TEST REPORT

Test Report No. : UL-RPT-RP10407435JD08A V2.0

Manufacturer	:	Apple Inc.
Model No.	:	A1601
FCC ID	:	BCGA1601
Technology	:	LTE – Band 2
Test Standard(s)	:	FCC Part 24 Subpart E

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: 15 September 2014

Checked by:

Sarah Williams
Engineer, Radio Laboratory

Issued by :

pp

John Newell
Quality Manager,
UL VS LTD

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

UL VS LTD

Pavilion A, Ashwood Park, Ashwood Way, Basingstoke, Hampshire, RG23 8BG, UK
Telephone: +44 (0)1256 312000
Facsimile: +44 (0)1256 312001

This page has been left intentionally blank.

Table of Contents

1. Customer Information **4**

2. Summary of Testing **5**
2.1. General Information 5
2.2. Summary of Test Results 5
2.3. Methods and Procedures 5
Deviations from the Test Specification 5

3. Equipment Under Test (EUT) **6**
3.1. Identification of Equipment Under Test (EUT) 6
3.2. Description of EUT 6
3.3. Modifications Incorporated in the EUT 6
3.4. Additional Information Related to Testing 7
3.5. Support Equipment 8

4. Operation and Monitoring of the EUT during Testing **9**
4.1. Operating Modes 9
4.2. Configuration and Peripherals 9
4.3. Resource Block Allocation 10

5. Measurements, Examinations and Derived Results **11**
5.1. General Comments 11
5.2. Test Results 12
5.2.1. Transmitter Output Power (EIRP) 12
5.2.2. Transmitter Peak-To-Average Ratio (PAR) 23
5.2.3. Transmitter Occupied Bandwidth 34
5.2.4. Transmitter Out of Band Radiated Emissions 71
5.2.5. Transmitter Radiated Emissions at Band Edges 75
5.2.6. Transmitter Frequency Stability (Temperature Variation) 100
5.2.7. Transmitter Frequency Stability (Voltage Variation) 102

6. Measurement Uncertainty **104**

7. Report Revision History **105**

1. Customer Information

Company Name:	Apple Inc.
Address:	1 Infinite Loop Cupertino, CA 95014 U.S.A

2. Summary of Testing

2.1. General Information

Specification Reference:	47CFR24
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications): Part 24 Subpart E (Personal Communication 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:	12 August 2014 to 12 September 2014

2.2. Summary of Test Results

FCC Reference (47CFR)	Measurement	Result
Part 24.232(c)	Transmitter Output Power (EIRP)	✓
Part 24.232(d)	Peak-to-Average Ratio (PAR)	✓
Part 2.1049	Transmitter Occupied Bandwidth	✓
Part 2.1053 / 24.238(a)	Transmitter Out of Band Radiated Emissions	✓
Part 2.1053 / 24.238(a)	Transmitter Band Edge Radiated Emissions	✓
Part 2.1055 / 24.235	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

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:	Apple
Model Name or Number:	A1601
Test Sample IMEI:	352025060521607 *(Conducted Sample)*
Hardware Version Number:	REV 1.0
Software Version Number:	iOS 12A314 BB:3.08.08
FCC ID:	BCGA1601

Brand Name:	Apple
Model Name or Number:	A1601
Test Sample IMEI:	352025060511608 *(Radiated sample)*
Hardware Version Number:	REV 1.0
Software Version Number:	iOS 12A314 BB:3.08.08
FCC ID:	BCGA1601

3.2. Description of EUT

The Equipment Under Test was a tablet with GSM/GPRS/EGPRS/UMTS and LTE. It also supports IEEE 802.11 a/b/g/n (MIMO 2x2) and *Bluetooth*®. The rechargeable battery is not user accessible.

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 2		
Type of Equipment	Transceiver		
Channel Bandwidth(s):	1.4, 3, 5, 10, 15 & 20 MHz		
Modulation Type:	QPSK & 16QAM		
Duty Cycle:	100%		
Antenna Gain:	2.15 dBi		
Power Supply Requirement:	Nominal	3.8 V	
	Minimum	3.4 V	
	Maximum	4.2 V	
Transmit Frequency Range:	1850 to 1910 MHz		
Channels Tested:	**Channel Bandwidth**	**N_{ul}**	**Frequency of Uplink (MHz)**
Bottom Channel	1.4	18607	1850.7
	3	18615	1851.5
	5	18625	1852.5
	10	18650	1855.0
	15	18675	1857.5
	20	18700	1860.0
Middle Channel	All	18900	1880.0
Top Channel	1.4	19193	1909.3
	3	19185	1908.5
	5	19175	1907.5
	10	19150	1905.0
	15	19125	1902.5
	20	19100	1900.0

3.5. Support Equipment

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

Brand Name:	Dell
Description:	Test Laptop PC
Model Name or Number:	Latitude E5400
Serial Number:	01150

Brand Name:	Not marked or stated
Description:	USB diagnostic cable
Model Name or Number:	Not marked or stated
Serial Number:	Not marked or stated

Brand Name:	Apple
Description:	Test Laptop
Model Name or Number:	MacBook Pro
Serial Number:	C2QLQ03XF9F2

Brand Name:	Apple
Description:	USB Cable
Model Name or Number:	A1480
Serial Number:	Not marked or stated

Brand Name:	Apple
Description:	USB Charger
Model Name or Number:	A1399
Serial Number:	Not marked or stated

Brand Name:	Apple
Description:	PHF
Model Name or Number:	Apple Ear Plugs
Serial Number:	Not marked or stated

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 emissions tests were performed with the EUT set to transmit with a 3 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.
- Transmitter radiated spurious emissions tests were performed with the AC Charger and PHF connected to the EUT as this was found to be the worst case during pre-scans. All the accessories were individually connected and measurements made during the pre-scans to determine the worst case combination.
- Conducted measurements at temperature and voltage extremes were performed using a conducted sample supplied by the customer. Short 4-wire DC flying leads were connected internally to the device in place of the battery, and exited through a hole in the casing. These leads were then extended to a DC power supply for testing purposes.
- For conducted cellular measurements, the RF conducted port was created by removing a micro connector from the pcb antenna and extending it with a short flexible microstrip supplied by the customer. This microstrip exited the device through a hole in the casing and was terminated in a proprietary micro-coax to SMA adaptor.
- The conducted sample with IMEI 352025060521607 was used for frequency stability, occupied bandwidth and power measurements.
- The sample with IMEI 352025060511608 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
15	75	1	0	1	74	36	18	75	0
20	100	1	0	1	99	50	25	100	0

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

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

Transmitter Radiated Emissions testing was carried out using sub test 1, with a 3 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 measurements were carried with sub test 4 on all supported channel bandwidths using QPSK and 16-QAM modulations with the maximum resource blocks settings.

Transmitter Frequency Stability tests were carried out using 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 (EIRP)

Test Summary:

Test Engineer:	Keith Tucker	**Test Dates:**	13 August 2014 to 14 August 2014
Test Sample IMEI:	352025060521607		

FCC Reference:	Part 24.232(c)
Test Method Used:	As detailed in KDB 971168 Section 5.2.3

Environmental Conditions:

Temperature (℃):	23 to 24
Relative Humidity (%):	36 to 38

Note(s):

1. The customer stated that the antenna gain is 2.15 dBi.
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. RF output power was measured using a wideband power meter utilising a fast-responding diode detector and a video bandwidth greater than the emission bandwidth.
4. The conducted RF port of the EUT was connected to the power meter via an RF cable and directional coupler network. An RF level offset was used to compensate for the path loss of the coupler and RF cable.

Transmitter Output Power (EIRP) (continued)

Results: 1.4 MHz Channel Bandwidth / Bottom Channel / QPSK

Frequency (MHz)	Resource Blocks	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Margin (dB)	Result
1850.7	6	0	21.6	2.15	23.75	33.0	9.25	Complied
1850.7	3	2	22.6	2.15	24.75	33.0	8.25	Complied
1850.7	1	0	22.6	2.15	24.75	33.0	8.25	Complied
1850.7	1	5	22.7	2.15	24.85	33.0	8.15	Complied

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

Frequency (MHz)	Resource Blocks	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Margin (dB)	Result
1850.7	6	0	20.7	2.15	22.85	33.0	10.15	Complied
1850.7	3	2	21.5	2.15	23.65	33.0	9.35	Complied
1850.7	1	0	21.3	2.15	23.45	33.0	9.55	Complied
1850.7	1	5	21.5	2.15	23.65	33.0	9.35	Complied

Results: 1.4 MHz Channel Bandwidth / Middle Channel / QPSK

Frequency (MHz)	Resource Blocks	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Margin (dB)	Result
1880.0	6	0	21.5	2.15	23.65	33.0	9.35	Complied
1880.0	3	2	22.5	2.15	24.65	33.0	8.35	Complied
1880.0	1	0	22.5	2.15	24.65	33.0	8.35	Complied
1880.0	1	5	22.5	2.15	24.65	33.0	8.35	Complied

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

Frequency (MHz)	Resource Blocks	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Margin (dB)	Result
1880.0	6	0	20.6	2.15	22.75	33.0	10.25	Complied
1880.0	3	2	21.5	2.15	23.65	33.0	9.35	Complied
1880.0	1	0	21.4	2.15	23.55	33.0	9.45	Complied
1880.0	1	5	21.4	2.15	23.55	33.0	9.45	Complied

Transmitter Output Power (EIRP) (continued)

Results: 1.4 MHz Channel Bandwidth / Top Channel / QPSK

Frequency (MHz)	Resource Blocks	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Margin (dB)	Result
1909.3	6	0	21.4	2.15	23.55	33.0	9.45	Complied
1909.3	3	2	22.4	2.15	24.55	33.0	8.45	Complied
1909.3	1	0	22.4	2.15	24.55	33.0	8.45	Complied
1909.3	1	5	22.3	2.15	24.45	33.0	8.55	Complied

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

Frequency (MHz)	Resource Blocks	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Margin (dB)	Result
1909.3	6	0	20.4	2.15	22.55	33.0	10.45	Complied
1909.3	3	2	21.3	2.15	23.45	33.0	9.55	Complied
1909.3	1	0	21.2	2.15	23.35	33.0	9.65	Complied
1909.3	1	5	21.2	2.15	23.35	33.0	9.65	Complied

Results: 3 MHz Channel Bandwidth / Bottom Channel / QPSK

Frequency (MHz)	Resource Blocks	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Margin (dB)	Result
1851.5	15	0	21.6	2.15	23.75	33.0	9.25	Complied
1851.5	8	4	21.6	2.15	23.75	33.0	9.25	Complied
1851.5	1	0	22.6	2.15	24.75	33.0	8.25	Complied
1851.5	1	14	22.7	2.15	24.85	33.0	8.15	Complied

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

Frequency (MHz)	Resource Blocks	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Margin (dB)	Result
1851.5	15	0	20.7	2.15	22.85	33.0	10.15	Complied
1851.5	8	4	20.7	2.15	22.85	33.0	10.15	Complied
1851.5	1	0	21.3	2.15	23.45	33.0	9.55	Complied
1851.5	1	14	21.6	2.15	23.75	33.0	9.25	Complied

Transmitter Output Power (EIRP) (continued)

Results: 3 MHz Channel Bandwidth / Middle Channel / QPSK

Frequency (MHz)	Resource Blocks	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Margin (dB)	Result
1880.0	15	0	21.6	2.15	23.75	33.0	9.25	Complied
1880.0	8	4	21.6	2.15	23.75	33.0	9.25	Complied
1880.0	1	0	22.6	2.15	24.75	33.0	8.25	Complied
1880.0	1	14	22.5	2.15	24.65	33.0	8.35	Complied

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

Frequency (MHz)	Resource Blocks	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Margin (dB)	Result
1880.0	15	0	20.5	2.15	22.65	33.0	10.35	Complied
1880.0	8	4	20.6	2.15	22.75	33.0	10.25	Complied
1880.0	1	0	21.6	2.15	23.75	33.0	9.25	Complied
1880.0	1	14	21.4	2.15	23.55	33.0	9.45	Complied

Results: 3 MHz Channel Bandwidth / Top Channel / QPSK

Frequency (MHz)	Resource Blocks	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Margin (dB)	Result
1908.5	15	0	21.4	2.15	23.55	33.0	9.45	Complied
1908.5	8	4	21.4	2.15	23.55	33.0	9.45	Complied
1908.5	1	0	22.5	2.15	24.65	33.0	8.35	Complied
1908.5	1	14	22.2	2.15	24.35	33.0	8.65	Complied

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

Frequency (MHz)	Resource Blocks	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Margin (dB)	Result
1908.5	15	0	20.5	2.15	22.65	33.0	10.35	Complied
1908.5	8	4	20.5	2.15	22.65	33.0	10.35	Complied
1908.5	1	0	21.3	2.15	23.45	33.0	9.55	Complied
1908.5	1	14	21.2	2.15	23.35	33.0	9.65	Complied

Transmitter Output Power (EIRP) (continued)

Results: 5 MHz Channel Bandwidth / Bottom Channel / QPSK

Frequency (MHz)	Resource Blocks	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Margin (dB)	Result
1852.5	25	0	21.6	2.15	23.75	33.0	9.25	Complied
1852.5	12	6	21.7	2.15	23.85	33.0	9.15	Complied
1852.5	1	0	22.5	2.15	24.65	33.0	8.35	Complied
1852.5	1	24	22.7	2.15	24.85	33.0	8.15	Complied

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

Frequency (MHz)	Resource Blocks	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Margin (dB)	Result
1852.5	25	0	20.8	2.15	22.95	33.0	10.05	Complied
1852.5	12	6	20.7	2.15	22.85	33.0	10.15	Complied
1852.5	1	0	21.4	2.15	23.55	33.0	9.45	Complied
1852.5	1	24	21.6	2.15	23.75	33.0	9.25	Complied

Results: 5 MHz Channel Bandwidth / Middle Channel / QPSK

Frequency (MHz)	Resource Blocks	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Margin (dB)	Result
1880.0	25	0	21.6	2.15	23.75	33.0	9.25	Complied
1880.0	12	6	21.6	2.15	23.75	33.0	9.25	Complied
1880.0	1	0	22.5	2.15	24.65	33.0	8.35	Complied
1880.0	1	24	22.4	2.15	24.55	33.0	8.45	Complied

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

Frequency (MHz)	Resource Blocks	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Margin (dB)	Result
1880.0	25	0	20.5	2.15	22.65	33.0	10.35	Complied
1880.0	12	6	20.6	2.15	22.75	33.0	10.25	Complied
1880.0	1	0	21.4	2.15	23.55	33.0	9.45	Complied
1880.0	1	24	21.3	2.15	23.45	33.0	9.55	Complied

Transmitter Output Power (EIRP) (continued)

Results: 5 MHz Channel Bandwidth / Top Channel / QPSK

Frequency (MHz)	Resource Blocks	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Margin (dB)	Result
1907.5	25	0	21.4	2.15	23.55	33.0	9.45	Complied
1907.5	12	6	21.5	2.15	23.65	33.0	9.35	Complied
1907.5	1	0	22.4	2.15	24.55	33.0	8.45	Complied
1907.5	1	24	22.3	2.15	24.45	33.0	8.55	Complied

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

Frequency (MHz)	Resource Blocks	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Margin (dB)	Result
1907.5	25	0	20.5	2.15	22.65	33.0	10.35	Complied
1907.5	12	6	20.5	2.15	22.65	33.0	10.35	Complied
1907.5	1	0	21.2	2.15	23.35	33.0	9.65	Complied
1907.5	1	24	21.2	2.15	23.35	33.0	9.65	Complied

Results: 10 MHz Channel Bandwidth / Bottom Channel / QPSK

Frequency (MHz)	Resource Blocks	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Margin (dB)	Result
1855.0	50	0	21.7	2.15	23.85	33.0	9.15	Complied
1855.0	25	12	21.6	2.15	23.75	33.0	9.25	Complied
1855.0	1	0	22.6	2.15	24.75	33.0	8.25	Complied
1855.0	1	49	22.7	2.15	24.85	33.0	8.15	Complied

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

Frequency (MHz)	Resource Blocks	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Margin (dB)	Result
1855.0	50	0	20.7	2.15	22.85	33.0	10.15	Complied
1855.0	25	12	20.7	2.15	22.85	33.0	10.15	Complied
1855.0	1	0	21.4	2.15	23.55	33.0	9.45	Complied
1855.0	1	49	21.6	2.15	23.75	33.0	9.25	Complied

Transmitter Output Power (EIRP) (continued)

Results: 10 MHz Channel Bandwidth / Middle Channel / QPSK

Frequency (MHz)	Resource Blocks	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Margin (dB)	Result
1880.0	50	0	21.4	2.15	23.55	33.0	9.45	Complied
1880.0	25	12	21.5	2.15	23.65	33.0	9.35	Complied
1880.0	1	0	22.5	2.15	24.65	33.0	8.35	Complied
1880.0	1	49	22.6	2.15	24.75	33.0	8.25	Complied

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

Frequency (MHz)	Resource Blocks	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Margin (dB)	Result
1880.0	50	0	20.5	2.15	22.65	33.0	10.35	Complied
1880.0	25	12	20.5	2.15	22.65	33.0	10.35	Complied
1880.0	1	0	21.5	2.15	23.65	33.0	9.35	Complied
1880.0	1	49	21.5	2.15	23.65	33.0	9.35	Complied

Results: 10 MHz Channel Bandwidth / Top Channel / QPSK

Frequency (MHz)	Resource Blocks	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Margin (dB)	Result
1905.0	50	0	21.4	2.15	23.55	33.0	9.45	Complied
1905.0	25	12	21.3	2.15	23.45	33.0	9.55	Complied
1905.0	1	0	22.3	2.15	24.45	33.0	8.55	Complied
1905.0	1	49	22.3	2.15	24.45	33.0	8.55	Complied

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

Frequency (MHz)	Resource Blocks	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Margin (dB)	Result
1905.0	50	0	20.4	2.15	22.55	33.0	10.45	Complied
1905.0	25	12	20.3	2.15	22.45	33.0	10.55	Complied
1905.0	1	0	21.2	2.15	23.35	33.0	9.65	Complied
1905.0	1	49	21.2	2.15	23.35	33.0	9.65	Complied

Transmitter Output Power (EIRP) (continued)

Results: 15 MHz Channel Bandwidth / Bottom Channel / QPSK

Frequency (MHz)	Resource Blocks	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Margin (dB)	Result
1857.5	75	0	21.6	2.15	23.75	33.0	9.25	Complied
1857.5	36	18	21.6	2.15	23.75	33.0	9.25	Complied
1857.5	1	0	22.6	2.15	24.75	33.0	8.25	Complied
1857.5	1	74	22.7	2.15	24.85	33.0	8.15	Complied

Results: 15 MHz Channel Bandwidth / Bottom Channel / 16QAM

Frequency (MHz)	Resource Blocks	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Margin (dB)	Result
1857.5	75	0	20.7	2.15	22.85	33.0	10.15	Complied
1857.5	36	18	20.6	2.15	22.75	33.0	10.25	Complied
1857.5	1	0	21.5	2.15	23.65	33.0	9.35	Complied
1857.5	1	74	21.5	2.15	23.65	33.0	9.35	Complied

Results: 15 MHz Channel Bandwidth / Middle Channel / QPSK

Frequency (MHz)	Resource Blocks	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Margin (dB)	Result
1880.0	75	0	21.4	2.15	23.55	33.0	9.45	Complied
1880.0	36	18	21.5	2.15	23.65	33.0	9.35	Complied
1880.0	1	0	22.4	2.15	24.55	33.0	8.45	Complied
1880.0	1	74	22.4	2.15	24.55	33.0	8.45	Complied

Results: 15 MHz Channel Bandwidth / Middle Channel / 16QAM

Frequency (MHz)	Resource Blocks	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Margin (dB)	Result
1880.0	75	0	20.4	2.15	22.55	33.0	10.45	Complied
1880.0	36	18	20.6	2.15	22.75	33.0	10.25	Complied
1880.0	1	0	21.4	2.15	23.55	33.0	9.45	Complied
1880.0	1	74	21.4	2.15	23.55	33.0	9.45	Complied

Transmitter Output Power (EIRP) (continued)

Results: 15 MHz Channel Bandwidth / Top Channel / QPSK

Frequency (MHz)	Resource Blocks	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Margin (dB)	Result
1902.5	75	0	21.3	2.15	23.45	33.0	9.55	Complied
1902.5	36	18	21.4	2.15	23.55	33.0	9.45	Complied
1902.5	1	0	22.6	2.15	24.75	33.0	8.25	Complied
1902.5	1	74	22.3	2.15	24.45	33.0	8.55	Complied

Results: 15 MHz Channel Bandwidth / Top Channel / 16QAM

Frequency (MHz)	Resource Blocks	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Margin (dB)	Result
1902.5	75	0	20.4	2.15	22.55	33.0	10.45	Complied
1902.5	36	18	20.3	2.15	22.45	33.0	10.55	Complied
1902.5	1	0	21.5	2.15	23.65	33.0	9.35	Complied
1902.5	1	74	21.2	2.15	23.35	33.0	9.65	Complied

Results: 20 MHz Channel Bandwidth / Bottom Channel / QPSK

Frequency (MHz)	Resource Blocks	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Margin (dB)	Result
1860.0	100	0	21.6	2.15	23.75	33.0	9.25	Complied
1860.0	50	25	21.6	2.15	23.75	33.0	9.25	Complied
1860.0	1	0	22.7	2.15	24.85	33.0	8.15	Complied
1860.0	1	99	22.6	2.15	24.75	33.0	8.25	Complied

Results: 20 MHz Channel Bandwidth / Bottom Channel / 16QAM

Frequency (MHz)	Resource Blocks	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Margin (dB)	Result
1860.0	100	0	20.6	2.15	22.75	33.0	10.25	Complied
1860.0	50	25	20.7	2.15	22.85	33.0	10.15	Complied
1860.0	1	0	21.6	2.15	23.75	33.0	9.25	Complied
1860.0	1	99	21.5	2.15	23.65	33.0	9.35	Complied

Transmitter Output Power (EIRP) (continued)

Results: 20 MHz Channel Bandwidth / Middle Channel / QPSK

Frequency (MHz)	Resource Blocks	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Margin (dB)	Result
1880.0	100	0	21.6	2.15	23.75	33.0	9.25	Complied
1880.0	50	25	21.5	2.15	23.65	33.0	9.35	Complied
1880.0	1	0	22.6	2.15	24.75	33.0	8.25	Complied
1880.0	1	99	22.4	2.15	24.55	33.0	8.45	Complied

Results: 20 MHz Channel Bandwidth / Middle Channel / 16QAM

Frequency (MHz)	Resource Blocks	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Margin (dB)	Result
1880.0	100	0	20.5	2.15	22.65	33.0	10.35	Complied
1880.0	50	25	20.5	2.15	22.65	33.0	10.35	Complied
1880.0	1	0	21.4	2.15	23.55	33.0	9.45	Complied
1880.0	1	99	21.3	2.15	23.45	33.0	9.55	Complied

Results: 20 MHz Channel Bandwidth / Top Channel / QPSK

Frequency (MHz)	Resource Blocks	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Margin (dB)	Result
1900.0	100	0	21.5	2.15	23.65	33.0	9.35	Complied
1900.0	50	25	21.3	2.15	23.45	33.0	9.55	Complied
1900.0	1	0	22.6	2.15	24.75	33.0	8.25	Complied
1900.0	1	99	22.3	2.15	24.45	33.0	8.55	Complied

Results: 20 MHz Channel Bandwidth / Top Channel / 16QAM

Frequency (MHz)	Resource Blocks	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Margin (dB)	Result
1900.0	100	0	20.5	2.15	22.65	33.0	10.35	Complied
1900.0	50	25	20.4	2.15	22.55	33.0	10.45	Complied
1900.0	1	0	21.5	2.15	23.65	33.0	9.35	Complied
1900.0	1	99	21.2	2.15	23.35	33.0	9.65	Complied

Transmitter Output Power (EIRP) (continued)

Test Equipment Used:

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M1657	Thermohygrometer	JM Handelspunkt	30.5015.13	None stated	14 Mar 2015	12
S0523	DC Power Supply	TTi	PL320	224235	Calibrated before use	-
M1871	Power Meter	Agilent	N1911A	MY45100338	28 May 2015	12
M1872	Wideband Power Sensor	Agilent	N1921A	MY45241950	08 Oct 2014	12
M122	Multimeter	Fluke	77	64910017	24 Apr 2015	12
A2535	Directional Coupler	AtlanTec RF	CDC-003060-20	14041701719	Calibrated before use	-
A2504	Directional Coupler	AtlanTec RF	CDC-003060-10	13122501839	Calibrated before use	-
A2508	Attenuator	AtlanTec RF	AN18-10	821846#3	Calibrated before use	-

5.2.2. Transmitter Peak-To-Average Ratio (PAR)

Test Summary:

Test Engineer:	Keith Tucker	**Test Dates:**	13 August 2014 & 14 August 2014
Test Sample IMEI:	352025060521607		

FCC Reference:	Part 24.232(d)
Test Method Used:	As detailed in KDB 971168 Section 5.7.2

Environmental Conditions:

Temperature (℃):	23 to 24
Relative Humidity (%):	36 to 38

Note(s):

1. In accordance with KDB 971168, Peak power (P_{Pk}) measurements were performed as detailed in Section 5.1.2 and Average power (P_{Avg}) measurements were performed as detailed in Section 5.2.3. The PAPR was determined using the following calculation:

$$PAPR\ (dB) = P_{Pk}\ (dBm) - P_{Avg}\ (dBm).$$

Transmitter Peak-To-Average Ratio (PAR) (PAPR) (continued)

Results: 1.4 MHz Channel Bandwidth / Bottom Channel / QPSK

Frequency (MHz)	Resource Blocks	Resource Block Offset	P_{Pk} (dBm)	P_{Avg} (dBm)	PAPR (dB)	Ratio Limit (dB)	Margin (dB)	Result
1850.7	6	0	27.7	21.6	6.1	13.0	6.9	Complied
1850.7	3	2	28.2	22.6	5.6	13.0	7.4	Complied
1850.7	1	0	27.7	22.6	5.1	13.0	7.9	Complied
1850.7	1	5	27.9	22.7	5.2	13.0	7.8	Complied

