TEST REPORT

Test Report No. : UL-RPT-RP10295106JD02C V2.0

Manufacturer : Sony Mobile Communications Inc.

FCC ID : PY7PM-0806

Technology : LTE – Band 5

Test Standard(s) : FCC Part 22 Subpart H

1. This test report shall not be reproduced in full or partial, without the written approval of UL VS LTD.
2. The results in this report apply only to the sample(s) tested.
3. The sample tested is in compliance with the above standard(s).
4. The test results in this report are traceable to the national or international standards.
5. Version 2.0 supersedes all previous versions.

Date of Issue: 04 August 2014

Checked by:

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Engineer, Radio Laboratory

Issued by :

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pp

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This laboratory is accredited by UKAS. The tests reported herein have been performed in accordance with its' terms of accreditation.

UL VS LTD

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Table of Contents

1. Customer Information

Company Name:	Sony Mobile Communications Inc.
Address:	Nya Vattentornet Mobilvägen 10 Lund 22188 Sweden

2. Summary of Testing

2.1. General Information

Specification Reference:	47CFR22
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications): Part 22 Subpart H (Public Mobile Services)
Site Registration:	209735
Location of Testing:	UL VS LTD, Unit 3 Horizon, Wade Road, Kingsland Business Park, Basingstoke, Hampshire, RG24 8AH, United Kingdom
Test Dates:	09 June 2014 to 19 June 2014

2.2. Summary of Test Results

FCC Reference (47CFR)	Measurement	Result
Part 22.913(a)(2)	Transmitter Output Power (ERP)	✅
Part 2.1049	Transmitter Occupied Bandwidth	✅
Part 2.1053 / 22.917	Transmitter Out of Band Radiated Emissions	✅
Part 2.1053 / 22.917	Transmitter Band Edge Radiated Emissions	✅
Part 2.1055 / 22.355	Transmitter Frequency Stability (Temperature and Voltage Variation)	✅
Key to Results		
✅ = Complied ❌ = Did not comply		

2.3. Methods and Procedures

Reference:	ANSI/TIA-603-C-2004
Title:	Land Mobile Communications Equipment, Measurements and performance Standards
Reference:	FCC KDB 971168 D01 v02r01, 7 June 2013
Title:	Measurement Guidance for Certification of Licensed Digital Transmitters

2.4. Deviations from the Test Specification

For the measurements contained within this test report, there were no deviations from, additions to, or exclusions from the test specification identified above.

3. Equipment Under Test (EUT)

3.1. Identification of Equipment Under Test (EUT)

Brand Name:	Sony
IMEI:	004402452728243 *(Radiated sample)*
Test Sample Serial Number:	CB5A1Z2H3A
Hardware Version Number:	A
Software Version Number:	23.0.A.0.204
FCC ID:	PY7PM-0806

Brand Name:	Sony
IMEI:	004402452727823 *(Conducted sample with RF port #1)*
Test Sample Serial Number:	CB5A1Z2H22
Hardware Version Number:	A
Software Version Number:	23.0.A.0.204
FCC ID:	PY7PM-0806

Brand Name:	Sony
IMEI:	004402452726833 *(Conducted sample with RF port #2)*
Test Sample Serial Number:	CB5A1Z2H9E
Hardware Version Number:	A
Software Version Number:	23.0.A.0.204
FCC ID:	PY7PM-0806

Brand Name:	Sony
Description:	AC Charger
Model Name or Number:	EP880

Brand Name:	Generic
Description:	MHL Cable
Model Name or Number:	Not marked

Brand Name:	Sony
Description:	MHL Adaptor
Model Name or Number:	IM750

Identification of Equipment Under Test (EUT) (continued)

Brand Name:	Sony
Description:	USB Cable
Model Name or Number:	EC803

Brand Name:	Sony
Description:	Deskstand
Model Name or Number:	DK43

Brand Name:	Sony
Description:	PHF
Model Name or Number:	MH410c

3.2. Description of EUT

The equipment under test (EUT) was a GSM/WCDMA/LTE Phone + Bluetooth, DTS/UNII a/b/g/n/ac + NFC & ANT+.

3.3. Modifications Incorporated in the EUT

No modifications were applied to the EUT during testing.

3.4. Additional Information Related to Testing

Tested Technology:	LTE Band 5		
Type of Equipment	Transceiver		
Channel Bandwidth(s):	1.4, 3, 5 & 10 MHz		
Modulation Type:	QPSK & 16QAM		
Duty Cycle:	100%		
Antenna Gain:	-4.25 dBd		
Power Supply Requirement:	Nominal	3.8 VDC	
	Minimum	3.42 VDC	
	Maximum	4.18 VDC	
Transmit Frequency Range:	824 MHz to 849 MHz		
Channels Tested:	Channel Bandwidth (MHz)	N_{ul}	Frequency of Uplink (MHz)
Bottom Channel	1.4	20407	824.7
	3	20415	825.5
	5	20425	826.5
	10	20450	829.0
Middle Channel	All	20525	836.5
Top Channel	1.4	20643	848.3
	3	20635	847.5
	5	20625	846.5
	10	20600	844.0

3.5. Support Equipment

The following support equipment was used to exercise the EUT during testing:

Description:	2 GB Micro SD Card
Brand Name:	Generic
Model Name or Number:	Not marked

Description:	22" High Definition Television
Brand Name:	Logik
Model Name or Number:	L22FE12A
Serial Number:	1309020661

Description:	Voltage variation jig
Brand Name:	Not marked
Model Name or Number:	Not marked
Serial Number:	Not marked

4. Operation and Monitoring of the EUT during Testing

4.1. Operating Modes

The EUT was tested in the following operating mode(s):

- Transmit Mode – The EUT was set to transmit with maximum output power using the required channel bandwidth. QPSK and 16QAM modulations were both tested, with Resource Block allocation as detailed in section 4.3.

4.2. Configuration and Peripherals

The EUT was tested in the following configuration(s):

- The EUT was connected to a Rohde and Schwarz CMW500 LTE system simulator, operating in a transceiver mode.

- Transmitter radiated spurious emission tests were performed with the following configurations, employing all available accessories:

    o Configuration 1 – Handset with the AC charger, USB Cable, MHL cable (terminated in to a television), MHL adaptor and PHF

    o Configuration 2 – Handset with the AC charger, Desk stand and PHF

    Pre-scans below 1 GHz were performed in both configurations 1 and 2, with final measurements limited to the configuration which provided worst case results. Pre-scans above 1 GHz were performed in the configuration that employed the most accessories (Configuration 1), with any final measurements being performed in both configurations.

- Transmitter radiated spurious emissions tests were performed with the EUT set to transmit with a 10 MHz channel bandwidth with QPSK modulation applied and 1 resource block with 0 offset. This was found to be the worst case modulation scheme with regards to emissions after preliminary investigations and, as this mode emits the highest transmit output power level, it was deemed to be the worst case.

- The EUT was supplied with an RF conducted port and external RF connector, to allow conducted measurements to be performed where necessary.

- Testing at temperature and voltage extremes was performed using a voltage variation jig and adaptor supplied by the customer. The adaptor plugs onto the handset in place of the battery connector.

- The voltage variation jig and adaptor were used for conducted measurements set at the nominal voltage.

- The conducted sample with IMEI 004402452726833 was used for frequency stability measurements.

- The conducted sample with IMEI 0044002452727823 was used for average power and occupied bandwidth measurements.

- The radiated sample with IMEI 004402452728243 was used for all radiated measurements.

4.3. Resource Block Allocation

Channel Bandwidth (MHz)	Maximum No. of Resource Blocks	Resource Block / Offset Number							
		Sub Test 1		Sub Test 2		Sub Test 3		Sub Test 4	
		RB	Offset	RB	Offset	RB	Offset	RB	Offset
1.4	6	1	0	1	5	3	2	6	0
3	15	1	0	1	14	8	4	15	0
5	25	1	0	1	24	12	6	25	0
10	50	1	0	1	49	25	12	50	0

Transmitter Output Power was carried out using sub tests 1, 2, 3 and 4, with both QPSK and 16QAM modulation schemes.

Transmitter Occupied Bandwidth was carried out using sub tests 3 and 4, for both QPSK and 16QAM modulation schemes.

Transmitter radiated spurious emissions tests carried out using sub test 1, with a 10 MHz channel bandwidth and QPSK modulation scheme as this was found to be the worst case modulation scheme with regards to emissions after preliminary investigations and, as this mode emits the highest transmit output power level, it was deemed to be the worst case.

Transmitter Radiated Band Edge Emissions was tested with sub test 4 on all supported channel bandwidths, using QPSK and 16QAM modulations with the maximum resource blocks settings.

Transmitter Frequency Stability test was carried out with sub test 4, with a channel bandwidth of 1.4 MHz only.

5. Measurements, Examinations and Derived Results

5.1. General Comments

Measurement uncertainties are evaluated in accordance with current best practice. Our reported expanded uncertainties are based on standard uncertainties, which are multiplied by an appropriate coverage factor to provide a statistical confidence level of approximately 95%. Please refer to *Section 6. Measurement Uncertainty* for details.

In accordance with UKAS requirements all the measurement equipment is on a calibration schedule. All equipment was within the calibration period on the date of testing.

5.2. Test Results

5.2.1. Transmitter Output Power (ERP)

Test Summary:

Test Engineer:	Ben Mercer	Test Date:	09 June 2014
Test Sample IMEI:	0044002452727823		

FCC Reference:	Part 22.913(a)(2)
Test Method Used:	As detailed in FCC KDB 971168 Section 5.2.1

Environmental Conditions:

Temperature (°C):	25
Relative Humidity (%):	40 to 50

Note(s):

1. The customer stated a maximum antenna gain of -2.1 dBi. As the limit is ERP the gain in dBi has been converted. The dBd has been calculated as follows.

$$-2.1\ dBi - 2.15\ dB = -4.25\ dBd$$

2. Measurements were performed with the EUT transmitting with QPSK and 16QAM modulation schemes, with resource blocks settings as detailed in section 4.3 of this report.

3. The spectrum analyser's channel power function was used to integrate across the occupied bandwidth. The resolution bandwidth was set to between 1-5% of the occupied bandwidth and the video bandwidth was set to at least 3 times the resolution bandwidth. An RMS detector was used, sweep time was set to auto and the trace was averaged over at least 100 traces. The span was set to at least 1.5 times the occupied bandwidth. The channel power results are recorded in the tables below.

4. The RF port of the EUT was connected to the spectrum analyser via RF cables, directional coupler and suitable attenuation. An RF level offset was entered on the spectrum analyser, to compensate for the signal path losses in these components.
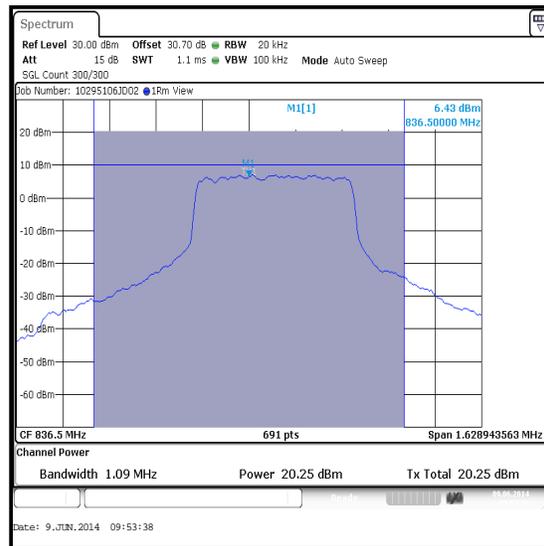
Transmitter Output Power (ERP) (continued)

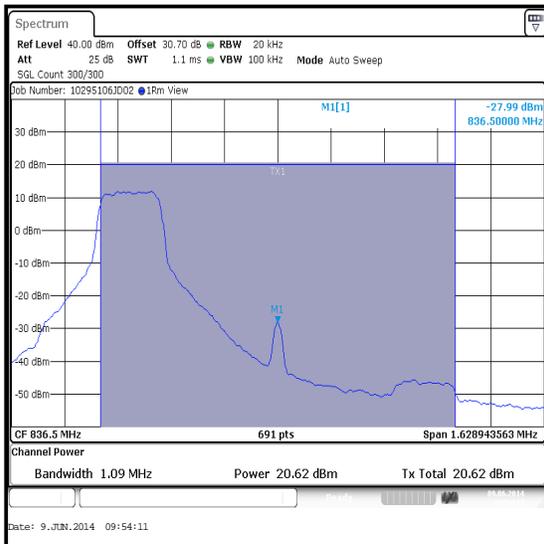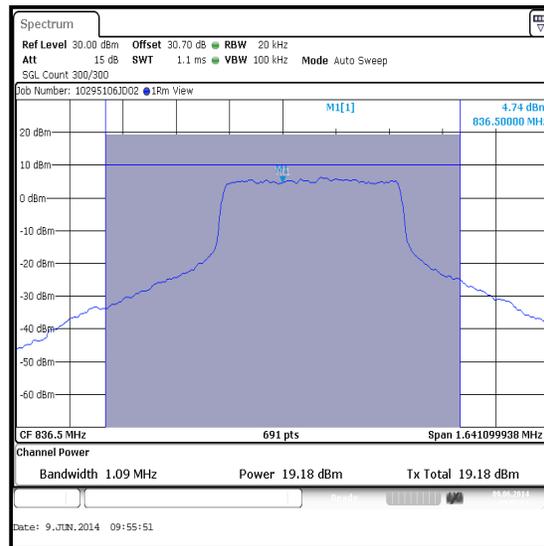### Results: 1.4 MHz Channel Bandwidth / Bottom Channel / QPSK
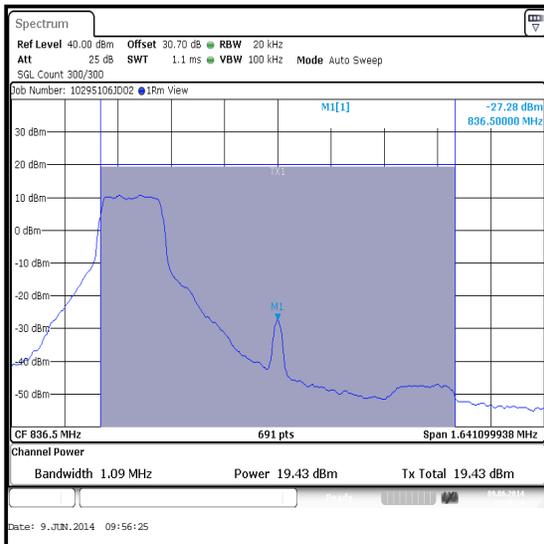
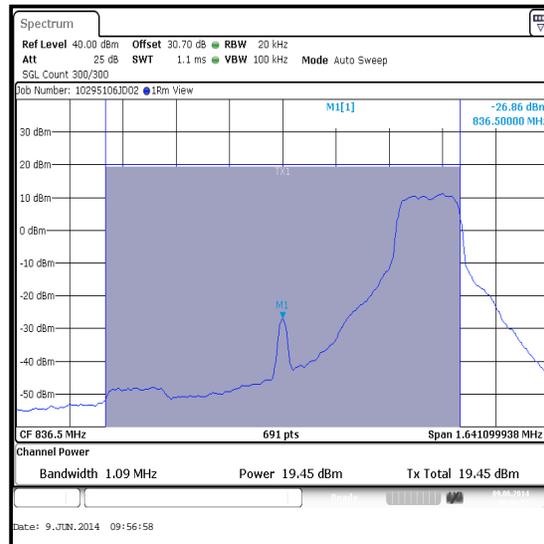| Frequency (MHz)	Resource Block(s)	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBd)	ERP (dBm)	ERP Limit (dBm)	Margin (dB)	Result
824.7	6	0	19.2	-4.25	14.95	38.5	23.55	Complied
824.7	3	2	20.3	-4.25	16.05	38.5	22.45	Complied
824.7	1	0	20.6	-4.25	16.35	38.5	22.15	Complied
824.7	1	5	20.7	-4.25	16.45	38.5	22.05	Complied

QPSK / 6 Resource Blocks (0 Offset)
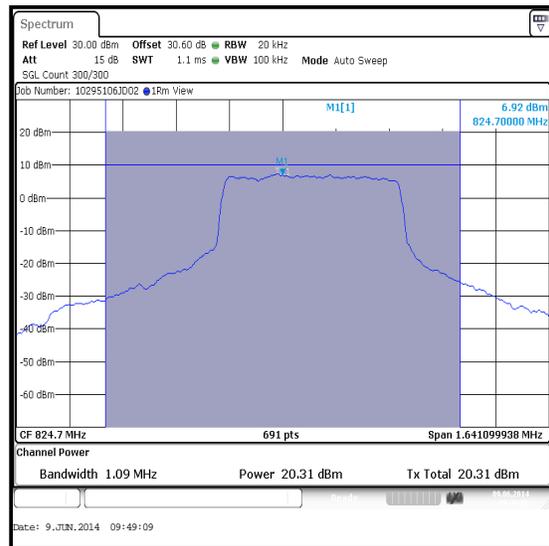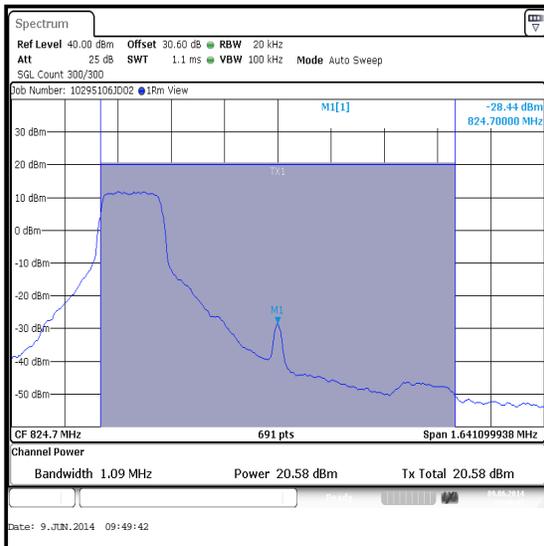
QPSK / 3 Resource Blocks (2 Offset)

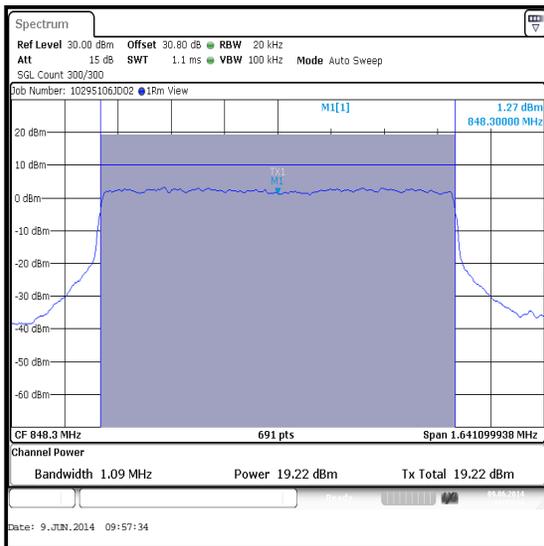**QPSK / 1 Resource Block (0 Offset)**
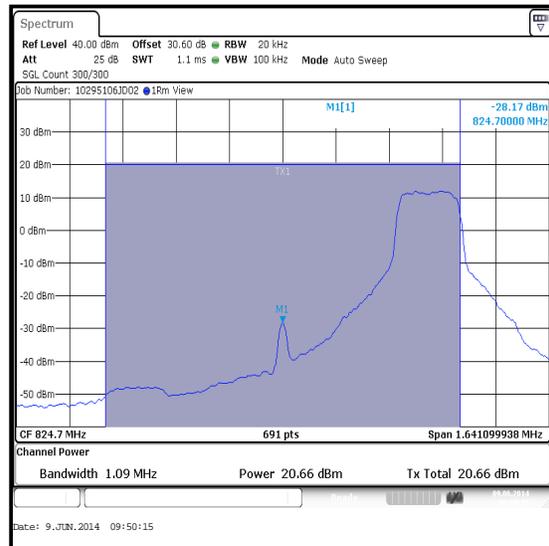
QPSK / 1 Resource Block (5 Offset)

Transmitter Output Power (ERP) (continued)

Results: 1.4 MHz Channel Bandwidth / Bottom Channel / 16QAM

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBd)	ERP (dBm)	ERP Limit (dBm)	Margin (dB)	Result
824.7	6	0	18.2	-4.25	13.95	38.5	24.55	Complied
824.7	3	2	19.3	-4.25	15.05	38.5	23.45	Complied
824.7	1	0	19.4	-4.25	15.15	38.5	23.35	Complied
824.7	1	5	19.1	-4.25	14.85	38.5	23.65	Complied

16QAM / 6 Resource Blocks (0 Offset)
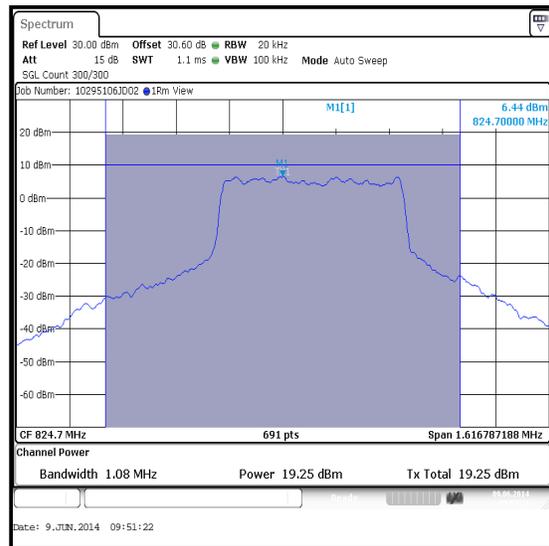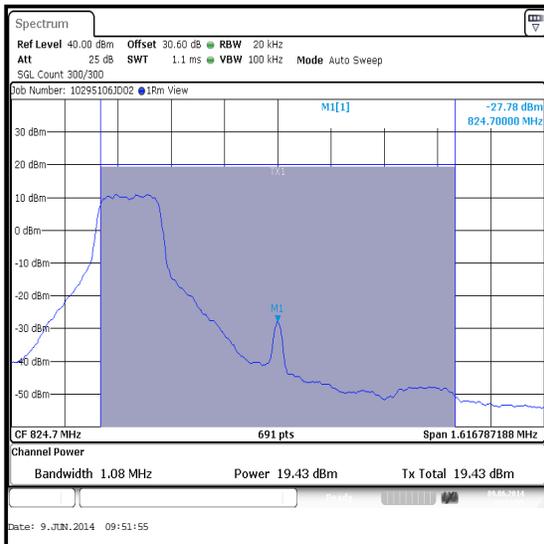
16QAM / 3 Resource Blocks (2 Offset)

