TEST REPORT
FROM
RFI GLOBAL SERVICES LTD

Test of: IPWireless 2.5GHz USB Stick Modem. Model: ADT

To: FCC Part 27: 2008 Subpart C

Test Report Serial No:
RFI/RPT3/RP75679JD04A

Supersedes Test Report Serial No:
RFI/RPT2/RP75679JD01A

This Test Report Is Issued Under The Authority Of Brian Watson, Operations Director: 	
Checked By:	Tony Henriques
Signature: 	
Date of Issue:	15 December 2009

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1. Customer Information

Company Name:	IPWireless (UK) Ltd
Address:	Unit 7 Greenways Business Park Bellinger Close Chippenham Wilts SN15 1BN

2. Summary of Testing

2.1. General Information

Specification Reference:	47CFR27
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications) 2008: Part 27 Subpart C (Miscellaneous Wireless Communication Services)
Site Registration:	FCC: 209735
Location of Testing:	RFI Global Services Ltd, Wade Road, Basingstoke, Hampshire, RG24 8AH.
Test Dates:	07 September 2009 to 15 September 2009

2.2. Summary of Test Results – High & Low Chip Rates

FCC Reference (47CFR)	Measurement	Port Type	Result
Part 15.107	Receive/Idle Mode AC Conducted Spurious Emissions	AC Mains	✓
Part 15.109	Receive/Idle Mode Radiated Spurious Emissions	Enclosure	✓
Part 15.207	Transmitter AC Conducted Spurious emissions	AC Mains	✓
Part 27.50(h)(2)	Transmitter Equivalent Isotropic Radiated Power (EIRP)	Antenna	✓
Part 27.54	Transmitter Frequency Stability (Temperature & Voltage Variation)	Antenna*	✓
Part 2.1049	Transmitter Occupied Bandwidth	Antenna*	✓
Parts 2.1051, 27.53	Transmitter Radiated Spurious Emissions - Channel Edge	Antenna	✓
Parts 2.1051, 27.53	Transmitter Radiated Spurious Emissions	Antenna	✓
Parts 2.1051, 27.53	Transmitter Radiated Spurious Emissions at Band Edges	Antenna	✓
Part 2.1046	Transmitter Conducted Average Output Power	Antenna*	N/A

Key to Results

✓ = Complied ✗ = Did not comply

**A temporary direct antenna connection to the EUT was made available in order to perform these measurements.*

2.3. Methods and Procedures

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

2.4. Deviations from the Test Specification

Testing at voltage extremes was carried out at V_{nom} and V_{nom} ±5% at the request of the customer and not Vnom ±15% as required by the standard. This is because the EUT complies with the USB Standard which specifies the ±5% tolerance.

3. Equipment Under Test (EUT)

3.1. Identification of Equipment Under Test (EUT)

Brand Name:	IPWireless
Model Name or Number:	ADT
Serial Number:	ADWA928000816 (PCB Serial Number)
Hardware Version Number:	Version 1
Software Version Number:	5.6.3
FCC ID Number:	PKTUSBSTKADT

3.2. Description of EUT

The equipment under test was a USB Stick Modem.

3.3. Modifications Incorporated in the EUT

No modifications were applied to the EUT during testing.

3.4. Additional Information Related to Testing

Power Supply Requirement:	5.0 V DC ±5%		
Equipment Category:	USB Modem		
Type of Unit:	Transceiver		
Modulation Type:	QPSK, 16QAM and 64QAM		
Duty Cycle:	80%		
Antenna Type:	Integral		
Power Supply Requirement:	5 V DC		
HIGH CHIP RATE			
Chip Rate:	7.68 Mcps		
Declared Channel Bandwidth:	11 MHz		
Transmit / Receive Frequency Range:	2496 MHz to 2690 MHz		
Transmit / Receive Channels Tested:	**Channel ID**	**Channel Number**	**Channel Frequency (MHz)**
	Bottom	12507	2501.4
	Middle	12965	2593.0
	Top	13420	2684.6
LOW CHIP RATE			
Chip Rate:	3.84 Mcps		
Declared Channel Bandwidth:	5.5 MHz		
Transmit / Receive Frequency Range:	2496 MHz to 2690 MHz		
Transmit / Receive Channels Tested:	**Channel ID**	**Channel Number**	**Channel Frequency (MHz)**
	Bottom	12494	2498.8
	Middle	12965	2593.0
	Top	13436	2687.2

3.5. Support Equipment

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

Description:	Laptop PC
Brand Name:	Toshiba
Model Name or Number:	PSAAPE-00H00KEN
Serial Number:	670709710

4. Operation and Monitoring of the EUT during Testing

4.1. Operating Modes

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

- Receive/Idle mode on all 15 timeslots.
- Traffic mode on all 15 timeslots at full power (+24 dBm).
- For radiated emissions testing, the EUT was connected and powered via a laptop with a USB cable.
- The customer configured the EUT so that residual carrier breakthrough was present at the centre of the carrier in order to make frequency measurements.

4.2. Configuration and Peripherals

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

- Connected to a laptop PC via the USB port. A bespoke application on the laptop PC was used to configure the EUT during the testing via the adaptor board.

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.

5.2. Test Results – High Chip Rate

5.2.1. Receive/Idle Mode AC Conducted Spurious Emissions

Test Summary:

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

Environmental Conditions:

Temperature (°C):	26
Relative Humidity (%):	37

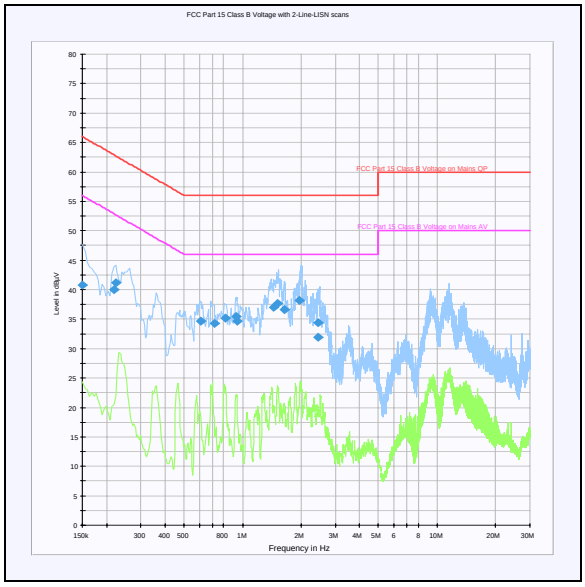
Results: Quasi Peak Detector Measurements

Frequency (MHz)	Line	Quasi Peak Level (dBμV)	Limit (dBμV)	Margin (dB)	Result
0.150000	Neutral	40.8	66.0	25.2	Complied
0.217500	Live	40.1	62.9	22.8	Complied
0.222000	Live	41.2	62.7	21.5	Complied
0.609000	Live	34.7	56.0	21.3	Complied
0.712500	Neutral	34.2	56.0	21.8	Complied
0.816000	Neutral	35.2	56.0	20.8	Complied
0.924000	Neutral	35.4	56.0	20.6	Complied
0.942000	Neutral	34.6	56.0	21.4	Complied
1.437000	Live	37.0	56.0	19.0	Complied
1.509000	Live	37.7	56.0	18.3	Complied
1.635000	Live	36.6	56.0	19.4	Complied
1.963500	Live	38.1	56.0	17.9	Complied
2.427000	Live	31.9	56.0	24.1	Complied
2.454000	Live	34.4	56.0	21.6	Complied

Note(s):

1. All average measurements were at least 20 dB below the appropriate specification limit

Receive/Idle AC Conducted Spurious Emissions (continued)



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

5.2.2. Receive/Idle Mode Radiated Emissions

Test Summary:

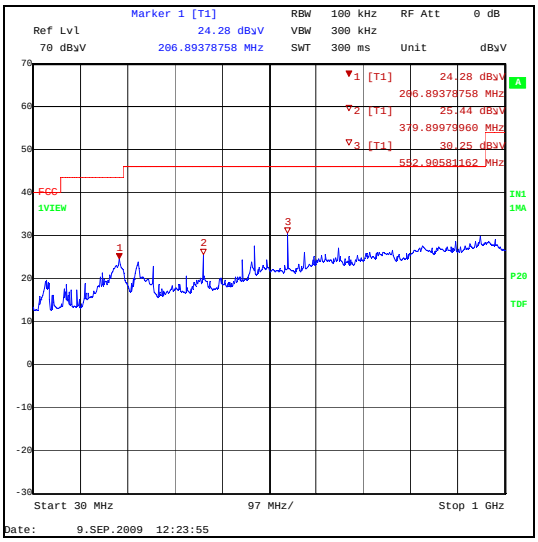
FCC Part:	15.109
Test Method Used:	As detailed in ANSI C63.4 Section 8 and relevant annexes
Frequency Range:	30 MHz to 1000 MHz

Environmental Conditions:

Temperature (°C):	26
Relative Humidity (%):	33

Results:

Frequency (MHz)	Antenna Polarity	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
207.962	Horizontal	21.4	43.5	22.1	Complied
380.263	Horizontal	27.4	46.0	18.6	Complied
553.131	Horizontal	31.5	46.0	14.5	Complied



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

Receive/Idle Mode Radiated Emissions (continued)

Test Summary:

FCC Part:	15.109
Test Method Used:	As detailed in ANSI C63.4 Section 8 and relevant annexes
Frequency Range:	1 GHz to 26.5 GHz

Environmental Conditions:

Temperature (°C):	26
Relative Humidity (%):	33

Results: Highest Peak Level

Frequency (GHz)	Antenna Polarity	Detector level (dBμV)	Antenna factor (dB)	Actual Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
17.516	Vertical	41.0	16.5	57.5	74.0	16.5	Complied

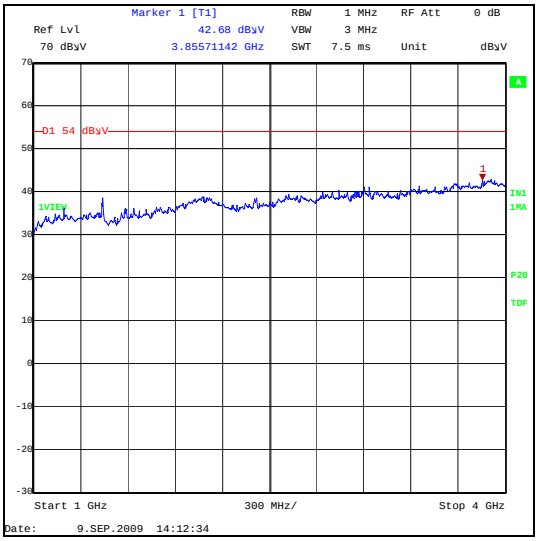
Results: Highest Average Level

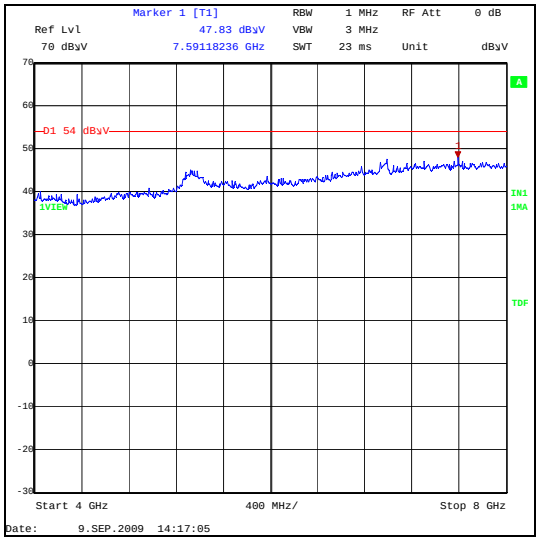
Frequency (GHz)	Antenna Polarity	Detector level (dBμV)	Antenna factor (dB)	Actual Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
17.463	Vertical	29.2	16.8	46.0	54.0	8.0	Complied

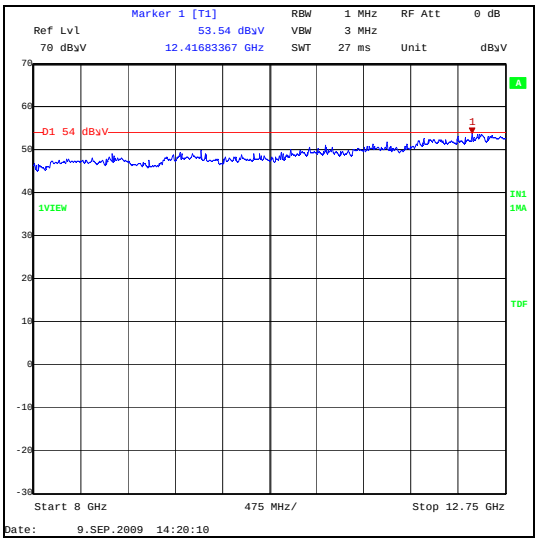
Note(s):

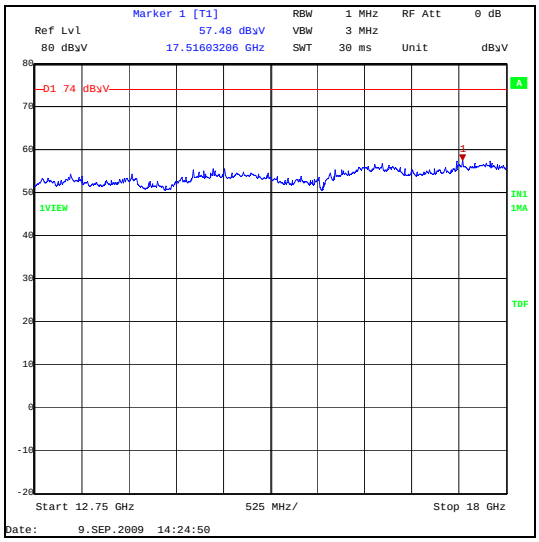
1. No spurious emissions were detected above the noise floor of the measuring receiver; therefore, the highest peak and average noise floor readings of the measuring receiver was recorded as shown in the tables above.
2. All pre-scans were performed with a peak detector against average limits apart from measurements made in the range of 12.75 to 18 GHz where pre-scans were performed with peak and average detectors and the applicable limit applied. This was due to the noise floor exceeding the average limit when using a peak detector.

Receive/Idle Mode Radiated Emissions (continued)

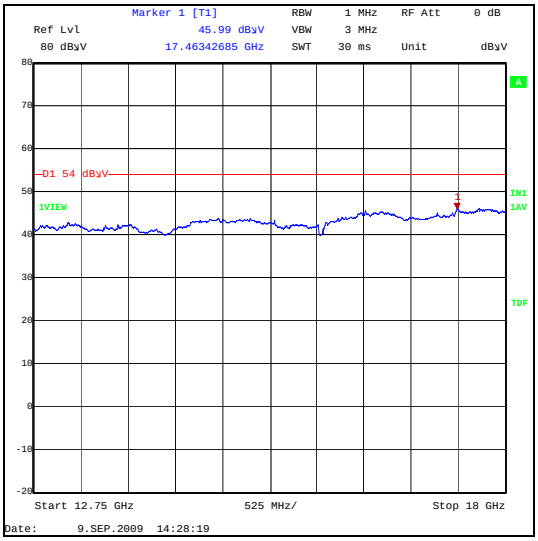


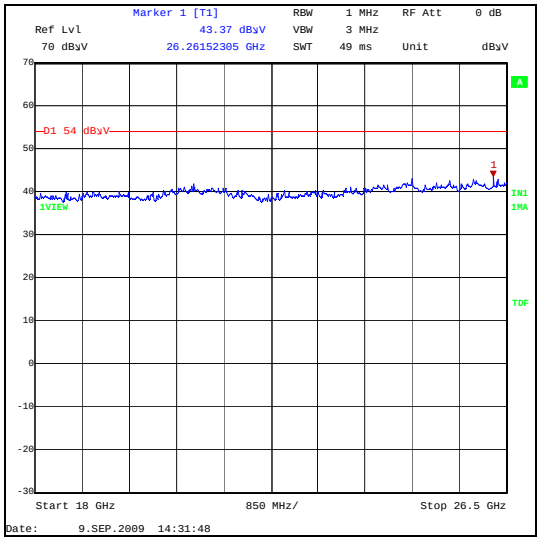






Receive/Idle Mode Radiated Emissions (continued)





5.2.3. Transmitter AC Conducted Spurious Emissions

Test Summary:

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

Environmental Conditions:

Temperature (°C):	26
Relative Humidity (%):	37

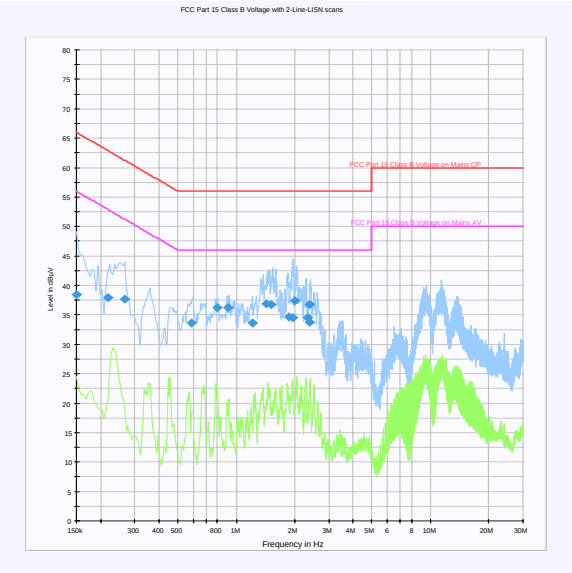
Results: Quasi Peak Detector Measurements

Frequency (MHz)	Line	Quasi Peak Level (dBμV)	Limit (dBμV)	Margin (dB)	Result
0.150000	Live	38.5	66.0	27.5	Complied
0.217500	Live	37.9	62.9	25.0	Complied
0.267000	Live	37.6	61.2	23.6	Complied
0.591000	Live	33.6	56.0	22.4	Complied
0.798000	Neutral	36.2	56.0	19.8	Complied
0.901500	Neutral	36.2	56.0	19.8	Complied
1.207500	Live	33.6	56.0	22.4	Complied
1.419000	Live	36.9	56.0	19.1	Complied
1.513500	Live	36.8	56.0	19.2	Complied
1.869000	Live	34.7	56.0	21.3	Complied
1.963500	Live	34.5	56.0	21.5	Complied
2.008500	Live	37.4	56.0	18.6	Complied
2.341500	Live	34.6	56.0	21.4	Complied
2.373000	Live	36.7	56.0	19.3	Complied
2.395500	Live	33.7	56.0	22.3	Complied

Note(s):

1. All average measurements were at least 20 dB below the appropriate specification limit

Transmitter AC Conducted Spurious Emissions (continued)



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

5.2.4. Transmitter Equivalent Isotropically Radiated Power (EIRP)

Test Summary:

FCC Part:	27.50(h)(2)
Test Method Used:	As detailed in ANSI TIA-603-C-2004 Section 2.2.17.2

Environmental Conditions:

Temperature (°C):	25
Relative Humidity (%):	50

Results: QPSK

Channel	Frequency (MHz)	EIRP (dBm)	EIRP Limit (dBm)	Margin (dB)	Result
12507	2501.4	21.7	33.0	11.3	Complied
12965	2593.0	20.1	33.0	12.9	Complied
13420	2684.6	16.5	33.0	16.5	Complied

Results: 16QAM

Channel	Frequency (MHz)	EIRP (dBm)	EIRP Limit (dBm)	Margin (dB)	Result
12507	2501.4	21.1	33.0	11.9	Complied
12965	2593.0	19.8	33.0	13.2	Complied
13420	2684.6	16.0	33.0	17.0	Complied

Results: 64QAM

Channel	Frequency (MHz)	EIRP (dBm)	EIRP Limit (dBm)	Margin (dB)	Result
12507	2501.4	20.8	33.0	12.2	Complied
12965	2593.0	19.8	33.0	13.2	Complied
13420	2684.6	16.0	33.0	17.0	Complied

5.2.5. Transmitter Frequency Stability (Temperature Variation)

Test Summary:

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

Environmental Conditions:

Temperature (°C):	24
Relative Humidity (%):	32

Results: 2501.4 MHz

Temp (ºC)	Measured Frequency (MHz)	Frequency Error (Hz)
-30	2501.399779	-221
-20	2501.400301	3001
-10	2501.400502	502
0	2501.400124	124
10	2501.399841	-159
20	2501.399848	-152
30	2501.400197	197
40	2501.400205	205
50	2501.400718	718