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

Frequency (MHz)	Resource Blocks	Resource Block Offset	P_{Pk} (dBm)	P_{Avg} (dBm)	PAPR (dB)	Ratio Limit (dB)	Margin (dB)	Result
1850.7	6	0	27.6	20.7	6.9	13.0	6.1	Complied
1850.7	3	2	28.0	21.5	6.5	13.0	6.5	Complied
1850.7	1	0	27.8	21.3	6.5	13.0	6.5	Complied
1850.7	1	5	27.7	21.5	6.2	13.0	6.8	Complied

Results: 1.4 MHz Channel Bandwidth / Middle Channel / QPSK

Frequency (MHz)	Resource Blocks	Resource Block Offset	P_{Pk} (dBm)	P_{Avg} (dBm)	PAPR (dB)	Ratio Limit (dB)	Margin (dB)	Result
1880.0	6	0	27.6	21.5	6.1	13.0	6.9	Complied
1880.0	3	2	28.0	22.5	5.5	13.0	7.5	Complied
1880.0	1	0	27.8	22.5	5.3	13.0	7.7	Complied
1880.0	1	5	27.8	22.5	5.3	13.0	7.7	Complied

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

Frequency (MHz)	Resource Blocks	Resource Block Offset	P_{Pk} (dBm)	P_{Avg} (dBm)	PAPR (dB)	Ratio Limit (dB)	Margin (dB)	Result
1880.0	6	0	27.3	20.6	6.7	13.0	6.3	Complied
1880.0	3	2	27.9	21.5	6.4	13.0	6.6	Complied
1880.0	1	0	27.8	21.4	6.4	13.0	6.6	Complied
1880.0	1	5	27.8	21.4	6.4	13.0	6.6	Complied

Transmitter Peak-To-Average Ratio (PAR) (continued)

Results: 1.4 MHz Channel Bandwidth / Top Channel / QPSK

Frequency (MHz)	Resource Blocks	Resource Block Offset	P_{Pk} (dBm)	P_{Avg} (dBm)	PAPR (dB)	Ratio Limit (dB)	Margin (dB)	Result
1909.3	6	0	27.2	21.4	5.8	13.0	7.2	Complied
1909.3	3	2	27.4	22.4	5.0	13.0	8.0	Complied
1909.3	1	0	27.2	22.4	4.8	13.0	8.2	Complied
1909.3	1	5	27.1	22.3	4.8	13.0	8.2	Complied

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

Frequency (MHz)	Resource Blocks	Resource Block Offset	P_{Pk} (dBm)	P_{Avg} (dBm)	PAPR (dB)	Ratio Limit (dB)	Margin (dB)	Result
1909.3	6	0	27.1	20.4	6.7	13.0	6.3	Complied
1909.3	3	2	27.3	21.3	6.0	13.0	7.0	Complied
1909.3	1	0	27.2	21.2	6.0	13.0	7.0	Complied
1909.3	1	5	27.2	21.2	6.0	13.0	7.0	Complied

Results: 3 MHz Channel Bandwidth / Bottom Channel / QPSK

Frequency (MHz)	Resource Blocks	Resource Block Offset	P_{Pk} (dBm)	P_{Avg} (dBm)	PAPR (dB)	Ratio Limit (dB)	Margin (dB)	Result
1851.5	15	0	27.8	21.6	6.2	13.0	6.8	Complied
1851.5	8	4	27.9	21.6	6.3	13.0	6.7	Complied
1851.5	1	0	27.9	22.6	5.3	13.0	7.7	Complied
1851.5	1	14	27.8	22.7	5.1	13.0	7.9	Complied

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

Frequency (MHz)	Resource Blocks	Resource Block Offset	P_{Pk} (dBm)	P_{Avg} (dBm)	PAPR (dB)	Ratio Limit (dB)	Margin (dB)	Result
1851.5	15	0	27.7	20.7	7.0	13.0	6.0	Complied
1851.5	8	4	27.8	20.7	7.1	13.0	5.9	Complied
1851.5	1	0	27.7	21.3	6.4	13.0	6.6	Complied
1851.5	1	14	27.9	21.6	6.3	13.0	6.7	Complied

Transmitter Peak-To-Average Ratio (PAR) (continued)

Results: 3 MHz Channel Bandwidth / Middle Channel / QPSK

Frequency (MHz)	Resource Blocks	Resource Block Offset	P_{Pk} (dBm)	P_{Avg} (dBm)	PAPR (dB)	Ratio Limit (dB)	Margin (dB)	Result
1880.0	15	0	27.8	21.6	6.2	13.0	6.8	Complied
1880.0	8	4	27.7	21.6	6.1	13.0	6.9	Complied
1880.0	1	0	28.0	22.6	5.4	13.0	7.6	Complied
1880.0	1	14	27.9	22.5	5.4	13.0	7.6	Complied

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

Frequency (MHz)	Resource Blocks	Resource Block Offset	P_{Pk} (dBm)	P_{Avg} (dBm)	PAPR (dB)	Ratio Limit (dB)	Margin (dB)	Result
1880.0	15	0	27.5	20.5	7.0	13.0	6.0	Complied
1880.0	8	4	27.6	20.6	7.0	13.0	6.0	Complied
1880.0	1	0	27.8	21.6	6.2	13.0	6.8	Complied
1880.0	1	14	27.7	21.4	6.3	13.0	6.7	Complied

Results: 3 MHz Channel Bandwidth / Top Channel / QPSK

Frequency (MHz)	Resource Blocks	Resource Block Offset	P_{Pk} (dBm)	P_{Avg} (dBm)	PAPR (dB)	Ratio Limit (dB)	Margin (dB)	Result
1908.5	15	0	27.3	21.4	5.9	13.0	7.1	Complied
1908.5	8	4	27.2	21.4	5.8	13.0	7.2	Complied
1908.5	1	0	27.6	22.5	5.1	13.0	7.9	Complied
1908.5	1	14	27.1	22.2	4.9	13.0	8.1	Complied

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

Frequency (MHz)	Resource Blocks	Resource Block Offset	P_{Pk} (dBm)	P_{Avg} (dBm)	PAPR (dB)	Ratio Limit (dB)	Margin (dB)	Result
1908.5	15	0	27.4	20.5	6.9	13.0	6.1	Complied
1908.5	8	4	27.2	20.5	6.7	13.0	6.3	Complied
1908.5	1	0	27.5	21.3	6.2	13.0	6.8	Complied
1908.5	1	14	27.1	21.2	5.9	13.0	7.1	Complied

Transmitter Peak-To-Average Ratio (PAR) (continued)

Results: 5 MHz Channel Bandwidth / Bottom Channel / QPSK

Frequency (MHz)	Resource Blocks	Resource Block Offset	P_{Pk} (dBm)	P_{Avg} (dBm)	PAPR (dB)	Ratio Limit (dB)	Margin (dB)	Result
1852.5	25	0	27.6	21.6	6.0	13.0	7.0	Complied
1852.5	12	6	27.7	21.7	6.0	13.0	7.0	Complied
1852.5	1	0	27.8	22.5	5.3	13.0	7.7	Complied
1852.5	1	24	27.8	22.7	5.1	13.0	7.9	Complied

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

Frequency (MHz)	Resource Blocks	Resource Block Offset	P_{Pk} (dBm)	P_{Avg} (dBm)	PAPR (dB)	Ratio Limit (dB)	Margin (dB)	Result
1852.5	25	0	27.6	20.8	6.8	13.0	6.2	Complied
1852.5	12	6	27.8	20.7	7.1	13.0	5.9	Complied
1852.5	1	0	27.7	21.4	6.3	13.0	6.7	Complied
1852.5	1	24	27.6	21.6	6.0	13.0	7.0	Complied

Results: 5 MHz Channel Bandwidth / Middle Channel / QPSK

Frequency (MHz)	Resource Blocks	Resource Block Offset	P_{Pk} (dBm)	P_{Avg} (dBm)	PAPR (dB)	Ratio Limit (dB)	Margin (dB)	Result
1880.0	25	0	27.8	21.6	6.2	13.0	6.8	Complied
1880.0	12	6	27.7	21.6	6.1	13.0	6.9	Complied
1880.0	1	0	27.9	22.5	5.4	13.0	7.6	Complied
1880.0	1	24	27.7	22.4	5.3	13.0	7.7	Complied

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

Frequency (MHz)	Resource Blocks	Resource Block Offset	P_{Pk} (dBm)	P_{Avg} (dBm)	PAPR (dB)	Ratio Limit (dB)	Margin (dB)	Result
1880.0	25	0	27.4	20.5	6.9	13.0	6.1	Complied
1880.0	12	6	27.4	20.6	6.8	13.0	6.2	Complied
1880.0	1	0	27.8	21.4	6.4	13.0	6.6	Complied
1880.0	1	24	27.7	21.3	6.4	13.0	6.6	Complied

Transmitter Peak-To-Average Ratio (PAR) (continued)

Results: 5 MHz Channel Bandwidth / Top Channel / QPSK

Frequency (MHz)	Resource Blocks	Resource Block Offset	P_{Pk} (dBm)	P_{Avg} (dBm)	PAPR (dB)	Ratio Limit (dB)	Margin (dB)	Result
1907.5	25	0	27.3	21.4	5.9	13.0	7.1	Complied
1907.5	12	6	27.6	21.5	6.1	13.0	6.9	Complied
1907.5	1	0	27.7	22.4	5.3	13.0	7.7	Complied
1907.5	1	24	27.1	22.3	4.8	13.0	8.2	Complied

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

Frequency (MHz)	Resource Blocks	Resource Block Offset	P_{Pk} (dBm)	P_{Avg} (dBm)	PAPR (dB)	Ratio Limit (dB)	Margin (dB)	Result
1907.5	25	0	27.3	20.5	6.8	13.0	6.2	Complied
1907.5	12	6	27.5	20.5	7.0	13.0	6.0	Complied
1907.5	1	0	27.5	21.2	6.3	13.0	6.7	Complied
1907.5	1	24	27.1	21.2	5.9	13.0	7.1	Complied

Results: 10 MHz Channel Bandwidth / Bottom Channel / QPSK

Frequency (MHz)	Resource Blocks	Resource Block Offset	P_{Pk} (dBm)	P_{Avg} (dBm)	PAPR (dB)	Ratio Limit (dB)	Margin (dB)	Result
1855.0	50	0	27.9	21.7	6.2	13.0	6.8	Complied
1855.0	25	12	27.6	21.6	6.0	13.0	7.0	Complied
1855.0	1	0	27.9	22.6	5.3	13.0	7.7	Complied
1855.0	1	49	27.7	22.7	5.0	13.0	8.0	Complied

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

Frequency (MHz)	Resource Blocks	Resource Block Offset	P_{Pk} (dBm)	P_{Avg} (dBm)	PAPR (dB)	Ratio Limit (dB)	Margin (dB)	Result
1855.0	50	0	27.7	20.7	7.0	13.0	6.0	Complied
1855.0	25	12	27.7	20.7	7.0	13.0	6.0	Complied
1855.0	1	0	27.7	21.4	6.3	13.0	6.7	Complied
1855.0	1	49	27.6	21.6	6.0	13.0	7.0	Complied

Transmitter Peak-To-Average Ratio (PAR) (continued)

Results: 10 MHz Channel Bandwidth / Middle Channel / QPSK

Frequency (MHz)	Resource Blocks	Resource Block Offset	P_{Pk} (dBm)	P_{Avg} (dBm)	PAPR (dB)	Ratio Limit (dB)	Margin (dB)	Result
1880.0	50	0	27.7	21.4	6.3	13.0	6.7	Complied
1880.0	25	12	27.6	21.5	6.1	13.0	6.9	Complied
1880.0	1	0	27.9	22.5	5.4	13.0	7.6	Complied
1880.0	1	49	27.7	22.6	5.1	13.0	7.9	Complied

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

Frequency (MHz)	Resource Blocks	Resource Block Offset	P_{Pk} (dBm)	P_{Avg} (dBm)	PAPR (dB)	Ratio Limit (dB)	Margin (dB)	Result
1880.0	50	0	27.2	20.5	6.7	13.0	6.3	Complied
1880.0	25	12	27.3	20.5	6.8	13.0	6.2	Complied
1880.0	1	0	27.8	21.5	6.3	13.0	6.7	Complied
1880.0	1	49	27.6	21.5	6.1	13.0	6.9	Complied

Results: 10 MHz Channel Bandwidth / Top Channel / QPSK

Frequency (MHz)	Resource Blocks	Resource Block Offset	P_{Pk} (dBm)	P_{Avg} (dBm)	PAPR (dB)	Ratio Limit (dB)	Margin (dB)	Result
1905.0	50	0	27.6	21.4	6.2	13.0	6.8	Complied
1905.0	25	12	27.5	21.3	6.2	13.0	6.8	Complied
1905.0	1	0	27.7	22.3	5.4	13.0	7.6	Complied
1905.0	1	49	27.2	22.3	4.9	13.0	8.1	Complied

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

Frequency (MHz)	Resource Blocks	Resource Block Offset	P_{Pk} (dBm)	P_{Avg} (dBm)	PAPR (dB)	Ratio Limit (dB)	Margin (dB)	Result
1905.0	50	0	27.6	20.4	7.2	13.0	5.8	Complied
1905.0	25	12	27.7	20.3	7.4	13.0	5.6	Complied
1905.0	1	0	27.6	21.2	6.4	13.0	6.6	Complied
1905.0	1	49	27.2	21.2	6.0	13.0	7.0	Complied

Transmitter Peak-To-Average Ratio (PAR) (continued)

Results: 15 MHz Channel Bandwidth / Bottom Channel / QPSK

Frequency (MHz)	Resource Blocks	Resource Block Offset	P_{Pk} (dBm)	P_{Avg} (dBm)	PAPR (dB)	Ratio Limit (dB)	Margin (dB)	Result
1857.5	75	0	27.5	21.6	5.9	13.0	7.1	Complied
1857.5	36	18	27.5	21.6	5.9	13.0	7.1	Complied
1857.5	1	0	27.8	22.6	5.2	13.0	7.8	Complied
1857.5	1	74	27.7	22.7	5.0	13.0	8.0	Complied

Results: 15 MHz Channel Bandwidth / Bottom Channel / 16QAM

Frequency (MHz)	Resource Blocks	Resource Block Offset	P_{Pk} (dBm)	P_{Avg} (dBm)	PAPR (dB)	Ratio Limit (dB)	Margin (dB)	Result
1857.5	75	0	27.3	20.7	6.6	13.0	6.4	Complied
1857.5	36	18	27.2	20.6	6.6	13.0	6.4	Complied
1857.5	1	0	27.7	21.5	6.2	13.0	6.8	Complied
1857.5	1	74	27.5	21.5	6.0	13.0	7.0	Complied

Results: 15 MHz Channel Bandwidth / Middle Channel / QPSK

Frequency (MHz)	Resource Blocks	Resource Block Offset	P_{Pk} (dBm)	P_{Avg} (dBm)	PAPR (dB)	Ratio Limit (dB)	Margin (dB)	Result
1880.0	75	0	27.5	21.4	6.1	13.0	6.9	Complied
1880.0	36	18	27.8	21.5	6.3	13.0	6.7	Complied
1880.0	1	0	27.9	22.4	5.5	13.0	7.5	Complied
1880.0	1	74	27.6	22.4	5.2	13.0	7.8	Complied

Results: 15 MHz Channel Bandwidth / Middle Channel / 16QAM

Frequency (MHz)	Resource Blocks	Resource Block Offset	P_{Pk} (dBm)	P_{Avg} (dBm)	PAPR (dB)	Ratio Limit (dB)	Margin (dB)	Result
1880.0	75	0	27.2	20.4	6.8	13.0	6.2	Complied
1880.0	36	18	27.3	20.6	6.7	13.0	6.3	Complied
1880.0	1	0	27.7	21.4	6.3	13.0	6.7	Complied
1880.0	1	74	27.5	21.4	6.1	13.0	6.9	Complied

Transmitter Peak-To-Average Ratio (PAR) (continued)

Results: 15 MHz Channel Bandwidth / Top Channel / QPSK

Frequency (MHz)	Resource Blocks	Resource Block Offset	P_{Pk} (dBm)	P_{Avg} (dBm)	PAPR (dB)	Ratio Limit (dB)	Margin (dB)	Result
1902.5	75	0	27.5	21.3	6.2	13.0	6.8	Complied
1902.5	36	18	27.7	21.4	6.3	13.0	6.7	Complied
1902.5	1	0	27.6	22.6	5.0	13.0	8.0	Complied
1902.5	1	74	27.2	22.3	4.9	13.0	8.1	Complied

Results: 15 MHz Channel Bandwidth / Top Channel / 16QAM

Frequency (MHz)	Resource Blocks	Resource Block Offset	P_{Pk} (dBm)	P_{Avg} (dBm)	PAPR (dB)	Ratio Limit (dB)	Margin (dB)	Result
1902.5	75	0	27.7	20.4	7.3	13.0	5.7	Complied
1902.5	36	18	27.5	20.3	7.2	13.0	5.8	Complied
1902.5	1	0	27.6	21.5	6.1	13.0	6.9	Complied
1902.5	1	74	27.2	21.2	6.0	13.0	7.0	Complied

Results: 20 MHz Channel Bandwidth / Bottom Channel / QPSK

Frequency (MHz)	Resource Blocks	Resource Block Offset	P_{Pk} (dBm)	P_{Avg} (dBm)	PAPR (dB)	Ratio Limit (dB)	Margin (dB)	Result
1860.0	100	0	27.6	21.6	6.0	13.0	7.0	Complied
1860.0	50	25	27.7	21.6	6.1	13.0	6.9	Complied
1860.0	1	0	28.0	22.7	5.3	13.0	7.7	Complied
1860.0	1	99	27.8	22.6	5.2	13.0	7.8	Complied

Results: 20 MHz Channel Bandwidth / Bottom Channel / 16QAM

Frequency (MHz)	Resource Blocks	Resource Block Offset	P_{Pk} (dBm)	P_{Avg} (dBm)	PAPR (dB)	Ratio Limit (dB)	Margin (dB)	Result
1860.0	100	0	27.5	20.6	6.9	13.0	6.1	Complied
1860.0	50	25	27.5	20.7	6.8	13.0	6.2	Complied
1860.0	1	0	27.6	21.6	6.0	13.0	7.0	Complied
1860.0	1	99	27.7	21.5	6.2	13.0	6.8	Complied

Transmitter Peak-To-Average Ratio (PAR) (continued)

Results: 20 MHz Channel Bandwidth / Middle Channel / QPSK

Frequency (MHz)	Resource Blocks	Resource Block Offset	P_{Pk} (dBm)	P_{Avg} (dBm)	PAPR (dB)	Ratio Limit (dB)	Margin (dB)	Result
1880.0	100	0	27.5	21.6	5.9	13.0	7.1	Complied
1880.0	50	25	27.7	21.5	6.2	13.0	6.8	Complied
1880.0	1	0	27.9	22.6	5.3	13.0	7.7	Complied
1880.0	1	99	27.5	22.4	5.1	13.0	7.9	Complied

Results: 20 MHz Channel Bandwidth / Middle Channel / 16QAM

Frequency (MHz)	Resource Blocks	Resource Block Offset	P_{Pk} (dBm)	P_{Avg} (dBm)	PAPR (dB)	Ratio Limit (dB)	Margin (dB)	Result
1880.0	100	0	27.2	20.5	6.7	13.0	6.3	Complied
1880.0	50	25	27.3	20.5	6.8	13.0	6.2	Complied
1880.0	1	0	27.8	21.4	6.4	13.0	6.6	Complied
1880.0	1	99	27.4	21.3	6.1	13.0	6.9	Complied

Results: 20 MHz Channel Bandwidth / Top Channel / QPSK

Frequency (MHz)	Resource Blocks	Resource Block Offset	P_{Pk} (dBm)	P_{Avg} (dBm)	PAPR (dB)	Ratio Limit (dB)	Margin (dB)	Result
1900.0	100	0	28.0	21.5	6.5	13.0	6.5	Complied
1900.0	50	25	27.5	21.3	6.2	13.0	6.8	Complied
1900.0	1	0	27.5	22.6	4.9	13.0	8.1	Complied
1900.0	1	99	27.2	22.3	4.9	13.0	8.1	Complied

Results: 20 MHz Channel Bandwidth / Top Channel / 16QAM

Frequency (MHz)	Resource Blocks	Resource Block Offset	P_{Pk} (dBm)	P_{Avg} (dBm)	PAPR (dB)	Ratio Limit (dB)	Margin (dB)	Result
1900.0	100	0	27.8	20.5	7.3	13.0	5.7	Complied
1900.0	50	25	27.8	20.4	7.4	13.0	5.6	Complied
1900.0	1	0	27.4	21.5	5.9	13.0	7.1	Complied
1900.0	1	99	27.2	21.2	6.0	13.0	7.0	Complied

Transmitter Peak-To-Average Ratio (PAR) (continued)

Test Equipment Used:

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M1657	Thermohygrometer	JM Handelspunkt	30.5015.13	None stated	14 Mar 2015	12
S0523	DC Power Supply	TTi	PL320	224235	Calibrated before use	-
M1871	Power Meter	Agilent	N1911A	MY45100338	28 May 2015	12
M1872	Wideband Power Sensor	Agilent	N1921A	MY45241950	08 Oct 2014	12
M122	Multimeter	Fluke	77	64910017	24 Apr 2015	12
A2535	Directional Coupler	AtlanTec RF	CDC-003060-20	14041701719	Calibrated before use	-
A2504	Directional Coupler	AtlanTec RF	CDC-003060-10	13122501839	Calibrated before use	-
A2508	Attenuator	AtlanTec RF	AN18-10	821846#3	Calibrated before use	-

5.2.3. Transmitter Occupied Bandwidth

Test Summary:

Test Engineer:	Keith Tucker	**Test Date:**	18 August 2014
Test Sample IMEI:	352025060521607		

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

Environmental Conditions:

Temperature (℃):	24
Relative Humidity (%):	32

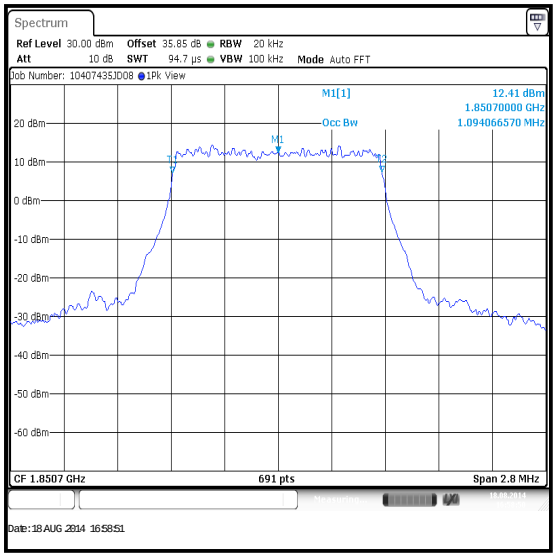
Note(s):

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 test receiver was connected to the RF port on the EUT using suitable attenuation and RF cable.

