

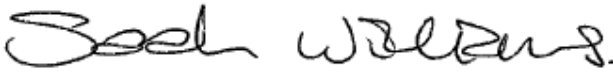
## TEST REPORT FROM RFI GLOBAL SERVICES LTD

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

FCC ID: PKTUSBSTKARM

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-RP88727JD01A

|                                                                                                  |                                                                                      |                                                                                      |
|--------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| <b>This Test Report Is Issued Under The Authority<br/>Of John Newell, Group Quality Manager:</b> |                                                                                      |  |
| <b>Checked By:</b>                                                                               | Sarah Williams                                                                       |                                                                                      |
| <b>Signature:</b>                                                                                |  |                                                                                      |
| <b>Date of Issue:</b>                                                                            | 07 September 2012                                                                    |                                                                                      |

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**1. Customer Information**

|                      |                                                                                                        |
|----------------------|--------------------------------------------------------------------------------------------------------|
| <b>Company Name:</b> | General Dynamics Broadband                                                                             |
| <b>Address:</b>      | Unit 7 Greenways Business Park<br>Bellinger Close<br>Chippenham<br>Wilts<br>SN15 1BN<br>United Kingdom |

## **2. Summary of Testing**

### **2.1. General Information**

|                                 |                                                                                                                                                   |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Specification Reference:</b> | 47CFR27                                                                                                                                           |
| <b>Specification Title:</b>     | Code of Federal Regulations Volume 47 (Telecommunications) 2011: Part 27 Subpart C (Miscellaneous Wireless Communication Services)                |
| <b>Specification Reference:</b> | 47CFR15.107, 47CFR15.109 and CFR15.111                                                                                                            |
| <b>Specification Title:</b>     | Code of Federal Regulations Volume 47 (Telecommunications) 2011: Part 15 Subpart B (Unintentional Radiators) - Sections 15.107, 15.109 and 15.111 |
| <b>Site Registration:</b>       | 209735                                                                                                                                            |
| <b>Location of Testing:</b>     | RFI Global Services Ltd, Wade Road, Basingstoke, Hampshire, RG24 8AH.                                                                             |
| <b>Test Dates:</b>              | 16 August 2012 to 23 August 2012                                                                                                                  |

### **2.2. Summary of Test Results**

| <b>FCC Reference (47CFR)</b>                                                                                                                                                                                          | <b>Measurement</b>                                                  | <b>Result</b>                                                                         |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| 15.107                                                                                                                                                                                                                | Receiver/Idle Mode AC Conducted Emissions                           |    |
| 15.109                                                                                                                                                                                                                | Receiver/Idle Mode Radiated Spurious Emissions                      |    |
| 15.109                                                                                                                                                                                                                | Receiver/Idle Mode Radiated Spurious Emissions – External Antenna   |   |
| 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)(10) / 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                        |  |
| 27.53(g) / 2.1053                                                                                                                                                                                                     | Transmitter Radiated Spurious Emissions – External Antenna          |  |
| 27.53(g) / 2.1053                                                                                                                                                                                                     | Transmitter Radiated Emissions at Band Edges – External Antenna     |  |
| 27.54 / 2.1055                                                                                                                                                                                                        | Transmitter Frequency Stability                                     |  |
| Key to Results<br> = Complied  = Did not comply |                                                                     |                                                                                       |

**2.3. Methods and Procedures**

|                   |                                                                                                                                                                     |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Reference:</b> | ANSI/TIA-603-C-2004                                                                                                                                                 |
| <b>Title:</b>     | Land Mobile Communications Equipment, Measurements and performance Standards                                                                                        |
| <b>Reference:</b> | ANSI C63.4 (2009)                                                                                                                                                   |
| <b>Title:</b>     | 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 |
| <b>Reference:</b> | FCC Response To Inquiry                                                                                                                                             |
| <b>Title:</b>     | Tracking Number 305667 Date: 10 July 2012                                                                                                                           |
| <b>Reference:</b> | FCC Response to Inquiry                                                                                                                                             |
| <b>Title:</b>     | 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)**

|                                 |                            |
|---------------------------------|----------------------------|
| <b>Brand Name:</b>              | General Dynamics Broadband |
| <b>Model Name or Number:</b>    | ARM                        |
| <b>Serial Number:</b>           | ARMHC30003112              |
| <b>Hardware Version Number:</b> | Pass 1                     |
| <b>Software Version Number:</b> | Release 3                  |
| <b>FCC ID:</b>                  | PKTUSBSTKARM               |

|                                 |                            |
|---------------------------------|----------------------------|
| <b>Brand Name:</b>              | General Dynamics Broadband |
| <b>Model Name or Number:</b>    | ARM                        |
| <b>Serial Number:</b>           | ARMHC30001F12              |
| <b>Hardware Version Number:</b> | Pass 1                     |
| <b>Software Version Number:</b> | Release 3                  |
| <b>FCC ID:</b>                  | PKTUSBSTKARM               |

|                              |                            |
|------------------------------|----------------------------|
| <b>Description:</b>          | External Antenna – Band 12 |
| <b>Brand Name:</b>           | None                       |
| <b>Model Name or Number:</b> | LTE-ODUP003-IPW            |
| <b>Serial Number:</b>        | GT1229LT006040             |

#### **3.2. Description of EUT**

The equipment under test was a LTE USB Stick.

#### **3.3. Modifications Incorporated in the EUT**

No modifications were applied to the EUT during testing.

**3.4. Additional Information Related to Testing**

|                                  |                                                              |                                |
|----------------------------------|--------------------------------------------------------------|--------------------------------|
| <b>Tested Technology:</b>        | LTE                                                          |                                |
| <b>Type of Equipment</b>         | USB Stick                                                    |                                |
| <b>Channel Bandwidth:</b>        | 5 MHz                                                        |                                |
| <b>Modulation Type:</b>          | QPSK & 16QAM                                                 |                                |
| <b>Duty Cycle:</b>               | 100%                                                         |                                |
| <b>Antenna Type:</b>             | Proprietary for integral and external antenna                |                                |
| <b>Antenna Gain:</b>             | 0 dBi internal, 1.7 dBi external antenna                     |                                |
| <b>Power Supply Requirement:</b> | Nominal                                                      | 5.0 V                          |
|                                  | Minimum                                                      | 4.25 V                         |
|                                  | Maximum                                                      | 5.75 V                         |
| <b>Transmit Frequency Range:</b> | Band 12 (699 MHz to 716 MHz)<br>Part 27 (698 MHz to 746 MHz) |                                |
| <b>Transmit Channels Tested:</b> | <b>EARFCN</b>                                                | <b>Channel Frequency (MHz)</b> |
|                                  | 23035                                                        | 701.5                          |
|                                  | 23095                                                        | 707.5                          |
|                                  | 23155                                                        | 713.5                          |
| <b>Receive Frequency Range:</b>  | Band 12 (729 MHz to 746MHz)<br>Part 27 (698 MHz to 746 MHz)  |                                |
| <b>Receive Channels Tested:</b>  | <b>EARFCN</b>                                                | <b>Channel Frequency (MHz)</b> |
|                                  | 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:

|                              |                |
|------------------------------|----------------|
| <b>Description:</b>          | Laptop PC      |
| <b>Brand Name:</b>           | Dell           |
| <b>Model Name or Number:</b> | Latitude D620  |
| <b>Serial Number:</b>        | 345-310-064-11 |

|                              |                                             |
|------------------------------|---------------------------------------------|
| <b>Description:</b>          | External Power Board for voltage variation. |
| <b>Brand Name:</b>           | Not marked or stated                        |
| <b>Model Name or Number:</b> | Pass 1                                      |
| <b>Serial Number:</b>        | Not marked or stated                        |

## **4. Operation and Monitoring of the EUT during Testing**

### **4.1. Operating Modes**

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

- Transmit Mode - the EUT was set to transmit with maximum output power using 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 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 Hirose MS162A connector ports 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 LTE-ODUP003-IPW antennas', which were connected to the main and diversity ports. The antenna gain was declared as 1.7dBi.
- The customer supplied a USB MTR Test Board, which allowed voltage variation directly to the USB Stick; 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:             | Mark Percival | Test Date: | 22 August 2012 |
| Test Sample Serial Number: | ARMHC30001F12 |            |                |

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

**Environmental Conditions:**

|                        |    |
|------------------------|----|
| Temperature (°C):      | 23 |
| Relative Humidity (%): | 53 |

**Note(s):**

1. The EUT can be installed into a host device which is AC powered therefore AC Conducted Emissions testing is required. The EUT was powered from a Dell laptop with 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 (dBμV) | Limit (dBμV) | Margin (dB) | Result   |
|-----------------|------|--------------|--------------|-------------|----------|
| 0.487           | Live | 52.4         | 56.2         | 3.8         | Complied |
| 0.730           | Live | 51.9         | 56.0         | 4.1         | Complied |
| 0.730           | Live | 51.9         | 56.0         | 4.1         | Complied |
| 0.964           | Live | 52.2         | 56.0         | 3.8         | Complied |
| 1.243           | Live | 47.3         | 56.0         | 8.7         | Complied |
| 1.302           | Live | 50.8         | 56.0         | 5.2         | Complied |
| 1.459           | Live | 51.6         | 56.0         | 4.4         | Complied |
| 1.657           | Live | 50.6         | 56.0         | 5.4         | Complied |
| 1.824           | Live | 51.8         | 56.0         | 4.2         | Complied |
| 2.175           | Live | 49.9         | 56.0         | 6.1         | Complied |

**Results: Live / Average**

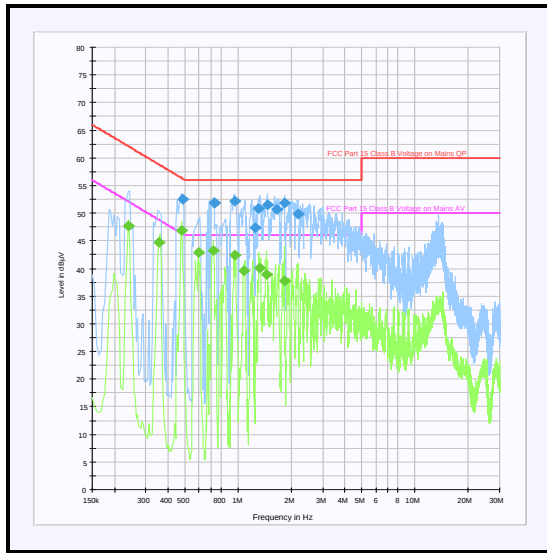
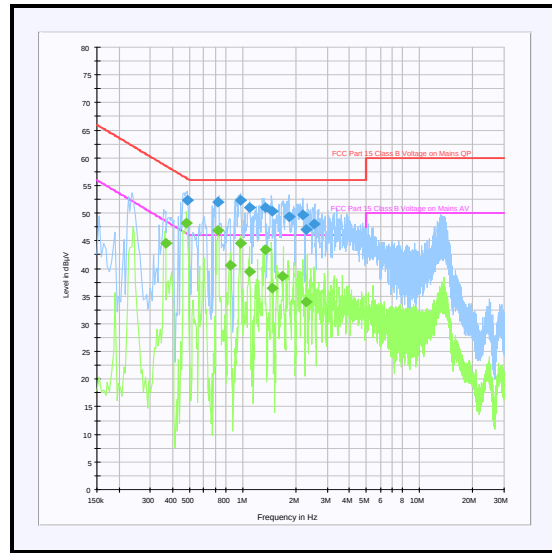
| Frequency (MHz) | Line | Level (dBμV) | Limit (dBμV) | Margin (dB) | Result   |
|-----------------|------|--------------|--------------|-------------|----------|
| 0.240           | Live | 47.6         | 52.1         | 4.5         | Complied |
| 0.357           | Live | 44.8         | 48.8         | 4.0         | Complied |
| 0.600           | Live | 42.8         | 46.0         | 3.2         | Complied |
| 0.726           | Live | 43.3         | 46.0         | 2.7         | Complied |
| 0.955           | Live | 42.4         | 46.0         | 3.6         | Complied |
| 1.077           | Live | 39.6         | 46.0         | 6.4         | Complied |
| 1.324           | Live | 40.0         | 46.0         | 6.0         | Complied |
| 1.455           | Live | 38.8         | 46.0         | 7.2         | Complied |
| 1.824           | Live | 37.7         | 46.0         | 8.3         | Complied |

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

| Frequency (MHz) | Line    | Level (dBμV) | Limit (dBμV) | Margin (dB) | Result   |
|-----------------|---------|--------------|--------------|-------------|----------|
| 0.487           | Neutral | 52.3         | 56.2         | 3.9         | Complied |
| 0.726           | Neutral | 52.0         | 56.0         | 4.0         | Complied |
| 0.973           | Neutral | 52.3         | 56.0         | 3.7         | Complied |
| 1.095           | Neutral | 51.0         | 56.0         | 5.0         | Complied |
| 1.338           | Neutral | 50.9         | 56.0         | 5.1         | Complied |
| 1.459           | Neutral | 50.4         | 56.0         | 5.6         | Complied |
| 1.828           | Neutral | 49.4         | 56.0         | 6.6         | Complied |
| 2.188           | Neutral | 49.7         | 56.0         | 6.3         | Complied |
| 2.287           | Neutral | 47.1         | 56.0         | 8.9         | Complied |
| 2.544           | Neutral | 48.0         | 56.0         | 8.0         | Complied |

**Results: Neutral / Average**

| Frequency (MHz) | Line    | Level (dBμV) | Limit (dBμV) | Margin (dB) | Result   |
|-----------------|---------|--------------|--------------|-------------|----------|
| 0.366           | Neutral | 44.6         | 48.6         | 4.0         | Complied |
| 0.852           | Neutral | 40.6         | 46.0         | 5.4         | Complied |
| 0.973           | Neutral | 44.5         | 46.0         | 1.5         | Complied |
| 1.099           | Neutral | 39.4         | 46.0         | 6.6         | Complied |
| 1.338           | Neutral | 43.4         | 46.0         | 2.6         | Complied |
| 1.459           | Neutral | 36.5         | 46.0         | 9.5         | Complied |
| 1.675           | Neutral | 38.6         | 46.0         | 7.4         | Complied |
| 2.278           | Neutral | 34.0         | 46.0         | 12.0        | 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:**

|                                   |               |                   |                |
|-----------------------------------|---------------|-------------------|----------------|
| <b>Test Engineer:</b>             | Nick Steele   | <b>Test Date:</b> | 23 August 2012 |
| <b>Test Sample Serial Number:</b> | ARMHC30001F12 |                   |                |

|                          |                      |
|--------------------------|----------------------|
| <b>FCC Part:</b>         | 15.109               |
| <b>Test Method Used:</b> | ANSI C63.4 Section 8 |
| <b>Frequency Range:</b>  | 30 MHz to 1000 MHz   |

**Environmental Conditions:**

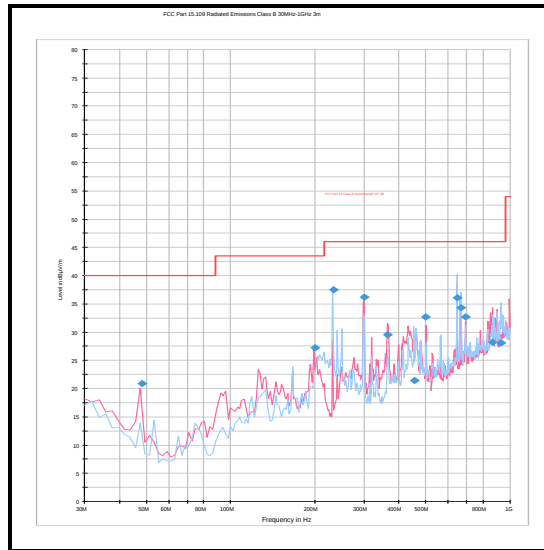
|                               |    |
|-------------------------------|----|
| <b>Temperature (°C):</b>      | 28 |
| <b>Relative Humidity (%):</b> | 34 |

**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 (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Result   |
|-----------------|------------------|----------------|----------------|-------------|----------|
| 48.307          | Vertical         | 20.8           | 40.0           | 19.2        | Complied |
| 199.950         | Vertical         | 27.2           | 43.5           | 16.3        | Complied |
| 233.198         | Horizontal       | 37.5           | 46.0           | 8.5         | Complied |
| 299.830         | Vertical         | 36.2           | 46.0           | 9.8         | Complied |
| 364.998         | Vertical         | 29.5           | 46.0           | 16.5        | Complied |
| 497.693         | Vertical         | 32.6           | 46.0           | 13.4        | Complied |
| 646.313         | Horizontal       | 36.1           | 46.0           | 9.9         | Complied |
| 666.301         | Horizontal       | 34.4           | 46.0           | 11.6        | Complied |
| 692.553         | Vertical         | 32.7           | 46.0           | 13.3        | Complied |
| 863.654         | Vertical         | 28.2           | 46.0           | 17.8        | Complied |
| 928.263         | Horizontal       | 28.1           | 46.0           | 17.9        | 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:**

|                                   |               |                   |                |
|-----------------------------------|---------------|-------------------|----------------|
| <b>Test Engineer:</b>             | Nick Steele   | <b>Test Date:</b> | 21 August 2012 |
| <b>Test Sample Serial Number:</b> | ARMHC30001F12 |                   |                |

|                          |                      |
|--------------------------|----------------------|
| <b>FCC Part:</b>         | 15.109               |
| <b>Test Method Used:</b> | ANSI C63.4 Section 8 |
| <b>Frequency Range:</b>  | 1 GHz to 4 GHz       |

**Environmental Conditions:**

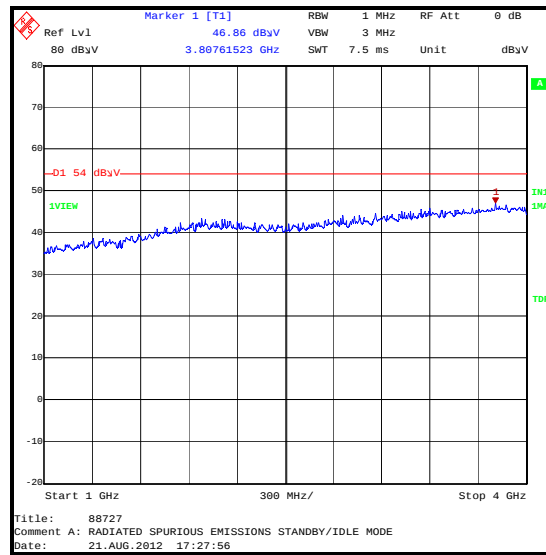
|                               |    |
|-------------------------------|----|
| <b>Temperature (°C):</b>      | 27 |
| <b>Relative Humidity (%):</b> | 46 |