Results: 2593 MHz

Temp (ºC)	Measured Frequency (MHz)	Frequency Error (Hz)
-30	2592.999760	-240
-20	2593.000291	291
-10	2593.000525	525
0	2593.000134	134
10	2592.999836	-164
20	2592.999830	-170
30	2593.000193	193
40	2593.000226	226
50	2593.000706	706

Transmitter Frequency Stability (Temperature Variation) (continued)

Results: 2684.6 MHz

Temp (ºC)	Measured Frequency (MHz)	Frequency Error (Hz)
-30	2684.599744	-256
-20	2684.600280	280
-10	2684.600555	555
0	2684.600153	153
10	2684.599836	-164
20	2684.599825	-175
30	2684.600174	174
40	2684.600250	250
50	2684.600690	690

5.2.6. Transmitter Frequency Stability (Voltage Variation)

Test Summary:

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

Environmental Conditions:

Temperature (°C):	24
Relative Humidity (%):	32

Results: 2501.4 MHz

Supply Voltage (VDC)	Measured Frequency (MHz)	Frequency Error (Hz)
4.75	2501.400110	110
5.00	2501.400205	205
5.25	2501.400018	18

Results: 2593 MHz

Supply Voltage (VDC)	Measured Frequency (MHz)	Frequency Error (Hz)
4.75	2593.000111	111
5.00	2593.000236	236
5.25	2593.000032	32

Results: 2684.6 MHz

Supply Voltage (VDC)	Measured Frequency (MHz)	Frequency Error (Hz)
4.75	2684.600120	120
5.00	2684.600275	275
5.25	2684.600089	89

5.2.7. Transmitter Occupied Bandwidth

Test Summary:

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

Environmental Conditions:

Temperature (°C):	25
Relative Humidity (%):	32

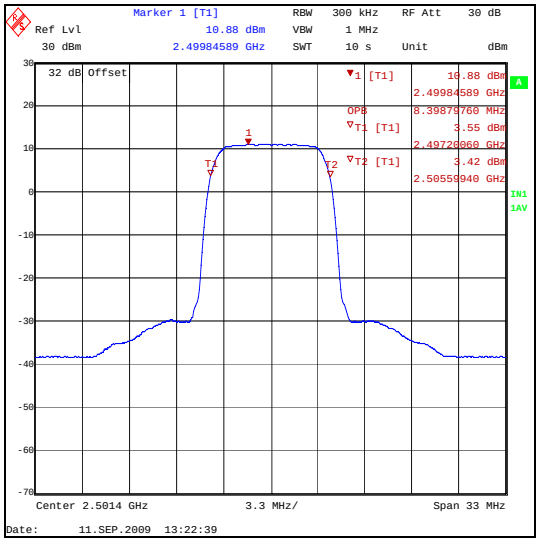
Results: QPSK

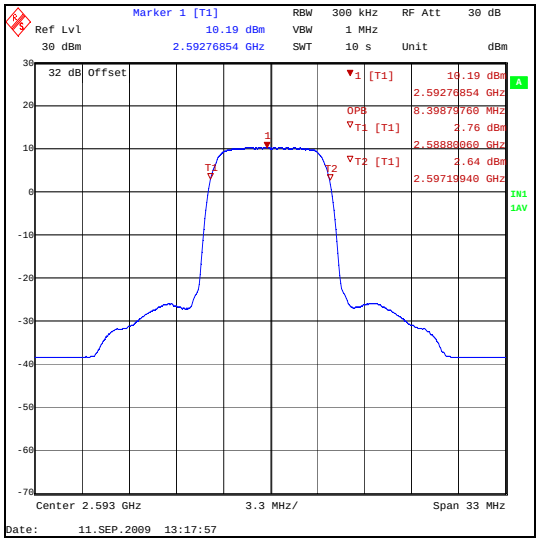
Channel Number	Frequency (MHz)	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
12507	2501.4	300	1000	8.399
12965	2593.0	300	1000	8.399
13423	2684.6	300	1000	8.399

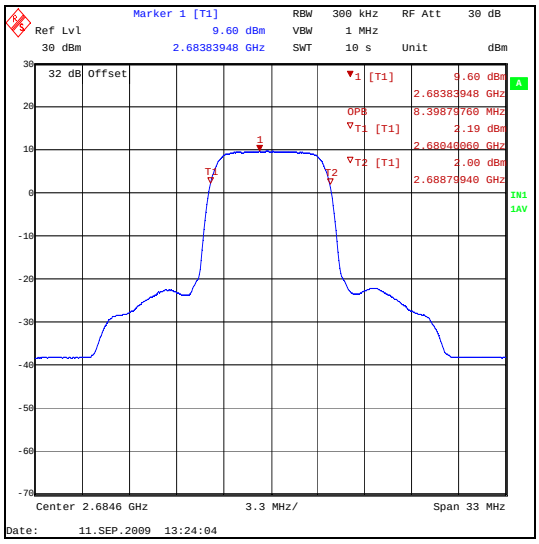
Note(s):

1. In lieu of the test method detailed in ANSI C63.4 Section 13.1.7 the 99% occupied bandwidth was measured using the Occupied Bandwidth function of the spectrum analyser.

Transmitter Occupied Bandwidth (continued)







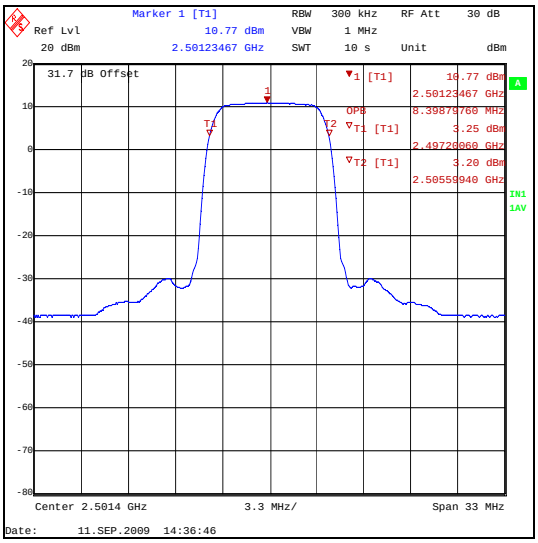
Transmitter Occupied Bandwidth (continued)

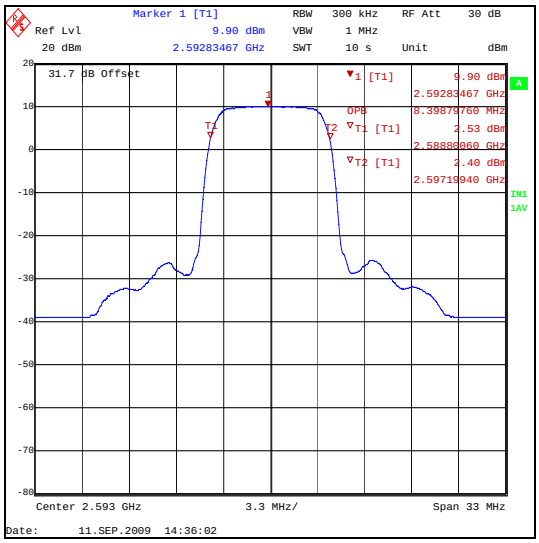
Results: 16QAM

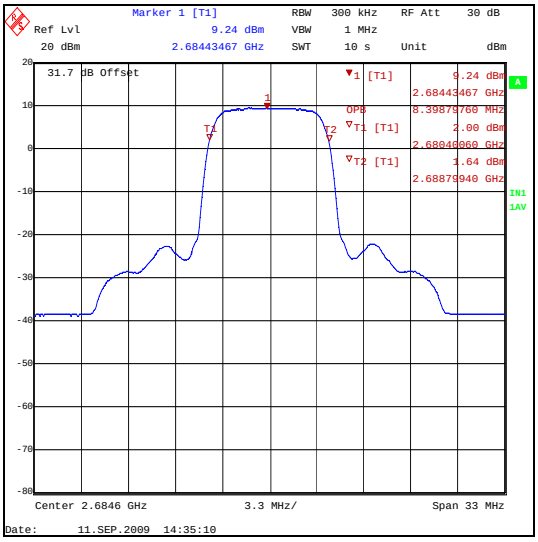
Channel Number	Frequency (MHz)	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
12507	2501.4	300	1000	8.399
12965	2593.0	300	1000	8.399
13423	2684.6	300	1000	8.399

Note(s):

1. In lieu of the test method detailed in ANSI C63.4 Section 13.1.7 the 99% occupied bandwidth was measured using the Occupied Bandwidth function of the spectrum analyser.







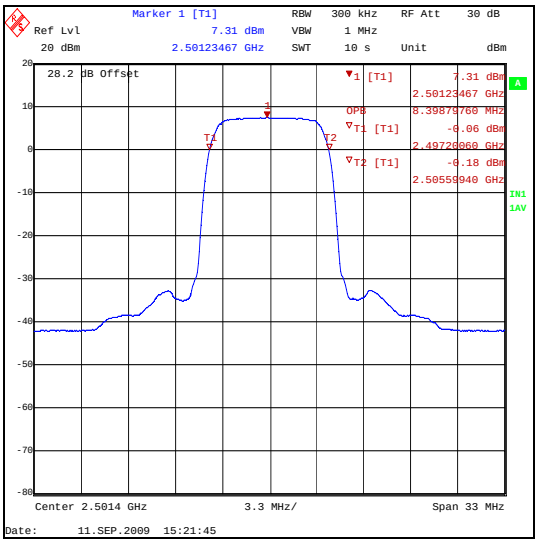
Transmitter Occupied Bandwidth (continued)

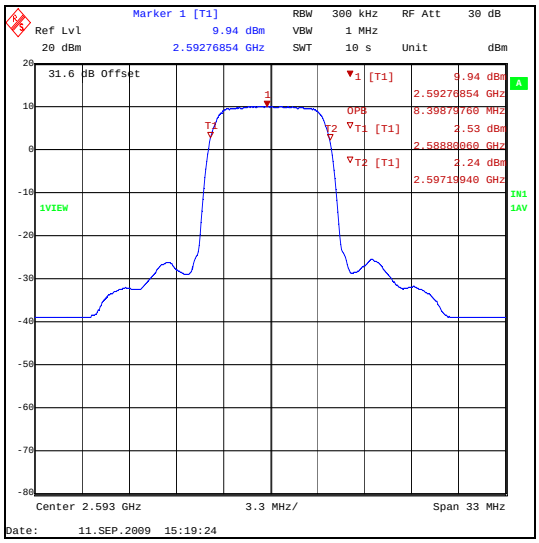
Results: 64QAM

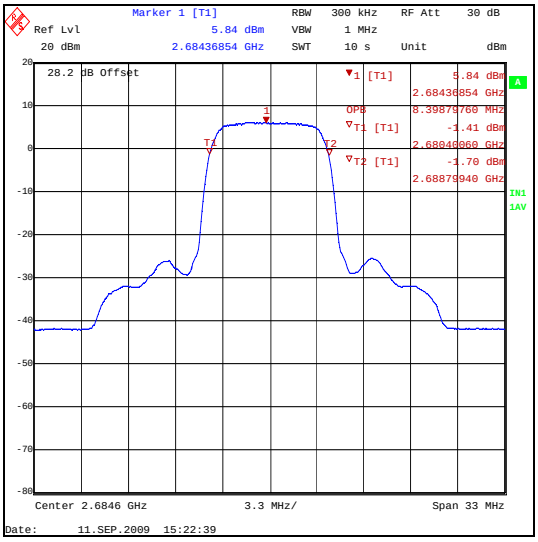
Channel Number	Frequency (MHz)	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
12507	2501.4	300	1000	8.399
12965	2593.0	300	1000	8.399
13423	2684.6	300	1000	8.399

Note(s):

1. In lieu of the test method detailed in ANSI C63.4 Section 13.1.7 the 99% occupied bandwidth was measured using the Occupied Bandwidth function of the spectrum analyser.







5.2.8. Transmitter Radiated Spurious Emissions - Channel Edge

Test Summary:

FCC Part:	FCC Part 2.1051 and FCC Part 27.53
Test Method Used:	As detailed in ANSI TIA-603-C-2004 Section 2.2.12 referencing FCC CFR Part 2.1053

Environmental Conditions:

Temperature (°C):	25
Relative Humidity (%):	32

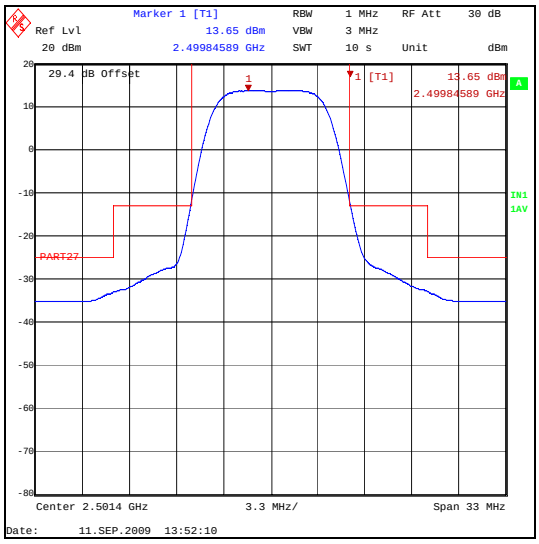
Note(s):

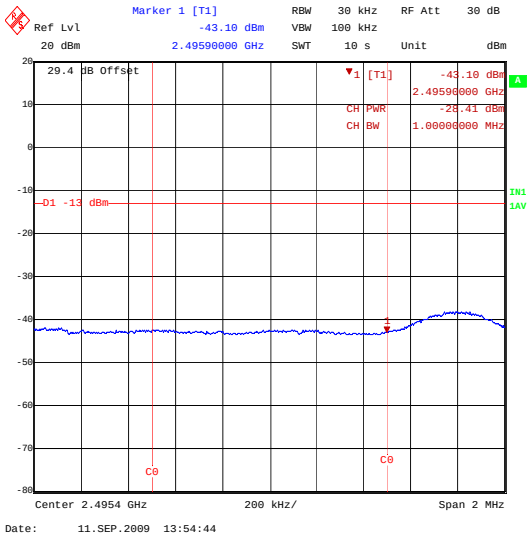
1. It can be seen on the main mask plots that the emission goes through the limit line. This is on account of the analyser bandwidth being too great to make an accurate measurement. The analyser Integration function was thus used to demonstrate compliance and this can be seen on the two plots accompanying the mask plot.

Results: Bottom Channel / QPSK

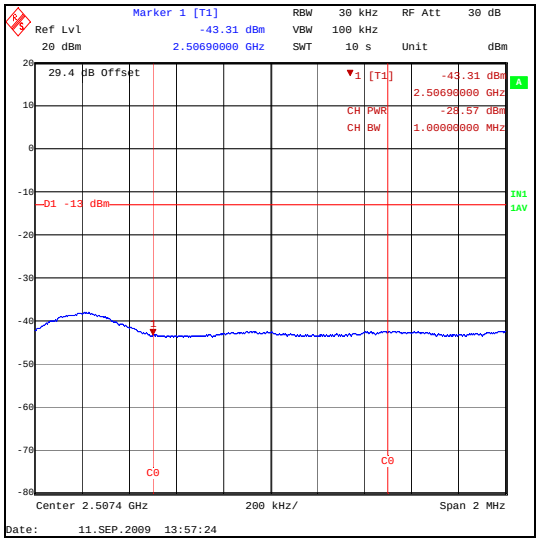
Frequency of 1 MHz strip adjacent to channel edge	Level in 1 MHz strip adjacent to block edge (dBm)	Band Edge Limit (dBm)	Margin (dB)	Result
2495.9	-28.4	-13.0	15.4	Complied
2506.9	-28.6	-13.0	15.6	Complied

Transmitter Radiated Emissions - Channel Edge (continued)





1 MHz strip below channel centre freq -5.5 MHz measured using the spectrum analyser Channel Power function.

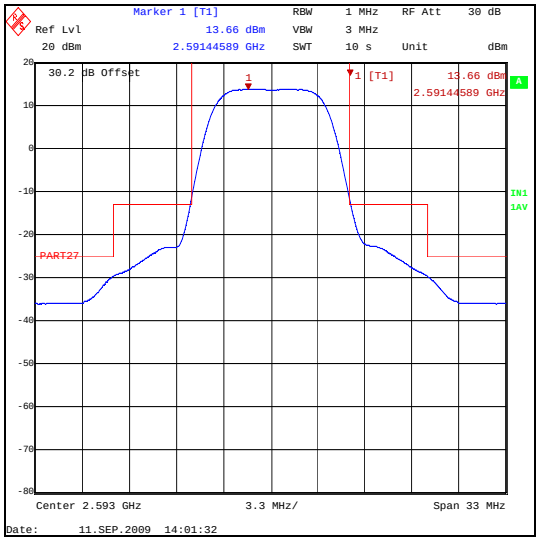


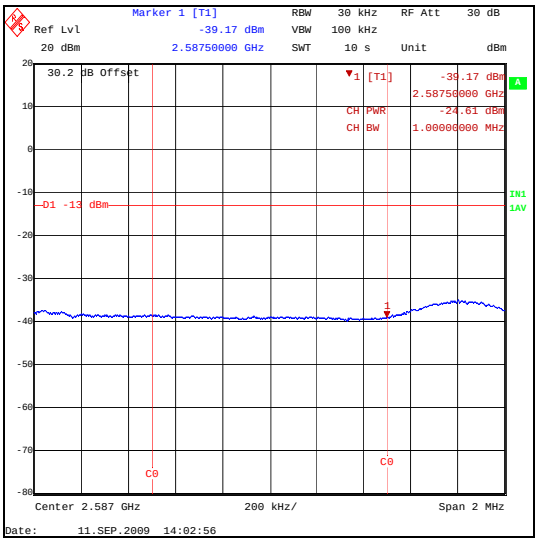
1 MHz strip above channel centre freq +5.5 MHz measured using the spectrum analyser Channel Power function.

Transmitter Radiated Emissions - Channel Edge (continued)

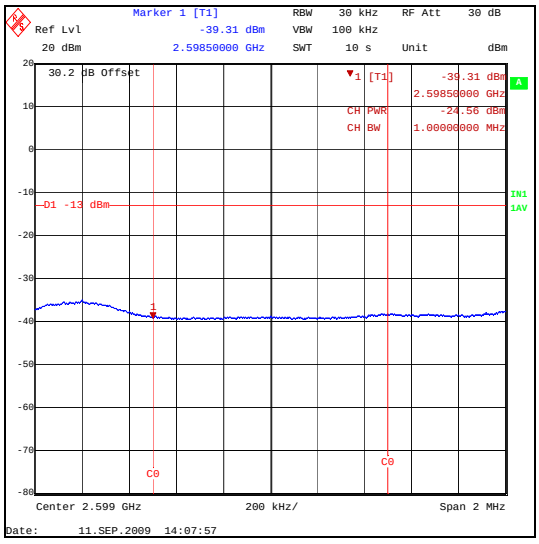
Results: Middle channel / QPSK

Frequency of 1 MHz strip adjacent to channel edge	Level in 1 MHz strip adjacent to block edge (dBm)	Band Edge Limit (dBm)	Margin (dB)	Result
2587.5	-24.6	-13.0	11.6	Complied
2598.5	-24.6	-13.0	11.6	Complied





1 MHz strip below channel centre freq -5.5 MHz measured using the spectrum analyser Channel Power function.

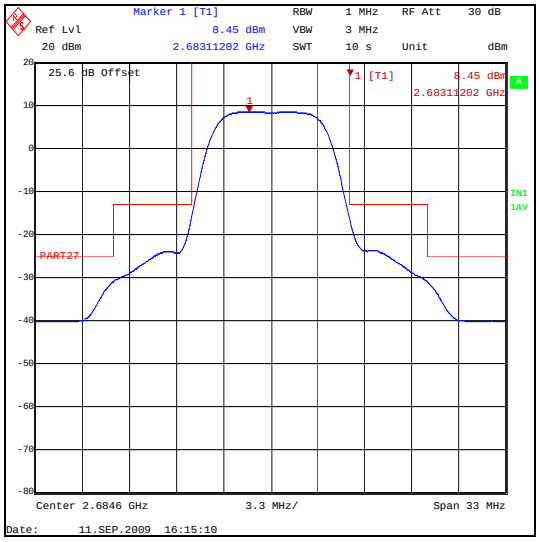


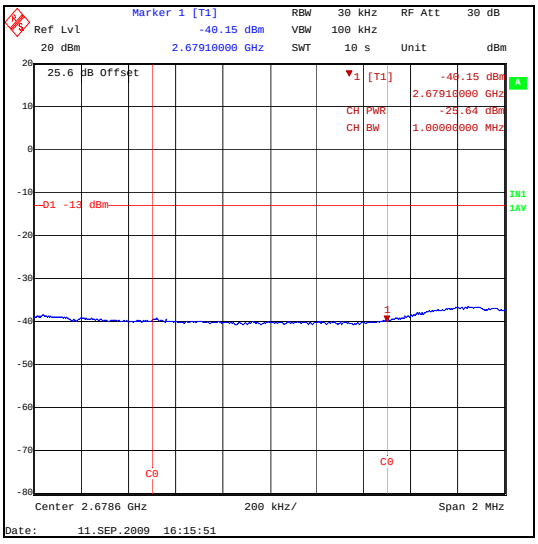
1 MHz strip above channel centre freq +5.5 MHz measured using the spectrum analyser Channel Power function.

