



TEST REPORT

Test Report No. : UL-RPT-RP10014945JD03A

Manufacturer : Sony Mobile Communications AB

Type No. : PM-0460-BV

FCC ID : PY7PM-0460

Technology : LTE – Band 17

Test Standard(s) : FCC Part 27 Subpart C

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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 1.0

Date of Issue: 19 July 2013

Checked by:

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WiSE Laboratory Engineer

Issued by :

pp

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

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1. Customer Information

Company Name:	Sony Mobile Communications AB
Address:	Nya Vattentorget Lund SE-221 88 Sweden

2. Summary of Testing

2.1. General Information

Specification Reference:	47CFR27
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications): Part 27 Subpart C (Miscellaneous Wireless Communication Services)
Site Registration:	FCC: 209735
Location of Testing:	UL VS LTD, Unit 3 Horizon, Wade Road, Kingsland Business Park, Basingstoke, Hampshire, RG24 8AH, United Kingdom
Test Dates:	27 June 2013 to 15 July 2013

2.2. Summary of Test Results

FCC Reference (47CFR)	Measurement	Result
2.1046 / 27.50(c)(10)	Transmitter Output Power (EIRP)	
2.1049	Transmitter Occupied Bandwidth	
2.1053 / 27.53(g)	Transmitter Radiated Spurious Emissions	
2.1053 / 27.53(g)	Transmitter Radiated Emissions at Band Edges	
2.1055 / 27.54	Transmitter Frequency Stability	
Key to Results  = Complied  = Did not comply		

2.3. Methods and Procedures

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

2.4. Deviations from the Test Specification

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

3. Equipment Under Test (EUT)

3.1. Identification of Equipment Under Test (EUT)

Brand Name:	Sony
IMEI:	004402451263820 (<i>Radiated Sample</i>)
Serial Number:	CB5124U6EF
Hardware Version Number:	AP2
Software Version Number:	14.1.G.1.241
FCC ID:	PY7PM-0460

Brand Name:	Sony
IMEI:	004402451256097 (<i>Conducted Sample #1</i>)
Serial Number:	CB5124TWQ9
Hardware Version Number:	AP2
Software Version Number:	14.1.G.1.241
FCC ID:	PY7PM-0460

Brand Name:	Sony
IMEI:	004402451254886 (<i>Conducted Sample #2</i>)
Serial Number:	CB5124TWLF
Hardware Version Number:	AP2
Software Version Number:	14.1.G.1.241
FCC ID:	PY7PM-0460

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

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

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

Identification of Equipment Under Test (EUT) (continued)

Brand Name:	Sony
Description:	Magnetic Plug
Model Name or Number:	EC801

Brand Name:	Sony
Description:	USB cable
Model Name or Number:	EC21

Brand Name:	Sony
Description:	PHF
Model Name or Number:	MH750

3.2. Description of EUT

The equipment under test (EUT) is a model of GSM/UMTS/LTE mobile phone with integrated antenna and inbuilt Li-Polymer battery.

The EUT supports GSM 850/900/1800/1900MHz bands, WCDMA FDD bands 1/2/4/5/8 and LTE FDD bands 1/2/3/4/5/7/8/17. It also supports GPRS service with multi-slots class 33 and EGPRS service with multi-slots class 33 too. The HSDPA and HSUPA features are also supported. It has MP3, camera, FM radio, USB memory, GPS receiver, NFC, Mobile High-Definition Link (MHL), Bluetooth (EDR and Bluetooth 4.0), WLAN (802.11 a/b/g/n/ac) and Wi-Fi hotspot functions.

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 17		
Type of Equipment	Transceiver		
Channel Bandwidth:	5 MHz & 10 MHz		
Modulation Type:	QPSK & 16QAM		
Duty Cycle:	100%		
Antenna Gain:	-5.64 dBd		
Power Supply Requirement:	Nominal	3.8 V	
Transmit Frequency Range:	704 MHz to 716 MHz		
Channels Tested:	Channel Bandwidth	N _{ul}	Frequency of Uplink (MHz)
Bottom Channel	5	23755	706.5
	10	23780	709.0
Middle Channel	All	23790	710.0
Top Channel	5	23825	713.5
	10	23800	711.0

3.5. Support Equipment

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

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

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

Brand Name:	Not marked or stated
Description:	Voltage variation jig
Model Name or Number:	Not marked or stated
Serial Number:	310119

4. Operation and Monitoring of the EUT during Testing

4.1. Operating Modes

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

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

4.2. Configuration and Peripherals

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

- The EUT was connected to a Rohde and Schwarz CMW500 LTE system simulator, operating in a transceiver mode.
- Transmitter radiated spurious emission tests were performed with the following configurations, employing all available accessories:
 - Configuration 1 – Handset with the AC charger, USB Cable, MHL cable (terminated in to a television), MHL adaptor and PHF
 - Configuration 2 – Handset with the AC charger, Magnetic plug and PHF

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

- Transmitter radiated spurious emissions tests were performed with the EUT was set to transmit with a 10 MHz channel bandwidth with QPSK modulation applied and 1 resource block with 0 offset. This was found to be the worst case modulation scheme with regards to emissions after preliminary investigations and, as this mode emits the highest transmit output power level, it was deemed to be the worst case.
- The EUT was supplied with an RF conducted port and external RF cable, to allow conducted measurements to be performed where necessary.
- Testing at temperature and voltage extremes was performed using a voltage variation jig and adaptor supplied by the Customer. The adaptor plugs onto the handset in place of the battery connector.
- The voltage variation jig and adaptor were used for conducted measurements set at the nominal voltage.
- The conducted sample with IMEI 004402451256097 was used for output power and occupied bandwidth measurements.
- The conducted sample with IMEI 004402451254886 was used for frequency stability measurements.
- The radiated sample with IMEI 004402451263820 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
5	25	1	0	1	24	12	6	25	0
10	50	1	0	1	49	25	12	50	0

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

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

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

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

Transmitter Frequency Stability test was carried out with sub test 4, with a channel bandwidth of 5 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* for Measurement Uncertainty details.

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

5.2. Test Results

5.2.1. Transmitter Output Power (ERP)

Test Summary:

Test Engineer:	Ben Mercer	Test Date:	03 July 2013
Test Sample IMEI:	004402451256097		

FCC Reference:	Parts 2.1046 & 27.50(c)(10)
Test Method Used:	As detailed in FCC KDB 971168 D01 v02r01 Section 5.2.1

Environmental Conditions:

Temperature (°C):	23 to 25
Relative Humidity (%):	36 to 38

Note(s):

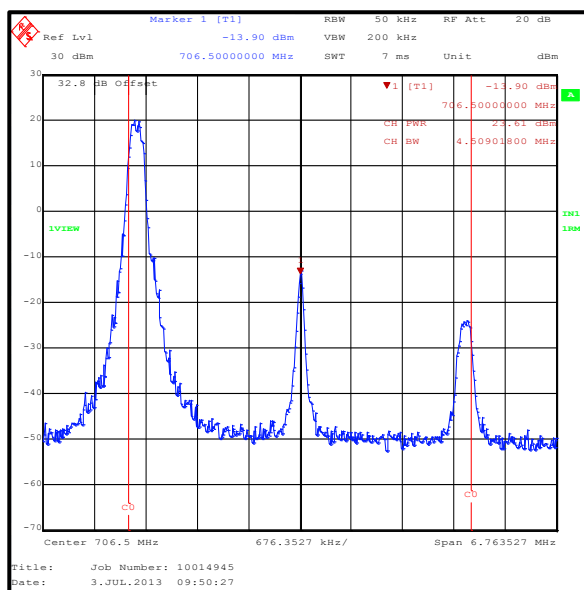
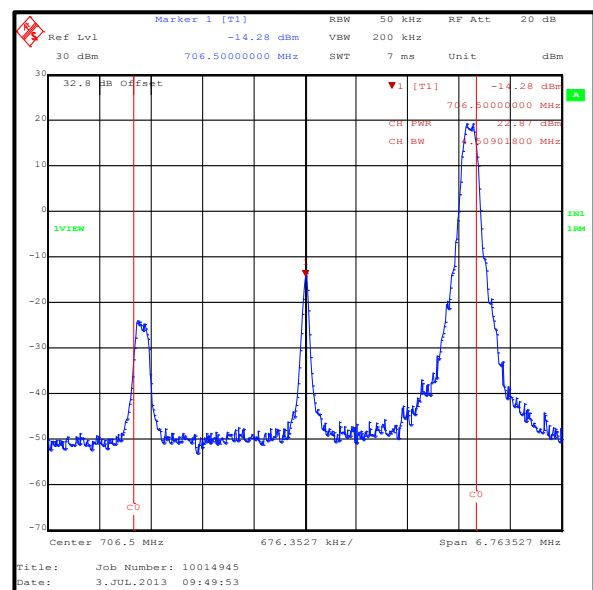
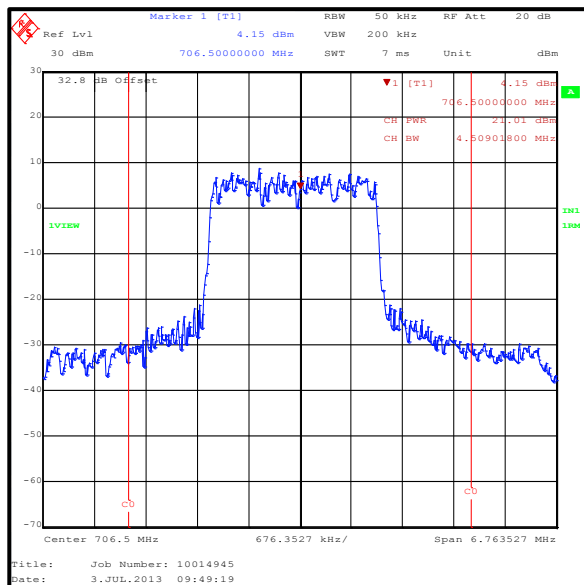
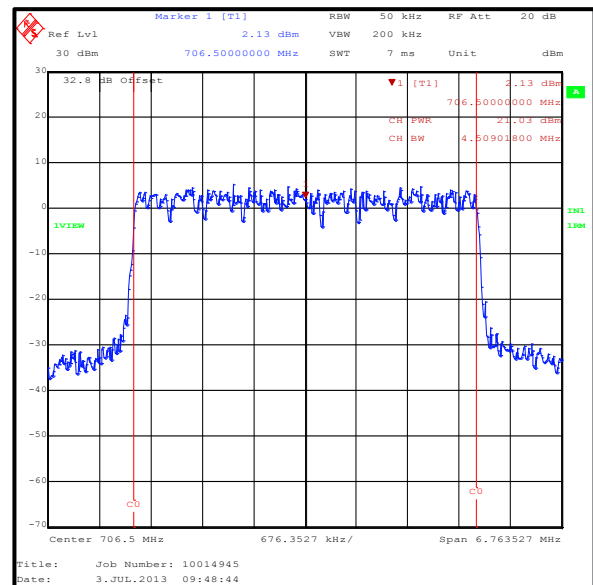
1. The Customer stated a maximum antenna gain of -3.49 dBi, as the limit is ERP the gain in dBi has been converted. The dBd has been calculated as.

$$-3.49 \text{ dBi} - 2.15 \text{ dB} = -5.64 \text{ dBd}$$

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

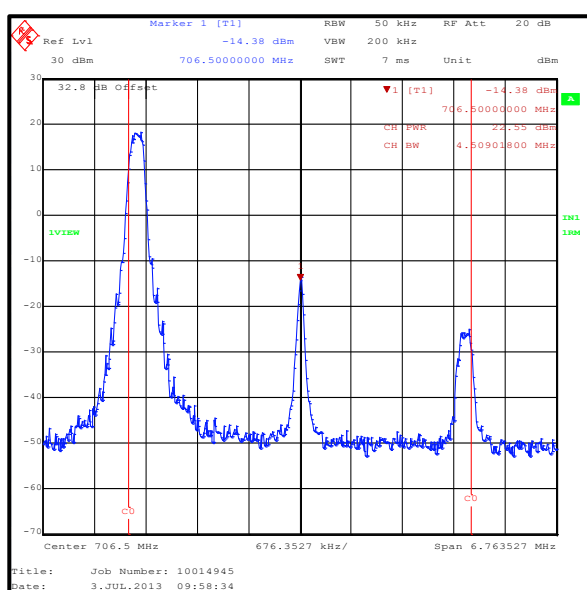
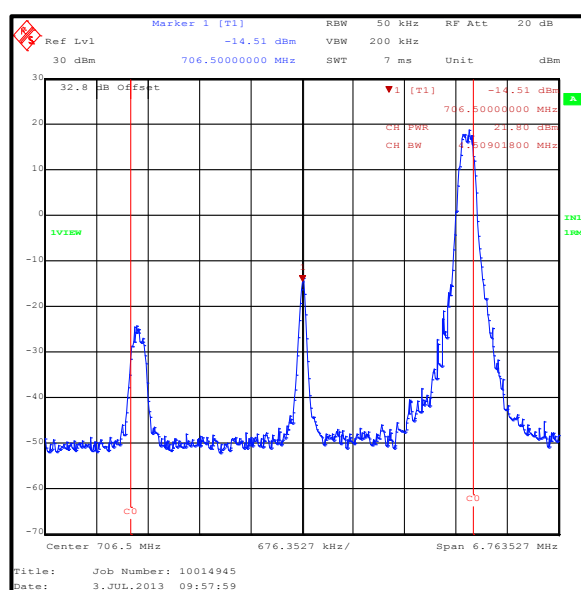
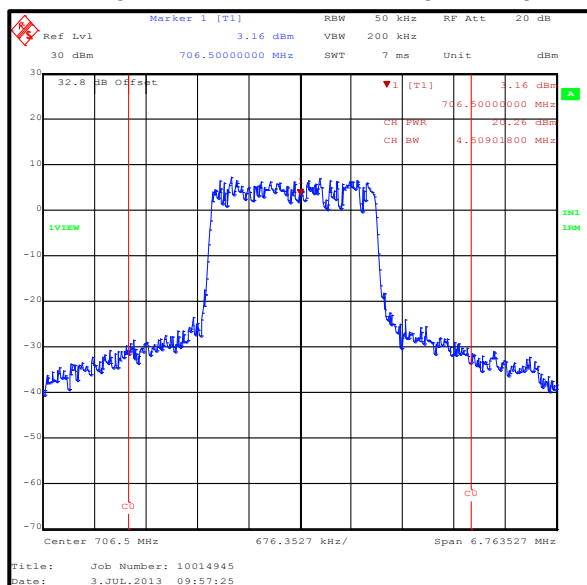
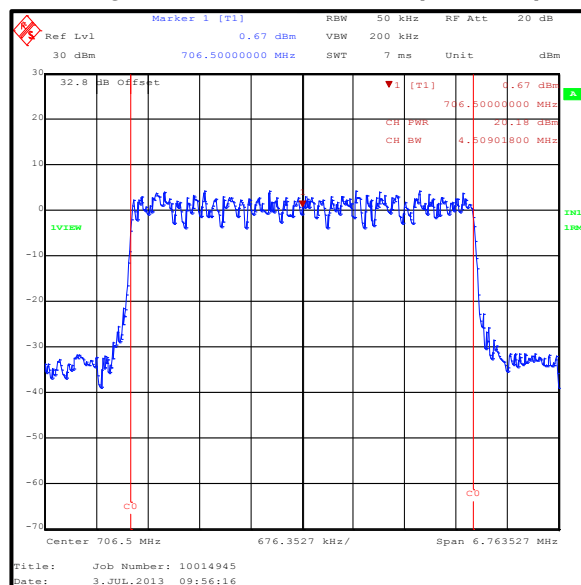
Transmitter Output Power (ERP) (continued)**Results: 5 MHz Channel Bandwidth / Bottom Channel / QPSK**

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBi)	ERP (dBm)	ERP Limit (dBm)	Margin (dB)	Result
706.5	1	0	23.6	-5.64	17.96	34.8	16.84	Complied
706.5	1	24	22.9	-5.64	17.26	34.8	17.54	Complied
706.5	12	6	21.0	-5.64	15.36	34.8	19.44	Complied
706.5	25	0	21.0	-5.64	15.36	34.8	19.44	Complied