**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:**

| <b>Frequency (MHz)</b> | <b>Antenna Polarity</b> | <b>Peak Level (dBµV/m)</b> | <b>Average Limit (dBµV/m)</b> | <b>Margin (dB)</b> | <b>Result</b> |
|------------------------|-------------------------|----------------------------|-------------------------------|--------------------|---------------|
| 3807.615               | Vertical                | 46.9                       | 54.0                          | 7.1                | 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                            |
| M1124  | Test Receiver          | ESIB 26      | 14 Aug 2013     | 12                            |

**5.2.3. Receiver/Idle Mode Radiated Spurious Emissions – External Antenna's****Test Summary:**

|                                   |               |                   |                |
|-----------------------------------|---------------|-------------------|----------------|
| <b>Test Engineer:</b>             | Nick Steele   | <b>Test Date:</b> | 23 August 2012 |
| <b>Test Sample Serial Number:</b> | ARMHC30001F12 |                   |                |

|                          |                      |
|--------------------------|----------------------|
| <b>FCC Part:</b>         | 15.109               |
| <b>Test Method Used:</b> | ANSI C63.4 Section 8 |
| <b>Frequency Range:</b>  | 30 MHz to 1000 MHz   |

**Environmental Conditions:**

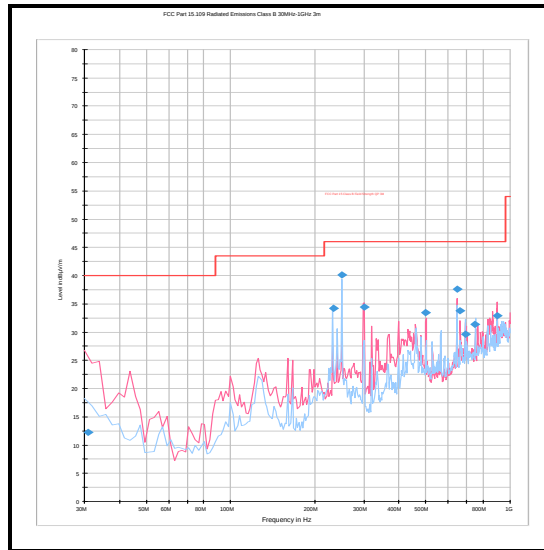
|                               |    |
|-------------------------------|----|
| <b>Temperature (°C):</b>      | 28 |
| <b>Relative Humidity (%):</b> | 34 |

**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 (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Result   |
|-----------------|------------------|----------------|----------------|-------------|----------|
| 233.170         | Horizontal       | 34.2           | 46.0           | 11.8        | Complied |
| 249.991         | Horizontal       | 40.1           | 46.0           | 5.9         | Complied |
| 299.849         | Vertical         | 34.5           | 46.0           | 11.5        | Complied |
| 499.810         | Vertical         | 33.4           | 46.0           | 12.6        | Complied |
| 646.332         | Vertical         | 37.6           | 46.0           | 8.4         | Complied |
| 662.481         | Vertical         | 33.7           | 46.0           | 12.3        | Complied |
| 692.485         | Horizontal       | 29.6           | 46.0           | 16.4        | Complied |
| 749.956         | Horizontal       | 31.3           | 46.0           | 14.7        | Complied |
| 896.113         | Vertical         | 32.9           | 46.0           | 13.1        | Complied |

**Receiver/Idle Mode Radiated Spurious Emissions – External Antenna's (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 – External Antenna's (continued)****Test Summary:**

|                                   |               |                   |                |
|-----------------------------------|---------------|-------------------|----------------|
| <b>Test Engineer:</b>             | Nick Steele   | <b>Test Date:</b> | 21 August 2012 |
| <b>Test Sample Serial Number:</b> | ARMHC30001F12 |                   |                |

|                          |                      |
|--------------------------|----------------------|
| <b>FCC Part:</b>         | 15.109               |
| <b>Test Method Used:</b> | ANSI C63.4 Section 8 |
| <b>Frequency Range:</b>  | 1 GHz to 4 GHz       |

**Environmental Conditions:**

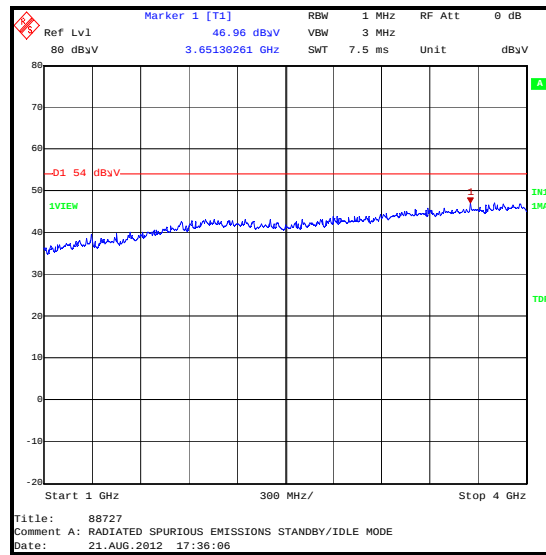
|                               |    |
|-------------------------------|----|
| <b>Temperature (°C):</b>      | 27 |
| <b>Relative Humidity (%):</b> | 46 |

**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:**

| <b>Frequency (MHz)</b> | <b>Antenna Polarity</b> | <b>Peak Level (dBµV/m)</b> | <b>Average Limit (dBµV/m)</b> | <b>Margin (dB)</b> | <b>Result</b> |
|------------------------|-------------------------|----------------------------|-------------------------------|--------------------|---------------|
| 3651.303               | Vertical                | 47.0                       | 54.0                          | 7.0                | Complied      |

**Receiver/Idle Mode Radiated Spurious Emissions – External Antenna's (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                            |
| M1124  | Test Receiver          | ESIB 26      | 14 Aug 2013     | 12                            |

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

|                                   |               |                   |                |
|-----------------------------------|---------------|-------------------|----------------|
| <b>Test Engineer:</b>             | Mark Percival | <b>Test Date:</b> | 23 August 2012 |
| <b>Test Sample Serial Number:</b> | ARMHC30001F12 |                   |                |

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

**Environmental Conditions:**

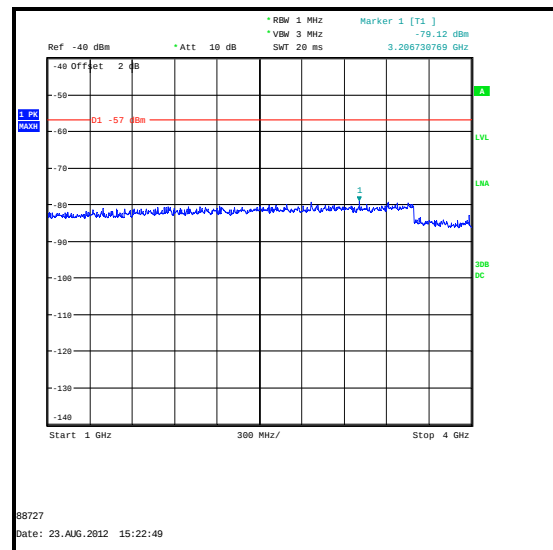
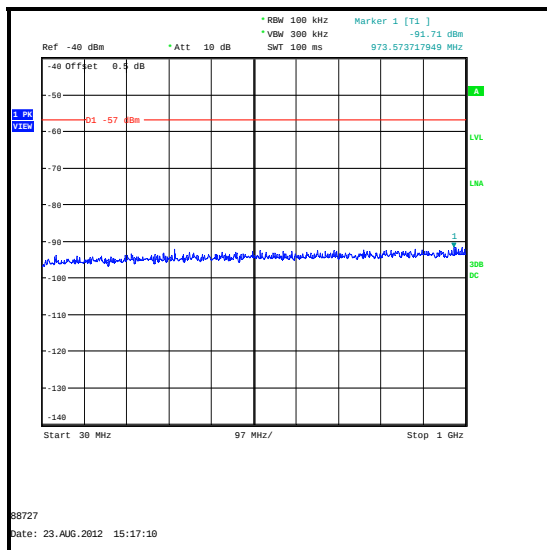
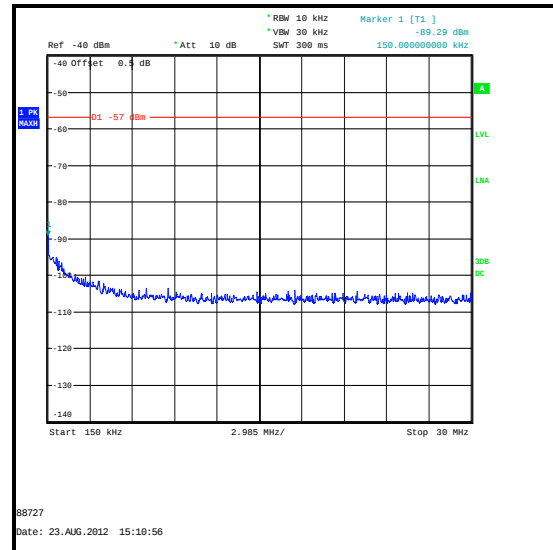
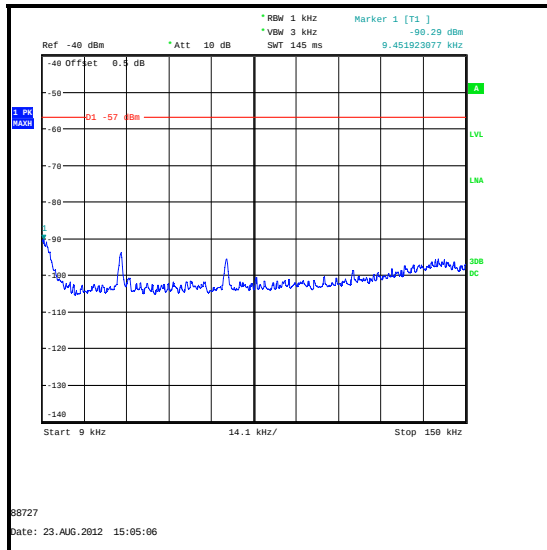
|                               |    |
|-------------------------------|----|
| <b>Temperature (°C):</b>      | 24 |
| <b>Relative Humidity (%):</b> | 41 |

**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:**

| <b>Frequency<br/>(MHz)</b> | <b>Level<br/>(dBµV/m)</b> | <b>Limit<br/>(d/m)</b> | <b>Margin<br/>(dB)</b> | <b>Result</b> |
|----------------------------|---------------------------|------------------------|------------------------|---------------|
| 3206.731                   | -79.1                     | -57.0                  | 22.1                   | Complied      |

**Receive/Idle Mode Conducted Emissions – Main RF Port (continued)****Test Equipment Used:**

| RFI ID | Instrument Description | Model Number | Calibration Due | Calibration Interval (Months) |
|--------|------------------------|--------------|-----------------|-------------------------------|
| M1630  | Test Receiver          | ESU 40       | 06 Feb 2013     | 12                            |
| M199   | Power Meter            | NRVS         | 07 Jun 2013     | 12                            |
| M260   | Signal Generator       | 1035.5005.02 | 14 Jun 2013     | 12                            |
| M1267  | Thermal Power Sensor   | NRV-Z52      | 07 Jun 2013     | 12                            |

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

|                                   |               |                   |                |
|-----------------------------------|---------------|-------------------|----------------|
| <b>Test Engineer:</b>             | Mark Percival | <b>Test Date:</b> | 23 August 2012 |
| <b>Test Sample Serial Number:</b> | ARMHC30001F12 |                   |                |

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

**Environmental Conditions:**

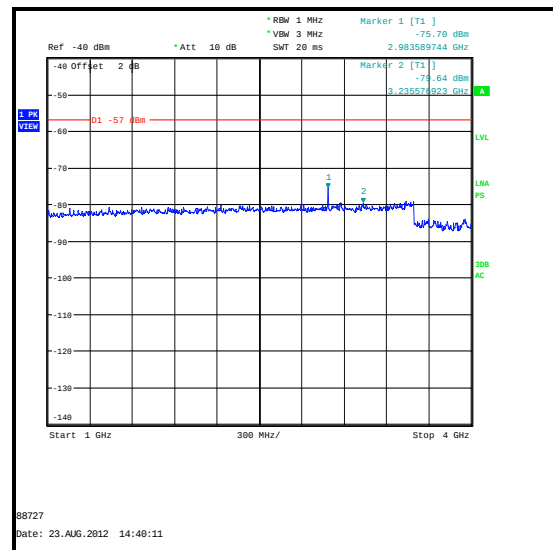
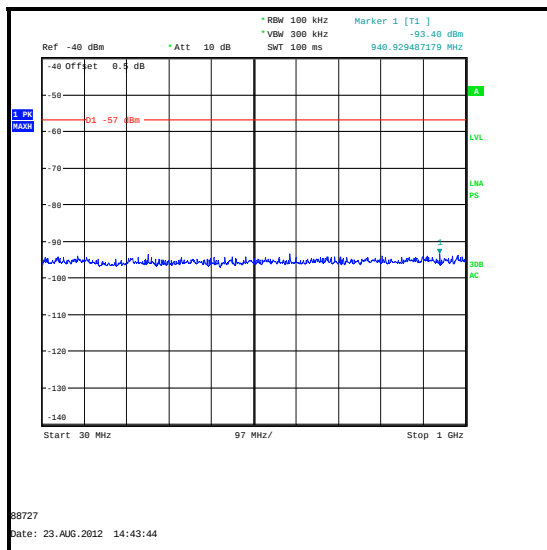
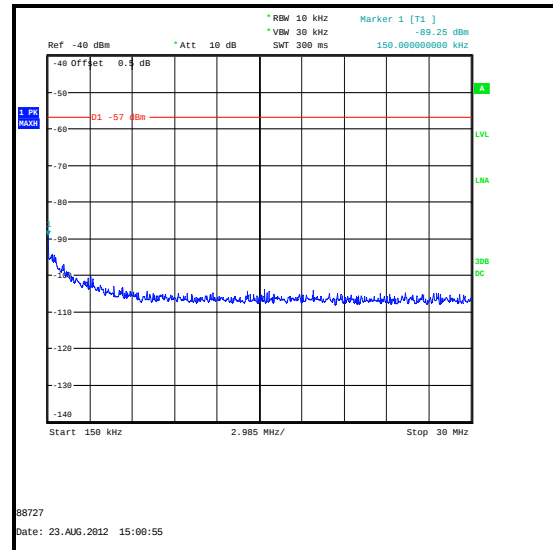
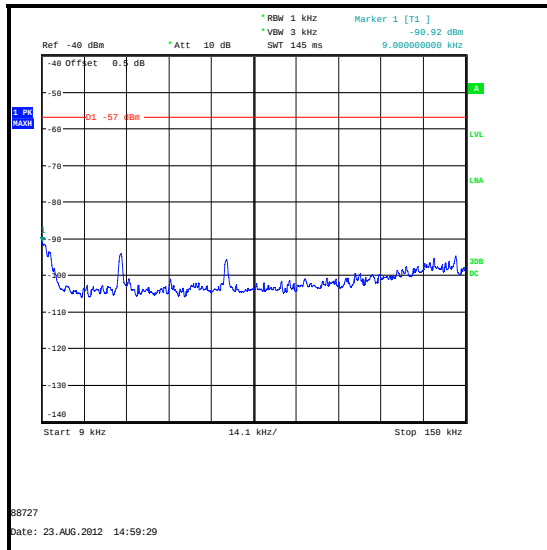
|                               |    |
|-------------------------------|----|
| <b>Temperature (°C):</b>      | 24 |
| <b>Relative Humidity (%):</b> | 41 |

**Note(s):**

1. The highest emission level was recorded in the table below. All other emissions shown on the pre-scan plots were investigated and found to be ambient or >20 dB below the applicable limit or below the measurement system noise floor.

**Results:**

| <b>Frequency<br/>(MHz)</b> | <b>Level<br/>(dB<math>\mu</math>V/m)</b> | <b>Limit<br/>(d/m)</b> | <b>Margin<br/>(dB)</b> | <b>Result</b> |
|----------------------------|------------------------------------------|------------------------|------------------------|---------------|
| 2983.614                   | -74.8                                    | -57.0                  | 17.8                   | Complied      |

**Receive/Idle Mode Conducted Emissions – Diversity RF Port (continued)****Test Equipment Used:**

| RFI ID | Instrument Description | Model Number | Calibration Due | Calibration Interval (Months) |
|--------|------------------------|--------------|-----------------|-------------------------------|
| M1630  | Test Receiver          | ESU 40       | 06 Feb 2013     | 12                            |
| M199   | Power Meter            | NRVS         | 07 Jun 2013     | 12                            |
| M260   | Signal Generator       | 1035.5005.02 | 14 Jun 2013     | 12                            |
| M1267  | Thermal Power Sensor   | NRV-Z52      | 07 Jun 2013     | 12                            |

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

|                                   |               |                   |                |
|-----------------------------------|---------------|-------------------|----------------|
| <b>Test Engineer:</b>             | Mark Percival | <b>Test Date:</b> | 23 August 2012 |
| <b>Test Sample Serial Number:</b> | ARMHC30001F12 |                   |                |

|                          |                                                     |
|--------------------------|-----------------------------------------------------|
| <b>FCC Part:</b>         | 2.1046 and 27.50(c)(10)                             |
| <b>Test Method Used:</b> | As detailed in ANSI TIA-603-C-2004 Section 2.2.17.2 |

**Environmental Conditions:**

|                               |    |
|-------------------------------|----|
| <b>Temperature (°C):</b>      | 24 |
| <b>Relative Humidity (%):</b> | 41 |

