



TEST REPORT FROM RFI GLOBAL SERVICES LTD

Test of: AQQ

FCC ID: PKTNODEBAQQ

To: FCC Parts 2.1046, 2.1049, 2.1051, 2.1053, 2.1055, 27.50(c)(3), 27.53(g) & 27.54

Test Report Serial No.:
RFI-RPT-RP84246JD01A V2.0

Version 2.0 supersedes all previous versions

This Test Report Is Issued Under The Authority Of John Newell, Group Quality Manager:	pp 
Checked By:	Sarah Williams
Signature:	
Date of Issue:	03 August 2012

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1. Customer Information










Company Name:	General Dynamics Broadband
Address:	Unit 7 Greenways Business Park Bellinger Close Chippenham Wilts SN15 1BN United Kingdom

2. Summary of Testing

2.1. General Information

Specification Reference:	47CFR27
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications) 2011: Part 27 Subpart C (Miscellaneous Wireless Communication Services)
Site Registration:	209735
Location of Testing:	RFI Global Services Ltd, Wade Road, Basingstoke, Hampshire, RG24 8AH.
Test Dates:	12 July 2012 to 31 July 2012

2.2. Summary of Test Results

FCC Reference (47CFR)	Measurement	Result
27.50(c)(3) / 2.1046	Transmitter Carrier Output Power and Effective Radiated Power (ERP)	
2.1049	Transmitter Occupied Bandwidth	
27.53(g) / 2.1051	Transmitter Conducted Spurious Emissions	
27.53(g) / 2.1051	Transmitter Conducted Emissions at Band Edges	
27.53(g) / 2.1053	Transmitter Radiated Spurious Emissions	
27.53(g) / 2.1053	Transmitter Radiated Emissions at Band Edges	
27.54 / 2.1055	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:	ANSI C63.4 (2009)
Title:	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
Reference:	FCC KDB 662911 D01 v01r01 10/25/2011
Title:	Emissions Testing of Transmitters with Multiple Outputs in the Same Band
Reference:	FCC Response To Inquiry
Title:	Tracking Number 644682 Date: 09 July 2012
Reference:	FCC Response To Inquiry
Title:	Tracking Number 720706 Date: 10 July 2012

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:	General Dynamics Broadband
Model Name or Number:	AQQ
Serial Number:	AQQAC27003212
Hardware Version Number:	1
Software Version Number:	8.0.4
FCC ID:	PKTNODEBAQQ

3.2. Description of EUT

The equipment under test was a LTE eNodeB.

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	
Type of Equipment	eNodeB	
Channel Bandwidth:	5 MHz	
Modulation Types:	QPSK, 16QAM & 64QAM	
Duty Cycle:	100%	
Antenna Gain:	20 dBi (maximum)	
Power Supply Requirement:	Nominal	-48.0 VDC
	Minimum	-40.8 VDC
	Maximum	-55.2 VDC
Transmit Frequency Range:	Band 12 (729 MHz to 746 MHz) Part 27 (698 MHz to 746 MHz)	
Transmit Channels Tested:	EARFCN	Channel Frequency (MHz)
	5035	731.5
	5095	737.5
	5155	743.5

3.5. Support Equipment

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

Description:	LAPTOP
Brand Name:	SONY
Model Name or Number:	VAIO
Serial Number:	28196160 5603019

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 a 5 MHz channel bandwidth. QPSK, 16QAM and 64QAM modulations were tested.

4.2. Configuration and Peripherals

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

- The EUT was controlled via a laptop PC, using bespoke software supplied by the Customer.
- The EUT was connected to the test laptop via ethernet.
- No AC conducted tests were performed as the EUT is DC powered.
- The EUT has two transmitter RF ports. The port not being used whilst testing was being performed was terminated with a 50 Ohm load.
- The EUT was configured for 25 Resource Blocks as defined in 3GPP 36.141 Rel 8.
- The EUT was configured using the following E-UTRA Test Models as defined in 3GPP 36.141 Rel 8:
 - E-TM1.1 for QPSK modulation
 - E-TM3.2 for 16QAM modulation
 - E-TM3.1 for 64QAM modulation.

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 Carrier Output Power and Effective Radiated Power (ERP)

Test Summary:

Test Engineer:	Mark Percival	Test Date:	31 July 2012
Test Sample Serial Number:	AQQAC27003212		

FCC Part:	2.1046 and 27.50(c)(3)
Test Method Used:	As detailed in ANSI TIA-603-C-2004 Section 2.2.17.2

Environmental Conditions:

Temperature (°C):	25
Relative Humidity (%):	43

Note(s):

- Power from both antenna ports was measured and combined using the measure-and-sum method stated in FCC KDB 662911 D01.
- The ERP limit is 1000W/MHz, this has been calculated and converted to be based on a 5 MHz channel bandwidth to dBm/MHz for this measurement. The correction factor (BWCF) was calculated as:

$$10 \log_{10} (5 \text{ MHz} / 1 \text{ MHz}) = 6.989 \text{ dB.}$$

- The Customer stated that the EUT is designed to operate with a maximum antenna gain of 20 dBi. As the limit is an ERP limit the gain in dBi has been converted to dBd. The dBd was calculated as:

$$20 \text{ dBi} - 2.15 \text{ dB} = 17.85 \text{ dBd.}$$

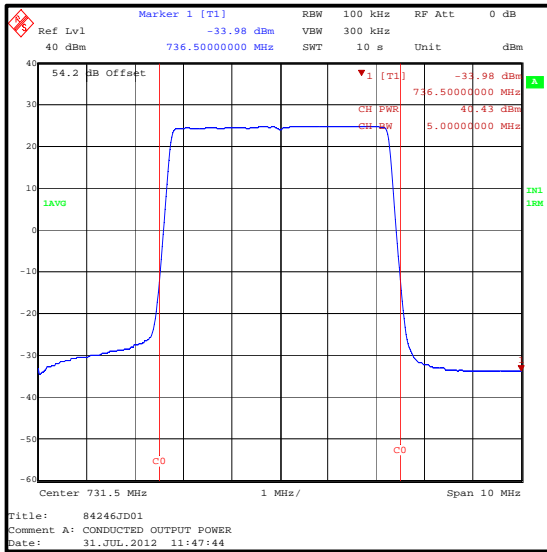
Results: 5 MHz Channel Bandwidth

Frequency (MHz)	Modulation	Conducted RF Power at Port RF1 (dBm)	Conducted RF Power at Port RF2 (dBm)	Combined Conducted RF Power (dBm)
731.5	QPSK	40.4	41.0	43.7
737.5	QPSK	40.4	40.5	43.5
743.5	QPSK	40.7	40.8	43.8

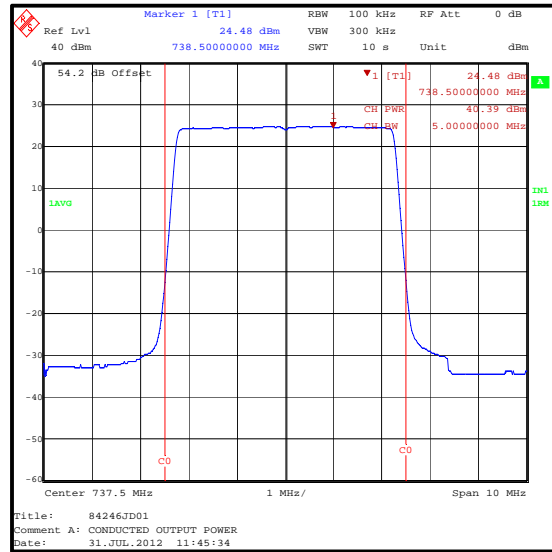
Frequency (MHz)	Combined Conducted RF Power (dBm)	Antenna Gain (dBd)	ERP (dBm / 5 MHz)	ERP Limit (dBm / 5 MHz)	Margin (dB)	Result
731.5	43.7	17.85	61.55	67.0	5.45	Complied
737.5	43.5	17.85	61.35	67.0	5.65	Complied
743.5	43.8	17.85	61.65	67.0	5.35	Complied

Transmitter Carrier Output Power and Effective Radiated Power (ERP) (continued)

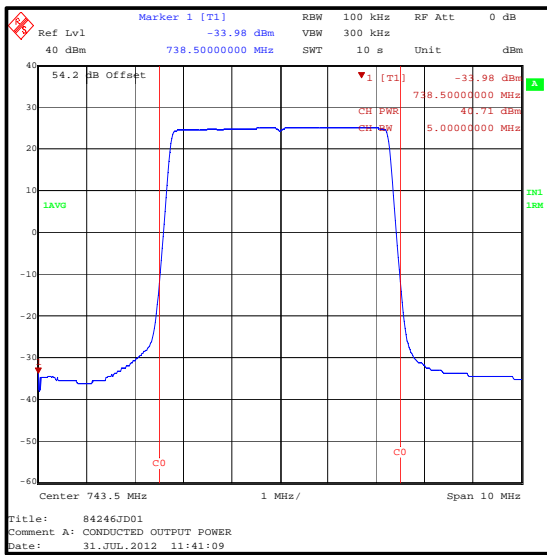
Results: 5 MHz Channel Bandwidth / QPSK / Port RF1



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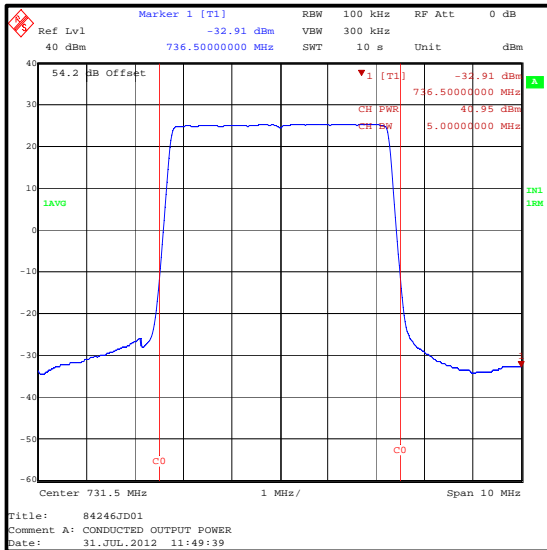
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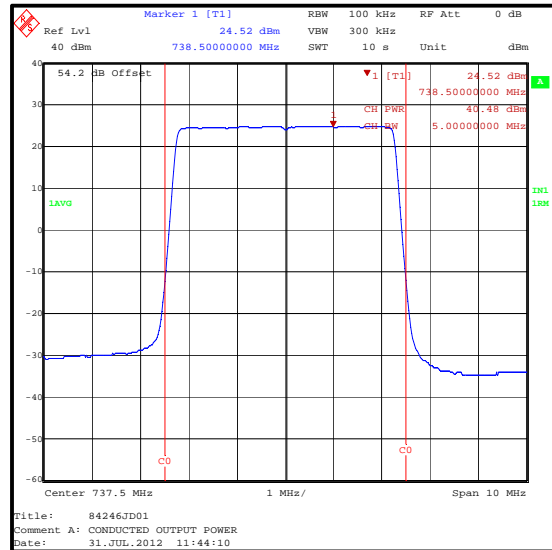
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Transmitter Carrier Output Power and Effective Radiated Power (ERP) (continued)

