# TEST REPORT
# FROM
# RFI GLOBAL SERVICES LTD

Test of: IPWireless 700 MHz V5 Node B Model: AFB/VT

To: FCC Part 27: 2008 Subpart C

**Test Report Serial No:**
RFI/RPT4/RP75336JD01A

**Version 4 supersedes all previous versions**

| | |
|---|---|
| **This Test Report Is Issued Under The Authority Of Brian Watson, Operations Director:**  | |
| **Checked By:** | Nigel Davison |
| **Signature:**  | |
| **Date of Issue:** | 28 January 2010 |

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# 1. Customer Information

| | |
|---|---|
| **Company Name:** | IPWireless (UK) Ltd |
| **Address:** | Unit 7<br>Greenways Business Park<br>Bellinger Close<br>Chippenham<br>Wiltshire<br>SN15 1BN<br>England<br>United Kingdom |

# 2. Summary of Testing

## 2.1. General Information

| | |
|---|---|
| **Specification Reference:** | 47CFR27 |
| **Specification Title:** | Code of Federal Regulations Volume 47 (Telecommunications) 2008: Part 27 Subpart C (Miscellaneous Wireless Communication Services) |
| **Site Registration:** | 209735 |
| **Location of Testing:** | RFI Global Services Ltd, Wade Road, Basingstoke, Hampshire, RG24 8AH. |
| **Test Dates:** | 29 September 2009 to 19 November 2009 |

## 2.2. Summary of Test Results (Sub Band A, B & C)

| FCC Reference (47CFR) | Measurement | Port Type | Result |
|---|---|---|---|
| FCC Part 2.1046<br>FCC Part 27.50 | Transmitter Carrier Output Power and Effective Radiated Power (ERP) | Antenna Terminals | ✓ |
| FCC Part 2.1049 | Transmitter Occupied Bandwidth | Antenna Terminals | ✓ |
| FCC Part 2.1055<br>FCC Part 27.54 | Frequency Stability (Temperature & Voltage Variation) | Antenna Terminals | ✓ |
| FCC Part 2.1051<br>FCC Part 27.53 | Transmitter Conducted Emissions Channel Edge | Antenna Terminals | ✓ |
| FCC Part 2.1051<br>FCC Part 27.53 | Transmitter Conducted Emissions | Antenna Terminals | ✓ |
| FCC Part 2.1051<br>FCC Part 27.53 | Transmitter Conducted Emissions at Band Edges | Antenna Terminals | ✓ |
| FCC Part 2.1051<br>FCC Part 27.53 | Transmitter Radiated Spurious Emissions Channel Edge | Antenna | ✓ |
| FCC Part 2.1051<br>FCC Part 27.53 | Transmitter Radiated Spurious Emissions | Antenna | ✓ |
| FCC Part 2.1051<br>FCC Part 27.53 | Transmitter Radiated Emissions at Band Edges | Antenna | ✓ |
| **Additional Testing Requirements on Sub Band B & C** | | | |
| FCC Part 2.1051<br>FCC Part 27.53 | Transmitter Conducted Emission Limitations | Antenna Terminals | ✓ |
| FCC Part 2.1051<br>FCC Part 27.53 | Transmitter Radiated Spurious Emission Limitations | Antenna | ✓ |

Key to Results

✓ **= Complied** ✗ **= Did not comply**

## 2.3. Methods and Procedures

| | |
|---|---|
| **Reference:** | ANSI/TIA-603-C-2004 |
| **Title:** | Land Mobile Communications Equipment, Measurements and performance Standards |
| **Reference:** | ANSI C63.4 (2003) |
| **Title:** | American National Standard Methods of Measurement of Electromagnetic Emissions from Low Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz. |

## 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)

| | |
|---|---|
| **Description:** | Radio Shelf |
| **Brand Name:** | IPWireless |
| **Model Name or Number:** | AFB |
| **Serial Number:** | AFJ938000111 |
| **FCC ID Number:** | PKTNODEBAFB |

| | |
|---|---|
| **Description:** | Digital Shelf |
| **Brand Name:** | IPWireless |
| **Model Name or Number:** | VT |
| **Serial Number:** | W1J73700CJ16 |

| | |
|---|---|
| **Description:** | Sector card 2 (part of VT digital shelf) |
| **Brand Name:** | IPWireless |
| **Model Name or Number:** | Sector card |
| **Serial Number:** | VU1J73700RV17 |

## 3.2. Description of EUT

The equipment under test was a W-CDMA Wireless Base Station comprising a radio shelf and a digital shelf intended for mounting into a 19” rack. Both shelves are connected together to create a Node B. The equipment utilizes Frequency Division Duplex technology.

## 3.3. Modifications Incorporated in the EUT

No modifications were applied to the EUT during testing.

## 3.4. Additional Information Related to Testing

| | | |
|---|---|---|
| **Power Supply Requirement:** | -48.0 V DC ±15% | |
| **Type of Unit:** | FDD Wireless base station transceiver | |
| **Modulation Type:** | QPSK, 16QAM, 64QAM | |
| **Duty Cycle:** | 100% | |
| **Antenna Ports:** | Two x 7/16 female. Marked ANT 1 and ANT 2 | |
| **Antenna Gain:** | Up to +20 dBi (stated) | |
| **Chip Rate:** | 3.84 Mcps | |
| **Channel Bandwidth:** | 5.0 MHz | |
| **Sub Band A** | | |
| **Transmit Frequency Range:** | 728 MHz to 746 MHz | |
| **Transmit Channels Tested:** | **Channel ID** | **Channel Frequency (MHz)** |
| | Bottom | 730.6 |
| | Top | 743.4 |
| **Receive Frequency Range:** | 698 MHz to 716 MHz | |
| **Receive Channels Tested:** | **Channel ID** | **Channel Frequency (MHz)** |
| | Bottom | 700.6 |
| | Top | 713.4 |
| **Sub Band B** | | |
| **Transmit Frequency Range:** | 746 MHz to 758 MHz | |
| **Transmit Channels Tested:** | **Channel ID** | **Channel Frequency (MHz)** |
| | Bottom | 748.6 |
| | Top | 755.4 |
| **Receive Frequency Range:** | 776 MHz to 787 MHz | |
| **Receive Channels Tested:** | **Channel ID** | **Channel Frequency (MHz)** |
| | Bottom | 778.6 |
| | Top | 784.4 |
| **Sub Band C** | | |
| **Transmit Frequency Range:** | 758 MHz to 763 MHz | |
| **Transmit Channels Tested:** | **Channel ID** | **Channel Frequency (MHz)** |
| | Single | 760.4 |
| **Receive Frequency Range:** | 788 MHz to 793 MHz | |
| **Receive Channels Tested:** | **Channel ID** | |
| | Single | 790.4 |

## 3.5. Support Equipment

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

| | |
|---|---|
| **Description:** | DC Power supply |
| **Brand Name:** | Agilent |
| **Model Name or Number:** | E4356A |
| **Serial Number:** | MY41000617 |

| | |
|---|---|
| **Description:** | Sector card 1 (part of VT digital shelf) |
| **Brand Name:** | IPWireless |
| **Model Name or Number:** | Sector card |
| **Serial Number:** | VU1J73700RQ17 |

| | |
|---|---|
| **Description:** | Sector card 2 (part of VT digital shelf) |
| **Brand Name:** | IPWireless |
| **Model Name or Number:** | Sector card |
| **Serial Number:** | VU1J73700RV17 |

| | |
|---|---|
| **Description:** | Sector card 3 (part of VT digital shelf) |
| **Brand Name:** | IPWireless |
| **Model Name or Number:** | Sector card |
| **Serial Number:** | VU1J73700RW17 |

| | |
|---|---|
| **Description:** | 30 dB RF attenuator |
| **Brand Name:** | NARDA |
| **Model Name or Number:** | 776C-30 |
| **Serial Number:** | 522 |

| | |
|---|---|
| **Description:** | Laptop PC |
| **Brand Name:** | Sony |
| **Model Name or Number:** | Vaio VGN-BX195VT |
| **Serial Number:** | None Stated |

# 4. Operation and Monitoring of the EUT during Testing

## 4.1. Operating Modes

The EUT was tested in the following operating modes, unless otherwise stated:

- Testing on Band A., B, C
- Transmitting and receiving simultaneously.
- Operating on the bottom or top channel, as per each test case requirement.
- Constantly transmitting the maximum of 15 timeslots at full power (+40 dBm) with a chip rate of 3.84 Mcps.
- No tests were performed in receive/idle mode as the device is constantly transmitting.

## 4.2. Configuration and Peripherals

The EUT was tested in the following configuration:

- The radio shelf and digital shelf connected together as required and powered from a bench DC power supply.
- Three sector cards were fitted to the digital shelf. Sector 2 card was connected to the radio shelf via the fibre optic cables. Sector 1 and 3 cards were not used during the testing and were only fitted in order to fill the card slots. This is a standard configuration of the EUT.
- The laptop PC was connected to the Ethernet port on the digital shelf by a CAT5 cable. A bespoke application on the laptop PC was used to configure the RF parameters of the EUT as required.
- RF Conducted emission tests - One RF port was connected to the measurement equipment using previously calibrated RF cables, filters and attenuators. The unused RF port was terminated with suitable loads or attenuators. Preliminary testing was performed on both antenna ports with the worse case port being selected for measurements.
- RF Radiated emission/case radiation tests - Both RF ports were terminated with suitable loads or attenuators. The EUT was connected to a suitable bench power supply powered from a 120 VAC 60 Hz mains supply and the output set to -48 VDC. Measurements were performed with the test system antenna polarised in the vertical and horizontal planes, the highest level was recorded. Most ports on the EUT were terminated and the Client stated that un-terminated ports were either inoperative or disabled.
- For conducted and radiated emissions out of band testing, preliminary checks were made on all three modulation schemes and the mode which exhibited the highest emissions profile (i.e. 64QAM) was scanned across the required measurement frequency range. Where an emission was detected final emission measurements were performed on all three modulation schemes.

# 5. Measurements, Examinations and Derived Results

## 5.1. General Comments

Measurement uncertainties are evaluated in accordance with current best practice. Our reported expanded uncertainties are based on standard uncertainties, which are multiplied by an appropriate coverage factor to provide a statistical confidence level of approximately 95%. Please refer to *Section 6. Measurement Uncertainty* for details.

## 5.2. Test Results - Sub Band A

### 5.2.1. Transmitter Carrier Output Power and Effective Radiated Power (ERP)

**Test Summary:**

| | |
|---|---|
| **FCC Part:** | 2.1046 and 27.50(c)(1) |
| **Test Method Used:** | As detailed in ANSI TIA-603-C-2004 Section 2.2.17.2 |

**Environmental Conditions:**

| | |
|---|---|
| **Temperature Variation (°C):** | 26 |
| **Relative Humidity Variation (%):** | 35 |

**Results: Antenna Port 1**

| Modulation | Frequency (MHz) | Conducted RF Power (dBm) | Antenna Gain (dBi) | ERP (dBm) | Limit ERP (dBm) | Margin (dB) | Result |
|---|---|---|---|---|---|---|---|
| QPSK | 730.6 | 38.8 | 20 | 58.8 | 60.0 | 1.2 | Complied |
| QPSK | 743.4 | 38.9 | 20 | 58.9 | 60.0 | 1.1 | Complied |
| 16QAM | 730.6 | 38.7 | 20 | 58.7 | 60.0 | 1.3 | Complied |
| 16QAM | 743.4 | 38.8 | 20 | 58.8 | 60.0 | 1.2 | Complied |
| 64QAM | 730.6 | 38.6 | 20 | 58.6 | 60.0 | 1.4 | Complied |
| 64QAM | 743.4 | 38.8 | 20 | 58.8 | 60.0 | 1.2 | Complied |

**Results: Antenna Port 2**

| Modulation | Frequency (MHz) | Conducted RF Power (dBm) | Antenna Gain (dBi) | ERP (dBm) | Limit ERP (dBm) | Margin (dB) | Result |
|---|---|---|---|---|---|---|---|
| QPSK | 730.6 | 39.0 | 20 | 59.0 | 60.0 | 1.0 | Complied |
| QPSK | 743.4 | 39.2 | 20 | 59.2 | 60.0 | 0.8 | Complied |
| 16QAM | 730.6 | 39.0 | 20 | 59.0 | 60.0 | 1.0 | Complied |
| 16QAM | 743.4 | 39.2 | 20 | 59.2 | 60.0 | 1.0 | Complied |
| 64QAM | 730.6 | 39.0 | 20 | 59.0 | 60.0 | 1.0 | Complied |
| 64QAM | 743.4 | 39.3 | 20 | 59.3 | 60.0 | 0.7 | Complied |

**Note(s):**

1. Measurements were performed with the EUT transmitting on all supported modulation types on the Antenna Port 1 and Antenna Port 2.

## 5.2.2. Transmitter Occupied Bandwidth

### Test Summary:

| | |
|---|---|
| **FCC Part:** | 2.1049 |
| **Test Method Used:** | As detailed in ANSI C63.4 Section 13.1.7 and relevant annexes referencing FCC CFR Part 2.1049 (see note below) |

### Environmental Conditions:

| | |
|---|---|
| **Temperature Variation (°C):** | 26 |
| **Relative Humidity Variation (%):** | 35 |

### Results: Antenna Port 1

| Modulation | Frequency (MHz) | Resolution Bandwidth (kHz) | Video Bandwidth (kHz) | Occupied Bandwidth (MHz) |
|---|---|---|---|---|
| QPSK | 730.6 | 100 | 300 | 4.118 |
| QPSK | 743.4 | 100 | 300 | 4.118 |
| 16QAM | 730.6 | 100 | 300 | 4.118 |
| 16QAM | 743.4 | 100 | 300 | 4.118 |
| 64QAM | 730.6 | 100 | 300 | 4.118 |
| 64QAM | 743.4 | 100 | 300 | 4.118 |

### Results: Antenna Port 2

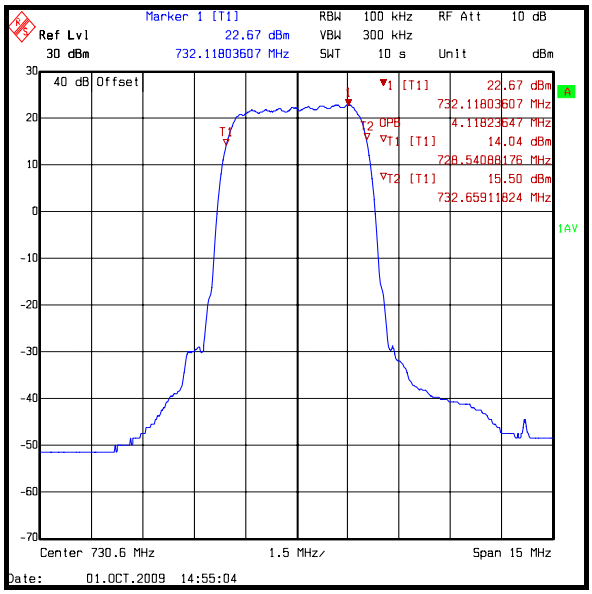
| Modulation | Frequency (MHz) | Resolution Bandwidth (kHz) | Video Bandwidth (kHz) | Occupied Bandwidth (MHz) |
|---|---|---|---|---|
| QPSK | 730.6 | 100 | 300 | 4.118 |
| QPSK | 743.4 | 100 | 300 | 4.118 |
| 16QAM | 730.6 | 100 | 300 | 4.118 |
| 16QAM | 743.4 | 100 | 300 | 4.118 |
| 64QAM | 730.6 | 100 | 300 | 4.118 |
| 64QAM | 743.4 | 100 | 300 | 4.118 |

### Note(s):

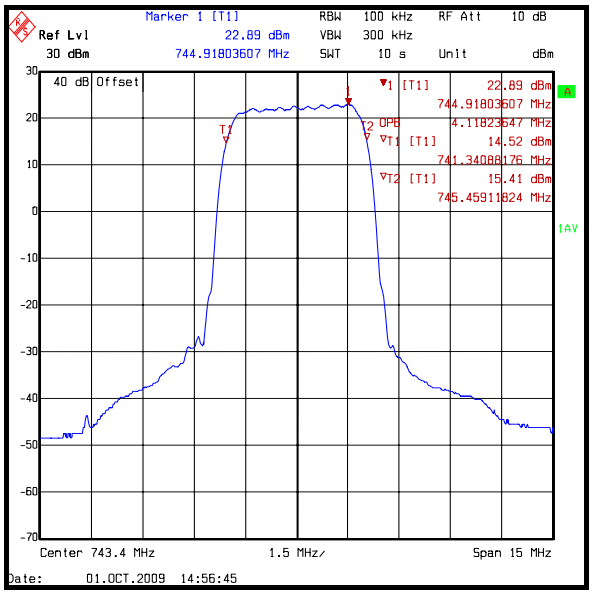
1. In lieu of the test method detailed in ANSI C63.4 Section 13.1.7 the 99% occupied bandwidth was measured using the Occupied Bandwidth function of the spectrum analyser.
2. Measurements were performed with the EUT transmitting on all supported modulation types on the Antenna Port 1 and Antenna Port 2.

## Transmitter Occupied Bandwidth (continued)

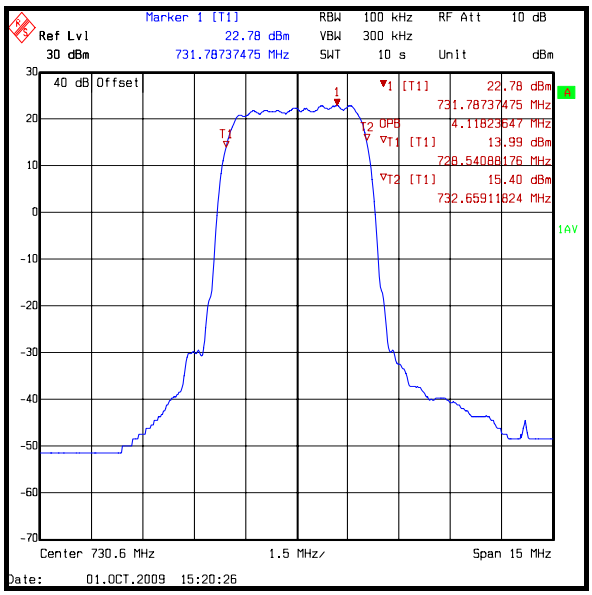
## Antenna Port 1



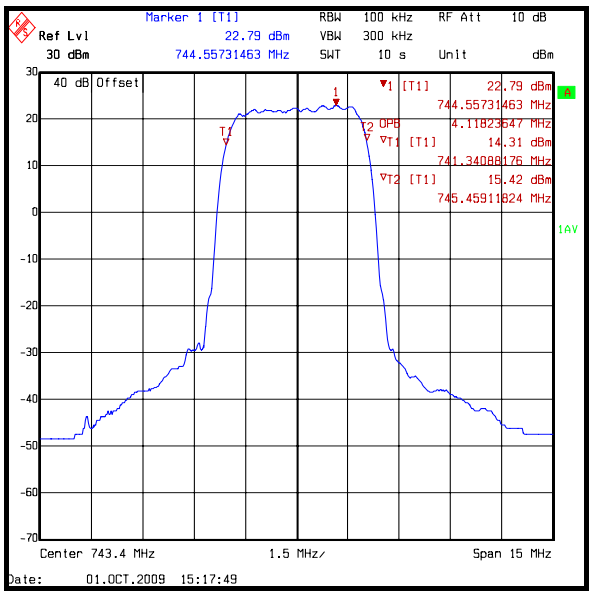

**QPSK**




**QPSK**

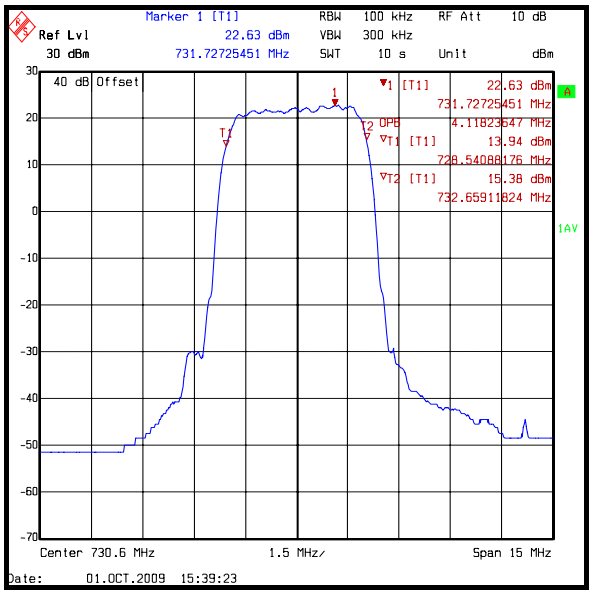



**16QAM**

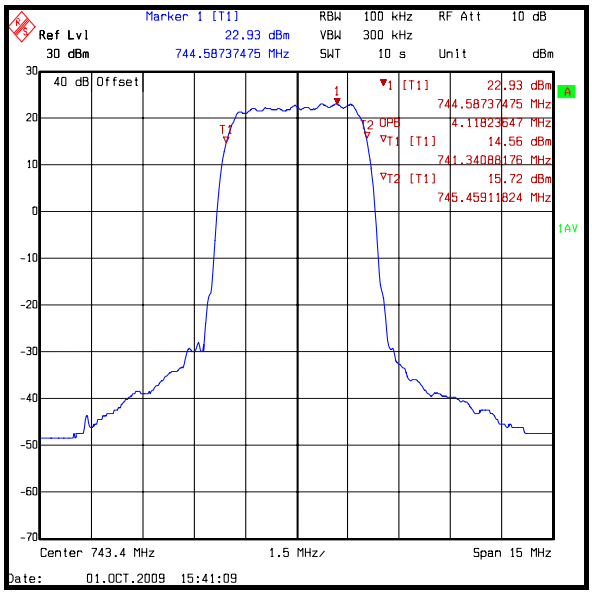



**16QAM**

## Transmitter Occupied Bandwidth (continued)



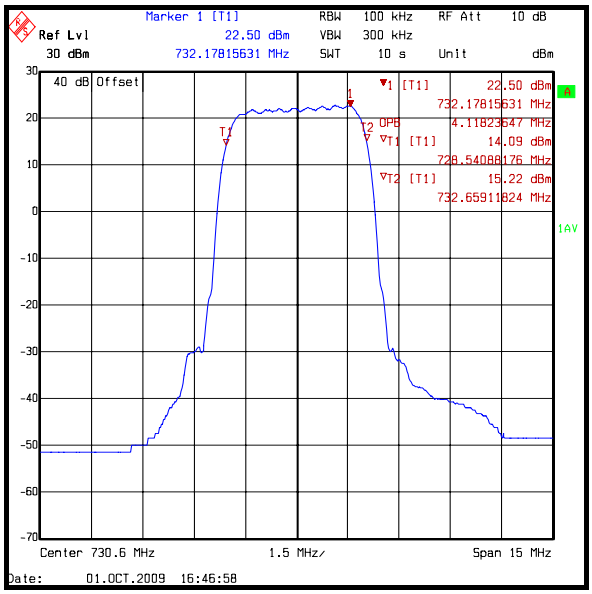

**64QAM**



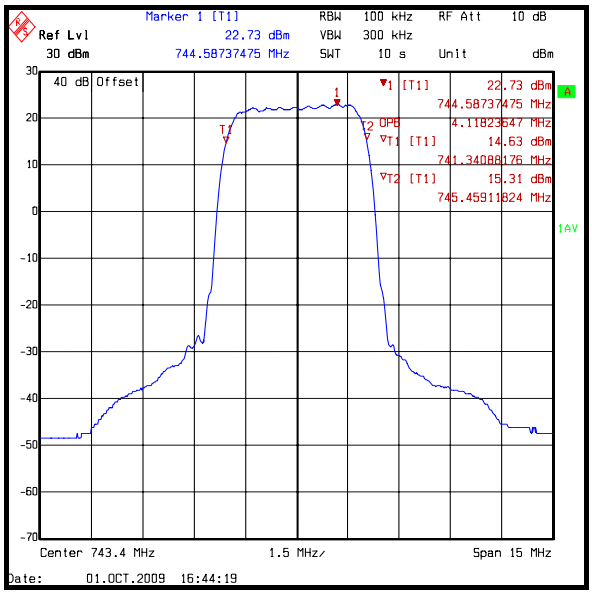

**64QAM**

## Transmitter Occupied Bandwidth (continued)

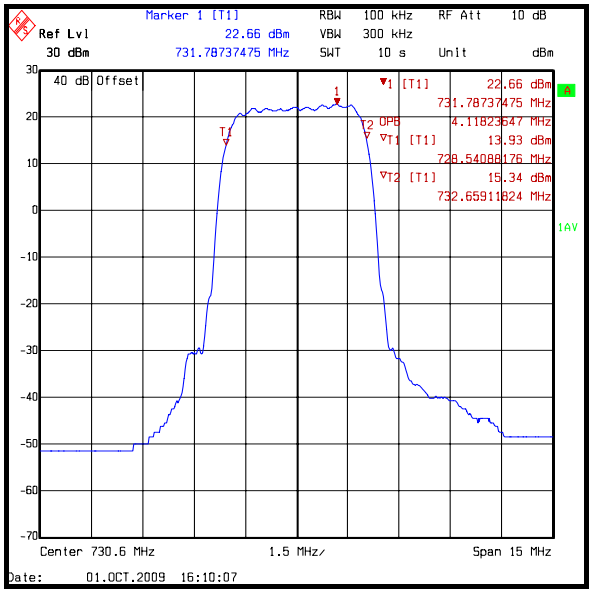
## Antenna Port 2



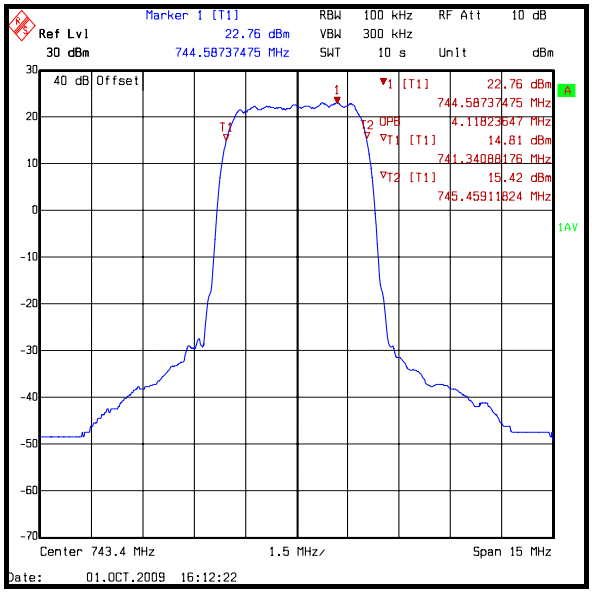

**QPSK**




**QPSK**

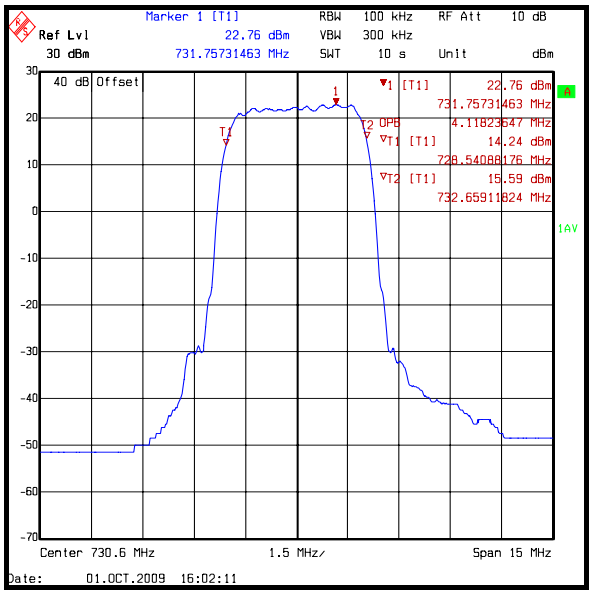



**16QAM**

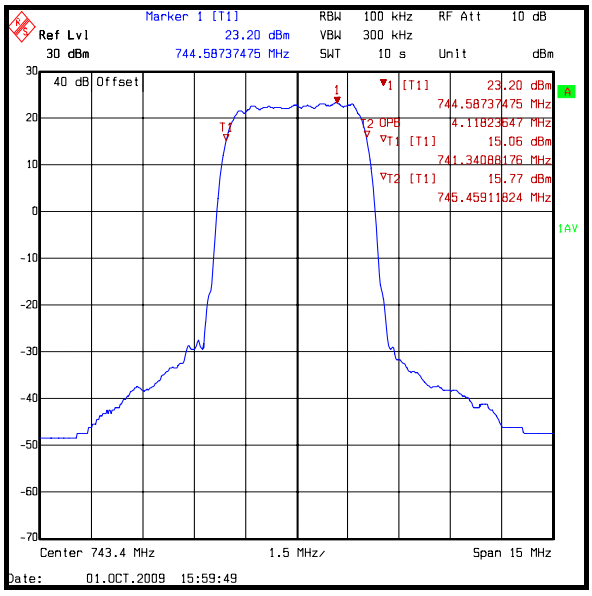



**16QAM**

## Transmitter Occupied Bandwidth (continued)




**64QAM**




**64QAM**

### 5.2.3. Transmitter Frequency Stability - Temperature Variation

**Test Summary:**

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

**Environmental Conditions:**

| | |
|---|---|
| **Temperature Variation (°C):** | 24 to 25 |
| **Relative Humidity Variation (%):** | 43 to 46 |

**Results: Sub Band A / Bottom Channel 730.6 MHz / Port 2**

| Temp (ºC) | Measured Frequency (MHz) | Frequency Error (Hz) |
|---|---|---|
| -30 | 730.599801 | 199 |
| -20 | 730.599804 | 196 |
| -10 | 730.599804 | 196 |
| 0 | 730.599808 | 192 |
| 10 | 730.599811 | 189 |
| 20 | 730.599809 | 191 |
| 30 | 730.599814 | 186 |
| 40 | 730.599818 | 182 |
| 50 | 730.599826 | 174 |

**Transmitter Frequency Stability - Temperature Variation – (continued)**

**Results: Sub Band A / Top Channel 743.4 MHz / Port 2**

| Temp (ºC) | Measured Frequency (MHz) | Frequency Error (Hz) |
|---|---|---|
| -30 | 743.399797 | 203 |
| -20 | 743.399800 | 200 |
| -10 | 743.399802 | 198 |
| 0 | 743.399804 | 196 |
| 10 | 743.399807 | 193 |
| 20 | 743.399806 | 194 |
| 30 | 743.399811 | 189 |
| 40 | 743.399816 | 184 |
| 50 | 743.399824 | 176 |

**Note(s):**

1.

## 5.2.4. Transmitter Frequency Stability - Voltage Variation

### Test Summary:

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

### Environmental Conditions:

| | |
|---|---|
| **Temperature Variation (°C):** | 25 |
| **Relative Humidity Variation (%):** | 43 |

### Results: Sub Band A / Bottom Channel 730.6 MHz / Port 2

| Supply Voltage (ºC) | Measured Frequency (MHz) | Frequency Error (Hz) |
|---|---|---|
| -40.8 | 730.599810 | 190 |
| -48.0 | 730.599809 | 191 |
| -55.2 | 730.599810 | 190 |

### Results: Sub Band A / Top Channel 743.4 MHz / Port 2

| Supply Voltage (ºC) | Measured Frequency (MHz) | Frequency Error (Hz) |
|---|---|---|
| -40.8 | 743.399806 | 194 |
| -48.0 | 743.399806 | 194 |
| -55.2 | 743.399806 | 194 |

### Note(s):

1.

## 5.2.5. Transmitter Conducted Emissions – Channel Edge

### Test Summary:

| | |
|---|---|
| **FCC Part:** | FCC Part 2.051 and FCC Part 27.53(g) |
| **Test Method Used** | As detailed in ANSI TIA-603.C-2004 Section 2.2.12 referencing FCC Part 2.1051 |

### Environmental Conditions:

| | |
|---|---|
| **Temperature Variation (°C):** | 24 |
| **Relative Humidity Variation (%):** | 31 |

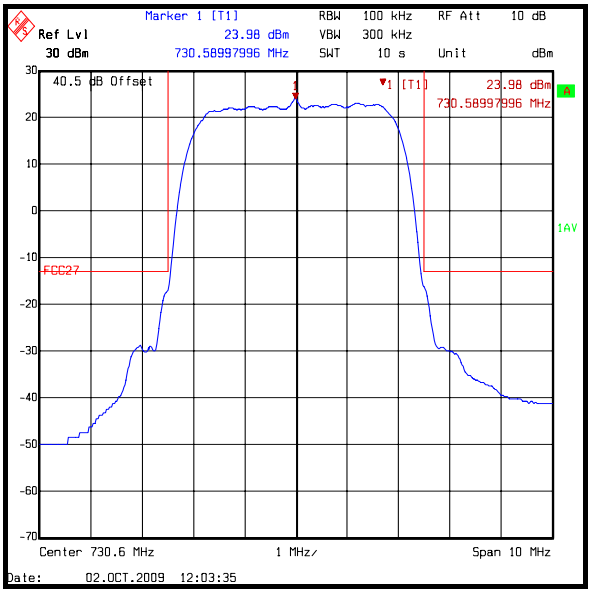
### Note(s):

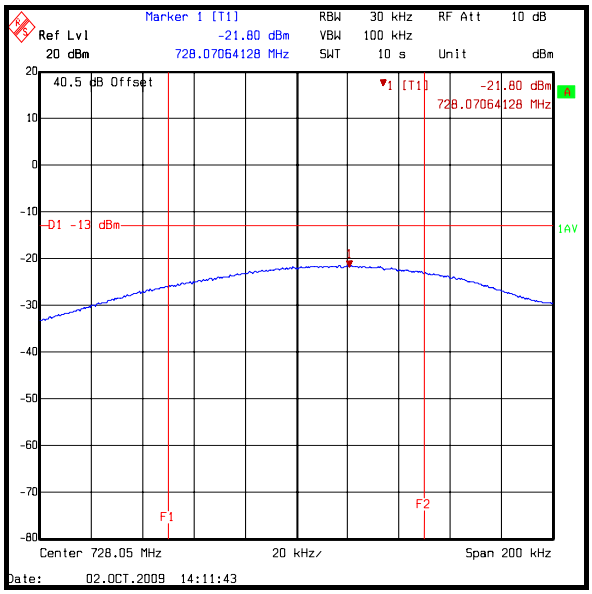
1. It can be seen on the main mask plot that the emission is close to the limit line. This is on account of the analyser bandwidth being too great to make an accurate measurement. As stated in FCC Part 27.53(g), a resolution bandwidth of 30 kHz was used in the 100 kHz bands immediately outside and adjacent to the frequency block to demonstrate compliance and this can be seen on the two plots accompanying the mask plot.
2. Preliminary testing was performed on both antenna ports with the worse case port being selected for measurements.