Transmitter Radiated Spurious Emissions - Channel Edge (continued)

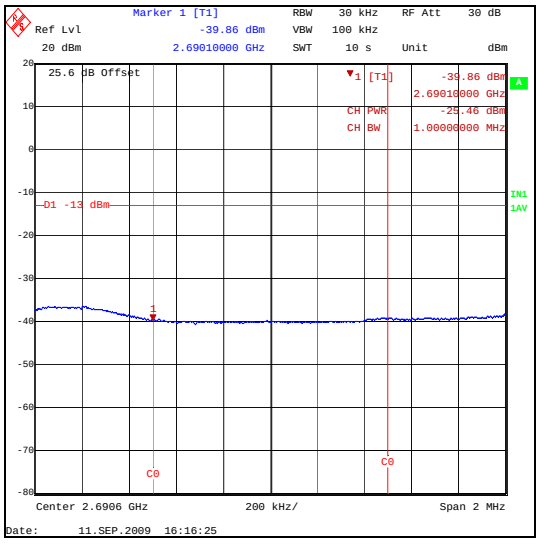
Results: Top channel / QPSK

Frequency of 1 MHz strip adjacent to channel edge	Level in 1 MHz strip adjacent to block edge (dBm)	Band Edge Limit (dBm)	Margin (dB)	Result
2679.1	-25.6	-13.0	12.6	Complied
2690.1	-25.5	-13.0	12.5	Complied





1 MHz strip below channel centre freq -5.5 MHz measured using the spectrum analyser Channel Power function.

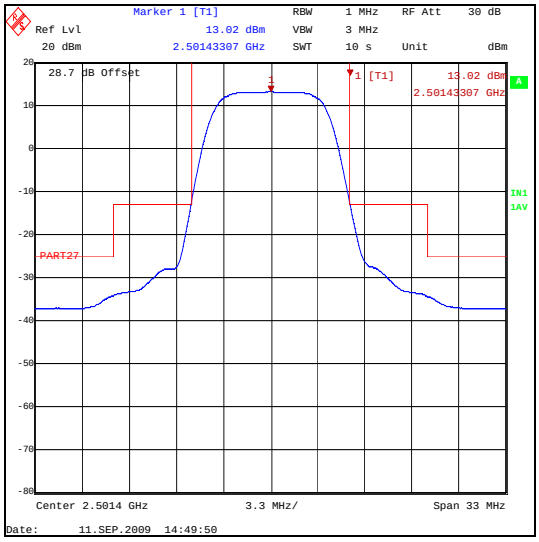


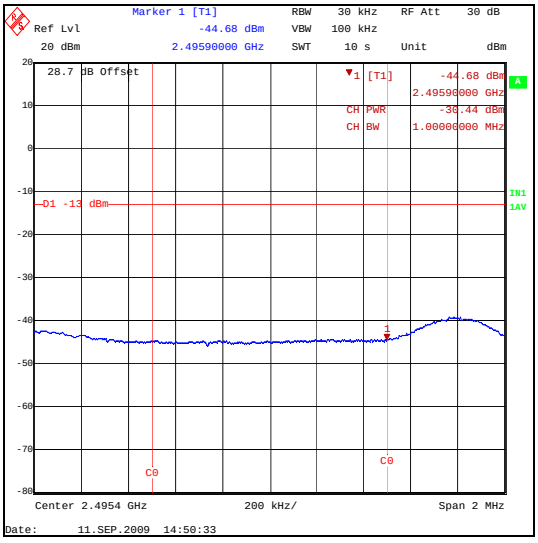
1 MHz strip above channel centre freq +5.5 MHz measured using the spectrum analyser Channel Power function.

Transmitter Radiated Spurious Emissions - Channel Edge (continued)

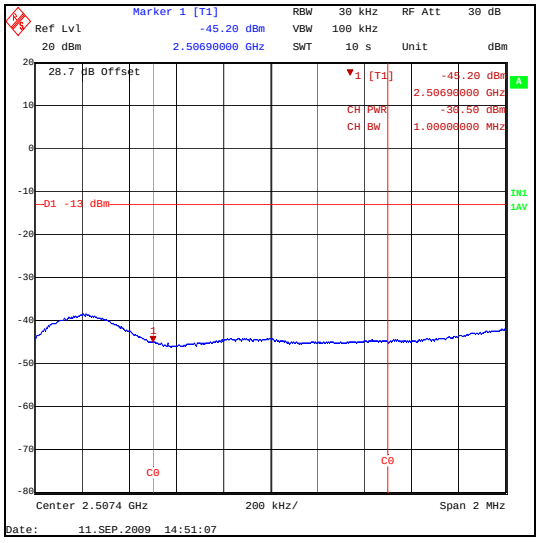
Results: Bottom channel / 16QAM

Frequency of 1 MHz strip adjacent to channel edge	Level in 1 MHz strip adjacent to block edge (dBm)	Band Edge Limit (dBm)	Margin (dB)	Result
2495.9	-30.4	-13.0	17.4	Complied
2506.9	-30.5	-13.0	17.5	Complied





1 MHz strip below channel centre freq -5.5 MHz measured using the spectrum analyser Channel Power function.

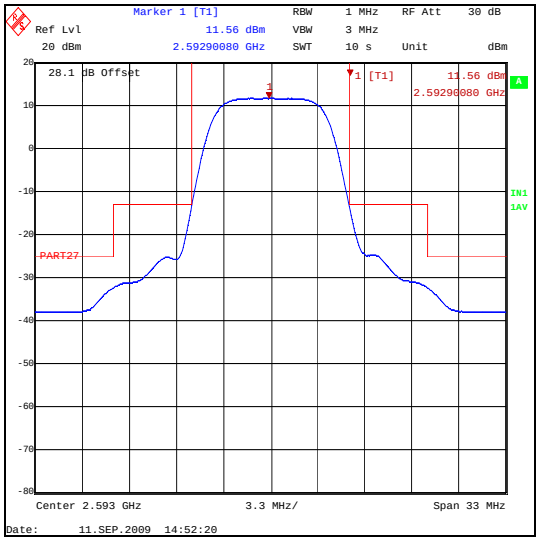


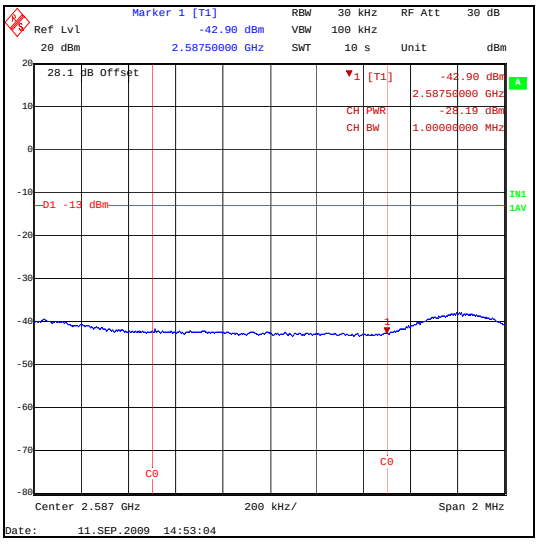
1 MHz strip above channel centre freq +5.5 MHz measured using the spectrum analyser Channel Power function.

Transmitter Radiated Spurious Emissions - Channel Edge (continued)

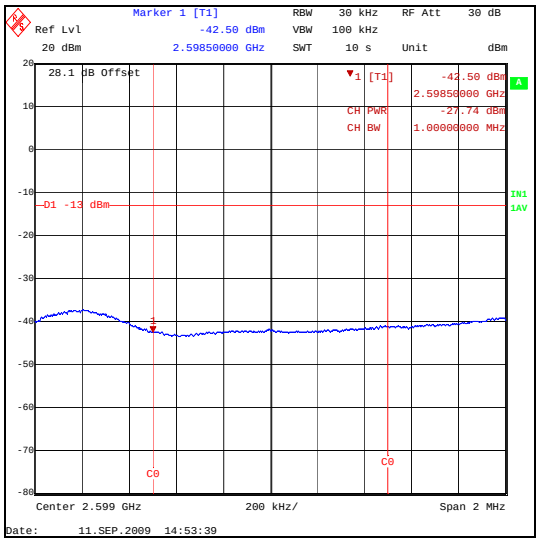
Results: Middle channel / 16QAM

Frequency of 1 MHz strip adjacent to channel edge	Level in 1 MHz strip adjacent to block edge (dBm)	Band Edge Limit (dBm)	Margin (dB)	Result
2587.5	-28.2	-13.0	15.2	Complied
2598.5	-27.7	-13.0	14.7	Complied





1 MHz strip below channel centre freq -5.5 MHz measured using the spectrum analyser Channel Power function.

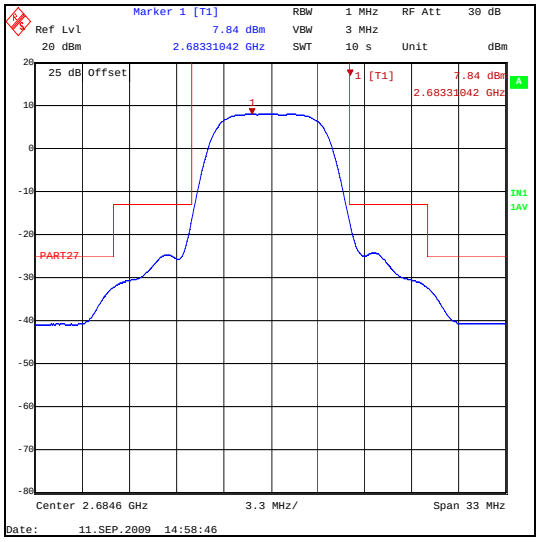


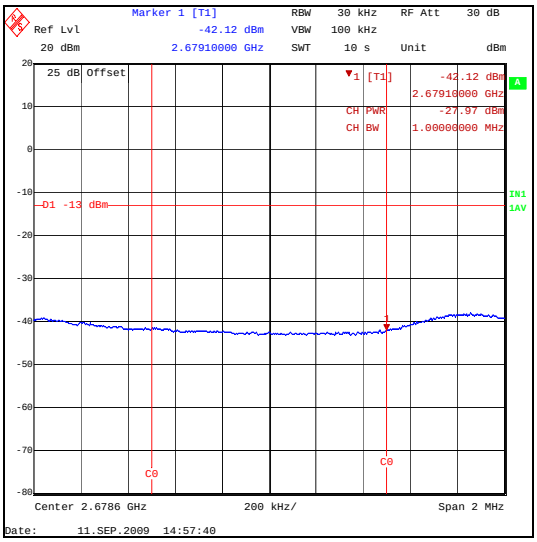
1 MHz strip above channel centre freq +5.5 MHz measured using the spectrum analyser Channel Power function.

Transmitter Radiated Spurious Emissions - Channel Edge (continued)

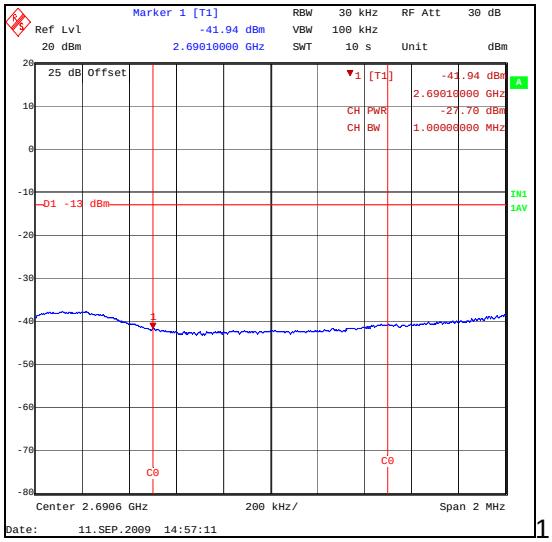
Results: Top channel / 16QAM

Frequency of 1 MHz strip adjacent to channel edge	Level in 1 MHz strip adjacent to block edge (dBm)	Band edge limit (dBm)	Margin (dB)	Result
2679.1	-28.0	-13.0	15.0	Complied
2690.1	-27.7	-13.0	14.7	Complied





1 MHz strip below channel centre freq -5.5 MHz measured using the spectrum analyser Channel Power function.

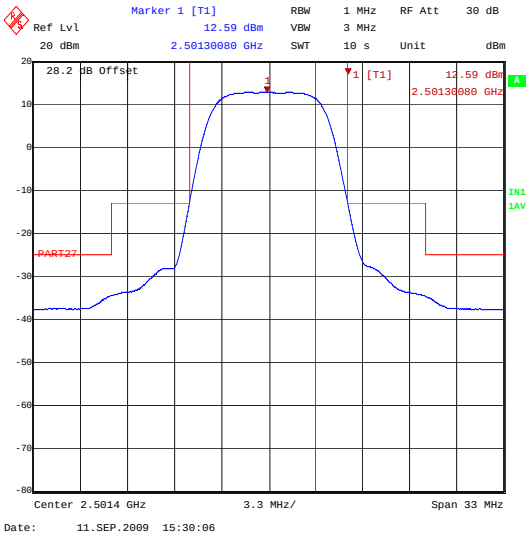


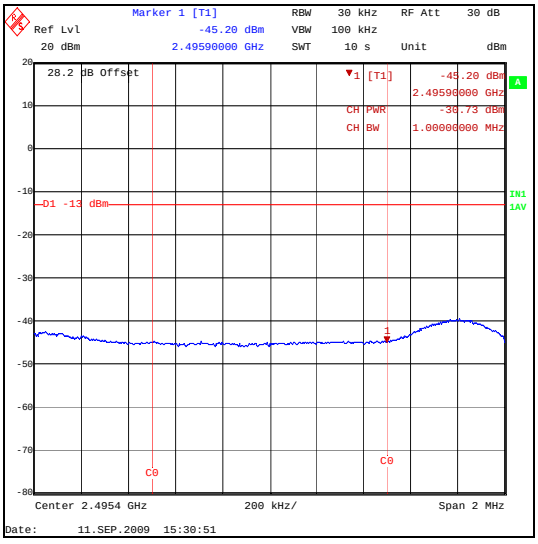
1 MHz strip above channel centre freq +5.5 MHz measured using the spectrum analyser Channel Power function.

Transmitter Radiated Spurious Emissions - Channel Edge (continued)

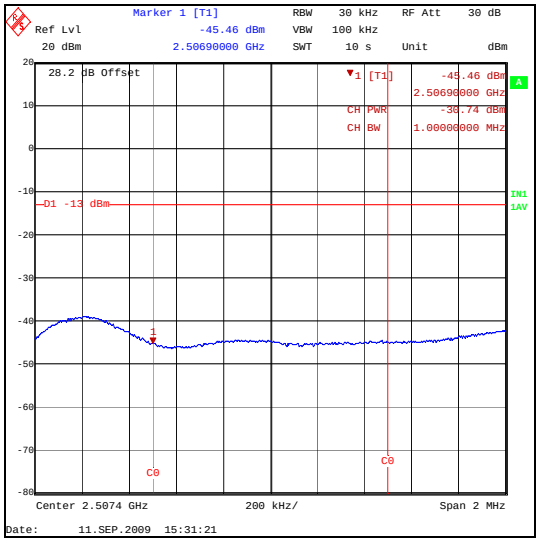
Results: Bottom channel / 64QAM

Frequency of 1 MHz strip adjacent to channel edge	Level in 1 MHz strip adjacent to block edge (dBm)	Band edge limit (dBm)	Margin (dB)	Result
2495.9	-30.7	-13.0	17.7	Complied
2506.9	-30.7	-13.0	17.7	Complied





1 MHz strip below channel centre freq -5.5 MHz measured using the spectrum analyser Channel Power function.

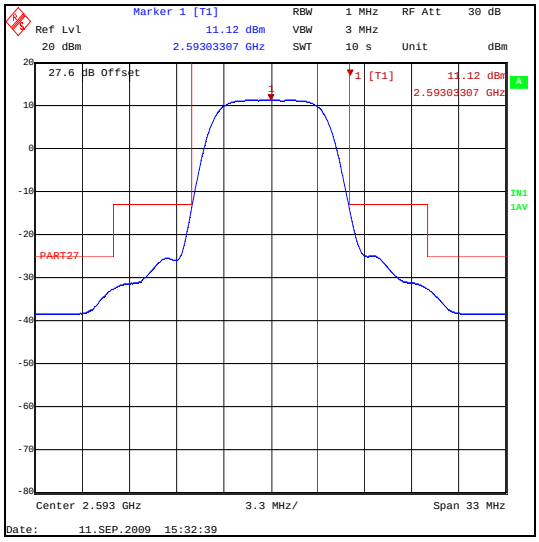


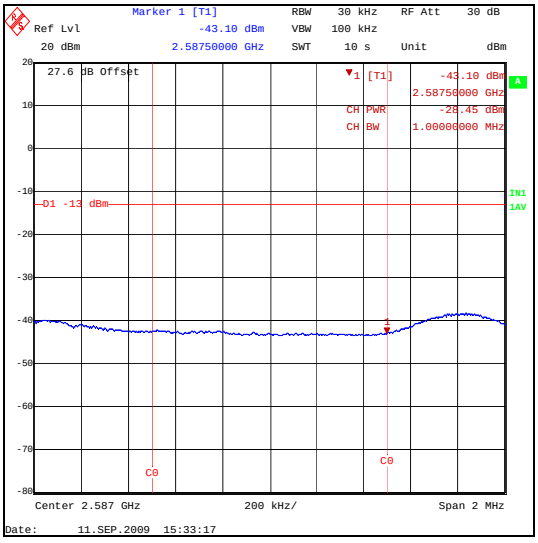
1 MHz strip above channel centre freq +5.5 MHz measured using the spectrum analyser Channel Power function.

Transmitter Radiated Spurious Emissions - Channel Edge (continued)

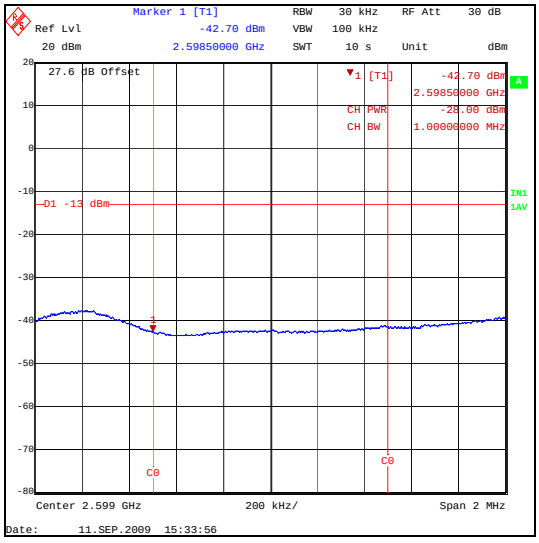
Results: Middle channel / 64QAM

Frequency of 1 MHz strip adjacent to channel edge	Level in 1 MHz strip adjacent to block edge (dBm)	Band edge limit (dBm)	Margin (dB)	Result
2587.5	-28.5	-13.0	15.5	Complied
2598.5	-28.0	-13.0	15.0	Complied





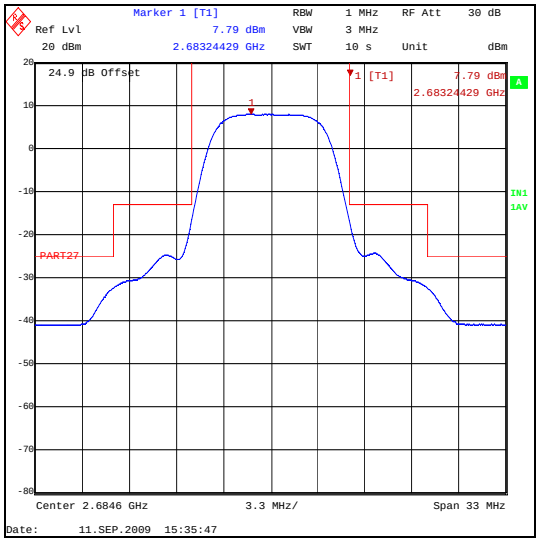
1 MHz strip below channel centre freq -5.5 MHz measured using the spectrum analyser Channel Power function.



