



# TEST REPORT FROM RFI GLOBAL SERVICES LTD

Test of: StarMAX 3160-25 Subscriber Station

To: FCC Part 27: 2009 Subpart C

**Test Report Serial No:**  
RFI-RPT-RP76313JD01A\_V3.0

**Version 3.0 supersedes all previous versions**

<b>This Test Report Is Issued Under The Authority of Brian Watson, COO Payments and Consultancy:</b>		pp 
<b>Checked By:</b>	R. Graham	
<b>Signature:</b>		
<b>Date of Issue:</b>	31 March 2010	

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**1. Customer Information**














<b>Company Name:</b>	Aviat Networks
<b>Address:</b>	4 Bell Drive Hamilton International Technology Park Blantyre Glasgow G72 0FB United Kingdom

## **2. Summary of Testing**

### **2.1. General Information**

<b>Specification Reference:</b>	47CFR27
<b>Specification Title:</b>	Code of Federal Regulations Volume 47 (Telecommunications) 2009: Part 27 Subpart C (Miscellaneous Wireless Communication Services)
<b>Site Registration:</b>	FCC: 209735
<b>Location of Testing:</b>	RFI Global Services Ltd, Wade Road, Basingstoke, Hampshire, RG24 8AH.
<b>Test Dates:</b>	08 March 2010 to 18 March 2010

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

<b>FCC Reference (47CFR)</b>	<b>Measurement</b>	<b>Result</b>
Part 15.107	Idle Mode AC Conducted Spurious Emissions	
Part 15.109	Idle Mode Radiated Spurious Emissions	
Part 15.207	Transmitter AC Conducted Spurious Emissions	
Parts 2.1046 & 27.50(h)(2)	Transmitter Carrier Output Power	
Part 2.1049	Transmitter Occupied Bandwidth	
Parts 2.1055 & 27.54	Transmitter Frequency Stability (Temperature Variation)	
Parts 2.1055 & 27.54	Transmitter Frequency Stability (Voltage Variation)	
Parts 2.1051 & 27.53	Transmitter Conducted Emissions	
Parts 2.1051 & 27.53	Transmitter Band Edge Conducted Emissions	
Parts 2.1051 & 27.53	Transmitter Radiated Spurious Emissions	
Parts 2.1051 & 27.53	Transmitter Band Edge Radiated Emissions	
<b>Key to Results</b>  = Complied  = Did not comply		

### **2.3. Methods and Procedures**

<b>Reference:</b>	ANSI/TIA-603-C-2004
<b>Title:</b>	Land Mobile Communications Equipment, Measurements and performance Standards
<b>Reference:</b>	ANSI C63.4 (2003)
<b>Title:</b>	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)**

<b>Description:</b>	WiMAX subscriber unit
<b>Brand Name:</b>	Aviat Networks
<b>Model Name or Number:</b>	3160-25-12-05
<b>Serial Number:</b>	TSS40340900031
<b>MAC Address:</b>	00:02:73:00:12:2F
<b>System Hardware Version:</b>	REV-B
<b>Software Kernal Version:</b>	20091120
<b>Software Application Version:</b>	20091120
<b>Build Revision:</b>	Trunk/14453
<b>Boot Loader Version:</b>	20091120
<b>FCC ID Number:</b>	VPX-3160-25A

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

The equipment under test was a WiMAX subscriber unit.

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

No modifications were applied to the EUT during testing.

**3.4. Additional Information Related to Testing**

<b>Category of Equipment:</b>	User station						
<b>Type of Radio Device:</b>	WiMAX Transceiver						
<b>Modulation Type:</b>	QPSK		16QAM		64QAM		
<b>Coding Scheme:</b>	1/2 CTC	3/4 CTC	1/2 CTC	3/4 CTC	2/3 CTC	3/4 CTC	5/6 CTC
<b>Channel Spacing:</b>	5 MHz and 10MHz						
<b>Frequency Range:</b>	2496MHz to 2690MHz						
<b>Power Supply Requirement(s):</b>	Nominal				110.0 VAC		
	Minimum				93.5 VAC		
	Maximum				126.5 VAC		
<b>5 MHz Transmit Channels Tested:</b>	<b>Channel ID</b>				<b>Channel Frequency (MHz)</b>		
	Bottom				2498.5		
	Middle				2600.0		
	Top				2687.5		
<b>5 MHz Receive Channels Tested:</b>	<b>Channel ID</b>				<b>Channel Frequency (MHz)</b>		
	Bottom				2498.5		
	Middle				2600.0		
	Top				2687.5		
<b>10 MHz Transmit Channels Tested:</b>	<b>Channel ID</b>				<b>Channel Frequency (MHz)</b>		
	Bottom				2501		
	Middle				2600		
	Top				2685		
<b>10 MHz Receive Channels Tested:</b>	<b>Channel ID</b>				<b>Channel Frequency (MHz)</b>		
	Bottom				2501		
	Middle				2600		
	Top				2685		

**3.5. Support Equipment**

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

<b>Description:</b>	WiMAX 802.16e Base Station
<b>Model Name or Number:</b>	8200-25
<b>Serial Number:</b>	TCM09381117

<b>Description:</b>	WiMAX 802.16e Base Station
<b>Model Name or Number:</b>	8200-26
<b>Serial Number:</b>	T00000146P0929T

<b>Description:</b>	Broadband wireless access platform and Mobile WiMAX IDU
<b>Brand Name:</b>	Telsima
<b>Model Name or Number:</b>	StarMAX™ 6100 and 6022
<b>Serial Number:</b>	ML18 18080-1817



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

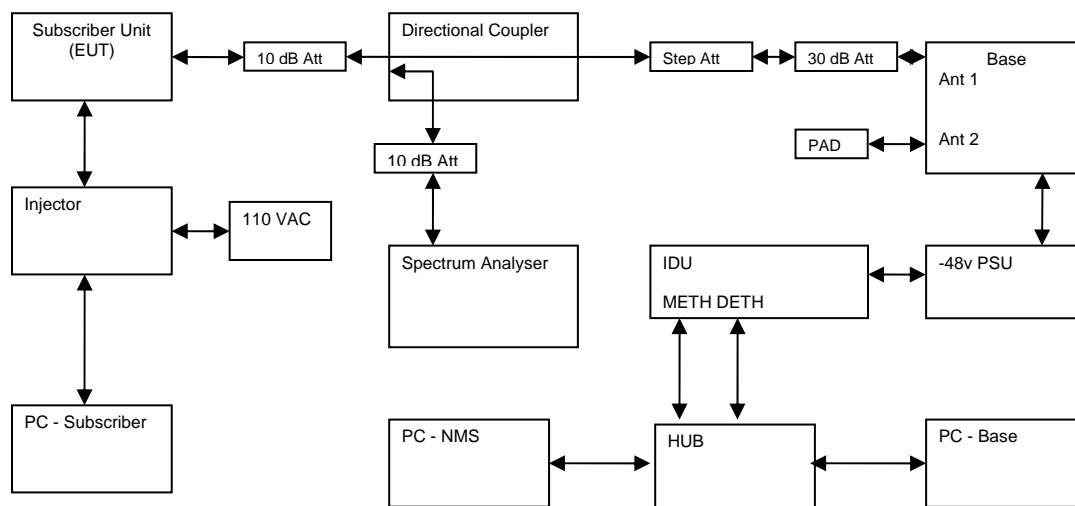
### **4.1. Operating Modes**

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

- On all channels with all modulation schemes and coding schemes.

### **4.2. Configuration and Peripherals**

The EUT was tested in the following configuration:



## **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

### 5.2.1. Idle Mode AC Conducted Spurious Emissions

#### Test Summary:

<b>FCC Part:</b>	15.107
<b>Test Method Used:</b>	As detailed in ANSI C63.4 Section 7 and relevant annexes

#### Environmental Conditions:

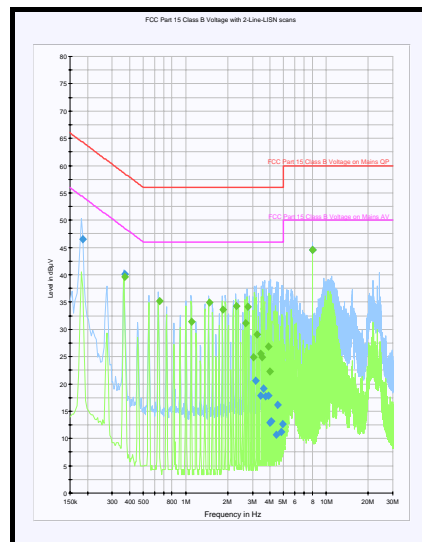
<b>Temperature (°C):</b>	26
<b>Relative Humidity (%):</b>	24

#### Results: Quasi Peak Detector Measurements

Frequency (MHz)	Line	Level (dBμV)	Limit (dBμV)	Margin (dB)	Result
0.186000	Live	46.5	64.2	17.7	Complied
0.370500	Live	40.1	58.5	18.4	Complied
3.142500	Live	20.6	56.0	35.4	Complied
3.421500	Live	17.9	56.0	38.1	Complied
3.606000	Live	19.2	56.0	36.8	Complied
3.700500	Neutral	17.7	56.0	38.3	Complied
3.885000	Live	17.9	56.0	38.1	Complied
3.975000	Live	12.9	56.0	43.1	Complied
4.069500	Neutral	13.2	56.0	42.8	Complied
4.438500	Neutral	10.7	56.0	45.3	Complied
4.533000	Live	16.1	56.0	39.9	Complied
4.807500	Live	11.2	56.0	44.8	Complied
4.902000	Live	12.7	56.0	43.3	Complied
8.020500	Live	44.6	60.0	15.4	Complied

**Idle Mode AC Conducted Spurious Emissions (continued)****Results: Average Detector Measurements**

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.370500	Live	39.6	48.5	8.9	Complied
0.649500	Live	35.2	46.0	10.8	Complied
1.108500	Live	31.4	46.0	14.6	Complied
1.482000	Live	34.9	46.0	11.1	Complied
1.851000	Live	33.6	46.0	12.4	Complied
2.314500	Live	34.2	46.0	11.8	Complied
2.683500	Live	31.2	46.0	14.8	Complied
2.778000	Live	34.1	46.0	11.9	Complied
3.052500	Live	24.9	46.0	21.1	Complied
3.241500	Neutral	29.0	46.0	17.0	Complied
3.426000	Live	25.5	46.0	20.5	Complied
3.516000	Live	24.8	46.0	21.2	Complied
3.889500	Live	26.8	46.0	19.2	Complied
3.979500	Live	22.3	46.0	23.7	Complied
8.020500	Neutral	44.5	50.0	5.5	Complied



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

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

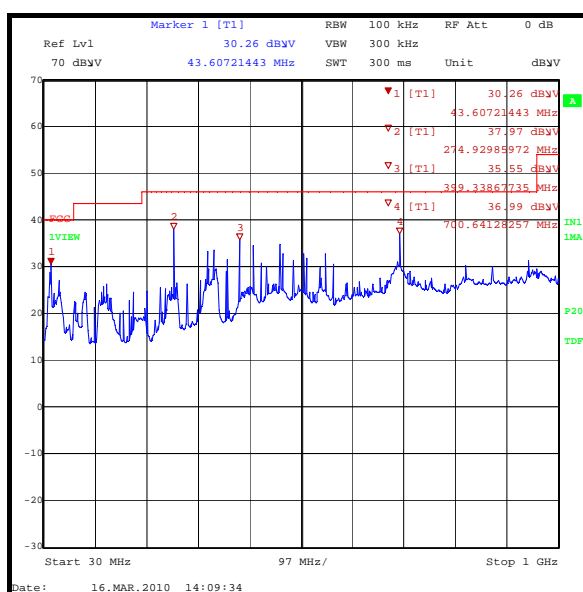
<b>FCC Part:</b>	15.109
<b>Test Method Used:</b>	As detailed in ANSI C63.4 Section 8 and relevant annexes
<b>Frequency Range:</b>	30MHz to 1GHz

**Environmental Conditions:**

<b>Temperature (°C):</b>	26
<b>Relative Humidity (%):</b>	17

**Results:**

Frequency (MHz)	Antenna Polarity	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
43.806	Vertical	27.6	40.0	12.4	Complied
58.726	Vertical	25.2	40.0	14.8	Complied
148.099	Vertical	24.7	43.5	18.8	Complied
224.989	Horizontal	24.5	43.5	19.0	Complied
274.993	Vertical	37.0	46.0	9.0	Complied
349.994	Vertical	32.1	46.0	13.9	Complied
399.982	Vertical	35.6	46.0	10.4	Complied
474.979	Vertical	34.5	46.0	11.5	Complied
559.988	Vertical	33.8	46.0	12.2	Complied
699.980	Horizontal	29.5	46.0	16.5	Complied



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

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

<b>FCC Part:</b>	15.109
<b>Test Method Used:</b>	As detailed in ANSI C63.4 Section 8 and relevant annexes
<b>Frequency Range:</b>	1 GHz to 13.5 GHz

**Environmental Conditions:**

<b>Temperature (°C):</b>	26
<b>Relative Humidity (%):</b>	20

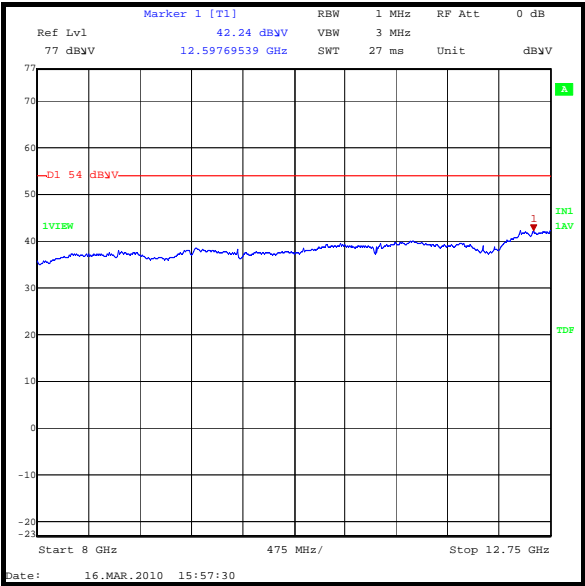
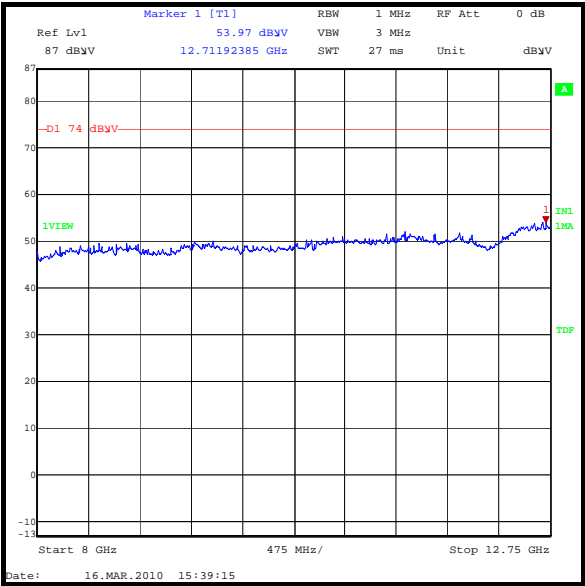
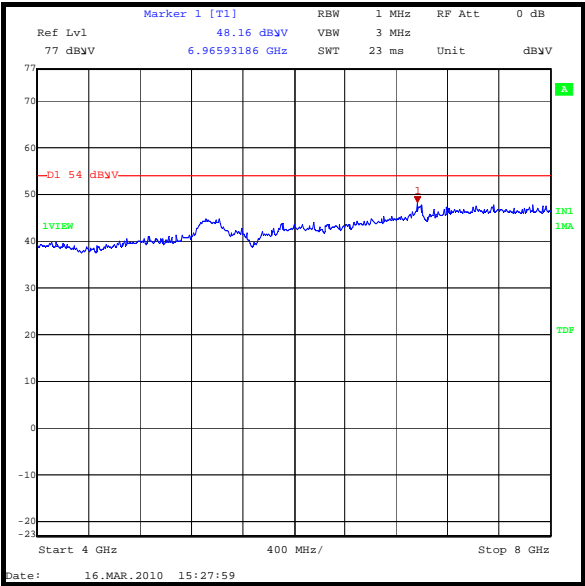
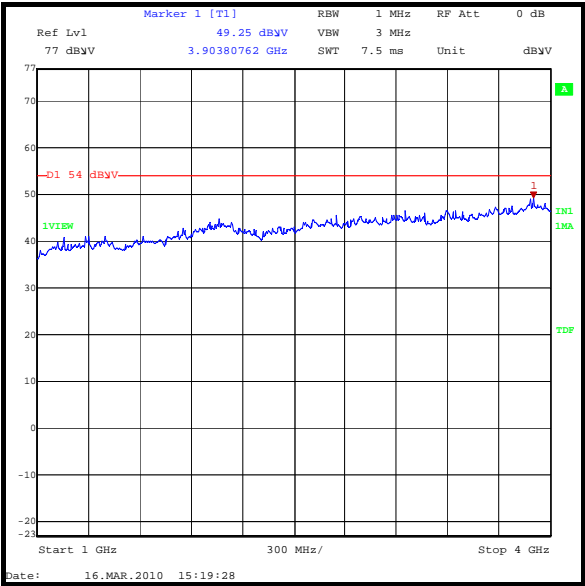
**Results: Highest Peak Level**

Frequency (MHz)	Antenna Polarity	Detector Level (dB $\mu$ V)	Transducer Factor (dB)	Actual Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
13245.992	Vertical	40.3	14.1	54.4	74.0	19.6	Complied

**Results: Highest Average Level**

Frequency (MHz)	Antenna Polarity	Detector Level (dB $\mu$ V)	Transducer Factor (dB)	Actual Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
13223.447	Vertical	31.3	14.1	45.4	54.0	8.6	Complied

Idle Mode Radiated Spurious Emissions (continued)

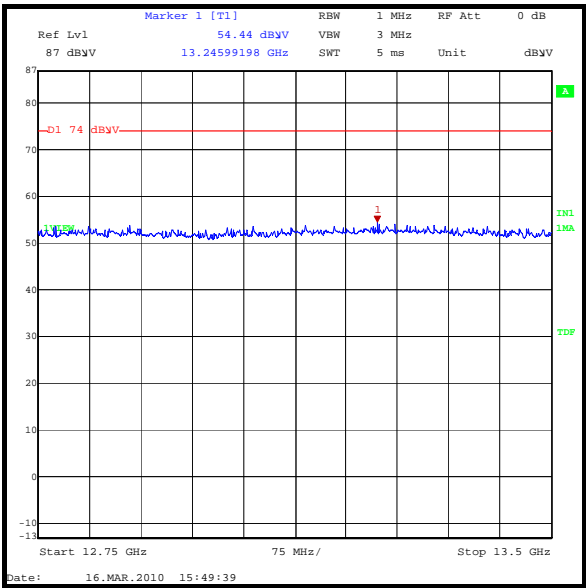


Peak detector

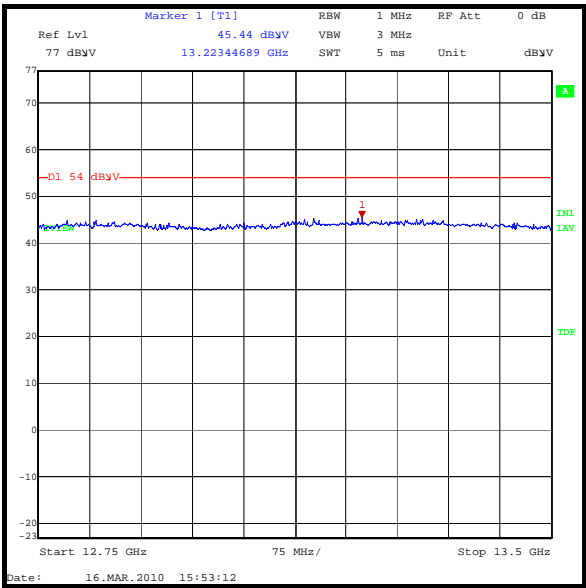
Average detector

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

Idle Mode Radiated Spurious Emissions (continued)



