



TEST REPORT FROM RFI GLOBAL SERVICES LTD

Test of: AMW
LTE Band 12, 5 MHz Channel Bandwidth

FCC ID: PKTPEMAMW

To: FCC Parts 2.1046, 2.1049, 2.1051, 2.1053, 2.1055, 15.107, 15.109, 15.111, 27.50(c)(9),
27.53(g) & 27.54

Test Report Serial No.:
RFI-RPT-RP85949JD01C V3.0

Version 3.0 Supersedes All Previous Versions

This Test Report Is Issued Under The Authority Of John Newell, Group Quality Manager:	
Checked By:	Sarah Williams
Signature:	
Date of Issue:	12 September 2012

This report is issued in Adobe Acrobat portable document format (PDF). It is only a valid copy of the report if it is being viewed in PDF format with the following security options not allowed: Changing the document, Selecting text and graphics, Adding or changing notes and form fields.

This report may not be reproduced other than in full, except with the prior written approval of RFI Global Services Ltd. The results in this report apply only to the sample(s) tested.

This page has been left intentionally blank.

Table of Contents

1. Customer Information	4
2. Summary of Testing	5
2.1. General Information	5
2.2. Summary of Test Results	5
2.3. Methods and Procedures	6
2.4. Deviations from the Test Specification	6
3. Equipment Under Test (EUT)	7
3.1. Identification of Equipment Under Test (EUT)	7
3.2. Description of EUT	7
3.3. Modifications Incorporated in the EUT	7
3.4. Additional Information Related to Testing	8
3.5. Support Equipment	9
4. Operation and Monitoring of the EUT during Testing	10
4.1. Operating Modes	10
4.2. Configuration and Peripherals	10
5. Measurements, Examinations and Derived Results	11
5.1. General Comments	11
5.2. Test Results	12
5.2.1. Receiver/Idle Mode AC Conducted Emissions	12
5.2.2. Receiver/Idle Mode Radiated Spurious Emissions	16
5.2.3. Receiver/Idle Mode Conducted Spurious Emissions – Main RF Port	20
5.2.4. Receiver/Idle Mode Conducted Spurious Emissions – Diversity RF Port	22
5.2.5. Transmitter Carrier Output Power and Effective Radiated Power (ERP)	24
5.2.6. Transmitter Occupied Bandwidth	32
5.2.7. Transmitter Conducted Spurious Emissions	40
5.2.8. Transmitter Conducted Emissions at Band Edges	43
5.2.9. Transmitter Radiated Spurious Emissions	49
5.2.10. Transmitter Radiated Emissions at Band Edges	52
5.2.11. Transmitter Frequency Stability (Temperature Variation)	58
5.2.12. Transmitter Frequency Stability (Voltage Variation)	62
6. Measurement Uncertainty	63
7. Report Revision History	64

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)
Specification Reference:	47CFR15.107, 47CFR15.109 and CFR15.111
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications) 2011: Part 15 Subpart B (Unintentional Radiators) - Sections 15.107, 15.109 and 15.111
Site Registration:	209735
Location of Testing:	RFI Global Services Ltd, Wade Road, Basingstoke, Hampshire, RG24 8AH.
Test Dates:	13 July 2012 to 01 August 2012

2.2. Summary of Test Results

FCC Reference (47CFR)	Measurement	Result
15.107	Receiver/Idle Mode AC Conducted Emissions	
15.109	Receiver/Idle Mode Radiated Spurious Emissions	
15.111 / 2.1051	Receiver/Idle Mode Conducted Spurious Emissions – Main RF Port	
15.111 / 2.1051	Receiver/Idle Mode Conducted Spurious Emissions – Diversity RF Port	
27.50(c)(9) / 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 Response To Inquiry
Title:	Tracking Number 547443 Date: 28 June 2012
Reference:	FCC Response to Inquiry
Title:	Tracking Number 644682 Date: 09 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:	AMW
Serial Number:	AMWGB84001G12
Hardware Version Number:	Pass 1
Software Version Number:	Release 4
FCC ID:	PKTPEMAMW

Description:	Antenna
Brand Name:	None
Model Name or Number:	OA-LTE-06-01-IPW
Serial Number:	Not marked or stated

3.2. Description of EUT

The equipment under test was a LTE PCI Express Mini Modem.

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	PCI Express mini module	
Channel Bandwidth:	5 MHz	
Modulation Type:	QPSK & 16QAM	
Duty Cycle:	100%	
Antenna Gain:	8.6 dBi	
Power Supply Requirement:	Nominal	3.3 V
	Minimum	3.0 V
	Maximum	3.6 V
Transmit Frequency Range:	Band 12 (699 MHz to 716 MHz) Part 27 (698 MHz to 746 MHz)	
Transmit Channels Tested:	EARFCN	Channel Frequency (MHz)
	23035	701.5
	23095	707.5
	23155	713.5
Receive Frequency Range:	Band 12 (729 MHz to 746MHz) Part 27 (698 MHz to 746 MHz)	
Receive 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:	UE PEM V1 NG Adaptor Board
Brand Name:	IPWireless
Model Name or Number:	AAF Pass3
Serial Number:	AAF838000V32

Description:	UE PEM V1 NG Adaptor Board – Voltage Variation
Brand Name:	IPWireless
Model Name or Number:	AAF Pass2
Serial Number:	EEMS 022530 0004

Description:	Laptop PC
Brand Name:	Toshiba
Model Name or Number:	PSAAPE-00H00KEN
Serial Number:	67071048Q

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 and 16QAM modulations were both tested, along with the Resource Blocks set to 1 and 25.
- Receive Mode – the EUT was set to receive only mode.

4.2. Configuration and Peripherals

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

- The EUT was connected to the UE PEM V1 NG Adaptor Board, for all tests.
- The EUT was controlled from a laptop PC, using bespoke software supplied by the Customer.
- The EUT was connected to a test laptop by using a USB extension cable and the laptop was connected to 120 VAC 60 Hz AC supply.
- The EUT has two U.FL connector ports, the customer supplied two short U.FL to SMA cables, to allow conducted measurements to be performed where necessary.
- The EUT was connected to an Anristu LTE system simulator, operating in a transceiver mode.
- For Resource Block setting of 1, testing was carried out on starting block numbers of 1 and 25.
- The EUT has a main RF port and a Receiver Diversity port. Transmitter testing was performed on the main RF port which is a transmit and receive port. The diversity port was terminated for all bench testing.
- For radiated emissions testing, the customer supplied two OA-LTE-06-01-IPW antennas', which were connected to the main and diversity ports. The antenna gain was declared as 8.6 dBi.
- The customer supplied a modified UE PEM V1NG Adaptor Board, which allowed voltage variation directly to the PEM, this was used for Transmitter Frequency Stability Voltage Variation testing 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. Receiver/Idle Mode AC Conducted Emissions****Test Summary:**

Test Engineer:	Nick Steele	Test Date:	30 July 2012
Test Sample Serial Number:	AMWGB84001G12		

FCC Part:	15.107
Test Method Used:	ANSI C63.4 Section 7

Environmental Conditions:

Temperature (°C):	26
Relative Humidity (%):	49

Note(s):

1. The EUT is a module and can be installed into a host device which is AC powered therefore AC Conducted Emissions testing is required. The EUT was powered from an AC to DC power supply, which was connected to 120 VAC 60 Hz mains.

Receiver/Idle Mode AC Conducted Emissions (continued)**Results: Live / Quasi Peak**

Frequency (MHz)	Line	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
0.150	Live	42.8	66.0	23.2	Complied
0.172	Live	42.2	64.8	22.6	Complied
4.601	Live	16.4	56.0	39.6	Complied
4.988	Live	16.4	56.0	39.6	Complied
5.645	Live	17.7	60.0	42.3	Complied
6.397	Live	19.8	60.0	40.2	Complied
6.729	Live	19.1	60.0	41.0	Complied
11.351	Live	32.5	60.0	27.5	Complied
12.687	Live	20.4	60.0	39.6	Complied
16.049	Live	21.7	60.0	38.3	Complied

Results: Live / Average

Frequency (MHz)	Line	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
0.173	Live	18.8	54.8	36.0	Complied
0.173	Live	18.8	54.8	36.0	Complied
4.655	Live	7.1	46.0	38.9	Complied
5.028	Live	8.9	50.0	41.1	Complied
5.487	Live	10.0	50.0	40.0	Complied
7.112	Live	11.8	50.0	38.2	Complied
7.346	Live	12.2	50.0	37.8	Complied
11.382	Live	27.9	50.0	22.1	Complied
12.669	Live	15.5	50.0	34.5	Complied
16.049	Live	17.7	50.0	32.3	Complied

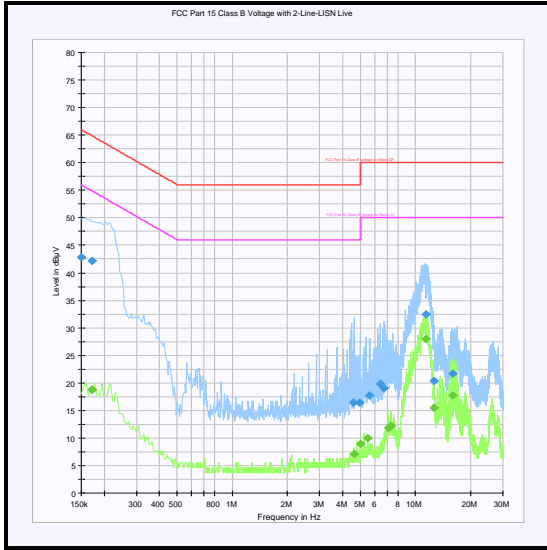
Receiver/Idle Mode AC Conducted Emissions (continued)**Results: Neutral / Quasi Peak**

Frequency (MHz)	Line	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
0.150	Neutral	44.9	21.1	66.0	Complied
0.164	Neutral	44.5	20.8	65.3	Complied
0.267	Neutral	28.6	32.6	61.2	Complied
6.558	Neutral	19.8	40.2	60.0	Complied
7.076	Neutral	18.3	41.7	60.0	Complied
11.058	Neutral	34.5	25.5	60.0	Complied
11.387	Neutral	35.7	24.3	60.0	Complied
13.484	Neutral	24.4	35.6	60.0	Complied
15.585	Neutral	25.5	34.5	60.0	Complied
16.409	Neutral	23.2	36.8	60.0	Complied

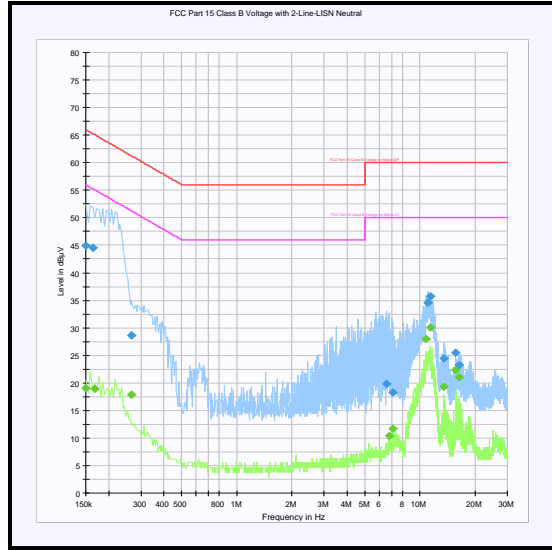
Results: Neutral / Average

Frequency (MHz)	Line	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
0.150	Neutral	19.0	37.0	56.0	Complied
0.168	Neutral	19.0	36.1	55.1	Complied
0.267	Neutral	17.9	33.3	51.2	Complied
6.774	Neutral	10.4	39.6	50.0	Complied
7.112	Neutral	11.7	38.3	50.0	Complied
10.797	Neutral	27.9	22.1	50.0	Complied
11.382	Neutral	30.1	19.9	50.0	Complied
13.484	Neutral	19.3	30.7	50.0	Complied
15.585	Neutral	22.3	27.7	50.0	Complied
16.404	Neutral	21.0	29.0	50.0	Complied

Receiver/Idle Mode AC Conducted Emissions (continued)



Live



Neutral

Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.

Test Equipment Used:

RFI ID	Instrument Description	Model Number	Calibration Due	Calibration Interval (Months)
A649	LISN	ESH3-Z5	19 Feb 2013	12
A1830	Pulse Limiter	ESH3-Z2	25 Feb 2013	12
M1229	Digital Multimeter	179	18 Jun 2013	12
M1379	Test Receiver	ESIB7	20 Oct 2012	12
S0529	DC Power Supply	IPS2302A	Cal Before Use	-

5.2.2. Receiver/Idle Mode Radiated Spurious Emissions**Test Summary:**

Test Engineer:	Andrew Edwards	Test Date:	13 July 2012
Test Sample Serial Number:	AMWGB84001G12		

FCC Part:	15.109
Test Method Used:	ANSI C63.4 Section 8
Frequency Range:	30 MHz to 1000 MHz

Environmental Conditions:

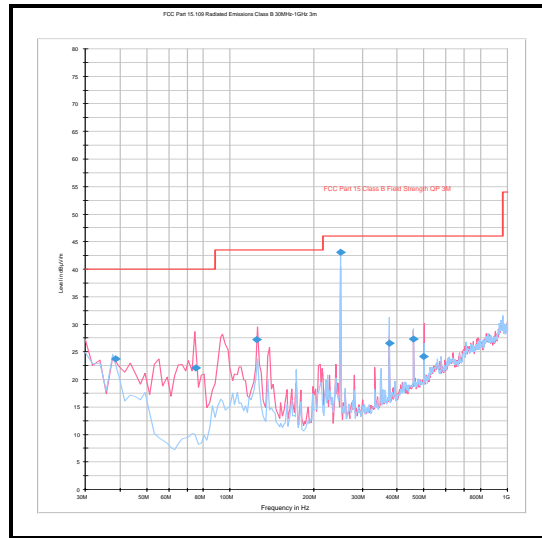
Temperature (°C):	25
Relative Humidity (%):	45

Note(s):

1. The final measured value, for the given emission, in the table below incorporates the calibrated antenna factor and cable loss.
2. All other emissions shown on the pre-scan plot were investigated and found to be ambient or >20 dB below the applicable limit or below the measurement system noise floor.
3. 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 Middle of the chamber turntable. Maximum emission levels were determined by height searching the measurement antenna over the range 1 metre to 4 metres.

Results: Quasi Peak

Frequency (MHz)	Antenna Polarity	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
38.723	Horizontal	23.7	40.0	16.3	Complied
74.984	Vertical	22.1	40.0	17.9	Complied
125.024	Vertical	27.2	43.5	16.3	Complied
250.001	Horizontal	43.1	46.0	2.9	Complied
375.016	Horizontal	26.6	46.0	19.4	Complied
458.786	Vertical	27.3	46.0	18.7	Complied
500.041	Vertical	24.2	46.0	21.8	Complied

Receiver/Idle Mode Radiated Spurious Emissions (continued)

Note: This plot is a pre-scan and for indication purposes only. For final measurements, see accompanying table.

