TEST REPORT
FROM
RFI GLOBAL SERVICES LTD

Test of: Eclipse IRU600, 5.8GHz

FCC ID: VK6-IRU600HB

To: FCC Part 15.247: 2009 Subpart C

Test Report Serial No:
RFI-RPT-RP78289JD10B

Version 3.0 supersedes all previous versions

This Test Report Is Issued Under The Authority Of Scott D'Adamo, Operations Manager Global Approvals:	
Checked By:	Nigel Davison
Signature:	
Date of Issue:	29 September 2010

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Registered in England and Wales. Company number:2117901

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1. Customer Information

Company Name:	Aviat Networks
Address:	4 Bell Drive Hamilton International Technology Park Blantyre, Lanarkshire Scotland G72 0FB

2. Summary of Testing

2.1. General Information

Specification Reference:	47CFR15.247
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications) 2009: Part 15 Subpart C (Intentional Radiators) - Section 15.247
Specification Reference:	47CFR15.107 and 47CFR15.109
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications) 2009: Part 15 Subpart B (Unintentional Radiators) - Sections 15.107 and 15.109
Specification Reference:	47CFR15.207 and 47CFR15.209
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications) 2009: Part 15 Subpart C (Intentional Radiators) - Sections 15.207 and 15.209
Site Registration:	FCC: 209735
Location of Testing:	RFI Global Services Ltd, Wade Road, Basingstoke, Hampshire, RG24 8AH.
Test Dates:	21 July 2010 to 23 September 2010

2.2. Summary of Test Results

FCC Reference (47CFR)	Measurement	Result
Part 15.207	Transmitter AC Conducted Emissions	✓
Part 15.247(a)(2)	Transmitter Minimum 6 dB Bandwidth	✓
Part 15.247(a)(1)	Transmitter 20 dB Bandwidth	✓
Part 15.247(a)(1)	Transmitter Peak Power Spectral Density	✓
Part 15.247(b)(3)	Transmitter Maximum Average Output Power	✓
Part 15.247(d) & 15.209(a)	Transmitter Radiated Emissions	✓
Part 15.247(d) & 15.209(a)	Transmitter Band Edge Conducted Emissions	✓
Part 15.247(d) & 15.209(a)	Transmitter Band Edge Radiated Emissions	✓

Key to Results

✓ = Complied ✗ = Did not comply

Notes:

1) The customer declared that there is no idle mode and that the EUT goes into transceive mode as soon as it is powered up.

2.3. Methods and Procedures

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)

Brand Name:	Aviat Networks
Model Name or Number:	Eclipse IRU600, 5.8GHz (high band)
Serial Number(s):	ZLS10040050
Hardware Version Number:	Not Supplied
Software Version Number:	5.01.44
FCC ID::	VK6-IRU600HB

3.2. Description of EUT

The equipment under test was a 5.8GHz microwave radio unit.

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:	*Microwave Fixed Link System*			
Power Supply Requirement:	Nominal	-48 V		
Type of Unit:	Transceiver			
Channel Spacing:	3.75MHz, 5MHz, 10MHz, 30MHz			
Modulation:	32QAM	64QAM	128QAM	256QAM
Maximum Transmit EIRP:	29.0 dBm (Conducted) / 64.0dBm (Radiated)			
Duty Cycle	100%			
Antenna Gain Tested	35dBi			
Transmit Frequency:	Spot tuned frequencies 5805 and 5835MHz			
Transmit Channels Tested: (High Band)	**Channel ID**		**Channel Frequency (MHz)**	
	Bottom		5805	
	Top		5835	
Receive Frequency Range:	5470MHz to 5770MHz			

*Note. The EUT is a single channel device but can be configured to operate at either of the channels shown above by changing filter sections.

3.5. Support Equipment

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

Description:	4ft parabolic antenna, 35dBi gain
Brand Name:	Andrew Antennas
Model Name or Number:	HP4-57W-P3A/A
Serial Number:	10ACZ10602232

Description:	8 port network switch
Brand Name:	Belkin
Model Name or Number:	#F5D5131-8
Serial Number:	V3000uk

Description:	Laptop
Brand Name:	Dell
Model Name or Number:	Latitude D600
Serial Number:	CN-0G5152-48643-42D-3710

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 transmitting each of the specified modulation schemed listed in section 3.4

4.2. Configuration and Peripherals

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

- The EUT was placed into a continuous transmit mode, with the appropriate modulation scheme enabled, using a bespoke software application which was supplied by the customer.
- For radiated emissions test a smaller 4 foot parabolic antenna of the same type as the 12 foot parabolic dish that would be used in the field was tested. This was done in accordance with FCC guidance tracking not number 450912 which states a smaller antenna can be used of the same type installed with data being extrapolated up the specification of the actual antenna.
- The antenna gain for the antenna tested was 35 dBi, the antenna gain for the 15 foot end product is 46.8 dBi, as such, the difference being 11.8 dB. There were no radiated emissions found from the EUT above 1GHz either from the cabinet or the antenna and as such there was no need to add the 11.8 dB correction.

  The radiated band edge level was found to be similar to the conducted band edge minus the 3 meter path loss. The antenna made no difference even with its high level of gain. The reason being that at 3 meters the antenna has no gain and for a 15 foot dish this would even more so the case as a dish antenna must propagate a certain distance before any measurable gain becomes apparent. This fact was also proven through substitution where the signal put into the antenna was the same radiated minus path losses. It was no possible to correctly measure the radiated band edge with any degree of confidence. It was thus deemed that a worse case approach was the best way forward where by the conducted band edge level would be used with the antenna gain added and the path loss for 3 meters taken off. Note that the measurement is made relative to the carrier due to the fact none of the band edges reside in a restricted band the path loss or antenna gain have no bearing on the final measurement as the band edge level will move relative to the peak level.
- The EUT cannot be aligned over the frequency band of operation directly. In order to achieve the required channel the device is tuned to it through software and by replacing a filter section. The client advised the FCC have agreed that the client may select channels by switching the filters and tuning of the EUT.

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. Transmitter AC Conducted Spurious Emissions

Test Summary:

Test Engineer:	Nick Steele	**Test Date:**	29 July 2010
Test Sample Serial No:	ZLS10040050		

FCC Part:	15.207
Test Method Used:	As detailed in ANSI C63.10 Section 6.2 referencing ANSI C63.4

Environmental Conditions:

Temperature (°C):	26
Relative Humidity (%):	31

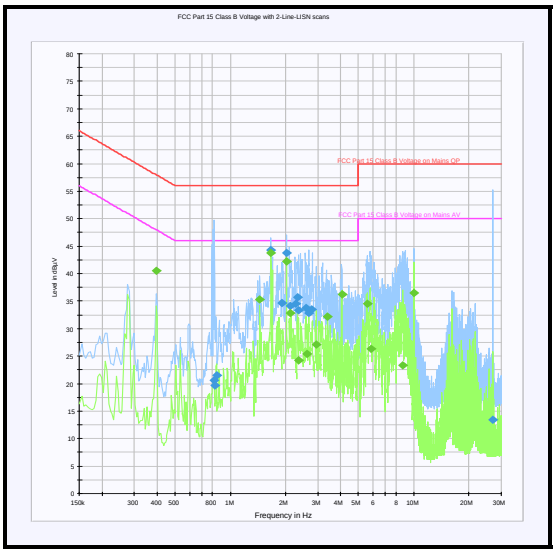
Results: Quasi Peak

Frequency (MHz)	Line	Level (dBµV)	Limit (dBµV)	Margin (dB)	Result
0.816000	Live 1	20.6	56.0	35.4	Complied
0.820500	Live 1	19.7	56.0	36.3	Complied
0.843000	Live 1	21.5	56.0	34.5	Complied
1.662000	Live 1	44.3	56.0	11.7	Complied
1.905000	Neutral	34.6	56.0	21.4	Complied
2.026500	Live 1	43.8	56.0	12.2	Complied
2.125500	Neutral	34.2	56.0	21.8	Complied
2.274000	Neutral	34.5	56.0	21.5	Complied
2.328000	Neutral	35.7	56.0	20.3	Complied
2.368500	Neutral	33.3	56.0	22.7	Complied
2.584500	Live 1	33.8	56.0	22.2	Complied
2.679000	Live 1	32.8	56.0	23.2	Complied
2.782500	Neutral	33.5	56.0	22.5	Complied
27.037500	Live 1	13.5	60.0	46.5	Complied

Transmitter AC Conducted Spurious Emissions (continued)

Results: Average

Frequency (MHz)	Line	Level (dBµV)	Limit (dBµV)	Margin (dB)	Result
0.393000	Live 1	40.5	48.0	7.5	Complied
1.450500	Neutral	35.3	46.0	10.7	Complied
1.662000	Live 1	43.8	46.0	2.2	Complied
2.026500	Live 1	42.3	46.0	3.7	Complied
2.121000	Neutral	32.8	46.0	13.2	Complied
2.359500	Live 1	24.2	46.0	21.8	Complied
2.607000	Live 1	25.4	46.0	20.6	Complied
2.940000	Live 1	27.1	46.0	18.9	Complied
3.394500	Neutral	32.2	46.0	13.8	Complied
4.056000	Live 1	36.2	46.0	9.8	Complied
5.559000	Neutral	34.5	50.0	15.5	Complied
5.824500	Neutral	26.3	50.0	23.7	Complied
8.718000	Neutral	23.3	50.0	26.7	Complied
10.000500	Neutral	36.5	50.0	13.5	Complied



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

Transmitter AC Conducted Spurious Emissions (continued)

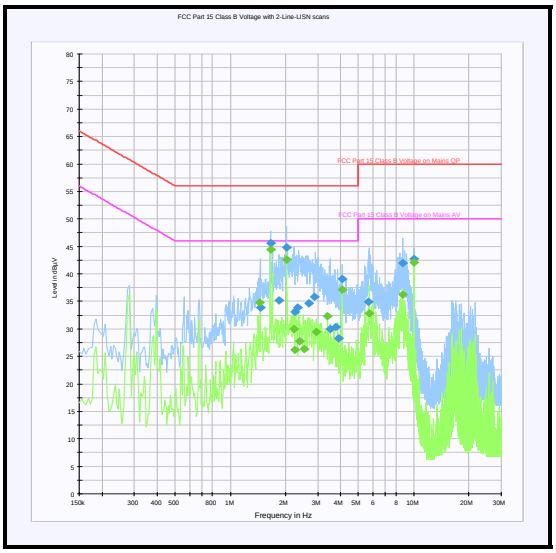
Results: Quasi Peak

Frequency (MHz)	Line	Level (dBμV)	Limit (dBμV)	Margin (dB)	Result
1.455000	Neutral	33.9	56.0	22.1	Complied
1.662000	Live 1	45.6	56.0	10.4	Complied
1.837500	Neutral	35.2	56.0	20.8	Complied
2.026500	Live 1	44.9	56.0	11.1	Complied
2.251500	Neutral	33.1	56.0	22.9	Complied
2.332500	Live 1	33.9	56.0	22.1	Complied
2.683500	Live 1	34.6	56.0	21.4	Complied
2.877000	Neutral	35.8	56.0	20.2	Complied
3.520500	Neutral	30.0	56.0	26.0	Complied
3.736500	Neutral	30.4	56.0	25.6	Complied
3.903000	Neutral	28.3	56.0	27.7	Complied
4.056000	Neutral	39.1	56.0	16.9	Complied
5.667000	Live 1	34.9	60.0	25.1	Complied
8.718000	Neutral	42.0	60.0	18.0	Complied
10.000500	Live 1	42.7	60.0	17.3	Complied

Transmitter AC Conducted Spurious Emissions (continued)

Results: Average

Frequency (MHz)	Line	Level (dBµV)	Limit (dBµV)	Margin (dB)	Result
1.450500	Neutral	34.8	46.0	11.2	Complied
1.662000	Neutral	44.4	46.0	1.6	Complied
2.026500	Live 1	42.6	46.0	3.4	Complied
2.211000	Neutral	30.0	46.0	16.0	Complied
2.247000	Live 1	26.2	46.0	19.8	Complied
2.395500	Live 1	27.8	46.0	18.2	Complied
2.539500	Live 1	26.3	46.0	19.7	Complied
2.944500	Live 1	29.4	46.0	16.6	Complied
3.390000	Live 1	32.3	46.0	13.7	Complied
4.056000	Neutral	37.1	46.0	8.9	Complied
5.743500	Live 1	32.8	50.0	17.2	Complied
8.718000	Live 1	36.2	50.0	13.8	Complied
10.000500	Neutral	42.1	50.0	7.9	Complied



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

5.2.2.Transmitter 6 dB Bandwidth

Test Summary:

Test Engineer:	Nick Steele	**Test Date:**	22 July 2010
Test Sample Serial No:	2		

FCC Part:	15.247(a)(2)
Test Method Used:	As detailed in ANSI C63.10 Section 6.9.1 (see note below)

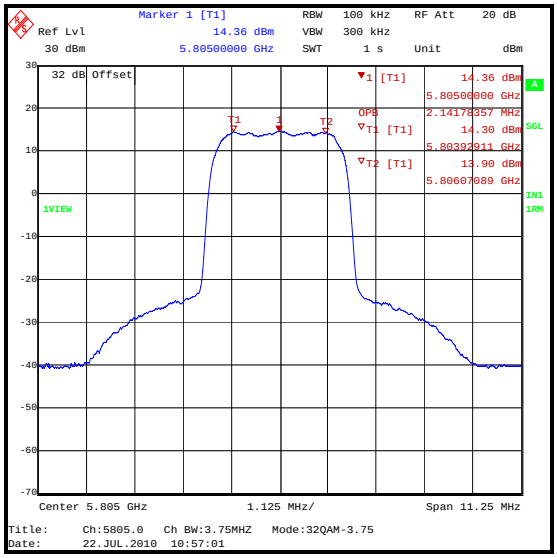
Environmental Conditions:

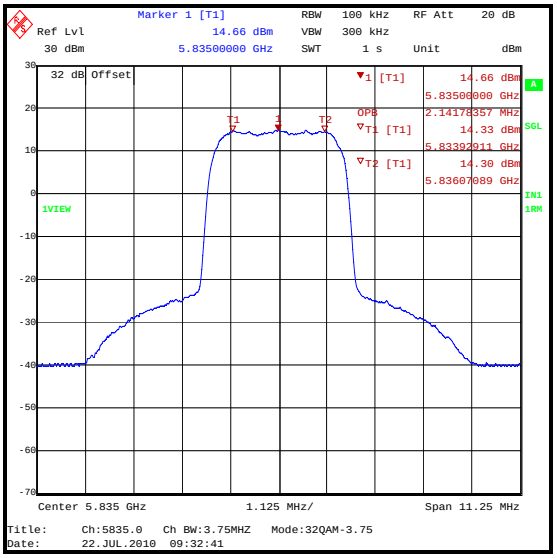
Temperature (°C):	30
Relative Humidity (%):	35

Transmitter 6 dB Bandwidth

Results - 32QAM 3.75MHz:

Channel	6 dB Bandwidth (kHz)
Bottom	2141.784
Top	2141.784

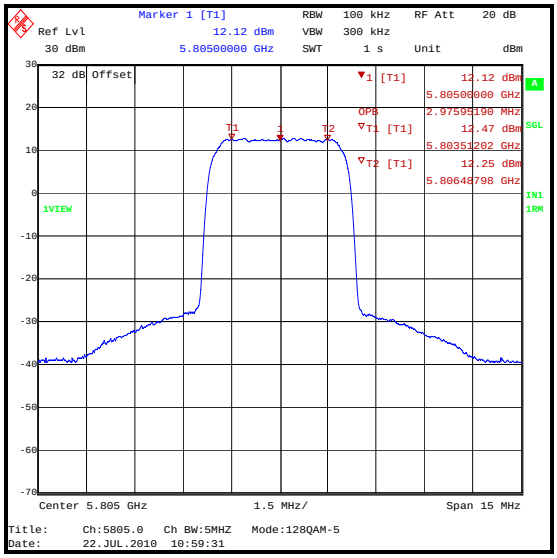


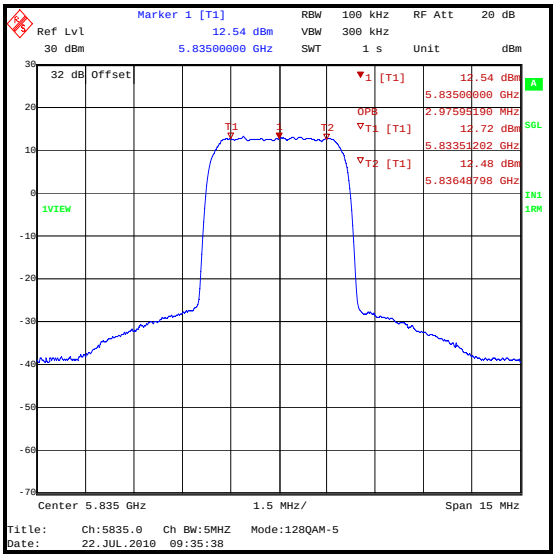


Transmitter 6 dB Bandwidth (continued)

Results - 128QAM 5MHz:

Channel	6 dB Bandwidth (kHz)
Bottom	2975.952
Top	2975.952

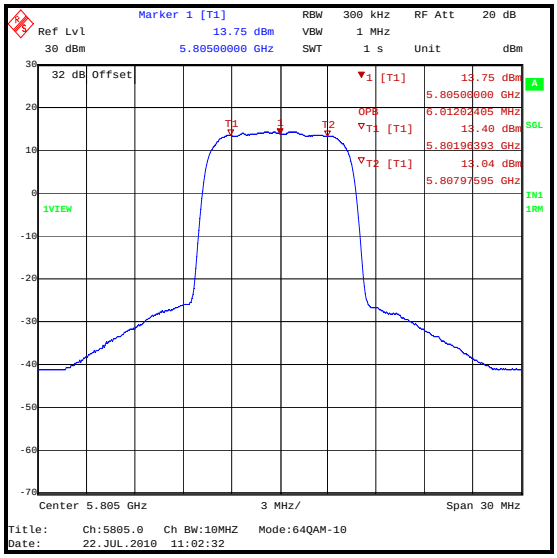


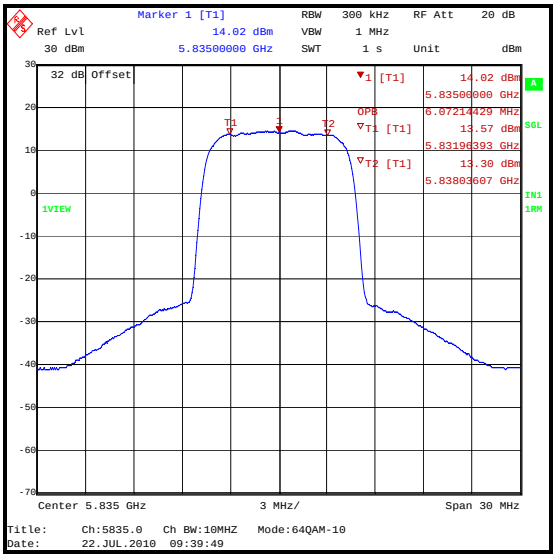


Transmitter 6 dB Bandwidth (continued)