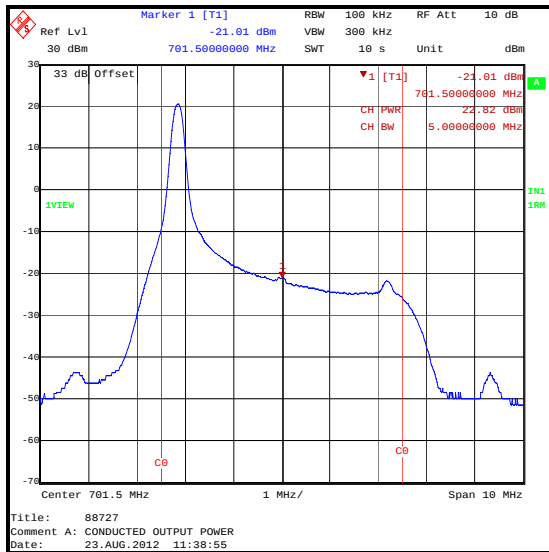
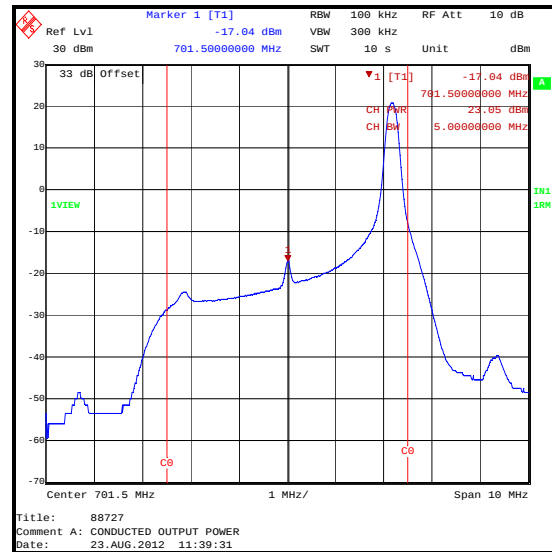
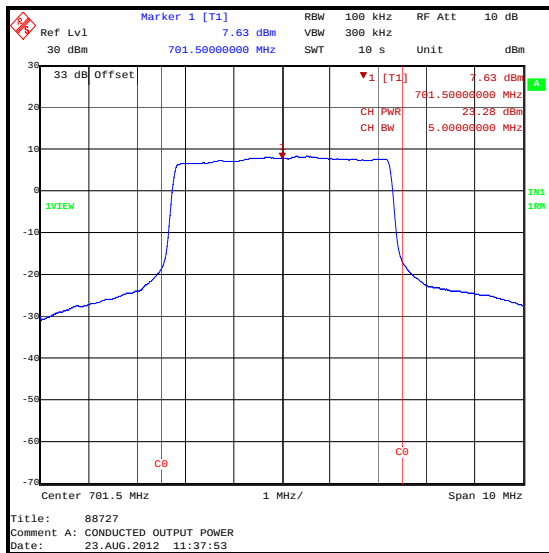
**Note(s):**

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 starting of blocks 1 and 25.
2. The Customer stated two antennas could be used with this product. An antenna gain of 1.7 dBi (highest declared gain) was used in the following calculations as it produces the highest EIRP and is therefore closest to the limit. As the limit is an ERP limit the gain in dBi has been converted to dBd. The dBd was calculated as:

$$1.7 \text{ dBi} - 2.15 \text{ dB} = -0.45 \text{ dBd}.$$

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

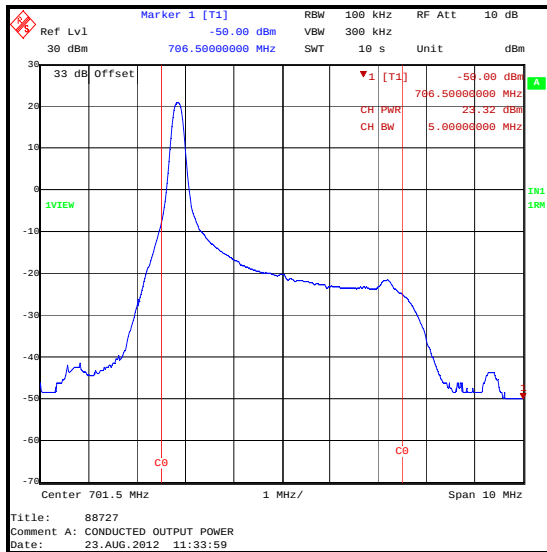
| Frequency (MHz) | Modulation | Resource Blocks | Conducted RF Power (dBm) | Antenna Gain (dBd) | ERP (dBm) | ERP Limit (dBm) | Margin (dB) | Result   |
|-----------------|------------|-----------------|--------------------------|--------------------|-----------|-----------------|-------------|----------|
| 701.5           | QPSK       | 1 (1)           | 22.8                     | -0.45              | 22.35     | 34.8            | 12.45       | Complied |
| 701.5           | QPSK       | 1 (25)          | 23.1                     | -0.45              | 22.65     | 34.8            | 12.15       | Complied |
| 701.5           | QPSK       | 25              | 23.3                     | -0.45              | 22.85     | 34.8            | 11.95       | Complied |

**QPSK / 1 Resource Block (Block 1)****QPSK / 1 Resource Block (Block 25)****QPSK / 25 Resource Blocks**

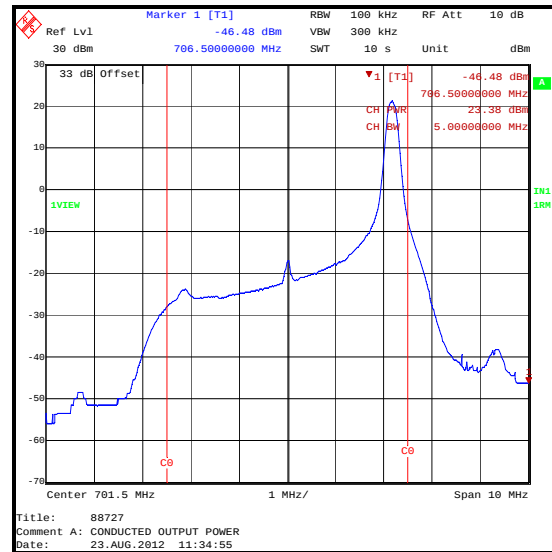
**Transmitter Carrier Output Power and Effective Radiated Power (ERP) (continued)**

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

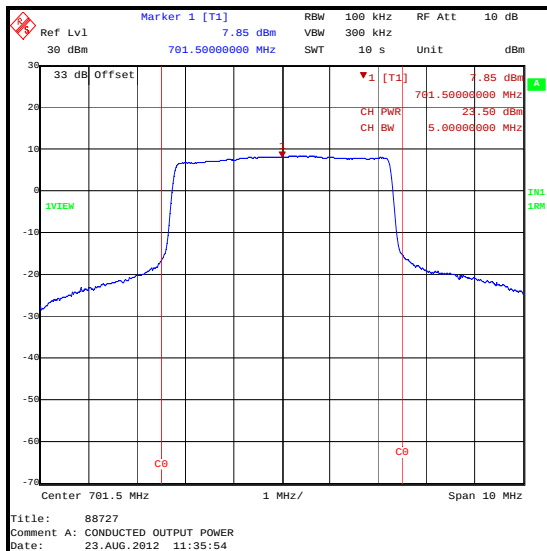
| Frequency (MHz) | Modulation | Resource Blocks | Conducted RF Power (dBm) | Antenna Gain (dBd) | ERP (dBm) | ERP Limit (dBm) | Margin (dB) | Result   |
|-----------------|------------|-----------------|--------------------------|--------------------|-----------|-----------------|-------------|----------|
| 701.5           | 16QAM      | 1 (1)           | 23.3                     | -0.45              | 22.85     | 34.8            | 11.95       | Complied |
| 701.5           | 16QAM      | 1 (25)          | 23.4                     | -0.45              | 22.95     | 34.8            | 11.85       | Complied |
| 701.5           | 16QAM      | 25              | 23.5                     | -0.45              | 23.05     | 34.8            | 11.75       | Complied |



### 16QAM / 1 Resource Block (Block 1)



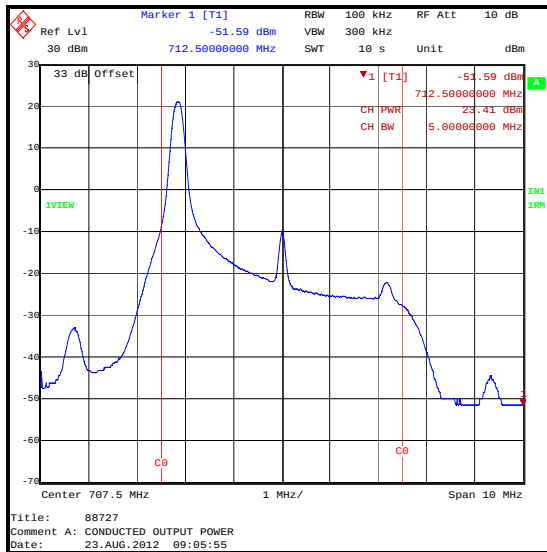
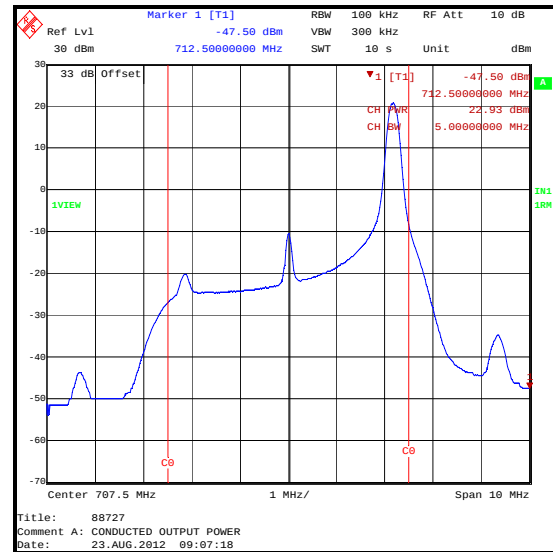
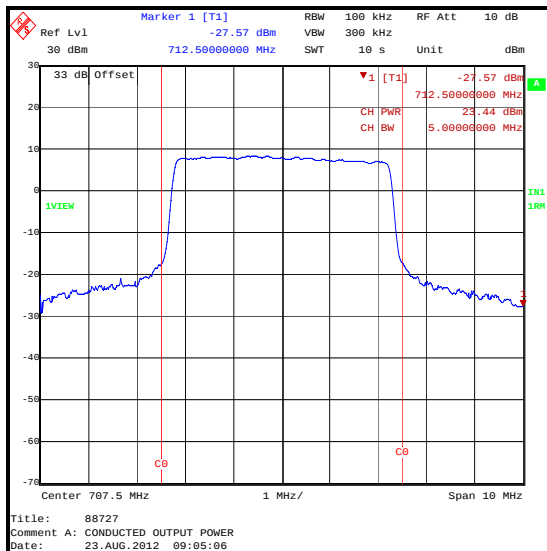
### 16QAM / 1 Resource Block (Block 25)



## 16QAM / 25 Resource Blocks

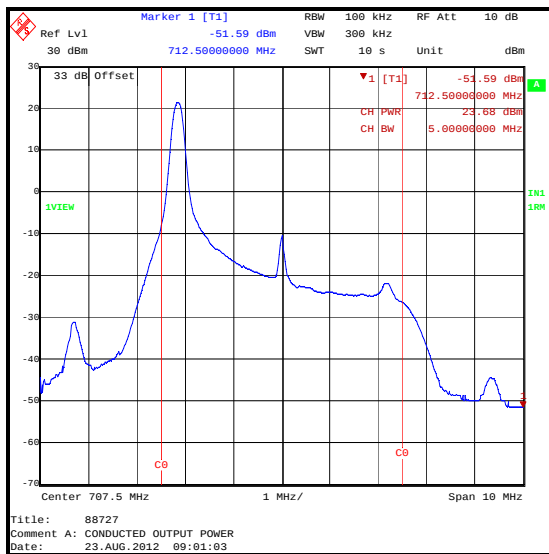
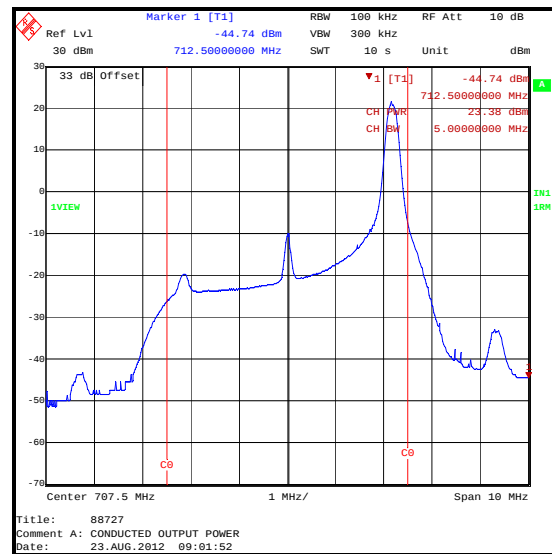
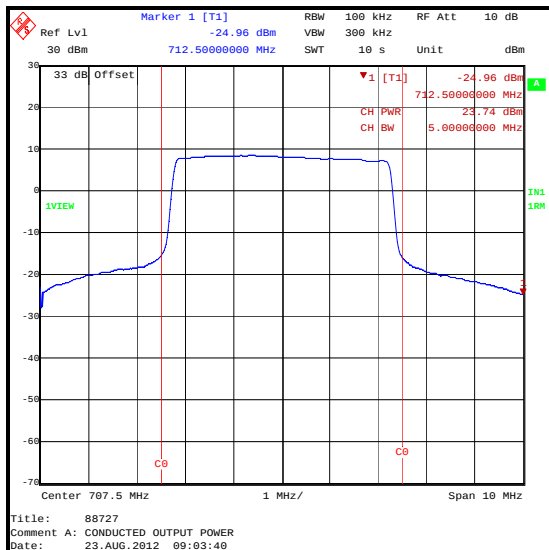
**Transmitter Carrier Output Power and Effective Radiated Power (ERP) (continued)****Results: 5 MHz Channel Bandwidth / Middle Channel**

| 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)           | 23.4                     | -0.45              | 22.95     | 34.8            | 11.85       | Complied |
| 707.5           | QPSK       | 1 (25)          | 22.9                     | -0.45              | 22.45     | 34.8            | 12.35       | Complied |
| 707.5           | QPSK       | 25              | 23.4                     | -0.45              | 22.95     | 34.8            | 11.85       | Complied |

**QPSK / 1 Resource Block (Block 1)****QPSK / 1 Resource Block (Block 25)****QPSK / 25 Resource Blocks**

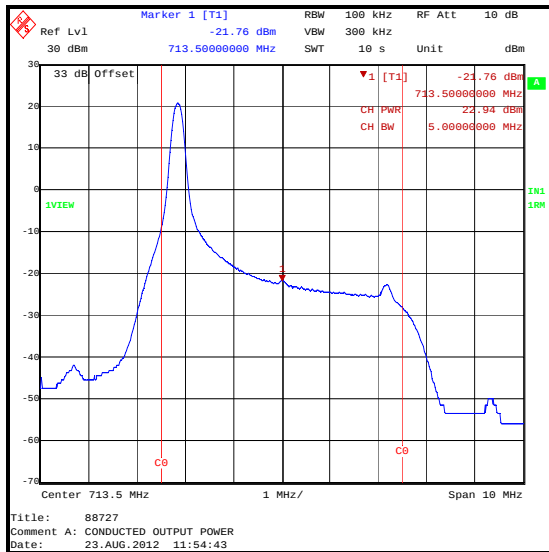
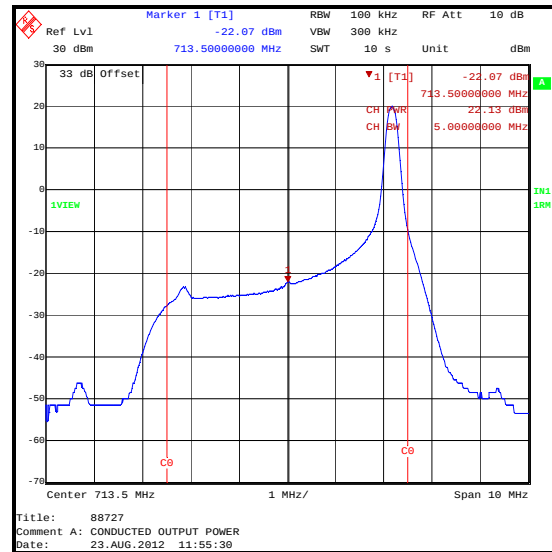
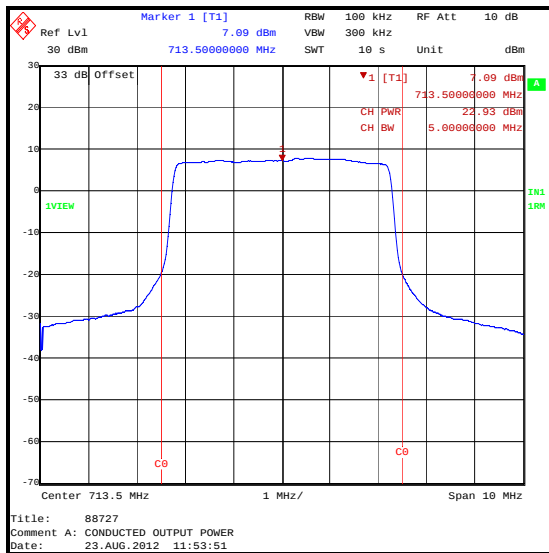
**Transmitter Carrier Output Power and Effective Radiated Power (ERP) (continued)****Results: 5 MHz Channel Bandwidth / Middle Channel**

| 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)           | 23.7                     | -0.45              | 23.25     | 34.8            | 11.55       | Complied |
| 707.5           | 16QAM      | 1 (25)          | 23.4                     | -0.45              | 22.95     | 34.8            | 11.85       | Complied |
| 707.5           | 16QAM      | 25              | 23.7                     | -0.45              | 23.25     | 34.8            | 11.55       | Complied |