Test Equipment Used:

RFI ID	Instrument Description	Model Number	Calibration Due	Calibration Interval (Months)
K0001	5m RSE Chamber	Rainford	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

Receiver/Idle Mode Radiated Spurious Emissions (continued)**Test Summary:**

Test Engineer:	Andrew Edwards	Test Date:	13 July 2012
Test Sample Serial Number:	AMWGB84001G12		

FCC Part:	15.109
Test Method Used:	ANSI C63.4 Section 8
Frequency Range:	1 GHz to 4 GHz

Environmental Conditions:

Temperature (°C):	25
Relative Humidity (%):	44

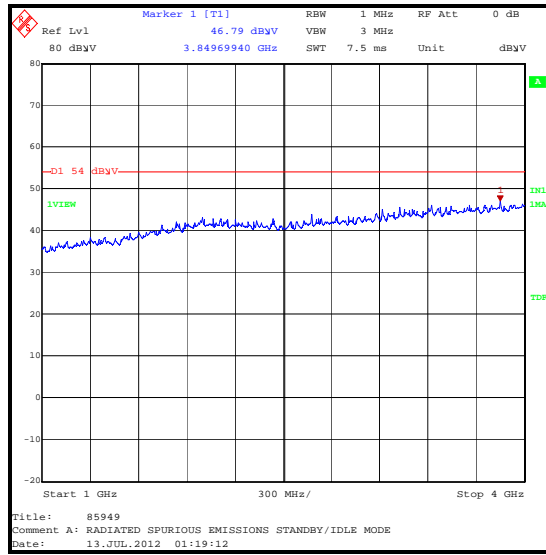
Note(s):

1. The final measured value, for the given emission, in the table below incorporates the calibrated antenna factor and cable loss.
2. 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 Middle 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 Middle of the chamber turntable. Maximum emission levels were determined by height searching the measurement antenna over the range 1 metre to 4 metres.
3. No spurious emissions were detected above the noise floor of the measuring receiver therefore the highest peak noise floor reading of the measuring receiver was recorded as shown in the table below. The peak level was compared to the average limit as opposed to being compared to the peak limit because this is the more onerous limit.

Results:

Frequency (MHz)	Antenna Polarity	Peak Level (dBμV/m)	Average Limit (dBμV/m)	Margin (dB)	Result
3849.699	Vertical	46.8	54.0	7.2	Complied

Receiver/Idle Mode Radiated Spurious Emissions (continued)



Test Equipment Used:

RFI ID	Instrument Description	Model Number	Calibration Due	Calibration Interval (Months)
A1534	Pre Amplifier	8449B	09 Oct 2012	12
A1818	Antenna	3115	09 Oct 2012	12
K0002	3m RSE Chamber	Rainford	09 Oct 2012	12
L1067	Test Receiver	ESIB 40	29 May 2013	12

5.2.3. Receiver/Idle Mode Conducted Spurious Emissions – Main RF Port**Test Summary:**

Test Engineer:	Nick Steele	Test Date:	25 July 2012
Test Sample Serial Number:	AMWGB84001G12		

FCC Part:	15.111 / 2.1051
Test Method Used:	As detailed in ANSI TIA-603-C-2004 section 2.1.2
Frequency Range:	9 kHz to 4 GHz

Environmental Conditions:

Temperature (°C):	26
Relative Humidity (%):	34

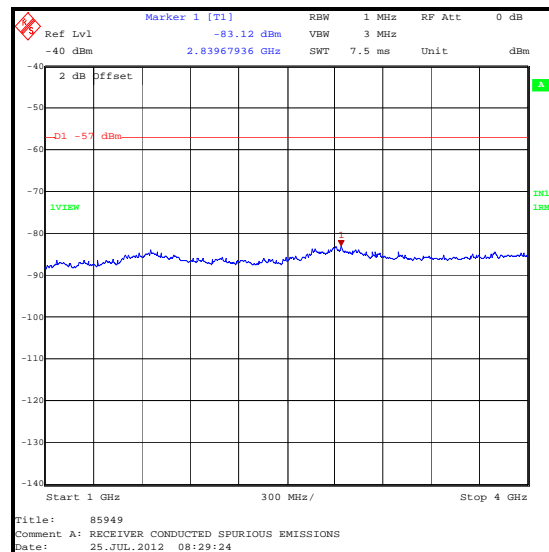
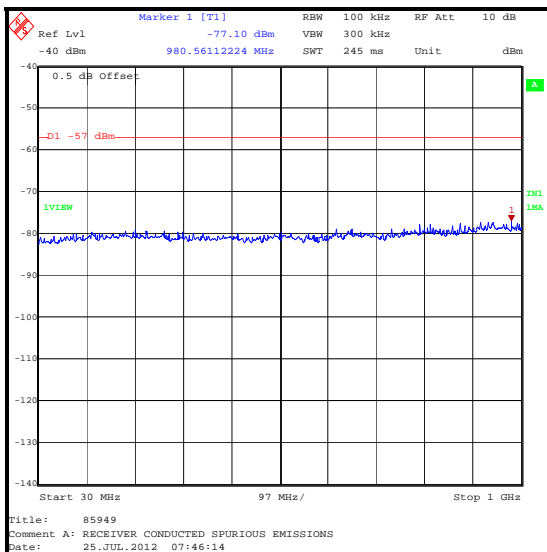
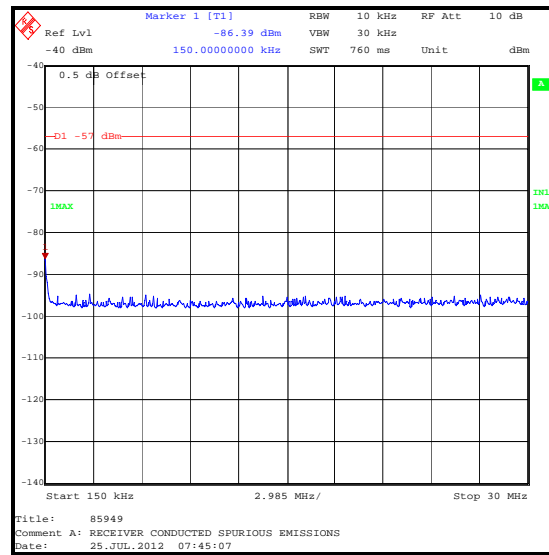
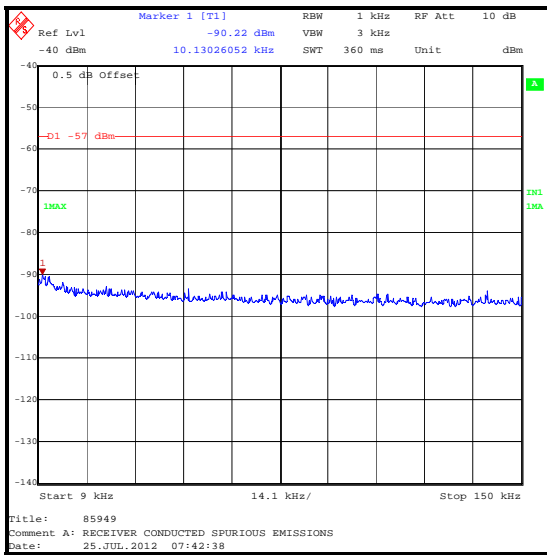
Note(s):

1. No spurious emissions were detected above the noise floor of the measuring receiver therefore the highest peak noise floor reading of the measuring receiver was recorded as shown in the table below.

Results:

Frequency (MHz)	Level (dBμV/m)	Limit (d/m)	Margin (dB)	Result
980.561	-77.1	-57.0	20.1	Complied

Receive/Idle Mode Conducted Emissions – Main RF Port (continued)



Test Equipment Used:

RFI ID	Instrument Description	Model Number	Calibration Due	Calibration Interval (Months)
L1067	Test Receiver	ESIB 40	29 May 2013	12
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

5.2.4. Receiver/Idle Mode Conducted Spurious Emissions – Diversity RF Port**Test Summary:**

Test Engineer:	Nick Steele	Test Date:	25 July 2012
Test Sample Serial Number:	AMWGB84001G12		

FCC Part:	15.111 / 2.1051
Test Method Used:	As detailed in ANSI TIA-603-C-2004 section 2.1.2
Frequency Range:	9 kHz to 4 GHz

Environmental Conditions:

Temperature (°C):	26
Relative Humidity (%):	34

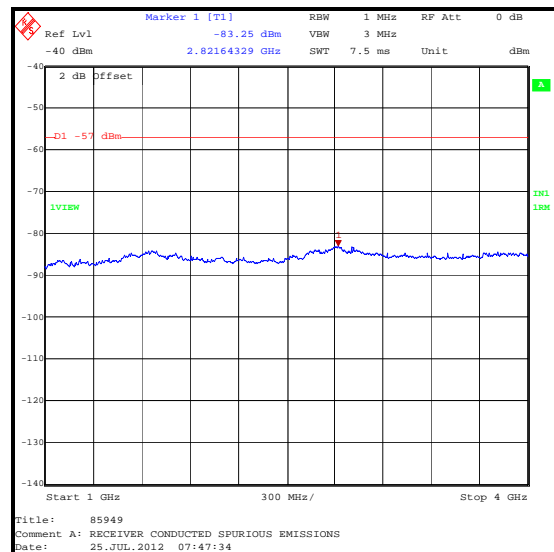
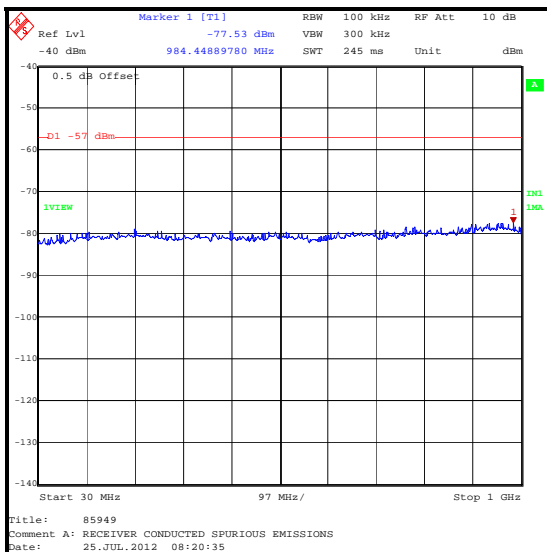
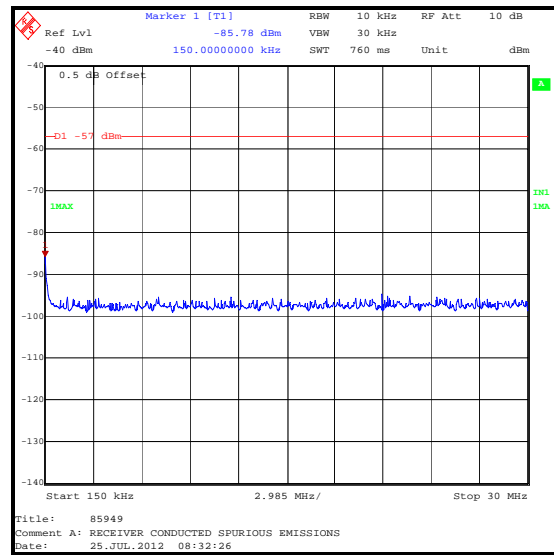
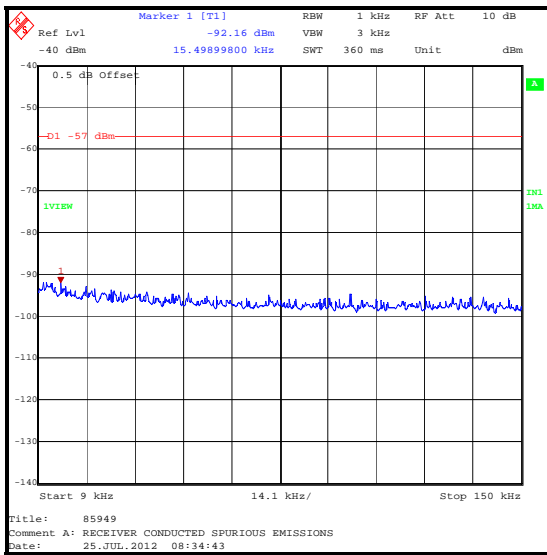
Note(s):

1. No spurious emissions were detected above the noise floor of the measuring receiver therefore the highest peak noise floor reading of the measuring receiver was recorded as shown in the table below.

Results:

Frequency (MHz)	Level (dBμV/m)	Limit (d/m)	Margin (dB)	Result
984.449	-77.5	-57.0	20.5	Complied

Receive/Idle Mode Conducted Emissions – Diversity RF Port (continued)



Test Equipment Used:

RFI ID	Instrument Description	Model Number	Calibration Due	Calibration Interval (Months)
L1067	Test Receiver	ESIB 40	29 May 2013	12
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

5.2.5. Transmitter Carrier Output Power and Effective Radiated Power (ERP)**Test Summary:**

Test Engineer:	Nick Steele	Test Dates:	27 July 2012, 30 July 2012 & 31 July 2012
Test Sample Serial Number:	AMWGB84001G12		

FCC Part:	2.1046 and 27.50(c)(9)
Test Method Used:	As detailed in ANSI TIA-603-C-2004 Section 2.2.17.2

Environmental Conditions:

Temperature (°C):	25 to 29
Relative Humidity (%):	35 to 38

Note(s):

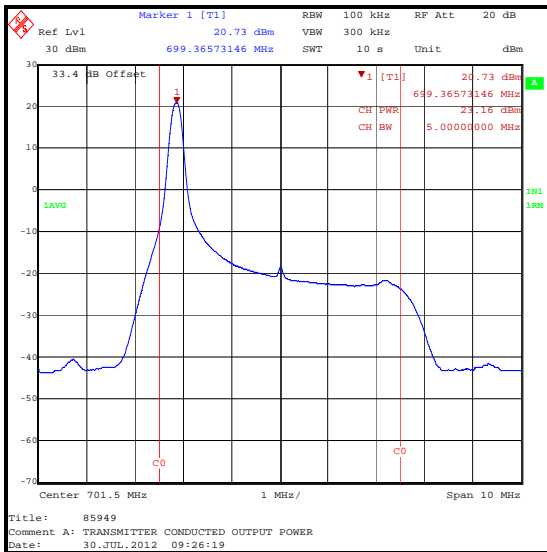
- Measurements were performed with the EUT transmitting with QPSK and 16QAM modulation schemes, with resource blocks of 1 and 25. For single resource blocks, measurements were performed with the starting of blocks 1 and 25.
- The Customer stated a maximum antenna gain of 8.6 dBi. As the limit is an ERP limit the gain in dBi has been converted to dBd. The dBd was calculated as:

$$8.6 \text{ dBi} - 2.15 \text{ dB} = 6.45 \text{ dBd}.$$

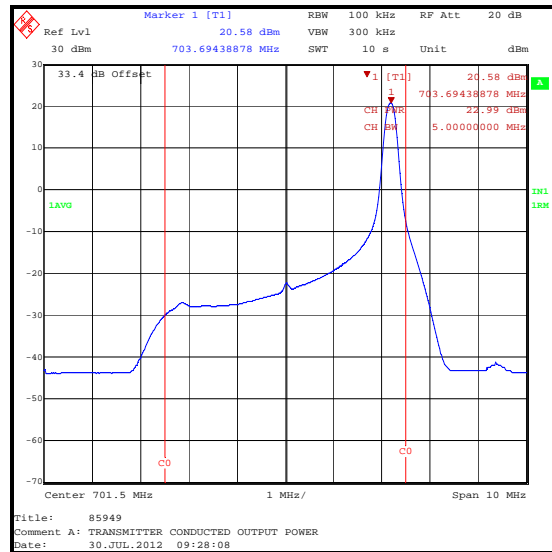
Transmitter Carrier Output Power and Effective Radiated Power (ERP) (continued)

