TEST REPORT
FROM
RFI GLOBAL SERVICES LTD

Test of: GWU-200

FCC ID: PIDGWU-200

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

Test Report Serial No:
RFI-RPT-RP81975JD01A V2.0

Version 2.0 Supersedes All Previous Versions

This Test Report Is Issued Under The Authority Of Chris Guy, Head of Global Approvals: 	
Checked By:	Ian Watch
Signature: 	
Date of Issue:	09 November 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:	47CFR90
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications) 2011:, Part 90 (47CFR90 2011): Private Land Mobile Radio Services. Subpart Z Wireless Broadband Services in the 3650-3700 MHz Band
Specification Reference:	47CFR15.107 and 47CFR15.109
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications) 2011: 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 07 November 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

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 5 MHz and 29:18 for 10 MHz channels. The device supports QPSK and 16-QAM modulation schemes 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 and 16QAM		
Duty Cycle	39.5% on 5 MHz channels 37.6% on 10 MHz channels		
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**	**5 MHz Channel**	**10 MHz 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**	**5 MHz Channel**	**10 MHz 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 with serial number C00E30 was set to transmit with maximum output power on the bottom, centre and top channels, using a 5 MHz or 10 MHz channel bandwidth.
- Receive Mode – The EUT with 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 by using a USB extension cable and the laptop was connected to 120 VAC 60 Hz AC supply.
- 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:	C00E2F		

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

Environmental Conditions:

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

Results: Live Quasi Peak

Frequency (MHz)	Line	Level (dBµV)	Limit (dBµV)	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 (dBµV)	Limit (dBµV)	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)

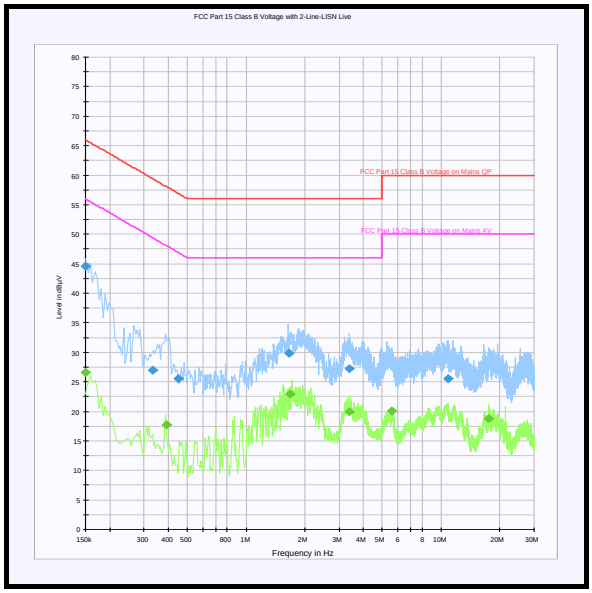
Results: Quasi Peak

Frequency (MHz)	Line	Level (dBμV)	Limit (dBμV)	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

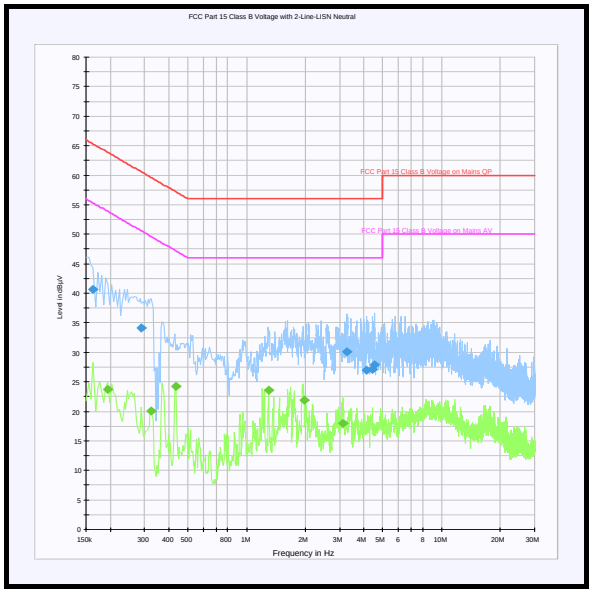
Results: Average

Frequency (MHz)	Line	Level (dBμV)	Limit (dBμV)	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:	ANSI C63.4 Section 8
Frequency Range:	30 MHz to 1000 MHz

Environmental Conditions:

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

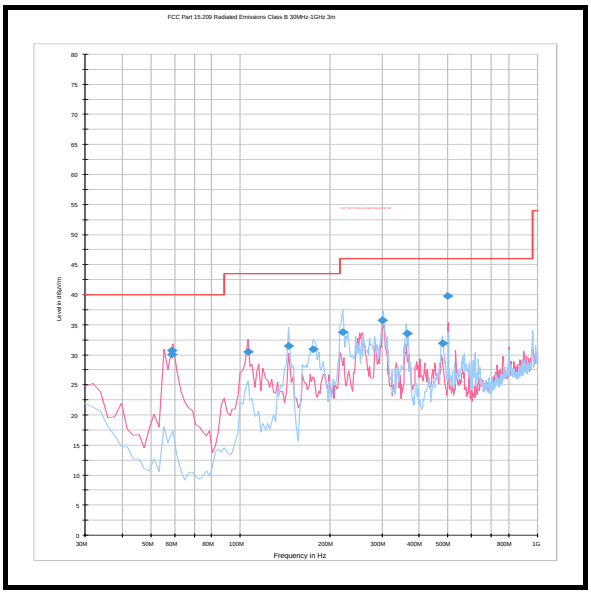
Results: Quasi Peak

Frequency (MHz)	Antenna Polarity	Level (dBµV/m)	Limit (dBµV/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 Middle 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:	ANSI C63.4 Section 8
Frequency Range:	1 GHz to 19 GHz

Environmental Conditions:

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

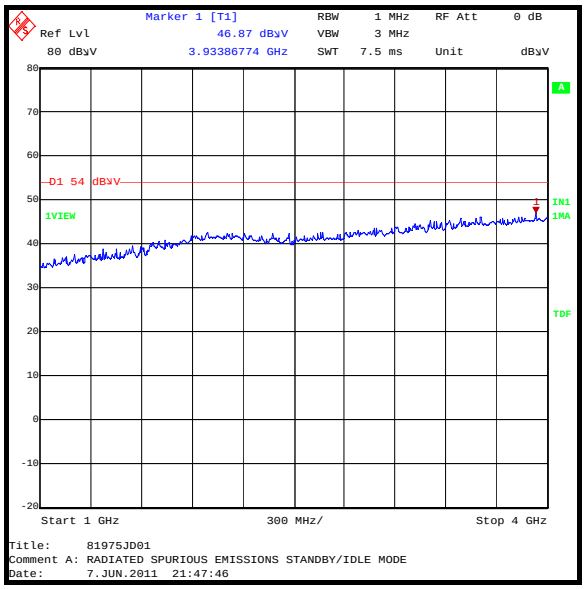
Results:

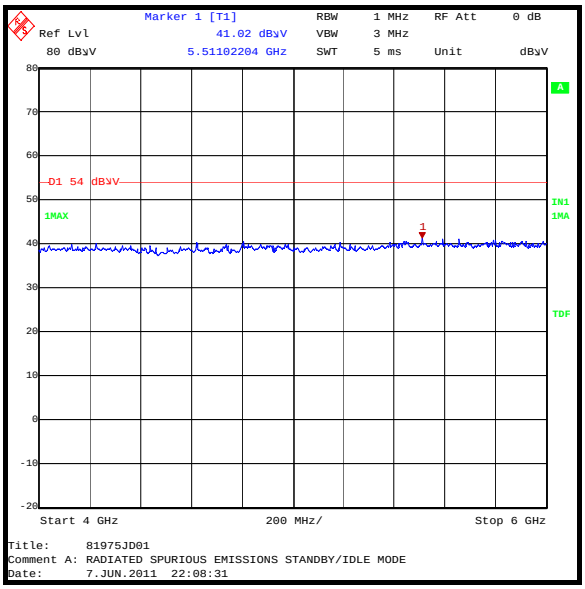
Frequency (MHz)	Antenna Polarity	Peak Level (dBµV/m)	Average Limit (dBµV/m)	Margin (dB)	Result
3933.868	Vertical	46.9	54.0	7.1	Complied

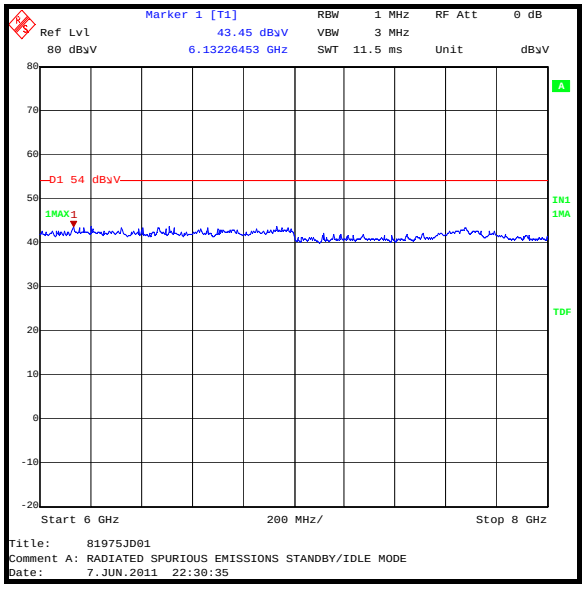
Note(s):

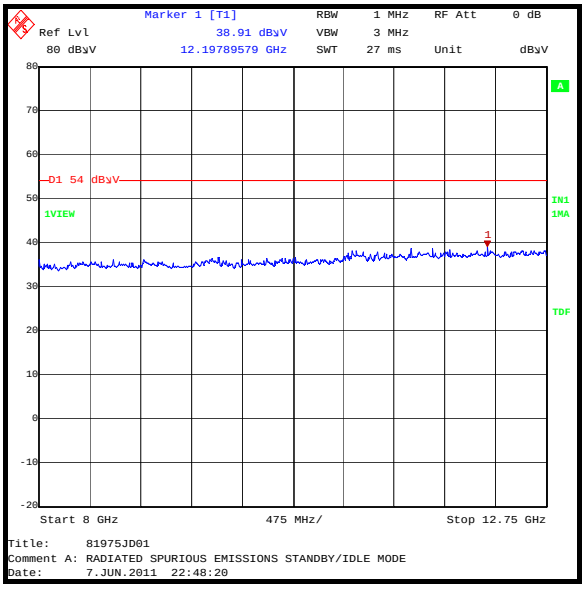
1. The final measured value, for the given emission, in the table above incorporates the calibrated antenna factor and cable loss.
2. Pre-scans above 1 GHz were performed in a fully anechoic chamber (RFI Asset Number K0002) at a distance of 3 metres. The EUT was placed at a height of 1.5 metres above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

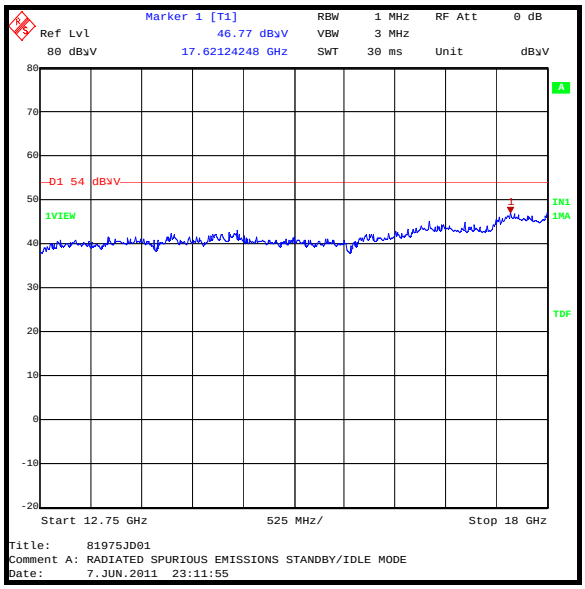


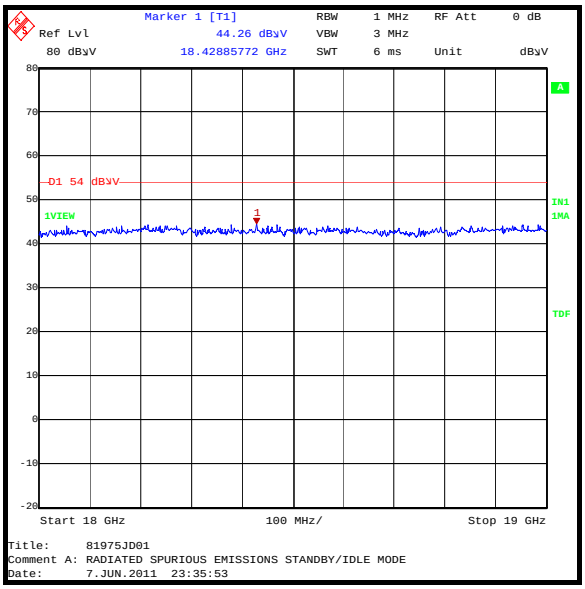






Receiver/Idle Mode Radiated Spurious Emissions (continued)





5.2.3. Transmitter Carrier Output Power (Conducted):

Test Summary:

Test Engineer:	Nick Steele	**Test Dates:**	09 June 2011 to 22 June 2011
Test Sample Serial Number:	C00E30		

FCC Part:	90.1321(c)/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 5 MHz channels, the spectrum analyser offset used incorporated a 4 dB offset for the 39.5% duty cycle of the EUT. This was calculated using the equation 10*Log10(Ton/Period), whereby Ton was measured as being 2ms and Period measured as being 5ms

   *Duty cycle = 10*log(1.983/5.013) = 39.5% = 4.0 dB*
4. For 10 MHz channels, the spectrum analyser offset used incorporated a 4.2 dB offset for the 37.6% duty cycle of the EUT. This was calculated using the equation 10*Log10(Ton/Period), whereby Ton was measured as being 1.9 ms and Period measured as being 5 ms

   *Duty cycle = 10*log(1.885/5.016) = 37.6% = 4.2 dB*

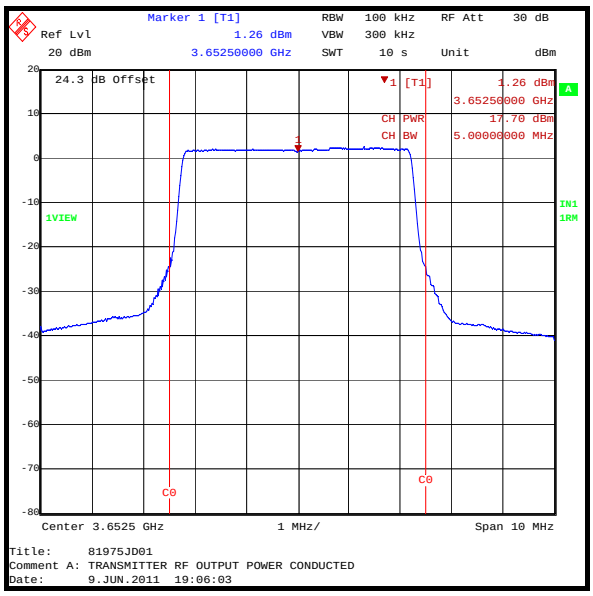
Transmitter Carrier Output Power (continued)

Results: 5 MHz Channel Bandwidth – QPSK

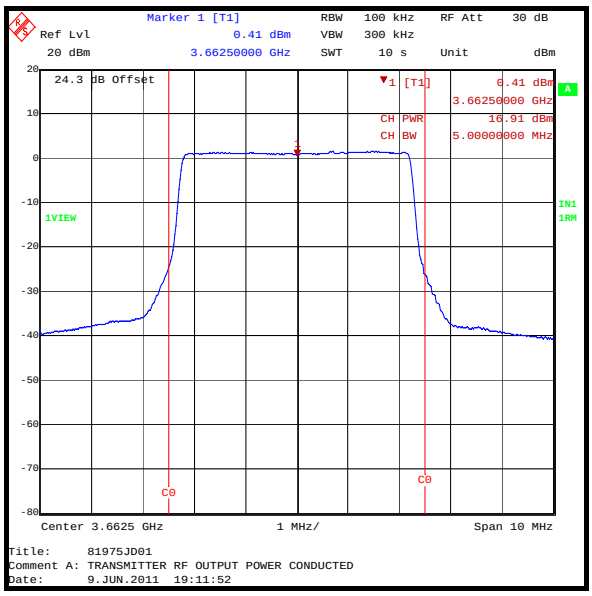
Channel	Frequency (MHz)	Conducted RF O/P Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dBm/5MHz)	Result
Bottom	3652.5	17.7	4.5	22.2	23.0	0.8	Complied
Middle	3662.5	16.9	4.5	21.4	23.0	1.6	Complied
Top	3672.5	17.4	4.5	21.9	23.0	1.1	Complied

Transmitter Carrier Output Power (continued)

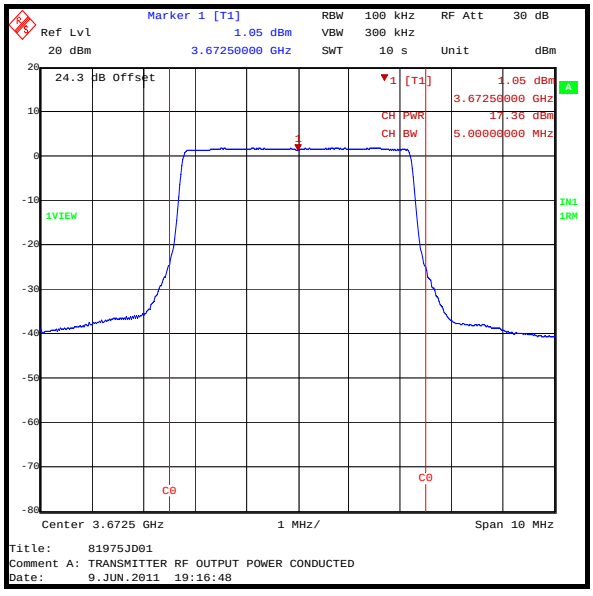
Results: 5 MHz Channel Bandwidth – QPSK



Bottom channel



Middle channel



Top channel

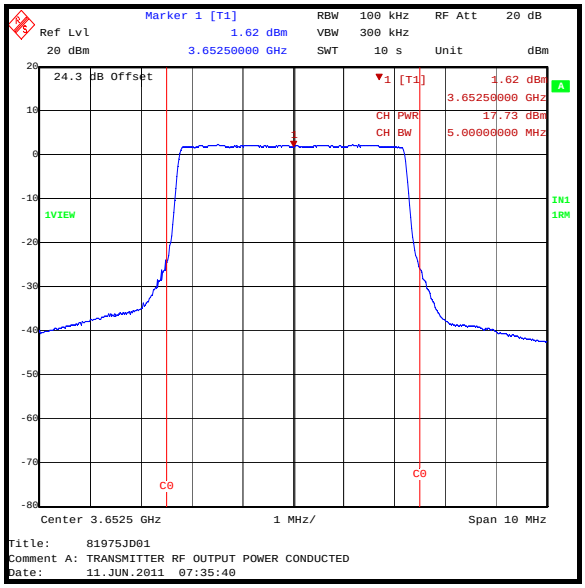
Transmitter Carrier Output Power (continued)

