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Report On

FCC Testing of the
The Boeing Company Black Smartphone
In accordance with FCC CFR 47 Part 2 and FCC CFR 47 Part 27 (LTE
Band XVII)

COMMERCIAL-IN-CONFIDENCE

FCC ID: H8V-BLK1

Document 75923267 Report 08 Issue 2

December 2013



Product Service

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COMMERCIAL-IN-CONFIDENCE

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The Boeing Company Black Smartphone
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(LTE Band XVII)

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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 2 and FCC CFR 47 Part 27. The sample tested was found to comply with the requirements defined in the applied rules.

Test Engineer(s);

N Rousell

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 2 and FCC CFR 47 Part 27 (LTE Band XVII)



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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 2 and FCC CFR 47 Part 27.

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)	XCV23200852
Number of Samples Tested	1
Test Specification/Issue/Date	FCC CFR 47 Part 2 (2012) FCC CFR 47 Part 27 (2012)
Incoming Release Date	Application Form 06 September 2013
Disposal Reference Number Date	Held Pending Disposal Not Applicable Not Applicable
Order Number Date	48774 01 July 2013
Start of Test	30 July 2013
Finish of Test	30 August 2013
Name of Engineer(s)	N Rousell G Lawler A Galpin
Related Document(s)	ANSI C63.4: 2003



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1.2 BRIEF SUMMARY OF RESULTS

A brief summary of the tests carried out in accordance with FCC CFR 47 Part 2 and FCC CFR 47 Part 27 is shown below.

Section	Spec Clause		Test Description	Result	Comments/Base Standard
	Pt 2	Pt 27			
LTE FDD XVII					
2.1	2.1046	27.50	Power Limits and Duty Cycle	Pass	
2.2	2.1049	27.53	Emission Limits	Pass	
2.3	2.1055	27.54	Frequency Stability	Pass	
2.4	2.1047(d)	-	Modulation Characteristics	Pass	



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1.3 APPLICATION FORM

APPLICANT'S DETAILS			
COMPANY NAME : The Boeing Company ADDRESS : 7700 Boston Blvd. Springfield, VA 22153			
NAME FOR CONTACT PURPOSES : Brian Chapman			
TELEPHONE NO: 703.270.6714		FAX NO:	
		E-MAIL: brian.s.chapman@boeing.com	

EQUIPMENT INFORMATION			
<u>Equipment designator:</u>			
Model name/number	Identification number		
<u>Supply Voltage:</u>			
☐ []	AC mains	State AC voltage V	and AC frequency Hz
☐ []	DC (external)	State DC voltage V	and DC current A
☒ [X]	DC (internal)	State DC voltage ... 3.8 V	and Battery type... Li-Polymer
<u>Frequency characteristics:</u>			
Frequency range	704 MHz to 715.90 MHz		Channel spacing 100kHz. (if channelized)
Designated test frequencies:			
Bottom: 704.0 MHz	Middle: 709.95 MHz	Top: 715.90 MHz	
<u>Power characteristics:</u>			
Maximum transmitter power 0.2W (23dBm)		Minimum transmitter power W (if variable)	
☒ [X]	Continuous transmission		
☐ []	Intermittent transmission		
If intermittent, can transmitter be set to continuous transmit test mode?		State duty cycle Y/N	
<u>Antenna characteristics:</u>			
☐ []	Antenna connector		State impedance ohm
☒ [X]	Temporary antenna connector		State impedance 50 ohm
☒ [X]	Integral antenna		State gain (peak) -3dBi
<u>Modulation characteristics:</u>			
☐ []	Amplitude		☒ [X] Other
☐ []	Frequency		Details: QPSK/16QAM
☐ []	Phase		
Can the transmitter operate un-modulated?			Y/N
ITU Class of emission:			
<u>Extreme conditions:</u>			
Maximum temperature	55 °C		Minimum temperature -10 °C
Maximum supply voltage	4.2 V		Minimum supply voltage 3.6 V

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 :

Position held :

Date :

Brian Chapman
Program Manager
12/13/13



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1.4 PRODUCT INFORMATION

1.4.1 Technical Description

The Equipment Under Test (EUT) was an 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 standards were made during testing.

1.7 MODIFICATION RECORD

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



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SECTION 2

TEST DETAILS

FCC Testing of the
The Boeing Company Black Smartphone
In accordance with FCC CFR 47 Part 2 and FCC CFR 47 Part 27 (LTE Band XVII)



2.1 POWER LIMITS AND DUTY CYCLE

2.1.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1046
FCC CFR 47 Part 27, Clause 27.50

2.1.2 Equipment Under Test and Modification State

Black Smartphone S/N: XCV23200852 - Modification State 0

2.1.3 Date of Test

30 July 2013, 6 August 2013 & 11 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

Carrier Power

The path loss between the EUT and the Spectrum Analyser was measured using a Network Analyser. The path loss for each measurement frequency was established and entered into the Spectrum Analyser as a reference level offset. The measurement detector was set to rms and a number of sweeps were taken. The maximum result was recorded.

Measurements were performed with the EUT operating at maximum power on Bottom, Middle and Top frequencies on QPSK and 16QAM modulation schemes with All Resource Blocks and a single Resource Block positioned at the Low, Middle and High position in the channel bandwidth.

The results are shown in the tables below.

Effective Radiated Power

Measurements of the fundamental from the EUT were obtained with the Measurement Antenna in both Horizontal and Vertical Polarisations. The fundamental frequency was maximised by adjusting the antenna height, antenna polarisation and turntable azimuth. A peak detector was used with the trace set to max hold. The maximum result was recorded.

The mast and controller were then returned to the positions which gave the maximum result. The Spectrum Analyser detector was set to rms and configured to integrate the power over the entire emission bandwidth to give the total output power.

The EUT was then removed from the chamber and replaced with a substitution antenna. Using a signal generator the level was adjusted to achieve the same value on the measuring instrument as previously recorded with the EUT. The final result (ERP) was determined by a calculation using the signal generator level, antenna gain and cable loss.

The measurements were performed at a 3m distance unless otherwise stated.



2.1.6 Environmental Conditions

Ambient Temperature 20.6 - 22.7°C
Relative Humidity 40.0 - 61.4%

2.1.7 Test Results

LTE FDD XVII

3.8 V DC Supply

Carrier Power

5.0 MHz Bandwidth - QPSK

Carrier Power (dBm)											
706.5 MHz				710.0 MHz				713.5 MHz			
1 Resource Block			All Resource Blocks	1 Resource Block			All Resource Blocks	1 Resource Block			All Resource Blocks
Low	Mid	High		Low	Mid	High		Low	Mid	High	
21.2	21.5	20.7	19.9	21.4	21.4	21.3	19.8	22.0	21.8	21.5	19.9

5.0 MHz Bandwidth - 16QAM

Carrier Power (dBm)											
706.5 MHz				710.0 MHz				713.5 MHz			
1 Resource Block			All Resource Blocks	1 Resource Block			All Resource Blocks	1 Resource Block			All Resource Blocks
Low	Mid	High		Low	Mid	High		Low	Mid	High	
19.2	20.3	19.6	18.8	21.3	21.1	20.4	18.7	20.8	20.1	20.3	19.0

10.0 MHz Bandwidth - QPSK

Carrier Power (dBm)											
709.0 MHz				710.0 MHz				711.0 MHz			
1 Resource Block			All Resource Blocks	1 Resource Block			All Resource Blocks	1 Resource Block			All Resource Blocks
Low	Mid	High		Low	Mid	High		Low	Mid	High	
21.9	21.7	21.2	19.6	21.8	22.0	21.4	19.6	21.4	21.2	20.7	19.6

10.0 MHz Bandwidth - 16QAM

Carrier Power (dBm)											
709.0 MHz				710.0 MHz				711.0 MHz			
1 Resource Block			All Resource Blocks	1 Resource Block			All Resource Blocks	1 Resource Block			All Resource Blocks
Low	Mid	High		Low	Mid	High		Low	Mid	High	
20.4	20.6	20.1	18.5	20.6	20.2	21.7	18.5	20.0	19.8	19.6	18.3

**Peak To Average Ratio****5.0 MHz Bandwidth - QPSK**

Peak To Average Ratio (dB)											
706.5 MHz				710.0 MHz				713.5 MHz			
1 Resource Block			All Resource Blocks	1 Resource Block			All Resource Blocks	1 Resource Block			All Resource Blocks
Low	Mid	High		Low	Mid	High		Low	Mid	High	
5.8	4.8	4.7	6.3	5.8	5.9	5.9	6.0	5.5	5.7	5.6	5.9

5.0 MHz Bandwidth - 16QAM

Peak To Average Ratio (dB)											
706.5 MHz				710.0 MHz				713.5 MHz			
1 Resource Block			All Resource Blocks	1 Resource Block			All Resource Blocks	1 Resource Block			All Resource Blocks
Low	Mid	High		Low	Mid	High		Low	Mid	High	
6.1	5.9	5.6	7.1	6.4	5.7	6.7	7.0	5.9	6.6	6.5	6.8

10.0 MHz Bandwidth - QPSK

Peak To Average Ratio (dB)											
709.0 MHz				710.0 MHz				711.0 MHz			
1 Resource Block			All Resource Blocks	1 Resource Block			All Resource Blocks	1 Resource Block			All Resource Blocks
Low	Mid	High		Low	Mid	High		Low	Mid	High	
6.3	4.9	6.0	6.6	6.0	6.0	5.7	6.4	5.4	4.7	5.4	6.3

10.0 MHz Bandwidth - 16QAM

Peak To Average Ratio (dB)											
709.0 MHz				710.0 MHz				711.0 MHz			
1 Resource Block			All Resource Blocks	1 Resource Block			All Resource Blocks	1 Resource Block			All Resource Blocks
Low	Mid	High		Low	Mid	High		Low	Mid	High	
6.9	5.9	6.7	7.2	6.9	5.8	6.0	7.1	6.3	5.6	6.4	6.8

**Effective Radiated Power****5.0 MHz Bandwidth - QPSK**

Resource Block	706.5 MHz		710.0 MHz		713.5 MHz	
	Result (dBm)	Result (W)	Result (dBm)	Result (W)	Result (dBm)	Result (W)
1 Resource Block - Low	13.08	0.020	11.02	0.013	12.08	0.016
1 Resource Block - Middle	11.83	0.015	11.96	0.016	13.25	0.021
1 Resource Block - High	11.64	0.015	13.98	0.025	11.77	0.015
All Resource Blocks	N/T	N/T	N/T	N/T	N/T	N/T

5.0 MHz Bandwidth – 16QAM

Resource Block	706.5 MHz		710.0 MHz		713.5 MHz	
	Result (dBm)	Result (W)	Result (dBm)	Result (W)	Result (dBm)	Result (W)
1 Resource Block - Low	11.86	0.015	10.13	0.010	11.12	0.013
1 Resource Block - Middle	10.73	0.012	11.01	0.013	12.06	0.016
1 Resource Block - High	10.28	0.011	12.89	0.019	10.69	0.012
All Resource Blocks	N/T	N/T	N/T	N/T	N/T	N/T

10.0 MHz Bandwidth - QPSK

Resource Block	709.0 MHz		710.0 MHz		711.0 MHz	
	Result (dBm)	Result (W)	Result (dBm)	Result (W)	Result (dBm)	Result (W)
1 Resource Block - Low	12.79	0.019	12.04	0.016	11.24	0.013
1 Resource Block - Middle	11.41	0.014	11.76	0.015	12.42	0.017
1 Resource Block - High	14.42	0.028	13.74	0.024	12.37	0.017
All Resource Blocks	N/T	N/T	N/T	N/T	N/T	N/T

10.0 MHz Bandwidth – 16QAM

Resource Block	709.0 MHz		710.0 MHz		711.0 MHz	
	Result (dBm)	Result (W)	Result (dBm)	Result (W)	Result (dBm)	Result (W)
1 Resource Block - Low	11.84	0.015	11.07	0.013	10.30	0.011
1 Resource Block - Middle	10.42	0.011	10.69	0.012	11.53	0.014
1 Resource Block - High	13.46	0.022	12.72	0.019	11.73	0.015
All Resource Blocks	N/T	N/T	N/T	N/T	N/T	N/T

Remarks

N/T – All resource blocks were identified as being a lower power compared with single resource block configurations and hence were not tested.

Limit Clause 27.50 (c)(3)

Basestations: <1000 W

Fixed, Mobile and Portable Stations: <3 W



2.2 EMISSION LIMITS

2.2.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1049
FCC CFR 47 Part 27, Clause 27.53

2.2.2 Equipment Under Test and Modification State

Black Smartphone S/N: XCV23200852 - Modification State 0

2.2.3 Date of Test

30 July 2013, 7 August 2013, 27 August 2013 & 30 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

Occupied Bandwidth

The Spectrum Analyser was configured to measure the Occupied Bandwidth of the EUT using the 99% Occupied Bandwidth measurement function. The EUT was tested on Bottom, Middle and Top channels, on all channel bandwidths with All Resource Blocks and a single Resource Block positioned at the low, middle and high positions within the channel bandwidth.

Band Edge

The path loss between the EUT and the Spectrum Analyser was measured using a Network Analyser and entered as a Reference Level Offset. The EUT was set to transmit on Maximum Power using a Communications Analyser. Using this instrument, the test channels were configured to the Top and Bottom of the band. The EUT was tested with All Resource Blocks active and with one Resource Block active at the position closest to the Band Edge. The RBW was set to a value of at least 1% of the Occupied Bandwidth value. The detector of the Spectrum Analyser was set to rms and the result checked against the -13 dBm limit defined in the specification. The results are shown in the following summary tables and plots.

The EUT shall only be used on the channels defined in the summary tables shown in the reports. Any channels above or below the frequencies listed have not been tested and should not be used.



Conducted Spurious Emissions

In accordance with Part 2.1051 and 27.53, the spurious emissions from the antenna terminal were measured. The transmitter output power was attenuated using a combination of filters and attenuators and the frequency spectrum investigated from 9 kHz to 8 GHz. The EUT was set to transmit on full power with QPSK and 16QAM modulation schemes. The EUT was tested on Bottom, Middle and Top channels on all channel bandwidths with one Resource Block active and Low, Middle and High positions of the channel bandwidth for maximum power. The resolution and video bandwidths were set to 1 MHz and 3 MHz thus meeting the requirements of Part 27.53(h). The spectrum analyser detector was set Peak and the trace to Max Hold.

From 9 kHz to 4 GHz, an attenuator was used. For measuring the range 4 GHz to 20 GHz an attenuator and high pass filter were used. This was to reduce saturation effects in the spectrum analyser.

The maximum path loss across the measurement bands were used as reference level offsets to ensure worst case.

Radiated Emissions

A preliminary profile of the Spurious Radiated Emissions was obtained up to the 10th harmonic by operating the EUT on a remotely controlled turntable within a semi-anechoic chamber. Measurements of emissions from the EUT were obtained with the Measurement Antenna in both Horizontal and Vertical Polarisations. The profiling produced a list of the worst-case emissions together with the EUT azimuth and antenna polarisation.

Using the information from the preliminary profiling of the EUT, the list of emissions was then confirmed or updated under Alternative Open Site conditions. Emission levels were maximised by adjusting the antenna height, antenna polarisation and turntable azimuth.

The EUT was set to transmit on maximum power on QPSK modulation with one Resource Block active on the worst case channel bandwidth. The EUT was tested on Bottom, Middle and Top channels.

For any emissions found the EUT was then removed from the chamber and replaced with a substitution antenna. Using a signal generator the level was adjusted to achieve the same value on the measuring instrument as previously recorded with the EUT. The final result was determined by a calculation using the signal generator level, antenna gain and cable loss.

The measurements were performed at a 3m distance unless otherwise stated.

2.2.6 Environmental Conditions

Ambient Temperature	20.3 - 24.9°C
Relative Humidity	46.0 - 62.6%



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2.2.7 Test Results

LTE FDD XVII

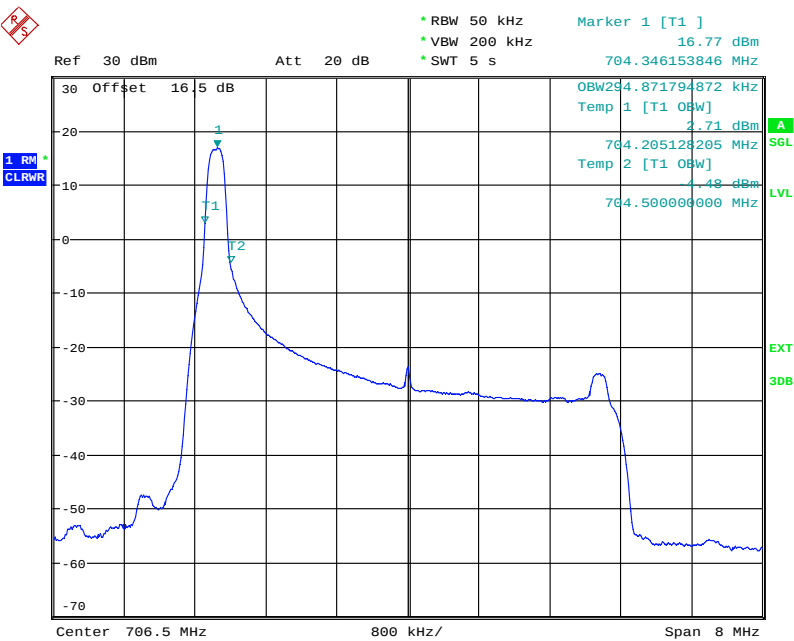
3.8 V DC Supply

Occupied Bandwidth

5.0 MHz Bandwidth - QPSK

Occupied Bandwidth (kHz)											
706.5 MHz				710.0 MHz				713.5 MHz			
1 Resource Block			All Resource Blocks	1 Resource Block			All Resource Blocks	1 Resource Block			All Resource Blocks
Low	Mid	High		Low	Mid	High		Low	Mid	High	
294.9	333.3	294.9	4461.5	307.7	307.7	307.7	4461.5	294.9	320.5	307.7	4474.4

706.5 MHz - 1 Resource Block - Low

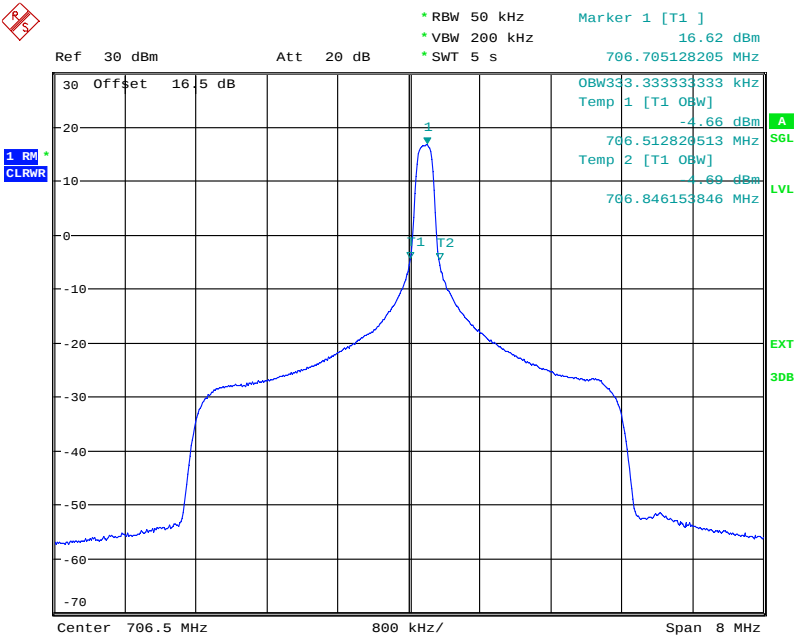


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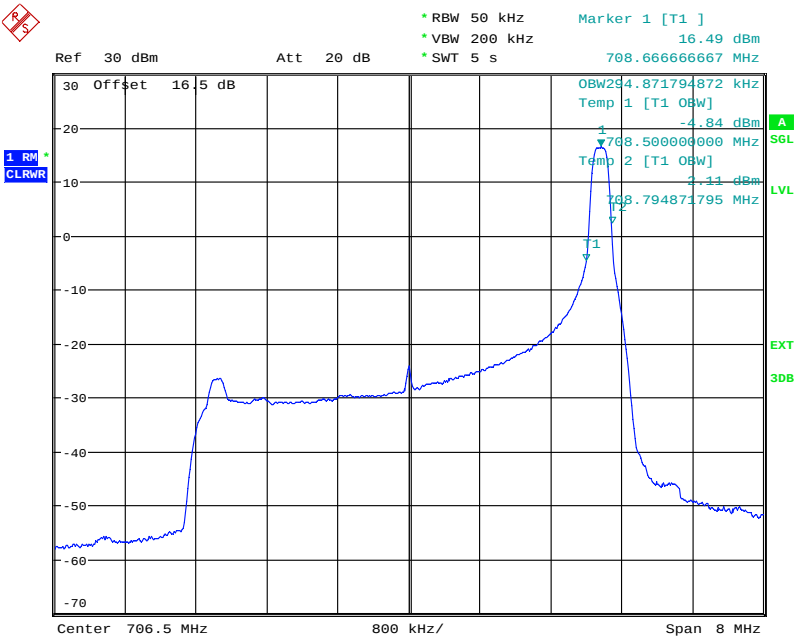
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706.5 MHz - 1 Resource Block - Middle



Date: 2.AUG.2013 15:07:15

706.5 MHz - 1 Resource Block - High

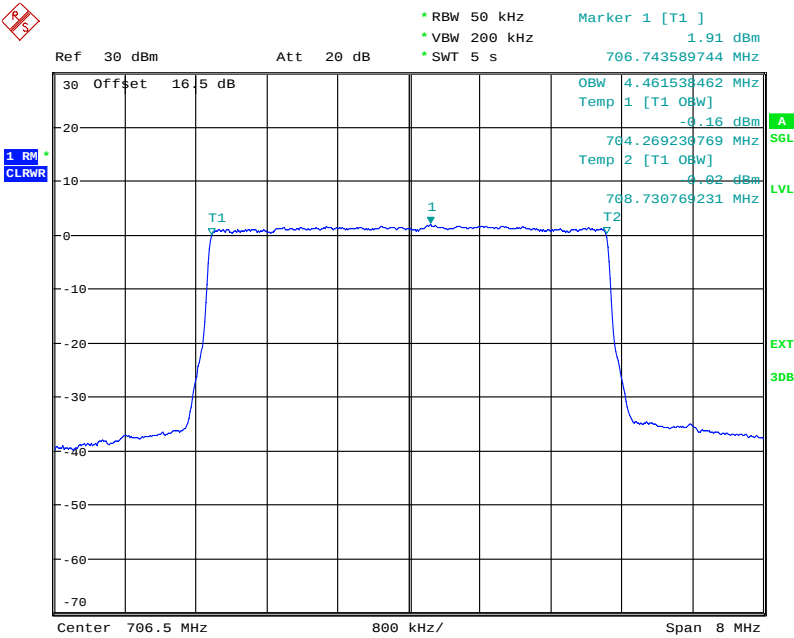


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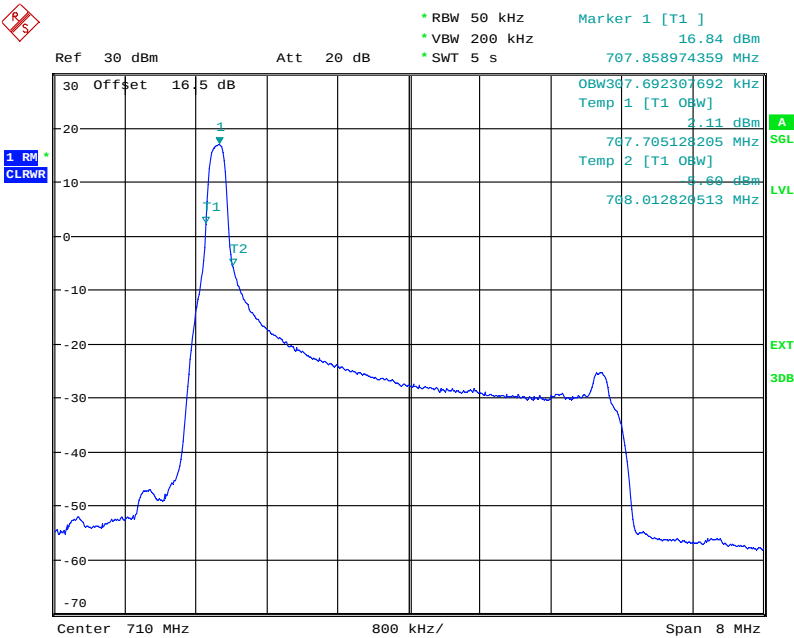
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706.5 MHz - All Resource Blocks



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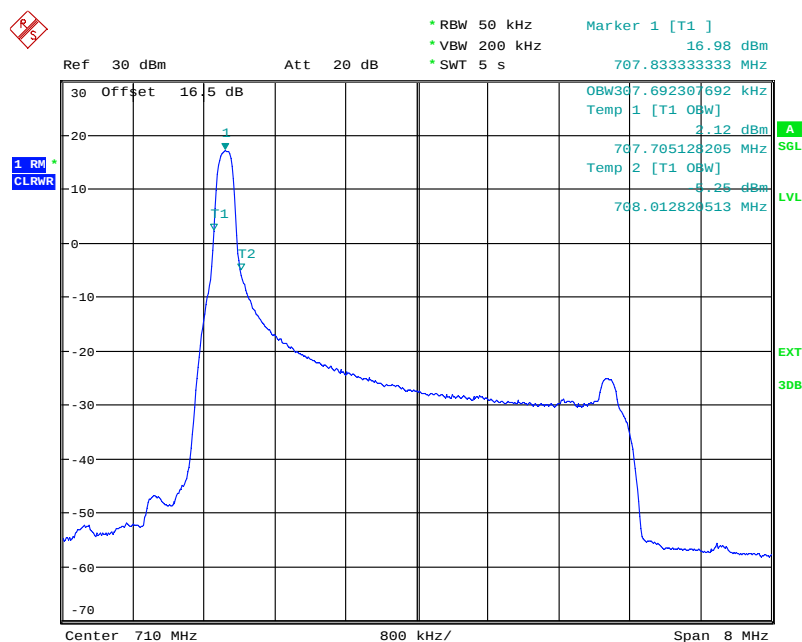
710 MHz - 1 Resource Block - Low



Date: 2.AUG.2013 15:41:04



710 MHz - 1 Resource Block - Middle



Date: 2.AUG.2013 15:22:47

710 MHz - 1 Resource Block - High

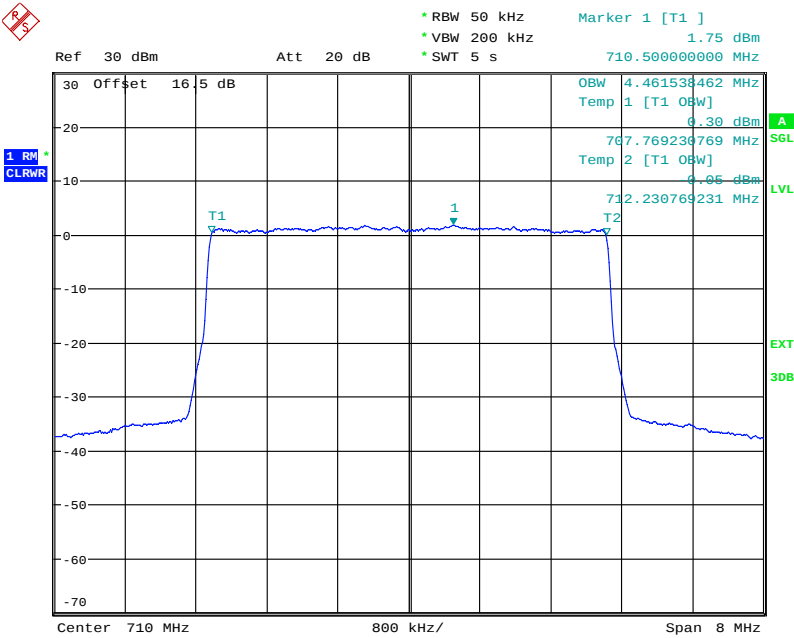


Date: 2.AUG.2013 15:32:09



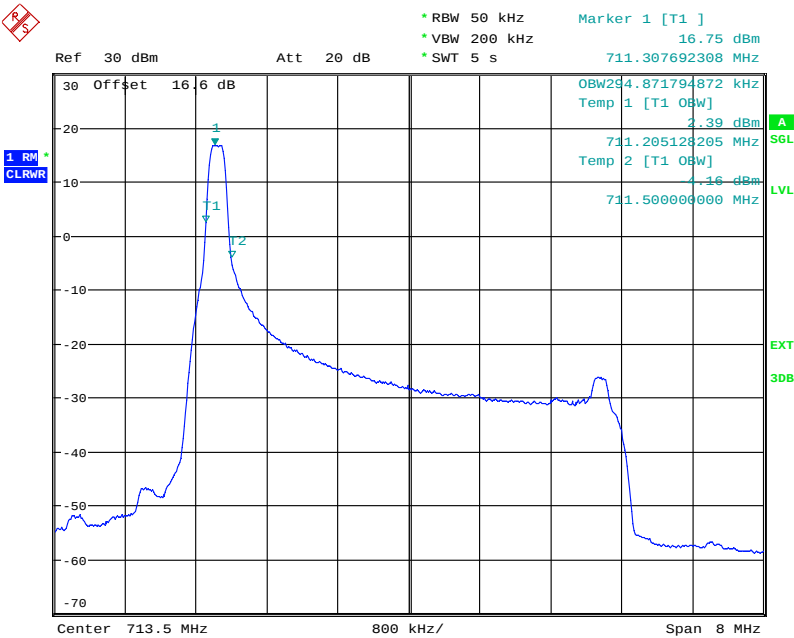
Product Service

710 MHz - All Resource Blocks



Date: 2.AUG.2013 15:52:55

713.5 MHz - 1 Resource Block - Low

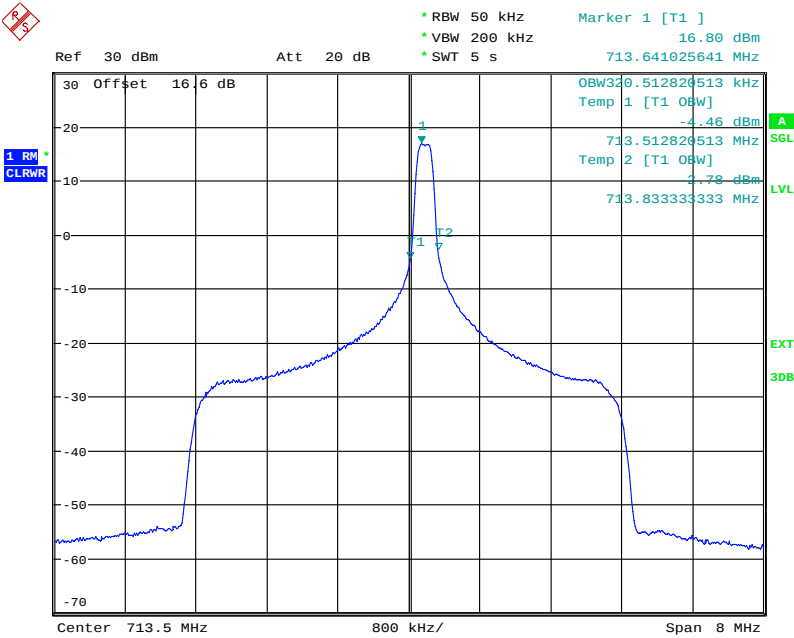


Date: 2.AUG.2013 16:33:40



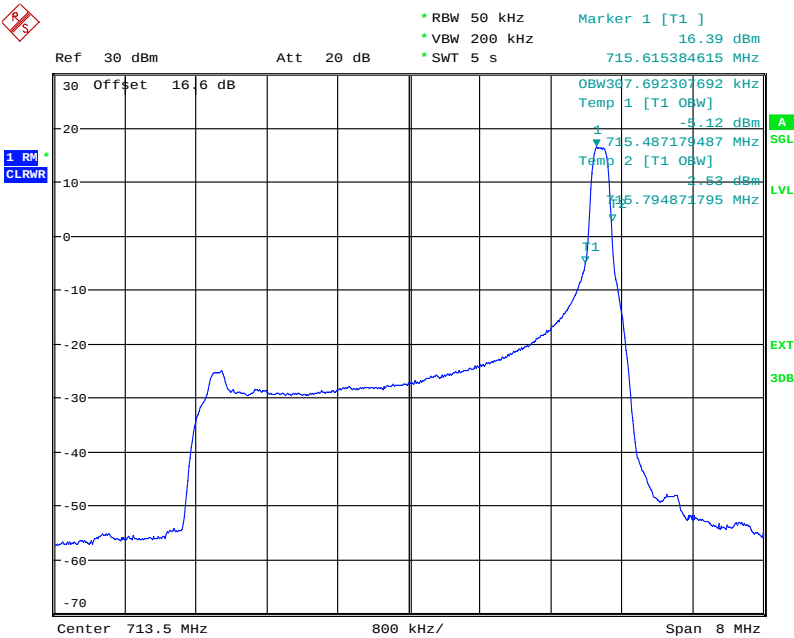
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713.5 MHz - 1 Resource Block - Middle



Date: 2.AUG.2013 16:23:44

713.5 MHz - 1 Resource Block - High

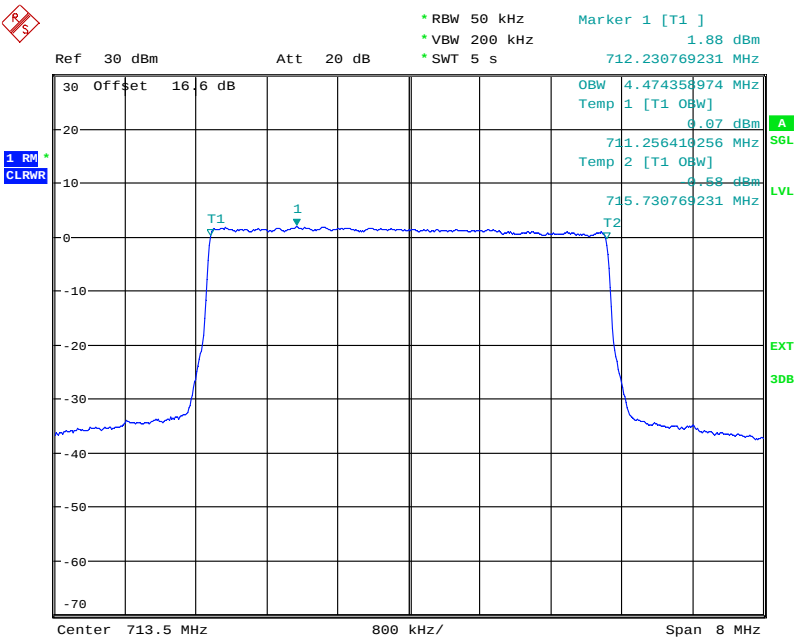


Date: 2.AUG.2013 16:13:54



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713.5 MHz - All Resource Blocks



Date: 2.AUG.2013 16:02:51

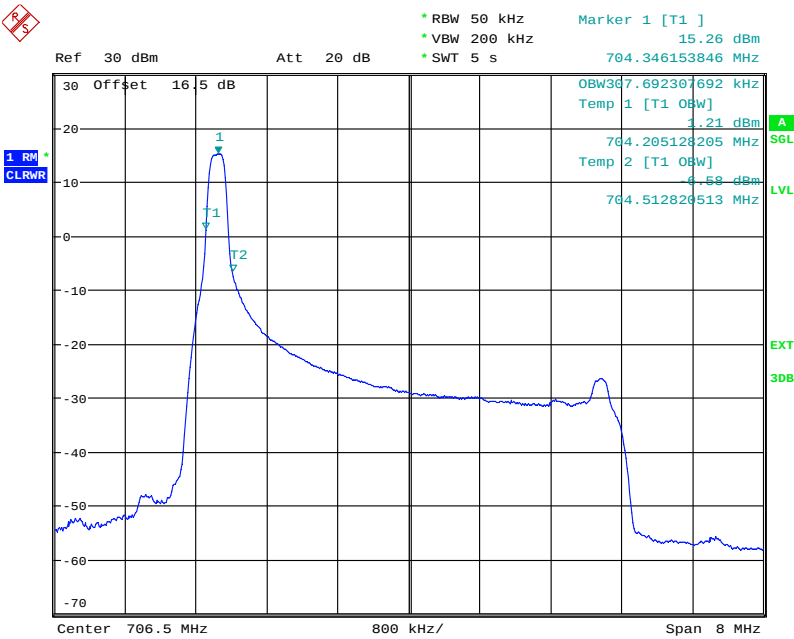


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5.0 MHz Bandwidth - 16QAM

Occupied Bandwidth (kHz)											
706.5 MHz				710.0 MHz				713.5 MHz			
1 Resource Block			All Resource Blocks	1 Resource Block			All Resource Blocks	1 Resource Block			All Resource Blocks
Low	Mid	High		Low	Mid	High		Low	Mid	High	
307.7	359.0	294.9	4461.5	307.7	346.2	307.7	4461.5	307.7	359.0	307.7	4461.5

706.5 MHz - 1 Resource Block - Low

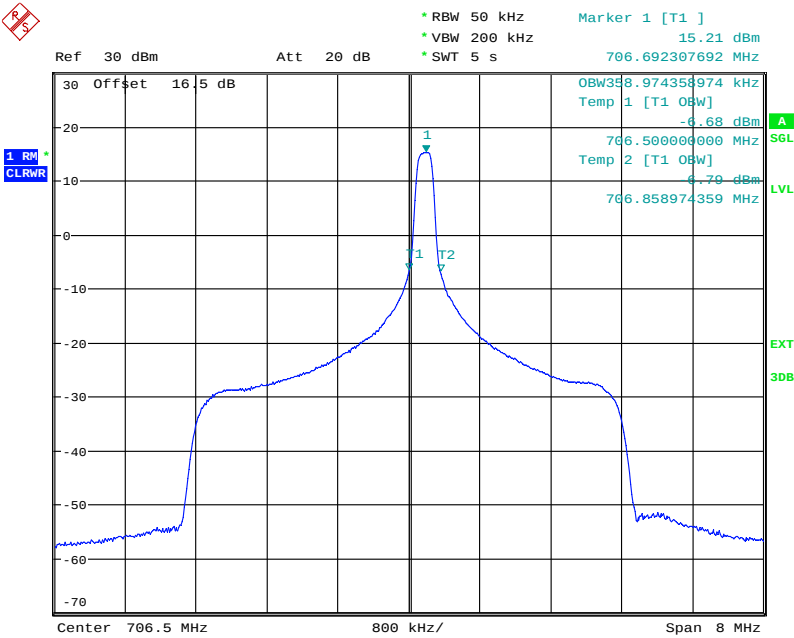


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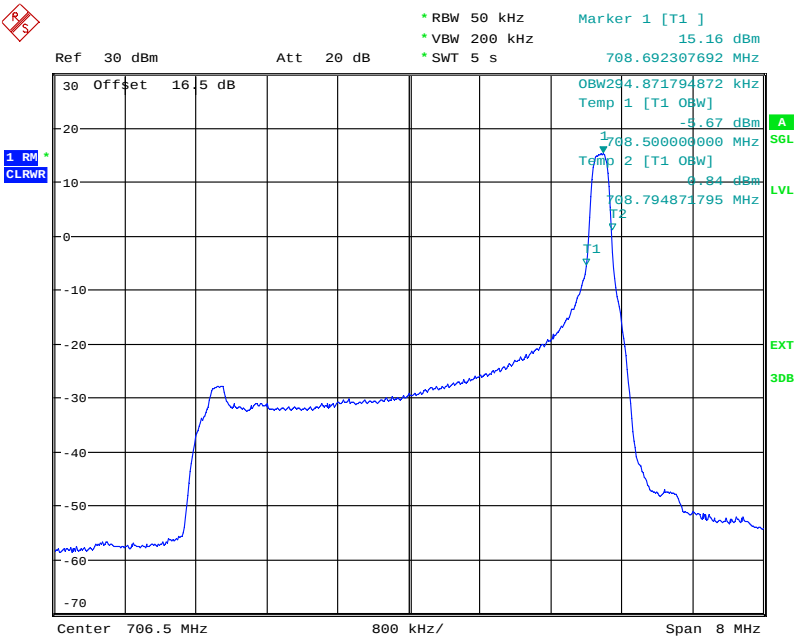
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706.5 MHz - 1 Resource Block - Middle