Results: 5 MHz Channel Bandwidth / Bottom Channel

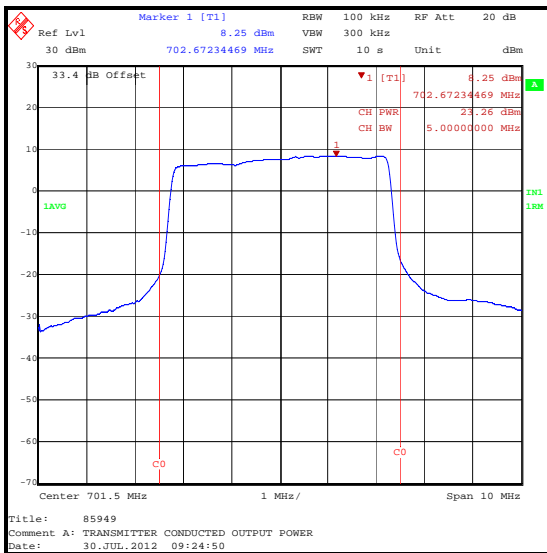
Frequency (MHz)	Modulation	Resource Blocks	Conducted RF Power (dBm)	Antenna Gain (dBd)	ERP (dBm)	ERP Limit (dBm)	Margin (dB)	Result
701.5	QPSK	1 (1)	23.2	6.45	29.65	44.8	15.15	Complied
701.5	QPSK	1 (25)	23.0	6.45	29.45	44.8	15.35	Complied
701.5	QPSK	25	23.3	6.45	29.75	44.8	15.05	Complied



QPSK / 1 Resource Block (Block 1)



QPSK / 1 Resource Block (Block 25)

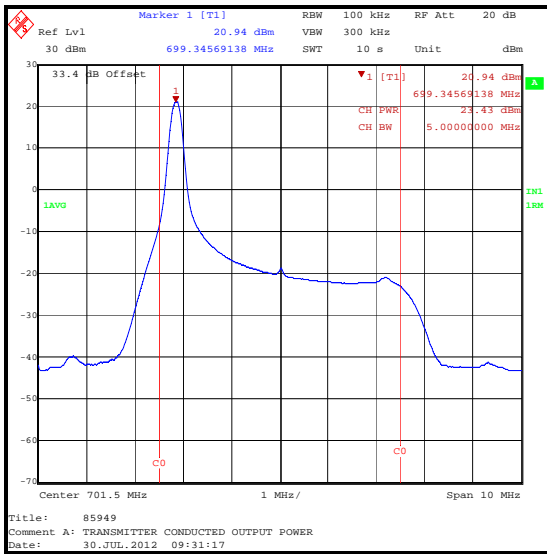


QPSK / 25 Resource Blocks

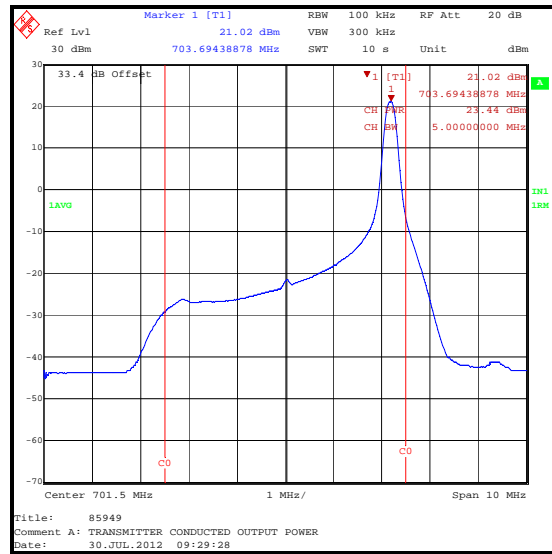
Transmitter Carrier Output Power and Effective Radiated Power (ERP) (continued)

Results: 5 MHz Channel Bandwidth / Bottom Channel

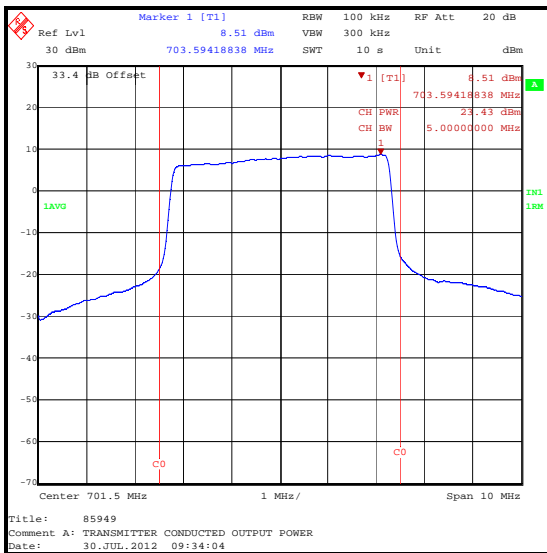
Frequency (MHz)	Modulation	Resource Blocks	Conducted RF Power (dBm)	Antenna Gain (dBd)	ERP (dBm)	ERP Limit (dBm)	Margin (dB)	Result
701.5	16QAM	1 (1)	23.4	6.45	29.85	44.8	14.95	Complied
701.5	16QAM	1 (25)	23.4	6.45	29.85	44.8	14.95	Complied
701.5	16QAM	25	23.4	6.45	29.85	44.8	14.95	Complied



16QAM / 1 Resource Block (Block 1)



16QAM / 1 Resource Block (Block 25)

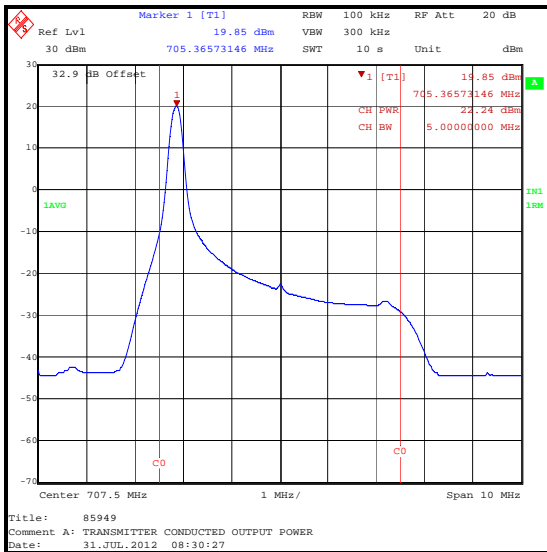


16QAM / 25 Resource Blocks

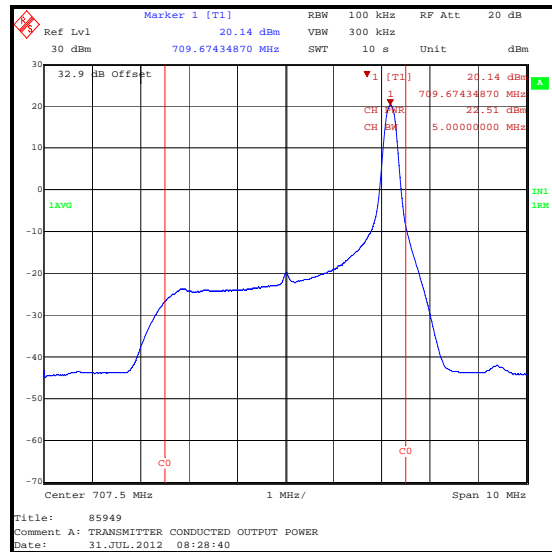
Transmitter Carrier Output Power and Effective Radiated Power (ERP) (continued)

Results: 5 MHz Channel Bandwidth / Middle Channel

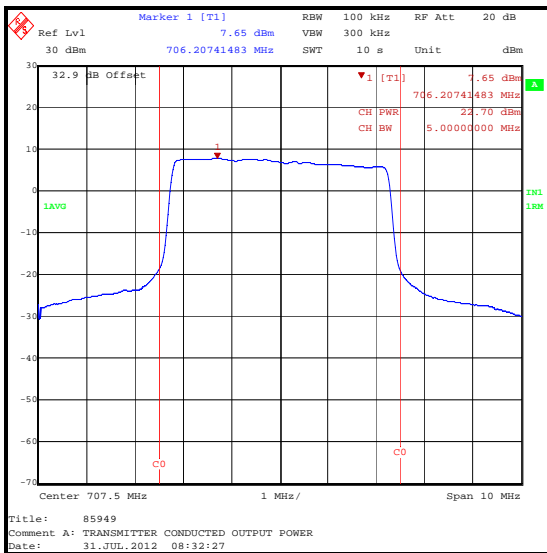
Frequency (MHz)	Modulation	Resource Blocks	Conducted RF Power (dBm)	Antenna Gain (dBd)	ERP (dBm)	ERP Limit (dBm)	Margin (dB)	Result
707.5	QPSK	1 (1)	22.2	6.45	28.65	44.8	16.15	Complied
707.5	QPSK	1 (25)	22.5	6.45	28.95	44.8	15.85	Complied
707.5	QPSK	25	22.7	6.45	29.15	44.8	15.65	Complied



QPSK / 1 Resource Block (Block 1)



QPSK / 1 Resource Block (Block 25)

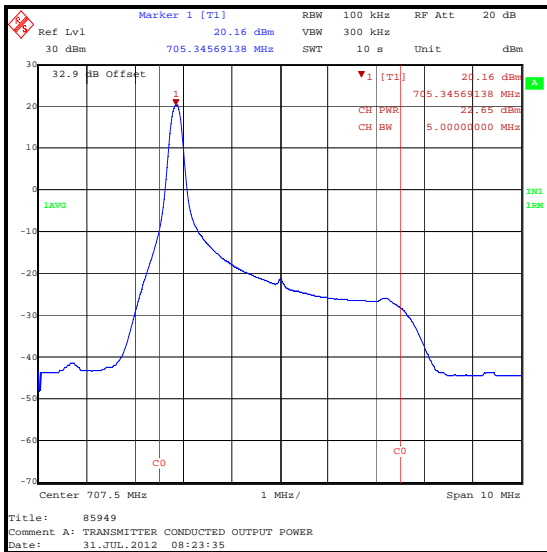


QPSK / 25 Resource Blocks

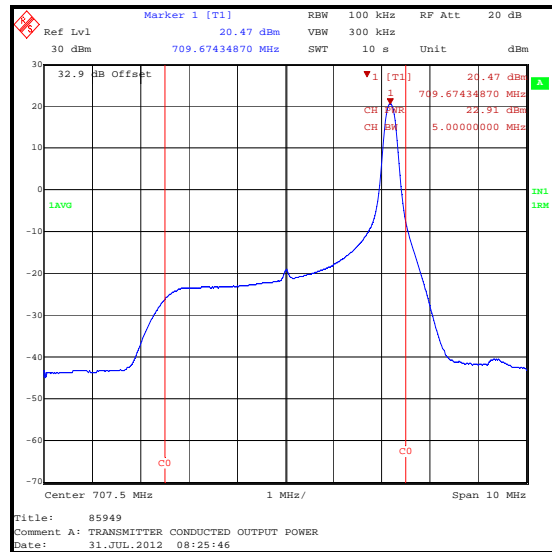
Transmitter Carrier Output Power and Effective Radiated Power (ERP) (continued)

Results: 5 MHz Channel Bandwidth / Middle Channel

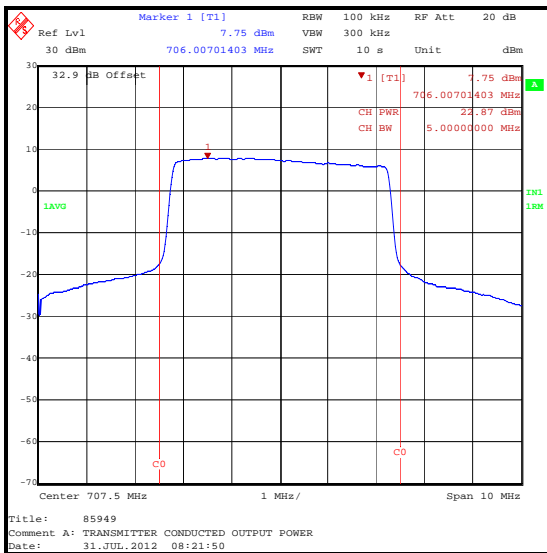
Frequency (MHz)	Modulation	Resource Blocks	Conducted RF Power (dBm)	Antenna Gain (dBd)	ERP (dBm)	ERP Limit (dBm)	Margin (dB)	Result
707.5	16QAM	1 (1)	22.7	6.45	29.15	44.8	15.65	Complied
707.5	16QAM	1 (25)	22.9	6.45	29.35	44.8	15.45	Complied
707.5	16QAM	25	22.9	6.45	29.35	44.8	15.45	Complied



16QAM / 1 Resource Block (Block 1)



16QAM / 1 Resource Block (Block 25)

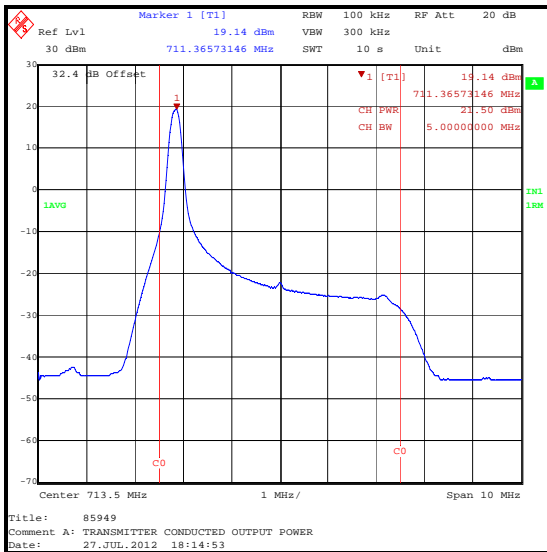


16QAM / 25 Resource Blocks

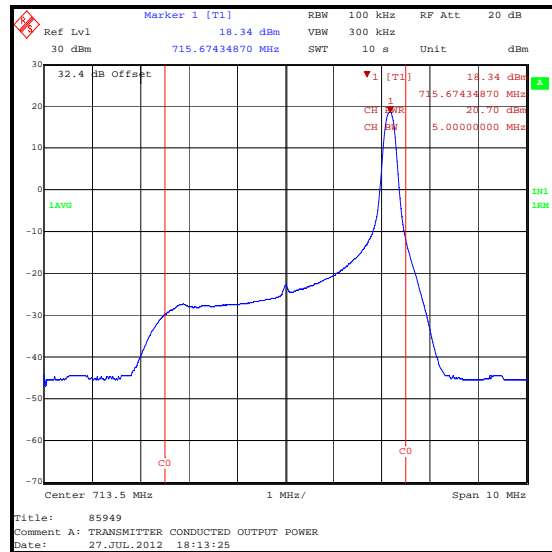
Transmitter Carrier Output Power and Effective Radiated Power (ERP) (continued)