Results: 5 MHz Channel Bandwidth – 16QAM

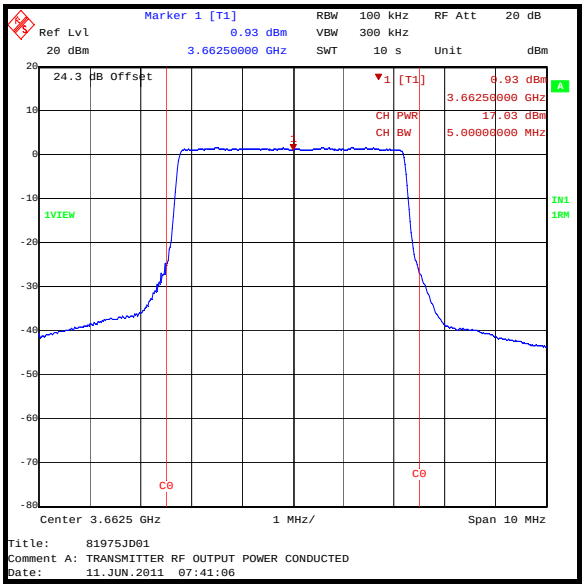
Channel	Frequency (MHz)	Conducted RF O/P Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dBm/5MHz)	Result
Bottom	3652.5	17.7	4.5	22.2	23.0	0.8	Complied
Middle	3662.5	17.0	4.5	21.5	23.0	1.5	Complied
Top	3672.5	17.6	4.5	22.1	23.0	0.9	Complied

Transmitter Carrier Output Power (continued)

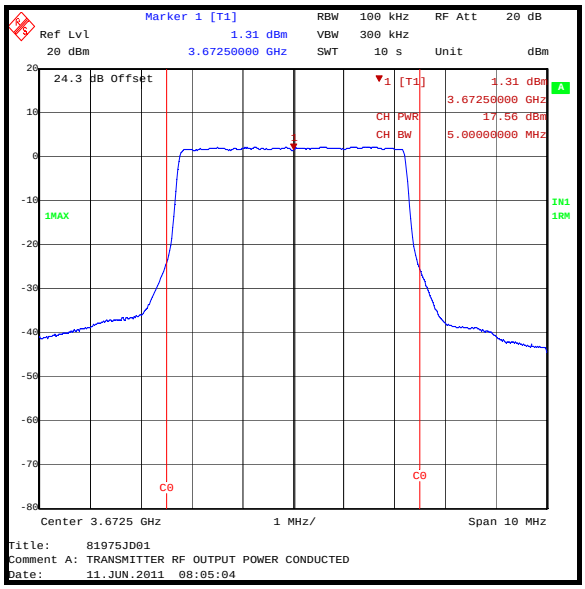
Results: 5 MHz Channel Bandwidth – 16QAM



Bottom channel



Middle channel



Top channel

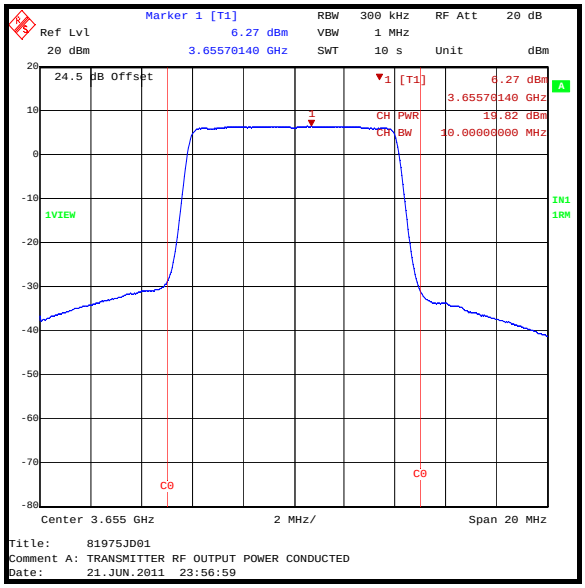
Transmitter Carrier Output Power (continued)

Results: 10 MHz Channel Bandwidth – QPSK

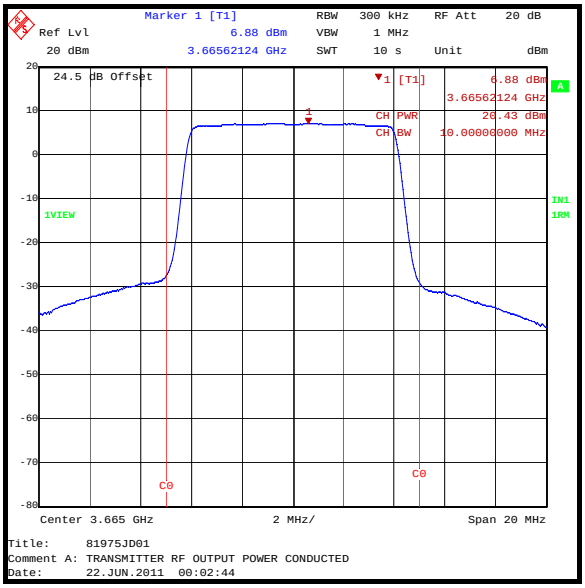
Channel	Frequency (MHz)	Conducted RF O/P Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dBm/10MHz)	Result
Bottom	3655.0	19.8	4.5	24.3	26.0	1.7	Complied
Middle	3665.0	20.4	4.5	24.9	26.0	1.1	Complied
Top	3670.0	20.4	4.5	24.9	26.0	1.1	Complied

Transmitter Carrier Output Power (continued)

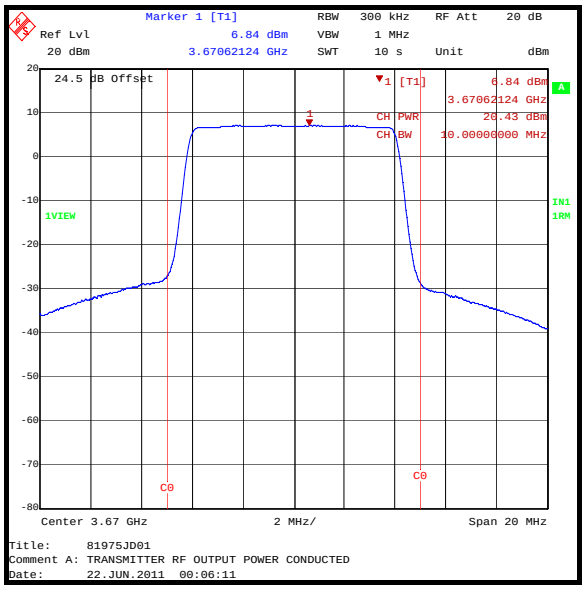
Results: 10 MHz Channel Bandwidth – QPSK



Bottom channel



Middle channel



Top channel

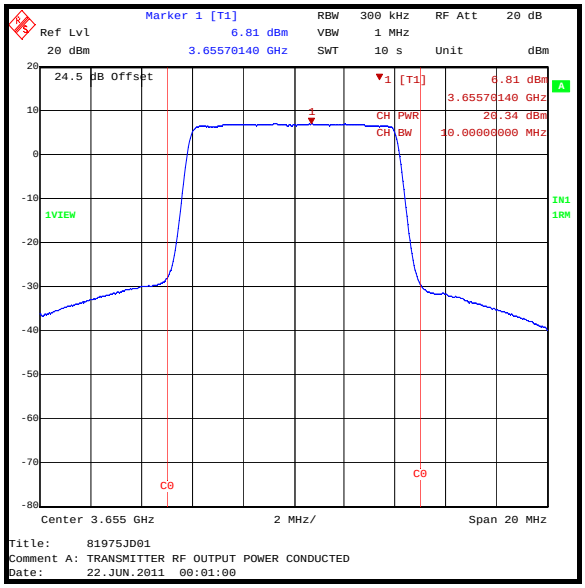
Transmitter Carrier Output Power (continued)

Results: 10 MHz Channel Bandwidth – 16QAM

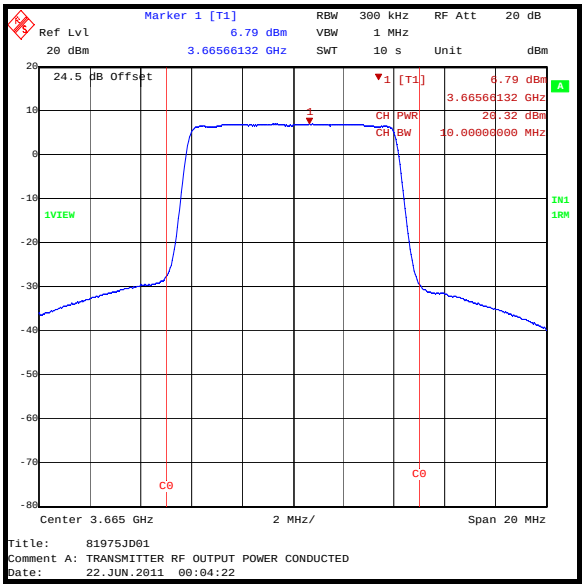
Channel	Frequency (MHz)	Conducted RF O/P Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dBm/10MHz)	Result
Bottom	3655.0	20.3	4.5	24.8	26.0	1.2	Complied
Middle	3665.0	20.3	4.5	24.8	26.0	1.2	Complied
Top	3670.0	20.4	4.5	24.9	26.0	1.1	Complied

Transmitter Carrier Output Power (continued)

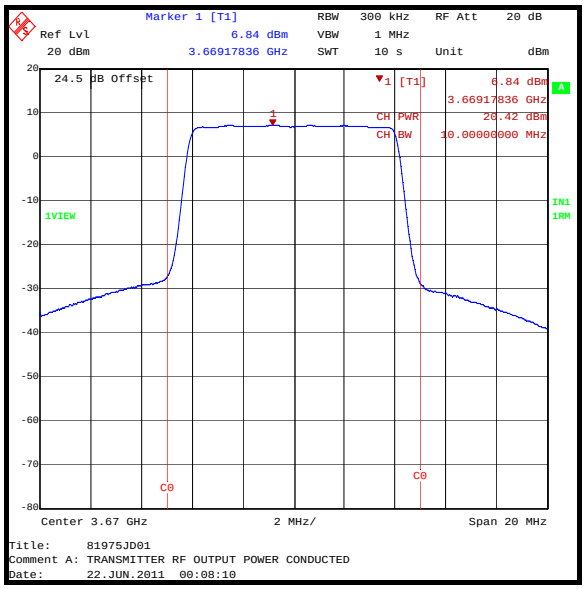
Results: 10 MHz Channel Bandwidth – 16QAM



Bottom channel



Middle channel



Top channel

5.2.4.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. The Customer stated that the EUT is designed to use an omni-directional antenna with 4.5 dBi gain.
2. Measurements were performed on bottom, middle and top channel using 5 MHz and 10 MHz channel bandwidths.
3. EIRP was calculated by adding the declared antenna gain to the measured conducted RF output power.
4. For 5 MHz channels, the spectrum analyser offset used incorporated a 4 dB offset for the 39.5% duty cycle of the EUT. This was calculated using the equation 10*Log10(Ton/Period), whereby Ton was measured as being 2 ms and Period measured as being 5 ms
5. For 10 MHz channels, the spectrum analyser offset used incorporated a 4.2 dB offset for the 37.6% duty cycle of the EUT. This was calculated using the equation 10*Log10(Ton/Period), whereby Ton was measured as being 1.9 ms and Period measured as being 5 ms

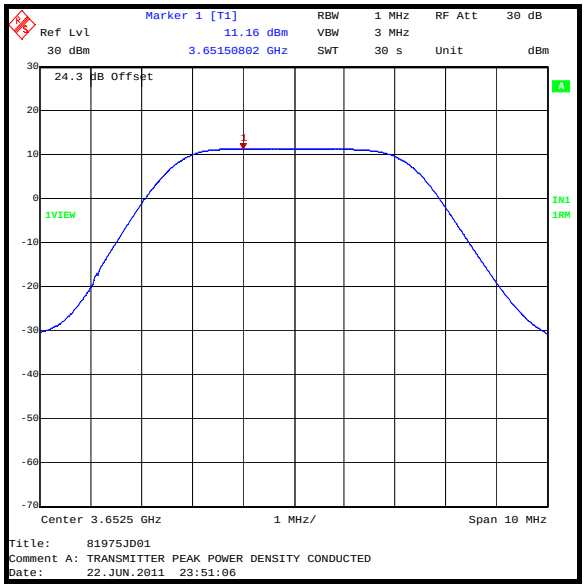
Transmitter Peak Power Spectral Density (continued)

Results: 5 MHz Channel Bandwidth - QPSK

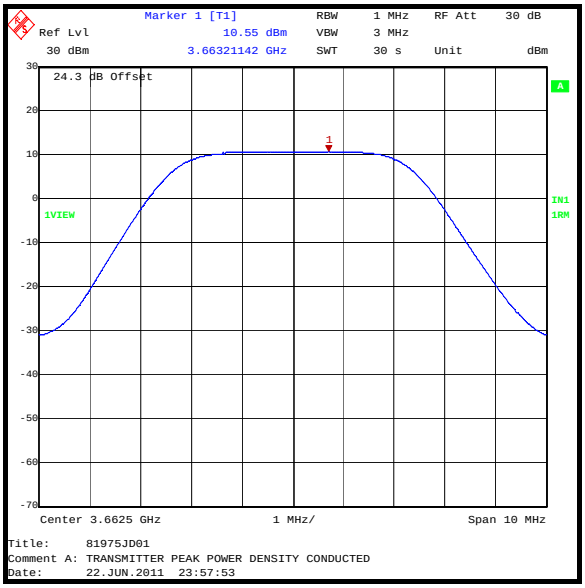
Channel	Frequency (MHz)	Conducted PSD (dBm)	Antenna Gain (dBi)	Peak EIRP Spectral Density (dBm)	Limit (dBm/1MHz)	Margin (dB)	Result
Bottom	3652.5	11.2	4.5	15.7	16.0	0.3	Complied
Middle	3662.5	10.6	4.5	15.1	16.0	0.9	Complied
Top	3672.5	11.0	4.5	15.5	16.0	0.5	Complied

Transmitter Peak Power Spectral Density (continued)

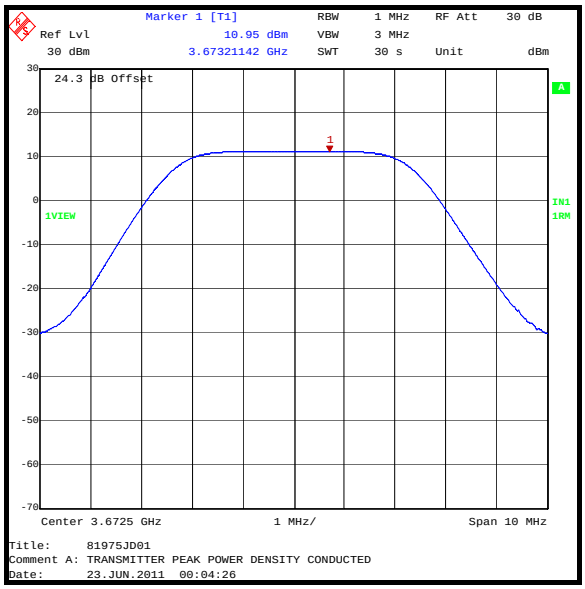
Results: 5 MHz Channel Bandwidth - QPSK



Bottom channel



Middle channel



Top channel

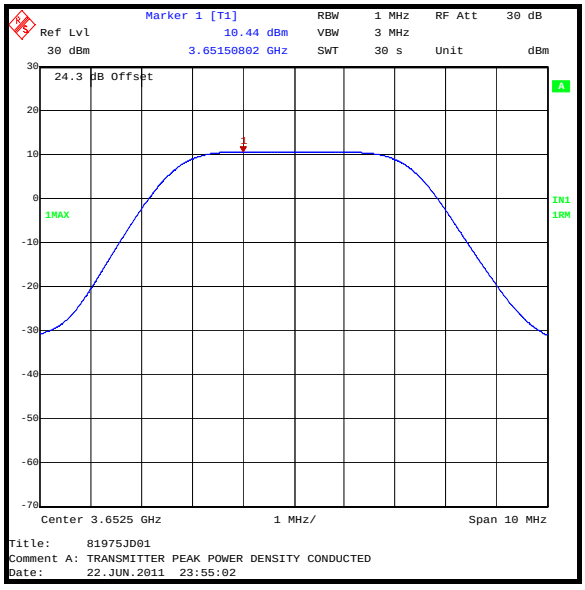
Transmitter Peak Power Spectral Density (continued)

Results: 5 MHz Channel Bandwidth – 16QAM

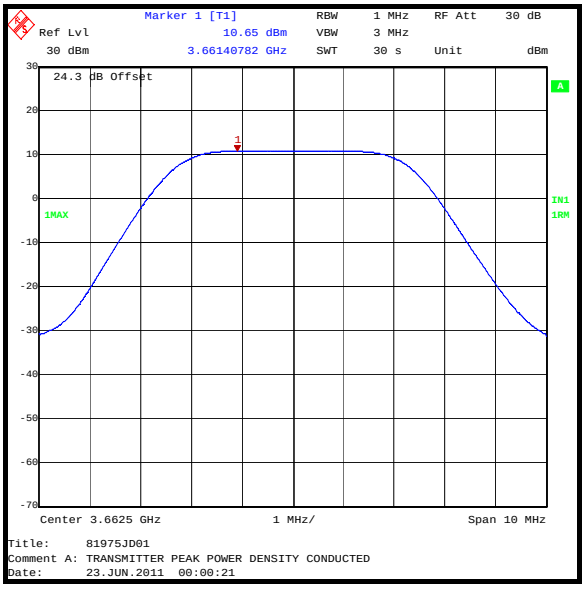
Channel	Frequency (MHz)	Conducted PSD (dBm)	Antenna Gain (dBi)	Peak EIRP Spectral Density (dBm)	Limit (dBm/1MHz)	Margin (dB)	Result
Bottom	3652.5	10.4	4.5	14.9	16.0	1.1	Complied
Middle	3662.5	10.7	4.5	15.2	16.0	0.8	Complied
Top	3672.5	11.0	4.5	15.5	16.0	0.5	Complied

Transmitter Peak Power Spectral Density (continued)

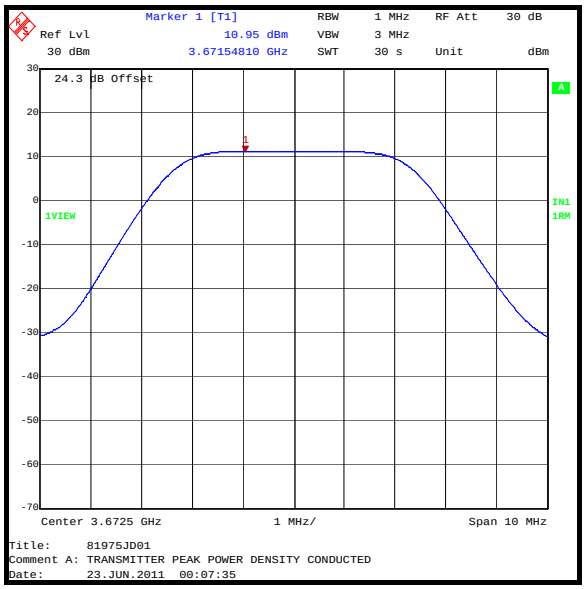
Results: 5 MHz Channel Bandwidth – 16QAM



Bottom channel



Middle channel



Top channel

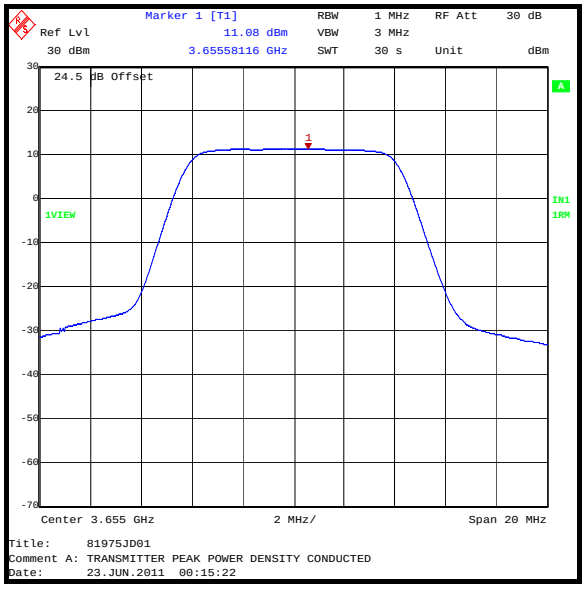
Transmitter Peak Power Spectral Density (continued)

