

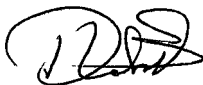
TEST REPORT FROM RFI GLOBAL SERVICES LTD

Test of: GWU-200

FCC ID: PIDGWU-200

To: FCC Part 15.107, 15.109, 90.1321, 90.1321, 90.210 and 90.1323

Test Report Serial No:
RFI-RPT-RP81975JD01A

This Test Report Is Issued Under The Authority Of Chris Guy, Head of Global Approvals: 	
Checked By:	PP David Lakeland
Signature:	
Date of Issue:	30 June 2011

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1. Customer Information

Company Name:	Airspan Communications Ltd.
Address:	Capital Point, 33 Bath Road Slough Berkshire SL1 3UF United Kingdom

2. Summary of Testing

2.1. General Information

Specification Reference:	FCC Part 90: 2010
Specification Title:	Code of Federal Regulations, Part 90 (47CFR90) Private Land Mobile Radio Services.
Specification Reference:	47CFR15.107 and 47CFR15.109
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications) 2010: Part 15 Subpart B (Unintentional Radiators) - Sections 15.107 and 15.109
Site Registration:	FCC: 209735
Location of Testing:	RFI Global Services Ltd, Wade Road, Basingstoke, Hampshire, RG24 8AH.
Test Dates:	26 May 2011 to 11 June 2011

2.2. Summary of Test Results

FCC Reference (47CFR)	Measurement	Result
15.107(a)	Receiver/Idle Mode AC Conducted Emissions	
15.109	Receiver/Idle Mode Radiated Spurious Emissions	
90.1321/2.1046	Transmitter Carrier Output Power (EIRP)	
90.1321/2.1046	Transmitter Power Output Density	
90.210(b)/90.210(n)/2.1051	Transmitter Conducted Emissions Mask	
90.1323 / 2.1051	Transmitter Conducted Emissions	
90.1323 / 2.1051	Transmitter Conducted Band Edge Emissions	
90.1323/2.1053	Transmitter Radiated Emissions	
90.1323/2.1053	Transmitter Radiated Band Edge Emissions	
Key to Results  = Complied  = Did not comply		

2.3. Methods and Procedures

Reference:	ANSI/TIA-603-C-2004
Title:	Land Mobile FM or PM – Communications Equipment – Measurement and Performance Standards.
Reference:	ANSI C63.4 (2009)
Title:	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
Reference:	ANSI C63.10 (2009)
Title:	American National Standard for Testing Unlicensed Wireless Devices

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:	WiMAX USB Dongle
Brand Name:	Airspan Communication Ltd
Model Name or Number:	GWU-200
Serial Number(s):	C00E30 (Transmitter Sample) C00E2F (Receiver Sample)
Hardware Version Number:	Rev 1.0
FCC ID Number:	PIDGWU-200

3.2. Description of EUT

The equipment under test was a WiMAX USB Dongle Modem operating at 3700 MHz Band with maximum Downlink to Uplink ratio scaled to 26:21 for 5MHz and 29:18 for 10 MHz channels. The device support QPSK and 16-QAM modulation only and operates using 5 MHz and 10 MHz channel bandwidths.

3.3. Modifications Incorporated in the EUT

No modifications were applied to the EUT during testing.

3.4. Additional Information Related to Testing

Tested Technology:	WiMAX		
Type of Equipment	Transceiver		
Modulation	QPSK, 16QAM		
Duty Cycle	5MHz Channel = 39.5% 10MHz Channel = 37.6%		
Antenna Type:	Integral		
Antenna Gain:	4.5 dBi		
Power Supply Requirement:	Nominal	5V via USB	
Transmit Frequency Range:	3650 to 3675 MHz		
Transmit Channels Tested:	Channel ID	5MHz Channel	10MHz Channel
	Bottom	3652.5	3655.0
	Middle	3662.5	3665.0
	Top	3672.5	3670.0
Receive Frequency Range:	3650 to 3675 MHz		
Receive Channels Tested:	Channel ID	5MHz Channel	10MHz Channel
	Bottom	3652.5	3655.0
	Middle	3662.5	3665.0
	Top	3672.5	3670.0

3.5. Support Equipment

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

Description:	Laptop
Brand Name:	Dell
Model Name or Number:	Latitude D620
Serial Number:	RFI Asset 00594

Description:	USB Extension Cable
Brand Name:	Not stated
Model Name or Number:	Not stated
Serial Number:	Not Stated

4. Operation and Monitoring of the EUT during Testing

4.1. Operating Modes

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

- Transmit Mode - The EUT serial number C00E30 was set to transmit with maximum output power on the bottom and top channels, using a 5 MHz or 10 MHz channel bandwidth.
- Receive Mode – The EUT serial number C00E2F was set to receive only mode, as supplied by the client.

4.2. Configuration and Peripherals

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

- The EUT was controlled from via a laptop PC using software supplied by the Customer.
- The EUT was connected to a test laptop via a USB extension cable and the laptop was connected to 120V mains.
- The EUT was supplied with an RF conducted port and external RF cable, to allow conducted measurements to be performed where necessary.

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. Receiver/Idle Mode AC Conducted Spurious Emissions****Test Summary:**

Test Engineer:	Nick Steele	Test Date:	08 June 2011
Test Sample Serial Number:	C00E30		

FCC Part:	15.107(a)
Test Method Used:	As detailed in ANSI C63.10 Section 6.2 referencing ANSI C63.4

Environmental Conditions:

Temperature (°C):	25
Relative Humidity (%):	27

Results: Live Quasi Peak

Frequency (MHz)	Line	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
0.150000	Live	44.5	66.0	21.5	Complied
0.330000	Live	26.9	59.5	32.6	Complied
0.451500	Live	25.6	56.8	31.2	Complied
1.657500	Live	29.8	56.0	26.2	Complied
3.385500	Live	27.2	56.0	28.8	Complied
10.846500	Live	25.6	60.0	34.4	Complied

Results: Live Average

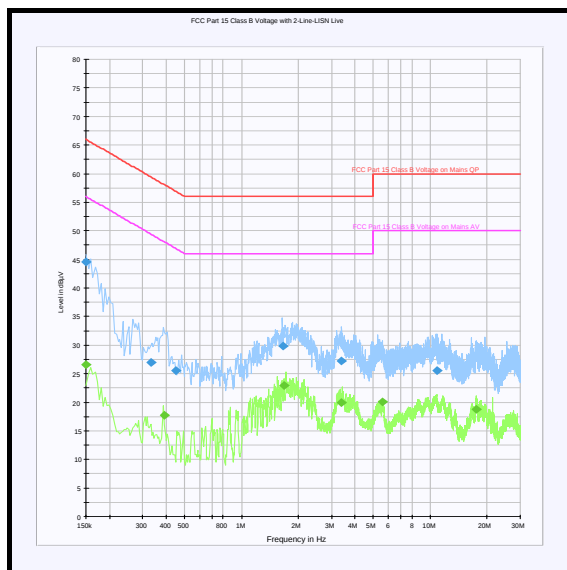
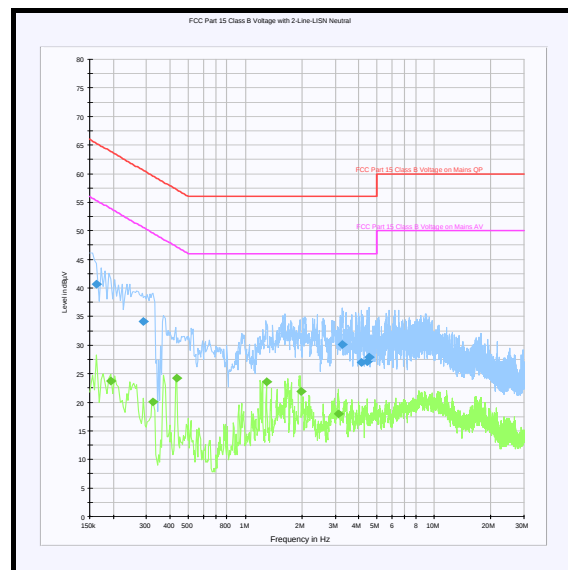
Frequency (MHz)	Line	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
0.150000	Live	26.6	56.0	29.4	Complied
0.388500	Live	17.7	48.1	30.4	Complied
1.67500	Live	23.0	46.0	23.0	Complied
3.372000	Live	20.0	46.0	26.0	Complied
5.604000	Live	20.1	50.0	29.9	Complied
17.587500	Live	18.7	50.0	31.3	Complied

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

Frequency (MHz)	Line	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
0.163500	Neutral	40.6	65.3	24.7	Complied
0.289500	Neutral	34.2	60.5	26.3	Complied
3.264000	Neutral	30.1	56.0	25.9	Complied
4.132500	Neutral	27.0	56.0	29.0	Complied
4.411500	Neutral	27.1	56.0	28.9	Complied
4.542000	Neutral	27.9	56.0	28.1	Complied

Results: Average

Frequency (MHz)	Line	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
0.195000	Neutral	23.8	53.8	30.0	Complied
0.325500	Neutral	20.1	49.6	29.5	Complied
0.433500	Neutral	24.2	47.2	23.0	Complied
1.293000	Neutral	23.6	46.0	22.4	Complied
1.977000	Neutral	21.9	46.0	24.1	Complied
3.129000	Neutral	18.0	46.0	28.0	Complied

Receiver/Idle Mode AC Conducted Spurious Emissions (continued)**Live****Neutral**

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

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

Test Engineer:	Nick Steele	Test Date:	08 June 2011
Test Sample Serial Number:	C00E2F		

FCC Part:	15.109
Test Method Used:	As detailed in ANSI C63.10 Sections 6.3 and 6.5 referencing ANSI C63.4
Frequency Range:	30 MHz to 1000 MHz

Environmental Conditions:

Temperature (°C):	27
Relative Humidity (%):	27

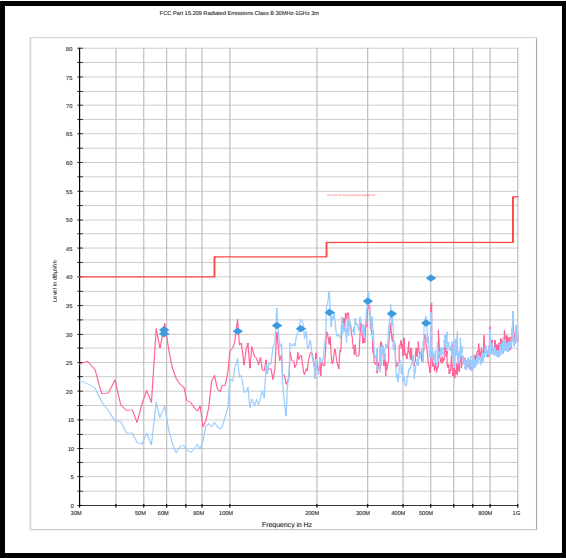
Results: Quasi Peak

Frequency (MHz)	Antenna Polarity	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
58.643	Vertical	30.7	40.0	9.3	Complied
58.702	Vertical	30.0	40.0	10.0	Complied
106.490	Vertical	30.5	43.5	13.0	Complied
145.704	Horizontal	31.5	43.5	12.0	Complied
176.085	Horizontal	30.9	43.5	12.6	Complied
220.602	Horizontal	33.8	46.0	12.2	Complied
299.994	Horizontal	35.7	46.0	10.3	Complied
363.044	Horizontal	33.6	46.0	12.4	Complied
480.005	Horizontal	31.9	46.0	14.1	Complied
499.983	Vertical	39.8	46.0	6.2	Complied

Note(s):

1. The final measured value, for the given emission, in the table above incorporates the calibrated antenna factor and cable loss.
2. All other emissions shown on the pre-scan plot were investigated and found to be ambient or >20 dB below the applicable limit or below the measurement system noise floor.
3. Measurements below 1 GHz were performed in a semi-anechoic chamber (RFI Asset Number K0001) at a distance of 3 metres. The EUT was placed at a height of 80 cm above the reference ground plane in the centre of the chamber turntable. Maximum emission levels were determined by height searching the measurement antenna over the range 1 metre to 4 metres.

Receiver/Idle Mode Radiated Spurious Emissions (continued)



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

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

Test Engineer:	Nick Steele	Test Date:	07 June 2011
Test Sample Serial Number:	C00E2F		

FCC Part:	15.109
Test Method Used:	As detailed in ANSI C63.10 Sections 6.3 and 6.6 referencing ANSI C63.4
Frequency Range:	1 GHz to 12.75 GHz

Environmental Conditions:

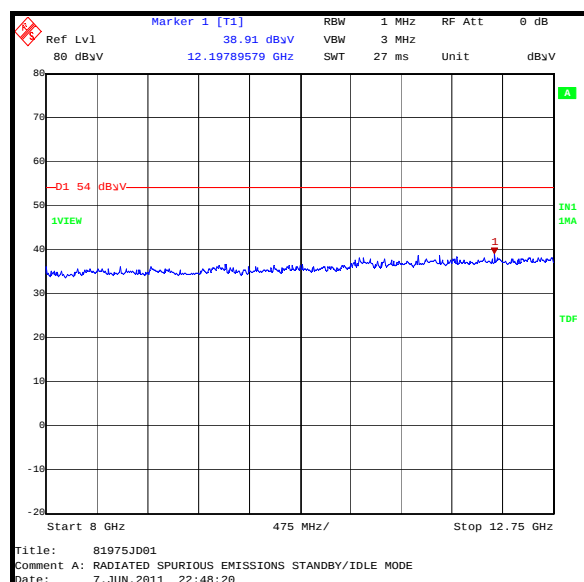
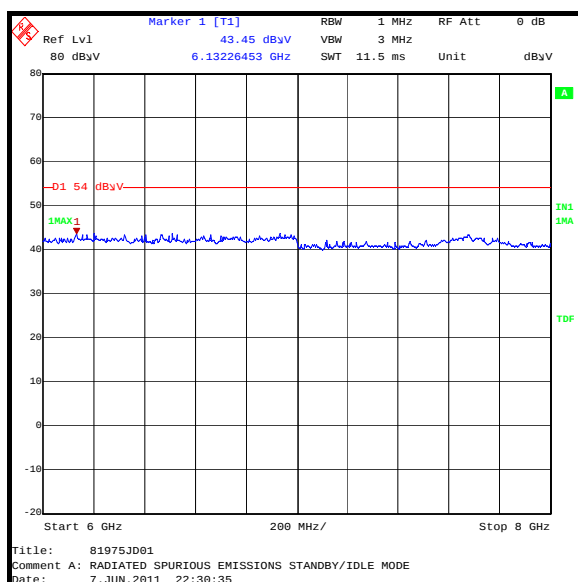
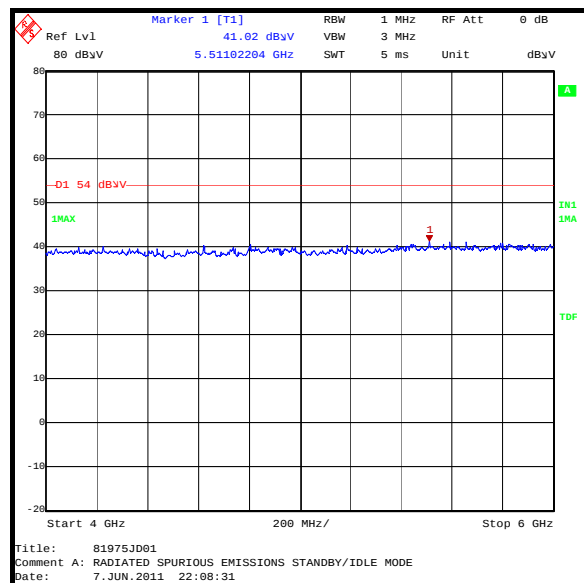
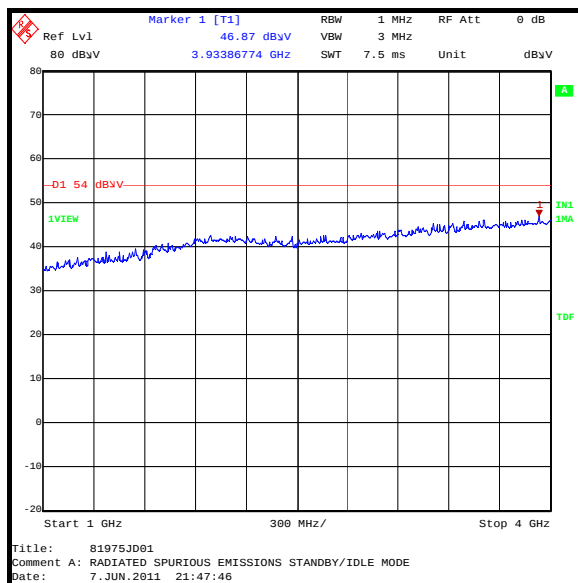
Temperature (°C):	30
Relative Humidity (%):	19

Results:

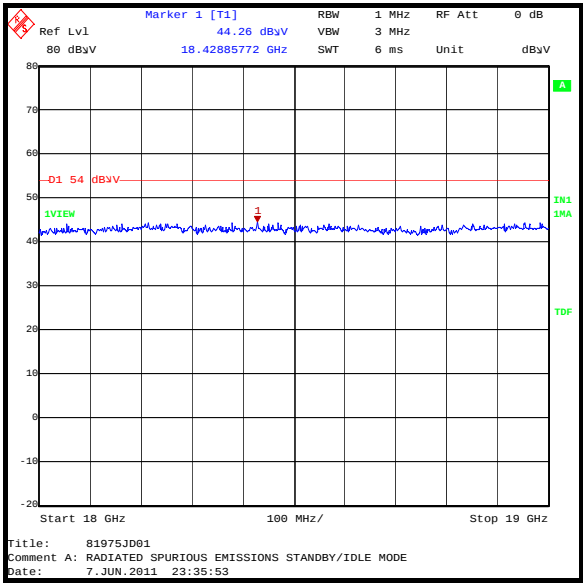
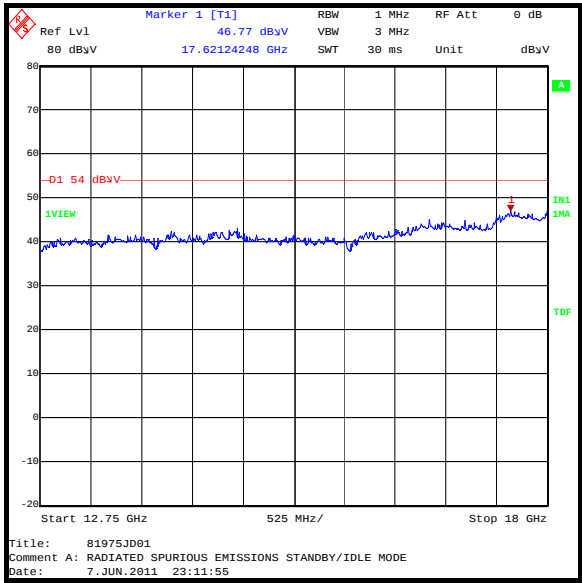
Frequency (MHz)	Antenna Polarity	Peak Level (dBμV/m)	Average Limit (dBμV/m)	Margin (dB)	Result
3933.868	Vertical	46.9	54.0	7.1	Complied

Note(s):

1. The final measured value, for the given emission, in the table above incorporates the calibrated antenna factor and cable loss.
2. Pre-scans above 1 GHz were performed in a fully anechoic chamber (RFI Asset Number K0002) at a distance of 3 metres. The EUT was placed at a height of 1.5 metres above the test chamber floor in the centre of the chamber turntable. All measurement antennas were placed at a fixed height of 1.5 metres above the test chamber floor, in line with the EUT. Final measurements above 1 GHz were performed in a semi-anechoic chamber (RFI Asset Number K0001) at a distance of 3 metres. The EUT was placed at a height of 80 cm above the reference ground plane in the centre of the chamber turntable. Maximum emission levels were determined by height searching the measurement antenna over the range 1 metre to 4 metres.
3. No spurious emissions were detected above the noise floor of the measuring receiver therefore the highest peak noise floor reading of the measuring receiver was recorded as shown in the table above. The peak level was compared to the average limit as opposed to being compared to the peak limit because this is the more onerous limit.