**QPSK / 1 Resource Block (0 offset)****QPSK / 1 Resource Block (24 offset)****QPSK / 12 Resource Blocks (6 offset)****QPSK / 25 Resource Blocks (0 offset)**

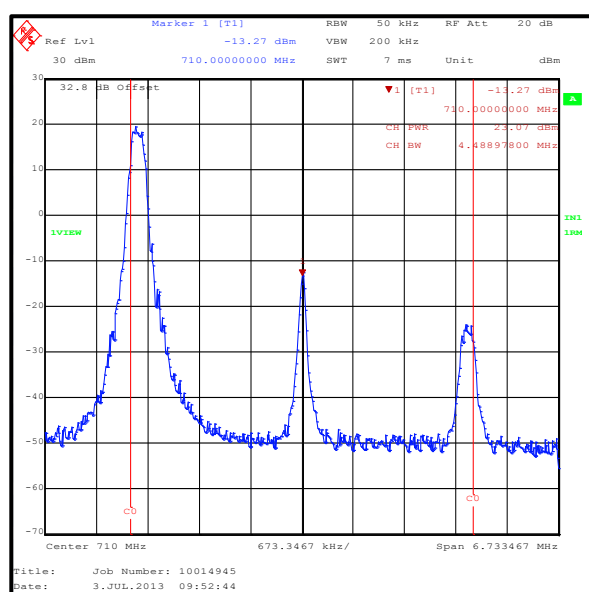
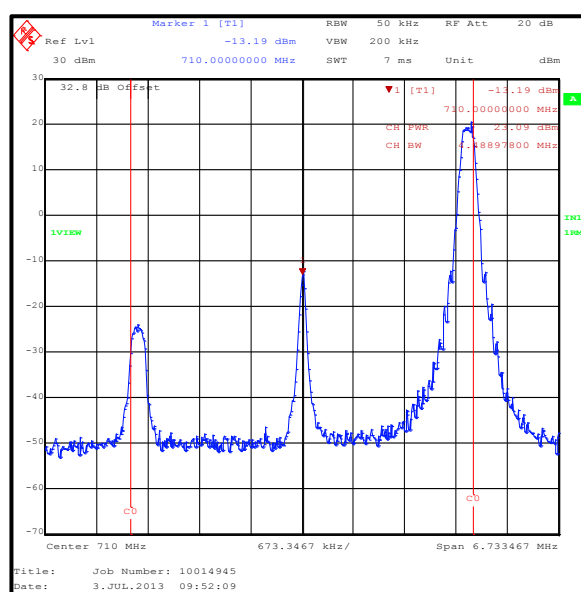
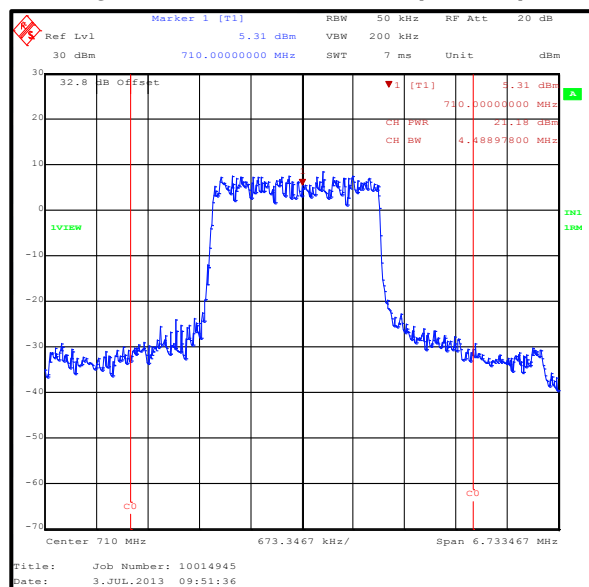
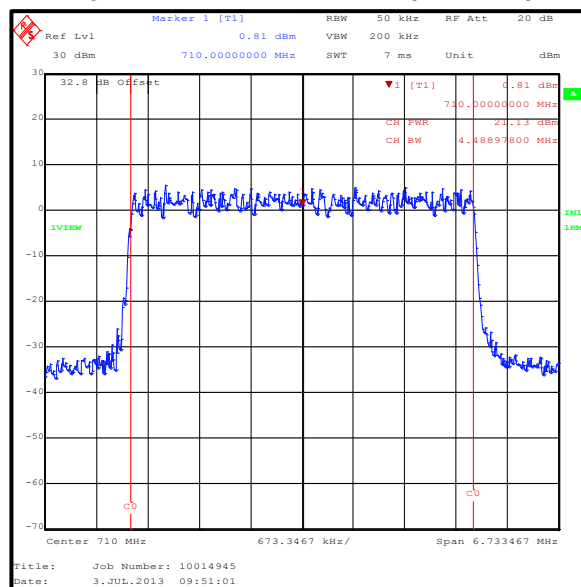
Transmitter Output Power (ERP) (continued)**Results: 5 MHz Channel Bandwidth / Bottom Channel / 16QAM**

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBi)	ERP (dBm)	ERP Limit (dBm)	Margin (dB)	Result
706.5	1	0	22.6	-5.64	16.96	34.8	17.84	Complied
706.5	1	24	21.8	-5.64	16.16	34.8	18.64	Complied
706.5	12	6	20.3	-5.64	14.66	34.8	20.14	Complied
706.5	25	0	20.2	-5.64	14.56	34.8	20.24	Complied

**16QAM / 1 Resource Block (0 offset)****16QAM / 1 Resource Block (24 offset)****16QAM / 12 Resource Blocks (6 offset)****16QAM / 25 Resource Blocks (0 offset)**

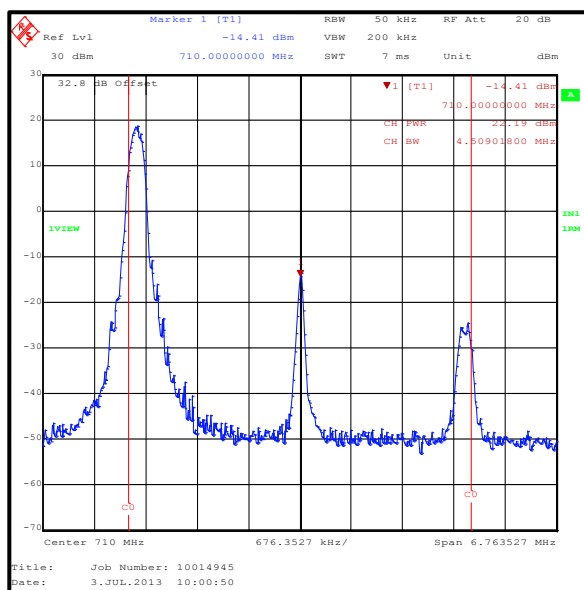
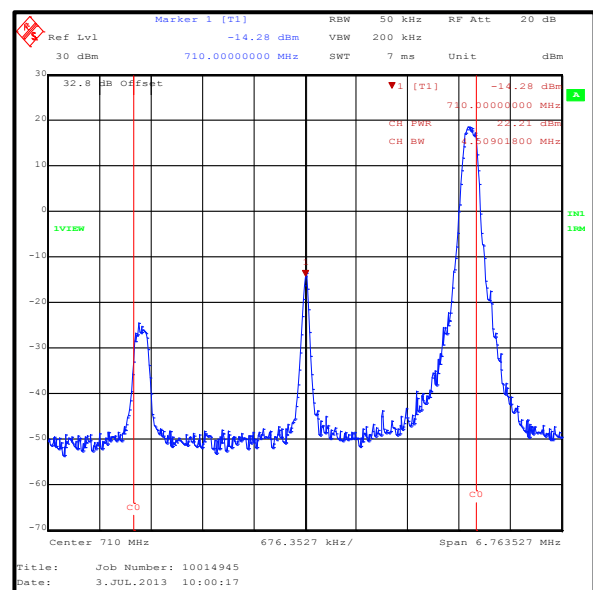
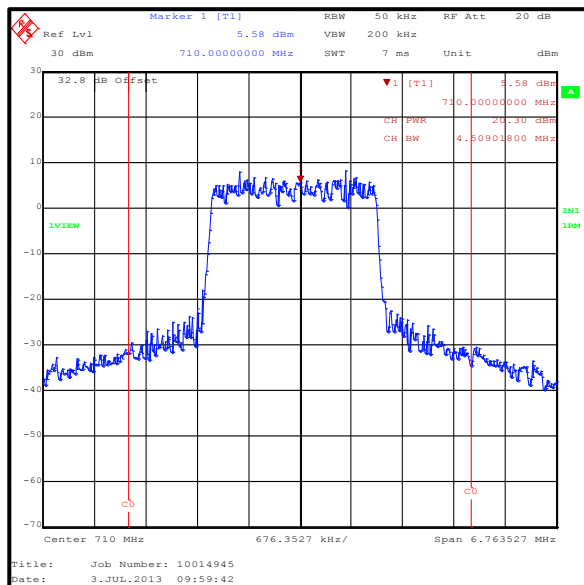
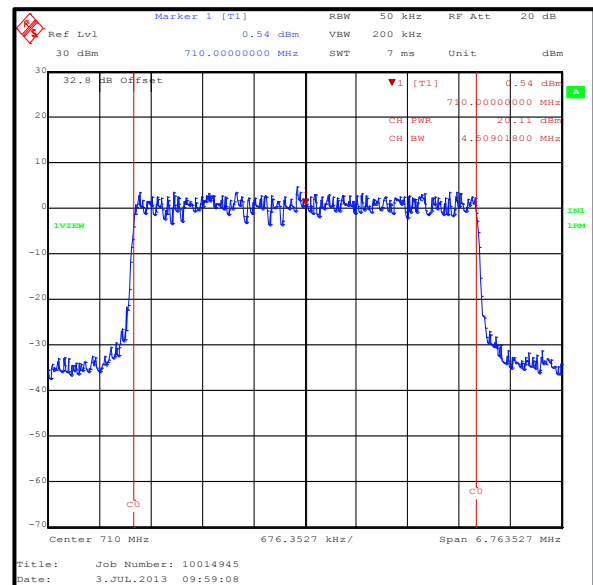
Transmitter Output Power (ERP) (continued)**Results: 5 MHz Channel Bandwidth / Middle Channel / QPSK**

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBi)	ERP (dBm)	ERP Limit (dBm)	Margin (dB)	Result
710.0	1	0	23.1	-5.64	17.46	34.8	17.34	Complied
710.0	1	24	23.1	-5.64	17.46	34.8	17.34	Complied
710.0	12	6	21.2	-5.64	15.56	34.8	19.24	Complied
710.0	25	0	21.1	-5.64	15.46	34.8	19.34	Complied

**QPSK / 1 Resource Block (0 offset)****QPSK / 1 Resource Block (24 offset)****QPSK / 12 Resource Blocks (6 offset)****QPSK / 25 Resource Blocks (0 offset)**

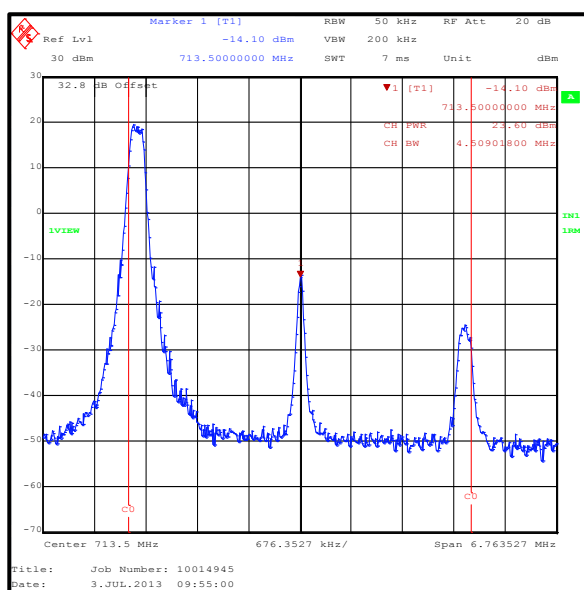
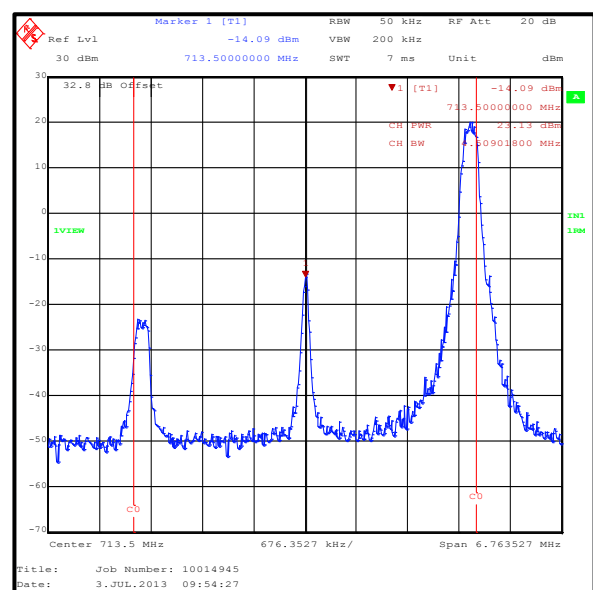
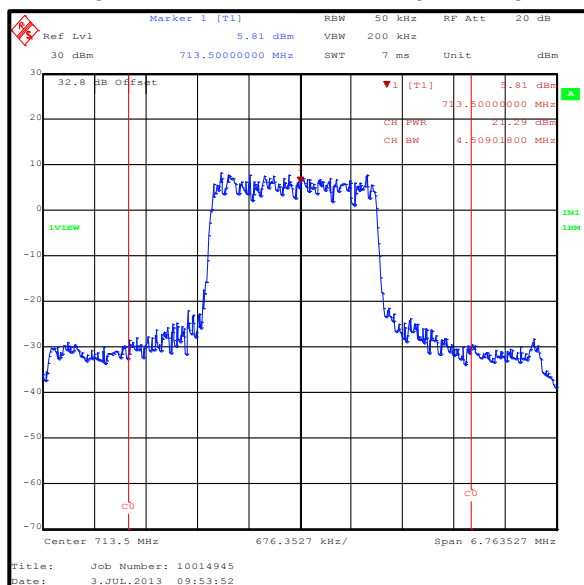
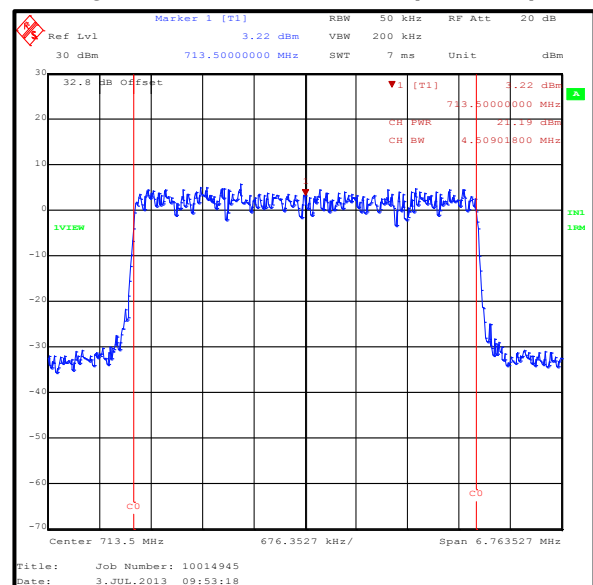
Transmitter Output Power (ERP) (continued)**Results: 5 MHz Channel Bandwidth / Middle Channel / 16QAM**

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBi)	ERP (dBm)	ERP Limit (dBm)	Margin (dB)	Result
710.0	1	0	22.2	-5.64	16.56	34.8	18.24	Complied
710.0	1	24	22.2	-5.64	16.56	34.8	18.24	Complied
710.0	12	6	20.3	-5.64	14.66	34.8	20.14	Complied
710.0	25	0	20.1	-5.64	14.46	34.8	20.34	Complied