Results: 10 MHz Channel Bandwidth – QPSK

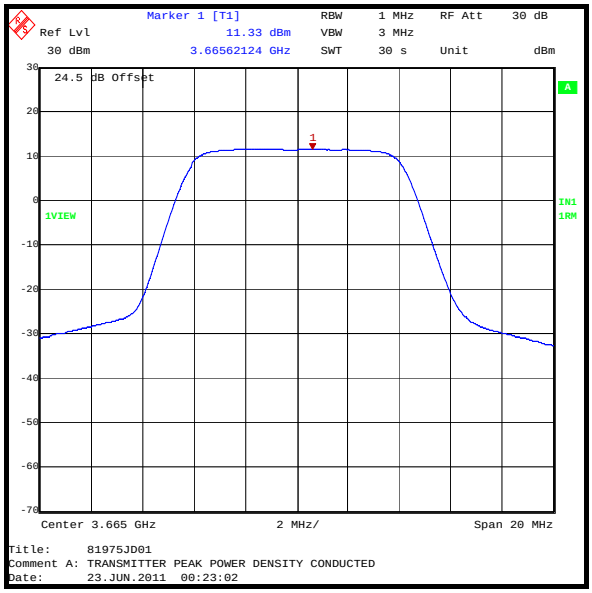
Channel	Frequency (MHz)	Conducted PSD (dBm)	Antenna Gain (dBi)	Peak EIRP Spectral Density (dBm)	Limit (dBm/1MHz)	Margin (dB)	Result
Bottom	3655.0	11.1	4.5	15.6	16.0	0.4	Complied
Middle	3665.0	11.3	4.5	15.8	16.0	0.2	Complied
Top	3670.0	11.2	4.5	15.7	16.0	0.3	Complied

Transmitter Peak Power Spectral Density (continued)

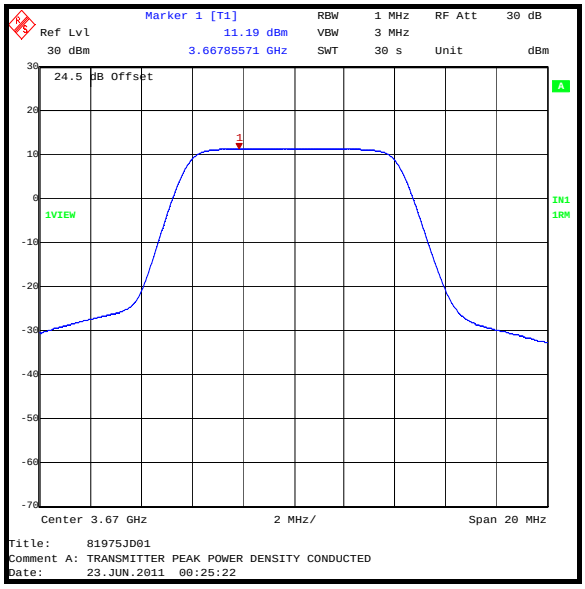
Results: 10 MHz Channel Bandwidth – QPSK



Bottom channel



Middle channel



Top channel

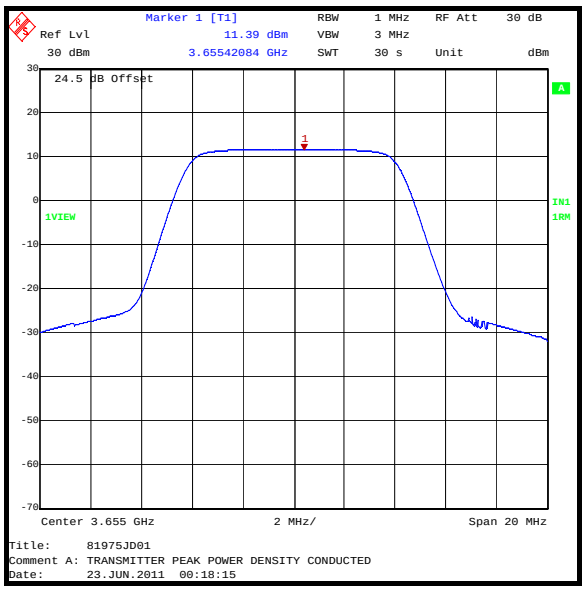
Transmitter Peak Power Spectral Density (continued)

Results: 10 MHz Channel Bandwidth – 16QAM

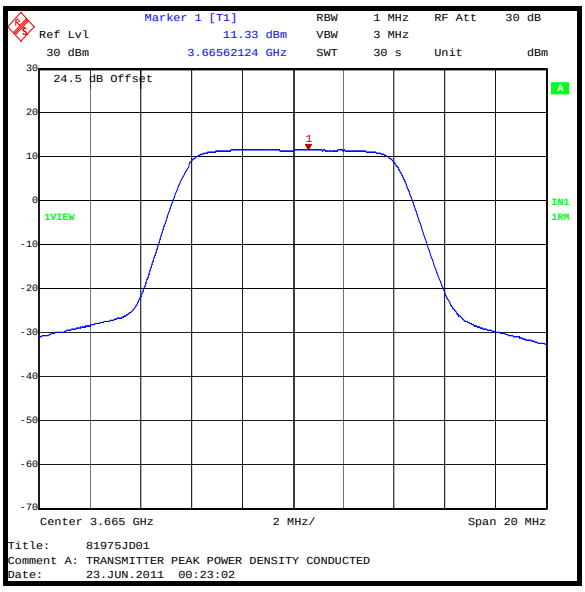
Channel	Frequency (MHz)	Conducted PSD (dBm)	Antenna Gain (dBi)	Peak EIRP Spectral Density (dBm)	Limit (dBm/1MHz)	Margin (dB)	Result
Bottom	3655.0	11.4	4.5	15.9	16.0	0.1	Complied
Middle	3665.0	11.3	4.5	15.8	16.0	0.2	Complied
Top	3670.0	11.2	4.5	15.7	16.0	0.3	Complied

Transmitter Peak Power Spectral Density (continued)

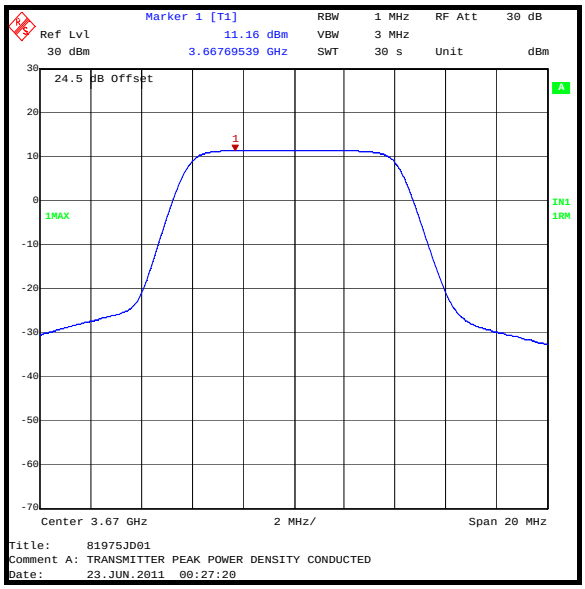
Results: 10 MHz Channel Bandwidth – 16QAM



Bottom channel



Middle channel



Top channel

5.2.5. Transmitter Conducted Emission Mask

Test Summary:

Test Engineer:	Nick Steele	**Test Dates:**	07 November 2011
Test Sample Serial Number:	C00E30		

FCC Part:	90.210(n)/2.1051
Test Method Used:	As detailed in ANSI TIA-603-C-2004 section 2.2.13 with deviations as specified in Part 90.210

Environmental Conditions:

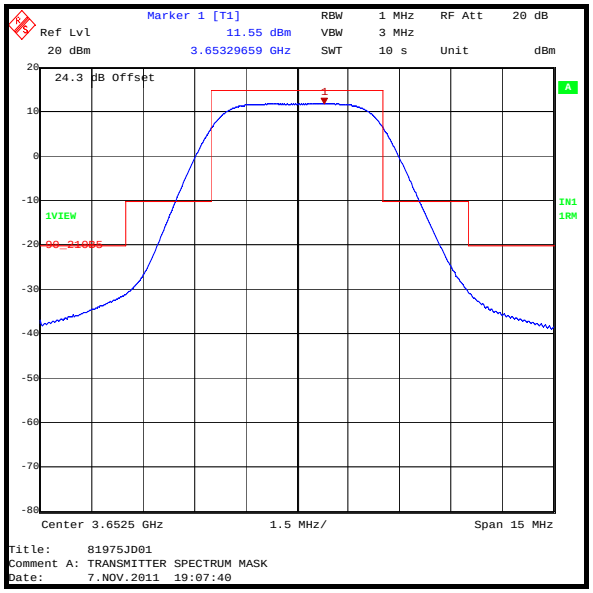
Temperature (°C):	23
Relative Humidity (%):	31

Note(s):

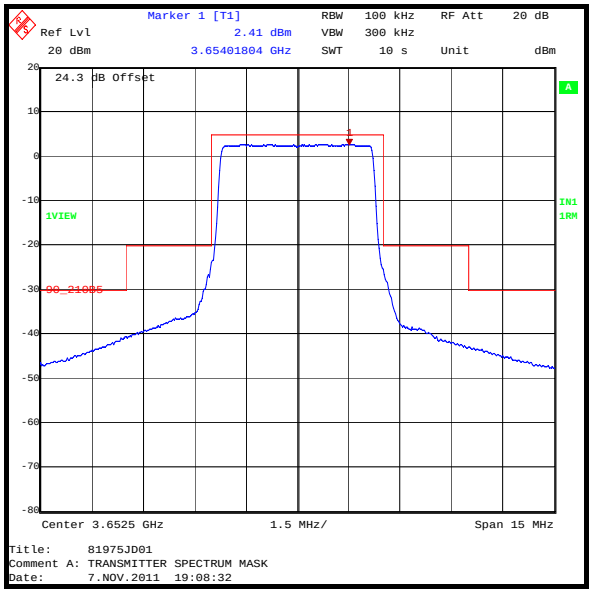
1. The measurement was performed with the EUT antenna port coupled to a spectrum analyser via suitable attenuation and cable. The power of the modulated signal was measured on a spectrum analyser using an RMS detector and 10 second sweep time in order to maximise the level.
2. Mask incursions occurred when performing the measurements in a 1 MHz measurement bandwidth. The tests were repeated by reducing the measurement bandwidth and limit mask by a factor of 10. The measurement was then found to be compliant.
3. Measurements were performed on bottom, middle and top channels, using both a 5 MHz and 10 MHz channel bandwidth.
4. For 5 MHz 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*Log10(Ton/Period), whereby Ton was measured as being 2ms and Period measured as being 5ms
5. For 10 MHz 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*Log10(Ton/Period), whereby Ton was measured as being 1.9ms and Period measured as being 5ms
6. Part 90.210 emissions mask B was applied to all measurements.

Transmitter Conducted Emission Mask (continued)

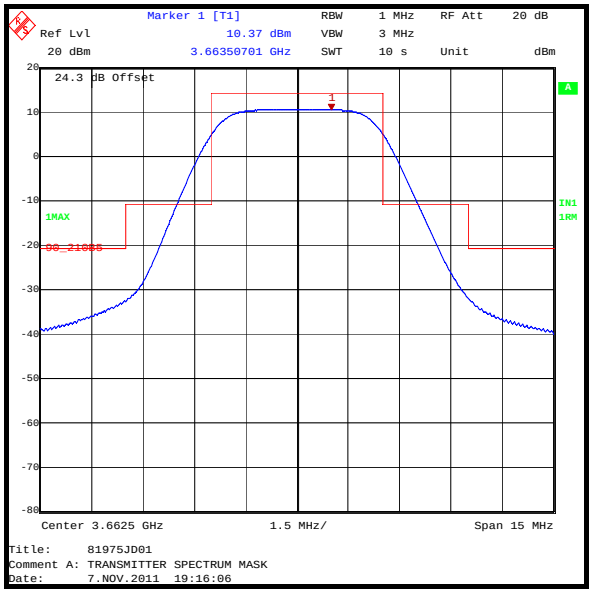
Results: 5 MHz Channel Bandwidth / QPSK



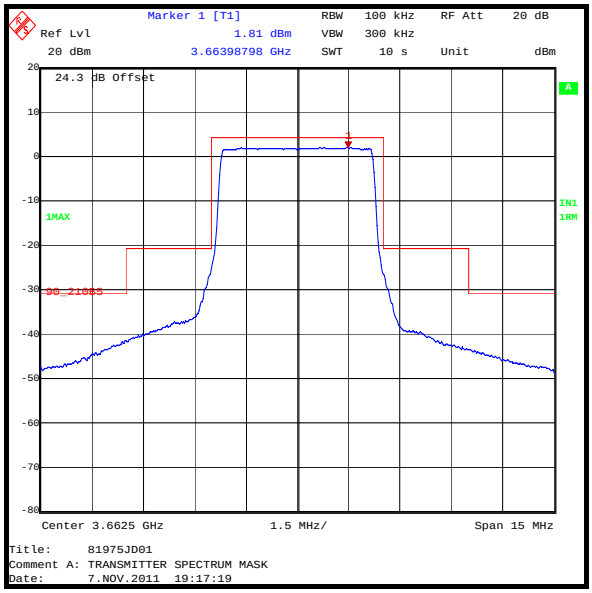
Bottom channel / 1 MHz Measurement Bandwidth



Bottom channel / 100 kHz Measurement Bandwidth



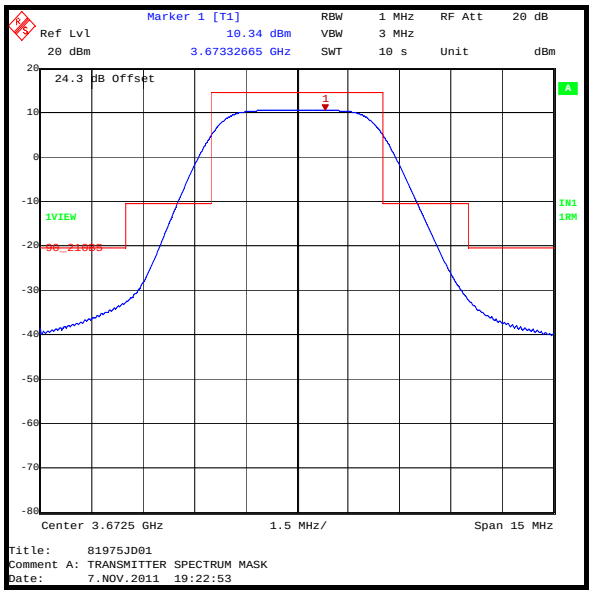
Middle channel / 1 MHz Measurement Bandwidth



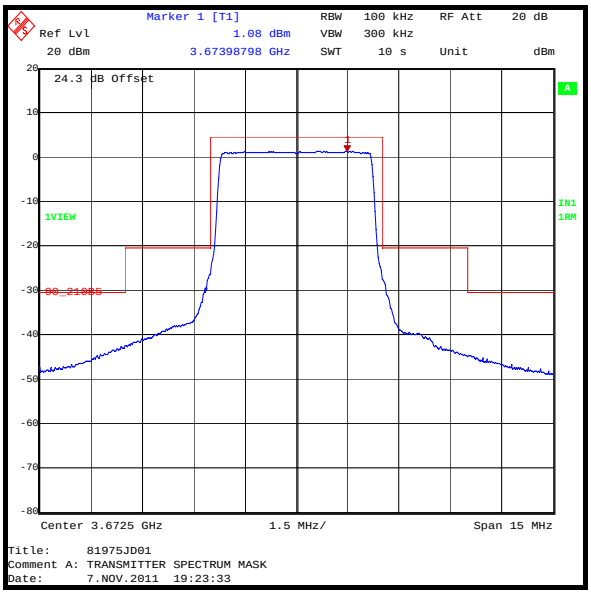
Middle channel / 100 kHz Measurement Bandwidth

Transmitter Conducted Emission Mask (continued)

Results: 5 MHz Channel Bandwidth / QPSK



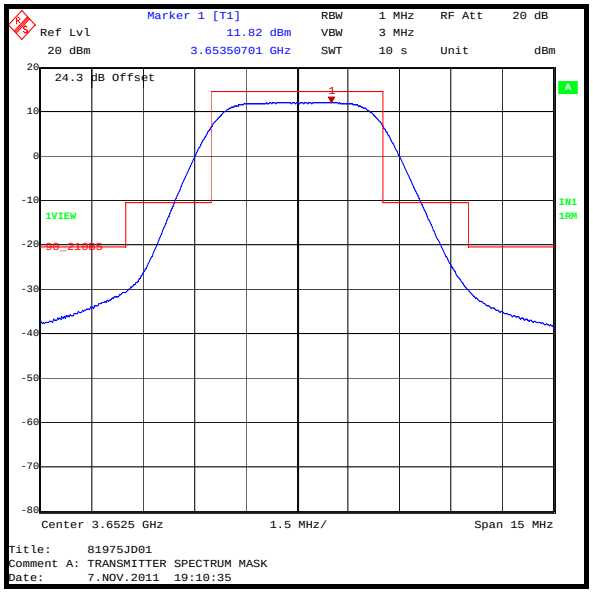
Top channel / 1MHz Measurement Bandwidth



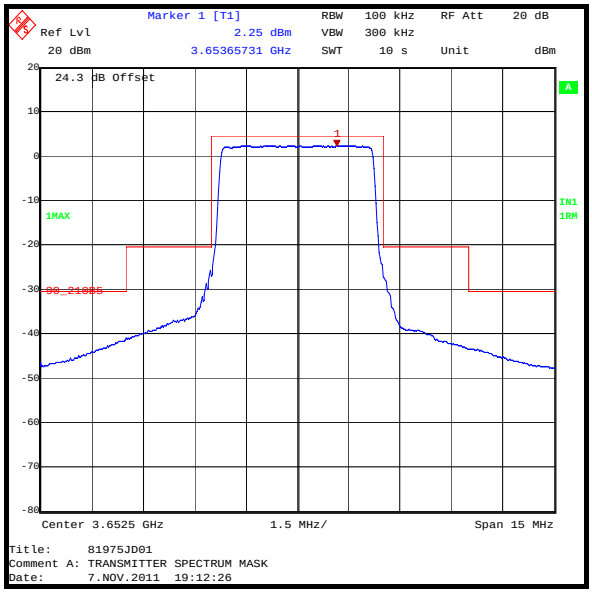
Top channel / 100 kHz Measurement Bandwidth

Transmitter Conducted Emission Mask (continued)

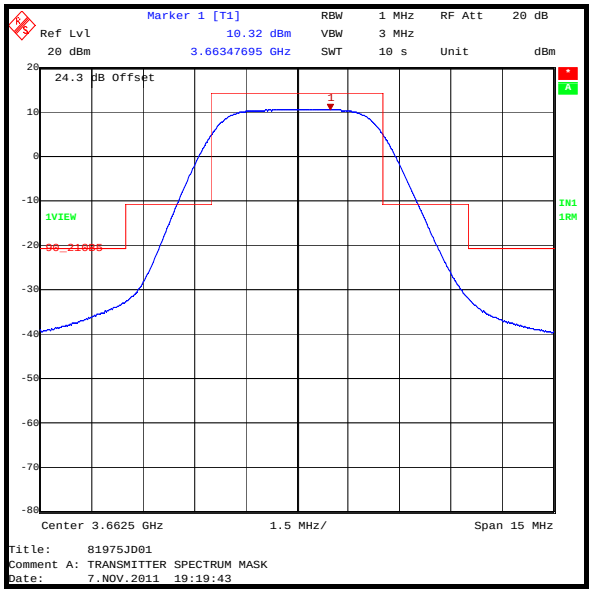
Results: 5 MHz Channel Bandwidth / 16QAM