Receiver/Idle Mode Radiated Spurious Emissions (continued)

Receiver/Idle Mode Radiated Spurious Emissions (continued)



5.2.3. Transmitter Carrier Output Power (Conducted):**Test Summary:**

Test Engineer:	Nick Steele	Test Date:	09 June 2011, 11 June 2011, 21 June 2011 & 22 June 2011
Test Sample Serial Number:	C00E30		

FCC Part:	90.1321/2.1046
Test Method Used:	As detailed in KDB 965270 dated 04/15/2010

Environmental Conditions:

Temperature (°C):	24 to 29
Relative Humidity (%):	19 to 21

Note(s):

1. The Client stated that the system is designed to use an omni-directional antenna with 4.5 dBi gain.
2. Measurements were performed on bottom, middle and top channels, for both a 5 MHz and 10 MHz channel bandwidth, using the spectrum analyser channel power function.
3. For 5MHz channels, the spectrum analyser offset used incorporated a 4dB offset for the 39.5% duty cycle of the EUT. This was calculated using the equation $10 \cdot \log_{10}(\text{Ton}/\text{Period})$, whereby Ton was measured as being 2ms and Period measured as being 5ms
4. For 10MHz channels, the spectrum analyser offset used incorporated a 4.2dB offset for the 37.6% duty cycle of the EUT. This was calculated using the equation $10 \cdot \log_{10}(\text{Ton}/\text{Period})$, whereby Ton was measured as being 1.9ms and Period measured as being 5ms

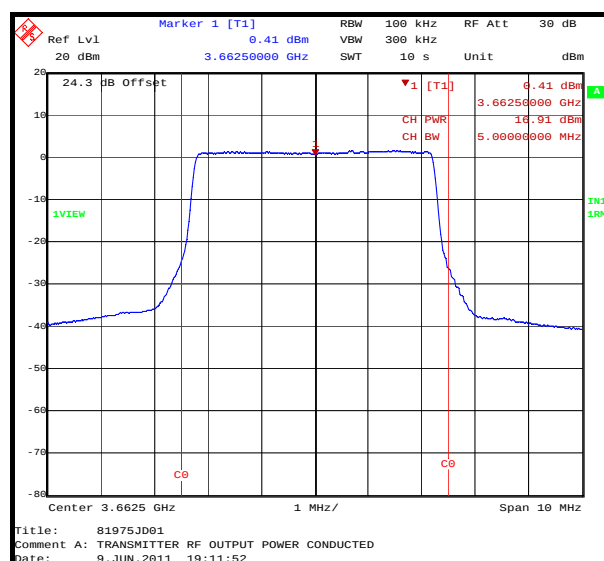
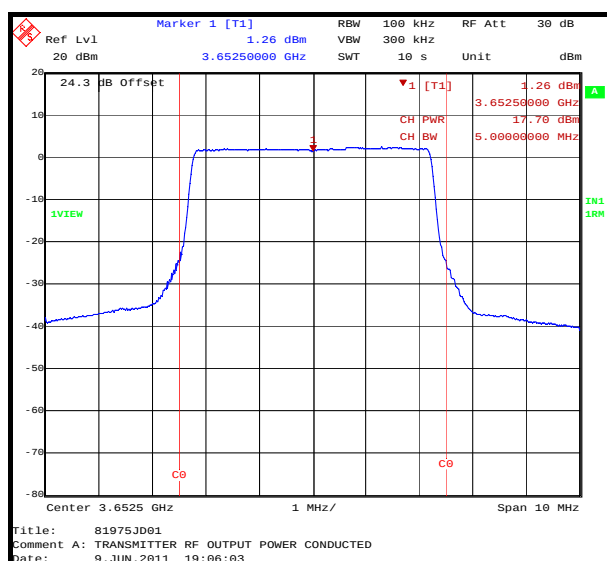
Transmitter Carrier Output Power (continued)**Results: 5 MHz Channel Bandwidth – QPSK as per FCC 90z**

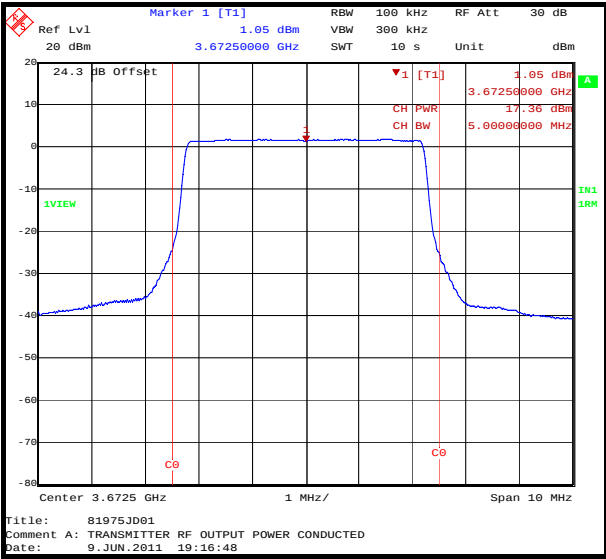
Channel	Frequency (MHz)	Conducted RF O/P Power (dBm)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Result
Bottom	3652.5	17.7	22.2	30.0	7.8	Complied
Middle	3662.5	16.9	21.4	30.0	8.6	Complied
Top	3672.5	17.4	21.9	30.0	8.1	Complied

SAR DL:UL Scaled Power

Channel	Frequency (MHz)	Conducted RF O/P Power (dBm)	Scale Factor	Scaled Power (dBm)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Result
Bottom	3652.5	17.7	2.757	21.7	26.2	30.0	3.8	Complied
Middle	3662.5	16.9	2.401	21.7	26.2	30.0	3.8	Complied
Top	3672.5	17.4	2.401	21.7	26.2	30.0	3.8	Complied

Scaled SAR Power 21.5 dBm - Scaled EMC Power 21.7 dBm = 0.2 dB Margin





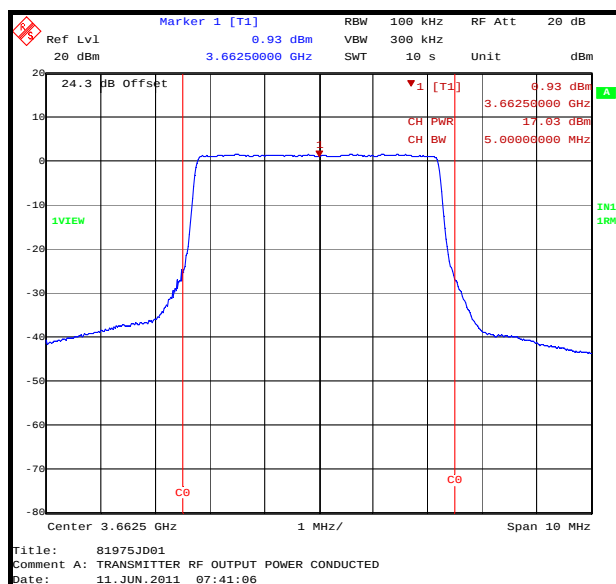
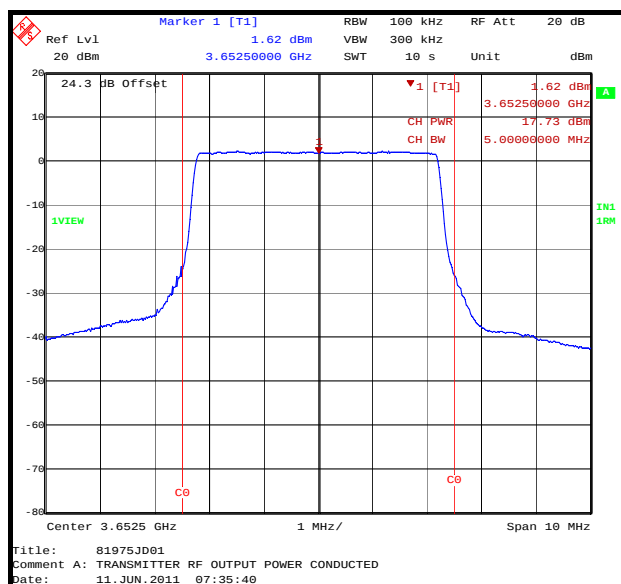
Transmitter Carrier Output Power (continued)**Results: 5 MHz Channel Bandwidth – 16QAM**

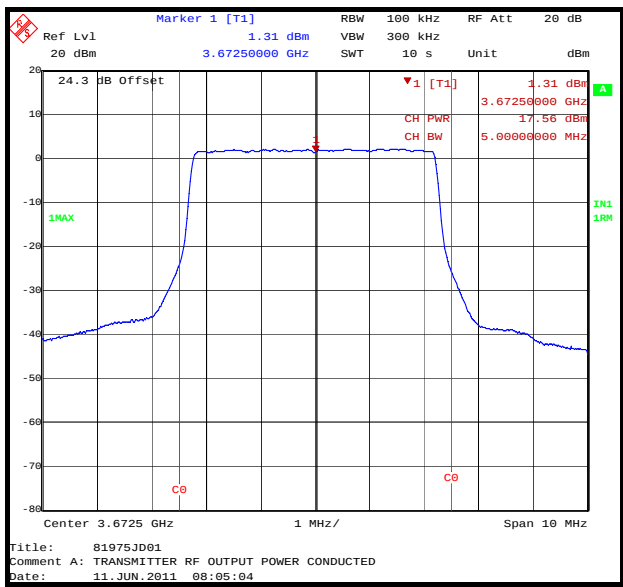
Channel	Frequency (MHz)	Conducted RF O/P Power (dBm)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Result
Bottom	3652.5	17.7	22.2	30.0	7.8	Complied
Middle	3662.5	17.0	21.5	30.0	8.5	Complied
Top	3672.5	17.6	22.1	30.0	7.9	Complied

SAR DL:UL Scaled Power

Channel	Frequency (MHz)	Conducted RF O/P Power (dBm)	Scale Factor	Scaled Power (dBm)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Result
Bottom	3652.5	17.7	2.512	21.7	26.2	30.0	3.8	Complied
Middle	3662.5	17.0	2.951	21.7	26.2	30.0	3.8	Complied
Top	3672.5	17.6	2.570	21.7	26.2	30.0	3.8	Complied

Scaled SAR Power 21.5 dBm - Scaled EMC Power 21.7 dBm = 0.2 dB Margin





Transmitter Carrier Output Power (continued)

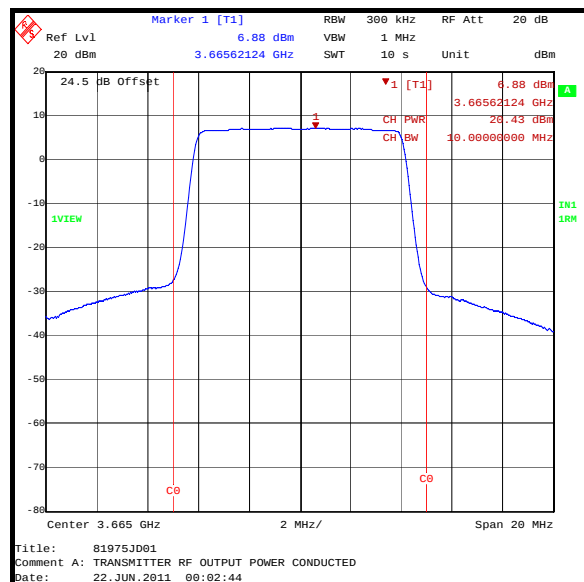
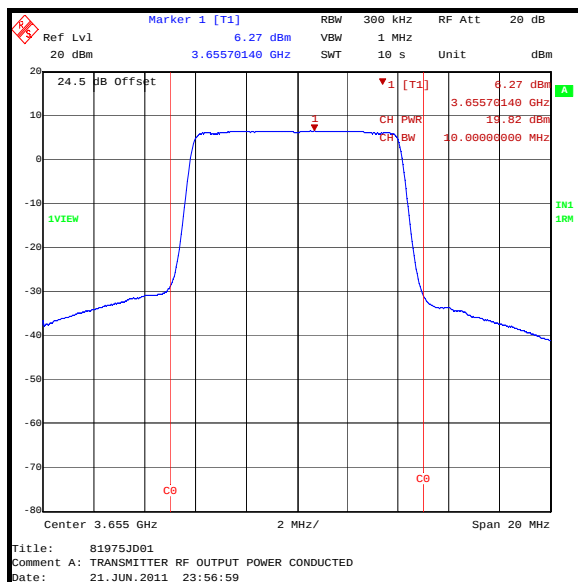
Results: 10MHz Channel Bandwidth - QPSK

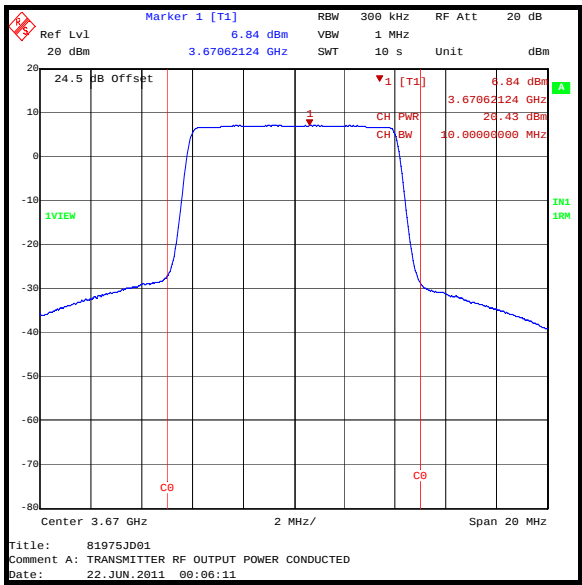
Channel	Frequency (MHz)	Conducted RF O/P Power (dBm)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Result
Bottom	3655.0	19.8	24.3	30.0	5.7	Complied
Middle	3665.0	20.4	24.9	30.0	5.1	Complied
Top	3670.0	20.4	24.9	30.0	5.1	Complied

SAR DL:UL Scaled Power

Channel	Frequency (MHz)	Conducted RF O/P Power (dBm)	Scale Factor	Scaled Power (dBm)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Result
Bottom	3652.5	19.8	2.757	24.2	28.7	30.0	1.3	Complied
Middle	3662.5	20.4	2.401	24.2	28.7	30.0	1.3	Complied
Top	3672.5	20.4	2.401	24.2	28.7	30.0	1.3	Complied

Scaled SAR Power 24.0 dBm - Scaled EMC Power 24.2 dBm = 0.2 dB Margin





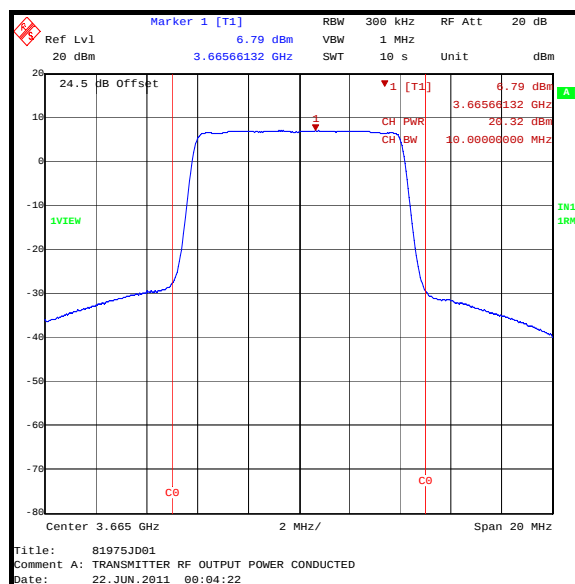
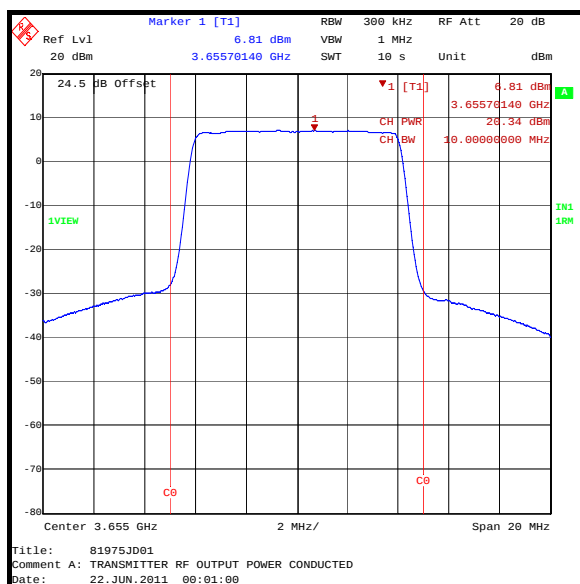
Transmitter Carrier Output Power (continued)**Results: 10MHz Channel Bandwidth – 16QAM**

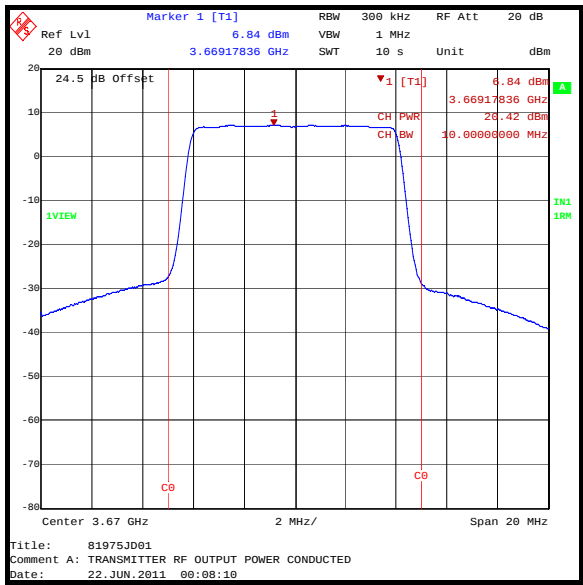
Channel	Frequency (MHz)	Conducted RF O/P Power (dBm)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Result
Bottom	3655.0	20.3	24.8	30.0	5.2	Complied
Middle	3665.0	20.3	24.8	30.0	5.2	Complied
Top	3670.0	20.4	24.9	30.0	5.1	Complied

SAR DL:UL Scaled Power

Channel	Frequency (MHz)	Conducted RF O/P Power (dBm)	Scale Factor	Scaled Power (dBm)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Result
Bottom	3652.5	20.3	2.457	24.2	28.7	30.0	1.3	Complied
Middle	3662.5	20.3	2.457	24.2	28.7	30.0	1.3	Complied
Top	3672.5	20.4	2.401	24.2	28.7	30.0	1.3	Complied

Scaled SAR Power 24.0 dBm - Scaled EMC Power 24.2 dBm = 0.2 dB Margin





5.2.3.1. Transmitter Peak Power Spectral Density (Conducted)**Test Summary:**

Test Engineer:	Nick Steele	Test Date:	22 June 2011
Test Sample Serial Number:	C00E30		

FCC Part:	90.1321/2.1046
Test Method Used:	As detailed in KDB 965270 dated 04/15/2010

Environmental Conditions:

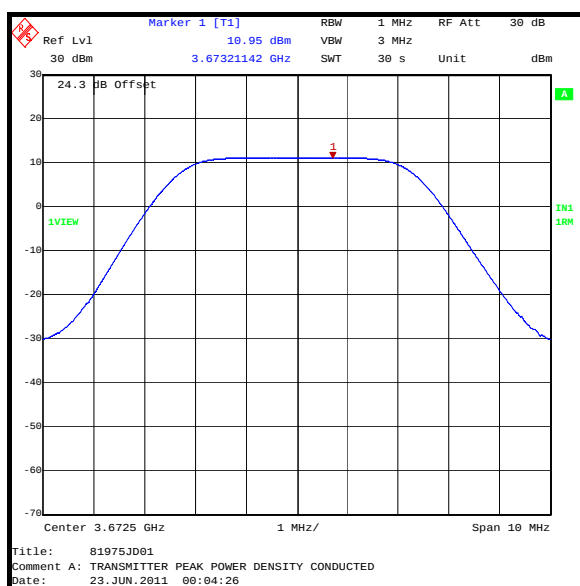
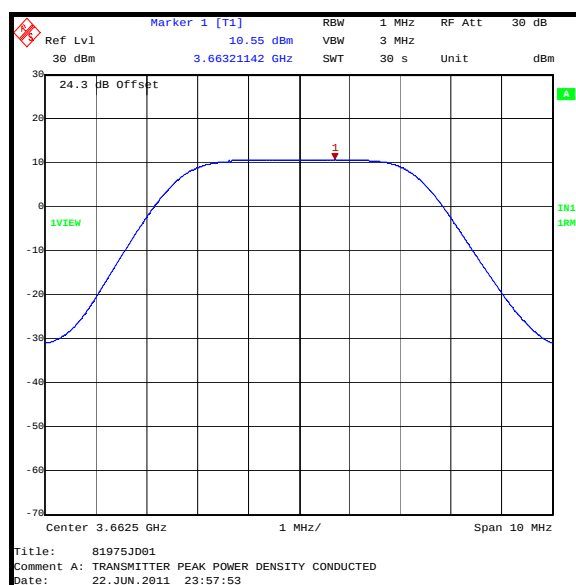
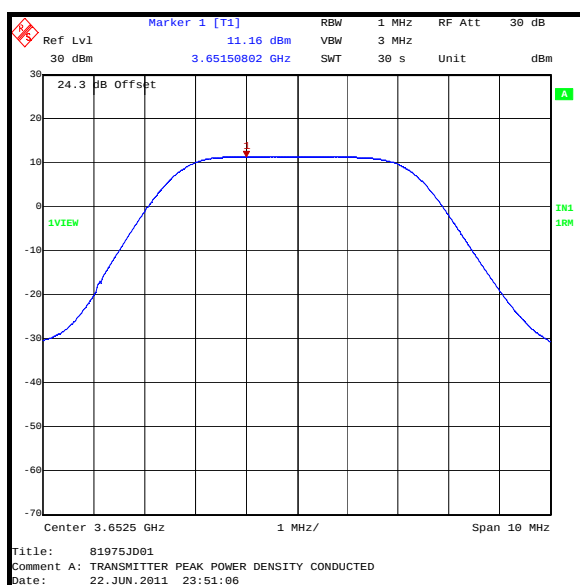
Temperature (°C):	24 to 29
Relative Humidity (%):	19 to 21

Note(s):