**16QAM / 1 Resource Block (0 offset)****16QAM / 1 Resource Block (24 offset)****16QAM / 12 Resource Blocks (6 offset)****16QAM / 25 Resource Blocks (0 offset)**

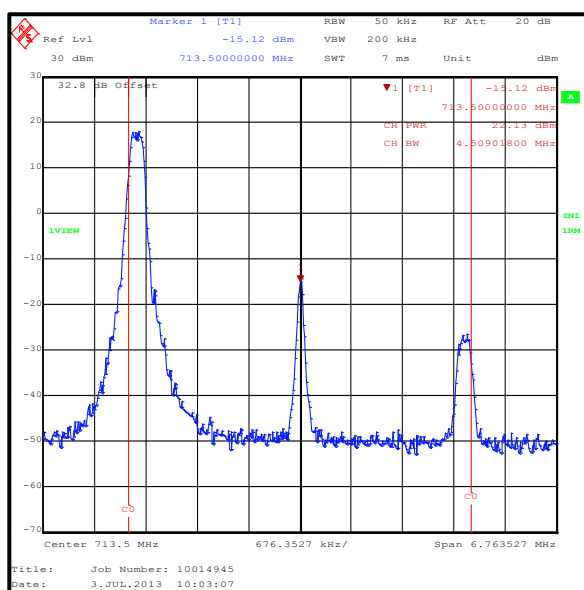
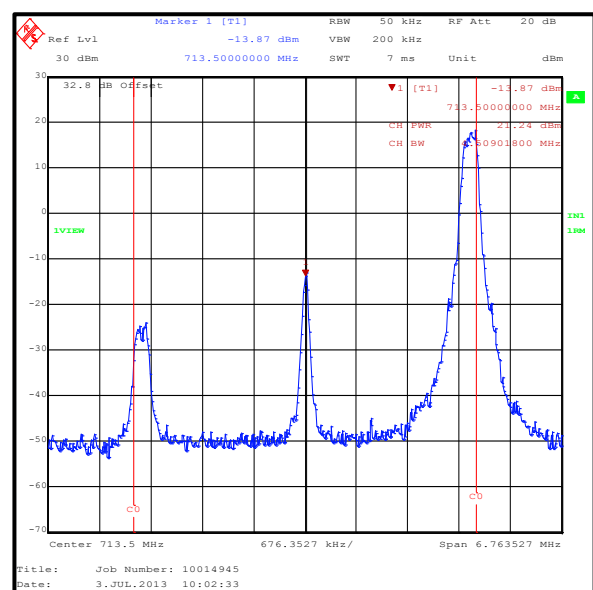
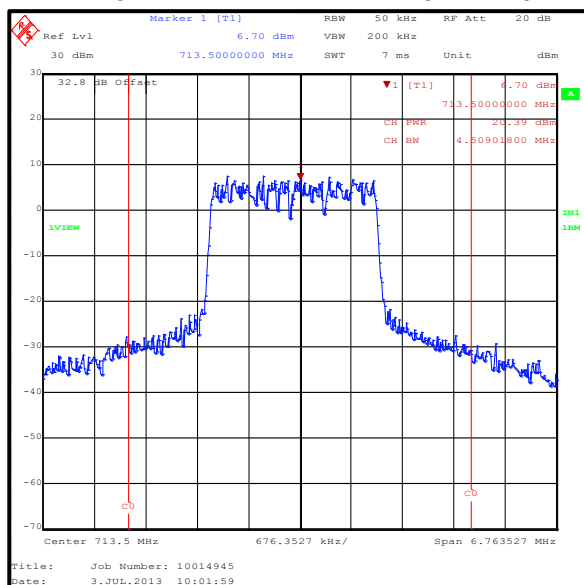
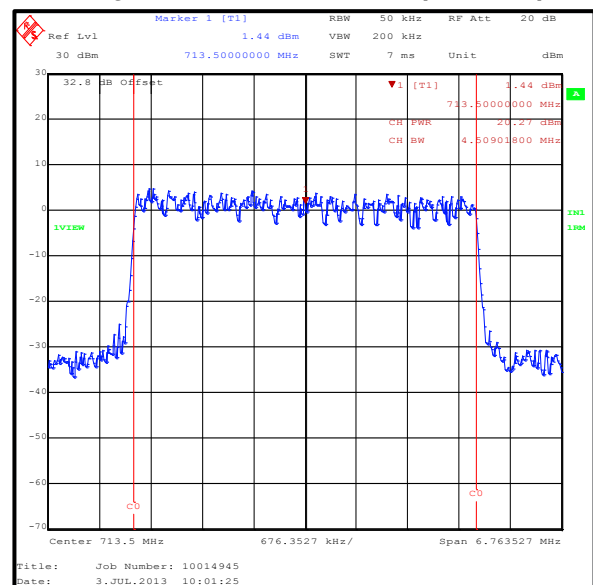
Transmitter Output Power (ERP) (continued)**Results: 5 MHz Channel Bandwidth / Top Channel / QPSK**

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBi)	ERP (dBm)	ERP Limit (dBm)	Margin (dB)	Result
713.5	1	0	23.6	-5.64	17.96	34.8	16.84	Complied
713.5	1	24	23.1	-5.64	17.46	34.8	17.34	Complied
713.5	12	6	21.3	-5.64	15.66	34.8	19.14	Complied
713.5	25	0	21.2	-5.64	15.56	34.8	19.24	Complied

**QPSK / 1 Resource Block (0 offset)****QPSK / 1 Resource Block (24 offset)****QPSK / 12 Resource Blocks (6 offset)****QPSK / 25 Resource Blocks (0 offset)**

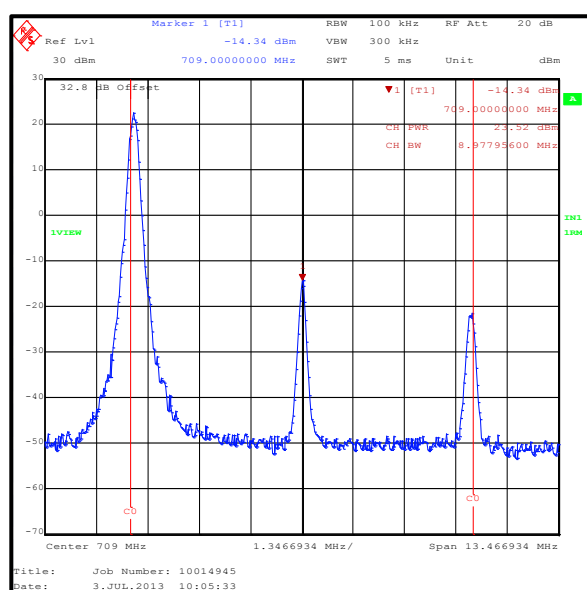
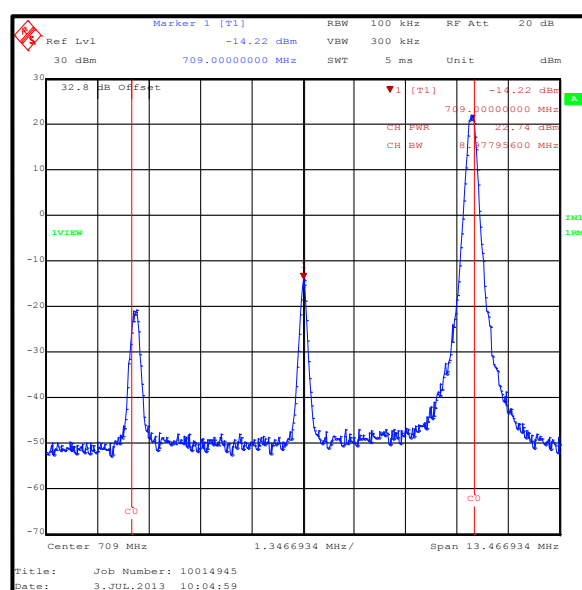
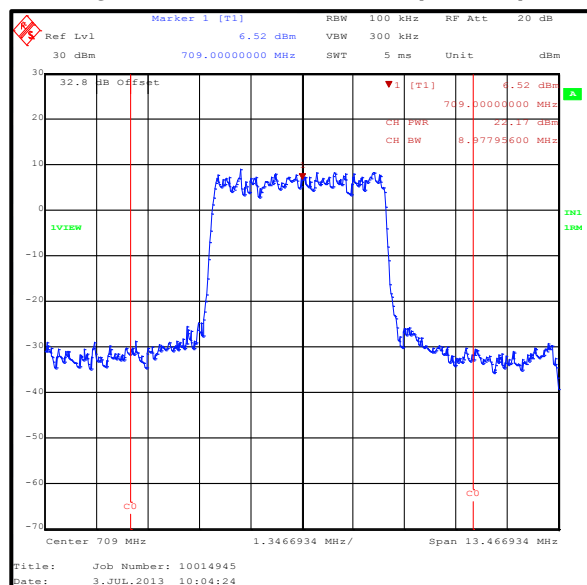
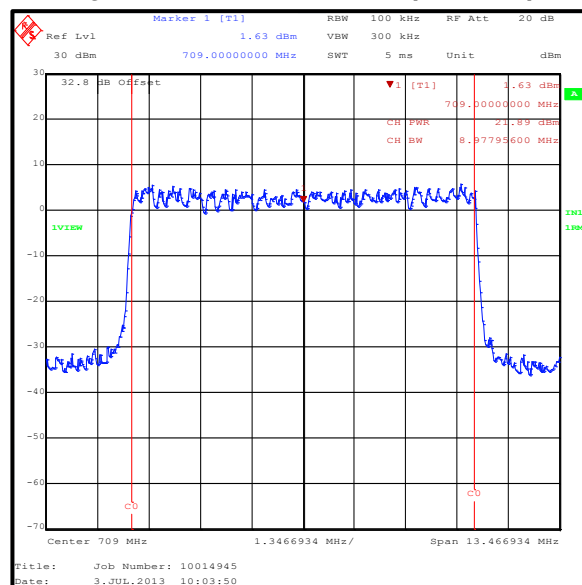
Transmitter Output Power (ERP) (continued)**Results: 5 MHz Channel Bandwidth / Top Channel / 16QAM**

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBi)	ERP (dBm)	ERP Limit (dBm)	Margin (dB)	Result
713.5	1	0	22.1	-5.64	16.46	34.8	18.34	Complied
713.5	1	24	21.2	-5.64	15.56	34.8	19.24	Complied
713.5	12	6	20.4	-5.64	14.76	34.8	20.04	Complied
713.5	25	0	20.3	-5.64	14.66	34.8	20.14	Complied

**16QAM / 1 Resource Block (0 offset)****16QAM / 1 Resource Block (24 offset)****16QAM / 12 Resource Blocks (6 offset)****16QAM / 25 Resource Blocks (0 offset)**

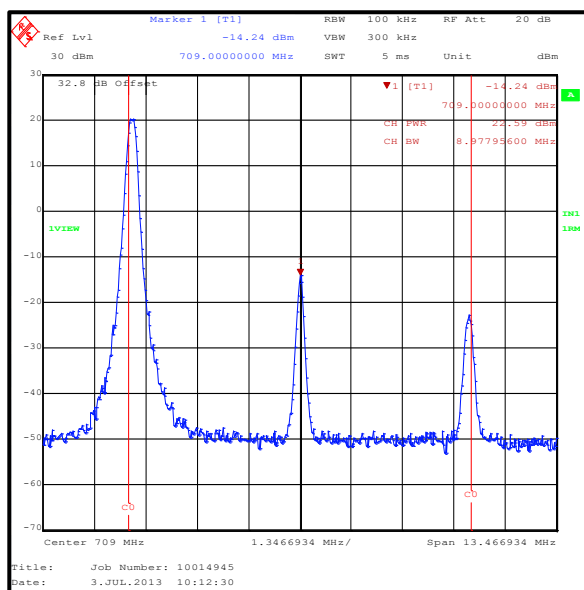
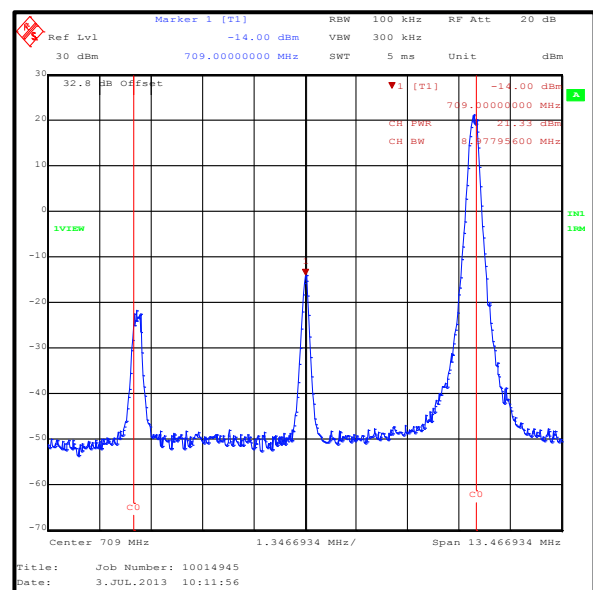
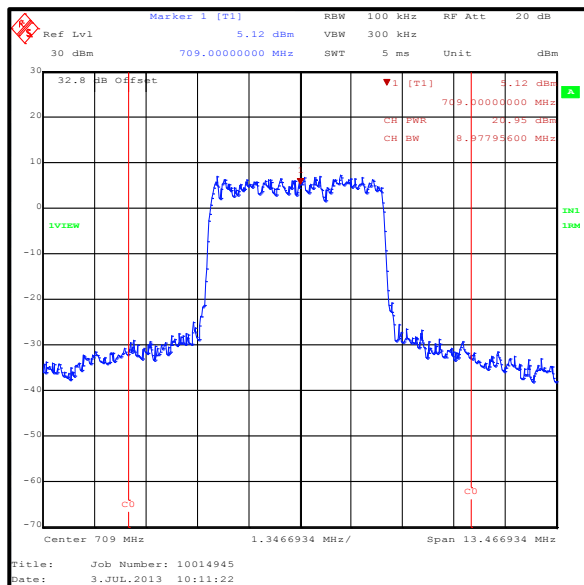
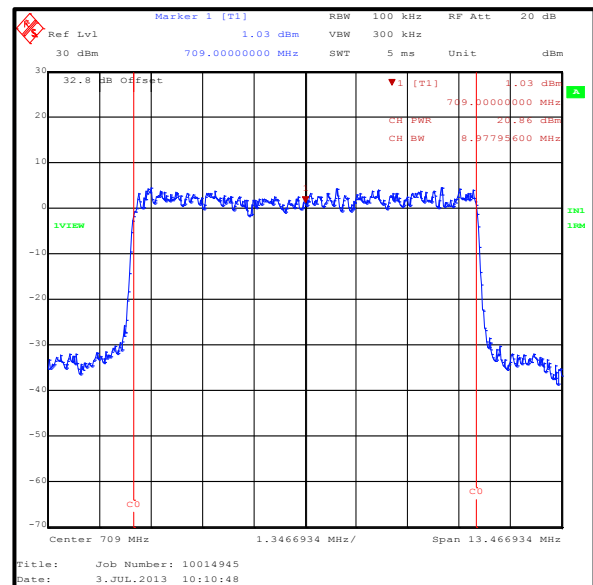
Transmitter Output Power (ERP) (continued)**Results: 10 MHz Channel Bandwidth / Bottom Channel / QPSK**

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBi)	ERP (dBm)	ERP Limit (dBm)	Margin (dB)	Result
709.0	1	0	23.5	-5.64	17.86	34.8	16.94	Complied
709.0	1	49	22.7	-5.64	17.06	34.8	17.74	Complied
709.0	25	12	22.2	-5.64	16.56	34.8	18.24	Complied
709.0	50	0	21.9	-5.64	16.26	34.8	18.54	Complied

**QPSK / 1 Resource Block (0 offset)****QPSK / 1 Resource Block (49 offset)****QPSK / 25 Resource Blocks (12 offset)****QPSK / 50 Resource Blocks (0 offset)**