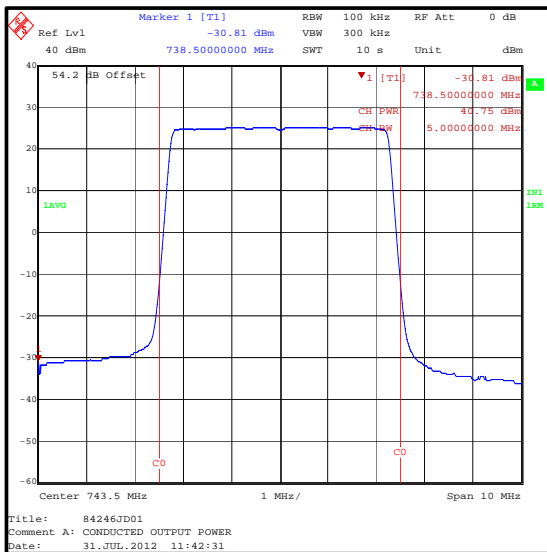
Results: 5 MHz Channel Bandwidth / QPSK / Port RF2



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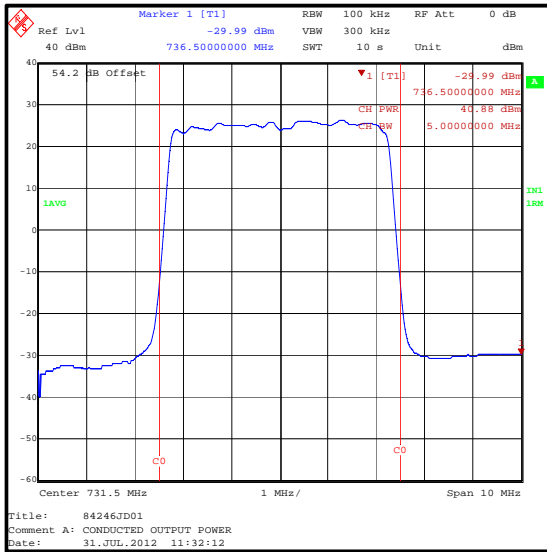
Transmitter Carrier Output Power and Effective Radiated Power (ERP) (continued)**Results: 5 MHz Channel Bandwidth**

Frequency (MHz)	Modulation	Conducted RF Power at Port RF1 (dBm)	Conducted RF Power at Port RF2 (dBm)	Combined Conducted RF Power (dBm)
731.5	16QAM	40.9	41.0	44.0
737.5	16QAM	40.6	40.6	43.6
743.5	16QAM	40.6	40.6	43.6

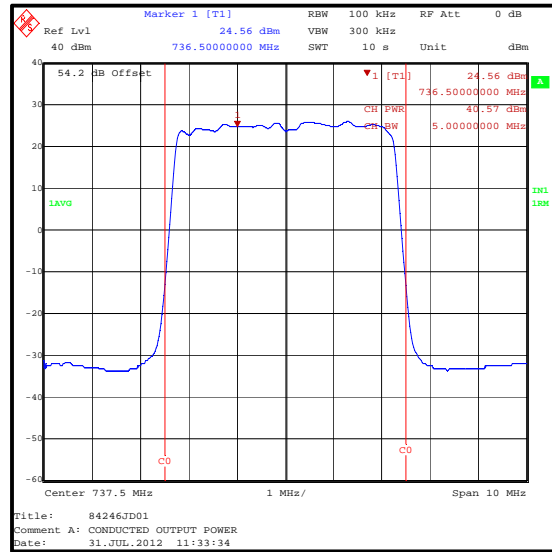
Frequency (MHz)	Combined Conducted RF Power (dBm)	Antenna Gain (dBd)	ERP (dBm / 5 MHz)	ERP Limit (dBm / 5 MHz)	Margin (dB)	Result
731.5	44.0	17.85	61.85	67.0	5.15	Complied
737.5	43.6	17.85	61.45	67.0	5.55	Complied
743.5	43.6	17.85	61.45	67.0	5.55	Complied

Transmitter Carrier Output Power and Effective Radiated Power (ERP) (continued)

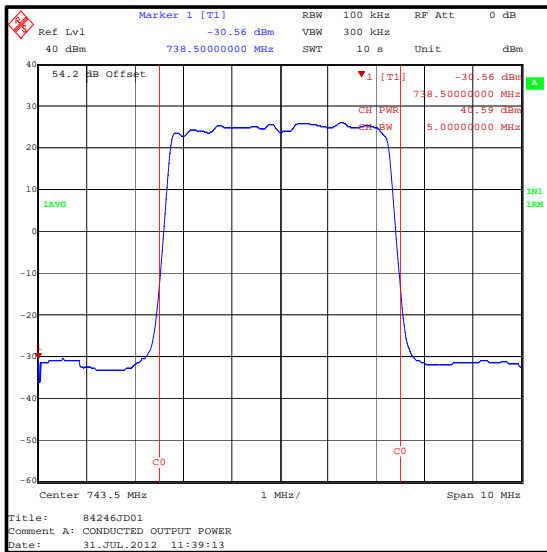
Results: 5 MHz Channel Bandwidth / 16QAM / Port RF1



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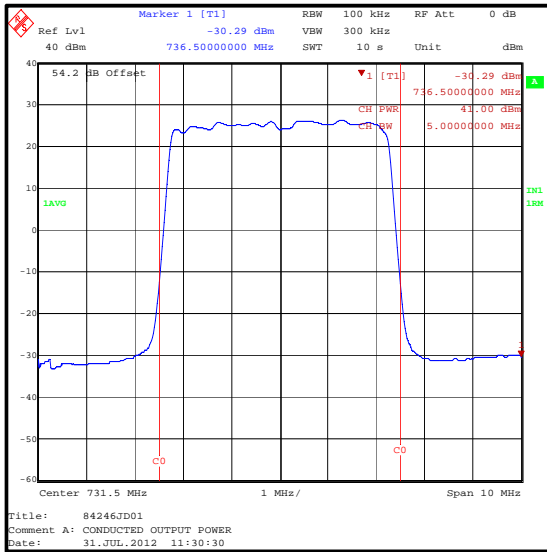
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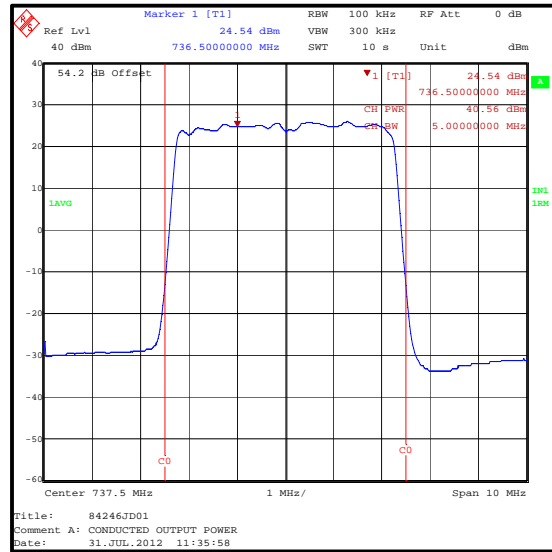
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Transmitter Carrier Output Power and Effective Radiated Power (ERP) (continued)

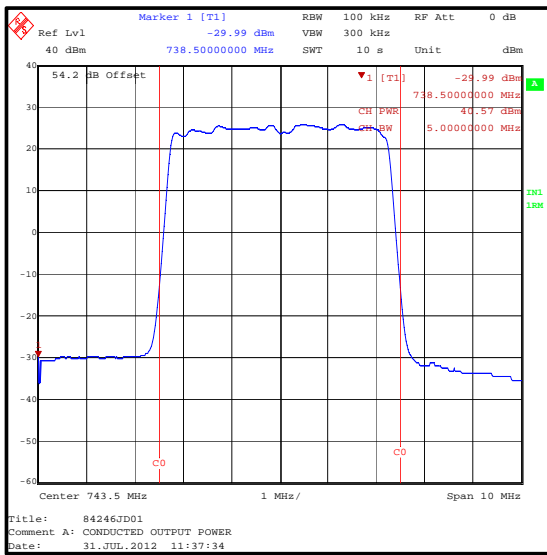
Results: 5 MHz Channel Bandwidth / 16QAM / Port RF2



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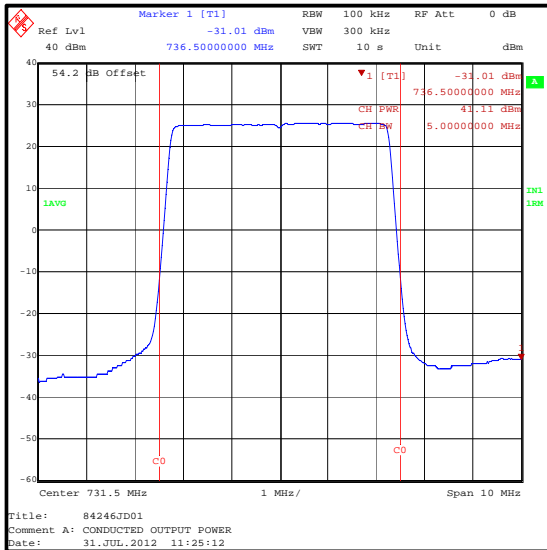
Transmitter Carrier Output Power and Effective Radiated Power (ERP) (continued)**Results: 5 MHz Channel Bandwidth**

Frequency (MHz)	Modulation	Conducted RF Power at Port RF1 (dBm)	Conducted RF Power at Port RF2 (dBm)	Combined Conducted RF Power (dBm)
731.5	64QAM	41.1	41.1	44.1
737.5	64QAM	40.6	41.2	43.9
743.5	64QAM	41.1	40.9	44.0

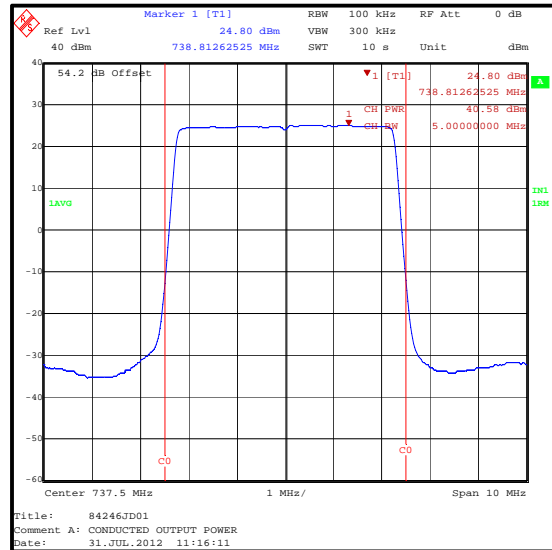
Frequency (MHz)	Combined Conducted RF Power (dBm)	Antenna Gain (dBd)	ERP (dBm / 5 MHz)	ERP Limit (dBm / 5 MHz)	Margin (dB)	Result
731.5	44.1	17.85	61.95	67.0	5.05	Complied
737.5	43.9	17.85	61.75	67.0	5.25	Complied
743.5	44.0	17.85	61.85	67.0	5.15	Complied

Transmitter Carrier Output Power and Effective Radiated Power (ERP) (continued)

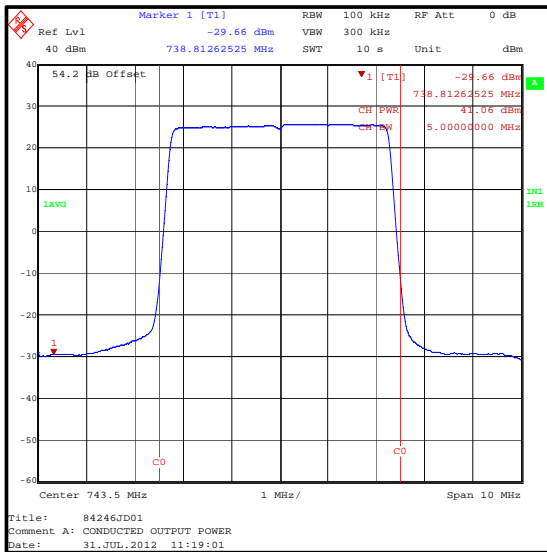
Results: 5 MHz Channel Bandwidth / 64QAM / Port RF1