1. As declared by the client, the EUT is designed to use an omni-directional antenna with 4.5dBi gain.
2. Measurements were performed on bottom, centre and top channel, 5 MHz and 10 MHz channel bandwidth
3. EIRP was calculated by adding the declared antenna gain to the measured conducted RF output power.
4. For 5MHz channels, the spectrum analyser offset used incorporated a 4dB offset for the 39.5% duty cycle of the EUT. This was calculated using the equation $10 \cdot \log_{10}(\text{Ton}/\text{Period})$, whereby Ton was measured as being 2ms and Period measured as being 5ms
5. For 10MHz channels, the spectrum analyser offset used incorporated a 4.2dB offset for the 37.6% duty cycle of the EUT. This was calculated using the equation $10 \cdot \log_{10}(\text{Ton}/\text{Period})$, whereby Ton was measured as being 1.9ms and Period measured as being 5ms

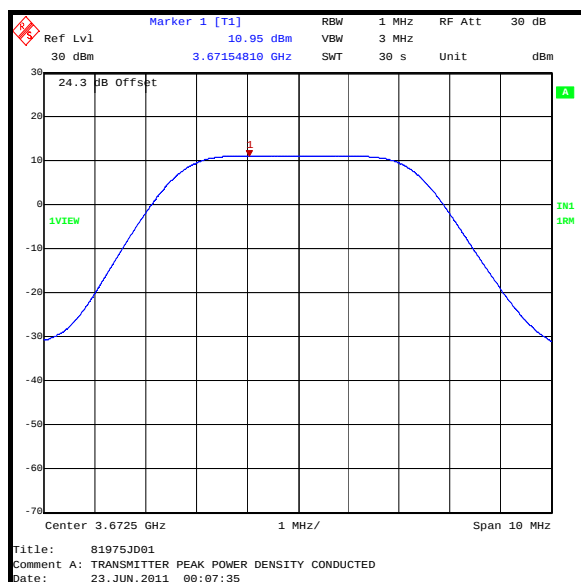
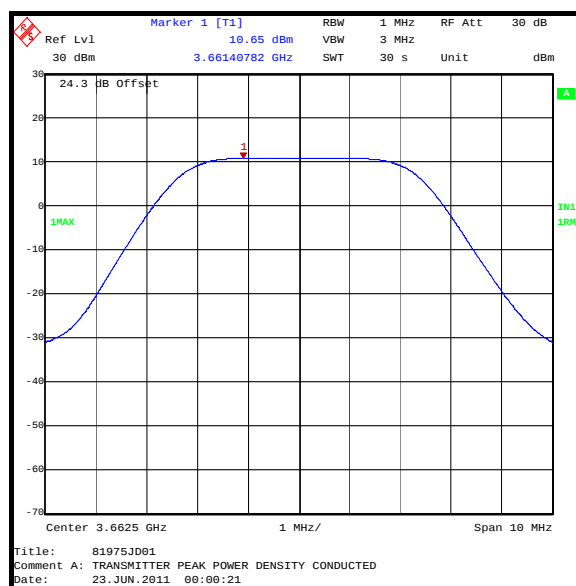
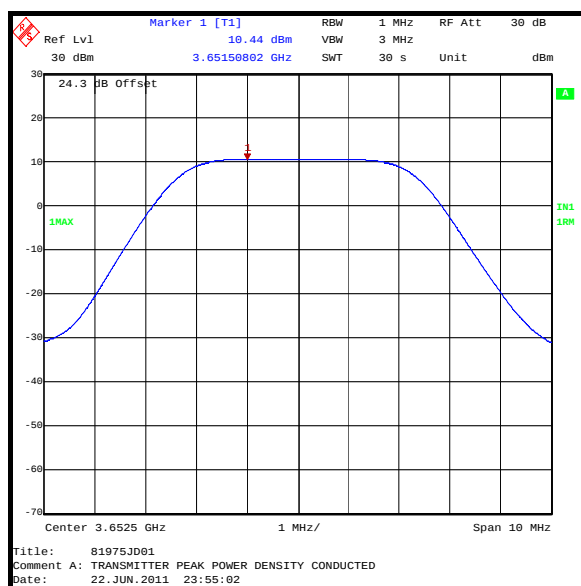
Transmitter Peak Power Spectral Density (Conducted) (continued)**Results: 5 MHz Channel Bandwidth - QPSK**

Channel	Frequency (MHz)	Calculated EIRP (dBm)	Limit (dBm)	Margin (dB)	Result
Bottom	3652.5	15.7	16.0	0.3	Complied
Middle	3662.5	15.1	16.0	0.9	Complied
Top	3672.5	15.5	16.0	0.5	Complied



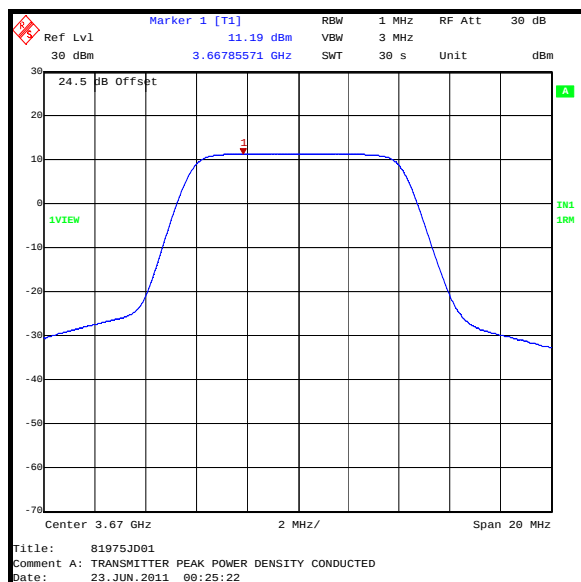
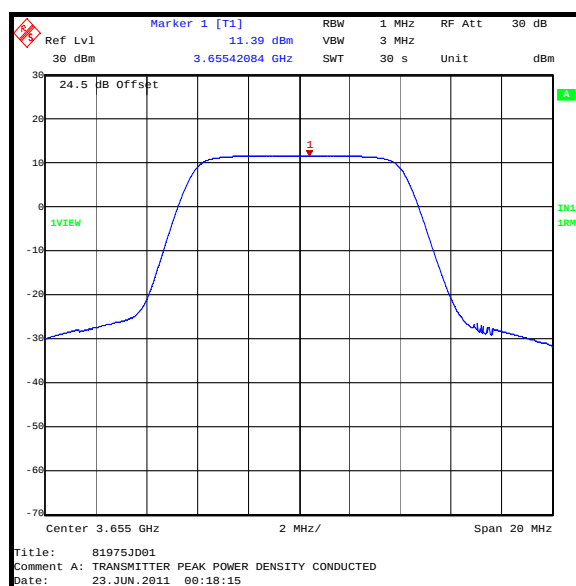
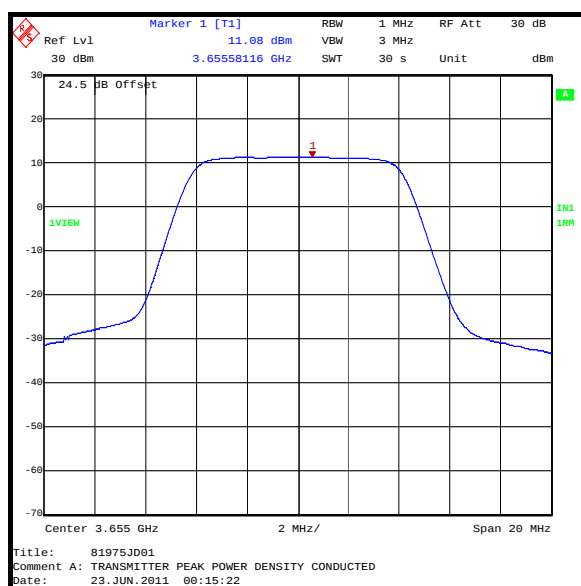
Transmitter Peak Power Spectral Density (Conducted) (continued)**Results: 5 MHz Channel Bandwidth – 16QAM**

Channel	Frequency (MHz)	Calculated EIRP (dBm)	Limit (dBm)	Margin (dB)	Result
Bottom	3652.5	14.9	16.0	1.1	Complied
Middle	3662.5	15.4	16.0	0.6	Complied
Top	3672.5	15.5	16.0	0.5	Complied



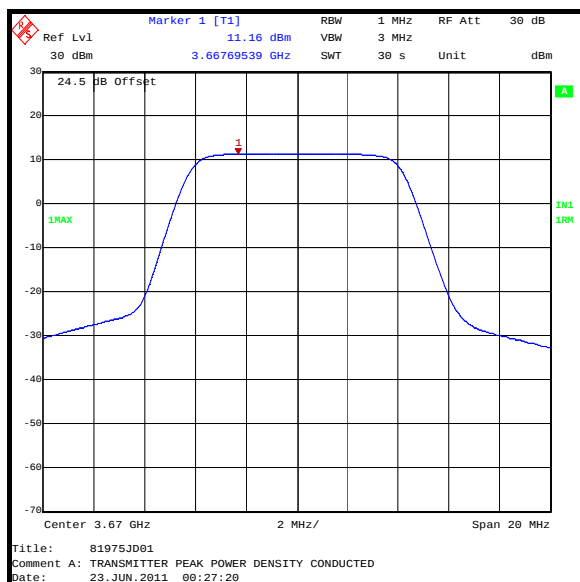
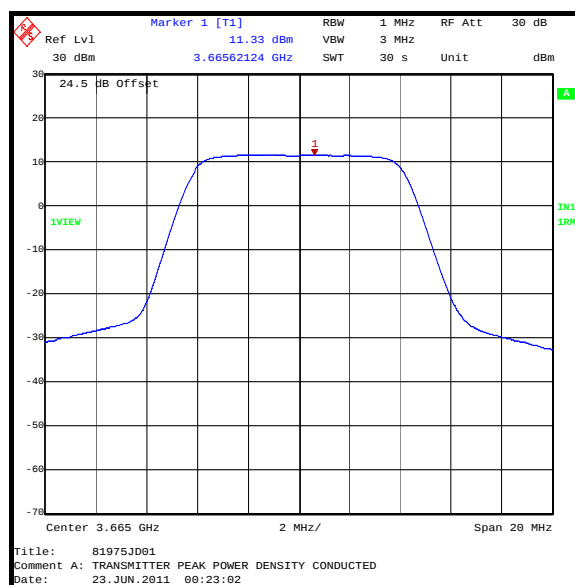
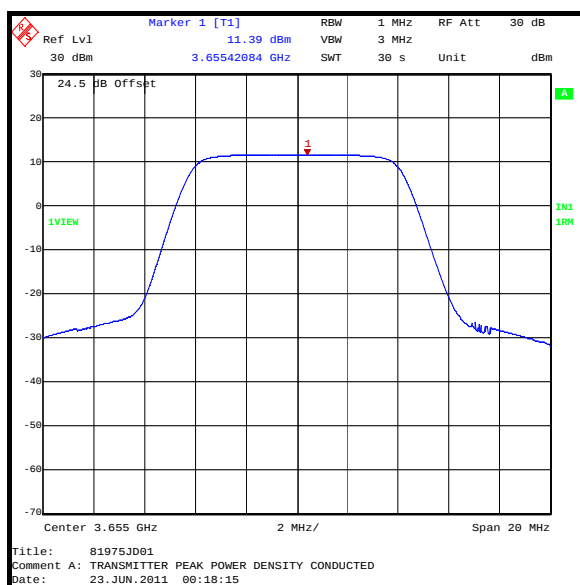
Transmitter Peak Power Spectral Density (Conducted) (continued)**Results: 10 MHz Channel Bandwidth - QPSK**

Channel	Frequency (MHz)	Calculated EIRP (dBm)	Limit (dBm)	Margin (dB)	Result
Bottom	3655.0	15.6	16.0	0.4	Complied
Middle	3665.0	15.5	16.0	0.5	Complied
Top	3670.0	15.7	16.0	0.3	Complied



Transmitter Peak Power Spectral Density (Conducted) (continued)**Results: 10 MHz Channel Bandwidth – 16QAM**

Channel	Frequency (MHz)	Calculated EIRP (dBm)	Limit (dBm)	Margin (dB)	Result
Bottom	3655.0	15.9	16.0	0.1	Complied
Middle	3665.0	15.8	16.0	0.2	Complied
Top	3670.0	15.7	16.0	0.3	Complied



5.2.3.2. Transmitter Conducted Emission Mask**Test Summary:**

Test Engineer:	Nick Steele	Test Date:	09 June 2011 & 11 June 2011
Test Sample Serial Number:	C00E30		

FCC Part:	90.210(n)(b)/2.1051
Test Method Used:	As detailed in ANSI TIA-603-C-2004 and relevant annexes

Environmental Conditions:

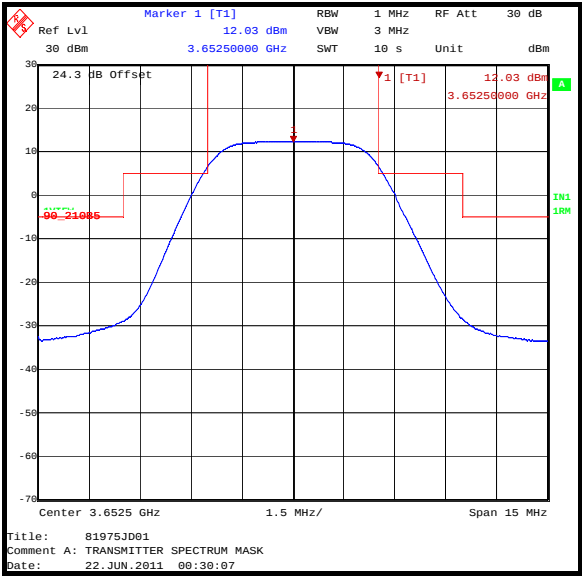
Temperature (°C):	27 to 29
Relative Humidity (%):	19 to 20

Note(s):

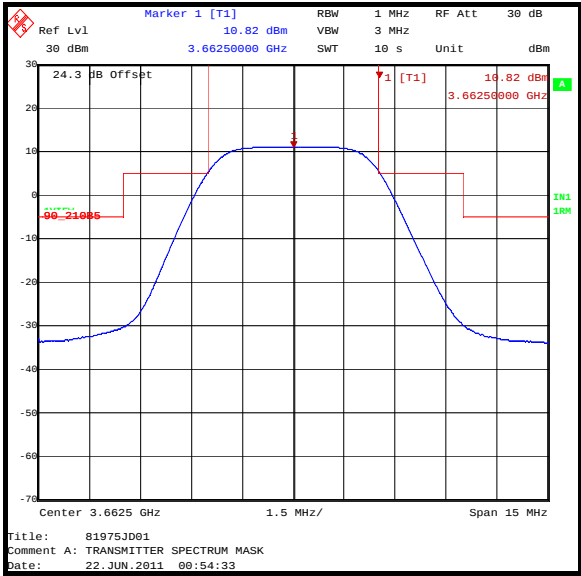
1. The measurement was performed with the EUT antenna port coupled to a spectrum analyser via suitable attenuation and cable. The power of the modulated signal was measured on a spectrum analyser using an RMS detector and 10 second sweep time, to give the full output power in the whole channel band. The spectrum analyser power measurements were verified using a calibrated power meter. The limit mask was placed at the level of the peak of the carrier. The analyser resolution bandwidth was then changed to 1 MHz, to carry out the measurement according to the applicable Standard.
For the 5MHz channel, to eliminate the effects of measuring with a relatively wide resolution bandwidth, which caused the signal to cross the mask limit, the final measurements were performed with a 100 kHz resolution bandwidth and the mask limit was reduced by 10 dB to compensate.
2. Measurements were performed on bottom, middle and top channels, using both a 5 MHz and 10 MHz channel bandwidth.
3. For 5MHz channels, the spectrum analyser offset used incorporated a 4dB offset for the 39.5% duty cycle of the EUT. This was calculated using the equation $10 \cdot \log_{10}(\text{Ton}/\text{Period})$, whereby Ton was measured as being 2ms and Period measured as being 5ms
4. For 10MHz channels, the spectrum analyser offset used incorporated a 4.2dB offset for the 37.6% duty cycle of the EUT. This was calculated using the equation $10 \cdot \log_{10}(\text{Ton}/\text{Period})$, whereby Ton was measured as being 1.9ms and Period measured as being 5ms

Transmitter Conducted Emission Mask (continued)

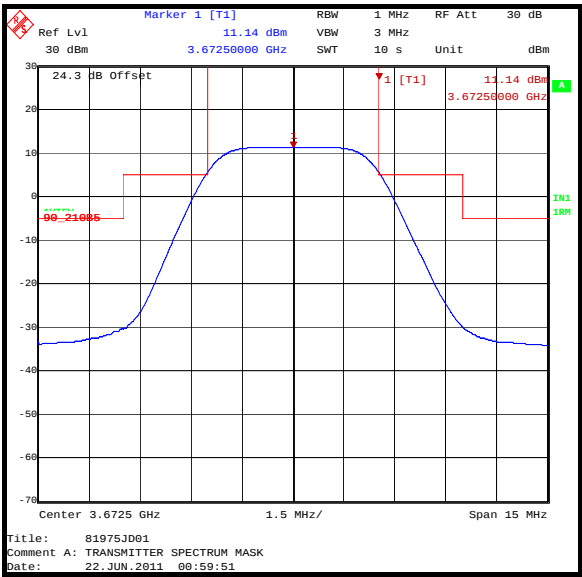
Results: 5MHz Channel Bandwidth - QPSK



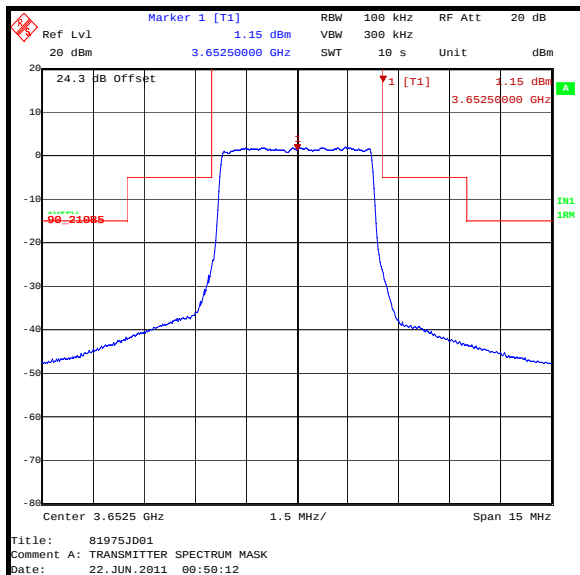
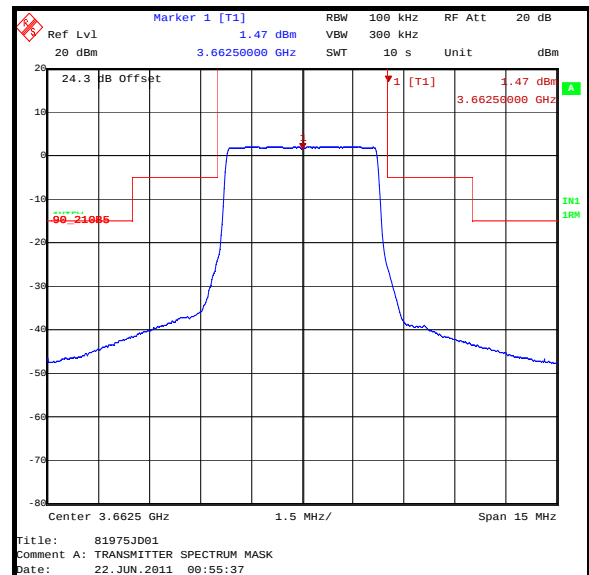
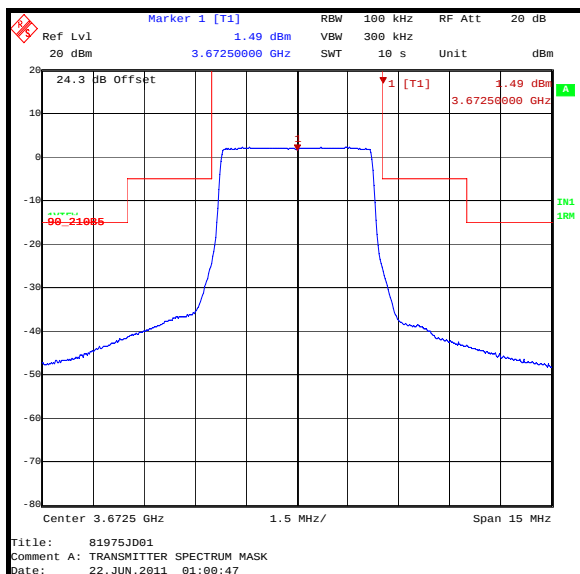
1MHz Resolution Bandwidth