Peak detector



Average detector

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



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

<b>FCC Part:</b>	FCC 15.207
<b>Test Method Used:</b>	As detailed in ANSI C63.4 Section 7 and relevant annexes

**Environmental Conditions:**

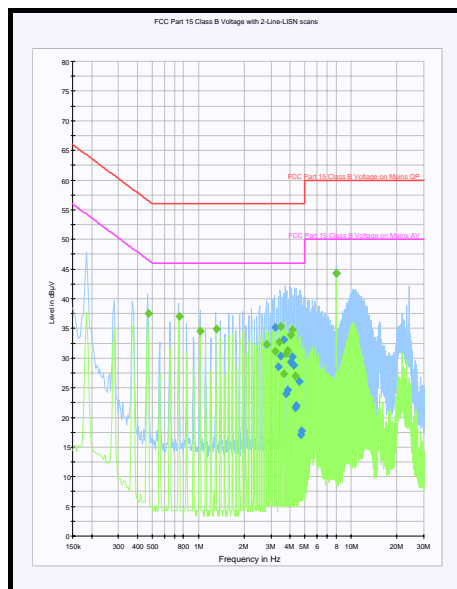
<b>Temperature (°C):</b>	26
<b>Relative Humidity (%):</b>	24

**Results: Quasi Peak Detector Measurements**

<b>Frequency (MHz)</b>	<b>Line</b>	<b>Level (dBμV)</b>	<b>Limit (dBμV)</b>	<b>Margin (dB)</b>	<b>Result</b>
3.178500	Live	35.2	56.0	20.8	Complied
3.363000	Live	28.5	56.0	27.5	Complied
3.457500	Live	30.3	56.0	25.7	Complied
3.646500	Live	33.1	56.0	22.9	Complied
3.736500	Live	24.0	56.0	32.0	Complied
3.831000	Live	24.6	56.0	31.4	Complied
4.020000	Live	29.3	56.0	26.7	Complied
4.114500	Live	30.2	56.0	25.8	Complied
4.209000	Neutral	28.8	56.0	27.2	Complied
4.299000	Live	21.7	56.0	34.3	Complied
4.393500	Neutral	22.0	56.0	34.0	Complied
4.582500	Live	26.1	56.0	29.9	Complied
4.672500	Live	17.0	56.0	39.0	Complied
4.767000	Neutral	17.8	56.0	38.2	Complied
8.020500	Neutral	44.3	60.0	15.7	Complied

**Transmitter AC Conducted Spurious Emissions (continued)****Results: Average Detector Measurements**

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.469500	Live	37.6	46.5	8.9	Complied
0.748500	Live	37.0	46.0	9.0	Complied
1.027500	Live	34.5	46.0	11.5	Complied
1.311000	Live	34.9	46.0	11.1	Complied
2.805000	Live	32.4	46.0	13.6	Complied
3.178500	Live	31.1	46.0	14.9	Complied
3.367500	Live	32.8	46.0	13.2	Complied
3.462000	Live	35.3	46.0	10.7	Complied
3.646500	Live	27.3	46.0	18.7	Complied
3.741000	Live	30.7	46.0	15.3	Complied
3.835500	Live	31.2	46.0	14.8	Complied
4.024500	Live	33.9	46.0	12.1	Complied
4.119000	Live	34.8	46.0	11.2	Complied
4.303500	Live	27.0	46.0	19.0	Complied
8.020500	Neutral	44.3	50.0	5.7	Complied



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

**5.2.4. Transmitter Carrier Output Power and EIRP Limitations****Test Summary:**

<b>FCC Part:</b>	FCC 2.1046 and FCC 27.50(h)(2)
<b>Test Method Used:</b>	<p>Tests were performed using the test methods detailed in ANSI TIA-603-C-2004.</p> <p>The measurement was made by integrating over the specified channel bandwidth using the analyser built in channel power function using an RMS detector. The analyser was gated to measure over the burst transmission thus exempting the need for a duty cycle correction factor.</p> <p>The maximum output power was achieved by setting the loop attenuation between the subscriber station and the support base station such that the subscriber was forced to its maximum power level. The maximum power level set by the subscriber station is preset in firmware.</p>

**Environmental Conditions:**

<b>Temperature (°C):</b>	26
<b>Relative Humidity (%):</b>	24

**Results:**

Channel	BW (MHz)	Modulation	Coding	Level (dBW)	Limit (dBW)	Margin (dB)	Result
Bottom	5	QPSK	1/2	-2.8	3.0	5.8	Complied
Bottom	5	QPSK	3/4	-1.8	3.0	4.8	Complied
Bottom	5	QAM16	1/2	-2.8	3.0	5.8	Complied
Bottom	5	QAM16	3/4	-2.9	3.0	5.9	Complied
Bottom	5	QAM64	2/3	-4.5	3.0	7.5	Complied
Bottom	5	QAM64	3/4	-4.8	3.0	7.8	Complied
Bottom	5	QAM64	5/6	-4.6	3.0	7.6	Complied
Middle	5	QPSK	1/2	-1.9	3.0	4.9	Complied
Middle	5	QPSK	3/4	-2.0	3.0	5.0	Complied
Middle	5	QAM16	1/2	-3.0	3.0	6.0	Complied
Middle	5	QAM16	3/4	-3.1	3.0	6.1	Complied
Middle	5	QAM64	2/3	-5.0	3.0	8.0	Complied
Middle	5	QAM64	3/4	-5.4	3.0	8.4	Complied
Middle	5	QAM64	5/6	-5.0	3.0	8.0	Complied
Top	5	QPSK	1/2	-1.8	3.0	4.8	Complied
Top	5	QPSK	3/4	-1.8	3.0	4.8	Complied
Top	5	QAM16	1/2	-2.9	3.0	5.9	Complied
Top	5	QAM16	3/4	-3.0	3.0	6.0	Complied

Channel	BW (MHz)	Modulation	Coding	Level (dBW)	Limit (dBW)	Margin (dB)	Result
Top	5	QAM64	2/3	-4.9	3.0	7.9	Complied
Top	5	QAM64	3/4	-5.2	3.0	8.2	Complied
Top	5	QAM64	5/6	-5.0	3.0	8.0	Complied

**Transmitter Carrier Output Power and EIRP Limitations (continued)****Results: (continued)**

Channel	BW (MHz)	Modulation	Coding	Level (dBW)	Limit (dBW)	Margin (dB)	Result
Bottom	10	QPSK	1/2	-2.4	3.0	5.4	Complied
Bottom	10	QPSK	3/4	-2.4	3.0	5.4	Complied
Bottom	10	QAM16	1/2	-3.2	3.0	6.2	Complied
Bottom	10	QAM16	3/4	-3.2	3.0	6.2	Complied
Bottom	10	QAM64	2/3	-5.1	3.0	8.1	Complied
Bottom	10	QAM64	3/4	-5.5	3.0	8.5	Complied
Bottom	10	QAM64	5/6	-5.1	3.0	8.1	Complied
Middle	10	QPSK	1/2	-1.8	3.0	4.8	Complied
Middle	10	QPSK	3/4	-1.9	3.0	4.9	Complied
Middle	10	QAM16	1/2	-2.9	3.0	5.9	Complied
Middle	10	QAM16	3/4	-2.9	3.0	5.9	Complied
Middle	10	QAM64	2/3	-4.6	3.0	7.6	Complied
Middle	10	QAM64	3/4	-5.1	3.0	8.1	Complied
Middle	10	QAM64	5/6	-4.8	3.0	7.8	Complied
Top	10	QPSK	1/2	-1.9	3.0	4.9	Complied
Top	10	QPSK	3/4	-1.9	3.0	4.9	Complied
Top	10	QAM16	1/2	-3.1	3.0	6.1	Complied
Top	10	QAM16	3/4	-3.1	3.0	6.1	Complied
Top	10	QAM64	2/3	-4.6	3.0	7.6	Complied
Top	10	QAM64	3/4	-5.1	3.0	8.1	Complied
Top	10	QAM64	5/6	-4.7	3.0	7.7	Complied

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

<b>FCC Part:</b>	FCC 2.1049
<b>Test Method Used:</b>	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.

**Environmental Conditions:**

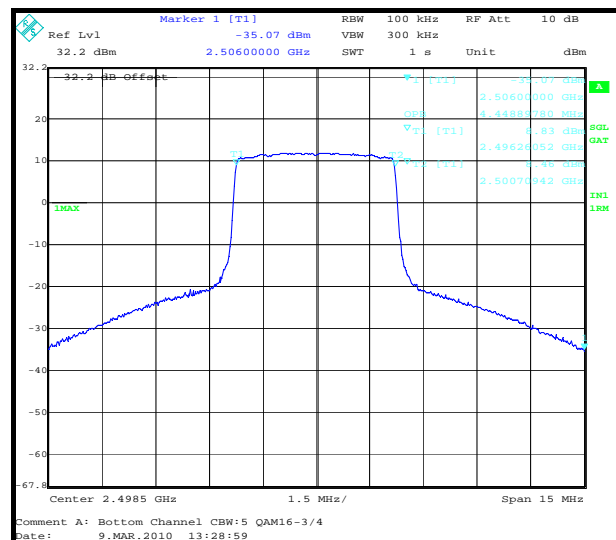
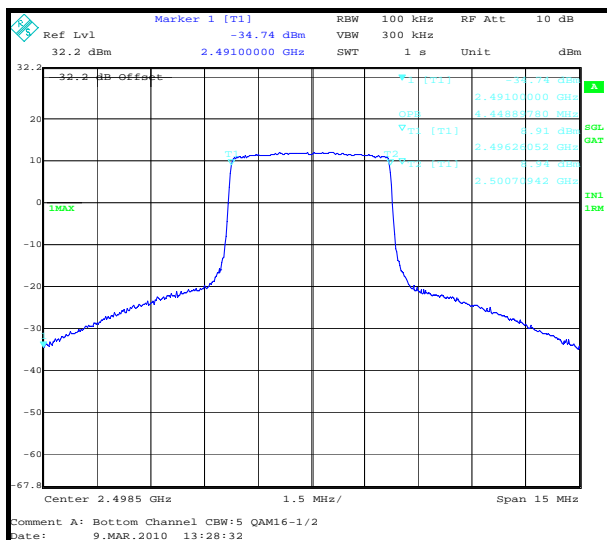
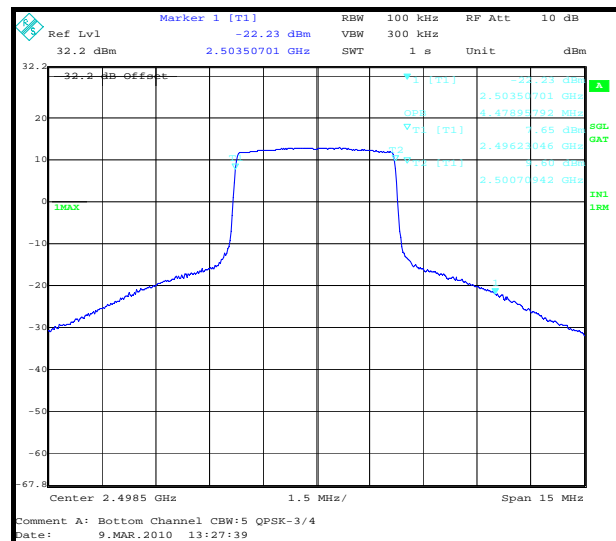
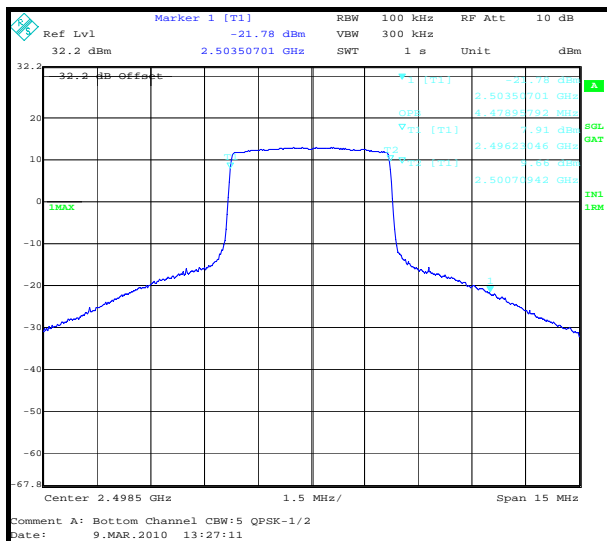
<b>Temperature (°C):</b>	23
<b>Relative Humidity (%):</b>	36

**Results:**

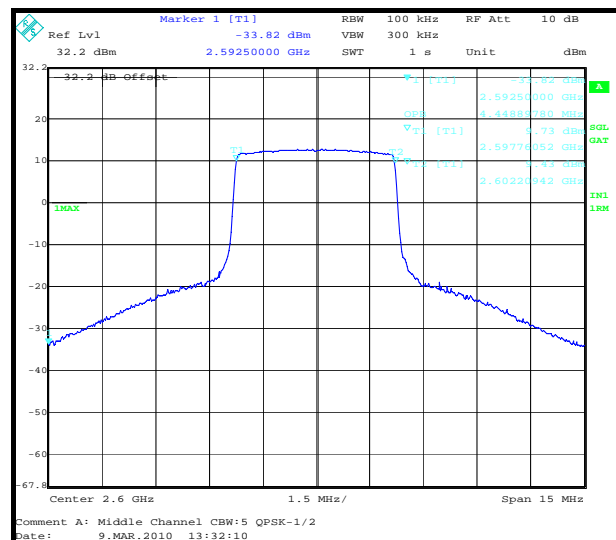
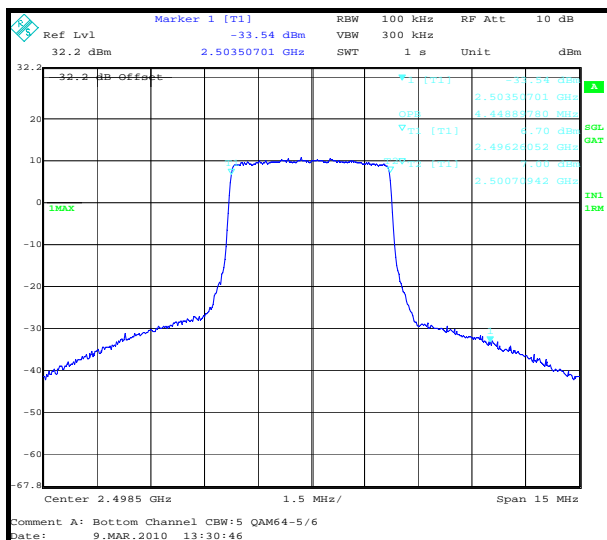
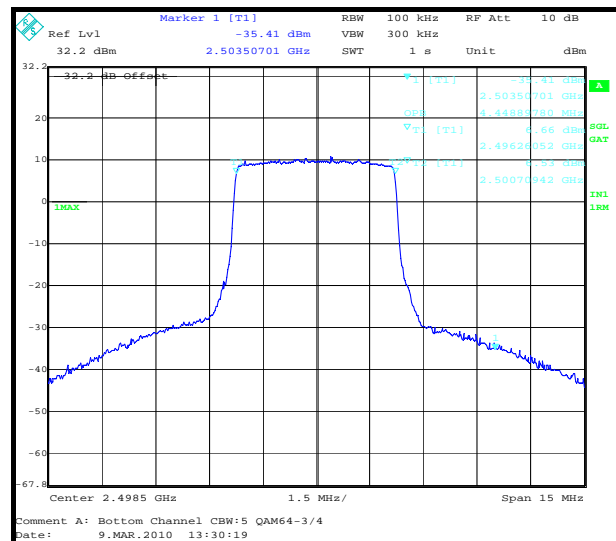
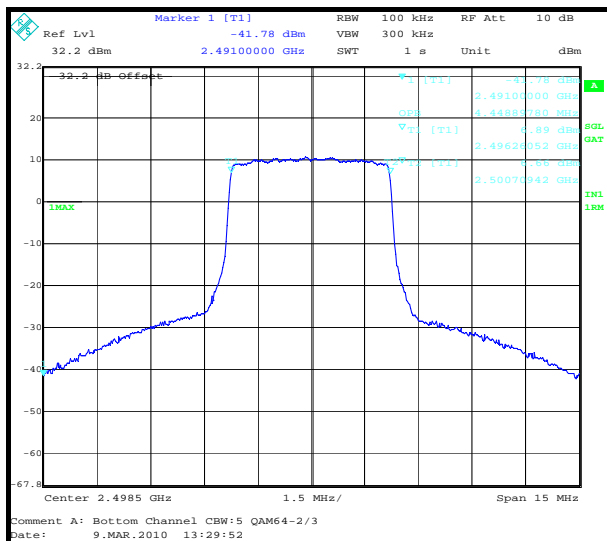
Channel	Frequency	Channel Bandwidth (MHz)	Modulation	Coding	Occupied Bandwidth (MHz)
Bottom	2498.5	5	QPSK	1/2	4.479
Bottom	2498.5	5	QPSK	3/4	4.479
Bottom	2498.5	5	QAM16	1/2	4.449
Bottom	2498.5	5	QAM16	3/4	4.449
Bottom	2498.5	5	QAM64	2/3	4.449
Bottom	2498.5	5	QAM64	3/4	4.449
Bottom	2498.5	5	QAM64	5/6	4.449
Middle	2600.0	5	QPSK	1/2	4.449
Middle	2600.0	5	QPSK	3/4	4.449
Middle	2600.0	5	QAM16	1/2	4.449
Middle	2600.0	5	QAM16	3/4	4.449
Middle	2600.0	5	QAM64	2/3	4.449
Middle	2600.0	5	QAM64	3/4	4.449
Middle	2600.0	5	QAM64	5/6	4.449
Top	2687.5	5	QPSK	1/2	4.449
Top	2687.5	5	QPSK	3/4	4.479
Top	2687.5	5	QAM16	1/2	4.449
Top	2687.5	5	QAM16	3/4	4.479
Top	2687.5	5	QAM64	2/3	4.449
Top	2687.5	5	QAM64	3/4	4.449
Top	2687.5	5	QAM64	5/6	4.449

