InterLab

FCC Measurement/Technical Report on

TOBY-L210 GSM/UMTS/HSPA/LTE Data Module

FCC ID: XPYTOBYL210
IC:8595A-TOBYL210

Report Reference: MDE_UBLOX_1409_FCCb Rev 02

according to FCC Part 22, Subpart H

Test Laboratory:
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Table of Contents

0 Summary

0.1 Technical Report Summary

Type of Authorization
Certification for a GSM/WCDMA/LTE cellular radiotelephone device. This report covers only the LTE portion of this device.

Applicable FCC Rules

Prepared in accordance with the requirements of FCC Rules and Regulations as listed in 47 CFR Ch.1 Parts 0 to 69. The following subparts are applicable to the results in this test report.

Part 2, Subpart J - Equipment Authorization Procedures, Certification

§ 2.1046 Measurement required: RF power output
§ 2.1049 Measurement required: Occupied bandwidth
§ 2.1051 Measurement required: Spurious emissions at antenna terminals
§ 2.1053 Measurement required: Field strength of spurious radiation*
§ 2.1055 Measurement required: Frequency stability
§ 2.1057 Frequency spectrum to be investigated

*Covered by external report.

Part 22, Subpart C – Operational and Technical Requirements

§ 22.355 Frequency tolerance

Part 22, Subpart H – Cellular Radiotelephone Service

§ 22.913 Effective radiated power limits
§ 22.917 Emission limitations for cellular equipment

Additional documents

Note:

ANSI TIA-603-C-2004

Correlation of measurement requirements for Cellular Equipment from FCC and IC

FCC Rule / IC Standard	Part 22 /	RSS-132	Part 24 / RSS-133 (NA)		Part 27 /	RSS-139 /	RSS-199
Effective (isotropic) Radiated Power	§2.1046 §22.913	RSS-GEN, §4.8 RSS-132, §5.4	§2.1046 §24.232	RSS-GEN, §4.8 RSS-133, §6.4	§2.1046 §27.50 (d)	RSS-GEN, §4.8 RSS-139; §6.4	RSS-GEN, §4.8 RSS-199; §4.4
Occupied Bandwidth	§2.1049	RSS-GEN §4.6	§2.1049	RSS-GEN §4.6	§2.1049	RSS-GEN §4.6	RSS-GEN §4.6
"Spuri" at Antenna Terminal	§2.1051 §22.917	RSS-GEN, §4.9 RSS-132, §5.5	§2.1051 §24.238	RSS-GEN, §4.9 RSS-132, §6.5	§2.1051 §27.5 (h)	RSS-GEN, §4.9 RSS-139, §6.5	RSS-GEN, §4.9 RSS-199, §4.6
Band Edge compliance	§2.1051 §22.917	RSS-GEN, §4.6	§2.1051 §24.238	RSS-GEN, §4.6	§2.1051 §27.5 (h)	RSS-GEN, §4.6	RSS-GEN, §4.6
Frequency Stability	§2.1055 §22.355	RSS-GEN, §4.7	§2.1055 §24.235	RSS-GEN, §4.7 RSS-132, §6.3	§2.1055 §27.51	RSS-GEN, §4.7 RSS-139, §6.3	RSS-GEN, §4.7 RSS-199, §4.3
Peak to Average Ration	N/A	RSS-132, §5.3	§2.1046 §24.232	RSS-133, §6.4	§2.1046 §27.50 (d)	RSS-139, §6.4	NA
Modulation Characteristics	§2.1047	RSS-132, §5.4	§2.1047	RSS-133, §6.2	§2.1047	RSS-139, §6.2	RSS-199, §4.1
Field Strength of Spurious Radiation	§2.1053 §22.917	RSS-132, §5.2	§2.1053 §24.235	RSS-GEN, §4.9 RSS-133, §6.5	§2.1053 §27.51	RSS-GEN, §4.9 RSS-139, §6.5	RSS-GEN, §4.9 RSS-199, §4.6

*) Receivers which are part of Transceivers are exempted with respect to Notice 2012-DRS0126.

Summary Test Results:

The EUT complied with all performed tests as listed in chapter 0.2 Measurement Summary.

0.2 Measurement Summary

FCC Part 22, Subpart H	§2.1046, §22.913	
RF Power Output		
Setup	**Port**	**Final Result**
Setup_01	AC Port (power line)	passed 09-18-2014

FCC Part 22, Subpart H	§2.1055	
Frequency stability		
Setup	**Port**	**Final Result**
Setup_02	Temp.ant.connector	passed 09-18-2014

FCC Part 22, Subpart H	§2.1051, §22.917	
Spurious emissions at antenna terminals		
Setup	**Port**	**Final Result**
Setup_01	Temp.ant.connector	passed 09-18-2014

FCC Part 22, Subpart H	§2.1049, §22.917	
Emission and Occupied Bandwidth		
Setup	**Port**	**Final Result**
Setup_01	Temp.ant.connector	passed 09-18-2014

FCC Part 22, Subpart H	§2.1053, §22.917	
Band edge compliance		
Setup	**Port**	**Final Result**
Setup_01	Temp.ant.connector	passed 09-18-2014

FCC Part 22, Subpart H , RSS-132 Issue 5	§5.4, §22.913	
Peak-Average Ratio		
Setup	**Port**	**Final Result**
Setup_01	Temp.ant.connector	passed 09-18-2014

FCC Part 22, Subpart H	§2.1046, §22.917	
Field strength of spurious radiation		
Setup	**Port**	**Final Result**
na	na	Not performed see external report

Responsible for Accreditation Scope:

Responsible for Test Report:

7 layers AG, Borsigstr. 11, 40880 Ratingen, Germany, Phone +49 (0)2102 749 0

Version	Release date	Changes	Version validity
01	08.10.2014	Initial version	not valid
02	20.10.2014	Updated FCC/IC correlation table	valid

1 Administrative Data

1.1 Testing Laboratory

Company Name:	7Layers AG
Address	Borsigstr. 11 40880 Ratingen Germany

This facility has been fully described in a report submitted to the FCC and accepted under the registration number 96716 .

The test facility is also accredited by the following accreditation organisation:

Laboratory accreditation no.:	DAkkS D-PL-12140-01-01
Responsible for Accreditation Scope:	Dipl.-Ing. Bernhard Retka Dipl.-Ing. Robert Machulec Dipl.-Ing. Thomas Hoell Dipl.-Ing. Marco Kullik Dipl.-Ing. Andreas Petz
Report Template Version:	2014-09-18

1.2 Project Data

Responsible for testing and report:	Patrick Lomax
Date of Test(s):	2014-07-14 to 2014-09-10
Date of Report:	2014-10-20

1.3 Applicant Data

Company Name:	u-blox AG
Address:	Zürcherstrasse 68, CH-8800 Thalwil Switzerland
Contact Person:	Mr. Giulio Comar
Phone:	+41 44 722 7462
Email Address:	giulio.comar@u-blox.com

1.4 Manufacturer Data

Company Name:	please see applicant data
Address:	
Contact Person:	

2 Test object Data

2.1 General EUT Description

Equipment under Test:	GSM/UMTS/HSPA/LTE Data Module
Type Designation:	TOBY-L210
Kind of Device: (optional)	Module
Voltage Type:	DC
Voltage Level:	3.8 V
Tested Modulation Type:	QPSK;16QAM

General product description:

The Module is able to operating in the following bands:
GSM 850/1900 900/1800
UMTS/HSDPA/HSUPA FDD1,2,5,8
LTE eFDD 1,3,5,7,8,20

The EUT provides the following ports:

Ports
Temporary antenna connector
Enclosure

2.2 EUT Main components

Type, S/N, Short Descriptions etc. used in this Test Report

Short Description	Equipment under Test	Type Designation	Serial No.	HW Status	SW Status
EUT A (Code: DE1015004AX12)	GSM/UMTS/ LTE Module	TOBY-L210	352255060018185	192BA04	09.41
EUT B (Code: DE1015004BC13)	GSM/UMTS/ LTE Module	TOBY-L210	352255060017906	192BA00	09.39
Remark: EUT A is equipped with a temporary antenna connector. The Module is not sold with a predefined antenna.					

NOTE: The code mentioned in short description is used to simplify the identification of the EUT in this test report.

2.3 Ancillary Equipment

For the purposes of this test report, ancillary equipment is defined as equipment which is used in conjunction with the EUT to provide operational and control features to the EUT. It is necessary to configure the system in a typical fashion, as a customer would normally use it. But nevertheless Ancillary Equipment can influence the test results.

Short Description	Equipment under Test	Type Designation	HW Status	SW Status	Serial no.	FCC ID
AE 1	AC/DC converter	UUX324-1215	-	-	E04-0392137	–
AE 2	Evaluation test board	EVB-WL1	HP02_HW_CS_136000		BS 081110	

2.4 Auxiliary Equipment

For the purposes of this test report, auxiliary equipment is defined as equipment which is used temporarily to enable operational and control features especially used for the tests of the EUT which is not used during normal operation or equipment that is used during the tests in combination with the EUT but is not subject of this test report. It is necessary to configure the system in a typical fashion, as a customer would normally use it. But nevertheless Auxiliary Equipment can influence the test results.

Short Description	Equipment under Test	Type Designation	Serial no.	HW Status	SW Status	FCC ID
*						

* No auxiliary equipment was required to operate the module

2.5 EUT Setups

This chapter describes the combination of EUTs and equipment used for testing. The rationale for selecting the EUTs, ancillary and auxiliary equipment and interconnecting cables, is to test a representative configuration meeting the requirements of the referenced standards.

Setup No.	Combination of EUTs	Description and Rationale
Setup_01	EUT A + AE 1 + AE 2	setup for conducted measurements
Setup_02	EUT B + AE 1 + AE 2	setup for conducted measurements

2.6 Operating Modes

The below table shows the test frequencies and channels bandwidths used for testing.

TEST MODE	TX / RX	RF Channel		
		Low	Mid	High
LTE eFDD 5	TX (1.4M)	20407	20525	20643
		824.7 MHz	836.5 MHz	848.3 MHz
	TX (3M)	CH 20415	CH 20525	CH 20635
		825.50 MHz	836.50 MHz	847.50 MHz
	TX (5M)	CH 20425	CH 20525	CH 20625
		826.50 MHz	836.50 MHz	846.50 MHz
	TX (10)	CH 20450	CH 20525	CH 20600
		829.00 MHz	836.50 MHz	844.00 MHz
	RX (1.4M)	CH 2407	CH 20525	CH 2643
		869.70 MHz	881.50 MHz	893.70 MHz
	RX (3M)	CH 2415	CH 20525	CH 2635
		870.50 MHz	881.50 MHz	892.50 MHz
	RX (5M)	CH 2425	CH 2525	CH 2625
		871.50 MHz	881.50 MHz	891.50 MHz
	RX (10M)	CH 2450	CH 2525	CH 2600
		874.00 MHz	881.50 MHz	889.00 MHz

eFDD 5 Test configuration					
Setup Number	**Test ITEM**	**Channel Band width**	**Channels tested**	**Modulation**	**RB Allocation**
01	RF OUTPUT POWER	1.4 MHz	20407, 20525, 20643	QPSK, 16QAM	1RB, 3RB, 6RB
		3 MHz	20415, 20525, 20635	QPSK, 16QAM	1RB, 15RB
		5 MHz	20425, 20525, 20625	QPSK, 16QAM	1RB , 12RB , 25RB
		10 MHz	20450, 20525, 20635	QPSK, 16QAM	1RB, 50RB
02	FREQUENCY STABILITY	1.4	20525	QPSK	1RB
01	OCCUPIED BANDWIDTH	1.4 MHz	20407, 20525, 20643	QPSK, 16QAM	6RB
		3 MHz	20415, 20525, 20635	QPSK, 16QAM	15RB
		5 MHz	20425, 20525, 20625	QPSK, 16QAM	25RB
		10 MHz	20450, 20525, 20635	QPSK, 16QAM	50RB
01	PEAK TO AVERAGE RATIO	5 MHz	20425, 20525, 20625	QPSK, 16QAM	25RB
01	BAND EDGE Compliance	1.4 MHz	20407, 20525, 20643	QPSK, 16QAM	6RB / Max offset
		3 MHz	20415, 20525, 20635	QPSK, 16QAM	15RB/ Max offset
		5 MHz	20425, 20525, 20625	QPSK, 16QAM	25RB/ Max offset
		10 MHz	20450, 20525, 20635	QPSK, 16QAM	50RB/ Max offset
01	CONDUCTED EMISSION	5 MHz	20425, 20525, 20625	QPSK, 16QAM	1RB
NA	RADIATED EMISSION	NA	See external report	NA	NA

2.7 Special software used for testing

- NA

2.7.1 Software to control the EUT directly

- NA

2.7.2 Software to enable control the EUT by a signaling unit

- NA

2.8 Product labeling

-

2.8.1 FCC ID label

Please refer to the documentation of the applicant.

2.8.2 Location of the label on the EUT

Please refer to the documentation of the applicant.