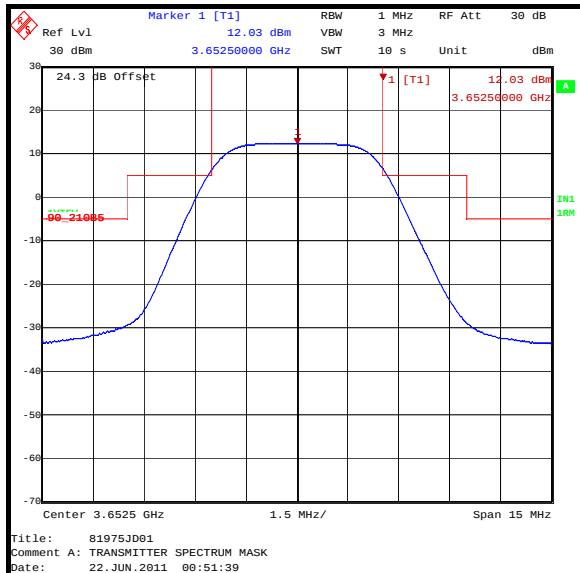
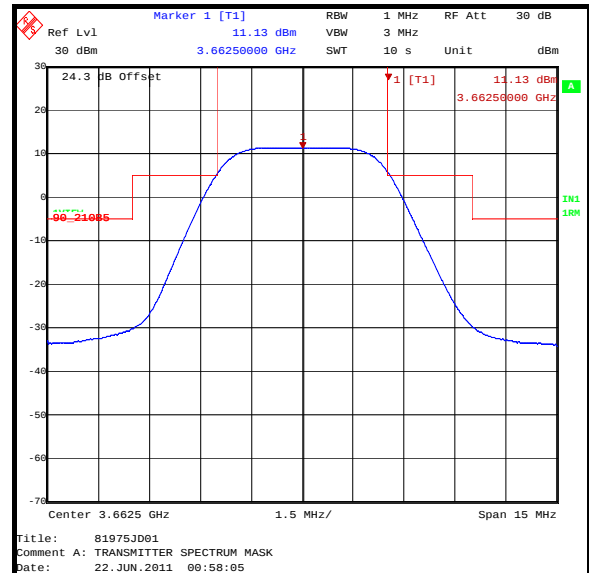
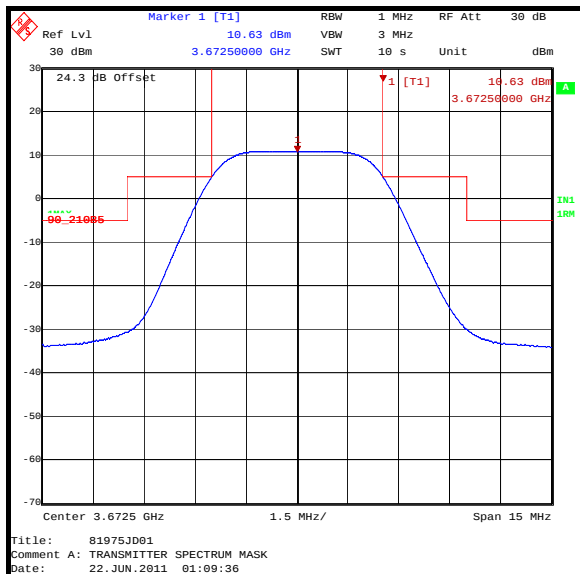


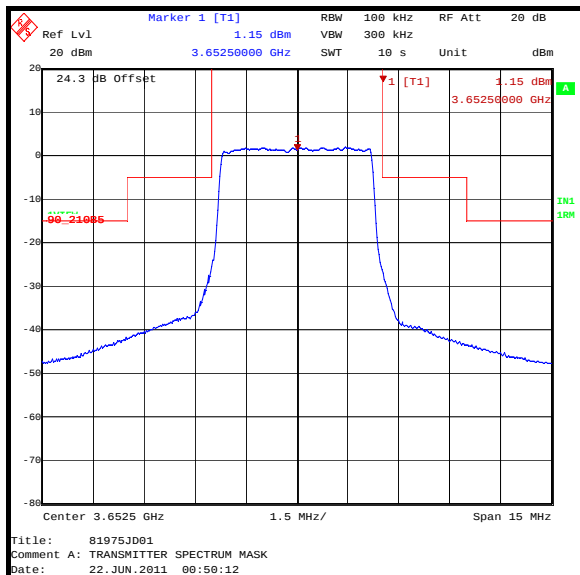
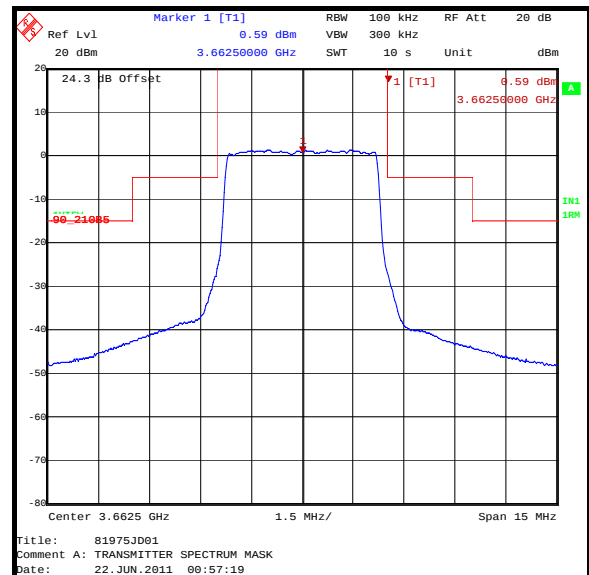
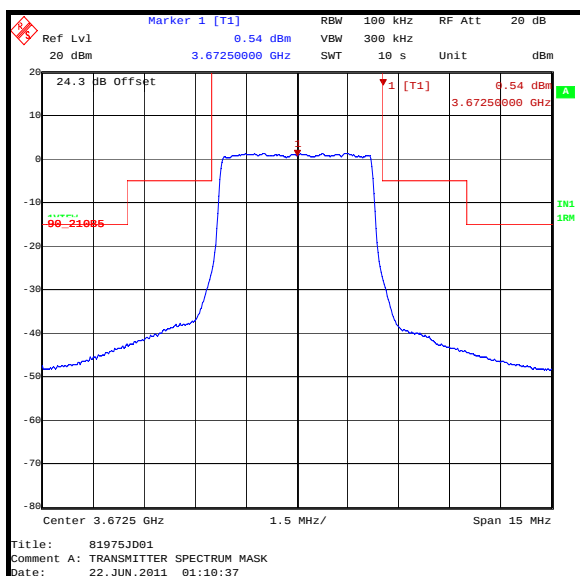
1MHz Resolution Bandwidth

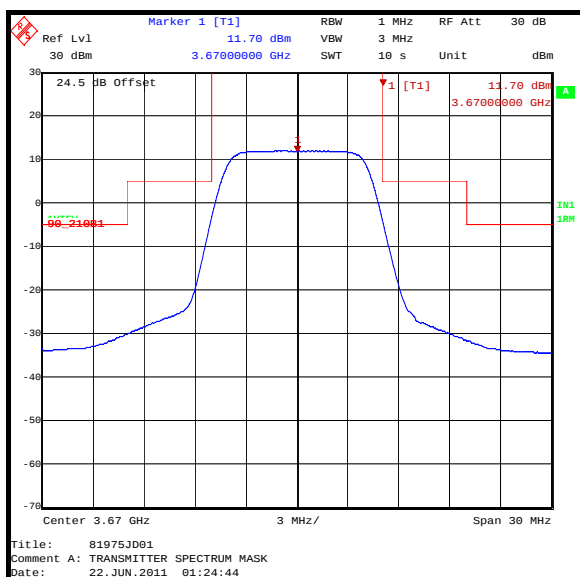
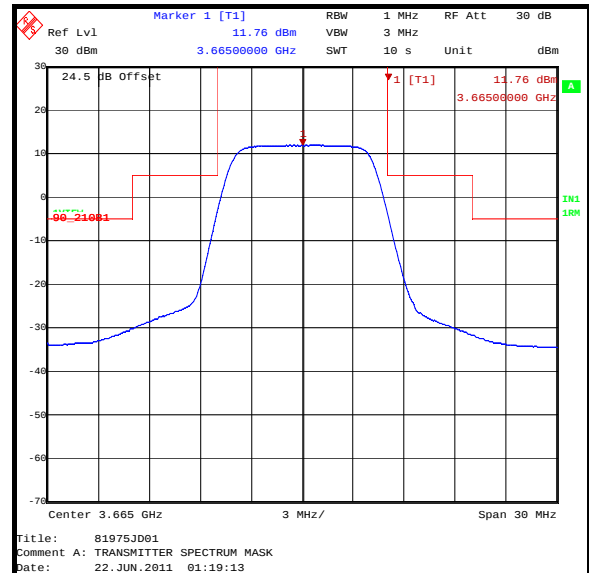
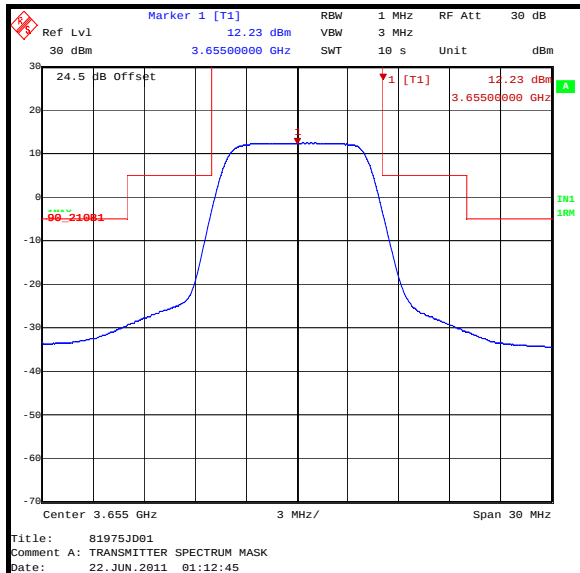


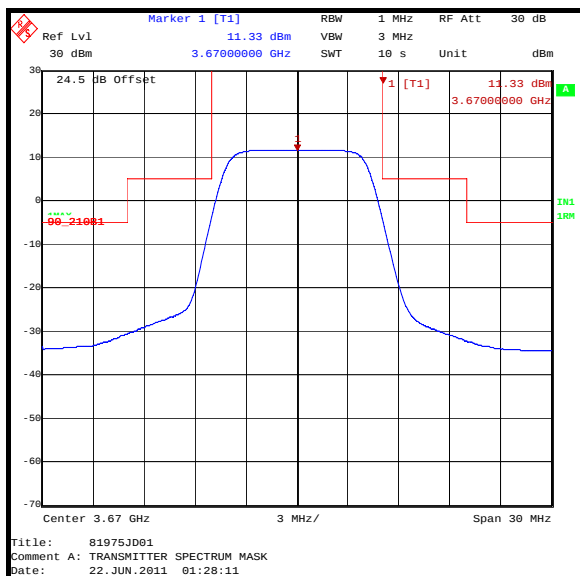
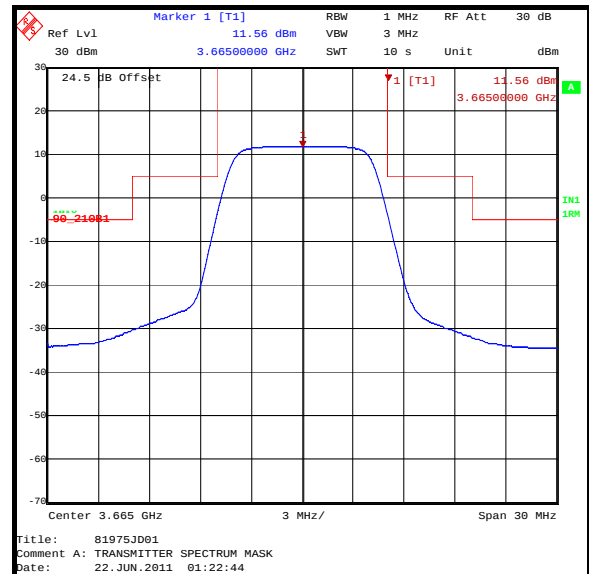
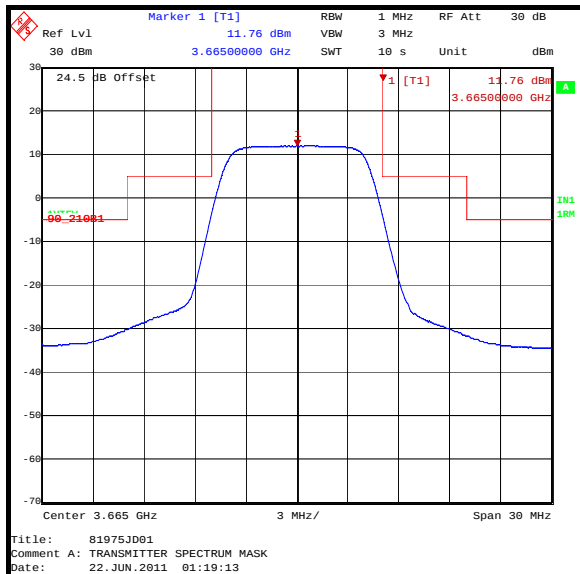
1MHz Resolution Bandwidth

Transmitter Conducted Emission Mask (continued)**Results: 5MHz Channel Bandwidth - QPSK****100kHz Resolution Bandwidth****100kHz Resolution Bandwidth****100kHz Resolution Bandwidth**

Transmitter Conducted Emission Mask (continued)**Results: 5MHz Channel Bandwidth – 16QAM****1MHz Resolution Bandwidth****1MHz Resolution Bandwidth****1MHz Resolution Bandwidth**

Transmitter Conducted Emission Mask (continued)**Results: 5MHz Channel Bandwidth – 16QAM****100kHz Resolution Bandwidth****100kHz Resolution Bandwidth****100kHz Resolution Bandwidth**

Transmitter Conducted Emission Mask (continued)**Results: 10MHz Channel Bandwidth - QPSK**

Transmitter Conducted Emission Mask (continued)**Results: 10MHz Channel Bandwidth – 16QAM**

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

Test Engineer:	Nick Steele	Test Date:	08 June 2011 & 09 June 2011
Test Sample Serial Number:	C00E30		

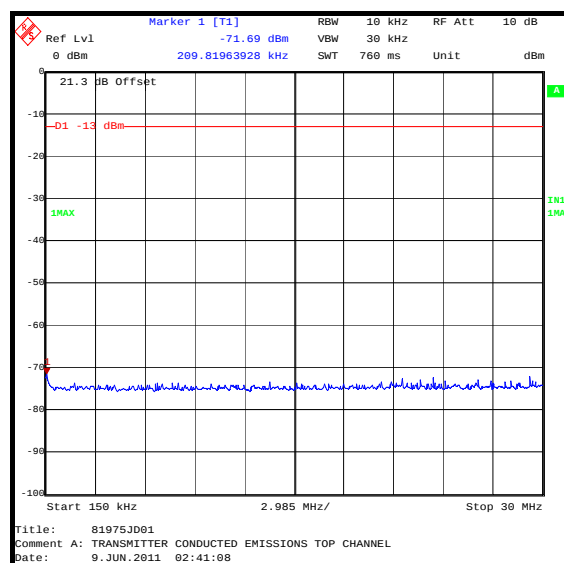
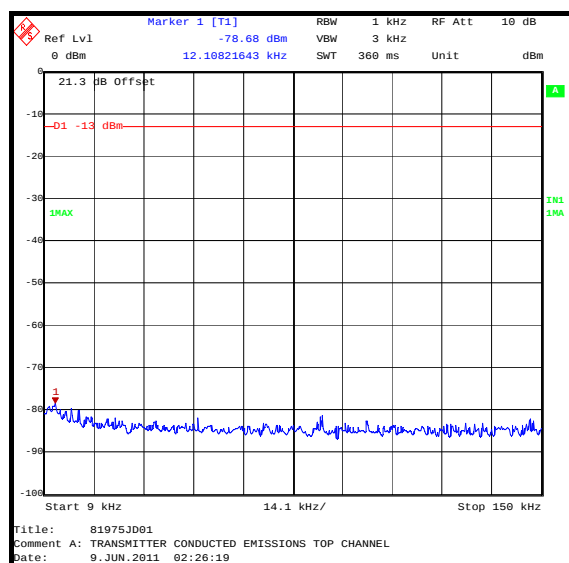
FCC Part:	90.1323 / 2.1051
Test Method Used:	As detailed in ANSI TIA-603-C-2004 and relevant annexes

Environmental Conditions:

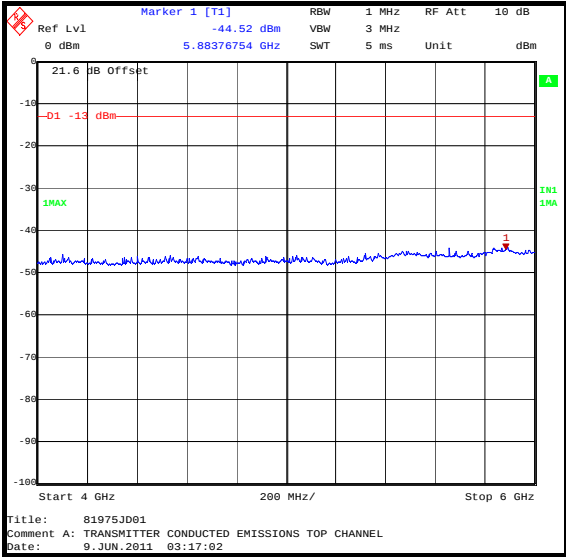
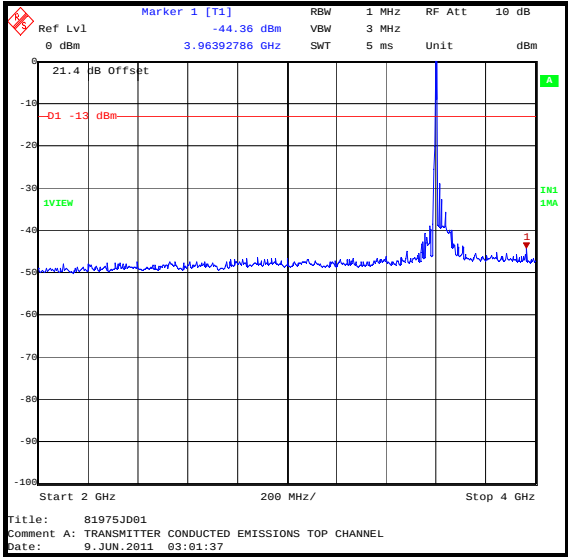
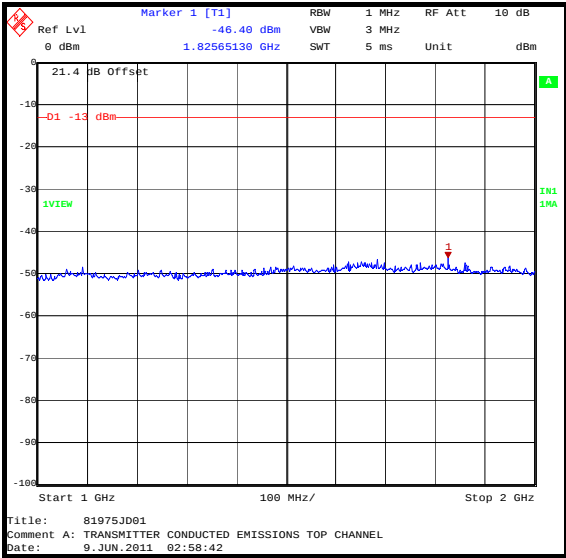
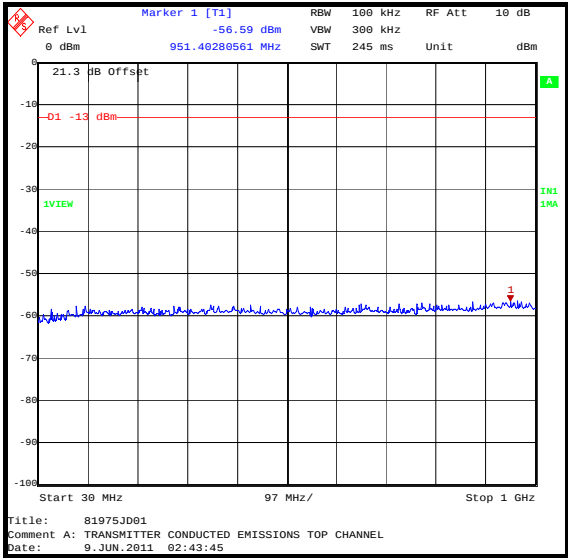
Temperature (°C):	28 to 29
Relative Humidity (%):	17 to 19