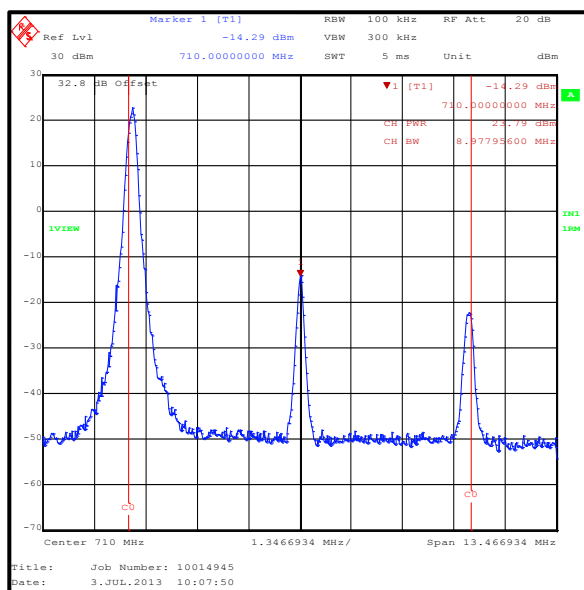
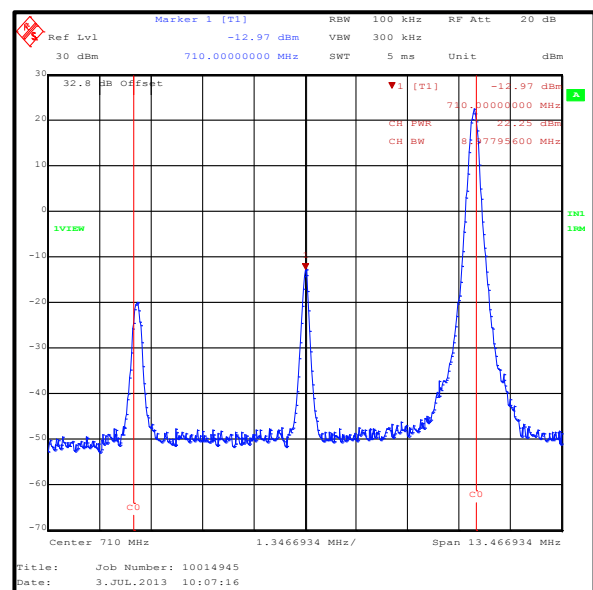
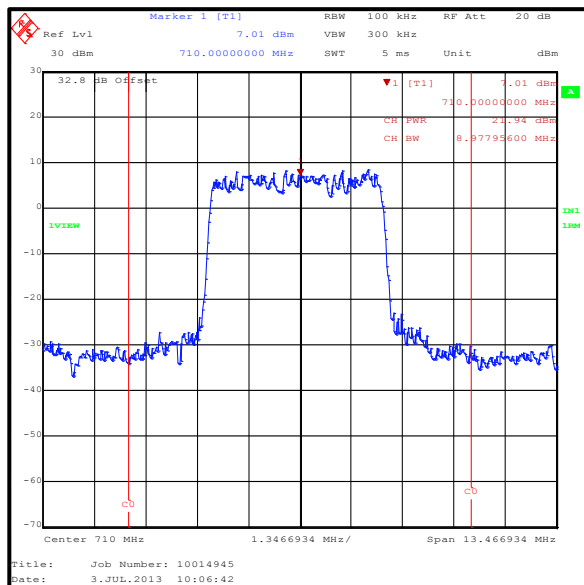
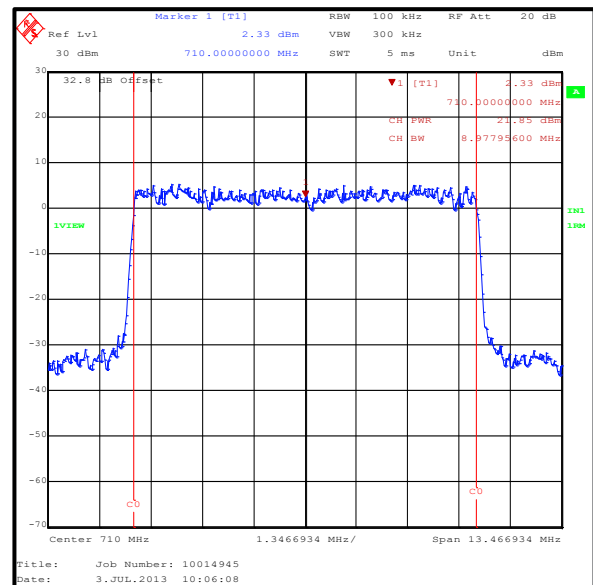
Transmitter Output Power (ERP) (continued)**Results: 10 MHz Channel Bandwidth / Bottom Channel / 16QAM**

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBi)	ERP (dBm)	ERP Limit (dBm)	Margin (dB)	Result
709.0	1	0	22.6	-5.64	16.96	34.8	17.84	Complied
709.0	1	49	21.3	-5.64	15.66	34.8	19.14	Complied
709.0	25	12	21.0	-5.64	15.36	34.8	19.44	Complied
709.0	50	0	20.9	-5.64	15.26	34.8	19.54	Complied

**16QAM / 1 Resource Block (0 offset)****16QAM / 1 Resource Block (49 offset)****16QAM / 25 Resource Blocks (12 offset)****16QAM / 50 Resource Blocks (0 offset)**

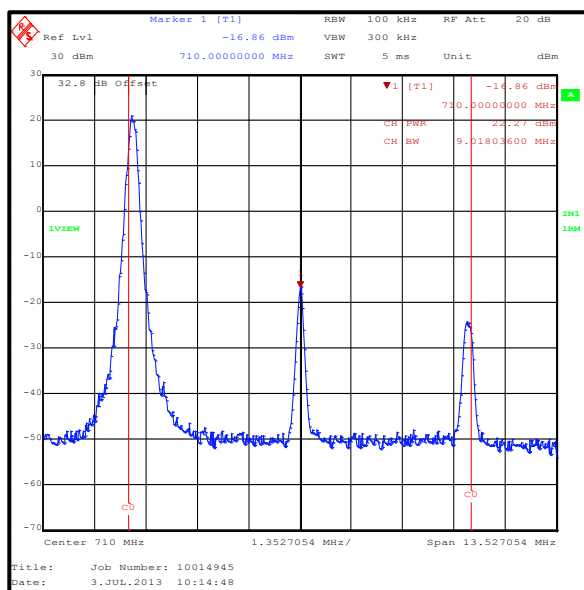
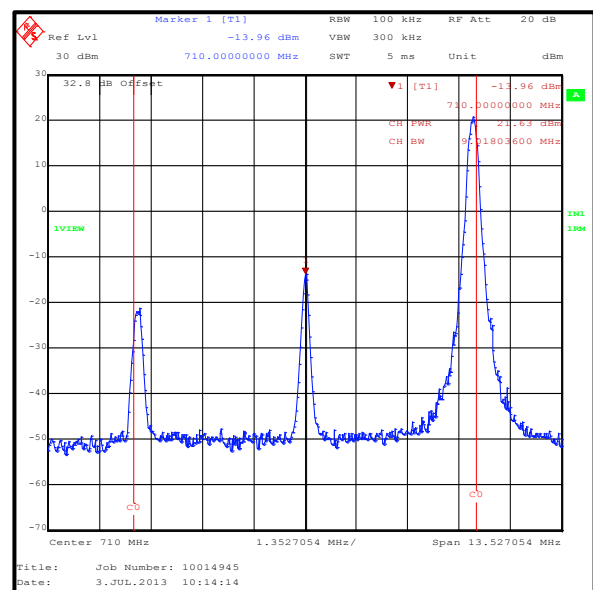
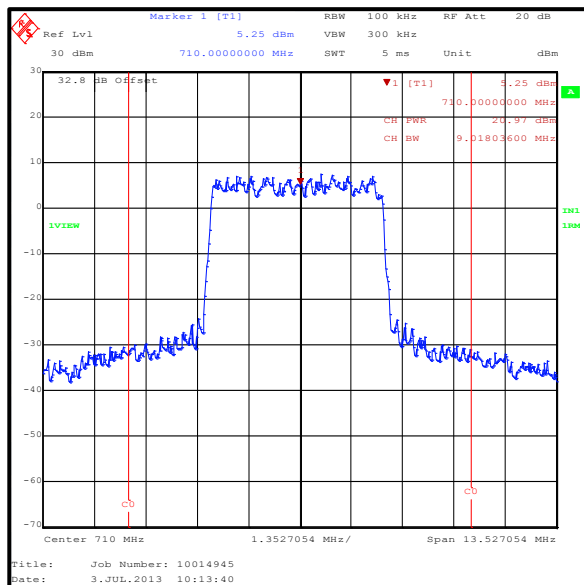
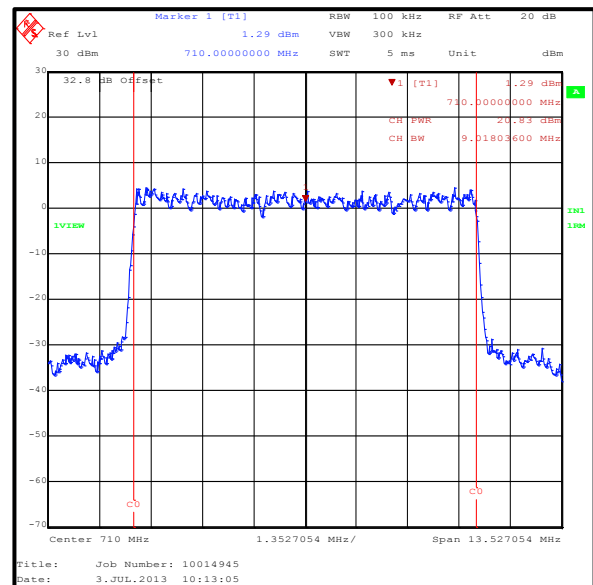
Transmitter Output Power (ERP) (continued)**Results: 10 MHz Channel Bandwidth / Middle Channel / QPSK**

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBi)	ERP (dBm)	ERP Limit (dBm)	Margin (dB)	Result
710.0	1	0	23.8	-5.64	18.16	34.8	16.64	Complied
710.0	1	49	22.3	-5.64	16.66	34.8	18.14	Complied
710.0	25	12	21.9	-5.64	16.26	34.8	18.54	Complied
710.0	50	0	21.9	-5.64	16.26	34.8	18.54	Complied

**QPSK / 1 Resource Block (0 offset)****QPSK / 1 Resource Block (49 offset)****QPSK / 25 Resource Blocks (12 offset)****QPSK / 50 Resource Blocks (0 offset)**

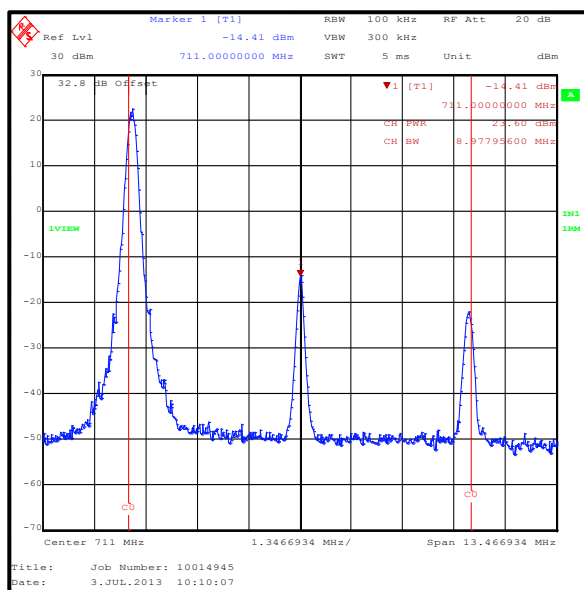
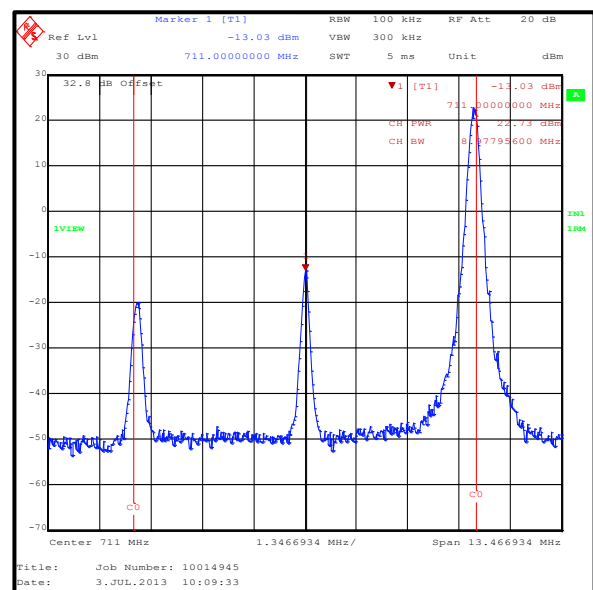
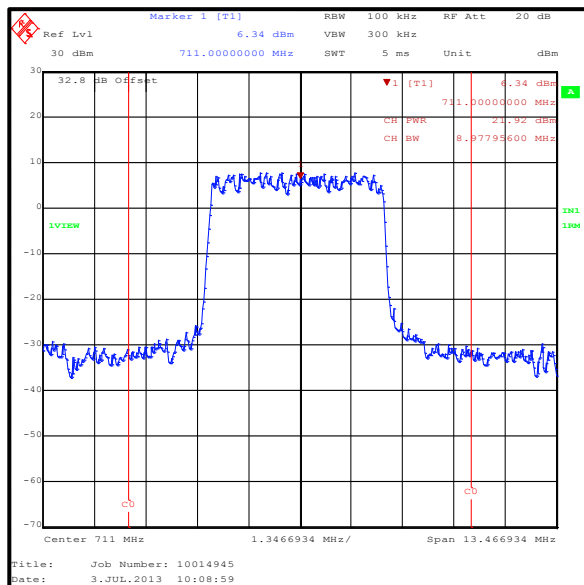
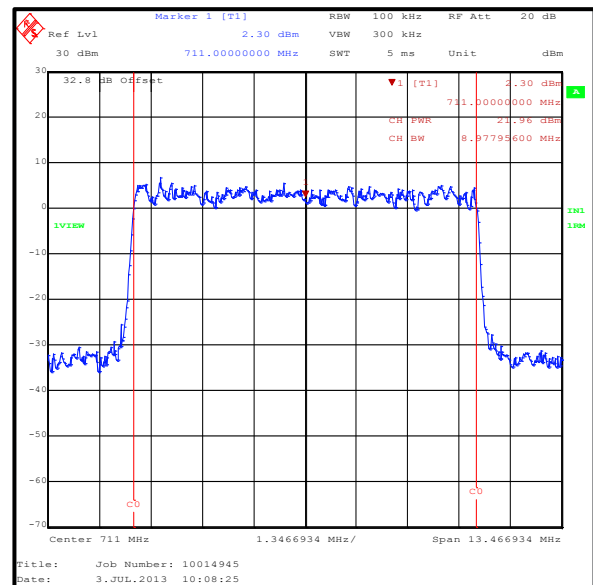
Transmitter Output Power (ERP) (continued)**Results: 10 MHz Channel Bandwidth / Middle Channel / 16QAM**

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBi)	ERP (dBm)	ERP Limit (dBm)	Margin (dB)	Result
710.0	1	0	22.3	-5.64	16.66	34.8	18.14	Complied
710.0	1	49	21.6	-5.64	15.96	34.8	18.84	Complied
710.0	25	12	21.0	-5.64	15.36	34.8	19.44	Complied
710.0	50	0	20.8	-5.64	15.16	34.8	19.64	Complied

**16QAM / 1 Resource Block (0 offset)****16QAM / 1 Resource Block (49 offset)****16QAM / 25 Resource Blocks (12 offset)****16QAM / 50 Resource Blocks (0 offset)**