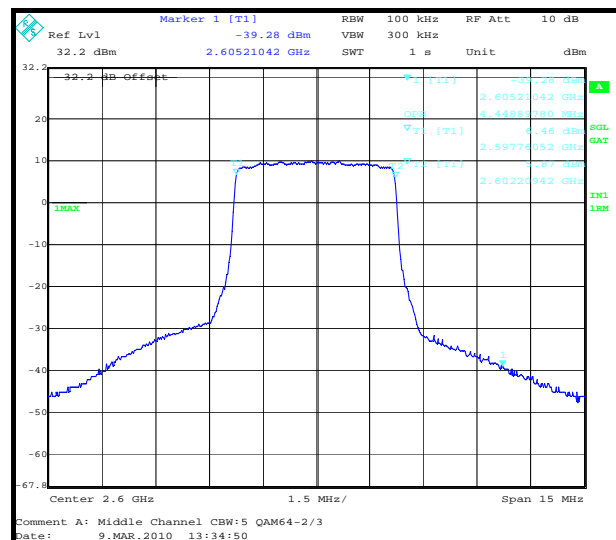
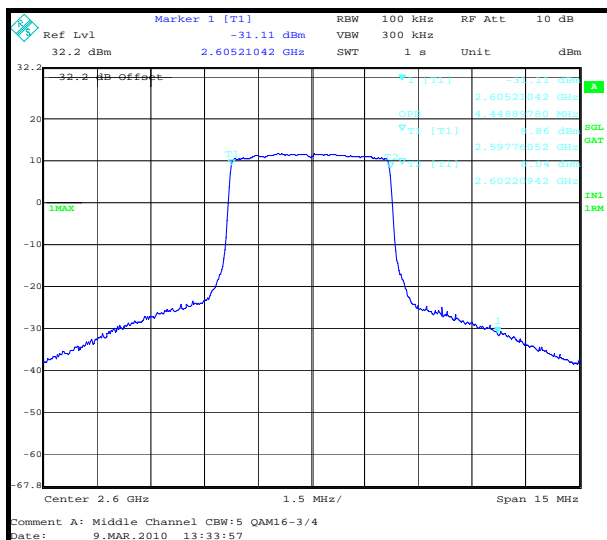
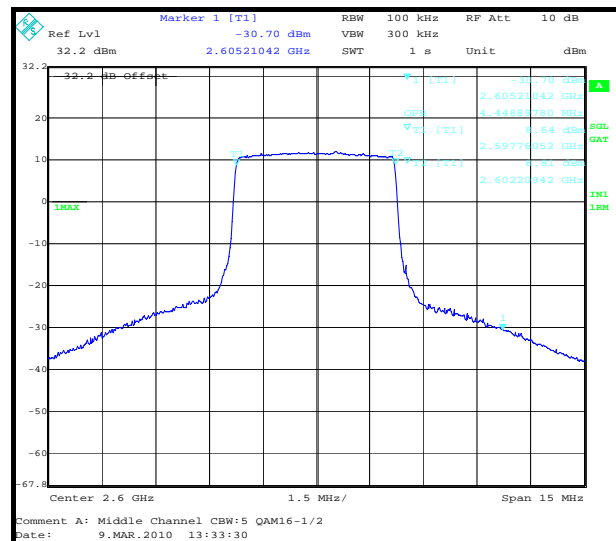
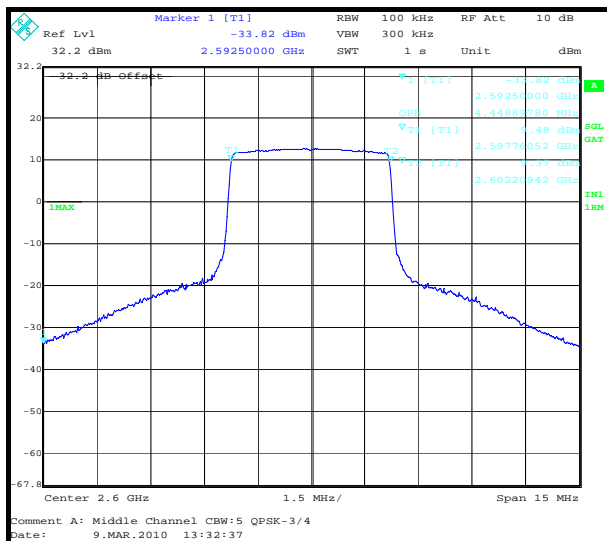
**Transmitter Occupied Bandwidth****Results: (continued)**

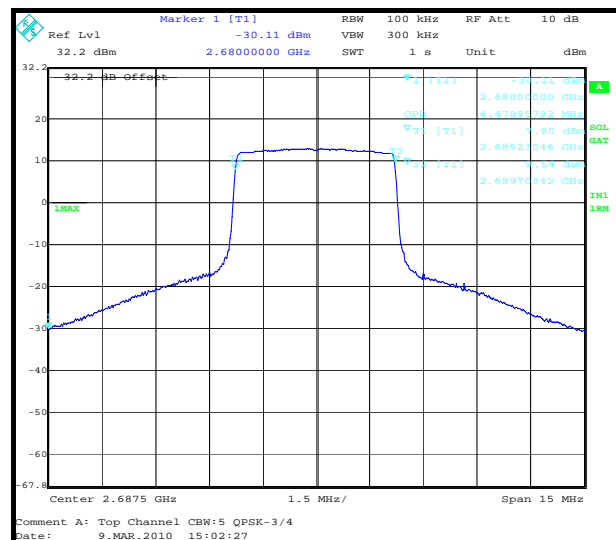
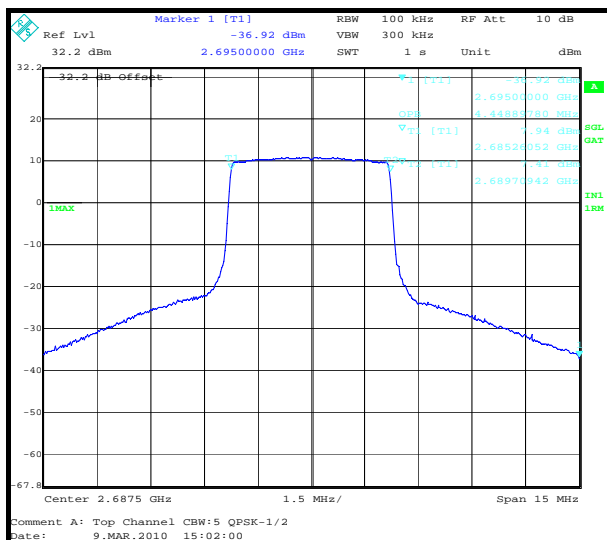
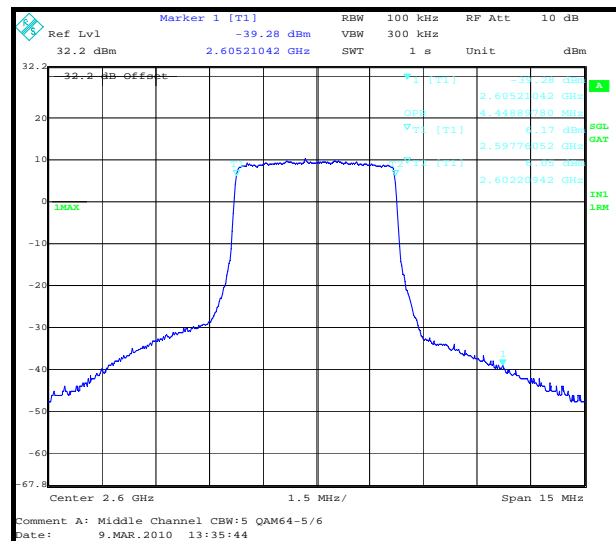
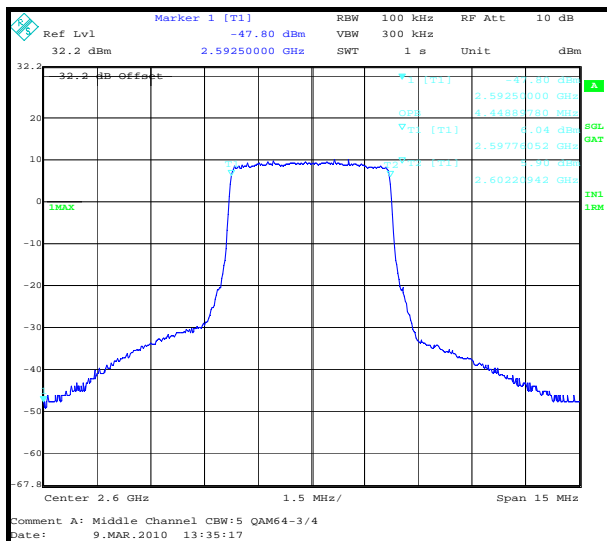
Channel	Frequency	Channel Bandwidth (MHz)	Modulation	Coding	Occupied Bandwidth (MHz)
Bottom	2501.0	10	QPSK	1/2	9.259
Bottom	2501.0	10	QPSK	3/4	9.259
Bottom	2501.0	10	QAM16	1/2	9.259
Bottom	2501.0	10	QAM16	3/4	9.259
Bottom	2501.0	10	QAM64	2/3	9.259
Bottom	2501.0	10	QAM64	3/4	9.198
Bottom	2501.0	10	QAM64	5/6	9.259
Middle	2600.0	10	QPSK	1/2	9.259
Middle	2600.0	10	QPSK	3/4	9.259
Middle	2600.0	10	QAM16	1/2	9.259
Middle	2600.0	10	QAM16	3/4	9.259
Middle	2600.0	10	QAM64	2/3	9.259
Middle	2600.0	10	QAM64	3/4	9.198
Middle	2600.0	10	QAM64	5/6	9.198
Top	2685.0	10	QPSK	1/2	9.259
Top	2685.0	10	QPSK	3/4	9.259
Top	2685.0	10	QAM16	1/2	9.259
Top	2685.0	10	QAM16	3/4	9.259
Top	2685.0	10	QAM64	2/3	9.259
Top	2685.0	10	QAM64	3/4	9.259
Top	2685.0	10	QAM64	5/6	9.259

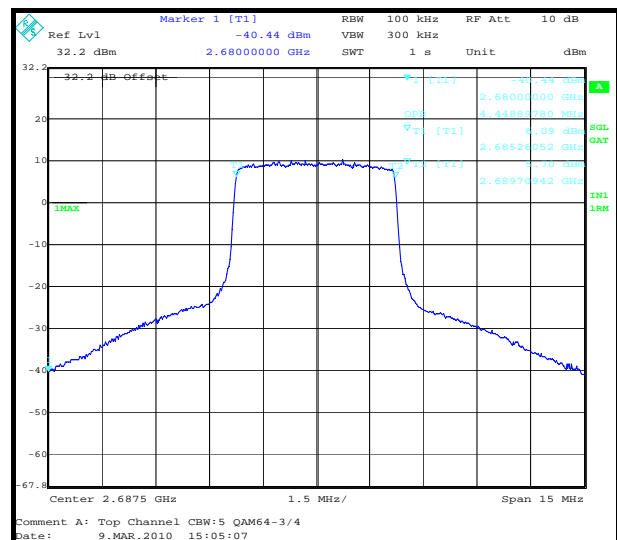
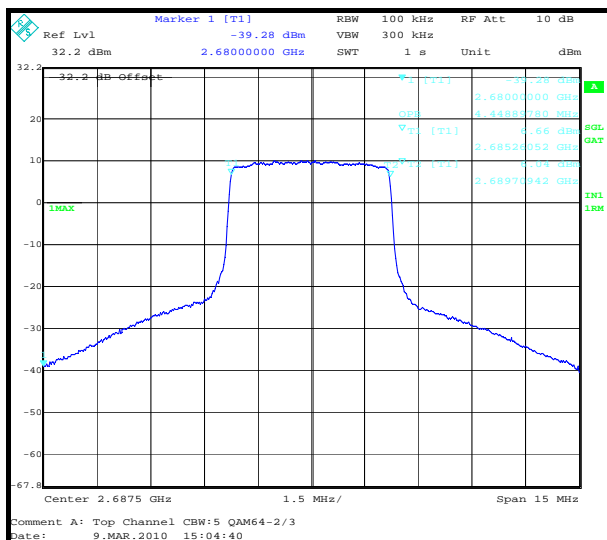
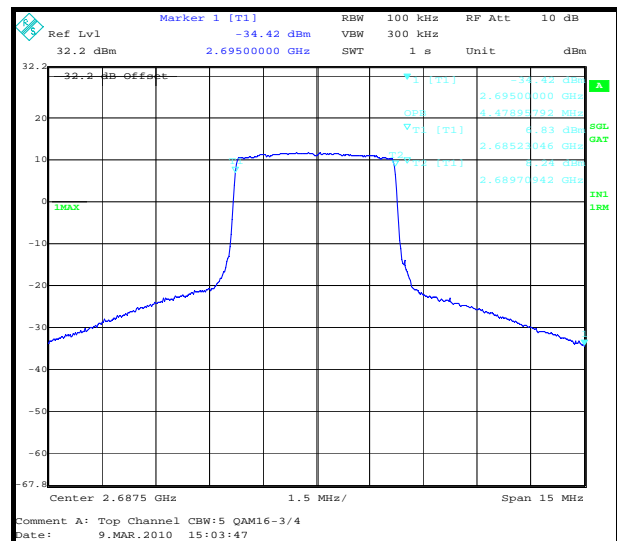
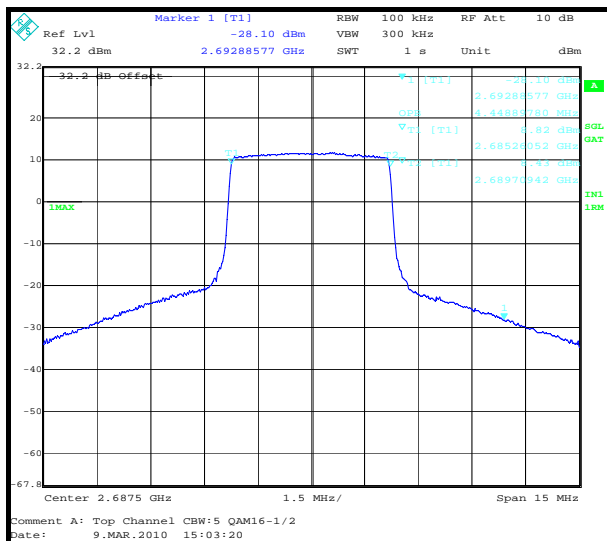
**Transmitter Occupied Bandwidth (continued)****Occupied Bandwidth Plots – 5MHz**



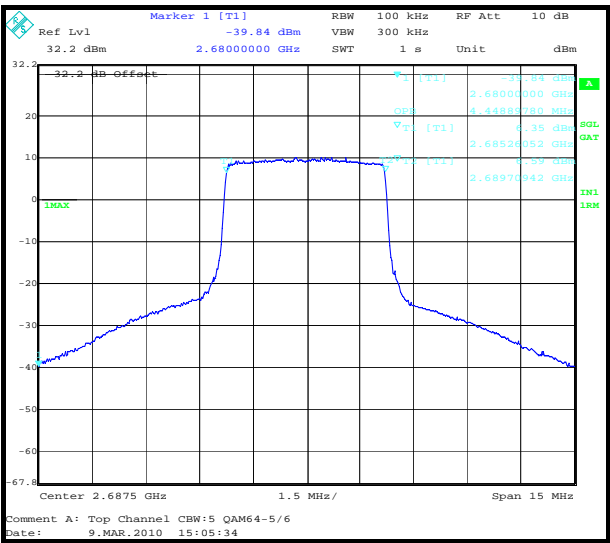
**Transmitter Occupied Bandwidth (continued)****Occupied Bandwidth Plots – 5MHz (continued)**

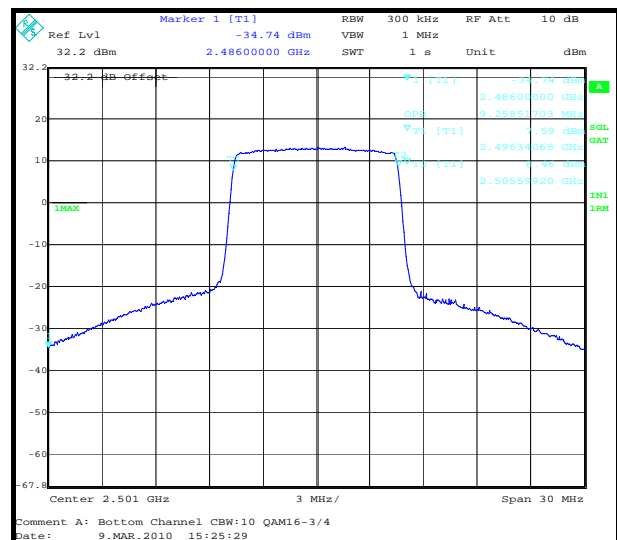
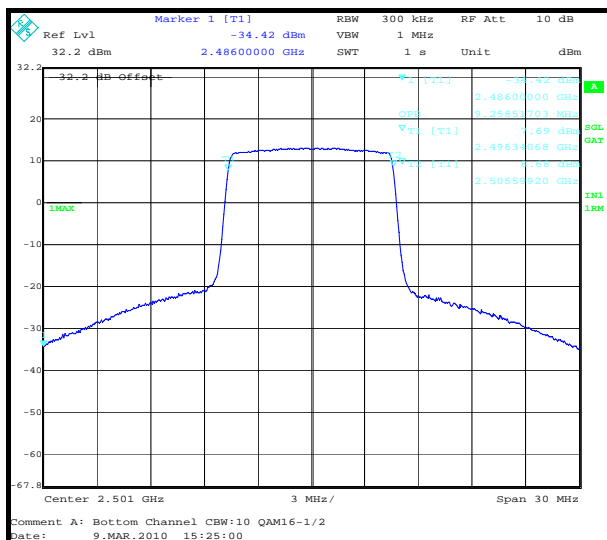
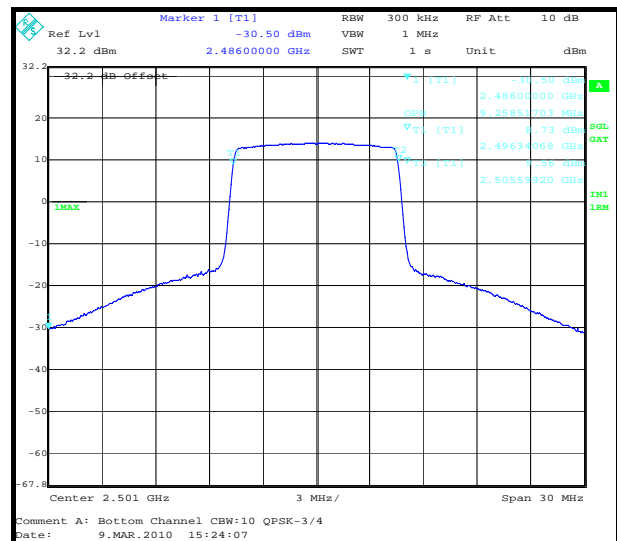
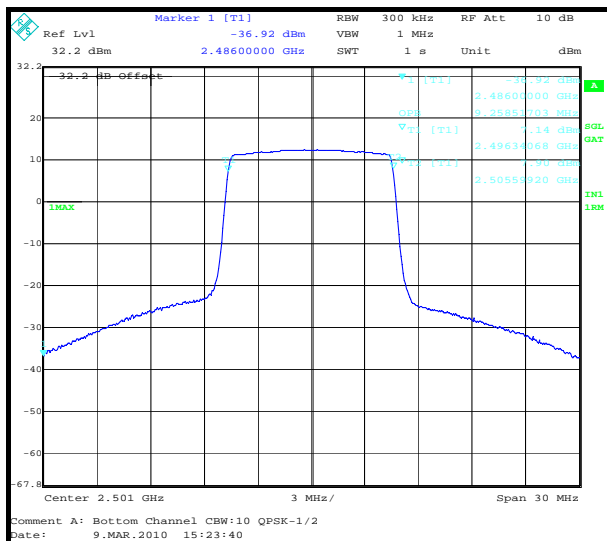
**Transmitter Occupied Bandwidth (continued)****Occupied Bandwidth Plots – 5MHz (continued)**