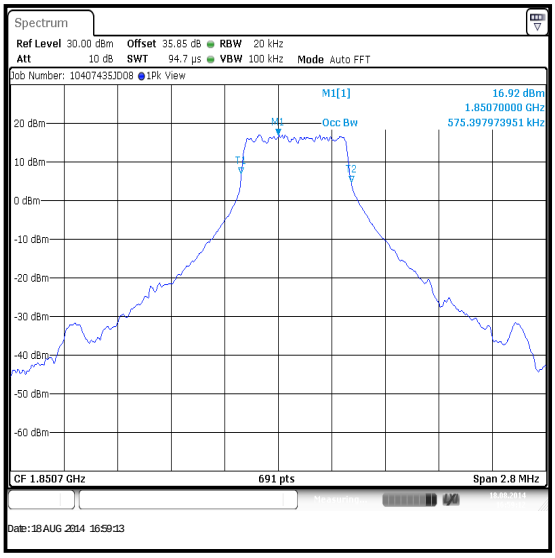
Transmitter Occupied Bandwidth (continued)

Results: 1.4 MHz Channel Bandwidth / Bottom Channel / QPSK

Frequency (MHz)	Resource Blocks	Resource Block Offset	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
1850.7	6	0	20	100	1.094
1850.7	3	2	20	100	0.575



QPSK / 6 Resource Blocks (0 Offset)

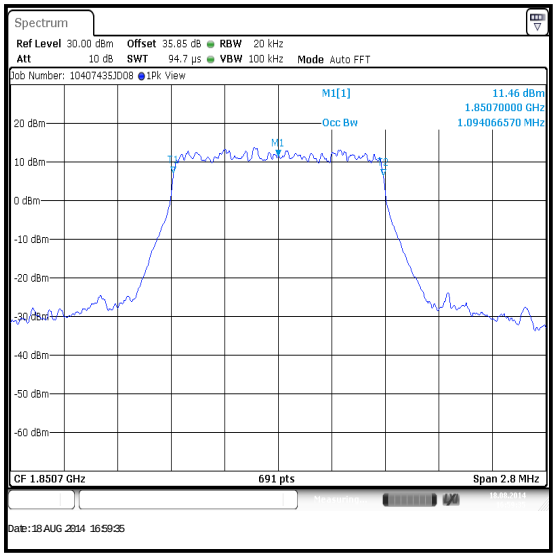


QPSK / 3 Resource Blocks (2 Offset)

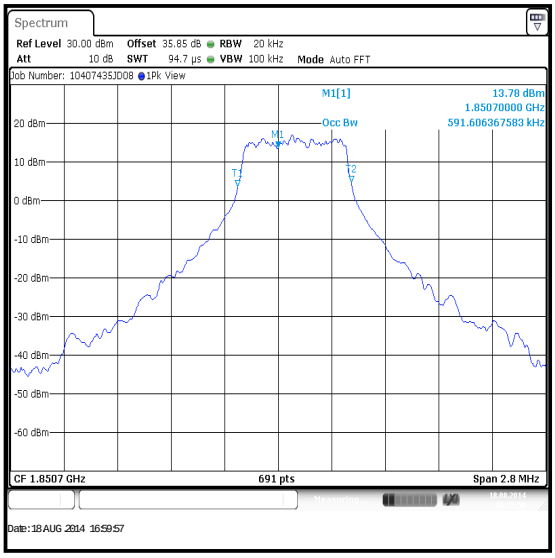
Transmitter Occupied Bandwidth (continued)

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

Frequency (MHz)	Resource Blocks	Resource Block Offset	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
1850.7	6	0	20	100	1.094
1850.7	3	2	20	100	0.592



16QAM / 6 Resource Blocks (0 Offset)

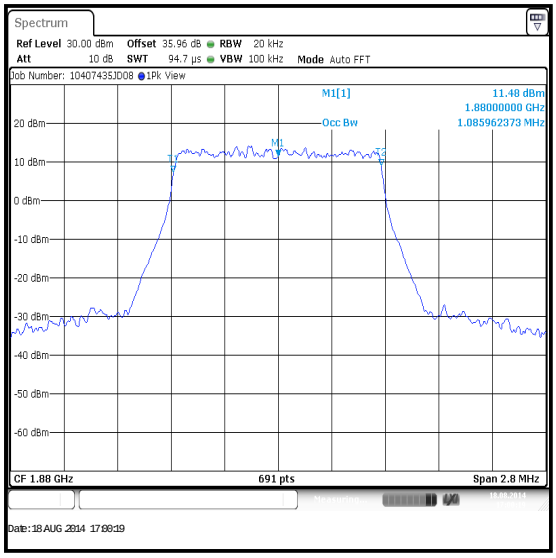


16QAM / 3 Resource Blocks (2 Offset)

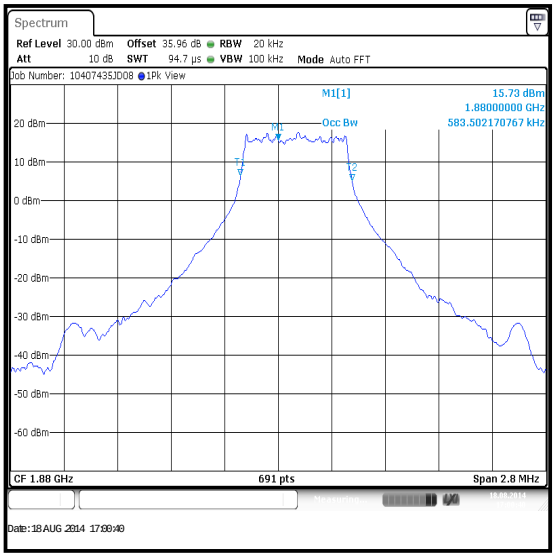
Transmitter Occupied Bandwidth (continued)

Results: 1.4 MHz Channel Bandwidth / Middle Channel / QPSK

Frequency (MHz)	Resource Blocks	Resource Block Offset	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
1880.0	6	0	20	100	1.086
1880.0	3	2	20	100	0.584



QPSK / 6 Resource Blocks (0 Offset)

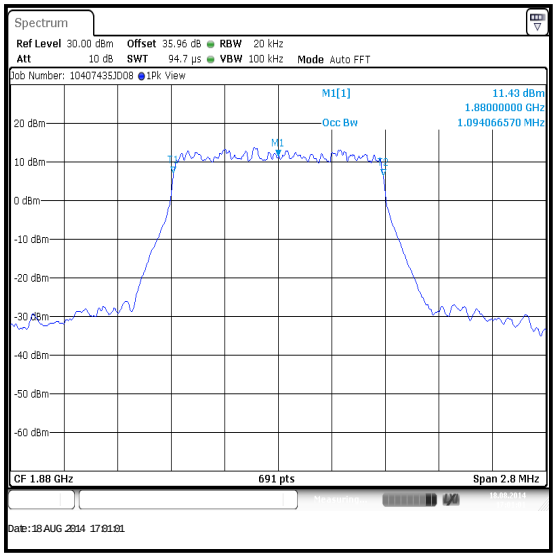


QPSK / 3 Resource Blocks (2 Offset)

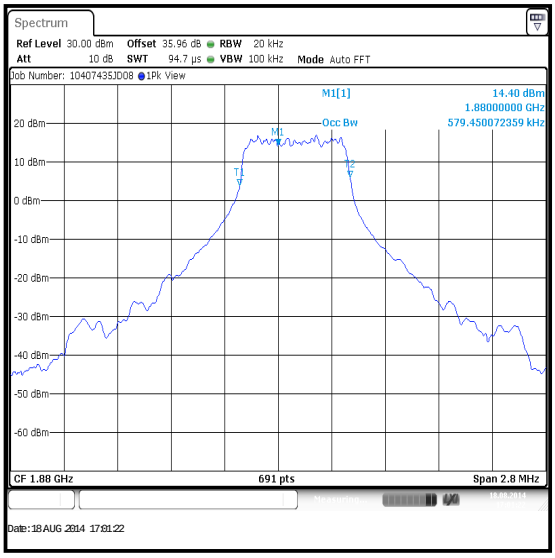
Transmitter Occupied Bandwidth (continued)

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

Frequency (MHz)	Resource Blocks	Resource Block Offset	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
1880.0	6	0	20	100	1.094
1880.0	3	2	20	100	0.579



16QAM / 6 Resource Blocks (0 Offset)

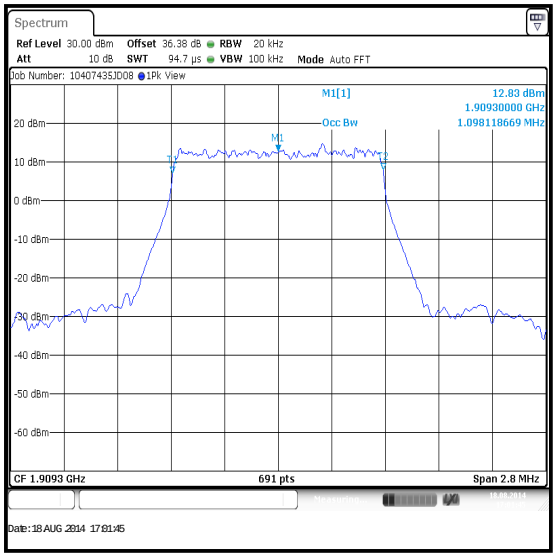


16QAM / 3 Resource Blocks (2 Offset)

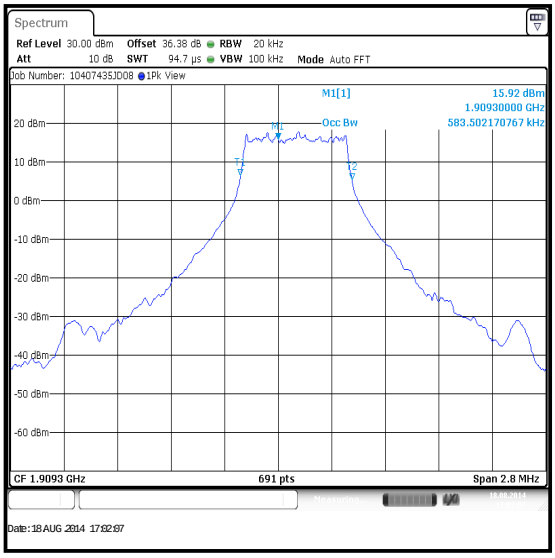
Transmitter Occupied Bandwidth (continued)

Results: 1.4 MHz Channel Bandwidth / Top Channel / QPSK

Frequency (MHz)	Resource Blocks	Resource Block Offset	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
1909.3	6	0	20	100	1.098
1909.3	3	2	20	100	0.584



QPSK / 6 Resource Blocks (0 Offset)

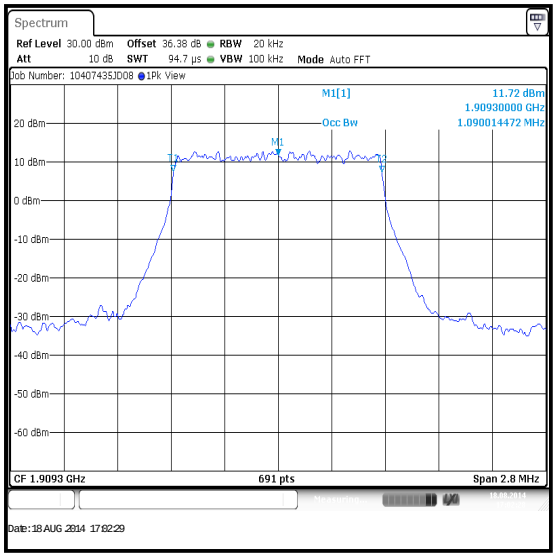


QPSK / 3 Resource Blocks (2 Offset)

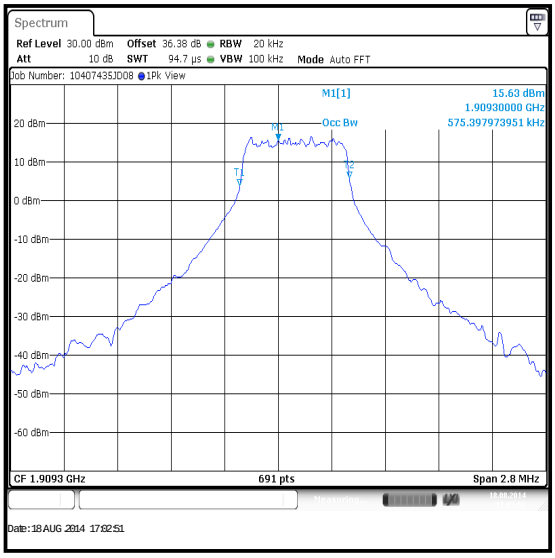
Transmitter Occupied Bandwidth (continued)

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

Frequency (MHz)	Resource Blocks	Resource Block Offset	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
1909.3	6	0	20	100	1.090
1909.3	3	2	20	100	0.575



16QAM / 6 Resource Blocks (0 Offset)

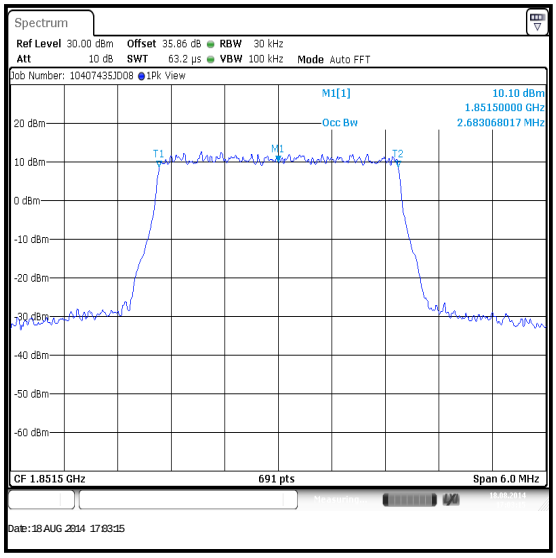


16QAM / 3 Resource Blocks (2 Offset)

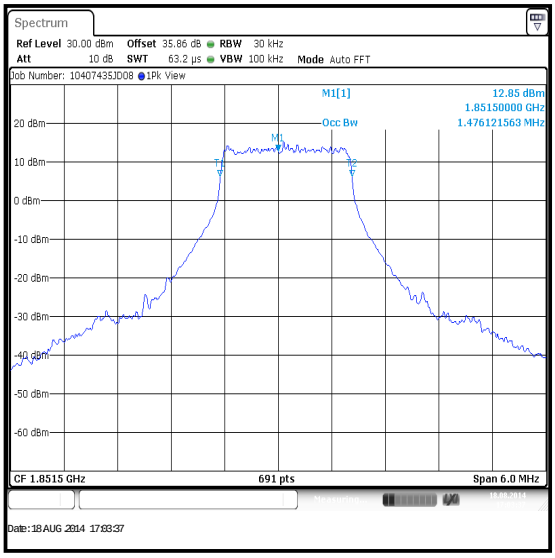
Transmitter Occupied Bandwidth (continued)

Results: 3 MHz Channel Bandwidth / Bottom Channel / QPSK

Frequency (MHz)	Resource Blocks	Resource Block Offset	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
1851.5	15	0	30	100	2.683
1851.5	8	4	30	100	1.476



QPSK / 15 Resource Blocks (0 Offset)

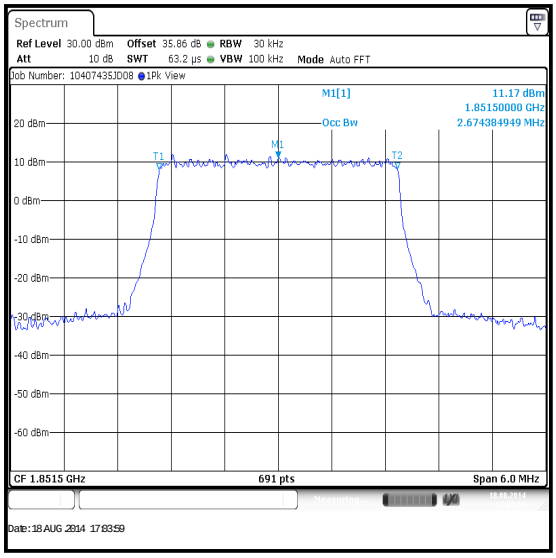


QPSK / 8 Resource Blocks (4 Offset)

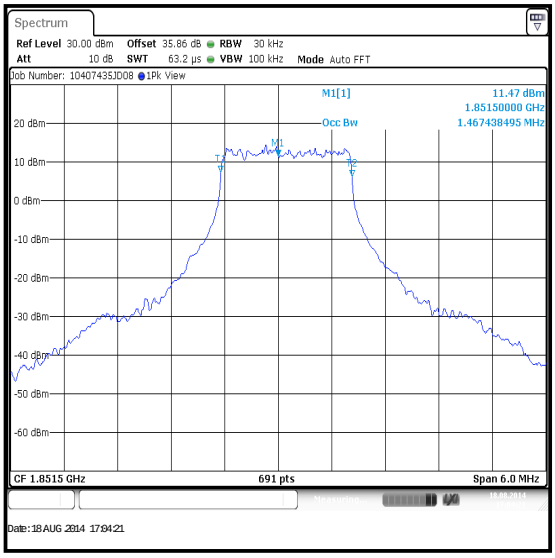
Transmitter Occupied Bandwidth (continued)

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

Frequency (MHz)	Resource Blocks	Resource Block Offset	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
1851.5	15	0	30	100	2.674
1851.5	8	4	30	100	1.467



16QAM / 15 Resource Blocks (0 Offset)

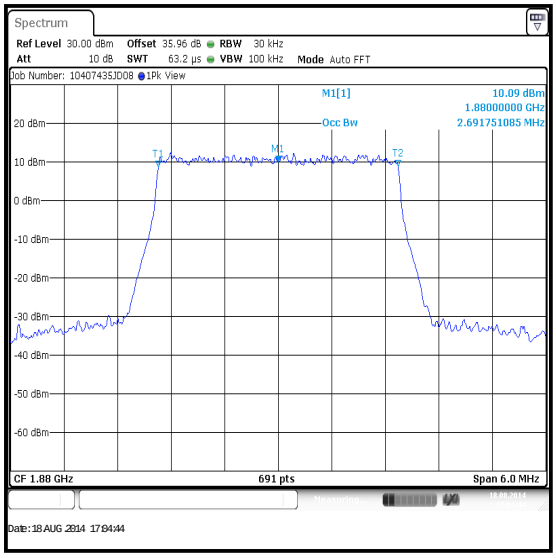


16QAM / 8 Resource Blocks (4 Offset)

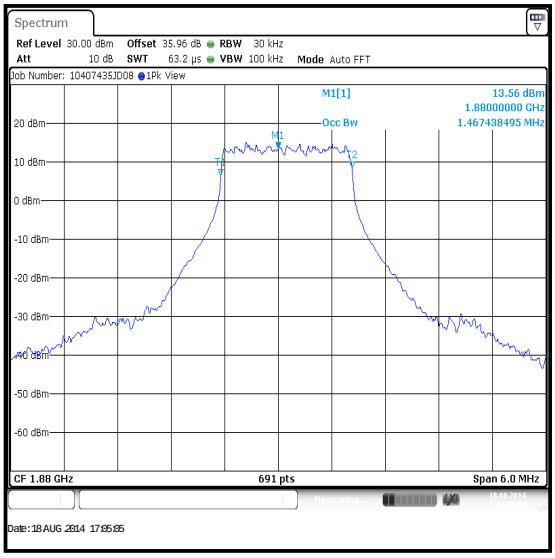
Transmitter Occupied Bandwidth (continued)

Results: 3 MHz Channel Bandwidth / Middle Channel / QPSK

Frequency (MHz)	Resource Blocks	Resource Block Offset	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
1880.0	15	0	30	100	2.692
1880.0	8	4	30	100	1.467



QPSK / 15 Resource Blocks (0 Offset)

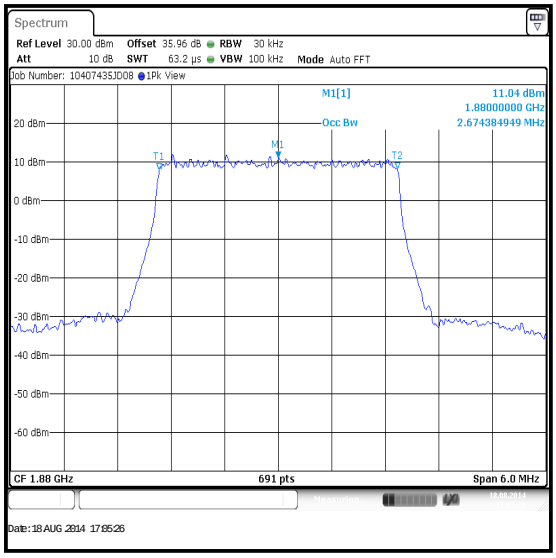


QPSK / 8 Resource Blocks (4 Offset)

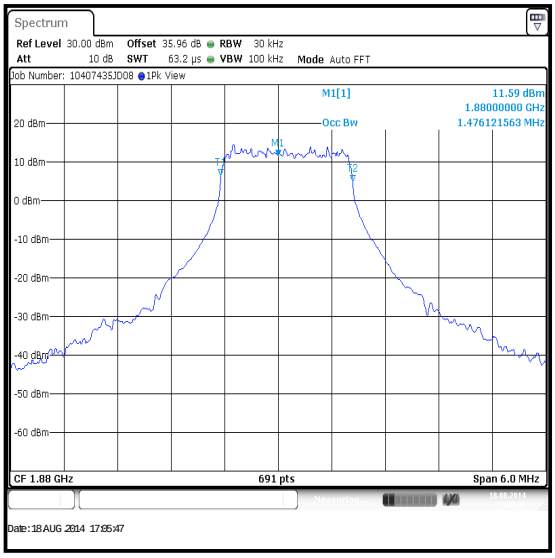
Transmitter Occupied Bandwidth (continued)

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

Frequency (MHz)	Resource Blocks	Resource Block Offset	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
1880.0	15	0	30	100	2.674
1880.0	8	4	30	100	1.476



16QAM / 15 Resource Blocks (0 Offset)

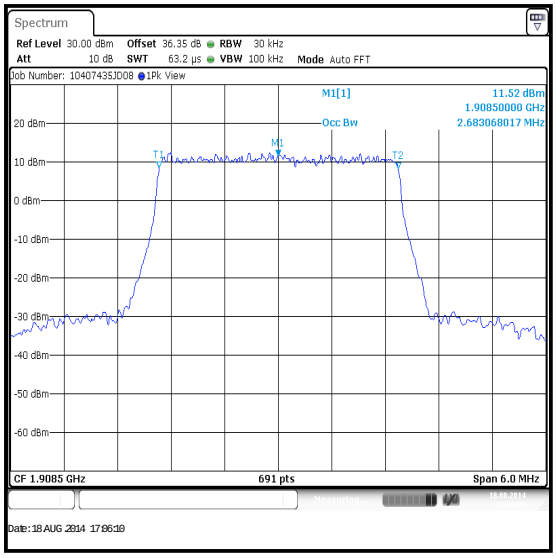


16QAM / 8 Resource Blocks (4 Offset)

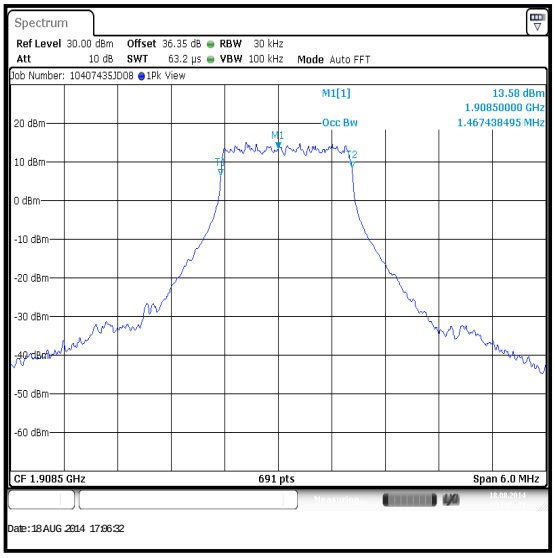
Transmitter Occupied Bandwidth (continued)

Results: 3 MHz Channel Bandwidth / Top Channel / QPSK

Frequency (MHz)	Resource Blocks	Resource Block Offset	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
1908.5	15	0	30	100	2.683
1908.5	8	4	30	100	1.467



QPSK / 15 Resource Blocks (0 Offset)

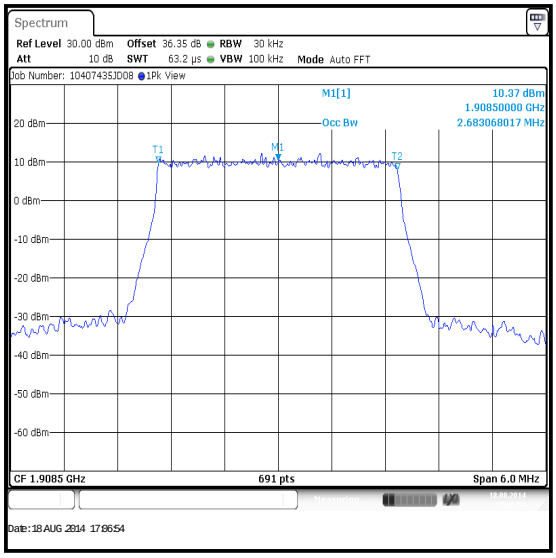


QPSK / 8 Resource Blocks (4 Offset)

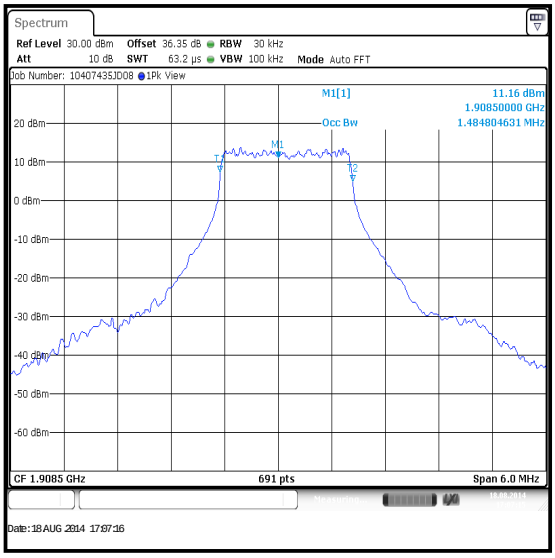
Transmitter Occupied Bandwidth (continued)

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

Frequency (MHz)	Resource Blocks	Resource Block Offset	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
1908.5	15	0	30	100	2.683
1908.5	8	4	30	100	1.485



16QAM / 15 Resource Blocks (0 Offset)

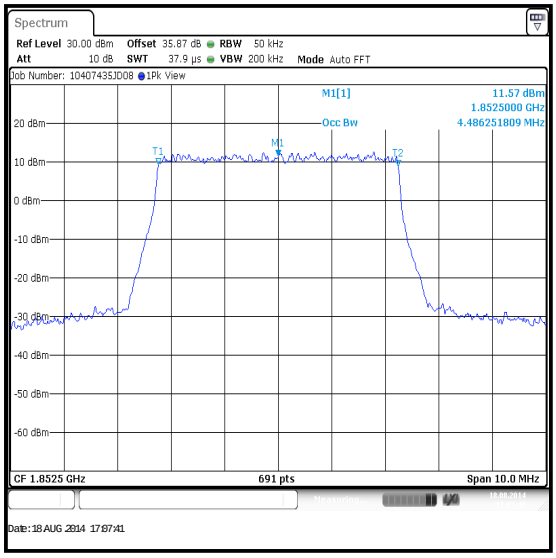


16QAM / 8 Resource Blocks (4 Offset)

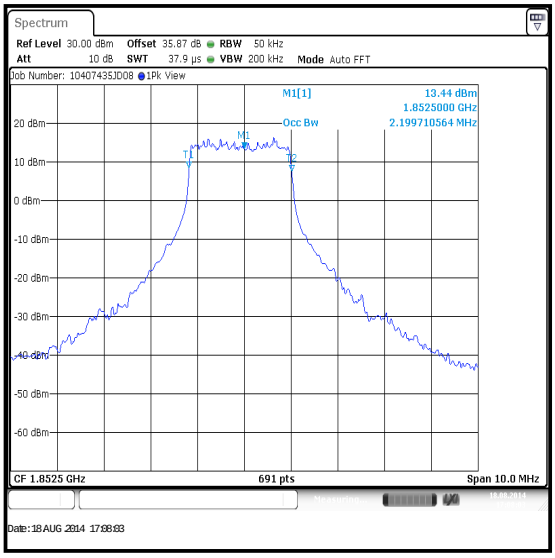
Transmitter Occupied Bandwidth (continued)

Results: 5 MHz Channel Bandwidth / Bottom Channel / QPSK

Frequency (MHz)	Resource Blocks	Resource Block Offset	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
1852.5	25	0	50	200	4.486
1852.5	12	6	50	200	2.200



QPSK / 25 Resource Blocks (0 Offset)