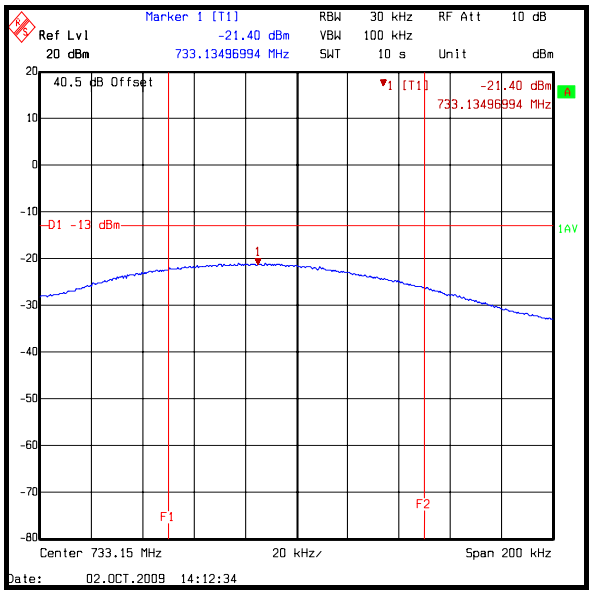
### Results: Sub Band A / Bottom Channel 730.6 MHz / QPSK / Port 2

| Frequency of 100 kHz strip adjacent to channel edge (MHz) | Level in 100 kHz strip adjacent to block edge (dBm) | Band Edge Limit (dBm) | Margin (dB) | Result |
|---|---|---|---|---|
| 728.071 | -21.8 | -13.0 | 8.8 | Complied |
| 733.135 | -21.4 | -13.0 | 8.4 | Complied |

## Transmitter Conducted Emissions – Channel Edge (continued)



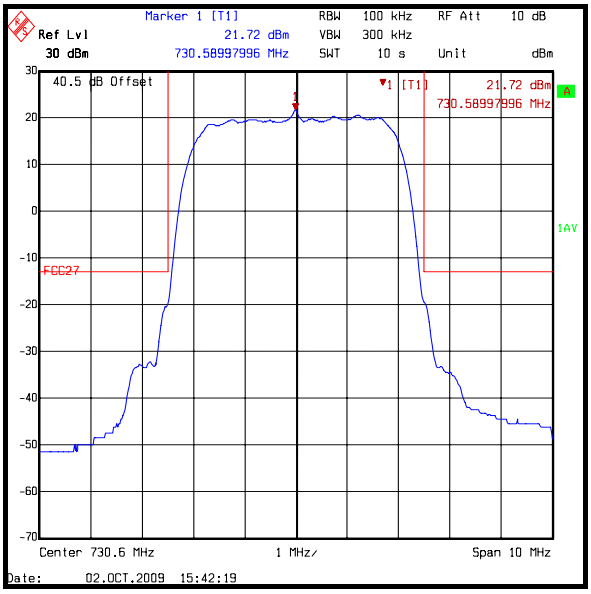



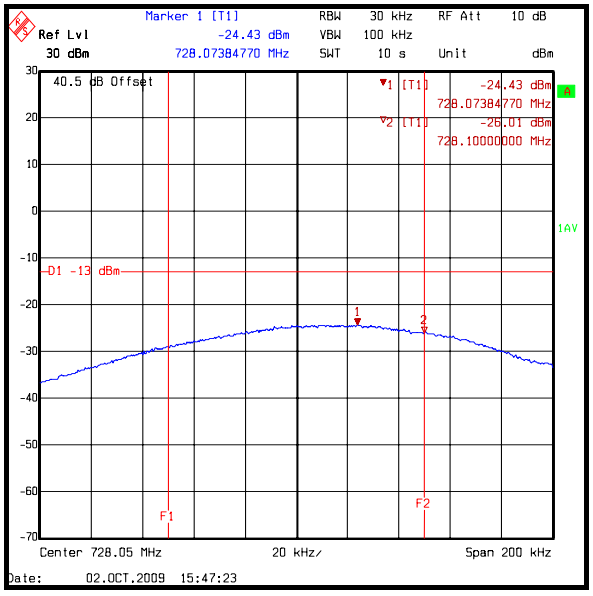



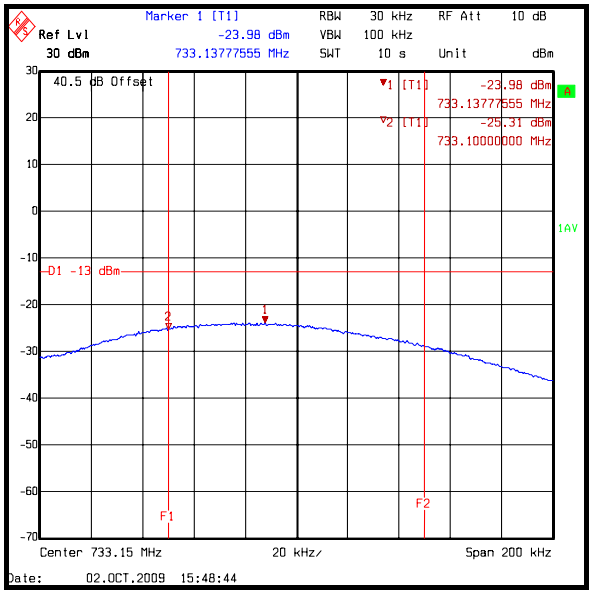
## Transmitter Conducted Emissions – Channel Edge (continued)

## Results: Sub Band A / Bottom Channel 730.6 MHz / 16QAM / Port 2

| Frequency of 100 kHz strip adjacent to channel edge (MHz) | Level in 100 kHz strip adjacent to block edge (dBm) | Band Edge Limit (dBm) | Margin (dB) | Result |
|---|---|---|---|---|
| 728.074 | -24.4 | -13.0 | 11.4 | Complied |
| 733.138 | -24.0 | -13.0 | 11.0 | Complied |



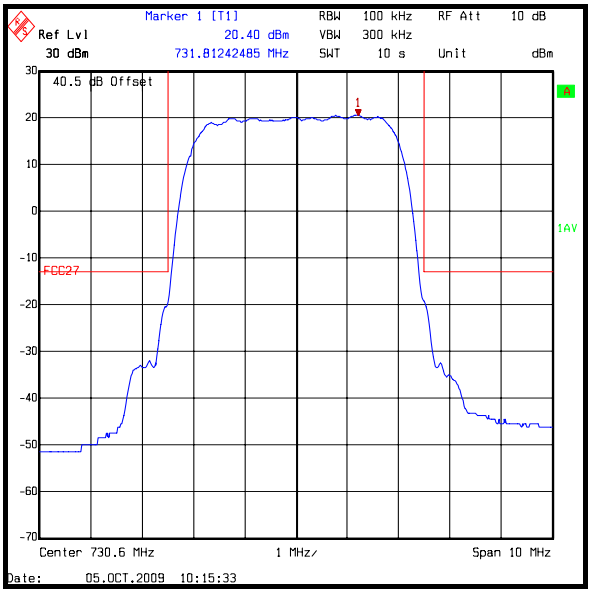



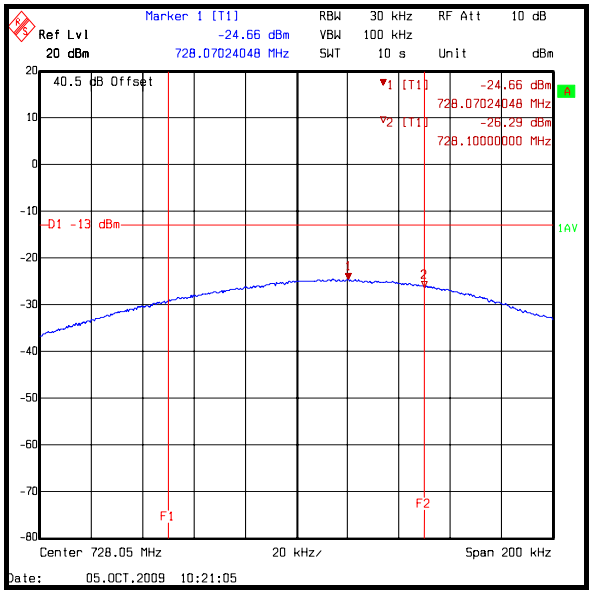



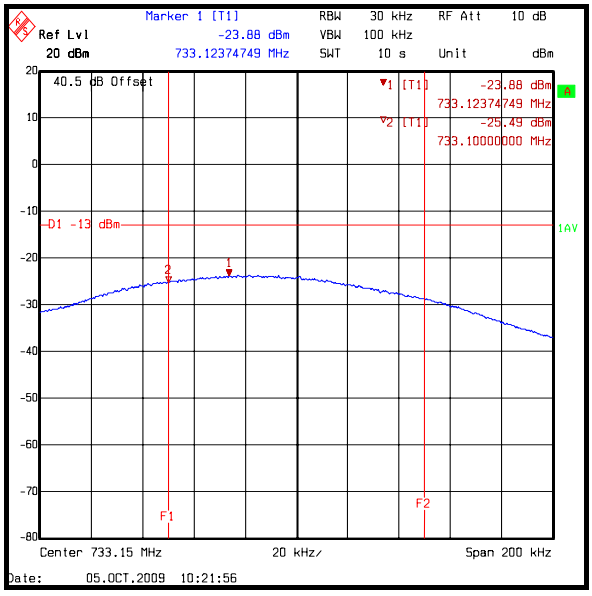
## Transmitter Conducted Emissions – Channel Edge (continued)

## Results: Sub Band A / Bottom Channel 730.6 MHz / 64QAM / Port 2

| Frequency of 100 kHz strip adjacent to channel edge (MHz) | Level in 100 kHz strip adjacent to block edge (dBm) | Band Edge Limit (dBm) | Margin (dB) | Result |
|---|---|---|---|---|
| 728.070 | -24.7 | -13.0 | 11.7 | Complied |
| 733.124 | -23.9 | -13.0 | 10.9 | Complied |



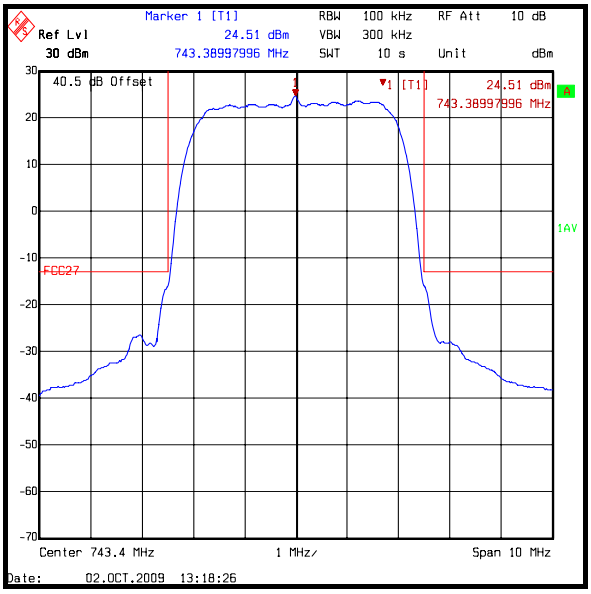



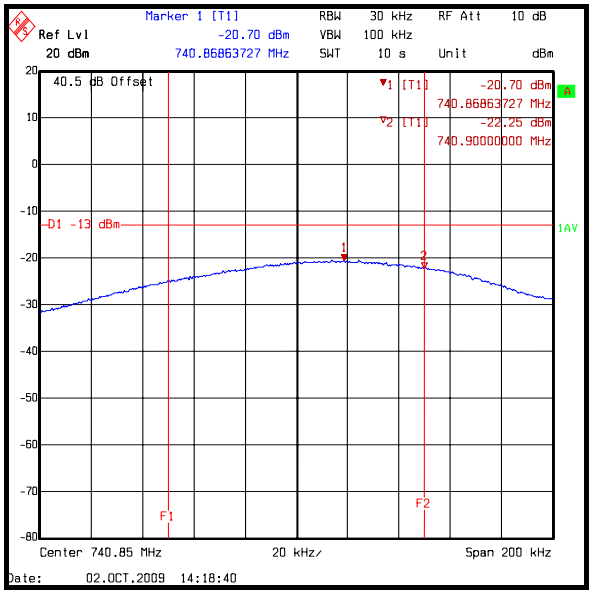



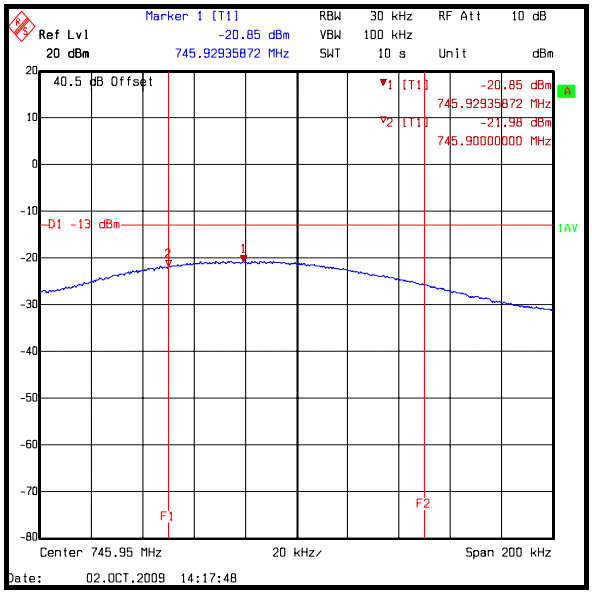
## Transmitter Conducted Emissions – Channel Edge (continued)

## Results: Sub Band A / Top Channel 743.4 MHz / QPSK / Port 2

| Frequency of 100 kHz strip adjacent to channel edge (MHz) | Level in 100 kHz strip adjacent to block edge (dBm) | Band Edge Limit (dBm) | Margin (dB) | Result |
|---|---|---|---|---|
| 740.869 | -20.7 | -13.0 | 7.7 | Complied |
| 745.929 | -20.9 | -13.0 | 7.9 | Complied |



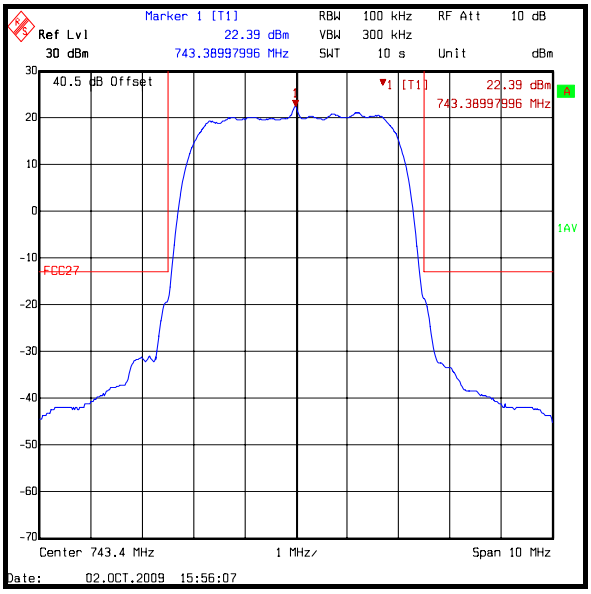



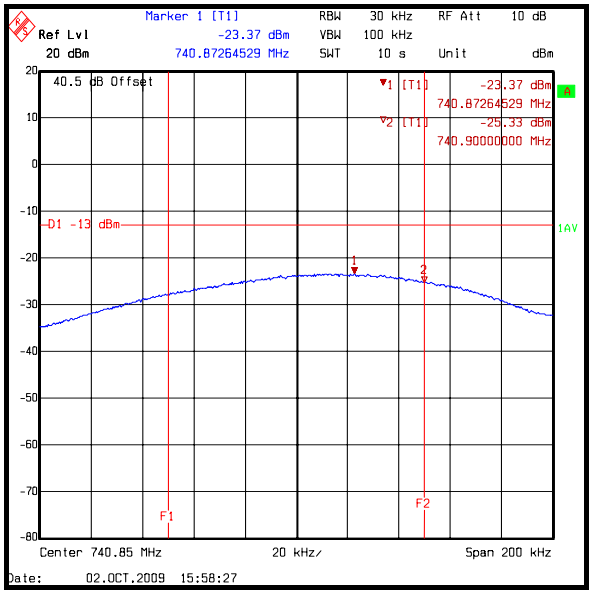



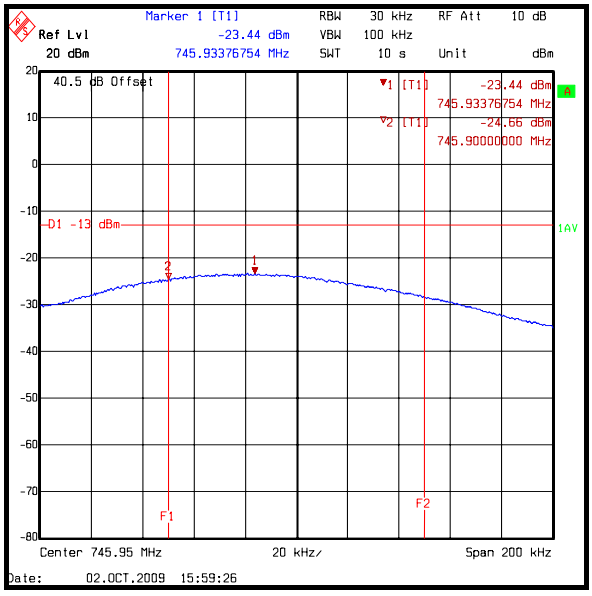
## Transmitter Conducted Emissions – Channel Edge (continued)

## Results: Sub Band A / Top Channel 743.4 MHz / 16QAM / Port 2

| Frequency of 100 kHz strip adjacent to channel edge (MHz) | Level in 100 kHz strip adjacent to block edge (dBm) | Band Edge Limit (dBm) | Margin (dB) | Result |
|---|---|---|---|---|
| 740.873 | -23.4 | -13.0 | 10.4 | Complied |
| 745.934 | -23.4 | -13.0 | 10.4 | Complied |



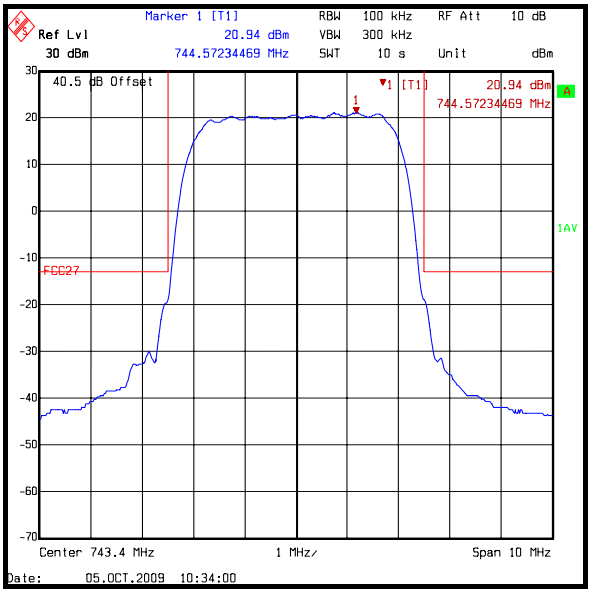



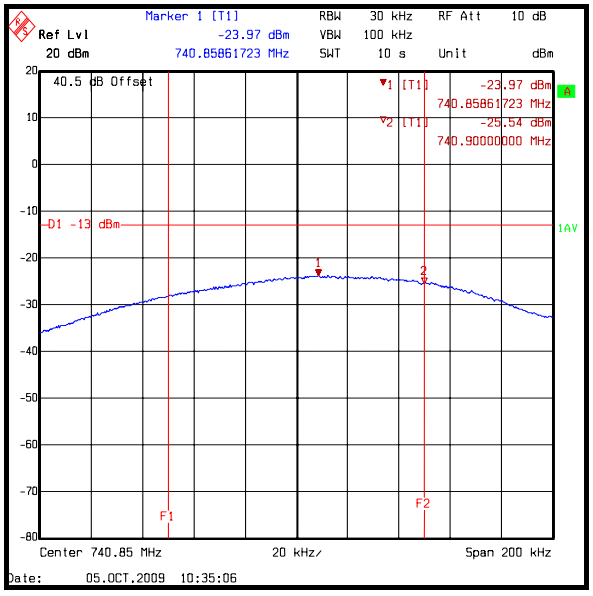



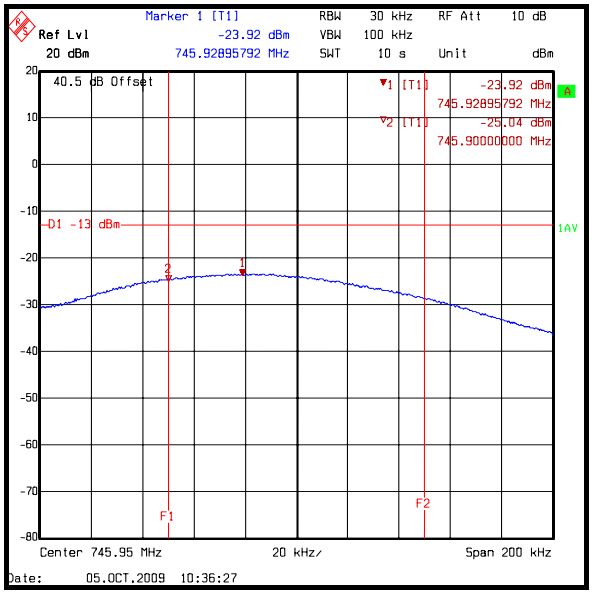
## Transmitter Conducted Emissions – Channel Edge (continued)

## Results: Sub Band A / Top Channel 743.4 MHz / 64QAM / Port 2

| Frequency of 100 kHz strip adjacent to channel edge (MHz) | Level in 100 kHz strip adjacent to block edge (dBm) | Band Edge Limit (dBm) | Margin (dB) | Result |
|---|---|---|---|---|
| 740.859 | -24.0 | -13.0 | 11.0 | Complied |
| 745.929 | -23.9 | -13.0 | 12.9 | Complied |



## 5.2.6. Transmitter Conducted Emissions

### Test Summary:

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

### Environmental Conditions:

| | |
|---|---|
| **Temperature Variation (°C):** | 25 to 26 |
| **Relative Humidity Variation (%):** | 23 to 32 |

### Results: Sub Band A / Bottom Channel 730.6 MHz / Port 2

| Modulation | Frequency (MHz) | Emission Level (dBm) | Limit (dBm) | Margin (dB) | Result |
|---|---|---|---|---|---|
| QPSK | 1463.008520 | -25.2 | -13.0 | 12.2 | Complied |
| 16QAM | 1463.160700 | -30.2 | -13.0 | 17.2 | Complied |
| 64QAM | 1463.057360 | -30.4 | -13.0 | 17.4 | Complied |

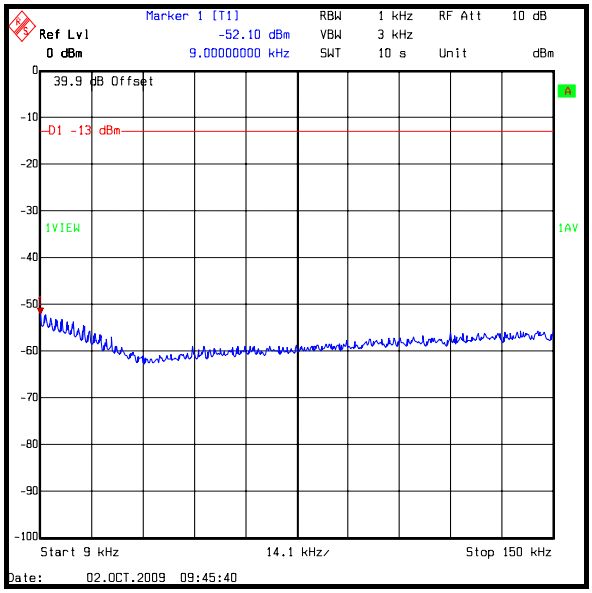
### Results: Sub Band A / Top Channel 743.4 MHz / Port 2

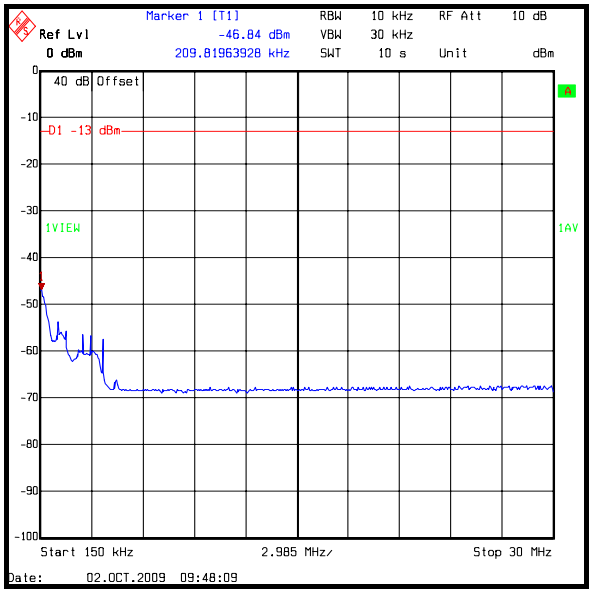
| Modulation | Frequency (MHz) | Emission Level (dBm) | Limit (dBm) | Margin (dB) | Result |
|---|---|---|---|---|---|
| QPSK | 1488.604710 | -26.8 | -13.0 | 13.8 | Complied |
| 16QAM | 1488.586550 | -31.8 | -13.0 | 18.8 | Complied |
| 64QAM | 1488.564630 | -31.3 | -13.0 | 18.3 | Complied |

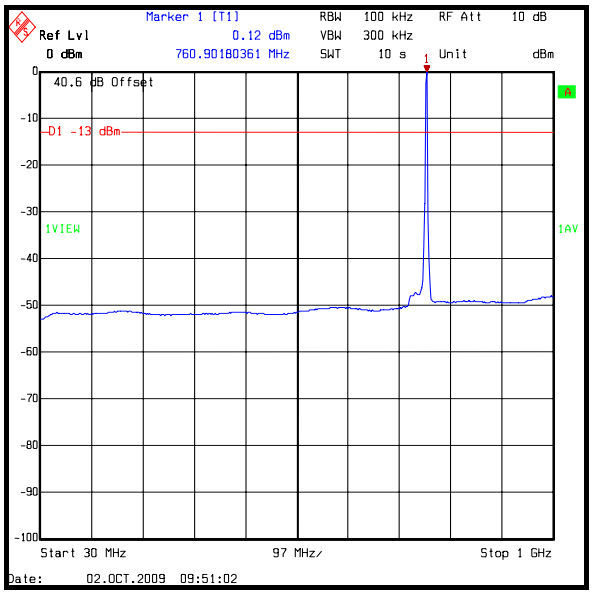
### Note(s):

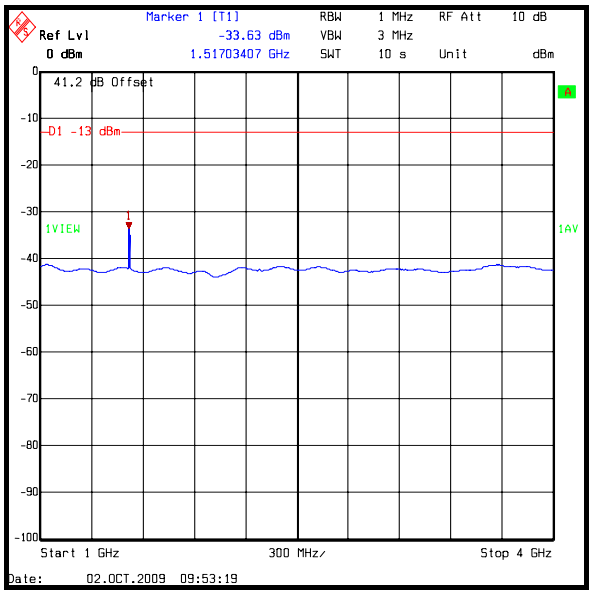
1. The emissions shown at approximately 760.902 MHz on the 30 MHz to 1 GHz plot is the carrier
2. All other emissions were >20 dB below the applicable limit or below the level of the noise floor of the measuring receiver.
3. Preliminary testing was performed on both antenna ports with the worse case port being selected for measurements.

## Transmitter Conducted Emissions (continued)

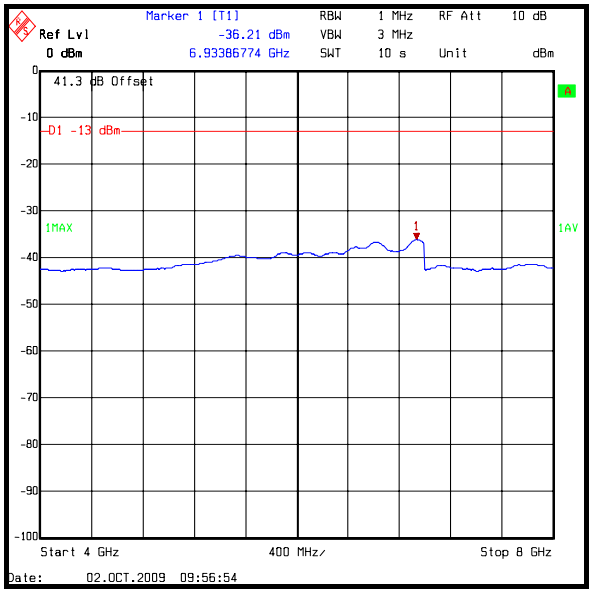


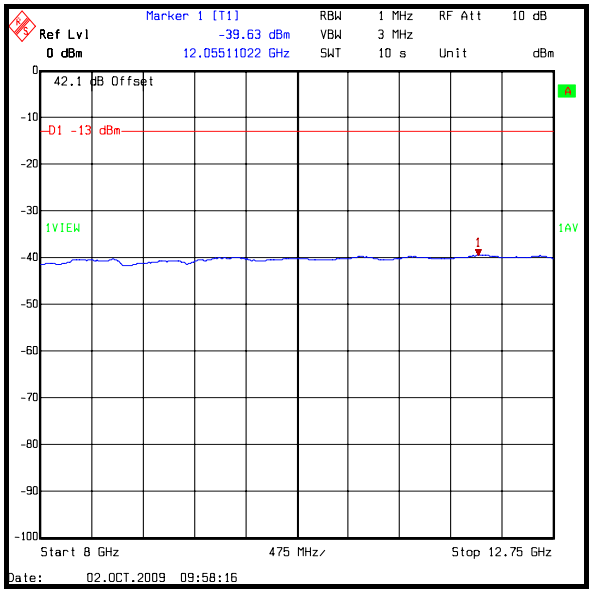



## Transmitter Conducted Emissions (continued)



## 5.2.7. Transmitter Conducted Emissions at Band Edges

### Test Summary:

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

### Environmental Conditions:

| | |
|---|---|
| **Temperature Variation (°C):** | 24 |
| **Relative Humidity Variation (%):** | 37 |

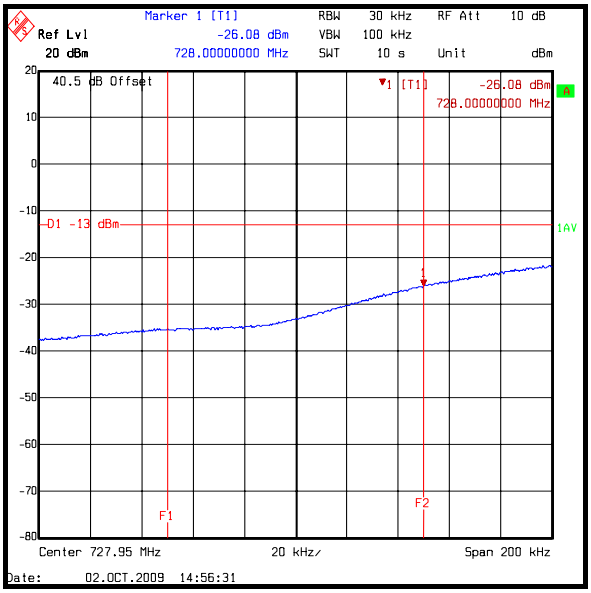
### Results: Sub Band A / Bottom Channel 730.6 MHz / Port 2

| Modulation | Frequency of 100 kHz strip adjacent to block edge (MHz) | Level in 100 kHz strip adjacent to block edge (dBm) | Band edge limit (dBm) | Margin (dB) | Result |
|---|---|---|---|---|---|
| QPSK | 728.0 | -26.1 | -13.0 | 13.1 | Complied |
| QPSK | 746.0 | -25.9 | -13.0 | 12.9 | Complied |
| 16QAM | 728.0 | -29.2 | -13.0 | 16.2 | Complied |
| 16QAM | 746.0 | -28.5 | -13.0 | 15.5 | Complied |
| 64QAM | 728.0 | -29.7 | -13.0 | 16.7 | Complied |
| 64QAM | 746.0 | -29.0 | -13.0 | 16.0 | Complied |

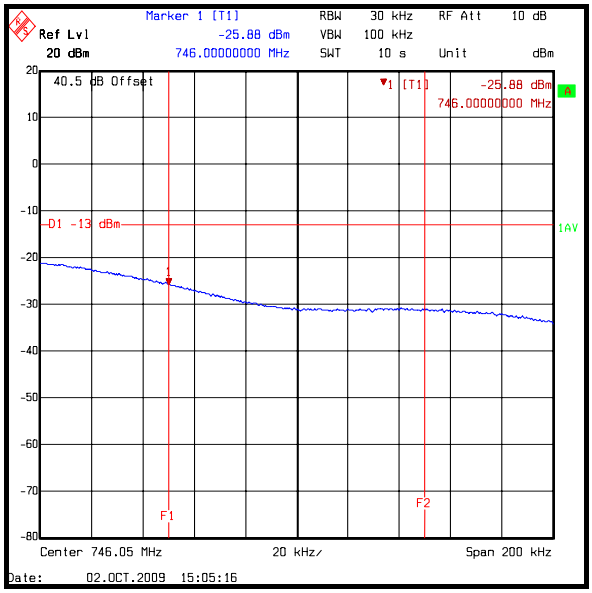
### Note(s):

1. As stated in FCC Part 27.53(g) a resolution bandwidth of 30 kHz was used in the 100 kHz bands immediately outside and adjacent to the frequency block to demonstrate compliance and this can be seen on the plots below.
2. Preliminary testing was performed on both antenna ports with the worse case port being selected for measurements.