16QAM / 1 Resource Block (0 Offset)
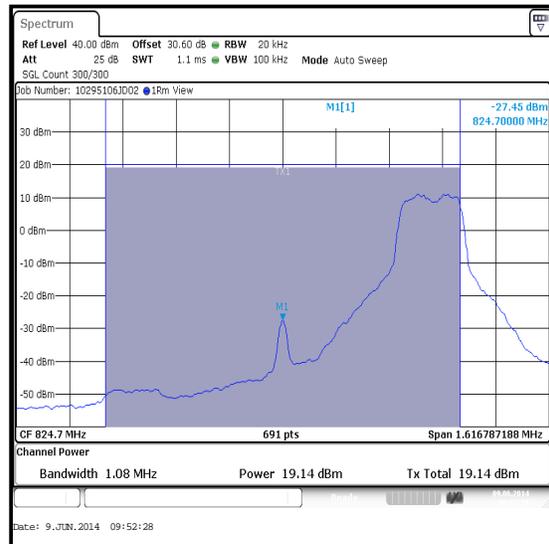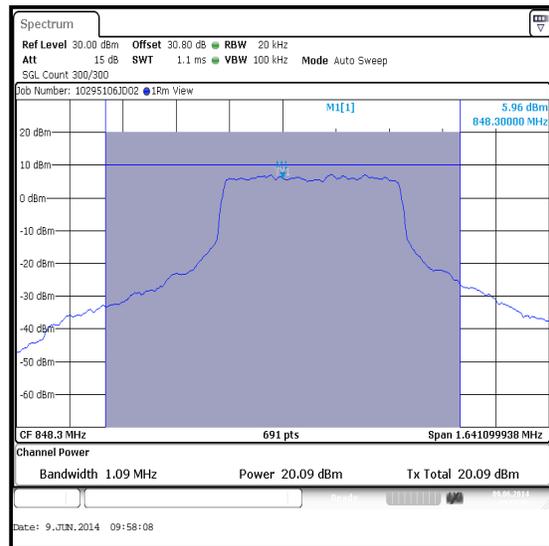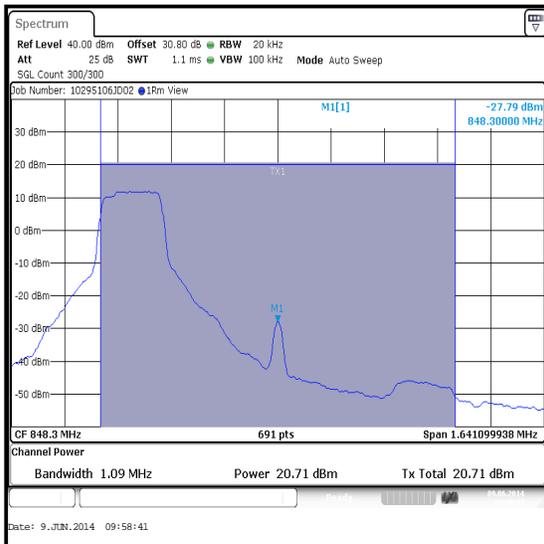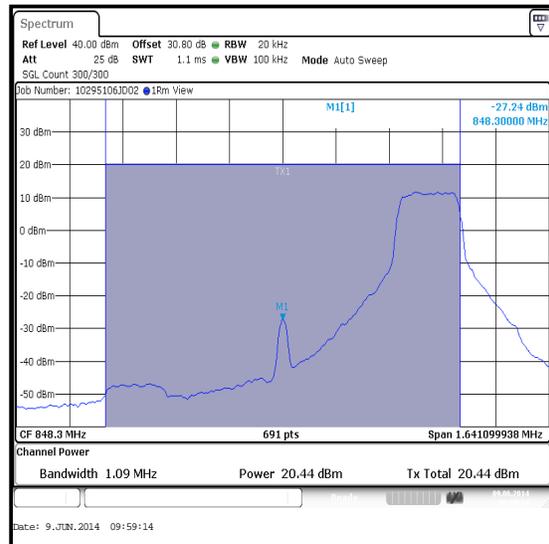

16QAM / 1 Resource Block (5 Offset)

Transmitter Output Power (ERP) (continued)

Results: 1.4 MHz Channel Bandwidth / Middle Channel / QPSK

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBd)	ERP (dBm)	ERP Limit (dBm)	Margin (dB)	Result
836.5	6	0	19.2	-4.25	14.95	38.5	23.55	Complied
836.5	3	2	20.3	-4.25	16.05	38.5	22.45	Complied
836.5	1	0	20.6	-4.25	16.35	38.5	22.15	Complied
836.5	1	5	20.4	-4.25	16.15	38.5	22.35	Complied

QPSK / 6 Resource Blocks (0 Offset)

QPSK / 3 Resource Blocks (2 Offset)
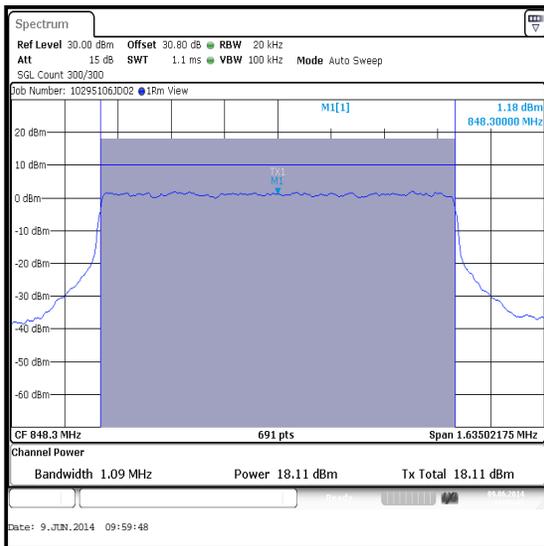

QPSK / 1 Resource Block (0 Offset)
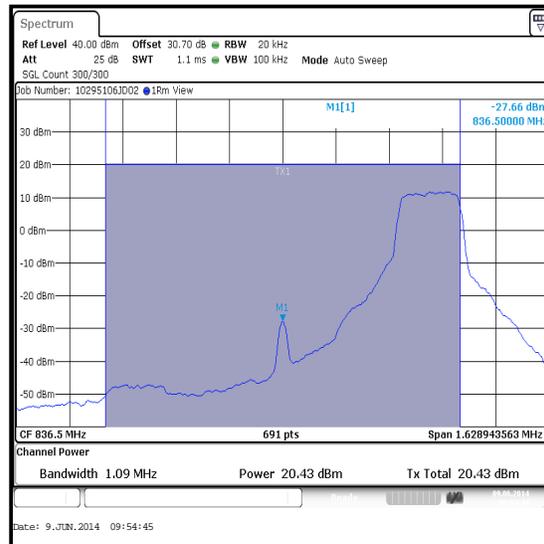
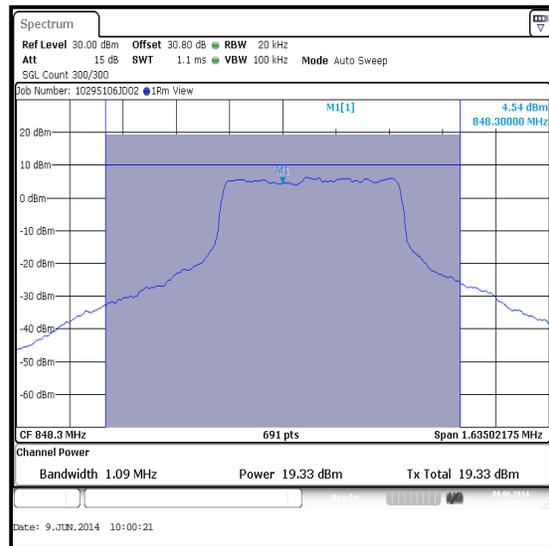

QPSK / 1 Resource Block (5 Offset)

Transmitter Output Power (ERP) (continued)

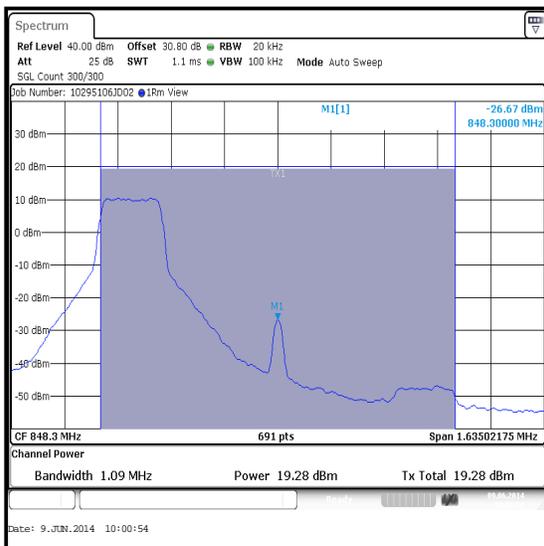### Results: 1.4 MHz Channel Bandwidth / Middle Channel / 16QAM

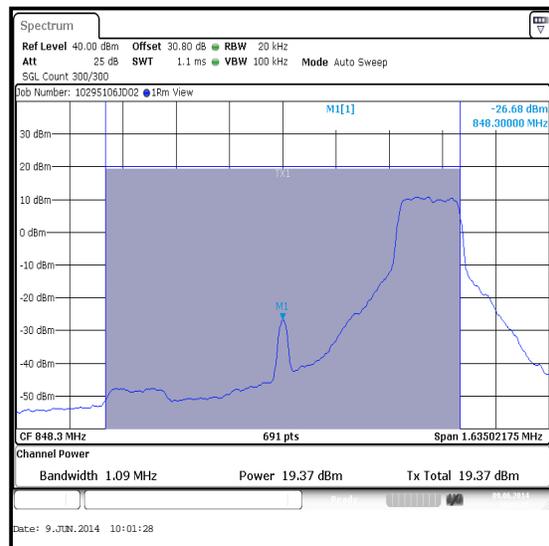| Frequency (MHz)	Resource Block(s)	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBd)	ERP (dBm)	ERP Limit (dBm)	Margin (dB)	Result
836.5	6	0	18.2	-4.25	13.95	38.5	24.55	Complied
836.5	3	2	19.2	-4.25	14.95	38.5	23.55	Complied
836.5	1	0	19.4	-4.25	15.15	38.5	23.35	Complied
836.5	1	5	19.5	-4.25	15.25	38.5	23.25	Complied

16QAM / 6 Resource Blocks (0 Offset)

16QAM / 3 Resource Blocks (2 Offset)

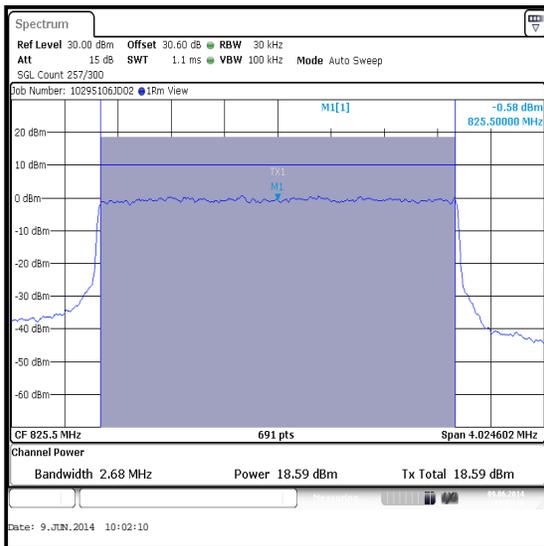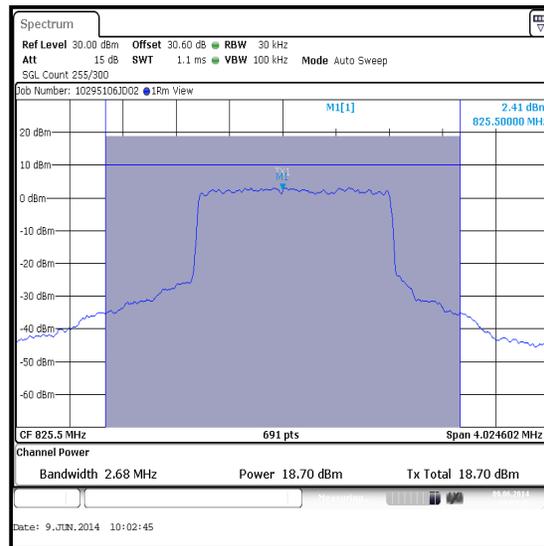**16QAM / 1 Resource Block (0 Offset)**

16QAM / 1 Resource Block (5 Offset)

Transmitter Output Power (ERP) (continued)

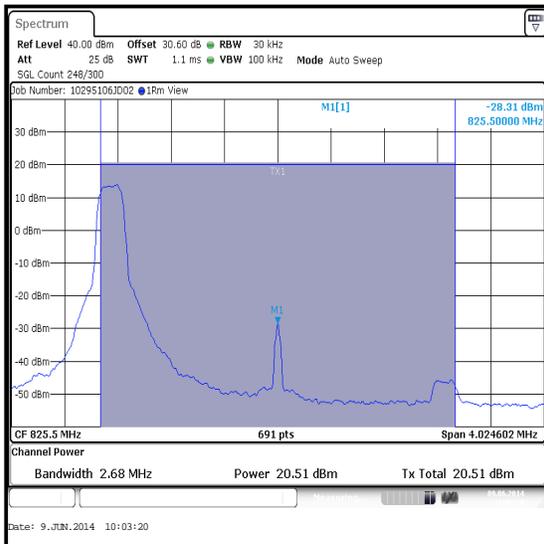## Results: 1.4 MHz Channel Bandwidth / Top Channel / QPSK

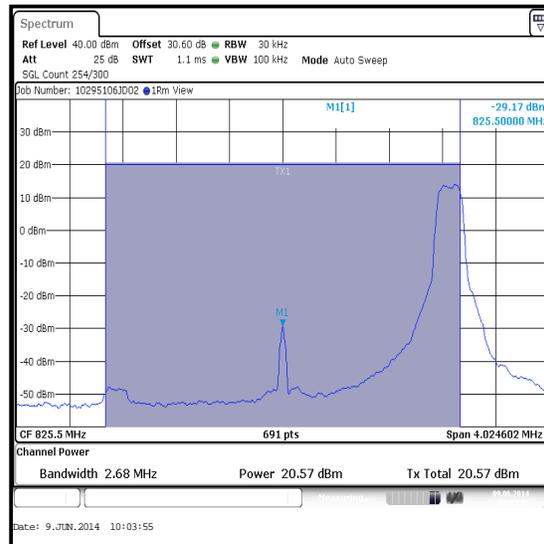| Frequency (MHz)	Resource Block(s)	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBd)	ERP (dBm)	ERP Limit (dBm)	Margin (dB)	Result
848.3	6	0	19.2	-4.25	14.95	38.5	23.55	Complied
848.3	3	2	20.1	-4.25	15.85	38.5	22.65	Complied
848.3	1	0	20.7	-4.25	16.45	38.5	22.05	Complied
848.3	1	5	20.4	-4.25	16.15	38.5	22.35	Complied

QPSK / 6 Resource Blocks (0 Offset)

QPSK / 3 Resource Blocks (2 Offset)
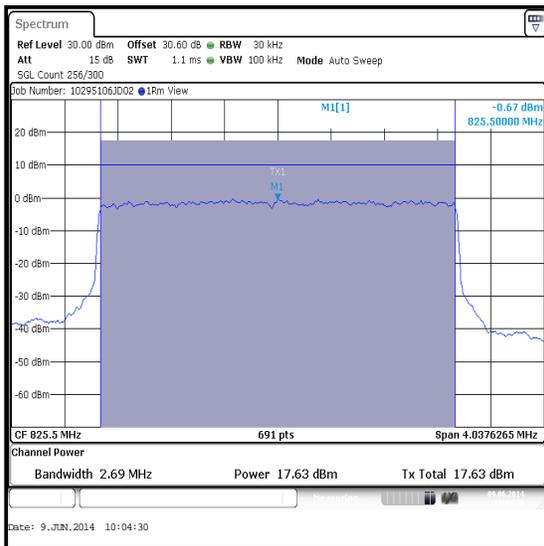
QPSK / 1 Resource Block (0 Offset)

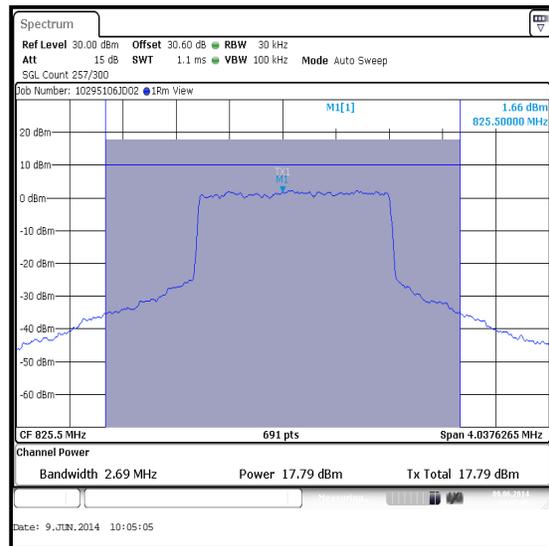**QPSK / 1 Resource Block (5 Offset)**

Transmitter Output Power (ERP) (continued)

Results: 1.4 MHz Channel Bandwidth / Top Channel / 16QAM
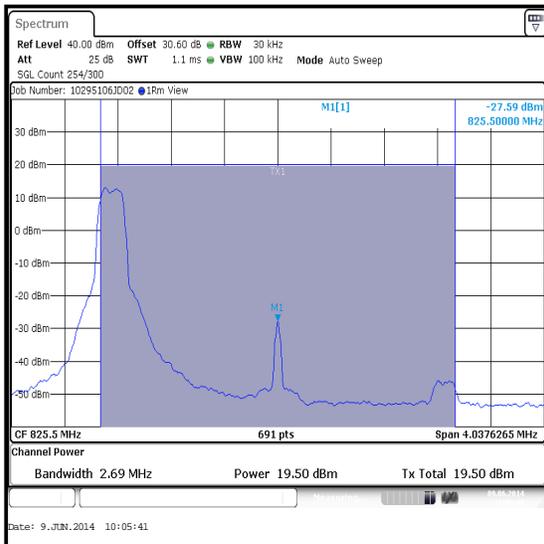
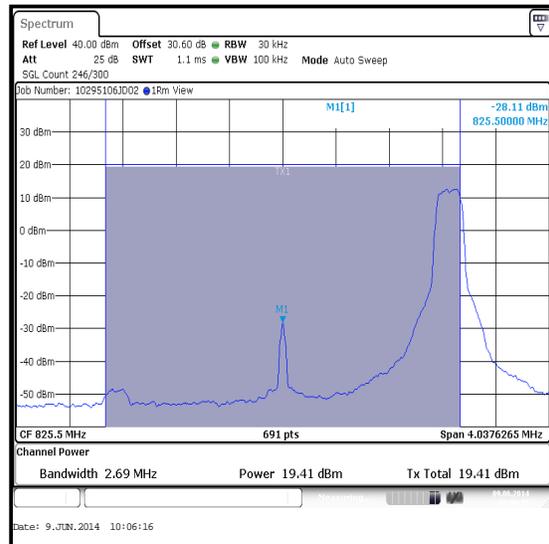| Frequency (MHz)	Resource Block(s)	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBd)	ERP (dBm)	ERP Limit (dBm)	Margin (dB)	Result
848.3	6	0	18.1	-4.25	13.85	38.5	24.65	Complied
848.3	3	2	19.3	-4.25	15.05	38.5	23.45	Complied
848.3	1	0	19.3	-4.25	15.05	38.5	23.45	Complied
848.3	1	5	19.4	-4.25	15.15	38.5	23.35	Complied

16QAM / 6 Resource Blocks (0 Offset)

16QAM / 3 Resource Blocks (2 Offset)

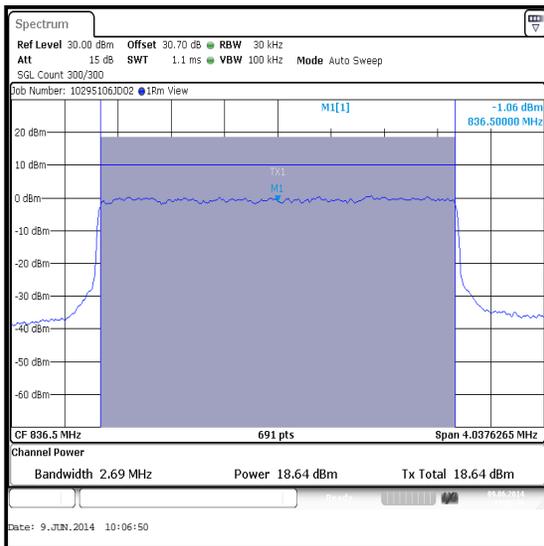**16QAM / 1 Resource Block (0 Offset)**

16QAM / 1 Resource Block (5 Offset)

Transmitter Output Power (ERP) (continued)

Results: 3 MHz Channel Bandwidth / Bottom Channel / QPSK

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBd)	ERP (dBm)	ERP Limit (dBm)	Margin (dB)	Result
825.5	15	0	18.6	-4.25	14.35	38.5	24.15	Complied
825.5	8	4	18.7	-4.25	14.45	38.5	24.05	Complied
825.5	1	0	20.5	-4.25	16.25	38.5	22.25	Complied
825.5	1	14	20.6	-4.25	16.35	38.5	22.15	Complied

QPSK / 15 Resource Blocks (0 Offset)

QPSK / 8 Resource Blocks (4 Offset)

QPSK / 1 Resource Block (0 Offset)
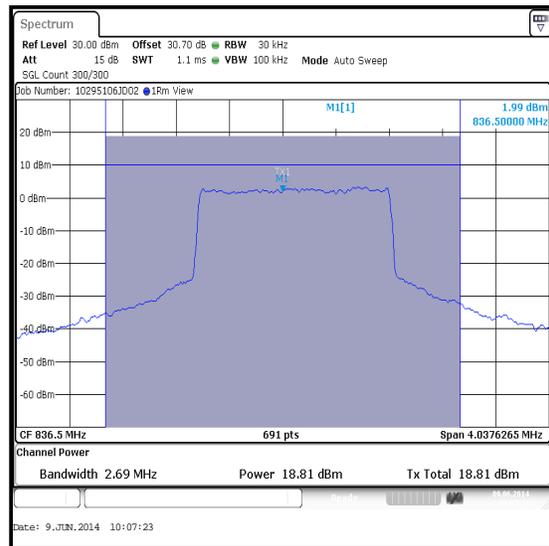

QPSK / 1 Resource Block (14 Offset)

Transmitter Output Power (ERP) (continued)

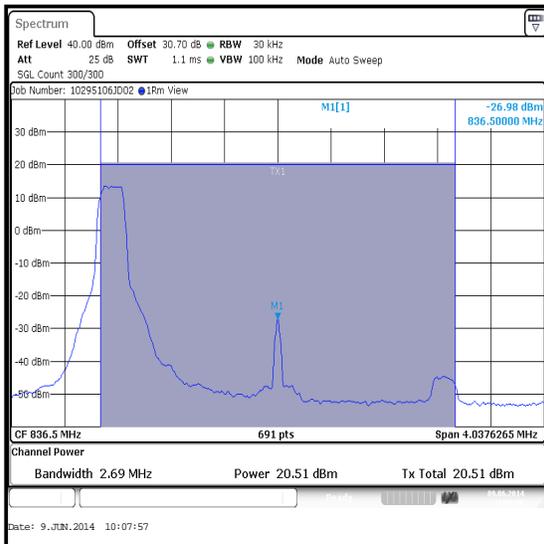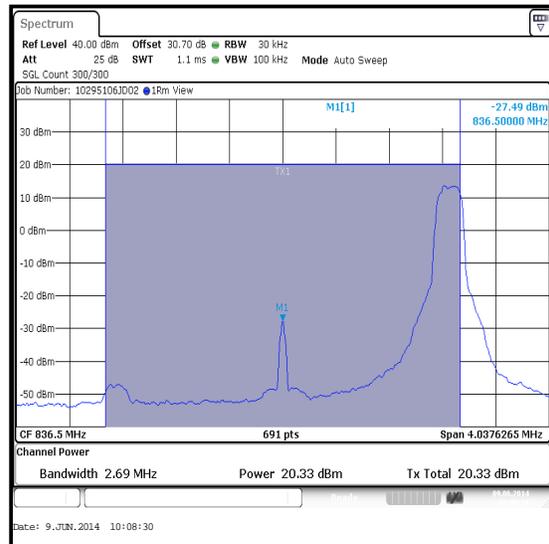### Results: 3 MHz Channel Bandwidth / Bottom Channel / 16QAM

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBd)	ERP (dBm)	ERP Limit (dBm)	Margin (dB)	Result
825.5	15	0	17.6	-4.25	13.35	38.5	25.15	Complied
825.5	8	4	17.8	-4.25	13.55	38.5	24.95	Complied
825.5	1	0	19.5	-4.25	15.25	38.5	23.25	Complied
825.5	1	14	19.4	-4.25	15.15	38.5	23.35	Complied

16QAM / 15 Resource Blocks (0 Offset)

16QAM / 8 Resource Blocks (4 Offset)

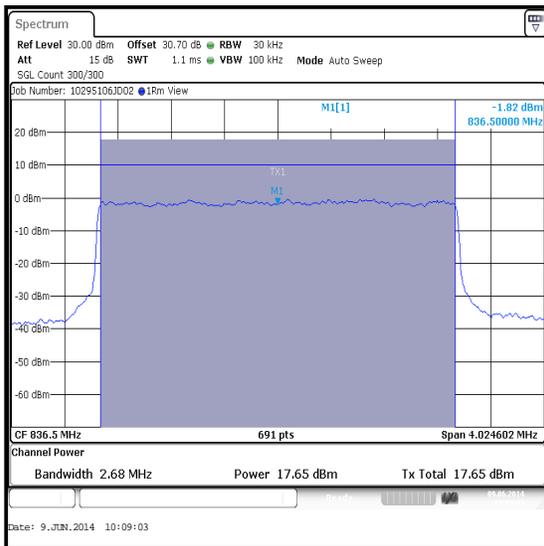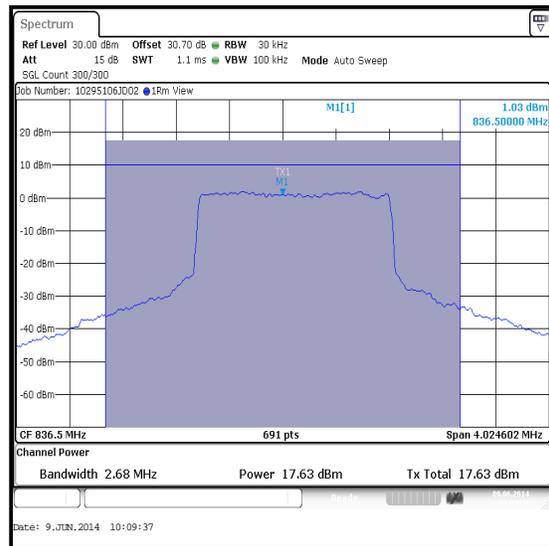**16QAM / 1 Resource Block (0 Offset)**