3 Test Results

3.1 RF Power Output

Standard FCC Part 22, Subpart H

The test was performed according to: FCC §2.1046

3.1.1 Test Description (conducted procedure)

1) The EUT was coupled to a Spectrum Analyser and a Digital Communication Tester through a Power Divider. Refer to chapter "Setup Drawings".
2) The total insertion losses for signal path 1 and signal path 2 were measured. The values were used to correct the readings from the Spectrum Analyser and the Digital Communication Tester.
3) A call was established on a Traffic Channel between the EUT and the Digital Communication Tester.
4) Important Settings:
5) Channel (Frequency): please refer to the detailed results
6) The transmitted power of the EUT was recorded by using a spectrum analyser.

Test Description (radiated measurement procedure)

1) The EUT was placed inside an anechoic chamber. Refer to chapter "Setup Drawings". The EUT was coupled to a Digital Communication Tester which was located outside the chamber via a small signalling antenna.
2) A call was established on a Traffic Channel between the EUT and the Digital Communication Tester.
1) Important Settings:
2) Output Power: Maximum
3) Channel: please refer to the detailed results
4) A substitution procedure is used so that the readings from the spectrum analyser are corrected and represent directly the equivalent radiated power (related to a lamda/2 dipole).
5) The output power was measured in both vertical and horizontal antenna polarisation during the call is established on the lowest channel, mid channel and on the highest channel. To find the worst case power all orientations (X, Y, Z) of the EUT have been measured.
6) The test procedure according to TIA-603-C-2004 has been considered.

3.1.2 Test Requirements / Limits

§2.1046 Measurements Required: RF Power Output

(a) For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, power output shall be measured at the RF output terminals when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in § 2.1033(c)(8). The electrical characteristics of the output terminals when this test is made shall be stated.

§22.913 Effective radiated power limits

(a)(2) Maximum ERP. … The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

3.1.3 Test Protocol

Test Band	Band width	Channel	Modulation	RB	RMS Conducted power (dBm)	FCC EIRP limit (W)	IC EIRP limit per SRSP-503 (W)	Maximum antenna gain (dBi)	Verdict
eFDD5	1.4	Low	QPSK	RB 1	24.17	11.48	11.5	16.43	Passed
eFDD5	1.4	Low	QPSK	RB 3	24.1	11.48	11.5	16.5	Passed
eFDD5	1.4	Low	QPSK	RB 6	24.17	11.48	11.5	16.43	Passed
eFDD5	1.4	Low	16QAM	RB 1	24.18	11.48	11.5	16.42	Passed
eFDD5	1.4	Low	16QAM	RB 6	23.07	11.48	11.5	17.53	Passed
eFDD5	1.4	MID	QPSK	RB 1	24.12	11.48	11.5	16.48	Passed
eFDD5	1.4	MID	QPSK	RB 3	24.08	11.48	11.5	16.52	Passed
eFDD5	1.4	MID	QPSK	RB 6	24.19	11.48	11.5	16.41	Passed
eFDD5	1.4	MID	16QAM	RB 1	24.19	11.48	11.5	16.41	Passed
eFDD5	1.4	MID	16QAM	RB 6	23.06	11.48	11.5	17.54	Passed
eFDD5	1.4	High	QPSK	RB 1	24.04	11.48	11.5	16.56	Passed
eFDD5	1.4	High	QPSK	RB 3	24.09	11.48	11.5	16.51	Passed
eFDD5	1.4	High	QPSK	RB 6	24.03	11.48	11.5	16.57	Passed
eFDD5	1.4	High	16QAM	RB 1	23.92	11.48	11.5	16.68	Passed
eFDD5	1.4	High	16QAM	RB 6	23.07	11.48	11.5	17.53	Passed
eFDD5	3	Low	QPSK	RB 1	24.33	11.48	11.5	16.27	Passed
eFDD5	3	Low	QPSK	RB 15	24.12	11.48	11.5	16.48	Passed
eFDD5	3	Low	16QAM	RB 1	24.21	11.48	11.5	16.39	Passed
eFDD5	3	Low	16QAM	RB 15	22.98	11.48	11.5	17.62	Passed
eFDD5	3	Mid	QPSK	RB 1	24.21	11.48	11.5	16.39	Passed
eFDD5	3	Mid	QPSK	RB 15	24.13	11.48	11.5	16.47	Passed
eFDD5	3	Mid	16QAM	RB 1	24.17	11.48	11.5	16.43	Passed
eFDD5	3	Mid	16QAM	RB 15	23.04	11.48	11.5	17.56	Passed
eFDD5	3	High	QPSK	RB 1	24.09	11.48	11.5	16.51	Passed
eFDD5	3	High	QPSK	RB 15	24.03	11.48	11.5	16.57	Passed

eFDD5	3	High	16QAM	RB 1	23.9	11.48	11.5	16.7	Passed
eFDD5	3	High	16QAM	RB 15	22.97	11.48	11.5	17.63	Passed
eFDD5	5	Low	QPSK	RB 1	24.25	11.48	11.5	16.35	Passed
eFDD5	5	Low	QPSK	RB 12	24.12	11.48	11.5	16.48	Passed
eFDD5	5	Low	QPSK	RB 25	24.22	11.48	11.5	16.38	Passed
eFDD5	5	Low	16QAM	RB 1	24.13	11.48	11.5	16.47	Passed
eFDD5	5	Low	16QAM	RB 25	23.04	11.48	11.5	17.56	Passed
eFDD5	5	MID	QPSK	RB 1	24.14	11.48	11.5	37.6	Passed
eFDD5	5	MID	QPSK	RB 12	24.08	11.48	11.5	16.52	Passed
eFDD5	5	MID	QPSK	RB 25	24.2	11.48	11.5	16.4	Passed
eFDD5	5	MID	16QAM	RB 1	24.05	11.48	11.5	16.55	Passed
eFDD5	5	MID	16QAM	RB 25	23.02	11.48	11.5	17.58	Passed
eFDD5	5	High	QPSK	RB 1	24.1	11.48	11.5	16.5	Passed
eFDD5	5	High	QPSK	RB 12	24.03	11.48	11.5	16.57	Passed
eFDD5	5	High	QPSK	RB 25	24.1	11.48	11.5	16.5	Passed
eFDD5	5	High	16QAM	RB 1	23.96	11.48	11.5	16.64	Passed
eFDD5	5	High	16QAM	RB 25	23.07	11.48	11.5	17.53	Passed
eFDD5	10	Low	QPSK	RB 1	24.15	11.48	11.5	16.45	Passed
eFDD5	10	Low	QPSK	RB 50	24.14	11.48	11.5	16.46	Passed
eFDD5	10	Low	16QAM	RB 1	24.08	11.48	11.5	16.52	Passed
eFDD5	10	Low	16QAM	RB 50	23.04	11.48	11.5	17.56	Passed
eFDD5	10	MID	QPSK	RB 1	24.11	11.48	11.5	16.49	Passed
eFDD5	10	MID	QPSK	RB 50	24.13	11.48	11.5	16.47	Passed
eFDD5	10	MID	16QAM	RB 1	24.2	11.48	11.5	16.4	Passed
eFDD5	10	MID	16QAM	RB 50	23.04	11.48	11.5	17.56	Passed
eFDD5	10	High	QPSK	RB 1	24.21	11.48	11.5	16.39	Passed
eFDD5	10	High	QPSK	RB 50	24.14	11.48	11.5	16.46	Passed
eFDD5	10	High	16QAM	RB 1	24.13	11.48	11.5	16.47	Passed
eFDD5	10	High	16QAM	RB 50	23.05	11.48	11.5	17.55	Passed

3.2 Frequency stability

Standard FCC Part 22, Subpart H

The test was performed according to: FCC §2.1055

3.2.1 Test Description

1) The EUT was placed inside a temperature chamber.
2) The EUT was coupled to a Digital Communication Tester. Refer to chapter "Setup Drawings".
3) The climatic chamber was cycled down/up to a certain temperature, starting with the EUT minimum temperature.
4) After the temperature was stabilized the EUT was switched on and a call was established on a Traffic Channel between the EUT and the Digital Communication Tester.
Important Settings:
- Output Power: Maximum
- Mid Channel
5) The frequency error of the EUT was recorded by using an internal measurement function of the Digital Communication Tester immediately after the call was established, five minutes after the call was established and ten minutes after the call was established.
6) This measurement procedure was performed for temperature variation from –30°C to +50°C in increments of 10°C, if not otherwise stated in the detailed results.
When the EUT did not operate at certain temperature levels, these measurements were left out.

3.2.2 Test Requirements / Limits

§2.1055 Measurements required: Frequency stability

(a) The frequency stability shall be measured with variation of ambient temperature as follows:

(1) From -30° to +50° centigrade for all equipment except that specified in paragraphs (a) (2) and (3) of this section.

(b) Frequency measurements shall be made at the extremes of the specified temperature range and at intervals of not more than 10° centigrade through the range. A period of time sufficient to stabilize all of the components of the oscillator circuit at each temperature level shall be allowed prior to frequency measurement. The short term transient effects on the frequency of the transmitter due to keying (except for broadcast transmitters) and any heating element cycling normally occurring at each ambient temperature level also shall be shown. Only the portion or portions of the transmitter containing the frequency determining and stabilizing circuitry need be subjected to the temperature variation test.

(d) The frequency stability shall be measured with variation of primary supply voltage as follows:

(1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.

(2) For hand carried, battery powered equipment, reduce primary supply voltage to the

battery operating end point which shall be specified by the manufacturer.

(3) The supply voltage shall be measured at the input to the cable normally provided with the equipment, or at the power supply terminals if cables are not normally provided. Effects on frequency of transmitter keying (except for broadcast transmitters) and any heating element cycling at the nominal supply voltage and at each extreme also shall be shown.

§22.355 Frequency tolerance
…the carrier frequency of each transmitter in the Public Mobile Service must be maintained within the tolerances given in table C-1 of this section.

Table C-1.- Frequency Tolerance for Transmitters in the Public Mobile Services

Frequency range (MHz)	Base, fixed (ppm)	Mobile up to 3 watts (ppm)	Mobile above 3 watts (ppm)
25 to 50	20.0	20.0	50.0
50 to 450	5.0	5.0	50.0
450 to 512	2.5	5.0	5.0
821 to 896	1.5	2.5	2.5
928 to 929	5.0	n/a	n/a
929 to 960	1.5	n/a	n/a
2110 to 2220	10.0	n/a	n/a

3.2.3 Test Protocol

Channel: 20525 / 1.4MHz Bandwidth / 1 Resource Block / QPSK Modulation

Temp. °C	Duration min	Voltage	Limit Hz	Freq. error Average (Hz)	Freq. error Max. (Hz)	Verdict
-30	0	normal	2091.25	-5	-13	passed
-30	5			0	-7	passed
-30	10			-3	-7	passed
-20	0	normal	2091.25	-3	12	passed
-20	5			1	7	passed
-20	10			-5	-10	passed
-10	0	normal	2091.25	4	9	passed
-10	5			-1	-13	passed
-10	10			-2	-13	passed
0	0	normal	2091.25	0	-5	passed
0	5			0	5	passed
0	10			-1	-9	passed
10	0	normal	2091.25	-1	16	passed
10	5			-6	-16	passed
10	10			-1	-12	passed
20	0	low	2091.25	0	-11	passed
20	5			-4	-16	passed
20	10			-1	-11	passed
20	0	normal = high [1)]	2091.25	1	10	passed
20	5			5	17	passed
20	10			-4	-11	passed
20	0	high	2091.25	-2	-11	passed
20	5			1	10	passed
20	10			-4	-15	passed
30	0	normal	2091.25	-5	-10	passed
30	5			-4	-12	passed
30	10			-4	-9	passed
40	0	normal	2091.25	6	12	passed
40	5			0	-2	passed
40	10			2	7	passed
50	0	normal	2091.25	2	-15	passed
50	5			2	11	passed
50	10			-3	-7	passed

3.3 Spurious emissions at antenna terminals

Standard FCC Part 22, Subpart H

The test was performed according to FCC §2.1051

3.3.1 Test Description

1) The EUT was coupled to a Spectrum Analyser and a Digital Communication Tester through a Power Divider. Refer to chapter "Setup Drawings".
2) The total insertion losses for signal path 1 and signal path 2 were measured. The values were used to correct the readings from the Spectrum Analyser and the Digital Communication Tester.
3) A call was established on a Traffic Channel between the EUT and the Digital Communication Tester.
Important Settings:
- Output Power: Maximum
- Channel: please refer to the detailed results
4) Important Analyser Settings
- [Resolution Bandwidth]:
a) [>=1% of wanted signal bandwidth] in the Span of 1 MHz directly below and above the PCS-Band,
b) otherwise [100 kHz] (or [1 MHz] for accelerated sweep times)
c) [reduced resolution bandwidth] in case the curve of the analyser IF-Filter or the wanted EUT signal leads to an exceeding of the limit, in this case a correction factor was used
- Sweep Time: depending on the transmitting signal, the span and the resolution bandwidth
5) The spurious emissions peaks were measured in the frequency range from 9 kHz to 10 GHz (up to the 10th harmonic) during the call was established

3.3.2 Test Requirements / Limits

§ 2.1051 Spurious emissions at antenna terminals

The radio frequency voltage or power generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminals when properly loaded with a suitable artificial antenna. Curves or equivalent data shall show the magnitude of each harmonic and other spurious emission that can be detected when the equipment is operated under the conditions specified in Sec. 2.1049 as appropriate. The magnitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be specified.