1 MHz strip above channel centre freq +5.5 MHz measured using the spectrum analyser Channel Power function.

Transmitter Radiated Spurious Emissions - Channel Edge (continued)

Results: Top channel / 64QAM



5.2.9. Transmitter Radiated Spurious Emissions

Test Summary:

FCC Part:	FCC 2.1051 and FCC Part 27.53
Test Method Used:	As detailed in ANSI TIA-603-C-2004 Section 2.2.12 referencing FCC CFR Part 2.1053

Environmental Conditions:

Temperature (°C):	25
Relative Humidity (%):	50

Results: QPSK Bottom Channel

Frequency (MHz)	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
5006.583	-55.3	-25.0	30.3	Complied
7510.701	-39.8	-25.0	14.8	Complied
10013.691	-58.2	-25.0	33.2	Complied
12496.304	-49.9	-25.0	24.9	Complied

Results: QPSK Middle Channel

Frequency (MHz)	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
5182.349	-52.0	-25.0	27.0	Complied
7773.908	-40.8	-25.0	15.8	Complied
10372.284	-55.9	-25.0	30.9	Complied
12976.423	-54.1	-25.0	29.1	Complied

Results: QPSK Top Channel

Frequency (MHz)	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
5372.916	-44.5	-25.0	19.5	Complied
8059.474	-34.6	-25.0	9.6	Complied
10738.635	-42.4	-25.0	17.4	Complied
13412.424	-39.4	-25.0	14.4	Complied

Transmitter Radiated Spurious Emissions (continued)

Results: 16QAM Bottom Channel

Frequency (MHz)	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
5006.594	-53.7	-25.0	28.7	Complied
7510.681	-38.7	-25.0	13.7	Complied
9998.105	-58.6	-25.0	33.6	Complied
12496.539	-49.2	-25.0	24.2	Complied

Results: 16QAM Middle Channel

Frequency (MHz)	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
5189.815	-48.9	-25.0	23.9	Complied
7772.748	-40.0	-25.0	15.0	Complied
10364.445	-56.2	-25.0	31.2	Complied
12976.302	-52.2	-25.0	27.2	Complied

Results: 16QAM Top Channel

Frequency (MHz)	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
5373.015	-49.0	-25.0	24.0	Complied
8047.279	-33.0	-25.0	8.0	Complied
10746.224	-41.9	-25.0	16.9	Complied
13433.818	-39.6	-25.0	14.6	Complied

Transmitter Radiated Spurious Emissions (continued)

Results: 64QAM Bottom Channel

Frequency (MHz)	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
5006.532	-54.1	-25.0	29.1	Complied
7498.141	-38.6	-25.0	13.6	Complied
9998.345	-58.6	-25.0	33.6	Complied
12496.689	-49.9	-25.0	24.9	Complied

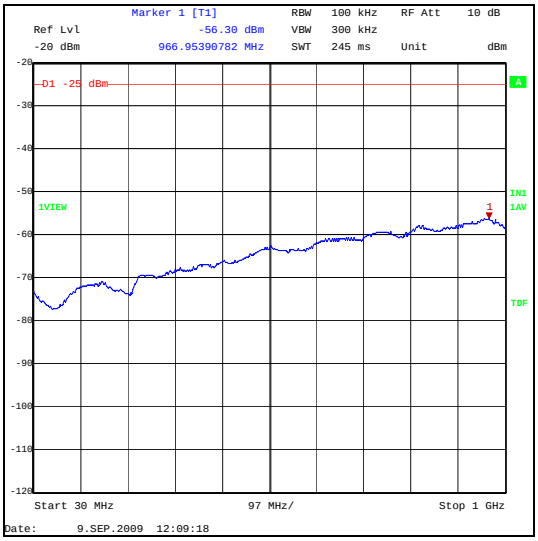
Results: 64QAM Middle Channel

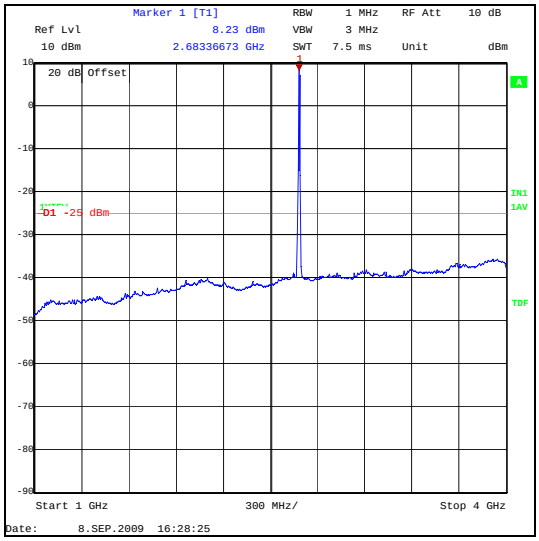
Frequency (MHz)	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
5190.083	-49.4	-25.0	24.4	Complied
7773.156	-40.1	-25.0	15.1	Complied
10379.956	-56.2	-25.0	31.2	Complied
12976.022	-53.3	-25.0	28.3	Complied

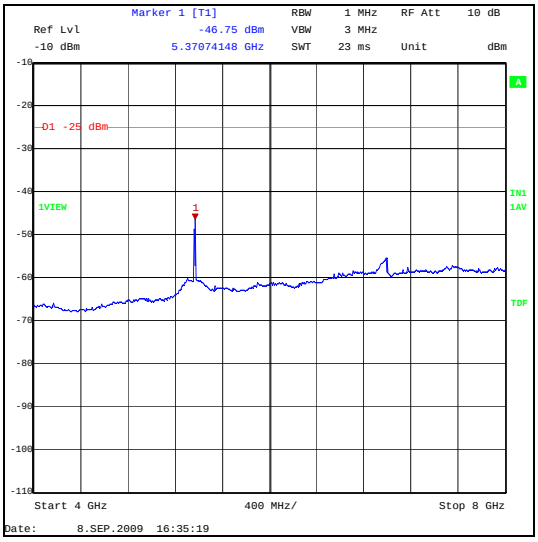
Results: 64QAM Top Channel

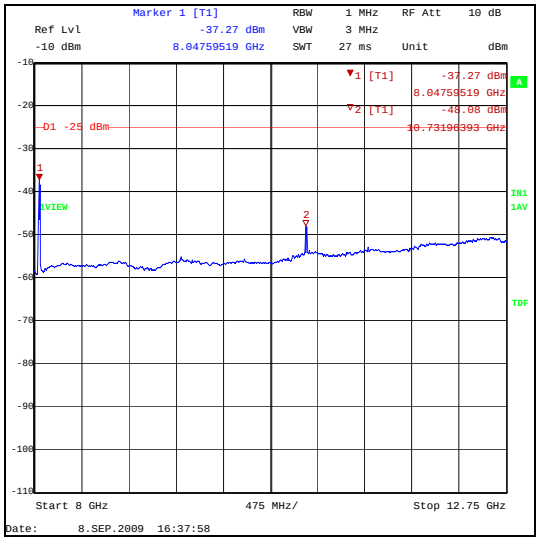
Frequency (MHz)	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
5373.005	-42.8	-25.0	17.8	Complied
8047.725	-33.6	-25.0	8.6	Complied
10746.373	-43.3	-25.0	18.3	Complied
13412.699	-41.1	-25.0	16.1	Complied

Transmitter Radiated Spurious Emissions (continued)



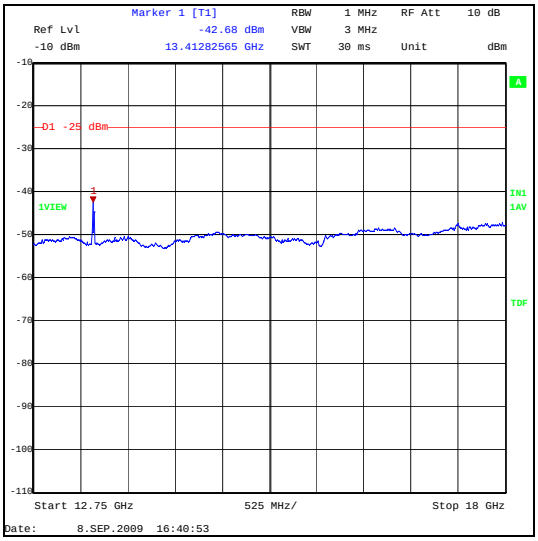


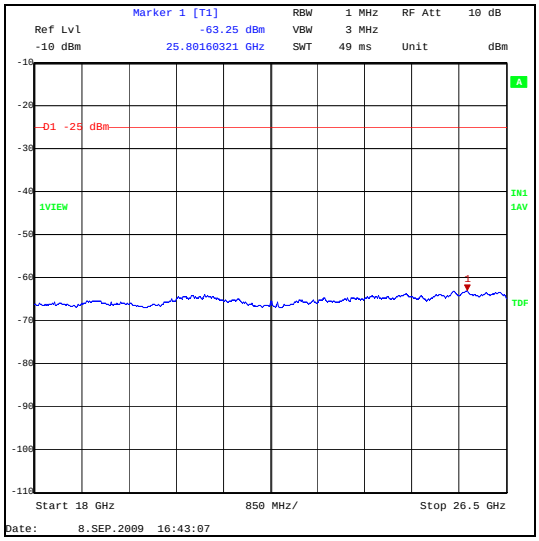


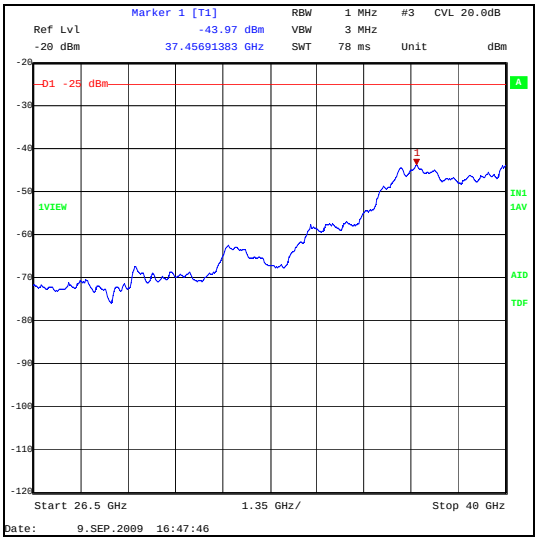


Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.

Transmitter Radiated Spurious Emissions (continued)

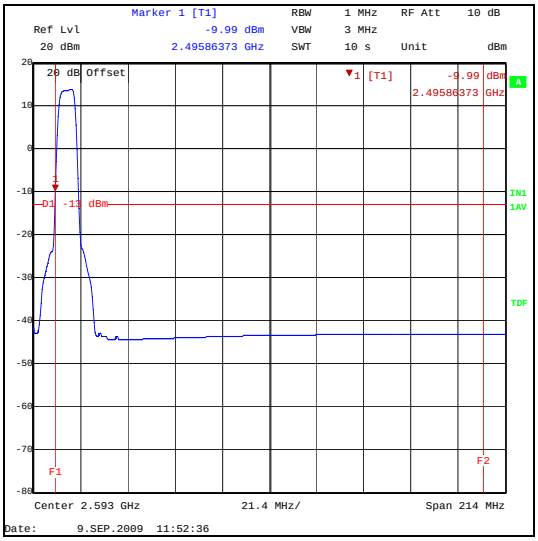




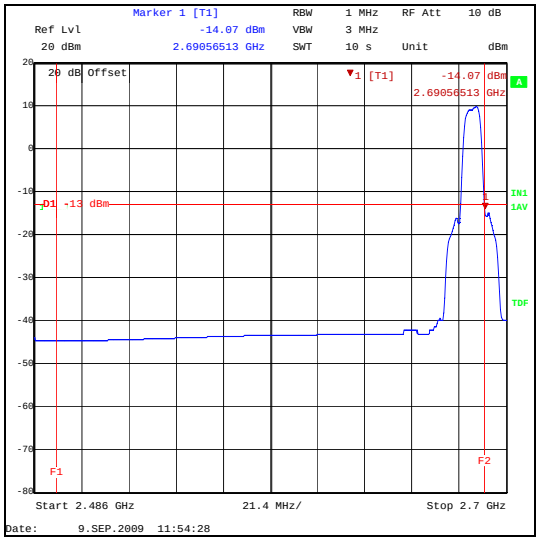


Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.

Transmitter Radiated Spurious Emissions (continued)



In Band (Bottom Channel)



In Band (Top Channel)

Note(s):

1. *The emission shown at approximately 2683.367 MHz on the 1 GHz to 4 GHz plot is the carrier.*

5.2.10. Transmitter Radiated Spurious Emissions at Band Edges

Test Summary:

FCC Part:	FCC Part 2.1051 and FCC Part 27.53
Test Method Used:	As detailed in ANSI TIA-603-C-2004 Section 2.2.12 referencing FCC CFR Part 2.1053

Environmental Conditions:

Temperature (°C):	25
Relative Humidity (%):	32

Results: QPSK 1 MHz strip below the lower band edge

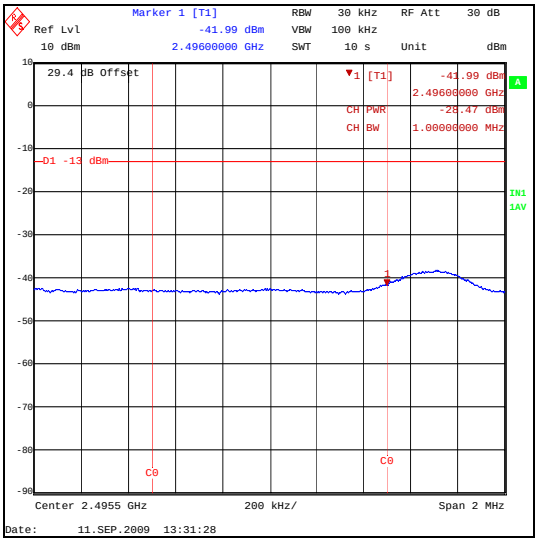
Frequency (MHz)	Spurious Emission (dBm)	Limit (dBm)	Margin (dB)	Result
2495 to 2496	-28.5	-13.0	15.5	Complied

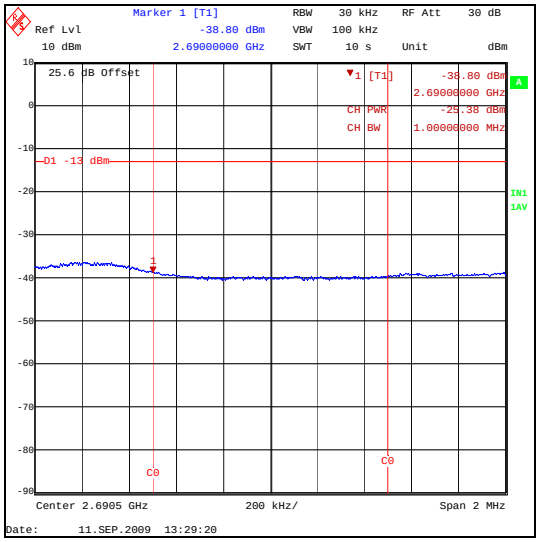
Results: QPSK 1 MHz strip above the upper band edge

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
2690 to 2691	-25.4	-13.0	12.4	Complied

Note(s):

1. Measured with a 1 MHz resolution bandwidth and also using the channel power function of the spectrum analyser.





Transmitter Radiated Spurious Emissions at Band Edges (continued)

Results: 16QAM 1 MHz strip below the lower band edge

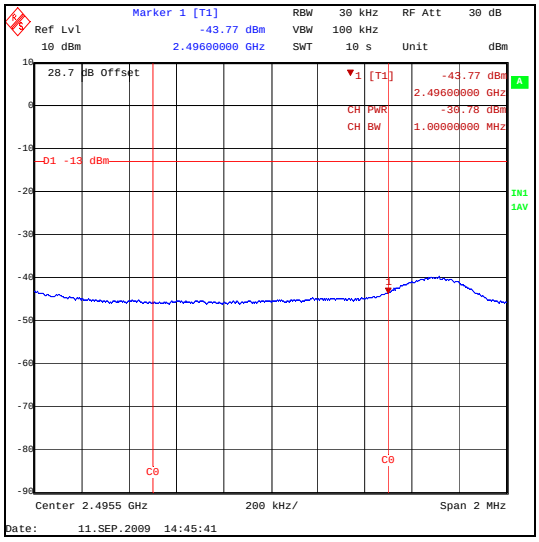
Frequency (MHz)	Spurious Emission (dBm)	Limit (dBm)	Margin (dB)	Result
2495 to 2496	-30.8	-13.0	17.8	Complied

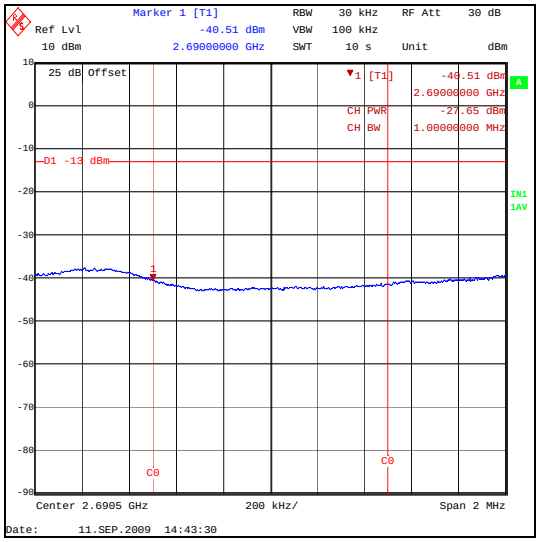
Results: 16QAM 1 MHz strip above the upper band edge

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
2690 to 2691	-27.7	-13.0	14.7	Complied

Note(s):

1. Measured with a 1 MHz resolution bandwidth and also using the channel power function of the spectrum analyser.





Transmitter Radiated Spurious Emissions at Band Edges (continued)

Results: 64QAM 1 MHz strip below the lower band edge

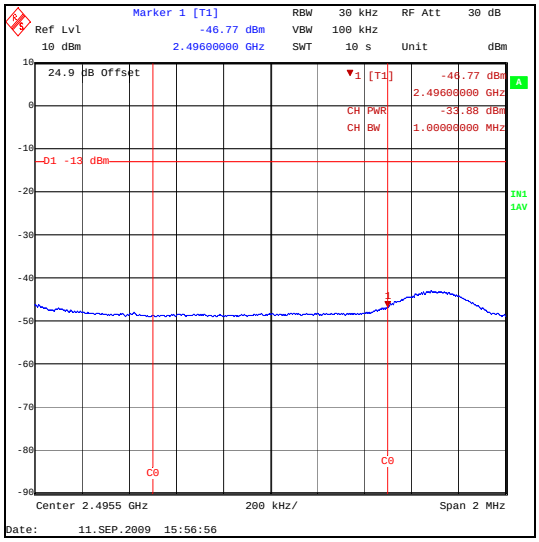
Frequency (MHz)	Spurious Emission (dBm)	Limit (dBm)	Margin (dB)	Result
2495 to 2496	-33.9	-13.0	20.9	Complied

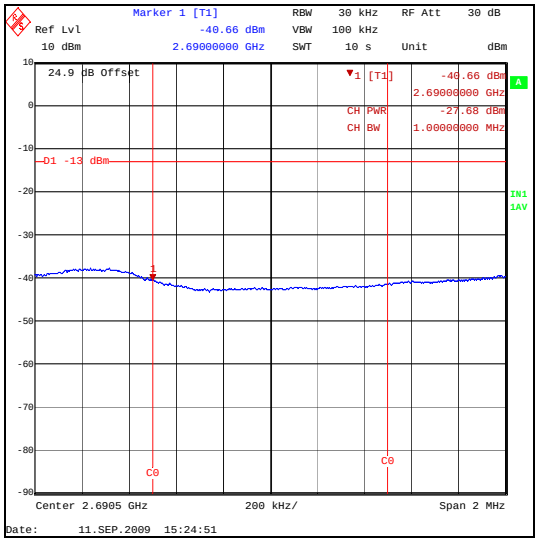
Results: 64QAM 1 MHz strip above the upper band edge

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
2690 to 2691	-27.7	-13.0	14.7	Complied

Note(s):

1. Measured with a 1 MHz resolution bandwidth and also using the channel power function of the spectrum analyser.





5.2.11. Transmitter Conducted Average Output Power

Test Summary:

FCC Part:	Part 2.1046
Test Method Used:	As detailed in ANSI TIA-603-C-2004 Section 2.2.1