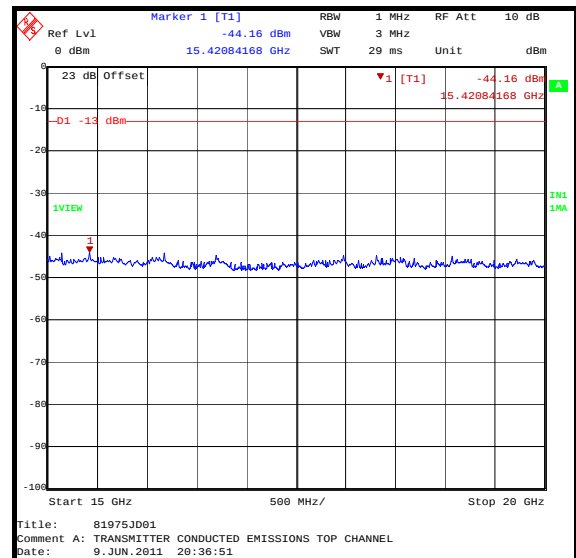
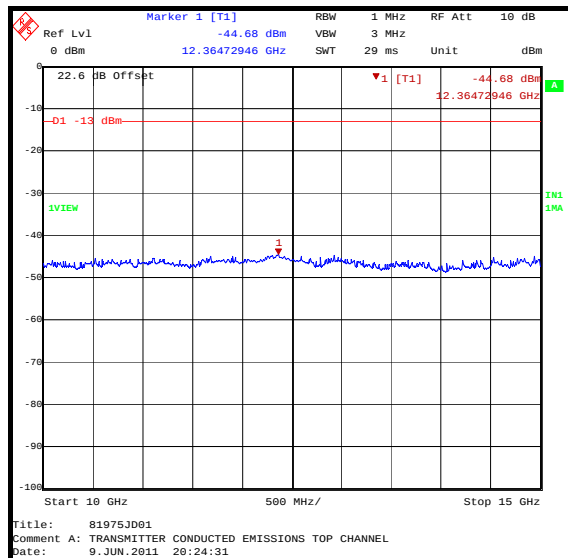
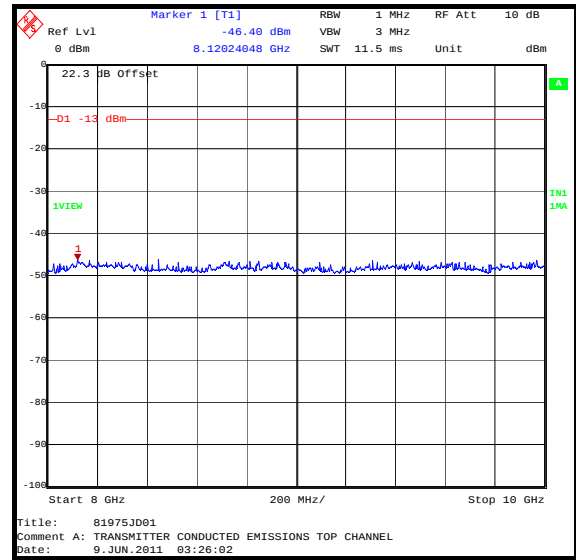
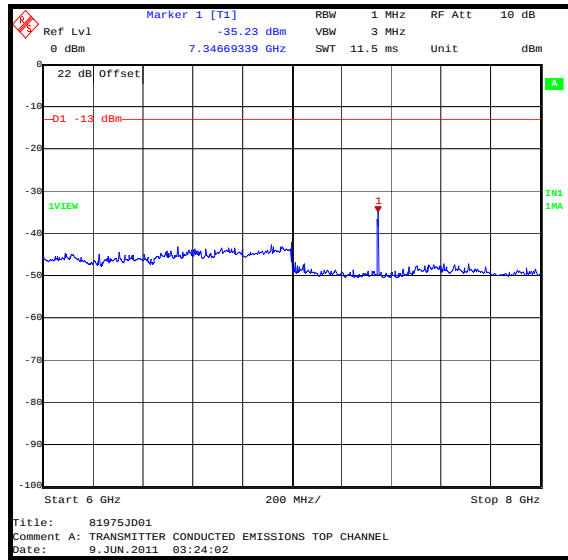
Results: 5MHz Channel Bandwidth – QPSK Top Channel

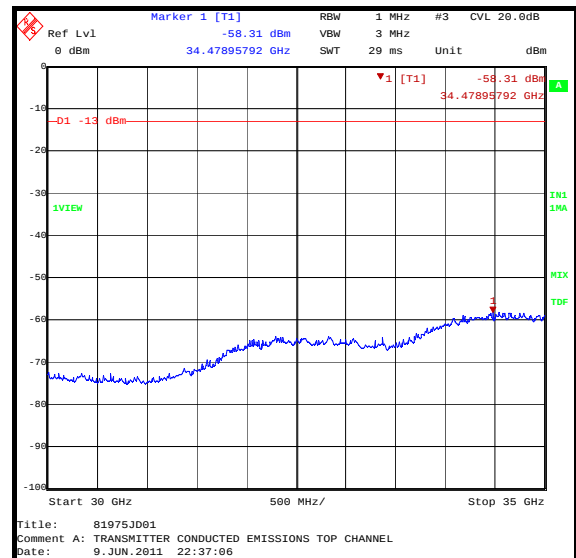
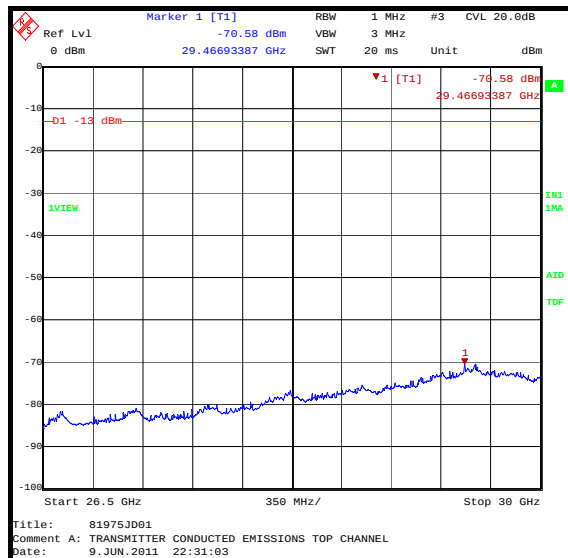
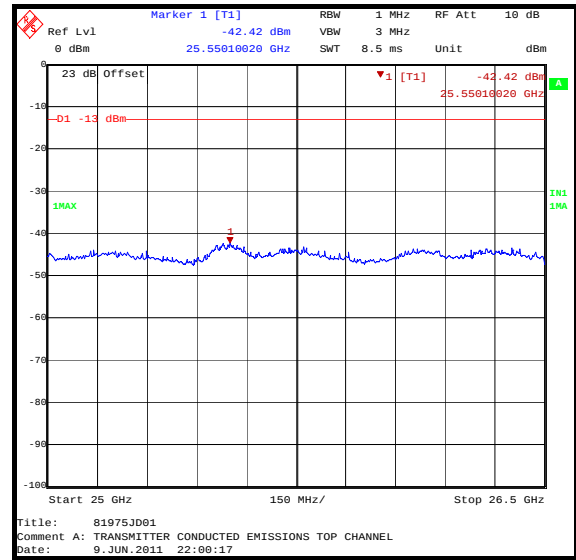
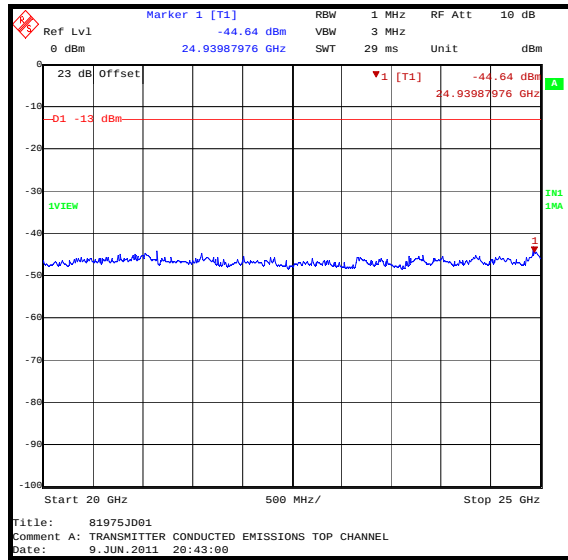
Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
7346.693	-35.2	-13.0	22.2	Complied



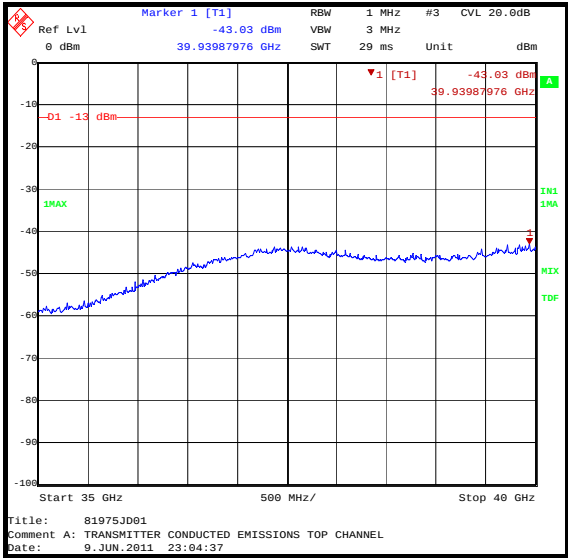
Transmitter Conducted Emissions (continued)



Transmitter Conducted Emissions (continued)

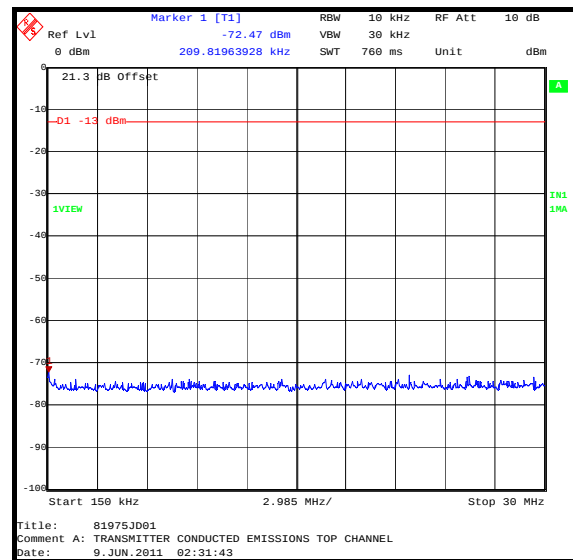
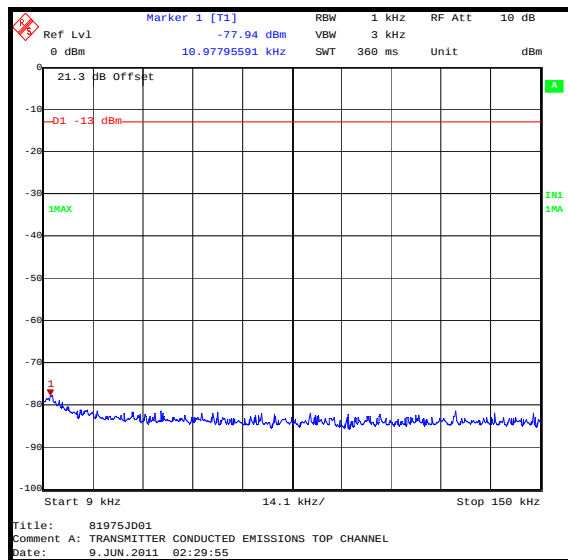
Transmitter Conducted Emissions (continued)

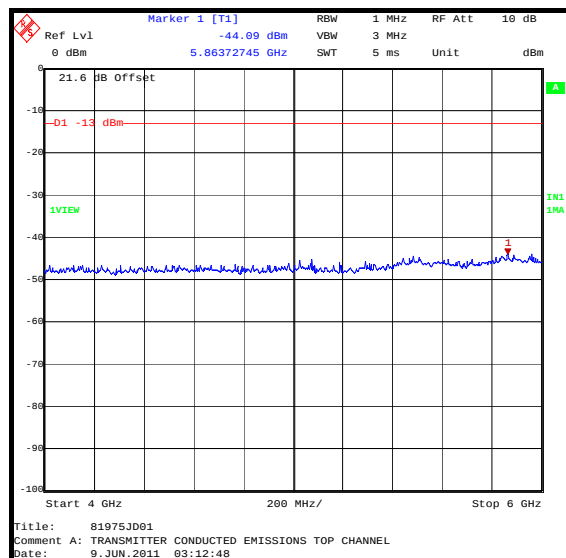
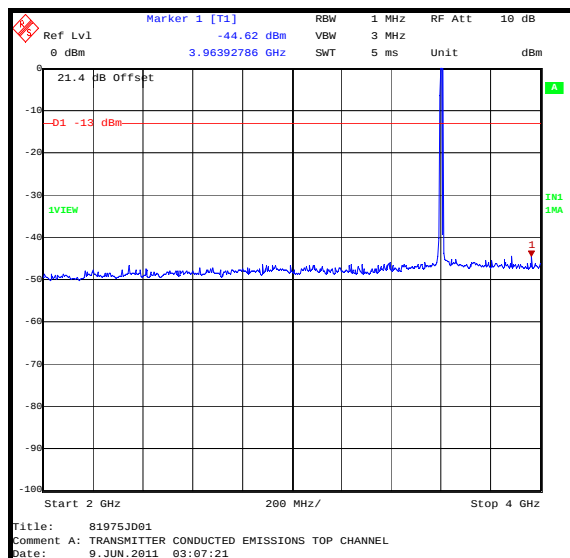
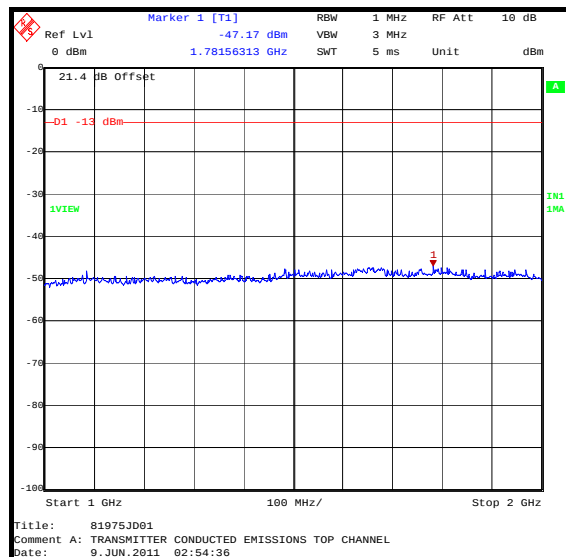
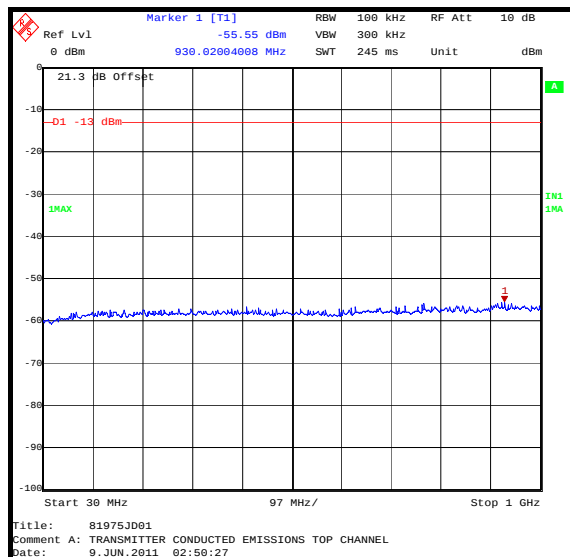
Transmitter Conducted Emissions (continued)

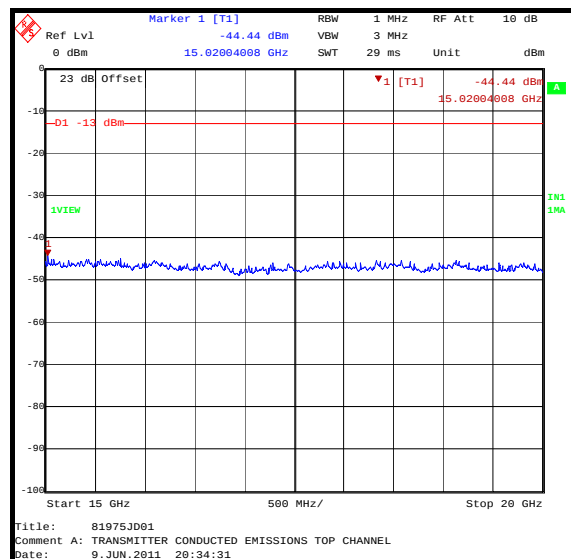
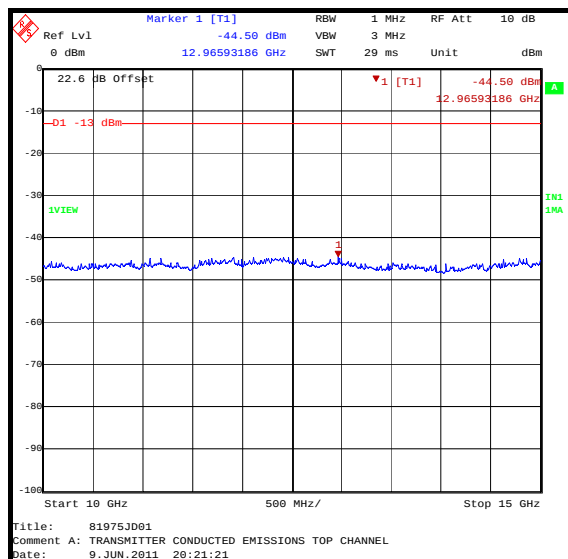
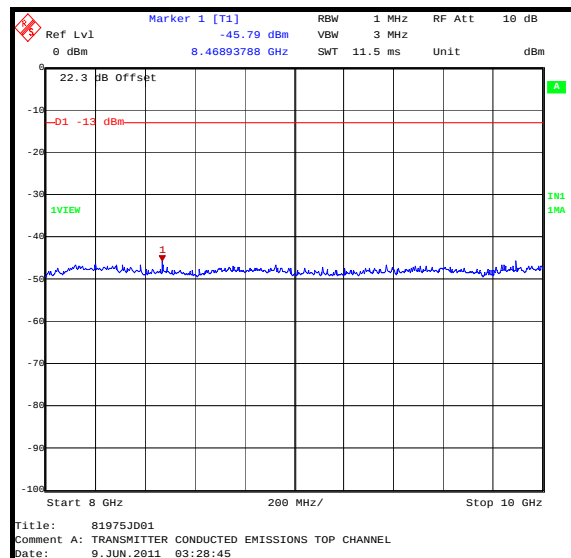
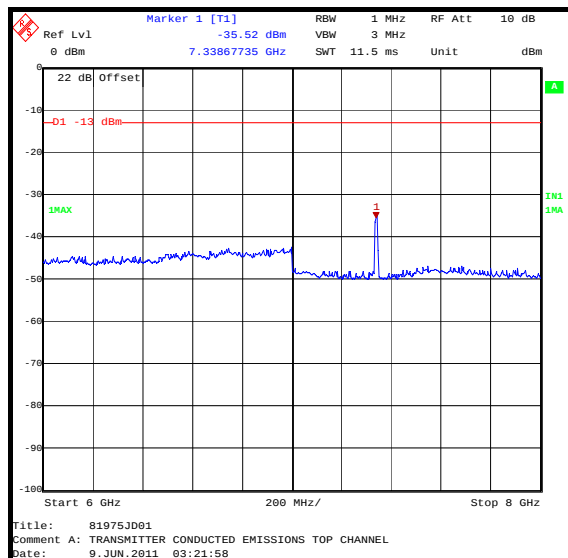


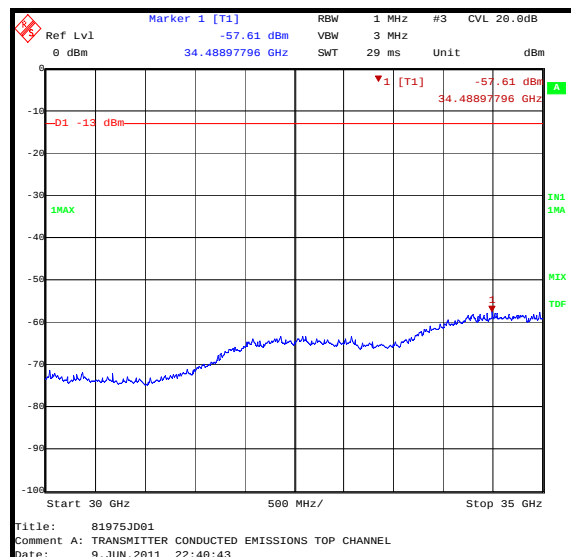
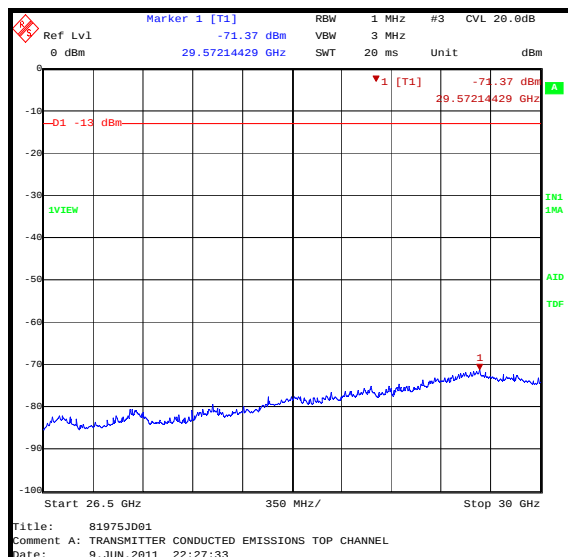
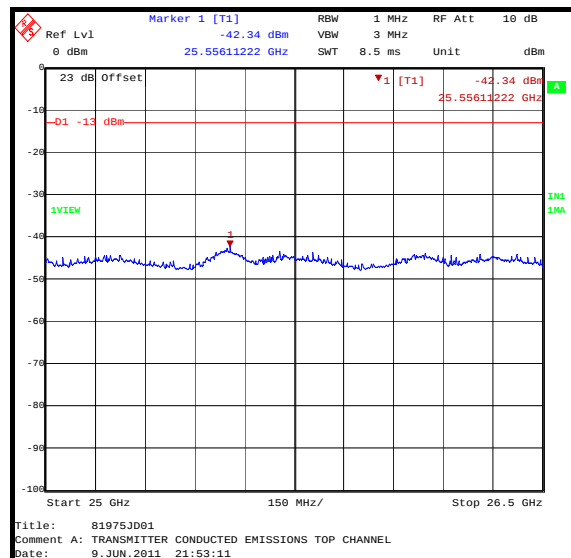
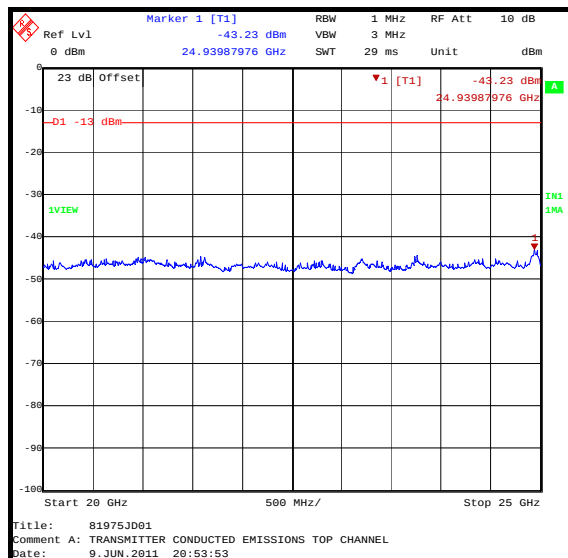
Transmitter Conducted Emissions (continued)**Results: 10MHz Channel Bandwidth – QPSK Top Channel**

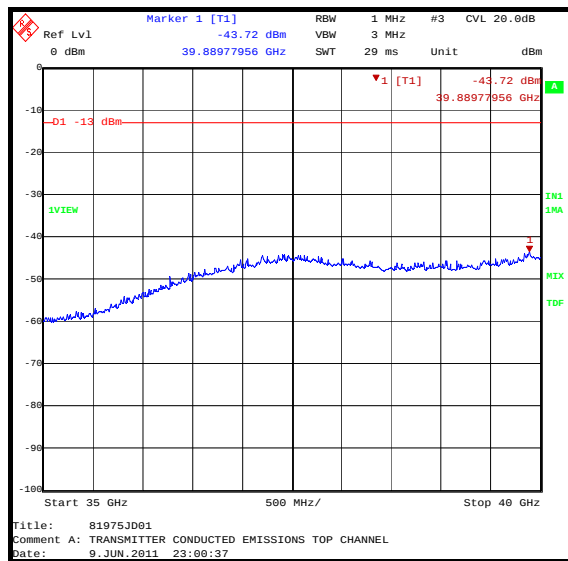
Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
7338.677	-35.5	-13.0	22.5	Complied



Transmitter Conducted Emissions (continued)

Transmitter Conducted Emissions (continued)

Transmitter Conducted Emissions (continued)

Transmitter Conducted Emissions (continued)**Note(s):**

1. The EUT was set to transmit on both the 5MHz and 10MHz bandwidths, with QPSK modulation applied, as this was found to have the highest output power.
2. All other emissions were at least 20 dB below the specification limit or below the measurement system noise floor.