Results - 64QAM 10MHz:

Channel	6 dB Bandwidth (kHz)
Bottom	6012.024
Top	6072.144

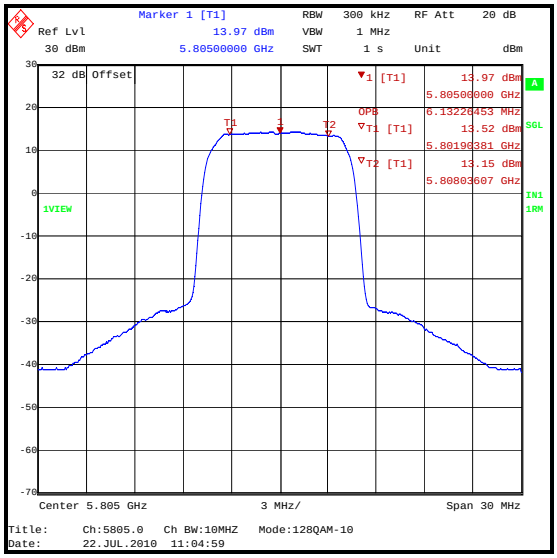


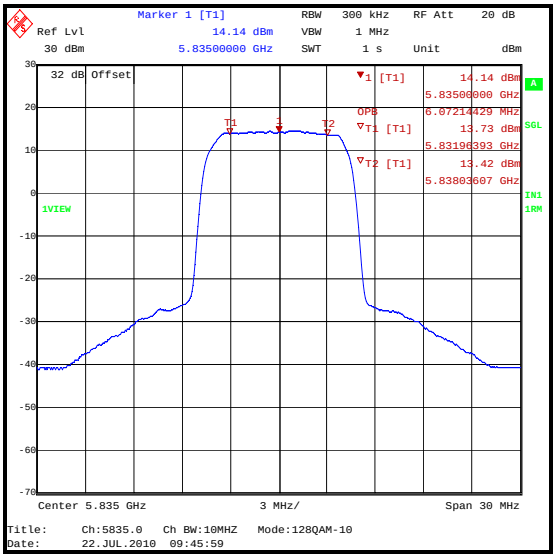


Transmitter 6 dB Bandwidth (continued)

Results - 128QAM 10MHz:

Channel	6 dB Bandwidth (kHz)
Bottom	6132.264
Top	6072.144

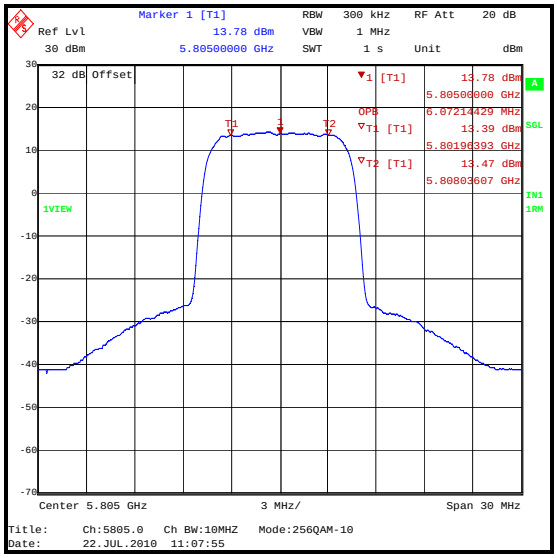


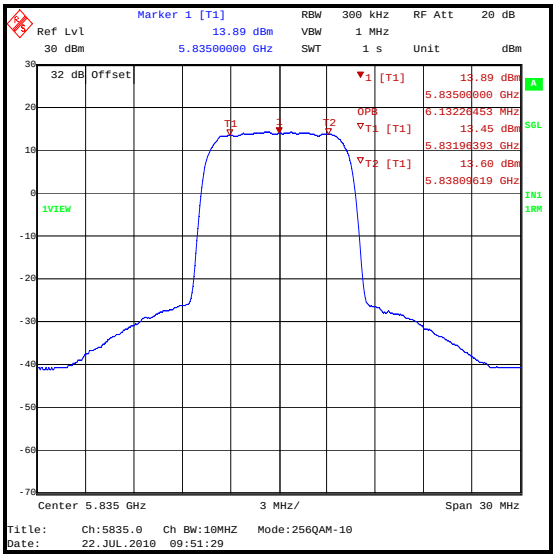


Transmitter 6 dB Bandwidth (continued)

Results - 256QAM 10MHz:

Channel	6 dB Bandwidth (kHz)
Bottom	6072.144
Top	6132.265

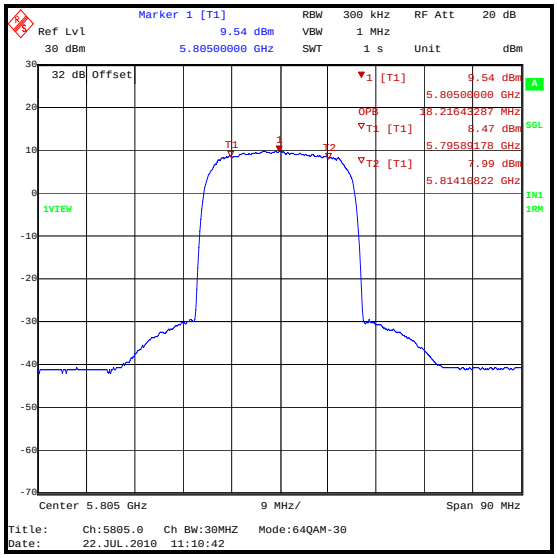


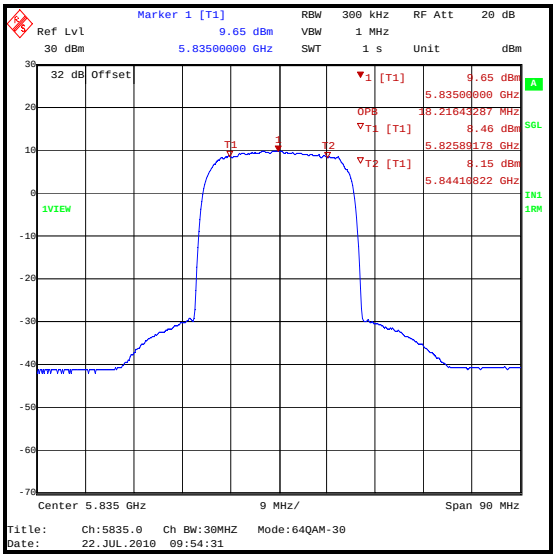


Transmitter 6 dB Bandwidth (continued)

Results - 64QAM 30MHz:

Channel	6 dB Bandwidth (kHz)
Bottom	18216.433
Top	18216.433

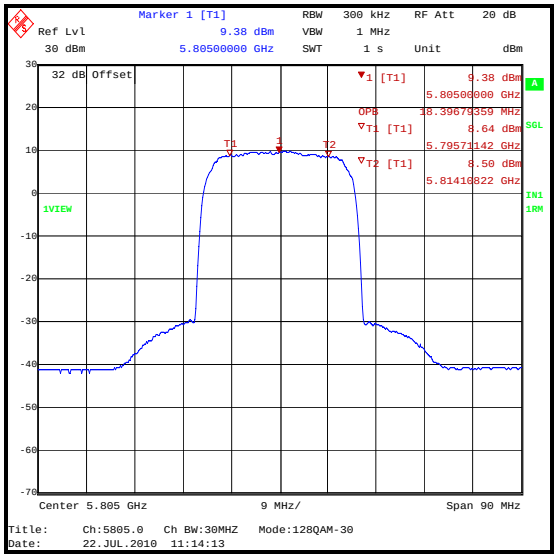


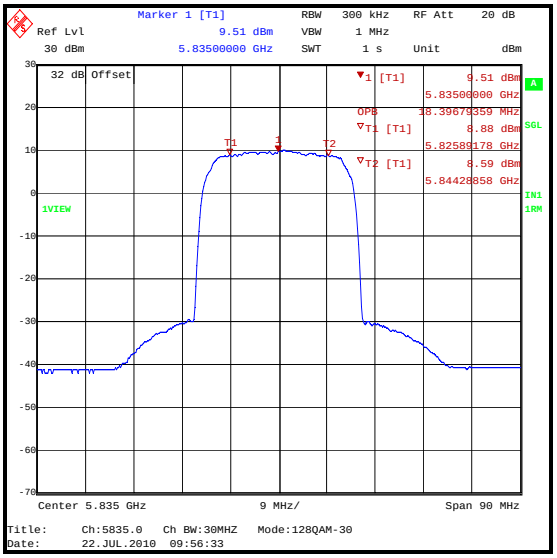


Transmitter 6 dB Bandwidth (continued)

Results - 128QAM 30MHz:

Channel	6 dB Bandwidth (kHz)
Bottom	18396.794
Top	18396.794

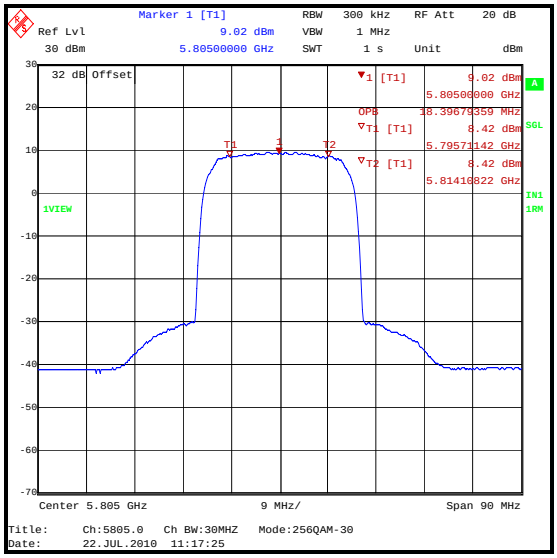


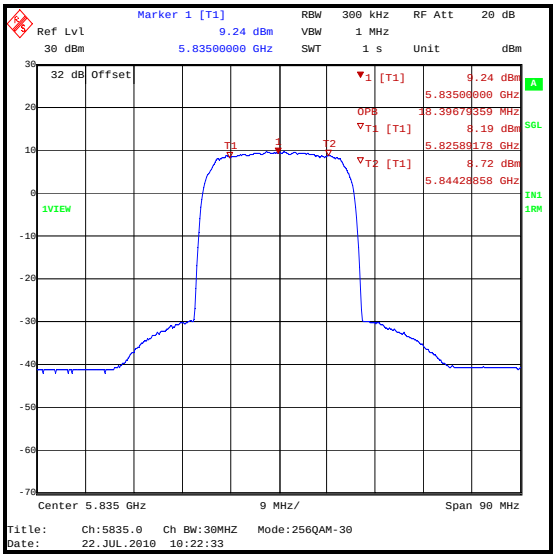


Transmitter 6 dB Bandwidth (continued)

Results - 256QAM 30MHz:

Channel	6 dB Bandwidth (kHz)
Bottom	18396.794
Top	18396.794

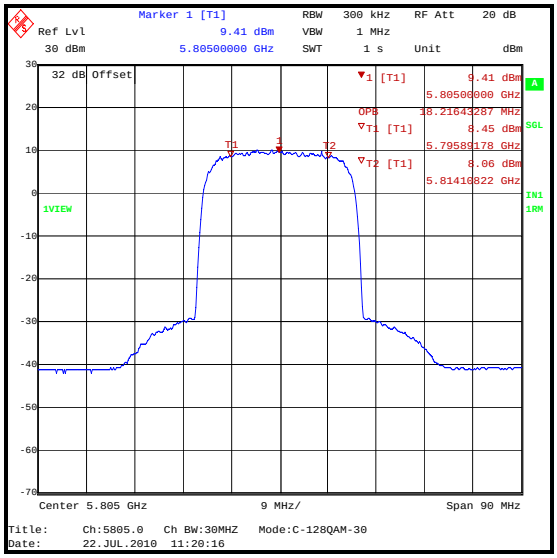


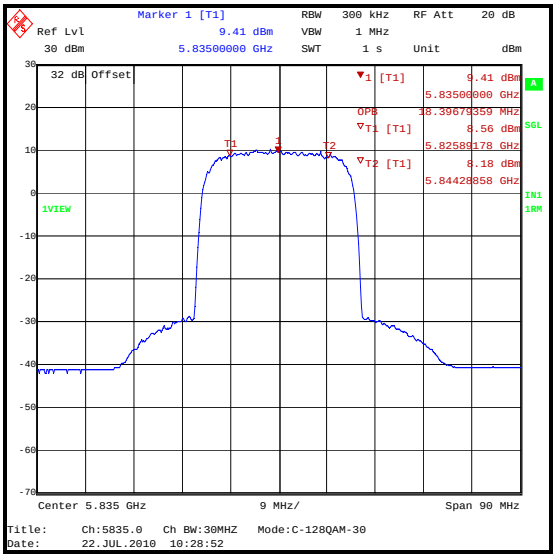


Transmitter 6 dB Bandwidth (continued)

Results - C128QAM 30MHz:

Channel	6 dB Bandwidth (kHz)
Bottom	18216.433
Top	18396.794





5.2.3.Transmitter 20 dB Bandwidth

Test Summary:

Test Engineer:	Nick Steele	**Test Date:**	22 July 2010
Test Sample Serial No:	2		

FCC Part:	15.247(a)(1)
Test Method Used:	As detailed in ANSI C63.10 Section 6.9.1 (see note below)

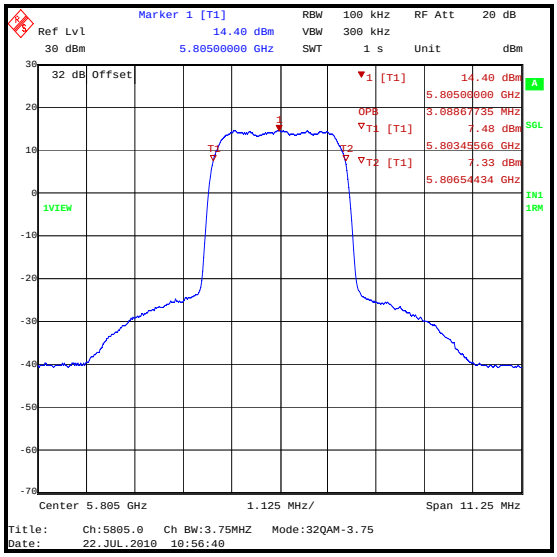
Environmental Conditions:

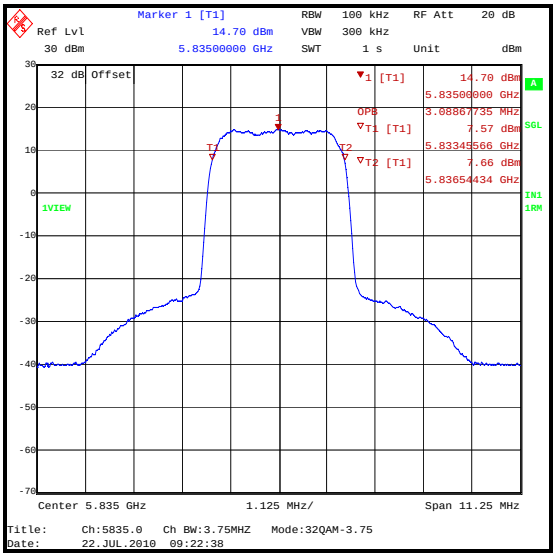
Temperature (°C):	30
Relative Humidity (%):	35

Transmitter 20 dB Bandwidth (continued)

Results - 32QAM 3.75MHz:

Channel	20 dB Bandwidth (kHz)
Bottom	3088.677
Top	3088.677

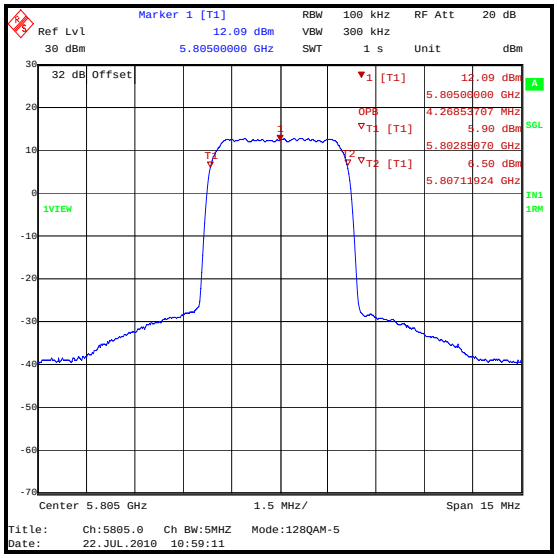


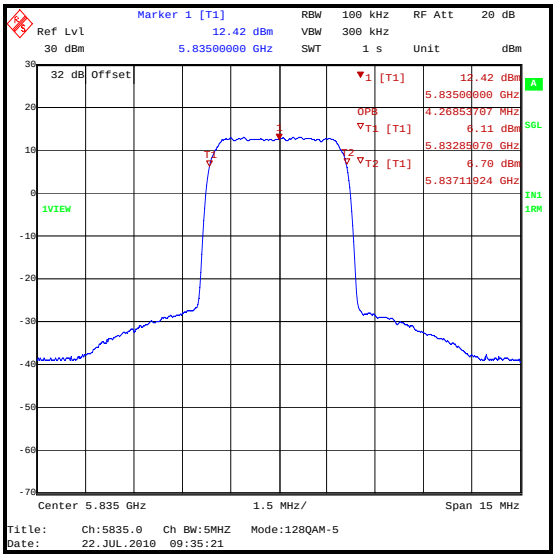


Transmitter 20 dB Bandwidth (continued)