Results: QPSK

Channel	Frequency (MHz)	Conducted Average Output Power (dBm)
12507	2501.4	24.5
12965	2593.0	23.8
13420	2684.6	23.2

Results: 16QAM

Channel	Frequency (MHz)	Conducted Average Output Power (dBm)
12507	2501.4	24.5
12965	2593.0	23.7
13420	2684.6	23.0

Results: 64QAM

Channel	Frequency (MHz)	Conducted Average Output Power (dBm)
12507	2501.4	24.5
12965	2593.0	23.7
13420	2684.6	23.0

5.3. Test Results – Low Chip Rate

5.3.1. Receive/Idle Mode AC Conducted Spurious Emissions

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

Environmental Conditions:

Temperature (°C):	26
Relative Humidity (%):	37

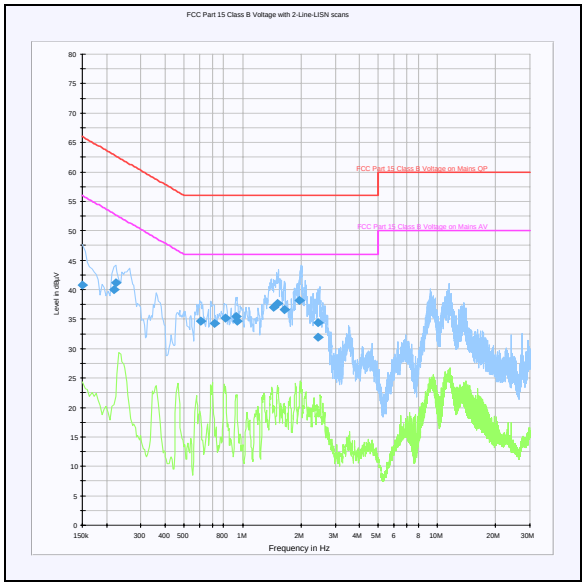
Results: Quasi Peak Detector Measurements

Frequency (MHz)	Line	Quasi Peak Level (dBμV)	Limit (dBμV)	Margin (dB)	Result
0.150000	Neutral	40.8	66.0	25.2	Complied
0.217500	Live	40.1	62.9	22.8	Complied
0.222000	Live	41.2	62.7	21.5	Complied
0.609000	Live	34.7	56.0	21.3	Complied
0.712500	Neutral	34.2	56.0	21.8	Complied
0.816000	Neutral	35.2	56.0	20.8	Complied
0.924000	Neutral	35.4	56.0	20.6	Complied
0.942000	Neutral	34.6	56.0	21.4	Complied
1.437000	Live	37.0	56.0	19.0	Complied
1.509000	Live	37.7	56.0	18.3	Complied
1.635000	Live	36.6	56.0	19.4	Complied
1.963500	Live	38.1	56.0	17.9	Complied
2.427000	Live	31.9	56.0	24.1	Complied
2.454000	Live	34.4	56.0	21.6	Complied

Note(s):

1. All average measurements were at least 20 dB below the appropriate specification limit

Receive/Idle AC Conducted Spurious Emissions (continued)



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

5.3.2. Receive/Idle Mode Radiated Spurious Emissions

Test Summary:

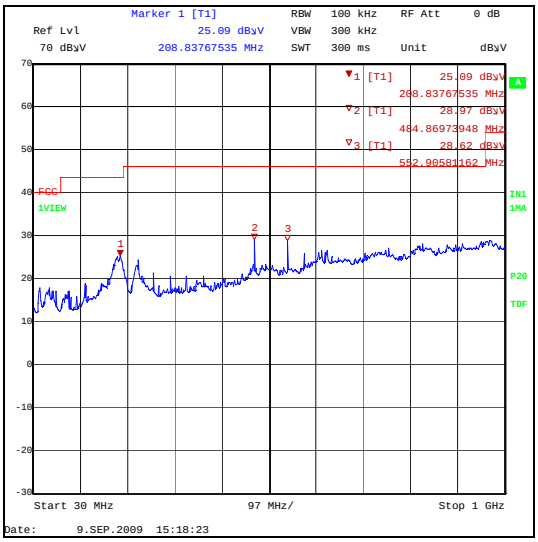
FCC Part:	15.109
Test Method Used:	As detailed in ANSI C63.4 Section 8 and relevant annexes
Frequency Range:	30 MHz to 1000 MHz

Environmental Conditions:

Temperature (°C):	26
Relative Humidity (%):	33

Results:

Frequency (MHz)	Antenna Polarity	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
209.198	Horizontal	21.4	43.5	21.9	Complied
483.981	Horizontal	29.6	46.0	16.4	Complied
553.119	Horizontal	30.7	46.0	15.3	Complied



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

Receive/Idle Radiated Spurious Emissions

Test Summary:

FCC Part:	FCC Part 15.109
Test Method Used:	As detailed in ANSI C63.4 Section 8 and relevant annexes
Frequency Range:	1 GHz to 26.5 GHz

Environmental Conditions:

Temperature (°C):	26
Relative Humidity (%):	33

Results: Highest Peak Level:

Frequency (GHz)	Antenna Polarity	Detector level (dBμV)	Antenna factor (dB)	Actual Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
17.705	Vertical	40.6	16.6	57.2	74.0	16.8	Complied

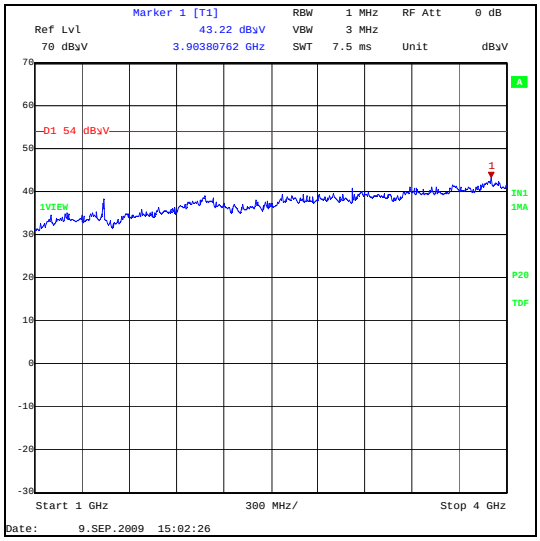
Results: Highest Average Level:

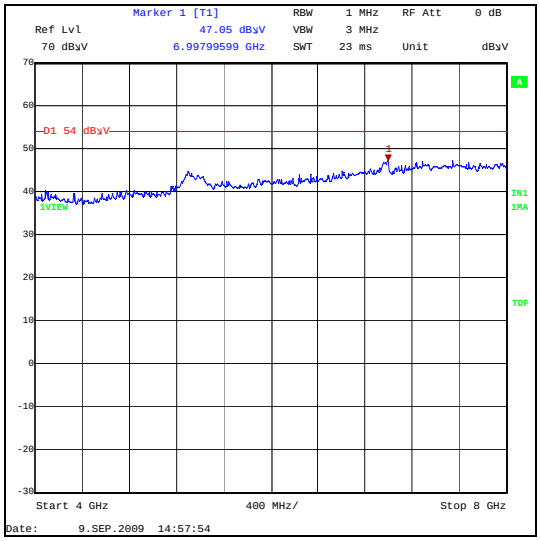
Frequency (GHz)	Antenna Polarity	Detector level (dBμV)	Antenna factor (dB)	Actual Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
17.695	Vertical	29.3	16.6	45.9	54.0	8.1	Complied

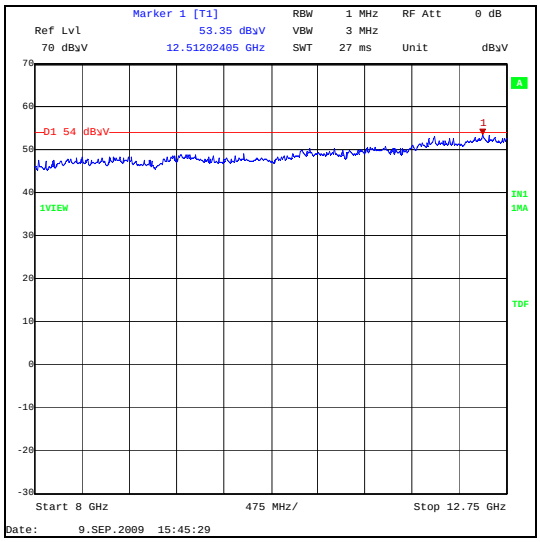
Note(s):

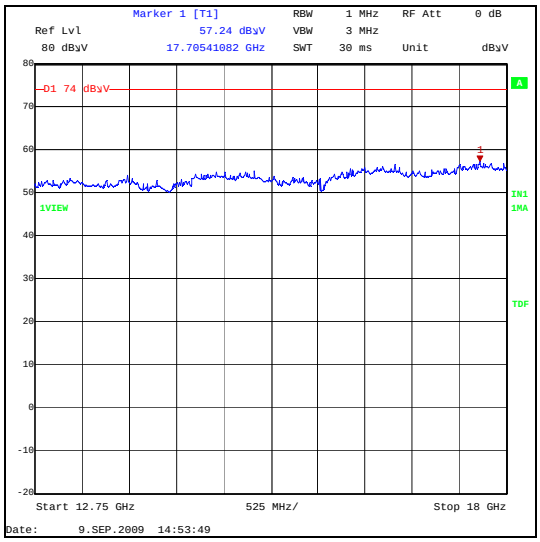
1. No spurious emissions were detected above the noise floor of the measuring receiver; therefore, the highest peak and average noise floor reading of the measuring receiver was recorded as shown in the table above.
2. All pre-scans were performed with a peak detector against average limits apart from measurements made in the range of 12.75 to 18 GHz where pre-scans were performed with peak and average detectors and the applicable limit applied. This was due to the noise floor exceeding the average limit when using a peak detector.

Receive/Idle Radiated Spurious Emissions (continued)



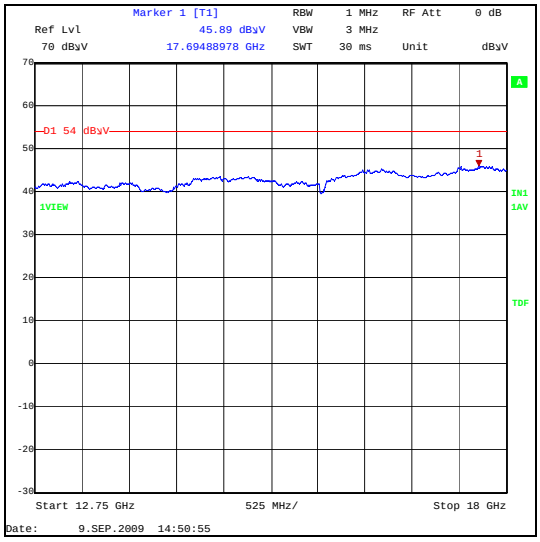


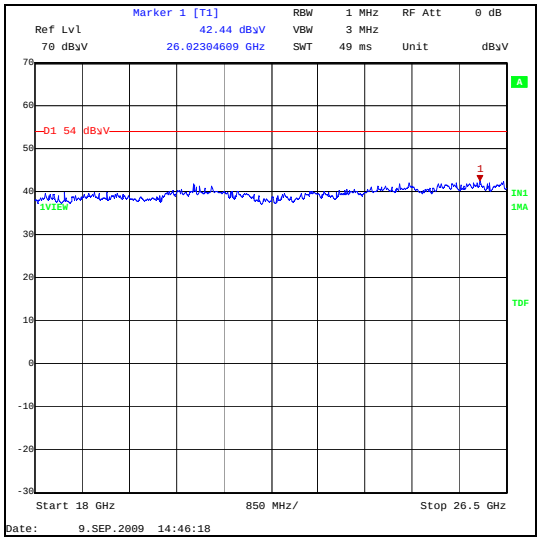




Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.

Receive/Idle Radiated Spurious Emissions (continued)





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

5.3.3. Transmitter AC Conducted Spurious Emissions

Test Summary:

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

Environmental Conditions:

Temperature (°C):	26
Relative Humidity (%):	37

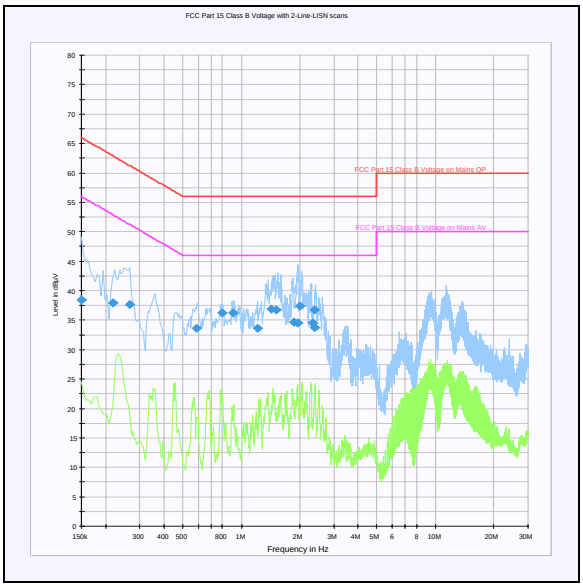
Results: Quasi Peak Detector Measurements

Frequency (MHz)	Line	Quasi Peak Level (dBμV)	Limit (dBμV)	Margin (dB)	Result
0.150000	Live	38.5	66.0	27.5	Complied
0.217500	Live	37.9	62.9	25.0	Complied
0.267000	Live	37.6	61.2	23.6	Complied
0.591000	Live	33.6	56.0	22.4	Complied
0.798000	Neutral	36.2	56.0	19.8	Complied
0.901500	Neutral	36.2	56.0	19.8	Complied
1.207500	Live	33.6	56.0	22.4	Complied
1.419000	Live	36.9	56.0	19.1	Complied
1.513500	Live	36.8	56.0	19.2	Complied
1.869000	Live	34.7	56.0	21.3	Complied
1.963500	Live	34.5	56.0	21.5	Complied
2.008500	Live	37.4	56.0	18.6	Complied
2.341500	Live	34.6	56.0	21.4	Complied
2.373000	Live	36.7	56.0	19.3	Complied
2.395500	Live	33.7	56.0	22.3	Complied

Note(s):

1. All average measurements were at least 20 dB below the appropriate specification limit

Transmitter AC Conducted Spurious Emissions (continued)



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

5.3.4. Transmitter Equivalent Isotropically Radiated Power (EIRP)

Test Summary:

FCC Part:	FCC 27.50(h)(2)
Test Method Used:	As detailed in ANSI TIA-603-C-2004 Section 2.2.17.2

Environmental Conditions:

Temperature (°C):	25
Relative Humidity (%):	50

Results: QPSK

Channel	Frequency (MHz)	EIRP (dBm)	EIRP Limit (dBm)	Margin (dB)	Result
12494	2498.8	21.6	33.0	11.4	Complied
12965	2593.0	22.1	33.0	10.9	Complied
13436	2687.2	18.7	33.0	14.3	Complied

Results: 16QAM

Channel	Frequency (MHz)	EIRP (dBm)	EIRP Limit (dBm)	Margin (dB)	Result
12494	2498.8	21.2	33.0	11.8	Complied
12965	2593.0	20.9	33.0	12.1	Complied
13436	2687.2	18.6	33.0	14.4	Complied

Results: 64QAM

Channel	Frequency (MHz)	EIRP (dBm)	EIRP Limit (dBm)	Margin (dB)	Result
12494	2498.8	21.3	33.0	11.7	Complied
12965	2593.0	20.8	33.0	12.2	Complied
13436	2687.2	20.0	33.0	13.0	Complied

5.3.5. Transmitter Frequency Stability: (Temperature Variation)

Test Summary:

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

Environmental Conditions:

Temperature (°C):	24
Relative Humidity (%):	32

Results: 2498.8 MHz

Temp (ºC)	Measured Frequency (MHz)	Frequency Error (Hz)
-30	2498.799773	-227
-20	2498.800257	257
-10	2498.800493	493
0	2498.800140	140
10	2498.799842	-158
20	2498.799833	-167
30	2498.800168	168
40	2498.800193	193
50	2498.800361	361

Results: 2593 MHz

Temp (ºC)	Measured Frequency (MHz)	Frequency Error (Hz)
-30	2592.999780	-220
-20	2593.000223	223
-10	2593.000514	514
0	2593.000163	163
10	2592.999841	-159
20	2592.999812	-188
30	2593.000147	147
40	2593.000208	208
50	2593.000343	343

Transmitter Frequency Stability: (Temperature Variation) (continued)

Results: 2687.2 MHz

Temp (ºC)	Measured Frequency (MHz)	Frequency Error (Hz)
-30	2687.199777	-223
-20	2687.200204	204
-10	2684.200544	544
0	2687.200199	199
10	2687.199858	-144
20	2687.199797	-203
30	2687.200144	144
40	2687.200235	235
50	2687.200315	315

5.3.5.1. Transmitter Frequency Stability: (Voltage Variation)

Test Summary:

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

Environmental Conditions:

Temperature (°C):	24
Relative Humidity (%):	32

Results: 2498.8 MHz

Supply Voltage (VDC)	Measured Frequency (MHz)	Frequency Error (Hz)
4.75	2498.800120	120
5.00	2498.800242	242
5.25	2498.800064	64

Results: 2593 MHz

Supply Voltage (VDC)	Measured Frequency (MHz)	Frequency Error (Hz)
4.75	2593.000161	161
5.00	2593.000278	278
5.25	2593.000049	49

Results: 2687.2 MHz

Supply Voltage (VDC)	Measured Frequency (MHz)	Frequency Error (Hz)
4.75	2687.200213	213
5.00	2687.200297	297
5.25	2687.200060	60

5.3.6. Transmitter Occupied Bandwidth

Test Summary:

FCC Part:	FCC 2.1049
Test Method Used:	As detailed in ANSI C63.4 Section13.1.7 and relevant annexes referencing FCC CFR Part 2.1049 (see note below)

Environmental Conditions:

Temperature (°C):	25
Relative Humidity (%):	32

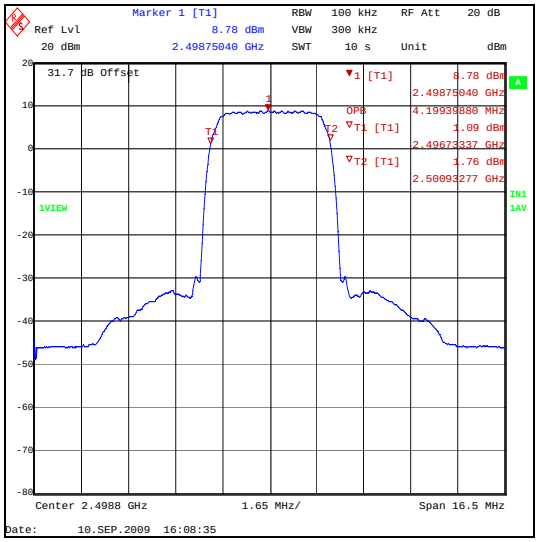
Results: QPSK

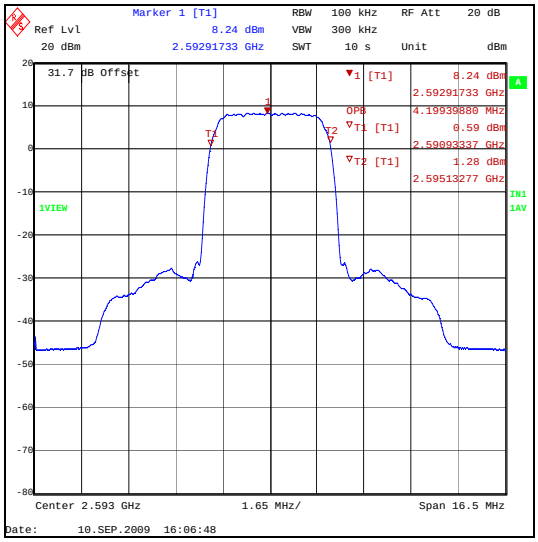
Channel Number	Frequency (MHz)	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
12494	2498.8	100	300	4.199
12965	2593.0	100	300	4.199
13436	2687.2	100	300	4.199

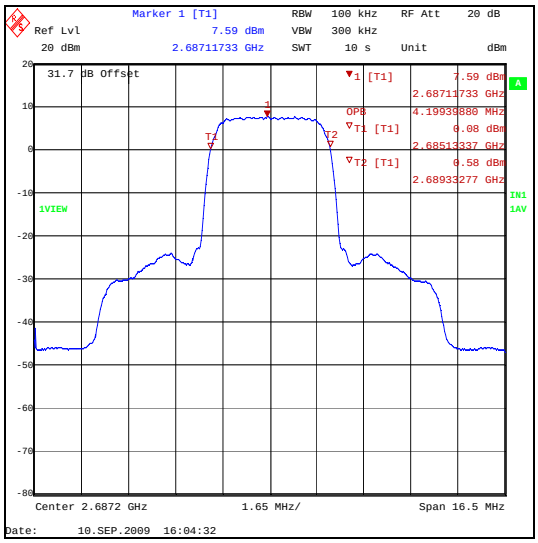
Note(s):

1. In lieu of the test method detailed in ANSI C63.4 Section 13.1.7 the 99% occupied bandwidth was measured using the Occupied Bandwidth function of the spectrum analyser.