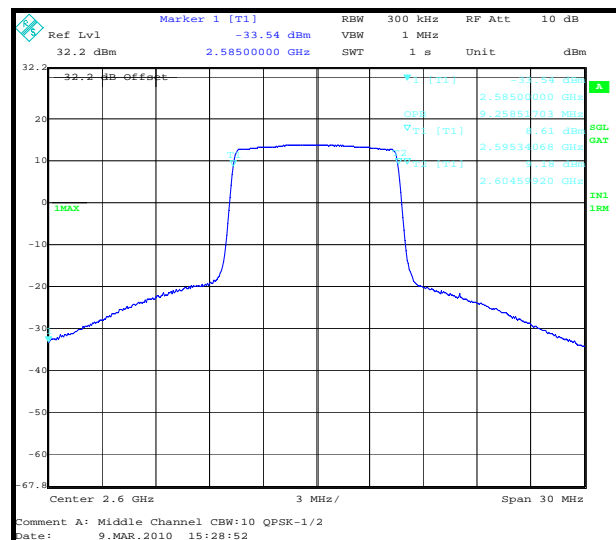
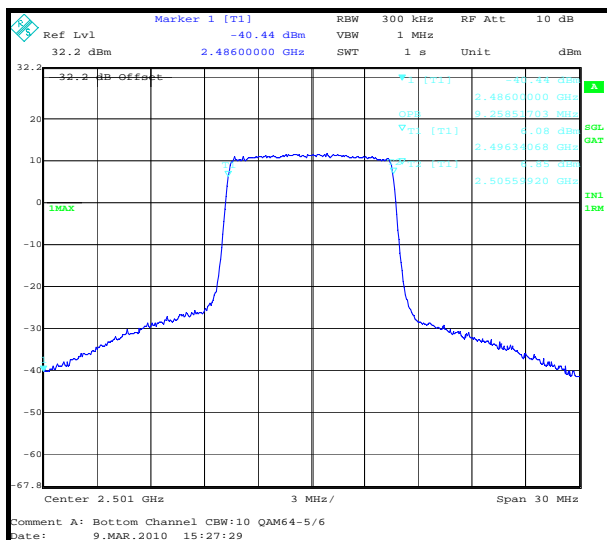
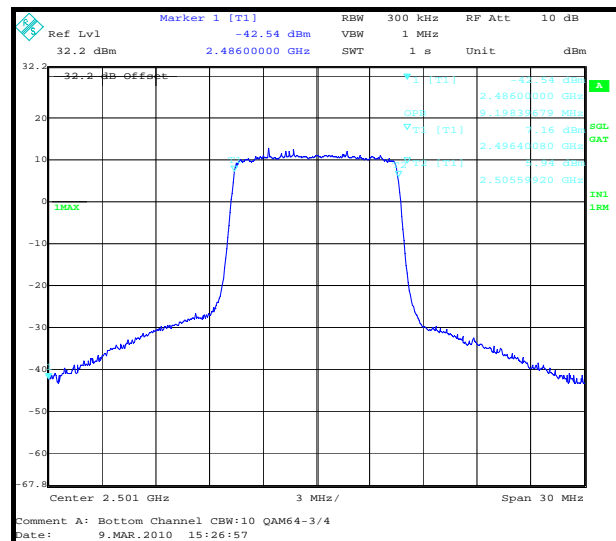
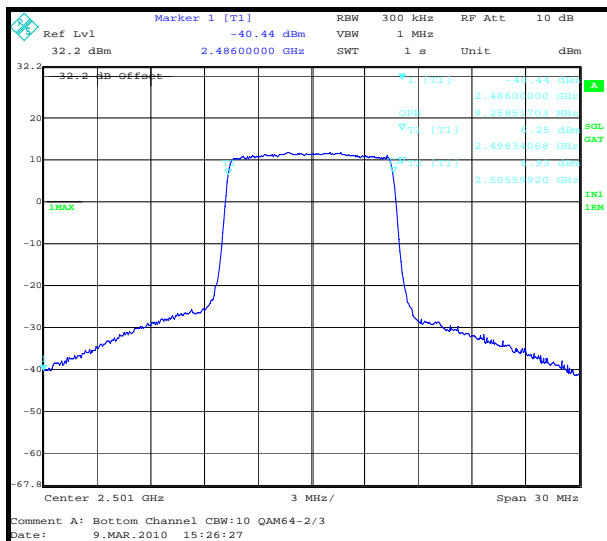
**Transmitter Occupied Bandwidth (continued)****Occupied Bandwidth Plots – 5MHz (continued)**

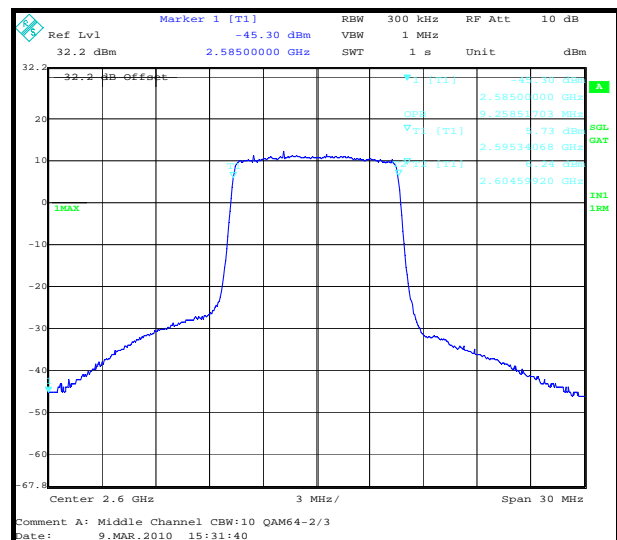
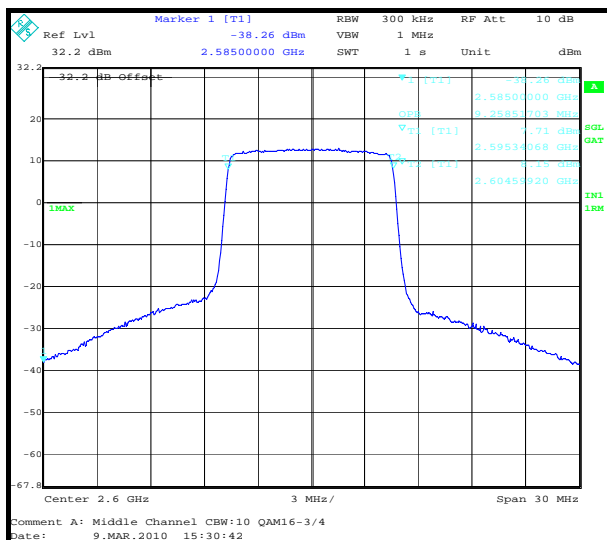
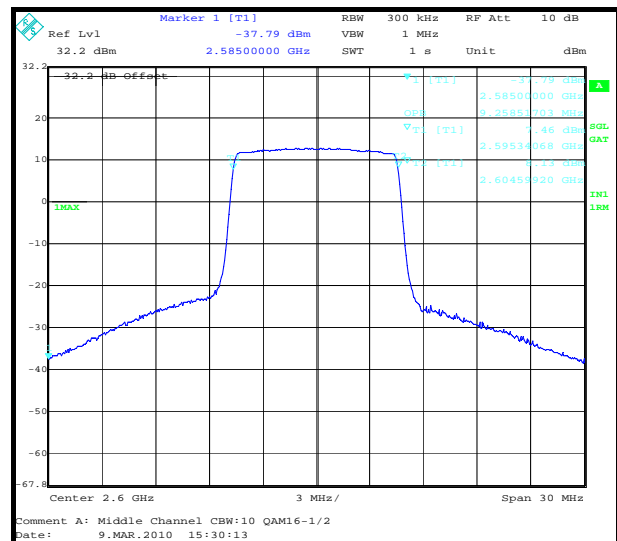
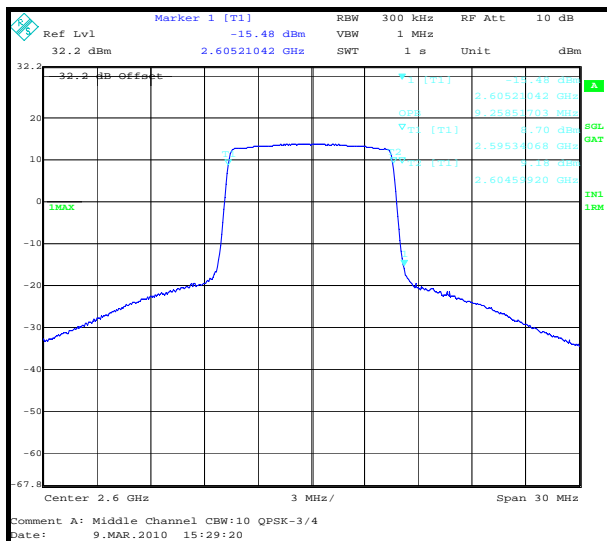
**Transmitter Occupied Bandwidth (continued)****Occupied Bandwidth Plots – 5MHz (continued)**

**Transmitter Occupied Bandwidth (continued)**  
**Occupied Bandwidth Plots – 5MHz (continued)**

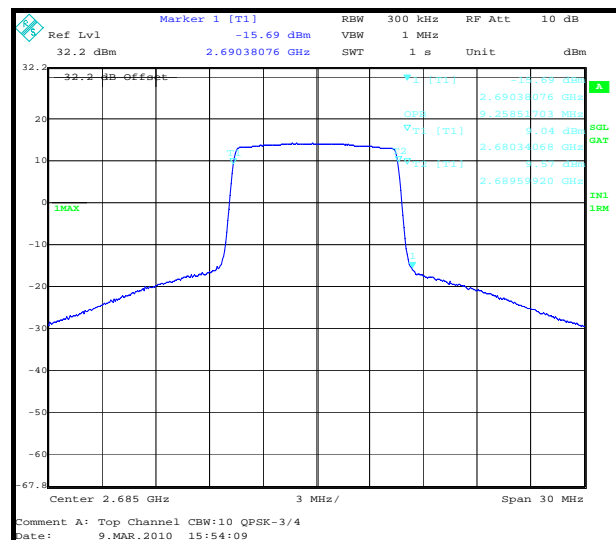
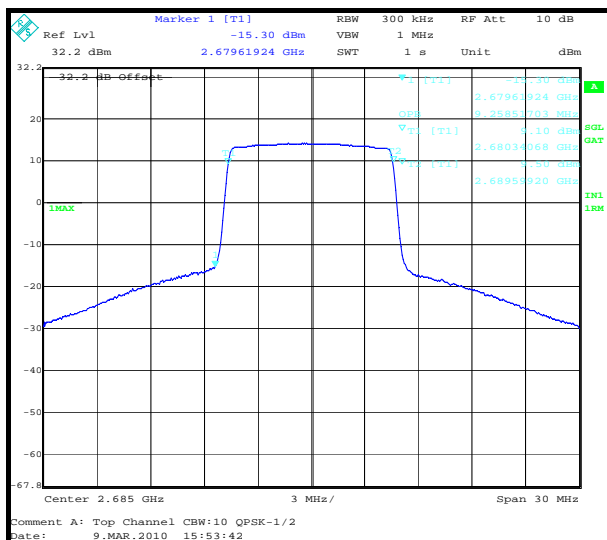
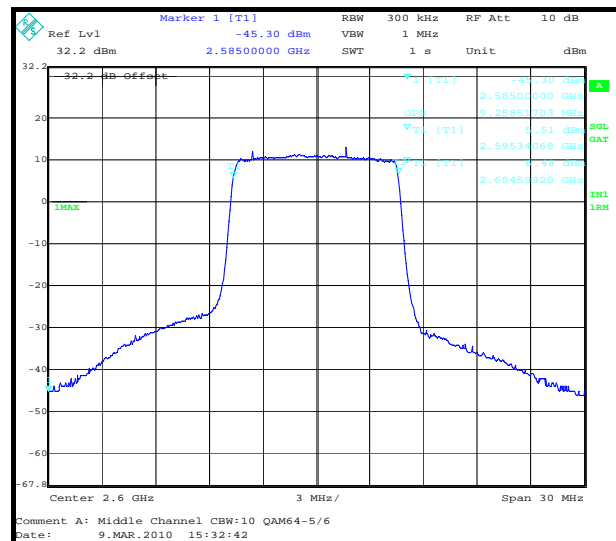
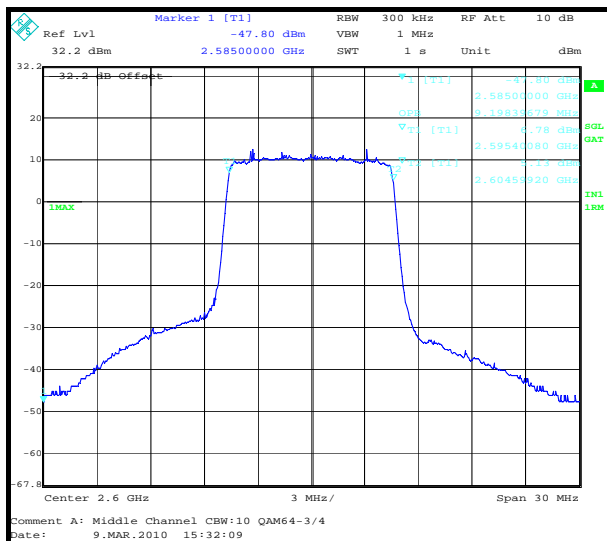


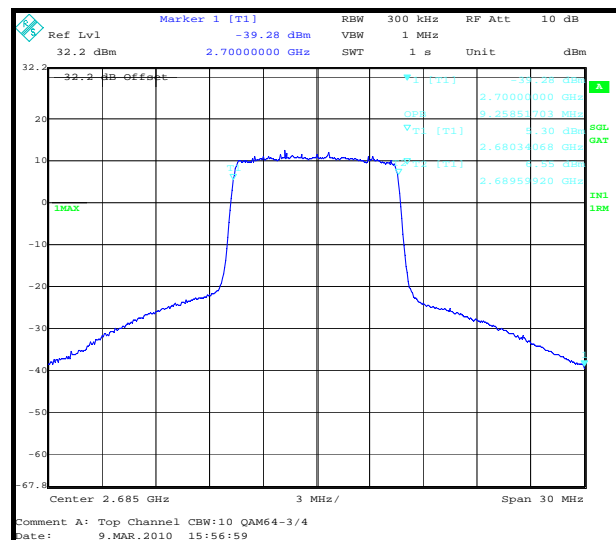
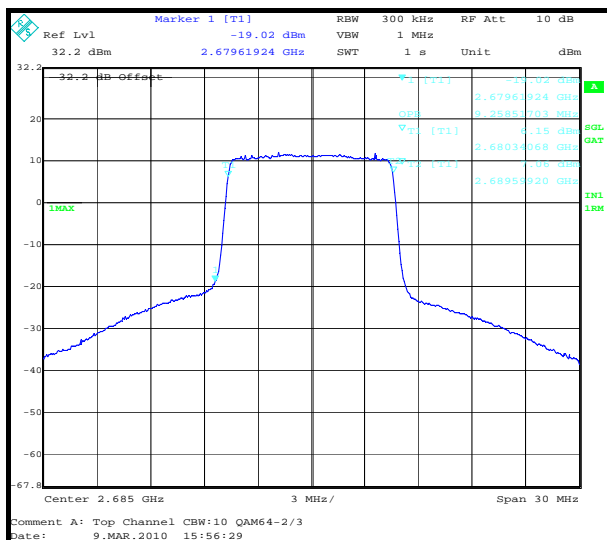
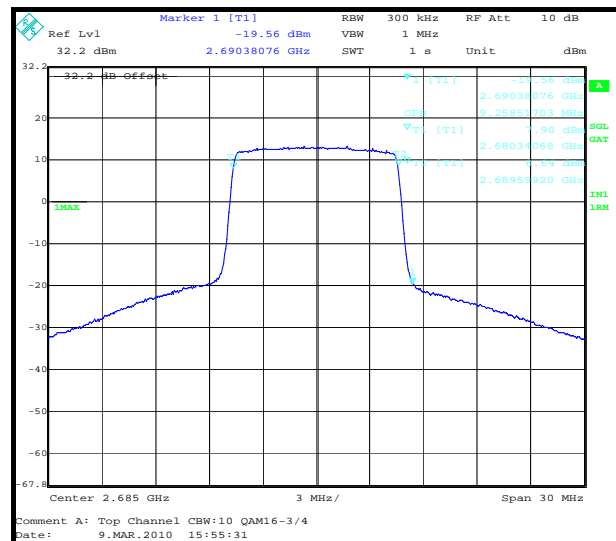
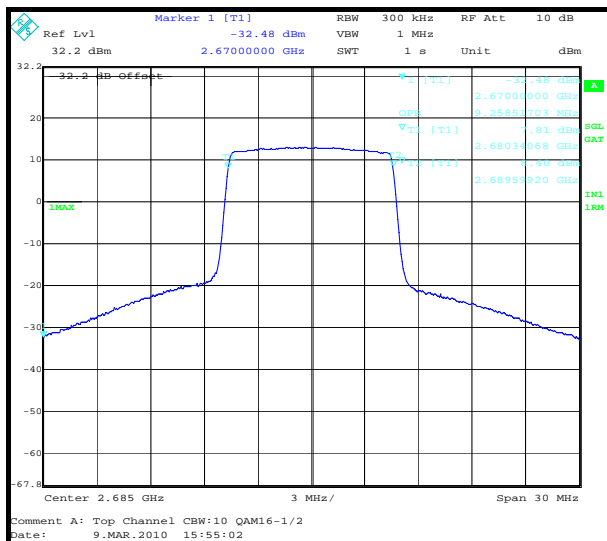
**Transmitter Occupied Bandwidth (continued)****Occupied Bandwidth Plots – 10MHz**

**Transmitter Occupied Bandwidth (continued)****Occupied Bandwidth Plots – 10MHz (continued)**

**Transmitter Occupied Bandwidth (continued)****Occupied Bandwidth Plots – 10MHz (continued)**

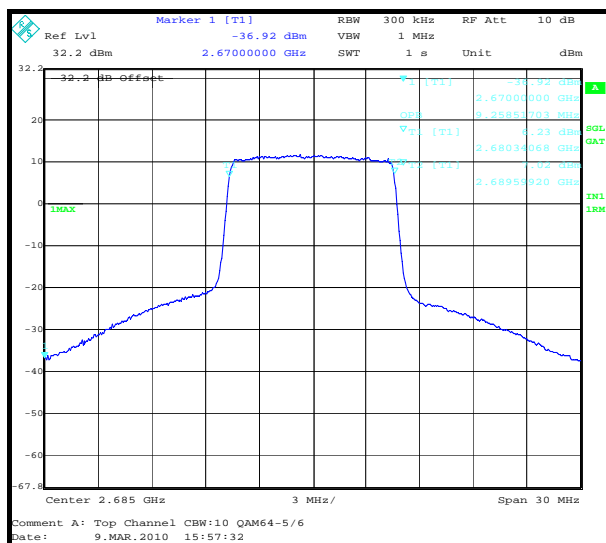


**Transmitter Occupied Bandwidth (continued)****Occupied Bandwidth Plots – 10MHz (continued)**

**Transmitter Occupied Bandwidth (continued)****Occupied Bandwidth Plots – 10MHz (continued)**

### **Transmitter Occupied Bandwidth (continued)**

### Occupied Bandwidth Plots – 10MHz (continued)



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

<b>FCC Part:</b>	FCC 2.1055(a)(1) and FCC 27.54
<b>Test Method Used:</b>	Tests were performed using the test methods detailed in ANSI TIA-603-C-2004

**Environmental Conditions:**

<b>Temperature (°C):</b>	23
<b>Relative Humidity (%):</b>	34

**Results: -30°C – 110 VAC**

Channel	BW (MHz)	Modulation	Coding	Frequency (-26dBc)	Limit (MHz)	Margin (MHz)	Result
Bottom	5	QPSK	1/2	2496.021	2496	0.021	Complied
Bottom	5	QPSK	3/4	2496.027	2496	0.027	Complied
Bottom	5	QAM16	1/2	2496.069	2496	0.069	Complied
Bottom	5	QAM16	3/4	2496.063	2496	0.063	Complied
Bottom	5	QAM64	2/3	2496.093	2496	0.093	Complied
Bottom	5	QAM64	3/4	2496.093	2496	0.093	Complied
Bottom	5	QAM64	5/6	2496.099	2496	0.099	Complied
Top	5	QPSK	1/2	2689.931	2690	0.069	Complied
Top	5	QPSK	3/4	2689.925	2690	0.075	Complied
Top	5	QAM16	1/2	2689.925	2690	0.075	Complied
Top	5	QAM16	3/4	2689.877	2690	0.123	Complied
Top	5	QAM64	2/3	2689.877	2690	0.123	Complied
Top	5	QAM64	3/4	2689.853	2690	0.147	Complied
Top	5	QAM64	5/6	2689.877	2690	0.123	Complied