5.2.4. Transmitter Band Edge Conducted Emissions**Test Summary:**

Test Engineer:	Nick Steele	Test Date:	09 June 2011 & 11 June 2011
Test Sample Serial Number:	C00E30		

FCC Part:	90.1323 / 2.1051
Test Method Used:	As detailed in ANSI TIA-603-C-2004 and relevant annexes

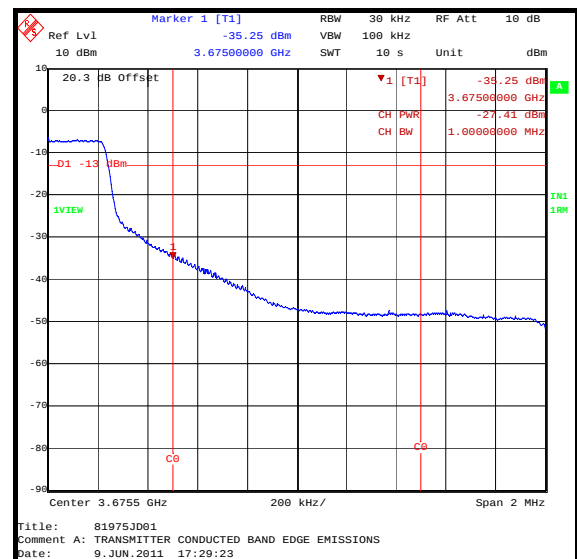
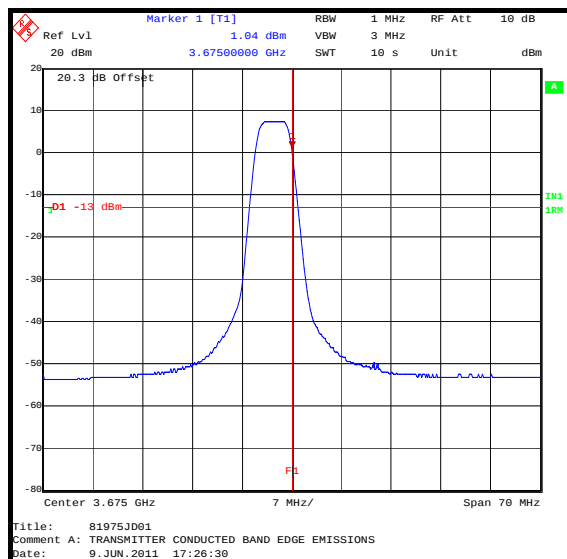
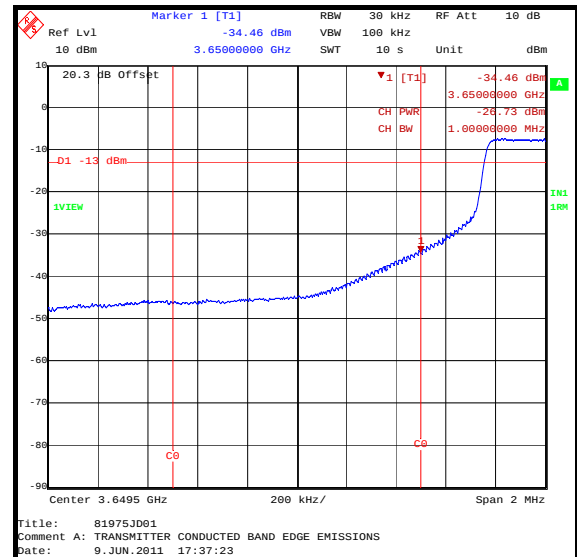
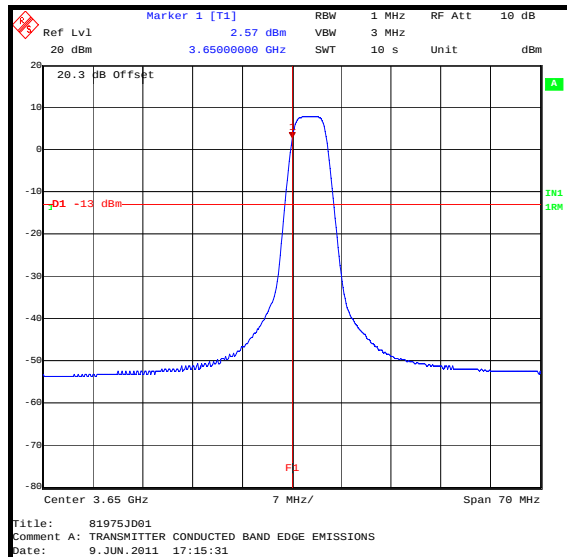
Environmental Conditions:

Temperature (°C):	27 to 29
Relative Humidity (%):	19 to 20

Results: 5MHz Channel Bandwidth - QPSK

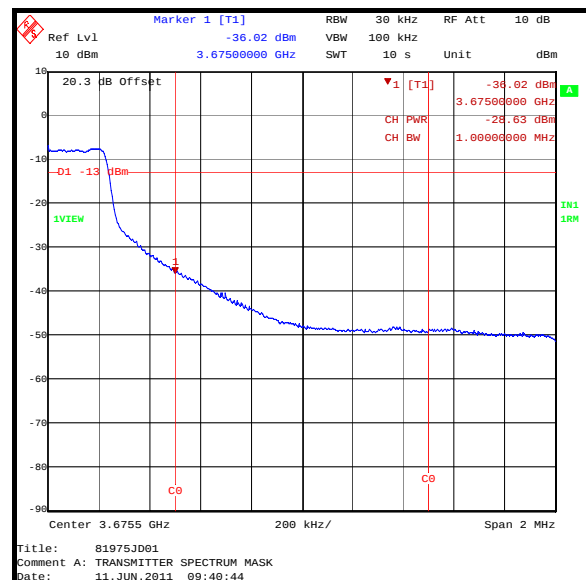
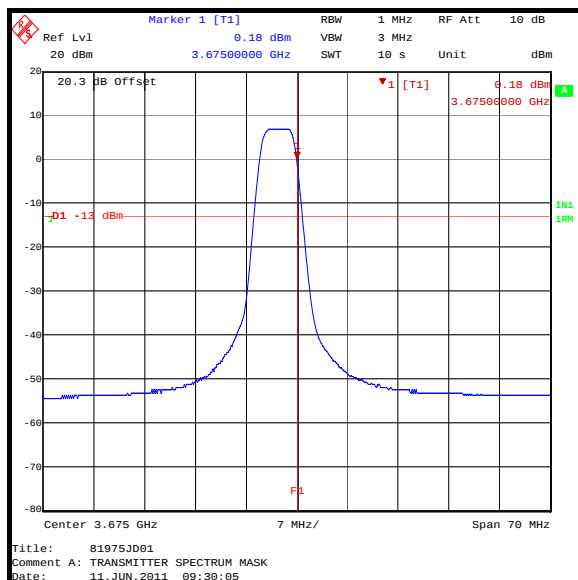
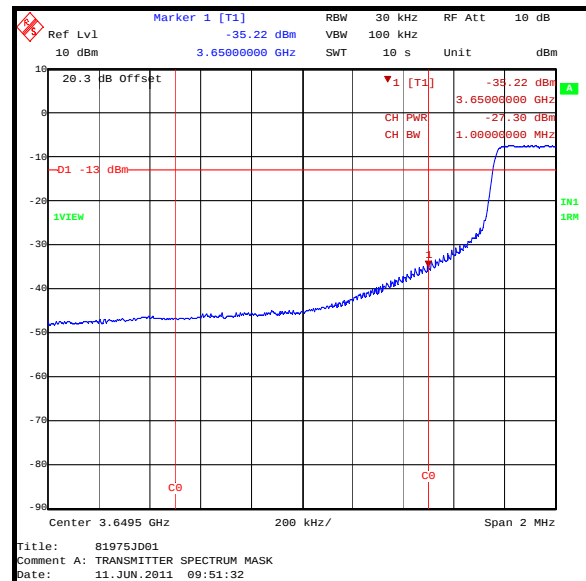
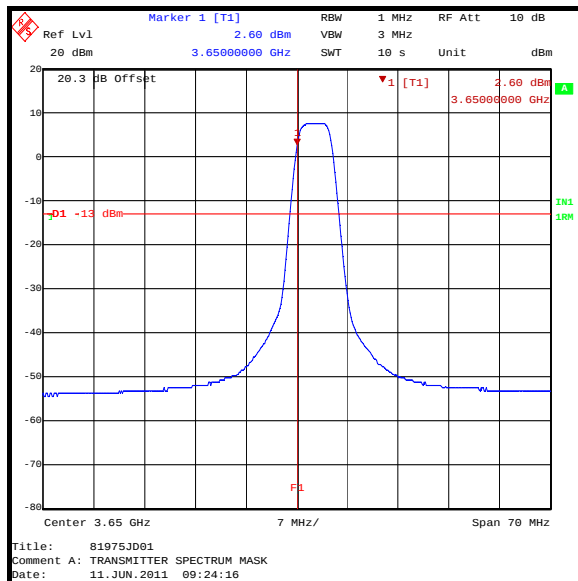
Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
3650.0	-26.7	-13.0	13.7	Complied
3675.0	-27.4	-13.0	14.4	Complied

Transmitter Band Edge Conducted Emissions (continued)



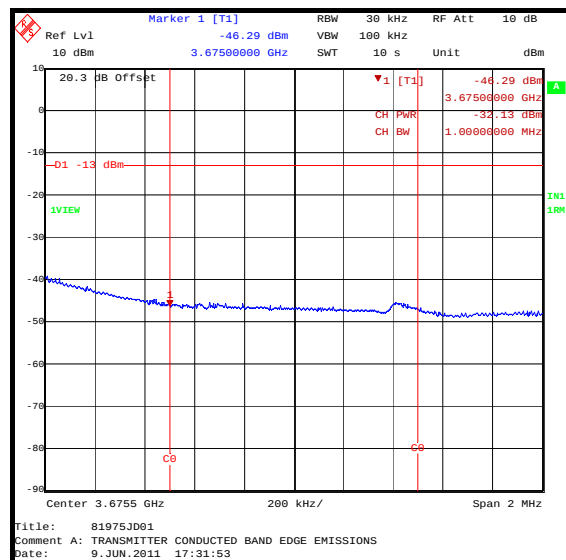
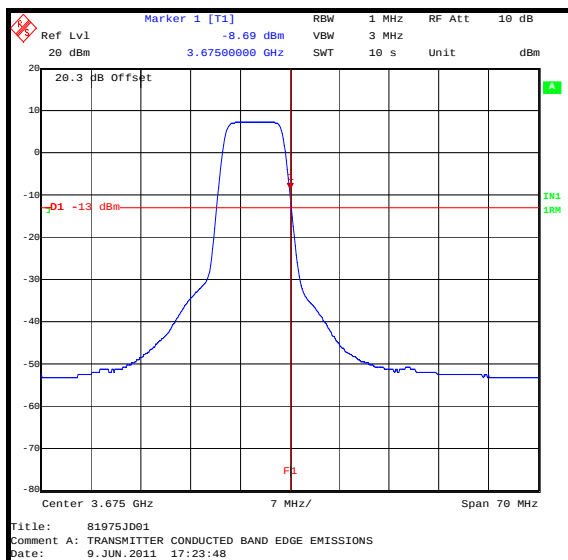
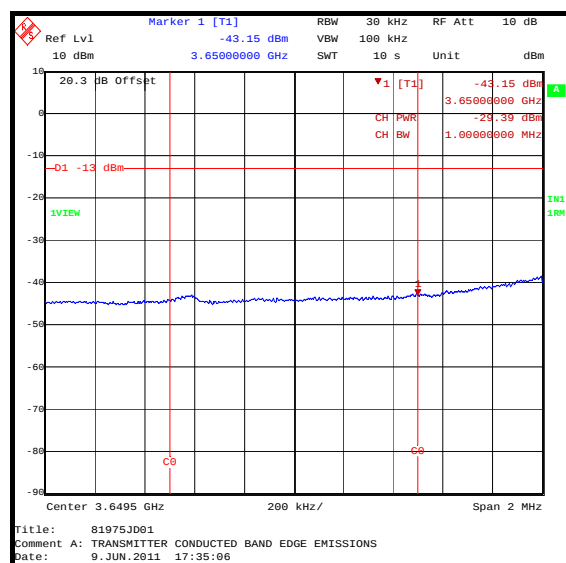
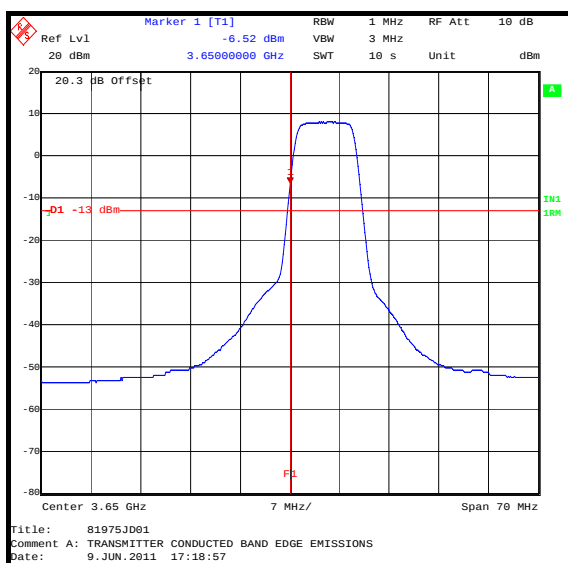
Transmitter Band Edge Conducted Emissions (continued)**Results: 5MHz Channel Bandwidth – 16QAM**

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
3650.0	-27.3	-13.0	14.3	Complied
3675.0	-28.6	-13.0	15.6	Complied



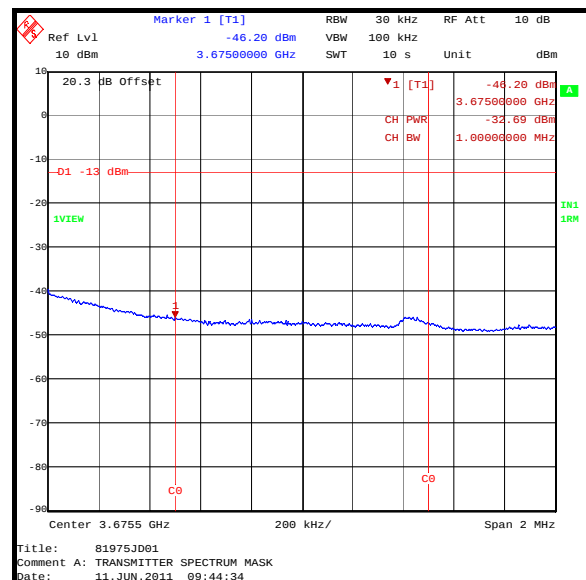
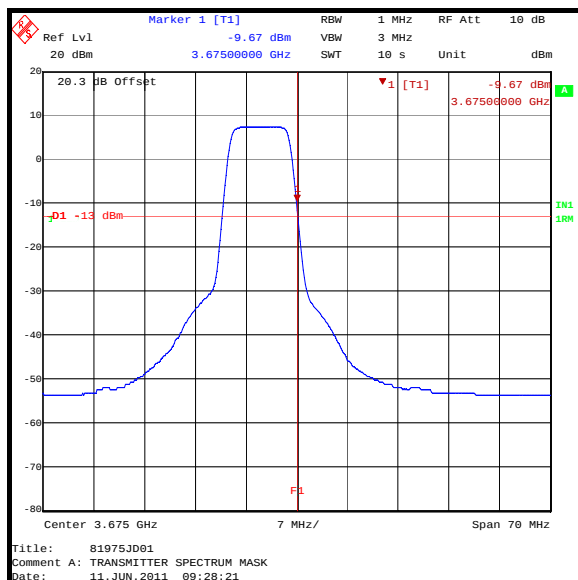
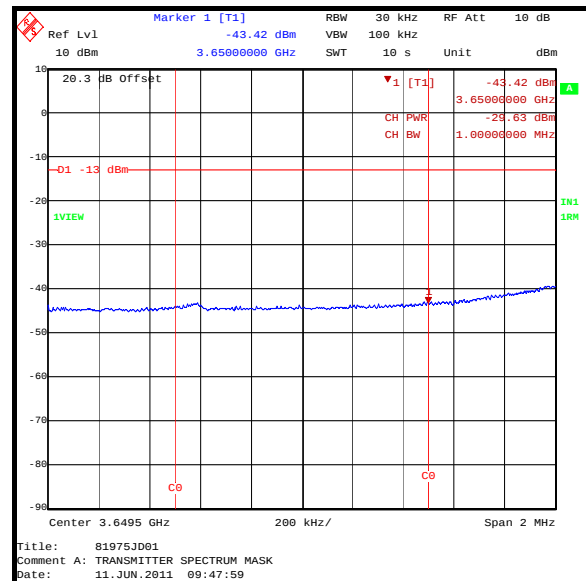
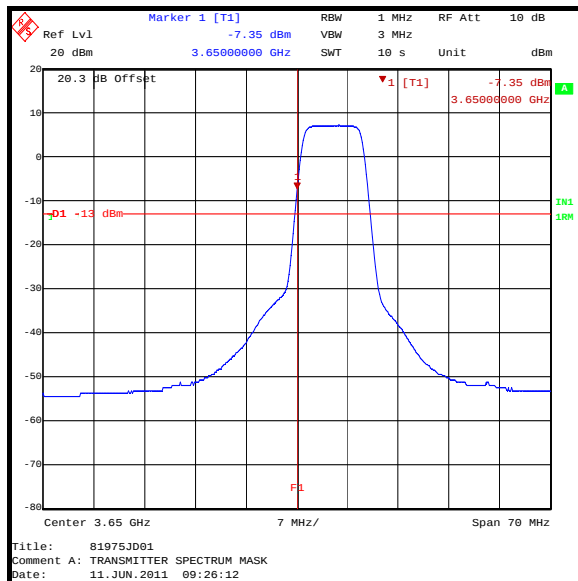
Transmitter Band Edge Conducted Emissions (continued)**Results: 10MHz Channel Bandwidth - QPSK**

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
3650.0	-29.4	-13.0	16.4	Complied
3675.0	-32.1	-13.0	19.1	Complied



Transmitter Band Edge Conducted Emissions (continued)**Results: 10MHz Channel Bandwidth – 16QAM**

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
3650.0	-29.6	-13.0	16.6	Complied
3675.0	-32.7	-13.0	19.7	Complied



Transmitter Band Edge Conducted Emissions (continued)**Note(s):**

1. Tests were initially performed with a 1 MHz resolution bandwidth (RBW). Where the band edge limit was exceeded on the bottom channels using a 1 MHz measurement bandwidth, the EUT was retested using the channel power function of the spectrum analyser centred on the 1 MHz block immediately below and adjacent to the lower band edge. The measurement bandwidths were set automatically by the spectrum analyser.
2. The EUT was set to transmit on both the 5MHz and 10MHz bandwidths, with QPSK modulation applied, as this was found to have the highest output power.