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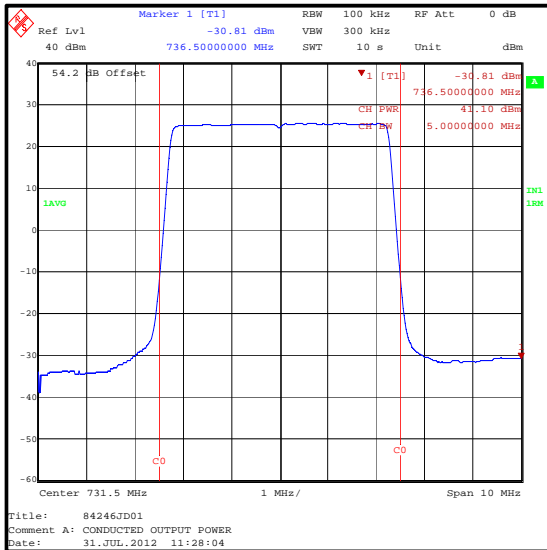
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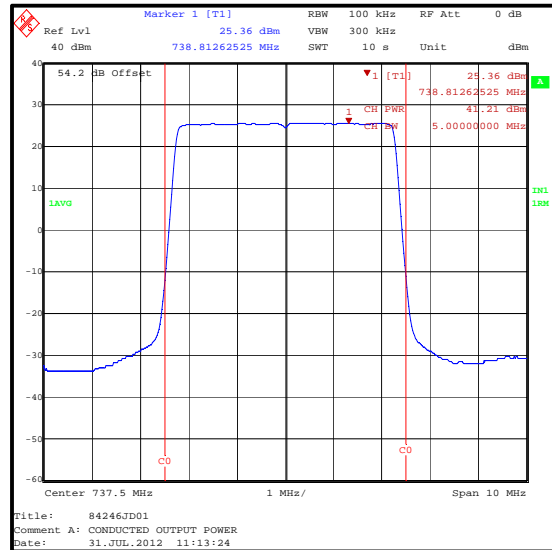
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Transmitter Carrier Output Power and Effective Radiated Power (ERP) (continued)

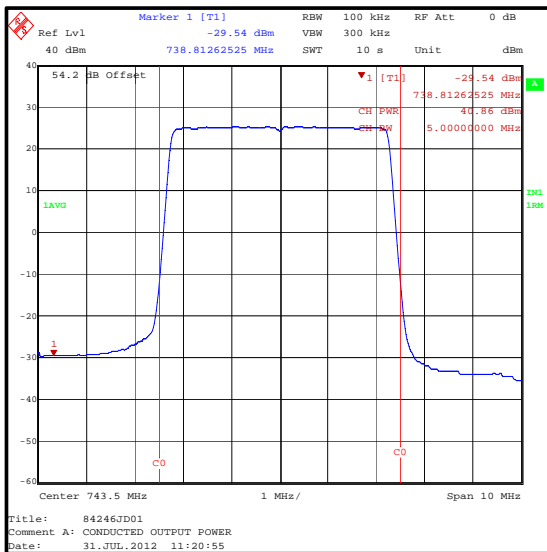
Results: 5 MHz Channel Bandwidth / 64QAM / Port RF2



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Transmitter Carrier Output Power and Effective Radiated Power (ERP) (continued)**Test Equipment Used:**

RFI ID	Instrument Description	Model Number	Calibration Due	Calibration Interval (Months)
A1317	40W Termination	376BNM	Cal Before Use	-
A2006	Attenuator	769-30	Cal Before Use	-
A2007	Attenuator	769-20	Cal Before Use	-
L1067	Test Receiver	ESIB 40	29 May 2013	12
M199	Power Meter	NRVS	07 Jun 2013	12
M1252	Signal Generator	83640A	05 Oct 2012	12
M1267	Thermal Power Sensor	NRV-Z52	07 Jun 2013	12
S0550	120 VAC Power Supply	6032A	Cal Before Use	-

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

Test Engineer:	Mark Percival	Test Date:	31 July 2012
Test Sample Serial Number:	AQQAC27003212		

FCC Part:	2.1049
Test Method Used:	As detailed in ANSI C63.4 Section 13.7 and relevant annexes referencing FCC CFR Part 2.1049 (see note below)

Environmental Conditions:

Temperature (°C):	25
Relative Humidity (%):	43

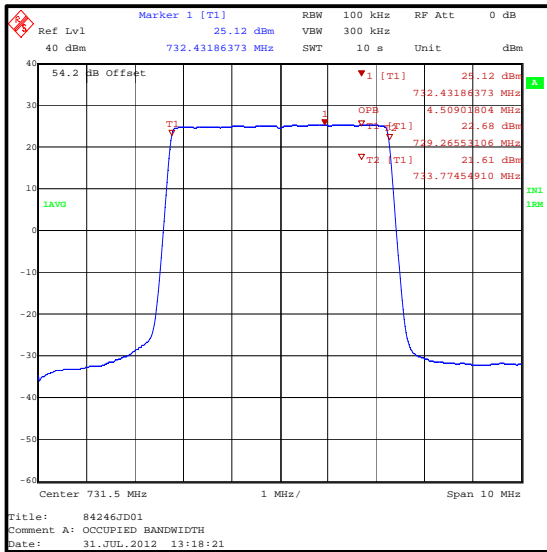
Note(s):

1. In lieu of the test method detailed in ANSI C63.4 Section 13.1.7 the 99% occupied bandwidth was measured using the Occupied Bandwidth function of the test receiver.

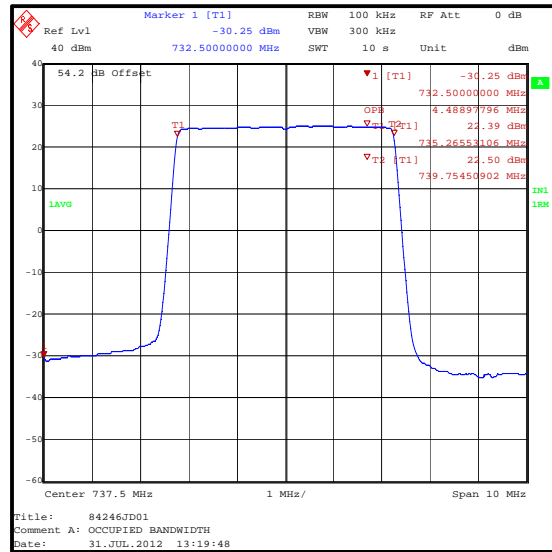
Transmitter Occupied Bandwidth (continued)

Results: 5 MHz Channel Bandwidth / Port RF1

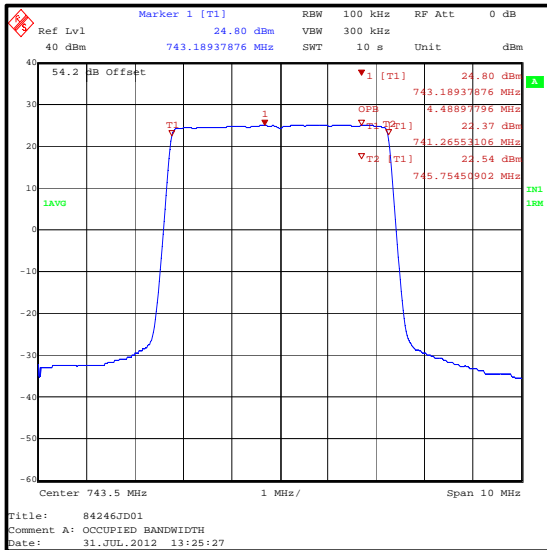
Frequency (MHz)	Modulation	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
731.5	QPSK	100	300	4.509
737.5	QPSK	100	300	4.489
743.5	QPSK	100	300	4.489



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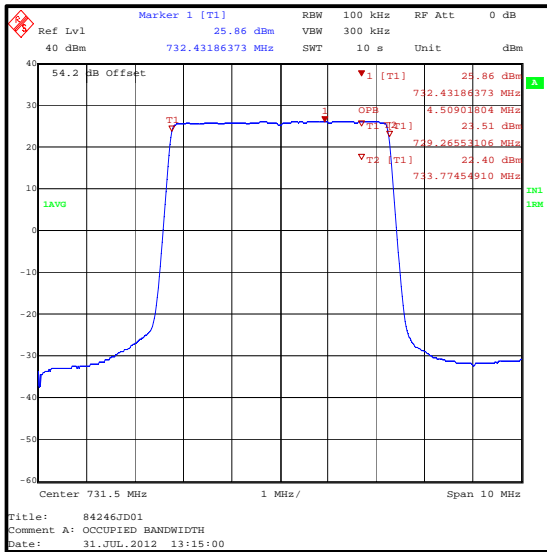


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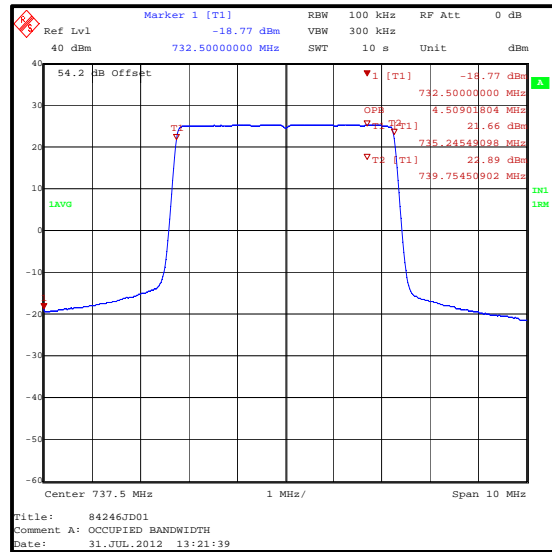
Transmitter Occupied Bandwidth (continued)

Results: 5 MHz Channel Bandwidth / Port RF2

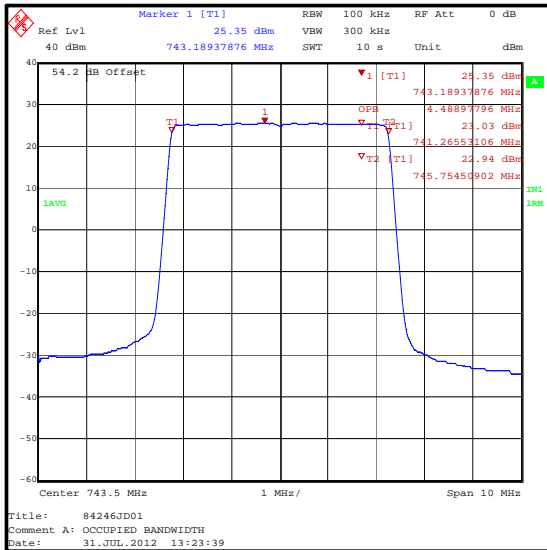
Frequency (MHz)	Modulation	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
731.5	QPSK	100	300	4.509
737.5	QPSK	100	300	4.509
743.5	QPSK	100	300	4.489



