

InterLab[®]

FCC Measurement/Technical Report on

**TOBY-L200 GSM/UMTS/HSPA/LTE Data
Module**

FCC ID: XPYTOBYL200

IC: 8595A-TOBYL200

Report Reference: MDE_UBLOX_1408_FCCd

according to FCC Part 27, Subpart C

Test Laboratory:

7Layers AG
Borsigstr. 11
40880 Ratingen
Germany

Note:

The following test results relate only to the devices specified in this document. This report shall not be reproduced in parts without the written approval of the test laboratory.

7Layers AG
Borsigstrasse 11
40880 Ratingen, Germany
Phone: +49 (0) 2102 749 0
Fax: +49 (0) 2102 749 350
www.7Layers.com

Aufsichtsratsvorsitzender •
Chairman of the Supervisory Board:
Peter Mertel
Vorstand • Board:
Dr. H.-J. Meckelburg
Dr. H. Ansorge



Registergericht • registered in:
Düsseldorf, HRB 44096
USt-IdNr • VAT No.:
DE 203159652
TAX No. 147/5869/0385

Table of Contents

0.1	Summary	3
0.2	Technical Report Summary	3
0.3	Measurement Summary	5
1	Administrative Data	6
1.1	Testing Laboratory	6
1.2	Project Data	6
1.3	Applicant Data	6
1.4	Manufacturer Data	6
2	Test object Data	7
2.1	General EUT Description	7
2.2	EUT Main components	8
2.3	Ancillary Equipment	8
2.4	Auxiliary Equipment	8
2.5	EUT Setups	9
2.6	Operating Modes	9
2.7	Special software used for testing	13
2.8	Product labeling	13
3	Test Results	14
3.1	RF Power Output	14
3.2	Frequency stability	21
3.3	Spurious emissions at antenna terminals	26
3.4	Emission and Occupied Bandwidth	29
3.5	Band edge compliance	32
3.6	Power to Average Ratio	36
4	Test Equipment	38
5	Photo Report	42
6	Setup Drawings	42
7	Annex measurement plots (worst case)	44
7.1	RF Power Output	44
7.2	Peak to Average Ratio	47
7.3	Spurious emissions at antenna terminals	51
7.4	Emission and Occupied Bandwidth	54
7.5	Band edge compliance	66

0.1 Summary

0.2 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

Part 27, Subpart C—Technical Standards

- § 27.50 Power and antenna height limits
- § 27.53 Emissions limits
- § 27.54 Frequency stability

Additional documents

ANSI TIA-603-C-2004

Correlation of measurement requirements for Cellular Equipment from FCC and IC

Test Case	FCC Rule / IC Standard					
	22 / RSS-132		24 / RSS-133		27 / RSS-139	
	Applicable Bands: GSM 850 FDD 5 E-FDD5		Applicable Bands: GSM 1900 FDD 2 E-FDD 2		Applicable Bands: FDD 4 E-FDD 4 E-FDD 7 E-FDD 17	
Effective (isotropic) Radiated Power	§2.1046 §22.913 AV ERP !!	RSS-GEN, §4.8 RSS-132, §5.4 AV EIRP Power	§2.1046 §24.232 Peak EIRP Power (RMS- equivalent calibrated))	RSS-GEN, §4.8 RSS-133, §6.4 AV EIRP Power	§2.1046 §27.50 (d) AV EIRP Power	RSS-GEN, §4.8 RSS-139; §6.4 AV EIRP Power
Occupied Bandwidth	§2.1049	RSS-GEN §4.6	§2.1049	RSS-GEN §4.6	§2.1049	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
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
Frequency Stability	§2.1055 §22.355	RSS-GEN, §4.7 RSS-132, §5.3	§2.1055 §24.235	RSS-GEN, §4.7 RSS-132, §6.3	§2.1055 §27.51	RSS-GEN, §4.7 RSS-139, §6.3
Peak to Average Ration	N/A	RSS-132, §5.4	§2.1046 §24.232	RSS-133, §6.4	§2.1046 §27.50 (d)	RSS-139, §6.4
Modulation Characteristics	§2.1047	RSS-132, §5.2	§2.1047	RSS-133, §6.2	§2.1047	RSS-139, §6.2
Field Strength of Spurious Radiation	§2.1053 §22.917	RSS-GEN, §4.9 RSS-132, §5.5	§2.1053 §24.235	RSS-GEN, §4.9 RSS-133, §6.5	§2.1053 §27.51	RSS-GEN, §4.9 RSS-139, §6.5

*) 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.

0.3 Measurement Summary

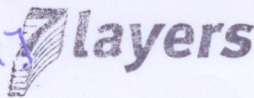
FCC Part 27, Subpart C		§2.1046, §27.50(d)	
RF Power Output			
	Setup	Port	Final Result
	Setup_01	AC Port (power line)	passed 09-12-2014
FCC Part 27, Subpart C		§2.1055, §27.51	
Frequency stability			
	Setup	Port	Final Result
	Setup_02	Temp.ant.connector	passed 07-30-2014
FCC Part 27, Subpart C		§2.1051, §27.53(h)	
Spurious emissions at antenna terminals			
	Setup	Port	Final Result
	Setup_01	Temp.ant.connector	passed 09-04-2014
FCC Part 27, Subpart C		§2.1049	
Emission and Occupied Bandwidth			
	Setup	Port	Final Result
	Setup_01	Temp.ant.connector	passed 08-27-2014
FCC Part 27, Subpart C		§2.1051, §27.53 (h)	
Band edge compliance			
	Setup	Port	Final Result
	Setup_01	Temp.ant.connector	passed 09-04-2014
FCC Part 27, Subpart C		§2.1046, §27.50(d)	
Peak-Average Ratio			
	Setup	Port	Final Result
	Setup_01	Temp.ant.connector	passed 09-04-2014
FCC Part 27, Subpart C		§2.1046, §27.50(d)	
Field strength of spurious radiation			
	Setup	Port	Final Result
	na	na	Not performed see external report

Responsible for
Accreditation Scope:

M. Kullik
[M. Kullik]

Responsible
for Test Report:

[Signature]



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

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: 2014-09-18

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-L200
Kind of Device:	Module
(optional)	
Voltage Type:	DC
Voltage Level:	3.8 V
Tested Modulation Type:	QPSK;16QAM

General product description:

The Module is able to operate in the following bands:
GSM 850/1900 900/1800
UMTS/HSDPA/HSUPA FDD 1,2,4,5 and 8
LTE eFDD 2,4,5,7 and 17

*This report only covers the LTE portion.

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: DE1015003AY09)	GSM/UMTS/LTE Module	TOBY-L200	352251060043772	192BA04	09.41
EUT B (Code: DE1015003AP07)	GSM/UMTS/LTE Module	TOBY-L200	352251060022016	192BA00	09.39

Remark: EUT A,B 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_C	S_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 4	TX (1.4M)	19957	20175	20393
		1710.7	1732.5	1754.3
	TX (3M)	CH 19965	CH 20175	CH 20385
		1711.50 MHz	1732.50 MHz	1753.50 MHz
	TX (5M)	CH 19975	CH 20175	CH 20375
		1712.50 MHz	1732.50 MHz	1752.50 MHz
	TX (10)	CH 20000	CH 20175	CH 20350
		1715.00 MHz	1732.50 MHz	1750.00 MHz
	TX (15M)	CH 20025	CH 20175	CH 20325
		1717.50 MHz	1732.50 MHz	1747.50 MHz
	TX (20M)	CH 20050	CH 20175	CH 20300
		1720.00 MHz	1732.50 MHz	1745.00 MHz
	RX (1.4M)	CH 1957	CH 2175	CH 2393
		2114.30 MHz	2132.50 MHz	2154.30 MHz
	RX (3M)	CH 1965	CH 2175	CH 2385
		2113.50 MHz	2132.50 MHz	2153.50 MHz
	RX (5M)	CH 1975	CH 2175	CH 2375
		2112.50 MHz	2132.50 MHz	2152.50 MHz
	RX (10M)	CH 2000	CH 2175	CH 2350
		2115.00 MHz	2132.50 MHz	2150.00 MHz
RX (15M)	CH 2025	CH 2175	CH 2325	
	2117.50 MHz	2132.50 MHz	2147.50 MHz	
RX (20M)	CH 2050	CH 2175	CH 2300	
	2120.00 MHz	2132.50 MHz	2145.00 MHz	

TEST MODE	TX / RX	RF Channel		
		Low	Mid	High
LTE eFDD 7	TX (5M)	CH 20775	CH 21100	CH 21425
		2502.50 MHz	2535.00 MHz	2567.50 MHz
	TX (10)	CH 20800	CH 21100	CH 21400
		2505.00 MHz	2535.00 MHz	2565.00 MHz
	TX (15M)	CH 20825	CH 21100	CH 21375
		2507.50 MHz	2535.00 MHz	2562.50 MHz
	TX (20M)	CH 20850	CH 21100	CH 21350
		2510.00 MHz	2535.00 MHz	2560.00 MHz
	RX (5M)	CH 2775	CH 3100	CH 3425
		2622.50 MHz	2655.00 MHz	2687.50 MHz
	RX (10M)	CH 2800	CH 3100	CH 3400
		2625.00 MHz	2655.00 MHz	2685.00 MHz
RX (15M)	CH 2825	CH 3100	CH 3375	
	2675.50 MHz	2655.00 MHz	2682.50 MHz	
RX (20M)	CH 2850	CH 3100	CH 3350	
	2630.00 MHz	2655.00 MHz	2680.00 MHz	

TEST MODE	TX / RX	RF Channel		
		Low	Mid	High
LTE eFDD 17	TX (5M)	CH 23755	CH 23790	CH 23780
		706.50 MHz	710.00 MHz	713.50 MHz
	TX (10)	CH 23825	CH 23790	CH 23800
		709.00 MHz	710.00 MHz	711.00 MHz
	RX (5M)	CH 23825	CH 23790	CH 23800
		713.50 MHz	710.00 MHz	711.00 MHz
RX (10M)	CH 5825	CH 5790	CH 5800	
	743.50 MHz	740.00 MHz	741.00 MHz	

eFDD 4 Test configuration					
Setup Number	Test ITEM	Channel Band width	Channels tested	Modulation	RB Allocation
01	RF OUTPUT POWER	1.4 MHz	19957, 20175, 20393	QPSK, 16QAM	1RB, 3RB, 6RB
		3 MHz	19965, 20175, 20385	QPSK, 16QAM	1RB, 15RB
		5 MHz	19975, 20175, 20375	QPSK, 16QAM	1RB, 12RB, 25RB
		10 MHz	2000, 20175, 20350	QPSK, 16QAM	1RB, 50RB
		15 MHz	20025, 20175, 20325	QPSK, 16QAM	1RB, 36RB, 75RB
		20 MHz	20050, 20175, 20300	QPSK, 16QAM	1RB, 100RB
02	FREQUENCY STABILITY	1.4	20175	QPSK	1RB
01	OCCUPIED BANDWIDTH	1.4 MHz	19957, 20175, 20393	QPSK, 16QAM	6RB
		3 MHz	19965, 20175, 20385	QPSK, 16QAM	15RB
		5 MHz	19975, 20175, 20375	QPSK, 16QAM	25RB
		10 MHz	2000, 20175, 20350	QPSK, 16QAM	50RB
		15 MHz	20025, 20175, 20325	QPSK, 16QAM	75RB
		20 MHz	20050, 20175, 20300	QPSK, 16QAM	100RB
01	PEAK TO AVERAGE RATIO	5 MHz	19975, 20175, 20375	QPSK, 16QAM	25RB
01	BAND EDGE Compliance	1.4 MHz	19957, 20175, 20393	QPSK, 16QAM	6RB / Max offset
		3 MHz	19965, 20175, 20385	QPSK, 16QAM	15RB/ Max offset
		5 MHz	19975, 20175, 20375	QPSK, 16QAM	25RB/ Max offset
		10 MHz	2000, 20175, 20350	QPSK, 16QAM	50RB/ Max offset
		15 MHz	20025, 20175, 20325	QPSK, 16QAM	75RB/ Max offset
		20 MHz	20050, 20175, 20300	QPSK, 16QAM	100RB/ Max offset
01	CONDCUDED EMISSION	5 MHz	19975, 20175, 20375	QPSK, 16QAM	1RB
NA	RADIATED EMISSION	NA	See external report	NA	NA

eFDD 7 Test configuration					
Setup Number	Test ITEM	Channel Band width	Channels tested	Modulation	RB Allocation
01	RF OUTPUT POWER	5 MHz	20775, 21110, 21425	QPSK, 16QAM	1RB , 12RB , 25RB
		10 MHz	20800, 2110, 21400	QPSK, 16QAM	1RB, 50RB
		15 MHz	20825, 21110, 21375	QPSK, 16QAM	1RB, 36RB, 75RB
		20 MHz	20850, 21100, 21350	QPSK, 16QAM	1RB, 100RB
02	FREQUENCY STABILITY	5	21100	QPSK	1RB
01	OCCUPIED BANDWIDTH	5 MHz	20775, 21110, 21425	QPSK, 16QAM	25RB
		10 MHz	20800, 2110, 21400	QPSK, 16QAM	50RB
		15 MHz	20825, 21110, 21375	QPSK, 16QAM	75RB
		20 MHz	20850, 21100, 21350	QPSK, 16QAM	100RB
01	PEAK TO AVERAGE RATIO	5 MHz	19975, 20175, 20375	QPSK, 16QAM	25RB
01	BAND EDGE Compliance	5 MHz	20775, 21110, 21425	QPSK, 16QAM	25RB/ Max offset
		10 MHz	20800, 2110, 21400	QPSK, 16QAM	50RB/ Max offset
		15 MHz	20825, 21110, 21375	QPSK, 16QAM	75RB/ Max offset
		20 MHz	20850, 21100, 21350	QPSK, 16QAM	100RB/ Max offset
01	CONDCUDETED EMISSION	5 MHz	20775, 21110, 21425	QPSK, 16QAM	1RB
NA	RADIATED EMISSION	NA	See external report	NA	NA

eFDD 17 Test configuration					
Setup Number	Test ITEM	Channel Band width	Channels tested	Modulation	RB Allocation
01	RF OUTPUT POWER	5 MHz	23755, 23790, 23780	QPSK, 16QAM	1RB , 12RB , 25RB
		10 MHz	23825, 23790, 23800	QPSK, 16QAM	1RB, 50RB
02	FREQUENCY STABILITY	5	23790	QPSK	1RB
01	OCCUPIED BANDWIDTH	5 MHz	23755, 23790, 23780	QPSK, 16QAM	25RB
		10 MHz	23825, 23790, 23800	QPSK, 16QAM	50RB
01	PEAK TO AVERAGE RATIO	5 MHz	23755, 23790, 23780	QPSK, 16QAM	25RB
01	BAND EDGE Compliance	5 MHz	23755, 23790, 23780	QPSK, 16QAM	25RB/ Max offset
		10 MHz	23825, 23790, 23800	QPSK, 16QAM	50RB/ Max offset
01	CONDCUDED EMISSION	5 MHz	23755, 23790, 23780	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

FCC Part 27, Subpart C

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".

a) The EUT was set up for the maximum power with LTE link data modulation and link up with simulator.

b) Set the EUT to transmit under low, middle and high channel and record the power level shown on simulator.

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:

- Channel (Frequency): please refer to the detailed results

4) The transmitted power of the EUT was recorded by using a spectrum analyser.

a. The EUT was set up for the maximum power with LTE link data modulation and link up with simulator.

b. Set the EUT to transmit under low, middle and high channel and record the power level shown on simulator.

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.

Important Settings:

- Output Power: Maximum

- Channel: please refer to the detailed results

3) 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 $\lambda/2$ dipole).

4) 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.

5) 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.

§27.50 Power and antenna height limits.

(d) The following power and antenna height requirements apply to stations transmitting in the 1710–1755 MHz and 2110–2155 MHz bands:

(2) Fixed, mobile, and portable (hand-held) stations operating in the 1710–1755 MHz band are limited to a peak EIRP of 1 watt.

Fixed stations operating in this band are limited to a maximum antenna height of 10 meters above ground, and mobile and portable stations must employ a means for limiting power to the minimum necessary for successful communications.

Portable stations (hand-held devices) operating in the 704-716 MHz band are limited to 3 watts ERP

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
eFDD4	1.4	Low	QPSK	RB 1	22.75	1	1	7.25	Passed
				RB 3	22.08	1	1	7.92	Passed
				RB 6	20.94	1	1	9.06	Passed
			16QAM	RB 1	21.84	1	1	8.16	Passed
				RB 6	19.88	1	1	10.12	Passed
				RB 6	19.88	1	1	10.12	Passed
		MID	QPSK	RB 1	23.01	1	1	6.99	Passed
				RB 3	22.31	1	1	7.69	Passed
				RB 6	21.31	1	1	8.69	Passed
			16QAM	RB 1	22.08	1	1	7.92	Passed
				RB 6	20.23	1	1	9.77	Passed
				RB 6	20.23	1	1	9.77	Passed
		High	QPSK	RB 1	23.04	1	1	6.96	Passed
				RB 3	22.16	1	1	7.84	Passed
				RB 6	21.13	1	1	8.87	Passed

		16QAM	RB 1	22.04	1	1	7.96	Passed	
	3	Low	QPSK	RB 6	20.21	1	1	9.79	Passed
				RB 1	23.85	1	1	6.15	Passed
		16QAM	RB 15	21.73	1	1	8.27	Passed	
			RB 1	22.63	1	1	7.37	Passed	
		Mid	QPSK	RB 15	20.67	1	1	9.33	Passed
				RB 1	24.07	1	1	5.93	Passed
	16QAM		RB 15	22.11	1	1	7.89	Passed	
			RB 1	22.94	1	1	7.06	Passed	
	High	QPSK	RB 15	21.1	1	1	8.9	Passed	
			RB 1	24.02	1	1	5.98	Passed	
		16QAM	RB 15	22.05	1	1	7.95	Passed	
			RB 1	22.78	1	1	7.22	Passed	
	5	Low	QPSK	RB 15	21	1	1	9	Passed
				RB 1	23.85	1	1	6.15	Passed
				RB 12	21.44	1	1	8.56	Passed
			16QAM	RB 25	21.63	1	1	8.37	Passed
				RB 1	22.73	1	1	7.27	Passed
				RB 25	21.64	1	1	8.36	Passed
		MID	QPSK	RB 1	24	1	1	6	Passed
				RB 12	21.88	1	1	8.12	Passed
				RB 25	21.9	1	1	8.1	Passed
			16QAM	RB 1	22.83	1	1	7.17	Passed
RB 25				20.95	1	1	9.05	Passed	
High		QPSK	RB 1	23.77	1	1	6.23	Passed	
			RB 12	21.73	1	1	8.27	Passed	
			RB 25	21.84	1	1	8.16	Passed	
		16QAM	RB 1	22.72	1	1	7.28	Passed	
			RB 25	20.89	1	1	9.11	Passed	
10	Low	QPSK	RB 1	24.27	1	1	5.73	Passed	
			RB 50	23	1	1	7	Passed	
		16QAM	RB 1	23.29	1	1	6.71	Passed	
			RB 50	21.94	1	1	8.06	Passed	
	MID	QPSK	RB 1	24.55	1	1	5.45	Passed	
			RB 50	23.21	1	1	6.79	Passed	
		16QAM	RB 1	23.44	1	1	6.56	Passed	
			RB 50	22.19	1	1	7.81	Passed	
	High	QPSK	RB 1	24.46	1	1	5.54	Passed	
			RB 50	23.14	1	1	6.86	Passed	
16QAM	RB 1	23.33	1	1	6.67	Passed			