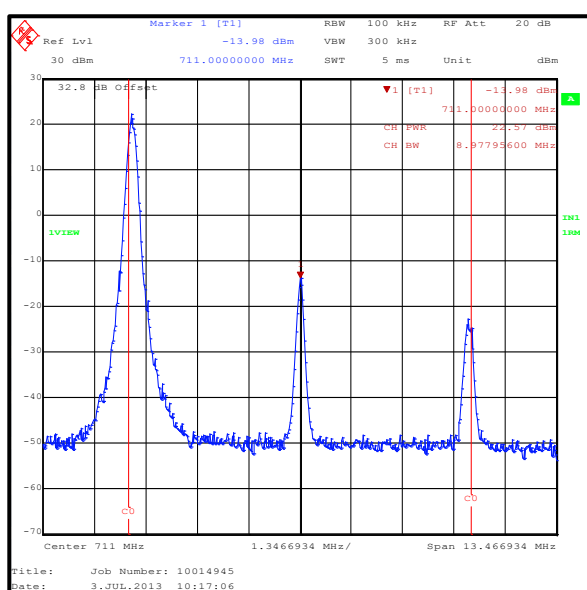
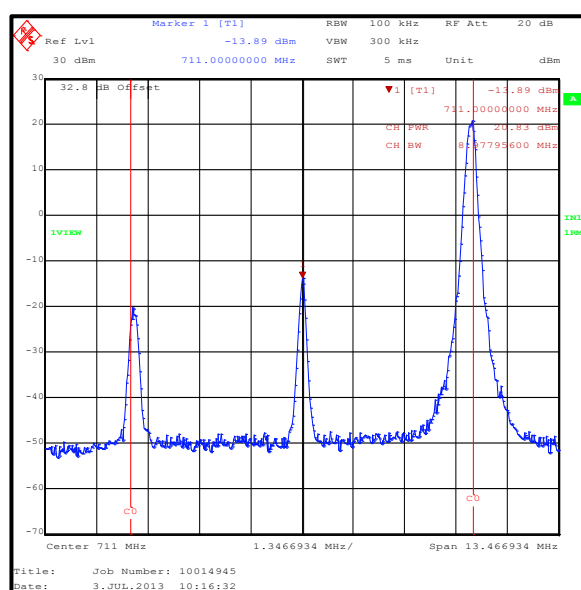
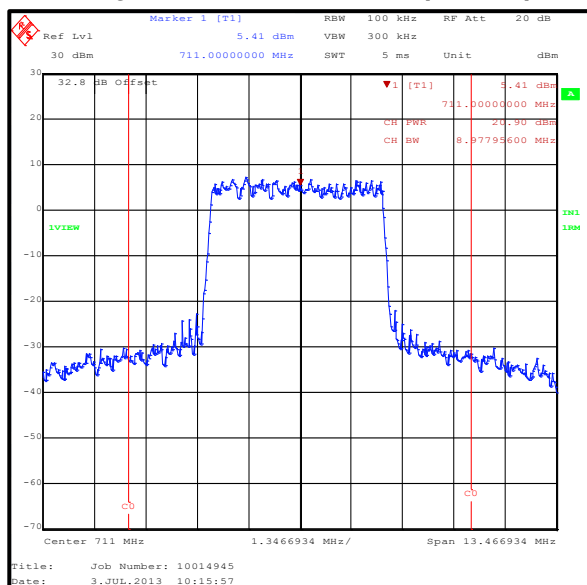
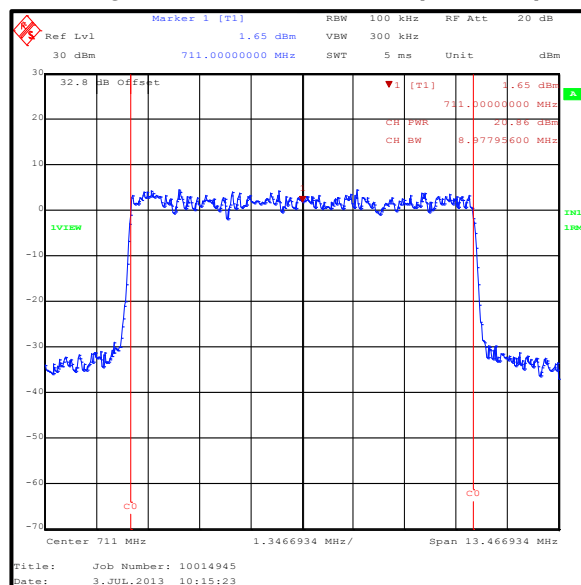
Transmitter Output Power (ERP) (continued)**Results: 10 MHz Channel Bandwidth / Top Channel / QPSK**

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBi)	ERP (dBm)	ERP Limit (dBm)	Margin (dB)	Result
711.0	1	0	23.6	-5.64	17.96	34.8	16.84	Complied
711.0	1	49	22.7	-5.64	17.06	34.8	17.74	Complied
711.0	25	12	21.9	-5.64	16.26	34.8	18.54	Complied
711.0	50	0	22.0	-5.64	16.36	34.8	18.44	Complied

**QPSK / 1 Resource Block (0 offset)****QPSK / 1 Resource Block (49 offset)****QPSK / 25 Resource Blocks (12 offset)****QPSK / 50 Resource Blocks (0 offset)**

Transmitter Output Power (ERP) (continued)**Results: 10 MHz Channel Bandwidth / Top Channel / 16QAM**

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBi)	ERP (dBm)	ERP Limit (dBm)	Margin (dB)	Result
711.0	1	0	22.6	-5.64	16.96	34.8	17.84	Complied
711.0	1	49	20.8	-5.64	15.16	34.8	19.64	Complied
711.0	25	12	20.9	-5.64	15.26	34.8	19.54	Complied
711.0	50	0	20.9	-5.64	15.26	34.8	19.54	Complied

**16QAM / 1 Resource Block (0 offset)****16QAM / 1 Resource Block (49 offset)****16QAM / 25 Resource Blocks (12 offset)****16QAM / 50 Resource Blocks (0 offset)**

Transmitter Output Power (ERP) (continued)**Test Equipment Used:**

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M1659	Thermometer / Hygrometer station	JM Handelspunkt	30.5015.13	None stated	24 May 2014	12
L1014	Test Receiver	Rohde & Schwarz	ESIB 40	100014	10 May 2014	24
A1368	Directional Coupler	Pasternack Enterprises	PE2214-10	None stated	Calibrated before use	-
A2143	Attenuator	AtlanTec RF	AN18-20	081120-23	10 May 2014	12
S0523	DC Power Supply	TTi	PL320	224235	Calibrated before use	-
M1269	Multimeter	Fluke	179	90250210	30 Jul 2013	12
M1267	Thermal Power Sensor	Rhode & Schwarz	NRV-Z52	100155	14 May 2014	12
M199	Power Meter	Rhode & Schwarz	NRVS	827023/075	15 May 2014	12
M1021	Signal Generator	Rhode & Schwarz	SMP02	833286/004	05 Feb 2014	12

5.2.2. Transmitter Occupied Bandwidth**Test Summary:**

Test Engineer:	Ben Mercer	Test Dates:	28 June 2013 & 03 July 2013
Test Sample IMEI:	004402451256097		

FCC Reference:	Part 2.1049
Test Method Used:	As detailed in KDB 971168 D01 Section 4.2

Environmental Conditions:

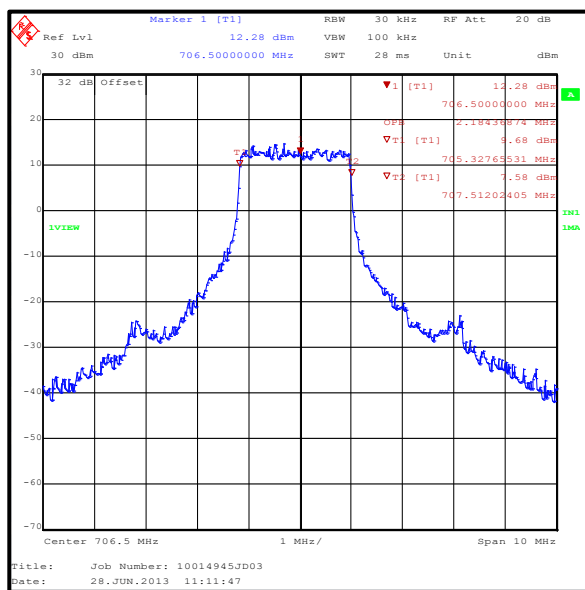
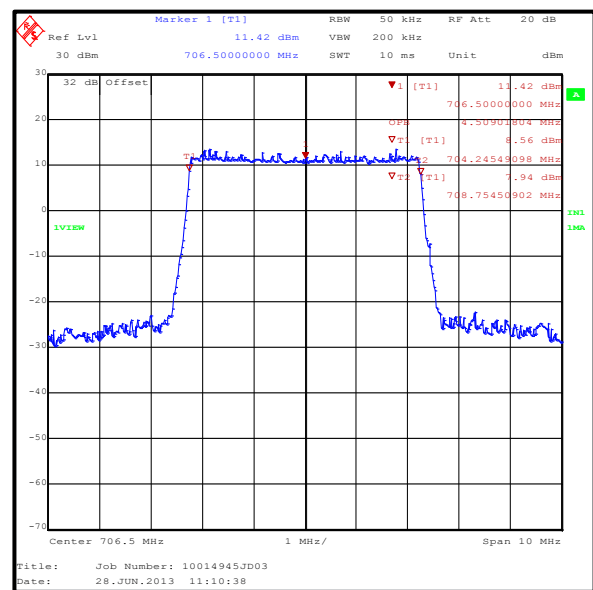
Temperature (°C):	23 to 25
Relative Humidity (%):	36 to 38

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 block settings as detailed in section 4.3 of this report.

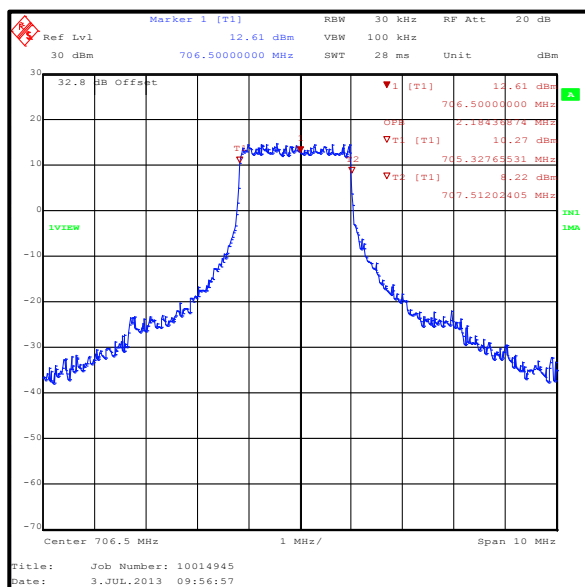
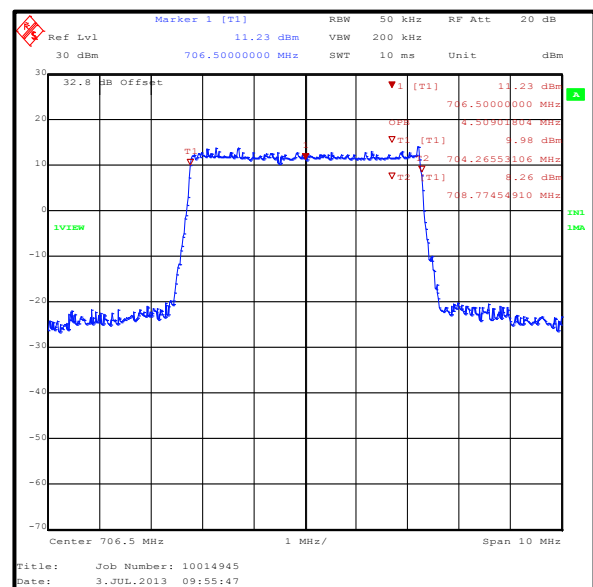
Transmitter Occupied Bandwidth (continued)**Results: 5 MHz Channel Bandwidth / Bottom Channel / QPSK**

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
706.5	12	6	30	100	2.184
706.5	25	0	50	200	4.509

**QPSK / 12 Resource Blocks (6 offset)****QPSK / 25 Resource Blocks (0 offset)**

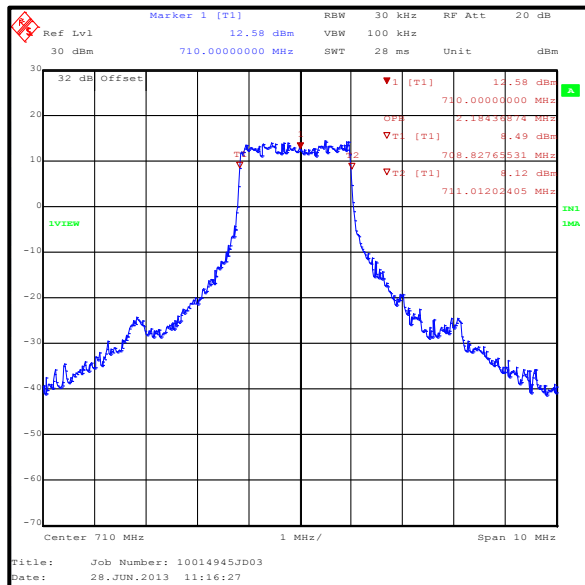
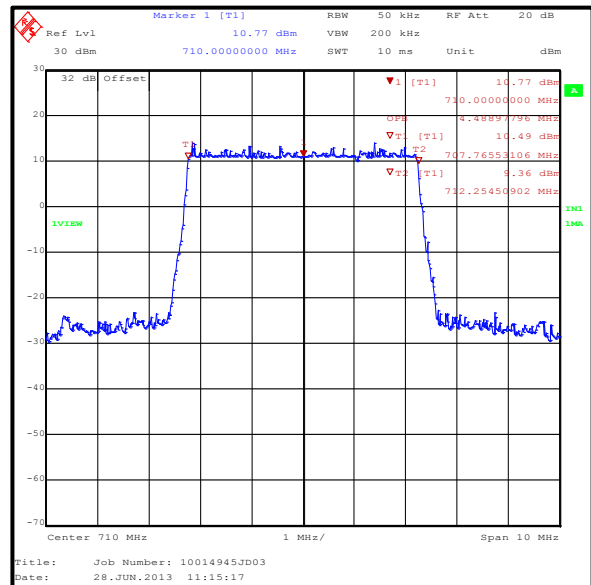
Transmitter Occupied Bandwidth (continued)**Results: 5 MHz Channel Bandwidth / Bottom Channel / 16QAM**

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
706.5	12	6	30	100	2.184
706.5	25	0	50	200	4.509

**16QAM / 12 Resource Blocks (6 offset)****16QAM / 25 Resource Blocks (0 offset)**

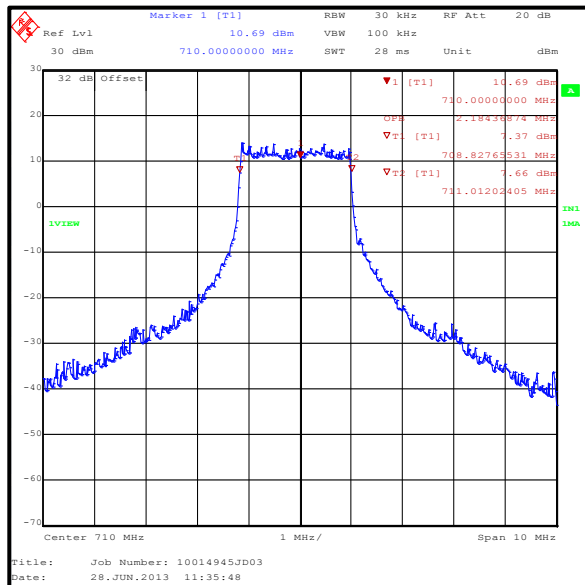
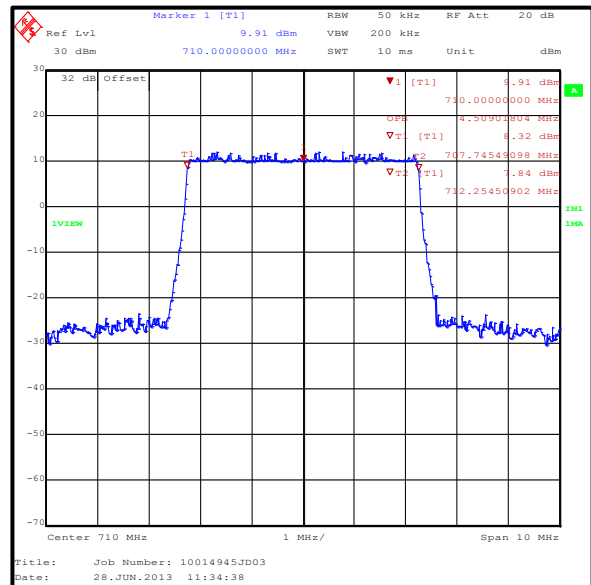
Transmitter Occupied Bandwidth (continued)**Results: 5 MHz Channel Bandwidth / Middle Channel / QPSK**