Date: 5.AUG.2013 10:38:37

706.5 MHz - 1 Resource Block - High

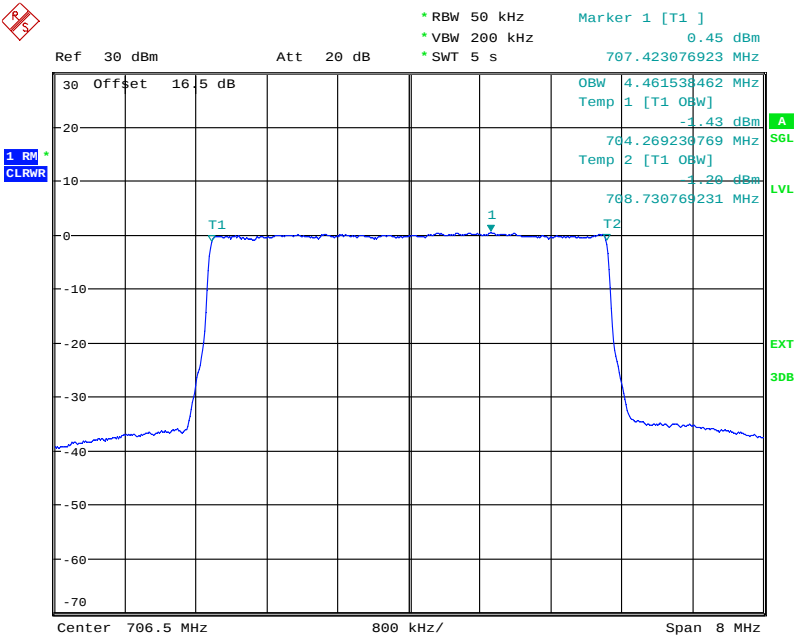


Date: 5.AUG.2013 10:47:04



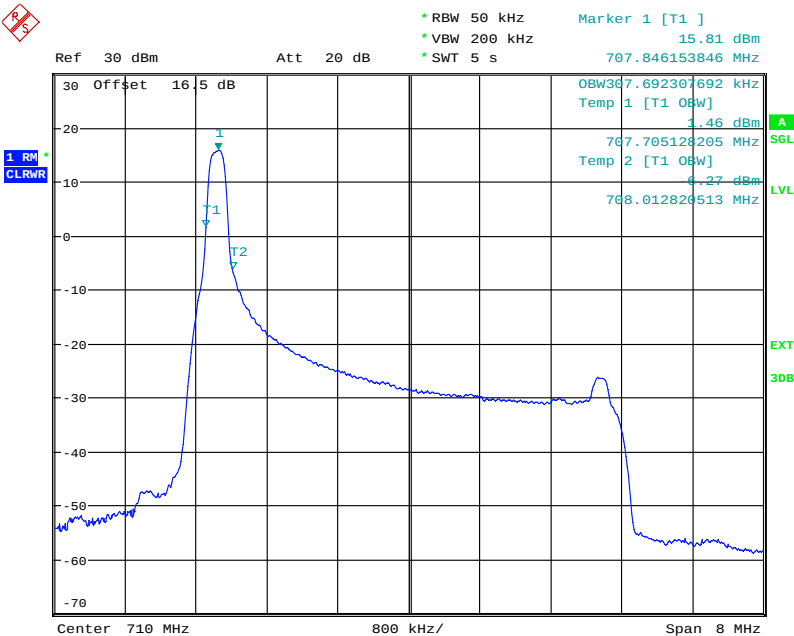
Product Service

706.5 MHz - All Resource Blocks



Date: 5.AUG.2013 10:26:11

710 MHz - 1 Resource Block - Low

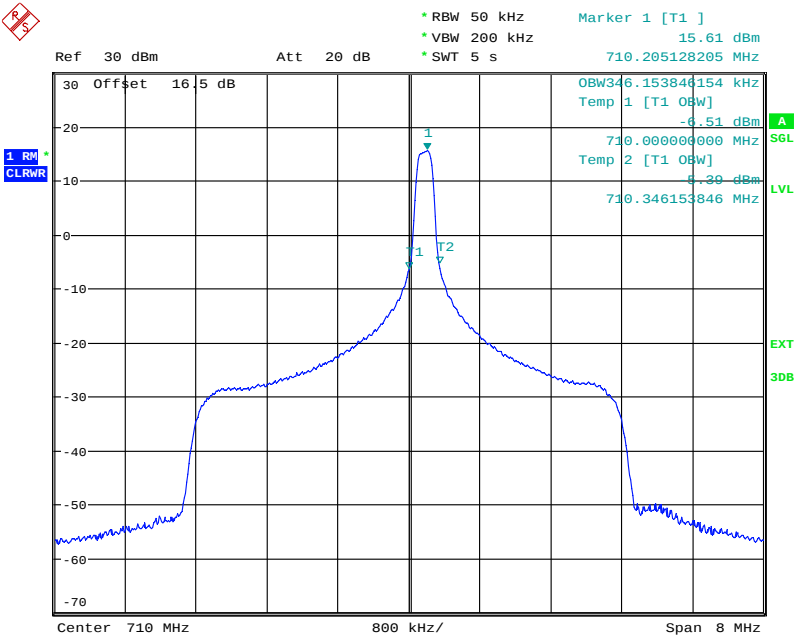


Date: 5.AUG.2013 11:11:49



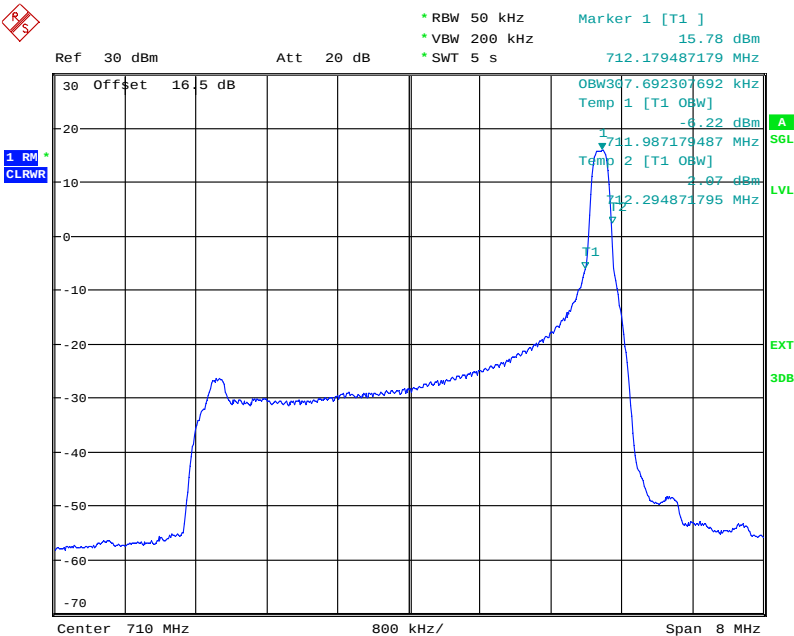
Product Service

710 MHz - 1 Resource Block - Middle



Date: 5.AUG.2013 11:03:33

710 MHz - 1 Resource Block - High

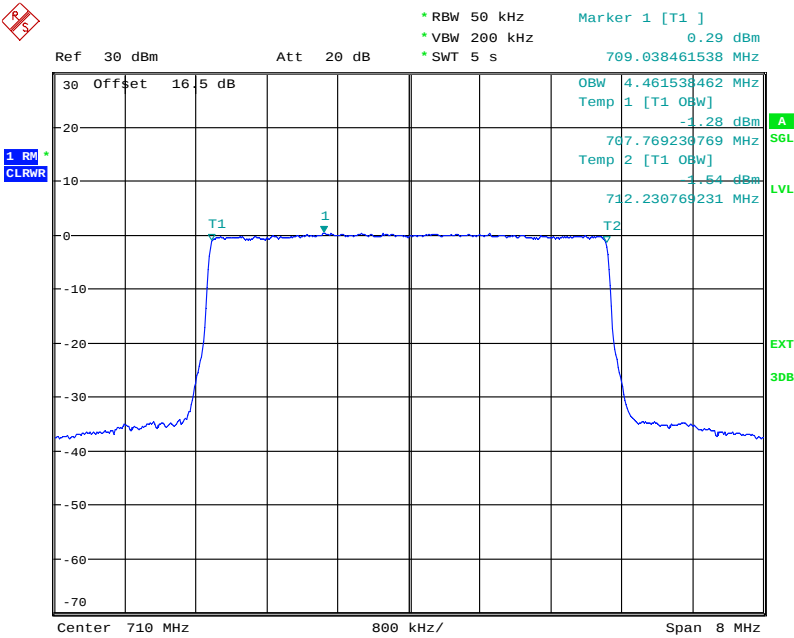


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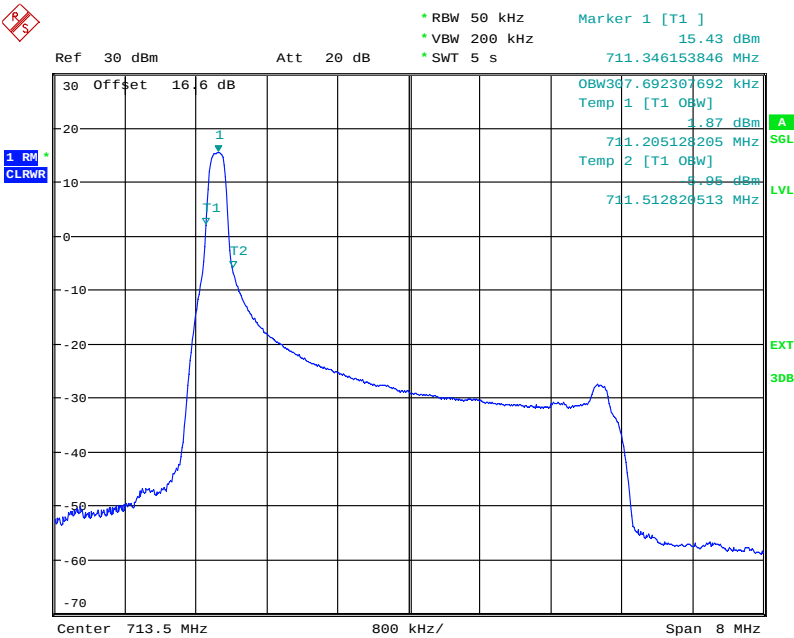
Product Service

710 MHz - All Resource Blocks



Date: 5.AUG.2013 11:19:59

713.5 MHz - 1 Resource Block - Low

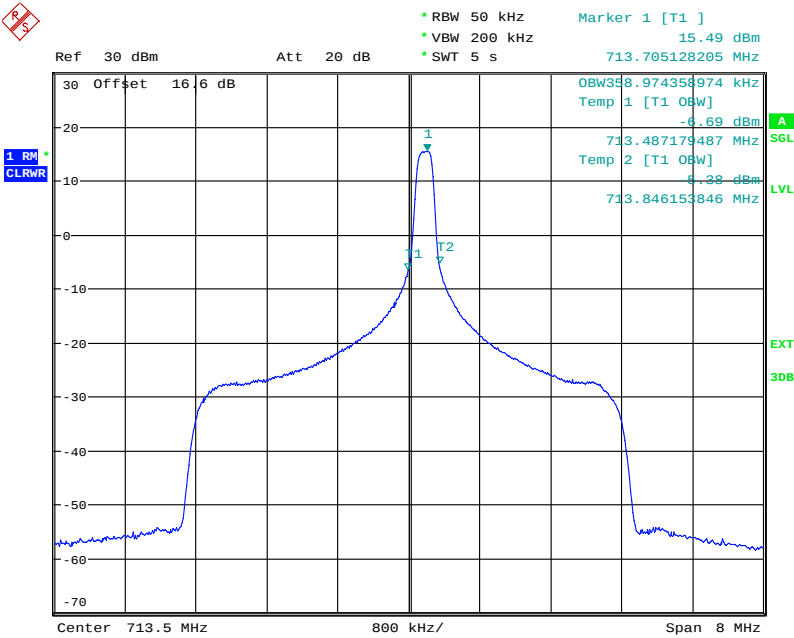


Date: 5.AUG.2013 11:57:51



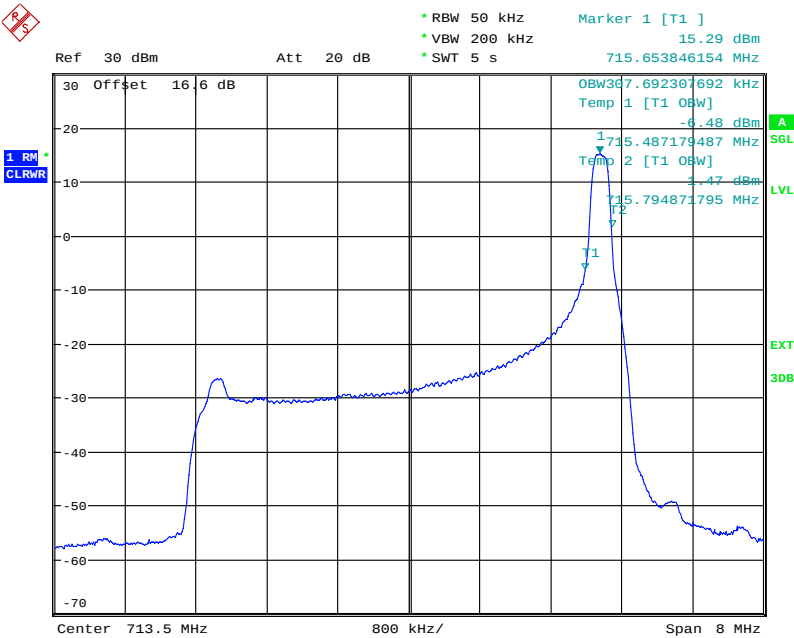
Product Service

713.5 MHz - 1 Resource Block - Middle



Date: 5.AUG.2013 11:49:39

713.5 MHz - 1 Resource Block - High

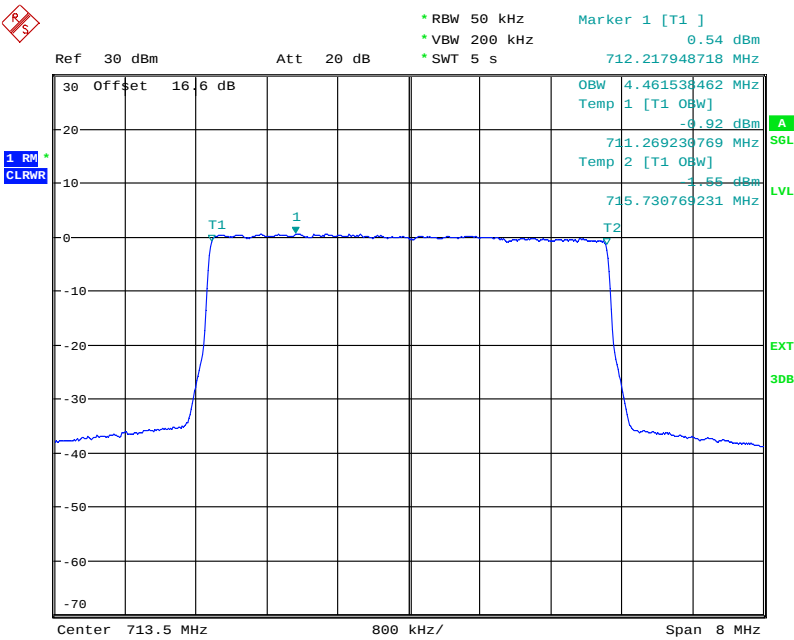


Date: 5.AUG.2013 11:39:14



Product Service

713.5 MHz - All Resource Blocks



Date: 5.AUG.2013 11:29:11

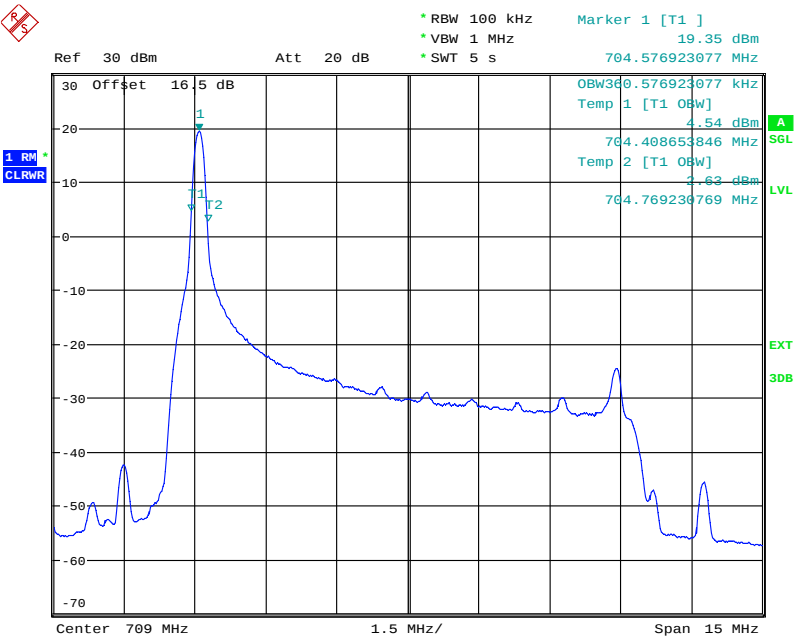


Product Service

10.0 MHz Bandwidth - QPSK

Occupied Bandwidth (kHz)											
709.0 MHz				710.0 MHz				711.0 MHz			
1 Resource Block			All Resource Blocks	1 Resource Block			All Resource Blocks	1 Resource Block			All Resource Blocks
Low	Mid	High		Low	Mid	High		Low	Mid	High	
360.6	384.6	384.6	8918.3	360.6	360.6	384.6	8918.3	360.6	408.7	384.6	8918.3

709 MHz - 1 Resource Block - Low

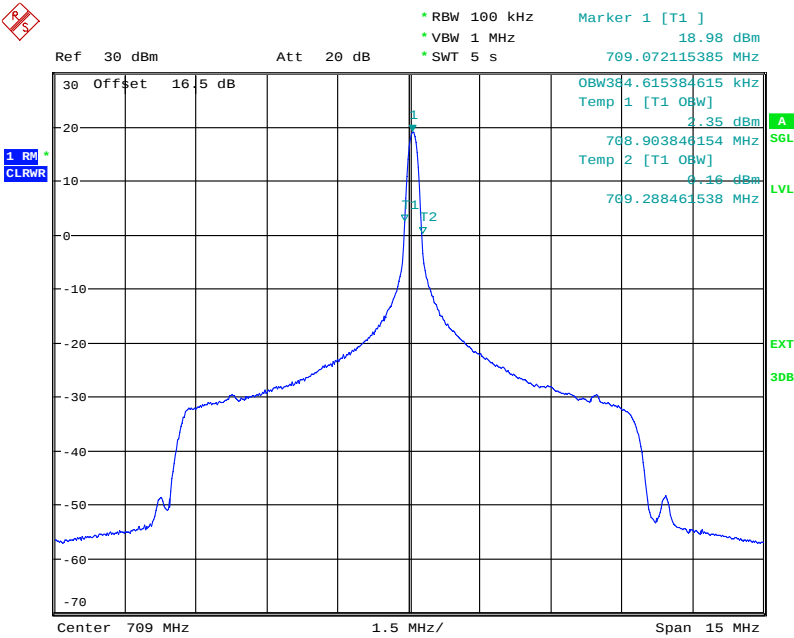


Date: 5.AUG.2013 08:20:50



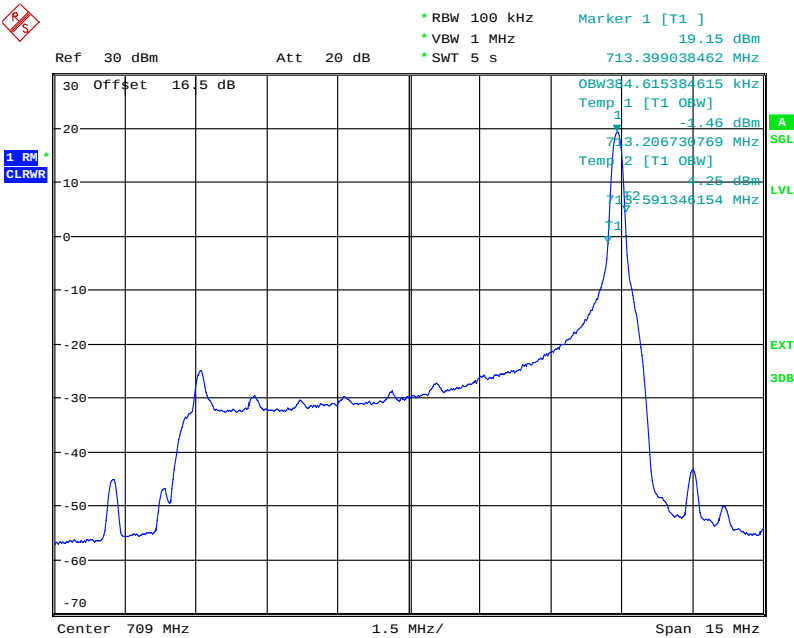
Product Service

709 MHz - 1 Resource Block - Middle



Date: 5.AUG.2013 08:54:15

709 MHz - 1 Resource Block - High

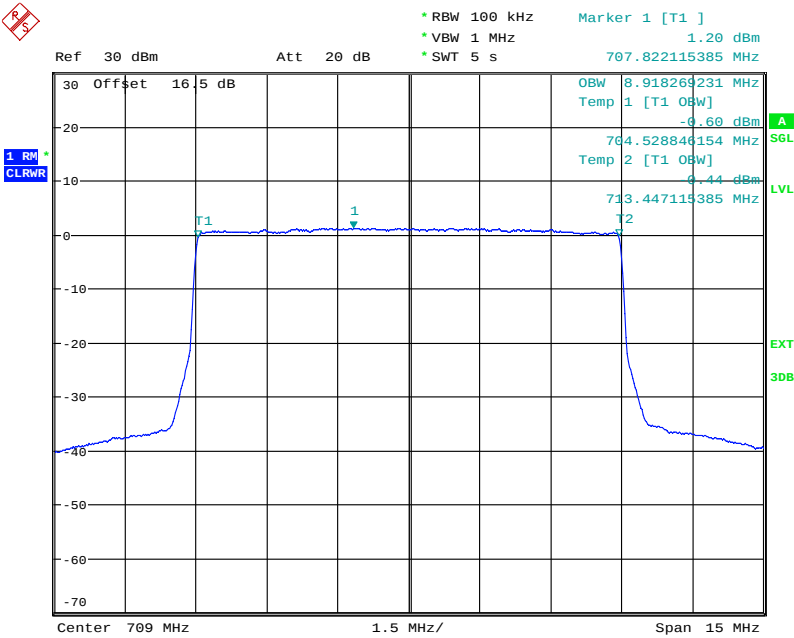


Date: 5.AUG.2013 08:45:48



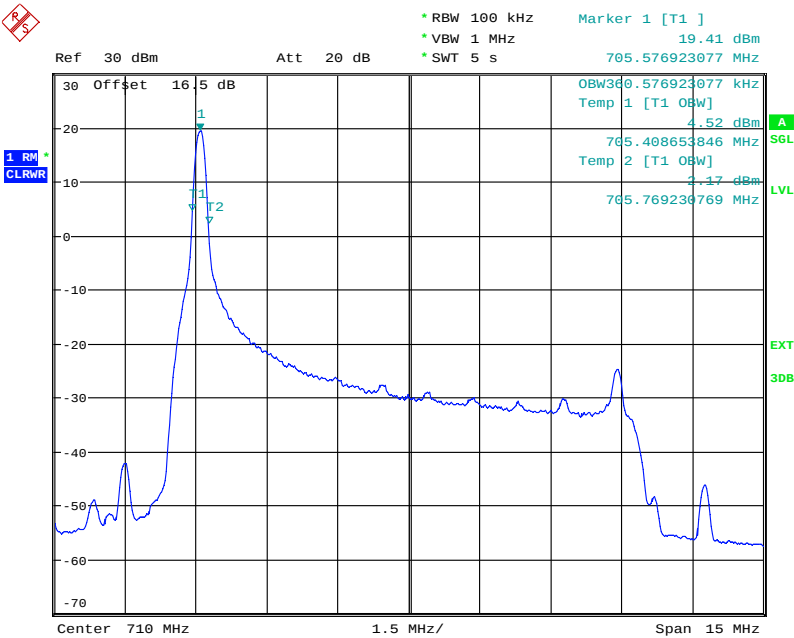
Product Service

709 MHz - All Resource Blocks



Date: 5.AUG.2013 08:33:31

710 MHz - 1 Resource Block - Low

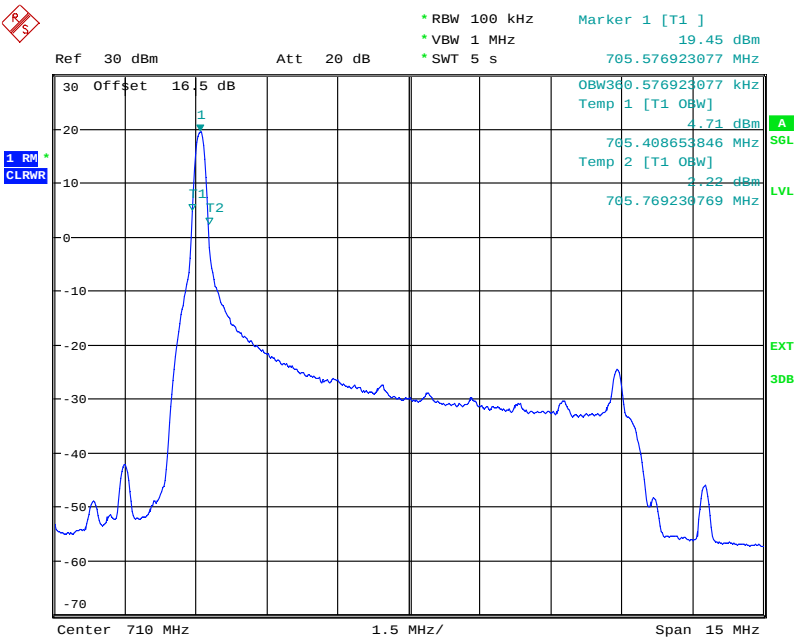


Date: 5.AUG.2013 09:12:02



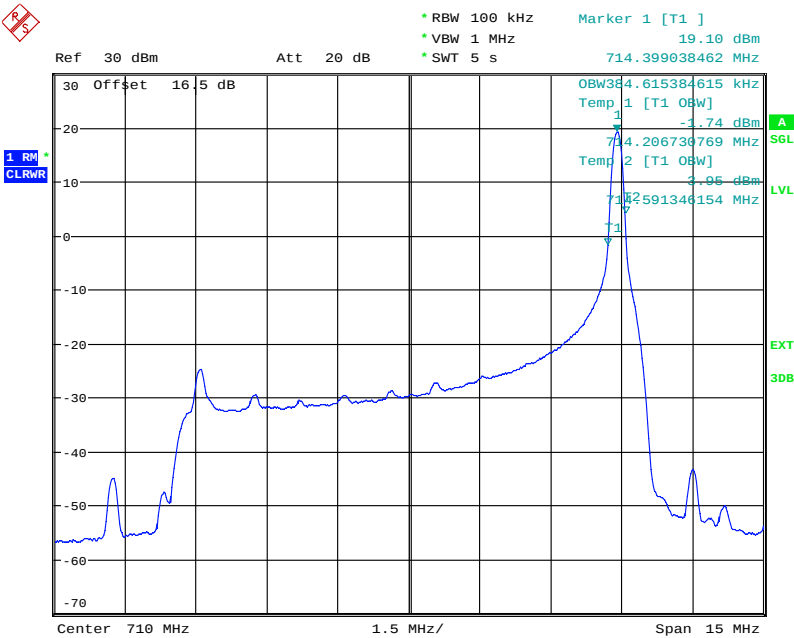
Product Service

710 MHz - 1 Resource Block - Middle



Date: 5.AUG.2013 09:03:23

710 MHz - 1 Resource Block - High

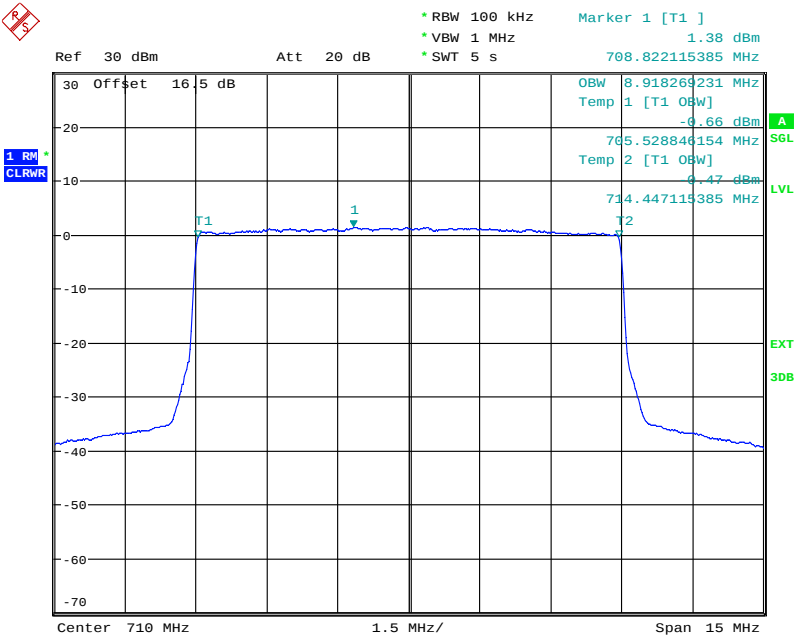


Date: 5.AUG.2013 09:20:18



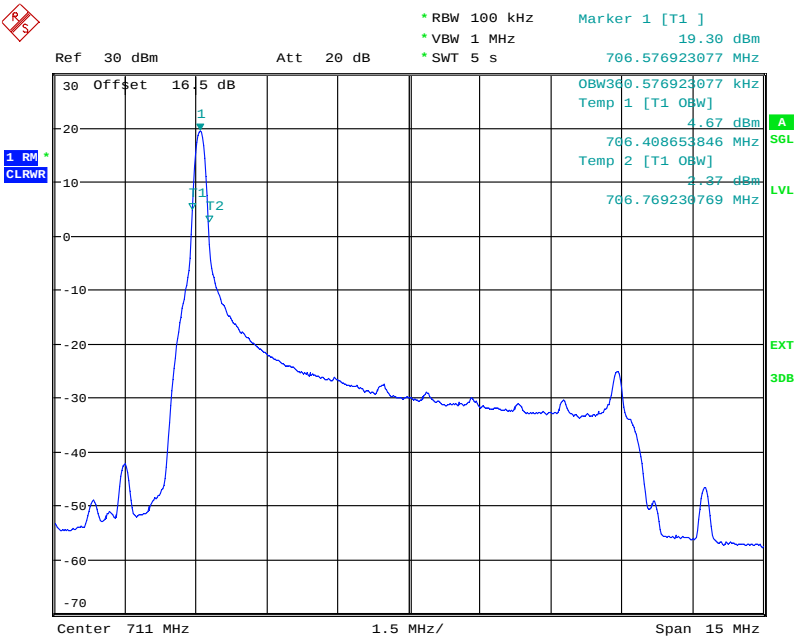
Product Service

710 MHz - All Resource Blocks



Date: 5.AUG.2013 09:28:24

711 MHz - 1 Resource Block - Low

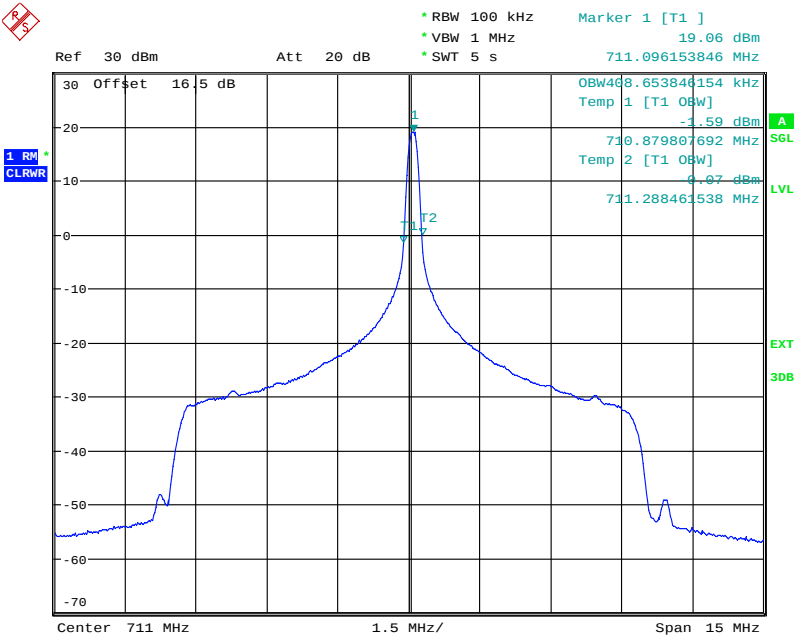


Date: 5.AUG.2013 10:07:17



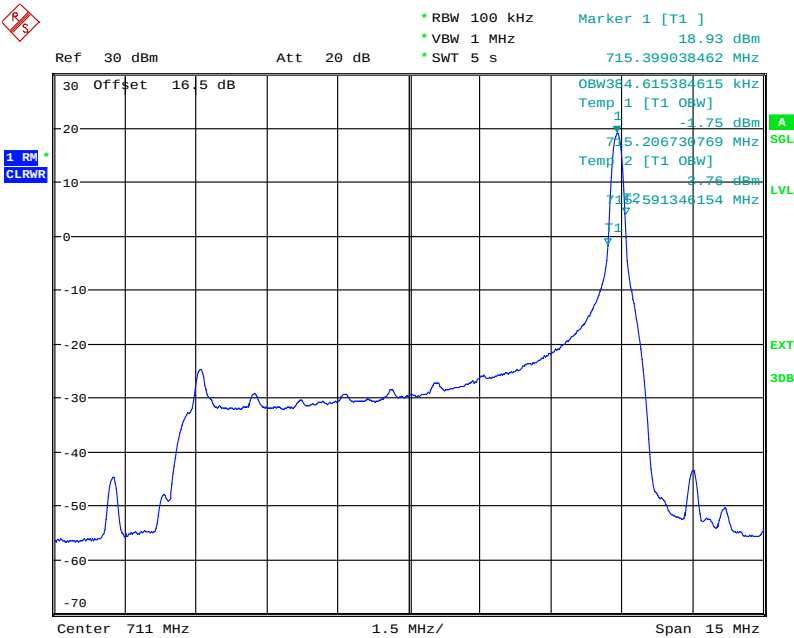
Product Service

711 MHz - 1 Resource Block - Middle



Date: 5.AUG.2013 09:58:18

711 MHz - 1 Resource Block - High

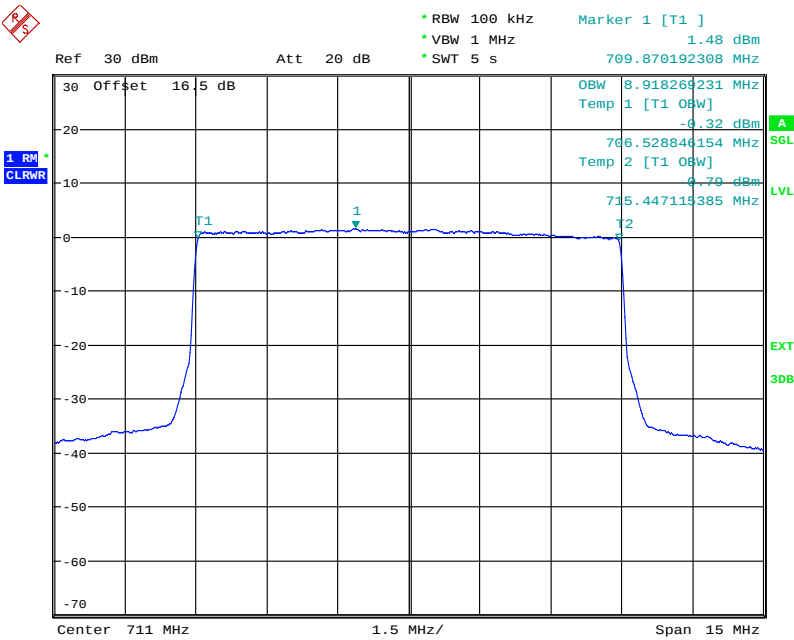


Date: 5.AUG.2013 09:47:25



Product Service

711 MHz - All Resource Blocks



Date: 5.AUG.2013 09:36:42

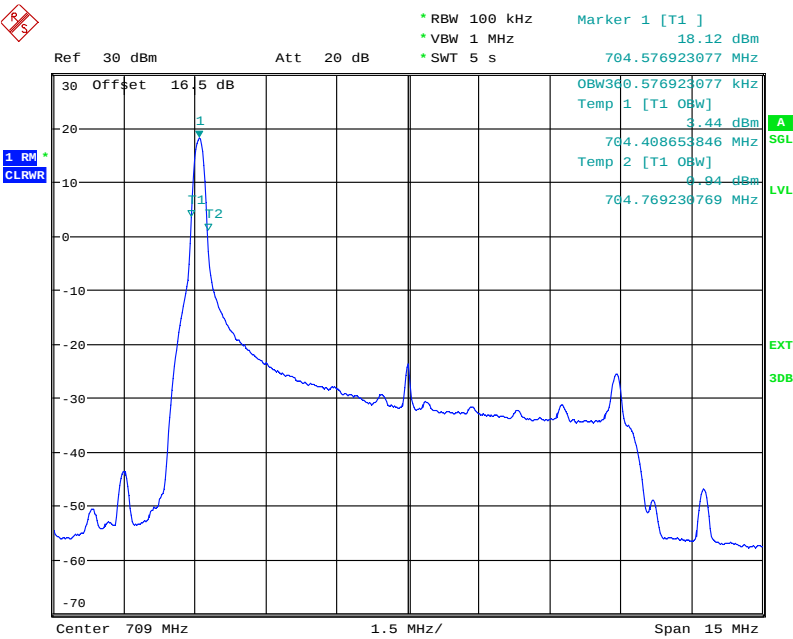


Product Service

10.0 MHz Bandwidth - 16QAM

Occupied Bandwidth (kHz)											
709.0 MHz				710.0 MHz				711.0 MHz			
1 Resource Block			All Resource Blocks	1 Resource Block			All Resource Blocks	1 Resource Block			All Resource Blocks
Low	Mid	High		Low	Mid	High		Low	Mid	High	
360.6	384.6	384.6	8918.3	384.6	384.6	360.6	8918.3	384.6	408.7	384.6	8918.3