Results - 128QAM 5MHz:

Channel	20 dB Bandwidth (kHz)
Bottom	4268.537
Top	4268.537

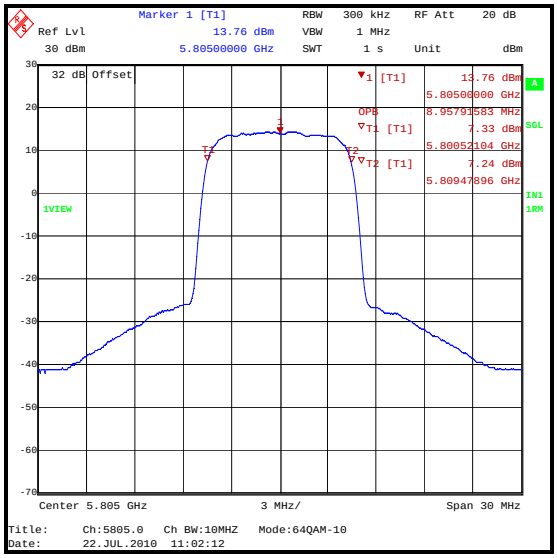


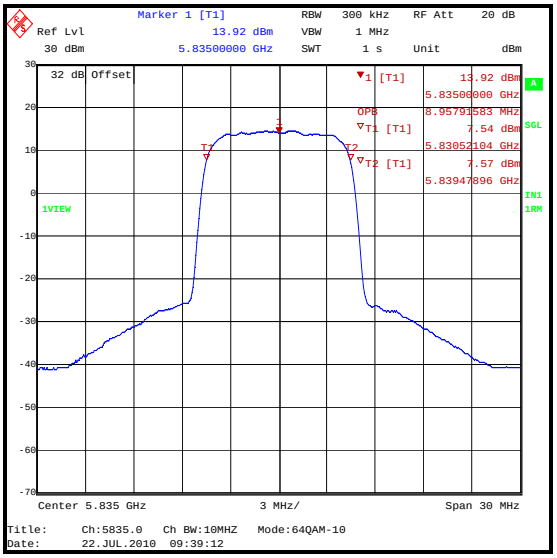


Transmitter 20 dB Bandwidth (continued)

Results - 64QAM 10MHz:

Channel	20 dB Bandwidth (kHz)
Bottom	8957.916
Top	8957.916

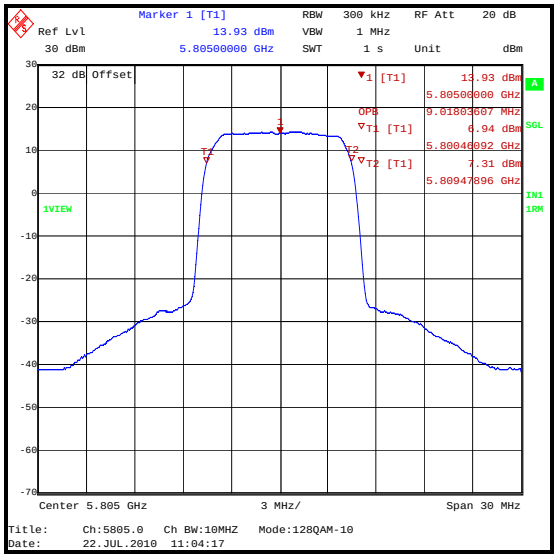


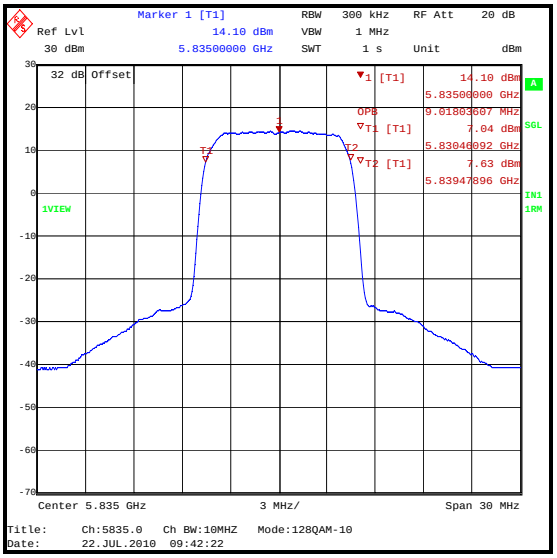


Transmitter 20 dB Bandwidth (continued)

Results - 128QAM 10MHz:

Channel	20 dB Bandwidth (kHz)
Bottom	9018.036
Top	9018.036

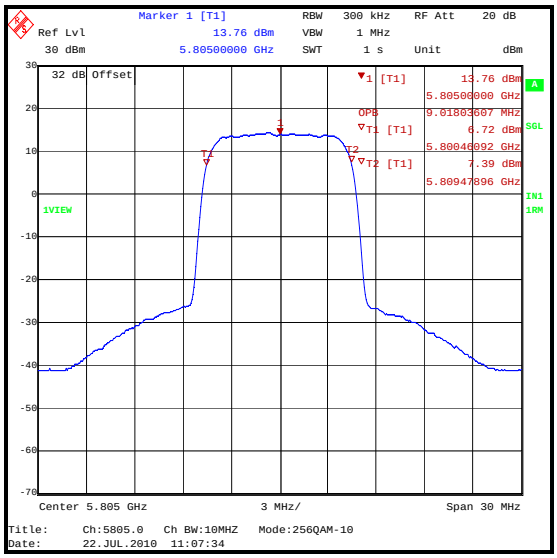


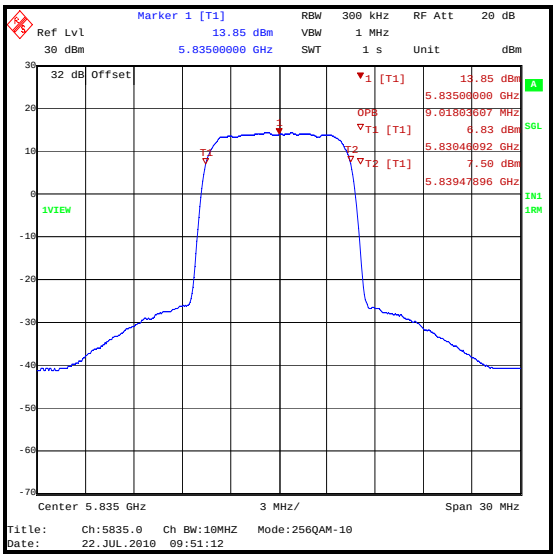


Transmitter 20 dB Bandwidth (continued)

Results - 256QAM 10MHz:

Channel	20 dB Bandwidth (kHz)
Bottom	9018.036
Top	9018.036

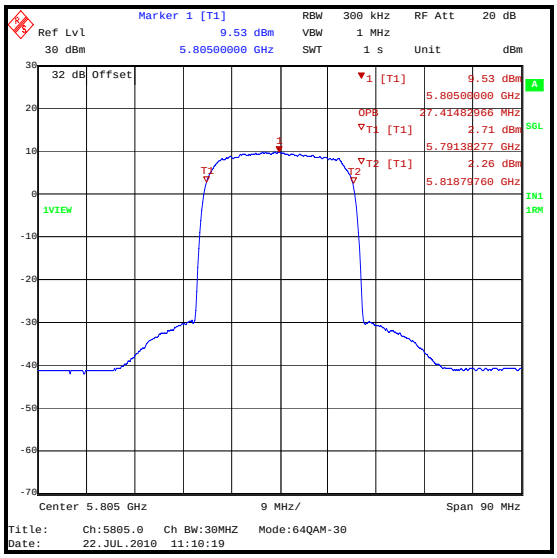


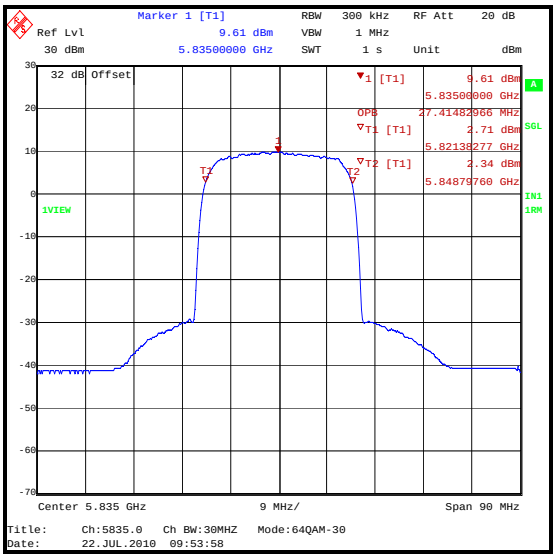


Transmitter 20 dB Bandwidth (continued)

Results - 64QAM 30MHz:

Channel	20 dB Bandwidth (kHz)
Bottom	27414.830
Top	27414.830

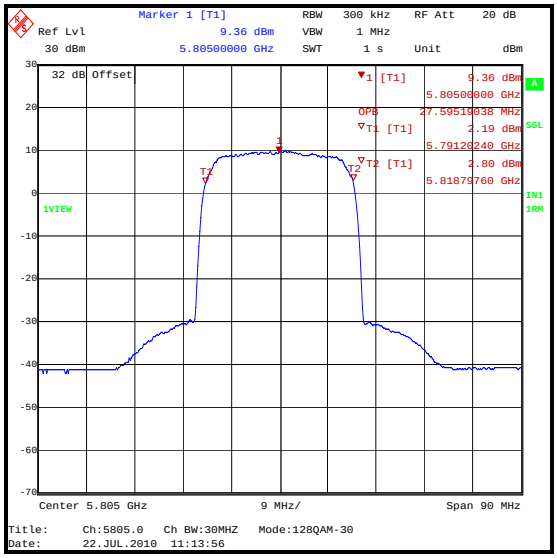


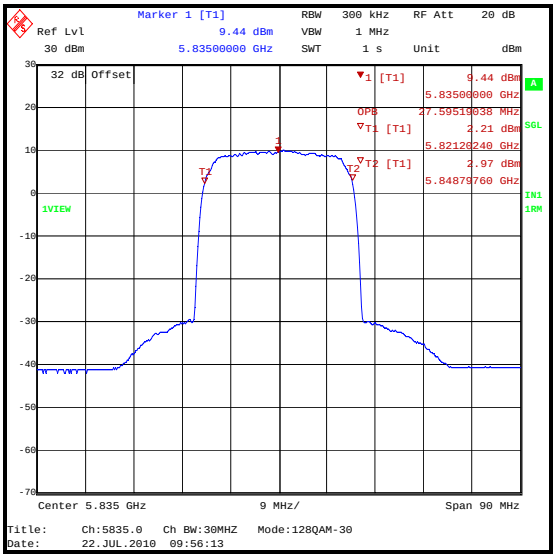


Transmitter 20 dB Bandwidth (continued)

Results - 128QAM 30MHz:

Channel	20 dB Bandwidth (kHz)
Bottom	27595.190
Top	27595.190

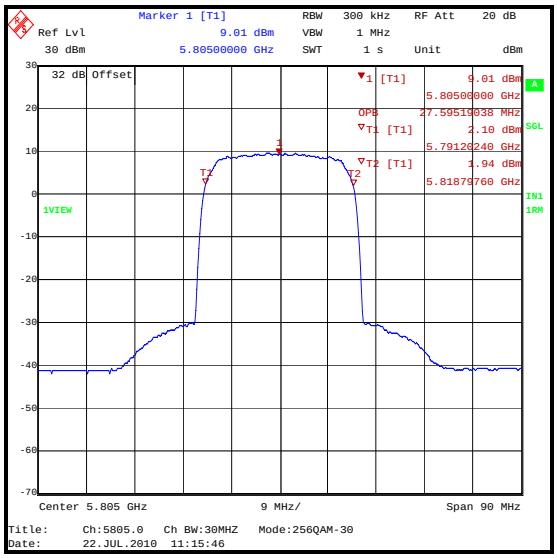


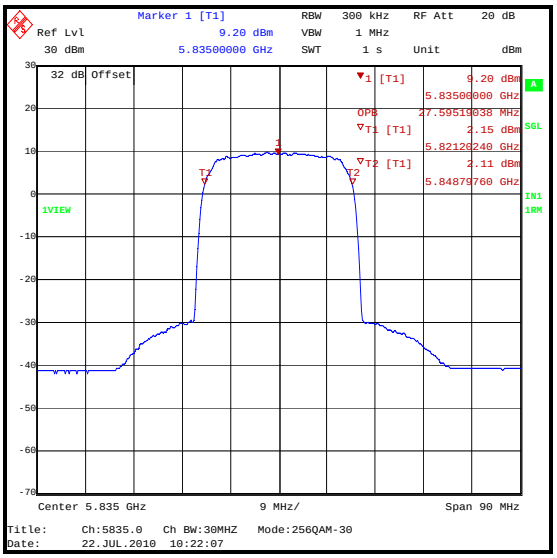


Transmitter 20 dB Bandwidth (continued)

Results - 256QAM 30MHz:

Channel	20 dB Bandwidth (kHz)
Bottom	27595.190
Top	27595.190

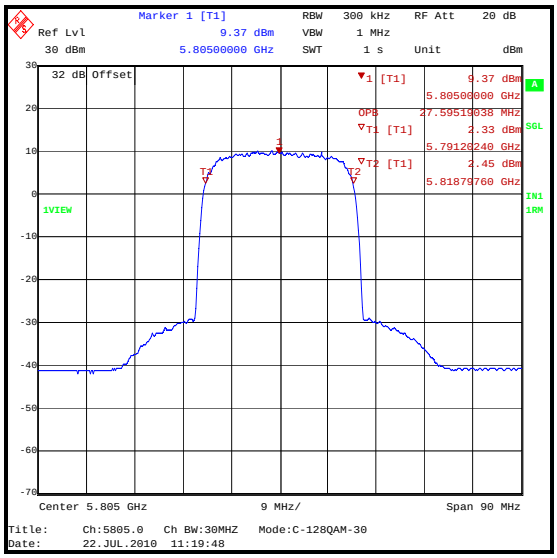


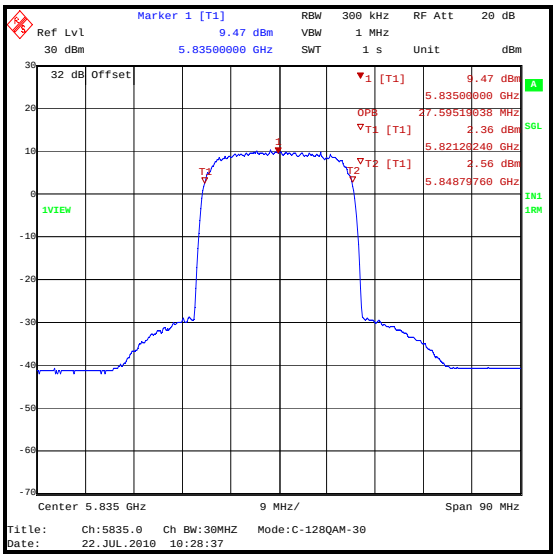


Transmitter 20 dB Bandwidth (continued)

Results - 128QAM 30MHz:

Channel	20 dB Bandwidth (kHz)
Bottom	27595.190
Top	27595.190





Note(s):

1. In lieu of the test method detailed in ANSI C63.10 Section 6.9.1 the 20 dB bandwidth was measured using the Occupied Bandwidth function of the spectrum analyser.

5.2.4. Transmitter Peak Power Density

Test Summary:

Test Engineer:	Nick Steele	**Test Date:**	22 July 2010
Test Sample Serial No:	2		

FCC Part:	15.247(a)(1)
Test Method Used:	The Power Spectral Density was measured by using a spectrum analyzer channel power integration function. This integrated the channel power over the specified 3kHz resulting in PSD dBm/3kHz.