	15	Low	QPSK	RB 50	22.16	1	1	7.84	Passed
				RB 1	24.23	1	1	5.77	Passed
				RB 36	22.9	1	1	7.1	Passed
			RB 75	22.96	1	1	7.04	Passed	
			16QAM	RB 1	23.17	1	1	6.83	Passed
				RB 75	21.97	1	1	8.03	Passed
		MID	QPSK	RB 1	24.56	1	1	5.44	Passed
				RB 36	23.38	1	1	6.62	Passed
				RB 75	23.31	1	1	6.69	Passed
			16QAM	RB 1	23.36	1	1	6.64	Passed
				RB 75	22.26	1	1	7.74	Passed
	High	QPSK	RB 1	24.48	1	1	5.52	Passed	
			RB 36	23.19	1	1	6.81	Passed	
			RB 75	23.18	1	1	6.82	Passed	
		16QAM	RB 1	23.23	1	1	6.77	Passed	
			RB 75	22.21	1	1	7.79	Passed	
	20	MID	QPSK	RB 1	24.27	1	1	5.73	Passed
				RB 100	23.3	1	1	6.7	Passed
			16QAM	RB 1	23.28	1	1	6.72	Passed
				RB 100	22.34	1	1	7.66	Passed
		Low	QPSK	RB 1	24.07	1	1	5.93	Passed
RB 100				22.79	1	1	7.21	Passed	
16QAM			RB 1	23.05	1	1	6.95	Passed	
			RB 100	22.06	1	1	7.94	Passed	
High		QPSK	RB 1	24.19	1	1	5.81	Passed	
			RB 100	23.29	1	1	6.71	Passed	
		16QAM	RB 100	22.28	1	1	7.72	Passed	
			RB 1	22.94	1	1	7.06	Passed	

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
eFDD7	5	Low	QPSK	RB 1	22.52	1	1	7.48	Passed
				RB 12	21.91	1	1	8.09	Passed
				RB 25	21.92	1	1	8.08	Passed
			16QAM	RB 1	21.75	1	1	8.25	Passed
				RB 25	20.99	1	1	9.01	Passed
				RB 1	23.37	1	1	6.63	Passed
		MID	QPSK	RB 12	22.59	1	1	7.41	Passed
				RB 25	22.66	1	1	7.34	Passed
				RB 1	22.52	1	1	7.48	Passed
			16QAM	RB 25	21.7	1	1	8.3	Passed
				RB 1	23.08	1	1	6.92	Passed
				RB 12	22.3	1	1	7.7	Passed
		High	QPSK	RB 25	22.3	1	1	7.7	Passed
				RB 1	22.26	1	1	7.74	Passed
				RB 25	21.49	1	1	8.51	Passed
			16QAM	RB 1	22.54	1	1	7.46	Passed
				RB 50	21.83	1	1	8.17	Passed
				RB 1	21.79	1	1	8.21	Passed
eFDD7	10	Low	QPSK	RB 50	20.89	1	1	9.11	Passed
				RB 1	23.51	1	1	6.49	Passed
			16QAM	RB 50	22.52	1	1	7.48	Passed
				RB 1	22.55	1	1	7.45	Passed
		MID	QPSK	RB 50	21.71	1	1	8.29	Passed
				RB 1	23.14	1	1	6.86	Passed
			16QAM	RB 50	22.33	1	1	7.67	Passed
				RB 1	22.31	1	1	7.69	Passed
		High	QPSK	RB 50	21.44	1	1	8.56	Passed
				RB 1	22.4	1	1	7.6	Passed
			16QAM	RB 36	21.75	1	1	8.25	Passed
				RB 75	21.78	1	1	8.22	Passed
eFDD7	15	Low	QPSK	RB 1	21.61	1	1	8.39	Passed
				RB 75	20.88	1	1	9.12	Passed
			16QAM	RB 1	23.35	1	1	6.65	Passed
				RB 36	22.52	1	1	7.48	Passed
		MID	QPSK	RB 1	23.35	1	1	6.65	Passed
				RB 36	22.52	1	1	7.48	Passed

				RB 75	22.44	1	1	7.56	Passed						
				16QAM	RB 1	22.66	1	1	7.34	Passed					
					RB 75	21.62	1	1	8.38	Passed					
				High	QPSK	RB 1	22.87	1	1	7.13	Passed				
						RB 36	22.09	1	1	7.91	Passed				
						RB 75	22.21	1	1	7.79	Passed				
				16QAM	RB 1	22.29	1	1	7.71	Passed					
					RB 75	21.29	1	1	8.71	Passed					
				eFDD7	20			QPSK	RB 1	23.29	1	1	6.71	Passed	
									RB 100	22.59	1	1	7.41	Passed	
								16QAM	RB 1	22.54	1	1	7.46	Passed	
									RB 100	21.7	1	1	8.3	Passed	
								Low	QPSK	RB 1	22.51	1	1	7.49	Passed
										RB 100	21.89	1	1	8.11	Passed
16QAM	RB 1	21.7	1					1	8.3	Passed					
	RB 100	20.97	1					1	9.03	Passed					
High	QPSK	RB 1	22.73					1	1	7.27	Passed				
		RB 100	22.09					1	1	7.91	Passed				
	16QAM	RB 100	21.29					1	1	8.71	Passed				
		RB 1	22.06					1	1	7.94	Passed				

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
eFDD 17	5	Low	QPSK	RB 1	23.63	3	3	11.14	Passed
				RB 12	22.49	3	3	12.28	Passed
				RB 25	22.59	3	3	12.18	Passed
			16QAM	RB 1	22.60	3	3	12.17	Passed
				RB 25	21.50	3	3	13.27	Passed
				RB 50	21.52	3	3	13.25	Passed
		MID	QPSK	RB 1	23.82	3	3	10.95	Passed
				RB 12	22.73	3	3	12.04	Passed
				RB 25	22.73	3	3	12.04	Passed
			16QAM	RB 1	22.84	3	3	11.93	Passed
				RB 25	21.65	3	3	13.12	Passed
				RB 50	21.47	3	3	13.3	Passed
	High	QPSK	RB 1	23.44	3	3	11.33	Passed	
			RB 12	22.63	3	3	12.14	Passed	
			RB 25	22.57	3	3	12.2	Passed	
		16QAM	RB 1	22.43	3	3	12.34	Passed	
			RB 25	21.50	3	3	13.27	Passed	
			RB 50	21.52	3	3	13.25	Passed	
	10	Low	QPSK	RB 1	23.78	3	3	10.99	Passed
				RB 50	22.58	3	3	12.19	Passed
				RB 100	22.52	3	3	12.19	Passed
			16QAM	RB 1	22.92	3	3	11.85	Passed
				RB 50	21.52	3	3	13.25	Passed
				RB 100	21.52	3	3	13.25	Passed
MID		QPSK	RB 1	23.85	3	3	10.92	Passed	
			RB 50	22.58	3	3	12.19	Passed	
			RB 100	22.58	3	3	12.19	Passed	
		16QAM	RB 1	22.95	3	3	11.82	Passed	
			RB 50	21.47	3	3	13.3	Passed	
			RB 100	21.47	3	3	13.3	Passed	
High	QPSK	RB 1	23.76	3	3	11.01	Passed		
		RB 50	22.67	3	3	12.1	Passed		
		RB 100	22.67	3	3	12.1	Passed		
	16QAM	RB 1	22.84	3	3	11.93	Passed		
		RB 50	21.52	3	3	13.25	Passed		
		RB 100	21.52	3	3	13.25	Passed		

3.2 Frequency stability

Standard FCC Part 27, Subpart C

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 $+50^{\circ}\text{C}$ 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 $+50^{\circ}$ 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.

§27.54 Frequency stability

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

7Layers interpretation of limit:

To ensure that the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block following limit was used:

+/- 2.5 ppm = 4350 Hz for channel 1450, frequency 1740.0 MHz

+/- 2.5 ppm = 4331 Hz for channel 1412, frequency 1732.4 MHz

in accordance with FCC Part 22, Subpart H, §22.355, table C-1: Frequency tolerance for the carrier frequency of mobile transmitters in the Public Mobile Service in the frequency range 821 to 896 MHz.

3.2.3 Test Protocol

eFDD 4	Temp. °C	Duration min	Voltage	Limit Hz	Freq. error Max. (Hz)	Verdict
	-30	0	normal	4331.25	60	passed
	-30	5			12	passed
	-30	10			-32	passed
	-20	0	normal	4331.25	-50	passed
	-20	5			63	passed
	-20	10			-18	passed
	-10	0	normal	4331.25	78	passed
	-10	5			-11	passed
	-10	10			262	passed
	0	0	normal	4331.25	121	passed
	0	5			5	passed
	0	10			51	passed
	10	0	normal	4331.25	-92	passed
	10	5			-19	passed
	10	10			-18	passed
	20	0	low	4331.25	-12	passed
	20	5			65	passed
	20	10			-9	passed
	20	0	normal = high ¹⁾	4331.25	-73	passed
	20	5			-105	passed
	20	10			109	passed
	20	0	high	4331.25	-60	passed
	20	5			-120	passed
	20	10			2	passed
	30	0	normal	4331.25	-74	passed
	30	5			60	passed
	30	10			7	passed
40	0	normal	4331.25	-40	passed	
40	5			113	passed	
40	10			-74	passed	
50	0	normal	4331.25	-63	passed	
50	5			34	passed	
50	10			-34	passed	

eFDD 7	Temp. °C	Duration min	Voltage	Limit Hz	Freq. error Max. (Hz)	Verdict
	-30	0	normal	6337.5	34	passed
	-30	5			8	passed
	-30	10			56	passed
	-20	0	normal	6337.5	21	passed
	-20	5			-7	passed
	-20	10			-24	passed
	-10	0	normal	6337.5	-8	passed
	-10	5			61	passed
	-10	10			61	passed
	0	0	normal	6337.5	-5	passed
	0	5			76	passed
	0	10			-8	passed
	10	0	normal	6337.5	66	passed
	10	5			8	passed
	10	10			-87	passed
	20	0	low	6337.5	21	passed
	20	5			104	passed
	20	10			431	passed
	20	0	normal = high ¹⁾	6337.5	17	passed
	20	5			-8	passed
	20	10			-19	passed
	20	0	high	6337.5	78	passed
	20	5			-41	passed
20	10	-23			passed	
30	0	normal	6337.5	-41	passed	
30	5			2	passed	
30	10			59	passed	
40	0	normal	6337.5	-24	passed	
40	5			72	passed	
40	10			10	passed	
50	0	normal	6337.5	42	passed	
50	5			31	passed	
50	10			7	passed	

eFDD 17	Temp. °C	Duration min	Voltage	Limit Hz	Freq. error Max. (Hz)	Verdict
	-30	0	normal	2130	57	passed
	-30	5			15	passed
	-30	10			64	passed
	-20	0	normal	2130	-25	passed
	-20	5			45	passed
	-20	10			25	passed
	-10	0	normal	2130	30	passed
	-10	5			29	passed
	-10	10			15	passed
	0	0	normal	2130	5	passed
	0	5			43	passed
	0	10			12	passed
	10	0	normal	2130	31	passed
	10	5			28	passed
	10	10			28	passed
	20	0	low	2130	20	passed
	20	5			28	passed
	20	10			37	passed
	20	0	normal = high ¹⁾	2130	13	passed
	20	5			-16	passed
	20	10			14	passed
	20	0	high	2130	-34	passed
	20	5			23	passed
	20	10			7	passed
	30	0	normal	2130	40	passed
	30	5			-13	passed
	30	10			22	passed
40	0	normal	2130	23	passed	
40	5			7	passed	
40	10			23	passed	
50	0	normal	2130	9	passed	
50	5			20	passed	
50	10			15	passed	

3.3 Spurious emissions at antenna terminals

Standard FCC Part 27, Subpart C

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) [$\geq 1\%$ 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.

§ 27.53 Emission limits

(h) For operations in the 1710–1755 MHz and 2110–2155 MHz bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least $43 + 10 \log_{10}(P)$ dB.

Remark of the test laboratory: This is calculated to be -13 dBm.

(1) Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. 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.

(2) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the licensee's frequency block edges, both upper and lower, as the design permits.

(3) The measurements of emission power can be expressed in peak or average values, provided they are expressed in the same parameters as the transmitter power.

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

3.3.3 Test Protocol

Band / Band width	Modulation	Channel	detector	trace	resolution band width /kHz	frequency /MHz	peak value /dBm	margin to limit /dB	limit /dBm	verdict
eFDD4 / 5MHz	QPSK	19975	rms	maxhold	100	1708.96	-24.4	11.4	-13.0	passed
			rms	maxhold	50	1709.99	-24.1	11.1	-13.0	passed
		20375	rms	maxhold	1000	2132.265	-42.03	29.03	-13	passed
			rms	maxhold	50	1755.00	-25.2	12.2	-13.0	passed
			rms	maxhold	100	1756.00	-23.4	10.4	-13.0	passed
	16QAM	19975	rms	maxhold	100	1708.93	-24.9	11.9	-13.0	passed
			rms	maxhold	50	1709.99	-24.9	11.9	-13.0	passed
		20375	rms	maxhold	1000	2132.265	-42.03	29.03	-13	passed
			rms	maxhold	50	1755.01	-26.0	13.0	-13.0	passed
			rms	maxhold	100	1756.04	-23.7	10.7	-13.0	passed
eFDD7 / 5MHz	QPSK	20775	rms	maxhold	100	2498.89	-23.2	10.2	-13.0	passed
			rms	maxhold	50	2500.00	-24.9	11.9	-13.0	passed
		21425	rms	maxhold	1000	2653.533	-41.83	28.83	-13	passed
			rms	maxhold	50	2570	-26.1	13.1	-13	passed
			rms	maxhold	100	2571.04	-22.8	9.8	-13	passed
	16QAM	20775	rms	maxhold	100	2498.91	-23.1	10.1	-13	passed
			rms	maxhold	50	2500	-24.8	11.8	-13	passed
		21425	rms	maxhold	1000	2653.533	-41.46	28.46	-13	passed
			rms	maxhold	50	2570	-26.5	13.5	-13	passed
			rms	maxhold	100	2571	-22.8	9.8	-13	passed
eFDD17 / 5MHz	QPSK	23755	rms	maxhold	50	703.99	-23.7	10.7	-13.0	passed
		23790	rms	maxhold	50	703.856	-37.62	24.62	-13	passed
		23825	rms	maxhold	50	716.00	-26.7	13.7	-13.0	passed
	16QAM	23755	rms	maxhold	100	702.96	-32.9	19.9	-13.0	passed
			rms	maxhold	50	704.00	-24.9	11.9	-13.0	passed
		23790	rms	maxhold	50	703.886	-39.84	26.84	-13	passed
			rms	maxhold	50	716.00	-27.3	14.3	-13.0	passed
			rms	maxhold	100	717.05	-32.4	19.4	-13.0	passed

3.4 Emission and Occupied Bandwidth

Standard FCC Part 27, Subpart C

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 4							
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	1710.7	1.184369	1.190381	low	1711.50 MHz	2.717435	2.729459
mid	1732.5	1.184369	1.196393	mid	1732.50 MHz	2.717435	2.717435
High	1754.3	1.178357	1.178357	High	1753.50 MHz	2.717435	2.729459

LTE Band 4							
Channel BW: 5MHz				Channel BW: 10 MHz			
Channel	Frequency (MHz)	99% BW (MHz)		Channel	Frequency (MHz)	99% BW (MHz)	
		QPSK	16QAM			QPSK	16QAM
low	1712.50 MHz	4.569138	4.569138	low	1715.00 MHz	8.977956	8.977956
mid	1732.50 MHz	4.569138	4.569138	mid	1732.50 MHz	8.977956	8.977956
High	1752.50 MHz	4.569138	4.569138	High	1750.00 MHz	8.977956	8.977956

LTE Band 4							
Channel BW: 15MHz				Channel BW: 20 MHz			
Channel	Frequency (MHz)	99% BW (MHz)		Channel	Frequency (MHz)	99% BW (MHz)	
		QPSK	16QAM			QPSK	16QAM
low	1717.50 MHz	13.46693	13.46693	low	1720.00 MHz	17.87575	17.95591
mid	1732.50 MHz	13.58717	13.58717	mid	1732.50 MHz	17.95591	17.96691
High	1747.50 MHz	13.58717	13.52705	High	1745.00 MHz	17.95591	17.95591

LTE Band 7							
Channel BW: 5MHz				Channel BW: 10 MHz			
Channel	Frequency (MHz)	99% BW (MHz)		Channel	Frequency (MHz)	99% BW (MHz)	
		QPSK	16QAM			QPSK	16QAM
low	2502.50 MHz	4.569138	4.569138	low	2505.00 MHz	8.977956	8.977956
mid	2535.00 MHz	4.593186	4.569138	mid	2535.00 MHz	8.977956	8.977956
High	2567.50 MHz	4.593186	4.569138	High	2565.00 MHz	8.977956	8.977956

LTE Band 7							
Channel BW: 15MHz				Channel BW: 20 MHz			
Channel	Frequency (MHz)	99% BW (MHz)		Channel	Frequency (MHz)	99% BW (MHz)	
		QPSK	16QAM			QPSK	16QAM
low	2507.50 MHz	13.58717	13.58717	low	2510.00 MHz	17.95591	17.95591
mid	2535.00 MHz	13.52705	13.52705	mid	2535.00 MHz	17.95591	17.95591
High	2562.50 MHz	13.52705	13.52705	High	2560.00 MHz	17.87575	17.95591

LTE Band 17							
Channel BW: 5MHz				Channel BW: 10 MHz			
Channel	Frequency (MHz)	99% BW (MHz)		Channel	Frequency (MHz)	99% BW (MHz)	
		QPSK	16QAM			QPSK	16QAM
low	706.50 MHz	4.59318637	4.5691383	low	709 MHz	8.97795591	8.977956
mid	710.00 MHz	4.56913828	4.5691383	mid	710.00 MHz	8.97795591	8.977956
High	713.5 MHz	4.56913828	4.5691383	High	711.00 MHz	8.97795591	8.977956

3.5 Band edge compliance

Standard FCC Part 24, Subpart C

The test was performed according to: FCC §27.53

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

§ 27.53 Emission limitations for cellular equipment

(h) For operations in the 1710–1755 MHz and 2110–2155 MHz bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least $43 + 10 \log_{10}(P)$ dB.

Remark of the test laboratory: This is calculated to be -13 dBm.

(1) Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. 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.

(2) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the licensee's frequency block edges, both upper and lower, as the design permits.

(3) The measurements of emission power can be expressed in peak or average values, provided they are expressed in the same parameters as the transmitter power.