Results: 5 MHz Channel Bandwidth / Top Channel

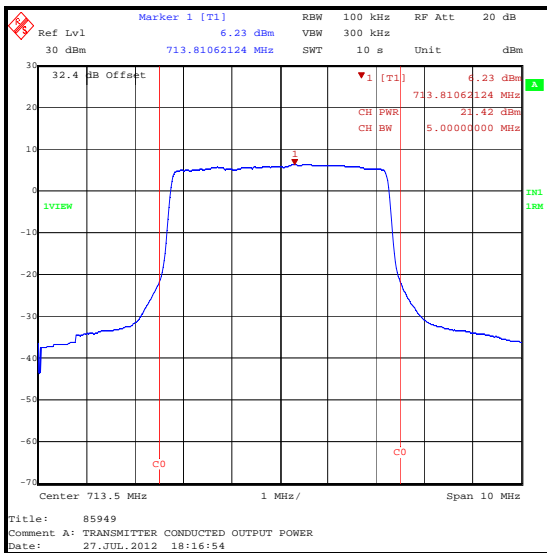
Frequency (MHz)	Modulation	Resource Blocks	Conducted RF Power (dBm)	Antenna Gain (dBd)	ERP (dBm)	ERP Limit (dBm)	Margin (dB)	Result
713.5	QPSK	1 (1)	21.5	6.45	27.95	44.8	16.85	Complied
713.5	QPSK	1 (25)	20.7	6.45	27.15	44.8	17.65	Complied
713.5	QPSK	25	21.4	6.45	27.85	44.8	16.95	Complied



QPSK / 1 Resource Block (Block 1)



QPSK / 1 Resource Block (Block 25)

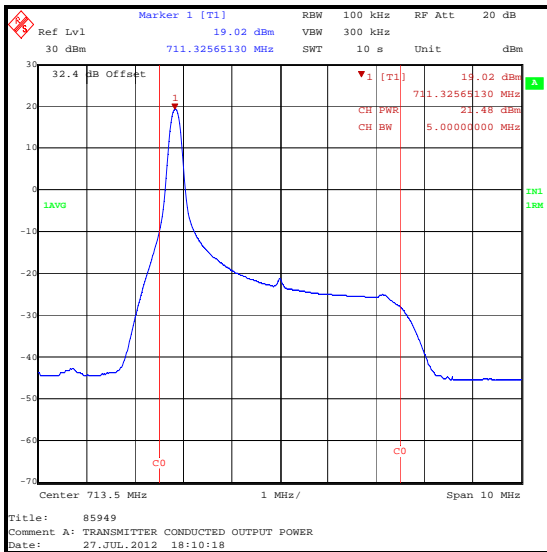


QPSK / 25 Resource Blocks

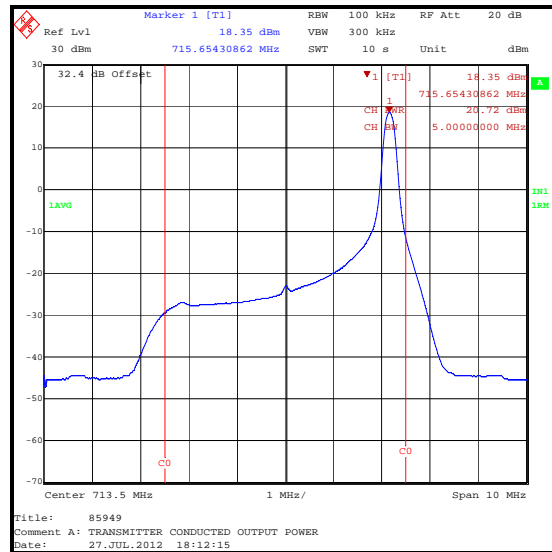
Transmitter Carrier Output Power and Effective Radiated Power (ERP) (continued)

Results: 5 MHz Channel Bandwidth / Top Channel

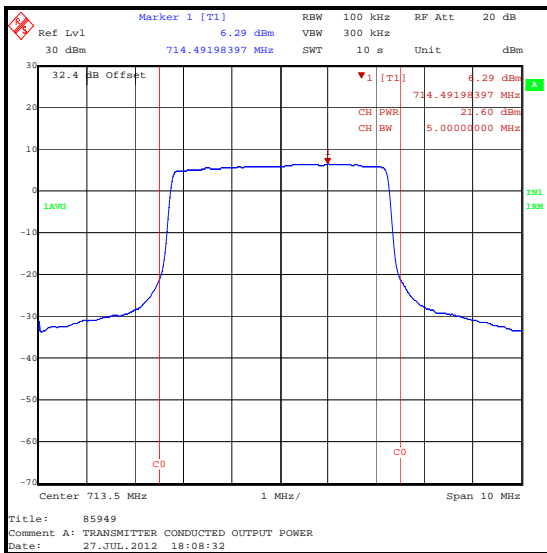
Frequency (MHz)	Modulation	Resource Blocks	Conducted RF Power (dBm)	Antenna Gain (dBd)	ERP (dBm)	ERP Limit (dBm)	Margin (dB)	Result
713.5	16QAM	1 (1)	21.5	6.45	27.95	44.8	16.85	Complied
713.5	16QAM	1 (25)	20.7	6.45	27.15	44.8	17.65	Complied
713.5	16QAM	25	21.6	6.45	28.05	44.8	16.75	Complied



16QAM / 1 Resource Block (Block 1)



16QAM / 1 Resource Block (Block 25)



16QAM / 25 Resource Blocks

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

RFI ID	Instrument Description	Model Number	Calibration Due	Calibration Interval (Months)
A1368	Directional Coupler	PE2214-10	Cal Before Use	-
A1999	Attenuator	6820.17.B	04 Apr 2013	12
L1067	Test Receiver	ESIB 40	29 May 2013	12
M199	Power Meter	NRVS	07 Jun 2013	12
M1021	Signal Generator	1035.5005.02	09 Jan 2013	12
M1267	Thermal Power Sensor	NRV-Z52	07 Jun 2013	12

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

Test Engineer:	Nick Steele	Test Dates:	27 July 2012, 30 July 2012 & 31 July 2012
Test Sample Serial Number:	AMWGB84001G12		

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 to 29
Relative Humidity (%):	35 to 38

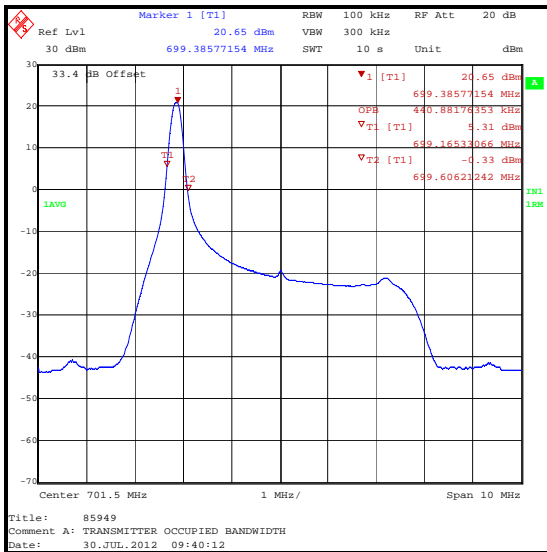
Note(s):

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.
2. Measurements were performed with the EUT transmitting with QPSK and 16QAM modulation schemes, with resource blocks of 1 and 25. For single resource blocks, measurements were performed with the block starting of blocks 1 and 25.

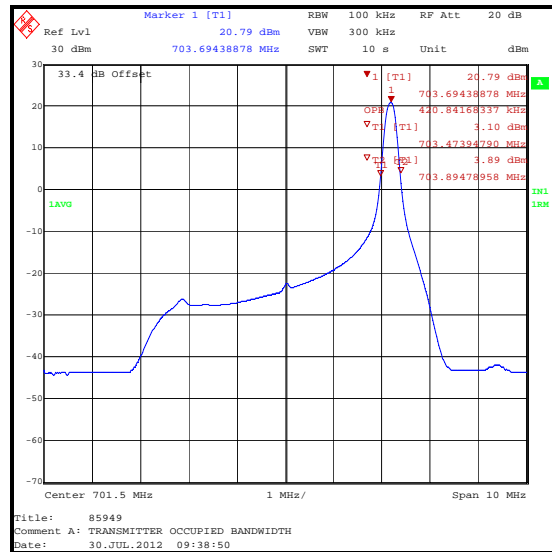
Transmitter Occupied Bandwidth (continued)

Results: 5 MHz Channel Bandwidth / Bottom Channel

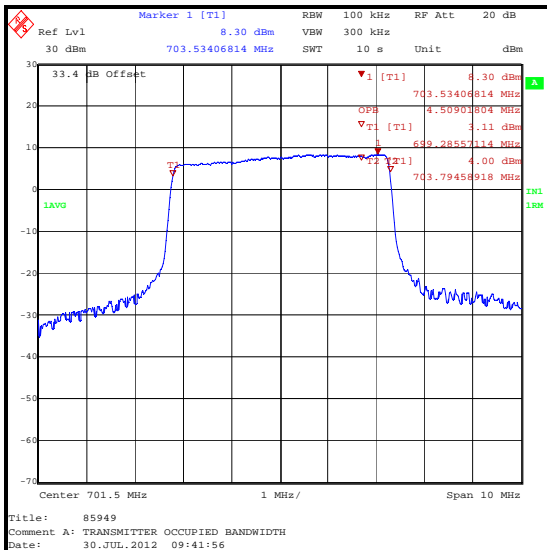
Frequency	Modulation	Resource Blocks	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
701.5	QPSK	1 (1)	100	300	0.441
701.5	QPSK	1 (25)	100	300	0.421
701.5	QPSK	25	100	300	4.509



QPSK / 1 Resource Block (Block 1)



QPSK / 1 Resource Block (Block 25)

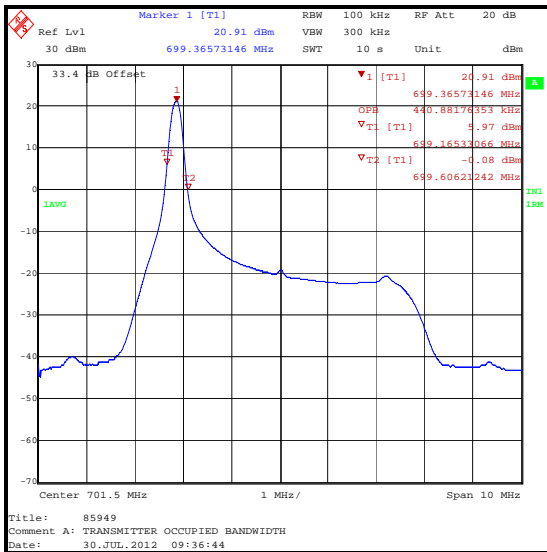


QPSK / 25 Resource Blocks

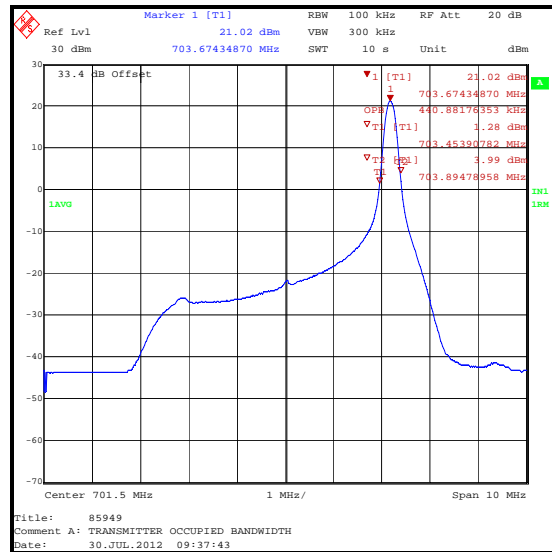
Transmitter Occupied Bandwidth (continued)

Results: 5 MHz Channel Bandwidth / Bottom Channel

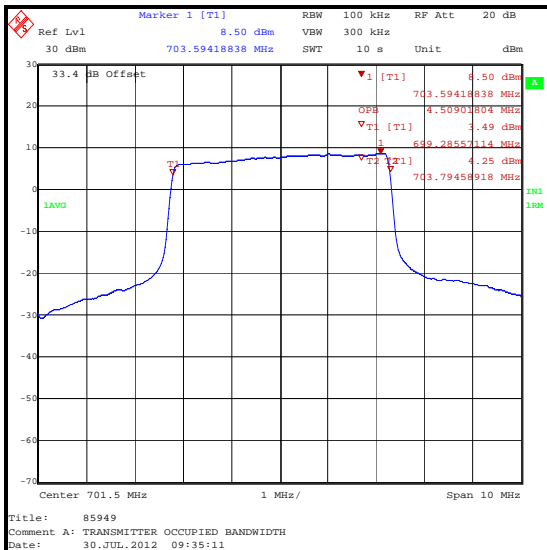
Frequency	Modulation	Resource Blocks	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
701.5	16QAM	1 (1)	100	300	0.441
701.5	16QAM	1 (25)	100	300	0.441
701.5	16QAM	25	100	300	4.509



16QAM / 1 Resource Block (Block 1)



16QAM / 1 Resource Block (Block 25)

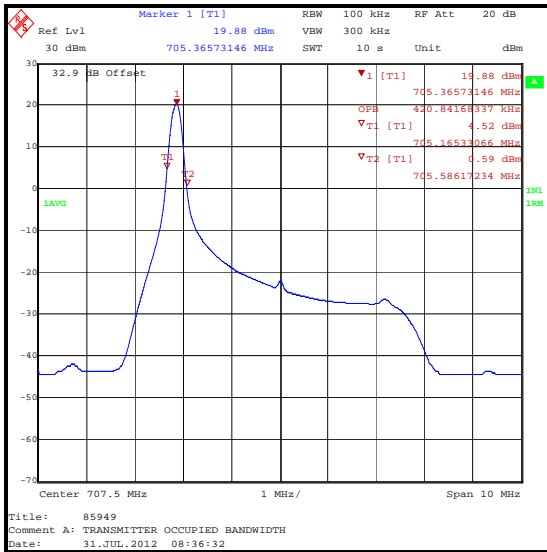


16QAM / 25 Resource Blocks

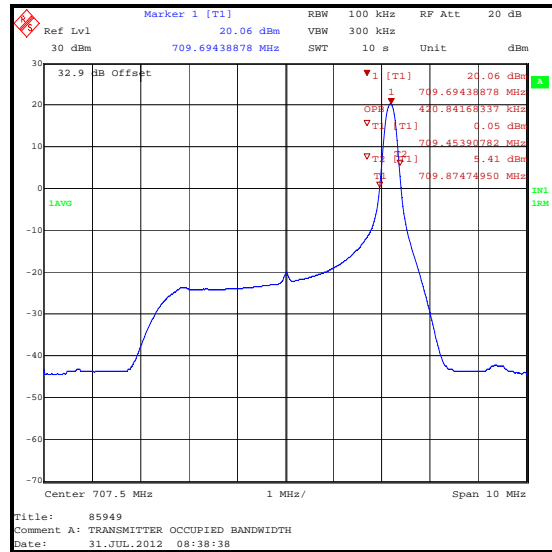
Transmitter Occupied Bandwidth (continued)