709 MHz - 1 Resource Block - Low

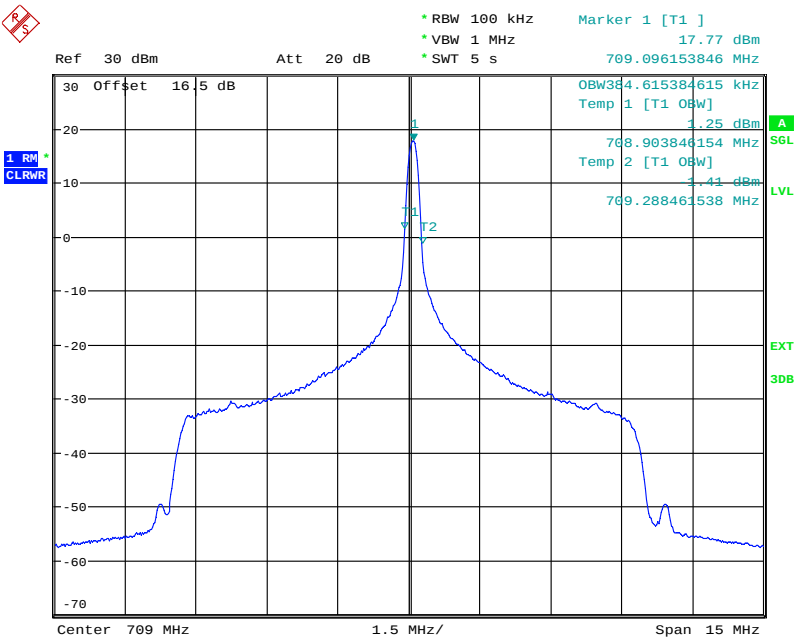


Date: 5.AUG.2013 12:16:36



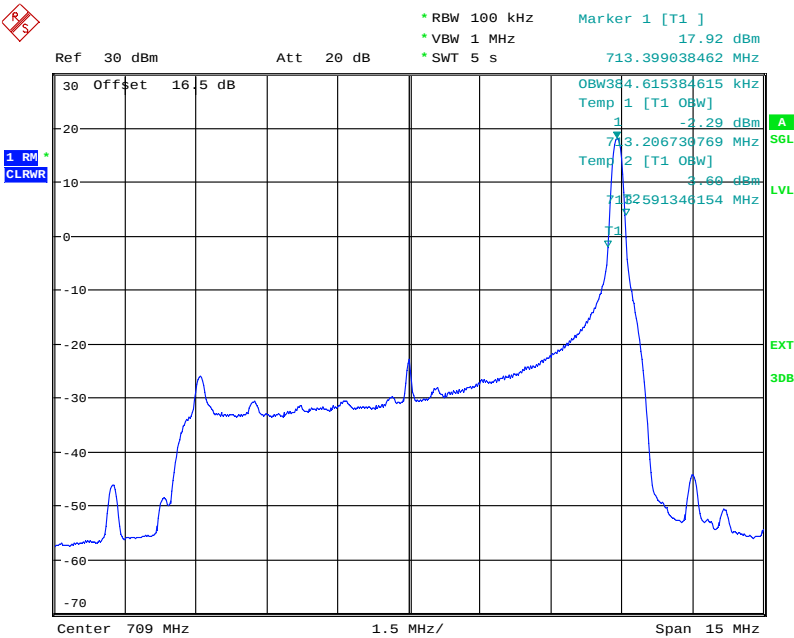
Product Service

709 MHz - 1 Resource Block - Middle



Date: 5.AUG.2013 12:26:11

709 MHz - 1 Resource Block - High

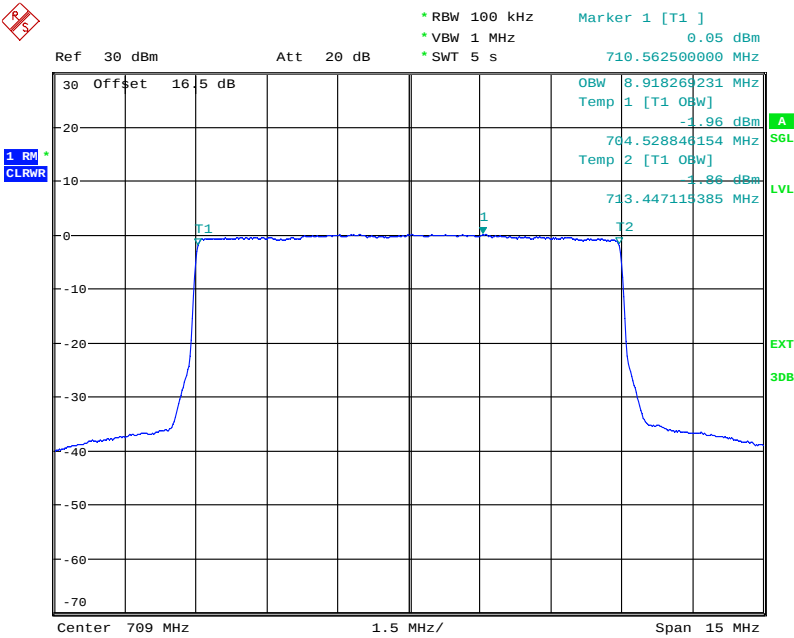


Date: 5.AUG.2013 12:35:09



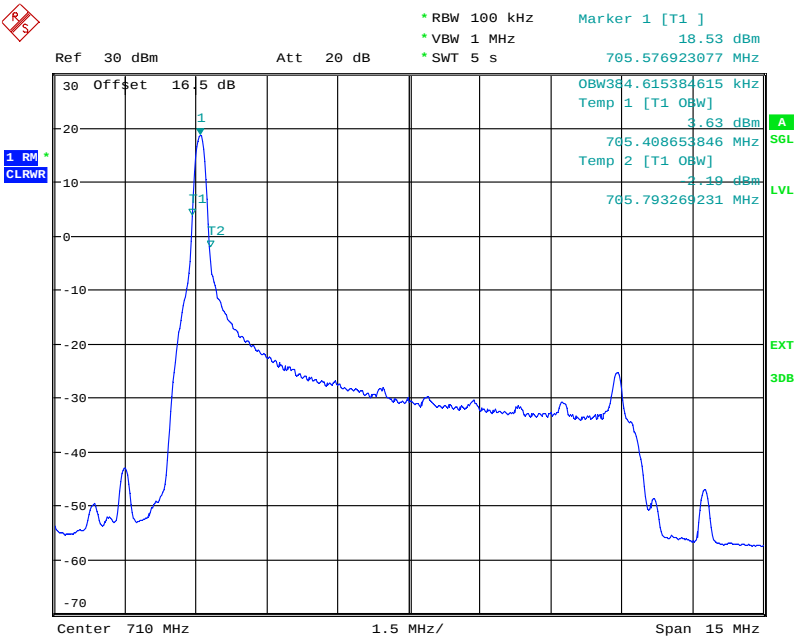
Product Service

709 MHz - All Resource Blocks



Date: 5.AUG.2013 12:07:04

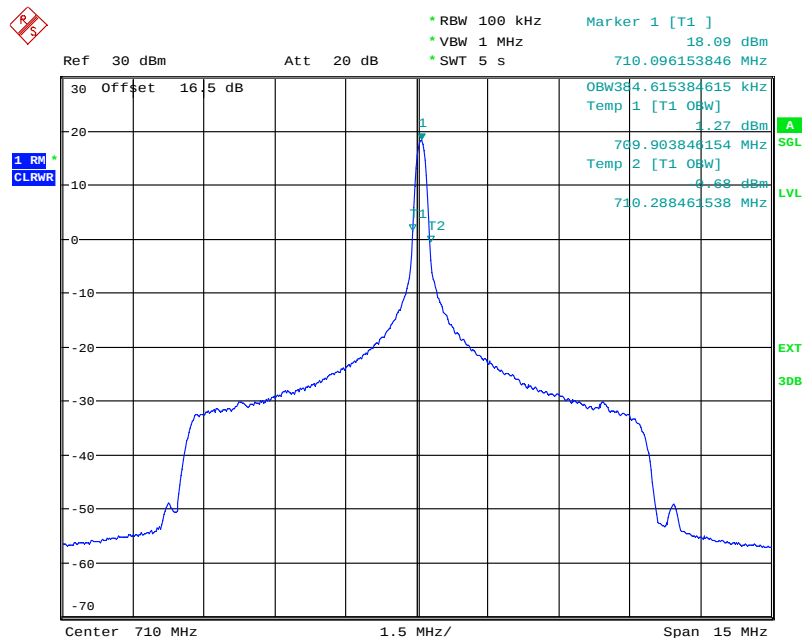
710 MHz - 1 Resource Block - Low



Date: 5.AUG.2013 12:59:48

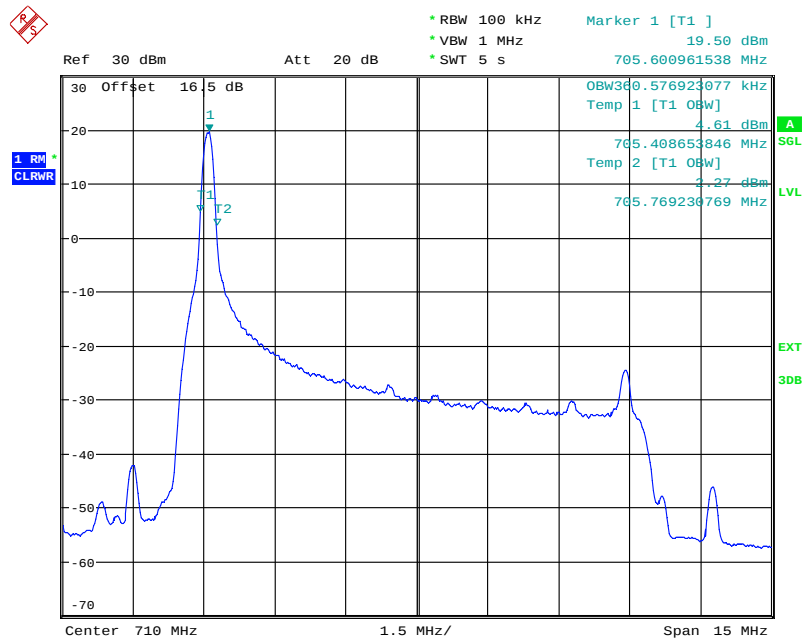


710 MHz - 1 Resource Block - Middle



Date: 5.AUG.2013 12:51:41

710 MHz - 1 Resource Block - High

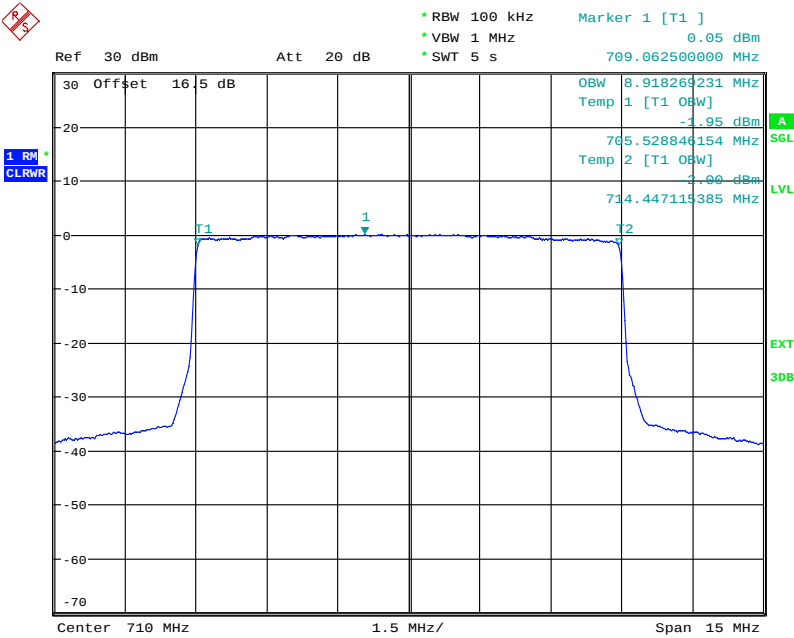


Date: 5.AUG.2013 12:43:45



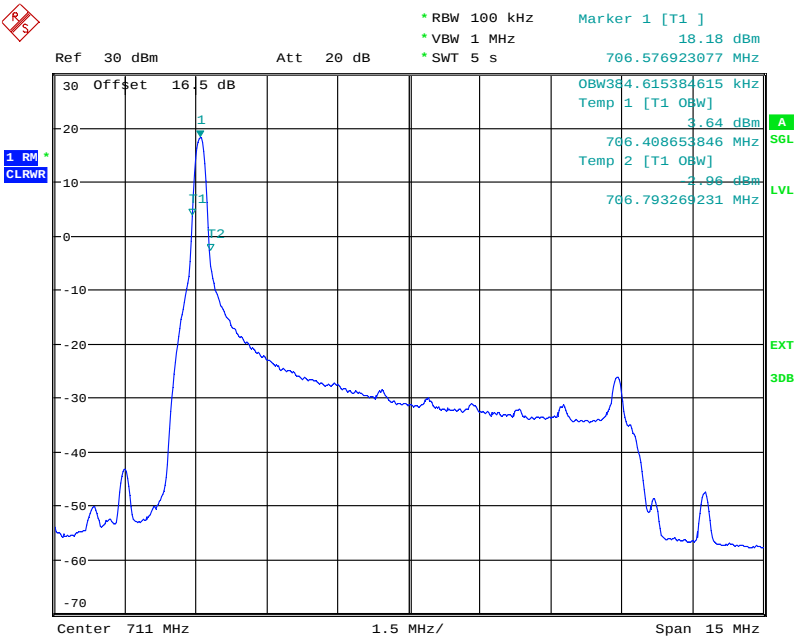
Product Service

710 MHz - All Resource Blocks



Date: 5.AUG.2013 13:35:20

711 MHz - 1 Resource Block - Low

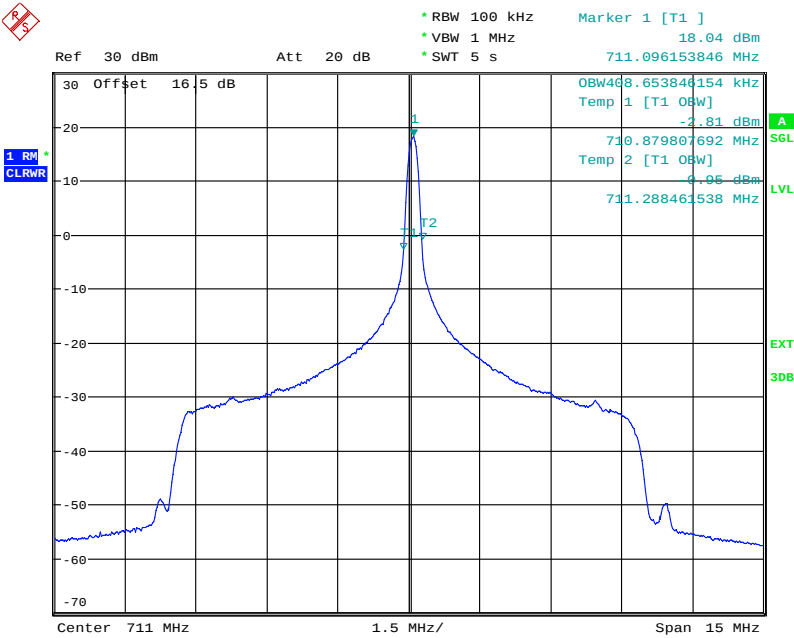


Date: 5.AUG.2013 14:12:36



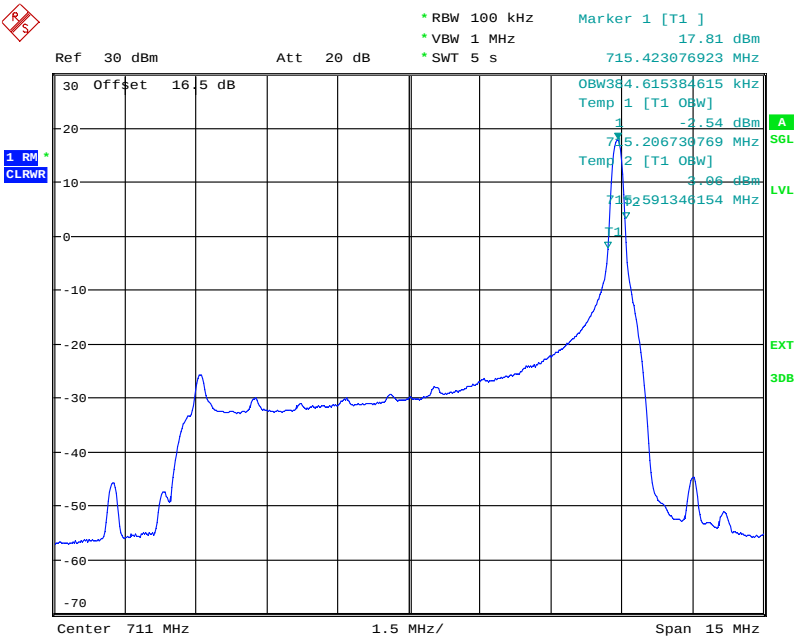
Product Service

711 MHz - 1 Resource Block - Middle



Date: 5.AUG.2013 14:04:02

711 MHz - 1 Resource Block - High

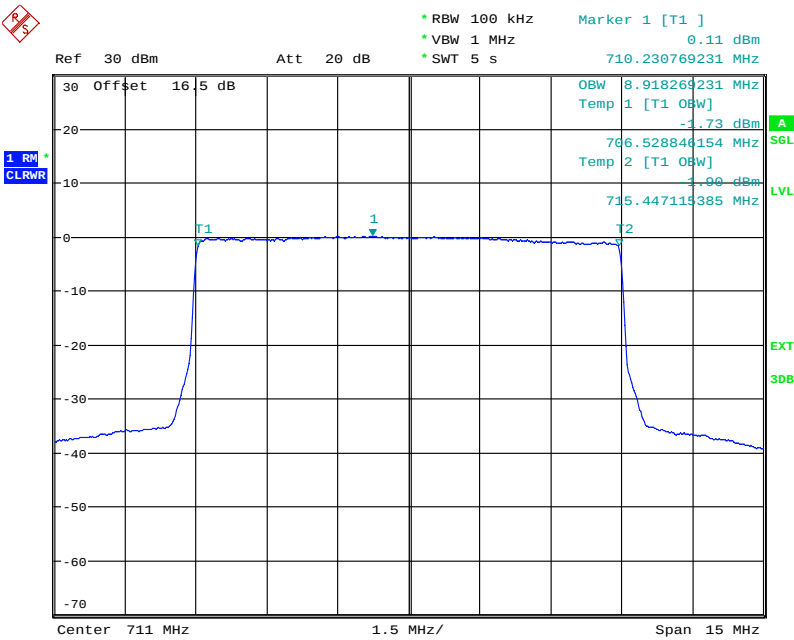


Date: 5.AUG.2013 13:54:10



Product Service

711 MHz - All Resource Blocks



Date: 5.AUG.2013 14:25:21



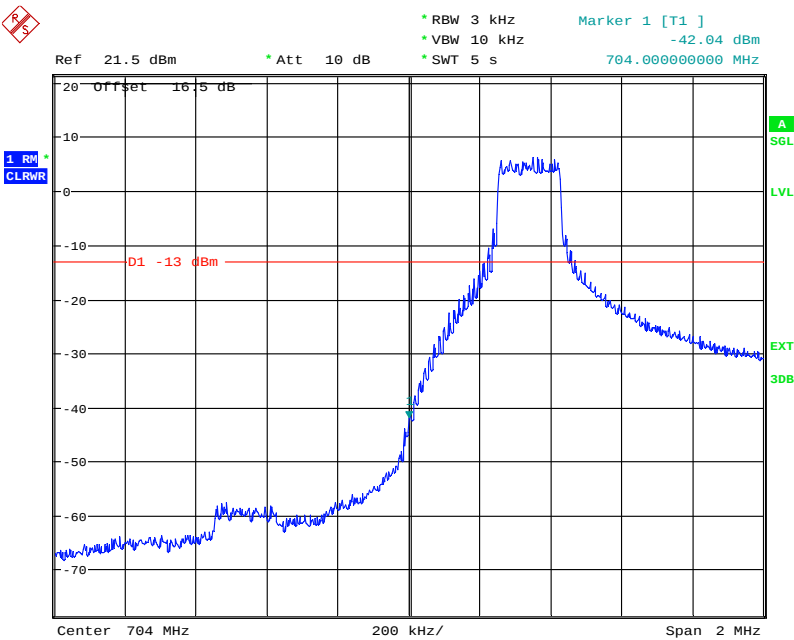
Product Service

Band Edge

5.0 MHz Bandwidth - QPSK

Band Edge (dBm)			
706.5 MHz		713.5 MHz	
1 Resource Block	All Resource Blocks	1 Resource Block	All Resource Blocks
Low		High	
-42.0	-34.9	-38.5	-31.9

706.5 MHz - 1 Resource Block - Low

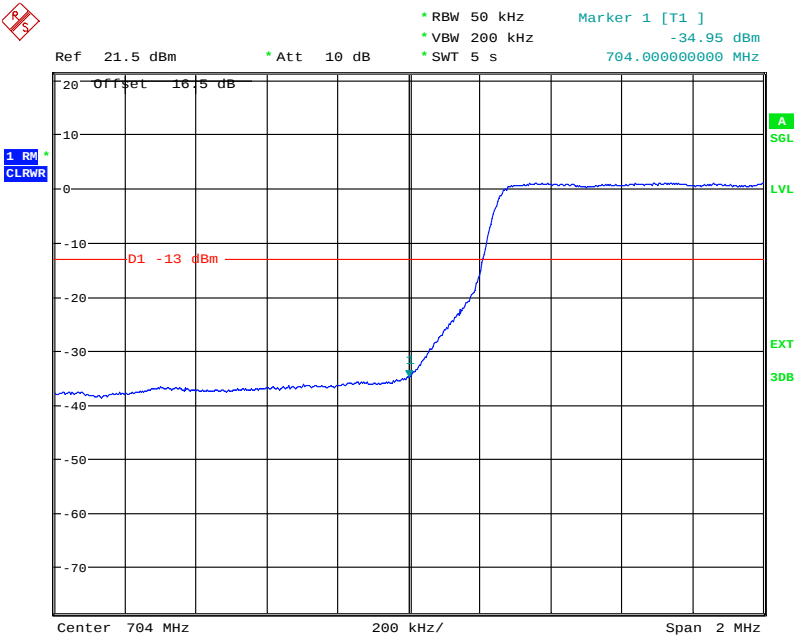


Date: 2.AUG.2013 14:26:38



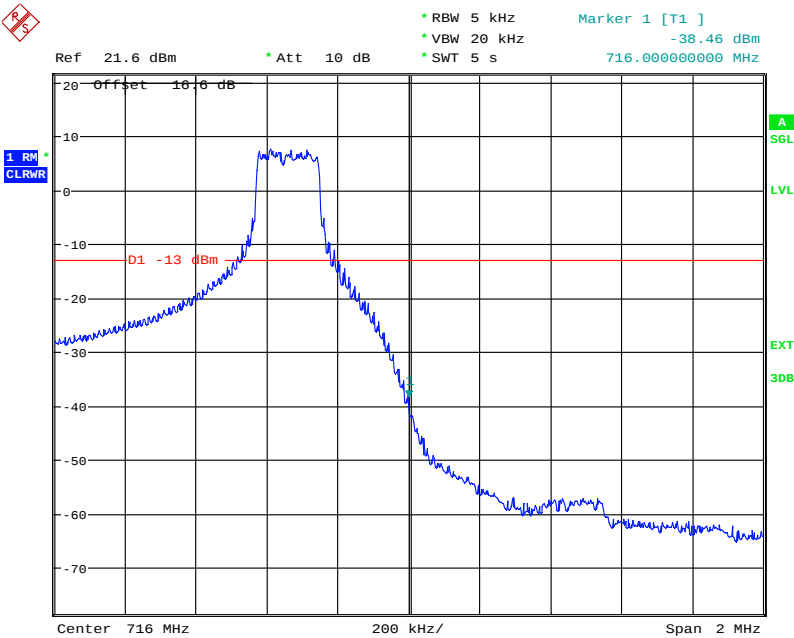
Product Service

706.5 MHz - All Resource Blocks



Date: 2.AUG.2013 14:38:52

713.5 MHz - 1 Resource Block - High

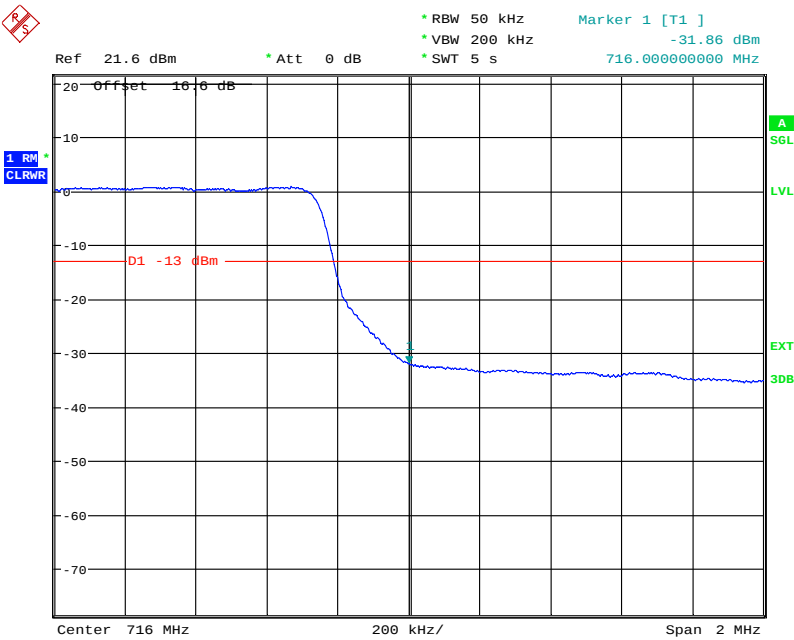


Date: 2.AUG.2013 16:14:31



Product Service

713.5 MHz - All Resource Blocks



Date: 2.AUG.2013 16:03:28

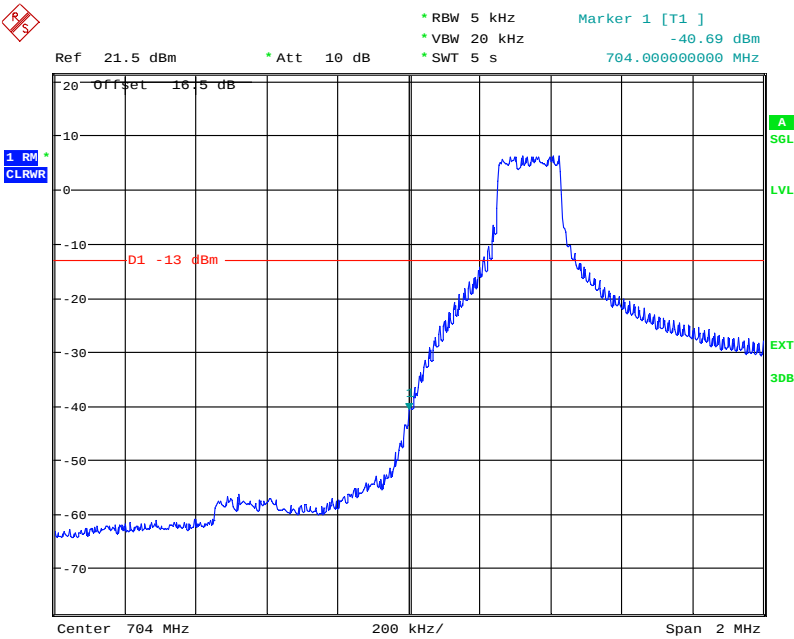


Product Service

5.0 MHz Bandwidth - 16QAM

Band Edge (dBm)			
706.5 MHz		713.5 MHz	
1 Resource Block	All Resource Blocks	1 Resource Block	All Resource Blocks
Low		High	
-40.7	-34.6	-40.8	-33.9

706.5 MHz - 1 Resource Block - Low

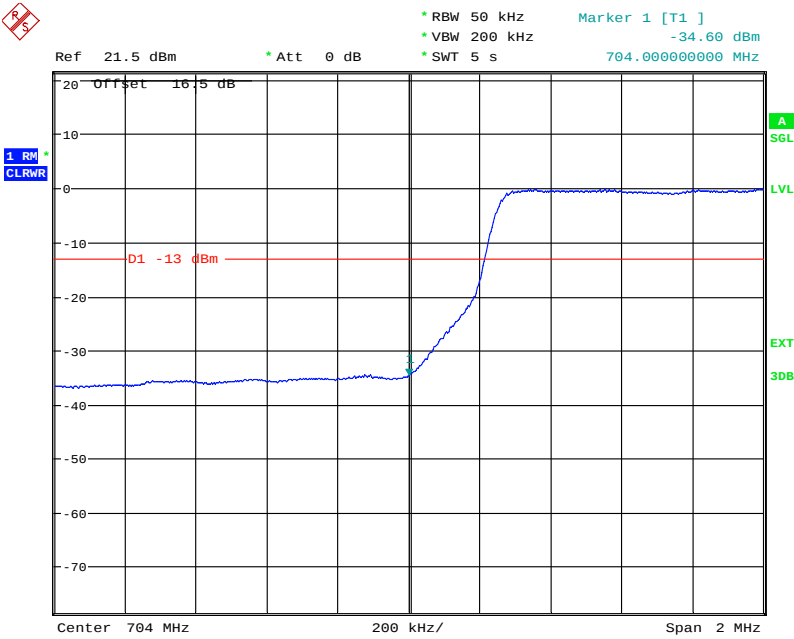


Date: 5.AUG.2013 10:29:46



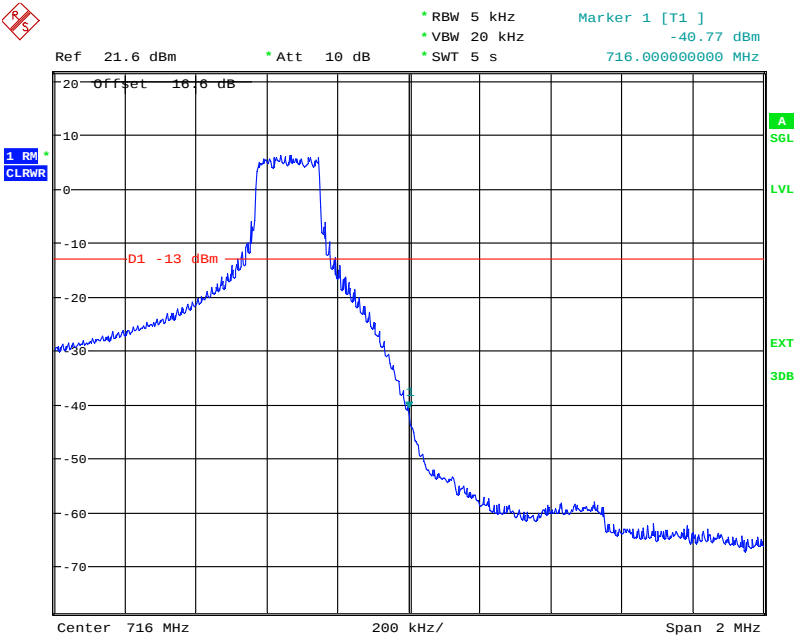
Product Service

706.5 MHz - All Resource Blocks



Date: 5.AUG.2013 10:26:49

713.5 MHz - 1 Resource Block - High

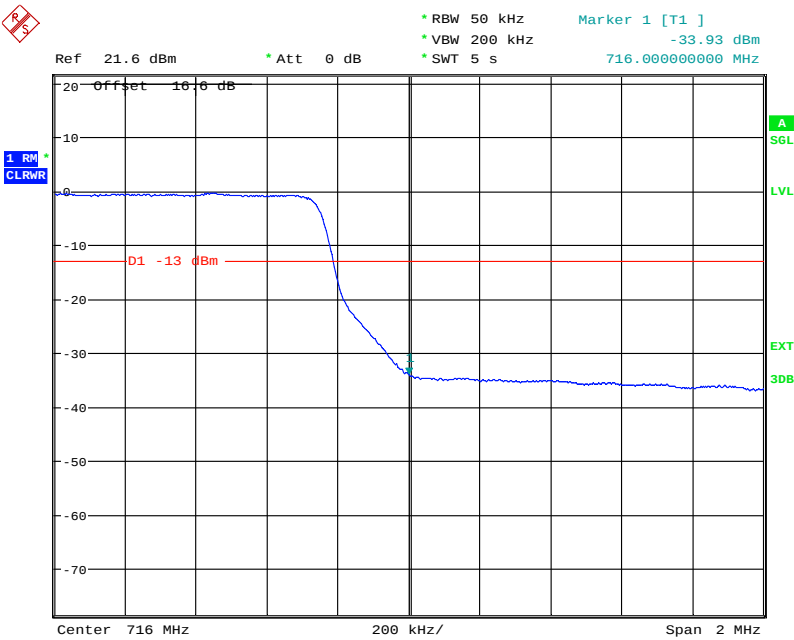


Date: 5.AUG.2013 11:39:52



Product Service

713.5 MHz - All Resource Blocks



Date: 5.AUG.2013 11:29:48

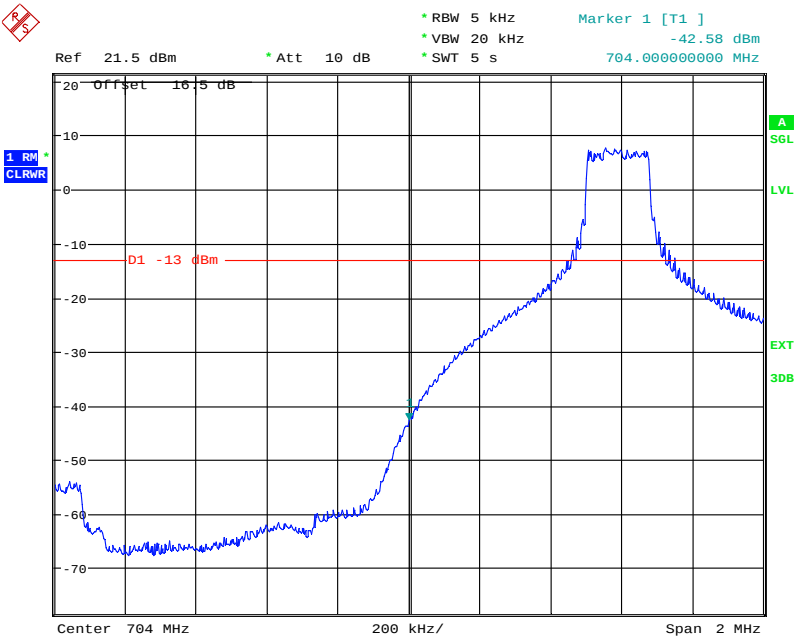


Product Service

10.0 MHz Bandwidth - QPSK

Band Edge (dBm)			
709.0 MHz		711.0 MHz	
1 Resource Block	All Resource Blocks	1 Resource Block	All Resource Blocks
Low		High	
-42.6	-33.5	-41.6	-33.3

709 MHz - 1 Resource Block - Low

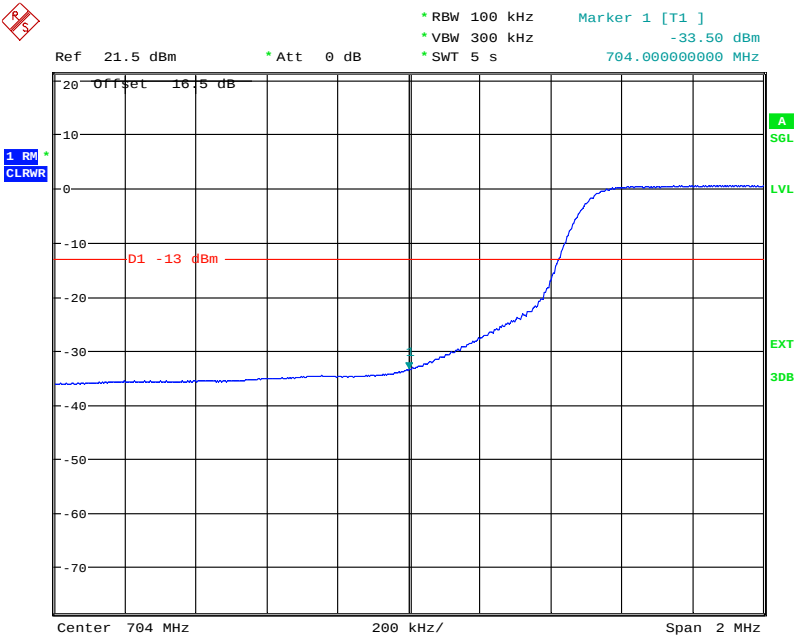


Date: 5.AUG.2013 08:21:28



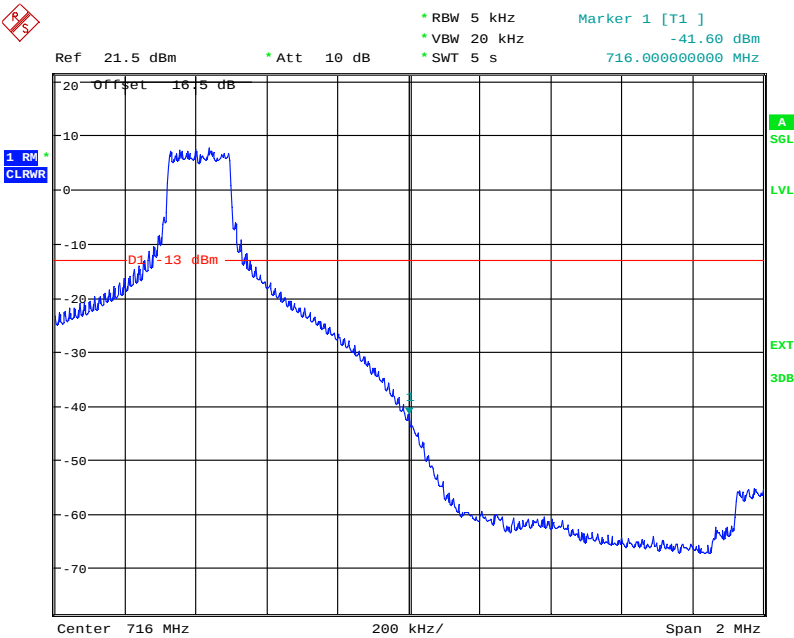
Product Service

709 MHz - All Resource Blocks



Date: 5.AUG.2013 08:34:08

711 MHz - 1 Resource Block - High

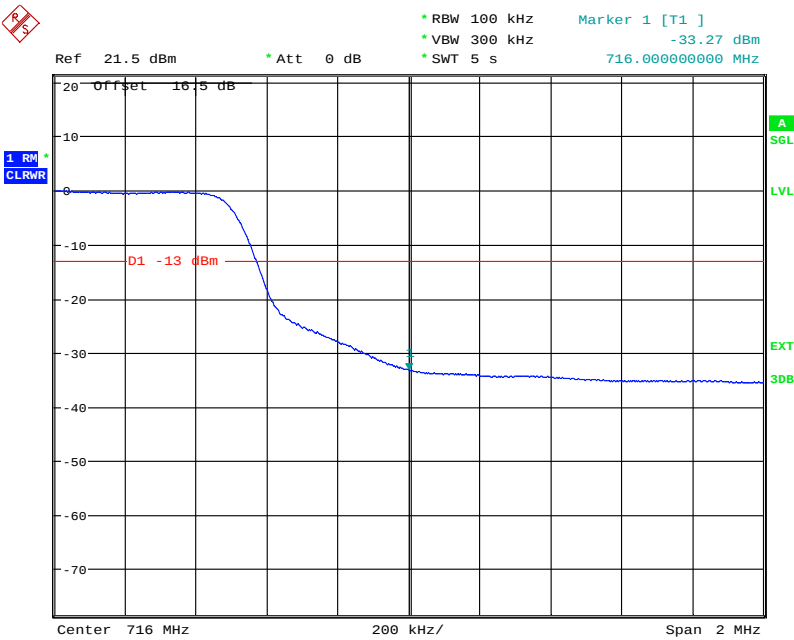


Date: 5.AUG.2013 09:48:02



Product Service

711 MHz - All Resource Blocks



Date: 5.AUG.2013 09:37:19

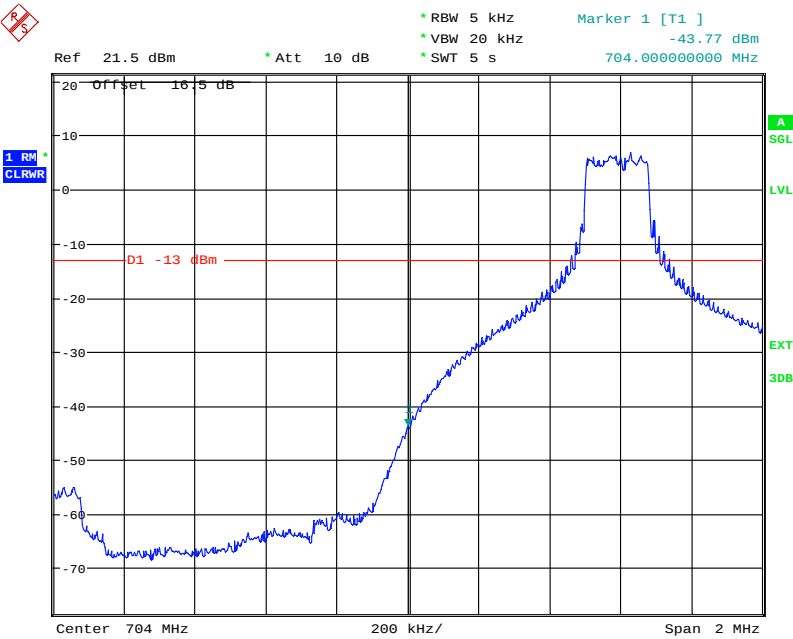


Product Service

10.0 MHz Bandwidth - 16QAM

Band Edge (dBm)			
709.0 MHz		711.0 MHz	
1 Resource Block	All Resource Blocks	1 Resource Block	All Resource Blocks
Low		High	
-43.8	-34.4	-42.7	-33.8