**16QAM / 1 Resource Block (Block 1)****16QAM / 1 Resource Block (Block 25)****16QAM / 25 Resource Blocks**

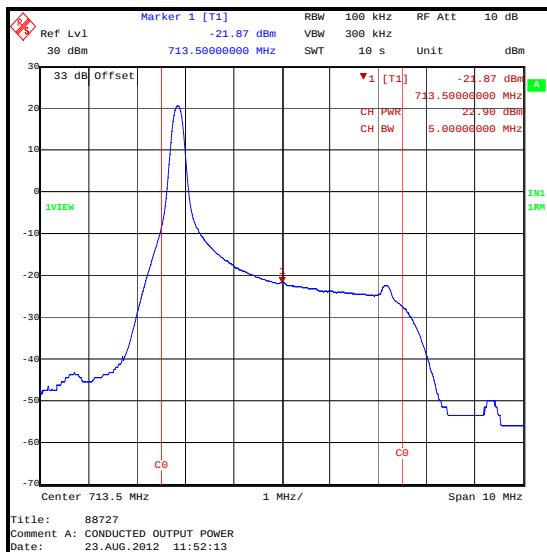
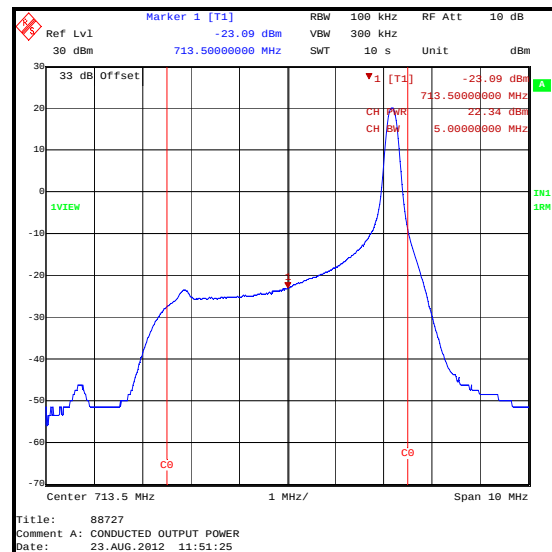
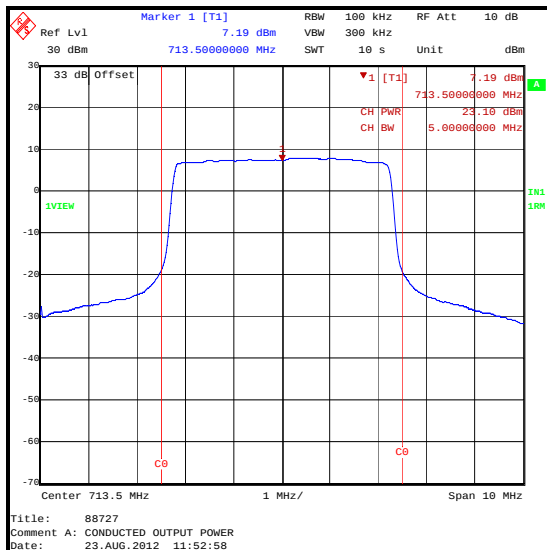
**Transmitter Carrier Output Power and Effective Radiated Power (ERP) (continued)****Results: 5 MHz Channel Bandwidth / Top Channel**

| 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)           | 22.9                     | -0.45              | 22.45     | 34.8            | 12.35       | Complied |
| 713.5           | QPSK       | 1 (25)          | 22.1                     | -0.45              | 21.65     | 34.8            | 13.15       | Complied |
| 713.5           | QPSK       | 25              | 22.9                     | -0.45              | 22.45     | 34.8            | 12.35       | 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)           | 22.9                     | -0.45              | 22.45     | 34.8            | 12.35       | Complied |
| 713.5           | 16QAM      | 1 (25)          | 22.3                     | -0.45              | 21.85     | 34.8            | 12.95       | Complied |
| 713.5           | 16QAM      | 25              | 23.1                     | -0.45              | 22.65     | 34.8            | 12.15       | 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  | -                             |
| A1998  | Attenuator             | 6820.17.B    | 03 Apr 2013     | 12                            |
| L1017  | Test Receiver          | ESIB 40      | 29 May 2013     | 12                            |
| M199   | Power Meter            | NRVS         | 07 Jun 2013     | 12                            |
| M260   | Signal Generator       | 1035.5005.02 | 14 Jun 2013     | 12                            |
| M1267  | Thermal Power Sensor   | NRV-Z52      | 07 Jun 2013     | 12                            |

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

|                                   |               |                   |                |
|-----------------------------------|---------------|-------------------|----------------|
| <b>Test Engineer:</b>             | Mark Percival | <b>Test Date:</b> | 23 August 2012 |
| <b>Test Sample Serial Number:</b> | ARMHC30001F12 |                   |                |

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

**Environmental Conditions:**

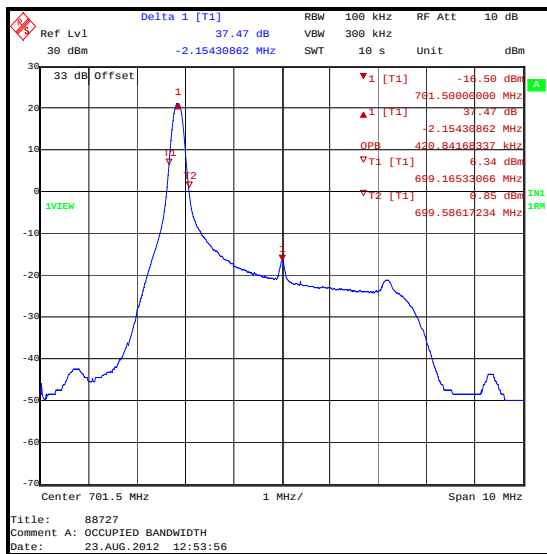
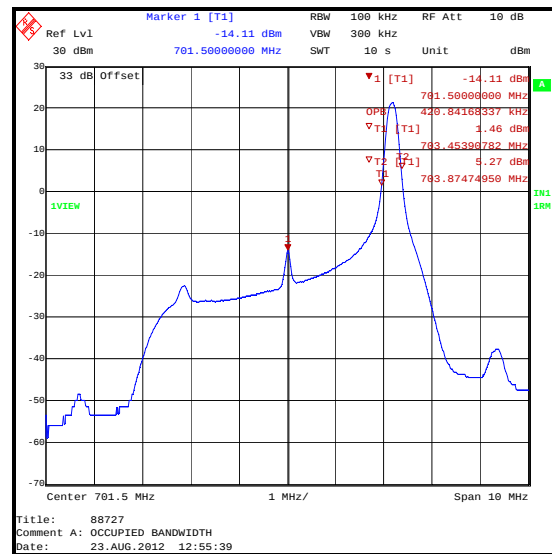
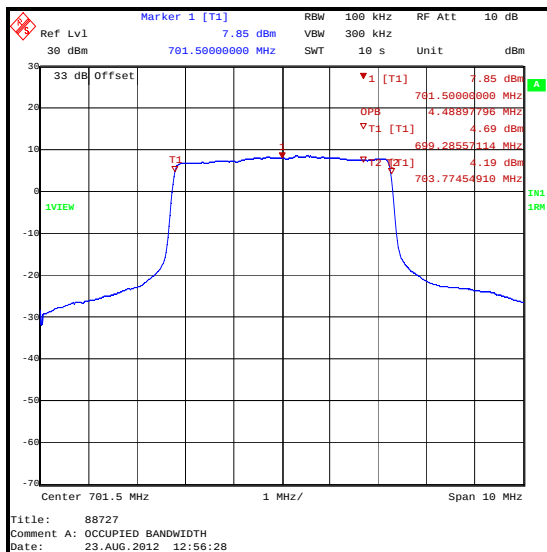
|                               |    |
|-------------------------------|----|
| <b>Temperature (°C):</b>      | 24 |
| <b>Relative Humidity (%):</b> | 41 |

**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.

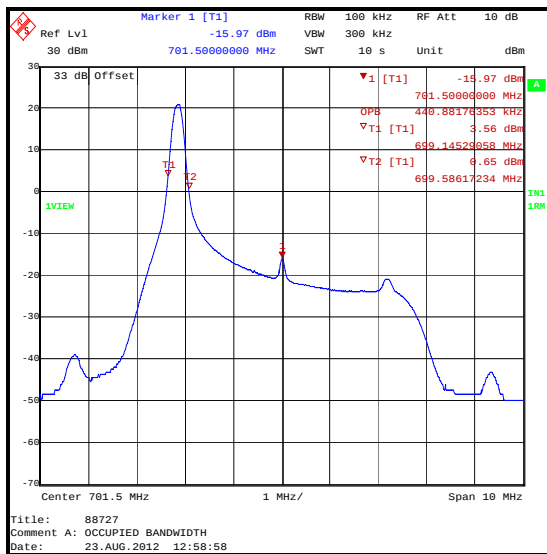
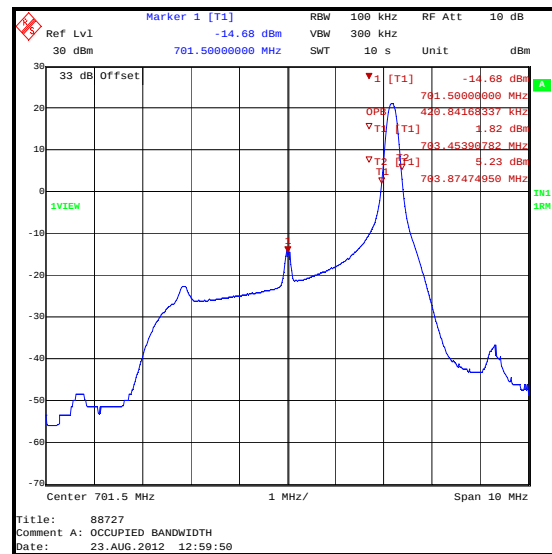
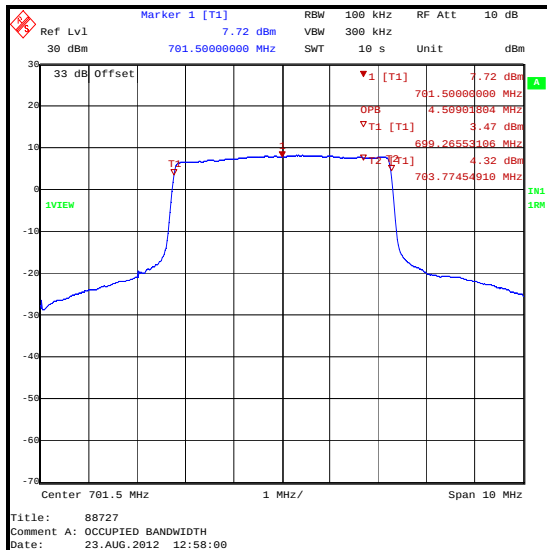
**Transmitter Occupied Bandwidth (continued)****Results: 5 MHz Channel Bandwidth / Bottom Channel**

| Frequency | Modulation | Resource Blocks | Resolution Bandwidth (kHz) | Video Bandwidth (kHz) | Occupied Bandwidth (MHz) |
|-----------|------------|-----------------|----------------------------|-----------------------|--------------------------|
| 701.5     | QPSK       | 1 (1)           | 100                        | 300                   | 0.421                    |
| 701.5     | QPSK       | 1 (25)          | 100                        | 300                   | 0.421                    |
| 701.5     | QPSK       | 25              | 100                        | 300                   | 4.489                    |

**QPSK / 1 Resource Block (Block 1)****QPSK / 1 Resource Block (Block 25)****QPSK / 25 Resource Blocks**

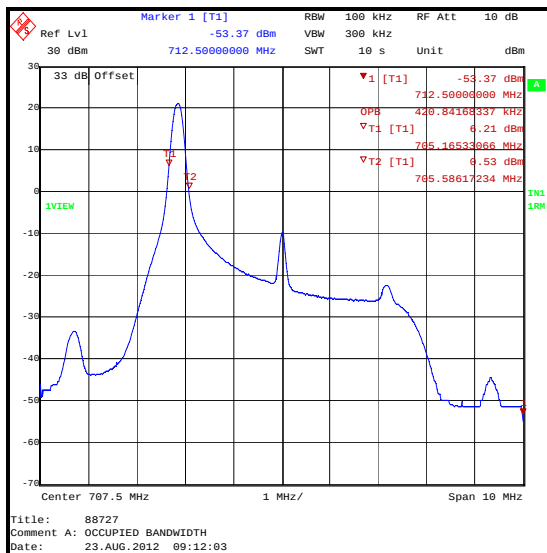
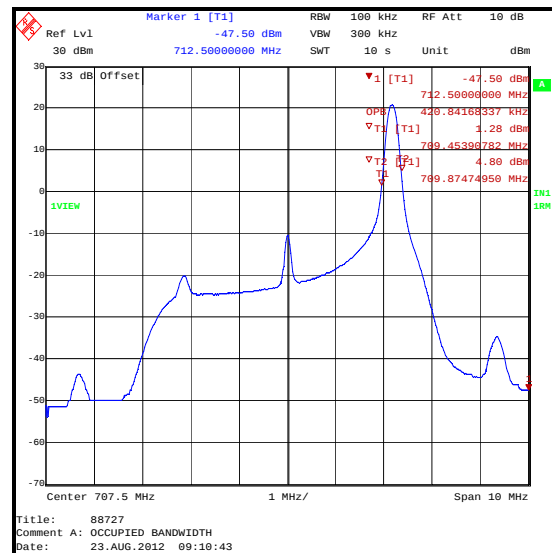
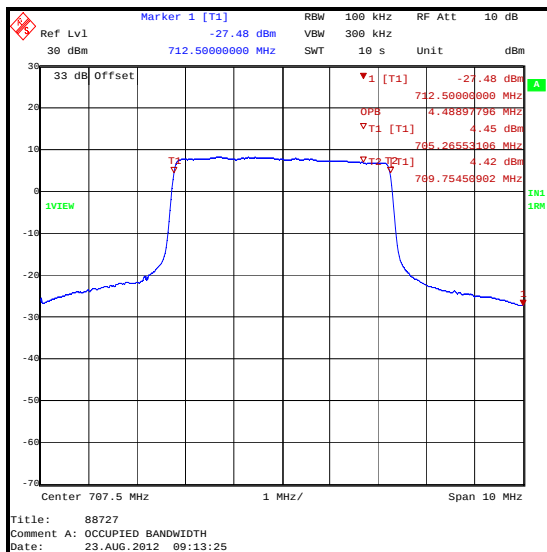
**Transmitter Occupied Bandwidth (continued)****Results: 5 MHz Channel Bandwidth / Bottom Channel**

| 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                   | 0.421                    |
| 701.5     | 16QAM      | 25              | 100                        | 300                   | 4.509                    |

**16QAM / 1 Resource Block (Block 1)****16QAM / 1 Resource Block (Block 25)****16QAM / 25 Resource Blocks**

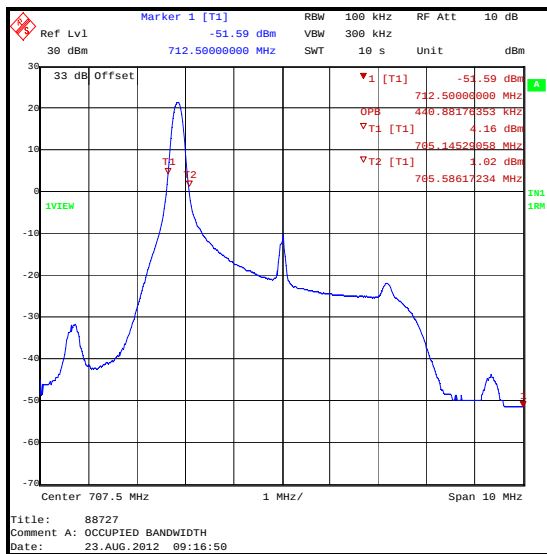
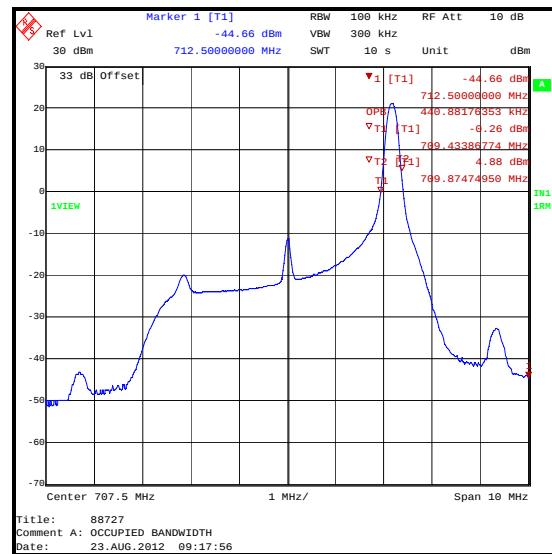
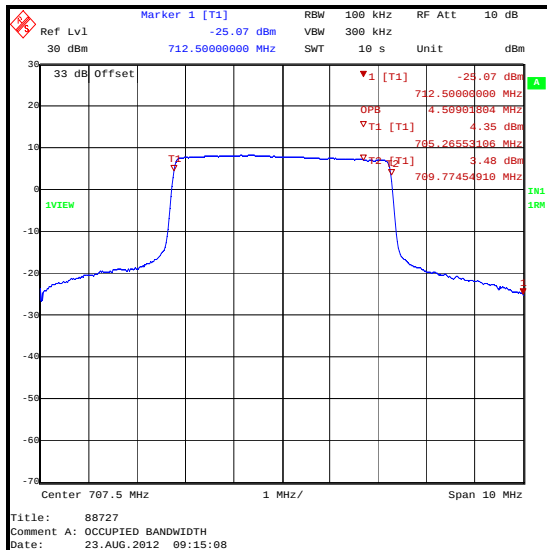
**Transmitter Occupied Bandwidth (continued)****Results: 5 MHz Channel Bandwidth / Middle Channel**

| 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**

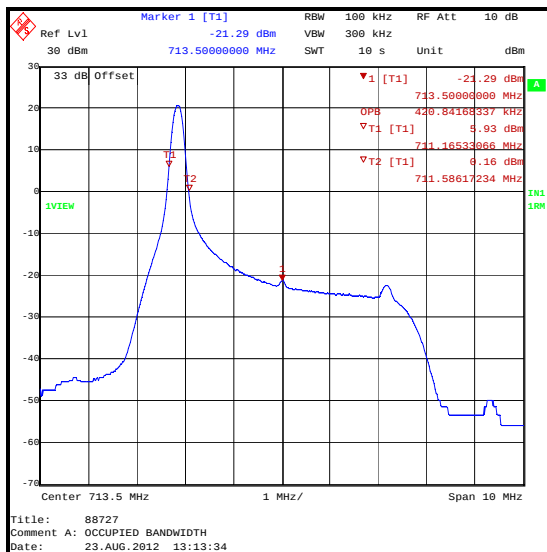
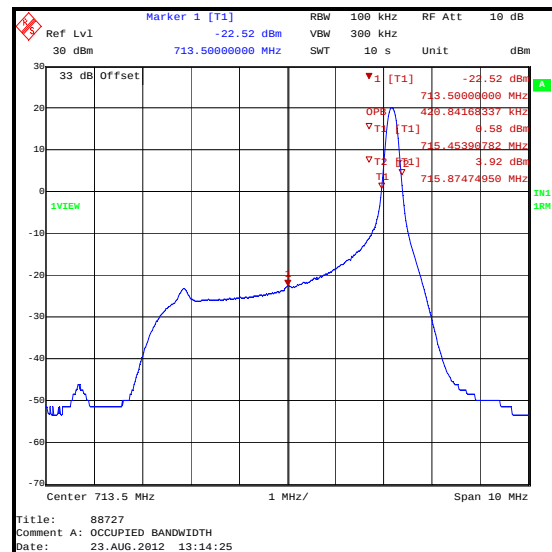
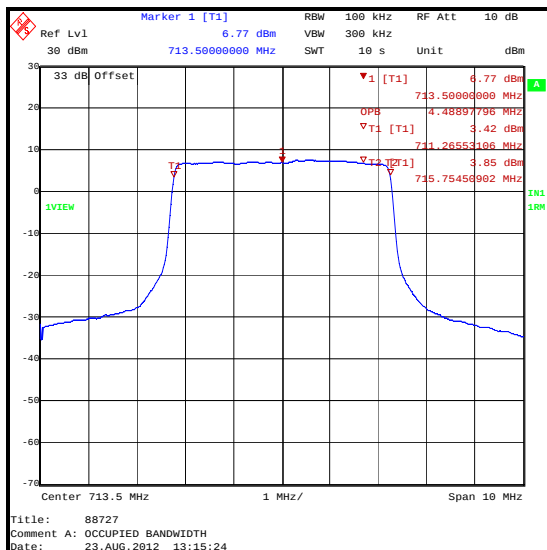
**Transmitter Occupied Bandwidth (continued)****Results: 5 MHz Channel Bandwidth / Middle Channel**

| Frequency | Modulation | Resource Blocks | Resolution Bandwidth (kHz) | Video Bandwidth (kHz) | Occupied Bandwidth (MHz) |
|-----------|------------|-----------------|----------------------------|-----------------------|--------------------------|
| 707.5     | 16QAM      | 1 (1)           | 100                        | 300                   | 0.441                    |
| 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**