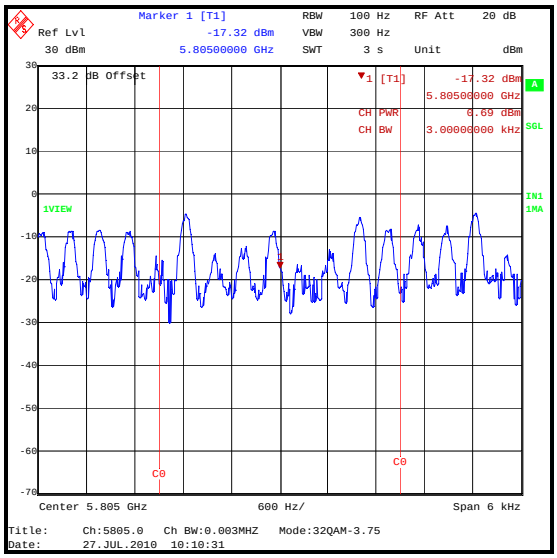
Environmental Conditions:

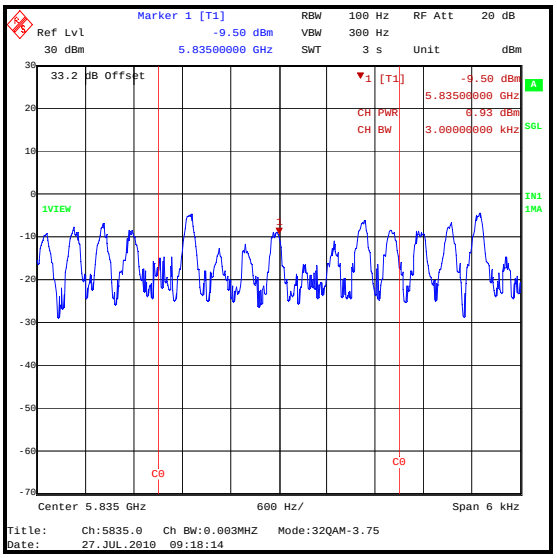
Temperature (°C):	30
Relative Humidity (%):	35

Transmitter Peak Power Density

Results - 32QAM 3.75MHz:

Channel	Output Power (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)	Result
Bottom	0.7	8.0	7.3	Complied
Top	0.9	8.0	7.1	Complied

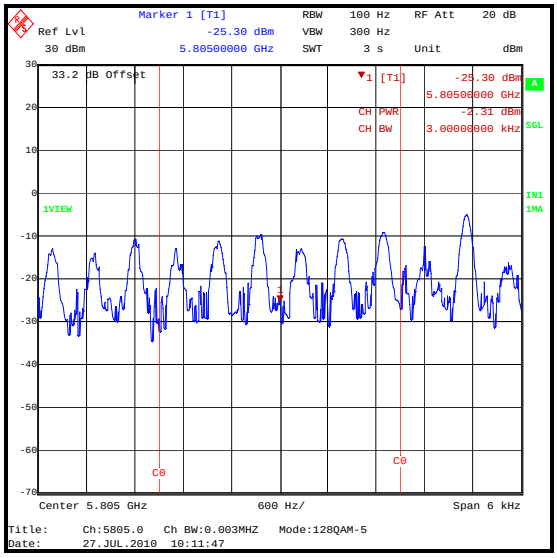


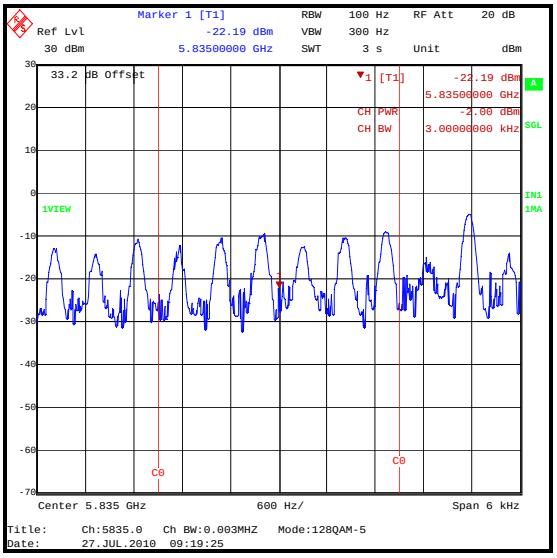


Transmitter Peak Power Density (continued)

Results - 128QAM 5MHz:

Channel	Output Power (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)	Result
Bottom	-2.3	8.0	10.3	Complied
Top	-2.0	8.0	10.0	Complied

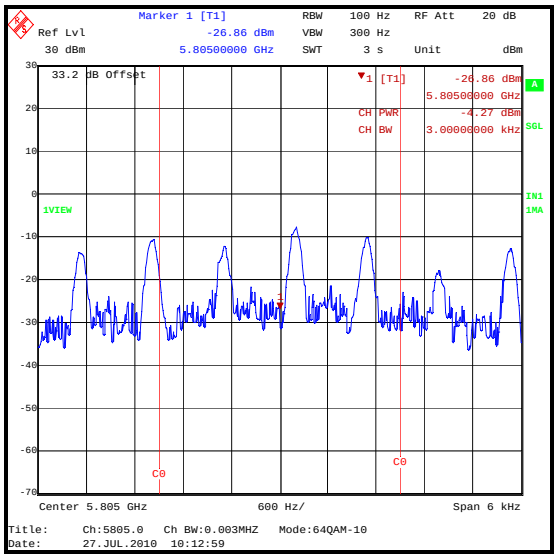


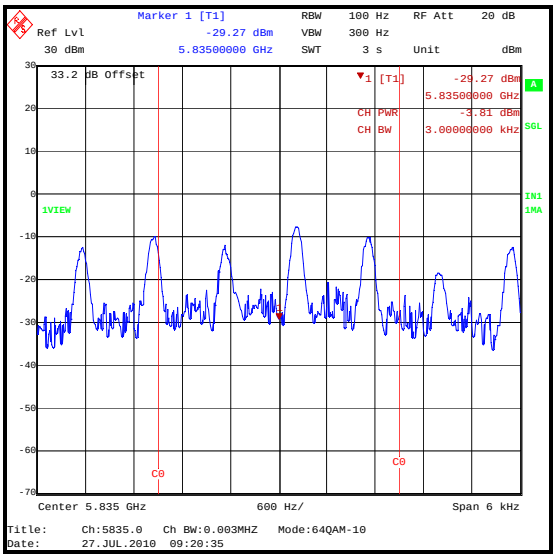


Transmitter Peak Power Density (continued)

Results - 64QAM 10MHz:

Channel	Output Power (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)	Result
Bottom	-4.3	8.0	12.3	Complied
Top	-3.8	8.0	11.8	Complied

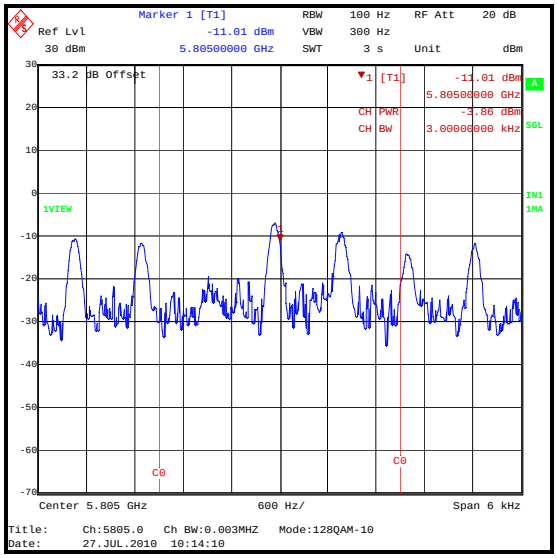


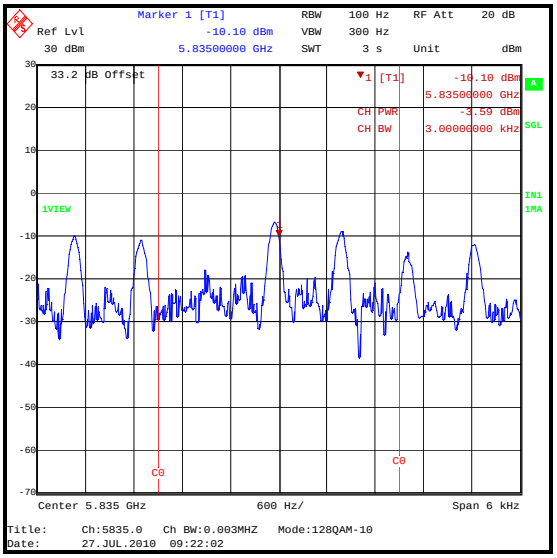


Transmitter Peak Power Density (continued)

Results - 128QAM 10MHz:

Channel	Output Power (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)	Result
Bottom	-3.9	8.0	11.9	Complied
Top	-3.6	8.0	11.6	Complied

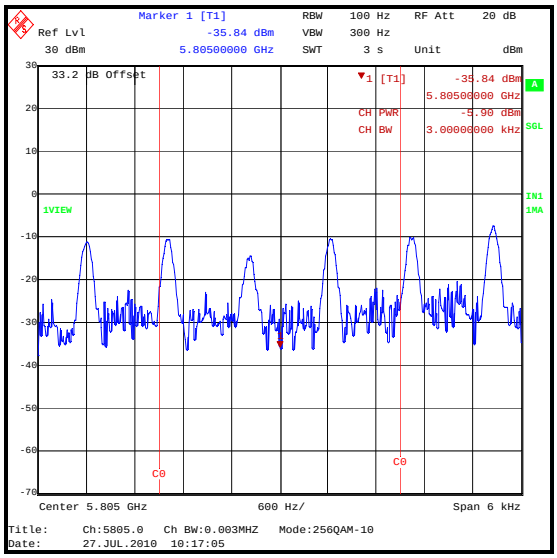


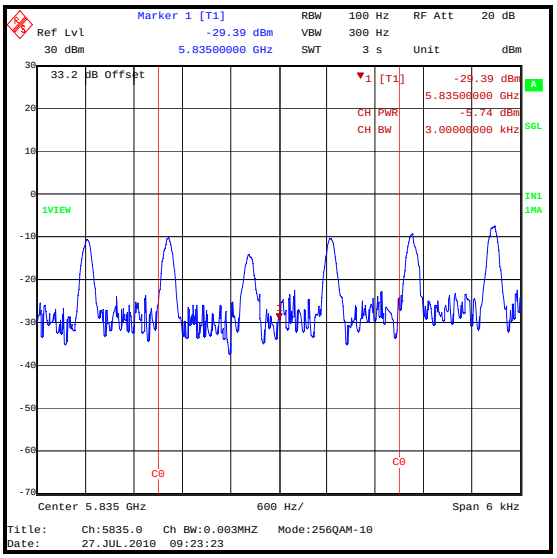


Transmitter Peak Power Density (continued)

Results - 256QAM 10MHz:

Channel	Output Power (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)	Result
Bottom	-5.9	8.0	13.9	Complied
Top	-5.7	8.0	-13.7	Complied

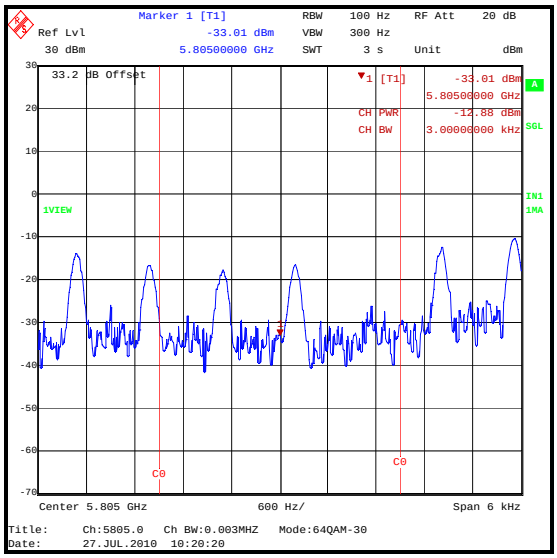


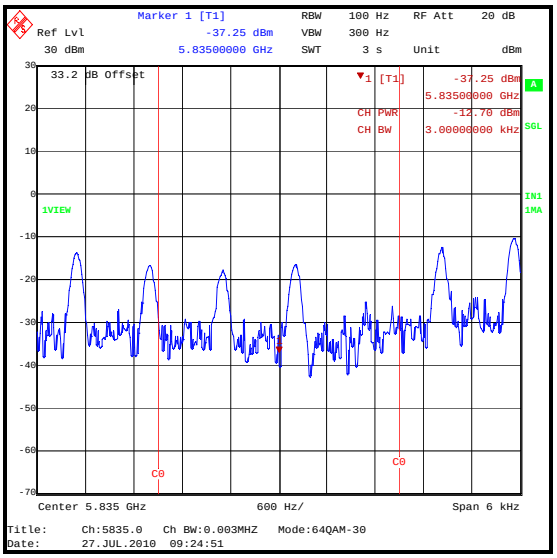


Transmitter Peak Power Density (continued)

Results - 64QAM 30MHz:

Channel	Output Power (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)	Result
Bottom	-12.9	8.0	20.9	Complied
Top	-12.7	8.0	20.7	Complied

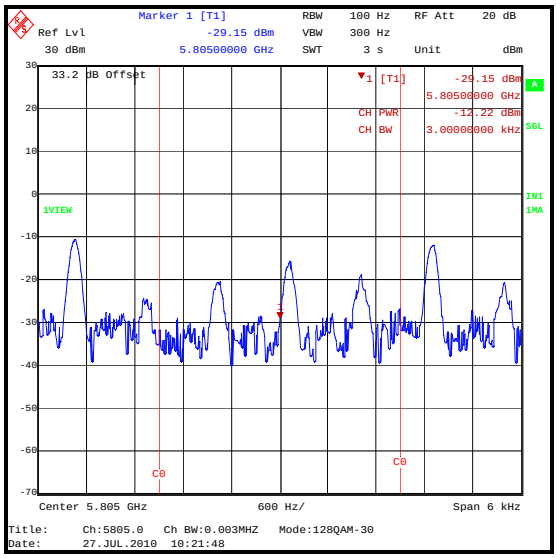


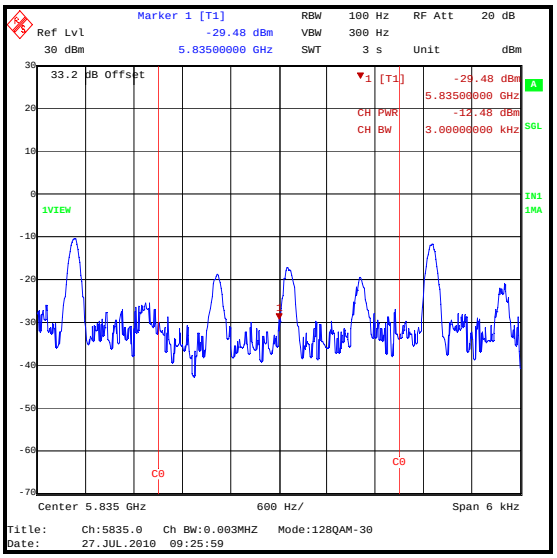


Transmitter Peak Power Density (continued)

Results - 128QAM 30MHz:

Channel	Output Power (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)	Result
Bottom	-12.2	8.0	20.2	Complied
Top	-12.5	8.0	20.5	Complied

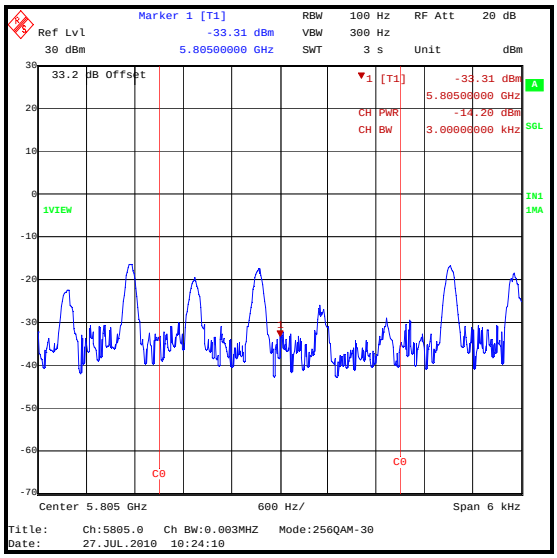


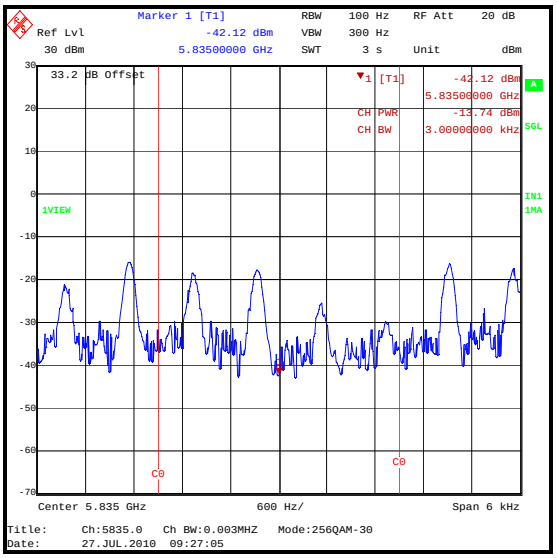


Transmitter Peak Power Density (continued)

Results - 256QAM 30MHz:

Channel	Output Power (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)	Result
Bottom	-14.2	8.0	22.2	Complied
Top	-13.7	8.0	21.7	Complied

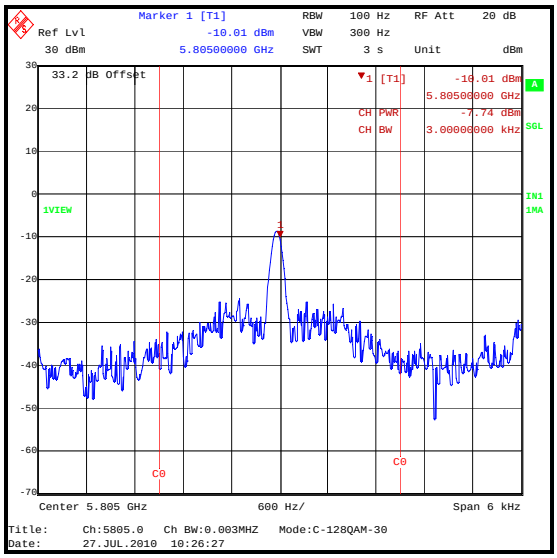


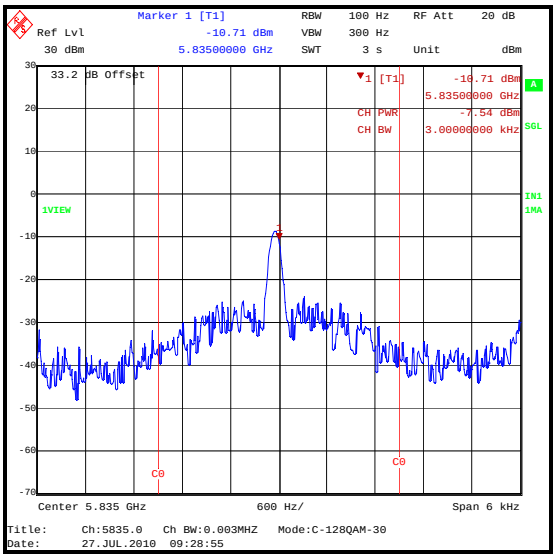


Transmitter Peak Power Density (continued)

Results - C128QAM 30MHz:

Channel	Output Power (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)	Result
Bottom	-7.7	8.0	15.7	Complied
Top	-7.5	8.0	15.5	Complied





5.2.5. Transmitter Maximum Average Output Power

Test Summary:

Test Engineer:	Nick Steele	**Test Date:**	22 July 2010
Test Sample Serial No:	2		

FCC Part:	15.247(b)(3)
Test Method Used:	The Maximum Average Power was measured by using a spectrum analyzer channel power integration function. This integrated the power over the EUT's channel bandwidth resulting in the maximum power for the tested bandwidth. Note the EUT was transmitting on a 100% duty cycle and thus no duty cycle correction factor was applied.