709 MHz - 1 Resource Block - Low

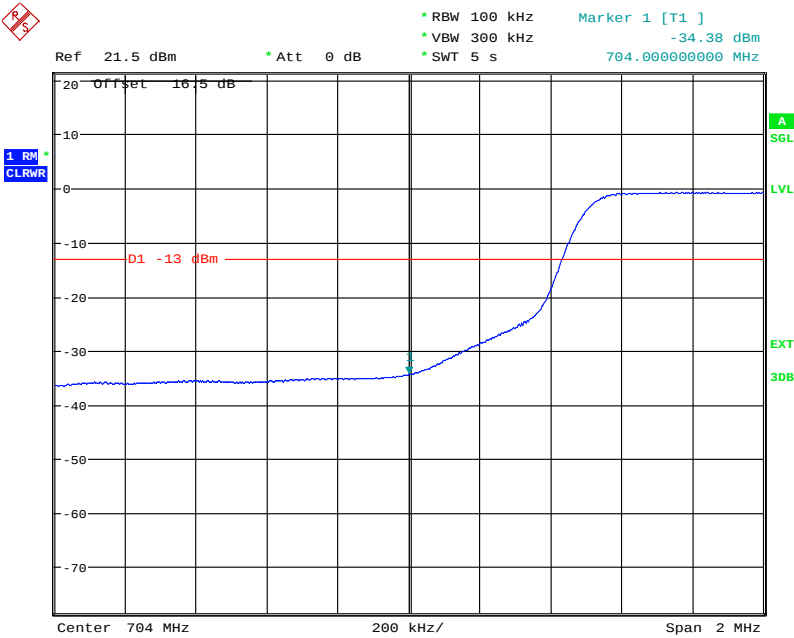


Date: 5.AUG.2013 12:17:14



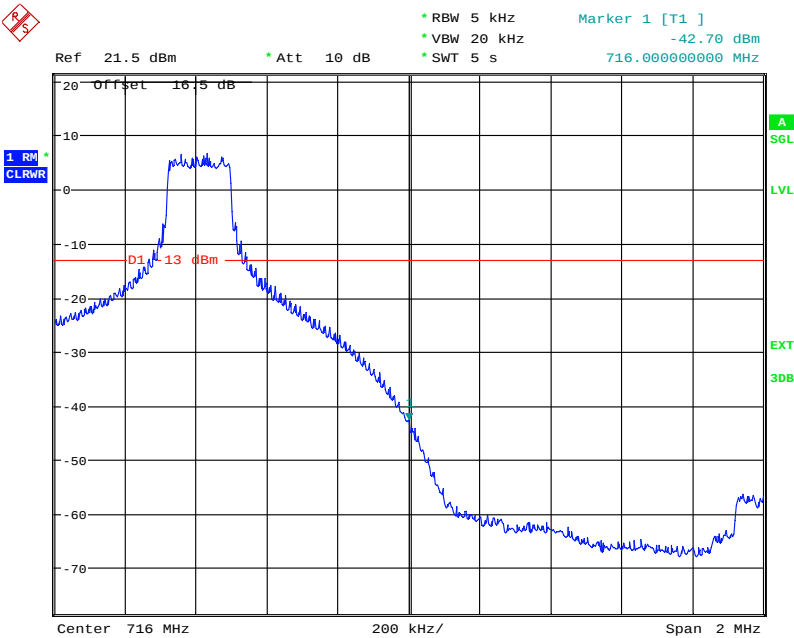
Product Service

709 MHz - All Resource Blocks



Date: 5.AUG.2013 12:07:41

711 MHz - 1 Resource Block - High

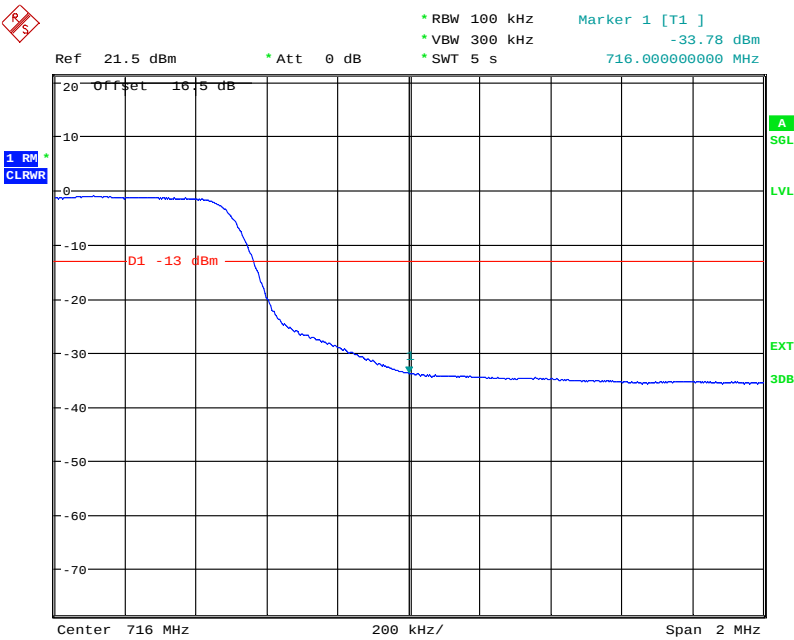


Date: 5.AUG.2013 13:54:47



Product Service

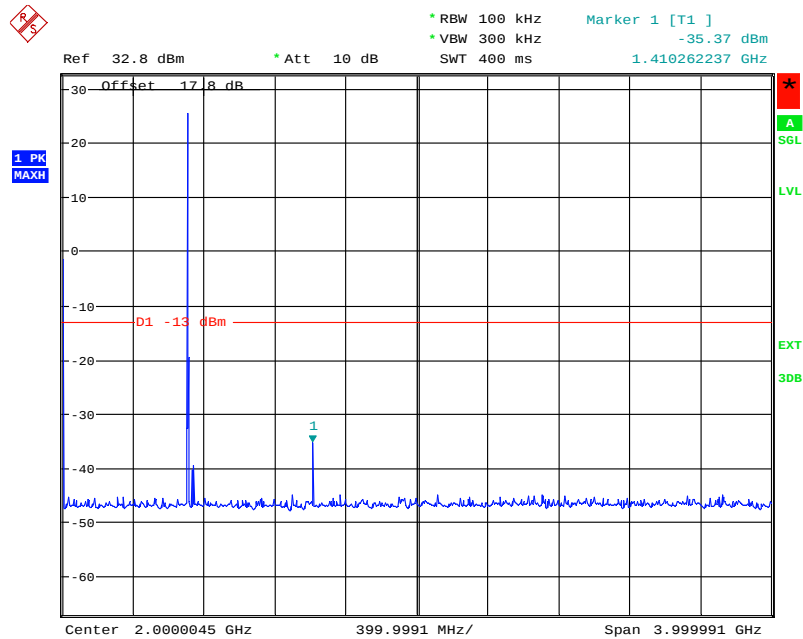
711 MHz - All Resource Blocks



Date: 5.AUG.2013 14:26:03



Product Service

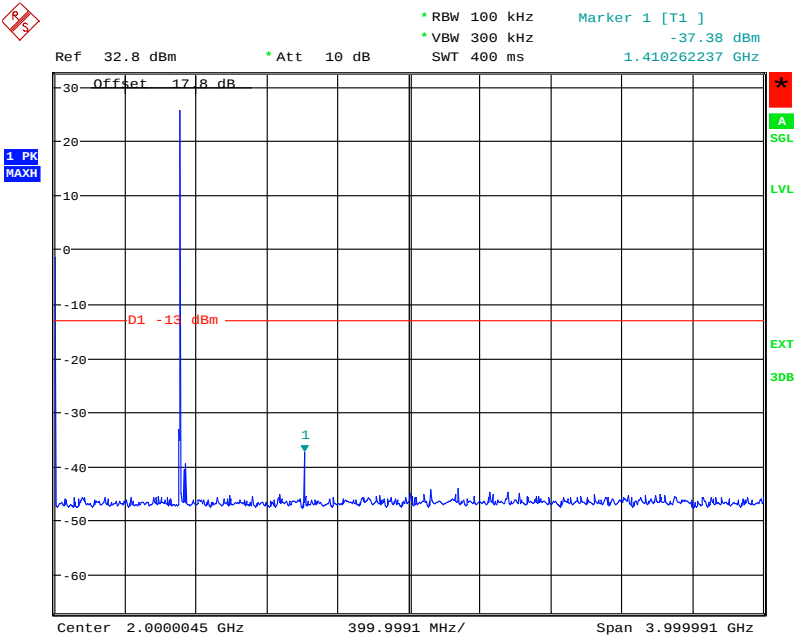
Conducted Spurious Emissions (Band 1 - 9kHz to 4 GHz)5.0 MHz Bandwidth - QPSK706.5 MHz - 1 Resource Block - Low