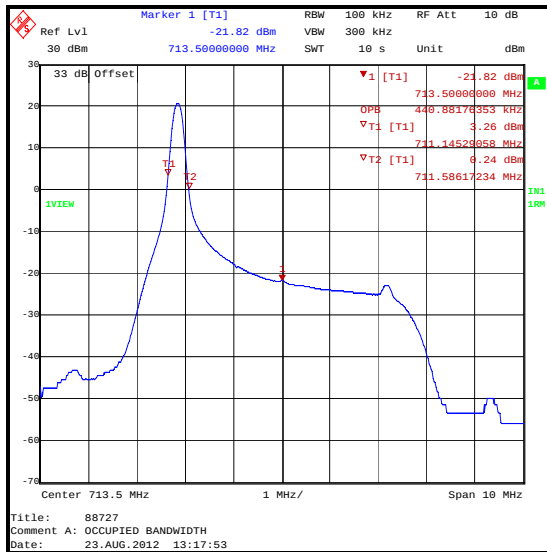
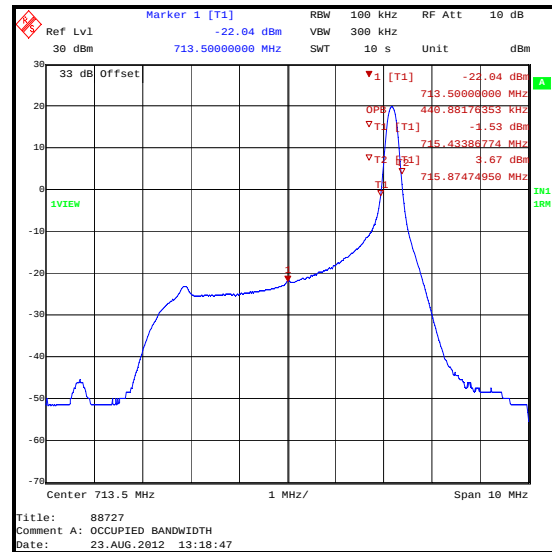
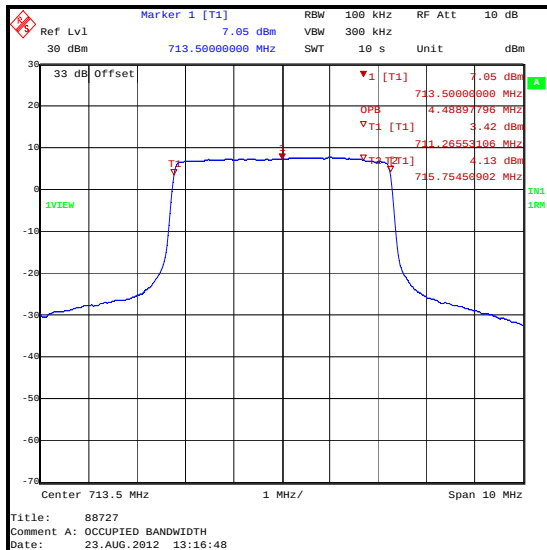
**Transmitter Occupied Bandwidth (continued)****Results: 5 MHz Channel Bandwidth /Top Channel**

| 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                   | 0.421                    |
| 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                   | 0.441                    |
| 713.5     | 16QAM      | 1 (25)          | 100                        | 300                   | 0.441                    |
| 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  | -                             |
| A1998  | Attenuator             | 6820.17.B    | 03 Apr 2013     | 12                            |
| L1017  | Test Receiver          | ESIB 40      | 29 May 2013     | 12                            |
| M199   | Power Meter            | NRVS         | 07 Jun 2013     | 12                            |
| M260   | Signal Generator       | 1035.5005.02 | 14 Jun 2013     | 12                            |
| M1267  | Thermal Power Sensor   | NRV-Z52      | 07 Jun 2013     | 12                            |

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

|                                   |               |                   |                |
|-----------------------------------|---------------|-------------------|----------------|
| <b>Test Engineer:</b>             | Mark Percival | <b>Test Date:</b> | 23 August 2012 |
| <b>Test Sample Serial Number:</b> | ARMHC30001F12 |                   |                |

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

**Environmental Conditions:**

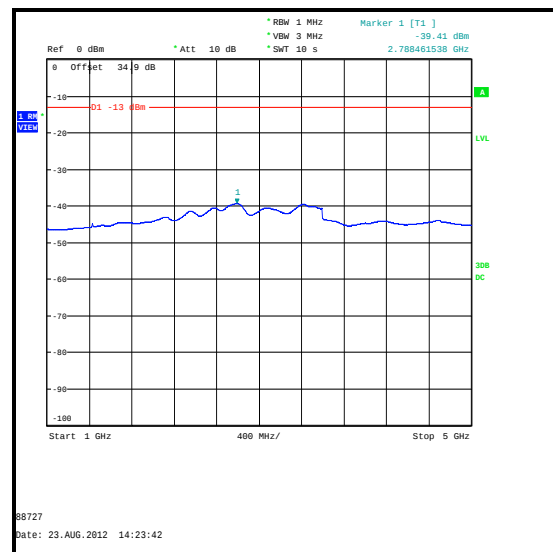
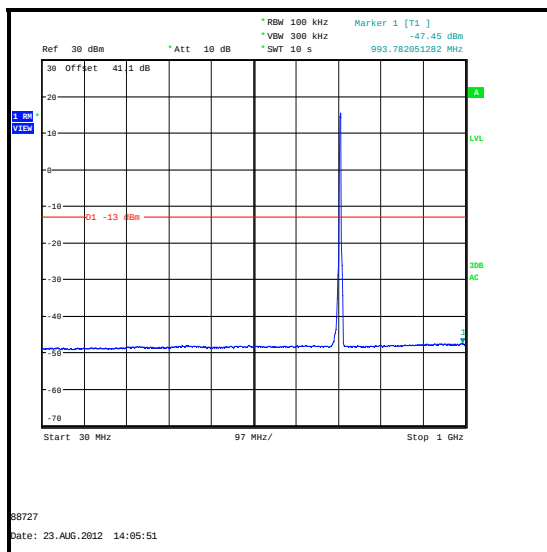
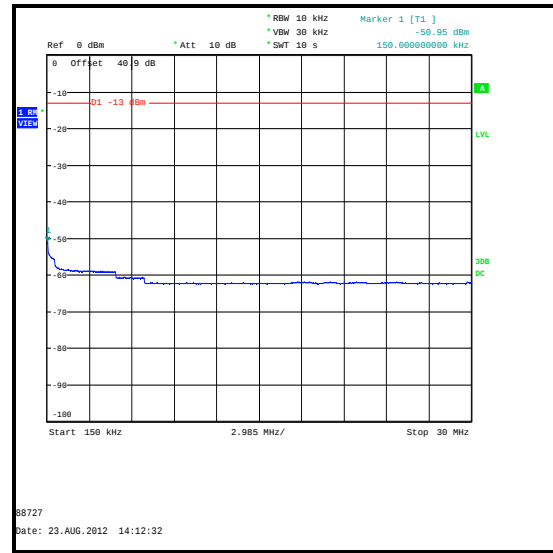
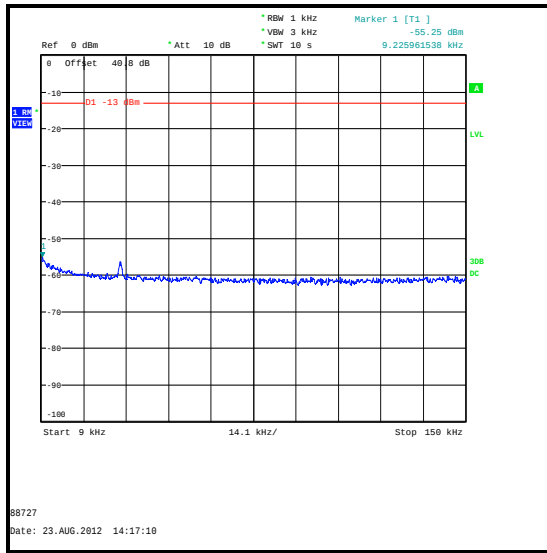
|                               |    |
|-------------------------------|----|
| <b>Temperature (°C):</b>      | 24 |
| <b>Relative Humidity (%):</b> | 41 |

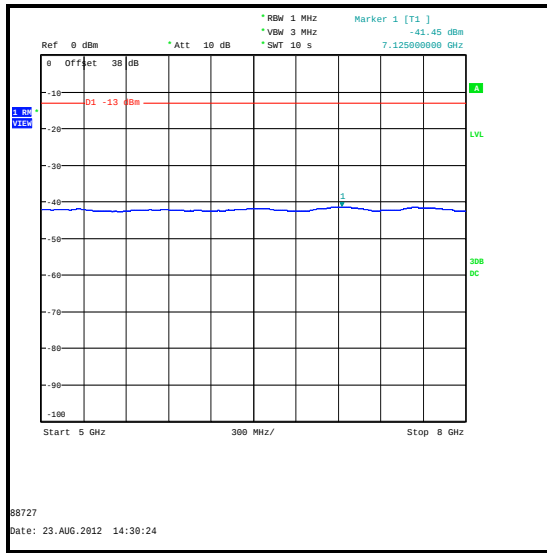
**Note(s):**

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**

| <b>Frequency (MHz)</b> | <b>Peak Emission Level (dBm)</b> | <b>Limit (dBm)</b> | <b>Margin (dB)</b> | <b>Result</b> |
|------------------------|----------------------------------|--------------------|--------------------|---------------|
| 2788.462               | -39.4                            | -13.0              | 26.4               | 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  | -                             |
| A1998  | Attenuator             | 6820.17.B    | 04 Apr 2013     | 12                            |
| M1630  | Test Receiver          | ESU 40       | 06 Feb 2013     | 12                            |
| M199   | Power Meter            | NRVS         | 07 Jun 2013     | 12                            |
| M260   | Signal Generator       | 1035.5005.02 | 09 Jan 2013     | 12                            |
| M1267  | Thermal Power Sensor   | NRV-Z52      | 07 Jun 2013     | 12                            |

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

|                                   |               |                   |                |
|-----------------------------------|---------------|-------------------|----------------|
| <b>Test Engineer:</b>             | Mark Percival | <b>Test Date:</b> | 23 August 2012 |
| <b>Test Sample Serial Number:</b> | ARMHC30001F12 |                   |                |

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

**Environmental Conditions:**

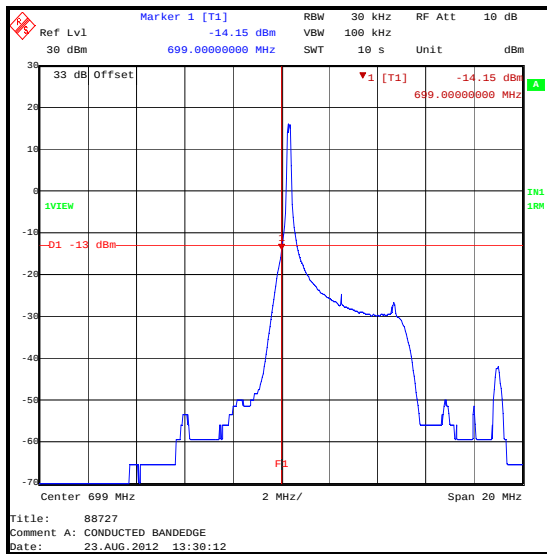
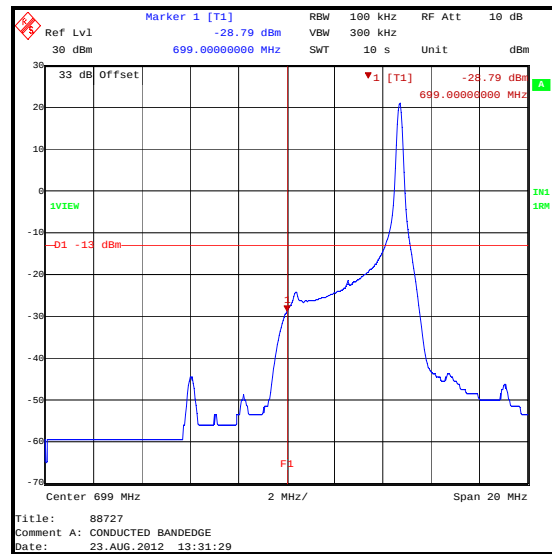
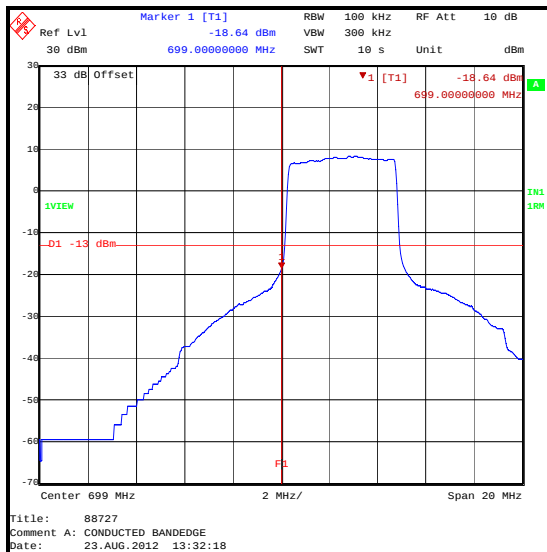
|                               |    |
|-------------------------------|----|
| <b>Temperature (°C):</b>      | 24 |
| <b>Relative Humidity (%):</b> | 41 |

**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.

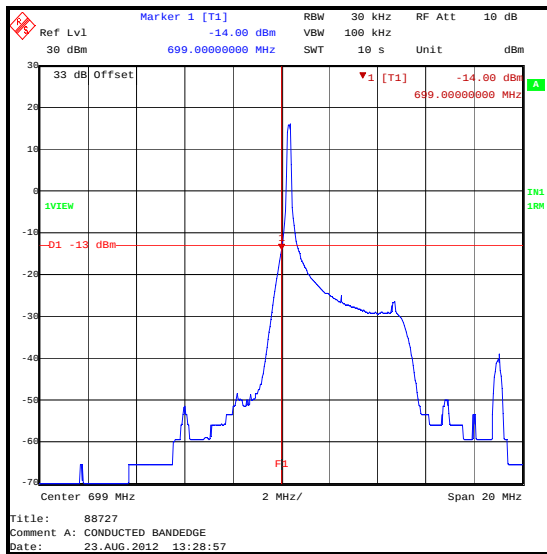
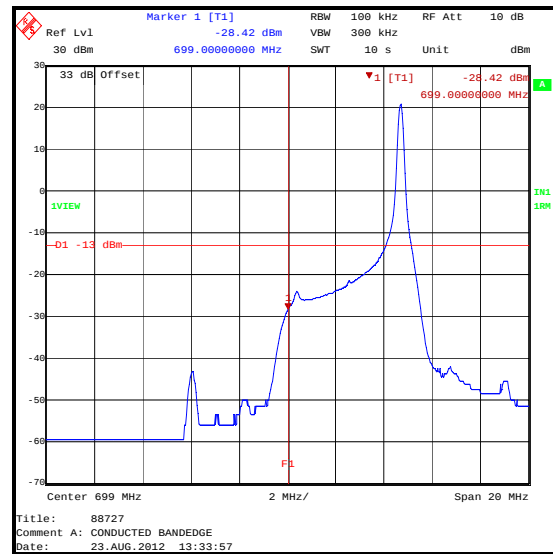
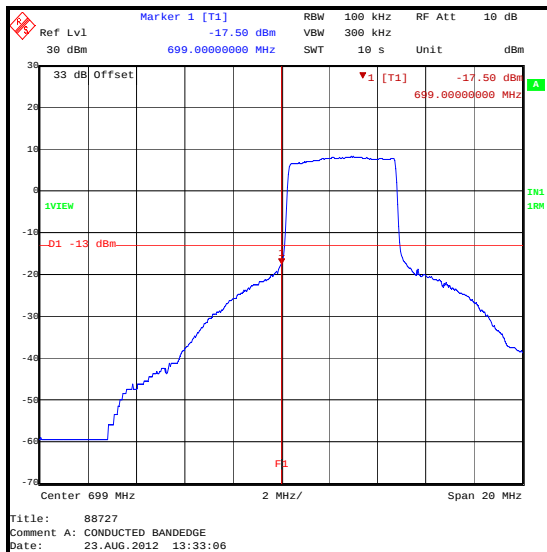
**Transmitter Conducted Emissions at Band Edges (continued)****Results: 5 MHz Channel Bandwidth / Bottom Channel / QPSK**

| Frequency (MHz) | Resource Blocks | Emission Level (dBm) | Limit (dBm) | Margin (dB) | Result   |
|-----------------|-----------------|----------------------|-------------|-------------|----------|
| 699             | 1 (1)           | -14.2                | -13.0       | 1.2         | Complied |
| 699             | 1 (25)          | -28.8                | -13.0       | 15.8        | Complied |
| 699             | 25              | -18.6                | -13.0       | 5.6         | Complied |