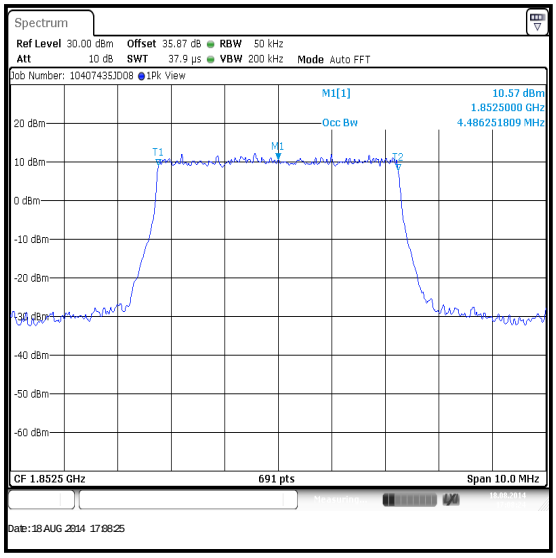


QPSK / 12 Resource Blocks (6 Offset)

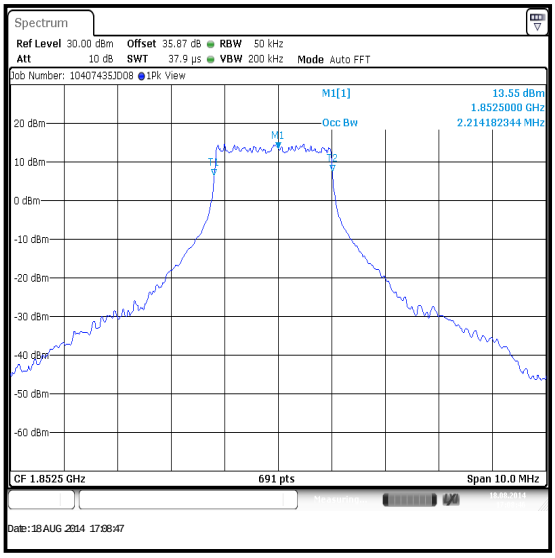
Transmitter Occupied Bandwidth (continued)

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

Frequency (MHz)	Resource Blocks	Resource Block Offset	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
1852.5	25	0	50	200	4.486
1852.5	12	6	50	200	2.214



16QAM / 25 Resource Blocks (0 Offset)

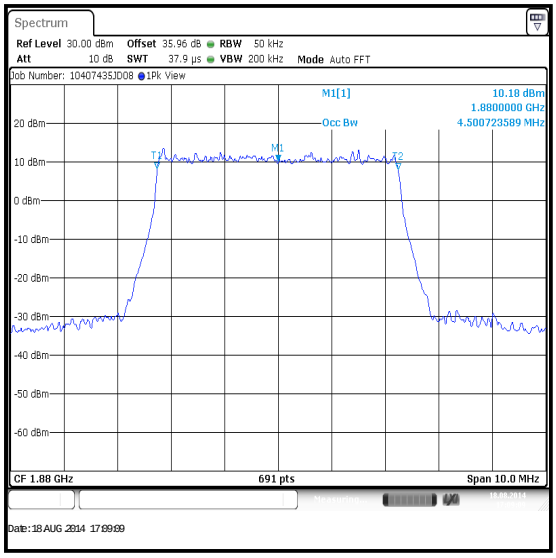


16QAM / 12 Resource Blocks (6 Offset)

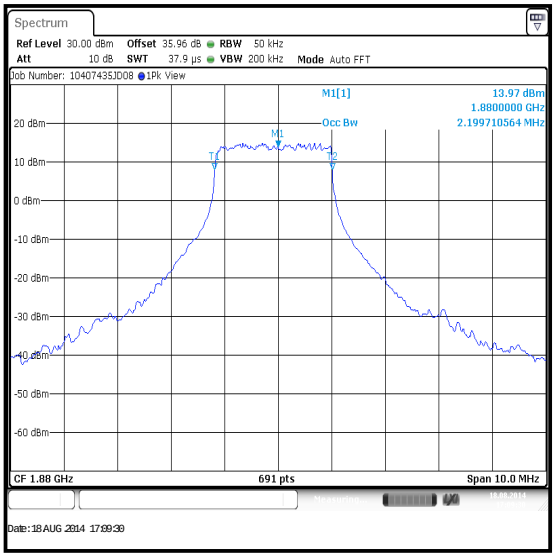
Transmitter Occupied Bandwidth (continued)

Results: 5 MHz Channel Bandwidth / Middle Channel / QPSK

Frequency (MHz)	Resource Blocks	Resource Block Offset	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
1880.0	25	0	50	200	4.501
1880.0	12	6	50	200	2.200



QPSK / 25 Resource Blocks (0 Offset)

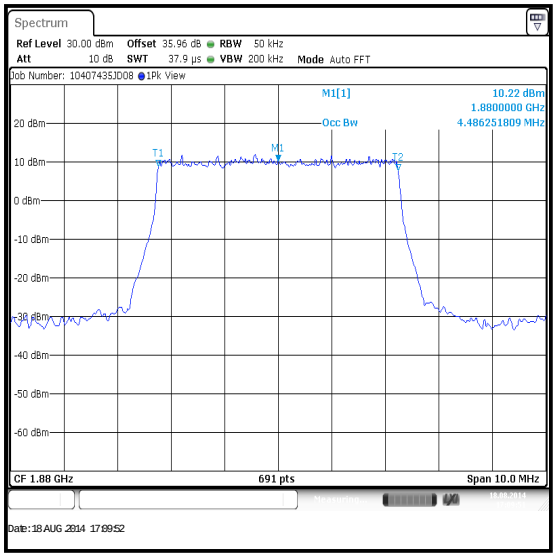


QPSK / 12 Resource Blocks (6 Offset)

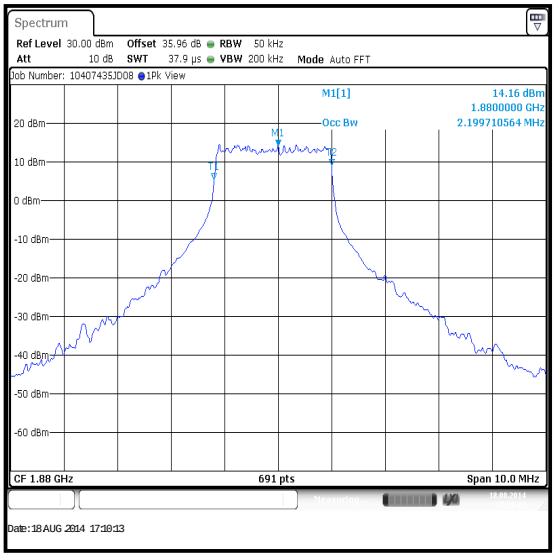
Transmitter Occupied Bandwidth (continued)

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

Frequency (MHz)	Resource Blocks	Resource Block Offset	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
1880.0	25	0	50	200	4.486
1880.0	12	6	50	200	2.200



16QAM / 25 Resource Blocks (0 Offset)

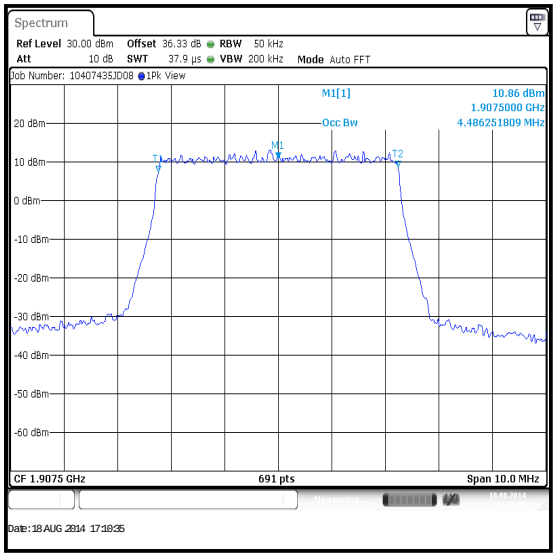


16QAM / 12 Resource Blocks (6 Offset)

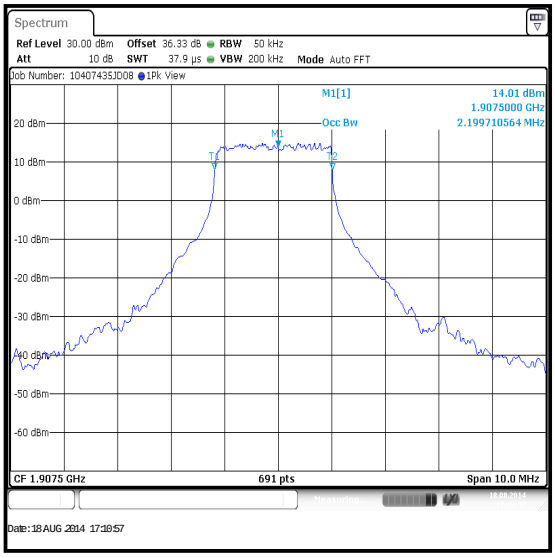
Transmitter Occupied Bandwidth (continued)

Results: 5 MHz Channel Bandwidth / Top Channel / QPSK

Frequency (MHz)	Resource Blocks	Resource Block Offset	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
1907.5	25	0	50	200	4.486
1907.5	12	6	50	200	2.200



QPSK / 25 Resource Blocks (0 Offset)

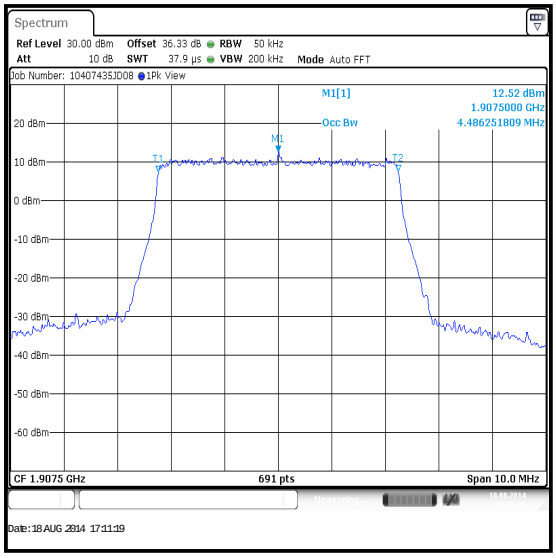


QPSK / 12 Resource Blocks (6 Offset)

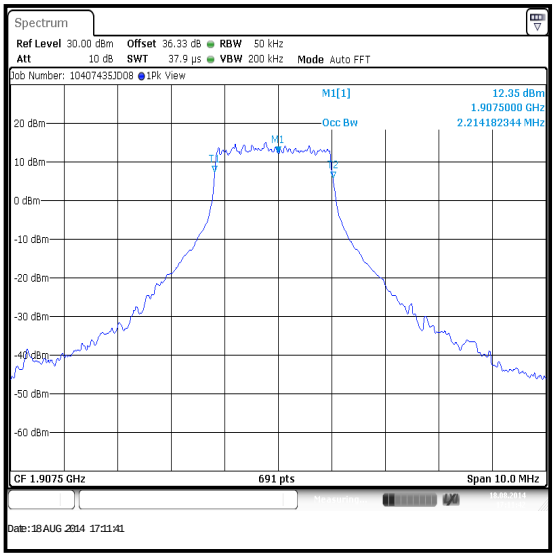
Transmitter Occupied Bandwidth (continued)

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

Frequency (MHz)	Resource Blocks	Resource Block Offset	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
1907.5	25	0	50	200	4.486
1907.5	12	6	50	200	2.214



16QAM / 25 Resource Blocks (0 Offset)

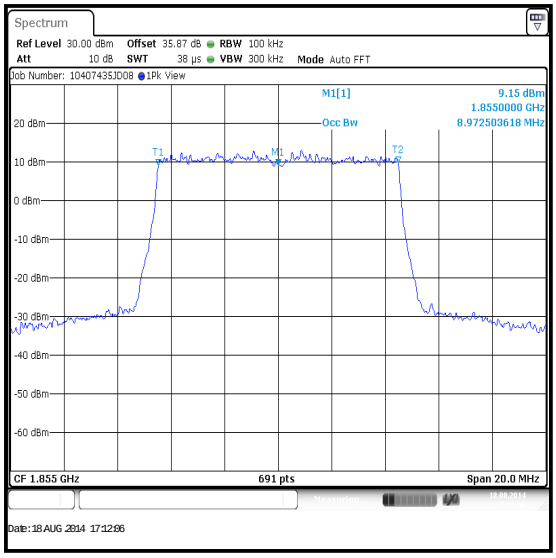


16QAM / 12 Resource Blocks (6 Offset)

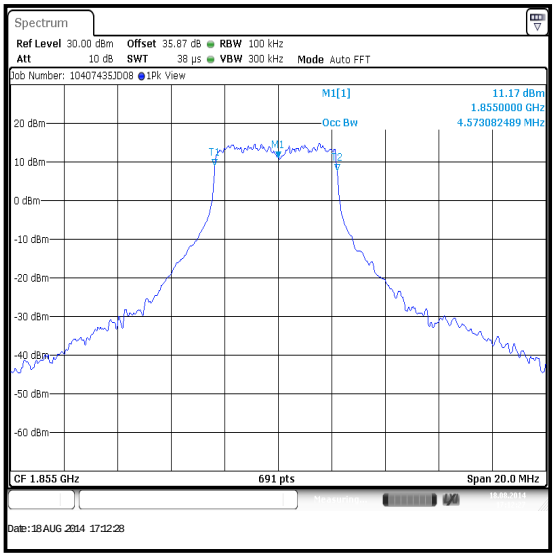
Transmitter Occupied Bandwidth (continued)

Results: 10 MHz Channel Bandwidth / Bottom Channel / QPSK

Frequency (MHz)	Resource Blocks	Resource Block Offset	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
1855.0	50	0	100	300	8.973
1855.0	25	12	100	300	4.573



QPSK / 50 Resource Blocks (0 Offset)

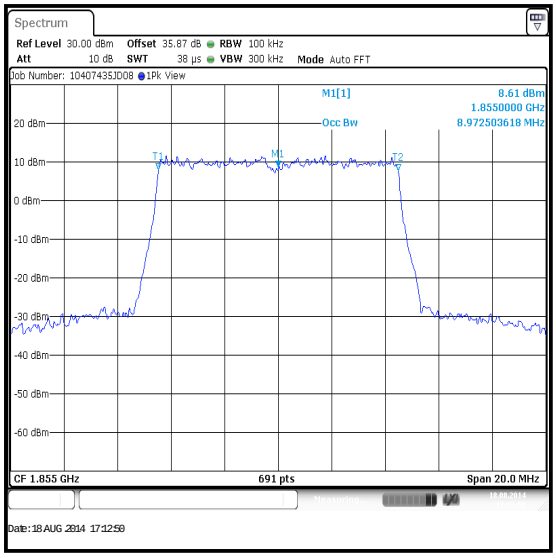


QPSK / 25 Resource Blocks (12 Offset)

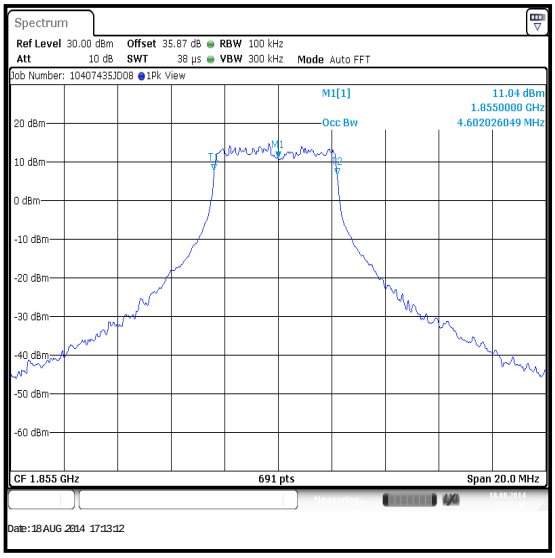
Transmitter Occupied Bandwidth (continued)

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

Frequency (MHz)	Resource Blocks	Resource Block Offset	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
1855.0	50	0	100	300	8.973
1855.0	25	12	100	300	4.602



16QAM / 50 Resource Blocks (0 Offset)

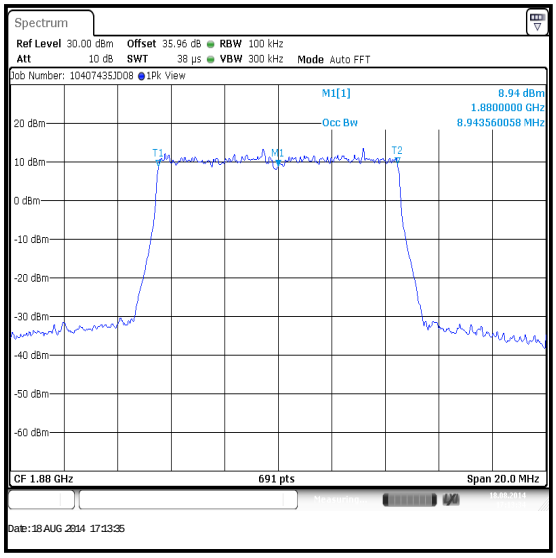


16QAM / 25 Resource Blocks (12 Offset)

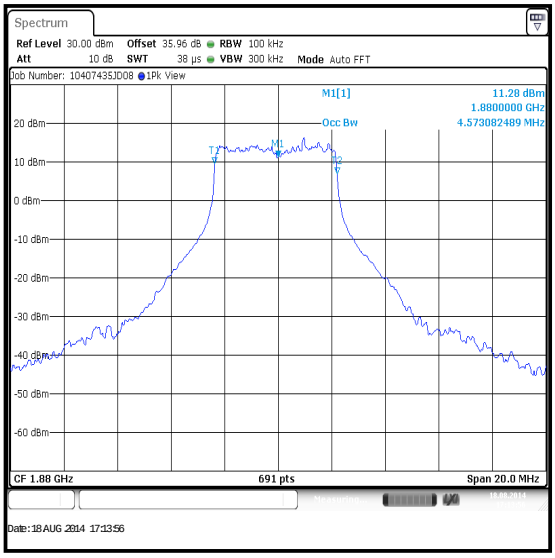
Transmitter Occupied Bandwidth (continued)

Results: 10 MHz Channel Bandwidth / Middle Channel / QPSK

Frequency (MHz)	Resource Blocks	Resource Block Offset	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
1880.0	50	0	100	300	8.944
1880.0	25	12	100	300	4.573



QPSK / 50 Resource Blocks (0 Offset)

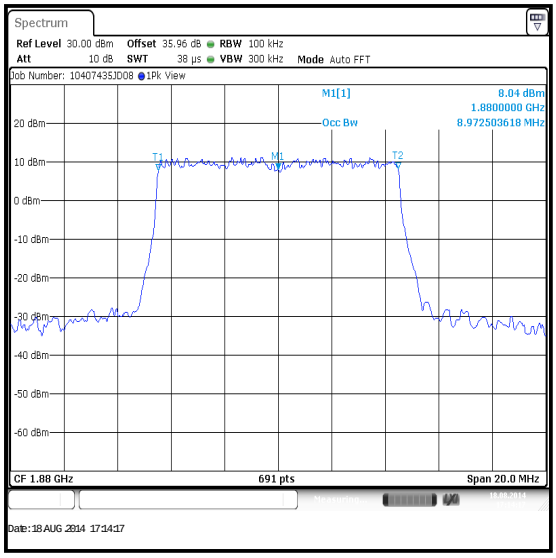


QPSK / 25 Resource Blocks (12 Offset)

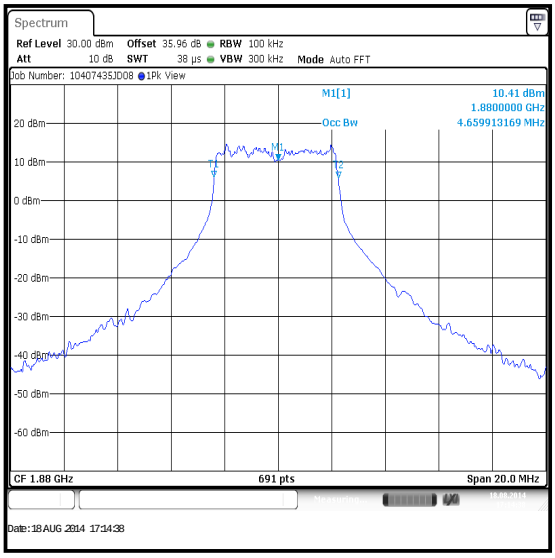
Transmitter Occupied Bandwidth (continued)

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

Frequency (MHz)	Resource Blocks	Resource Block Offset	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
1880.0	50	0	100	300	8.973
1880.0	25	12	100	300	4.660



16QAM / 50 Resource Blocks (0 Offset)

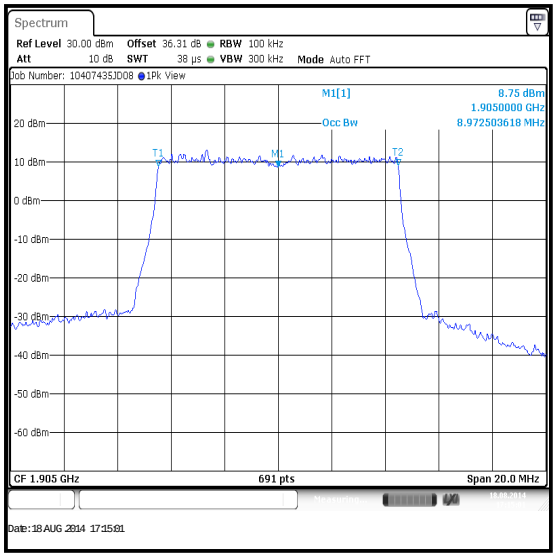


16QAM / 25 Resource Blocks (12 Offset)

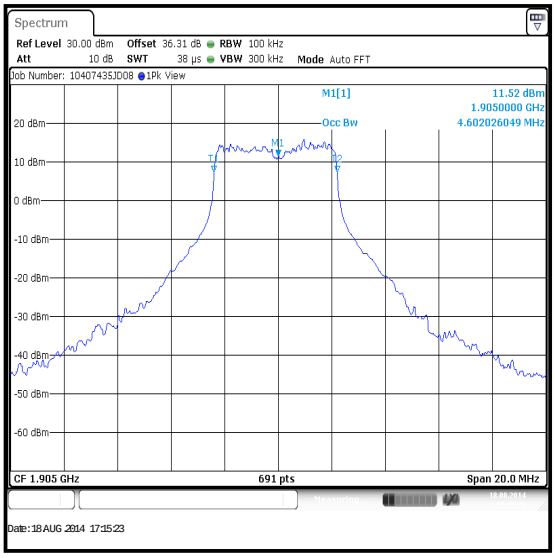
Transmitter Occupied Bandwidth (continued)

Results: 10 MHz Channel Bandwidth / Top Channel / QPSK

Frequency (MHz)	Resource Blocks	Resource Block Offset	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
1905.0	50	0	100	300	8.973
1905.0	25	12	100	300	4.602



QPSK / 50 Resource Blocks (0 Offset)

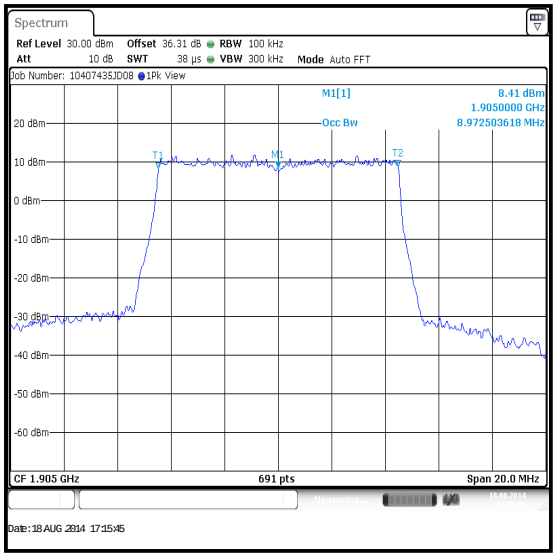


QPSK / 25 Resource Blocks (12 Offset)

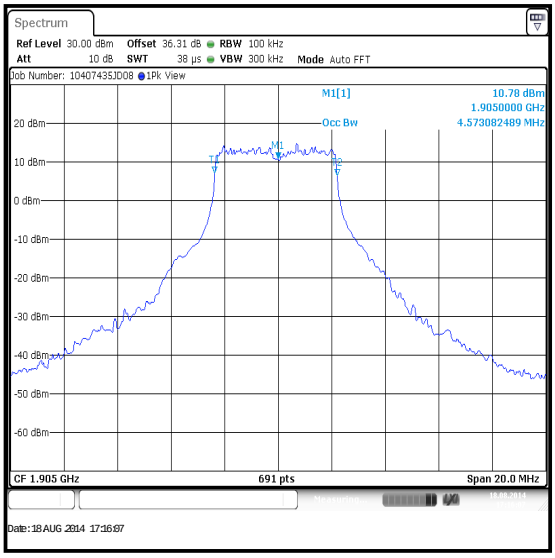
Transmitter Occupied Bandwidth (continued)

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

Frequency (MHz)	Resource Blocks	Resource Block Offset	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
1905.0	50	0	100	300	8.973
1905.0	25	12	100	300	4.573



16QAM / 50 Resource Blocks (0 Offset)

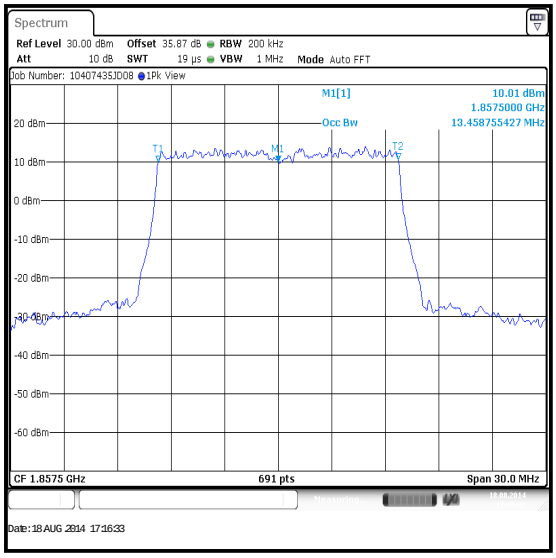


16QAM / 25 Resource Blocks (12 Offset)