Results: 5 MHz Channel Bandwidth / Middle Channel

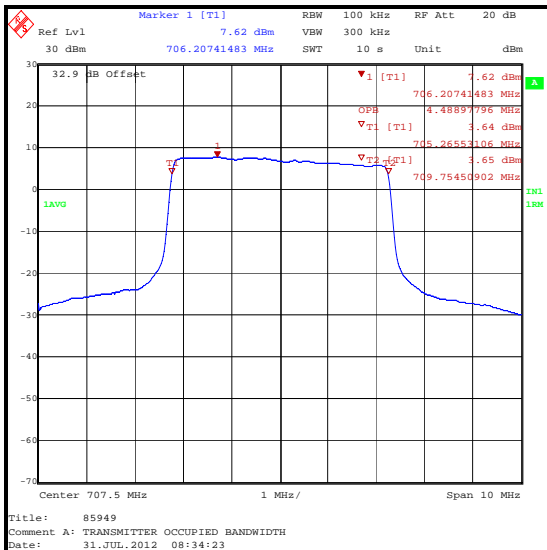
Frequency	Modulation	Resource Blocks	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
707.5	QPSK	1 (1)	100	300	0.421
707.5	QPSK	1 (25)	100	300	0.421
707.5	QPSK	25	100	300	4.489



QPSK / 1 Resource Block (Block 1)



QPSK / 1 Resource Block (Block 25)

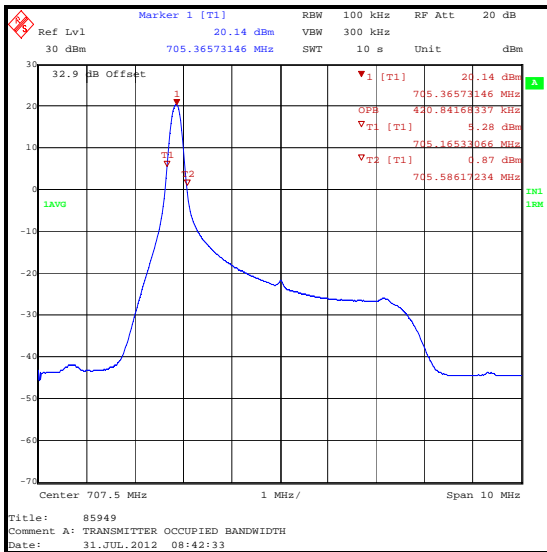


QPSK / 25 Resource Blocks

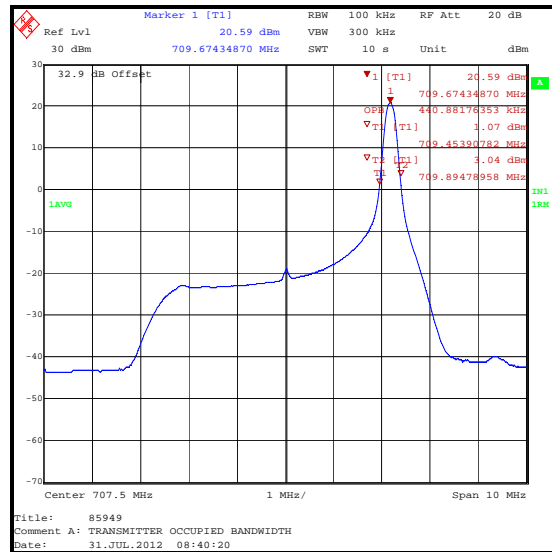
Transmitter Occupied Bandwidth (continued)

Results: 5 MHz Channel Bandwidth / Middle Channel

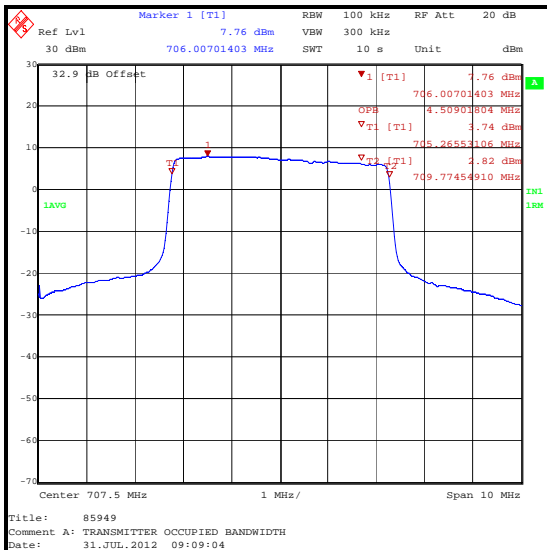
Frequency	Modulation	Resource Blocks	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
707.5	16QAM	1 (1)	100	300	0.421
707.5	16QAM	1 (25)	100	300	0.441
707.5	16QAM	25	100	300	4.509



16QAM / 1 Resource Block (Block 1)



16QAM / 1 Resource Block (Block 25)

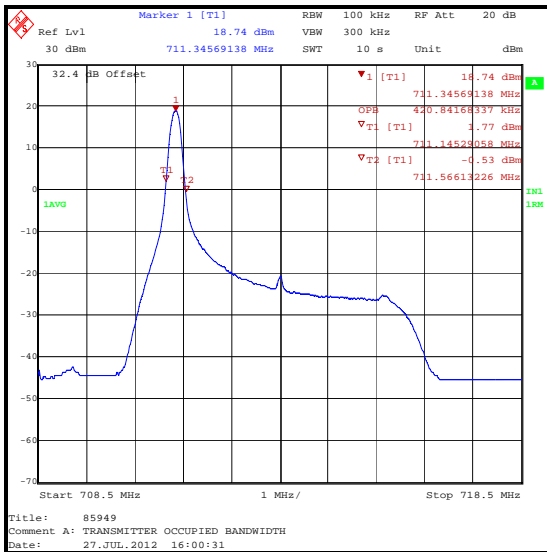


16QAM / 25 Resource Blocks

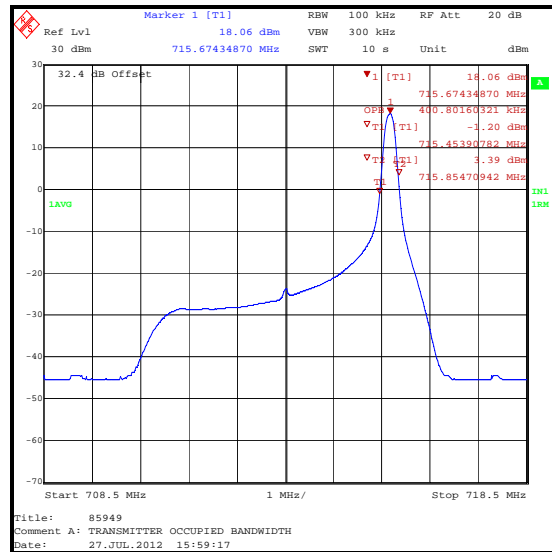
Transmitter Occupied Bandwidth (continued)

Results: 5 MHz Channel Bandwidth /Top Channel

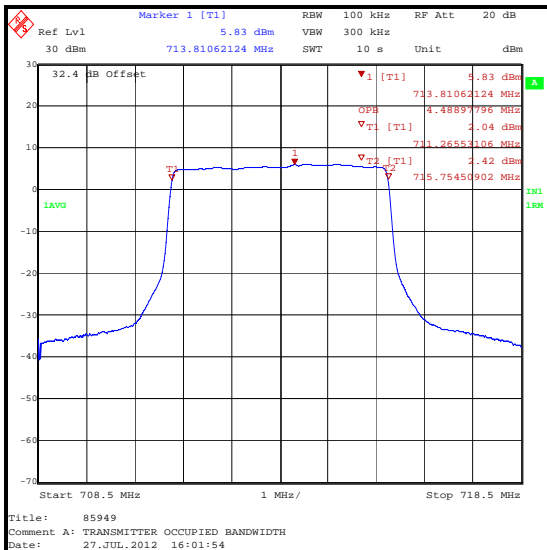
Frequency	Modulation	Resource Blocks	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
713.5	QPSK	1 (1)	100	300	0.421
713.5	QPSK	1 (25)	100	300	0.401
713.5	QPSK	25	100	300	4.489



QPSK / 1 Resource Block (Block 1)



QPSK / 1 Resource Block (Block 25)

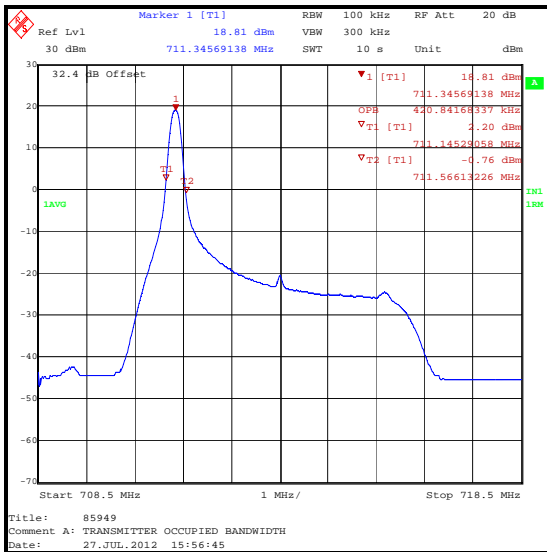


QPSK / 25 Resource Blocks

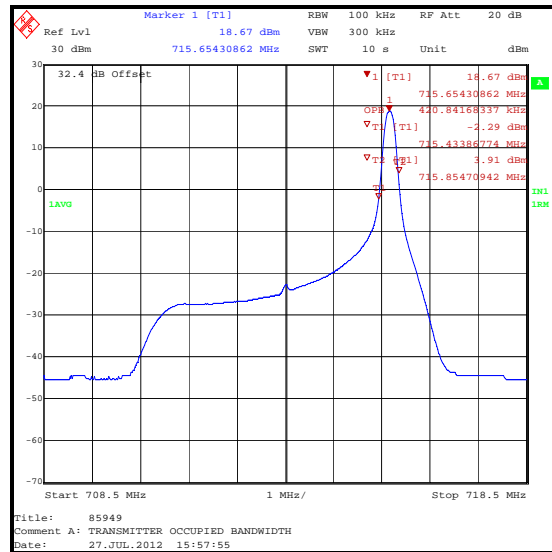
Transmitter Occupied Bandwidth (continued)

Results: 5 MHz Channel Bandwidth / Top Channel

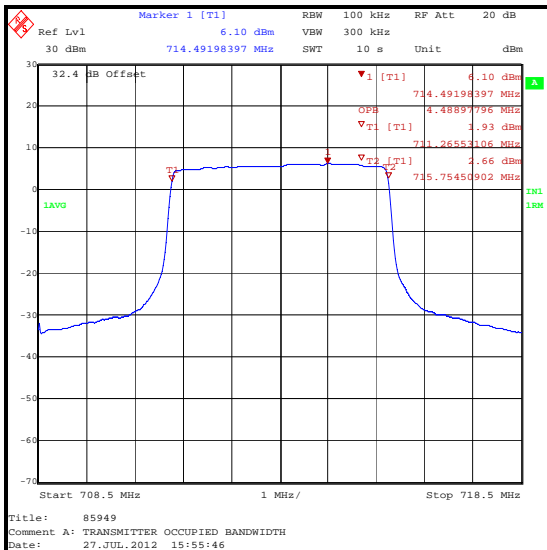
Frequency	Modulation	Resource Blocks	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
713.5	16QAM	1 (1)	100	300	0.421
713.5	16QAM	1 (25)	100	300	0.421
713.5	16QAM	25	100	300	4.489



16QAM / 1 Resource Block (Block 1)



16QAM / 1 Resource Block (Block 25)



16QAM / 25 Resource Blocks

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

RFI ID	Instrument Description	Model Number	Calibration Due	Calibration Interval (Months)
A1368	Directional Coupler	PE2214-10	Cal Before Use	-
A1999	Attenuator	6820.17.B	04 Apr 2013	12
L1067	Test Receiver	ESIB 40	29 May 2013	12
M199	Power Meter	NRVS	07 Jun 2013	12
M1021	Signal Generator	1035.5005.02	09 Jan 2013	12
M1267	Thermal Power Sensor	NRV-Z52	07 Jun 2013	12

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

Test Engineer:	Nick Steele	Test Date:	27 July 2012
Test Sample Serial Number:	AMWGB84001G12		

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):	28
Relative Humidity (%):	39

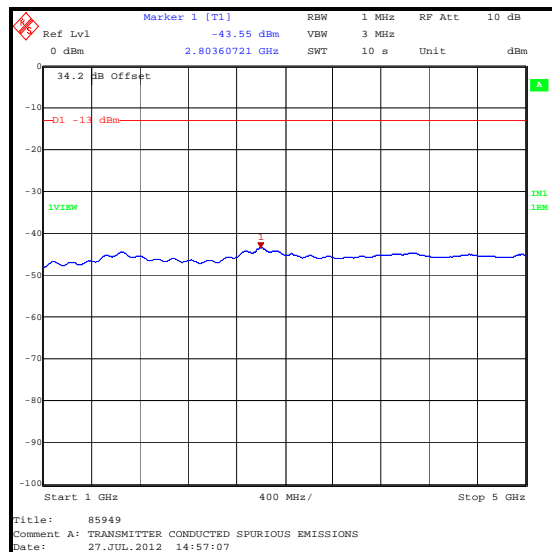
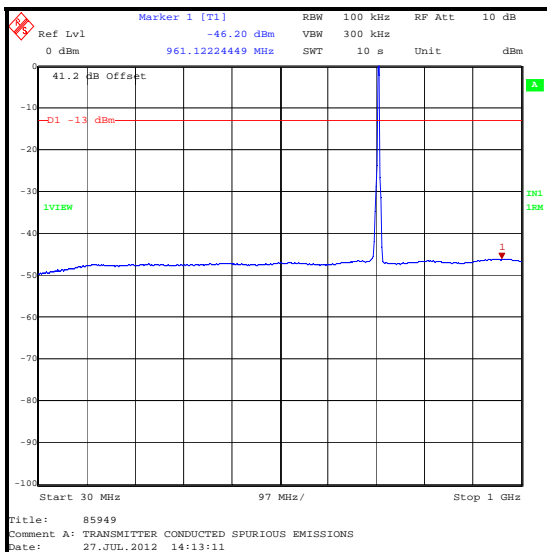
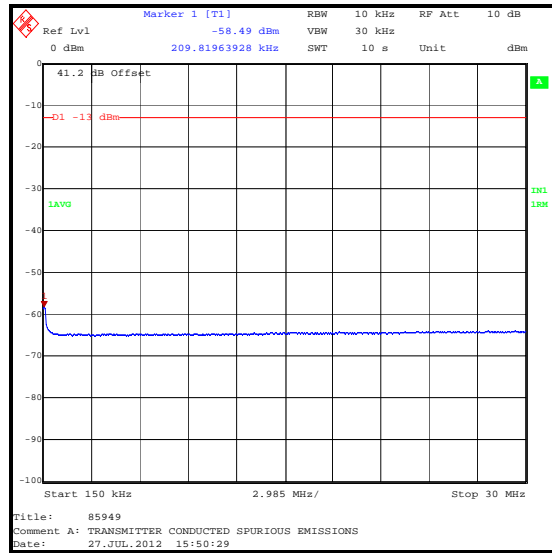
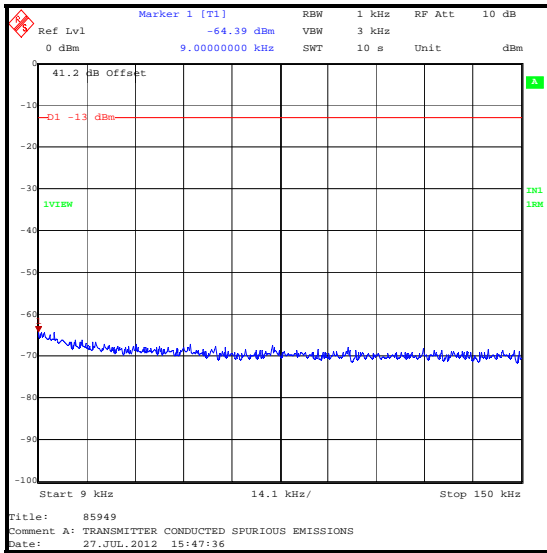
Note(s):

1. The EUT was transmitting using 16QAM Modulation scheme, with resource blocks set to 25, as this produced the highest power level and was therefore deemed worst case.
2. The emission seen on the 30 MHz to 1 GHz plot at approximately 713.5 MHz is the EUT carrier.
3. 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.