## Transmitter Conducted Emissions at Band Edges (continued)

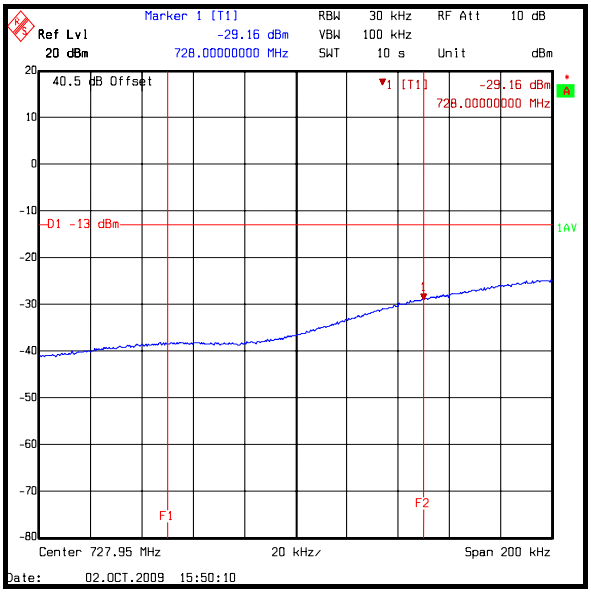



**QPSK – Lower Band Edge**

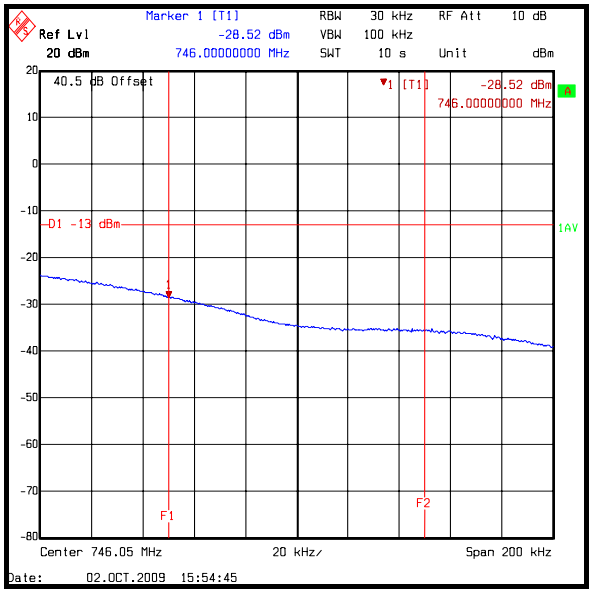



**QPSK – Upper Band Edge**

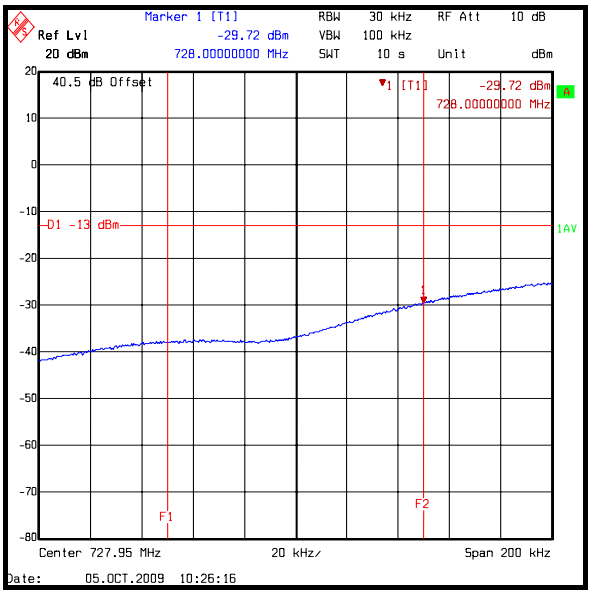
## Transmitter Conducted Emissions at Band Edges (continued)



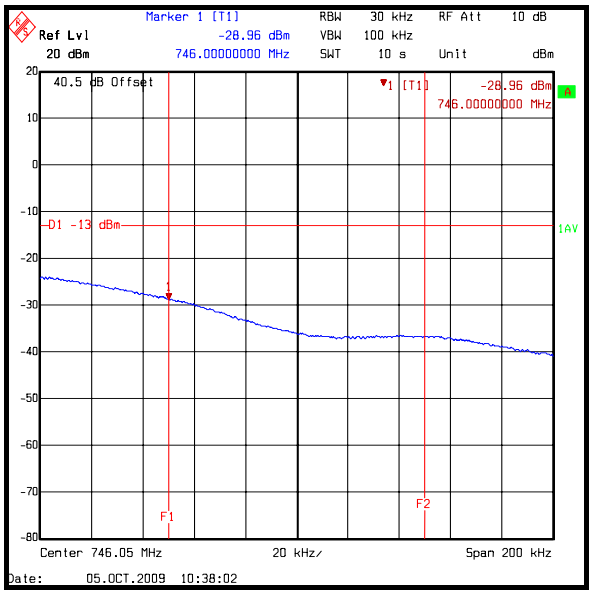

**16QAM – Lower Band Edge**




**16QAM – Upper Band Edge**




**64QAM – Lower Band Edge**

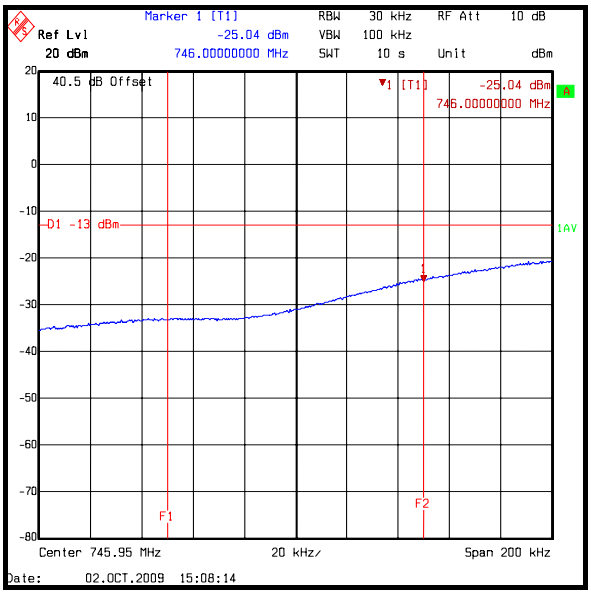



**64QAM – Upper Band Edge**

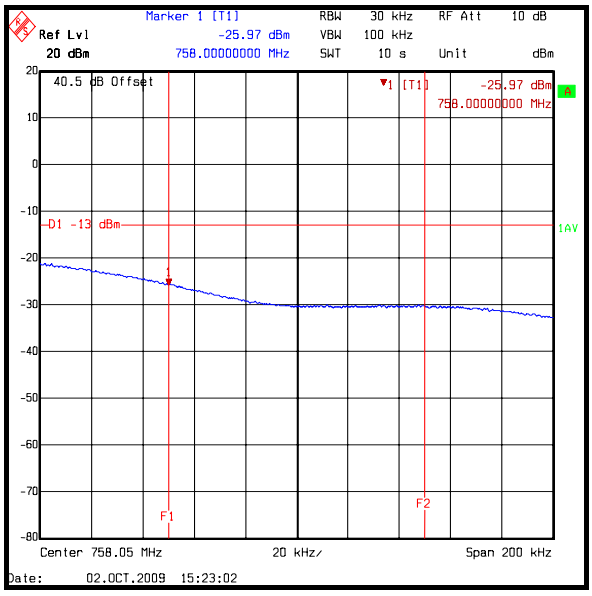
## Transmitter Conducted Emissions at Band Edges (continued)

## Results: Sub Band A / Top Channel 743.4 MHz / Port 2

| Modulation | Frequency of 100 kHz strip adjacent to block edge (MHz) | Level in 100 kHz strip adjacent to block edge (dBm) | Band edge limit (dBm) | Margin (dB) | Result |
|---|---|---|---|---|---|
| QPSK | 746.0 | -25.0 | -13.0 | 12.0 | Complied |
| QPSK | 758.0 | -26.0 | -13.0 | 13.0 | Complied |
| 16QAM | 746.0 | -27.6 | -13.0 | 14.6 | Complied |
| 16QAM | 758.0 | -28.6 | -13.0 | 15.6 | Complied |
| 64QAM | 746.0 | -28.3 | -13.0 | 15.3 | Complied |
| 64QAM | 758.0 | -29.8 | -13.0 | 16.8 | Complied |

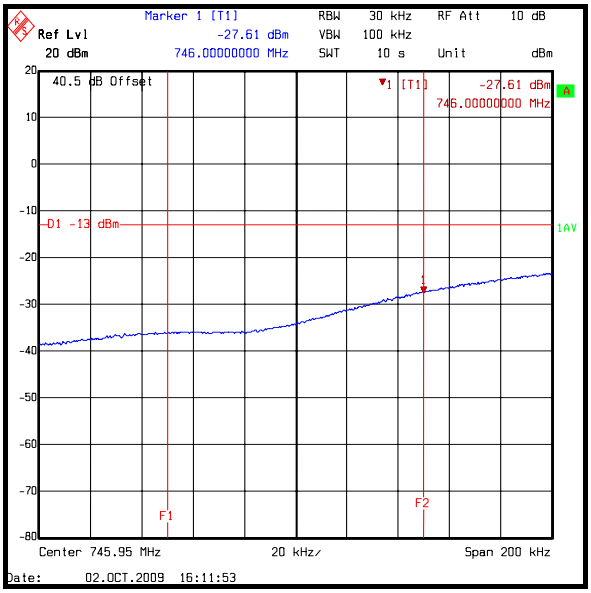



**QPSK – Lower Band Edge**

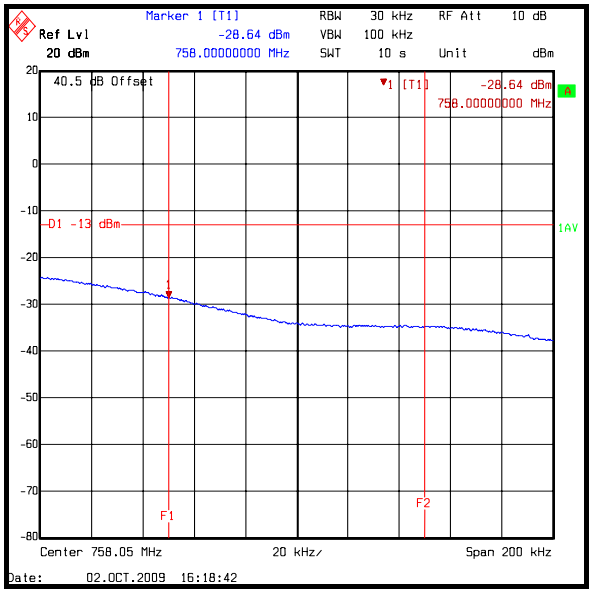



**QPSK – Upper Band Edge**

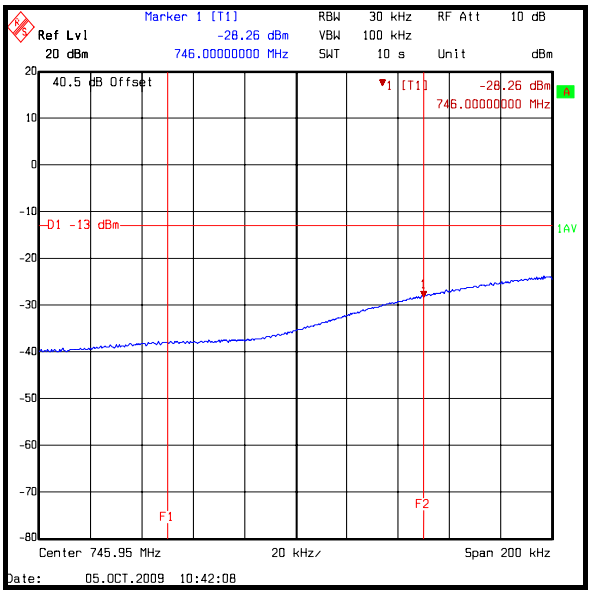
## Transmitter Conducted Emissions at Band Edges (continued)



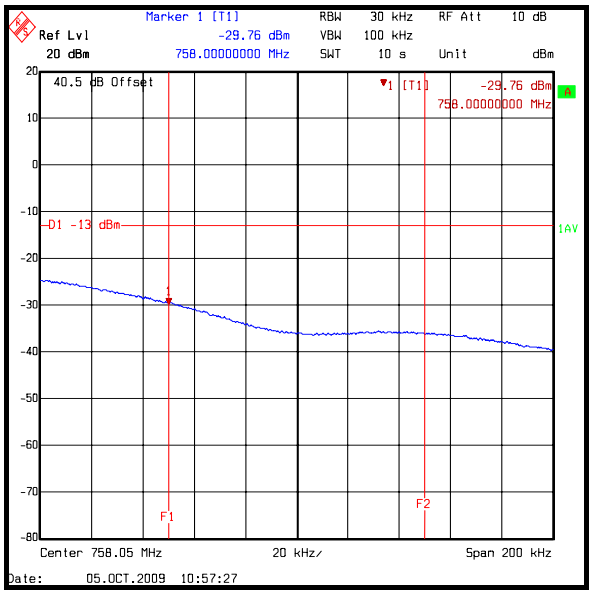

**16QAM – Lower Band Edge**




**16QAM – Upper Band Edge**




**64QAM – Lower Band Edge**




**64QAM – Upper Band Edge**

## 5.2.8. Transmitter Radiated Spurious Emissions

### Test Summary:

| | |
|---|---|
| **FCC Part:** | 2.1051 and 27.53(g) |
| **Test Method Used:** | As detailed in ANSI TIA-603-C-2004 Section 2.2.12. referencing FCC Part 2.1053 |
| **Frequency Range:** | 30 MHz to 12.75 GHz |

### Environmental Conditions:

| | |
|---|---|
| **Temperature Variation (°C):** | 26 |
| **Relative Humidity Variation (%):** | 33 |

### Results: Sub Band A / Bottom Channel

| Frequency (MHz) | Emission Level (dBm) | Limit (dBm) | Margin (dB) | Result |
|---|---|---|---|---|
| 1667.335 | -34.2 | -13.0 | 21.2 | Complied |

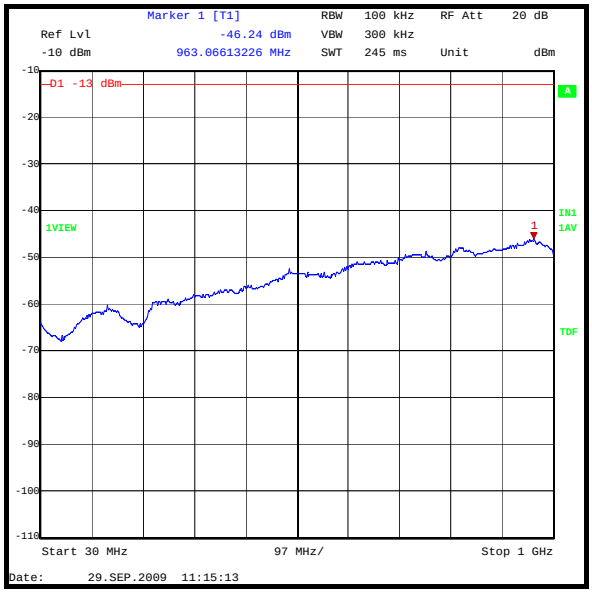
### Results: Sub Band A / Top Channel

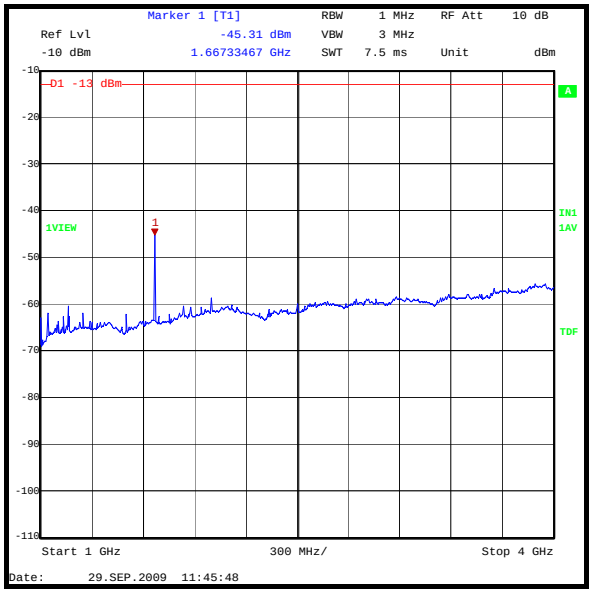
| Frequency (MHz) | Emission Level (dBm) | Limit (dBm) | Margin (dB) | Result |
|---|---|---|---|---|
| 1666.735 | -34.9 | -13.0 | 21.9 | Complied |

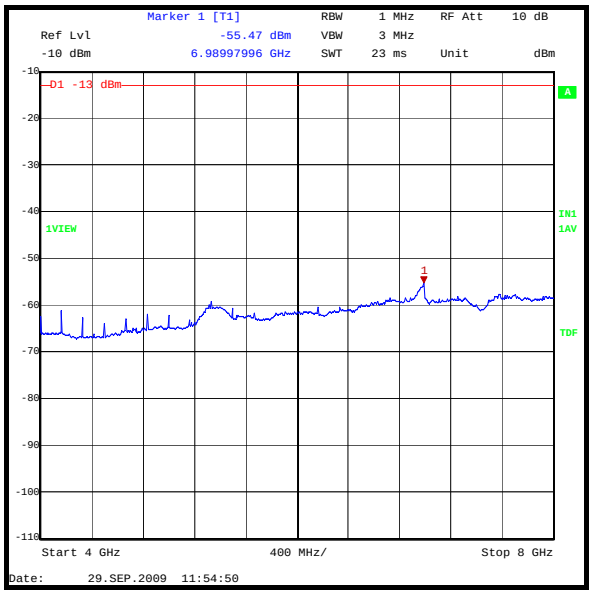
### Note(s):

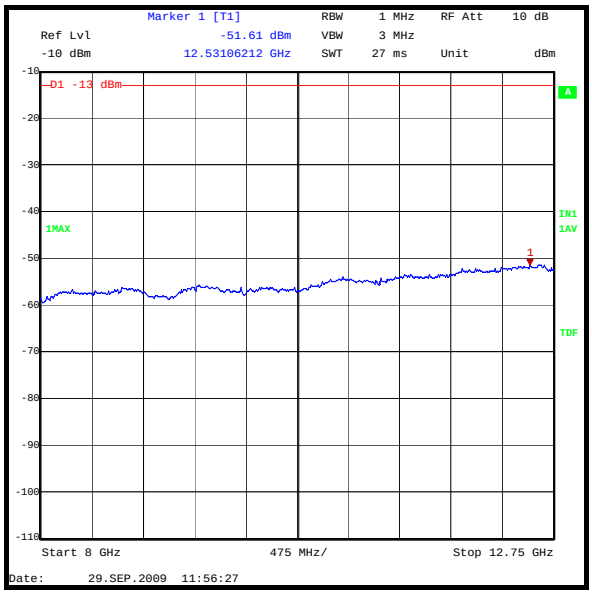
1. All other emissions were >20 dB below the applicable limit or below the level of the noise floor of the measuring receiver.

## Transmitter Radiated Spurious Emissions (continued)



## 5.2.9. Transmitter Radiated Spurious Emissions at Band Edges

### Test Summary:

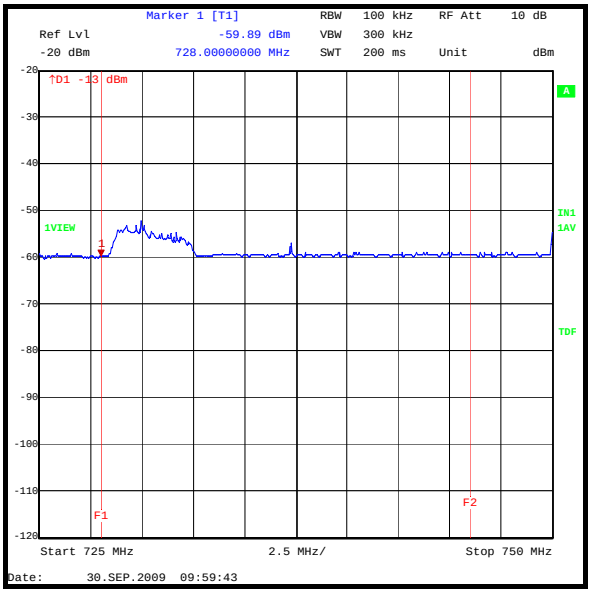
| | |
|---|---|
| **FCC Part:** | FCC Part 2.1051 and FCC Part 27.53(g) |
| **Test Method Used:** | As described in ANSI TIA-603-C-2004 Section 2.2.12 referencing FCC CFR Part 2.1053 |

### Environmental Conditions:

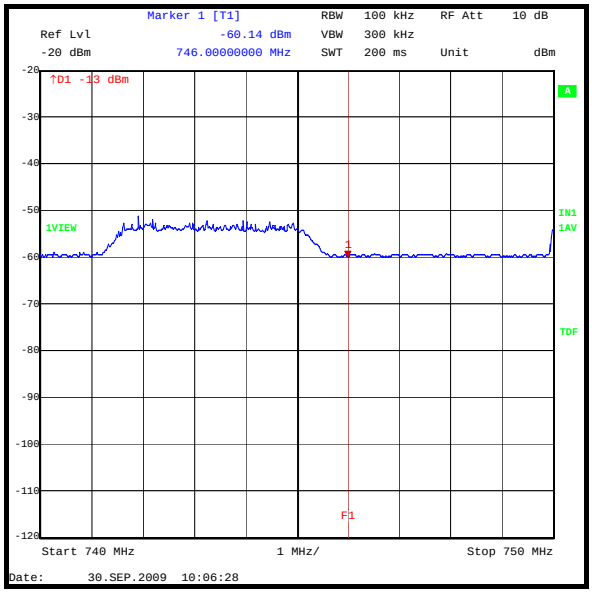
| | |
|---|---|
| **Temperature Variation (°C):** | 26 |
| **Relative Humidity Variation (%):** | 33 |

### Results: Sub Band A

| Modulation | Frequency (MHz) | Emission Level (dBm) | Limit (dBm) | Margin (dB) | Result |
|---|---|---|---|---|---|
| QPSK | 728.0 | -58.9 | -13.0 | 45.9 | Complied |
| QPSK | 746.0 | -60.1 | -13.0 | 47.1 | Complied |
| 16QAM | 728.0 | -60.1 | -13.0 | 47.1 | Complied |
| 16QAM | 746.0 | -59.6 | -13.0 | 46.6 | Complied |
| 64QAM | 728.0 | -60.4 | -13.0 | 47.4 | Complied |
| 64QAM | 746.0 | -59.6 | -13.0 | 46.6 | Complied |

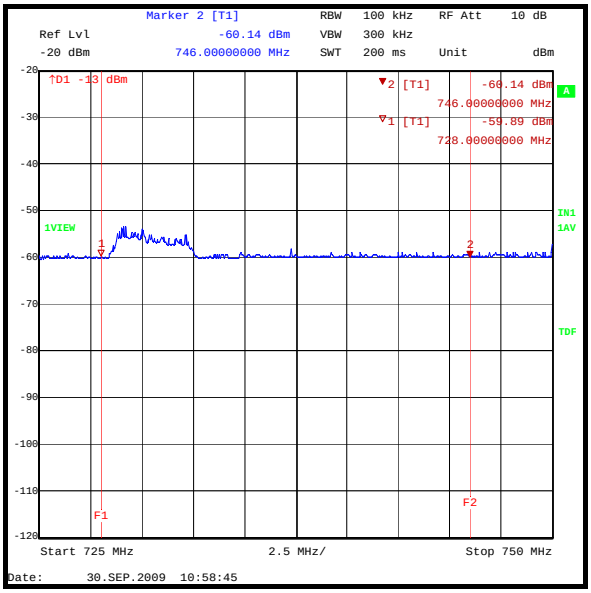



**QPSK – Lower Band Edge**

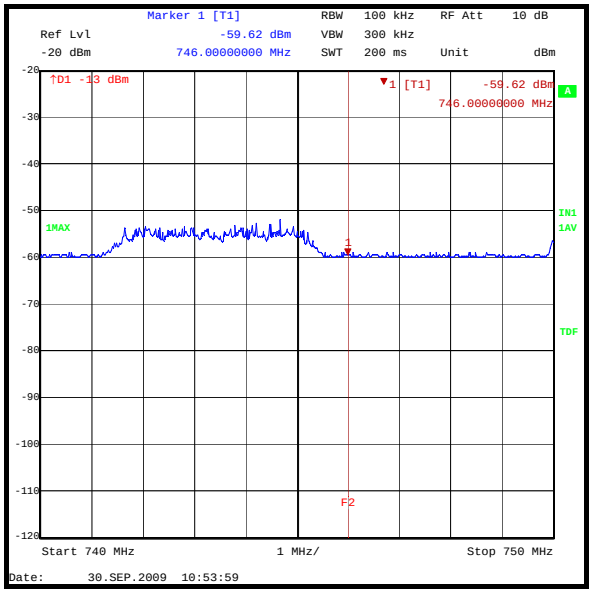



**QPSK – Upper Band Edge**

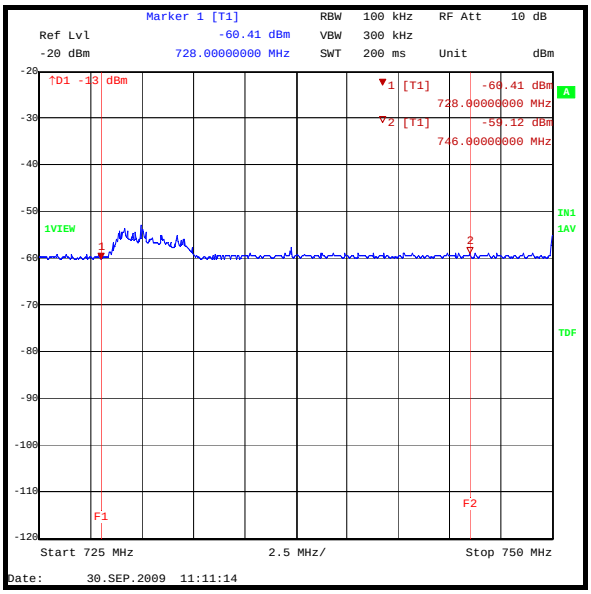
## Transmitter Radiated Emissions at Band Edges (continued)



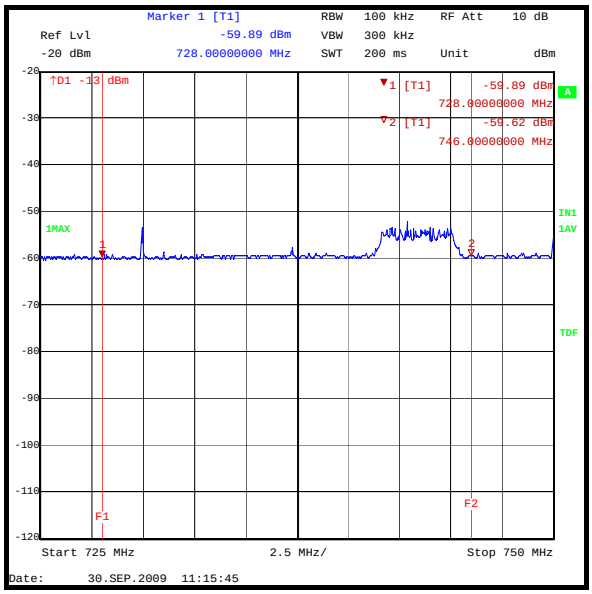

**16QAM – Lower Band Edge**




**16QAM – Upper Band Edge**




**64QAM – Lower Band Edge**




**64QAM – Upper Band Edge**

## 5.3. Test Results – Sub Band B

### 5.3.1. Transmitter Carrier Output Power and Effective Radiated Power (ERP)

**Test Summary:**

| | |
|---|---|
| **FCC Part:** | 2.1046 and 27.50(b)(1) |
| **Test Method Used:** | As detailed in ANSI TIA-603-C-2004 |

**Environmental Conditions:**

| | |
|---|---|
| **Temperature Variation (°C):** | 26 |
| **Relative Humidity Variation (%):** | 35 |

**Results: Antenna Port 1**

| Modulation | Frequency (MHz) | Conducted RF Power (dBm) | Antenna Gain (dBi) | ERP (dBm) | Limit ERP (dBm) | Margin (dB) | Result |
|---|---|---|---|---|---|---|---|
| QPSK | 748.6 | 38.9 | 20 | 58.9 | 60.0 | 1.1 | Complied |
| QPSK | 755.4 | 38.9 | 20 | 58.9 | 60.0 | 1.1 | Complied |
| 16QAM | 748.6 | 38.8 | 20 | 58.8 | 60.0 | 1.2 | Complied |
| 16QAM | 755.4 | 38.8 | 20 | 58.8 | 60.0 | 1.2 | Complied |
| 64QAM | 748.6 | 38.8 | 20 | 58.8 | 60.0 | 1.2 | Complied |
| 64QAM | 755.4 | 38.9 | 20 | 58.9 | 60.0 | 1.1 | Complied |

**Results: Antenna Port 2**

| Modulation | Frequency (MHz) | Conducted RF Power (dBm) | Antenna Gain (dBi) | ERP (dBm) | Limit ERP (dBm) | Margin (dB) | Result |
|---|---|---|---|---|---|---|---|
| QPSK | 748.6 | 39.0 | 20 | 59.0 | 60.0 | 1.0 | Complied |
| QPSK | 755.4 | 39.1 | 20 | 59.1 | 60.0 | 0.9 | Complied |
| 16QAM | 748.6 | 39.2 | 20 | 59.2 | 60.0 | 0.8 | Complied |
| 16QAM | 755.4 | 39.2 | 20 | 59.2 | 60.0 | 0.8 | Complied |
| 64QAM | 748.6 | 39.2 | 20 | 59.2 | 60.0 | 0.8 | Complied |
| 64QAM | 755.4 | 39.2 | 20 | 59.2 | 60.0 | 0.8 | Complied |

**Note(s):**

1. Measurements were performed with the EUT transmitting on all supported modulation types on the Antenna Port 1 and Antenna Port 2.

## 5.3.2. Transmitter Occupied Bandwidth

### Test Summary:

| | |
|---|---|
| **FCC Part:** | FCC 2.1049 |
| **Test Method Used:** | As detailed in ANSI C63.4 Section 13.1.7 and relevant annexes referencing FCC CFR Part 2.1049 (see note below) |

### Environmental Conditions:

| | |
|---|---|
| **Temperature Variation (°C):** | 26 |
| **Relative Humidity Variation (%):** | 35 |

### Results: Antenna Port 1

| Modulation | Frequency (MHz) | Resolution Bandwidth (kHz) | Video Bandwidth (kHz) | Occupied Bandwidth (MHz) |
|---|---|---|---|---|
| QPSK | 748.6 | 100 | 300 | 4.118 |
| QPSK | 755.4 | 100 | 300 | 4.118 |
| 16QAM | 748.6 | 100 | 300 | 4.118 |
| 16QAM | 755.4 | 100 | 300 | 4.118 |
| 64QAM | 748.6 | 100 | 300 | 4.118 |
| 64QAM | 755.4 | 100 | 300 | 4.118 |

### Results: Antenna Port 2

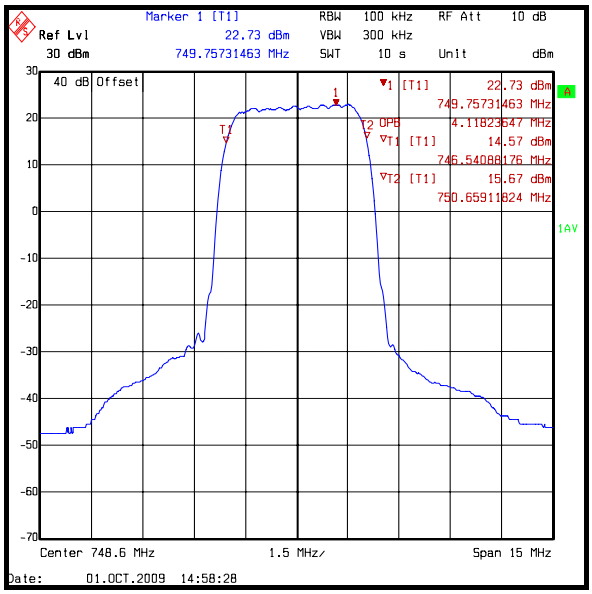
| Modulation | Frequency (MHz) | Resolution Bandwidth (kHz) | Video Bandwidth (kHz) | Occupied Bandwidth (MHz) |
|---|---|---|---|---|
| QPSK | 748.6 | 100 | 300 | 4.118 |
| QPSK | 755.4 | 100 | 300 | 4.118 |
| 16QAM | 748.6 | 100 | 300 | 4.118 |
| 16QAM | 755.4 | 100 | 300 | 4.118 |
| 64QAM | 748.6 | 100 | 300 | 4.118 |
| 64QAM | 755.4 | 100 | 300 | 4.118 |

### Note(s):

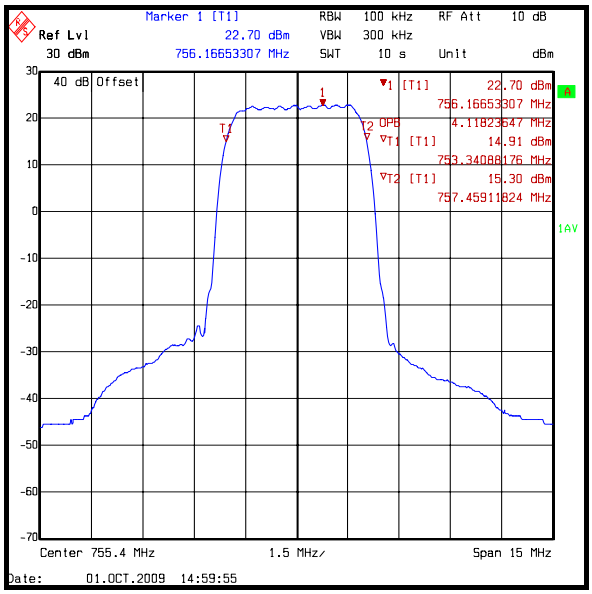
1. In lieu of the test method detailed in ANSI C63.4 Section 13.1.7 the 99% occupied bandwidth was measured using the Occupied Bandwidth function of the spectrum analyser.
2. Measurements were performed with the EUT transmitting on all supported modulation types on the Antenna Port 1 and Antenna Port 2.