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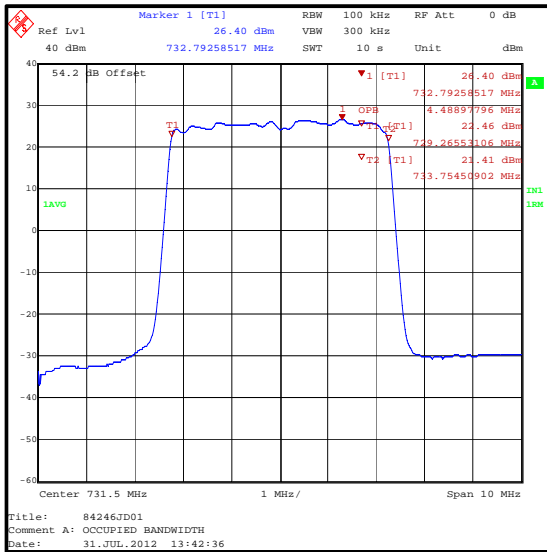


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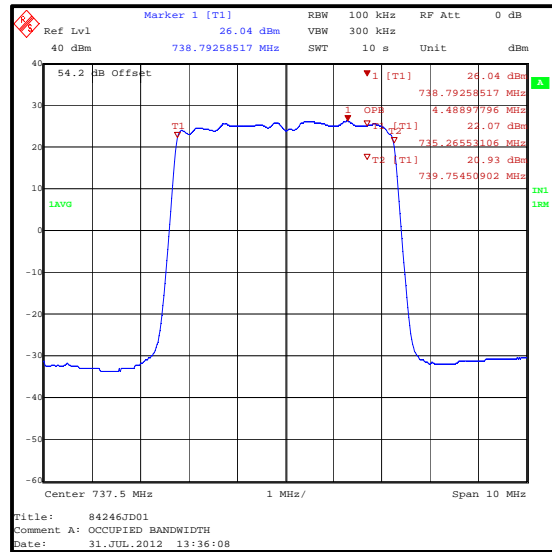
Transmitter Occupied Bandwidth (continued)

Results: 5 MHz Channel Bandwidth / Port RF1

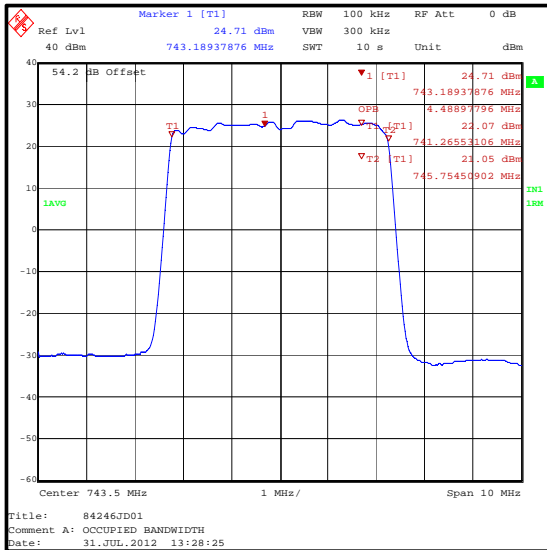
Frequency (MHz)	Modulation	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
731.5	16QAM	100	300	4.489
737.5	16QAM	100	300	4.489
743.5	16QAM	100	300	4.489



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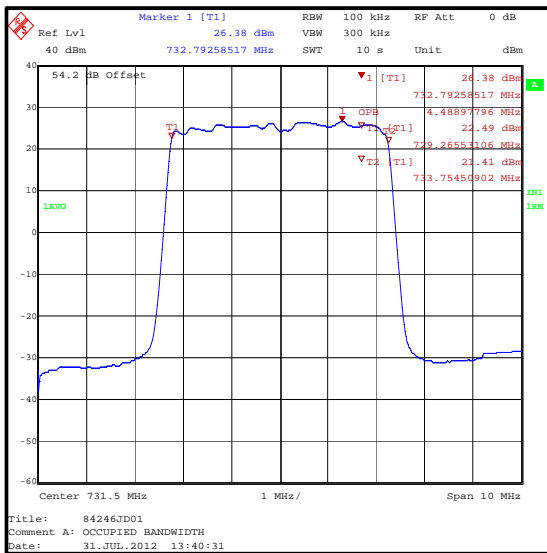


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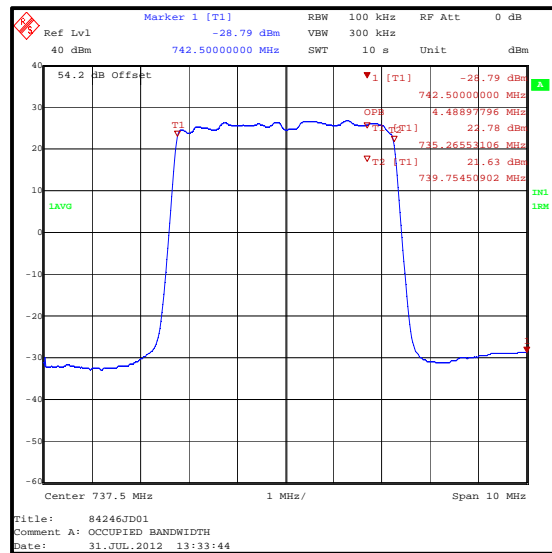
Transmitter Occupied Bandwidth (continued)

Results: 5 MHz Channel Bandwidth / Port RF2

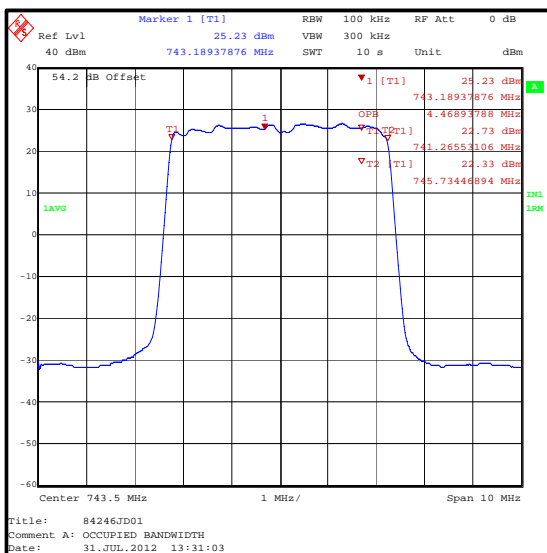
Frequency (MHz)	Modulation	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
731.5	16QAM	100	300	4.489
737.5	16QAM	100	300	4.489
743.5	16QAM	100	300	4.469



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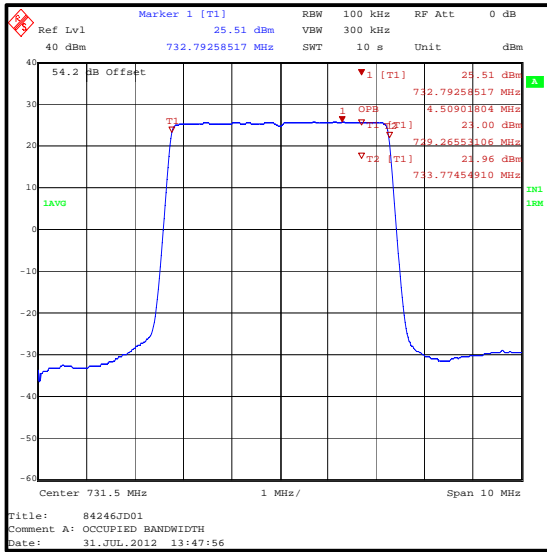


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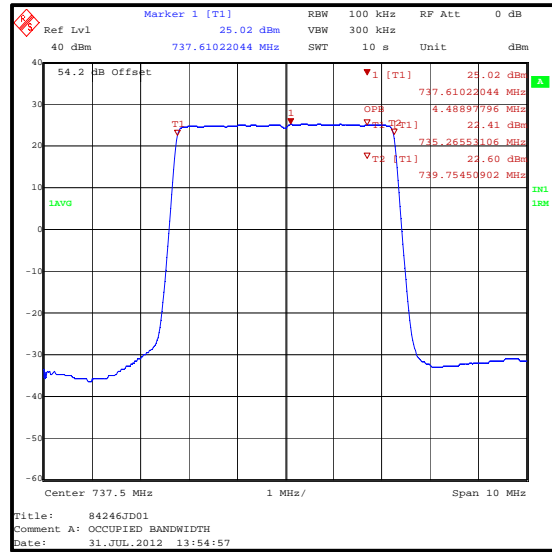
Transmitter Occupied Bandwidth (continued)

Results: 5 MHz Channel Bandwidth / Port RF1

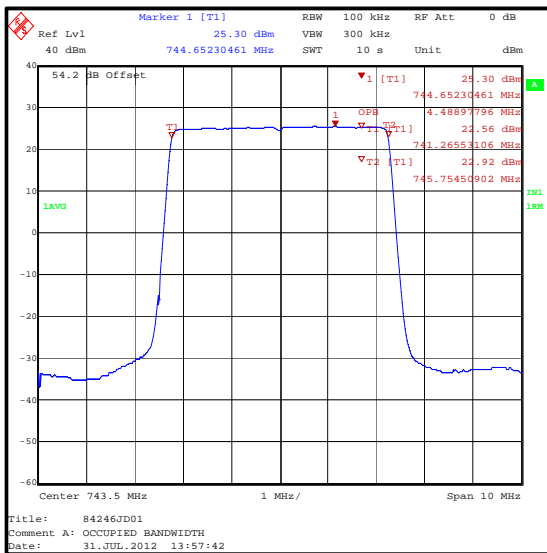
Frequency (MHz)	Modulation	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
731.5	64QAM	100	300	4.509
737.5	64QAM	100	300	4.489
743.5	64QAM	100	300	4.489



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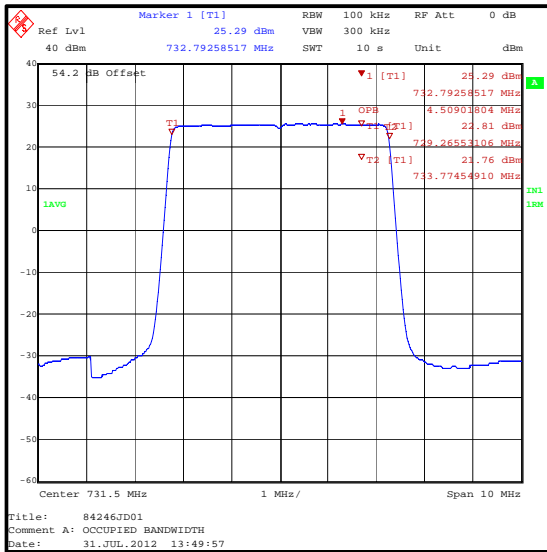


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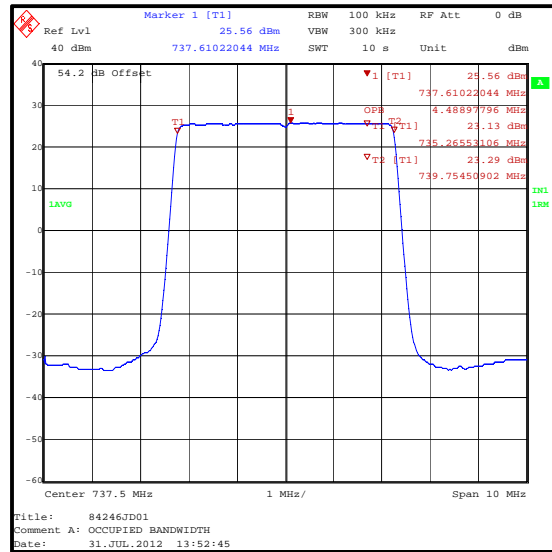
Transmitter Occupied Bandwidth (continued)