**Results: -30°C – 110 VAC (continued)**

Channel	BW (MHz)	Modulation	Coding	Frequency (-26dBc)	Limit (MHz)	Margin (MHz)	Result
Bottom	10	QPSK	1/2	2496.147	2496	0.147	Complied
Bottom	10	QPSK	3/4	2496.159	2496	0.159	Complied
Bottom	10	QAM16	1/2	2496.123	2496	0.123	Complied
Bottom	10	QAM16	3/4	2496.159	2496	0.159	Complied
Bottom	10	QAM64	2/3	2496.165	2496	0.165	Complied
Bottom	10	QAM64	3/4	2496.201	2496	0.201	Complied
Bottom	10	QAM64	5/6	2496.231	2496	0.231	Complied
Top	10	QPSK	1/2	2689.847	2690	0.153	Complied
Top	10	QPSK	3/4	2689.835	2690	0.165	Complied
Top	10	QAM16	1/2	2689.823	2690	0.177	Complied
Top	10	QAM16	3/4	2689.769	2690	0.231	Complied
Top	10	QAM64	2/3	2689.757	2690	0.243	Complied
Top	10	QAM64	3/4	2689.744	2690	0.256	Complied
Top	10	QAM64	5/6	2689.763	2690	0.237	Complied

**Results: -20°C – 110 VAC**

Channel	BW (MHz)	Modulation	Coding	Frequency (-26dBc)	Limit (MHz)	Margin (MHz)	Result
Bottom	5	QPSK	1/2	2496.045	2496	0.045	Complied
Bottom	5	QPSK	3/4	2496.045	2496	0.045	Complied
Bottom	5	QAM16	1/2	2496.051	2496	0.051	Complied
Bottom	5	QAM16	3/4	2496.069	2496	0.069	Complied
Bottom	5	QAM64	2/3	2496.069	2496	0.069	Complied
Bottom	5	QAM64	3/4	2496.123	2496	0.123	Complied
Bottom	5	QAM64	5/6	2496.093	2496	0.093	Complied
Top	5	QPSK	1/2	2689.931	2690	0.069	Complied
Top	5	QPSK	3/4	2689.919	2690	0.081	Complied
Top	5	QAM16	1/2	2689.931	2690	0.069	Complied
Top	5	QAM16	3/4	2689.883	2690	0.117	Complied
Top	5	QAM64	2/3	2689.913	2690	0.087	Complied
Top	5	QAM64	3/4	2689.871	2690	0.129	Complied
Top	5	QAM64	5/6	2689.871	2690	0.129	Complied

**Results: -20°C – 110 VAC (continued)**

Channel	BW (MHz)	Modulation	Coding	Frequency (-26dBc)	Limit (MHz)	Margin (MHz)	Result
Bottom	10	QPSK	1/2	2496.153	2496	0.153	Complied
Bottom	10	QPSK	3/4	2496.147	2496	0.147	Complied
Bottom	10	QAM16	1/2	2496.159	2496	0.159	Complied
Bottom	10	QAM16	3/4	2496.171	2496	0.171	Complied
Bottom	10	QAM64	2/3	2496.165	2496	0.165	Complied
Bottom	10	QAM64	3/4	2496.100	2496	0.100	Complied
Bottom	10	QAM64	5/6	2496.189	2496	0.189	Complied
Top	10	QPSK	1/2	2689.853	2690	0.147	Complied
Top	10	QPSK	3/4	2689.847	2690	0.153	Complied
Top	10	QAM16	1/2	2689.829	2690	0.171	Complied
Top	10	QAM16	3/4	2689.793	2690	0.207	Complied
Top	10	QAM64	2/3	2689.744	2690	0.256	Complied
Top	10	QAM64	3/4	2689.714	2690	0.286	Complied
Top	10	QAM64	5/6	2689.757	2690	0.243	Complied

**Results: -10°C – 110 VAC**

Channel	BW (MHz)	Modulation	Coding	Frequency (-26dBc)	Limit (MHz)	Margin (MHz)	Result
Bottom	5	QPSK	1/2	2496.243	2496	0.243	Complied
Bottom	5	QPSK	3/4	2496.143	2496	0.143	Complied
Bottom	5	QAM16	1/2	2496.045	2496	0.045	Complied
Bottom	5	QAM16	3/4	2496.063	2496	0.063	Complied
Bottom	5	QAM64	2/3	2496.081	2496	0.081	Complied
Bottom	5	QAM64	3/4	2496.117	2496	0.117	Complied
Bottom	5	QAM64	5/6	2496.105	2496	0.105	Complied
Top	5	QPSK	1/2	2689.883	2690	0.117	Complied
Top	5	QPSK	3/4	2689.871	2690	0.129	Complied
Top	5	QAM16	1/2	2689.865	2690	0.135	Complied
Top	5	QAM16	3/4	2689.871	2690	0.129	Complied
Top	5	QAM64	2/3	2689.841	2690	0.159	Complied
Top	5	QAM64	3/4	2689.883	2690	0.117	Complied
Top	5	QAM64	5/6	2689.901	2690	0.099	Complied



**Results: -10°C – 110 VAC (continued)**

Channel	BW (MHz)	Modulation	Coding	Frequency (-26dBc)	Limit (MHz)	Margin (MHz)	Result
Bottom	10	QPSK	1/2	2496.177	2496	0.177	Complied
Bottom	10	QPSK	3/4	2496.147	2496	0.147	Complied
Bottom	10	QAM16	1/2	2496.165	2496	0.165	Complied
Bottom	10	QAM16	3/4	2496.153	2496	0.153	Complied
Bottom	10	QAM64	2/3	2496.171	2496	0.171	Complied
Bottom	10	QAM64	3/4	2496.195	2496	0.195	Complied
Bottom	10	QAM64	5/6	2496.183	2496	0.183	Complied
Top	10	QPSK	1/2	2689.835	2690	0.165	Complied
Top	10	QPSK	3/4	2689.811	2690	0.189	Complied
Top	10	QAM16	1/2	2689.835	2690	0.165	Complied
Top	10	QAM16	3/4	2689.793	2690	0.207	Complied
Top	10	QAM64	2/3	2689.763	2690	0.237	Complied
Top	10	QAM64	3/4	2688.590	2690	0.410	Complied
Top	10	QAM64	5/6	2689.732	2690	0.268	Complied

**Results: 0°C – 110 VAC**

Channel	BW (MHz)	Modulation	Coding	Frequency (-26dBc)	Limit (MHz)	Margin (MHz)	Result
Bottom	5	QPSK	1/2	2496.200	2496	0.200	Complied
Bottom	5	QPSK	3/4	2496.150	2496	0.150	Complied
Bottom	5	QAM16	1/2	2496.100	2496	0.100	Complied
Bottom	5	QAM16	3/4	2496.099	2496	0.099	Complied
Bottom	5	QAM64	2/3	2496.093	2496	0.093	Complied
Bottom	5	QAM64	3/4	2496.105	2496	0.105	Complied
Bottom	5	QAM64	5/6	2496.075	2496	0.075	Complied
Top	5	QPSK	1/2	2689.919	2690	0.081	Complied
Top	5	QPSK	3/4	2689.901	2690	0.099	Complied
Top	5	QAM16	1/2	2689.907	2690	0.093	Complied
Top	5	QAM16	3/4	2689.925	2690	0.075	Complied
Top	5	QAM64	2/3	2689.859	2690	0.141	Complied
Top	5	QAM64	3/4	2689.877	2690	0.123	Complied
Top	5	QAM64	5/6	2689.877	2690	0.123	Complied

**Results: 0°C – 110 VAC (continued)**

Channel	BW (MHz)	Modulation	Coding	Frequency (-26dBc)	Limit (MHz)	Margin (MHz)	Result
Bottom	10	QPSK	1/2	2496.145	2496	0.145	Complied
Bottom	10	QPSK	3/4	2496.122	2496	0.122	Complied
Bottom	10	QAM16	1/2	2496.147	2496	0.147	Complied
Bottom	10	QAM16	3/4	2496.183	2496	0.183	Complied
Bottom	10	QAM64	2/3	2496.213	2496	0.213	Complied
Bottom	10	QAM64	3/4	2496.231	2496	0.231	Complied
Bottom	10	QAM64	5/6	2496.213	2496	0.213	Complied
Top	10	QPSK	1/2	2689.835	2690	0.165	Complied
Top	10	QPSK	3/4	2689.847	2690	0.153	Complied
Top	10	QAM16	1/2	2689.835	2690	0.165	Complied
Top	10	QAM16	3/4	2689.744	2690	0.256	Complied
Top	10	QAM64	2/3	2689.726	2690	0.274	Complied
Top	10	QAM64	3/4	2688.638	2690	0.362	Complied
Top	10	QAM64	5/6	2689.744	2690	0.256	Complied

**Results: 10°C – 110 VAC**

Channel	BW (MHz)	Modulation	Coding	Frequency (-26dBc)	Limit (MHz)	Margin (MHz)	Result
Bottom	5	QPSK	1/2	2496.093	2496	0.093	Complied
Bottom	5	QPSK	3/4	2496.129	2496	0.129	Complied
Bottom	5	QAM16	1/2	2496.075	2496	0.075	Complied
Bottom	5	QAM16	3/4	2496.075	2496	0.075	Complied
Bottom	5	QAM64	2/3	2496.087	2496	0.087	Complied
Bottom	5	QAM64	3/4	2496.117	2496	0.117	Complied
Bottom	5	QAM64	5/6	2496.087	2496	0.087	Complied
Top	5	QPSK	1/2	2689.901	2690	0.099	Complied
Top	5	QPSK	3/4	2689.889	2690	0.111	Complied
Top	5	QAM16	1/2	2689.937	2690	0.063	Complied
Top	5	QAM16	3/4	2689.895	2690	0.105	Complied
Top	5	QAM64	2/3	2689.889	2690	0.111	Complied
Top	5	QAM64	3/4	2689.877	2690	0.123	Complied
Top	5	QAM64	5/6	2689.871	2690	0.129	Complied

**Results: 10°C – 110 VAC (continued)**

Channel	BW (MHz)	Modulation	Coding	Frequency (-26dBc)	Limit (MHz)	Margin (MHz)	Result
Bottom	10	QPSK	1/2	2496.194	2496	0.194	Complied
Bottom	10	QPSK	3/4	2496.166	2496	0.166	Complied
Bottom	10	QAM16	1/2	2496.141	2496	0.141	Complied
Bottom	10	QAM16	3/4	2496.165	2496	0.165	Complied
Bottom	10	QAM64	2/3	2496.231	2496	0.231	Complied
Bottom	10	QAM64	3/4	2496.200	2496	0.200	Complied
Bottom	10	QAM64	5/6	2496.225	2496	0.225	Complied
Top	10	QPSK	1/2	2689.853	2690	0.147	Complied
Top	10	QPSK	3/4	2689.835	2690	0.165	Complied
Top	10	QAM16	1/2	2689.835	2690	0.165	Complied
Top	10	QAM16	3/4	2689.799	2690	0.201	Complied
Top	10	QAM64	2/3	2689.775	2690	0.225	Complied
Top	10	QAM64	3/4	2688.638	2690	0.362	Complied
Top	10	QAM64	5/6	2689.744	2690	0.256	Complied

**Results: 20°C – 110 VAC**

Channel	BW (MHz)	Modulation	Coding	Frequency (-26dBc)	Limit (MHz)	Margin (MHz)	Result
Bottom	5	QPSK	1/2	2496.069	2496	0.069	Complied
Bottom	5	QPSK	3/4	2496.099	2496	0.099	Complied
Bottom	5	QAM16	1/2	2496.081	2496	0.081	Complied
Bottom	5	QAM16	3/4	2496.069	2496	0.069	Complied
Bottom	5	QAM64	2/3	2496.099	2496	0.099	Complied
Bottom	5	QAM64	3/4	2496.123	2496	0.123	Complied
Bottom	5	QAM64	5/6	2496.093	2496	0.093	Complied
Top	5	QPSK	1/2	2689.895	2690	0.105	Complied
Top	5	QPSK	3/4	2689.883	2690	0.117	Complied
Top	5	QAM16	1/2	2689.877	2690	0.123	Complied
Top	5	QAM16	3/4	2689.877	2690	0.123	Complied
Top	5	QAM64	2/3	2689.883	2690	0.117	Complied
Top	5	QAM64	3/4	2689.883	2690	0.117	Complied
Top	5	QAM64	5/6	2689.877	2690	0.123	Complied

**Results: 20°C – 110 VAC (continued)**

Channel	BW (MHz)	Modulation	Coding	Frequency (-26dBc)	Limit (MHz)	Margin (MHz)	Result
Bottom	10	QPSK	1/2	2496.276	2496	0.276	Complied
Bottom	10	QPSK	3/4	2496.118	2496	0.118	Complied
Bottom	10	QAM16	1/2	2496.123	2496	0.123	Complied
Bottom	10	QAM16	3/4	2496.201	2496	0.201	Complied
Bottom	10	QAM64	2/3	2496.219	2496	0.219	Complied
Bottom	10	QAM64	3/4	2496.200	2496	0.200	Complied
Bottom	10	QAM64	5/6	2496.213	2496	0.213	Complied
Top	10	QPSK	1/2	2689.847	2690	0.153	Complied
Top	10	QPSK	3/4	2689.883	2690	0.117	Complied
Top	10	QAM16	1/2	2689.835	2690	0.165	Complied
Top	10	QAM16	3/4	2689.787	2690	0.213	Complied
Top	10	QAM64	2/3	2689.751	2690	0.249	Complied
Top	10	QAM64	3/4	2688.590	2690	0.410	Complied
Top	10	QAM64	5/6	2689.732	2690	0.268	Complied

**Results: 30°C – 110 VAC**

Channel	BW (MHz)	Modulation	Coding	Frequency (-26dBc)	Limit (MHz)	Margin (MHz)	Result
Bottom	5	QPSK	1/2	2496.093	2496	0.093	Complied
Bottom	5	QPSK	3/4	2496.075	2496	0.075	Complied
Bottom	5	QAM16	1/2	2496.093	2496	0.093	Complied
Bottom	5	QAM16	3/4	2496.075	2496	0.075	Complied
Bottom	5	QAM64	2/3	2496.087	2496	0.087	Complied
Bottom	5	QAM64	3/4	2496.117	2496	0.117	Complied
Bottom	5	QAM64	5/6	2496.099	2496	0.099	Complied
Top	5	QPSK	1/2	2689.901	2690	0.099	Complied
Top	5	QPSK	3/4	2689.889	2690	0.111	Complied
Top	5	QAM16	1/2	2689.889	2690	0.111	Complied
Top	5	QAM16	3/4	2689.877	2690	0.123	Complied
Top	5	QAM64	2/3	2689.913	2690	0.087	Complied
Top	5	QAM64	3/4	2689.895	2690	0.105	Complied
Top	5	QAM64	5/6	2689.859	2690	0.141	Complied



**Results: 30°C – 110 VAC (continued)**

Channel	BW (MHz)	Modulation	Coding	Frequency (-26dBc)	Limit (MHz)	Margin (MHz)	Result
Bottom	10	QPSK	1/2	2496.201	2496	0.201	Complied
Bottom	10	QPSK	3/4	2496.220	2496	0.220	Complied
Bottom	10	QAM16	1/2	2496.129	2496	0.129	Complied
Bottom	10	QAM16	3/4	2496.165	2496	0.165	Complied
Bottom	10	QAM64	2/3	2496.219	2496	0.219	Complied
Bottom	10	QAM64	3/4	2496.200	2496	0.200	Complied
Bottom	10	QAM64	5/6	2496.225	2496	0.225	Complied
Top	10	QPSK	1/2	2689.811	2690	0.189	Complied
Top	10	QPSK	3/4	2689.835	2690	0.165	Complied
Top	10	QAM16	1/2	2689.829	2690	0.171	Complied
Top	10	QAM16	3/4	2689.799	2690	0.201	Complied
Top	10	QAM64	2/3	2689.781	2690	0.219	Complied
Top	10	QAM64	3/4	2688.662	2690	0.338	Complied
Top	10	QAM64	5/6	2689.799	2690	0.201	Complied

**Results: 40°C – 110 VAC**

Channel	BW (MHz)	Modulation	Coding	Frequency (-26dBc)	Limit (MHz)	Margin (MHz)	Result
Bottom	5	QPSK	1/2	2496.069	2496	0.069	Complied
Bottom	5	QPSK	3/4	2496.087	2496	0.087	Complied
Bottom	5	QAM16	1/2	2496.069	2496	0.069	Complied
Bottom	5	QAM16	3/4	2496.081	2496	0.081	Complied
Bottom	5	QAM64	2/3	2496.075	2496	0.075	Complied
Bottom	5	QAM64	3/4	2496.081	2496	0.081	Complied
Bottom	5	QAM64	5/6	2496.099	2496	0.099	Complied
Top	5	QPSK	1/2	2689.907	2690	0.093	Complied
Top	5	QPSK	3/4	2689.883	2690	0.117	Complied
Top	5	QAM16	1/2	2689.871	2690	0.129	Complied
Top	5	QAM16	3/4	2689.889	2690	0.111	Complied
Top	5	QAM64	2/3	2689.877	2690	0.123	Complied
Top	5	QAM64	3/4	2689.883	2690	0.117	Complied
Top	5	QAM64	5/6	2689.859	2690	0.141	Complied

**Results: 40°C – 110 VAC (continued)**

Channel	BW (MHz)	Modulation	Coding	Frequency (-26dBc)	Limit (MHz)	Margin (MHz)	Result
Bottom	10	QPSK	1/2	2496.152	2496	0.152	Complied
Bottom	10	QPSK	3/4	2496.196	2496	0.196	Complied
Bottom	10	QAM16	1/2	2496.147	2496	0.147	Complied
Bottom	10	QAM16	3/4	2496.177	2496	0.177	Complied
Bottom	10	QAM64	2/3	2496.219	2496	0.219	Complied
Bottom	10	QAM64	3/4	2496.150	2496	0.150	Complied
Bottom	10	QAM64	5/6	2496.195	2496	0.195	Complied
Top	10	QPSK	1/2	2689.829	2690	0.171	Complied
Top	10	QPSK	3/4	2689.829	2690	0.171	Complied
Top	10	QAM16	1/2	2689.847	2690	0.153	Complied
Top	10	QAM16	3/4	2689.805	2690	0.195	Complied
Top	10	QAM64	2/3	2689.793	2690	0.207	Complied
Top	10	QAM64	3/4	2688.638	2690	0.362	Complied
Top	10	QAM64	5/6	2689.775	2690	0.225	Complied

**Results: 40°C – 110 VAC (continued)**

Channel	BW (MHz)	Modulation	Coding	Frequency (-26dBc)	Limit (MHz)	Margin (MHz)	Result
Bottom	5	QPSK	1/2	2496.081	2496	0.081	Complied
Bottom	5	QPSK	3/4	2496.057	2496	0.057	Complied
Bottom	5	QAM16	1/2	2496.099	2496	0.099	Complied
Bottom	5	QAM16	3/4	2496.075	2496	0.075	Complied
Bottom	5	QAM64	2/3	2496.081	2496	0.081	Complied
Bottom	5	QAM64	3/4	2496.099	2496	0.099	Complied
Bottom	5	QAM64	5/6	2496.111	2496	0.111	Complied
Top	5	QPSK	1/2	2689.835	2690	0.165	Complied
Top	5	QPSK	3/4	2689.889	2690	0.111	Complied
Top	5	QAM16	1/2	2689.883	2690	0.117	Complied
Top	5	QAM16	3/4	2689.901	2690	0.099	Complied
Top	5	QAM64	2/3	2689.853	2690	0.147	Complied
Top	5	QAM64	3/4	2689.889	2690	0.111	Complied
Top	5	QAM64	5/6	2689.907	2690	0.093	Complied

**Results: 50°C – 110 VAC**

Channel	BW (MHz)	Modulation	Coding	Frequency (-26dBc)	Limit (MHz)	Margin (MHz)	Result
Bottom	10	QPSK	1/2	2496.106	2496	0.106	Complied
Bottom	10	QPSK	3/4	2496.144	2496	0.144	Complied
Bottom	10	QAM16	1/2	2496.147	2496	0.147	Complied
Bottom	10	QAM16	3/4	2496.183	2496	0.183	Complied
Bottom	10	QAM64	2/3	2496.195	2496	0.195	Complied
Bottom	10	QAM64	3/4	2496.100	2496	0.100	Complied
Bottom	10	QAM64	5/6	2496.207	2496	0.207	Complied
Top	10	QPSK	1/2	2689.823	2690	0.177	Complied
Top	10	QPSK	3/4	2689.811	2690	0.189	Complied
Top	10	QAM16	1/2	2689.817	2690	0.183	Complied
Top	10	QAM16	3/4	2689.823	2690	0.177	Complied
Top	10	QAM64	2/3	2689.787	2690	0.213	Complied
Top	10	QAM64	3/4	2689.781	2690	0.219	Complied
Top	10	QAM64	5/6	2689.787	2690	0.213	Complied

**Limits:**

The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation. The lower and upper 26dB point was measured and compared to the appropriate band edge to show compliance.