Transmitter Occupied Bandwidth (continued)







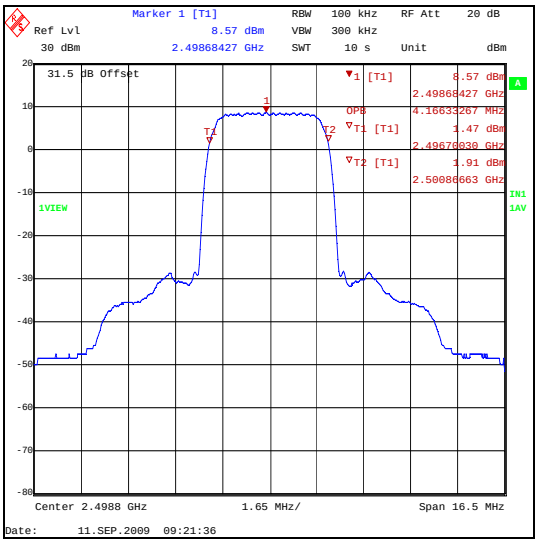
Transmitter Occupied Bandwidth (continued)

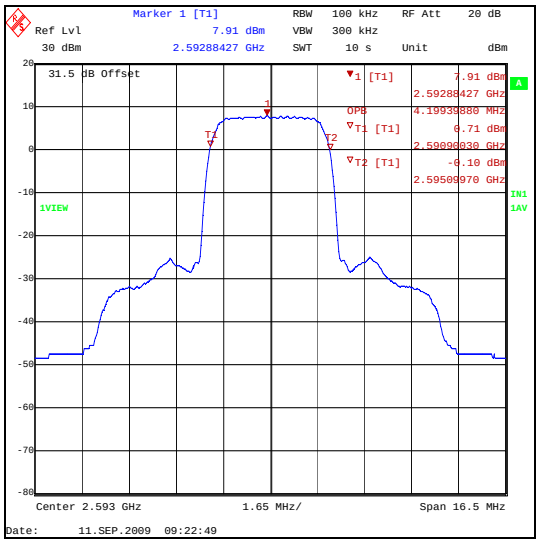
Results: 16QAM

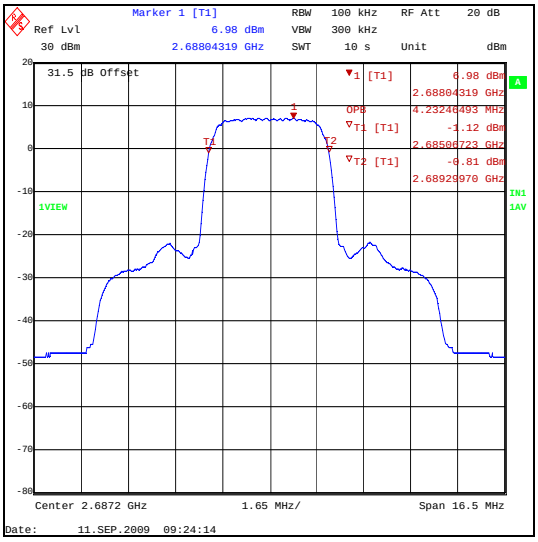
Channel Number	Frequency (MHz)	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
12494	2498.8	100	300	4.166
12965	2593.0	100	300	4.199
13436	2687.2	100	300	4.232

Note(s):

1. In lieu of the test method detailed in ANSI C63.4 Section 13.1.7 the 99% occupied bandwidth was measured using the Occupied Bandwidth function of the spectrum analyser.







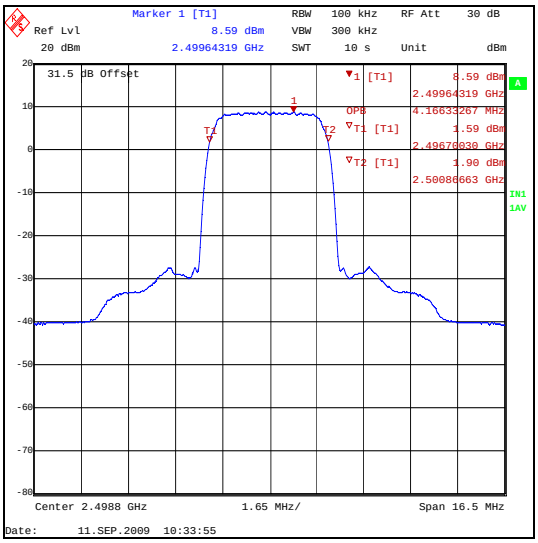
Transmitter Occupied Bandwidth (continued)

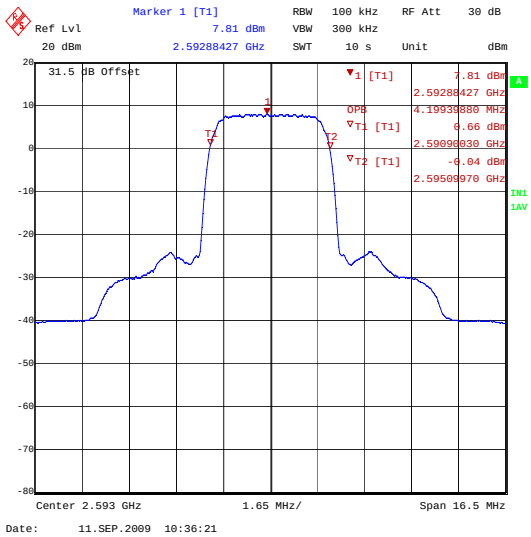
Results: 64QAM

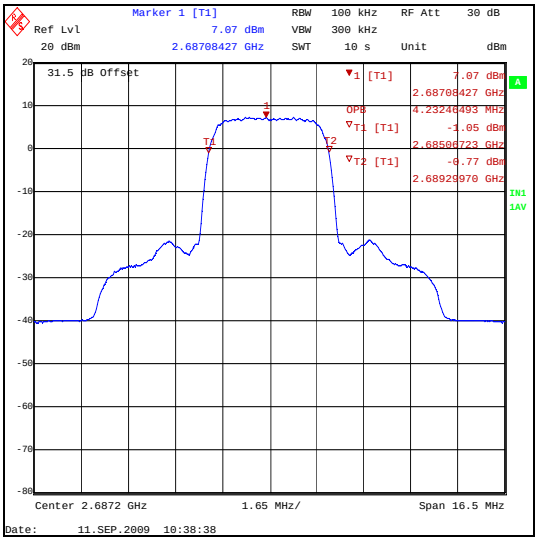
Channel Number	Frequency (MHz)	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
12494	2498.8	100	300	4.166
12965	2593.0	100	300	4.199
13436	2687.2	100	300	4.232

Note(s):

1. In lieu of the test method detailed in ANSI C63.4 Section 13.1.7 the 99% occupied bandwidth was measured using the Occupied Bandwidth function of the spectrum analyser.







5.3.7. Transmitter Radiated Spurious Emissions - Channel Edge

Test Summary:

FCC Part:	FCC Part 2.1051 and FCC Part 27.53
Test Method Used:	As detailed in ANSI TIA-603-C-2004 Section 2.2.12 referencing FCC CFR Part 2.1053

Environmental Conditions:

Temperature (°C):	25
Relative Humidity (%):	32

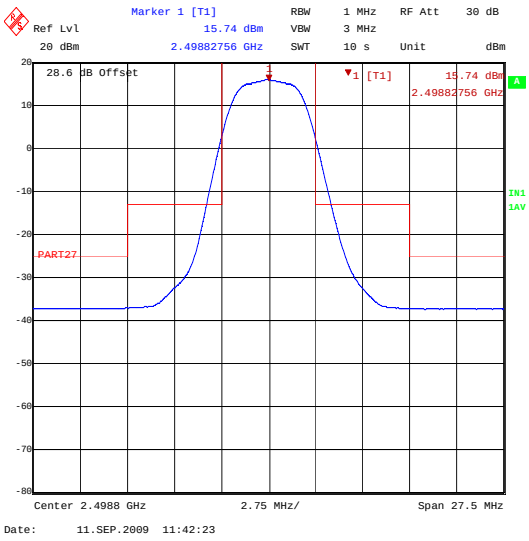
Note(s):

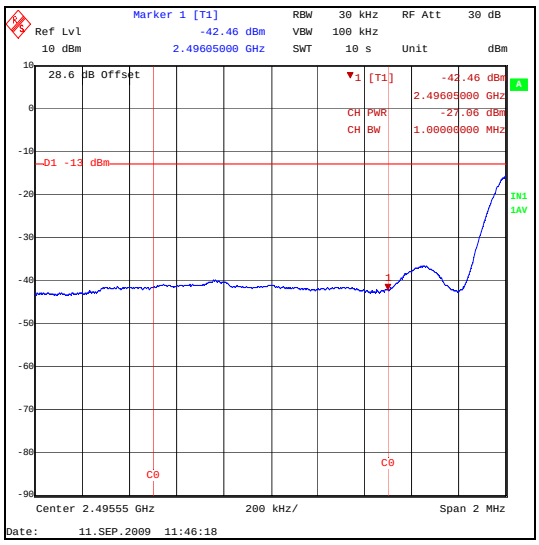
1. It can be seen on the main mask plots that the emission goes through the limit line. This is on account of the analyser bandwidth being too great to make an accurate measurement. The analyser Integration function was thus used to demonstrate compliance and this can be seen on the two plots accompanying the mask plot.

Results: Bottom Channel / QPSK

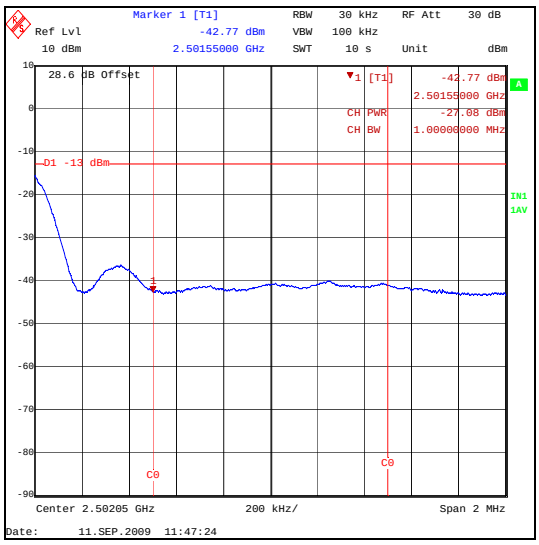
Frequency of 1 MHz strip adjacent to channel edge	Level in 1 MHz strip adjacent to block edge (dBm)	Band Edge Limit (dBm)	Margin (dB)	Result
2496.05	-27.1	-13.0	14.1	Complied
2501.55	-27.1	-13.0	14.1	Complied

Transmitter Radiated Emissions - Channel Edge (continued)





1 MHz strip below channel centre freq -5.5 MHz measured using the spectrum analyser Channel Power function.

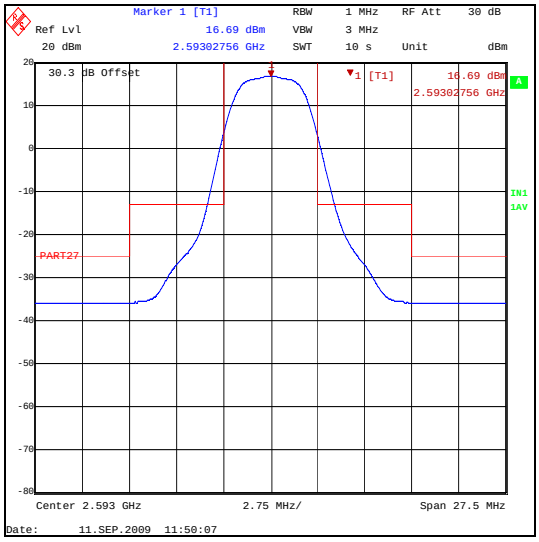


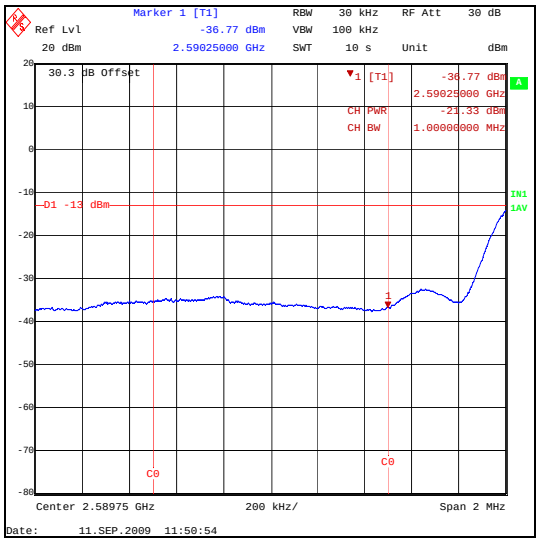
1 MHz strip above channel centre freq +5.5 MHz measured using the spectrum analyser Channel Power function.

Transmitter Radiated Emissions - Channel Edge (continued)

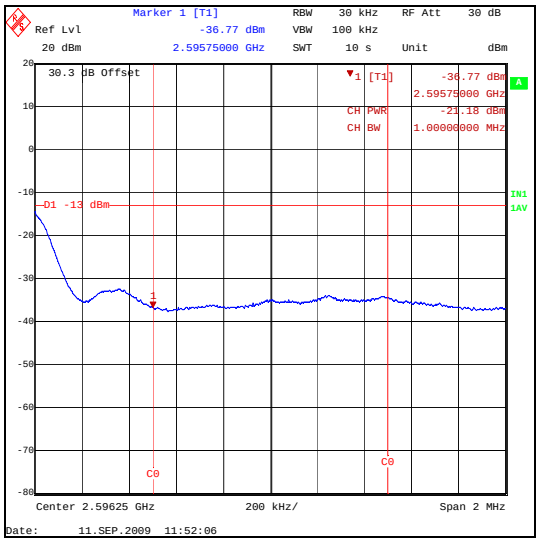
Results: Middle channel / QPSK

Frequency of 1 MHz strip adjacent to channel edge	Level in 1 MHz strip adjacent to block edge (dBm)	Band Edge Limit (dBm)	Margin (dB)	Result
2590.25	-21.3	-13.0	8.3	Complied
2595.75	-21.2	-13.0	8.2	Complied





1 MHz strip below channel centre freq -5.5 MHz measured using the spectrum analyser Channel Power function.

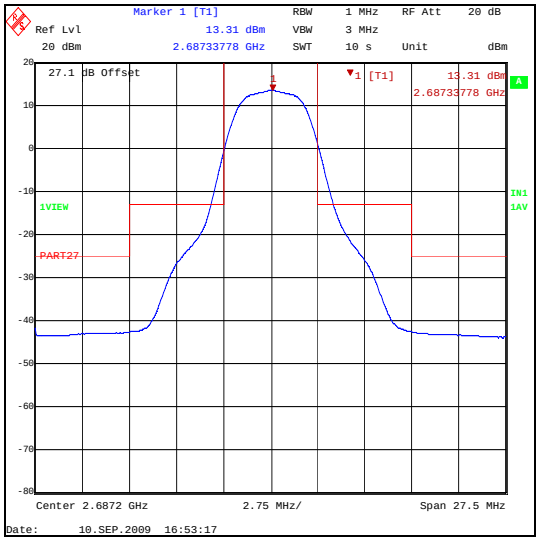


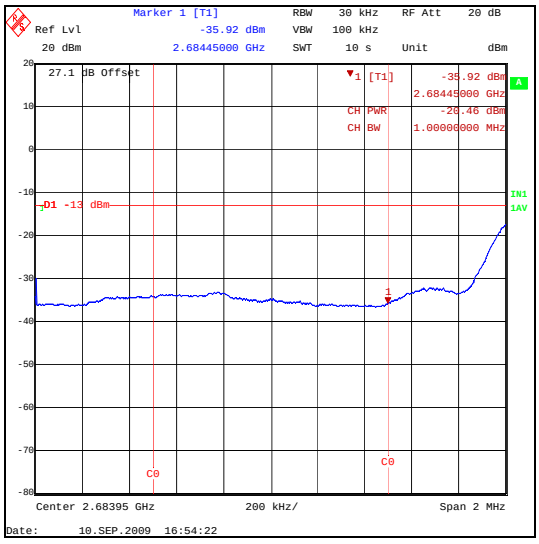
1 MHz strip above channel centre freq +5.5 MHz measured using the spectrum analyser Channel Power function.

Transmitter Radiated Spurious Emissions - Channel Edge (continued)

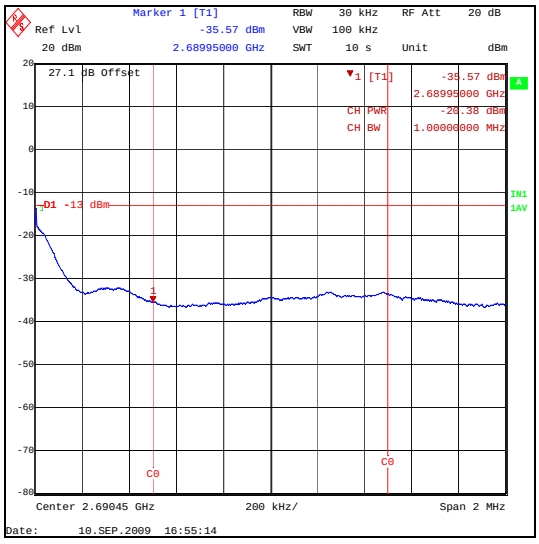
Results: Top channel / QPSK

Frequency of 1 MHz strip adjacent to channel edge	Level in 1 MHz strip adjacent to block edge (dBm)	Band Edge Limit (dBm)	Margin (dB)	Result
2684.45	-20.5	-13.0	7.5	Complied
2689.95	-20.4	-13.0	7.4	Complied





1 MHz strip below channel centre freq -5.5 MHz measured using the spectrum analyser Channel Power function.

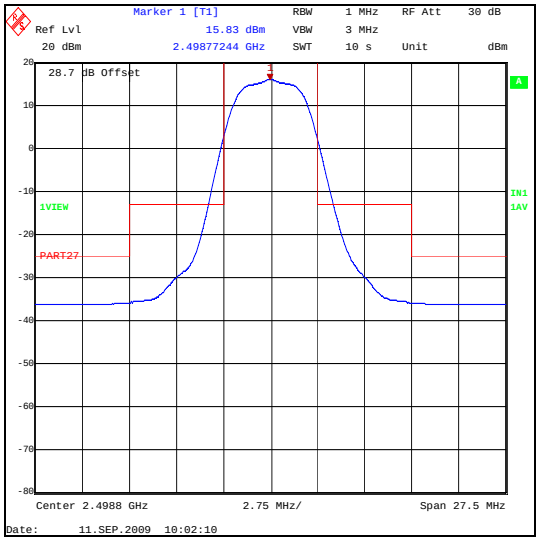


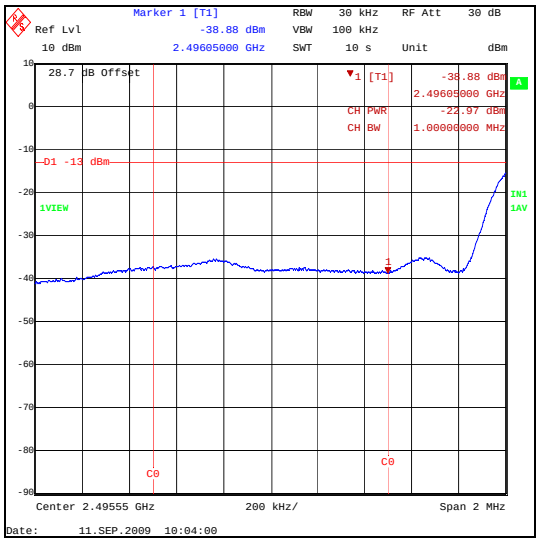
1 MHz strip above channel centre freq +5.5 MHz measured using the spectrum analyser Channel Power function.