## Transmitter Occupied Bandwidth (continued)

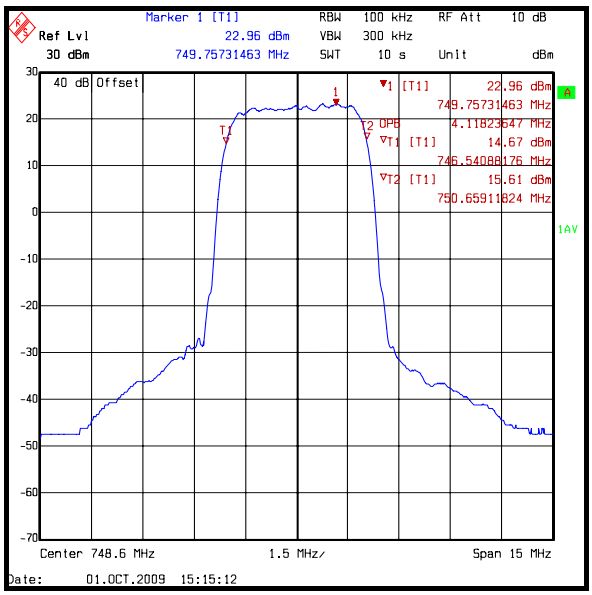
## Antenna Port 1



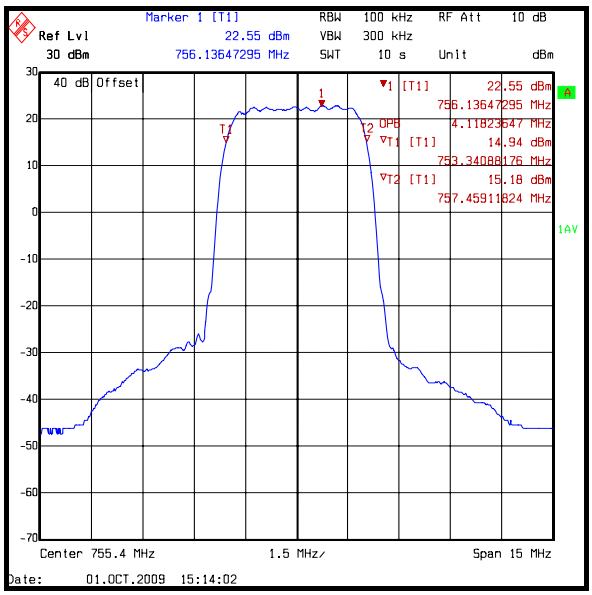

QPSK




QPSK



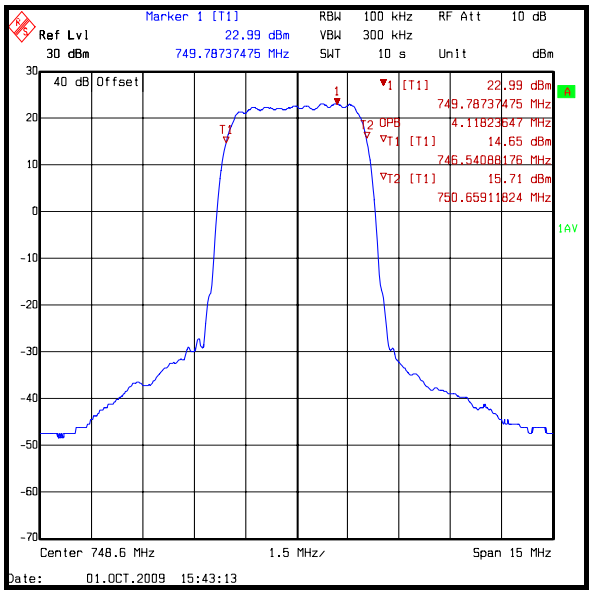

**16QAM**



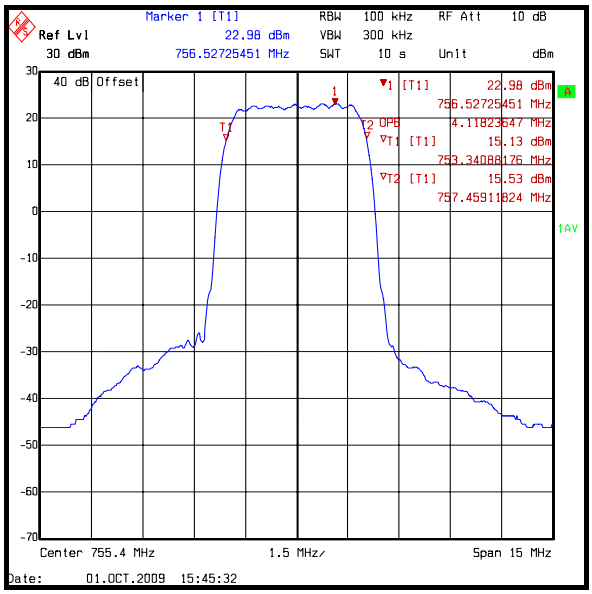

**16QAM**

## Transmitter Occupied Bandwidth (continued)

### Antenna Port 1



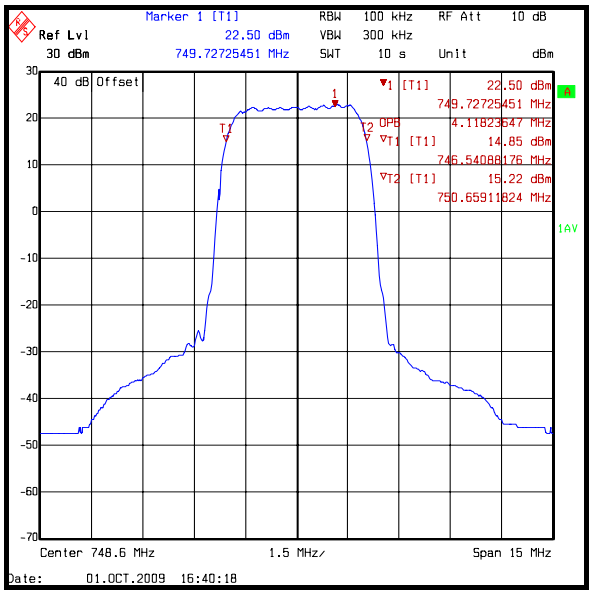

**64QAM**



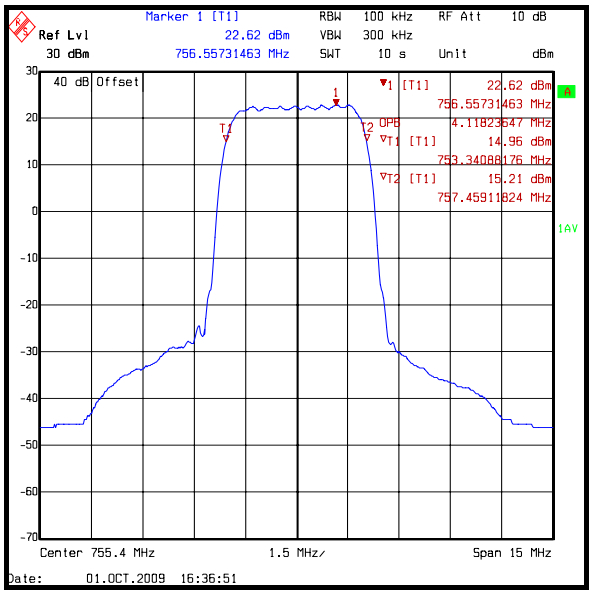

**64QAM**

## Transmitter Occupied Bandwidth (continued)

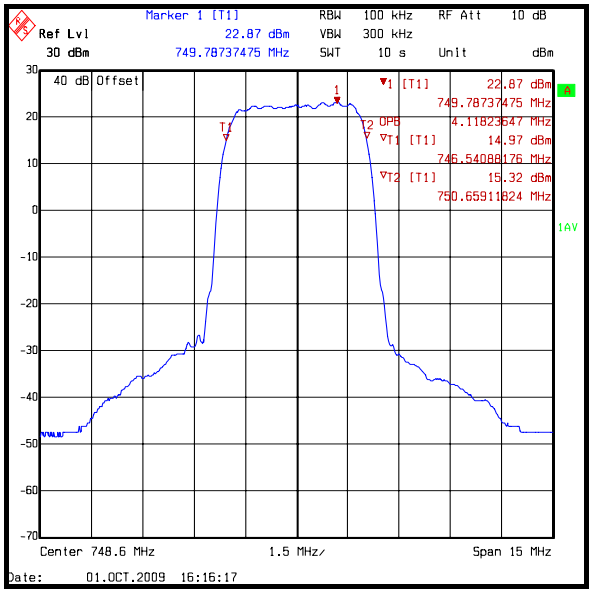
### Antenna Port 2



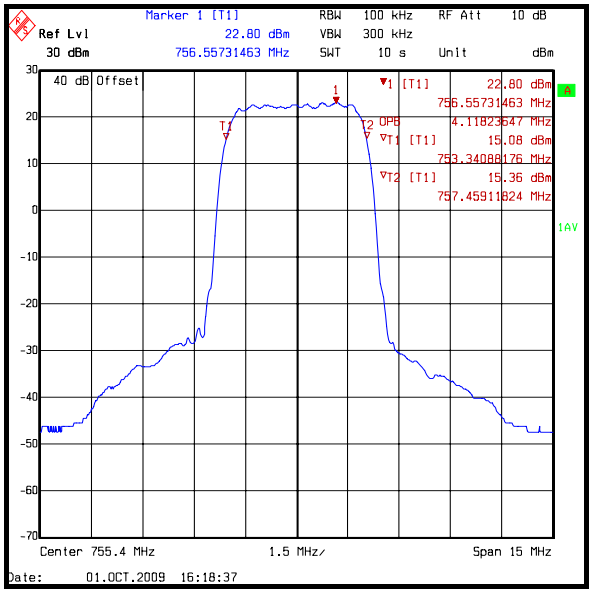

QPSK




QPSK



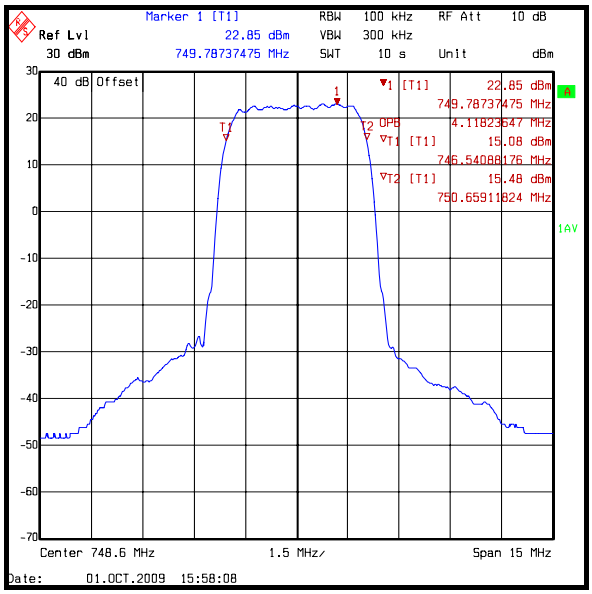

16QAM



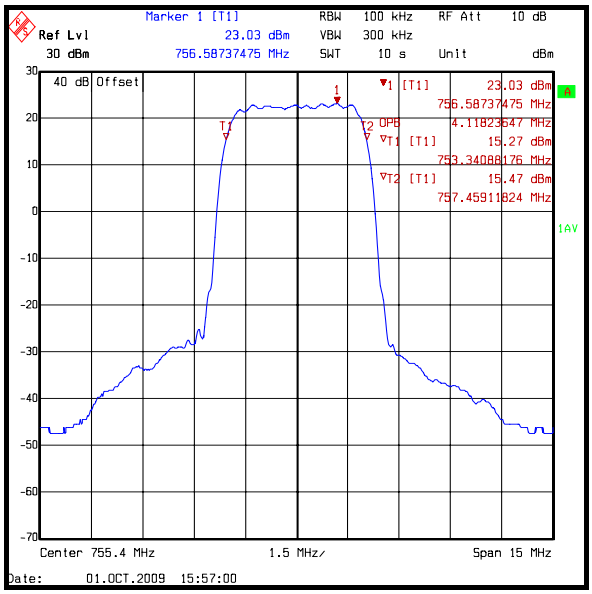

16QAM

## Transmitter Occupied Bandwidth (continued)

### Antenna Port 2




64QAM




64QAM

### 5.3.3. Transmitter Frequency Stability - Temperature Variation

**Test Summary:**

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

**Environmental Conditions:**

| | |
|---|---|
| **Temperature Variation (°C):** | 24 to 25 |
| **Relative Humidity Variation (%):** | 43 to 46 |

**Results: Sub Band B / Bottom Channel 748.6 MHz / Port 2**

| Temp (ºC) | Measured Frequency (MHz) | Frequency Error (Hz) |
|---|---|---|
| -30 | 748.599796 | 204 |
| -20 | 748.599799 | 201 |
| -10 | 748.599800 | 200 |
| 0 | 748.599803 | 197 |
| 10 | 748.599806 | 194 |
| 20 | 748.599805 | 195 |
| 30 | 748.599811 | 189 |
| 40 | 748.599815 | 185 |
| 50 | 748.599821 | 179 |

**Transmitter Frequency Stability - Temperature Variation – (continued)**

**Results: Sub Band B / Top Channel 755.4 MHz / Port 2**

| Temp (ºC) | Measured Frequency (MHz) | Frequency Error (Hz) |
|---|---|---|
| -30 | 755.399794 | 206 |
| -20 | 755.399796 | 204 |
| -10 | 755.399798 | 202 |
| 0 | 755.399801 | 199 |
| 10 | 755.399804 | 196 |
| 20 | 755.399804 | 196 |
| 30 | 755.399808 | 192 |
| 40 | 755.399813 | 187 |
| 50 | 755.399820 | 180 |

**Note(s):**

1.

## 5.3.4. Transmitter Frequency Stability - Voltage Variation

### Test Summary:

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

### Environmental Conditions:

| | |
|---|---|
| **Temperature Variation (°C):** | 25 |
| **Relative Humidity Variation (%):** | 43 |

### Results: Sub Band B / Bottom Channel 748.6 MHz / Port 2

| Supply Voltage (ºC) | Measured Frequency (MHz) | Frequency Error (Hz) |
|---|---|---|
| -40.8 | 748.599805 | 195 |
| -48.0 | 748.599805 | 195 |
| -55.2 | 748.599805 | 195 |

### Results: Sub Band B / Top Channel 755.4 MHz / Port 2

| Supply Voltage (ºC) | Measured Frequency (MHz) | Frequency Error (Hz) |
|---|---|---|
| -40.8 | 755.399804 | 196 |
| -48.0 | 755.399804 | 196 |
| -55.2 | 755.399804 | 196 |

### Note(s):

1.

## 5.3.5. Transmitter Conducted Emissions – Channel Edge

### Test Summary:

| | |
|---|---|
| **FCC Part:** | 27.53(c)(1) |
| **Test Method Used** | As detailed in ANSI TIA-603.C-2004 referencing FCC Part 2.1051 |

### Environmental Conditions:

| | |
|---|---|
| **Temperature Variation (°C):** | 24 |
| **Relative Humidity Variation (%):** | 31 |

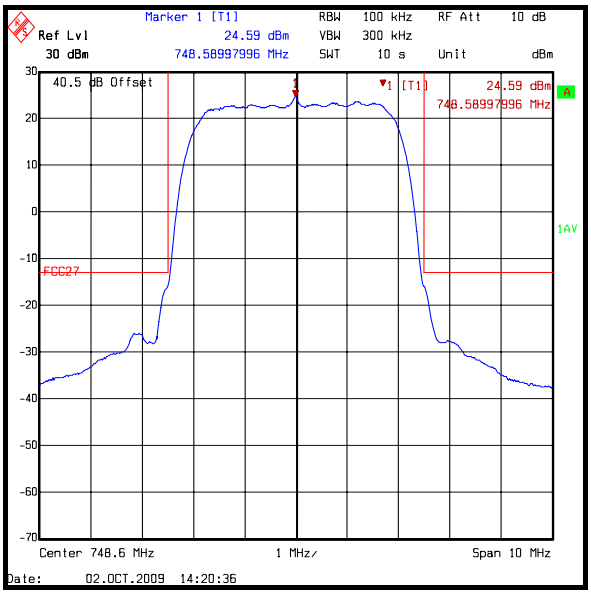
### Note(s):

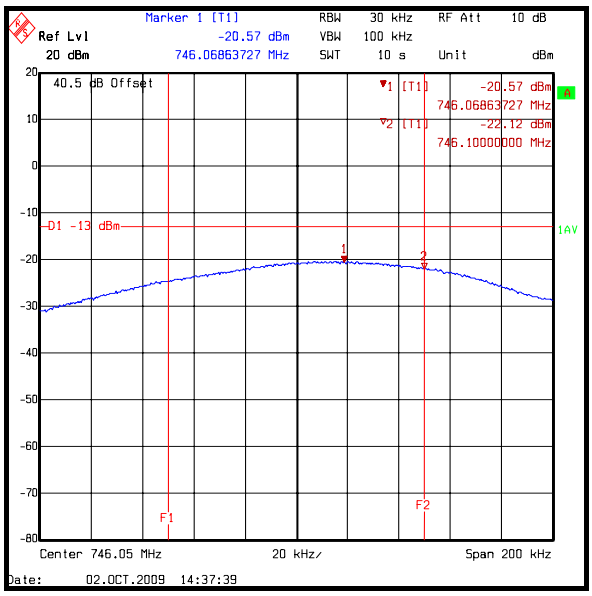
1. It can be seen on the main mask plot that the emission is close to the limit line. This is on account of the analyser bandwidth being too great to make an accurate measurement. As stated in FCC Part 27.53(c)(5), a resolution bandwidth of 30 kHz was used in the 100 kHz bands immediately outside and adjacent to the frequency block to demonstrate compliance and this can be seen on the two plots accompanying the mask plot.
2. Preliminary testing was performed on both antenna ports with the worse case port being selected for measurements.

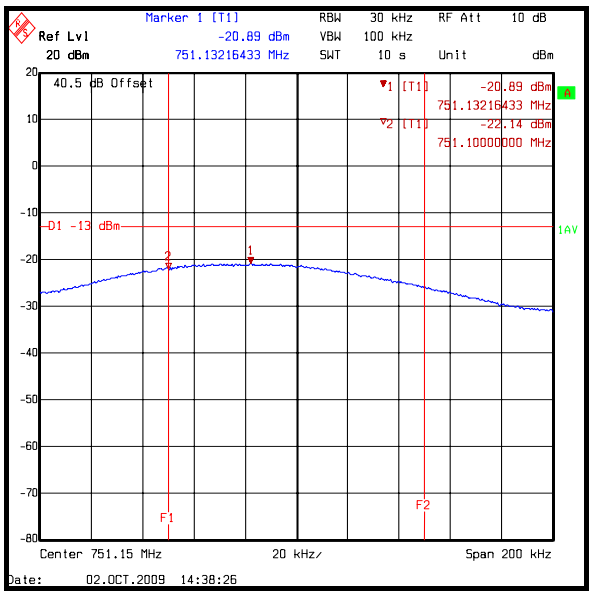
### Results: Sub Band B / Bottom Channel 748.6 MHz / QPSK / Port 2

| Frequency of 100 kHz strip adjacent to channel edge (MHz) | Level in 100 kHz strip adjacent to block edge (dBm) | Band Edge Limit (dBm) | Margin (dB) | Result |
|---|---|---|---|---|
| 746.069 | -20.6 | -13.0 | 7.6 | Complied |
| 751.132 | -20.9 | -13.0 | 7.9 | Complied |

## Transmitter Conducted Emissions – Channel Edge (continued)



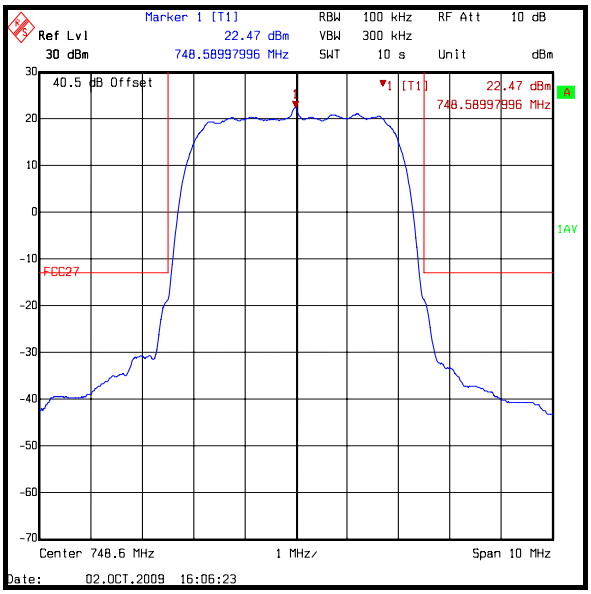



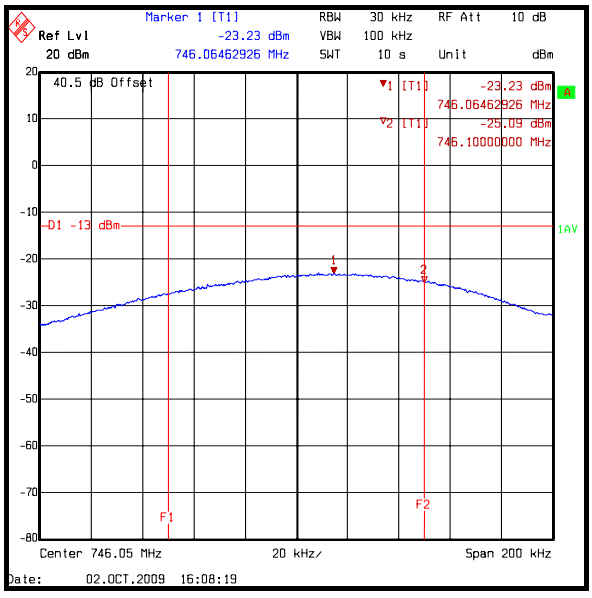



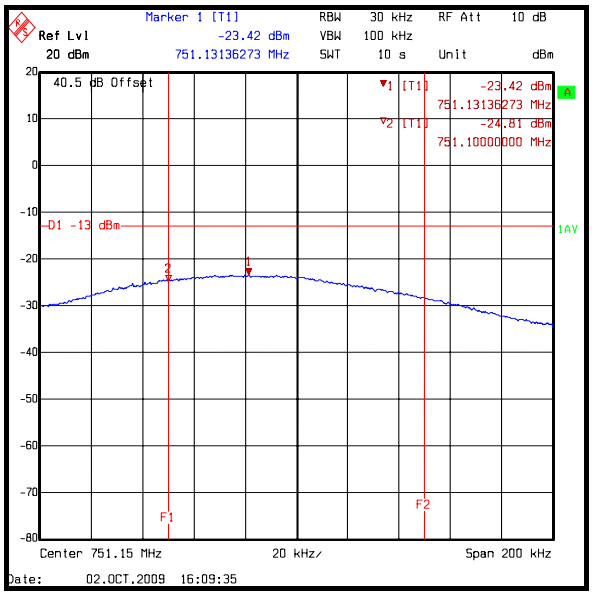
## Transmitter Conducted Emissions – Channel Edge (continued)

## Results: Sub Band B / Bottom Channel 748.6 MHz / 16QAM / Port 2

| Frequency of 100 kHz strip adjacent to channel edge (MHz) | Level in 100 kHz strip adjacent to block edge (dBm) | Band Edge Limit (dBm) | Margin (dB) | Result |
|---|---|---|---|---|
| 746.065 | -23.2 | -13.0 | 10.2 | Complied |
| 751.131 | -23.4 | -13.0 | 10.4 | Complied |



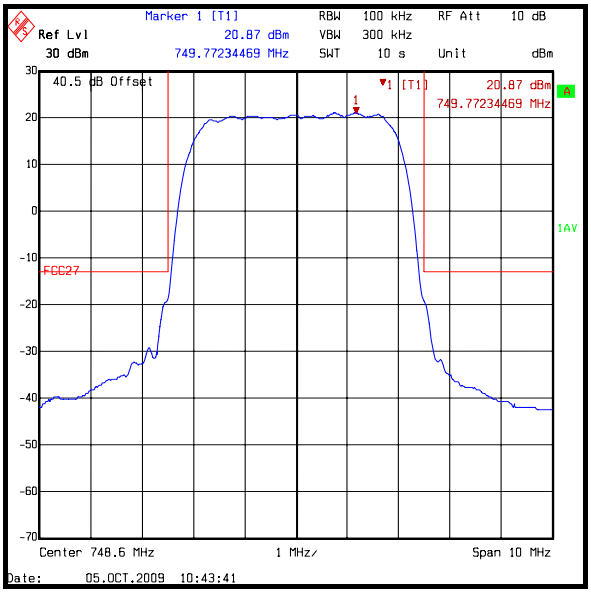



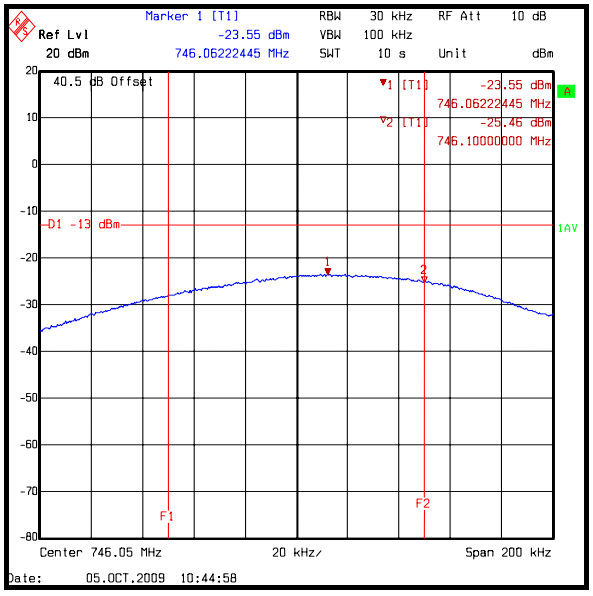



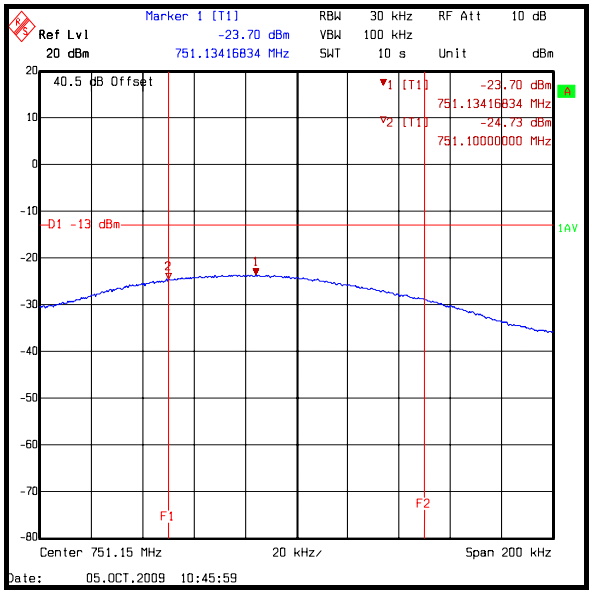
## Transmitter Conducted Emissions – Channel Edge (continued)

## Results: Sub Band B / Bottom Channel 748.6 MHz / 64QAM / Port 2

| Frequency of 100 kHz strip adjacent to channel edge (MHz) | Level in 100 kHz strip adjacent to block edge (dBm) | Band Edge Limit (dBm) | Margin (dB) | Result |
|---|---|---|---|---|
| 746.062 | -23.6 | -13.0 | 10.6 | Complied |
| 751.134 | -23.7 | -13.0 | 10.7 | Complied |



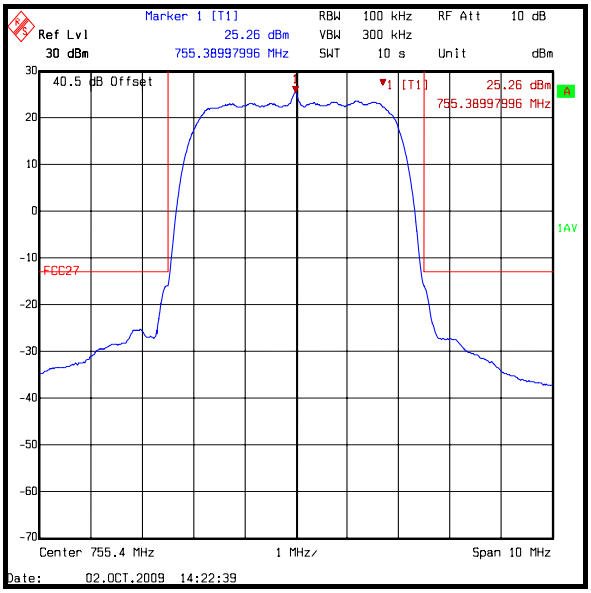



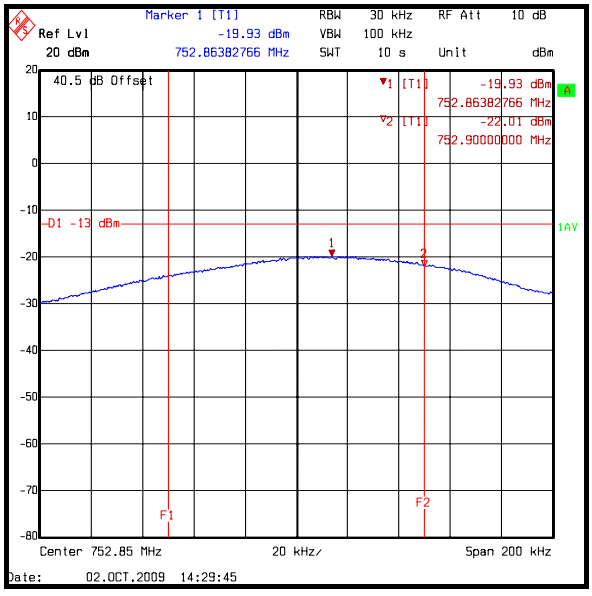



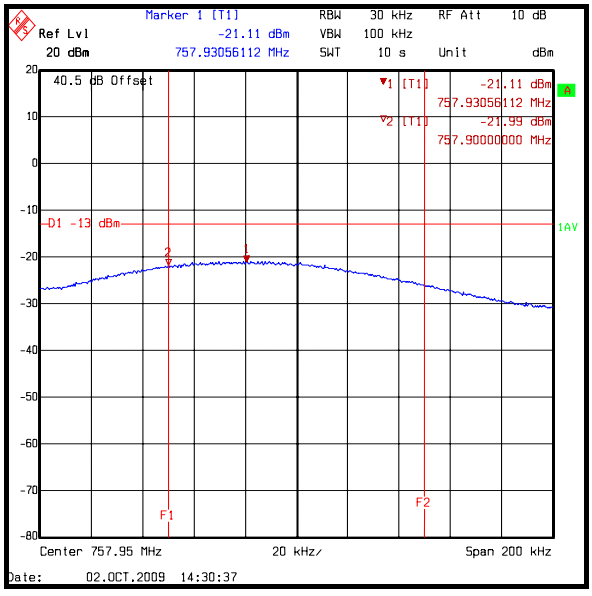
## Transmitter Conducted Emissions – Channel Edge (continued)

## Results: Sub Band B / Top Channel 755.4 MHz / QPSK / Port 2

| Frequency of 100 kHz strip adjacent to channel edge (MHz) | Level in 100 kHz strip adjacent to block edge (dBm) | Band Edge Limit (dBm) | Margin (dB) | Result |
|---|---|---|---|---|
| 752.864 | -19.9 | -13.0 | 6.9 | Complied |
| 757.931 | -21.1 | -13.0 | 8.1 | Complied |



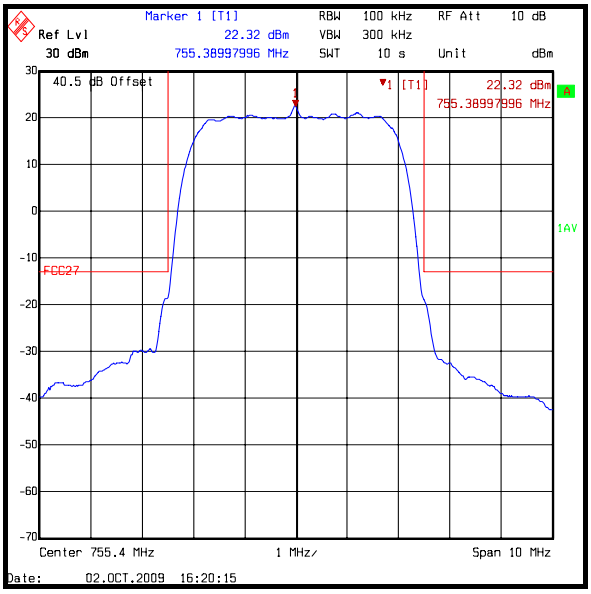



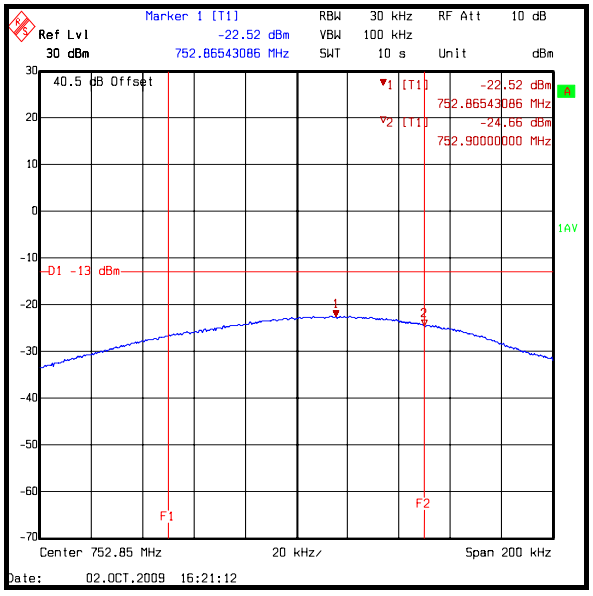



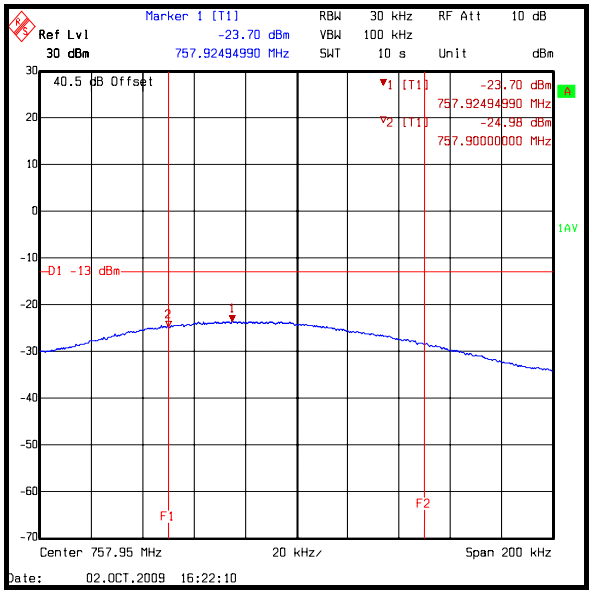
## Transmitter Conducted Emissions – Channel Edge (continued)

## Results: Sub Band B / Top Channel 755.4 MHz / 16QAM / Port 2

| Frequency of 100 kHz strip adjacent to channel edge (MHz) | Level in 100 kHz strip adjacent to block edge (dBm) | Band Edge Limit (dBm) | Margin (dB) | Result |
|---|---|---|---|---|
| 752.865 | -22.5 | -13.0 | 9.5 | Complied |
| 757.925 | -23.7 | -13.0 | 10.7 | Complied |



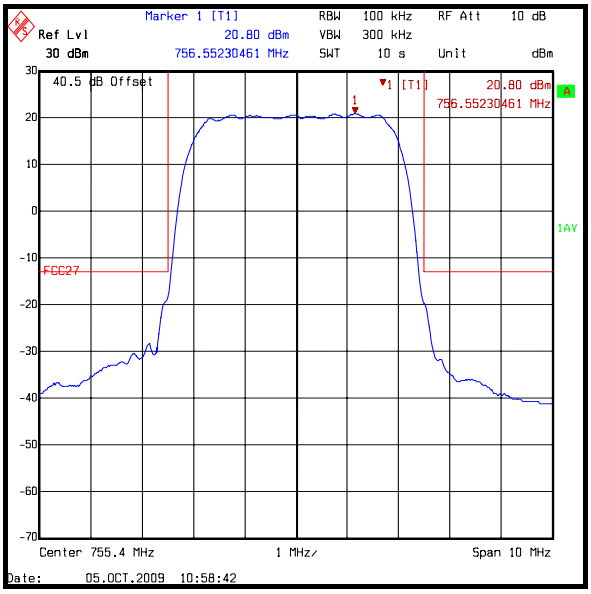



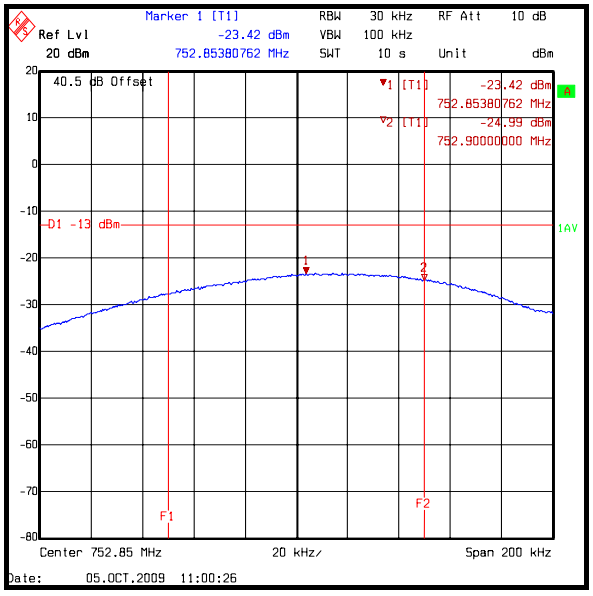



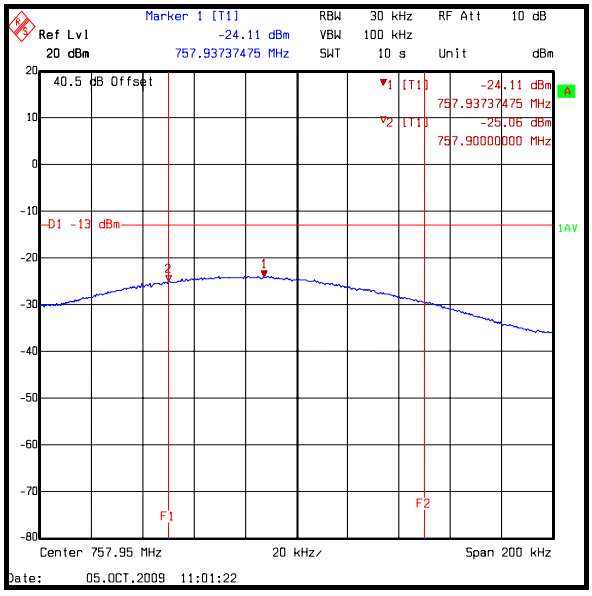
## Transmitter Conducted Emissions – Channel Edge (continued)

## Results: Sub Band B / Top Channel 755.4 MHz / 64QAM / Port 2

| Frequency of 100 kHz strip adjacent to channel edge (MHz) | Level in 100 kHz strip adjacent to block edge (dBm) | Band Edge Limit (dBm) | Margin (dB) | Result |
|---|---|---|---|---|
| 752.854 | -23.4 | -13.0 | 10.4 | Complied |
| 757.937 | -24.1 | -13.0 | 11.1 | Complied |



## 5.3.6. Transmitter Conducted Emissions

### Test Summary:

| | |
|---|---|
| **FCC Part:** | 2.1051 and 27.53(c)(1) |
| **Test Method Used:** | As detailed in ANSI TIA-603.C-2004 referencing FCC Part 2.1051 |