16QAM / 1 Resource Block (14 Offset)

Transmitter Output Power (ERP) (continued)

Results: 3 MHz Channel Bandwidth / Middle Channel / QPSK
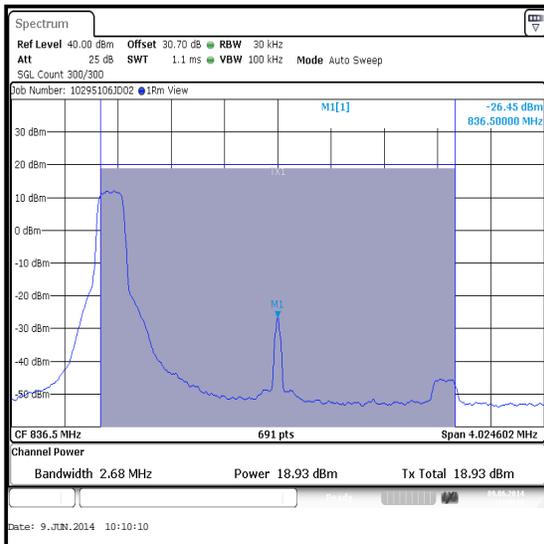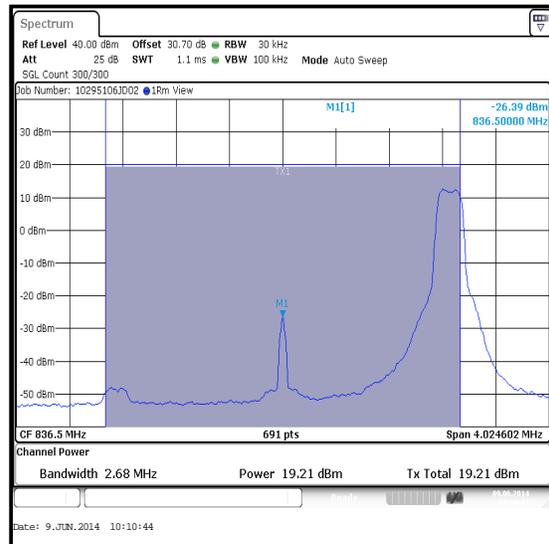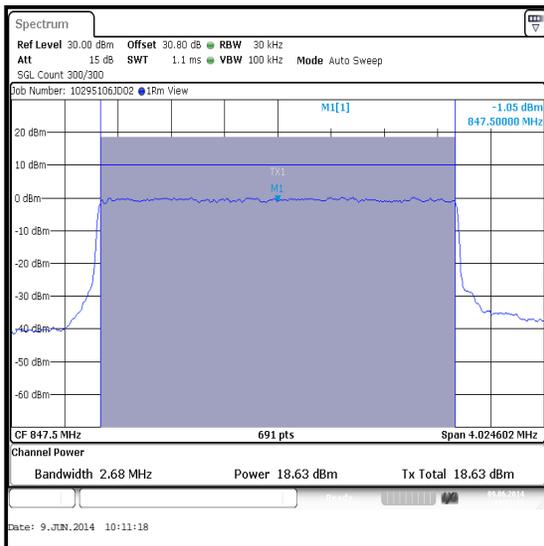
Frequency (MHz)	Resource Block(s)	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBd)	ERP (dBm)	ERP Limit (dBm)	Margin (dB)	Result
836.5	15	0	18.6	-4.25	14.35	38.5	24.15	Complied
836.5	8	4	18.8	-4.25	14.55	38.5	23.95	Complied
836.5	1	0	20.5	-4.25	16.25	38.5	22.25	Complied
836.5	1	14	20.3	-4.25	16.05	38.5	22.45	Complied

QPSK / 15 Resource Blocks (0 Offset)

QPSK / 8 Resource Blocks (4 Offset)

QPSK / 1 Resource Block (0 Offset)

QPSK / 1 Resource Block (14 Offset)

Transmitter Output Power (ERP) (continued)

Results: 3 MHz Channel Bandwidth / Middle Channel / 16QAM

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBd)	ERP (dBm)	ERP Limit (dBm)	Margin (dB)	Result
836.5	15	0	17.7	-4.25	13.45	38.5	25.05	Complied
836.5	8	4	17.6	-4.25	13.35	38.5	25.15	Complied
836.5	1	0	18.9	-4.25	14.65	38.5	23.85	Complied
836.5	1	14	19.2	-4.25	14.95	38.5	23.55	Complied

16QAM / 15 Resource Blocks (0 Offset)

16QAM / 8 Resource Blocks (4 Offset)

16QAM / 1 Resource Block (0 Offset)
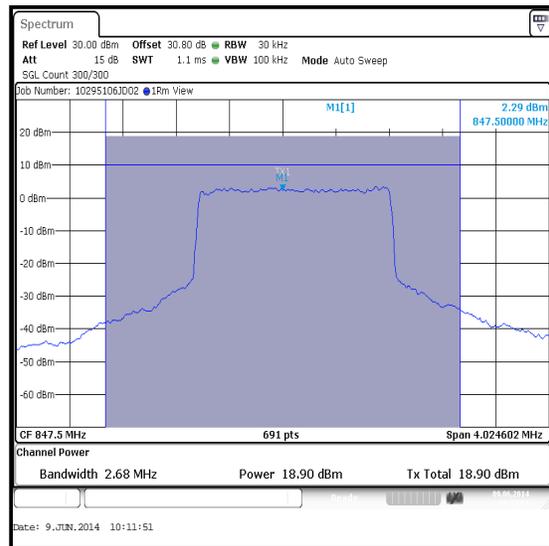

16QAM / 1 Resource Block (14 Offset)

Transmitter Output Power (ERP) (continued)
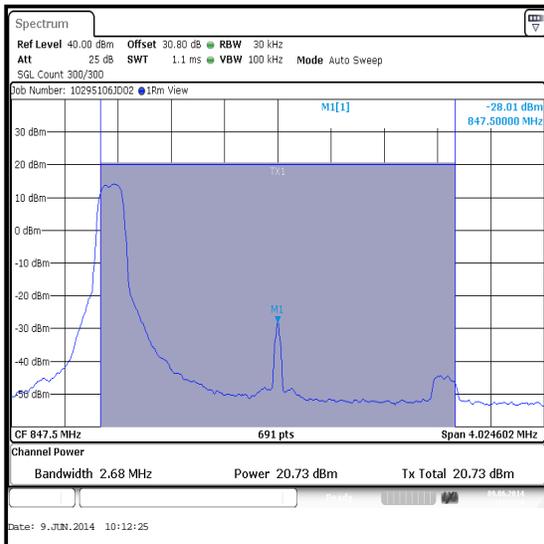
Results: 3 MHz Channel Bandwidth / Top Channel / QPSK

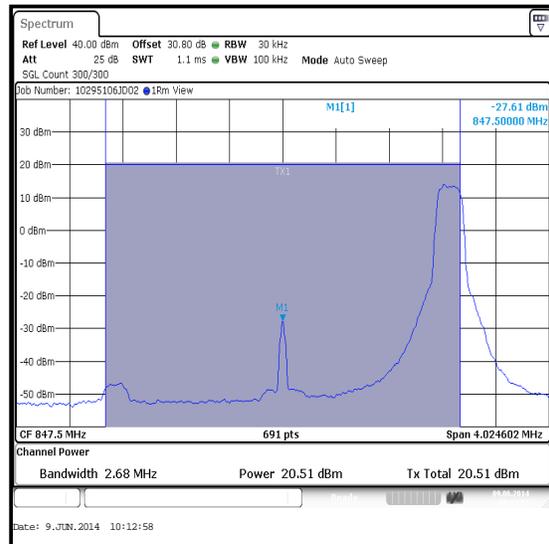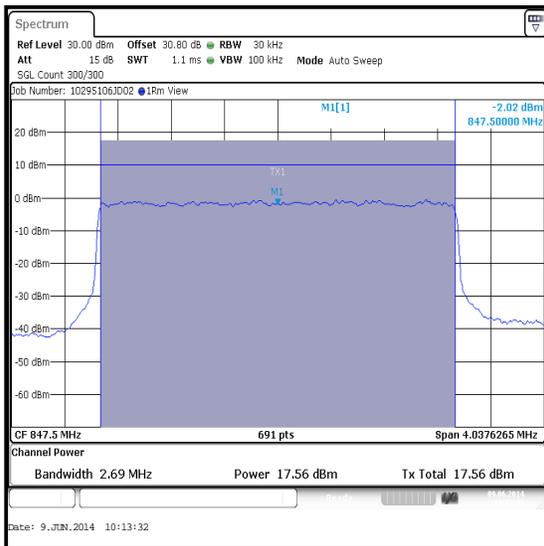| Frequency (MHz)	Resource Block(s)	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBd)	ERP (dBm)	ERP Limit (dBm)	Margin (dB)	Result
847.5	15	0	18.6	-4.25	14.35	38.5	24.15	Complied
847.5	8	4	18.9	-4.25	14.65	38.5	23.85	Complied
847.5	1	0	20.7	-4.25	16.45	38.5	22.05	Complied
847.5	1	14	20.5	-4.25	16.25	38.5	22.25	Complied

QPSK / 15 Resource Blocks (0 Offset)

QPSK / 8 Resource Blocks (4 Offset)

QPSK / 1 Resource Block (0 Offset)

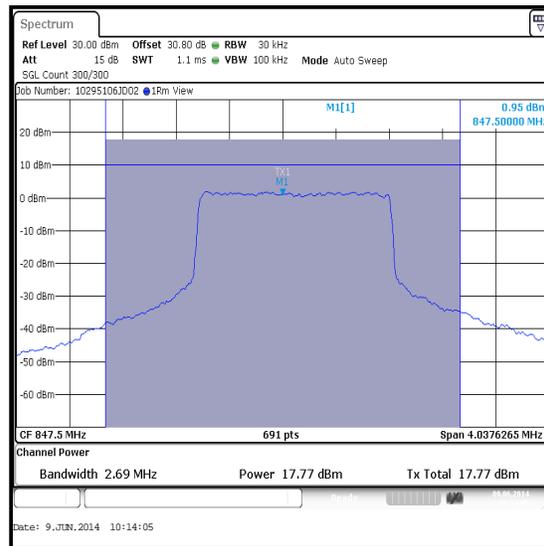**QPSK / 1 Resource Block (14 Offset)**

Transmitter Output Power (ERP) (continued)

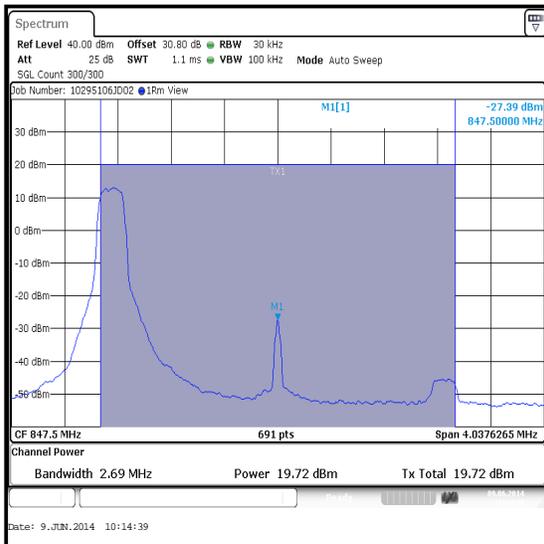### Results: 3 MHz Channel Bandwidth / Top Channel / 16QAM

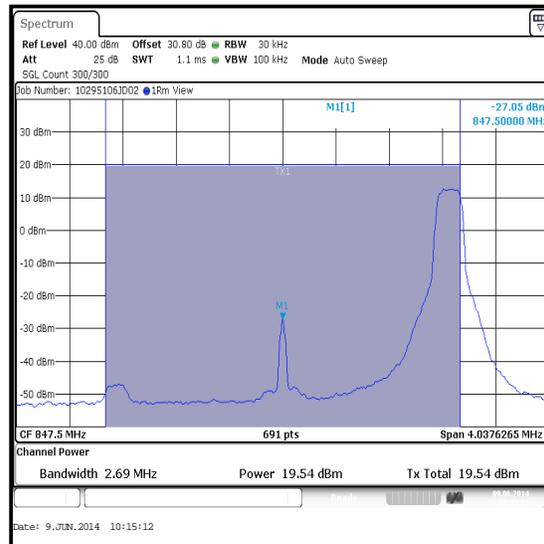| Frequency (MHz)	Resource Block(s)	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBd)	ERP (dBm)	ERP Limit (dBm)	Margin (dB)	Result
847.5	15	0	17.6	-4.25	13.35	38.5	25.15	Complied
847.5	8	4	17.8	-4.25	13.55	38.5	24.95	Complied
847.5	1	0	19.7	-4.25	15.45	38.5	23.05	Complied
847.5	1	14	19.5	-4.25	15.25	38.5	23.25	Complied

16QAM / 15 Resource Blocks (0 Offset)

16QAM / 8 Resource Blocks (4 Offset)

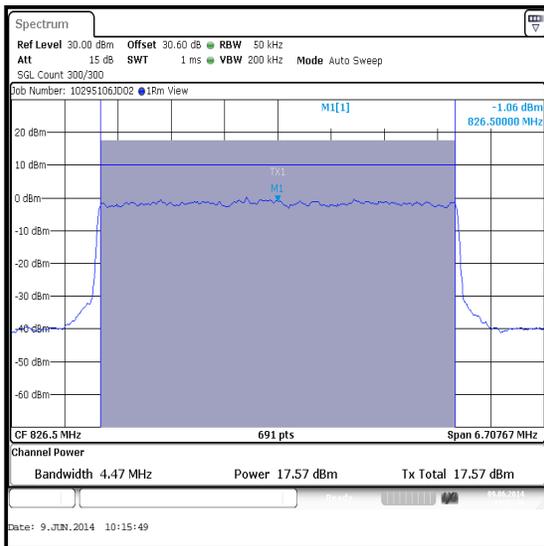**16QAM / 1 Resource Block (0 Offset)**

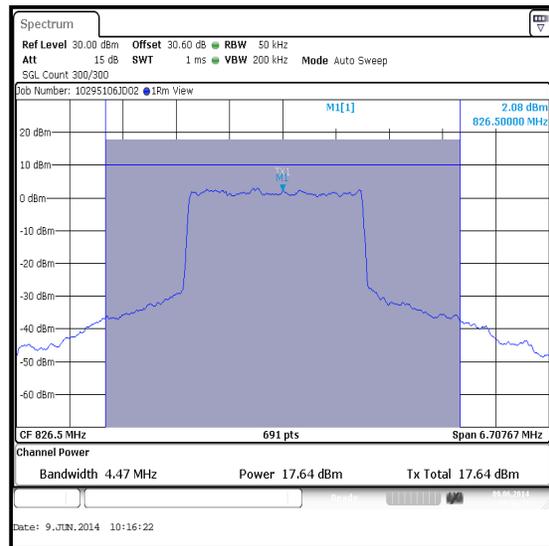**16QAM / 1 Resource Block (14 Offset)**

Transmitter Output Power (ERP) (continued)

Results: 5 MHz Channel Bandwidth / Bottom Channel / QPSK

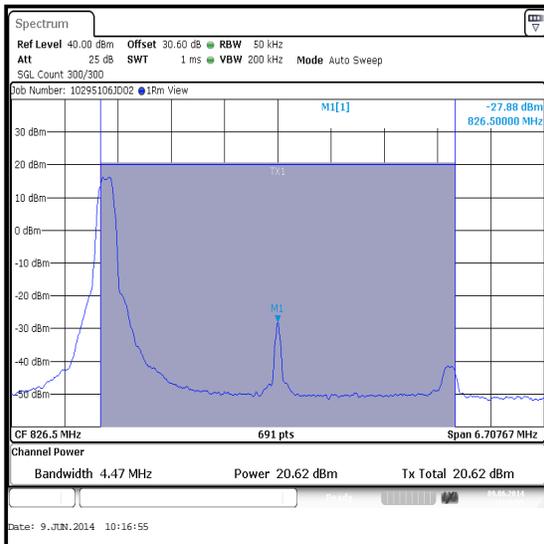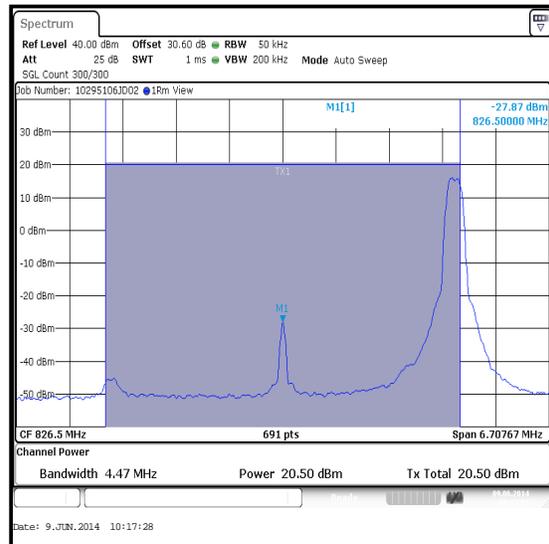| Frequency (MHz)	Resource Block(s)	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBd)	ERP (dBm)	ERP Limit (dBm)	Margin (dB)	Result
826.5	25	0	17.6	-4.25	13.35	38.5	25.15	Complied
826.5	12	6	17.6	-4.25	13.35	38.5	25.15	Complied
826.5	1	0	20.6	-4.25	16.35	38.5	22.15	Complied
826.5	1	24	20.5	-4.25	16.25	38.5	22.25	Complied

QPSK / 25 Resource Blocks (0 Offset)

QPSK / 12 Resource Blocks (6 Offset)

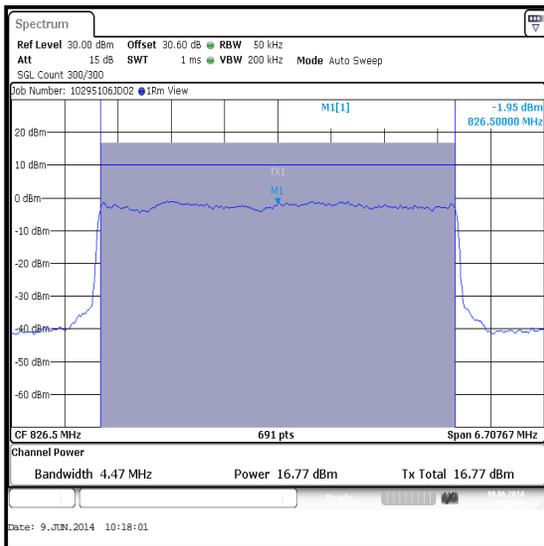**QPSK / 1 Resource Block (0 Offset)**

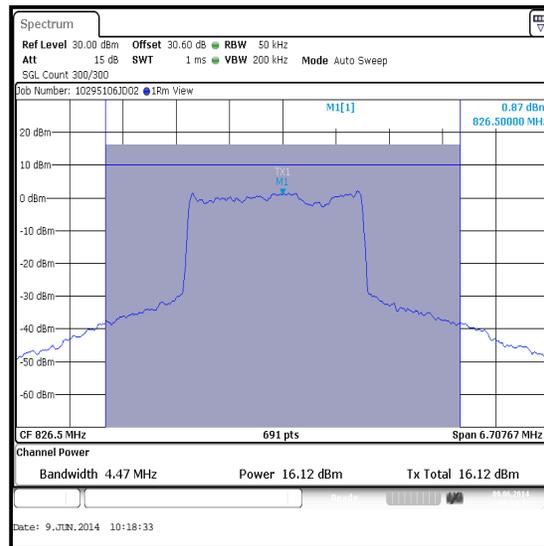**QPSK / 1 Resource Block (24 Offset)**

Transmitter Output Power (ERP) (continued)

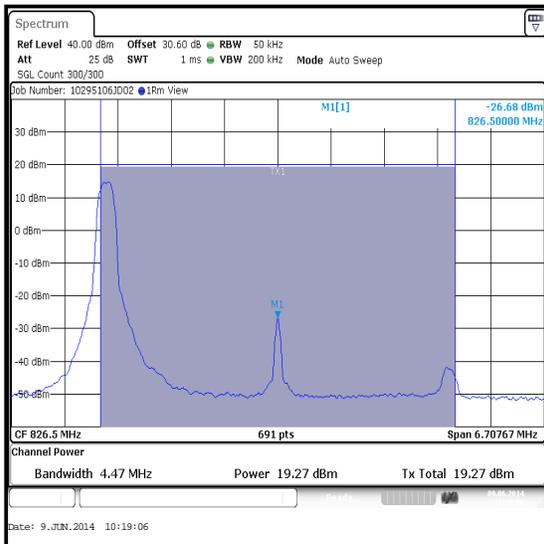### Results: 5 MHz Channel Bandwidth / Bottom Channel / 16QAM

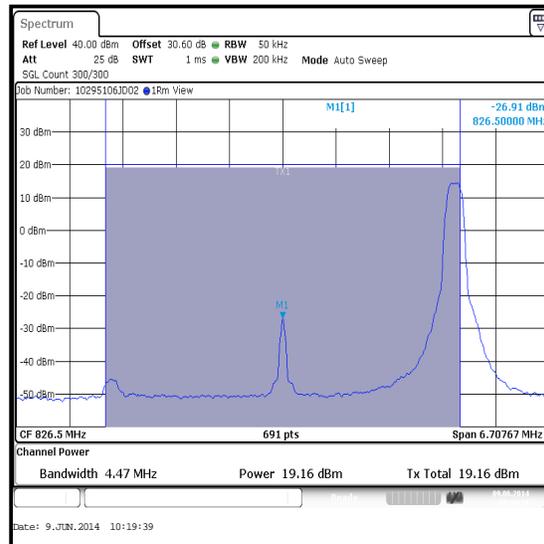| Frequency (MHz)	Resource Block(s)	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBd)	ERP (dBm)	ERP Limit (dBm)	Margin (dB)	Result
826.5	25	0	16.8	-4.25	12.55	38.5	25.95	Complied
826.5	12	6	16.1	-4.25	11.85	38.5	26.65	Complied
826.5	1	0	19.3	-4.25	15.05	38.5	23.45	Complied
826.5	1	24	19.2	-4.25	14.95	38.5	23.55	Complied

16QAM / 25 Resource Blocks (0 Offset)

16QAM / 12 Resource Blocks (6 Offset)

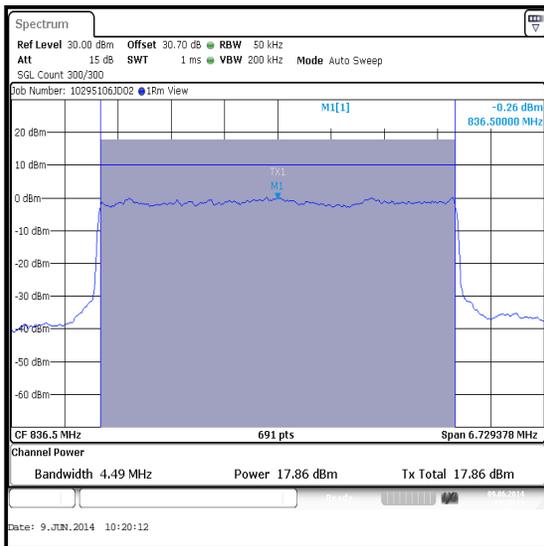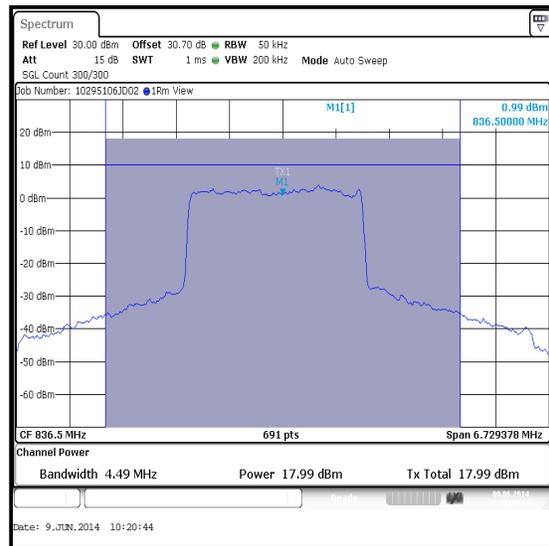**16QAM / 1 Resource Block (0 Offset)**