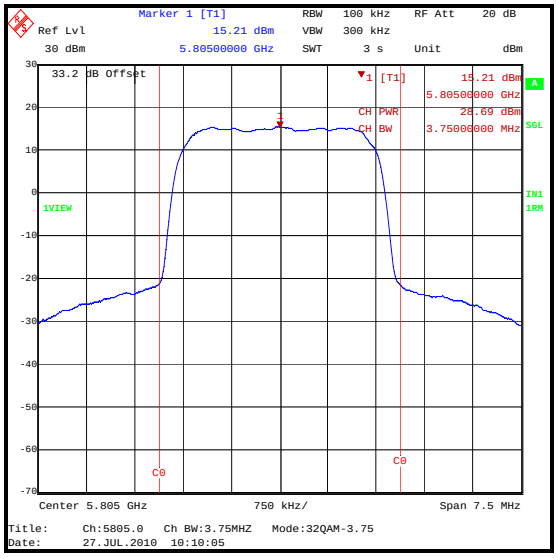
Environmental Conditions:

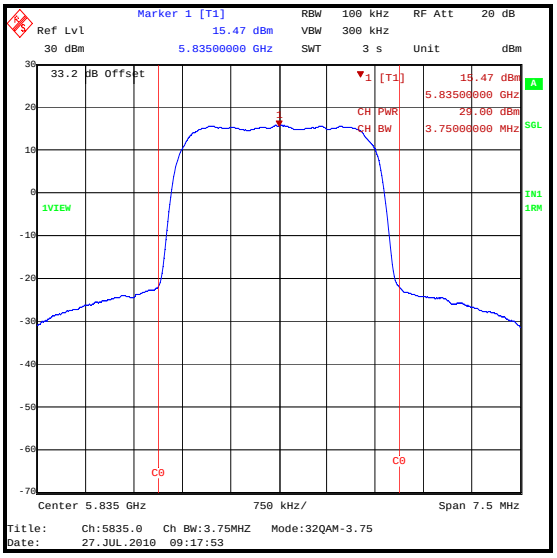
Temperature (°C):	30
Relative Humidity (%):	35

Transmitter Maximum Average Output Power (continued)

Results - 32QAM 3.75MHz:

Channel	Power (dBm)	Limit (dBm)	Margin (dB)	Result
Bottom	28.7	30.0	1.3	Complied
Top	29.0	30.0	1.0	Complied

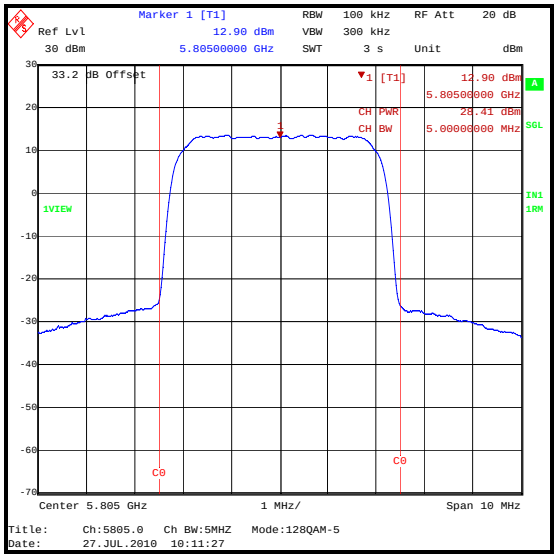


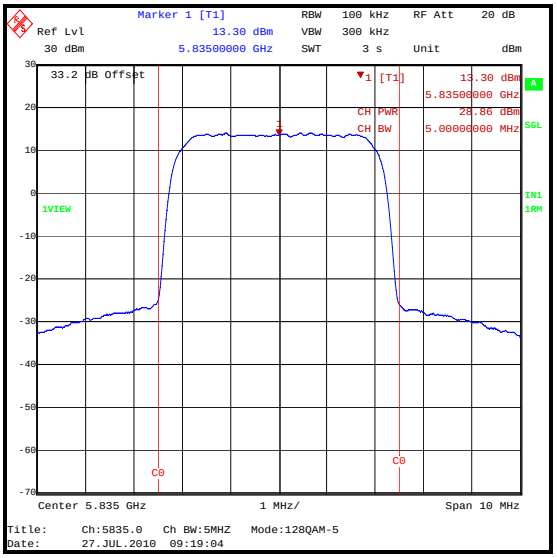


Transmitter Maximum Average Output Power (continued)

Results - 128QAM 5MHz:

Channel	Power (dBm)	Limit (dBm)	Margin (dB)	Result
Bottom	28.4	30.0	1.6	Complied
Top	28.9	30.0	1.1	Complied

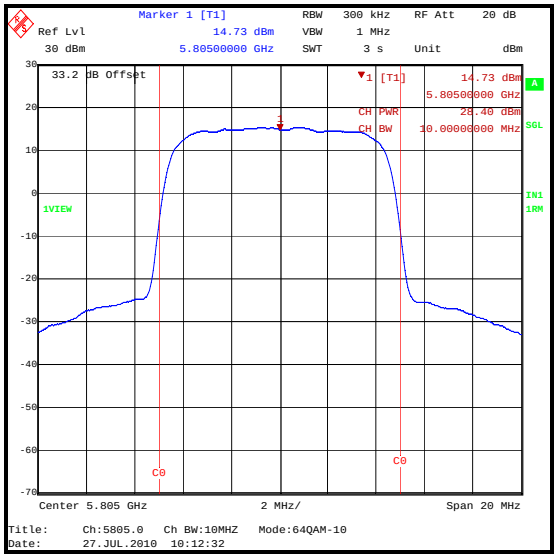


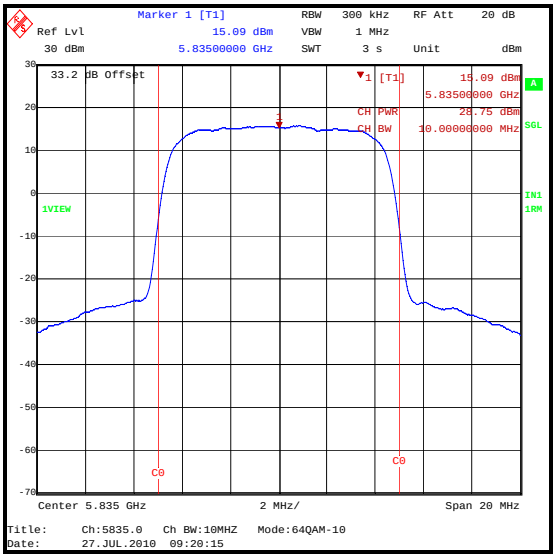


Transmitter Maximum Average Output Power (continued)

Results - 64QAM 10MHz:

Channel	Power (dBm)	Limit (dBm)	Margin (dB)	Result
Bottom	28.4	30.0	1.6	Complied
Top	28.7	30.0	1.3	Complied

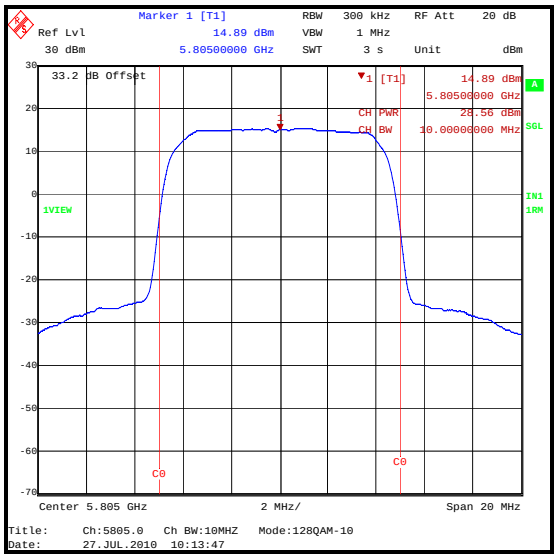


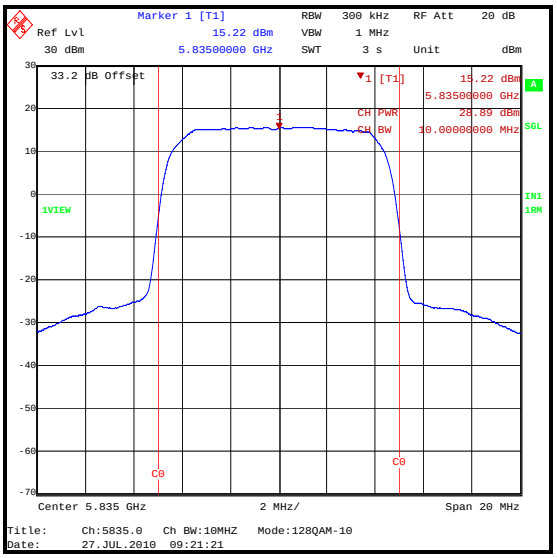


Transmitter Maximum Average Output Power (continued)

Results - 128QAM 10MHz:

Channel	Power (dBm)	Limit (dBm)	Margin (dB)	Result
Bottom	28.6	30.0	1.4	Complied
Top	28.9	30.0	1.1	Complied

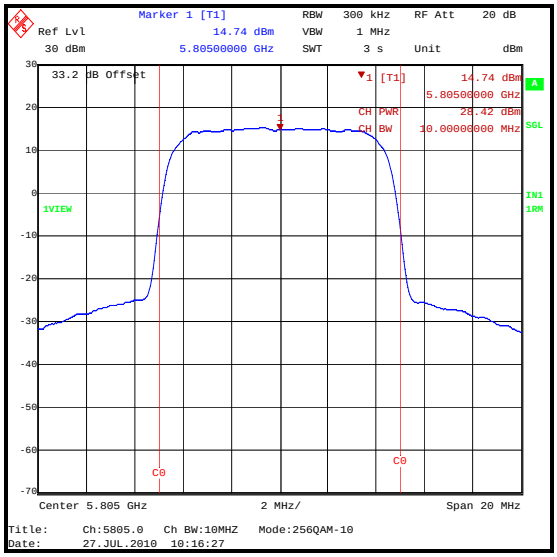


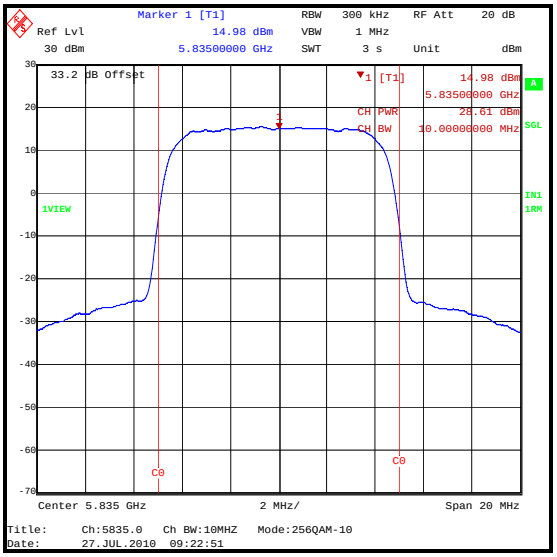


Transmitter Maximum Average Output Power (continued)

Results - 256QAM 10MHz:

Channel	Power (dBm)	Limit (dBm)	Margin (dB)	Result
Bottom	28.4	30.0	1.6	Complied
Top	28.6	30.0	1.4	Complied

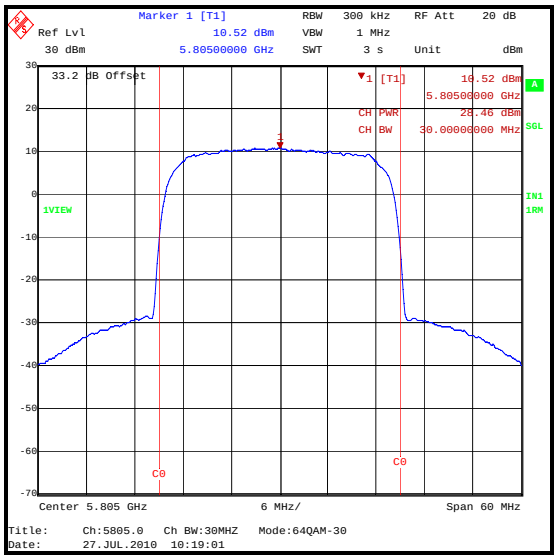


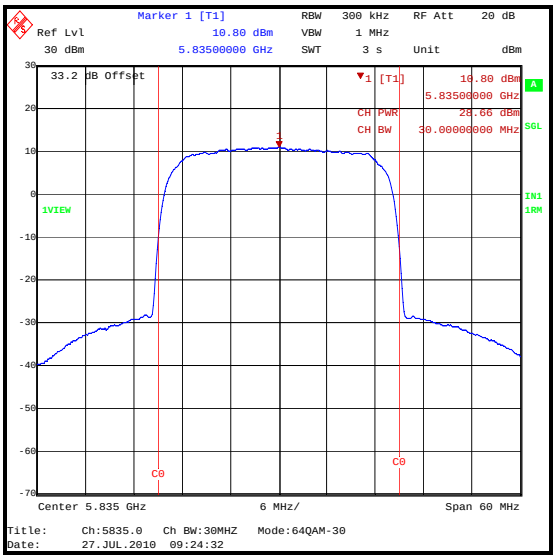


Transmitter Maximum Output Power (continued)

Results - 64QAM 30MHz:

Channel	Power (dBm)	Limit (dBm)	Margin (dB)	Result
Bottom	28.5	30.0	1.5	Complied
Top	28.7	30.0	1.3	Complied

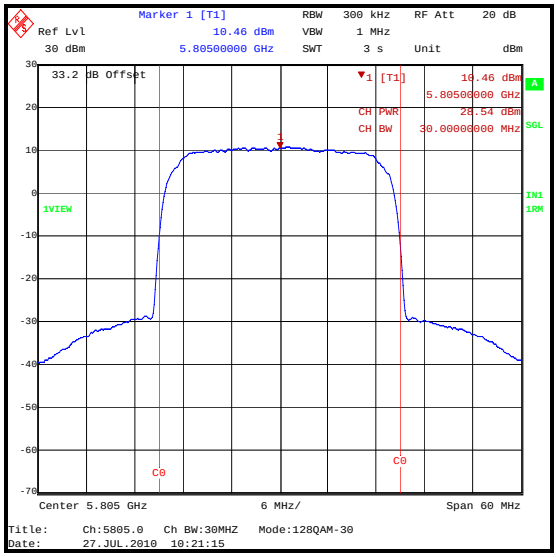


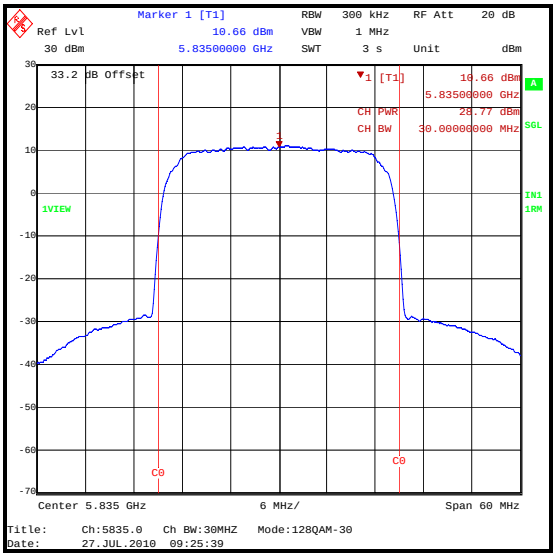


Transmitter Power Density (continued)

Results - 128QAM 30MHz:

Channel	Power (dBm)	Limit (dBm)	Margin (dB)	Result
Bottom	28.5	30.0	1.5	Complied
Top	28.8	30.0	1.2	Complied

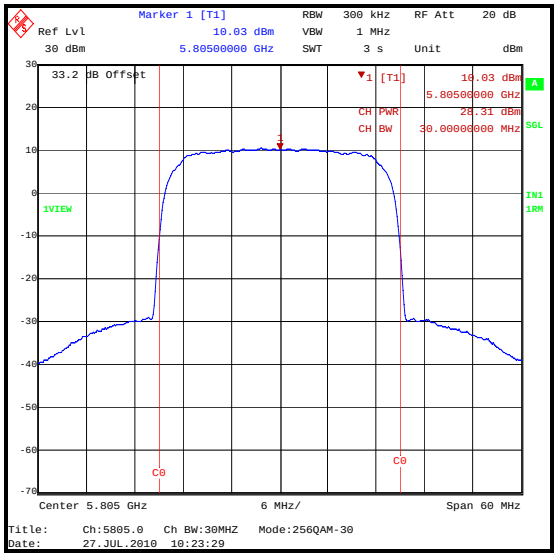


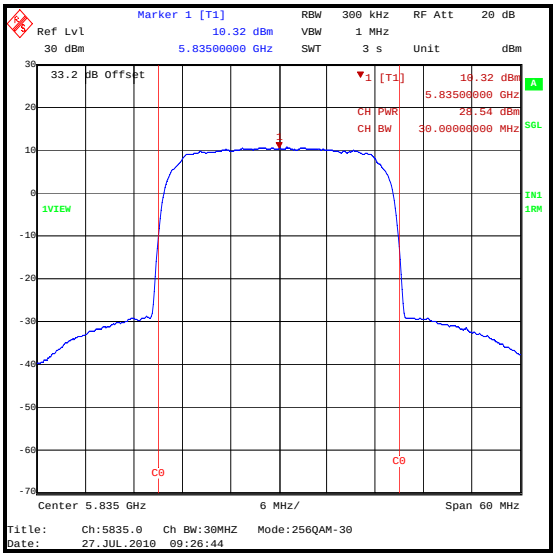


Transmitter Power Density (continued)

Results - 256QAM 30MHz:

Channel	Power (dBm)	Limit (dBm)	Margin (dB)	Result
Bottom	28.3	30.0	1.7	Complied
Top	28.5	30.0	1.5	Complied

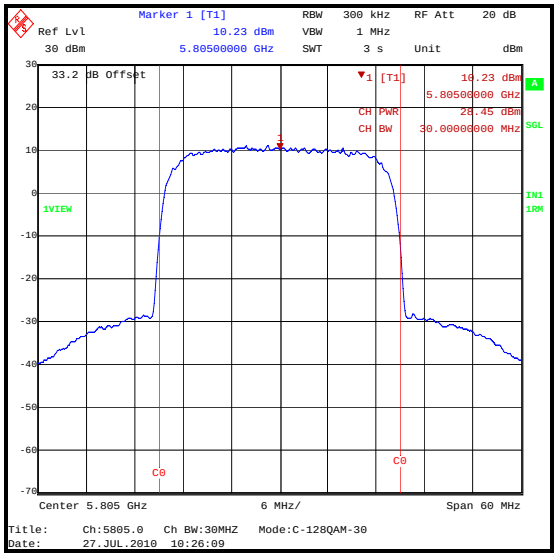


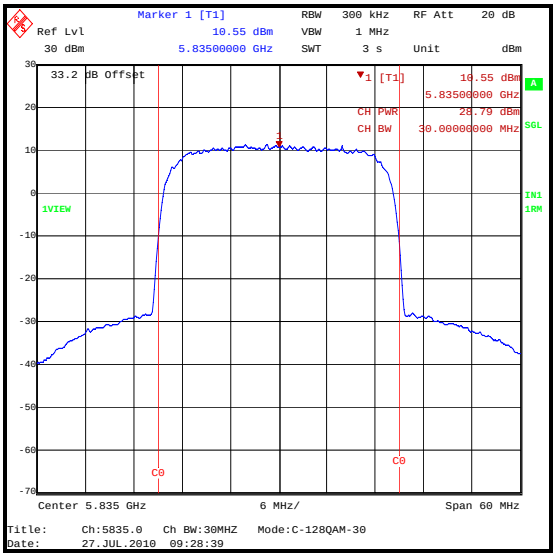


Transmitter Power Density (continued)