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

Test Engineer:	Nick Steele	Test Date:	26 May 2011
Test Sample Serial Number:	C00E30		

FCC Part:	90.1323/2.1053
Test Method Used:	As detailed in ANSI TIA-603-C-2004 and relevant annexes

Environmental Conditions:

Temperature (°C):	28
Relative Humidity (%):	20

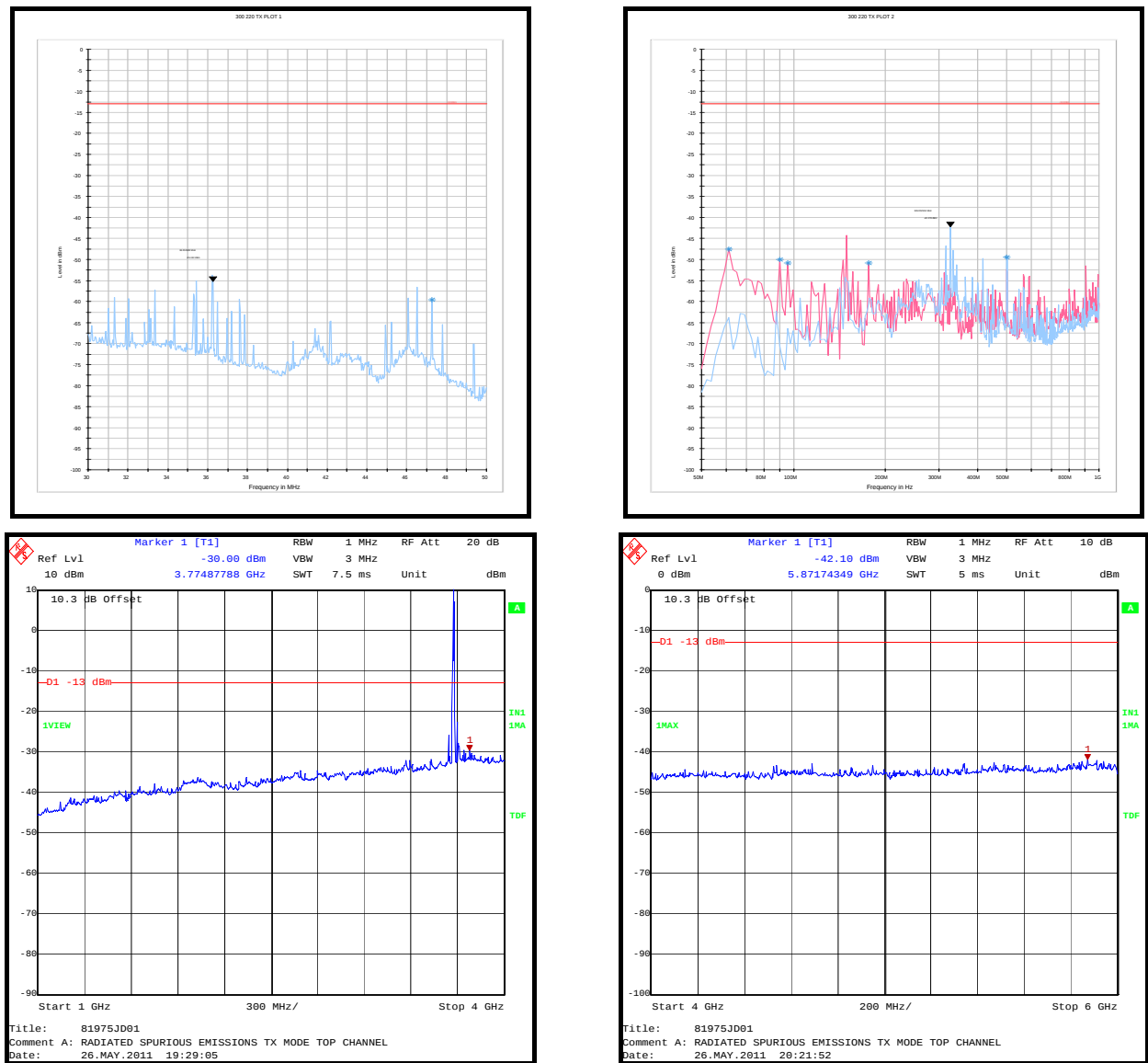
Results: 5MHz Channel Bandwidth - QPSK

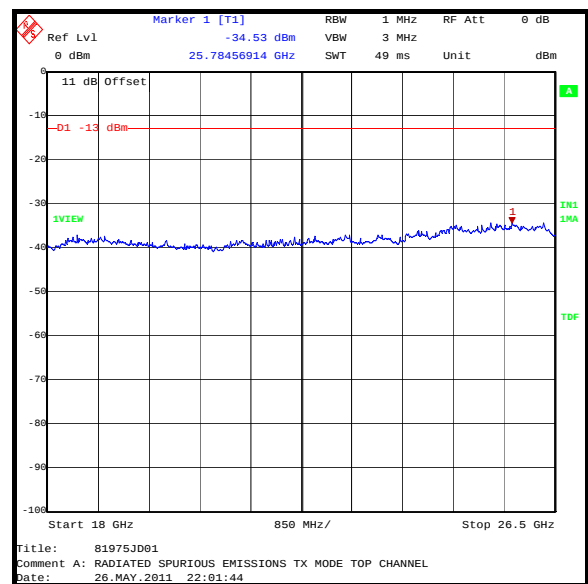
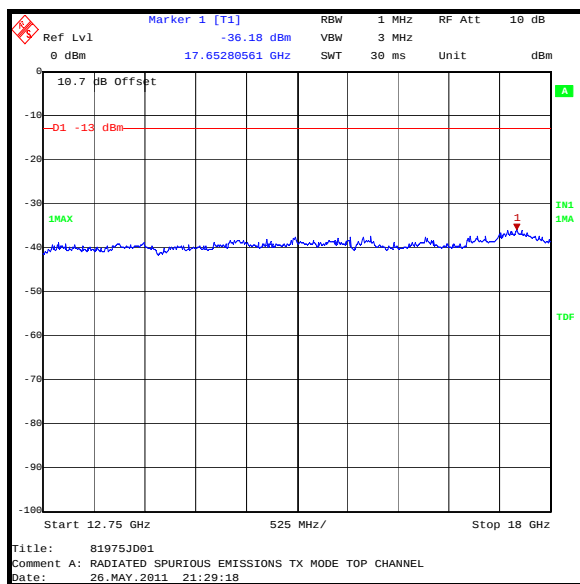
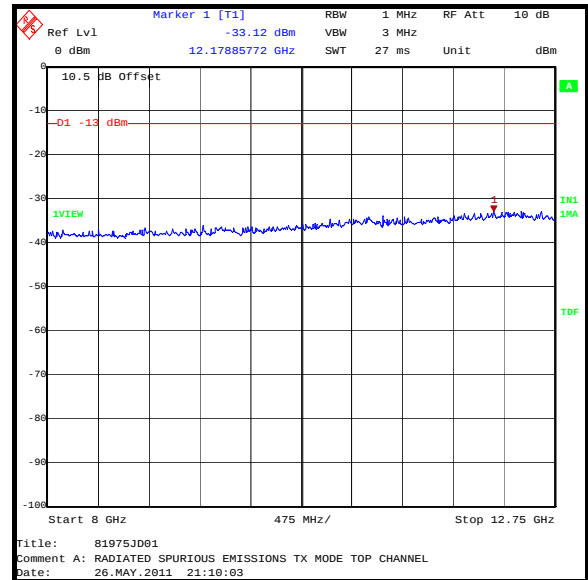
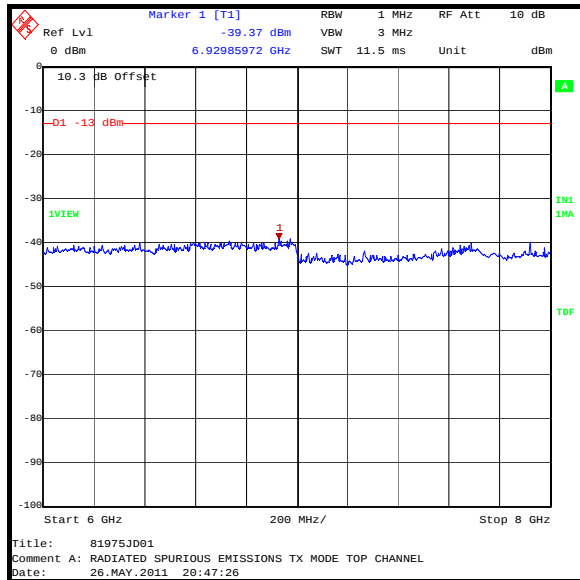
Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
3774.878	-30.0	-13.0	17.0	Complied

Note(s):

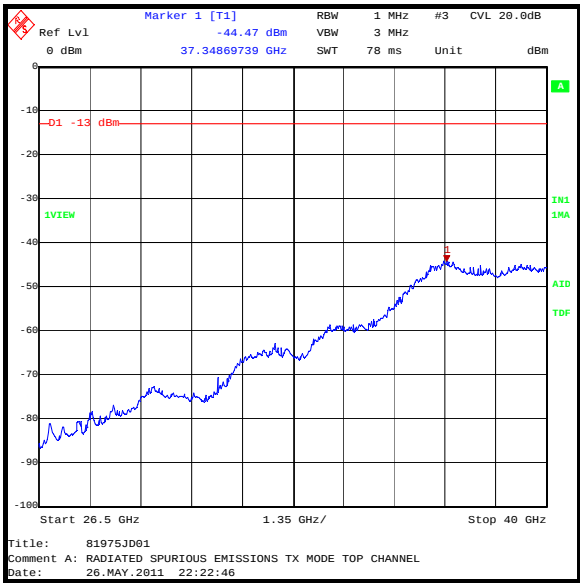
1. The emission seen on the 2GHz to 4GHz plot, is the EUT carrier frequency.
2. All other emissions were at least 20 dB below the specification limit or below the measurement system noise floor.

Transmitter Radiated Emissions: Section 90.1323/2.1053, (continued)



Transmitter Radiated Emissions: Section 90.1323/2.1053, (continued)

Transmitter Radiated Emissions: Section 90.1323/2.1053, (continued)



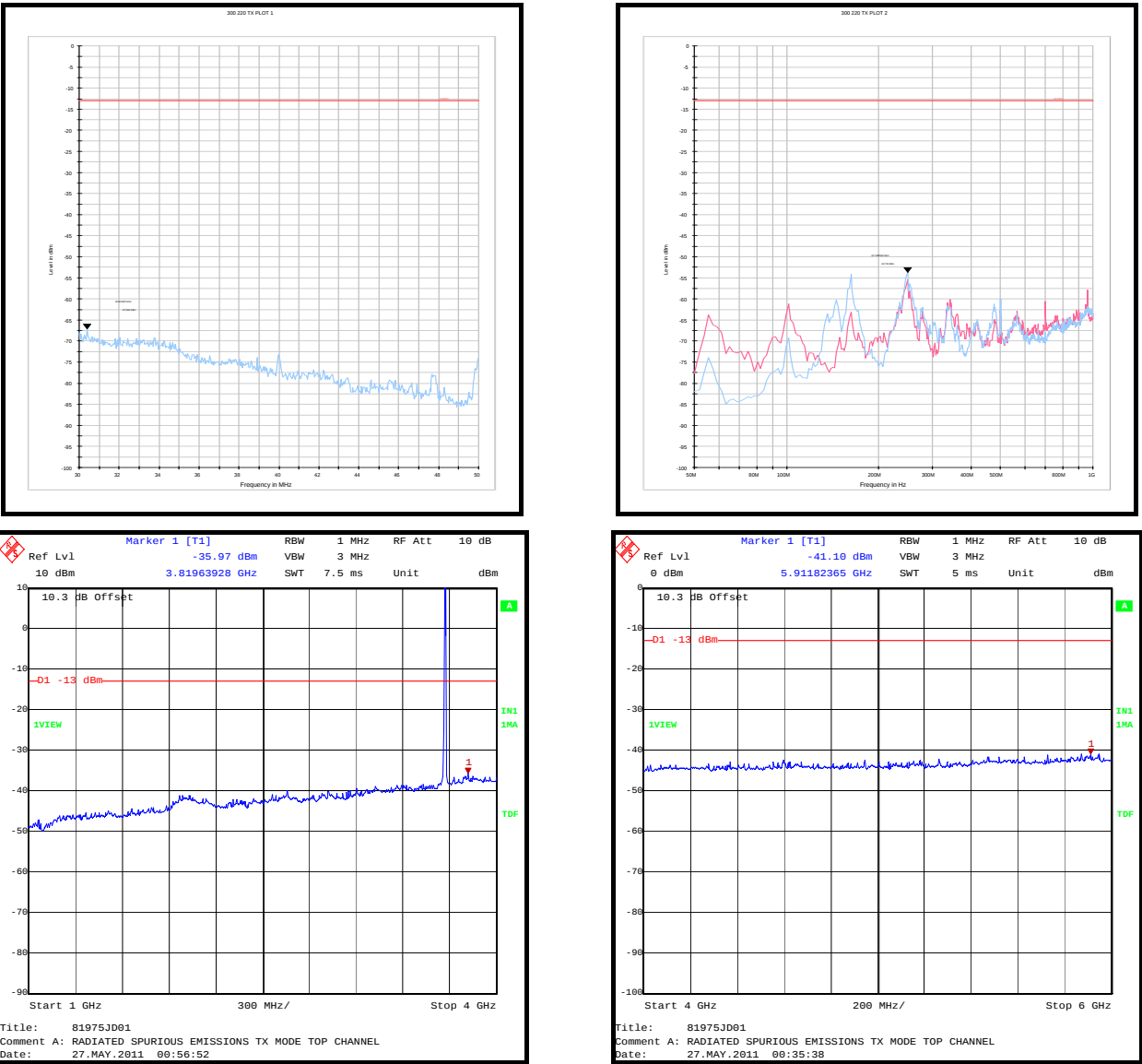
Transmitter Radiated Emissions: Section 90.1323/2.1053 (continued)**Results: 10MHz Channel Bandwidth - QPSK**

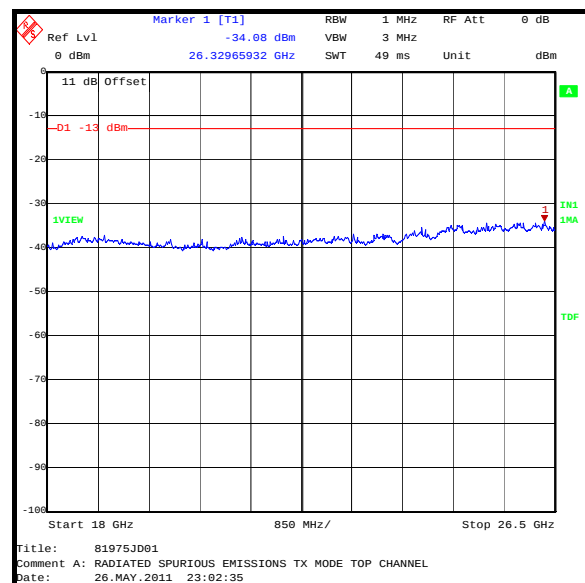
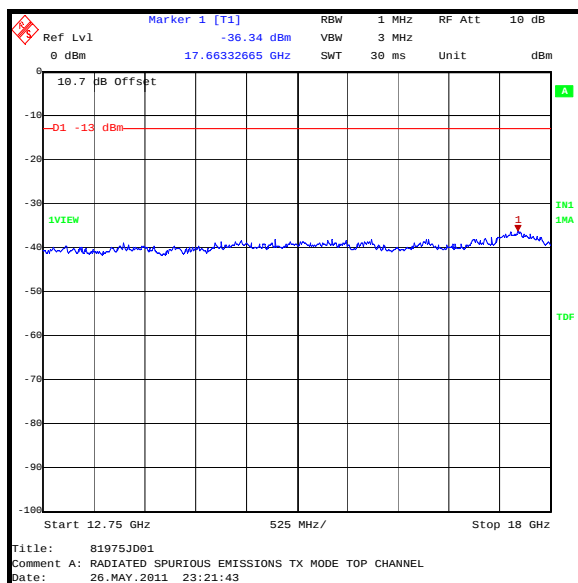
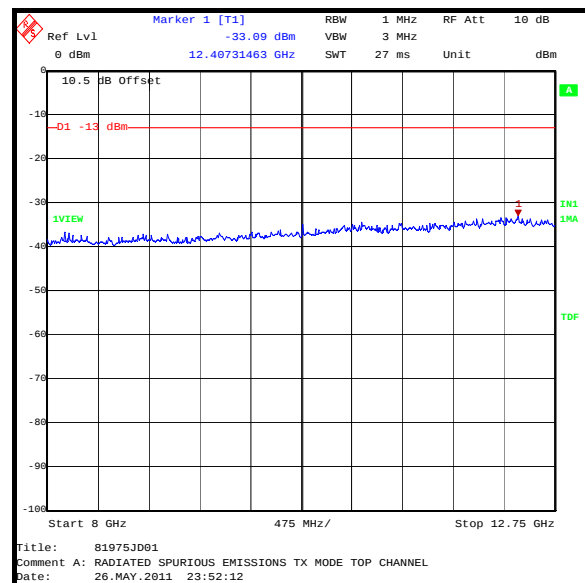
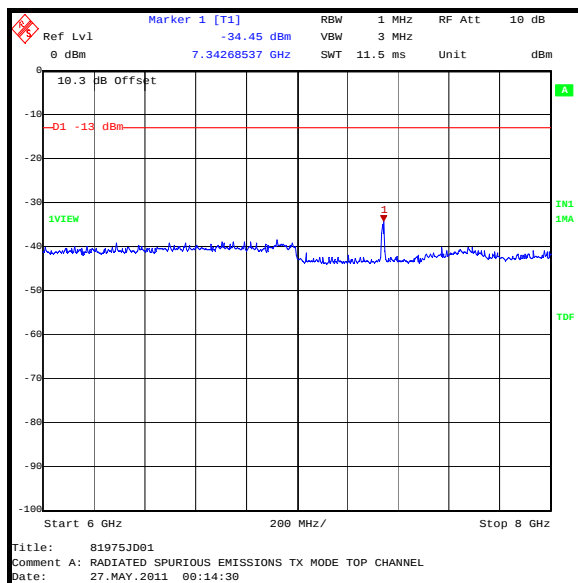
Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
12407.315	-33.1	-13.0	20.1	Complied

Note(s):

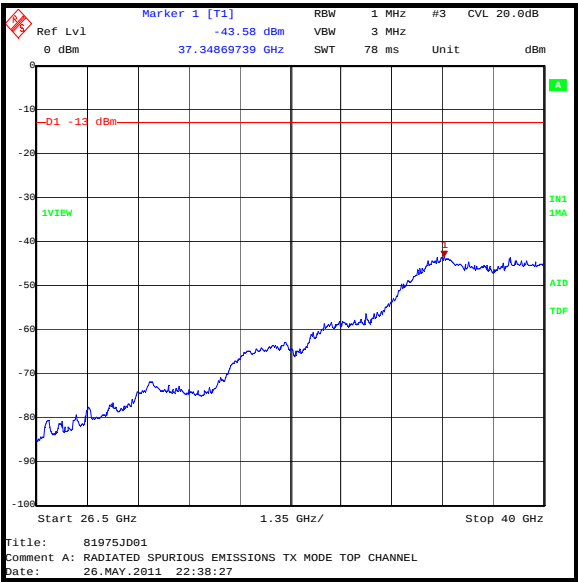
1. The emission seen on the 1 GHz to 4 GHz plot, is the EUT carrier frequency.
2. All emissions were at least 20dB below the analyser noise floor, therefore the highest level of noise floor was recorded in the table above.