Date: 2.AUG.2013 14:31:56



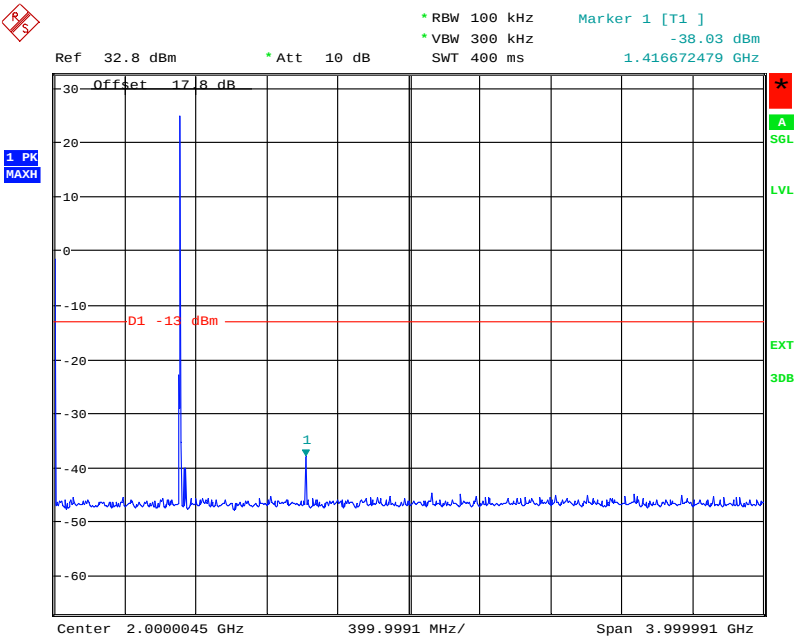
Product Service

706.5 MHz - 1 Resource Block - Middle



Date: 2.AUG.2013 15:10:38

706.5 MHz - 1 Resource Block - High

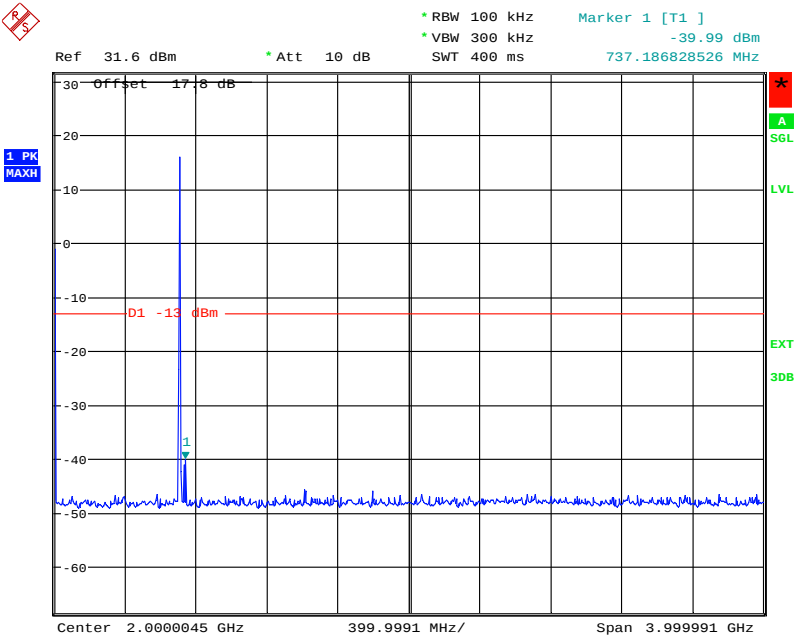


Date: 2.AUG.2013 14:57:16



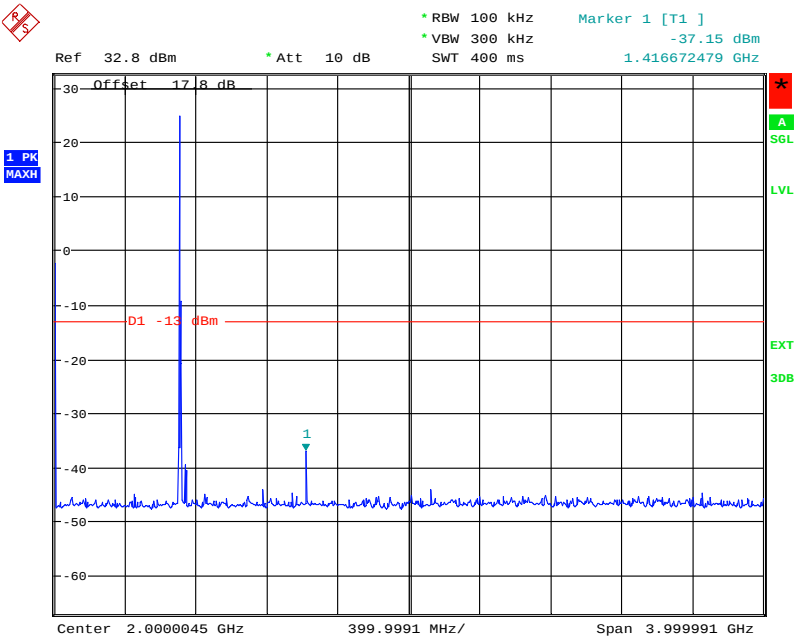
Product Service

706.5 MHz - All Resource Blocks



Date: 2.AUG.2013 14:43:10

710 MHz - 1 Resource Block - Low

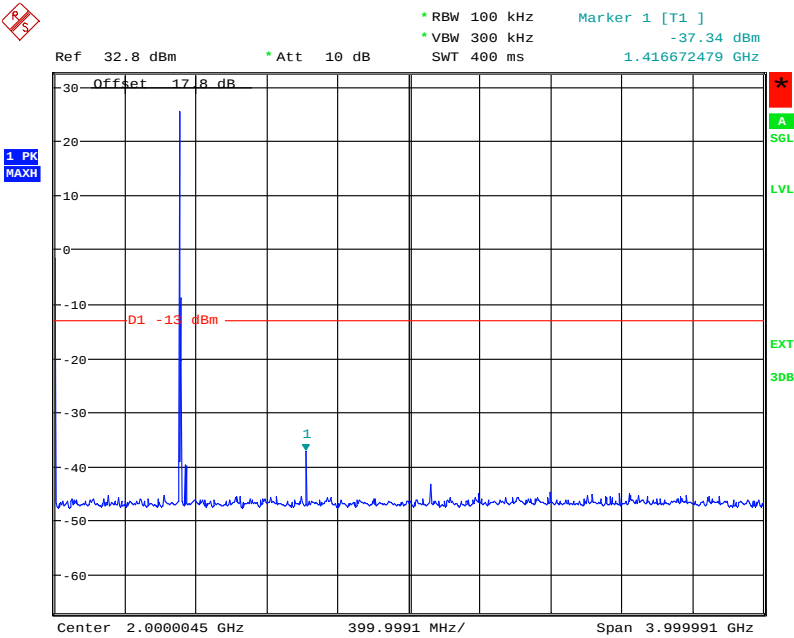


Date: 2.AUG.2013 15:45:10



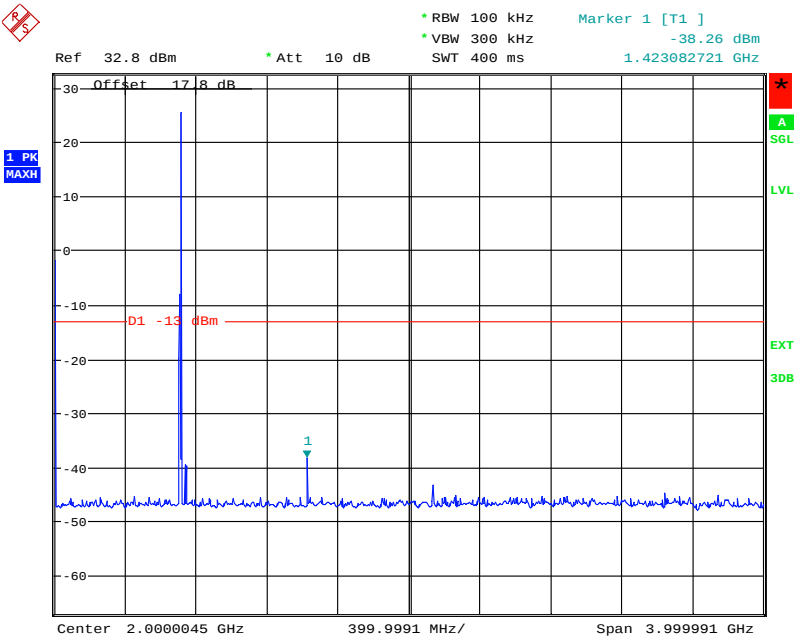
Product Service

710 MHz - 1 Resource Block - Middle



Date: 2.AUG.2013 15:25:43

710 MHz - 1 Resource Block - High

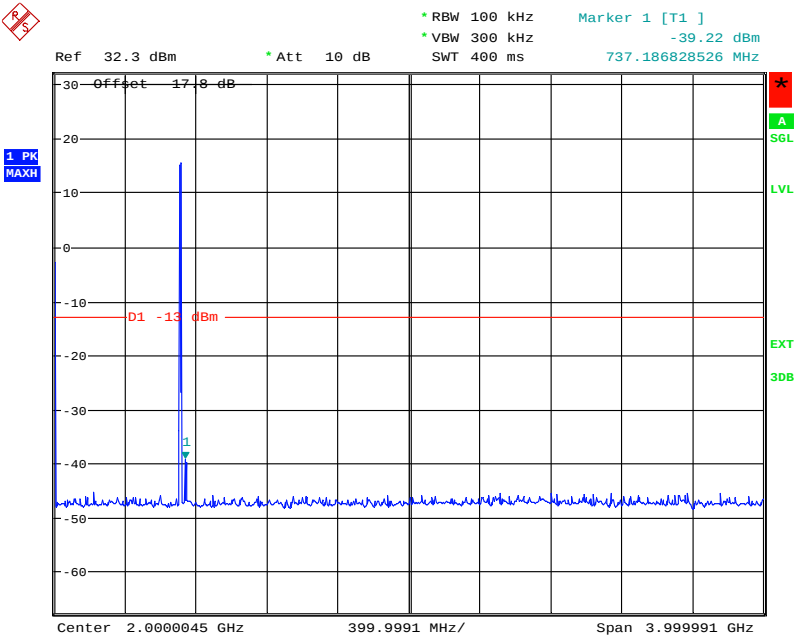


Date: 2.AUG.2013 15:35:33



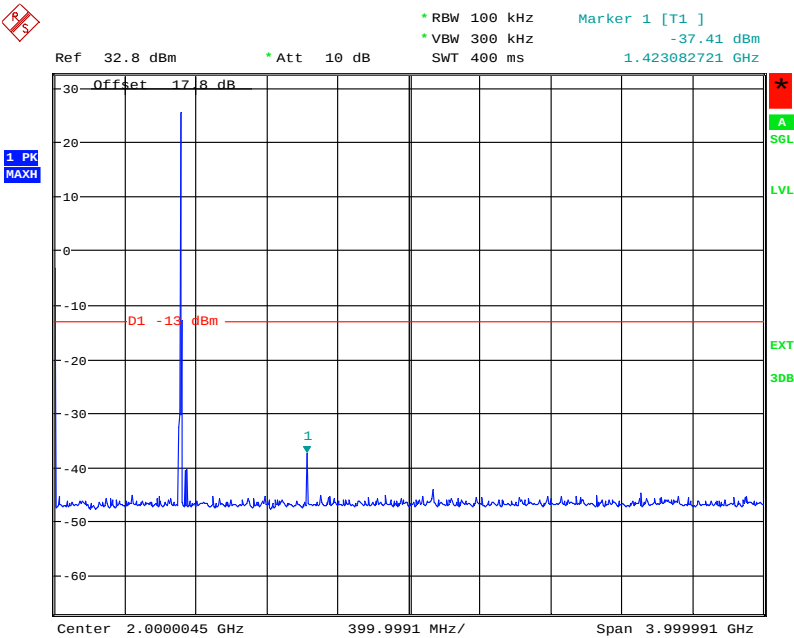
Product Service

710 MHz - All Resource Blocks



Date: 2.AUG.2013 15:56:24

713.5 MHz - 1 Resource Block - Low

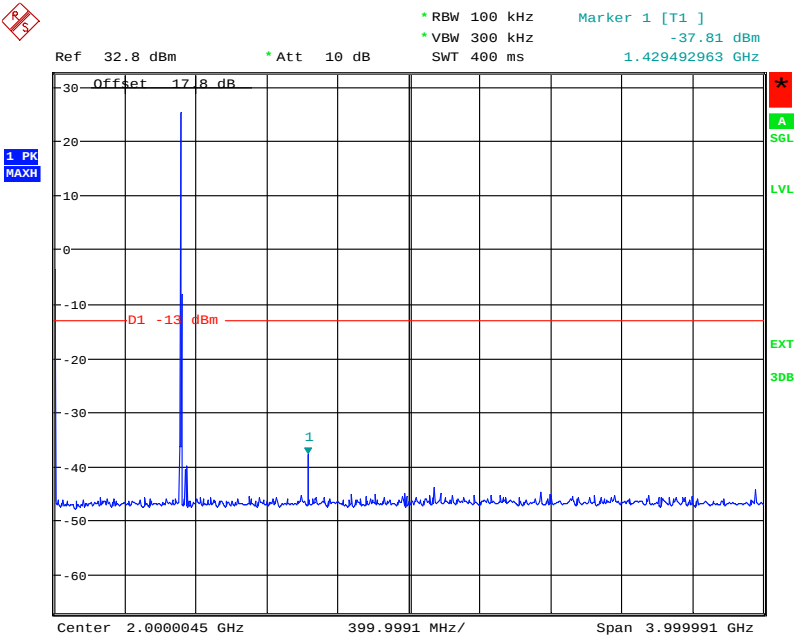


Date: 2.AUG.2013 16:36:42



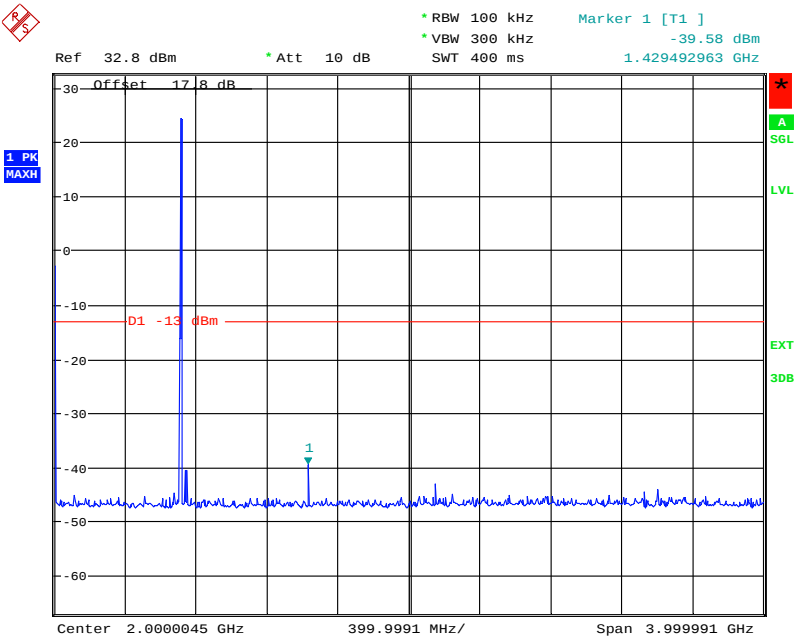
Product Service

713.5 MHz - 1 Resource Block - Middle



Date: 2.AUG.2013 16:28:21

713.5 MHz - 1 Resource Block - High

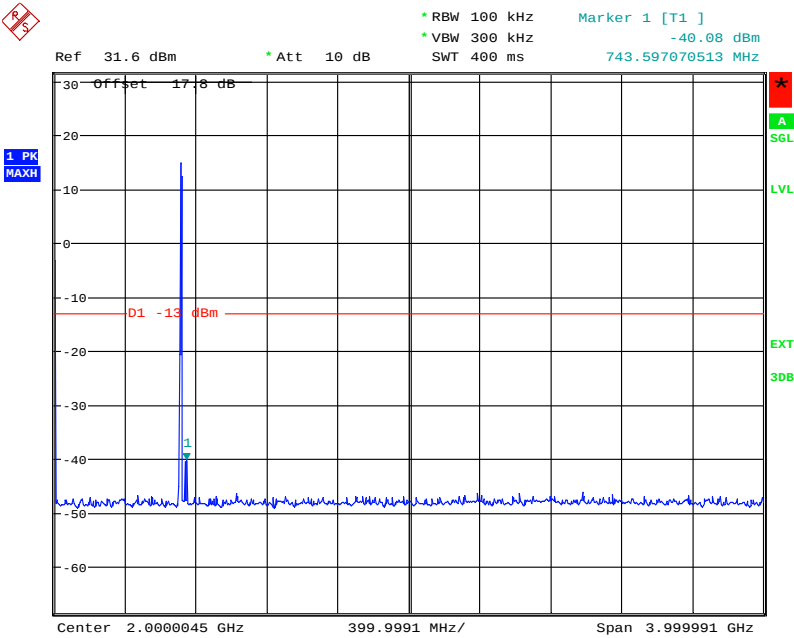


Date: 2.AUG.2013 16:18:27



Product Service

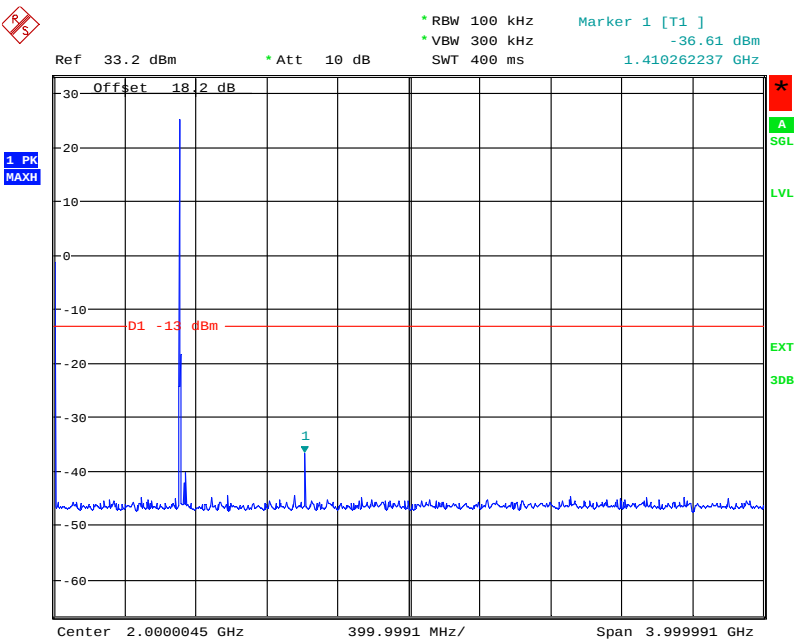
713.5 MHz - All Resource Blocks



Date: 2.AUG.2013 16:07:42

5.0 MHz Bandwidth - 16QAM

706.5 MHz - 1 Resource Block - Low

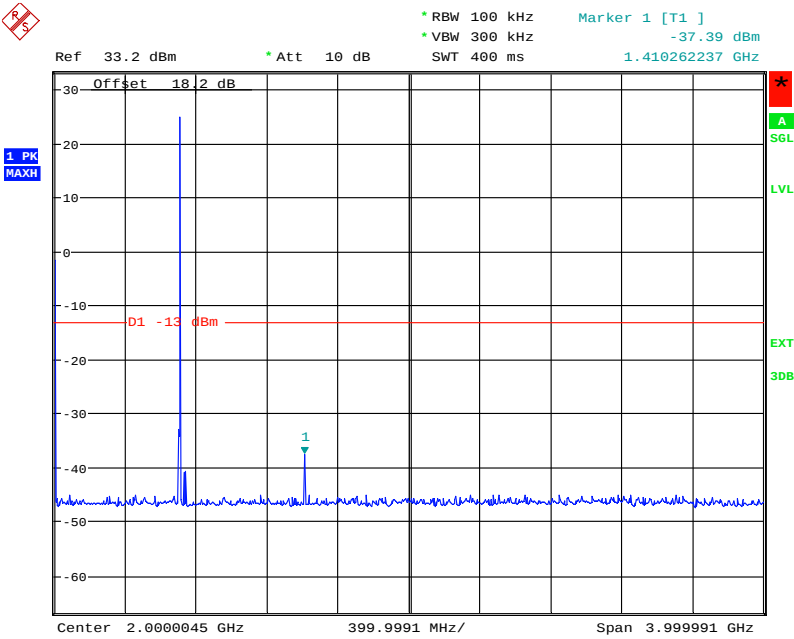


Date: 5.AUG.2013 10:33:20



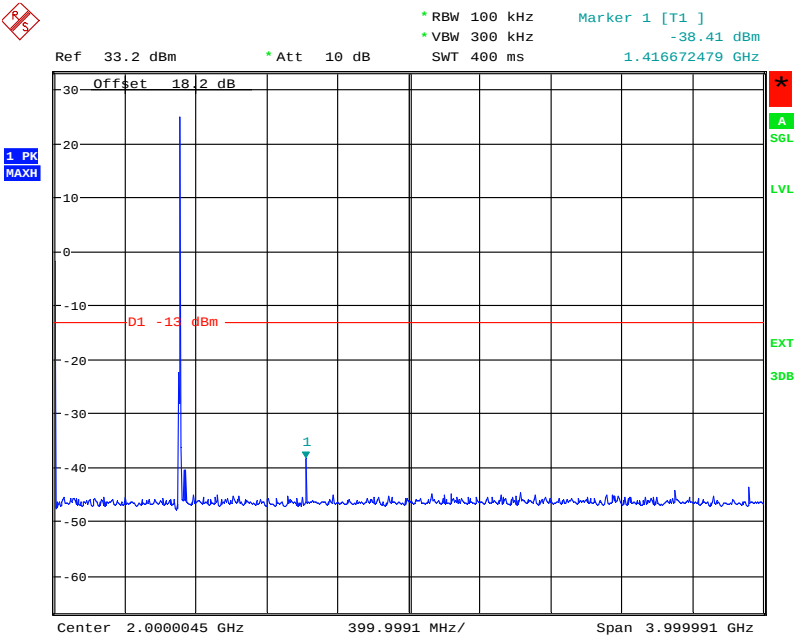
Product Service

706.5 MHz - 1 Resource Block - Middle



Date: 5.AUG.2013 10:42:08

706.5 MHz - 1 Resource Block - High

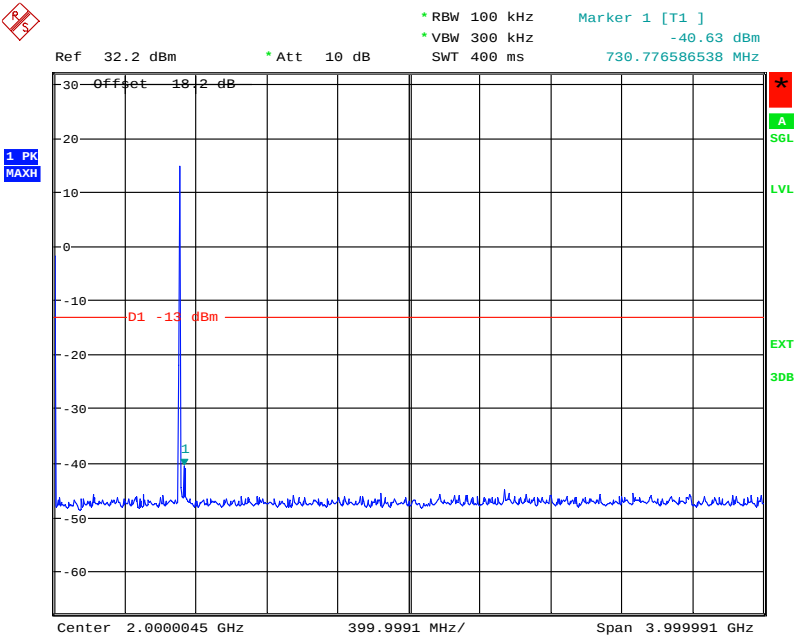


Date: 5.AUG.2013 10:50:07



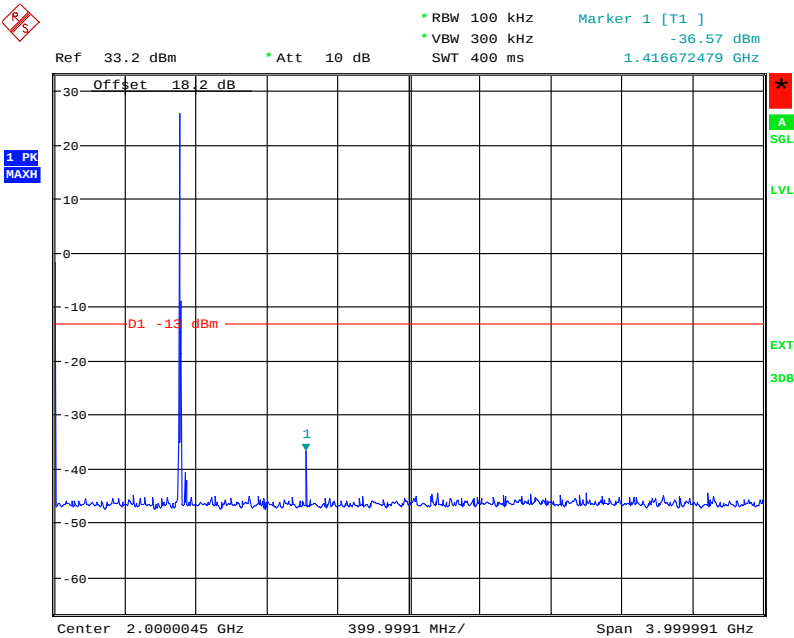
Product Service

706.5 MHz - All Resource Blocks



Date: 5.AUG.2013 10:21:46

710 MHz - 1 Resource Block - Low

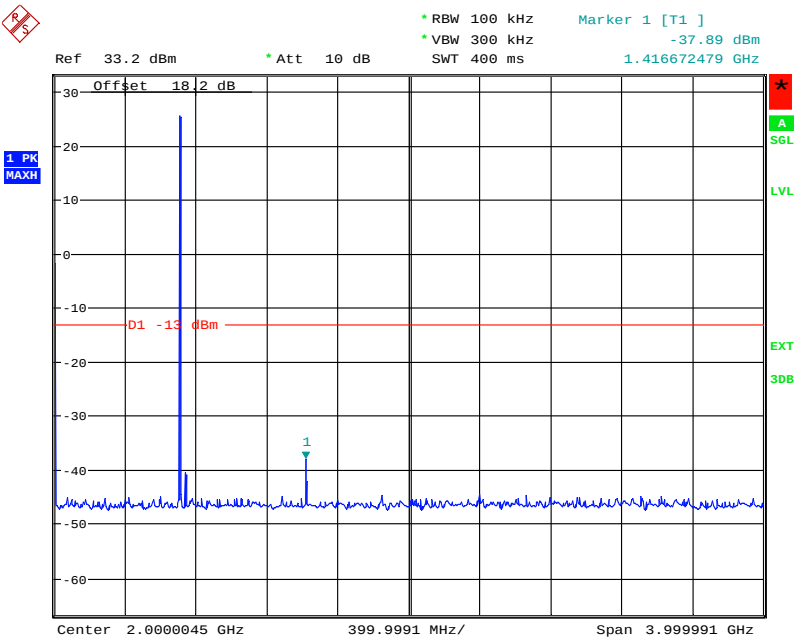


Date: 5.AUG.2013 11:14:49



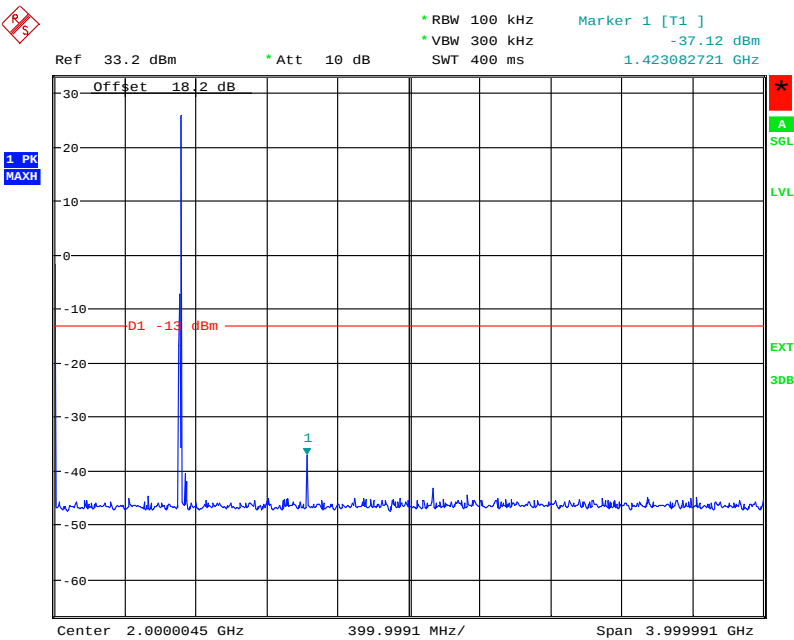
Product Service

710 MHz - 1 Resource Block - Middle



Date: 5.AUG.2013 11:06:36

710 MHz - 1 Resource Block - High

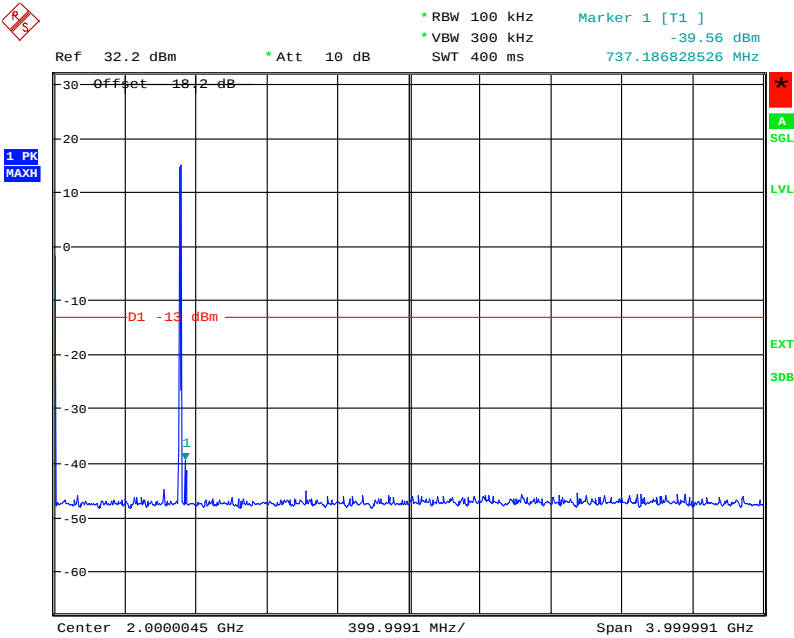


Date: 5.AUG.2013 10:58:26



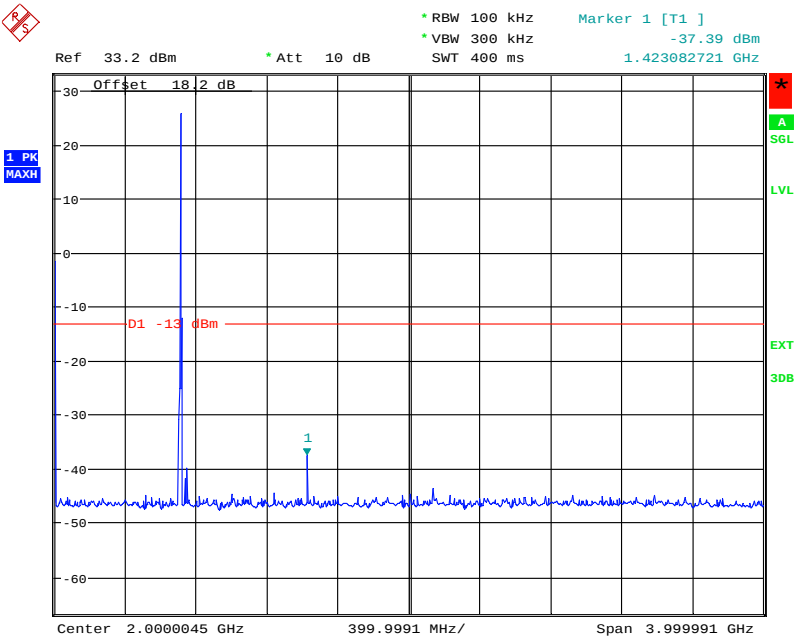
Product Service

710 MHz - All Resource Blocks



Date: 5.AUG.2013 11:23:00

713.5 MHz - 1 Resource Block - Low

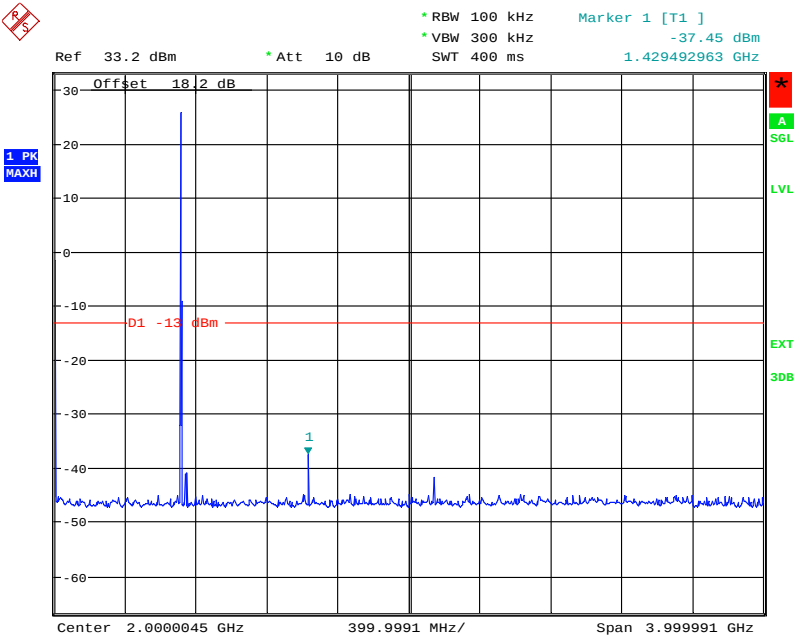


Date: 5.AUG.2013 12:00:52



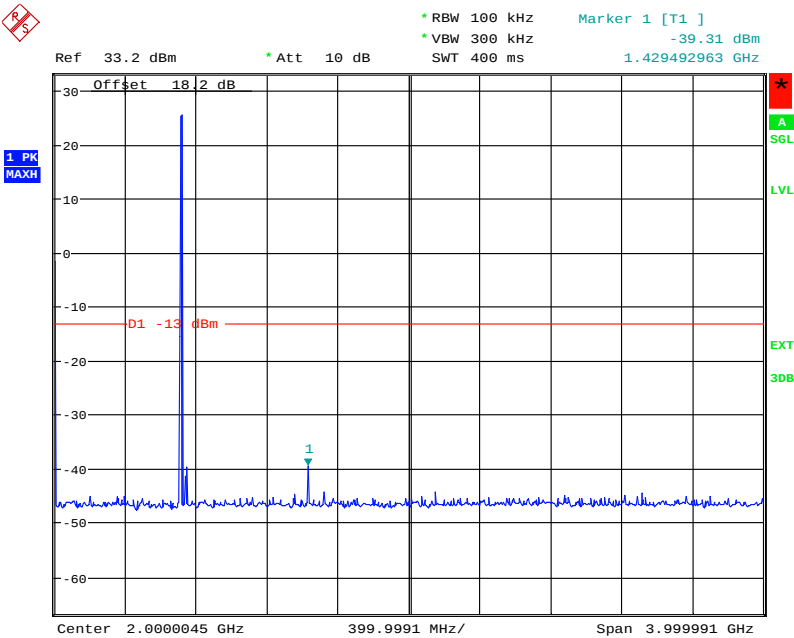
Product Service

713.5 MHz - 1 Resource Block - Middle



Date: 5.AUG.2013 11:52:36

713.5 MHz - 1 Resource Block - High

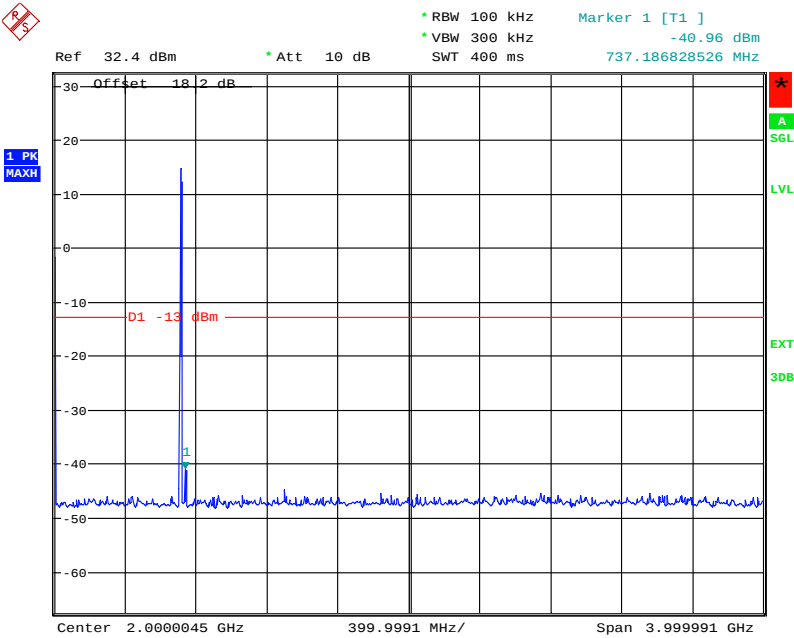


Date: 5.AUG.2013 11:43:25



Product Service

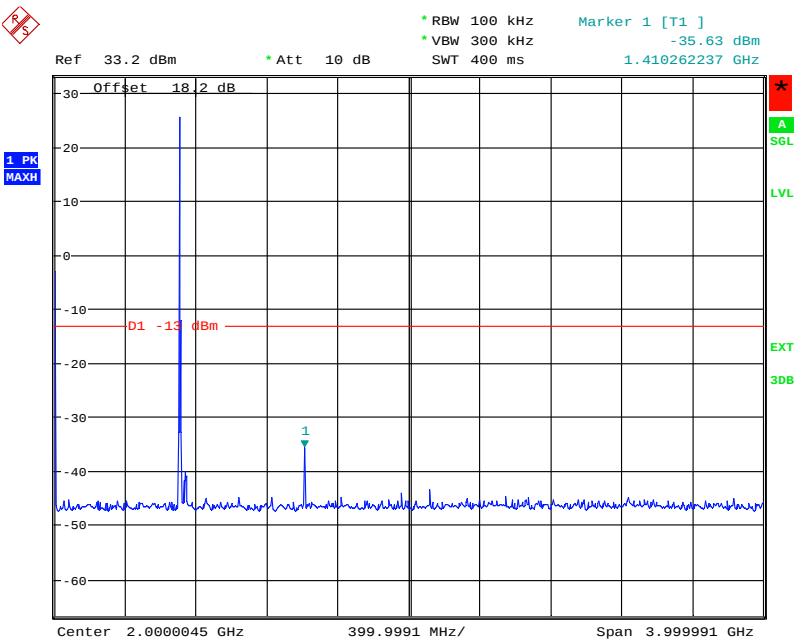
713.5 MHz - All Resource Blocks



Date: 5.AUG.2013 11:33:44

10.0 MHz Bandwidth - QPSK

709 MHz - 1 Resource Block - Low

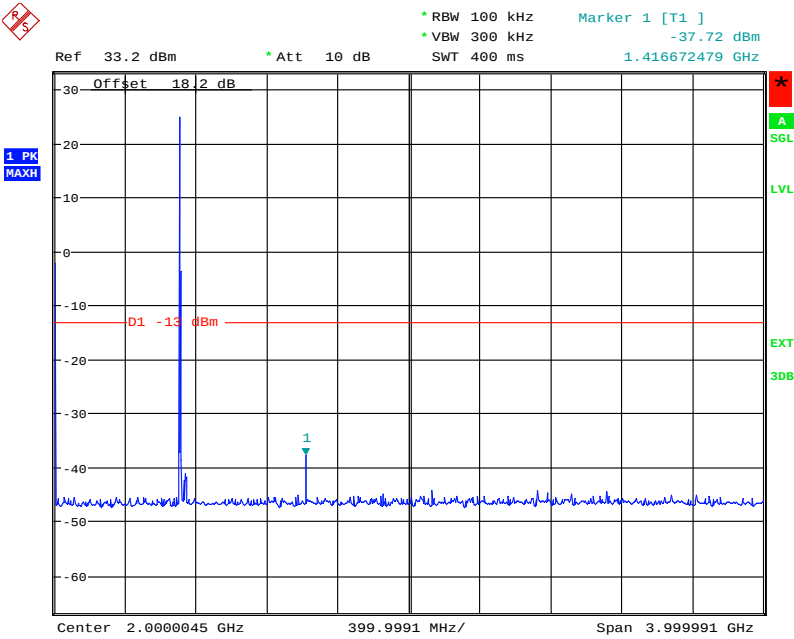


Date: 5.AUG.2013 08:27:33



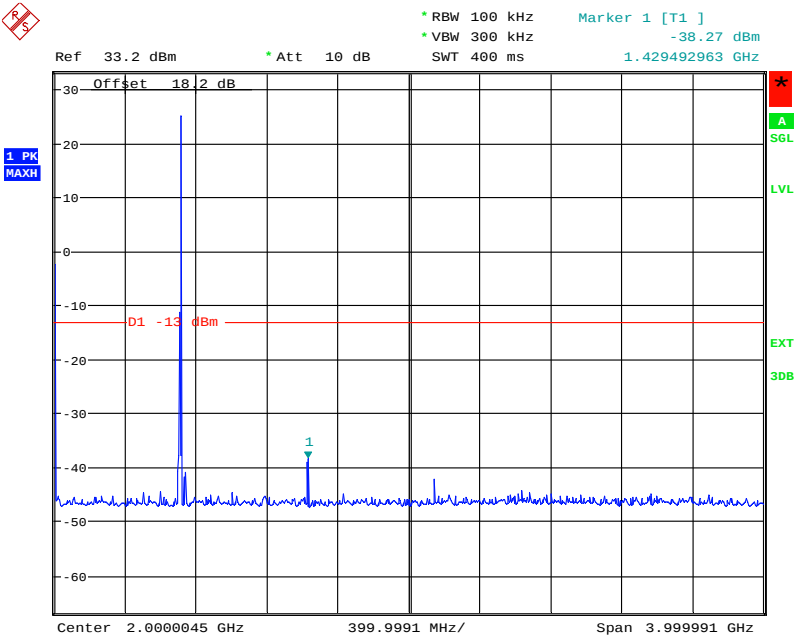
Product Service

709 MHz - 1 Resource Block - Middle



Date: 5.AUG.2013 08:57:15

709 MHz - 1 Resource Block - High

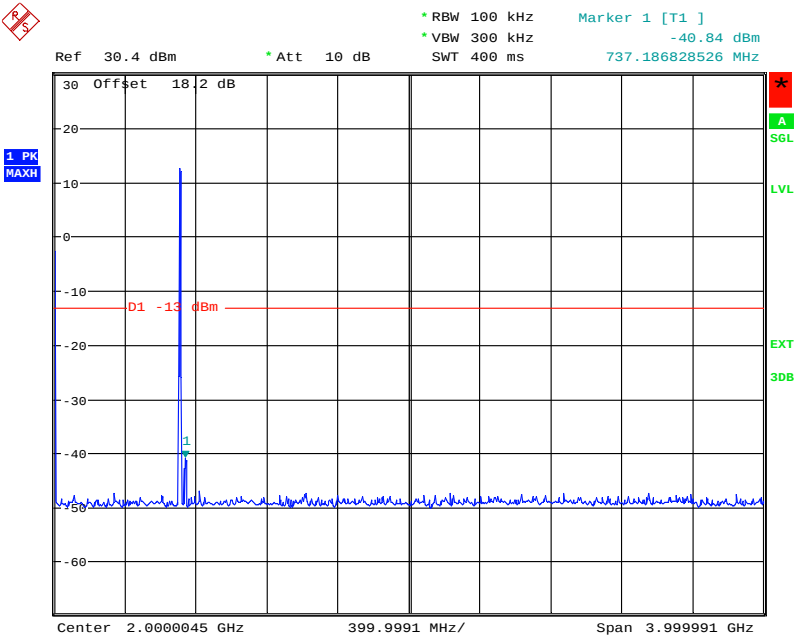


Date: 5.AUG.2013 08:48:52



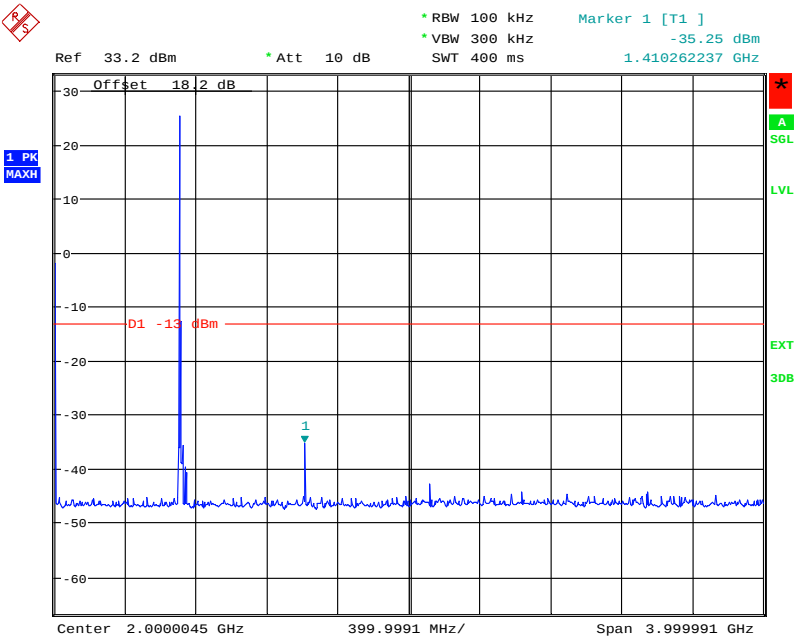
Product Service

709 MHz - All Resource Blocks



Date: 5.AUG.2013 08:37:44

710 MHz - 1 Resource Block - Low

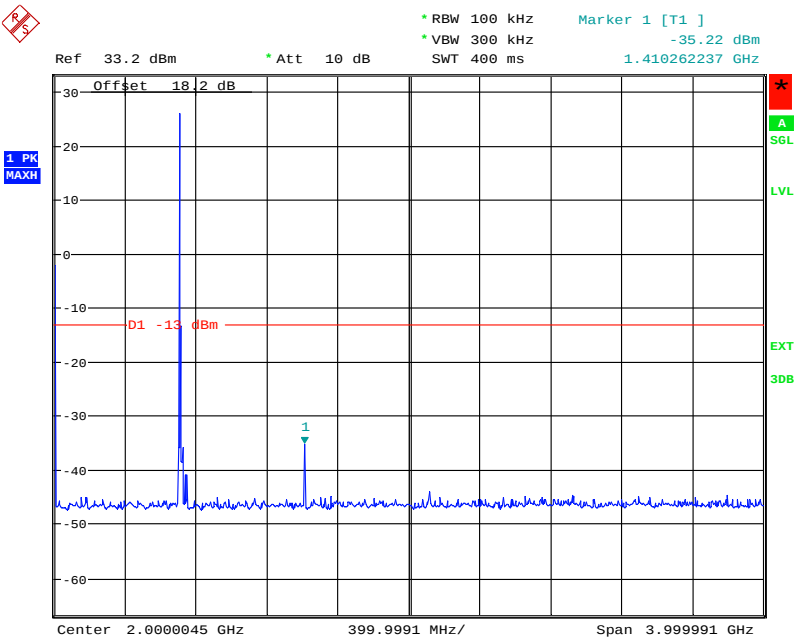


Date: 5.AUG.2013 09:15:02



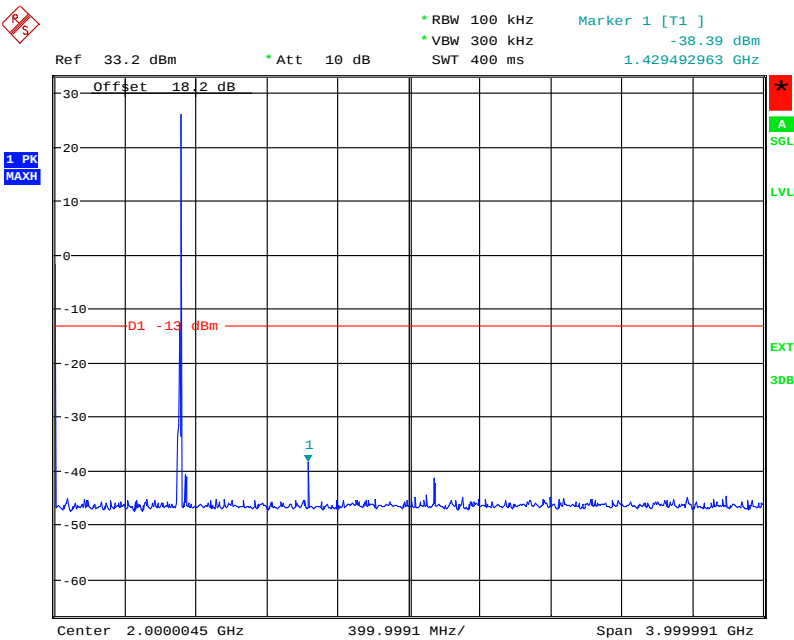
Product Service

710 MHz - 1 Resource Block - Middle



Date: 5.AUG.2013 09:06:23

710 MHz - 1 Resource Block - High

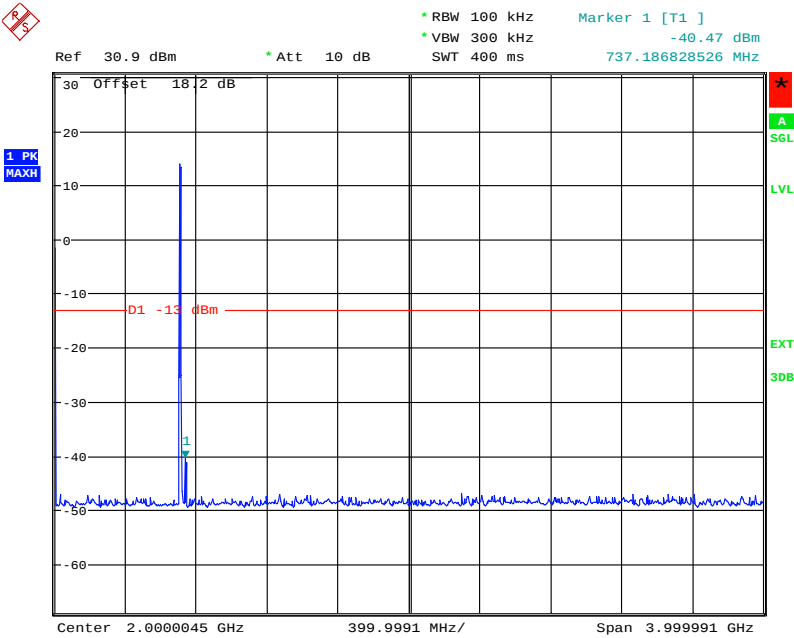


Date: 5.AUG.2013 09:23:15



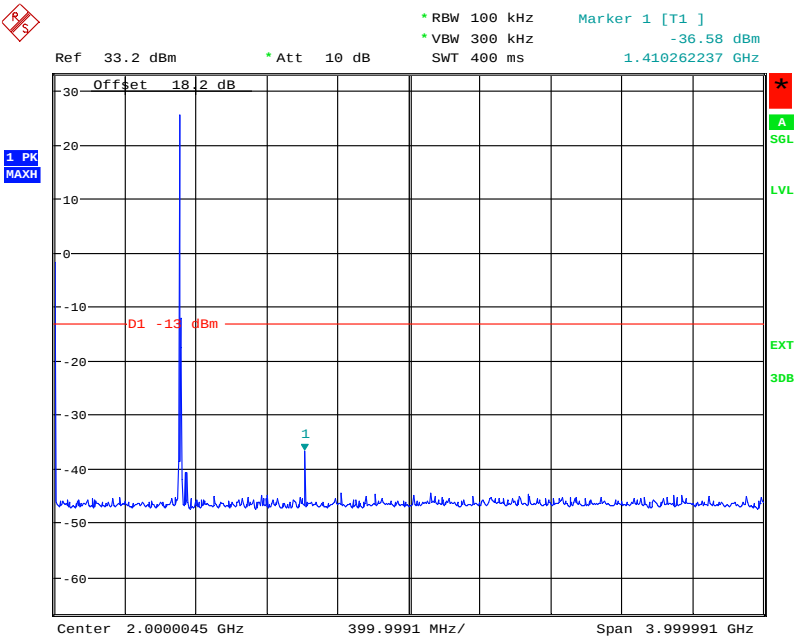
Product Service

710 MHz - All Resource Blocks



Date: 5.AUG.2013 09:31:30

711 MHz - 1 Resource Block - Low

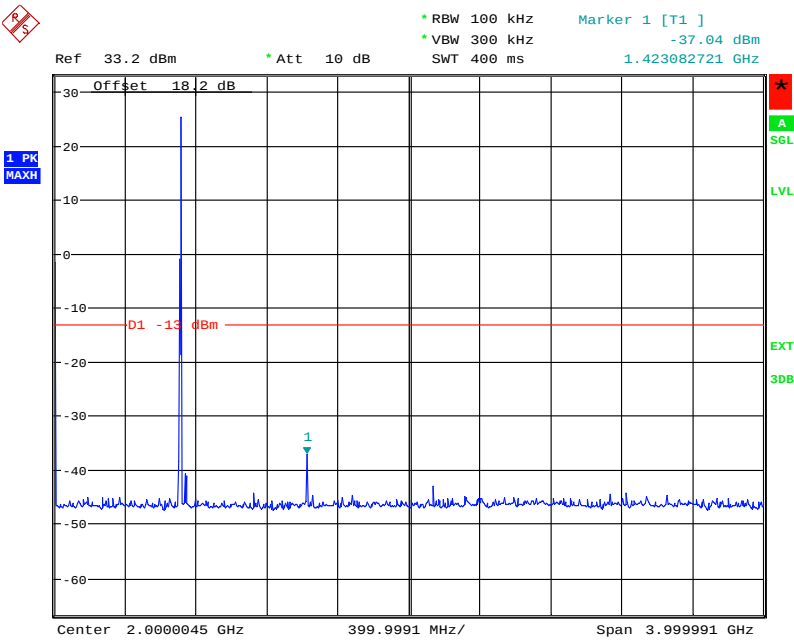


Date: 5.AUG.2013 10:10:19



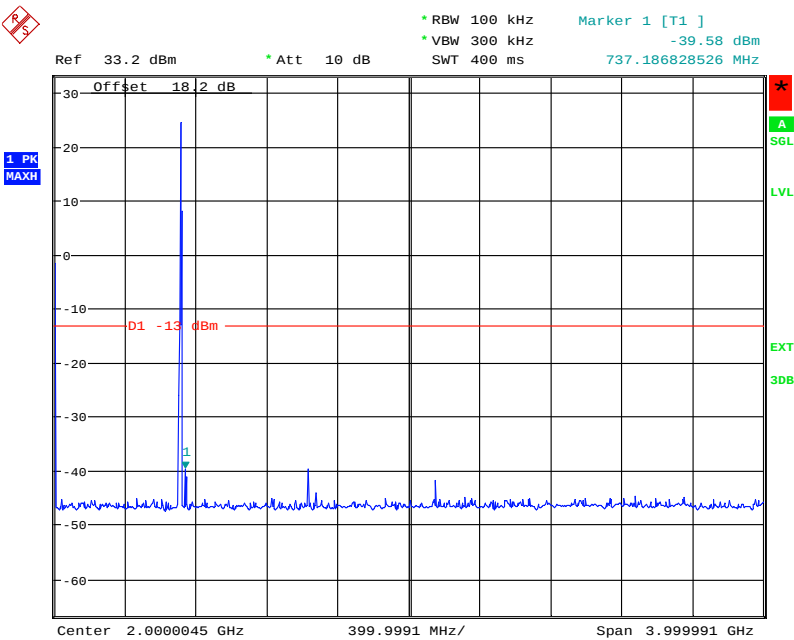
Product Service

711 MHz - 1 Resource Block - Middle



Date: 5.AUG.2013 10:01:24

711 MHz - 1 Resource Block - High

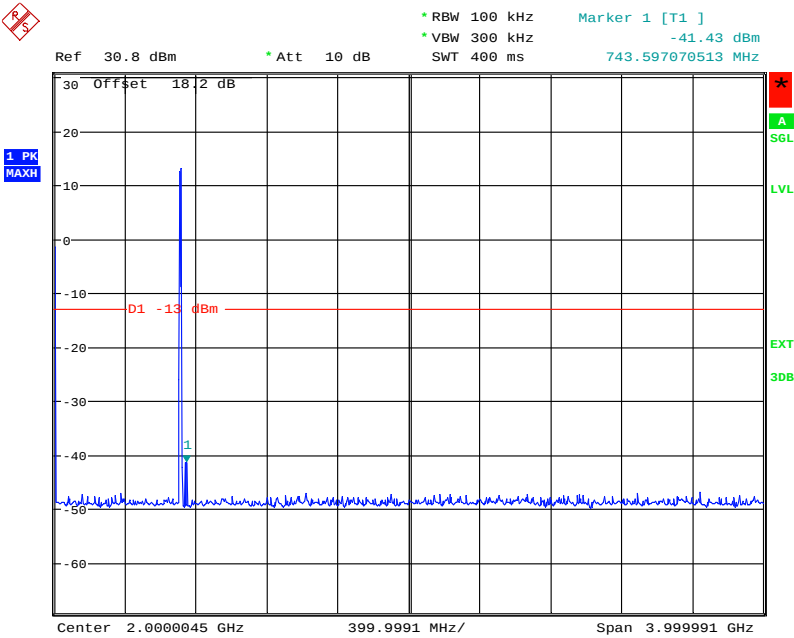


Date: 5.AUG.2013 09:52:02



Product Service

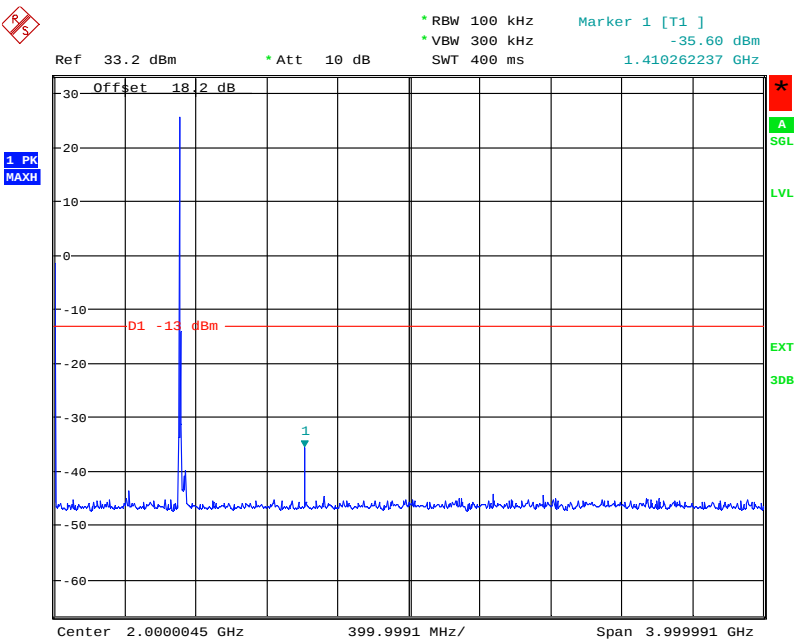
711 MHz - All Resource Blocks



Date: 5.AUG.2013 09:41:29

10.0 MHz Bandwidth - 16QAM

709 MHz - 1 Resource Block - Low

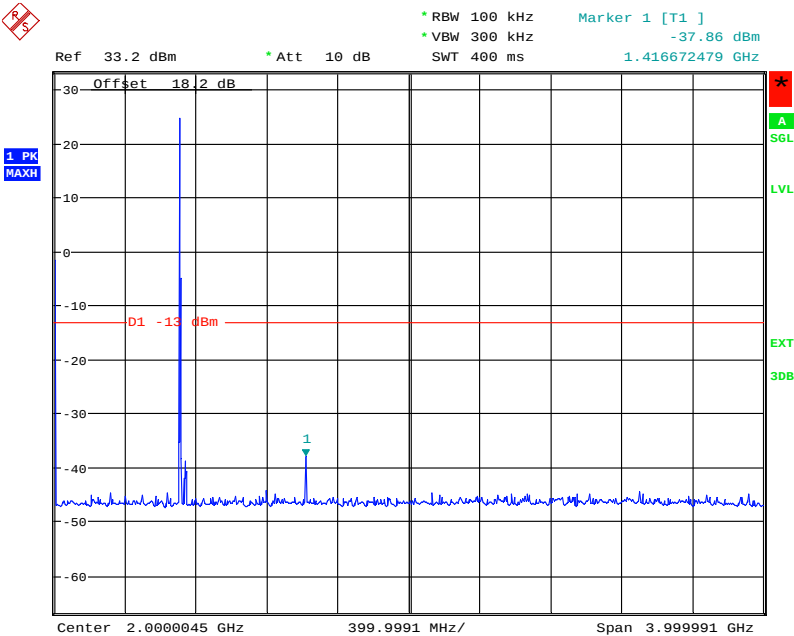


Date: 5.AUG.2013 12:20:47



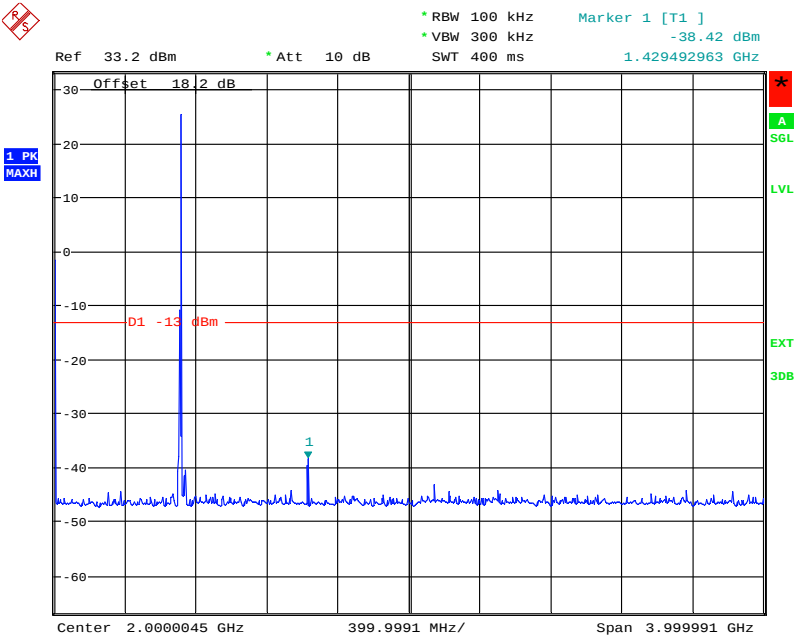
Product Service

709 MHz - 1 Resource Block - Middle



Date: 5.AUG.2013 12:29:22

709 MHz - 1 Resource Block - High

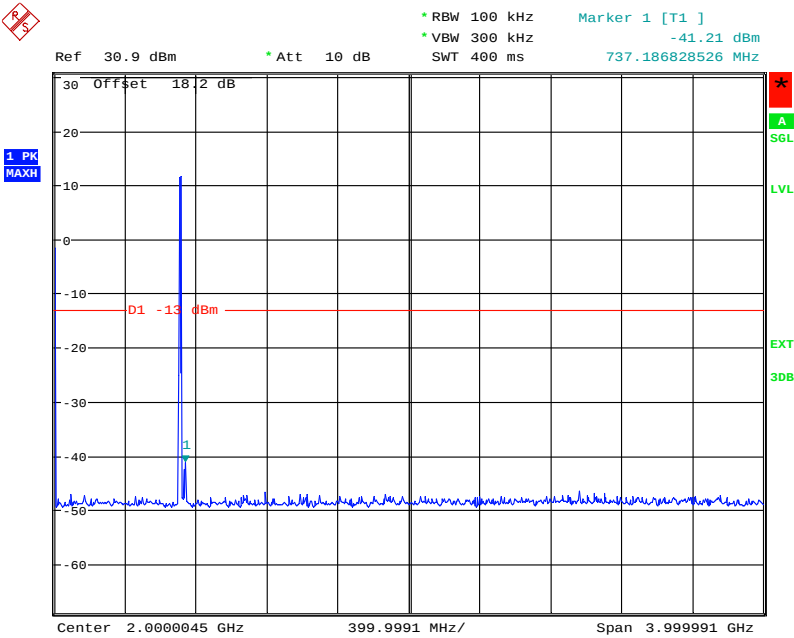


Date: 5.AUG.2013 12:38:34



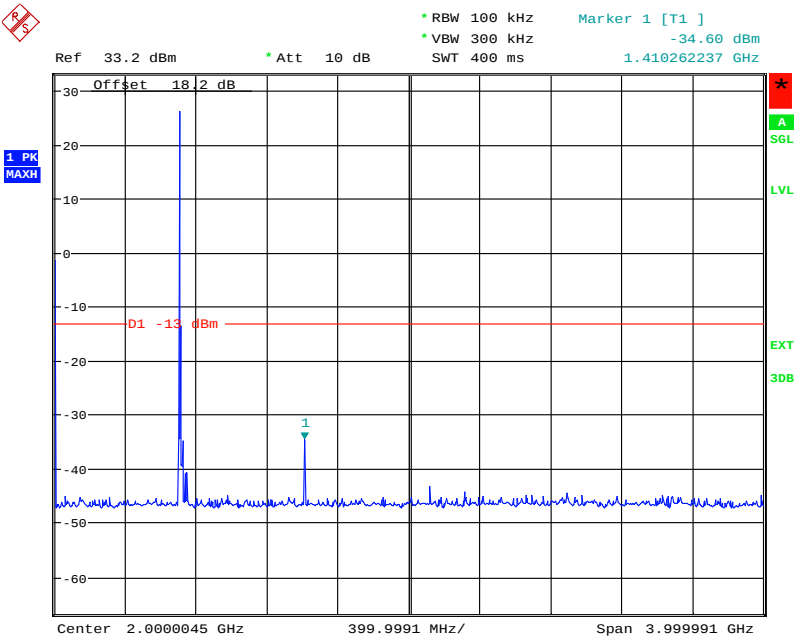
Product Service

709 MHz - All Resource Blocks



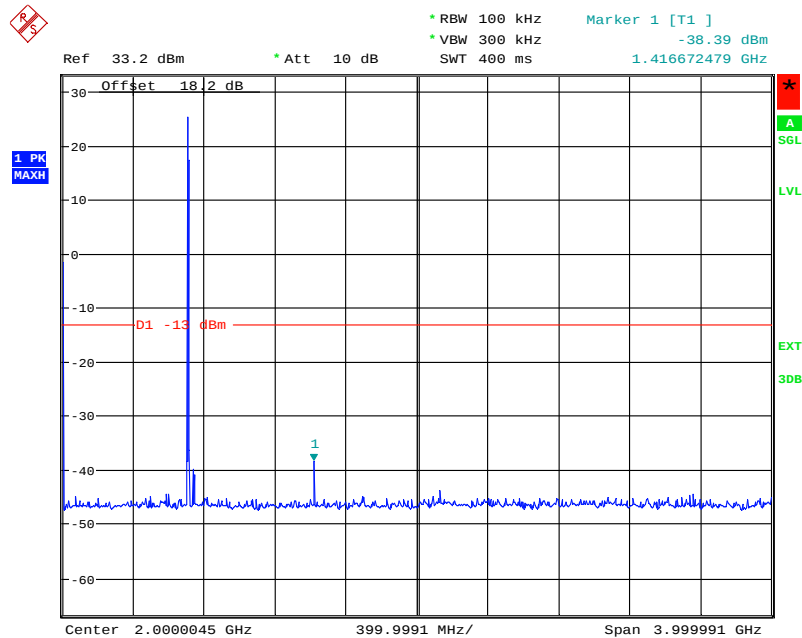
Date: 5.AUG.2013 12:11:15

710 MHz - 1 Resource Block - Low



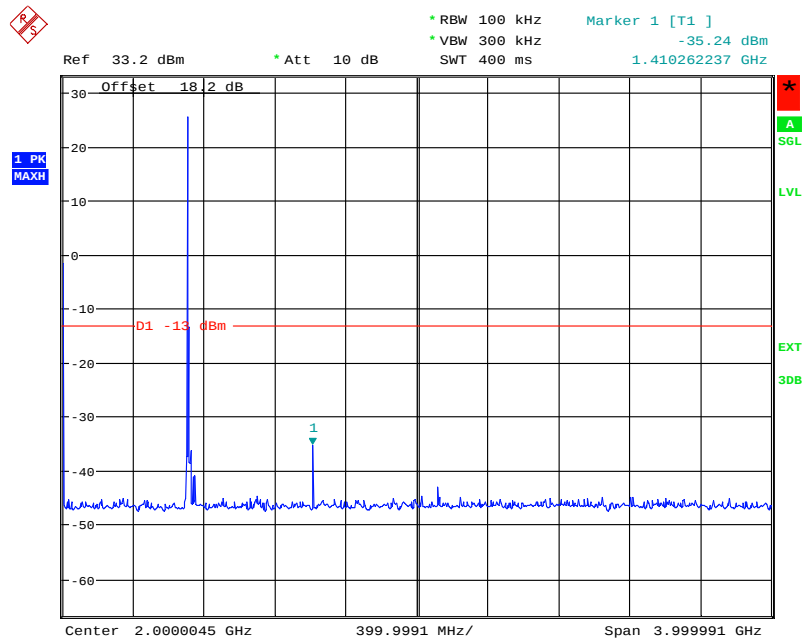
Date: 5.AUG.2013 13:03:17

710 MHz - 1 Resource Block - Middle



Date: 5.AUG.2013 12:54:38

710 MHz - 1 Resource Block - High

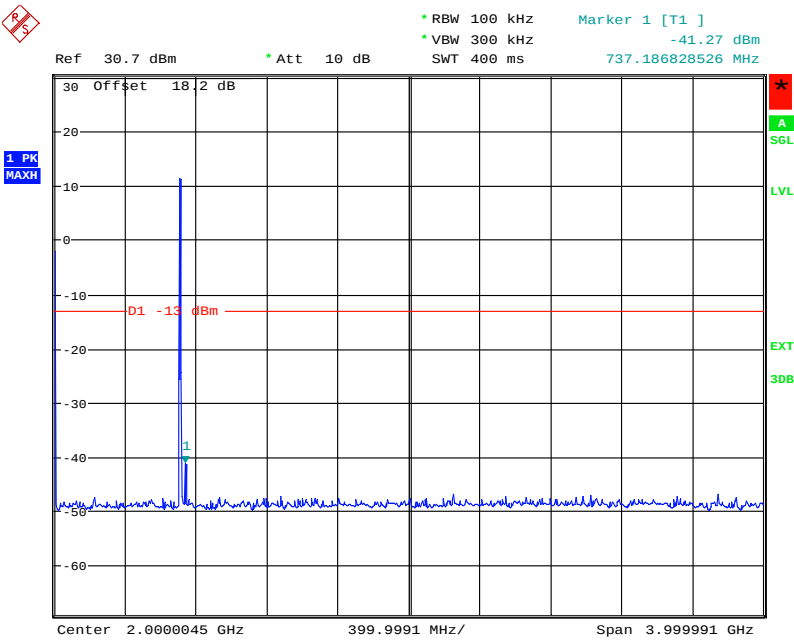


Date: 5.AUG.2013 12:46:44



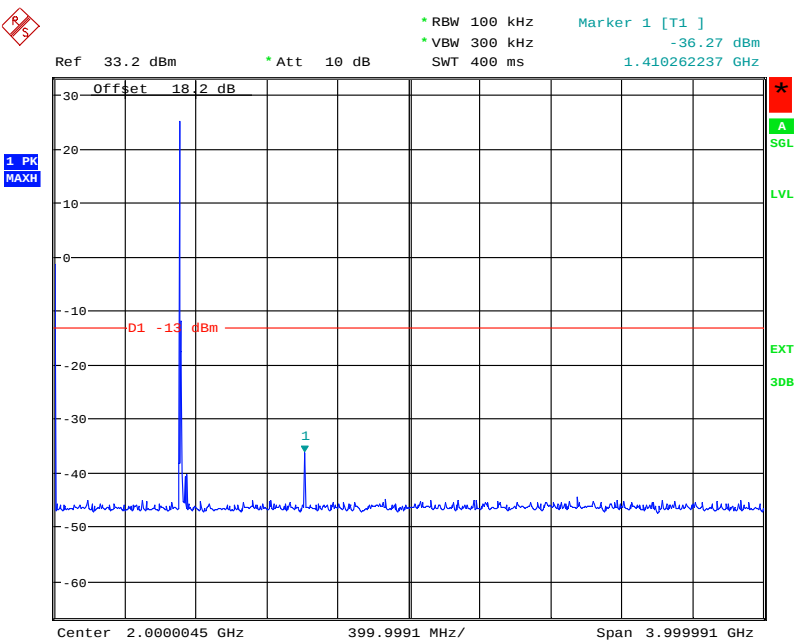
Product Service

710 MHz - All Resource Blocks



Date: 5.AUG.2013 13:38:28

711 MHz - 1 Resource Block - Low

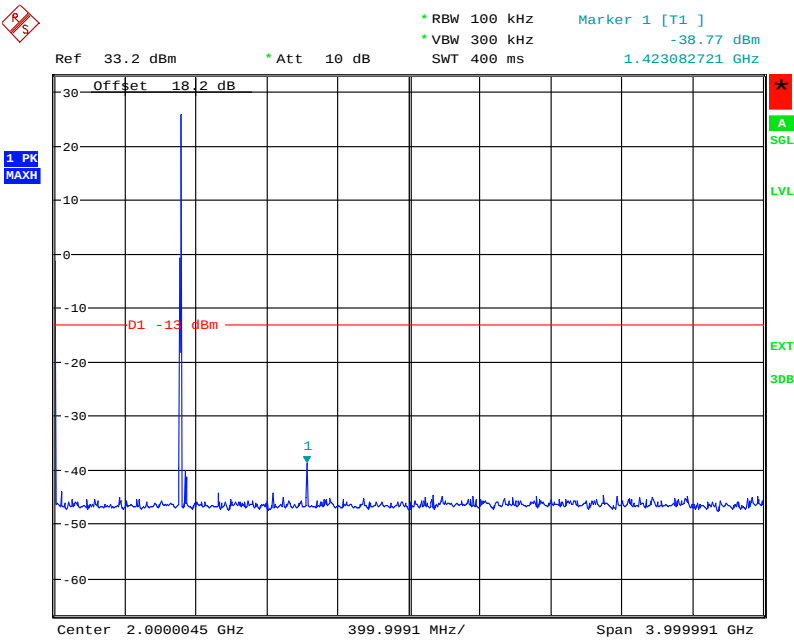


Date: 5.AUG.2013 14:15:47



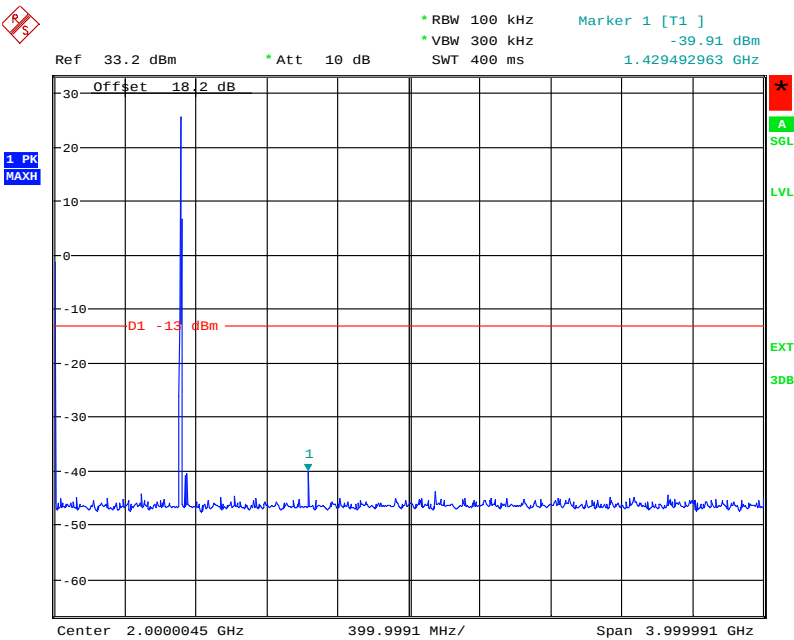
Product Service

711 MHz - 1 Resource Block - Middle



Date: 5.AUG.2013 14:07:15

711 MHz - 1 Resource Block - High

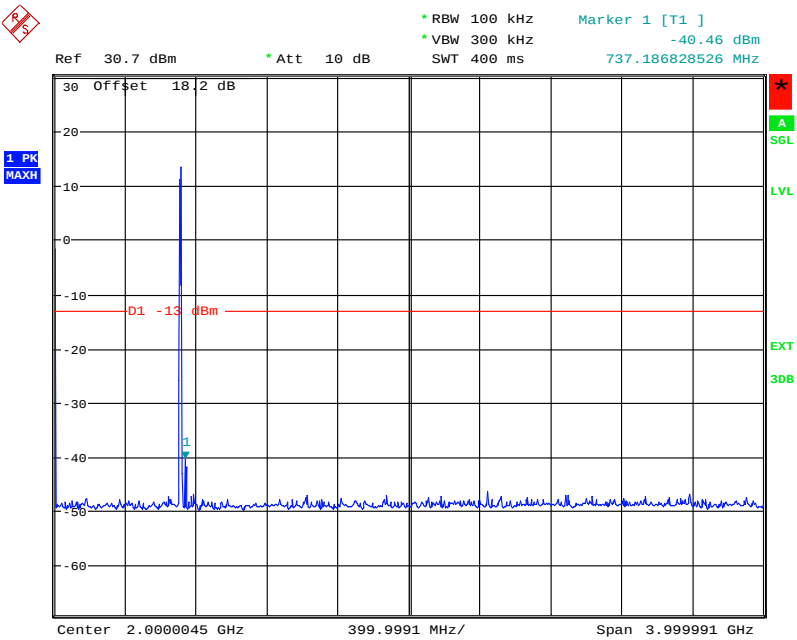


Date: 5.AUG.2013 13:58:25



Product Service

711 MHz - All Resource Blocks



Date: 5.AUG.2013 14:29:43

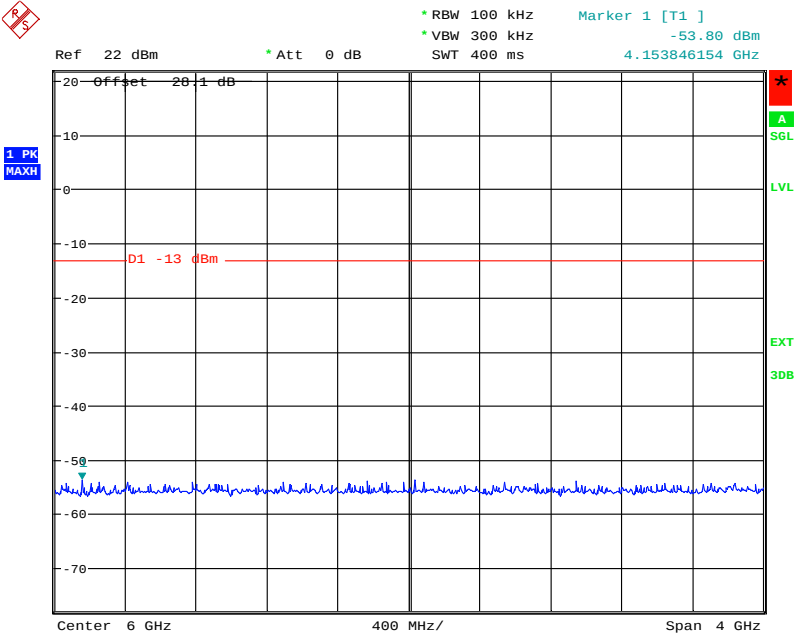


Product Service

Conducted Spurious Emissions (Band 2 - 4 GHz to 8 GHz)

