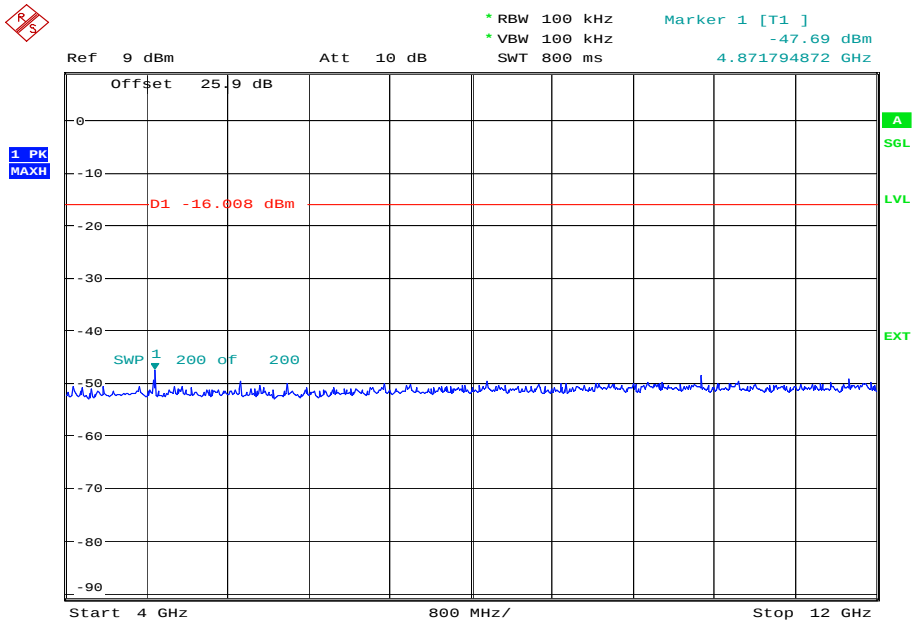


Date: 7.AUG.2013 15:54:23



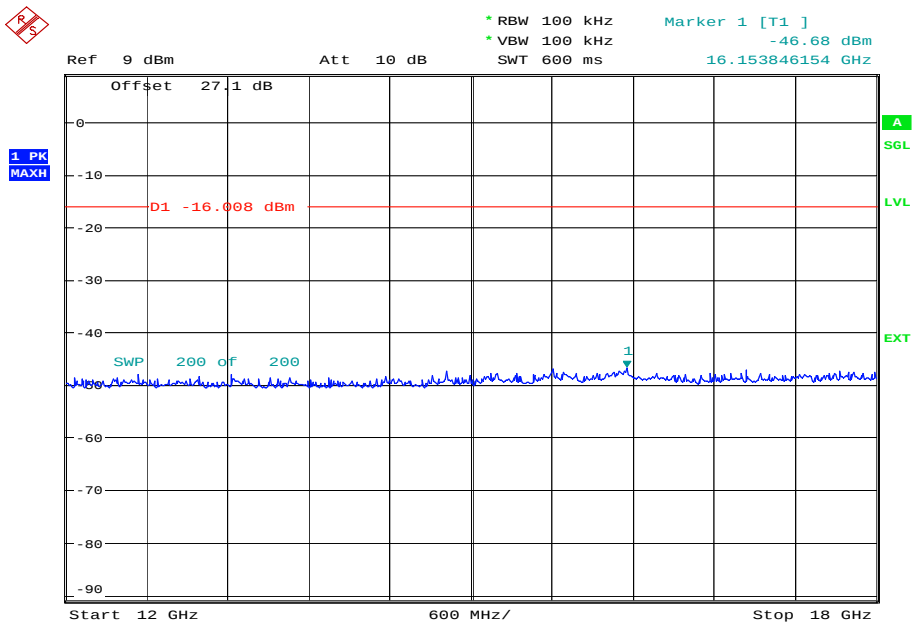
Product Service

4 GHz to 12 GHz



Date: 7.AUG.2013 15:57:57

12 GHz to 18 GHz

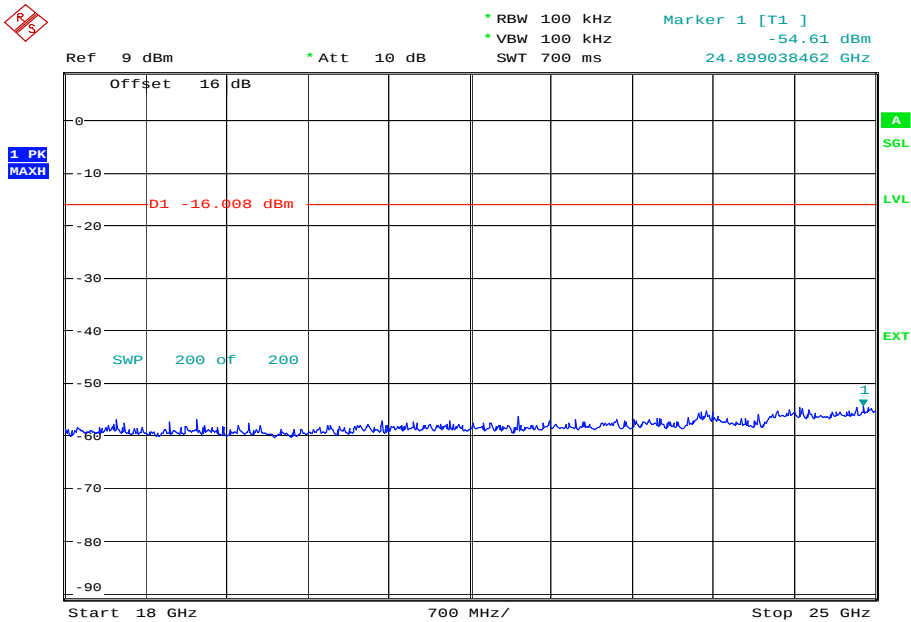


Date: 7.AUG.2013 16:00:25



Product Service

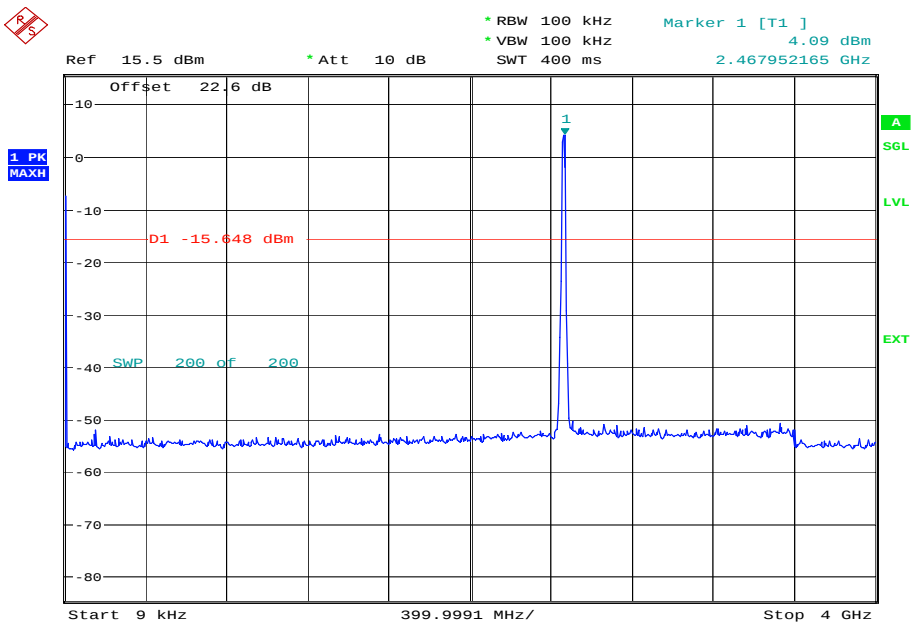
18 GHz to 25 GHz



Date: 7.AUG.2013 16:03:43

2462 MHz

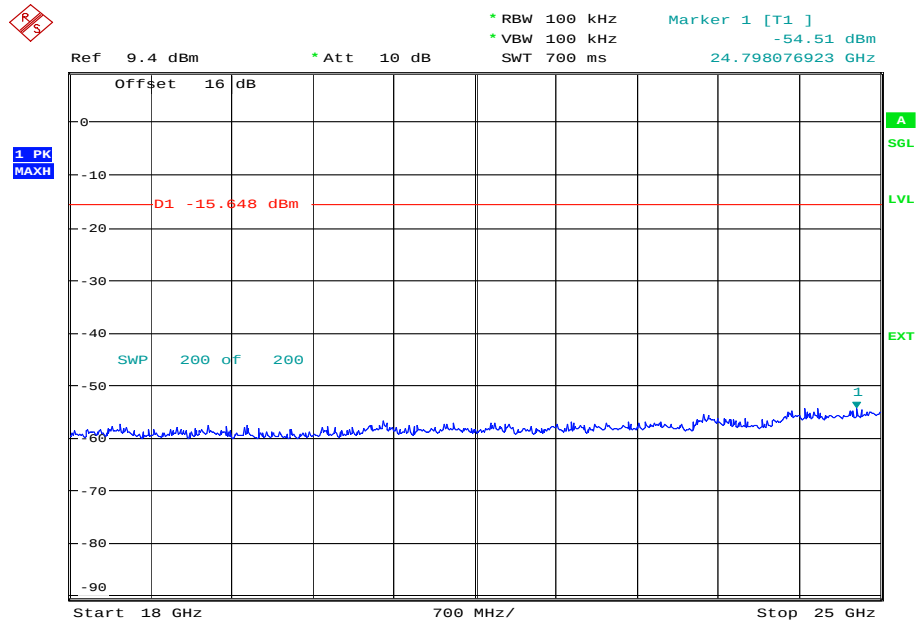
9 kHz to 4 GHz



Date: 7.AUG.2013 16:07:03



Product Service

18 GHz to 25 GHz

Date: 7.AUG.2013 16:16:16

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.

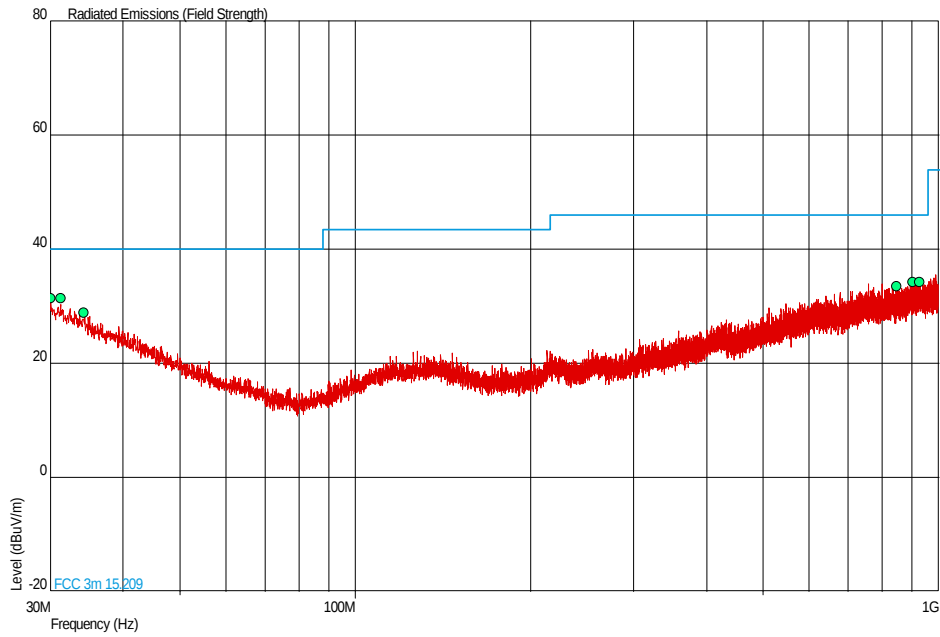


Product Service

Spurious Radiated Emissions

2412 MHz

30 MHz to 1 GHz

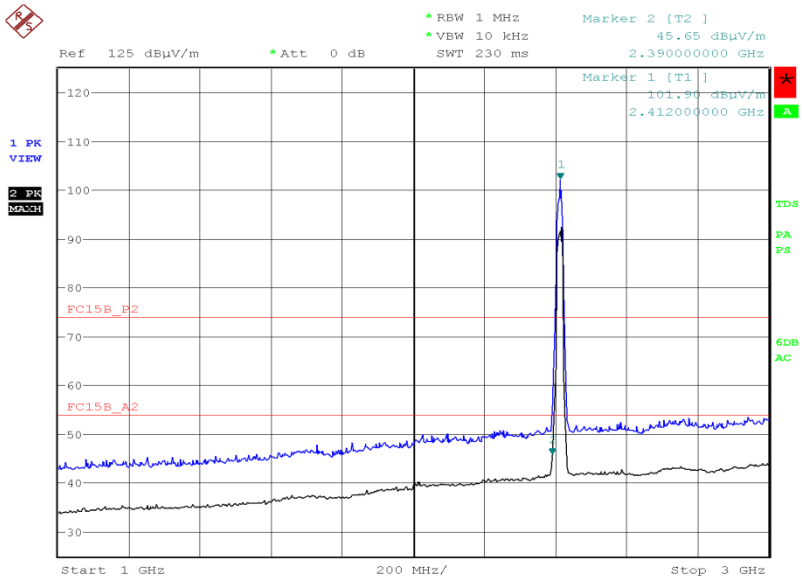


Frequency (MHz)	QP Level (dBμV/m)	QP Level (μV/m)	QP Limit (dBμV/m)	QP Limit (μV/m)	QP Margin (dBμV/m)	QP Margin (μV/m)	Angle (Deg)	Height (m)	Polarity
30.097	31.4	37.2	40.0	100	-8.6	62.8	0	1.00	Vertical
31.261	31.4	37.2	40.0	100	-8.6	62.8	0	1.00	Vertical
34.268	29.0	28.2	40.0	100	-11.0	71.8	0	1.00	Vertical
847.613	33.4	46.8	46.0	200	-12.6	153.2	0	1.00	Vertical
903.097	34.3	51.9	46.0	200	-11.7	148.1	0	1.00	Vertical
926.717	34.3	51.9	46.0	200	-11.7	148.1	0	1.00	Vertical



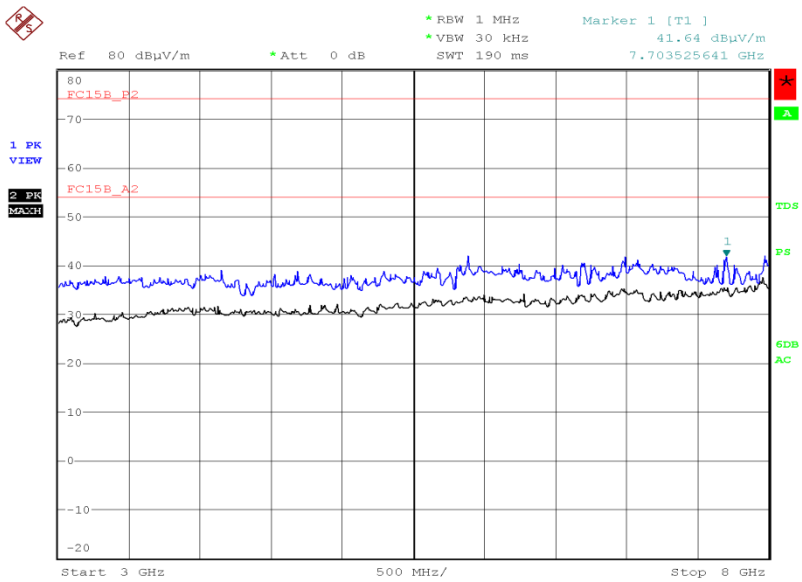
Product Service

1 GHz to 3 GHz



Date: 18.AUG.2013 12:31:56

3 GHz to 8 GHz

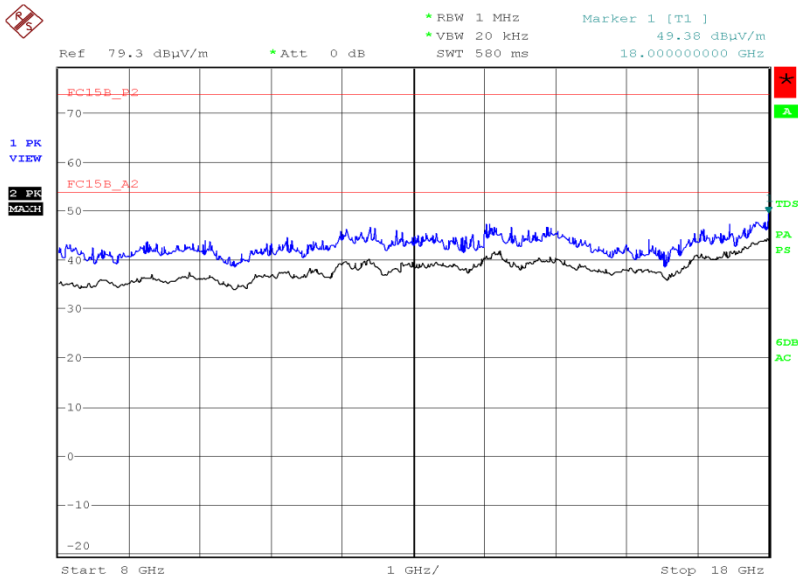


Date: 19.AUG.2013 17:36:45



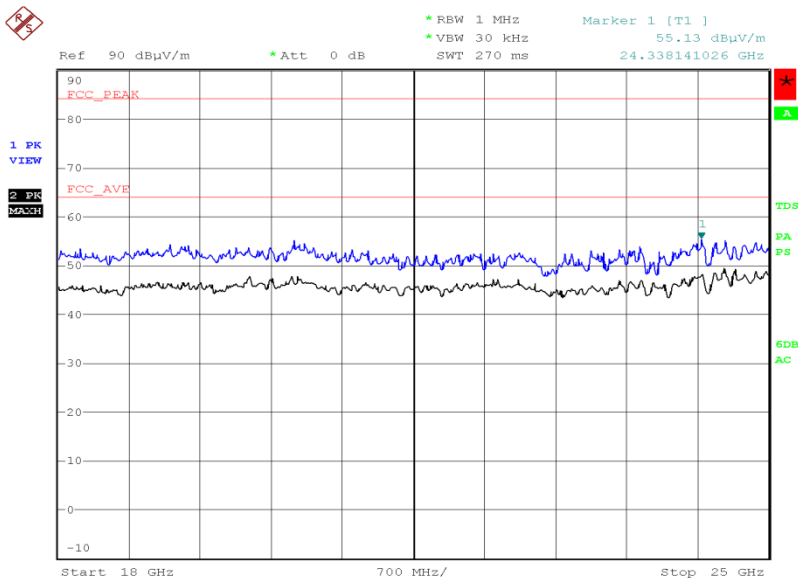
Product Service

8 GHz to 18 GHz



Date: 19.AUG.2013 19:45:12

18 GHz to 25 GHz



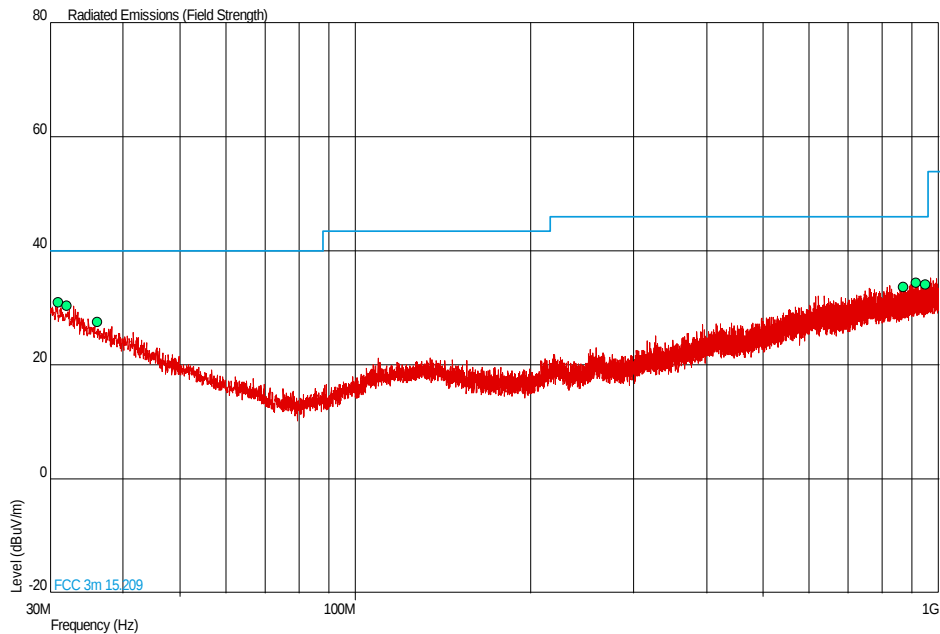
Date: 19.AUG.2013 21:30:55



Product Service

2437 MHz

30 MHz to 1 GHz

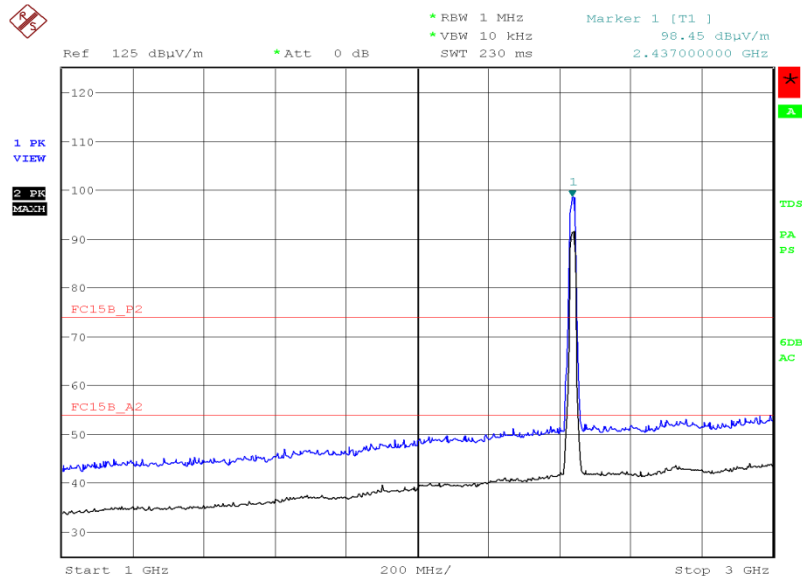


Frequency (MHz)	QP Level (dBµV/m)	QP Level (µV/m)	QP Limit (dBµV/m)	QP Limit (µV/m)	QP Margin (dBµV/m)	QP Margin (µV/m)	Angle (Deg)	Height (m)	Polarity
31.019	31.0	35.5	40.0	100	-9.0	64.5	0	1.00	Vertical
31.989	30.4	33.1	40.0	100	-9.6	66.9	0	1.00	Vertical
36.093	27.6	24.0	40.0	100	-12.4	76.0	0	1.00	Vertical
869.244	33.6	47.9	46.0	200	-12.4	152.1	0	1.00	Vertical
914.980	34.4	52.5	46.0	200	-11.6	147.5	0	1.00	Vertical
950.773	34.1	50.7	46.0	200	-11.9	149.3	0	1.00	Vertical



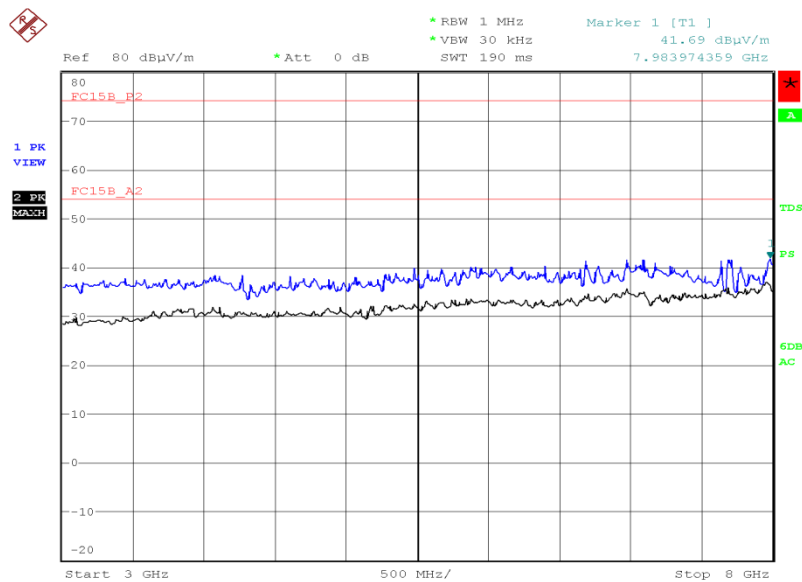
Product Service

1 GHz to 3 GHz



Date: 18.AUG.2013 12:36:42

3 GHz to 8 GHz

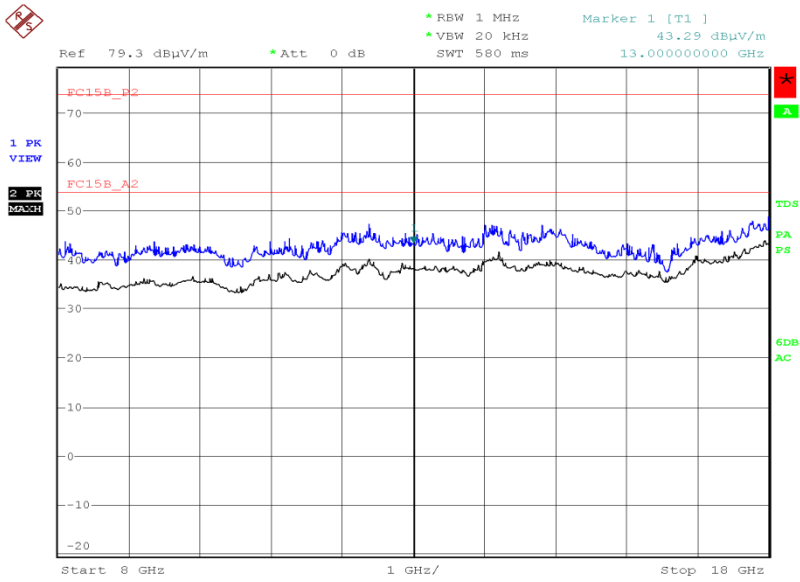


Date: 19.AUG.2013 17:42:10



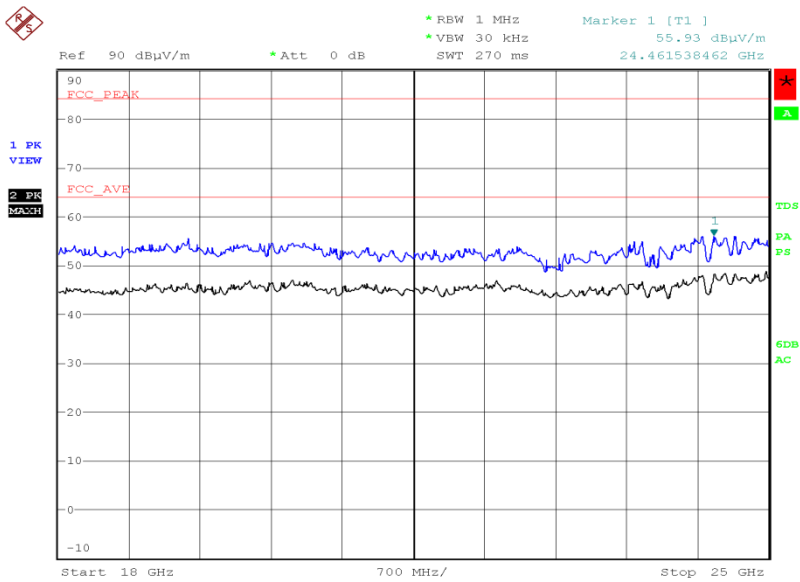
Product Service

8 GHz to 18 GHz



Date: 19.AUG.2013 19:54:09

18 GHz to 25 GHz



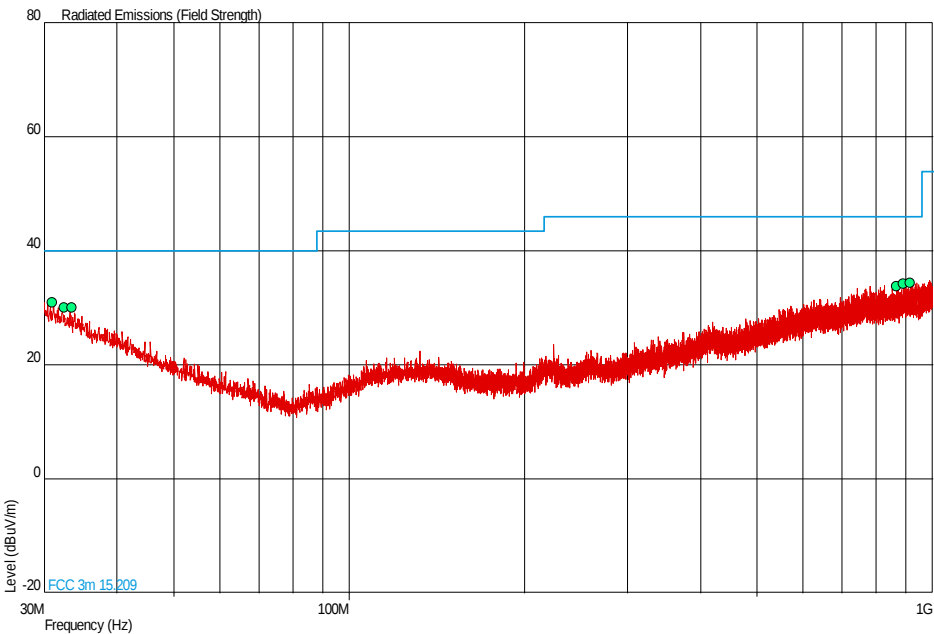
Date: 19.AUG.2013 21:39:54



Product Service

2462 MHz

30 MHz to 1 GHz

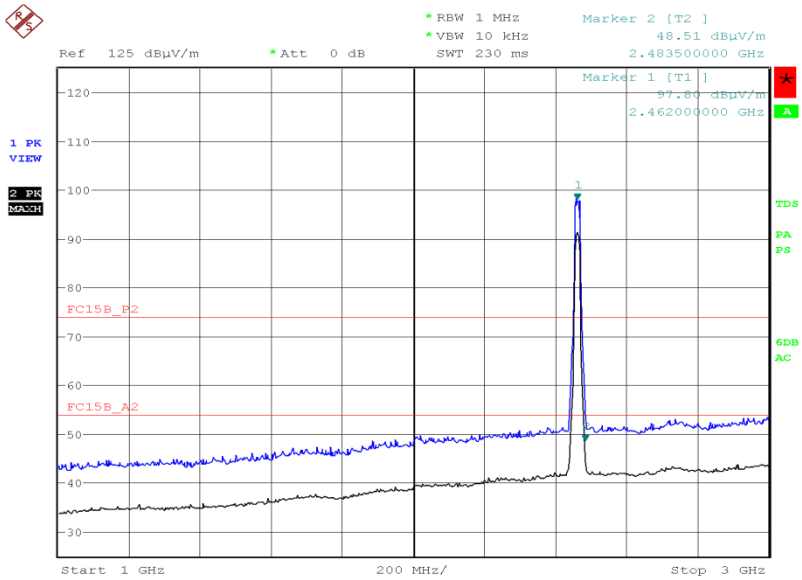


Frequency (MHz)	QP Level (dBµV/m)	QP Level (µV/m)	QP Limit (dBµV/m)	QP Limit (µV/m)	QP Margin (dBµV/m)	QP Margin (µV/m)	Angle (Deg)	Height (m)	Polarity
31.019	31.0	35.5	40.0	100	-9.0	64.5	0	1.00	Vertical
32.474	30.1	32.0	40.0	100	-9.9	68.0	0	1.00	Vertical
33.444	30.0	31.6	40.0	100	-10.0	68.4	0	1.00	Vertical
865.801	33.8	49.0	46.0	200	-12.2	151.0	0	1.00	Vertical
890.245	34.2	51.3	46.0	200	-11.8	148.7	0	1.00	Vertical
915.659	34.3	51.9	46.0	200	-11.7	148.1	0	1.00	Vertical