### Environmental Conditions:

| | |
|---|---|
| **Temperature Variation (°C):** | 25 to 26 |
| **Relative Humidity Variation (%):** | 23 to 32 |

### Results: Sub Band B / Bottom Channel 748.6 MHz / Port 2

| Modulation | Frequency (MHz) | Emission Level (dBm) | Limit (dBm) | Margin (dB) | Result |
|---|---|---|---|---|---|
| QPSK | 1499.065630 | -28.1 | -13.0 | 15.1 | Complied |
| 16QAM | 1499.037140 | -32.7 | -13.0 | 19.7 | Complied |
| 64QAM | 1499.084110 | -32.5 | -13.0 | 19.5 | Complied |

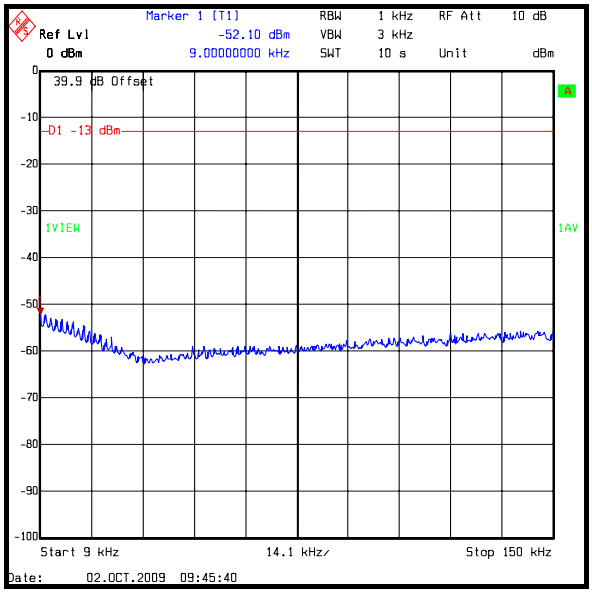
### Results: Sub Band B / Top Channel 755.4 MHz / Port 2

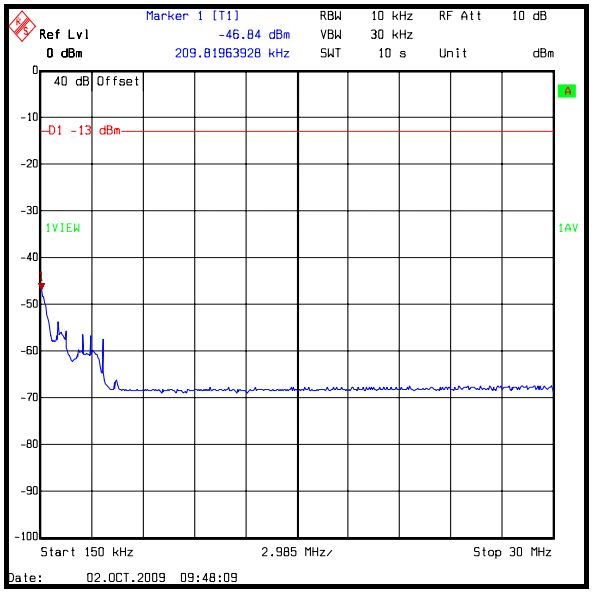
| Modulation | Frequency (MHz) | Emission Level (dBm) | Limit (dBm) | Margin (dB) | Result |
|---|---|---|---|---|---|
| QPSK | 1512.592690 | -28.9 | -13.0 | 15.9 | Complied |
| 16QAM | 1512.640520 | -33.5 | -13.0 | 20.5 | Complied |
| 64QAM | 1512.611160 | -33.2 | -13.0 | 20.2 | Complied |

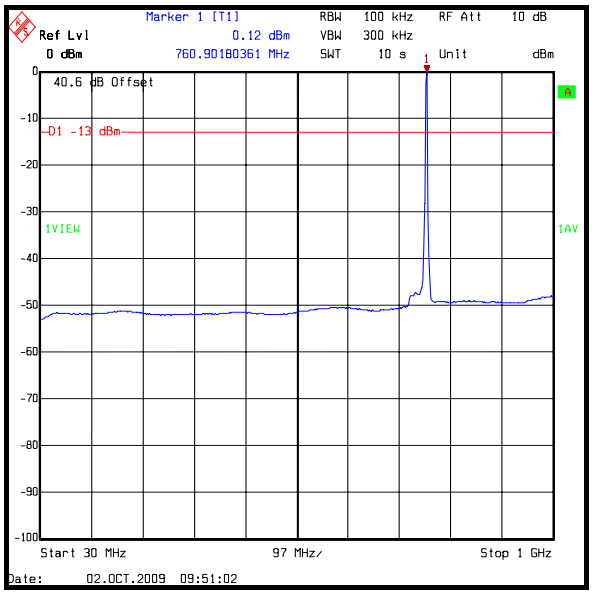
### Note(s):

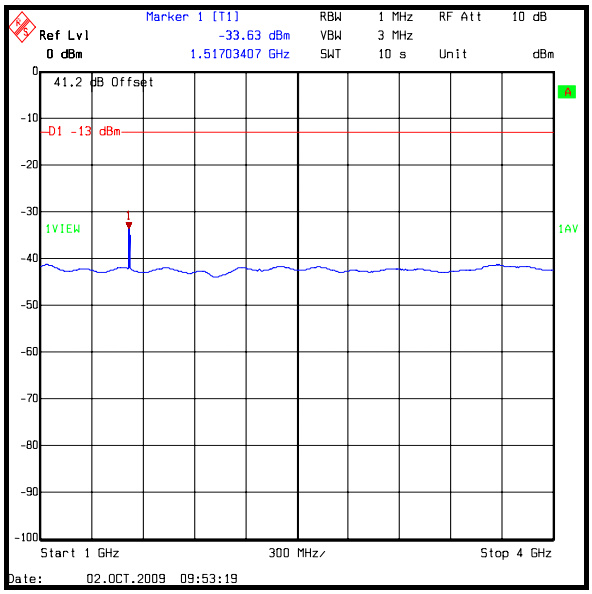
1. The emissions shown at approximately 760.902 MHz on the 30 MHz to 1 GHz plot is the carrier
2. All other emissions were >20 dB below the applicable limit or below the level of the noise floor of the measuring receiver.
3. Preliminary testing was performed on both antenna ports with the worse case port being selected for measurements.

## Transmitter Conducted Emissions (continued)

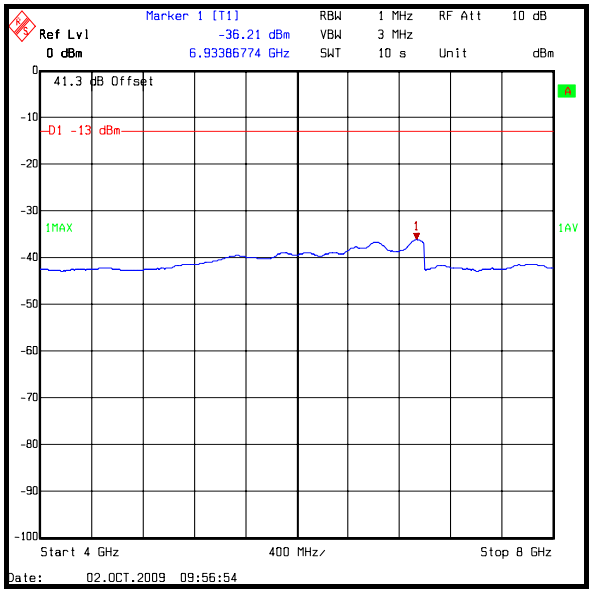


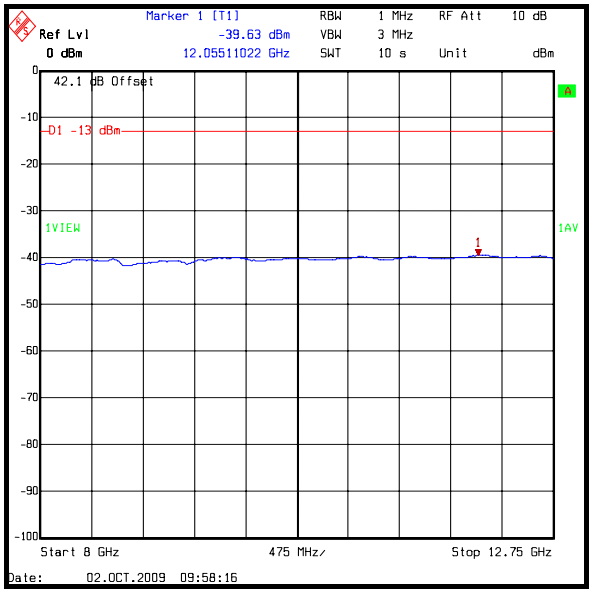



## Transmitter Conducted Emissions (continued)



## 5.3.7. Transmitter Conducted Emissions at Band Edges

### Test Summary:

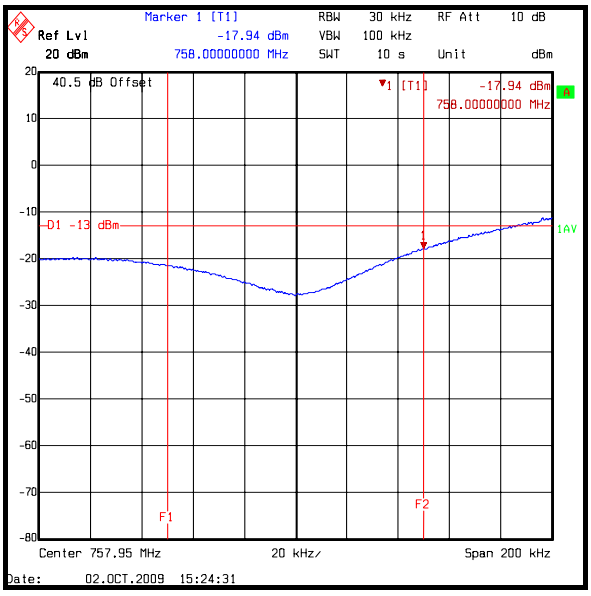
| | |
|---|---|
| **FCC Part:** | 2.1051 and 27.53(c)(1) |
| **Test Method Used:** | As detailed in ANSI TIA-603.C-2004 referencing FCC Part 2.1051 |

### Environmental Conditions:

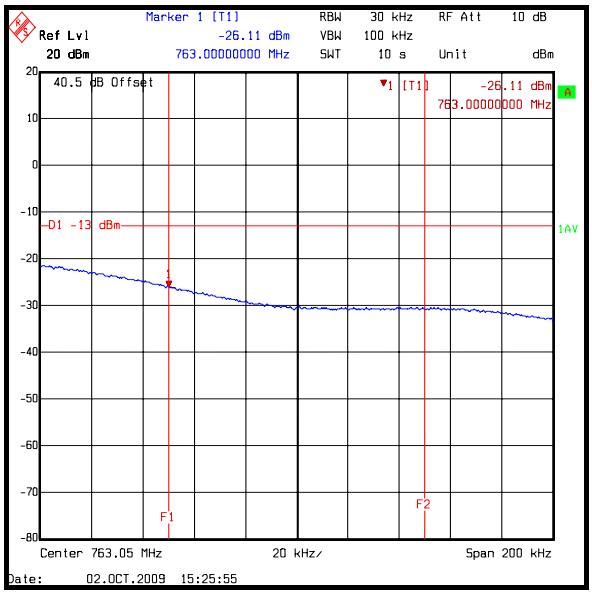
| | |
|---|---|
| **Temperature Variation (°C):** | 24 |
| **Relative Humidity Variation (%):** | 37 |

### Results: Sub Band B / Port 2

| Modulation | Frequency of 100 kHz strip adjacent to block edge (MHz) | Level in 100 kHz strip adjacent to block edge (dBm) | Band edge limit (dBm) | Margin (dB) | Result |
|---|---|---|---|---|---|
| QPSK | 758.0 | -17.9 | -13.0 | 4.9 | Complied |
| QPSK | 763.0 | -26.1 | -13.0 | 13.1 | Complied |
| 16QAM | 758.0 | -20.7 | -13.0 | 7.7 | Complied |
| 16QAM | 763.0 | -28.8 | -13.0 | 15.8 | Complied |
| 64QAM | 758.0 | -21.0 | -13.0 | 8.0 | Complied |
| 64QAM | 763.0 | -29.6 | -13.0 | 16.6 | Complied |

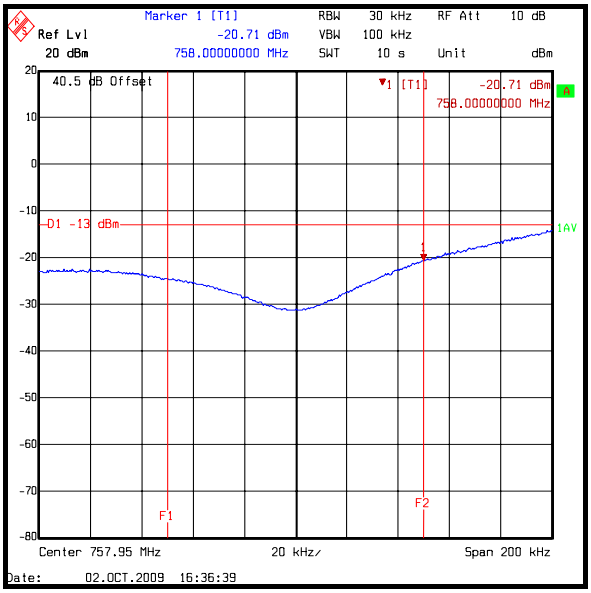



**QPSK – Lower Band Edge**

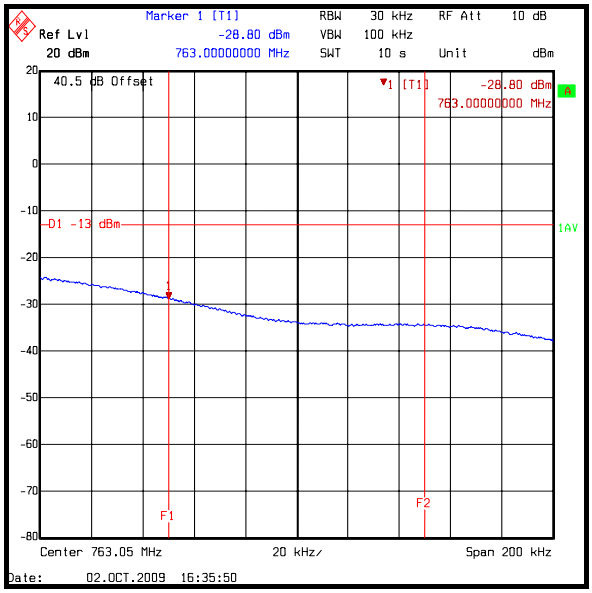



**QPSK – Upper Band Edge**

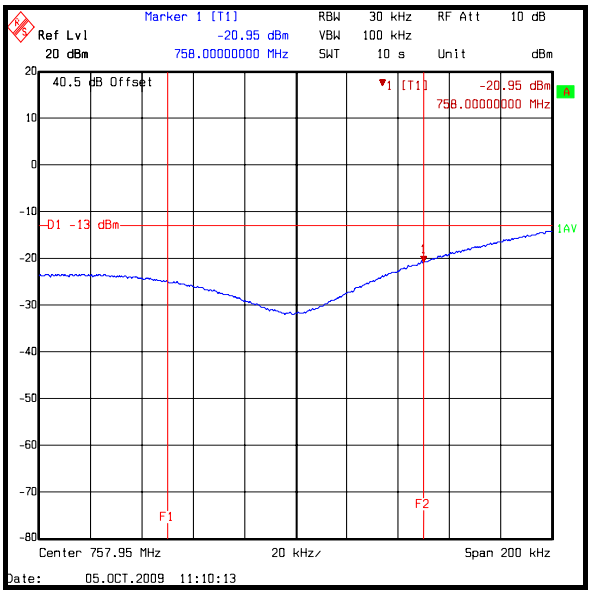
## Transmitter Conducted Emissions at Band Edges (continued)



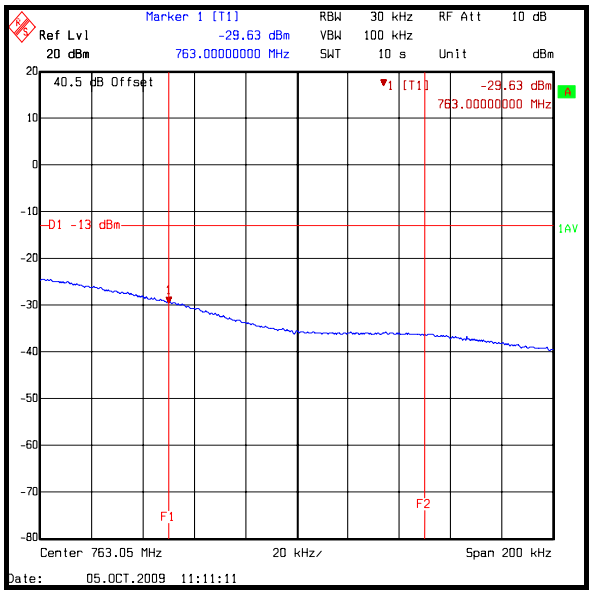

**16QAM – Lower Band Edge**




**16QAM – Upper Band Edge**




**64QAM – Lower Band Edge**




**64QAM – Upper Band Edge**

## Note(s):

1. Preliminary testing was performed on both antenna ports with the worse case port being selected for measurements.

## 5.3.8. Transmitter Radiated Spurious Emissions

### Test Summary:

| | |
|---|---|
| **FCC Part:** | 2.1051 and 27.53(c)(1) |
| **Test Method Used:** | As detailed in ANSI TIA-603-C-2004 Section 2.2.12. referencing FCC Part 2.1053 |
| **Frequency Range:** | 30 MHz to 12.75 GHz |

### Environmental Conditions:

| | |
|---|---|
| **Temperature Variation (°C):** | 26 |
| **Relative Humidity Variation (%):** | 33 |

### Results: Sub Band B / Bottom Channel 748.6 MHz

| Frequency (MHz) | Emission Level (dBm) | Limit (dBm) | Margin (dB) | Result |
|---|---|---|---|---|
| 1667.735 | -34.2 | -13.0 | 21.2 | Complied |

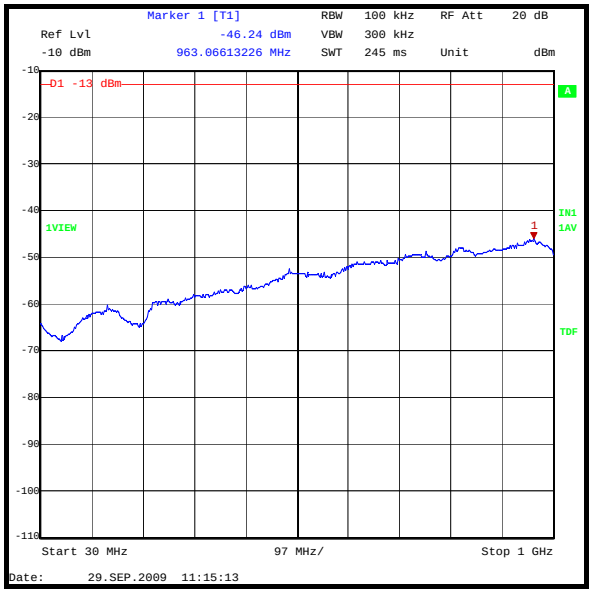
### Results: Sub Band B / Top Channel 755.4 MHz

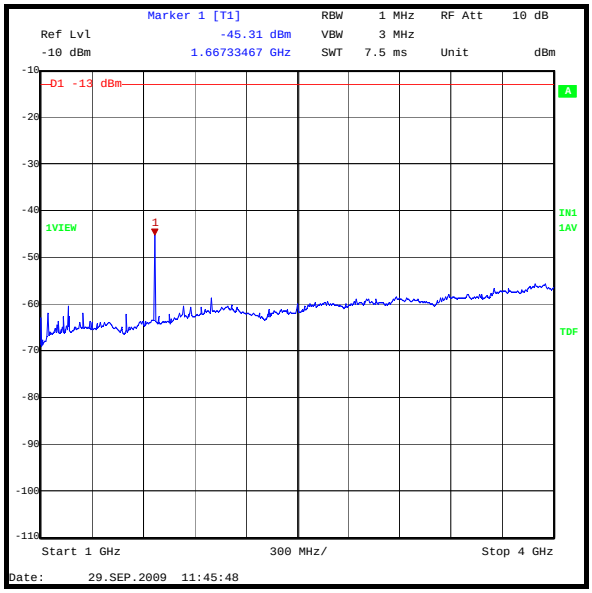
| Frequency (MHz) | Emission Level (dBm) | Limit (dBm) | Margin (dB) | Result |
|---|---|---|---|---|
| 1666.735 | -34.9 | -13.0 | 21.9 | Complied |

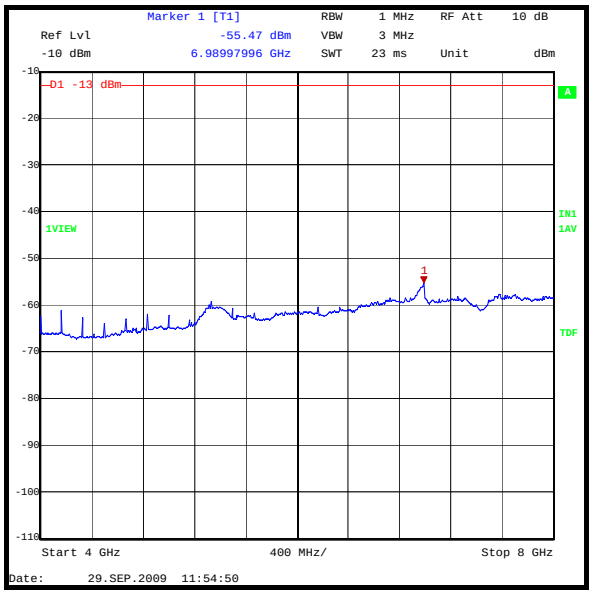
### Note(s):

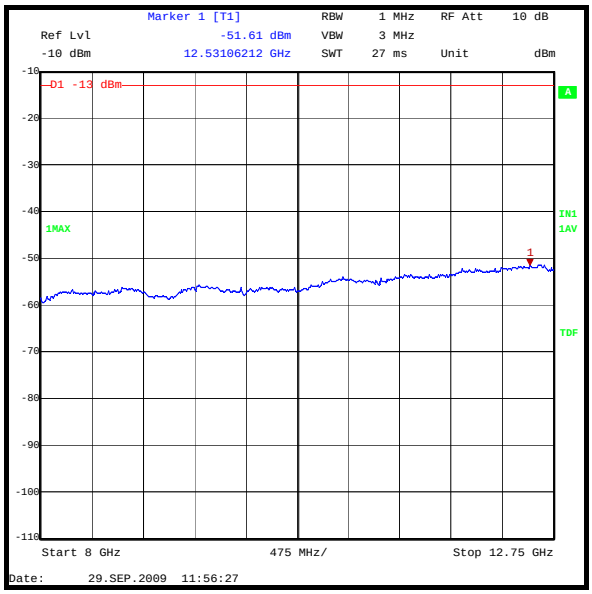
1. All other emissions were >20 dB below the applicable limit or below the level of the noise floor of the measuring receiver.

## Transmitter Radiated Spurious Emissions (continued)



## 5.3.9. Transmitter Radiated Spurious Emissions at Band Edges

### Test Summary:

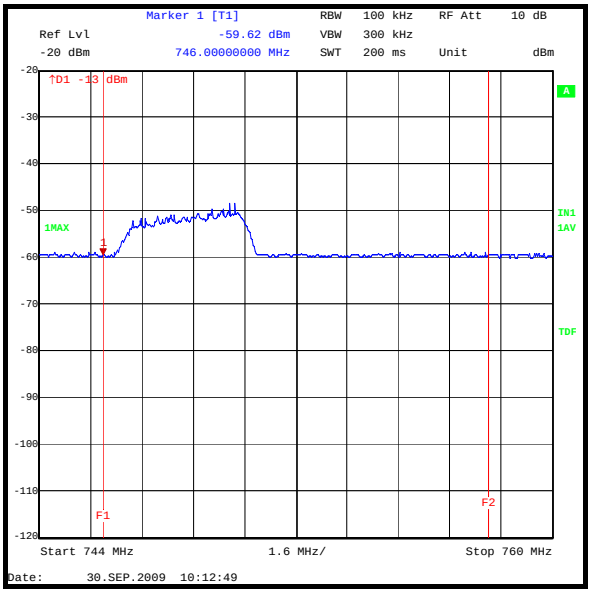
| | |
|---|---|
| **FCC Part:** | FCC 2.1051 and FCC 27.53(c)(1) |
| **Test Method Used:** | As described in ANSI TIA-603-C-2004 Section 2.2.12 referencing FCC CFR Part 2.1053 |

### Environmental Conditions:

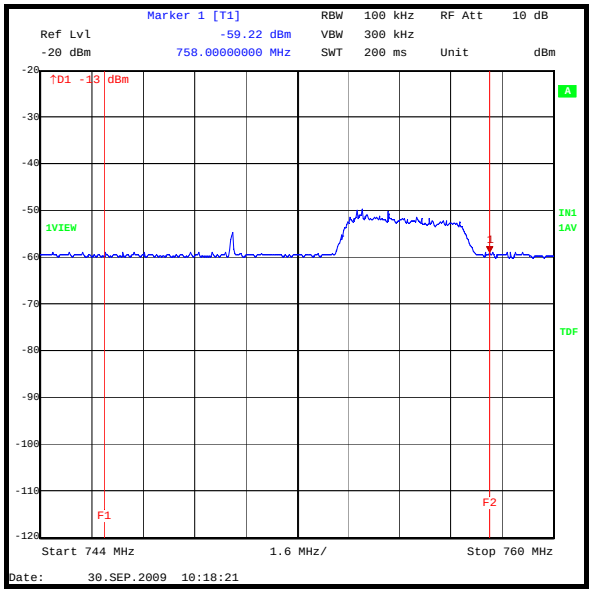
| | |
|---|---|
| **Temperature Variation (°C):** | 26 |
| **Relative Humidity Variation (%):** | 33 |

### Results: Sub Band B

| Modulation | Frequency (MHz) | Emission Level (dBm) | Limit (dBm) | Margin (dB) | Result |
|---|---|---|---|---|---|
| QPSK | 746.0 | -59.6 | -13.0 | 58.6 | Complied |
| QPSK | 758.0 | -59.2 | -13.0 | 46.2 | Complied |
| 16QAM | 746.0 | -60.1 | -13.0 | 47.1 | Complied |
| 16QAM | 758.0 | -59.7 | -13.0 | 46.7 | Complied |
| 64QAM | 746.0 | -59.6 | -13.0 | 46.6 | Complied |
| 64QAM | 758.0 | -59.7 | -13.0 | 46.7 | Complied |

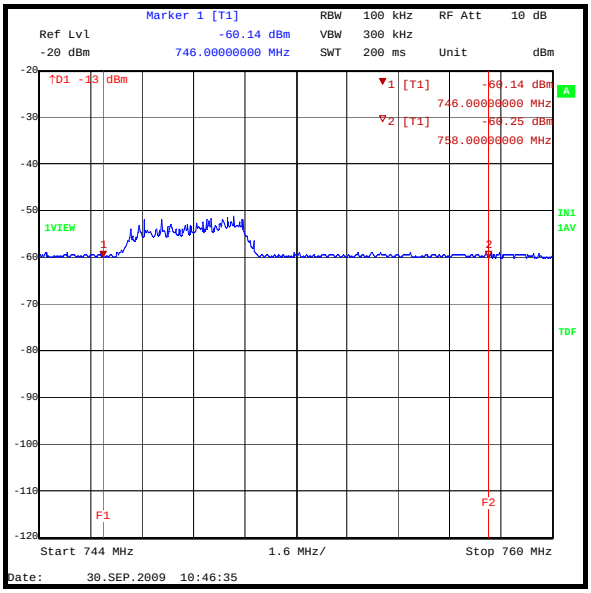



**QPSK – Lower Band Edge**

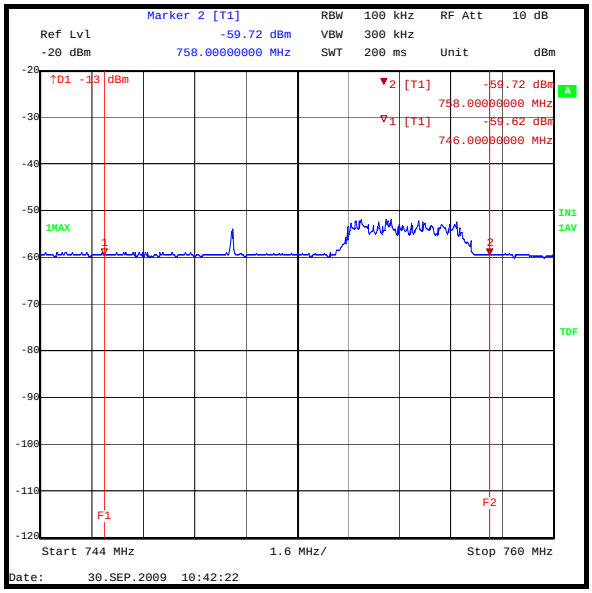



**QPSK – Upper Band Edge**

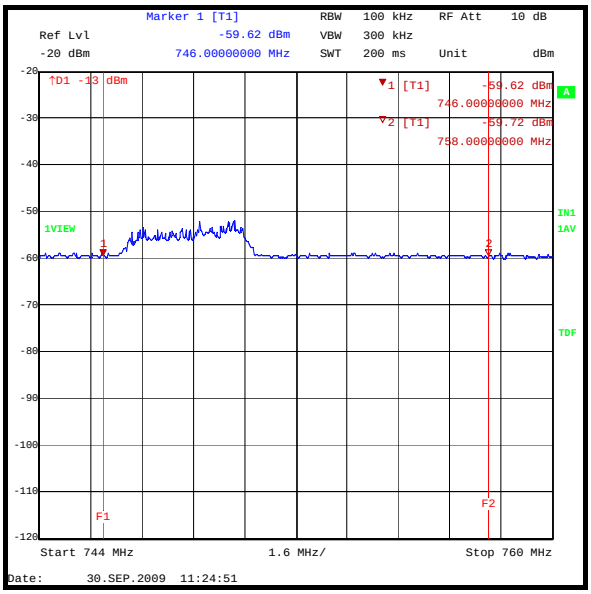
## Transmitter Radiated Emissions at Band Edges (continued)



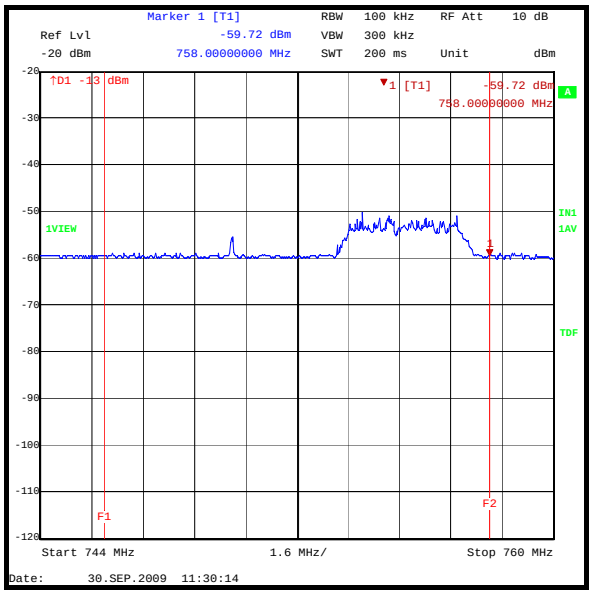

**16QAM – Lower Band Edge**




**16QAM – Upper Band Edge**




**64QAM – Lower Band Edge**




**64QAM – Upper Band Edge**

## 5.3.10. Transmitter Conducted Emissions – Emission Limitations

### Test Summary:

| | |
|---|---|
| **FCC Part:** | FCC 27.53(c)(3) |
| **Test Method Used:** | As detailed in ANSI TIA-603.C-2004 referencing FCC Part 2.1051 |
| **Frequency Range:** | 763 MHz to 775 MHz & 793 MHz to 805 MHz |

### Environmental Conditions:

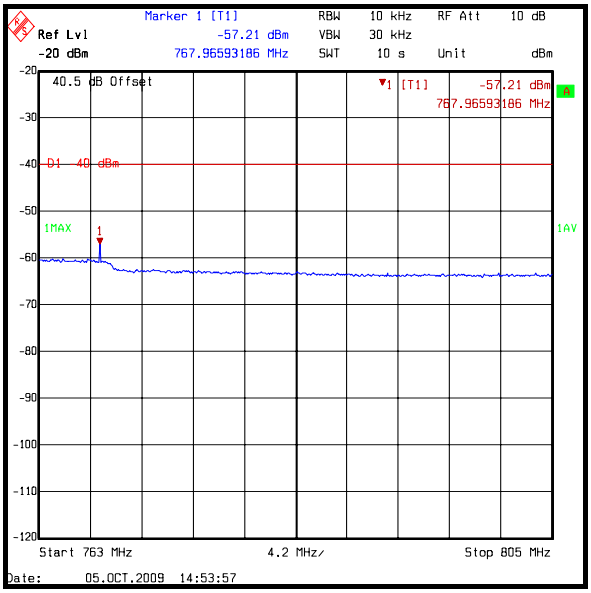
| | |
|---|---|
| **Temperature Variation (°C):** | 26 |
| **Relative Humidity Variation (%):** | 33 |

### Note(s):

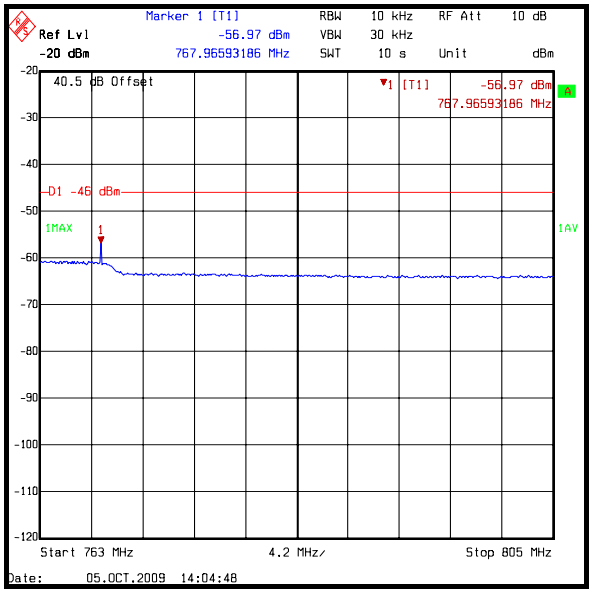
1. Preliminary testing was performed on both antenna ports with the worse case port being selected for measurements.