§ 2.1057 Frequency spectrum to be investigated.

(a) In all of the measurements set forth in Secs. 2.1051 and 2.1053, the spectrum shall be investigated from the lowest radio frequency signal generated in the equipment, without going below 9 kHz, up to at least the frequency shown below:
(1) If the equipment operates below 10 GHz: to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.
(b) Particular attention should be paid to harmonics and subharmonics of the carrier frequency as well as to those frequencies removed from the carrier by multiples of the oscillator frequency. Radiation at the frequencies of multiplier stages should also be checked.
(c) The amplitude of spurious emissions which are attenuated more than 20 dB below the

permissible value need not be reported.
(d) Unless otherwise specified, measurements above 40 GHz shall be performed using a minimum resolution bandwidth of 1 MHz.

§ 22.917 Emission limitations for cellular equipment

(a) The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.
Remark of the test laboratory: This is calculated to be -13 dBm.
(b) Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 100 kHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.
(c) Licensees in this service may establish an alternative out of band emission limit to be used at specified band edge(s) in specified geographical areas [...].
(d) If any emission from a transmitter operating in this service results in interference to users of another radio service, the FCC may require a greater attenuation of that emission than specified in this section.

For reporting only spurious emission levels reaching to the 20dB margin to limit were noted.

3.3.3 Test Protocol

Band	Band width	Modul-ation	Channel	detector	trace	resolution band width /kHz	frequency /MHz	peak value /dBm	margin to limit /dB	limit /dBm	verdict
eFDD5	5 MHz	QPSK	20425	rms	maxhold	100	823.00	-25.4	12.4	-13.0	passed
				rms	maxhold	50	823.99	-21.9	8.9	-13.0	passed
			20525	peak	maxhold	100	6985.972	-44.40	31.40	-13	passed
			20625	rms	maxhold	50	849.01	-20.8	7.8	-13.0	passed
				rms	maxhold	100	850.00	-23.8	10.8	-13.0	passed
		16QAM	20425	rms	maxhold	100	822.96	-28.5	15.5	-13.0	passed
				rms	maxhold	50	824.00	-22.4	9.4	-13.0	passed
			20525	peak	maxhold	100	6991.984	-44.83	31.83	-13	passed
			20625	rms	maxhold	50	849.00	-22.0	9.0	-13.0	passed
				rms	maxhold	100	850.00	-26.2	13.2	-13.0	passed

3.4 Emission and Occupied Bandwidth

Standard FCC Part 22, Subpart H

The test was performed according to: FCC §2.1049

3.4.1 Test Description

1) The EUT was coupled to a Spectrum Analyser and a Digital Communication Tester through a Power Divider. Refer to chapter "Setup Drawings".
2) The total insertion losses for signal path 1 and signal path 2 were measured. The values were used to correct the readings from the Spectrum Analyser and the Digital Communication Tester.
3) A call was established on a Traffic Channel between the EUT and the Digital Communication Tester.
Important Settings:
- Output Power: Maximum
- Channel: please refer to the detailed results
4) Important Analyser Settings:
- Resolution Bandwidth: >1% of the manufacturer's stated occupied bandwidth
5) The maximum spectral level of the modulated signal was recorded as the reference.
6) The emission bandwidth is measured as follows:
the two furthest frequencies above and below the frequency of the maximum reference level where the spectrum is –26 dB down have to be found.
7) The occupied bandwidth (99% Bandwidth) is measured as follows:
the occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5 percent of the total mean power.

The maximum number of resource blocks are used for each channel bandwidth.

3.4.2 Test Requirements / Limits

§ 2.1049 Measurements required: Occupied bandwidth

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured under the following conditions (as applicable):

(h) Transmitters employing digital modulation techniques - when modulated by an input signal such that its amplitude and symbol rate represent the maximum rated conditions under which the equipment will be operated. The signal shall be applied through any filter networks, pseudo-random generators or other devices required in normal service. Additionally, the occupied bandwidth shall be shown for operation with any devices used for modifying the spectrum when such devices are optional at the discretion of the user.

3.4.3 Test Protocol

The maximum number of resource blocks are used for each channel bandwidth.

LTE Band 5							
Channel BW: 1.4 MHz				Channel BW: 3 MHz			
Channel	Frequency (MHz)	99% BW (MHz)		Channel	Frequency (MHz)	99% BW (MHz)	
		QPSK	16QAM			QPSK	16QAM
low	824.7 MHz	1.11577424	1.11577424	low	825.50 MHz	2.691751	2.691751
mid	836.5 MHz	1.11577424	1.11143271	mid	836.50 MHz	2.691751	2.683068
High	848.3 MHz	1.111432706	1.12879884	High	847.50 MHz	2.691751	2.691751

LTE Band 5							
Channel BW: 5MHz				Channel BW: 10 MHz			
Channel	Frequency (MHz)	99% BW (MHz)		Channel	Frequency (MHz)	99% BW (MHz)	
		QPSK	16QAM			QPSK	16QAM
low	826.50 MHz	4.529667149	4.51519537	low	829.00 MHz	8.94356	8.94356
mid	836.50 MHz	4.544138929	4.54413893	mid	836.50 MHz	8.972504	8.972504
High	846.50 MHz	4.529667149	4.54413893	High	844.00 MHz	8.972504	8.94356

3.5 Band edge compliance

Standard FCC Part 22, Subpart H

The test was performed according to: FCC §22.913

3.5.1 Test Description

1) The EUT was coupled to a Spectrum Analyser and a Digital Communication Tester through a Power Divider. Refer to chapter "Setup Drawings".
2) The total insertion losses for signal path 1 and signal path 2 were measured. The values were used to correct the readings from the Spectrum Analyser and the Digital Communication Tester.
3) A call was established on a Traffic Channel between the EUT and the Digital Communication Tester.
Important Settings:
- Output Power: Maximum
- Channel: please refer to the detailed results
4) Important Analyser Settings:
- Resolution Bandwidth = Video Bandwidth: >1% of the manufacturer's stated occupied bandwidth

3.5.2 Test Requirements / Limits

§ 22.917 Emission limitations for cellular equipment

Refer to chapter "Field strength of spurious radiation".

3.5.3 Test Protocol

Band	Band width (MHz)	Modulation	Resource Blocks / Offset	Channel	Detector	Frequency (MHz)	Peak Value (dBm)	Limit (dBm)	Verdict
eFDD5	1.4	QPSK	6 / 0	20407	Average	824	-21.28	-13	Passed
eFDD5	1.4	QPSK	6 / 0	20407	RMS	824	-19.49	-13	Passed
eFDD5	1.4	QPSK	6 / Max	20643	Average	849	-19.75	-13	Passed
eFDD5	1.4	QPSK	6 / Max	20643	RMS	849	-18.53	-13	Passed
eFDD5	1.4	16QAM	6 / 0	20407	Average	824	-21.82	-13	Passed
eFDD5	1.4	16QAM	6 / 0	20407	RMS	824	-19.58	-13	Passed
eFDD5	1.4	16QAM	6 / Max	20643	Average	849	-21.28	-13	Passed
eFDD5	1.4	16QAM	6 / Max	20643	RMS	849	-19.93	-13	Passed
eFDD5	3	QPSK	15 / 0	20415	Average	824	-22.89	-13	Passed
eFDD5	3	QPSK	15 / 0	20415	RMS	824	-20.11	-13	Passed
eFDD5	3	QPSK	15 / Max	20635	Average	849	-22.28	-13	Passed
eFDD5	3	QPSK	15 / Max	20635	RMS	849	-20.39	-13	Passed
eFDD5	3	16QAM	15 / 0	20415	Average	824	-25.02	-13	Passed
eFDD5	3	16QAM	15 / 0	20415	RMS	824	-22.16	-13	Passed
eFDD5	3	16QAM	15 / Max	20635	Average	849	-24.4	-13	Passed
eFDD5	3	16QAM	15 / Max	20635	RMS	849	-22.05	-13	Passed
eFDD5	5	QPSK	25 / 0	20425	Average	824	-24.7	-13	Passed
eFDD5	5	QPSK	25 / 0	20425	RMS	824	-22.28	-13	Passed
eFDD5	5	QPSK	25 / Max	20625	Average	849	-23.27	-13	Passed
eFDD5	5	QPSK	25 / Max	20625	RMS	849	-21.28	-13	Passed
eFDD5	5	16QAM	25 / 0	20415	Average	824	-27	-13	Passed
eFDD5	5	16QAM	25 / 0	20415	RMS	824	-23.68	-13	Passed
eFDD5	5	16QAM	25 / Max	20635	Average	849	-25.02	-13	Passed
eFDD5	5	16QAM	25 / Max	20635	RMS	849	-22.64	-13	Passed
eFDD5	10	QPSK	50 / 0	20450	Average	824	-26.41	-13	Passed
eFDD5	10	QPSK	50 / 0	20450	RMS	824	-24.7	-13	Passed
eFDD5	10	QPSK	50 / Max	20600	Average	849	-25.51	-13	Passed
eFDD5	10	QPSK	50 / Max	20600	RMS	849	-24.1	-13	Passed
eFDD5	10	16QAM	50 / 0	20450	Average	824	-29.56	-13	Passed
eFDD5	10	16QAM	50 / 0	20450	RMS	824	-27.41	-13	Passed
eFDD5	10	16QAM	50/ Max	20600	Average	849	-28.3	-13	Passed
eFDD5	10	16QAM	50/ Max	20600	RMS	849	-26.41	-13	Passed

3.6 Power to Average Ratio

Standard RSS-132, §5.4

The test was performed according to: RSS-132, §5.4

A peak to average ratio measurement is performed at the conducted port of the EUT. The spectrum analyzers Complementary Cumulative Distribution Function (CCDF) measurement profile is used to determine the largest deviation between the average and the peak power of the EUT in a given bandwidth.
The CCDF curve shows how much time the peak waveform spends at or above a given average power level. The percent of time the signal spends at or above the level defines the probability for that particular power level.

KDB 971168 v02r01 – Section 5.7.1 was applied.

Test Settings

1. The signal analyzer's CCDF measurement profile is enabled
2. Frequency = carrier center frequency
3. Measurement BW > Emission bandwidth of signal
4. The signal analyser was set to collect one million samples to generate the CCDF curve
5. The measurement interval was set depending on the type of signal analysed. For continuous
signals (>98% duty cycle), the measurement interval was set to 1ms.

3.6.1 Test Protocol

Band	Band width	RB	Channel	Modulation	Measured Value (dB)	Limit	Verdict
eFDD5	1.4	6 / 0	20407	QPSK	4.52	13 dB	Passed
		6 / 0	20525		4.7	13 dB	Passed
		6 / 0	20643		3.91	13 dB	Passed
		6 / 0	20407	16QAM	5.45	13 dB	Passed
		6 / 0	20525		5.68	13 dB	Passed
		6 / 0	20643		4.75	13 dB	Passed

4 Test Equipment

The calibration, hardware and software states are shown for the testing period.

Test Equipment Anechoic Chamber

Lab ID:	**Lab 1**		
Manufacturer:	Frankonia		
Description:	Anechoic Chamber for radiated testing		
Type:	10.58x6.38x6.00 m³		
	Calibration Details	*Last Execution*	*Next Exec.*
	NSA (FCC)	2014/01/09	2017/01/09

Single Devices for Anechoic Chamber

Single Device Name	*Type*	*Serial Number*	*Manufacturer*	
Air compressor	none	-	Atlas Copco	
Anechoic Chamber	10.58 x 6.38 x 6.00 m³	none	Frankonia	
	Calibration Details		*Last Execution*	*Next Exec.*
	FCC listing 96716 3m Part15/18		2014/01/09	2017/01/08
Controller Maturo	MCU	961208	Maturo GmbH	
EMC camera	CE-CAM/1	-	CE-SYS	
EMC camera Nr.2	CCD-400E	0005033	Mitsubishi	
Filter ISDN	B84312-C110-E1		Siemens&Matsushita	
Filter Universal 1A	BB4312-C30-H3	-	Siemens&Matsushita	

Test Equipment Radio Lab Test Equipment

Lab ID:	**Lab 2**
Description:	Radio Lab Test Equipment

Single Devices for Radio Lab Test Equipment

Single Device Name	*Type*	*Serial Number*	*Manufacturer*	
Broadband Power Divider SMA	WA1515	A856	Weinschel Associates	
Coax Attenuator 10dB SMA 2W	4T-10	F9401	Weinschel Associates	
Coax Attenuator 10dB SMA 2W	56-10	W3702	Weinschel Associates	
Coax Attenuator 10dB SMA 2W	56-10	W3711	Weinschel Associates	
Coax Cable Huber&Suhner	Sucotest 2,0m		Huber&Suhner	
Coax Cable Rosenberger Micro Coax FA210A0010003030 SMA/SMA 1,0m	FA210A0010003030	54491-2	Rosenberger Micro-Coax	
Power Meter	NRVD	828110/016	Rohde & Schwarz GmbH & Co.KG	
	Calibration Details		*Last Execution*	*Next Exec.*
	Standard calibration		2014/05/13	2015/05/12
RF Step Attenuator RSP	RSP	833695/001	Rohde & Schwarz GmbH & Co.KG	
Rubidium Frequency Standard	Datum, Model: MFS	5489/001	Datum-Beverly	
	Standard calibration		2014/07/03	2015/07/02
Sensor Head A	NRV-Z1	827753/005	Rohde & Schwarz GmbH & Co.KG	
	Calibration Details		*Last Execution*	*Next Exec.*
	Standard calibration		2014/05/13	2015/05/12
Signal Generator SME	SME03	827460/016	Rohde & Schwarz GmbH & Co.KG	
	Calibration Details		*Last Execution*	*Next Exec.*
	Standard calibration		2011/11/25	2014/11/24
Signal Generator SMP	SMP02	836402/008	Rohde & Schwarz GmbH & Co. KG	
	Calibration Details		*Last Execution*	*Next Exec.*
	Standard calibration		2013/05/06	2016/05/05
Spectrum Analyser	FSIQ26	840061/005	Rohde & Schwarz GmbH & Co. KG	
	Calibration Details		*Last Execution*	*Next Exec.*
	Standard Calibration		2013/02/12	2015/02/11