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

<b>FCC Part:</b>	FCC 2.1055 and FCC 27.54
<b>Test Method Used:</b>	Tests were performed using the test methods detailed in ANSI TIA-603-C-2004

**Environmental Conditions:**

<b>Temperature (°C):</b>	23
<b>Relative Humidity (%):</b>	34

**Results:**

Channel	Voltage (AC)	BW (MHz)	Modulation	Coding	Frequency (-26dBc)	Limit (MHz)	Margin (MHz)	Result
Bottom	93.5	5	QPSK	1/2	2496.031	2496	0.031	Complied
Bottom	110	5	QPSK	1/2	2496.045	2496	0.045	Complied
Bottom	126.5	5	QPSK	1/2	2496.075	2496	0.075	Complied

Channel	Voltage (AC)	BW (MHz)	Modulation	Coding	Frequency (-26dBc)	Limit (MHz)	Margin (MHz)	Result
Bottom	93.5	10	QPSK	1/2	2496.112	2496	0.112	Complied
Bottom	110	10	QPSK	1/2	2496.123	2496	0.123	Complied
Bottom	126.5	10	QPSK	1/2	2496.151	2496	0.151	Complied

Channel	Voltage (AC)	BW (MHz)	Modulation	Coding	Frequency (-26dBc)	Limit (MHz)	Margin (MHz)	Result
Top	93.5	5	QPSK	1/2	2689.844	2690	-0.156	Complied
Top	110	5	QPSK	1/2	2689.872	2690	-0.128	Complied
Top	126.5	5	QPSK	1/2	2689.867	2690	-0.133	Complied

Channel	Voltage (AC)	BW (MHz)	Modulation	Coding	Frequency (-26dBc)	Limit (MHz)	Margin (MHz)	Result
Top	93.5	10	QPSK	1/2	2689.783	2690	-0.217	Complied
Top	110	10	QPSK	1/2	2689.784	2690	-0.216	Complied
Top	126.5	10	QPSK	1/2	2689.790	2690	-0.210	Complied

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

<b>FCC Part:</b>	FCC 2.1051 and FCC Part 27.53(m)(2)
<b>Test Method Used:</b>	Tests were performed using the test methods detailed in ANSI TIA-603-C-2004

**Environmental Conditions:**

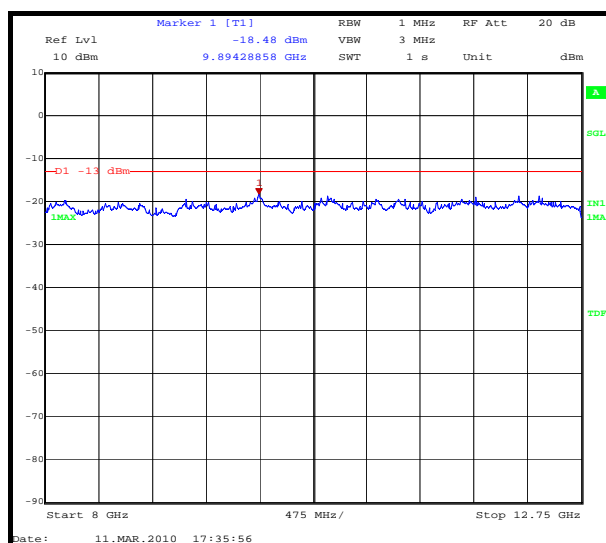
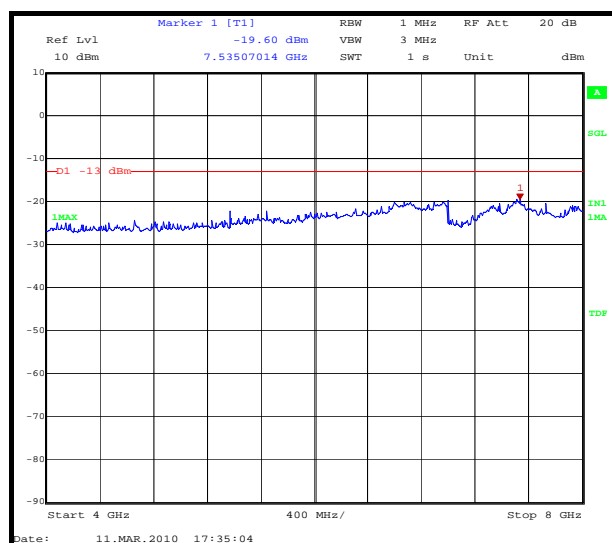
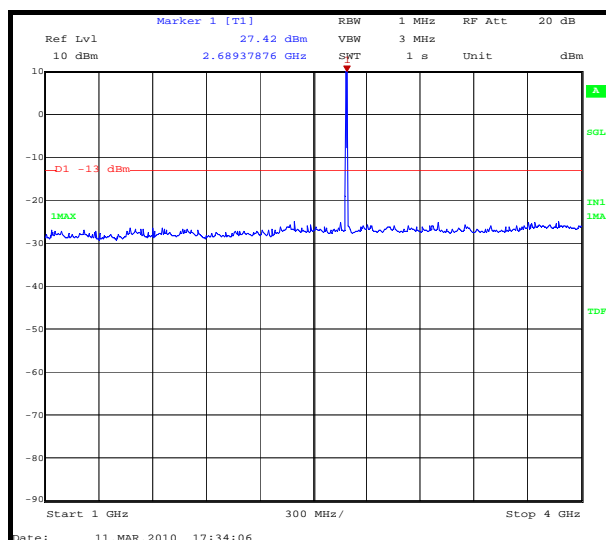
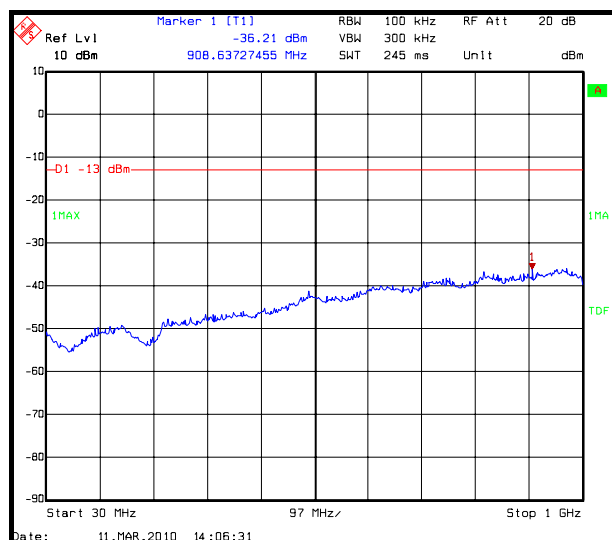
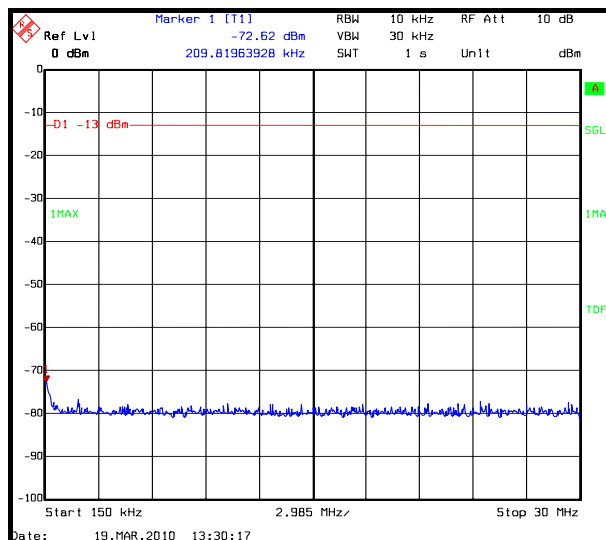
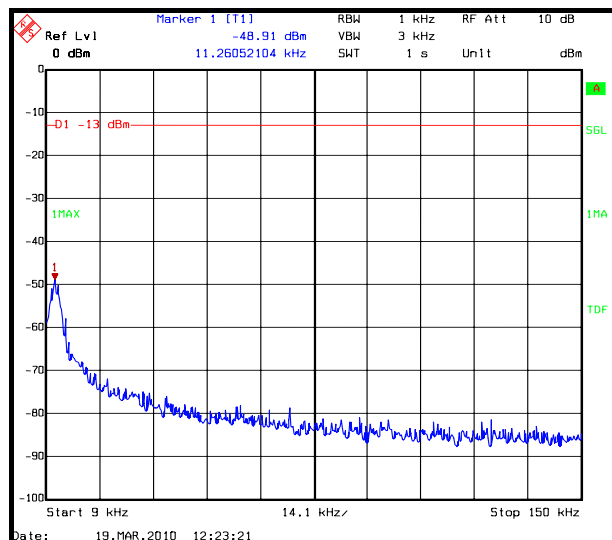
<b>Temperature (°C):</b>	23
<b>Relative Humidity (%):</b>	36

**Results:**

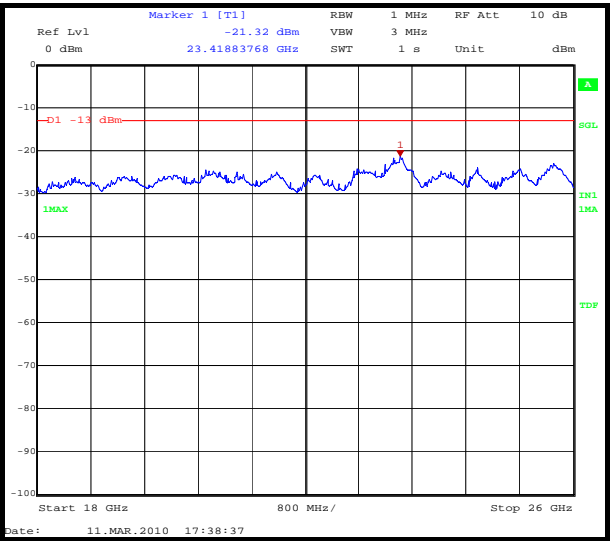
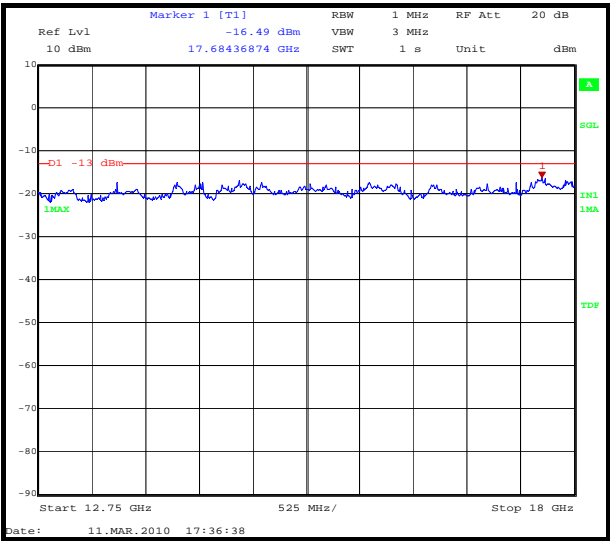
<b>Frequency (MHz)</b>	<b>Emission Level (dBm)</b>	<b>Limit (dBm)</b>	<b>Margin (dB)</b>	<b>Result</b>
7535.070	-22.5	-13.0	6.6	Complied
6997.996	-23.0	-13.0	7.0	Complied
9894.289	-17.8	-13.0	5.5	Complied
17684.369	-15.6	-13.0	3.5	Complied
23418.838	-20.7	-13.0	8.3	Complied

**Limits:**

<b>Applicable limit</b>	<b>Limit (dBm)</b>
43 + 10 log (P)	-13.0

**Transmitter Conducted Emissions (continued)**





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

<b>FCC Part:</b>	FCC 2.1051 and FCC Part 27.53
<b>Test Method Used:</b>	ANSI TIA-603-C-2004 referencing FCC CFR Parts 2.

**Environmental Conditions:**

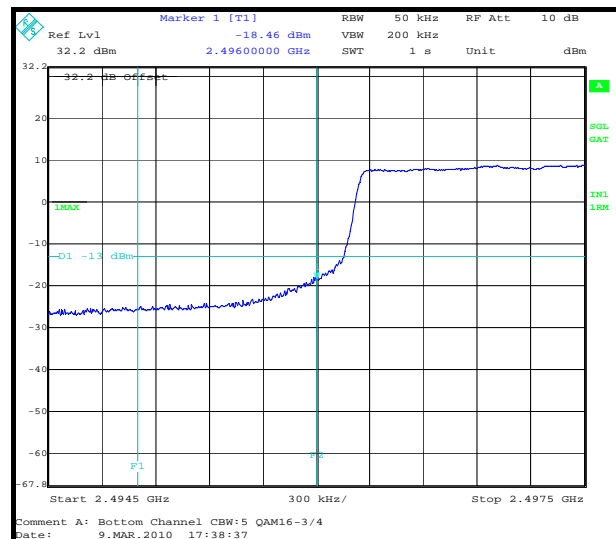
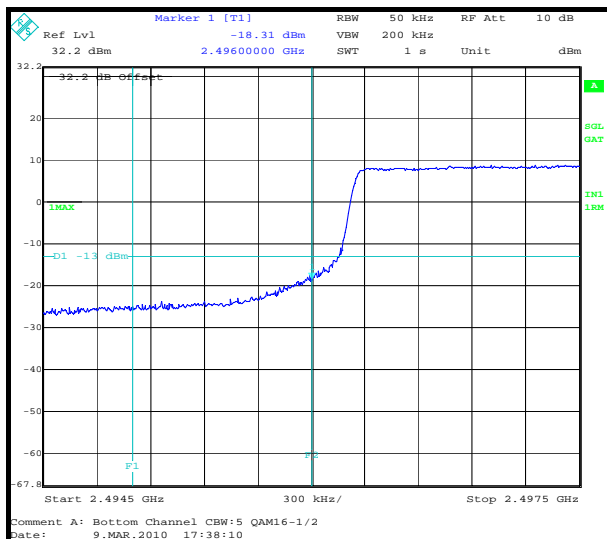
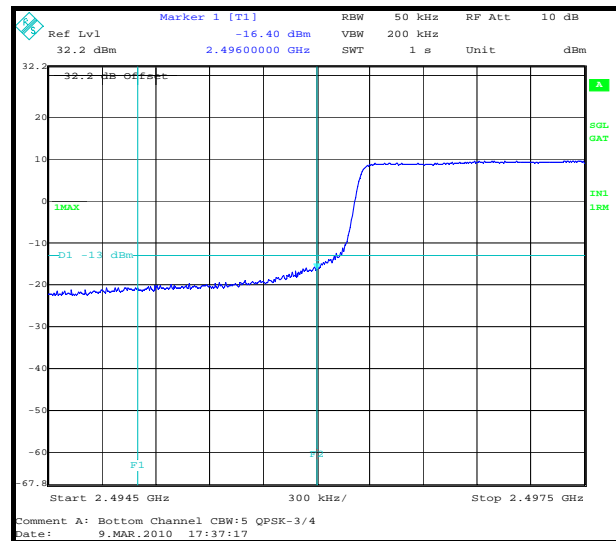
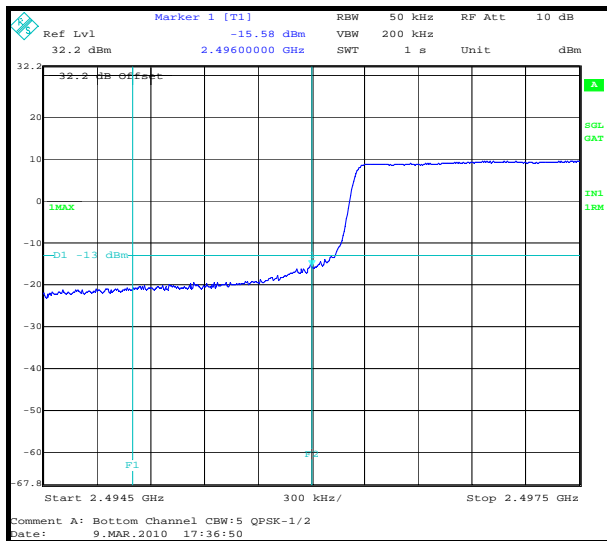
<b>Temperature (°C):</b>	23
<b>Relative Humidity (%):</b>	34