Results: 5 MHz Channel Bandwidth / Port RF2

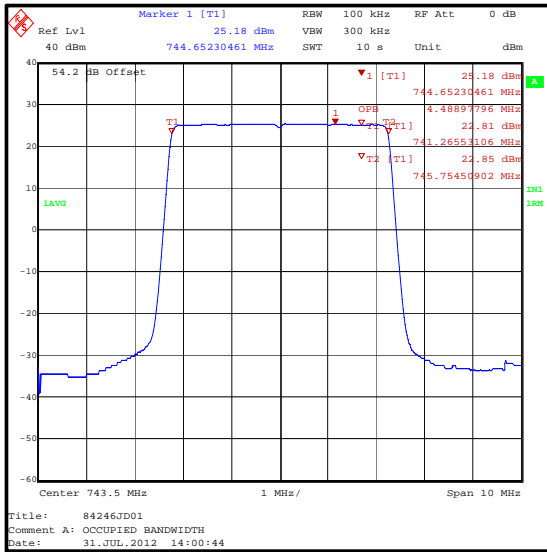
Frequency (MHz)	Modulation	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
731.5	64QAM	100	300	4.509
737.5	64QAM	100	300	4.489
743.5	64QAM	100	300	4.489



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

RFI ID	Instrument Description	Model Number	Calibration Due	Calibration Interval (Months)
A1317	40W Termination	376BNM	Cal Before Use	-
A2006	Attenuator	769-30	Cal Before Use	-
A2007	Attenuator	769-20	Cal Before Use	-
L1067	Test Receiver	ESIB 40	29 May 2013	12
M199	Power Meter	NRVS	07 Jun 2013	12
M1252	Signal Generator	83640A	05 Oct 2012	12
M1267	Thermal Power Sensor	NRV-Z52	07 Jun 2013	12
S0550	120 VAC Power Supply	6032A	Cal Before Use	-

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

Test Engineer:	Mark Percival	Test Dates:	13 July 2012 & 23 July 2012
Test Sample Serial Number:	AQQAC27003212		

FCC Part:	2.1051 and 27.53(g)
Test Method Used:	As detailed in ANSI TIA-603.C-2004 Section 2.2.13 referencing FCC Part 2.1051
Frequency Range:	9 kHz to 8 GHz

Environmental Conditions:

Temperature (°C):	26
Relative Humidity (%):	44

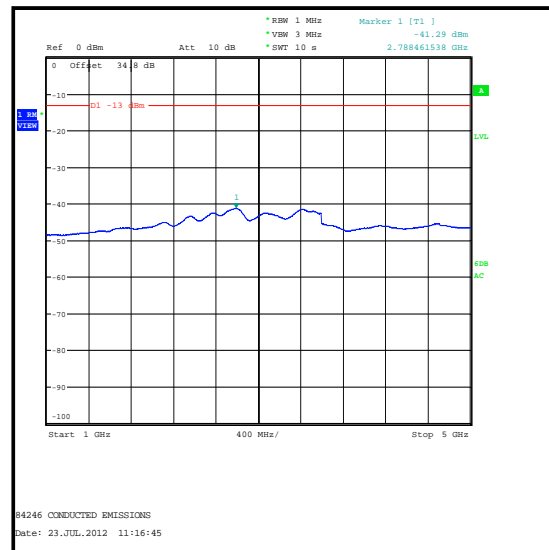
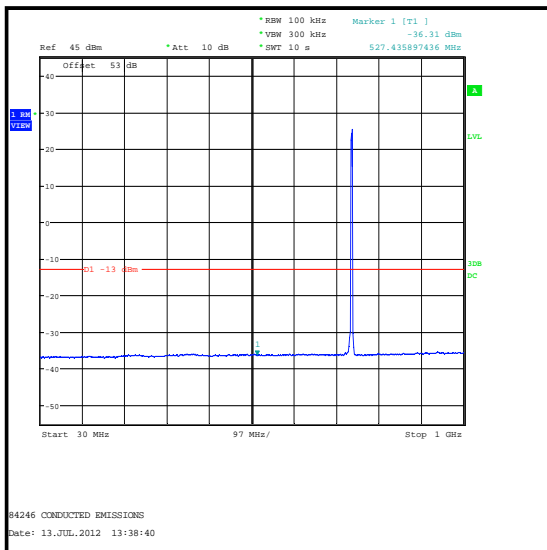
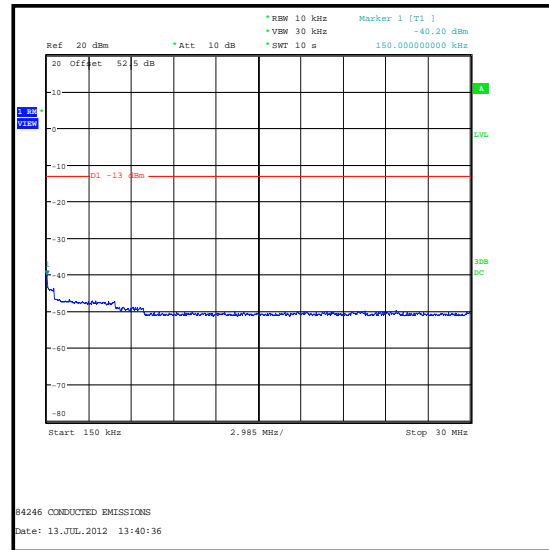
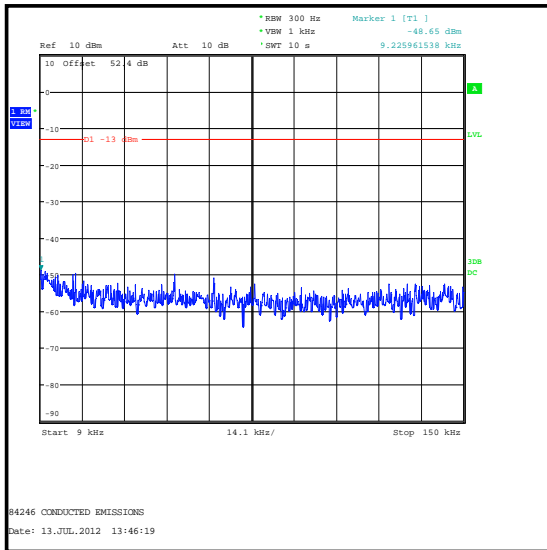
Note(s):

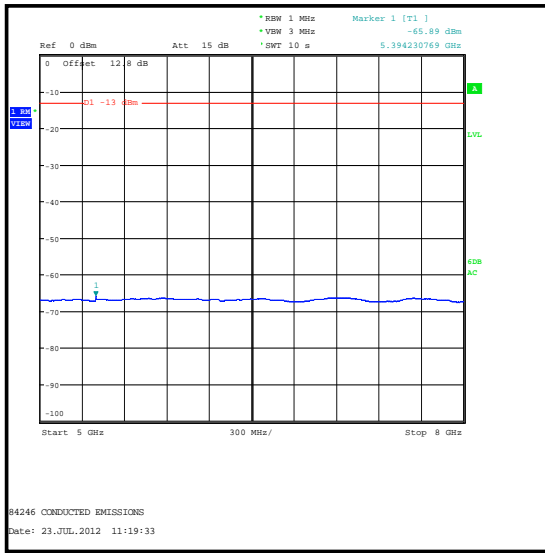
1. The EUT was transmitting using the QPSK Modulation scheme as this produced the highest output power level and was therefore deemed worst case.
2. Measurements were made on port RF2 as this produced the highest power out of the two antenna ports.
3. The emission seen on the 30 MHz to 1 GHz plot at approximately 743.5 MHz is the EUT carrier.
4. All emissions were >20 dB below the applicable limit or below the level of the noise floor of the measuring receiver, therefore the highest level of noise floor is recorded in the table below.

Results: 5 MHz Channel Bandwidth / Top Channel

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
527.436	-36.3	-13.0	23.3	Complied

Transmitter Conducted Spurious Emissions (continued)



Transmitter Conducted Spurious Emissions (continued)**Test Equipment Used**

RFI ID	Instrument Description	Model Number	Calibration Due	Calibration Interval (Months)
A1317	40W Termination	376BNM	Cal Before Use	-
A2006	Attenuator	769-30	Cal Before Use	-
A2007	Attenuator	769-20	Cal Before Use	-
M199	Power Meter	NRVS	07 Jun 2013	12
M1020	Signal Generator	1038.6002.03	15 Aug 2012	12
M1252	Signal Generator	83640A	05 Oct 2012	12
M1267	Thermal Power Sensor	NRV-Z52	07 Jun 2013	12
M1630	Test Receiver	ESU 40	13 Jan 2013	12
S0550	120 VAC Power Supply	6032A	Cal Before Use	-

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

Test Engineer:	Mark Percival	Test Date:	31 July 2012
Test Sample Serial Number:	AQQAC27003212		

FCC Part:	2.1051 and 27.53(g)
Test Method Used:	As detailed in ANSI TIA-603.C-2004 Section 2.2.13 referencing FCC Part 2.1051

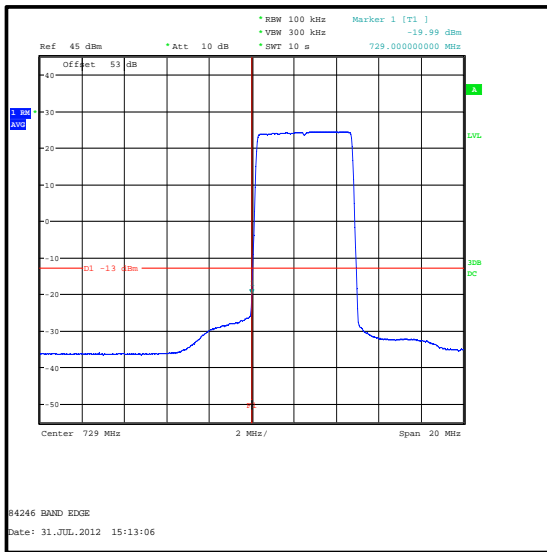
Environmental Conditions:

Temperature (°C):	26
Relative Humidity (%):	48

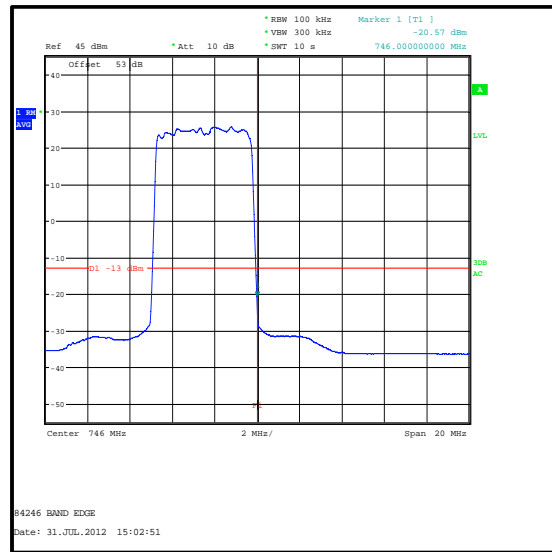
Transmitter Conducted Emissions at Band Edges (continued)

Results: 5 MHz Channel Bandwidth / QPSK / Port RF1

Frequency (MHz)	Port RF1 Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
729	-20.0	-13.0	7.0	Complied
746	-20.6	-13.0	7.6	Complied