16QAM / 1 Resource Block (24 Offset)

Transmitter Output Power (ERP) (continued)

Results: 5 MHz Channel Bandwidth / Middle Channel / QPSK

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBd)	ERP (dBm)	ERP Limit (dBm)	Margin (dB)	Result
836.5	25	0	17.9	-4.25	13.65	38.5	24.85	Complied
836.5	12	6	18.0	-4.25	13.75	38.5	24.75	Complied
836.5	1	0	20.6	-4.25	16.35	38.5	22.15	Complied
836.5	1	24	20.3	-4.25	16.05	38.5	22.45	Complied

QPSK / 25 Resource Blocks (0 Offset)

QPSK / 12 Resource Blocks (6 Offset)

QPSK / 1 Resource Block (0 Offset)

QPSK / 1 Resource Block (24 Offset)

Transmitter Output Power (ERP) (continued)

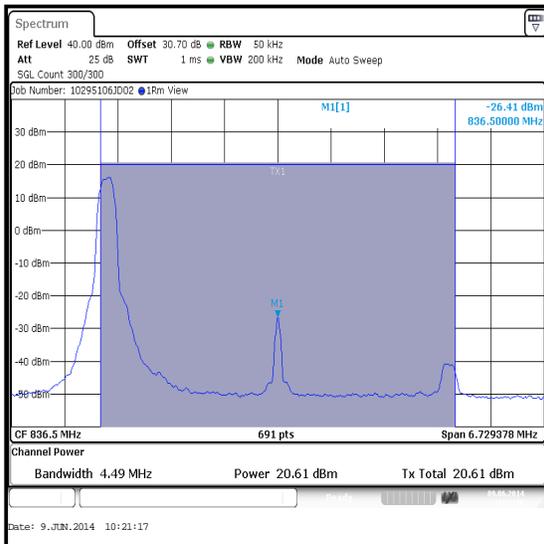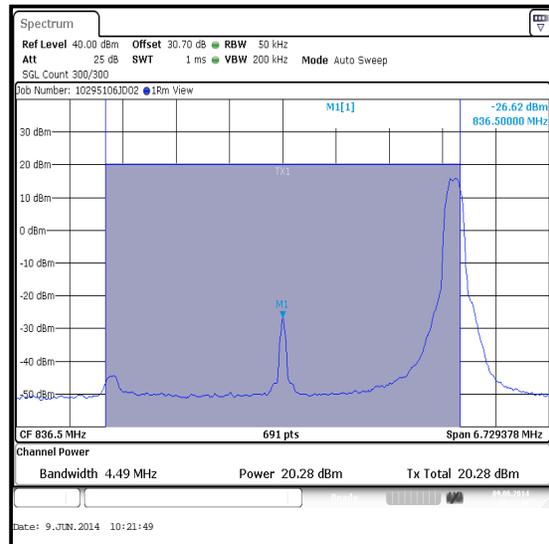### Results: 5 MHz Channel Bandwidth / Middle Channel / 16QAM

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBd)	ERP (dBm)	ERP Limit (dBm)	Margin (dB)	Result
836.5	25	0	16.8	-4.25	12.55	38.5	25.95	Complied
836.5	12	6	16.5	-4.25	12.25	38.5	26.25	Complied
836.5	1	0	19.4	-4.25	15.15	38.5	23.35	Complied
836.5	1	24	19.3	-4.25	15.05	38.5	23.45	Complied

16QAM / 25 Resource Blocks (0 Offset)

16QAM / 12 Resource Blocks (6 Offset)

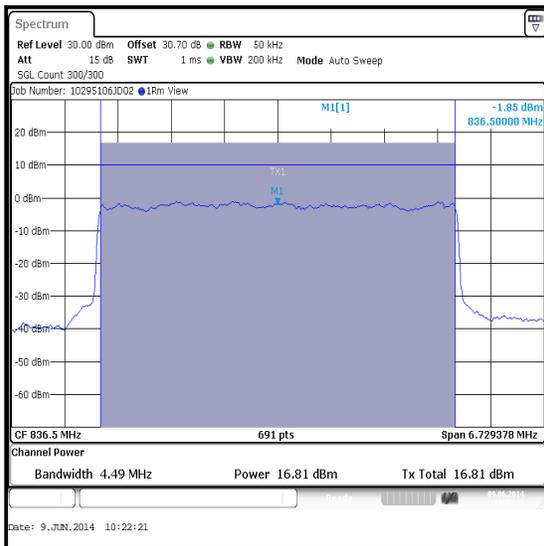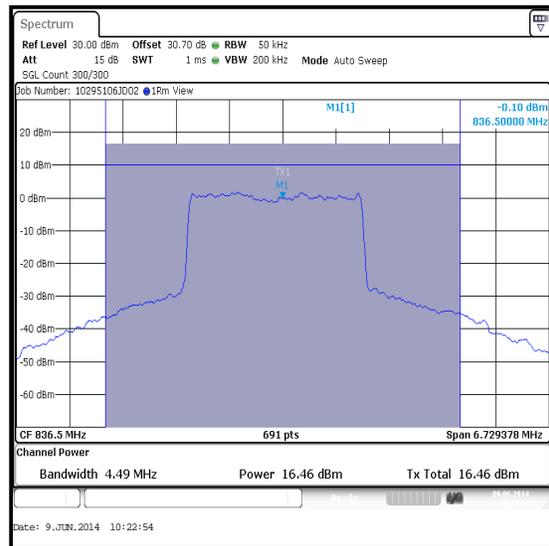**16QAM / 1 Resource Block (0 Offset)**

16QAM / 1 Resource Block (24 Offset)

Transmitter Output Power (ERP) (continued)

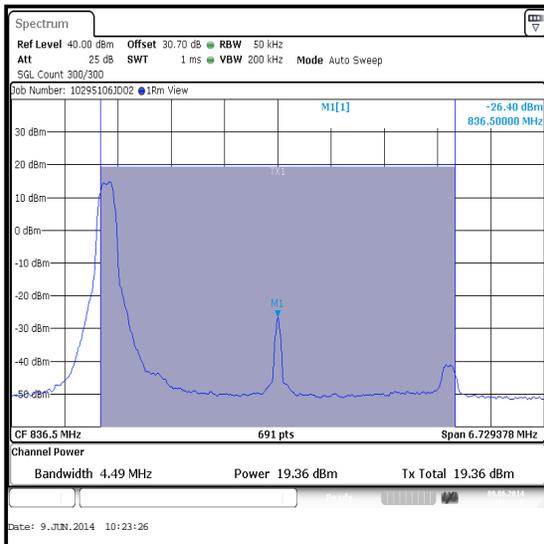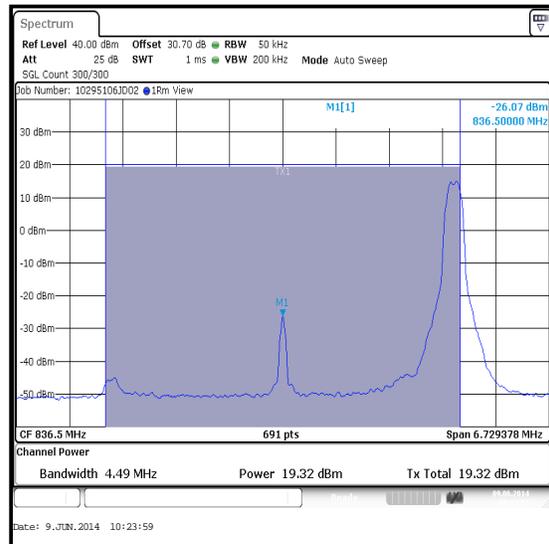## Results: 5 MHz Channel Bandwidth / Top Channel / QPSK

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBd)	ERP (dBm)	ERP Limit (dBm)	Margin (dB)	Result
846.5	25	0	17.7	-4.25	13.45	38.5	25.05	Complied
846.5	12	6	17.6	-4.25	13.35	38.5	25.15	Complied
846.5	1	0	20.7	-4.25	16.45	38.5	22.05	Complied
846.5	1	24	20.4	-4.25	16.15	38.5	22.35	Complied

QPSK / 25 Resource Blocks (0 Offset)

QPSK / 12 Resource Blocks (6 Offset)

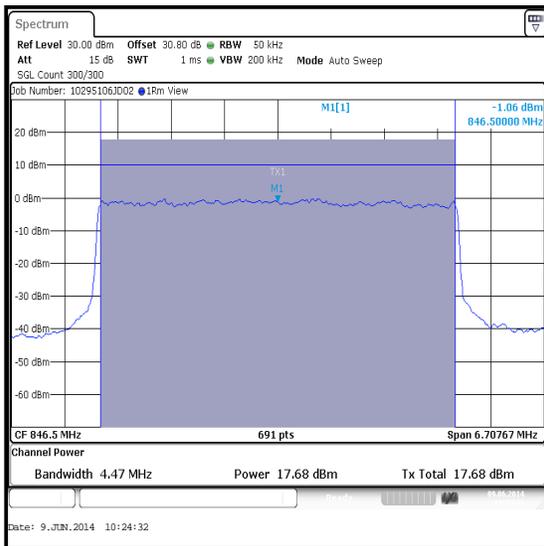**QPSK / 1 Resource Block (0 Offset)**

QPSK / 1 Resource Block (24 Offset)

Transmitter Output Power (ERP) (continued)

Results: 5 MHz Channel Bandwidth / Top Channel / 16QAM

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBd)	ERP (dBm)	ERP Limit (dBm)	Margin (dB)	Result
846.5	25	0	16.9	-4.25	12.65	38.5	25.85	Complied
846.5	12	6	17.2	-4.25	12.95	38.5	25.55	Complied
846.5	1	0	19.0	-4.25	14.75	38.5	23.75	Complied
846.5	1	24	19.2	-4.25	14.95	38.5	23.55	Complied

16QAM / 25 Resource Blocks (0 Offset)

16QAM / 12 Resource Blocks (6 Offset)

16QAM / 1 Resource Block (0 Offset)
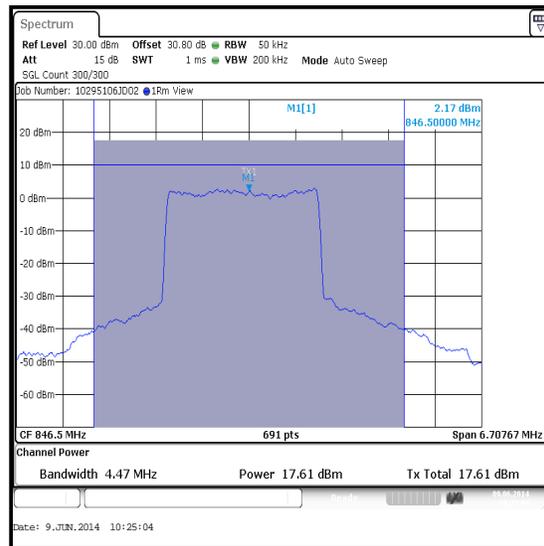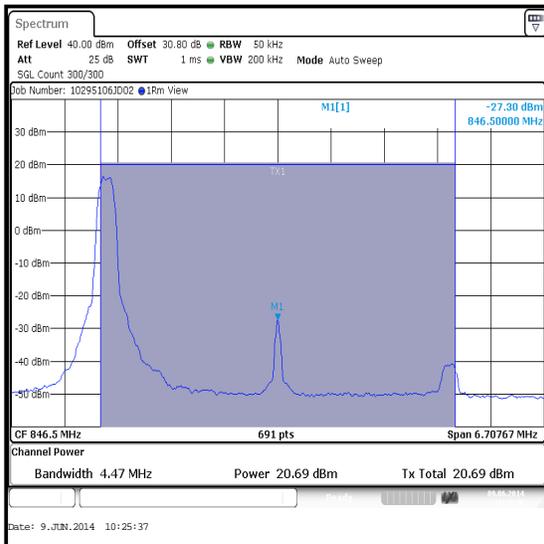

16QAM / 1 Resource Block (24 Offset)

Transmitter Output Power (ERP) (continued)

Results: 10 MHz Channel Bandwidth / Bottom Channel / QPSK

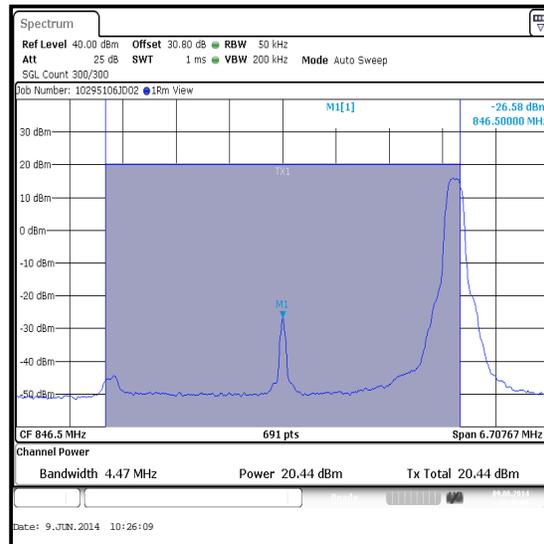| Frequency (MHz)	Resource Block(s)	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBd)	ERP (dBm)	ERP Limit (dBm)	Margin (dB)	Result
829.0	50	0	18.2	-4.25	13.95	38.5	24.55	Complied
829.0	25	12	18.2	-4.25	13.95	38.5	24.55	Complied
829.0	1	0	20.7	-4.25	16.45	38.5	22.05	Complied
829.0	1	49	20.6	-4.25	16.35	38.5	22.15	Complied

QPSK / 50 Resource Blocks (0 Offset)
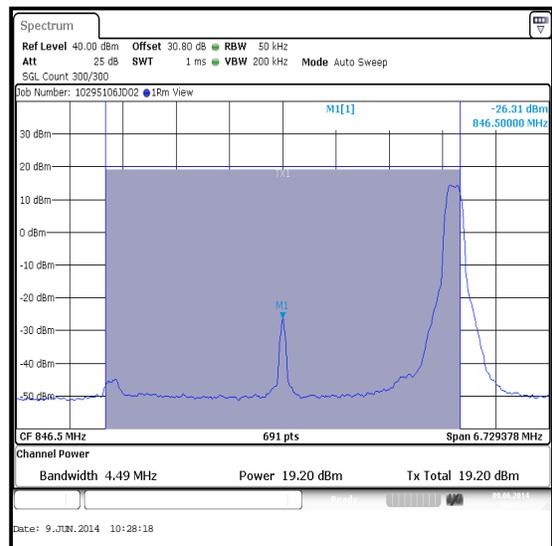

QPSK / 25 Resource Blocks (12 Offset)

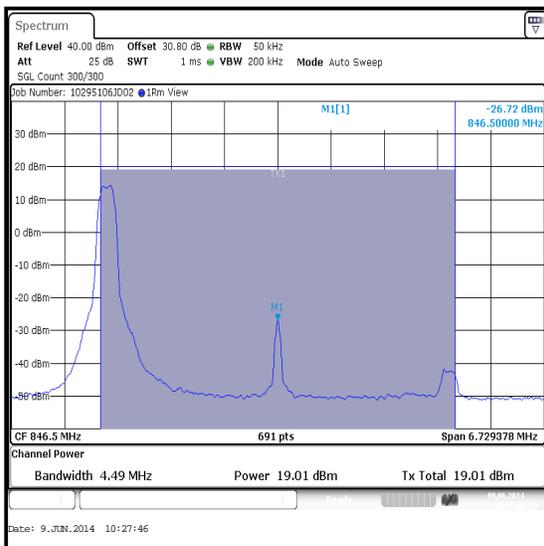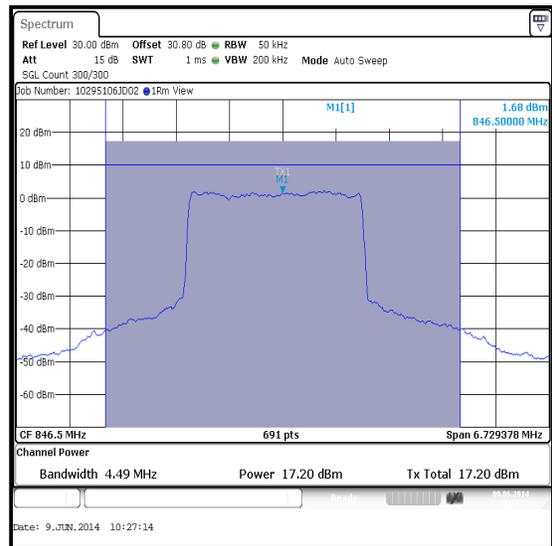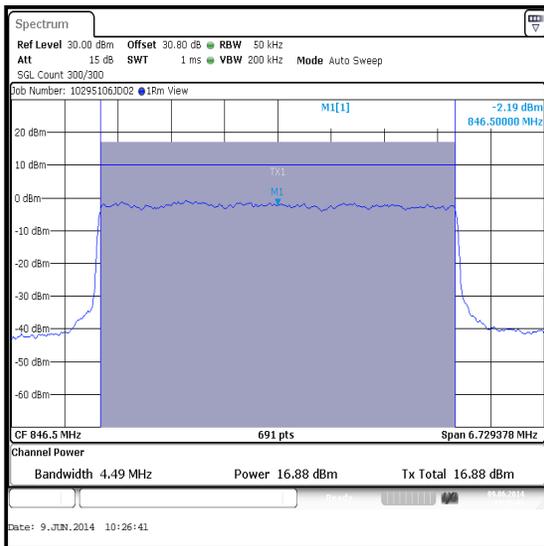**QPSK / 1 Resource Block (0 Offset)**

QPSK / 1 Resource Block (49 Offset)

Transmitter Output Power (ERP) (continued)

Results: 10 MHz Channel Bandwidth / Bottom Channel / 16QAM
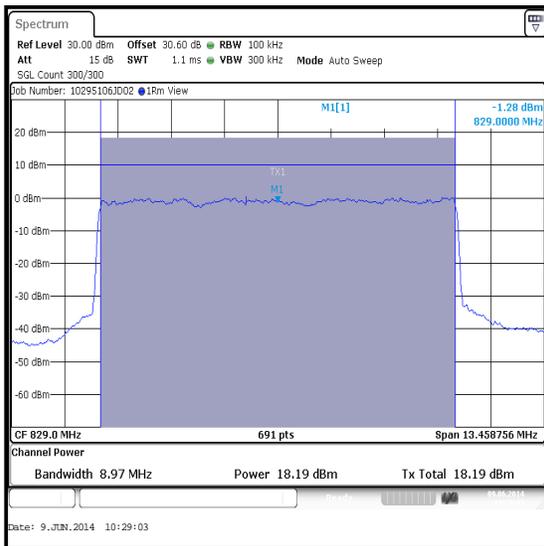
Frequency (MHz)	Resource Block(s)	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBd)	ERP (dBm)	ERP Limit (dBm)	Margin (dB)	Result
829.0	50	0	17.3	-4.25	13.05	38.5	25.45	Complied
829.0	25	12	17.3	-4.25	13.05	38.5	25.45	Complied
829.0	1	0	19.6	-4.25	15.35	38.5	23.15	Complied
829.0	1	49	19.3	-4.25	15.05	38.5	23.45	Complied

16QAM / 50 Resource Blocks (0 Offset)

16QAM / 25 Resource Blocks (12 Offset)

16QAM / 1 Resource Block (0 Offset)
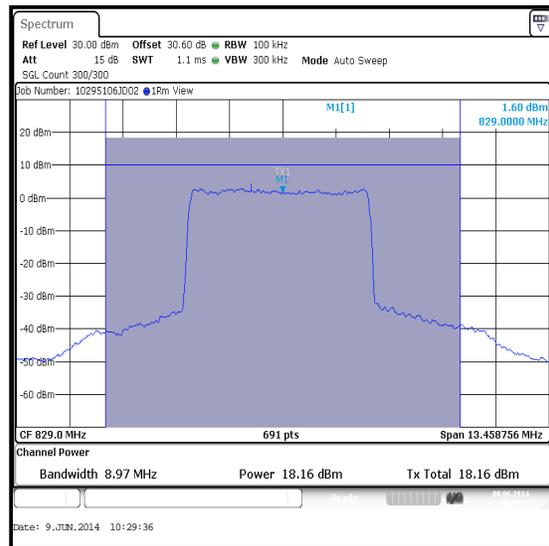

16QAM / 1 Resource Block (49 Offset)

Transmitter Output Power (ERP) (continued)

Results: 10 MHz Channel Bandwidth / Middle Channel / QPSK
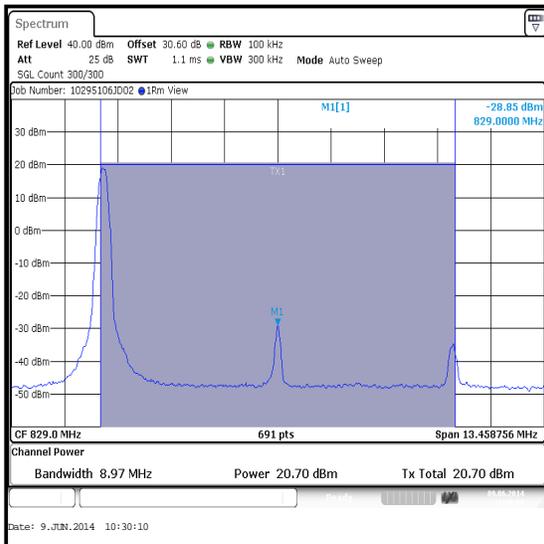
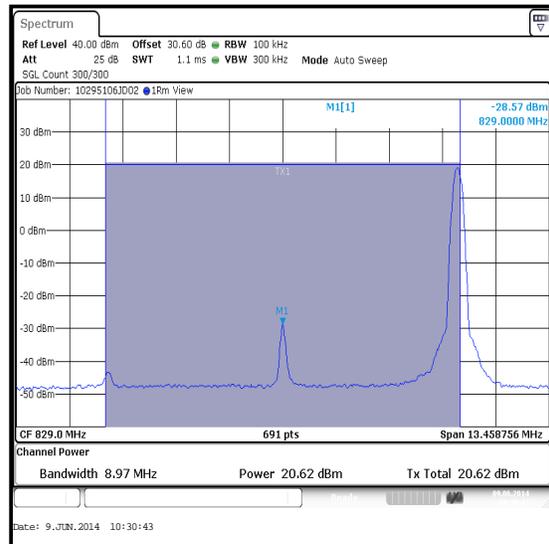| Frequency (MHz)	Resource Block(s)	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBd)	ERP (dBm)	ERP Limit (dBm)	Margin (dB)	Result
836.5	50	0	18.2	-4.25	13.95	38.5	24.55	Complied
836.5	25	12	18.1	-4.25	13.85	38.5	24.65	Complied
836.5	1	0	20.7	-4.25	16.45	38.5	22.05	Complied
836.5	1	49	20.4	-4.25	16.15	38.5	22.35	Complied

QPSK / 50 Resource Blocks (0 Offset)

QPSK / 25 Resource Blocks (12 Offset)

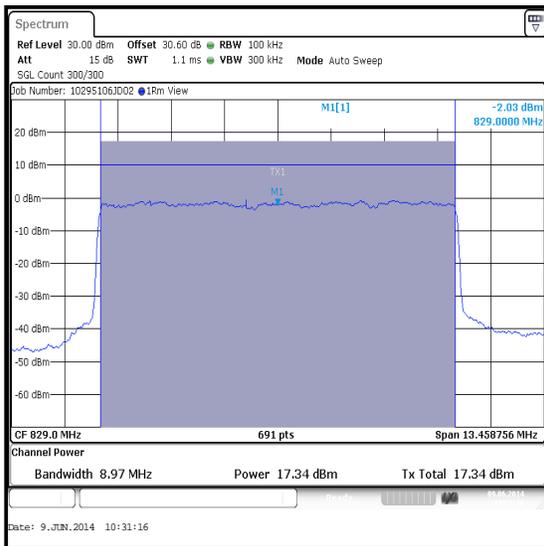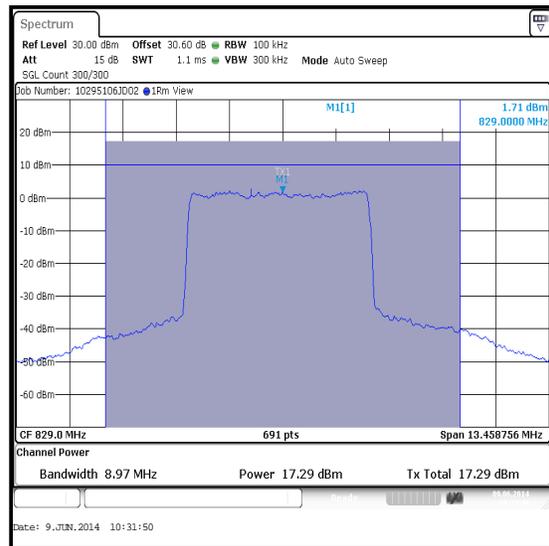**QPSK / 1 Resource Block (0 Offset)**