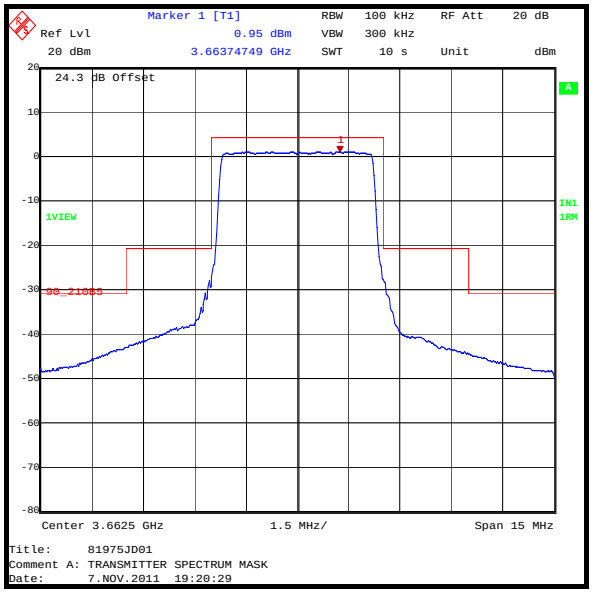
Bottom channel / 1 MHz Measurement Bandwidth



Bottom channel / 100 kHz Measurement Bandwidth



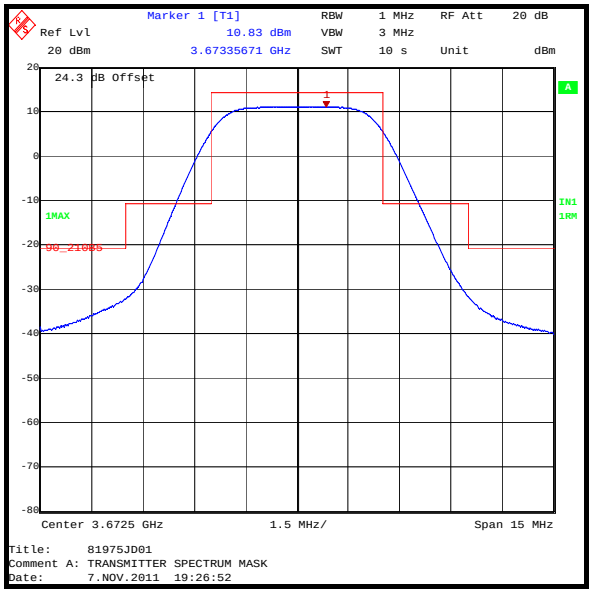
Middle channel / 1 MHz Measurement Bandwidth



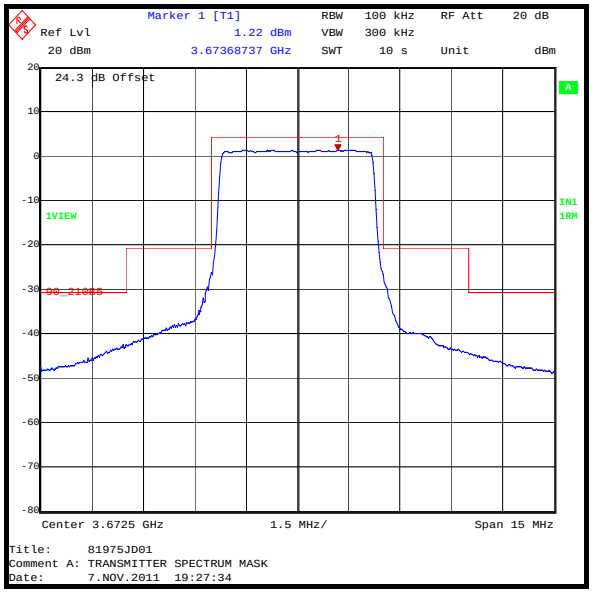
Middle channel / 100 kHz Measurement Bandwidth

Transmitter Conducted Emission Mask (continued)

Results: 5 MHz Channel Bandwidth / 16QAM



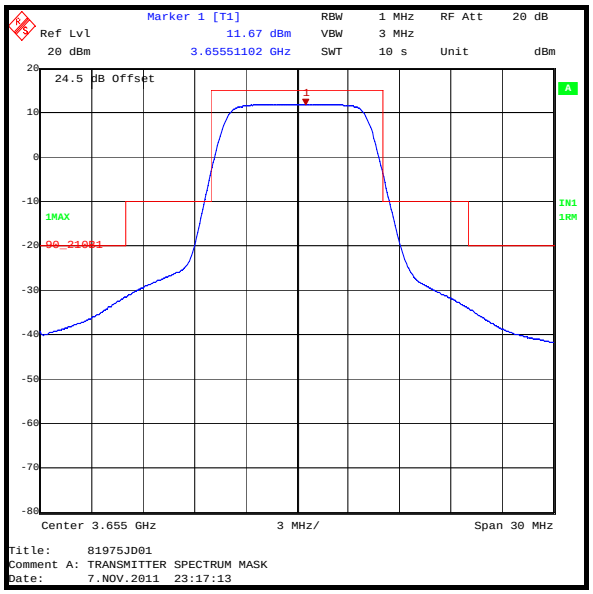
Top channel / 1 MHz Measurement Bandwidth



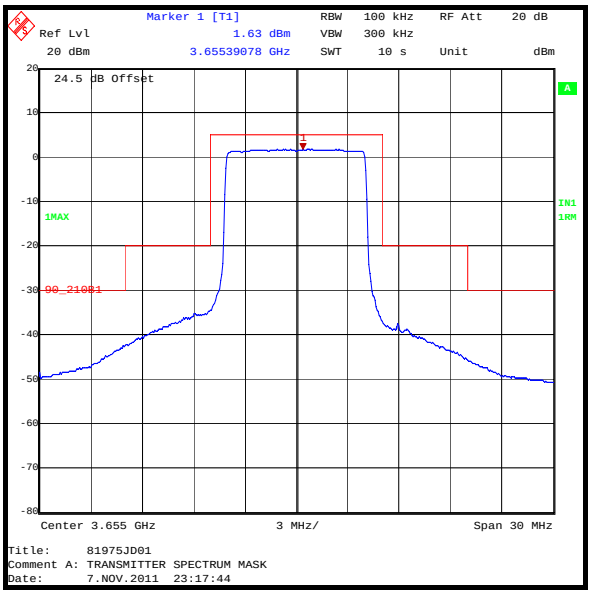
Top channel / 100 kHz Measurement Bandwidth

Transmitter Conducted Emission Mask (continued)

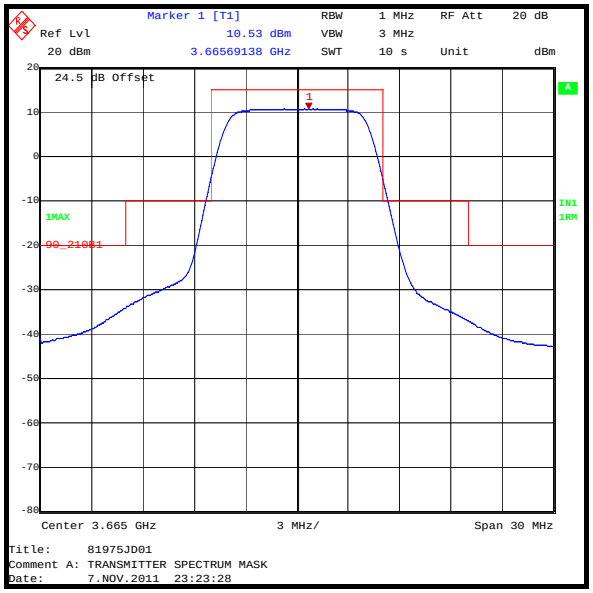
Results: 10 MHz Channel Bandwidth / QPSK



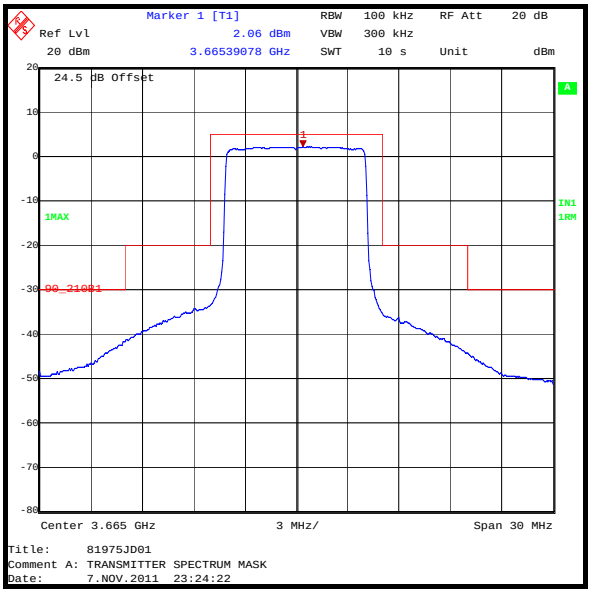
Bottom channel / 1 MHz Measurement Bandwidth



Bottom channel / 100 kHz Measurement Bandwidth



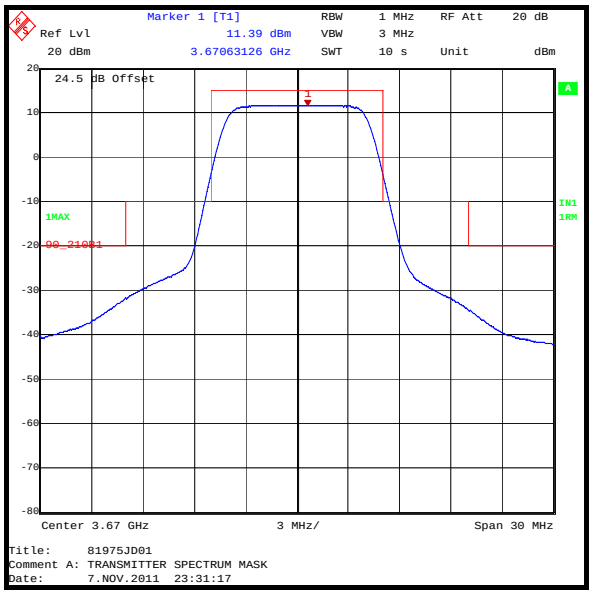
Middle channel / 1 MHz Measurement Bandwidth



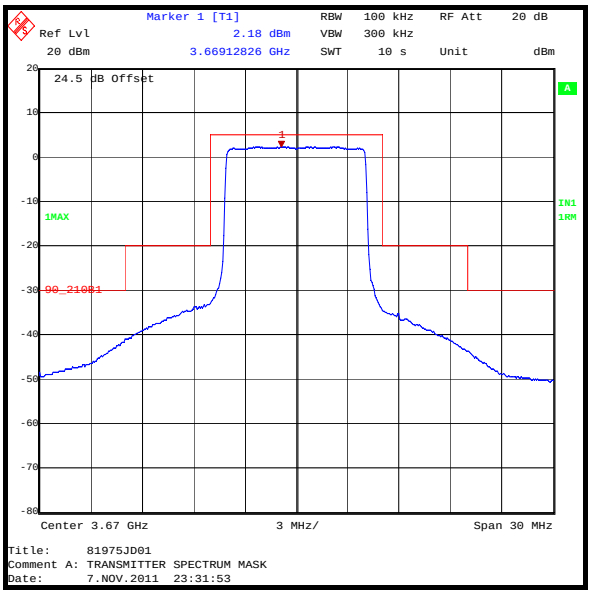
Middle channel / 100 kHz Measurement Bandwidth

Transmitter Conducted Emission Mask (continued)

Results: 10 MHz Channel Bandwidth / QPSK



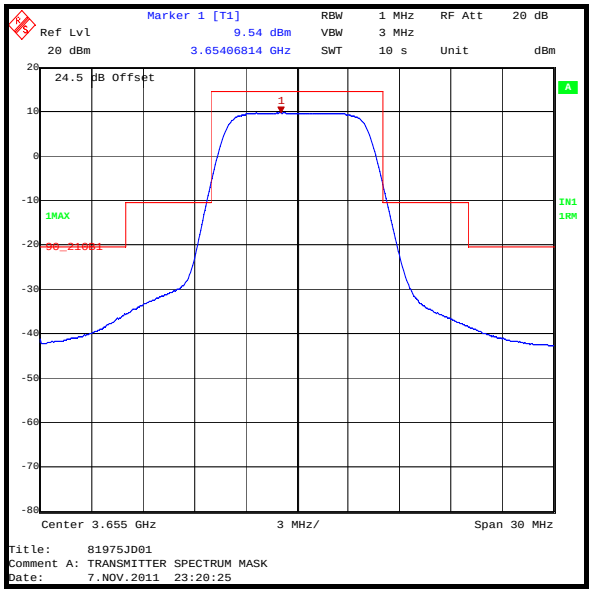
Top channel / 1 MHz Measurement Bandwidth



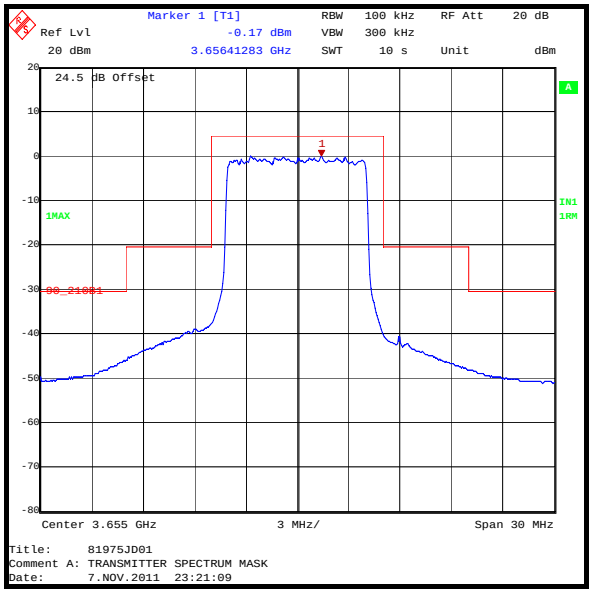
Top channel / 100 kHz Measurement Bandwidth

Transmitter Conducted Emission Mask (continued)

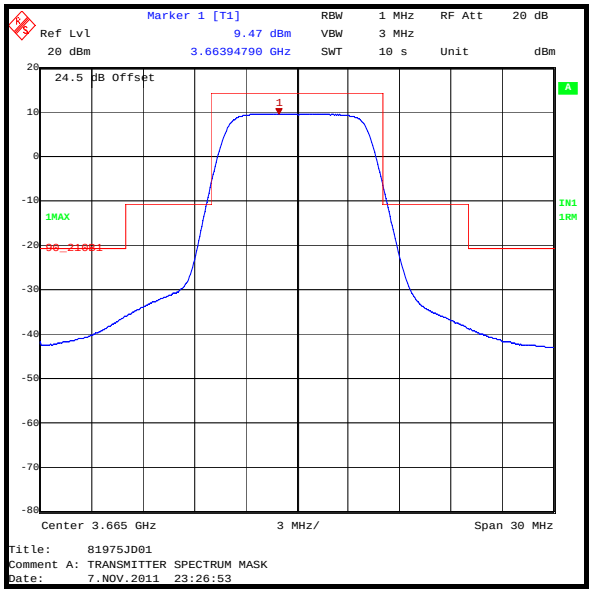
Results: 10 MHz Channel Bandwidth / 16QAM



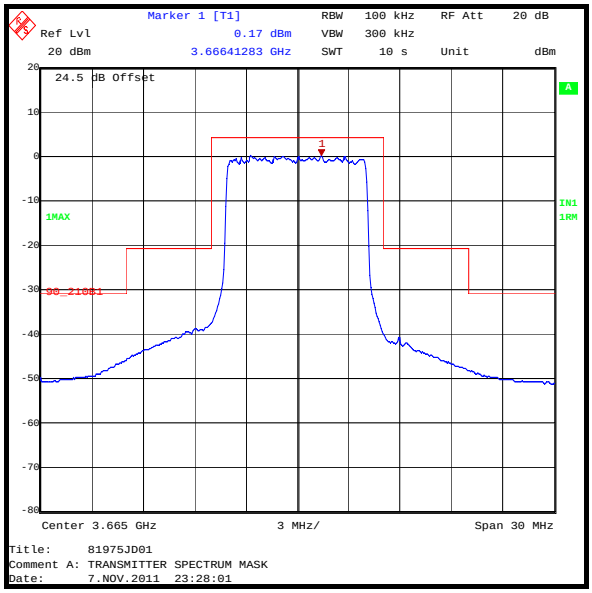
Bottom channel / 1 MHz Measurement Bandwidth



Bottom channel / 100 kHz Measurement Bandwidth



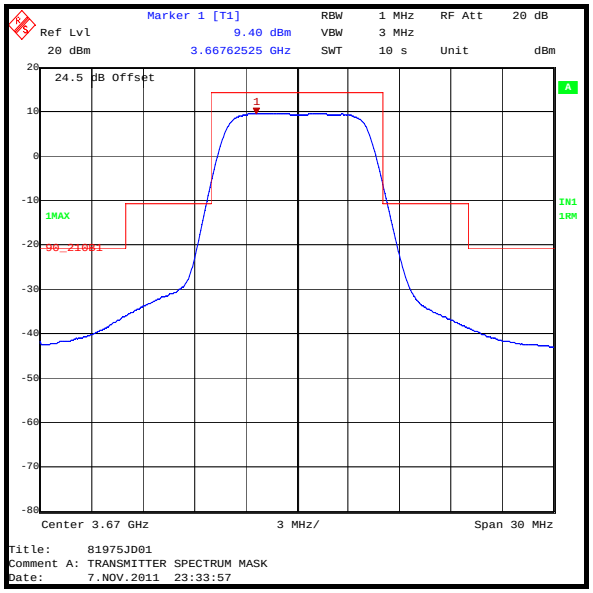
Middle channel / 1 MHz Measurement Bandwidth



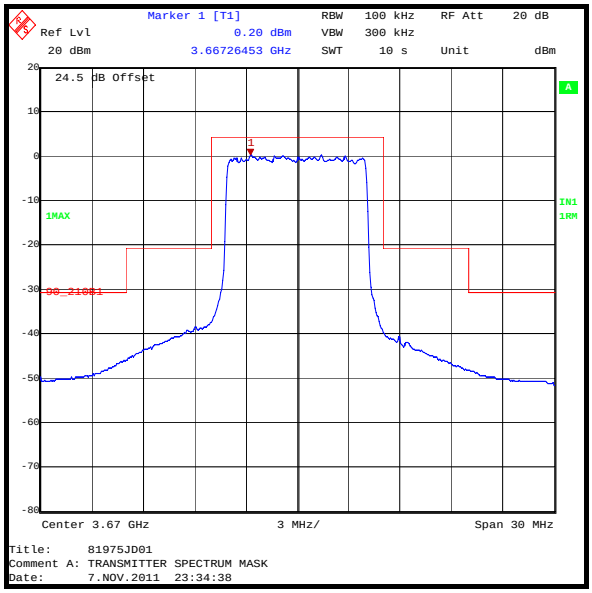
Middle channel / 100 kHz Measurement Bandwidth

Transmitter Conducted Emission Mask (continued)

Results: 10 MHz Channel Bandwidth / 16QAM



Top channel / 1 MHz Measurement Bandwidth



Top channel / 100 kHz Measurement Bandwidth

5.2.6. 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 Section 2.2.13
Frequency Range:	9 kHz to 40 GHz