### Results: Sub Band B / Bottom Channel 748.6 MHz / Port 2

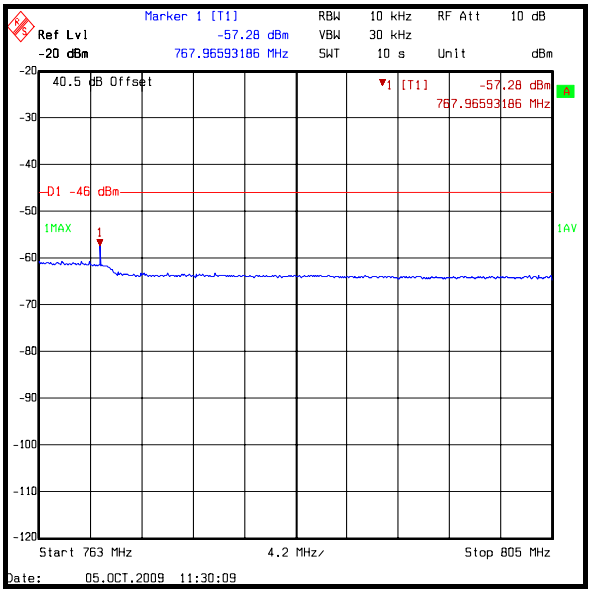
| Modulation | Frequency (MHz) | Level (dBm) | Limit (dBm) | Margin (dB) | Result |
|---|---|---|---|---|---|
| QPSK | 768.000516 | -48.3 | -46.0 | 2.3 | Complied |
| 16QAM | 768.000282 | -48.1 | -46.0 | 2.1 | Complied |
| 64QAM | 768.000084 | -48.5 | -46.0 | 2.5 | Complied |




**QPSK**




**16QAM**

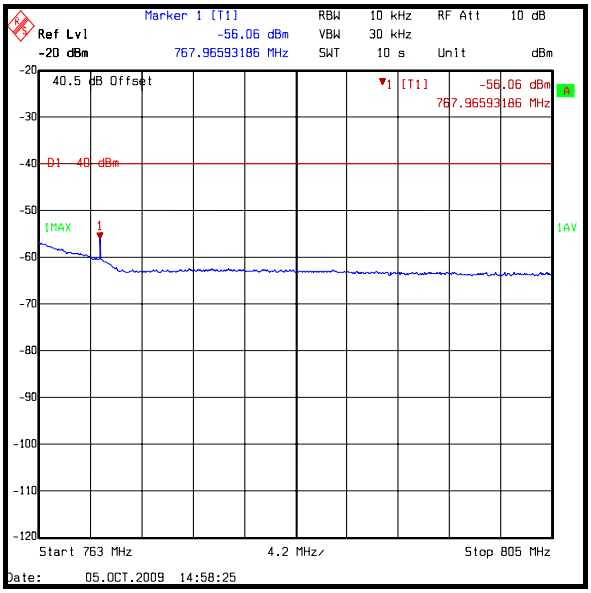

Marker 1 [T1]
RBW 10 kHz
RF Att 10 dB
Ref Lvl
-57.28 dBm
VBW 30 kHz
-20 dBm
767.96593186 MHz
SWT 10 s
Unit dBm
40.5 dB Offset
1 [T1] -57.28 dBm
767.96593186 MHz
D1 -46 dBm
1MAX
1AV
Start 763 MHz
4.2 MHz/
Stop 805 MHz
Date: 05.OCT.2009 11:30:09

**64QAM**

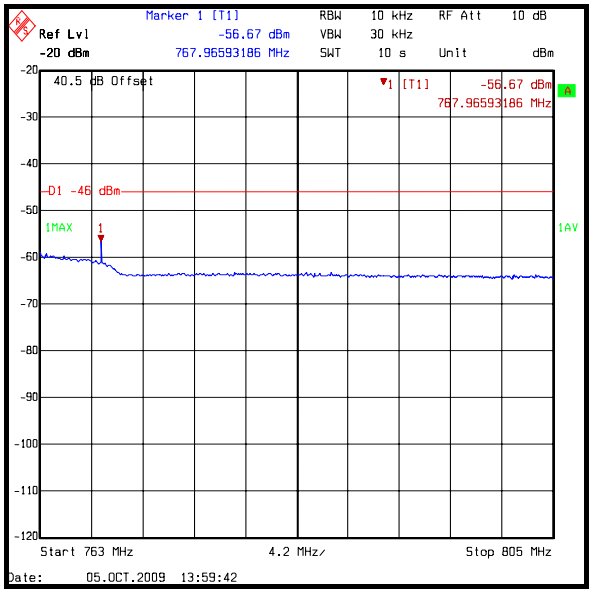
## Transmitter Conducted Emissions – Emission Limitations (continued)

## Results: Sub Band B / Top Channel 755.4 MHz / Port 2

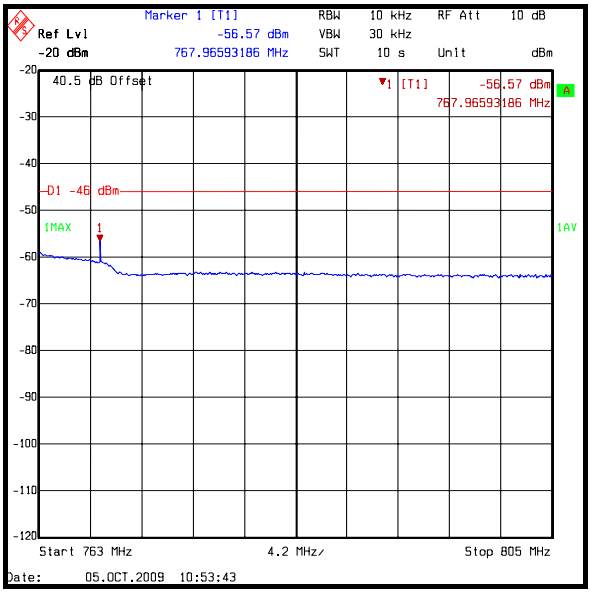
| Modulation | Frequency (MHz) | Level (dBm) | Limit (dBm) | Margin (dB) | Result |
|---|---|---|---|---|---|
| QPSK | 768.000595 | -46.8 | -46.0 | 0.8 | Complied |
| 16QAM | 768.000031 | -46.9 | -46.0 | 0.9 | Complied |
| 64QAM | 768.000023 | -46.9 | -46.0 | 0.9 | Complied |




**QPSK**




**16QAM**




**64QAM**

## 5.3.11. Transmitter Conducted Emissions – Emission Limitations

### Test Summary:

| | |
|---|---|
| **FCC Part:** | Part 27.53(f) |
| **Test Method Used:** | As detailed in ANSI TIA-603.C-2004 referencing FCC Part 2.1051 |
| **Frequency Range:** | 1559 MHz to 1610 MHz |

### Environmental Conditions:

| | |
|---|---|
| **Temperature Variation (°C):** | 26 |
| **Relative Humidity Variation (%):** | 33 |

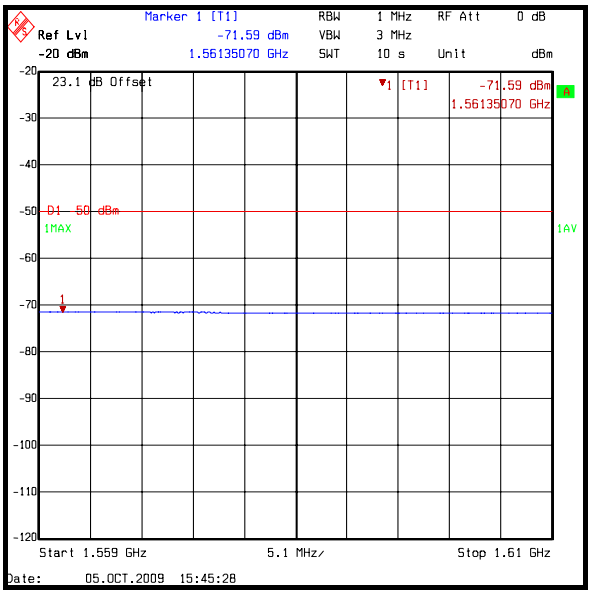
### Note(s):

1. Preliminary testing was performed on both antenna ports with the worse case port being selected for measurements.

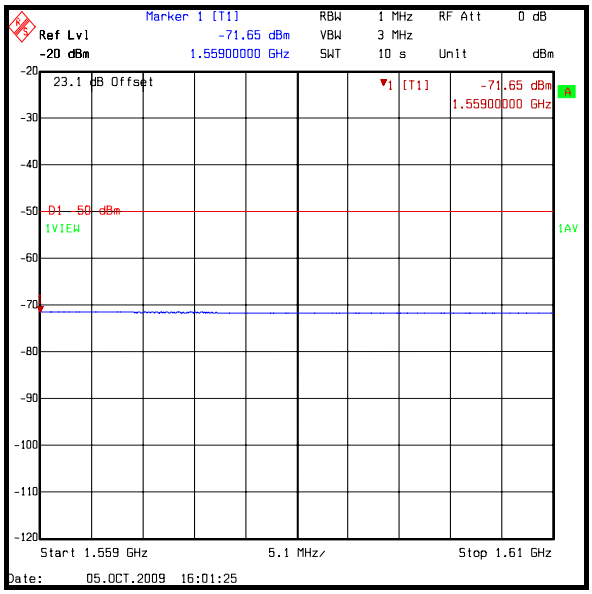
### Results: Sub Band B / Bottom Channel 748.6 MHz / Port 2

| Modulation | Frequency (MHz) | Level (dBm) | Limit (dBm) | Margin (dB) | Result |
|---|---|---|---|---|---|
| QPSK | 1561.35070 | -71.6 | -50.0 | 21.6 | Complied |
| 16QAM | 1559.00000 | -71.7 | -50.0 | 21.7 | Complied |
| 64QAM | 1559.10220 | -71.7 | -50.0 | 21.7 | Complied |

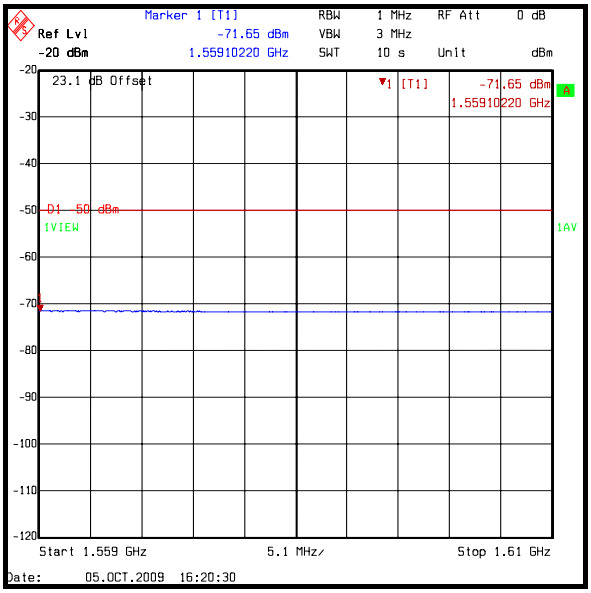
## Transmitter Conducted Emissions – Emission Limitations (continued)




**QPSK**




**16QAM**

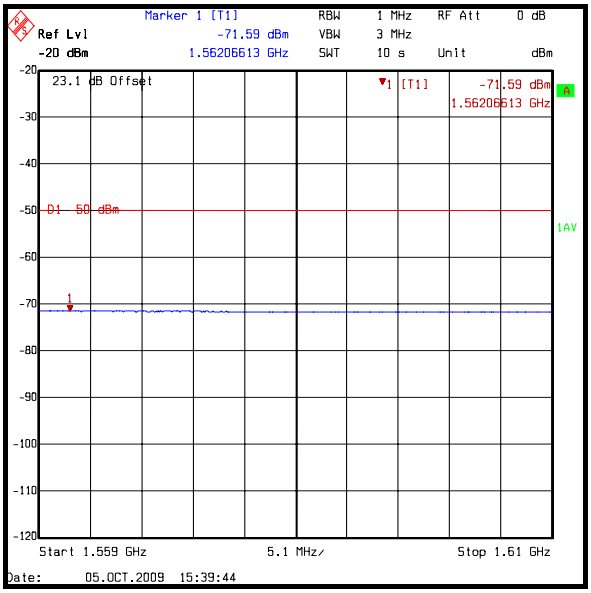



**64QAM**

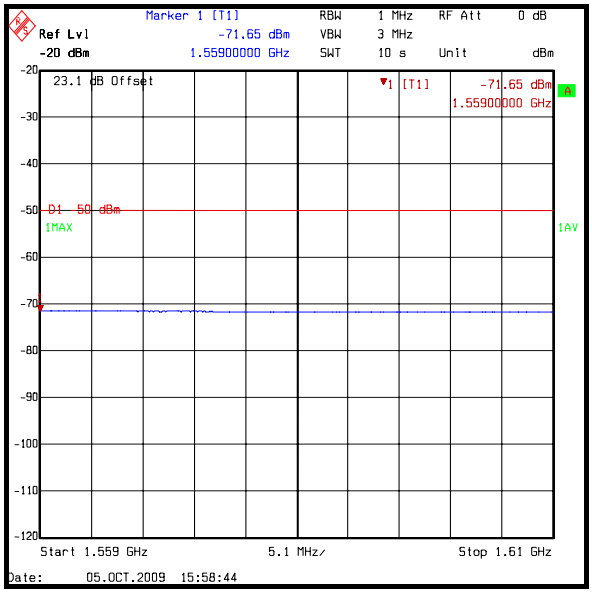
## Transmitter Conducted Emissions – Emission Limitations (continued)

## Results: Sub Band B / Top Channel 755.4 MHz / Port 2

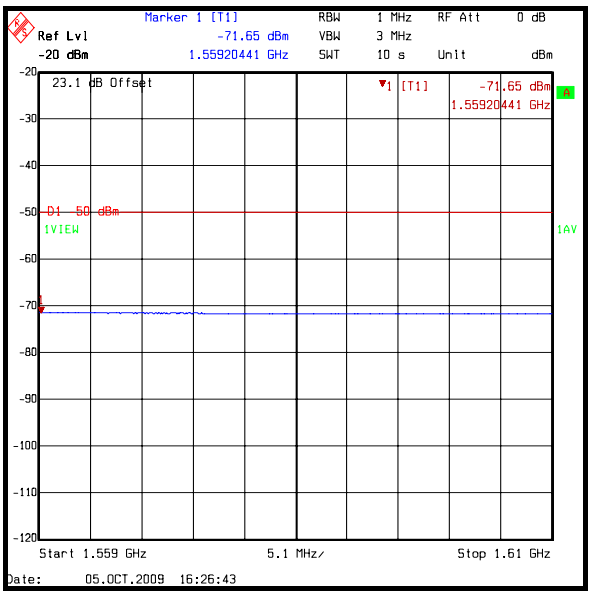
| Modulation | Frequency (MHz) | Level (dBm) | Limit (dBm) | Margin (dB) | Result |
|---|---|---|---|---|---|
| QPSK | 1562.066130 | -71.6 | -50.0 | 21.6 | Complied |
| 16QAM | 1559.000000 | -71.7 | -50.0 | 21.7 | Complied |
| 64QAM | 1559.204410 | -71.7 | -50.0 | 21.7 | Complied |




QPSK




16QAM




64QAM

## 5.3.12. Transmitter Radiated Spurious Emissions – Emission Limitations

### Test Summary:

| | |
|---|---|
| **FCC Part:** | Part 27.53(c)(3) |
| **Test Method Used:** | As detailed in ANSI TIA-603-C-2004 Section 2.2.12. referencing FCC Part 2.1053 |
| **Frequency Range:** | 763 MHz to 775 MHz & 793 MHz to 805 MHz |

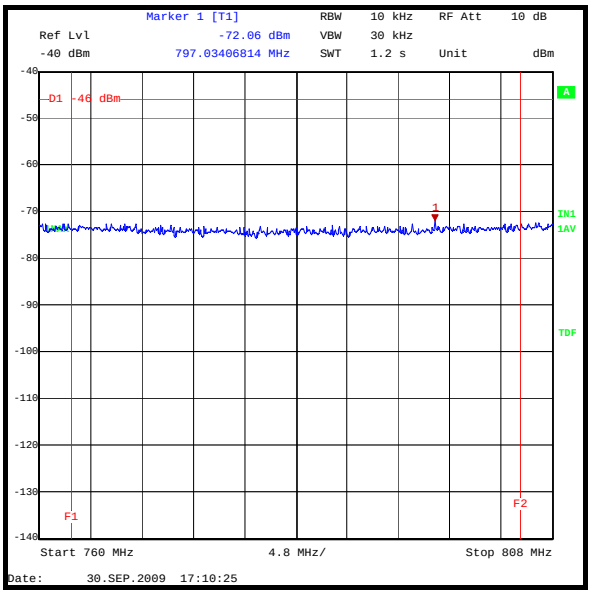
### Environmental Conditions:

| | |
|---|---|
| **Temperature Variation (°C):** | 26 |
| **Relative Humidity Variation (%):** | 33 |

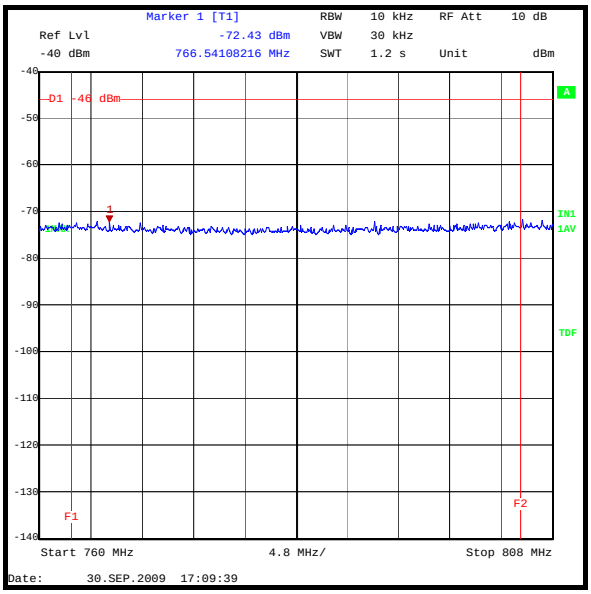
### Results: Sub Band B / Bottom Channel 748.6 MHz

| Modulation | Freq (MHz) | Level (dBm) | Limit (dBm) | Margin (dB) | Result |
|---|---|---|---|---|---|
| QPSK | 747.034 | -72.1 | -46.0 | 26.1 | Complied |
| 16QAM | 755.541 | -72.4 | -46.0 | 26.4 | Complied |
| 64QAM | 804.248 | -72.5 | -46.0 | 26.5 | Complied |

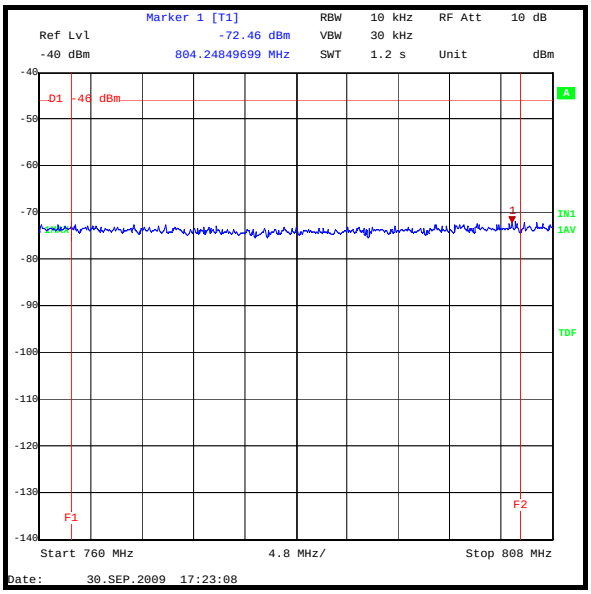
## Transmitter Radiated Spurious Emissions – Emission Limitations (continued)




**QPSK**




**16QAM**

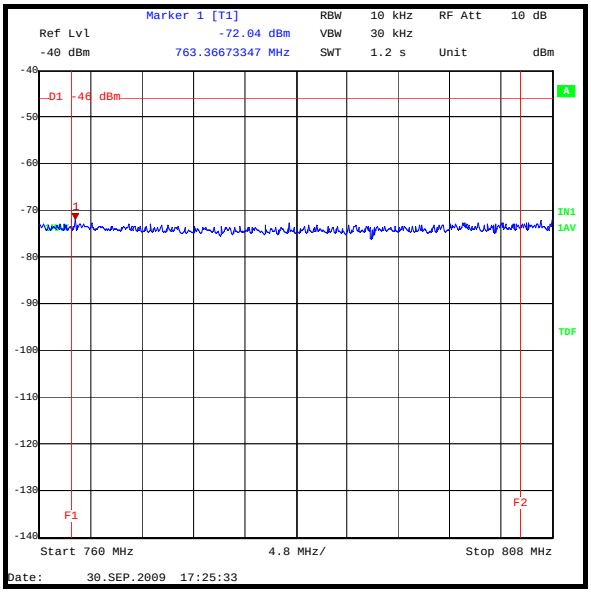



**64QAM**

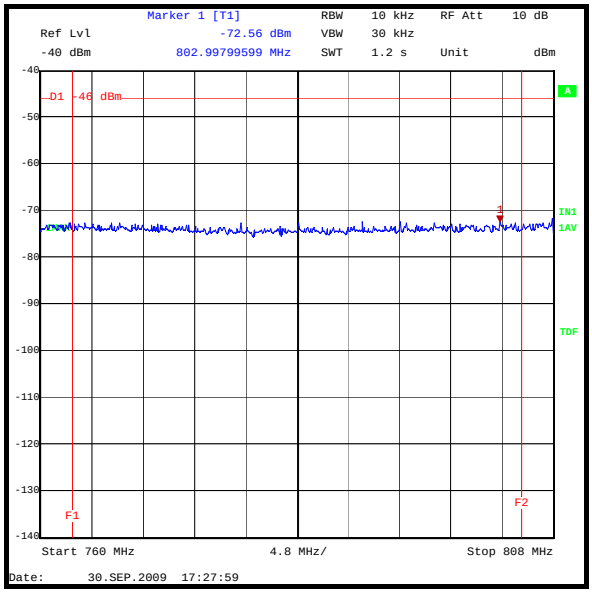
## Transmitter Radiated Spurious Emissions – Emission Limitations (continued)

## Results: Sub Band B / Top Channel 755.4 MHz

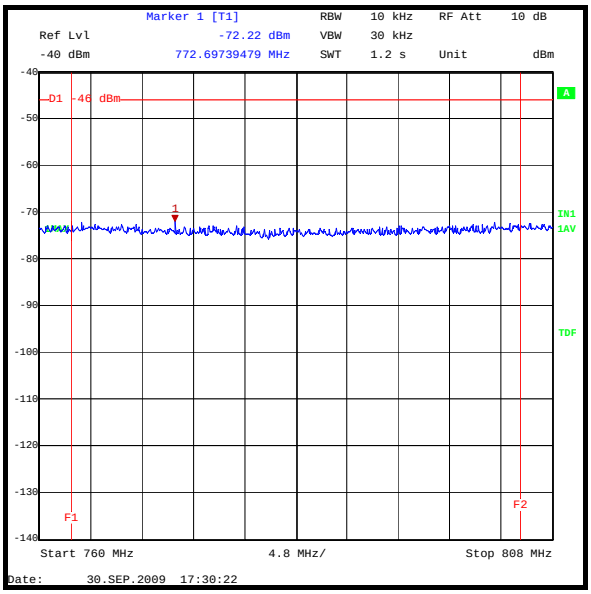
| Modulation | Freq (MHz) | Level (dBm) | Limit (dBm) | Margin (dB) | Result |
|---|---|---|---|---|---|
| QPSK | 763.367 | -72.0 | -46.0 | 26.0 | Complied |
| 16QAM | 802.998 | -72.6 | -46.0 | 26.6 | Complied |
| 64QAM | 772.697 | -72.2 | -46.0 | 26.2 | Complied |




QPSK




16QAM




64QAM

## 5.3.13. Transmitter Radiated Spurious Emissions – Emission Limitations

### Test Summary:

| | |
|---|---|
| **FCC Part:** | Part 27.53(f) |
| **Test Method Used:** | As detailed in ANSI TIA-603-C-2004 Section 2.2.12. referencing FCC Part 2.1053 |
| **Frequency Range:** | 1559 MHz to 1610 MHz |

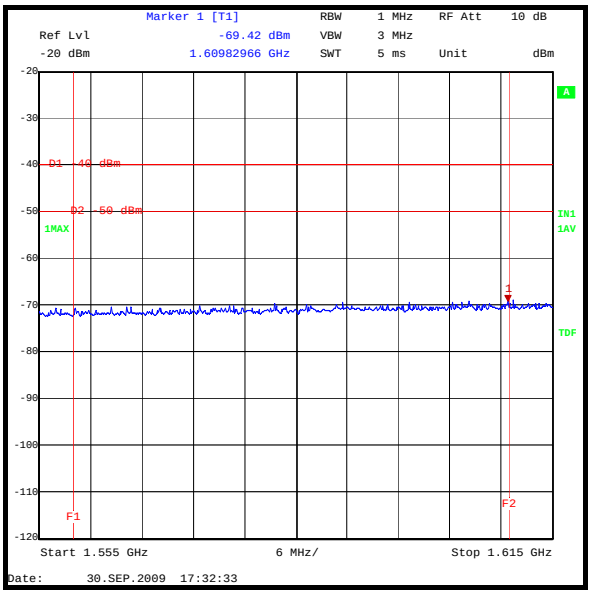
### Environmental Conditions:

| | |
|---|---|
| **Temperature Variation (°C):** | 26 |
| **Relative Humidity Variation (%):** | 33 |

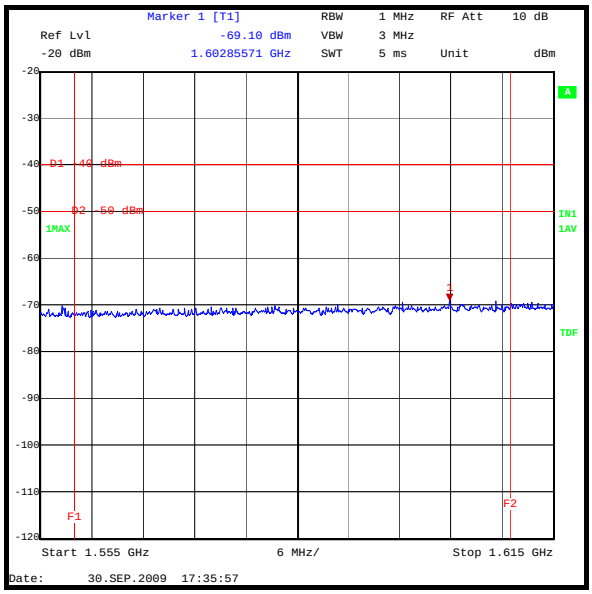
### Results: Sub Band B / Bottom Channel 748.6 MHz

| Modulation | Frequency (MHz) | Level (dBm) | Limit (dBm) | Margin (dB) | Result |
|---|---|---|---|---|---|
| QPSK | 1609.830 | -69.4 | -50.0 | 19.4 | Complied |
| 16QAM | 1602.856 | -69.1 | -50.0 | 19.1 | Complied |
| 64QAM | 1604.178 | -69.7 | -50.0 | 19.7 | Complied |

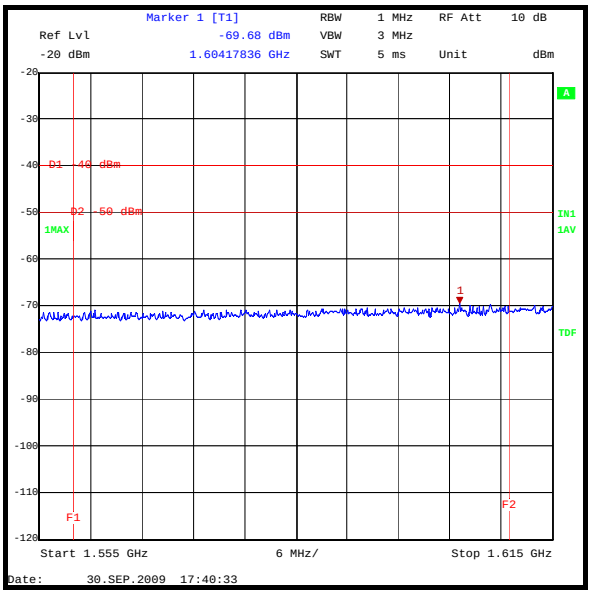
## Transmitter Radiated Spurious Emissions – Emission Limitations (continued)




**QPSK**




**16QAM**

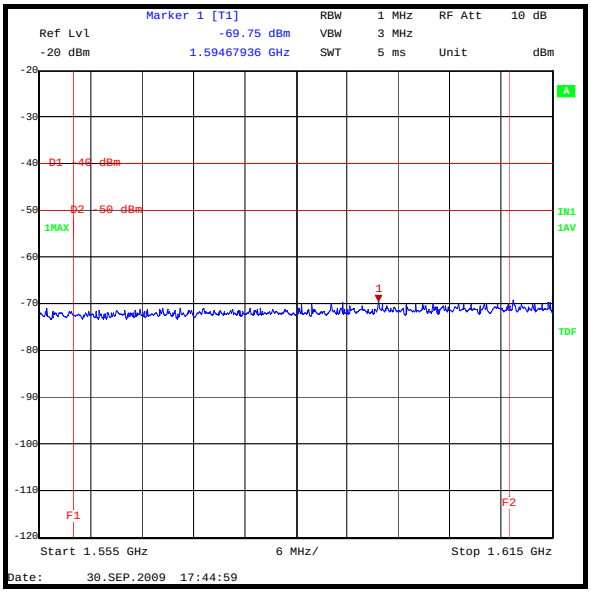



**64QAM**

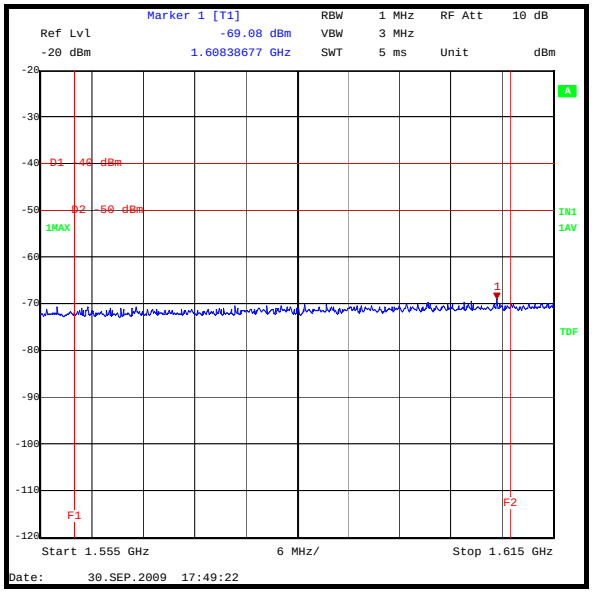
## Transmitter Radiated Spurious Emissions – Emission Limitations (continued)

## Results: Sub Band B / Top Channel 755.4 MHz

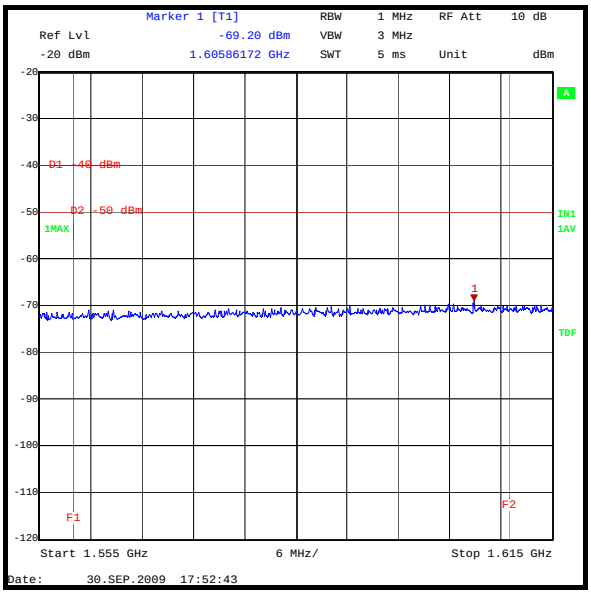
| Modulation | Frequency (MHz) | Level (dBm) | Limit (dBm) | Margin (dB) | Result |
|---|---|---|---|---|---|
| QPSK | 1594.679 | -69.8 | -50.0 | 19.8 | Complied |
| 16QAM | 1608.387 | -69.1 | -50.0 | 19.1 | Complied |
| 64QAM | 1605.862 | -69.2 | -50.0 | 19.2 | Complied |




**QPSK**




**16QAM**




**64QAM**

## 5.4. Test Results – Sub Band C

### 5.4.1. Transmitter Carrier Output Power and Effective Radiated Power (ERP)

**Test Summary:**

| | |
|---|---|
| **FCC Part:** | 2.1046 and 27.50(b)(1) |
| **Test Method Used:** | As detailed in ANSI TIA-603-C-2004 Section 2.2.17.2 |

**Environmental Conditions:**

| | |
|---|---|
| **Temperature Variation (°C):** | 26 |
| **Relative Humidity Variation (%):** | 35 |

**Results: Antenna Port 1**

| Modulation | Frequency (MHz) | Conducted RF Power (dBm) | Antenna Gain (dBi) | ERP (dBm) | Limit ERP (dBm) | Margin (dB) | Result |
|---|---|---|---|---|---|---|---|
| QPSK | 760.4 | 38.9 | 20 | 58.9 | 60.0 | 1.1 | Complied |
| 16QAM | 760.4 | 38.7 | 20 | 58.7 | 60.0 | 1.3 | Complied |
| 64QAM | 760.4 | 38.7 | 20 | 58.7 | 60.0 | 1.3 | Complied |

**Results: Antenna Port 2**

| Modulation | Frequency (MHz) | Conducted RF Power (dBm) | Antenna Gain (dBi) | ERP (dBm) | Limit ERP (dBm) | Margin (dB) | Result |
|---|---|---|---|---|---|---|---|
| QPSK | 760.4 | 39.1 | 20 | 59.1 | 60.0 | 0.9 | Complied |
| 16QAM | 760.4 | 39.2 | 20 | 59.2 | 60.0 | 0.8 | Complied |
| 64QAM | 760.4 | 39.2 | 20 | 59.2 | 60.0 | 0.8 | Complied |

**Note(s):**

1. Measurements were performed with the EUT transmitting on all supported modulation types on the Antenna Port 1 and Antenna Port 2.

## 5.4.2. Transmitter Occupied Bandwidth

### Test Summary:

| | |
|---|---|
| **FCC Part:** | FCC 2.1049 |
| **Test Method Used:** | As detailed in ANSI C63.4 Section 13.1.7 and relevant annexes referencing FCC CFR Part 2.1049 (see note below) |

### Environmental Conditions:

| | |
|---|---|
| **Temperature Variation (°C):** | 26 |
| **Relative Humidity Variation (%):** | 35 |

### Results: Antenna Port 1

| Modulation | Frequency (MHz) | Resolution Bandwidth (kHz) | Video Bandwidth (kHz) | Occupied Bandwidth (MHz) |
|---|---|---|---|---|
| QPSK | 760.4 | 100 | 300 | 4.118 |
| 16QAM | 760.4 | 100 | 300 | 4.118 |
| 64QAM | 760.4 | 100 | 300 | 4.118 |

### Results: Antenna Port 2

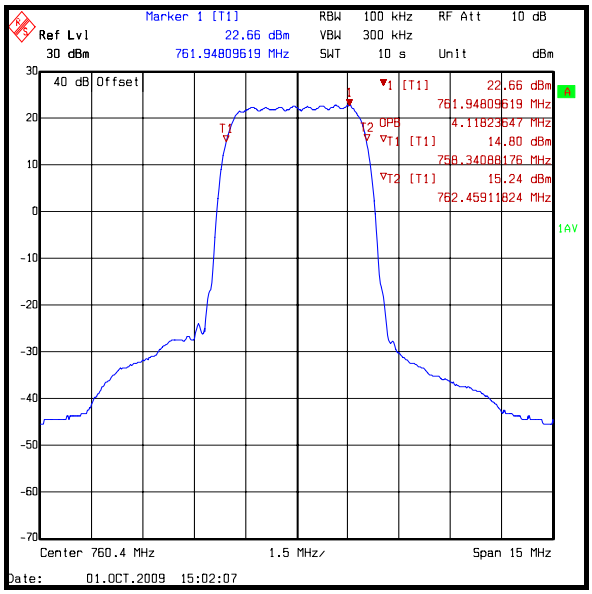
| Modulation | Frequency (MHz) | Resolution Bandwidth (kHz) | Video Bandwidth (kHz) | Occupied Bandwidth (MHz) |
|---|---|---|---|---|
| QPSK | 760.4 | 100 | 300 | 4.118 |
| 16QAM | 760.4 | 100 | 300 | 4.118 |
| 64QAM | 760.4 | 100 | 300 | 4.118 |

### Note(s):

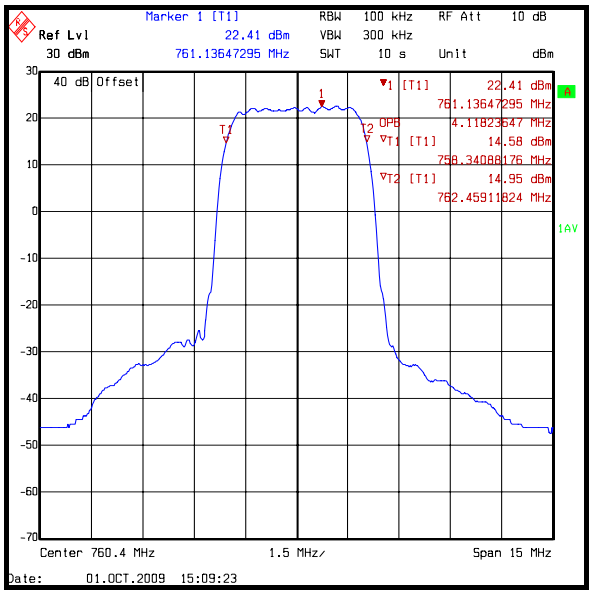
1. In lieu of the test method detailed in ANSI C63.4 Section 13.1.7 the 99% occupied bandwidth was measured using the Occupied Bandwidth function of the spectrum analyser.
2. Measurements were performed with the EUT transmitting on all supported modulation types on the Antenna Port 1 and Antenna Port 2.