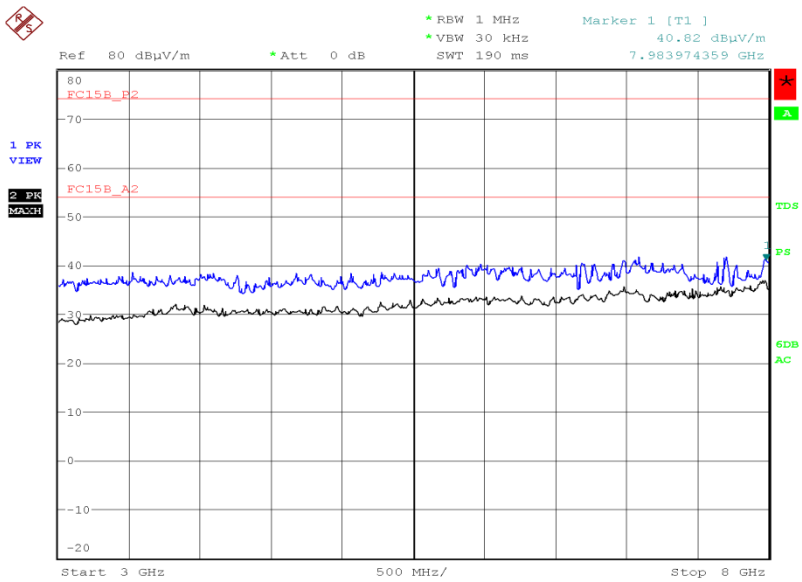
Product Service

1 GHz to 3 GHz



Date: 18.AUG.2013 13:01:22

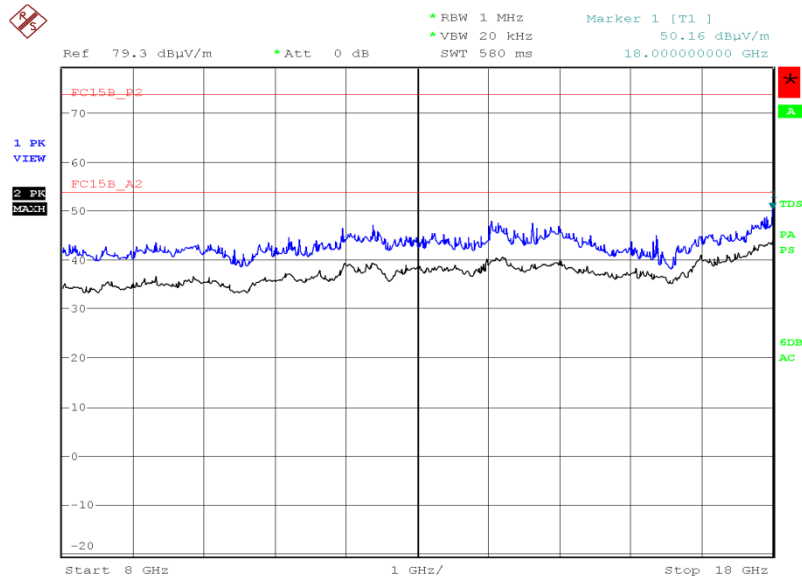
3 GHz to 8 GHz



Date: 19.AUG.2013 17:47:50

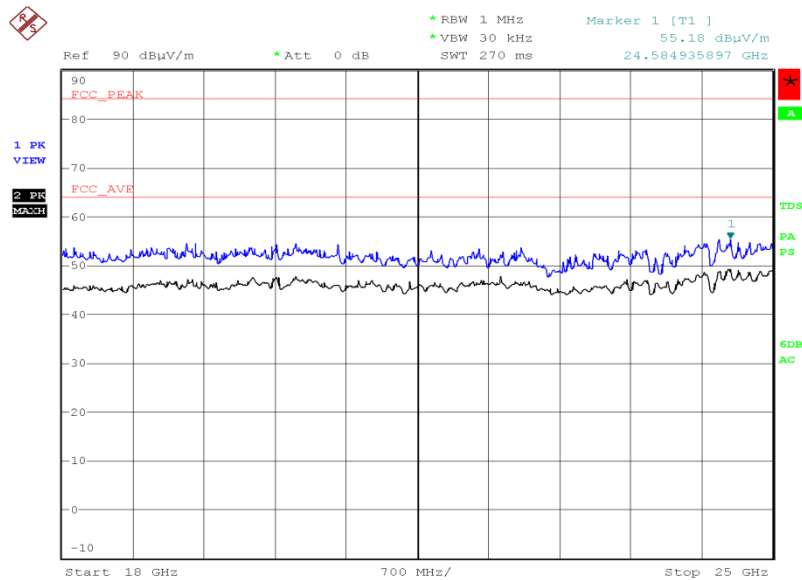


8 GHz to 18 GHz



Date: 19.AUG.2013 20:05:14

18 GHz to 25 GHz



Date: 19.AUG.2013 21:49:59

Limit

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

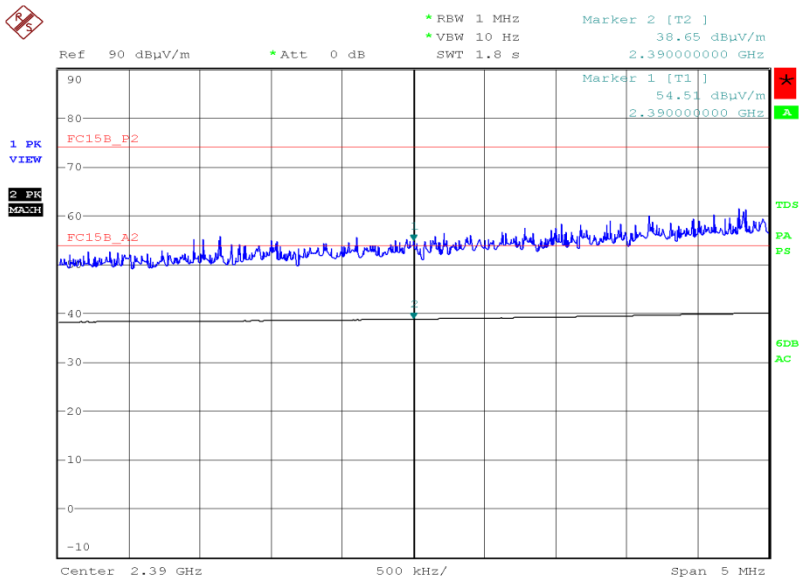


Product Service

Band Edge Emissions

2412 MHz

Polarisation	Final Peak (dBμV/m)	Final Average (dBμV/m)
Horizontal	54.51	38.65



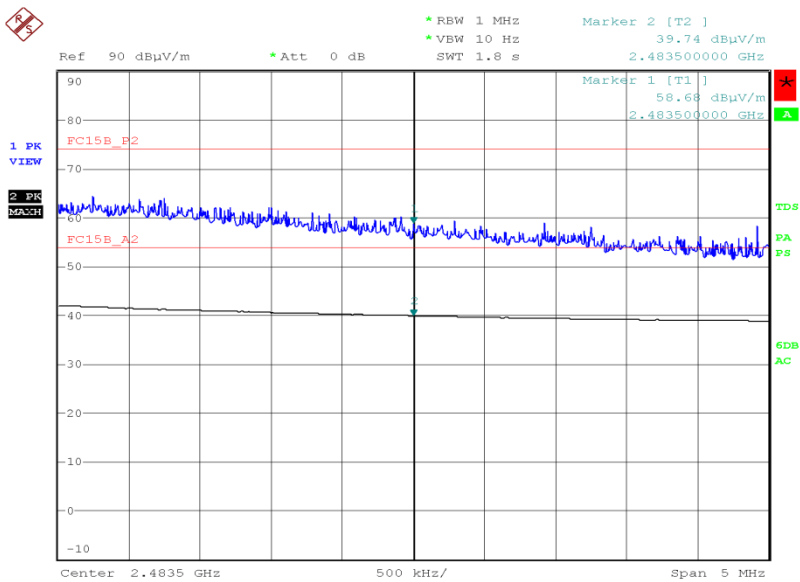
Date: 18.AUG.2013 12:27:21



Product Service

2462 MHz

Polarisation	Final Peak (dBµV/m)	Final Average (dBµV/m)
Horizontal	58.68	39.74



Date: 18.AUG.2013 12:56:54

Limit

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



Product Service

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

Black Smartphone S/N: XCV23200909 - Modification State 0

2.5.3 Date of Test

7 August 2013, 28 August 2013 & 29 August 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	22.3 - 24.2°C
Relative Humidity	36.6 - 56.8%



Product Service

2.5.7 Test Results802.11(b)

3.8 V DC Supply

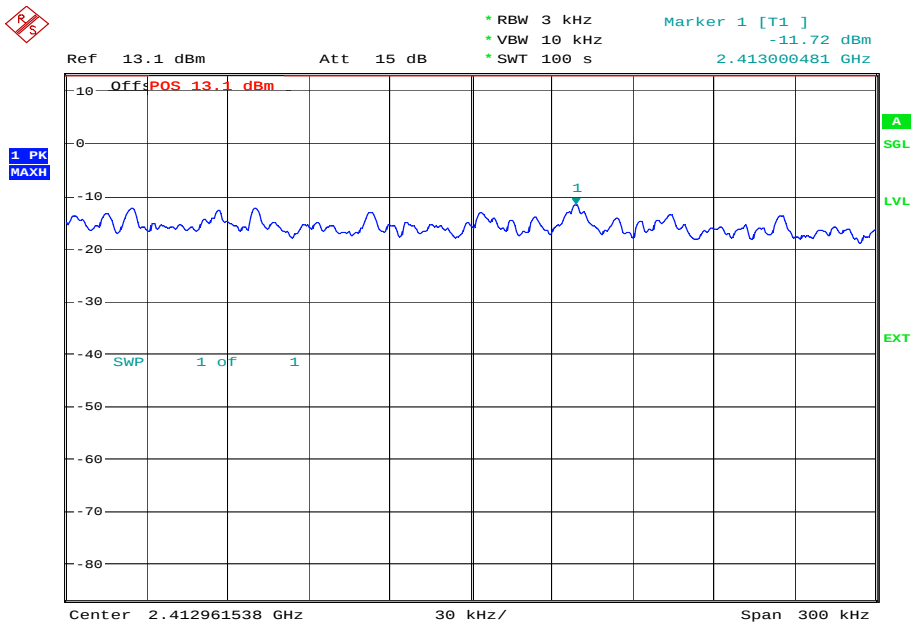
Frequency	Data Rate (Mbps)	Power Spectral Density in 3 kHz Bands (dBm)
2412 MHz	1	-11.72
	2	-13.05
	5.5	-14.78
	11	-14.34
2437 MHz	1	-10.49
	2	-10.31
	5.5	-13.98
	11	-13.11
2462 MHz	1	-11.43
	2	-11.34
	5.5	-13.66
	11	-11.73



Product Service

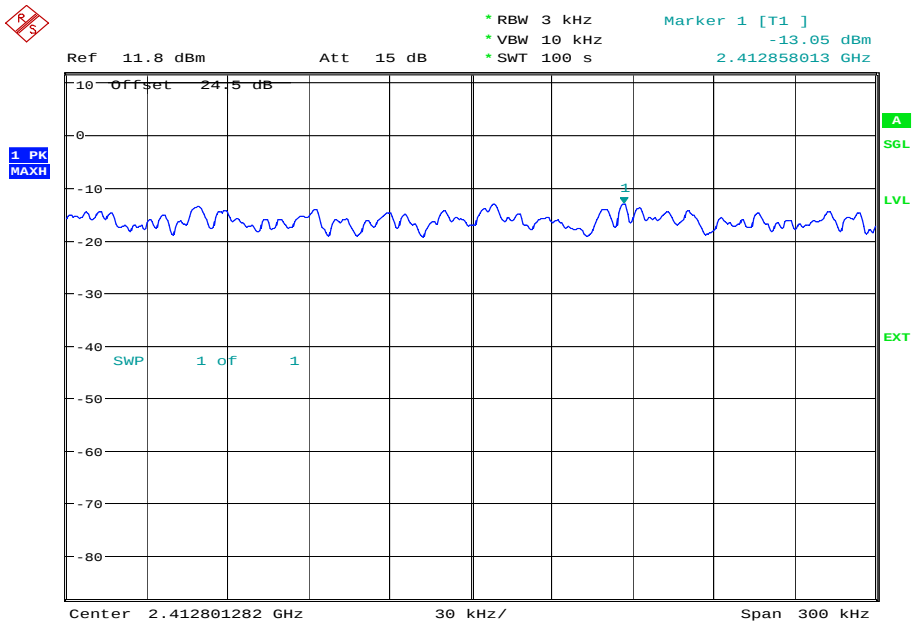
2412 MHz

1 Mbps



Date: 28.AUG.2013 14:26:44

2 Mbps

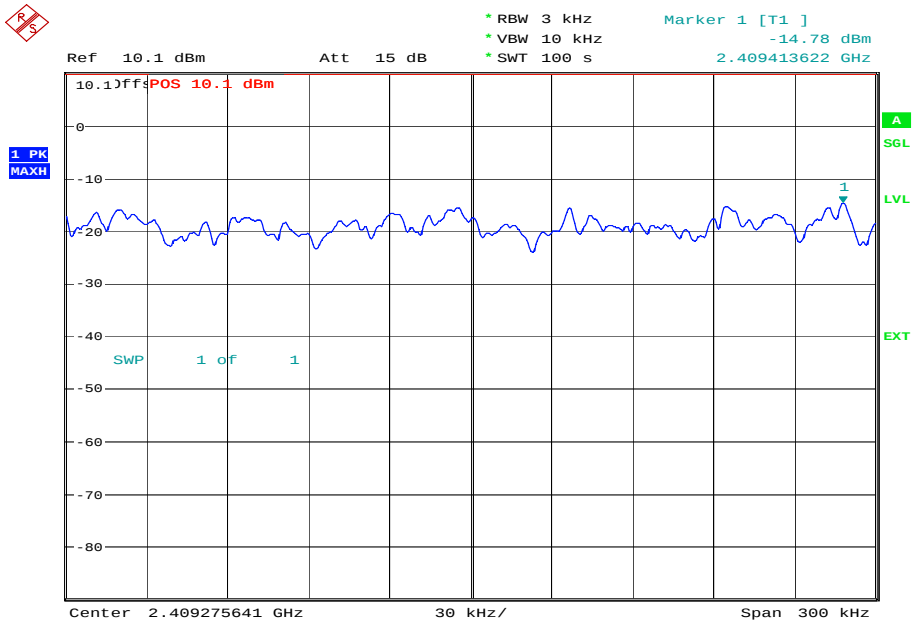


Date: 28.AUG.2013 14:46:25



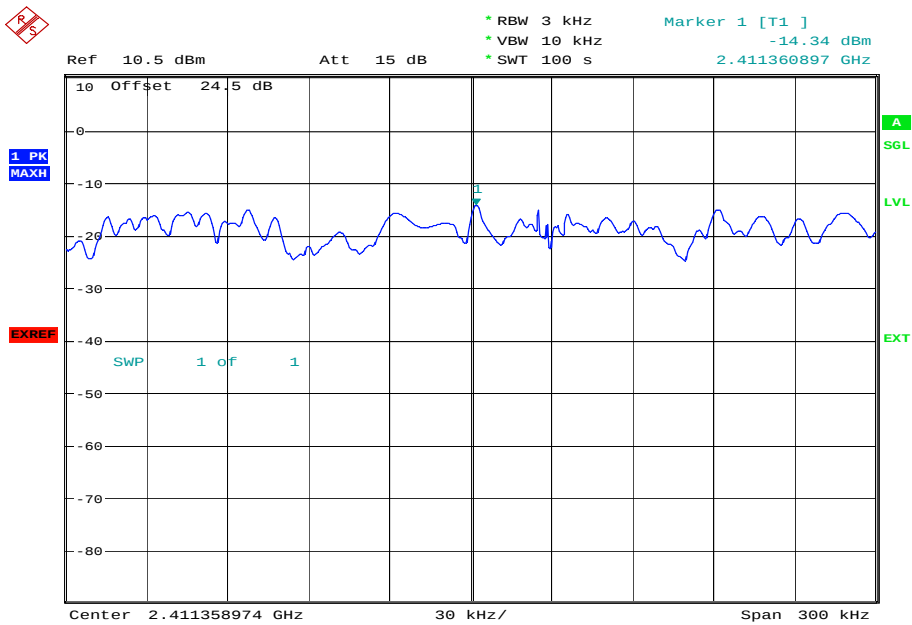
Product Service

5.5 Mbps



Date: 28.AUG.2013 14:50:44

11 Mbps



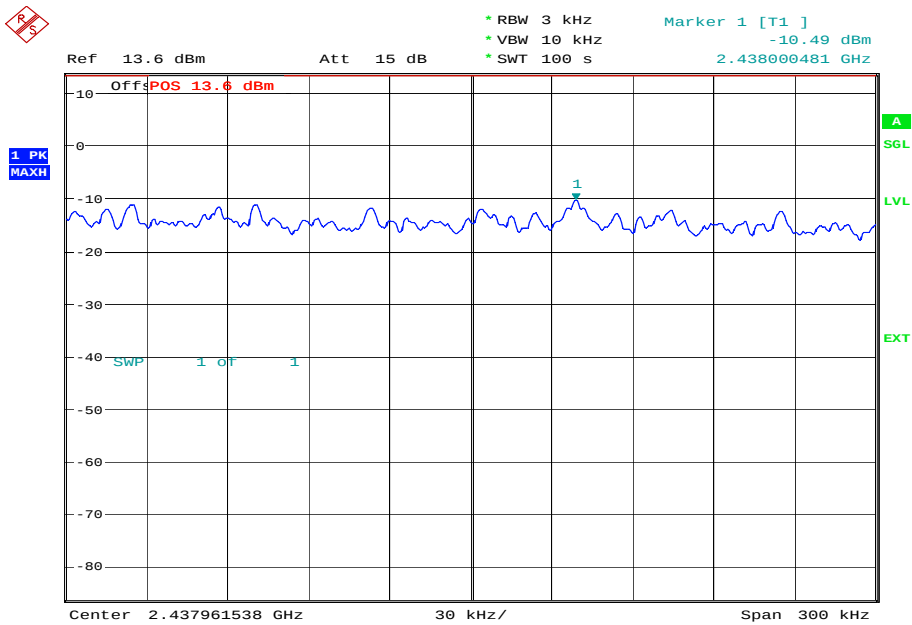
Date: 28.AUG.2013 15:11:10



Product Service

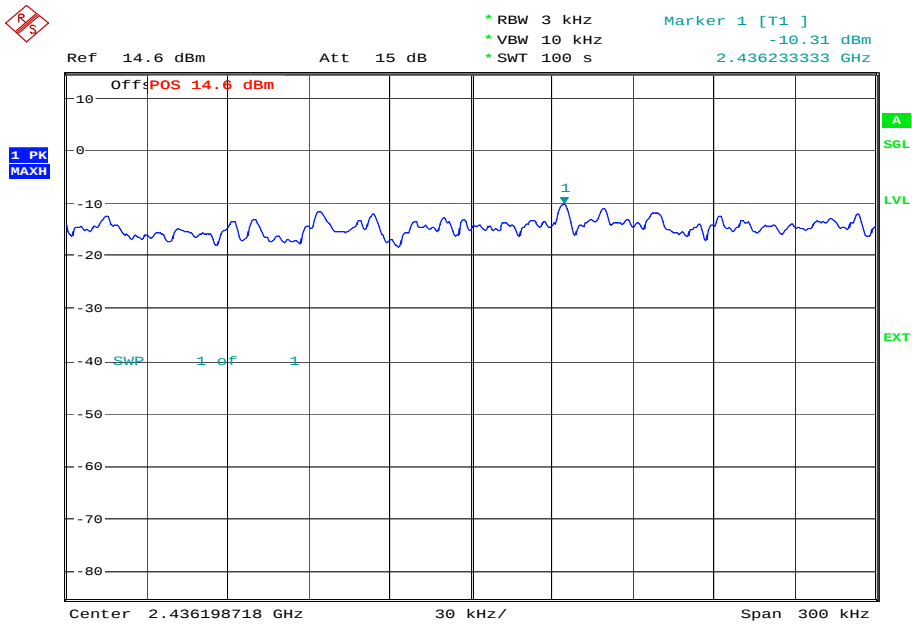
2437 MHz

1 Mbps



Date: 28.AUG.2013 14:30:26

2 Mbps

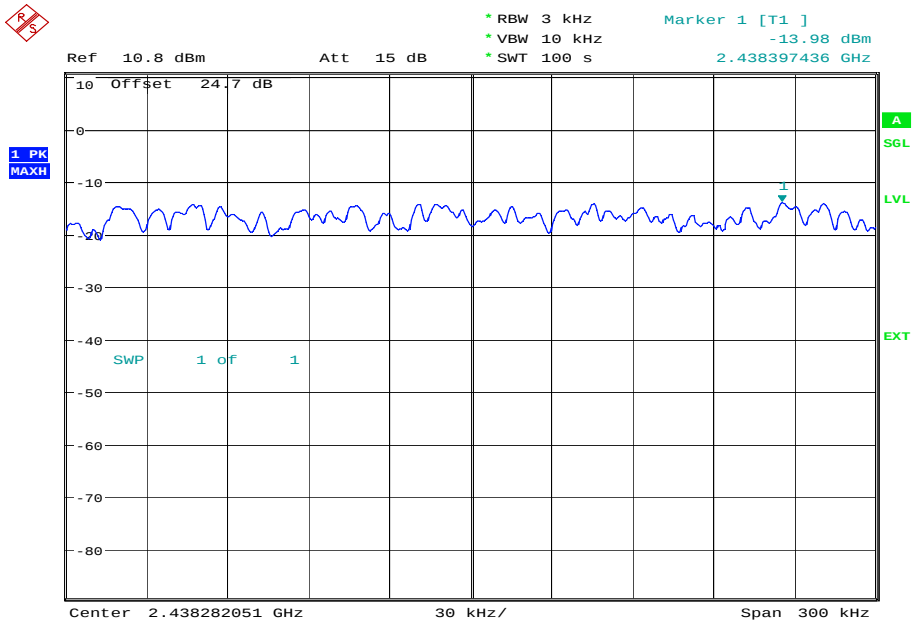


Date: 28.AUG.2013 14:42:58



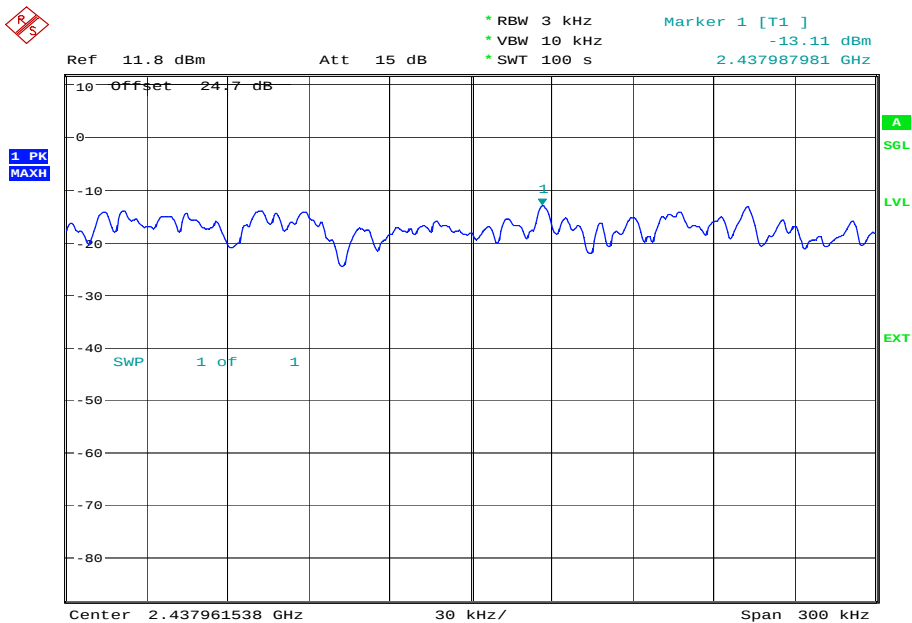
Product Service

5.5 Mbps



Date: 28.AUG.2013 14:54:15

11 Mbps



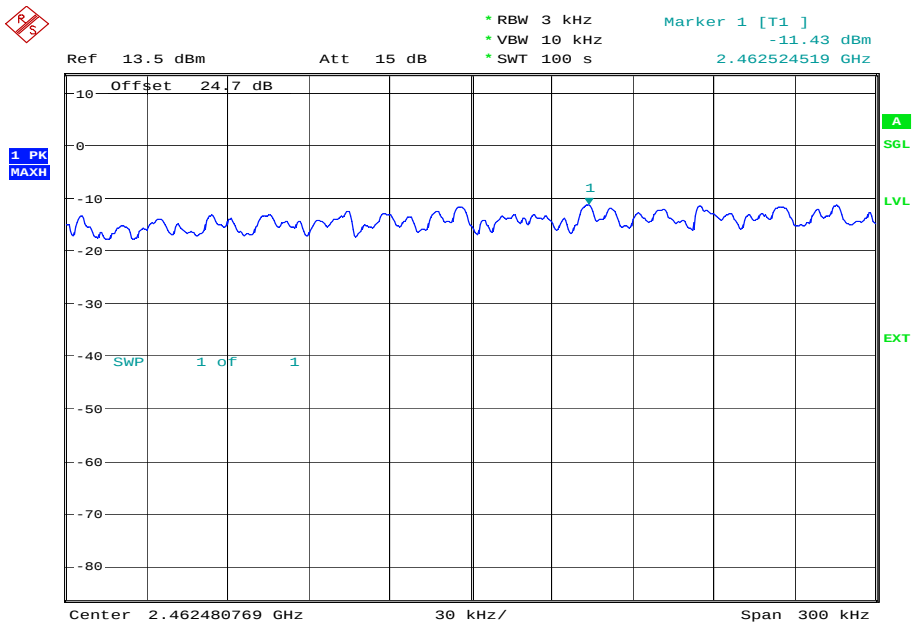
Date: 28.AUG.2013 15:07:44



Product Service

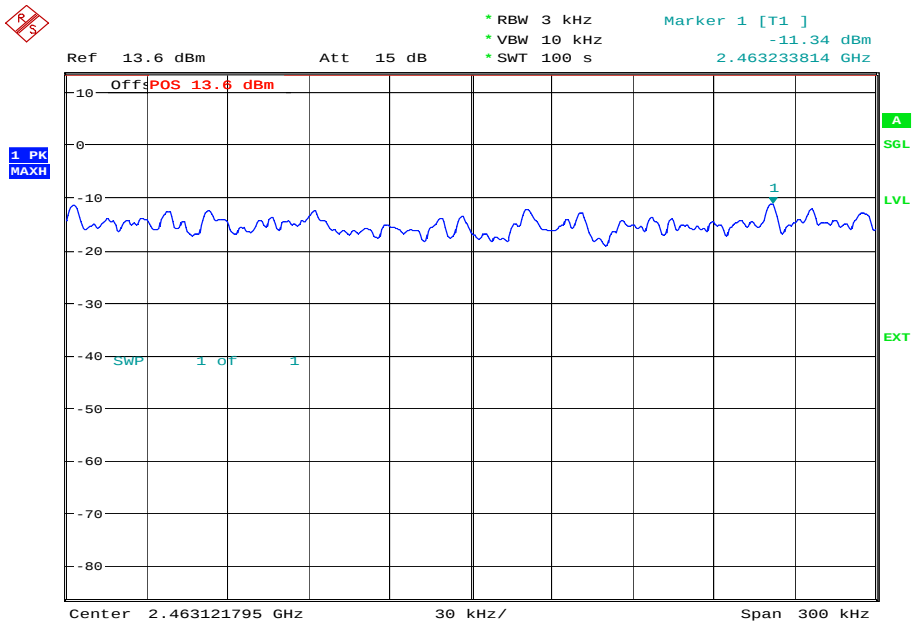
2462 MHz

1 Mbps



Date: 28.AUG.2013 14:33:48

2 Mbps

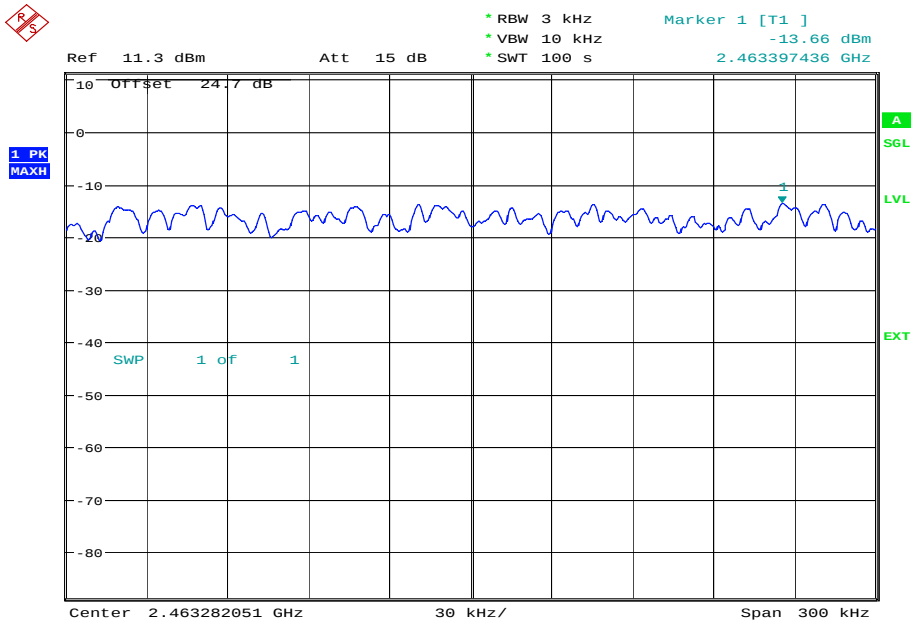


Date: 28.AUG.2013 14:39:24



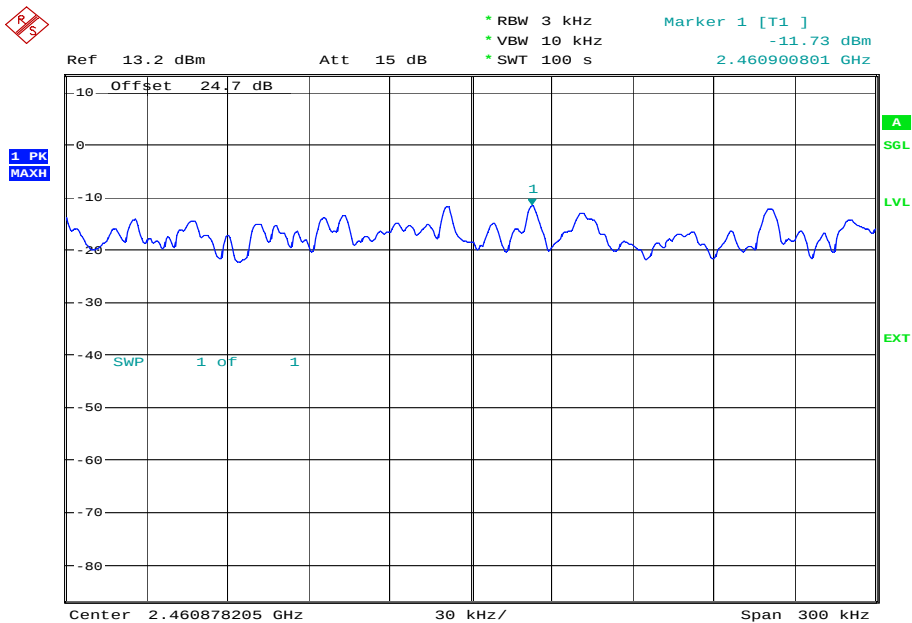
Product Service

5.5 Mbps



Date: 28.AUG.2013 14:57:40

11 Mbps



Date: 28.AUG.2013 15:02:59

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)

3.8 V DC Supply

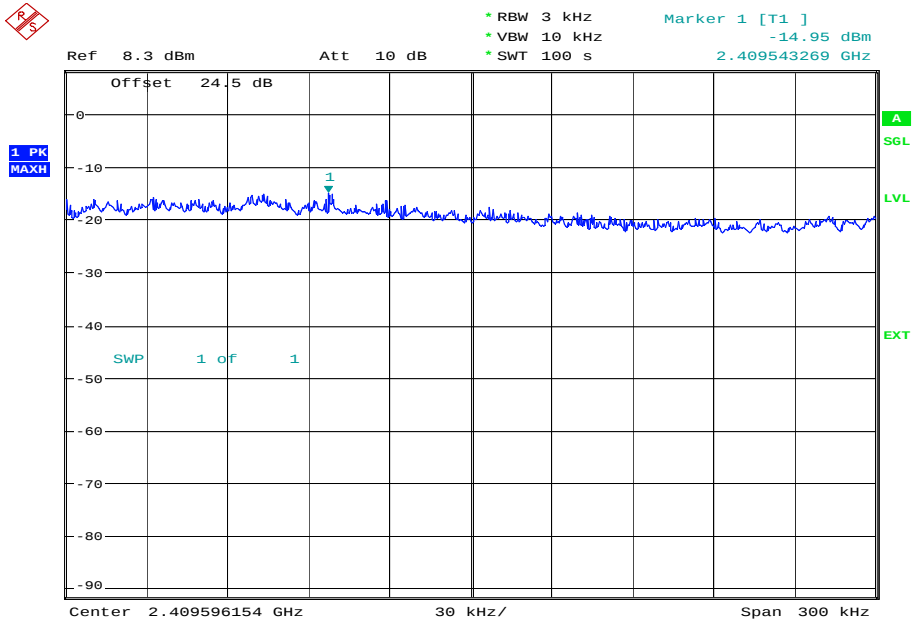
Frequency	Data Rate (Mbps)	Power Spectral Density in 3 kHz Bands (dBm)
2412 MHz	6	-14.95
	9	-14.90
	12	-14.64
	18	-15.94
	24	-15.57
	36	-17.02
	48	-18.52
	54	-19.05
2437 MHz	6	-11.70
	9	-13.63
	12	-13.20
	18	-12.81
	24	-14.19
	36	-14.84
	48	-17.35
	54	-18.11
2462 MHz	6	-12.71
	9	-12.58
	12	-14.77
	18	-13.57
	24	-13.70
	36	-16.03
	48	-16.36
	54	-16.92