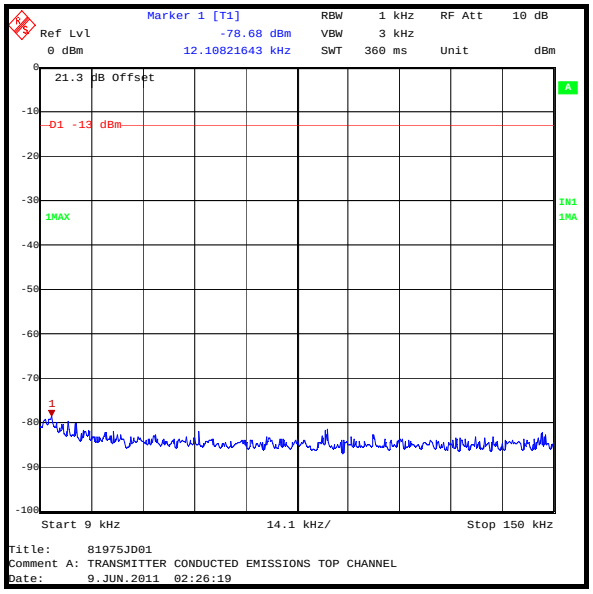
Environmental Conditions:

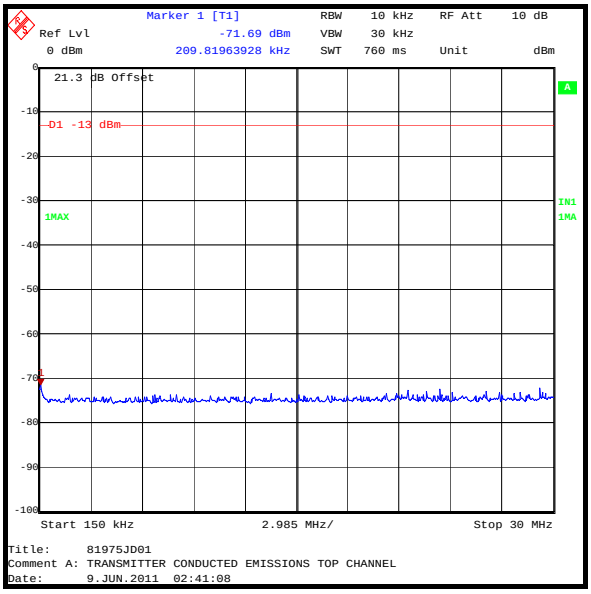
Temperature (°C):	28 to 29
Relative Humidity (%):	17 to 19

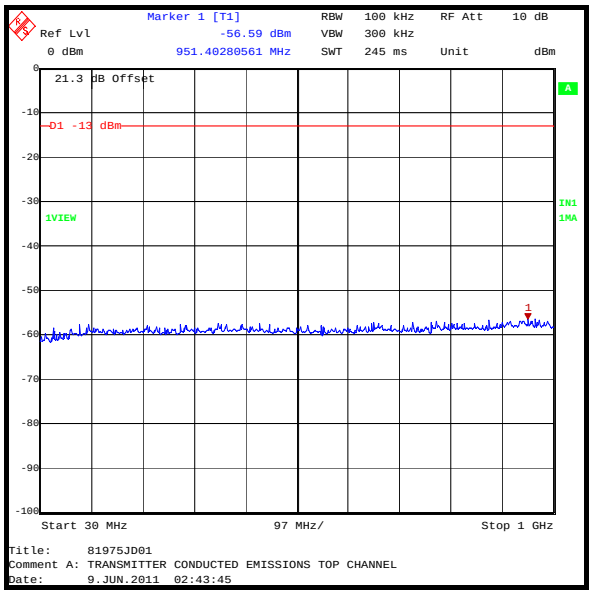
Results: 5 MHz Channel Bandwidth – QPSK Top Channel

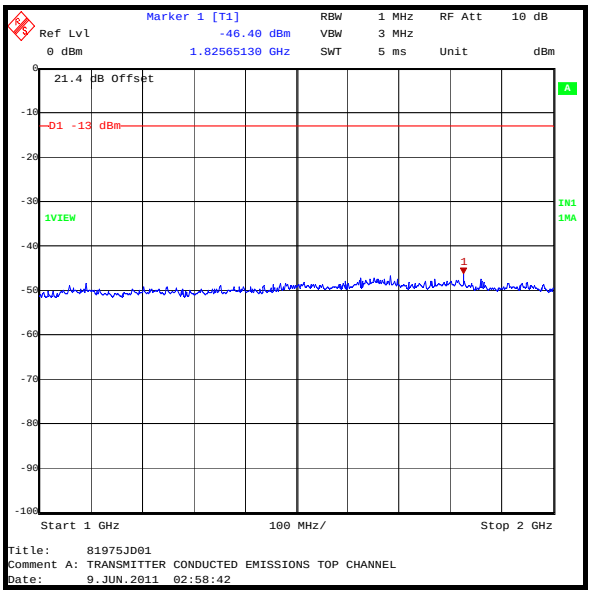
Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
7346.693	-35.2	-13.0	22.2	Complied

Results: 5 MHz Channel Bandwidth / QPSK Top Channel

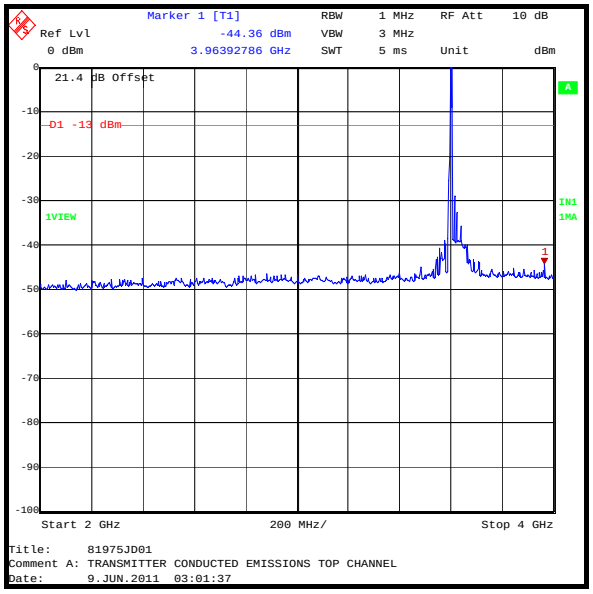


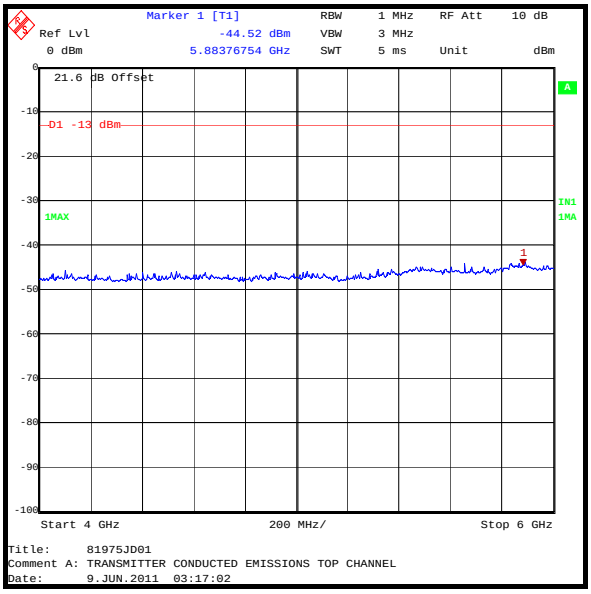


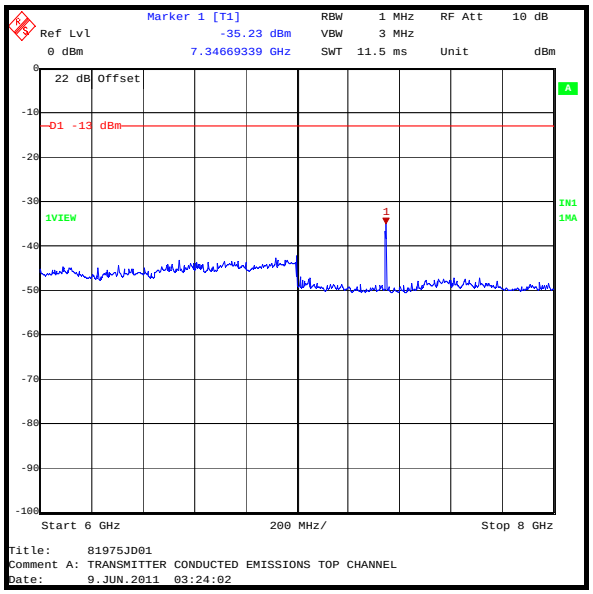


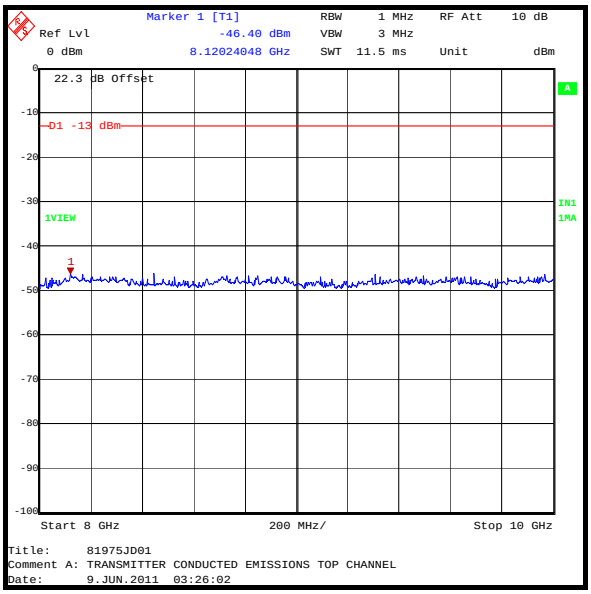


Transmitter Conducted Emissions (continued)

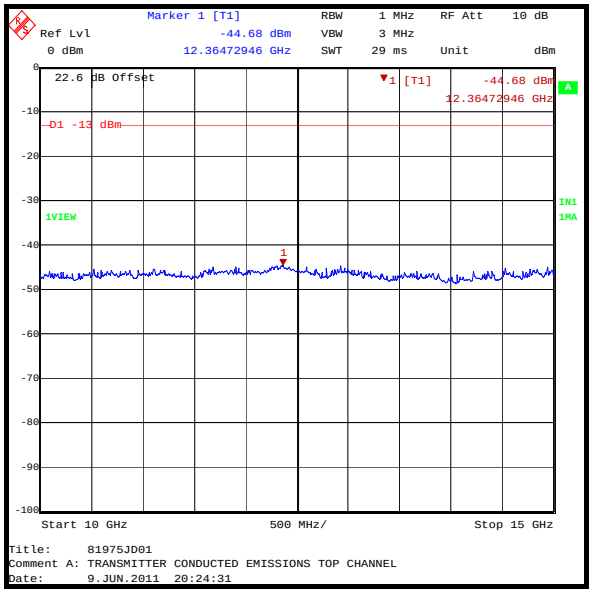


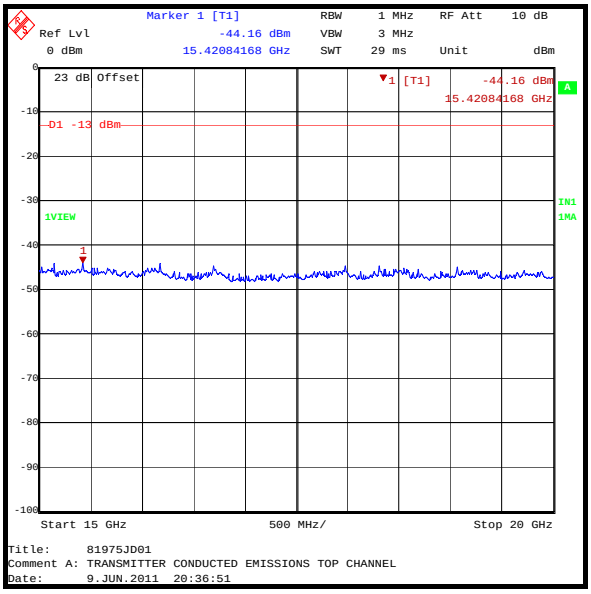


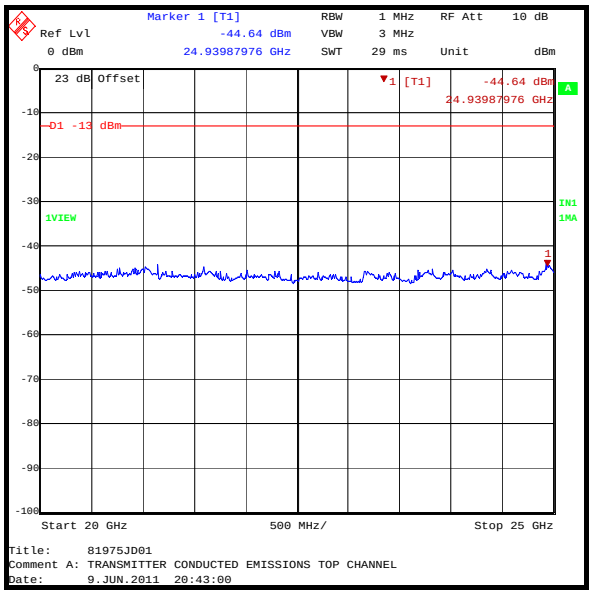


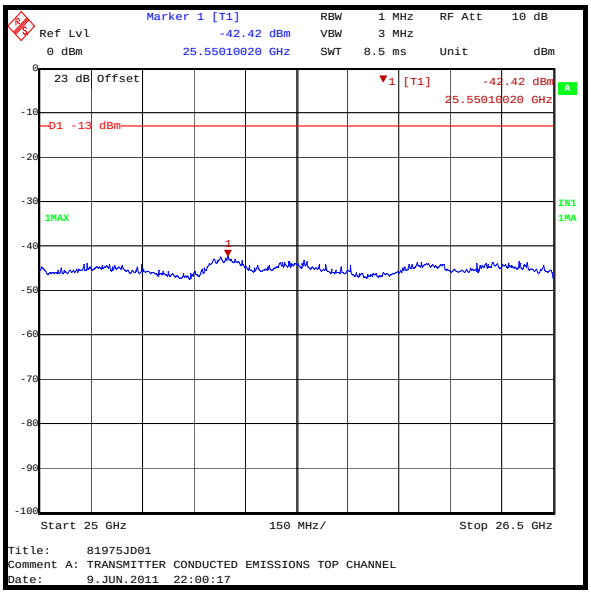


Transmitter Conducted Emissions (continued)

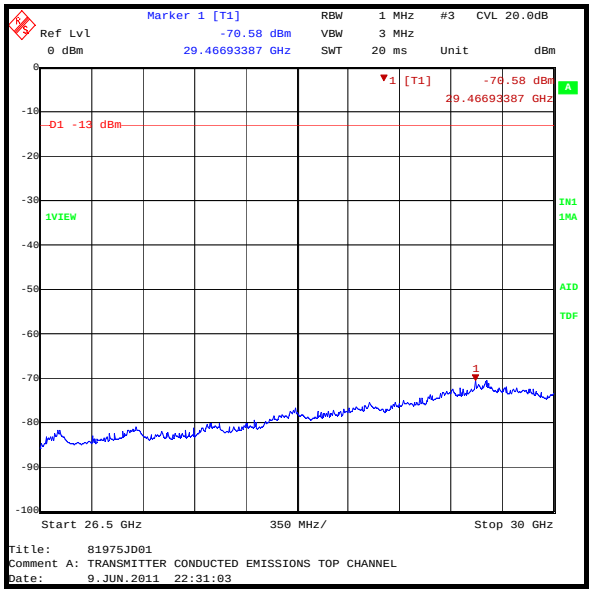


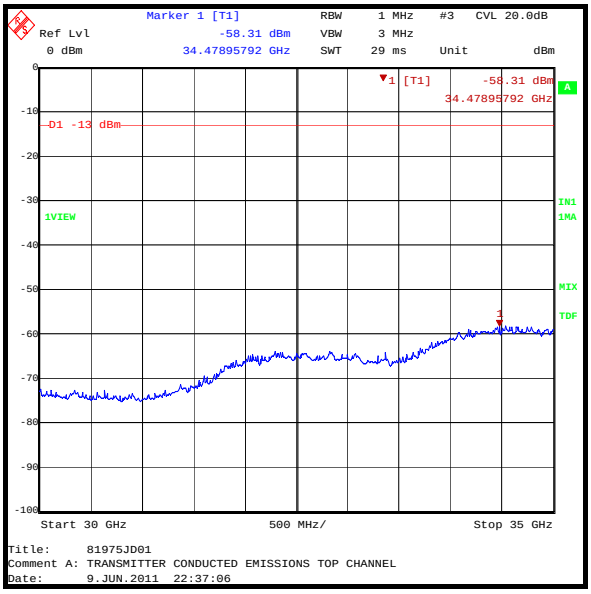


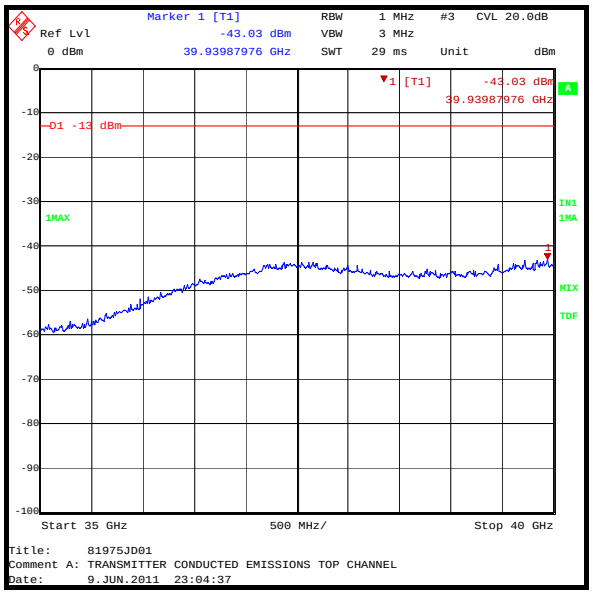




Transmitter Conducted Emissions (continued)







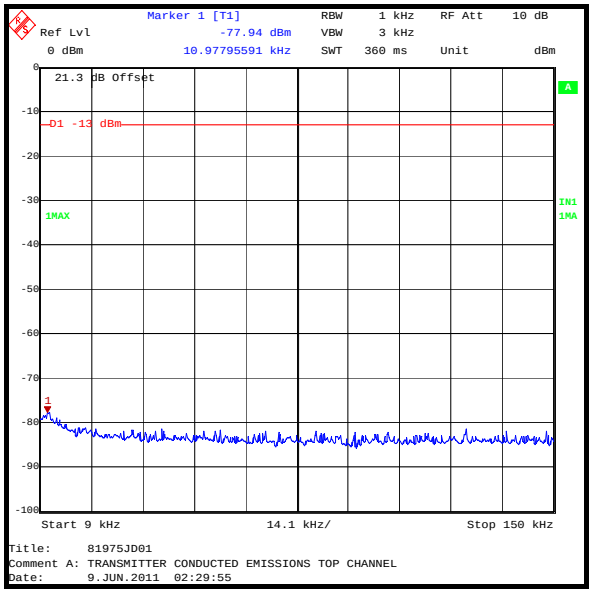
Transmitter Conducted Emissions (continued)

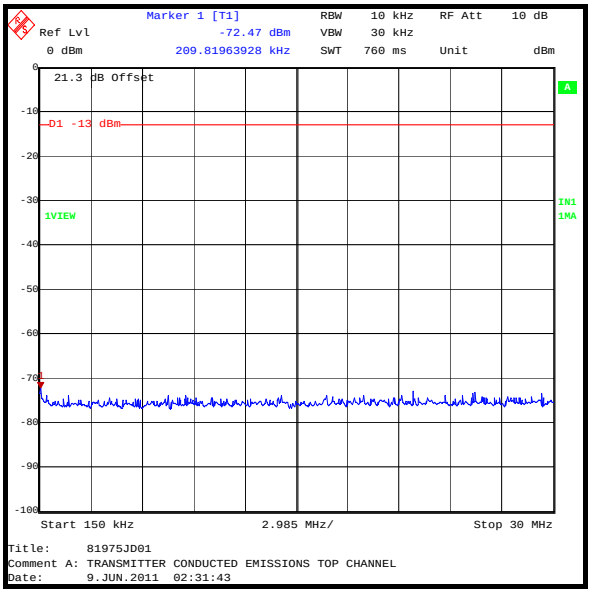
Results: 10 MHz Channel Bandwidth / QPSK Top Channel