## Transmitter Occupied Bandwidth (continued)

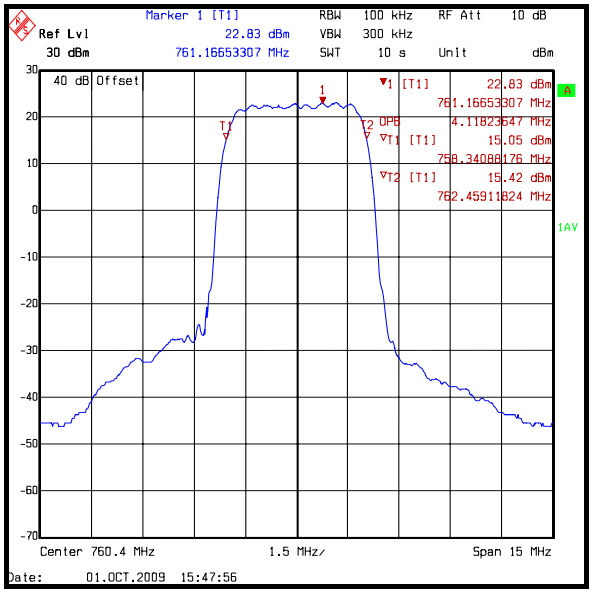
## Antenna Port 1




**QPSK**



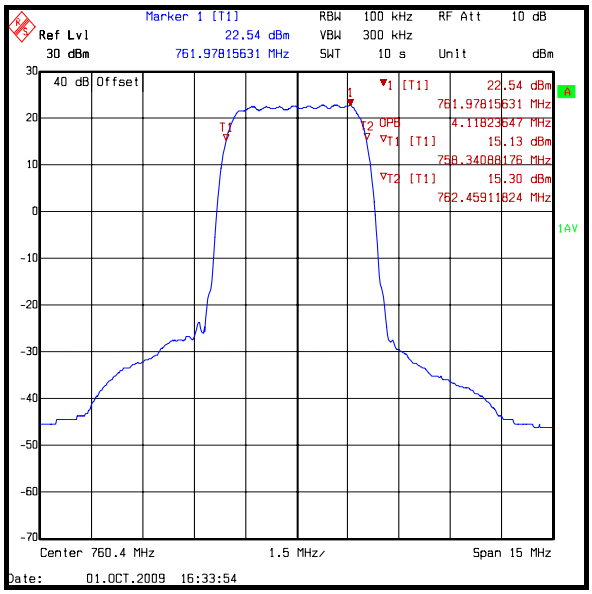

**16QAM**



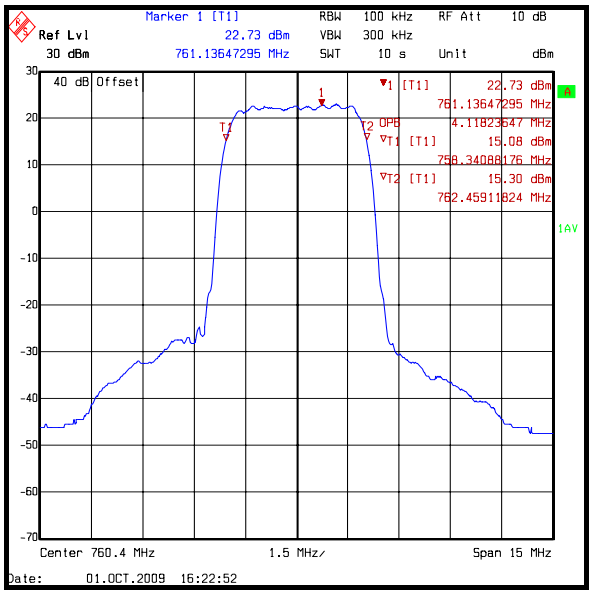

**64QAM**

## Transmitter Occupied Bandwidth (continued)

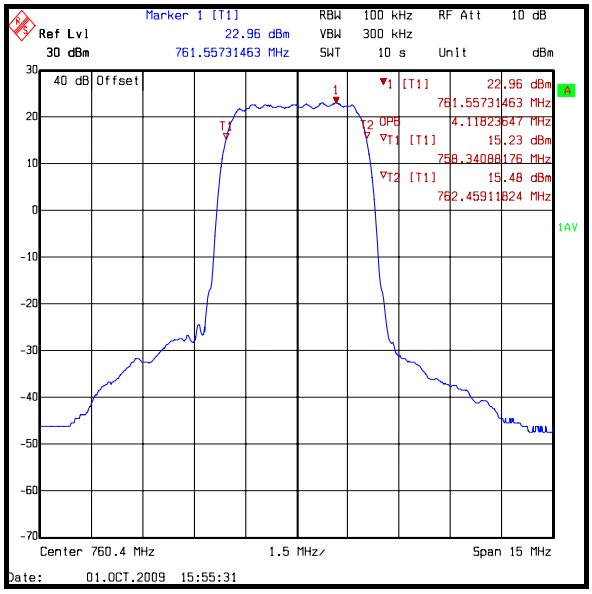
### Antenna Port 2




**QPSK**




**16QAM**




**64QAM**

## 5.4.3. Transmitter Frequency Stability - Temperature Variation

### Test Summary:

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

### Environmental Conditions:

| | |
|---|---|
| **Temperature Variation (°C):** | 24-25 |
| **Relative Humidity Variation (%):** | 43-46 |

### Results: Sub Band C / Single Channel 760.4 MHz / Port 2

| Temp (ºC) | Measured Frequency (MHz) | Frequency Error (Hz) |
|---|---|---|
| -30 | 760.399793 | 207 |
| -20 | 760.399797 | 203 |
| -10 | 760.399797 | 203 |
| 0 | 760.399800 | 200 |
| 10 | 760.399802 | 198 |
| 20 | 760.399803 | 197 |
| 30 | 760.399806 | 194 |
| 40 | 760.399812 | 188 |
| 50 | 760.399819 | 181 |

### Note(s):

1. Measurements were performed with a reduced resolution bandwidth to determine absolute accuracy. This technique identifies the carrier breakthrough. A marker was placed on the carrier breakthrough point and the frequency recorded.

### Limits:

The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

## 5.4.4. Transmitter Frequency Stability - Voltage Variation

### Test Summary:

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

### Environmental Conditions:

| | |
|---|---|
| **Temperature Variation (°C):** | 25 |
| **Relative Humidity Variation (%):** | 43 |

### Results: Sub Band C / Single Channel 760.4 MHz / Port 2

| Supply Voltage (ºC) | Measured Frequency (MHz) | Frequency Error (Hz) |
|---|---|---|
| -40.8 | 760.399803 | 197 |
| -48.0 | 760.399803 | 197 |
| -55.2 | 760.399803 | 197 |

### Note(s):

1.

## 5.4.5. Transmitter Conducted Emissions – Channel Edge

### Test Summary:

| | |
|---|---|
| **FCC Part:** | 27.53(d) |
| **Test Method Used** | As detailed in ANSI TIA-603.C-2004 referencing FCC Part 2.1051 |

### Environmental Conditions:

| | |
|---|---|
| **Temperature Variation (°C):** | 24 |
| **Relative Humidity Variation (%):** | 31 |

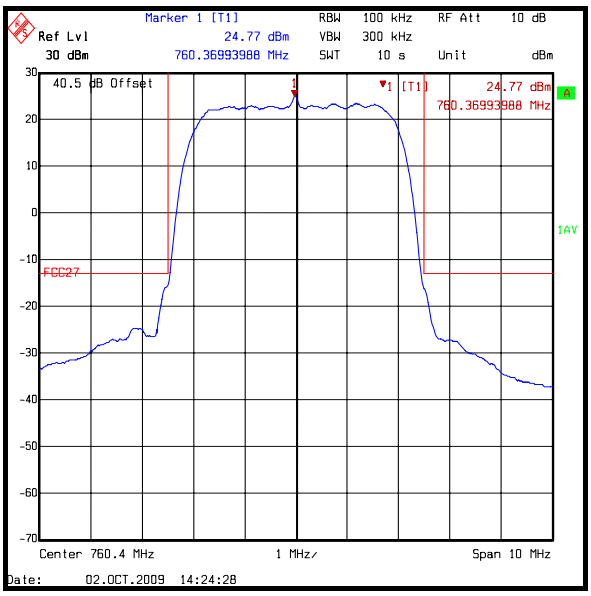
### Note(s):

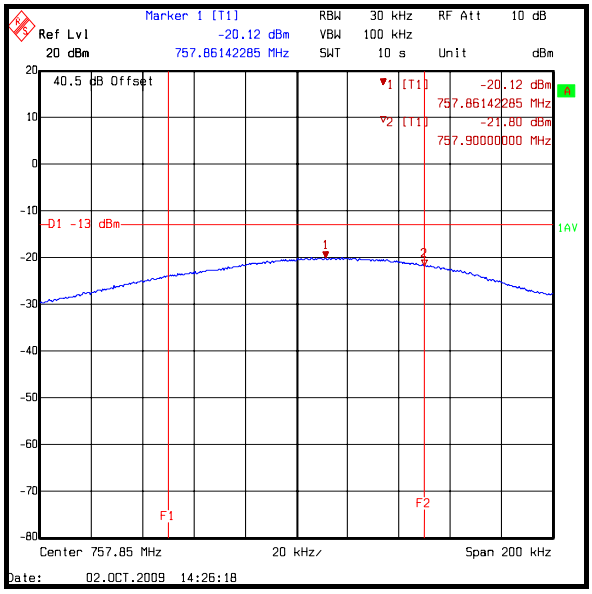
1. It can be seen on the main mask plot that the emission is close to the limit line. This is on account of the analyser bandwidth being too great to make an accurate measurement. As stated in FCC Part 27.53(c)(5), FCC Part 27.53(d)(5), a resolution bandwidth of 30 kHz was used in the 100 kHz bands immediately outside and adjacent to the frequency block to demonstrate compliance and this can be seen on the two plots accompanying the mask plot.
2. Preliminary testing was performed on both antenna ports with the worse case port being selected for measurements.

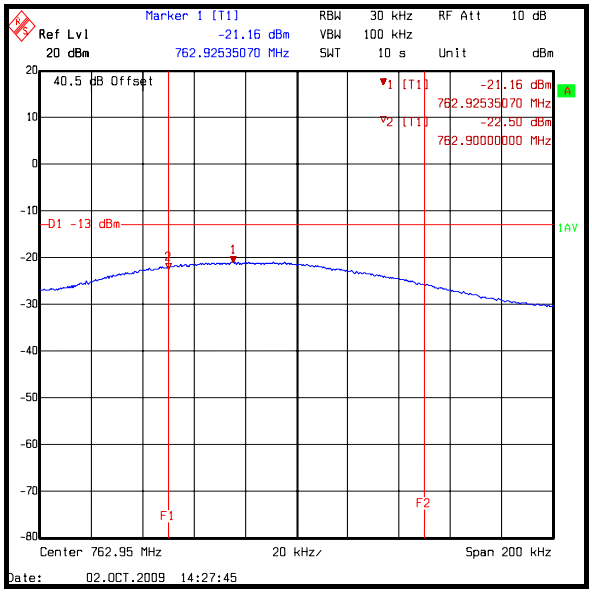
### Results: Sub Band C / Single Channel 760.4 MHz / QPSK / Port 2

| Frequency of 100 kHz strip adjacent to channel edge (MHz) | Level in 100 kHz strip adjacent to block edge (dBm) | Band Edge Limit (dBm) | Margin (dB) | Result |
|---|---|---|---|---|
| 757.861 | -20.1 | -13.0 | 7.1 | Complied |
| 762.925 | -21.2 | -13.0 | 8.2 | Complied |

## Transmitter Conducted Emissions – Channel Edge (continued)



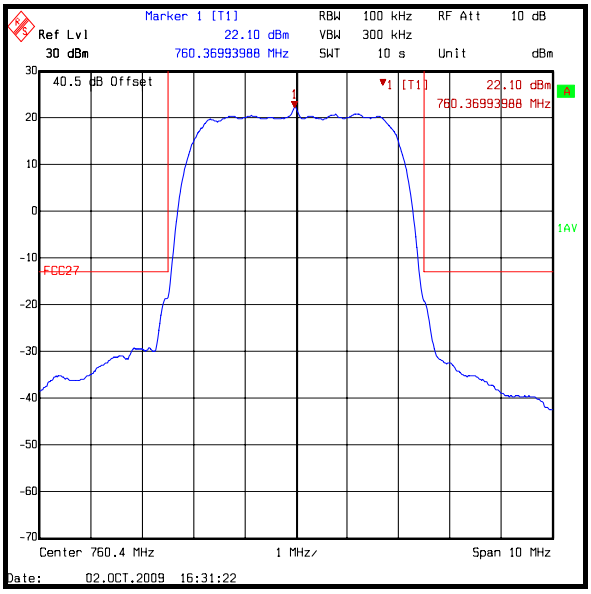



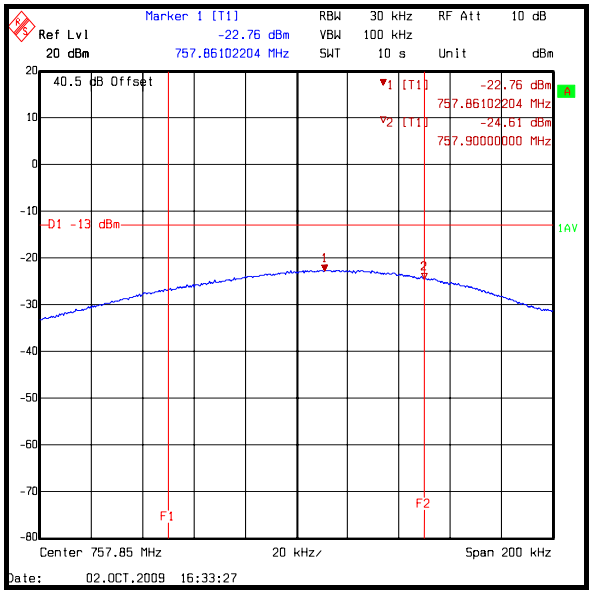



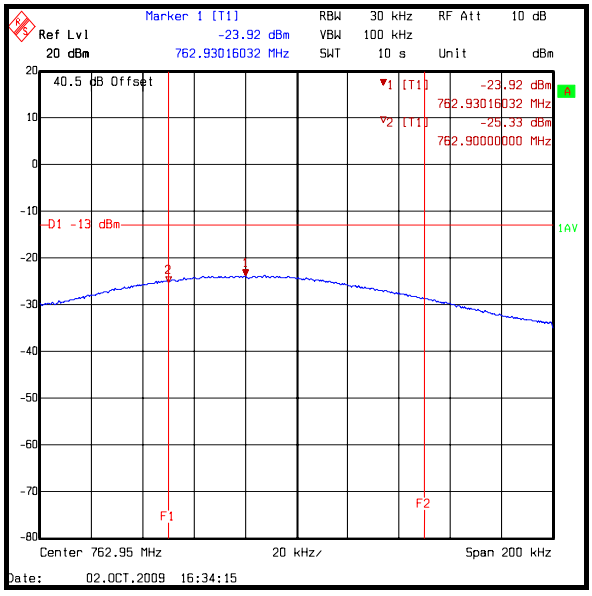
## Transmitter Conducted Emissions – Channel Edge (continued)

## Results: Sub Band C / Single Channel 760.4 MHz / 16QAM / Port 2

| Frequency of 100 kHz strip adjacent to channel edge (MHz) | Level in 100 kHz strip adjacent to block edge (dBm) | Band Edge Limit (dBm) | Margin (dB) | Result |
|---|---|---|---|---|
| 757.861 | -22.8 | -13.0 | 9.8 | Complied |
| 762.930 | -23.9 | -13.0 | 10.9 | Complied |



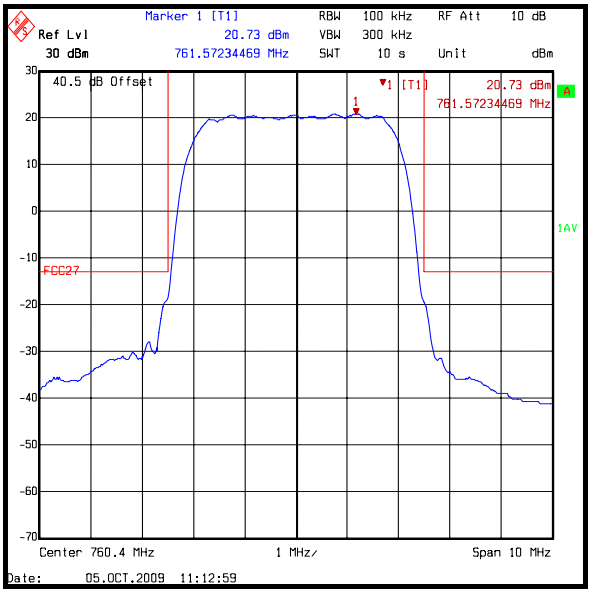



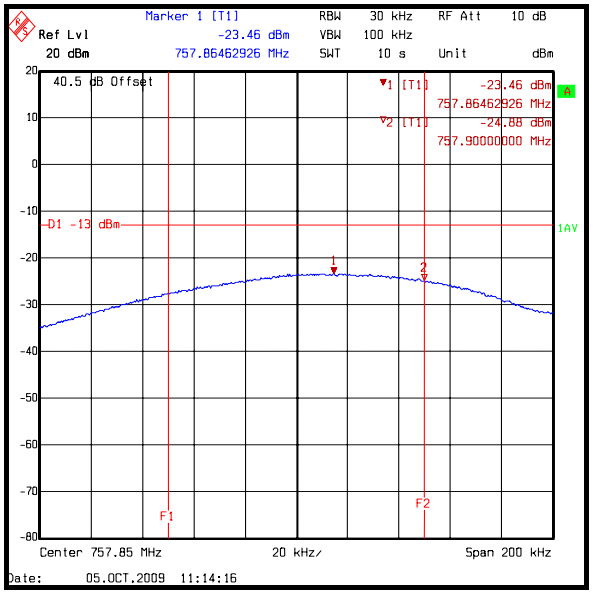



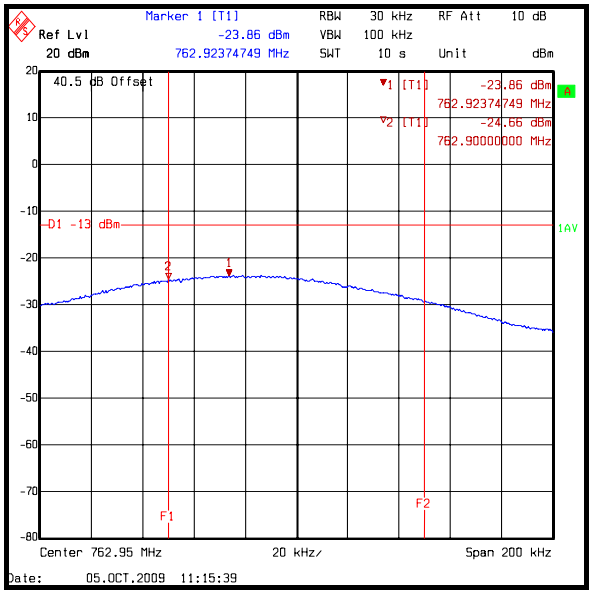
## Transmitter Conducted Emissions – Channel Edge (continued)

## Results: Sub Band C / Single Channel 760.4 MHz / 64QAM / Port 2

| Frequency of 100 kHz strip adjacent to channel edge (MHz) | Level in 100 kHz strip adjacent to block edge (dBm) | Band Edge Limit (dBm) | Margin (dB) | Result |
|---|---|---|---|---|
| 757.865 | -23.5 | -13.0 | 10.5 | Complied |
| 762.924 | -23.9 | -13.0 | 10.9 | Complied |



## 5.4.6. Transmitter Conducted Emissions

### Test Summary:

| | |
|---|---|
| **FCC Part:** | 2.1051 and 27.53(d)(3) |
| **Test Method Used:** | As detailed in ANSI TIA-603.C-2004 referencing FCC Part 2.1051 |

### Environmental Conditions:

| | |
|---|---|
| **Temperature Variation (°C):** | 24 |
| **Relative Humidity Variation (%):** | 31 |

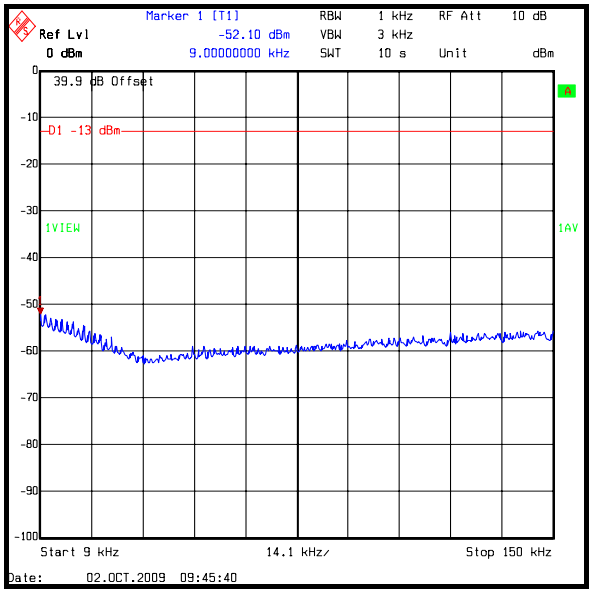
### Results: Sub Band C / Single Channel 760.4 MHz / Port 2

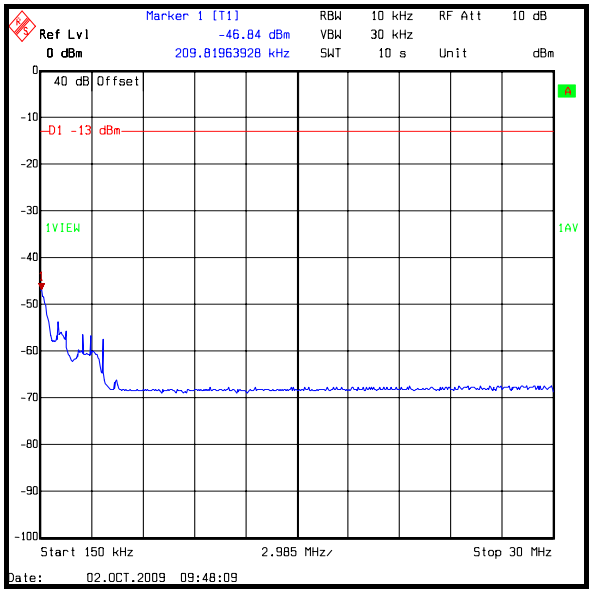
| Modulation | Frequency (MHz) | Emission Level (dBm) | Limit (dBm) | Margin (dB) | Result |
|---|---|---|---|---|---|
| QPSK | 1519.081660 | -29.3 | -13.0 | 16.3 | Complied |
| 16QAM | 1522.623370 | -33.4 | -13.0 | 20.4 | Complied |
| 64QAM | 1522.580160 | -33.9 | -13.0 | 20.9 | Complied |

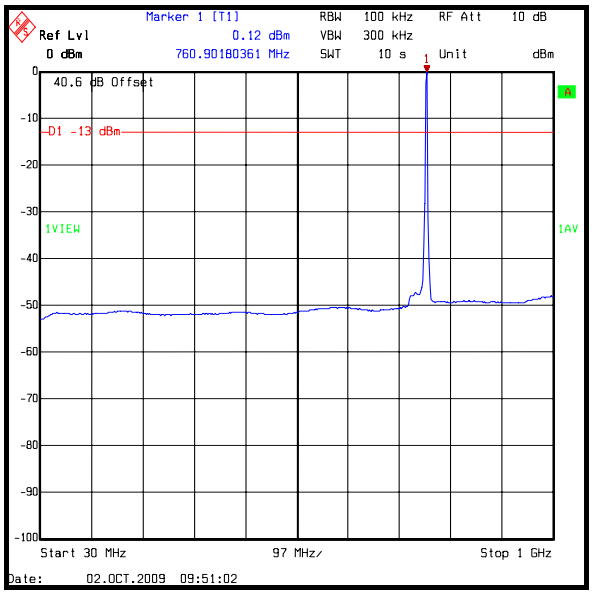
### Note(s):

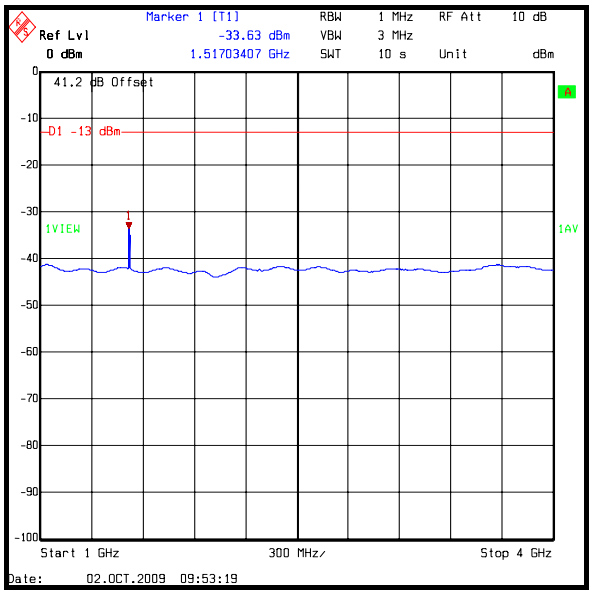
1. The emissions shown at approximately 760.902 MHz on the 30 MHz to 1 GHz plot is the carrier
2. All other emissions were >20 dB below the applicable limit or below the level of the noise floor of the measuring receiver.
3. Preliminary testing was performed on both antenna ports with the worse case port being selected for measurements.

## Transmitter Conducted Emissions (continued)

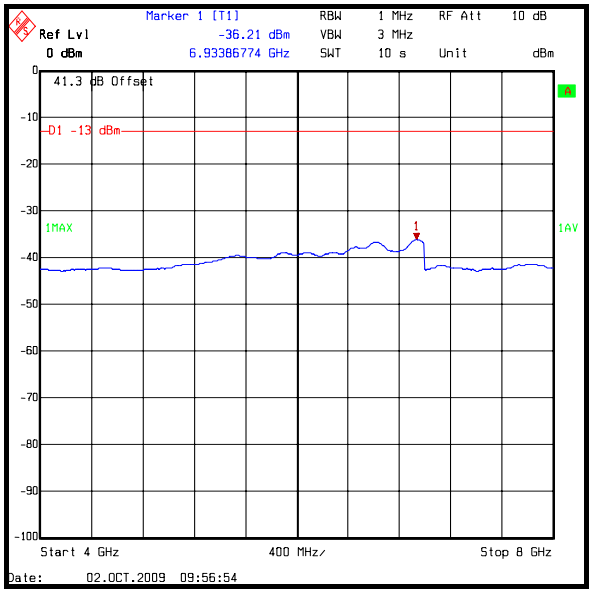


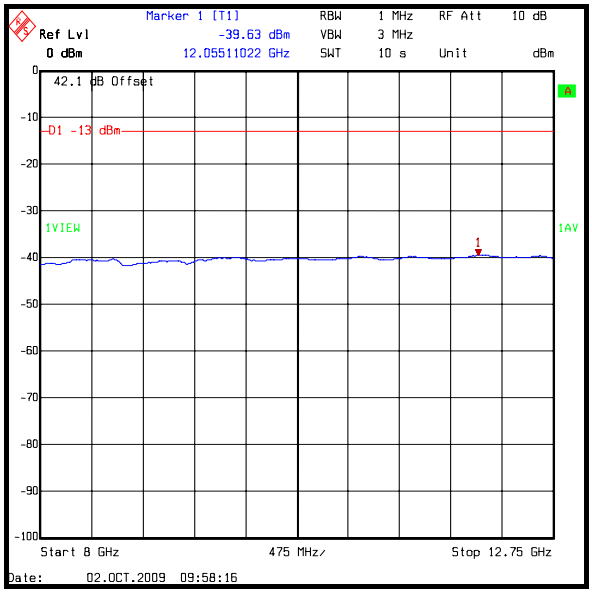



## Transmitter Conducted Emissions (continued)



## 5.4.7. Transmitter Conducted Emissions at Band Edges

### Test Summary:

| | |
|---|---|
| **FCC Part:** | 2.1051 and 27.53(d)(3) |
| **Test Method Used:** | As detailed in ANSI TIA-603.C-2004 referencing FCC Part 2.1051 |

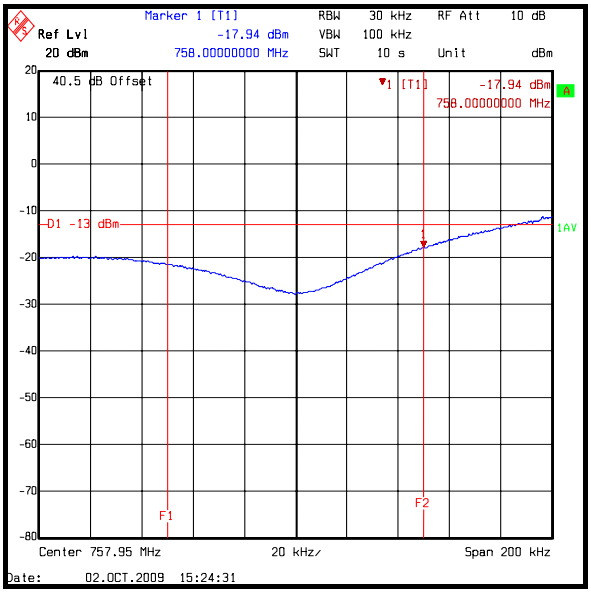
### Environmental Conditions:

| | |
|---|---|
| **Temperature Variation (°C):** | 24 |
| **Relative Humidity Variation (%):** | 37 |

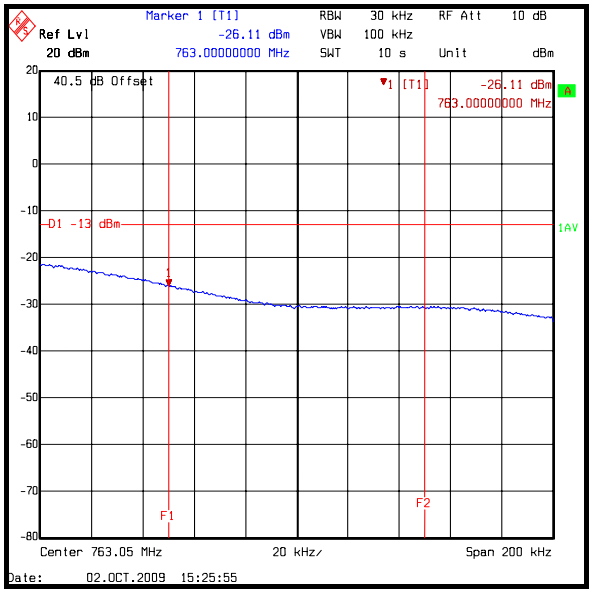
### Transmitter Conducted Emissions at Band Edges (continued)

### Results: Sub Band C / Single Channel 760.4 MHz / Port 2

| Modulation | Frequency of 100 kHz strip adjacent to block edge (MHz) | Level in 100 kHz strip adjacent to block edge (dBm) | Band edge limit (dBm) | Margin (dB) | Result |
|---|---|---|---|---|---|
| QPSK | 758.0 | -17.9 | -13.0 | 4.9 | Complied |
| QPSK | 763.0 | -26.1 | -13.0 | 13.1 | Complied |
| 16QAM | 758.0 | -20.7 | -13.0 | 7.7 | Complied |
| 16QAM | 763.0 | -28.8 | -13.0 | 15.8 | Complied |
| 64QAM | 758.0 | -21.0 | -13.0 | 8.0 | Complied |
| 64QAM | 763.0 | -29.6 | -13.0 | 16.6 | Complied |

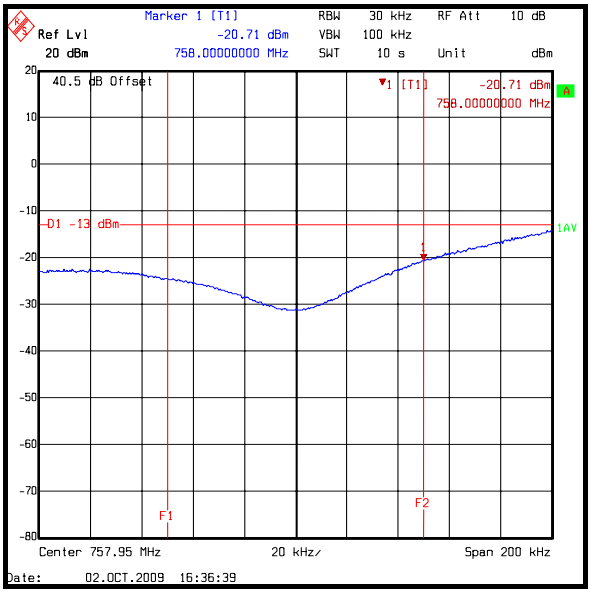



**QPSK – Lower Band Edge**

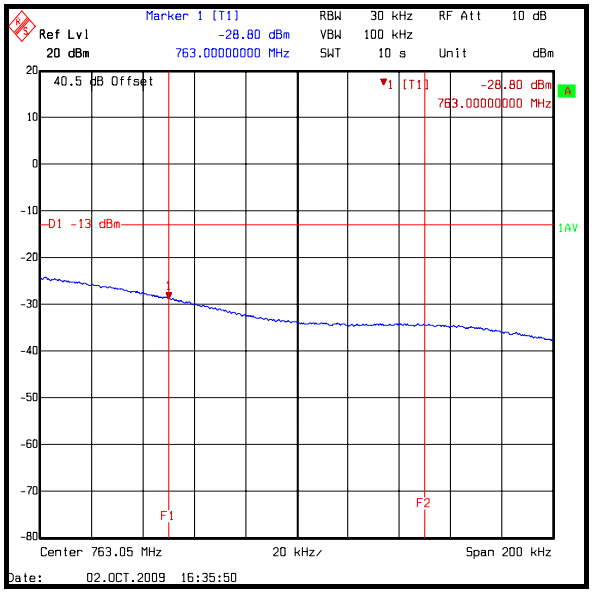



**QPSK – Upper Band Edge**

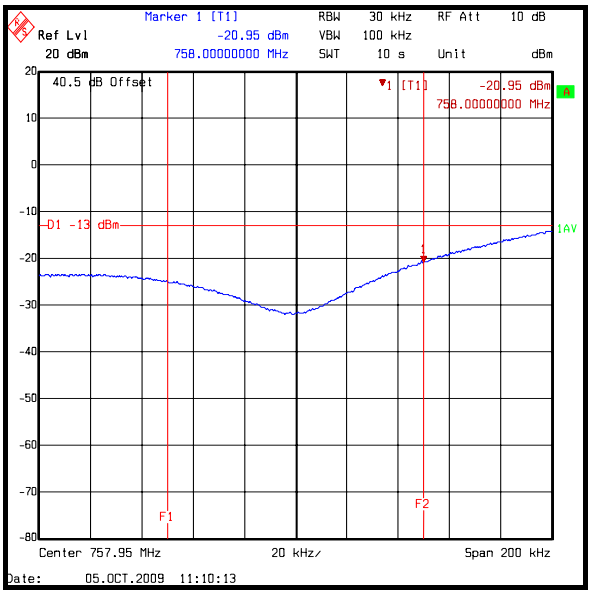
## Transmitter Conducted Emissions at Band Edges (continued)