Transmitter Radiated Emissions: Section 90.1323/2.1053 (continued)



Transmitter Radiated Emissions: Section 90.1323/2.1053 (continued)

Transmitter Radiated Emissions: Section 90.1323/2.1053 (continued)



5.2.6. Transmitter Band Edge Radiated Emissions**Test Summary:**

Test Engineer:	Nick Steele	Test Date:	08 June 2011 & 11 June 2011
Test Sample Serial Number:	C00E30		

FCC Part:	90.1323/2.1053
Test Method Used:	As detailed in ANSI TIA-603-C-2004 and relevant annexes

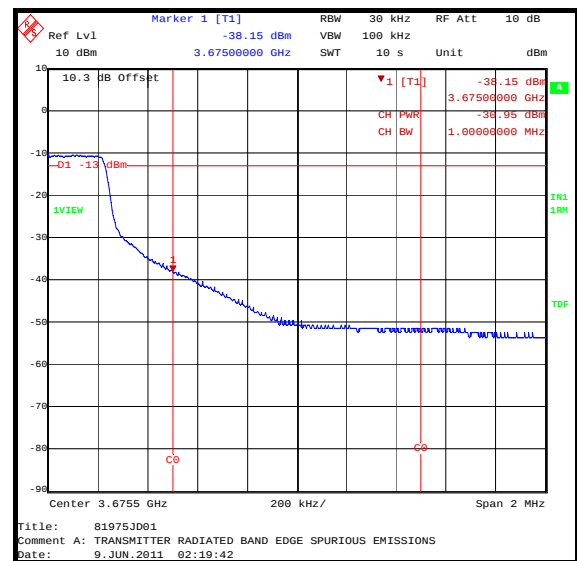
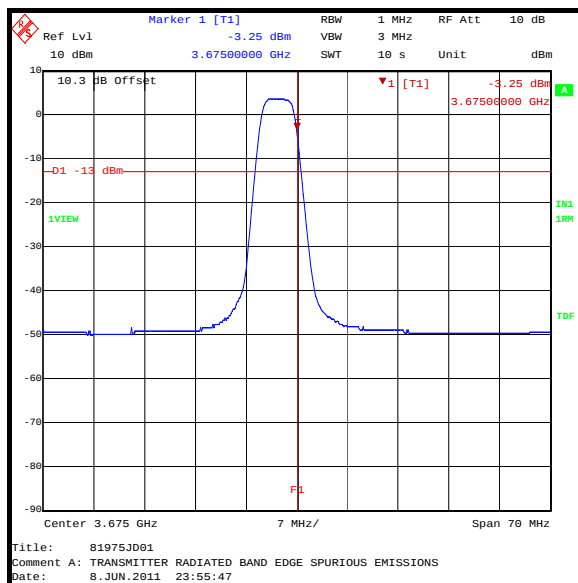
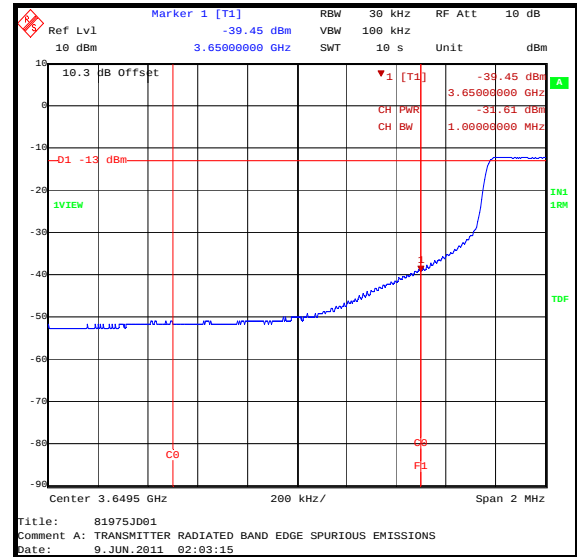
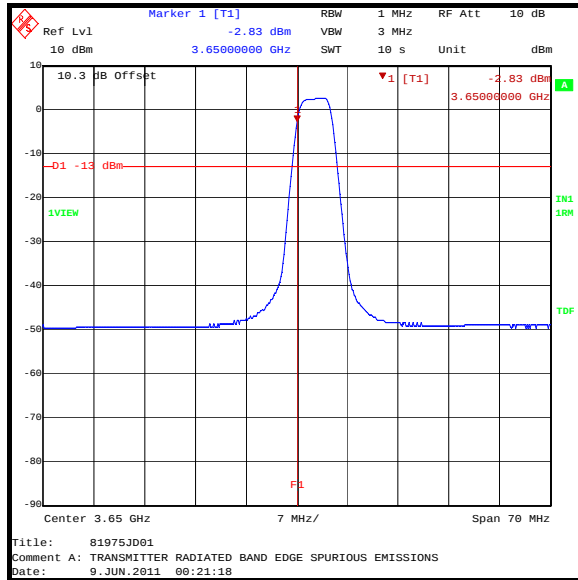
Environmental Conditions:

Temperature (°C):	27 to 28
Relative Humidity (%):	20 to 21

Results: 5MHz Channel Bandwidth - QPSK

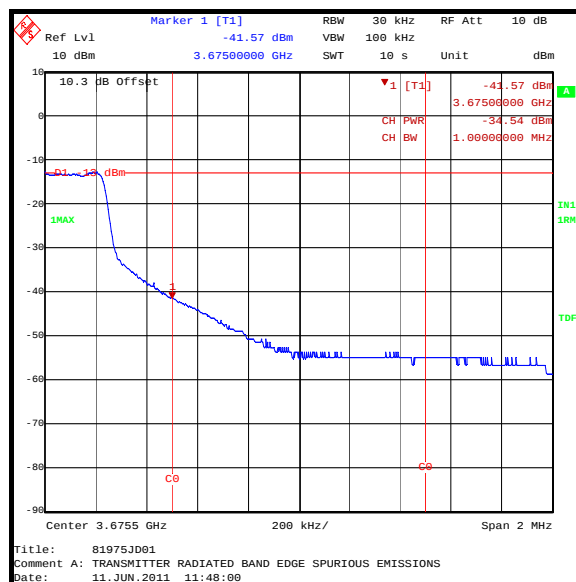
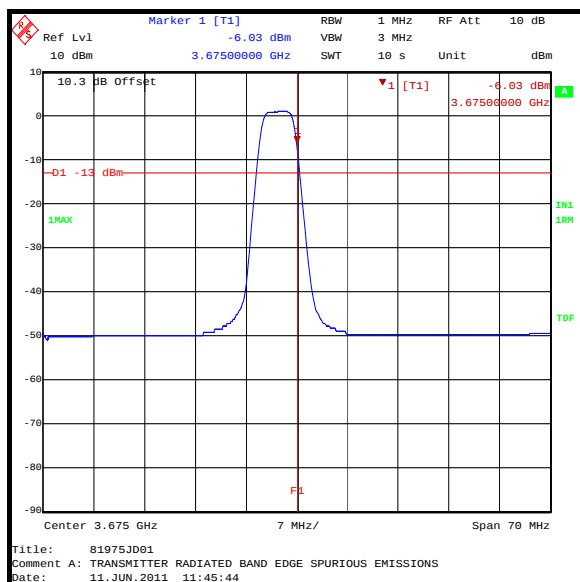
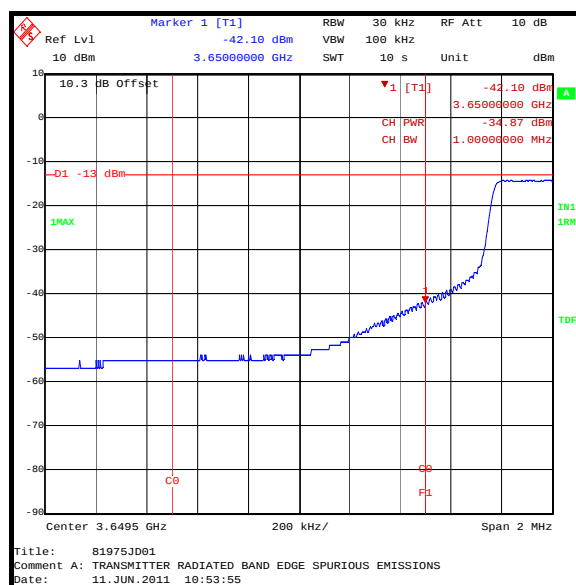
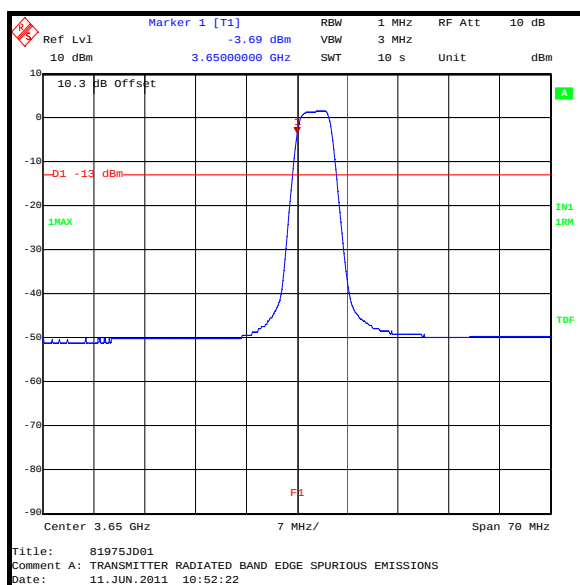
Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
3650.0	-31.6	-13.0	18.6	Complied
3675.0	-31.0	-13.0	18.0	Complied

Transmitter Band Edge Radiated Emissions (continued)



Transmitter Band Edge Radiated Emissions (continued)**Results: 5MHz Channel Bandwidth – 16QAM**

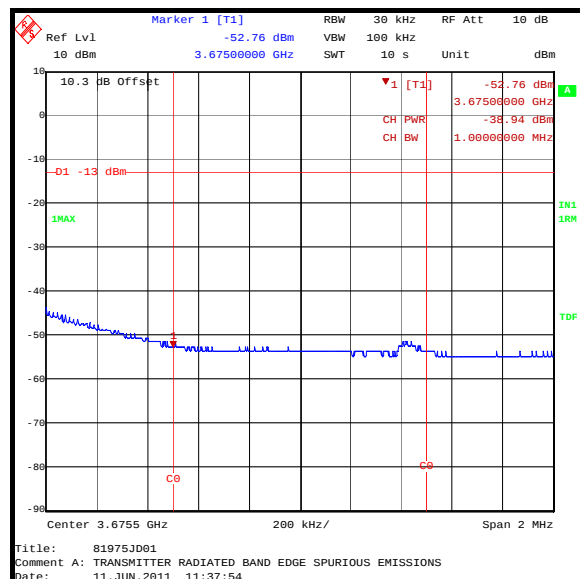
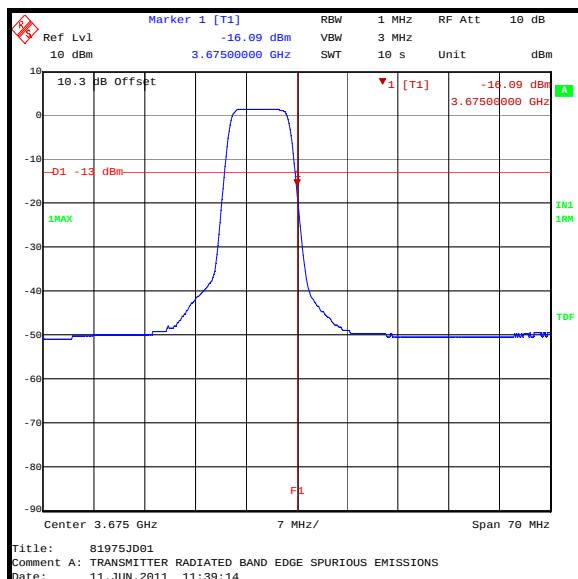
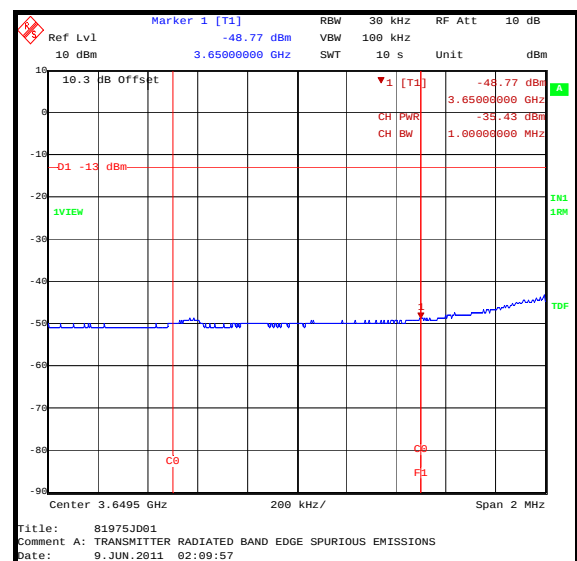
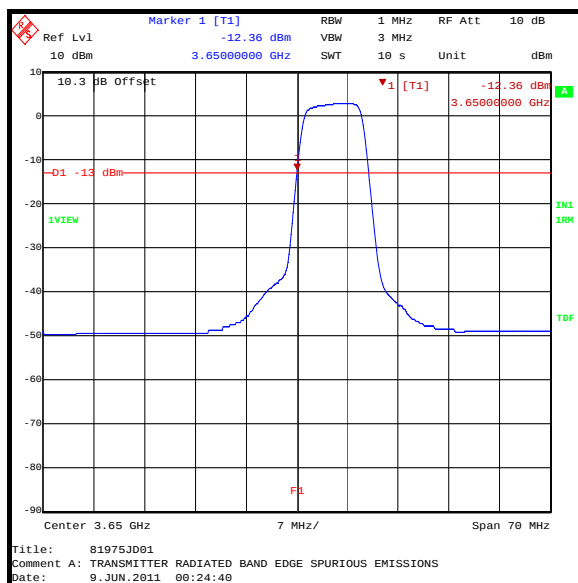
Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
3650.0	-34.9	-13.0	21.9	Complied
3675.0	-33.5	-13.0	20.5	Complied



Transmitter Band Edge Radiated Emissions (continued)

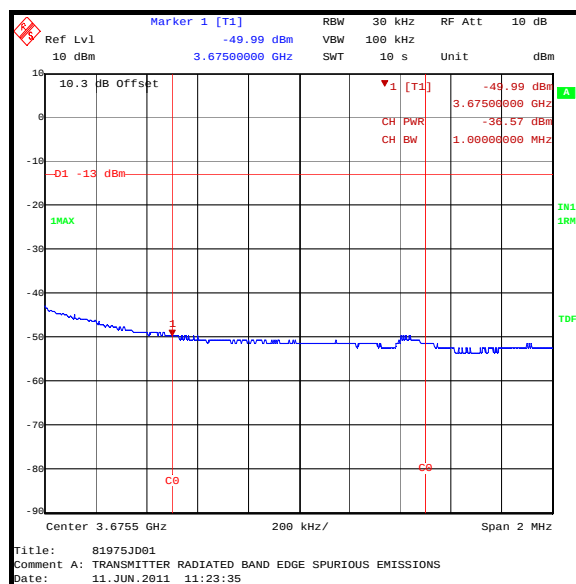
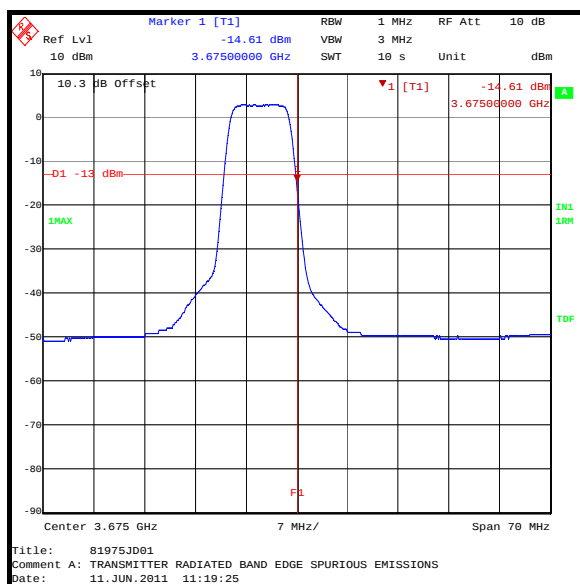
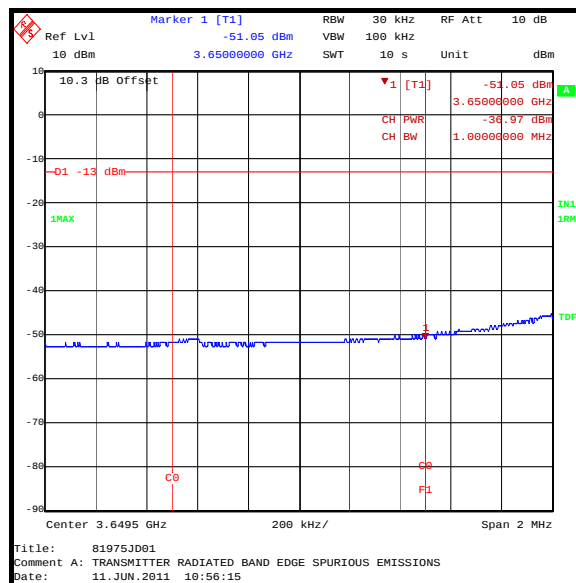
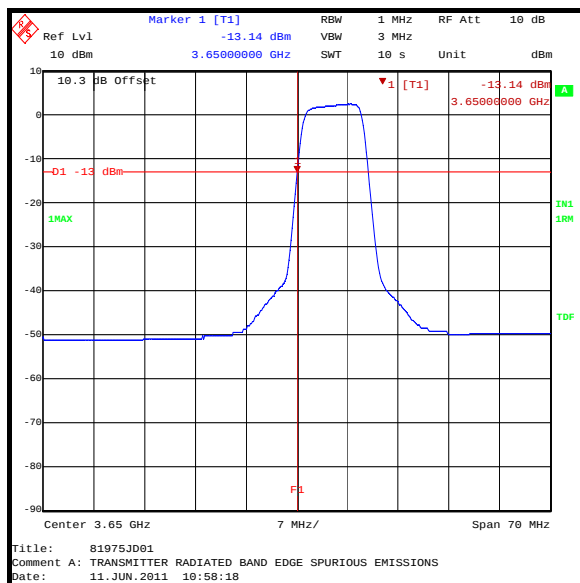
Results: 10MHz Channel Bandwidth - QPSK

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
3650.0	-35.4	-13.0	22.4	Complied
3675.0	-38.9	-13.0	25.9	Complied



Transmitter Band Edge Radiated Emissions (continued)**Results: 10MHz Channel Bandwidth – 16QAM**

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
3650.0	-37.0	-13.0	24.0	Complied
3675.0	-36.6	-13.0	23.6	Complied



Transmitter Band Edge Radiated Emissions (continued)**Note(s):**

1. Tests were initially performed with a 1 MHz resolution bandwidth (RBW). Where the band edge limit was exceeded on the bottom channels using a 1 MHz measurement bandwidth, the EUT was retested using the channel power function of the spectrum analyser centred on the 1 MHz block immediately below and adjacent to the lower band edge. The measurement bandwidths were set automatically by the spectrum analyser.
2. The EUT was set to transmit on both the 5MHz and 10MHz bandwidths, with QPSK modulation applied, as this was found to have the highest output power.

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
Transmitter Carrier Output Power (EIRP)	Not Applicable	95%	±0.92 ppm
Transmitter Power Output Density	Not Applicable	95%	±2.94 dB
Transmitter Conducted Emissions Mask	Not Applicable	95%	±2.62 dB
Transmitter Radiated Emissions	9 kHz to 1000 MHz	95%	±3.53 dB
Transmitter Radiated 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 Calibration Due	Cal. Interval Months
A1393	Attenuator	HUBER + SUHNER AG	757456	6820.17.B	06 Jul 2011	12
A1396	Attenuator	HUBER + SUHNER AG	757987	6810.17.B	06 Jul 2011	12
A1534	Pre Amplifier	Hewlett Packard	8449B	3008A00405	06 Jun 2011	12
A1785	Low Noise Amplifier	Farran Technology	FLNA-28-30	FTL 6483	03 Aug 2007	12
A1818	Antenna	EMCO	3115	00075692	05 Sep 2011	12
A1830	Pulse Limiter	Rhode & Schwarz	ESH3-Z2	100668	05 Mar 2012	12
A1834	Attenuator	Hewlett Packard	8491B	10444	30 Jun 2011	12
A1980	Atlan TecRF High Pass Filter	Atlan TecRF	AFH-06000	09110900303	28 Feb 2012	12
A1981	AtlanTecRF High Pass Filter	AtlanTecRF	AFH-05000	09110200090	28 Feb 2012	12
A203	Antenna	Flann Microwave Ltd	22240-20	343	11 May 2013	36
A253	Antenna	Flann Microwave	12240-20	128	05 Sep 2011	12
A255	Antenna	Flann Microwave	16240-20	519	05 Sep 2011	12
A256	Antenna	Flann Microwave	18240-20	400	05 Sep 2011	12
A427	Antenna	Flann	14240-20	150	21 Nov 2013	36
A436	Antenna	Flann	20240-20	330	05 Sep 2011	12
A553	Antenna	Chase	CBL6111A	1593	26 Mar 2012	12
A649	Single Phase LISN	Rohde & Schwarz	ESH3-Z5	825562/008	05 Apr 2012	12
G0543	Amplifier	Sonoma Instrument Co.	310N	230801	30 Jun 2011	12
K0001	5m Semi-Anechoic Chamber	Rainford EMC	N/A	N/A	29 May 2012	12
K0002	3m RSE Chamber	Rainford EMC	N/A	N/A	05 Sep 2011	12
M1124	Spectrum Analyser	Rohde & Schwarz	ESI26	100046K	22 Apr 2011	12
M1269	Multimeter	Fluke	179	90250210	15 Jul 2011	12
M1272	Fluke 73 III Multimeter	Fluke	73 III Multimeter	89550200	10 Mar 2009	12

RFI No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval Months
M1379	Test Receiver	Rohde and Schwarz	ESIB7	100330	26 Aug 2011	12
M1390	Harmonic Mixer	Farran Technology	WHMP 28	FTL1677B	03 Aug 2007	12
S0537	EL302D Dual Power Supply	TTI	EL302D	249928	Calibrated before use	-

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