Transmitter Radiated Spurious Emissions - Channel Edge (continued)

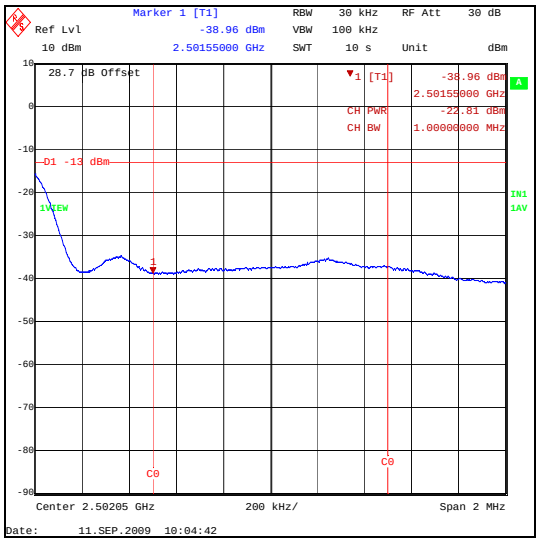
Results: Bottom channel / 16QAM

Frequency of 1 MHz strip adjacent to channel edge	Level in 1 MHz strip adjacent to block edge (dBm)	Band Edge Limit (dBm)	Margin (dB)	Result
2496.05	-23.0	-13.0	10.0	Complied
2501.55	-22.8	-13.0	9.8	Complied





1 MHz strip below channel centre freq -5.5 MHz measured using the spectrum analyser Channel Power function.

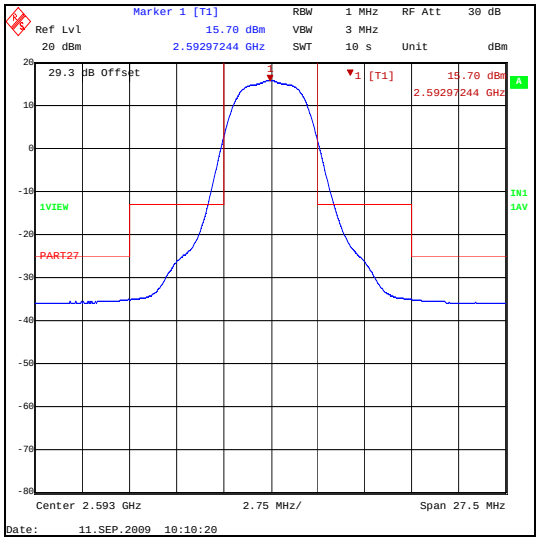


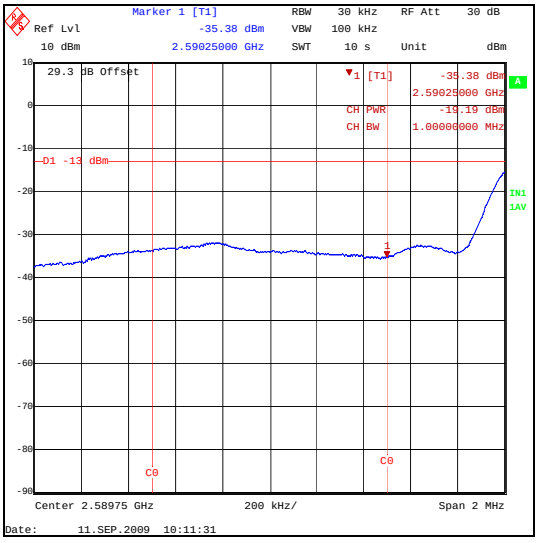
1 MHz strip above channel centre freq +5.5 MHz measured using the spectrum analyser Channel Power function.

Transmitter Radiated Spurious Emissions - Channel Edge (continued)

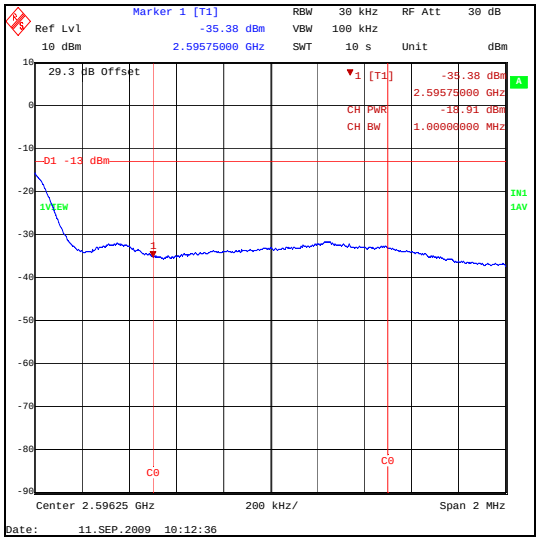
Results: Middle channel / 16QAM

Frequency of 1 MHz strip adjacent to channel edge	Level in 1 MHz strip adjacent to block edge (dBm)	Band Edge Limit (dBm)	Margin (dB)	Result
2590.25	-19.2	-13.0	6.2	Complied
2595.75	-18.9	-13.0	5.9	Complied





1 MHz strip below channel centre freq -5.5 MHz measured using the spectrum analyser Channel Power function.

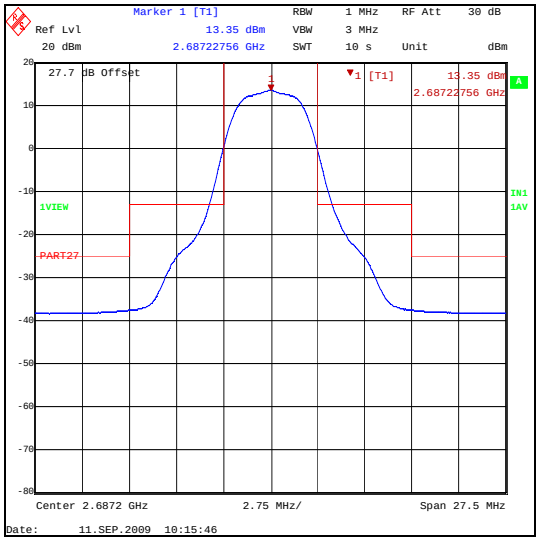


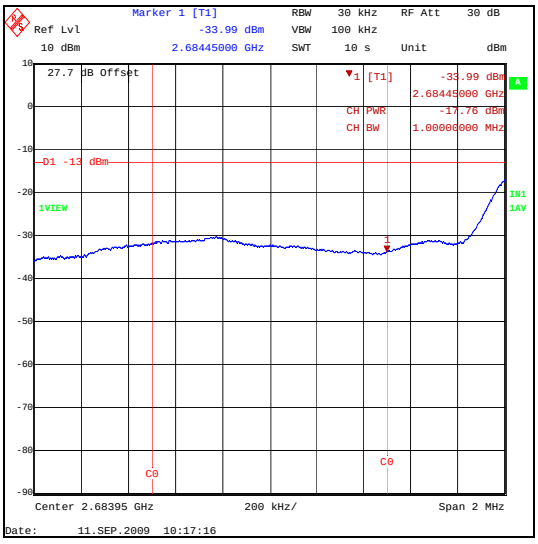
1 MHz strip above channel centre freq +5.5 MHz measured using the spectrum analyser Channel Power function.

Transmitter Radiated Spurious Emissions - Channel Edge (continued)

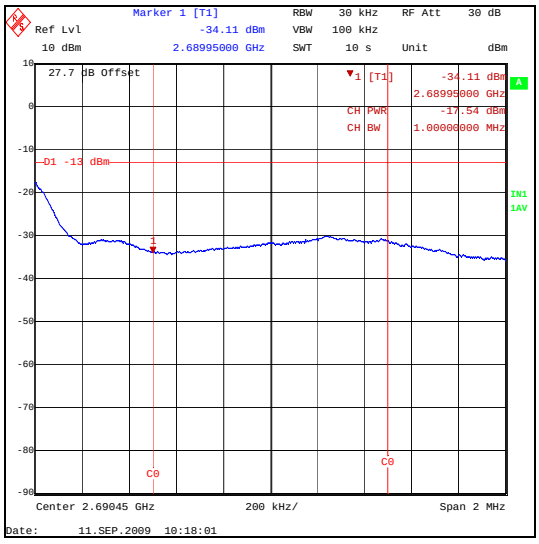
Results: Top channel / 16QAM

Frequency of 1 MHz strip adjacent to channel edge	Level in 1 MHz strip adjacent to block edge (dBm)	Band edge limit (dBm)	Margin (dB)	Result
2684.45	-17.8	-13.0	4.8	Complied
2689.95	-17.5	-13.0	4.5	Complied





1 MHz strip below channel centre freq -5.5 MHz measured using the spectrum analyser Channel Power function.

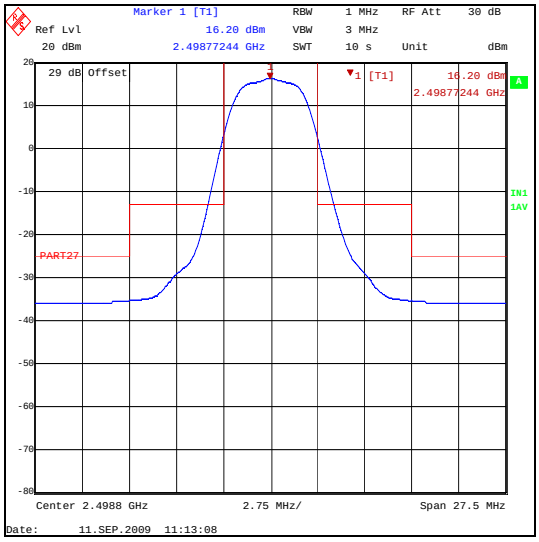


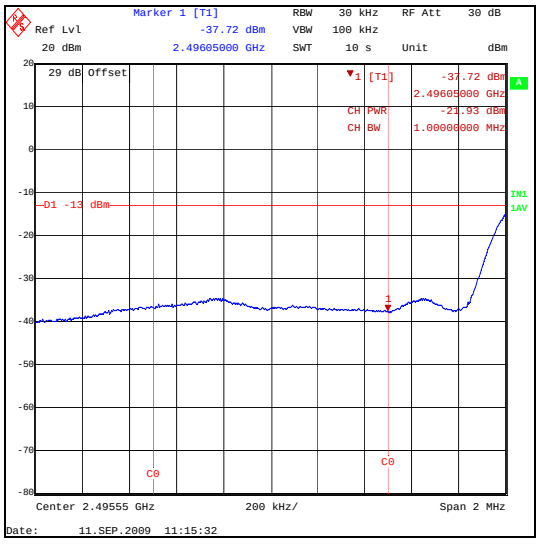
1 MHz strip above channel centre freq +5.5 MHz measured using the spectrum analyser Channel Power function.

Transmitter Radiated Spurious Emissions - Channel Edge (continued)

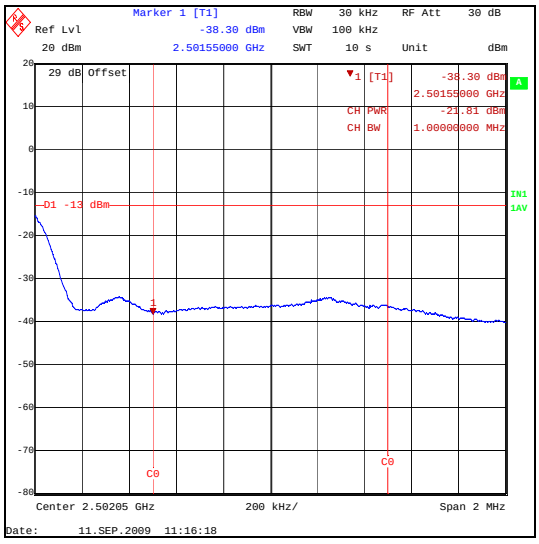
Results: Bottom channel / 64QAM

Frequency of 1 MHz strip adjacent to channel edge	Level in 1 MHz strip adjacent to block edge (dBm)	Band edge limit (dBm)	Margin (dB)	Result
2496.05	-21.9	-13.0	8.9	Complied
2501.55	-21.8	-13.0	8.8	Complied





1 MHz strip below channel centre freq -5.5 MHz measured using the spectrum analyser Channel Power function.

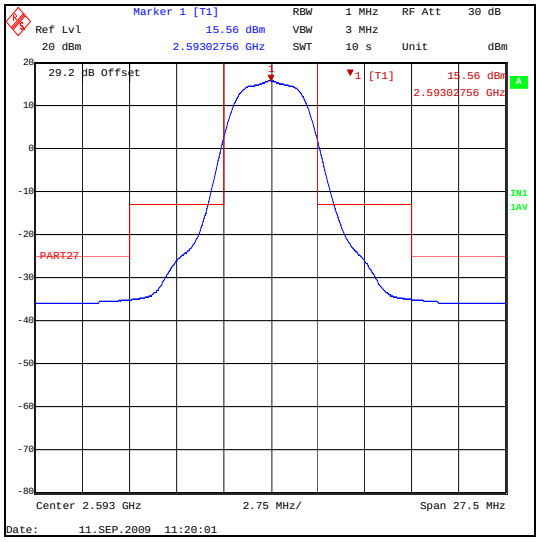


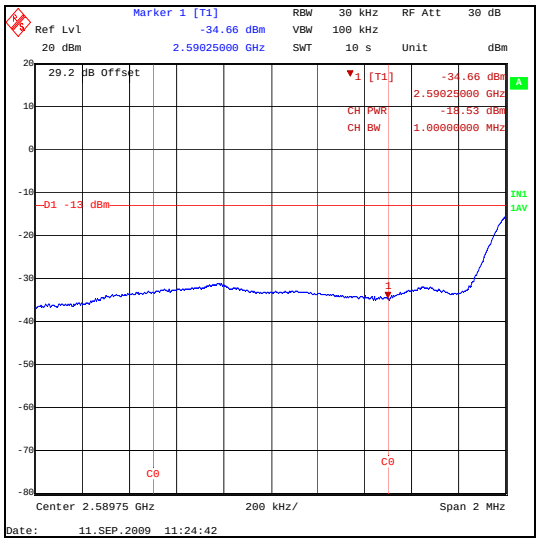
1 MHz strip above channel centre freq +5.5 MHz measured using the spectrum analyser Channel Power function.

Transmitter Radiated Spurious Emissions - Channel Edge (continued)

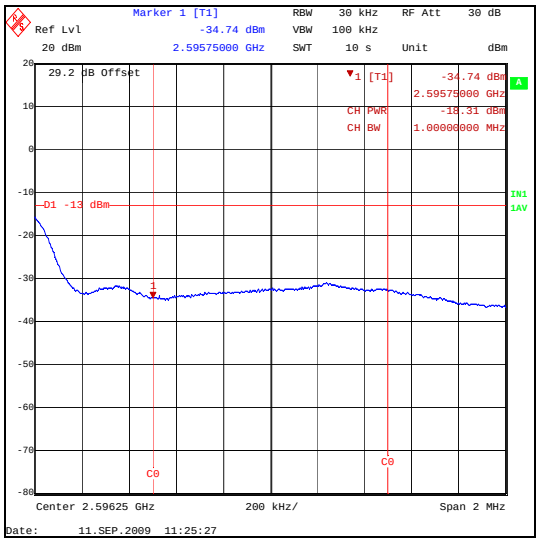
Results: Middle channel / 64QAM

Frequency of 1 MHz strip adjacent to channel edge	Level in 1 MHz strip adjacent to block edge (dBm)	Band edge limit (dBm)	Margin (dB)	Result
2590.25	-18.5	-13.0	5.5	Complied
2595.75	-18.3	-13.0	5.3	Complied





1 MHz strip below channel centre freq -5.5 MHz measured using the spectrum analyser Channel Power function.

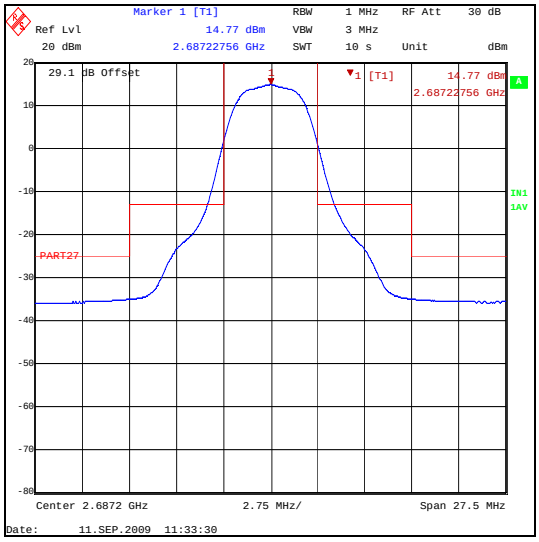


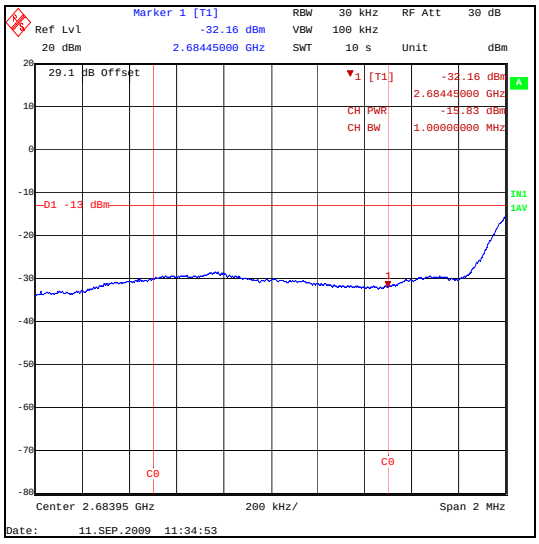
1 MHz strip above channel centre freq +5.5 MHz measured using the spectrum analyser Channel Power function.