Product Service

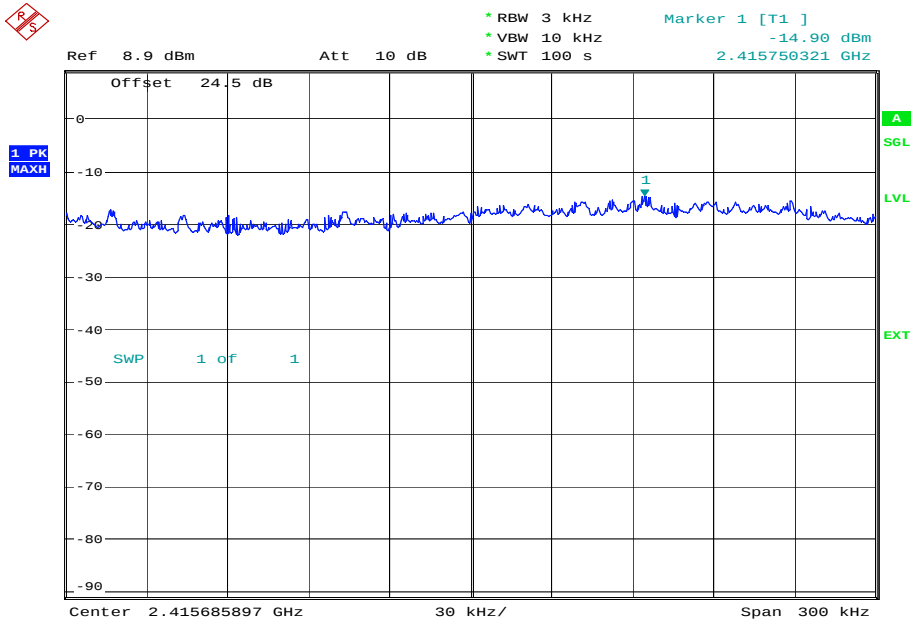
2412 MHz

6 Mbps



Date: 28.AUG.2013 15:17:22

9 Mbps

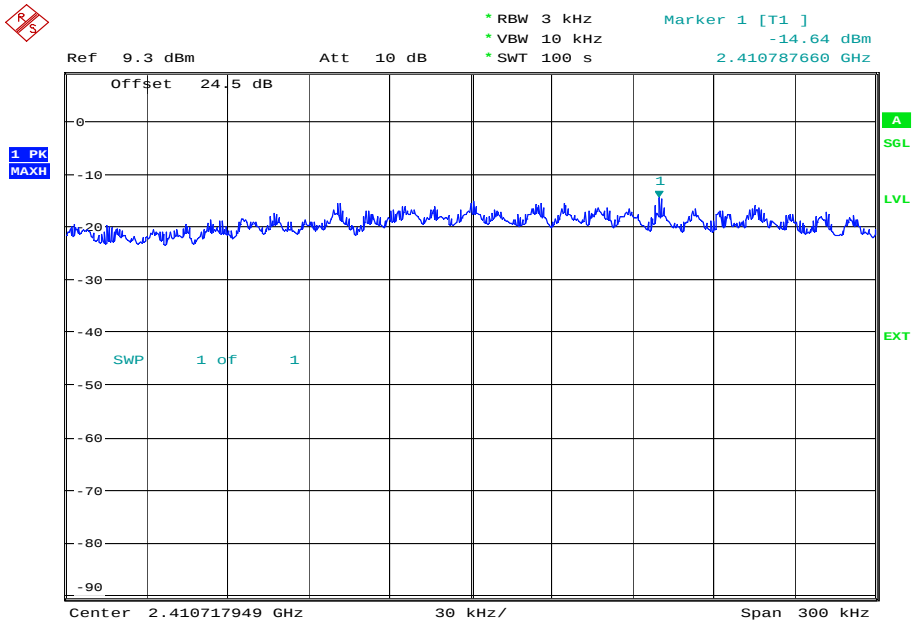


Date: 28.AUG.2013 15:41:11



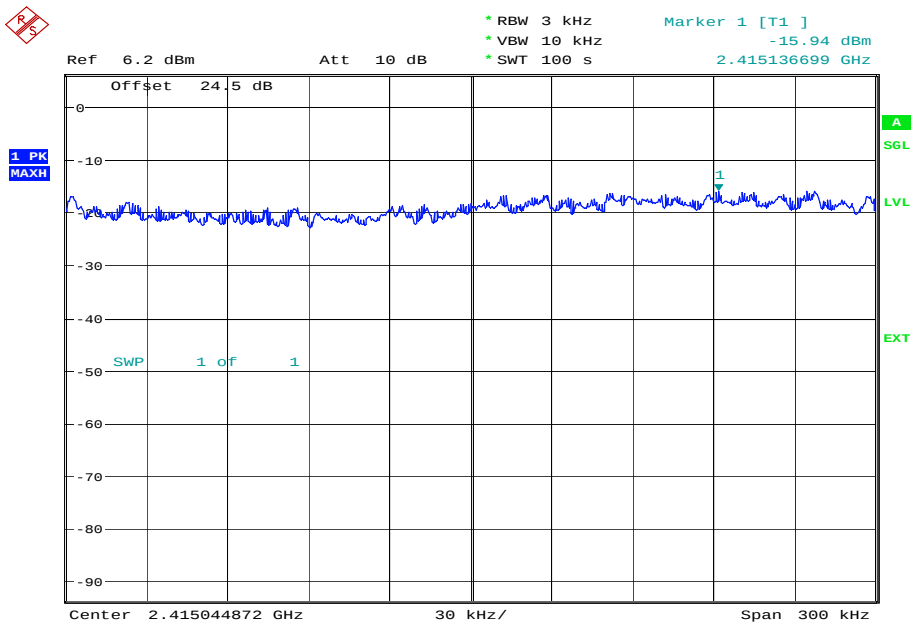
Product Service

12 Mbps



Date: 28.AUG.2013 15:45:56

18 Mbps

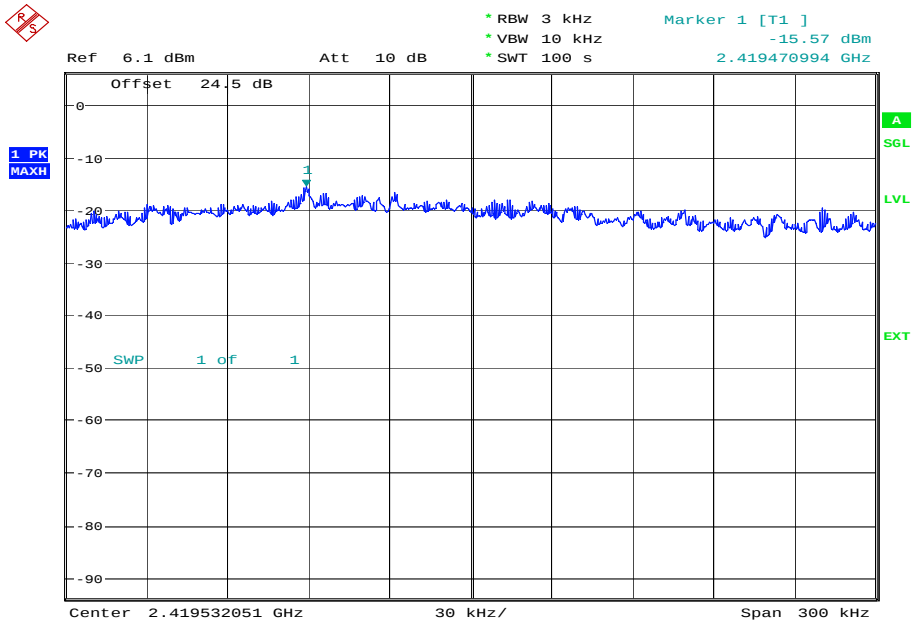


Date: 28.AUG.2013 16:06:34



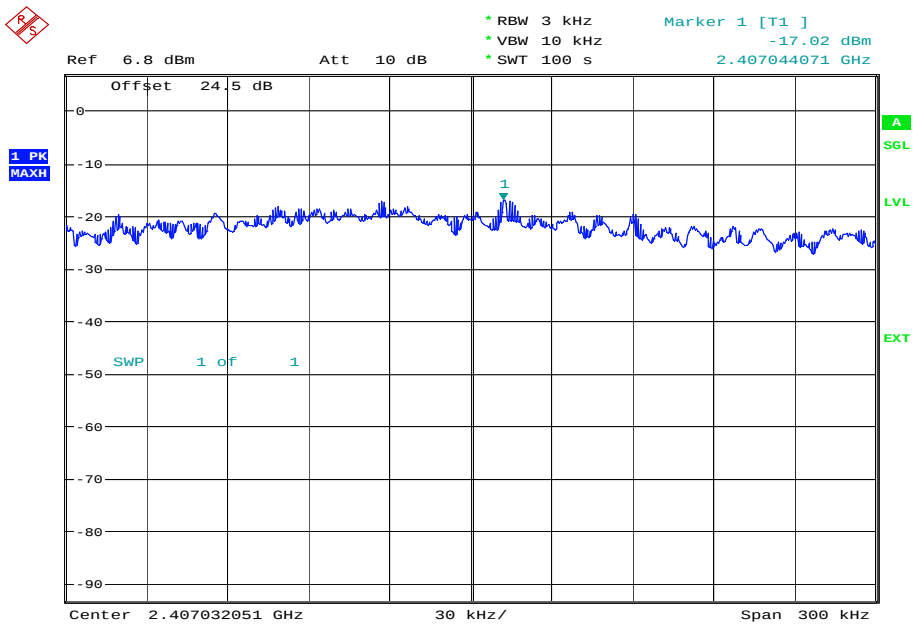
Product Service

24 Mbps



Date: 29.AUG.2013 08:04:37

36 Mbps

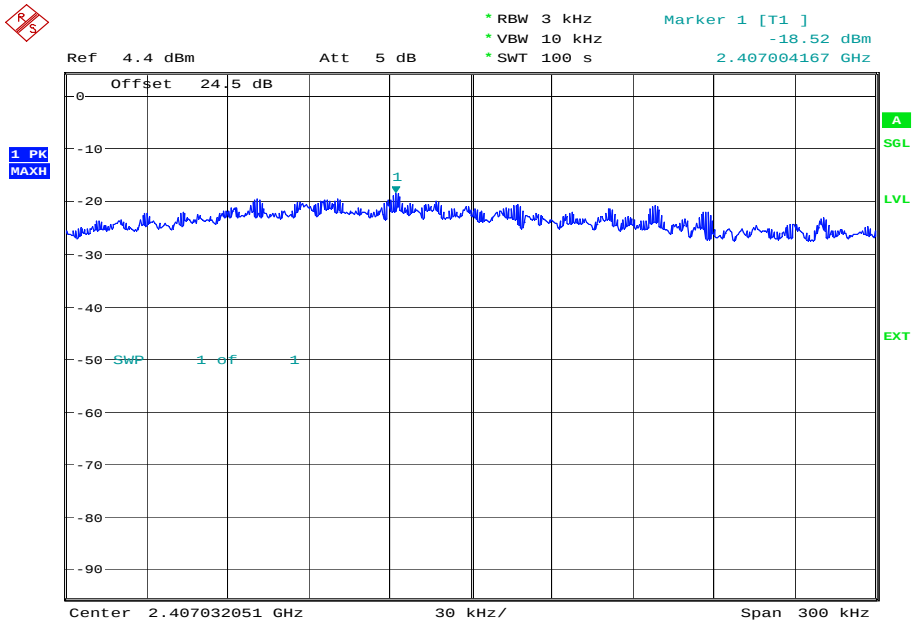


Date: 29.AUG.2013 08:30:02



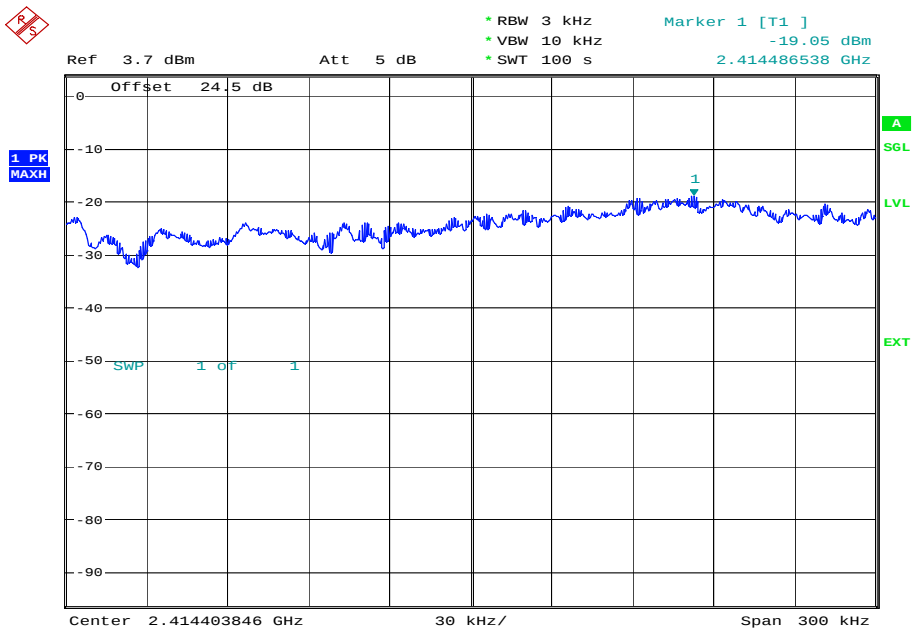
Product Service

48 Mbps



Date: 29.AUG.2013 08:34:12

54 Mbps



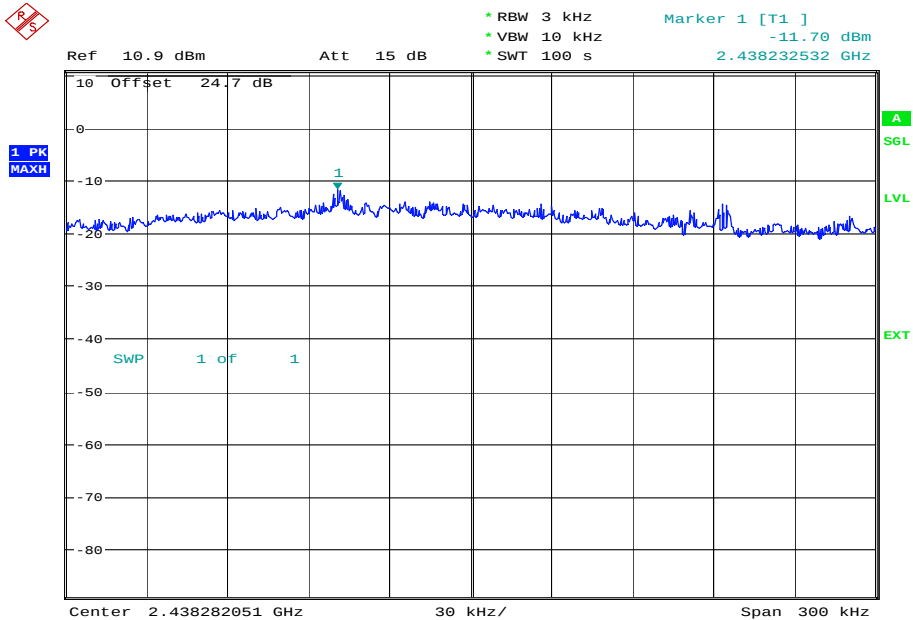
Date: 29.AUG.2013 08:58:38



Product Service

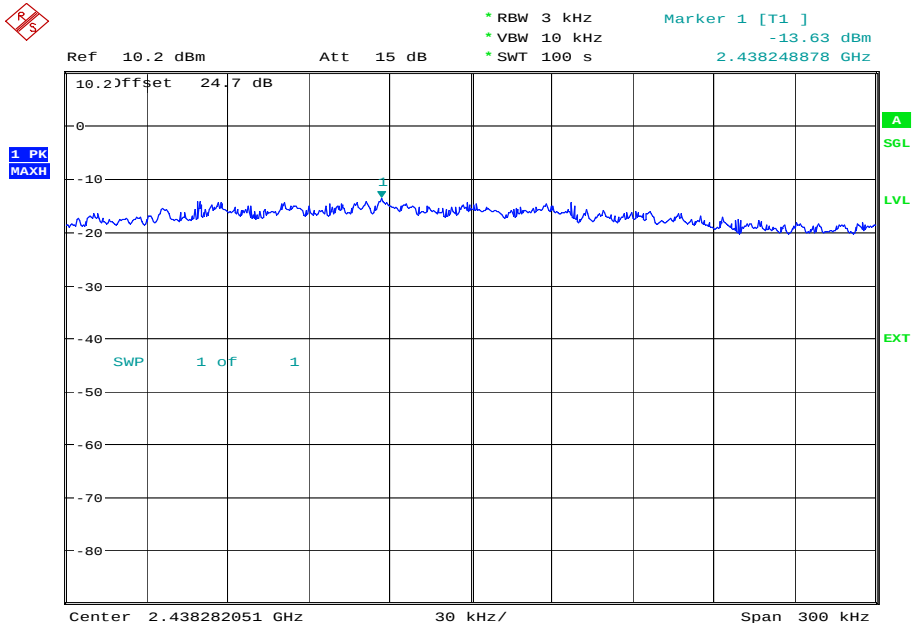
2437 MHz

6 Mbps



Date: 28.AUG.2013 15:23:09

9 Mbps

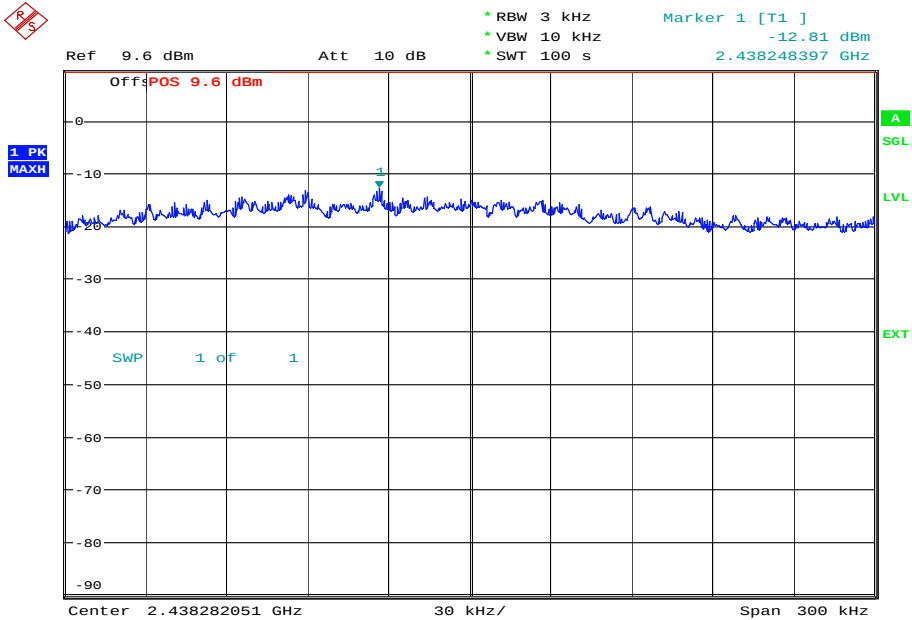


Date: 28.AUG.2013 15:37:07



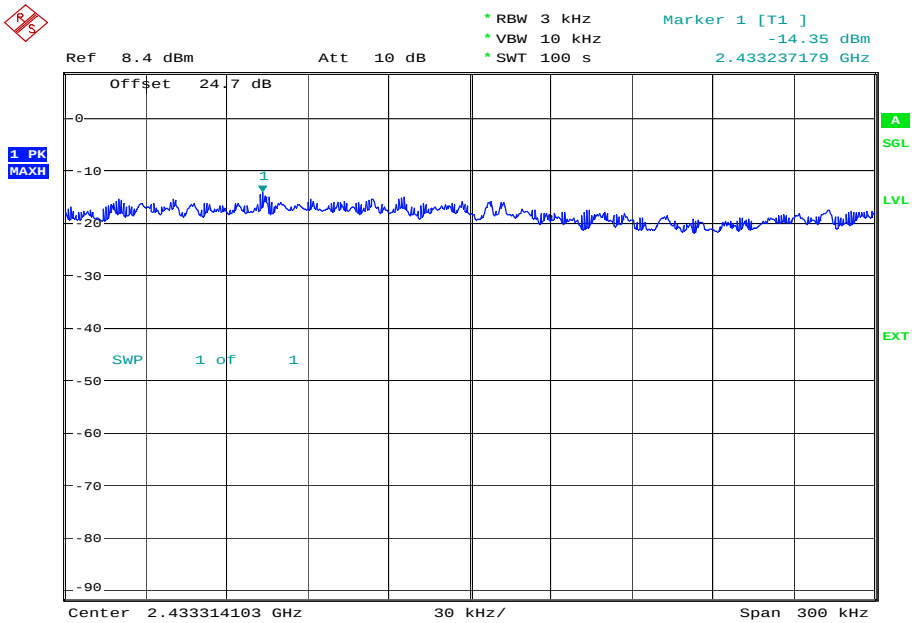
Product Service

12 Mbps



Date: 28.AUG.2013 15:49:23

18 Mbps

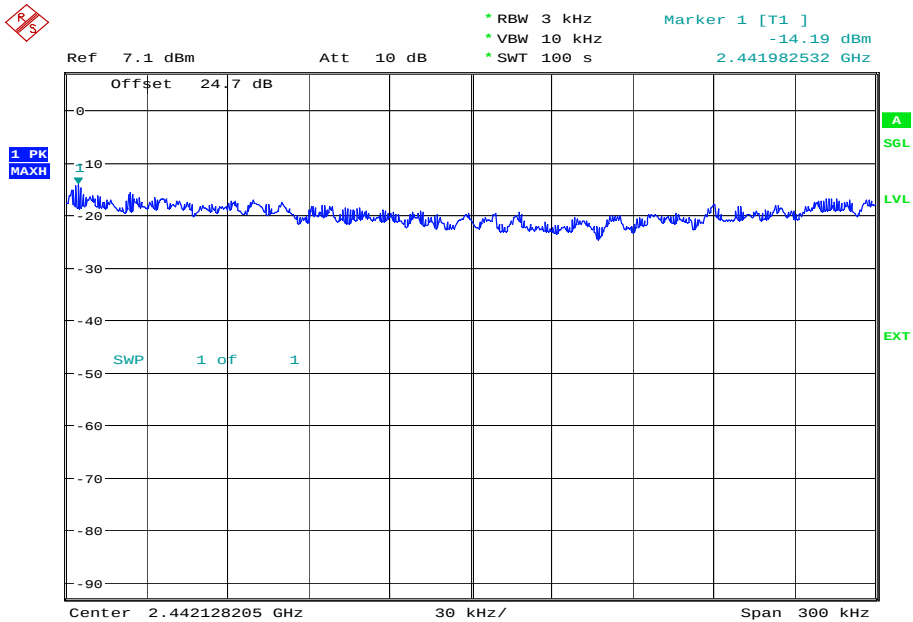


Date: 28.AUG.2013 16:03:05



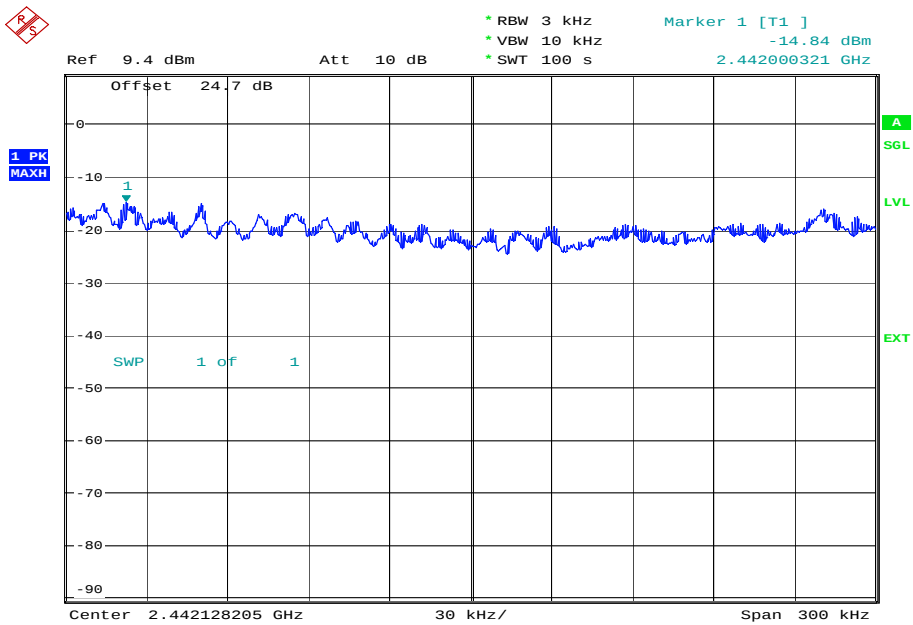
Product Service

24 Mbps



Date: 29.AUG.2013 08:09:17

36 Mbps

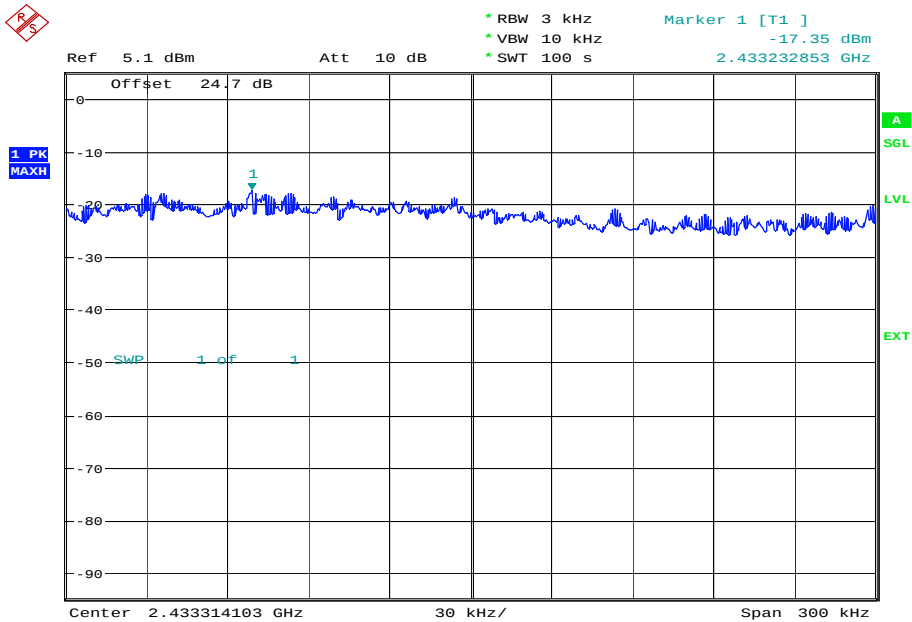


Date: 29.AUG.2013 08:26:09



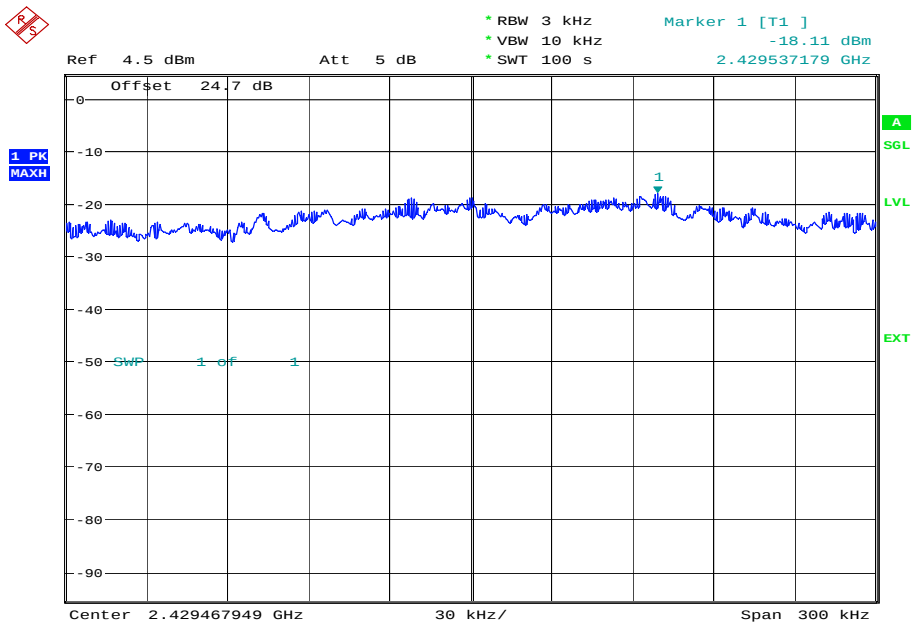
Product Service

48 Mbps



Date: 29.AUG.2013 08:37:42

54 Mbps



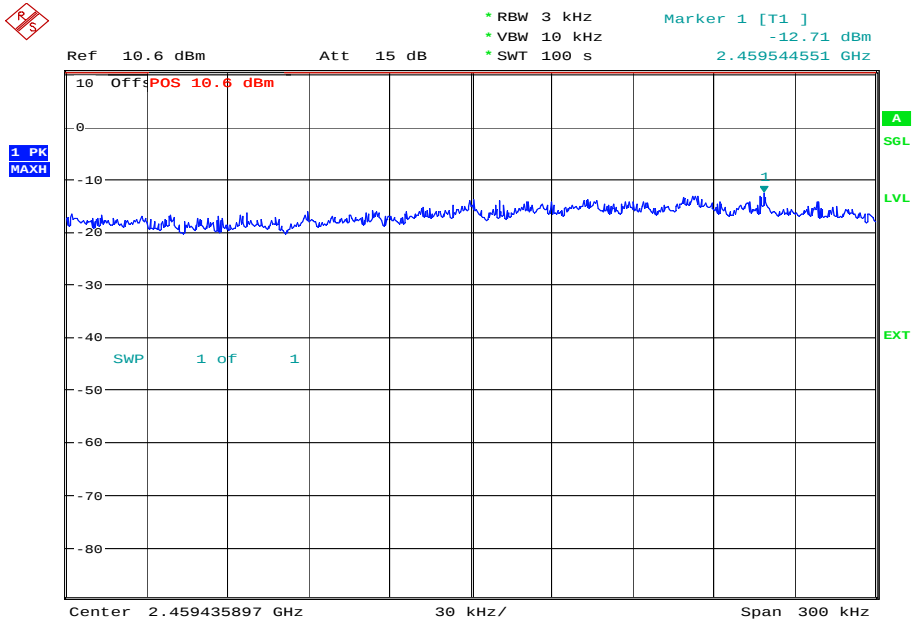
Date: 29.AUG.2013 08:53:21



Product Service

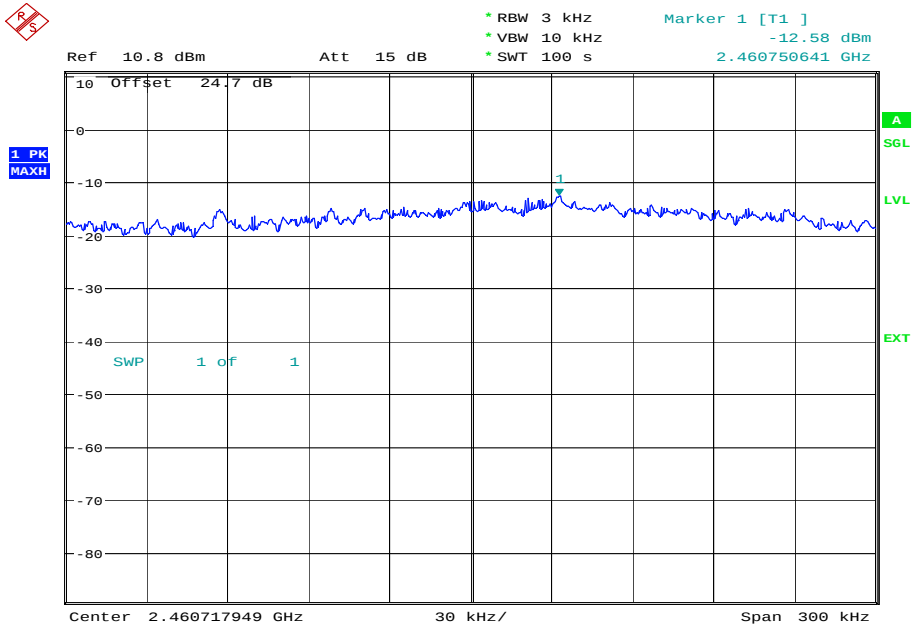
2462 MHz

6 Mbps



Date: 28.AUG.2013 15:27:29

9 Mbps

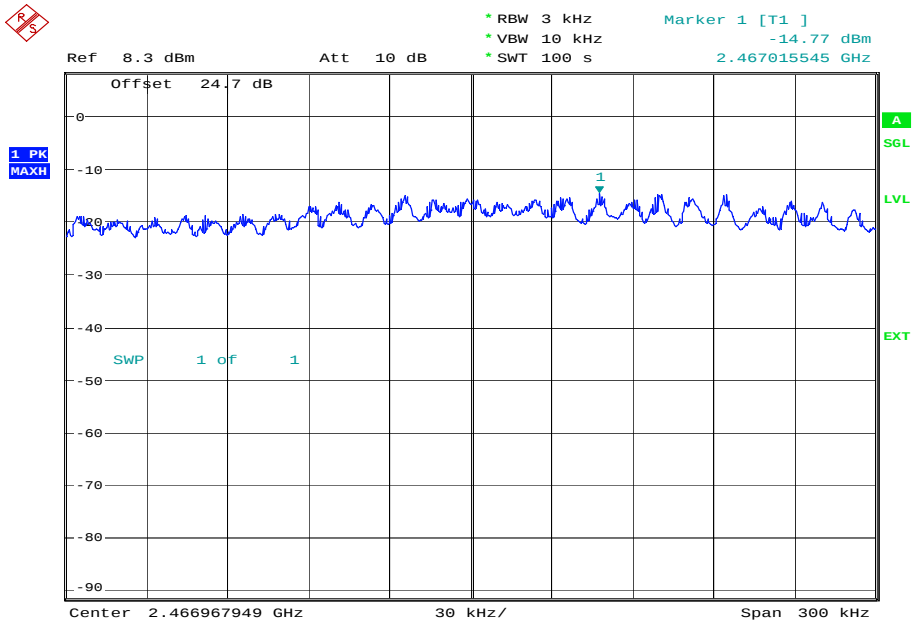


Date: 28.AUG.2013 15:32:29



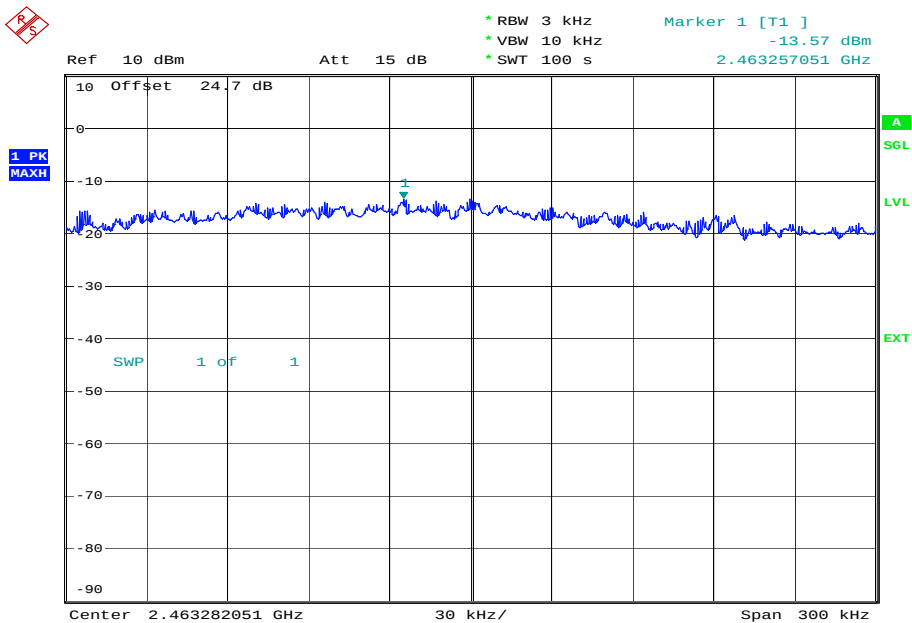
Product Service

12 Mbps



Date: 28.AUG.2013 15:54:32

18 Mbps

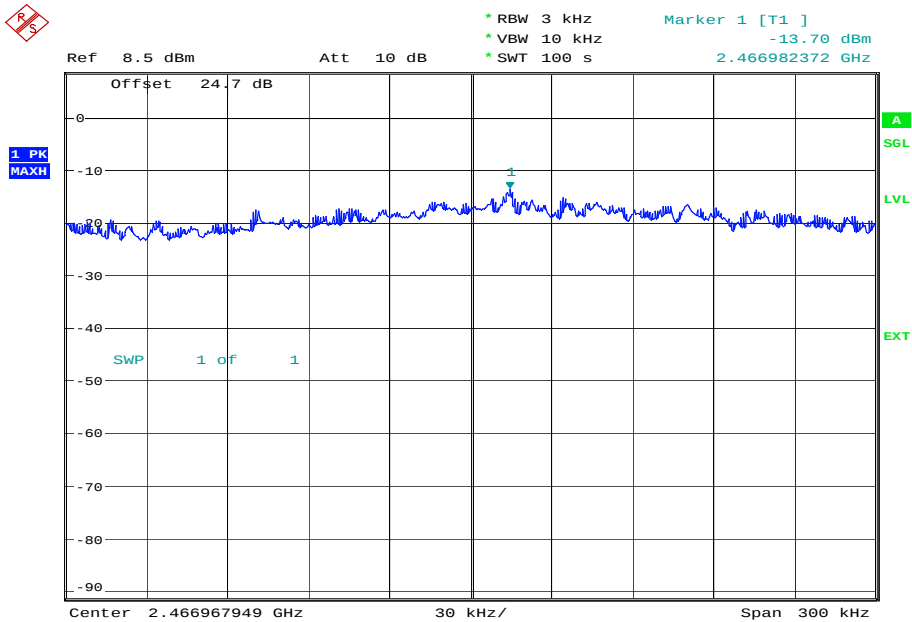


Date: 28.AUG.2013 15:59:13



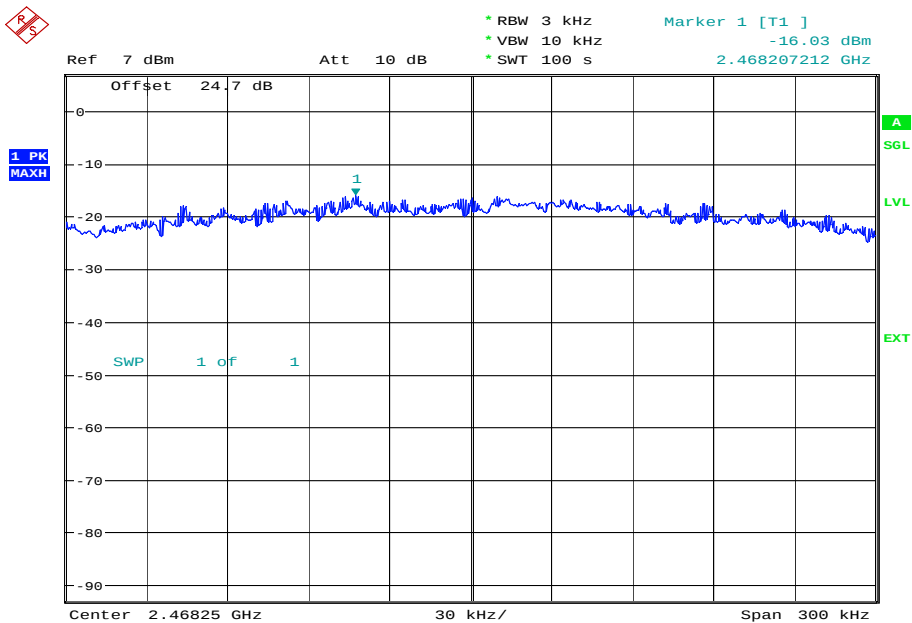
Product Service

24 Mbps



Date: 29.AUG.2013 08:13:13

36 Mbps

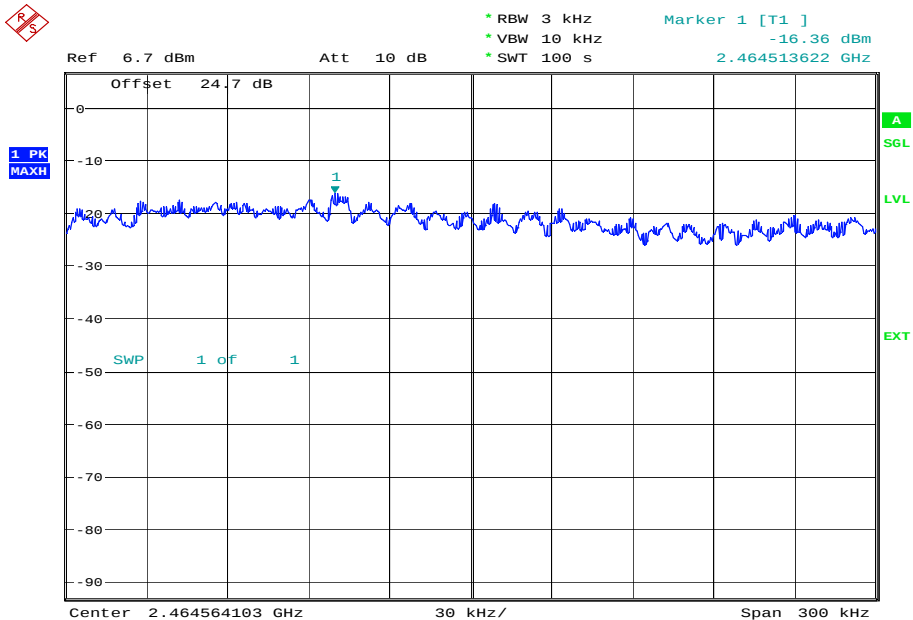


Date: 29.AUG.2013 08:17:28



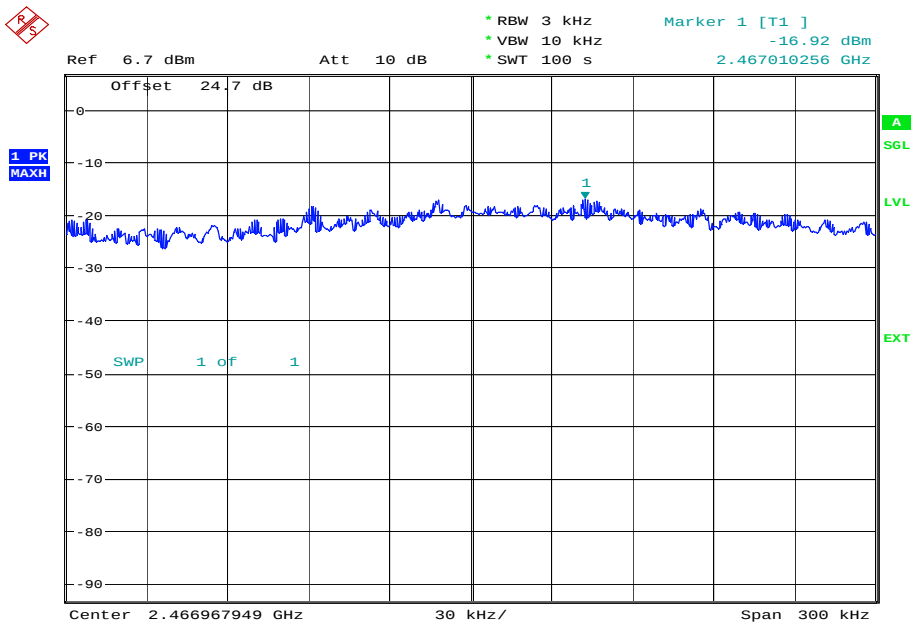
Product Service

48 Mbps



Date: 29.AUG.2013 08:41:04

54 Mbps



Date: 29.AUG.2013 08:45:06

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)

3.8 V DC Supply

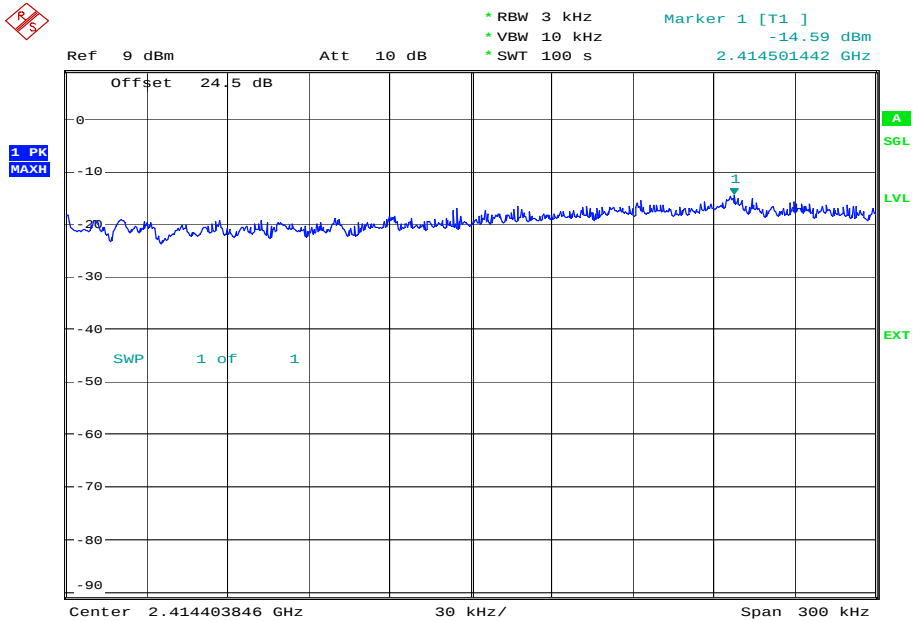
Frequency	Data Rate (Mbps)	Power Spectral Density in 3 kHz Bands (dBm)
2412 MHz	6.5	-14.59
	13	-15.36
	19.5	-14.18
	26	-17.09
	39	-16.56
	52	-19.73
	58.5	-18.39
	65	-19.27
2437 MHz	6.5	-13.40
	13	-13.31
	19.5	-14.43
	26	-15.79
	39	-15.27
	52	-18.22
	58.5	-17.73
	65	-17.69
2462 MHz	6.5	-12.95
	13	-12.62
	19.5	-13.15
	26	-14.73
	39	-14.90
	52	-15.82
	58.5	-16.27
	65	-17.42