Test Equipment Temperature Chamber 05

Lab ID:	**Lab 2**
Manufacturer:	see single devices
Description:	Temperature Chamber VT4002
Type:	Vötsch
Serial Number:	see single devices

Single Devices for Temperature Chamber 05

Single Device Name	*Type*	*Serial Number*	*Manufacturer*	
Temperature Chamber Vötsch 05	VT 4002	58566080550010	Vötsch	
	Calibration Details		*Last Execution*	*Next Exec.*
	Customized calibration		2014/03/11	2016/03/10

Test Equipment Auxiliary Test Equipment

Lab ID:	**Lab 1, Lab 2**
Manufacturer:	see single devices
Description:	Single Devices for various Test Equipment
Type:	various
Serial Number:	none

Single Devices for Auxiliary Test Equipment

Single Device Name	*Type*	*Serial Number*	*Manufacturer*	
Broadband Power Divider N (Aux)	1506A / 93459	LM390	Weinschel Associates	
Broadband Power Divider SMA	WA1515	A855	Weinschel Associates	
Digital Multimeter 03 (Multimeter)	Fluke 177	86670383	Fluke Europe B.V.	
	Calibration Details		*Last Execution*	*Next Exec.*
	Customized calibration		2013/12/04	2015/12/03
Fibre optic link Satellite (Aux)	FO RS232 Link	181-018	Pontis	
Fibre optic link Transceiver (Aux)	FO RS232 Link	182-018	Pontis	
Isolating Transformer	LTS 604	1888	Thalheimer Transformatorenwerke GmbH	
Notch Filter Ultra Stable (Aux)	WRCA800/960-6EEK	24	Wainwright	
Signal Analyzer	FSV30	103005	Rohde & Schwarz GmbH & Co. KG	
	Calibration Details		*Last Execution*	*Next Exec.*
	Standard		2014/02/10	2016/02/09
Spectrum Analyser	FSP3	836722/011	Rohde & Schwarz GmbH & Co. KG	
	Calibration Details		*Last Execution*	*Next Exec.*
	Standard		2012/06/13	2015/06/12
Spectrum Analyser	FSU26	200418	Rohde & Schwarz GmbH & Co.KG	
	Calibration Details		*Last Execution*	*Next Exec.*
	Standard calibration		2013/07/29	2014/07/28
	Standard calibration		2014/07/29	2015/07/28
Vector Signal Generator	SMIQ 03B	832492/061	Rohde & Schwarz GmbH & Co.KG	

Test Equipment Digital Signalling Devices

Lab ID:	**Lab 1, Lab 2**
Description:	Signalling equipment for various wireless technologies.

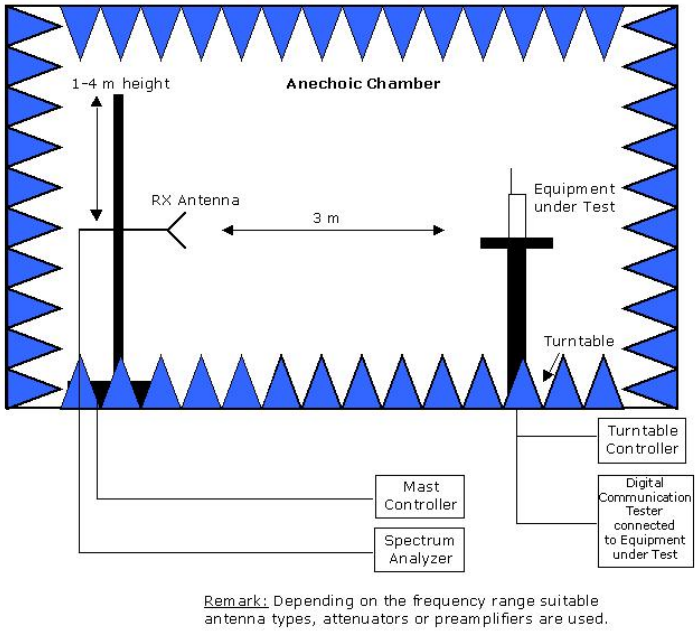
Single Devices for Digital Signalling Devices

Single Device Name	*Type*	*Serial Number*	*Manufacturer*	
Bluetooth Signalling Unit CBT	CBT	100589	Rohde & Schwarz GmbH & Co. KG	
	Calibration Details		*Last Execution*	*Next Exec.*
	Standard calibration		2011/11/24	2014/11/23
CMW500	CMW500	107500	Rohde & Schwarz GmbH & Co.KG	
	Calibration Details		*Last Execution*	*Next Exec.*
	Standard calibration		2014/01/27	2016/01/26
Digital Radio Communication Tester	CMD 55	831050/020	Rohde & Schwarz GmbH & Co. KG	
	Calibration Details		*Last Execution*	*Next Exec.*
	Standard calibration		2011/11/28	2014/11/27
Universal Radio Communication Tester	CMU 200	102366	Rohde & Schwarz GmbH & Co. KG	
	HW/SW Status		*Date of Start*	*Date of End*
	Hardware: B11, B21V14, B21-2, B41, B52V14, B52-2, B53-2, B56V14, B68 3v04, PCMCIA, U65V04 Software: K21 4v21, K22 4v21, K23 4v21, K24 4v21, K42 4v21, K43 4v21, K53 4v21, K56 4v22, K57 4v22, K58 4v22, K59 4v22, K61 4v22, K62 4v22, K63 4v22, K64 4v22, K65 4v22, K66 4v22, K67 4v22, K68 4v22, K69 4v22 Firmware: µP1 8v50 02.05.06 ---		2007/07/16	
Universal Radio Communication Tester	CMU 200	837983/052	Rohde & Schwarz GmbH & Co. KG	
	Calibration Details		*Last Execution*	*Next Exec.*
	Standard calibration		2011/12/07	2014/12/06
	HW/SW Status		*Date of Start*	*Date of End*
	HW options: B11, B21V14, B21-2, B41, B52V14, B52-2, B53-2, B54V14, B56V14, B68 3v04, B95, PCMCIA, U65V02 SW options: K21 4v11, K22 4v11, K23 4v11, K24 4v11, K27 4v10, K28 4v10, K42 4v11, K43 4v11, K53 4v10, K65 4v10, K66 4v10, K68 4v10, Firmware: µP1 8v40 01.12.05 ---		2007/01/02	
	SW: K62, K69		2008/11/03	
Vector Signal Generator	SMU200A	100912	Rohde & Schwarz GmbH & Co. KG	

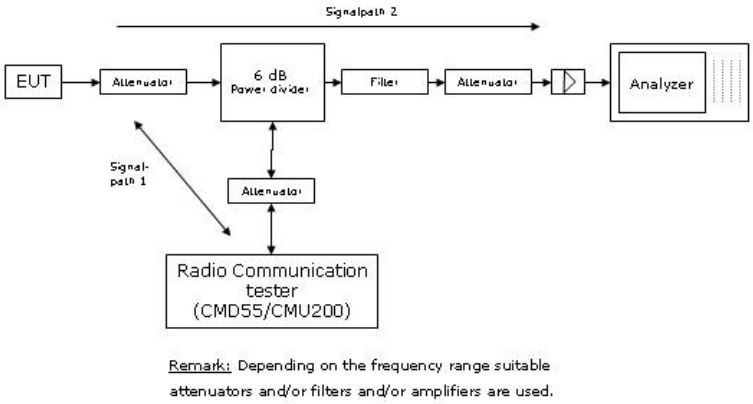
5 Photo Report

Photos are included in an external report.

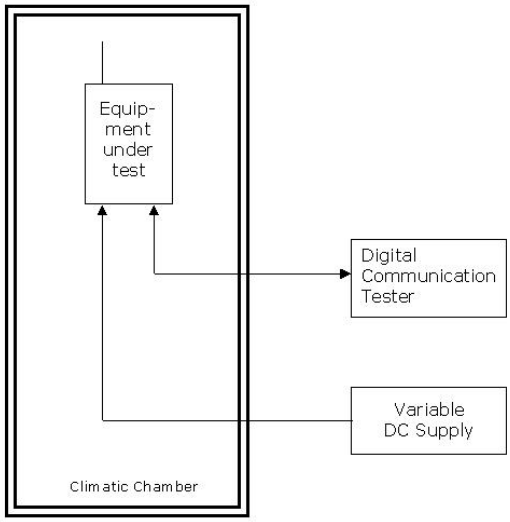
6 Setup Drawings



Drawing 1: Setup in the anechoic chamber. For measurements below 1 GHz the ground was replaced by a conducting ground plane.