QPSK / 1 Resource Block (49 Offset)

Transmitter Output Power (ERP) (continued)

Results: 10 MHz Channel Bandwidth / Middle Channel / 16QAM
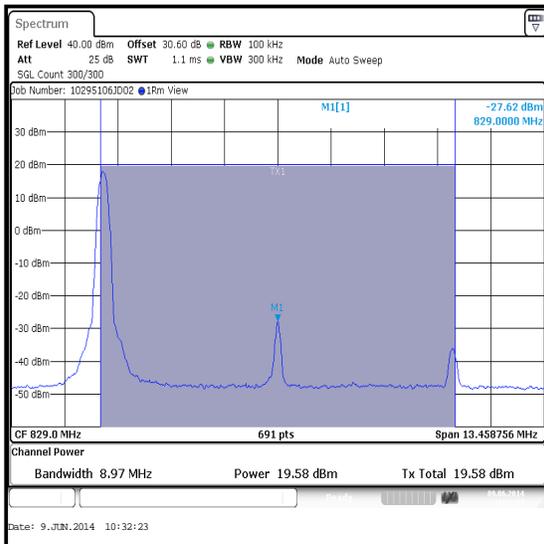
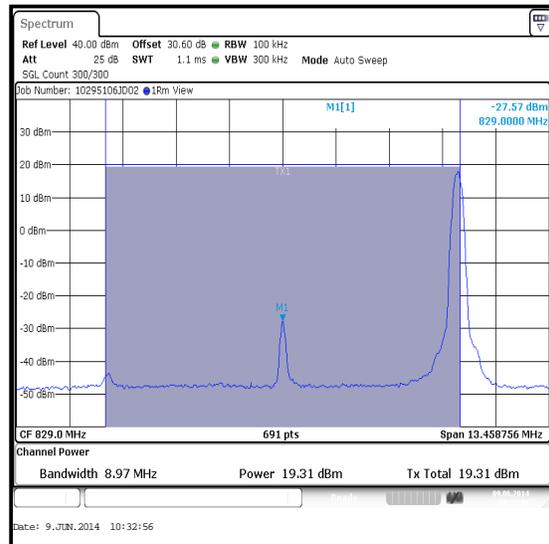| Frequency (MHz)	Resource Block(s)	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBd)	ERP (dBm)	ERP Limit (dBm)	Margin (dB)	Result
836.5	50	0	17.3	-4.25	13.05	38.5	25.45	Complied
836.5	25	12	17.3	-4.25	13.05	38.5	25.45	Complied
836.5	1	0	19.2	-4.25	14.95	38.5	23.55	Complied
836.5	1	49	19.2	-4.25	14.95	38.5	23.55	Complied

16QAM / 50 Resource Blocks (0 Offset)

16QAM / 25 Resource Blocks (12 Offset)

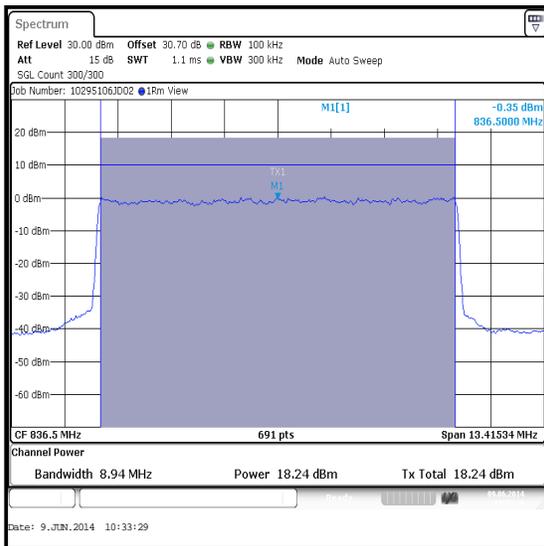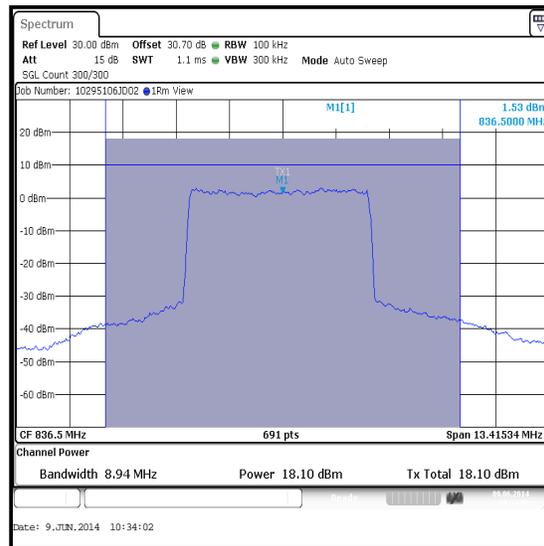**16QAM / 1 Resource Block (0 Offset)**

16QAM / 1 Resource Block (49 Offset)

Transmitter Output Power (ERP) (continued)

Results: 10 MHz Channel Bandwidth / Top Channel / QPSK

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBd)	ERP (dBm)	ERP Limit (dBm)	Margin (dB)	Result
844.0	50	0	18.4	-4.25	14.15	38.5	24.35	Complied
844.0	25	12	18.4	-4.25	14.15	38.5	24.35	Complied
844.0	1	0	20.7	-4.25	16.45	38.5	22.05	Complied
844.0	1	49	20.5	-4.25	16.25	38.5	22.25	Complied

QPSK / 50 Resource Blocks (0 Offset)
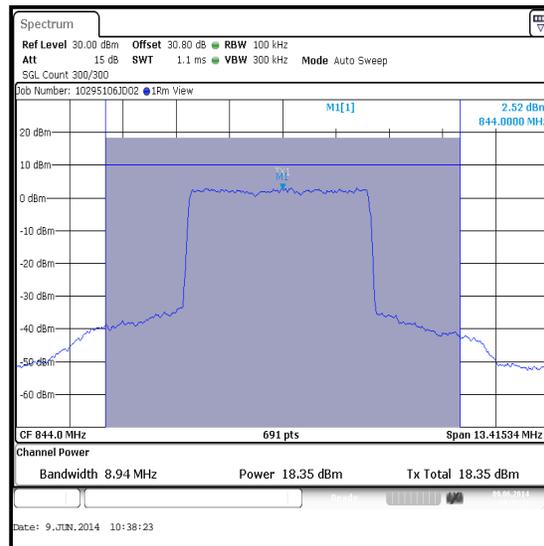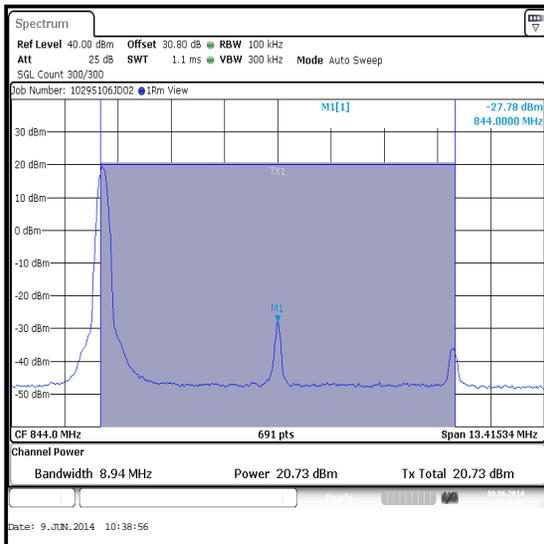
QPSK / 25 Resource Blocks (12 Offset)

QPSK / 1 Resource Block (0 Offset)
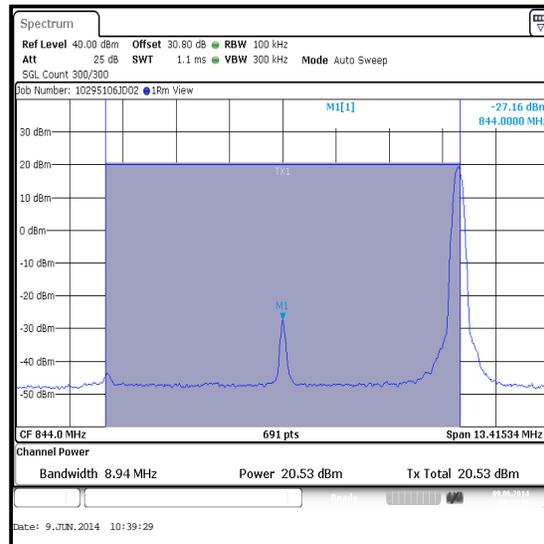
QPSK / 1 Resource Block (49 Offset)

Transmitter Output Power (ERP) (continued)

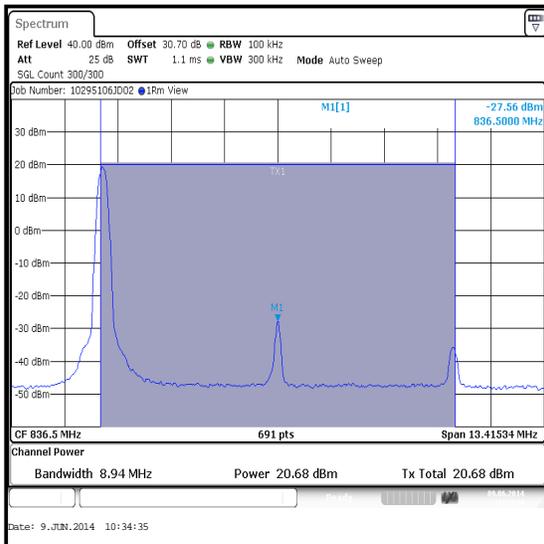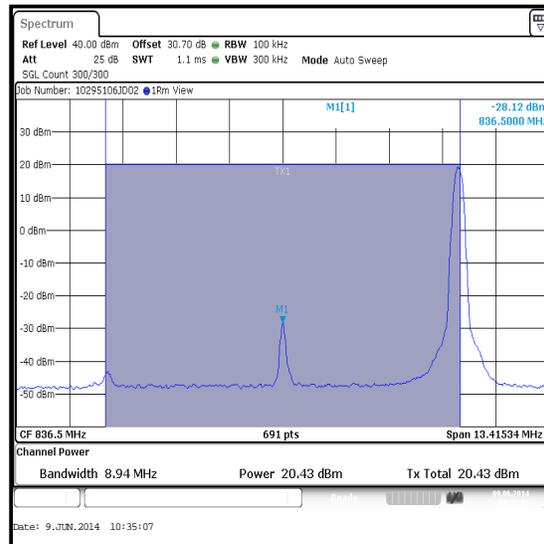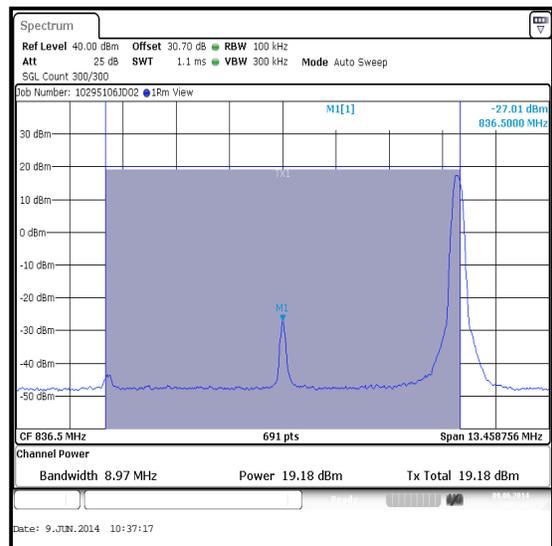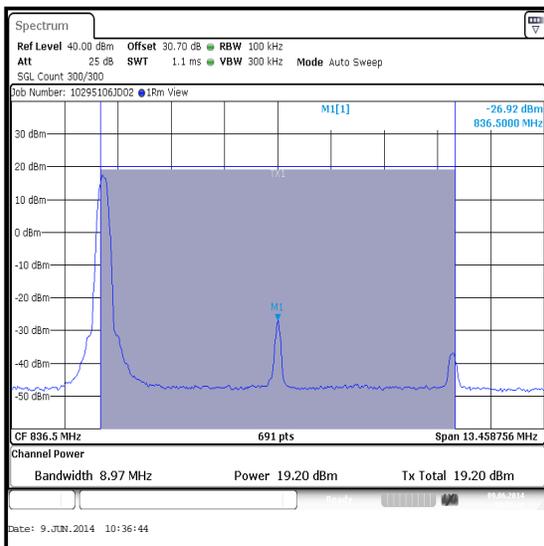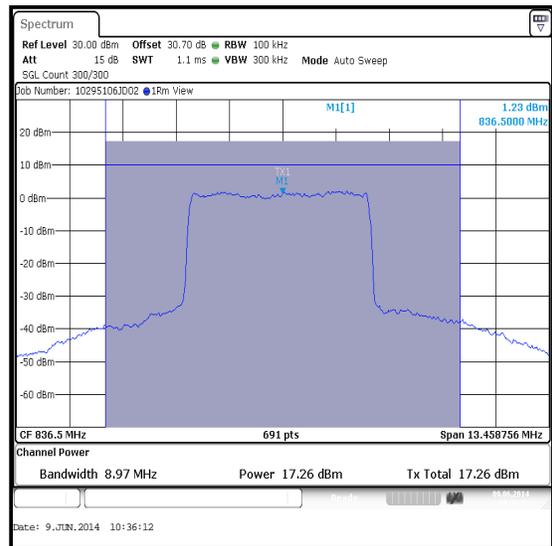### Results: 10 MHz Channel Bandwidth / Top Channel / 16QAM

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBd)	ERP (dBm)	ERP Limit (dBm)	Margin (dB)	Result
844.0	50	0	17.5	-4.25	13.25	38.5	25.25	Complied
844.0	25	12	17.3	-4.25	13.05	38.5	25.45	Complied
844.0	1	0	19.7	-4.25	15.45	38.5	23.05	Complied
844.0	1	49	19.0	-4.25	14.75	38.5	23.75	Complied

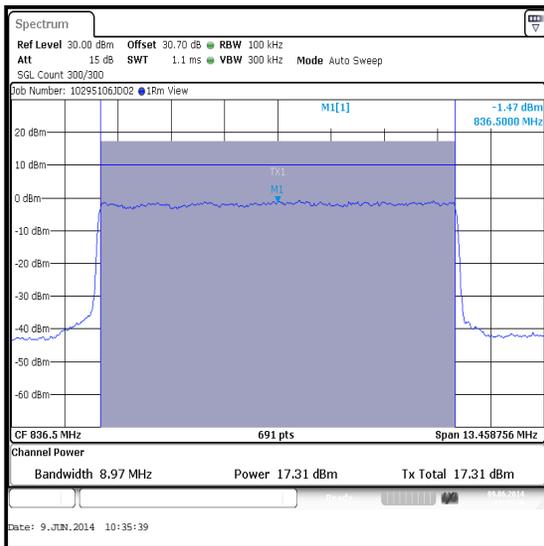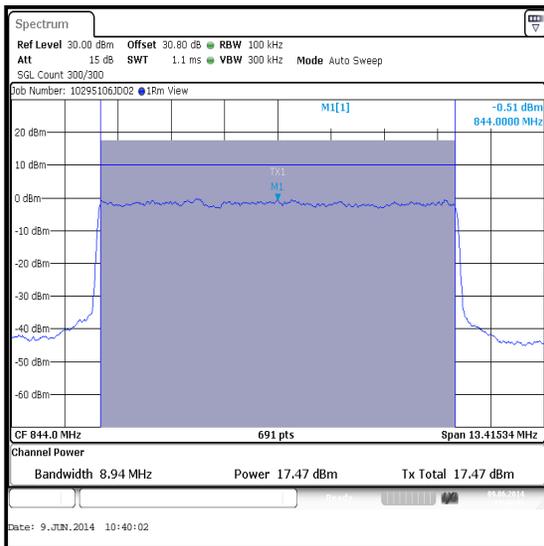**16QAM / 50 Resource Blocks (0 Offset)**
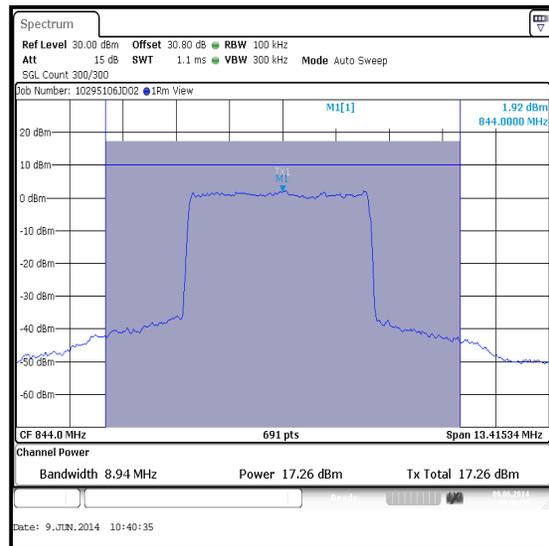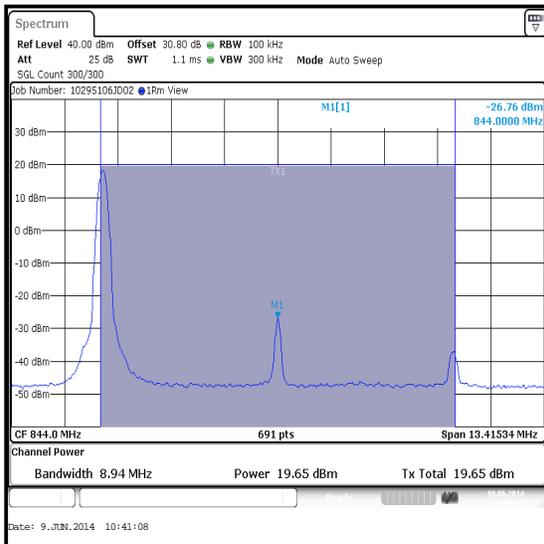
16QAM / 25 Resource Blocks (12 Offset)

16QAM / 1 Resource Block (0 Offset)
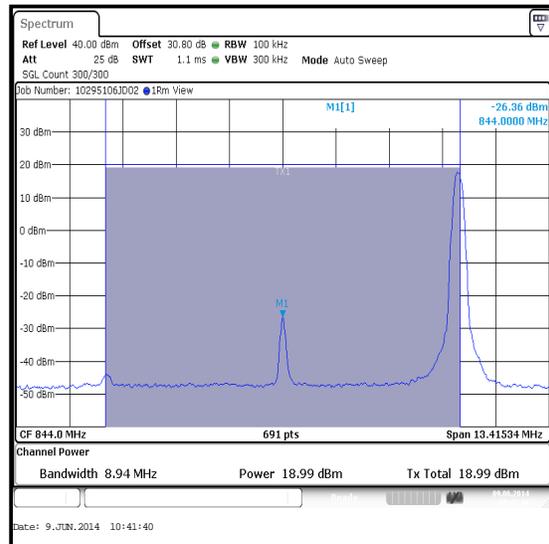
16QAM / 1 Resource Block (49 Offset)

Transmitter Output Power (ERP) (continued)

Test Equipment Used:

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M1659	Thermohygrometer	JM Handelspunkt	30.5015.13	None stated	14 Mar 2015	12
L1127	Signal Analyser	Rohde & Schwarz	FSV13	100863	24 April 2015	12
A2535	Directional Coupler	AtlanTecRF	CDC-003060-20	14041701719	Calibrated before use	-
A2508	Attenuator	AtlanTecRF	AN18-10	821846#3	Calibrated before use	-
S0557	DC Power Supply	Tti	EL303R	395819	Calibrated before use	-
M1251	Digital Multimeter	Fluke	175	8717019	19 May 2015	12
G0608	Signal Generator	Rohde & Schwarz	SMIQ 06B	838341/033	14 Feb 2015	12
M1009	Power Meter	Hewlett Packard	437B	3125U13706	04 Feb 2015	12
M1592	Power Sensor	Hewlett Packard	8487A	3318A02094	28 Aug 2014	12

5.2.2. Transmitter Occupied Bandwidth

Test Summary:

Test Engineer:	Ben Mercer	Test Date:	09 June 2014
Test Sample IMEI:	0044002452727823		

FCC Reference:	Part 2.1049
Test Method Used:	As detailed in KDB 971168 Section 4.2

Environmental Conditions:

Temperature (°C):	25
Relative Humidity (%):	45 to 50

Note(s):

1. Occupied bandwidth (99% bandwidth) was measured using a test receiver occupied bandwidth function.

2. Measurements were performed with the EUT transmitting with QPSK and 16QAM modulation schemes, with resource blocks settings as detailed in section 4.3 of this report.

3. The RF port of the EUT was connected to the spectrum analyser via RF cables, directional coupler and suitable attenuation.