Results - C128QAM 30MHz:

Channel	Power (dBm)	Limit (dBm)	Margin (dB)	Result
Bottom	28.5	30.0	1.5	Complied
Top	28.8	30.0	1.2	Complied





5.2.6. Transmitter Radiated Emissions

Test Summary:

Test Engineer:	Nick Steele Andrew Edwards Grant Mason	**Test Dates:**	23 August 2010 to 25 August 2010
Test Sample Serial No:	1 & 2		

FCC Part:	15.247(d) & 15.209(a)
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):	24 to 29
Relative Humidity (%):	32 to 36

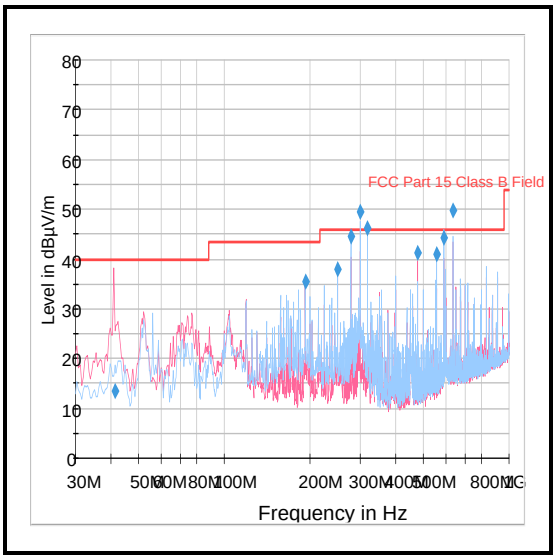
Results:

Frequency (MHz)	Antenna Polarity	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
60.030	Vertical	34.7	40.0	5.3	Complied
82.570	Vertical	35.6	40.0	4.4	Complied
147.567	Vertical	40.6	43.5	2.9	Complied
170.091	Horizontal	37.7	43.5	5.8	Complied
192.717	Horizontal	39.9	46.0	6.1	Complied
199.794	Horizontal	32.4	46.0	13.6	Complied
250.223	Vertical	29.4	46.0	16.6	Complied
278.031	Horizontal	44.5	46.0	1.5	Complied
317.750	Vertical	43.8	46.0	2.2	Complied
476.648	Vertical	45.0	46.0	1.0	Complied
556.079	Vertical	44.8	46.0	1.2	Complied
635.517	Vertical	45.9	46.0	0.1	Complied
834.138	Horizontal	44.6	46.0	1.4	Complied

Note(s):

1. The preliminary scans showed similar emission levels below 1 GHz, for each channel of operation. Therefore final radiated emissions measurements were performed with the EUT set to the top channel only.
2. The final measured value, for the given emission, in the table above incorporates the calibrated antenna factor and cable loss
3. All other emissions were at least 20 dB below the appropriate limit.

Transmitter Radiated Emissions (continued)



Site 1

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

Transmitter Radiated Emissions (continued)

Test Summary:

Test Engineer:	Nick Steele Andrew Edwards	**Test Dates:**	23 August 2010 to 24 August 2010
Test Sample Serial No:	1 & 2		

FCC Part:	15.247(d) & 15.209(a)
Test Method Used:	As detailed in ANSI C63.10 Sections 6.3 and 6.6 referencing ANSI C63.4
Frequency Range	1 GHz to 26.5 GHz

Environmental Conditions:

Temperature (°C):	25 to 28
Relative Humidity (%):	30 to 34

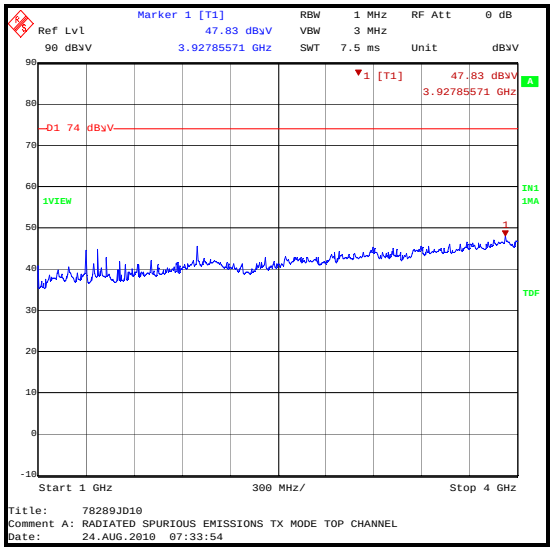
Results:

Frequency (MHz)	Antenna Polarity	Peak Level (dBµV/m)	Average Limit (dBµV/m)	Margin (dB)	Result
1372.746	Vertical	45.2	54.0	8.8	Complied
1625.251	Vertical	40.9	54.0	13.1	Complied

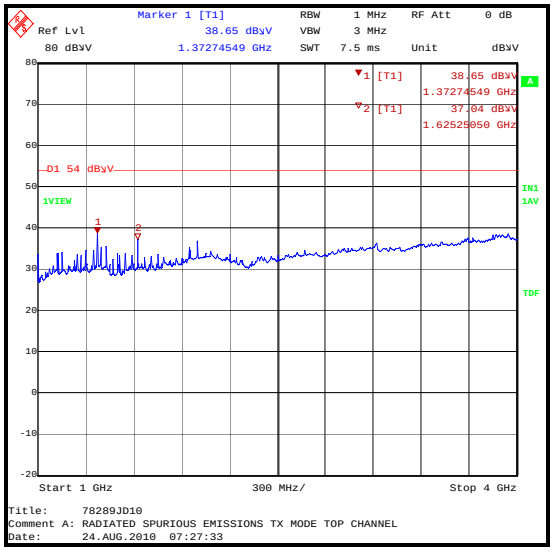
Note(s):

1. The final measured value, for the given emission, in the table above incorporates the calibrated antenna factor and cable loss
2. The emission shown on the 4 GHz to 8 GHz plot is the EUT carrier at 5835 MHz.
3. All emissions were at least 20 dB below the appropriate specification limit or below the measurement system noise floor.

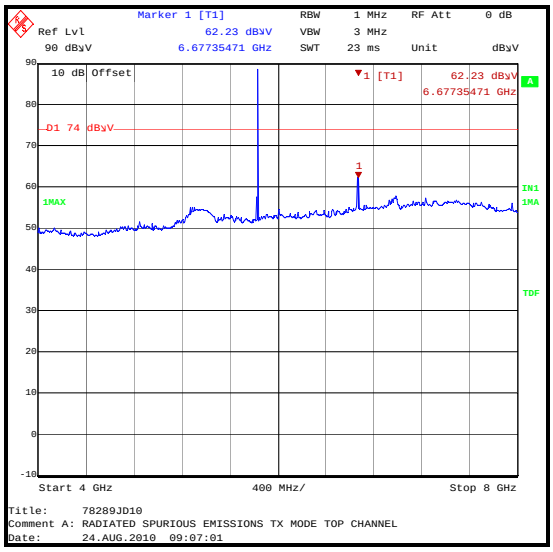
Transmitter Radiated Emissions (continued)



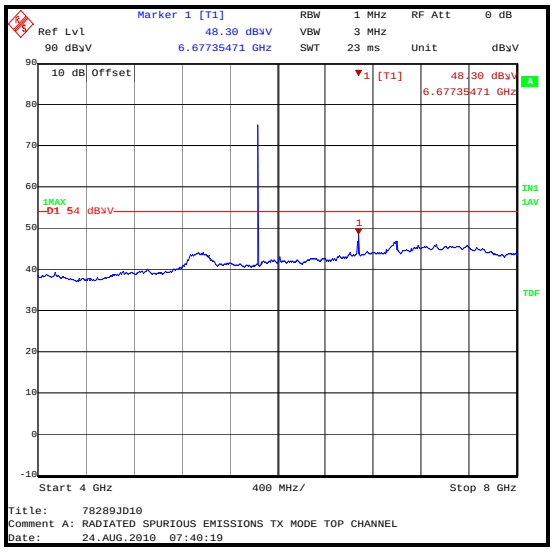
Peak Detector



Average Detector

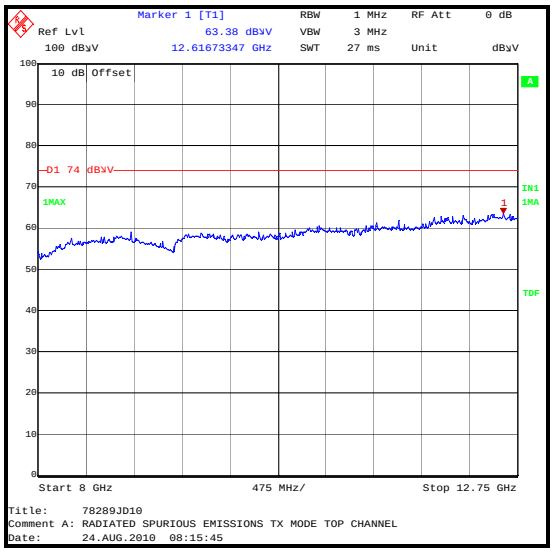


Peak Detector

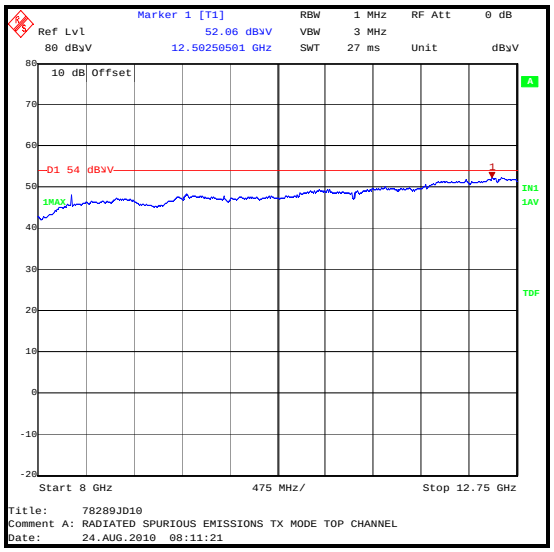


Average Detector

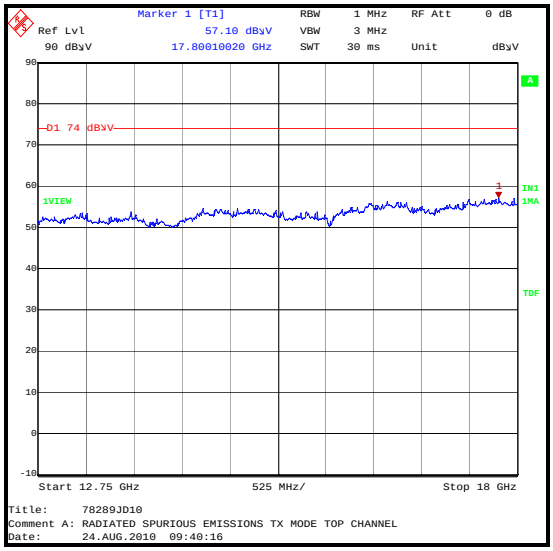
Transmitter Radiated Emissions (continued)



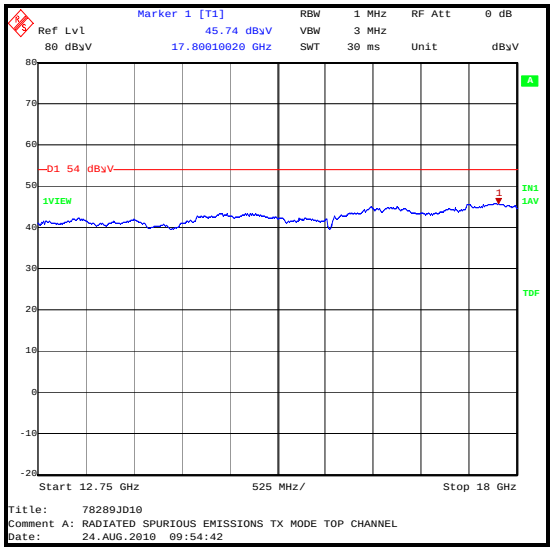
Peak Detector



Average Detector

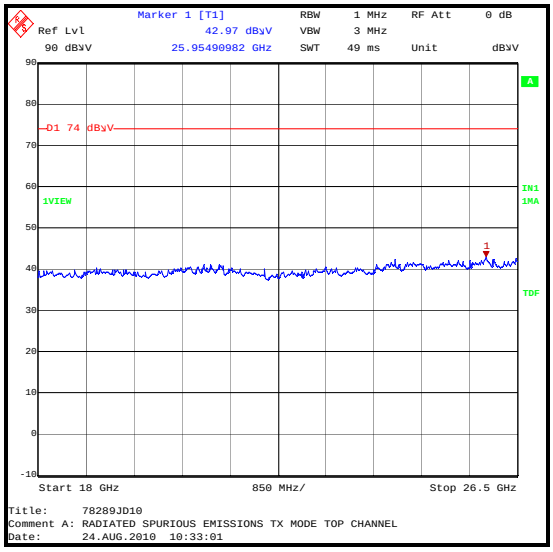


Peak Detector

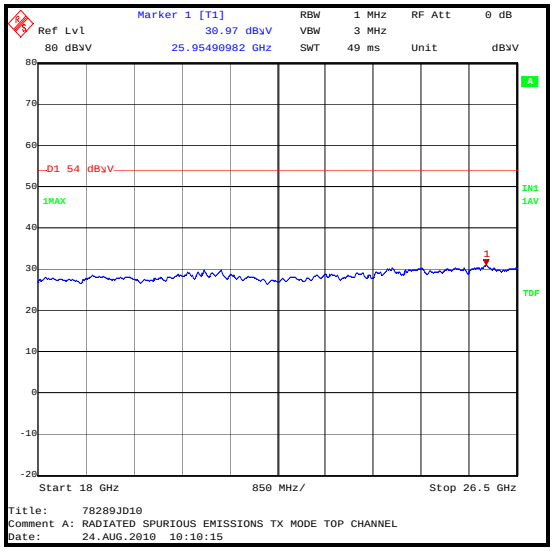


Average Detector

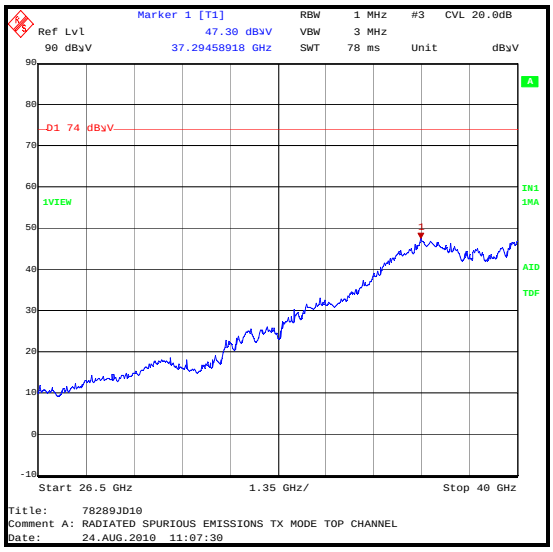
Transmitter Radiated Emissions (continued)



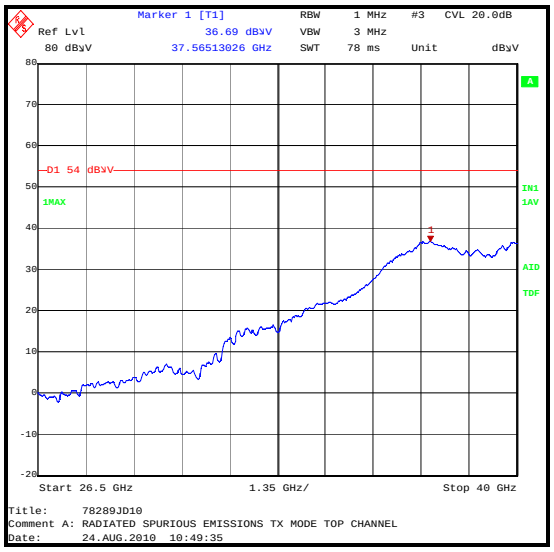
Peak Detector



Average Detector



Peak Detector



Average Detector

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

5.2.7. Transmitter Band Edge Conducted Emissions

Test Summary:

Test Engineer:	Nick Steele	**Test Dates:**	23 September 2010
Test Sample Serial No:	2		

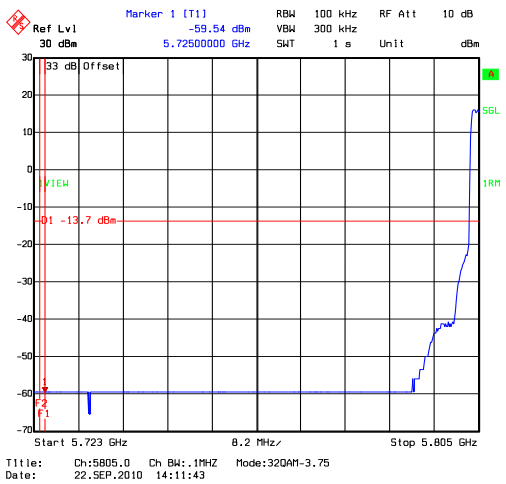
FCC Part:	15.247(d) & 15.209(a)
Test Method Used:	As detailed in ANSI C63.10 Sections 6.9.2 – note that as the EUT Maximum Output Power was measured Average and so the non restricted band edge limit is set to 30dBc. Please also refer to section 4.2 of this report for additional notes on the band edge measurements.