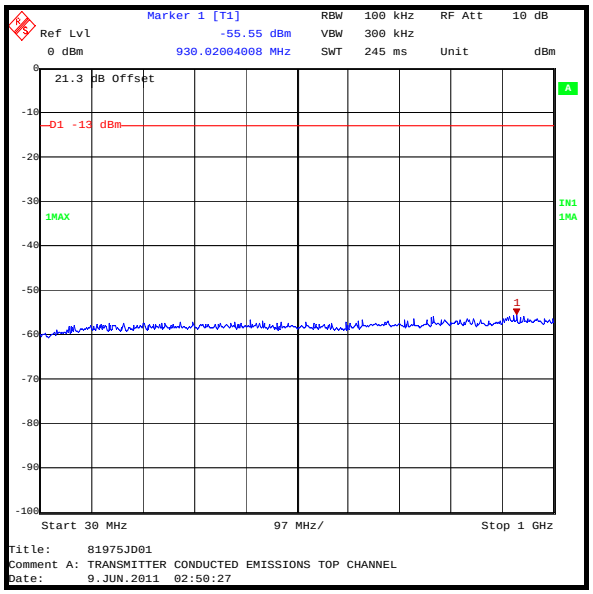
Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
7338.677	-35.5	-13.0	22.5	Complied

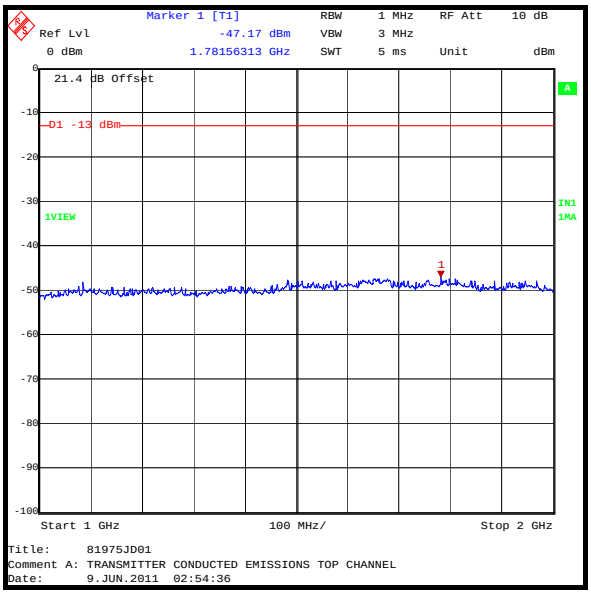
Transmitter Conducted Emissions (continued)

Results: 10 MHz Channel Bandwidth / QPSK Top Channel



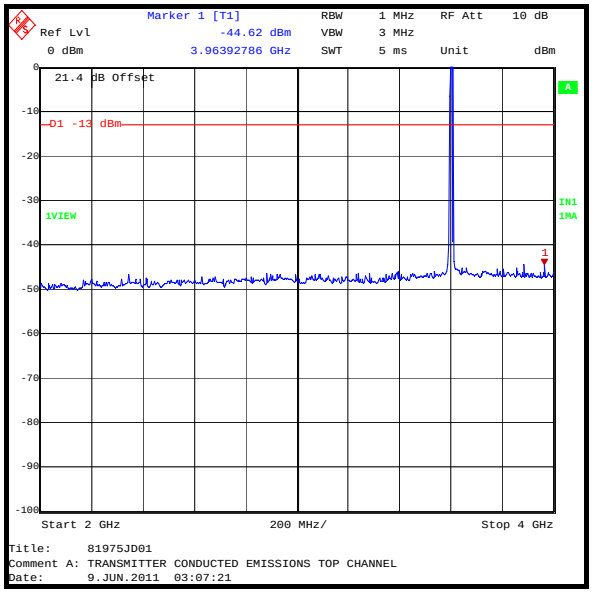


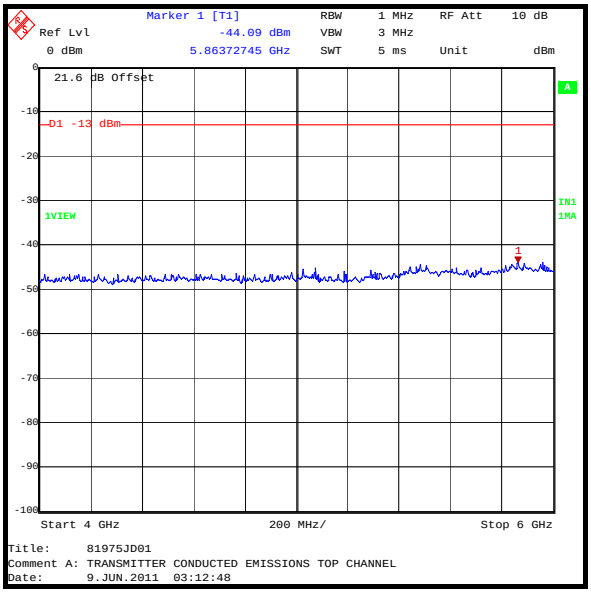


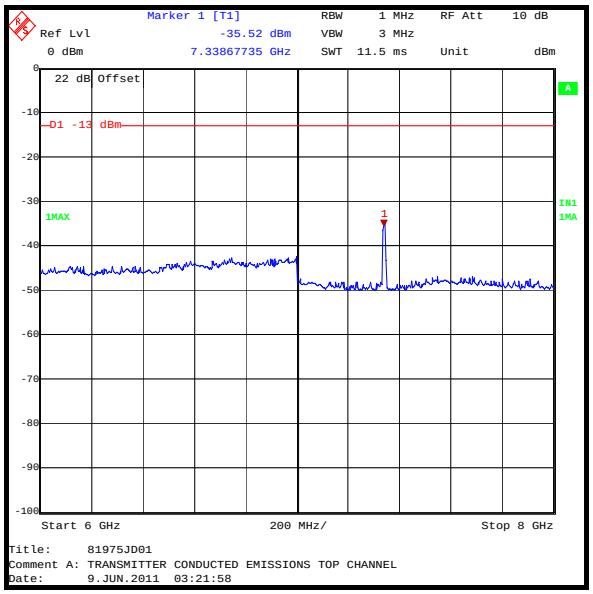


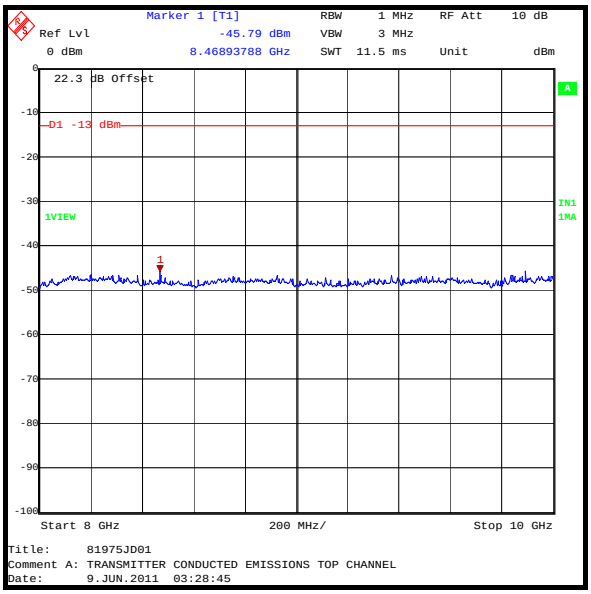
Transmitter Conducted Emissions (continued)

Results: 10 MHz Channel Bandwidth / QPSK Top Channel



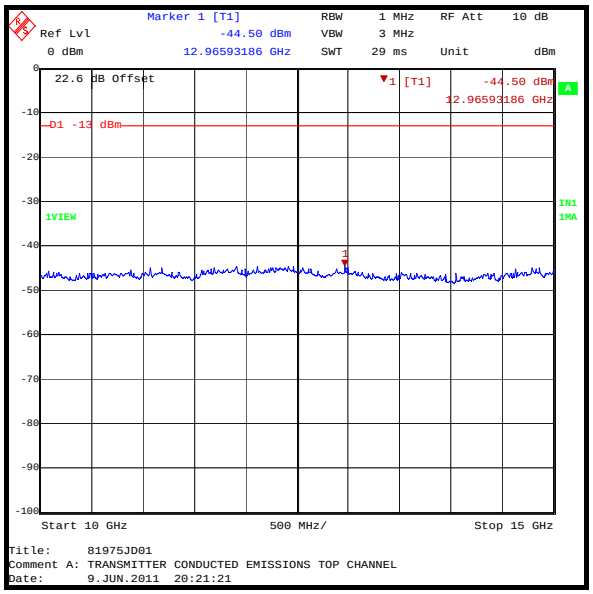


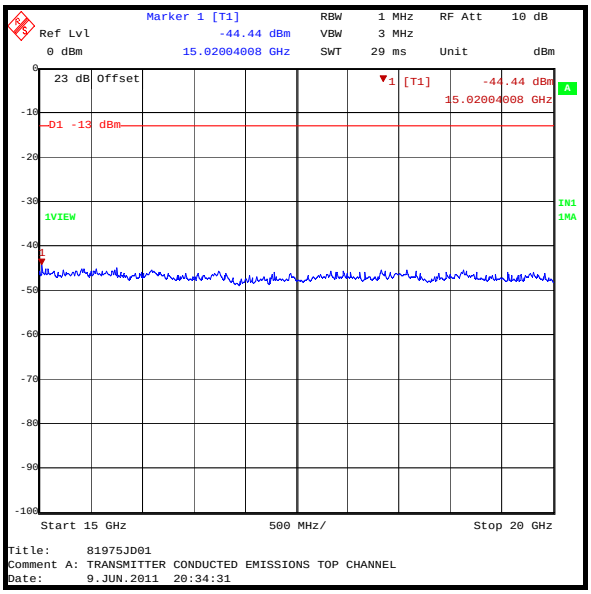


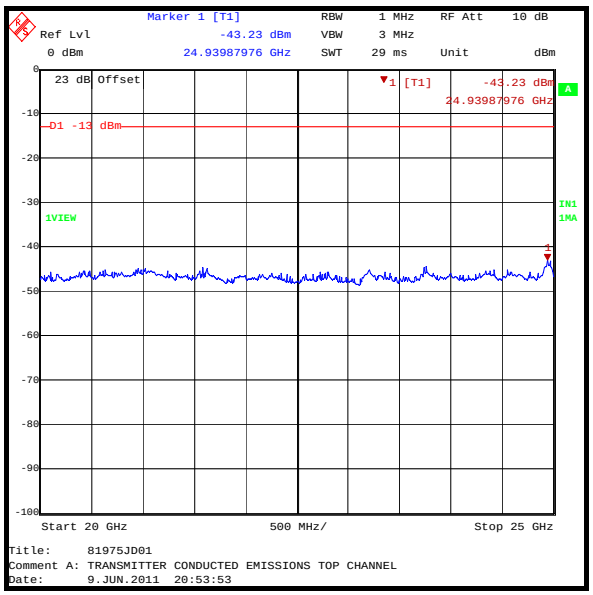


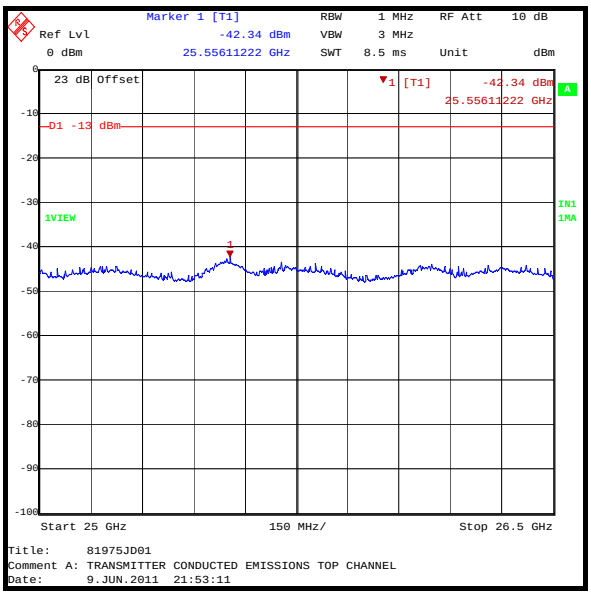
Transmitter Conducted Emissions (continued)

Results: 10 MHz Channel Bandwidth / QPSK Top Channel



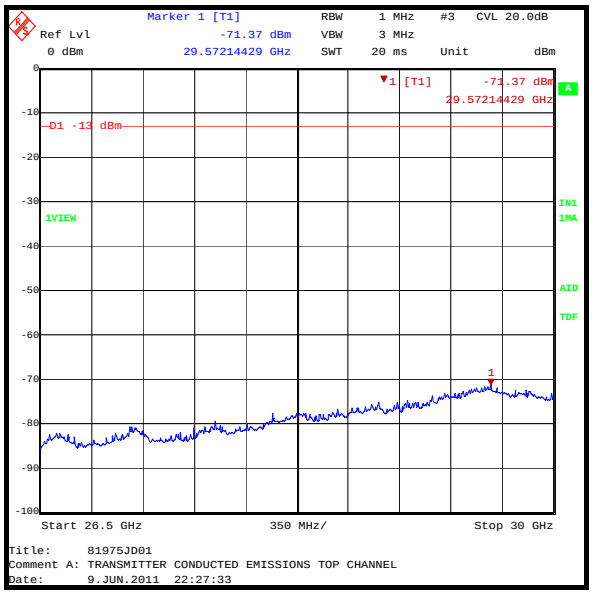


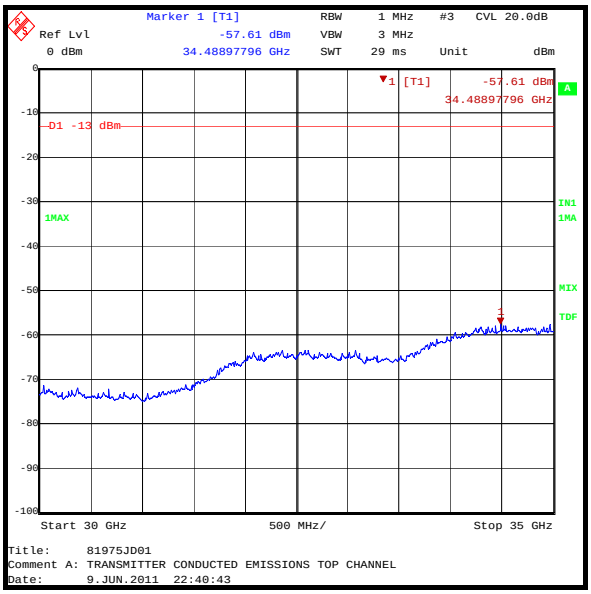


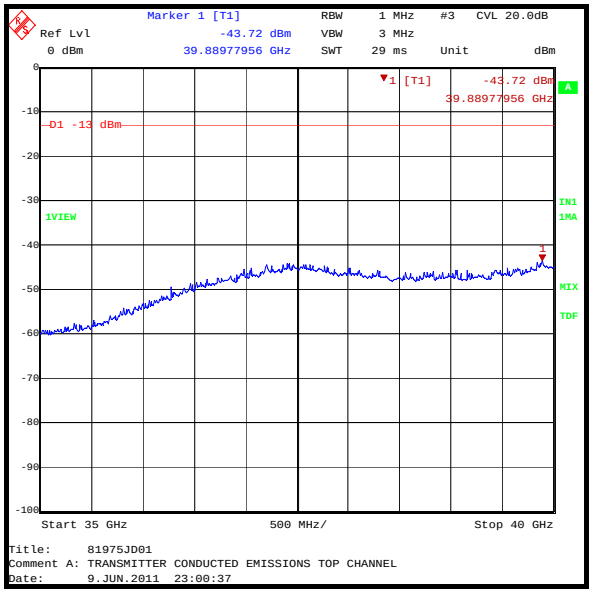


Transmitter Conducted Emissions (continued)

Results: 10 MHz Channel Bandwidth / QPSK Top Channel







5.2.7. 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 Section 2.2.13

Environmental Conditions:

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

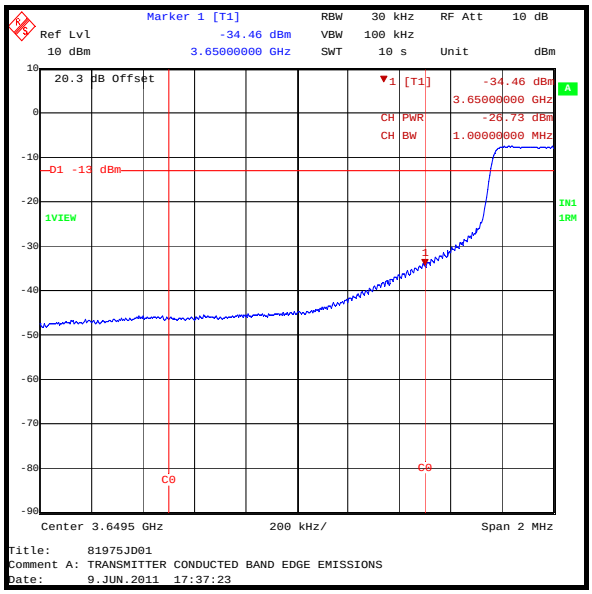
Note(s):

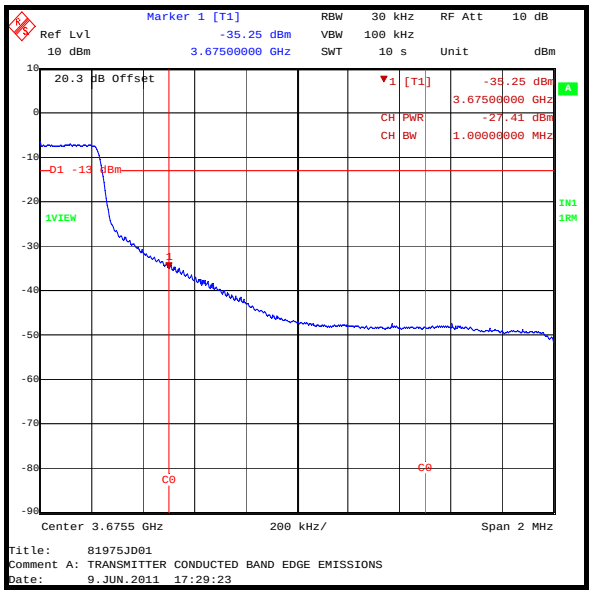
1. Tests were initially performed with a 1 MHz resolution bandwidth (RBW). Where the band edge limit was exceeded on the bottom/top channels using a 1 MHz measurement bandwidth, the EUT was retested using the channel power function of the spectrum analyser centred on the 1 MHz block immediately below/above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

Transmitter Band Edge Conducted Emissions (continued)