Transmitter Occupied Bandwidth (continued)

Results: 1.4 MHz Channel Bandwidth / Bottom Channel / QPSK

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
824.7	6	0	20	100	1.094
824.7	3	2	20	100	0.579
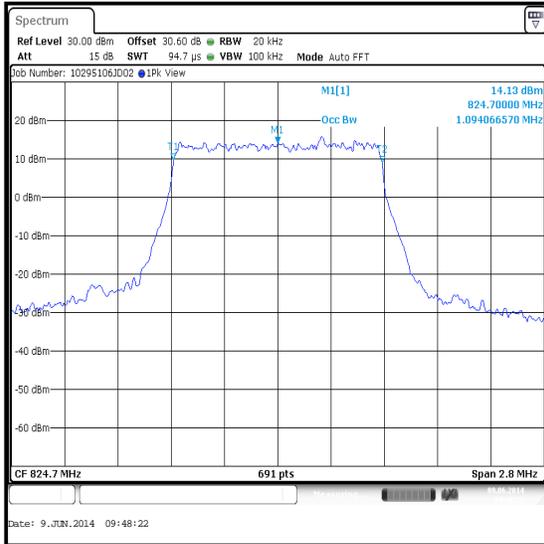
QPSK / 6 Resource Blocks (0 Offset)

QPSK / 3 Resource Blocks (2 Offset)

Transmitter Occupied Bandwidth (continued)

Results: 1.4 MHz Channel Bandwidth / Bottom Channel / 16QAM

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
824.7	6	0	20	100	1.078
824.7	3	2	20	100	0.588

16QAM / 6 Resource Blocks (0 Offset)

16QAM / 3 Resource Blocks (2 Offset)

Transmitter Occupied Bandwidth (continued)

Results: 1.4 MHz Channel Bandwidth / Middle Channel / QPSK

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
836.5	6	0	20	100	1.086
836.5	3	2	20	100	0.584

QPSK / 6 Resource Blocks (0 Offset)

QPSK / 3 Resource Blocks (2 Offset)

Transmitter Occupied Bandwidth (continued)

Results: 1.4 MHz Channel Bandwidth / Middle Channel / 16QAM

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
836.5	6	0	20	100	1.094
836.5	3	2	20	100	0.579

16QAM / 6 Resource Blocks (0 Offset)

16QAM / 3 Resource Blocks (2 Offset)

Transmitter Occupied Bandwidth (continued)

Results: 1.4 MHz Channel Bandwidth / Top Channel / QPSK

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
848.3	6	0	20	100	1.094
848.3	3	2	20	100	0.575

QPSK / 6 Resource Blocks (0 Offset)

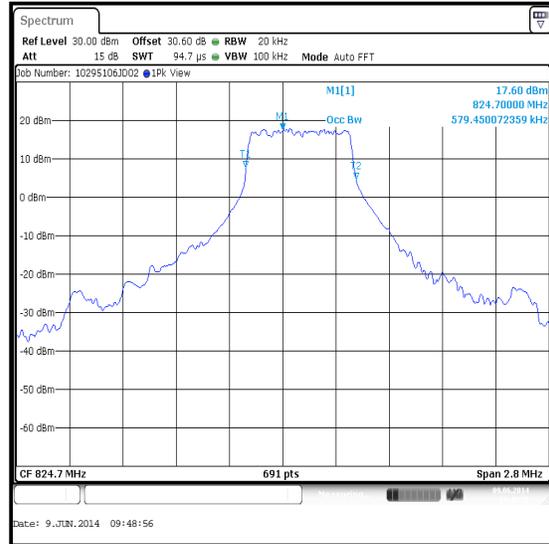**QPSK / 3 Resource Blocks (2 Offset)**

Transmitter Occupied Bandwidth (continued)

Results: 1.4 MHz Channel Bandwidth / Top Channel / 16QAM

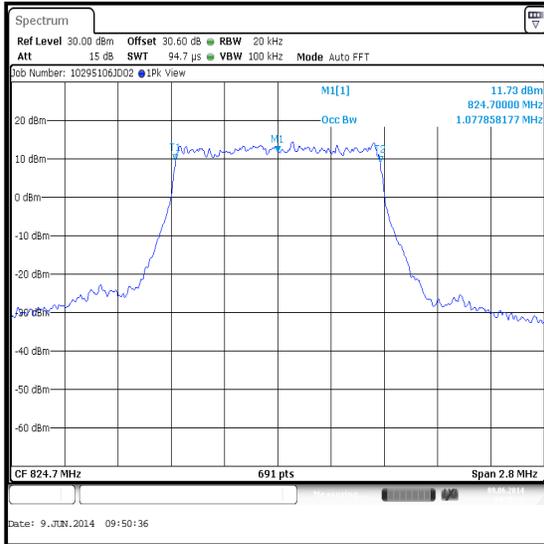| Frequency (MHz)	Resource Block(s)	Resource Block Offset	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
848.3	6	0	20	100	1.090
848.3	3	2	20	100	0.592

16QAM / 6 Resource Blocks (0 Offset)

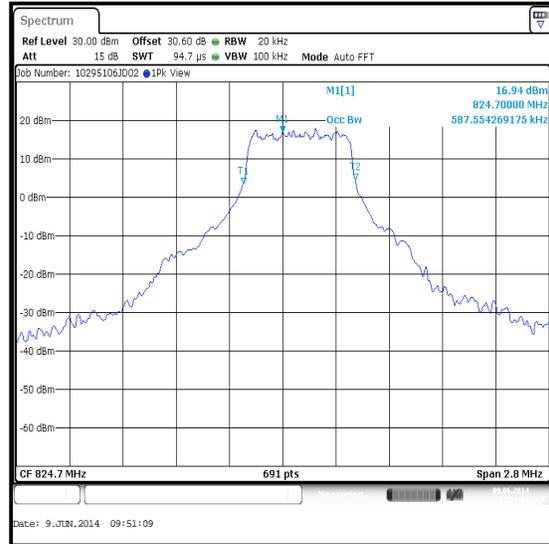**16QAM / 3 Resource Blocks (2 Offset)**

Transmitter Occupied Bandwidth (continued)

Results: 3 MHz Channel Bandwidth / Bottom Channel / QPSK

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
825.5	15	0	30	100	2.683
825.5	8	4	30	100	1.467

QPSK / 15 Resource Blocks (0 Offset)
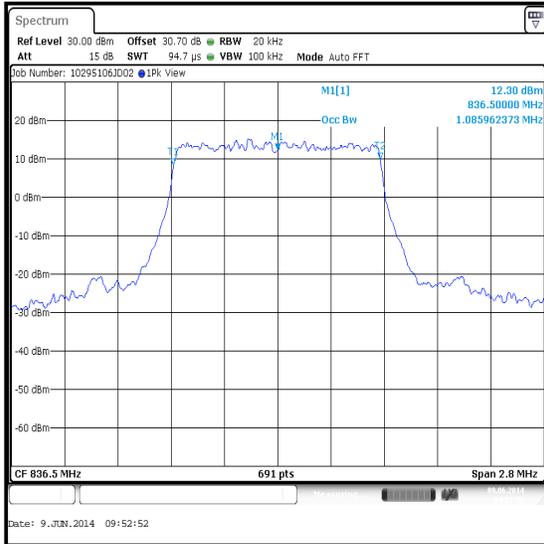

QPSK / 8 Resource Blocks (4 Offset)

Transmitter Occupied Bandwidth (continued)

Results: 3 MHz Channel Bandwidth / Bottom Channel / 16QAM

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
825.5	15	0	30	100	2.692
825.5	8	4	30	100	1.467

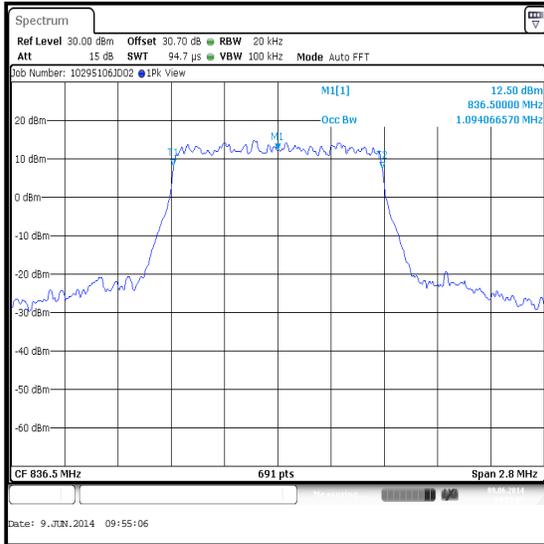
16QAM / 15 Resource Blocks (0 Offset)

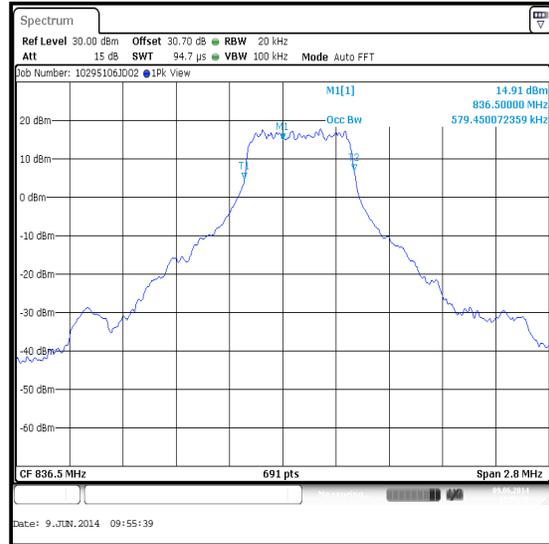**16QAM / 8 Resource Blocks (4 Offset)**

Transmitter Occupied Bandwidth (continued)

Results: 3 MHz Channel Bandwidth / Middle Channel / QPSK

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
836.5	15	0	30	100	2.692
836.5	8	4	30	100	1.467

QPSK / 15 Resource Blocks (0 Offset)

QPSK / 8 Resource Blocks (4 Offset)

Transmitter Occupied Bandwidth (continued)

Results: 3 MHz Channel Bandwidth / Middle Channel / 16QAM

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
836.5	15	0	30	100	2.683
836.5	8	4	30	100	1.476

16QAM / 15 Resource Blocks (0 Offset)

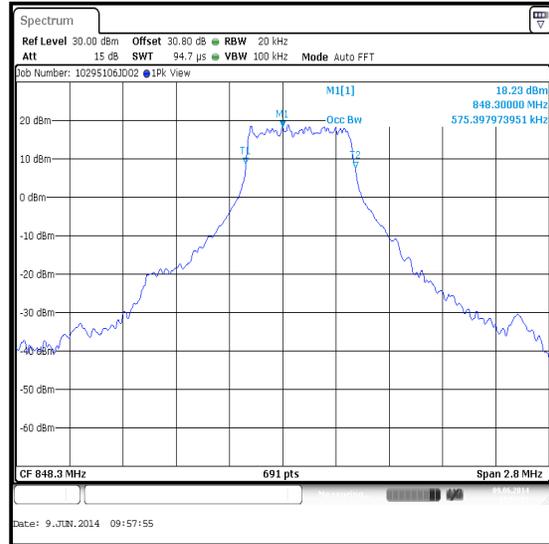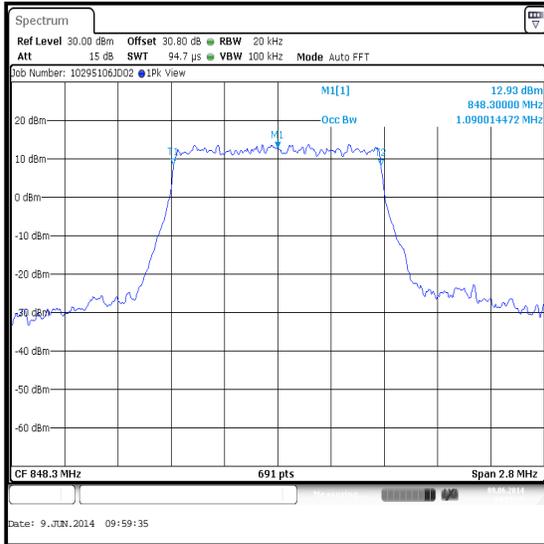**16QAM / 8 Resource Blocks (4 Offset)**

Transmitter Occupied Bandwidth (continued)

Results: 3 MHz Channel Bandwidth / Top Channel / QPSK

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
847.5	15	0	30	100	2.683
847.5	8	4	30	100	1.476

QPSK / 15 Resource Blocks (0 Offset)
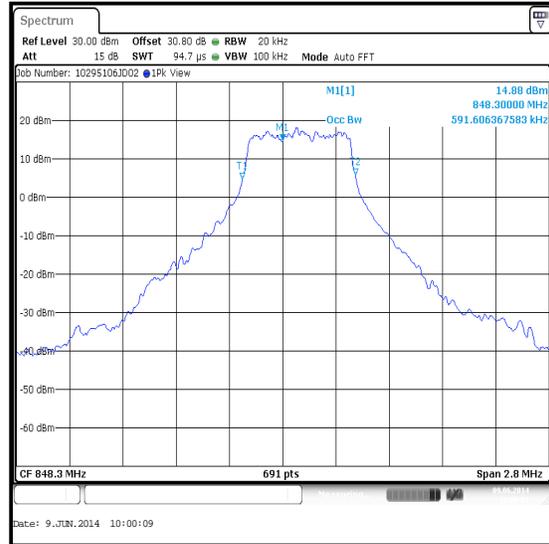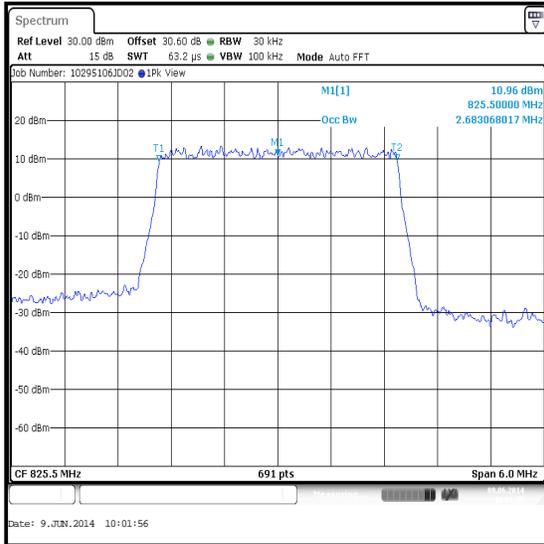

QPSK / 8 Resource Blocks (4 Offset)

Transmitter Occupied Bandwidth (continued)

Results: 3 MHz Channel Bandwidth / Top Channel / 16QAM

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
847.5	15	0	30	100	2.692
847.5	8	4	30	100	1.485

16QAM / 15 Resource Blocks (0 Offset)

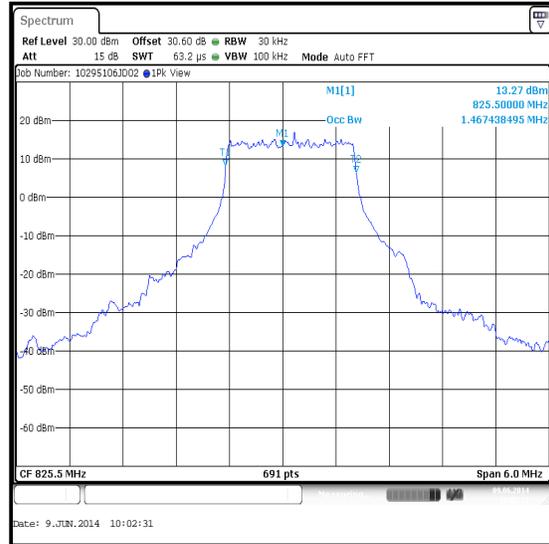**16QAM / 8 Resource Blocks (4 Offset)**

Transmitter Occupied Bandwidth (continued)

Results: 5 MHz Channel Bandwidth / Bottom Channel / QPSK

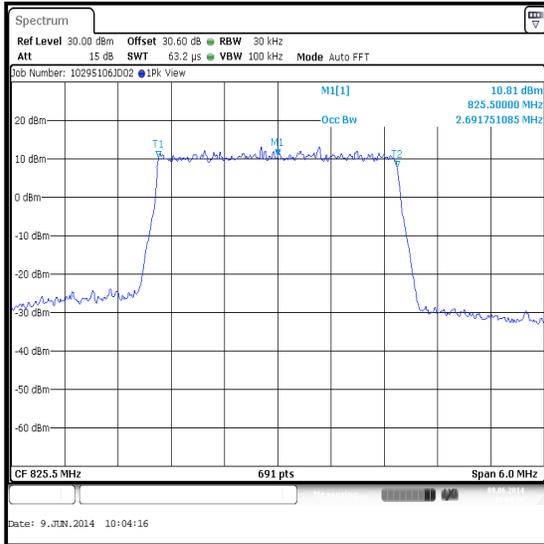| Frequency (MHz)	Resource Block(s)	Resource Block Offset	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
826.5	25	0	50	200	4.472
826.5	12	6	50	200	2.229

QPSK / 25 Resource Blocks (0 Offset)

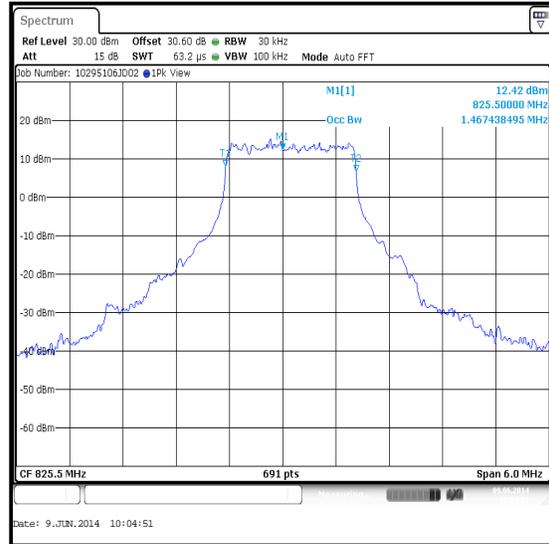
QPSK / 12 Resource Blocks (6 Offset)

Transmitter Occupied Bandwidth (continued)

Results: 5 MHz Channel Bandwidth / Bottom Channel / 16QAM

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
826.5	25	0	50	200	4.472
826.5	12	6	50	200	2.214

16QAM / 25 Resource Blocks (0 Offset)
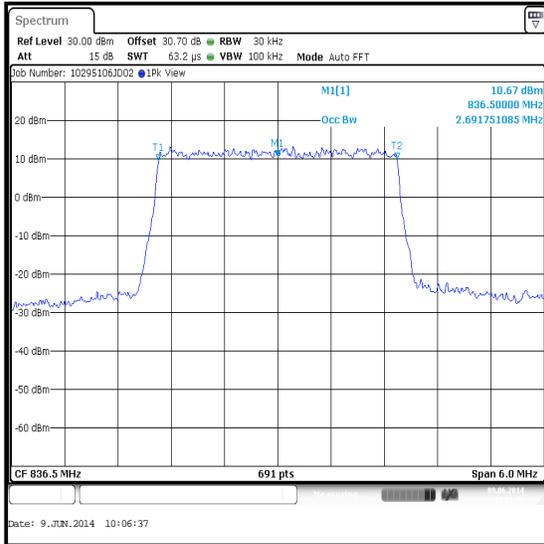

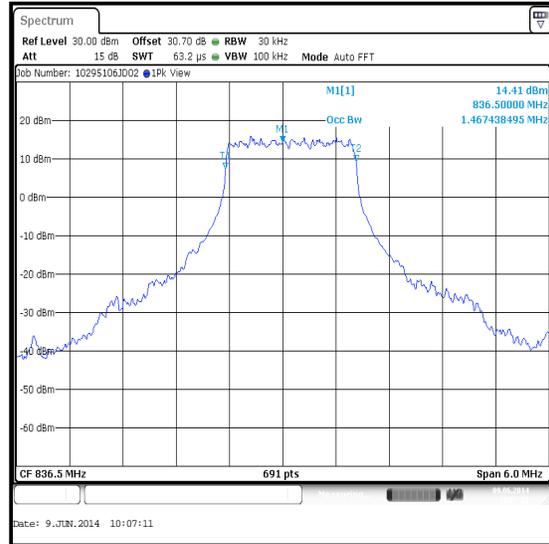**16QAM / 12 Resource Blocks (6 Offset)**

Transmitter Occupied Bandwidth (continued)

Results: 5 MHz Channel Bandwidth / Middle Channel / QPSK

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
836.5	25	0	50	200	4.486
836.5	12	6	50	200	2.200

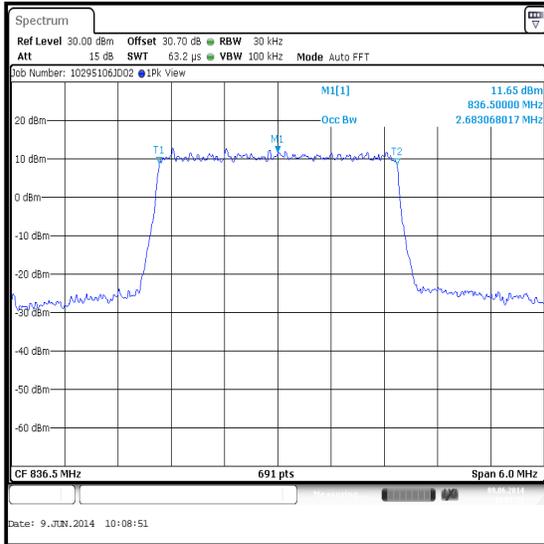**QPSK / 25 Resource Blocks (0 Offset)**

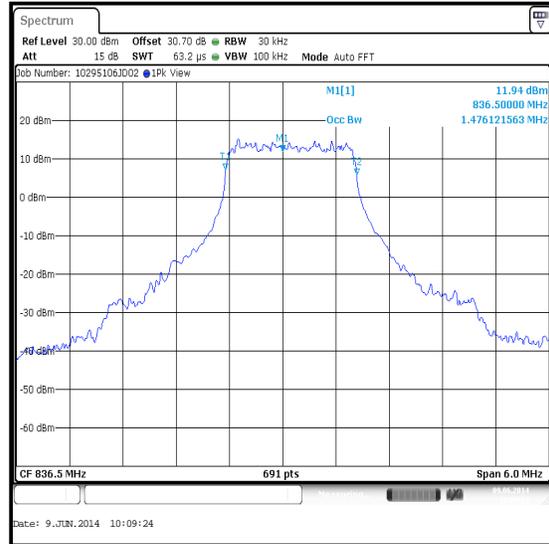**QPSK / 12 Resource Blocks (6 Offset)**

Transmitter Occupied Bandwidth (continued)

Results: 5 MHz Channel Bandwidth / Middle Channel / 16QAM

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
836.5	25	0	50	200	4.486
836.5	12	6	50	200	2.200

16QAM / 25 Resource Blocks (0 Offset)

16QAM / 12 Resource Blocks (6 Offset)

Transmitter Occupied Bandwidth (continued)

Results: 5 MHz Channel Bandwidth / Top Channel / QPSK

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
846.5	25	0	50	200	4.472
846.5	12	6	50	200	2.200

QPSK / 25 Resource Blocks (0 Offset)
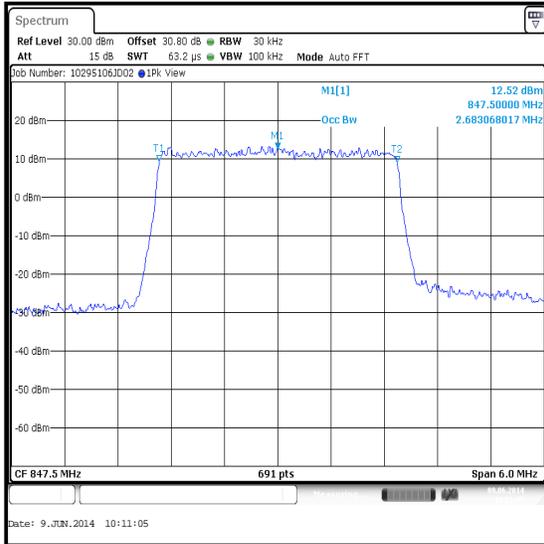

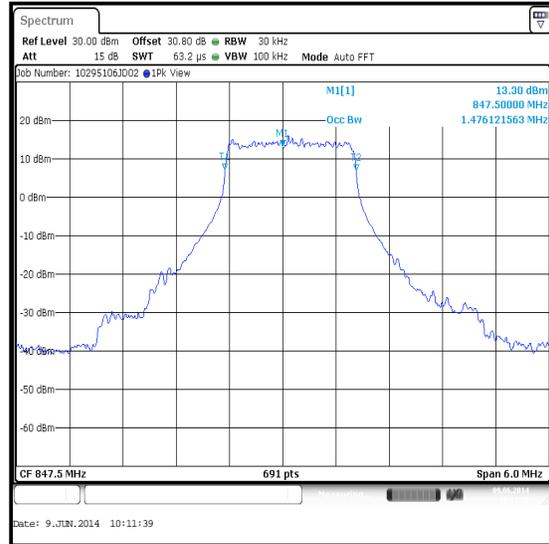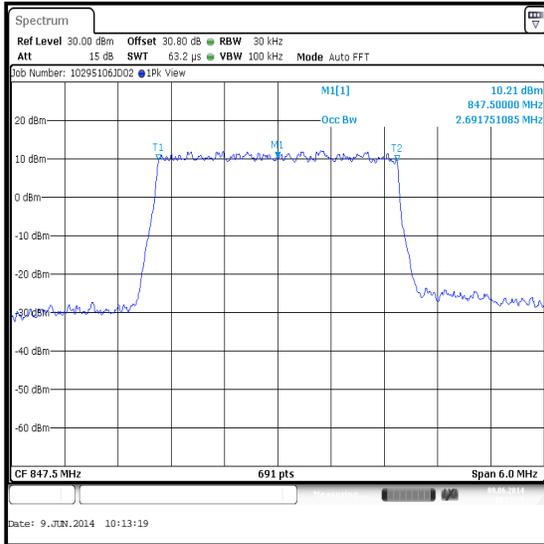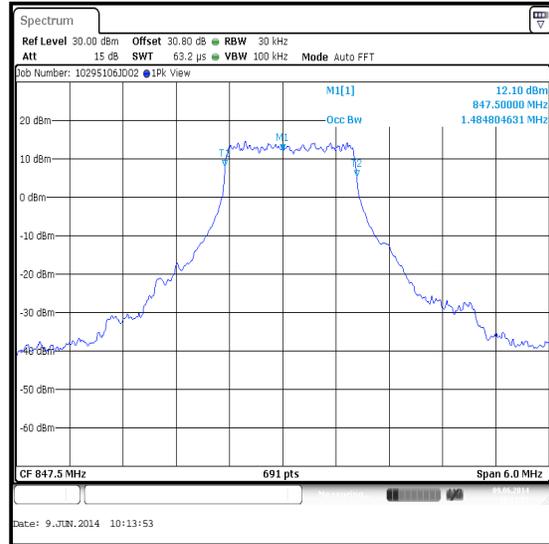**QPSK / 12 Resource Blocks (6 Offset)**

Transmitter Occupied Bandwidth (continued)

Results: 5 MHz Channel Bandwidth / Top Channel / 16QAM

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
846.5	25	0	50	200	4.486
846.5	12	6	50	200	2.229

16QAM / 25 Resource Blocks (0 Offset)

16QAM / 12 Resource Blocks (6 Offset)

Transmitter Occupied Bandwidth (continued)

Results: 10 MHz Channel Bandwidth / Bottom Channel / QPSK

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
829.0	50	0	100	300	8.973
829.0	25	12	100	300	4.515