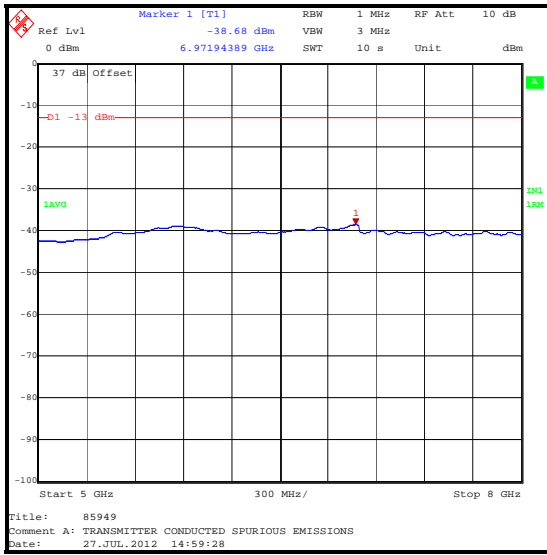
Results: 5 MHz Channel Bandwidth / Top Channel

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
6971.944	-38.7	-13.0	25.7	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)
A1368	Directional Coupler	PE2214-10	Cal Before Use	-
A1999	Attenuator	6820.17.B	04 Apr 2013	12
L1067	Test Receiver	ESIB 40	29 May 2013	12
M199	Power Meter	NRVS	07 Jun 2013	12
M1021	Signal Generator	1035.5005.02	09 Jan 2013	12
M1267	Thermal Power Sensor	NRV-Z52	07 Jun 2013	12

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

Test Engineer:	Nick Steele	Test Dates:	27 July 2012 & 30 July 2012
Test Sample Serial Number:	AMWGB84001G12		

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):	27 to 29
Relative Humidity (%):	35 to 37

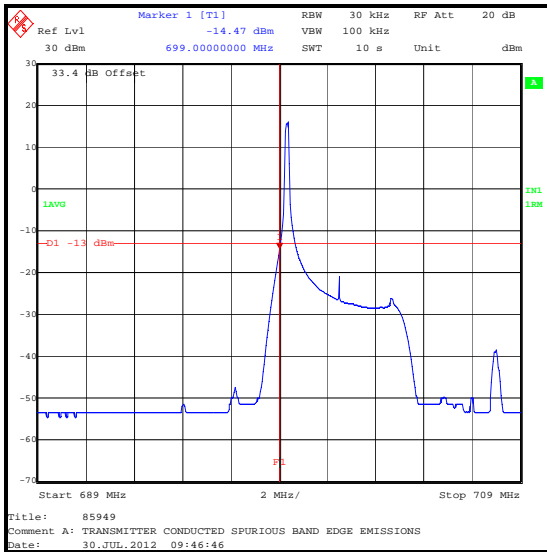
Note(s):

1. Measurements were performed with the EUT transmitting with QPSK and 16QAM modulation schemes, with resource blocks of 1 and 25. For single resource blocks, measurements were performed with the block starting of blocks 1 and 25.
2. Where a single Resource Block of 1 for the lower Band edge and Resource Block of 25 for the upper band edge is applied, the Resolution Bandwidth was adjusted to be between 1% and 5% of the measured occupied bandwidth. The Video Bandwidth was set to three times the Resolution Bandwidth.

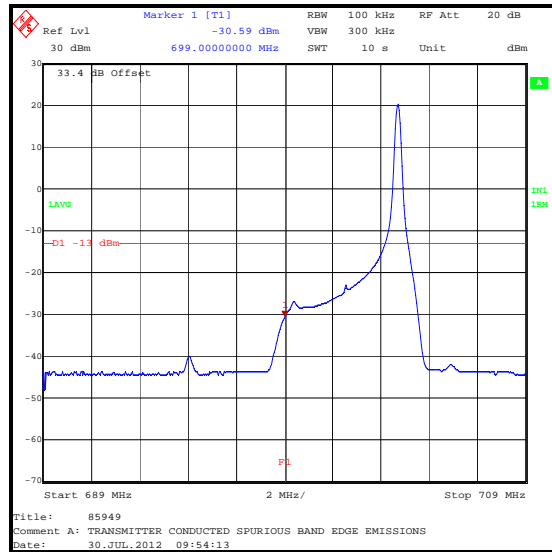
Transmitter Conducted Emissions at Band Edges (continued)

Results: 5 MHz Channel Bandwidth / Bottom Channel / QPSK

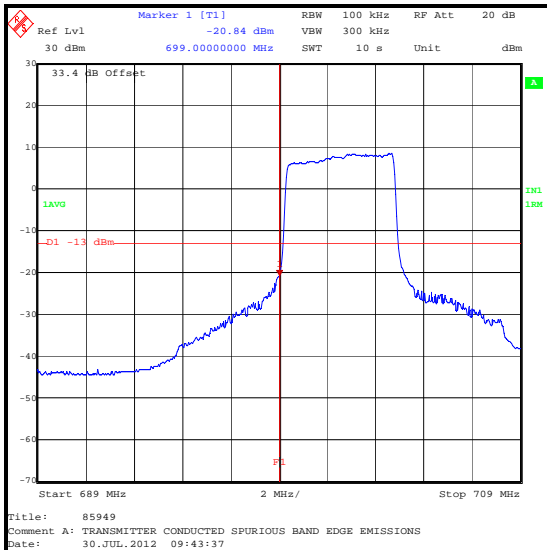
Frequency (MHz)	Resource Blocks	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
699	1 (1)	-14.5	-13.0	1.5	Complied
699	1 (25)	-30.6	-13.0	17.6	Complied
699	25	-20.8	-13.0	7.8	Complied



QPSK / 1 Resource Block (1)



QPSK / 1 Resource Block (25)

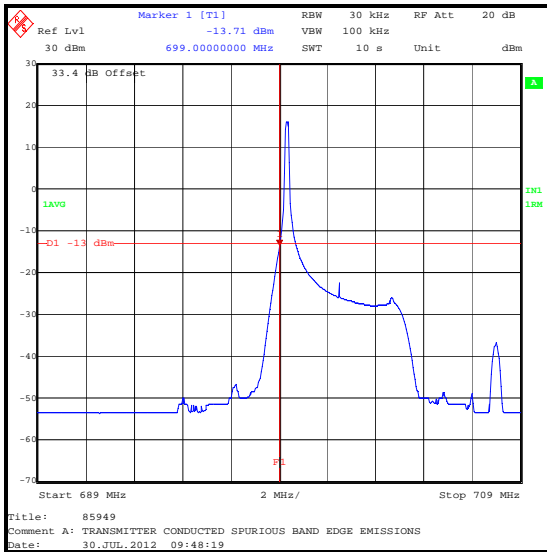


QPSK / 25 Resource Blocks

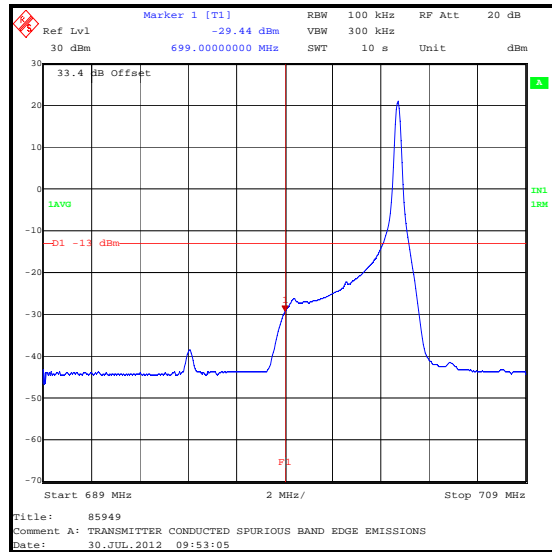
Transmitter Conducted Emissions at Band Edges (continued)

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

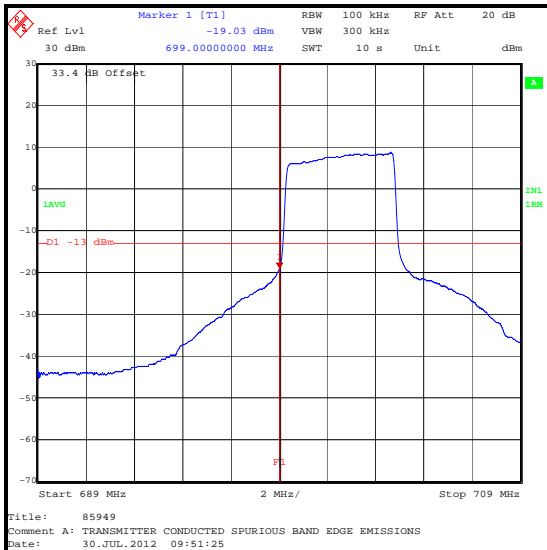
Frequency (MHz)	Resource Blocks	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
699	1 (1)	-13.7	-13.0	0.7	Complied
699	1 (25)	-29.4	-13.0	16.4	Complied
699	25	-19.0	-13.0	6.0	Complied



16QAM / 1 Resource Block (1)



16QAM / 1 Resource Block (25)

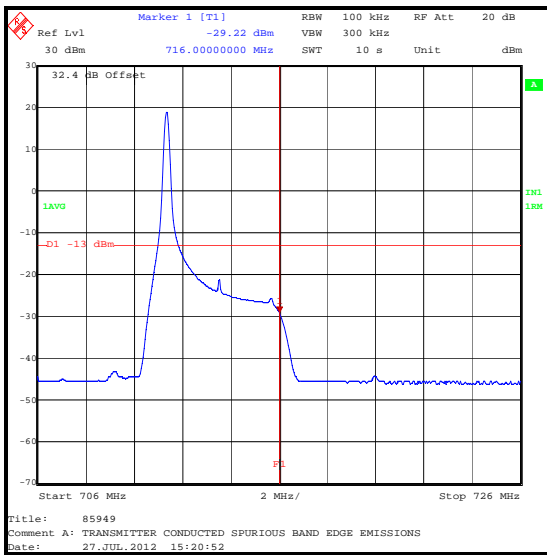


16QAM / 25 Resource Blocks

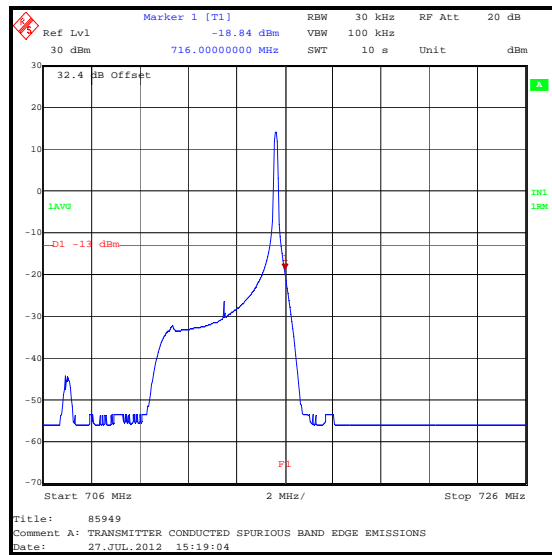
Transmitter Conducted Emissions at Band Edges (continued)

Results: 5 MHz Channel Bandwidth / Top Channel / QPSK

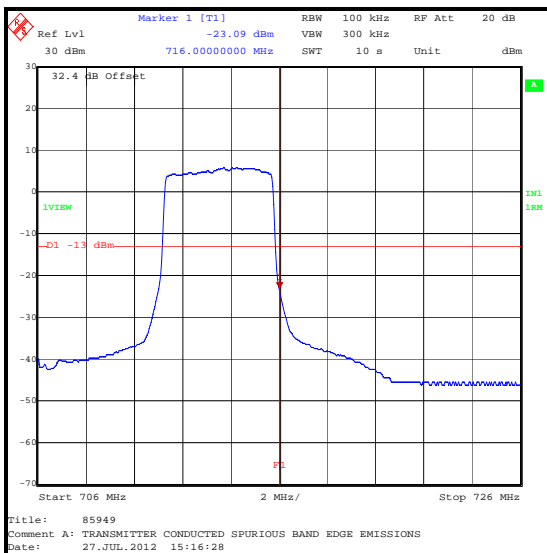
Frequency (MHz)	Resource Blocks	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
716	1(1)	-29.2	-13.0	16.2	Complied
716	1 (25)	-18.8	-13.0	5.8	Complied
716	25	-23.1	-13.0	10.1	Complied



QPSK / 1 Resource Block (1)



QPSK / 1 Resource Block (25)

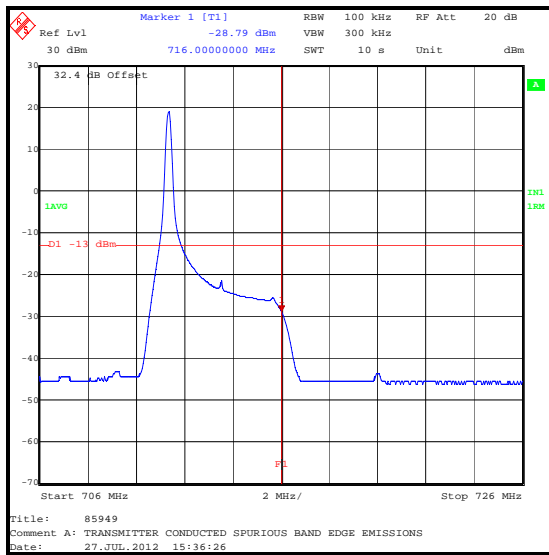


QPSK / 25 Resource Blocks

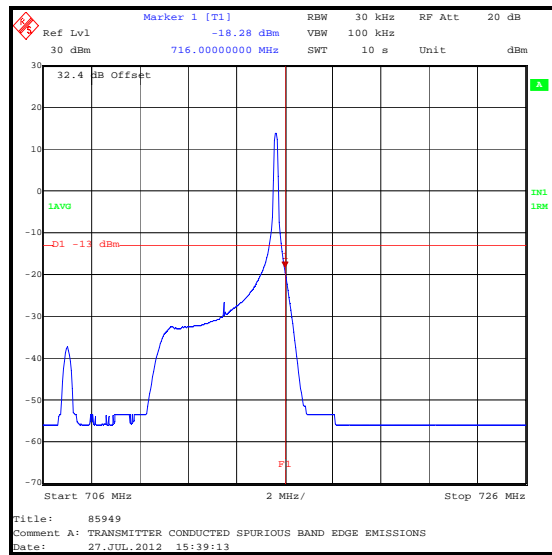
Transmitter Conducted Emissions at Band Edges (continued)