Lower Band Edge / Band 12

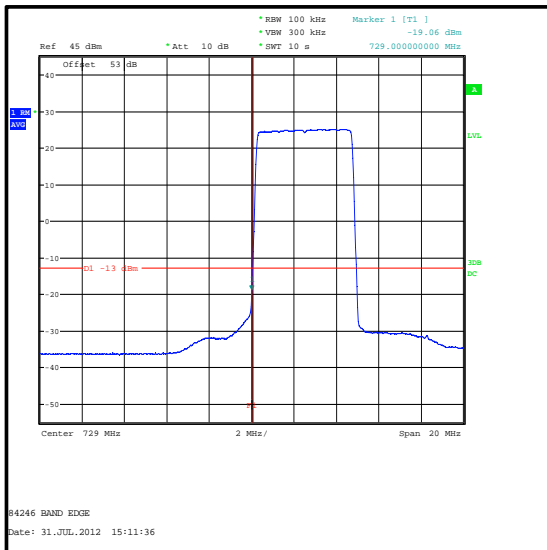


Upper Band Edge / Band 12

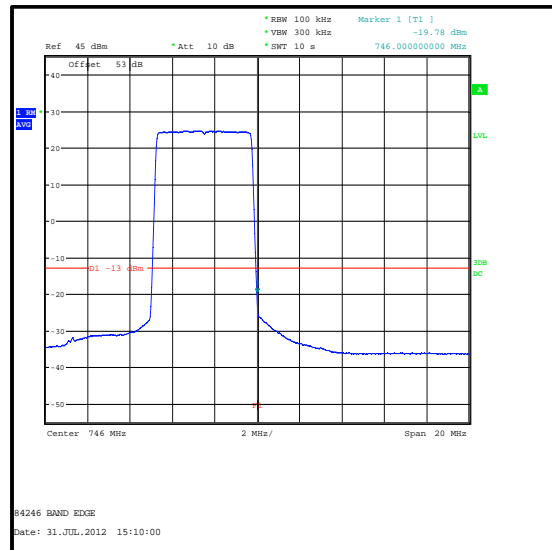
Transmitter Conducted Emissions at Band Edges (continued)

Results: 5 MHz Channel Bandwidth / QPSK / Port RF2

Frequency (MHz)	Port RF2 Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
729	-19.1	-13.0	6.1	Complied
746	-19.8	-13.0	6.8	Complied



Lower Band Edge / Band 12

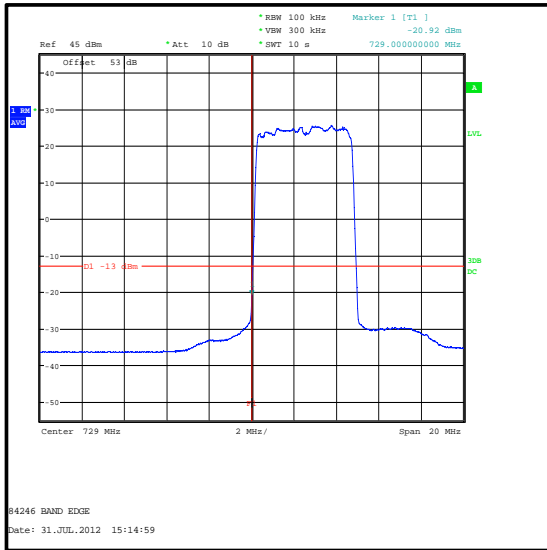


Upper Band Edge / Band 12

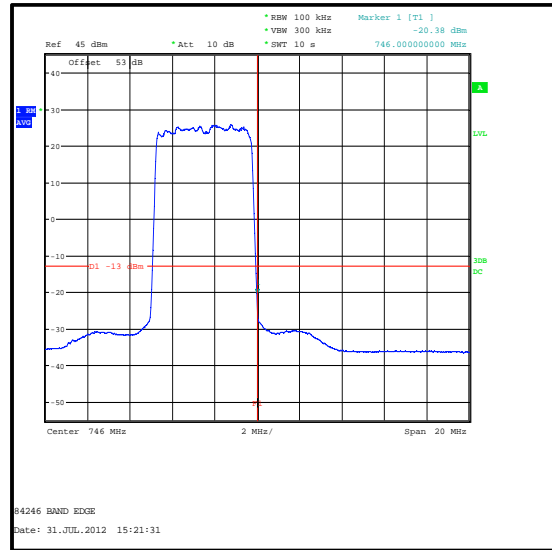
Transmitter Conducted Emissions at Band Edges (continued)

Results: 5 MHz Channel Bandwidth / 16QAM / Port RF1

Frequency (MHz)	Port RF1 Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
729	-20.9	-13.0	7.9	Complied
746	-20.4	-13.0	7.4	Complied



Lower Band Edge / Band 12

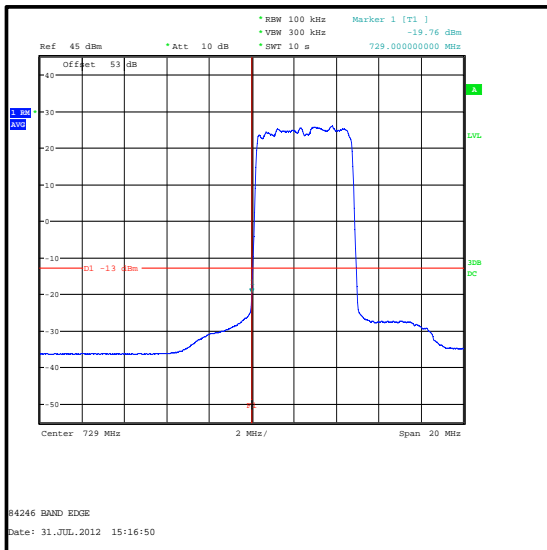


Upper Band Edge / Band 12

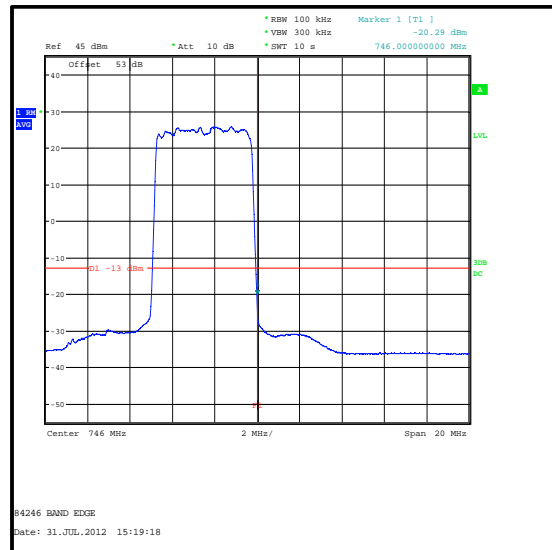
Transmitter Conducted Emissions at Band Edges (continued)

Results: 5 MHz Channel Bandwidth / 16QAM / Port RF2

Frequency (MHz)	Port RF2 Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
729	-19.8	-13.0	6.8	Complied
746	-20.3	-13.0	7.3	Complied



Lower Band Edge / Band 12

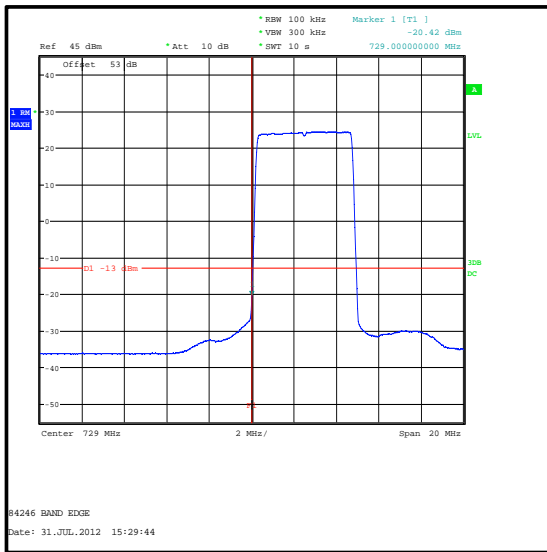


Upper Band Edge / Band 12

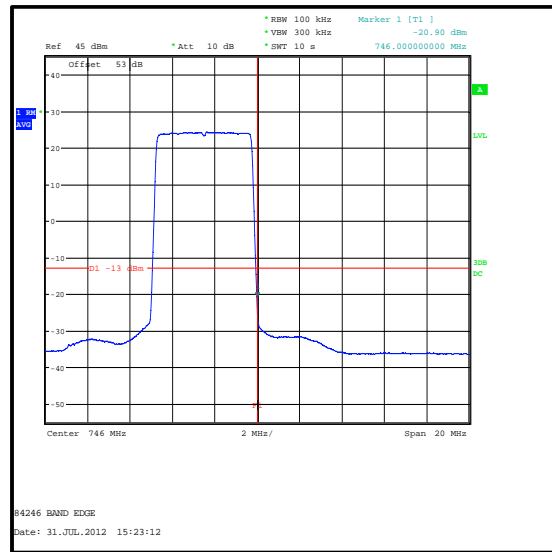
Transmitter Conducted Emissions at Band Edges (continued)

Results: 5 MHz Channel Bandwidth / 64QAM / Port RF1

Frequency (MHz)	Port RF1 Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
729	-20.4	-13.0	7.4	Complied
746	-20.9	-13.0	7.9	Complied



Lower Band Edge / Band 12

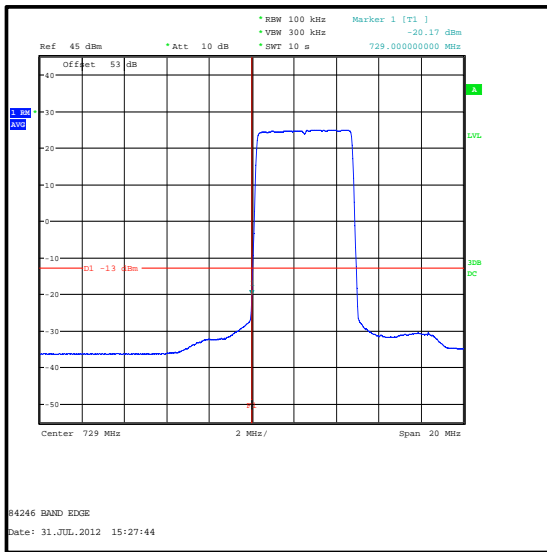


Upper Band Edge / Band 12

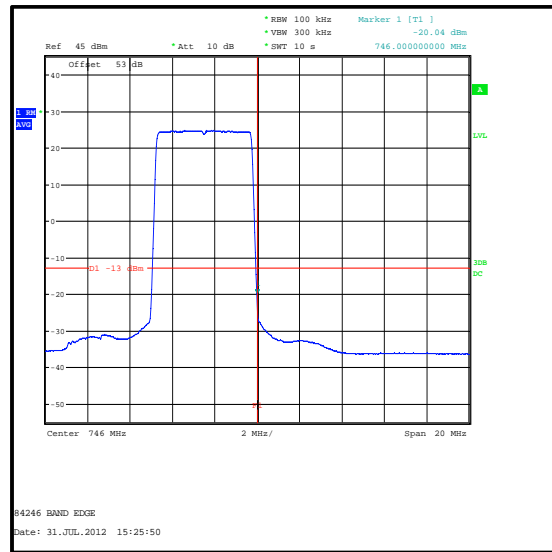
Transmitter Conducted Emissions at Band Edges (continued)

Results: 5 MHz Channel Bandwidth / 64QAM / Port RF2

Frequency (MHz)	Port RF2 Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
729	-20.2	-13.0	7.2	Complied
746	-20.0	-13.0	7.0	Complied