Results: 5 MHz 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

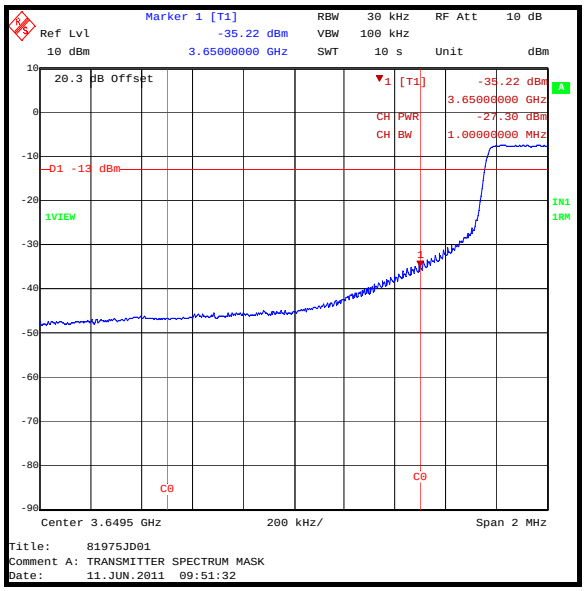


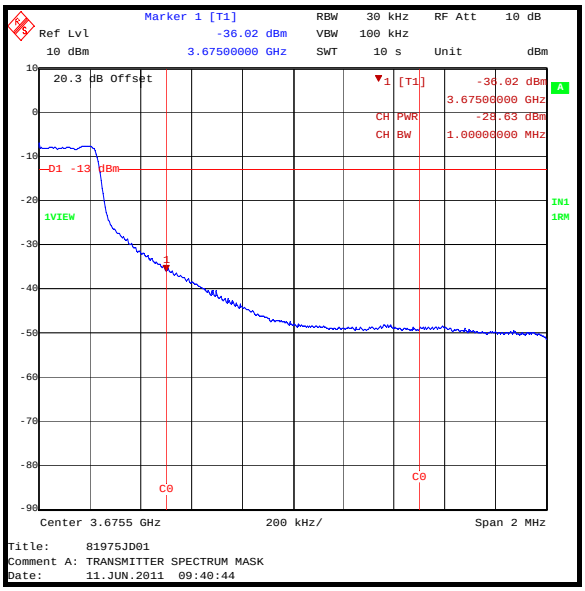


Transmitter Band Edge Conducted Emissions (continued)

Results: 5 MHz 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

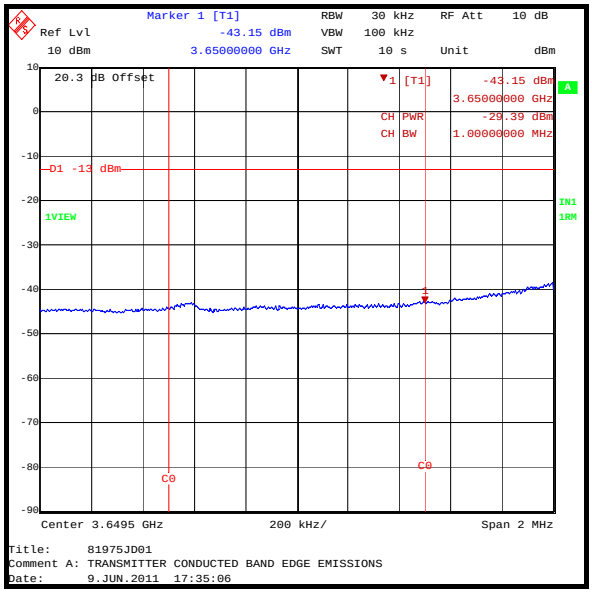


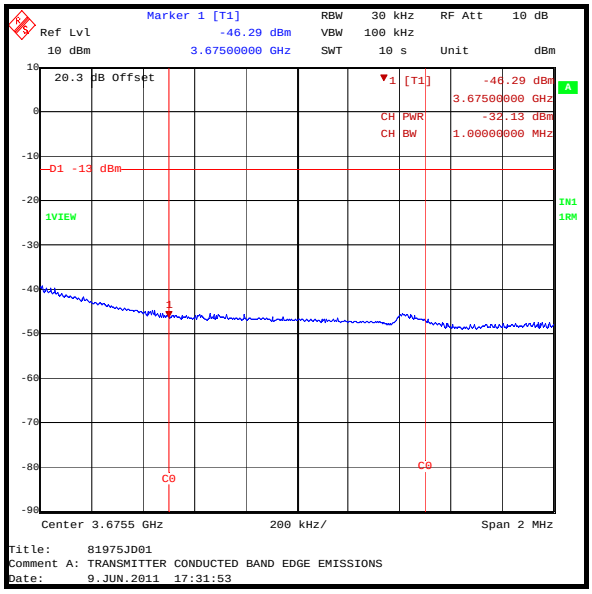


Transmitter Band Edge Conducted Emissions (continued)

Results: 10 MHz 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

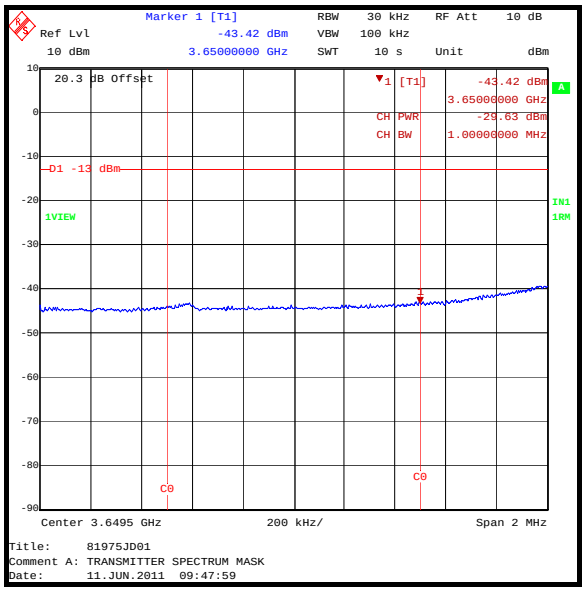


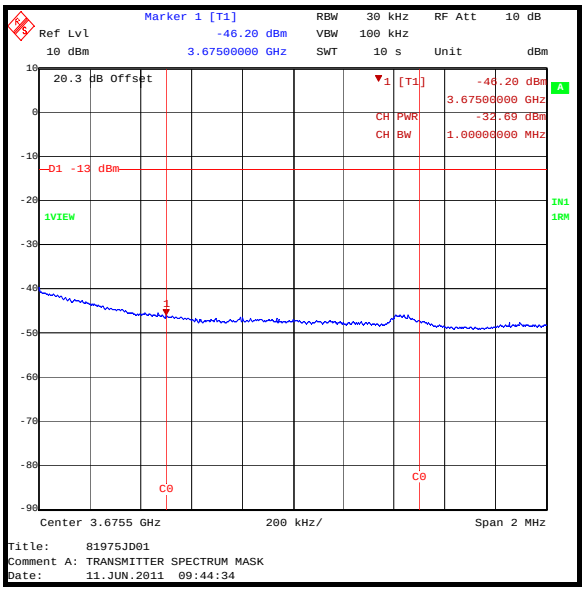


Transmitter Band Edge Conducted Emissions (continued)

Results: 10 MHz 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





5.2.8. 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 Section 2.2.12
Frequency Range:	30 MHz to 40 GHz

Environmental Conditions:

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

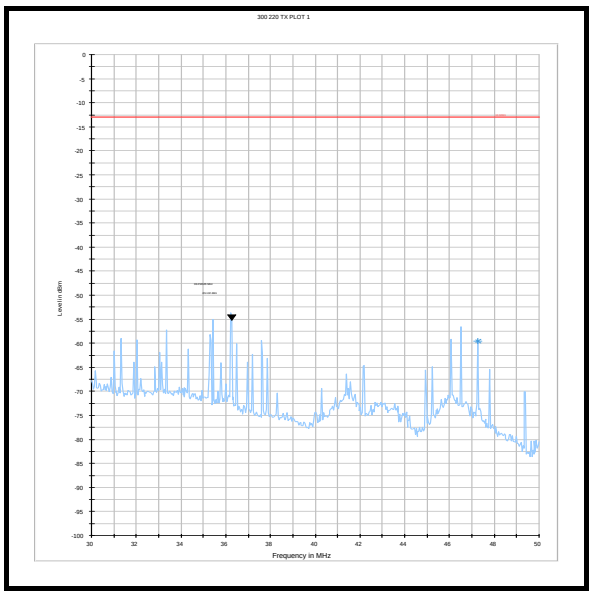
Note(s):

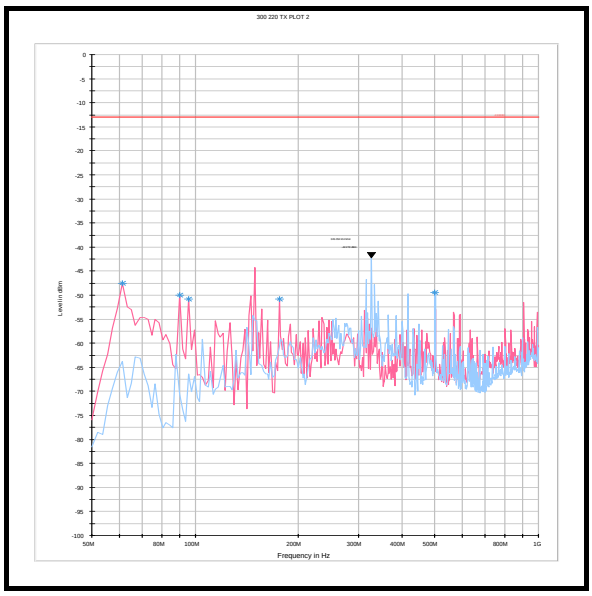
1. The emission seen on the 1 GHz to 4 GHz plot is the EUT carrier.
2. As no harmonic emissions were visible during pre-scans of the top channel, no measurements were performed on the bottom and middle channels.
3. All other emissions were at least 20 dB below the specification limit or below the measurement system noise floor.

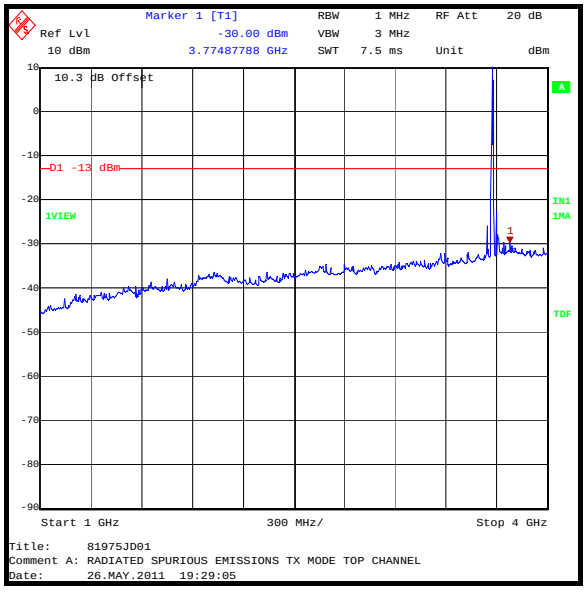
Transmitter Radiated Emissions (continued)

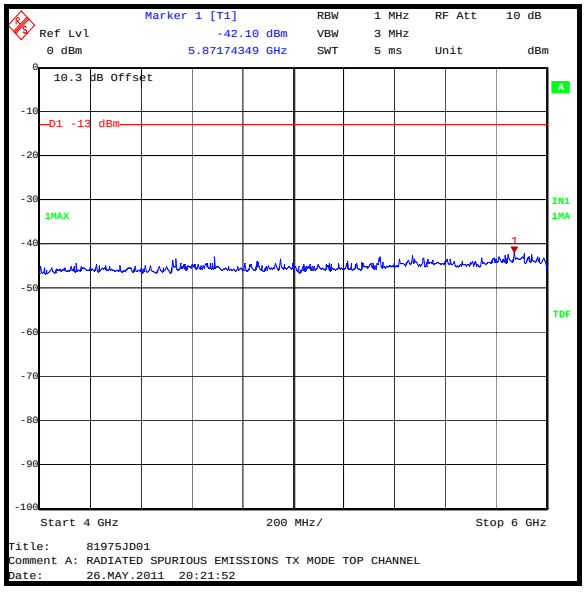
Results: 5 MHz Channel Bandwidth / QPSK

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



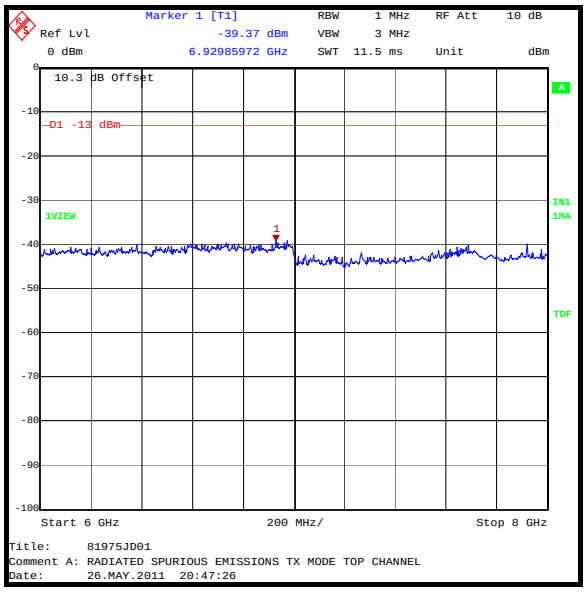


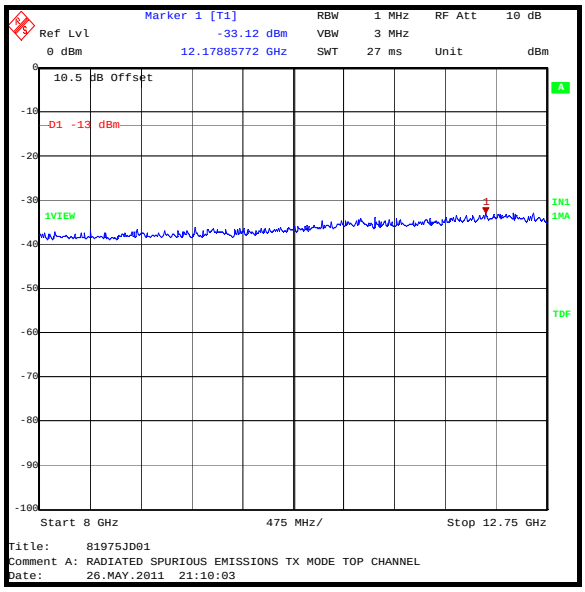


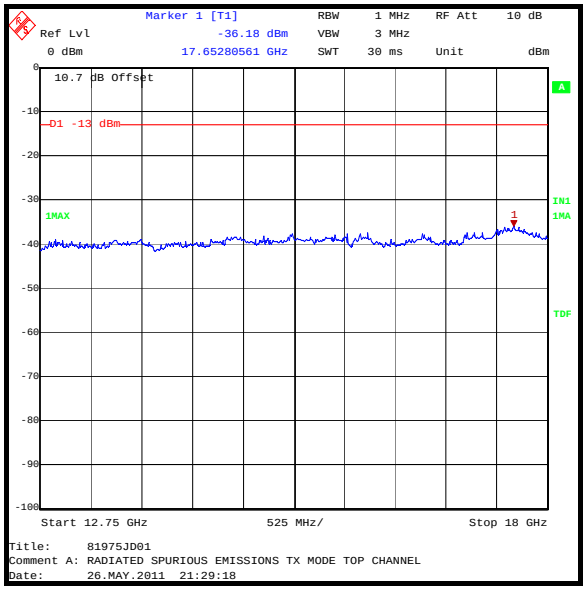


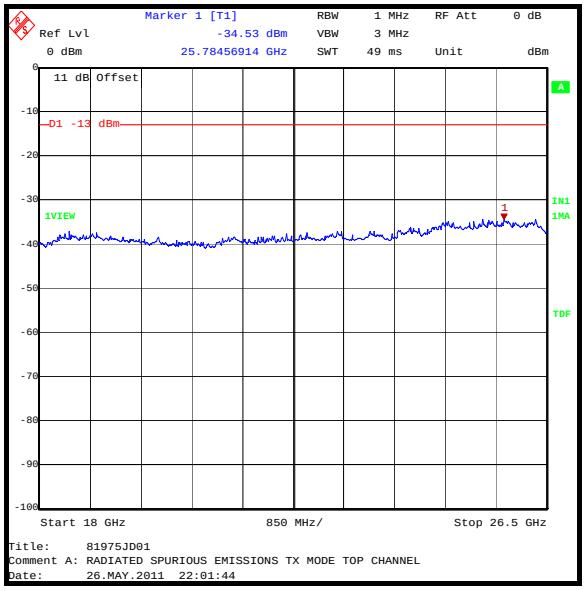
Transmitter Radiated Emissions (continued)

Results: 5 MHz Channel Bandwidth / QPSK



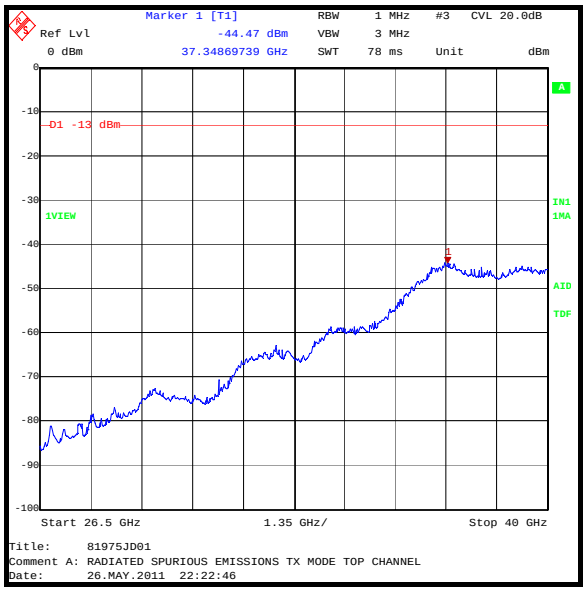






Transmitter Radiated Emissions (continued)

Results: 5 MHz Channel Bandwidth / QPSK



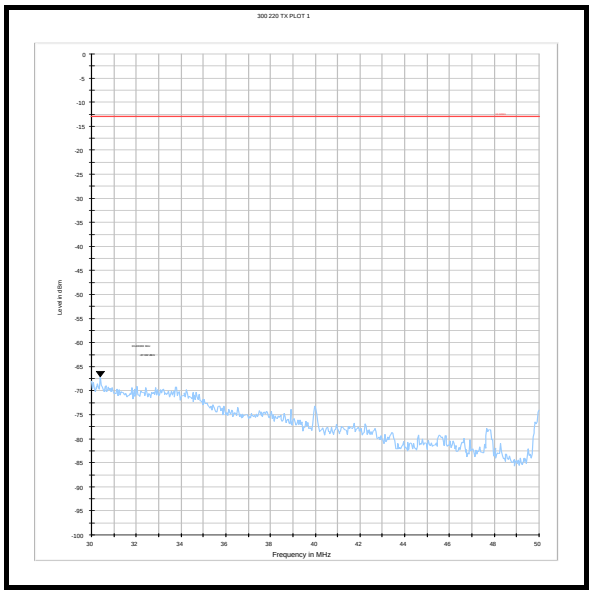
Transmitter Radiated Emissions (continued)

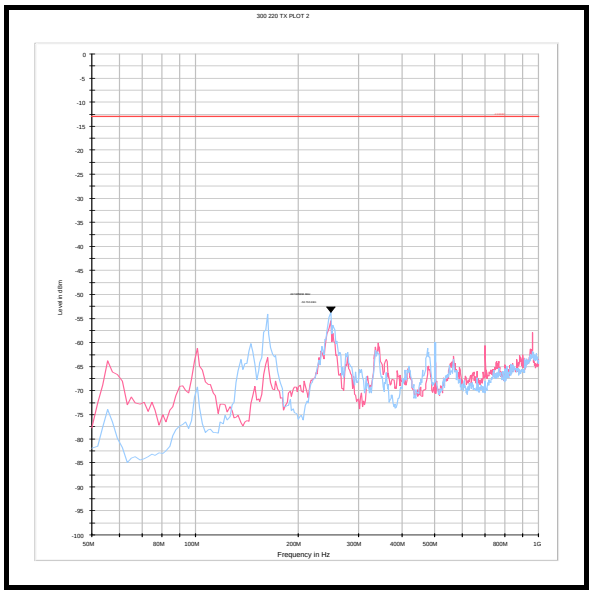
Results: 10 MHz Channel Bandwidth / QPSK