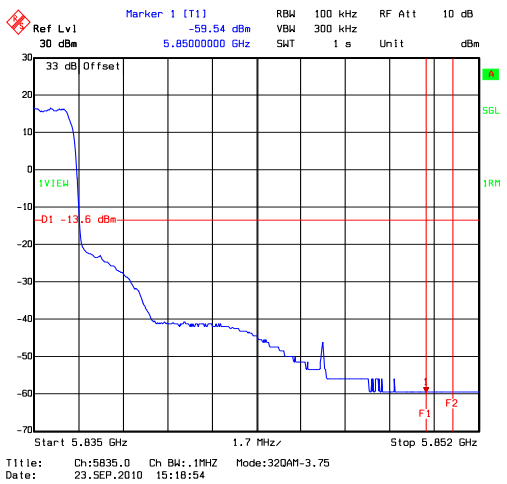
Environmental Conditions:

Temperature (°C):	25 to 29
Relative Humidity (%):	36 to 38

Results - 32QAM 3.75MHz:

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
5725.0	-59.5	-13.7*	45.8	Complied
5850.0	-59.5	-13.6*	45.9	Complied

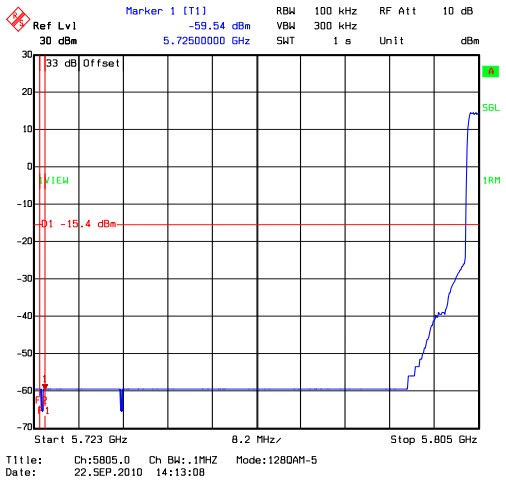


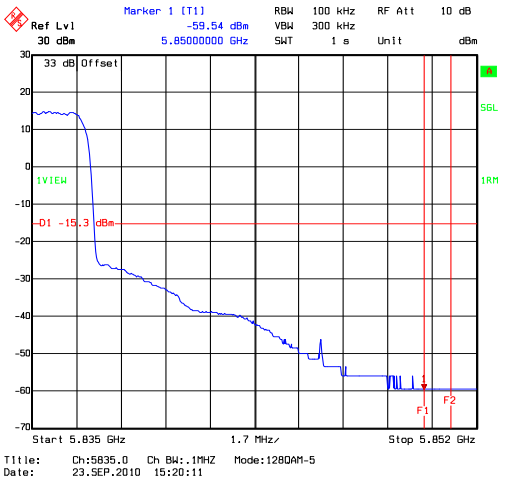


Transmitter Band Edge Conducted Emissions (continued)

Results - 128QAM 5MHz:

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
5725.0	-59.5	-15.4*	44.1	Complied
5850.0	-59.5	-15.3*	44.2	Complied

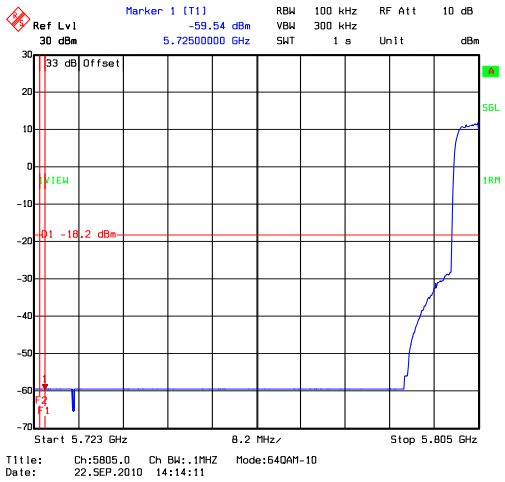


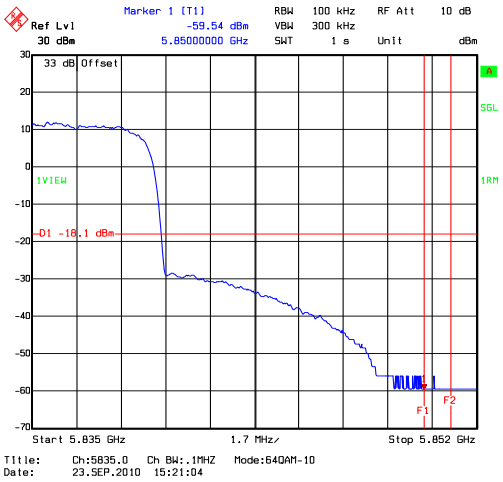


Transmitter Band Edge Conducted Emissions (continued)

Results - 64QAM 10MHz:

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
5725.0	-59.5	-18.2*	41.3	Complied
5850.0	-59.5	-18.1*	41.4	Complied

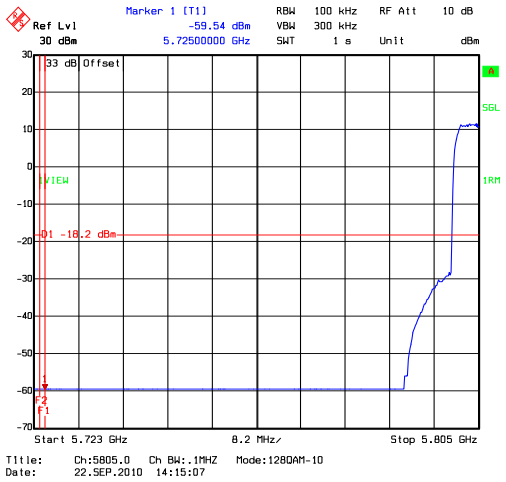


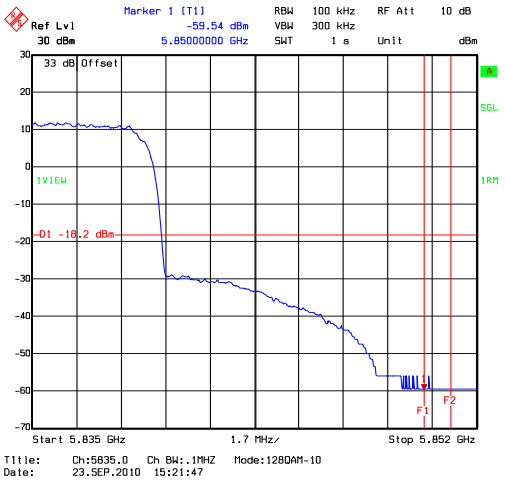


Transmitter Band Edge Conducted Emissions (continued)

Results - 128QAM 10MHz:

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
5725.0	-59.5	-18.2*	41.2	Complied
5850.0	-59.5	-18.2*	41.2	Complied

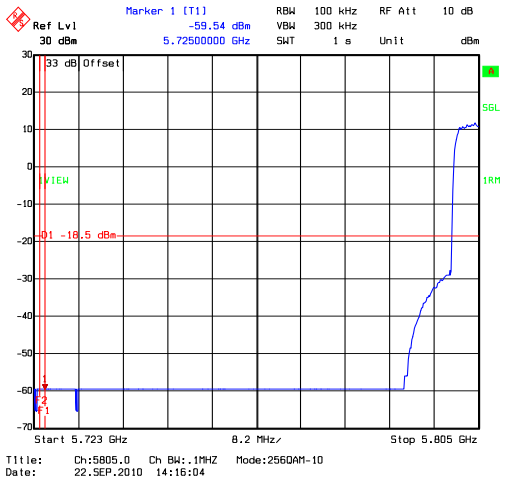


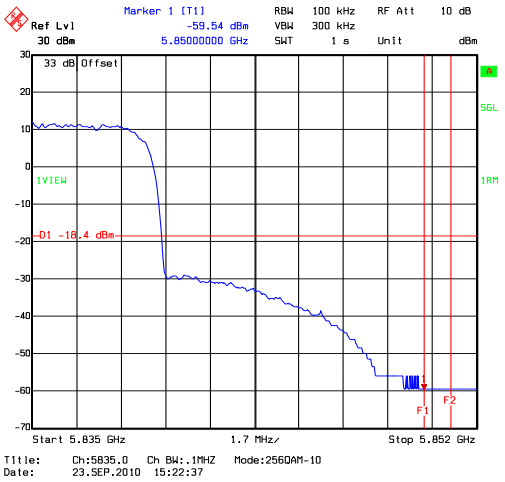


Transmitter Band Edge Conducted Emissions (continued)

Results - 256QAM 10MHz:

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
5725.0	-59.5	-18.5*	41.0	Complied
5850.0	-59.5	-18.4*	41.1	Complied

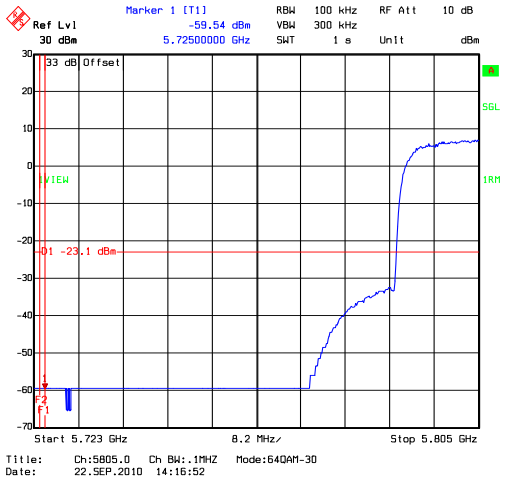


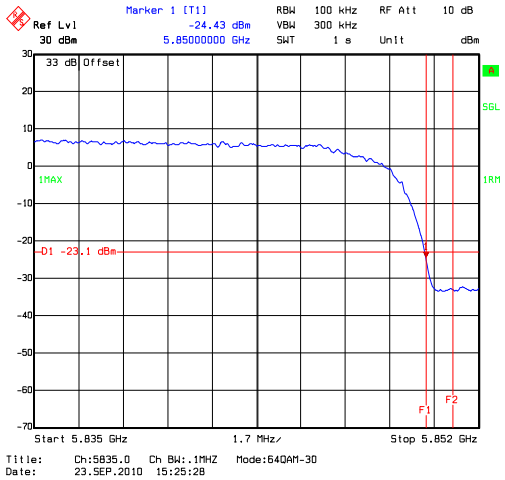


Transmitter Band Edge Conducted Emissions (continued)

Results - 64QAM 30MHz:

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
5725.0	-59.5	-23.1*	36.4	Complied
5850.0	-24.4	-23.1*	1.3	Complied

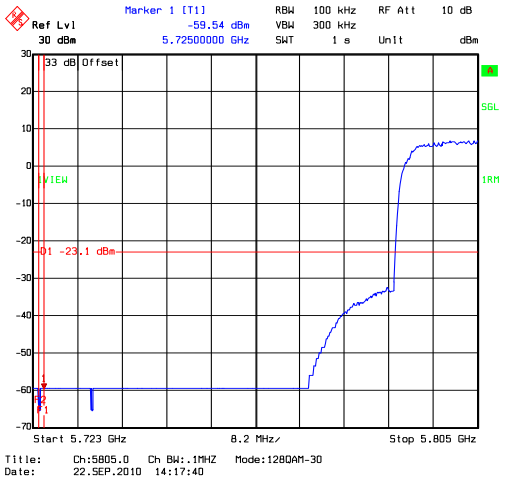


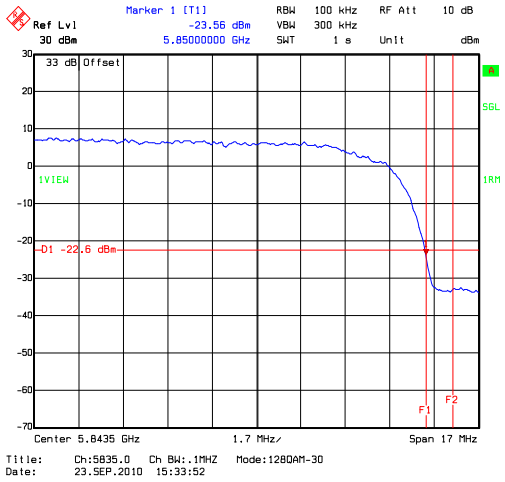


Transmitter Band Edge Conducted Emissions (continued)

Results - 128QAM 30MHz:

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
5725.0	-59.5	-23.1*	36.4	Complied
5850.0	-23.6	-22.6*	1.0	Complied

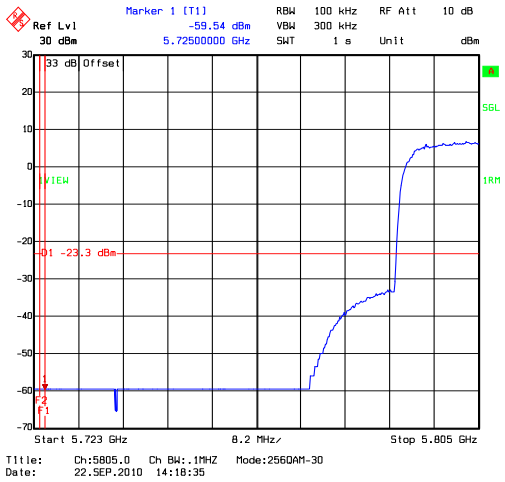


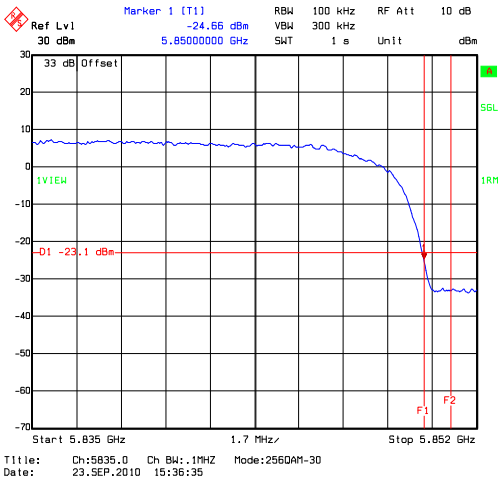


Transmitter Band Edge Conducted Emissions (continued)

Results - 256QAM 30MHz:

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
5725.0	-59.5	-23.3*	36.2	Complied
5850.0	-24.7	-23.1*	1.6	Complied

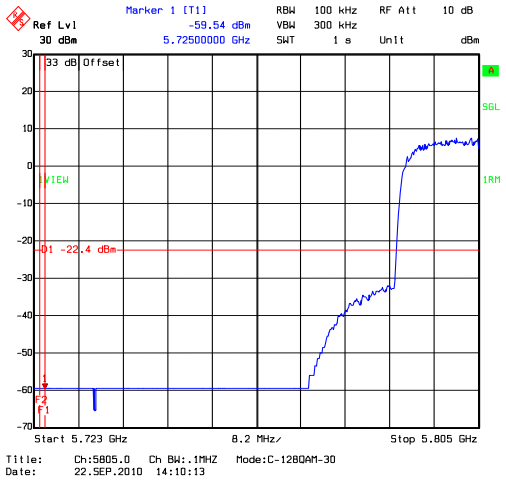


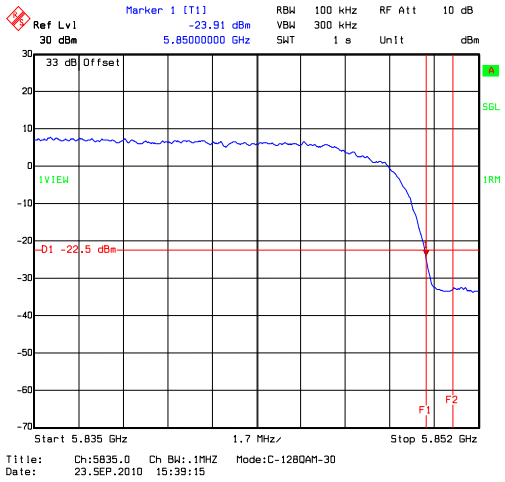


Transmitter Band Edge Conducted Emissions (continued)

Results - C128QAM 30MHz:

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
5725.0	-59.5	-22.4*	37.1	Complied
5850.0	-23.9	-22.5*	1.4	Complied





Note(s):

1. * -30 dBc limit

5.2.8. Transmitter Band Edge Radiated Emissions

Test Summary:

Test Engineer:	Nick Steele	**Test Date:**	22 September 2010
Test Sample Serial No:	1		

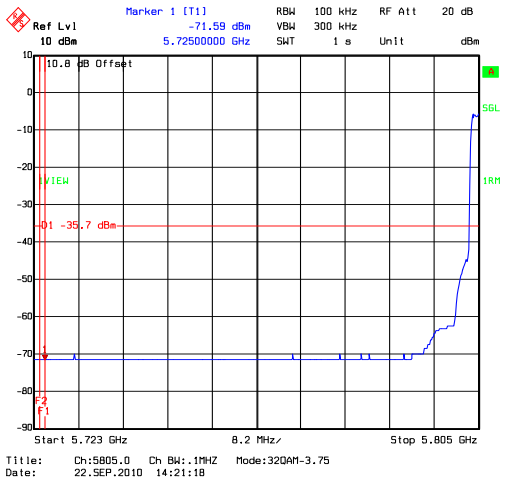
FCC Part:	15.247(d) & 15.209(a)
Test Method Used:	As detailed in ANSI C63.10 Sections 6.9.2

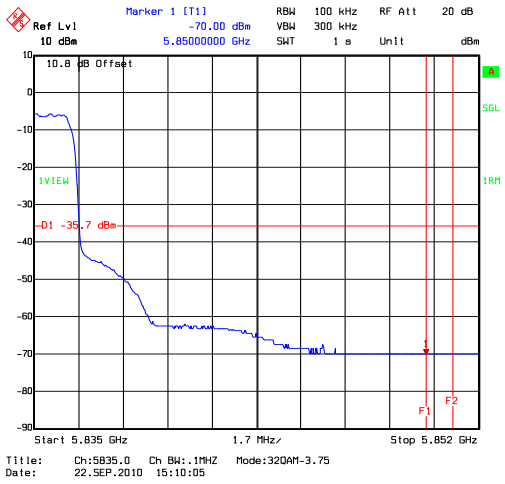
Environmental Conditions:

Temperature (°C):	25 to 29
Relative Humidity (%):	36 to 38

Results - 32QAM 3.75MHz:

Frequency (MHz)	Antenna Polarity	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
5725.0	Vertical	-71.6	-35.7*	35.9	Complied
5850.0	Vertical	-70.0	-35.7*	34.3	Complied