Principle set-up for conducted measurements under nominal conditions

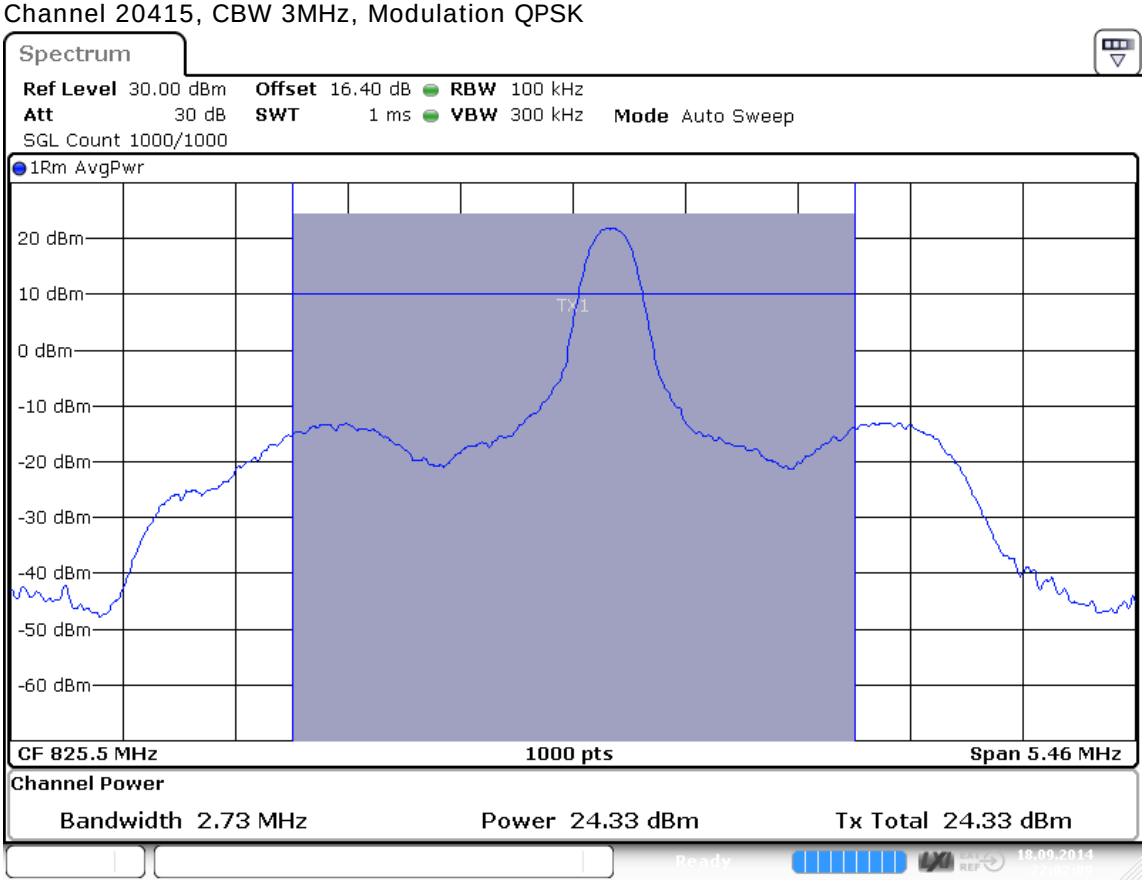


Principle set-up for tests under extreme test conditions

7 Annex measurement plots

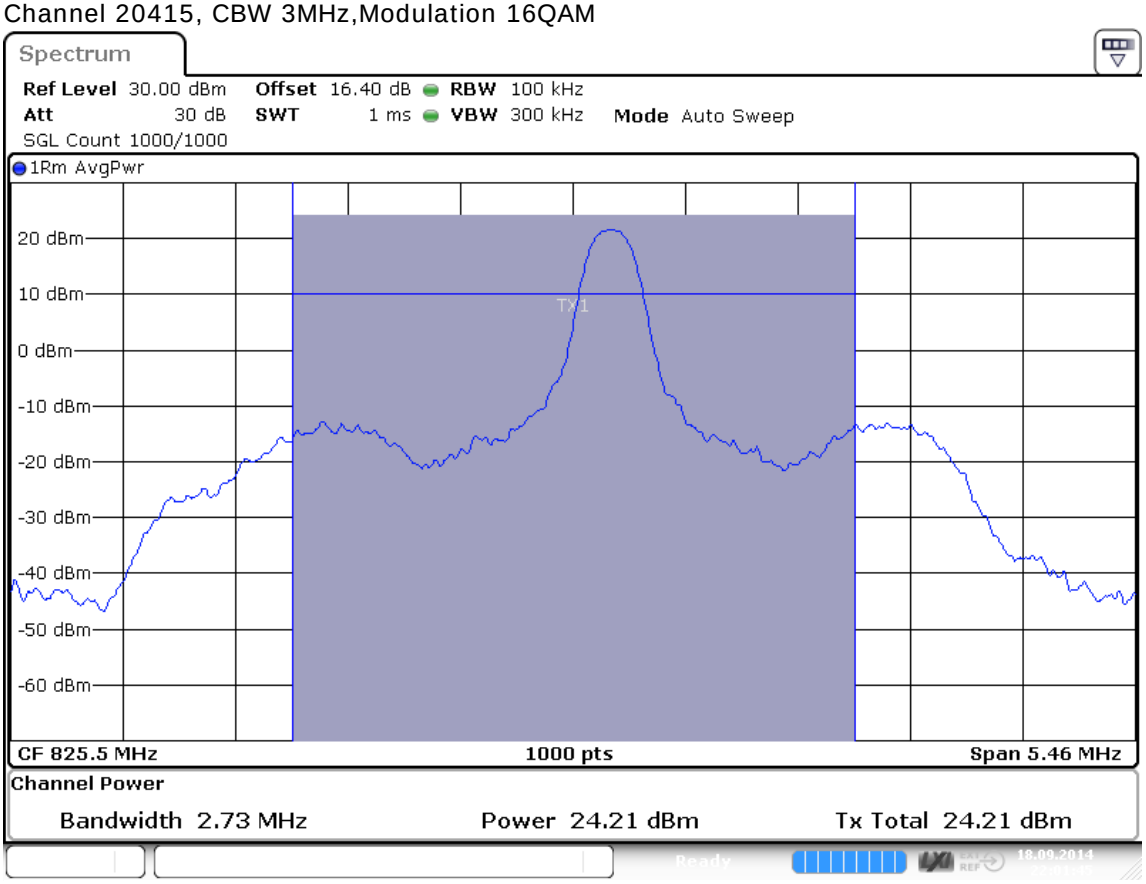
7.1 RF Power Output §2.1046, §22.913

Channel 20415, CBW 3MHz, Modulation QPSK



Date: 18.SEP.2014 22:02:09

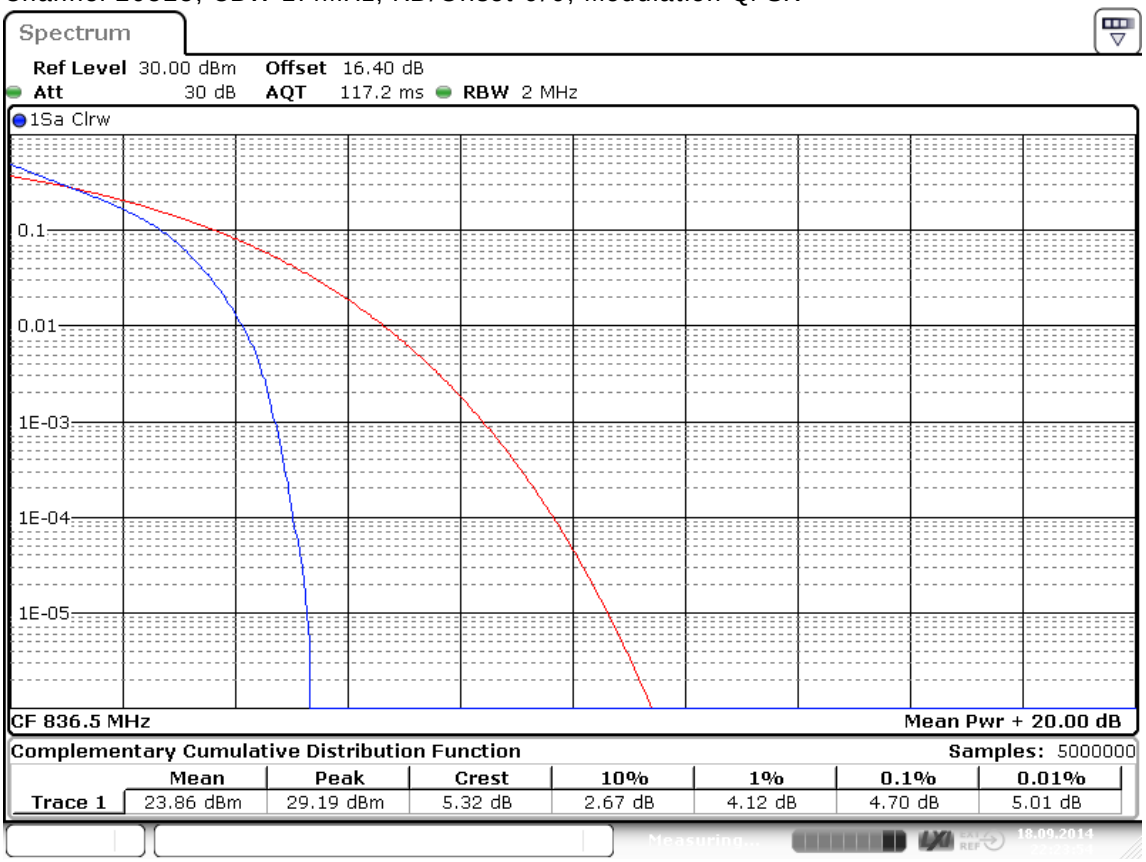
Channel 20415, CBW 3MHz,Modulation 16QAM



Date: 18.SEP.2014 22:01:45

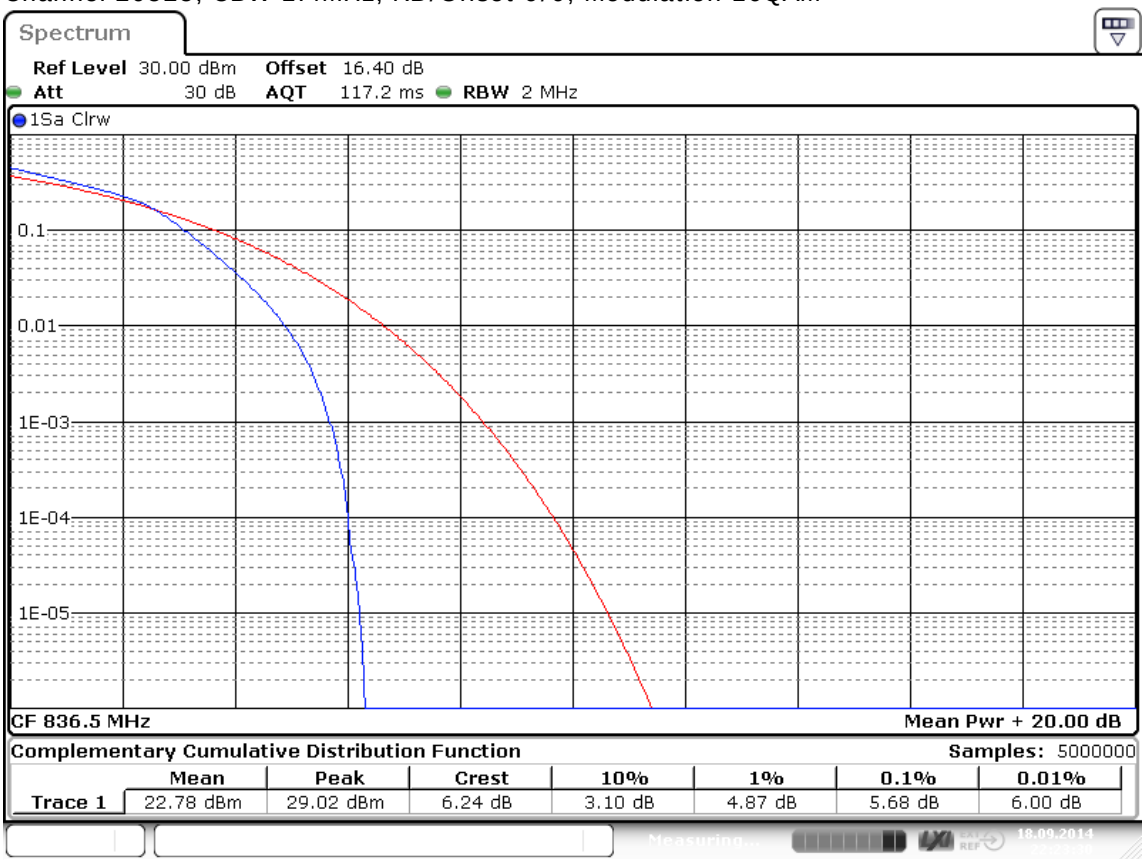
7.2 Peak to Average Ratio RSS-132, §5.4

Channel 20525, CBW 1.4MHz, RB/Offset 6/0, Modulation QPSK



Date: 18.SEP.2014 22:23:54

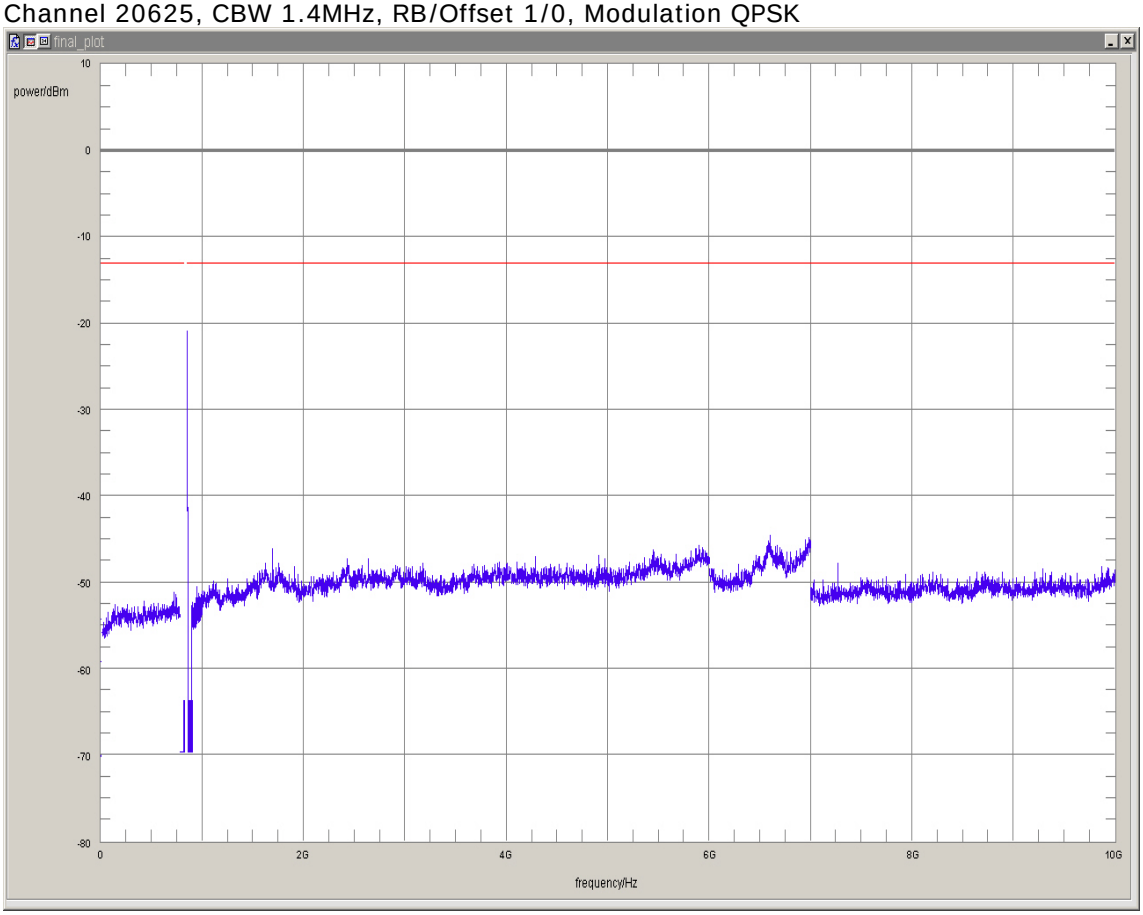
Channel 20525, CBW 1.4MHz, RB/Offset 6/0, Modulation 16QAM