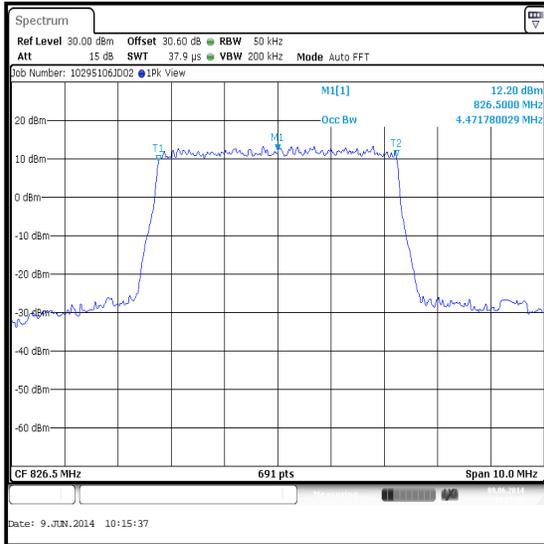**QPSK / 50 Resource Blocks (0 Offset)**

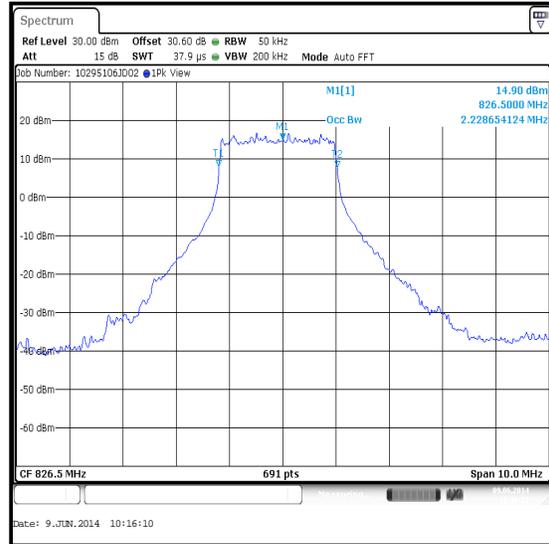**QPSK / 25 Resource Blocks (12 Offset)**

Transmitter Occupied Bandwidth (continued)

Results: 10 MHz Channel Bandwidth / Bottom Channel / 16QAM

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
829.0	50	0	100	300	8.973
829.0	25	12	100	300	4.602

16QAM / 50 Resource Blocks (0 Offset)
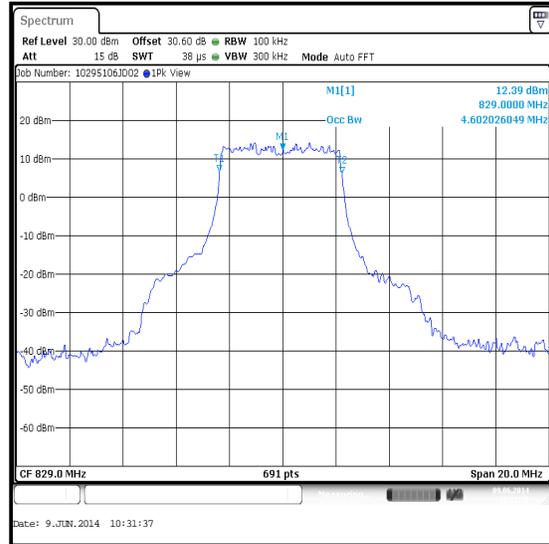
16QAM / 25 Resource Blocks (12 Offset)

Transmitter Occupied Bandwidth (continued)

Results: 10 MHz Channel Bandwidth / Middle Channel / QPSK

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
836.5	50	0	100	300	8.944
836.5	25	12	100	300	4.544
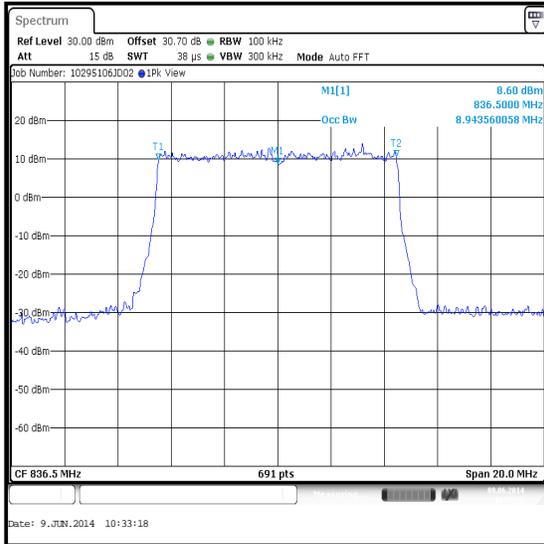
QPSK / 50 Resource Blocks (0 Offset)
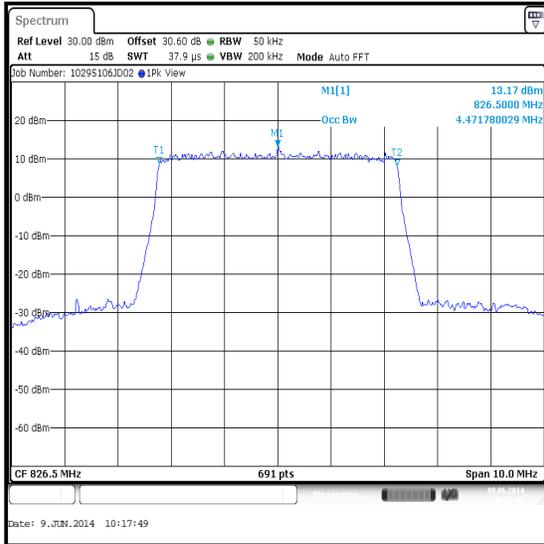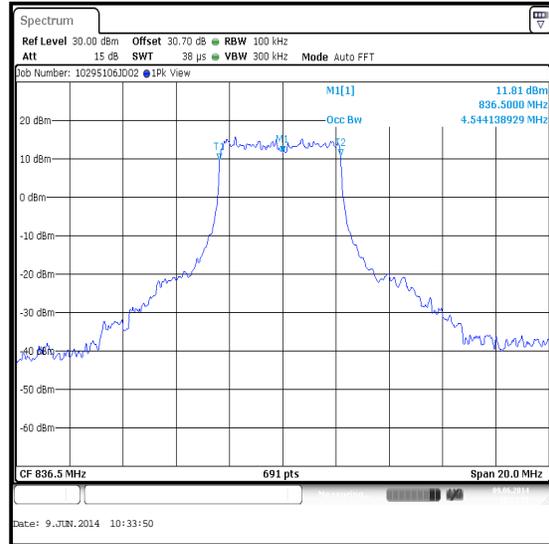

QPSK / 25 Resource Blocks (12 Offset)

Transmitter Occupied Bandwidth (continued)
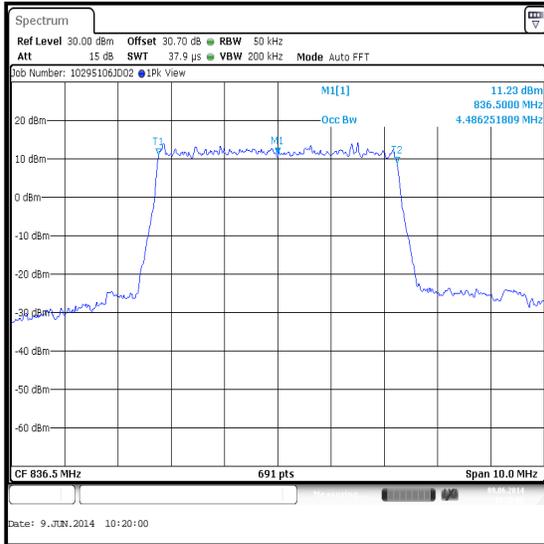
Results: 10 MHz Channel Bandwidth / Middle Channel / 16QAM

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
836.5	50	0	100	300	8.973
836.5	25	12	100	300	4.573

16QAM / 50 Resource Blocks (0 Offset)

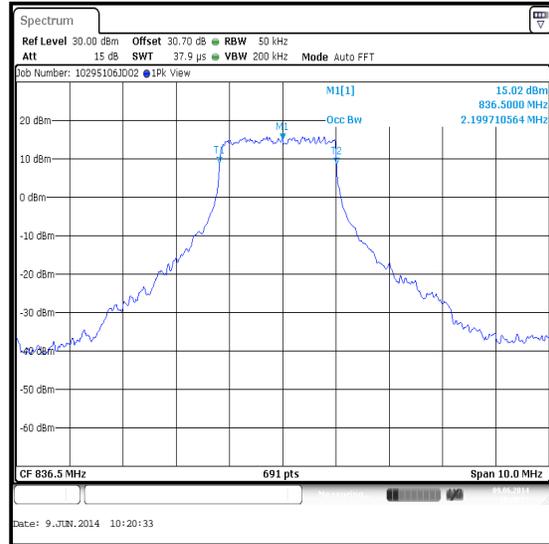**16QAM / 25 Resource Blocks (12 Offset)**

Transmitter Occupied Bandwidth (continued)

Results: 10 MHz Channel Bandwidth / Top Channel / QPSK

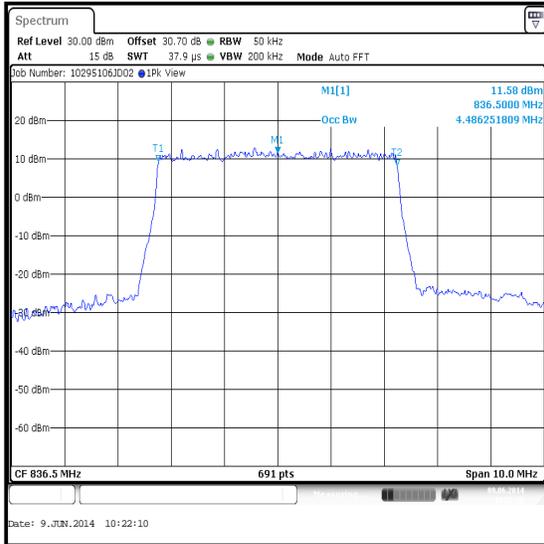| Frequency (MHz)	Resource Block(s)	Resource Block Offset	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
844.0	50	0	100	300	8.944
844.0	25	12	100	300	4.544

QPSK / 50 Resource Blocks (0 Offset)

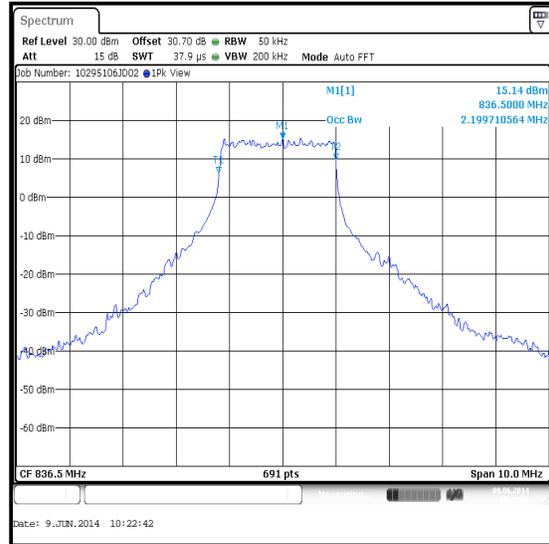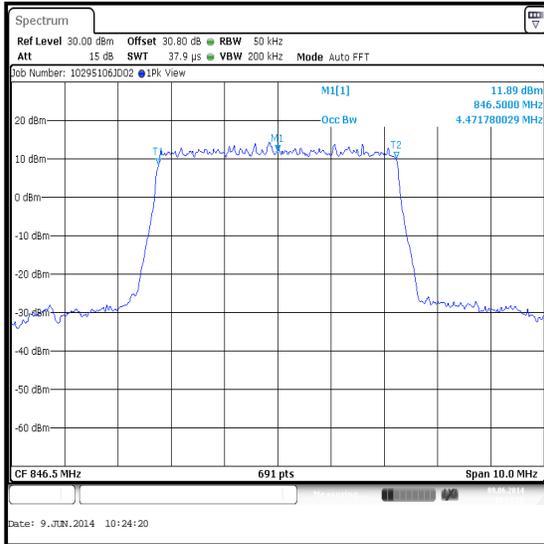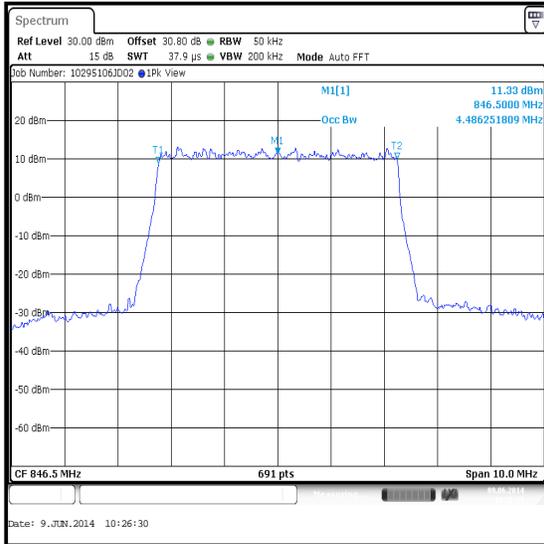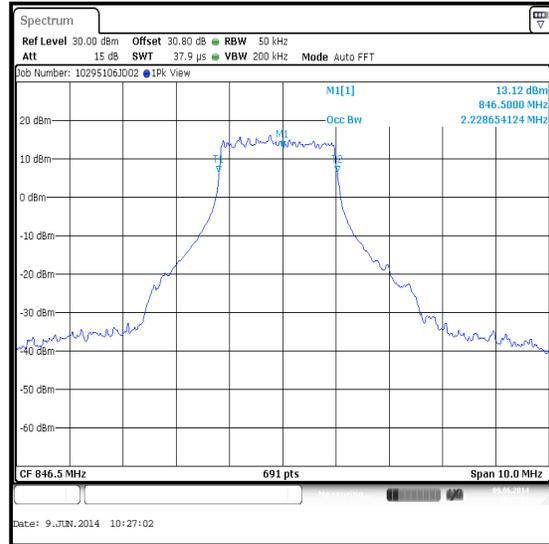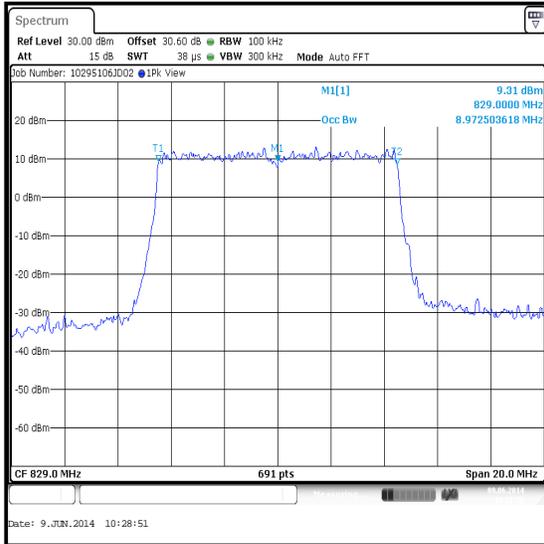QPSK / 25 Resource Blocks (12 Offset)

Transmitter Occupied Bandwidth (continued)

Results: 10 MHz Channel Bandwidth / Top Channel / 16QAM

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
844.0	50	0	100	300	8.944
844.0	25	12	100	300	4.515

16QAM / 50 Resource Blocks (0 Offset)
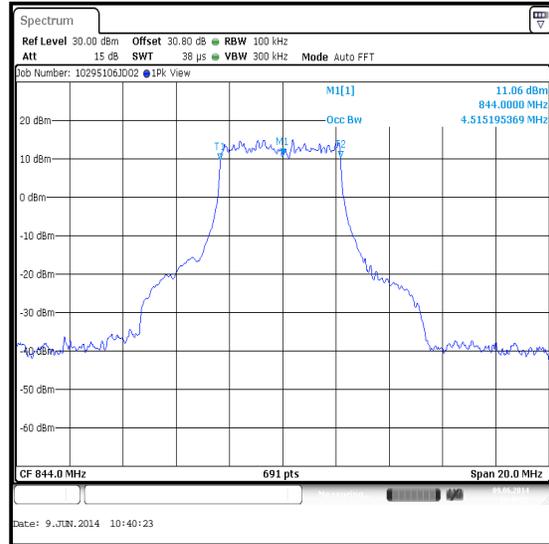
16QAM / 25 Resource Blocks (12 Offset)

Test Equipment Used:

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M1659	Thermohygrometer	JM Handelspunkt	30.5015.13	None stated	14 Mar 2015	12
L1127	Signal Analyser	Rohde & Schwarz	FSV13	100863	24 April 2015	12
A2535	Directional Coupler	AtlanTecRF	CDC-003060-20	14041701719	Calibrated before use	-
A2508	Attenuator	AtlanTecRF	AN18-10	821846#3	Calibrated before use	-
S0557	DC Power Supply	Tti	EL303R	395819	Calibrated before use	-
M1251	Digital Multimeter	Fluke	175	8717019	19 May 2015	12
G0608	Signal Generator	Rohde & Schwarz	SMIQ 06B	838341/033	14 Feb 2015	12
M1009	Power Meter	Hewlett Packard	437B	3125U13706	04 Feb 2015	12
M1592	Power Sensor	Hewlett Packard	8487A	3318A02094	28 Aug 2014	12

5.2.3. Transmitter Out of Band Radiated Emissions

Test Summary:

Test Engineers:	David Doyle & Georgios Vrezas	Test Dates:	17 June 2014 & 19 June 2014
Test Sample IMEI:	004402452728243		

FCC Reference:	Parts 2.1053 & 22.917
Test Method Used:	As detailed in KDB 971168 Section 6.1 referencing FCC Part 2.1053
Frequency Range:	30 MHz to 9 GHz
Configuration:	10 MHz, QPSK, 1RB, 0 Offset

Environmental Conditions:

Temperature (°C):	23 to 24
Relative Humidity (%):	32 to 49

Note(s):

1. The EUT was set to transmit with a 10 MHz channel bandwidth with QPSK modulation applied and 1 resource block with 0 offset, as this was found to be the worst case modulation scheme with regards to emissions after preliminary investigations and, as this mode emits the highest transmit output power level, it was deemed to be the worst case.

2. The emission seen on the 30 MHz to 1 GHz plot at approximately 844 MHz is the EUT carrier.

3. No spurious emissions were detected above the measurement system noise floor therefore the highest peak noise floor reading of the measuring receiver was recorded in the table below.

4. Measurements below 1 GHz were performed in a semi-anechoic chamber (Asset Number K0001) at a distance of 3 metres. The EUT was placed at a height of 80 cm above the reference ground plane in the centre of the chamber turntable. Maximum emission levels were determined by height searching the measurement antenna over the range 1 metre to 4 metres.

5. Pre-scans above 1 GHz were performed in a fully anechoic chamber (Asset Number K0002) at a distance of 3 metres. The EUT was placed at a height of 1.5 metres above the test chamber floor in the centre of the chamber turntable. All measurement antennas were placed at a fixed height of 1.5 metres above the test chamber floor, in line with the EUT. Final measurements above 1 GHz were performed in a semi-anechoic chamber (Asset Number K0001) at a distance of 3 metres. The EUT was placed at a height of 80 cm above the reference ground plane in the centre of the chamber turntable. Maximum emission levels were determined by height searching the measurement antenna over the range 1 metre to 4 metres.

Results: Top Channel

Frequency (MHz)	Peak Level (dBm)	Limit (dBm)	Margin (dB)	Result
3963.928	-38.0	-13.0	25.0	Complied

Transmitter Out of Band Radiated Emissions (continued)
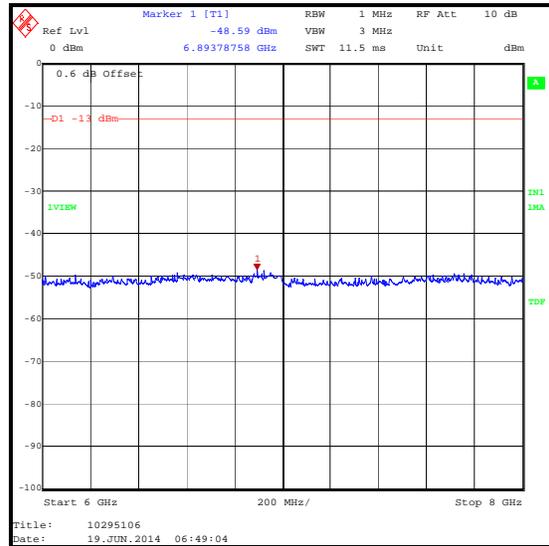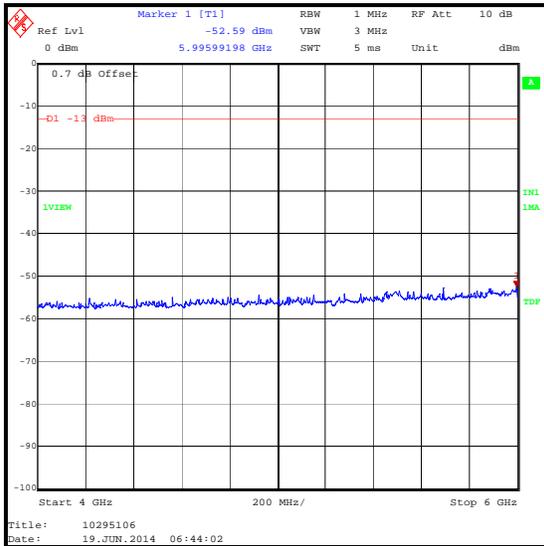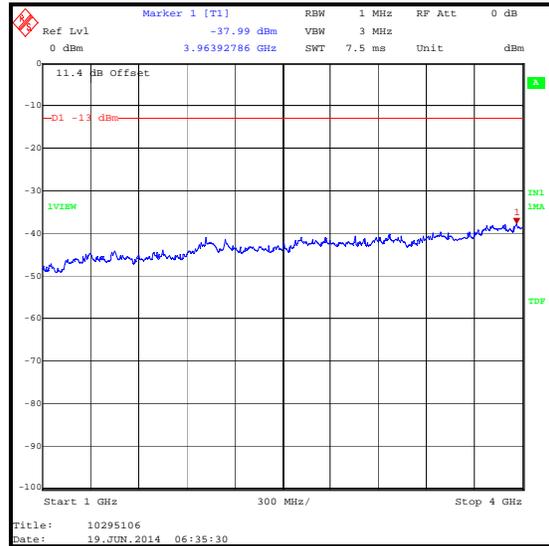
Transmitter Out of Band Radiated Emissions (continued)
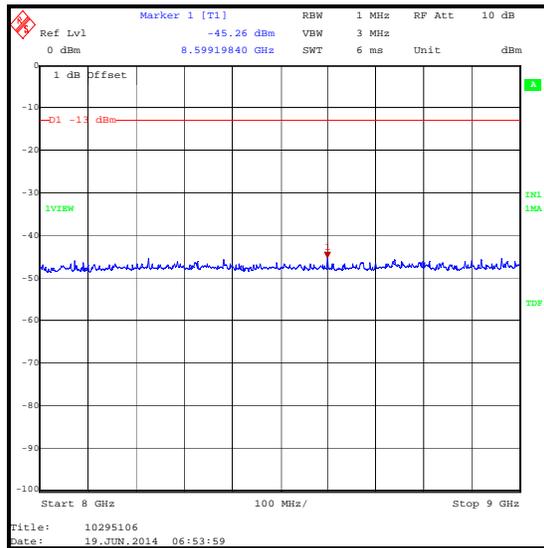

```
                  Marker 1 [T1]          RBW   1 MHz   RF Att   10 dB
  Ref Lvl                   -45.26 dBm   VBW   3 MHz
     0 dBm             8.59919840 GHz    SWT   6 ms    Unit     dBm

    1 dB Offset                                               A
 -10
-D1 -13 dBm
 -20
 -30                                                          1N1
   1VIEW                                                      1MA
 -40
 -50
 -60                                                          TDF
 -70
 -80
 -90
-100
     Start 8 GHz          100 MHz/              Stop 9 GHz
Title:    10295106
Date:     19.JUN.2014  06:53:59
```

Test Equipment Used:

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
A490	Antenna	Chase	CBL6111A	1590	29 Apr 2015	12
A1834	Attenuator	Hewlett Packard	8491B	10444	15 Nov 2014	12
A1393	Attenuator	Huber & Suhner	6820.17.B	757456	02 May 2015	12
K0001	5m RSE Chamber	Rainford EMC	N/A	N/A	26 Nov 2014	12
G0543	Amplifier	Sonoma	310N	230801	19 Aug 2014	3
M1273	Test Receiver	Rohde & Schwarz	ESIB 26	100275	15 Feb 2015	12
M1622	Thermohygrometer	JM Handelspunkt	30.5015.13	Not stated	31 Dec 2014	12
M1656	Thermohygrometer	JM Handelspunkt	30.5015.13	None stated	14 Mar 2015	12
K0002	3m RSE Chamber	Rainford EMC	N/A	N/A	14 Nov 2014	12
M1124	Test Receiver	Rohde & Schwarz	ESIB 26	100046K	01 Oct 2014	12
A1534	Pre Amplifier	Hewlett Packard	8449B	3008A00405	18 May 2015	12
A1396	Attenuator	Huber & Suhner	6810.17.B	757987	02 May 2015	12
A148	High Pass Filter	AtlanTechRF	5H036	32218	17 May 2015	12
A1818	Antenna	EMCO	3115	00075692	14 Nov 2014	12
A253	Antenna	Flann Microwave	12240-20	128	14 Nov 2014	12
A254	Antenna	Flann Microwave	14240-20	139	14 Nov 2014	12
A255	Antenna	Flann Microwave	16240-20	519	14 Nov 2014	12

5.2.4. Transmitter Radiated Emissions at Band Edges

Test Summary:

Test Engineer:	David Doyle	Test Date:	18 June 2014
Test Sample IMEI:	004402452728243		

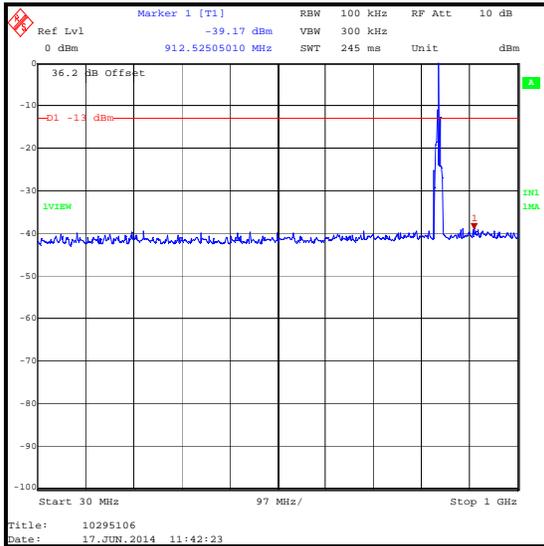| FCC Reference:	Parts 2.1053 & 22.917
Test Method Used:	As detailed in KDB 971168 Section 6.1 referencing FCC Part 22.917

Environmental Conditions:

Temperature (°C):	23
Relative Humidity (%):	45

Note(s):

1. Measurements were performed with the EUT transmitting QPSK and 16QAM modulation schemes, with the maximum resource blocks settings as detailed in section 4.3 of this report.