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

3.5.3 Test Protocol

Band	Band width (MHz)	Modulation	Resource Blocks / Offset	Channel	Detector	Frequency (MHz)	Peak Value (dBm)	Limit (dBm)	Verdict
eFDD4	1.4	QPSK	6 / 0	19957	Average	1710	-20.08	-13	Passed
	1.4	QPSK	6 / 0	19957	RMS	1710	-17.83	-13	Passed
	1.4	QPSK	6 / Max	20393	Average	1755	-19.8	-13	Passed
	1.4	QPSK	6 / Max	20393	RMS	1755	-17.68	-13	Passed
	1.4	16QAM	6 / 0	19957	Average	1710	-21.54	-13	Passed
	1.4	16QAM	6 / 0	19957	RMS	1710	-19.35	-13	Passed
	1.4	16QAM	6 / Max	20393	Average	1755	-20.38	-13	Passed
	1.4	16QAM	6 / Max	20393	RMS	1755	-18.05	-13	Passed
	3	QPSK	15 / 0	19965	Average	1710	-23.14	-13	Passed
	3	QPSK	15 / 0	19965	RMS	1710	-19.62	-13	Passed
	3	QPSK	15 / Max	20385	Average	1755	-23.7	-13	Passed
	3	QPSK	15 / Max	20385	RMS	1755	-20.08	-13	Passed
	3	16QAM	15 / 0	19965	Average	1710	-24.3	-13	Passed
	3	16QAM	15 / 0	19965	RMS	1710	-20.78	-13	Passed
	3	16QAM	15 / Max	20385	Average	1755	-24.3	-13	Passed
	3	16QAM	15 / Max	20385	RMS	1755	-20.58	-13	Passed
	5	QPSK	25 / 0	19975	Average	1710	-28.14	-13	Passed
	5	QPSK	25 / 0	19975	RMS	1710	-24.3	-13	Passed
	5	QPSK	25 / Max	20375	Average	1755	-28.9	-13	Passed
	5	QPSK	25 / Max	20375	RMS	1755	-25.29	-13	Passed
5	16QAM	25 / 0	19975	Average	1710	-29.44	-13	Passed	
5	16QAM	25 / 0	19975	RMS	1710	-25.82	-13	Passed	
5	16QAM	25 / Max	20375	Average	1755	-29.72	-13	Passed	
5	16QAM	25 / Max	20375	RMS	1755	-26.2	-13	Passed	
eFDD4	10	QPSK	50 / 0	20000	Average	1710	-34.66	-13	Passed
	10	QPSK	50 / 0	20000	RMS	1710	-31.31	-13	Passed
	10	QPSK	50 / Max	20350	Average	1755	-34.16	-13	Passed
	10	QPSK	50 / Max	20350	RMS	1755	-31.31	-13	Passed
	10	16QAM	50 / 0	20000	Average	1710	-36.34	-13	Passed
	10	16QAM	50 / 0	20000	RMS	1710	-33.24	-13	Passed
	10	16QAM	50 / Max	20350	Average	1755	-35.18	-13	Passed
	10	16QAM	50 / Max	20350	RMS	1755	-32.82	-13	Passed
	15	QPSK	75 / 0	20025	Average	1710	-35.18	-13	Passed
	15	QPSK	75 / 0	20025	RMS	1710	-32.42	-13	Passed
	15	QPSK	75 / Max	20325	Average	1755	-33.24	-13	Passed
	15	QPSK	75 / Max	20325	RMS	1755	-30.97	-13	Passed
	15	16QAM	75 / 0	20025	Average	1710	-36.34	-13	Passed
	15	16QAM	75 / 0	20025	RMS	1710	-33.69	-13	Passed

	15	16QAM	75 / Max	20325	Average	1755	-34.66	-13	Passed
	15	16QAM	75 / Max	20325	RMS	1755	-32.82	-13	Passed
	20	QPSK	100 / 0	20050	Average	1710	-37.68	-13	Passed
	20	QPSK	100 / 0	20050	RMS	1710	-36.34	-13	Passed
	20	QPSK	100 / Max	20300	Average	1755	-33.69	-13	Passed
	20	QPSK	100 / Max	20300	RMS	1755	-32.42	-13	Passed
	20	16QAM	100 / 0	20050	Average	1710	-38.44	-13	Passed
	20	16QAM	100 / 0	20050	RMS	1710	-36.9	-13	Passed
	20	16QAM	100 / Max	20300	Average	1755	-35.18	-13	Passed
	20	16QAM	100 / Max	20300	RMS	1755	-34.16	-13	Passed

Band	Band width (MHz)	Modulation	Resource Blocks / Offset	Channel	Detector	Frequency (MHz)	Peak Value (dBm)	Limit (dBm)	Verdict
eFDD7	5	QPSK	25 / 0	20775	Average	2500	-27.94	-13	Passed
	5	QPSK	25 / 0	20775	RMS	2500	-24.75	-13	Passed
	5	QPSK	25 / Max	21425	Average	2570	-29.24	-13	Passed
	5	QPSK	25 / Max	21425	RMS	2570	-26.4	-13	Passed
	5	16QAM	25 / 0	20775	Average	2500	-28.7	-13	Passed
	5	16QAM	25 / 0	20775	RMS	2500	-25.62	-13	Passed
	5	16QAM	25 / Max	21425	Average	2570	-29.52	-13	Passed
	5	16QAM	25 / Max	21425	RMS	2570	-26.81	-13	Passed
	10	QPSK	50 / 0	20800	Average	2500	-34.98	-13	Passed
	10	QPSK	50 / 0	20800	RMS	2500	-32.22	-13	Passed
	10	QPSK	50 / Max	21400	Average	2570	-34.46	-13	Passed
	10	QPSK	50 / Max	21400	RMS	2570	-32.22	-13	Passed
	10	16QAM	50 / 0	20800	Average	2500	-34.46	-13	Passed
	10	16QAM	50 / 0	20800	RMS	2500	-32.22	-13	Passed
	10	16QAM	50 / Max	21400	Average	2570	-34.98	-13	Passed
	10	16QAM	50 / Max	21400	RMS	2570	-33.04	-13	Passed
	15	QPSK	75 / 0	20825	Average	2500	-34.98	-13	Passed
	15	QPSK	75 / 0	20825	RMS	2500	-32.62	-13	Passed
	15	QPSK	75 / Max	21375	Average	2570	-34.98	-13	Passed
	15	QPSK	75 / Max	21375	RMS	2570	-33.04	-13	Passed
	15	16QAM	75 / 0	20825	Average	2500	-34.46	-13	Passed
	15	16QAM	75 / 0	20825	RMS	2500	-32.62	-13	Passed
	15	16QAM	75 / Max	21375	Average	2570	-34.98	-13	Passed
	15	16QAM	75 / Max	21375	RMS	2570	-33.49	-13	Passed
20	QPSK	100 / 0	20850	Average	2500	-36.79	-13	Passed	
20	QPSK	100 / 0	20850	RMS	2500	-35.54	-13	Passed	

	20	QPSK	100 /Max	21350	Average	2570	-35.54	-13	Passed
	20	QPSK	100 /Max	21350	RMS	2570	-34.46	-13	Passed
	20	16QAM	100 / 0	20850	Average	2500	-36.14	-13	Passed
	20	16QAM	100 / 0	20850	RMS	2500	-34.98	-13	Passed
	20	16QAM	100 /Max	21350	Average	2570	-36.14	-13	Passed
	20	16QAM	100 /Max	21350	RMS	2570	-34.98	-13	Passed

Band	Band width (MHz)	Modulation	Resource Blocks / Offset	Channel	Detector	Frequency (MHz)	Peak Value (dBm)	Limit (dBm)	Verdict
eFDD17	5	QPSK	1 / 0	23755	Average	704	-28.54	-13	Passed
		QPSK	1 / 0	23755	RMS	704	-24.25	-13	Passed
		QPSK	1 / Max	23825	Average	716	-30.42	-13	Passed
		QPSK	1 / Max	23825	RMS	716	-27	-13	Passed
		16QAM	1 / 0	23755	Average	704	-29.3	-13	Passed
		16QAM	1 / 0	23755	RMS	704	-25.02	-13	Passed
		16QAM	1 / Max	23825	Average	716	-30.42	-13	Passed
		16QAM	1 / Max	23825	RMS	716	-27.92	-13	Passed
	10	QPSK	1 / 0	23780	Average	704	-33.22	-13	Passed
		QPSK	1 / 0	23780	RMS	704	-30.42	-13	Passed
		QPSK	1 / Max	23800	Average	716	-34.56	-13	Passed
		QPSK	1 / Max	23800	RMS	716	-32.06	-13	Passed
		16QAM	1 / 0	23780	Average	704	-33.22	-13	Passed
		16QAM	1 / 0	23780	RMS	704	-31.04	-13	Passed
		16QAM	1 / Max	23800	Average	716	-34.56	-13	Passed
		16QAM	1 / Max	23800	RMS	716	-32.43	-13	Passed

3.6 Power to Average Ratio

Standard FCC §2.1046, §27.50 (d)

The test was performed according to: §2.1046, §27.50 (d)

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	Bandwidth (MHz) / RB	Channel	Modulation	Measured Value (dB)	Limit	Verdict
eFDD4	1.4 MHz / 6	19957	QPSK	5.48	13 dB	Passed
		20175		5.04	13 dB	Passed
		20393		5.13	13 dB	Passed
		19957	16-QAM	6.43	13 dB	Passed
		20175		5.94	13 dB	Passed
		20393		5.91	13 dB	Passed

Band	Bandwidth / RB	Channel	Modulation	Measured Value (dB)	Limit	Verdict
eFDD7	5 MHz / 25	CH 20775	QPSK	5.45	13 dB	Passed
		CH 21100		5.33	13 dB	Passed
		CH 21425		5.25	13 dB	Passed
		CH 20775	16-QAM	6.14	13 dB	Passed
		CH 21100		6	13 dB	Passed
		CH 21425		5.94	13 dB	Passed

Band	Bandwidth / RB	Channel	Modulation	Measured Value (dB)	Limit	Verdict
eFDD17	5 MHz / 25	Low	QPSK	5.45	13 dB	Passed
		mid		5.39	13 dB	Passed
		High		5.65	13 dB	Passed
		Low	16-QAM	6.32	13 dB	Passed
		mid		6.2	13 dB	Passed
		High		6.49	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 m ³		
	<i>Calibration Details</i>	<i>Last Execution</i>	<i>Next Exec.</i>
	NSA (FCC)	2014/01/09	2017/01/09

Single Devices for Anechoic Chamber

<i>Single Device Name</i>	<i>Type</i>	<i>Serial Number</i>	<i>Manufacturer</i>
Air compressor	none	-	Atlas Copco
Anechoic Chamber	10.58 x 6.38 x 6.00 m ³	none	Frankonia
	<i>Calibration Details</i>	<i>Last Execution</i>	<i>Next Exec.</i>
	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	
	<i>Calibration Details</i>		<i>Last Execution</i>	<i>Next Exec.</i>
	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	
	<i>Calibration Details</i>		<i>Last Execution</i>	<i>Next Exec.</i>
	Standard calibration		2014/05/13	2015/05/12
Signal Generator SME	SME03	827460/016	Rohde & Schwarz GmbH & Co.KG	
	<i>Calibration Details</i>		<i>Last Execution</i>	<i>Next Exec.</i>
	Standard calibration		2011/11/25	2014/11/24
Signal Generator SMP	SMP02	836402/008	Rohde & Schwarz GmbH & Co. KG	
	<i>Calibration Details</i>		<i>Last Execution</i>	<i>Next Exec.</i>
	Standard calibration		2013/05/06	2016/05/05
Spectrum Analyser	FSIQ26	840061/005	Rohde & Schwarz GmbH & Co. KG	
	<i>Calibration Details</i>		<i>Last Execution</i>	<i>Next Exec.</i>
	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
	<i>Calibration Details</i>		<i>Last Execution</i> <i>Next Exec.</i>
	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.
	<i>Calibration Details</i>		<i>Last Execution</i> <i>Next Exec.</i>
	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
	<i>Calibration Details</i>		<i>Last Execution</i> <i>Next Exec.</i>
	Standard		2014/02/10 2016/02/09
Spectrum Analyser	FSP3	836722/011	Rohde & Schwarz GmbH & Co. KG
	<i>Calibration Details</i>		<i>Last Execution</i> <i>Next Exec.</i>
	Standard		2012/06/13 2015/06/12
Spectrum Analyser	FSU26	200418	Rohde & Schwarz GmbH & Co.KG
	<i>Calibration Details</i>		<i>Last Execution</i> <i>Next Exec.</i>
	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.

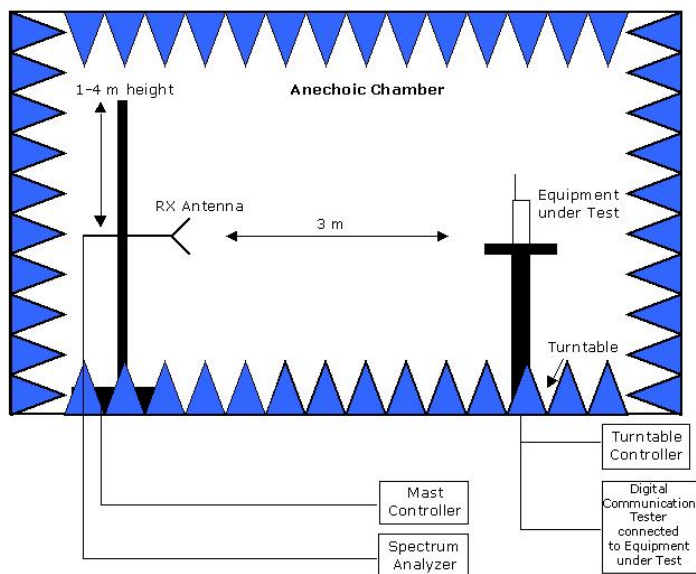
Single Devices for Digital Signalling Devices

Single Device Name	Type	Serial Number	Manufacturer	
Bluetooth Signalling Unit CBT	CBT	100589	Rohde & Schwarz GmbH & Co. KG	
	<i>Calibration Details</i>		<i>Last Execution</i>	<i>Next Exec.</i>
	Standard calibration		2011/11/24	2014/11/23
CMW500	CMW500	107500	Rohde & Schwarz GmbH & Co.KG	
	<i>Calibration Details</i>		<i>Last Execution</i>	<i>Next Exec.</i>
	Standard calibration		2014/01/27	2016/01/26
Digital Radio Communication Tester	CMD 55	831050/020	Rohde & Schwarz GmbH & Co. KG	
	<i>Calibration Details</i>		<i>Last Execution</i>	<i>Next Exec.</i>
	Standard calibration		2011/11/28	2014/11/27
Universal Radio Communication Tester	CMU 200	102366	Rohde & Schwarz GmbH & Co. KG	
	<i>HW/SW Status</i>		<i>Date of Start</i>	<i>Date of End</i>
	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	
	<i>Calibration Details</i>		<i>Last Execution</i>	<i>Next Exec.</i>
	Standard calibration		2011/12/07	2014/12/06
	<i>HW/SW Status</i>		<i>Date of Start</i>	<i>Date of End</i>
	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 --- SW: K62, K69		2007/01/02	
Vector Signal Generator	SMU200A	100912	Rohde & Schwarz GmbH & Co. KG	

5 Photo Report

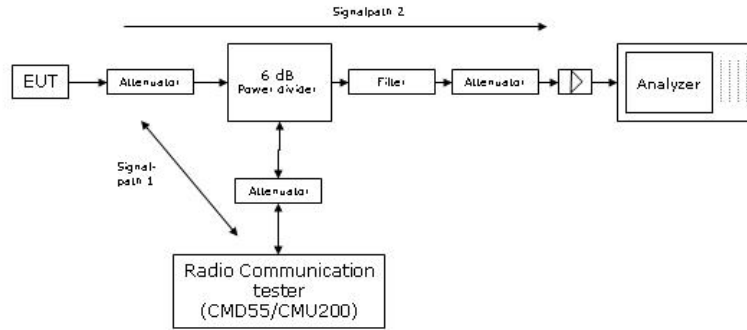
Photos are included in an external report.

6 Setup Drawings



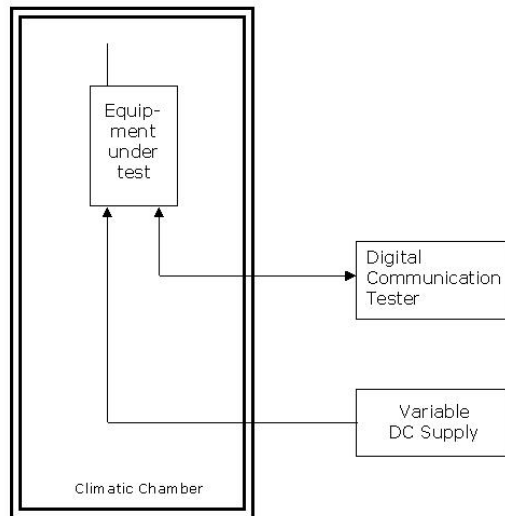
Remark: Depending on the frequency range suitable antenna types, attenuators or preamplifiers are used.

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



Remark: Depending on the frequency range suitable attenuators and/or filters and/or amplifiers are used.