**Results:**

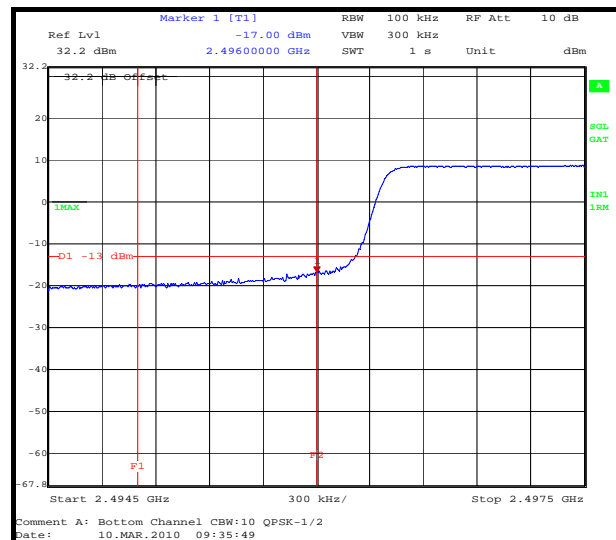
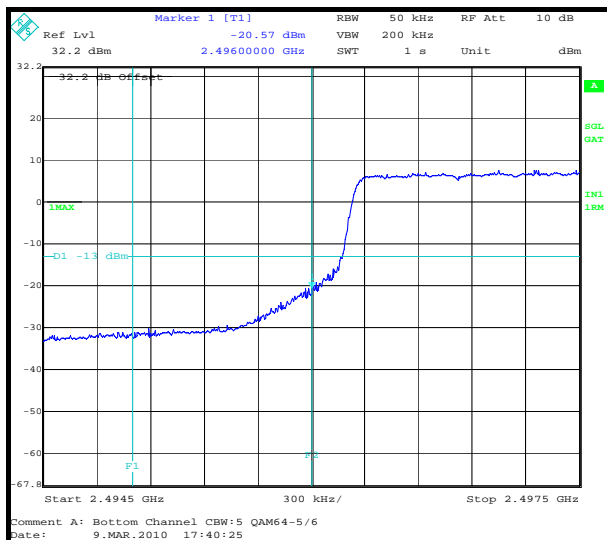
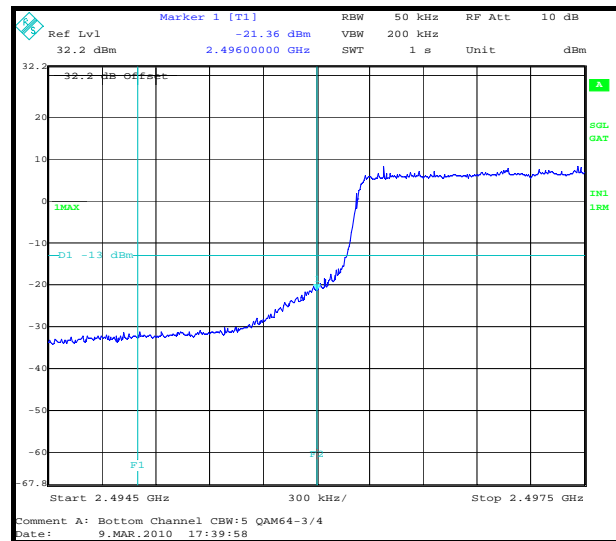
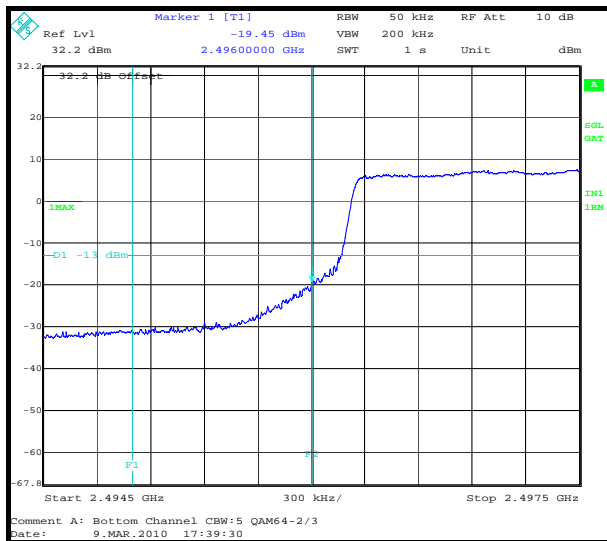
Channel	BW (MHz)	Modulation	Coding	Level (dBm)	Limit (dBm)	Margin (dB)	Result
Bottom	5	QPSK	1/2	-15.6	-13.0	2.6	Complied
Bottom	5	QPSK	3/4	-16.4	-13.0	3.4	Complied
Bottom	5	QAM16	1/2	-18.3	-13.0	5.3	Complied
Bottom	5	QAM16	3/4	-18.5	-13.0	5.5	Complied
Bottom	5	QAM64	2/3	-19.4	-13.0	6.4	Complied
Bottom	5	QAM64	3/4	-21.4	-13.0	8.4	Complied
Bottom	5	QAM64	5/6	-20.6	-13.0	7.6	Complied
Top	5	QPSK	1/2	-17.2	-13.0	4.2	Complied
Top	5	QPSK	3/4	-17.1	-13.0	4.1	Complied
Top	5	QAM16	1/2	-19.2	-13.0	6.2	Complied
Top	5	QAM16	3/4	-20.1	-13.0	7.1	Complied
Top	5	QAM64	2/3	-21.6	-13.0	8.6	Complied
Top	5	QAM64	3/4	-21.6	-13.0	8.6	Complied
Top	5	QAM64	5/6	-21.8	-13.0	8.8	Complied

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

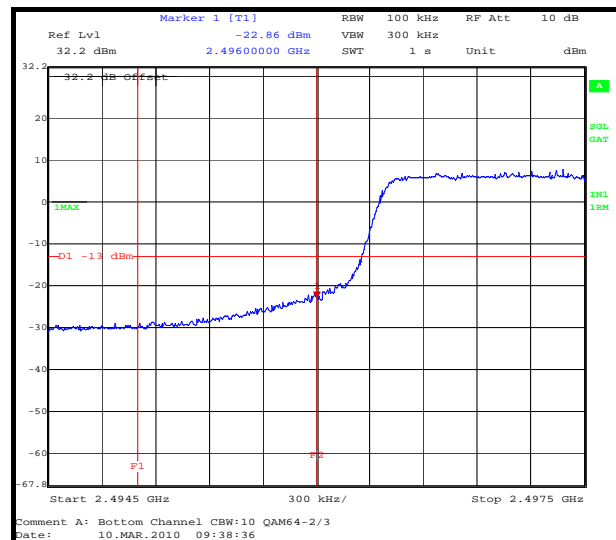
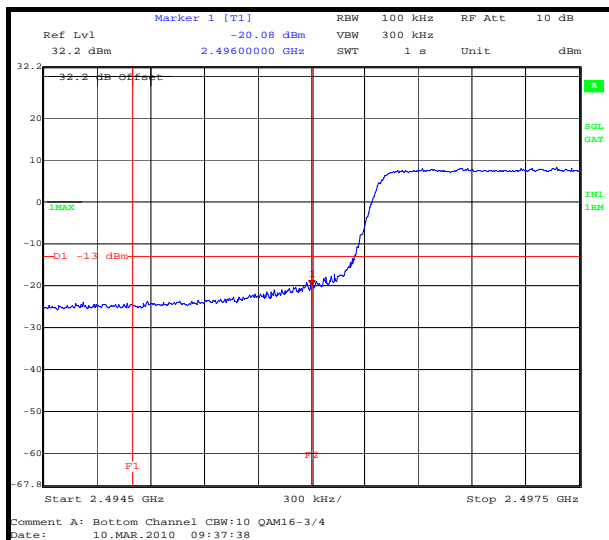
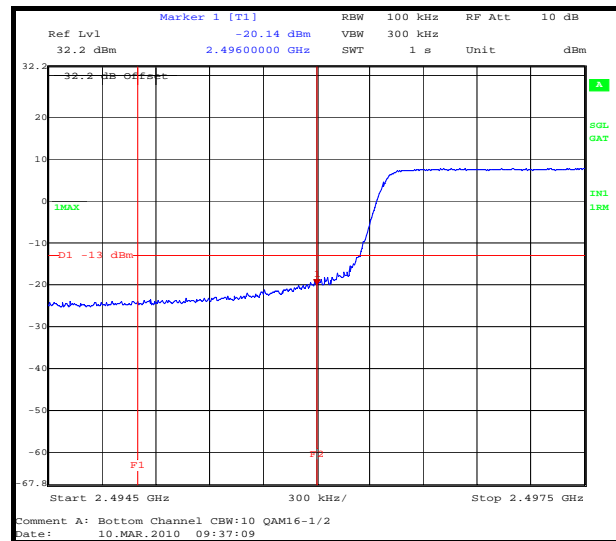
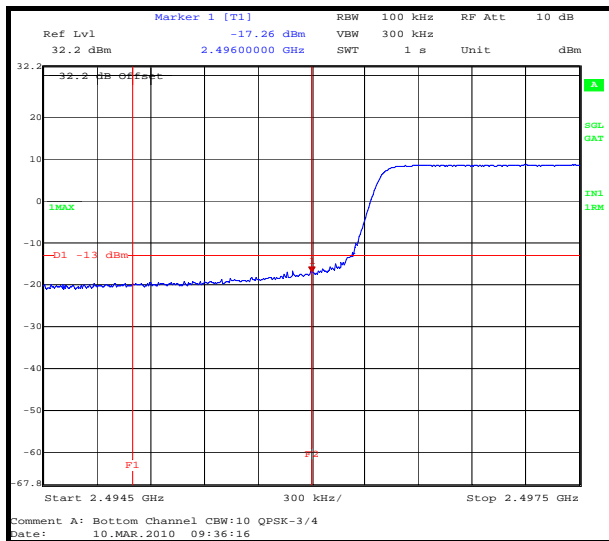
Channel	BW (MHz)	Modulation	Coding	Level (dBm)	Limit (dBm)	Margin (dB)	Result
Bottom	10	QPSK	1/2	-17.0	-13.0	4.0	Complied
Bottom	10	QPSK	3/4	-17.3	-13.0	4.3	Complied
Bottom	10	QAM16	1/2	-20.1	-13.0	7.1	Complied
Bottom	10	QAM16	3/4	-20.1	-13.0	7.1	Complied
Bottom	10	QAM64	2/3	-22.9	-13.0	9.9	Complied
Bottom	10	QAM64	3/4	-23.5	-13.0	10.5	Complied
Bottom	10	QAM64	5/6	-22.6	-13.0	9.6	Complied
Top	10	QPSK	1/2	-20.7	-13.0	7.7	Complied
Top	10	QPSK	3/4	-21.4	-13.0	8.4	Complied
Top	10	QAM16	1/2	-22.6	-13.0	9.6	Complied
Top	10	QAM16	3/4	-22.6	-13.0	9.6	Complied
Top	10	QAM64	2/3	-24.2	-13.0	11.2	Complied
Top	10	QAM64	3/4	-24.0	-13.0	11.0	Complied
Top	10	QAM64	5/6	-23.9	-13.0	10.9	Complied

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

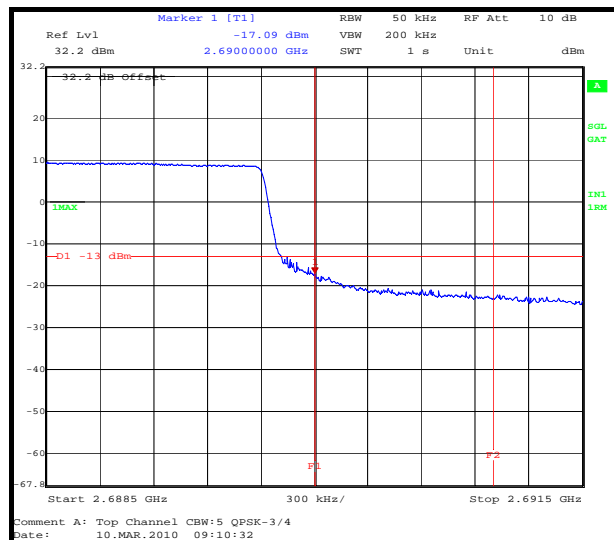
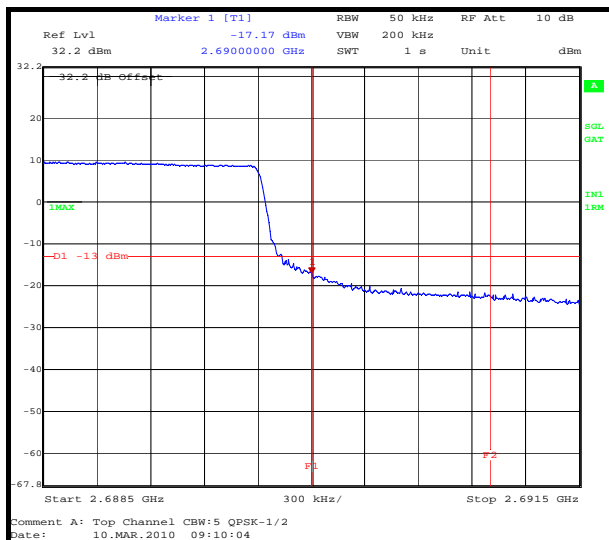
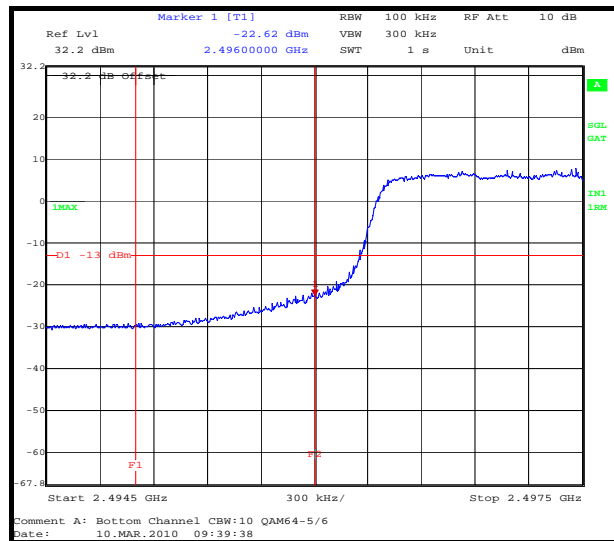
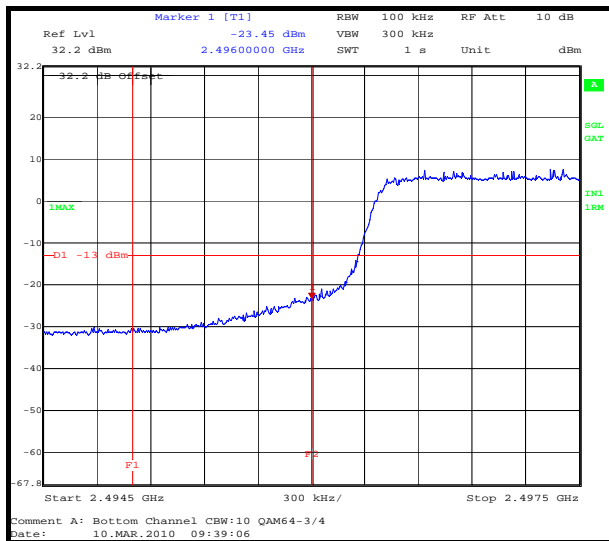
*Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.*

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

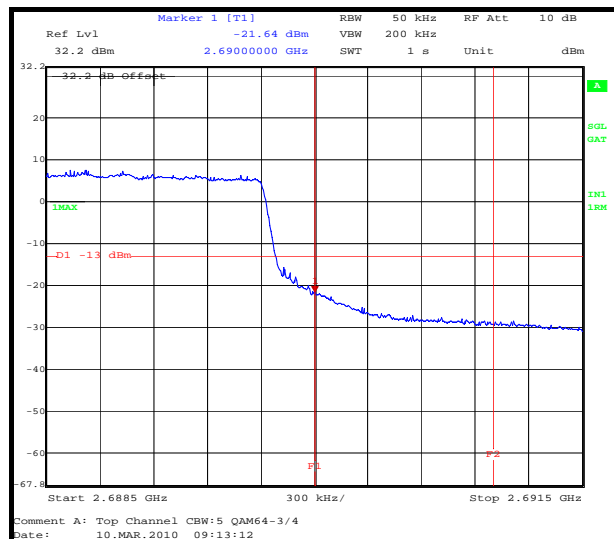
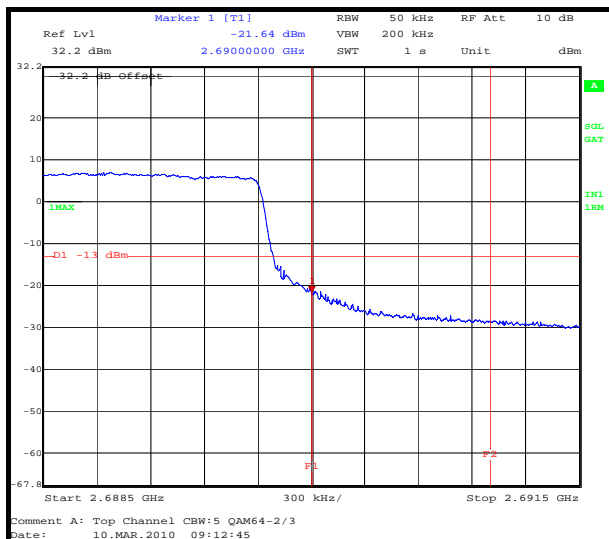
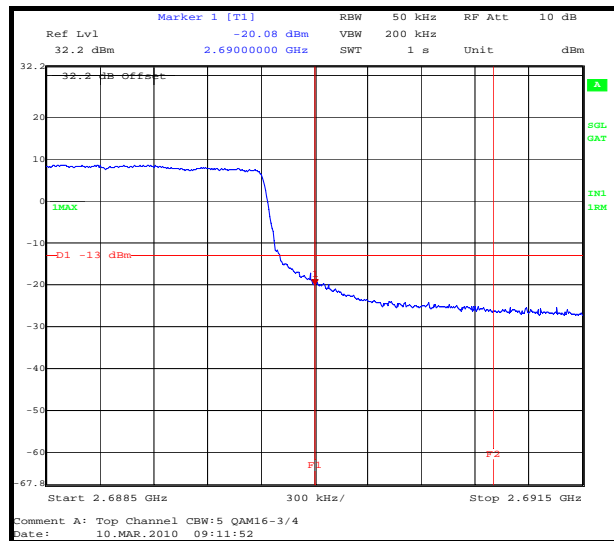
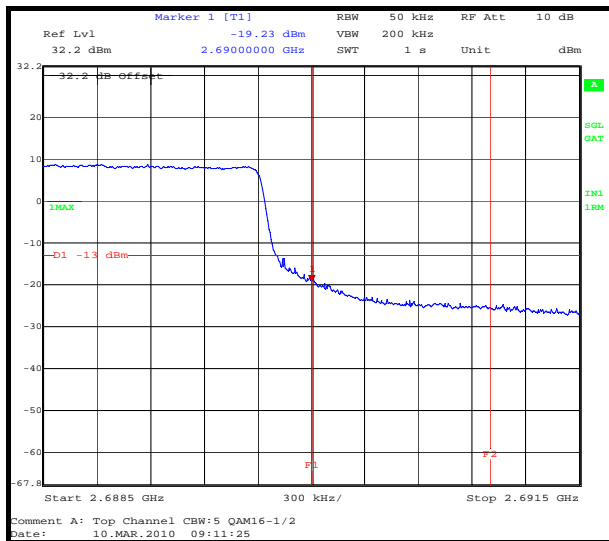
*Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.*

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

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

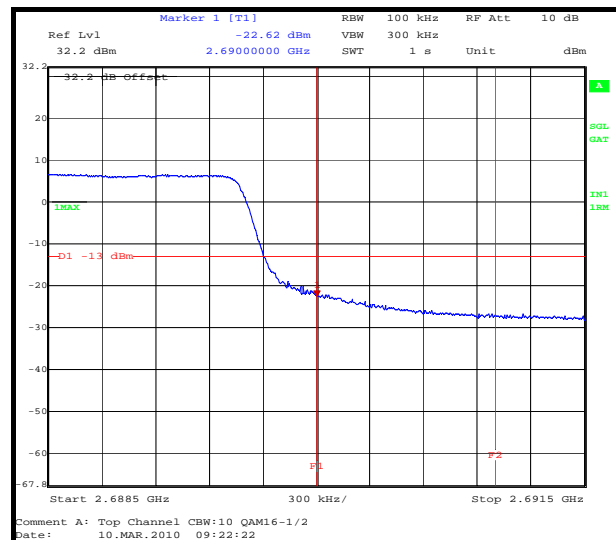
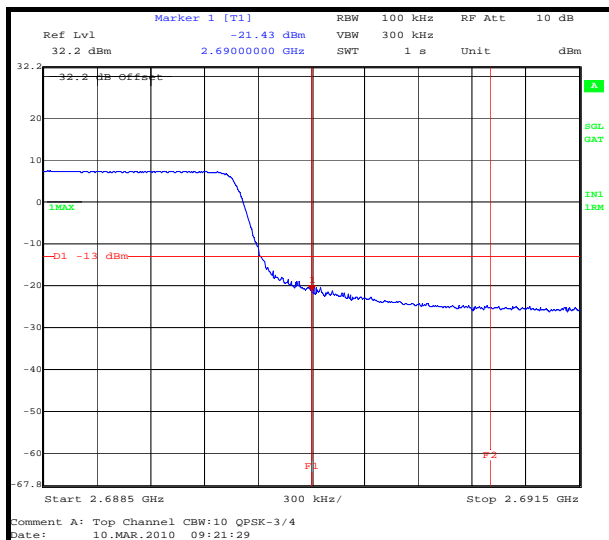
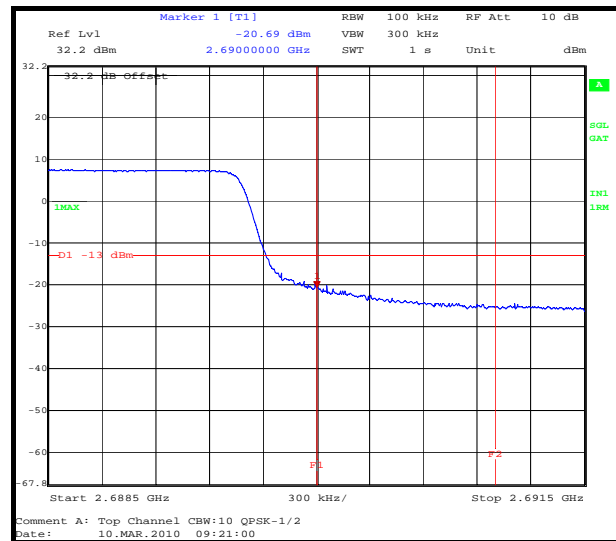
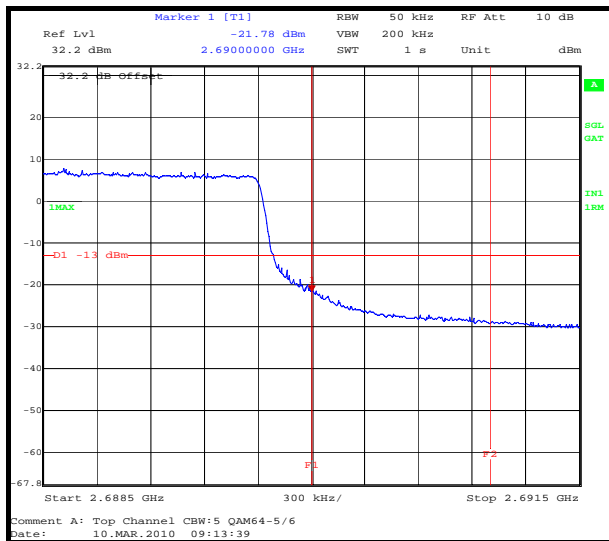
**Transmitter Conducted Emissions at Band Edges (continued)**