**QPSK / 1 Resource Block (1)****QPSK / 1 Resource Block (25)****QPSK / 25 Resource Blocks**

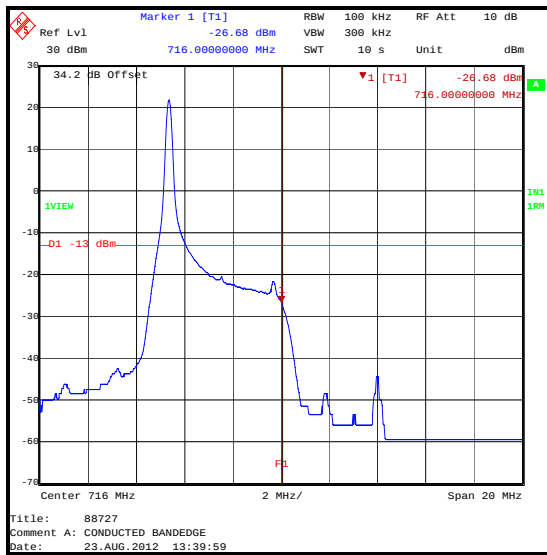
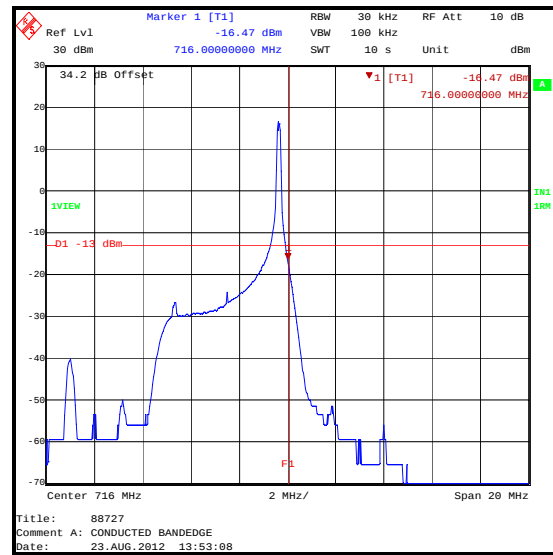
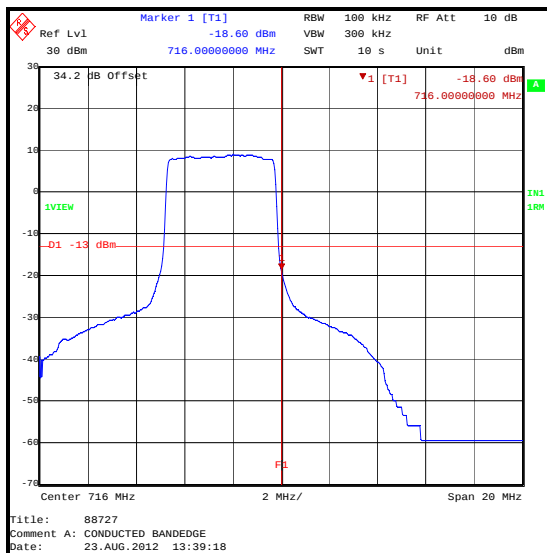
**Transmitter Conducted Emissions at Band Edges (continued)****Results: 5 MHz Channel Bandwidth / Bottom Channel / 16QAM**

| Frequency (MHz) | Resource Blocks | Emission Level (dBm) | Limit (dBm) | Margin (dB) | Result   |
|-----------------|-----------------|----------------------|-------------|-------------|----------|
| 699             | 1 (1)           | -14.0                | -13.0       | 1.0         | Complied |
| 699             | 1 (25)          | -28.4                | -13.0       | 15.4        | Complied |
| 699             | 25              | -17.5                | -13.0       | 4.5         | Complied |

**16QAM / 1 Resource Block (1)****16QAM / 1 Resource Block (25)****16QAM / 25 Resource Blocks**

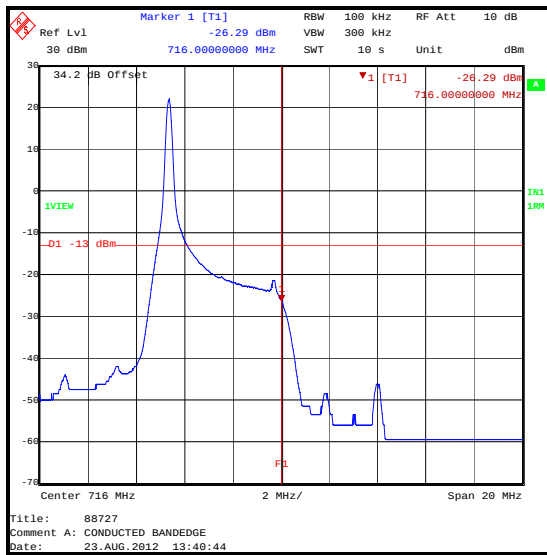
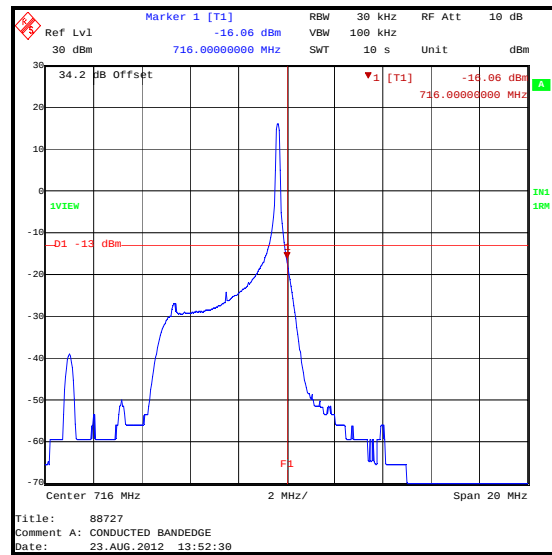
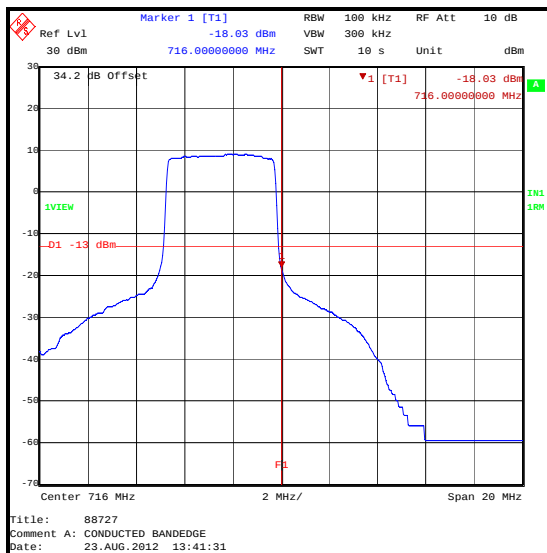
**Transmitter Conducted Emissions at Band Edges (continued)****Results: 5 MHz Channel Bandwidth / Top Channel / QPSK**

| Frequency (MHz) | Resource Blocks | Emission Level (dBm) | Limit (dBm) | Margin (dB) | Result   |
|-----------------|-----------------|----------------------|-------------|-------------|----------|
| 716             | 1(1)            | -26.7                | -13.0       | 13.7        | Complied |
| 716             | 1 (25)          | -16.5                | -13.0       | 3.5         | Complied |
| 716             | 25              | -18.6                | -13.0       | 5.6         | 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)            | -26.3                | -13.0       | 13.3        | Complied |
| 716             | 1 (25)          | -16.1                | -13.0       | 3.1         | Complied |
| 716             | 25              | -18.0                | -13.0       | 5.0         | 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  | -                             |
| A1998  | Attenuator             | 6820.17.B    | 03 Apr 2013     | 12                            |
| L1017  | Test Receiver          | ESIB 40      | 29 May 2013     | 12                            |
| M199   | Power Meter            | NRVS         | 07 Jun 2013     | 12                            |
| M260   | Signal Generator       | 1035.5005.02 | 14 Jun 2013     | 12                            |
| M1267  | Thermal Power Sensor   | NRV-Z52      | 07 Jun 2013     | 12                            |

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

|                                   |               |                   |                |
|-----------------------------------|---------------|-------------------|----------------|
| <b>Test Engineer:</b>             | Nick Steele   | <b>Test Date:</b> | 21 August 2012 |
| <b>Test Sample Serial Number:</b> | ARMHC30001F12 |                   |                |

|                          |                                                                                |
|--------------------------|--------------------------------------------------------------------------------|
| <b>FCC Part:</b>         | 2.1053 and 27.53(g)                                                            |
| <b>Test Method Used:</b> | As detailed in ANSI TIA-603-C-2004 Section 2.2.12. referencing FCC Part 2.1053 |
| <b>Frequency Range:</b>  | 30 MHz to 8 GHz                                                                |

**Environmental Conditions:**

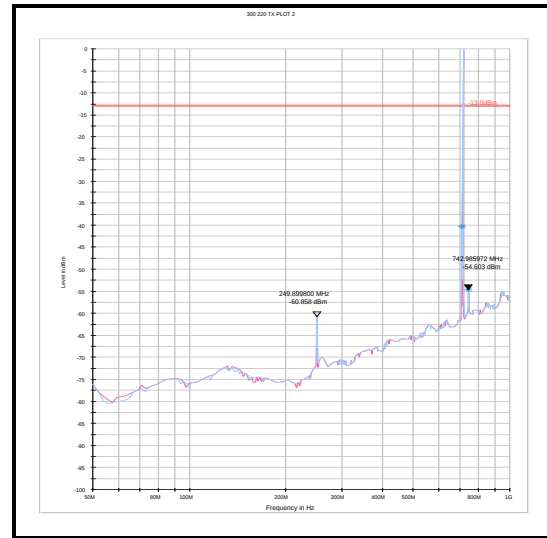
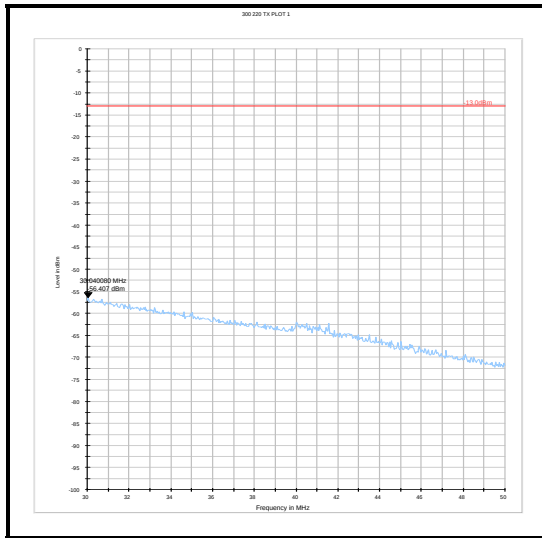
|                               |    |
|-------------------------------|----|
| <b>Temperature (°C):</b>      | 28 |
| <b>Relative Humidity (%):</b> | 46 |

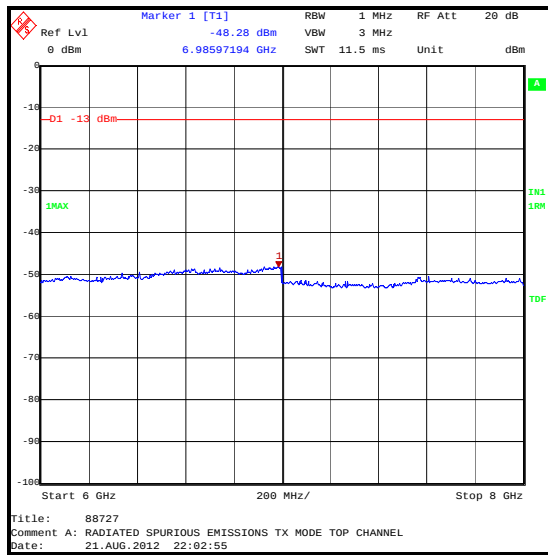
**Note(s):**

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   |
|-----------------|----------------------|----------------------|-------------|-------------|----------|
| 3969.940        | Vertical             | -46.0                | -13.0       | 33.0        | 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                            |
| M1124  | Test Receiver          | ESIB 26      | 14 Aug 2013     | 12                            |
| M1273  | Test Receiver          | ESIB 26      | 03 Feb 2013     | 12                            |

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

|                                   |               |                   |                |
|-----------------------------------|---------------|-------------------|----------------|
| <b>Test Engineer:</b>             | Nick Steele   | <b>Test Date:</b> | 21 August 2012 |
| <b>Test Sample Serial Number:</b> | ARMHC30001F12 |                   |                |

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

**Environmental Conditions:**

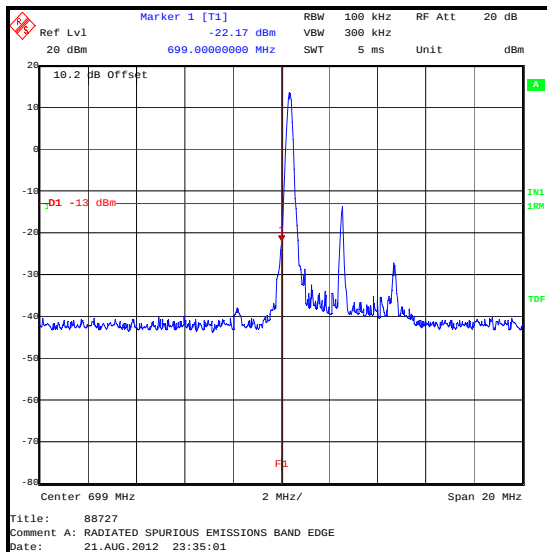
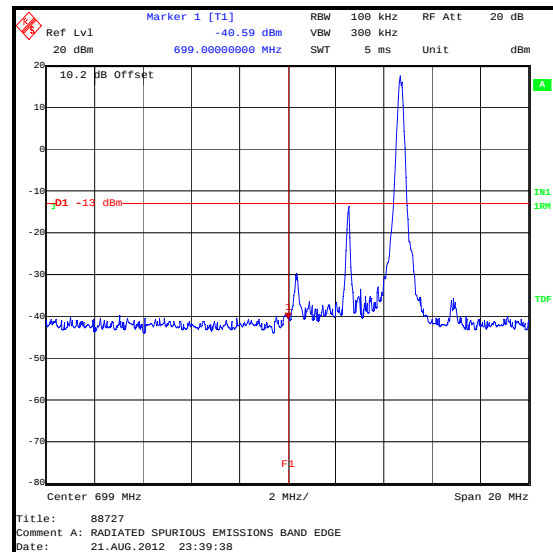
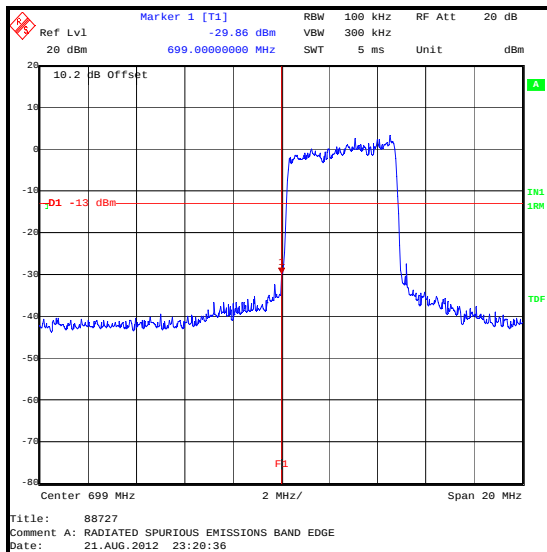
|                               |    |
|-------------------------------|----|
| <b>Temperature (°C):</b>      | 28 |
| <b>Relative Humidity (%):</b> | 46 |

**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.

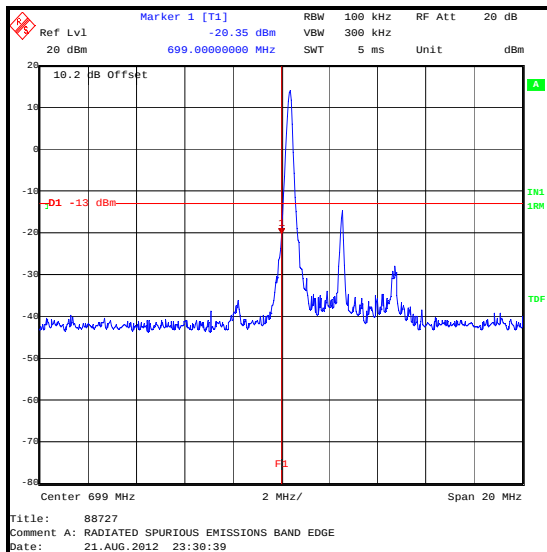
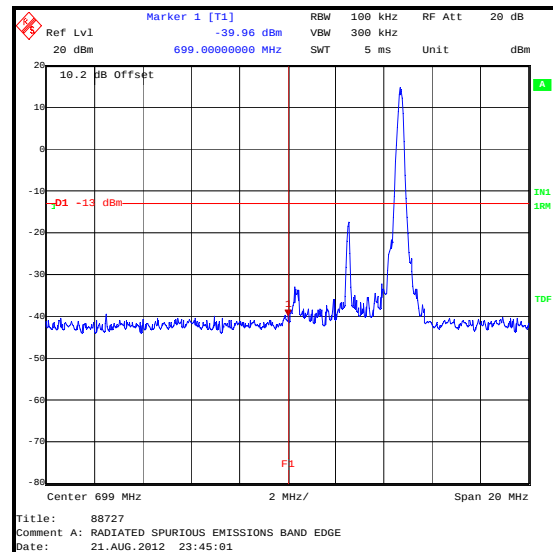
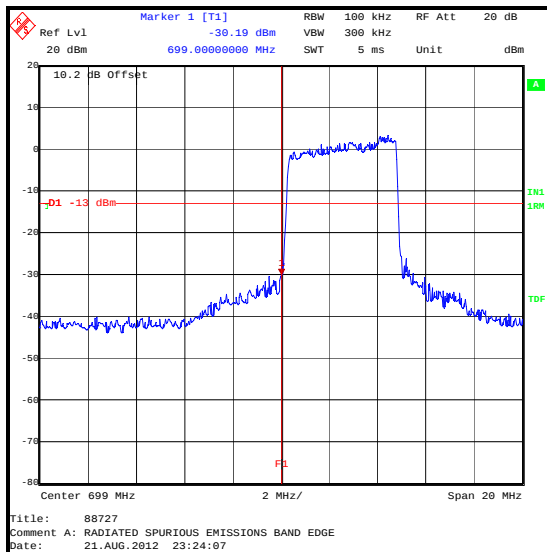
**Transmitter Radiated Emissions at Band Edges (continued)****Results: 5 MHz Channel Bandwidth / Bottom channel / QPSK**

| Frequency (MHz) | Resource Blocks | Emission Level (dBm) | Limit (dBm) | Margin (dB) | Result   |
|-----------------|-----------------|----------------------|-------------|-------------|----------|
| 699             | 1 (1)           | -22.2                | -13.0       | 9.2         | Complied |
| 699             | 1 (25)          | -40.6                | -13.0       | 27.6        | Complied |
| 699             | 25              | -29.9                | -13.0       | 16.9        | Complied |