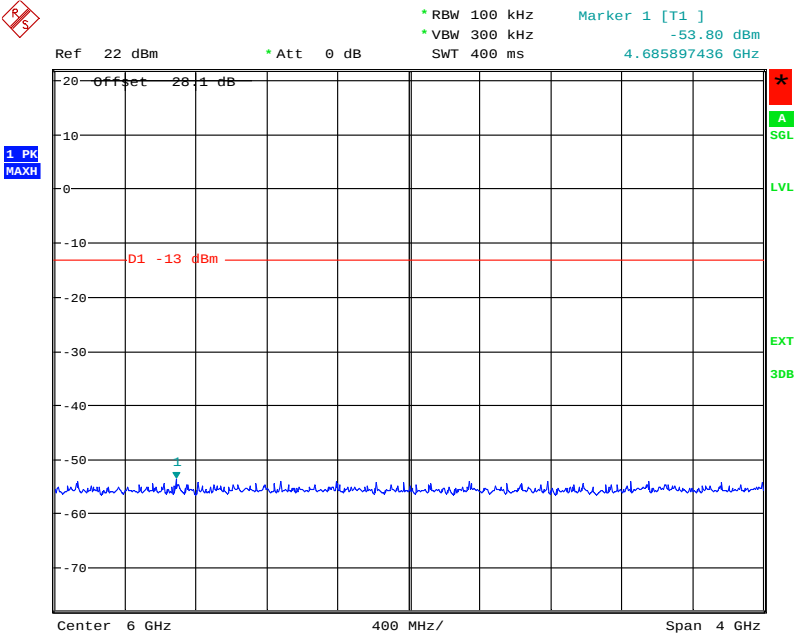
5.0 MHz Bandwidth - QPSK

706.5 MHz - 1 Resource Block - Low



Date: 2.AUG.2013 14:35:15

706.5 MHz - 1 Resource Block - Middle

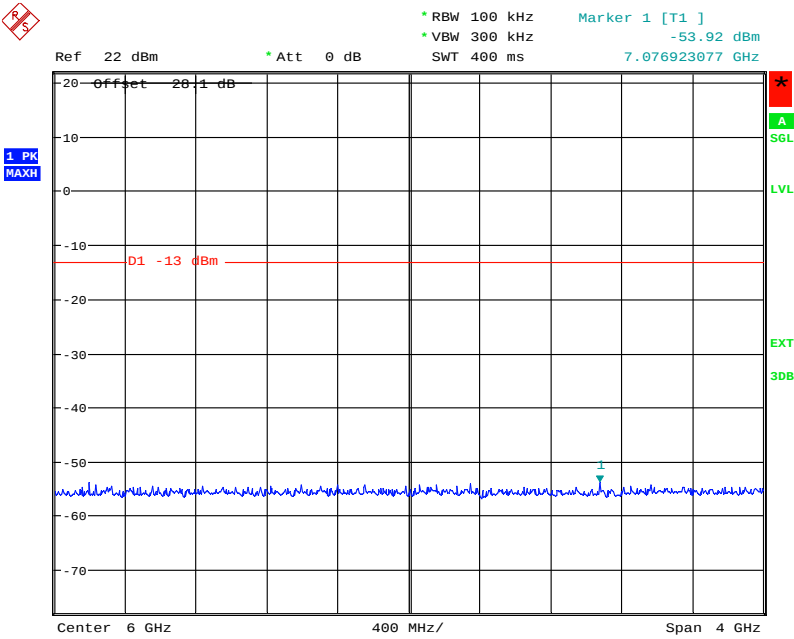


Date: 2.AUG.2013 15:16:40



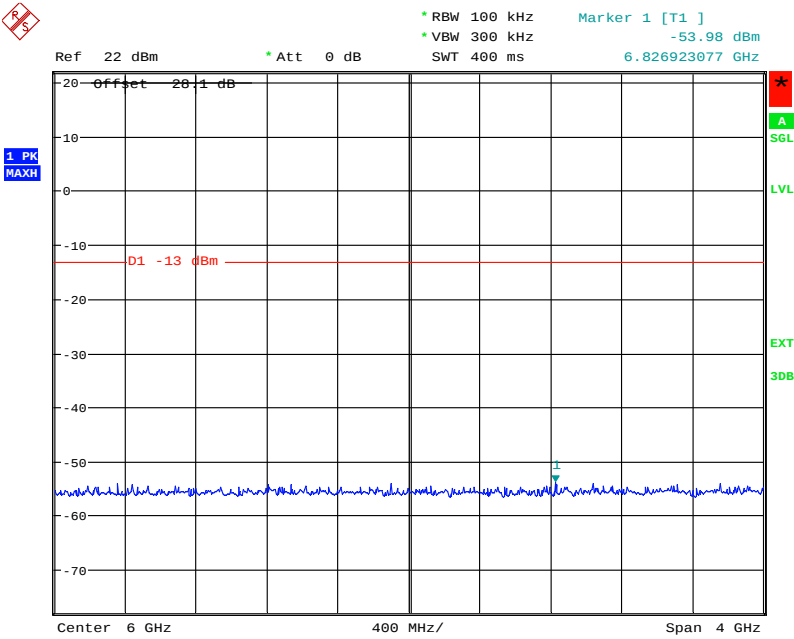
Product Service

706.5 MHz - 1 Resource Block - High



Date: 2.AUG.2013 15:04:57

706.5 MHz - All Resource Blocks

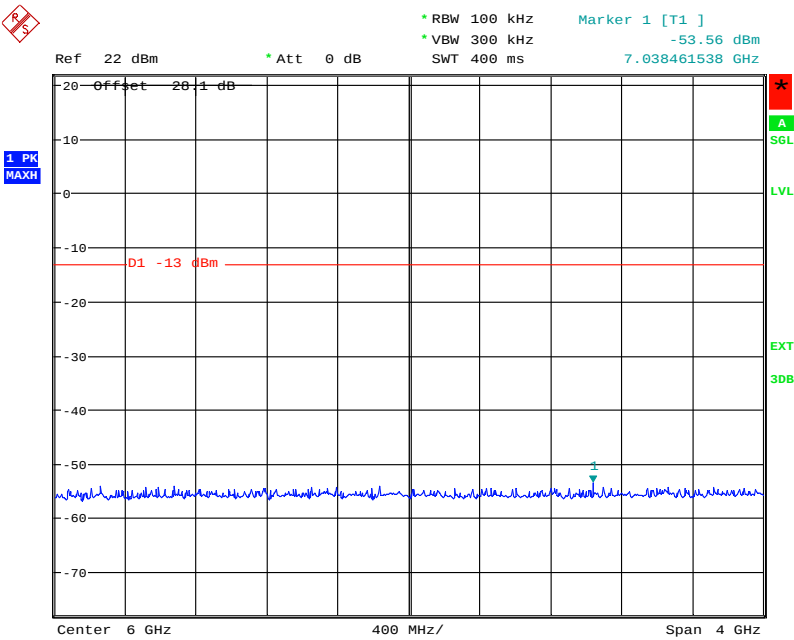


Date: 2.AUG.2013 14:46:32



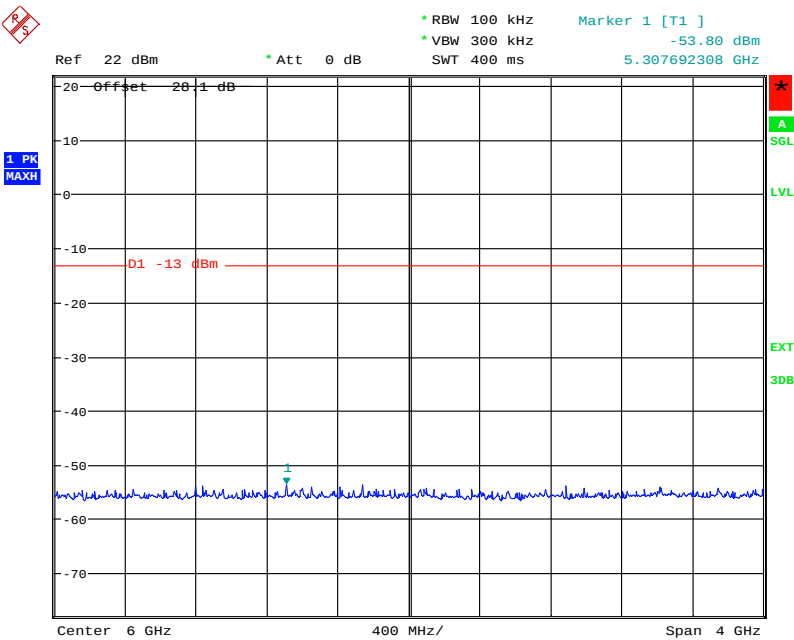
Product Service

710 MHz - 1 Resource Block - Low



Date: 2.AUG.2013 15:49:55

710 MHz - 1 Resource Block - Middle

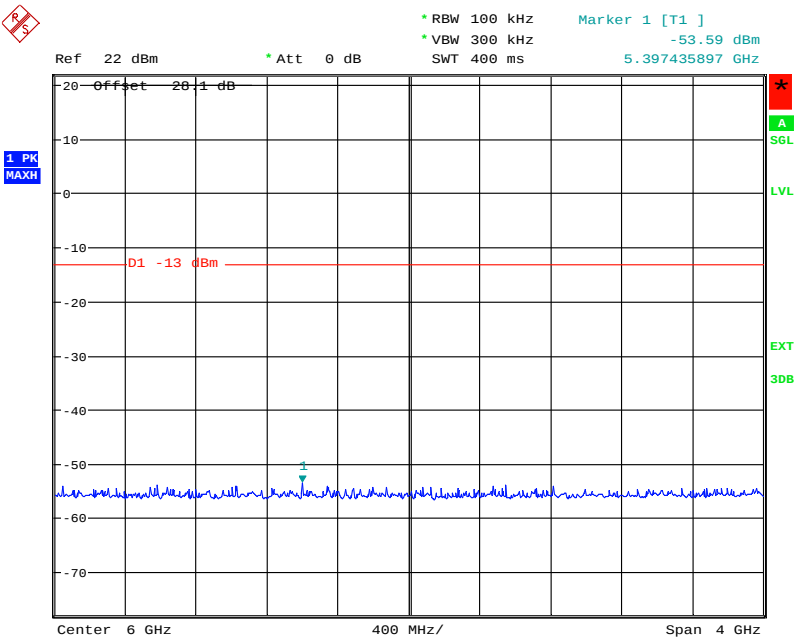


Date: 2.AUG.2013 15:29:23



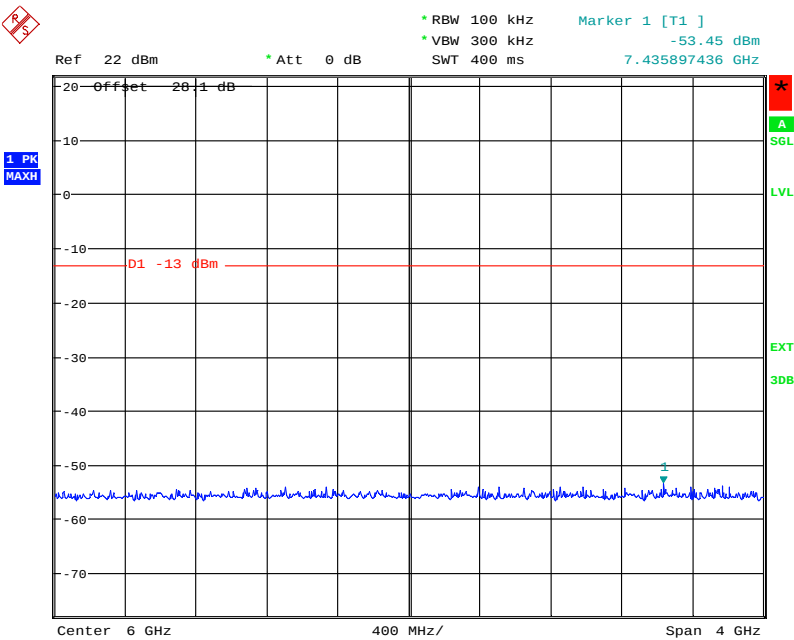
Product Service

710 MHz - 1 Resource Block - High



Date: 2.AUG.2013 15:38:59

710 MHz - All Resource Blocks

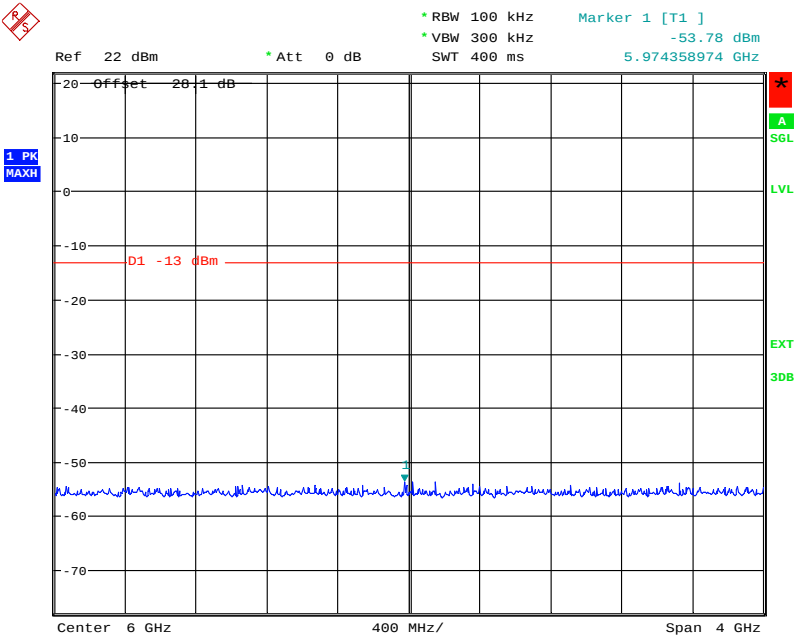


Date: 2.AUG.2013 16:00:04



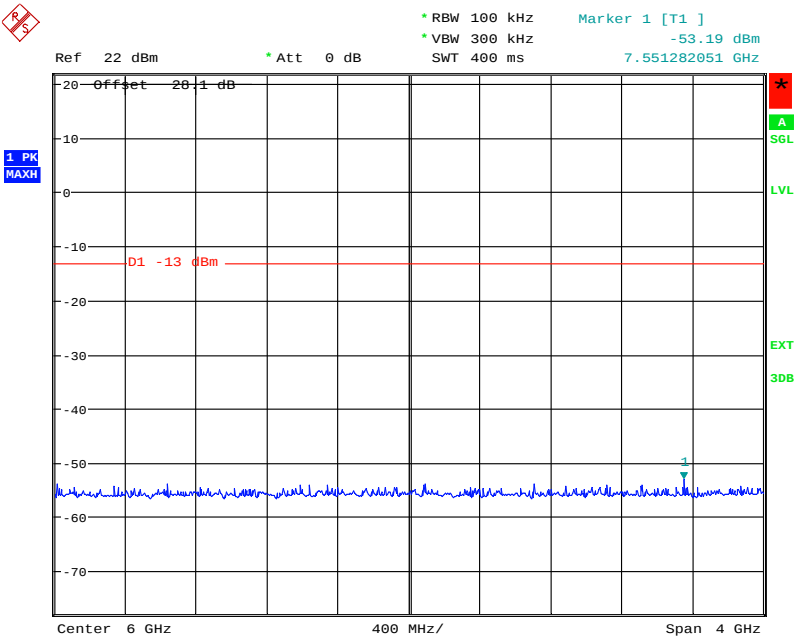
Product Service

713.5 MHz - 1 Resource Block - Low



Date: 2.AUG.2013 16:40:03

713.5 MHz - 1 Resource Block - Middle

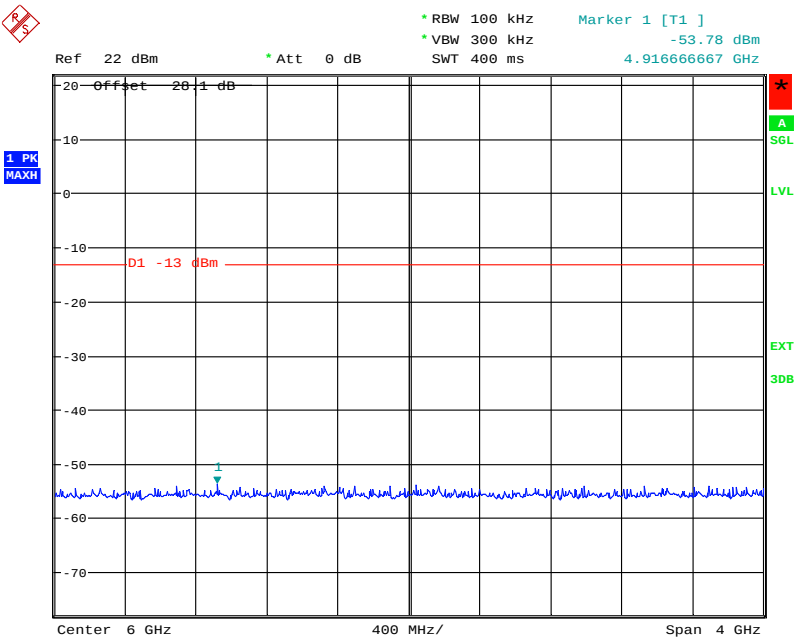


Date: 2.AUG.2013 16:31:47



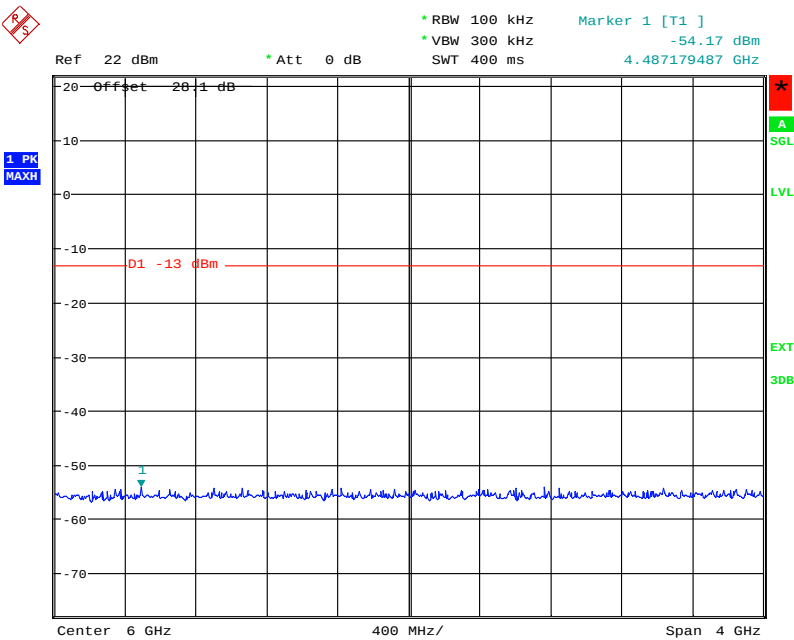
Product Service

713.5 MHz - 1 Resource Block - High



Date: 2.AUG.2013 16:21:36

713.5 MHz - All Resource Blocks



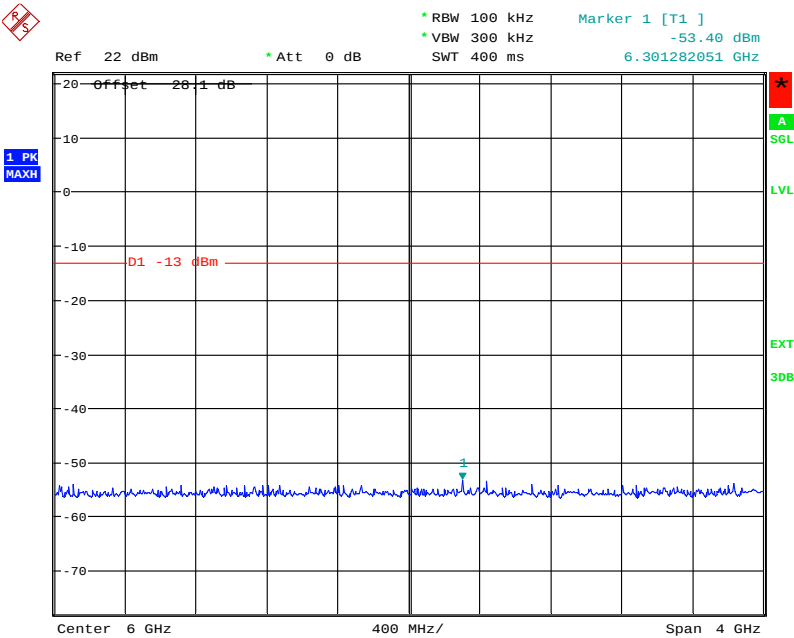
Date: 2.AUG.2013 16:11:35



Product Service

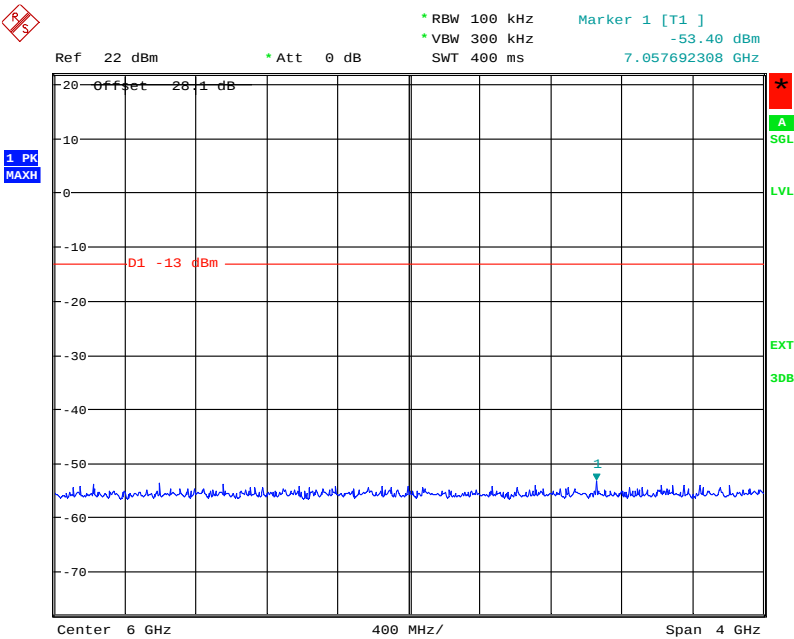
5.0 MHz Bandwidth - 16QAM

706.5 MHz - 1 Resource Block - Low



Date: 5.AUG.2013 10:36:50

706.5 MHz - 1 Resource Block - Middle

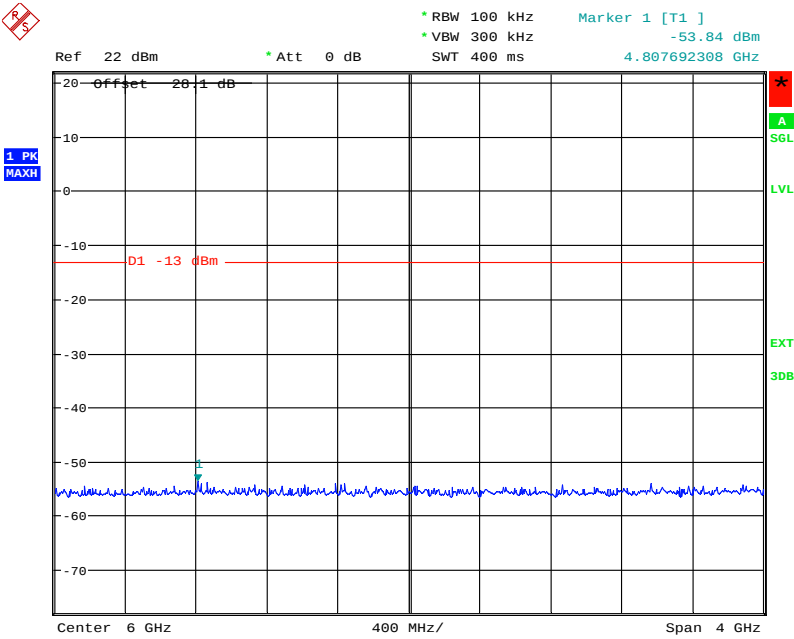


Date: 5.AUG.2013 10:45:24



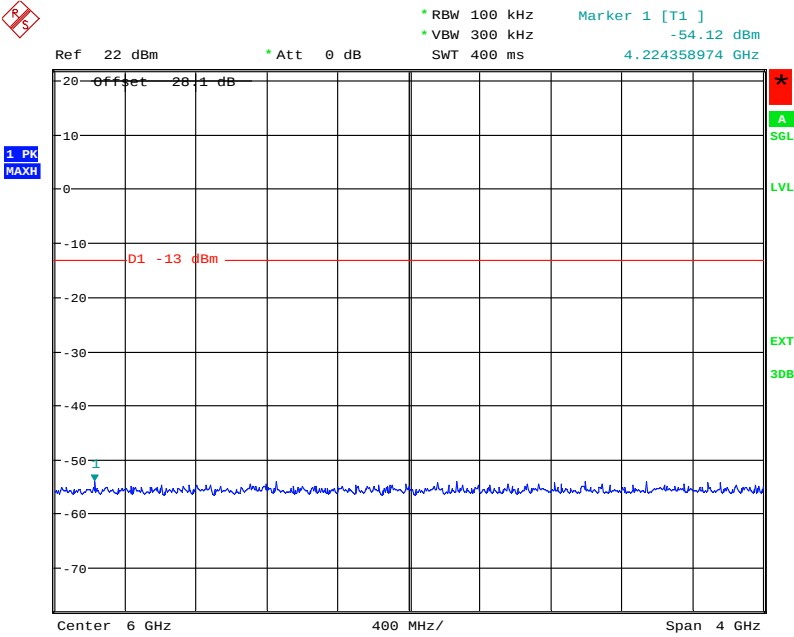
Product Service

706.5 MHz - 1 Resource Block - High



Date: 5.AUG.2013 10:53:35

706.5 MHz - All Resource Blocks

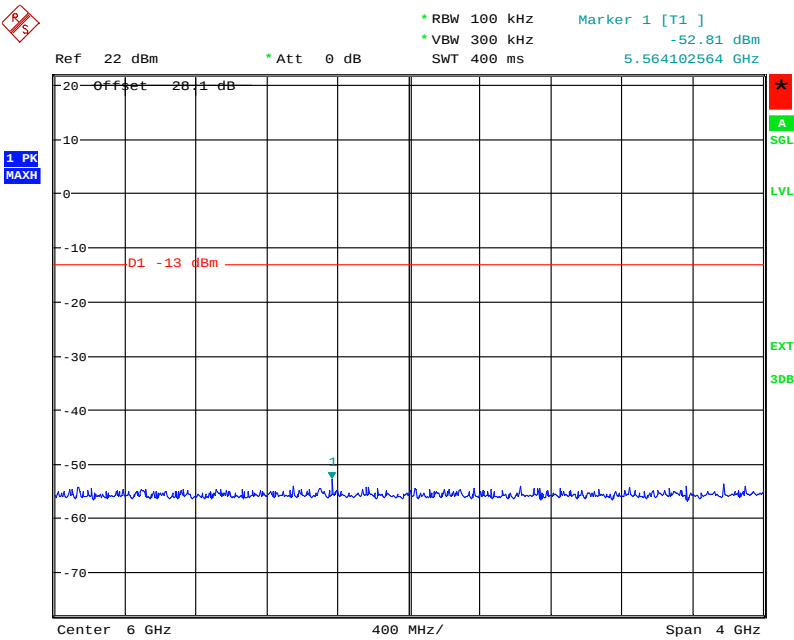


Date: 5.AUG.2013 10:25:32



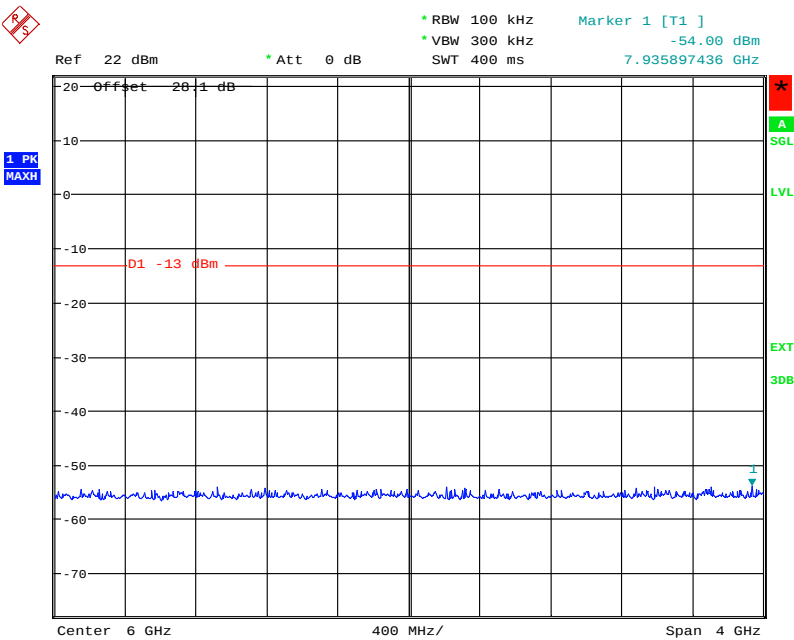
Product Service

710 MHz - 1 Resource Block - Low



Date: 5.AUG.2013 11:18:08

710 MHz - 1 Resource Block - Middle

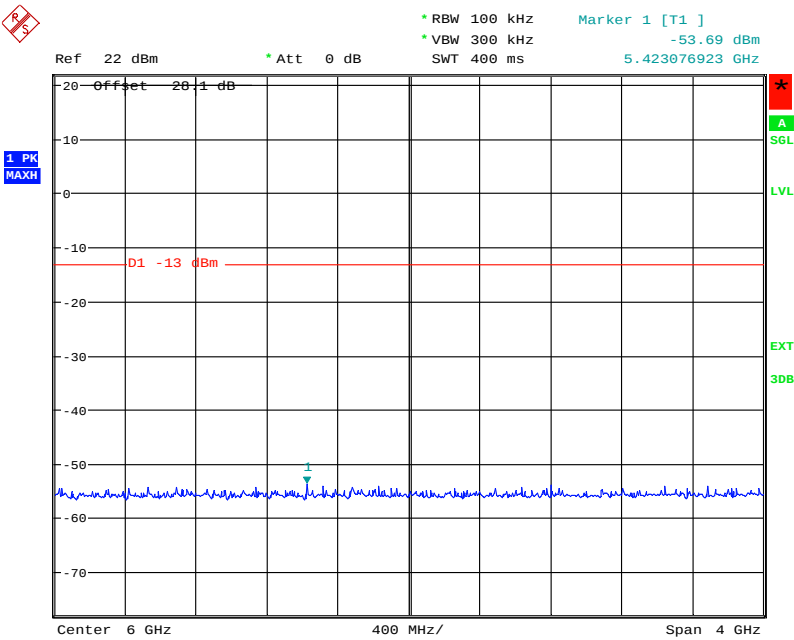


Date: 5.AUG.2013 11:09:53



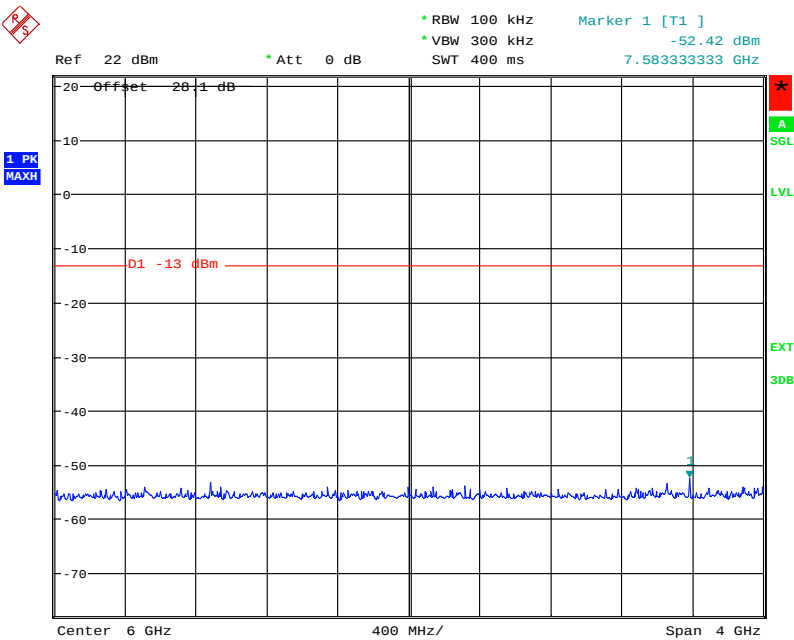
Product Service

710 MHz - 1 Resource Block - High



Date: 5.AUG.2013 11:01:43

710 MHz - All Resource Blocks

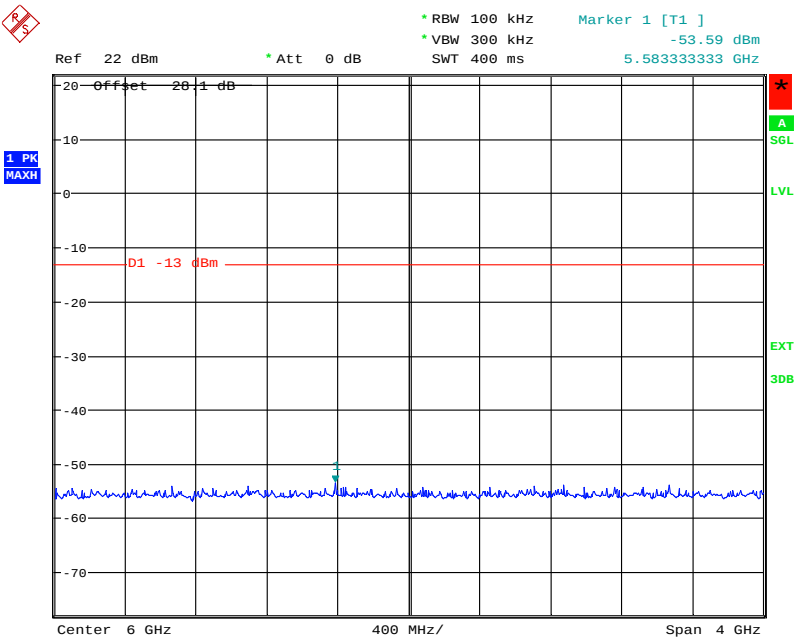


Date: 5.AUG.2013 11:26:33



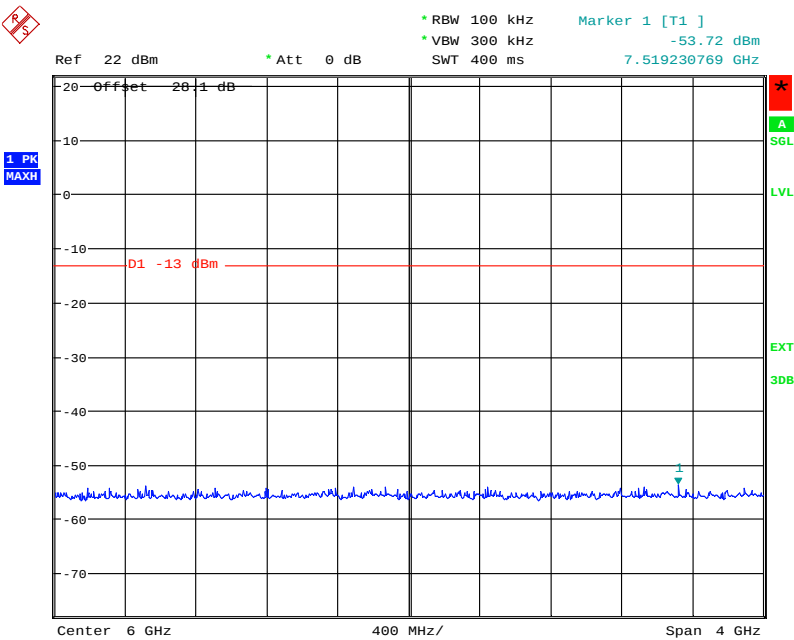
Product Service

713.5 MHz - 1 Resource Block - Low



Date: 5.AUG.2013 12:04:11

713.5 MHz - 1 Resource Block - Middle

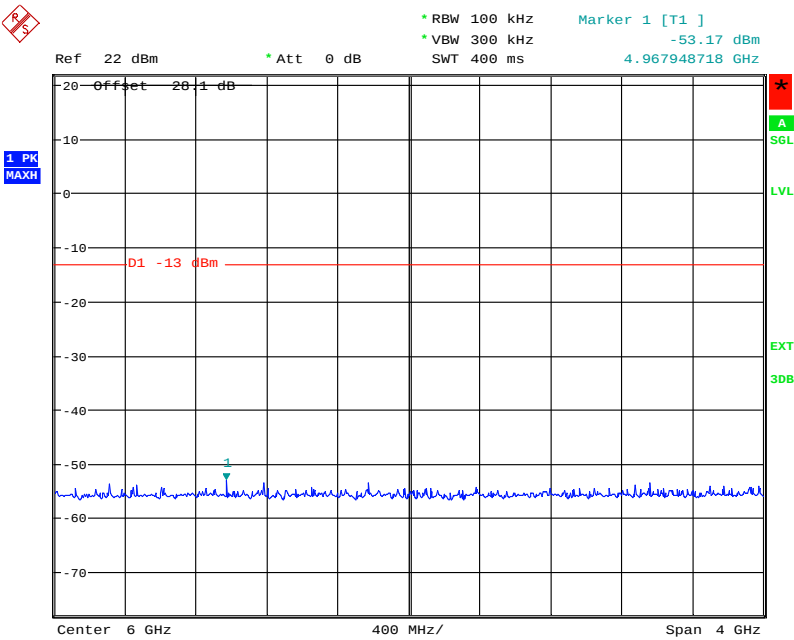


Date: 5.AUG.2013 11:55:53



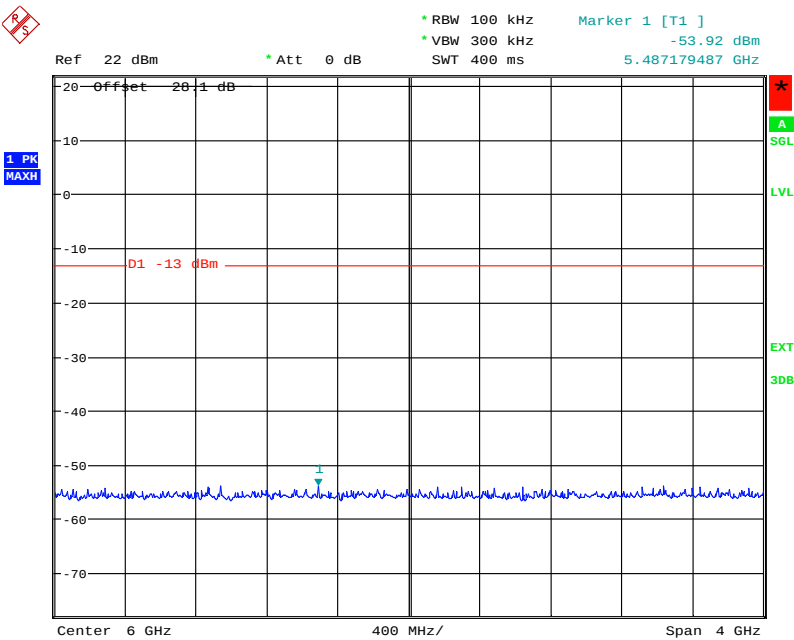
Product Service

713.5 MHz - 1 Resource Block - High



Date: 5.AUG.2013 11:47:40

713.5 MHz - All Resource Blocks



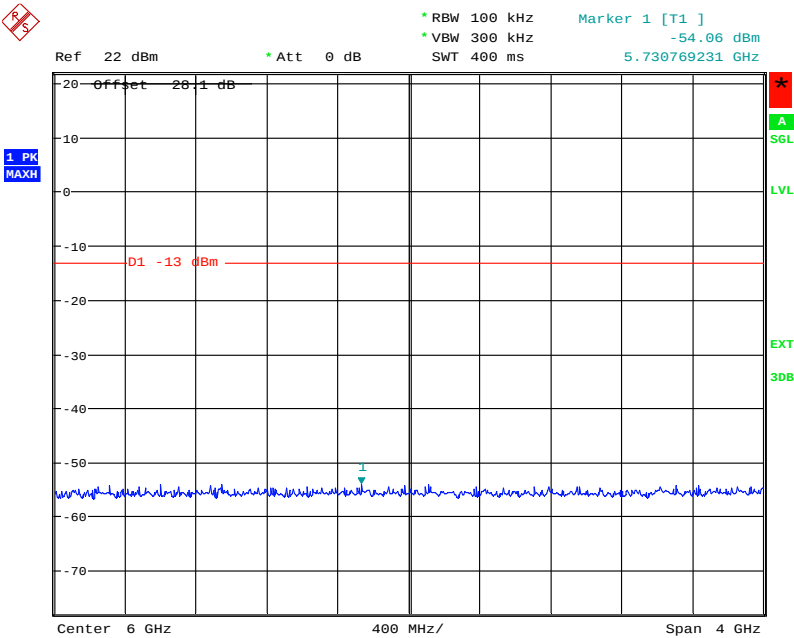
Date: 5.AUG.2013 11:37:07



Product Service

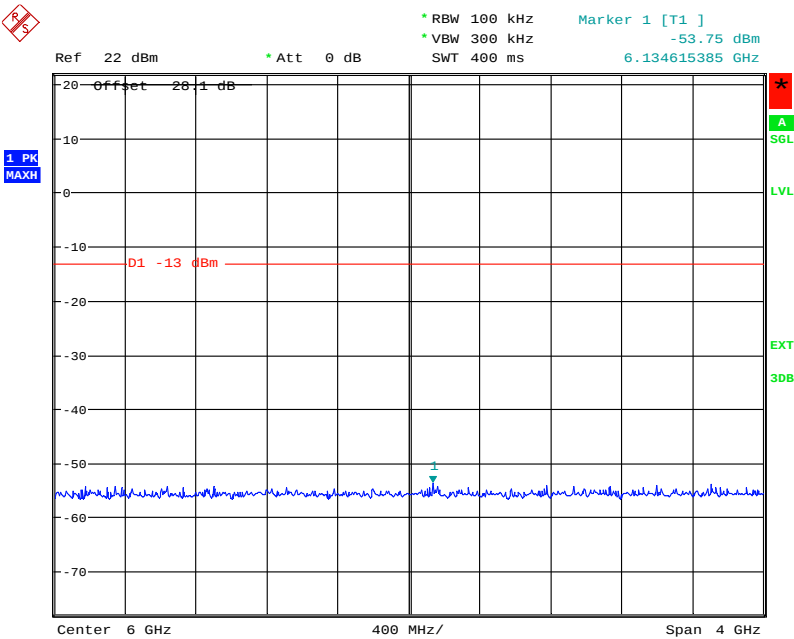