Product Service

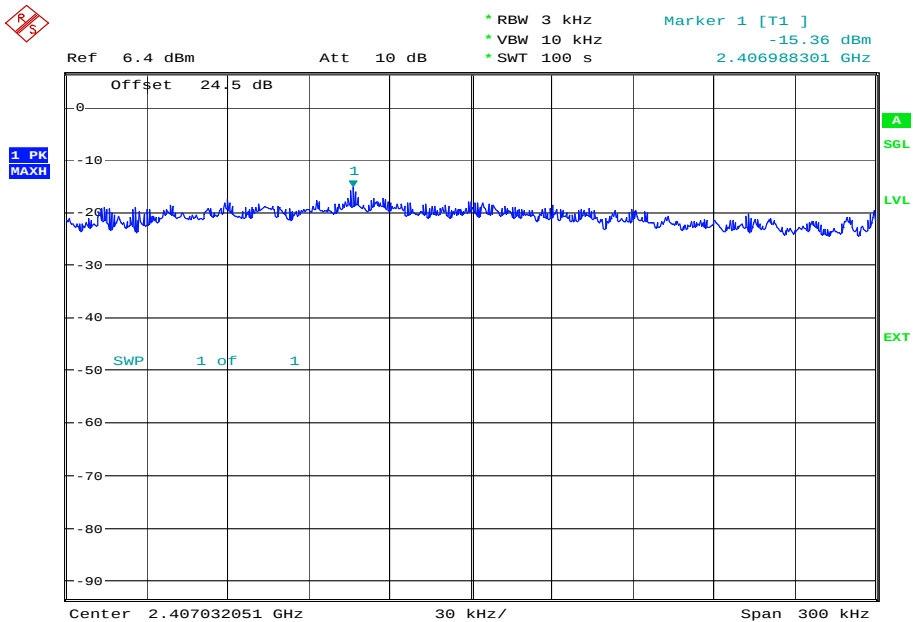
2412 MHz

6.5 Mbps



Date: 29.AUG.2013 09:07:34

13 Mbps

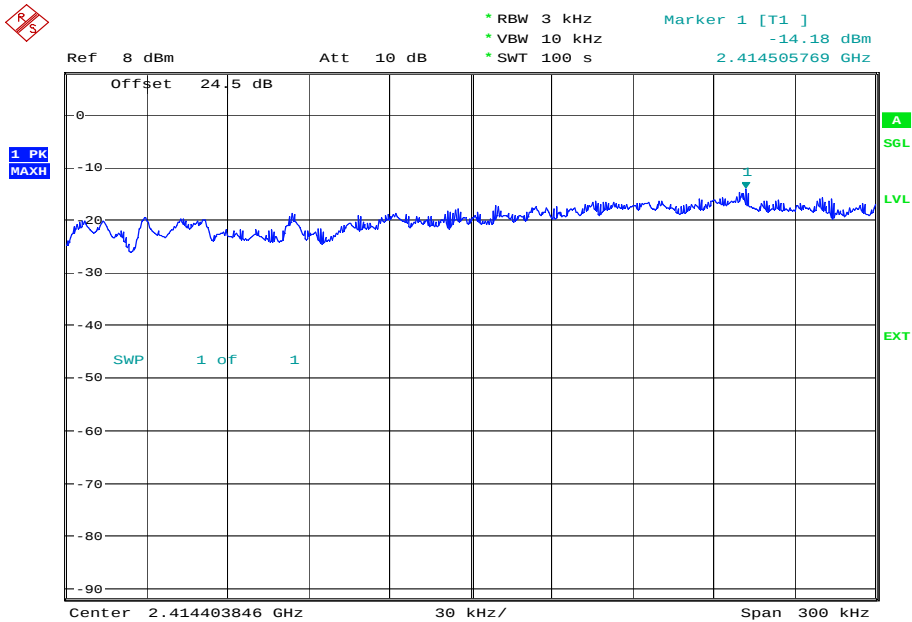


Date: 29.AUG.2013 09:38:06



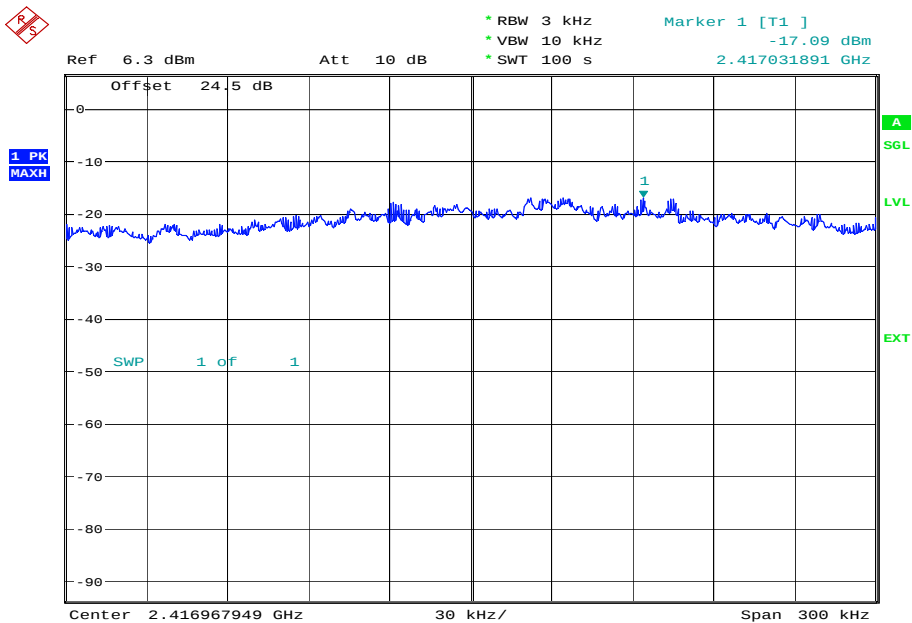
Product Service

19.5 Mbps



Date: 29.AUG.2013 09:45:03

26 Mbps

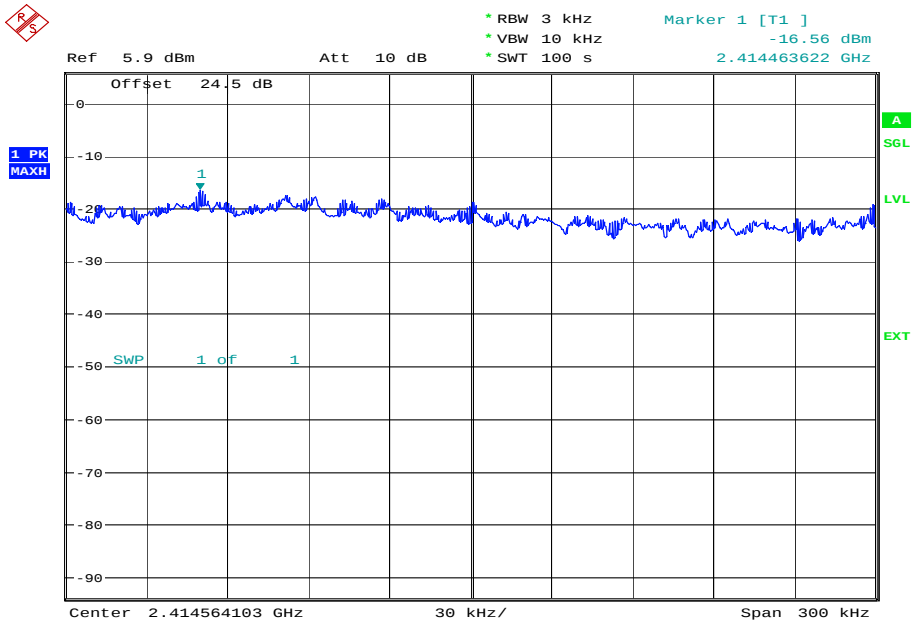


Date: 29.AUG.2013 10:14:45



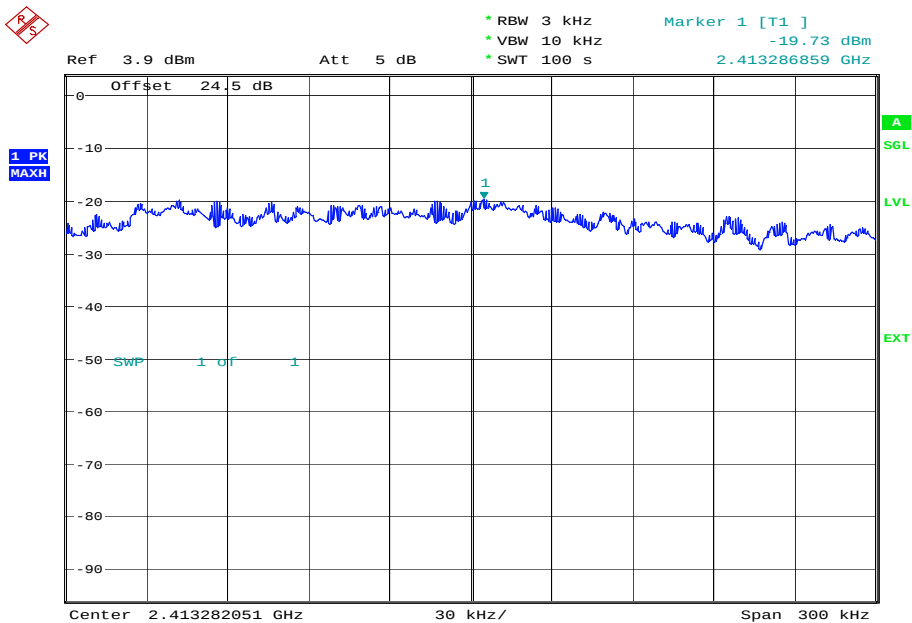
Product Service

39 Mbps



Date: 29.AUG.2013 10:19:04

52 Mbps

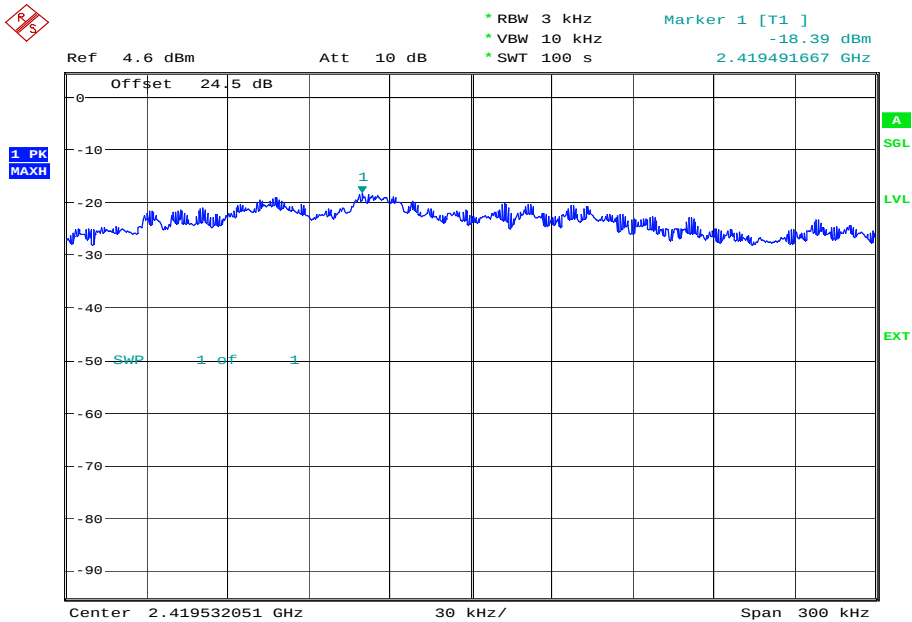


Date: 29.AUG.2013 10:56:34



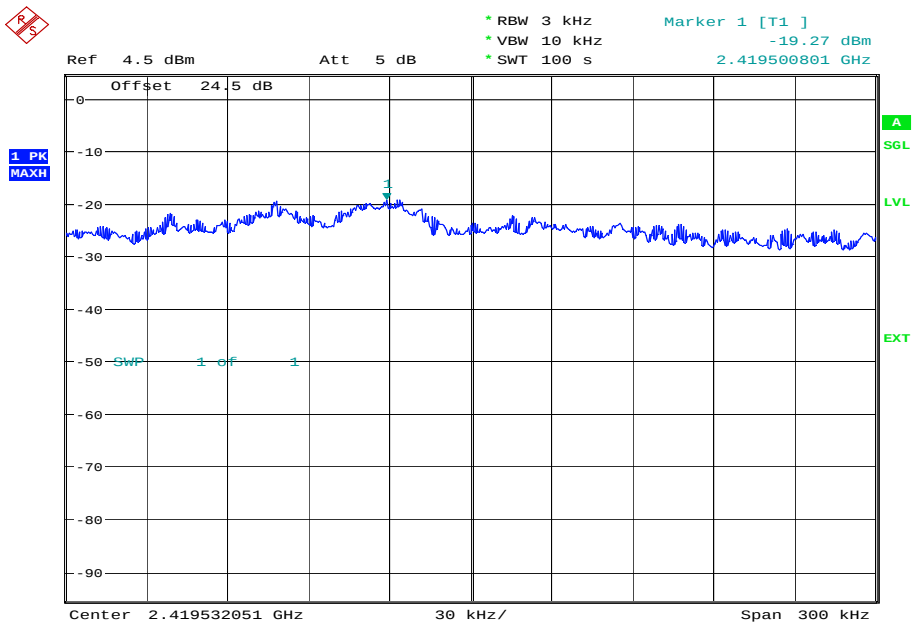
Product Service

58.5 Mbps



Date: 29.AUG.2013 11:12:38

65 Mbps



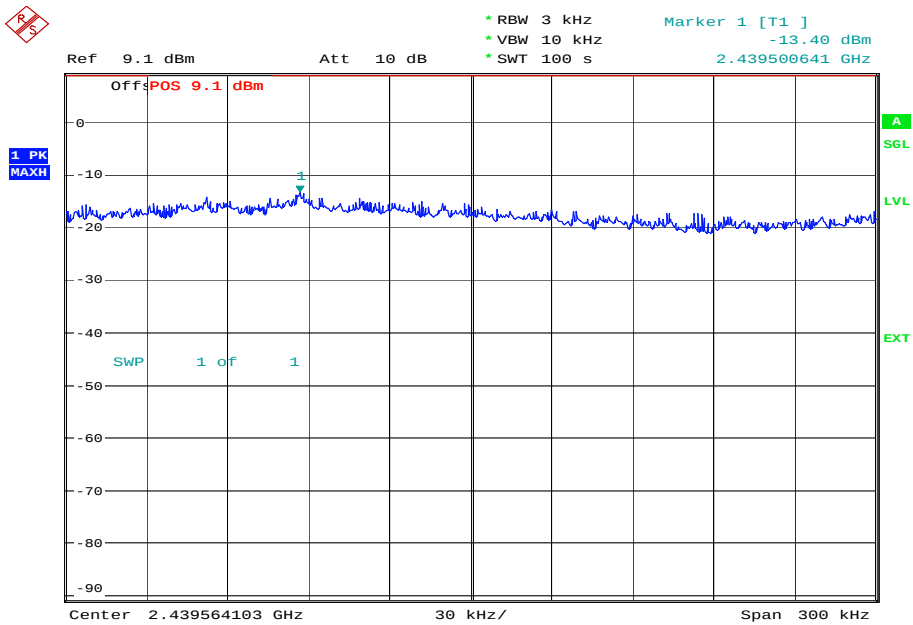
Date: 29.AUG.2013 11:38:44



Product Service

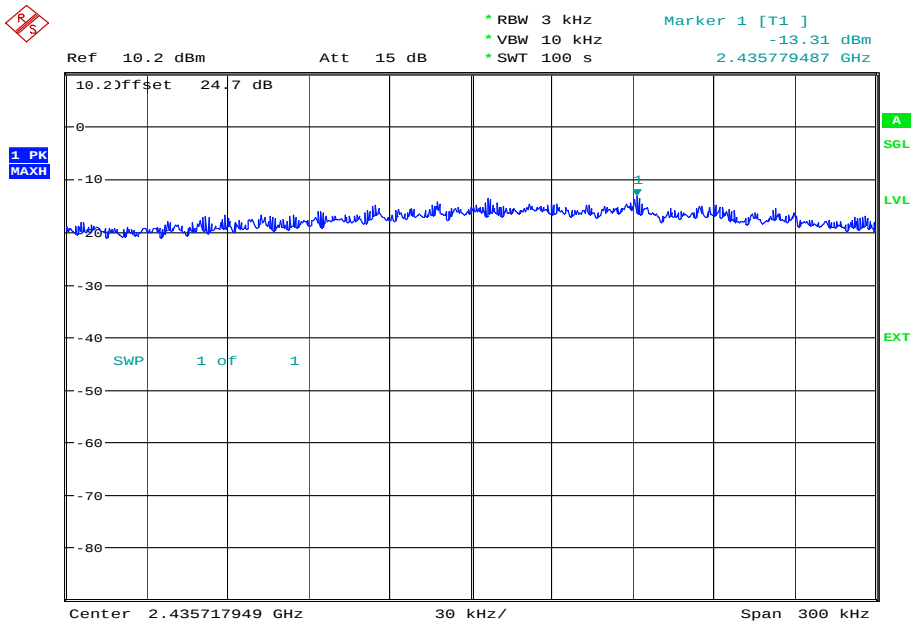
2437 MHz

6.5 Mbps



Date: 29.AUG.2013 09:14:44

13 Mbps

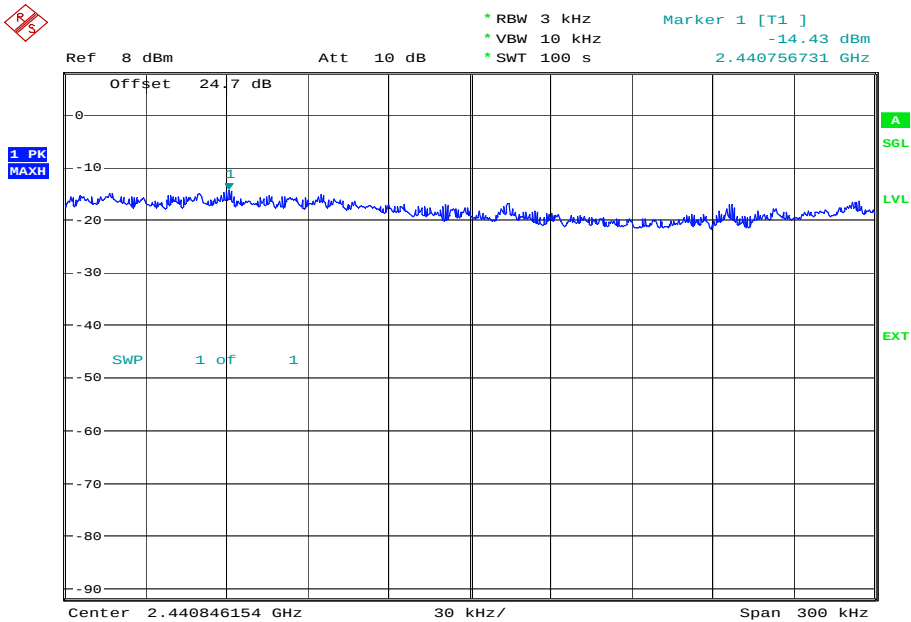


Date: 29.AUG.2013 09:31:37



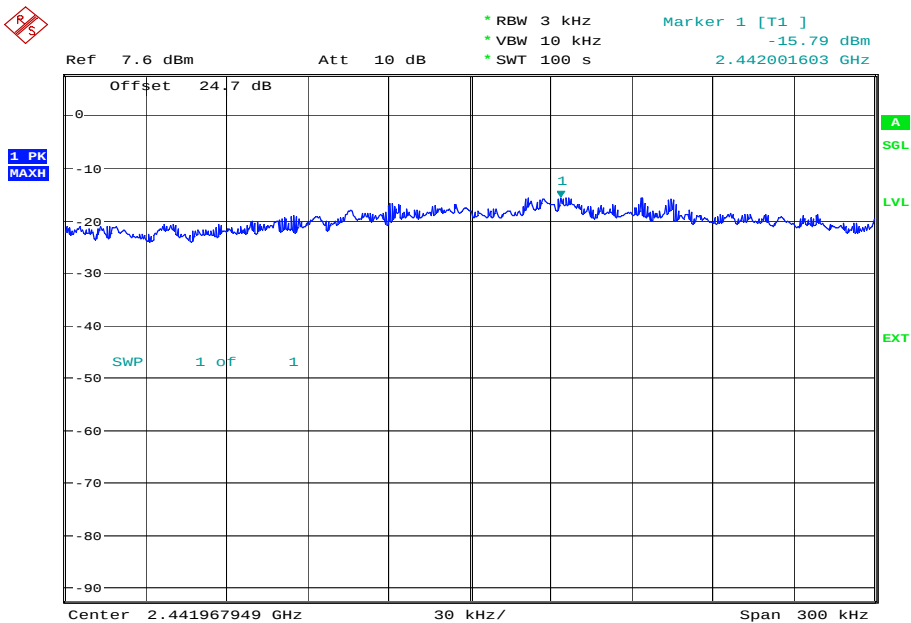
Product Service

19.5 Mbps



Date: 29.AUG.2013 09:56:04

26 Mbps

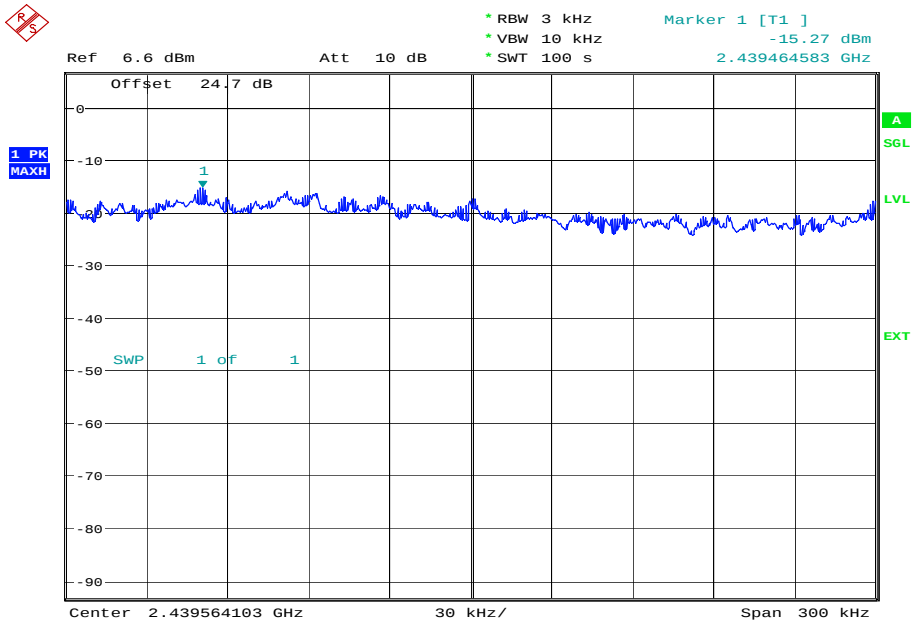


Date: 29.AUG.2013 10:10:03



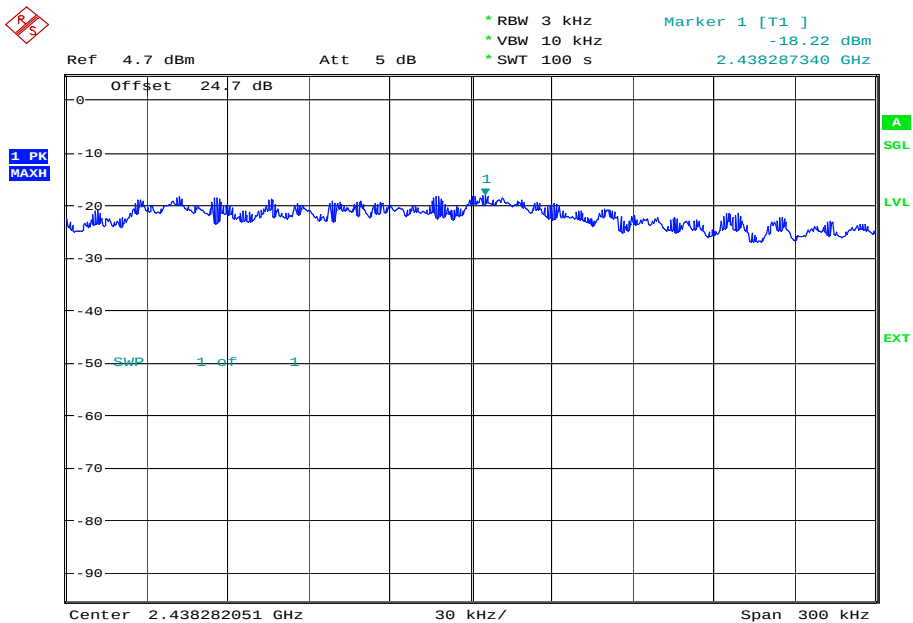
Product Service

39 Mbps



Date: 29.AUG.2013 10:22:50

52 Mbps

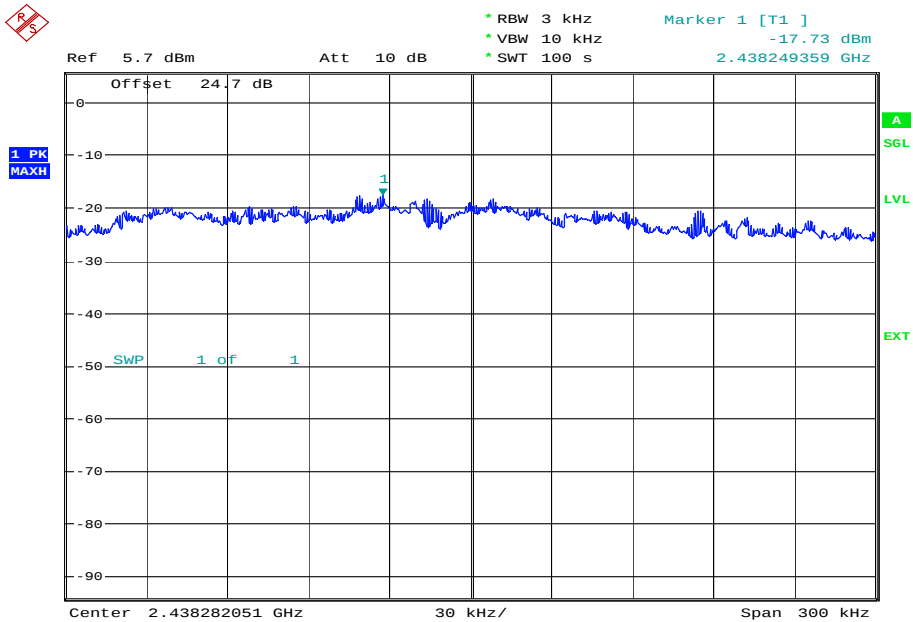


Date: 29.AUG.2013 10:46:28



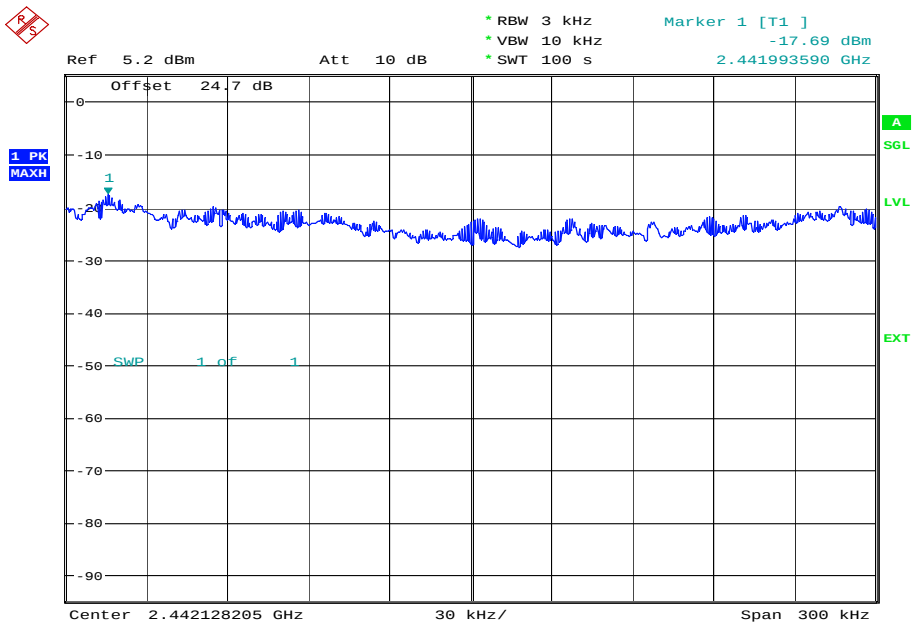
Product Service

58.5 Mbps



Date: 29.AUG.2013 11:16:14

65 Mbps



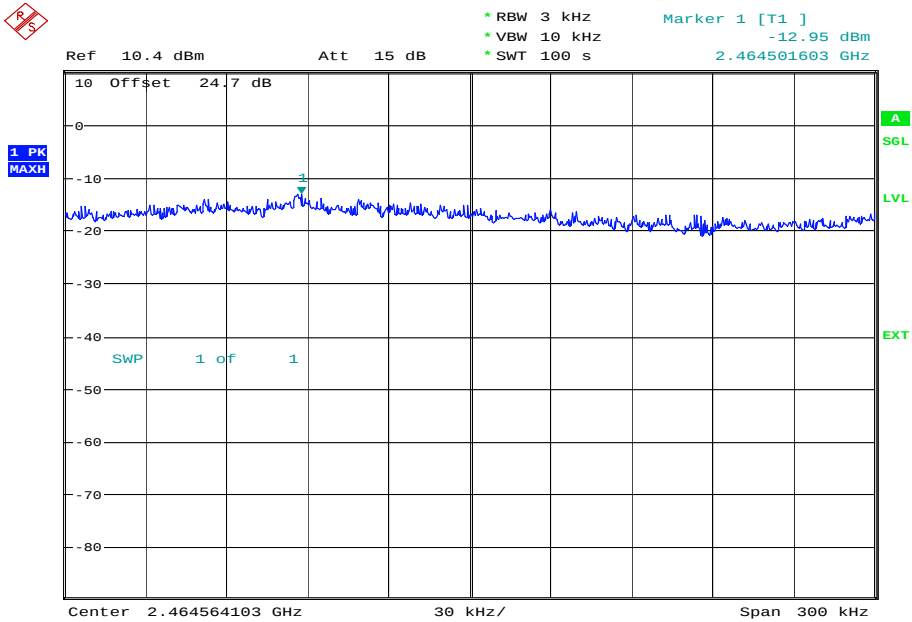
Date: 29.AUG.2013 11:33:14



Product Service

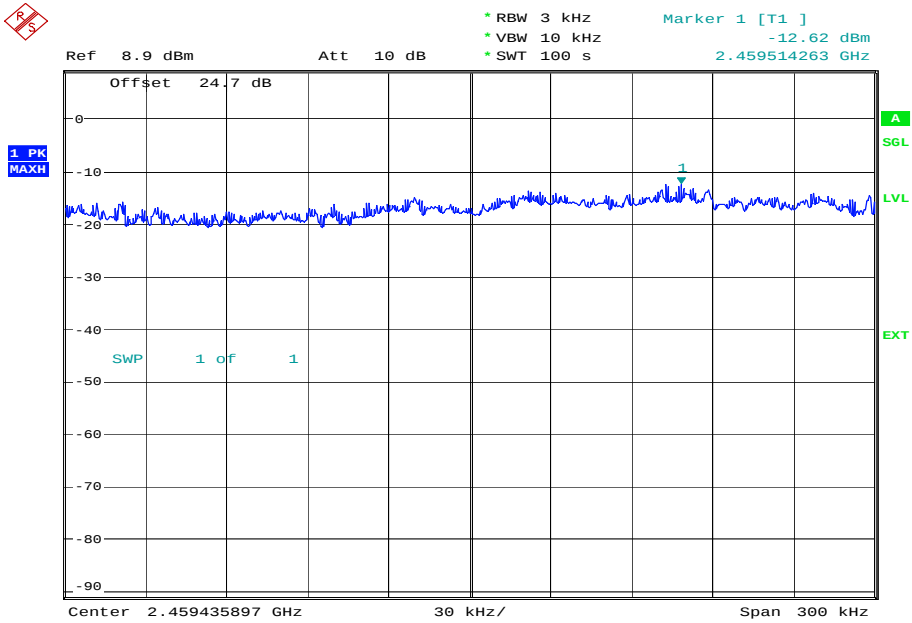
2462 MHz

6.5 Mbps



Date: 29.AUG.2013 09:21:17

13 Mbps

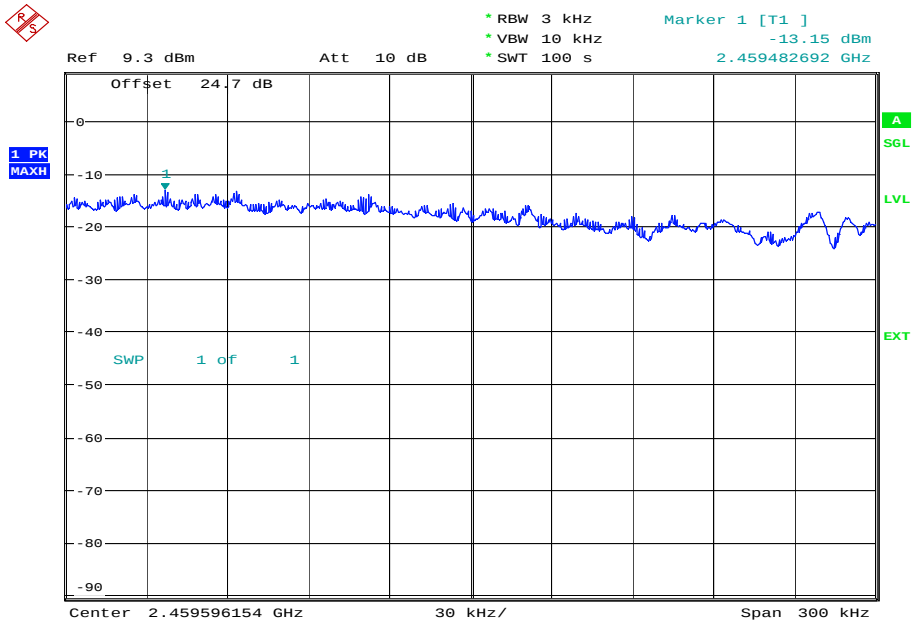


Date: 29.AUG.2013 09:28:04



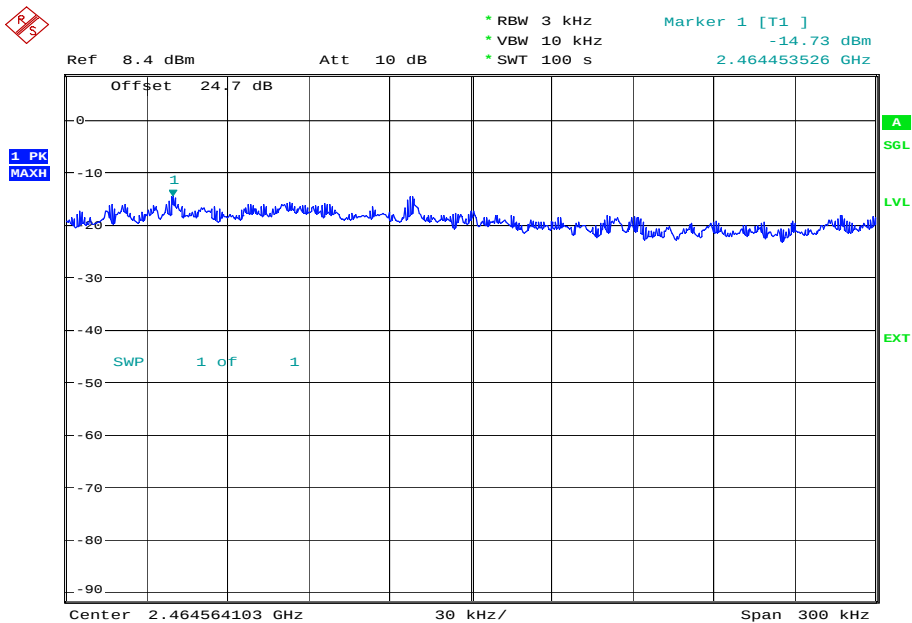
Product Service

19.5 Mbps



Date: 29.AUG.2013 10:00:37

26 Mbps

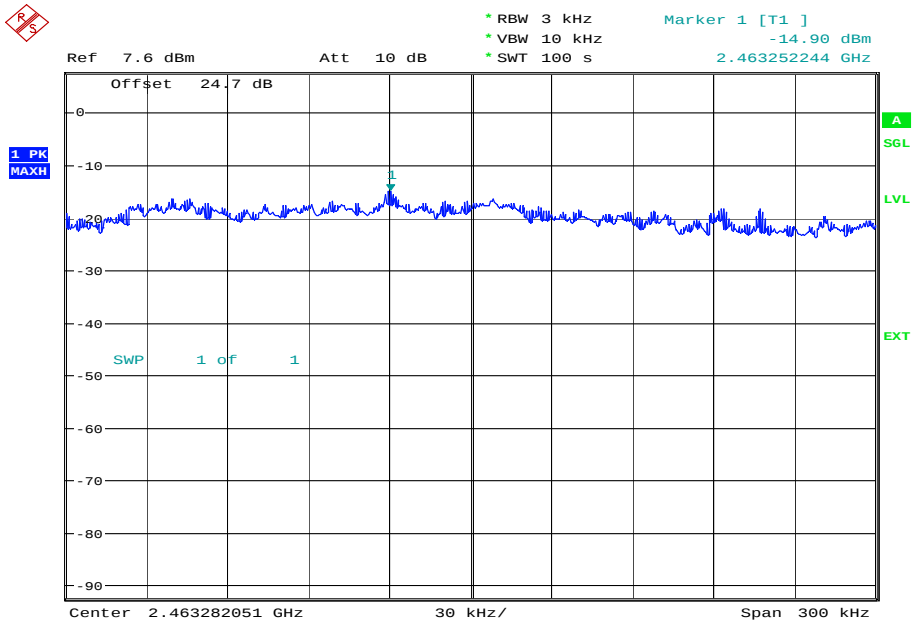


Date: 29.AUG.2013 10:06:07



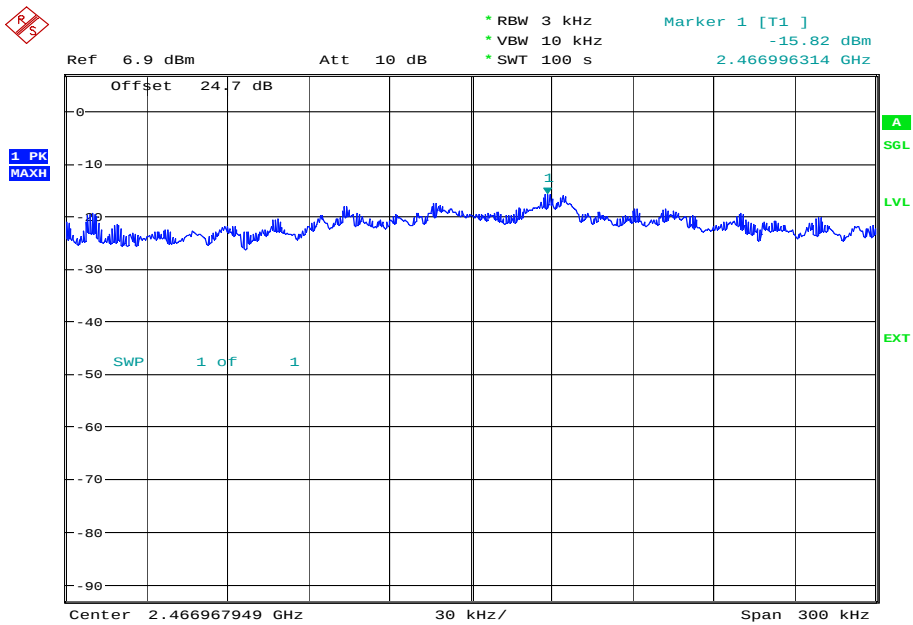
Product Service

39 Mbps



Date: 29.AUG.2013 10:26:24

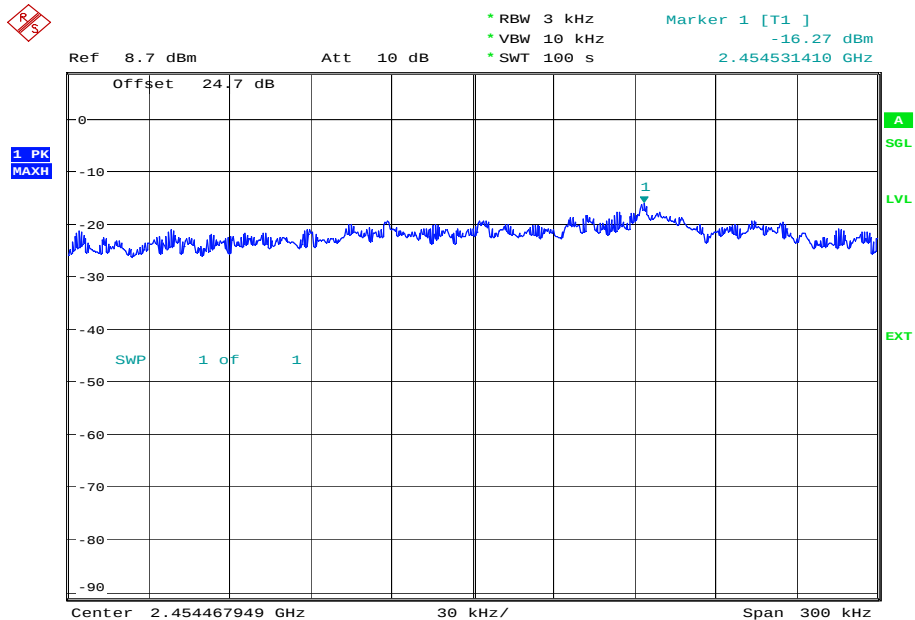
52 Mbps



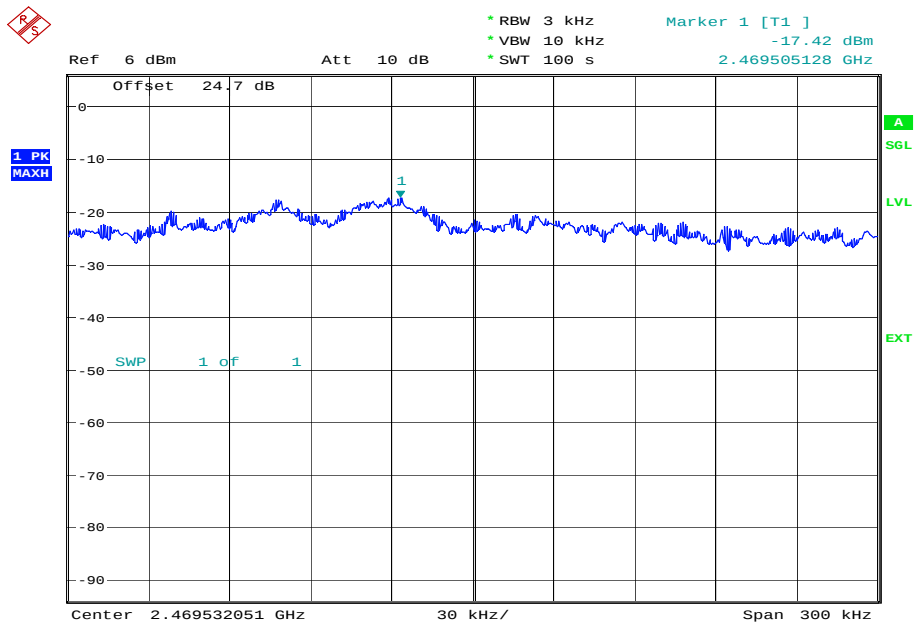
Date: 29.AUG.2013 10:30:42



Product Service

58.5 Mbps

Date: 29.AUG.2013 11:20:04

65 Mbps

Date: 29.AUG.2013 11:28:11

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.



Product Service

2.6 6dB BANDWIDTH**2.6.1 Specification Reference**

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

2.6.2 Equipment Under Test and Modification State

Black Smartphone S/N: XCV23200909 - Modification State 0

2.6.3 Date of Test

7 August 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	22.3°C
Relative Humidity	56.8%



Product Service

2.6.7 Test Results802.11(b)

3.8 V DC Supply

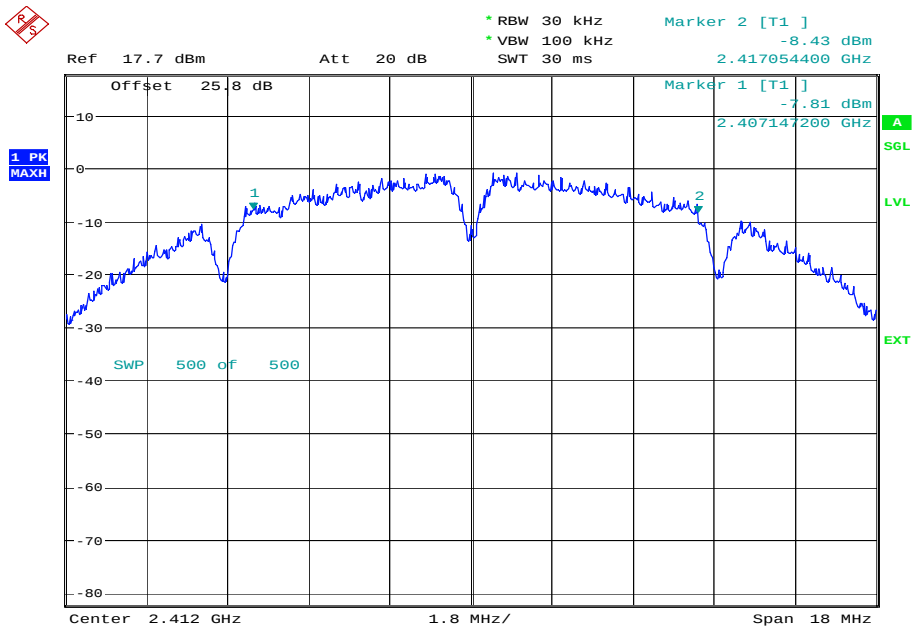
Frequency (MHz)	Data Rate (Mbps)	6dB Bandwidth (kHz)
2412 MHz	1	9907.2
	2	9446.4
	5.5	10310.4
	11	8640
2437 MHz	1	9878.4
	2	9590.4
	5.5	10224
	11	8640
2462 MHz	1	9907.2
	2	9504
	5.5	10224
	11	8611.2