Principle set-up for conducted measurements under nominal conditions

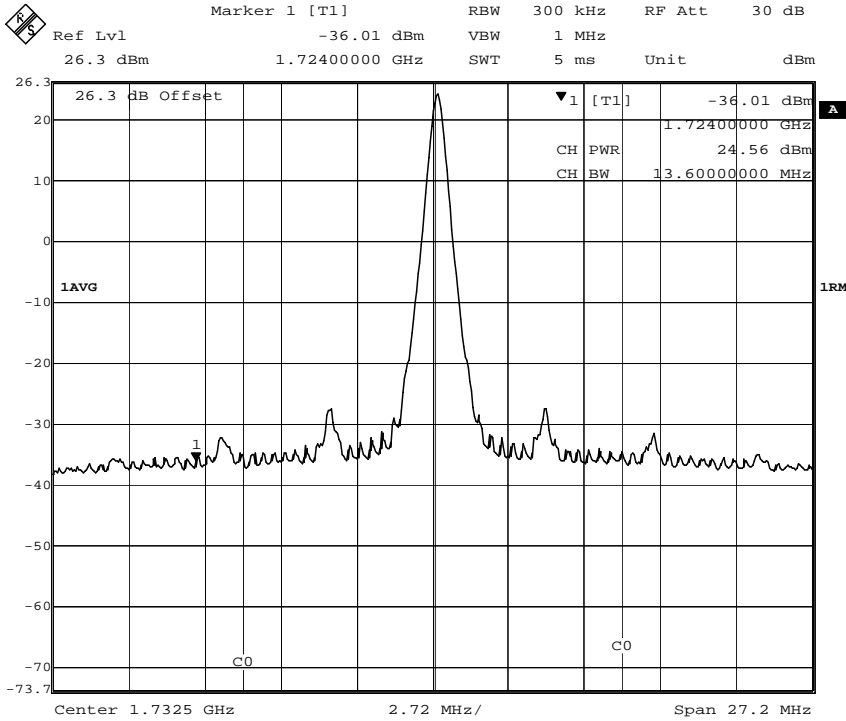


Principle set-up for tests under extreme test conditions

7 Annex measurement plots (worst case)

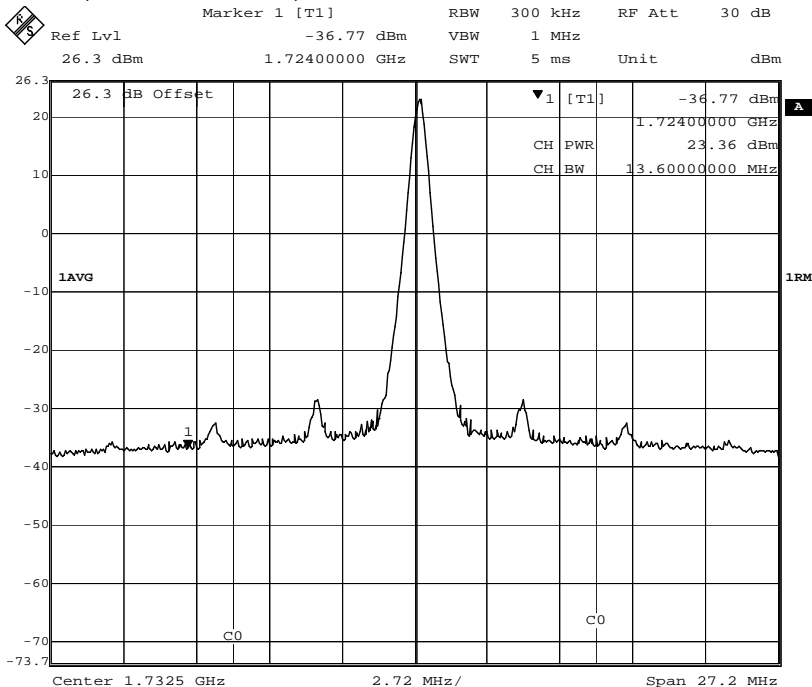
7.1 RF Power Output

FDD 4, Channel 20175, QPSK



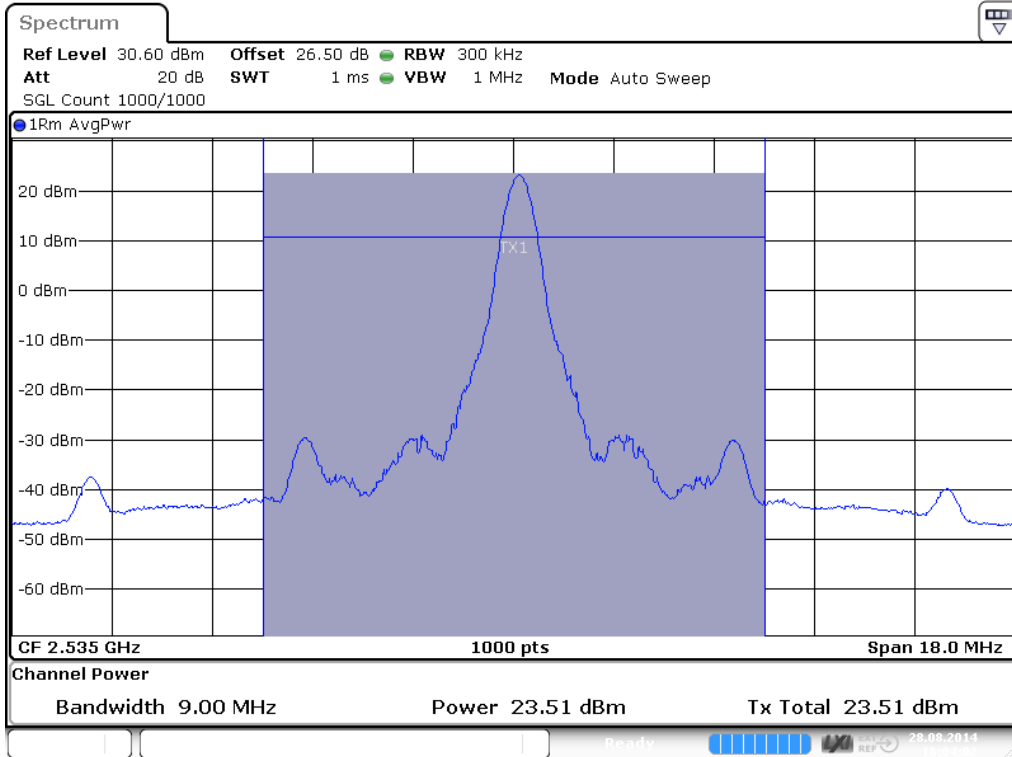
Date: 27.AUG.2014 21:54:43

FDD 4, Channel 20175, 16QAM



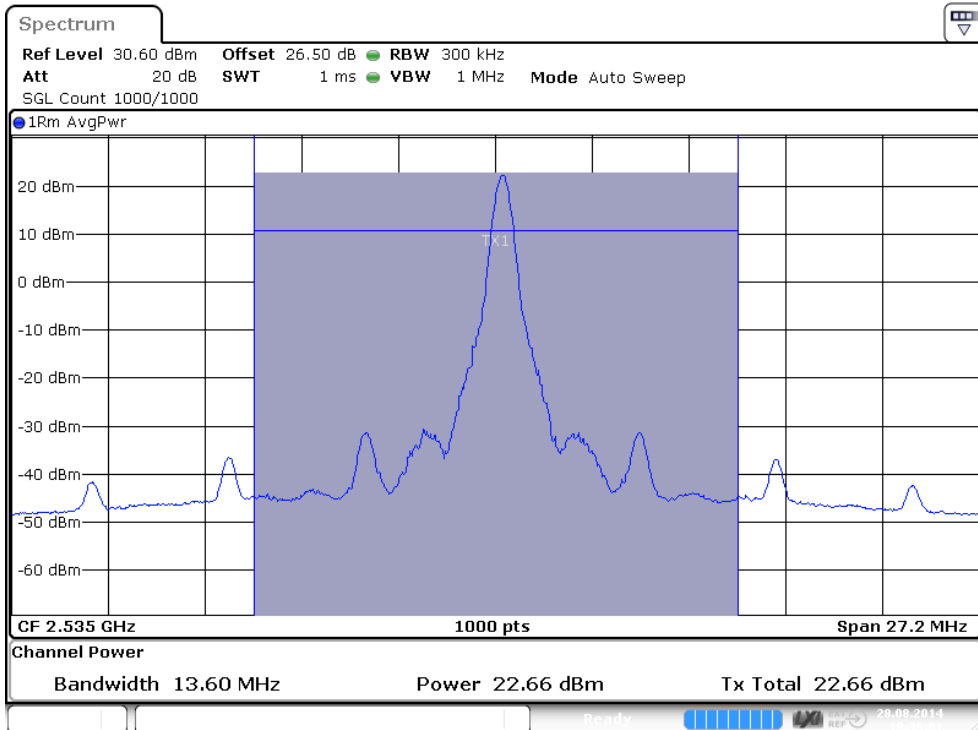
Date: 27.AUG.2014 21:55:24

FDD 7, Channel 21100, QPSK



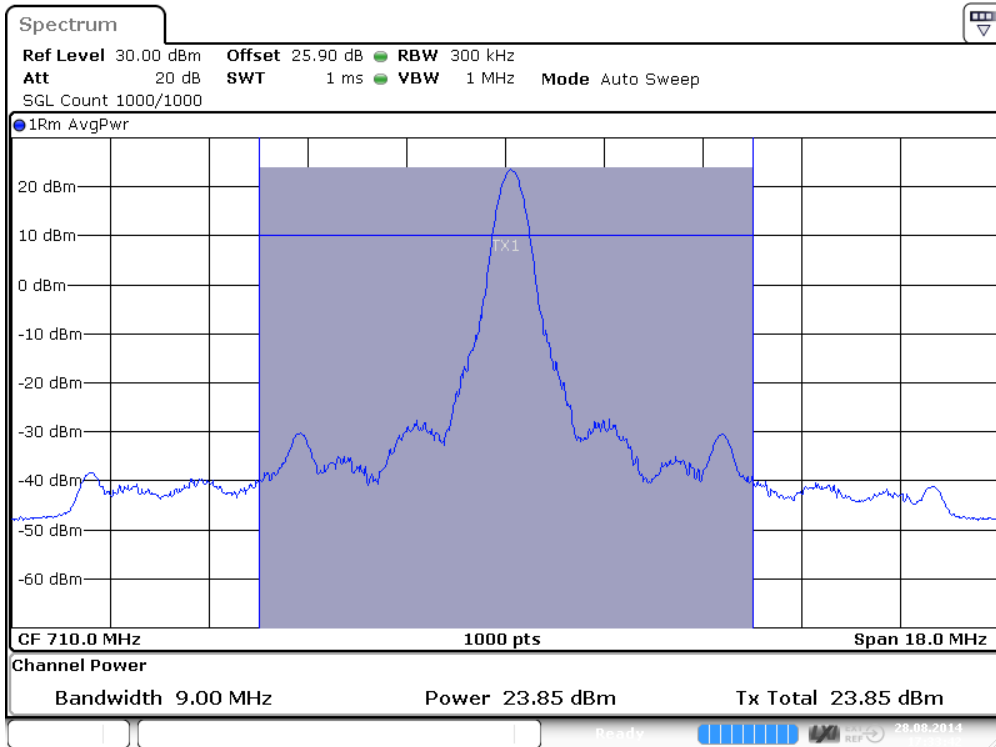
Date: 28 AUG 2014 18:04:02

FDD 7, Channel 21100, 16QAM



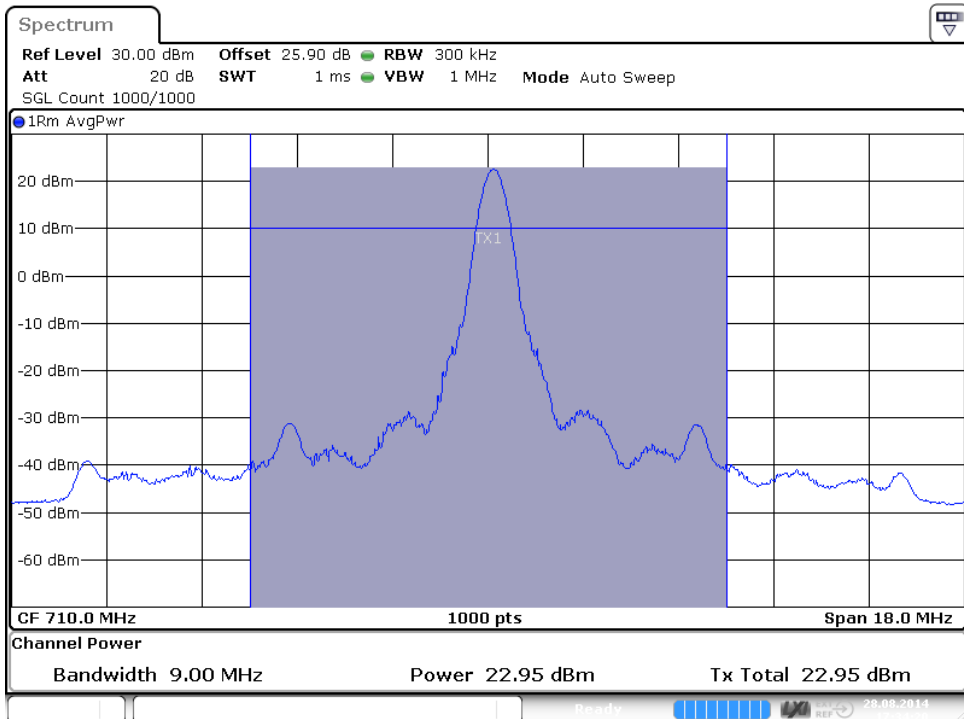
Date: 28 AUG 2014 18:36:02

FDD 17, Channel 23790, QPSK



Date: 28 AUG 2014 17:33:42

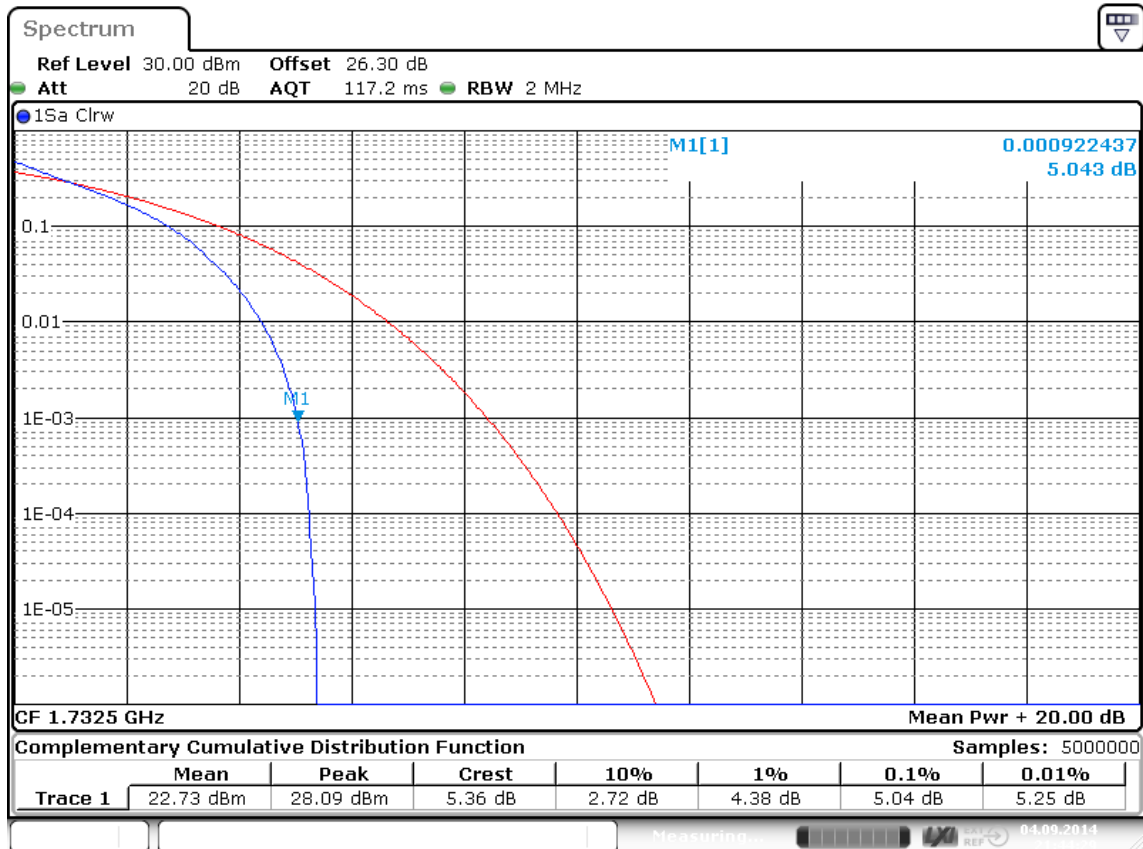
FDD 17, Channel 23790, QPSK



Date: 28 AUG 2014 17:34:21

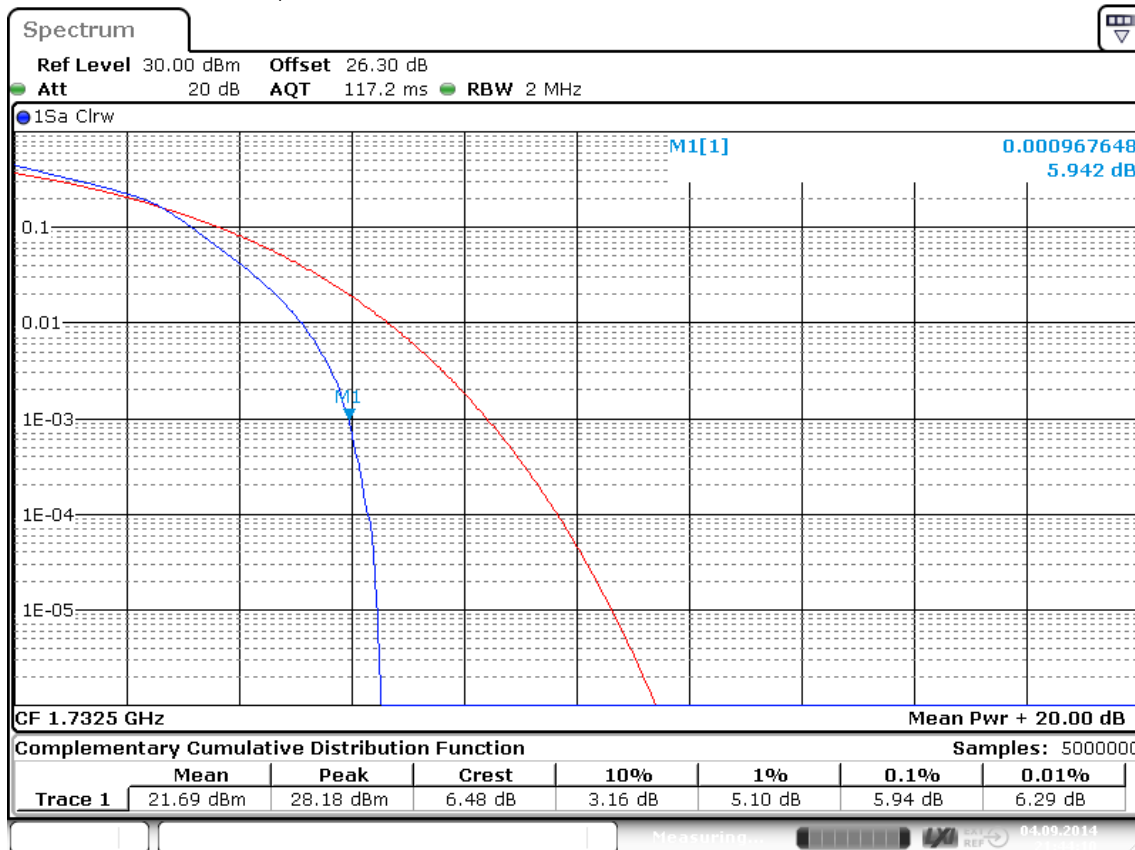
7.2 Peak to Average Ratio

FDD4 Channel 20175, QPSK



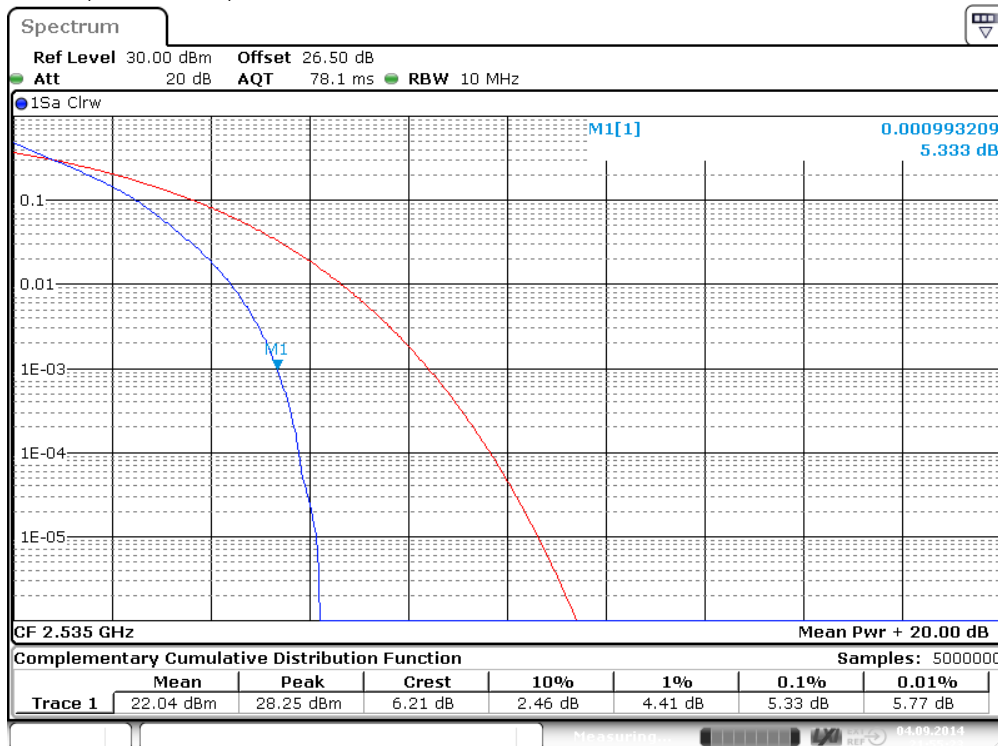
Date: 4 SEP 2014 21:44:29

FDD4 Channel 20175, 16QAM

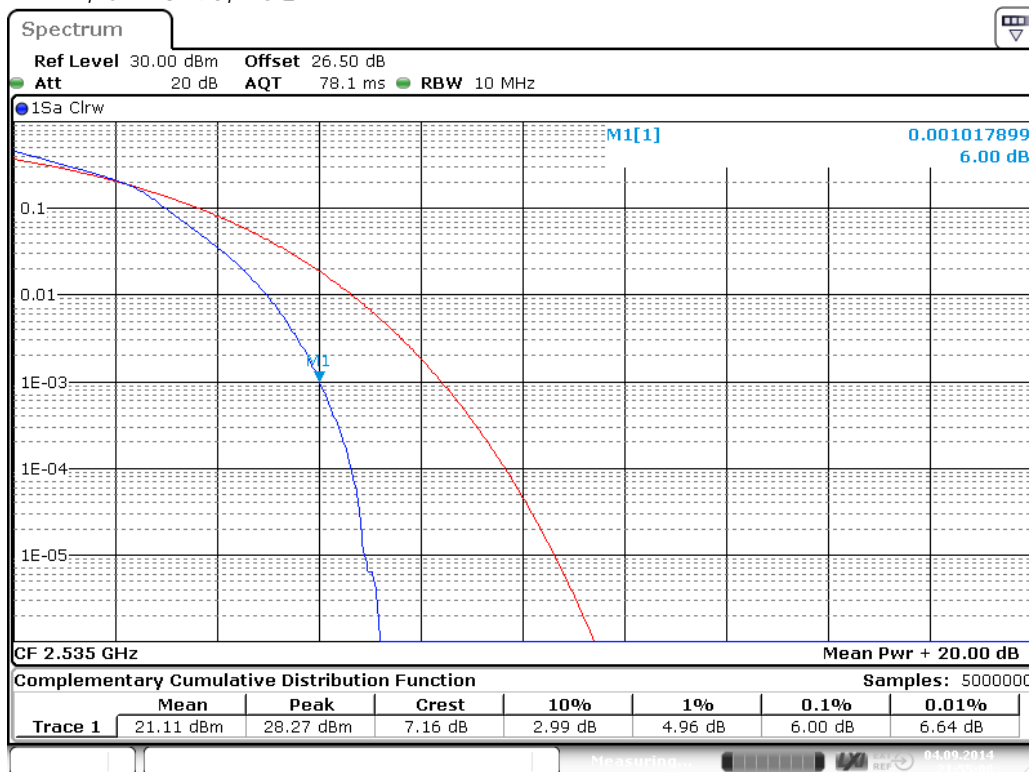


Date: 4 SEP 2014 21:44:10

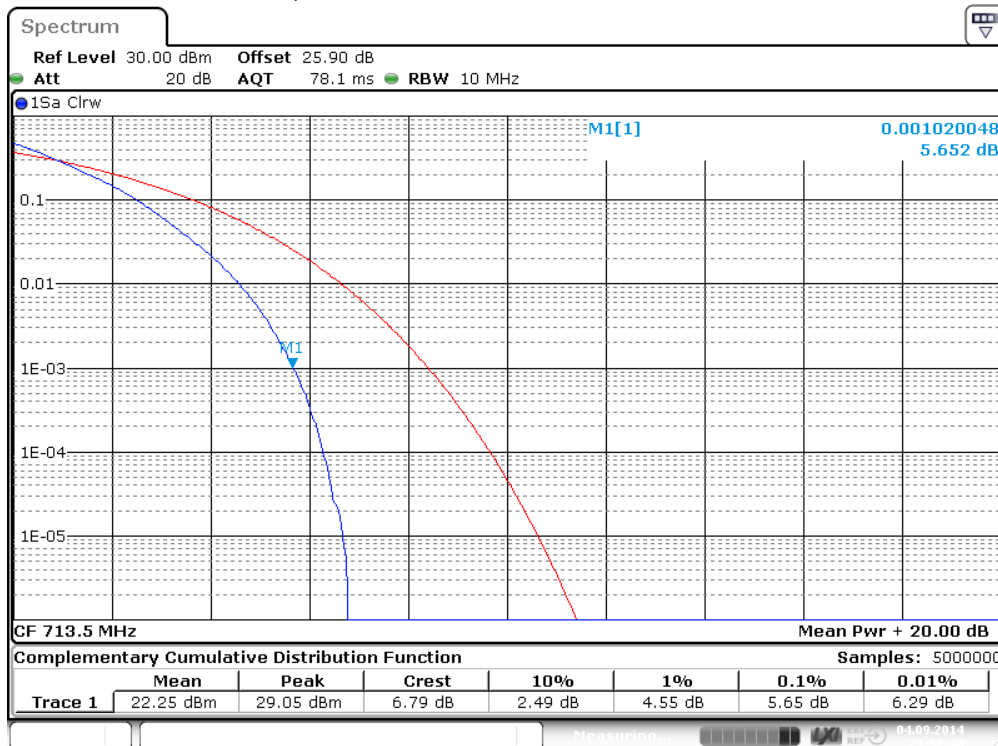
FDD 7, Ch 23790, QPSK



FDD 7, Ch 23790, 16QAM