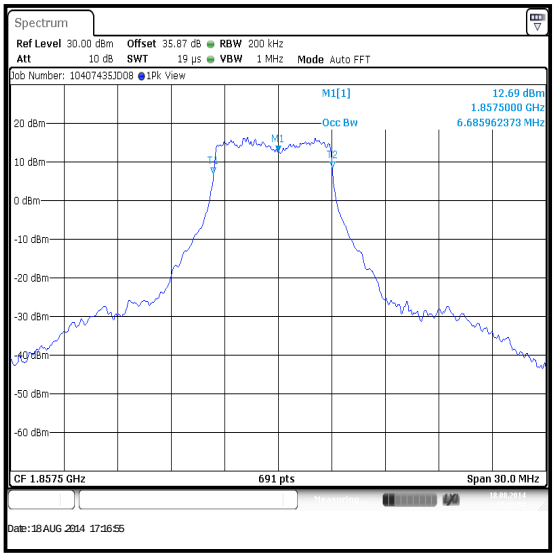
Transmitter Occupied Bandwidth (continued)

Results: 15 MHz Channel Bandwidth / Bottom Channel / QPSK

Frequency (MHz)	Resource Blocks	Resource Block Offset	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
1857.5	75	0	200	1000	13.459
1857.5	36	18	200	1000	6.686



QPSK / 75 Resource Blocks (0 Offset)

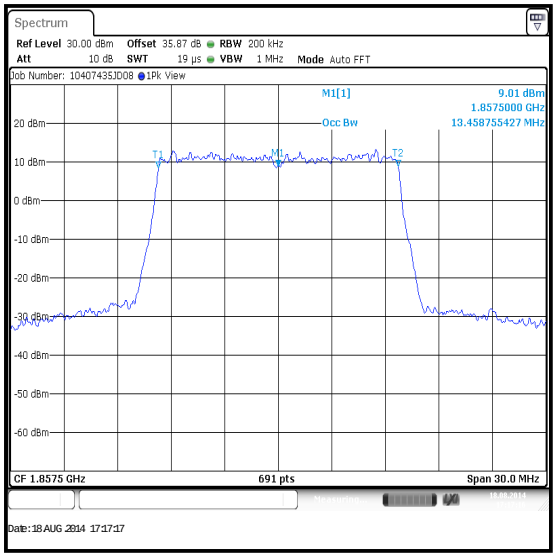


QPSK / 36 Resource Blocks (18 Offset)

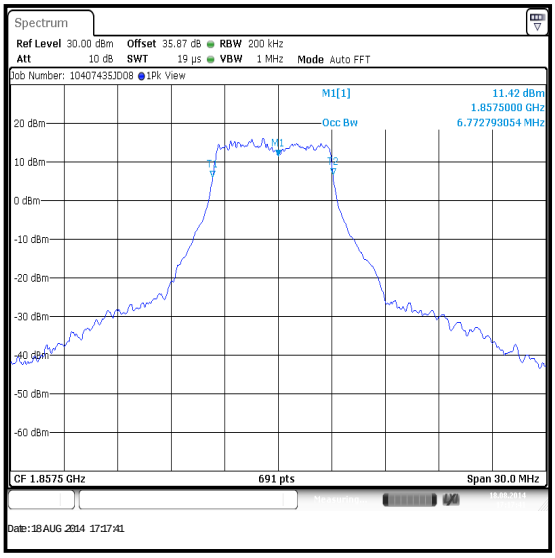
Transmitter Occupied Bandwidth (continued)

Results: 15 MHz Channel Bandwidth / Bottom Channel / 16QAM

Frequency (MHz)	Resource Blocks	Resource Block Offset	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
1857.5	75	0	200	1000	13.459
1857.5	36	18	200	1000	6.773



16QAM / 75 Resource Blocks (0 Offset)

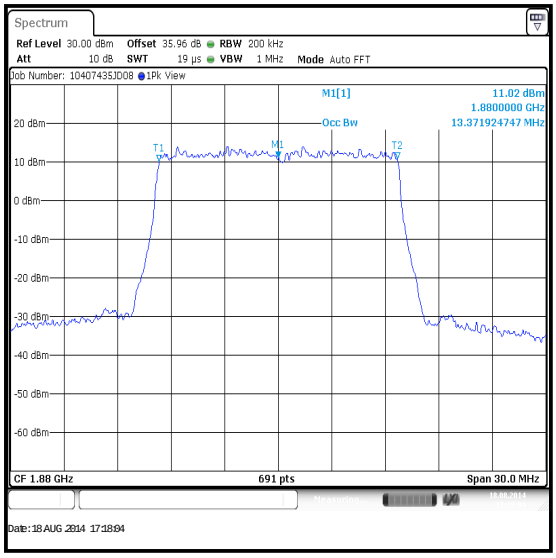


16QAM / 36 Resource Blocks (18 Offset)

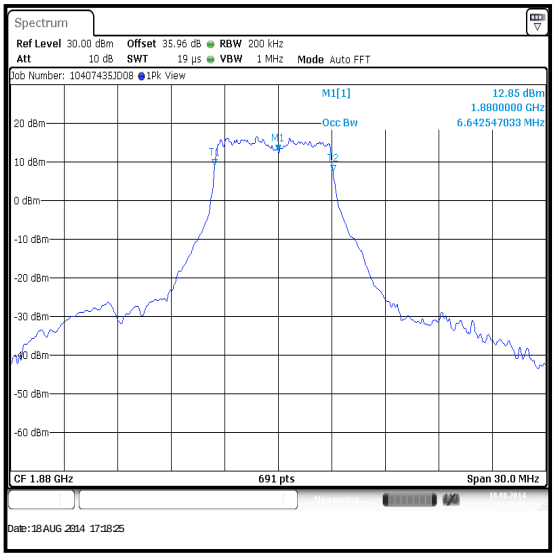
Transmitter Occupied Bandwidth (continued)

Results: 15 MHz Channel Bandwidth / Middle Channel / QPSK

Frequency (MHz)	Resource Blocks	Resource Block Offset	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
1880.0	75	0	200	1000	13.372
1880.0	36	18	200	1000	6.643



QPSK / 75 Resource Blocks (0 Offset)

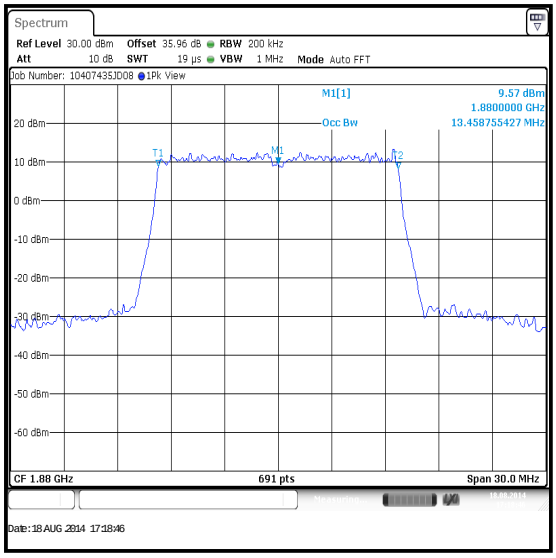


QPSK / 36 Resource Blocks (18 Offset)

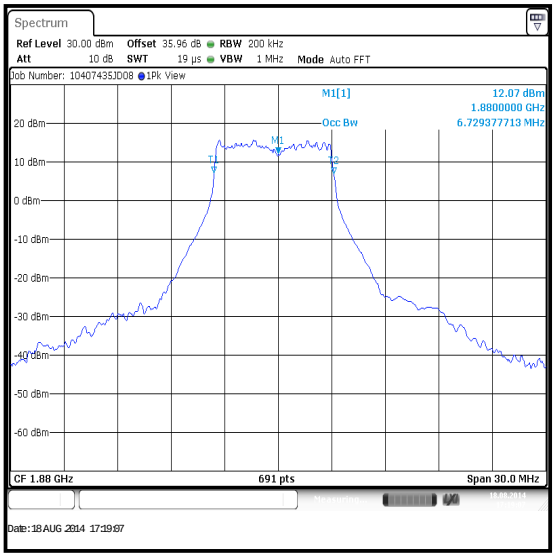
Transmitter Occupied Bandwidth (continued)

Results: 15 MHz Channel Bandwidth / Middle Channel / 16QAM

Frequency (MHz)	Resource Blocks	Resource Block Offset	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
1880.0	75	0	200	1000	13.459
1880.0	36	18	200	1000	6.729



16QAM / 75 Resource Blocks (0 Offset)

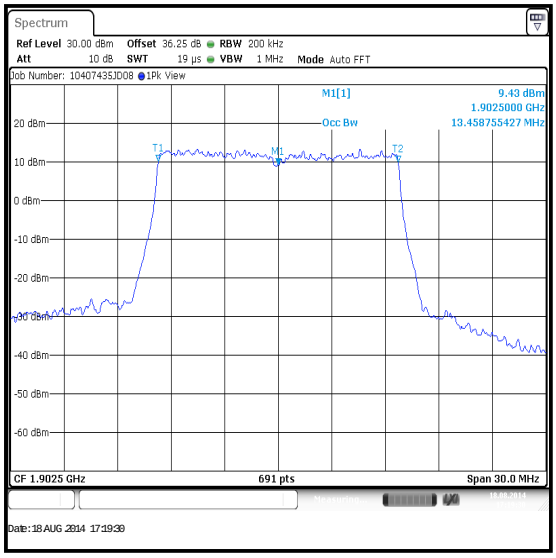


16QAM / 36 Resource Blocks (18 Offset)

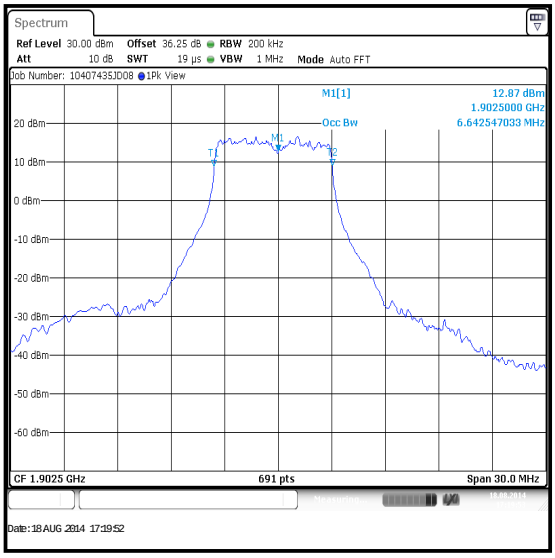
Transmitter Occupied Bandwidth (continued)

Results: 15 MHz Channel Bandwidth / Top Channel / QPSK

Frequency (MHz)	Resource Blocks	Resource Block Offset	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
1902.5	75	0	200	1000	13.459
1902.5	36	18	200	1000	6.643



QPSK / 75 Resource Blocks (0 Offset)

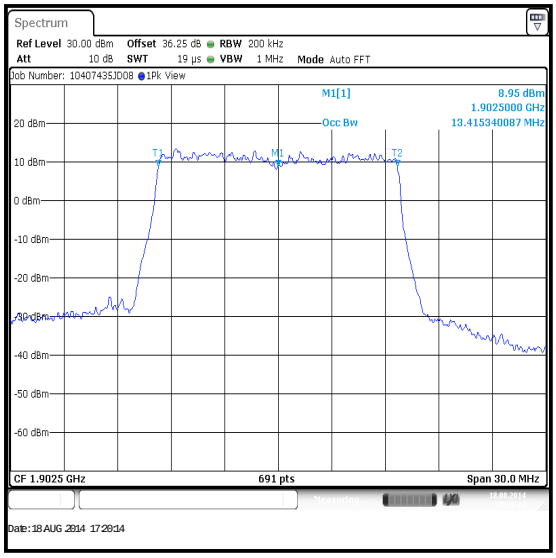


QPSK / 36 Resource Blocks (18 Offset)

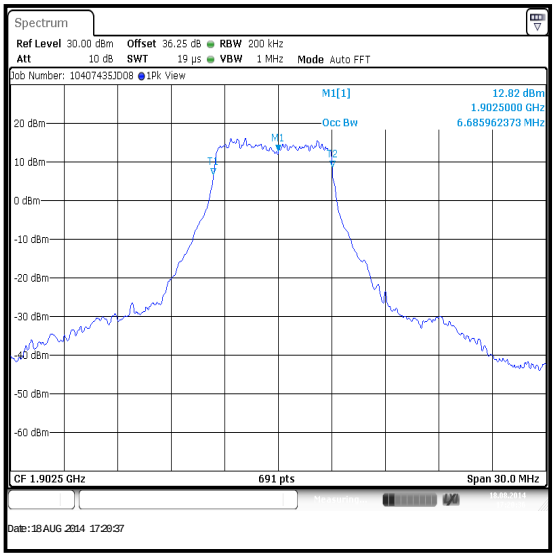
Transmitter Occupied Bandwidth (continued)

Results: 15 MHz Channel Bandwidth / Top Channel / 16QAM

Frequency (MHz)	Resource Blocks	Resource Block Offset	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
1902.5	75	0	200	1000	13.415
1902.5	36	18	200	1000	6.686



16QAM / 75 Resource Blocks (0 Offset)

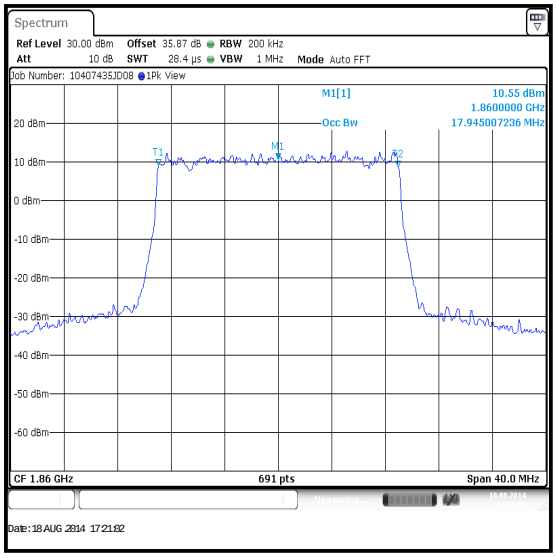


16QAM / 36 Resource Blocks (18 Offset)

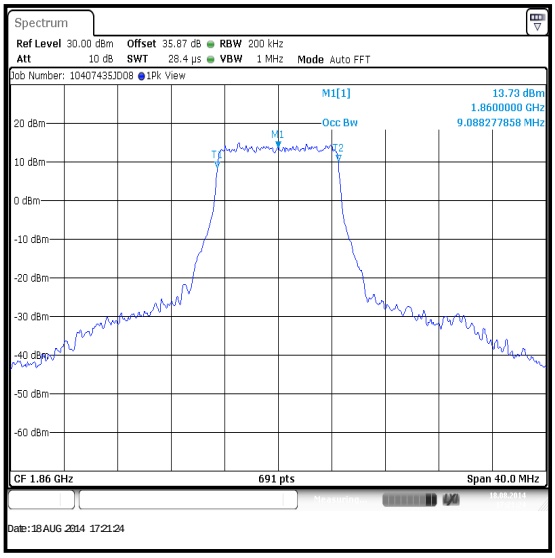
Transmitter Occupied Bandwidth (continued)

Results: 20 MHz Channel Bandwidth / Bottom Channel / QPSK

Frequency (MHz)	Resource Blocks	Resource Block Offset	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
1860.0	100	0	200	1000	17.945
1860.0	50	25	200	1000	9.088



QPSK / 100 Resource Blocks (0 Offset)

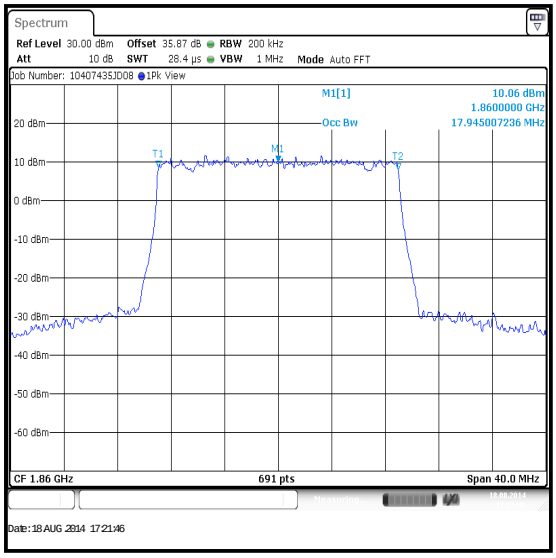


QPSK / 50 Resource Blocks (25 Offset)

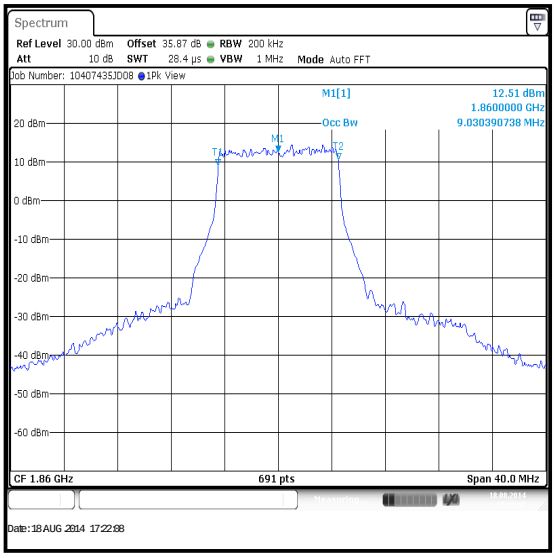
Transmitter Occupied Bandwidth (continued)

Results: 20 MHz Channel Bandwidth / Bottom Channel / 16QAM

Frequency (MHz)	Resource Blocks	Resource Block Offset	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
1860.0	100	0	200	1000	17.945
1860.0	50	25	200	1000	9.030



16QAM / 100 Resource Blocks (0 Offset)

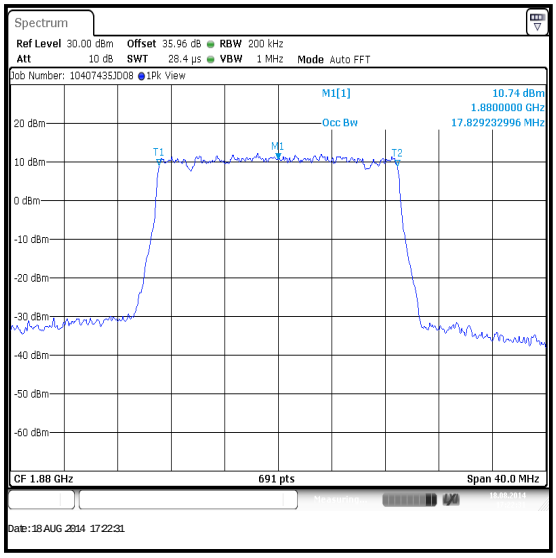


16QAM / 50 Resource Blocks (25 Offset)

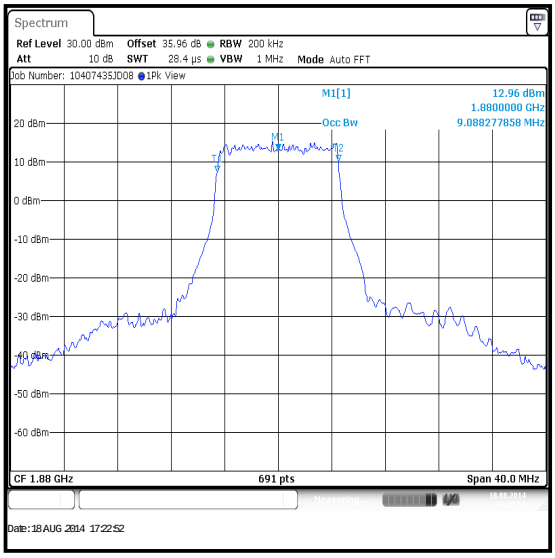
Transmitter Occupied Bandwidth (continued)

Results: 20 MHz Channel Bandwidth / Middle Channel / QPSK

Frequency (MHz)	Resource Blocks	Resource Block Offset	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
1880.0	100	0	200	1000	17.829
1880.0	50	25	200	1000	9.088



QPSK / 100 Resource Blocks (0 Offset)

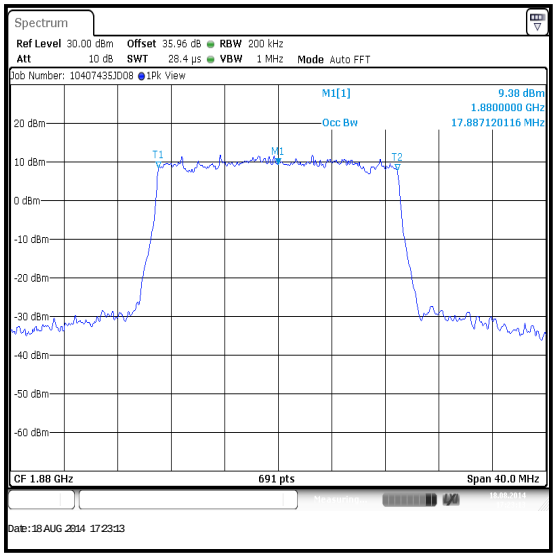


QPSK / 50 Resource Blocks (25 Offset)

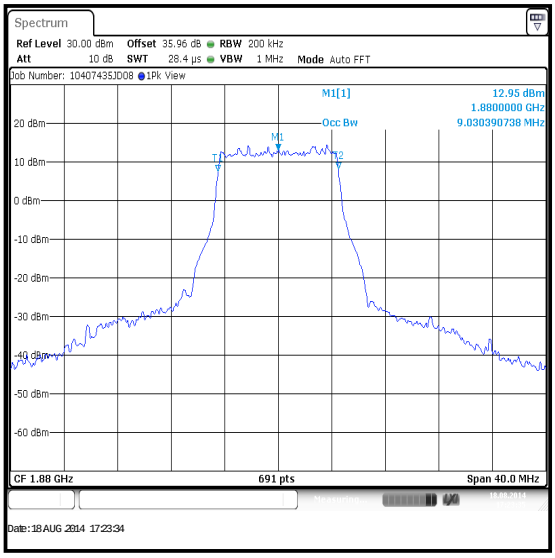
Transmitter Occupied Bandwidth (continued)

Results: 20 MHz Channel Bandwidth / Middle Channel / 16QAM

Frequency (MHz)	Resource Blocks	Resource Block Offset	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
1880.0	100	0	200	1000	17.887
1880.0	50	25	200	1000	9.030



16QAM / 100 Resource Blocks (0 Offset)

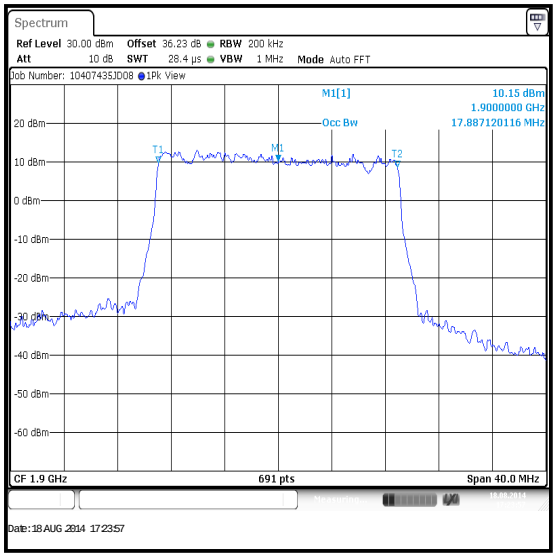


16QAM / 50 Resource Blocks (25 Offset)

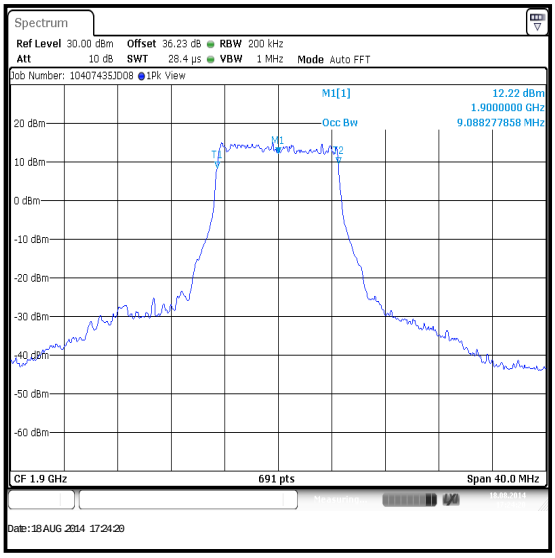
Transmitter Occupied Bandwidth (continued)

Results: 20 MHz Channel Bandwidth / Top Channel / QPSK

Frequency (MHz)	Resource Blocks	Resource Block Offset	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
1900.0	100	0	200	1000	17.887
1900.0	50	25	200	1000	9.088



QPSK / 100 Resource Blocks (0 Offset)

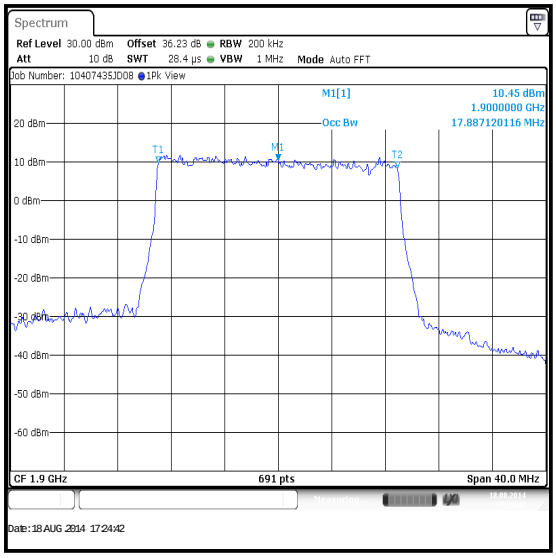


QPSK / 50 Resource Blocks (25 Offset)