10.0 MHz Bandwidth - QPSK

709 MHz - 1 Resource Block - Low



Date: 5.AUG.2013 08:31:14

709 MHz - 1 Resource Block - Middle

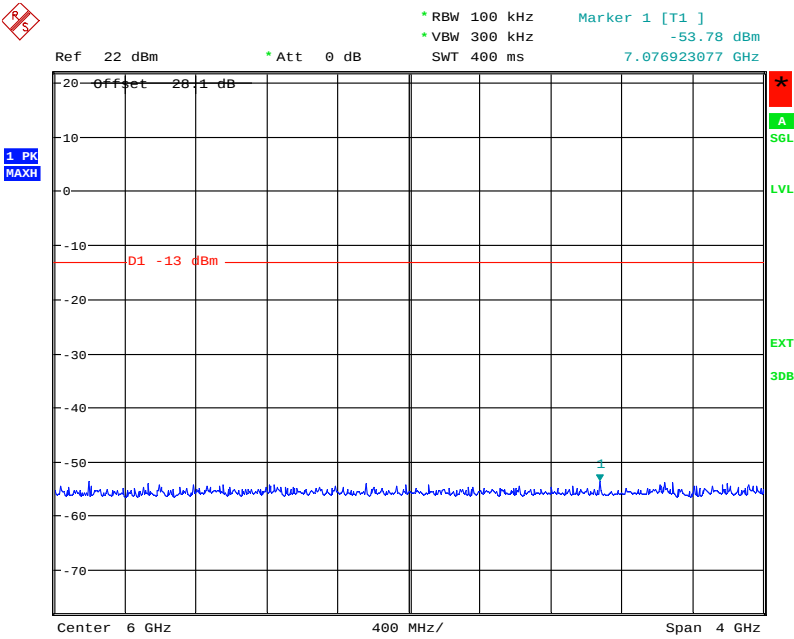


Date: 5.AUG.2013 09:00:32



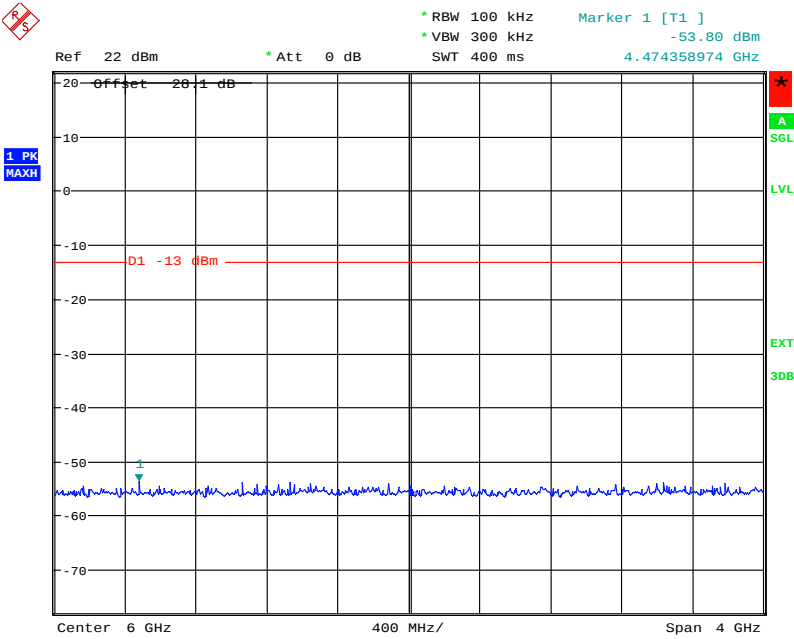
Product Service

709 MHz - 1 Resource Block - High



Date: 5.AUG.2013 08:52:13

709 MHz - All Resource Blocks

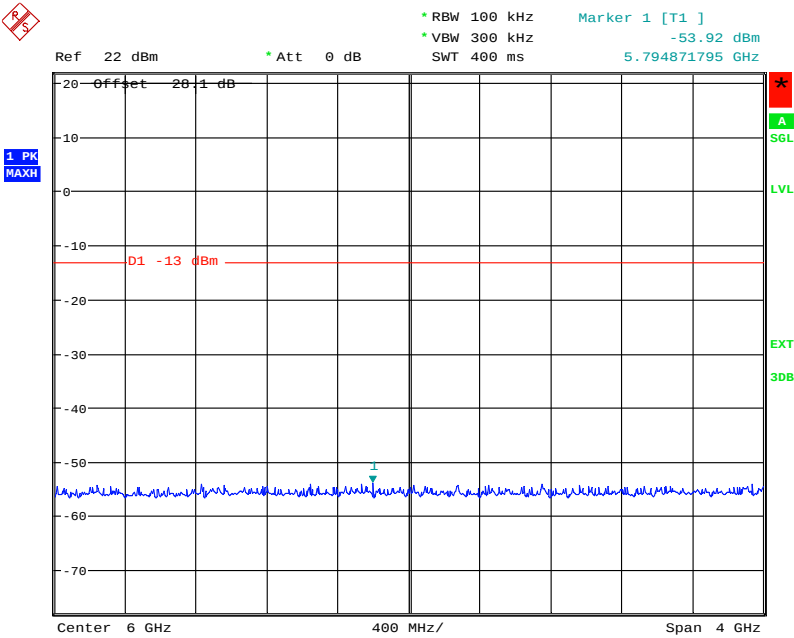


Date: 5.AUG.2013 08:41:35



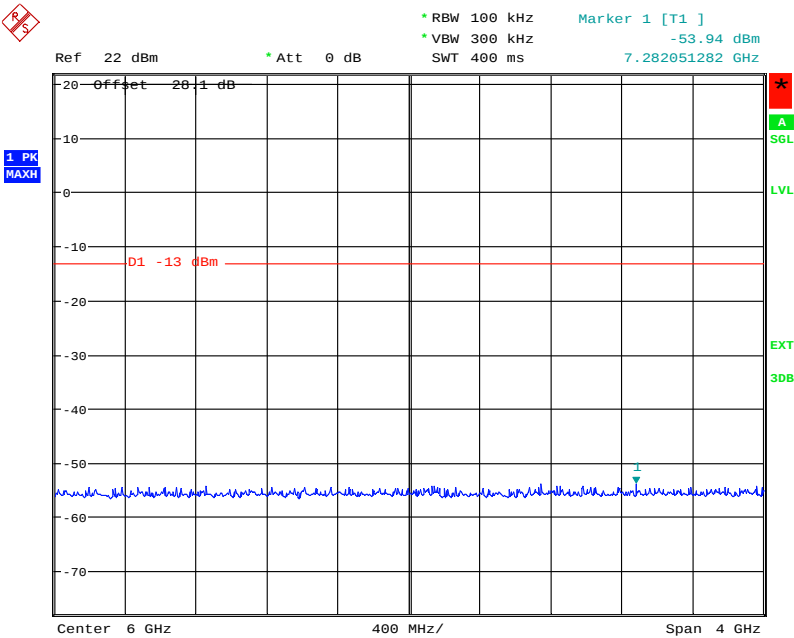
Product Service

710 MHz - 1 Resource Block - Low



Date: 5.AUG.2013 09:18:33

710 MHz - 1 Resource Block - Middle

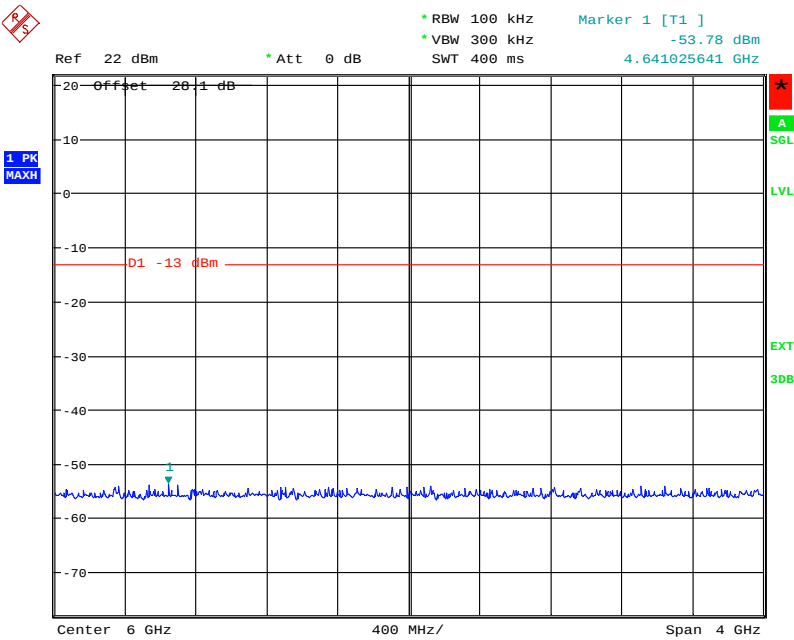


Date: 5.AUG.2013 09:09:43



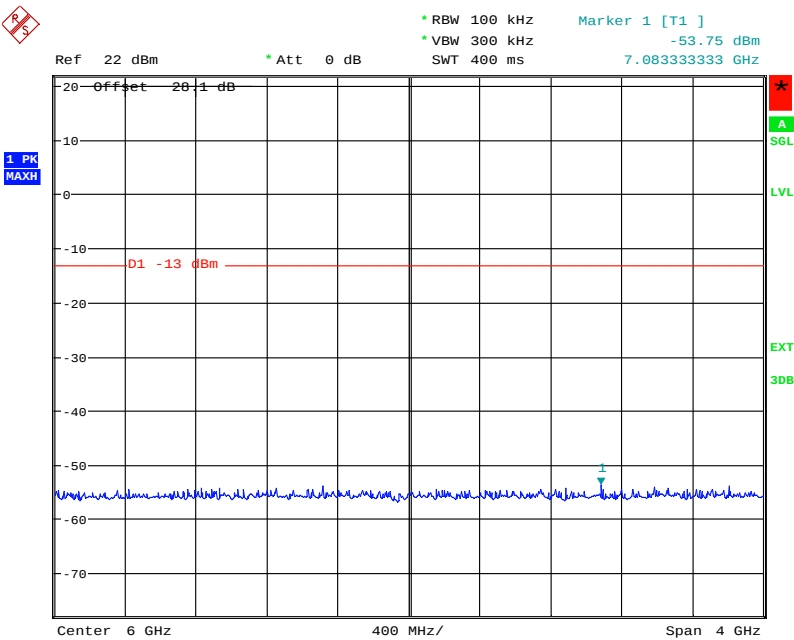
Product Service

710 MHz - 1 Resource Block - High



Date: 5.AUG.2013 09:26:42

710 MHz - All Resource Blocks

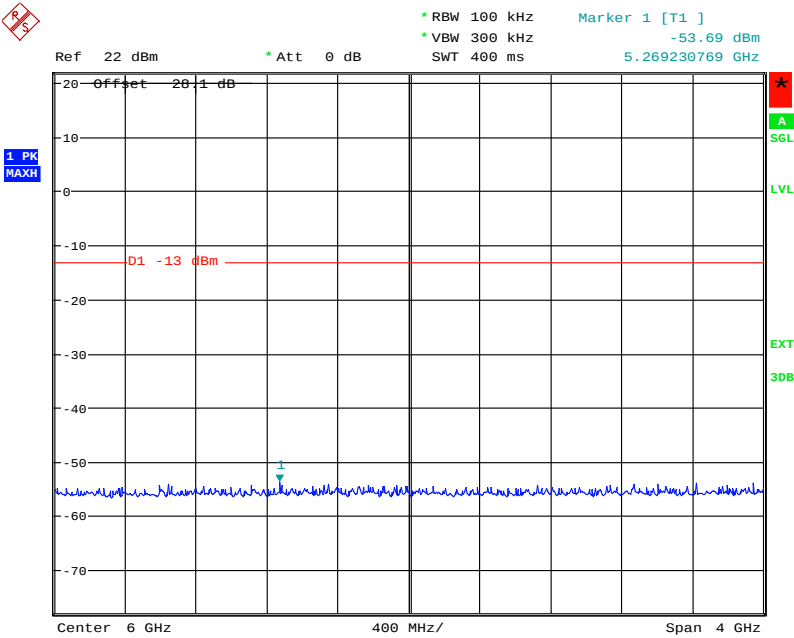


Date: 5.AUG.2013 09:34:55



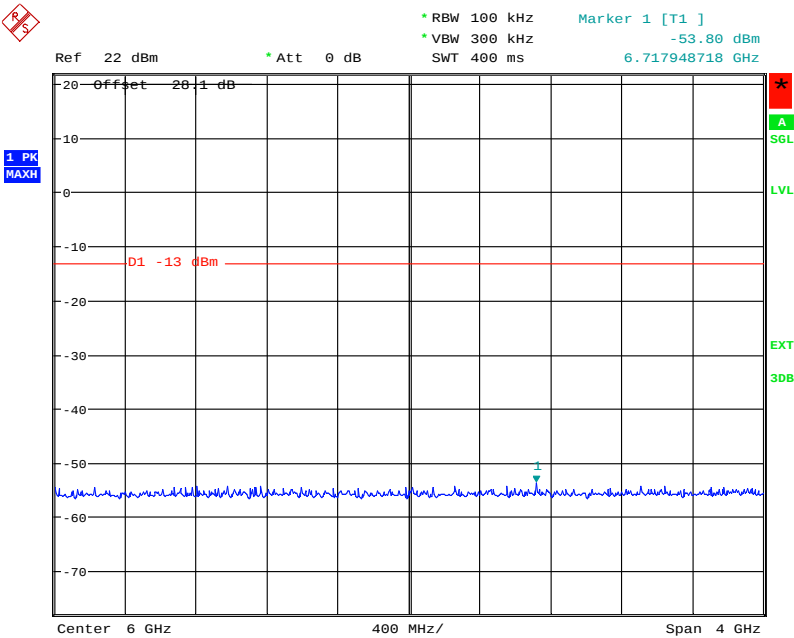
Product Service

711 MHz - 1 Resource Block - Low



Date: 5.AUG.2013 10:14:16

711 MHz - 1 Resource Block - Middle

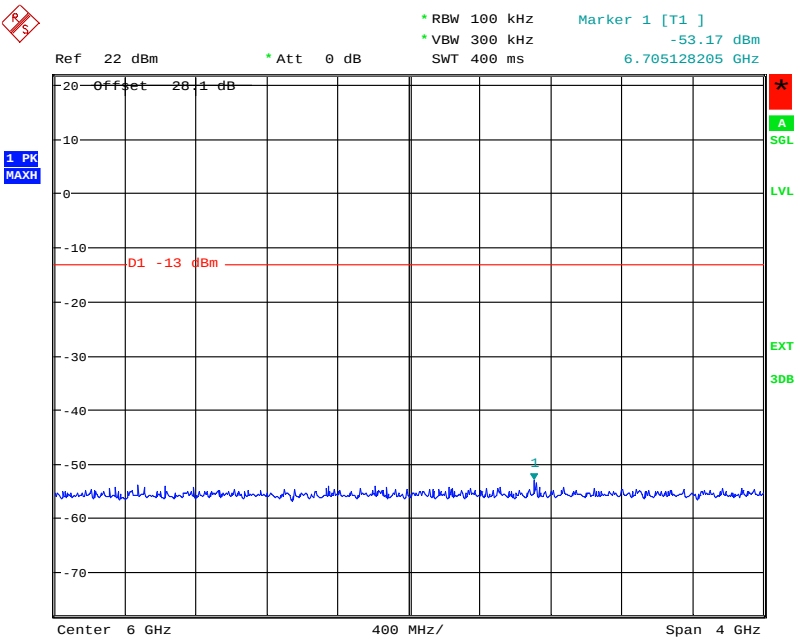


Date: 5.AUG.2013 10:05:07



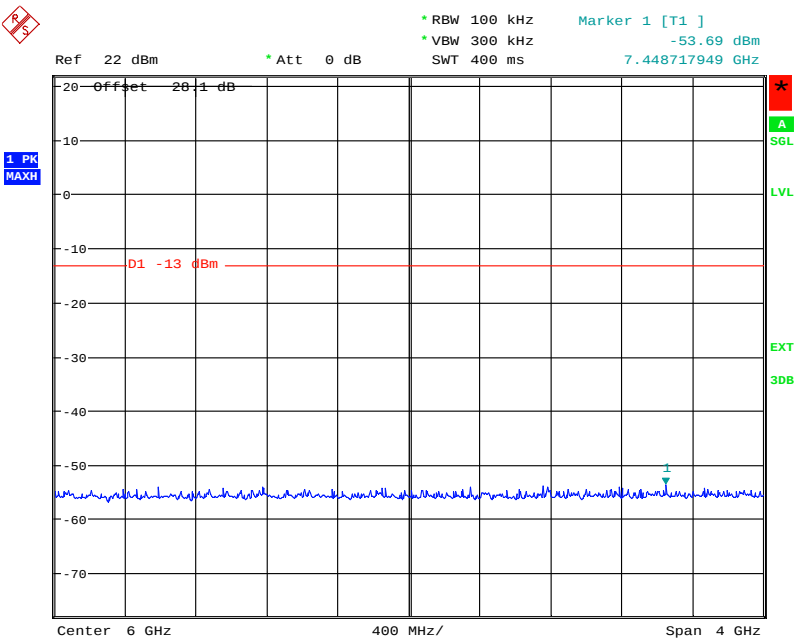
Product Service

711 MHz - 1 Resource Block - High



Date: 5.AUG.2013 09:56:00

711 MHz - All Resource Blocks



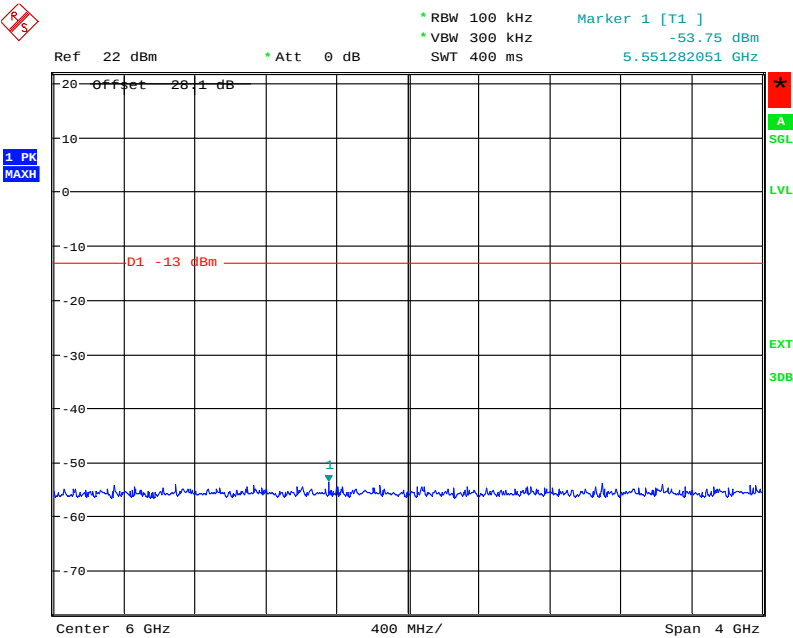
Date: 5.AUG.2013 09:44:42



Product Service

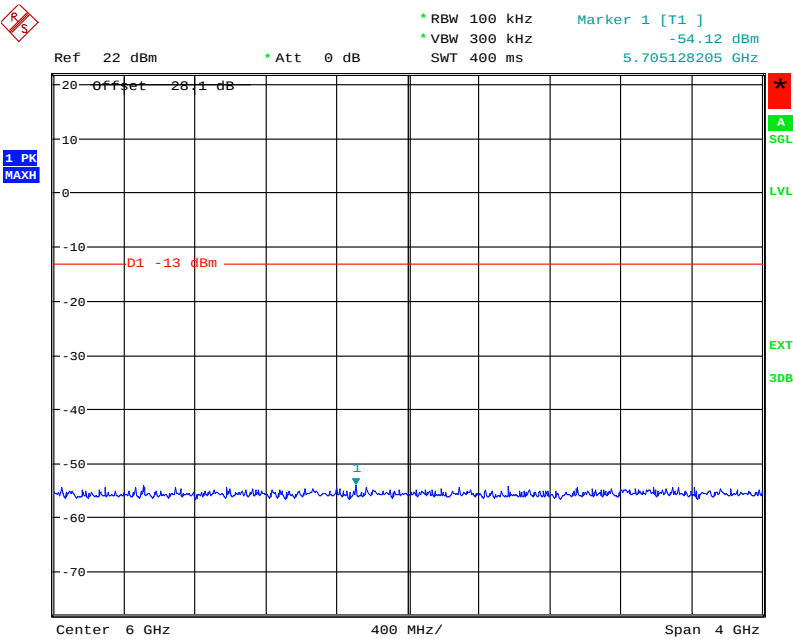
10.0 MHz Bandwidth - 16QAM

709 MHz - 1 Resource Block - Low



Date: 5.AUG.2013 12:24:12

709 MHz - 1 Resource Block - Middle

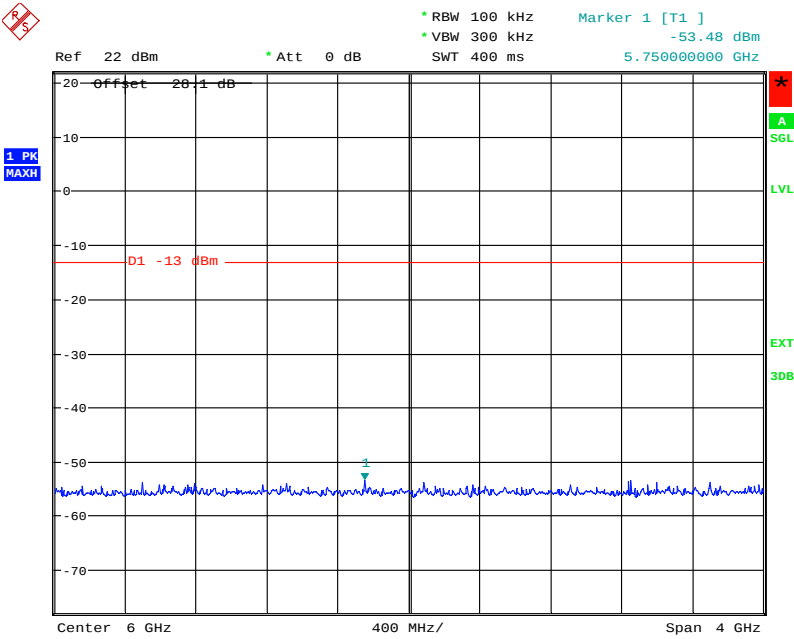


Date: 5.AUG.2013 12:32:42



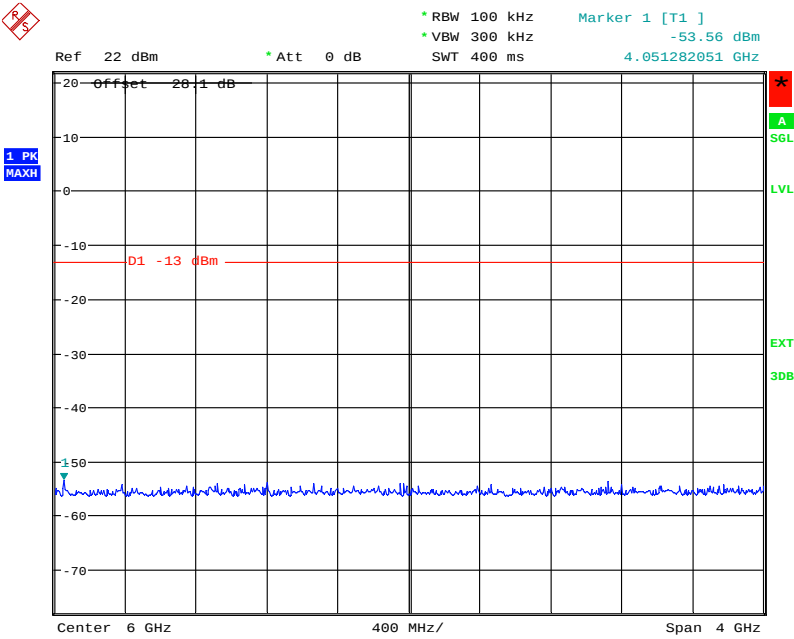
Product Service

709 MHz - 1 Resource Block - High



Date: 5.AUG.2013 12:41:38

709 MHz - All Resource Blocks

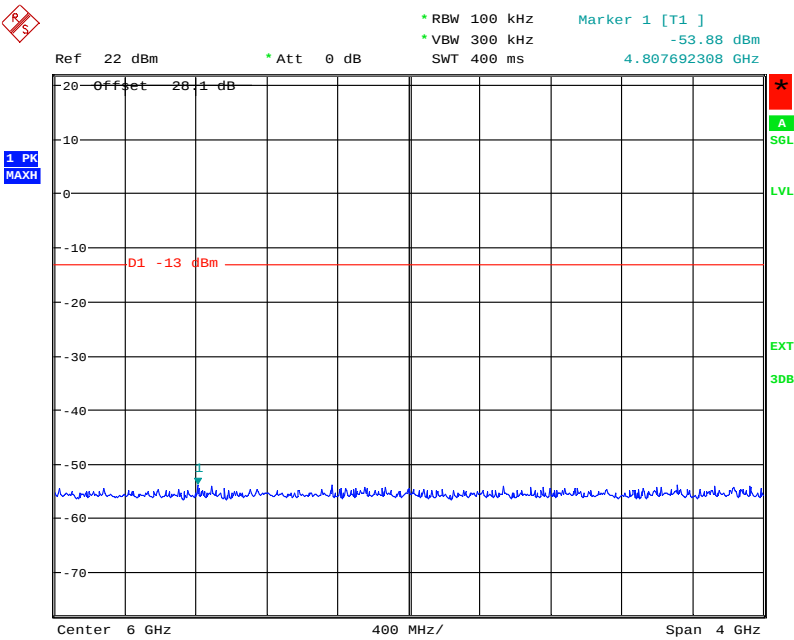


Date: 5.AUG.2013 12:14:36



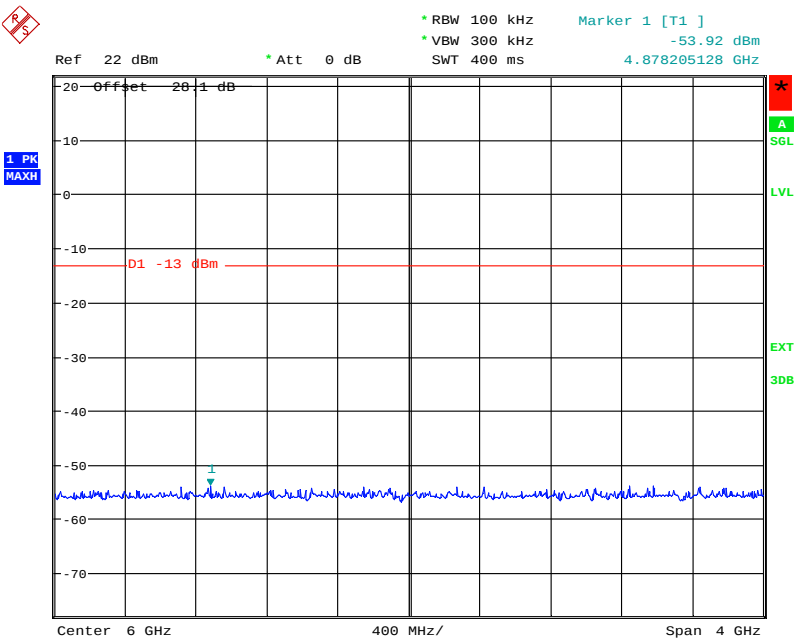
Product Service

710 MHz - 1 Resource Block - Low



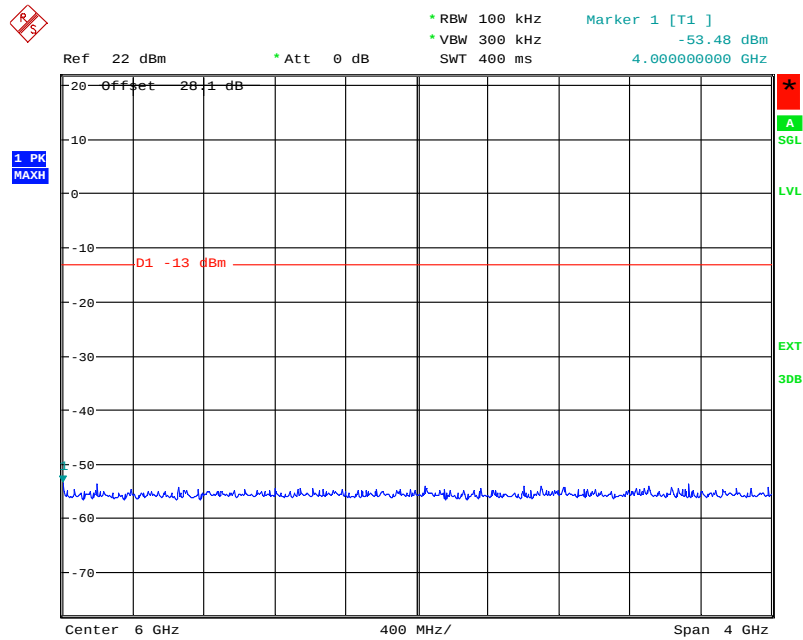
Date: 5.AUG.2013 13:06:31

710 MHz - 1 Resource Block - Middle



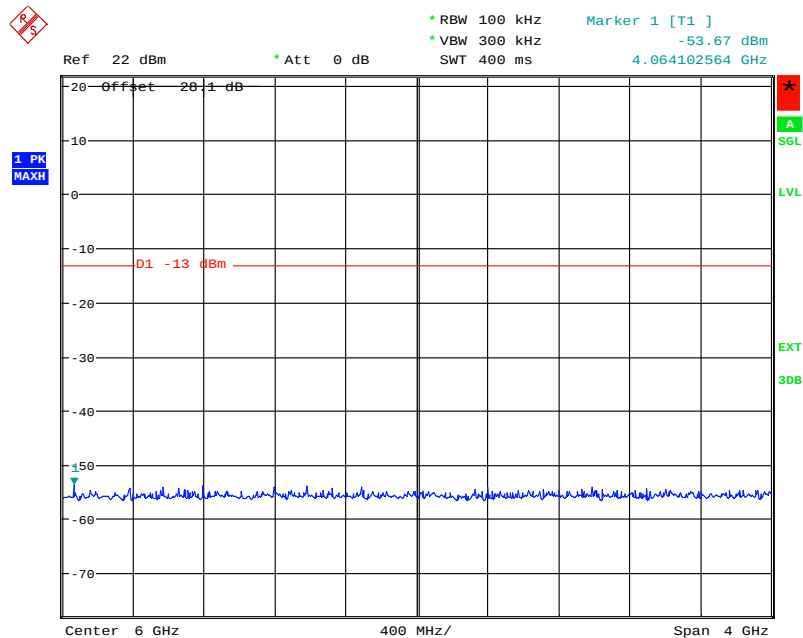
Date: 5.AUG.2013 12:57:57

710 MHz - 1 Resource Block - High



Date: 5.AUG.2013 12:50:04

710 MHz - All Resource Blocks

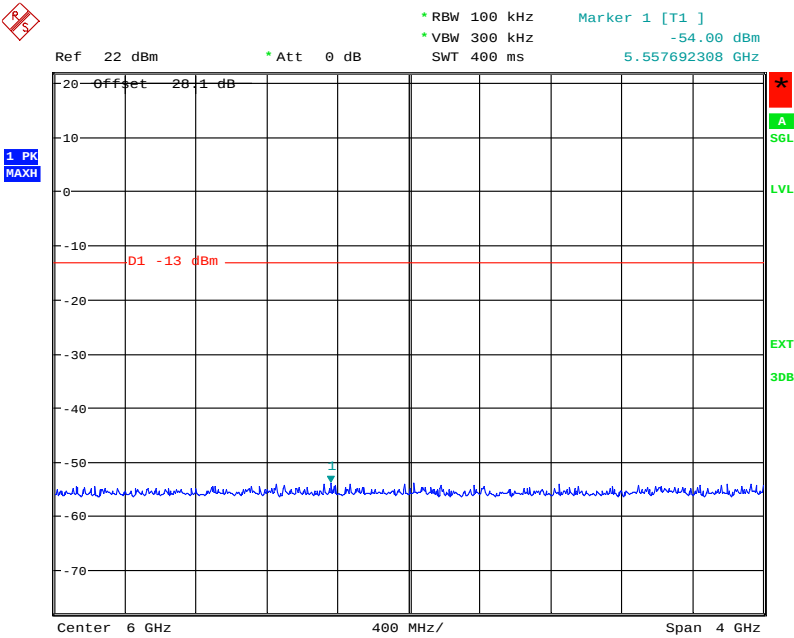


Date: 5.AUG.2013 13:41:45



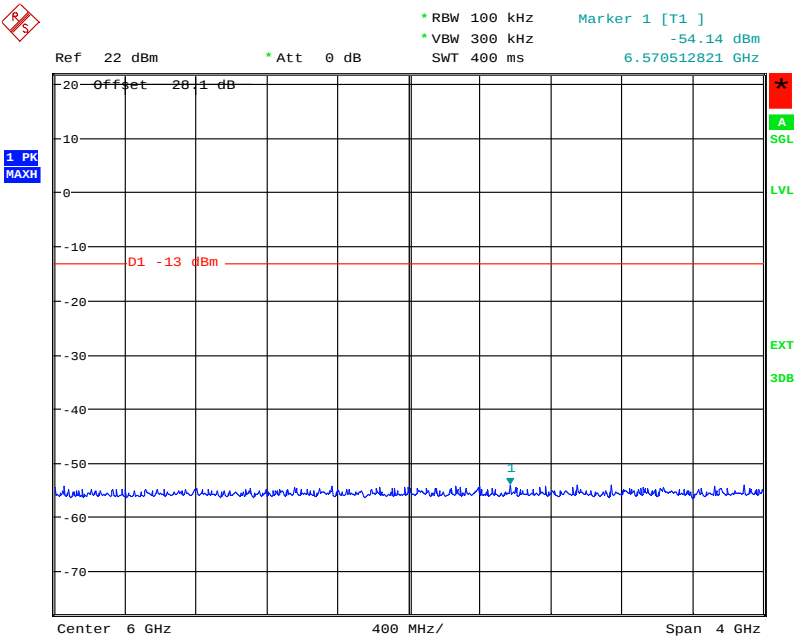
Product Service

711 MHz - 1 Resource Block - Low



Date: 5.AUG.2013 14:19:01

711 MHz - 1 Resource Block - Middle

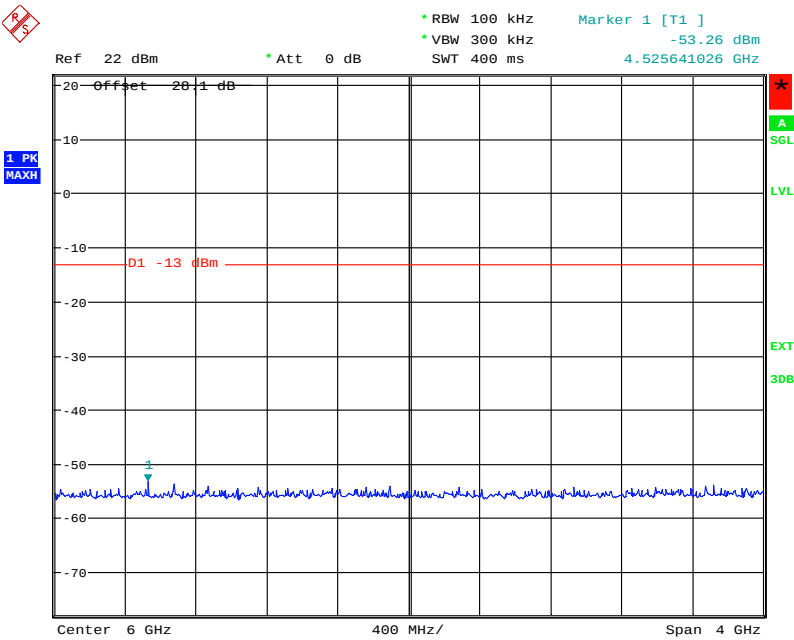


Date: 5.AUG.2013 14:10:33



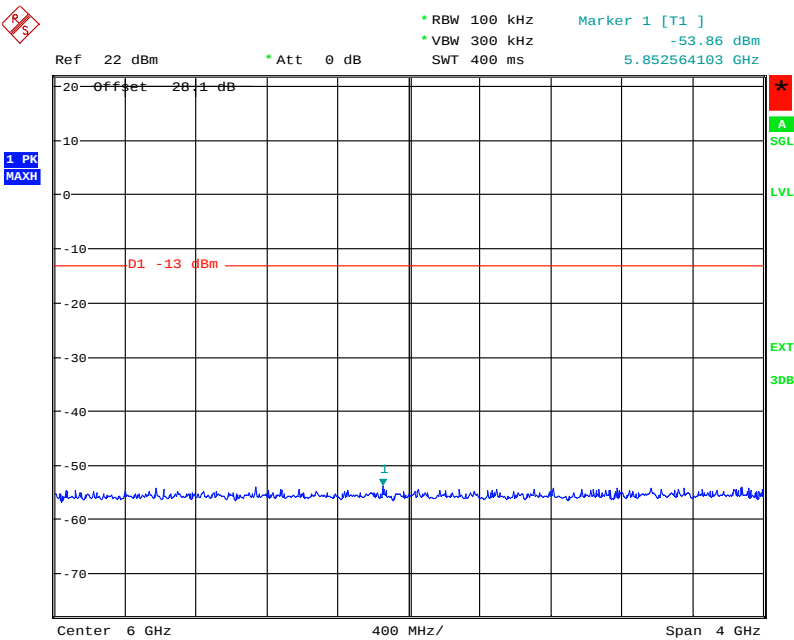
Product Service

711 MHz - 1 Resource Block - High



Date: 5.AUG.2013 14:01:43

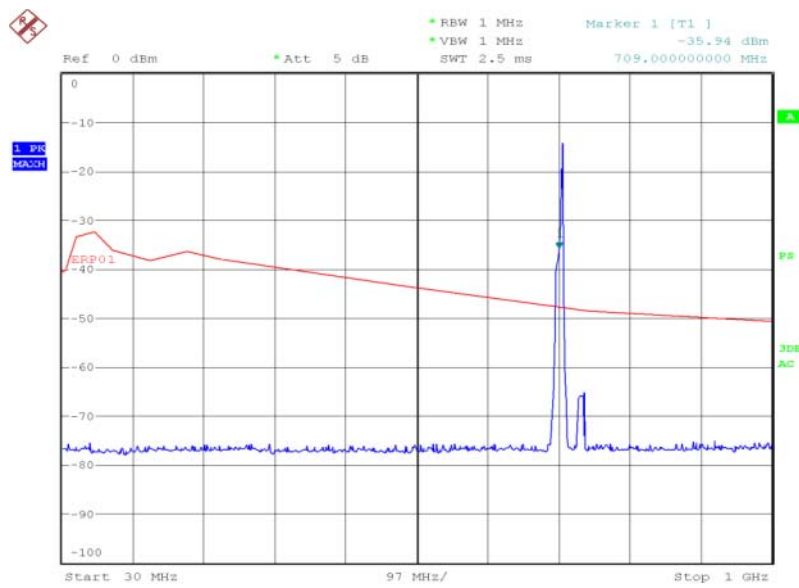
711 MHz - All Resource Blocks



Date: 5.AUG.2013 14:33:10



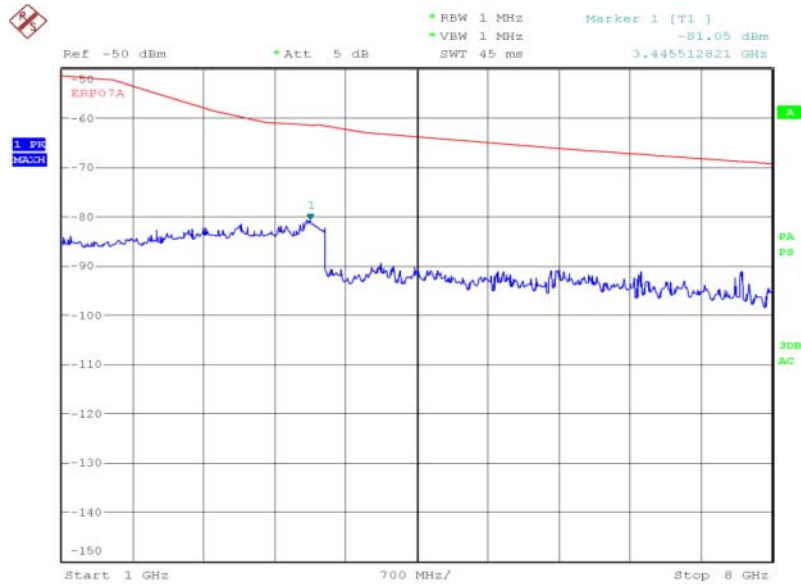
Product Service

Radiated Emissions10 MHz Bandwidth – QPSK1 Resource Block - High706.5 MHz30 MHz to 1 GHz