**QPSK / 1 Resource Block (1)****QPSK / 1 Resource Block (25)****QPSK / 25 Resource Blocks**

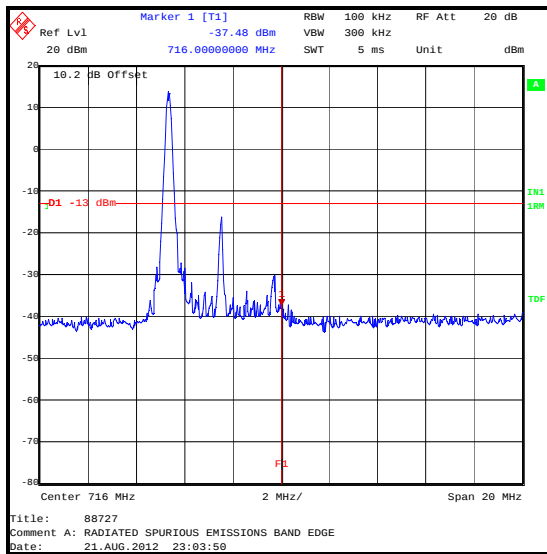
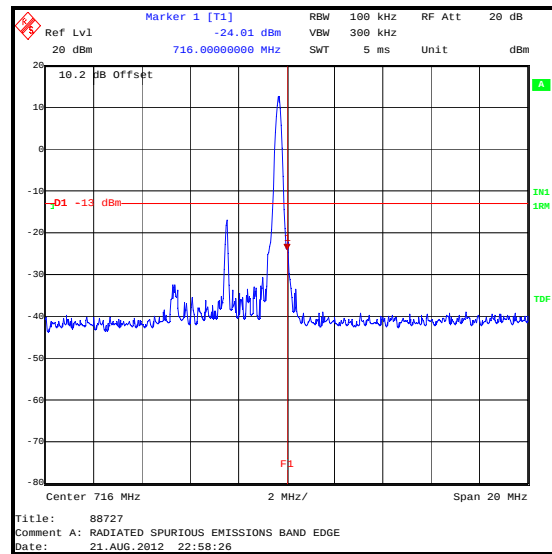
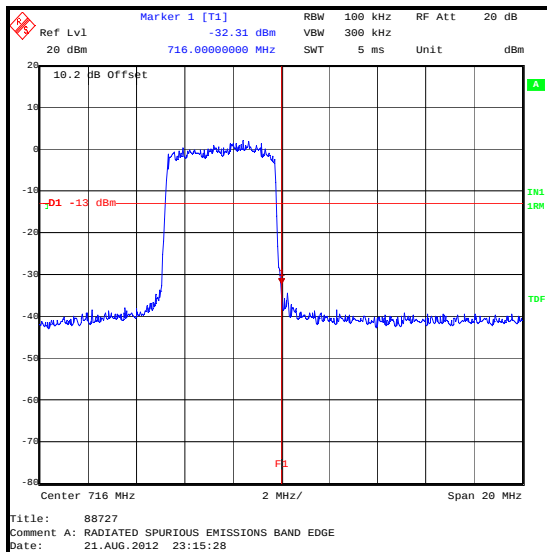
**Transmitter Radiated Emissions at Band Edges (continued)****Results: 5 MHz Channel Bandwidth / Bottom Channel / 16QAM**

| Frequency (MHz) | Resource Blocks | Emission Level (dBm) | Limit (dBm) | Margin (dB) | Result   |
|-----------------|-----------------|----------------------|-------------|-------------|----------|
| 699             | 1 (1)           | -20.4                | -13.0       | 7.4         | Complied |
| 699             | 1 (25)          | -40.0                | -13.0       | 27.0        | Complied |
| 699             | 25              | -30.2                | -13.0       | 17.2        | Complied |

**16QAM / 1 Resource Block (1)****16QAM / 1 Resource Block (25)****16QAM / 25 Resource Blocks**

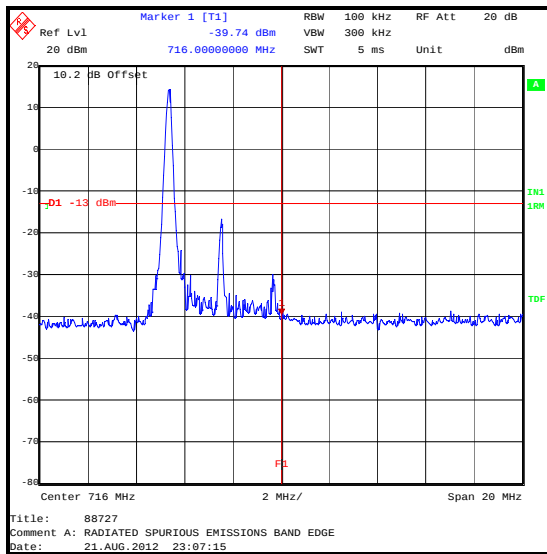
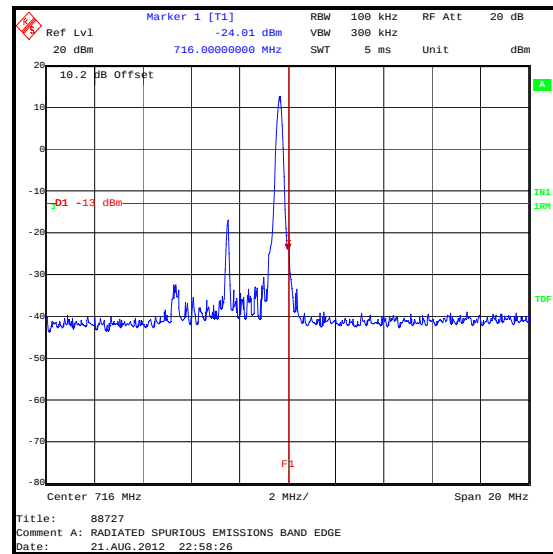
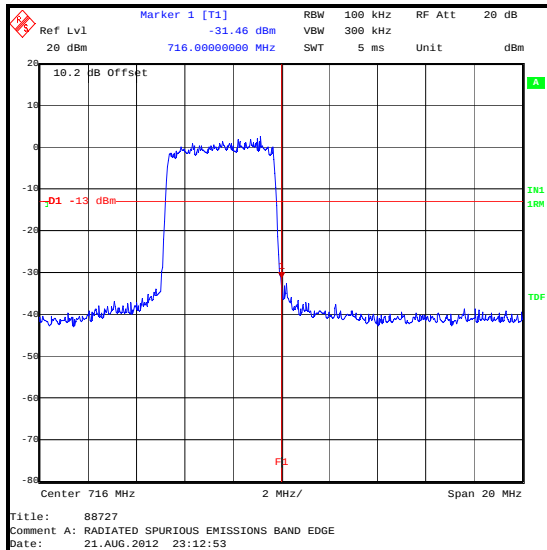
**Transmitter Radiated Emissions at Band Edges (continued)****Results: 5 MHz Channel Bandwidth / Top Channel / QPSK**

| Frequency (MHz) | Resource Blocks | Emission Level (dBm) | Limit (dBm) | Margin (dB) | Result   |
|-----------------|-----------------|----------------------|-------------|-------------|----------|
| 716             | 1 (1)           | -37.5                | -13.0       | 24.5        | Complied |
| 716             | 1 (25)          | -24.0                | -13.0       | 11.0        | Complied |
| 716             | 25              | -32.3                | -13.0       | 19.3        | 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)           | -39.7                | -13.0       | 26.7        | Complied |
| 716             | 1 (25)          | -24.0                | -13.0       | 11.0        | Complied |
| 716             | 25              | -31.5                | -13.0       | 18.5        | 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     | 15 Aug 2013     | 12                            |
| K0002  | 3m RSE Chamber         | Rainford     | 09 Oct 2012     | 12                            |
| M1124  | Test Receiver          | ESIB 26      | 14 Aug 2013     | 12                            |

**5.2.12. Transmitter Radiated Spurious Emissions – External Antenna's****Test Summary:**

|                                   |               |                   |                |
|-----------------------------------|---------------|-------------------|----------------|
| <b>Test Engineer:</b>             | Nick Steele   | <b>Test Date:</b> | 21 August 2012 |
| <b>Test Sample Serial Number:</b> | ARMHC30001F12 |                   |                |

|                          |                                                                                |
|--------------------------|--------------------------------------------------------------------------------|
| <b>FCC Part:</b>         | 2.1053 and 27.53(g)                                                            |
| <b>Test Method Used:</b> | As detailed in ANSI TIA-603-C-2004 Section 2.2.12. referencing FCC Part 2.1053 |
| <b>Frequency Range:</b>  | 30 MHz to 8 GHz                                                                |

**Environmental Conditions:**

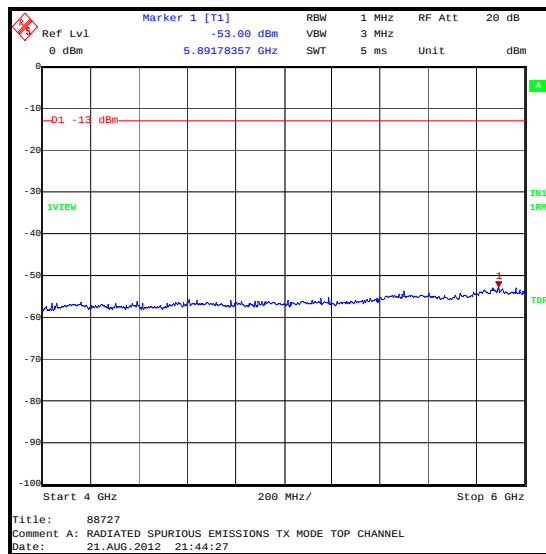
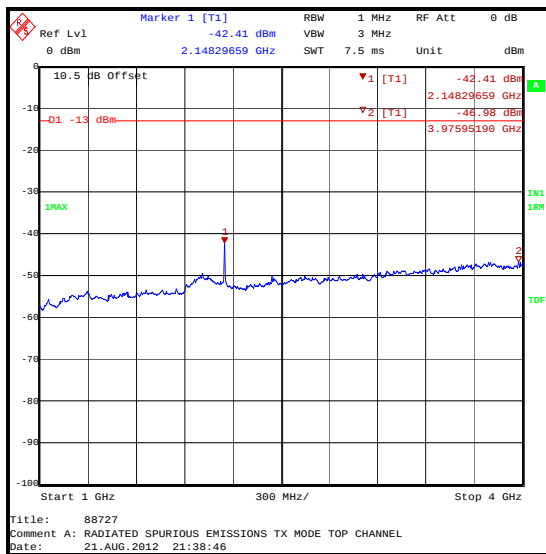
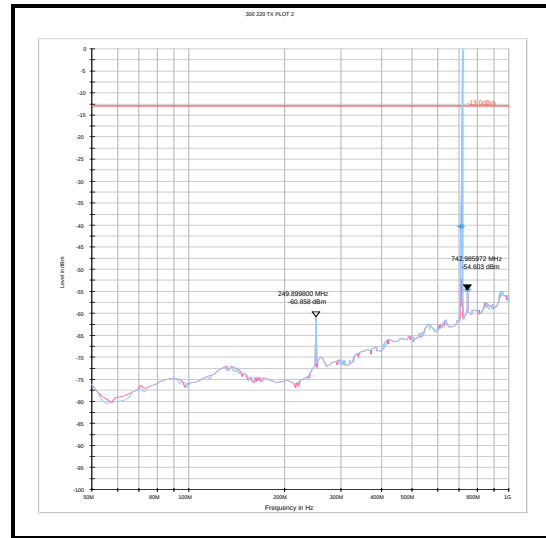
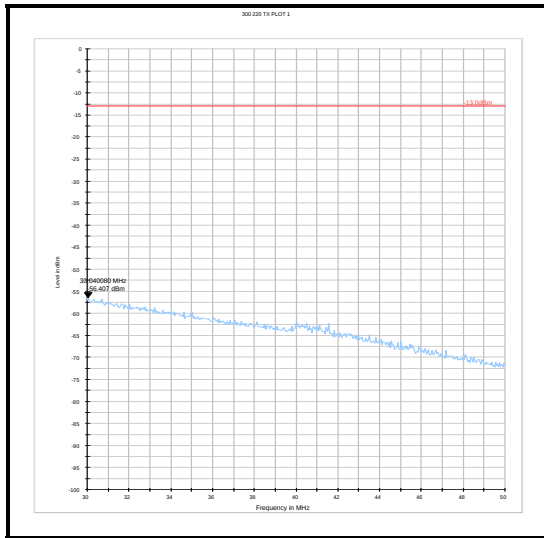
|                               |    |
|-------------------------------|----|
| <b>Temperature (°C):</b>      | 28 |
| <b>Relative Humidity (%):</b> | 46 |

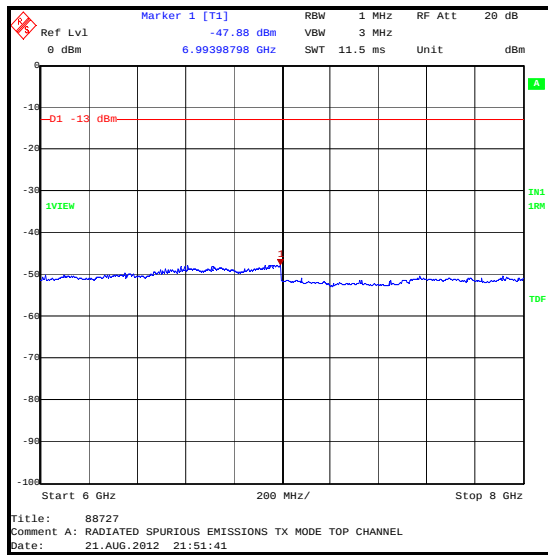
**Note(s):**

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   |
|-----------------|----------------------|----------------------|-------------|-------------|----------|
| 2148.297        | Vertical             | -42.4                | -13.0       | 29.4        | 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                            |
| M1124  | Test Receiver          | ESIB 26      | 18 Aug 2013     | 12                            |
| M1273  | Test Receiver          | ESIB 26      | 03 Feb 2013     | 12                            |

**5.2.13. Transmitter Radiated Emissions at Band Edges - External Antenna's****Test Summary:**

|                                   |               |                   |                |
|-----------------------------------|---------------|-------------------|----------------|
| <b>Test Engineer:</b>             | Nick Steele   | <b>Test Date:</b> | 21 August 2012 |
| <b>Test Sample Serial Number:</b> | ARMHC30001F12 |                   |                |

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

**Environmental Conditions:**

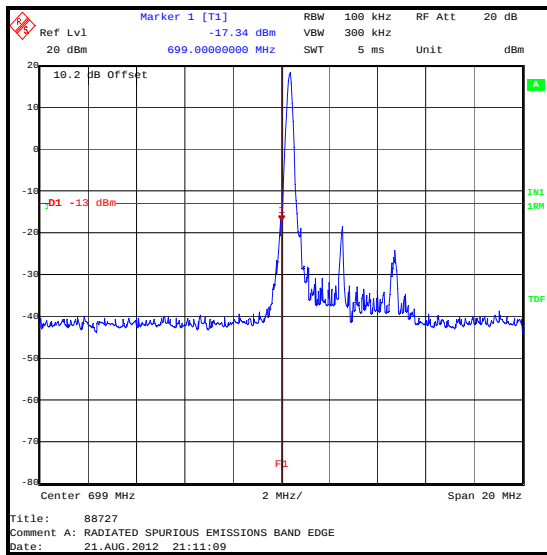
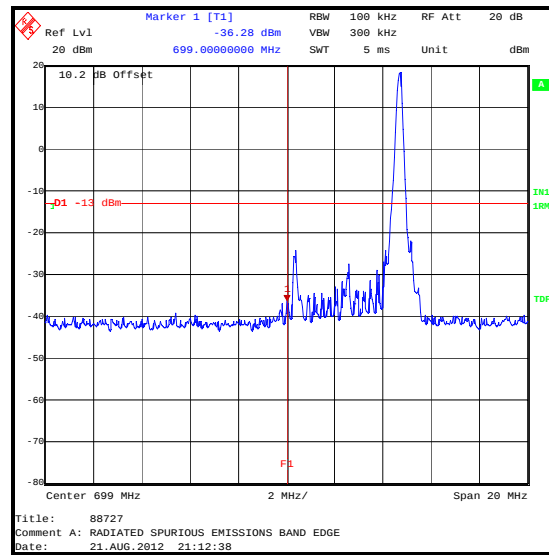
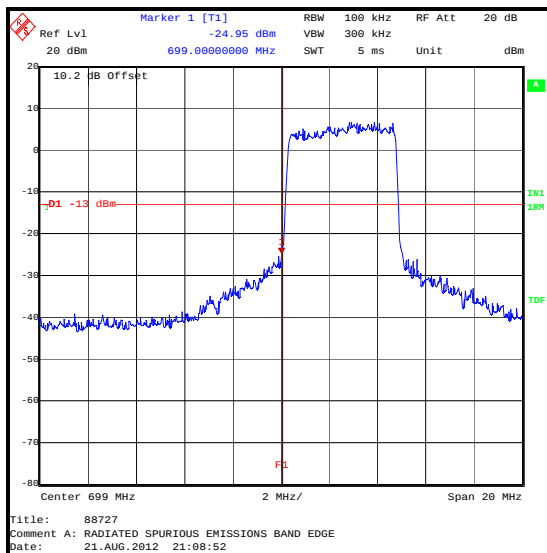
|                               |    |
|-------------------------------|----|
| <b>Temperature (°C):</b>      | 28 |
| <b>Relative Humidity (%):</b> | 46 |