Lower Band Edge / Band 12



Upper Band Edge / Band 12

Test Equipment Used

RFI ID	Instrument Description	Model Number	Calibration Due	Calibration Interval (Months)
A1317	40W Termination	376BNM	Cal Before Use	-
A2006	Attenuator	769-30	Cal Before Use	-
A2007	Attenuator	769-20	Cal Before Use	-
M199	Power Meter	NRVS	07 Jun 2013	12
M1252	Signal Generator	83640A	05 Oct 2012	12
M1267	Thermal Power Sensor	NRV-Z52	07 Jun 2013	12
M1630	Test Receiver	ESU 40	13 Jan 2013	12
S0550	120 VAC Power Supply	6032A	Cal Before Use	-

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

Test Engineers:	Mark Percival & Andrew Edwards	Test Dates:	17 July 2012 & 25 July 2012
Test Sample Serial Number:	AQQAC27003212		

FCC Part:	2.1053 and 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

Environmental Conditions:

Temperature (°C):	24 to 26
Relative Humidity (%):	32 to 52

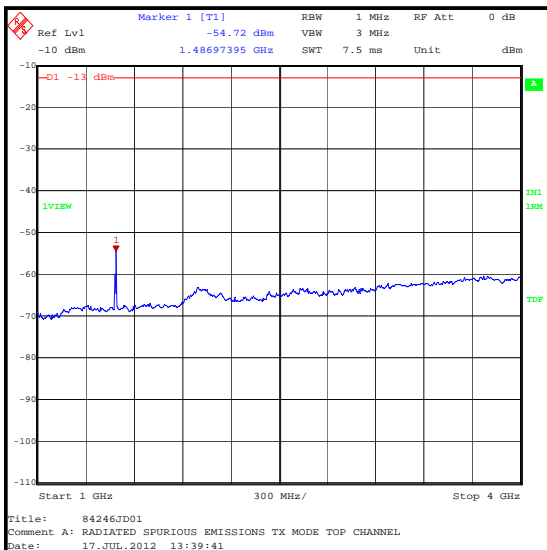
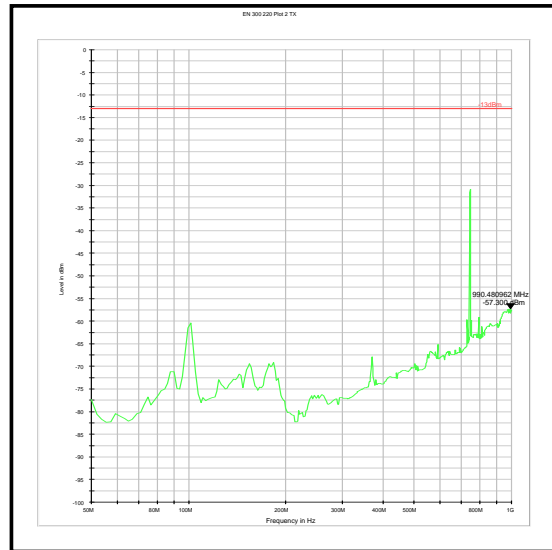
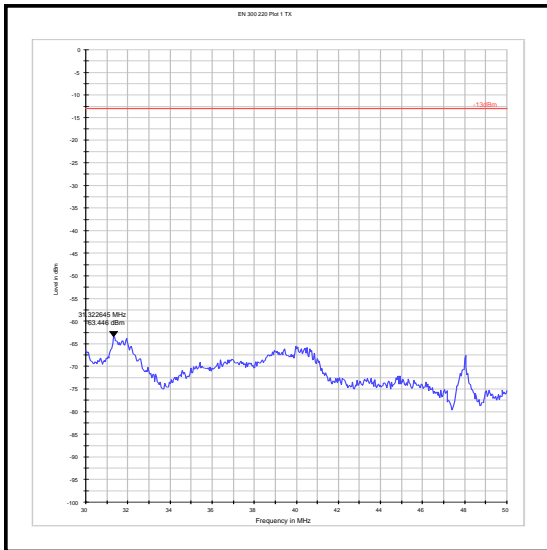
Note(s):

1. The EUT was set to transmit with QPSK modulation as this was found to have the highest output power.
2. The emission seen on the 30 MHz to 1 GHz plot at approximately 743.5 MHz is the EUT carrier.
3. All other emissions were at least 20 dB below the specification limit or below the measurement system noise floor.
4. Measurements below 1 GHz were performed in a semi-anechoic chamber (RFI 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 (RFI 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 (RFI 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.

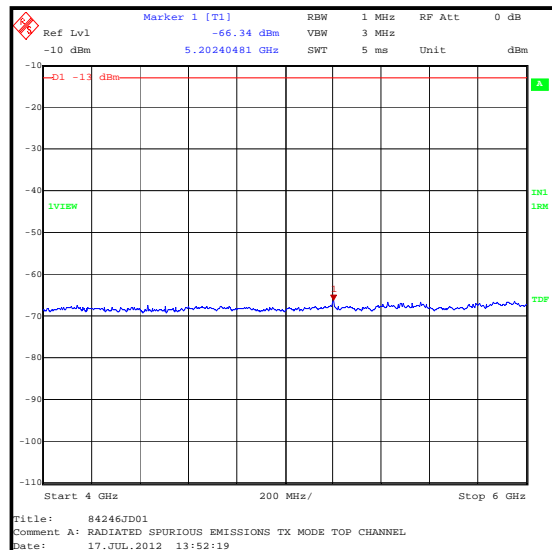
Results

Frequency (MHz)	Antenna Polarisation	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
1487.114	Vertical	-44.6	-13.0	31.6	Complied

Transmitter Radiated Spurious Emissions (continued)

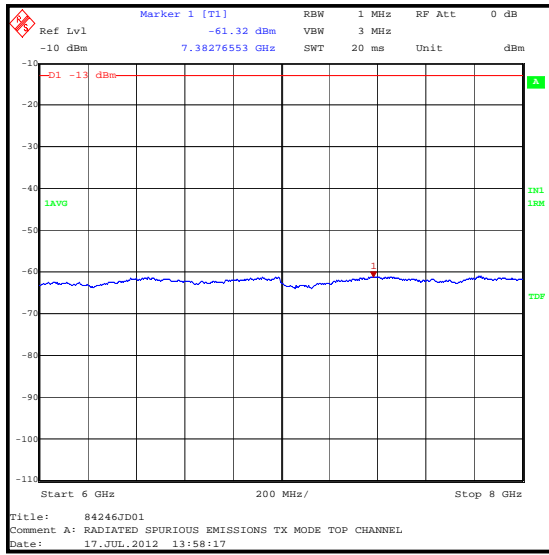


Title: 84246JD01
Comment A: RADIATED SPURIOUS EMISSIONS TX MODE TOP CHANNEL
Date: 17_JUL_2012 13:39:41



Title: 84246JD01
Comment A: RADIATED SPURIOUS EMISSIONS TX MODE TOP CHANNEL
Date: 17_JUL_2012 13:52:19

Transmitter Radiated Spurious Emissions (continued)



Test Equipment Used

RFI ID	Instrument Description	Model Number	Calibration Due	Calibration Interval (Months)
K0001	5m RSE Chamber	N/A	31 Aug 2012	12
A1834	Attenuator	8491B	29 Jan 2013	12
A553	Antenna	CBL6111A	15 Feb 2013	12
M1273	Test Receiver	ESIB 26	03 Feb 2013	12
G0543	Amplifier	310N	15 Oct 2012	3
K0002	3m RSE Chamber	N/A	09 Oct 2012	12
L1067	Test Receiver	ESIB 40	29 May 2013	12
A1818	Antenna	3115	09 Oct 2012	12
A1534	Pre Amplifier	8449B	09 Oct 2012	12
A253	Antenna	12240-20	09 Oct 2012	12
A254	Antenna	14240-20	09 Oct 2012	12
S0550	120 VAC Power Supply	6032A	Cal Before Use	-

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

Test Engineer:	Mark Percival	Test Date:	31 July 2012
Test Sample Serial Number:	AQQAC27003212		

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

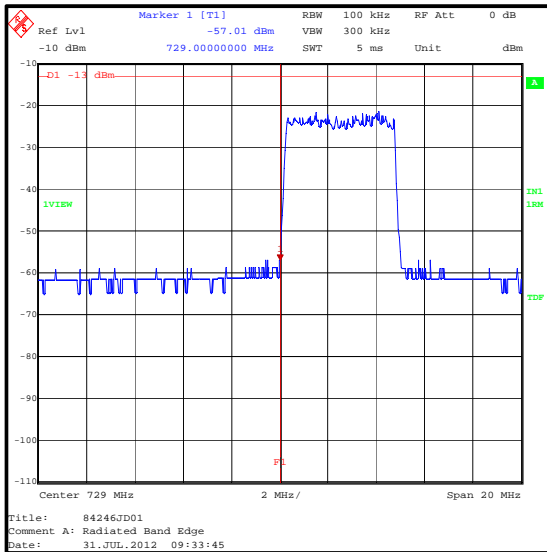
Environmental Conditions:

Temperature (°C):	24
Relative Humidity (%):	52

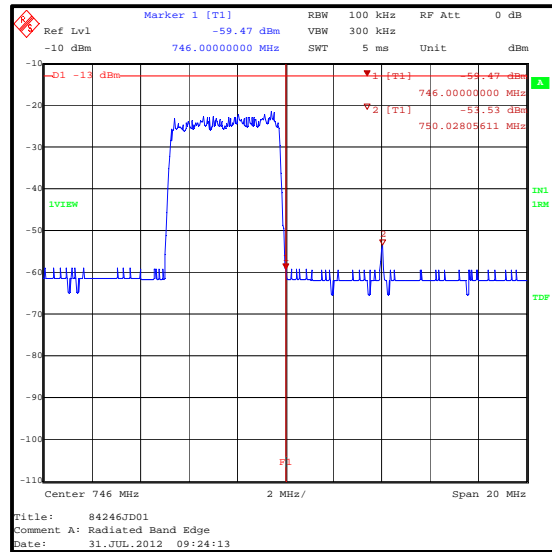
Transmitter Radiated Emissions at Band Edges (continued)

Results: 5 MHz Channel Bandwidth / QPSK

Frequency (MHz)	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
729	-57.0	-13.0	43.0	Complied
746	-59.5	-13.0	46.5	Complied
750.028	-53.5	-13.0	40.5	Complied



Lower Band Edge / Band 12

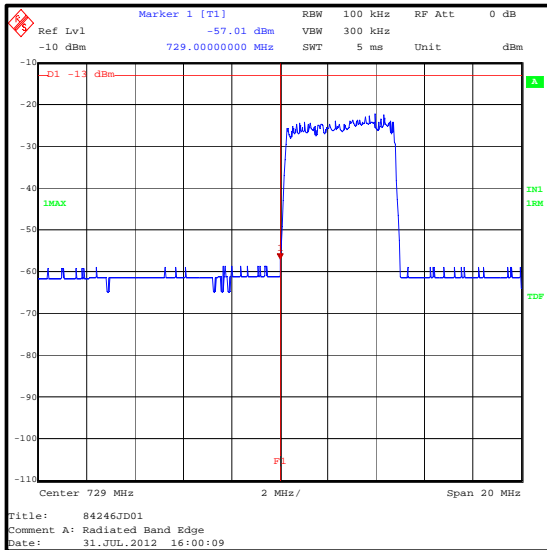


Upper Band Edge / Band 12

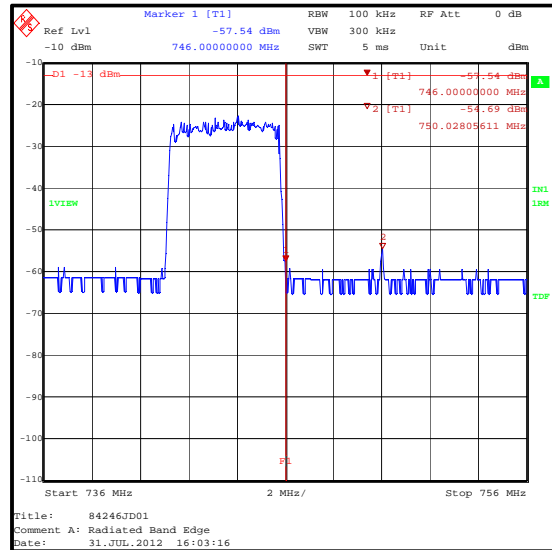
Transmitter Radiated Emissions at Band Edges (continued)