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

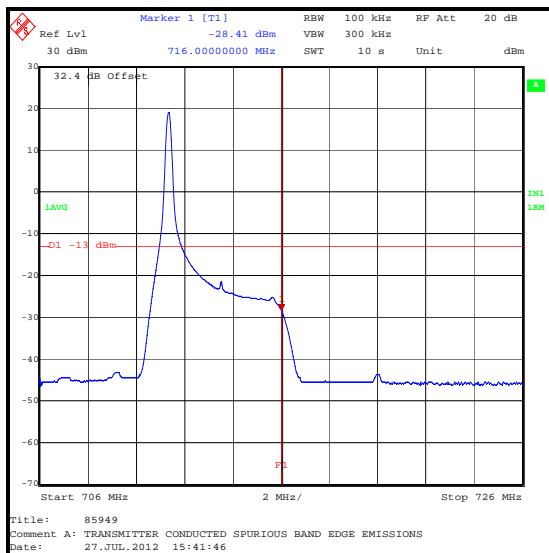
Frequency (MHz)	Resource Blocks	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
716	1(1)	-28.8	-13.0	15.8	Complied
716	1 (25)	-18.3	-13.0	5.3	Complied
716	25	-28.4	-13.0	15.4	Complied



16QAM / 1 Resource Block (1)



16QAM / 1 Resource Block (25)



16QAM / 25 Resource Blocks

Transmitter Conducted Emissions at Band Edges (continued)**Test Equipment Used:**

RFI ID	Instrument Description	Model Number	Calibration Due	Calibration Interval (Months)
A1368	Directional Coupler	PE2214-10	Cal Before Use	-
A1999	Attenuator	6820.17.B	04 Apr 2013	12
M127	Spectrum Analyser	FSEB 30	11 Sept 2012	12
M199	Power Meter	NRVS	07 Jun 2013	12
M1021	Signal Generator	1035.5005.02	09 Jan 2013	12
M1267	Thermal Power Sensor	NRV-Z52	07 Jun 2013	12

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

Test Engineers:	Nick Steele & Andrew Edwards	Test Dates:	14 July 2012, 30 July 2012 & 31 July 2012
Test Sample Serial Number:	AMWGB84001G12		

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 (%):	38 to 42

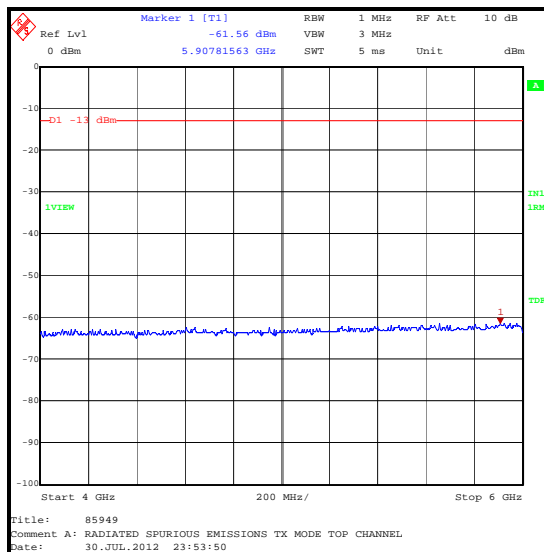
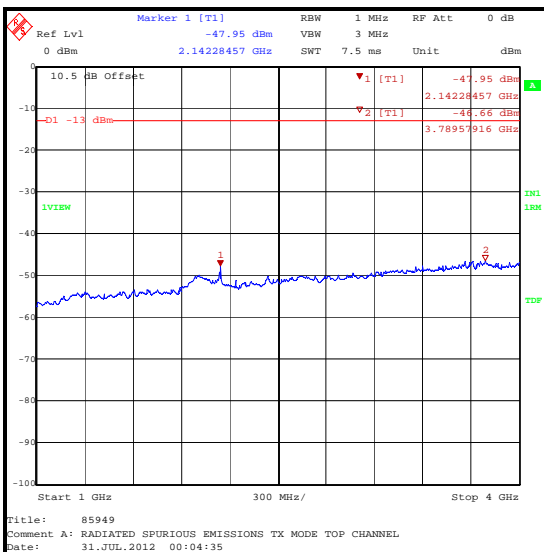
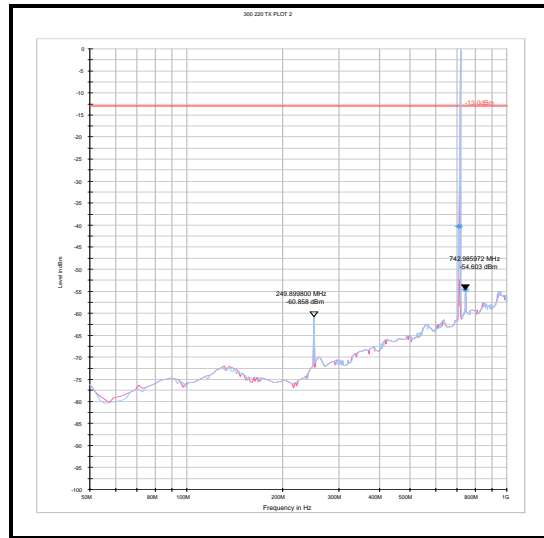
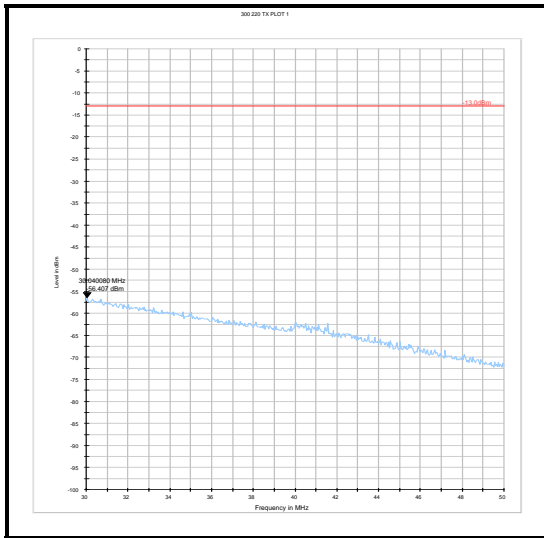
Note(s):

1. The EUT was set to transmit with 16QAM modulation applied with 25 Resource Blocks, as this was found to have the highest output power.
2. The emission seen on the 50 MHz to 1 GHz plot at approximately 713.5 MHz is the EUT carrier.
3. The emission seen on the 50 MHz to 1 GHz plot at approximately 743.5 MHz is the downlink from the LTE test set.
4. All other emissions were at least 20 dB below the specification limit or below the measurement system noise floor.
5. 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.
6. 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.

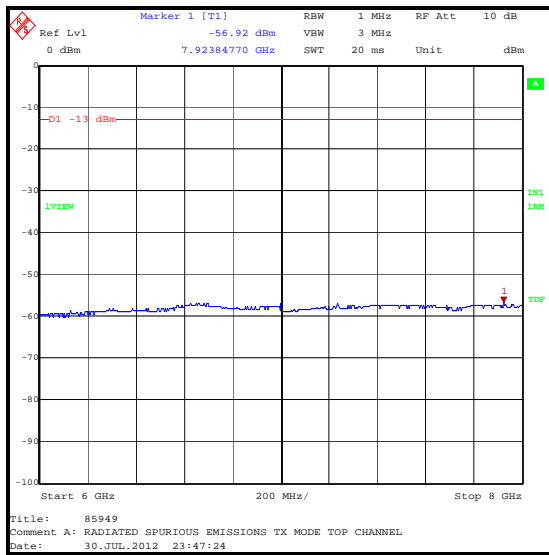
Results:

Frequency (MHz)	Antenna Polarisation	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
3789.579	Vertical	-46.7	-13.0	33.7	Complied

Transmitter Radiated Spurious Emissions (continued)



Transmitter Radiated Spurious Emissions (continued)



Test Equipment Used:

RFI ID	Instrument Description	Model Number	Calibration Due	Calibration Interval (Months)
A1396	Attenuator	6810.17.B	06 Jul 2013	12
A1534	Pre Amplifier	8449B	09 Oct 2012	12
A1818	Antenna	3115	09 Oct 2012	12
A1834	Attenuator	8491B	29 Jan 2013	12
A1974	High Pass Filter	AFH-01000	15 Mar 2013	12
A253	Antenna	12240-20	09 Oct 2012	12
A254	Antenna	14240-20	09 Oct 2012	12
A553	Antenna	CBL6111A	15 Feb 2013	12
G0543	Amplifier	310N	15 Oct 2012	3
K0001	5m RSE Chamber	Rainford	31 Aug 2012	12
K0002	3m RSE Chamber	Rainford	09 Oct 2012	12
L1067	Test Receiver	ESIB 40	29 May 2013	12
M1273	Test Receiver	ESIB 26	03 Feb 2013	12

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

Test Engineer:	Andrew Edwards	Test Date:	31 July 2012
Test Sample Serial Number:	AMWGB84001G12		

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 (%):	40

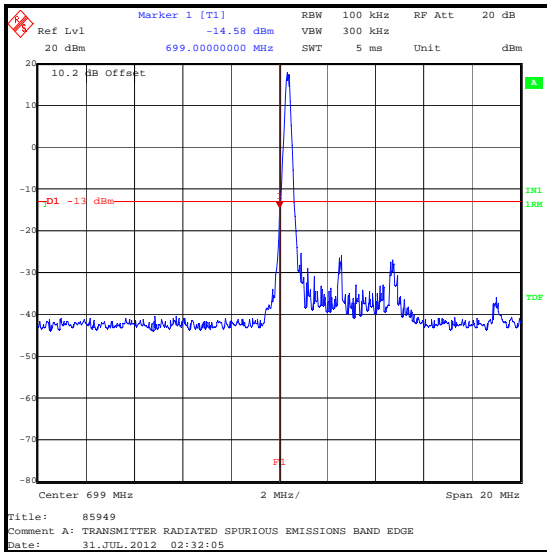
Note(s):

1. Measurements were performed with the EUT transmitting with QPSK and 16QAM modulation schemes, with resource blocks of 1 and 25. For single resource blocks, measurements were performed with the block starting of blocks 1 and 25.

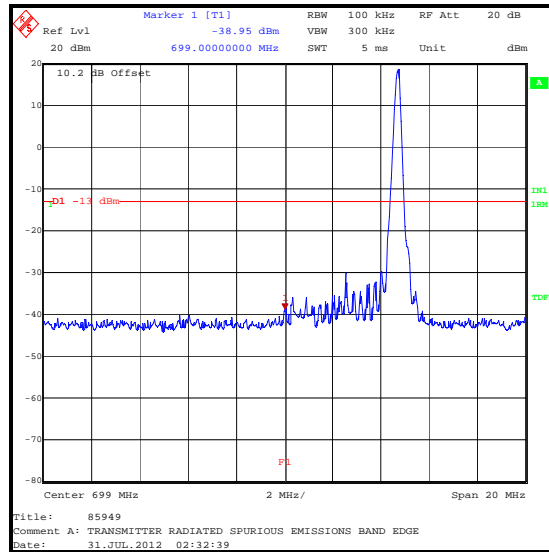
Transmitter Radiated Emissions at Band Edges (continued)

Results: 5 MHz Channel Bandwidth / Bottom channel / QPSK

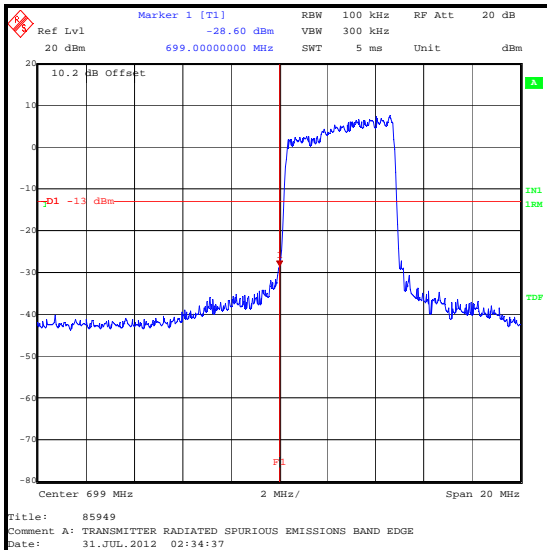
Frequency (MHz)	Resource Blocks	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
699	1 (1)	-14.6	-13.0	1.6	Complied
699	1 (25)	-39.0	-13.0	26.0	Complied
699	25	-28.6	-13.0	15.6	Complied



QPSK / 1 Resource Block (1)



QPSK / 1 Resource Block (25)

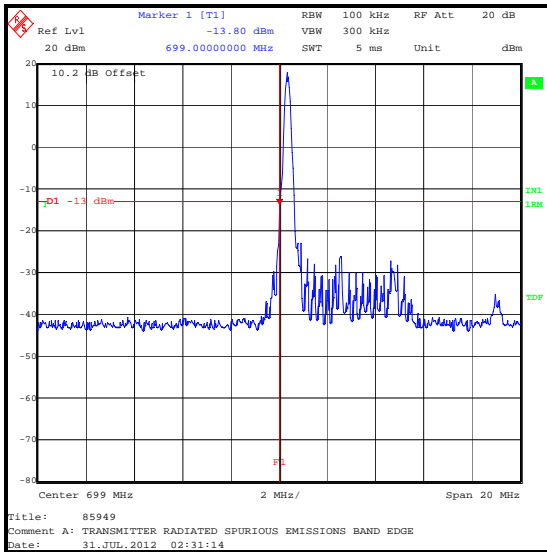


QPSK / 25 Resource Blocks

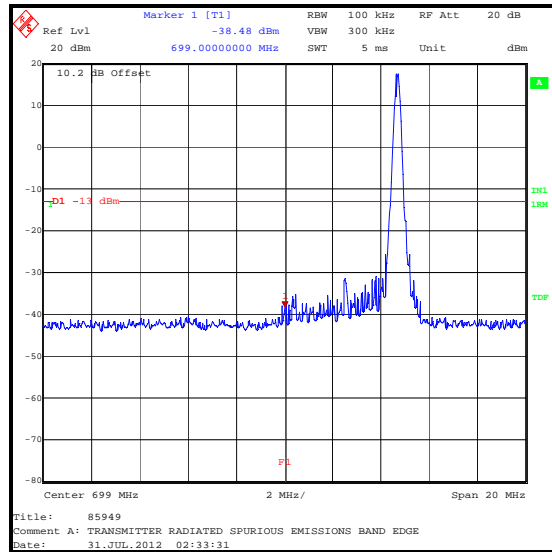
Transmitter Radiated Emissions at Band Edges (continued)