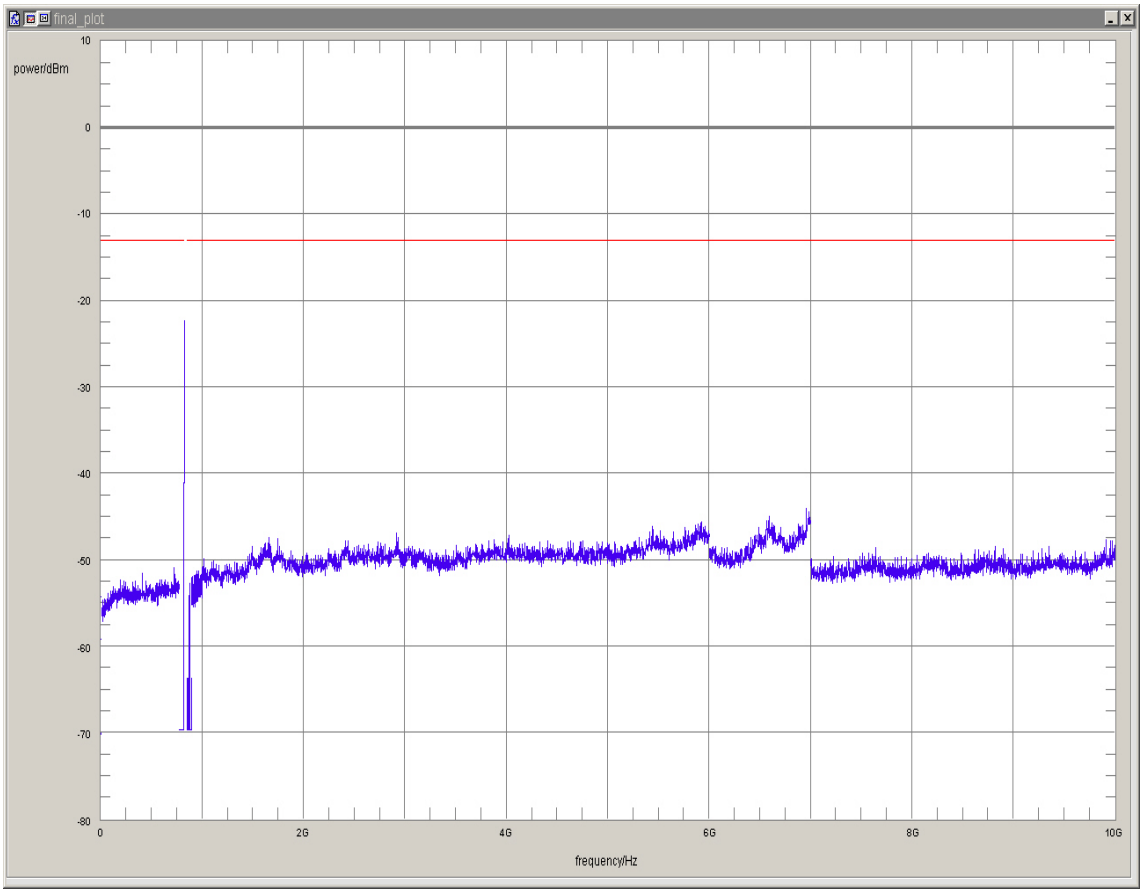
Date: 18.SEP.2014 22:23:30

7.3 Spurious emissions at antenna terminals §2.1051, §22.917

Channel 20625, CBW 1.4MHz, RB/Offset 1/0, Modulation QPSK

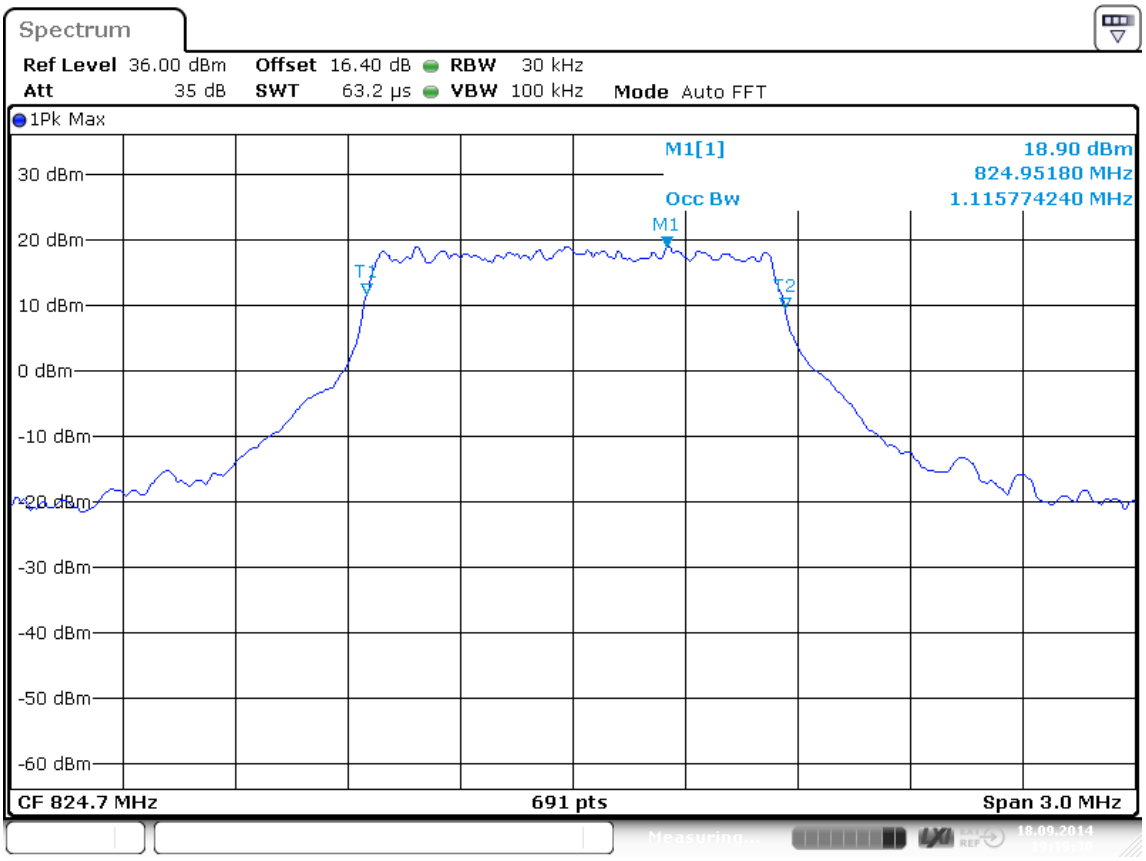


Channel 20425, CBW 1.4MHz, RB/Offset 1/0, Modulation 16QAM



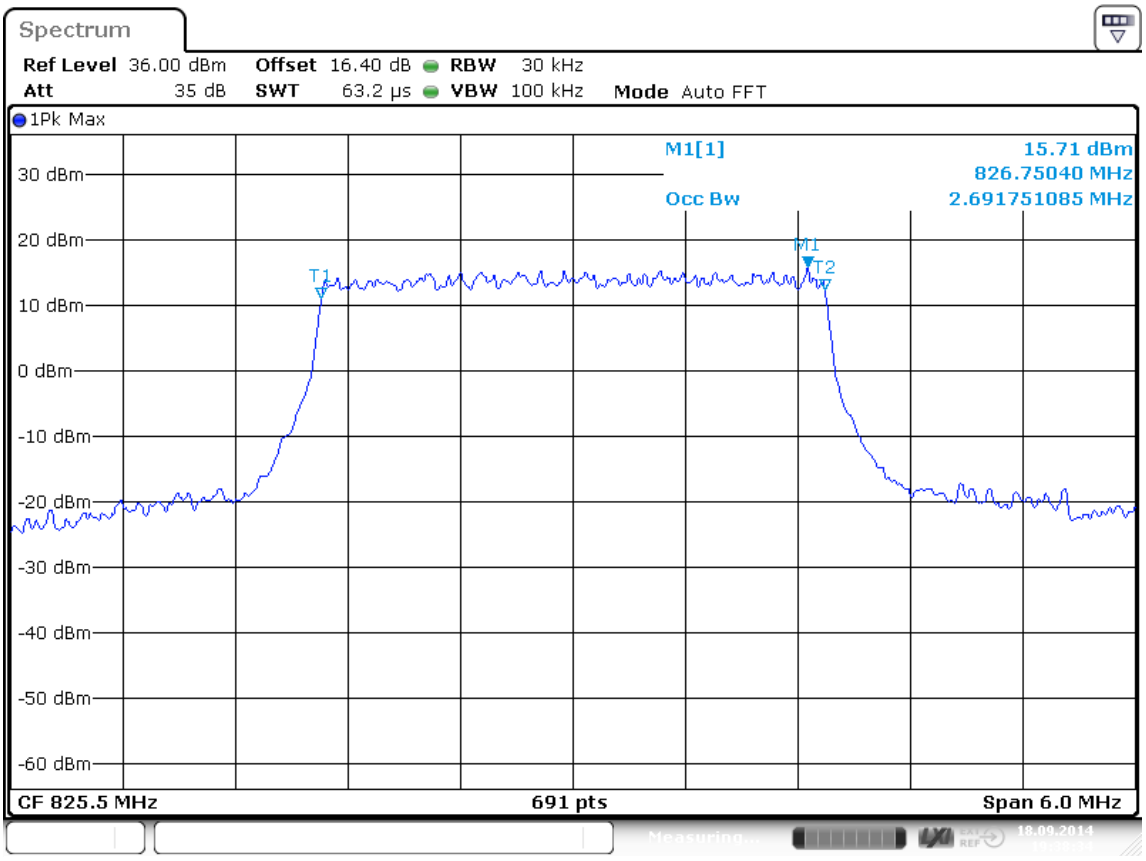
7.4 Emission and Occupied Bandwidth §2.1049, §22.917