**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.

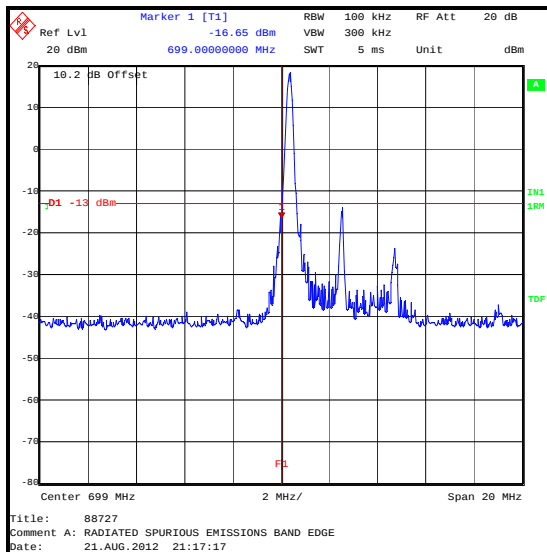
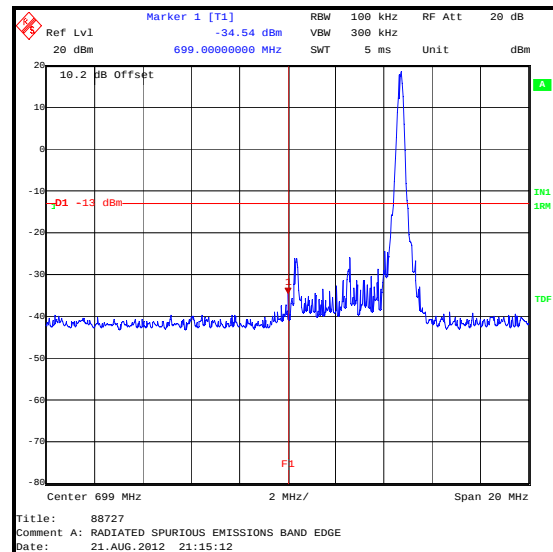
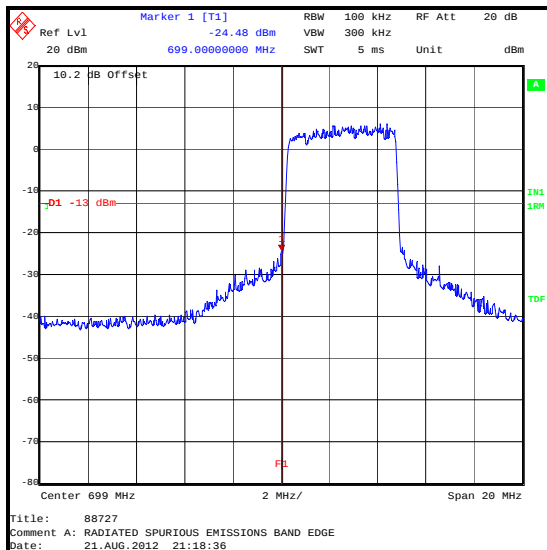
**Transmitter Radiated Emissions at Band Edges - External Antenna's (continued)****Results: 5 MHz Channel Bandwidth / Bottom channel / QPSK**

| Frequency (MHz) | Resource Blocks | Emission Level (dBm) | Limit (dBm) | Margin (dB) | Result   |
|-----------------|-----------------|----------------------|-------------|-------------|----------|
| 699             | 1 (1)           | -17.3                | -13.0       | 4.3         | Complied |
| 699             | 1 (25)          | -36.3                | -13.0       | 23.3        | Complied |
| 699             | 25              | -25.0                | -13.0       | 12.0        | Complied |

**QPSK / 1 Resource Block (1)****QPSK / 1 Resource Block (25)****QPSK / 25 Resource Blocks**

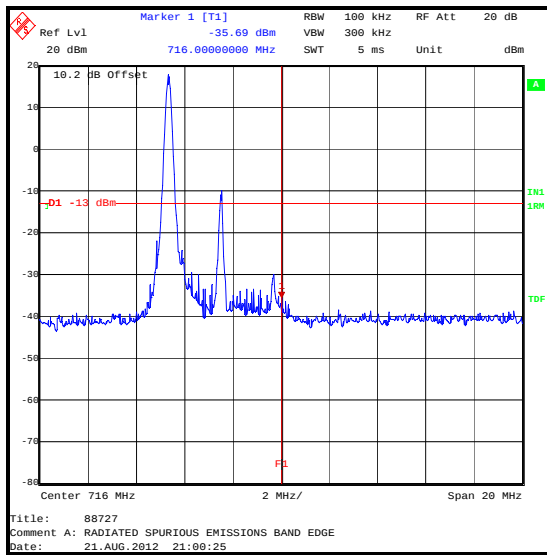
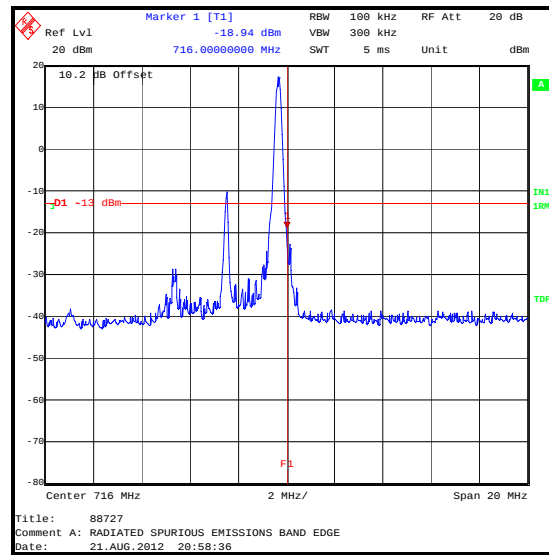
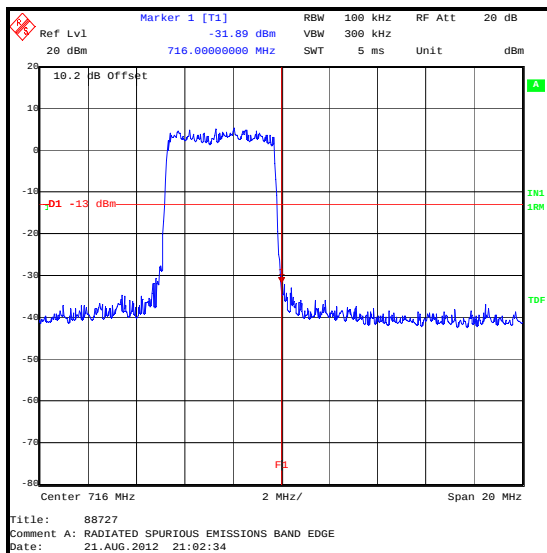
**Transmitter Radiated Emissions at Band Edges - External Antenna's (continued)****Results: 5 MHz Channel Bandwidth / Bottom Channel / 16QAM**

| Frequency (MHz) | Resource Blocks | Emission Level (dBm) | Limit (dBm) | Margin (dB) | Result   |
|-----------------|-----------------|----------------------|-------------|-------------|----------|
| 699             | 1 (1)           | -16.7                | -13.0       | 3.7         | Complied |
| 699             | 1 (25)          | -34.5                | -13.0       | 21.5        | Complied |
| 699             | 25              | -24.5                | -13.0       | 11.5        | Complied |

**16QAM / 1 Resource Block (1)****16QAM / 1 Resource Block (25)****16QAM / 25 Resource Blocks**

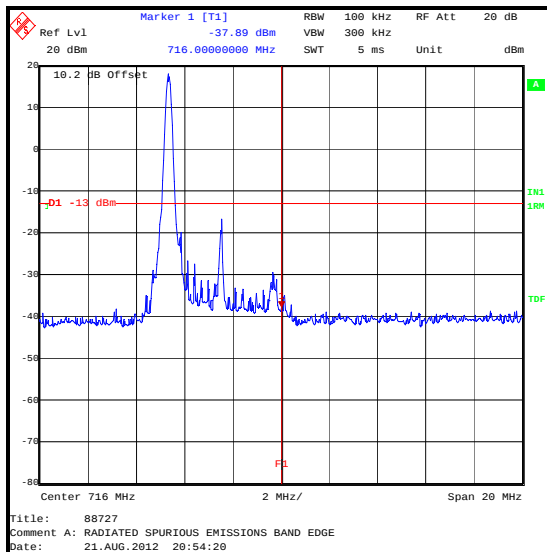
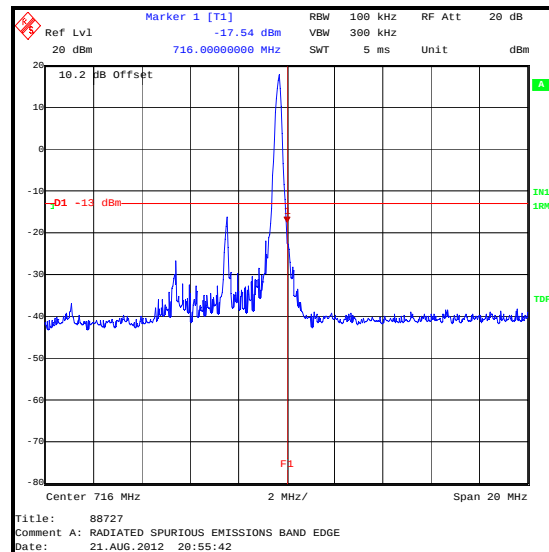
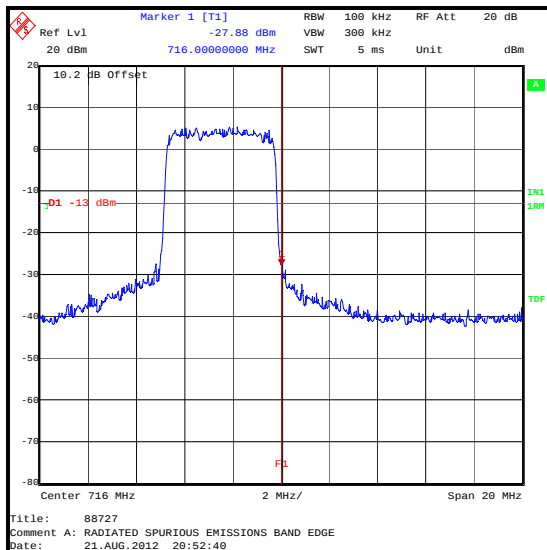
**Transmitter Radiated Emissions at Band Edges - External Antenna's (continued)****Results: 5 MHz Channel Bandwidth / Top Channel / QPSK**

| Frequency (MHz) | Resource Blocks | Emission Level (dBm) | Limit (dBm) | Margin (dB) | Result   |
|-----------------|-----------------|----------------------|-------------|-------------|----------|
| 716             | 1 (1)           | -35.7                | -13.0       | 22.7        | Complied |
| 716             | 1 (25)          | -18.9                | -13.0       | 5.9         | Complied |
| 716             | 25              | -31.9                | -13.0       | 18.9        | Complied |

**QPSK / 1 Resource Block (1)****QPSK / 1 Resource Block (25)****QPSK / 25 Resource Blocks**

**Transmitter Radiated Emissions at Band Edges - External Antenna's (continued)****Results: 5 MHz Channel Bandwidth / Top Channel / 16QAM**

| Frequency (MHz) | Resource Blocks | Emission Level (dBm) | Limit (dBm) | Margin (dB) | Result   |
|-----------------|-----------------|----------------------|-------------|-------------|----------|
| 716             | 1 (1)           | -37.9                | -13.0       | 24.9        | Complied |
| 716             | 1 (25)          | -17.5                | -13.0       | 4.5         | Complied |
| 716             | 25              | -27.9                | -13.0       | 14.9        | 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     | 15 Aug 2013     | 12                            |
| K0002  | 3m RSE Chamber         | Rainford     | 09 Oct 2012     | 12                            |
| M1124  | Test Receiver          | ESIB 26      | 14 Aug 2013     | 12                            |

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

|                                   |               |                    |                                    |
|-----------------------------------|---------------|--------------------|------------------------------------|
| <b>Test Engineer:</b>             | Mark Percival | <b>Test Dates:</b> | 16 August 2012 &<br>21 August 2012 |
| <b>Test Sample Serial Number:</b> | ARMHC30001F12 |                    |                                    |

|                          |                                                                                     |
|--------------------------|-------------------------------------------------------------------------------------|
| <b>FCC Part:</b>         | 2.1055 and 27.54                                                                    |
| <b>Test Method Used:</b> | As detailed in ANSI TIA-603-C-2004 Section 2.2.2 referencing<br>FCC CFR Part 2.1055 |

**Environmental Conditions:**

|                               |    |
|-------------------------------|----|
| <b>Temperature (°C):</b>      | 24 |
| <b>Relative Humidity (%):</b> | 53 |

**Note(s):**

1. Temperature was monitored throughout the test with a calibrated digital thermometer.
2. Measurements were made using the Anritsu 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) (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              | 701.499994          | 701.500004     | 701.499984      | 701.499995      | 701.499987      | 701.500006      |
| -20              | 701.499996          | 701.500003     | 701.499990      | 701.499998      | 701.499993      | 701.499991      |
| -10              | 701.500008          | 701.499998     | 701.500006      | 701.500003      | 701.500003      | 701.500002      |
| 0                | 701.499998          | 701.500004     | 701.500004      | 701.499999      | 701.499993      | 701.499999      |
| 10               | 701.500016          | 701.499993     | 701.500001      | 701.500007      | 701.499991      | 701.499991      |
| 20               | 701.500014          | 701.500002     | 701.499998      | 701.499993      | 701.499990      | 701.499988      |
| 30               | 701.500008          | 701.499991     | 701.499990      | 701.500001      | 701.499989      | 701.499993      |
| 40               | 701.499994          | 701.499996     | 701.499993      | 701.499988      | 701.499989      | 701.499994      |
| 50               | 701.499997          | 701.499995     | 701.499989      | 701.500003      | 701.499991      | 701.499991      |

| Temperature (°C) | Time after Start-up |                 |                 |                 |                  |
|------------------|---------------------|-----------------|-----------------|-----------------|------------------|
|                  | 6 minutes (MHz)     | 7 minutes (MHz) | 8 minutes (MHz) | 9 minutes (MHz) | 10 minutes (MHz) |
| -30              | 701.499997          | 701.499983      | 701.499985      | 701.500002      | 701.499999       |
| -20              | 701.500001          | 701.500003      | 701.499994      | 701.499988      | 701.499992       |
| -10              | 701.500003          | 701.499997      | 701.499998      | 701.499994      | 701.499989       |
| 0                | 701.499992          | 701.499990      | 701.500004      | 701.499993      | 701.499994       |
| 10               | 701.499990          | 701.499998      | 701.499997      | 701.499992      | 701.499989       |
| 20               | 701.499996          | 701.499991      | 701.499988      | 701.499995      | 701.499990       |
| 30               | 701.499986          | 701.499998      | 701.499987      | 701.500003      | 701.500001       |
| 40               | 701.499988          | 701.499991      | 701.499997      | 701.500004      | 701.499995       |
| 50               | 701.499996          | 701.499988      | 701.499990      | 701.499994      | 701.500002       |

| 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) (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              | 713.499993          | 713.499992     | 713.499986      | 713.500004      | 713.499994      | 713.500001      |
| -20              | 713.500014          | 713.500002     | 713.500010      | 713.500007      | 713.500015      | 713.500005      |
| -10              | 713.499987          | 713.500019     | 713.500001      | 713.499999      | 713.499997      | 713.499998      |
| 0                | 713.500004          | 713.500002     | 713.499993      | 713.499994      | 713.499995      | 713.500001      |
| 10               | 713.500001          | 713.499996     | 713.500009      | 713.500003      | 713.500001      | 713.499986      |
| 20               | 713.500015          | 713.499999     | 713.499993      | 713.500001      | 713.499993      | 713.499991      |
| 30               | 713.500010          | 713.500007     | 713.500002      | 713.499990      | 713.499995      | 713.499989      |
| 40               | 713.500008          | 713.500002     | 713.499996      | 713.499992      | 713.499999      | 713.500001      |
| 50               | 713.500001          | 713.499996     | 713.499999      | 713.499989      | 713.499998      | 713.499996      |

| Temperature (°C) | Time after Start-up |                 |                 |                 |                  |
|------------------|---------------------|-----------------|-----------------|-----------------|------------------|
|                  | 6 minutes (MHz)     | 7 minutes (MHz) | 8 minutes (MHz) | 9 minutes (MHz) | 10 minutes (MHz) |
| -30              | 713.499993          | 713.499990      | 713.500006      | 713.500009      | 713.500004       |
| -20              | 713.500006          | 713.499998      | 713.499995      | 713.499990      | 713.499992       |
| -10              | 713.500003          | 713.500001      | 713.499991      | 713.499993      | 713.499987       |
| 0                | 713.499997          | 713.499995      | 713.499989      | 713.499991      | 713.499985       |
| 10               | 713.499986          | 713.499990      | 713.500002      | 713.499992      | 713.499988       |
| 20               | 713.499987          | 713.500002      | 713.500000      | 713.499993      | 713.499991       |
| 30               | 713.500003          | 713.499999      | 713.499998      | 713.499991      | 713.499989       |
| 40               | 713.499995          | 713.499997      | 713.499993      | 713.500002      | 713.499992       |
| 50               | 713.499993          | 713.500001      | 713.499998      | 713.499985      | 713.499992       |

| Frequency closest to Upper Band 12 Edge (MHz) | Upper Band Edge Limit (MHz) | Margin (MHz) | Result   |
|-----------------------------------------------|-----------------------------|--------------|----------|
| 713.500019                                    | 716.0                       | 2.499981     | 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   | Cal Before Use      | 12                            |
| M1582  | LTE Test Set           | MT8820C      | Verified Before Use | -                             |
| M1642  | Thermometer            | 52II         | 21 Feb 2013         | 12                            |
| M1229  | Digital Multimeter     | 179          | 18 Jun 2013         | 12                            |
| S0537  | DC Power Supply Unit   | EL302D       | Cal Before Use      | -                             |

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

|                                   |               |                   |                |
|-----------------------------------|---------------|-------------------|----------------|
| <b>Test Engineer:</b>             | Mark Percival | <b>Test Date:</b> | 21 August 2012 |
| <b>Test Sample Serial Number:</b> | ARMHC30001F12 |                   |                |

|                          |                                                                                  |
|--------------------------|----------------------------------------------------------------------------------|
| <b>FCC Part:</b>         | 2.1055 and 27.54                                                                 |
| <b>Test Method Used:</b> | As detailed in ANSI TIA-603-C-2004 Section 2.2.2 referencing FCC CFR Part 2.1055 |

**Environmental Conditions:**

|                               |    |
|-------------------------------|----|
| <b>Temperature (°C):</b>      | 20 |
| <b>Relative Humidity (%):</b> | 46 |

**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   |
|----------------------|--------------------------|-----------------------------|--------------|----------|
| 4.25                 | 701.500001               | 699.0                       | 2.500001     | Complied |
| 5.75                 | 701.500016               | 699.0                       | 2.500016     | Complied |

**Results: Top Channel**

| Supply Voltage (VDC) | Measured Frequency (MHz) | Lower Band Edge Limit (MHz) | Margin (MHz) | Result   |
|----------------------|--------------------------|-----------------------------|--------------|----------|
| 4.25                 | 713.499993               | 716.0                       | 2.500007     | Complied |
| 5.75                 | 713.500005               | 716.0                       | 2.499995     | Complied |

**Test Equipment Used:**

| RFI ID | Instrument Description | Model Number | Calibration Due     | Calibration Interval (Months) |
|--------|------------------------|--------------|---------------------|-------------------------------|
| M1582  | LTE Test Set           | MT8820C      | Verified Before Use | -                             |
| 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 |