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

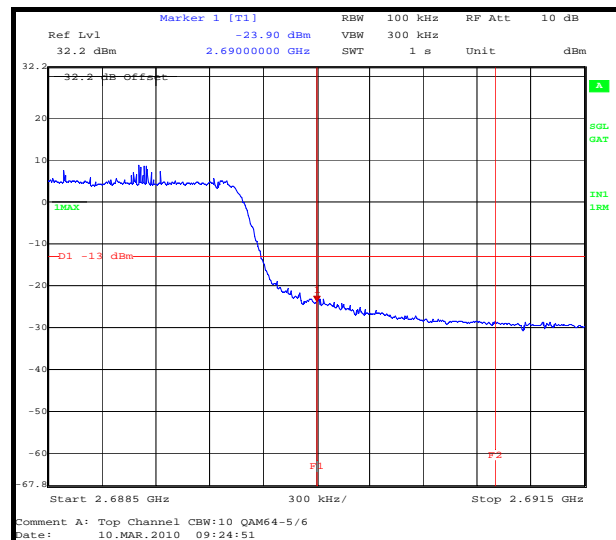
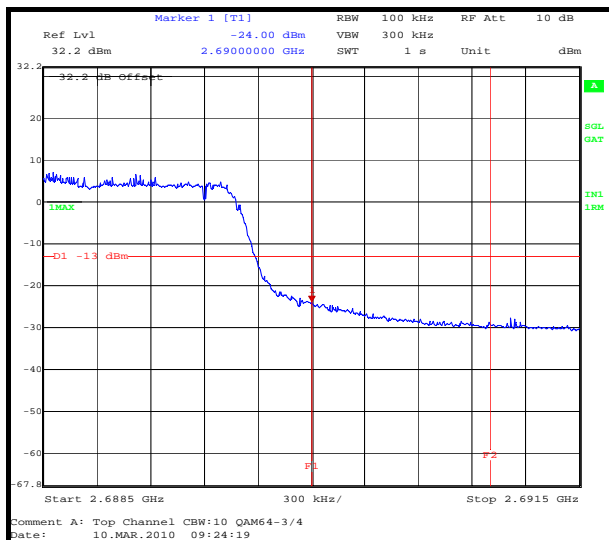
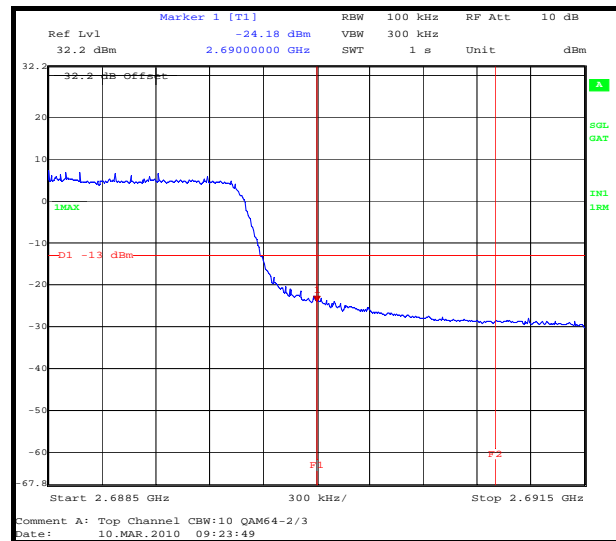
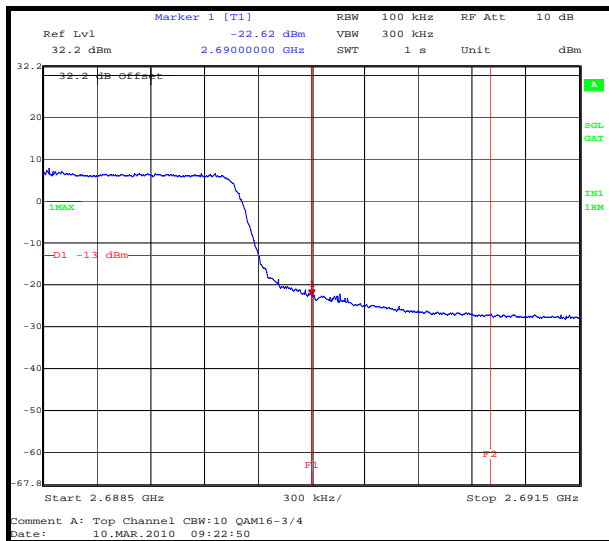
**Transmitter Conducted Emissions at Band Edges (continued)**

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



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

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

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

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

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

<b>FCC Part:</b>	FCC 2.1051 and FCC Part 27.53(m)(2)
<b>Test Method Used:</b>	Tests were performed using the test methods detailed in ANSI TIA-603-C-2004

**Environmental Conditions:**

<b>Temperature (°C):</b>	24
<b>Relative Humidity (%):</b>	20

**Results:**

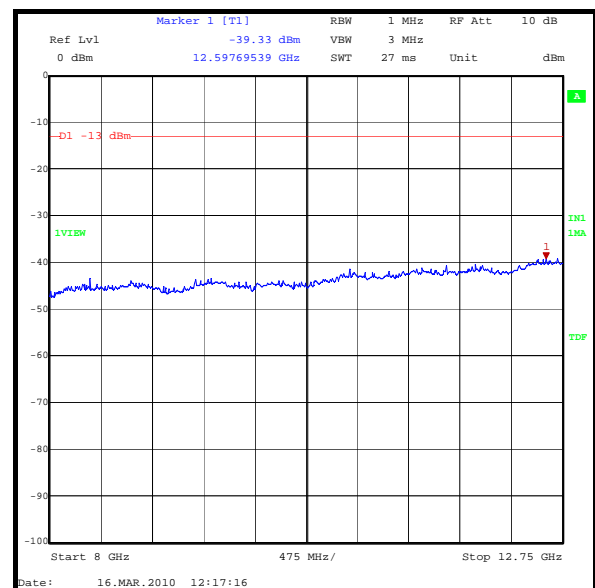
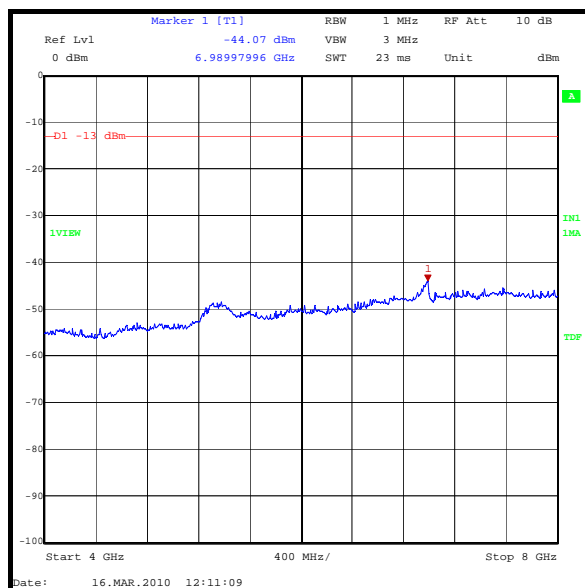
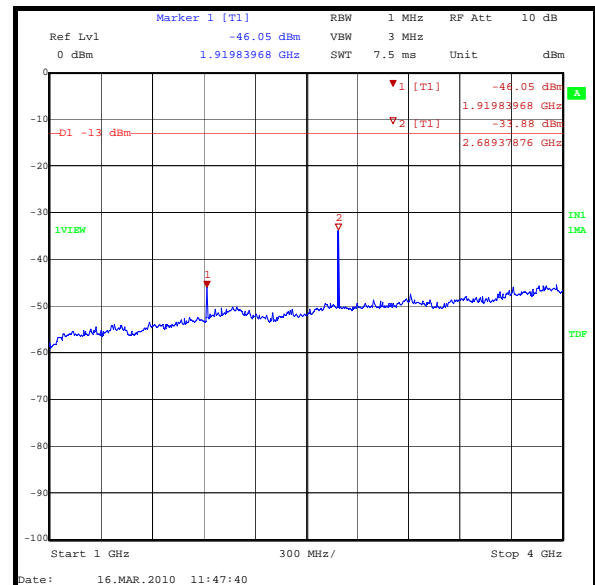
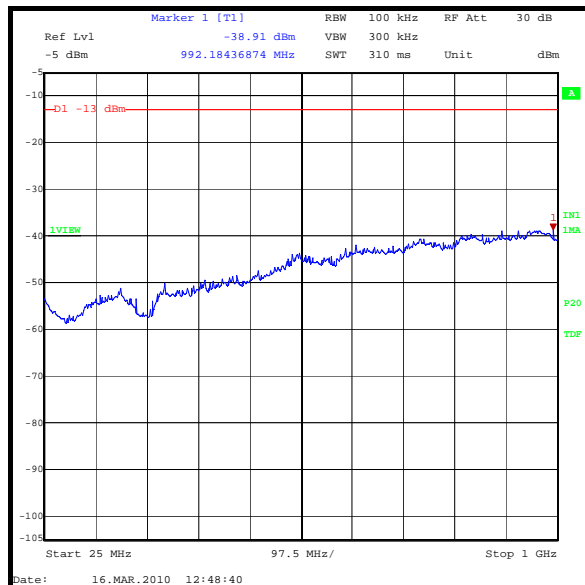
Frequency (MHz)	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
992.184	-38.9	-13.0	25.9	Complied
1919.839	-46.1	-13.0	33.1	Complied
6989.980	-44.1	-13.0	31.1	Complied
12597.695	-39.3	-13.0	26.3	Complied
17863.227	-35.3	-13.0	22.3	Complied
24541.082	-29.4	-13.0	16.4	Complied

**Note(s):**

1. The Fundamental frequency can be noted at 2689.379 in the plots MHz
2. The EUT was connected to a vertical metal pole using the supplied brackets. The EUT was at a height of 1.5 meters above the chamber floor.

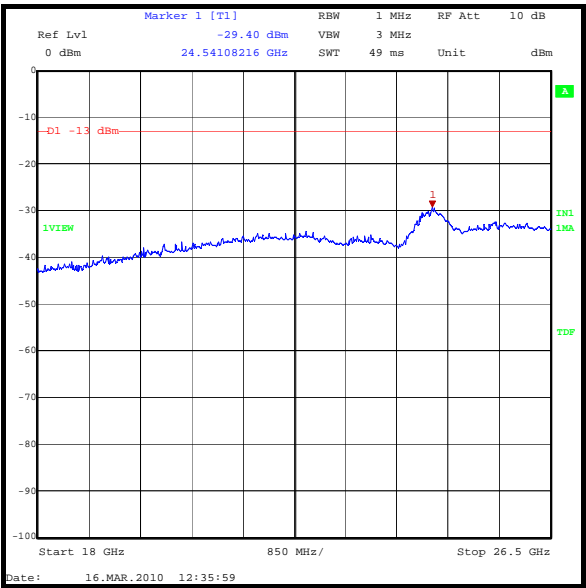
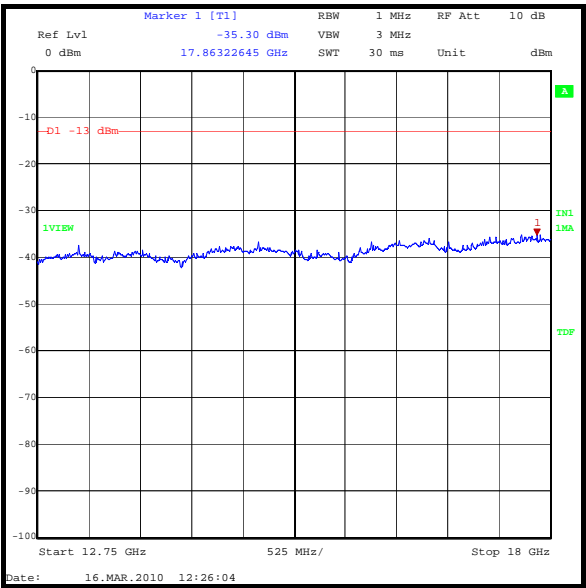
**Limits:**

Applicable limit	Limit (dBm)
43 + 10 log (P)	-13

**Transmitter Radiated Emissions (continued)**

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

Transmitter Radiated Emissions (continued)



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

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

<b>FCC Part:</b>	FCC 2.1051 and FCC Part 27.53(m)(2)
<b>Test Method Used:</b>	As detailed in ANSI TIA-603-C-2004 referencing FCC Part 2

**Environmental Conditions:**

<b>Temperature (°C):</b>	25
<b>Relative Humidity (%):</b>	20

**Results:**

Channel	BW (MHz)	Modulation	Coding	Level (dBm)	Limit (dBm)	Margin (dB)	Result
Bottom	5	QPSK	1/2	-54.9	-13.0	41.9	Complied
Bottom	5	QPSK	3/4	-55.4	-13.0	42.4	Complied
Bottom	5	QAM16	1/2	-55.7	-13.0	42.7	Complied
Bottom	5	QAM16	3/4	-56.5	-13.0	43.5	Complied
Bottom	5	QAM64	2/3	-57.1	-13.0	44.1	Complied
Bottom	5	QAM64	3/4	-58.1	-13.0	45.1	Complied
Bottom	5	QAM64	5/6	-57.0	-13.0	44.0	Complied
Top	5	QPSK	1/2	-46.5	-13.0	33.5	Complied
Top	5	QPSK	3/4	-46.0	-13.0	33.0	Complied
Top	5	QAM16	1/2	-47.0	-13.0	34.0	Complied
Top	5	QAM16	3/4	-46.0	-13.0	33.0	Complied
Top	5	QAM64	2/3	-49.5	-13.0	36.5	Complied
Top	5	QAM64	3/4	-50.6	-13.0	37.6	Complied
Top	5	QAM64	5/6	-49.1	-13.0	36.1	Complied

**Transmitter Radiated Emissions at Band Edges (continued)**

Channel	BW (MHz)	Modulation	Coding	Level (dBm)	Limit (dBm)	Margin (dB)	Result
Bottom	10	QPSK	1/2	-55.0	-13.0	42.0	Complied
Bottom	10	QPSK	3/4	-55.1	-13.0	42.1	Complied
Bottom	10	QAM16	1/2	-56.2	-13.0	43.2	Complied
Bottom	10	QAM16	3/4	-57.3	-13.0	44.3	Complied
Bottom	10	QAM64	2/3	-59.8	-13.0	46.8	Complied
Bottom	10	QAM64	3/4	-58.7	-13.0	45.7	Complied
Bottom	10	QAM64	5/6	-56.8	-13.0	43.8	Complied
Top	10	QPSK	1/2	-44.0	-13.0	31.0	Complied
Top	10	QPSK	3/4	-46.8	-13.0	33.8	Complied
Top	10	QAM16	1/2	-46.2	-13.0	33.2	Complied
Top	10	QAM16	3/4	-48.3	-13.0	35.3	Complied
Top	10	QAM64	2/3	-48.9	-13.0	35.9	Complied
Top	10	QAM64	3/4	-46.6	-13.0	33.6	Complied
Top	10	QAM64	5/6	-48.4	-13.0	35.4	Complied

## 6. Measurement Uncertainty

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

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

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

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

Measurement Type	Range	Confidence Level (%)	Calculated Uncertainty
AC Conducted Spurious Emissions	0.15 MHz to 30.0 MHz	95%	±3.25 dB
Conducted Carrier Output Power	2350 MHz to 2360 MHz	95%	±1.2 dB
Occupied Bandwidth	2350 MHz to 2360 MHz	95%	±0.92 ppm
Conducted Emissions Antenna Port	9 kHz to 26.5 GHz	95%	±1.2 dB
Frequency Stability	2350 MHz to 2360 MHz	95%	±0.92 ppm
Radiated Spurious Emissions	30 MHz to 1000 MHz	95%	±5.26 dB
Radiated Spurious Emissions	1 GHz to 26.5 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**

<b>RFI No.</b>	<b>Instrument</b>	<b>Manufacturer</b>	<b>Type No.</b>	<b>Serial No.</b>	<b>Date Last Calibrated</b>	<b>Cal. Interval (Months)</b>
A067	LISN	Rohde & Schwarz	ESH3-Z5	890603/002	03 Jun 2009	12
A1065	Attenuator	Hewlett Packard	8494B	3308A38165	Calibrated before use	-
A1368	Directional Coupler	Pasternack Enterprises.	PE2214-10	None	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	01 Mar 2010	12
A288	Antenna	Chase	CBL6111A	1589	16 Mar 2010	12
C1092	Cable	RS	293-334	1087200-3 3402	Calibrated before use	-
C1112	Cable	Semflex, Inc.	X116BFSX 10080	None	Calibrated before use	-
C363	Cable	Rosenberger	RG142	None	23 Feb 2010	12
G0565	Telecom DC Power Supply	Hewlett Packard	E4356A	US3929010 2	Calibrated before use	-
K0002	3m RSE Chamber	Rainford EMC	N/A	N/A	01 Sep 2009	12
K0008	Site Reference 4422	RFI Global Services Ltd	N/A	N/A	01 Sep 2009	12
M037	Digital RF Power Meter	Rohde & Schwarz	URY	891.259/053	19 August 2009	12
M1124	Spectrum Analyser	Rohde & Schwarz	ESIB26	100046K	09 Mar 2009	12
M1223	Votsch VT4002	Votsch	VT4002	5856607272 0010	Calibrated before use	-
M1252	Signal Generator	HP	83640A	3119A00489	Calibrated before use	-
M127	Spectrum Analyser	Rohde & Schwarz	FSEB 30	842 659/016	10 Jul 2009	12
M1379	Spectrum Analyser	Rohde & Schwarz	ESIB7	100330	20 Aug 2009	12
M208	Thermometer / Hygrometer	RS Ltd	212-124	None stated	30 Apr 2009	12

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