Channel 20407, CBW 1.4MHz, RB/Offset 6/0, Modulation QPSK



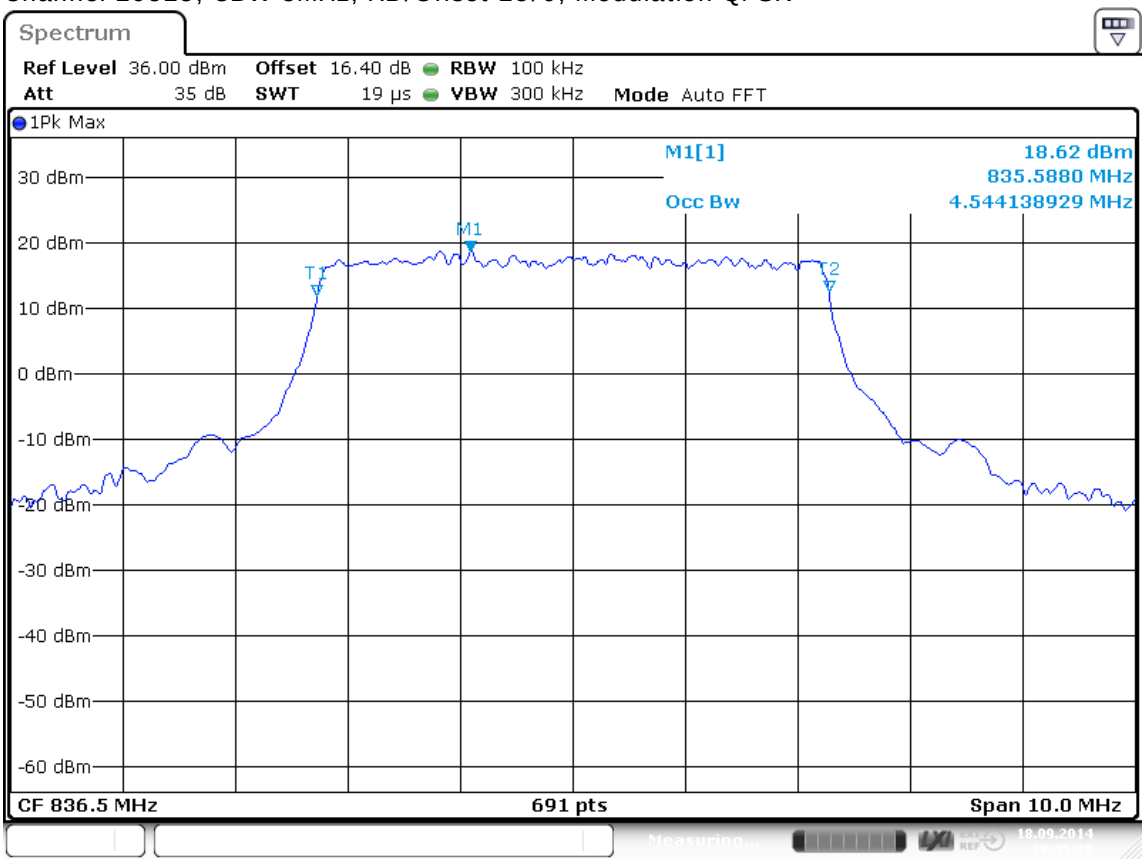
Date: 18.SEP.2014 19:19:30

Channel 20415, CBW 3MHz, RB/Offset 15/0, Modulation QPSK



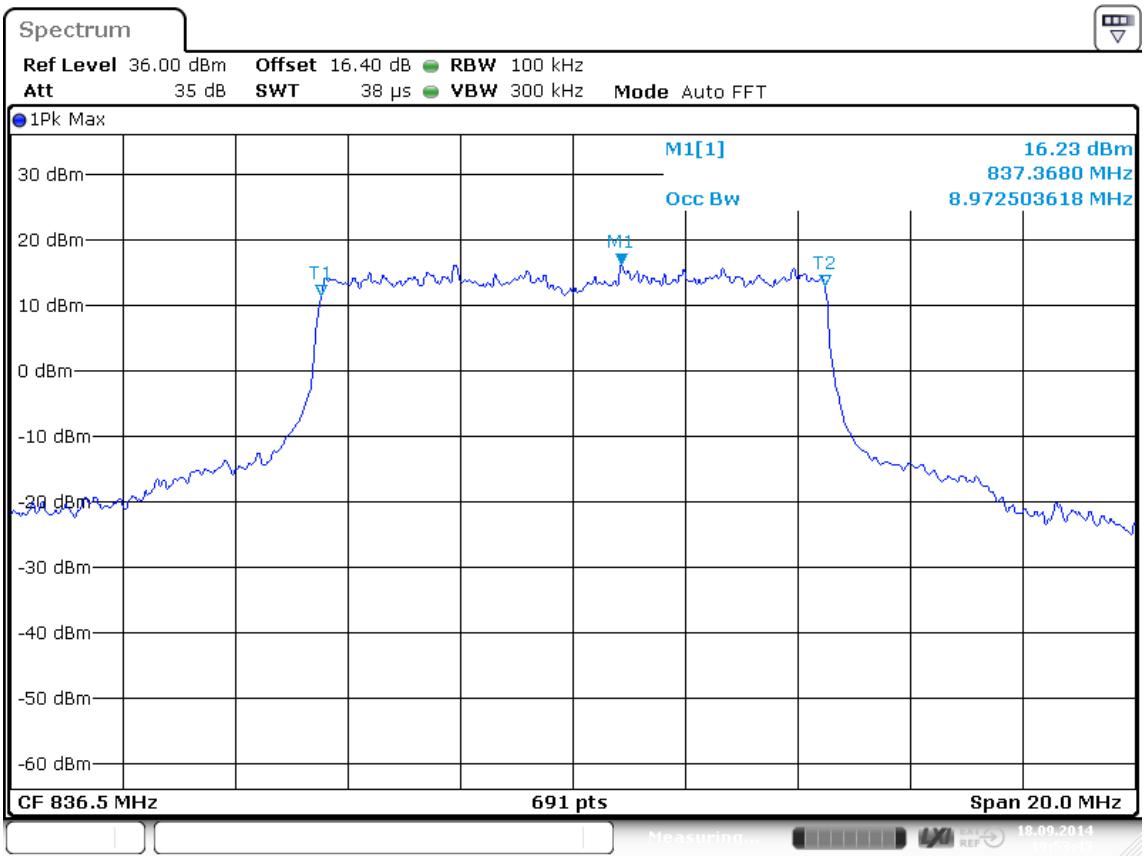
Date: 18.SEP.2014 19:38:34

Channel 20525, CBW 5MHz, RB/Offset 25/0, Modulation QPSK



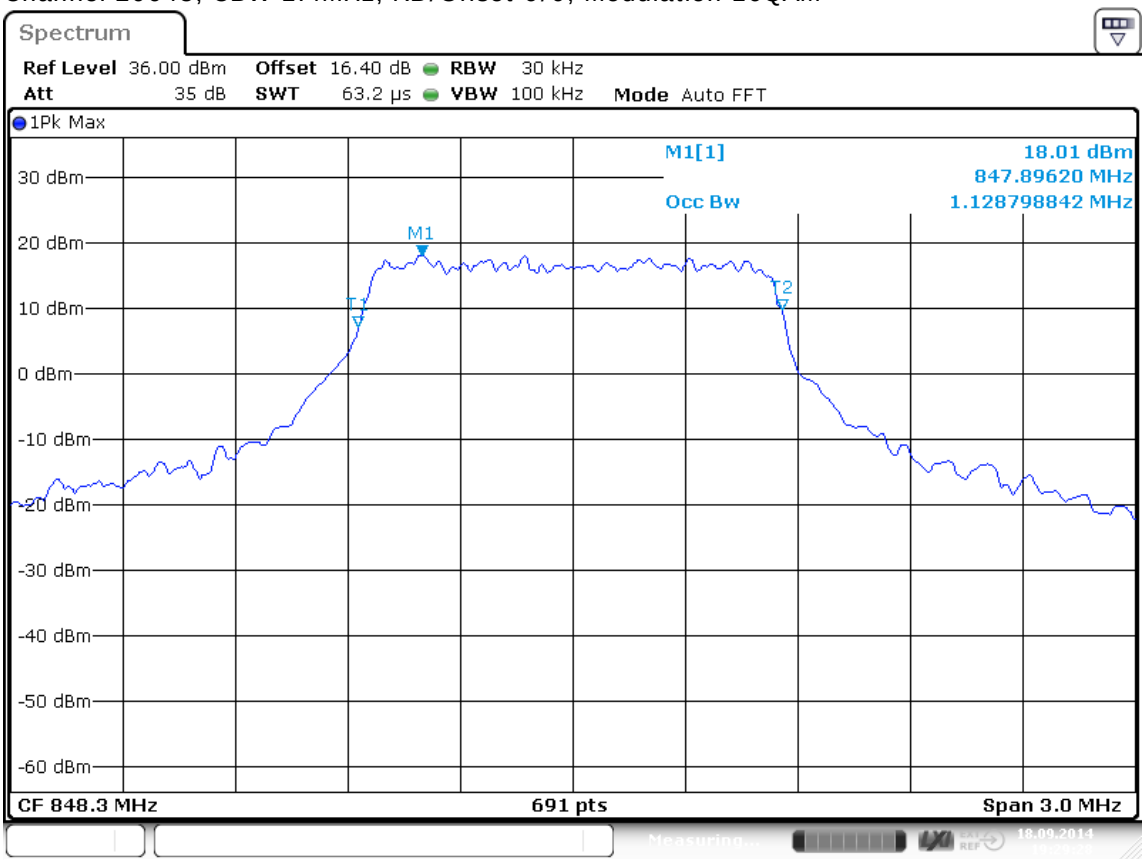
Date: 18.SEP.2014 19:45:28

Channel 20525, CBW 10MHz, RB/Offset 50/0, Modulation QPSK



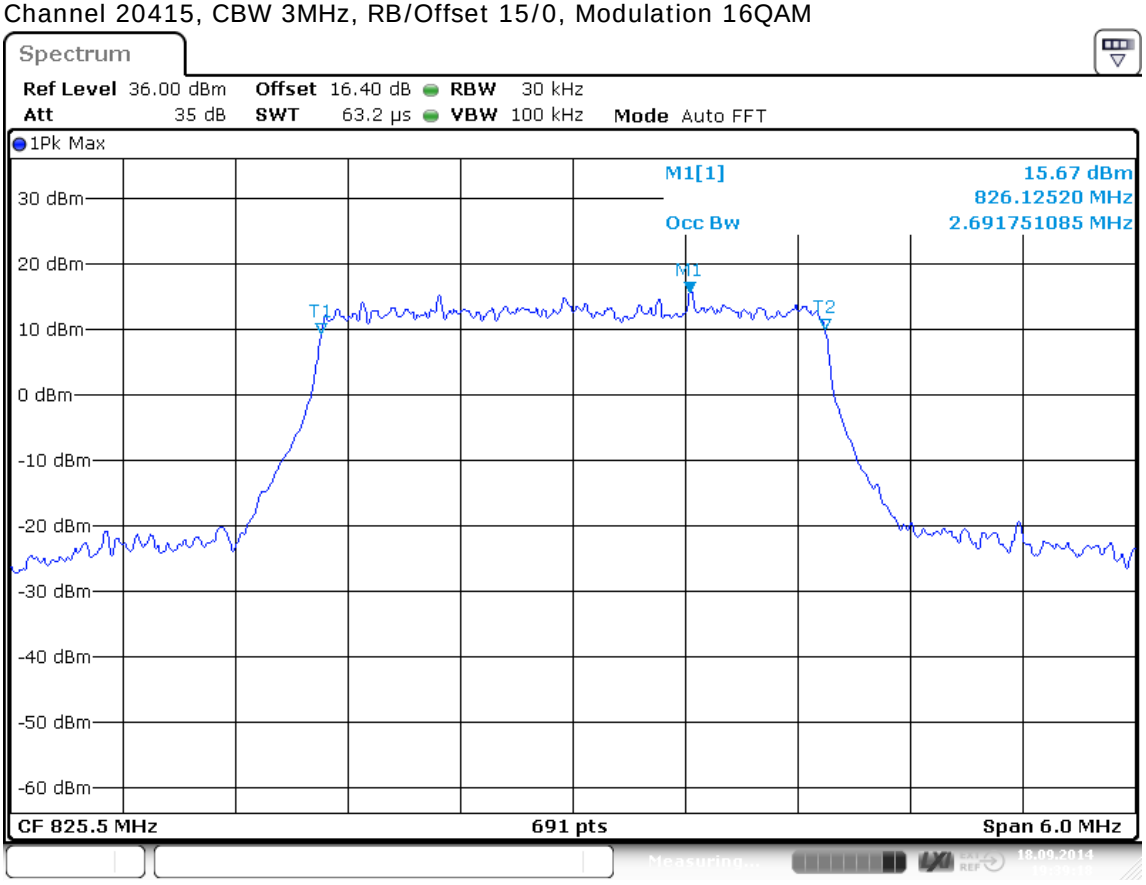
Date: 18.SEP.2014 19:53:45

Channel 20643, CBW 1.4MHz, RB/Offset 6/0, Modulation 16QAM



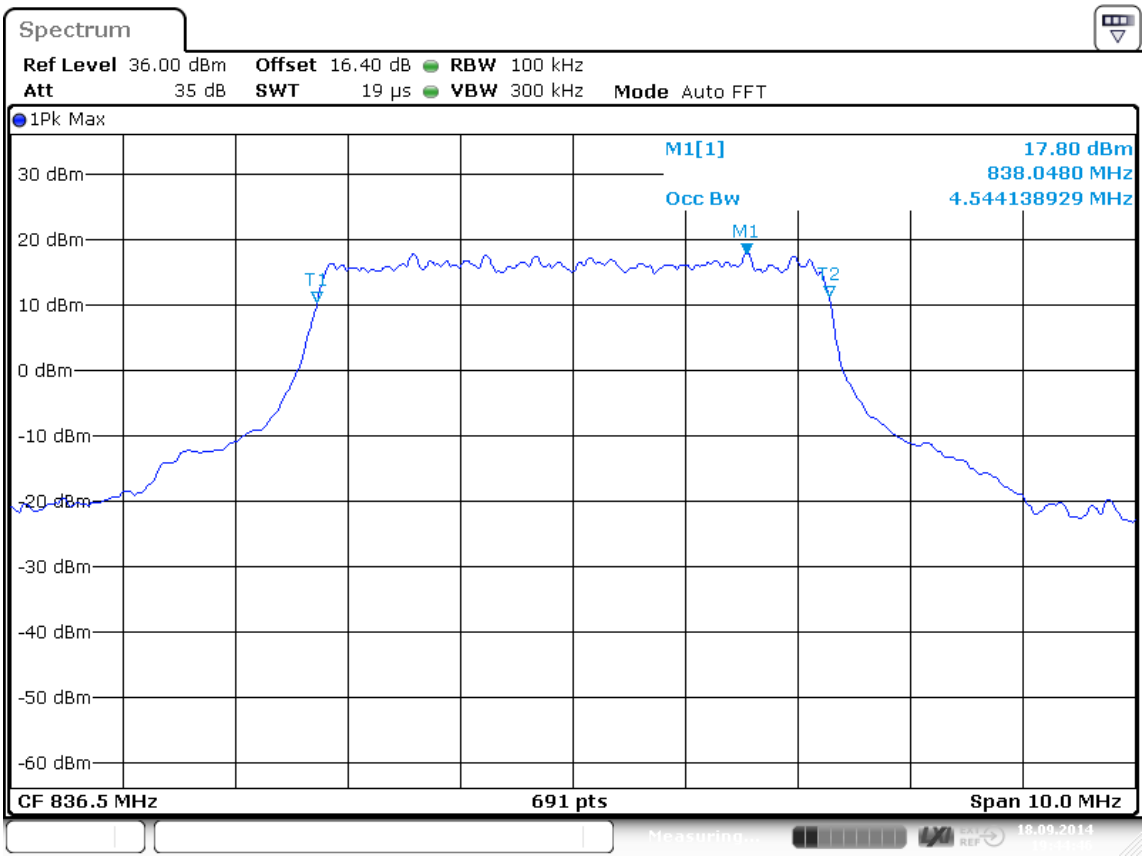
Date: 18.SEP.2014 19:29:29

Channel 20415, CBW 3MHz, RB/Offset 15/0, Modulation 16QAM