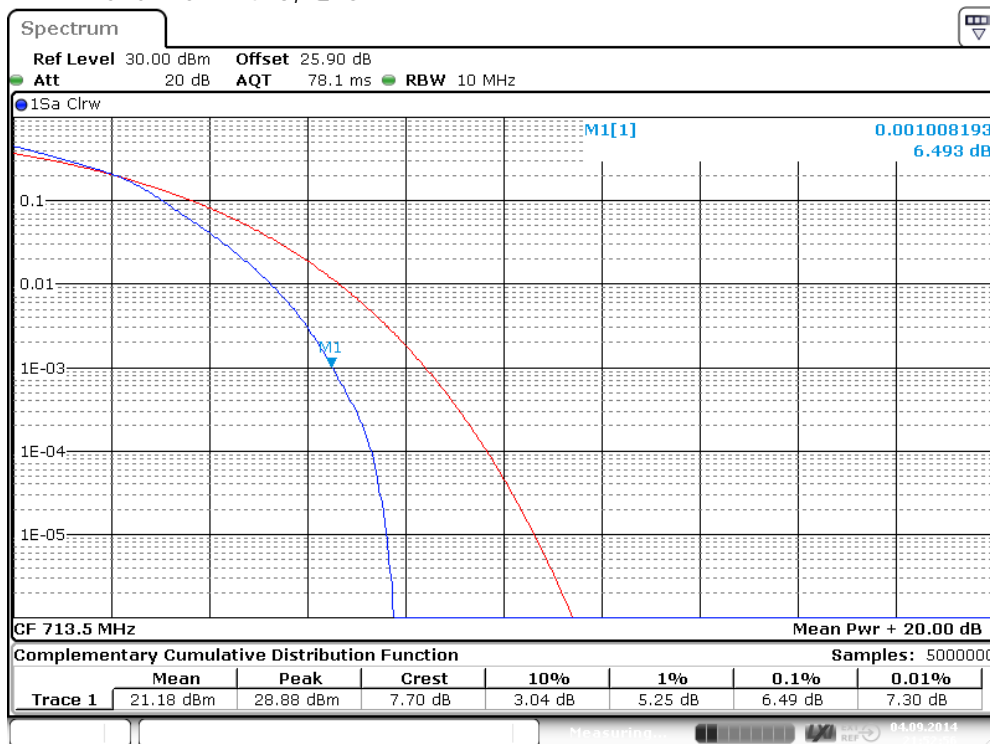


FDD17 Channel 21425, QPSK



Date: 4 SEP. 2014 21:52:41

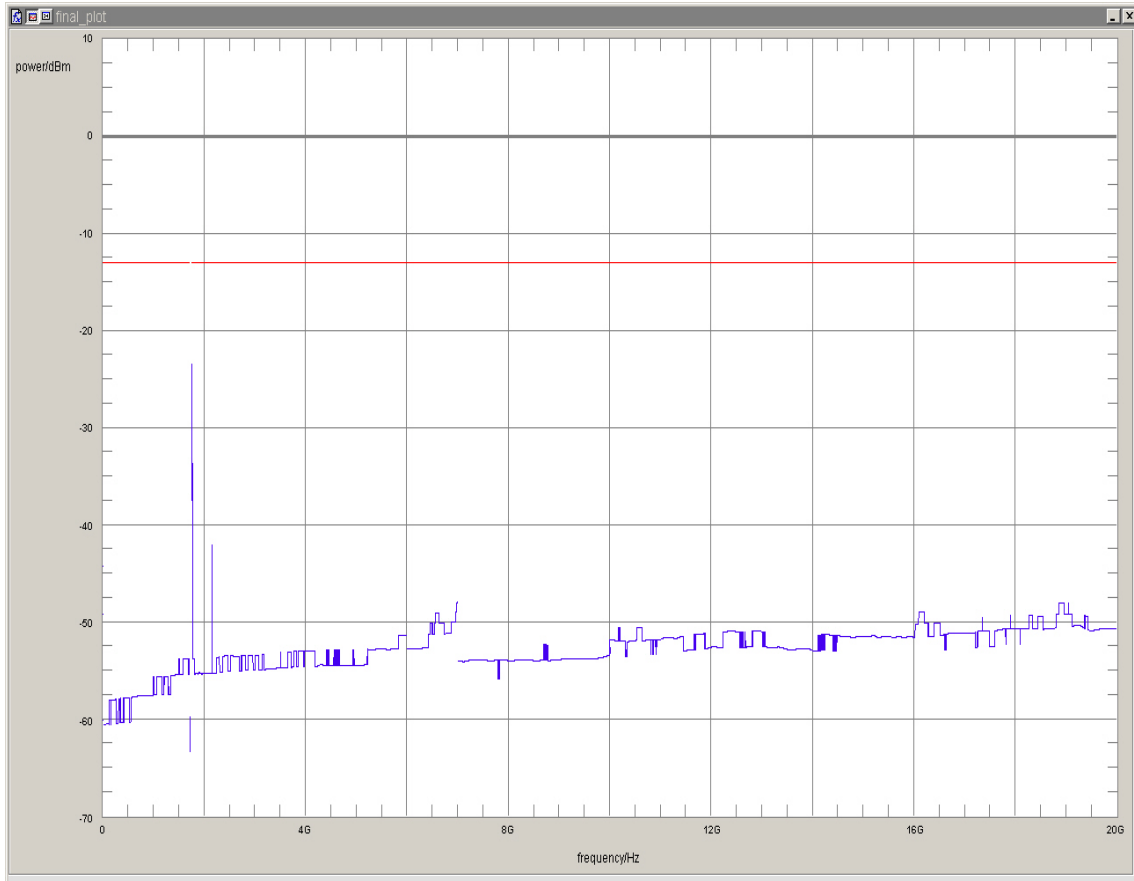
FDD17 Channel 21425, QPSK



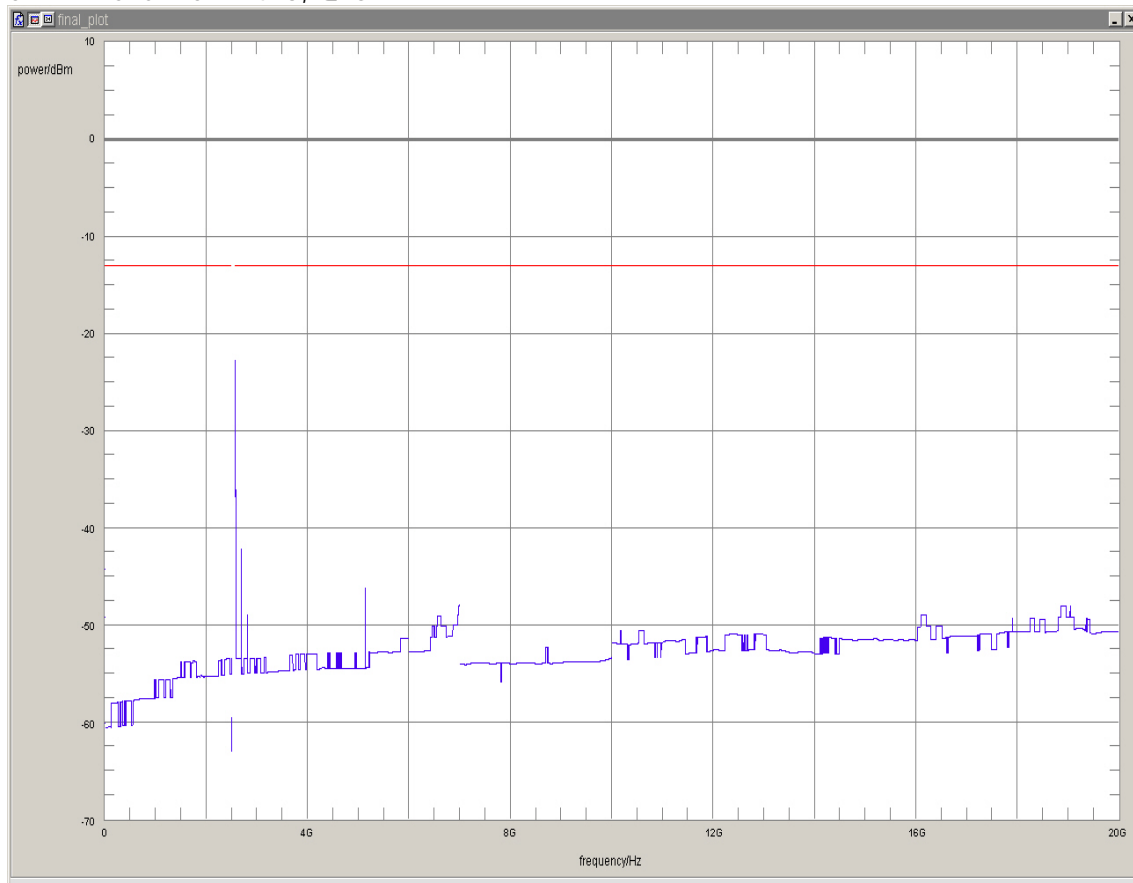
Date: 4 SEP. 2014 21:52:56

7.3 Spurious emissions at antenna terminals

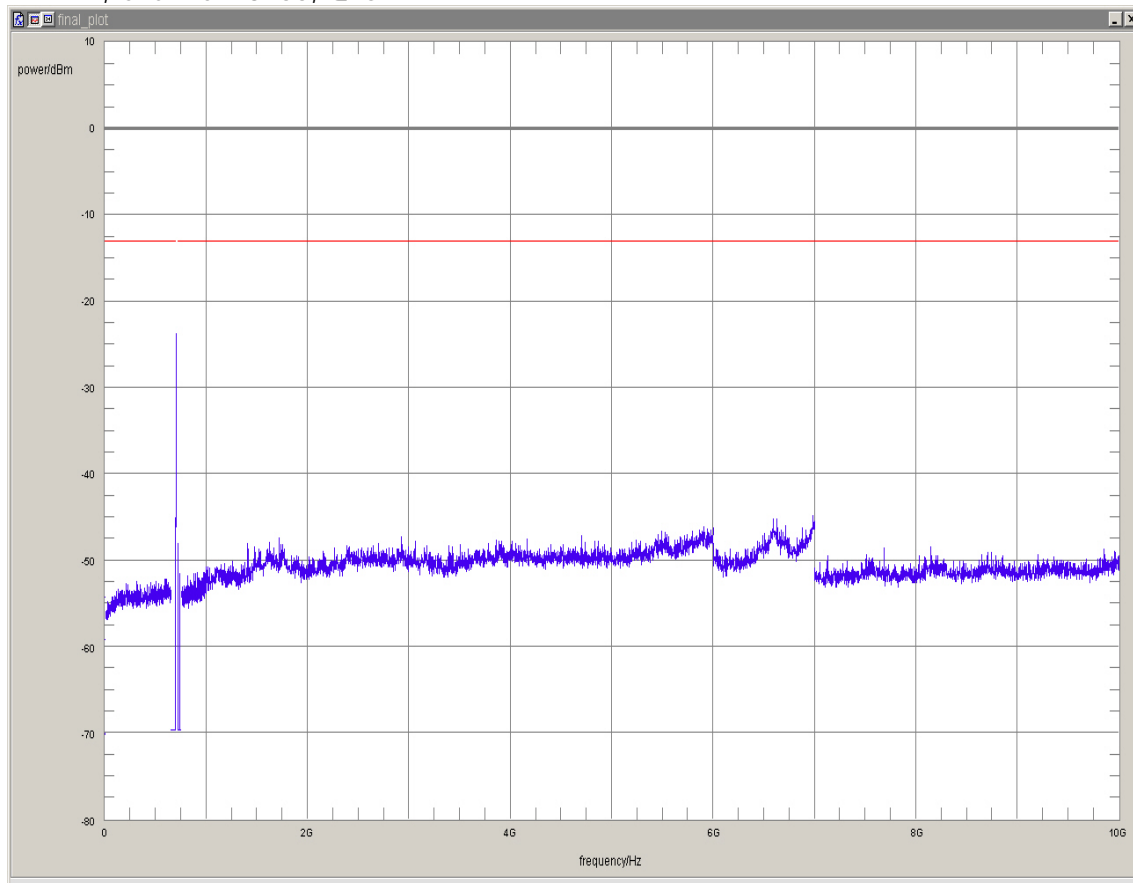
eFDD4 Channel 20375, QPSK



eFDD 7 Channel 21425, QPSK

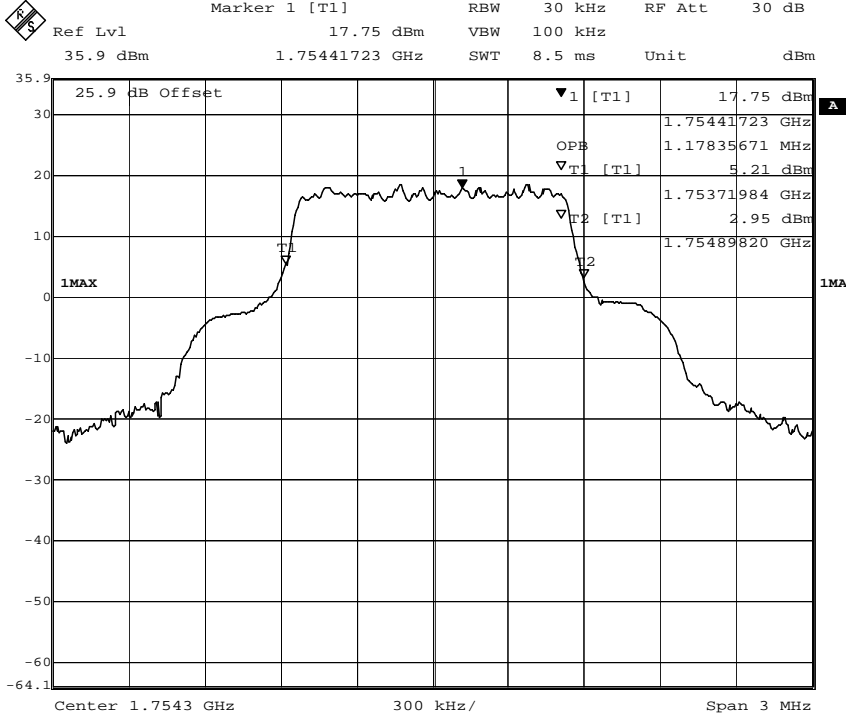


FDD 17, Channel 23755, QPSK



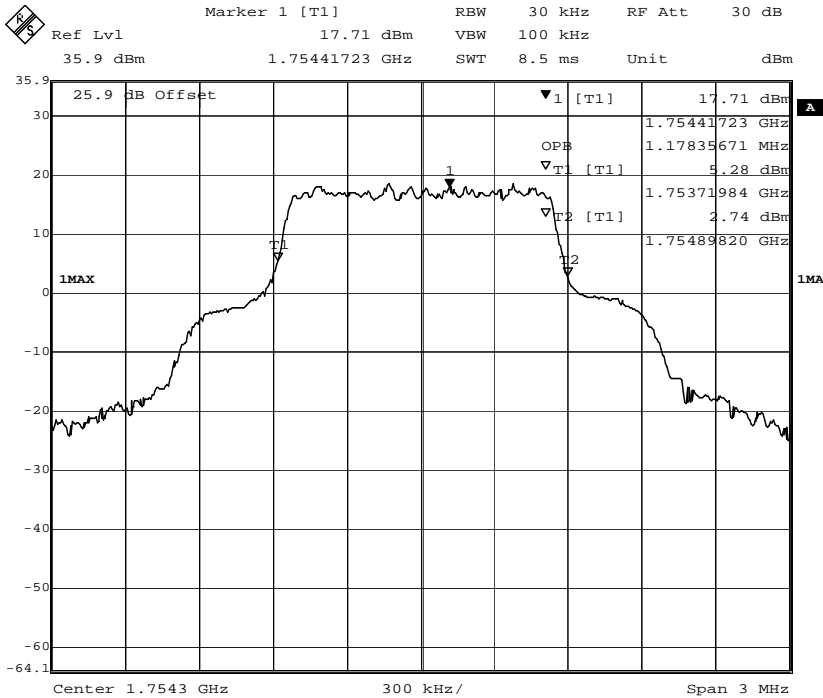
7.4 Emission and Occupied Bandwidth

FDD 4 1754.3 MHz, CBW 1.4 MHz, QPSK




Date: 27.AUG.2014 18:09:09

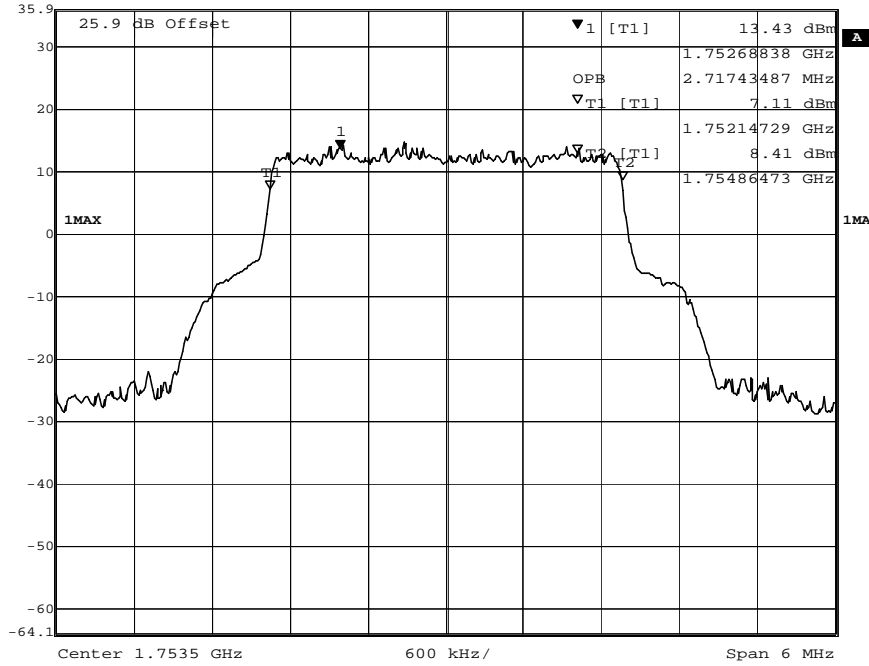
FDD 4 1754.3 MHz, CBW 1.4 MHz, 16QAM



Date: 27.AUG.2014 18:06:36


FDD 4 1754.5 MHz, CBW 3 MHz, QPSK

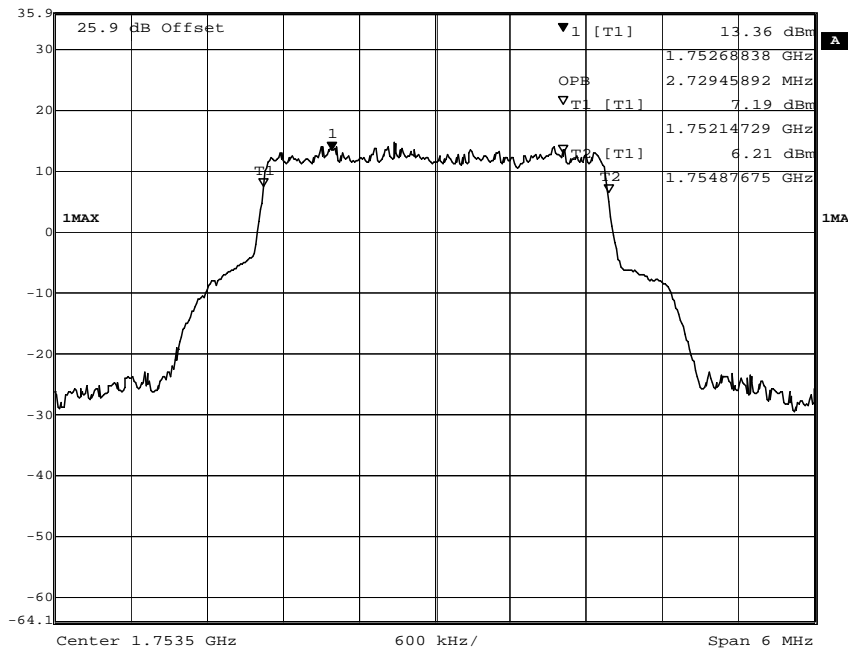

 Ref Lvl 35.9 dBm Marker 1 [T1] 13.43 dBm RBW 30 kHz RF Att 30 dB
 1.75268838 GHz VBW 100 kHz
 SWT 17 ms Unit dBm



Date: 27.AUG.2014 18:21:17

FDD 4 1754.5 MHz, CBW 3 MHz, 16QAM

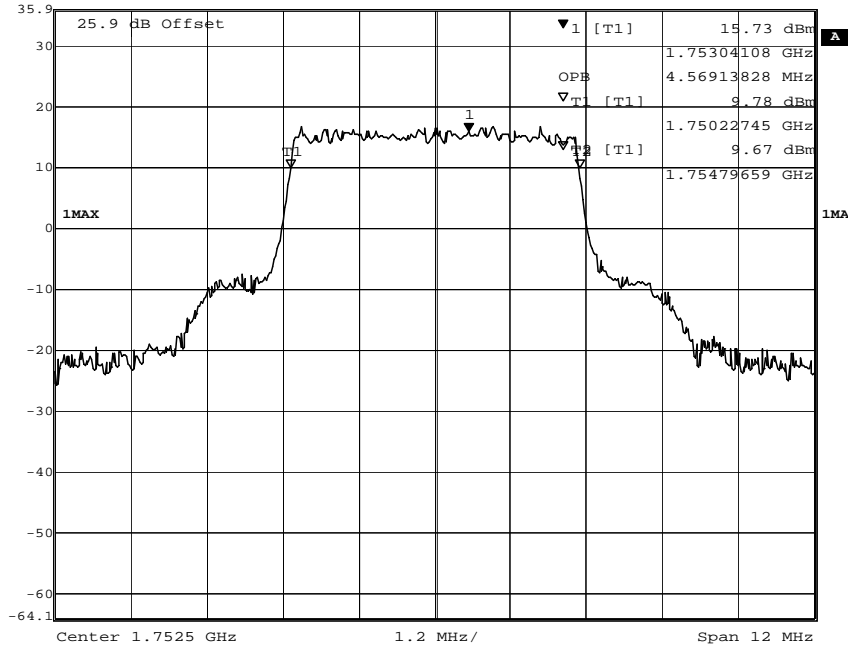

 Ref Lvl 35.9 dBm Marker 1 [T1] 13.36 dBm RBW 30 kHz RF Att 30 dB
 1.75268838 GHz VBW 100 kHz
 SWT 17 ms Unit dBm



Date: 27.AUG.2014 18:23:18

FDD 4 1752.5 MHz, CBW 5 MHz, QPSK

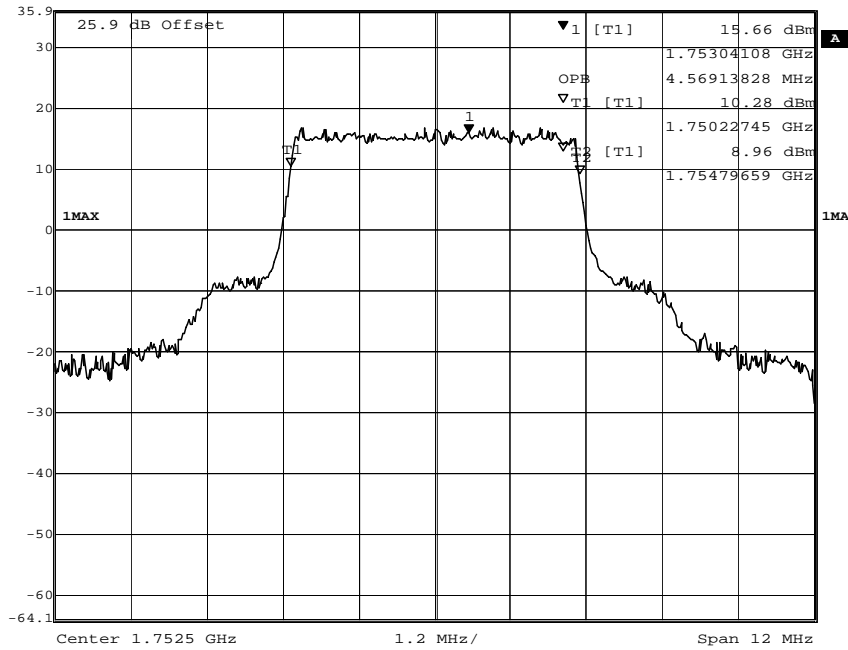