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
710.0	12	6	30	100	2.184
710.0	25	0	50	200	4.489

**QPSK / 12 Resource Blocks (6 offset)****QPSK / 25 Resource Blocks (0 offset)**

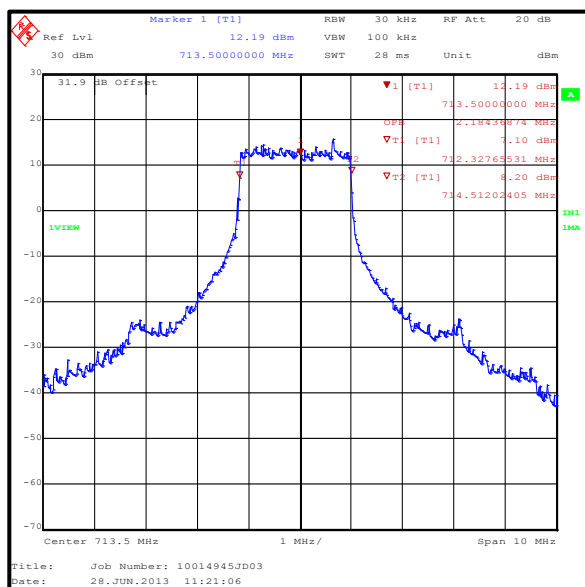
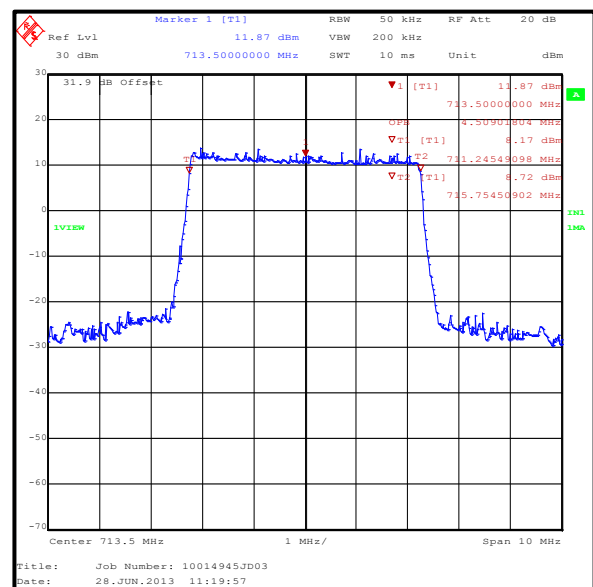
Transmitter Occupied Bandwidth (continued)**Results: 5 MHz Channel Bandwidth / Middle Channel / 16QAM**

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
710.0	12	6	30	100	2.184
710.0	25	0	50	200	4.509

**16QAM / 12 Resource Blocks (6 offset)****16QAM / 25 Resource Blocks (0 offset)**

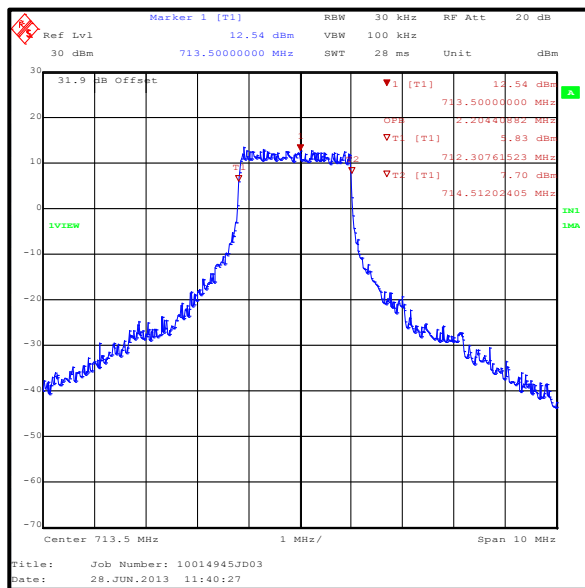
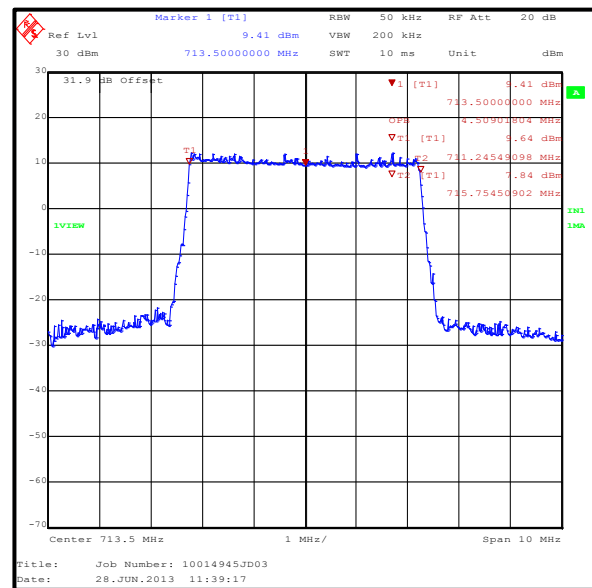
Transmitter Occupied Bandwidth (continued)**Results: 5 MHz Channel Bandwidth / Top Channel / QPSK**

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
713.5	12	6	30	100	2.184
713.5	25	0	50	200	4.509

**QPSK / 12 Resource Blocks (6 offset)****QPSK / 25 Resource Blocks (0 offset)**

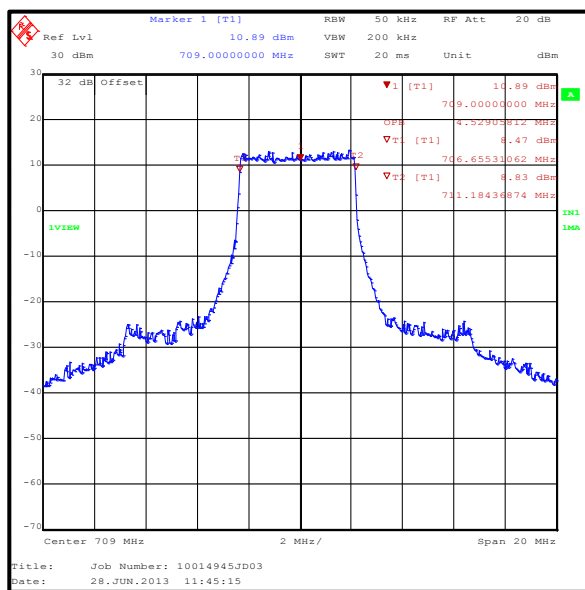
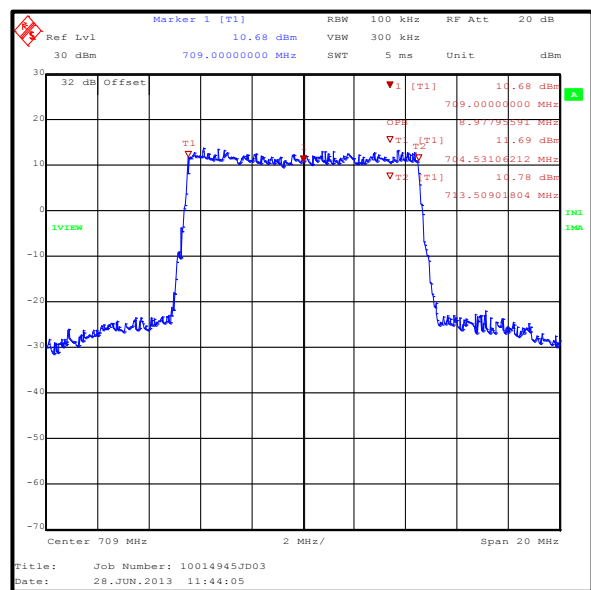
Transmitter Occupied Bandwidth (continued)**Results: 5 MHz Channel Bandwidth / Top Channel / 16QAM**

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
713.5	12	6	30	100	2.204
713.5	25	0	50	200	4.509

**16QAM / 12 Resource Blocks (6 offset)****16QAM / 25 Resource Blocks (0 offset)**

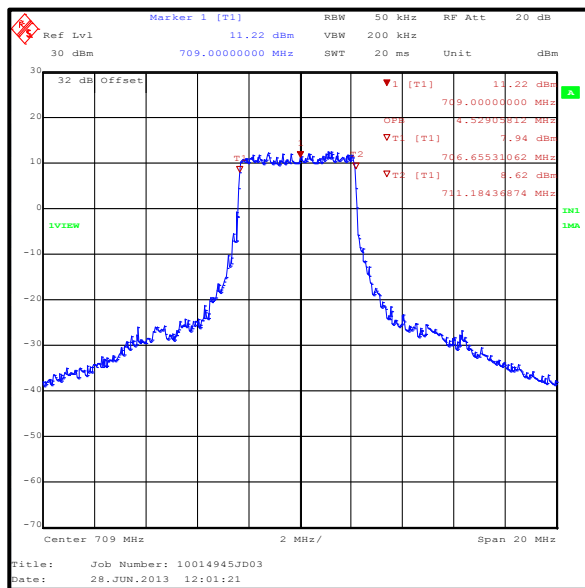
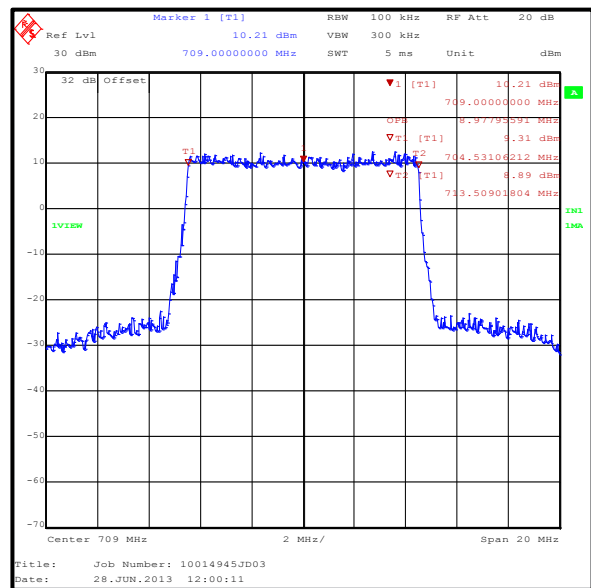
Transmitter Occupied Bandwidth (continued)**Results: 10 MHz Channel Bandwidth / Bottom Channel / QPSK**

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
709.0	25	12	50	200	4.529
709.0	50	0	100	300	8.978

**QPSK / 25 Resource Blocks (12 offset)****QPSK / 50 Resource Blocks (0 offset)**

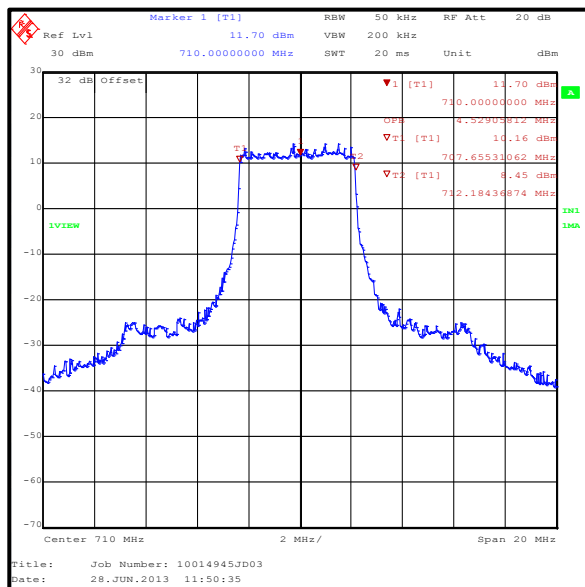
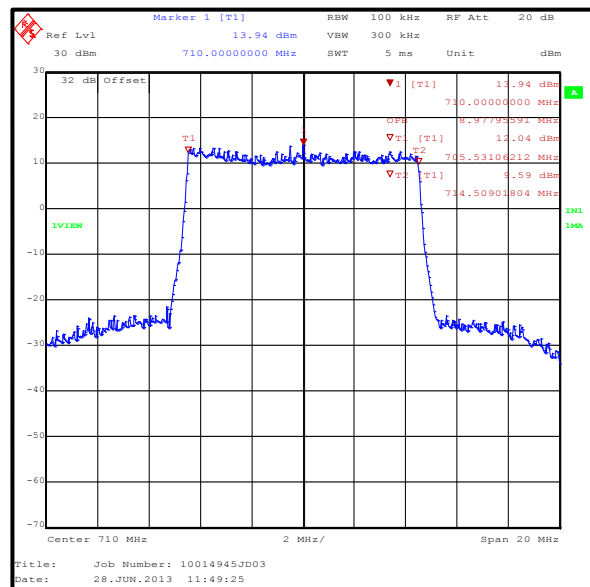
Transmitter Occupied Bandwidth (continued)**Results: 10 MHz Channel Bandwidth / Bottom Channel / 16QAM**

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
709.0	25	12	50	200	4.529
709.0	50	0	100	300	8.978

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

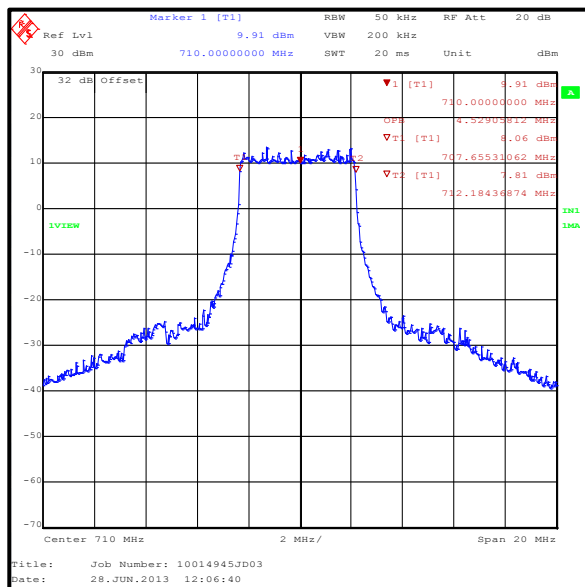
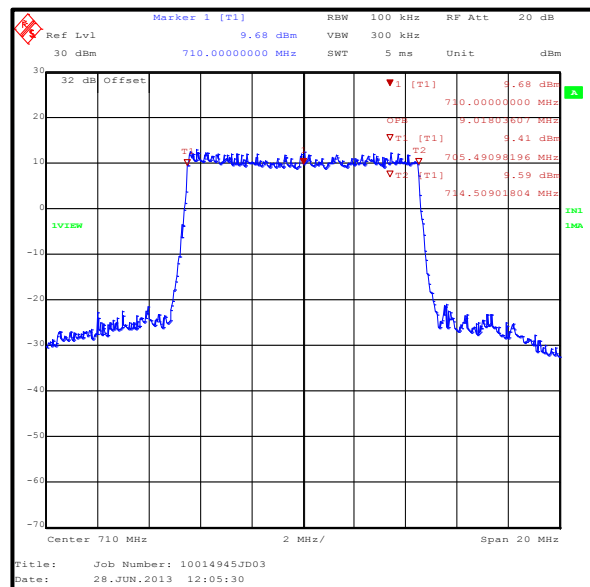
Transmitter Occupied Bandwidth (continued)**Results: 10 MHz Channel Bandwidth / Middle Channel / QPSK**

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
710.0	25	12	50	200	4.529
710.0	50	0	100	300	8.978