Product Service

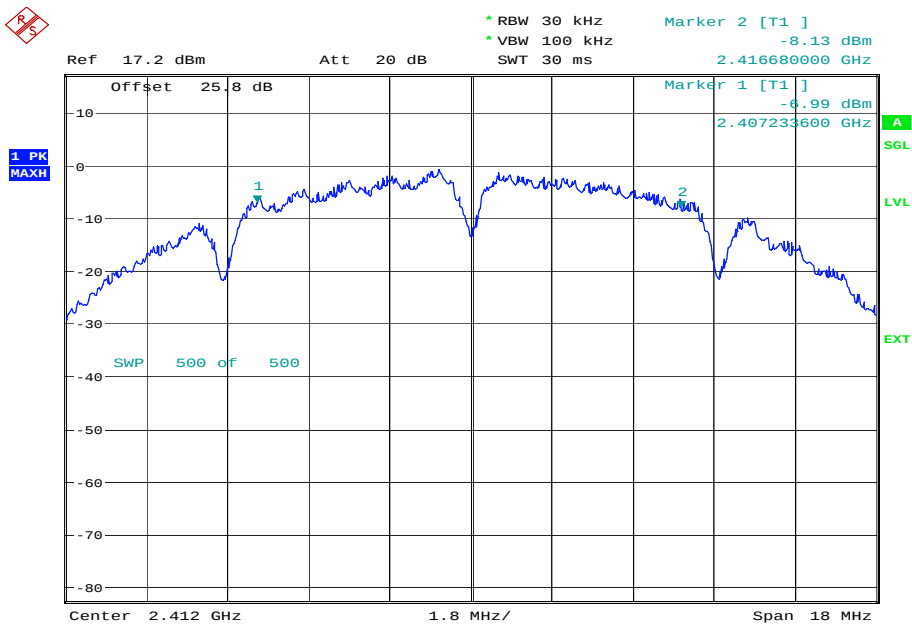
2412 MHz

1 Mbps



Date: 6.AUG.2013 08:55:18

2 Mbps

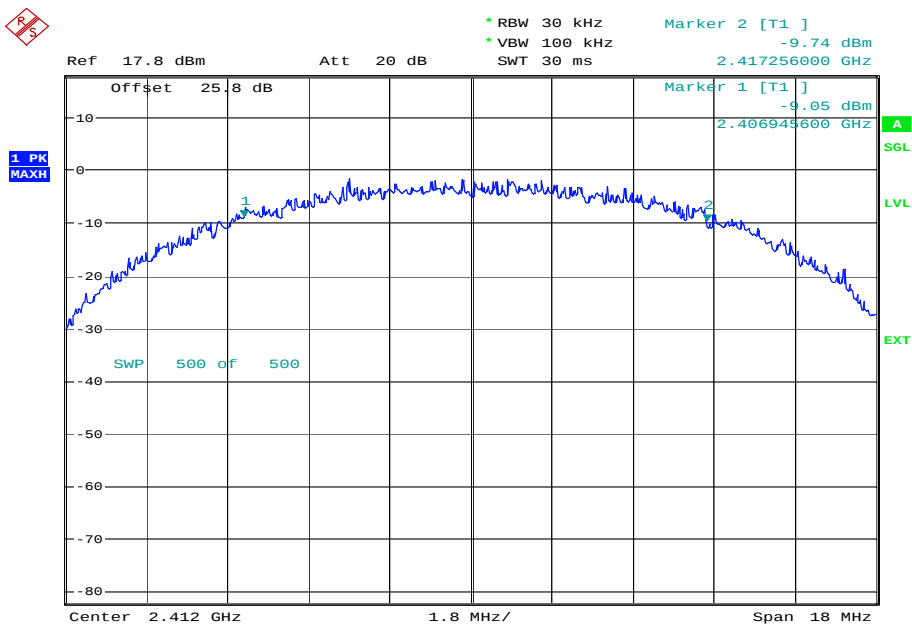


Date: 6.AUG.2013 09:09:30



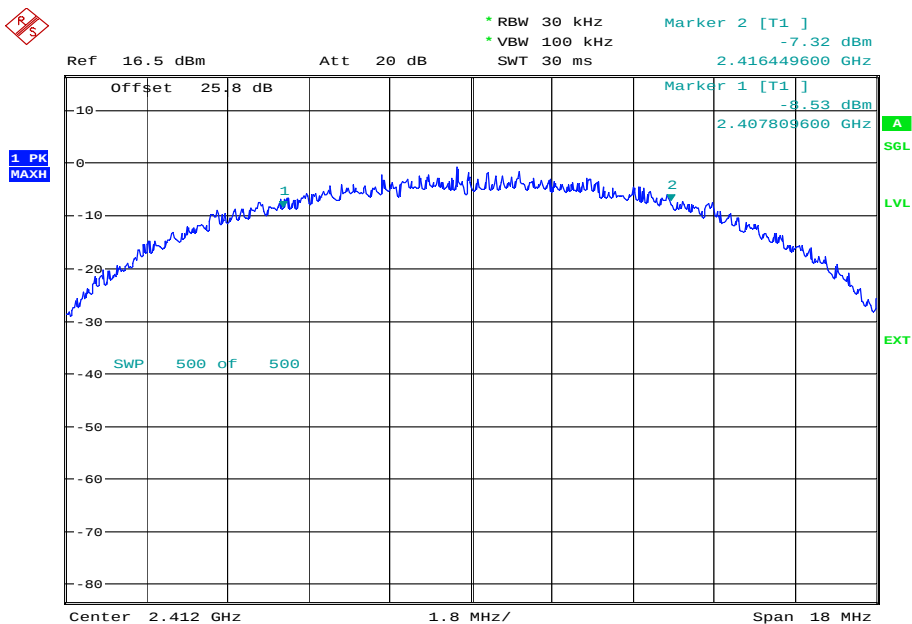
Product Service

5.5 Mbps



Date: 6.AUG.2013 09:15:12

11 Mbps



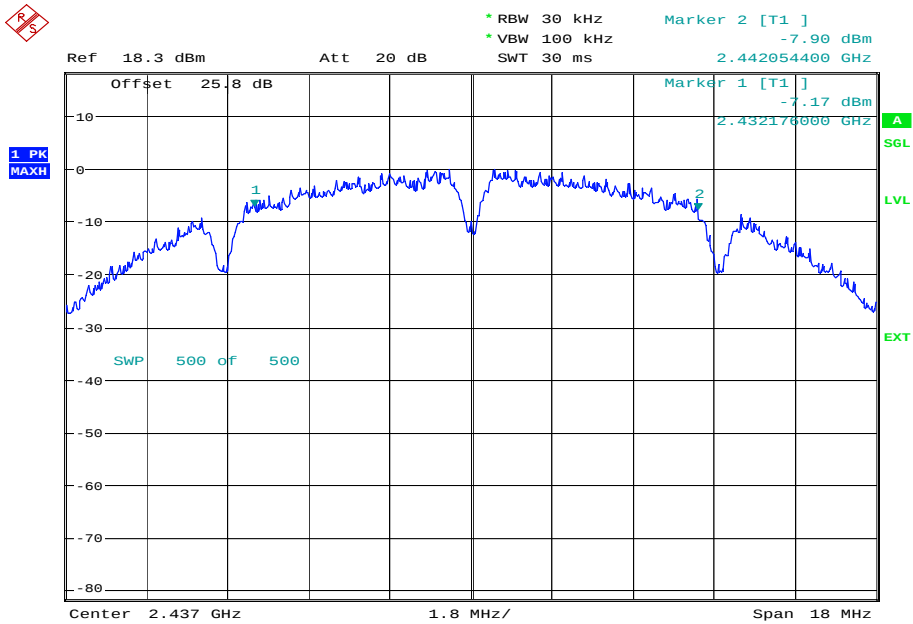
Date: 6.AUG.2013 09:21:40



Product Service

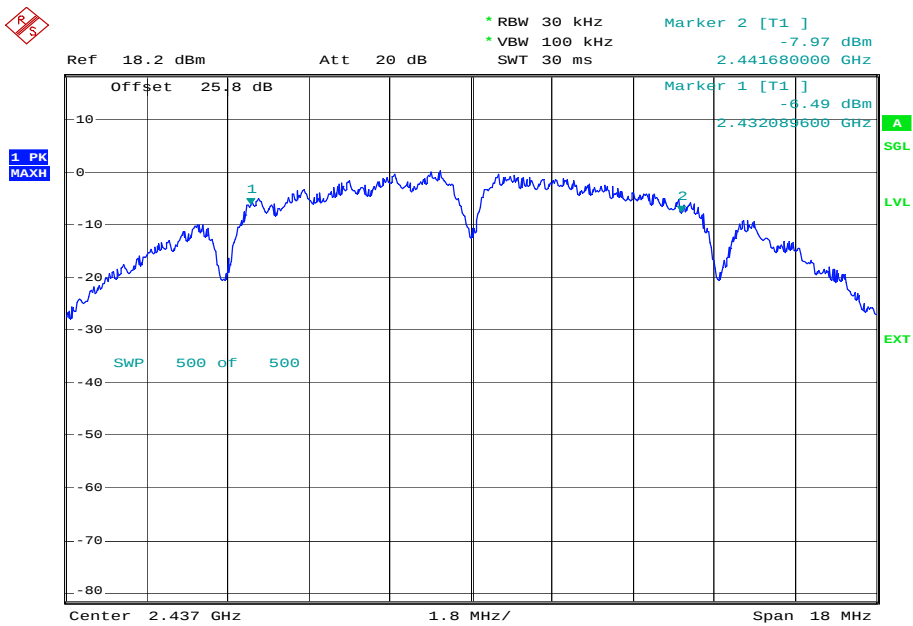
2437 MHz

1 Mbps



Date: 6.AUG.2013 09:36:34

2 Mbps

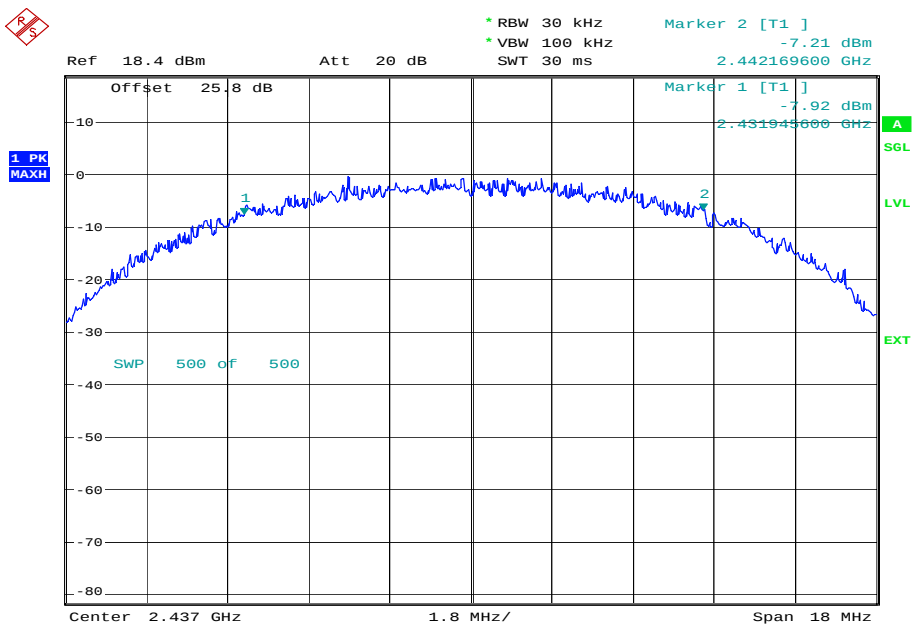


Date: 6.AUG.2013 09:44:21



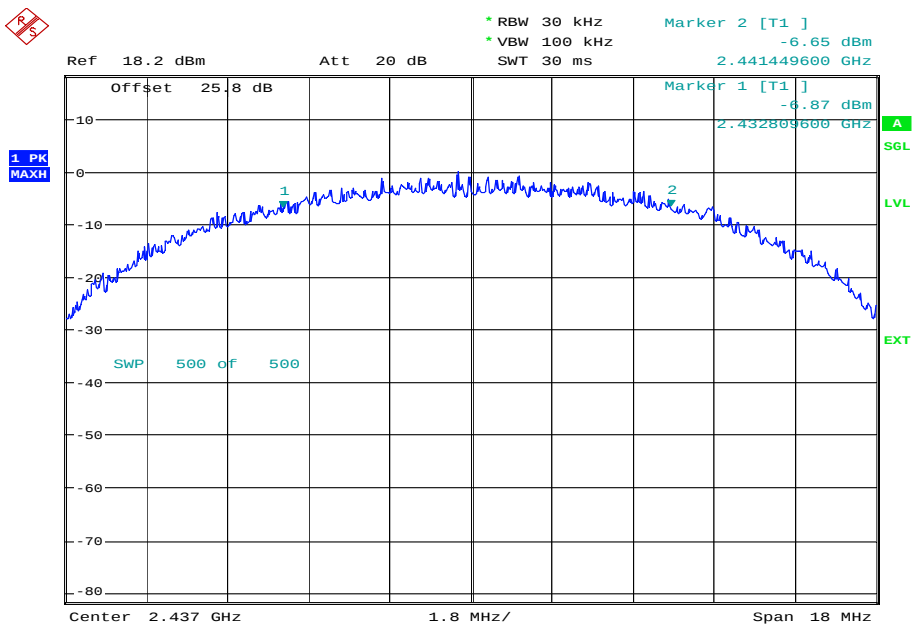
Product Service

5.5 Mbps



Date: 6.AUG.2013 09:53:26

11 Mbps



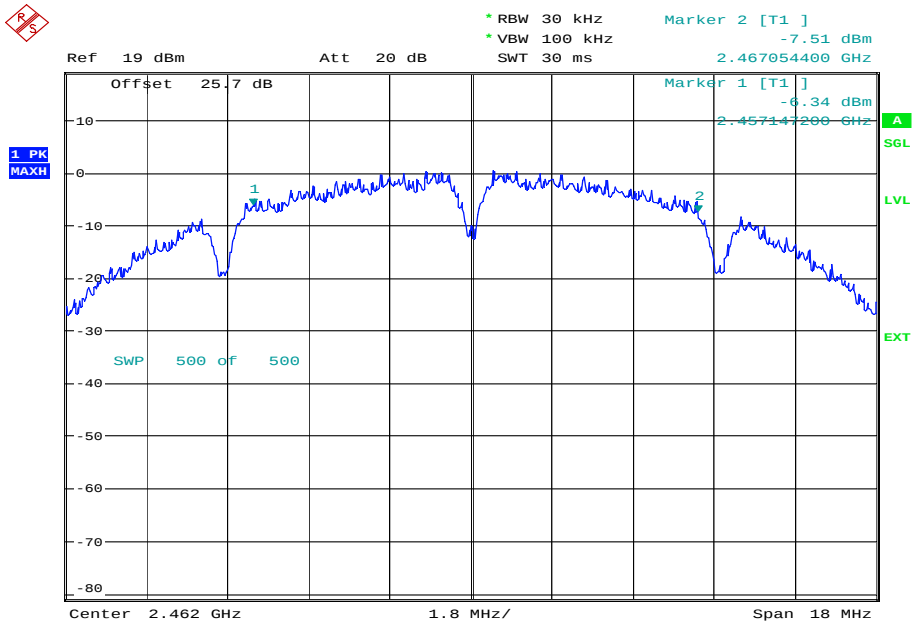
Date: 6.AUG.2013 09:58:41



Product Service

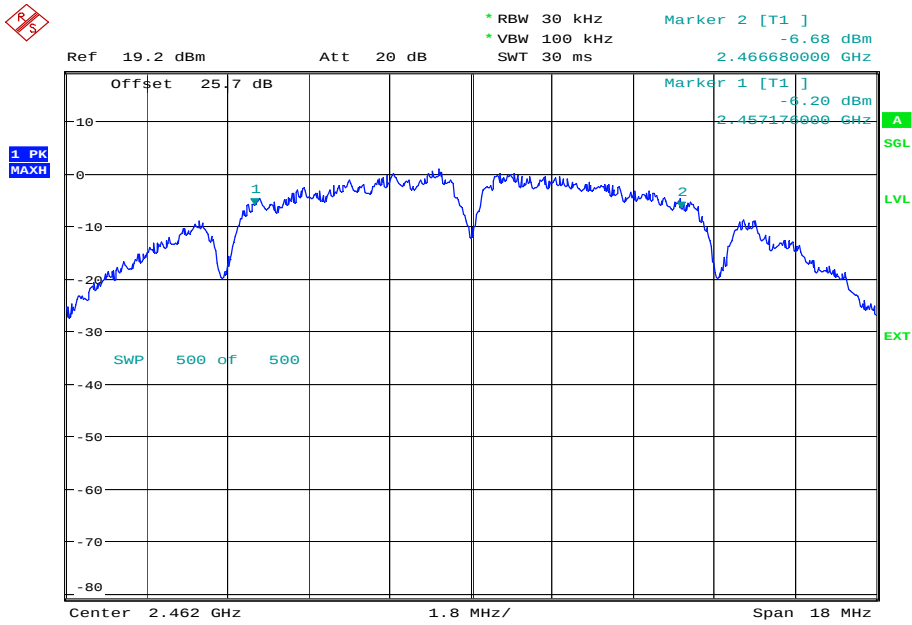
2462 MHz

1 Mbps



Date: 6.AUG.2013 10:23:47

2 Mbps

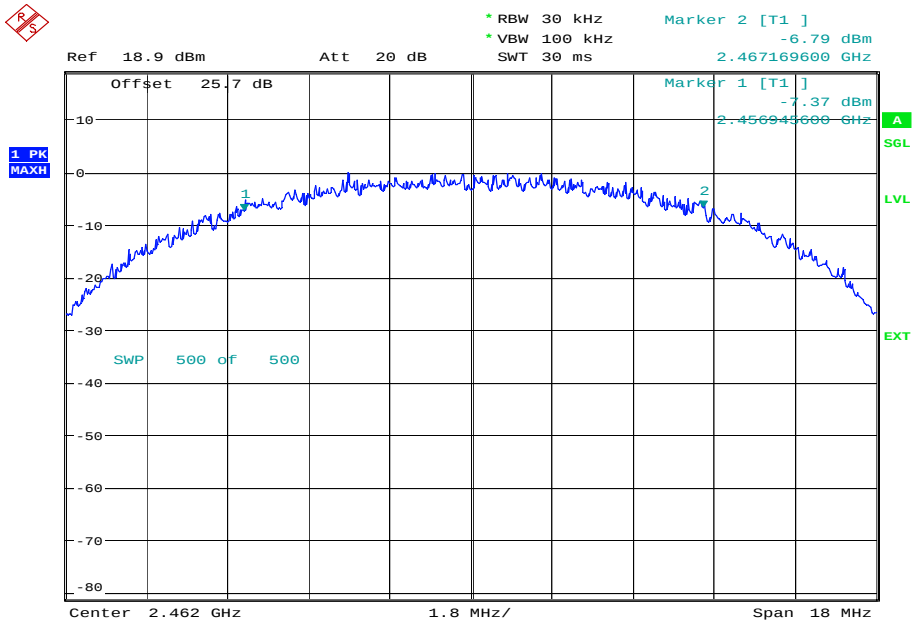


Date: 6.AUG.2013 10:18:48



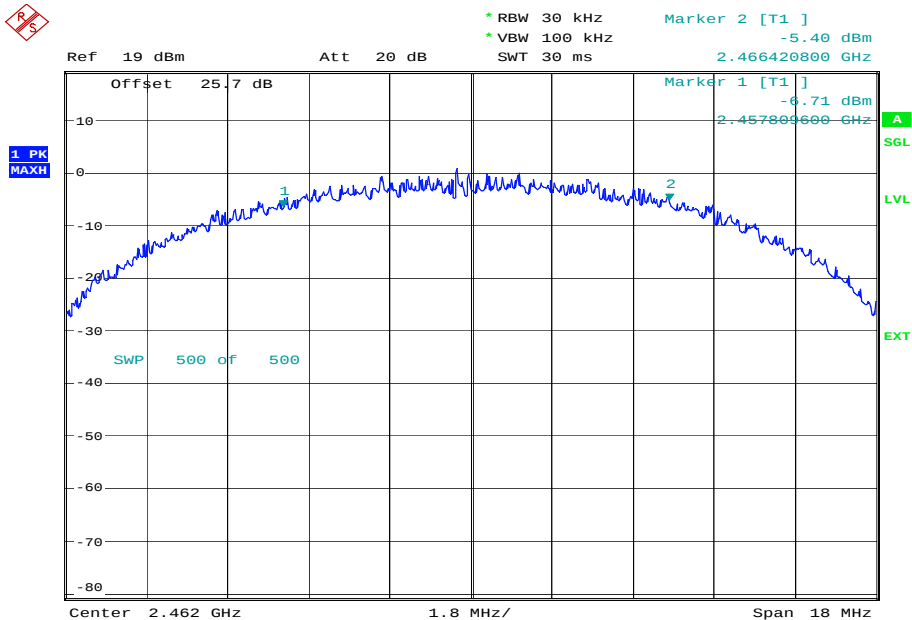
Product Service

5.5 Mbps



Date: 6.AUG.2013 10:12:45

11 Mbps



Date: 6.AUG.2013 10:07:56

Limit Clause

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

802.11(g)

3.8 V DC Supply

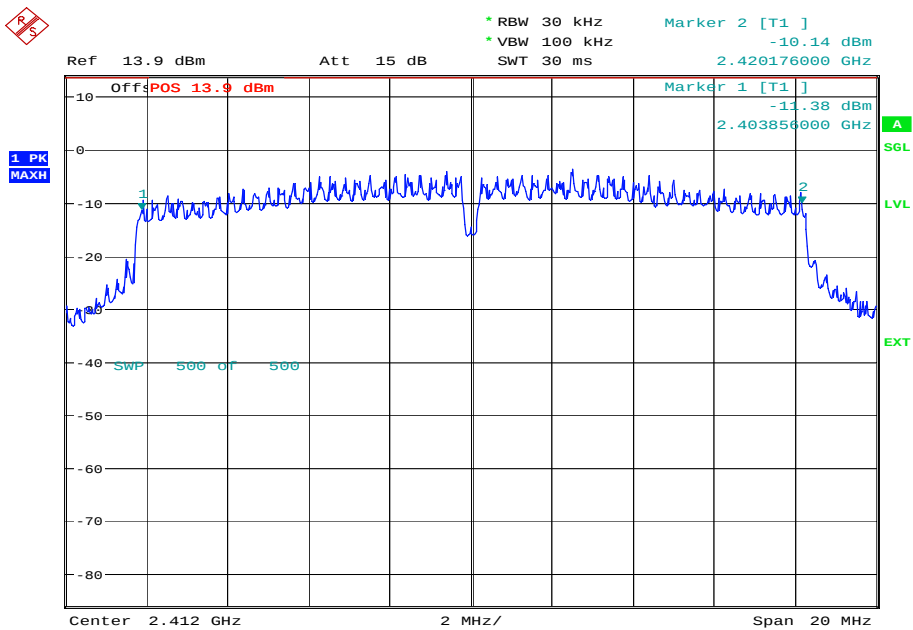
Frequency (MHz)	Data Rate (Mbps)	6dB Bandwidth (kHz)
2412 MHz	6	16320
	9	16352
	12	16416
	18	15968
	24	16512
	36	16544
	48	16480
	54	16512
2437 MHz	6	16352
	9	16096
	12	16448
	18	16064
	24	16576
	36	16544
	48	16544
	54	16576
2462 MHz	6	16352
	9	16352
	12	16416
	18	16352
	24	16576
	36	16576
	48	16544
	54	16576