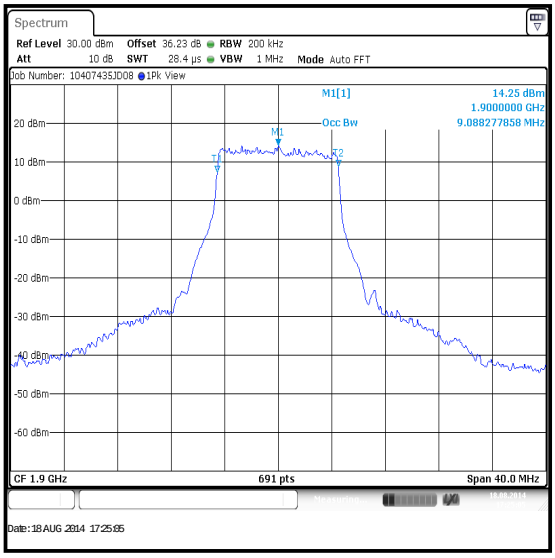
Transmitter Occupied Bandwidth (continued)

Results: 20 MHz Channel Bandwidth / Top Channel / 16QAM

Frequency (MHz)	Resource Blocks	Resource Block Offset	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
1900.0	100	0	200	1000	17.887
1900.0	50	25	200	1000	9.088



16QAM / 100 Resource Blocks (0 Offset)



16QAM / 50 Resource Blocks (25 Offset)

Test Equipment Used:

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M1658	Thermohygrometer	JM Handelspunkt	30.5015.13	None stated	14 Mar 2015	12
M1835	Signal Analyser	Rohde & Schwarz	FSV30	103050	26 Mar 2015	12
S0558	DC Power Supply	TTi	EL303R	395825	Calibrated before use	-
M122	Multimeter	Fluke	77	64910017	24 Apr 2015	12
A2535	Directional Coupler	AtlanTec RF	CDC-003060-20	14041701719	Calibrated before use	-
A2504	Directional Coupler	AtlanTec RF	CDC-003060-10	13122501839	Calibrated before use	-
A2508	Attenuator	AtlanTec RF	AN18-10	821846#3	Calibrated before use	-

5.2.4. Transmitter Out of Band Radiated Emissions

Test Summary:

Test Engineer:	David Doyle	**Test Dates:**	19 August 2014 & 21 August 2014
Test Sample IMEI:	352025060511608		

FCC Reference:	Parts 2.1053 & 24.238(a)
Test Method Used:	As detailed in KDB 971168 Section 6.1 & FCC Part 24.238
Frequency Range:	30 MHz to 20 GHz
Configuration:	3 MHz, QPSK, 1RB, 0 Offset

Environmental Conditions:

Temperature (℃):	20 to 23
Relative Humidity (%):	30 to 38

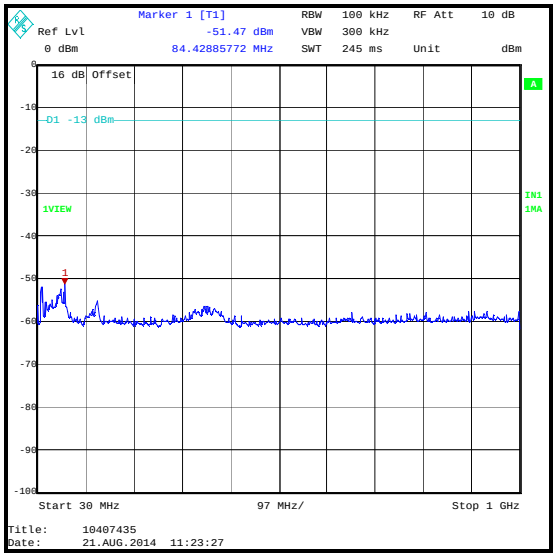
Note(s):

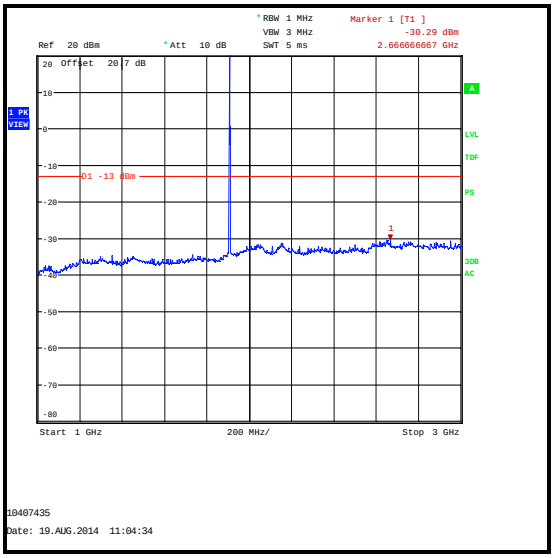
1. The EUT was set to transmit with a 3 MHz channel bandwidth with QPSK modulation applied and 1 resource block with 0 offset. This was found to be the worst case modulation scheme with regards to emissions after preliminary investigations and, as this mode emits the highest transmit output power level, it was deemed to be the worst case.
2. The emission seen on the 1 GHz to 3 GHz plot at approximately 1908.5 MHz is the EUT carrier.
3. All emissions shown on the pre-scan plots were investigated. Final measurements were made using appropriate RF filters and attenuators where required. All emissions shown on the pre-scan plots were found to be below the measurement system noise floor or ambient, 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.

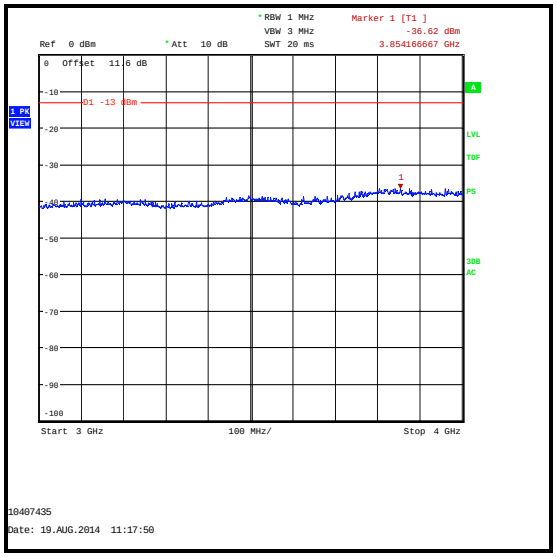
Transmitter Out of Band Radiated Emissions (continued)

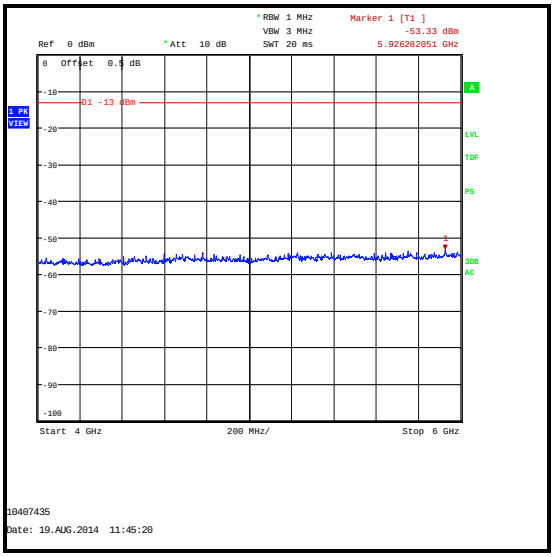
Results: Top Channel

Frequency (MHz)	Peak Level (dBm)	Limit (dBm)	Margin (dB)	Result
2666.667	-30.3	-13.0	17.3	Complied

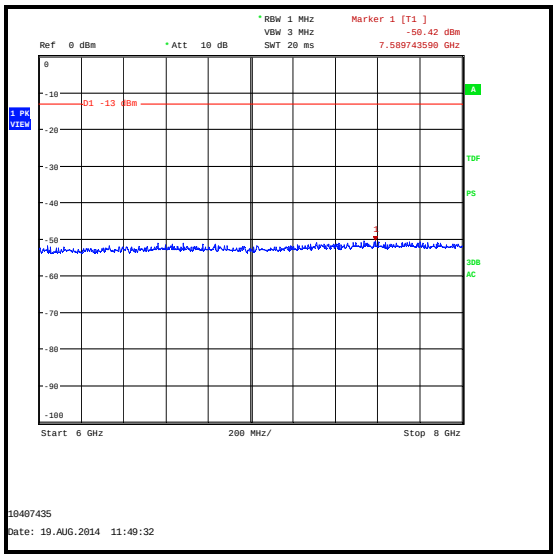


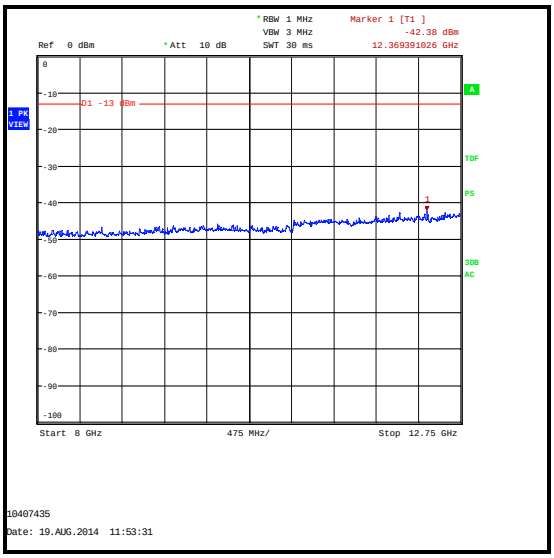


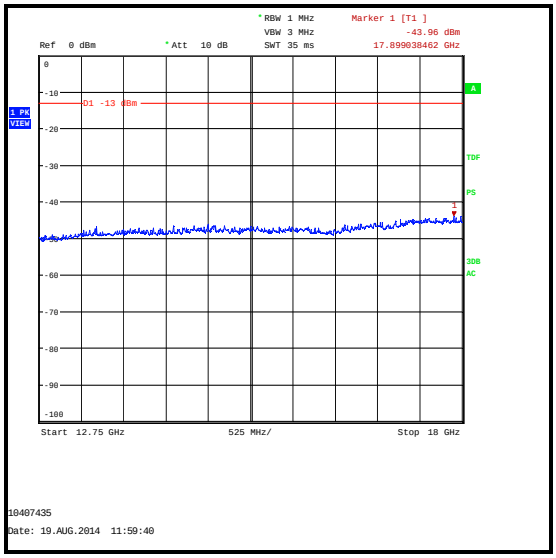


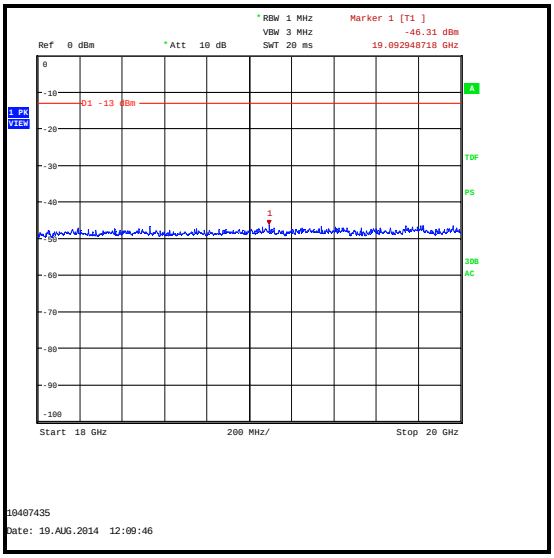


Transmitter Out of Band Radiated Emissions (continued)









Transmitter Out of Band Radiated Emissions (continued)

Test Equipment Used:

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M1622	Thermohygrometer	JM Handelspunkt	30.5015.06	Not stated	31 Dec 2014	12
K0001	5m RSE Chamber	Rainford EMC	N/A	N/A	26 Nov 2014	12
M1273	Test Receiver	Rohde & Schwarz	ESIB26	100275	15 Feb 2015	12
G0543	Amplifier	Sonoma	310N	230801	19 Aug 2014	3
A490	Antenna	Chase	CBL6111A	1590	29 Apr 2015	12
A1834	Attenuator	Hewlett Packard	8491B	10444	15 Nov 2014	12
M1656	Thermohygrometer	JM Handelspunkt	30.5015.13	Not 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
A1534	Pre Amplifier	Hewlett Packard	8449B	3008A00405	18 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
A256	Antenna	Flann Microwave	18240-20	400	14 Nov 2014	12
A436	Antenna	Flann Microwave	20240-20	330	14 Nov 2014	12
A1393	Attenuator	Huber & Suhner	6820.17.B	757456	02 May 2015	12
A1396	Attenuator	Huber & Suhner	6810.17.B	757987	02 May 2015	12
A1975	High Pass Filter	AtlanTecRF	AFH-03000	090424010	12 Apr 2015	12

5.2.5. Transmitter Radiated Emissions at Band Edges

Test Summary:

Test Engineers:	Andrew Edwards & Nick Steele	**Test Dates:**	12 August 2014 & 12 September 2014
Test Sample IMEI:	352025060511608		

FCC Reference:	Parts 2.1053 & 24.238(a)
Test Method Used:	As detailed in KDB 971168 Section 6.1 & FCC Part 24.238

Environmental Conditions:

Temperature (℃):	23 to 25
Relative Humidity (%):	43 to 46

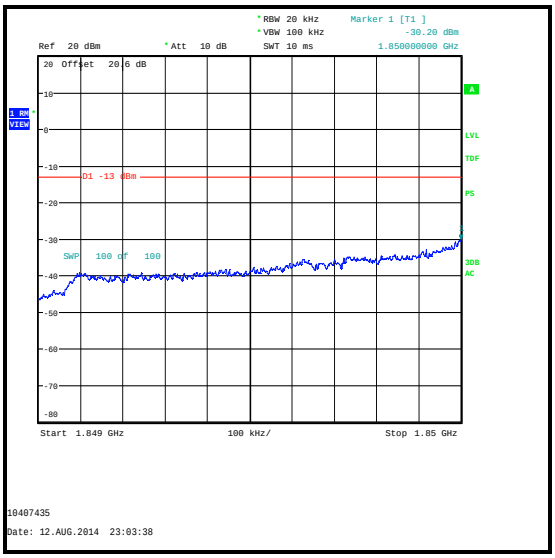
Note(s):

1. 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.
2. Measurements 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. The measurement antenna was placed at a fixed height of 1.5 metres above the test chamber floor in line with the EUT.
3. 1.4 MHz Channel bandwidth: In the first 1.0 MHz immediately outside and adjacent to the operating band, the test receiver resolution bandwidth was set to 20 kHz (>1% of 1.45 MHz, the widest 26 dB emission bandwidth) and video bandwidth 100 kHz (as close to > three times the resolution bandwidth as the test receiver allowed).
4. 3 MHz Channel bandwidth: In the first 1.0 MHz immediately outside and adjacent to the operating band, the test receiver resolution bandwidth was set to 30 kHz (1% of 3 MHz, the widest 26 dB emission bandwidth) and video bandwidth 100 kHz (as close to > three times the resolution bandwidth as the test receiver allowed).
5. 5 MHz Channel bandwidth: In the first 1.0 MHz immediately outside and adjacent to the operating band, the test receiver resolution bandwidth was set to 50 kHz (1% of 5 MHz, the widest 26 dB emission bandwidth) and video bandwidth 200 kHz (as close to > three times the resolution bandwidth as the test receiver allowed).
6. 10 MHz Channel bandwidth: In the first 1.0 MHz immediately outside and adjacent to the operating band, the test receiver resolution bandwidth was set to 100 kHz (>1% of 9.9 MHz, the widest 26 dB emission bandwidth) and video bandwidth 300 kHz (three times the resolution bandwidth).
7. 15 MHz Channel bandwidth: In the first 1.0 MHz immediately outside and adjacent to the operating band, the test receiver resolution bandwidth was set to 200 kHz (>1% of 14.9 MHz, the widest 26 dB emission bandwidth) and video bandwidth 1 MHz (as close to > three times the resolution bandwidth as the test receiver allowed).
8. 20 MHz Channel bandwidth: In the first 1.0 MHz immediately outside and adjacent to the operating band, the test receiver resolution bandwidth was set to 200 kHz (1% of 20 MHz, the widest 26 dB emission bandwidth) and video bandwidth 1 MHz (as close to > three times the resolution bandwidth as the test receiver allowed).

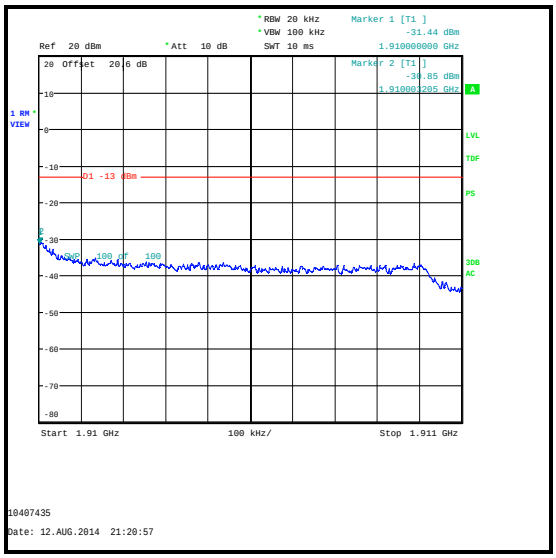
Transmitter Radiated Emissions at Band Edges (continued)

Results: 1.4 MHz Channel Bandwidth / QPSK

Frequency (MHz)	Resource Blocks	Resource Block Offset	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
1850	6	0	-30.2	-13.0	17.2	Complied
1910	6	0	-31.4	-13.0	18.4	Complied
1910.003	6	0	-30.9	-13.0	17.9	Complied



QPSK / Lower Band Edge

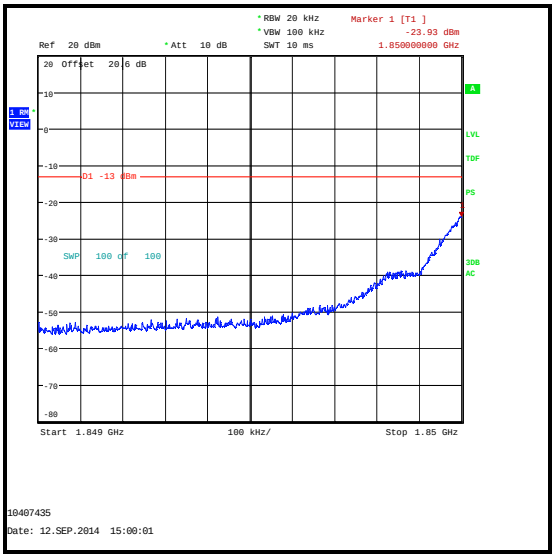


QPSK / Upper Band Edge

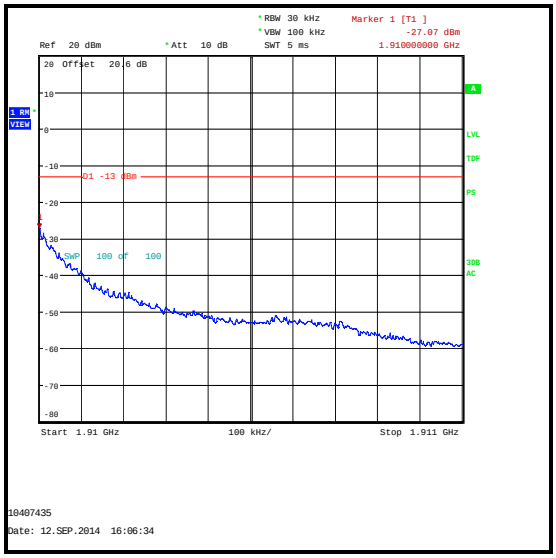
Transmitter Radiated Emissions at Band Edges (continued)

Results: 1.4 MHz Channel Bandwidth / QPSK

Frequency (MHz)	Resource Blocks	Resource Block Offset	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
1850	1	0	-23.9	-13.0	10.9	Complied
1910	1	5	-27.1	-13.0	14.1	Complied



QPSK / Lower Band Edge

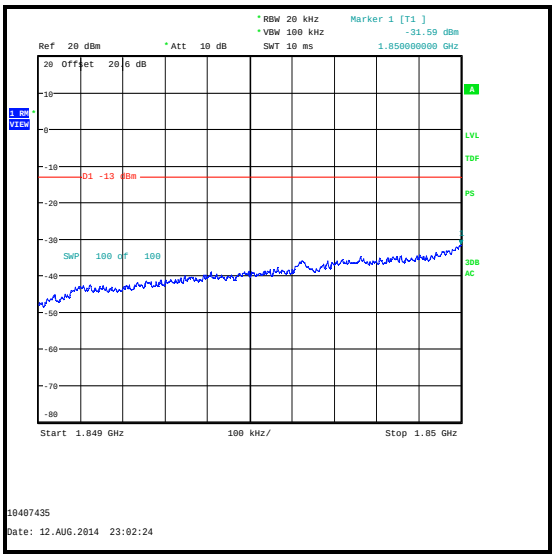


QPSK / Upper Band Edge

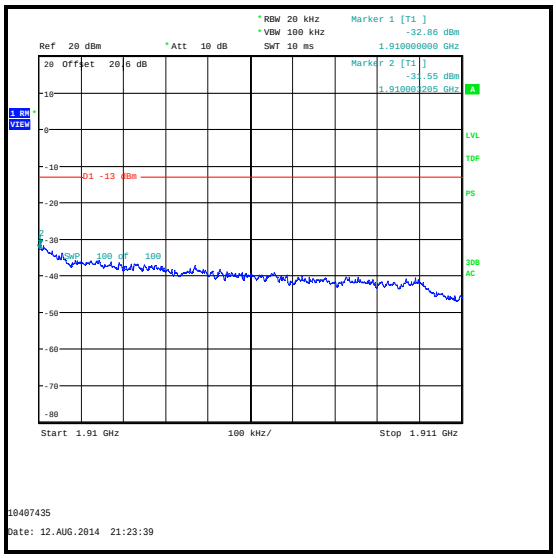
Transmitter Radiated Emissions at Band Edges (continued)

Results: 1.4 MHz Channel Bandwidth / 16QAM

Frequency (MHz)	Resource Blocks	Resource Block Offset	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
1850	6	0	-31.6	-13.0	18.6	Complied
1910	6	0	-32.9	-13.0	19.9	Complied
1910.003	6	0	-31.6	-13.0	18.6	Complied



16QAM / Lower Band Edge

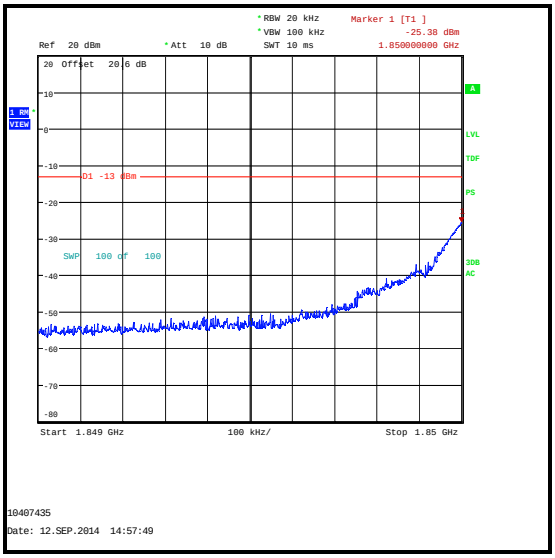


16QAM / Upper Band Edge

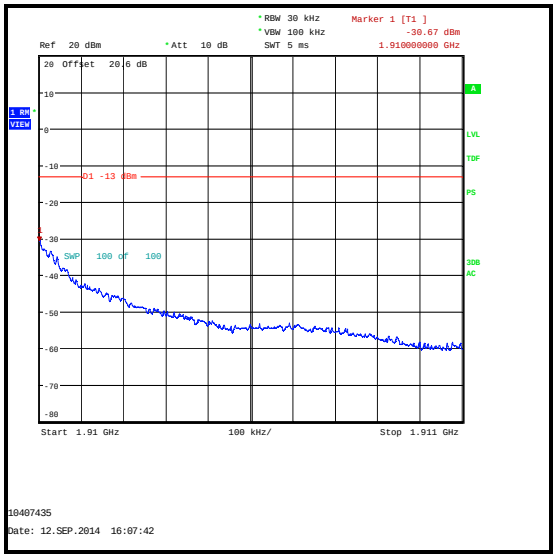
Transmitter Radiated Emissions at Band Edges (continued)

Results: 1.4 MHz Channel Bandwidth / 16QAM

Frequency (MHz)	Resource Blocks	Resource Block Offset	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
1850	1	0	-25.4	-13.0	12.4	Complied
1910	1	5	-30.7	-13.0	17.7	Complied



16QAM / Lower Band Edge

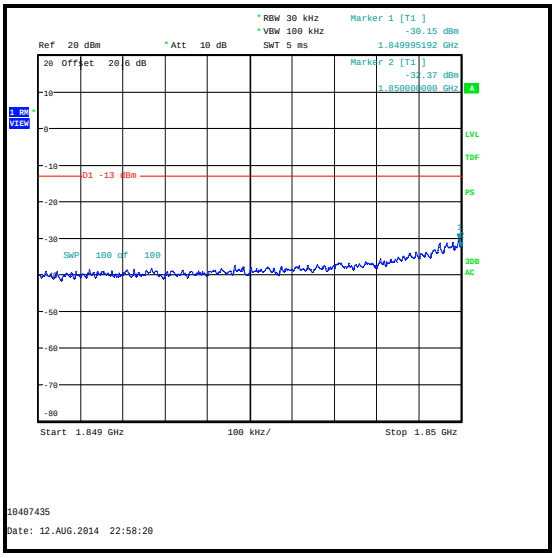


16QAM / Upper Band Edge

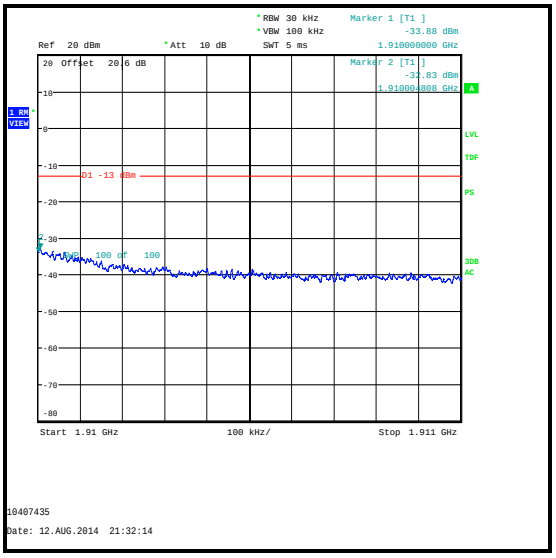
Transmitter Radiated Emissions at Band Edges (continued)