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

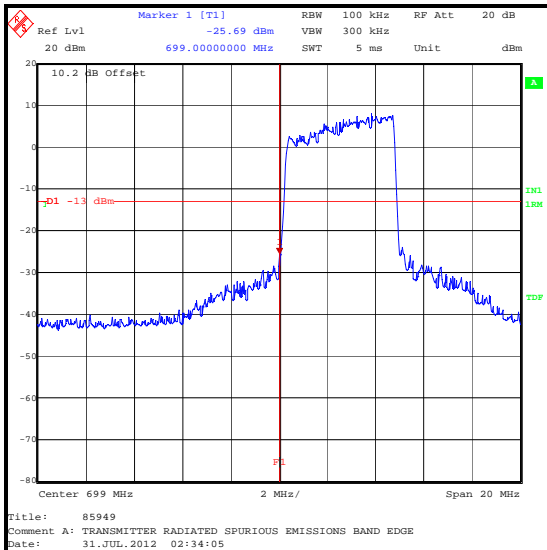
Frequency (MHz)	Resource Blocks	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
699	1 (1)	-13.8	-13.0	0.8	Complied
699	1 (25)	-38.5	-13.0	25.5	Complied
699	25	-25.7	-13.0	12.7	Complied



16QAM / 1 Resource Block (1)



16QAM / 1 Resource Block (25)

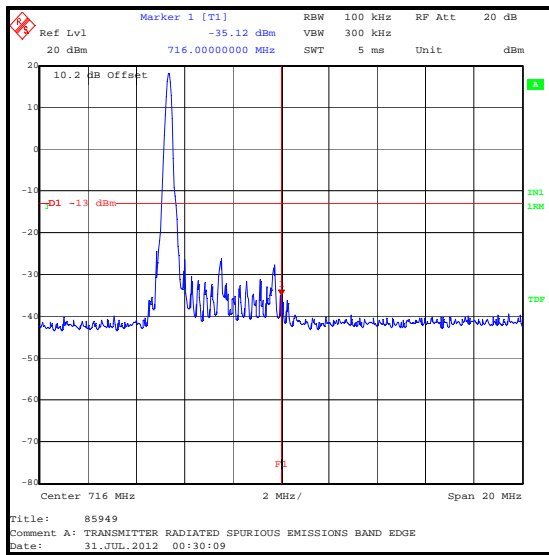


16QAM / 25 Resource Blocks

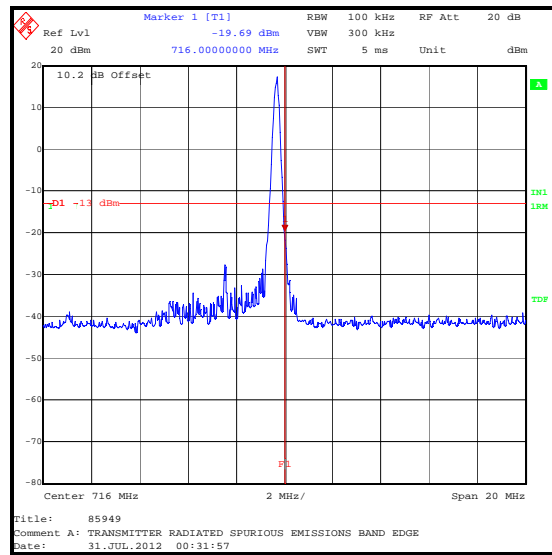
Transmitter Radiated Emissions at Band Edges (continued)

Results: 5 MHz Channel Bandwidth / Top Channel / QPSK

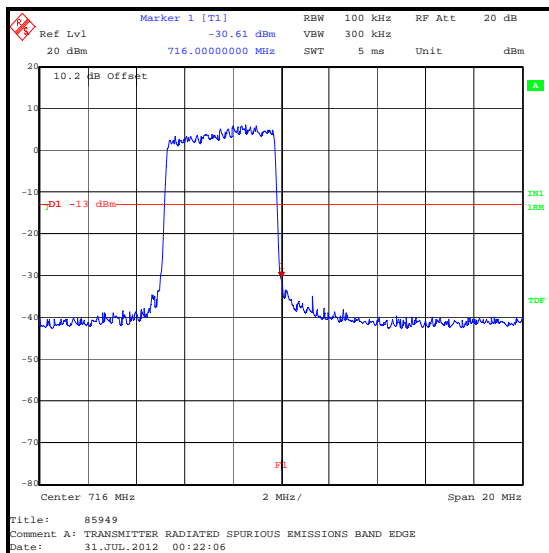
Frequency (MHz)	Resource Blocks	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
716	1 (1)	-35.1	-13.0	22.1	Complied
716	1 (25)	-19.7	-13.0	6.7	Complied
716	25	-30.6	-13.0	17.6	Complied



QPSK / 1 Resource Block (1)



QPSK / 1 Resource Block (25)

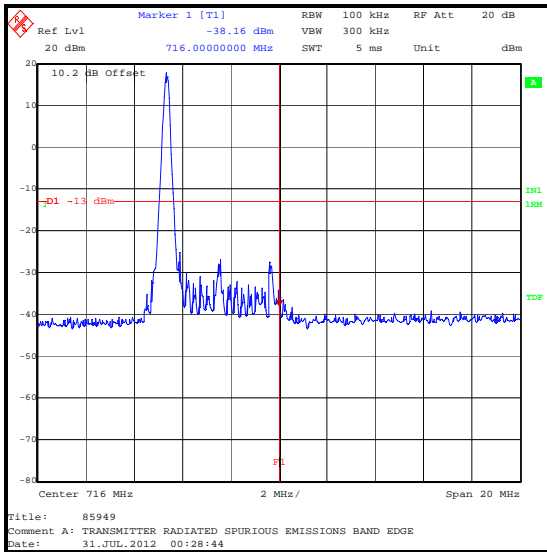


QPSK / 25 Resource Blocks

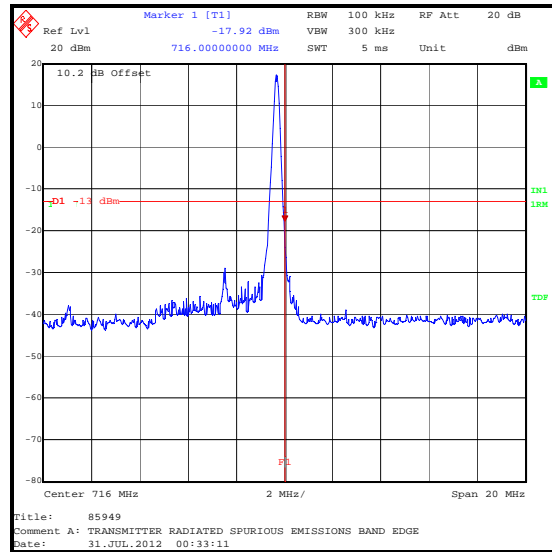
Transmitter Radiated Emissions at Band Edges (continued)

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

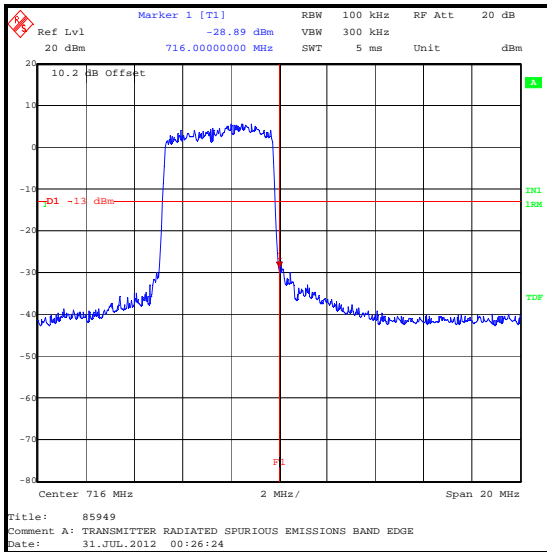
Frequency (MHz)	Resource Blocks	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
716	1 (1)	-38.2	-13.0	25.2	Complied
716	1 (25)	-17.9	-13.0	4.9	Complied
716	25	-28.9	-13.0	15.9	Complied



16QAM / 1 Resource Block (1)



16QAM / 1 Resource Block (25)



16QAM / 25 Resource Blocks

Transmitter Radiated Emissions at Band Edges (continued)**Test Equipment Used:**

RFI ID	Instrument Description	Model Number	Calibration Due	Calibration Interval (Months)
A1534	Pre Amplifier	8449B	09 Oct 2012	12
A1818	Antenna	3115	09 Oct 2012	12
A239	Attenuator	6806-17-B	22 Nov 2012	12
A288	Antenna	CBL6111A	19 Aug 2012	12
K0002	3m RSE Chamber	Rainford	09 Oct 2012	12
L1067	Test Receiver	ESIB 40	29 May 2013	12

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

Test Engineer:	Nick Steele	Test Dates:	26 July 2012 & 01 August 2012
Test Sample Serial Number:	AMWGB84001G12		

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:

Temperature (°C):	25 to 30
Relative Humidity (%):	33 to 34

Note(s):

1. Temperature was monitored throughout the test with a calibrated digital thermometer.
2. Measurements were made using the Anristu MT8820C Radio Communications Analyser.
3. The transmit frequency was monitored throughout the test and did not drift outside of the frequency limits of LTE Band 12 – 699 MHz to 716 MHz.

Transmitter Frequency Stability (Temperature Variation) (cont)**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	701.499983	701.499996	701.500006	701.500005	701.500013	701.500012
-20	701.500008	701.500009	701.500012	701.500013	701.500012	701.500009
-10	701.499994	701.500006	701.500007	701.500011	701.500014	701.500004
0	701.500001	701.500007	701.500011	701.500014	701.500011	701.500009
10	701.500002	701.500006	701.500009	701.500013	701.500014	701.500010
20	701.499995	701.499988	701.499992	701.499990	701.499991	701.499987
30	701.499987	701.499996	701.499987	701.499997	701.499998	701.499987
40	701.499986	701.499998	701.499997	701.499995	701.499996	701.499994
50	701.499988	701.499996	701.500013	701.500006	701.500008	701.500010

Temperature (°C)	Time after Start-up				
	6 minutes (MHz)	7 minutes (MHz)	8 minutes (MHz)	9 minutes (MHz)	10 minutes (MHz)
-30	701.500003	701.499998	701.499999	701.500000	701.499999
-20	701.500010	701.500006	701.500008	701.500007	701.500006
-10	701.500003	701.500007	701.500006	701.500002	701.500003
0	701.500007	701.500004	701.500005	701.500003	701.500002
10	701.500009	701.500009	701.500005	701.500006	701.500005
20	701.499993	701.499986	701.499994	701.499996	701.499997
30	701.499989	701.499993	701.499992	701.499997	701.499999
40	701.499992	701.499994	701.499990	701.499994	701.499992
50	701.500012	701.500007	701.500007	701.500005	701.500003

Frequency closest to Lower Band 12 Edge (MHz)	Lower Band Edge Limit (MHz)	Margin (MHz)	Result
701.499983	699.0	2.499983	Complied

Transmitter Frequency Stability (Temperature Variation) (cont)**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	713.500005	713.500008	713.500010	713.500008	713.500007	713.500005
-20	713.499990	713.499992	713.499996	713.499999	713.500003	713.500005
-10	713.499989	713.499993	713.499998	713.500002	713.500006	713.500004
0	713.499994	713.499991	713.500008	713.500004	713.500004	713.500002
10	713.499998	713.499994	713.500012	713.500005	713.500006	713.500007
20	713.500013	713.500009	713.500007	713.500002	713.499998	713.499999
30	713.499988	713.499990	713.500000	713.499997	713.499994	713.499990
40	713.499994	713.499999	713.500003	713.500009	713.500011	713.500010
50	713.499987	713.499992	713.499998	713.500002	713.500006	713.500011

Temperature (°C)	Time after Start-up				
	6 minutes (MHz)	7 minutes (MHz)	8 minutes (MHz)	9 minutes (MHz)	10 minutes (MHz)
-30	713.500003	713.500002	713.500002	713.500002	713.500001
-20	713.500003	713.500001	713.500002	713.500002	713.500002
-10	713.500002	713.500003	713.500001	713.500001	713.500001
0	713.500001	713.500002	713.500001	713.500002	713.500001
10	713.500005	713.500006	713.500003	713.500002	713.500002
20	713.500001	713.500002	713.500002	713.500001	713.500001
30	713.500000	713.500001	713.500003	713.500000	713.500000
40	713.500007	713.500000	713.500003	713.500001	713.500001
50	713.500015	713.500005	713.500004	713.500002	713.500002

Frequency closest to Upper Band 12 Edge (MHz)	Upper Band Edge Limit (MHz)	Margin (MHz)	Result
713.500015	716.0	2.499985	Complied

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

RFI ID	Instrument Description	Model Number	Calibration Due	Calibration Interval (Months)
E013	Environmental Chamber	MTH-4200PR	10 Aug 2012	12
L1068	LTE Test Set	MT8820A	15 May 2013	12
M1068	Thermometer	RS55	08 Mar 2013	12
M1229	Digital Multimeter	179	18 Jun 2013	12
S0537	DC Power Supply Unit	EL302D	Cal Before Use	-

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

Test Engineer:	Nick Steele	Test Dates:	27 July 2012 & 01 August 2012
Test Sample Serial Number:	AMWGB84001G12		

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:

Temperature (°C):	28 to 30
Relative Humidity (%):	34 to 40

Note(s):

1. Voltage was monitored throughout the test with a calibrated digital voltmeter.
2. Measurements were made using the Anristu MT8820C Radio Communications Analyser.
3. The transmit frequency was monitored throughout the test and did not drift outside of the frequency limits of LTE Band 12 – 699 MHz to 716 MHz.

Results: Bottom Channel

Supply Voltage (VDC)	Measured Frequency (MHz)	Lower Band Edge Limit (MHz)	Margin (MHz)	Result
3.0	701.500007	699.0	2.500007	Complied
3.6	701.500004	699.0	2.500004	Complied

Results: Top Channel

Supply Voltage (VDC)	Measured Frequency (MHz)	Lower Band Edge Limit (MHz)	Margin (MHz)	Result
3.0	713.499998	716.0	2.500002	Complied
3.6	713.500004	716.0	2.499996	Complied

Test Equipment Used:

RFI ID	Instrument Description	Model Number	Calibration Due	Calibration Interval (Months)
L1068	LTE Test Set	MT8820A	15 May 2013	12
M1229	Digital Multimeter	179	18 Jun 2013	12
S0537	DC Power Supply Unit	EL302D	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
AC Conducted Spurious Emissions	0.15 MHz to 30 MHz	95%	±3.25 dB
Occupied Bandwidth	699 MHz to 716 MHz	95%	±0.92 ppm
Conducted Carrier Output Power	699 MHz to 716 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	699 MHz to 716 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	8	3.4	Remove Antenna Type
2.0	8, 10, 24 to 30	3.4, 4.2, 5.2.5	Update Antenna Gain from 0 dBi to 19 dBi and recalculate ERP
3.0	8, 10, 24 to 30	3.4, 4.2, 5.2.5	Update Antenna Gain detail and recalculate ERP