Product Service

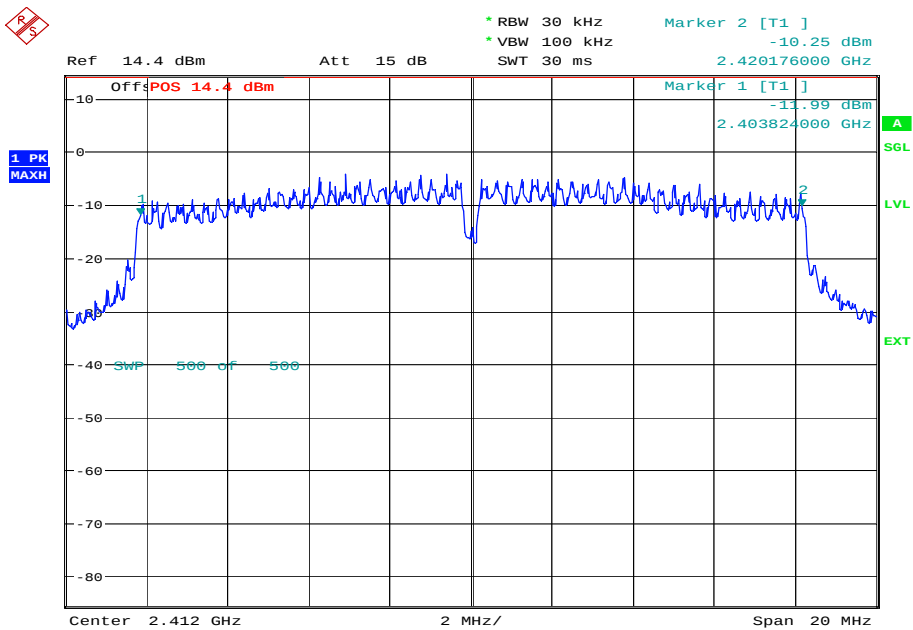
2412 MHz

6 Mbps



Date: 7.AUG.2013 08:14:27

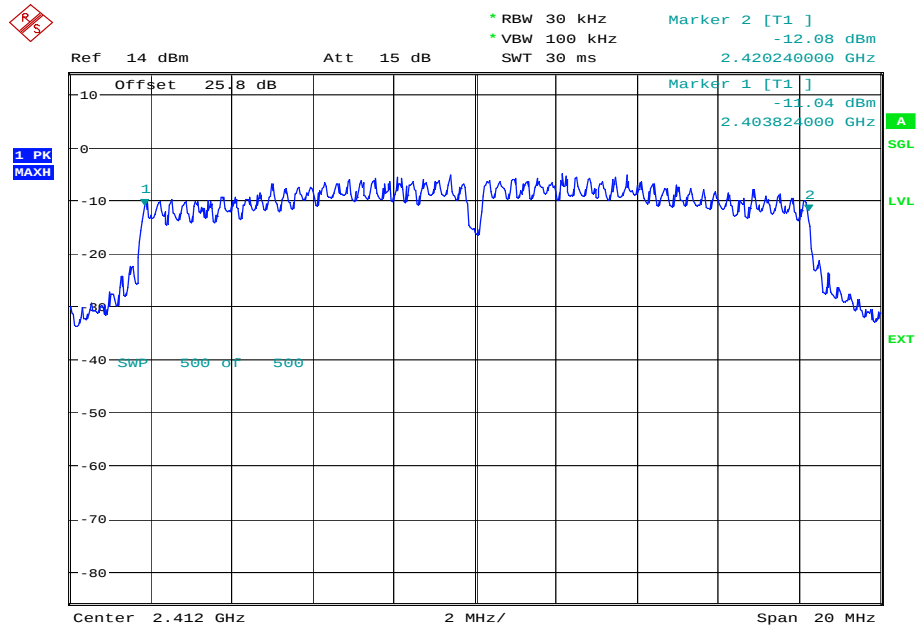
9 Mbps



Date: 7.AUG.2013 08:31:44

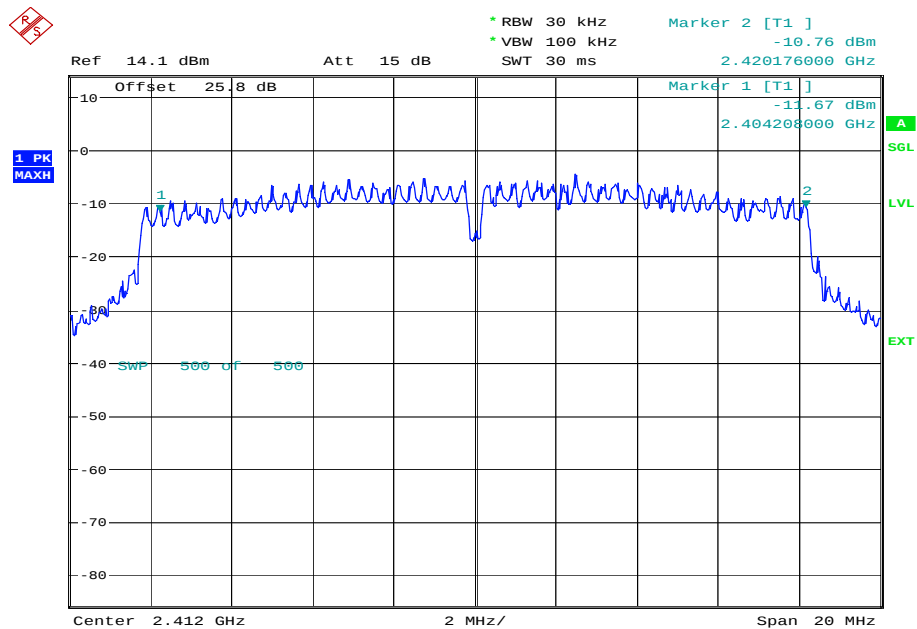


12 Mbps



Date: 7.AUG.2013 08:48:53

18 Mbps

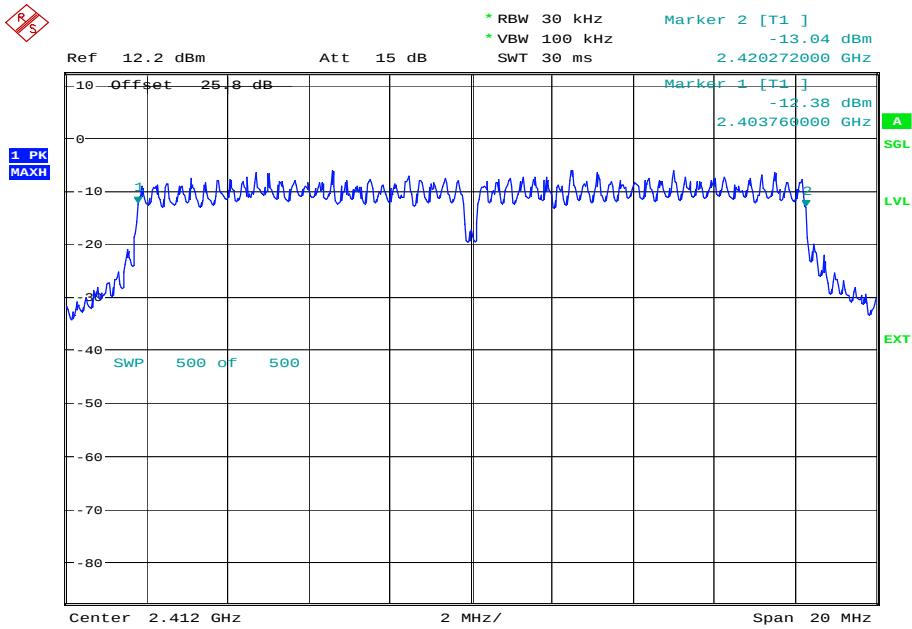


Date: 7.AUG.2013 09:05:55



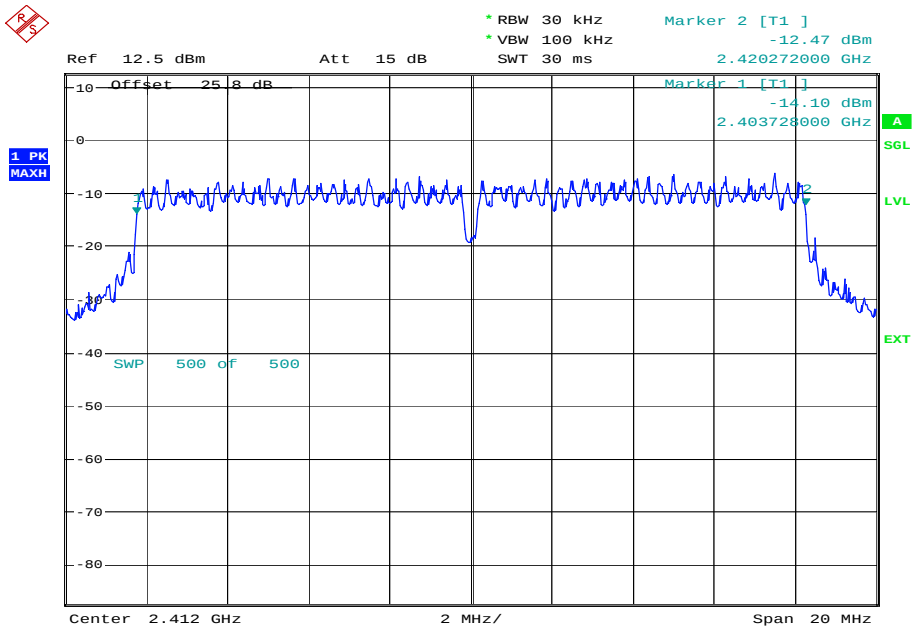
Product Service

24 Mbps



Date: 7.AUG.2013 09:24:27

36 Mbps

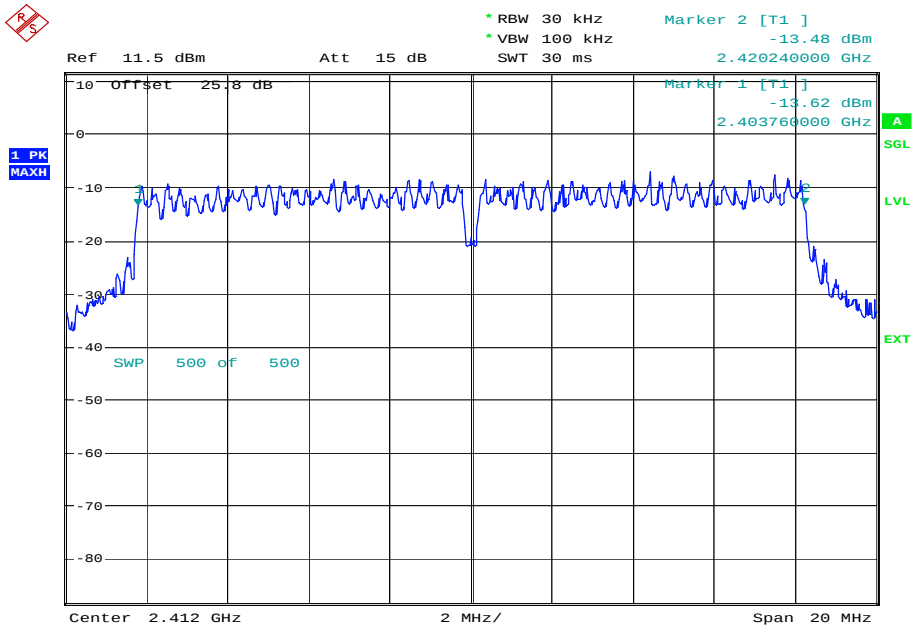


Date: 7.AUG.2013 09:44:12



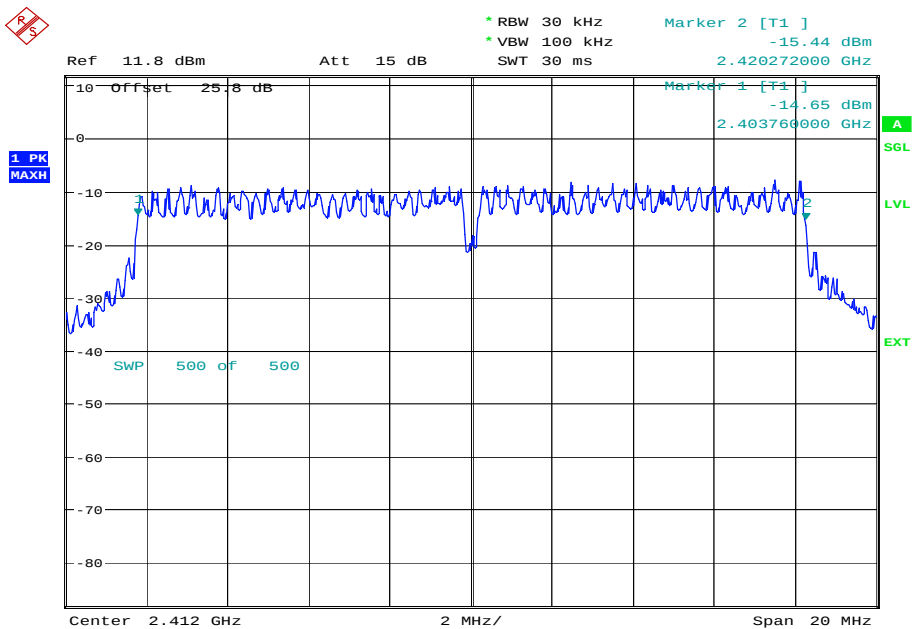
Product Service

48 Mbps



Date: 7.AUG.2013 10:07:33

54 Mbps



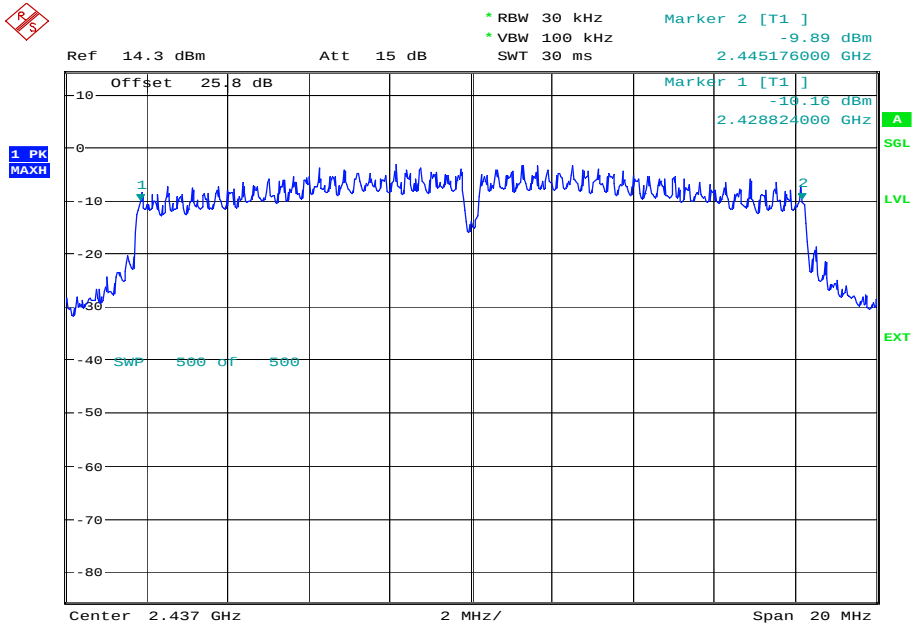
Date: 7.AUG.2013 10:24:55



Product Service

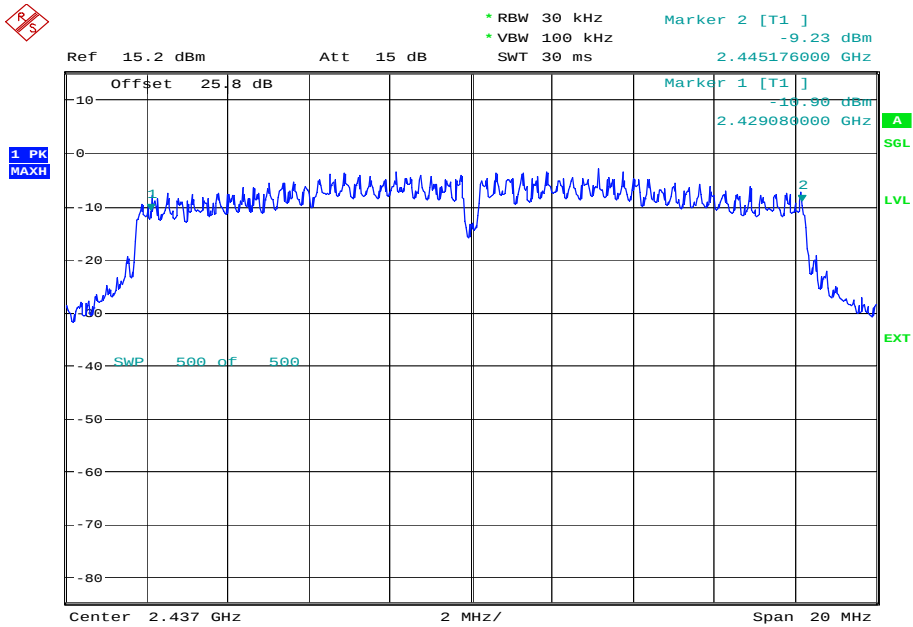
2437 MHz

6 Mbps



Date: 7.AUG.2013 08:19:57

9 Mbps

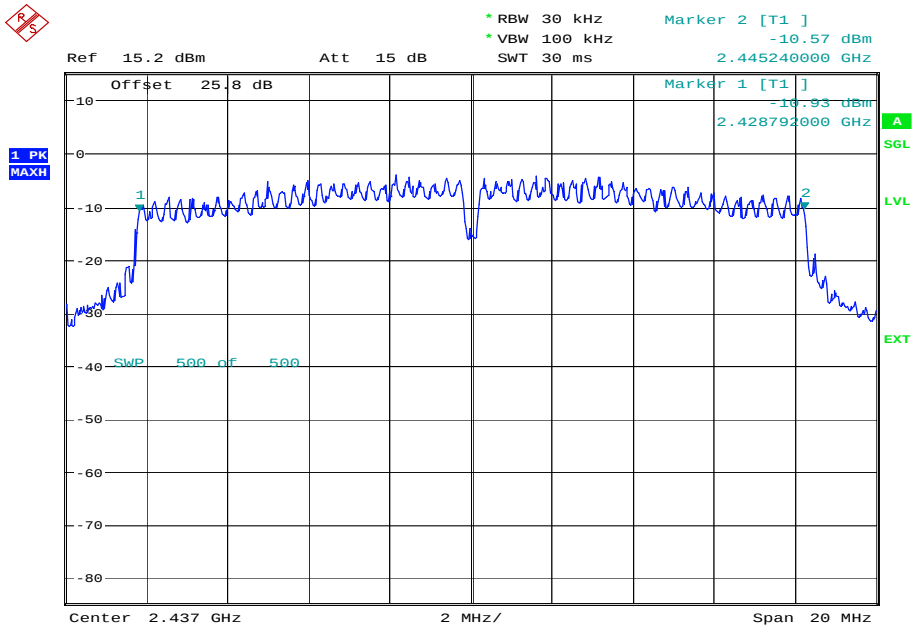


Date: 7.AUG.2013 08:37:23



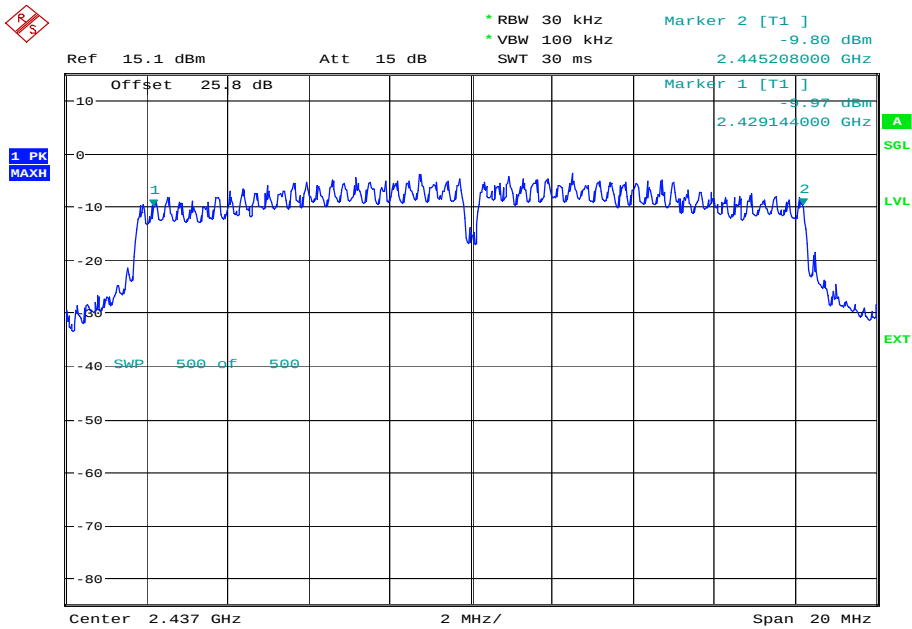
Product Service

12 Mbps



Date: 7.AUG.2013 08:55:01

18 Mbps

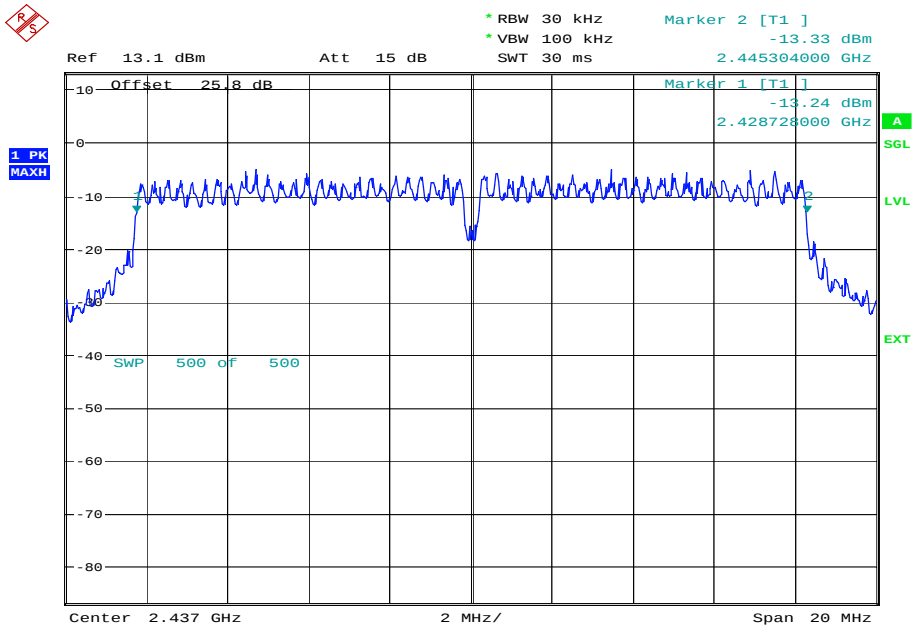


Date: 7.AUG.2013 09:12:49



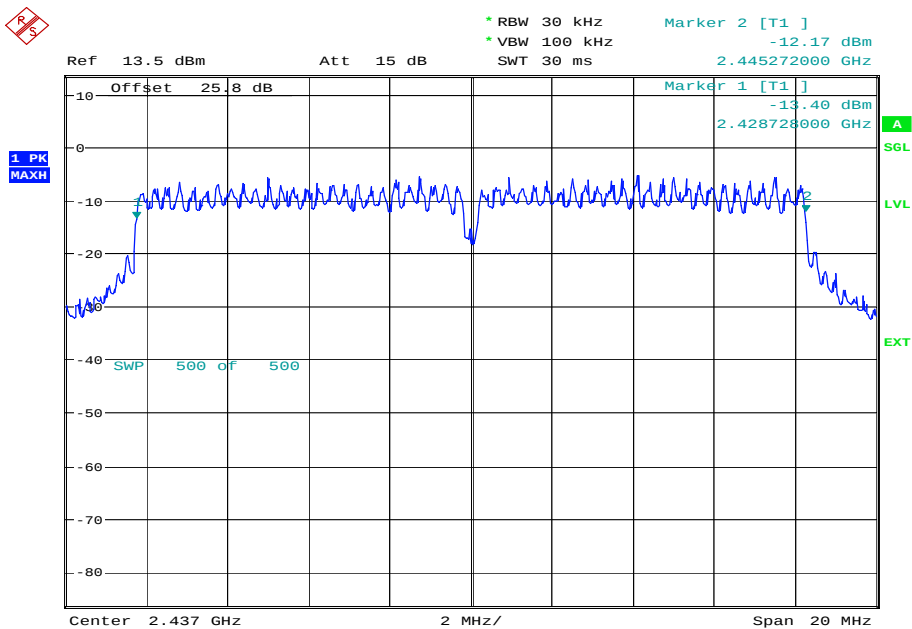
Product Service

24 Mbps



Date: 7.AUG.2013 09:32:06

36 Mbps

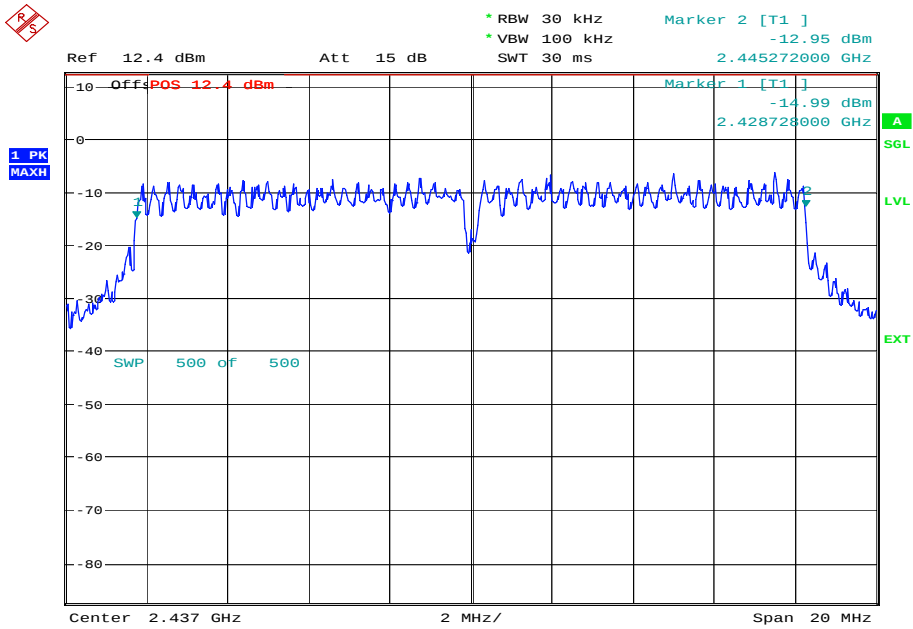


Date: 7.AUG.2013 09:54:52



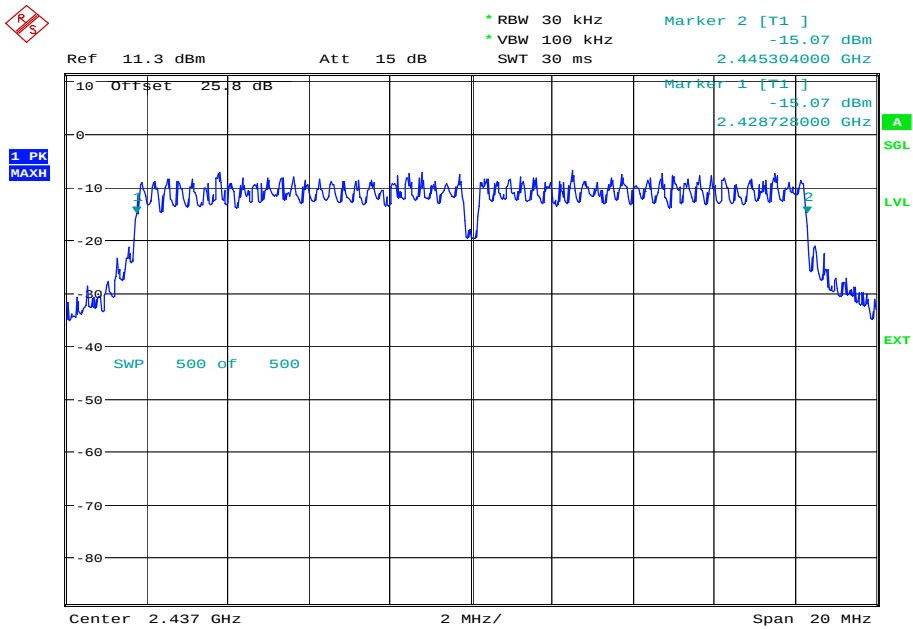
Product Service

48 Mbps



Date: 7.AUG.2013 10:13:48

54 Mbps



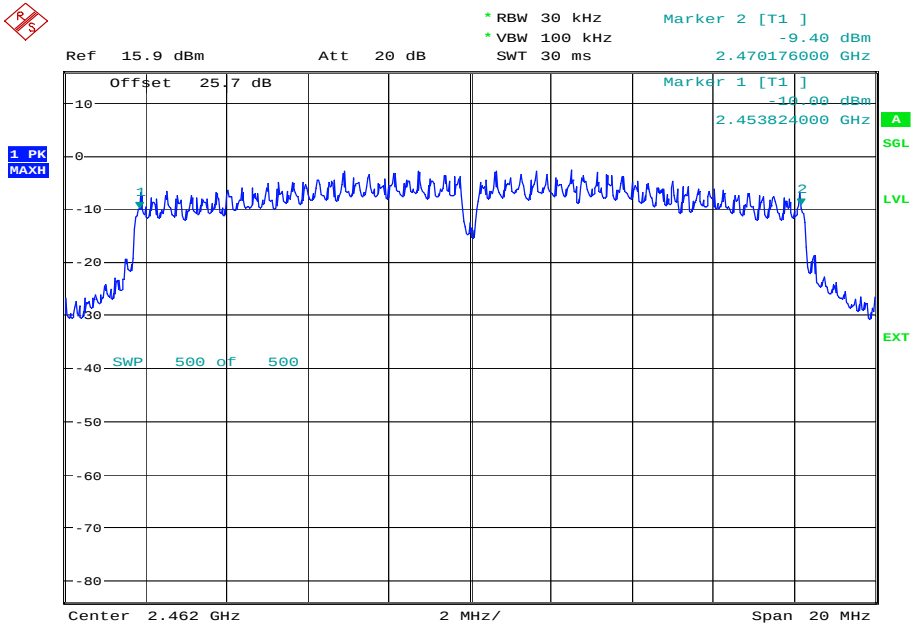
Date: 7.AUG.2013 10:30:25



Product Service

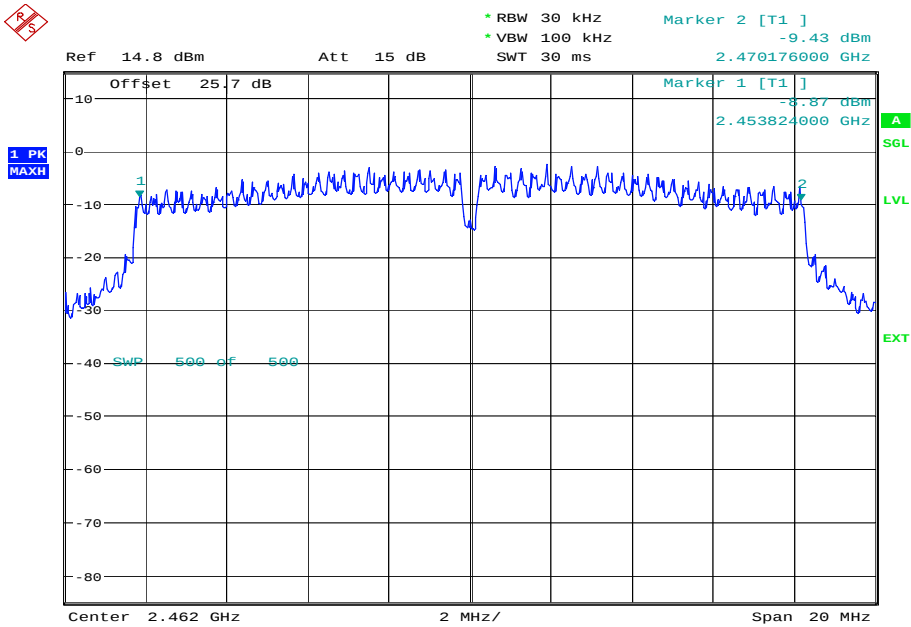
2462 MHz

6 Mbps



Date: 7.AUG.2013 08:25:20

9 Mbps

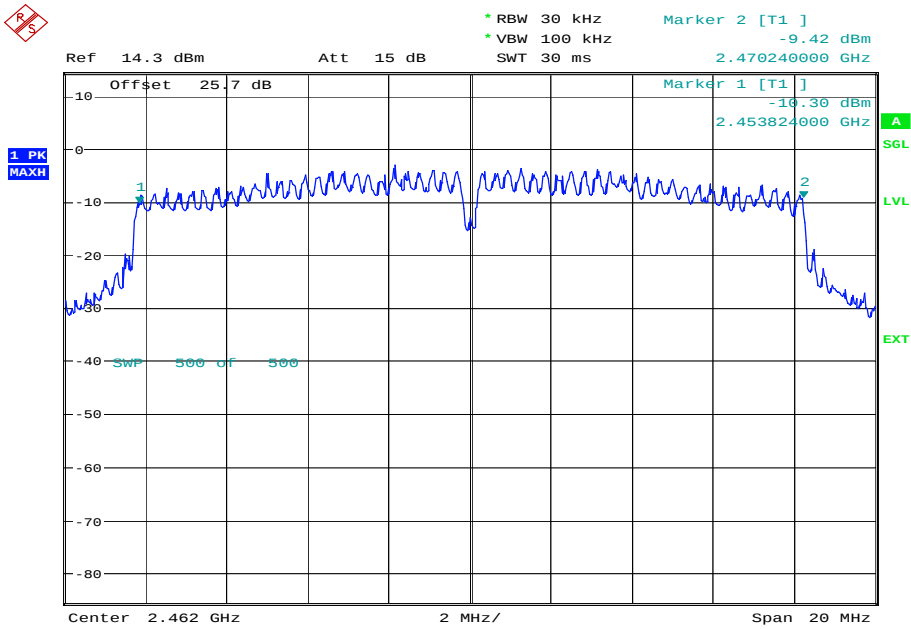


Date: 7.AUG.2013 08:42:20



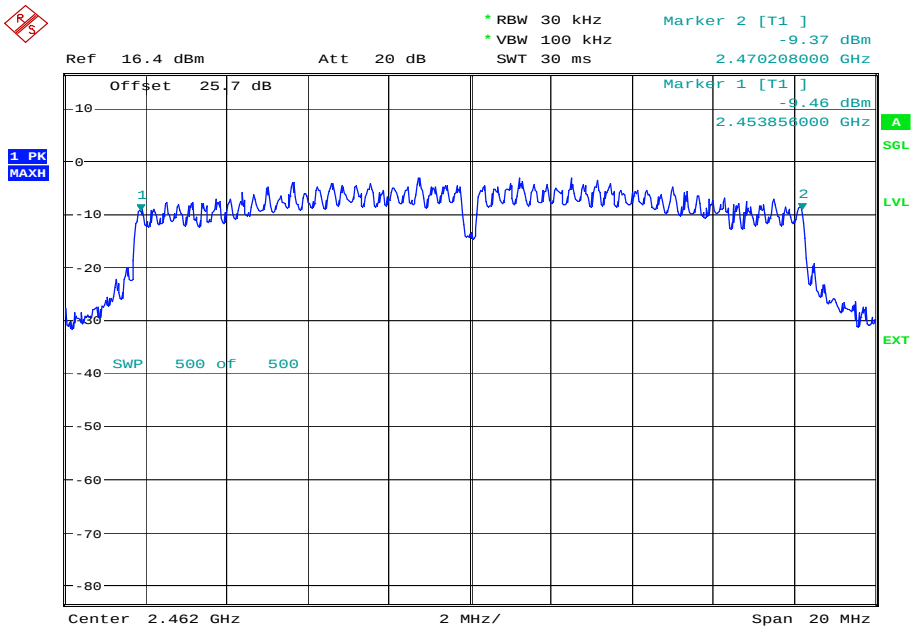
Product Service

12 Mbps



Date: 7.AUG.2013 09:00:01

18 Mbps

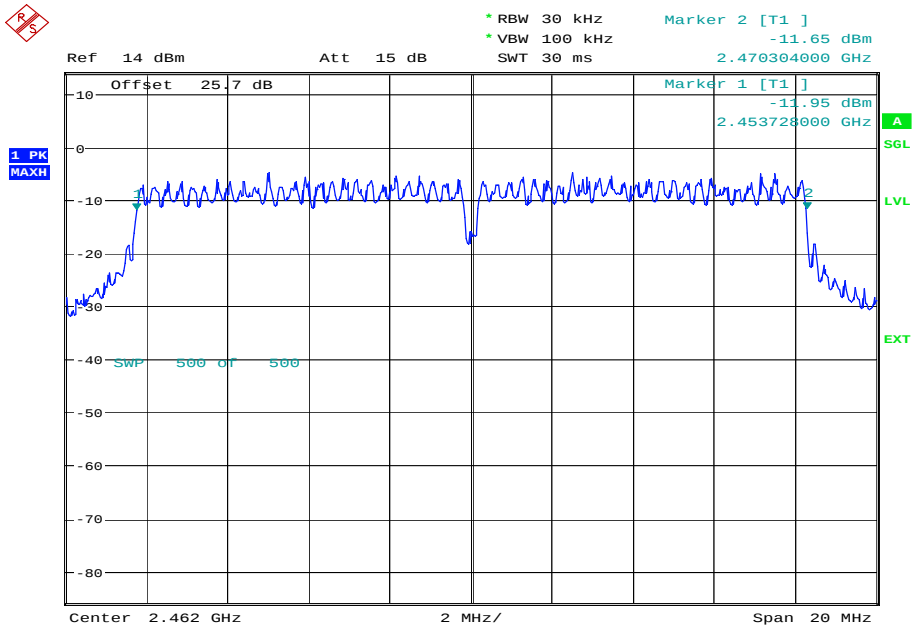


Date: 7.AUG.2013 09:17:46



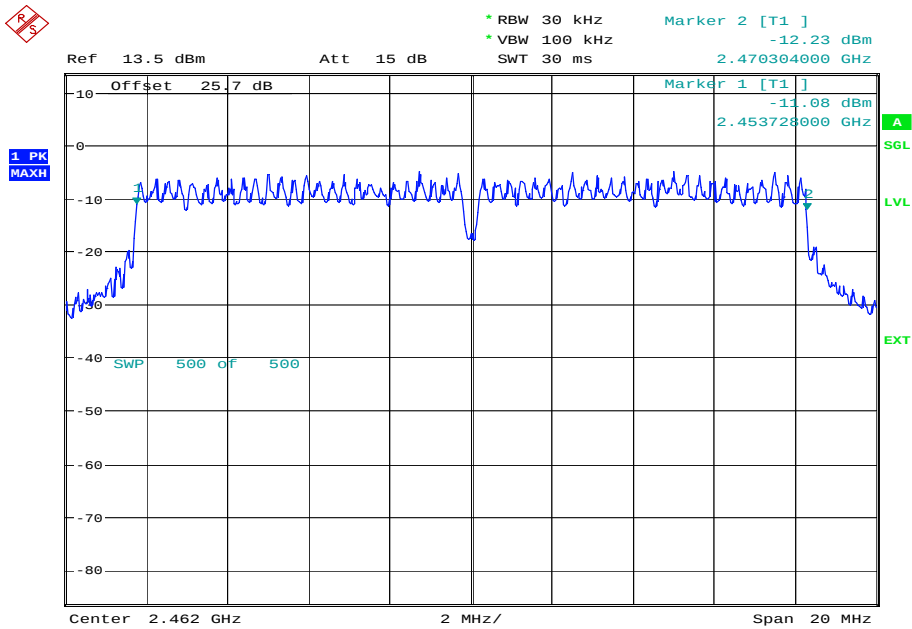
Product Service

24 Mbps



Date: 7.AUG.2013 09:37:02

36 Mbps

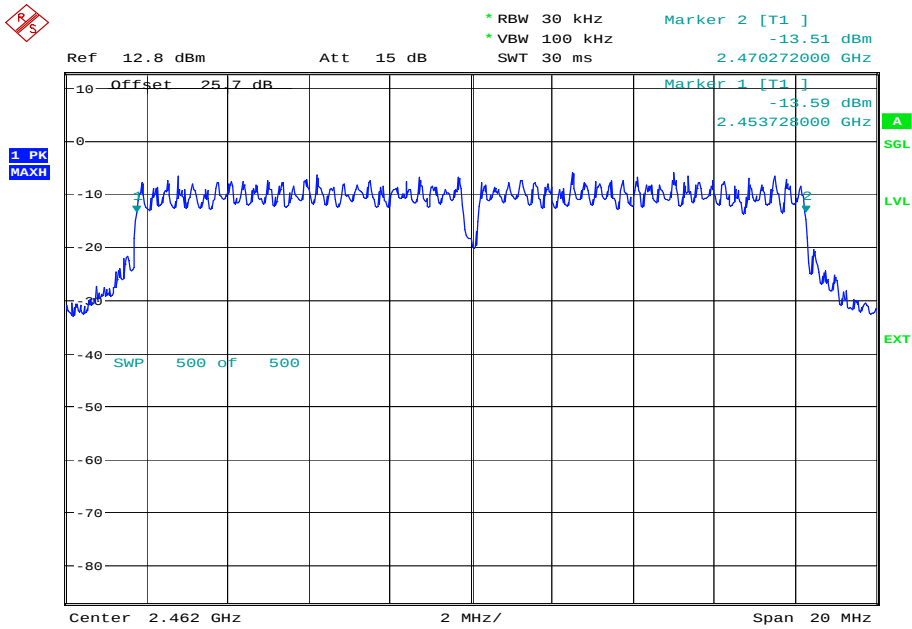


Date: 7.AUG.2013 10:00:18



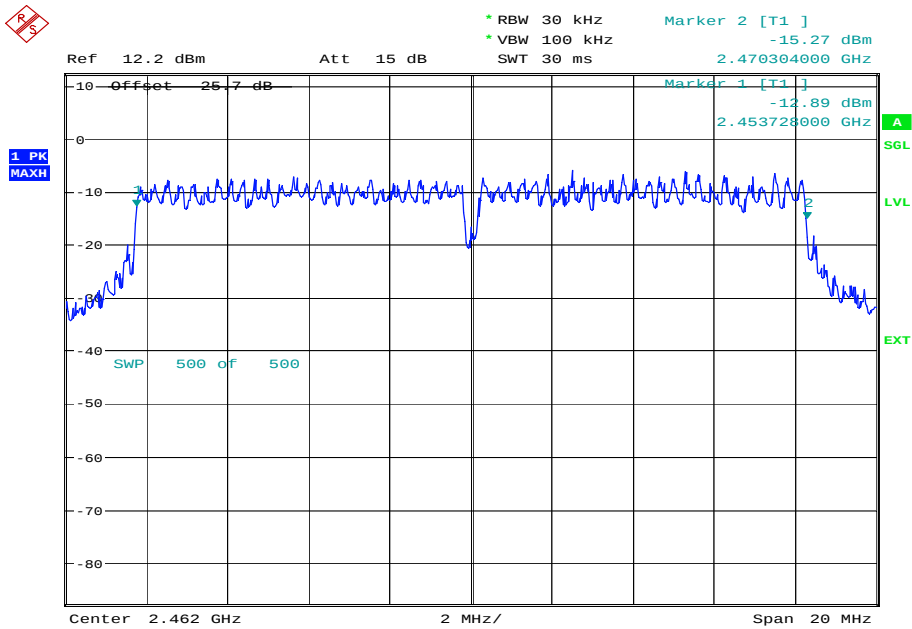
Product Service

48 Mbps



Date: 7.AUG.2013 10:18:55

54 Mbps



Date: 7.AUG.2013 10:36:06

Limit Clause

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

802.11(n)

3.8 V DC Supply

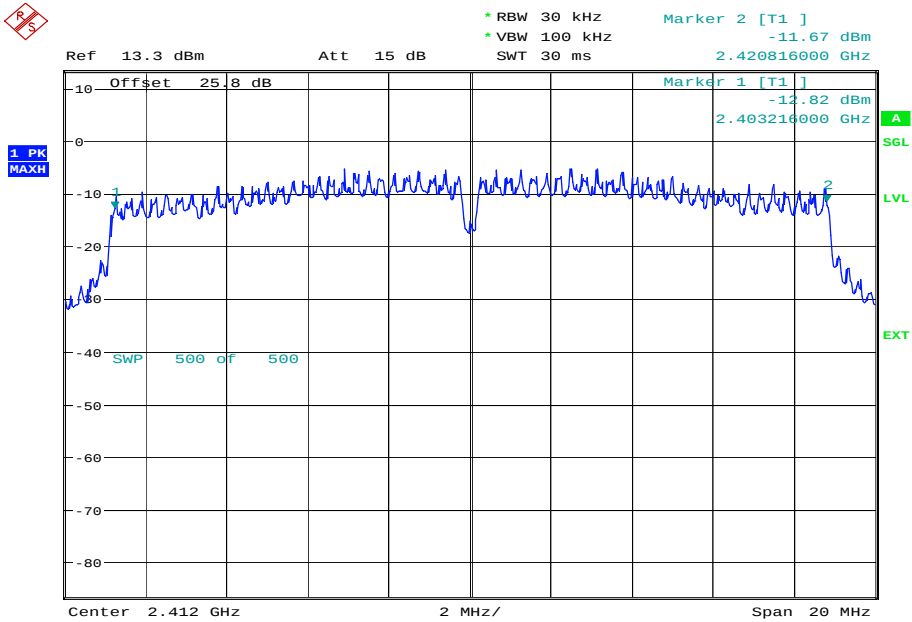
Frequency (MHz)	Data Rate (Mbps)	6dB Bandwidth (kHz)
2412 MHz	6.5	17600
	13	17312
	19.5	17024
	26	17792
	39	17760
	52	17792
	58.5	17760
	65	17760
2437 MHz	6.5	17600
	13	17024
	19.5	17696
	26	17792
	39	17760
	52	17760
	58.5	17792
	65	17760
2462 MHz	6.5	17632
	13	17344
	19.5	17408
	26	17760
	39	17792
	52	17824
	58.5	17792
	65	17792