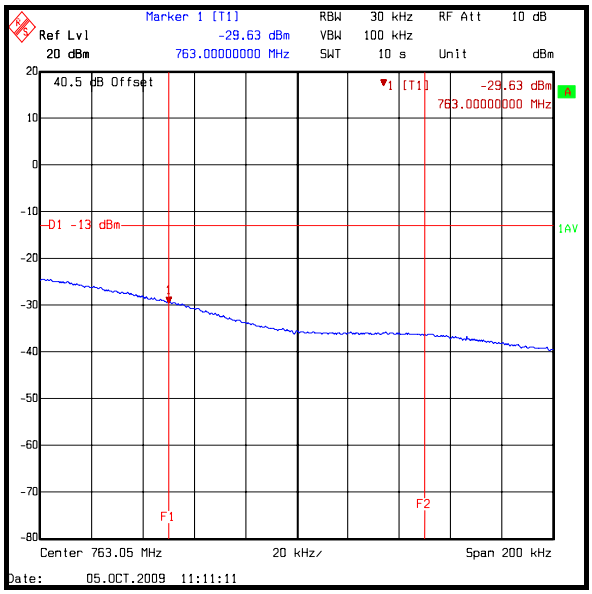

**16QAM – Lower Band Edge**




**16QAM – Upper Band Edge**




**64QAM – Lower Band Edge**




**64QAM – Upper Band Edge**

## Note(s):

1. Preliminary testing was performed on both antenna ports with the worse case port being selected for measurements.

## 5.4.8. Transmitter Radiated Spurious Emissions

### Test Summary:

| | |
|---|---|
| **FCC Part:** | 2.1051 and 27.53(d)(3) |
| **Test Method Used:** | As detailed in ANSI TIA-603-C-2004 Section 2.2.12. referencing FCC Part 2.1053 |
| **Frequency Range:** | 30 MHz to 12.75 GHz |

### Environmental Conditions:

| | |
|---|---|
| **Temperature Variation (°C):** | 26 |
| **Relative Humidity Variation (%):** | 33 |

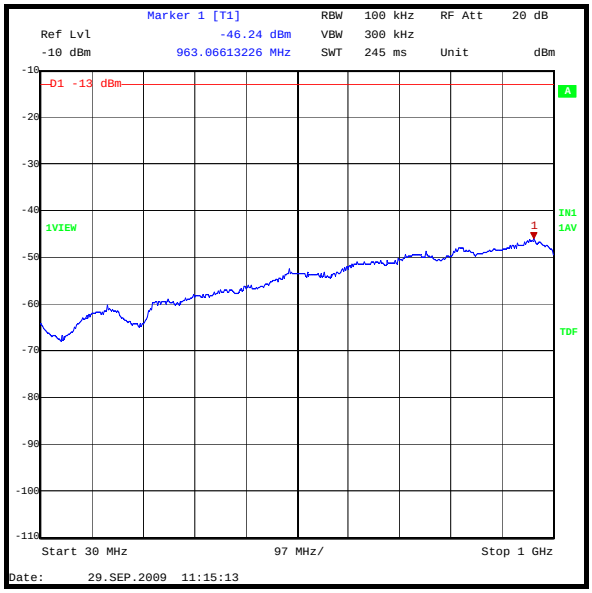
### Results: Sub Band C / Single Channel 760.4 MHz

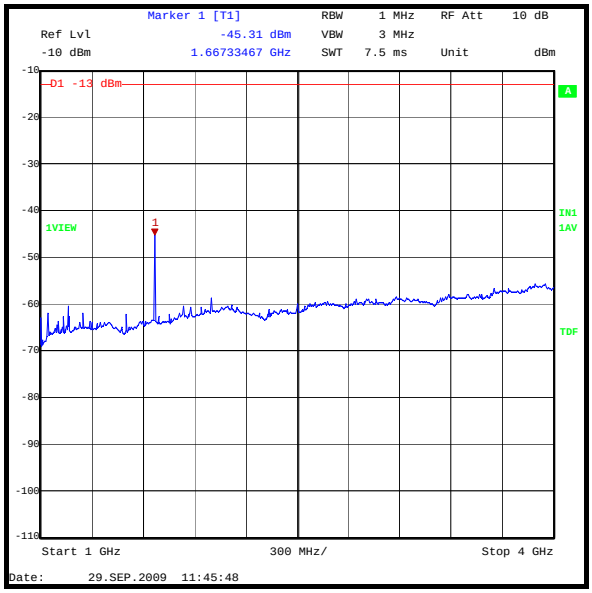
| Modulation | Frequency (MHz) | Emission Level (dBm) | Limit (dBm) | Margin (dB) | Result |
|---|---|---|---|---|---|
| QPSK | 1667.334670 | -34.2 | -13.0 | 21.2 | Complied |
| 16QAM | 1667.734670 | -34.9 | -13.0 | 21.9 | Complied |
| 64QAM | 1667.145330 | -33.9 | -13.0 | 20.9 | Complied |

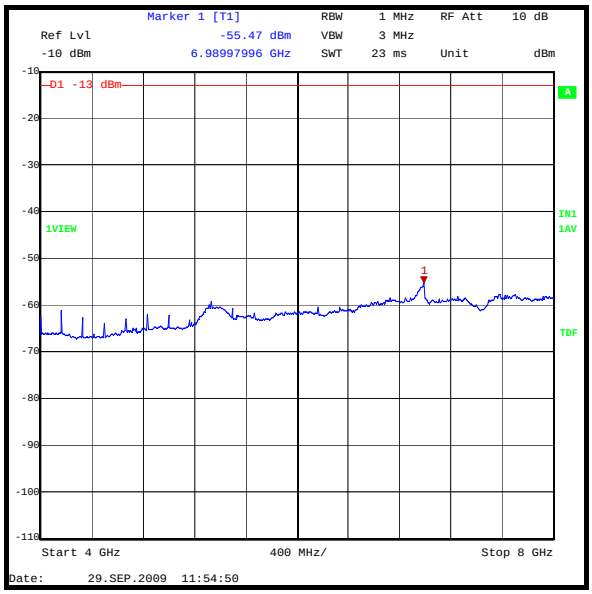
### Note(s):

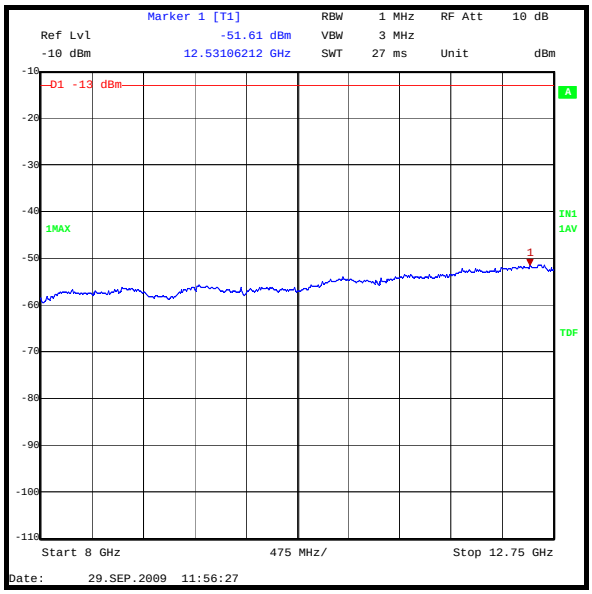
1. The emission at 1667 MHz was present only when EUT transmitting on this channel. Therefore, there are no emissions reported on other channels.
2. The carrier and all other emissions were >20 dB below the applicable limit or below the level of the noise floor of the measuring receiver.

## Transmitter Radiated Spurious Emissions (continued)



## 5.4.9. Transmitter Radiated Spurious Emissions at Band Edges

### Test Summary:

| | |
|---|---|
| **FCC Part:** | 2.1051 and 27.53(d) |
| **Test Method Used:** | As described in ANSI TIA-603-C-2004 referencing FCC Part 2 |

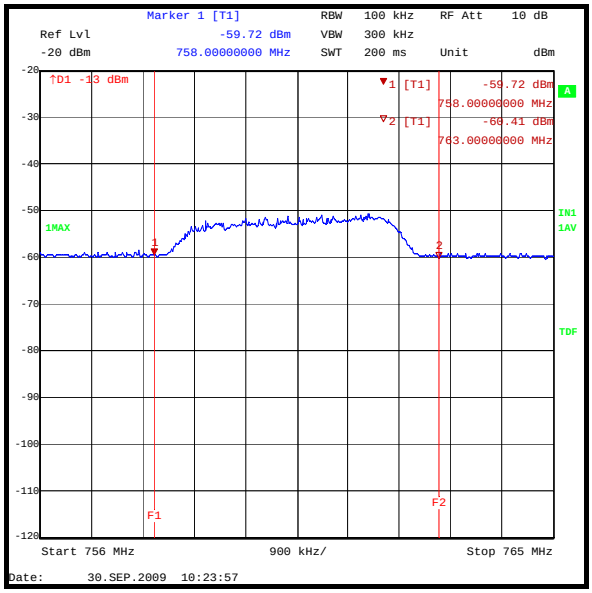
### Environmental Conditions:

| | |
|---|---|
| **Temperature Variation (°C):** | 26 |
| **Relative Humidity Variation (%):** | 33 |

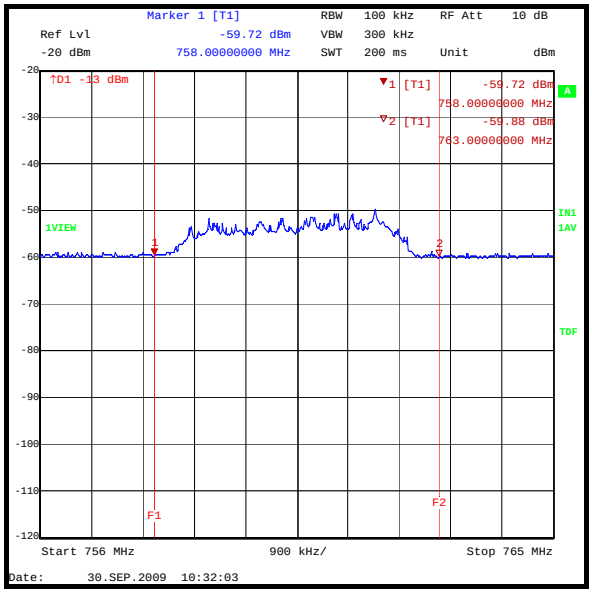
### Results: Sub Band C

| Modulation | Frequency (MHz) | Emission Level (dBm) | Limit (dBm) | Margin (dB) | Result |
|---|---|---|---|---|---|
| QPSK | 758.0 | -59.7 | -13.0 | 46.7 | Complied |
| QPSK | 763.0 | -60.4 | -13.0 | 47.4 | Complied |
| 16QAM | 758.0 | -59.7 | -13.0 | 46.7 | Complied |
| 16QAM | 763.0 | -59.9 | -13.0 | 46.9 | Complied |
| 64QAM | 758.0 | -59.7 | -13.0 | 46.7 | Complied |
| 64QAM | 763.0 | -59.9 | -13.0 | 46.9 | Complied |

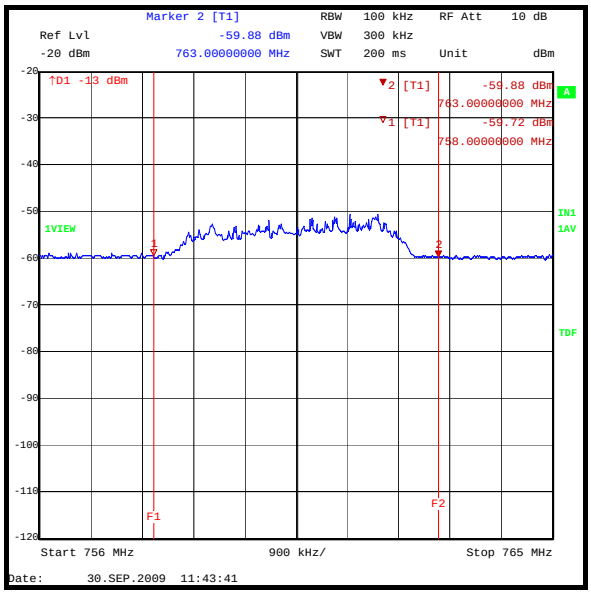
## Transmitter Radiated Emissions at Band Edges (continued)




**QPSK**




**16QAM**




**64QAM**

## 5.4.10. Transmitter Conducted Emissions – Emission Limitations

### Test Summary:

| | |
|---|---|
| **FCC Part:** | Part 27.53(d)(1) |
| **Test Method Used:** | As detailed in ANSI TIA-603.C-2004 referencing FCC Part 2.1051 |
| **Frequency Range:** | 769 to 805 MHz |

### Environmental Conditions:

| | |
|---|---|
| **Temperature Variation (°C):** | 26 |
| **Relative Humidity Variation (%):** | 33 |

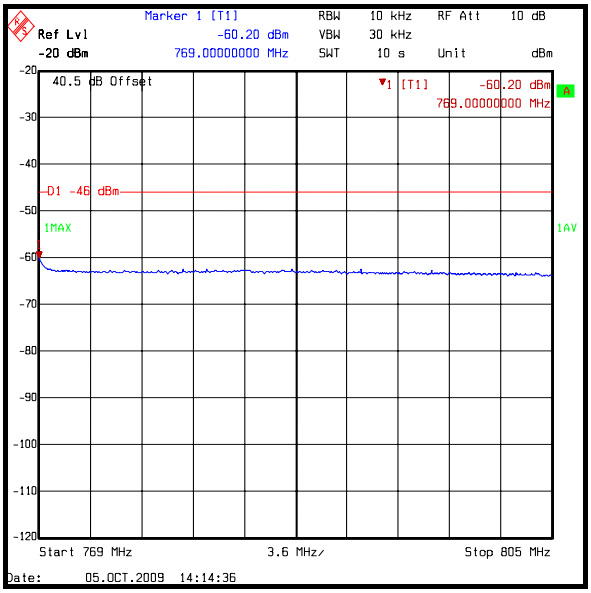
### Results: Sub Band C / Single Channel 760.4 MHz / Port 2

| Modulation | Frequency (MHz) | Level (dBm) | Limit (dBm) | Margin (dB) | Result |
|---|---|---|---|---|---|
| QPSK | 769.000000 | -60.2 | -46.0 | 14.2 | Complied |
| 16QAM | 769.000000 | -61.9 | -46.0 | 15.9 | Complied |
| 64QAM | 769.000000 | -61.7 | -46.0 | 15.7 | Complied |

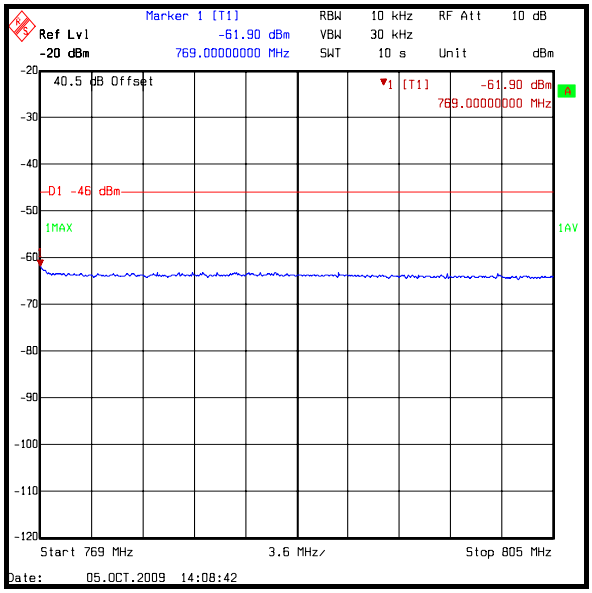
### Note(s):

1. Preliminary testing was performed on both antenna ports with the worse case port being selected for measurements.

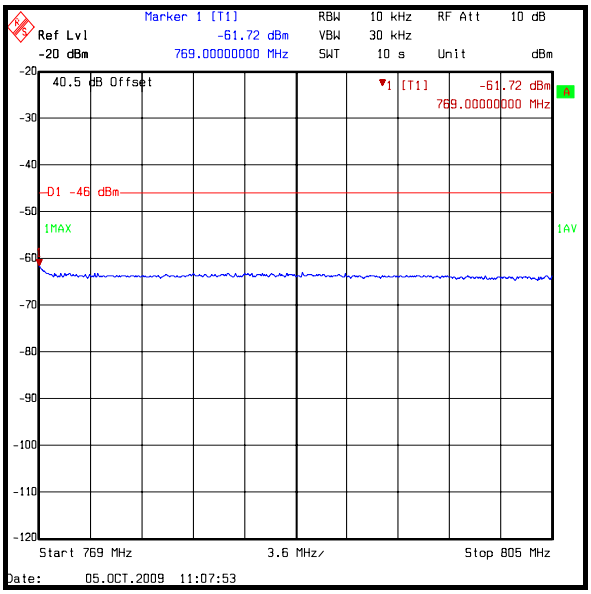
## Transmitter Conducted Emissions – Emission Limitations (continued)




**QPSK**




**16QAM**




**64QAM**

## 5.4.11. Transmitter Conducted Emissions – Emission Limitations

### Test Summary:

| | |
|---|---|
| **FCC Part:** | Part 27.53(f) |
| **Test Method Used:** | As detailed in ANSI TIA-603.C-2004 referencing FCC Part 2.1051 |
| **Frequency Range:** | 1559 MHz to 1610 MHz |

### Environmental Conditions:

| | |
|---|---|
| **Temperature Variation (°C):** | 26 |
| **Relative Humidity Variation (%):** | 33 |

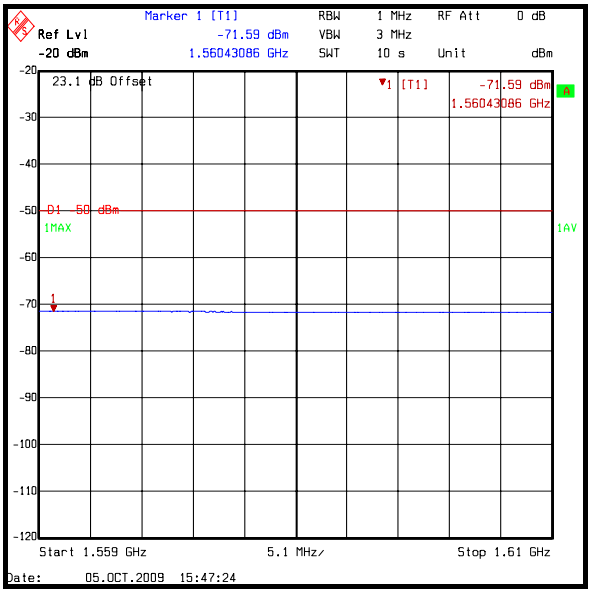
### Results: Sub Band C / Single Channel 760.4 MHz / Port 2

| Modulation | Frequency (MHz) | Level (dBm) | Limit (dBm) | Margin (dB) | Result |
|---|---|---|---|---|---|
| QPSK | 1560.430860 | -71.6 | -50.0 | 21.6 | Complied |
| 16QAM | 1559.000000 | -71.7 | -50.0 | 21.7 | Complied |
| 64QAM | 1559.000000 | -71.7 | -50.0 | 21.7 | Complied |

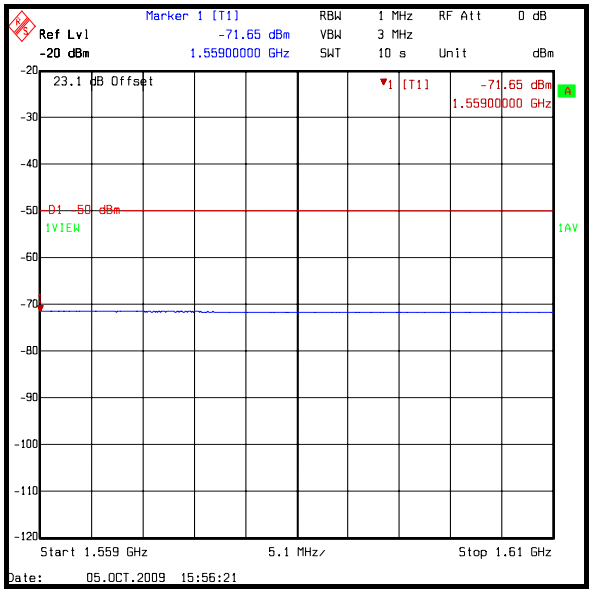
### Note(s):

1. Preliminary testing was performed on both antenna ports with the worse case port being selected for measurements.

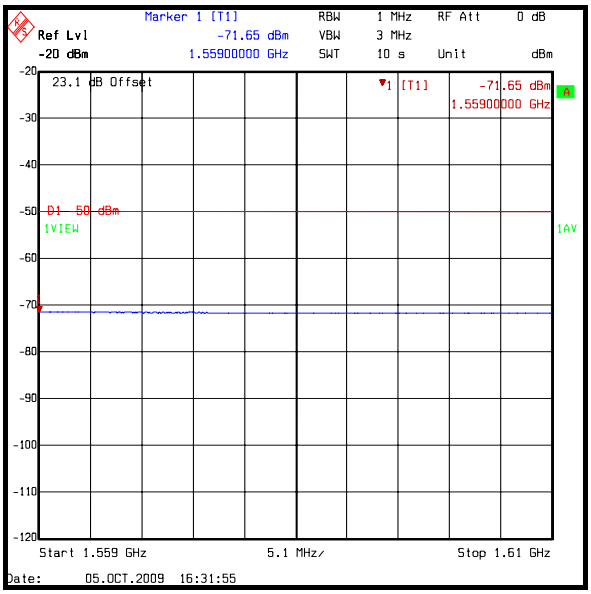
## Transmitter Conducted Emissions – Emission Limitations (continued)




**QPSK**




**16QAM**




**64QAM**

## 5.4.12. Transmitter Radiated Spurious Emissions – Emission Limitations (continued)

### Test Summary:

| | |
|---|---|
| **FCC Part:** | Part 27.53(d)(1) |
| **Test Method Used:** | As detailed in ANSI TIA-603.C-2004 referencing FCC Part 2.1051 |
| **Frequency Range:** | 769 MHz to 805 MHz |

### Environmental Conditions:

| | |
|---|---|
| **Temperature Variation (°C):** | 26 |
| **Relative Humidity Variation (%):** | 33 |

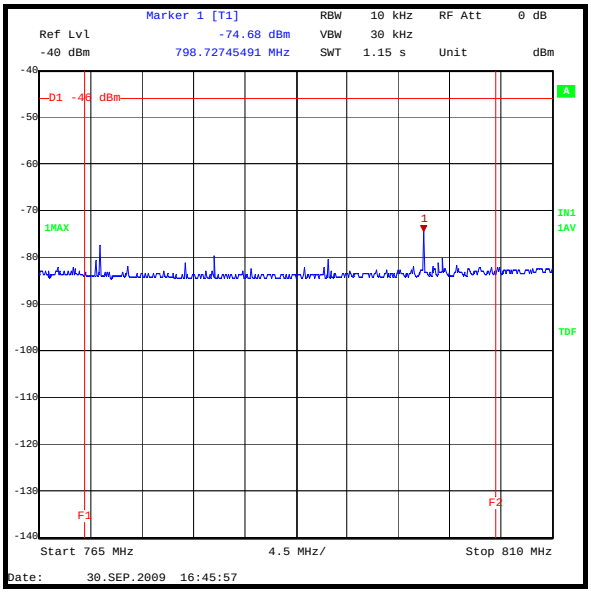
### Results: Sub Band C / Single Channel 760.4 MHz

| Modulation | Frequency (MHz) | Level (dBm) | Limit (dBm) | Margin (dB) | Result |
|---|---|---|---|---|---|
| QPSK | 798.727 | -74.7 | -46.0 | 28.7 | Complied |
| 16QAM | 798.727 | -73.2 | -46.0 | 27.2 | Complied |
| 64QAM | 798.727 | -72.0 | -46.0 | 26.0 | Complied |

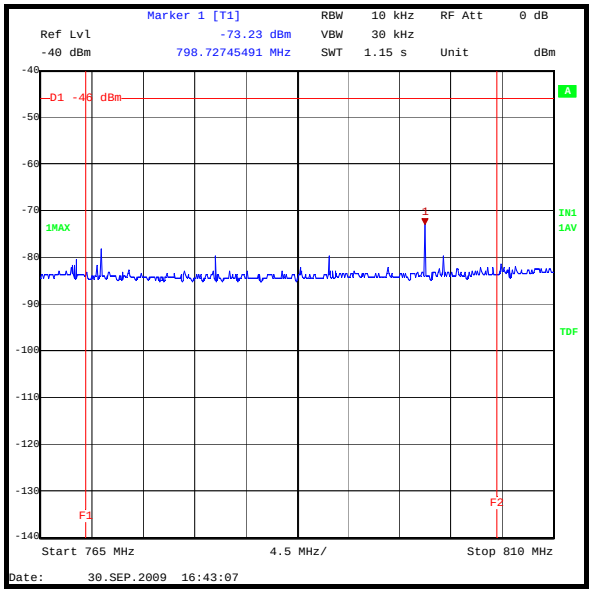
### Note(s):

1.

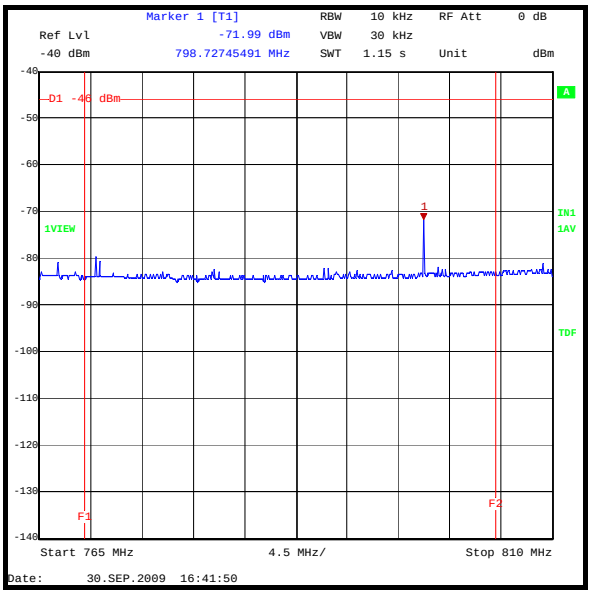
## Transmitter Radiated Spurious Emissions – Emission Limitations (continued)




**QPSK**




**16QAM**




**64QAM**

## 5.4.13. Transmitter Radiated Spurious Emissions – Emission Limitations (continued)

### Test Summary:

| | |
|---|---|
| **FCC Part:** | Part 27.53(f) |
| **Test Method Used:** | As detailed in ANSI TIA-603.C-2004 referencing FCC Part 2.1051 |
| **Frequency Range:** | 1559 MHz to 1610 MHz |

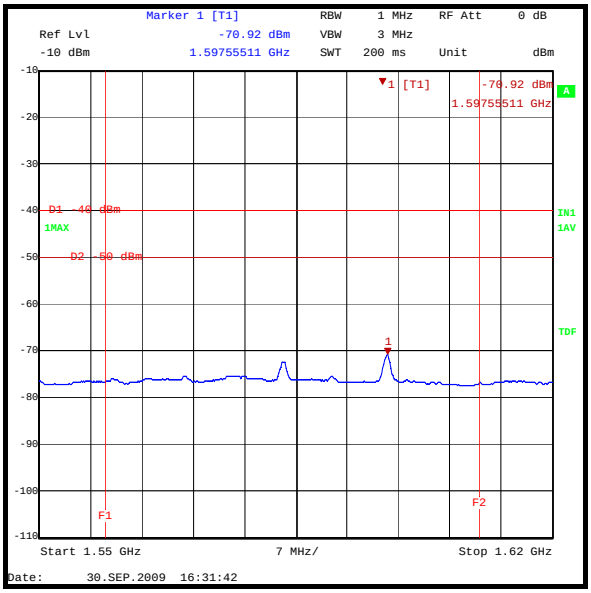
### Environmental Conditions:

| | |
|---|---|
| **Temperature Variation (°C):** | 26 |
| **Relative Humidity Variation (%):** | 33 |

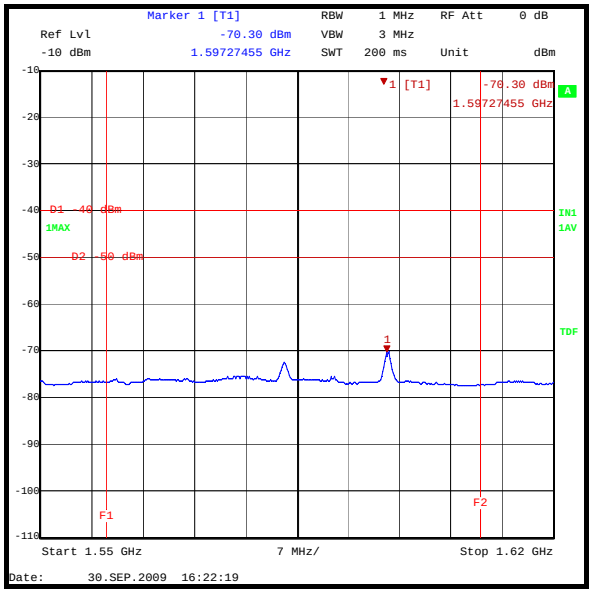
**Results: Sub Band C / Single Channel 760.4 MHz**

| Modulation | Frequency (MHz) | Level (dBm) | Limit (dBm) | Margin (dB) | Result |
|---|---|---|---|---|---|
| QPSK | 1597.555 | -70.9 | -50.0 | 20.9 | Complied |
| 16QAM | 1597.275 | -70.3 | -50.0 | 20.3 | Complied |
| 64QAM | 1597.415 | -70.5 | -50.0 | 20.5 | Complied |

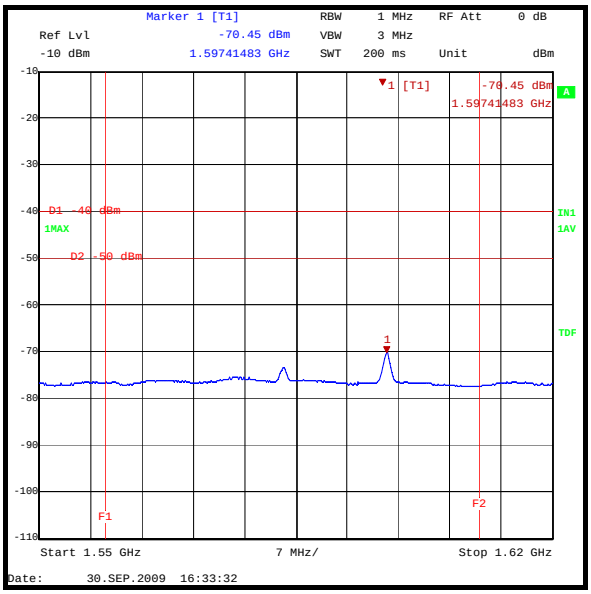
## Transmitter Radiated Spurious Emissions – Emission Limitations (continued)




**QPSK**




**16QAM**




**64QAM**

# 6. Measurement Uncertainty

No measurement or test can ever be perfect and the imperfections give rise to error of measurement in the results. Consequently the result of a measurement is only an approximation to the value of the measurand (the specific quantity subject to measurement) and is only complete when accompanied by a statement of the uncertainty of the approximation.

The expression of uncertainty of a measurement result allows realistic comparison of results with reference values and limits given in specifications and standards.

The uncertainty of the result may need to be taken into account when interpreting the measurement results.

The reported expanded uncertainties below are based on a standard uncertainty multiplied by an appropriate coverage factor such that a confidence level of approximately 95% is maintained. For the purposes of this document “approximately” is interpreted as meaning “effectively” or “for most practical purposes”.

| **Measurement Type** | **Range** | **Confidence Level (%)** | **Calculated Uncertainty** |
|---|---|---|---|
| Conducted Carrier Output Power | 728 MHz to 763 MHz | 95% | ±1.2 dB |
| Carrier Output Power (ERP) | 728 MHz to 763 MHz | 95% | ±1.78 dB |
| Occupied Bandwidth | 728 MHz to 763 MHz | 95% | ±0.12% |
| Conducted Emissions Antenna Port | 9 kHz to 26.5 GHz | 95% | ±1.2 dB |
| Frequency Stability | 728 MHz to 763 MHz | 95% | ±20 Hz |
| Radiated Spurious Emissions | 30 MHz to 1000 MHz | 95% | ±4.65 dB |
| Radiated Spurious Emissions | 1 GHz to 40 GHz | 95% | ±2.94 dB |

The methods used to calculate the above uncertainties are in line with those recommended within the various measurement specifications. Where measurement specifications do not include guidelines for the evaluation of measurement uncertainty the published guidance of the appropriate accreditation body is followed.

# Appendix 1. Test Equipment Used

| RFI No. | Instrument | Manufacturer | Type No. | Serial No. | Date Last Calibrated | Cal. Interval (Months) |
|---|---|---|---|---|---|---|
| A1399 | Attenuator | Weinschel Associates | WA46-10 | A126 | Calibrated before use | - |
| A1534 | Pre Amplifier | Hewlett Packard | 8449B OPT H02 | 3008A00405 | Calibrated before use | - |
| A1818 | Antenna | EMCO | 3115 | 00075692 | 27 Nov 2009 | 12 |
| A1830 | Pulse Limiter | Rhode & Schwarz | ESH3-Z2 | 100668 | 05 Jan 2009 | 12 |
| A188 | High Pass Notch Filter | Aerial Facilities | TF179-2/50N | 473 813 | Calibration not required | - |
| A1888 | SSCU | R&S | SSCU_W | 100016 | Calibrated as part of system | - |
| A288 | Antenna | Chase | CBL6111A | 1589 | 13 Mar 2009 | 12 |
| C363 | Cable | Rosenberger | RG142 | None | 29 Mar 2009 | 12 |
| E0516 | Environmental Chamber | TAS | LT1000 | 23880706 | Calibration not required | - |
| K0001 | 5m Semi-Anechoic Chamber | Rainford EMC | N/A | N/A | 04 May 2009 | 12 |
| K0002 | 3m RSE Chamber | Rainford EMC | N/A | N/A | 01 Sep 2009 | 12 |
| K0003 | Bench Test Site | RFI Global Services Ltd | N/A | N/A | Calibration not required | - |
| K0008 | Site Reference 4422 | RFI Global Services Ltd | N/A | N/A | Calibration not required | - |
| M1068 | Thermometer | Iso-Tech | RS55 | 93102884 | 09 Jul 2009 | 12 |
| M1124 | Spectrum Analyser | Rohde & Schwarz | ESIB26 | 100046K | 09 Mar 2009 | 12 |
| M122 | Digital Voltmeter | Fluke | 77 | 64910017 | 23 Jun 2009 | 12 |
| M1242 | Spectrum Analyser | Rohde & Schwarz, Inc. | FSEM30 | 845986/022 | 09 Dec 2008 | 12 |
| M1252 | Signal Generator | HP | 83640A | 3119A00489 | Calibrated before use | - |
| M1263 | Test Receiver | Rohde & Schwarz | ESIB7 | 100265 | 22 Apr 2009 | 12 |
| M199 | Power Meter | Rohde & Schwarz | NRVS | 827023/075 | 14 May 2009 | 12 |

**NB** In accordance with UKAS requirements all the measurement equipment is on a calibration schedule.