Results: 5 MHz Channel Bandwidth / 16QAM

Frequency (MHz)	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
729	-57.0	-13.0	44.0	Complied
746	-57.5	-13.0	44.5	Complied



Lower Band Edge / Band 12

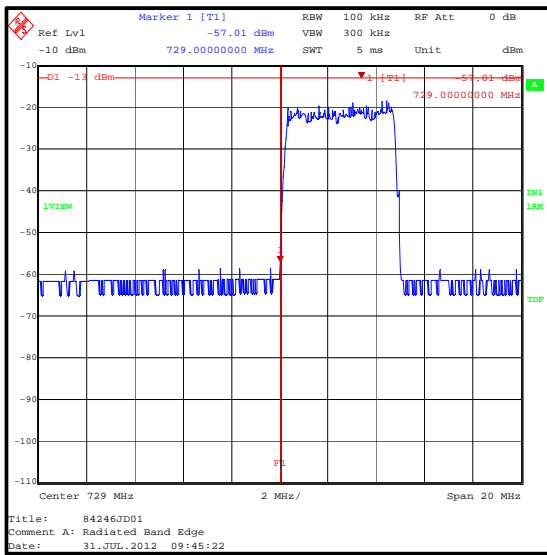


Upper Band Edge / Band 12

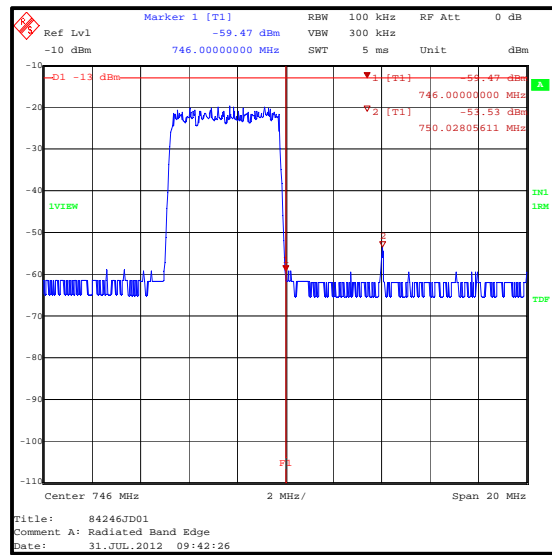
Transmitter Radiated Emissions at Band Edges (continued)

Results: 5 MHz Channel Bandwidth / 64QAM

Frequency (MHz)	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
729	-57.0	-13.0	44.0	Complied
746	-59.5	-13.0	46.5	Complied
750.028	-53.5	-13.0	40.5	Complied



Lower Band Edge / Band 12



Upper Band Edge / Band 12

Test Equipment Used

RFI ID	Instrument Description	Model Number	Calibration Due	Calibration Interval (Months)
K0002	3m RSE Chamber	N/A	09 Oct 2012	12
L1067	Test Receiver	ESIB 40	29 May 2013	12
A1818	Antenna	3115	09 Oct 2012	12
S0550	120 VAC Power Supply	6032A	Cal Before Use	-

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

Test Engineer:	Mark Percival	Test Dates:	25 July 2012, 26 July 2012 & 30 July 2012
Test Sample Serial Number:	AQQAC27003212		

FCC Part:	2.1055 and 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:

Ambient Temperature (°C):	26 to 29
Ambient Relative Humidity (%):	35 to 40

Note(s):

1. Temperature was monitored throughout the test with a calibrated digital thermometer.
2. An external GPS antenna was connected to port RF1 of the EUT, using the customers bespoke software, it was seen that the EUT was frequency locked to 4 satellites.
3. The EUT was configured to transmit an un-modulated CW test tone in order to measure the frequency stability.
4. Measurements were made using the frequency count function of the test receiver.

Transmitter Frequency Stability (Temperature Variation) (continued)**Results: Bottom Channel**

Temperature (°C)	Time after Start-up					
	0 minutes (MHz)	1 minute (MHz)	2 minutes (MHz)	3 minutes (MHz)	4 minutes (MHz)	5 minutes (MHz)
-30	731.499981	731.499979	731.499976	731.499978	731.499979	731.499978
-20	731.499978	731.499978	731.499977	731.499977	731.499978	731.499977
-10	731.499976	731.499976	731.499976	731.499976	731.499976	731.499976
0	731.499976	731.499976	731.499976	731.499976	731.499976	731.499976
10	731.499977	731.499976	731.499976	731.499976	731.499975	731.499975
20	731.499975	731.499976	731.499976	731.499976	731.499976	731.499976
30	731.499977	731.499979	731.499978	731.499977	731.499980	731.499976
40	731.499980	731.499978	731.499975	731.499981	731.499978	731.499975
50	731.499970	731.499970	731.499970	731.499971	731.499971	731.499971

Temperature (°C)	Time after Start-up				
	6 minutes (MHz)	7 minutes (MHz)	8 minutes (MHz)	9 minutes (MHz)	10 minutes (MHz)
-30	731.499978	731.499977	731.499977	731.499977	731.499977
-20	731.499976	731.499977	731.499977	731.499977	731.499977
-10	731.499976	731.499976	731.499976	731.499976	731.499976
0	731.499975	731.499975	731.499975	731.499975	731.499975
10	731.499974	731.499973	731.499973	731.499972	731.499972
20	731.499975	731.499975	731.499975	731.499975	731.499975
30	731.499977	731.499979	731.499977	731.499976	731.499976
40	731.499978	731.499975	731.499980	731.499972	731.499975
50	731.499971	731.499970	731.499970	731.499970	731.499970

Frequency closest to Lower Band Edge (MHz)	Lower Band Edge Limit (MHz)	Margin (MHz)	Result
731.499970	729.0	2.499970	Complied

Transmitter Frequency Stability (Temperature Variation) (continued)**Results: Top Channel**

Temperature (°C)	Time after Start-up					
	0 minutes (MHz)	1 minute (MHz)	2 minutes (MHz)	3 minutes (MHz)	4 minutes (MHz)	5 minutes (MHz)
-30	743.499980	743.499981	743.499981	743.499979	743.499980	743.499980
-20	743.499980	743.499980	743.499980	743.499980	743.499980	743.499980
-10	743.499984	743.499984	743.499985	743.499985	743.499985	743.499985
0	743.499978	743.499978	743.499978	743.499978	743.499978	743.499978
10	743.499977	743.499977	743.499978	743.499978	743.499978	743.499978
20	743.499979	743.499979	743.499979	743.499979	743.499979	743.499978
30	743.499980	743.499983	743.499977	743.499981	743.499977	743.499983
40	743.499973	743.499974	743.499973	743.499973	743.499973	743.499973
50	743.499976	743.499976	743.499976	743.499976	743.499977	743.499977

Temperature (°C)	Time after Start-up				
	6 minutes (MHz)	7 minutes (MHz)	8 minutes (MHz)	9 minutes (MHz)	10 minutes (MHz)
-30	743.499982	743.499981	743.499980	743.499980	743.499981
-20	743.499980	743.499981	743.499979	743.499980	743.499980
-10	743.499985	743.499984	743.499984	743.499985	743.499985
0	743.499978	743.499978	743.499978	743.499978	743.499978
10	743.499978	743.499978	743.499978	743.499978	743.499978
20	743.499978	743.499979	743.499979	743.499979	743.499980
30	743.499981	743.499983	743.499981	743.499981	743.499981
40	743.499973	743.499971	743.499971	743.499971	743.499971
50	743.499977	743.499977	743.499977	743.499977	743.499977

Frequency closest to Upper Band Edge (MHz)	Upper Band Edge Limit (MHz)	Margin (MHz)	Result
743.499985	746.0	2.500015	Complied

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

RFI ID	Instrument Description	Model Number	Calibration Due	Calibration Interval (Months)
A1317	40W Termination	376BNM	Cal Before Use	-
A2006	Attenuator	769-30	Cal Before Use	-
A2007	Attenuator	769-20	Cal Before Use	-
M199	Power Meter	NRVS	07 Jun 2013	12
M1068	Thermometer	RS55	08 Mar 2013	12
M1229	Digital Multimeter	179	18 Jun 2013	12
M1252	Signal Generator	83640A	05 Oct 2012	12
M1267	Thermal Power Sensor	NRV-Z52	07 Jun 2013	12
M1630	Test Receiver	ESU 40	13 Jan 2013	12
S0550	120 VAC Power Supply	6032A	Cal Before Use	-

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

Test Engineer:	Mark Percival	Test Dates:	26 July 2012 & 30 July 2012
Test Sample Serial Number:	AQQAC27003212		

FCC Part:	2.1055 and 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:

Ambient Temperature (°C):	26 to 29
Ambient Relative Humidity (%):	35 to 40

Note(s):

1. Voltage was monitored throughout the test with a calibrated digital voltmeter.
2. An external GPS antenna was connected to port RF1 of the EUT, using the customers bespoke software, it was seen that the EUT was frequency locked to 4 satellites.
3. The EUT was configured to transmit an un-modulated CW test tone in order to measure the frequency stability.
4. Measurements were made using the frequency count function of the test receiver.

Results: Bottom Channel

Supply Voltage (VDC)	Measured Frequency (MHz)	Lower Band Edge Limit (MHz)	Margin (MHz)	Result
-40.8	731.499975	729.0	2.499975	Complied
-55.2	731.499975	729.0	2.499975	Complied

Results: Top Channel

Supply Voltage (VDC)	Measured Frequency (MHz)	Upper Band Edge Limit (MHz)	Margin (MHz)	Result
-40.8	743.499978	746.0	2.500022	Complied
-55.2	743.499978	746.0	2.500022	Complied

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

RFI ID	Instrument Description	Model Number	Calibration Due	Calibration Interval (Months)
A1317	40W Termination	376BNM	Cal Before Use	-
A2006	Attenuator	769-30	Cal Before Use	-
A2007	Attenuator	769-20	Cal Before Use	-
M199	Power Meter	NRVS	07 Jun 2013	12
M1229	Digital Multimeter	179	18 Jun 2013	12
M1252	Signal Generator	83640A	05 Oct 2012	12
M1267	Thermal Power Sensor	NRV-Z52	07 Jun 2013	12
M1630	Test Receiver	ESU 40	13 Jan 2013	12
S0550	120 VAC Power Supply	6032A	Cal 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
Occupied Bandwidth	698 MHz to 746 MHz	95%	±0.92 ppm
Conducted Carrier Output Power	698 MHz to 746 MHz	95%	±0.27 dB
Conducted Spurious Emissions	9 kHz to 8 GHz	95%	±2.64 dB
Radiated Spurious Emissions	30 MHz to 8 GHz	95%	±2.94 dB
Frequency Stability	698 MHz to 746 MHz	95%	±0.92 ppm

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	6	2.3	Added Reference to KDB 644682
	9	4.2	E-UTRA Test models added to configuration
	11	5.2.1	dBi converted to dBd and results updated accordingly