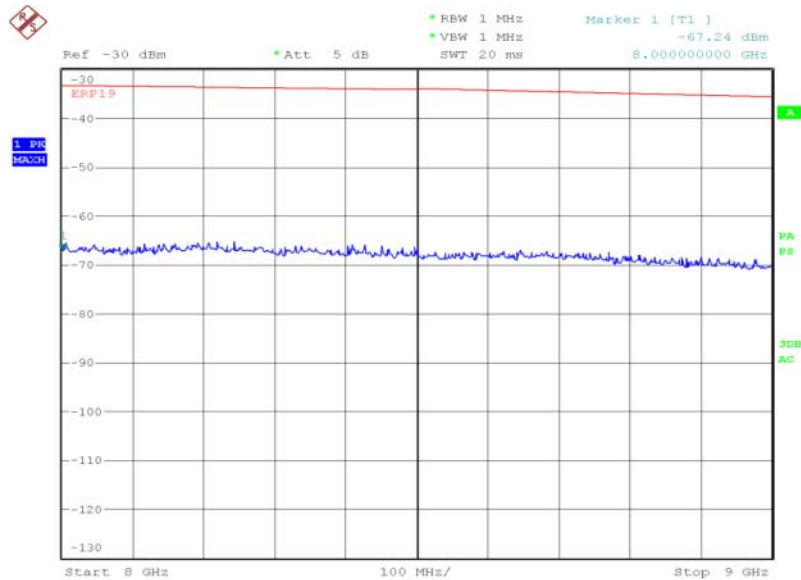
Date: 11.AUG.2013 14:44:57



Product Service

1 GHz to 8 GHz

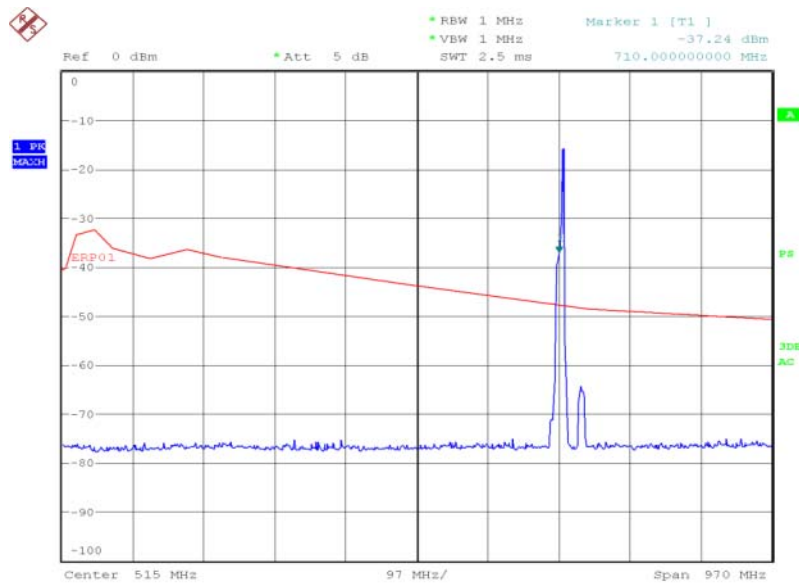
Date: 11.AUG.2013 14:58:25

8 GHz to 9 GHz

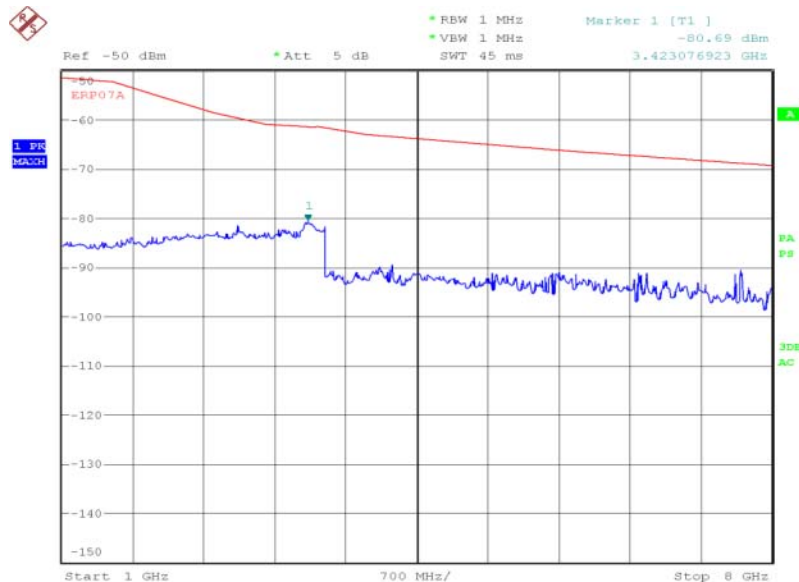
Date: 11.AUG.2013 15:04:44



Product Service

710.0 MHz30 MHz to 1 GHz

Date: 11.AUG.2013 14:46:49

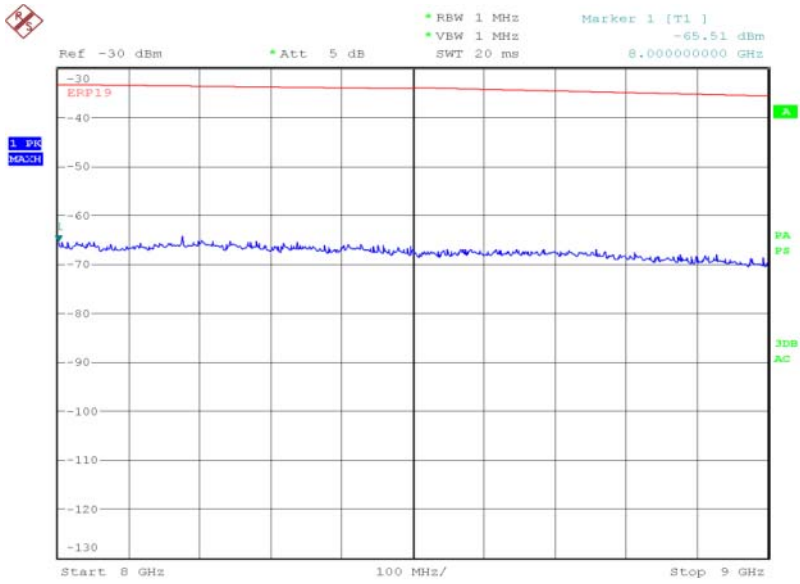
1 GHz to 8 GHz

Date: 11.AUG.2013 14:56:41



Product Service

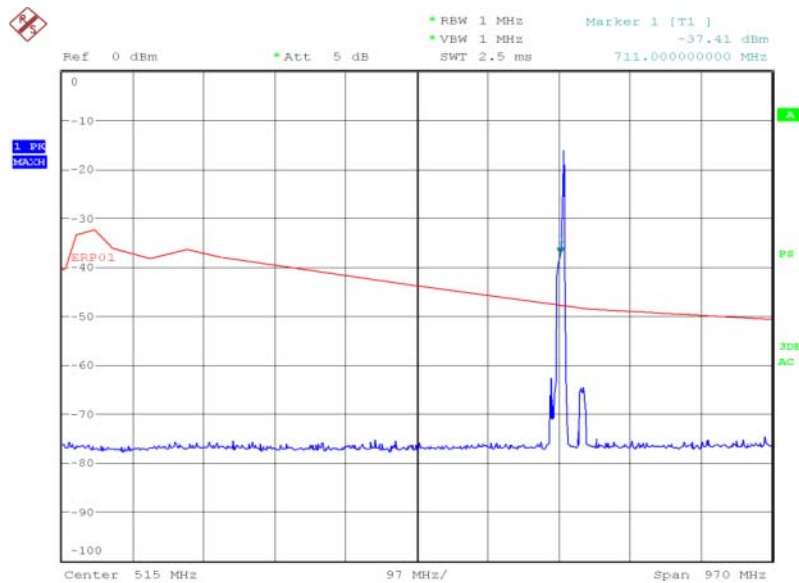
8 GHz to 9 GHz



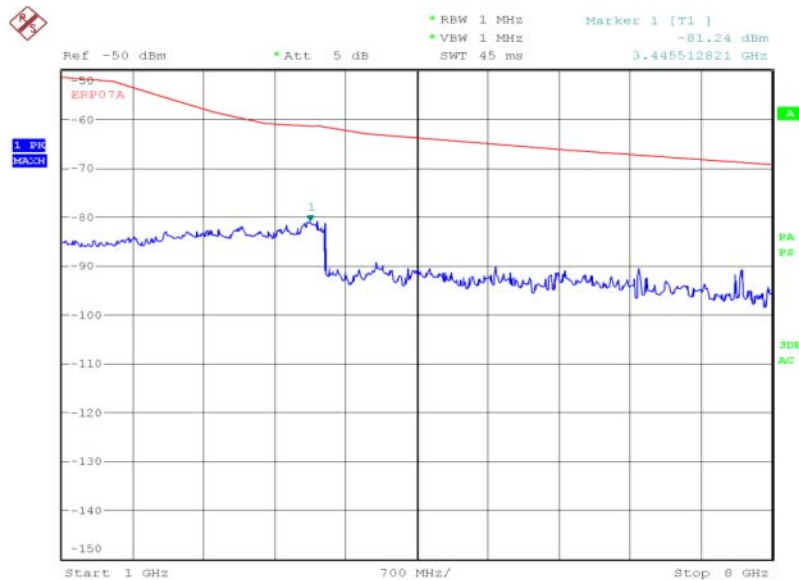
Date: 11.AUG.2013 15:08:03



Product Service

713.5 MHz30 MHz to 1 GHz

Date: 11.AUG.2013 14:51:03

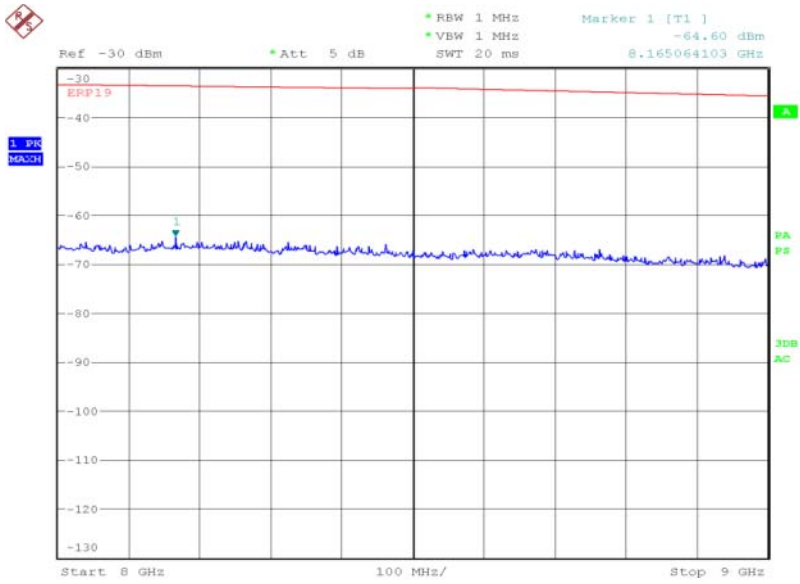
1 GHz to 8 GHz

Date: 11.AUG.2013 14:55:05



Product Service

8 GHz to 9 GHz



Date: 11.AUG.2013 15:10:03

Limit Clause 27.53 (g)

Conducted Emissions:	-13 dBm
Band Edge:	
Radiated Emissions:	



Product Service

2.3 FREQUENCY STABILITY

2.3.1 Specification Reference

FCC CFR 47 Part 2 , Clause 2.1055
FCC CFR 47 Part 27, Clause 27.54

2.3.2 Equipment Under Test and Modification State

Black Smartphone S/N: XCV23200852 - Modification State 0

2.3.3 Date of Test

6 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 configured to transmit on all resource blocks with a 10 MHz channel bandwidth on the middle channel. In accordance with 2.1055, the temperature was varied from -30°C to +50°C in 10° steps.

At 20°C, the EUT supply voltage was varied between 85% and 115% of the declared nominal. At each extreme voltage, the maximum frequency error was measured.

Note: For hand carried battery equipment, only the end point voltage as declared by the manufacturer was tested.

2.3.6 Environmental Conditions

Ambient Temperature	21.2°C
Relative Humidity	42.3%



2.3.7 Test Results

LTE FDD XVII

3.8 V DC Supply

Frequency Stability

Under Temperature Variations

10 MHz Bandwidth - QPSK

Frequency Error (Hz)		
710.0 MHz		
Supply Voltage	Temperature Interval °C	All Resource Blocks
V _{min} (3.6 V DC)	+20	-18.98
V _{nom} (3.8 V DC)	-30	-25.98
V _{nom} (3.8 V DC)	-20	-24.68
V _{nom} (3.8 V DC)	-10	18.15
V _{nom} (3.8 V DC)	0	-13.62
V _{nom} (3.8 V DC)	+10	-16.11
V _{nom} (3.8 V DC)	+20	-17.45
V _{nom} (3.8 V DC)	+30	-16.68
V _{nom} (3.8 V DC)	+40	-17.02
V _{nom} (3.8 V DC)	+50	-14.45

10 MHz Bandwidth – 16QAM

Frequency Error (Hz)		
710.0 MHz		
Supply Voltage	Temperature Interval °C	All Resource Blocks
V _{min} (3.6 V DC)	+20	-18.25
V _{nom} (3.8 V DC)	-30	-25.58
V _{nom} (3.8 V DC)	-20	-20.23
V _{nom} (3.8 V DC)	-10	-13.58
V _{nom} (3.8 V DC)	0	-15.68
V _{nom} (3.8 V DC)	+10	-17.60
V _{nom} (3.8 V DC)	+20	-14.63
V _{nom} (3.8 V DC)	+30	-17.85
V _{nom} (3.8 V DC)	+40	-16.42
V _{nom} (3.8 V DC)	+50	-13.46



Product Service

Remarks

The EUT is a battery powered, hand carried portable and therefore was tested at the end point voltage only.

Limit Clause 2.1055 (a)(1)(b) and 27.54

The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorised bands of operation.



Product Service

2.4 MODULATION CHARACTERISTICS

2.4.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1047(d)

2.4.2 Equipment Under Test and Modification State

Black Smartphone S/N: XCV23200852 - Modification State 0

2.4.3 Date of Test

5 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

The following plots show a representation of the Modulation Characteristics of an LTE signal as measured from the EUT. Both supported modulation schemes of QPSK and 16QAM are recorded as plots below.

2.4.6 Environmental Conditions

Ambient Temperature	23.1°C
Relative Humidity	57.2%

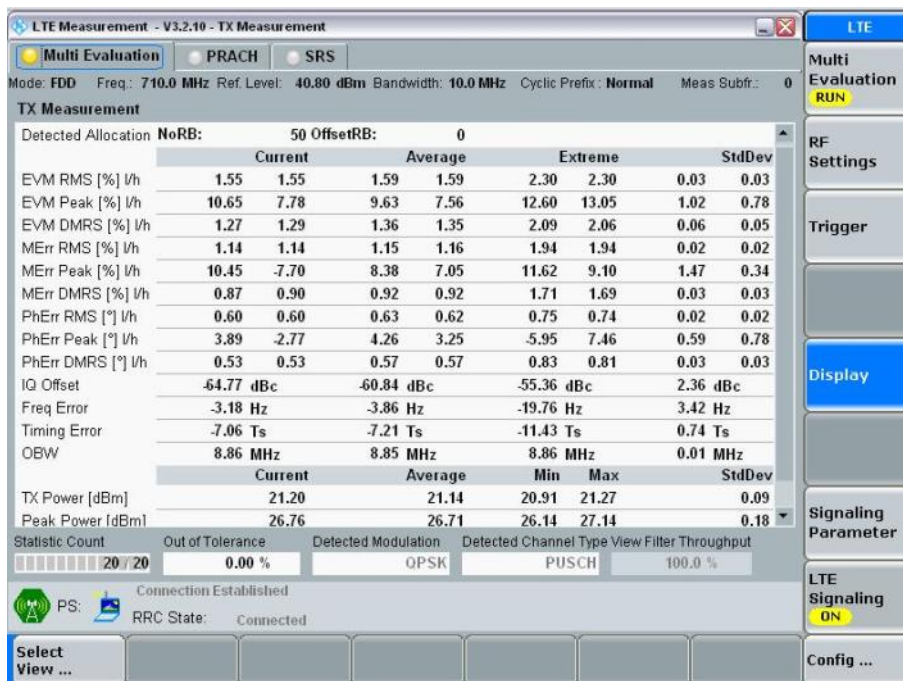


2.4.7 Test Results

LTE FDD XVII

10.0 MHz Bandwidth - QPSK

Transmitter Measurements Summary - All Resource Blocks



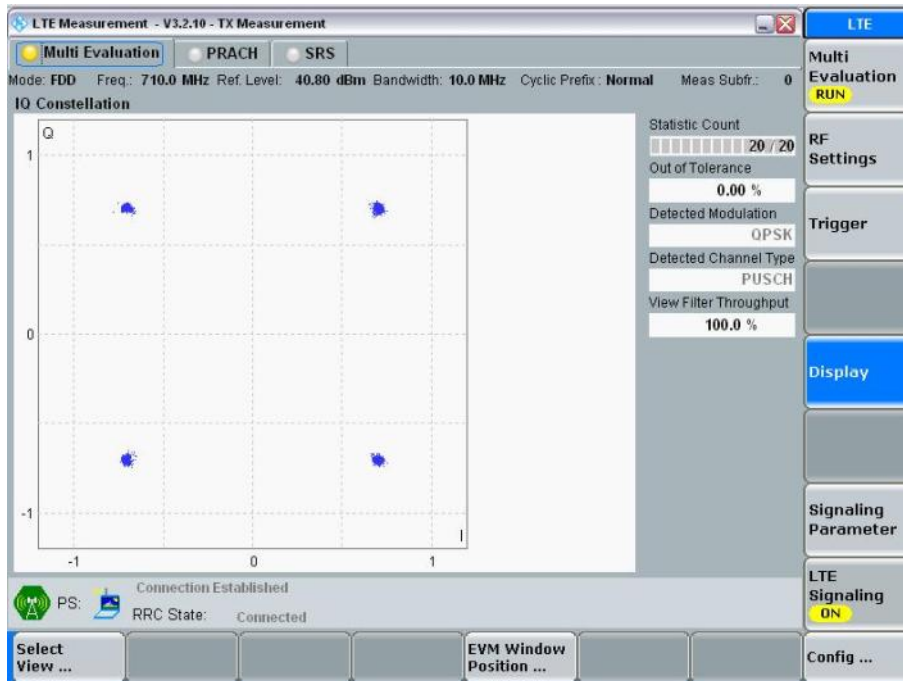
Error Vector Magnitude – All Resource Blocks



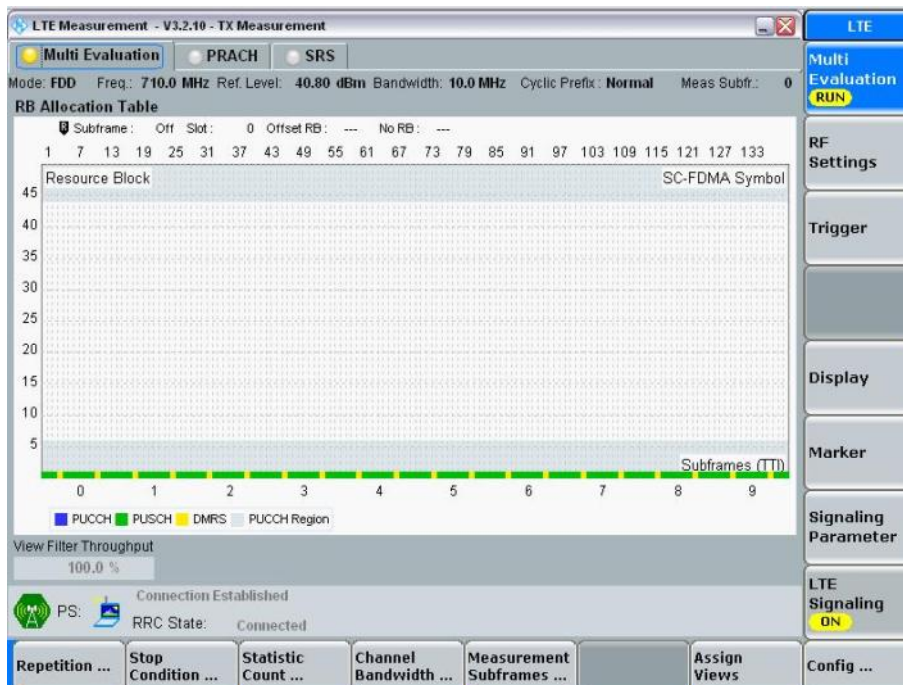


Product Service

IQ Constellation – All Resource Blocks



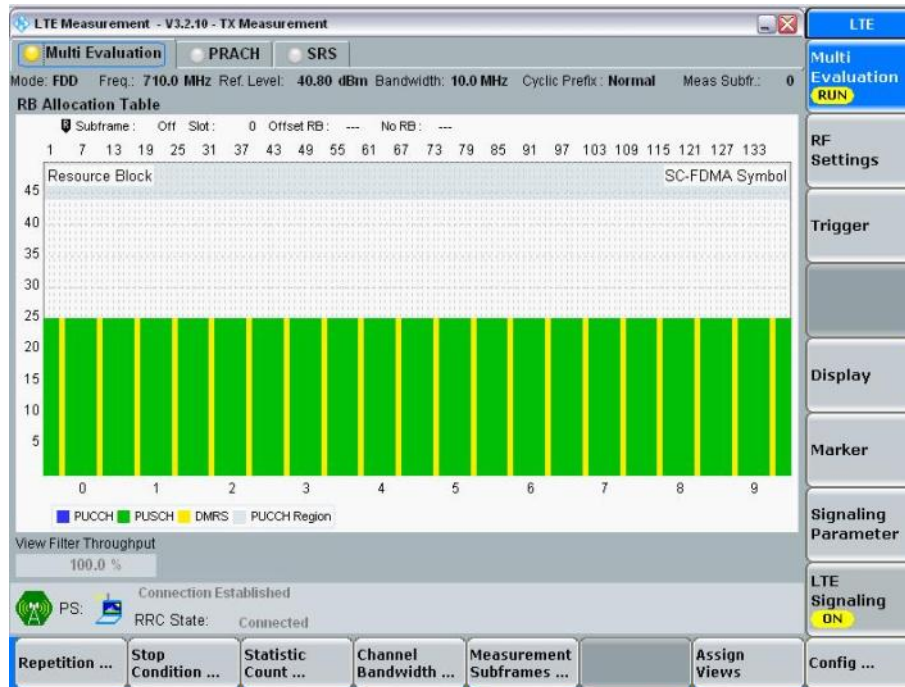
Resource Block Allocation – 1 Resource Block



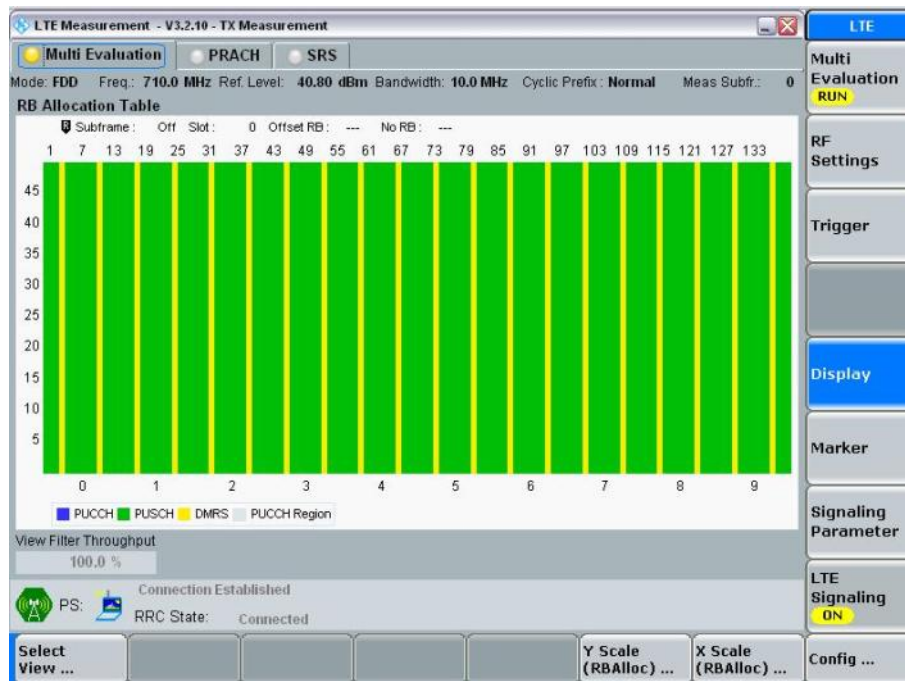


Product Service

Resource Block Allocation – 25 Resource Block

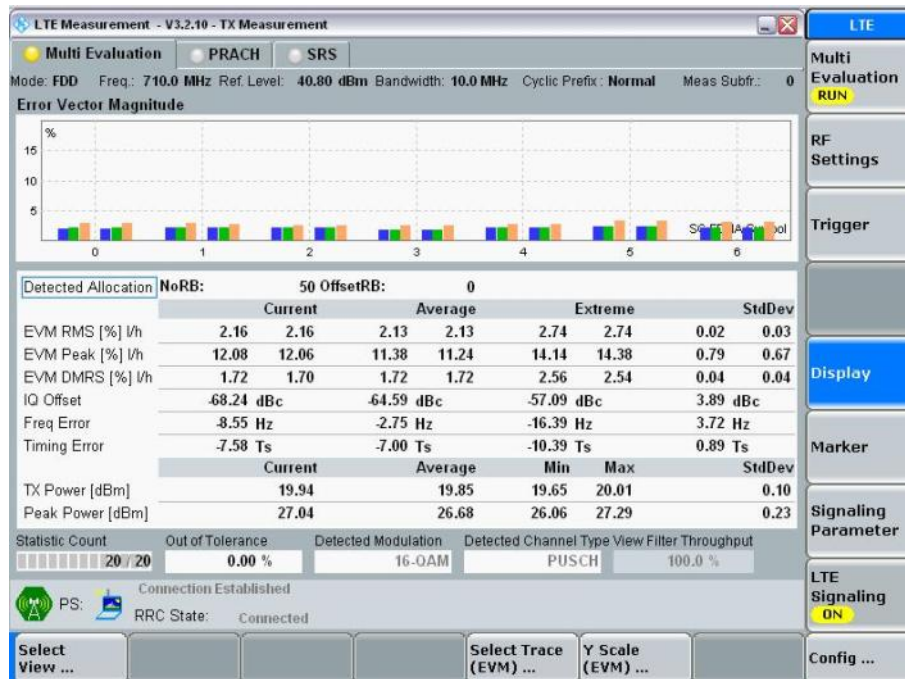


Resource Block Allocation – All Resource Blocks





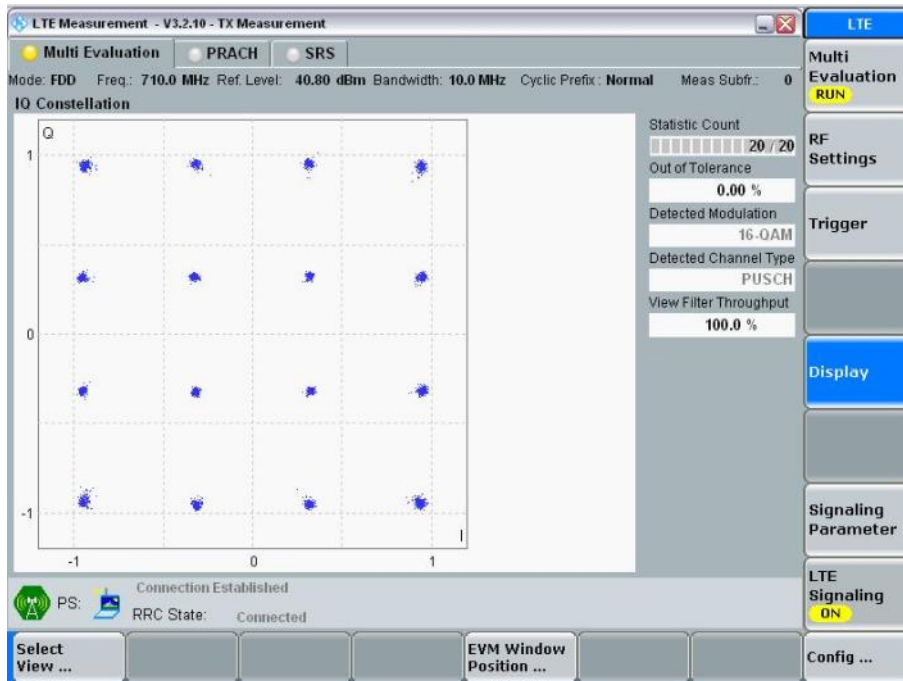
Product Service

10.0 MHz - 16QAMTransmitter Measurements Summary - All Resource BlocksError Vector Magnitude – All Resource Blocks

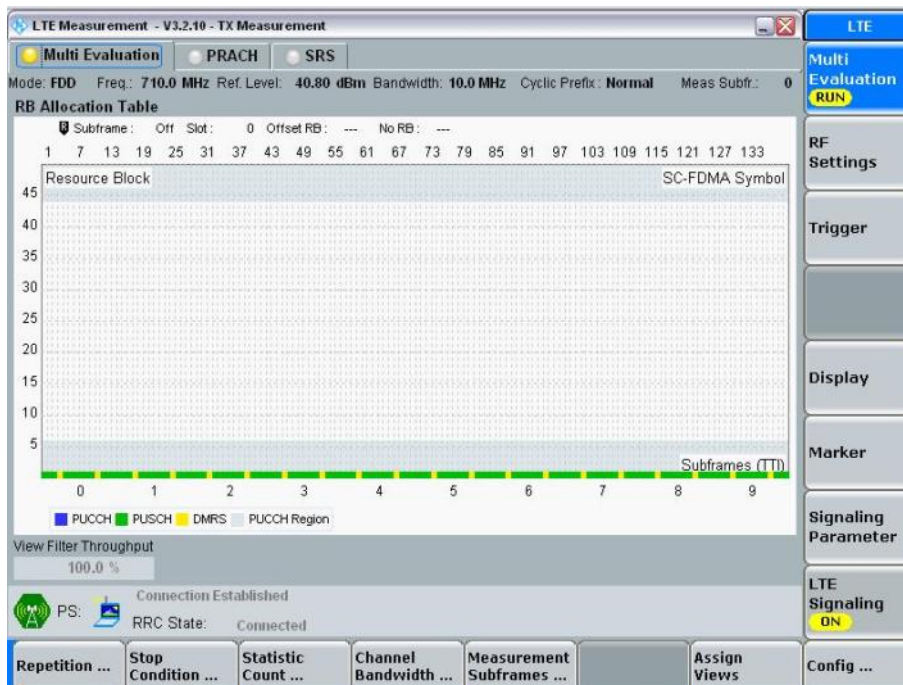


Product Service

IQ Constellation – All Resource Blocks

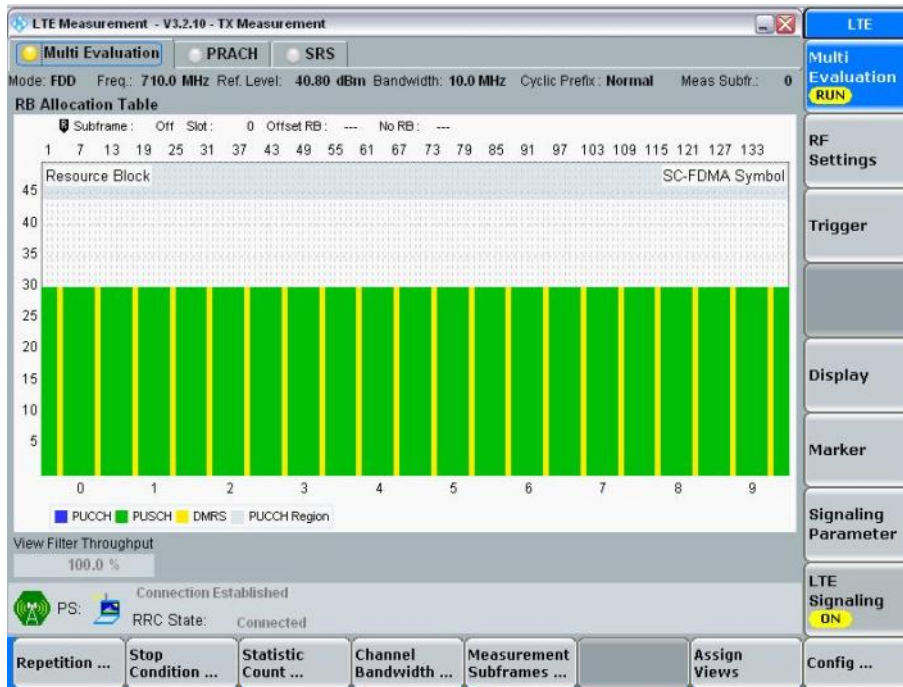
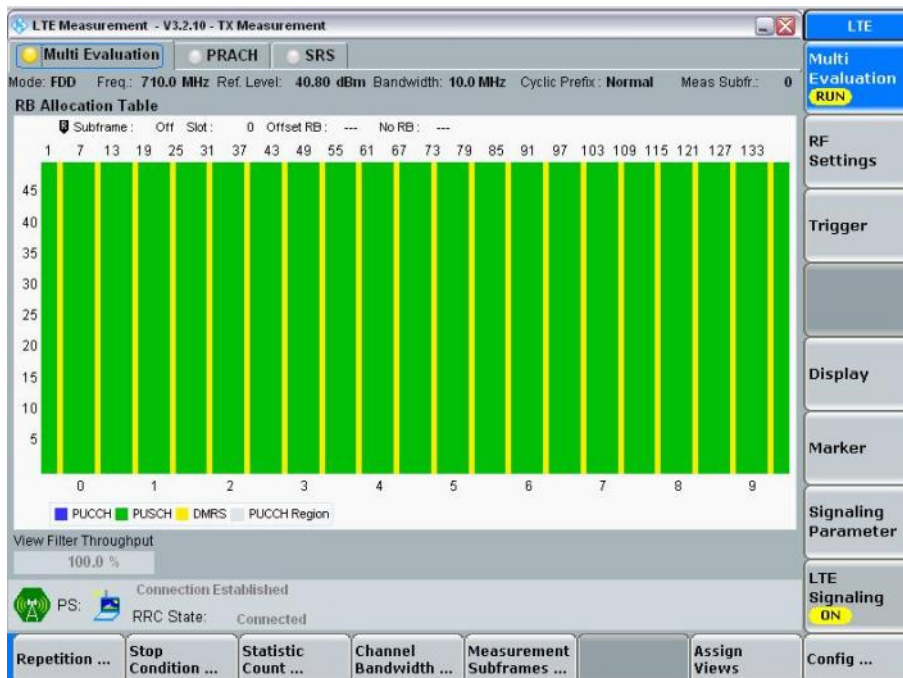


Resource Block Allocation – 1 Resource Block





Product Service

Resource Block Allocation – 30 Resource BlockResource Block Allocation – All Resource Blocks



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 – Power Limits and Duty Cycle					
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
Attenuator (20dB/ 2W)	Pasternack	PE7004-20	489	12	18-Oct-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
Power Supply	Hewlett Packard	6104A	1948	-	TU
Radio Communications Test Set	Rohde & Schwarz	CMU 200	3035	12	6-Dec-2013
ESA-E Series Spectrum Analyser	Agilent Technologies	E4402B	3348	12	13-Jun-2014
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	11-Oct-2013
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	31-Aug-2013
9m RF Cable (N Type)	Rhophase	NPS-2303-9000-NPS	3791	-	TU
Tilt Antenna Mast	maturo GmbH	TAM 4.0-P	3916	-	TU
Combiner/Splitter	Weinschel	1506A	3877	12	19-Mar-2014
Mast Controller	maturo GmbH	NCD	3917	-	TU
1 Metre SMA Cable	Rhophase	3PS-1801A-1000-3PS	4099	12	26-Oct-2013
Wideband Radio Communication Tester	Rohde & Schwarz	CMW 500	4144	12	17-Jul-2014
Section 2.2 – Emission Limits					
Antenna (Double Ridge Guide)	Link Microtek Ltd	AM180HA-K-TU2	230	24	13-Sep-2013
Antenna (Double Ridge Guide, 1GHz-18GHz)	EMCO	3115	234	12	3-Apr-2014
Antenna (Bilog)	Schaffner	CB16143	287	24	18-Jan-2014
Communications Tester	Rohde & Schwarz	CMU 200	442	12	1-Nov-2013
Filter (High Pass)	Lorch	SHP7-7000-SR	566	12	20-Feb-2014
Pre-Amplifier	Phase One	PS04-0086	1533	12	27-Sep-2013
Pre-Amplifier	Phase One	PS04-0087	1534	12	28-Sep-2013
Screened Room (5)	Rainford	Rainford	1545	36	25-Dec-2013
Turntable Controller	Inn-Co GmbH	CO 1000	1606	-	TU
Amplifier (1 - 8GHz)	Phase One	PS06-0060	3175	12	9-Aug-2014
Amplifier (8 - 18GHz)	Phase One	PS06-0061	3176	12	9-Aug-2014
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	11-Oct-2013
3 GHz High Pass Filter	K&L Microwave	11SH10-3000/X18000-O/O	3552	12	1-Feb-2014
10mohm Resistor	Cropico	RS3	3616	48	12-Mar-2017
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
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 2.3 - Frequency Stability					
Multimeter	White Gold	WG022	190	12	30-Oct-2013
Temperature Chamber	Montford	2F3	467	-	O/P Mon
Power Supply Unit	Farnell	D302T	609	-	O/P Mon
Radio Communications Test Set	Rohde & Schwarz	CMU 200	3035	12	6-Dec-2013
Thermocouple Thermometer	Fluke	51	3173	12	23-Aug-2013
Attenuator (10dB, 20W)	Lucas Weinschel	1	3225	12	11-Dec-2013
1 Metre N Type Cable	Rhophase	NPS-1601A-1000-NPS	4103	12	11-Jun-2014
Wideband Radio Communication Tester	Rohde & Schwarz	CMW 500	4144	12	17-Jul-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
Frequency Stability	± 22 Hz
Modulation Characteristics	Occupied Bandwidth ; ± 262 kHz
Emission Limits	Radiated Emissions ; 30 MHz to 1 GHz ; ± 5.1 dB Radiated Emissions ; 1 GHz to 40 GHz ; ± 6.2 dB ERP / EIRP ; ± 3.0 dB Band Edge ; 30 MHz to 1 GHz ; ± 5.1 dB Band Edge ; 1 GHz to 40 GHz ; ± 6.2 dB
Power Limits and Duty Cycle	Conducted Power ; ± 0.7 dB ERP / EIRP ; ± 3.0 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
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