Product Service

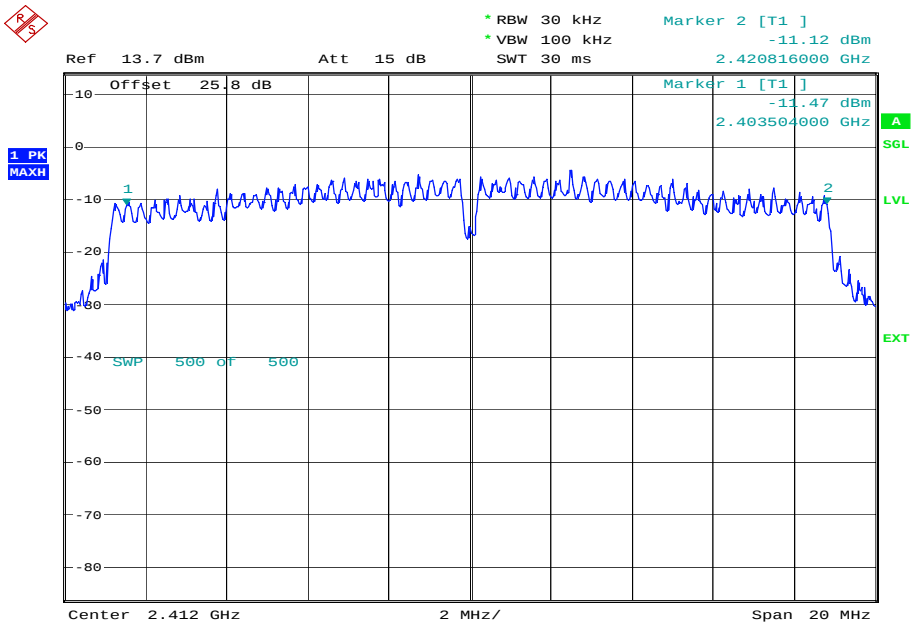
2412 MHz

6.5 Mbps



Date: 7.AUG.2013 12:52:19

13 Mbps

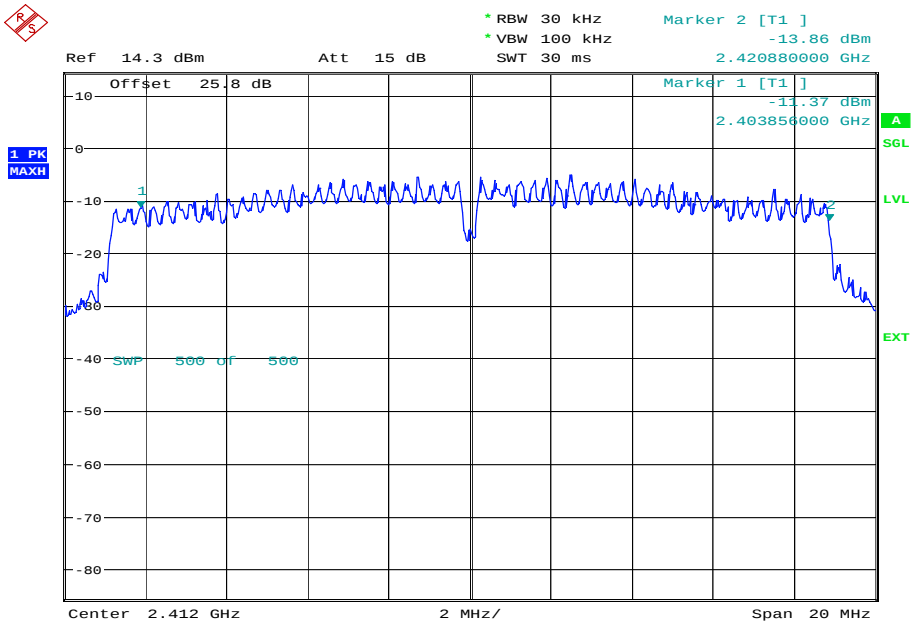


Date: 7.AUG.2013 13:11:20



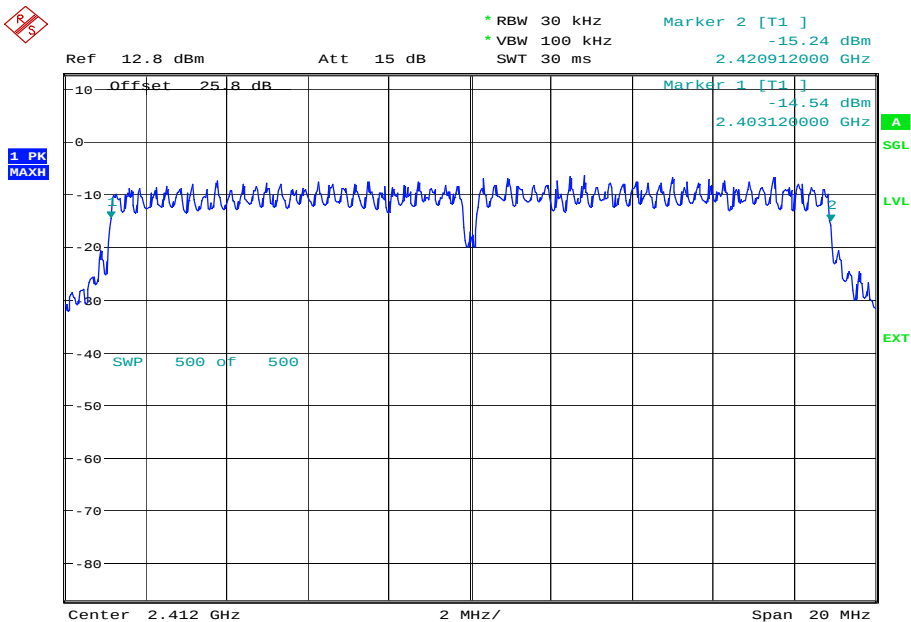
Product Service

19.5 Mbps



Date: 7.AUG.2013 13:28:37

26 Mbps

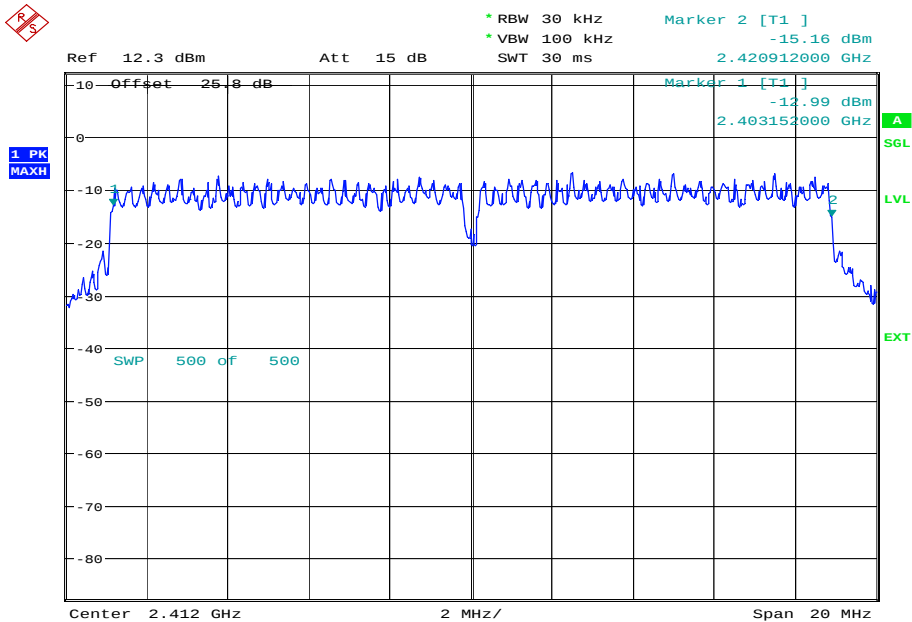


Date: 7.AUG.2013 13:50:35



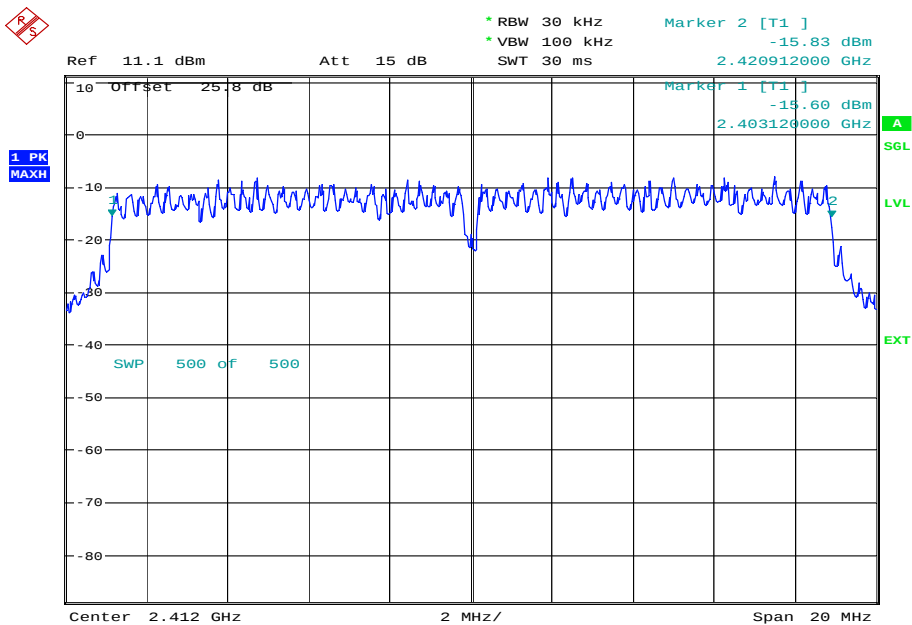
Product Service

39 Mbps



Date: 7.AUG.2013 14:07:14

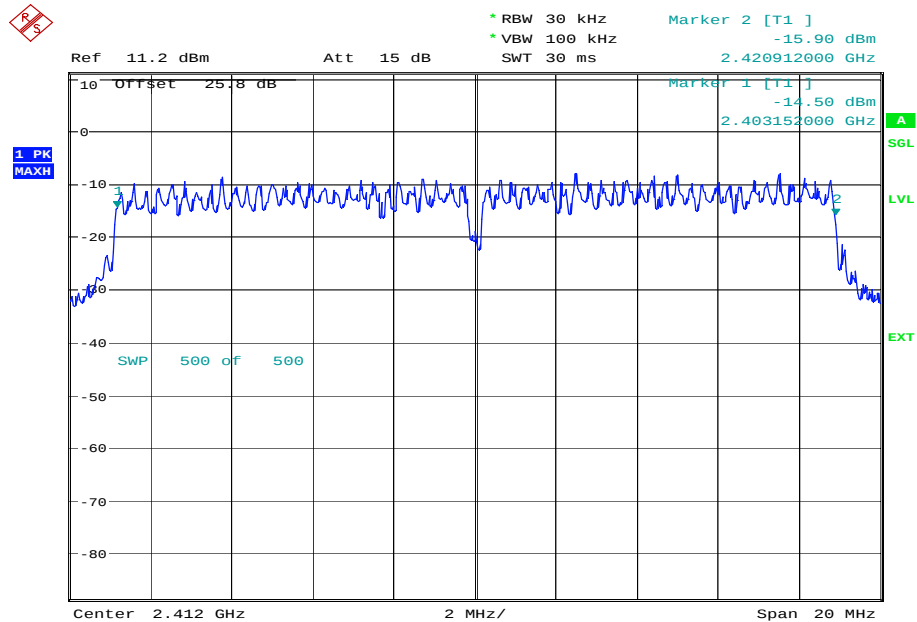
52 Mbps



Date: 7.AUG.2013 14:28:12

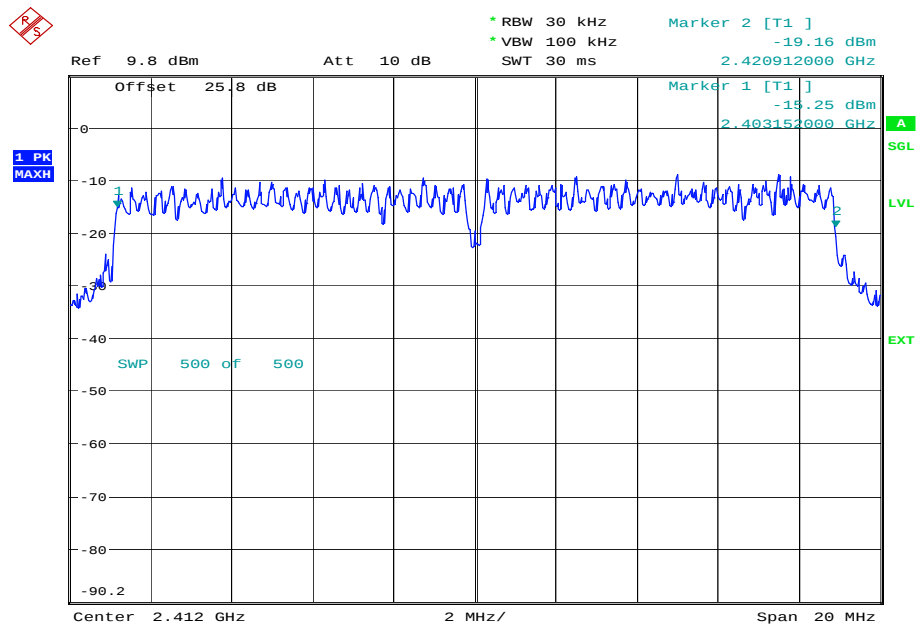


58.5 Mbps



Date: 7.AUG.2013 14:46:41

65 Mbps



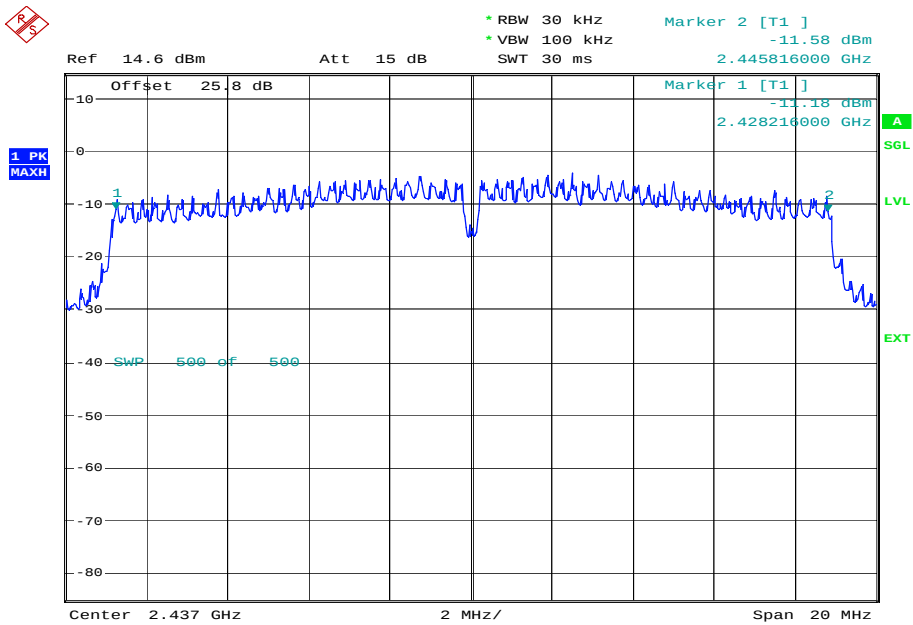
Date: 7.AUG.2013 15:03:11



Product Service

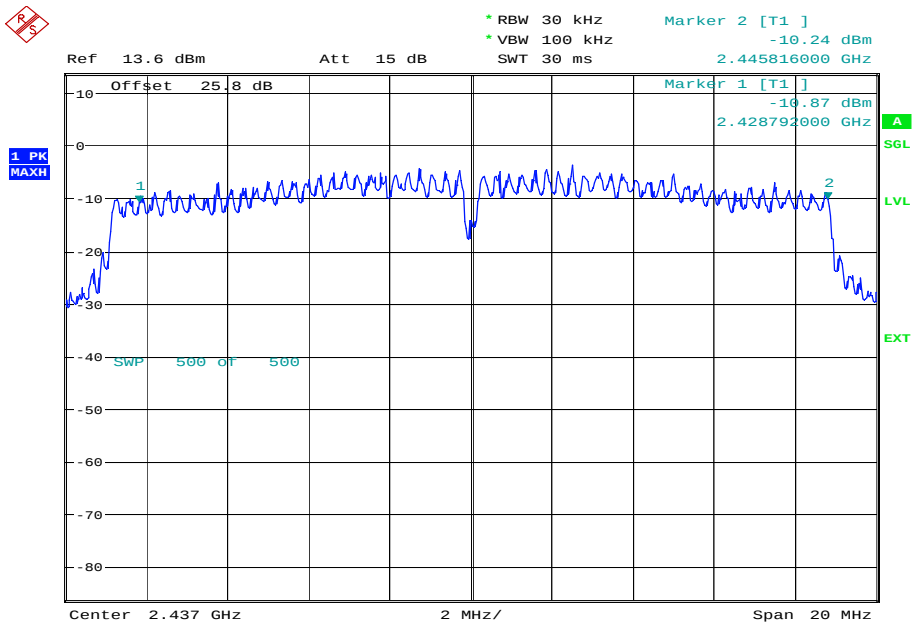
2437 MHz

6.5 Mbps



Date: 7.AUG.2013 12:56:50

13 Mbps

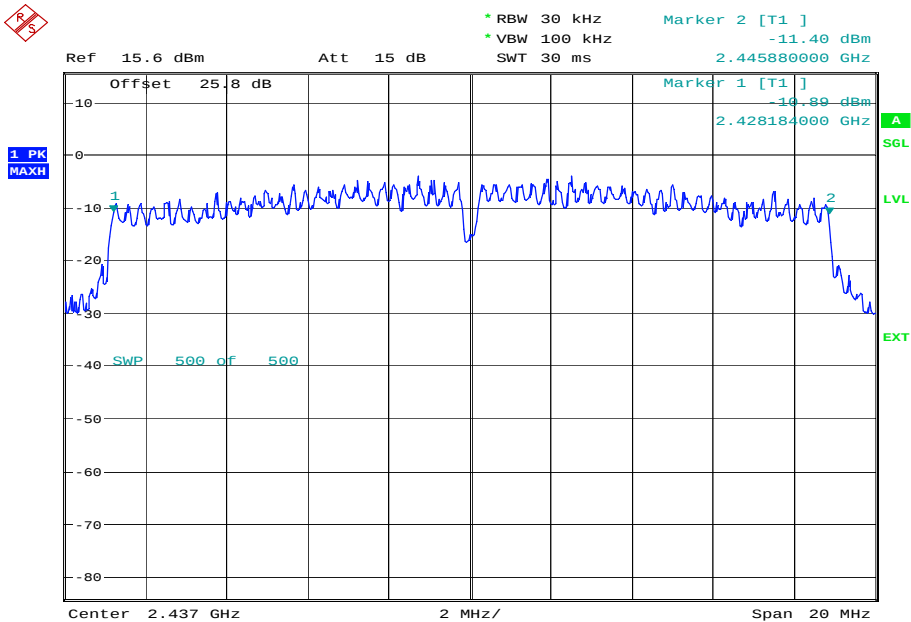


Date: 7.AUG.2013 13:17:33



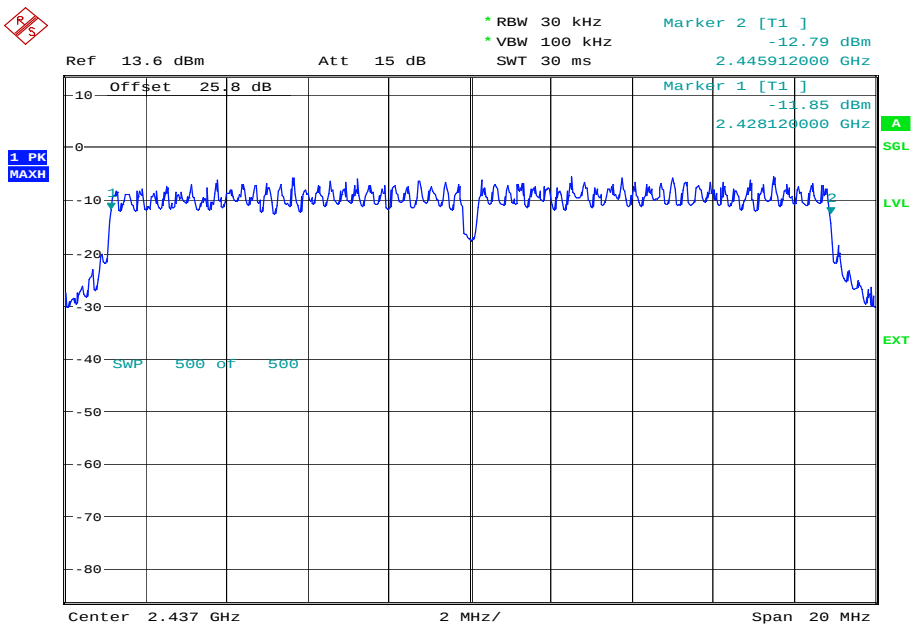
Product Service

19.5 Mbps



Date: 7.AUG.2013 13:37:35

26 Mbps

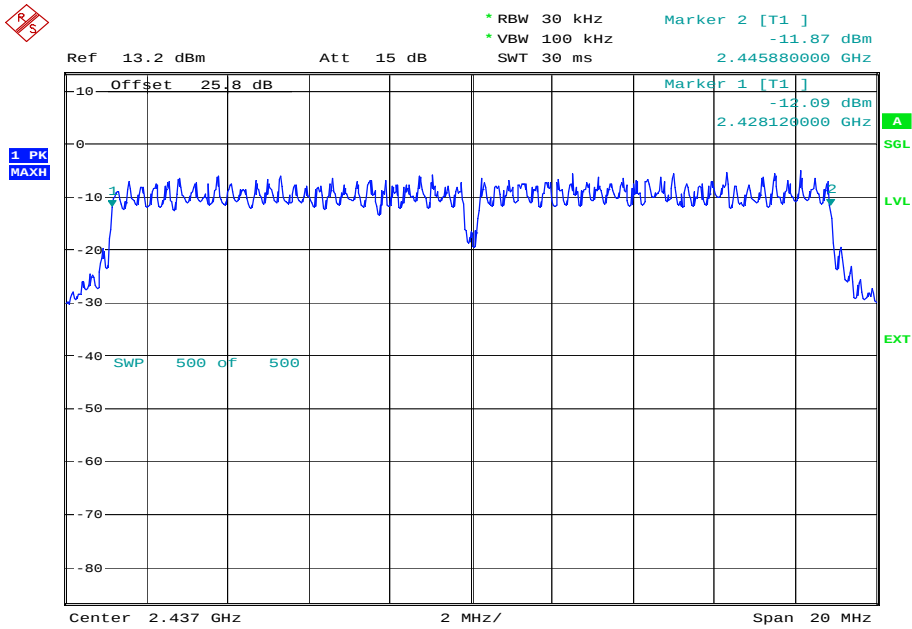


Date: 7.AUG.2013 13:55:42



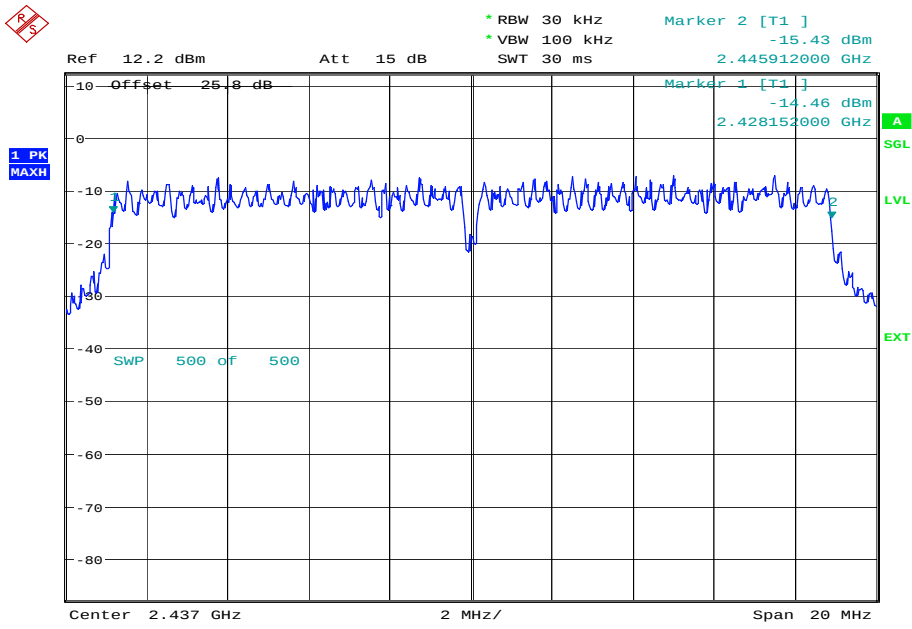
Product Service

39 Mbps



Date: 7.AUG.2013 14:15:21

52 Mbps

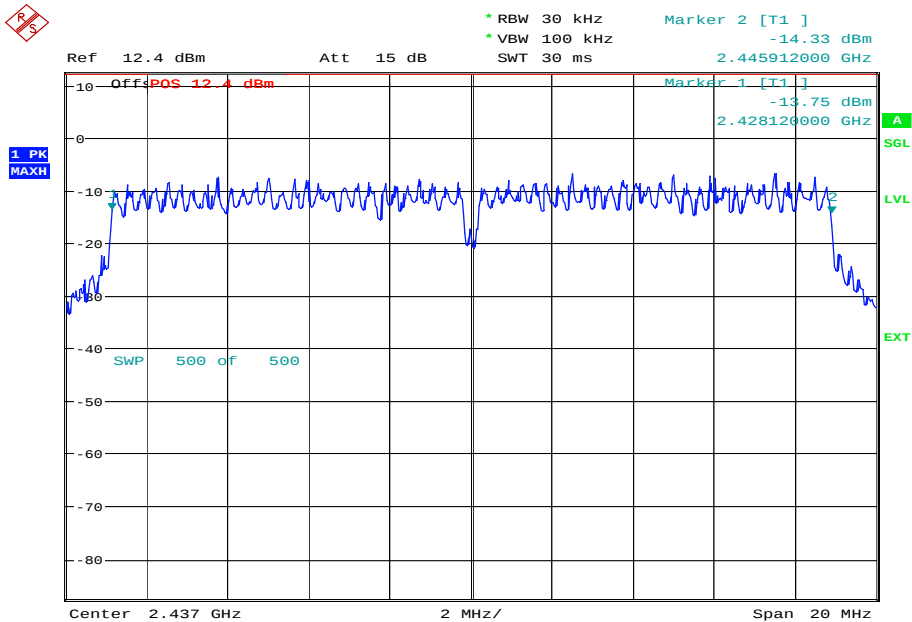


Date: 7.AUG.2013 14:33:06



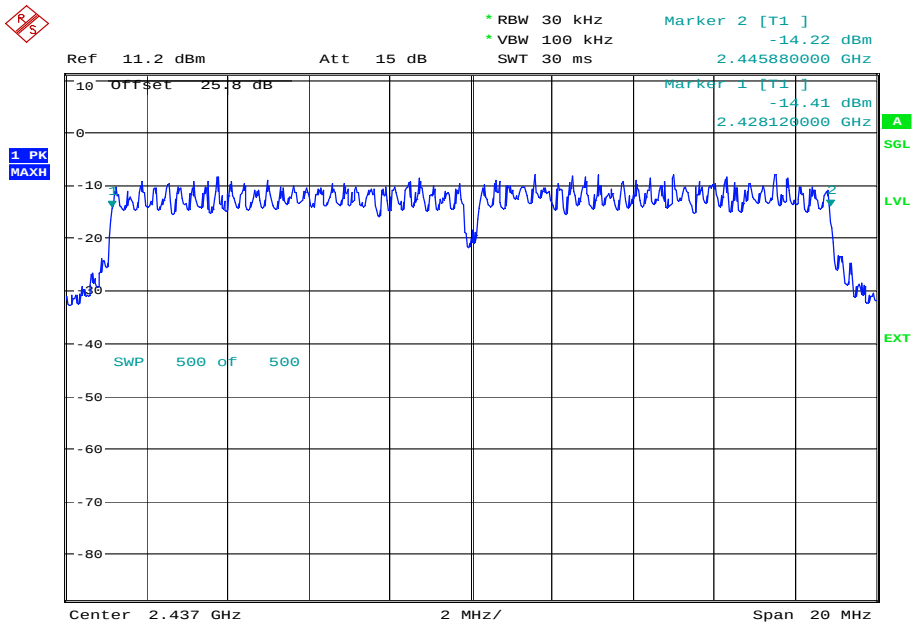
Product Service

58.5 Mbps



Date: 7.AUG.2013 14:51:16

65 Mbps



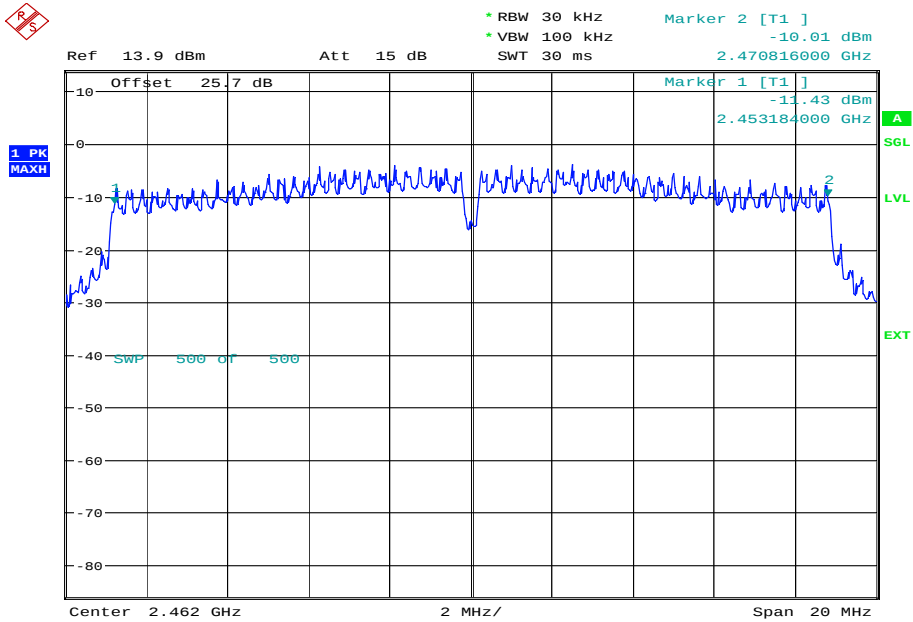
Date: 7.AUG.2013 15:08:05



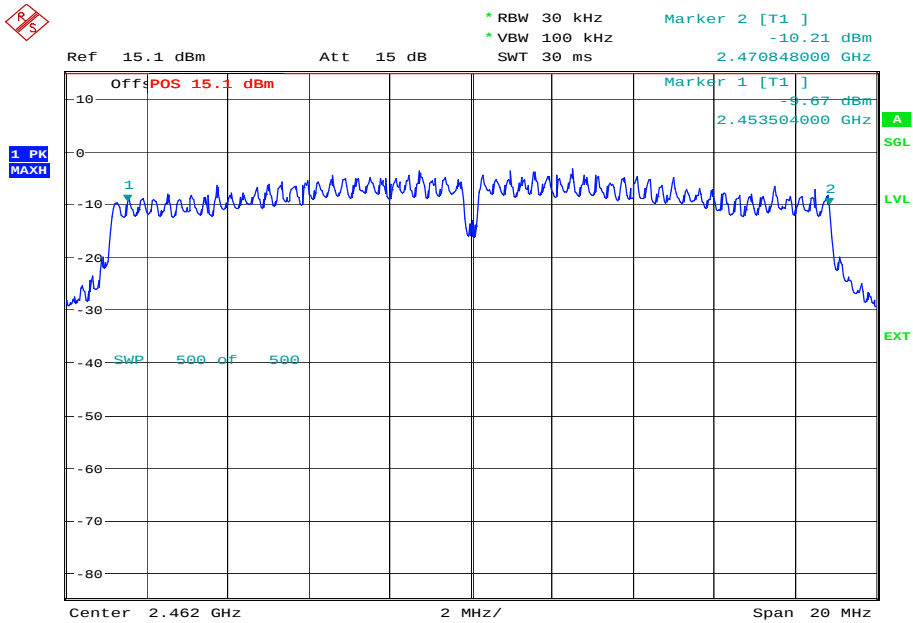
Product Service

2462 MHz

6.5 Mbps



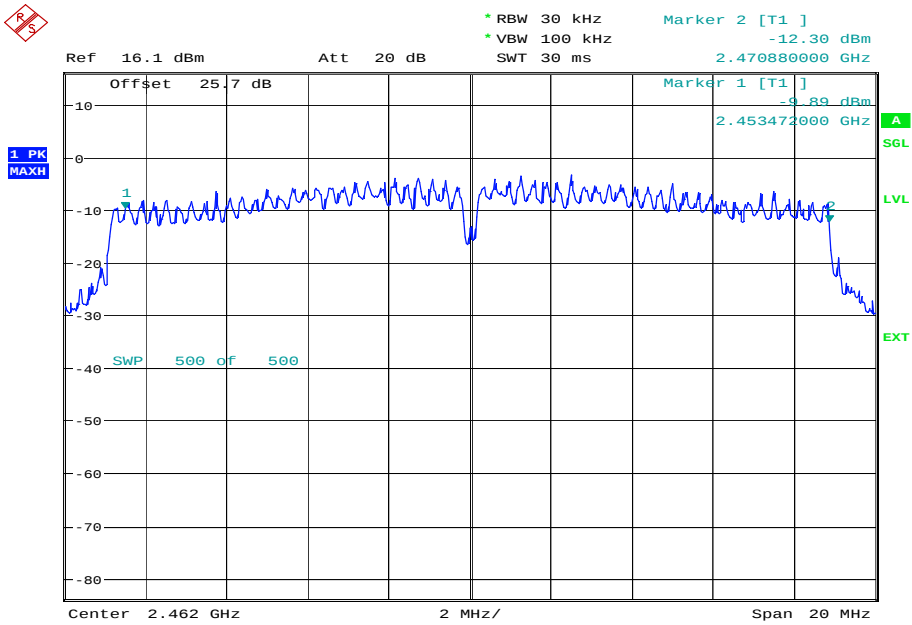
13 Mbps





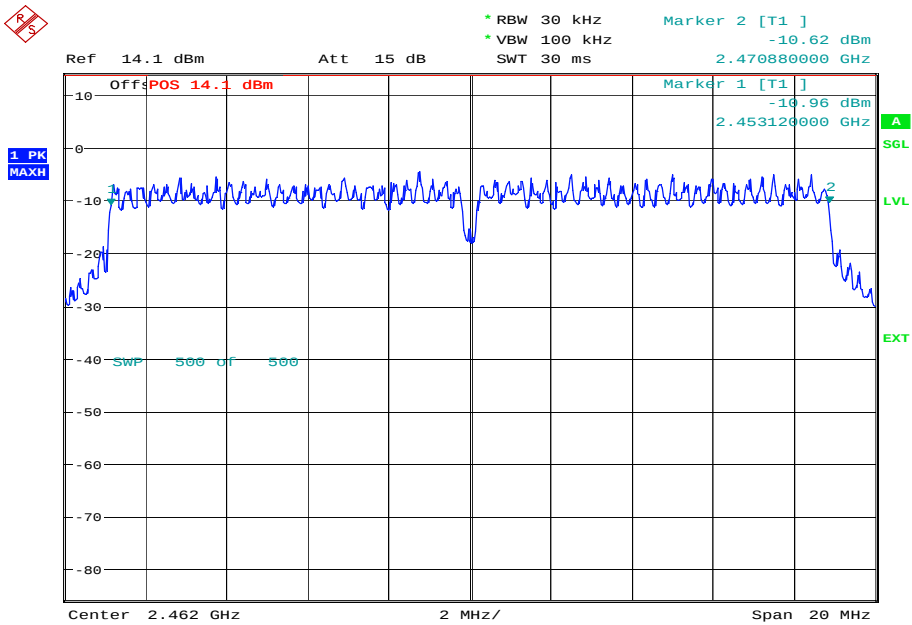
Product Service

19.5 Mbps



Date: 7.AUG.2013 13:44:34

26 Mbps

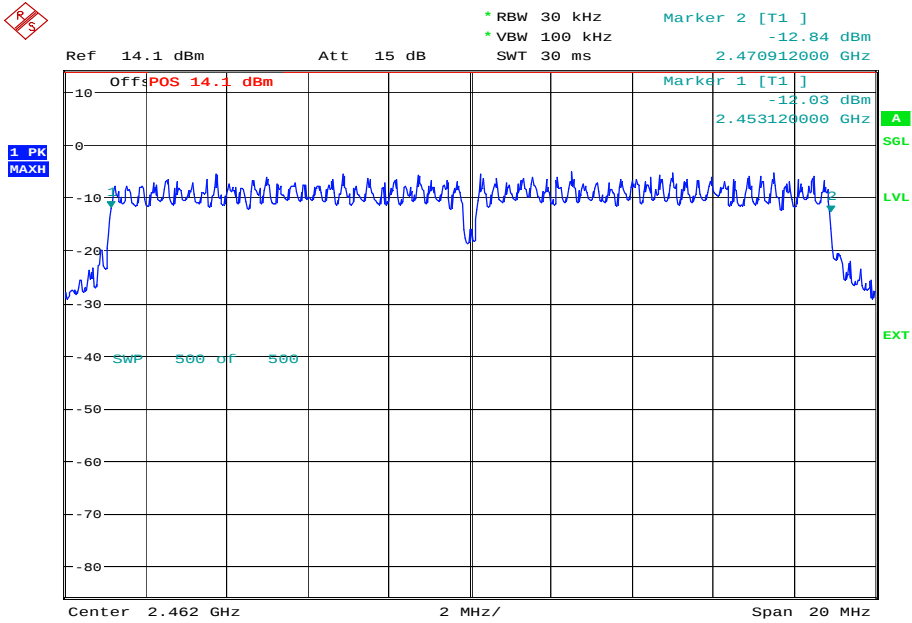


Date: 7.AUG.2013 14:01:29

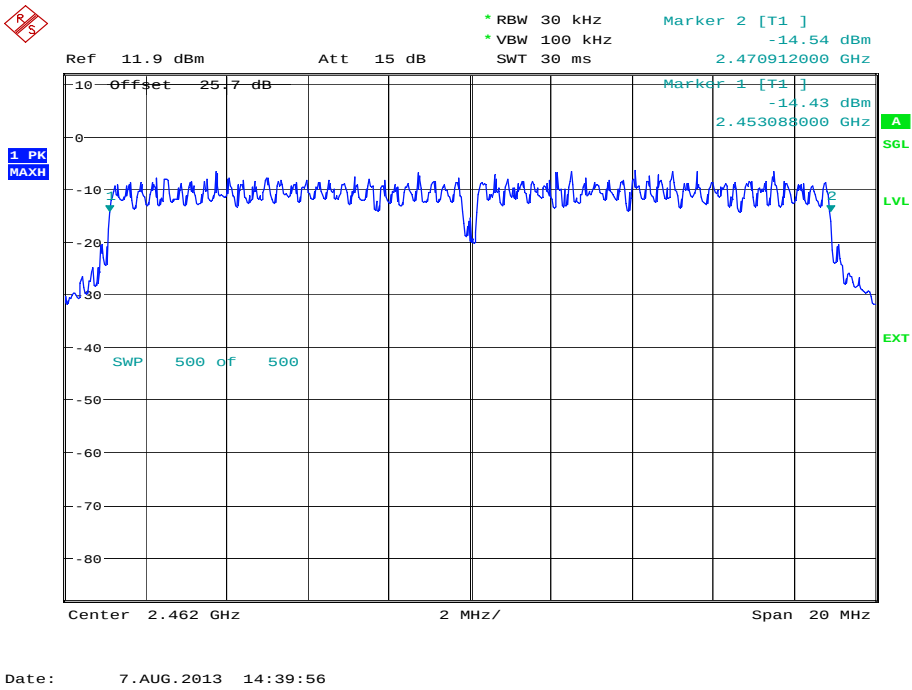


Product Service

39 Mbps

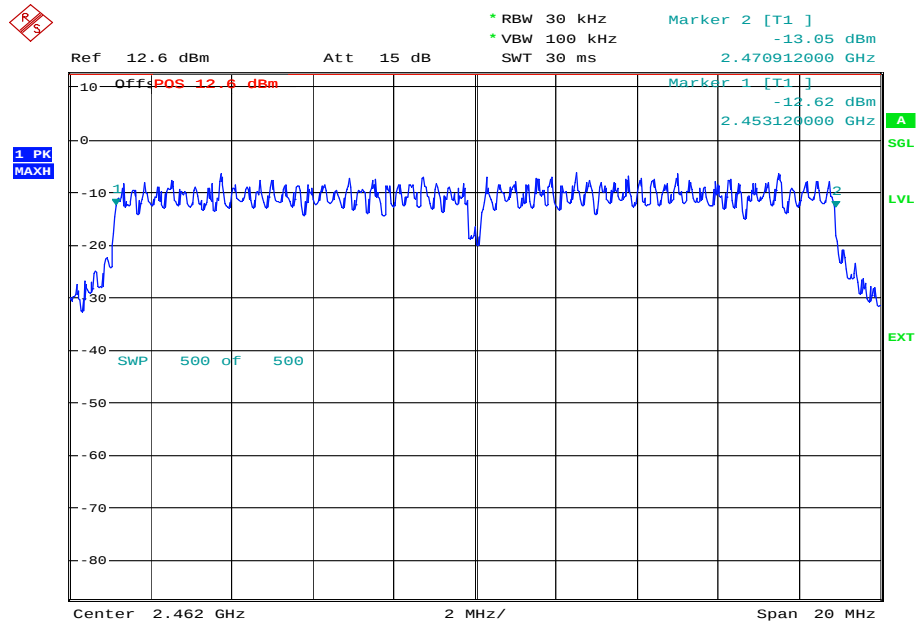


52 Mbps

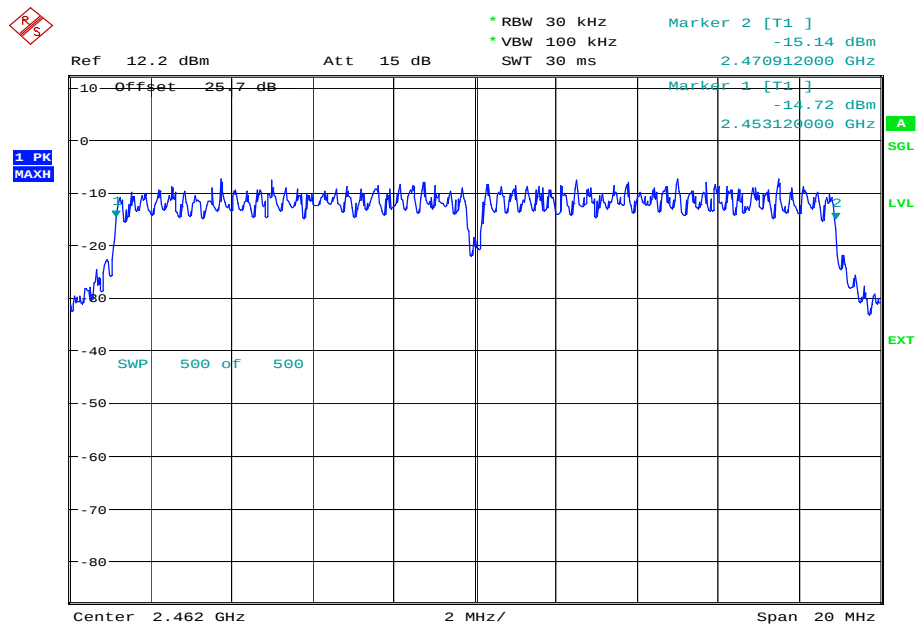




Product Service

58.5 Mbps

Date: 7.AUG.2013 14:56:57

65 Mbps

Date: 7.AUG.2013 15:14:55

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
Screened Room (5)	Rainford	Rainford	1545	36	25-Dec-2013
Transient Limiter	Hewlett Packard	11947A	2377	12	13-Feb-2014
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	11-Oct-2013
7m Armoured RF Cable	SSI Cable Corp.	1501-13-13-7m WA(-)	3600	-	TU
Section 2.2 - Maximum Peak Conducted Output Power					
Attenuator (20dB/ 2W)	Pasternack	PE7004-20	489	12	18-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
Power Divider	Weinschel	1506A	3345	12	23-May-2014
P-Series Power Meter	Agilent Technologies	N1911A	3980	12	17-Sep-2013