Results: 3 MHz Channel Bandwidth / QPSK

Frequency (MHz)	Resource Blocks	Resource Block Offset	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
1849.995	15	0	-30.2	-13.0	17.2	Complied
1850	15	0	-32.4	-13.0	19.4	Complied
1910	15	0	-33.9	-13.0	20.9	Complied
1910.005	15	0	-32.8	-13.0	19.8	Complied



QPSK / Lower Band Edge

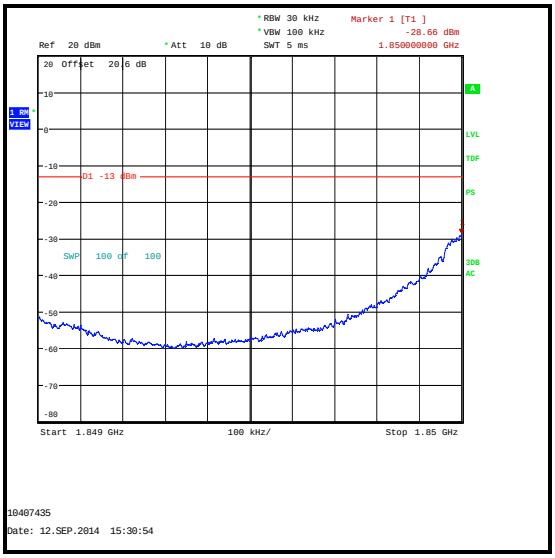


QPSK / Upper Band Edge

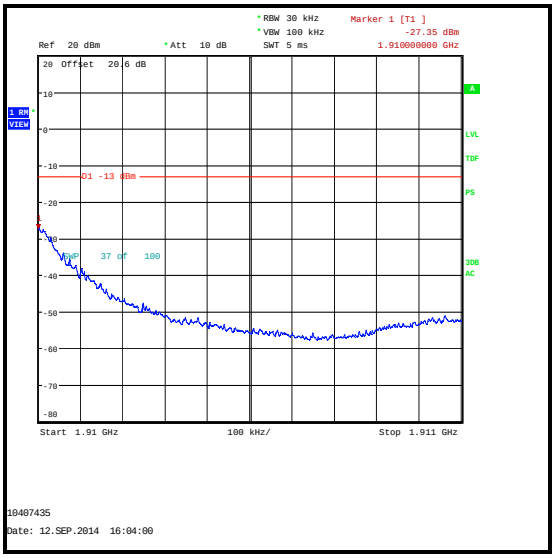
Transmitter Radiated Emissions at Band Edges (continued)

Results: 3 MHz Channel Bandwidth / QPSK

Frequency (MHz)	Resource Blocks	Resource Block Offset	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
1850	1	0	-28.7	-13.0	15.7	Complied
1910	1	14	-27.4	-13.0	14.4	Complied



QPSK / Lower Band Edge

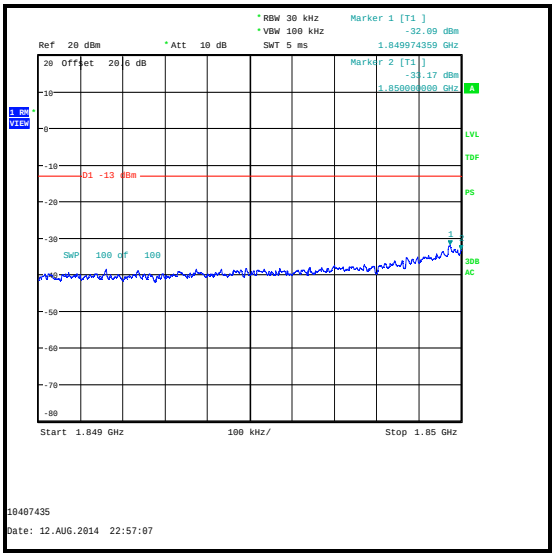


QPSK / Upper Band Edge

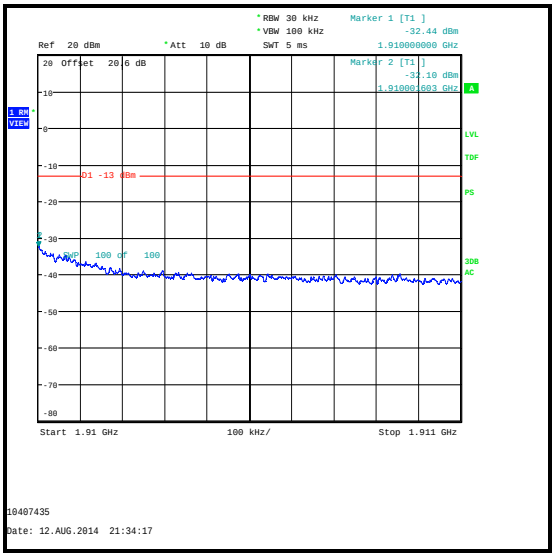
Transmitter Radiated Emissions at Band Edges (continued)

Results: 3 MHz Channel Bandwidth / 16QAM

Frequency (MHz)	Resource Blocks	Resource Block Offset	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
1849.974	15	0	-32.1	-13.0	19.1	Complied
1850	15	0	-33.2	-13.0	20.2	Complied
1910	15	0	-32.4	-13.0	19.4	Complied
1910.002	15	0	-32.1	-13.0	19.1	Complied



16QAM / Lower Band Edge

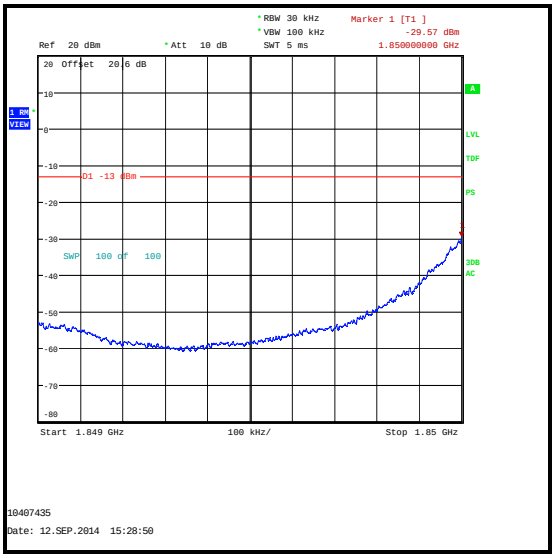


16QAM / Upper Band Edge

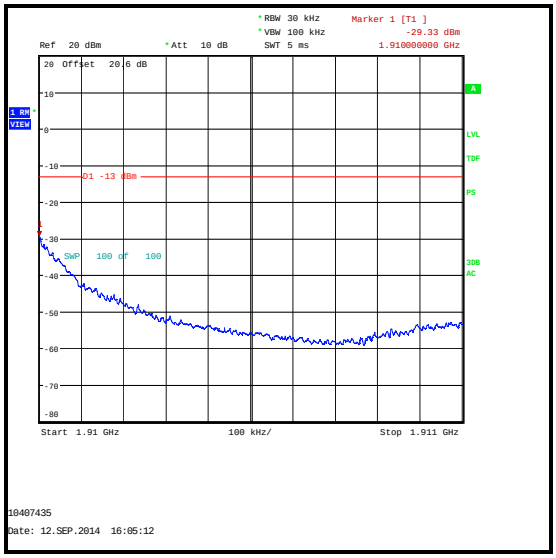
Transmitter Radiated Emissions at Band Edges (continued)

Results: 3 MHz Channel Bandwidth / 16QAM

Frequency (MHz)	Resource Blocks	Resource Block Offset	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
1850	1	0	-29.6	-13.0	16.6	Complied
1910	1	14	-29.3	-13.0	16.3	Complied



16QAM / Lower Band Edge

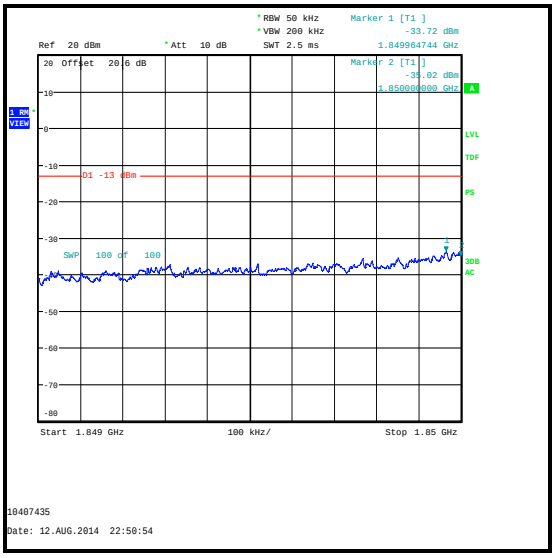


16QAM / Upper Band Edge

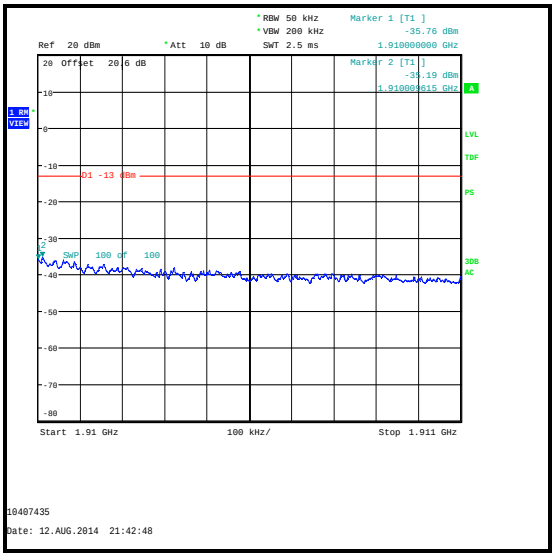
Transmitter Radiated Emissions at Band Edges (continued)

Results: 5 MHz Channel Bandwidth / QPSK

Frequency (MHz)	Resource Blocks	Resource Block Offset	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
1849.965	25	0	-33.7	-13.0	20.7	Complied
1850	25	0	-35.0	-13.0	22.0	Complied
1910	25	0	-35.8	-13.0	22.8	Complied
1910.010	25	0	-35.2	-13.0	22.2	Complied



QPSK / Lower Band Edge

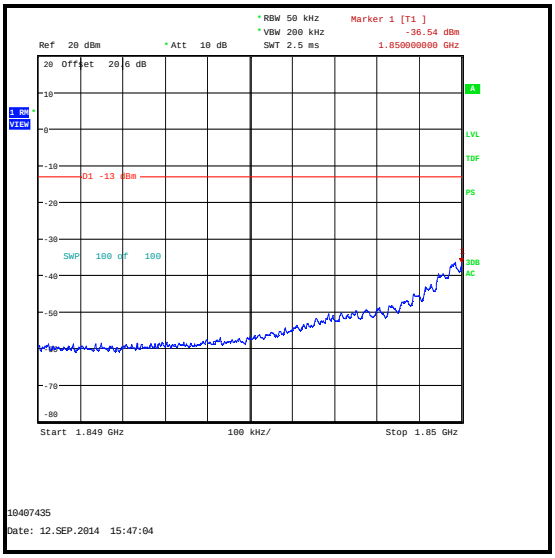


QPSK / Upper Band Edge

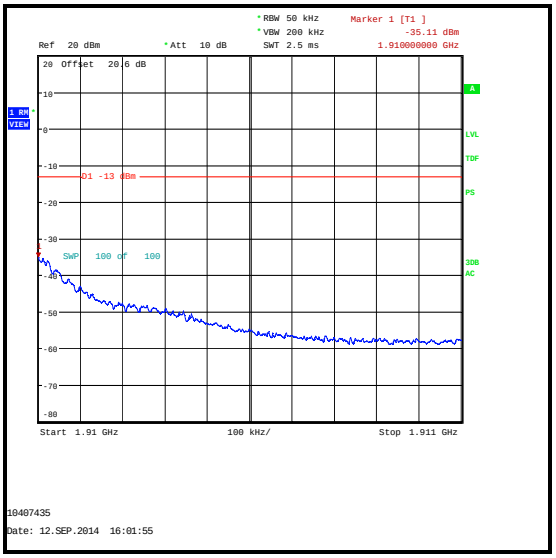
Transmitter Radiated Emissions at Band Edges (continued)

Results: 5 MHz Channel Bandwidth / QPSK

Frequency (MHz)	Resource Blocks	Resource Block Offset	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
1850	1	0	-36.5	-13.0	23.5	Complied
1910	1	24	-35.1	-13.0	22.1	Complied



QPSK / Lower Band Edge

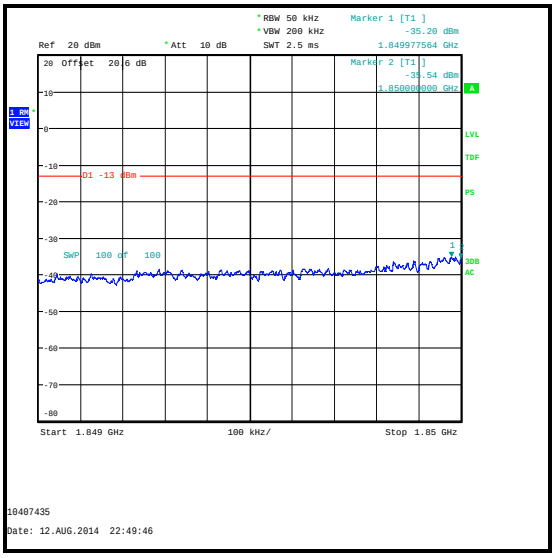


QPSK / Upper Band Edge

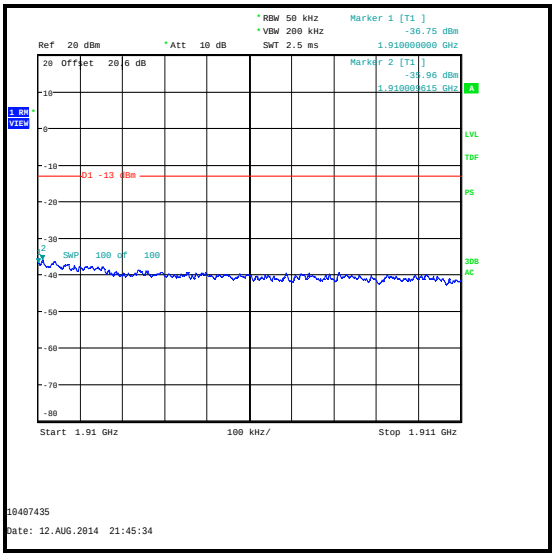
Transmitter Radiated Emissions at Band Edges (continued)

Results: 5 MHz Channel Bandwidth / 16QAM

Frequency (MHz)	Resource Blocks	Resource Block Offset	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
1849.978	25	0	-35.2	-13.0	22.2	Complied
1850	25	0	-35.5	-13.0	22.5	Complied
1910	25	0	-36.8	-13.0	23.8	Complied
1910.010	25	0	-36.0	-13.0	23.0	Complied



16QAM / Lower Band Edge

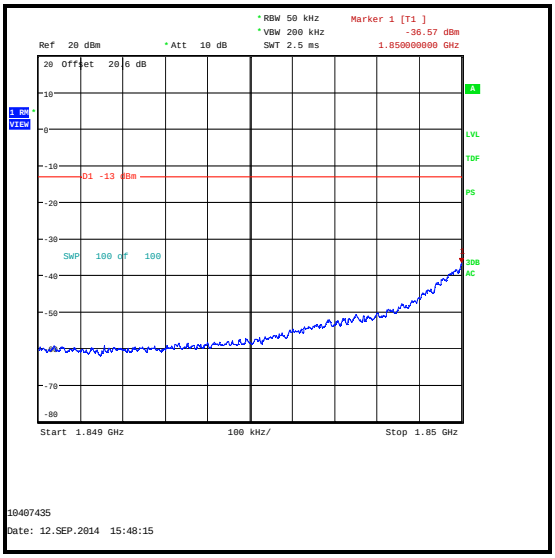


16QAM / Upper Band Edge

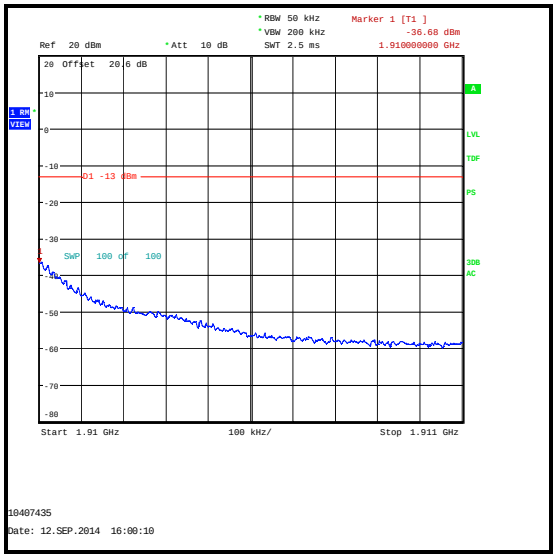
Transmitter Radiated Emissions at Band Edges (continued)

Results: 5 MHz Channel Bandwidth / 16QAM

Frequency (MHz)	Resource Blocks	Resource Block Offset	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
1850	1	0	-36.6	-13.0	23.6	Complied
1910	1	24	-36.7	-13.0	23.7	Complied



16QAM / Lower Band Edge

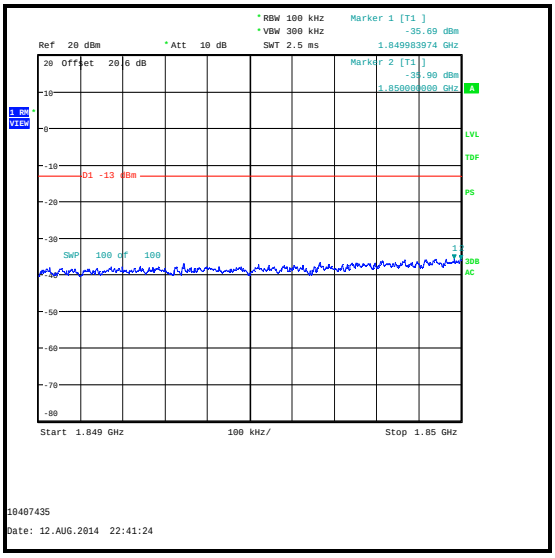


16QAM / Upper Band Edge

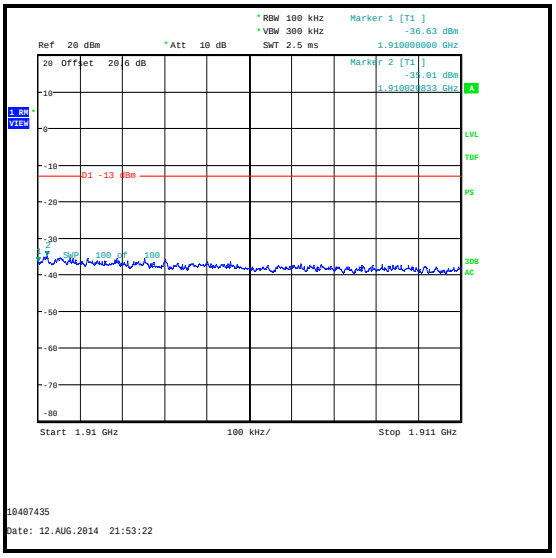
Transmitter Radiated Emissions at Band Edges (continued)

Results: 10 MHz Channel Bandwidth / QPSK

Frequency (MHz)	Resource Blocks	Resource Block Offset	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
1849.984	50	0	-35.7	-13.0	22.7	Complied
1850	50	0	-35.9	-13.0	22.9	Complied
1910	50	0	-36.6	-13.0	23.6	Complied
1910.021	50	0	-35.0	-13.0	22.0	Complied



QPSK / Lower Band Edge

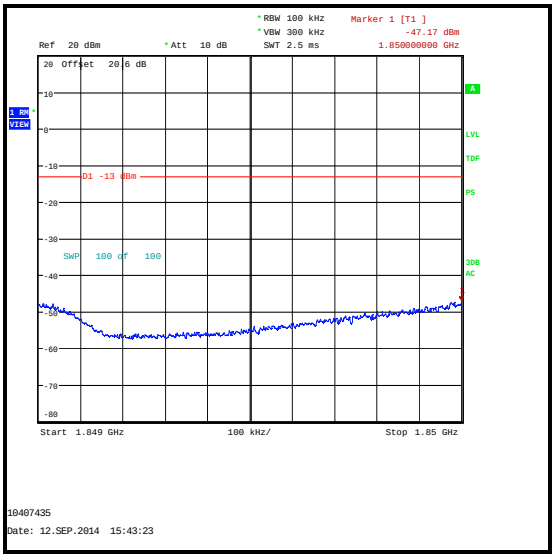


QPSK / Upper Band Edge

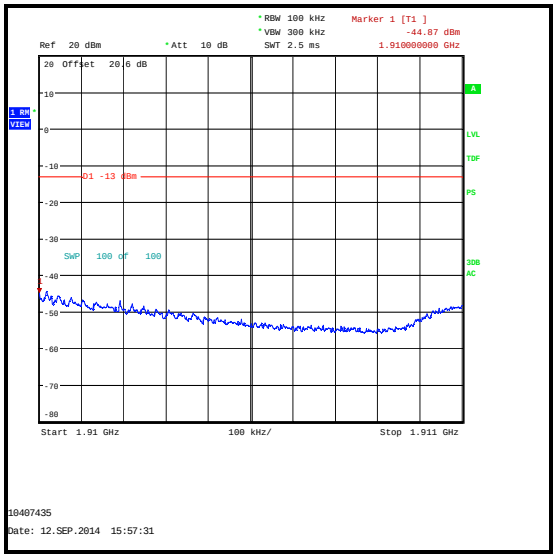
Transmitter Radiated Emissions at Band Edges (continued)

Results: 10 MHz Channel Bandwidth / QPSK

Frequency (MHz)	Resource Blocks	Resource Block Offset	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
1850	1	0	-47.2	-13.0	34.2	Complied
1910	1	49	-44.9	-13.0	31.9	Complied



QPSK / Lower Band Edge

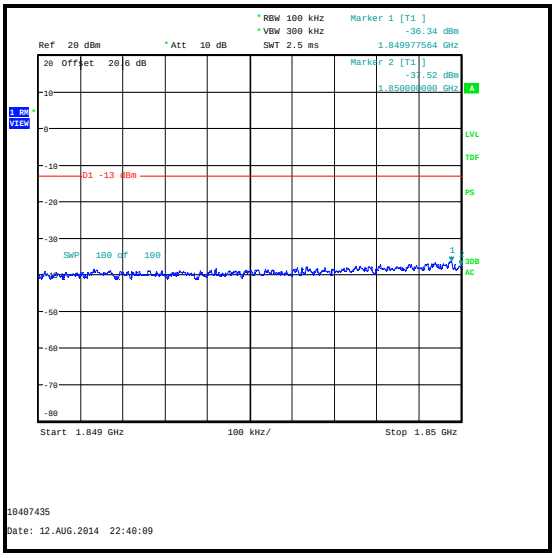


QPSK / Upper Band Edge

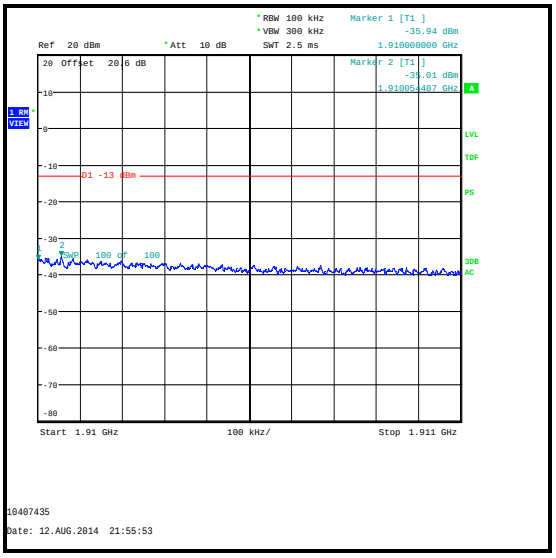
Transmitter Radiated Emissions at Band Edges (continued)

Results: 10 MHz Channel Bandwidth / 16QAM

Frequency (MHz)	Resource Blocks	Resource Block Offset	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
1849.978	50	0	-36.3	-13.0	23.3	Complied
1850	50	0	-37.5	-13.0	24.5	Complied
1910	50	0	-35.9	-13.0	22.9	Complied
1910.054	50	0	-35.0	-13.0	22.0	Complied



16QAM / Lower Band Edge

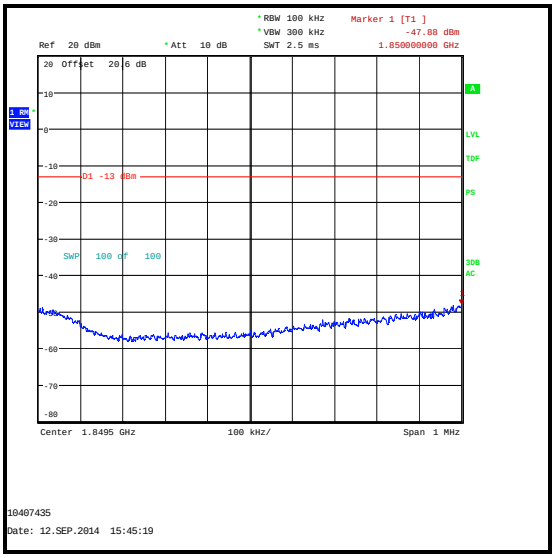


16QAM / Upper Band Edge

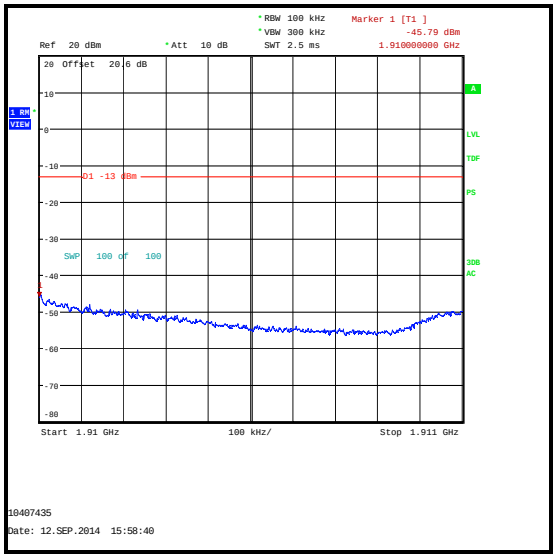
Transmitter Radiated Emissions at Band Edges (continued)