**QPSK / 25 Resource Blocks (12 offset)****QPSK / 50 Resource Blocks (0 offset)**

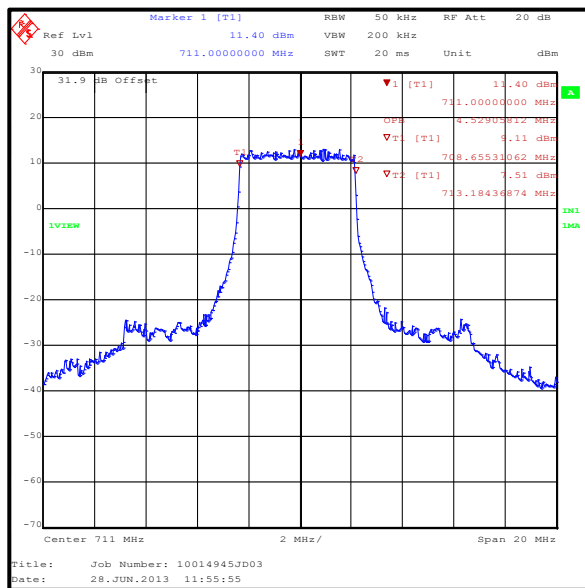
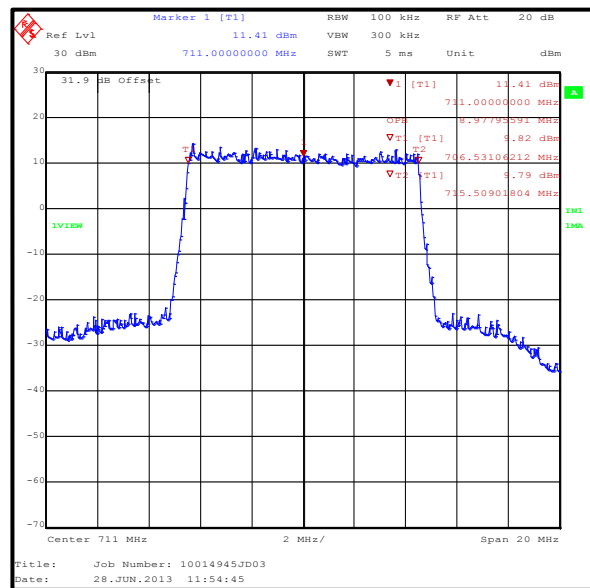
Transmitter Occupied Bandwidth (continued)**Results: 10 MHz Channel Bandwidth / Middle Channel / 16QAM**

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
710.0	25	12	50	200	4.529
710.0	50	0	100	300	9.018

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

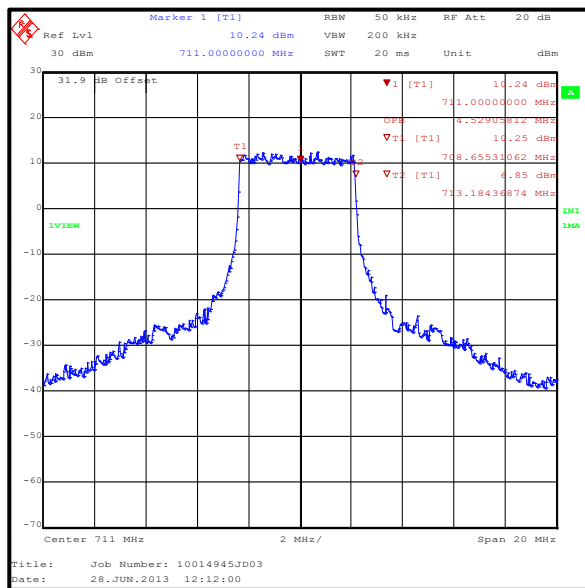
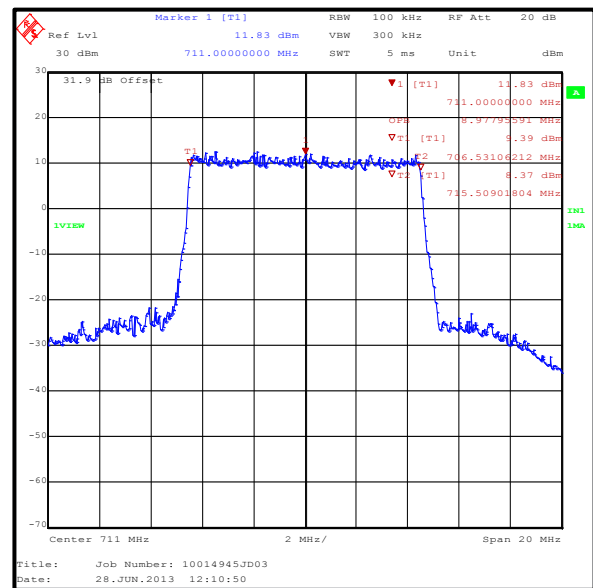
Transmitter Occupied Bandwidth (continued)**Results: 10 MHz Channel Bandwidth / Top Channel / QPSK**

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
711.0	25	12	50	200	4.529
711.0	50	0	100	300	8.978

**QPSK / 25 Resource Blocks (12 offset)****QPSK / 50 Resource Blocks (0 offset)**

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

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
711.0	25	12	50	200	4.529
711.0	50	0	100	300	8.978

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

Transmitter Occupied Bandwidth (continued)**Test Equipment Used:**

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M1659	Thermometer / Hygrometer station	JM Handelspunkt	30.5015.13	None stated	24 May 2014	12
L1014	Test Receiver	Rohde & Schwarz	ESIB 40	100014	10 May 2014	24
A2143	Attenuator	AtlanTec RF	AN18-20	081120-23	10 May 2014	12
A1368	Directional Coupler	Pasternack Enterprises	PE2214-10	None stated	Calibrated before use	-
S0520	DC Power Supply	GW Instek	GPC-3030	E835141	Calibrated before use	-
M1269	Multimeter	Fluke	179	90250210	30 Jul 2013	12

5.2.3. Transmitter Radiated Spurious Emissions**Test Summary:**

Test Engineers:	Mark Percival & Nick Steele	Test Dates:	27 June 2013 & 07 July 2013
Test Sample IMEI:	004402451263820		

FCC Reference:	Parts 2.1053 & 27.53(g)
Test Method Used:	As detailed in ANSI TIA-603-C-2004 Section 2.2.12. referencing FCC Part 2.1053
Frequency Range:	30 MHz to 8 GHz
Configuration:	10 MHz QPSK, 1RB, 0 Offset

Environmental Conditions:

Temperature (°C):	22 to 25
Relative Humidity (%):	35 to 44

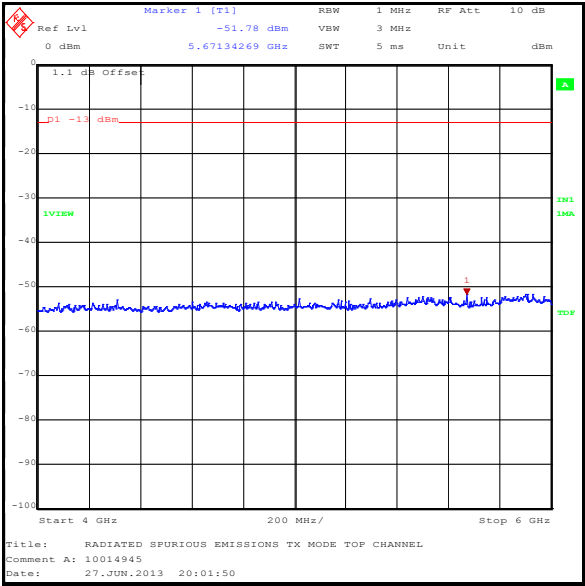
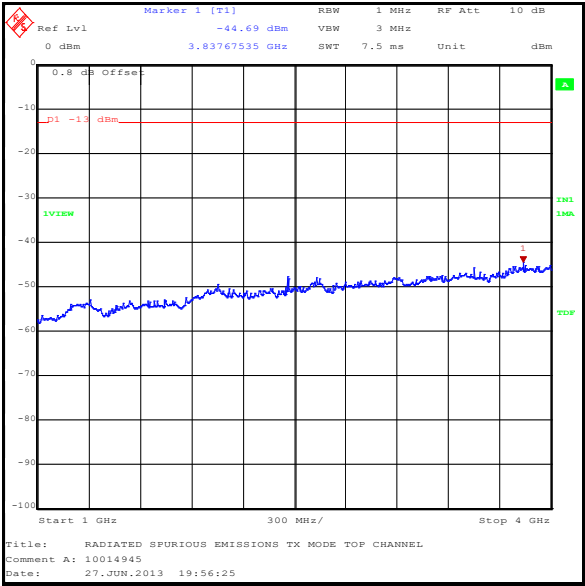
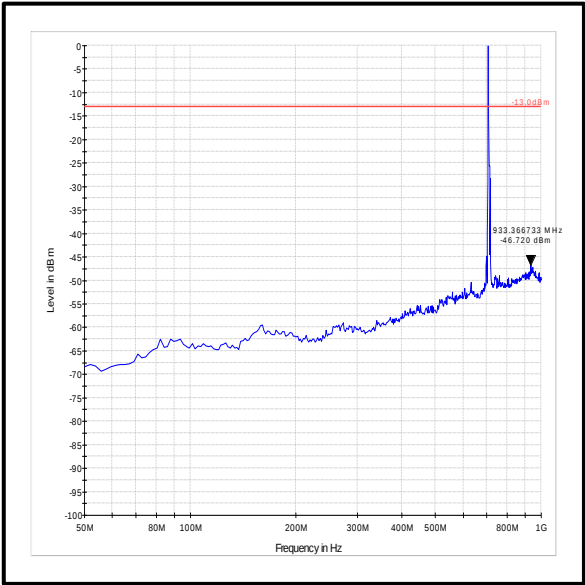
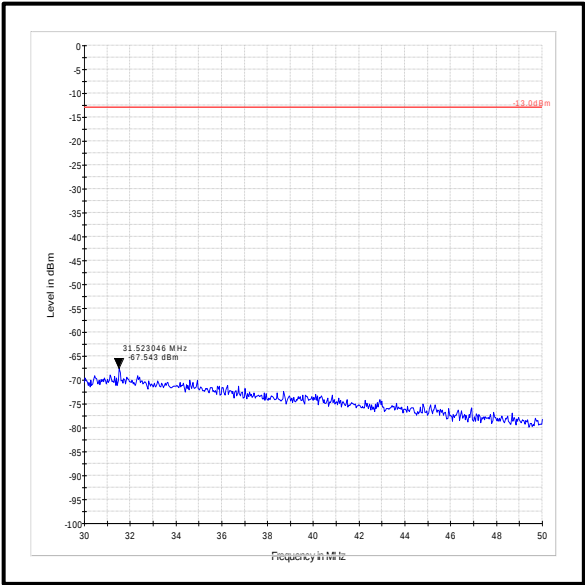
Note(s):

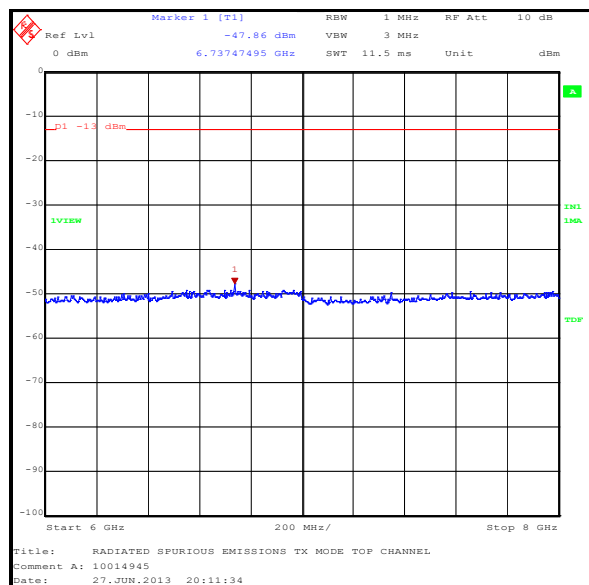
1. The EUT was set to transmit with 10 MHz channel bandwidth using QPSK modulation and 1 resource block with 0 offset, as this was found to be the worst case modulation scheme with regards to emissions after preliminary investigations and, as this mode emits the highest transmit output power level, it was deemed to be the worst case.
2. The emission seen on the 30 MHz to 1 GHz plot at approximately 711 MHz is the EUT carrier.
3. No spurious emissions were detected above the measurement system noise floor therefore the highest peak noise floor reading of the measuring receiver was recorded in the table below.
4. Measurements below 1 GHz were performed in a semi-anechoic chamber (Asset Number K0001) at a distance of 3 metres. The EUT was placed at a height of 80 cm above the reference ground plane in the centre of the chamber turntable. Maximum emission levels were determined by height searching the measurement antenna over the range 1 metre to 4 metres.
5. Pre-scans above 1 GHz were performed in a fully anechoic chamber (Asset Number K0002) at a distance of 3 metres. The EUT was placed at a height of 1.5 metres above the test chamber floor in the centre of the chamber turntable. All measurement antennas were placed at a fixed height of 1.5 metres above the test chamber floor, in line with the EUT. Final measurements above 1 GHz were performed in a semi-anechoic chamber (Asset Number K0001) at a distance of 3 metres. The EUT was placed at a height of 80 cm above the reference ground plane in the centre of the chamber turntable. Maximum emission levels were determined by height searching the measurement antenna over the range 1 metre to 4 metres.

Results:

Frequency (MHz)	Antenna Polarisation	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
3837.675	Vertical	-44.7	-13.0	31.7	Complied

Transmitter Radiated Spurious Emissions (continued)



Transmitter Radiated Spurious Emissions (continued)**Test Equipment Used:**

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M1622	Thermometer / Hygrometer station	JM Handelspunkt	30.5015.13	None stated	24 May 2014	12
K0001	5m RSE Chamber	Rainford EMC	N/A	N/A	24 Oct 2013	12
G0543	Amplifier	Sonoma	310N	230801	05 Oct 2013	3
M1273	Test Receiver	Rohde & Schwarz	ESIB 26	100275	07 Feb 2014	12
A1834	Attenuator	Hewlett Packard	8491B	10444	27 Jan 2014	12
A1393	Attenuator	Huber & Suhner	6820.17.B	757456	10 May 2014	12
A490	Antenna	Chase	CBL6111A	1590	09 Apr 2014	12
K0002	3m RSE Chamber	Rainford EMC	N/A	N/A	04 Nov 2013	12
M1656	Thermometer / Hygrometer station	JM Handelspunkt	30.5015.13	None stated	24 May 2014	12
M1124	Test Receiver	Rohde & Schwarz	ESIB 26	100046K	14 Aug 2013	12
A1534	Pre-Amplifier	Hewlett Packard	8449B	3008A00405	04 Nov 2013	12
A1396	Attenuator	Huber & Suhner	6810.17.B	757987	10 May 2014	12
A1974	High Pass Filter	AtlanTecRF	AFH-01000	090000283	19 Apr 2014	12
A1818	Antenna	EMCO	3115	00075692	04 Nov 2013	12
A253	Antenna	Flann	12240-20	128	04 Nov 2013	12
A254	Antenna	Flann	14240-20	139	04 Nov 2013	12

5.2.4. Transmitter Radiated Emissions at Band Edges**Test Summary:**

Test Engineer:	Mark Percival	Test Dates:	10 July 2013 & 14 July 2013
Test Sample IMEI:	004402451263820		

FCC Reference:	Parts 2.1053 & 27.53(g)
Test Method Used:	As detailed in ANSI TIA-603-C-2004 Section 2.2.12. referencing FCC Part 27.53

Environmental Conditions:

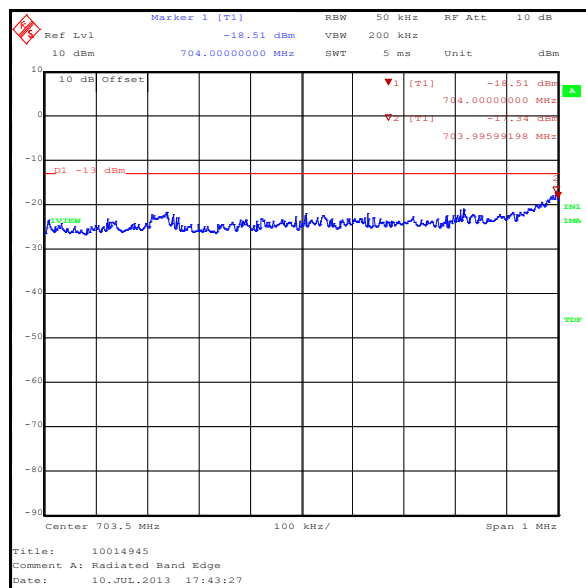
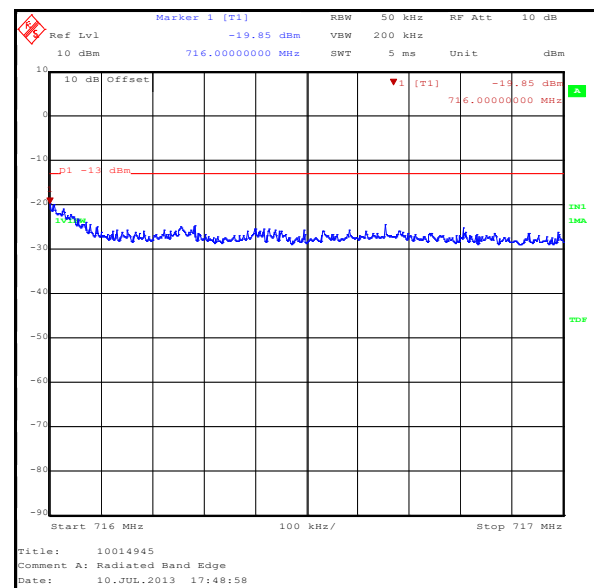
Temperature (°C):	22 to 24
Relative Humidity (%):	36 to 37

Note(s):

1. Measurements were performed with the EUT transmitting QPSK and 16QAM modulation schemes, with maximum resource block settings.