	Ref Lvl	Marker 1 [T1]	RBW	100 kHz	RF Att	30 dB
	35.9 dBm	15.73 dBm	VBW	300 kHz		
		1.75304108 GHz	SWT	5 ms	Unit	dBm



Date: 27.AUG.2014 18:35:06

FDD 4 1752.5 MHz, CBW 5 MHz, 16QAM

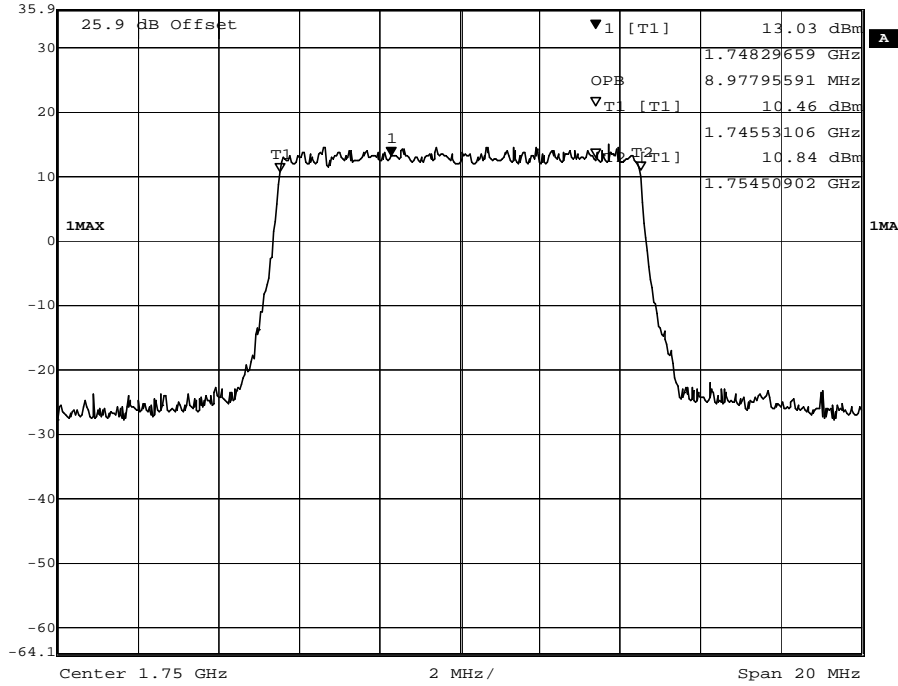
	Ref Lvl	Marker 1 [T1]	RBW	100 kHz	RF Att	30 dB
	35.9 dBm	15.66 dBm	VBW	300 kHz		
		1.75304108 GHz	SWT	5 ms	Unit	dBm



Date: 27.AUG.2014 18:36:47

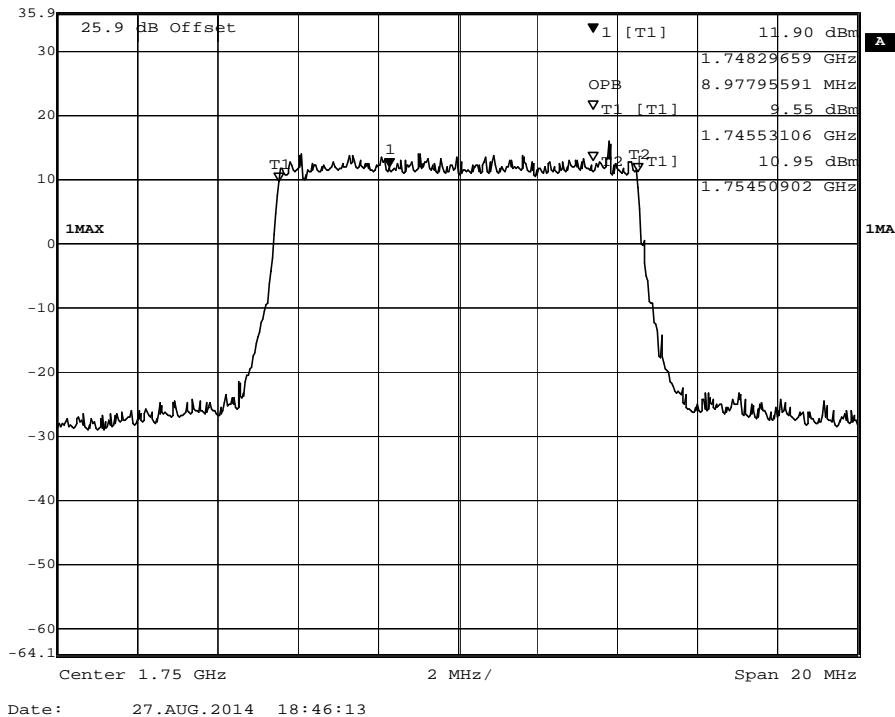
FDD 4 1750 MHz, CBW 10 MHz, QPSK

Marker 1 [T1] RBW 100 kHz RF Att 30 dB
 Ref Lvl 13.03 dBm VBW 300 kHz
 35.9 dBm 1.74829659 GHz SWT 5 ms Unit dBm



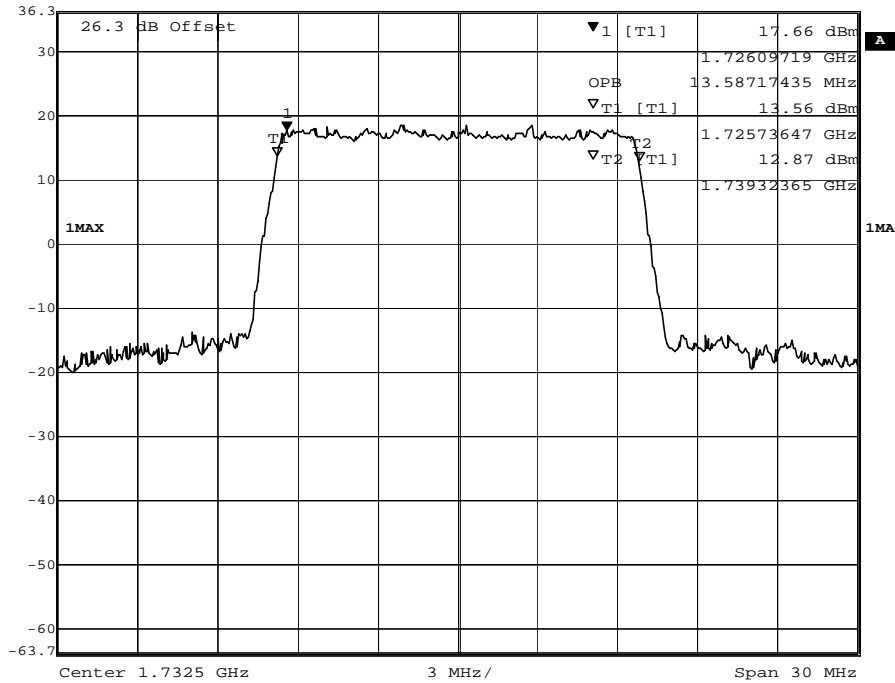
FDD 4 1750 MHz, CBW 10 MHz, 16QAM

Marker 1 [T1] RBW 100 kHz RF Att 30 dB
 Ref Lvl 11.90 dBm VBW 300 kHz
 35.9 dBm 1.74829659 GHz SWT 5 ms Unit dBm



FDD 4 1735.50 MHz, CBW 15 MHz, QPSK

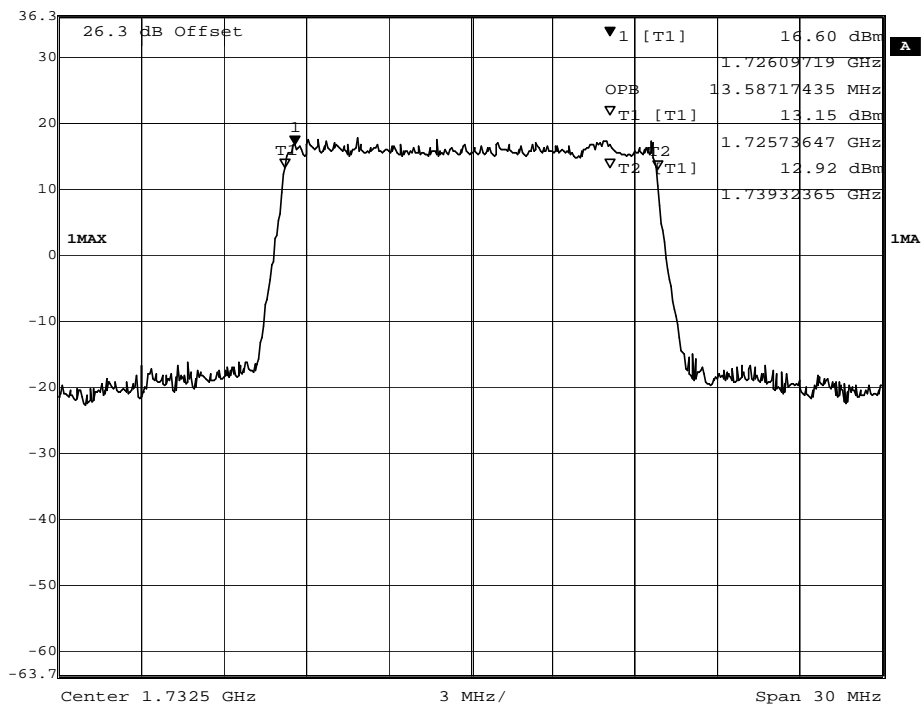
K/S
 Marker 1 [T1]
 RBW 300 kHz RF Att 30 dB
 Ref Lvl 17.66 dBm
 VBW 1 MHz
 36.3 dBm
 1.72609719 GHz
SWT 5 ms Unit dBm



Date: 27.AUG.2014 18:55:37


FDD 4 1735.50 MHz, CBW 15 MHz, 16QAM

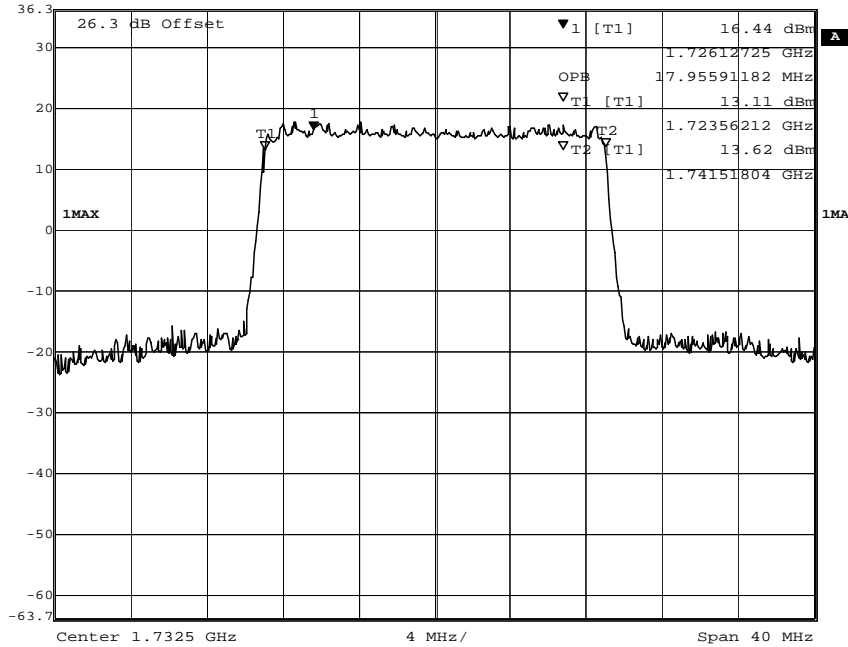
K/S
 Marker 1 [T1]
 RBW 300 kHz RF Att 30 dB
 Ref Lvl 16.60 dBm
 VBW 1 MHz
 36.3 dBm
 1.72609719 GHz
SWT 5 ms Unit dBm