50 MHz-18 GHz Wideband Power Sensor	Agilent Technologies	N1921A	3983	12	17-Sep-2013
1 Metre SMA Cable	Rhophase	3PS-1801A-1000-3PS	4099	12	26-Oct-2013
1 Metre N Type Cable	Rhophase	NPS-1601A-1000-NPS	4102	12	11-Jun-2014
Section 2.3 - EIRP Peak Power					
Antenna (Double Ridge Guide, 1GHz-18GHz)	EMCO	3115	234	12	3-Apr-2014
Antenna (Double Ridge Guide, 1GHz-18GHz)	EMCO	3115	235	12	9-Nov-2013
Signal Generator (10MHz to 40GHz)	Rohde & Schwarz	SMR40	1002	12	6-Sep-2013
Screened Room (5)	Rainford	Rainford	1545	36	25-Dec-2013
Turntable Controller	Inn-Co GmbH	CO 1000	1606	-	TU
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	11-Oct-2013
9m RF Cable (N Type)	Rhophase	NPS-2303-9000-NPS	3791	-	TU
Tilt Antenna Mast	matur GmbH	TAM 4.0-P	3916	-	TU
Mast Controller	matur GmbH	NCD	3917	-	TU
Wideband Radio Communication Tester	Rohde & Schwarz	CMW 500	4144	12	17-Jul-2014



Product Service

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Section 2.4 - Spurious and Band Edge Emissions					
Antenna (Bilog)	Schaffner	CBL6143	287	24	18-Jan-2014
Attenuator (20dB/ 2W)	Pasternack	PE7004-20	489	12	18-Oct-2013
GPS Frequency Standard	Rapco	GPS-804/3	1312	6	24-Jan-2014
Screened Room (5)	Rainford	Rainford	1545	36	25-Dec-2013
Turntable Controller	Inn-Co GmbH	CO 1000	1606	-	TU
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
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	11-Oct-2013
'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
9m RF Cable (N Type)	Rhophase	NPS-2303-9000-NPS	3791	-	TU
Tilt Antenna Mast	maturo GmbH	TAM 4.0-P	3916	-	TU
Mast Controller	maturo GmbH	NCD	3917	-	TU
Dc-40GHz Power Splitter	Aeroflex / Weinschel	1534	3986	-	TU
1 Metre SMA Cable	Rhophase	3PS-1801A-1000-3PS	4099	12	26-Oct-2013
Section 2.5 - Power Spectral Density					
Attenuator (20dB/ 2W)	Pasternack	PE7004-20	489	12	18-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
Power Divider	Weinschel	1506A	3345	12	23-May-2014
P-Series Power Meter	Agilent Technologies	N1911A	3980	12	17-Sep-2013
50 MHz-18 GHz Wideband Power Sensor	Agilent Technologies	N1921A	3983	12	17-Sep-2013
1 Metre SMA Cable	Rhophase	3PS-1801A-1000-3PS	4099	12	26-Oct-2013
1 Metre N Type Cable	Rhophase	NPS-1601A-1000-NPS	4102	12	11-Jun-2014
Section 2.6 - 6dB Bandwidth					
Power Divider	Weinschel	1506A	3345	12	23-May-20

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



Product Service

SECTION 4

ACCREDITATION, DISCLAIMERS AND COPYRIGHT



Product Service

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).

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TÜV SÜD Product Service

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