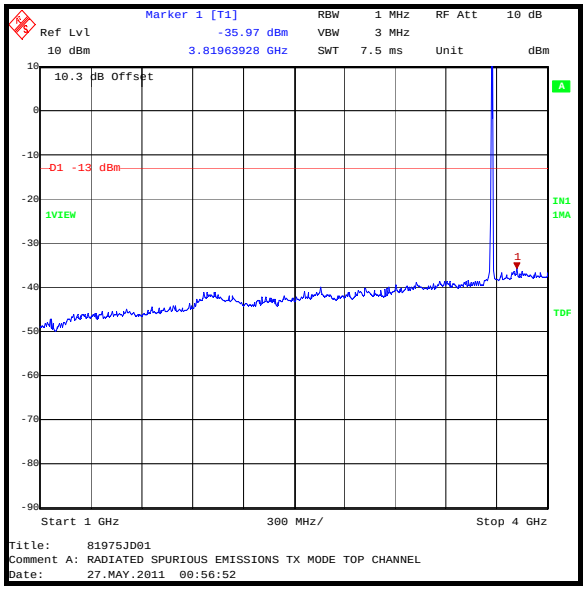
Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
12407.315	-33.1	-13.0	20.1	Complied

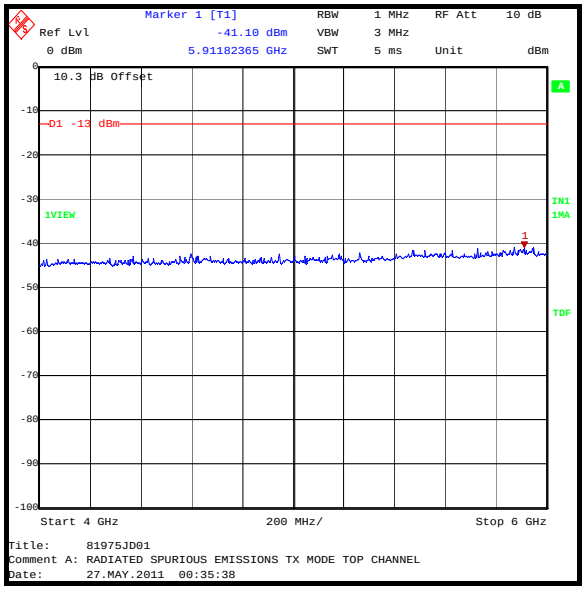
Transmitter Radiated Emissions (continued)

Results: 10 MHz Channel Bandwidth / QPSK



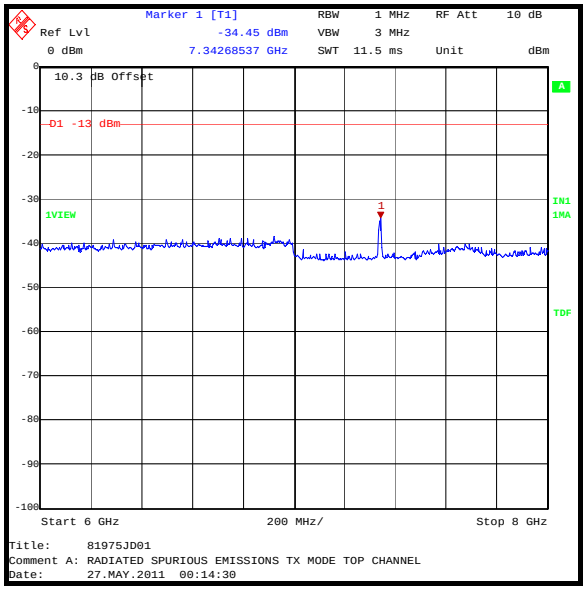


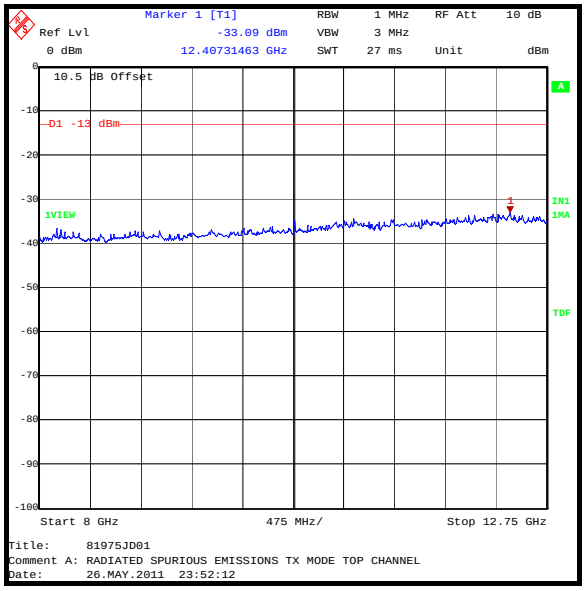


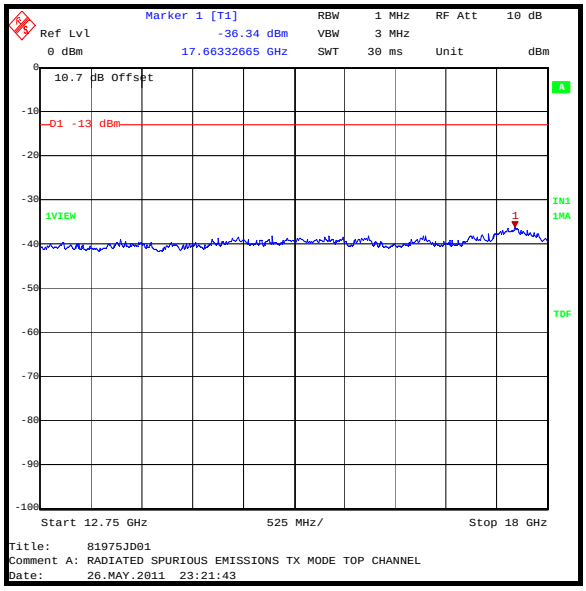


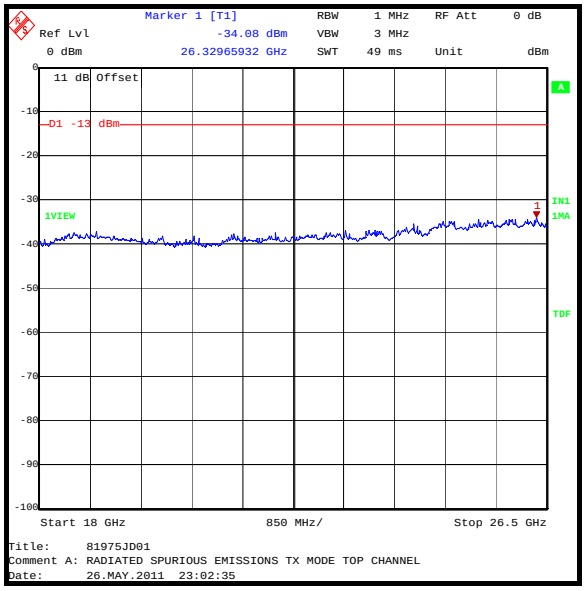
Transmitter Radiated Emissions (continued)

Results: 10 MHz Channel Bandwidth / QPSK



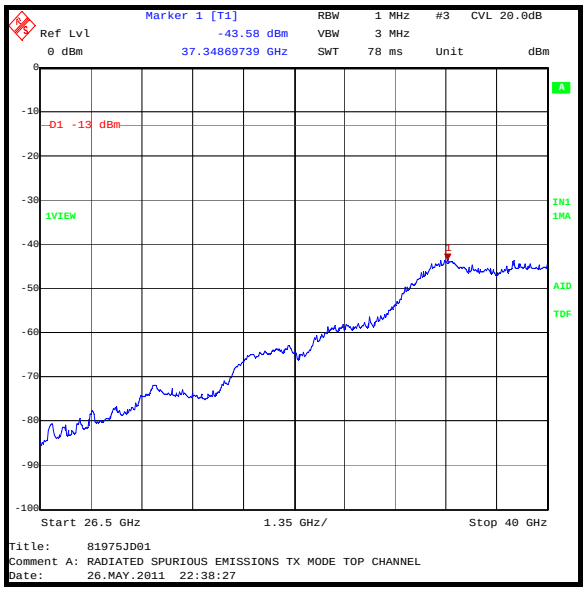






Transmitter Radiated Emissions (continued)

Results: 10 MHz Channel Bandwidth / QPSK



5.2.9. 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 Section 2.2.12

Environmental Conditions:

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

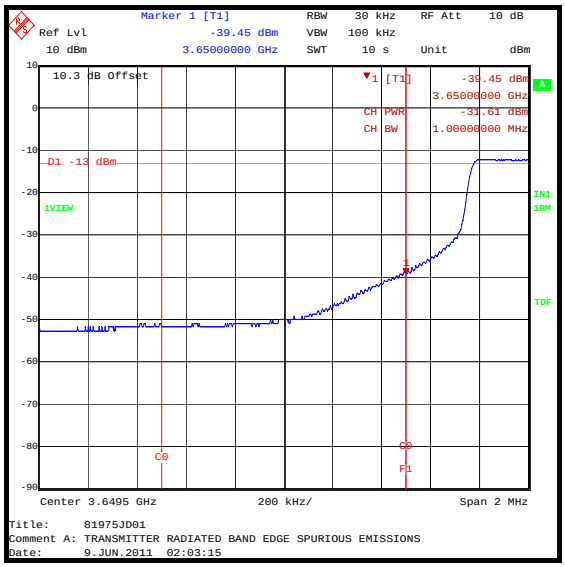
Note(s):

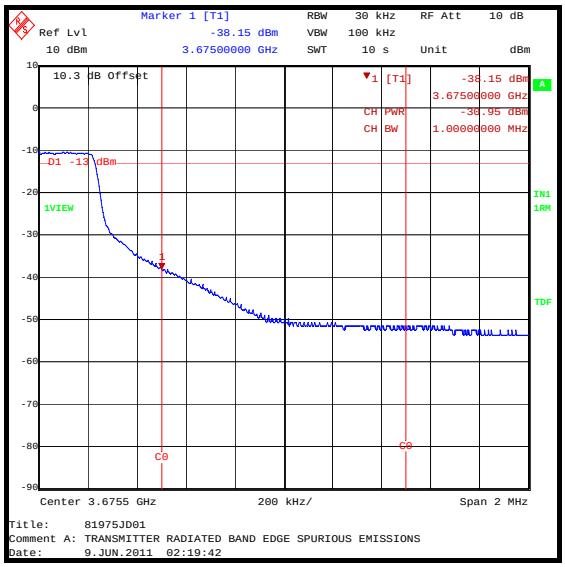
1. Tests were initially performed with a 1 MHz resolution bandwidth (RBW). Where the band edge limit was exceeded on the bottom/top channels using a 1 MHz measurement bandwidth, the EUT was retested using the channel power function of the spectrum analyser centred on the 1 MHz block immediately below/above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

Transmitter Band Edge Radiated Emissions (continued)

Results: 5 MHz 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

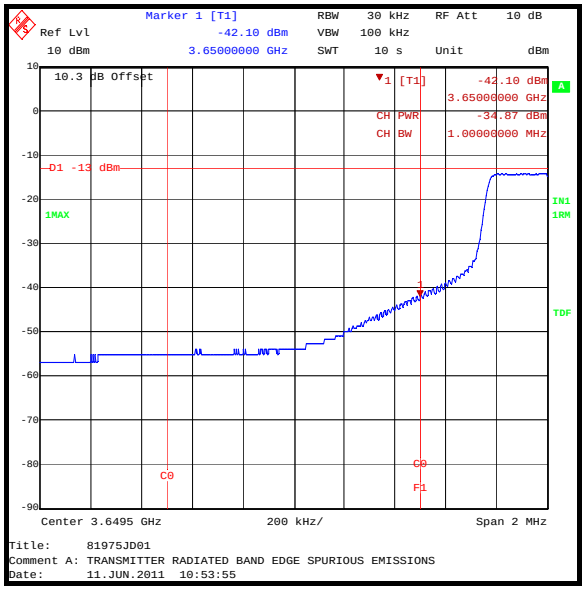


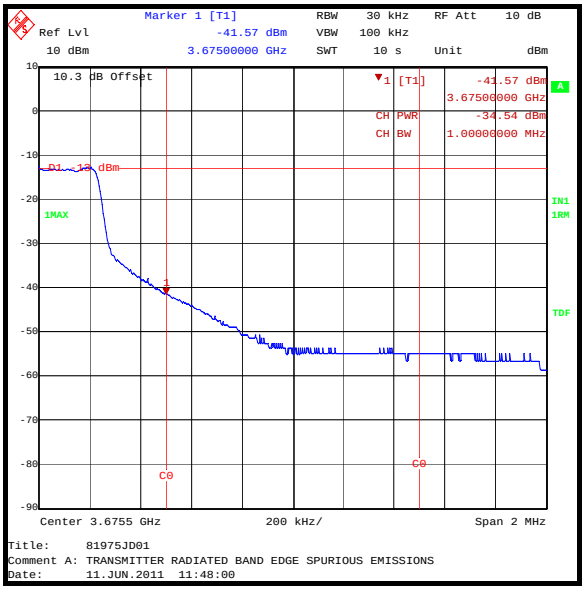


Transmitter Band Edge Radiated Emissions (continued)

Results: 5 MHz 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

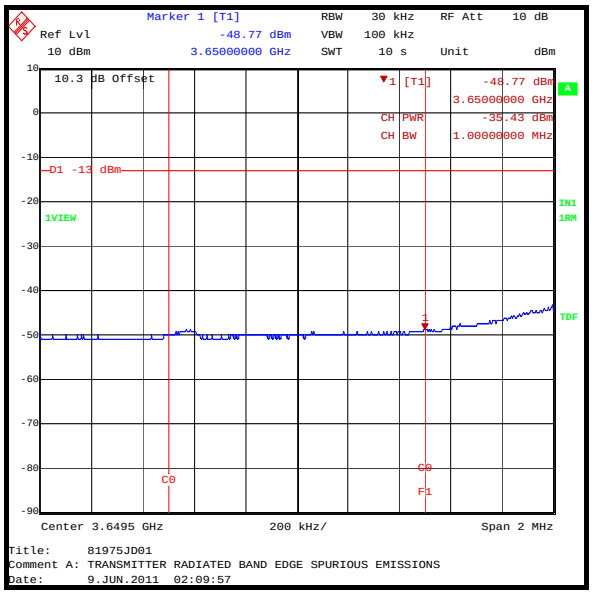


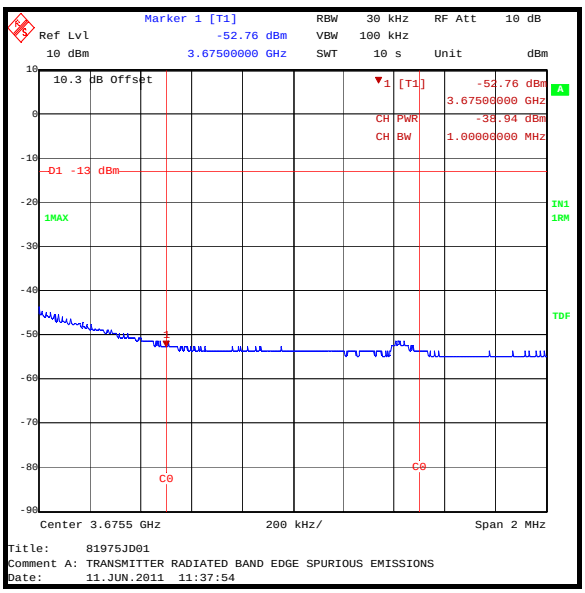


Transmitter Band Edge Radiated Emissions (continued)

Results: 10 MHz 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

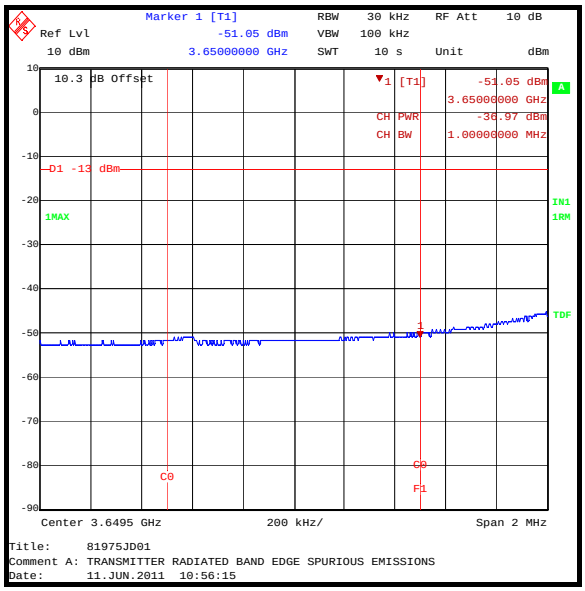


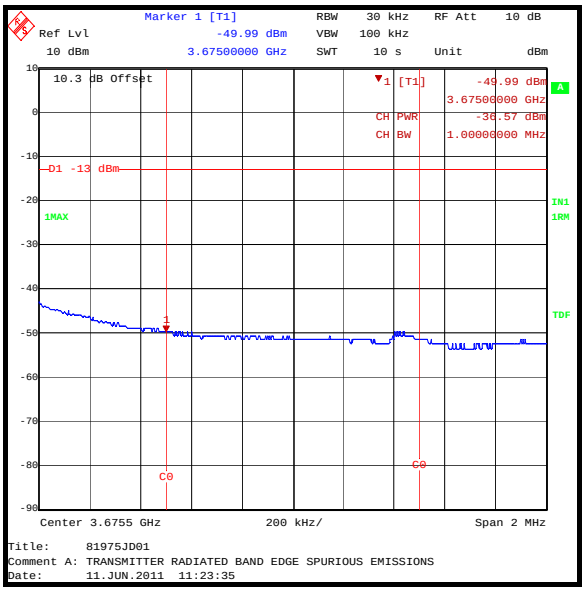


Transmitter Band Edge Radiated Emissions (continued)

Results: 10 MHz 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





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)	3650 MHz to 3675 MHz	95%	±2.94 dB
Transmitter Power Output Density	3650 MHz to 3675 MHz	95%	±2.94 dB
Transmitter Conducted Emissions Mask	3650 MHz to 3675 MHz	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	757456	6820.17.B	06 Jul 2011	12
A1396	Attenuator	Huber & Suhner	757987	6810.17.B	06 Jul 2011	12
A1534	Pre Amplifier	Hewlett Packard	8449B	3008A00405	20 Jun 2012	12
A1818	Antenna	EMCO	3115	00075692	05 Sep 2011	12
A1830	Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100668	05 Mar 2012	12
A1834	Attenuator	Hewlett Packard	8491B	10444	30 Jun 2011	12
A1980	High Pass Filter	Atlan TecRF	AFH-06000	09110900303	28 Feb 2012	12
A1981	High Pass Filter	AtlanTecRF	AFH-05000	09110200090	28 Feb 2012	12
A203	Antenna	Flann	22240-20	343	11 May 2013	36
A253	Antenna	Flann	12240-20	128	05 Sep 2011	12
A255	Antenna	Flann	16240-20	519	05 Sep 2011	12
A256	Antenna	Flann	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	RF Amplifier	Sonoma	310N	230801	30 Jun 2011	12
K0001	5m RSE 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	29 Jun 2012	12
M1269	Multimeter	Fluke	179	90250210	15 Jul 2011	12
M1379	Test Receiver	Rohde & Schwarz	ESIB7	100330	26 Aug 2011	12
M1390	Harmonic Mixer	Farran	WHMP 28	FTL1677B	Calibrated before use	-
S0537	Power Supply	TTI	EL302D	249928	Calibrated before use	-

NB In accordance with UKAS requirements all the measurement equipment is on a calibration schedule. All equipment was within the calibration period on the date of testing.