Date: 27.AUG.2014 18:53:44


FDD 4 1735.50 MHz, CBW 20 MHz, QPSK

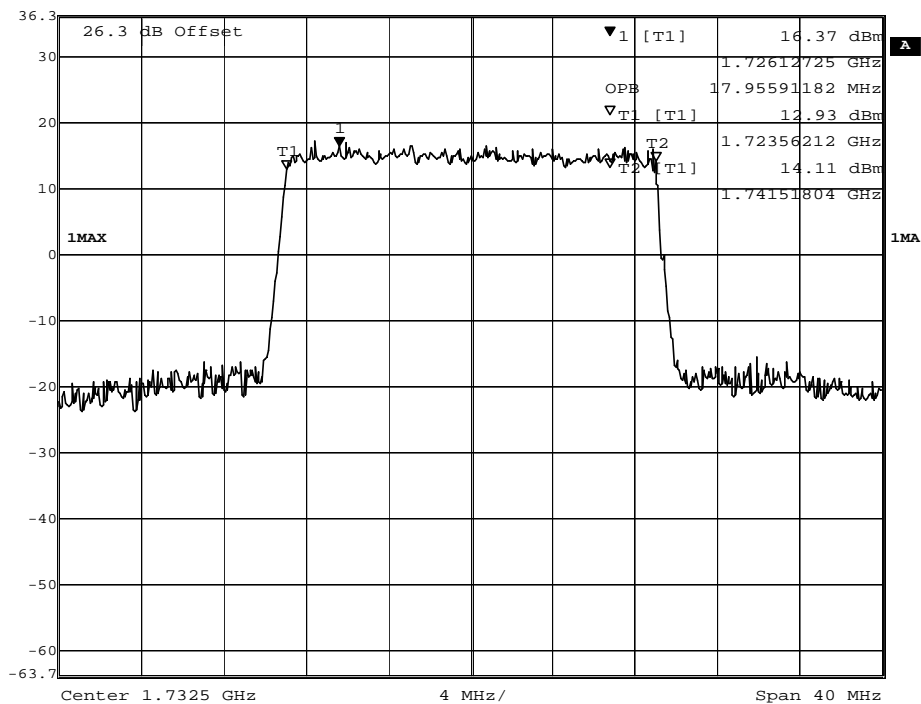

 Ref Lvl 16.44 dBm RBW 300 kHz RF Att 30 dB
 36.3 dBm 1.72612725 GHz VBW 1 MHz
 1.72612725 GHz SWT 5 ms Unit dBm



Date: 27.AUG.2014 18:58:37


FDD 4 1735.50 MHz, CBW 20 MHz, 16QAM

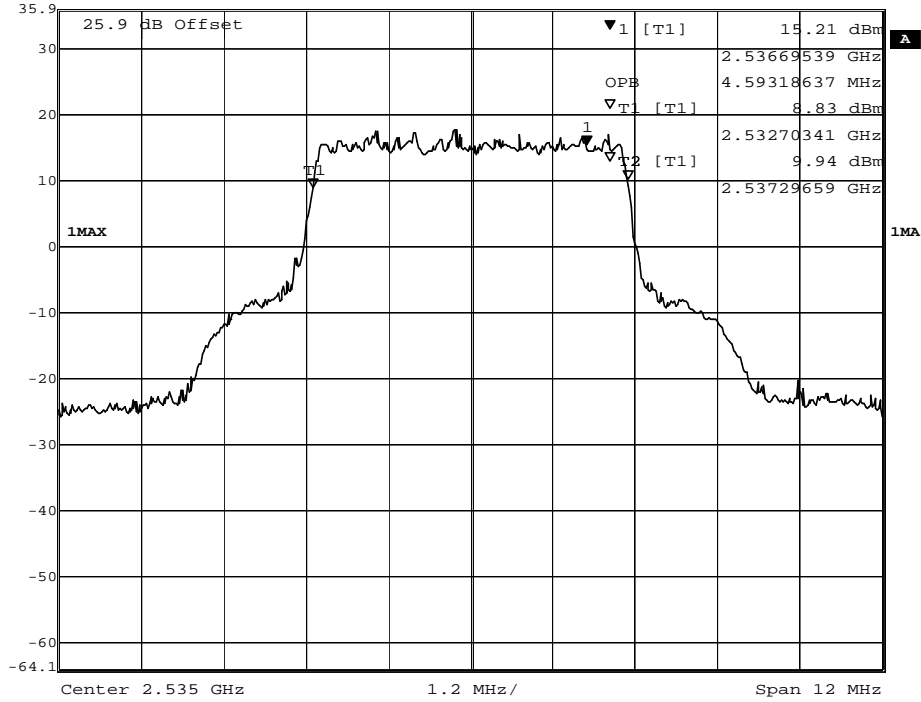

 Ref Lvl 16.37 dBm RBW 300 kHz RF Att 30 dB
 36.3 dBm 1.72612725 GHz VBW 1 MHz
 1.72612725 GHz SWT 5 ms Unit dBm



Date: 27.AUG.2014 18:57:17


FDD 7 2535.00 MHz, CBW 5 MHz, QPSK

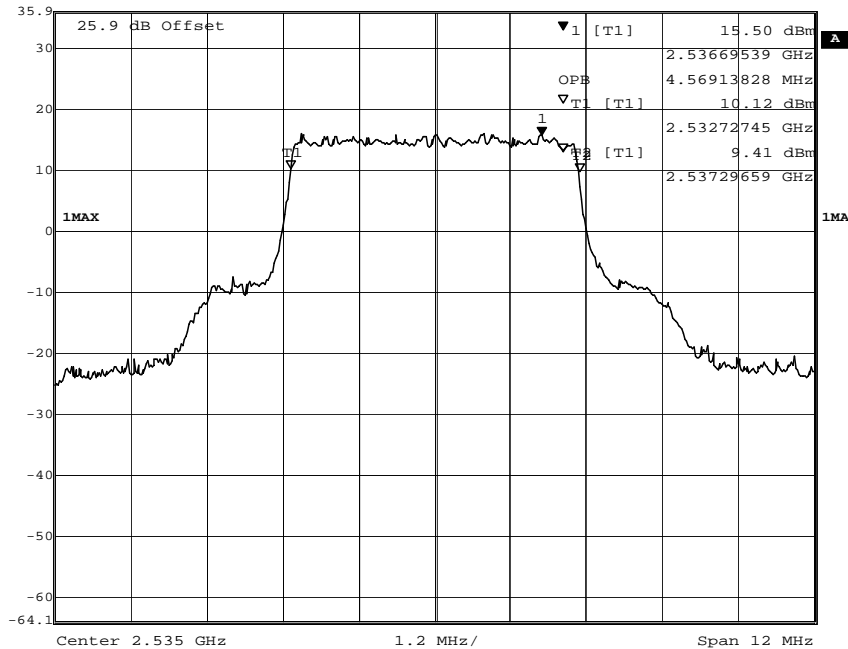

 Marker 1 [T1] RBW 100 kHz RF Att 30 dB
 Ref Lvl 15.21 dBm VBW 300 kHz
 35.9 dBm 2.53669539 GHz SWT 5 ms Unit dBm



Date: 27.AUG.2014 16:45:03


FDD 7 2535.00 MHz, CBW 5 MHz, 16QAM

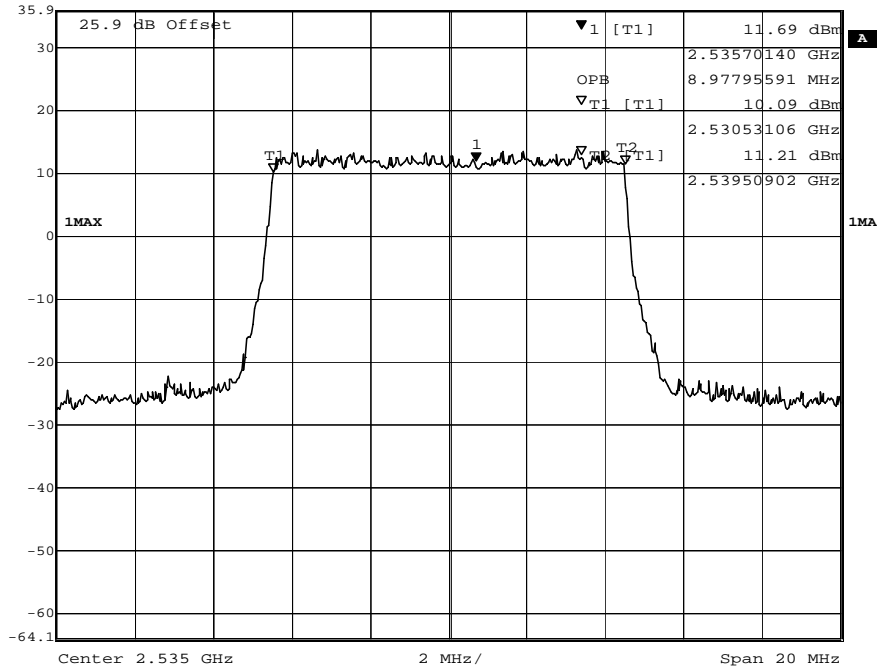

 Marker 1 [T1] RBW 100 kHz RF Att 30 dB
 Ref Lvl 15.50 dBm VBW 300 kHz
 35.9 dBm 2.53669539 GHz SWT 5 ms Unit dBm



Date: 27.AUG.2014 16:41:42


FDD 7 2535.00 MHz, CBW 10 MHz, QPSK

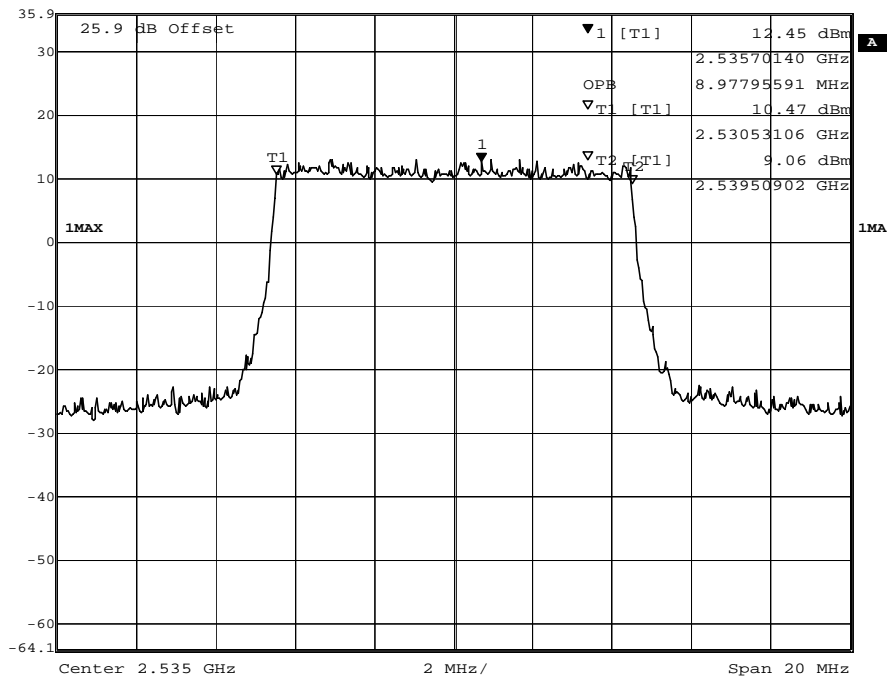
	Ref Lvl	Marker 1 [T1]	RBW	100 kHz	RF Att	30 dB
	35.9 dBm	2.53570140 GHz	VBW	300 kHz		
			SWT	5 ms	Unit	dBm



Date: 27.AUG.2014 17:03:35

FDD 7 2535.00 MHz, CBW 10 MHz, 16QAM

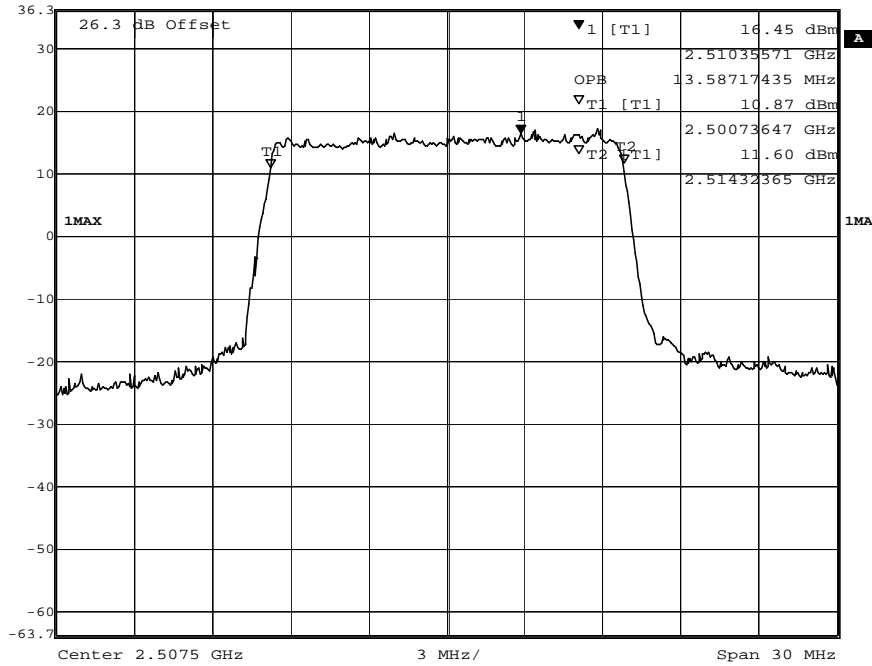
	Ref Lvl	Marker 1 [T1]	RBW	100 kHz	RF Att	30 dB
	35.9 dBm	2.53570140 GHz	VBW	300 kHz		
			SWT	5 ms	Unit	dBm



Date: 27.AUG.2014 17:02:28

FDD 7 2507.50 MHz, CBW 15 MHz, QPSK

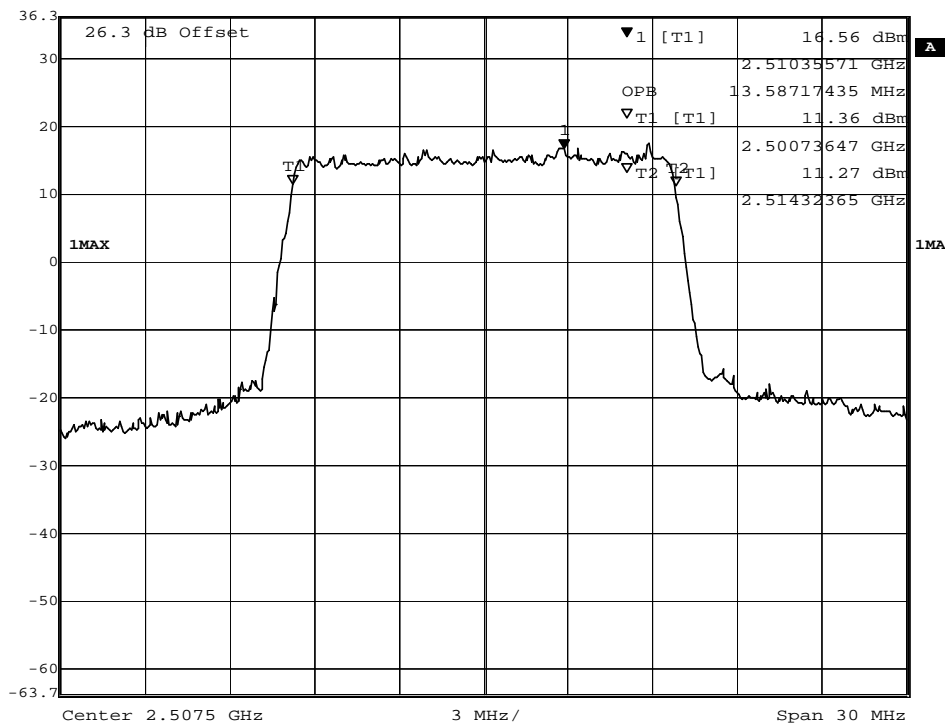
Marker 1 [T1] RBW 300 kHz RF Att 30 dB
 Ref Lvl 16.45 dBm VBW 1 MHz
 36.3 dBm 2.51035571 GHz SWT 5 ms Unit dBm



Date: 27.AUG.2014 17:11:34

FDD 7 2507.50 MHz, CBW 15 MHz, 16QAM

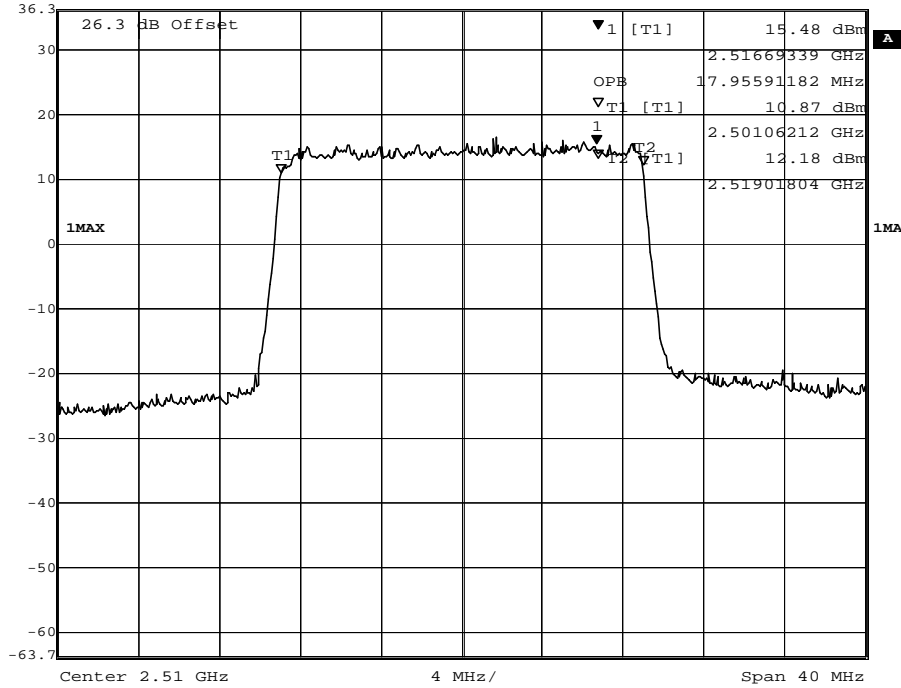
Marker 1 [T1] RBW 300 kHz RF Att 30 dB
 Ref Lvl 16.56 dBm VBW 1 MHz
 36.3 dBm 2.51035571 GHz SWT 5 ms Unit dBm



Date: 27.AUG.2014 17:09:08

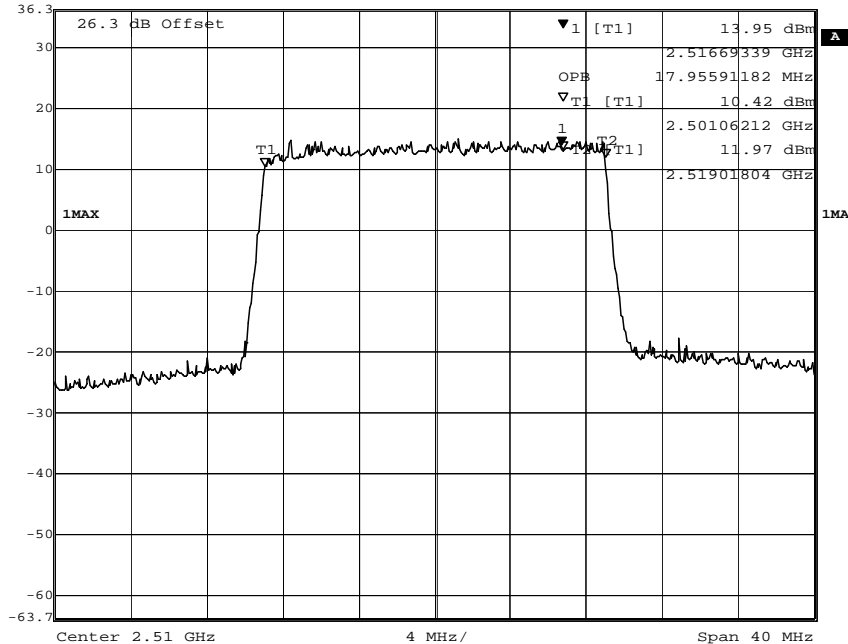
FDD 7 2510.00 MHz, CBW 20 MHz, QPSK

RS
 Marker 1 [T1] RBW 300 kHz RF Att 30 dB
 Ref Lvl 15.48 dBm VBW 1 MHz
 36.3 dBm 2.51669339 GHz SWT 5 ms Unit dBm