Results: 10 MHz Channel Bandwidth / 16QAM

Frequency (MHz)	Resource Blocks	Resource Block Offset	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
1850	1	0	-47.9	-13.0	34.9	Complied
1910	1	49	-45.8	-13.0	32.8	Complied



16QAM / Lower Band Edge

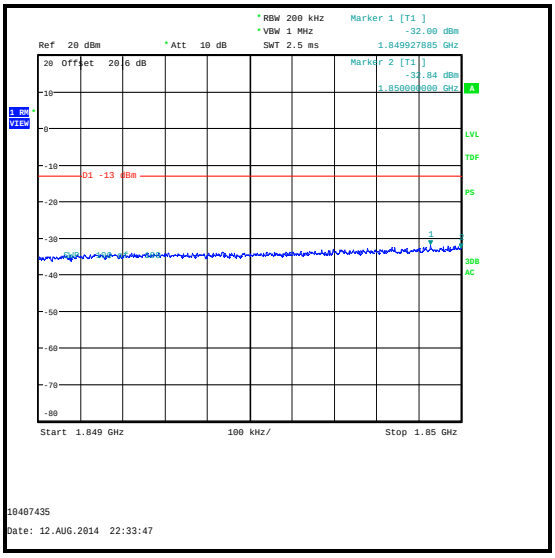


16QAM / Upper Band Edge

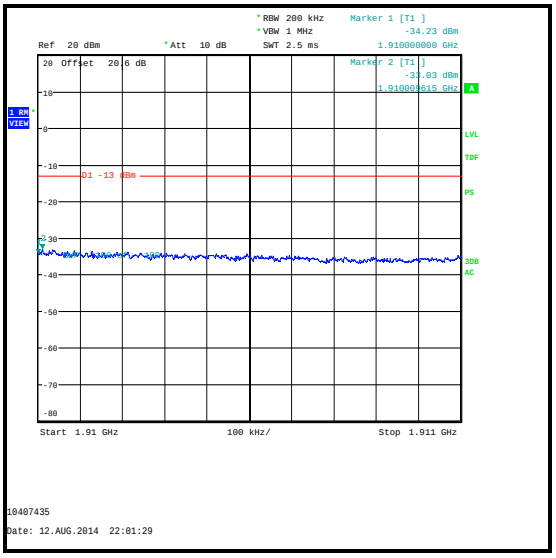
Transmitter Radiated Emissions at Band Edges (continued)

Results: 15 MHz Channel Bandwidth / QPSK

Frequency (MHz)	Resource Blocks	Resource Block Offset	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
1849.928	75	0	-32.0	-13.0	19.0	Complied
1850	75	0	-32.8	-13.0	19.8	Complied
1910	75	0	-34.2	-13.0	21.2	Complied
1910.010	75	0	-33.0	-13.0	20.0	Complied



QPSK / Lower Band Edge

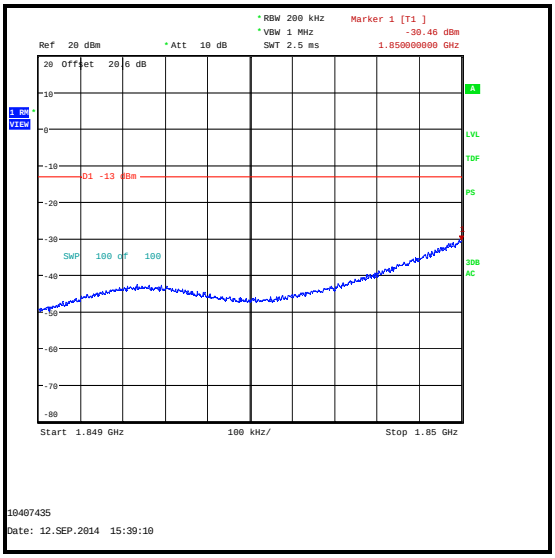


QPSK / Upper Band Edge

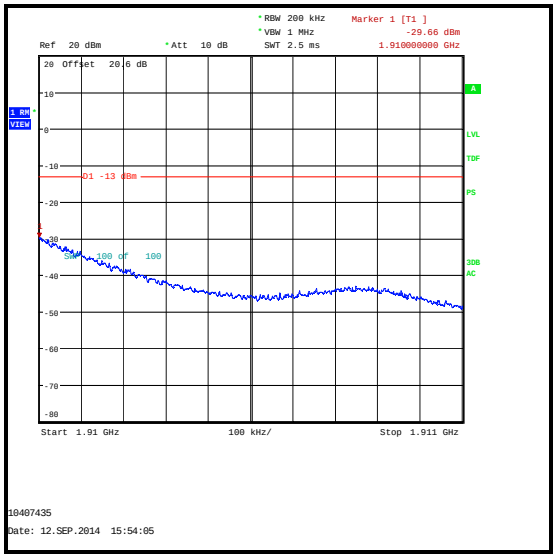
Transmitter Radiated Emissions at Band Edges (continued)

Results: 15 MHz Channel Bandwidth / QPSK

Frequency (MHz)	Resource Blocks	Resource Block Offset	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
1850	1	0	-30.5	-13.0	17.5	Complied
1910	1	74	-29.7	-13.0	16.7	Complied



QPSK / Lower Band Edge

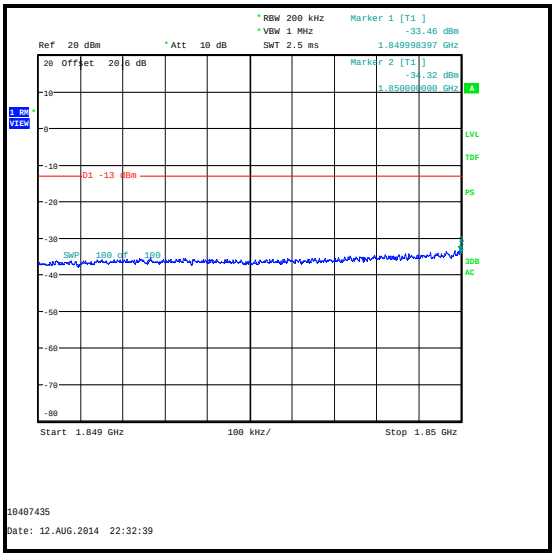


QPSK / Upper Band Edge

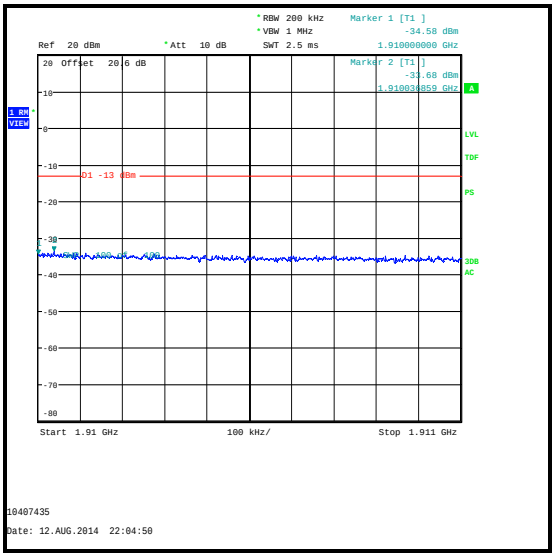
Transmitter Radiated Emissions at Band Edges (continued)

Results: 15 MHz Channel Bandwidth / 16QAM

Frequency (MHz)	Resource Blocks	Resource Block Offset	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
1849.998	75	0	-33.5	-13.0	20.5	Complied
1850	75	0	-34.3	-13.0	21.3	Complied
1910	75	0	-34.6	-13.0	21.6	Complied
1910.037	75	0	-33.7	-13.0	20.7	Complied



16QAM / Lower Band Edge

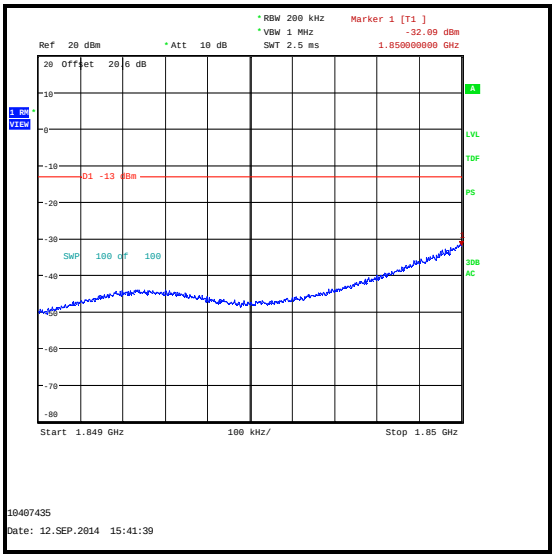


16QAM / Upper Band Edge

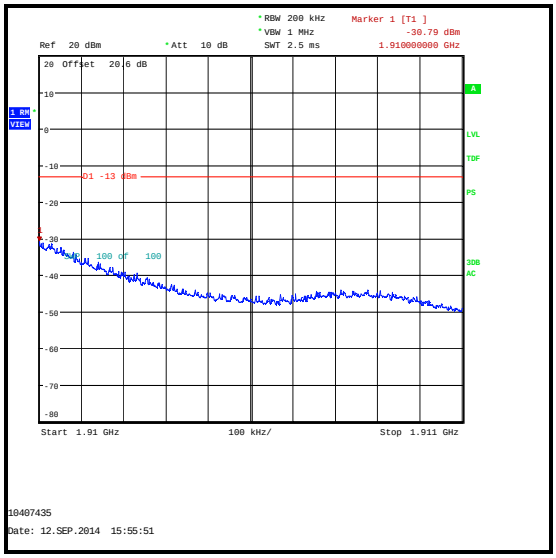
Transmitter Radiated Emissions at Band Edges (continued)

Results: 15 MHz Channel Bandwidth / 16QAM

Frequency (MHz)	Resource Blocks	Resource Block Offset	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
1850	1	0	-32.1	-13.0	19.1	Complied
1910	1	74	-30.8	-13.0	17.8	Complied



16QAM / Lower Band Edge

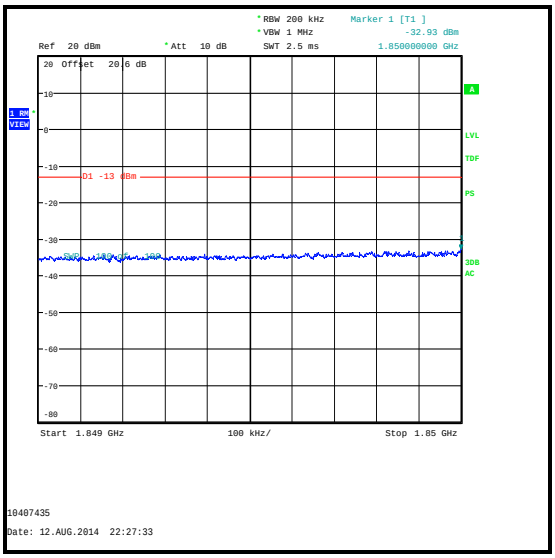


16QAM / Upper Band Edge

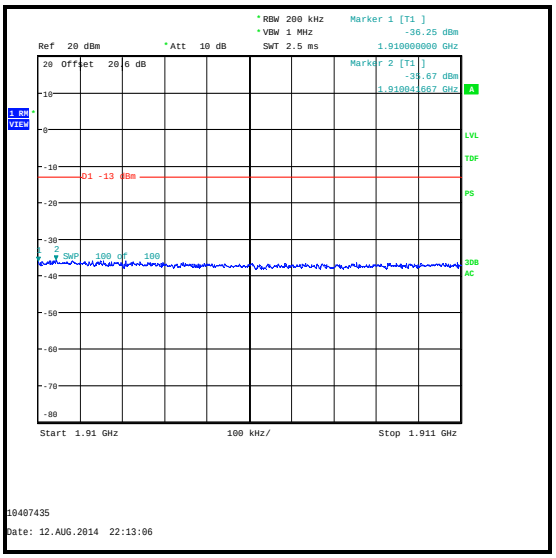
Transmitter Radiated Emissions at Band Edges (continued)

Results: 20 MHz Channel Bandwidth / QPSK

Frequency (MHz)	Resource Blocks	Resource Block Offset	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
1850	100	0	-32.9	-13.0	19.9	Complied
1910	100	0	-36.3	-13.0	23.3	Complied
1910.042	100	0	-35.6	-13.0	22.6	Complied



QPSK / Lower Band Edge

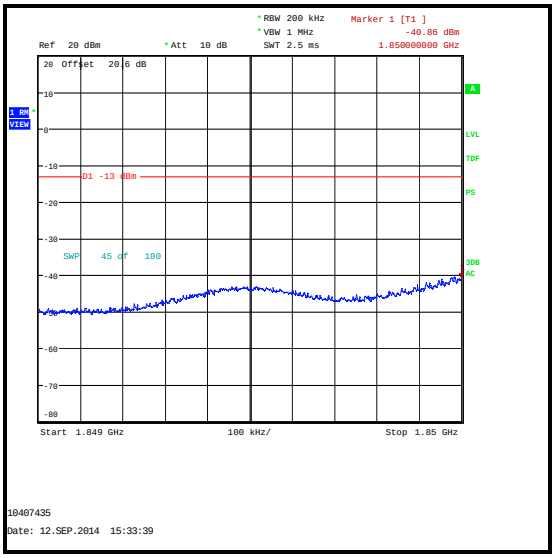


QPSK / Upper Band Edge

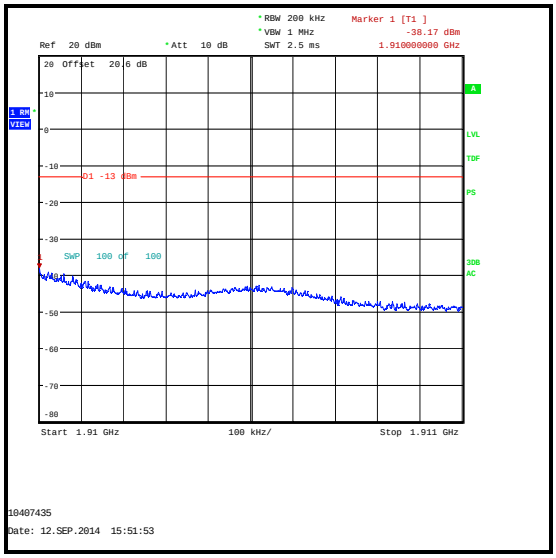
Transmitter Radiated Emissions at Band Edges (continued)

Results: 20 MHz Channel Bandwidth / QPSK

Frequency (MHz)	Resource Blocks	Resource Block Offset	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
1850	1	0	-40.9	-13.0	27.9	Complied
1910	1	99	-38.2	-13.0	25.2	Complied



QPSK / Lower Band Edge

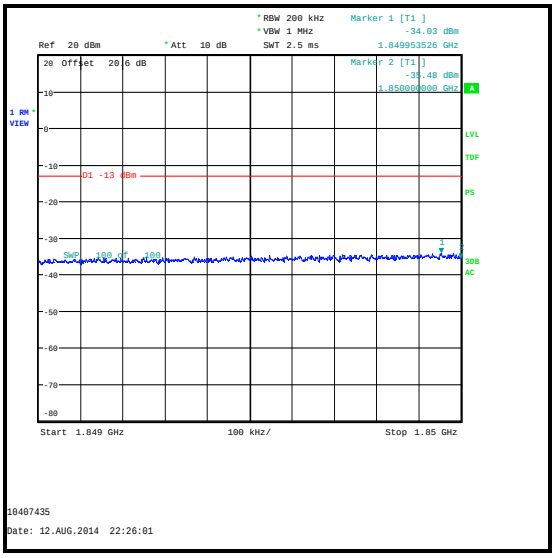


QPSK / Upper Band Edge

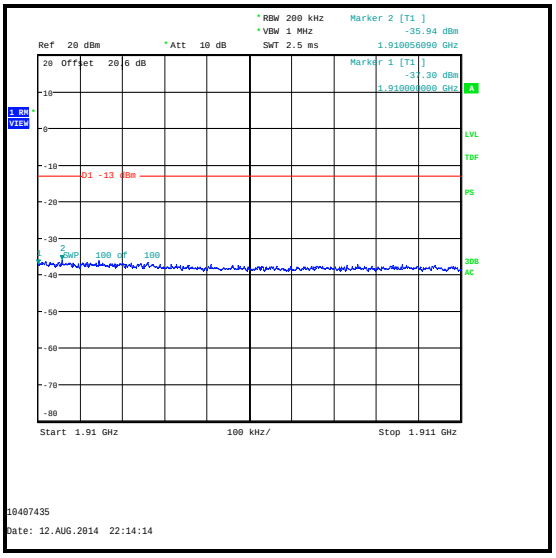
Transmitter Radiated Emissions at Band Edges (continued)

Results: 20 MHz Channel Bandwidth / 16QAM

Frequency (MHz)	Resource Blocks	Resource Block Offset	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
1849.954	100	0	-34.0	-13.0	21.0	Complied
1850	100	0	-35.5	-13.0	22.5	Complied
1910	100	0	-37.3	-13.0	24.3	Complied
1910.056	100	0	-35.9	-13.0	22.9	Complied



16QAM / Lower Band Edge

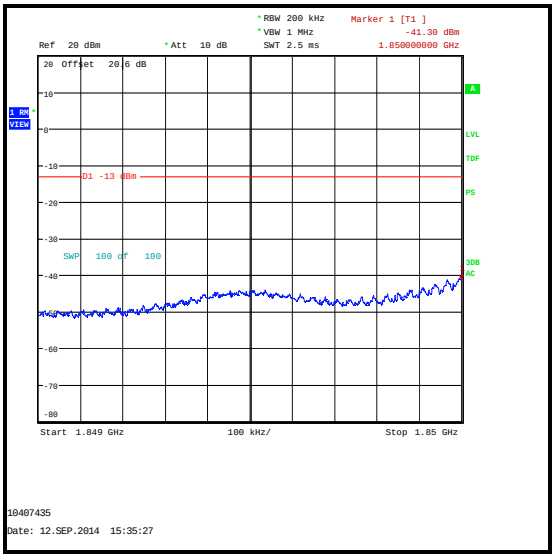


16QAM / Upper Band Edge

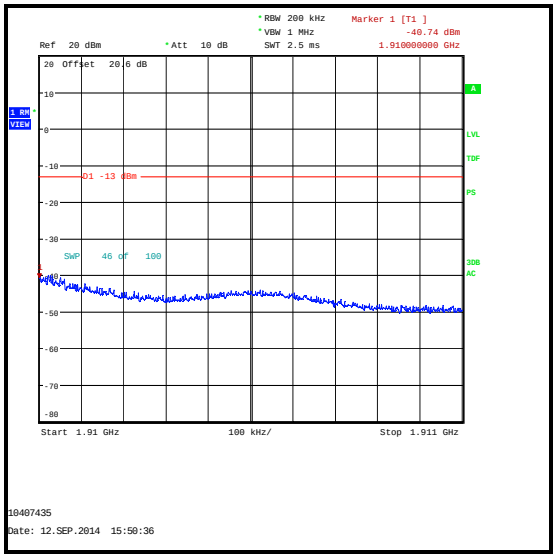
Transmitter Radiated Emissions at Band Edges (continued)

Results: 20 MHz Channel Bandwidth / 16QAM

Frequency (MHz)	Resource Blocks	Resource Block Offset	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
1850	1	0	-41.3	-13.0	28.3	Complied
1910	1	99	-40.7	-13.0	27.7	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	Not stated	14 Mar 2015	12
K0002	3m RSE Chamber	Rainford	N/A	N/A	14 Nov 2014	12
M1874	Test Receiver	Rohde & Schwarz	ESU26	100553	13 May 2015	12
A1534	Pre-Amplifier	Hewlett Packard	8449B	3008A00405	14 Nov 2014	12
A1818	Antenna	EMCO	3115	00075692	14 Nov 2014	12
A1393	Attenuator	Huber & Suhner	6820.17.B	757456	02 May 2015	12

5.2.6. Transmitter Frequency Stability (Temperature Variation)

Test Summary:

Test Engineer:	Keith Tucker	**Test Date:**	14 August 2014
Test Sample IMEI:	352025060521607		

FCC Reference:	Parts 2.1055 & 24.235
Test Method Used:	As detailed in KDB 971168 Section 9.0 referencing FCC Part 2.1055 & Notes below

Environmental Conditions:

Ambient Temperature (℃):	24
Ambient Relative Humidity (%):	38

Note(s):

1. Flying leads were connected internally to the EUT in place of the battery. These leads were extended and connected to a bench power supply.
2. Frequency error was measured using a calibrated Rohde & Schwarz CMW 500 Universal Radio Communications Tester in accordance with current Rohde & 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.

Transmitter Frequency Stability (Temperature Variation) (continued)

Results: Bottom Channel (1850.7 MHz)

Temperature (°C)	Frequency Error (Hz)	Measured Frequency (MHz)	Lower Band Edge Limit (MHz)	Margin (MHz)	Result
-30	20	1850.699980	1850.0	0.699980	Complied
-20	19	1850.700019	1850.0	0.700019	Complied
-10	15	1850.699985	1850.0	0.699985	Complied
0	19	1850.699981	1850.0	0.699981	Complied
10	18	1850.700018	1850.0	0.700018	Complied
20	15	1850.700015	1850.0	0.700015	Complied
30	18	1850.699982	1850.0	0.699982	Complied
40	20	1850.699980	1850.0	0.699980	Complied
50	19	1850.699981	1850.0	0.699981	Complied

Results: Top Channel (1909.3 MHz)

Temperature (°C)	Frequency Error (Hz)	Measured Frequency (MHz)	Upper Band Edge Limit (MHz)	Margin (MHz)	Result
-30	22	1909.299978	1910.0	0.700022	Complied
-20	20	1909.299980	1910.0	0.700020	Complied
-10	20	1909.299980	1910.0	0.700020	Complied
0	21	1909.299979	1910.0	0.700021	Complied
10	23	1909.299977	1910.0	0.700023	Complied
20	24	1909.299976	1910.0	0.700024	Complied
30	23	1909.299977	1910.0	0.700023	Complied
40	23	1909.299977	1910.0	0.700023	Complied
50	23	1909.299977	1910.0	0.700023	Complied

Test Equipment Used:

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M1657	Thermohygrometer	JM Handelspunkt	30.5015.13	None stated	14 Mar 2015	12
M1869	Wideband Radio Comms Tester	Rohde & Schwarz	CMW500	145923	06 May 2015	12
S0523	DC power supply	TTi	PL320	224235	Calibrated before use	-
M122	Multimeter	Fluke	77	64910017	24 Apr 2015	12
M1643	Thermometer	Fluke	52II	18890136	07 Apr 2015	12
E0520	Environmental Chamber	Thermotron	S-1.2CB	S-1.2CB	Calibrated before use	-

5.2.7. Transmitter Frequency Stability (Voltage Variation)

Test Summary:

Test Engineer:	Keith Tucker	**Test Date:**	14 August 2014
Test Sample IMEI:	352025060521607		

FCC Reference:	Parts 2.1055 & 24.235
Test Method Used:	As detailed in KDB 971168 Section 9.0 referencing FCC Part 2.1055 & Notes below

Environmental Conditions:

Temperature (℃):	20
Relative Humidity (%):	38

Note(s):

1. Flying leads were connected internally to the EUT in place of the battery. These leads were extended and connected to a bench power supply.
2. Frequency error was measured using a calibrated Rohde & Schwarz CMW 500 Universal Radio Communications Tester in accordance with current Rohde & 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: Bottom Channel (1850.7 MHz)

Supply Voltage (V)	Frequency Error (Hz)	Measured Frequency (MHz)	Lower Band Edge Limit (MHz)	Margin (MHz)	Result
3.4	20	1850.699980	1850.0	0.699980	Complied
4.2	20	1850.700020	1850.0	0.700020	Complied

Results: Top Channel (1909.3 MHz)

Supply Voltage (V)	Frequency Error (Hz)	Measured Frequency (MHz)	Upper Band Edge Limit (MHz)	Margin (MHz)	Result
3.4	11	1909.300011	1910.0	0.699989	Complied
4.2	24	1909.299976	1910.0	0.700024	Complied

Transmitter Frequency Stability (Voltage Variation) (continued)

Test Equipment Used:

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M1657	Thermohygrometer	JM Handelspunkt	30.5015.13	None stated	14 Mar 2015	12
M1869	Wideband Radio Comms Tester	Rohde & Schwarz	CMW500	145923	06 May 2015	12
S0523	DC power supply	TTi	PL320	224235	Calibrated before use	-
M1643	Thermometer	Fluke	52II	18890136	07 Apr 2015	12
M122	Multimeter	Fluke	77	64910017	24 Apr 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	1850 to 1910 MHz	95%	±0.76 dB
Frequency Stability	1850 to 1910 MHz	95%	±23 Hz
Occupied Bandwidth	1850 to 1910 MHz	95%	±3.92 %
Radiated Spurious Emissions	30 MHz to 1 GHz	95%	±5.65 dB
Radiated Spurious Emissions	1 GHz to 20 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	-	-	Admin updates Additional Radiated Band Edge measurements

--- END OF REPORT ---