Transmitter Radiated Spurious Emissions - Channel Edge (continued)

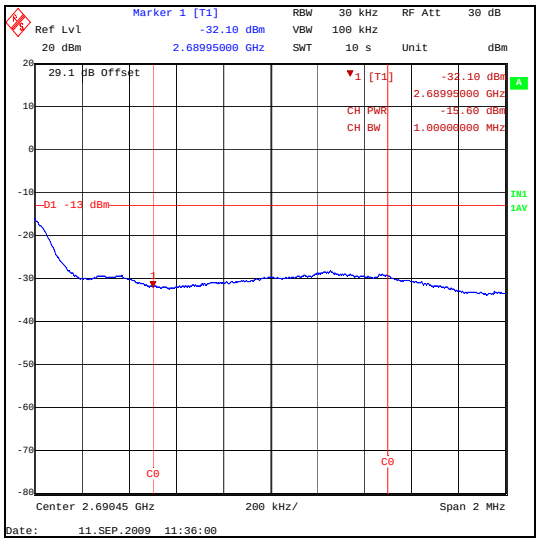
Results: Top channel / 64QAM

Frequency of 1 MHz strip adjacent to channel edge	Level in 1 MHz strip adjacent to block edge (dBm)	Band edge limit (dBm)	Margin (dB)	Result
2684.45	-15.8	-13.0	2.8	Complied
2689.95	-15.6	-13.0	2.6	Complied





1 MHz strip below channel centre freq -5.5 MHz measured using the spectrum analyser Channel Power function.



1 MHz strip above channel centre freq +5.5 MHz measured using the spectrum analyser Channel Power function.

5.3.8. Transmitter Radiated Emissions

Test Summary:

FCC Part:	FCC 2.1051 and FCC Part 27.53
Test Method Used:	As detailed in ANSI TIA-603-C-2004 Section 2.2.12 referencing FCC CFR Part 2.1053

Environmental Conditions:

Temperature (°C):	25
Relative Humidity (%):	50

Results: QPSK Bottom Channel

Frequency (MHz)	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
7493.587	-37.5	-25.0	12.5	Complied
9999.484	-53.9	-25.0	28.9	Complied
12488.995	-43.0	-25.0	18.0	Complied

Results: QPSK Middle Channel

Frequency (MHz)	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
7776.024	-37.0	-25.0	12.0	Complied
10372.301	-45.7	-25.0	20.7	Complied
12970.605	-53.7	-25.0	28.7	Complied

Results: QPSK Top Channel

Frequency (MHz)	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
8058.759	-42.2	-25.0	17.2	Complied
10748.977	-34.7	-25.0	9.7	Complied
13430.780	-40.4	-25.0	15.4	Complied

Transmitter Radiated Spurious Emissions (continued)

Results: 16QAM Bottom Channel

Frequency (MHz)	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
7493.715	-36.8	-25.0	11.8	Complied
9999.694	-55.7	-25.0	30.7	Complied
12488.930	-44.9	-25.0	19.9	Complied

Results: 16QAM Middle Channel

Frequency (MHz)	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
7775.913	-37.0	-25.0	12.0	Complied
10376.146	-45.7	-25.0	20.7	Complied
12970.912	-52.9	-25.0	27.9	Complied

Results: 16QAM Top Channel

Frequency (MHz)	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
8058.343	-42.2	-25.0	17.2	Complied
10752.948	-33.7	-25.0	8.7	Complied
13441.615	-40.0	-25.0	15.0	Complied

Transmitter Radiated Spurious Emissions (continued)

Results: 64QAM Bottom Channel

Frequency (MHz)	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
7493.685	-36.6	-25.0	11.6	Complied
9991.459	-54.6	-25.0	29.6	Complied
12489.105	-43.7	-25.0	18.7	Complied

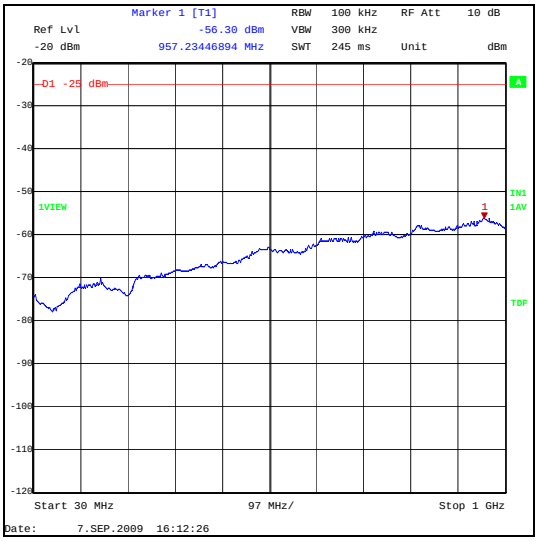
Results: 64QAM Middle Channel

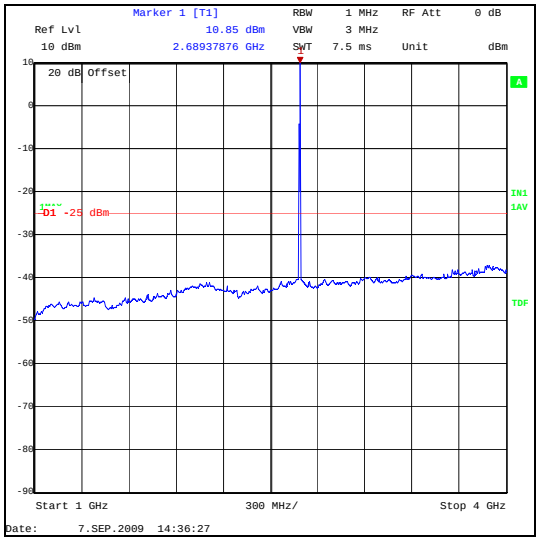
Frequency (MHz)	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
7782.318	-36.1	-25.0	11.1	Complied
10372.203	-45.3	-25.0	20.3	Complied
12970.496	-52.9	-25.0	27.9	Complied

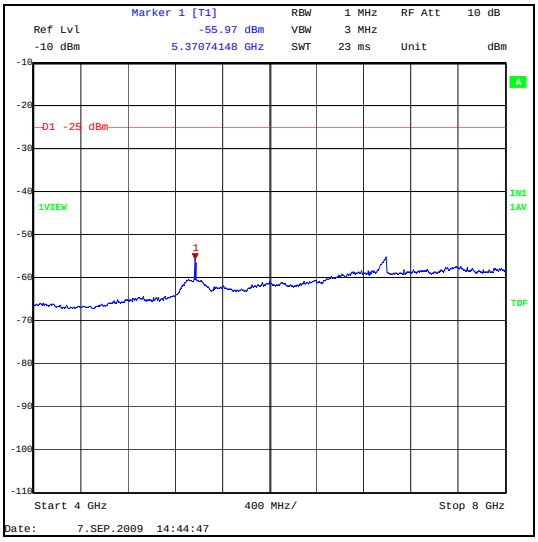
Results: 64QAM Top Channel:

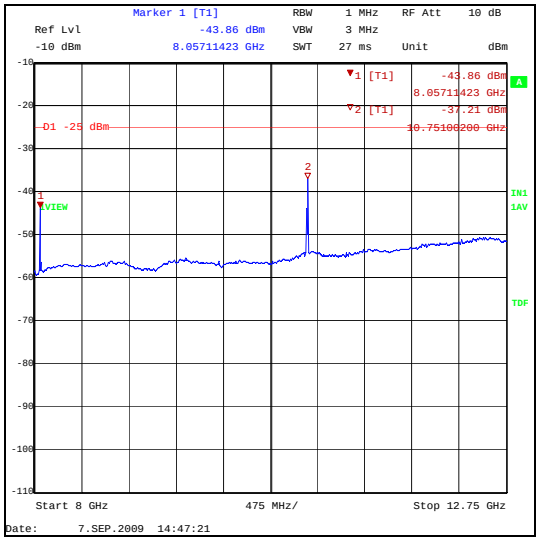
Frequency (MHz)	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
8058.592	-40.9	-25.0	15.9	Complied
10752.817	-32.7	-25.0	7.7	Complied
13441.697	-38.0	-25.0	13.0	Complied

Transmitter Radiated Emissions (continued)



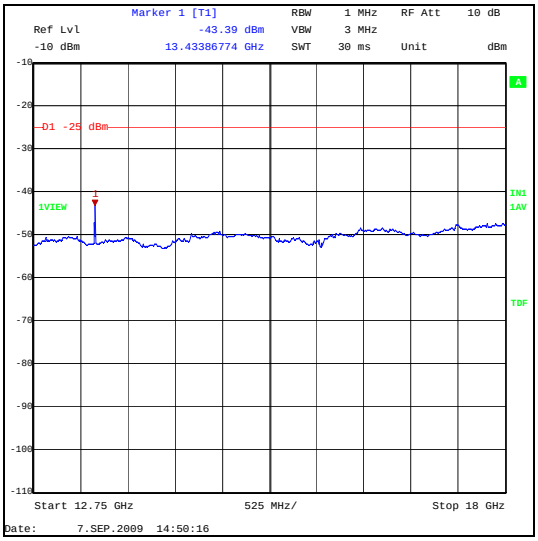


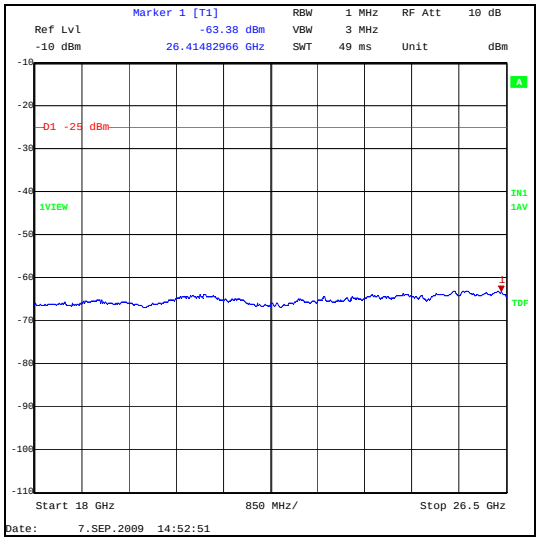


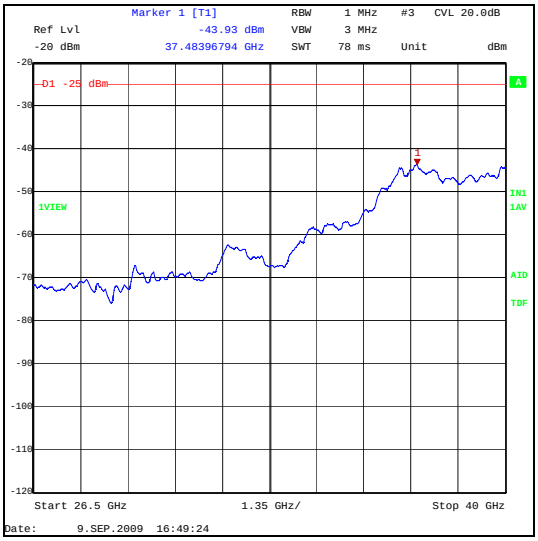


Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.

Transmitter Radiated Emissions (continued)

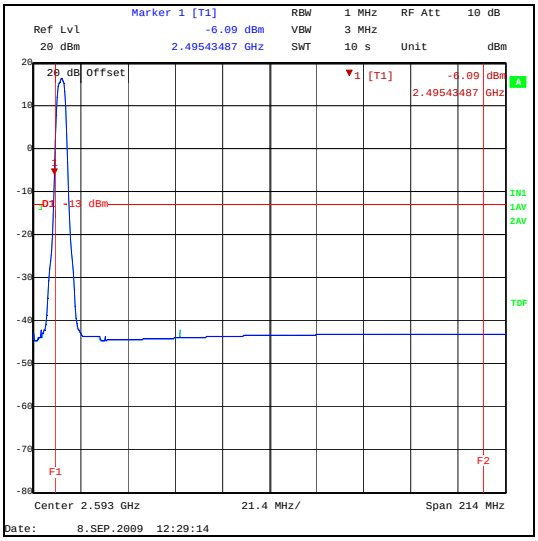




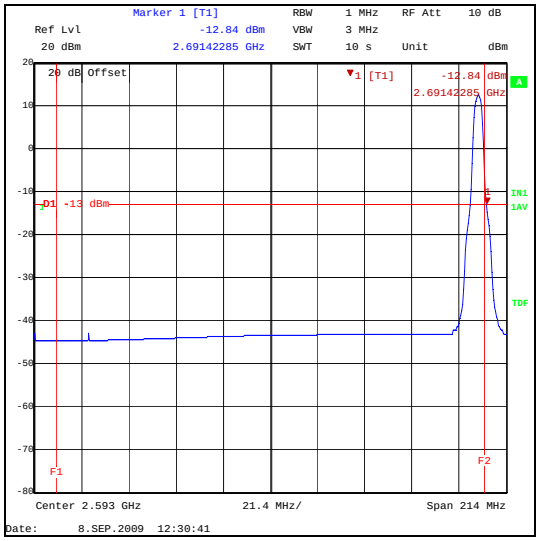


Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.

Transmitter Radiated Emissions (continued)



In Band (Bottom Channel)



In Band (Top Channel)

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

Note(s):

1. The emission shown at approximately 2689.379 MHz on the 1 GHz to 4 GHz plot is the carrier

5.3.9. Transmitter Radiated Emissions at Band Edges

Test Summary:

FCC Part:	FCC Part 2.1051 and FCC Part 27.53
Test Method Used:	As detailed in ANSI TIA-603-C-2004 Section 2.2.12 referencing FCC CFR Part 2.1053

Environmental Conditions:

Temperature (°C):	25
Relative Humidity (%):	32

Results: QPSK 1 MHz strip below the lower band edge

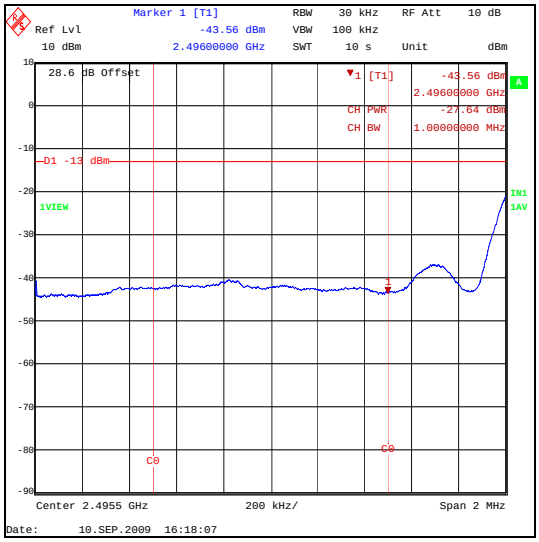
Frequency (MHz)	Spurious Emission (dBm)	Limit (dBm)	Margin (dB)	Result
2495 to 2496	-27.6	-13.0	14.6	Complied

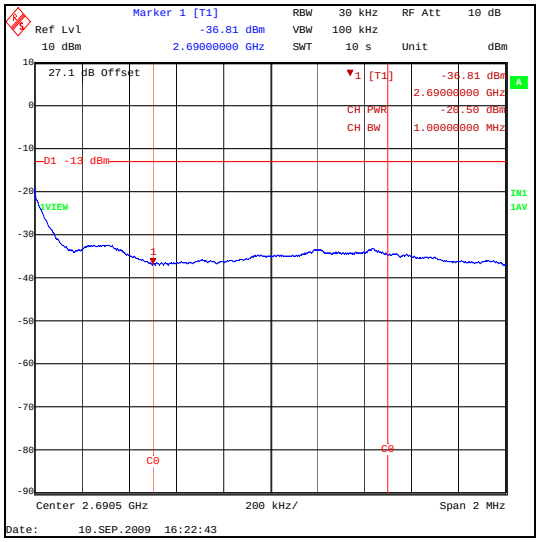
Results: QPSK 1 MHz strip above the upper band edge

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
2690 to 2691	-20.5	-13.0	7.5	Complied

Note(s):

1. Measured with a 1 MHz resolution bandwidth and also using the channel power function of the spectrum analyser.





Transmitter Radiated Emissions at Band Edges (continued)

Results: 16QAM 1 MHz strip below the lower band edge

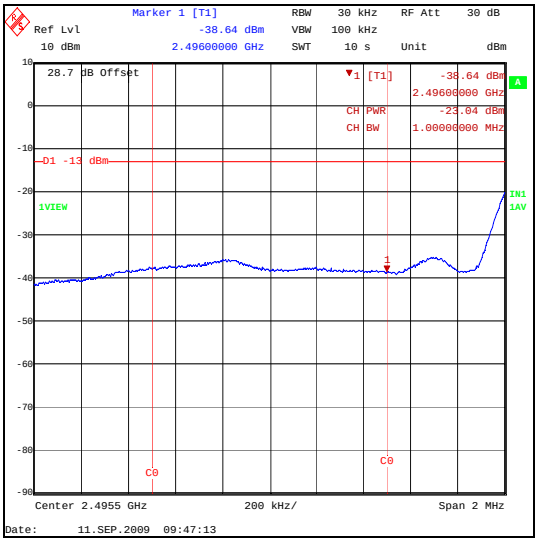
Frequency (MHz)	Spurious Emission (dBm)	Limit (dBm)	Margin (dB)	Result
2495 to 2496	-23.0	-13.0	10.0	Complied

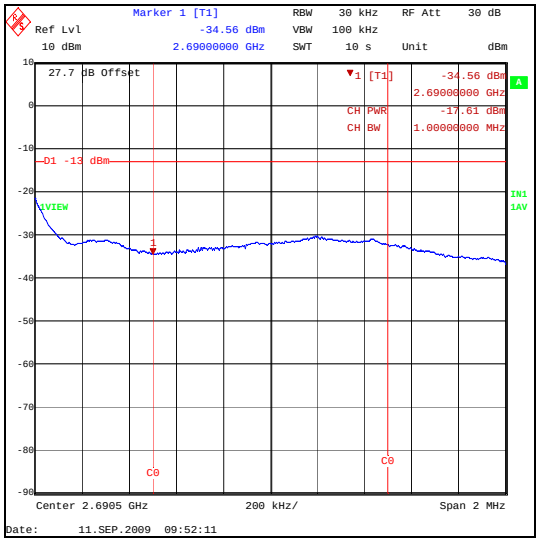
Results: 16QAM 1 MHz strip above the upper band edge

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
2690 to 2691	-17.6	-13.0	4.6	Complied

Note(s):

1. Measured with a 1 MHz resolution bandwidth and also using the channel power function of the spectrum analyser.





Transmitter Radiated Emissions at Band Edges (continued)

Results: 64QAM 1 MHz strip below the lower band edge

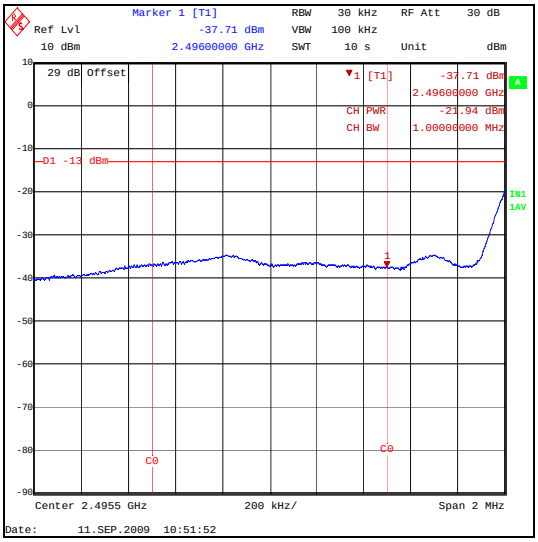
Frequency (MHz)	Spurious Emission (dBm)	Limit (dBm)	Margin (dB)	Result
2495 to 2496	-21.9	-13.0	8.9	Complied

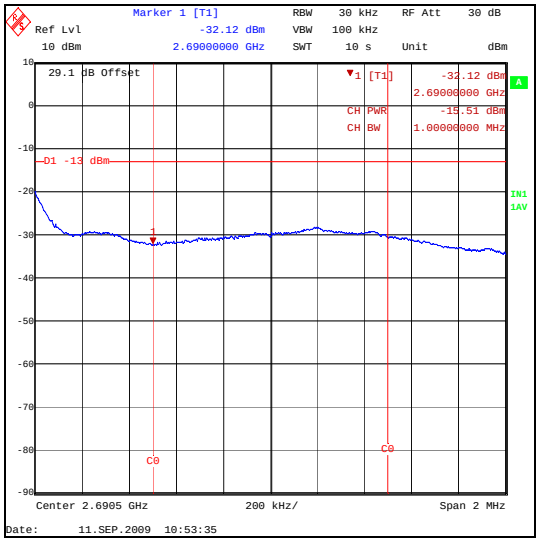
Results: 64QAM 1 MHz strip above the upper band edge

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
2690 to 2691	-15.5	-13.0	2.5	Complied

Note(s):

1. Measured with a 1 MHz resolution bandwidth and also using the channel power function of the spectrum analyser.





5.3.10. Transmitter Conducted Carrier Output Power

Test Summary:

FCC Part:	Part 2.1046
Test Method Used:	As detailed in ANSI TIA-603-C-2004 Section 2.2.1

Results: QPSK

Channel	Frequency (MHz)	Conducted Average Output Power (dBm)
12494	2498.8	24.2
12965	2593.0	23.7
13436	2687.2	23.0

Results: 16QAM

Channel	Frequency (MHz)	Conducted Average Output Power (dBm)
12494	2498.8	24.3
12965	2593.0	23.6
13436	2687.2	22.9

Results: 64QAM

Channel	Frequency (MHz)	Conducted Average Output Power (dBm)
12494	2498.8	24.3
12965	2593.0	23.6
13436	2687.2	22.9

6. Measurement Uncertainty

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

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

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

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

Measurement Type	**Range**	**Confidence Level**	**Calculated Uncertainty**
AC Conducted Spurious Emissions	0.15 MHz to 30.0 MHz	95%	±3.25 dB
Frequency Stability	Not applicable	95%	±0.92 ppm
Conducted Output Power	Not applicable	95%	±0.28 dB
Effective Isotropic Radiated Power (EIRP)	Not applicable	95%	±2.94 dB
Occupied 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 Last Calibrated	Cal. Interval
A1494	Attenuator	MCL	MCL BW - 230W2	9935	Calibrated before use	-
A1534	Pre Amplifier	Hewlett Packard	8449B OPT H02	3008A00405	Calibrated before use	-
A1830	Pulse Limiter	Rhode & Schwarz	ESH3-Z2	100668	05 Jan 2009	12
A649	LISN	Rohde & Schwarz	ESH3-Z5	825562/008	19 Mar 2009	12
K0002	3m RSE Chamber	Rainford EMC	N/A	N/A	01 Sep 2009	12
M1068	Thermometer	Iso-Tech	RS55	93102884	09 Jul 2009	12
M1124	Test Receiver	Rohde & Schwarz	ESIB26	100046K	09 Mar 2009	12
M1242	Spectrum Analyser	Rohde & Schwarz	FSEM30	845986/022	09 Dec 2008	12
M1263	Test Receiver	Rohde & Schwarz	ESIB7	100265	22 Apr 2009	12
M1347	Digital Multimeter	Fluke	73III	90680080	23 Jun 2009	12
M1379	Test Receiver	Rohde & Schwarz	ESIB7	100330	20 Aug 2009	12
M199	Power Meter	Rohde & Schwarz	NRVS	827023/075	14 May 2009	12
S021	DC Power Supply	Thurlby Thandar	CPX200	061034	Calibration before use	-

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