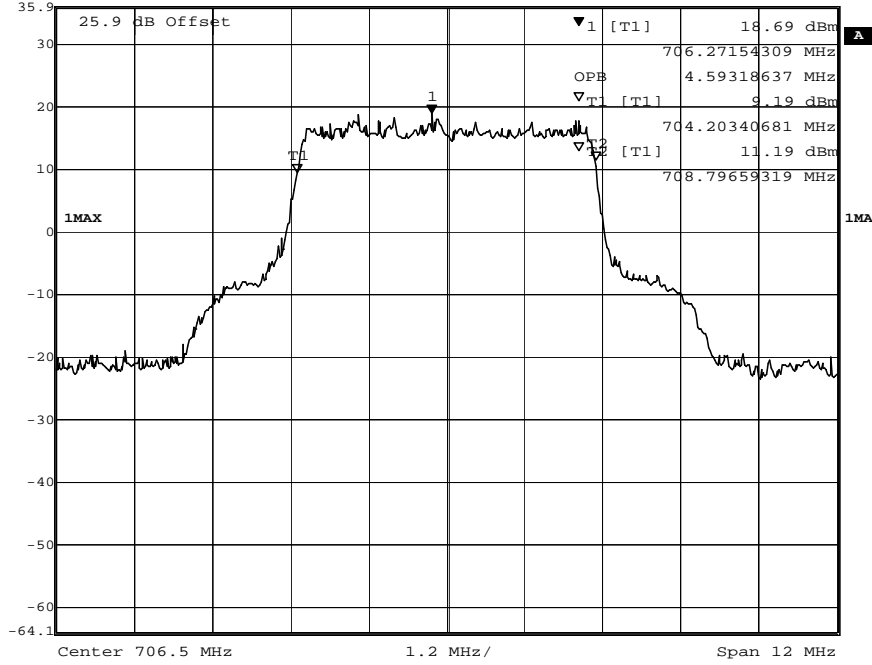
FDD 7 2510.00 MHz, CBW 20 MHz, 16QAM

RS
 Marker 1 [T1] RBW 300 kHz RF Att 30 dB
 Ref Lvl 13.95 dBm VBW 1 MHz
 36.3 dBm 2.51669339 GHz SWT 5 ms Unit dBm



FDD 17 706.50 MHz, CBW 5 MHz, QPSK

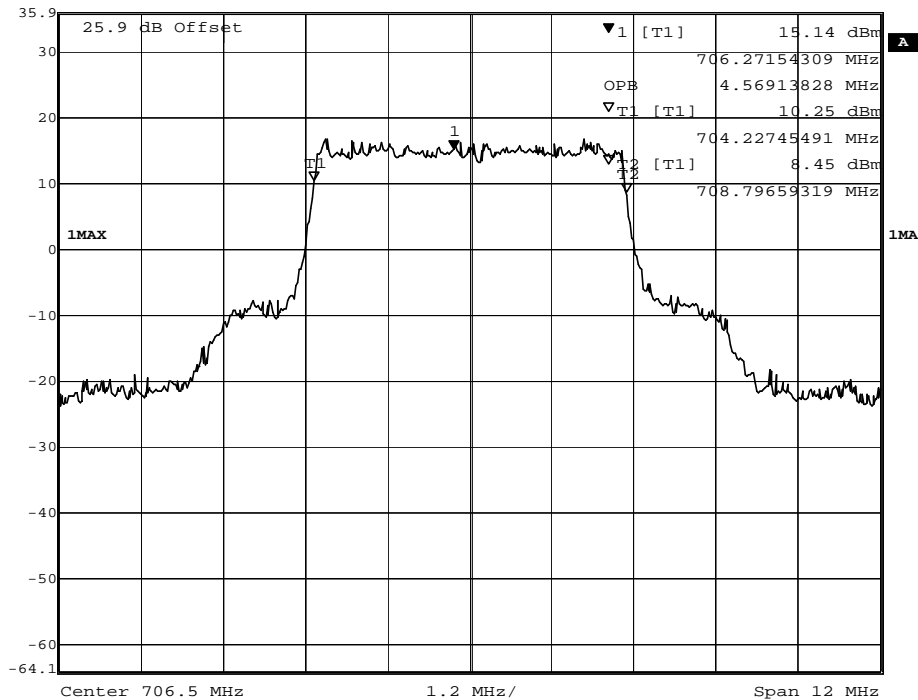
KS
 Marker 1 [T1] RBW 100 kHz RF Att 40 dB
 Ref Lvl 18.69 dBm VBW 300 kHz
 35.9 dBm 706.27154309 MHz SWT 5 ms Unit dBm



Date: 27.AUG.2014 17:57:14

FDD 17 706.50 MHz, CBW 5 MHz, 16QAM

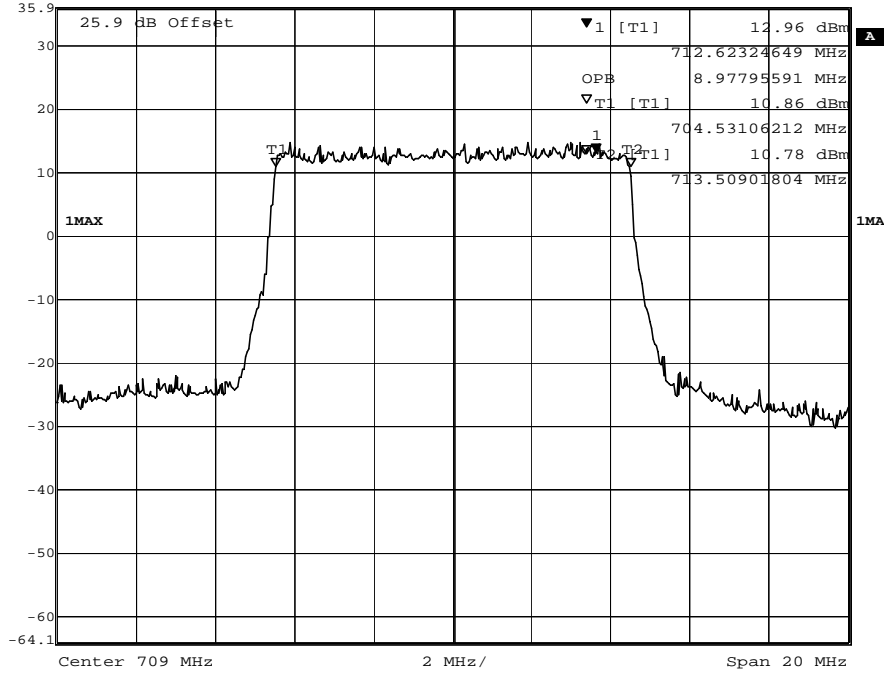
KS
 Marker 1 [T1] RBW 100 kHz RF Att 40 dB
 Ref Lvl 15.14 dBm VBW 300 kHz
 35.9 dBm 706.27154309 MHz SWT 5 ms Unit dBm



Date: 27.AUG.2014 17:58:26

FDD 17 709.00 MHz, CBW 10 MHz, QPSK

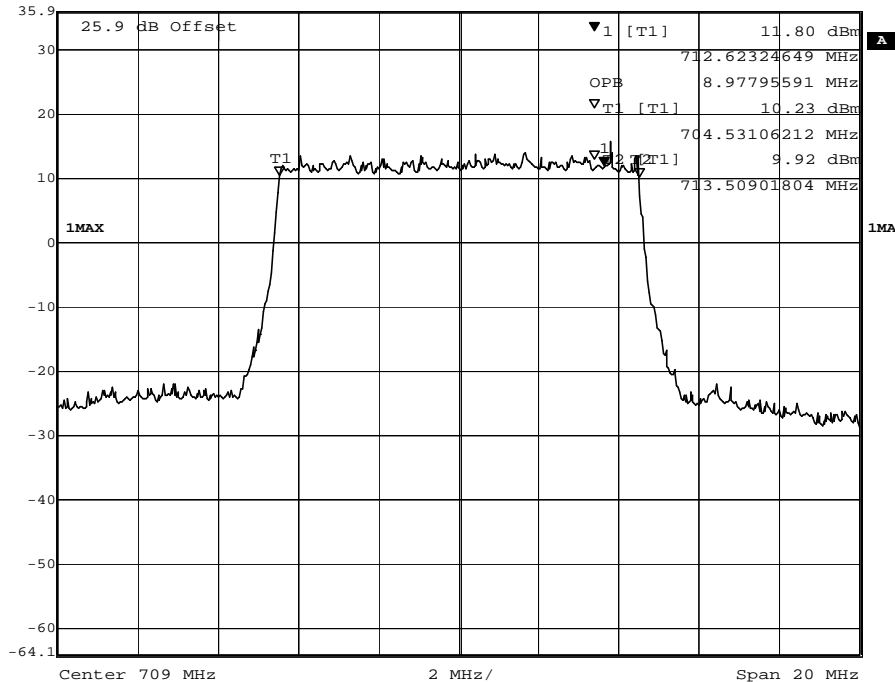
Marker 1 [T1] RBW 100 kHz RF Att 30 dB
 Ref Lvl 12.96 dBm VBW 300 kHz
 35.9 dBm 712.62324649 MHz SWT 5 ms Unit dBm



Date: 27.AUG.2014 17:44:21

FDD 17 709.00 MHz, CBW 10 MHz, 16QAM

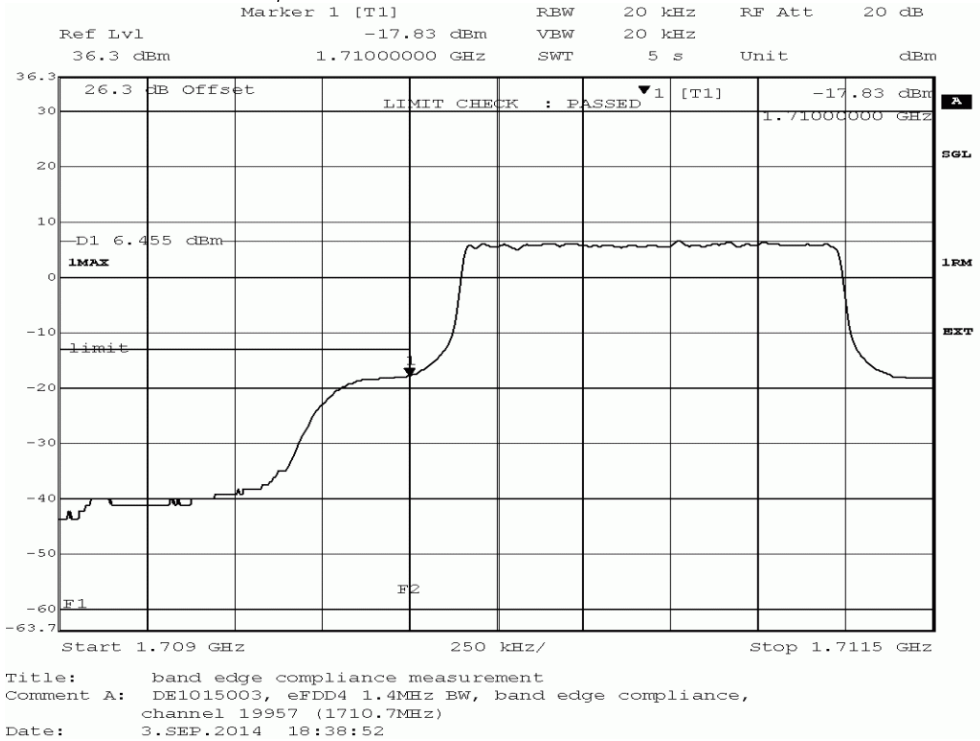
Marker 1 [T1] RBW 100 kHz RF Att 30 dB
 Ref Lvl 11.80 dBm VBW 300 kHz
 35.9 dBm 712.62324649 MHz SWT 5 ms Unit dBm



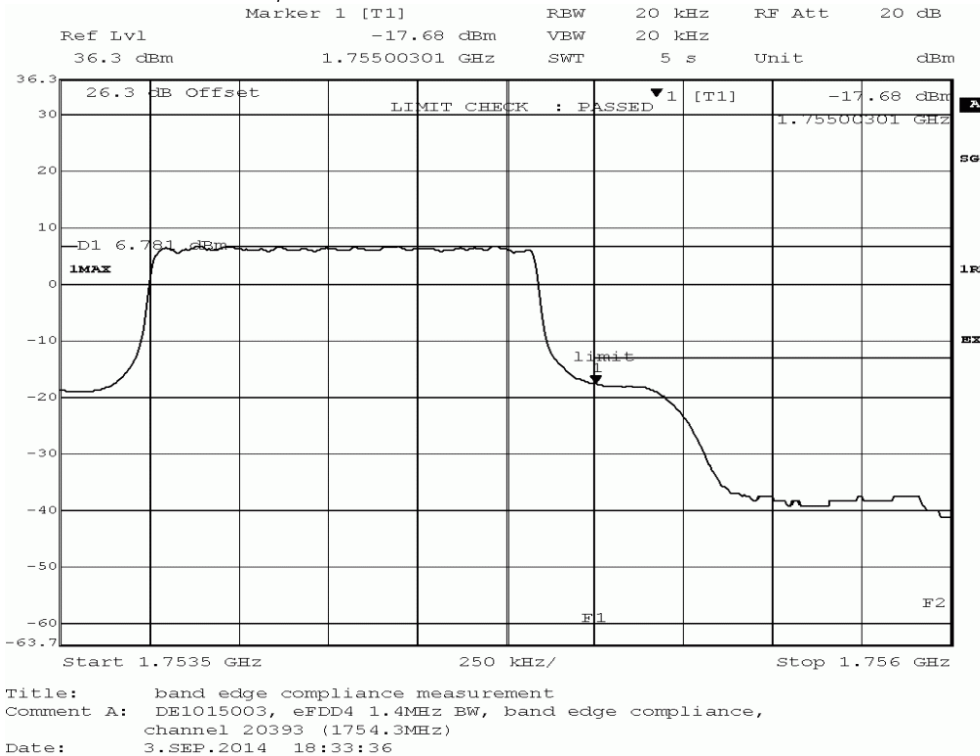
Date: 27.AUG.2014 17:45:52

7.5 Band edge compliance

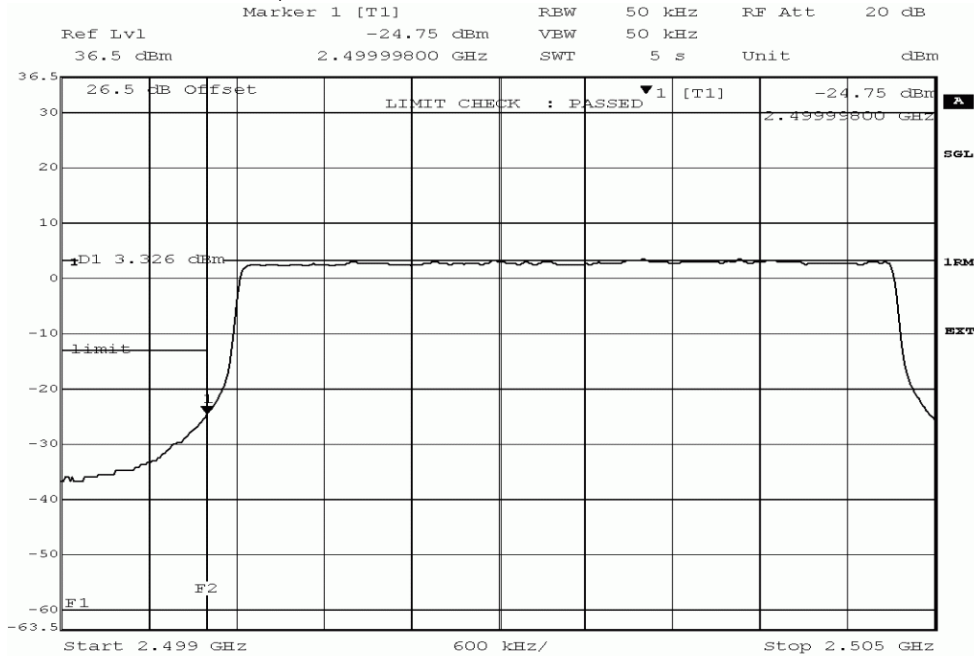
FDD4 Channel 19957, CBW 1.4MHz



FDD4 Channel 20393, CBW 1.4MHz

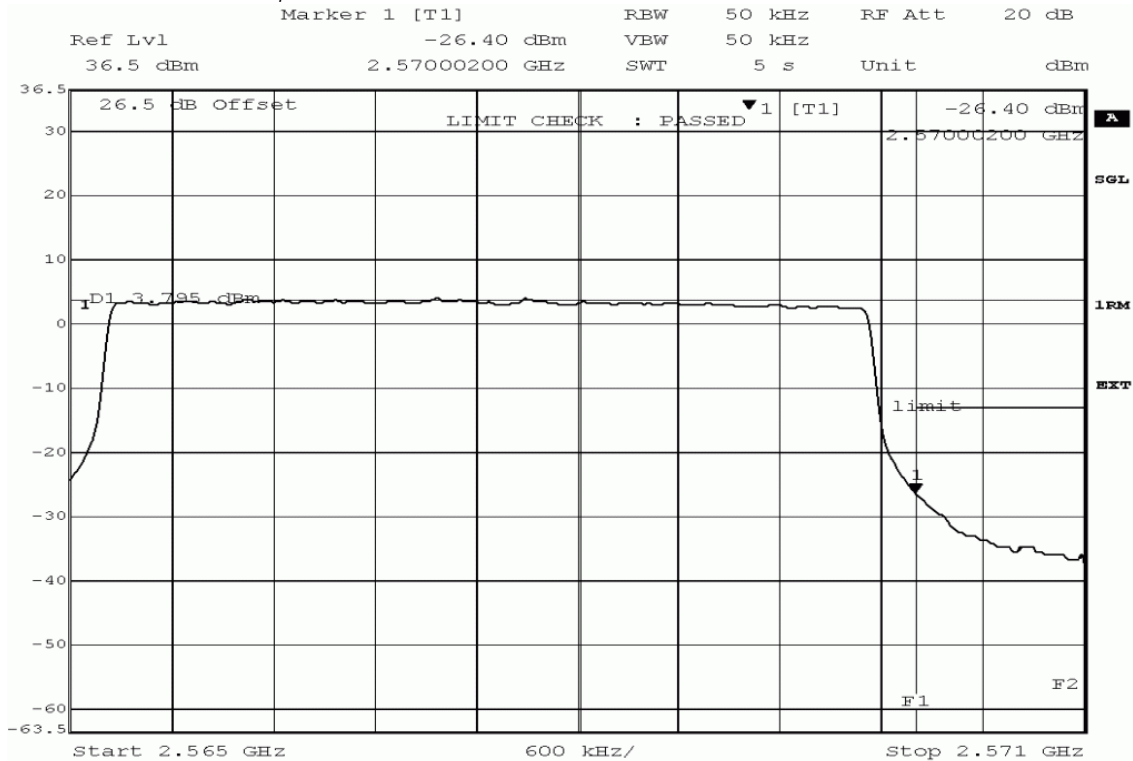


FDD7 Channel 20775, CBW 5MHz



Title: band edge compliance measurement
 Comment A: DE1015003, eFDD7 5MHz BW, band edge compliance, channel 20775 (2502.5MHz)
 Date: 3.SEP.2014 19:11:16

FDD7 Channel 21425, CBW 5MHz



Title: band edge compliance measurement
 Comment A: DE1015003, eFDD7 5MHz BW, band edge compliance, channel 21425 (2567.5MHz)
 Date: 8.SEP.2014 15:49:58