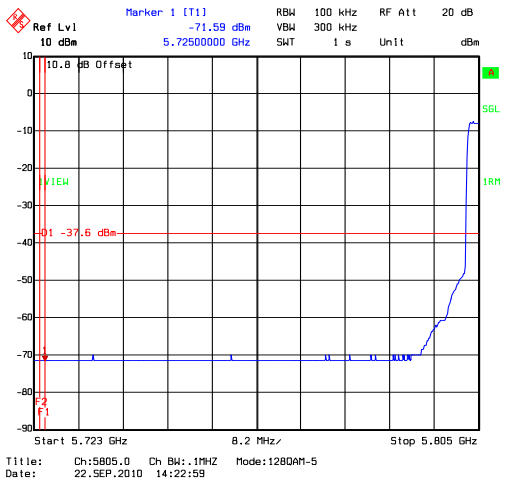


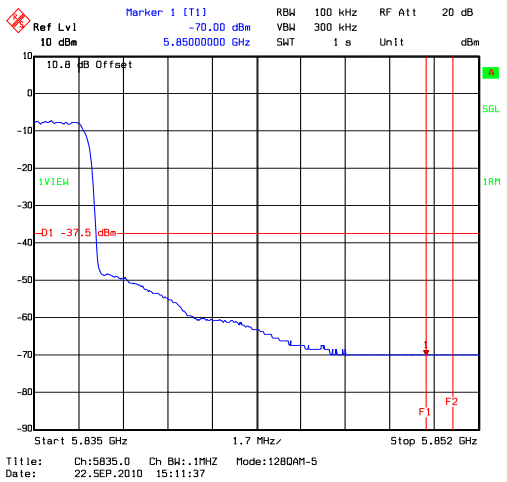


Transmitter Band Edge Radiated Emissions (continued)

Results - 128QAM 5MHz:

Frequency (MHz)	Antenna Polarity	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
5725.0	Vertical	-71.6	-37.6*	34.0	Complied
5850.0	Vertical	-70.0	-37.5*	32.5	Complied

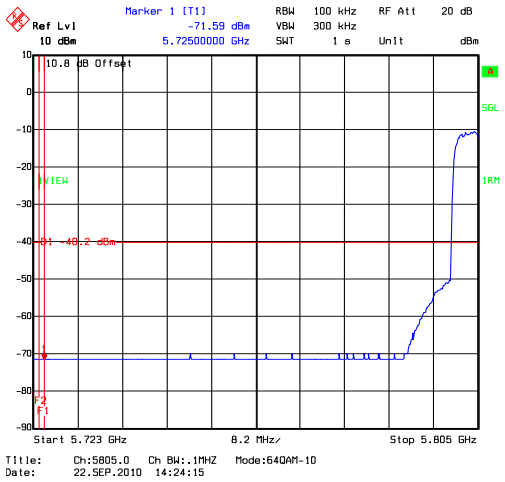


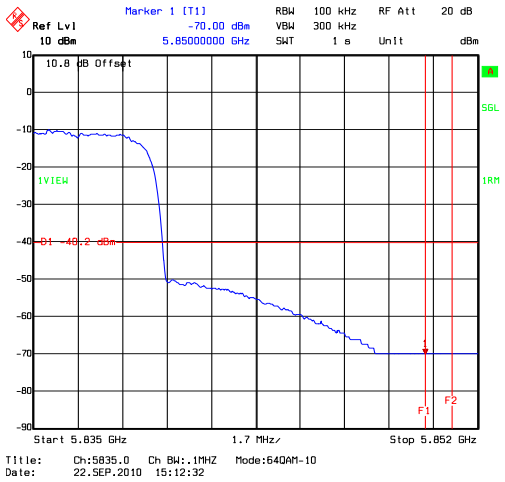


Transmitter Band Edge Radiated Emissions (continued)

Results - 64QAM 10MHz:

Frequency (MHz)	Antenna Polarity	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
5725.0	Vertical	-71.6	-40.2*	31.4	Complied
5850.0	Vertical	-70.0	-40.2*	29.8	Complied

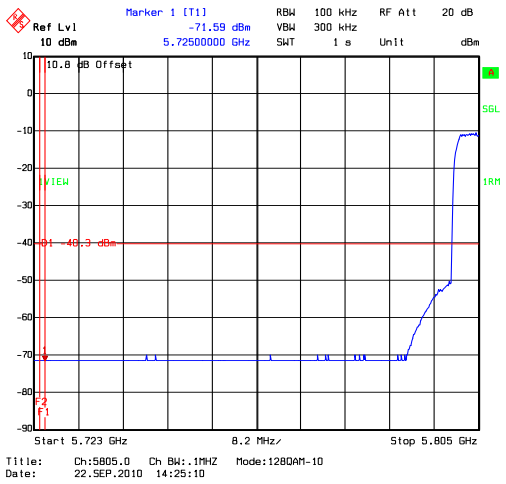


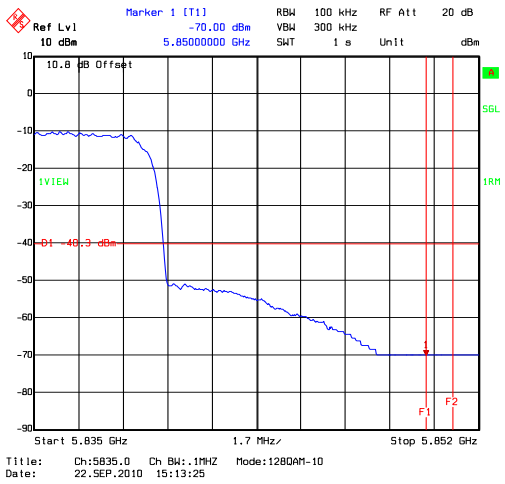


Transmitter Band Edge Radiated Emissions (continued)

Results - 128QAM 10MHz:

Frequency (MHz)	Antenna Polarity	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
5725.0	Vertical	-71.6	-40.3*	31.3	Complied
5850.0	Vertical	-70.0	-40.3*	29.7	Complied

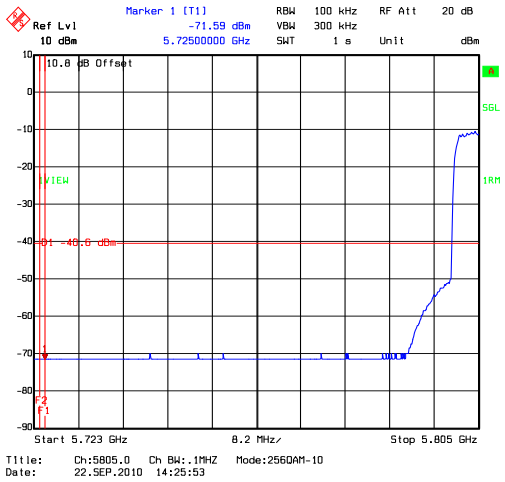


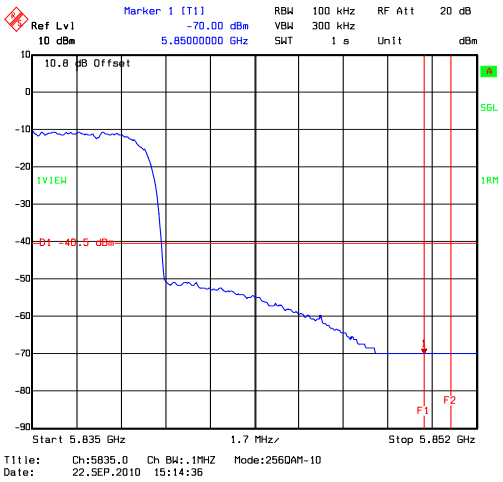


Transmitter Band Edge Radiated Emissions (continued)

Results - 256QAM 10MHz:

Frequency (MHz)	Antenna Polarity	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
5725.0	Vertical	-71.6	-40.6*	31.0	Complied
5850.0	Vertical	-70.0	-40.5*	29.5	Complied

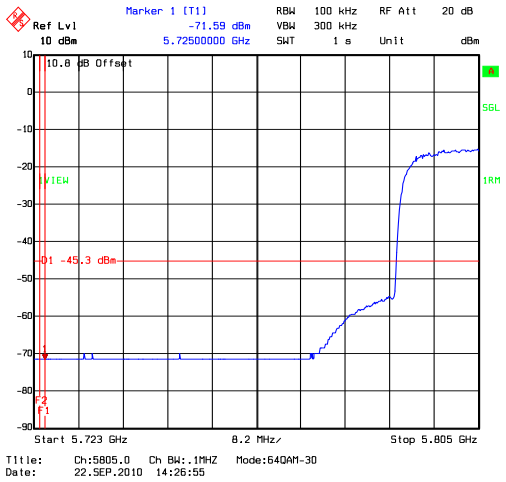


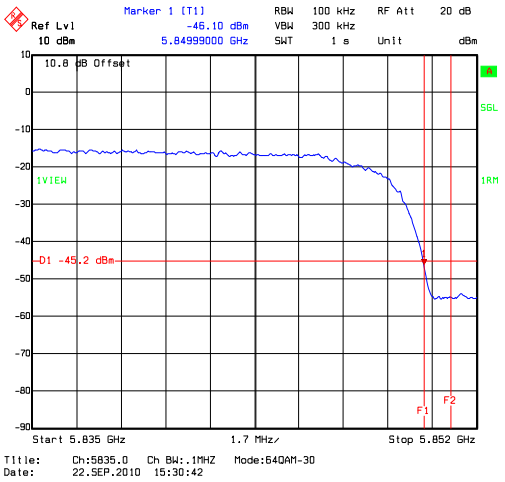


Transmitter Band Edge Radiated Emissions (continued)

Results - 64QAM 30MHz:

Frequency (MHz)	Antenna Polarity	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
5725.0	Vertical	-71.6	-45.3*	26.3	Complied
5850.0	Vertical	-46.1	-45.2*	0.9	Complied

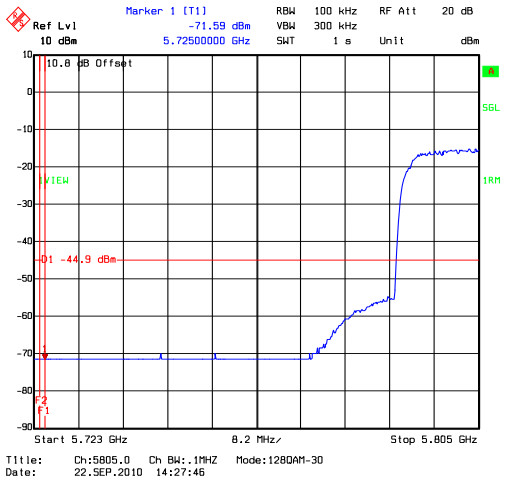


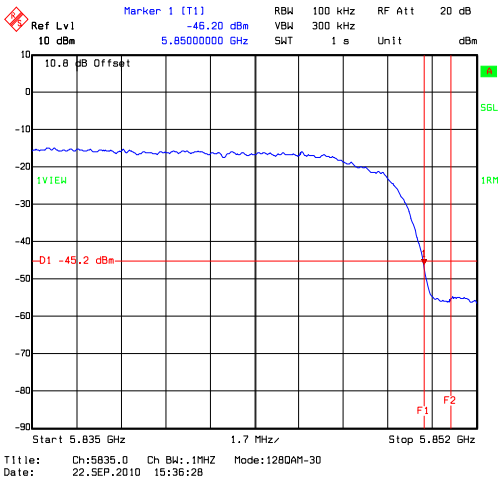


Transmitter Band Edge Radiated Emissions (continued)

Results - 128QAM 30MHz:

Frequency (MHz)	Antenna Polarity	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
5725.0	Vertical	-71.6	-44.9*	26.7	Complied
5850.0	Vertical	-46.2	-45.2*	1.0	Complied

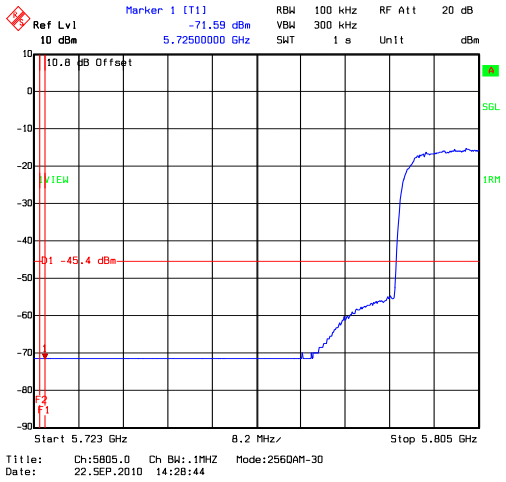


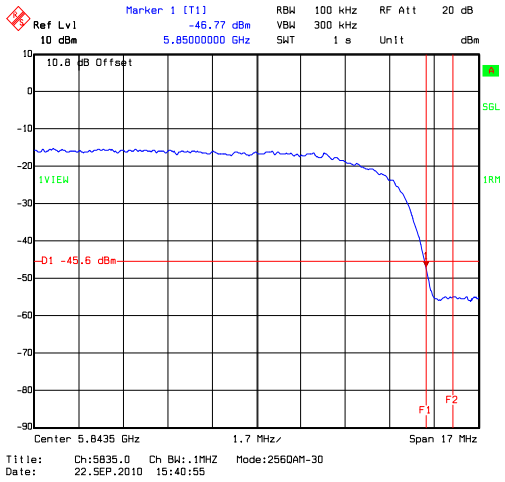


Transmitter Band Edge Radiated Emissions (continued)

Results - 256QAM 30MHz:

Frequency (MHz)	Antenna Polarity	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
5725.0	Vertical	-71.6	-45.4*	26.2	Complied
5850.0	Vertical	-46.8	-45.6*	1.2	Complied

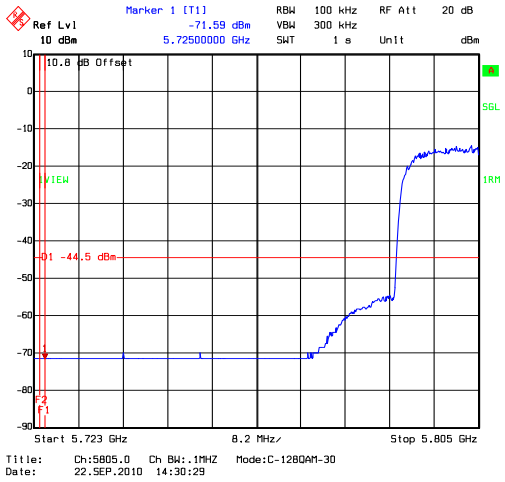


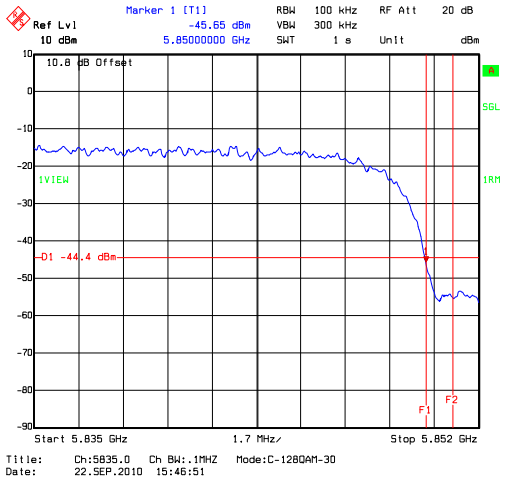


Transmitter Band Edge Radiated Emissions (continued)

Results - C128QAM 30MHz:

Frequency (MHz)	Antenna Polarity	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
5725.0	Vertical	-71.6	-44.5*	27.1	Complied
5850.0	Vertical	-45.7	-44.4*	1.3	Complied





Note(s):

1. * -30 dBc limit

6. Measurement Uncertainty

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

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

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

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

Measurement Type	Range	Confidence Level (%)	Calculated Uncertainty
AC Conducted Spurious Emissions	0.15 MHz to 30 MHz	95%	±3.99 dB
Maximum Peak Output Power	Not Applicable	95%	±2.94 dB
Carrier Frequency Separation	Not Applicable	95%	±0.92 ppm
Average Time of Occupancy	Not Applicable	95%	±0.3 ns
20 dB Bandwidth	Not Applicable	95%	±0.92 ppm
Radiated Spurious Emissions	30 MHz 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)
A1534	Pre Amplifier	Hewlett Packard	8449B OPT H02	3008A00405	Calibrated before use	-
A1818	Antenna	EMCO	3115	00075692	27 Nov 2010	12
A248	60 dB Variable Attenuator	Narda	743-60	01411	Calibration not required	-
A288	Antenna	Chase	CBL6111A	1589	16 Mar 2011	12
A436	Antenna	Flann	20240-20	330	05 Jun 2013	36
A553	Antenna	Chase	CBL6111A	1593	16 Mar 2011	12
G0543	Amplifier	Sonoma Instrument Co.	310N	230801	30 Jun 2011	12
G0565	Telecom DC Power Supply	Hewlett Packard	E4356A	US39290102	Calibrated before use	-
G0585	Vector Signal Generator	Anritsu	MG3700A	6200677085		12
G085	Continuous Wave Generator	Hewlett Packard	83650L	3614A00104	27 Oct 2010	24
K0001	5m Semi-Anechoic Chamber	Rainford EMC	N/A	N/A	25 Apr 2011	12
K0002	3m RSE Chamber	Rainford EMC	N/A	N/A	01 Sep 2010	12
K0003	Bench Test Site	RFI Global Services Ltd	N/A	N/A	Calibration not required	-
K0004	Bench Test Site	RFI Global Services Ltd	N/A	N/A	Calibration not required	-
K0008	Site Reference 4422	RFI Global Services Ltd	N/A	N/A	Calibration not required	-
L1001	ESU26	ROHDE & SCHWARZ	ESU26	100239	28 Jan 2011	12
M1124	Spectrum Analyser	Rohde & Schwarz	ESI26	100046K	22 Apr 2011	12
M1228	Attenuator	Agilent	11708A	31289	Calibrated before use	-
M1242	Spectrum Analyser	Rohde & Schwarz, Inc.	FSEM30	845986/022	08 Mar 2011	12
M1267	Thermal Power Sensor	Rohde and Schwarz	NRV-Z52	100155	12 May 2011	12
M1271	Fluke 73 III Multimeter	Fluke	73 III Multimeter	89550206	14 Jul 2011	12
M1273	Test Receiver	Rhode & Schwarz	ESIB 26	100275	08 Apr 2011	12
M199	Power Meter	Rohde & Schwarz	NRVS	827023/075	12 May 2011	12

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