Transmitter Radiated Emissions at Band Edges (continued)

Results: 1.4 MHz Channel Bandwidth / QPSK

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
824	6	0	-23.0	-13.0	10.0	Complied
849	6	0	-25.1	-13.0	12.1	Complied
849.002	6	0	-24.9	-13.0	11.9	Complied
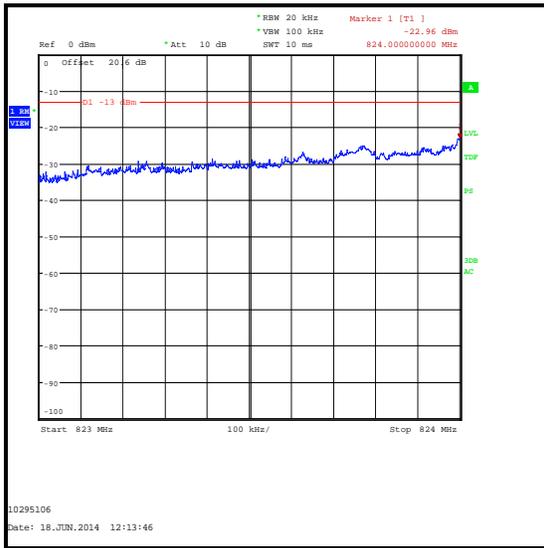
QPSK / Lower Band Edge

QPSK / Upper Band Edge

Transmitter Radiated Emissions at Band Edges (continued)

Results: 1.4 MHz Channel Bandwidth / 16QAM

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
823.984	6	0	-25.1	-13.0	12.1	Complied
824	6	0	-26.8	-13.0	13.8	Complied
849	6	0	-27.1	-13.0	14.1	Complied
849.006	6	0	-26.4	-13.0	13.4	Complied

16QAM / Lower Band Edge

16QAM / Upper Band Edge

Transmitter Radiated Emissions at Band Edges (continued)

Results: 3 MHz Channel Bandwidth / QPSK

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
824	15	0	-19.9	-13.0	6.9	Complied
849	15	0	-21.5	-13.0	8.5	Complied

QPSK / Lower Band Edge

QPSK / Upper Band Edge

Transmitter Radiated Emissions at Band Edges (continued)

Results: 3 MHz Channel Bandwidth / 16QAM

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
823.998	15	0	-21.8	-13.0	8.8	Complied
824	15	0	-22.4	-13.0	9.4	Complied
849	15	0	-22.5	-13.0	9.5	Complied

16QAM / Lower Band Edge

16QAM / Upper Band Edge

Transmitter Radiated Emissions at Band Edges (continued)

Results: 5 MHz Channel Bandwidth / QPSK

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
823.989	25	0	-20.1	-13.0	7.1	Complied
824	25	0	-21.9	-13.0	8.9	Complied
849	25	0	-20.4	-13.0	7.4	Complied

QPSK / Lower Band Edge

QPSK / Upper Band Edge

Transmitter Radiated Emissions at Band Edges (continued)

Results: 5 MHz Channel Bandwidth / 16QAM

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
823.912	25	0	-21.3	-13.0	8.3	Complied
824	25	0	-22.9	-13.0	9.9	Complied
849	25	0	-21.8	-13.0	8.8	Complied
849.006	25	0	-20.9	-13.0	7.9	Complied
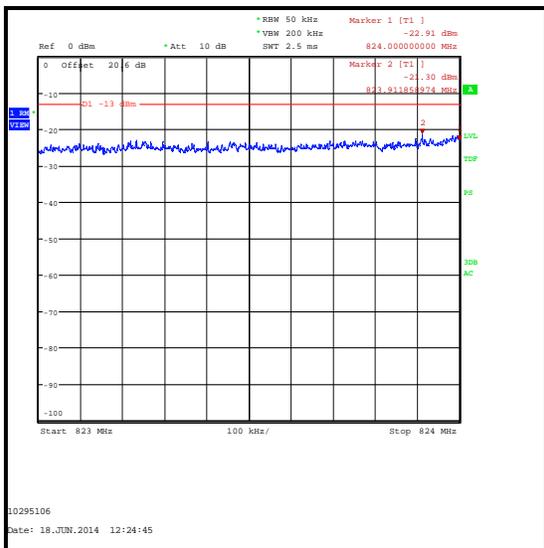
16QAM / Lower Band Edge
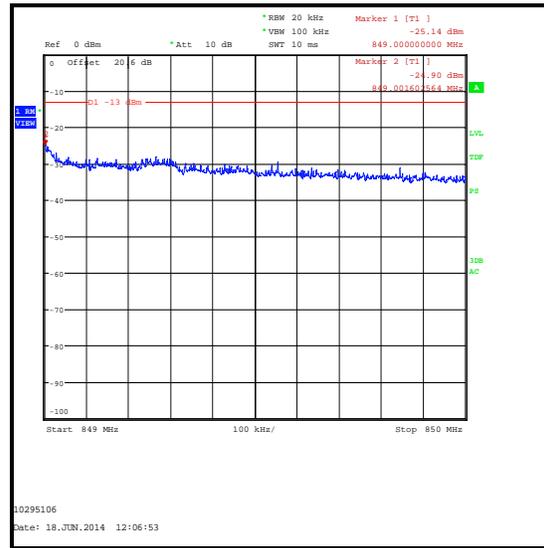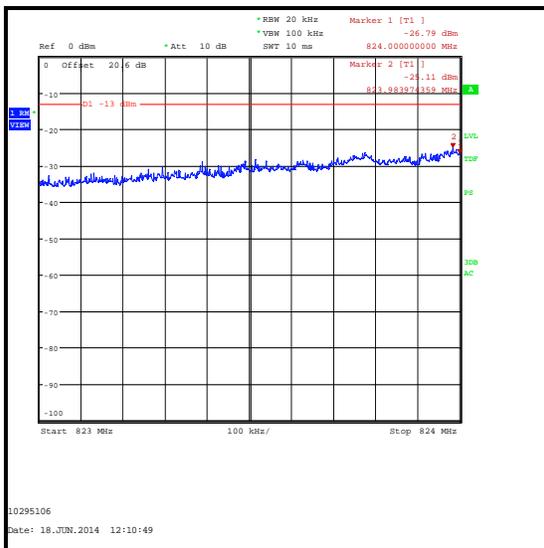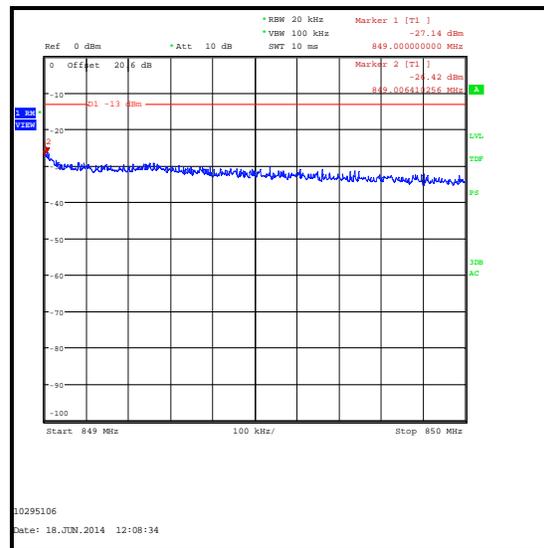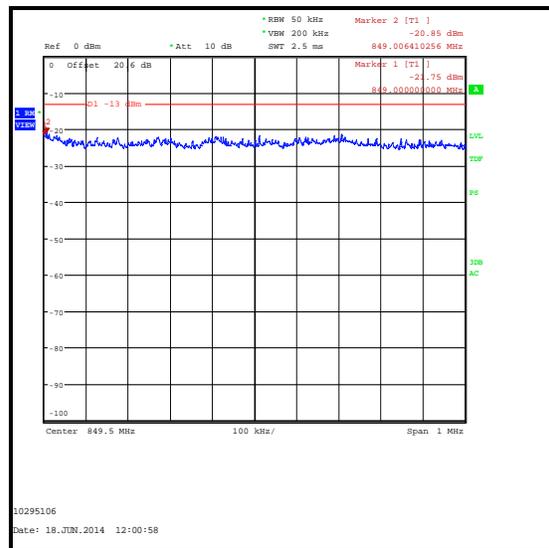

16QAM / Upper Band Edge

Transmitter Radiated Emissions at Band Edges (continued)

Results: 10 MHz Channel Bandwidth / QPSK

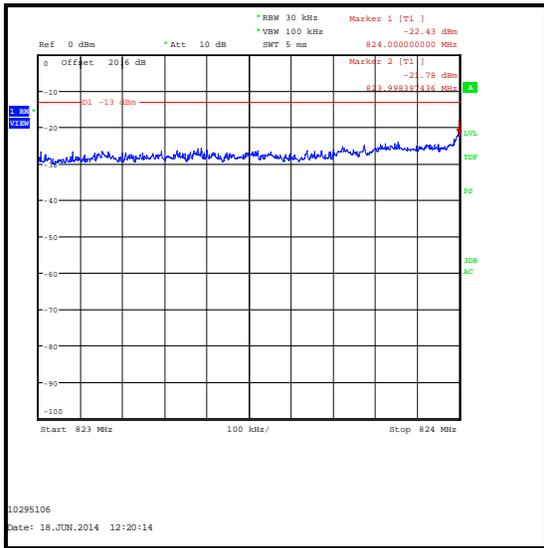| Frequency (MHz)	Resource Block(s)	Resource Block Offset	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
823.976	50	0	-20.2	-13.0	7.2	Complied
824	50	0	-21.7	-13.0	8.7	Complied
849	50	0	-20.3	-13.0	7.3	Complied
849.006	50	0	-20.2	-13.0	7.2	Complied
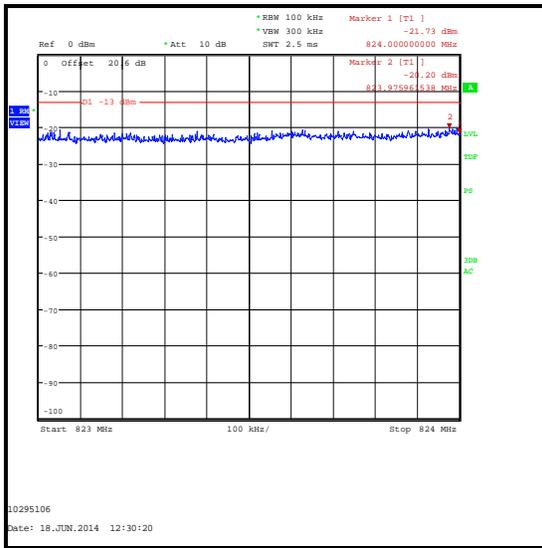
QPSK / Lower Band Edge
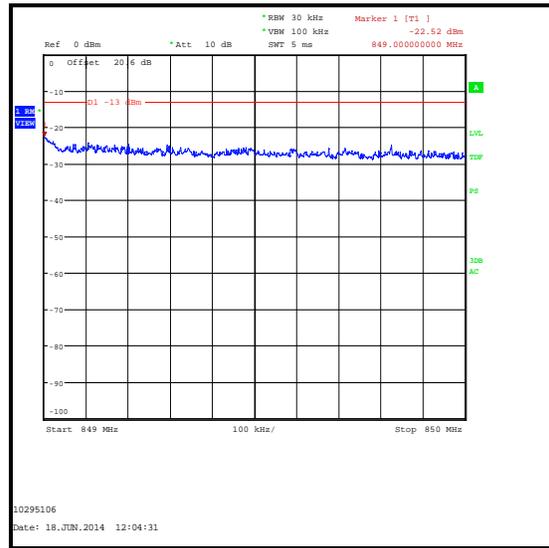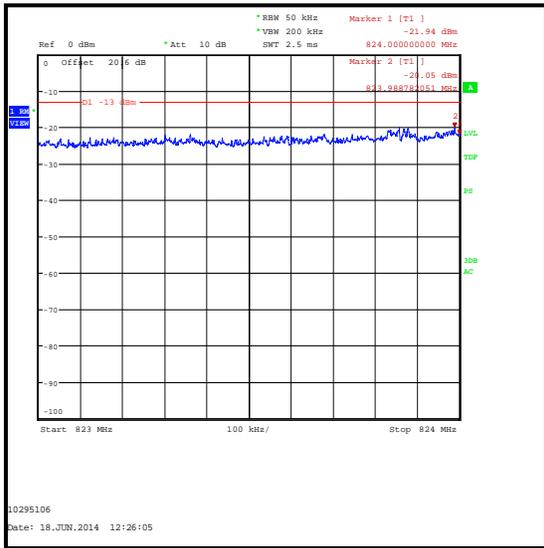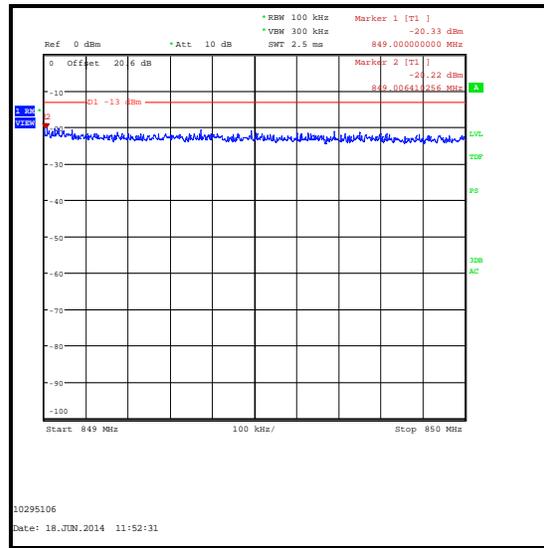

QPSK / Upper Band Edge

Transmitter Radiated Emissions at Band Edges (continued)

Results: 10 MHz Channel Bandwidth / 16QAM

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
823.998	50	0	-20.4	-13.0	7.4	Complied
824	50	0	-21.9	-13.0	8.9	Complied
849	50	0	-23.2	-13.0	10.2	Complied
849.024	50	0	-21.2	-13.0	8.2	Complied
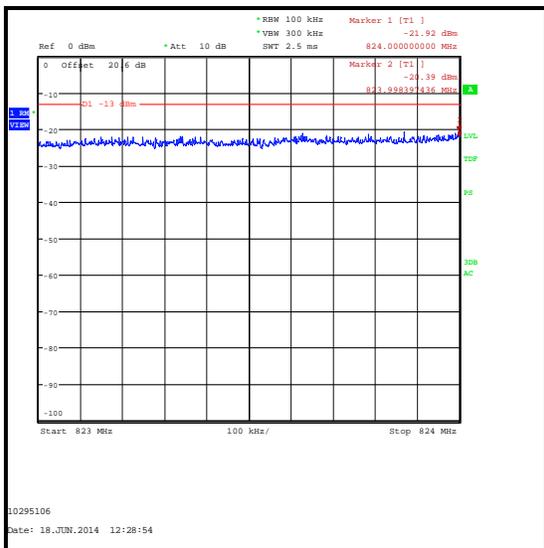
16QAM / Lower Band Edge
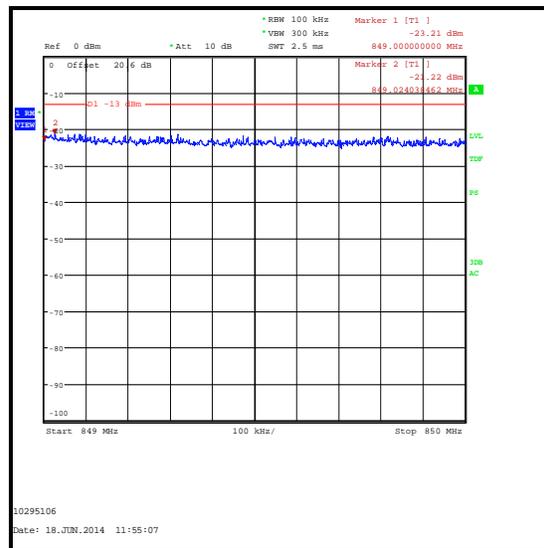
16QAM / Upper Band Edge

Test Equipment Used:

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M1656	Thermohygrometer	JM Handelspunkt	30.5015.13	None stated	14 Mar 2015	12
K0002	3m RSE Chamber	Rainford EMC	N/A	N/A	14 Nov 2014	12
M1874	Test Receiver	Rohde & Schwarz	ESU26	100553	13 May 2015	12
A288	Antenna	Chase	CBL6111A	1589	20 Aug 2014	12
A1393	Attenuator	Huber & Suhner	6820.17.B	757456	02 May 2015	12

5.2.5. Transmitter Frequency Stability (Temperature Variation)

Test Summary:

Test Engineer:	Keith Tucker	Test Dates:	09 June 2014 & 10 June 2014
Test Sample IMEI:	004402452726833		

FCC Reference:	Parts 2.1055 & 22.355
Test Method Used:	As detailed in KDB 971168 Section 9.0 referencing ANSI TIA-603-C-2004 Section 2.2.2 and FCC Part 2.1055

Environmental Conditions:

Ambient Temperature (°C):	23 to 25
Ambient Relative Humidity (%):	37 to 40

Note(s):

1. A voltage variation jig was connected to the EUT which was powered via a bench power supply at the nominal voltage of 3.8 V.

2. Frequency error was measured using a calibrated Rohde and Schwarz CMW 500 Universal Radio Communications Tester in accordance with current Rohde and Schwarz application notes. The EUT was connected by suitable RF cables to the CMW 500. A bi-directional communications link was established between the EUT and CMW 500. The frequency meter value was recorded.

3. Temperature was monitored throughout the test with a calibrated digital thermometer.

Results: Middle Channel (836.5 MHz)

Temperature (°C)	Measured Frequency (MHz)	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)	Margin (ppm)	Result
-30	836.499993	7	0.0084	2.5	2.4916	Complied
-20	836.500008	8	0.0096	2.5	2.4904	Complied
-10	836.499995	5	0.0060	2.5	2.4940	Complied
0	836.500006	6	0.0072	2.5	2.4928	Complied
10	836.499994	6	0.0072	2.5	2.4928	Complied
20	836.500006	6	0.0072	2.5	2.4928	Complied
30	836.499994	6	0.0072	2.5	2.4928	Complied
40	836.499994	6	0.0072	2.5	2.4928	Complied
50	836.499994	6	0.0072	2.5	2.4928	Complied

Transmitter Frequency Stability (Temperature Variation) (continued)

Test Equipment Used:

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M1659	Thermohygrometer	JM Handelspunkt	30.5015.13	None stated	14 Mar 2015	12
M1870	Wideband Radio Comms Tester	Rohde & Schwarz	CMW500	145919	05 May 2015	12
E0513	Environmental Chamber	TAS	LT600 Series 3	23900506	Calibrated before use	-
M1249	Thermometer	Fluke	52II	88800049	02 May 2015	12
S021	Dual DC power supply	Tti	CPX200	061034	Calibrated before use	-
M1251	Multimeter	Fluke	175	89170179	19 May 2015	12

5.2.6. Transmitter Frequency Stability (Voltage Variation)

Test Summary:

Test Engineer:	Keith Tucker	Test Dates:	09 June 2014 & 10 June 2014
Test Sample IMEI:	004402452726833		

FCC Reference:	Part 2.1055 & 22.355
Test Method Used:	As detailed in KDB 971168 Section 9.0 referencing ANSI TIA-603-C-2004 Section 2.2.2 and FCC Part 2.1055

Environmental Conditions:

Temperature (℃):	23 to 25
Relative Humidity (%):	37 to 40

Note(s):

1. A voltage variation jig was connected to the EUT which was powered via a bench power supply.

2. Frequency error was measured using a calibrated Rohde and Schwarz CMW 500 Universal Radio Communications Tester in accordance with current Rohde and Schwarz application notes. The EUT was connected by suitable RF cables to the CMW 500. A bi-directional communications link was established between the EUT and CMW 500. The frequency meter value was recorded.

3. Voltage was monitored throughout the test with a calibrated digital voltmeter.

Results: Middle Channel (836.5 MHz)

Supply Voltage (V)	Measured Frequency (MHz)	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)	Margin (ppm)	Result
3.42	836.500006	6	0.0072	2.5	2.4928	Complied
4.18	836.500007	7	0.0084	2.5	2.4916	Complied

Test Equipment Used:

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M1659	Thermohygrometer	JM Handelspunkt	30.5015.13	None stated	14 Mar 2015	12
M1870	Wideband Radio Comms Tester	Rohde & Schwarz	CMW500	145919	05 May 2015	12
S021	Dual DC power supply	Tti	CPX200	061034	Calibrated before use	-
M1251	Multimeter	Fluke	175	89170179	19 May 2015	12

6. Measurement Uncertainty

No measurement or test can ever be perfect and the imperfections give rise to error of measurement in the results. Consequently the result of a measurement is only an approximation to the value of the measurand (the specific quantity subject to measurement) and is only complete when accompanied by a statement of the uncertainty of the approximation.

The expression of uncertainty of a measurement result allows realistic comparison of results with reference values and limits given in specifications and standards.

The uncertainty of the result may need to be taken into account when interpreting the measurement results.

The reported expanded uncertainties below are based on a standard uncertainty multiplied by an appropriate coverage factor such that a confidence level of approximately 95% is maintained. For the purposes of this document "approximately" is interpreted as meaning "effectively" or "for most practical purposes".

Measurement Type	Range	Confidence Level (%)	Calculated Uncertainty
Conducted Output Power	824 to 849 MHz	95%	±1.13 dB
Frequency Stability	824 to 849 MHz	95%	±23 Hz
Occupied Bandwidth	824 to 849 MHz	95%	±3.92 %
Radiated Spurious Emissions	30 MHz to 1 GHz	95%	±5.65 dB
Radiated Spurious Emissions	1 GHz to 9 GHz	95%	±2.94 dB

The methods used to calculate the above uncertainties are in line with those recommended within the various measurement specifications. Where measurement specifications do not include guidelines for the evaluation of measurement uncertainty the published guidance of the appropriate accreditation body is followed.

7. Report Revision History

Version Number	Revision Details		
	Page No(s)	Clause	Details
1.0	-	-	Initial Version
2.0	-	-	EUT Description update

--- END OF REPORT ---