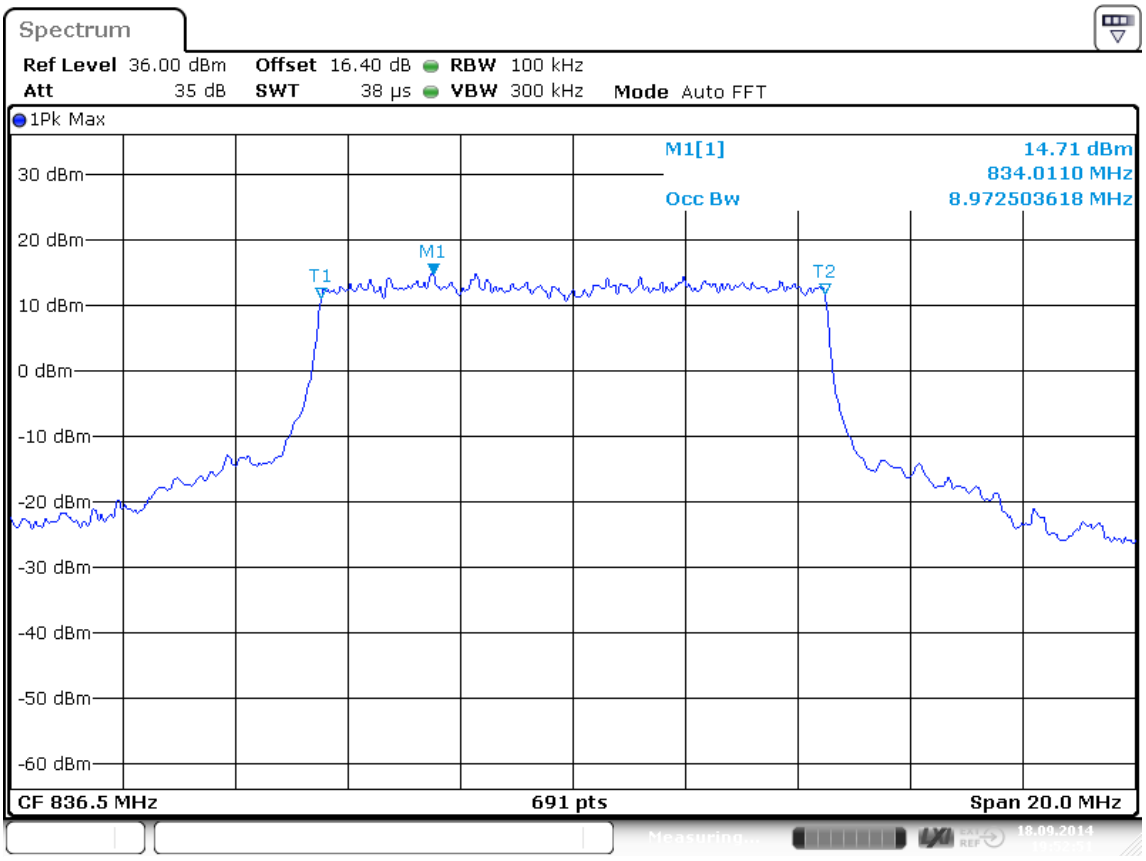
Date: 18.SEP.2014 19:39:19

Channel 20525, CBW 5MHz, RB/Offset 25/0, Modulation 16QAM



Date: 18.SEP.2014 19:44:46

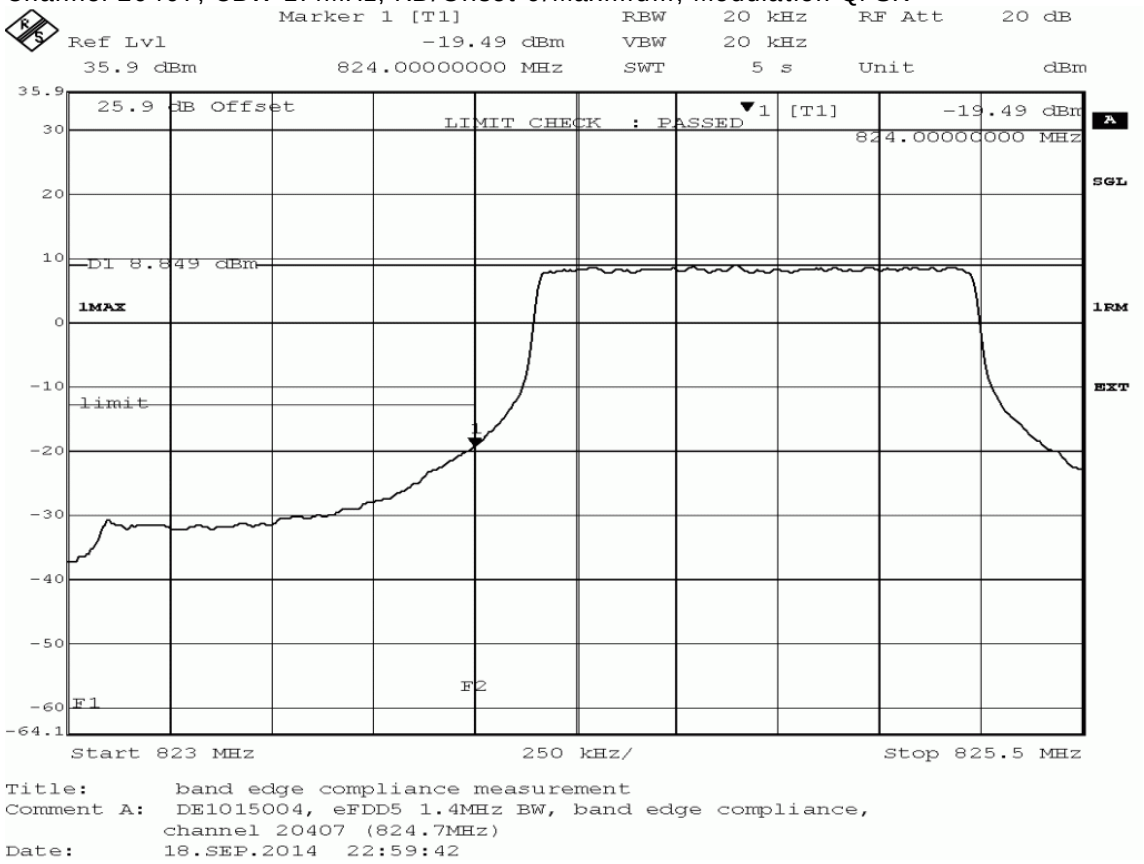
Channel 20525, CBW 10MHz, RB/Offset 50/0, Modulation 16QAM



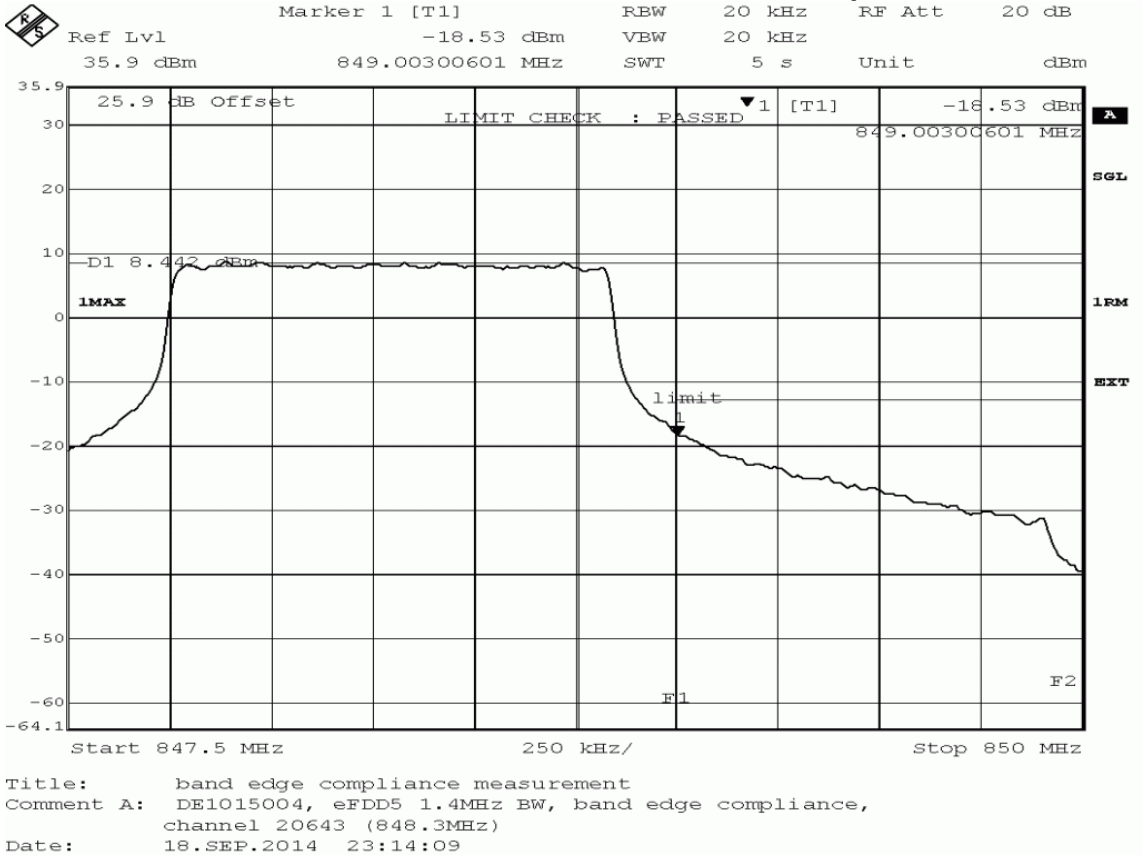
Date: 18.SEP.2014 19:52:51

7.5 Band edge compliance §2.1053, §22.917

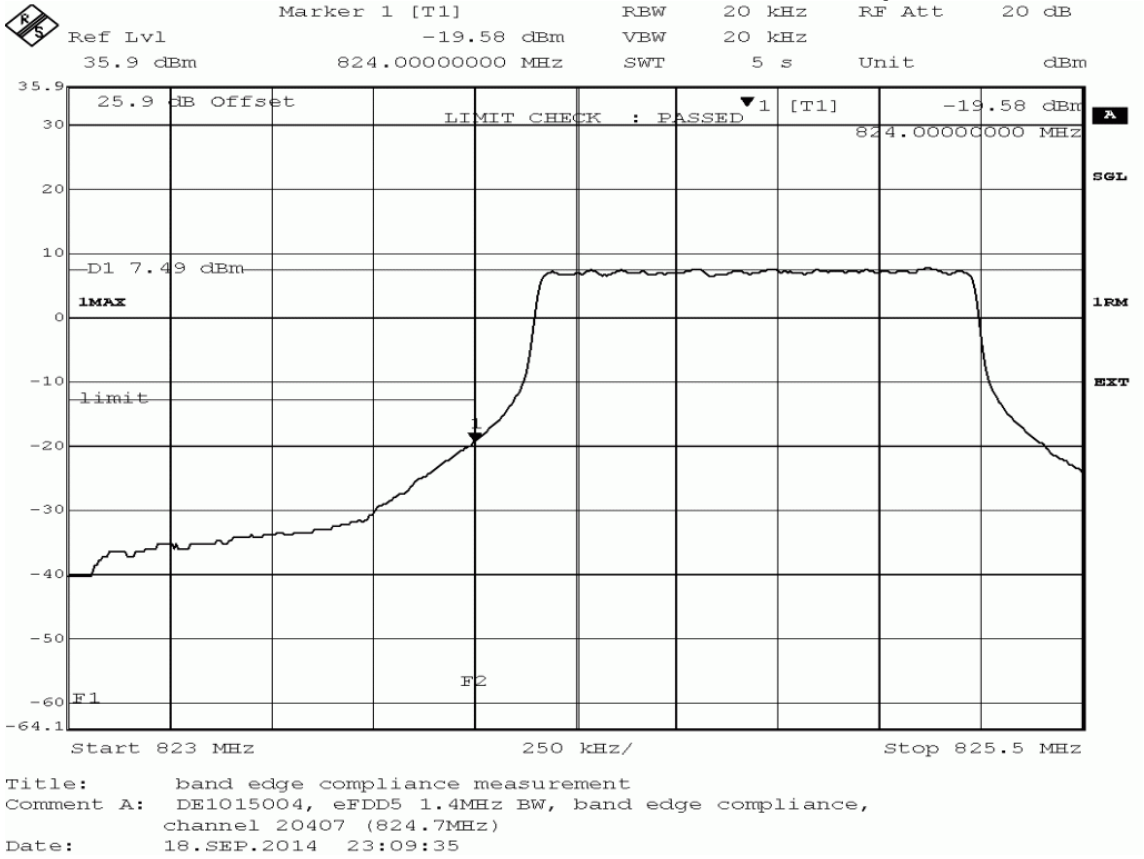
Channel 20407, CBW 1.4MHz, RB/Offset 6/Maximum, Modulation QPSK



Channel 20643, CBW 1.4MHz, RB/Offset 6/Maximum, Modulation QPSK



Channel 20407, CBW 1.4MHz, RB/Offset 6/Maximum, Modulation 16QAM



Channel 20643, CBW 1.4MHz, RB/Offset 6/Maximum, Modulation 16QAM