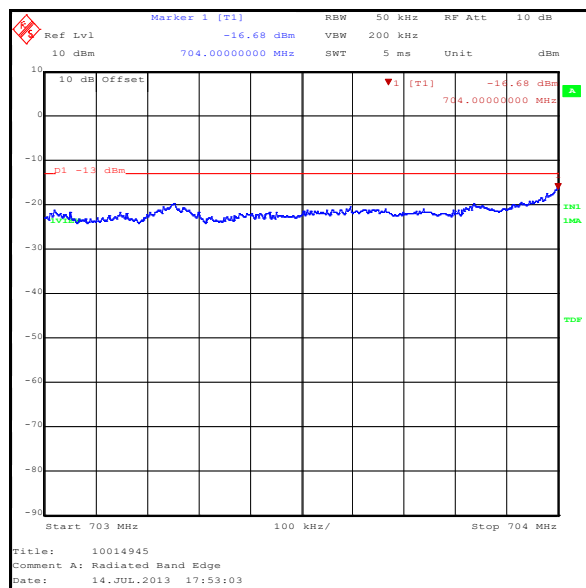
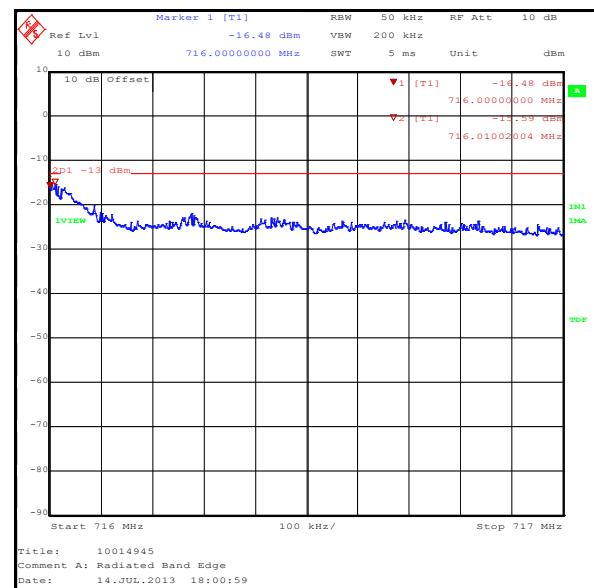
Transmitter Radiated Emissions at Band Edges (continued)**Results: 5 MHz Channel Bandwidth / QPSK**

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
703.996	25	0	-17.3	-13.0	4.3	Complied
704	25	0	-18.5	-13.0	5.5	Complied
716	25	0	-19.9	-13.0	6.9	Complied

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

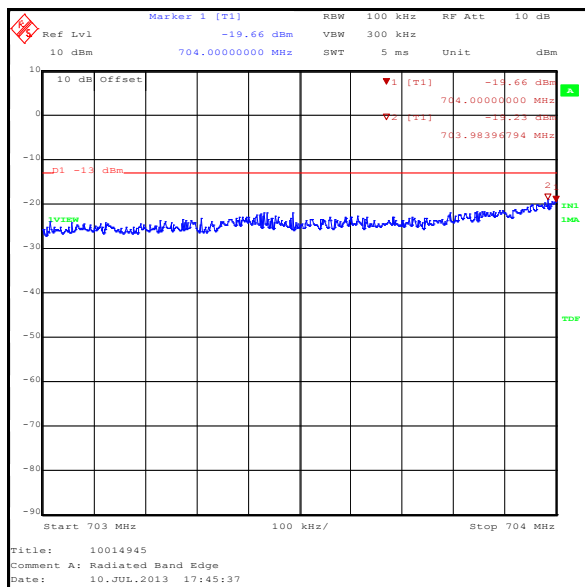
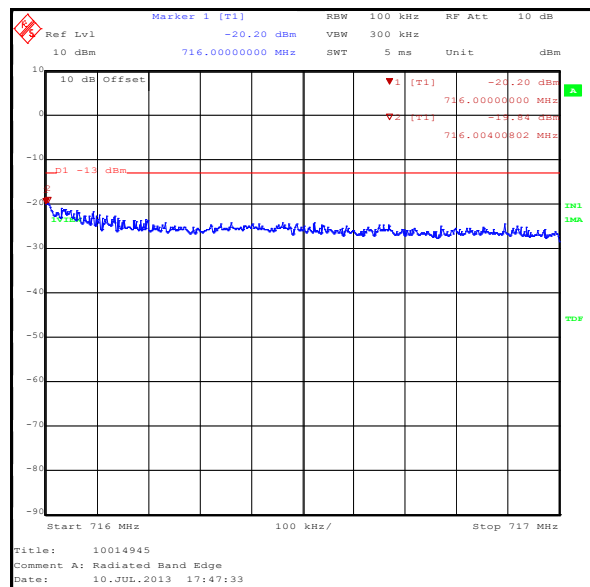
Transmitter Radiated Emissions at Band Edges (continued)**Results: 5 MHz Channel Bandwidth / 16QAM**

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
704	25	0	-16.7	-13.0	3.7	Complied
716	25	0	-16.5	-13.0	3.5	Complied
716.010	25	0	-15.6	-13.0	2.6	Complied

**16QAM / 25 Resource Blocks (0 offset)****16QAM / 25 Resource Blocks (0 offset)**

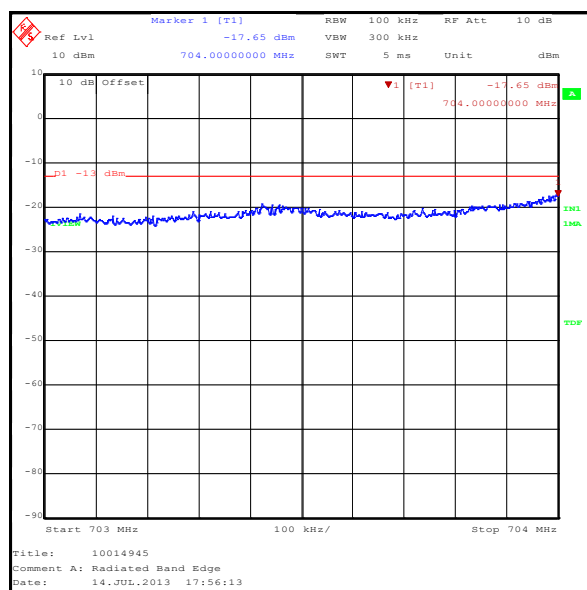
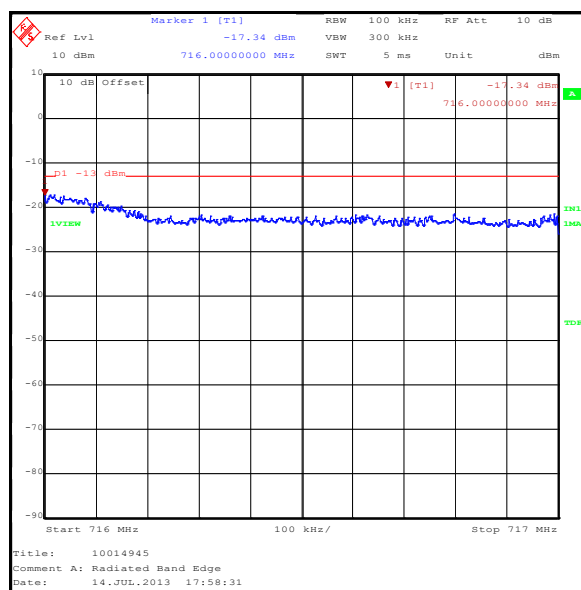
Transmitter Radiated Emissions at Band Edges (continued)**Results: 10 MHz Channel Bandwidth / QPSK**

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
703.984	50	0	-19.2	-13.0	6.2	Complied
704	50	0	-19.7	-13.0	6.7	Complied
716	50	0	-20.2	-13.0	7.2	Complied
716.004	50	0	-19.8	-13.0	6.8	Complied

**QPSK / 25 Resource Block (0 offset)****QPSK / 25 Resource Block (0 offset)**

Transmitter Radiated Emissions at Band Edges (continued)**Results: 10 MHz Channel Bandwidth / QPSK**

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
704	50	0	-17.7	-13.0	4.7	Complied
716	50	0	-17.3	-13.0	4.3	Complied

**QPSK / 25 Resource Block (0 offset)****QPSK / 25 Resource Block (0 offset)****Test Equipment Used:**

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M1656	Thermometer / Hygrometer station	JM Handelspunkt	30.5015.13	None stated	24 May 2014	12
K0002	3m RSE Chamber	Rainford	N/A	N/A	04 Nov 2013	12
M1124	Test Receiver	Rohde & Schwarz	ESIB 26	100046K	14 Aug 2013	12
A288	Antenna	Chase	CBL6111A	1589	15 Aug 2013	12
A1396	Attenuator	Huber & Suhner	6810.17.B	757987	10 May 2014	12

5.2.5. Transmitter Frequency Stability (Temperature Variation)**Test Summary:**

Test Engineers:	Ahmed Ali & Nick Steele	Test Dates:	09 July 2013 & 10 July 2013
Test Sample IMEI:	004402451254886		

FCC Reference:	Parts 2.1055 & 27.54
Test Method Used:	As detailed in ANSI TIA-603-C-2004 Section 2.2.2 referencing FCC CFR Part 2.1055

Environmental Conditions:

Temperature (°C):	23 to 24
Relative Humidity (%):	38 to 42

Note(s):

1. A voltage variation jig was connected to the EUT which was powered via a bench power supply.
2. Frequency error was measured using a calibrated Rohde & Schwarz CMW 500 Wideband Radio Communications Tester in accordance with current Rohde & Schwarz application notes. The EUT was connected by suitable RF cables to the CMW 500. A bidirectional 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 (706.5 MHz)**

Temperature (°C)	Frequency Error (Hz)	Measured Frequency (MHz)	Lower Band Edge Limit (MHz)	Margin (MHz)	Result
-30	8	706.499992	704	2.499992	Complied
-20	7	706.499993	704	2.499993	Complied
-10	6	706.499994	704	2.499994	Complied
0	4	706.499996	704	2.499996	Complied
10	5	706.500005	704	2.500005	Complied
20	6	706.499994	704	2.499994	Complied
30	7	706.499993	704	2.499993	Complied
40	6	706.499994	704	2.499994	Complied
50	4	706.499996	704	2.499996	Complied

Results: Top Channel (713.5 MHz)

Temperature (°C)	Frequency Error (Hz)	Measured Frequency (MHz)	Lower Band Edge Limit (MHz)	Margin (MHz)	Result
-30	7	713.499993	716	2.500007	Complied
-20	5	713.499995	716	2.500005	Complied
-10	6	713.499994	716	2.500006	Complied
0	3	713.500003	716	2.499997	Complied
10	6	713.499994	716	2.500006	Complied
20	6	713.499994	716	2.500006	Complied
30	6	713.499994	716	2.500006	Complied
40	4	713.499996	716	2.500004	Complied
50	4	713.500004	716	2.499996	Complied

Transmitter Frequency Stability (Temperature Variation) (Continued)**Test Equipment Used:**

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M1659	Thermometer / Hygrometer station	JM Handelspunkt	30.5015.13	None stated	24 May 2014	12
M1752	Radio Comms Tester	Rohde & Schwarz	CMW 500	139551	19 Jun 2014	12
E0513	Environmental Chamber	TAS	LT600 Series 3	23900506	Calibrated before use	-
M1643	Thermometer	Fluke	52II	18890136	19 Mar 2014	12
S0557	DC power supply	TTI	EL303R	395819	Calibrated before use	-
M1269	Multimeter	Fluke	179	90250210	30 Jul 2013	12

5.2.6. Transmitter Frequency Stability (Voltage Variation)**Test Summary:**

Test Engineers:	Ahmed Ali & Nick Steele	Test Dates:	09 July 2013 & 10 July 2013
Test Sample IMEI:	004402451254886		

FCC Reference:	Parts 2.1055 & 27.54
Test Method Used:	As detailed in ANSI TIA-603-C-2004 Section 2.2.2 referencing FCC CFR Part 2.1055

Environmental Conditions:

Temperature (°C):	23 to 24
Relative Humidity (%):	38 to 42

Note(s):

1. A voltage variation jig was connected to the EUT which was powered via a bench power supply.
2. Frequency error was measured using a calibrated Rohde and Schwarz CMW 500 Universal Radio Communications Tester in accordance with current Rohde and Schwarz application notes. The EUT was connected by suitable RF cables to the CMW 500. A bi-directional communications link was established between the EUT and CMW 500. The frequency meter value was recorded.
3. Voltage was monitored throughout the test with a calibrated digital voltmeter.

Results: Bottom Channel (706.5 MHz)

Supply Voltage (V)	Frequency Error (Hz)	Measured Frequency (MHz)	Lower Band Edge Limit (MHz)	Margin (MHz)	Result
3.6	6	706.499994	704	2.499994	Complied
4.2	5	706.499995	704	2.499995	Complied

Results: Top Channel (713.5 MHz)

Supply Voltage (V)	Frequency Error (Hz)	Measured Frequency (MHz)	Lower Band Edge Limit (MHz)	Margin (MHz)	Result
3.6	6	713.499994	716	2.500006	Complied
4.2	5	713.499995	716	2.500005	Complied

Transmitter Frequency Stability (Voltage Variation)**Test Equipment Used:**

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M1659	Thermometer / Hygrometer station	JM Handelspunkt	30.5015.13	None stated	24 May 2014	12
M1752	Radio Comms Tester	Rohde & Schwarz	CMW 500	139551	19 Jun 2014	12
E0513	Environmental Chamber	TAS	LT600 Series 3	23900506	Calibrated before use	-
M1643	Thermometer	Fluke	52II	18890136	19 Mar 2014	12
S0557	DC power supply	TTI	EL303R	395819	Calibrated before use	-

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	704 MHz to 716 MHz	95%	±1.13 dB
Frequency Stability	704 MHz to 716 MHz	95%	±0.92 ppm
Occupied Bandwidth	704 MHz to 716 MHz	95%	±0.92 ppm
Radiated Spurious Emissions	30 MHz to 1 GHz	95%	±5.65 dB
Radiated Spurious Emissions	1 GHz to 8 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